Disguise User Guide

Designer Version r34

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DISGUISE

Contents

About

What is Disguise? 1

Welcome to the new Help site! 2

Advisories

Technical Advisories Overview 3

Cloud

Cloud Dashboard

Cloud Dashboard 4

Cloud Troubleshooting 7

Domain Capture 8

Guest Accounts 11

Roles in an Organisation 12

Organisation Settings 14

Cloud Overview 17

Disguise Drive

Creating a Previz 19

Designer Sample Projects 20

Disguise Drive Supported File Formats 30

Import Content from Third Party Services 32

Uploading Content 39

Using Drive 41

Working with content 44

Legacy Mapping Matter

FAQs (legacy) 49

Getting Started (legacy) 56

Introduction (legacy) 81

Libraries (legacy) 84

My Account (legacy) 95

Print and Export (legacy) 96

Projectors and Cameras (legacy) 102

Share (legacy) 116

Viewport Brightness (legacy) 122

Mapping Matter

Cameras and POV 131

Collaboration 137

Effectors 141

Export and PDF Layouts 144

FAQs 148

Feedback 151

Getting Started 154

Introduction 162

Contents

Keyboard Shortcuts 164
Layers 167
LED Screens 169
Libraries and Assets 173
Measurements and Annotations 179
Mirror 181
Plan Entitlements 185
Projectors 186
Publish and Share 194
Snapshots and Revisions 197
System Requirements 199
Trusses and Mounting 201
Viewport and Analysis 207
What's New 216

Previz

About Previz 223
Creating a Previz Project 226
Creating a Share Link 227
Customizing a project 229
Editing Scenes 230
Exporting .glTF files from Blender 234
Getting started with Previz 238
Navigating the Viewer 240
Preparing Scenes 241
Renaming a Previz 242
Scenes 244
View modes 245
View and open files 248

Designer

Apis

OmniCal API 250
APIs Overview 252
API xR Calibration 256
Disguise Developer Portal 259
SMC API 260

Audio

Output Audio to DA Converters 264
Audio Overview 266
Audio Waveform View 267
Output Multichannel Audio 269
Output professional audio 271

Contents

Output Video-Embedded Audio 273
Quantised Audio 275
Setup Audio Output 279
Colour Management
ACES 282
CDL 288
Colour Inspector 290
Colour Management 296
Colour Profiles 301
Colour Shifts 305
Colour Transforms 308
Histogram 311
Livegrade Studio Integration 314
LUT Files 318
OCIO 321
Vectorscope 330
Waveform 333
Configuration
Blacktrax
BlackTrax Integration Setup 337
BlackTrax Motive Setup 344
BlackTrax Overview 346
Expressions
Accessing External Protocols 349
Accessing Resources 354
Expression Backward Compatibility 358
Common Datatypes 360
Examples
Using Expressions to drive camera angle 362
Expressions Overview 367
Functions Reference 368
Using Expressions in Layers 385
Linking Layers with Expressions 389
Operators 390
String Manipulation 392
Text Formatting 394
Expression Variables 399
Genlock Configuration 404
Indirections 422
Scheduling Events 429
Content Management

Contents

10-bit Content 433
Alembic Files 434
Archive Unused Objects 437
Content Management Overview 441
Content Versioning 443
Generate Content Table 446
Generating a Proof of Play 449
Image Sequences 452
Manage Old Media Editor 455
Media Distribution 458
Media Ingestion History 459
Missing and Unused Media 461
Placing media files 465
Project Location 469
Project Settings 470
Project Structure 480
Rendering Feed Movies 482
Rendering Media Overview 485
Rendering Screenshots 486
Rendering Stage Movies 489
Slideshows 492
VideoClip Object 497
Video Codecs
Adding Noise in After Effects 501
DXV 2.1.1 Codec 504
HAP / HAP-Q Codec 507
ProRes Codec 512
Transcoding Software 514
Video Codec Overview 515
Video Output Settings 516
D3manager
Advanced Machine Settings 518
Checkpointing projects 532
Creating a new project 535
Creating snapshots 536
d3Manager 539
Enabling Assistance Mode 545
Quitting a Project 548
Generating console files 549
Generating Diagnostic Archives 552
Joining a session from file list 558

Contents

Manage Networked Machines 561
Managing project folders 562
Opening a project from the file list 567
Relaunching the last active project 571
Creating a Remote Profile 573
Starting an existing project 574
Upgrading and downgrading Designer projects 576
Working with Templates 578

Devices

Agile Camera Device 580
Audio Analyser 585
Camera Tracking Device 587
CITP Device 592
Creating Devices 594
Device Monitor 595
Device Recording 596
Devices Index 599
DMX Device 605

Dmx Device Drivers

Art-Net Driver 610
Enttec Driver 613
ezDMX Driver 615
KiNET v1 Driver 617
KiNET v2 Driver 619
sACN Driver 621
SoundLight Driver 623

DMX Machine Control Device 625
DMX Projector Control Device 628
Expression Variables Device 635

Generic Receivers

GrpcReceiver Driver 637
Test Receiver Driver 639
UDP Receiver Driver 640

JSON Machine Control Device 641

Matrices

Analog Way OPS300 Matrix Setup 644
Barco MatrixPro Setup 646
Blackmagic Smart Videohub Setup 648
Direct Matrix Routing 651
Lightware Matrix Setup 656
Matrix Switches Overview 658

Contents

PureLink Matrix Setup 659
Riedel MediorNet Matrix Setup 661
Telnet Matrix Setup 663
MIDI Device 666
OSC Device 672
OSC Machine Control Setup 676
OSC Tester Device 678
Position Drivers
Camera Tracker Observations Tester 680
Camera Tracker Tester 681
CPS Driver 689
D3SSI Driver 691
DCS Driver 693
DMX Screen Position Driver 695
EzDriver 697
FreeD Driver 699
HMC Driver 701
Kinesys Driver 703
LCPUSB Driver 707
LDS Driver 709
Mo-Sys F4 Driver 711
MoveAI Driver 713
Movecat Driver 716
NatNet Driver 718
Navigator Driver 721
Ncam Driver 724
NG360 Driver 726
OSC Driver 729
PosiStageNet Driver 731
Posital Driver 733
Position Drivers 735
PRG Driver 737
PRG Stage Command Driver 739
RTTrPM Driver 741
Siemens SIMOTION Driver 743
Skeleton Tracker Tester 745
SKV Driver 747
Stage Kinetics MoveCat Driver 749
STS Driver 751
Stype Driver 753
Trackmen Driver 755

Contents

Unican Open Cue Driver 757
Vicon DataStream Driver 759
VisualAct Driver 760
Position Receiver Device 762
Projector Calibrator Device 765
Shot Recorder Device 768
String Projector Control Device 772
Telnet Device 776
Tracking
Axes 778
Screen Position Axis Expressions 788
Creating a New Motion Controller 790
Creating Driver Axes 800
Motion Control Systems 802
Tracking Source 804
UDP Device 806
Video Input
4K Quad Link Capture 808
HDMI Video Capture 810
ST 2110 Video Capture (Prerelease) 812
Setup Video Input 818
Video De-Interlacing Methods 822
Visca Camera Device 825
Feed Outputs
10-Bit Displays 830
Adding a Feed Rectangle for Screens 832
Alternate Feed Scenes 835
Apply Feed Settings 842
Blending and Masking Outputs 844
Configuring d3Net Feed Settings 848
Configuring Multiple VFC Cards 849
Configuring Output Settings 850
Configuring VFC Card Ports 851
Configuring VFC Card Slots 858
Editing a Feed Rectangle 860
Feed Level Navigation 873
Feed Outputs Overview 875
Head Configuration 878
Importing & Exporting Feed Scenes 885
Selecting Feed Rectangles 889
Setting Project Refresh Rate 890

Contents

- Using Duplicate Multiple 892
- Video Timings 896
- Viewing the Feed Level 901
- Warping Outputs 903

Getting Started

- Designer Overview 913
- Designer Elements 915
- Designer Keyboard Shortcuts 922
- Designer Licensing Comparison 929
- Designer Pro 930
- Designer Pro License Transfer 932
- Designer Starter 936
- Designer Pro Subscriptions 938
- Disguise Developer Portal 948
- Designer Download & Installation 950
- Educational Designer Licenses 956
- Identifying the Designer Version 957
- Known Issues 962
- Licensing for Older Designer Versions 964
- Designer Licenses and Activation Process 967
- Designer Licensing FAQs 973
- Offline License Update 980
- Restoring a CodeMeter License 991
- Creating Support Cases 996
- Supported file formats 999
- System Requirements 1004
- Sharing Designer Usage Analytics 1006

Layers

Common Layer Properties

- Blend Mode 1007
- Brightness 1012
- Colour Shift 1013
- Common Layer Properties 1021
- Content 1022
- Content properties 1023
- Mapping 1027
- Palette 1029
- Preview Thumbnail 1030
- xCol yCol 1031

- Compositing Layers 1032

Editing Layers

Contents

Copying & Pasting Layers 1035
Creating Layers 1036
Deleting Layers 1038
Disabling Layers 1039
Duplicating Layers 1042
Dynamic Layer Naming 1043
Editing Layers 1046
Extending Layers 1047
Fit To Contents 1048
Grouping Layers 1049
Isolating Layers 1052
Layer Colour Rules 1053
Locking and Anchoring Layers 1056
Moving Layers 1059
MultiLayer Editor 1060
Muting Layers 1062
Renaming Layers 1064
Save as and importing layers 1065
Selecting Multiple Layers 1068
Splitting Layers 1069
Working with Layers 1070

Keyframing Layers

Keyframing Toggle 1071
Keyframing Overview 1074
Multiple Keyframes 1080
Numeric Keyframes 1085
Object Keyframes 1089
Option Keyframe 1090

Layer Stacks 1091

Layer Types

Content

2.5D Layer 1092
Audio Layers 1103
Content Layers Overview 1105
Depth Video Layer 1106
RenderStream Layer 1108
RenderStream Local Layer 1122
StageRender Layer 1128
Video Layer 1139
VideoTrigger Layer 1160
VirtualLineup 1178

Contents

Web Layer 1196

Control

CameraControl 1210
CameraCutControl 1214
Control 1216
Control Layer Overview 1219
DMXLightsControl 1220
DMXShare Layer 1222
ExpressionVariables Layer 1224
HTTPControl Layer 1227
IndirectionControl Layer 1228
MasterBrightness Layer 1230
MatrixControl Layer 1234
MDC Layer 1237
MidiNote Layer 1238
MTC Layer 1239
Open Layer 1241
OscControl Layer 1244
PlayMode Layer 1246
ProjectorControl Layer 1247
TargetObject Layer 1249
TimecodeMode Layer 1251
TrackJump Layer 1252
TransportBrightnessLocal Layer 1253
TransportVolumeLocal Layer 1254
TransportControl Layer 1255

Effect

Blur Layer 1257
CDL Layer 1265
ChannelRouter Layer 1273
ColourAdjust 1285
Compose Layer 1289
EdgeFilter Layer 1300
Effect Layers Overview 1311
Fade Layer 1314
FilmicGrain Layer 1323
Kaleidoscope Layer 1332
LUT Layer 1341
MotionBlur Layer 1352
Noise Layer 1362
OCIO Layer 1371

Contents

Pixelate Layer 1382
Pixelmap Layer 1391
Scroll Layer 1403
SpinBitmap Layer 1413
Trigger Layer 1424
UVLookup Layer 1435
VideoTransition 1446

Generative

Bugs Layer 1465
Chevron Layer 1475
Colour Layer 1485
Generative Layers 1494
Gradient Layer 1495
Notch Layer 1505
Notch v1.0+ Compatibility Table 1515
Radar Layer 1519
Readout Layer 1529
RGB Colour 1539
Scan Layer 1547
Strobe Layer 1556
Tennis Layer 1567
TestPattern Layer 1577
Text Layer 1584
TrackingMarker Module 1594

Layers Types Index 1605

Legacy

Bitmap Layer 1610
Legacy Layers Overview 1629
Legacy Video Layer 1630

Previsualisation

AnimateCameraControl 1649
AnimateCameraPreset 1651
AnimateObjectPreset Layer 1654
Previsualisation Layers Overview 1660
Scene Animation Layer 1661
TargetControl Layer 1664
TargetPreset Layer 1666

Layers Overview 1669
Mask Blending 1670

Mapping

Common Mapping Properties 1679

Contents

Content Mapping Overview 1681
Creating a New Mapping 1683
Generating Textures 1685
Mapping Types Overview 1687
Mapping Types
CameraPlate Mapping 1690
Cylindrical Mapping 1693
Depth Map Mapping 1697
Direct Mapping 1700
Feed Mapping 1703
Fisheye Mapping 1714
Mesh Mapping 1721
Parallel Mapping 1731
Perspective Mapping 1738
PreComps 1742
Radial Mapping 1746
Spatial Mapping 1750
Spherical Mapping 1754
Networking
Create a ProSet Team CMDLet 1759
Create a VLAN with Hyper-V 1765
Create a VLAN with PowerShell 1768
d3Net Overview 1770
Disguise System Network Configuration 1773
Disguise System Network Configuration Guide 1778
Failover 1780
Hardware Network Design 1783
Network Adaptor 1786
Network Ports and Activity 1788
Network Status Widget 1793
Networking Overview 1799
NMOS in Disguise 1801
OmniCal Networking 1805
Output Sync Test 1806
RenderStream Networking 1812
Network Security Overview 1815
d3Net Setup 1820
Setup Editors 1828
Teaming 1833
Virtual Local Area Network (VLAN) 1835
Windows File Sharing 1838

Contents

Plugins

Ask AId3n 1851
Chromium Web Integration 1858
Disguise Cloud Media Browser Plugin 1859
Designer Plugins 1863
Disguise Plugins iOS App 1867
Grafana LiveUpdate Plugin 1873
Luma AI Video Generation Plugin 1876

Openvpcal Plugin

OpenVPCal Plugin 1880
OpenVPCal Plugin - Best Practice 1884
OpenVPCal Plugin - Quick Start 1886
OpenVPCal Plugin - Reference 1900

Designer Plugin Gallery 1927
Pulse Plugin 1930

Release Notes

Designer r14 Release Notes 1933
Designer r15 Release Notes 1936
Designer r16 Release Notes 1944
Designer r17 Release Notes 1958
Designer r18 Release Notes 1971
Designer r19 Release Notes 1975
Designer r20 Release Notes 1978
Designer r21 Release Notes 1981
Designer r22 Release Notes 1988
Designer r23 Release Notes 1992
Designer r24 Release Notes 1998
Designer r25 Release Notes 2003
Designer r26 Release Notes 2013
Designer r27 Release Notes 2031
Designer r28 Release Notes 2069
Designer r29 Release Notes 2073
Designer r30 Release Notes 2084
Designer r31 Release Notes 2117
Designer r32 Release Notes 2134
Designer r33 Release Notes 2168
Designer r34 Release Notes 2187
Designer Download Centre 2189
Designer Release Versioning Conventions 2200

Stage Setup

Camera Position Bookmarks 2202

Contents

Camera Properties 2205
Cameras 2215
Dmx Screens Lights
Configuring DMX Input and Output 2217
Dmx Lights
Creating a Fixture 2222
Creating DMX Lights 2226
DMX Addressing 2228
Fixture Drivers 2233
Fixtures Grid Setup 2242
Modifying Fixture Positions 2246
Targeting Fixtures 2248
DMX Screens and DMX Lights Overview 2251
Dmx Screens
Creating DMX Screens 2253
DMX Fixture Types 2257
DMX Table Screens 2261
Editing Local Channels 2267
Global DMX Options 2268
Objects
Depth Map Mesh 2270
Editing Objects 2273
Hierarchy 2279
Importing & Exporting Objects 2281
Managing Objects 2289
Multi-Edit Objects 2292
Object Assignment Hotkeys 2295
Object Libraries 2297
Object Tracking Source 2302
Objects Editor Overview 2304
Projector Simulation
Blending and Masking Outputs 2312
Creating and Removing Projectors 2316
Dynamic Blend 2318
Editing Projectors 2323
Importing Projectors 2341
Include Exclude List 2342
Outputting to Projectors 2343
Projector List Overview 2345
Projector Simulation Overview 2347
Projector Studies 2350

Contents

Warping Outputs 2355

Screens

Appearance Properties 2364

Changing the Screen Type 2366

Creating Screens 2367

Deleting Screens 2371

Output Properties 2372

Pixel Mask 2374

Population Mask 2376

Projection Examples

Projection Example - Downstage Curtains 2378

Projection Example - Light Casting 2384

Projector View Blending 2388

Removing Screens 2391

Screen Editor 2392

Screens Overview 2395

Single Large Canvas 2397

Stage Render Settings 2399

Stage Setup 2403

Venues And Props

Creating and Removing Props 2406

Creating and Switching Venues 2409

Editing Props 2411

Editing Venues 2415

Venues and Props Overview 2416

Visualiser Renderer

Heatmap 2417

Lux 2419

Schematic 2425

Visualiser Renderer Overview 2428

Timeline Tracks Transports

Adding and Removing Sections 2430

Creating & Managing Tracks 2431

Cue Lists 2432

Dmx

DMX Transports Overview 2436

DMX Event Transports Setup 2437

Switching Tracks with DMX 2443

Triggering Playback with DMX 2444

Jumping Track Bars 2446

Midi

Contents

Mixing MIDI Cue Types 2448
Sending MIDI Timecode 2449
MIDI Note Setup 2450
MIDI Show Control Setup 2454
Troubleshooting MIDI 2457
MultiTransport Controller 2460
Working with Notes 2466
Osc
Controlling the Transport 2469
Monitoring the Transport 2476
Monitoring using Custom Messages 2481
OSC Application Templates 2485
OSC Transport Overview 2491
OSC Transport Setup 2492
Triggering Cues with OSC 2496
Set List 2499
Tag Stacking and Multi-Tagging 2500
Working with Tags 2502
Timecode
Recording Timecode with Expression Variables 2505
LTC Setup 2512
MIDI Beat Clock Setup 2515
MTC Setup 2519
Timecode System Time 2521
Tap Tempo Setup 2523
Timecode Overview 2526
Timecode Tester 2527
Triggering Cues with Timecode 2528
Troubleshooting LTC 2532
Timeline 2534
Track Editor 2537
Track Timecode 2542
Tracks Overview 2543
Transport Player Controls 2544
Transport Manager 2547
Transports Overview 2552
Universal Crossfade 2553
Ui
Designer User Interface 2557
Using stage editor 2564
Navigating the stage 2571

Contents

Using the 3D Manipulators 2573

Disguise X Range

Disguise X Range FAQs 2577
Disguise X Range Licensing Features 2581
Disguise X Range CodeMeter USB License Key 2585
Disguise X Range Overview 2587
Disguise X Range Recommended System Specifications 2588
Disguise X Range License Support 2592

Disguise X1

Disguise X1 Overview 2593

Disguise X2

Disguise X2 Overview 2594

Disguise X3

Disguise X3 Overview 2596

Glossary

Glossary of Colour Terms 2597
Glossary 2615

Hardware

Common Hardware Operations

Enabling Background Removal 2621
Video Output 2624

Ex Range

Director Capabilities 2627
Optional EX Range Licenses 2629
EX Range Overview 2631
Replacing your NVMe SSD - EX 2634

Ex2

EX 2 Diagrams 2638
EX 2 Overview 2640
EX 2 Redisguise 2641
EX 2 Specification 2644

Ex2c

EX 2C Diagrams 2646
EX 2C Overview 2648
EX 2C Redisguise 2649
EX 2C Specifications 2652
EX 2C Video Input 2654

Ex3

EX 3 Diagrams 2657
EX 3 Overview 2659
EX 3 Redisguise 2661

Contents

Ex3plus

EX 3+ Diagrams 2664

EX 3+ Overview 2666

EX 3+ Redisguise 2667

EX 3+ Specifications 2670

EX 3+ Video Input 2672

Fabric

Fabric 2676

Fabric QuickStart Guide 2678

Filter Maintenance 2680

Gx Range

Common Operations

GX 3 & GX 3+ Audio Input and Output 2687

How to Start the Unit 2690

Managing EDIDs on NVIDIA Machines 2692

Powering the Unit 2701

GX Range Overview 2703

Gx3

GX 3 Diagrams 2705

GX 3 Overview 2707

GX 3 Redisguise 2708

GX 3 Specification 2714

GX 3 Unit rear light 2716

GX 3 Video Input 2717

Gx3plus

GX 3+ Diagrams 2721

GX 3+ IP-VFC Support Guidelines 2723

GX 3+ Overview 2725

GX 3+ Redisguise 2726

GX 3+ Specification 2732

GX 3+ Video Input 2734

Hardware Guides 2737

Hardware OS Images 2738

Disguise Hardware Ranges 2776

Ip Vfc

IP-VFC 25Gb SFP support 2778

IP-VFC Colour Conversion 2779

IP-VFC - FAQs 2781

IP-VFC and Genlock 2782

IP-VFC Interoperability 2786

IP-VFC Overview 2790

Contents

IP-VFC - Ports 2792
IP-VFC Release Notes 2794
IP-VFC SDI Video Configuration 2796
IP-VFC - SDI SFP module support 2798
IP-VFC ST 2110 Network Video Configuration 2799
IP-VFC - Supported Output Formats 2805
IP-VFC Troubleshooting 2806
IP-VFC Firmware Update 2808

Legacy

2x2

2x2plus Overview 2810
2x2plus Redisguise 2811
2x2plus Specifications 2816
2x2plus Card Configuration 2818
2x2plus Diagrams 2821
2x2plus DVI Capture 2823
2x2plus Filter Replacement 2827
Onboard Audio 2829
Powering the 2x2plus 2830
Pro Audio 2831
Optional SDI Video Capture 2835

2x4pro

2x4pro Diagrams 2837
2x4pro Overview 2838
2x4pro Redisguise 2839
2x4pro Specifications 2845
4K Output - 2x4pro 2847
2x4pro Audio Input and Output 2848
How to Start the 2x4pro 2851
Powering the 2x4pro 2853
Unit Rear Light - 2x4pro 2856
2x4pro Video Input 2857
2x4pro Video Output 2860

4u25

4U v2.5 - Overview of SDI Input 2862
Audio Breakout 2863
Audio Cards 2865
Configuring SDI Capture 2870
12HD Playback Configuration 2876
Flashing an Active Silicon Card 2880
4U v2.5 Graphics Cards Configuration 2883

Contents

4U v2.5 Hardware Overview 2888
4U v2.5 Identifying the Hardware Version 2892
Removable Media Drives 2893
4U v2.5 Updating the Software 2895
4U v2.5 Redisguise 2896
Viruses and Malware 2908
4U v2.5 Windows Updates 2909

4x2

4x2pro Diagrams 2912
4x2pro Overview 2914
4x2pro Redisguise 2915
4x2pro Specifications 2924
4x2pro Audio Input and Output 2926
How to Start the 4x2pro 2929
Powering the 4x2pro 2931
Unit Rear Light - 4x2pro 2933
4x2pro Video Input 2934
4x2pro Video Output 2937

4x4

4x4pro 4K Output 2938
4x4pro Audio Input and Output 2939
4x4pro Diagrams 2942
4x4pro Overview 2943
4x4pro Performance 2944
4x4pro Redisguise 2946
4x4pro Specifications 2954
Advanced RAID Controller Information 2956
Creating a RAID Array 2986
Hard Drive Configuration 2991
How to Start the 4x4pro 2992
Importing RAID from Different System 2994
Powering the 4x4pro 2999
RAID Controller 3001
Unconfigured Bad Drives 3004
Unit Rear Light - 4x4pro 3006
4x4pro Video Input 3007
4x4pro Video Output 3012

Gx 2c

GX 2C Diagrams 3013
GX 2C Overview 3014
GX 2C Redisguise 3016

Contents

GX 2C Specifications 3022
GX 2C Unit Rear Light 3024
GX 2C Video Input 3025
Gx1
GX 1 4K Output 3029
GX 1 Audio Input and Output 3030
GX 1 Diagrams 3031
GX 1 Overview 3032
GX 1 Redisguise 3033
GX 1 Specifications 3039
Unit Rear Light - GX 1 3041
GX 1 Video Input 3042
GX 1 Video Output 3044
How to Start the GX 1 3045
Powering the GX 1 3047
Gx2
GX 2 4K Output 3049
GX 2 Audio Input and Output 3050
GX 2 Diagrams 3053
GX 2 Overview 3054
GX 2 Performance 3055
GX 2 Redisguise 3057
GX 2 Specifications 3063
Unit Rear Light - GX 2 3065
GX 2 Video Input 3066
GX 2 Video Output 3069
How to Start the GX 2 3070
Powering the GX 2 3072
Legacy Servers Overview 3074
Rx Rxii
RX and RX II Diagrams 3075
RX and RX II Overview 3077
RX & RX II Redisguise 3078
RX II Specifications 3081
Vx1
VX 1 Diagrams 3083
VX 1 Hard Drive Configuration 3085
VX 1 Overview 3086
VX 1 Redisguise 3088
VX 1 Video Input 3094
Vx2

Contents

VX 2 Diagrams 3096
VX 2 Hard Drive Configuration 3098
VX 2 Overview 3099
VX 2 Redisguise 3101
VX 2 Specifications 3107
VX 2 Video Input 3109

Vx4

VX 4 Diagrams 3111
VX 4 Hard Drive Configuration 3113
VX 4 Overview 3114
RAID Configuration 3115
VX 4 Redisguise 3124
VX 4 Specifications 3127
VX 4 Video Input 3129

Omnical Kit

OmniCal Wired Kit 3134

Os Manager Cli

OSManagerCLI (prerelease) 3138
OSManagerCLI Release Notes 3141
OSManagerCLI Command Line & Exit Codes 3143

Performance

Capture Latency Methodology 3149
EX 2 Performance 3154
EX 2C Performance 3156
EX 3 Performance 3159
EX 3+ Performance 3162
Machine Monitoring Graphs 3165
GX 1 Performance 3185
GX 2C Performance 3187
GX 3 Performance 3189
GX 3+ Performance 3192
Machine Performance 3195
Hardware Playback Performance Capture 3197
Solo Performance 3206
VX 1 Performance 3208
VX 2 Performance 3210
VX 2+ Performance 3212
VX 3 Performance 3215
VX 4 Performance 3218
VX 4N Performance 3221
VX 4+ Performance 3224

Contents

Plus Range

10G Ethernet 3227
Card Configuration 3228
Solo Filter Replacement 3231
Onboard Audio 3233
Solo Powering the system 3234
Pro Audio 3235
SDI Capture 3239
Solo Diagrams 3241
Solo HDMI capture 3243
Solo Overview 3247
Solo Redisguise 3249
Solo Specifications 3252
Product Compatibility 3254
Product Lifecycle 3258
Px Range

PX & PX+ Overview 3266
Rack Slide Replacement 3267
Redisguise Advice 3269
Redisguise Overview 3271
Rx Range

How to Start the Unit 3274
RX Range Overview 3275
Replacing your NVMe SSD - RX 3276
Rxiii

RX III Diagrams 3280
RX III Overview 3281
RX III Redisguise 3282
Smc

SMC Mk I 3285
SMC Mk II 3287
System Management Controller 3288
SMC Troubleshooting 3293
Vfc Cards

DisplayPort FAQs 3295
EDID Overview 3298
Managing EDIDs 3301
Update VFC Card Firmware 3310
VFC Cards Overview 3315
VFC Card Replacement 3318
Vx Range

Contents

Common Operations

VX Audio Input and Output 3326
How to start the gx 3329
Managing EDIDs on NVIDIA Machines 3331
Powering the VX 3340
VX Unit Rear Light 3342
VX Range Overview 3343

Vx2plus

VX 2+ Diagrams 3345
VX 2+ Overview 3347
VX 2+ Redisguise 3348
VX 2+ Unit Rear Light 3354
VX 2+ Video Input 3355

Vx3

VX 3 Diagrams 3358
VX 3 Overview 3360
VX 3 Redisguise 3361
VX 3 Unit rear light 3367
VX 3 Video Input 3368

Vx4plus

VX 4+ Diagrams 3371
VX 4+ Hard Drive Configuration 3373
VX 4+ Overview 3375
RAID Configuration 3376
VX 4+ Redisguise 3388
VX 4+ Video Input 3394

Windows Activation 3397

Learning

Disguise Learn Courses 3400

Pdfs

PDF Guides 3401

Porta

Admin Account Management 3403
Establish a Designer Connection with Porta Bridge 3404
Porta Bridge RossTalk Integration 3407
Channels 3411
Designer HTTP Sockpuppet 3413
Designer Timeline Control 3417
Google API Integration 3422
Integrations 3444
Motion Design Integration 3445

Contents

Porta Newsroom Integration via MOS Gateway 3446
Page Colour 3449
Page Editor 3450
Porta Cloud 3451
Porta Keyboard Shortcuts 3452
Manager Widget 3454
Porta Media Supported File Types 3457
Porta Media Browser/Manager 3458
Porta On Prem
Porta Manager
Porta Manager Overview 3461
Vm
Changing the IP of Porta On Prem 3465
Porta VM Diagnostics Cheatsheet 3470
Porta VM Disaster Backup and Restore 3481
Manually Setting Up a Static IP for a Porta On Prem VM 3488
Manually Resetting the Identity of a Porta On Prem VM 3492
Migrating to a Virtual Machine - FAQ 3494
Porta VM Helper Commands and Scripts 3498
Porta On Prem VM Overview 3506
Porta On Prem VM Windows Shared Folder 3510
Porta VM Support Checklist 3516
Porta VM Troubleshooting Playbook 3523
Porta On Prem VM Setup Guide 3532
Wsl
Disaster Backup and Restore 3543
Group Replication and Troubleshooting 3547
Installation Instructions 3551
Porta On Prem Installation Troubleshooting 3557
Machine Setup 3561
Backup the Porta On Prem WSL virtual disk 3571
Migrating Porta On Prem WSL data to a new location 3573
Freeing Windows Disk Space 3581
Purging Database Replication Logs 3585
Restore the Porta On Prem WSL virtual disk 3588
Porta On Prem README 3594
Replication Group Member Recovery 3608
Porta On Prem Support Checklist 3615
Two Machine System Guide 3618
Porta Overview 3619
Page Preview 3622

Contents

Pages 3625
Porta Playlist 3630
Porta Plugins 3632
Porta Projects 3633
Settings 3635
Template Builder 3641
Porta Unreal Plugin 3644
Workspace 3661
Preferences 3670
Release Notes
Bridge
Porta Bridge 1.2 3671
Porta Bridge 1.3 3672
Manager
Porta Manager 0.1 Release Notes 3673
Porta Manager 0.2 Release Notes 3674
Porta Manager 0.3 Release Notes 3675
Porta Manager 0.4 Release Notes 3678
Porta 2.0 3679
Porta 2.1 3680
Porta 2.2 3681
Porta 2.3 3682
Porta 2.4 3684
Porta 2.5 Release Notes 3685
Porta 2.6 Release Notes 3687
Porta 2.7 Release Notes 3690
Porta Release Notes 3692
Vm
Porta VM 0.9 Release Notes 3695
Porta VM 0.10 Release Notes 3697
Porta VM 0.13 Release Notes 3698
Still Preview 3699
Template Builder Components 3700
Porta User Account Management 3702
Workflows
3d Modelling
3D Fundamentals Overview 3704
Exporting 3D models 3705
Led Screen Examples
Example 1 - MiSTRIP Star 3712
Example 2 - OLite column 3717

Contents

Example 3 - DNA Spiral 3721
Example 4 - Millenia Tower 3724
LED Screen Examples Overview 3727
Optimising 3D Models 3728
Projection Examples
Projection Examples- Cylindrical mapping 3731
Projection Examples - Pelt mapping 3737
Projection Examples - Perspective mapping 3740
Projection Examples - Pixel-perfect mapping 3745
Projection Examples - Planar mapping 3751
Projection Examples Overview 3754
Projection Examples - Shrink wrapping 3755
Projection Examples - Spline mapping 3759
Understanding .obj files 3763
Uv Mapping
Editing UV maps 3764
The UV map as the Hardware Output 3767
UV mapping documentation 3770
The UV map as the content template 3771
How does Disguise Designer sample UV maps? 3777
What is UV mapping? 3780
3dgs
Sony
Sony - XYN Spatial capture solution 3782
Volinga 3DGS 3786
Ar
AR 3789
AR Spatial Calibration 3790
Calibration Projection
Calibration Errors 3795
OmniCal Multi-Pose Alignment 3798
MultiPose Projector Calibration 3807
OmniCal Alignment 3809
OmniCal Calibration 3819
OmniCal Capture 3831
OmniCal Mesh Deform 3845
OmniCal Overview 3850
OmniCal RigCheck 3864
OmniCal Camera Setup 3871
Projector Calibration 3899
Quick Calibration 3900

Contents

QuickCal Projectors 3905
Creating & deleting reference points in QuickCal 3916
Manual Projector Calibration 3919
Evo
Capture 3926
Depence 3928
EVO 3932
MA3D 3938
Isaac Bridge
ISAAC Bridge 3942
Motion Capture
Motion Capture Overview 3945
Skinned Mesh Skeleton
Skeletal Point Tracking Source 3946
Skeleton 3950
Vicon Emulator 3957
Osc
OSC Workflows 3962
OSC Sockpuppet 3963
Renderstream
Extending RenderStream 3969
Notch
ONNX AI Models in Notch 3972
RenderStream - Notch Integration 3974
Nvidia Omniverse
RenderStream - Omniverse RTX Renderer Integration 3977
Tuning RenderStream Active Latency 3990
RenderStream Failover 3994
Understanding RenderStream Graphs 3995
RenderStream Layer 4004
RenderStream Local 4018
RenderStream Local Layer 4020
RenderStream Overview 4026
RenderStream 4028
RenderStream Resources 4030
RenderStream Schema 4035
Touchdesigner
RenderStream - TouchDesigner Integration 4038
RenderStream Input - TouchDesigner Configuration 4041
TouchDesigner on the EX range 4044
Unity

Contents

RenderStream - Unity Overview 4045
3D Object Transforms in Unity 4047
Exposed Parameters in Unity 4049
Unity Project Setup 4051
Remote Text Parameters in Unity 4056
Remote Texture Parameters in Unity 4058
Timeline and Time Control in Unity 4060
Unity 6 Project Setup 4062

Unreal Engine

3D object transforms 4065
Derived Data Cache (DDC) Setup 4069
Exposed Parameters in Unreal Engine 4072
Level Sequences 4080
Multi-User Editing 4082
Remote Text Parameters 4091
Remote Texture Sharing 4092
RenderStream - Unreal Engine 4095
Scene Levels and Maps 4097
UE Project Setup 4102
Unreal Engine - Troubleshooting 4105
Scene Optimisation 4108
Unreal Engine Settings 4111
Unreal OCIO Setup 4113
Verification checklist 4130

Sockpuppet

Bank Editor 4135

Http

HTTP Sockpuppet 4141

Patch Assignments 4143
Sequencing with Sockpuppet 4153
Sockpuppet 4157
Sockpuppet Personality Editor 4159

Virtual Reality

Virtual Reality 4168

Vp

2.5D Workflow 4172
Anamorphic Lenses 4178
ARRI Skypanels Setup 4180
Cuebric Disguise Integration 4186
Depth Workflows 4188
Green Screen Workflow 4192

Contents

Mesh Mapping Workflow 4196
Shot Recorder Setup 4198
Using Sony’s Moiré Alert with Designer 4202
Virtual Production Overview 4209

Xr

Camera Switching 4212
Colour calibration 4220
Depth of Field Workflow 4226
Inner-Outer Frustum Workflow 4232
Inverse LUT Method 4235
MR Set 4238
Multi Frame LED Processor Mapping 4243
Observations 4248
Set Extension 4253
Spatial Calibration 4255
Spatial Tracker Delay 4266
Video Receive Delay 4269
Virtual Cameras 4272
xR for VR Workflow 4278
xR Workflow Overview 4288
xR Project Setup 4289
xR Stage Setup 4290

What is Disguise?

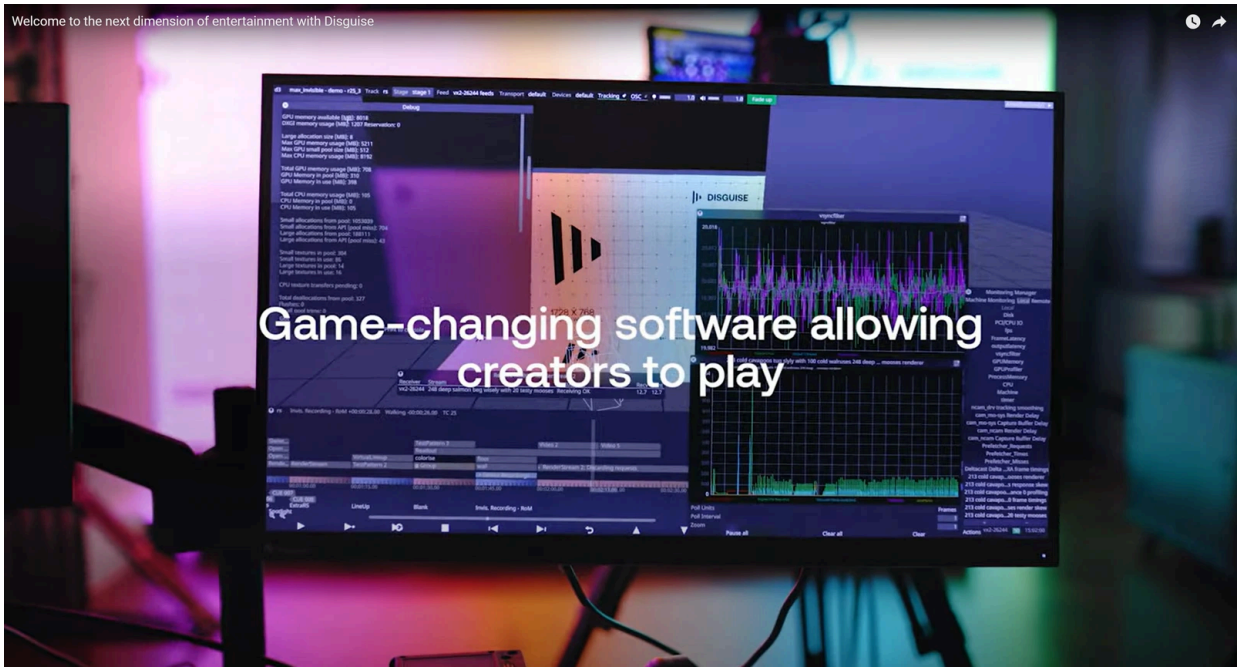
Disguise is the industry-leading platform at the heart of the new era of visual experiences. One powerful integrated system of software, hardware and cloud tools to power real-time or pre-rendered video content playback at scale.

We partner with the biggest entertainment brands and companies in the world to deliver the A-list of live music events, live TV broadcasts, location-based immersive experiences, installations, theatre, film and TV production, corporate keynotes and brand product launches.

We work hand-in-hand with our partners and offer a 24/7 global support system that ranges from essential technical service and online learning to innovative creative consultancy. From Disney to Snapchat, from Netflix to ESPN, from the Las Vegas Sphere to the Burj Khalifa, and from U2 to Beyonce, Disguise is the number one partner for the next dimension of entertainment.

For more information about our products, solutions, and services, please visit https://disguise.one.

Disguise 2024 Showcase



Watch on YouTube

Welcome to the new Help site!

Why change platform?

The user guide has been in action since 2017. While it has supported our users and internal teams for those 7 years, we are aware that some content has been inconsistent, inaccurate, out of date, or missing. With our legacy platform, the size of the team working on our publicly accessible technical documentation is small, and collaboration tools are limited.

At Disguise, we innovate rapidly and we need our documentation to reflect those changes and support our users.

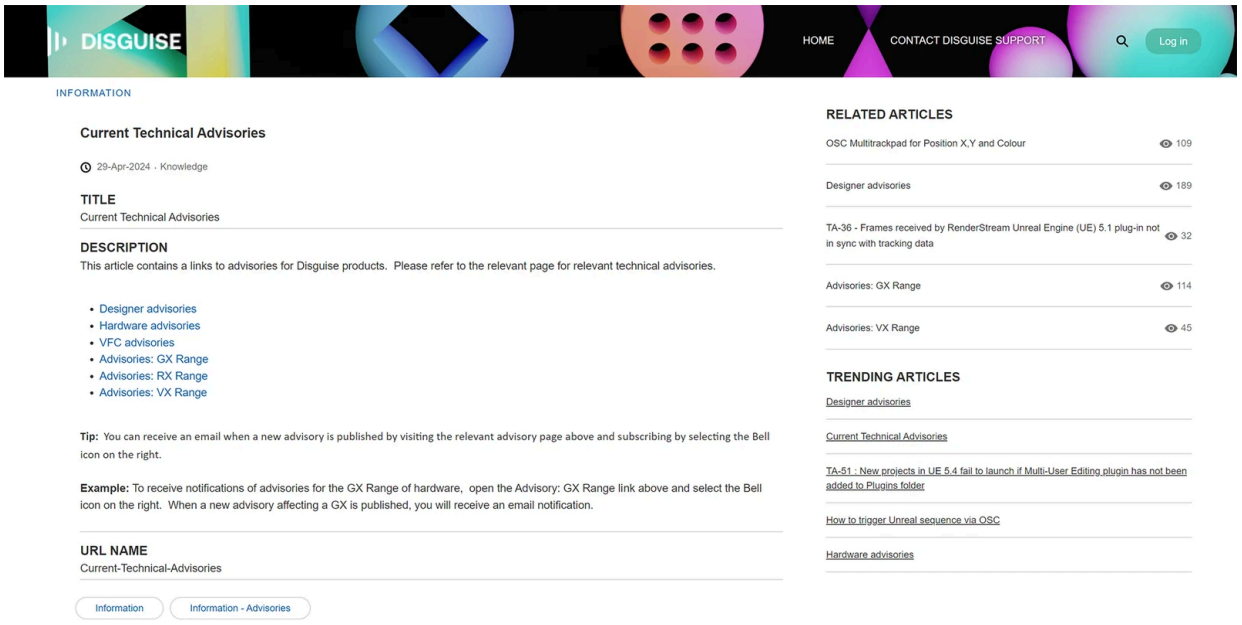
What's different?

The new site has been built using an open-source framework called Starlight and is source controlled in GitHub. Starlight is a documentation website framework for Astro which is a framework for generating web applications that can be extended with popular UI frameworks.

Our internal teams can all submit changes by adding a new branch, and then creating a pull request in GitHub. Pull requests require reviewers to approve changes before being merged into the main branch of the repository. Automatic deployment is triggered when new content is pushed to, or merged with, the main production branch. Once the production branch is built, all content is published to the live site.

The new process is faster and allows us to empower our experts across Disguise to collaborate on documentation by either writing, reviewing, or approving new content.

Technical Advisories Overview



Technical Advisories can now be found in the **Support portal** where you will be able to filter the advisories by category and be notified when a new advisory is added to a specific category such as a server range, or Designer version. To receive notifications, log in and select the Bell icon on the right.

Cloud Dashboard

Cloud Dashboard is a centralised management tool that enables users to launch Drive, Previz, and Mapping Matter on the Cloud platform. With Cloud Dashboard, you can manage your organisation and administer your team. You can also access your account to update your profile and customise your preferences.

Subscriptions



Cloud subscriptions

The following Cloud software are available for subscription:

- Starter
- Pro
- Studio

Learn more about Cloud subscriptions **here**.



Designer Pro subscriptions

Designer is available through Cloud where you can:

- Subscribe to Designer Pro - Select whether you want monthly or licenses. You can also adjust the quantity of licenses required.
- Manage your Designer Pro subscription.
- View the Designer release notes and download the Full installer.

Learn more about Designer Pro here.

Software Downloads



Designer Starter downloads

Designer is available through Cloud where you can:

- View the Designer release notes and download the Designer Starter installer.
- Log in to Disguise Cloud to authenticate your license using d3Manager.
- Upgrade to a Designer Pro subscription.
- Download previous versions of Designer.

Getting Started

Create a Disguise Cloud account

To sign up for Disguise cloud, you can create an account on the **Disguise cloud website**. It is free to sign up, no credit card is required. Please note that we recommend using a Chrome Browser to access Disguise Cloud.

Sign up with Google

1. Go to the Disguise Cloud account creation page, **https://disguise.cloud/signup**.

2. Click on the **Sign in with Google** button.
3. Confirm your Google email credentials.

Join with email

1. Go to the Disguise Cloud account creation page, **https://disguise.cloud/signup**.
2. Click on the **Join with email button**.
3. Confirm your email credentials.

Sign in

1. Go to the Disguise Cloud website, **https://disguise.cloud**.
2. Confirm your Google email credentials.

Sign out

1. Click on your profile avatar image.
2. Click **Sign Out**.

Edit your account details

1. To find your account details, select your Disguise Cloud avatar photo.
2. From the pop-up menu, click on your email address.
3. On the **Your Account** page, on the **General** tab, you can update your name, avatar photo, and light or dark mode application preference.
4. Click **Update**, edit the field that you wish to change, and then click **Save**.

Follow the links to learn more about Organisations and Domain Capture.

Cloud Troubleshooting

Disguise Cloud has some known issues that we are working hard to fix.

The sign in button has stopped working when the browser was closed during sign-up.

If this happens:

1. Restart your computer. Going offline and restarting will cause Designer to sign out of the cloud.
2. Sign back in once the computer has restarted and is connected to the internet.

”Get your D3 licence” message on D3 manager

This will be updated to “Get your Designer licence” in the next update. Designer and d3 have been used interchangeably by the Disguise Community. Designer is the formal name for our product.

Disguise Cloud avatar is cropped

This will be fixed in the next update.

Cloud login on Designer is not yet localised

Localisation is a key feature planned for a later release.

Create a support ticket from the Cloud Dashboard

1. To create a support ticket, click on your avatar photo.
2. From the pop-up menu, click on **Contact Support**.
3. Type your feedback into the input box and click on **Submit Feedback**.

If you are unable to log in or raise a ticket from Cloud Dashboard, please contact Cloud Support.

Domain Capture

Domain Capture lets users with the same email domain join your Disguise Cloud organisations. This feature allows users to join existing organisations rather than adding duplicate organisations for the same teams.

If your organisation has access to Drive, Previz and Mapping Matter, any users will also have access to these apps, along with the content files in Drive. This also includes Studio plan access to any shared groups in Mapping Matter, providing the same access to shared files and scenes.

Enabling Domain Capture

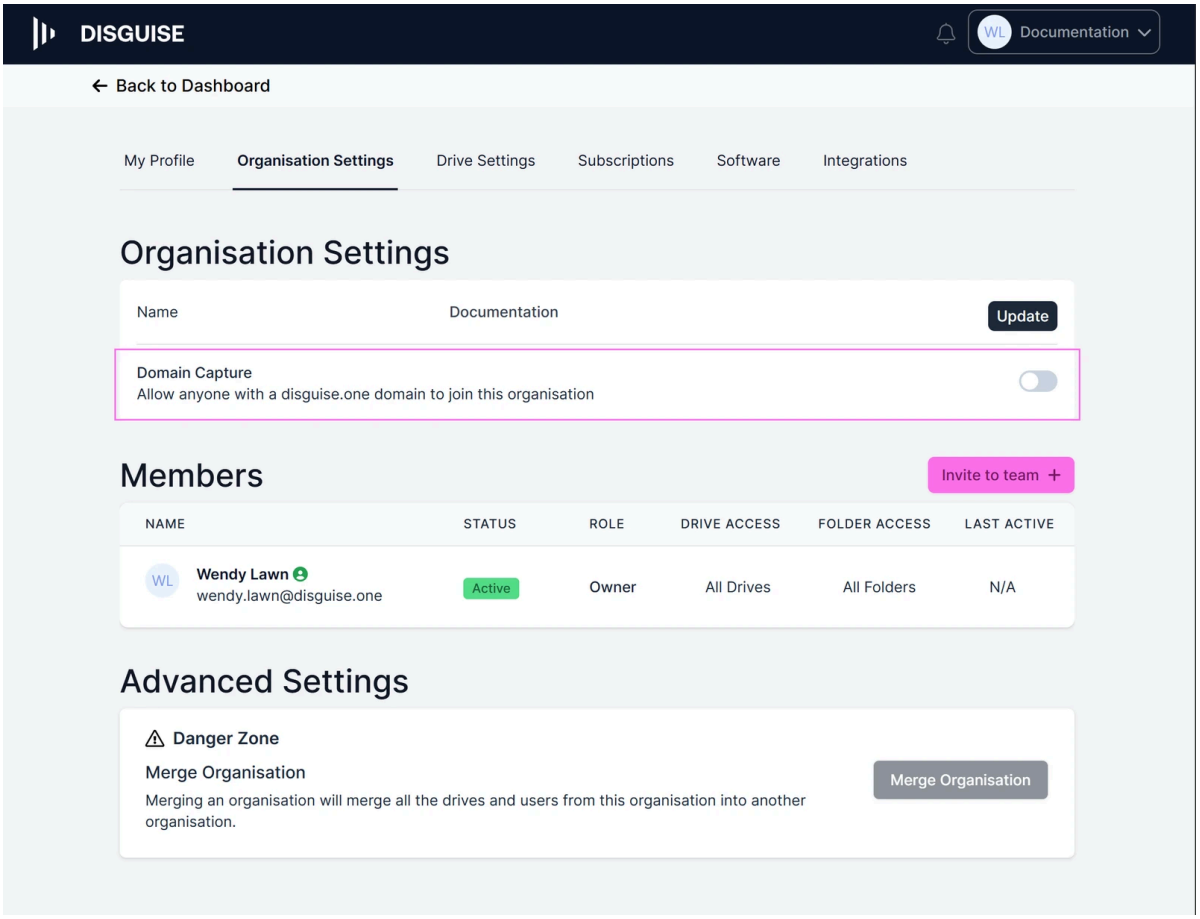
To enable Domain Capture, users must have an Admin or Owner role in an organisation and share the same email address domain. Please note that we are unable to support more widely shared email domain hosts such as Gmail, Outlook, and Hotmail. See **this link** for a list of commonly shared email domains that we are unable to support with Domain Capture.

If users do not share the same email domains, Admins will need to invite the member to join the organisation. See the Member Management page for more information.

When you create a new organisation, you have the option to **Allow anyone with @domain to join this Organisation**. Ensure toggle is enabled if you wish to allow users to join the organisation.

To enable Domain Capture in an existing organisation

1. Navigate to your **Profile Menu** (on the top right) > **Organisation Settings** and click to enable the toggle for **Domain Capture**.



2. Any members that have requested to join the organisation are listed in the Members section of Organisation Settings. The status for these members appears **Entitled**.
3. When an Admin enables Domain Capture, users with a matching email domain can request to join by navigating to **My Profile > Invitations**.
4. Admin/Owners can manually reject the user's request to join your organisation by clicking **Cancel**.

> **Note**
>
> The role that users are assigned is dependent on the type of Cloud plan subscribed to by the Admin of the Organisation.

Disabling Domain Capture

To disable Domain Capture, navigate to **Organisation Settings** and turn off the Domain Capture toggle. This will remove the list of eligible users. However, users who have already joined the organisation will remain members.

Join an existing organisation

Navigate to **My Profile > Invitations**.

Guest Accounts

The Guest Accounts feature in **Disguise Cloud** is designed to enable collaboration with a broader team within a structured and secure workspace. It provides sharing and interaction while maintaining control over access. Currently, guests using this feature do not have access to Previz or Mapping Matter.

When you send an invitation to a guest, it grants them access to a specific designated folder, inclusive of all its sub-folders, on a single Drive.

The Guest Accounts feature is a useful tool for inviting external team members to collaborate within a controlled workspace, ensuring that they can access the necessary content while keeping sensitive materials secure.

To invite a guest to collaborate

1. Navigate to **Organisation Settings** and click **Invite to Team.**
2. **Provide Guest Email:** Enter the email of the guest you wish to invite.
3. **Select Guest Role:** In the **Guest Role** section and choose the appropriate role for the guest based on the permissions they will need:
   - *Reviewer*: Reviewers can leave comments and view assets but cannot modify them.
   - *Collaborator*: Collaborators can upload new content and edit existing assets within their designated folder but cannot leave comments.
4. **Select Drive Folder:** Click **Select Drive Folder** to specify the Drive and folder that the guest will access.
5. **Confirm and Invite:** Click **Confirm** once you have entered the invitation details. Then, click **Invite** to send the invitation to the guest.
6. **Email Notification:** The guest will receive an email notification containing a link to the designated Drive folder, allowing them to access and collaborate within that folder.

For further role information, see Roles in an Organisation detailing permissions and limitations for guests, and other roles.

Roles in an Organisation

Organisation owners can assign roles to individuals and teams giving them different sets of permissions in the organisation.

The following roles exist in Disguise Cloud:

Admin

An Admin is the person who has administrator privileges in the Organisation or Drive. This means full drive access, and they can invite new users and manage content. They also have the power to manage user roles.

Owner

An Owner is the person who creates the Organisation or Drive. Owners are also able to manage Billing settings. Owners are Admins by default.

Member

A Member is part of an Organisation or Drive. A Member has access to Drive, and can upload and manage content.A

Billing

A Billing user is assigned to a user to enable them to manage billing, but have no other permissions. A Billing role does not count towards the seat count of a plan.

Reviewer (Guest)

A Reviewer role can be assigned by Admins when creating Guest Accounts. Learn more about Guest Accounts here.

Collaborators (Guest)

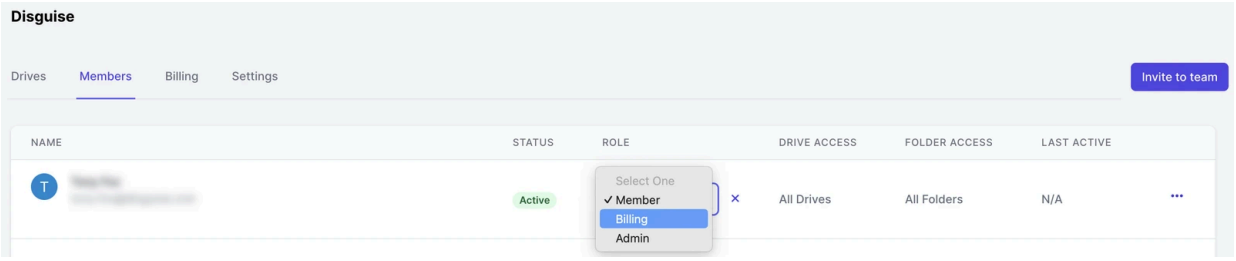
A Reviewer role can be assigned by Admins when creating Guest Accounts. Learn more about Guest Accounts here.

The permissions table below lists common actions and tasks performed in Disguise Cloud. The symbols indicate whether a person with that permission can (✔) or cannot (✘) perform the task.

Action/Role	Admin/Owner	Member	Billing	Reviewer (Guest)	Collaborator (Guest)
Create Organisations	✔	✘	✔	✘	✘
Invite people to join an Organisation	✔	✘	✔	✘	✘

Action/Role	Admin/Owner	Member	Billing	Reviewer (Guest)	Collaborator (Guest)
Edit and cancel invitations to join an Organisation	✓	✗	✓	✗	✗
Remove members from an Organisation	✓	✗	✓	✗	✗
Merge Organisations	✓	✗	✓	✗	✗
View and edit billing information	✓	✗	✓	✗	✗
Create Drives	✓	✗	✓	✗	✗
Archive Drives	✓	✗	✓	✗	✗
Access Smart Folders in Drives	✓	✓	✗	✗	✗
View Asset Versions	✓	✓	✗	✓	✗
Add Asset Versions	✓	✓	✗	✗	✓
Create, Add, Edit or Remove Tags	✓	✓	✗	✗	✗
View Tags	✓	✓	✗	✓	✓
Comment on an Asset	✓	✓	✗	✓	✗
Lock/Unlock Assets	✓	✓	✗	✗	✗
Share Assets	✓	✓	✗	✗	✗
Add Subscriptions	✓	✗	✓	✗	✗
Download Installers	✓	✓	✓	✓	✓

Admins can edit a member's role within the Organisation's settings under the Members section. This enables them to change a user's assigned role to either Member, Admin or Billing.



Organisation Settings

About Organisations

Disguise Cloud organisations bring together your company's users by having multiple accounts join the same organisation. This allows you to work together across multiple files and assets on collaborative projects. As an organisation Admin or Owner, you manage the Cloud accounts of your employees and the files that belong to your organisation.

You can invite others to join your organisation and assign them different roles, each providing varying levels of access and permissions. For more details, refer to Roles in an Organisation.

For more information on pricing please contact **Cloud Support**.

Create a new organisation

1. To create an organisation, navigate to the **Profile menu > Organisation Settings**.
2. Under **My Organisations**, click **Create an Organisation +**.
3. Under **Organisation Setup**, add the name of the organisation, toggle **Allow anyone at [*email domain*] to join**.
4. Select your Oganisation size and region.
5. Click **Create Organisation +**.

Invite a new member to an organisation

1. To access organisation management from the Dashboard, click on the **Management** button.
2. Click on the **Members** tab.
3. Click on the **Invite to Team** button.
4. Input the email address of the team member you want to add.
5. Select a Team Role for the new member by clicking on **Member** or **Administrator**.
6. Click on the Invite button.

> ⚠ **Caution**
>
> Cloud organisations cannot be deleted. However, they can be merged.

Merge organisations

> **Note**
>
> It is only possible to merge organisations if you have admin access to both organisations.
>
> Also, it is important to verify that the organisation you are merging into can support the changes. For example, if you're on Starter, you only get one drive, so you can't merge with another organisation.

1. Navigate to the **Profile menu > Organisaton Settings**.
2. Under **Advanced Settings**, Click on **Merge Organisation**.

Purchase a Cloud subscription

1. To purchase a Cloud subscription, left-click on your profile photo in the top right of the dashboard.
2. Select **Subscriptions**.
3. Select either Cloud Pro or Cloud Studio and click **Start 14 day trial**.
4. Add your payment details and click **Subscribe**.

You can view your active subscriptions on the **Subscriptions** page.

Purchase a Designer Pro subscription

To purchase a Designer Pro subscription, view this page.

Cancel a subscription

1. To cancel any subscription, ensure you are currently using the organisation associated with the subscription.
2. Navigate to **Subscriptions** in the profile menu in Cloud Dashboard.
3. Click **View**.
4. Click **Cancel**.

When you cancel a subscription, you will have a grace period until the next payment would normally be due. During this time, you are able to resume the subscription by clicking **Resume**.

Manage billing

1. To manage billing, navigate to the **Subscriptions** page in the profile menu.
2. Select the product you are subscribed to.
3. Click **Manage Billing**.

On this page you can:

- Click update your subscription to change your license quantity or billing plan.
- Use the edit icon to edit your payment method, or update your email and billing address.
- View your Invoice history. Your invoice will also be sent to the Admin/Owner's email address.

Order a Physical Dongle

The physical dongle is USB-based and can also host other supported licenses obtained from third parties such as Notch and TouchDesigner, as well as Designer. The USB Dongle can be purchased through the **Disguise Store**.

Using a dongle may be preferable if the license is to be shared in the same physical location.



Disguise USB Dongle

Follow the links to read more about Guest Accounts, Domain Capture, and Cloud Troubleshooting.

Cloud Overview

The Disguise Cloud platform is a collection of apps that are designed to empower and improve users' daily workflows with the Disguise platform. The focus of Disguise Cloud is to provide online-based interactions and experiences, with some additional offline features. Disguise Cloud is available for desktop and mobile.

Cloud Dashboard

Cloud Dashboard is a centralised management tool that enables users to launch Drive, Previz, and Mapping Matter on the Cloud platform. With Cloud Dashboard, you can manage your organisation and administer your team. You can also access your account to update your profile and customize your preferences.

Disguise Drive

Content teams involved in media and entertainment projects typically operate across various storage platforms. These solutions are not built specifically for complex, high-resolution projects and they don't acknowledge the modern way that studios and creatives are producing content. Disguise Drive allows users to upload and consolidate all of their project content in one simple online interface. A Drive is a place to collect and store content. Feel free to use it however best suits your setup. A Drive could be used for a project, a branch of your company or a location.

Previz

Previz empowers creative teams to publish and share 3D experiences and streamline the content review process. Users can preview 3D models from various perspectives with speed and ease. Designer users can share their creations to Previz, enabling collaboration and enhancing project efficiency. Sharing projects on Previz is straightforward, granting teams easy access to 3D visualisations for collaborative review. Previz supports 3D animations, cameras, and lighting, ensuring that your creative vision is accurately represented.

Collaboration is at the heart of Previz. Previz streamlines approval workflows for both internal teams and external clients, making the decision-making process more efficient and transparent. Discover how Previz can transform your creative projects here.

Mapping Matter

Mapping Matter is a simulation tool designed for audio visual professionals who need to create Video Projection Specs and recommendations for Large Scale Projects. It serves as a

comprehensive solution for confirming budget estimates, assessing luminance, pixel densities, and refining projector placements.

With the integration of Mapping Matter, Disguise Cloud is the only platform that offers interactive previsualisation and projection mapping tools directly in one web browser-based platform. Create large scale video projections in a simple 3D environment to plan everything you need before showtime. Learn more **here**.

Cloud APIs

Cloud APIs are documented on the Developer Portal. The Cloud API documentation walk you through the process of using the Cloud API to interact with your account, including your organisation, drives, and content.

These new APIs open up the possibilities to integrate applications that are part of your workflows with the Disguise Cloud ecosystem.

What can you do with the Content APIs?

- Manage Organisations and Drives:
  - Update your organisation properties.
  - Create, archive, and restore drives.
- Handle Assets and Folders:
  - View folder structure and download assets.
  - Upload assets and create folders.
  - Update, delete, and manage asset versions.

The APIs are divided into two categories:

- **Management API: Focused on managing organisations and drives.
- **Drive API**: Designed to handle assets and folders.

To learn more about our APIs and Integrations, go to **https://developer.disguise.one/cloud/**.

Creating a Previz

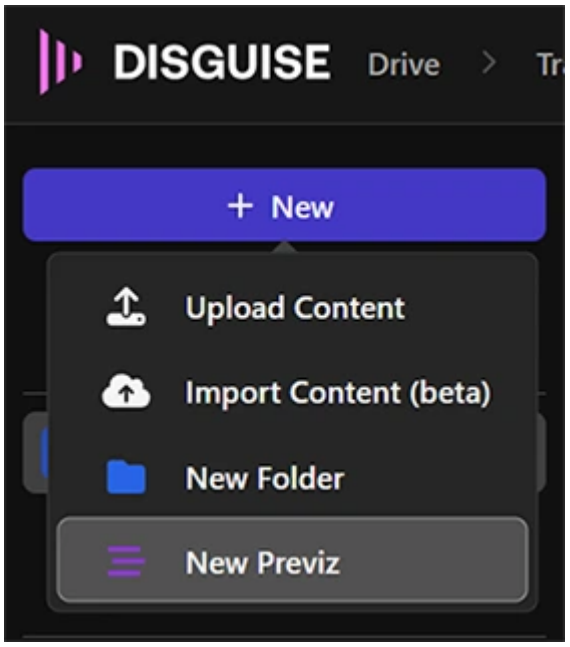
With Previz you can plan and preview your content in a real-time 3D environment.

Sequences in Previz can contain a range of different media including images, videos, 3d and scenes.

Create a new Previz

To create a new Previz:

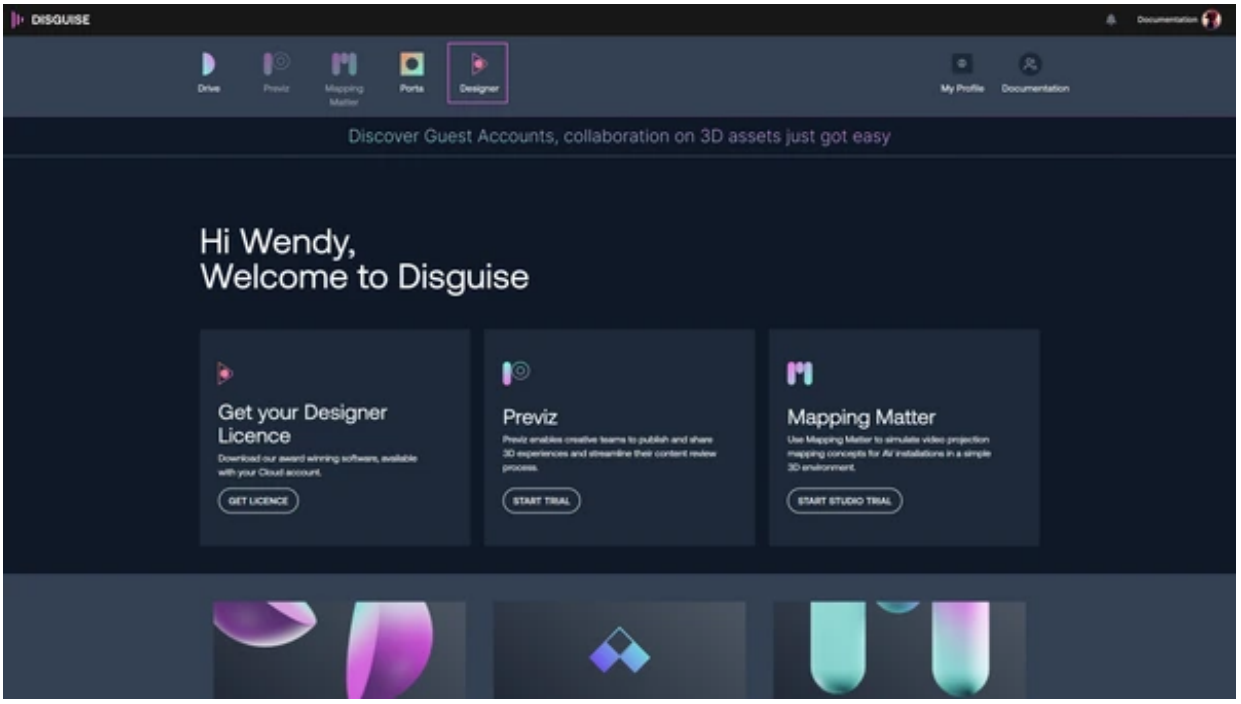
1. Select **New** from Drive.
2. Then select **New Previz** next to the team name in the team sidebar.
3. Enter the name for your new Previz.



Create a Previz

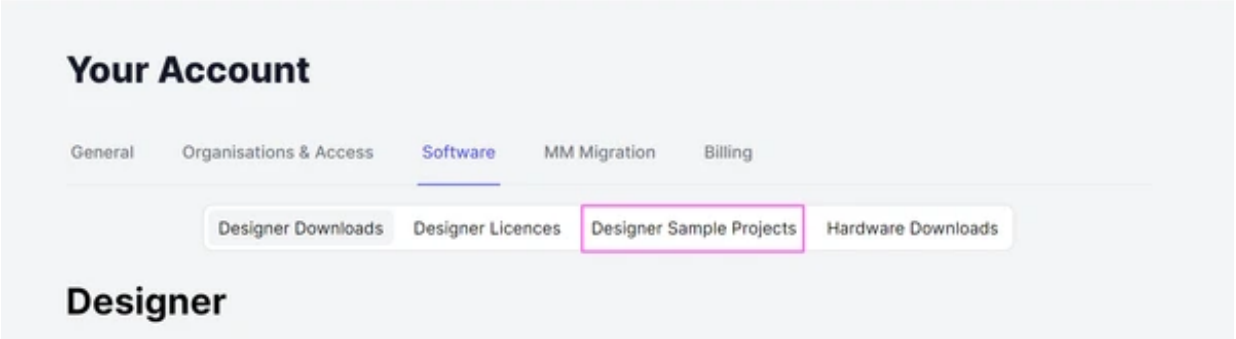
Designer Sample Projects

Designer Sample Projects are demo scenes created by Disguise ready for users to get started with Designer workflows. Covering each of the 7 industries Disguise operates in, these projects are available to download from Disguise Cloud.

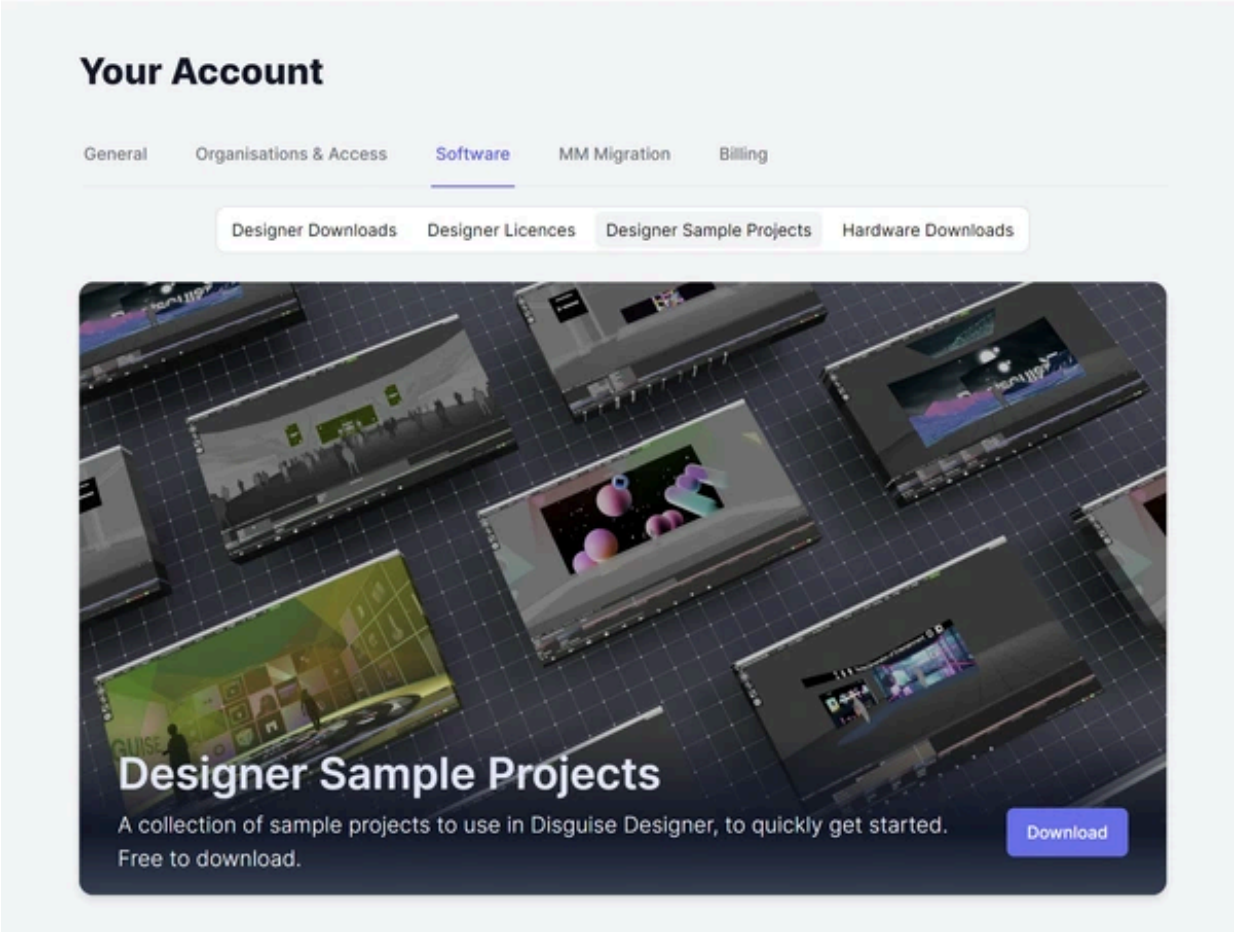


Downloading the Designer Sample Projects

1. Log in to your Disguise Cloud account.
2. In the Dashboard, click on **Designer**.
3. From the menu, select the **Designer Sample Projects** tab.
4. Click **View Content** to continue.
5. Click on the name or zip icon tile of a project.
6. Click on the **Download** button.



Select Designer Sample Projects

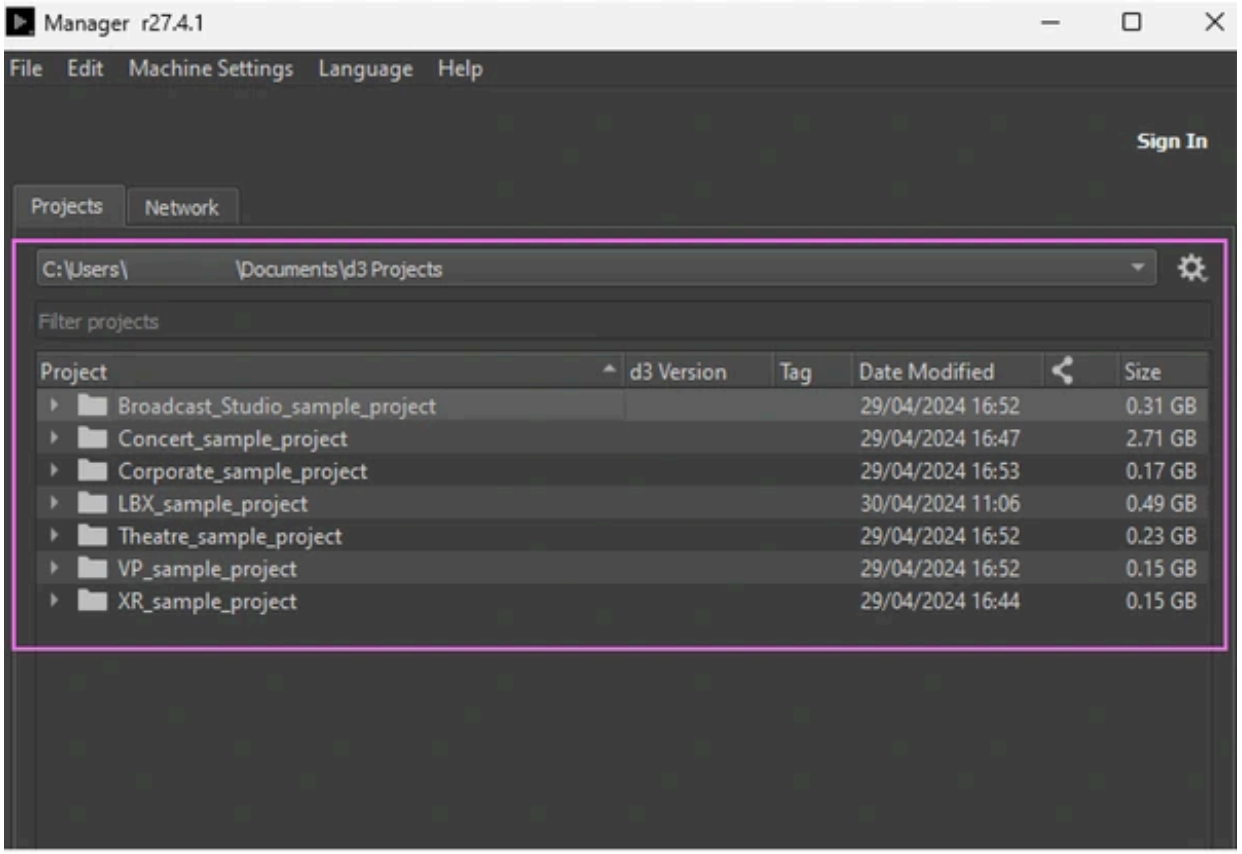


Download Sample projects

Installing the Designer Sample Projects

1. Once downloaded, extract each Designer Sample Project on your computer.

2. Add each of the Designer Sample Project folders to your d3 Projects folder. When you install Designer, the d3 Projects folder is automatically created in the default location: `C:\Users\[_username_]\Documents\d3 Projects`
3. Open **Manager** to view all the Designer Sample Projects.
4. Open the Sample Project in Designer by double-clicking on the project name.



Manager - sample projects

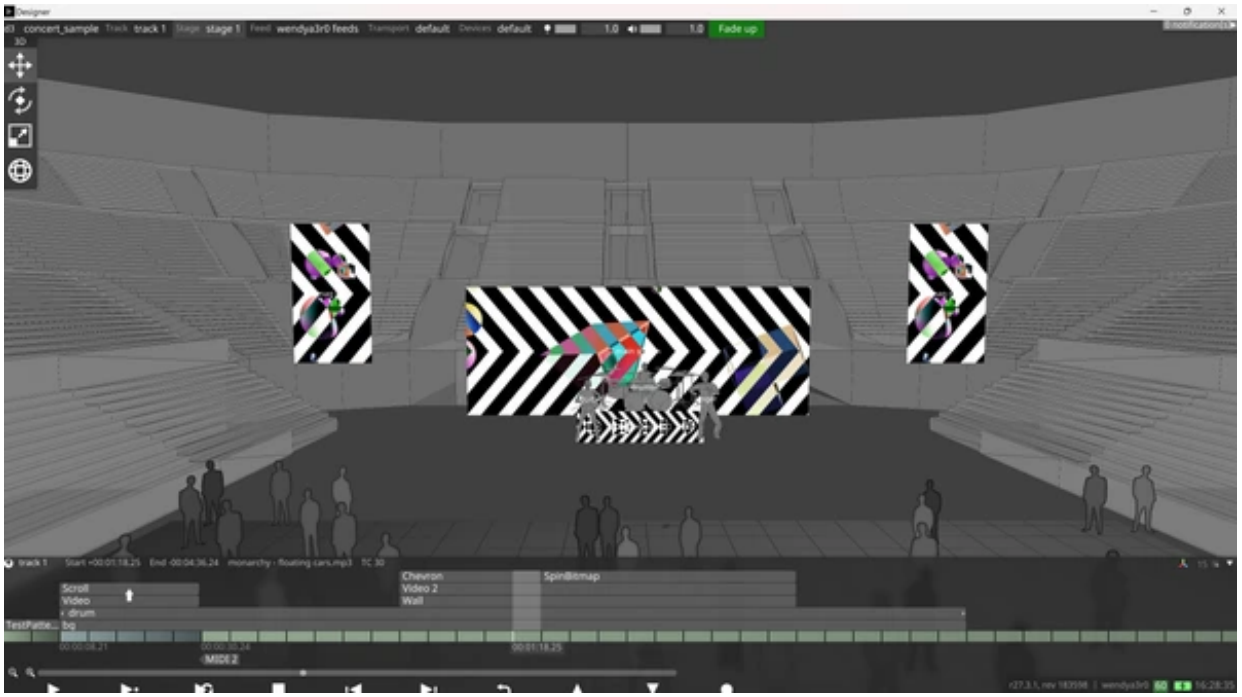
Live Concert Sample Project

Description

A concert venue with three screens placed behind a stage.

Demonstrates IMAG, live inputs, content slides in various aspect ratios, parallel mapping, Audio Quantizer, and matrix & MIDI device setup.

Concert_sample_project.zip Download link



Concert - sample project

Specs:

- Main screen: 2208 x 828px
- Drum riser: 736 x 184px
- Left and Right IMAG screens: 465 x 828px

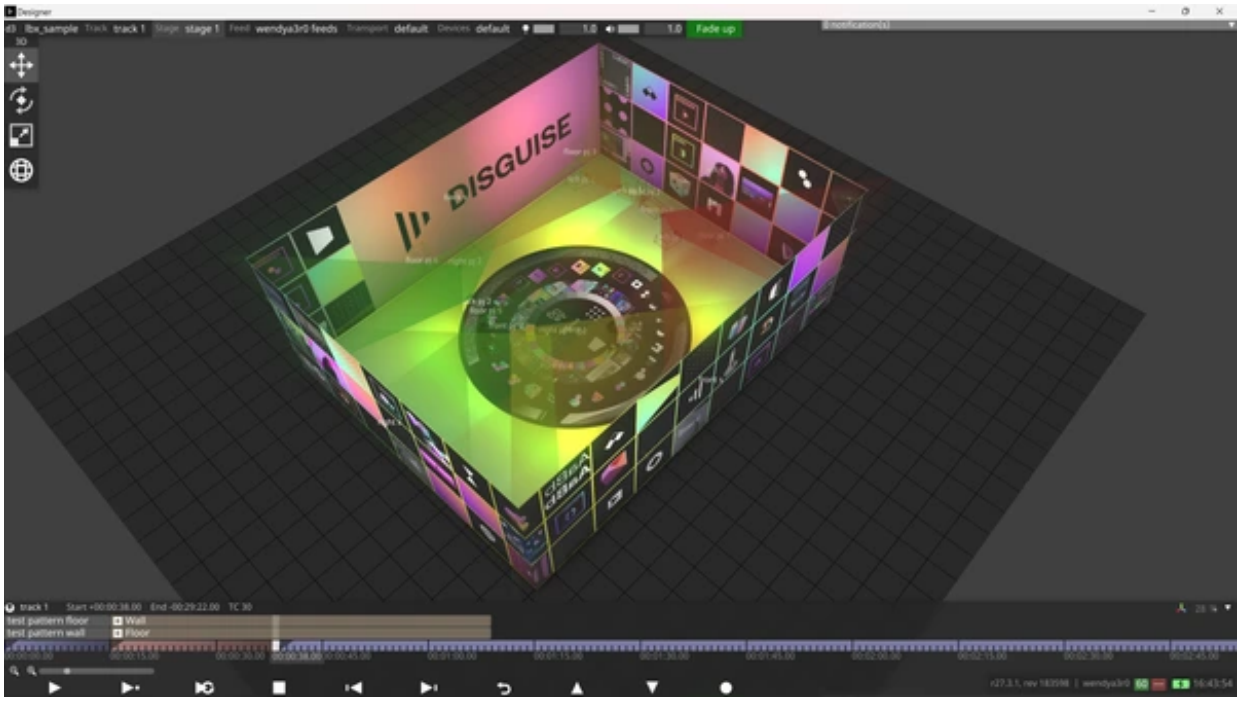
LBX Sample Project

Description

A 360° Immersive Room with projection surfaces on the walls and floor.

Demonstrates projection mapping, visualizer renderer in LUX mode, Omnical plan previsualization, dynamic blend, pixel-to-pixel mapping, and audio output patching.

LBX_sample_project.zip Download link



LBX - sample project

Specs:

- Left wall & Right wall: 2300px x 1024px
- Front wall & back wall: 2922px x 1024px
- Floor: 2922px x 2300px

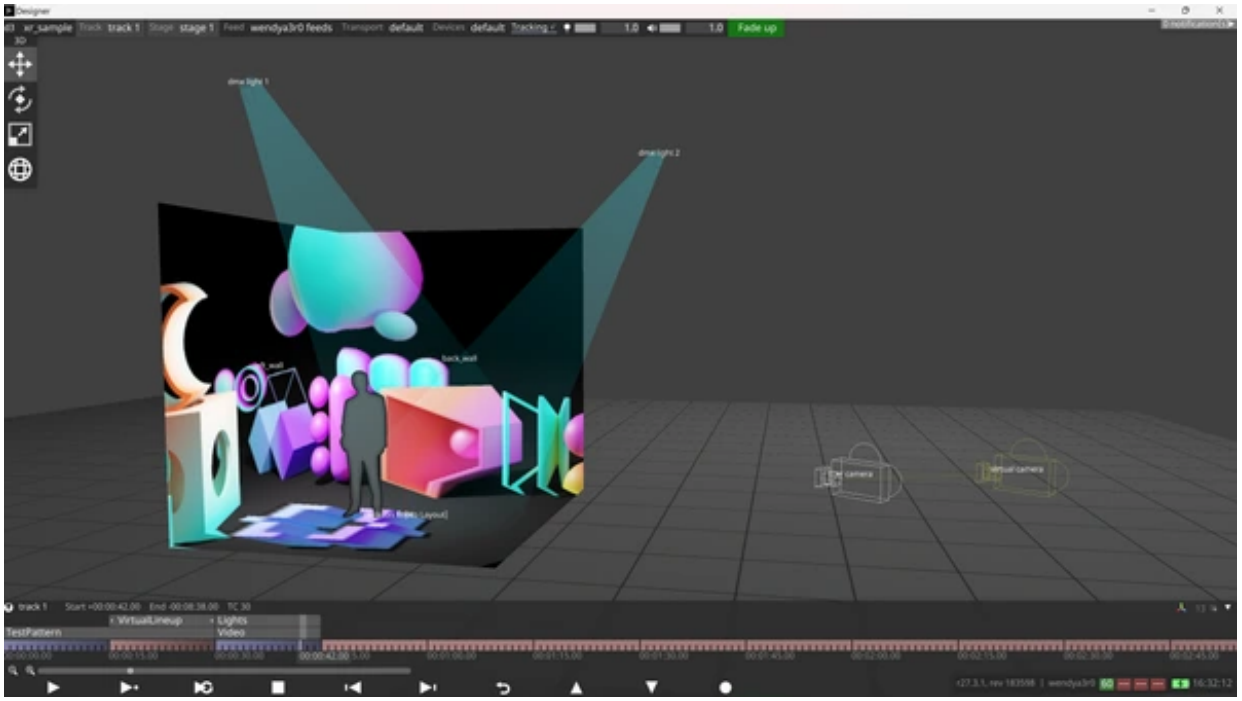
XR Cube Sample Project

Description

An extended reality volume, with three LED screens forming an “L” wall and floor stage.

Demonstrates a camera paired with a virtual camera. Includes provisions for camera tracking, matrix switching, and DMX lights control.

XR_sample_project.zip Download link



XR - sample project

Specs:

- Left wall: 1232 x 1232px
- Back wall: 1232 x 1232px
- Floor: 768 x 768px

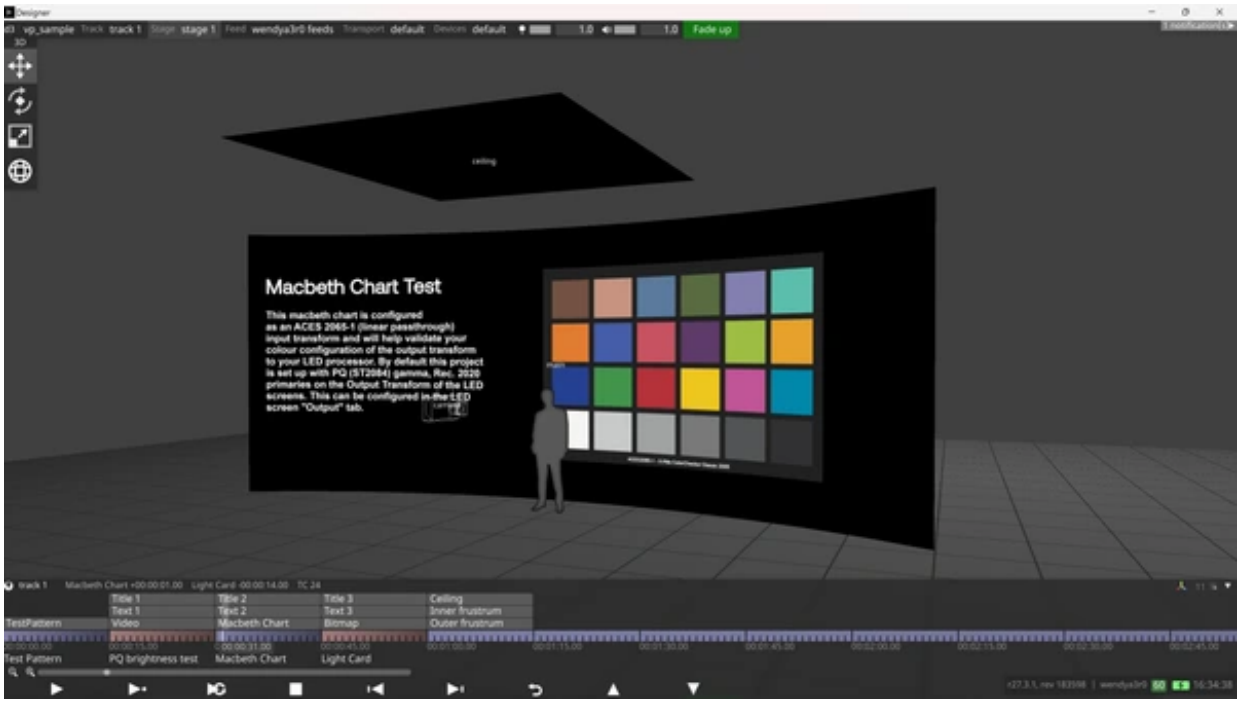
Virtual Production Sample Project

Description

A Virtual Production stage consisting of a curved LED screen and flat ceiling.

Demonstrates ACES colour profile, brightness test, Macbeth chart usage, Bitmap layer light cards for LED ceiling, camera frustum and out-of-frustum display, and shot recorder device.

VP_sample_project.zip Download link



VP - sample project

Specs:

- Main screen: 3840 x 1536px
- Ceiling: 1024 x 1024px

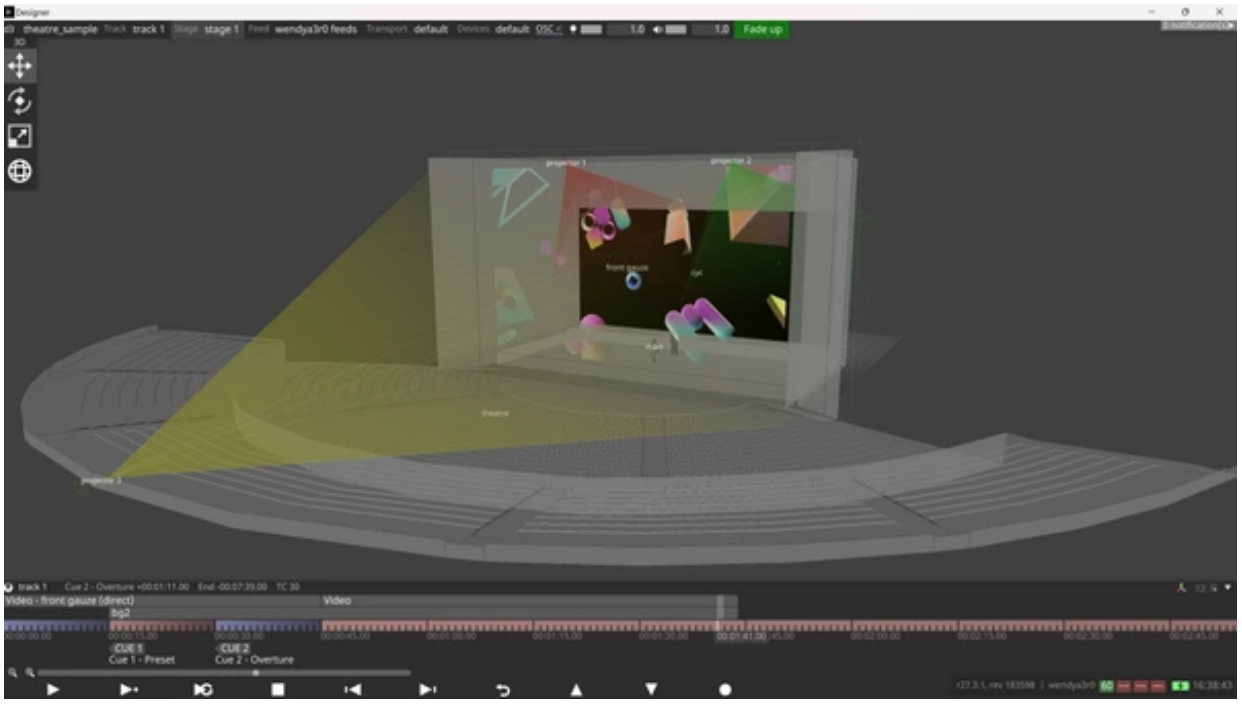
Theatre Sample Project

Description

A theatre stage with one projector for the front gauze and two for the rear screen.

Demonstrates projection mapping, matrices setup, OSC control, automation receiver, and simulation of gauze screen effects.

Theatre_sample_project.zip Download link



Theatre - sample project

Specs:

- Front Gauze: 1920 x 1080px
- Rear screen: 2400 x 1080px

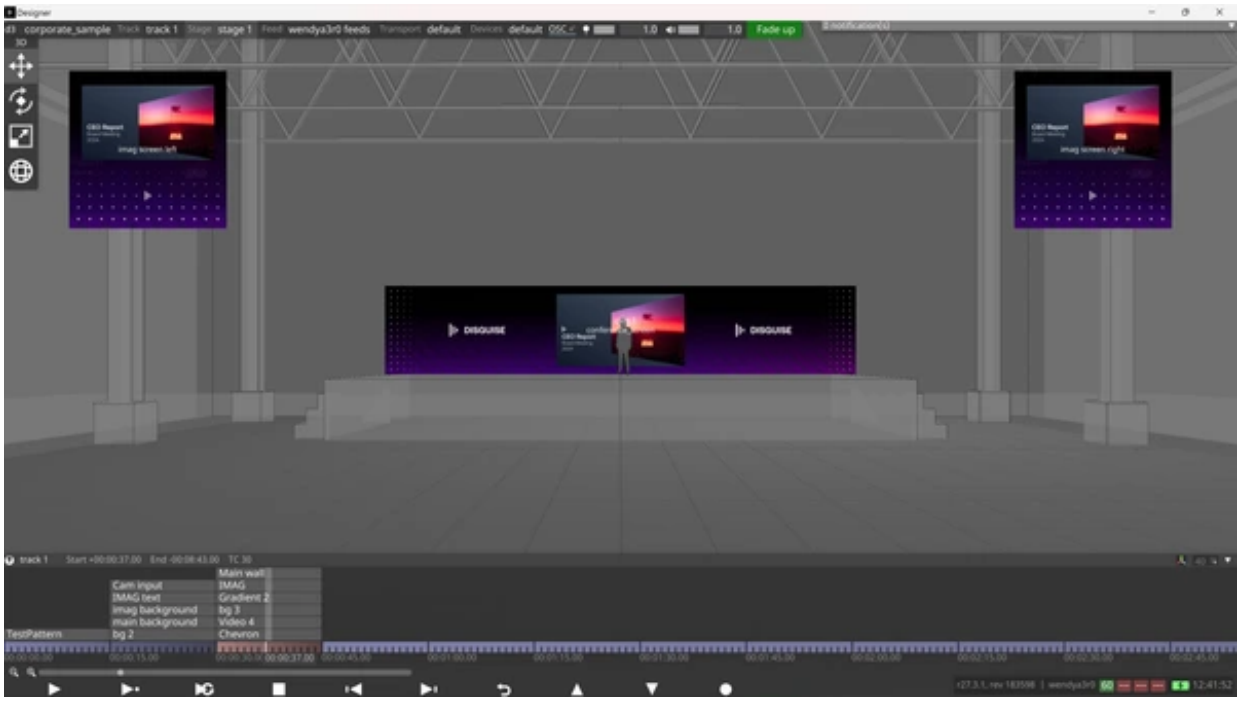
Corporate Sample Project

Description

A stage for a corporate event, consisting of one main LED screen and two side screens.

Demonstrates LED content mapping, live video input, redundant failover with matrix and d3Net, and internally generated text and effects.

Corporate_sample_project.zip Download link



Corporate - sample project

Specs:

- Main screen: 5632 x 1056px
- Side screens: 1056 x 1056px

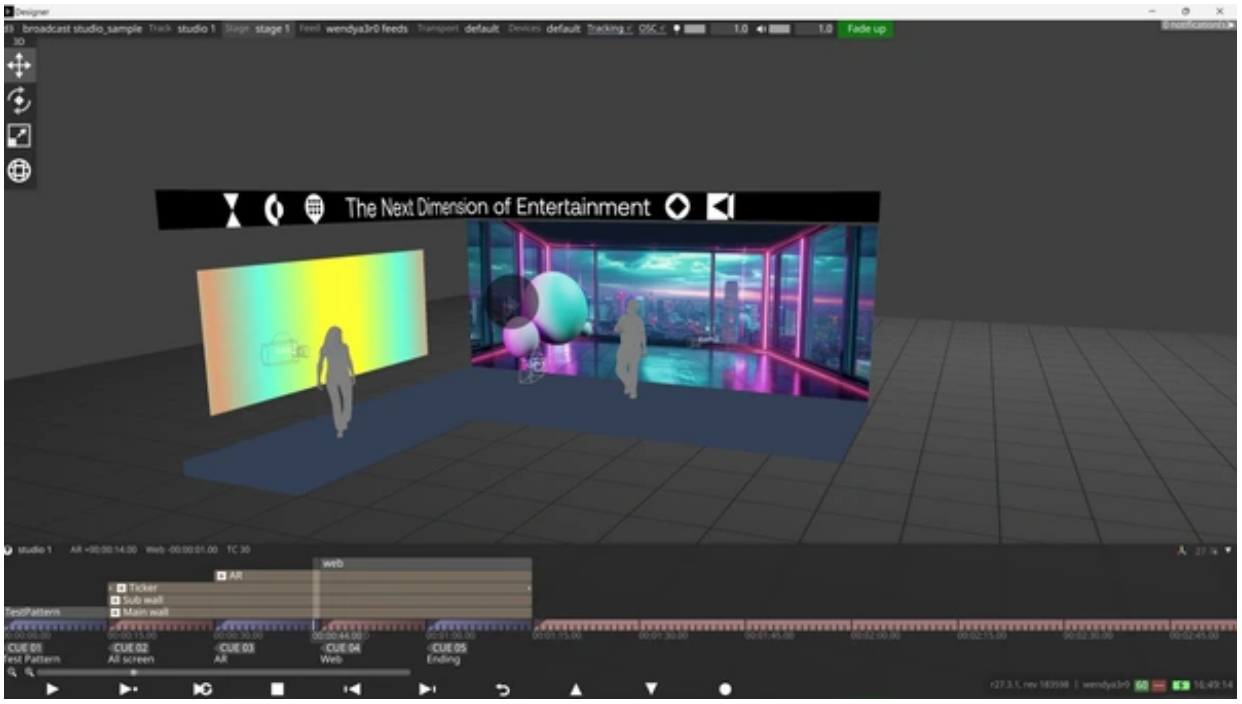
Broadcast Studio Sample Project

Description

A broadcast studio with a large video wall, a sub screen for breaking news or weather and a long ticker screen.

Demonstrates LED pixel mask, MR set, stage render layer front plate (AR), ticker scrolling, a web layer, timeline tags & cue list ready for Porta control, and layer patch to OSC.

Broadcast_Studio_sample_project.zip Download link



Broadcast studio - sample project

Specs:

- Main wall screen: 3072px x 1152px
- Sub wall screen: 1920px x 768px
- Ticker screen: 3072px x 192px

Disguise Drive Supported File Formats

Disguise Drive supports the following file formats:

Automatic Transcoding

Previz automatically transcodes your media for optimal performance in the viewer.

We can also accept a range of common video formats.

Video Formats

- MP4
- WebM
- MXF
- MPEG-2 TS container
- MPG
- fmp4
- FLV

Supported Video Codecs

- H.264
- VP9
- VP8
- MPEG-2

Not Supported

- HAP
- HAP-Q
- DXV

Audio Codecs

- AAC
- MP3

Recommended Video Specifications

- No larger than 8192 x 8192px
- h264 in a mp4 or quicktime container for the video
- aac or mp3 for audio

Transparency

Transparency in videos is not supported.

We are limited by the technologies implemented by the web browser vendors. WebM (the open video format pushed by the Mozilla Foundation in Firefox and Google in Chrome) allows video with transparency, but it is not supported by Safari nor IE / Edge. There is no good cross browser technology available to us at the moment.

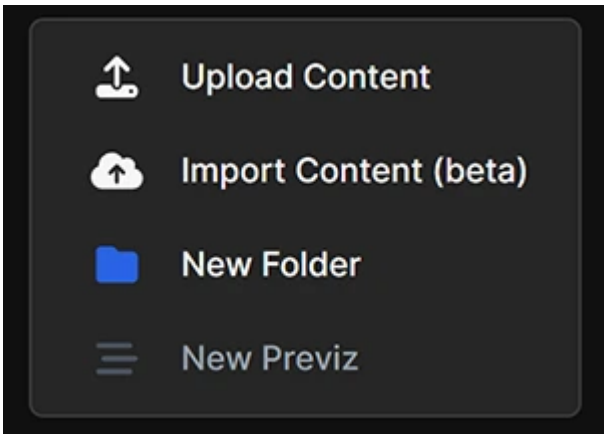
If you upload a video with a transparency layer, the transparent pixels will be rendered solid black in Previz.

Import Content from Third Party Services

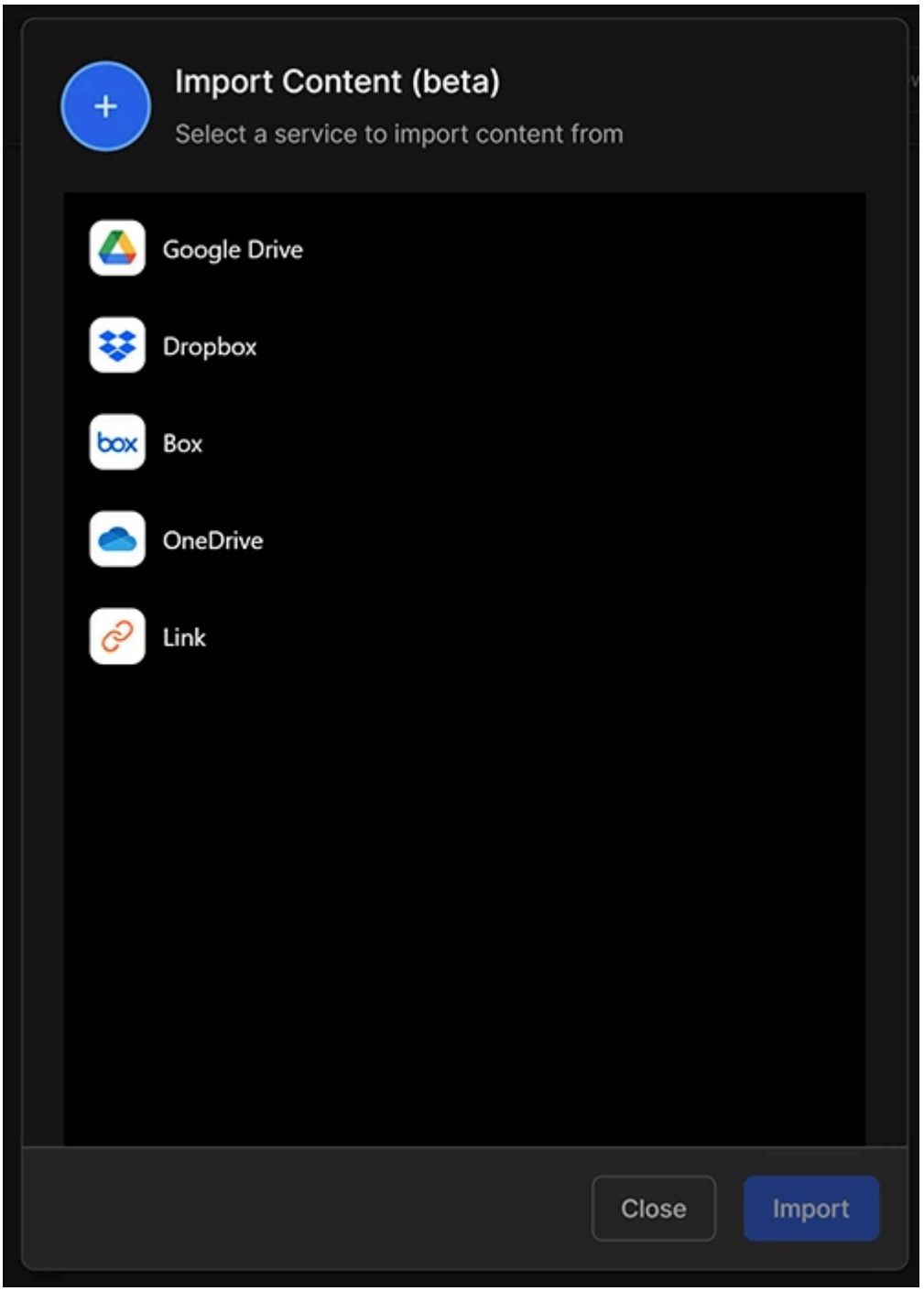
Cloud users can import content from third party storage services such as Google Drive, DropBox, Box, and via a link to an online storage service.

This feature is available for all Disguise Cloud users.

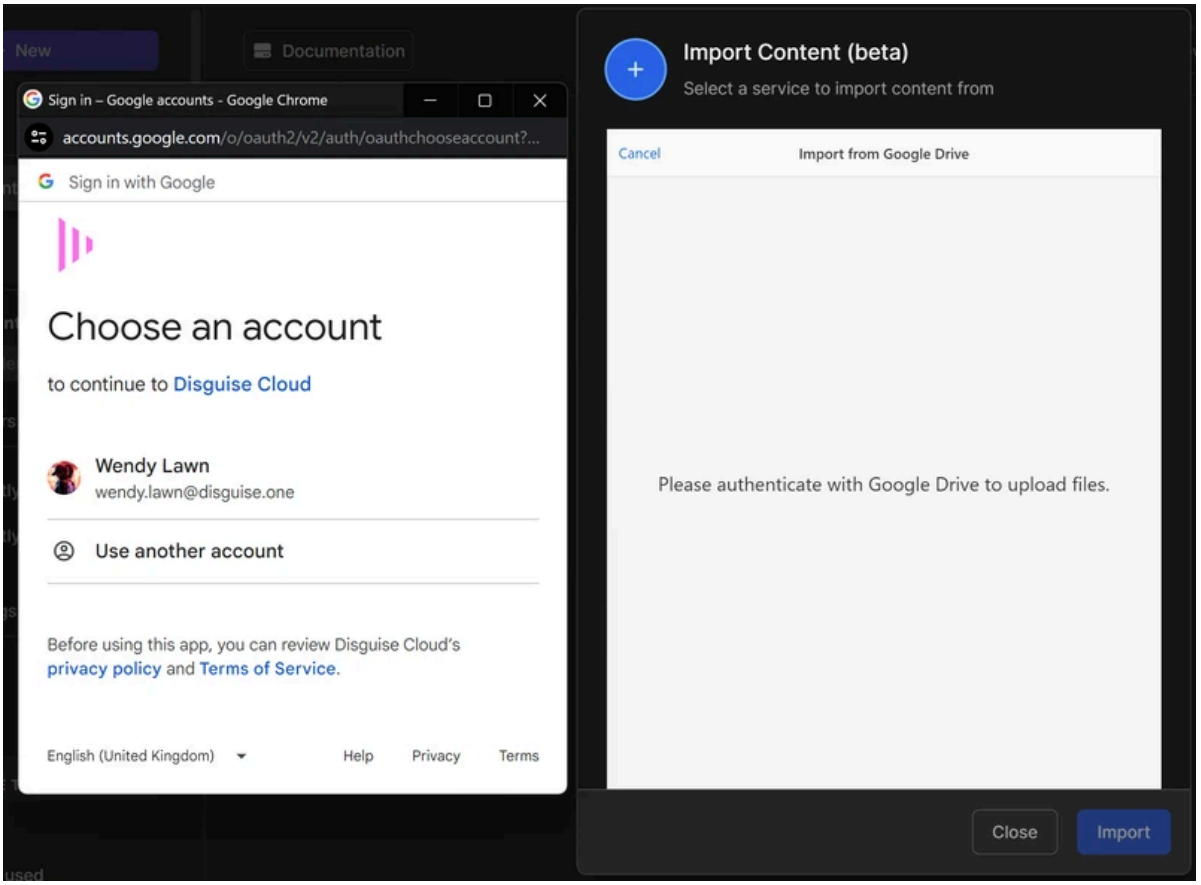
1. Log in to **Disguise Cloud**.
2. Right-click anywhere in Drive. Or, click **New**.
3. Select Import Content.



4. Select the third party service you wish to import content from. Options include **Google Drive**, **Dropbox**, **Box**, **OneDrive**, or via a link.



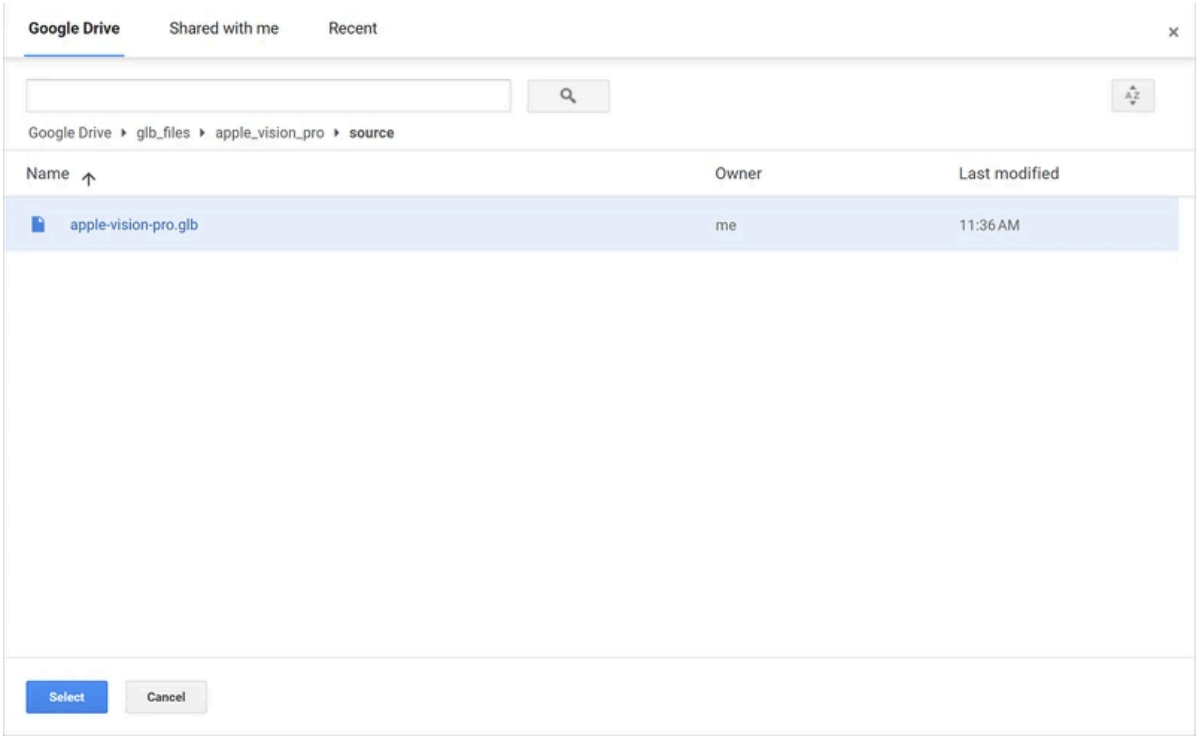
5. Sign-in to the service to access the content.



In this example, we use Google Drive

6. Confirm you are happy to use your Google account and click **Continue**.

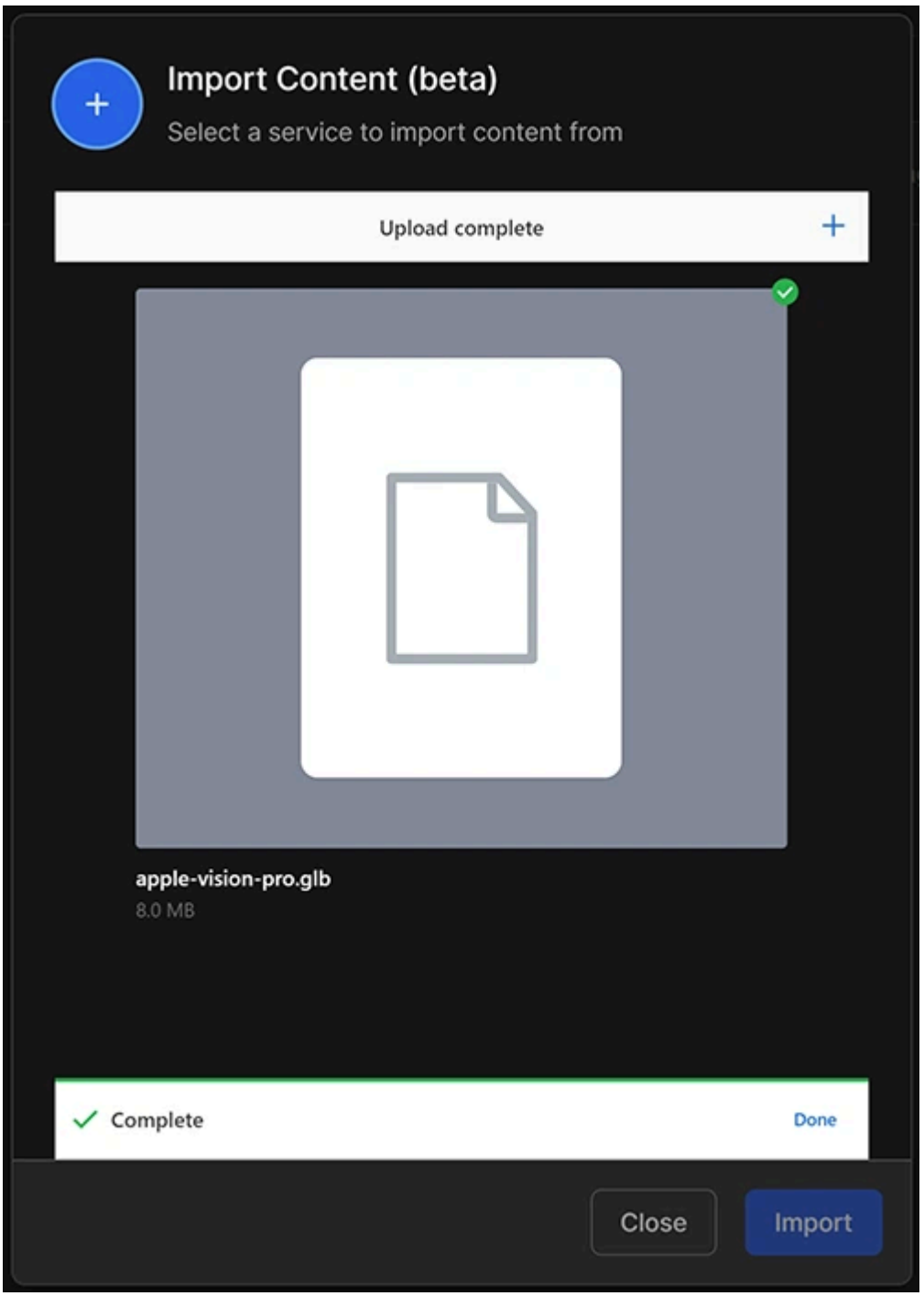
7. Select the content files or folders you want to add to your Cloud Drive and click **Select**.



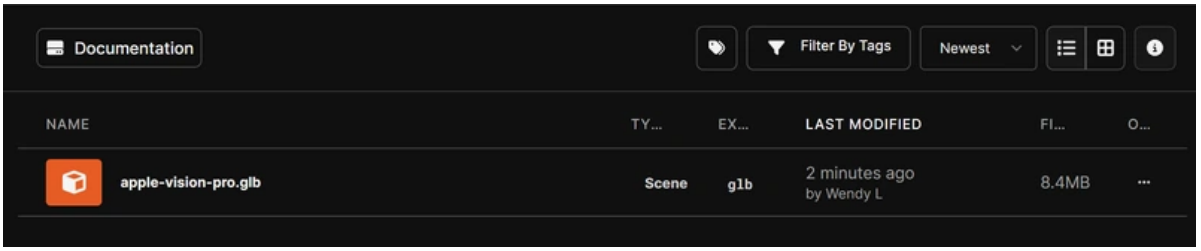
8. Next, click **Import**.



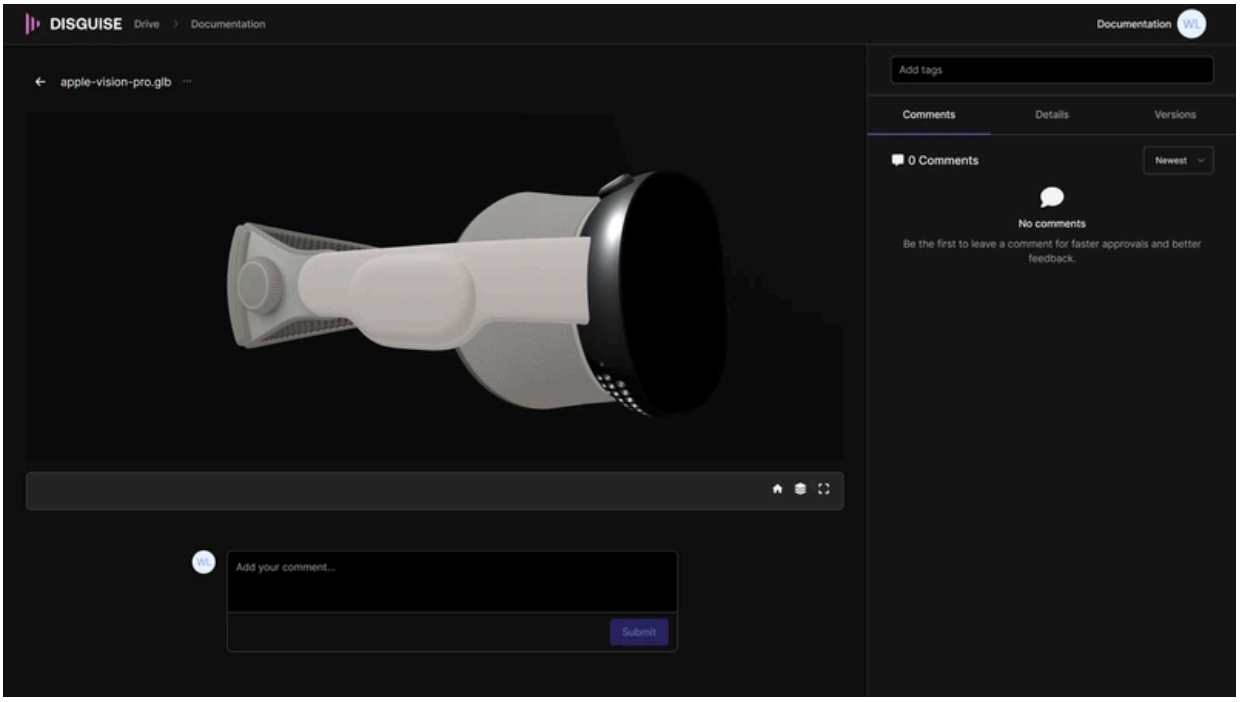
9. When the import has completed click **Close**.



10. Once imported, the content will appear in your drive.



11. You can preview 3D models with file formats such as .glb by clicking on the file name.



Uploading Content

Viewable file types

- Images
- Video
- Audio
- 3d Scenes (.gltf/.glb format)
- PDFs
- Folders containing the above file types

You are able to upload any type of file to your Drive, including ones not listed above, but only the above file types will be processed and viewable in the Drive application. The maximum file size for a single file is 20GB.

> **Note**: The amount of storage available is dependent on your subscription level.

There are two ways to add content to your previz:

1. Adding the files in the Drive application.
2. Dragging and dropping the files you want to upload to the Drive sidebar in your Previz.

Adding files in the Drive application

There are different ways to upload files to your Drive:

Method 1: Using the New Button

1. Navigate to the folder you want to upload the file to.
2. Click the **New** button at the top left of the Drive application.
3. Select **Upload Content**.
4. Browse for and select the file or files you wish to upload.

Method 2: Drag and Drop

1. Navigate to the folder you want to upload the file to.
2. Drag the file or files you wish to upload into the Drive application.

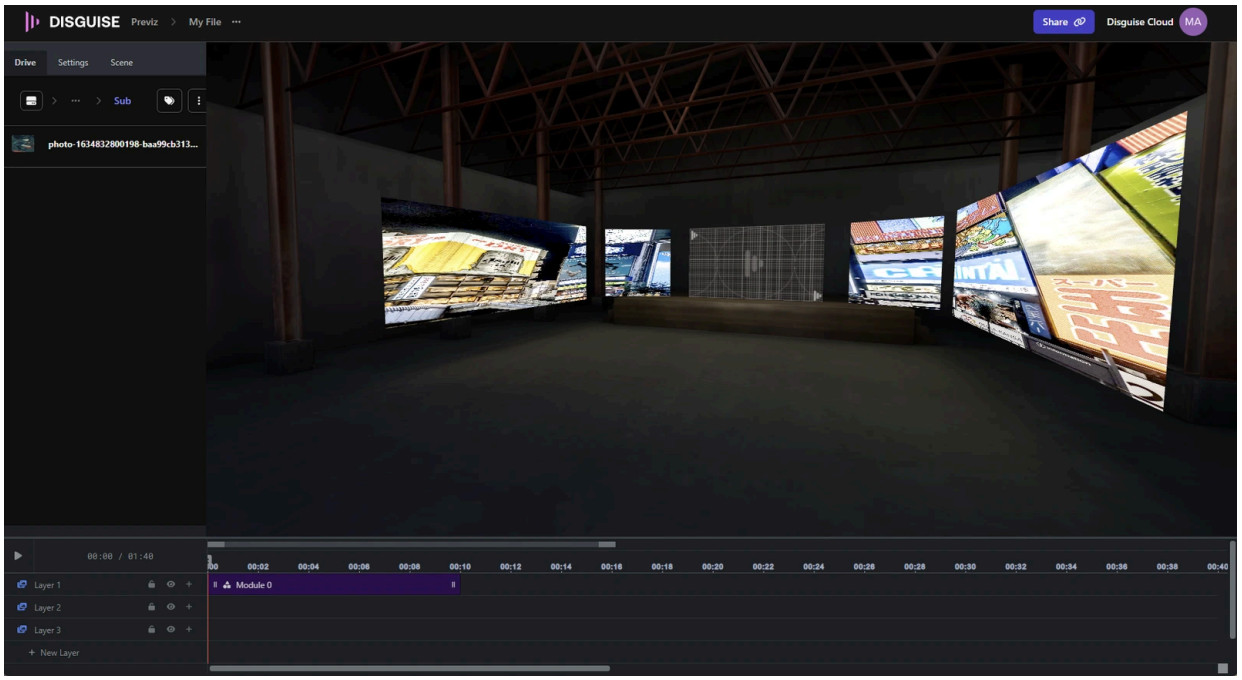
Method 3: Right-click

1. Navigate to the folder you want to upload the file to.
2. Right-click in the empty space in the folder content area.

3. Select **Upload Content**.
4. Browse for and select the file or files you wish to upload.

Drag files into Previz

1. In your Previz project, click on the Drive tab on the left sidebar.
2. Navigate to the folder where you want to upload the files.
3. Drag the files you want to upload into the Drive sidebar or use the right-click method.



Previz's Drive Sidebar

Using Drive

Set up a Drive

When you create an organisation, a primary Drive is automatically created for you with the name of your organisation. Primary Drives are indicated as such by a star icon in the Drive table in the Management area.

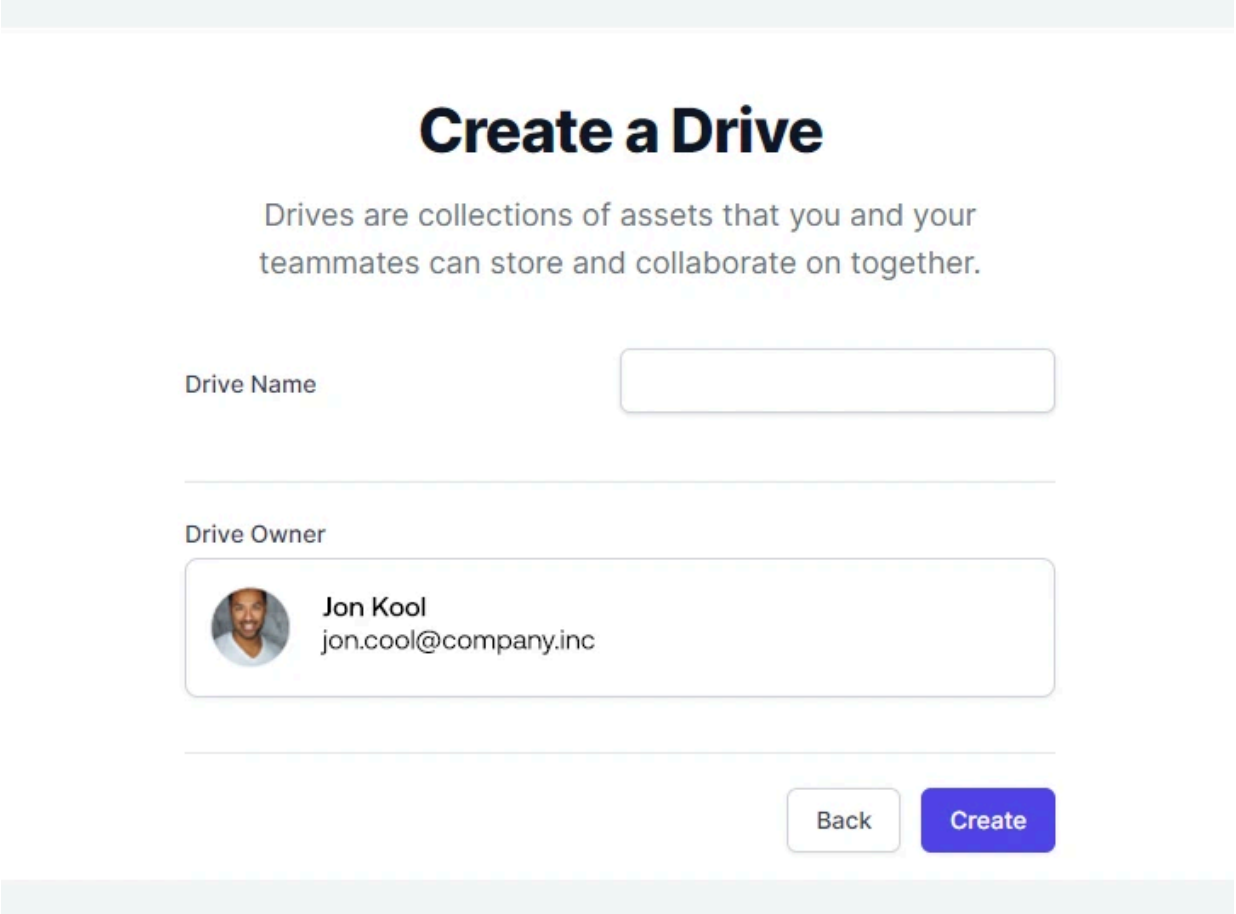
To add another Drive you will need to be on a paid plan.

If you want to add more Drives:

1. On your **Drive** page, click on the **+ New** icon and name the Drive.

Alternatively, here is a second method to create a Drive:

1. Click on the **Drives** tab if it is not the current tab.
2. Click on the **Create a Drive** button.
3. Type the Drive name in the **Drive Name** field.
4. Click on the **Create** button.
5. To configure your Drive, click on the **Update** button. Or if you'd rather do this at a later stage, click on **Not Now**.



Rename a Drive

1. To rename a Drive, click on **Settings** in Drive Settings.
2. To change the title, click on **Update**, type the new name, and then click **Save**.

Create a folder

1. To create a folder in your Drive, click on the plus icon **+** next to **Folders** below your Drive name.
2. Type the name for your new folder in the **Folder Name** text field and click **Create**.

Rename a folder

1. To rename a folder, click on the "..." symbol below OPTIONS in the Drive details view.
2. Click **Rename**.
3. Type the new name for your new folder in the **Rename Asset** field and click the **Rename Asset** button.

Delete a folder

1. To delete a folder, click on the "..." symbol below OPTIONS in the Drive details view.
2. Click **Delete**.
3. Click on the **Delete Asset** button to confirm you want to delete the folder.

Working with content

Supported file formats

The file formats currently supported in Disguise Drive are:

- Image: png, .jpg, .bmp, .webp, .gif
- Video: mp4, .mov, .ts,.avi, .y4m, .mkv
- Audio: .mp3, .wav
- 3D: .glb, .obj, .glTF, .fbx

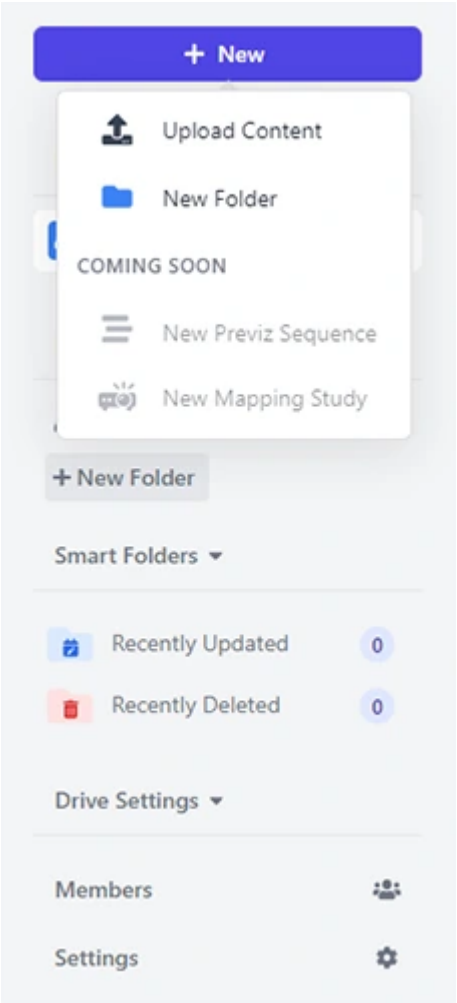
Upload content

1. From your **Drive** page, select the drive you want to use from the dropdown menu.
2. Click on the **+ New** icon and select **Upload Content**. This will allow you to browse your local files.
3. Select the item you want to upload and click **Open**.

The item will upload and appear listed in your drive.

Alternatively, you can drag and drop a file or asset or several files from your computer into the main drive content area to upload to the current directory you are in.

You can also upload a folder that will upload all files within that folder along with any nested folders.



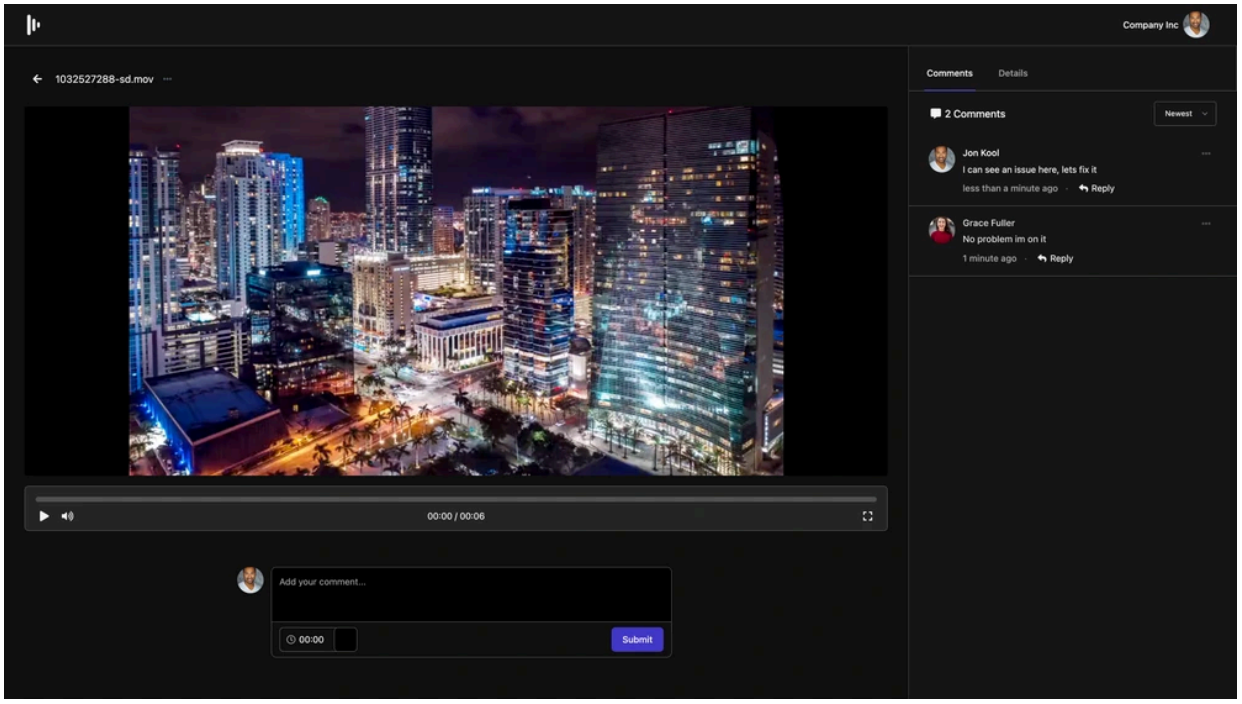
Preview content

To preview content, click on the item in drive view.

This will open a view of the item. Here, you can see any comments and details.

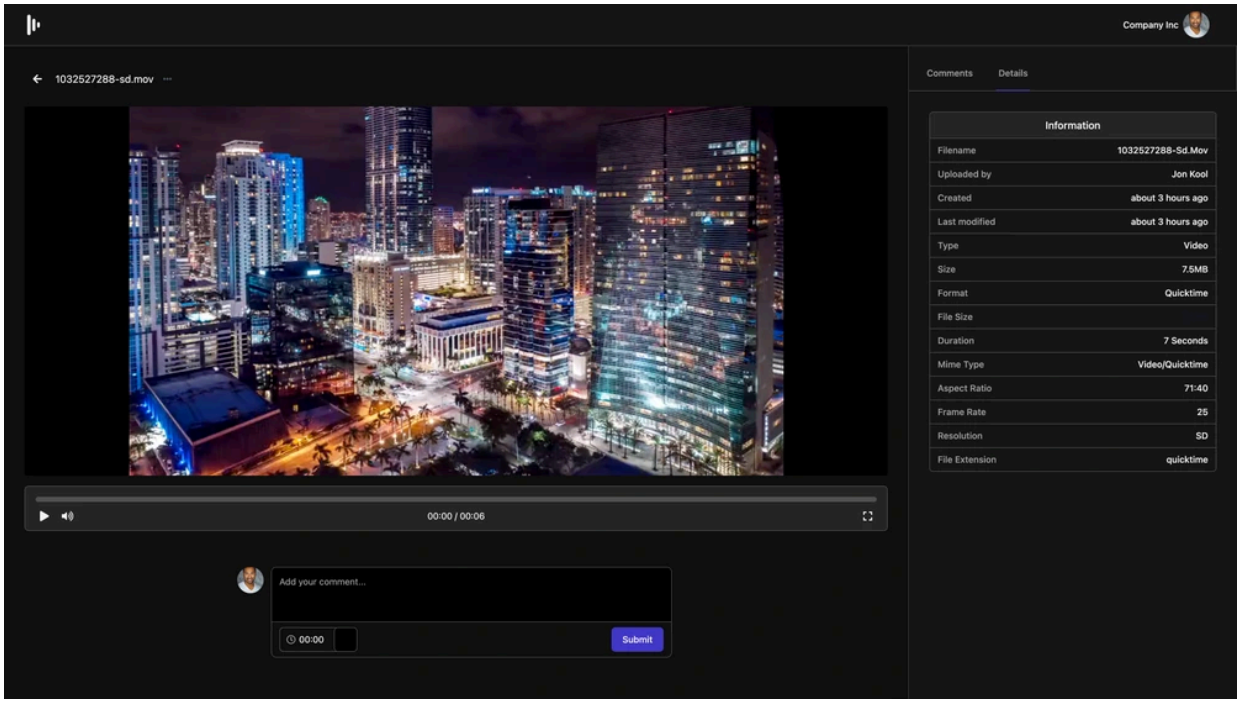
Leave a comment on an asset

1. To leave a comment on an asset, click on the item name to view it.
2. Then type on in the box below the item.
3. Click **Submit**.



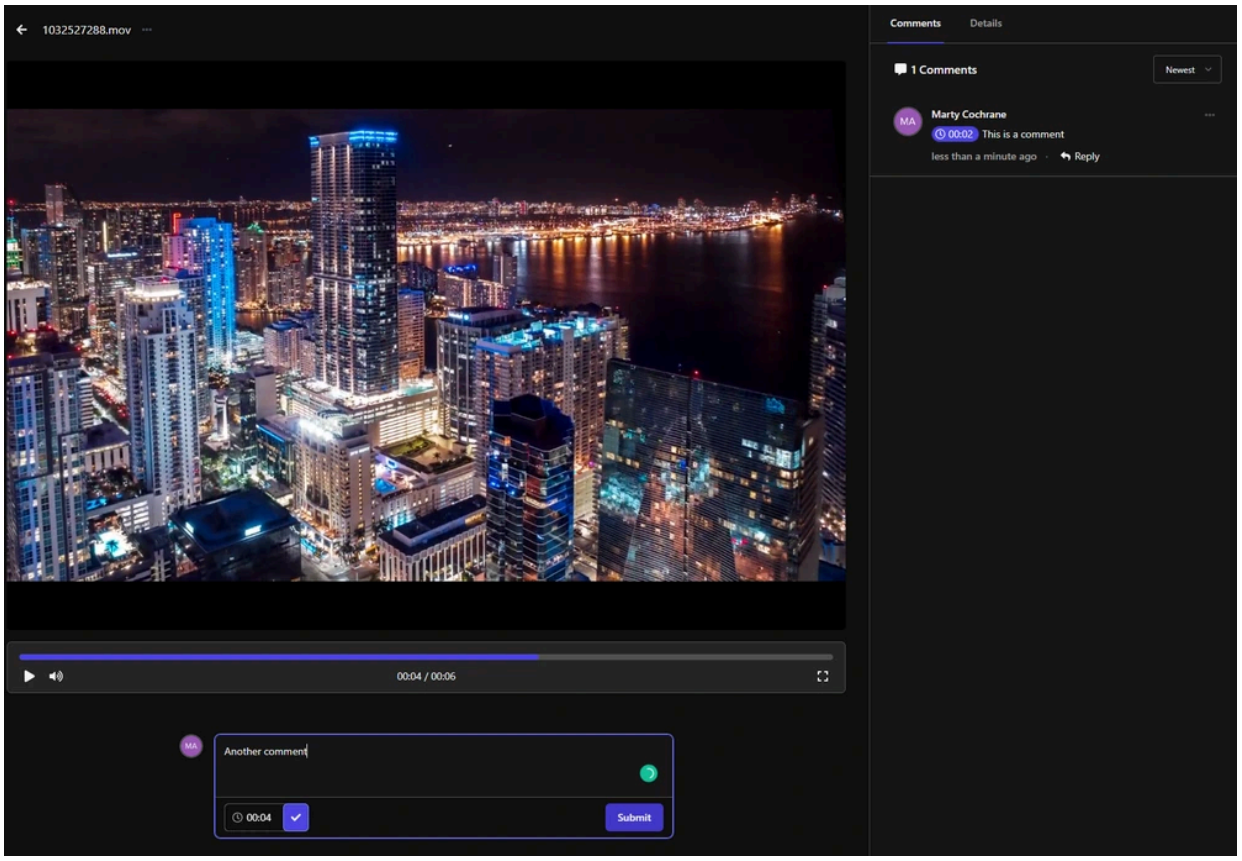
View the Metadata of an asset

1. To view an asset's Metadata, click on the item to preview it.
2. Click on the **details** tab.

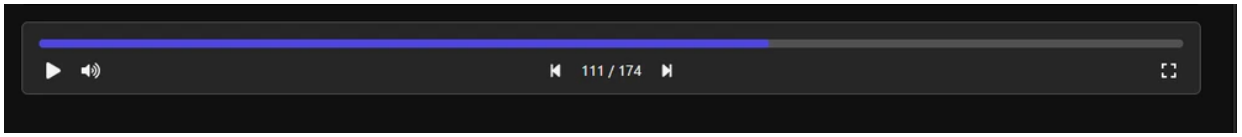


Add timestamped comments on a video

In the comment box, you can change the timestamp by clicking on it and adjusting the time and frames.



Clicking on a timestamp will jump you to the point in the video where the comment was left so you can review the frame it relates to.



Download an asset

1. From your drive's file list, click on the "..." below OPTIONS.
2. Click **Download**.

Delete an asset

1. From your drive's file list, click on the "..." below OPTIONS.
2. Click **Delete**.

Access recently deleted files

From your drive's file list view, click on the **Recently Deleted** SMART FOLDER.

This will list all of the recently deleted files and folders.

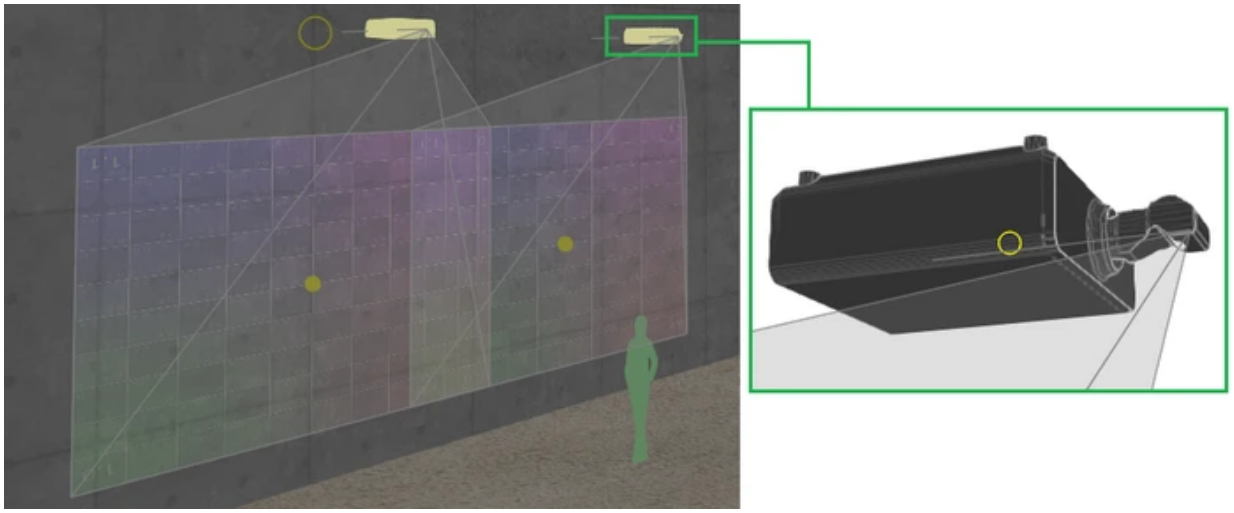
FAQs (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Keystone

There's no Keystone tool in Mapping Matter. To quickly set perfectly mapped previews of your Content projected on any surface, you can use the Reverse Mapping Mode There will be no distortion / loss of image quality.

Ultra Short Throw



Here you'll learn how to simulate odd lens configurations (often used for Ultra Short Throw), such as *Reverse Mirror* or *Snorkel*.

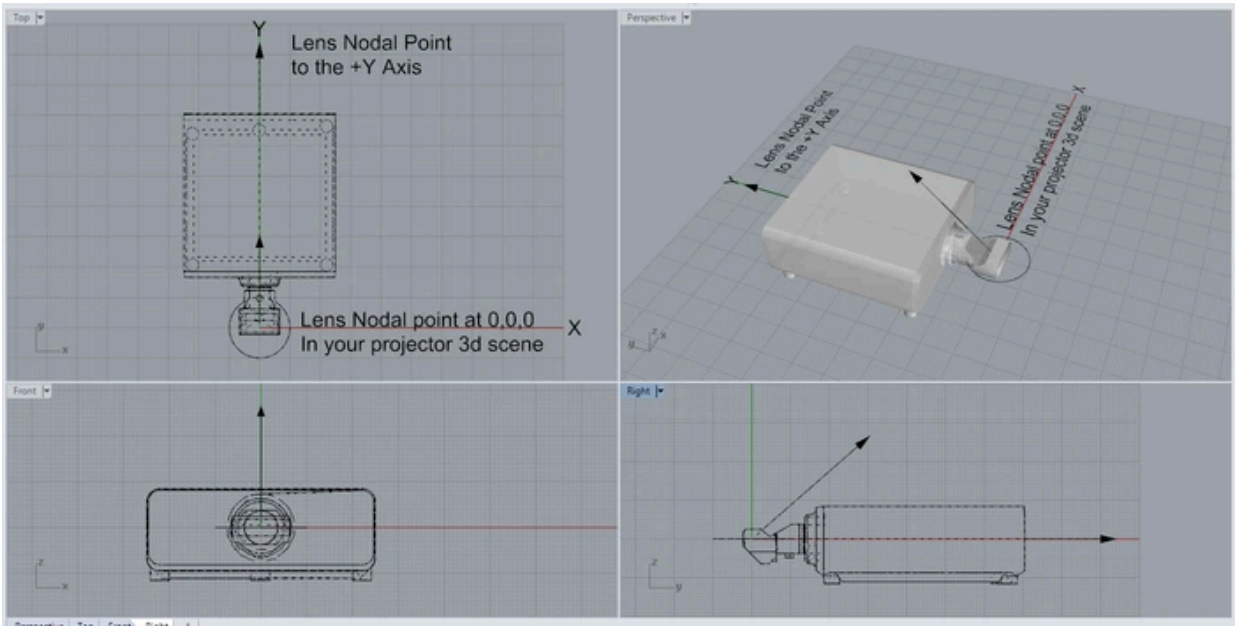
The Reverse Mirror type

> **Warning**
>
> You can design your Projector's mesh in another CAD software, and import it. Or you can directly create a basic custom box in Mapping Matter.

Create a single “joint” .OBJ body mesh in any CAD software, following all requirements below.

- Must have the axis Z-up. (Some softwares have Y-up.)
- It MUST be set in millimeters.
- Nodal Point must be at the Center (0, 0, 0) of your .OBJ file.

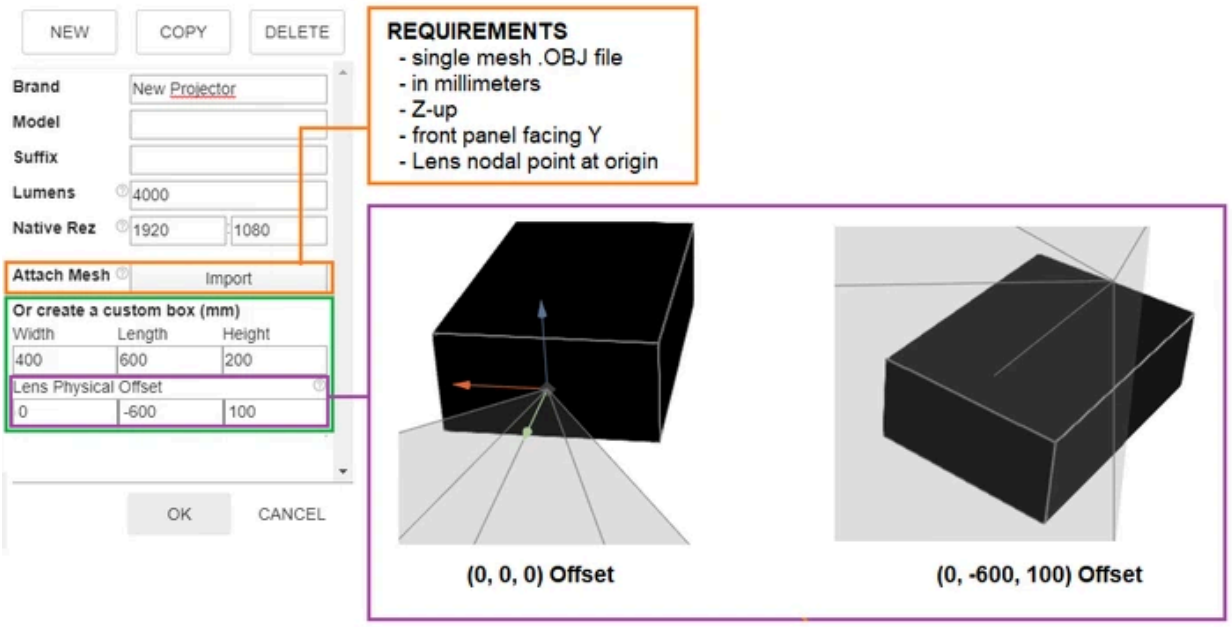
The Projector’s front panel should point towards the +Y axis. Note that the its body may be oriented however you like, it will simply be attached to the Light Beam in Mapping Matter.



Create a Projector in Mapping Matter.

> **Tip**
>
> Click here to learn how to manage your Projector Library.

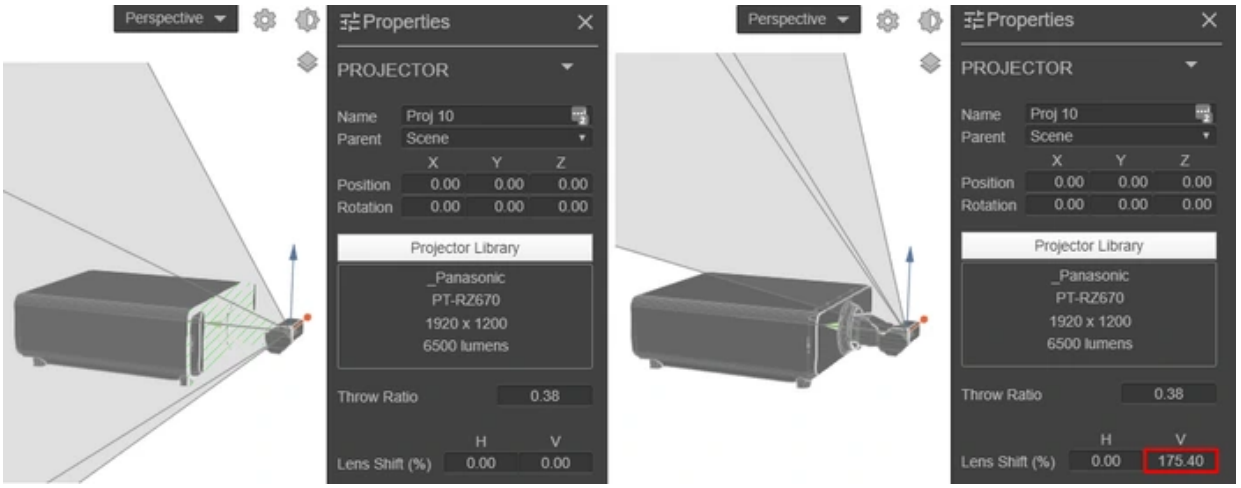
TOP MENU > Projectors > Projector



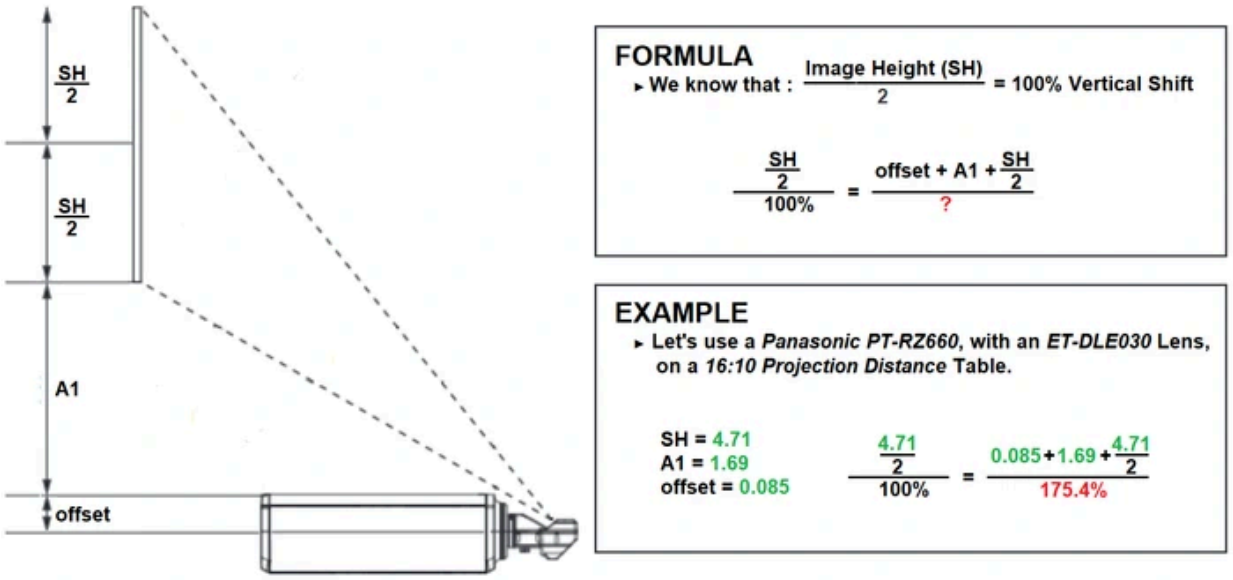
If you have any issue with your imported mesh, first make sure you followed the requirements above. Otherwise, you may have to Optimize your mesh pre-import.

You'll need to refresh your Browser for all updates to appear in your Scene and the Projector Library.

- Set the Throw Ratio according to the Manufacturer's specs.
- Adjust the Vertical Lens Shift. (Go to the **Properties** panel.)



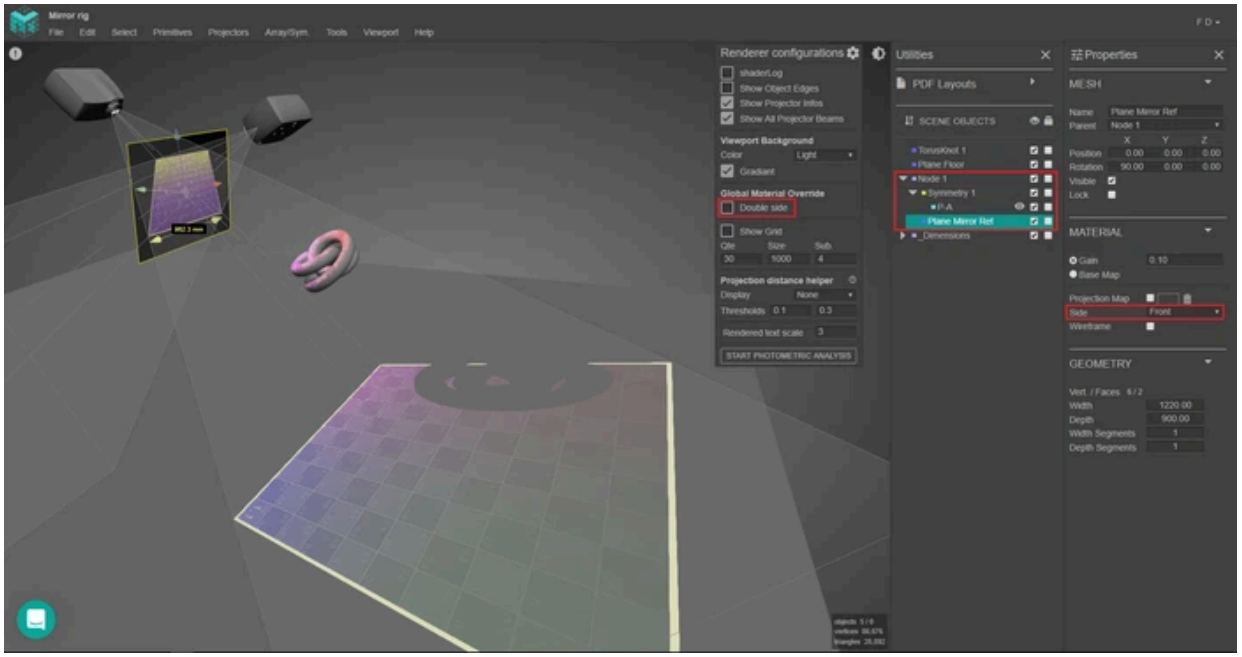
You can calculate the default (or "native") Vertical Lens Shift, using information that you will find in the Manufacturer's specs.



> **Tip**
>
> Learn how to use the Dimension Tool for your measurements.

Fake Mirror (Mirror Bounce)

There's no Mirror feature in Mapping Matter. But there's an easy workaround to achieve an identical result.



Make sure Global Material Override is disabled in the Viewport Settings panel.

Create a **Node** Primitive.

This will top the *Hierarchy* for all Objects of the Mirror setup, allowing you to move / rotate it all easily.

- Create a Symmetry, as a **Child of the Node**.
- Create a **Plane Primitive**, to simulate the Mirror itself. Make is a **Child of the Node**. And set its Side (MATERIAL) parameter to **Front**.
- Create a Projector. Make it a *Child* of the *Symmetry*. Adjust its Position / Orientation so it hits the Mirror from its Front side.

Pixel Resolution for Pixel

This may help you obtain your Full Projection's Resolution.

> **Warning**
>
> This method won't be as accurate as if calculated in a software like Autocad.

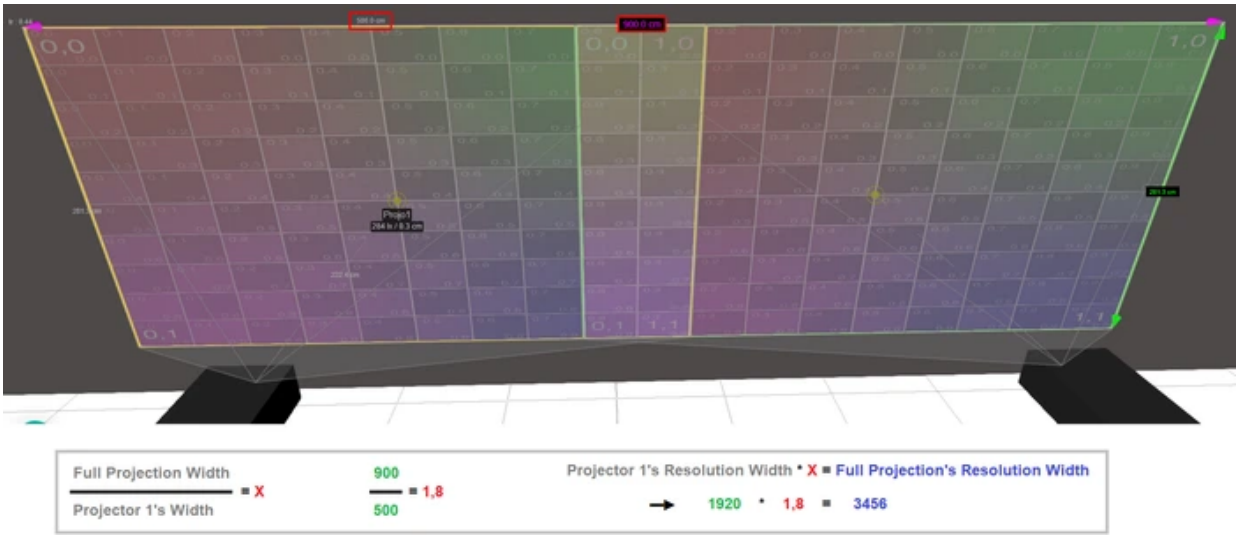
1. Use the Dimension Tool to measure the full area of Projection (Height & Width).

> **Tip**
>
> In the **Snap** toolbox, uncheck both **Bounding Box** and **Vertex** to get the Red Dot, which appears at any intersection between a Surface and your Cursor.

2. Check your Projector's Resolution, and solve the following equation.

Let's illustrate that with two 1920x1080 Projectors, on a 20% blending.

We'll find a Full Projection Resolution of 3456*1080 pixels.



Space Mouse

We don't support Space Mouses.

Shortcuts

Press **?** to display the full list of shortcuts.

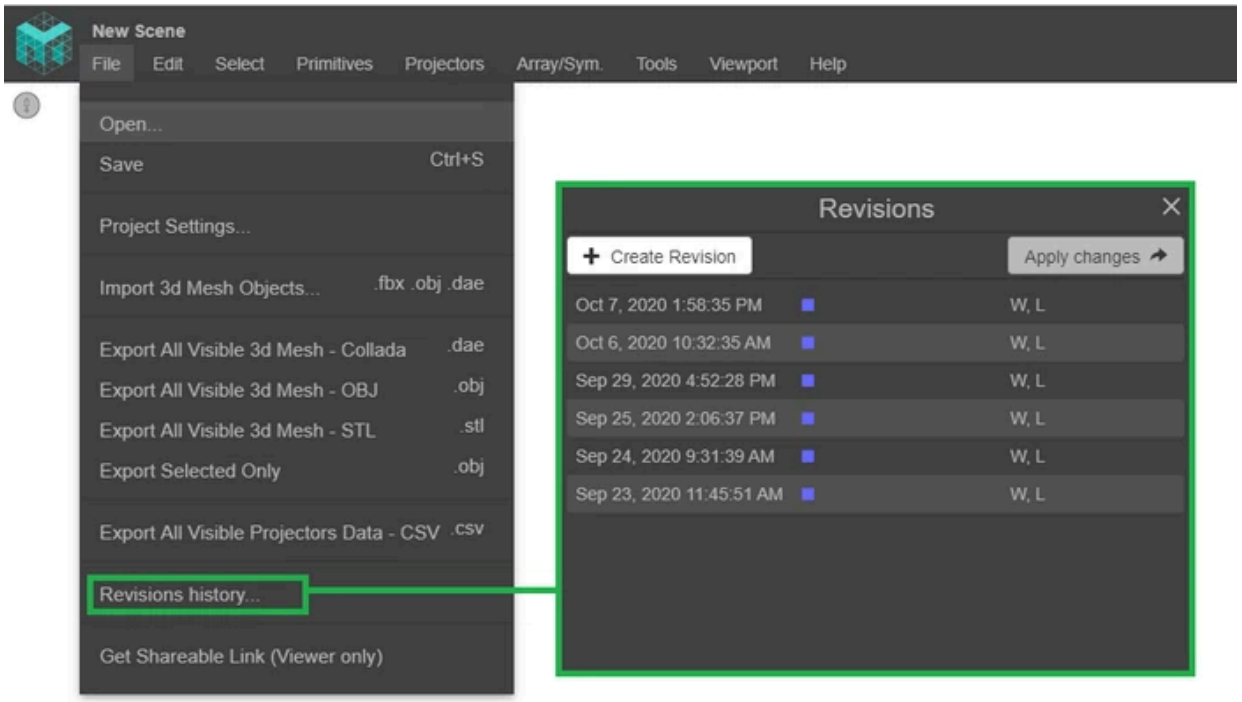
?	Show / hide this help menu
space	Videos - Play/Pause
h	Videos - Restart
f	Videos - Forward 10 sec.
b	Videos - Backward 10 sec.
a	Annotations
t	Dimensions
del	Delete selected object
ctrl + z	Undo
ctrl + ⇧ + z	Redo

ctrl + c	Copy
ctrl + v	Paste
ctrl + ⇧ + v	Paste
m	Transforms - Translate
r	Transforms - Rotate
ctrl + s	Save
c 1	Camera - Front
c 2	Camera - Bottom
c 4	Camera - Left
c 5	Camera - Perspective

Undo and Revisions History

You can Undo (**ctrl+Z**) or Redo (**ctrl+shift+Z)** any action by going to TOP MENU > Edit.

You can also use **Revisions History** to access the 10 last times you opened or refreshed your Scene.

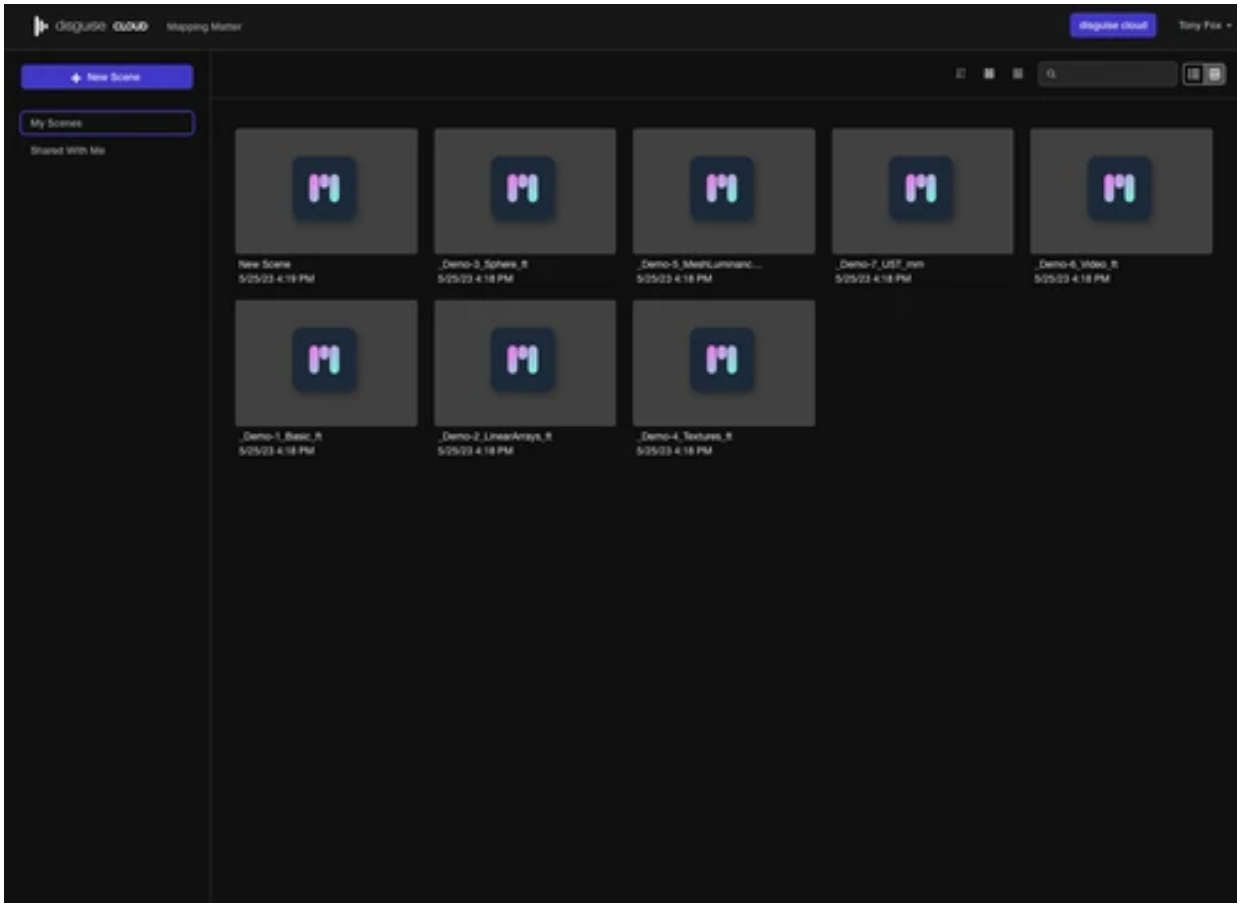


Getting Started (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Home Page

- Here you can create / open / rename / duplicate / delete any Scene.
- You can change the display of all Scenes from Grid to List.
- You can sort them alphabetically / most recently used / by creation date.

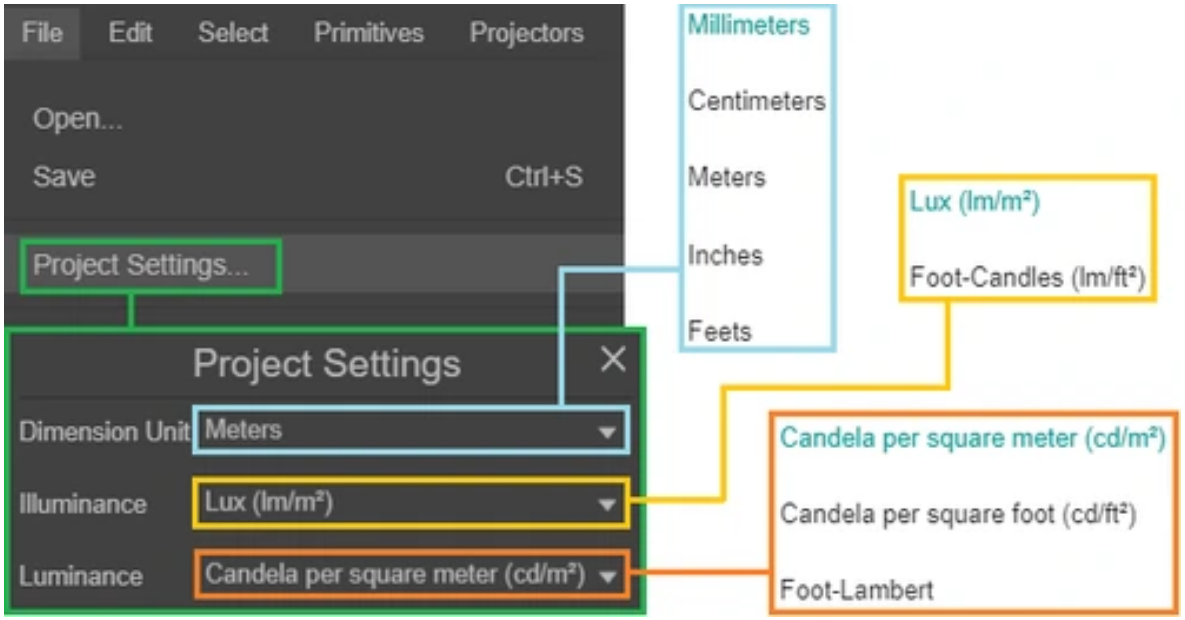


Mapping Matter

Base Units of Measurement

You first need to open a Scene. And then just navigate to :

TOP MENU > File > Project Settings...



Base units

Import a 3D Asset

We support .FBX(binary) very well, while .OBJ and .DAE work just fine. The maximum asset size is 100MB; you can load bigger assets but only locally.

> ⚠ **Warning**
>
> Mapping Matter is not primarily designed for performance. If you work with very heavy / complex 3D Assets, we strongly recommend to optimize your files before import. Otherwise, the Browser may crash (especially for computers with a small GPU).

Here's an article about pre-import 3D Asset Optimization.

Import a 3D Asset into your Scene

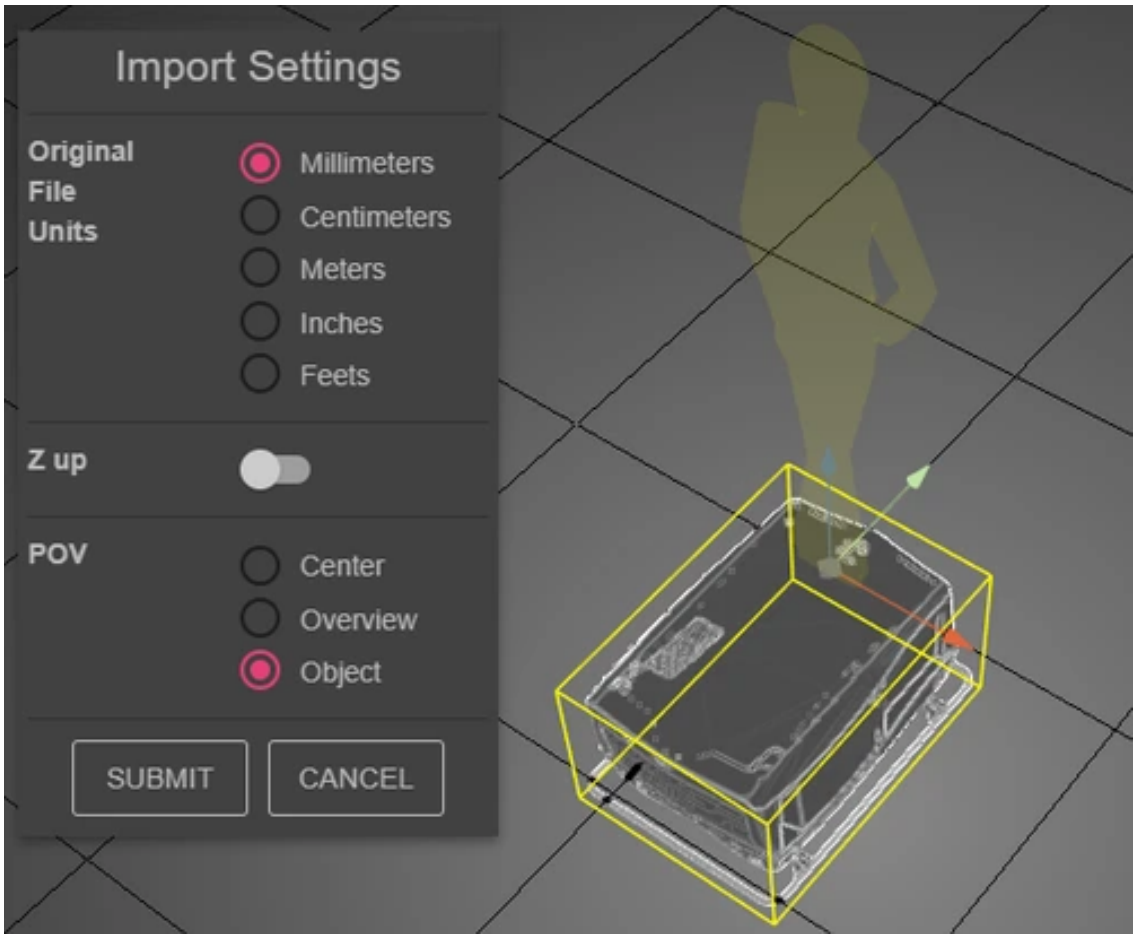
TOP MENU : File > Import 3D mesh Objects

This will give you access to the 3D Assets Library.

Double-click on any file to import it in your Scene.

The first time you import an asset into you Scene, the **Import Settings** window will pop-up.

> **Warning**
>
> For all updates to be effective in your Scene, you'll need to refresh your Browser.



Import 3D yellow shadow

Original File Units = the unit of measurement your 3D mesh was exported in.

Z up = map the imported asset's Y axis to the Scene's Z axis. This basically rotate your asset 90° on the X axis. This option is available because some 3D softwares export meshes with the Y up.

POV = Point Of View = change the camera perspective.

> **Tip**
>
> Do you see the humanoid yellow shadow? It has a 180 cm (5.91 feet) height. This will help get a sense of the Scale in your Scene.

> **Warning**
>
> If you don't see your mesh despite setting the correct original file units, test with bigger units. Sometimes, files are read as if they were smaller.
>
> You can also import it first, and then multiply its scale through its Properties. (See the following section.)

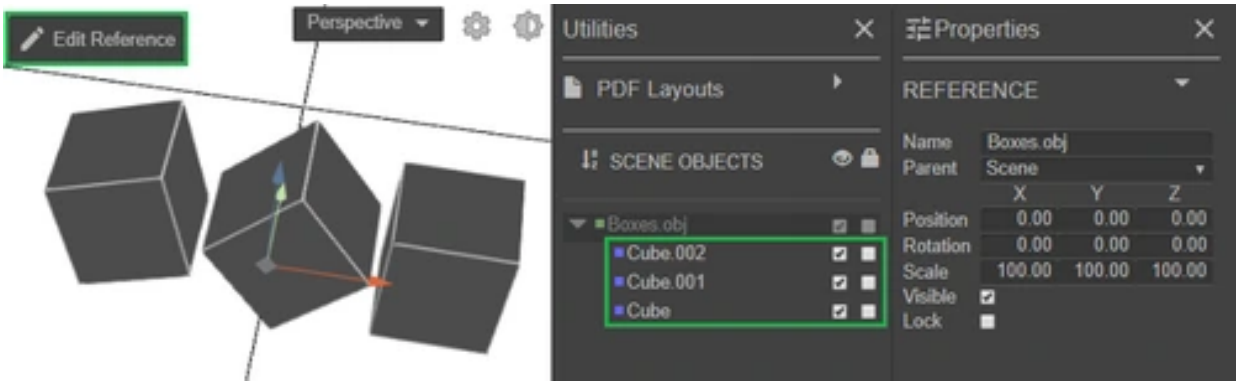
Edit the Properties of an imported 3D mesh Object

The editing parameters available will depend on how the the asset was exported (format, software, etc).

1. Select your Object, go to its **Properties**.



2. Next, navigate to the **Reference** panel.
3. If you have a 3D asset built with different sub-Object meshes, you can edit each of them individually by enabling the **Edit Reference** mode.



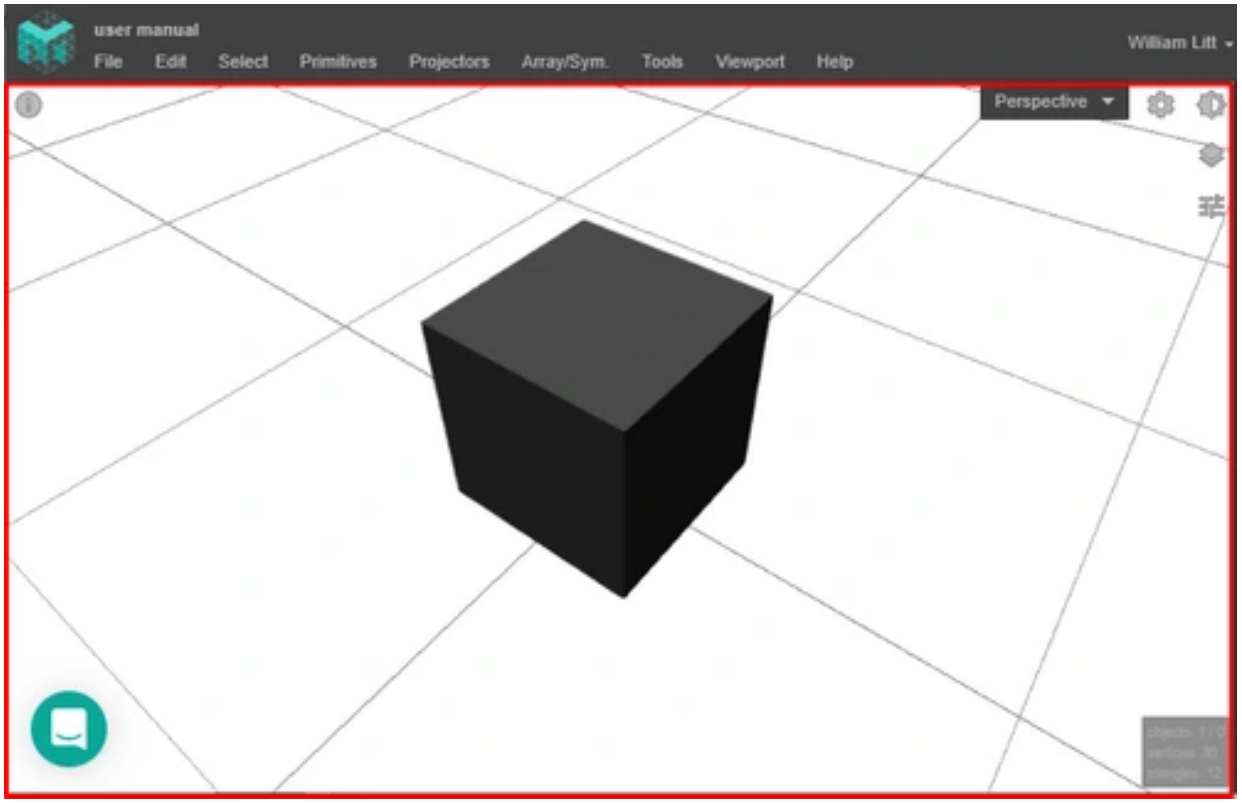
You cannot move / rotate / delete any sub-Object mesh individually, you'll have to import them already all set.

However, you can rename / hide them, and also edit their individual material.

If your mesh had UVs set pre-import, you can re-apply its Texture as a *Base Map*.

Move around the Viewport

The Viewport represents the whole visible area in which your Scene is displayed.



Viewport Overview

Pan

Hold left-click and drag to slide.

[Animated GIF: Pan]

Pan

Orbit

Hold right-click and drag to orbit your cursor. (On Mac: use two fingers while pressing on your touchpad.)

[Animated GIF: Orbit]

Orbit

Zoom-in & out

- Using your scroll wheel.
- Using two fingers on your touchpad.

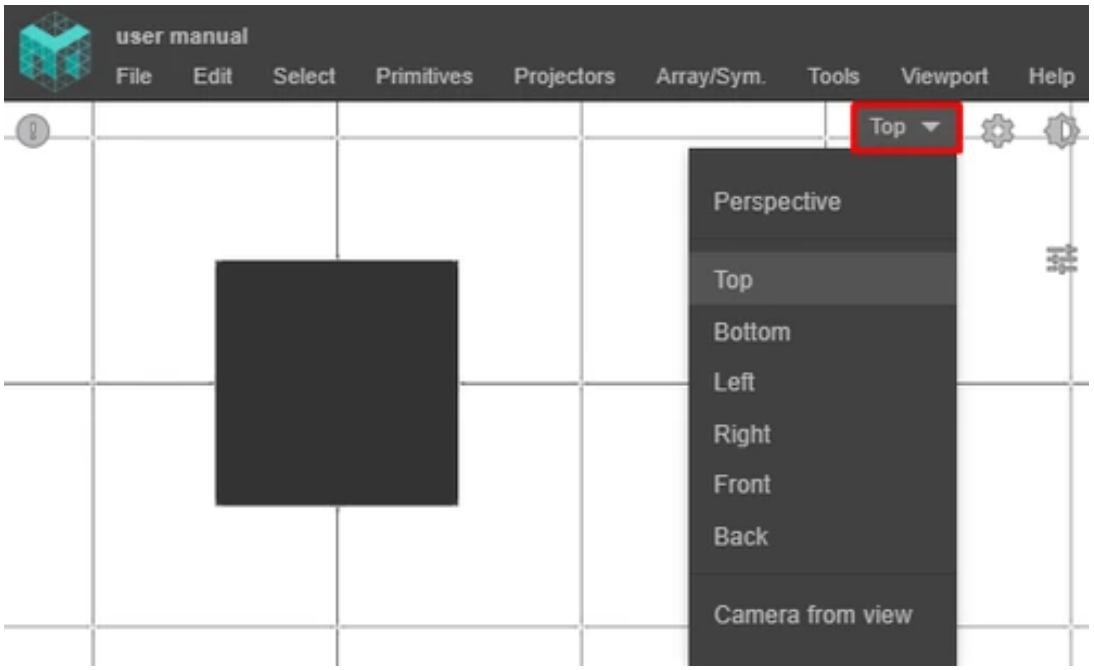
- Zoom-extend by...
  - Double-clicking on the Object's body in the Viewport itself.
  - Or double-clicking on the Object's name in the Scene Objects list.



- Or select your Object, and go to TOP MENU > Viewport > Object Focus

Switch to another Point Of View (POV)

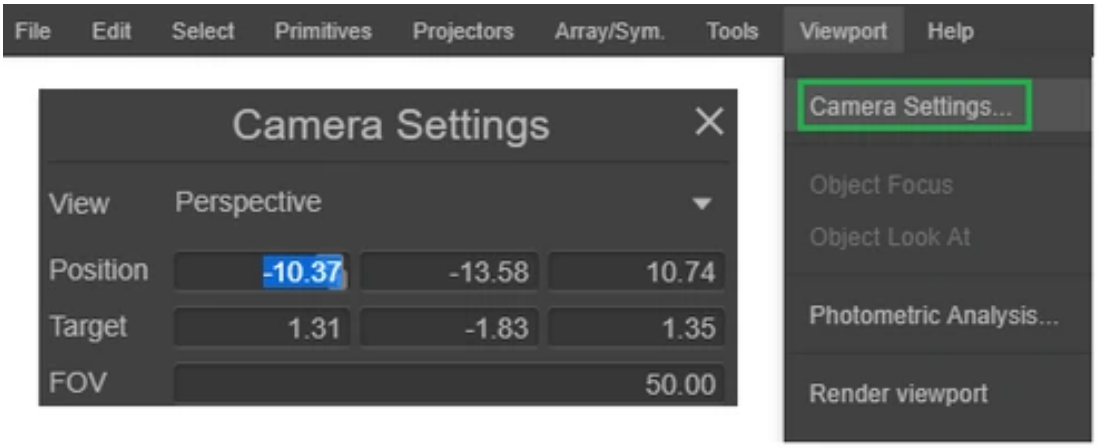
The **Perspective** dropdown menu allows to quickly look through our list of POVs.



Move viewport perspective overview

Camera from view = create a Camera from your current POV. This may come in handy as you may save a specific POV to come back to it later. All new Cameras will appear in the **Scene Objects** panel.

If needed, you can adjust very precisely the Position (and Target Point) of your Perspective POV (or any Orthographic Camera). Just go to **Camera Settings**.



Viewport camera settings

FOV = Zoom-in / out perfectly along the Target axis.

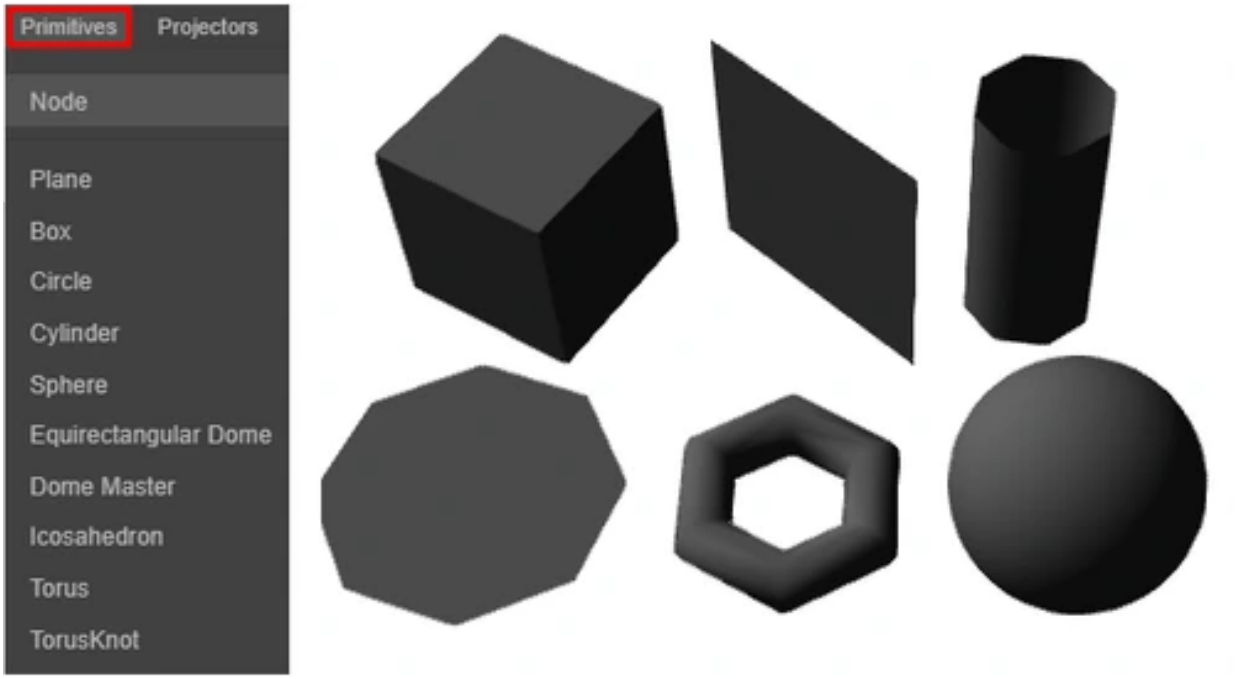
Primitives

Mapping Matter offers a quick & easy way to customize Parametric Objects. No need for advanced 3D skills.

Create a Primitive

Each type of **Primitive** has its own parameters to play with (Width, Height, Depth, Radius, Segments, etc).

TOP MENU > Primitives



Primitives overview

Customize a Primitive

Select it. Go to its **Properties**, and into the **GEOMETRY** section.

EXAMPLE 1: Build a Circular Wall with a Cylinder Primitive

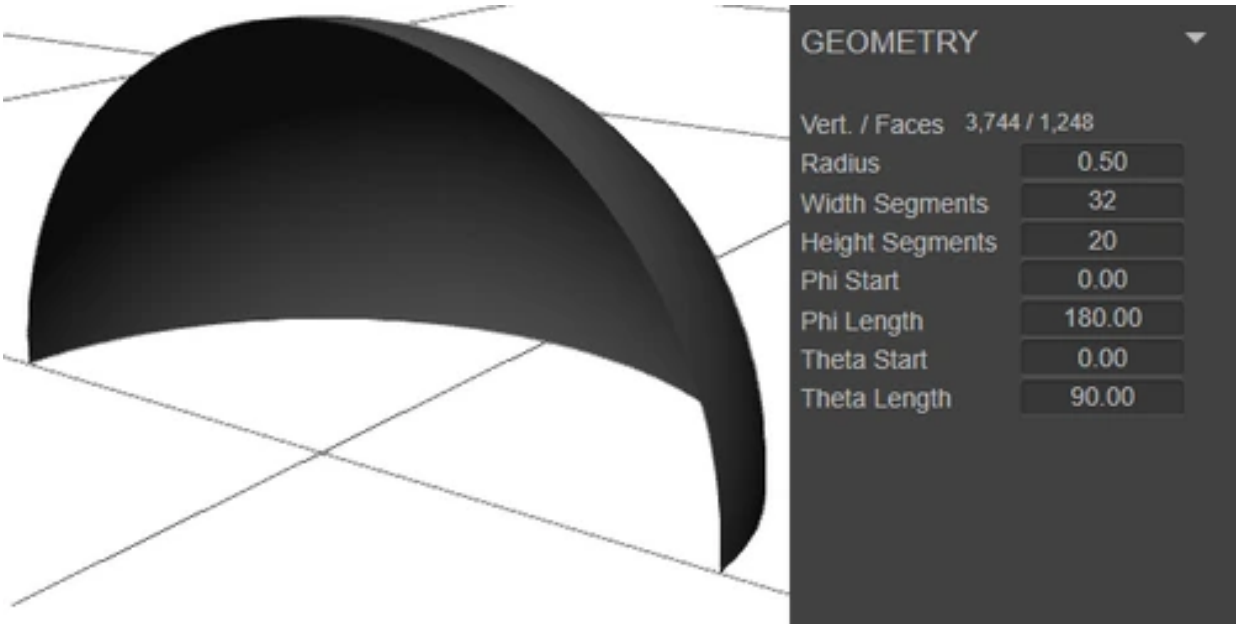
[Animated GIF: Primitive cyclinder circular wall]

Primitive cyclinder circular wall

Segments = higher values increase the resolution of the Primitive.

Theta = the angle of definition.

EXAMPLE 2: Build a semi-Dome with a Sphere Primitive



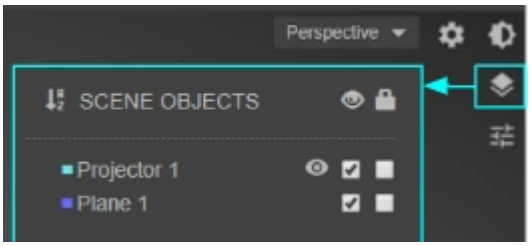
Primitive spheric half dome

Phi & Theta = the angles of definition for a Sphere.

Select / Sort / Rename / Delete / Hide / Lock an Object

Select

When you create an Object in your Scene, it will be listed in the **Scene Objects** panel.



Scene objects list

You can select an Object by clicking on its body in the Viewport, or through the Scene Objects list. Hold **Ctrl** to select many Objects.

> **Tip**
>
> If you have too many Objects in your Scene, try placing a group of Objects as Children of a Primitive Node. Learn about Parent / Child Hierarchy **here**.

Rename an Object

Select your Object in the **Scene Objects** panel.

Open the **Properties** panel, and edit its name in the textbox.

Tip

By default, all Objects will be sorted from A to Z. Click on the Scene Objects headline to sort them from Z to A. Using numbers like 1.1 / 1.2 / etc may come in handy if you have lots of Objects.



Scene objects headline

Delete an Object

Select it. And delete it...

by pressing Delete (PC) or Fn+Delete (Mac) on your keyboard,

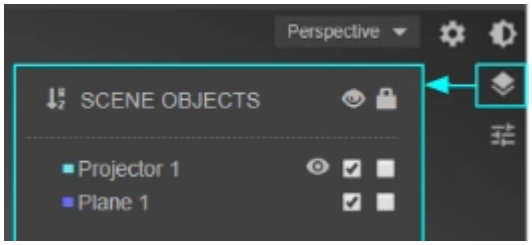
or through TOP MENU > Edit > Delete

Imported 3D Asset's sub-Objects cannot be deleted. However, you can hide them.

Hide / Show any Object of your Scene

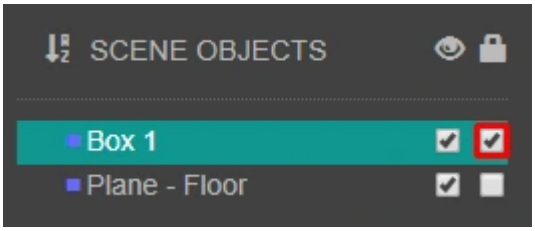
You will find this option in the **Scene Objects** panel.

Tick the box to make it visible.



Lock the properties of any Object in your Scene

Tick the box to lock it.

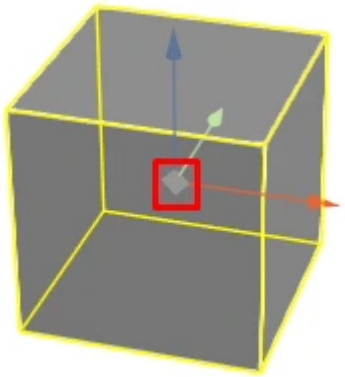


Scene object locked

> **Tip**
>
> Comes in pretty handy when you want to avoid selecting particular Objects while clicking around in the Viewport!

Move (or Duplicate) an Object

An Object's Position will be calculated from its Center Point, which appears as a diamond-shaped indicator.



Centre point

> **Tip**
>
> Hold **Ctrl** while clicking on different Objects to have them selected together. A new common Center Point will be calculated for the whole selection.

If you simply want to duplicate an Object, one way is to copy-paste it.

Select it.

Use Ctrl+C & Ctrl+V to have duplicated in any position.

Or go to TOP MENU > Edit > Clone to have it duplicated in the exact same position.

Using the Movement Gizmo in the Viewport

> **Definition**
>
> **Movement Gizmo** = visual 3D tool allowing you to move an Object in function of 3 axes (X, Y, Z).
>
> Three arrows point out of the Object's Center Point. By default, Red is for the X axis. Green for the Y axis. And Blue for the Z axis.

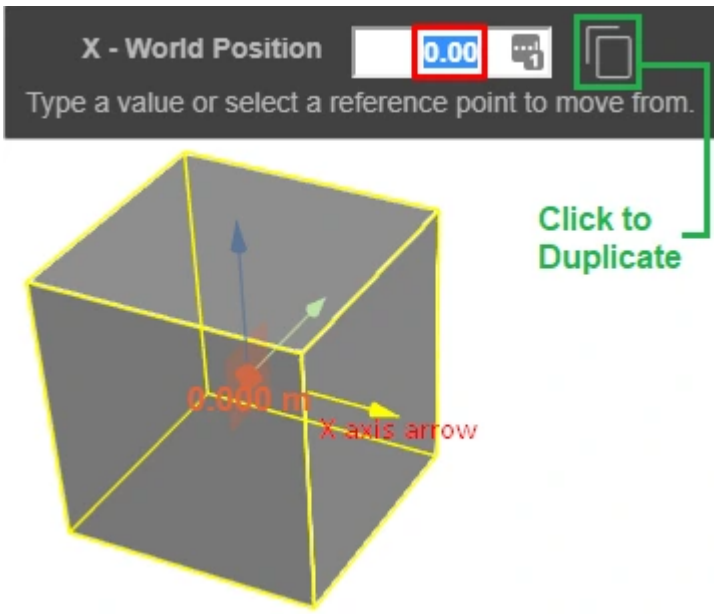
Hold-click on any axis vector and drag your cursor.

[Animated GIF: Move dup object axis]

Move dup object axis

> **Tip**
>
> You can also duplicate your Object by holding **Ctrl** while moving it.

Or click once on any axis vector, type a **World Position** value in the input box, and press **Enter**.



Move duplicate axis value

> **Tip**
>
> You can also move it away from its current position by inputting +X (positively) or +-X (negatively). E.g. to move it by -6 units on a given axis, set +-6 and press **Enter**.

Using coordinates in the properties panel

Hold-click on the input box of any coordinate and drag your cursor.

[Animated GIF: Move duplicate axis drag input box]

Move duplicate axis drag input box

Or type-in a specific value and press **Enter**

Using two reference points

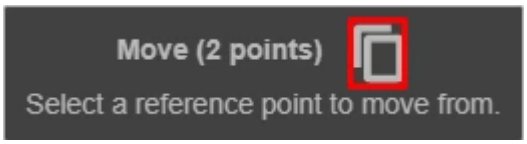
One to move from + one to move to.

[Animated GIF: Move from to - select object]

Move from to - select object

Select an Object, and click on its Center Point.

If you want to duplicate it, just click here.



Move duplicate ref duplicate

Click on a reference point to move from, and then another to move to.

Use the SNAP Tool to select a reference point more accurately in your Scene. This window will pop up automatically.

When neither Bounding Box or Vertex are enabled, the Red dot will appear at any intersection between the surface and your cursor.

[Animated GIF: Scene object locked]

*Scene object locked_*

> **Tip**
>
> You can add a constraint of movement on any given axis. Your Object will move (or be duplicated), but only along the chosen axis.
>
> Select your Object. Click on its Center Point. Click on the axis of constraint. Select a Point to move from, and another to move to.
>
> *[Animated GIF: Move duplicate axis constraint]*
>
> *Move duplicate axis constraint*

Move an Object A in orbit of an Object B

Here's a tutorial on how to set up a Pivot Point.

Rotate an Object

Select an Object. (Or many, holding **Ctrl**)

Press **R** on your keyboard to see the Rotation Gizmo.

Hold-click on any axis curve, and drag your cursor to adjust.

[Animated GIF: Rotate basic]

Rotate basic

Or click once on any axis curve, and type in a specific angle rotation value.



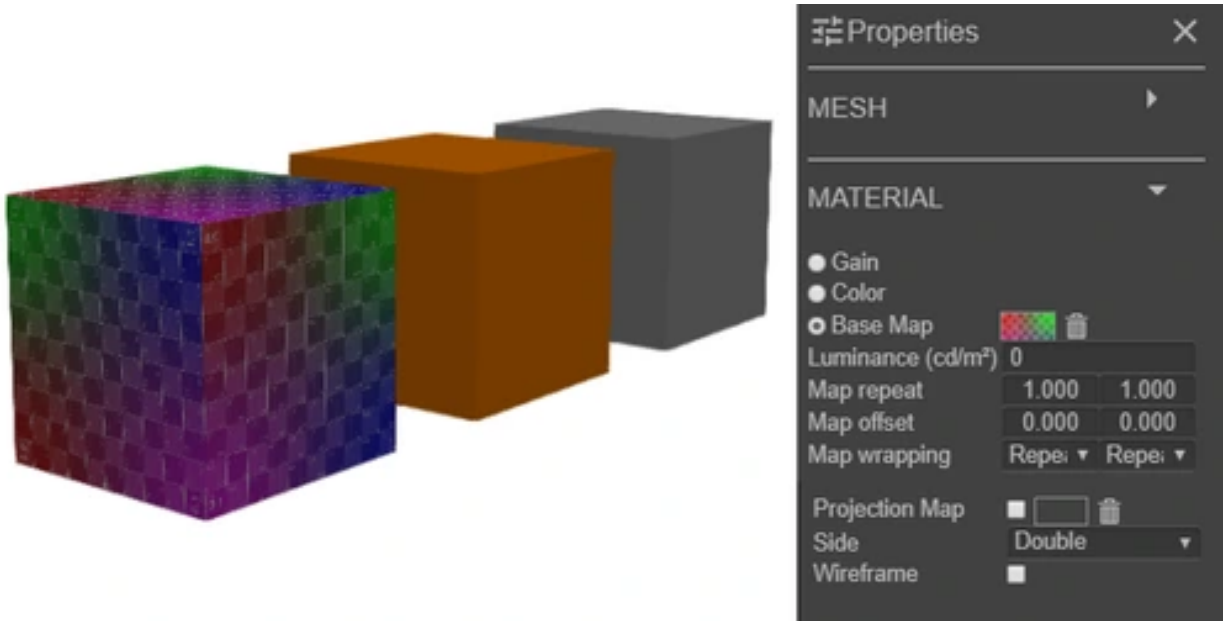
Rotate box"

Press **M** to get back to the Movement Gizmo.

> ⚠ **Warning**
>
> You have to be aware of a potential Gimbal Lock issue.
>
> *[Animated GIF: Rotation gimbal lockt]*
>
> Here is a definition of a Gimbal Lock issue: “When the pitch (green) and yaw (magenta) gimbals become aligned, changes to roll (blue) and yaw apply the same rotation to the airplane.” (Credits)

Material

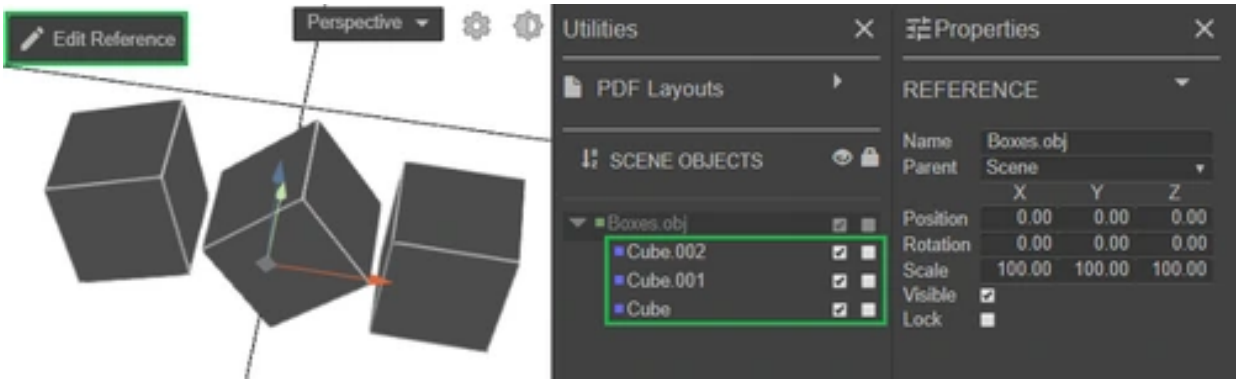
The **Material** of an Object refers to the characteristics of its surface. This has an impact on its appearance, reflectivity, and texture mapping.



Material overview

Select your Object.

You can also select an individual (sub-Object) mesh from an Imported 3D Asset. Just select your Asset, click on **Edit Reference**, and select any mesh in the **Scene Objects** list.



Go to its **Properties**, in the **MATERIAL** section.

Apply Gain

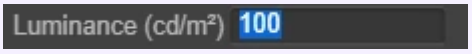
Gain = The gain ratio represents how much light is reflected by any given surface, compared to the light reflected from a standard white (magnesium oxide) board. A ratio of 1.0 will reflect the same amount of light as that of white board. Whereas a gray board with a 0.5 rating would reflect only 50% of the Light falling on.

This has an incidence in the Photometric Analysis mode, on the **Luminance** values

Apply Color

The brighter the selected color, the higher its reflectivity.

This has an incidence in the Photometric Analysis mode, on the **Luminance** values.

> **Tip**
>
> You can also manually adjust the Luminance setting below, to enhance its intrinsic brightness.
>
> Usually best to keep it at 0, unless you want to simulate a Screen / LED wall.
>
> 
>

Apply Base Map

The **Base Map** tool allows you to map (or “wrap”) an Image (or Video) onto the surface of a 3D mesh Object.

> **Warning**
>
> This will only work with **Primitives**, and imported 3D mesh Objects which already had their UVs set. You can set UVs in any good CAD software (e.g. Blender). To learn more, search for tutorials about “UV unwrapping”.

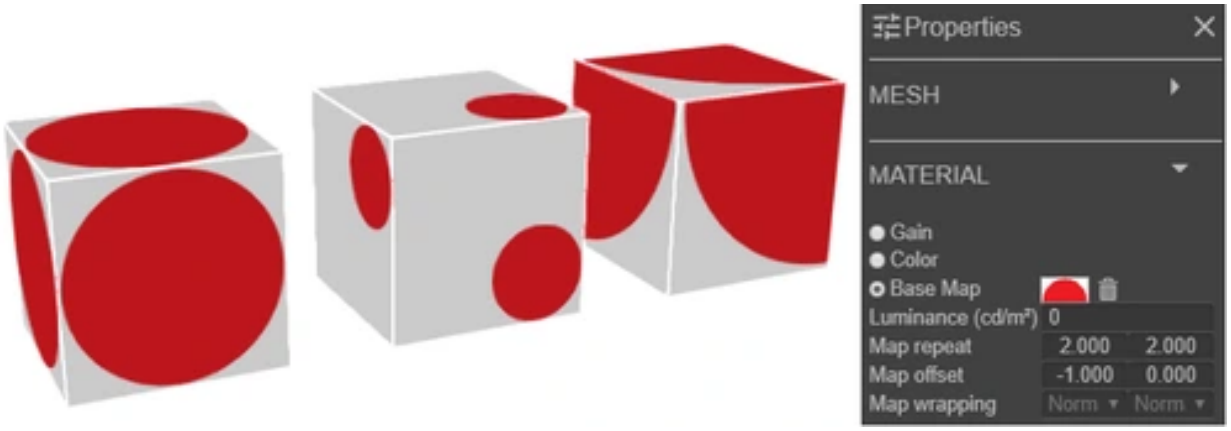
Go to **Base Map** and click in the framebox to open the **Texture Library**.



Material base map open texture

To learn how to use the Texture Library, click here.

Adjust the placement of your Texture with the **Map repeat** and **Map offset** ratios.

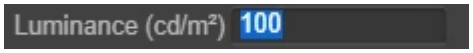


Material repeat offset

After you’ve selected an Image, you can remove it by clicking on the Trash icon.



> **Tip**
>
> You can also manually adjust the **Luminance** setting below, to enhance its intrinsic brightness.
>
> Usually best to keep it at 0, unless you want to simulate a Screen / LED wall.



*Material luminance_*

Apply a Projection Map (Projection Texture)

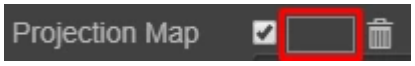
The Projection Map tool allows you to map (or “wrap”) an Image (or Video) onto the surface of a 3D mesh Object.

> ⚠ **Warning**
>
> This will only work with **Primitives**, and imported 3D mesh Objects which already had their UVs set. You can set UVs in any good CAD software (e.g. Blender). To learn more, search for tutorials about “UV unwrapping”.

The **Base Map** represents the intrinsic appearance of an Object.

Whereas the **Projection Map** represents a projected Texture onto the surface of an Object. By default, it won’t be visible in the Viewport. It will have to be “revealed”. Either by a Projector in Reverse Mapping mode, or using the Projection Texture tool.

Go to **Projection Map** and click in the framebox to open the **Texture Library**.



Projection map framebox

To learn how to use the Texture Library, click here

After you’ve selected an Image, you can remove it by clicking on the Trash icon.

Use Side to make it transparent

Warning

First, make sure **Global Material Override** is disabled.

Go to **Viewport Settings**, and tick off the **Double Side** option.

Also note that it will only work with 1-face meshes (e.g. it won’t work with a double wall).

Select an Object. Go to its **Properties**, and to the **MATERIAL** section.

[Animated GIF: Use Side to make it transparent]

*Use Side to make it transparent_*

Back = opacity prevents us to see through the surface.

Front = we can see through the surface.

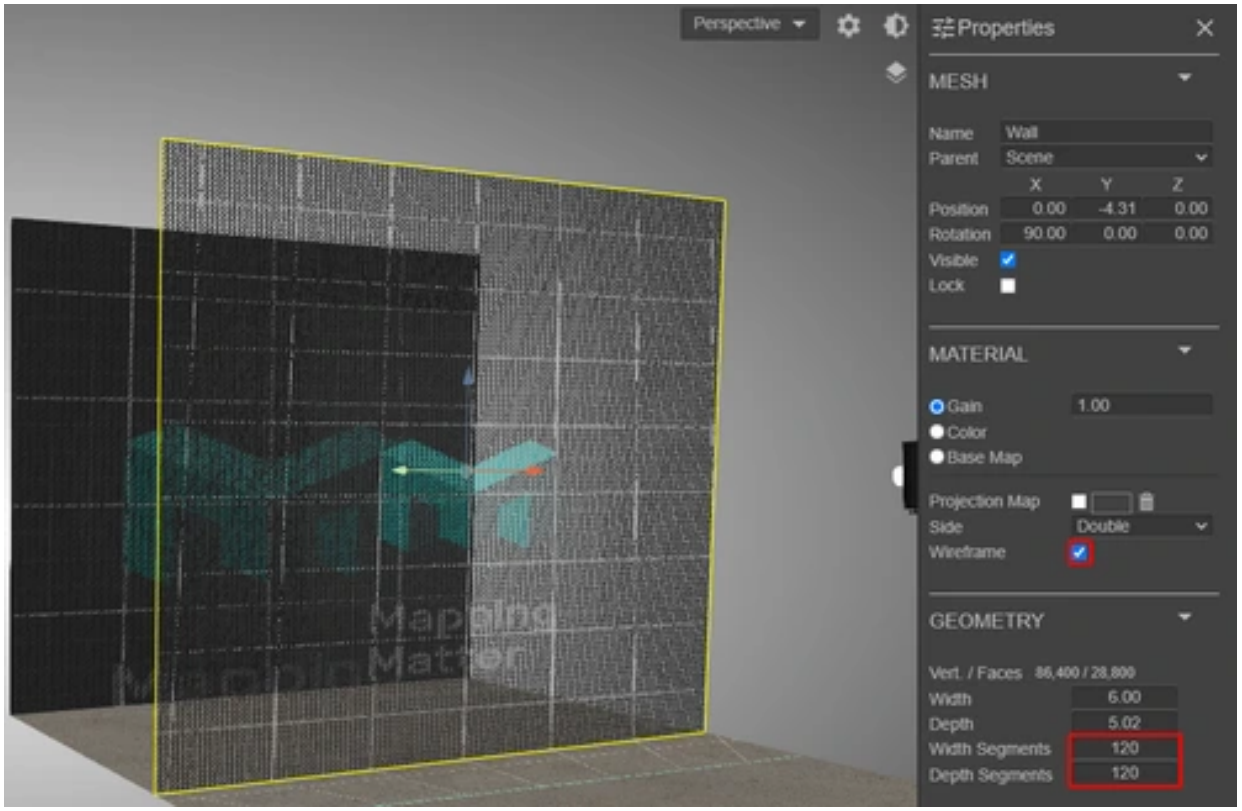
Double = what appears on one side also appears on the other

Use Wireframe to make it transparent

Wireframe =visual representation of a Mesh Object, only showing its vertices

> **Tip**
>
> Use a ***Circle Primitive** as a reference to measure any angle in your Scene, setting **360 Segments** and playing with its **Theta**. You can use the **Snap tool** to easily pin it where needed.
>
> *[Animated GIF: Material wireframe angle]*
>
> *Material wireframe angle*

> **Tip**
>
> You can also use **Wireframe** to create a “Transparent” Gauze / Scrim Material.



Material gauze

Parent Child Hierarchy

[Animated GIF: Parent - child]

Parent - child

The **Position** of an Object is calculated in function of the Center Point of its **Parent** Object.

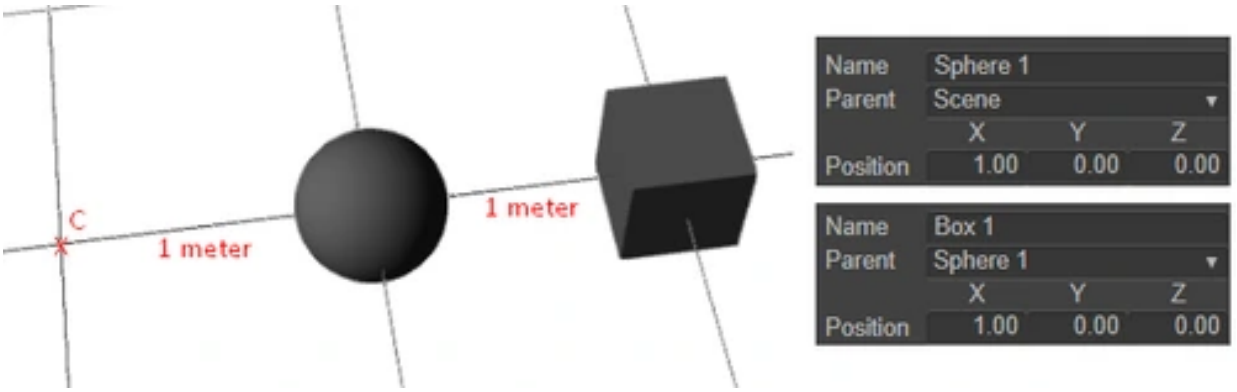
By default, each new Object is the **Child** of the Scene itself.

> **Tip**
>
> Here's how to offset the Center Point of the whole Scene. This may be useful when you're working on an imported Geometry which isn't centered already.

To change the Hierarchy between Objects :

Select your Object, go to its **Properties**, and to the **Parent** dropdown menu.

Illustration



Here both Sphere 1 and Box 1 have the coordinates (X=1, Y=0, Z=0). But Sphere 1 is positioned in function of its **Parent** the Scene (C), 1 meter away on the X axis. And Box 1 is 1 meter away from its Parent Sphere 1.

Arrays and Symmetries

These tools offer an easy, quick, and accurate way of creating large Object / Projector layouts in your Scene.

Definitions

Array = an immaterial Object which duplicates its Children into dummy Clones, either following a linear or a polar sequence.

Symmetry = an immaterial Object which duplicates its Children into dummy Clones, following a symmetric sequence.

Dummy = fake, visual only, not listed in Scene Objects, with no individual Propertie

Create a Linear Array

[Animated GIF: Parent - child hierarchy]

Parent - child hierarchy

TOP MENU : Array/Sym. > Array

The Array will appear as an Object, Child of your Scene, at (0, 0, 0).

Select the Object you want to lay out.

In the **Properties** panel, make the Object a **Child of the Array**.

Customize the Linear Array parameters.

Number = the total amount of Objects in the Array = original + dummies

Separation = the distance between each Object in the Linear Array

Create a Polar Array

[Animated GIF: Parent - child hierarchy]

Parent - child hierarchy

TOP MENU : Array/Sym. > Array Polar

The Array will appear as an Object, Child of your Scene, at (0, 0, 0).

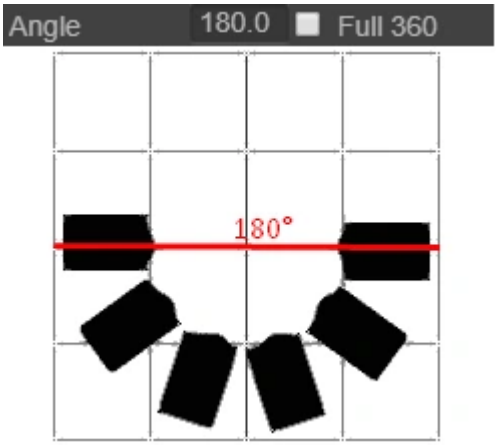
Select the Object you want to lay out.

In the **Properties** panel, make the Object a **Child of the Array**.

Customize the Polar Array parameters.

Number = the total amount of Objects in the Array = original + dummies

Angle = the angle of distribution for all Objects in a Polar Array.



Array polar angle

By default, a Full 360° angle distributes all Objects on a whole circle. But with a 180° input value, the distribution is limited on a 180° angle (half a circle). All Objects are automatically set equidistant to each other.

> **Tip**
>
> Use the Side tool to “see through” any Object in your Scene

Create a Symmetry

[Animated GIF: Array symmetry]

Array symmetry

TOP MENU : Array/Sym. > Symmetry

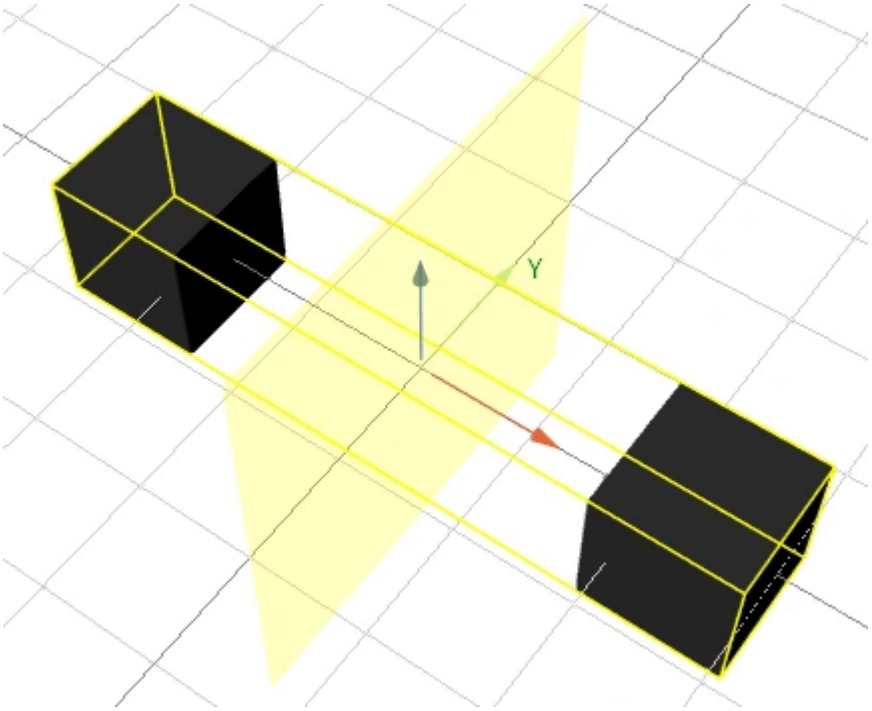
The Symmetry will appear as an Object, Child of your Scene, at (0, 0, 0).

Select the Object you want to lay out.

In the **Properties** panel, make the Object a **Child of the Symmetry**.

Now our Object has a symmetric dummy along the X axis of our Symmetry.

The axis of symmetry is the Y axis. This is illustrated by a transparent yellow plane, which appears when the Symmetry Object is selected.



Array symmetry plane reference

All modifications to our Object will be replicated immediately to its dummy.

> **Tip**
>
> You can also make an Array the Child of a Symmetry, etc.

Convert your dummy Objects into regular Objects

This will allow you to make individual modifications to your ex-dummy Objects.

You'll find each of them in the **Scene Objects** panel.

Select your original Object.

Go to the Properties panel.

In the **Array (or Symmetry)** section, hit the **Bake** command.

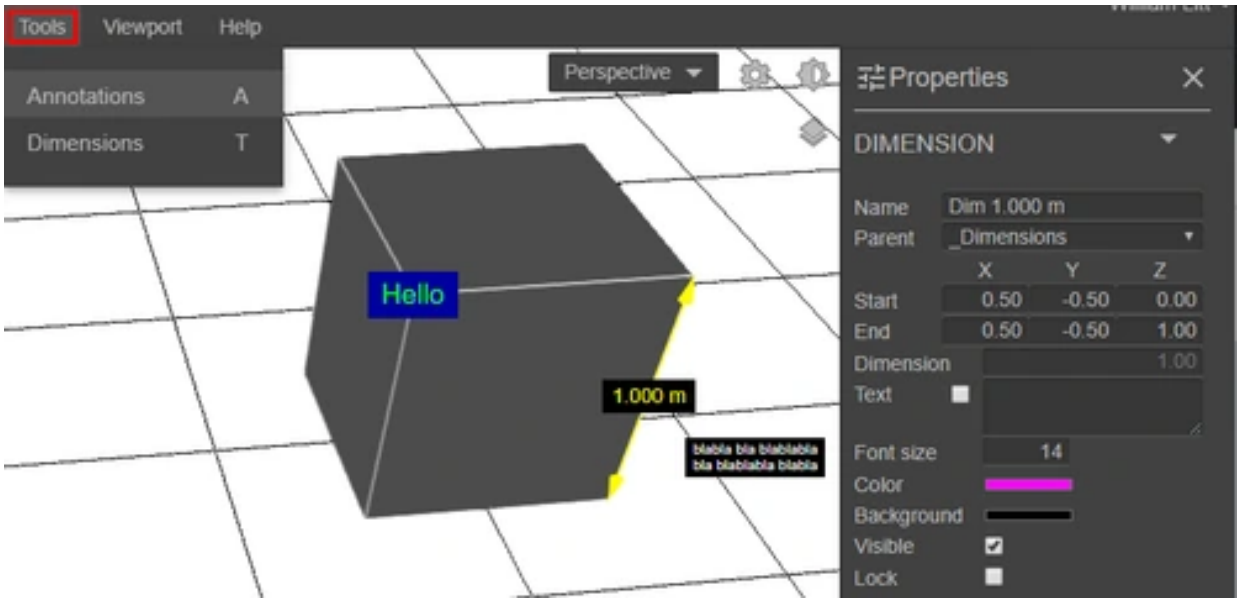


Array symmetry bake

Annotations and Dimensions

The **Annotations** tool allows you to create a bodyless Object holding Text.

While **Dimensions** allows you to create a bodyless Object measuring the distance between two given points the Scene.



Create an Annotation or Dimension Object in your Scene

TOP MENU > Tools

> **Tip**
>
> You can also use the keyboards shortcuts **A** (Annotation) and **T** (Dimension). Press **?** for all keyboard shortcuts.

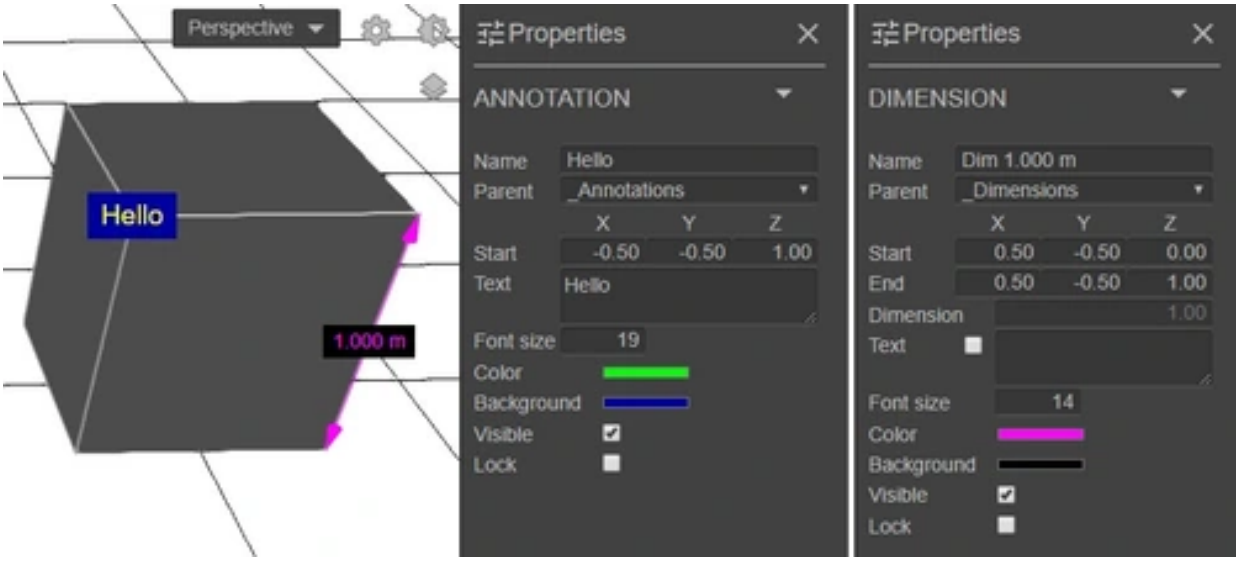
Select 1 or 2 Point(s) in your Scene.

1 Point only for Annotations. And 2 Points, from Start to End, for Dimensions.

> **Tip**
>
> Use the SNAP Tool to select a reference point more accurately in your Scene. This window will pop up automatically.
>
> When neither Bounding Box or Vertex are enabled, the Red dot will appear at any intersection between the surface and your cursor.
>
> *[Animated GIF: Snap tool]*

Edit an Annotation or Dimension

- Select the Object, from the Scene or the **Scene Objects** panel.
- Open the Object's **Properties** panel.

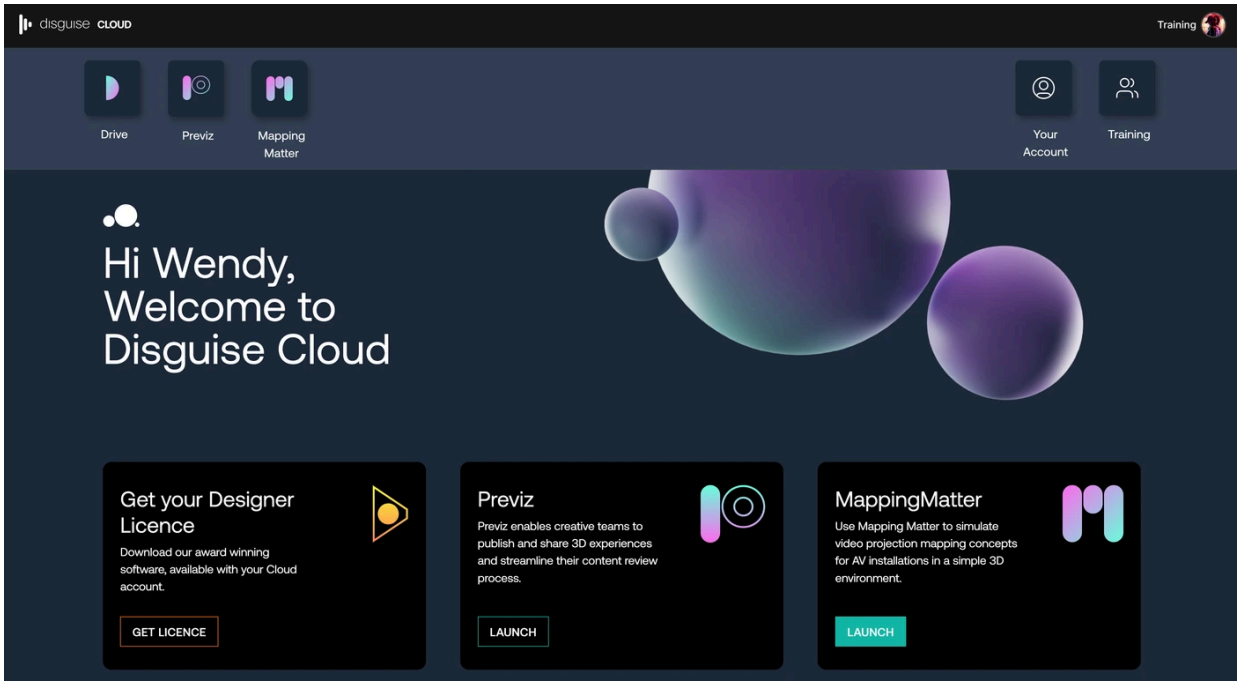


Annotations & dimensions properties

Introduction (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Introduction



How it works

Data

This platform is web-based. Nothing to install / download / update / store. All of our Data is stored on the Amazon Web Services Cloud.

Supported Browser

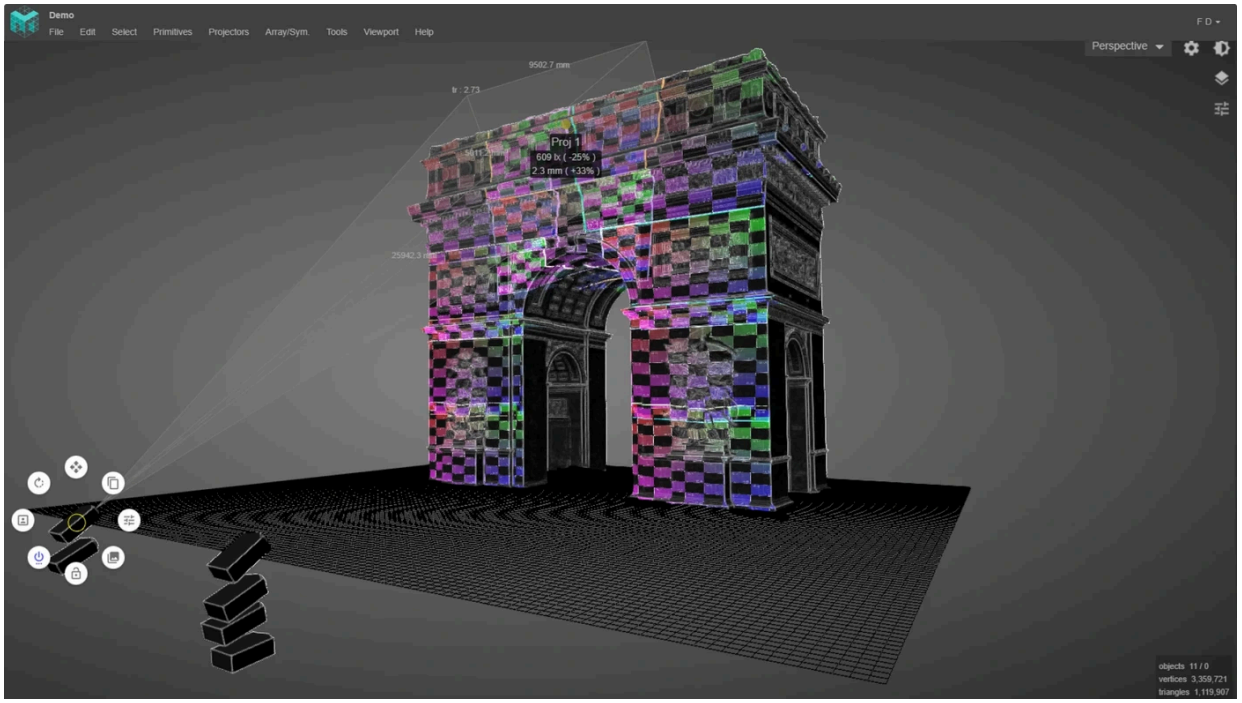
We only support Google Chrome.

OS

The platform works on both Mac and PC.

API

We use WebGL.



Who is Mapping Matter for/not for?

Who is it for?

Mapping Matter is a simulation tool designed for audio visual professionals such as Projectionnists, Technical Designers, Set Designers, Content Creators, Sales Team Members.

It will help them creating Projection Specs and Recommendations for large-scale projects (Shows, Permanent Installations, Building Projection Mapping, etc).

Mapping Matter provides fast, easy, enjoyable and highly comprehensible solutions to:

- Confirm budget estimates,
- Iterate on complex Projector placements,
- Work out Contrast Ratios (Photometric Analysis),
- Preview still Images and small Video clips on 3D Objects,
- See Projection Shadows on the Set,
- Measure Pixel Density (down to a single pixel),
- Share Client / Team Presentations,
- Define Media Server Output needs (with Convergence Simulation).

Who is it not for?

Mapping Matter is not intended for Content Creation and/or Video Playback. However it is possible to preview still Images and small .mp4 Clips on 3D Objects.

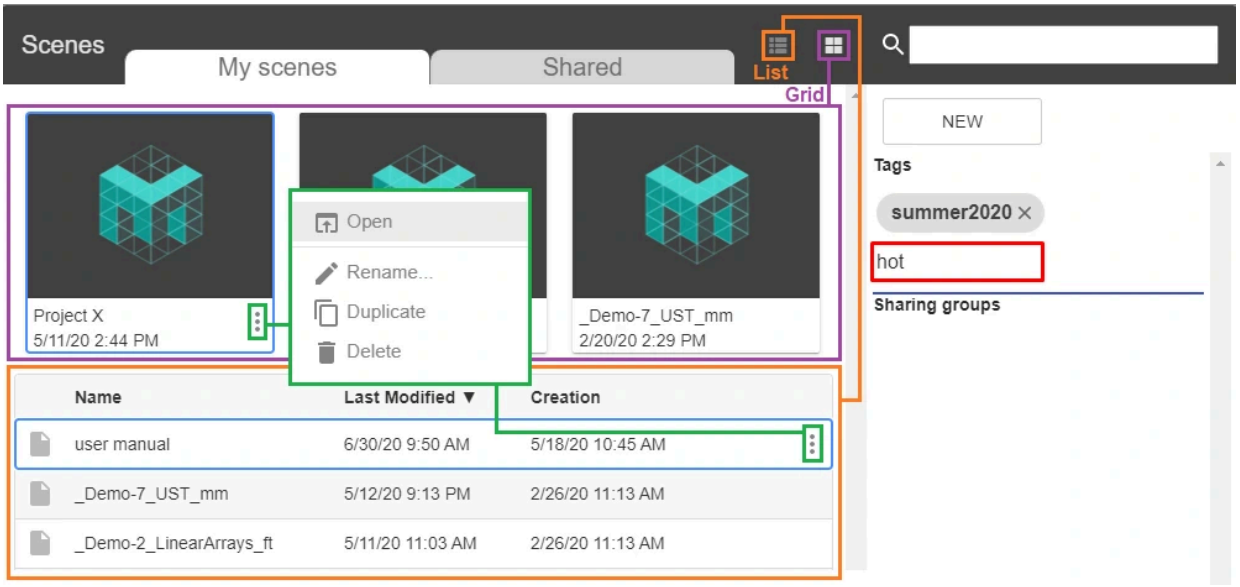
Libraries (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Scene Library

This is where you'll manage all your Scenes. You need to be already inside any Scene to access it:

TOP MENU > File > Open



Here you can create / open / rename / duplicate / delete any Scene.

You can change the display of all Scenes from Grid to List.

You can sort them alphabetically / most recently used / by creation date.

Here's how to Share a Scene.

Click once only on any Scene to select it. Write any Tag and press Enter to save it.

Use Tags not Folders

There are no sub-folders. But you can use Tags to easily organize your Scenes and later find them using the integrated Search engine.

3D Asset Library

This is where you'll manage all the 3D Assets to import into your Scene.

TOP MENU > File > Import 3D mesh Objects

> ⚠ **Warning**
>
> For all updates to be effective in your Scene, you'll need to refresh your Browser.

Select and Import a 3D Asset

To find an asset in the Library, use the Scroll bar or the Search engine.



To import a new file, click on IMPORT NEW.

Supported Formats = the best is .FBX(binary), .OBJ and .DAE work fine.

Meshes = a single asset may contain many meshes. They will be accessible as sub-Objects in the Scene Objects panel.

Max individual asset size = 100MB. You can load a bigger asset but only locally : it won't be saved online, and will need to be re-imported each time you open your Scene. To do so, hold Alt while clicking on Import 3D Mesh Objects.

Storage = all imported files will be stored in the My Assets Library.

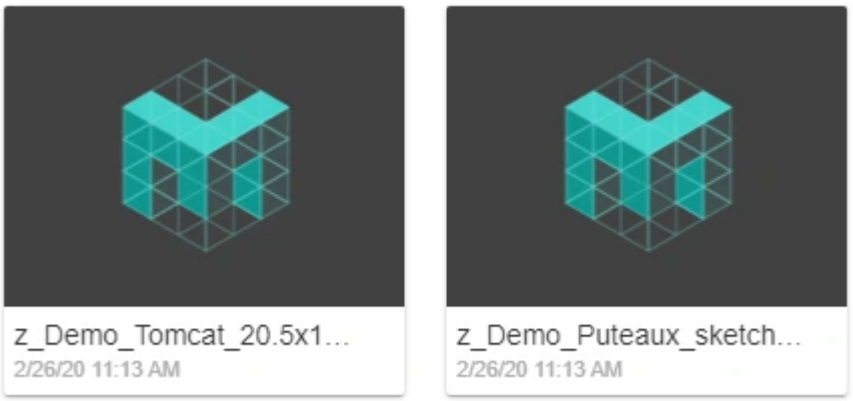
> 🚀 **Tip**
>
> Learn how to share a 3D Asset here.

Organize your 3D Assets

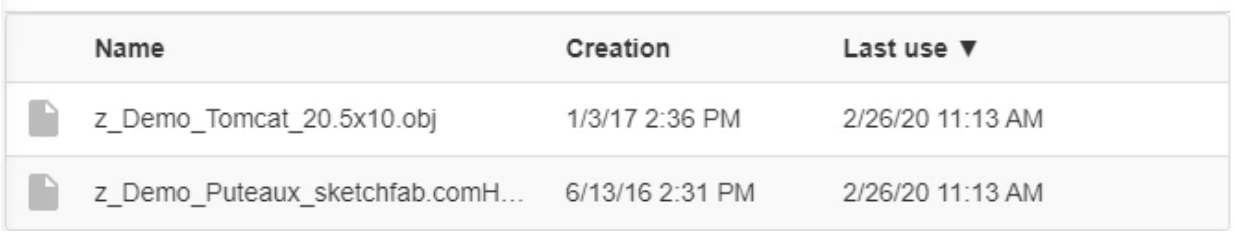
Display Modes: try switching it from Grid to List by clicking there.



Here's what the **Grid Mode** looks :



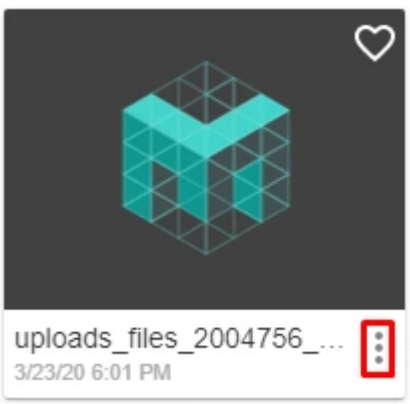
And here's what the **List Mode** looks like :



Name	Creation	Last use ▼
z_Demo_Tomcat_20.5x10.obj	1/3/17 2:36 PM	2/26/20 11:13 AM
z_Demo_Puteaux_sketchfab.comH...	6/13/16 2:31 PM	2/26/20 11:13 AM

Rename / Delete any asset by clicking here.

In the **Grid Mode** :

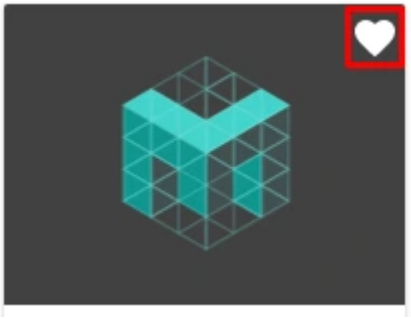


Or in the **List Mode** :



Favorites: click on an asset's Heart symbol to tag it as **Favorite**.

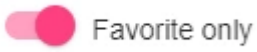
In the **Grid Mode** :



Or in the **List Mode** :



And activate **Favorite Only** to show all tagged assets:



Sort your files.

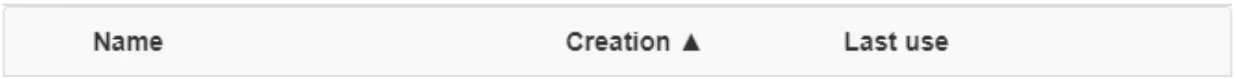
In the **Grid Mode**, by most recently used, or alphabetical order.

Click on the Filter icon.



In the **List Mode** : by date of creation, last used, or alphabetically.

Click on the category title.



3D Asset Optimization

Mapping Matter is not primarily designed for performance. If you work with heavy / complex 3D Assets, we strongly recommend to optimize your files before import. Otherwise, the Browser may crash (especially for computers with small GPU).

Here are a few tips. We'll use Blender, but this is easily transposable to any advanced 3D modeling software.

Delete all unnecessary meshes

In Blender, switch to **Edit Mode** to delete.

Delete all unnecessary vertices

In Blender, go to Edit Mode > Mesh > Clean Up > Delete Loose. Or select & delete them manually.

Merge some (or all) your meshes

Select them, holding Shift. Press Ctrl + J to get them joint.

Export in .FBX(binary) from your 3D software to Mapping Matter

.FBX(binary) will load much faster in Mapping Matter, and often be lighter. .OBJ / .DAE will also work fine.

File Size : max 100mb. Learn here how to upload bigger files (locally only).

Projector Library

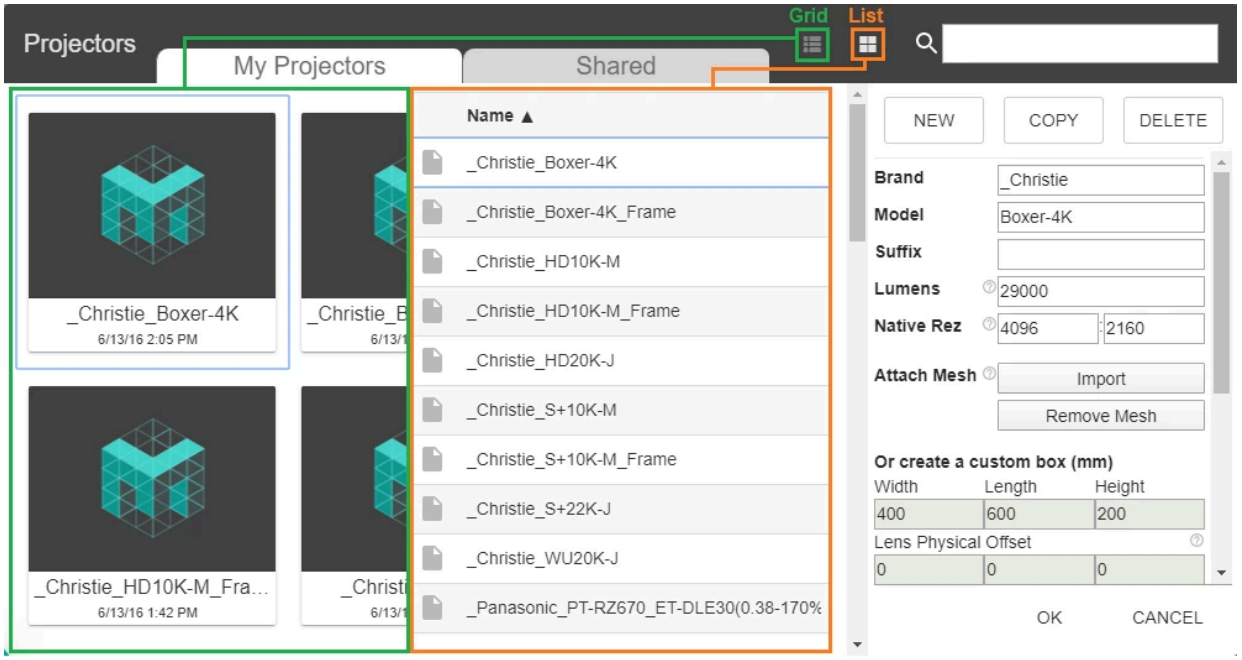
Mapping Matter is not a Projector Database. However, we provide you with a few demo Projectors.

Here you'll learn how to create and manage your own Projector Library.

> ⚠ **Warning**
>
> Refresh your Browser to see Projector Library updates applied in your Scene.

Manage all pre-existing Projectors

TOP MENU : Projectors > Projector



Info

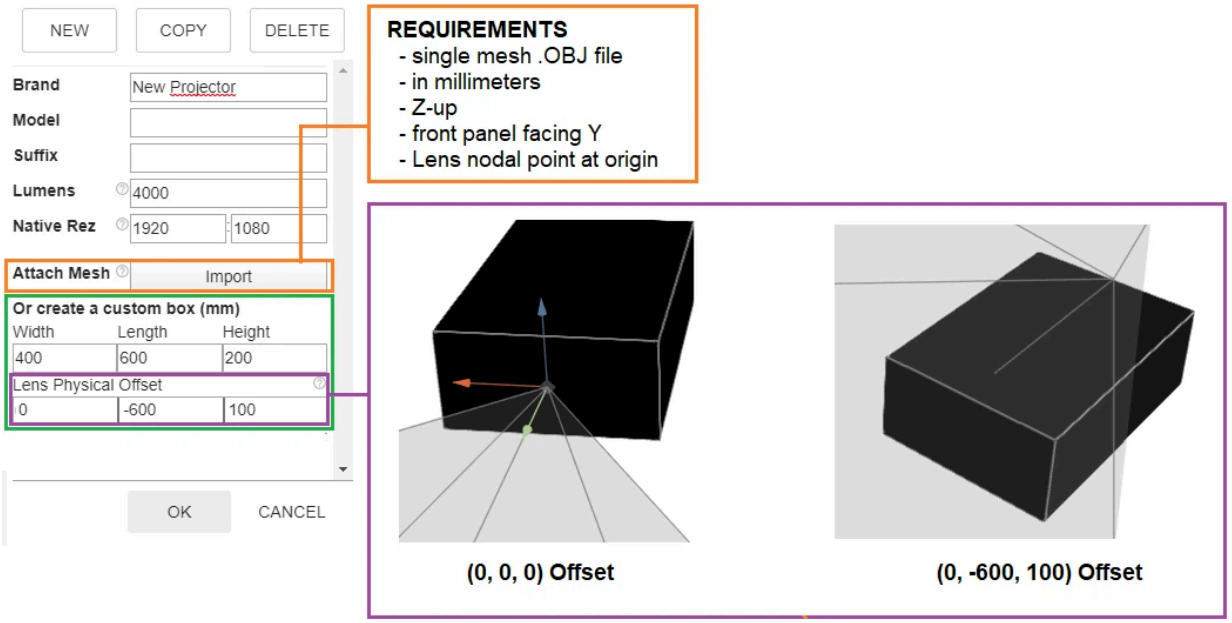
- You can display all Projectors in two modes: **Grid** or **List**.
- Sort them by Name or Creation Date, only in the **List** Display mode.
- Use the Search engine to find Projectors quicker.
- Use Tags to find them quicker in the Search engine.

Add a custom Projector to your Library

TOP MENU : Projectors > Projector

Click on **New**. And define its Specs in the section below.

For the Projector's body, you can either Attach Mesh or Create a custom box.



> **Warning**
>
> If you still don't see your mesh despite exporting it in millimeters, you may have to multiply its scale (before exporting it from your C4D software). Sometimes, the file may be read as way tinier than it is. Try multiplying its scale by 100x or 1000x.

After importing your file, try refreshing your browser and/or clearing your cache.

> **Tip**
>
> For odd Lens configurations (Ultra Short Throw / Mirror), check this article.

Finally, click on OK to create your Projector in the Scene.

Your new Projector and its Specs will be saved in your Projector Library.

Texture Library

The Texture Library contains your collection of Image and Video files.

This will be used to map an Object's *Material*, define a *Projector Image*, or do *Projective Texturing*.

> **Warning**
>
> For all updates to be effective in your Scene, you'll need to refresh your Browser.

Select and Import an Image / Video

To find a file in the Library, use the Scroll bar or the Search engine.



To import a new file, click on **Import New**

Supported Formats = JPEG / WEBP / GIF / PNG / BMP / ICO / MP4 / WEBM / OGG

Maximum file size = 50MB

All imported files will be stored in your Texture Library.

> **Tip**
>
> Learn how to share a Texture here.

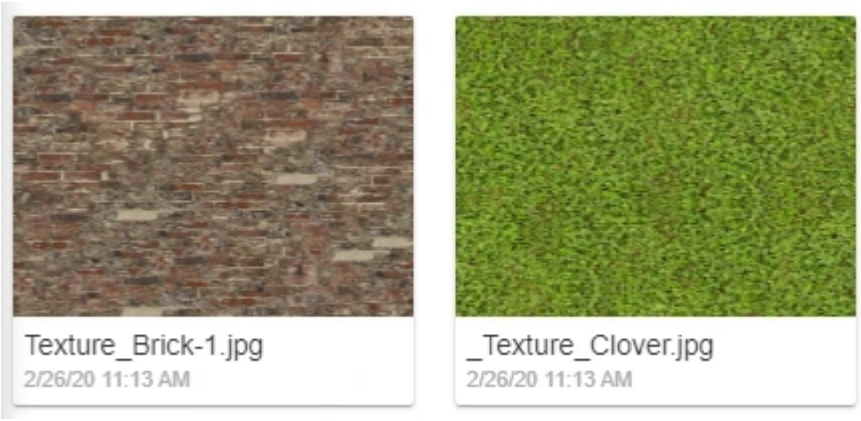
Organize your Texture Library

You can use different tools to organize your Texture Library.

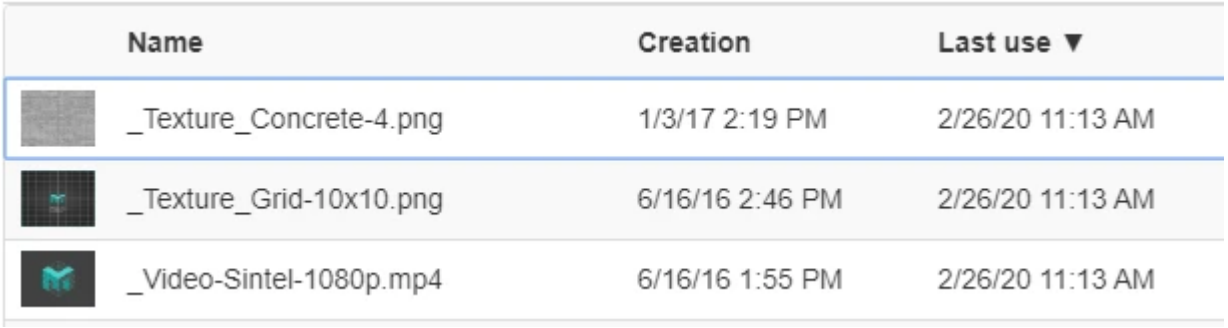
Display Modes: try switching it from **Grid** to **List** by clicking on the corresponding icons.



Here's what the **Grid Mode** looks :

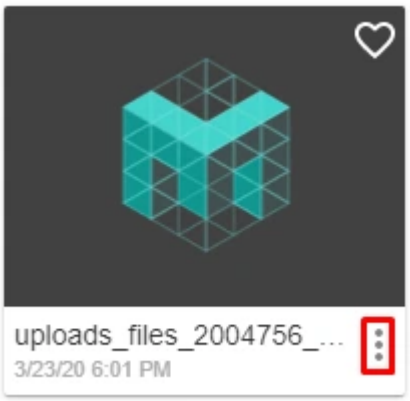


And here's what the **List Mode** looks like :



Rename / Delete

In the **Grid Mode**:

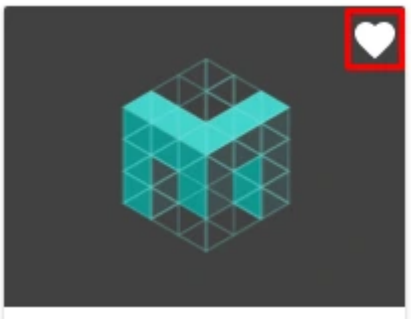


Or in the **List Mode** :



Favorites

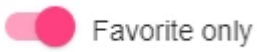
In the **Grid Mode**:



Or in the **List Mode** :

	Name	Creation	Last use ▼
	_Texture_Concrete-4.png	1/3/17 2:19 PM	2/26/20 11:13 AM
	_Texture_Grid-10x10.png	6/16/16 2:46 PM	2/26/20 11:13 AM
	_Video-Sintel-1080p.mp4	6/16/16 1:55 PM	2/26/20 11:13 AM

And activate **Favorite Only** to show all tagged files :



Sort your files.

In the **Grid Mode**, by most recently used, or alphabetical order.

Click on the **Filter** icon.



In the **List Mode** : by date of creation, last used, or alphabetically.

Click on the category title.

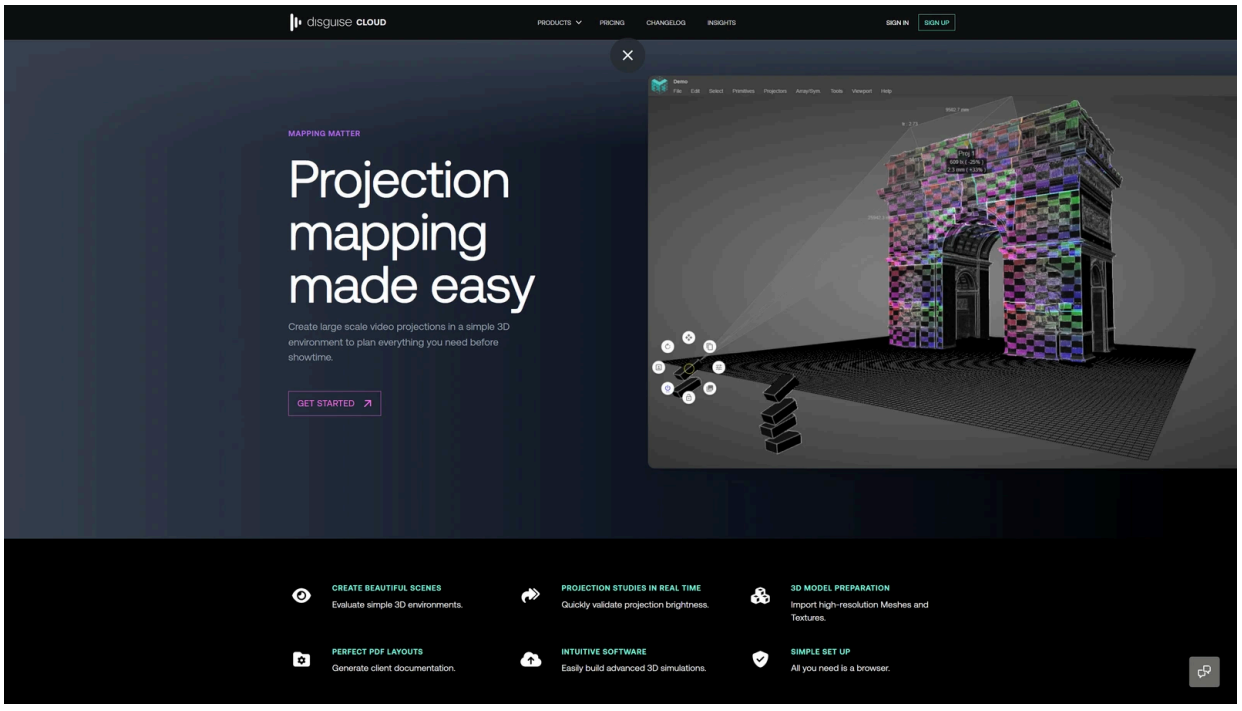
Name	Creation ▲	Last use

My Account (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Profile (User Name, Change Password, Notifications)

You cannot change the e-mail associated with your account. If you need to use a new e-mail, please sign up again.



Subscription

If you want to get (or modify) a Subscription, or obtain any information (e.g. expiry date), please reach out to support@disguise.one.

Print and Export (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

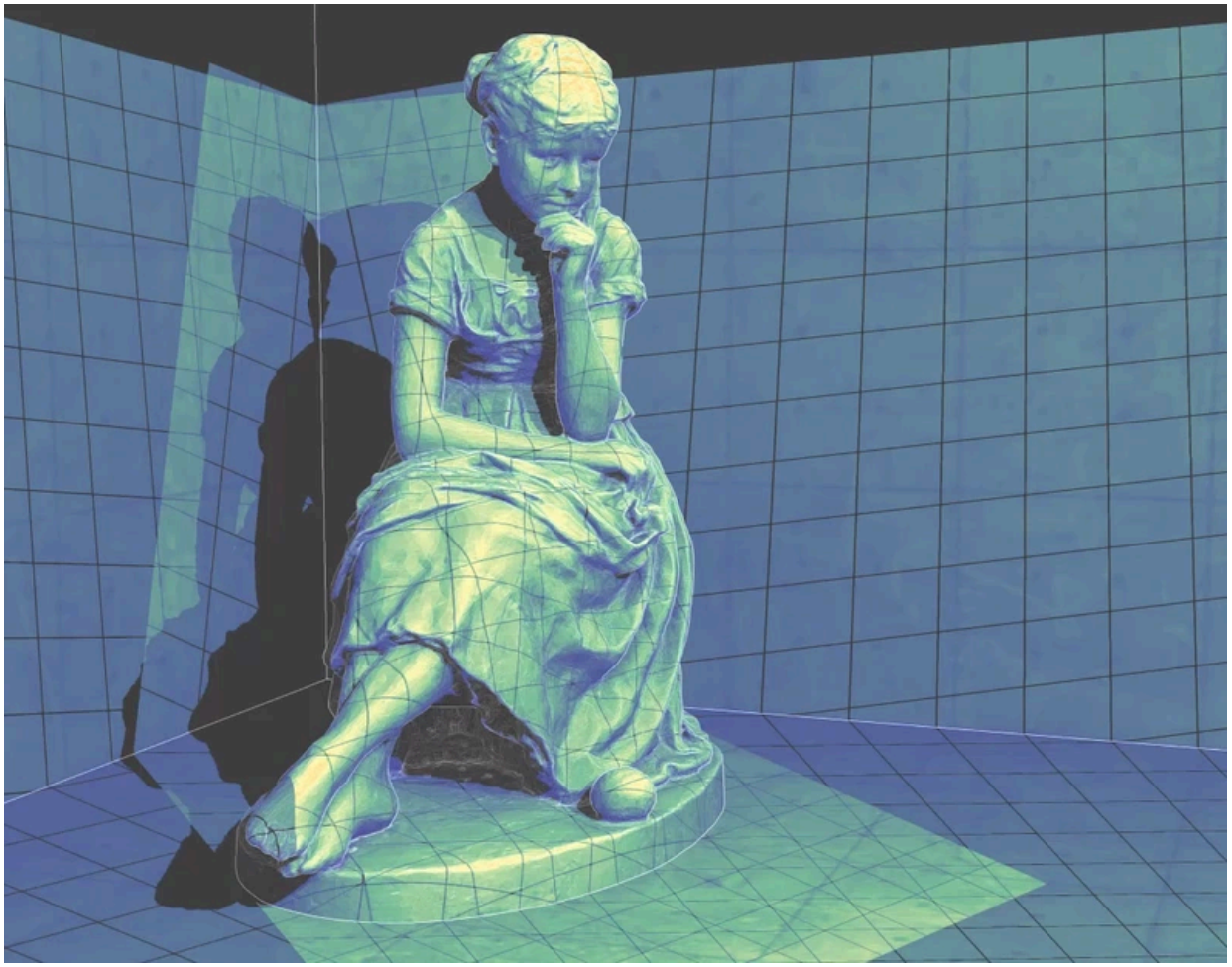
Snapshots / PDF Layouts

Save a Snapshot from your Scene

Adjust your Perspective in the Viewport.

TOP MENU > Viewport > Render Viewport

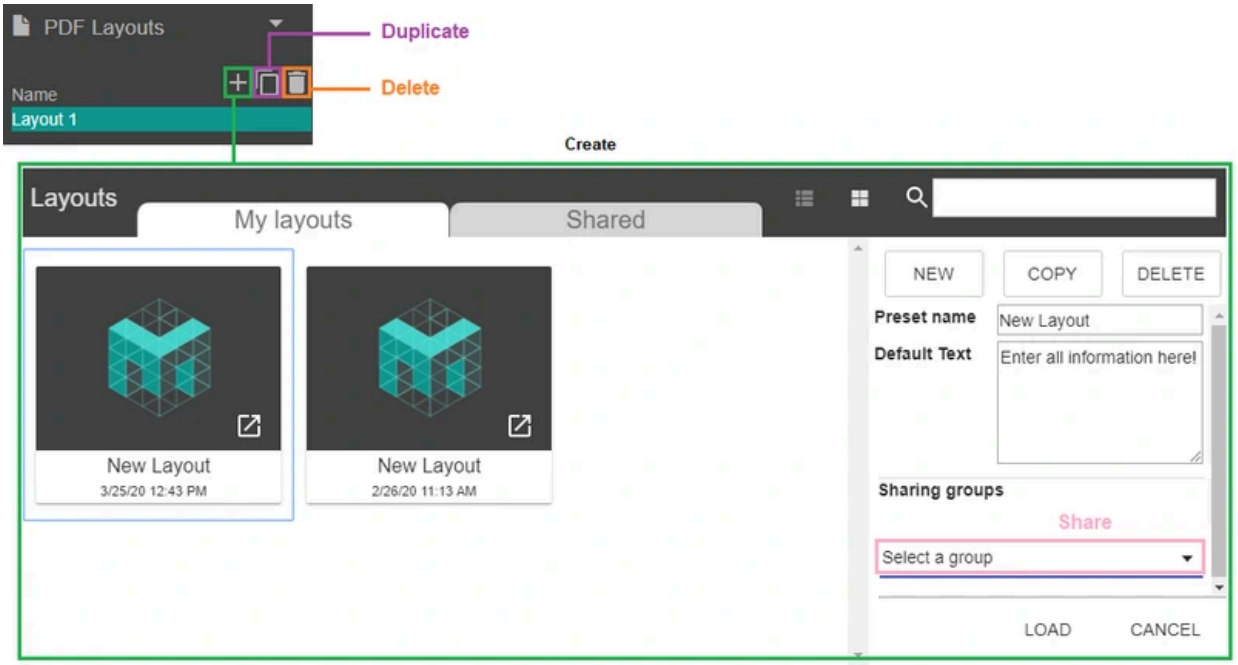
This will save a high resolution .PNG Image of your current *Viewport Perspective*.



Create a PDF Layout (and a Projectors' List)

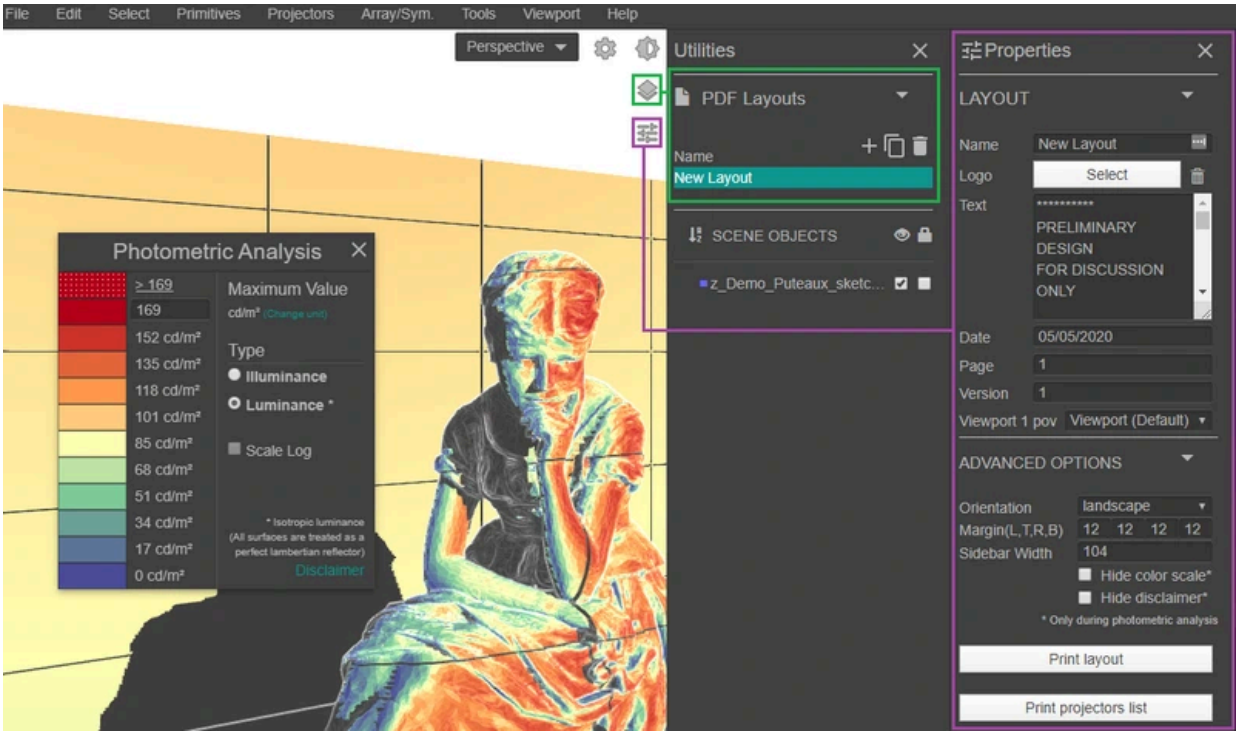
Go to **Scene Objects**, in the **PDF layout** section.

Select a Layout Template, or create a new Template.



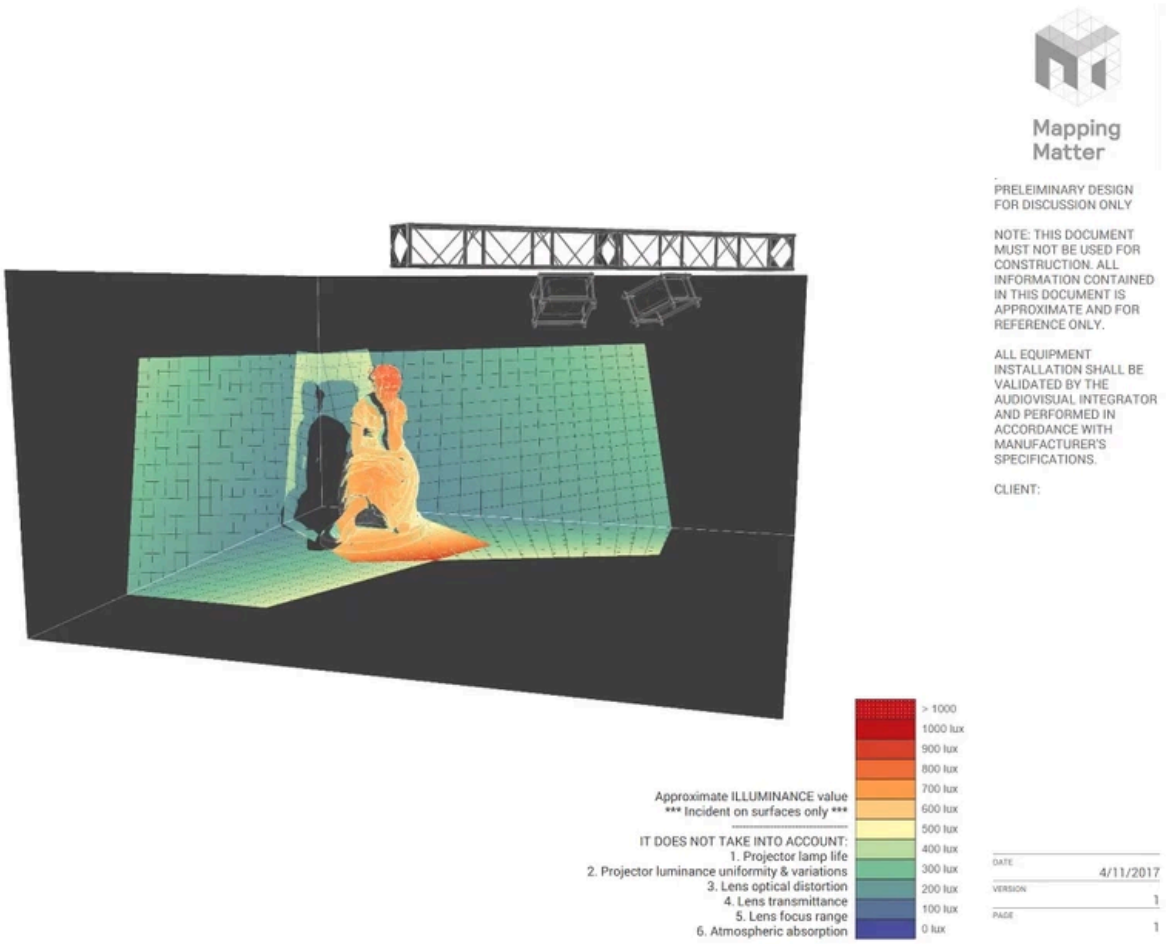
You'll have your own Template Library. You can **Share** any template, or use one from **Shared With Me**.

Go to its **Properties** panel.



By default, the Illustration Image will be taken from the Perspective POV. You can also select a Camera's POV in the **Viewport 1 pov** section.

Click on **Print layout**.



Click on **Print projectors list**.

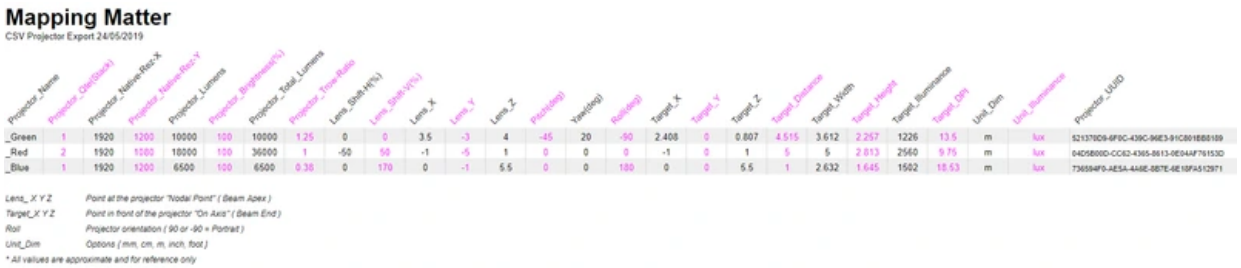
This will include information about all your Projectors in the Scene (Specs & in-Scene adjustments).

Name	Qte (Stack)	Brand	Model	Native Rez.	Lumens	Throw Ratio	Lens shift H	Lens shift V	Position(m) X	Position(m) Y	Position(m) Z	Rotation X	Rotation Y	Rotation Z
Proj A	1	Christie	S+10K-M Frame	1400 x 1050	10500	1.13	0%	0%	-1.93	-2.94	4.53	-25.00°	0.00°	-22.70°
Proj B	1	Christie	S+10K-M Frame	1400 x 1050	10500	1.13	0%	0%	-2.93	-2.01	4.53	-25.00°	0.00°	-67.00°

Export All Projectors Data (.CSV file)

TOP MENU > File > Export All Visible Projectors Data - CSV

This creates a .CSV file that you can transpose into all advanced professional media servers which support a 3D environment.



Mapping Matter

CSV Projector Export 24/05/2019

Projector_Name	Projector_Qty(Stack)	Projector_Native Res X	Projector_Native Res Y	Projector_Lumens	Projector_Brightness(%)	Projector_Total_Lumens	Projector_Throw Ratio	Lens_Shift-H(%)	Lens_Shift-V(%)	Lens_X	Lens_Y	Lens_Z	Pitch(deg)	Yaw(deg)	Roll(deg)	Target_X	Target_Y	Target_Z	Target_Distance	Target_Width	Target_Height	Target_Illuminance	Target_DPI	Unit_Dim	Unit_Illuminance	Projector_UUID
_Green	1	1920	1200	10000	100	10000	1.25	0	0	3.5	-3	4	-45	20	-90	2.408	0	0.807	4.515	3.612	2.257	1226	13.5	m	lux	521370D9-6F0C-439C-96E3-91C801BB8189
_Red	2	1920	1200	18000	100	36000	1	-50	50	-1	-5	1	0	0	0	-1	0	1	5	5	2.813	2560	9.75	m	lux	04D5B00D-CC62-4365-8613-0E04AF76153D
_Blue	1	1920	1200	6500	100	6500	0.38	0	170	0	-1	5.5	0	0	180	0	0	5.5	1	2.632	1.645	1502	18.53	m	lux	736594F0-AE5A-44BE-8B7E-6E10FA512971

Lens_ X Y Z	Point at the projector "Nodal Point" (Beam Apex)
Target_X Y Z	Point in front of the projector "On Axis" (Beam End)
Roll	Projector orientation (90 or -90 = Portrait)
Unit_Dim	Options (mm, cm, m, inch, foot)

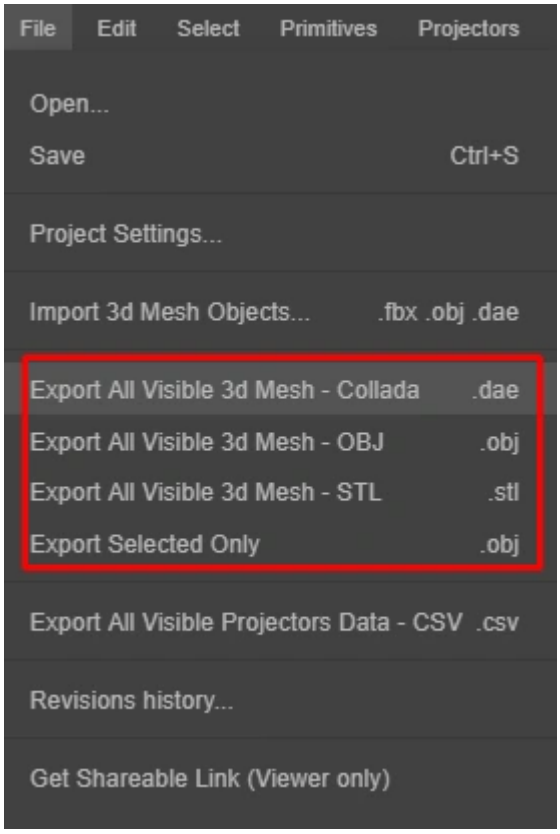
* All values are approximate and for reference only



> **Tip**
>
> Here's how the Mapping Matter integration works in Disguise.

Export 3D meshes

You can export All Visible (or only Selected) 3D meshes in a single file.



> **Warning**
>
> If you want your Projectors' Beams to be included in your export, first make sure **Show All Projector Beams** is enabled in the **Viewport Settings** panel.

Projectors and Cameras (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Projectors/Cameras

Create (or Swap) a Projector

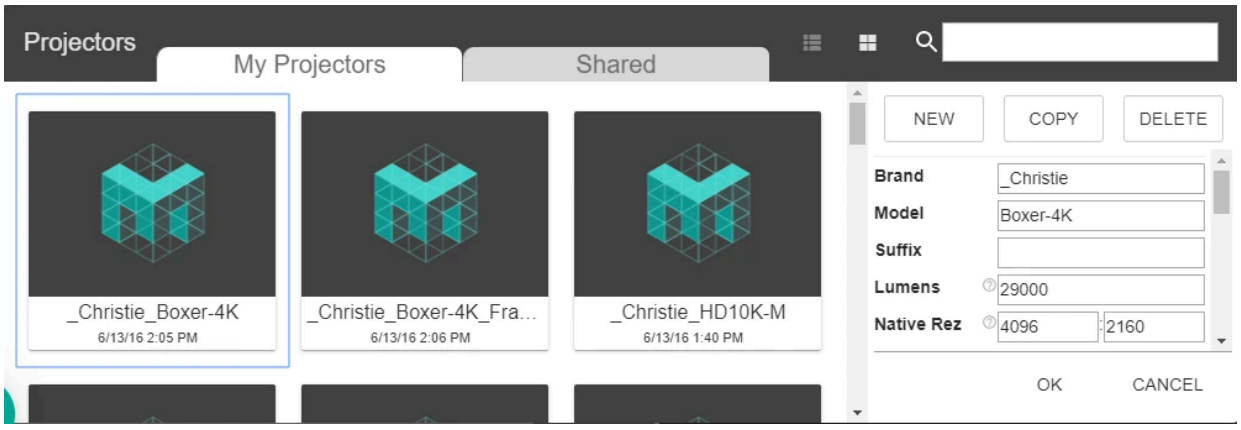
> **Warning**
>
> For all Projector modifications to be updated in your Scene, you'll need to refresh your Browser.

Create a Project in your Scene

TOP MENU : Projectors > Projector

Click to display Specs. Double-click to create it in your Scene.

To learn how to manage your Library and add new Projectors, click here.

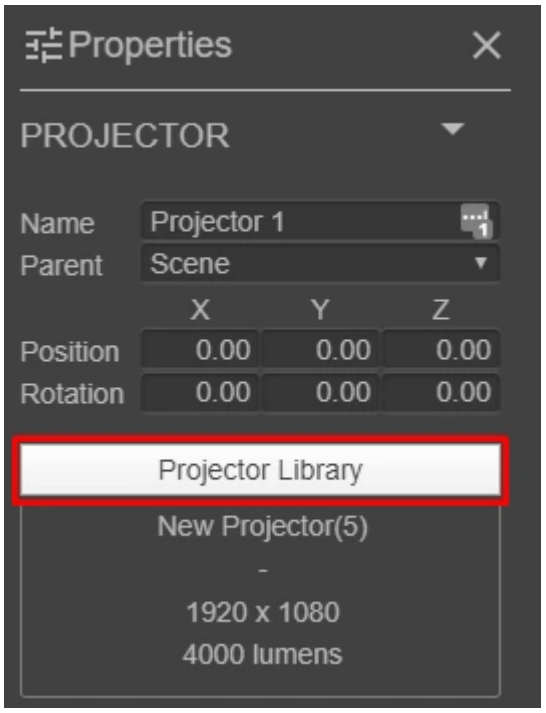


Swap a Projector from your Scene

You can test different Projectors, while the Scene Projector's settings (position, rotation, etc) remain unchanged.

Select a Projector. Go to its **Properties** and click on **Projector Library**.

> **Tip**
>
> You can also select many Projectors at once, holding **Ctrl**.



Projector Orientation

Use Rotation

[Animated GIF: Projector Orientation Basics]

The Orientation of a Projector is determined by the axis between its Lens and its *Target Point* (the Yellow Dot).

- With your keyboard's Arrows.

Press once on any Arrow for a 0.1° increment.

Hold **Shift** while pressing on any Arrow for a 1° increment.

- Through the Properties panel, with the Rotation input boxes.



Type-in a value.

Or left-click on any value, and drag to adjust. (Hold Shift to drag faster.)

- With the Rotation Gizmo. Press **R** on your keyboard to show the Rotation Gizmo.

Then hold-click on any curve to drag and adjust.

Or click once on any curve, and type-in a value.



User the Target Point

[Animated GIF: Projector Orientation]

- By dragging around the *Target Point* (the Yellow Dot) of the Projector.

Hold click on the **Target Point** of the Projector, and drag it around with your cursor.

- By aiming towards a Pin Point anywhere in the Scene.

Click on the Projector's **Target Point**. Then on the **Pin Point** icon. And anywhere in the Viewport.

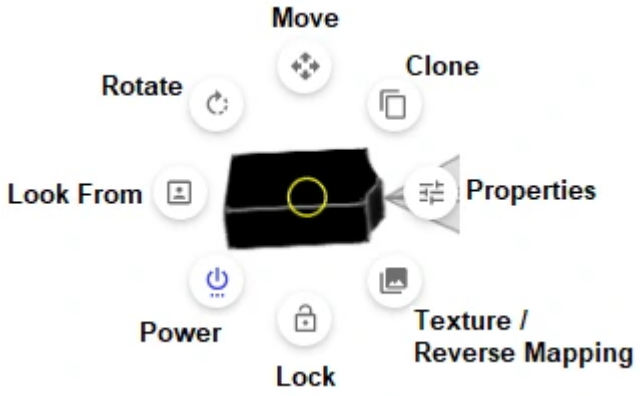
- Locking the Target Point

Select your Projector's **Target Point** and position it. Click on the **Target Point**, and enable the **Lock** icon. Now play with the **Position** and **Rotation** of your Projector.

Projector Beam

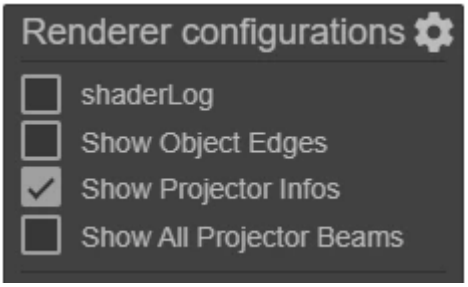
Here you'll learn how to adjust the *Throw Ratio / Throw Distance*, calculate the *Illuminance* and *Pixel Size* at the Target Point, and also adjust the *Brightness Factor*.

> **Tip**
>
> You can turn On / Off the Power an individual Beam through its Projector's Shortcut Wheel (in the Viewport). Or in its **Properties**.



Adjust the Width / Height / Throw Ratio

First, go to **Viewport Settings**, and make sure that **Show Projector Infos** is enabled.



Adjust the Width / Height / Throw Ratio directly in the Viewport.

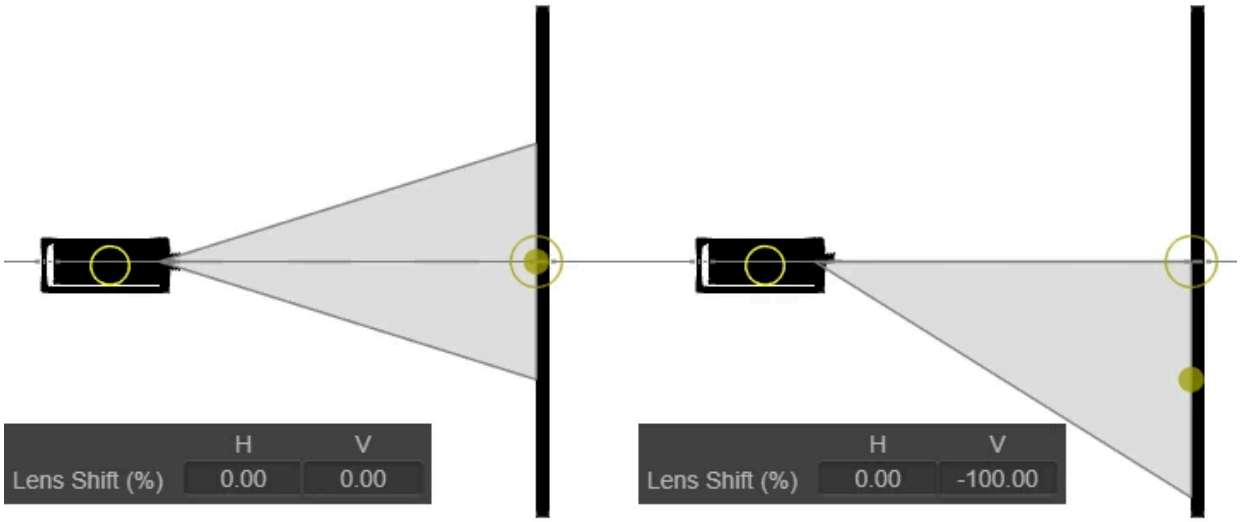
[Animated GIF: Projector Beam]

You can also adjust the **Throw Ratio** in the **Properties** panel. Just type-in a value, or hold-click on the input box and drag your cursor to adjust.



Lens Shift

Lens Shift allows to deviate the optical axis of the Beam. Select your Projector. Go to its **Properties**, and to **Lens Shift**. **H** = Horizontal, **V** = Vertical.



> **Warning**
>
> Our measurement reference is that 100% Shift represents 50% of the Image Height (or Width). This method is used by Barco and Christie. Other manufacturers may use another method (e.g. 100% Shift representing 100% of the Image Height).

Throw Distance, Illuminance & Pixel Size

[Animated GIF: Projector beam throw distance]

If the Beam's Depth axis hits no surface, Illuminance & Pixel Size will be calculated at its default Target Point.

But if it hits a surface, a new Target Point will be set at the intersection between the Beam's Depth axis and the given surface. Illuminance & Pixel Size will be automatically re-calculated.

Illuminance = value in Lux at Target Point.

Pixel Size = unit^2 at Target Point. Learn how to measure individual pixels using a Checkerboard, here.

Illuminance (**Stretch**) = the angle will make it x% dimmer (on matt surfaces).

Pixel Size (**Stretch**) = the angle will make it x% bigger (Keystone effect).

> **Tip**
>
> You can override the automatic Target Point reset by manually typing-in any specific value for the Beam's Depth. (See the GIF above.) The minimum is 1m on manual, but it may be shorter on automatic.

Adjust the Brightness Factor

This ratio is adjusting the total Lumens Output of the Projector.

> **Tip**
>
> A Projector's Lamp Life has a direct impact on the Brightness. The Brightness Factor is here to help you to integrate this reality.

Go to its Properties, and to the PROJECTOR menu.



Projector Image

The Projector Image refers to the visual content projected through the Beam.

Here you'll learn how to customize it with Images / Videos / Borders / Grid / Checkerboard.

[Animated GIF: Projector beam throw distance]

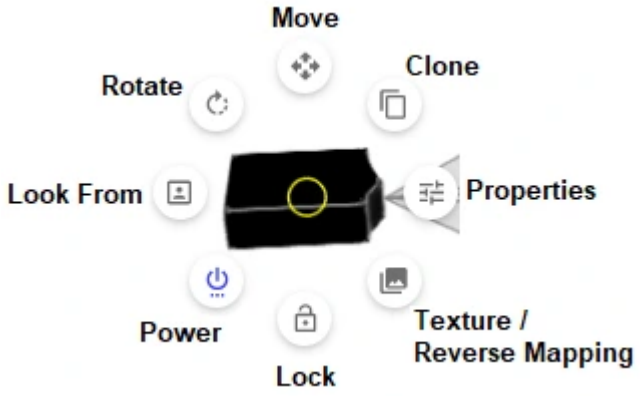
Select your Projector. Go to Properties > Projector > Projector Image

Use / Remove an Image (or Video)

Change the color of the Beam's borders

Add a parametric Grid

> **Tip**
>
> You can Look From any Projector. Using the Shortcut Wheel, or holding**Shift** while double-clicking on your Projector, or by clicking on the **Eye** icon from the **Scene Objects** panel.



Use / Remove an Image (or Video)

Click on the **Projector Image** button. You will have access to the Texture Library. It contains a collection of files that you may use for your Projector Image. You can also import your own files from your computer. Check how to use the Texture Library[here](#).

To remove a Projector Image, select your Projector and click on the Trash icon command.



> **Tip**
>
> You can preview a video in the Viewport. Just hit the space bar to start / stop it.

There will be no sound.

Use / Remove an Image (or Video)

Tick the **Border** box.

Click on the Color Bar and select a color.

To adjust the borders' thickness, type a value in the % input box.

> **Tip**
>
> A 5% border is a great way to represent Lens Tolerance.

Add a parametric Grid

Tick the appropriate box : **Grid** or **Checkerboard**.



Adjust the input values for the desired amount of (Left) vertical and (Right) horizontal blocks.

Use the Checkerboard to measure down to 1 pixel.

Projector Stack

[Animated GIF: Projector stack]

Select your Projector. Go to Properties > Projector > Projector Stack

Add any amount of dummy Projectors in the input box.

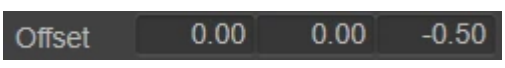
This will only create a dummy mesh and multiply the brightness.

Tick the “Automatic Lumens Multiplication” box (if you want to activate / de-activate the stacking effect on your Projector’s Beam).

If activated, the Lumens output of your Beam will be automatically multiplied.

The Total Stack Lumens value will be displayed in the Properties panel.

You may change the position sequencing of all additional dummy Projector by changing the Offset values in the input boxes below.



Reverse Mapping

Reverse Mapping allows you to reveal the projected Texture onto an Object’s surface.

The projected Texture may be applied as an Object's MATERIAL (Projection Map), or it may come from a **Camera Projector**.

Reverse Mapping is a powerful tool to quickly set perfectly mapped previews.

[Animated GIF: Projector reverse mapping]

In this example, a projected Texture was applied on the wall and revealed by the Projector in *Reverse Mapping* mode.

Activate Reverse Mapping on a Projector

Create or select a Projector.

Access its Shortcut Display in the Viewport.

Place your cursor on the Texture icon, and click on **Reverse Mapping**.



Now the Projector Beam will only reveal all projected Textures on the surfaces it hits.

Use the Projection Texture tool

The Projection Texture tool allows you to simultaneously reveal all projected Textures from the whole Scene. No need for any Projector Beam.

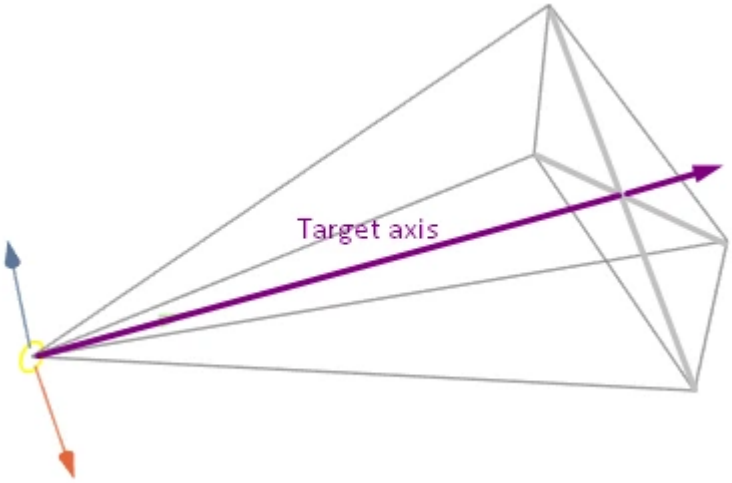
Go to **Brightness Settings** and ajust the value (in lux).

> **Tip**
>
> This may help removing the brighter overlap between Beams.

[Animated GIF: Projector reverse mapping projection texture blending]

Cameras

A Camera is a bodyless Object, no meshes attached.



Create a Camera

There are 2 methods to set a new Camera's position and orientation.

By default, creating it at the Center Point of your Scene.

TOP MENU > Projectors > Camera

It will be oriented towards the Scene's Y axis. Because its Target Point's position is by default (X=0, Y=2, Z=0).

Or from your current POV.

Go to



(in the top-right corner of your screen).

Select **Camera from View** in the dropdown menu.

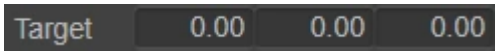
Set the Target Point of your Camera

A Camera's Target axis will always be automatically re-oriented towards its Target Point, regardless of your Camera's position in the Scene.

You can position the Target Point by typing-in its coordinates.

Select your Camera. Go to **Properties**, and to **Camera**.

Type-in the Target Point's (X, Y, Z) coordinates.



Rotate your Camera's Field Of Vision (FOV)

The rotation will occur on the Target axis.

Type-in an angle value in the Roll input box, available in your Camera's **Properties**.



Example

Type-in 90 to have a 90° rotation, and get a portrait FOV.

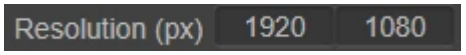
Adjust your Camera's FOV dimensions (Focal Length, Resolution)

The *Focal Length* simulates a standard camera's Lens Focal Length (in millimeters). The longer the focal length, the narrower the FOV values.

Adjust your Camera's Focal Length in its **Properties**.



The Resolution may also be customized in your Camera's Focal Length in its **Properties**.



The Horizontal (H) and the Vertical (V) will be proportional to your Camera's FOV, for its Width and Height respectively.

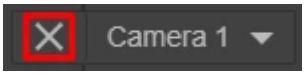
Look from any existing Camera

You can switch your own POV to any of your Cameras' anytime.

Just go to **Scene Objects** and click on the **Look From** icon.

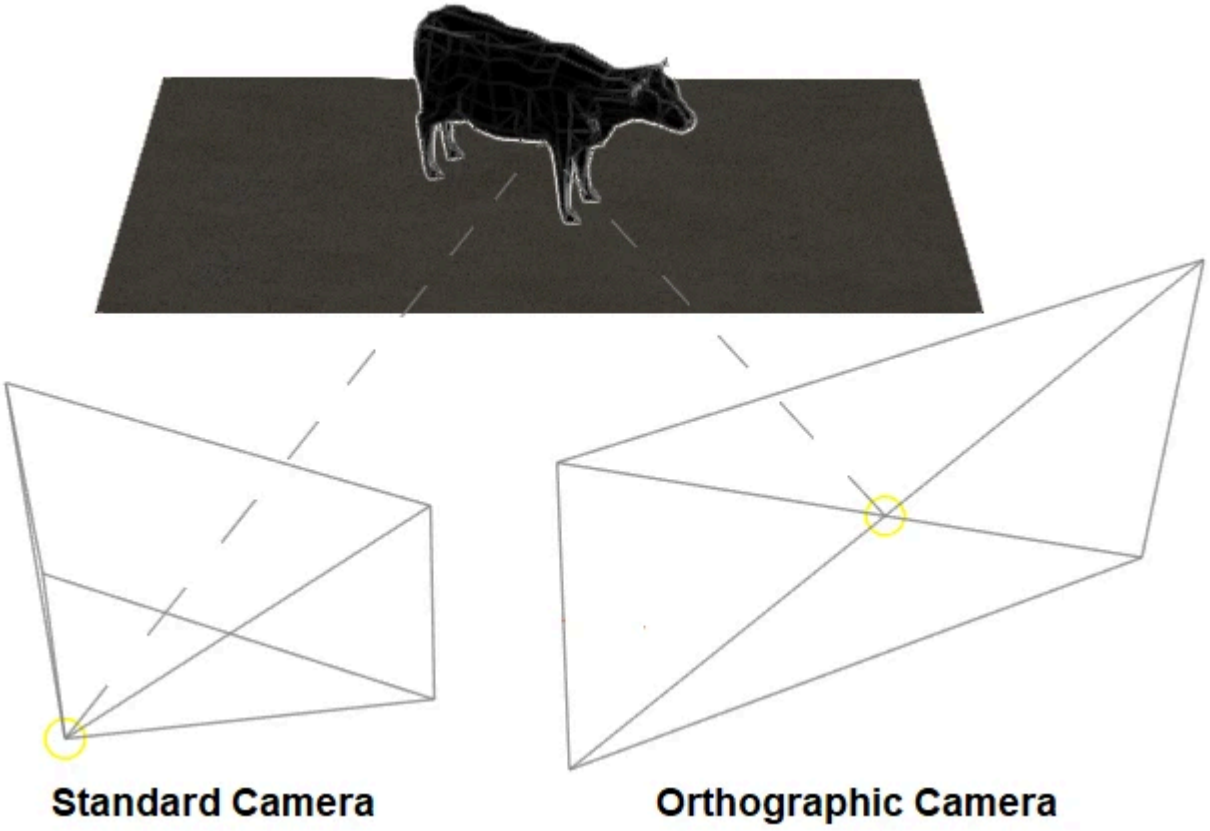


To exit the Camera's POV, click on **Exit view**.



Use an Orthographic Camera

Orthographic translates into a flat FOV cone.



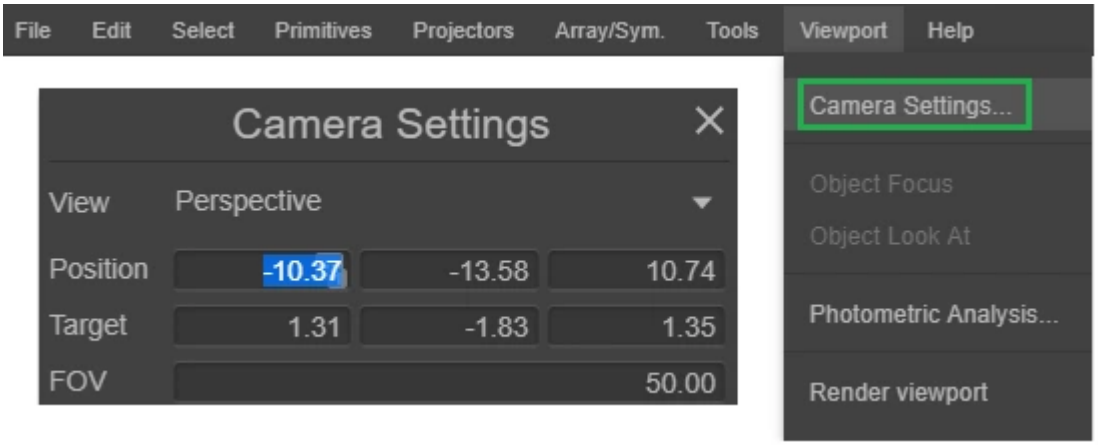
Go to



(in the top-right corner of your screen).

Select among Top / Bottom / Left / Right / Front / Back

Go to TOP MENU > Viewport > Camera Settings to adjust its Position/ Target / FOV.

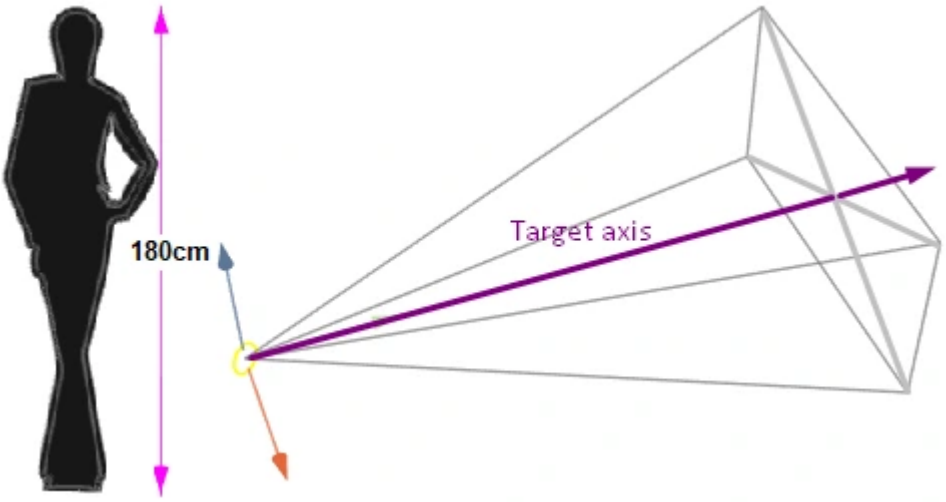


Camera Projectors

A Camera Projector is an hybrid Object, it shares some features of both a Camera and a Projector.

It is also represented in the Scene by a *human silhouette* 3D mesh (Height= 180cm).

The FOV is represented by a pyramidal cone. The Field Of Vision's dimensions are defined by the Camera Projector's Focal Length and Resolution.



Create a Camera Projector

You can only create it at the Center Point of your Scene.

TOP MENU > Projectors > Camera Projector

It will be oriented towards the Scene's Y axis. Because its Target Point's position is by default (X=0, Y=2, Z=0).

Adjust your Camera's FOV dimensions (Focal Length, Resolution)

The Focal Length simulates a standard camera's Lens Focal Length (in millimeters). The longer the focal length, the narrower the FOV. And vice-versa.

Adjust your Camera Projector's Focal Length in its Properties.



The Resolution may also be customized in your Camera Projector's **Properties**.



The Horizontal (**H**) and the Vertical (**V**) will be proportional to your Camera's FOV, for its Width and Height respectively

Project a Texture from your Camera Projector (Projective Texturing)

Projective Texturing allows you to see how your Objects' surfaces need to be mapped, in order to produce a certain Image from a given perspective.

This is particularly useful when you don't have any UVs on your 3D Objects.

[Animated GIF: Camera projector texture]

By default, the projected Texture won't be visible in the Viewport. It will have to be "revealed". Either by a Projector in **Reverse Mapping** mode, or using the Projection Texture tool.

Select your Camera Projector.

Go to its **Properties**, and click on Projector Image. (Or use the **Texture** shortcut icon, as displayed in the GIF.)

You will have access to the **Texture Library**. It contains a collection of files that you may use for your Camera Projector's Texture. You can also import your own files from your computer. Check how to use the Texture Library here.

Share (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

> **Warning**
>
> To share a Scene / an Individual Asset, you must first be in the same organisation as the people you wish to share it with. Ensure that both you and your teammates are part of the same organisation. If you need to manage members or add new teammates, please follow the steps outlined on this page. Note that after being added to a new organisation, your teammates may need to log in to Mapping Matter again.

For us to create one, please reach out at **support@disguise.one**

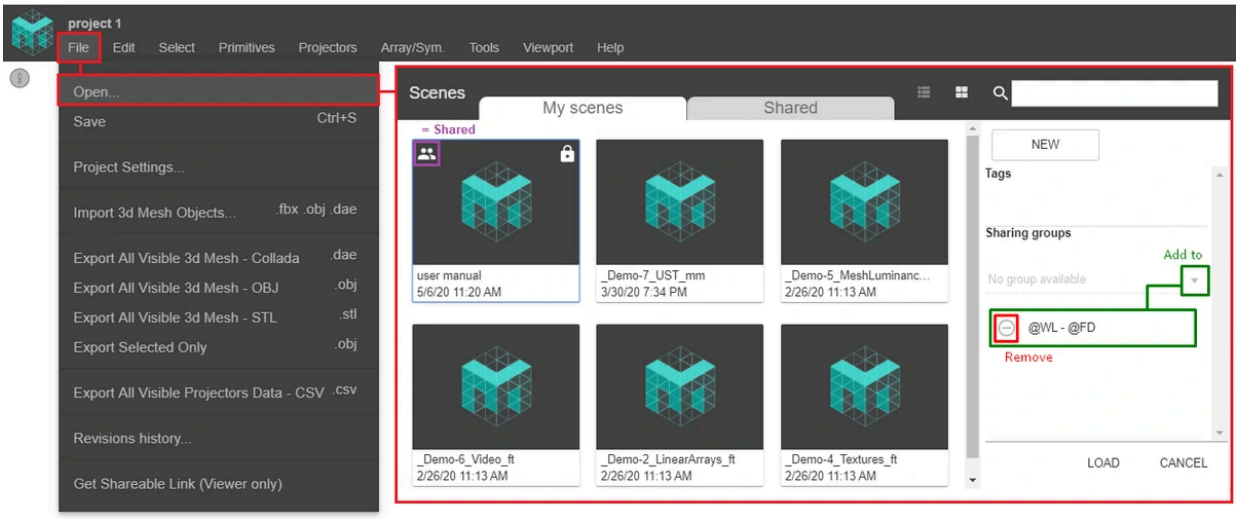
Your teammates may need to refresh their Browser to receive the copies.

Share a Scene

When you share a Scene file, it will also copy all of its assets (Projectors, Textures, 3D Objects, etc...).

> **Warning**
>
> You'll need to be the creator of the Scene. If it was shared with you, only a duplicate version of it can be shared. This option won't be accessible from the Home Page. You can do it through the Scene Library.

Access the Scene Library : TOP MENU > File > Open...

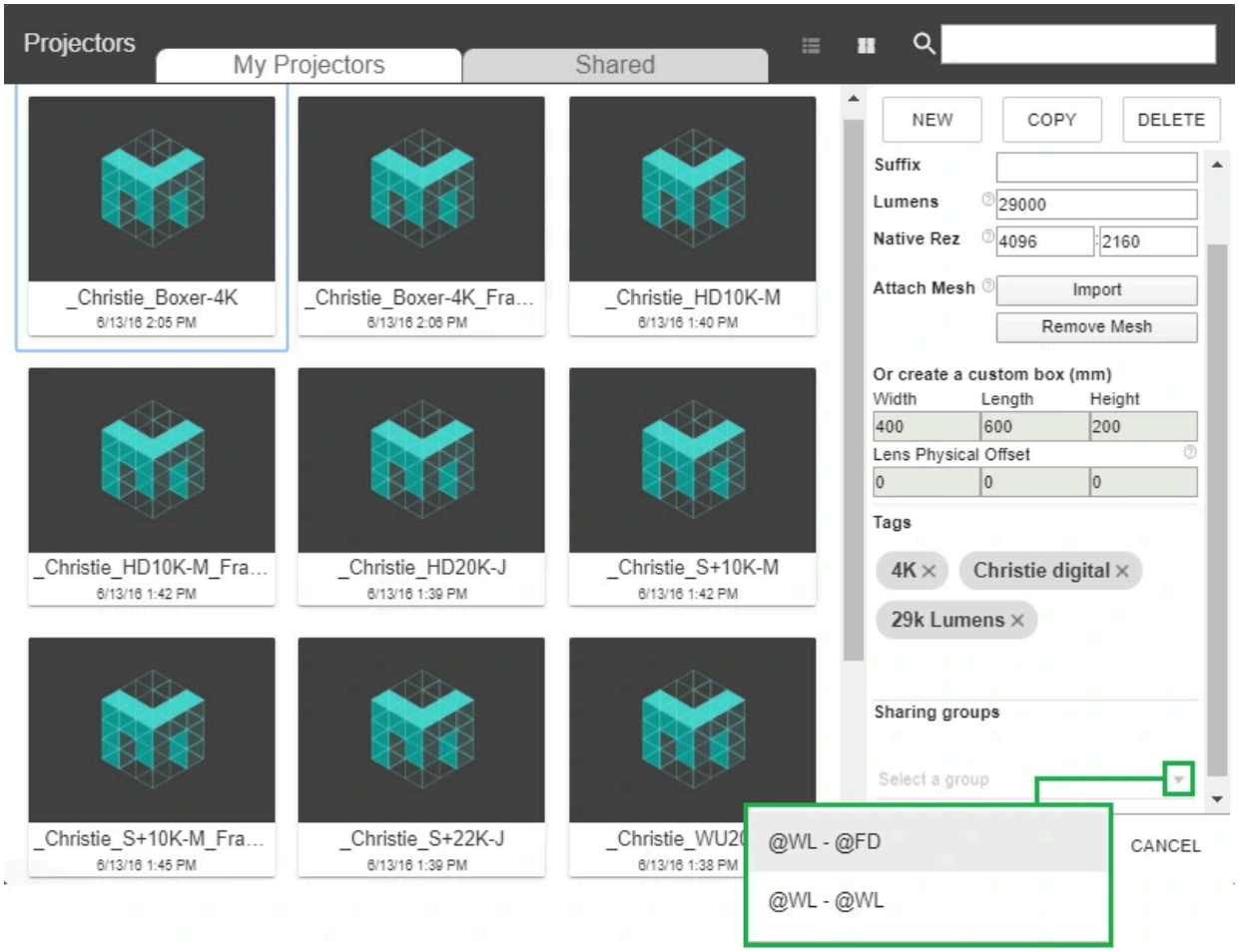


Share an Asset

Share a Projector

TOP MENU > Projectors > Projector

Select a Projector > Add it to any Group Sharing Folder



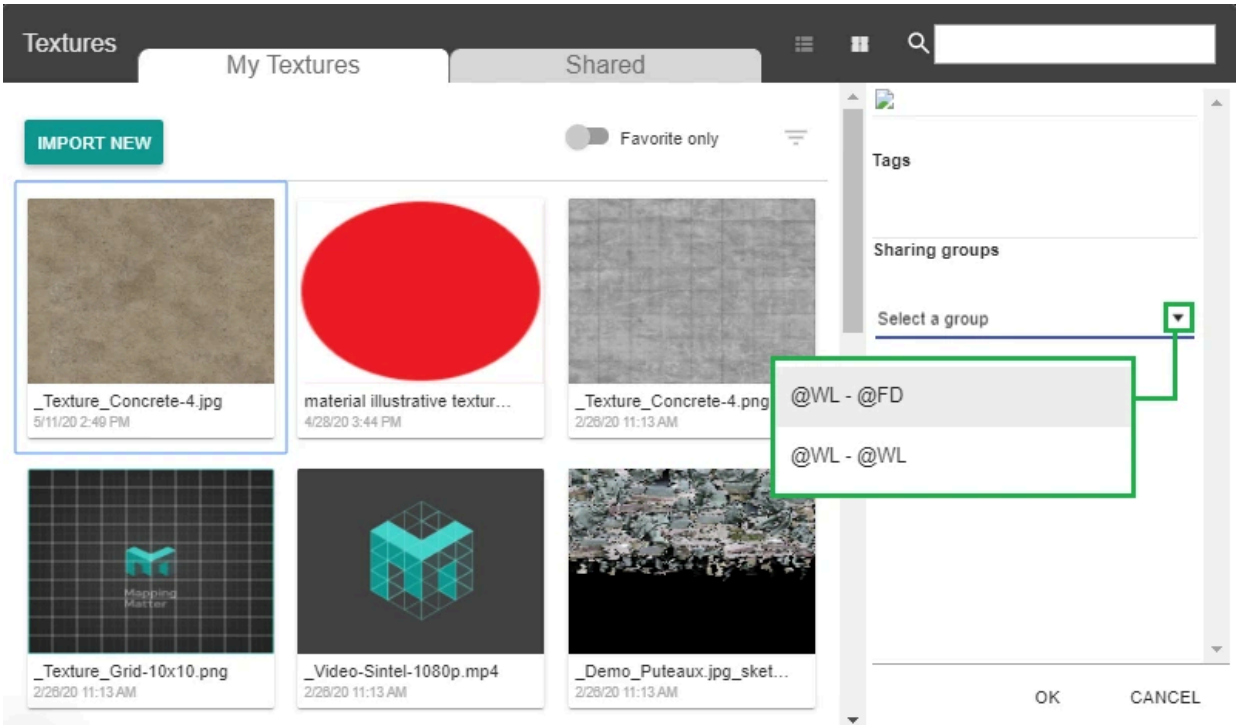
Share a Texture

You'll have access to the [Texture Library] through different paths.

Select a Projector > Properties > Projector Image

Select a Primitive > Properties > Base Map (or Projection Map).

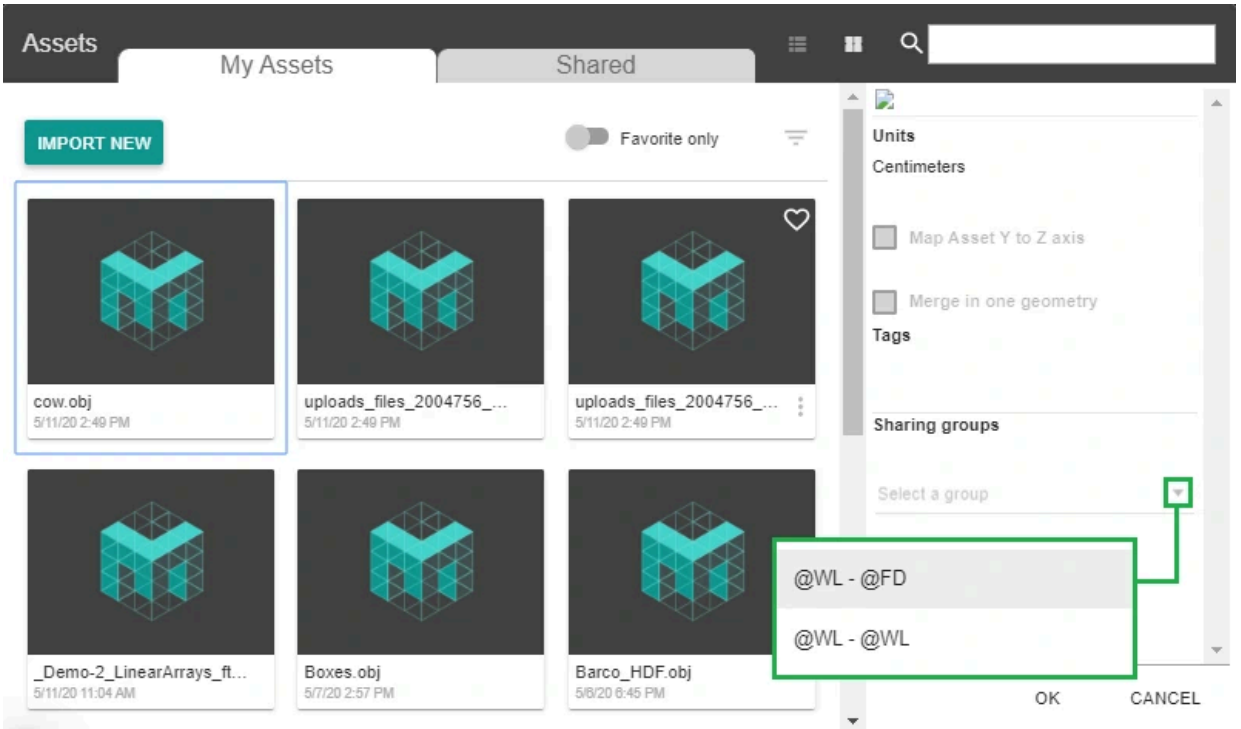
Select a Texture, and add it to any **Group Sharing Folder**.



Share a 3D mesh

TOP MENU > File > Import 3D Mesh Objects

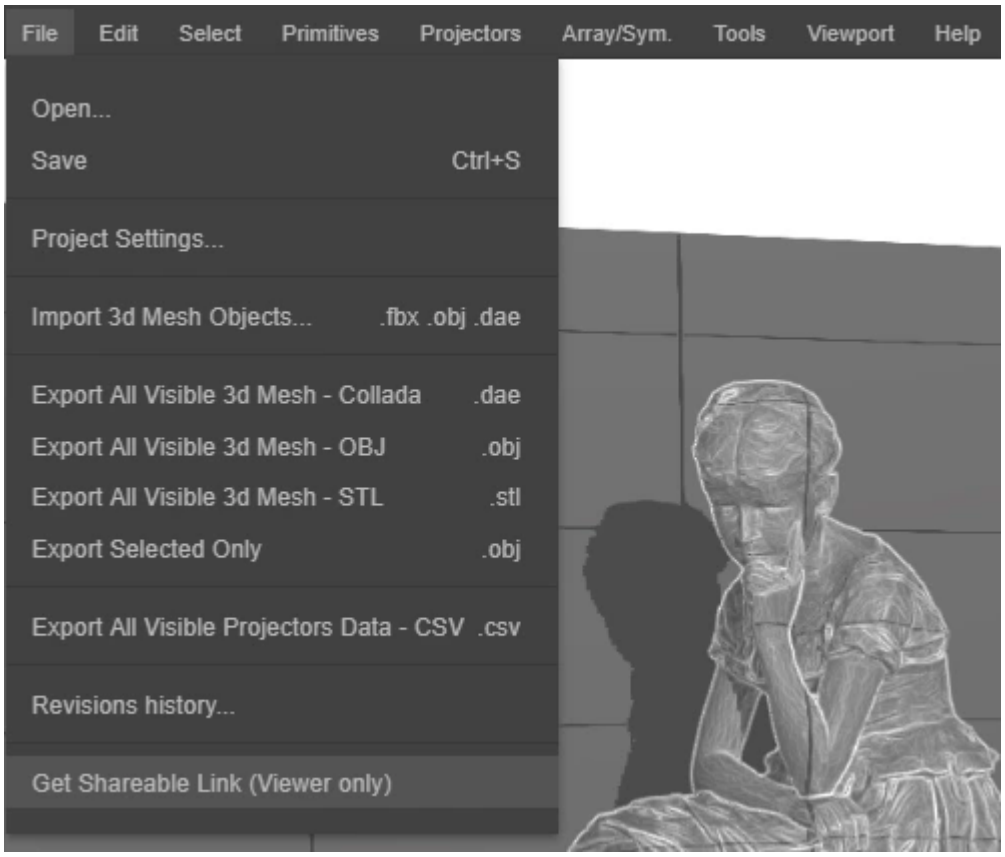
Select an Asset, and add it to any **Group Sharing Folder**.



Share a Viewer Only link

For anyone with the Link and Password to view your Scene and possibly previewing their own Content there.

How to generate a Viewer Only link



TOP MENU > File > Get Shareable Link

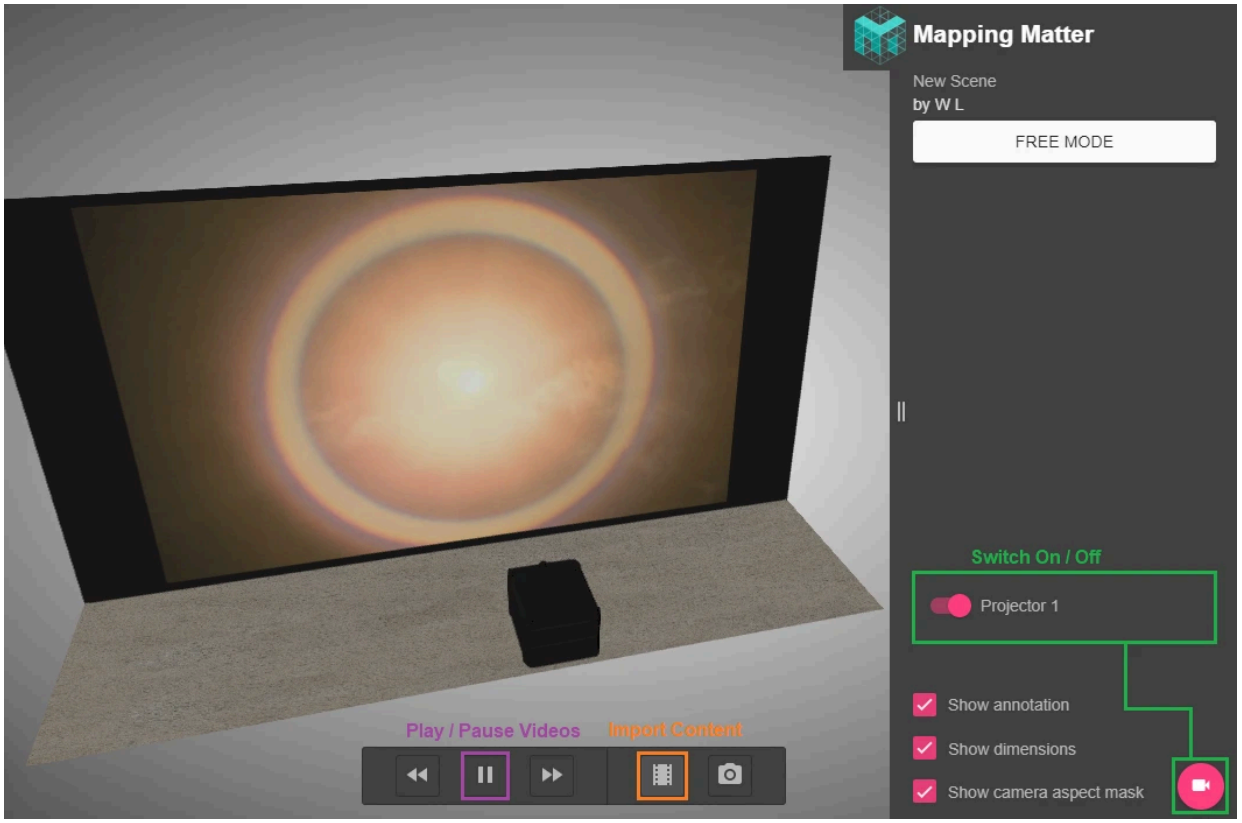
Tick the **Enabled Box**, and type-in a password.

How to operate on the Viewer's Landing Page

All people with the Link can preview their own Content on Reversed-Mapped Objects.

Imported Content will only apply on Objects which already had Content (Image / Video) as *Projection Map*.

The *Projection Map* has to be revealed in your Scene, either by a Projector in *Reverse Mapping* mode, or with the *Projection Texture* Tool.


Mapping Matter
New Scene
by W L
FREE MODE
Switch On / Off
Projector 1
Show annotation
Show dimensions
Show camera aspect mask
Play / Pause Videos
Import Content

Viewport Brightness (legacy)

> **Note**
>
> This page documents the **legacy** edition of Mapping Matter, kept for users who have not yet migrated. The current Mapping Matter docs begin at Introduction.

Viewport Settings

This helps you customize the visual information in your Scene.

Go to **Viewport Settings** (in the top-right corner of your screen).

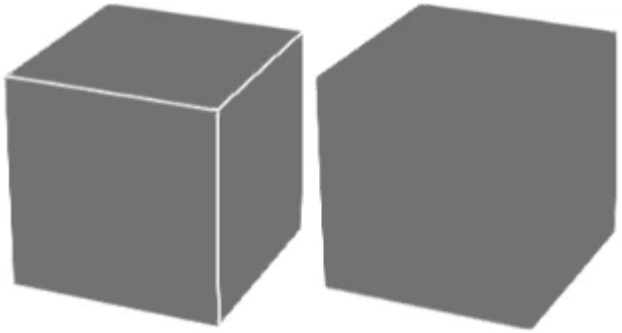
shaderlog

Enable / disable shaderlog.

This replicates *Luminance* as perceived by the human eye. It gives more detail in lower intensity, and less detail in higher intensity

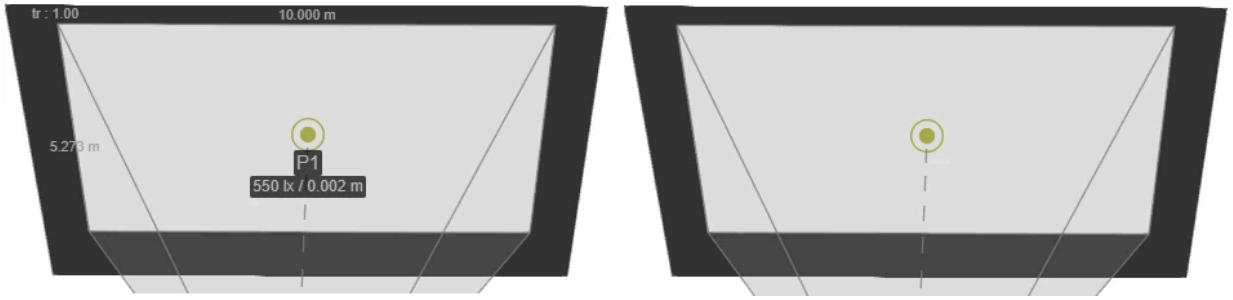
Show Object Edges

Tick the box to enable / disable it.



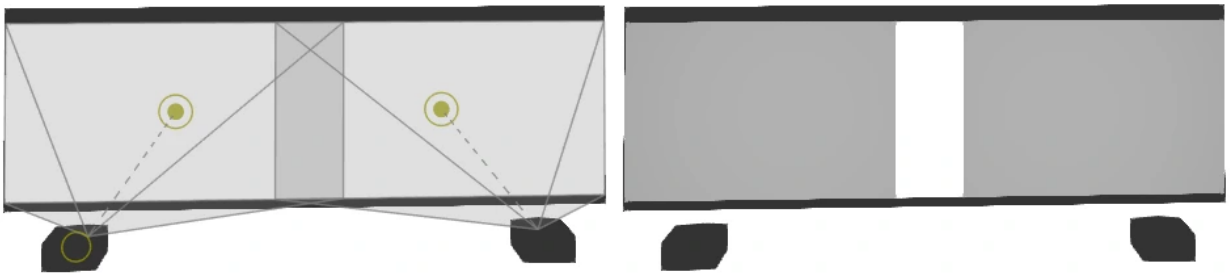
Show Projector Infos

Tick the box to enable / disable it.

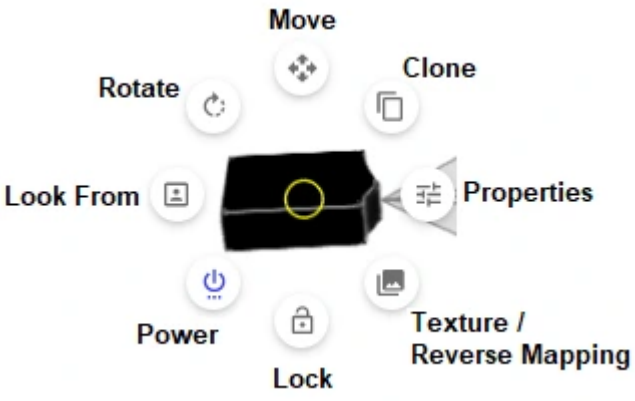


Show All Projector Beams

Tick the box to enable / disable it.



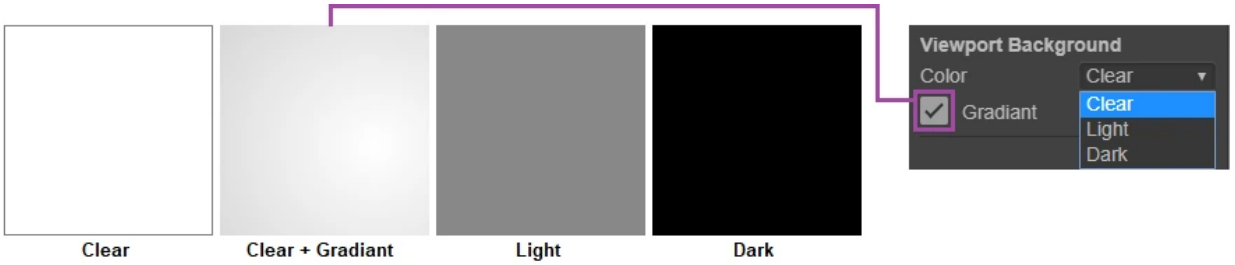
> **Tip**
>
> You can also turn On / Off the Power an individual Beam through its Projector's Shortcuts. Or in its **Properties**.



Viewport Background

You can change the **Viewport Background** for both ergonomic or aesthetic purposes.

Gradiant adds a soft esthetic glow to your Background.



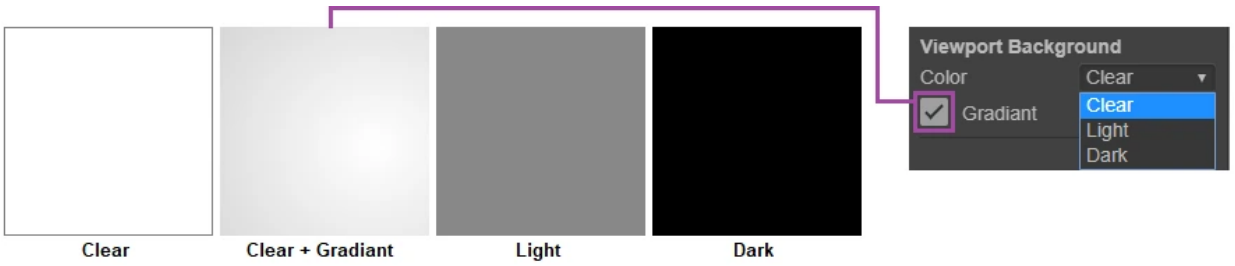
Global Material Override

Some Objects may have a Material Override option enabled. This means you can “see through” them in the Viewport.

Learn about the Side Tool for Material Override here.

This is a global effect. When enabled (with Double Side box ticked), all Material Overrides are suspended.

Show Grid



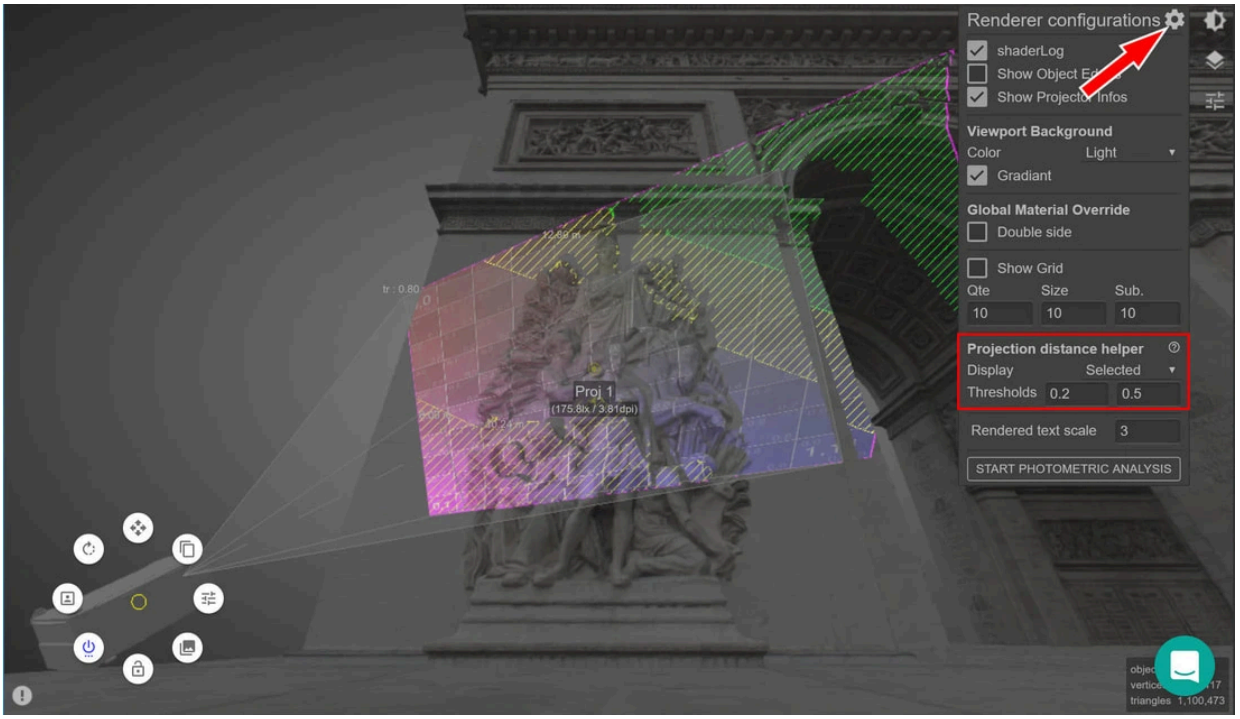
Qte = Quantity of Squares both Horizontal and Vertical.

Size = Unit Size of 1 Square.

Sub = Subdivisions of each Square.

Projection Distance Helper

This tool helps you visualizing the distance variations between a Projector’s Lens and the surfaces hit by its Beam. It will give you a better understanding of potential focus issues.



This is a global effect. When enabled, all Projectors apply it.

Go to Viewport Settings (in the top-right corner of your screen).

To disable it, go to the Display dropdown menu, and select **None**.

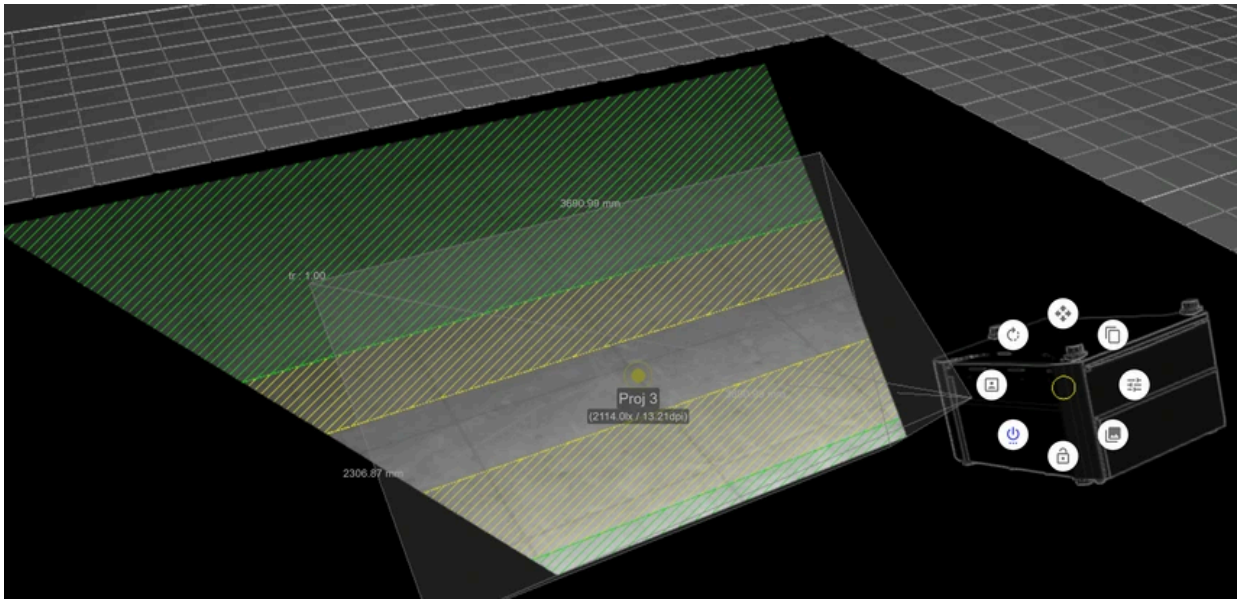
The two Thresholds parameters represent a fixed % value of the distance between any Projector and its Target Point.

Example

We have a Beam with a 10m projection distance.

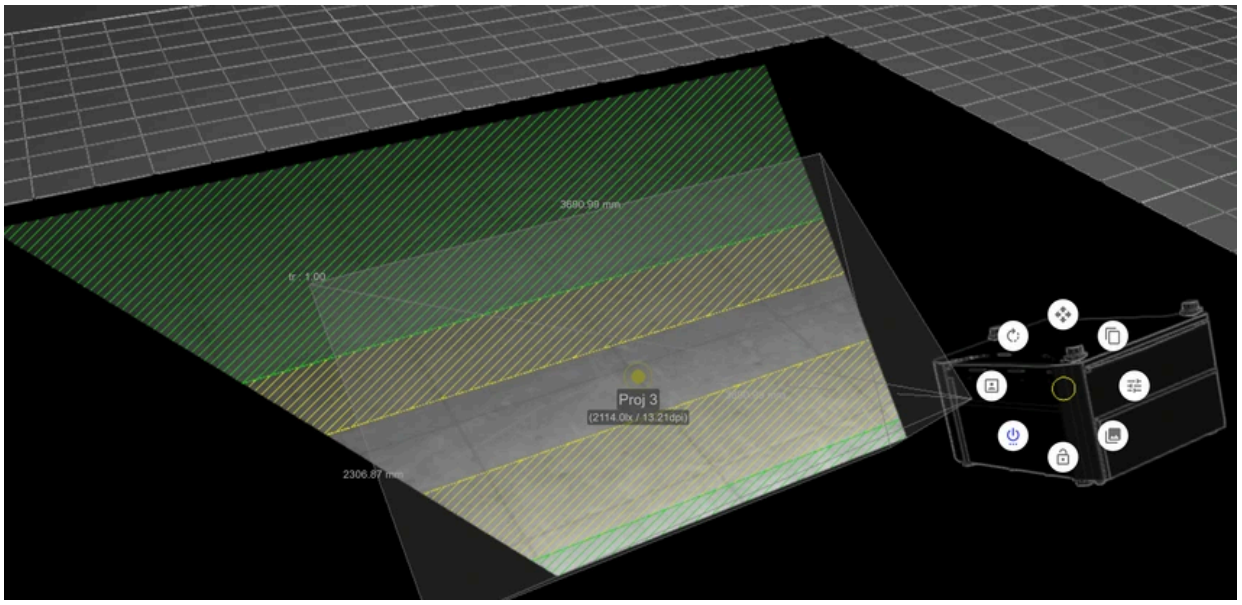
Both thresholds are set to 0.1 and 0.3.

Consequently, the areas between 1m and 3m away from the Target Point will be hatched in Yellow. And when 3m away or more, it will be all Green.



> **WARNING**
>
> This tool does not represent the real projection depth of field, or the minimum and maximum projection focus plane. But it's a simple and great way to flag potential focus issues.

Photometric Analysis



This tool allows you to evaluate both the *Illuminance* and *Luminance* on given surfaces in your Scene.

You can use this information to have an estimate of the Contrast Ratio on any surface. This will help you evaluate your needs in terms of Projection Light output.

Contrast Ratio = Projection Light / Ambient Light.

> **Tip**
>
> A 5 to 1 ratio is an indicative minimum for decent projection results. A 10 to 1 ratio is often pretty good.
>
> In reality, this will variate in function of numerous factors such as the surfaces' characteristics. Therefore, conducting on-site tests will be essential.

> **Warning**
>
> Photometric Analysis will exclude Ambient & Directional Light from its computation. You'll have to take that into account when estimating your Projection Light Output needs.

Start the **Photometric Analysis** mode either from the Viewport menu, or through the **Viewport Settings** panel.

Evaluate Illuminance and Luminance

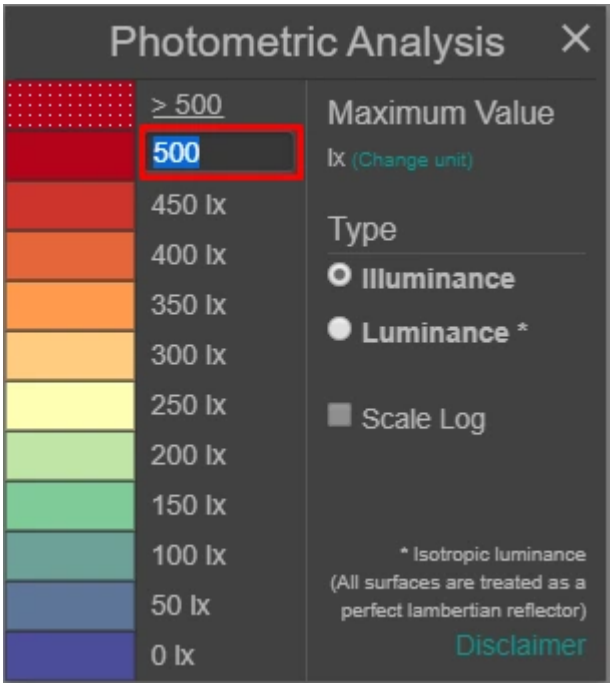
Illuminance = the amount of Light falling on a surface, per unit area.

The Object's Material and surface angle have no incidence on it.

Luminance = the amount of Light reflected from a surface, per unit area. Aka the Light Falloff.

The Object's Material (Gain / Color / Base Map) does have an incidence on it. The darker the surface, the lower the brightness.

The angle in which the Light Ray hits the surface also has an incidence. The wider the angle, the lower the brightness.



Scale Max is simply a reference value for all superior values in your Scene to show in a white-dotted Red.

You can also tick the **Scale Log** box to change the color distribution, as perceived by a human eye. It will give more details in the lower values, and less details in the higher ones.

> **Tip**
>
> Set Scale Max slightly above the Illuminance / Luminance value calculated at the Target Point. This info appears when Show Projector Infos (in Viewport Settings) is enabled.

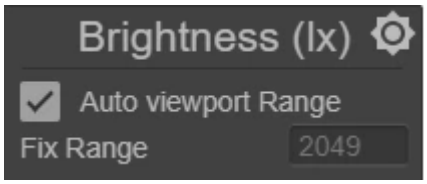
> **Warning**
>
> Changing the Color distribution with Scale Max / Scale Log does not affect the Brightness in your Scene. It simply presents you the same information on a different scale, allowing you to visualize variations as you please.

Brightness Settings

To adjust global Brightness parameters in your Scene:

Go to **Brightness Settings** (in the top-right corner of your screen).

Auto Viewport Range



This will define a value range for both *Projection Texture and Ambient / Directional Light*.

When enabled, the range is set automatically. The max brightness (100% white) will be adjusted in function of the selected Projector's Illuminance value on its Target Point.

When disabled, the range has to be set manually.

Example

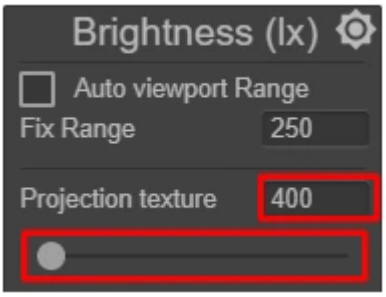
If we manually set 250 Lux, it will take 250 Lux to make any Object (which has a 1.0 Gain) 100% white. If it has a 0.5 Gain, 250 Lux will make it 50% white, etc. Same logic for Colors / Maps, the brighter the whiter.

Projection Texture

The Projection Texture tool is global effect. It allows you to simultaneously reveal all projected Textures from the Scene. No need for any Projector Beam.

The projected Textures may be applied as a Material Projection Map, or emitted from a Camera Projector.

Adjust the value in lux.

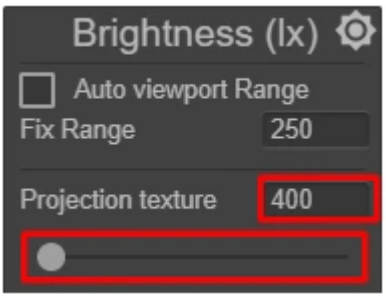


Ambient / Directional Light

Ambient & Directional Light are global effects. applying on all Objects of the Scene.

Ambient Light = the Light is equally emitted from all directions.

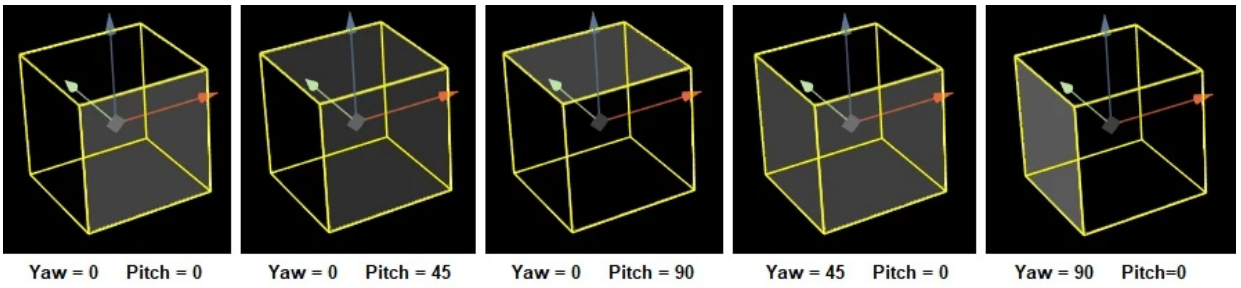
Directional Light = the Light is emitted from 1 source only.



Set a value (type-in or drag to adjust).

Yaw = the direction angle of the Light source, orbitting around the Blue Z axis. 180° shifts it to the opposite direction.

Pitch = the direction angle of the Light source, orbitting around the Red X (or Green Y) axis.



Cameras and POV

Mapping Matter has three viewpoint primitives:

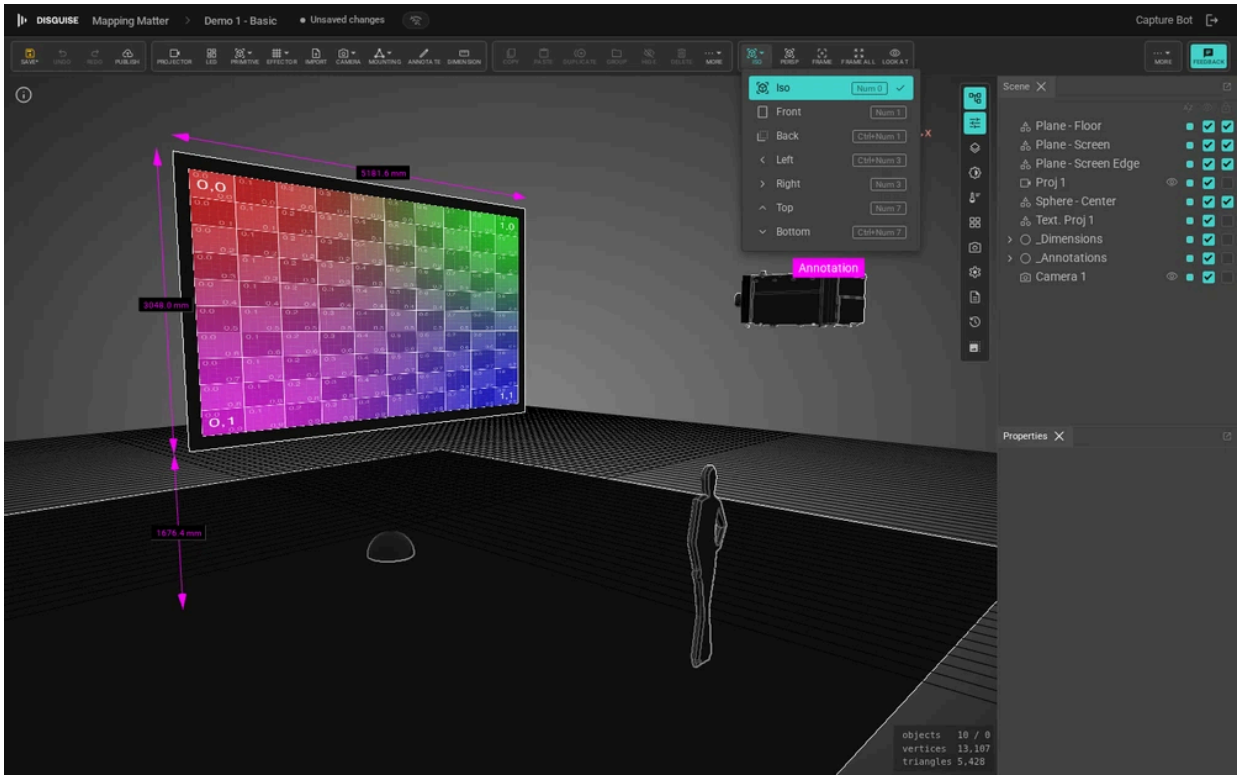
- **Saved views**: toolbar-driven snapshots of the Perspective camera that you can jump between.
- **POV camera**: a perspective scene object with an aim point, useful as a stand-in for a fixed observation location or a documented render position.
- **Observer**: a person object that places the camera at eye level, supports WASD walkthroughs, and unlocks the human acuity analysis.

Saved viewpoints

Click the **View** dropdown on the right of the toolbar to jump between **Perspective**, **Orthographic**, and the six axis views (Front, Back, Left, Right, Top, Bottom). The label updates to show the active view (`View: Perspective`, `View: Orthographic`, `View: Top`, etc.).

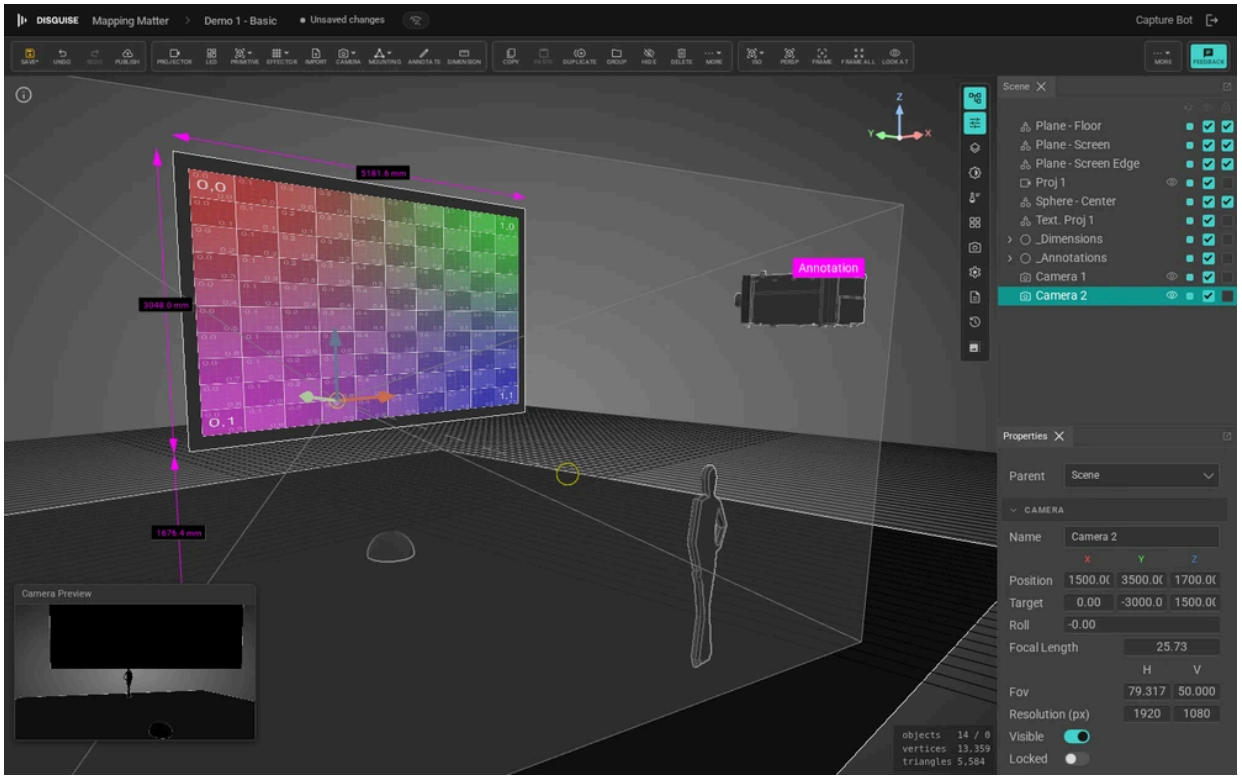
- **Perspective** and **Orthographic** are both free-orbit views. You choose which projection you want and keep your current viewing angle. Switching between them with `Num 5` flips the active projection in place.
- The six axis views snap to a clean axis-aligned orthographic view (and don't free-rotate by right-drag). Switching to one of them auto-frames the scene.

You can also reach the same views with the numpad: `Num 1/3/7` for Front/Right/Top (hold `Ctrl` for the opposite), `Num 0` for Perspective, `Num 5` to toggle ortho/perspective in place, and `Num 2/4/6/8` to orbit a perspective view in 15° steps. The **top-row digits** trigger the same actions, so laptops without a numpad work too. See Keyboard shortcuts for the full scheme.



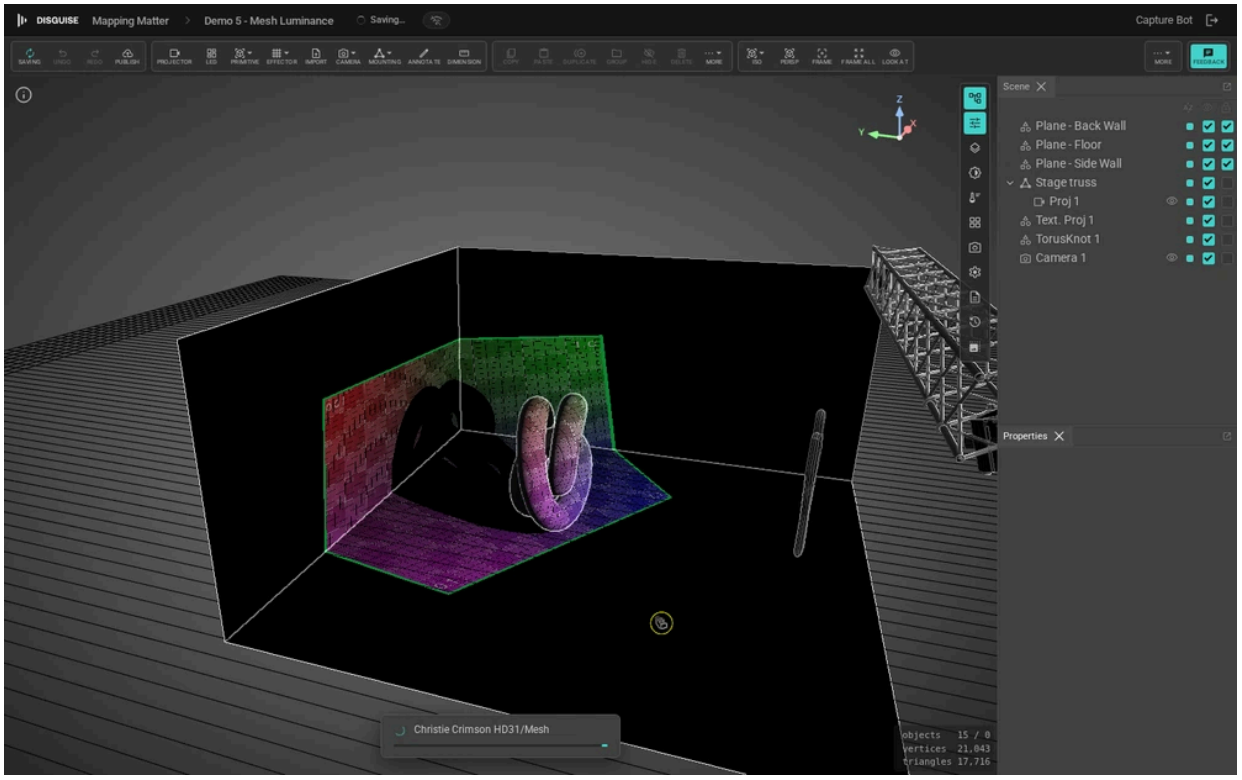
POV camera

A POV camera is a perspective camera with an aim point, closest to a traditional 3D-software camera object. Add one from the toolbar's **Camera** popover and pick **POV camera**. The camera body appears in the scene and an inset preview of what the camera sees opens in the viewport while the camera is selected.



In the POV camera's Properties panel:

- **Type**: Perspective or Orthographic.
- **FOV / focal length**: in degrees and millimetres.
- **Resolution**: H × V pixels for any rendered or exported still.
- **Sensor size**: derives focal-length-equivalent values.

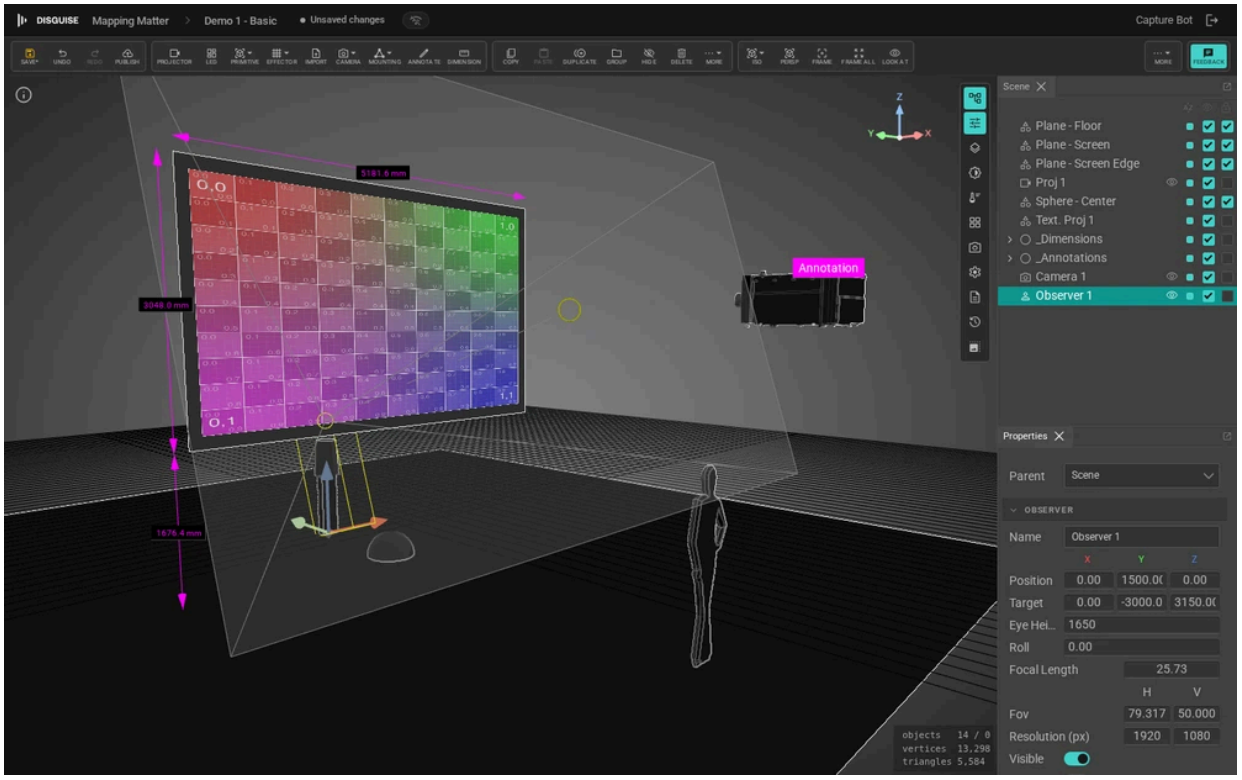


Observer

An **Observer** is a person object with the camera mounted at eye level. Use it to walk through the scene from a real human viewpoint, validate sightlines, and run human acuity analysis.

Add one from the toolbar's **Camera** popover and pick **Observer**. A simple person figure appears in the scene with a head, torso and a forward sight line emerging from the eye position.

When you aim the Observer up or down, the body stays standing upright and only the head pivots toward the target, so the figure looks where the camera is looking without leaning over.



Observer properties

- **Position**: XYZ of the figure's feet.
- **Target**: XYZ of the aim point the observer is looking at.
- **Eye Height**: height above the floor in the active scene unit. Defaults to **1650 mm** (95th-percentile standing adult).
- **Roll**: head roll.
- **Focal Length** / **Zoom**: perspective focal length, or zoom factor for an orthographic observer.
- **Resolution (px)**: H × V pixels for rendered output.

Look from the observer's eyes

Select an Observer and click **Look from** in the saved views strip (or use the eye-icon button on the Observer row in the Scene panel). The viewport jumps to the observer's eye position, hides the figure's body mesh, and locks the camera to the observer.

While looking from an Observer:

- `WASD`: walk forward / left / back / right at floor level.
- **Mouse look**: click the toolbar's **Mouse look** button to capture the cursor for free look-around. Click again or press `Escape` to release.
- **Lock projector view**: pins the Observer view so accidental viewport clicks don't move it.
- **Exit**: leave look-from mode and return to the previous Perspective view.

Human acuity analysis

When looking from an Observer, the toolbar exposes the **Acuity** button. Click it to colour-code every projected pixel and every LED pixel by how its apparent angular size compares to human visual acuity (1 arcminute, the 20/20 threshold). LED tiles and projected surfaces are tinted together so you can compare resolutions in a mixed rig. See Viewport & analysis: Human acuity for the colour key and what each band means.

See also

- Projectors
- Viewport & analysis: photometric, projection accuracy, brightness, and human acuity
- Export & PDF layouts

Collaboration

Mapping Matter scenes are collaborative documents. A scene lives inside a **Production**, a shared unit that you decide who can open. Once people are on the Production, anyone with read access can open the scene, anyone with write access can edit it live, and edits stream to other clients within a second.

Productions and access

Each scene lives in a Production. A Production has a **visibility** (who can see it) and a list of **shares** (specific people and teams who have access).

- **Private (only me)**: the default for new Productions. Only the people listed in the share dialog can see it.
- **Organisation**: every member of the owning organisation can open and edit the Production as an Editor. Admins still control sharing, scope changes, and deletion.

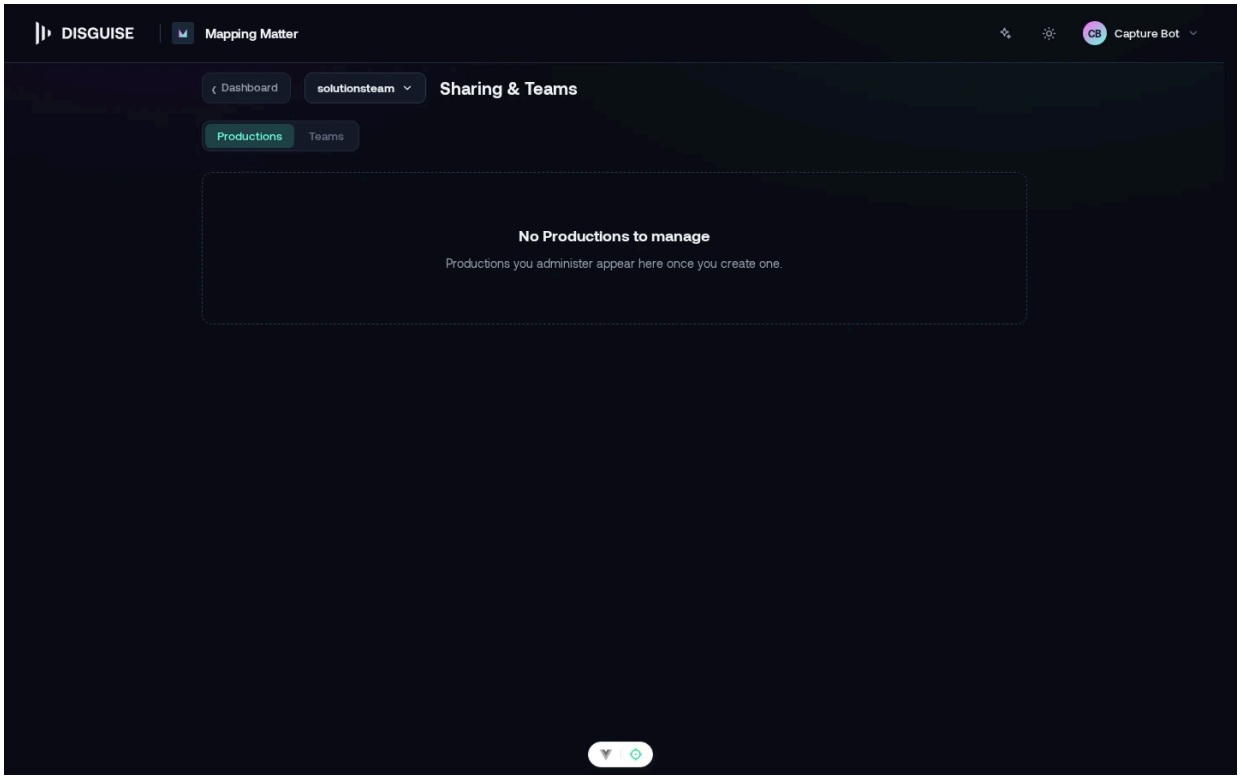
A user's role on a Production is the highest of:

1. Their explicit role on the Production (Admin / Editor / Viewer).
2. The org scope (Contributor / Editor if visibility is **Organisation** and they're in the owning org).
3. Membership of a Team that is shared onto the Production.

You can change visibility at any time. Flipping a Production from Private to Organisation grants every org member Editor access; flipping back removes that access immediately. Both directions prompt for confirmation.

Inviting people

Open **Publish & Share** in the editor and switch to the **Collaborate** tab to invite users to the current Production. You can also manage Productions from the launcher's **Sharing & Teams** dashboard (header menu).



- **By email**: type an email address. If the address belongs to a Disguise Cloud user, they're added immediately as the chosen role. If not, they receive a branded invitation email with a sign-in link, valid for 14 days; once they sign in with that email, they're auto-added to the Production.
- **Editor or Viewer**: pick the role at invite time. Editors can change scene content; Viewers can open the scene but can't edit. The role on an existing member can be changed inline.
- **Cross-organisation**: you can invite someone in another organisation. Cross-org invites land as Editor or Viewer (never as Admin); they can be revoked at any time.

Pending invitations and accepted members are listed together. Revoke an invite to invalidate the link, or remove a member to drop their access immediately. The owning org's Admins can manage the share list; Editors and Viewers cannot.

Teams

When the same group of people needs access to multiple Productions, set up a **Team** in the Sharing & Teams dashboard. A Team is a named group of users that you share onto a Production in one step rather than adding the same five people to ten Productions. Teams support external (cross-org) members the same way Productions do: invite by email, and the email-verified invitee joins on first sign-in.

A Team share grants Editor or Viewer (never Admin). To remove a Team's access from a Production, delete the Team share; to remove a person from every Production they're sharing into, take them out of the Team.

Real-time editing

Once two or more people are on a scene, edits stream live and presence shows up in the editor header.

The header shows an avatar for every user currently in the same scene. Hover an avatar to see the user's name. Each collaborator's view focus appears as a coloured cursor in the viewport, fading after a few seconds of inactivity.

To prevent conflicting edits, Mapping Matter takes a short-lived lock on the scene whenever a user is actively editing. If you try to edit while another user holds the lock, the toolbar shows a notice and your input is queued briefly. If a true conflict is detected (two users dragging the same object), Mapping Matter resolves by accepting the last write and surfacing a conflict toast with a quick undo to the affected user.

View-only and entitlements

Mapping Matter is free to read: any signed-in user can browse demo Productions and any Production they've been shared into. Creating and editing scenes requires an active Mapping Matter entitlement on the user's organisation.

If you open a scene without an editing entitlement (for example, you're an Editor on a shared Production but your own org doesn't have Mapping Matter), Mapping Matter shows a **View-only** notice once per session, and the editor hard-blocks every write action. People who only ever had Viewer access don't see the notice; they just open the scene read-only as expected.

Every mutation entry point is disabled and greyed in view-only mode: Properties sidebar inputs, toolbar copy / paste / duplicate / delete, transform gizmos, scene-tree drag-drop, layer add / remove, and every keyboard shortcut that would edit the scene. There are no controls that appear active but silently fail on write.

Sharing outside the editor

Productions are for ongoing collaboration. To share a frozen view with a client or external reviewer, without granting them access to live editing or scene history, publish a snapshot and create a link or user share.

See also

- Publish & share: snapshots, link shares, and user shares
- Snapshots & revisions
- Plan entitlements

Effectors

Effectors wrap a selected object (or group of objects) into a live container that produces copies. Edit the source and every copy follows; the originals stay editable in the scene tree, copies stay non-pickable until you bake. The toolbar **Effector** button in the add cluster opens a popover with four modes.

You can also create an effector with **no** selection: the effector's gizmo is added at the scene root and you populate it later by dragging objects into it in the Scene tree. Use this when you want to place the array/symmetry plane first and decide what to mirror or duplicate afterwards.

All four modes share the same lifecycle:

- The source object stays as a child of the effector, so edits propagate to every copy.
- Copies are non-pickable in the viewport and don't show in PDF / CSV exports unless the effector is baked.
- **Bake** (in the effector's Properties panel) converts the effector into independent objects, after which copies behave like any other scene object.

Symmetry

Mirrors the source across the array's X axis. Symmetry always produces exactly one copy. Move or rotate the source and the mirror tracks instantly, useful for stacked stage-left / stage-right rigs and any layout where the audience is centred on the venue's axis.

For projectors specifically, horizontal lens shift is inverted on the copy so the projected images converge symmetrically.

Linear Array

Duplicates along an axis. Set:

- **Number**: total instance count, including the original (1 = no copies, 2 = original + 1 copy, etc.).
- **Spacing** (X / Y / Z): inter-copy offset in the active scene unit. Most rigs use a single axis; setting two or three creates a diagonal stride.

The first copy sits one **Spacing** offset from the source; copies continue in the same direction.

Polar Array

Duplicates around the array's local origin. Copies share the source's distance from the array origin; only their angle around it changes.

- **Number**: total copy count including the source.
- **Angle Max**: spread in degrees (1–360). The first copy is at 0°, the last at Angle Max.
- **Full 360°**: when ticked, the spread wraps a complete circle and the last copy is placed at `Angle Max × (Number-1) / Number` so spacing is even.

To move the rotation centre, move the **Polar Array** object itself; the copies follow because they're its children.

Fan

Fans copies around a rotational axis. Unlike Polar Array, Fan keeps copies at fixed offsets from the source; only their *rotation* steps, not their position. Use Fan for things like lighting trusses tilted in chord progressions, or projector arrays where each unit toes inward.

- **Number**: total copy count including the source.
- **Spacing**: per-step position offset between copies. Independent of fan angle.
- **Fan Angle**: total angular spread in degrees.
- **Axis**: which Euler axis the fan rotates around: Yaw, Pitch or Roll.
- **Direction**: which side of the source the copies extend to (forward / backward).
- **Array Origin**: whether the source sits at one end of the spread or at its centre.

Mounting an effector on a truss

Mounting an effector onto a truss carries every copy with it: set the source projector's clamp position and all the copies inherit a chord-relative pose. The whole array slides as a unit along the chord.

See also

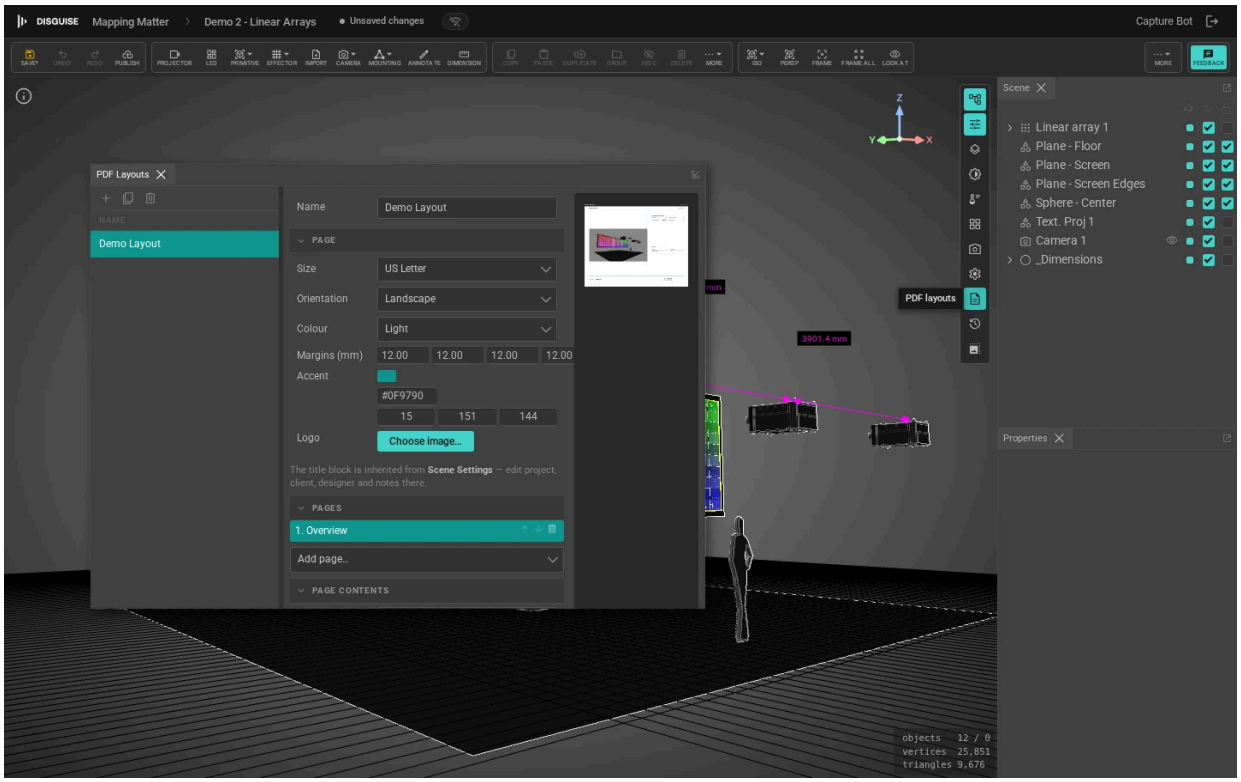
- Getting started: where the Effector button lives on the toolbar
- Trusses & mounting: clamping an effector to a truss
- Projectors and LED screens: the most common sources for effectors

Export and PDF Layouts

Mapping Matter produces field-ready documentation directly from your scene: fully customisable projection-study PDFs, projector spec CSVs, and 3D mesh exports for handoff to other tools.

Projection-study PDFs

A **projection study** is a bound PDF report you can shape page-by-page from a set of prebuilt templates. Open **PDF layouts** from the bottom Panels strip.



The panel has three areas:

- **Global page settings**: page size (**ISO A4** → **A0**, or **US Letter**), orientation, and margins. Every page in the layout uses these.
- **Title block**: logo image, free-text title, date, version, and page-number style. Applied to every page in the layout.
- **Pages list**: the list of pages that will be printed, in order. Add, remove, reorder, or swap the template. Each page's per-slot controls appear in the Properties panel when it's selected.

Templates

Every page picks from a set of prebuilt templates. Each template exposes typed **slots** that you fill:

- **Cover**: title block + hero render at any viewpoint.
- **Scene overview**: top-down or perspective render with a projector-count summary.
- **Per-projector detail** (repeats, one page per projector): projector's own viewpoint, spec table, throw and lens data.
- **Per-LED-screen detail** (repeats, one page per LED wall): spec table, tile-layout diagram, and 3D mesh view.
- **Per-observer detail** (repeats, one page per Observer): POV render and human-acuity page.
- **Photometric report**: illuminance (lux) and luminance renders on a chosen viewpoint.

Repeat pages materialise to one page per matching object when the PDF is generated, so a scene with eight projectors and one observer produces a single **Per-projector detail** entry in the list but eight pages in the output.

Render slots and visualisation modes

Any render slot on any page can be set to display one of several **visualisation modes**, picked per slot:

- **Projection output**: the beams-on-geometry view.
- **Pixel density**: pixels per unit length on the surface.
- **Pixel stretch**: the anisotropy of a projector's pixels on the surface.
- **Illuminance (lux)**: photometric heatmap.
- **Luminance**: the reflected-light view.
- **Visual acuity**: from an Observer's eye position.

The colour bar and legend follow the scene's active units and the panel's scale settings, so a lux page in a scene set to lumens per square metre reads the same as it does in the viewport.

Live preview + generate

The panel shows a **live preview** of the assembled document: swap templates or edit a slot and the preview updates in place. Click **Generate PDF** to render the final vector PDF using the scene's real render pipeline (via a headless HTML→PDF service). If no render service is configured the editor falls back to a browser print preview using the same layout, so you can still produce the deliverable locally.

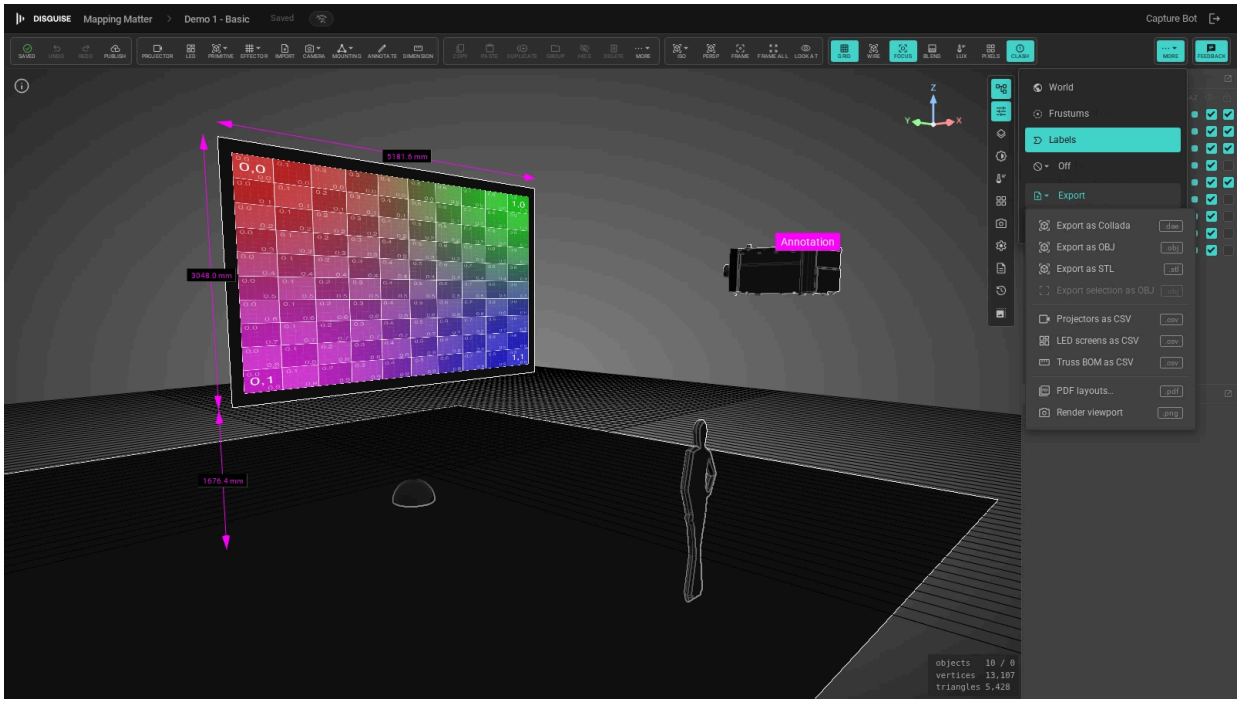
Generating a PDF never dirties the scene or flickers a mode to collaborators; the export uses an isolated render config that autosave and realtime broadcast ignore.

Reusing layouts across scenes

Save a study to the layout library from the panel's overflow menu. The whole page list, templates, slot settings, and title block are stored together, so you can drop the same study configuration onto a new project and just re-generate.

Export menu

Click **Export** on the right side of the toolbar to open the export dropdown:



CSV export

The **Projectors as CSV** and **LED screens as CSV** actions in the Export dropdown produce row-per-object specification tables. Useful for handoff to media servers (Designer, Notch, others) that import scene metadata.

Projector and LED CSV files are written without a UTF-8 byte-order mark so the Designer importer can parse them directly. **Truss BOM as CSV** still includes the BOM so Excel renders the multiplication sign in dimension columns correctly.

The **Truss BOM as CSV** action emits a rigging bill of materials: one row per truss (type, profile, dimensions, mass), one row per base, plus per-truss attachee rollups walked through any Symmetry copies so projector and LED counts reflect what's actually rigged. See Trusses & mounting.

3D mesh export

The Export dropdown's **Export as OBJ / Collada / STL** actions emit a scene mesh containing the selected geometry (or all visible geometry if nothing is selected). Use **Export selection as OBJ** to limit the output to the current selection. Multi-object selections (including imported References and projector bodies) emit non-empty geometry, and the units and axis convention match the whole-scene exports (metres, Y-up).

Snapshot export

A published snapshot can also be exported as a single self-contained `.zip` containing the scene JSON, all referenced textures, meshes, and the title block, used for offline archives and contractual handoff.

See also

- Cameras & POV
- Libraries and assets
- Publish & share

FAQs

Answers to the common questions when working in Mapping Matter: keystone correction, ultra-short-throw lenses, mirrors, pixel-resolution maths, navigation hardware, and sharing. If your question isn't here, send it through the **feedback form**.

How do I do keystone correction?

Mapping Matter does not have an explicit keystone tool because projection mapping itself solves the geometric correction problem: you align the projector to the surface and the geometry is correct. To visualise the projected texture *on the surface* without the physical beam visible, enable **Projection Map** in the receiving material's Properties panel and assign the same texture you assigned to the projector. This is useful for client review.

Can I model an ultra-short-throw projector?

Yes. UST lenses are first-class. Pick a UST projector from the **projector library** and Mapping Matter will:

- apply the lens's **fixed optical offset** (the large baked-in beam-up offset that defines a UST head) on top of any motorised shift,
- detect that you're on a UST lens and surface a **UST lens: add a fold mirror?** banner in the sidebar with an **Add suggested mirror** button that drops in a 45° fold plate aimed at the projector's target,
- show the beam footprint on the mirror plate so you can size it against the cone.

If the exact model isn't in the catalogue, click **+ Create custom** in the library overlay. The form covers everything the optics model needs (throw range, fixed optical offset with V/H plus convention, adjustable shift envelope and mode, mount slug), and the AI ghost-fill will populate them from the manufacturer + model name. See **Projectors: Custom projectors**.

Do I still need the "fake mirror" trick?

No. The **mirror feature** replaces the old workaround of parenting a Symmetry under an Empty Node. Use a real mirror plate for bounce, snorkel, and folded-beam configurations.

How do I calculate pixel resolution across multiple projectors?

The photometric analysis panel reports per-surface coverage and pixel density. For manual back-of-envelope:

```
effective_horizontal_pixels = N × image_width_px × (1 − blend_percent)
```

For example, two 1920 × 1080 projectors blended at 20%: `2 × 1920 × 0.8 = 3072` effective pixels.

Do you support SpaceMouse?

Not yet. The viewport supports keyboard + mouse navigation and the saved views strip; see Cameras & POV.

Where are the keyboard shortcuts?

Press `F1` anywhere in the editor, or open the Keyboard shortcuts page for the full list.

Where does the revision history live?

Every edit creates a revision automatically. Click **Revisions** in the bottom Panels strip to browse or restore. See Snapshots & revisions for the full model. The legacy “last 10 opens” snapshot system has been replaced by full history.

Which browsers are supported?

Recent desktop Chrome, Edge, Safari and Firefox on macOS and Windows. WebGL 2 is required. Mobile browsers are not supported.

How do I share with someone outside my organisation?

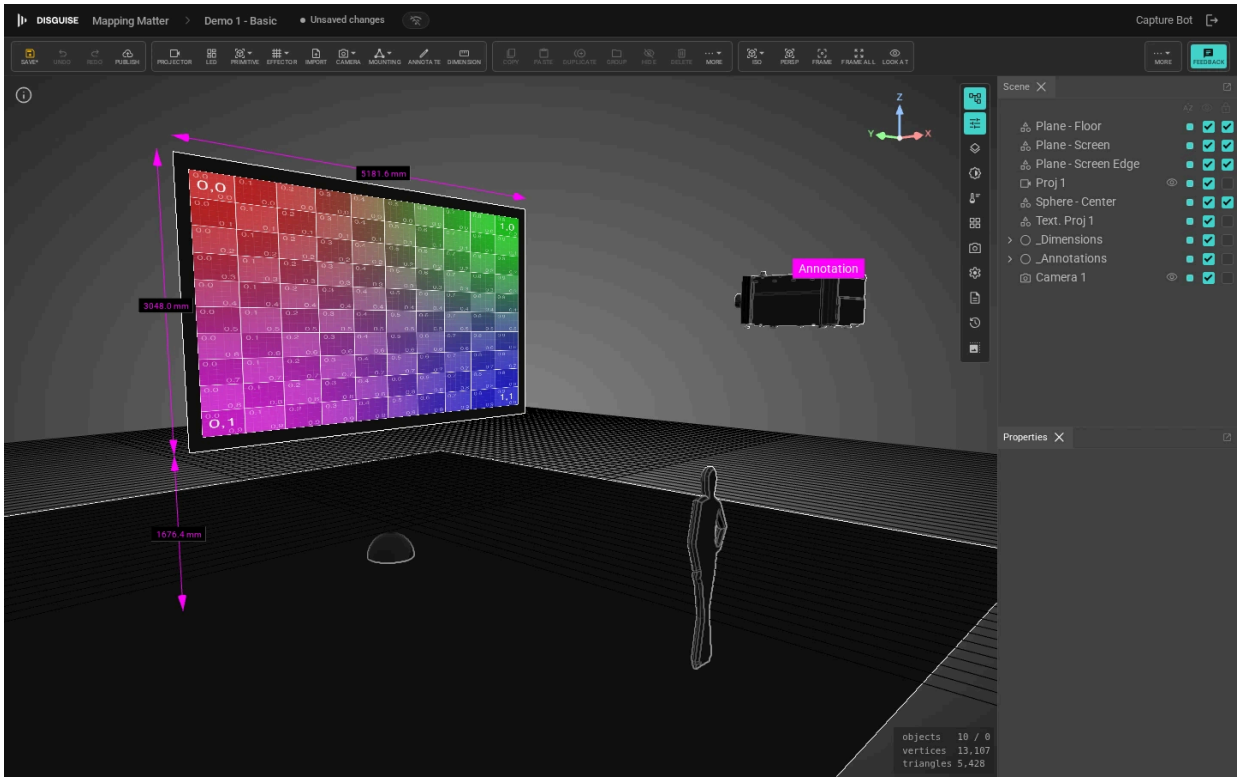
Publish a snapshot and add a link or user share (see Publish & share). Link shares can be password-protected and revoked at any time.

I get a “scene is locked by another user” notice. What now?

Another collaborator is actively editing. Mapping Matter queues your input for a few seconds; if the lock persists, ask them to pause. See **Collaboration**.

Feedback

Mapping Matter is under active development and we read every report. The fastest route to the team is the **Feedback** button pinned to the far right of the viewport toolbar.

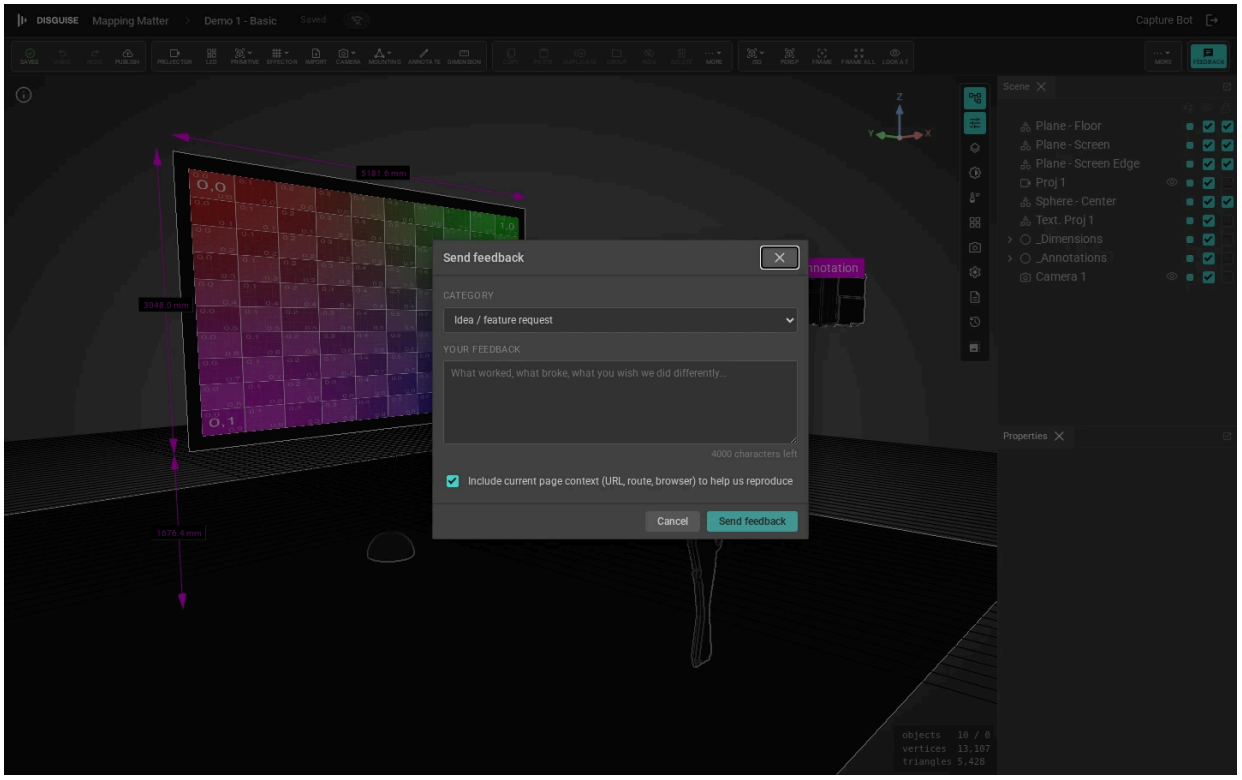


Submit a report

Click **Feedback** to open the feedback form. Choose a category, write a description, and submit.

Category	When to use it
Bug	Something didn't work as expected.
Idea	Feature suggestion or enhancement.
Usability	Something works but is hard to find, slow, or confusing.

Category	When to use it
Praise	Tell us what's working; this is the category we read most carefully.



Report a problem with a library entry

If a catalogue projector has the wrong throw ratio, lumens or lens options (or you spot a similar issue on an LED tile or truss), open the library overlay and click the small flag icon on the offending card. A short dialog pre-fills the entry's details so the report reaches the same triage queue with the right context. Use this rather than the general Feedback button whenever the problem is data on a specific catalogue item, so we can patch the model directly.

What is sent

Each submission includes:

- The text you wrote and the category you chose.
- Your Disguise Cloud user ID and the name of the project / scene you were in.
- The current URL, browser user-agent string, and Mapping Matter version.
- For library reports, the catalogue ID and the row's current spec values.
- No scene content or screenshots. If a bug needs visual context, attach a screenshot in the form's optional attachment field.

What happens next

Submissions land in the Disguise internal triage queue. A team member reviews each item, files a tracking ticket if it's actionable, and may follow up by email, so use a valid Disguise Cloud account when reporting.

You don't get an in-app reply. Status updates on individual reports are not currently exposed in Mapping Matter; product-wide changes are summarised in the release notes.

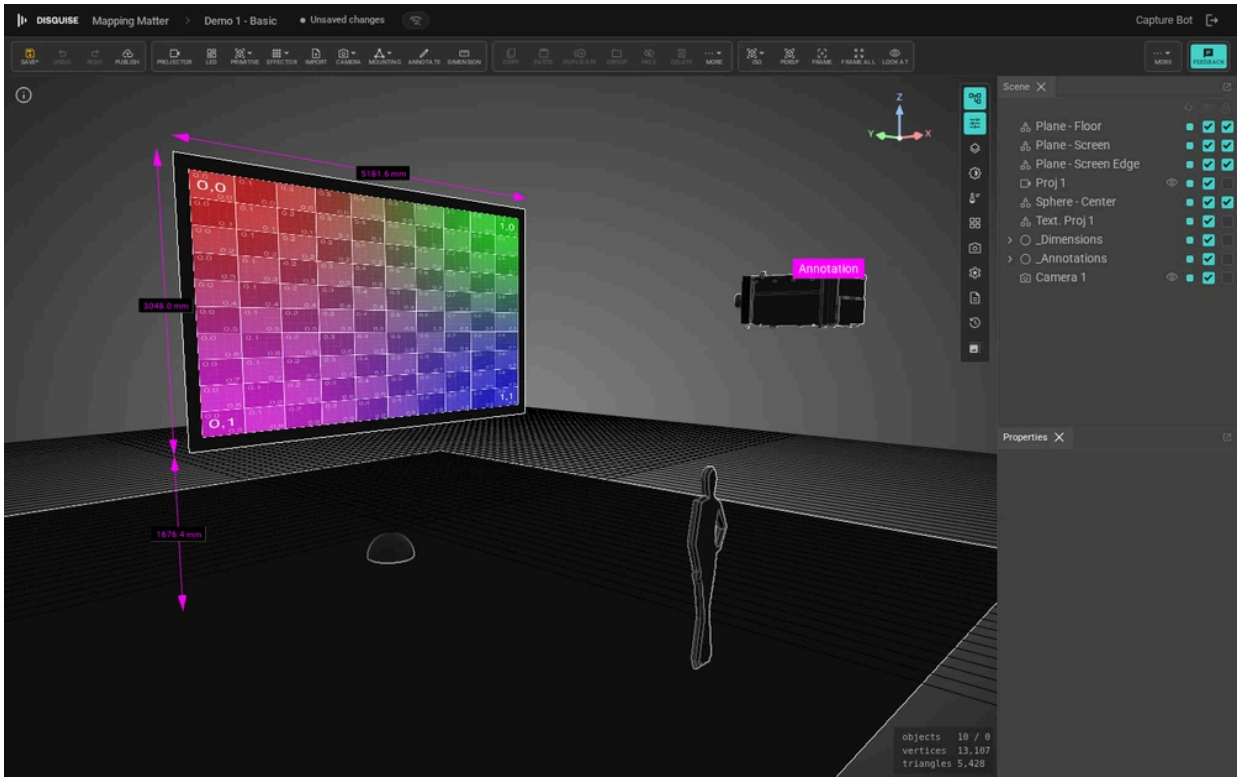
Getting Started

This page walks you through opening your first scene, the layout of the editor, and the basic operations you need to start designing.

Open or create a scene

You open Mapping Matter from the Disguise Cloud launcher dashboard. The launcher has up to three tabs:

- **My Projects**: your organisation's projects. Each project tile shows the plugins available on that project; clicking the Mapping Matter tile on a project opens its scene in the editor (if the project has no scene yet, Mapping Matter creates one).
- **Demos**: read-only demo scenes provided by Disguise. `Demo 1 - Basic` through `Demo 7 - UST` cover progressively richer setups (basic projection, linear arrays, sphere mapping, textures, mesh luminance, video playback, ultra-short-throw). Click a demo tile to open it in the editor.
- **Migratable**: only shown if you have scenes in **legacy Mapping Matter**. Each tile is a one-click handoff into the modern editor: the legacy scene is rebuilt as a new project with its meshes, textures and projectors carried over. The original is left untouched unless you opt in to marking it as migrated.

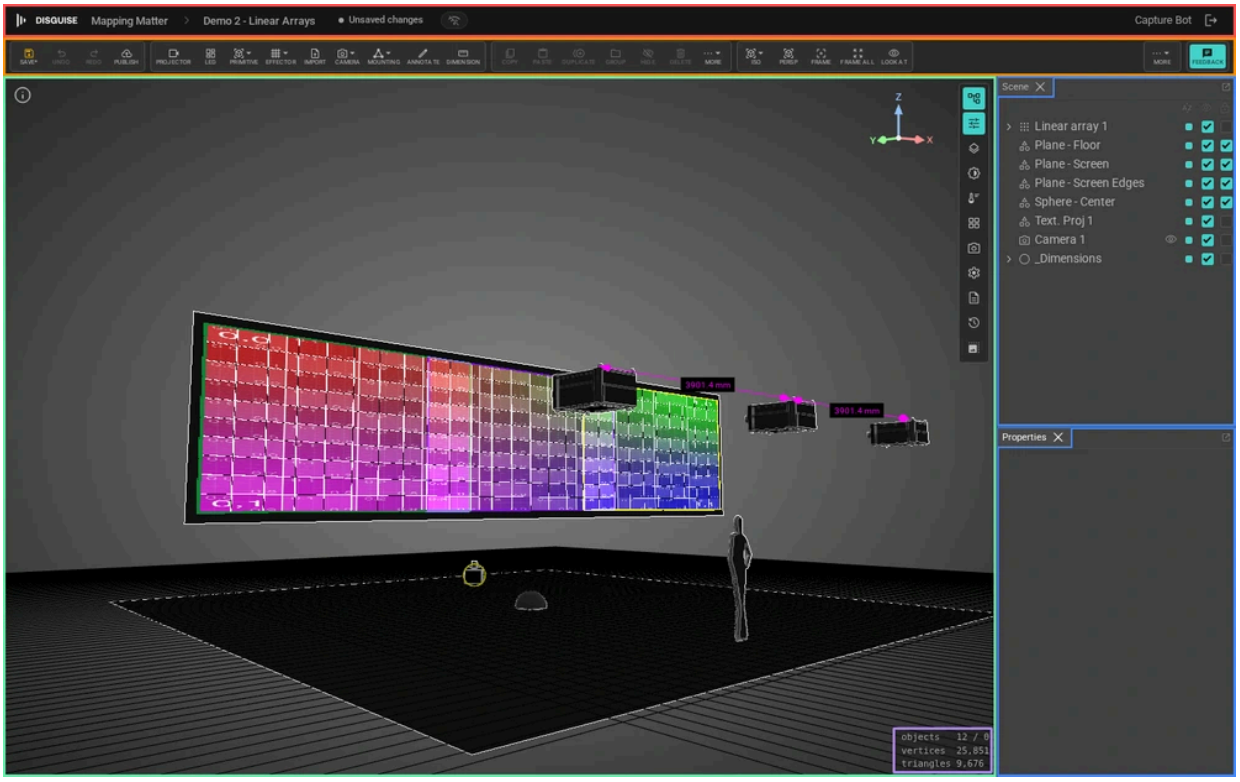


Project-to-scene is one-to-one: each project has exactly one Mapping Matter scene. To work on a different scene, switch projects in the launcher rather than looking for a scene picker inside Mapping Matter.

The launcher header shows a **sparkle icon**; open it any time to read the latest **What's New** announcement from the Disguise team. An unread dot appears when a new announcement is published; the dot clears once you open the panel. Fresh sign-ins to the dashboard always pick up the latest content.

The launcher remembers your **sort order** (Last edited ↔ Name), **scope filter** (All / Private / Org / Shared), and grid/list view per browser, so the dashboard opens the same way each time. The projector and LED library overlays in the editor persist their brand filter, origin filter, and sort the same way.

Editor layout



Region	Purpose
Header (top)	Disguise Cloud breadcrumb, scene name, network status, account menu.
Viewport toolbar (below the header)	Clustered buttons grouped left to right: file (Save / Undo / Redo / Publish), add objects, edit selection, view presets, display toggles, transform space, Export, Help. **Feedback** is pinned to the far right.
Viewport (centre)	The 3D scene. Pan with left-click drag on empty space, zoom with middle-click drag or scroll wheel, orbit with right-click drag.

Region	Purpose
🟦 Scene tree and Properties panels (right)	The Scene panel lists the scene graph; the Properties panel shows fields for the current selection. Both are dockable: open or close them from the bottom-edge **Panels** strip.
🟫 Panels strip (bottom edge)	Icon buttons for every dockable panel (Scene, Properties, Layers, Brightness, Pixel density, Camera settings, Viewport settings, PDF layouts, Revisions, Scene settings). Click any to open or close that panel.
🟪 Viewport info (bottom right)	Object / vertex / triangle counts.

If Mapping Matter deploys a new build while you're mid-session, a **Reload** banner appears in the top-right corner. It's non-blocking; click it when you're at a good stopping point. It never reloads on its own, so unsaved work stays safe. Focus a green **number field** in the Properties panel and the mouse wheel starts editing that field instead of scrolling the panel; focus off, and the panel scrolls again.

The toolbar adapts to viewport width. Below 1440 px the clusters collapse to icon-only buttons, and anything still wider than the editor pulls into a right-anchored **More** ▾ dropdown so the ribbon never overflows.

Panels

Click any icon button in the bottom-edge **Panels** strip to open or close that panel:

- **Scene**: scene graph tree with visibility and lock toggles per row.
- **Properties**: context-switched panel for the current selection (projector lens, LED tile count, material, etc.).
- **Layers**: bulk layer visibility and locking.
- **Brightness**: lux heatmap controls (see **Viewport & analysis**).
- **Accuracy**, **Camera settings**, **Viewport settings**: viewport tuning.
- **PDF layouts**: page templates (see **Export & PDF layouts**).
- **Revisions**: scene revision history.
- **Scene settings**: units, title block, auto-save.

Objects in the Scene panel are grouped into **layers**. Toggle a layer to hide everything beneath it, or include only specific layers when publishing a **snapshot**.

Reparenting in the Scene panel

Drag a row in the Scene panel onto another row to reparent it:

- Drop **onto** a node to set that node as the new parent.
- Drop **above or below** a sibling to reparent under the sibling's parent in that position.
- Drag a multi-selection to move the whole top-level selection at once.

The same restrictions as the Properties **Parent** dropdown apply: you can't reparent into a `Reference`, `Pov`, `Measure` or `Annotation`, into a locked subtree, or into the dragged object's own descendants.

Rearranging panels

Every panel is dockable. Grab the panel's header tab and drag it to:

- An edge of the editor: the panel snaps to a new vertical or horizontal rail.
- An existing panel's tab strip: the dragged panel becomes a tab alongside the target.
- The viewport area: the panel floats free as a movable window.

Your layout persists per scene, so the workspace you set up for a projector-heavy rig is different from the one for an LED-only scene.

Navigate the viewport

Action	Mouse
Pan	Left-click drag on empty space
Zoom	Middle-click drag, or scroll wheel
Orbit	Right-click drag
Frame selection	`F` (or the **Frame** button in the toolbar's view cluster)
Frame all	`Home`, or the **Frame all** button in the toolbar's view cluster. With nothing framable, Home recentres the camera on its default pose so pan/zoom speed feels normal again.

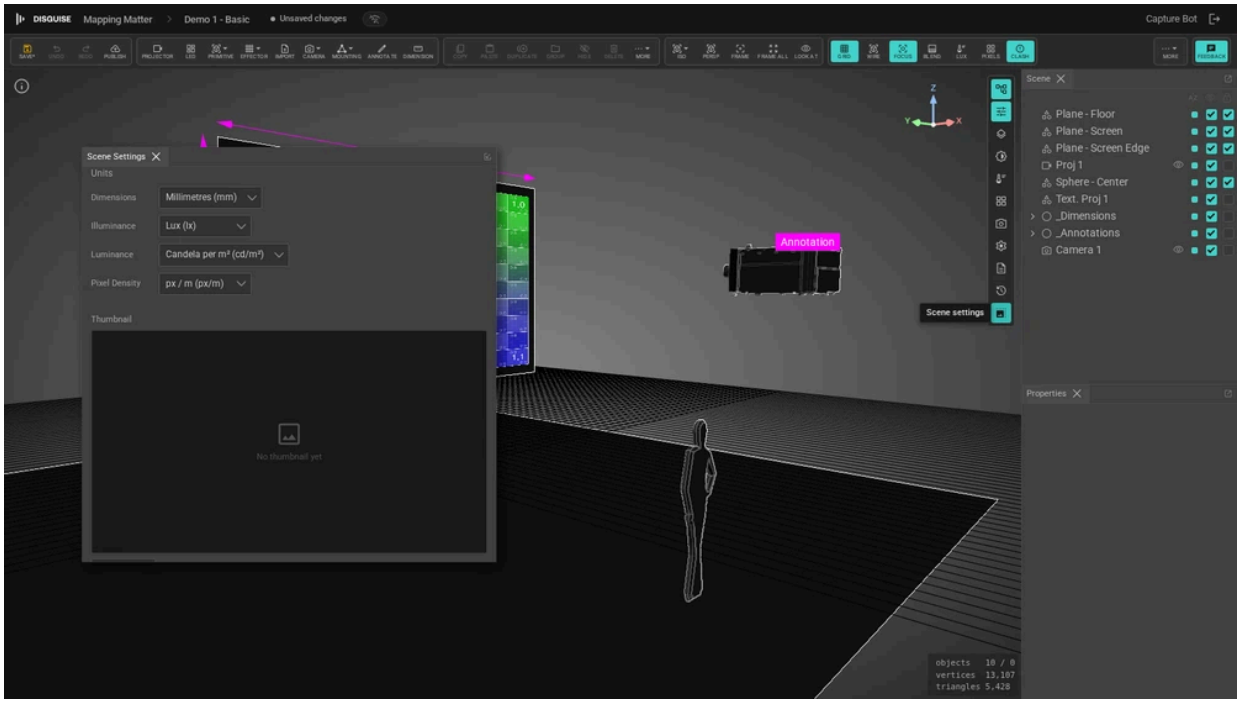
Action	Mouse
Look at selection	The **Look at** button (rotates the camera toward the current selection)

All keyboard shortcuts are listed in the **Keyboard shortcuts** page; press `F1` at any time to open the in-app reference.

If you prefer Blender / Maya's mouse convention, open **Scene settings** and turn on **Swap orbit / pan mouse buttons**. Left-drag then orbits, right-drag pans. Middle-click zoom is unchanged. The preference is per-browser and takes effect immediately across every open scene.

Scene units and settings

Click **Scene settings** in the bottom Panels strip to open the Scene Settings dialog. Set the working unit (mm, cm, m, ft, in), background colour and gradient, fog, and the title block that travels with every published snapshot.



Add objects

The viewport toolbar's add buttons are direct, with no "Add" submenu. Each button is in the second cluster from the left:

- **Projector**: opens the **projector library**.
- **LED**: opens the **LED library**.
- **Primitive**: popover with Plane, Box, Room, Circle, Cylinder, Sphere, Icosahedron, Torus, Torus Knot, Equirectangular Dome, Dome Master, and Empty Node.
- **Effector**: popover with Symmetry, Linear Array, Polar Array, and Fan effectors that duplicate or distribute the current selection.
- **Import**: opens the asset browser to bring in an `.obj`, `.fbx`, `.dae`, `.stl` or `.gltf` mesh. Imported meshes up to 100 MB are saved to your project library; larger meshes can still be loaded locally for the current session.
- **Camera**: popover with POV camera and Observer.
- **Mounting**: popover with truss types (Tower, Horizontal Span, Goal Post, A-Frame, Ladder, Arc, Ring), bases (Base Plate, GB Block, Sled, Outrigger), and a **Truss library...** entry for the full catalogue. See **Trusses & mounting**.
- **Annotate** (`A`): start the freehand annotation tool.
- **Dimension** (`T`): start the dimension measure tool.

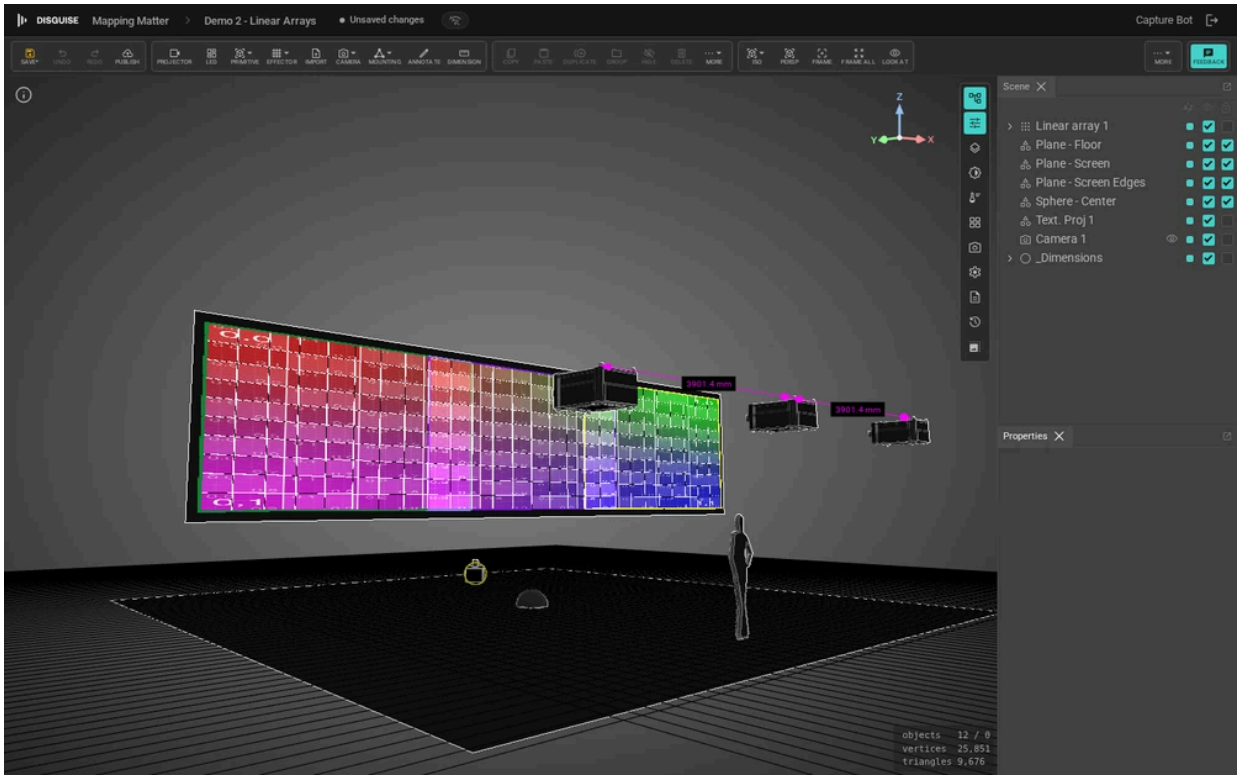
To add a mirror to a projector, select the projector and open the **Mirror** collapsible in its Properties panel; see **Mirror**.

Move, rotate, scale

Select any object and use the transform gizmo. Numerical position, rotation and scale are available in the Properties panel for the selection. The **World** / **Local** toggle in the toolbar switches the gizmo space. Changes auto-save and are added to the revision history.

Effectors: arrays and symmetries

Use the toolbar **Effector** button to wrap the current selection in an effector. Four modes are available (**Symmetry**, **Linear Array**, **Polar Array**, **Fan**), each with its own parameters and behaviour. See **Effectors** for the full reference and per-mode animations.



Materials and textures

Select any mesh and open its **Material** panel to set base map, projection map, colour, metallic, roughness, and emissive. Textures come from the **Library**; the same texture can be reused across multiple objects.

Saving, revisions and snapshots

You don't need to save manually; Mapping Matter auto-saves as you work. To return to an earlier state, click **Revisions** in the bottom Panels strip.

- **Revisions** are the per-edit history of your current scene. Restoring a revision overwrites the current scene.
- **Snapshots** are named, locked publishes of the scene at a point in time. Snapshots are how you share the design; see **Publish & share**.

See **Snapshots & revisions** for the full model.

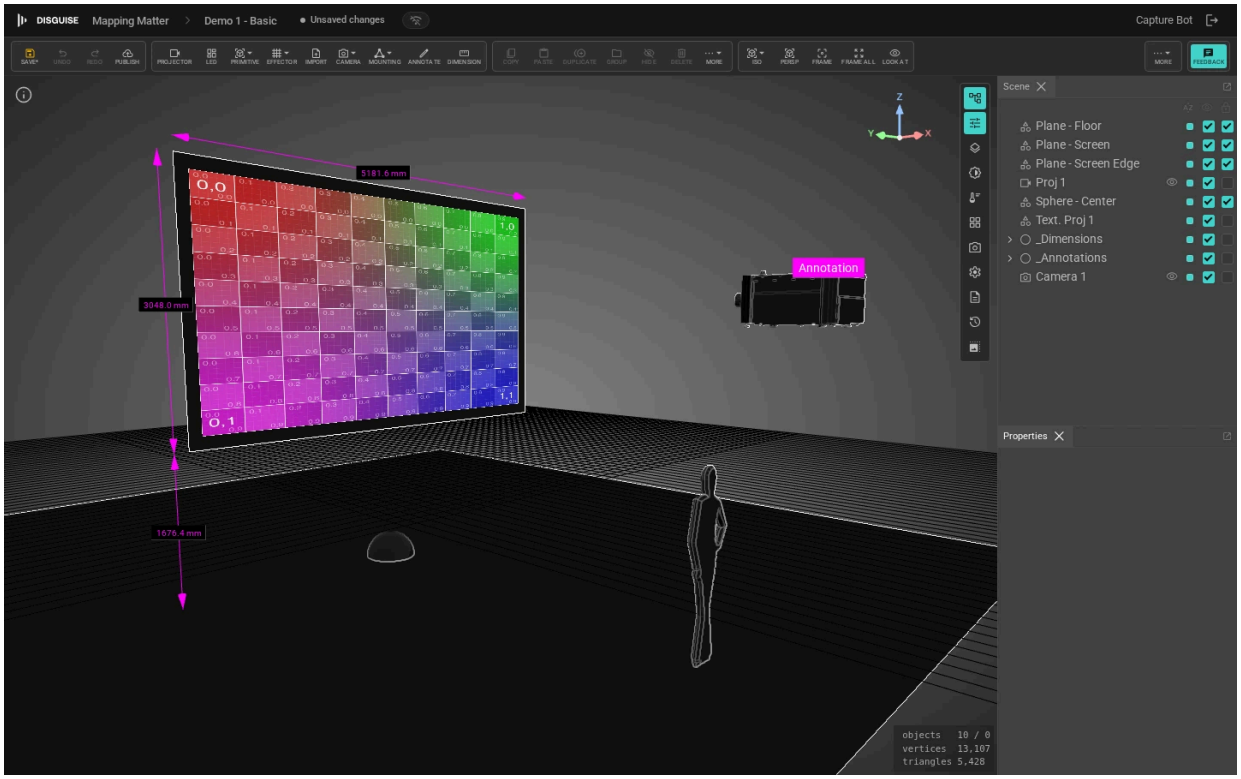
What's next

- Add projectors and aim them: see **Projectors**.
- Add an LED wall: see **LED screens**.
- Run a photometric or brightness check: see **Viewport & analysis**.

- Publish your work for a client: see **Publish & share**.

Introduction

Mapping Matter is a Disguise Cloud plugin for projection and LED design. In a scene you place projectors, LED tiles, cameras and observers; preview content on 3D geometry; run photometric, accuracy and brightness analyses; and publish snapshots for review.



How it works

Platform

Mapping Matter runs in desktop browsers (Chrome, Edge, Safari, Firefox) on macOS and Windows, and requires WebGL 2. Scenes, revisions and assets are stored in your Disguise Cloud project. There is no local install or backup.

Architecture

- **Scenes** are 3D documents tied to a Disguise Cloud project. They auto-save and keep a full revision history.
- **Snapshots** are named, locked publishes of a scene: read-only copies shared by anonymous link (with optional password) or by emailing specific users.

- **Collaboration** is real-time. You see other editors' cursors, and scene locks prevent conflicting edits.
- **Libraries** are split between your project (private assets, layouts, custom projectors) and a platform-wide demo library that signed-in users can browse.

Who uses it

Projection-mapping professionals: technical designers, projectionists, content creators, set designers, and sales engineers preparing budgets and proposals.

Typical use cases:

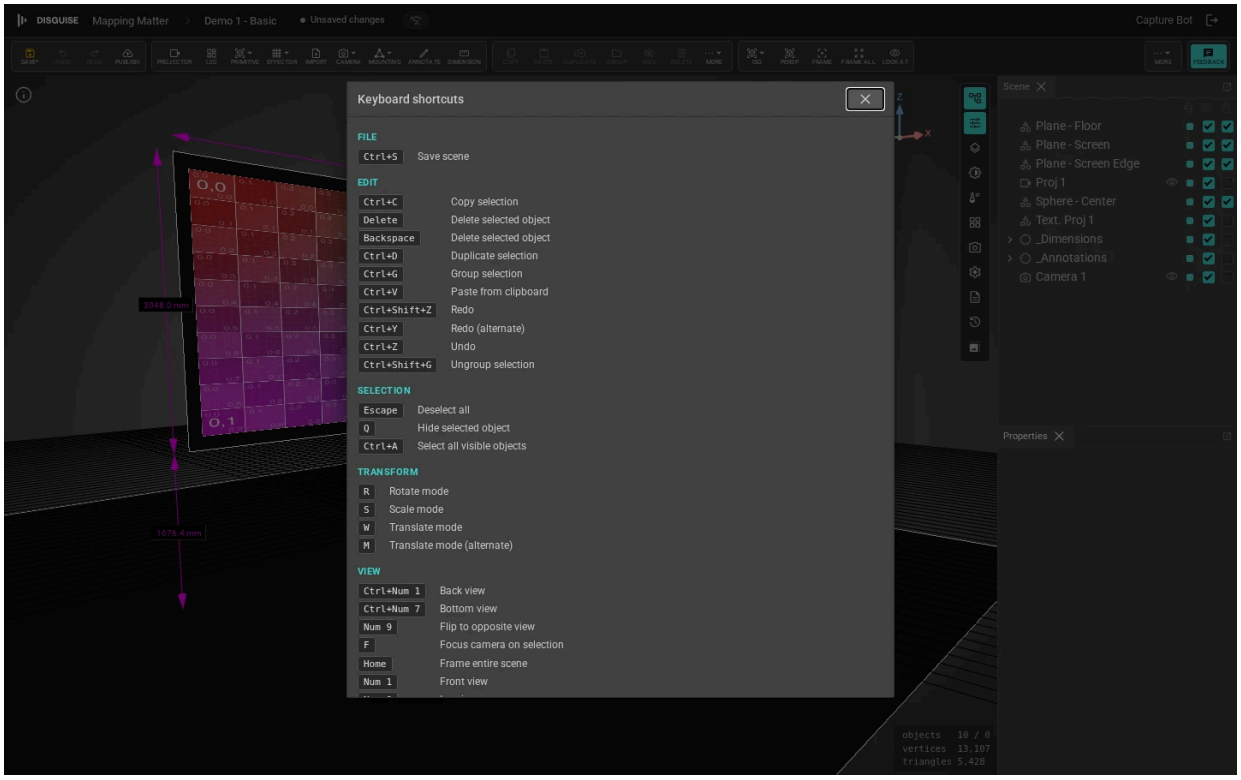
- Iterate on projector placement, lens choice, and stack count.
- Check contrast and coverage with the photometric and brightness viewports.
- Preview stills and short clips on 3D geometry, including LED tiles.
- Measure pixel density and overlap per surface.
- Produce PDF layouts and CSV exports for media servers.
- Share design intent with clients via published snapshots that can be password-protected and revoked.

What it isn't

Mapping Matter is not a content authoring or playback tool. It previews stills and short clips on geometry; use Designer for show authoring and playback.

Keyboard Shortcuts

Press `F1` at any time inside the editor to open the in-app shortcut reference. This page mirrors that reference for offline browsing; the in-app dialog is generated from the same registry that drives the handlers, so it can never drift.



File

Shortcut	Action
Ctrl+S	Save scene (auto-save also runs continuously)

Edit

Shortcut	Action
Ctrl+Z	Undo
Ctrl+Shift+Z	Redo
Ctrl+Y	Redo (alternate)

Shortcut	Action
Ctrl+C	Copy selection
Ctrl+V	Paste from clipboard
Ctrl+D	Duplicate selection
Ctrl+G	Group selection
Ctrl+Shift+G	Ungroup selection
Delete / Backspace	Delete selected object

Selection

Shortcut	Action
Ctrl+A	Select all visible objects
Q	Hide selected object
Escape	Deselect all

Transform

Shortcut	Action
W (or M)	Translate mode
R	Rotate mode
S	Scale mode

View

Shortcut	Action
F	Focus camera on selection
Home	Frame all (or reset camera to its home pose if nothing is framable)
G	Toggle scene grid

The numpad keys follow the Blender convention. Each ortho view auto-frames the scene after switching. All numpad shortcuts also fire from the **top-row digits** (`0` – `9`), so laptops without a numpad can drive them too. The in-app reference still shows the “Num …” labels for consistency.

Shortcut	Action
Num 0	Perspective view
Num 1	Front view
Ctrl+Num 1	Back view
Num 3	Right view
Ctrl+Num 3	Left view
Num 7	Top view
Ctrl+Num 7	Bottom view
Num 2 / Num 8	Orbit view down / up (15°, perspective only)
Num 4 / Num 6	Orbit view left / right (15°, perspective only)
Num 5	Toggle ortho / perspective (remembers the last ortho view)
Num 9	Flip to the opposite ortho view (Front ↔ Back, etc.)

The toolbar **View** dropdown applies the same auto-frame behaviour when you pick an ortho view from it.

Tools

Shortcut	Action
A	Open annotations tool
T	Open dimensions tool

Help

Shortcut	Action
F1	Show this shortcut reference

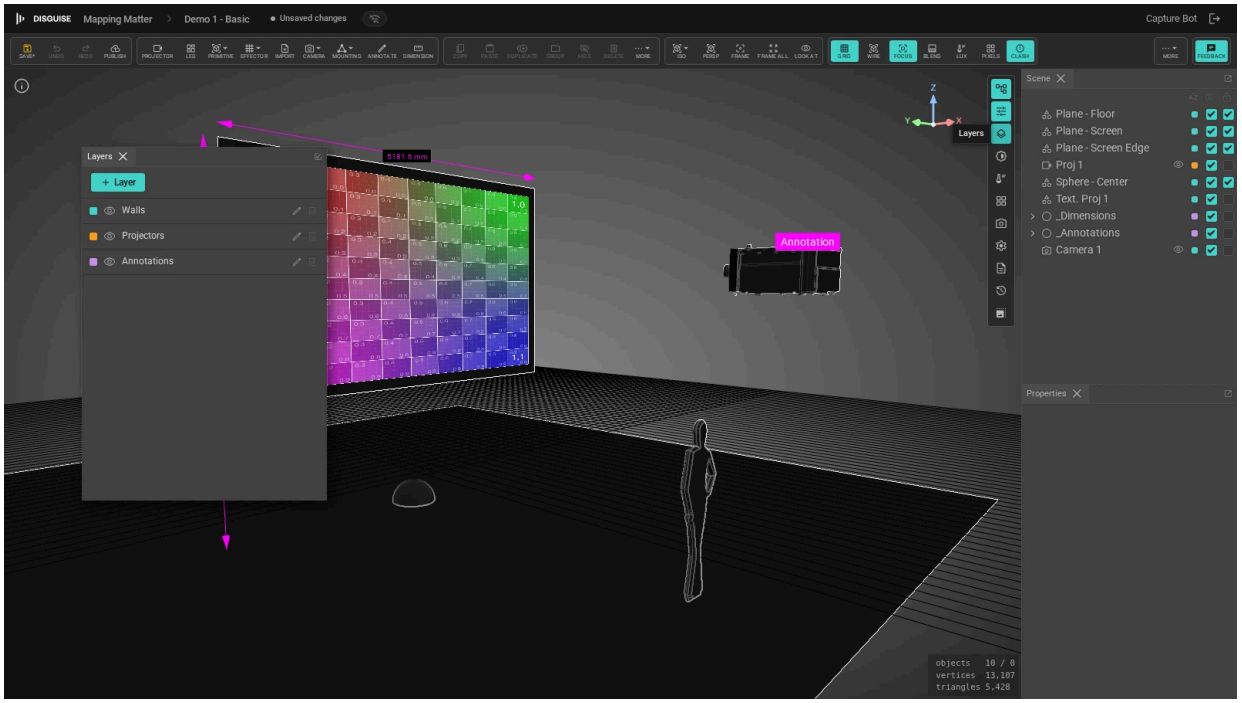
Shortcuts are fixed: they aren't user-remappable today. If a binding gets in your way, send us feedback and we'll consider remapping support.

Layers

Layers are a lightweight way to organise the objects in a Mapping Matter scene. Every scene starts with a single **Base** layer; you can add more layers, assign objects to them, and toggle whole groups of objects on and off at once. Layer membership also drives selective publishing: a snapshot can include only the layers you tick.

The Layers panel

Open the Layers panel from the **Layers** button in the bottom Panels strip. The panel lists every layer in the scene in order, with these per-row controls:



- A small colour swatch for the layer.
- A **visibility** toggle (eye icon) that shows or hides every object on the layer.
- The layer name.
- A **Rename** icon to change the name.
- A **Delete** icon to remove the layer. The **Base** layer cannot be deleted; deleting any other layer moves the objects assigned to it back to **Base**.

To add a layer, click the **+ Layer** button at the top of the panel and enter a name.

Layer changes are saved with the scene and broadcast to collaborators in real time, the same way that any other scene edit is.

Assigning objects to layers

Objects are assigned to layers from the **Scene** panel, not from the per-object Properties panel. Each row in the Scene panel shows a small layer chip; click the chip to open a layer popover and pick a layer:

- If the row is part of the current selection, the chosen layer is applied to **every** selected object.
- Otherwise, the chosen layer is applied to just that one row.

Objects without an explicit layer belong to the **Base** layer by default. When you delete a layer, its members fall back to **Base** automatically.

Visibility

Toggling a layer's eye icon hides or shows every object on that layer in the viewport. Per-object visibility (the eye toggle on individual rows in the Scene panel) is preserved across layer toggles: an object you hid manually stays hidden when the layer is shown again, and an object that the layer hid is restored when the layer comes back.

Locking is a **per-object** action, set from the lock toggle on each row in the Scene panel; there is no bulk lock toggle on the Layers panel itself. Locking blocks the gizmo and prevents the object from being edited or reparented; collaborators see the same lock state.

Layers in snapshots

When you publish a snapshot from **Publish & Share**, the **Publish** tab includes a **Layers to include** list. Tick the layers whose objects should appear in the published snapshot; by default, the currently-visible layers are pre-ticked.

This is how you produce a snapshot that highlights one part of a rig (for example, just the projector layer for a lighting brief), without rearranging or hiding objects in the working scene.

See Publish & share for the rest of the publish flow.

See also

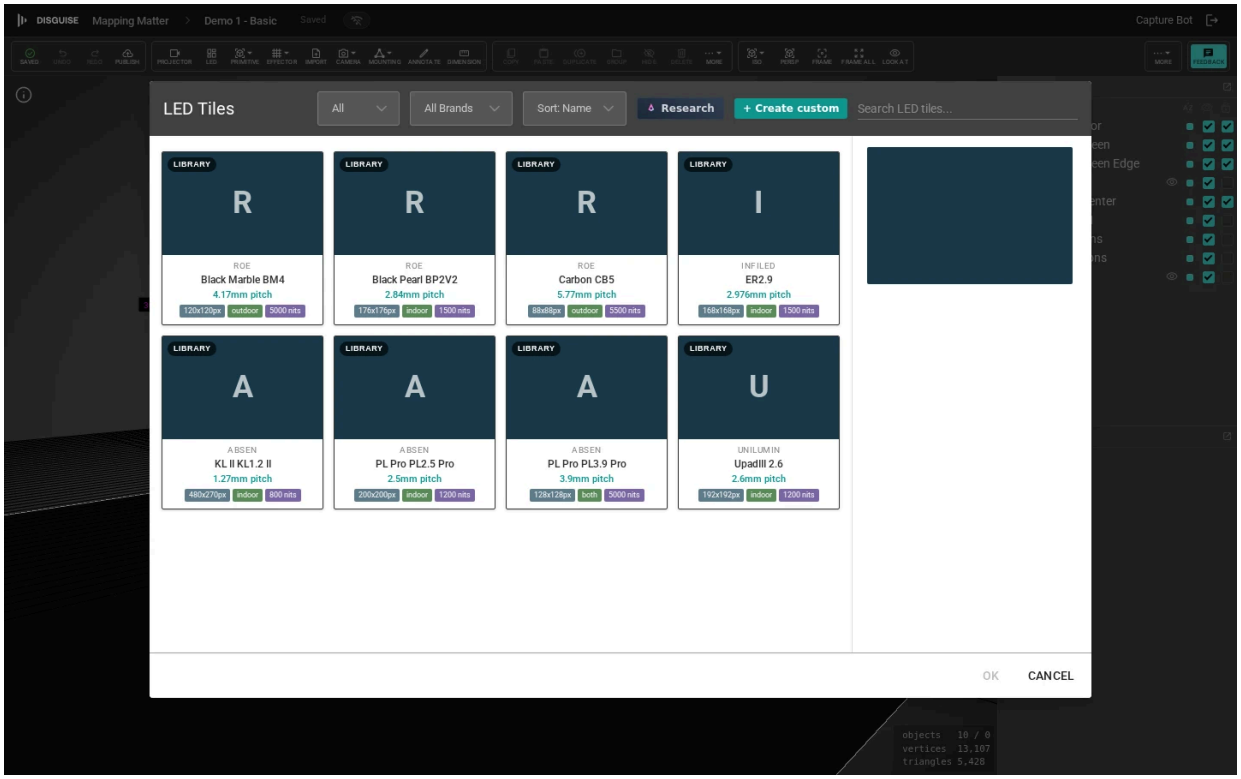
- Getting Started: overview of the editor and the Scene panel.
- Snapshots and Revisions: how snapshots fit alongside the revision history.
- Publish and Share: the full publish flow, including the **Layers to include** picker.

LED Screens

LED screens are first-class objects alongside projectors. You compose a wall from tiles, set physical pixel pitch, optionally curve the wall, and preview content directly on its surface. The same brightness and photometric viewports that analyse projection coverage also work on LED.

Add an LED screen

Click **LED** in the viewport toolbar's add cluster to open the LED library overlay. Choose a tile from the catalogue and set the wall layout.



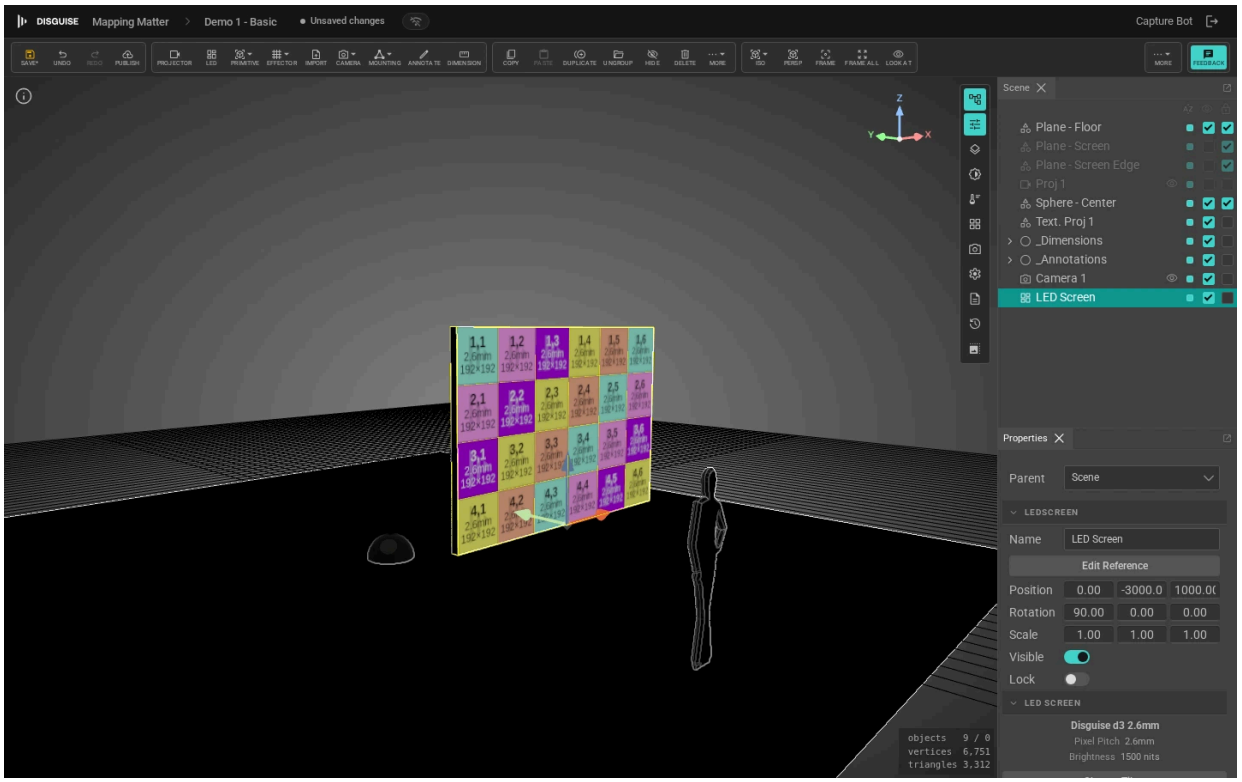
Configure the wall

The LED screen Properties panel covers:

- **Tile**: the active tile model (read-only label). Click **Change Tile...** to swap.
- **Pixel Pitch**: read-only, from the tile catalogue.
- **Tiles H** / **Tiles V**: horizontal and vertical tile counts (1–100 each).

- **Brightness (%)**: output factor from 1% to 200%, matching the projector control. The tile spec's rated peak brightness is shown read-only next to the field so you can see what the panel is rated at and how hard you're driving it. Combine **Brightness %** and the spec's nits to compare a flagship wall at 50% with a budget wall at 100%. When you multi-select LED screens and projectors together, the same **Brightness %** field writes to both.
- **Mounting**: Wall, Ground Stack, or Hung; affects how rigging is drawn.

The **Content** collapsible sets the **Texture** displayed on the wall and a fallback **Color** for when no texture is assigned.



The **Information** collapsible shows computed values: total **Resolution** (H × V pixels), physical **Dimensions**, aggregate **Weight** and **Power** draw across all tiles.

Curve the wall

To curve an LED wall, open the **Curve** collapsible in its Properties panel and toggle **Enable Curve**. The remaining fields appear:

- **Axis**: Horizontal or Vertical, the direction of curvature.
- **Direction**: Concave (curving toward the viewer) or Convex (curving away).
- **Tile Angle**: the angle each tile rotates relative to its neighbour, 0.1° to 45°.

The panel then displays the derived geometry:

- **Radius**: the absolute curve radius.

- **Total Curvature**: aggregate angle across all tiles.
- **Chord**: straight-line distance between the wall's outer tiles.
- **Depth**: maximum depth from the chord to the curved surface.

Every tile rotates by **Tile Angle** relative to the previous one; there is no per-tile override.

Position and rotate

LED walls follow the same transform rules as any other object: move, rotate, scale, and parent under groups or effectors. To duplicate a wall around a centre point or fan out a series of walls, use the toolbar **Effector** button with **Polar Array** or **Fan**.

Mount on a truss

LED tiles can be clamped to a truss the same way projectors are. The **Mounting** collapsible in the Properties panel surfaces clamp position, hang direction, height offset and the Ground tower / Flown truss / Existing truss quick-attach buttons. See Trusses & mounting.

Light, brightness and photometric analysis

LED screens cast forward-only emission into the scene: the panel's nits drive the lighting at the front of the wall, without spill behind the tiles. Curved walls emit along the curve (with adaptive sampling so wide arcs still light correctly), and LED contribution feeds the renderer's auto-exposure so a bright wall darkens the rest of the scene the way the eye expects.

LED screens contribute to the brightness viewport heatmap and to surface coverage statistics. Their photometric readout uses the **panel's native brightness** (rated nits × Brightness %) so the lux numbers match what you'd measure rather than depending on the displayed content. See Viewport & analysis.

See also

- Projectors
- Libraries and assets
- Export & PDF layouts

Libraries and Assets

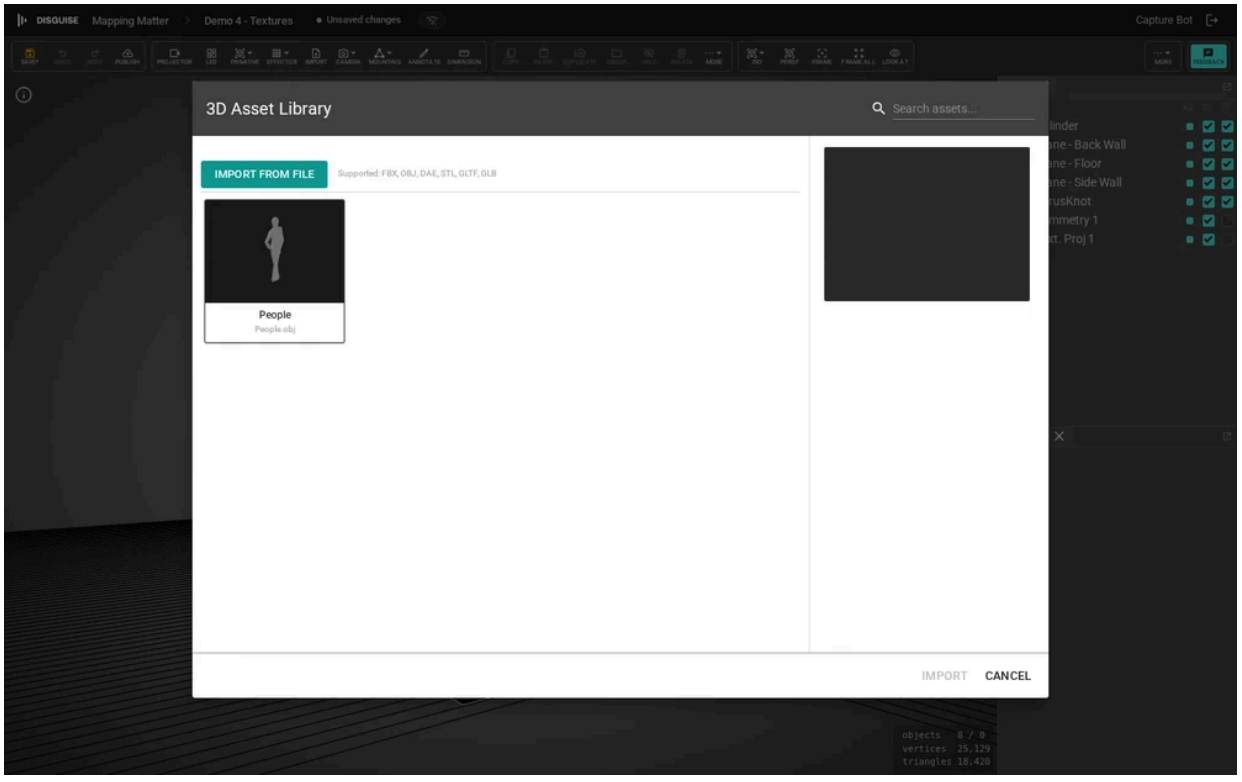
Mapping Matter splits content into per-project libraries (private to your project) and a platform demo library (read-only, available to everyone). Meshes, textures, projectors and layouts all share the same browser overlay pattern, with grid/list display and search.

Scenes are managed from the Disguise Cloud launcher, not from inside Mapping Matter; see Open or create a scene.

3D asset library

The 3D asset library holds imported meshes. Click **Import** in the toolbar add cluster to open the library overlay.

Supported formats: `.fbx` (binary), `.obj`, `.dae`, `.stl`, `.gltf`/`.glb`. Maximum saved size is 100 MB; larger files can still be loaded locally for the current session.



Import Settings

When you pick a file the **Import Settings** overlay opens. Set the file unit, the scale, and the rotation before confirming. The Bounds block shows two rows so you can sanity-check both the scene scaling and the picker:

- **Bounds**: the mesh extent expressed in the scene's current dimension unit. Switch the scene's dimension unit and this row's magnitude rescales.
- **In Source**: the raw bounding-box value in the unit you picked under **Original File Units**. Switch the picker and this row's unit label changes but the numbers stay the same.

A **Scale Reference** dropdown drops a translucent fixed-size helper next to the mesh while the overlay is open so you can eyeball its size before committing:

- **Yellow Human**: a 1.8 m figure (default).
- **1 m³ Cube**: a one-metre wireframe cube.
- **None**: no helper.

The helper renders at 50% opacity (so scene geometry remains visible through it) and sits a sensible distance from the import: small mm-scale imports get a 500 mm gap so the figure isn't on top of the origin, larger imports scale proportionally. The helper disappears on confirm or cancel.

Editing an imported mesh's colour

When a mesh has a single default material (no named material groups from the source file), the Properties panel shows its material controls inline, right below the **Edit Reference** button, so you can recolour, retexture or tweak opacity without switching modes. As soon as an imported mesh has named material groups, the inline panel disappears and the material controls move back inside Edit Reference, where you can pick which group to affect.

Delete an asset

The details pane of a user-imported mesh has a **Delete asset** action. Deleting removes the mesh from the library and stops it appearing in future scenes; instances already placed in your scenes keep their geometry until Disguise's background sweep runs (currently a 90-day retention window), so a mistaken delete is recoverable inside that period. The platform demo library is read-only, so Delete is only exposed for meshes your organisation owns.

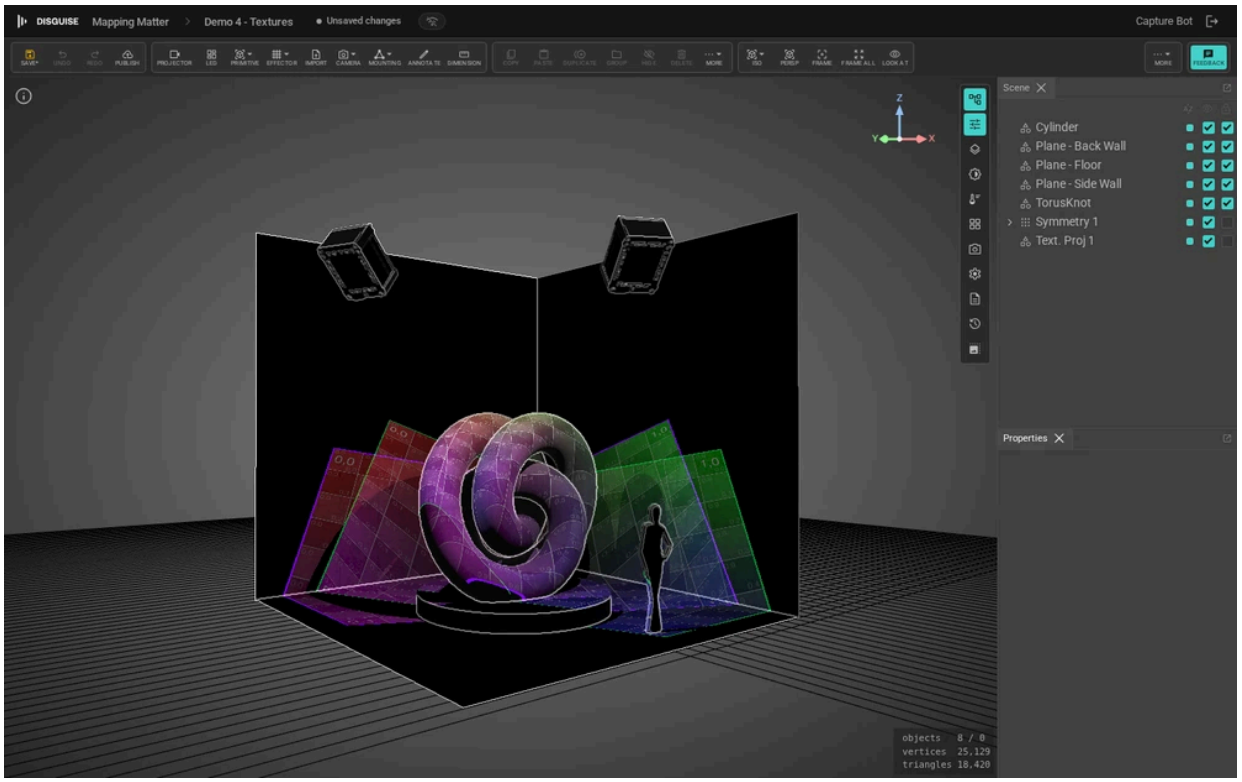
Optimisation tips

For best performance:

- Reduce unused geometry: delete loose vertices and hidden meshes.
- Merge meshes by material where possible.
- Export as `.fbx` binary or `.glb` (compact, fast to load).
- Avoid embedded textures over 4096 × 4096; assign textures separately from the texture library.

Texture library

Textures cover stills (`.jpg`, `.png`, `.webp`, `.gif`, `.bmp`) and short clips (`.mp4`, `.webm`, `.ogg`). Maximum size 50 MB.



Textures are assigned to projectors (as the projector image) or to meshes (as base map or projection map) via the Properties panel.

Projector library

The projector library lives in the same overlay pattern. Catalogue models are read-only; your project can also contain custom projectors that appear alongside catalogue entries.

Each card has a small flag icon; click it to report wrong specifications (incorrect throw ratio, missing lens, wrong lumens). The pre-filled dialog routes to the Disguise team via the same pipeline as the toolbar Feedback button.

Ownership scope

Every custom projector has an **ownership scope** that determines who sees it:

- **Project**: private to the current Production. Only members of the Production see the projector.

- **Organisation**: shared with every Production in your organisation. Anyone in the org sees the projector in the library, whether or not they're on the current Production.
- **Global**: the read-only platform catalogue. New custom projectors can't be added here.

When you create a new custom projector the ownership scope defaults to **Project**. Use the scope selector in the projector's edit dialog to promote it to **Organisation** so the rest of your team can pull it into any of their scenes without re-creating it. The launcher's Sharing & Teams area exposes the whole org projector library as its own section, where organisation admins can rename, delete, or scope-move entries from one place.

Legacy Mapping Matter customers can also import their existing custom projectors directly into the org library from the launcher, without having to open a scene.

LED library

The LED library opens from the toolbar **LED** button. It uses the same overlay pattern as projectors: filter by brand, sort by name or pixel pitch, switch between catalogue tiles and your project's own entries. If a tile model isn't in the catalogue, use **+ Create custom** to add it to the project.

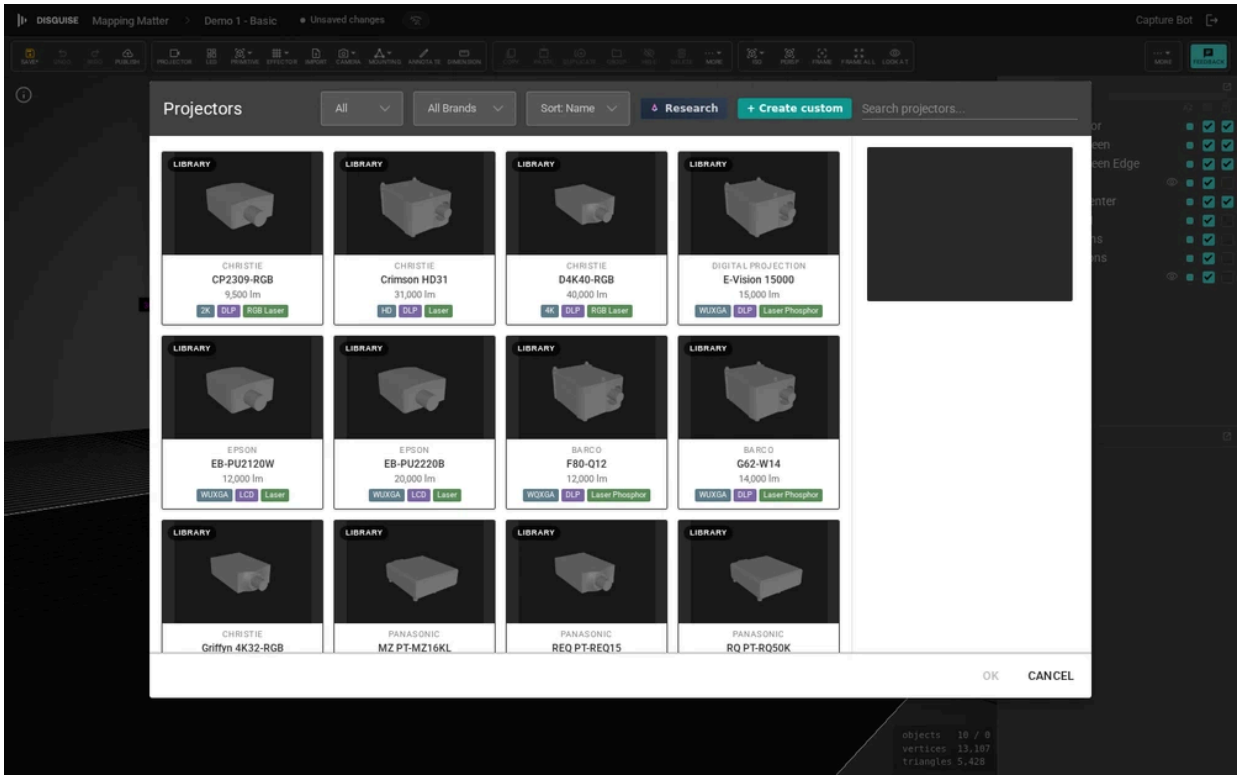
Truss library

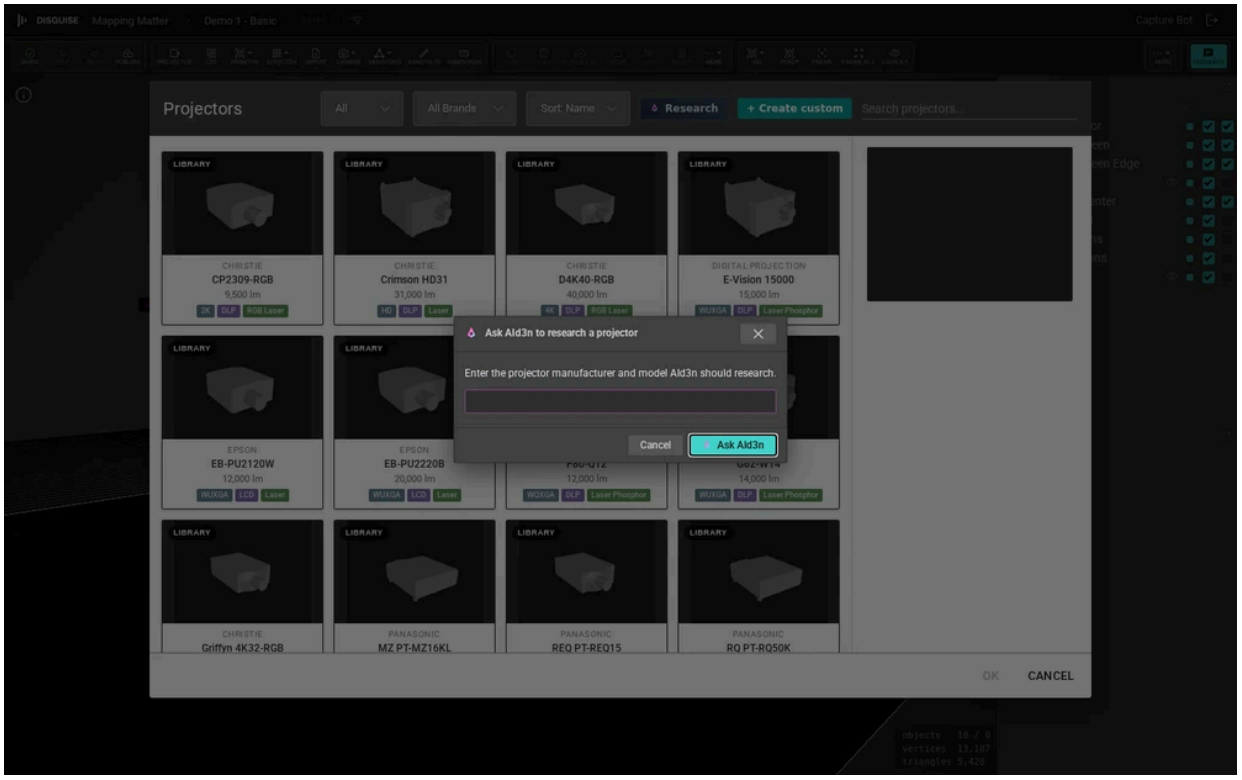
The truss library opens from the toolbar **Mounting** popover's **Truss library...** entry, and covers both truss profiles and mounting bases. Filter by cross-section or by the TRUSS / BASE toggle, then double-click an entry to add it to the scene. Custom trusses and bases are project-scoped and appear alongside the catalogue.

AId3n in the libraries

The Mapping Matter libraries are wired into **AId3n**, the Disguise AI assistant, so you can ask it to research a piece of kit and produce a custom entry rather than typing every field by hand.

- Each library overlay has an **Ask AId3n to research** call-to-action and a persistent **Research** button in the projector and LED library toolbars.





- Give AId3n a model name or paste a datasheet; it'll suggest spec values, propose a mesh, and surface them as an "AId3n suggests" banner you can accept, tweak, or discard.
- For meshes, a phase indicator shows progress (research → mesh search → preview).

- AId3n suggestions never overwrite catalogue entries; they create or update custom entries in your project, so the platform-wide catalogue stays trustworthy.

AId3n usage is metered against your organisation's credits; see your Disguise Cloud dashboard for the running total.

Layouts

A **layout** is a reusable PDF template with a title block, table of projector specs, page size, and viewport pose. Save the current PDF layout from the toolbar **Export** dropdown to add it to the layout library, then reuse it on other scenes.

See Export & PDF layouts.

Measurements and Annotations

Mapping Matter has two markup tools, both reached from direct buttons in the viewport toolbar's add cluster: **Dimension** (numeric measurement labels) and **Annotate** (freehand drawing). Both create real scene objects that persist across save and load, and both can be included in published snapshots and PDF layouts.

Dimensions

Click **Dimension** (or press `T`) on the toolbar, then click two points in the viewport to place a distance label. For an angle, click three points.

Vertex snap works across objects: pick the first point on one mesh and the second on a different mesh, and the tool will still snap to the nearest vertex on whatever's under the cursor. You can also orbit and pan while placing points; small drags (under about four pixels) are treated as a click, larger drags are treated as camera moves and don't drop a stray point when you release the mouse.

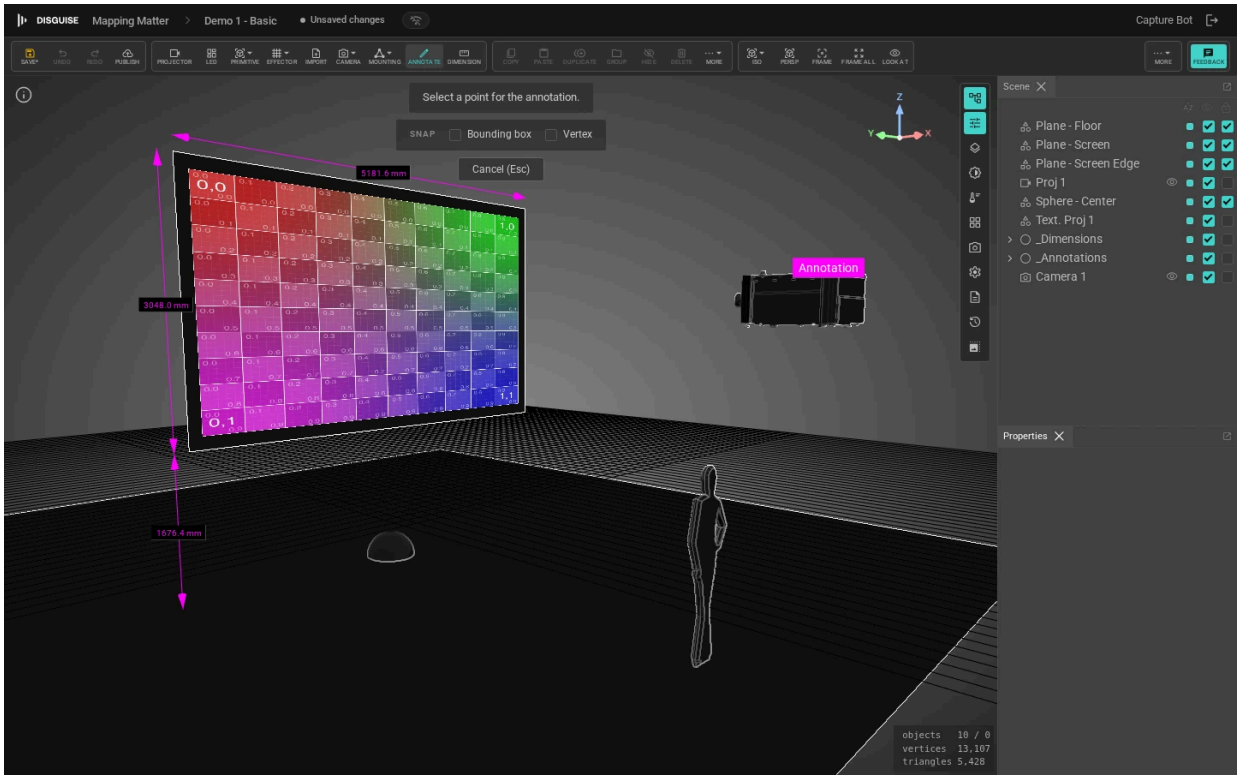
Each dimension carries:

- **Value**: the live numeric reading in the scene unit (mm, cm, m, ft, in).
- **Label**: optional free text.
- **Style**: leader colour, font size, decimal places.
- **Visibility**: toggle from the dimension's properties or hide via the Scene panel.

Dimensions are attached to scene geometry by default, so moving the underlying object moves the dimension with it.

Annotations

Click **Annotate** (or press `A`) on the toolbar to start a freehand annotation. Draw on screen; release to commit.



Annotations live on a layer in the Scene panel and can be hidden or excluded from snapshots like any other layer.

See also

- Snapshots & revisions
- Export & PDF layouts

Mirror

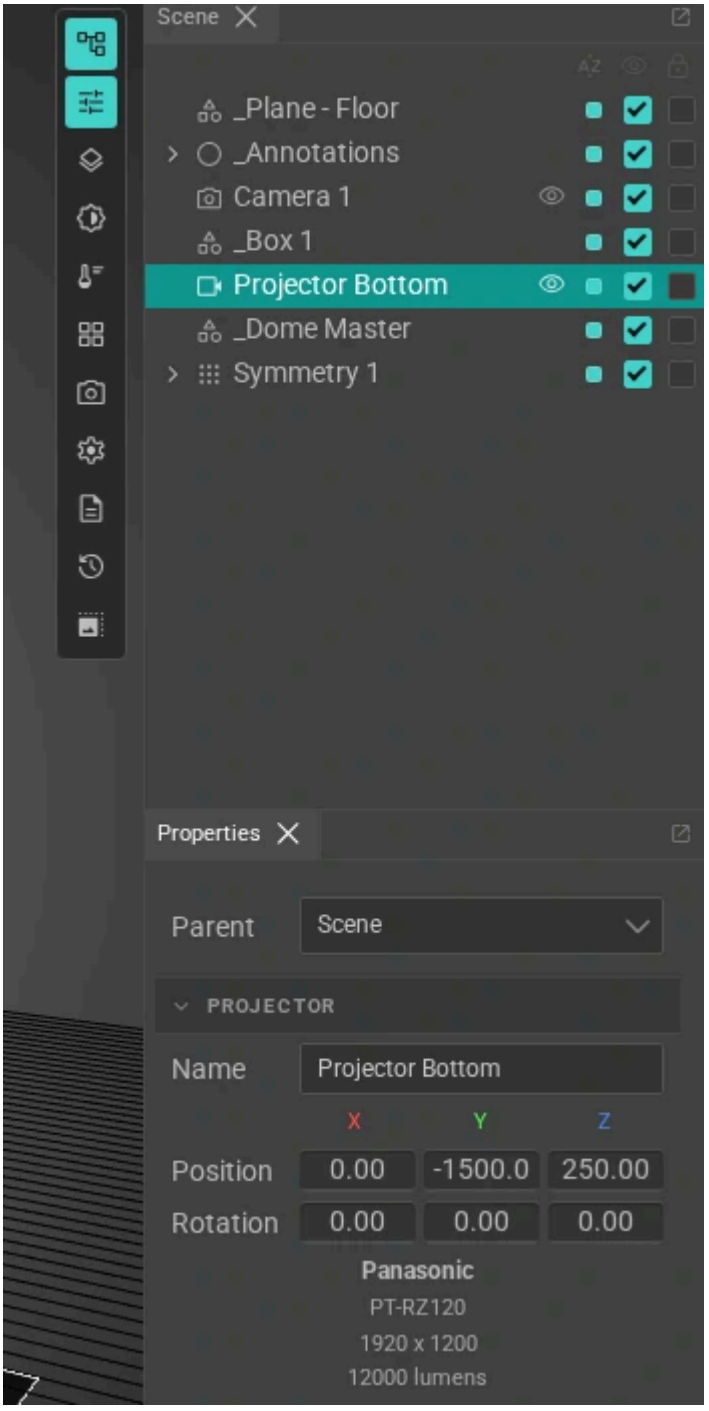
A mirror folds a projector's beam. This is useful for short-throw rigs, snorkel-style installations, and any case where the physical projector body can't sit on the optical axis. The mirror is a property of the projector, not a separate scene object: Mapping Matter models the reflection geometry, shows the folded beam path, and warns when the projector overshoots the mirror.

Enable the mirror

1. Select the projector you want to fold.
2. In the projector's **Properties** panel, expand the **Mirror** collapsible.
3. Toggle **Mirror** on. A mirror plate appears attached to the projector, sized to the beam by default.
4. Drag the mirror plate in the viewport to position it between the projector and the surface; drag the projector's target point to aim the folded beam.

Suggested mirror for UST lenses

If the active lens has a large fixed optical offset (typical of ultra-short-throw lenses, where the image projects steeply off-axis), the projector sidebar shows a **UST lens: add a fold mirror?** hint banner with an **Add suggested mirror** button. Click it and Mapping Matter picks a fold-mirror placement (offset, 45° starter pitch, plate size) that bends the chief ray onto the projector's current target. From there you can fine-tune position, rotation and dimensions like any other mirror. The banner only appears while no mirror is enabled; once you add one, manually or via the button, it goes away.


Scene
_Plane - Floor
_Annotations
Camera 1
_Box 1
Projector Bottom
_Dome Master
Symmetry 1
Properties
Parent
Scene
PROJECTOR
Name
Projector Bottom
X
Y
Z
Position
0.00
-1500.0
250.00
Rotation
0.00
0.00
0.00
Panasonic
PT-RZ120
1920 x 1200
12000 lumens

When the mirror is selected, the gizmo target rotates the mirror itself rather than the projector, which lets you tilt the mirror without changing the projector's pose.

Beam footprint on the plate

While the mirror is enabled, Mapping Matter draws the projector's beam footprint as an amber quad on the plate itself, exactly where the rays land (visible on the plate in the clip above). This makes it easy to size and position the plate against the optical surface without leaving the viewport. The amber tint stays visible even when the plate flips red for overshoot, so you can read both signals at once.

The mirror sidebar's **Scale mirror to fit** button resizes the plate to the smallest dimensions that contain every frustum corner, useful when the default plate size is too generous or has been shrunk past the beam. Dimensions round up to the next 10 mm so a numerical residual doesn't leave the overshoot tint flickering on the edge.

Beam overshoot warning

If the projector beam falls outside the mirror plate boundary, Mapping Matter tints the overshooting beam red and the mirror plate edges that are clipped. Resize the mirror in its Properties (or use **Scale mirror to fit**) or reposition the projector to clear the warning.

Mirror properties

In the projector's Properties panel, under the **Mirror** section:

- **Product**: pick a manufacturer mirror from the catalogue (loads body mesh and dimensions), or use a generic flat plate.
- **Width** / **Height**: physical dimensions of the mirror plate.
- **Offset**: X / Y / Z offset from the projector body.
- **Rotation**: pitch / yaw / roll relative to the projector.

Changes update the folded beam path in real time.

Limitations

- Mapping Matter simulates a single, perfectly flat, 100% reflective mirror. Brightness loss from real mirrors should be accounted for separately when reading the photometric outputs.
- Mirror assemblies in the catalogue are reference geometry; confirm dimensions and mounting with the manufacturer before relying on them on-site.

See also

- Projectors
- FAQs: ultra-short-throw and fake mirror techniques (now superseded by the mirror feature for most cases)

Plan Entitlements

Mapping Matter is delivered as a Disguise Cloud plugin. **Reading is public; creating and editing require an entitlement.**

What's free for any signed-in user

- Open and explore **demo scenes** (read-only).
- Open any **Production** you've been shared into (as Editor or Viewer) and view its scene without an entitlement of your own.
- Use the snapshot viewer for published shares.

What requires an entitlement

Creating or editing requires an active Mapping Matter entitlement on the user's organisation:

- Create a new Production.
- Edit a scene's geometry, projectors, LED screens, materials, or layers.
- Publish snapshots from a scene.

If you open a scene you've been shared as an Editor but your own org doesn't have Mapping Matter, the editor opens in **View-only** mode: every write affordance is blocked and a one-per-session notice tells you why.

Snapshot viewers

Recipients of a snapshot share, whether via anonymous link or user invite, do not need an entitled plan, and they never count against your seat allowance.

Upgrading

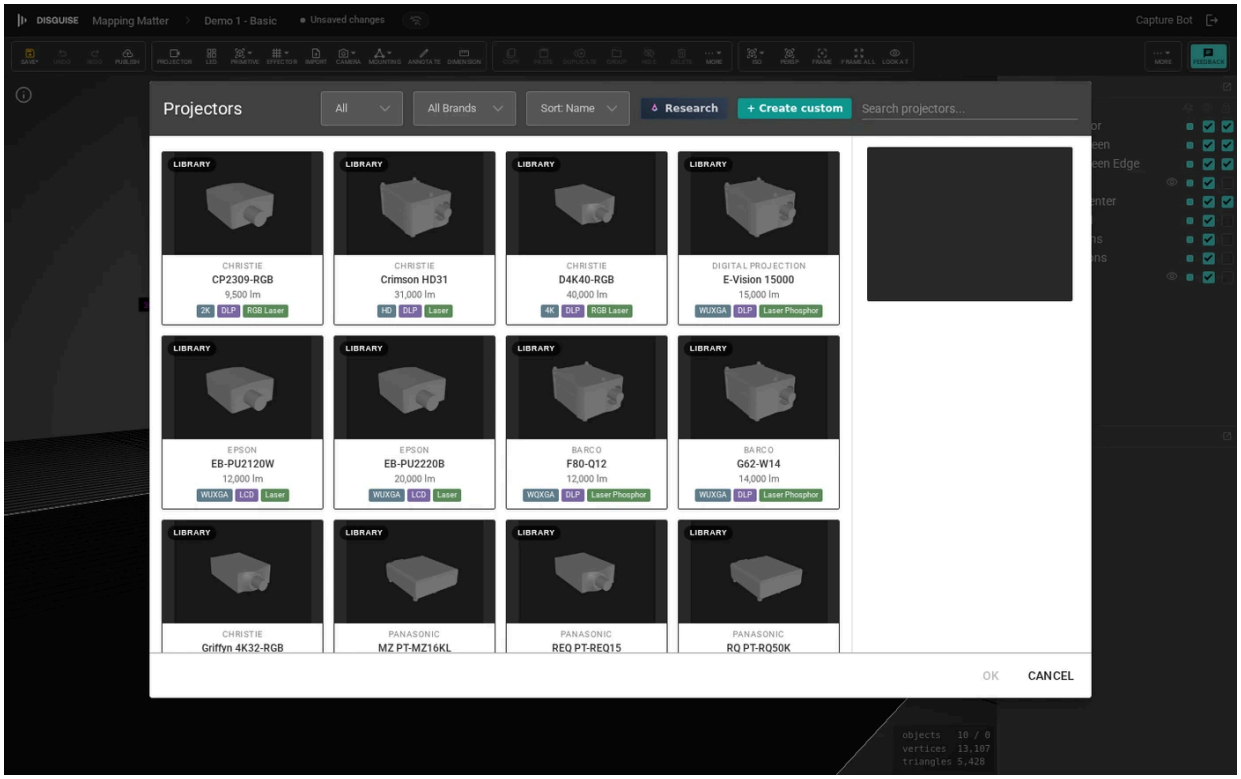
Plan changes are managed in Disguise Cloud organisation settings, not in Mapping Matter. See the organisation settings page, or contact **support@disguise.one**.

Projectors

Projectors are the core authoring object in Mapping Matter. Each projector carries real specifications from the catalogue (Panasonic, Christie, Barco, and others) including throw ratio, lens shift and lumens. You position projectors in 3D, aim them, and see the resulting beam, image and coverage on the geometry in the scene.

Add a projector

Click **Projector** in the viewport toolbar's add cluster to open the projector library overlay. Browse by manufacturer, search by model, or filter by lumens and resolution.



Double-click a projector to add it to the centre of the viewport. You can also drag a model from the library onto the scene tree.

If a catalogue entry has wrong specifications (incorrect throw ratio, missing lens, rated lumens that don't match the datasheet), click the small flag icon on the projector card to send a targeted report to the Disguise team. The dialog pre-fills the model name and the suspect values, so the report comes through with the right context attached. The same flag is available on LED tile and truss library cards.

Aim the beam

A projector's beam is aimed at its **target point**, a small handle in the viewport. Drag the target to point the beam; the projector rotates to face it. The aim can also be set numerically in the projector's Properties panel.

To rotate the projector body independently of the aim, use the Rotate gizmo on the projector directly.

Focus simulation

Real projector lenses have a depth of field, so surfaces nearer or farther than the focal plane look soft. Mapping Matter approximates this with a **Focus** overlay: surfaces that fall outside the projector's focal depth are drawn with diagonal banding, with denser, brighter bands the further out of focus they are.

Toggle the simulation with the **Focus** button in the toolbar's display cluster. Behind that button are three modes, set in **Viewport settings** (bottom Panels strip) under **Focus Mode**:

- **Off**: no overlay.
- **Per Projector**: only the selected projector contributes. Use this to read one fixture at a time when several beams overlap.

- **All Projectors**: every projector's focus depth is overlaid simultaneously. Useful for catching surfaces that no projector resolves cleanly.

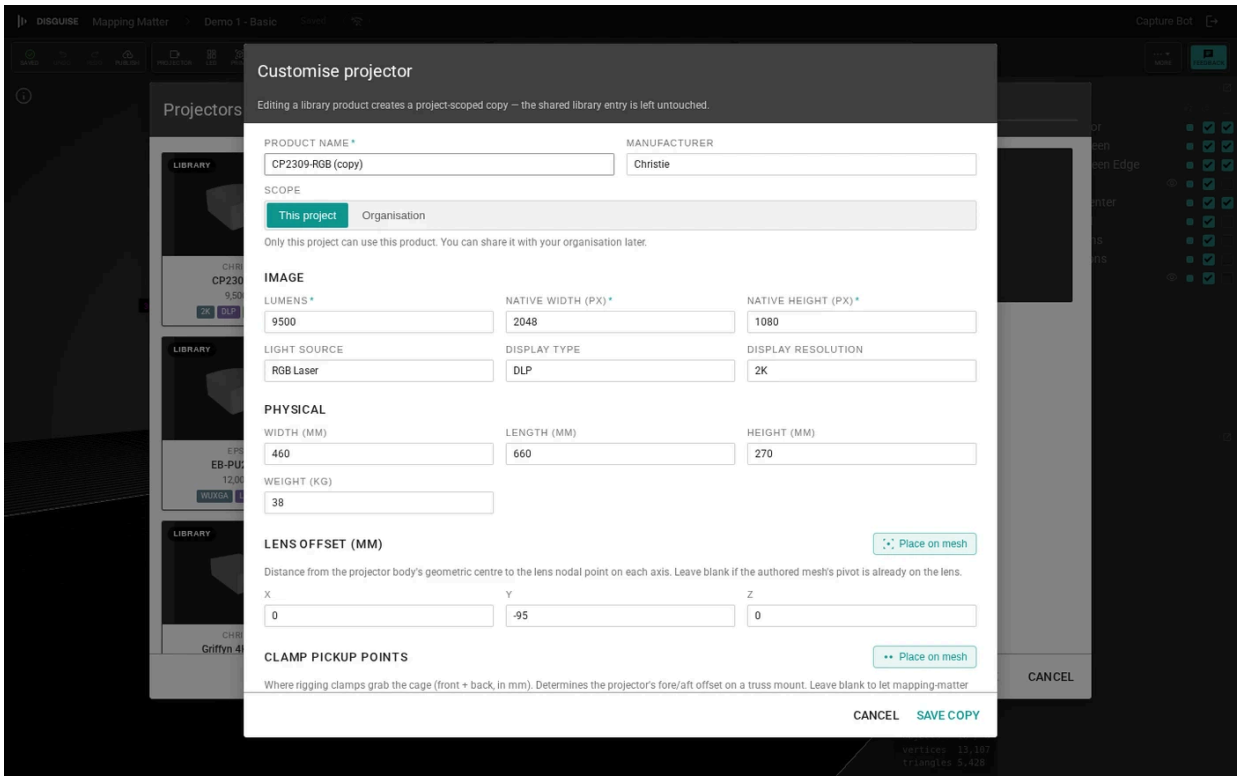
The two thresholds on the same panel control where the bands appear:

- **Focus T1**: the tight in-focus tolerance, expressed as a fraction of the projector's nominal throw distance. Surfaces within ±T1 are treated as fully sharp.
- **Focus T2**: the broader "near focus" tolerance. Between T1 and T2 surfaces render with the lighter banding; beyond T2 they get the heavier banding.

Defaults (T1 = 0.10, T2 = 0.30) approximate a typical mid-range zoom. Tighten T1 to model a long-throw lens; widen it for a short-throw / UST head.

Edit a projector

Select a projector to expose its full Properties panel:



- **Name**: label shown in the scene tree.
- **Position** / **Rotation**: XYZ values in the active scene unit; matches the gizmo.
- **Change Projector...**: swaps the model, preserving position, orientation and aim.
- **Lens**: the active lens preset for the projector. Each preset carries its own throw-ratio and lens-shift ranges; selecting one applies the geometry.

- **Resolution**: the active SDI/HDMI mode for projectors that ship multiple supported resolutions (e.g. 16:9 1920 × 1080 vs 16:10 1920 × 1200 on the same panel). The dropdown is hidden when the catalogue lists a single native resolution. Picking a mode overrides the projector's reported resolution everywhere (test pattern, projection width × height, the sidebar header) while the underlying library entry stays intact.
- **Throw Ratio**: image width as a multiple of throw distance. The field's allowed range follows the active lens; the row turns yellow near the lens limit and red beyond it.
- **Projection Distance**: distance from the projector to the surface it's aimed at. Accepts values below 1 m for ultra-short-throw lenses; the near plane of the frustum adapts so the image isn't clipped on short throws.
- **Lens Shift (%)**: horizontal and vertical optical shift expressed as a percentage of the image extent (100% = half the image dimension, matching Barco/Christie conventions). The row colours the same way as throw ratio when out of range. Some lenses publish an **asymmetric** envelope (e.g. shift up 50%, shift down 30%); the sliders honour the asymmetry. Values typed or scrolled into the number field are clamped to the active lens's shift envelope, so the input never shows a value the projector didn't apply. Lenses that publish a **firmware-locked** or **no-shift** envelope disable the sliders entirely; the optical offset baked into the lens (e.g. a UST lens's large fixed upward offset) still applies.
- **Brightness Factor (%)**: scales output lumens between 1% and 200%, useful for derated or aged units.
- **Visible** / **Locked** / **Powered**: visibility, transform lock, and on/off state.

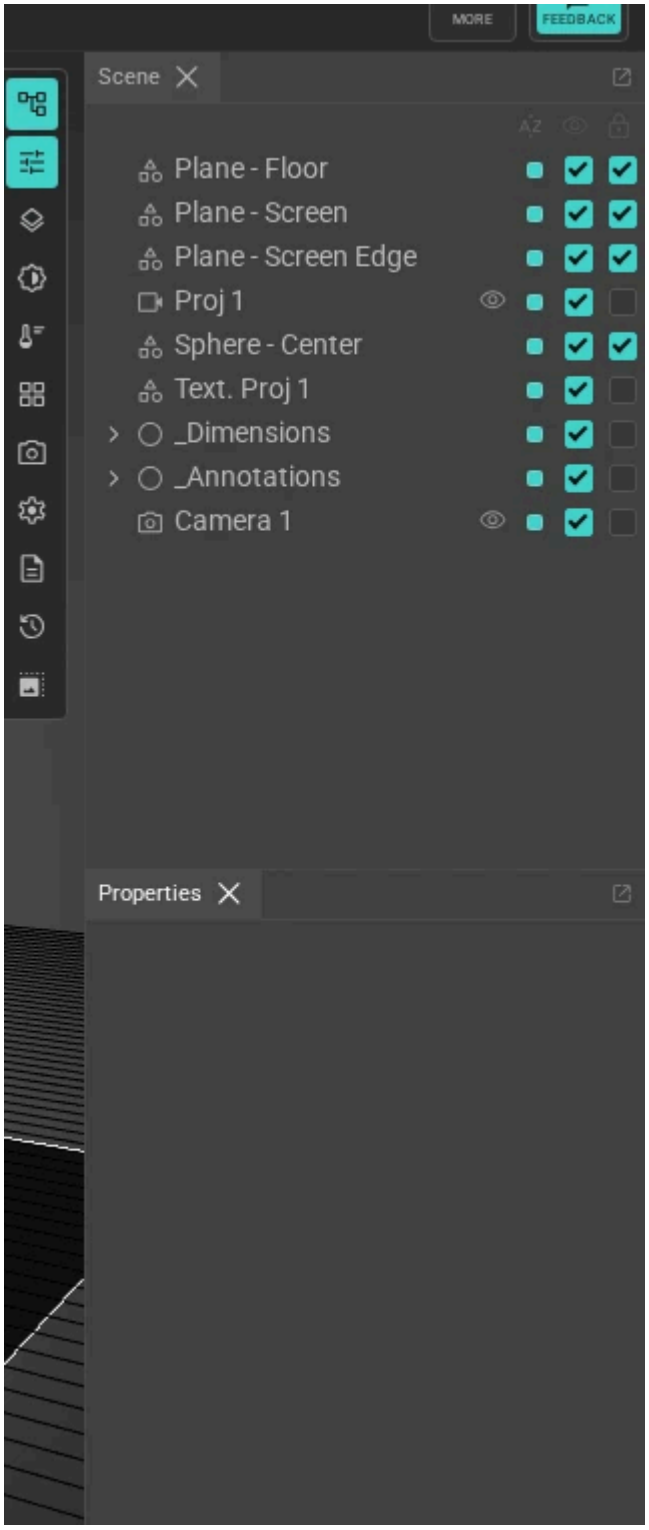
The **Information** collapsible shows derived geometry: Horizontal FOV, Vertical FOV and the equivalent Focal Length (computed for a 24 mm film height).

For projector identity (brand, model, lumens, native aspect ratio) the panel includes a read-only info box. When stacking is on, the box also shows **Total Stack Lumens**.

Projector image and test patterns

The **Projector Image** collapsible controls what the projector outputs. Each option is an independent toggle; Border, Grid and Checkers can all be enabled at once, and any of them can sit over an assigned Image.

- **Image**: assign a still or video texture. Press space to play a video texture.
- **Border**: draw a coloured frame around the projected image. Set the colour with the swatch and the thickness as a percentage of the frustum.
- **Grid**: overlay a grid; set the cell count along the H and V axes (independent values, 0–8192).
- **Checkers**: overlay a black-and-white checkerboard; set the cell count along H and V (independent values, 0–8192).



The Border / Grid / Checkerboard patterns are intentionally lightweight test patterns for verifying alignment and pixel density without needing a content file. Combine them with the Photometric analysis toggle to validate coverage as you align the rig.

Rear projection

By default a projector only lights the **front** of each surface it hits: the side whose face normal points back toward the projector. For rear-projection screens (translucent screens lit from behind) that means the image lands on the wrong side of the geometry.

To enable rear projection, open the target surface's Properties panel and change its material **Side** from `Front` to **Back** (rear-projection screen) or **Double** (lit from either side). Projectors aimed at the back of the surface then resolve and illuminate it as you'd expect. The same setting also controls back-side visibility in the viewport.

Use **Double** when one screen is shared between a stage projector and a rear unit; use **Back** when the screen is only ever lit from behind and the back-only face culling matches the physical install.

Stacking

Open the **Projector Stack** collapsible to overlay duplicate projectors at a single position for additional lumens:

- **Add Dummy Projectors**: slider, 1–20, the number of clones to add.
- **Automatic Lumens Multiplication**: when on, the read-only info box reports total stack lumens.
- **Offset** (X/Y/Z): physical spacing between the stacked units.

Mirror

A projector can drive an attached mirror to fold its beam, useful for short-throw, snorkel and bounce configurations. Open the **Mirror** collapsible in the selected projector's Properties panel and toggle **Enabled**. See Mirror for the full workflow.

Mounting on a truss

Projectors can be clamped to a truss with a per-instance clamp position, hang direction (below / above / left / right of the chord) and height offset. The **Mounting** collapsible in the Properties panel covers the cage toggle, clamp pickups, and the Ground tower / Flown truss / Existing truss quick-attach buttons. See Trusses & mounting for the full workflow.

Custom projectors and the nodal-point editor

If a projector model or lens you need is not in the catalogue, click **Projector** in the toolbar, then **+ Create custom** at the top of the library overlay. Custom projectors have an ownership scope

(set on creation and changeable later) that decides whether the model is private to this Production or shared with your whole organisation. The custom-product form asks for:

1. **Brand and model**.
2. **Dimensions** (mm): width, length, height. Optional but used by the nodal-point editor to scale the body mesh.
3. **Body mesh**: a `.glb`, `.fbx`, `.obj` or `.dae` upload. Converted to GLB client-side.
4. **Lens offset** (X/Y/Z): where the lens nodal point sits relative to the mesh origin.
5. **Lenses**: one or more lens presets, each with:
   - **Mount slug**, part number, manufacturer.
   - **Optical offset**: a *fixed* V/H beam offset baked into the lens, expressed as a percentage of image height (or half-height, per the convention dropdown; Christie uses half-height, DP/Epson/Sony use full-height).
   - **Adjustable shift envelope**: the **mode** (motorised, manual, firmware-locked, or none), the envelope **shape** (rectangular or rhomboid), and asymmetric `v_up / v_down / h_left / h_right` percentages. Firmware-locked and no-shift lenses disable the shift inputs but keep the fixed optical offset.
   - **Throw-ratio range** and a **throw reference offset** to mark where the lens's published throw is measured from.

AI ghost-fill on create

As soon as you've typed both a manufacturer and a model into the create form, Mapping Matter fires a background AI research call and shows an **AI suggestions ready** banner at the top of the form. Click **Apply all** to fill every still-empty field with the suggested specs; user-typed values are never overwritten. The form's lens name and lens-mount fields are also autocomplete-driven: typing into either pops a suggestion list pulled from the product DB (and falls back to a fresh AI lookup if there's no DB match).

To place the **nodal point** visually rather than by typing offsets, upload a body mesh first, then click **Place on mesh** under "Lens offset (mm)". The form panel switches to an embedded 3D view of your uploaded mesh with a teal gizmo at the current offset. Drag the gizmo onto the lens centre on the mesh, then click **Save** to write the new XYZ values back into the form. Click **Cancel** to keep the previous offset.

Saved custom projectors appear in the projector library under a "Project copies" group at the top, and behave identically to catalogue models in the rest of the editor. Each tile in that group has a delete affordance; confirm the prompt to remove the projector from the project library. Catalogue (manufacturer) rows are read-only and don't show the delete button.

The create dialog only closes via **Cancel** or `Escape`; clicking outside it does nothing, so an accidental backdrop click can't lose your edits.

Photometric and brightness analysis

Once projectors are placed, see Viewport & analysis to validate luminance, coverage, and overlap.

See also

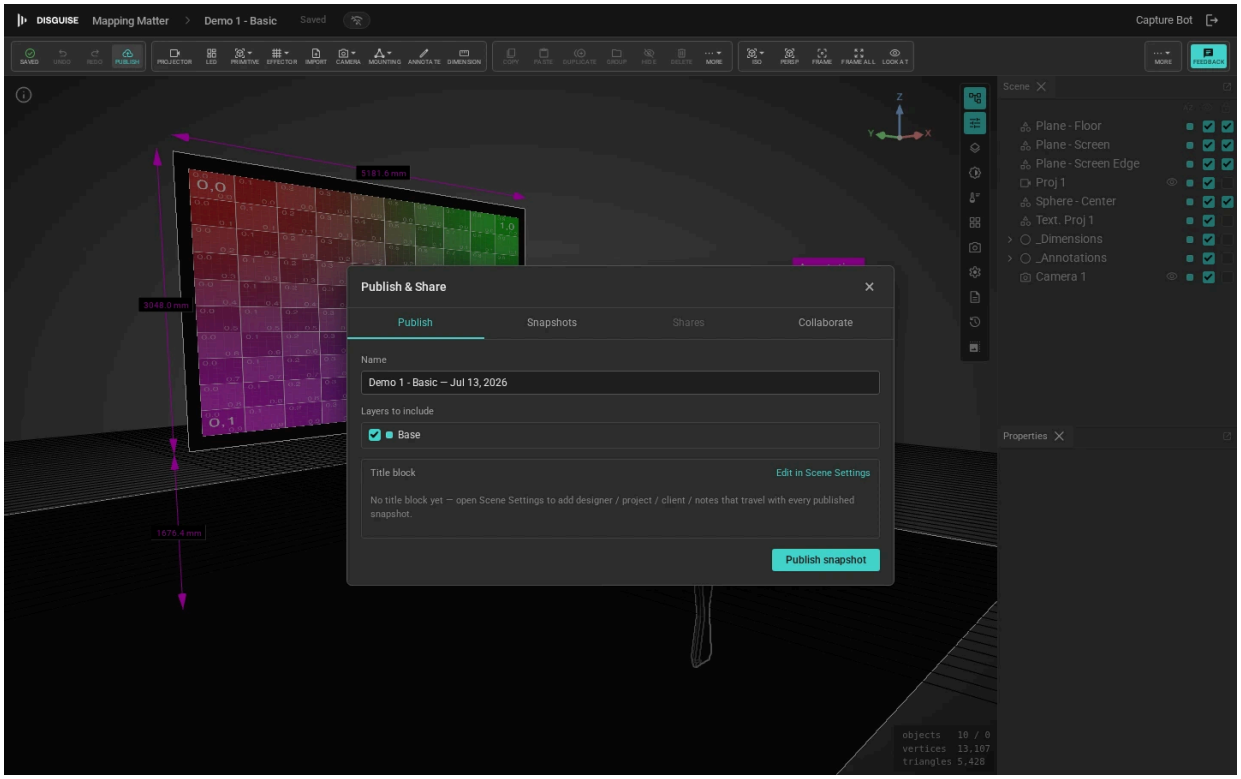
- LED screens
- Cameras & POV
- Mirror
- Export & PDF layouts

Publish and Share

When a design is ready for review, publish a snapshot and share it. Shares come in two flavours: **link shares** are anonymous and can be opened by anyone with the URL (with an optional password), and **user shares** invite specific people by email.

Publish a snapshot

Click **Publish & share** on the toolbar (the cloud-upload icon, far-left cluster) to open the Publish & Share dialog. On the **Publish** tab, enter a name and confirm the title block before clicking **Publish snapshot**.



In the dialog:

- **Name**: a short label for the snapshot (e.g. “v1 client review”).
- **Title block**: project name, designer, version, date, free-text notes.
- **Included layers**: pick which scene layers to include in the snapshot. Hidden layers are not published.
- **Visibility**: read-only is the default; the viewer cannot edit, but can toggle layer visibility within the included layers.

Click **Publish** to create the snapshot. You can then add one or more shares.

Share a snapshot

In the snapshot's overflow menu, choose **Add share...**

Link share (anonymous)

A link share generates a long, unguessable URL that anyone with the link can use. Optionally set a **password**; if set, the viewer must enter it before they can see the scene.

Link shares are good for client review where you don't want to know everyone who'll see the design, or where the recipient list is large.

User share (per-email invite)

A user share grants access to a single email address. If the email matches a Disguise Cloud account, the recipient sees the snapshot in their dashboard; if not, they receive an invitation email with a sign-in link.

User shares are auditable: you see exactly who has access and can revoke individual recipients.

Manage shares

The snapshot's panel lists all of its shares with:

- **View count**: number of times the share has been opened.
- **Last viewed**: most recent open.
- **Revoke**: disable the share. Existing viewers lose access immediately; the share row stays visible for audit.

You can also **revoke the snapshot itself** to invalidate every share in one go.

The viewer experience

When a recipient opens a share, they land on a read-only viewer with:

- The scene in a navigable 3D viewport.
- The title block, designer name, and notes.
- A layer-visibility panel limited to the layers the snapshot includes.
- A switch for the brightness viewport if it's enabled on the snapshot.

The viewer never sees the original scene, your project structure, or other users' identities. There is no edit affordance.

Revoking and rotating

If a link leaks, revoke it. To replace a revoked link with a new URL, add a new share. There is no “rotate” action that keeps the URL but changes the secret.

Migration from legacy viewer-only links

The old viewer-only link is replaced by link shares. Old links continue to work but no longer accept new viewer-imported content; for that workflow, use a collaboration seat instead.

See also

- Snapshots & revisions
- Collaboration
- Plan entitlements

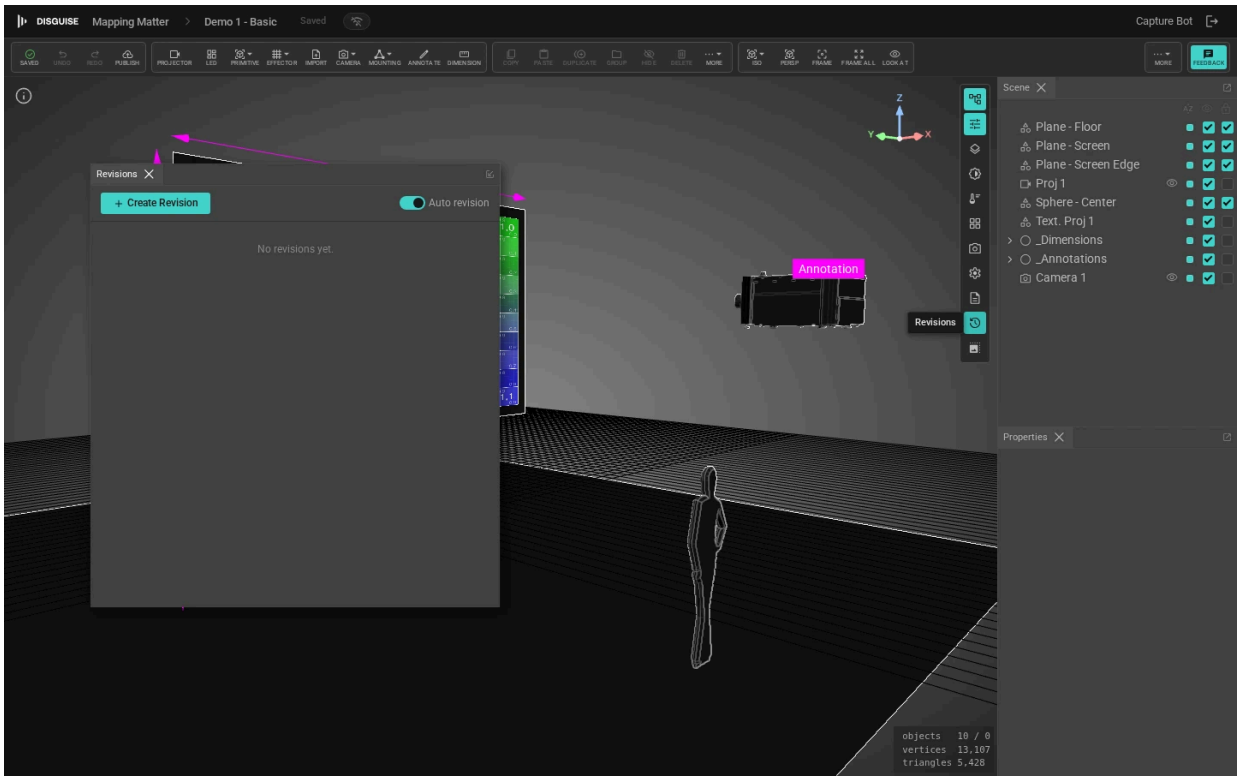
Snapshots and Revisions

Mapping Matter has two complementary forms of versioning: **revisions**, the rolling per-edit history of your scene, and **snapshots**, locked publishes used for sharing and milestones.

Revisions: your edit history

As you work, Mapping Matter auto-saves the scene a few seconds after each edit, so you don't need to save manually. A new revision is cut only when editing settles (after a couple of minutes of idle, or when you close the scene), so a long edit session produces one revision per checkpoint rather than one per save.

Click **Revisions** in the bottom Panels strip to see the timeline:



For each revision you can:

- **Preview**: load the scene state at that revision without committing.
- **Restore**: overwrite the current scene with that revision's state. This creates a new revision so nothing is lost.
- **Name**: mark a revision with a label (e.g. "client review v1") to make it easy to find later.

Revisions are retained for the lifetime of the scene. Renaming or deleting the scene removes its revisions too.

Snapshots: locked publishes

A snapshot is a named, locked copy of the scene at a moment in time. Once published it can't be edited, only revoked. Snapshots are how you share design intent with people outside the editor: clients, external collaborators, internal stakeholders who don't need edit access.

A snapshot:

- Carries its own copy of all scene data, including assets. Snapshots are independent of the live scene, so editing the source scene does not change a published snapshot.
- Records a **title block** (project name, designer, version, date, notes) similar to a CAD drawing.
- Can include only specific layers, useful for selectively publishing the lighting layer to a sound designer, or the projection layer to a content team.
- Can be **revoked**, which immediately disables all of its shares.
- Tracks **view counts** so you know whether a client has opened the link.

To publish a snapshot, see Publish & share.

When to use which

Use case	Use
Undo something I just did	Revision: restore the previous revision
Mark a milestone for myself	Revision: name it ("v3 - mirror added")
Send a draft to a client for review	Snapshot
Hand off to a colleague who'll edit further	Add them as a project member in Disguise Cloud, then they open the scene from the launcher (see Collaboration)
Archive the design at sign-off	Snapshot with a descriptive title block

See also

- Publish & share
- Collaboration

System Requirements

The specifications below are the hardware and software recommended for running Mapping Matter. Mapping Matter runs in a web browser as part of Disguise Cloud, with nothing to install.

Browser and graphics support

Mapping Matter runs entirely in Google Chrome using WebGL, with no local install. All project data is stored on AWS.

As it renders real-time 3D graphics inside a browser tab, its performance is set by the client machine's GPU, CPU and available memory, plus network quality, since every project lives in the cloud and syncs continuously.

Specifications

Component	Specification
Browser	Google Chrome (latest) with hardware acceleration enabled in browser settings
GPU	Discrete GPU with at least 4 GB video memory (min. 2 GB) for large or high-poly imported meshes
CPU	At least 6 cores, 12 threads and 3.0 GHz base frequency (min. 4 cores, 8 threads and 2.3 GHz base frequency)
Memory	16 GB (min. 8 GB)
Network	25 Mbps down / 10 Mbps up (min. 10 Mbps down / 5 Mbps up)

Notes

Browser

The application relies on WebGL; users on locked-down corporate machines should confirm WebGL is not disabled by IT policy.

GPU

A discrete GPU is recommended for any project involving multiple imported meshes, large textures, or several simulated projectors/LED panels at once.

CPU and Memory

CPU and RAM minimums assume a single active Mapping Matter tab; running other heavy applications alongside it will need headroom above the minimum.

16GB+ RAM is recommended for scenes approaching the 100MB per-asset import ceiling, or projects combining several large assets.

Network

Mapping Matter has no offline mode. All projects, assets and edits sync to AWS continuously, so a dropped connection interrupts work in progress.

Uploading large 3D assets (up to the 100MB limit) will be noticeably slower on the minimum upload speed. The recommended upload speed reflects a smoother experience.

Trusses and Mounting

Trusses, bases and the mounting workflow let you build the physical rigging plot alongside the projection design. Projectors and LED tiles attach to a truss by clamp position and hang direction; deleting or moving the truss carries everything mounted on it.

Object types

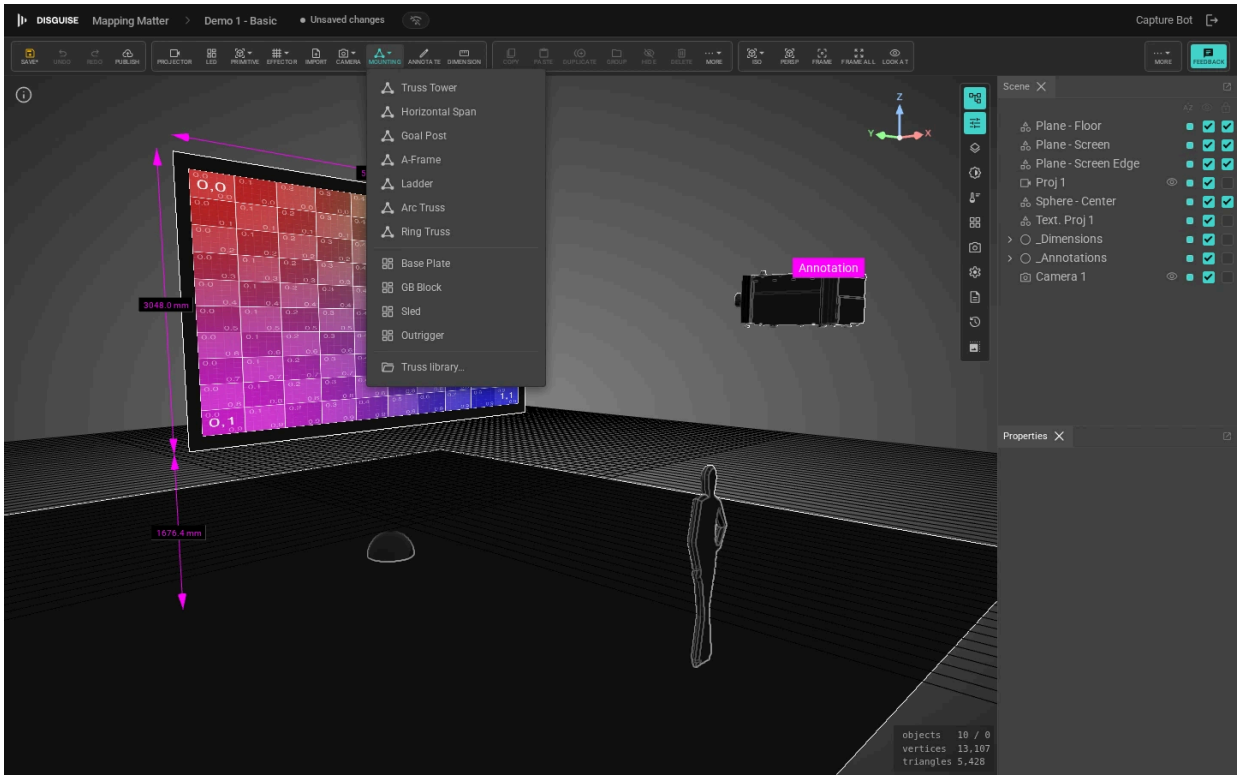
- **Truss**: a rigging member with a procedural chord-polyline geometry. Seven shapes are supported: Tower, Horizontal Span, Goal Post, A-Frame, Ladder, Arc, Ring. Each truss owns a chord profile (e.g. *Square 12" Truss*) drawn from the catalogue.
- **Base**: a procedural box that sits under a Tower / Goal Post / A-Frame, or stands alone as a load-spreader. Sizes are driven by a footprint in mm.

Trusses and bases live in the Scene panel as first-class objects with their own type-dot colour.

Add a truss or base

Click **Mounting** in the viewport toolbar's add cluster to open the popover. Pick one of:

- A truss type (Truss Tower, Horizontal Span, Goal Post, A-Frame, Ladder, Arc Truss, Ring Truss). Tower, Goal Post and A-Frame instantiate with their default base attached; the others stand alone.
- A base (Base Plate, GB Block, Sled, Outrigger): adds a standalone base mesh.
- **Truss library...**: opens the full catalogue with cross-section filters and the option to instance a saved custom truss.



Truss properties

Click the truss in the viewport, or pick it from the Scene panel, and the sidebar shows:

- **Type**: switch between the seven truss shapes; geometry rebuilds in place.
- **Profile**: the chord cross-section (Square 12”, Square 20”, etc.). Drawn from the truss product catalogue.
- **Length / Span / Diameter / Apex height**: dimension fields specific to the type. Goal Post exposes both leg and span lengths; Arc and Ring expose radius and arc angle.
- **Base**: when present, links to the Base child the Tower / Goal Post / A-Frame was created with. A Base sidebar appears once you select it.

Custom trusses and bases

The truss library overlay's **+ Create custom** button opens the same form pattern used for projectors. Set the truss shape, chord profile, span and weight; for bases, set the footprint and mass. Saved custom rows appear under "Project copies" in the library and instance like catalogue rows. Catalogue rows are read-only.

Mount a projector or LED tile

Select a projector or LED tile and expand the **Mounting** collapsible in its Properties panel.

- **Show cage**: toggles the visual cage / yoke around the projector body. Cage visibility is independent of mounting; you can have a cage in free space, or a mounted projector without one.
- **Clamp pickups**: the points on the projector body that hang on a truss chord. Most catalogue projectors ship with their factory pickup positions baked in; **Edit...** opens the Clamp Pickup editor to add per-instance overrides. **Reset** drops the override and falls back to the catalogue default.
- **Mounted to**: choose between *Nothing* (free transform) and *Truss* (clamped to a truss centreline).

When mounting is set to *Truss* but no truss is picked yet, three quick-action buttons appear:

- **Ground tower**: spawns a fresh Truss Tower, parents the projector to it, drops it onto the floor.
- **Flown truss**: spawns a Horizontal Span at the projector's current height and parents the projector to it.
- **Existing truss**: dropdown listing every Truss already in the scene.

Once mounted, the sidebar surfaces the truss-relative pose:

- **Clamp position**: the parameter `t` along the truss centreline (0 = start, 1 = end). Drag the slider to slide the projector along the chord.
- **Hang from**: Below chord, Above chord, Side of chord (left), Side of chord (right). Switches which face of the chord the projector clamps to.
- **Height offset**: distance from the clamp face along the hang direction, in mm. Useful for chain-motor drops below a flown truss, or stand-off plates on the side of a tower.
- **Unmount**: returns the projector to free transform, leaving its current world pose intact.

The same Mounting block appears on the LED-tile sidebar with the same fields.

Cage

Toggling **Show cage** draws the projector's yoke / cage rig over the body, independent of mounting, so a free-standing projector can carry a cage too. When the projector is on a truss, the cage moves with the body as you slide the clamp position.

Mounting arrays

Mounting a Symmetry-wrapped projector carries the whole array onto the truss, so every copy stays in lockstep. Edit the clamp position once and every projector in the array follows.

Grouped undo

Mounting is a multi-step operation (reparent, set clamp, set offset). Mapping Matter wraps it in an undo group so a single `Ctrl+Z` reverts the entire flow rather than peeling it back one signal at a time.

Snap to truss on drag

Drag an unmounted projector close to a truss and Mapping Matter prompts:

- **Snap**: clamp it to the nearest centreline point and switch the projector into mounted mode.
- **Always snap this session**: same as Snap, plus suppresses the prompt for subsequent near-truss drags for the rest of the session.
- **Don't snap**: leaves the projector where you dropped it.

The “Mount on nearest truss” action in the Mounting toolbar popover applies the same nearest-centreline logic without needing a drag.

Collision warnings

Trusses get a continuous spatial-collision check against scene meshes (Reference imports, Primitives). If a truss intersects geometry, its outline pulses red. Move the truss or resize the geometry to clear the warning.

The collision outline is purely a guidance overlay; it does not block the placement.

Selecting a clashing truss surfaces an **AId3n suggests** hint that names the offending object by its imported file name (e.g. `chair.glb`, the same label you see in the scene tree) rather than a raw sub-mesh identifier. **Translate to clear** in the hint nudges the truss along the shortest axis so the whole imported asset is out of the way, not just one sub-mesh.

The **Clash** button in the viewport toolbar’s display cluster toggles these warnings on and off, useful when you want to position a truss inside a structural column on purpose without the red pulse drawing attention away from the rest of the scene. The setting is per-scene and saved with the project.

Delete with attachees

Deleting a truss that has projectors or LEDs mounted to it opens a 3-way prompt:

- **Delete attachees too**: removes the truss and everything mounted on it.
- **Unmount and keep**: deletes the truss only; the attachees revert to their last truss-relative pose in world space.
- **Cancel**: closes the prompt without changing anything.

Truss BOM CSV

The toolbar’s **Export** menu includes **Truss BOM as CSV**, a rigging bill of materials (BOM). The file rolls up:

- One row per truss (type, profile, dimensions, mass).
- One row per base (product, footprint, mass).
- Per-truss attachees rolled up: projectors and LED tiles walked through any Symmetry copies so the count reflects what’s actually rigged.

Use the BOM as a handoff artefact for the rigger or to sanity-check loading totals before sign-off.

See also

- Projectors: the projector-side Mounting collapsible
- LED screens: the LED-tile Mounting block
- Export & PDF layouts: Truss BOM CSV row in the Export menu
- Libraries & assets: managing custom truss and base rows in the project library

Viewport and Analysis

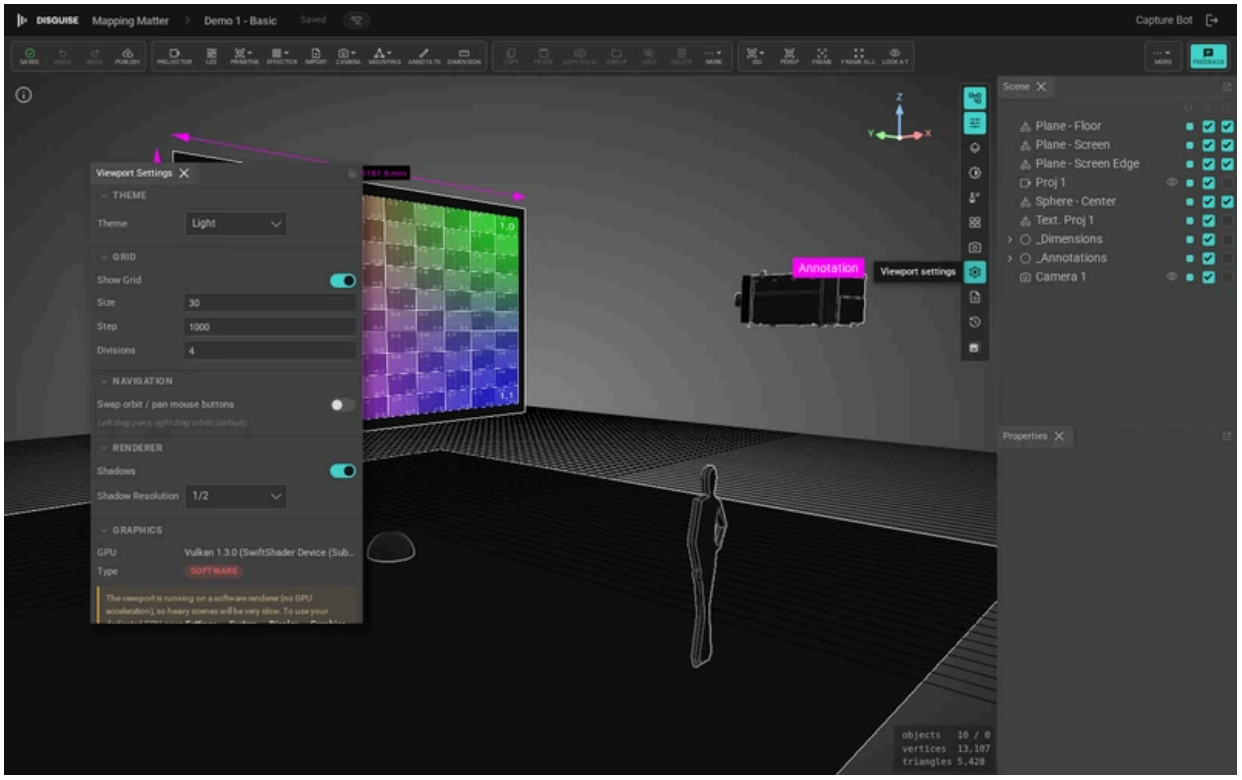
Four analysis tools share the viewport. Photometric, Projection Accuracy and Brightness are mutually exclusive: turning one on switches the others off. Human Acuity is a separate overlay that runs on top of any of them, but only from an Observer's eye view.

- **Photometric**: lux per surface, plus coverage and overlap statistics. Toggle with the **Lux** button on the toolbar's display cluster.
- **Projection accuracy**: pixel density or pixel stretch heatmaps. Toggle the viewport overlay with **Pixels** on the toolbar, and configure the mode and scale in the **Accuracy** panel.
- **Brightness**: live lux heatmap with a configurable colour bar. Controlled from the **Brightness** panel.
- **Human acuity**: colour-codes every projected pixel and LED pixel against the 1-arcminute (20/20) visual acuity threshold. Toggle with **Acuity** in the toolbar's camera-views cluster while looking from an Observer.

Viewport display settings

Open **Viewport settings** from the toolbar to toggle:

- **Perceptual luminance**: gamma-correct shading to match human perception.
- **Object edges**: render wireframes over all objects.
- **Projector beams**: show every projector's beam, even those not selected.
- **Projection distance helper**: colour-codes each surface by its distance from the nearest projector, useful for catching focus issues.
- **Grid**: quantity, size, subdivisions.
- **Background**: flat colour or gradient.
- **Material override**: replace all materials with a neutral grey for blocking checks.



Snap modes

The **Snap** button in the toolbar's Overlays cluster opens a popover with five global snap modes that govern gizmo translation:

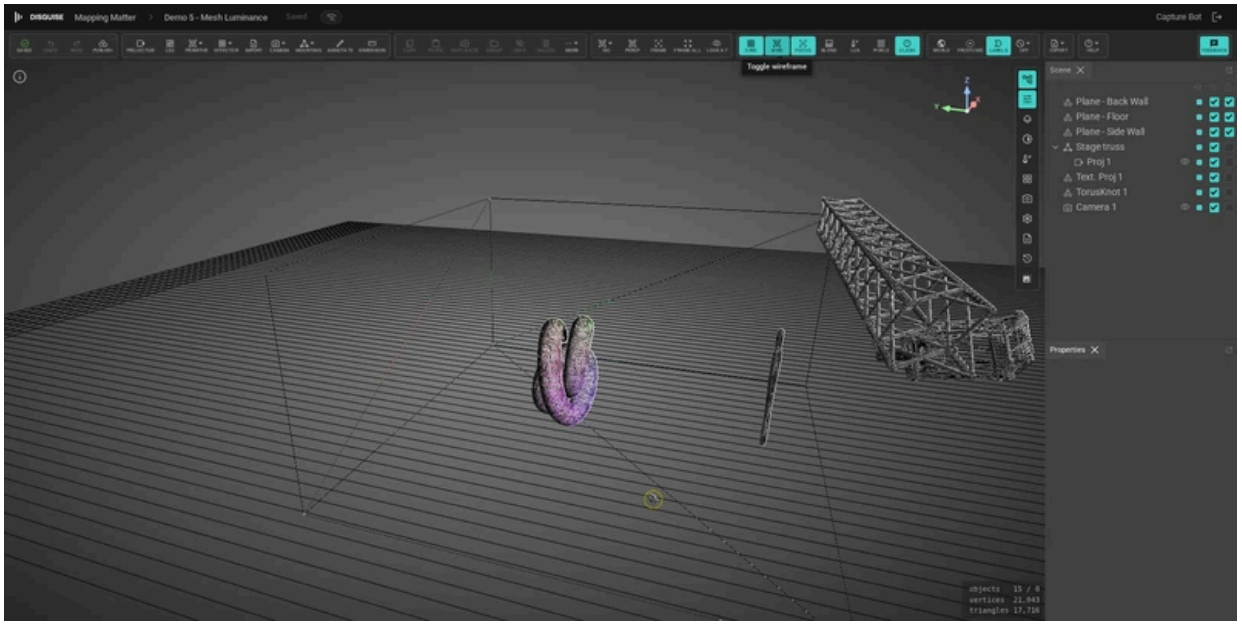
- **Off**: no snapping.
- **Grid**: clamps the drag delta to the grid spacing. A grid-step input appears in the popover while this mode is active.
- **Vertex**: snaps the gizmo origin to the nearest vertex on another mesh.
- **Edge**: snaps to the nearest edge segment.
- **Surface**: snaps to the surface point under the cursor.

Vertex, edge and surface modes treat every visible mesh as a candidate target, including truss members and the observer figure, so you can align a projector to a truss chord or an audience-side mesh without first picking it. A green disc appears at the snap target while you drag; the trigger button's icon and label reflect the active mode so you can see the current state without opening the popover.

> **Note**
>
> Snap defaults to **Off**. Previously, grid snap was always on at 1000 mm with no user-facing toggle; pick **Grid** explicitly if you want that behaviour back.

Wireframe

The display cluster's **Wire** button flips every mesh in the scene to a wireframe overlay, useful when you want to inspect geometry topology or see through a solid model without hiding it. The toggle is session-scoped: it doesn't save with the scene, so it always comes back off when you next open the editor.

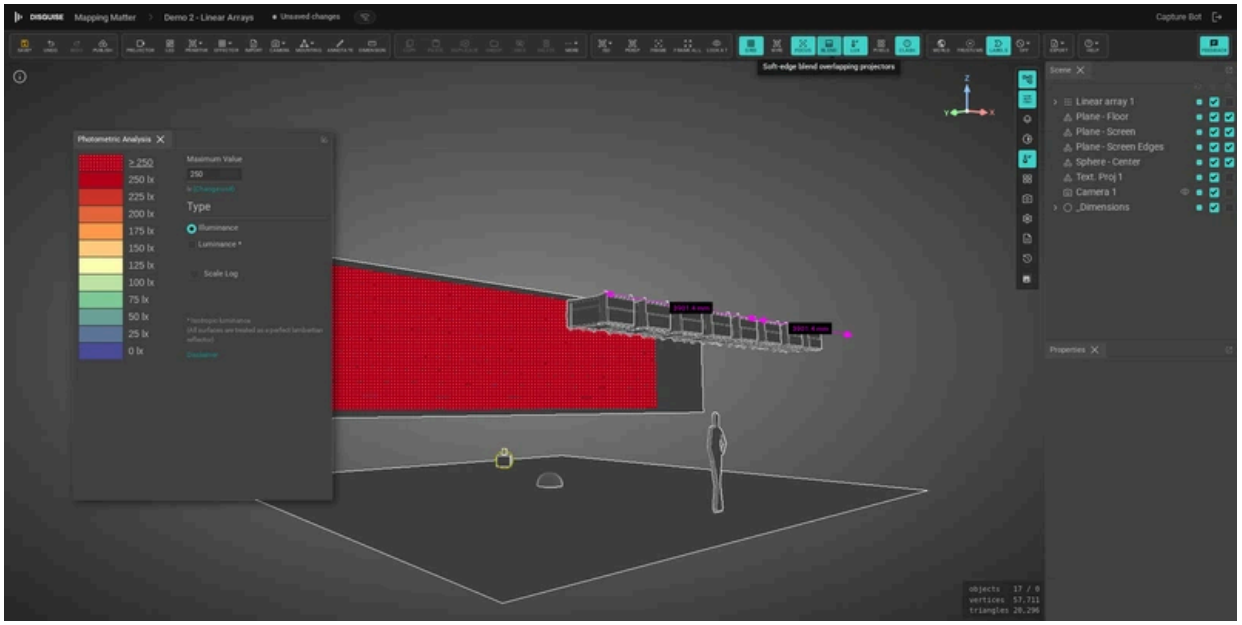


Blend mode

The display cluster includes a **Blend** toggle that controls how overlapping projector contributions are summed. By default, the viewport renders the literal physics: two projectors hitting the same surface combine their lux and look twice as bright. With **Blend** turned on, the renderer assumes those overlaps are soft-edge blended in production, and only counts a single projector's contribution in the overlap region (whichever delivers the most light there).

The setting affects both the shaded viewport and the photometric **Lux** / **Luminance** heatmap, so the readouts match what you'd measure on a properly blended rig. **Pixel density** and **Human acuity** are unaffected; they are geometric and don't care about overlap. **LED screens** are also unaffected; overlapping LED panels stack as before.

Use Blend on when you want to evaluate the final, blended deliverable; turn it off when you need to spot raw overlap zones that the operator will need to soft-edge in the first place.



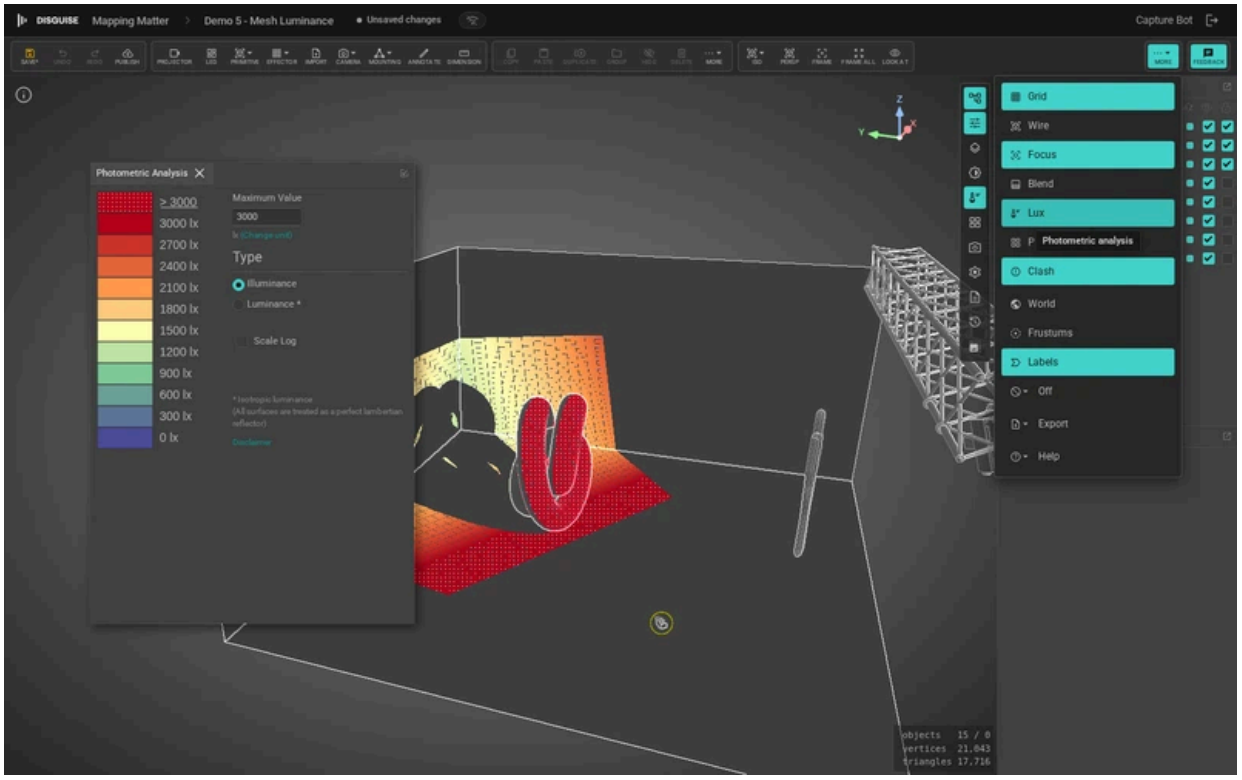
The toggle is persisted with the scene, defaults to off, and is also available from **Viewport settings** for keyboard-driven workflows.

Photometric analysis

The photometric viewport evaluates the projector contribution to each surface. Click **Lux** in the toolbar display cluster to toggle it on.

For each surface in the scene it reports:

- **Illuminance**: lux on the surface from all projectors combined.
- **Luminance**: light reflected from the surface back toward a chosen viewpoint.
- **Coverage**: % of the surface covered by at least one projector.
- **Overlap**: % of the surface covered by two or more projectors (for blending).
- **Contrast ratio**: luminance ratio across the surface; 5:1 is a minimum, 10:1 is ideal.



Photometric calculations consider only projector and LED contribution. Ambient and directional light in the scene are excluded from the calculation; use the **Brightness viewport** below for a full energy view.

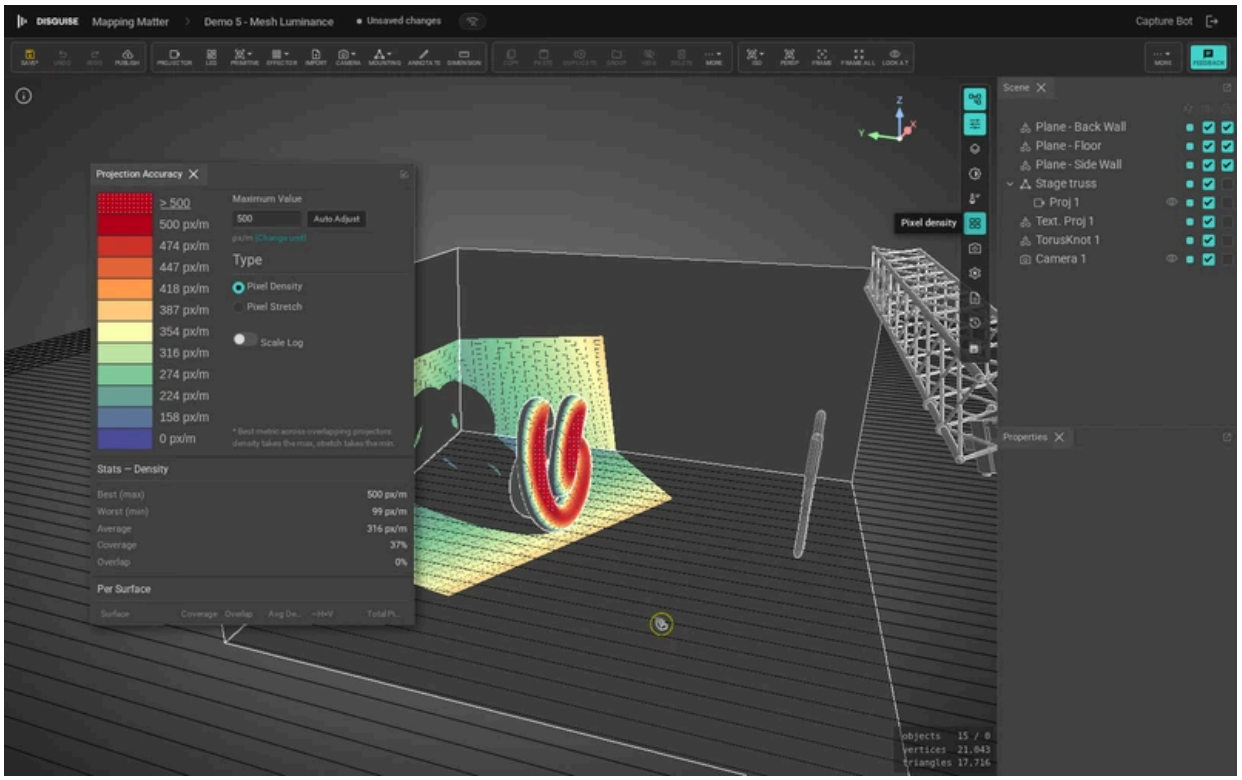
LED screen readouts use the **panel's native brightness**: the rated nits of the tile spec multiplied by the screen's brightness factor. The content being displayed (test pattern, video clip) is ignored, so the lux numbers match what you'd measure with an instrument rather than depending on whatever's playing. This matches the projector behaviour where output is independent of the projector image.

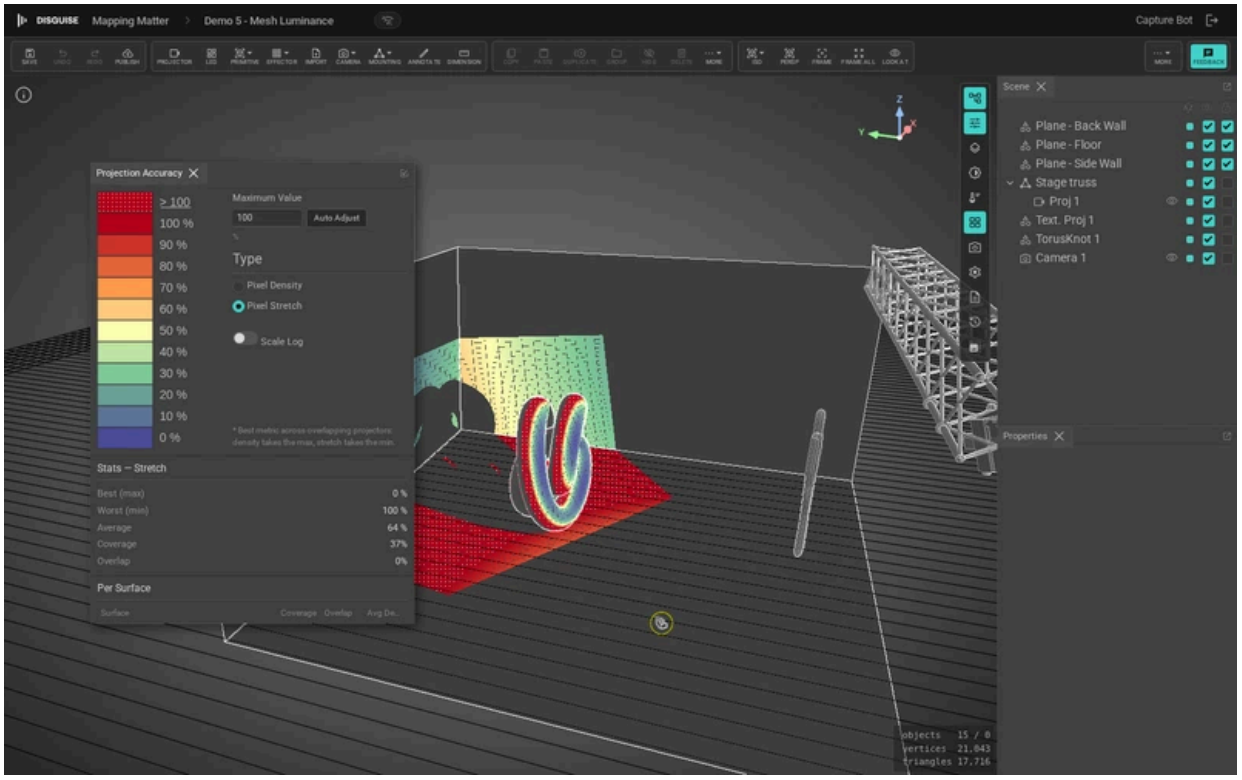
Projection accuracy

The Accuracy analysis answers a different question from Photometric: *how well does each projector resolve to the surface it's hitting?* Open **Pixel density** in the bottom Panels strip and pick a mode:

- **Pixel Density**: pixels per unit length on the surface, in the active scene unit. Set the **Maximum Value** to the density that should map to the top of the colour bar; areas at or above max render red, areas at the bottom render blue. Useful for confirming that a wall is hit with the resolution you sold to the client.
- **Pixel Stretch**: the anisotropy ratio between the projector's horizontal and vertical pixels on the surface. A perfectly square pixel is 1.0; the further from 1 the more distorted (oblique angles, off-axis projectors). Maximum tops out at 5×.

Toggle **Scale Log** to spread the colour bar across very different densities. The panel also reports aggregate stats (best, worst, average, and coverage) across all visible surfaces. The stats are sampled across each surface in world space and don't depend on the current camera view, so a sphere or curved wall reports its true coverage no matter how you orbit.





The **Pixels** button on the toolbar's display cluster is the in-viewport overlay for whichever mode the Accuracy panel last had selected. Use it as a quick on/off while the panel stays in the side dock.

Human acuity

The Human Acuity overlay tells you whether each projector or LED pixel is *resolvable to a human standing at the observer's eye*. The 1-arcminute (20/20) threshold is the reference. Place an Observer, use **Look from** to enter their view, then click **Acuity** on the toolbar to enable the overlay.

While looking from the observer you can walk around with `WASD` and free-look with **Mouse look** (toolbar button or hold the cursor); the acuity bands update live as the observer moves, so you can validate seat-by-seat coverage by stepping through the audience plot rather than guessing from a fixed POV.

The colour key (relative to the 1-arcminute threshold):

Band	Meaning
Blue / cyan	Pixels much smaller than acuity: finer than the eye can resolve. Wasted resolution.
Green	Pixels at or near acuity: the sweet spot.
Yellow / orange	Pixels larger than acuity: visible structure.

Band	Meaning
Red	Pixels far above acuity: clearly pixellated to the observer.

Acuity only renders from an Observer's eye view; leaving look-from mode (or selecting a non-observer view) clears the overlay. Use it together with **pixel density** to balance specified resolution against perceived resolution.

Brightness viewport

The brightness viewport renders the live lux distribution across all surfaces as a colour heatmap with a configurable colour bar.

In the **Brightness** panel:

- **Auto range**: fit the colour bar to the current scene's min/max lux.
- **Log scale**: apply a log mapping so dim regions are still discernible.
- **Projection texture overlay**: overlay each projector's assigned texture on the surface, regardless of beam visibility.
- **Ambient light**: overall scene fill; affects shading but not photometric numbers.
- **Directional light**: sun-like fill with yaw and pitch; affects shading and the brightness viewport.

Measurements and annotations

Within either analysis mode you can place numeric dimensions and freehand annotations; see Measurements & annotations.

See also

- Projectors for beam orientation
- LED screens for LED contribution to the heatmap
- Export & PDF layouts: photometric numbers are included in PDF and CSV exports

What's New

Modern Mapping Matter is a ground-up rewrite of the design tool many of you already know. The familiar shape is still here (projectors, screens, rigging, photometric and brightness analysis, shareable snapshots), but the platform underneath is new, and almost every workflow has been rebuilt around real-time collaboration, layered scenes, AI-assisted product creation, deeper truss and LED workflows, and a publishing pipeline that finally treats your design as the deliverable.

This page is the tour. Each section calls out what's new or materially better than the previous version, with deep links to the full documentation for each feature. If you're carrying scenes across, your legacy work is one click away in the launcher's **Migratable** tab; see Open or create a scene.

Designed together, in real time

Mapping Matter is now a collaborative editor. Two or more designers can be in the same scene at once, with live cursors, presence avatars in the header, and short-lived scene locks that prevent conflicting writes. See Collaboration.

For the rest of the world (clients, lighting designers, freelancers, the production manager who needs to sign off the rig) publishing is now first-class. A **snapshot** is a named, locked, independent copy of the scene at a moment in time. You publish a snapshot then attach as many shares as you need: anonymous URLs (with optional password), per-email invitations that surface in the recipient's Disguise Cloud dashboard, or both. View counts surface on every share, individual recipients can be revoked, and the whole snapshot can be invalidated in one click without losing the source scene. See Publish & share.

A new Layers system organises the scene the way drawings have always been organised. Every object lives on a named layer with a colour swatch in the Scene panel, and the Layers panel lets you toggle whole groups visible or hidden in bulk. The same picker is in the Publish & Share dialog, so you can send the lighting designer a snapshot of only the lighting layer, or the venue a snapshot with just the structural layer, without touching the source scene.

Revisions are no longer a "last 10 opens" rolling buffer. Every committed edit lands in an **auto-save** that flushes in seconds, and a new revision is cut whenever editing settles (or when you close the scene), so an evening's work reads as named checkpoints in the Revisions panel, each restorable in place.

Smarter modelling, smarter snapping

The transform gizmo has a brand-new global **Snap** control in the viewport toolbar. Pick one of five modes (**Off**, **Grid**, **Vertex**, **Edge**, or **Surface**) and the gizmo locks onto the nearest target on

any visible mesh as you drag, including truss members and observer figures. A green disc indicator confirms the snap target live. See Snap modes.

The 3D **asset library** now reports an imported mesh's bounds in your scene's active dimension unit (feet, metres, mm, anything) instead of forcing you to read millimetres. A new **Scale Reference** picker drops either a 1.8 m human figure or a 1 m^3 wireframe cube next to the mesh while the Import Settings overlay is open, so you can confirm scale at a glance before committing. See Import Settings.

Object hierarchy works the way you expect: drag any node in the Scene panel onto another to reparent in place, with a visible drop indicator and the same parent rules as the Properties Parent dropdown. Multi-selections move as a unit. See Reparenting in the Scene panel.

The whole editor is dockable. The Scene, Properties, Layers, Brightness, Pixel density, PDF layouts, Revisions, Scene settings and viewport-tuning panels are all in a bottom-edge **Panels** strip; click any to open or close it. Drag a panel's tab to any edge to dock it as a rail, drop it on another tab strip to merge them, or drag it onto the viewport to float it. Your layout persists per scene, so a projector-heavy rig and an LED-only rig can have completely different workspaces.

LED screens, first-class

Where legacy Mapping Matter focused on projection, modern Mapping Matter treats **LED walls** as full peers. Click **LED** in the toolbar's add cluster to open the LED library overlay (catalogue tiles plus any custom tiles you've added) and lay out a wall with horizontal and vertical tile counts up to 100 × 100. The Properties panel exposes pixel pitch, tile model, brightness in nits, mounting style and content texture, with a derived read-out for total resolution, dimensions, weight and power draw aggregated across every tile. See LED screens.

Walls can be **curved**, either concave (toward the viewer) or convex (away), around the horizontal or vertical axis. Sweep the **Tile Angle** parameter and the panel shows live derived geometry (radius, total curvature, chord length, depth) so you can size a wall to a venue's structural curve in feet of arc, not trial and error.

LED walls plug into every other system. They contribute to the **brightness viewport** heatmap and surface coverage statistics. They can be **mounted on a truss** via the same Mounting collapsible projectors use. They can be **duplicated through effectors**: the Polar Array and Fan modes are particularly useful for stacked LED rings and toed-in walls. And the new **Layers** system means an LED-only snapshot is a single click away.

AI-assisted product creation

If a projector or lens isn't in the catalogue, hit **+ Create custom** in the projector library and start typing a manufacturer and model. Modern Mapping Matter fires a background AI research call against the manufacturer's specs and shows an **AI suggestions ready** banner at the top of the form. One click on **Apply all** populates every still-empty field (throw range, fixed optical offset,

adjustable shift envelope, mount slug) with sourced values; any field you typed yourself is left untouched. The lens name and lens-mount fields are also autocomplete-driven, pulling matches from the product DB and falling back to a fresh AI lookup when there's no DB hit. See Custom projectors.

The custom-product workflow knows about ultra-short-throw optics specifically. Pick a UST lens (catalogue or custom) and the projector sidebar surfaces a **UST lens: add a fold mirror?** banner with an **Add suggested mirror** button that drops a 45° fold plate aimed at the projector's current target, sized to catch the chief ray. From there you fine-tune like any other mirror. See Suggested mirror for UST lenses.

Custom projectors save into a per-project "Project copies" group at the top of the library overlay and behave identically to catalogue models everywhere else in the editor.

Trusses and mounting, rebuilt

Modern Mapping Matter ships a complete **truss and base library** under a new **Mounting** popover in the toolbar's add cluster. Seven truss profiles (Tower, Horizontal Span, Goal Post, A-Frame, Ladder, Arc, Ring) and four base types (Base Plate, GB Block, Sled, Outrigger), with parameterised geometry, custom variants, and a full catalogue overlay you can search by cross-section. See Trusses and mounting and the Truss library.

Mounting a projector or LED wall onto a truss is a drag away. Drop the projector near a truss and Mapping Matter offers to clamp it to the nearest centreline; once mounted, the projector tracks the truss as you reposition the rig and slides freely along the chord via the **Clamp position** slider in the Mounting collapsible. Effectors mounted on a truss carry every copy with them, so a polar array of projectors moves and tilts as a single unit.

Trusses also get a continuous **clash check** against scene meshes. Any truss that intersects geometry pulses red so a hire-house operator can spot the conflict at a glance. Toggle the warnings via the **Clash** button in the viewport toolbar's display cluster. See Collision warnings.

Analysis, end to end

Every analysis mode from the previous version is here, faster and richer.

Photometric analysis computes lux per surface, plus coverage and overlap, and now reports contrast ratio per surface so you can validate a wall against a 5:1 minimum at a glance. **Projection accuracy** splits into two modes: **Pixel Density** for resolution-on-wall checks (px / mm^2, px / ft^2, whatever your scene unit is) and **Pixel Stretch** for projector keystoning, with an Auto Adjust that snaps the colour bar to the current scene peak. Both have a quick on/off in the toolbar's display cluster and a full configuration panel in the Panels strip. The **Brightness viewport** is a live lux heatmap with draggable min/max range handles and per-scene auto-fit, and adds a **projection texture overlay** so you can preview content directly on the rendered surface, regardless of beam visibility.

A new **POV camera** treats each saved camera as a real Three.js camera with its own resolution, FOV, focal length and sensor size. Pick one from the toolbar's Camera popover, and an inset preview opens in the viewport showing what the camera sees. See POV camera.

Observers are a new class of camera shaped like a person (head, body, eye-level bar) that you drop into the audience plot and walk through with `WASD`. Switch the toolbar's **Acuity** button on and a new **Human Acuity** overlay colour-codes every projected and LED pixel by how it compares to the 1-arcminute (20/20) acuity threshold from the observer's eye. The colour bands update live as you walk, so you can validate seat-by-seat coverage instead of guessing from a fixed POV. See Observer and Human acuity.

Rounding out the viewport tools: **Projection distance helper** colour-codes each surface by its distance from the nearest projector for focus-zone planning; **Object edges** shows wireframes over everything; **Material override** swaps every surface to a neutral grey for blocking checks; **Mouse look** captures the cursor for free POV navigation.

Output and handover

The **PDF layouts** system turns the editor into a producible-document tool. A layout is a reusable page template (title block, table of projector specs, page size, viewport pose) that you save from the Export dropdown and reuse on any scene. See Export & PDF layouts. CSV exports cover projector and tile data for downstream media-server prep.

The viewer side of publishing is the **`mapping-matter-viewer`** plugin: a public, account-optional, read-only renderer that opens any share link. Recipients see the scene in a navigable 3D viewport with the title block, designer name, the layers the snapshot included, and an optional brightness toggle. No sign-in required, no access to the source scene, no edit affordance.

Tooltips, slider polish, and other quality-of-life

A lot of small things add up. Every icon-only button in the viewport toolbar, the object sidebars, and the dock panels has a PrimeVue tooltip with the keyboard shortcut rendered as a teal-bordered chip. Panel sliders are now full-width with a larger thumb and a bigger hit target for precise mouse drags. The Mounting toolbar popover lists every truss type, every base type, and a one-click **Mount on nearest truss** action. The keyboard reference is one `F1` keystroke away (the in-app shortcut dialog is up to date with every binding).

For the deeper rabbit holes (collaboration locks, snapshot internals, RLS, the migration tool architecture) the FAQs cover the most-asked questions and link out to the per-page docs.

What's gone or changed

A handful of features from the previous Mapping Matter don't carry over verbatim. The modern editor handles them differently:

- **Viewer-only links** are replaced by snapshot **link shares**: anonymous, optionally password-protected, revocable, with view counts. See Share a snapshot.
- The **always-on 1000 mm grid snap** is now an opt-in **Grid** mode in the Snap popover; the default is **Off**. Pick **Grid** explicitly if you want the legacy behaviour back.
- The **Save** button is gone. Auto-save runs continuously and the Revisions panel is the rollback path.
- **Per-file scenes** are now **one scene per Disguise Cloud project**; switch projects from the launcher dashboard to work on a different scene.
- The **"last 10 opens" snapshot system** is replaced by an unlimited revision history and named locked snapshots.

Where to start

A suggested first session:

1. Open a demo scene from the launcher's **Demos** tab; `Demo 5 - Mesh Luminance` is the most analysis-rich.
2. Toggle the **Lux**, **Pixels** and **Acuity** buttons in the toolbar's display cluster to see the analysis overlays.
3. Drop a custom projector via **+ Create custom** and watch the AI suggestion banner populate.
4. Open the **Snap** popover and try **Vertex** or **Surface** while dragging a projector.
5. Publish a snapshot from the **Publish & Share** button and open the resulting link in a fresh window.

When you're ready to bring your own work across, the **Migratable** tab in the launcher walks each legacy scene through the migration. The original stays untouched unless you opt in to marking it as migrated.

Latest updates

New this release:

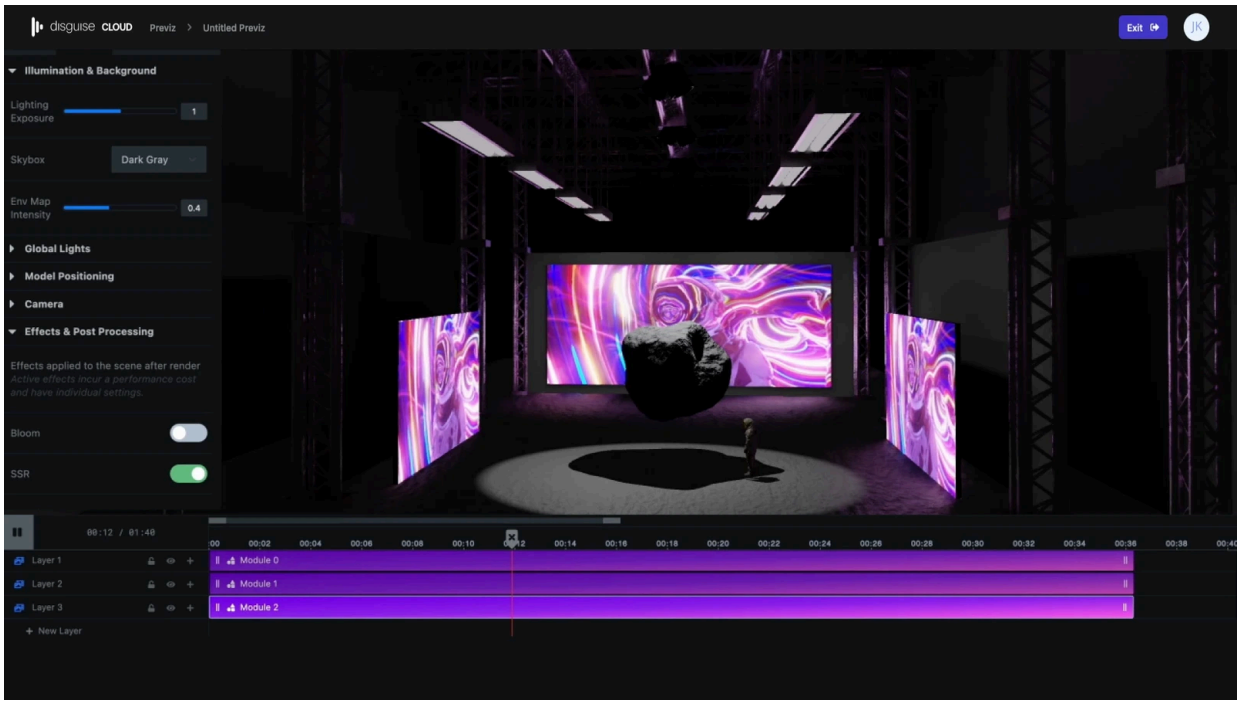
- **User-definable projection studies**: the PDF output has been rebuilt from three fixed generators into a template-plus-slot layout editor with a live preview. Pick ISO A4–A0 or US Letter, add per-projector, per-LED or per-observer pages, and set each render slot's mode to projection output, pixel density, pixel stretch, illuminance, luminance, or human acuity. Generated PDFs are real vector output, not screen captures. See Export & PDF layouts.

- **Organisation-scoped projectors**: custom projectors now have an ownership scope. Promote them from **Project** to **Organisation** so the rest of your team can pull the same custom model into any of their scenes; a launcher dashboard section lets an admin manage the whole org library. Legacy Mapping Matter customers can import straight into the org library without opening a scene. See Ownership scope.
- **Wireframe display toggle**: a new **Wire** button in the display cluster flips every mesh to a wireframe overlay, useful for topology checks without hiding geometry.
- **Delete assets from the 3D library**: user-imported meshes now have a **Delete asset** action with a 90-day retention window; the platform demo library stays read-only.
- **Inline material editing for single-material References**: when an imported mesh has one default material, its material controls appear inline in the Properties panel below the **Edit Reference** button; no need to enter edit mode to change colour or texture.
- **Full read-only enforcement for viewers**: every mutation entry point is disabled and greyed for viewer and unlicensed users, so there are no controls that appear active but silently fail on write.
- **What's New announcements + reload prompt**: the launcher header has a sparkle icon that opens the Disguise **What's New** panel; long-lived editor sessions surface a non-blocking **Reload** banner in the top-right when a new build is deployed.
- **Persistent library filters and sort**: the launcher dashboard, projector library and LED library remember your sort order, scope filter, and brand/origin filters per browser.
- **Numpad-free keyboard shortcuts**: every numpad view shortcut (`Num 0` – `9`) also fires on the top-row digit keys, so laptops without a numpad drive them the same way.
- **Swap orbit / pan**: a Scene Settings preference for Blender / Maya users flips the viewport bindings so left-drag orbits and right-drag pans.
- **View-independent accuracy stats**: the Accuracy panel's coverage, overlap, density and stretch numbers are now sampled across each surface in world space, so numbers on spheres and curved walls stay stable no matter how you orbit.
- **Better measurement snap and picking**: vertex snap works across meshes, and orbit-drags while placing a point no longer drop a stray point on release.
- **Truss collision hints name the file**: the AId3n suggests hint refers to the offending mesh by its imported file name, and **Translate to clear** clears against the whole imported asset.
- Under the hood, **large-scene load and save reliability** got a large lift: mesh caching, incremental scene diffs, material dedup, retry-on-blob-upload, and IndexedDB mesh caching all landed. Heavy scenes should open and autosave noticeably faster.

See also

- Introduction
- Getting Started
- FAQs

About Previz



Previz is a flexible, user-friendly, pre-production workflow for transforming ideas into incredible experiences.

It's been conceived to improve the collaborative working environment and communication of different event professionals, wherever they may be.

Previz features:

- A direct connection to disguise drive, comprehensive Content Management System that supports images, videos, and sequences.
- A real-time interactive 3D Scene editor and viewer that supports textures, lighting and cameras.
- A feature rich Sequencer to combine and integrate 3D scene data, production images and video assets into a timeline.
- Shareable view pages to provide clarity and alignment, helping with the review and approval process of your project.

Compatibility

To display 3D content in real-time we use WebGL, which is a standard in most modern browsers. You can check if your browser is compatible on **https://get.webgl.org/**

For more technical details about WebGL on your machine, see **https://webglreport.com**

Desktop

Previz is compatible with the following browsers:

- Mozilla Firefox
- Google Chrome
- Opera
- Safari
- Edge

Mobile

- iOS 8+
- Android 4.0

Troubleshooting

WebGL

If you run into problems in the 3d viewer, make sure your graphics driver and browser are up-to-date. If that doesn't help, try one of the other browsers listed above. **https://get.webgl.org/** is a good place to start troubleshooting.

Sometimes, your browser may disable WebGL based on your GPU. If you are using a compatible browser, but you see an incompatible warning or the viewer performs very badly, try forcing the browser to use your GPU:

Chrome

1. Go to Sys tem Settings (chrome://settings/ > Advanced > System) and make sure **Use hardware acceleration when available** is enabled.
2. Go to chrome://flags/#ignore-gpu-blacklist and enable the **Override software rendering list** flag.

Firefox

In Firefox, type about:config into the address bar and enable **webgl.force-enabled**.

Touch Screen / Tablets

Sometimes, navigating a model may not work on a touch screen or tablet device. This is especially common on certain Windows 10 devices. In Chrome, for example, visit chrome://flags/#touch-events and enable the "Touch Events API" flag.

Creating a Previz Project

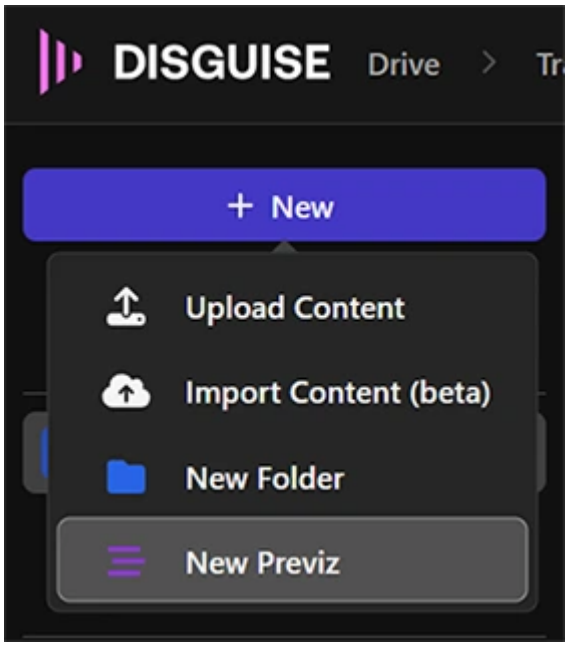
With Previz you can plan and preview your content in a real-time 3D environment.

Sequences in Previz can contain a range of different media including images, videos, 3d and scenes.

Create a new Previz Project

To create a new Previz Project:

1. Select **New** from Drive.
2. Then select **New Previz** next to the team name in the team sidebar.
3. Enter the name for your new Previz.



Create a Previz Project

Creating a Share Link

You can share specific files (including scenes and sequences) with external guests such as clients or project stakeholders.

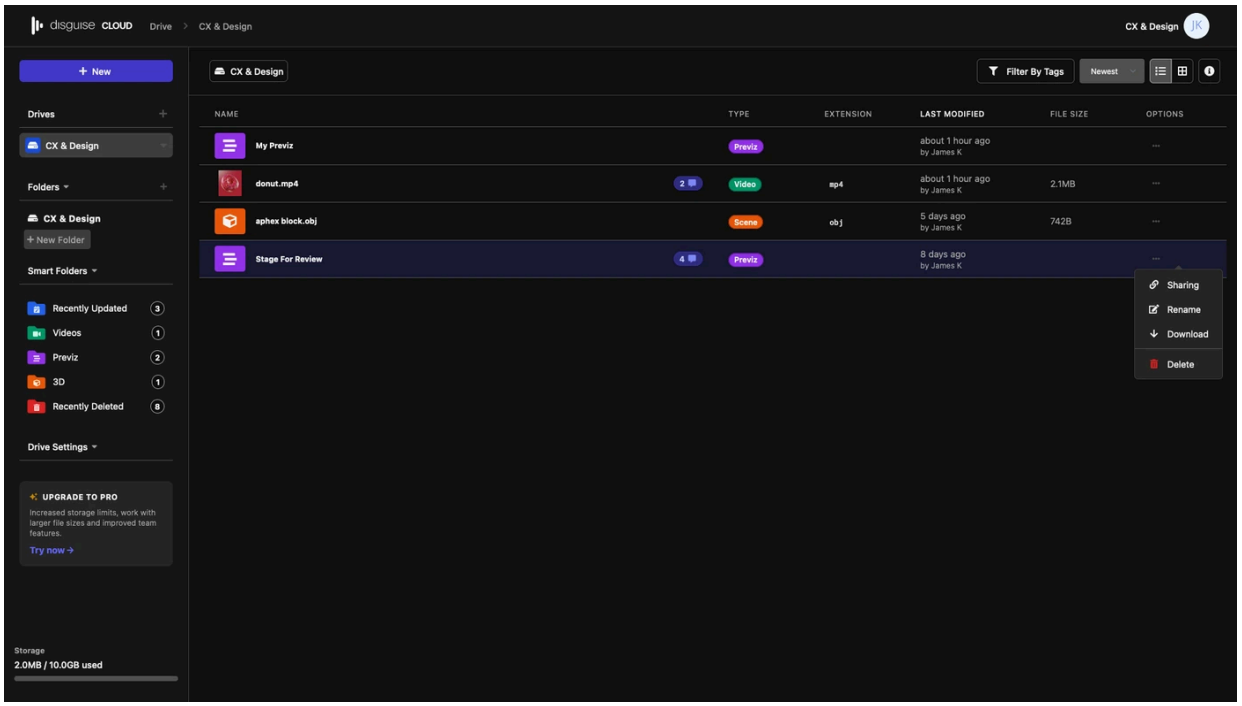
Creating a share link enables these users outside your team to be able to view your files.

There are two ways to create a share link:

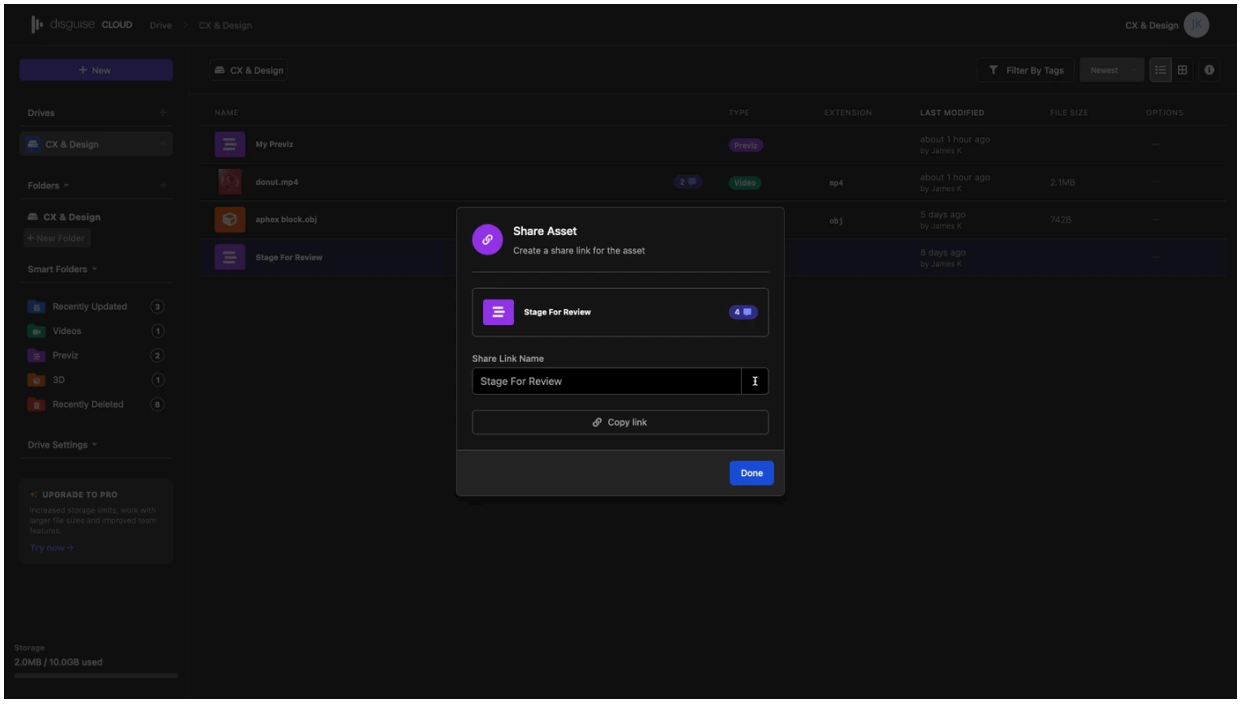
1. From the edit mode of an item. OR
2. From the view mode of an item.

Create a Share Link in View Mode

1. Navigate to the content view within a project.
2. Select the asset you want to share to open it.
3. In the sidebar click “Create Link”.
4. In the modal that opens you’ll have the option to add a title.
5. Next you’ll need to enable link sharing for the asset. You can do this by toggling the enable option or clicking the “Enable Link Sharing” button.
6. This will generate a link that you can copy.



Select the asset to share



Confirm the share link name

Customizing a project

Guides lead a user through a ‘specific’ task they want to accomplish, often with a sequence of steps. Writing a good guide requires thinking about what your users are trying to do.

Further reading

- Read the Disguise help guide

Editing Scenes

Global Settings

Previz offers you a convenient way to tweak your basic model settings including lighting and positioning to make sure your model is rendered exactly the way you want it. These options can all be controlled in the Viewer tab in the scene editor. Changes are rendered in real time and saved automatically.

Illumination

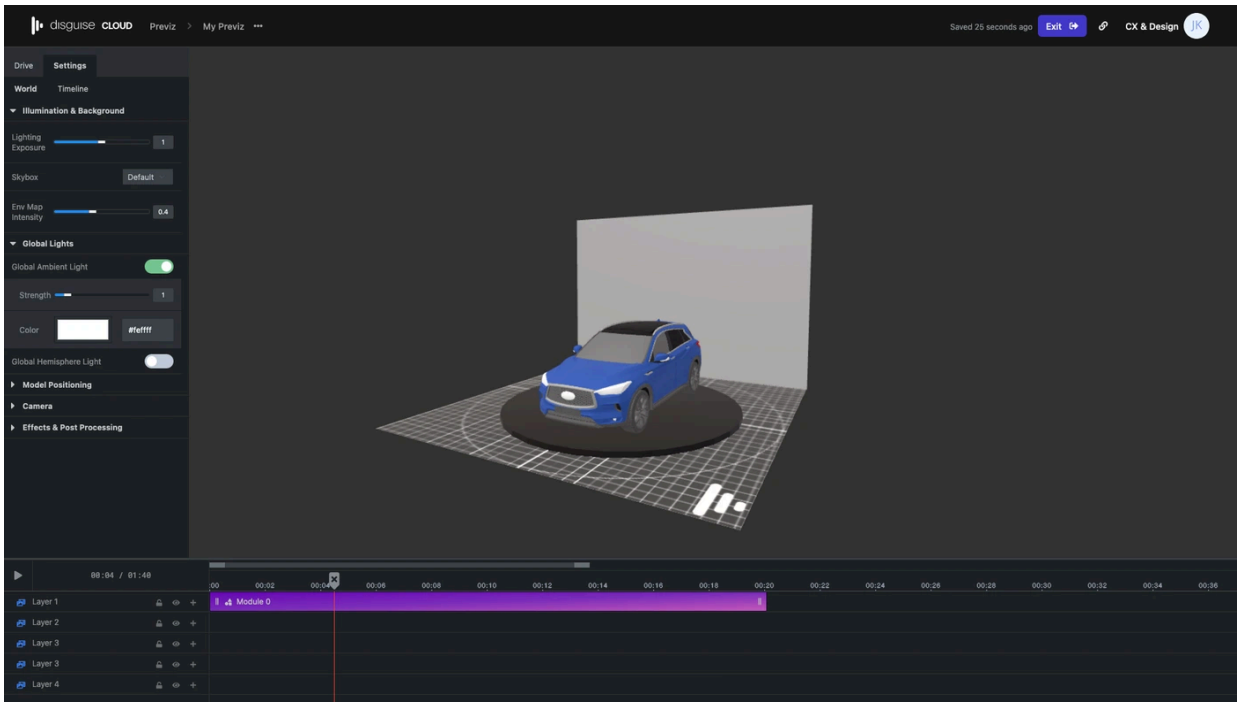
The illumination field allows you to edit the lighting exposure for the scene.

Note: This is independent of any lights you may have within your scene.

To edit the lighting exposure:

1. In the content view pick the scene you wish to edit.
2. Whilst in edit mode in the sidebar navigate to the Viewer tab and then the World sub-tab.
3. In the Illumination field adjust the lighting exposure by either clicking and adjusting the slider or by editing the number input field.

Note: The slider adjusts a range from 0 to 2. The number input will allow any value.



Illumination & background

Global Lighting

There are two lights added to every scene by default.

1. Global Ambient Light
2. Global Hemisphere Light

It is up to you whether to use these or not. If you have setup lighting in your imported 3D scene it is likely that you will want to turn both of these off.

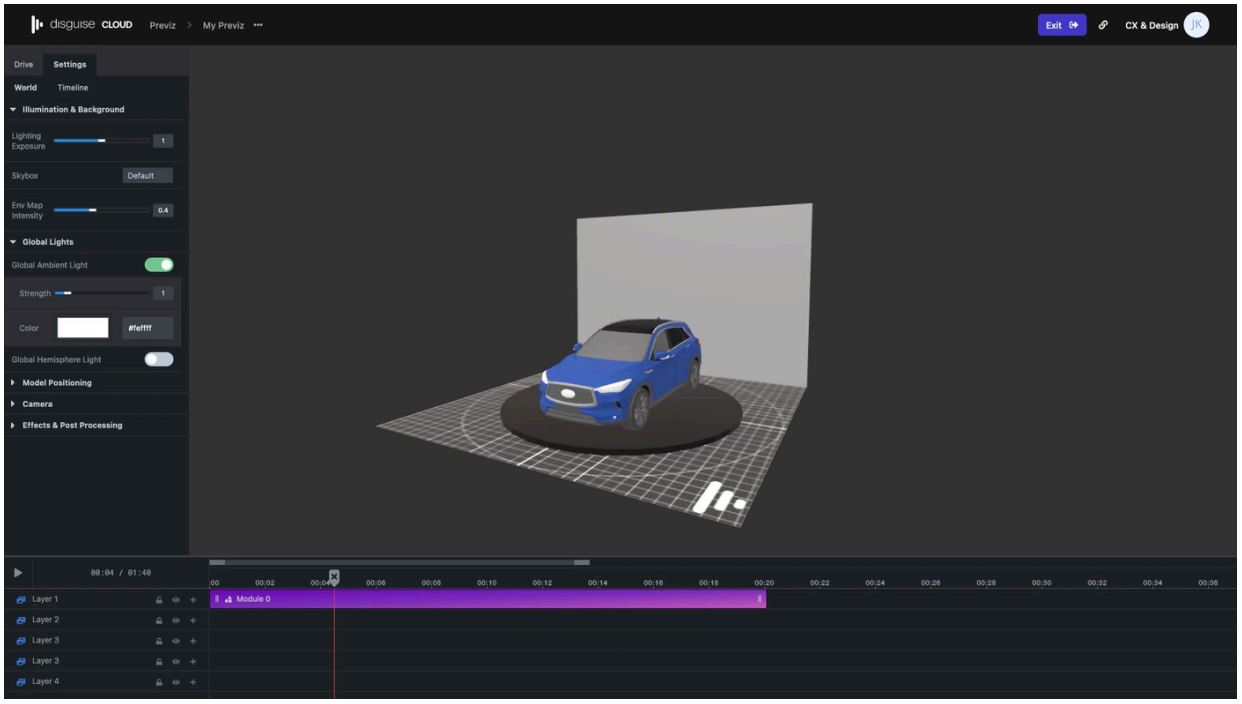
Global Ambient Light

This light globally illuminates all objects in the scene equally. This light cannot be used to cast shadows as it does not have a direction.

1. In the content view pick the scene you wish to edit.
2. Whilst in edit mode in the sidebar navigate to the **Viewer** tab and then the **World** sub-tab.
3. In the Illumination field adjust the lighting exposure by either clicking and adjusting the slider or by editing the number input field.

Global Hemisphere Light

1. In the content view pick the scene you wish to edit.
2. Whilst in edit mode in the sidebar navigate to **Settings**.
3. In the Illumination field adjust the lighting exposure by either clicking and adjusting the slider or by editing the number input field.



Global lights and illuminations

Model Positioning

There are three ways in which you can edit your model position.

1. World Scale
2. World Position
3. World Rotation

World Scale

Editing **World Scale** allows you to set the relative scale of your model in relation to the world space.

To edit the world scale:

1. In the content view pick the **scene** you wish to edit.
2. Whilst in edit mode in the sidebar navigate to the **Viewer** tab and then the **World** sub-tab.
3. In the **World Scale** field adjust the scale by either clicking and adjusting the slider or by editing the number input field.

Note: The slider adjusts a range from 0 to 2. The number input will allow any value.

World Position

Editing **World Position** allows you to adjust the XYZ coordinates.

To edit the world position

1. In the content view pick the **scene** you wish to edit.
2. Whilst in edit mode in the sidebar navigate to the **Viewer** tab and then the **World** sub-tab.
3. In the **World Position** field adjust the coordinates by entering your desired values in the number fields.

Note: You can also adjust these input fields by clicking and dragging.

World Rotation

Editing **World Scale** allows you to set the relative scale of your model in relation to the world space.

To edit the world scale

1. In the content view pick the **scene** you wish to edit.
2. Whilst in edit mode in the sidebar navigate to the **Viewer** tab and then the **World** sub-tab.
3. In the **World Rotation** field adjust the coordinates by entering your desired values in the number fields.

Note: You can also adjust these input fields by clicking and dragging.

Set to Defaults

To reset the model position click **set to defaults.**

Exporting .glTF files from Blender

To export from Blender

Go to **File > Export > glTF 2.0 (.glb/.gltf)**

File Format Variations

The glTF specification identifies different ways the data can be stored.

To export for the Previz platform

Select glTF Binary (.glb)

This produces a single .glb file with all mesh data, image textures, and related information packed into a single binary file.

Include

If you want to export your entire scene make sure that Selected Objects is **not checked**.

Transform

This option should be selected by default. Ensure it is to export your file using the glTF convention, +Y up.

Geometry

Make sure all options are selected by default.

Animation

glTF allows multiple animations per file, with animations targeted to particular objects at time of export. To ensure that an animation is included, either (a) make it the active Action on the object, (b) create a single-strip NLA track, or (c) stash the action.

Supported

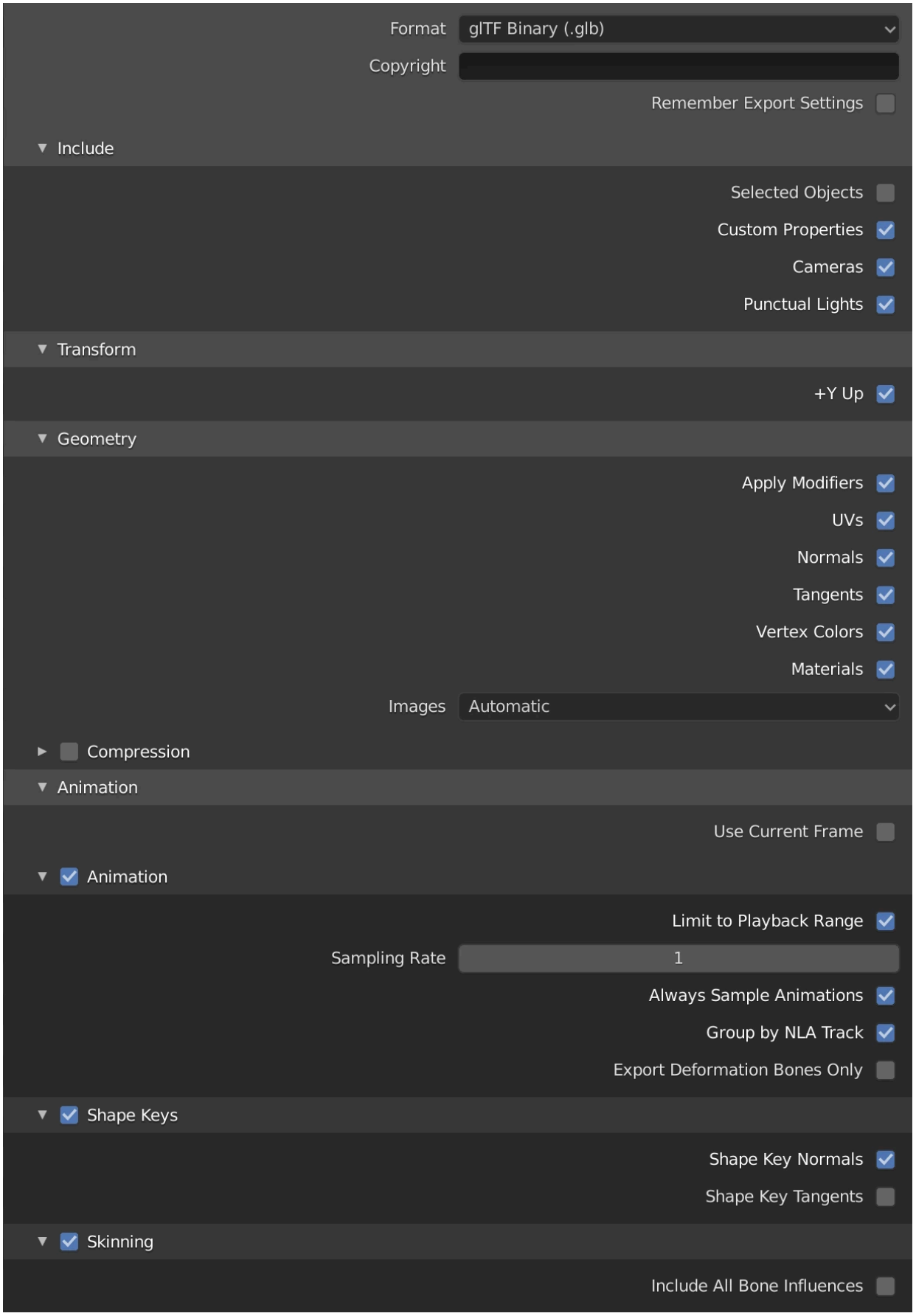
Only certain types of animation are supported:

- Keyframe (translation, rotation, scale)
- Shape keys
- Armatures / skinning

Animation of other properties, like lights or materials, will be ignored.

Default Options

The following image shows default options for a scene file with cameras, lights and animation included.


Format
glTF Binary (.glb)
Copyright
Remember Export Settings
Include
Selected Objects
Custom Properties
Cameras
Punctual Lights
Transform
+Y Up
Geometry
Apply Modifiers
UVs
Normals
Tangents
Vertex Colors
Materials
Images
Automatic
Compression
Animation
Use Current Frame
Animation
Limit to Playback Range
Sampling Rate
1
Always Sample Animations
Group by NLA Track
Export Deformation Bones Only
Shape Keys
Shape Key Normals
Shape Key Tangents
Skinning
Include All Bone Influences

Reference Links

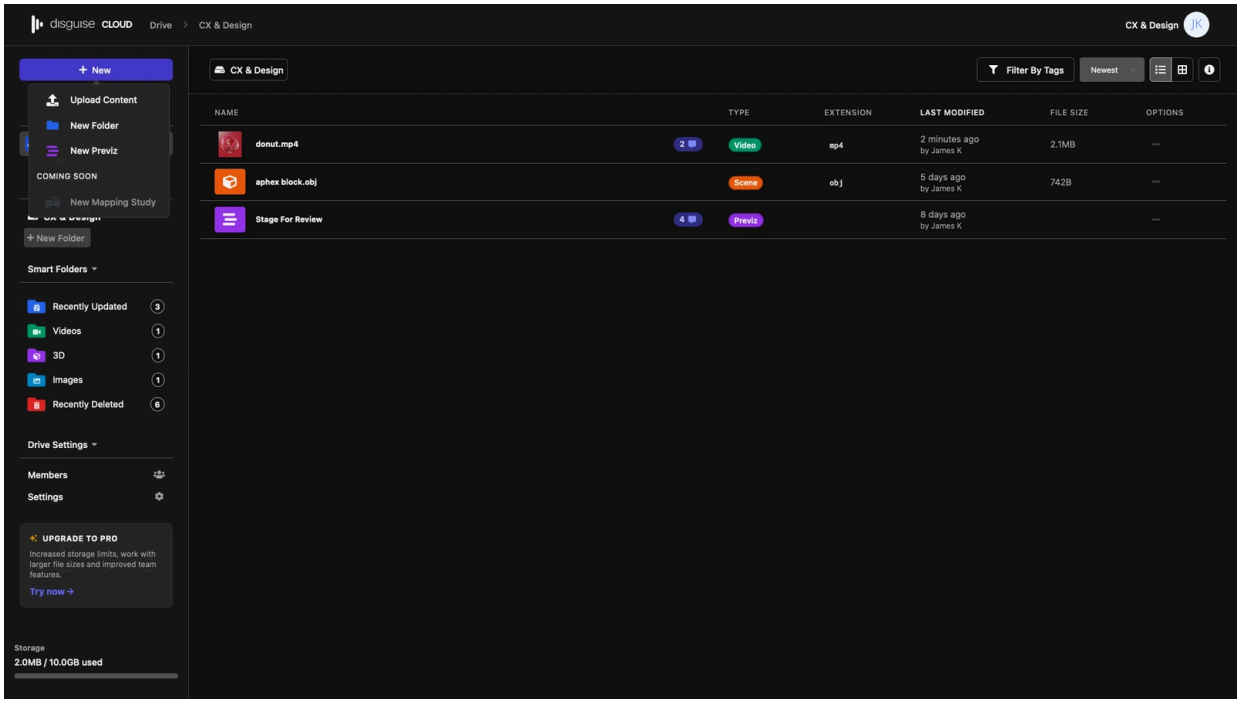
- Blender glTF reference

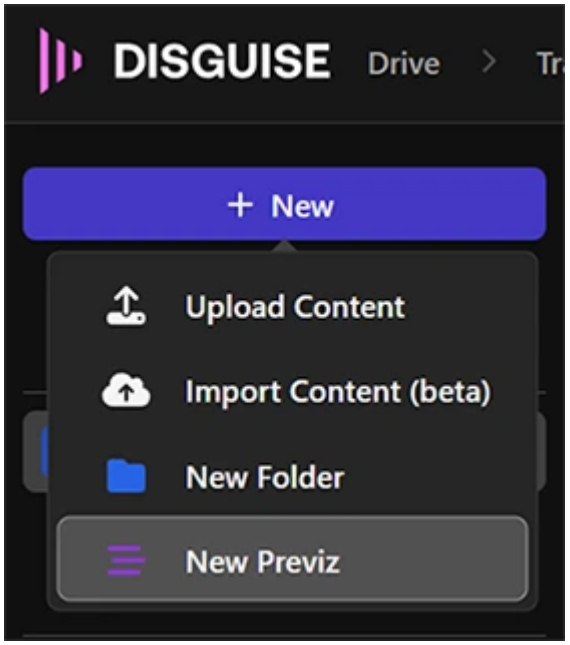
Getting started with Previz

If you have signed up for Disguise Cloud, then you can get access to the web-based Previz application. If not, you can create a Disguise Cloud account here.

Accessing Previz from Cloud

In Cloud Drive, you can create a new Previz project by clicking **New > New Previz**.




DISGUISE
Drive
+ New
Upload Content
Import Content (beta)
New Folder
New Previz

Navigating the Viewer

Viewer Controls

- **Orbit** - To orbit around the scene click and drag with your mouse. If you are on a touch device pointing and dragging will have the same affect.
- **Pan** - To pan, right-click and drag. Use two fingers on a touch device.
- **Zoom** - To zoom, scroll the mouse or pinch and zoom on a touch device.

Preparing Scenes

Preparing Scenes for Upload

The Previz platform is optimised to use the glTF (GL Transmission Format) 3d file format.

glTF reduces the size of 3D models and the runtime processing needed to unpack and render those models.

glTF Feature Support

The Previz platform supports the following glTF 2.0 features:

- Meshes
- Materials (Principled BSDF) and Shadeless (Unlit)Textures
- Cameras
- Punctual lights (point, spot, and directional)
- Animation (keyframe, shape key, and skinning)

Checklist before exporting to Previz

- Make sure geometries from CAD / LIDAR files have:
  - No orphan vertices
  - Only manifold objects
  - No inner faces
- Objects are logically regrouped into single meshes
- Each mesh has an unique name
- UV sets are properly named:
  - Mapping unique to a single mesh have an unique name
  - Mappings shared between several meshes have the exact same name
- A nice props look is baked into a texture

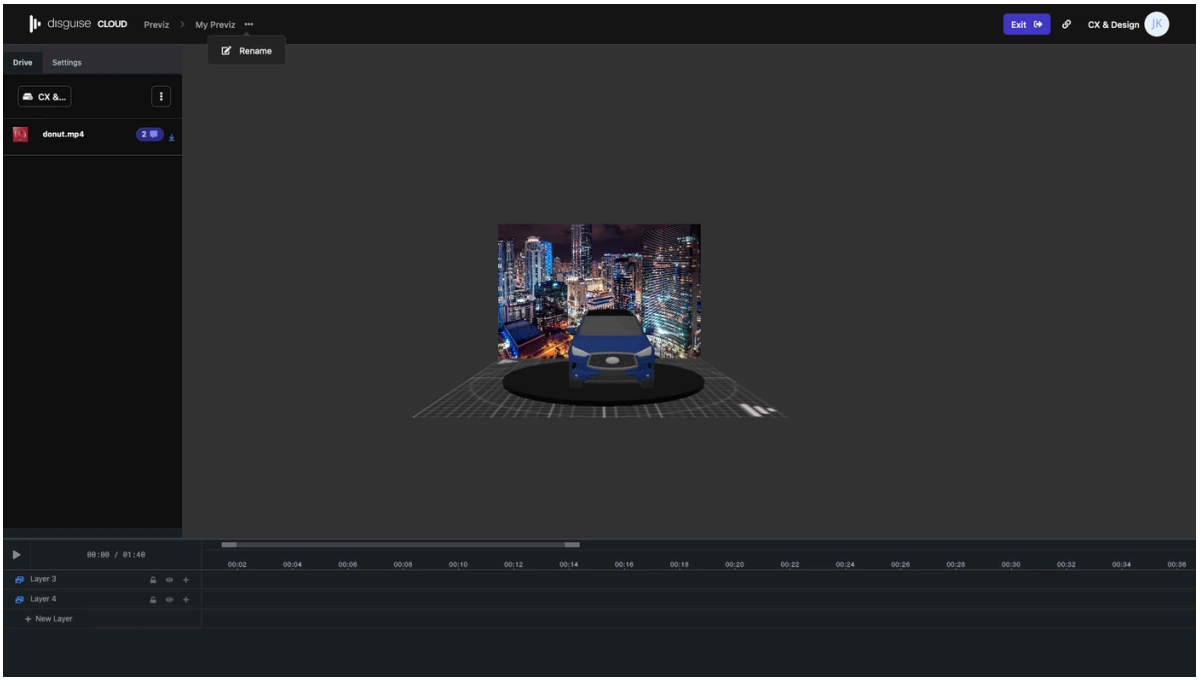
After checking these points, the scene is ready to be exported to Previz.

Renaming a Previz

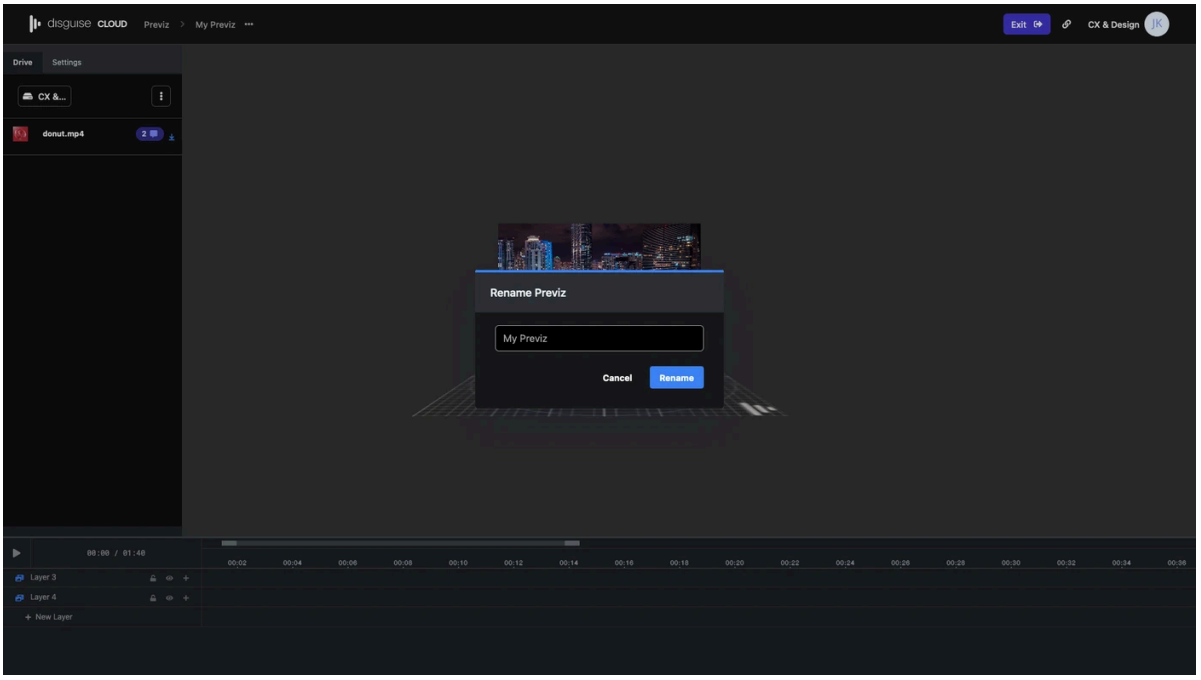
Select the ellipsis in the main navigation next to the Previz sequence. From the dropdown menu select Rename. This will trigger a modal where you will be able to rename your project.

Rename a Previz

1. Select **My Previz** > **Rename** from the menu.



2. Enter the new name for the Previz and click **Rename**.



Scenes

Upload your scenic data and share with unlimited guests for review and approval. Guests can interact with your scene directly in their browser.

Scenes are a way to present set designs and geometry. Each scene file can contain data such as objects and materials as well as lights and cameras. These scenes first need to be created in your 3D program of choice.

General Considerations

- We support .glb files (.glb is the binary version of the glTF 2.0 file format).
- Your .glb must be under 20MB in total. The smaller the better.
- Strip out unused data whenever possible. Unused vertex colors, UV's, etc. all add to the file size.
- Use PNG or JPEG files for textures.
- Use JPEG files unless you need transparency. This will make your files much smaller.
- Textures must be power-of-2 in each dimension (512x1024 for example).
- Textures can be up to 4k, but try to keep them under 2k. _ Once you have a .glb file, you can just drag it into the content area, pick a background color and share it.

Reference Links

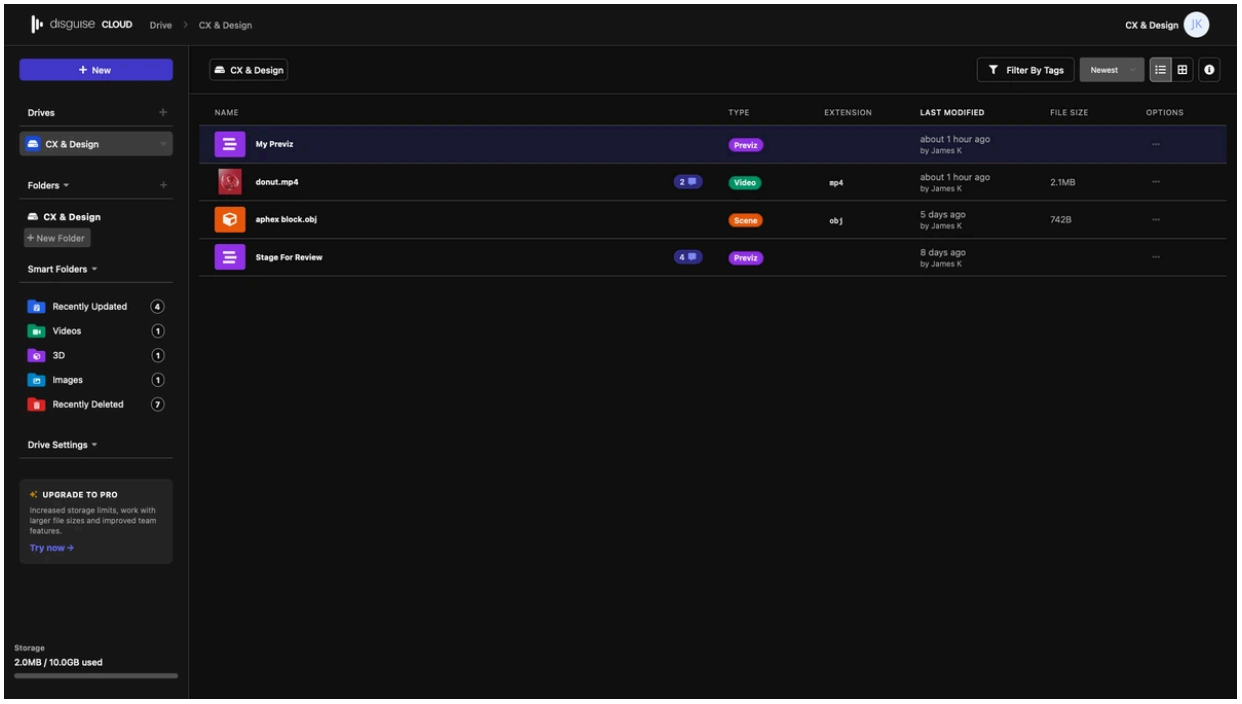
- Blender glTF reference
- Cinema 4D reference

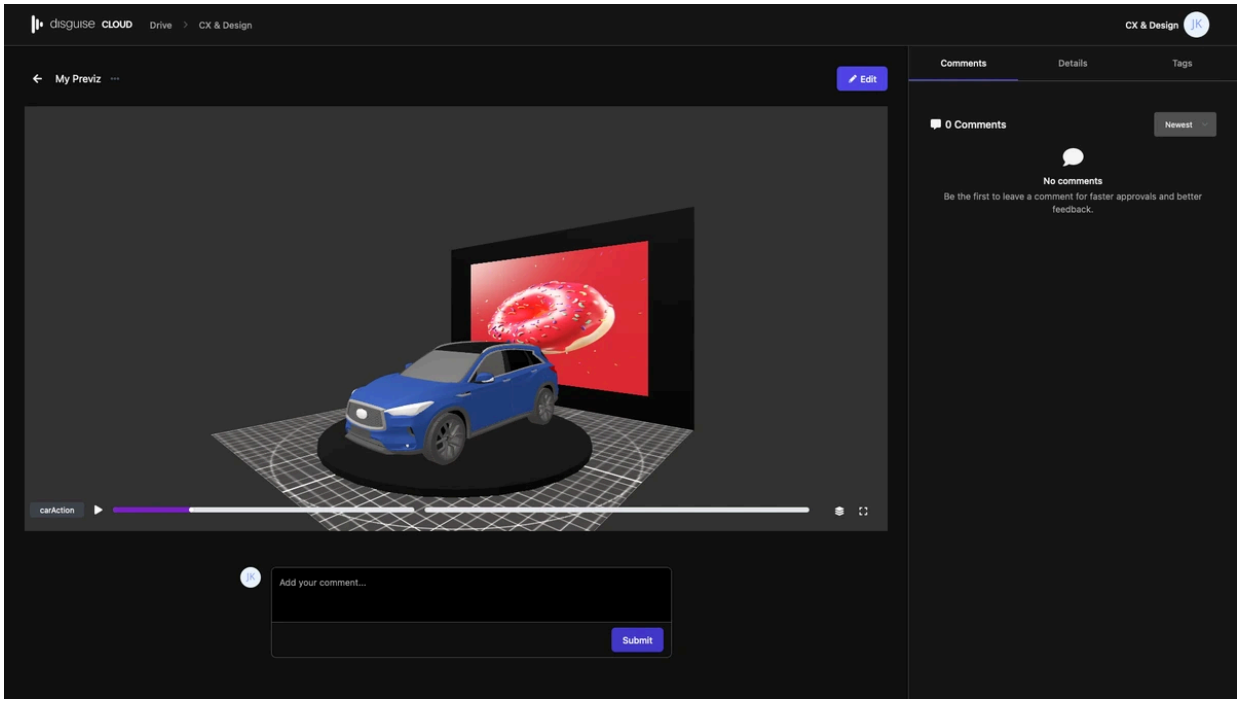
View modes

Sequences can be accessed by two different view modes - view mode and edit mode. You can switch between these modes when you are viewing a scene or sequence. You can access the view switcher in the top right corner is a view mode button to toggle between views.

Preview Mode

Preview mode is a way of previewing your content or current published state. It is the same view external guests have when you share an item with them.

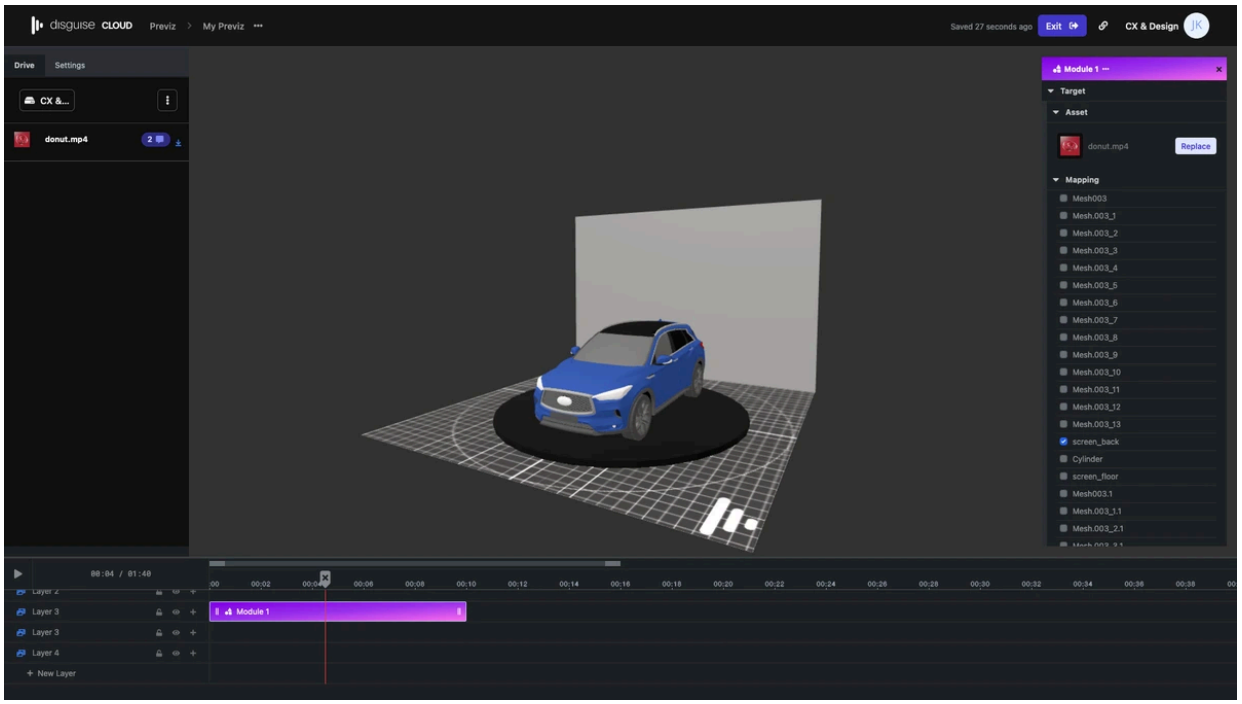




Edit Mode

View mode is a way of previewing your content or current published state. It is the same view external guests have when you share an item with them.

> **Note**
>
> Your access to the Edit Mode is dependent on your team permission settings.

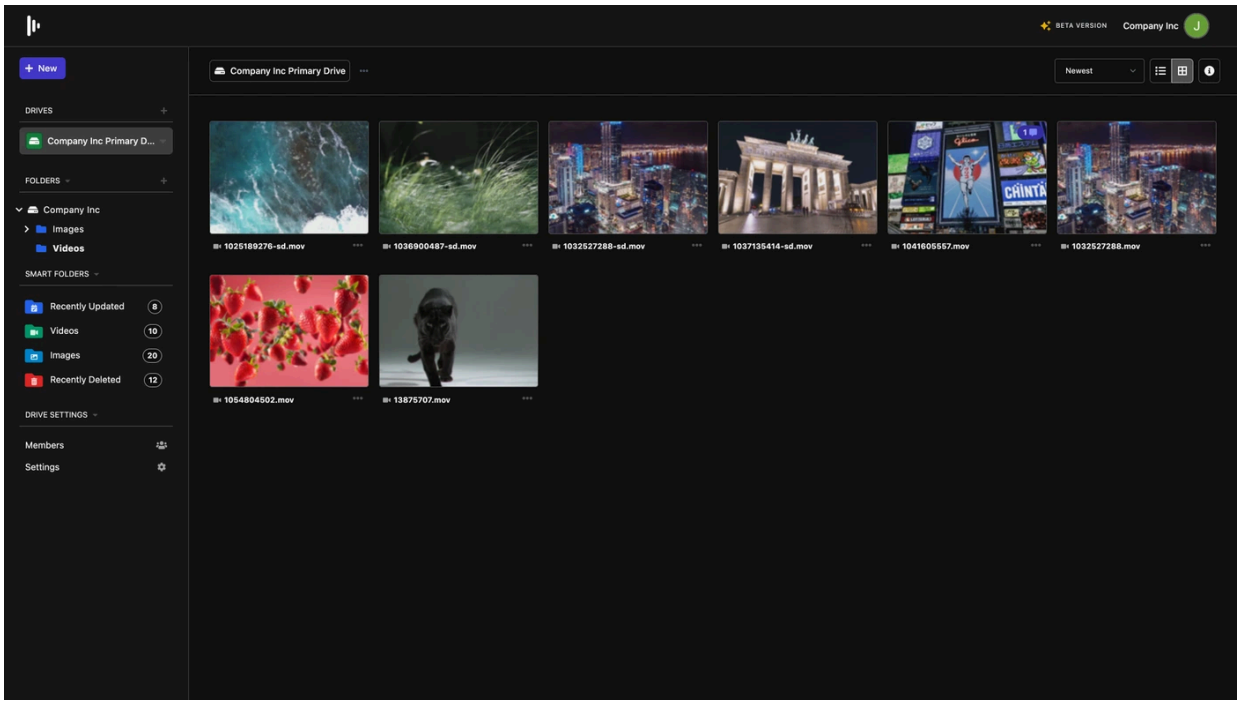


View and open files

With Previz you can view content including videos, images and 3D scene files.

View a file

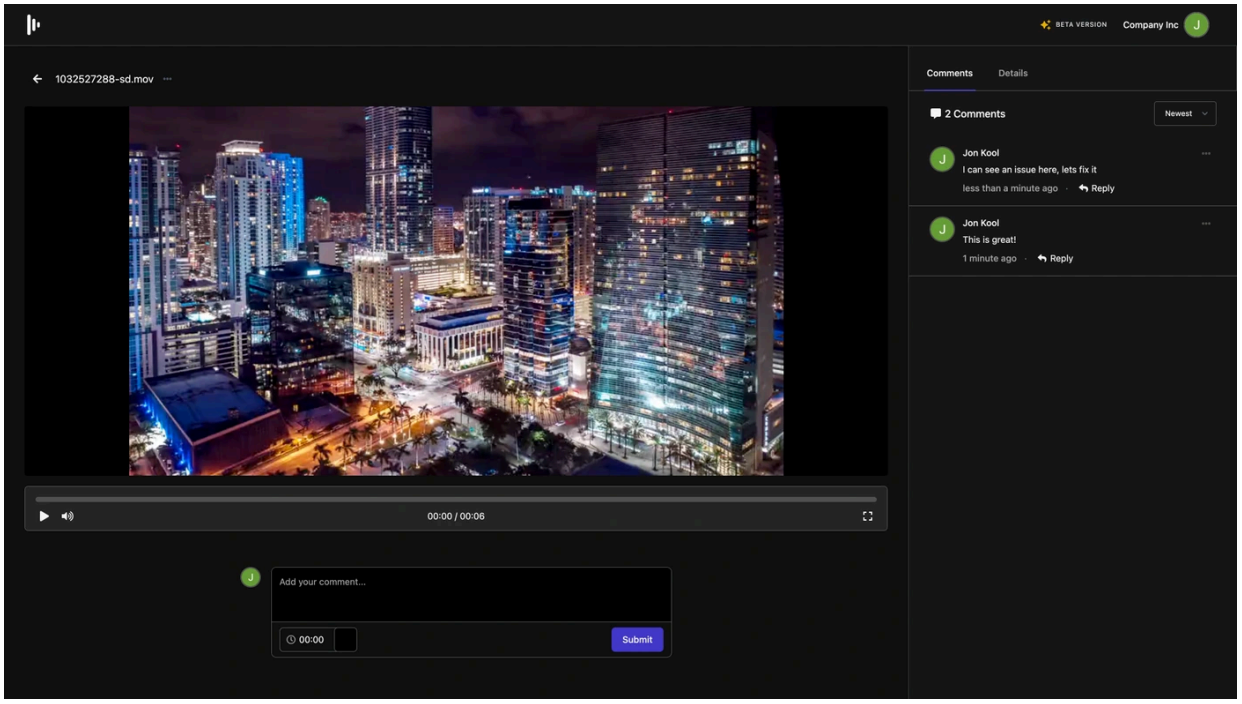
In your Drive, when you open a scene or sequence, it will open in View Mode. Note: there are two tpes of view modes for and sequences.



Play Videos

To play your video:

1. Single-click a file to select it.
2. Press the play icon in the play controls at the bottom of the video.
3. To play full-screen, at the bottom, click **Fullscreen**.


BETA VERSION
Company Inc
1032527288-sd.mov
Comments
Details
2 Comments
Newest
Jon Kool
I can see an issue here, lets fix it
less than a minute ago
Reply
Jon Kool
This is great!
1 minute ago
Reply
00:00 / 00:06
Add your comment...
00:00
Submit

OmniCal API

The OmniCal Application Programming Interface (API) provides programmable control of the OmniCal feature within Designer, accessible via d3Net.

Designer version r32.4 introduced the ability to perform OmniCal RigCheck directly from the API. RigCheck allows remote re-calibration of proven OmniCal Plans that were set up and calibrated earlier. This new API offers endpoints to trigger a new RigCheck, query the OmniCal result and take further action based on this information.

To access the OmniCal API, navigate to the base URL **localhost/docs/**.

For more in-depth information on the available API calls, please visit the **Disguise Developer docs**.

General OmniCal API endpoints

These currently include endpoints to:

- Query or request OmniCal camera discovery state.
- Query basic information about OmniCal Plans in Designer.

RigCheck API endpoints

These currently include endpoints to control most of the RigCheck workflow, except for making alignment adjustments.

- Query basic information about RigCheck Results in Designer.
- Execute a new RigCheck.
- Monitor progress of ongoing RigCheck via WebSockets stream.
- Query the status and success of the current RigCheck.
- Accept or revert the current RigCheck Result.
- Clean up old RigCheck Results.



RigCheck API Endpoints

APIs Overview

In Designer version r21, we introduced the ability to perform a number of controls from an API.

In Designer version r23.2, we released new APIs. With the release, we launched a new documentation portal specifically detailing our new suite of APIs.

Since the first release of our APIs, we have added new ones and updated existing ones. You can find the Designer APIs, RenderStream SDK, SMC API and others documented on the **Developer Portal**.

What is an API?

An API (Application Programming Interface) is a set of rules and protocols that allows one software application to interact with another. It defines the methods and data formats that programmes can use to request and exchange information. Essentially, an API serves as a bridge that allows different software systems to communicate with each other.

Disguise's APIs are used to make calls to Designer from an external, virtual, or actual physical interface to Designer projects to trigger a change or event. To make the call command, users must provide references to specific existing Designer projects and items within those. This is done by referencing the **Unique Identifier** (UID) for the object you want to interact with.

The Disguise approach to APIs

The **Developer Portal** supports the control and monitoring of Disguise media servers and Designer software using a comprehensive HTTP API.

An HTTP API is an API that uses Hypertext Transfer Protocol as the communication protocol between the two systems. HTTP APIs expose endpoints as API gateways for HTTP requests to have access to a server. Disguise APIs typically use `GET` requests to retrieve information and `POST` requests to modify data or execute actions.

Workflow Centric

APIs and SDKs designed to compliment and integrate with Disguise workflows.

Developer Focused

The developer portal has been designed with the developer experience in mind.

Integration Support

We are happy to support integrations with our products. Contact us at integrations@disguise.one for integration support and partnerships.

d3manager OpenAPI Documentation

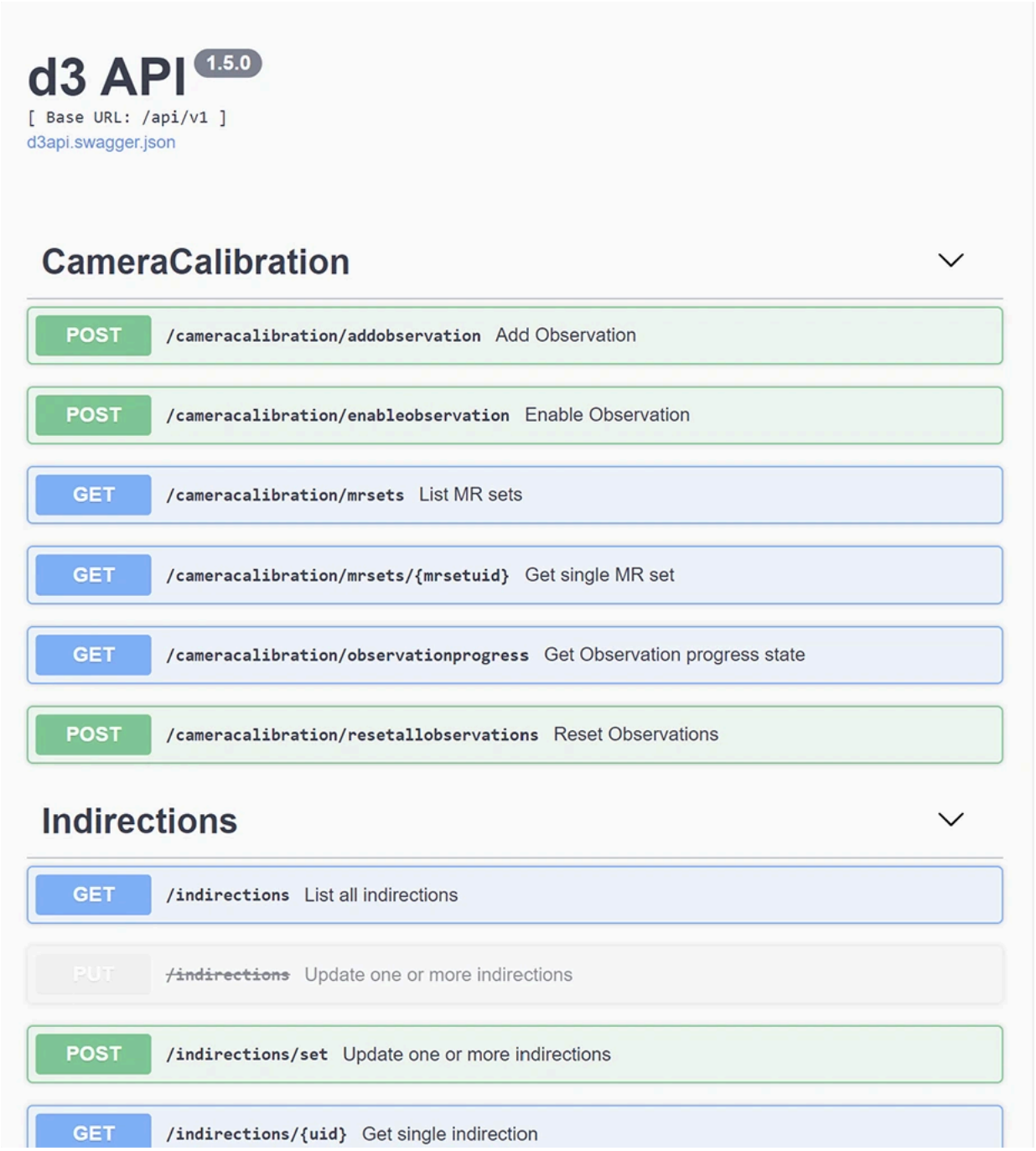
Documentation for our Disguise Designer APIs is also hosted within Designer.

To access API documentation from d3manager navigate to **Help > Open API Documentation**.

Note that this documentation uses the OpenAPI format which means that you can execute APIs from within the documentation.

Opening API Documentation

Designer uses an OpenAPI format (Swagger Docs) for the d3 API.



To access the API, open **d3Manager**, click **Help**, and select **Open API Documentation**.

[Animated GIF: Open API Documentation]

Configuring API

By default the API uses **TCP Port 80**. This can be can be changed in d3Manager.

1. Open d3Manager.

2. Select **Machine Settings > Advanced Network Configuration**.
3. Change the port specified under **API http port**.

To disable the API entirely, so no ports are open. Set the port to 0.

What is a UID?

A unique identifier (UID) is a numeric or alphanumeric string that is associated with a single entity within a given system.

Every item in Designer has a numeric UID assigned to it. API `GET` requests typically return a `Locator` that contains the UID and filename of an object. The UID can be used in many `POST` requests to uniquely identify the object that should be modified.

A UID is specified as a string containing either a decimal or hexadecimal number. For example, the following query excerpts refer to the same object:

- `"uid" : "2276480868532234653"`
- `"uid" : "0x1F97AF49E2D6299D"`

For more information, please see **Locator** on the Disguise Developer Portal.

Disguise Developer Portal Links

For additional information on APIs, please visit **https://developer.disguise.one** where we cover the following topics:

- Designer API
- RenderStream SDK
- Data Formats
- SMC API
- Cloud API
- Designer Plugins

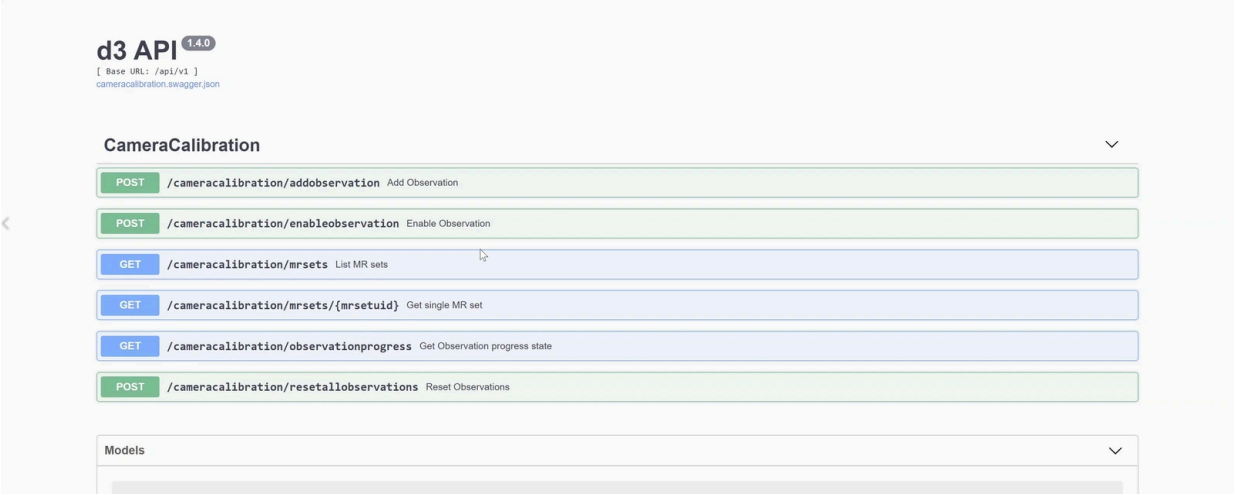
API xR Calibration

This topic covers the basic steps of aligning the physical and virtual worlds within Designer, using the API.

What is the API?

The xR API is an application programming interface accessible via d3Net that allows direct access to specific software functionality within the Designer software.

Designer version r20 introduced the ability to perform a spatial calibration directly from the API, allowing remote access to the functionality while reducing the number of people required to execute this process to one.



To access the API, navigate to the base URL `http://localhost/docs/v1/index.html`

Workflow

A well-calibrated stage will reveal no seams or visual artifacts that break the seamless blend between the real and virtual environments, and with adequate preparation, can be fully calibrated in less than a few hours.

Preparation

Prior to beginning spatial calibration, ensure that:

1. A camera tracking system is set up and is receiving reliable data.
2. The xR project has been configured with an MR set, accurate OBJ models of the LED screens, and tracked cameras with video inputs assigned.

3. The cameras, LED processors, and all servers are receiving the same genlock signal.
4. The feed outputs have been configured and confirmed working.
5. The **Delay Calibration** has been completed.

Calibration

A **Calibration** is a set of data that is contained within an individual camera object. The calibration process uses tracking data as a base against structured light patterns to determine the reality in relation to the raw tracking data.

Observations

An **observation** is a set of images of the stage captured by the camera of white dots on a black background (called structured light). The user determines the number of dots and their size/spacing.

- **Observations** are used as data points for the predefined algorithm Disguise will use to align the tracked camera with the stage and set up the lens characteristics.

There are two types of observations used in the process: **Primary and Secondary (P and S)**.

- **Primary observations** are the positional or spatial observations used to align the real world and virtual cameras. A minimum of five Primary observations is required for the solving method to compute, so aim for five good observations when you begin your calibration process. Primary or secondary status is defined by the most common zoom and focus values in the pool of observations.
- **Secondary observations** comprise the zoom and focus data that create the lens intrinsics file. Each new zoom and focus position will create a new **Lens Pose**.

Taking observations

There is no need to assign a zero point in Designer. Minimal offsets and transforms should be applied to align the tracking data and Disguise origin point prior to starting the Primary calibration.

Start by taking primary observations at a single locked zoom and focus level. This Primary Calibration will calibrate the offsets between the tracking system and Disguise's coordinate system.

- After each observation, the alignment should look good from the current camera position. If the alignment begins to fail, review all observations and remove suboptimal ones.
- The Secondary calibration calibrates the zoom and focus data. This will align the virtual content and the real-life camera zoom and focal changes.

Lens Pose

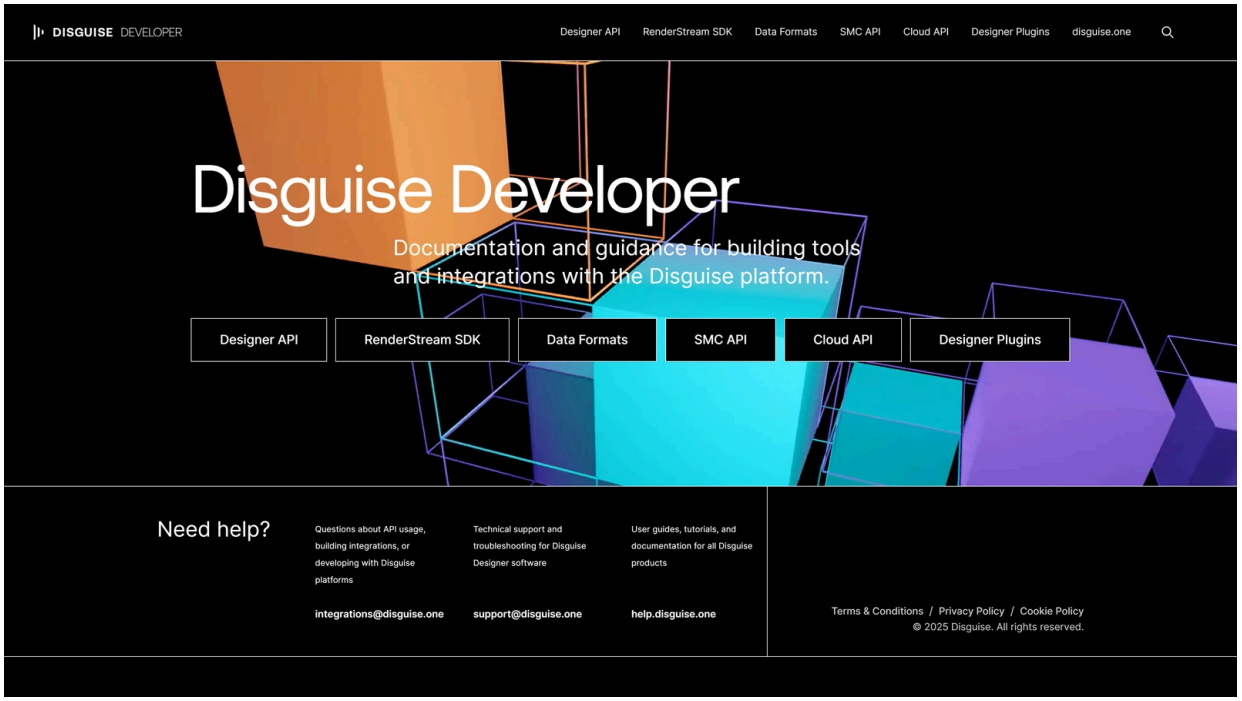
A **Lens Pose** is the result of the data captured in the observation process. They are different checkpoints that Disguise will intelligently interpolate between. The number of lens poses you will end up with will be dependent on the range of your camera's lens.

- A new lens pose is created for every new combination of zoom and focus values. The most common zoom/focus combination will be the **Primary** lens pose, attributed to the **Primary** calibration.

Disguise Developer Portal

What is the Disguise Developer Portal?

Documentation and guidance for building tools and developing integrations for Disguise products.



You can find documentation for all of Disguise's Designer APIs at the **Developer Portal**.

See API Overview for general information on Disguise APIs.

SMC API

The SMC API allows access to information related to the Disguise hardware.

The SMC is a management system that allows for:

Constant and up-to date access to information about the status of the main Disguise server it is contained within such as:

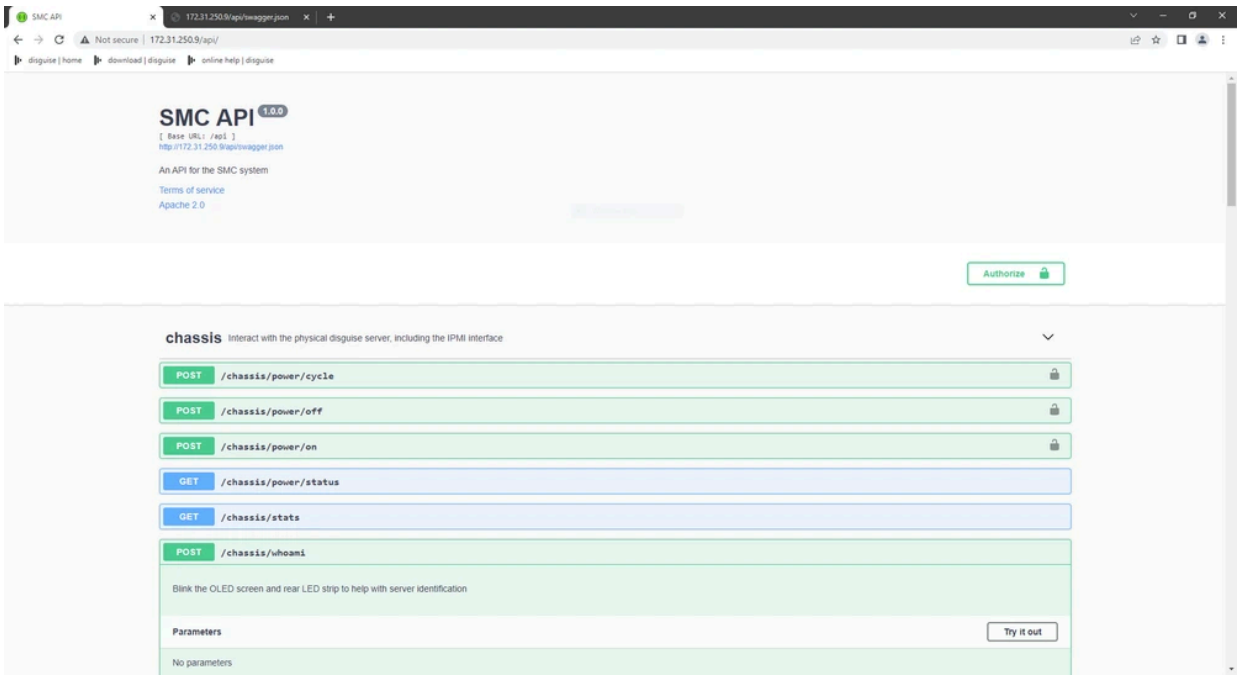
- Power state
- VFC cards currently inserted
- Network adapter details and configuration
- d3Net session details
- Communication with the BMC on the Motherboard allowing for:
  - Turning on and off machines remotely
  - Monitoring physical metrics such as power draw and temperature

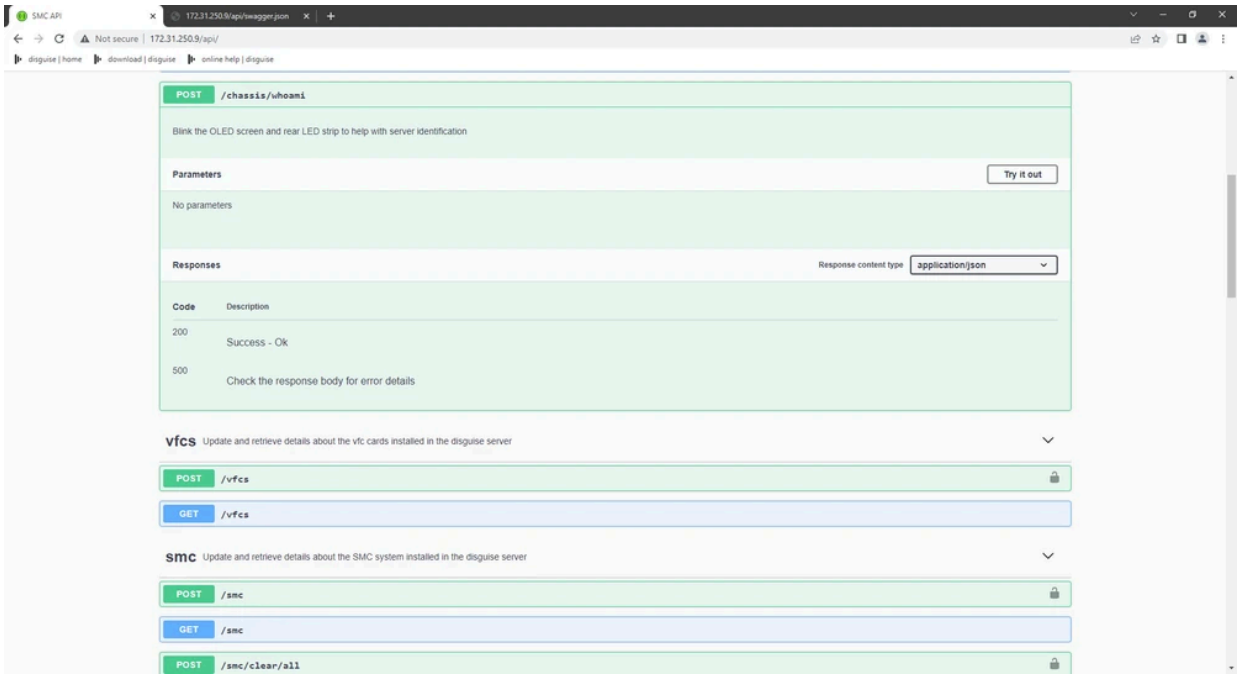
To make life easier, all this information is generally available in three different ways:

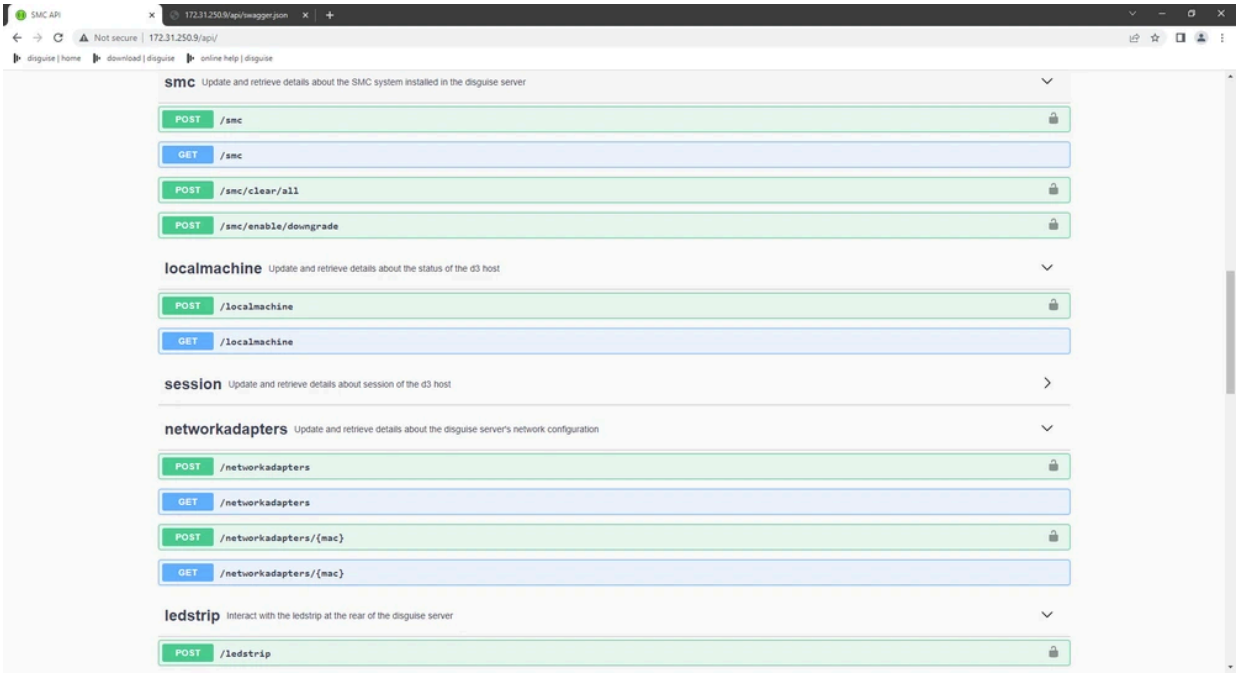
- OLED screen on the front of the servers
- Webpage
- REST API

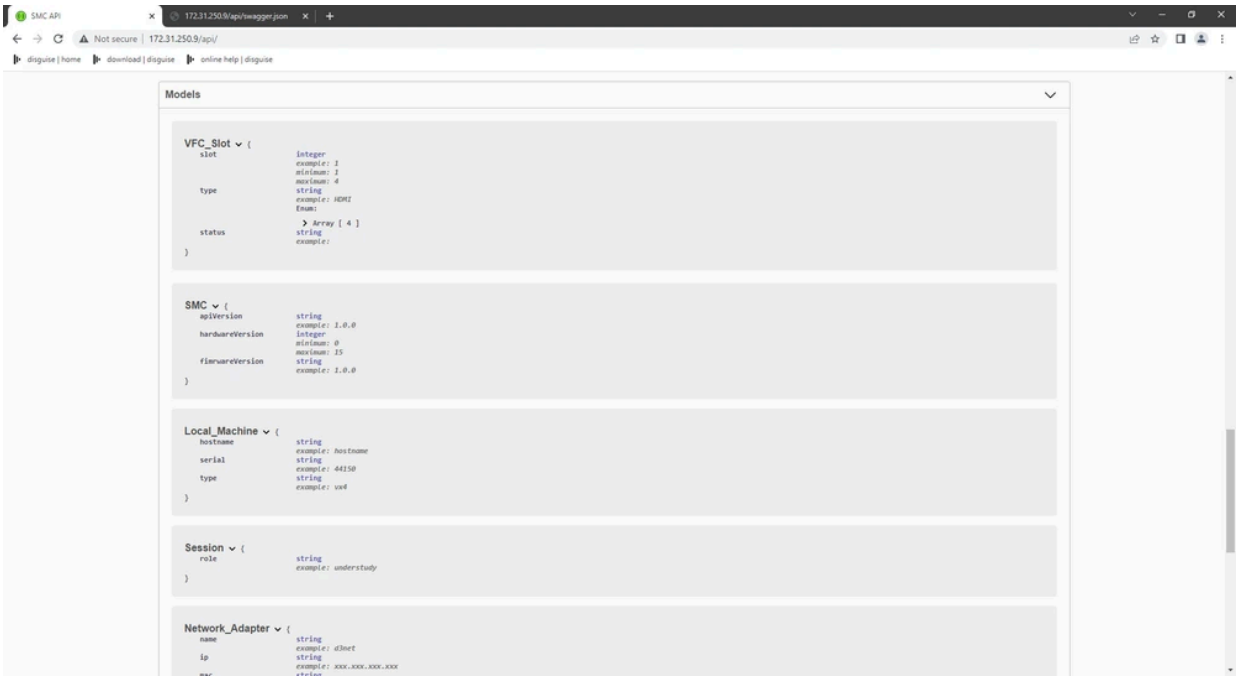
To access the SMC API, navigate to the base URL `http://{smc-ip}/api`

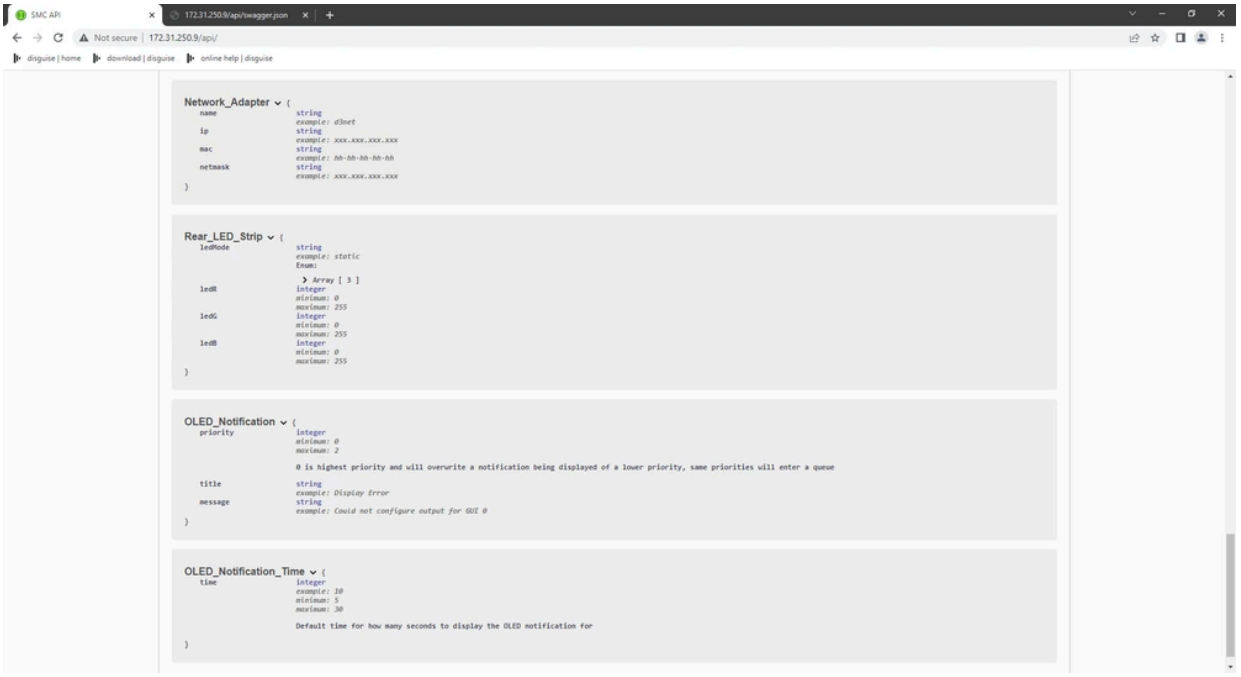
SMC System API






SMC API
172.31.250.9/api/swagger.json
Not secure | 172.31.250.9/api/
disguise | home
download | disguise
online help | disguise
smc Update and retrieve details about the SMC system installed in the disguise server
POST /smc
GET /smc
POST /smc/clear/all
POST /smc/enable/downgrade
localmachine Update and retrieve details about the status of the d3 host
POST /localmachine
GET /localmachine
session Update and retrieve details about session of the d3 host
networkadapters Update and retrieve details about the disguise server's network configuration
POST /networkadapters
GET /networkadapters
POST /networkadapters/{mac}
GET /networkadapters/{mac}
ledstrip Interact with the ledstrip at the rear of the disguise server
POST /ledstrip


SMC API
172.31.250.9/api/swagger.json
Not secure | 172.31.250.9/api/
disguise | home
download | disguise
online help | disguise
Models
VFC_Slot
SMC
Local_Machine
Session
Network_Adapter


SMC API
172.31.250.9/api/swagger.json
Not secure | 172.31.250.9/api/
disguise | home
download | disguise
online help | disguise
Network_Adapter {
name string example: d3net
ip string example: xxx.xxx.xxx.xxx
mac string example: hh-hh-hh-hh-hh
netmask string example: xxx.xxx.xxx.xxx
}
Rear_LED_Strip {
ledMode string example: static Enum: Array [3]
ledR integer minimum: 0 maximum: 255
ledG integer minimum: 0 maximum: 255
ledB integer minimum: 0 maximum: 255
}
OLED_Notification {
priority integer minimum: 0 maximum: 2
0 is highest priority and will overwrite a notification being displayed of a lower priority, same priorities will enter a queue
title string example: Display Error
message string example: Could not configure output for GUI 0
}
OLED_Notification_Time {
time integer example: 10 minimum: 5 maximum: 30
Default time for how many seconds to display the OLED notification for
}

Output Audio to DA Converters

Single system

If you are working with one machine it is relatively straightforward to setup audio output with a digital-analog converter.

1. Run an optical cable from the sound card on the Disguise system into your DA converter.
2. Set up the DA to receive a sync clock from an external device.

You should now have 1-8 channels of analogue audio coming out of your DA converter.

Multiple systems

If you have a backup (understudy) there are 2 ways to do:

1. Do as described above utilizing a dedicated DA for the master and a dedicated DA for the understudy.
2. Synchronise multiple machines to one DA or a Mixing Desk.

> **Note**
>
> This presumes your DA has 2 ADAT convertors (RME ADI-8 QS, RME ADI-8 DS, MOTU 2408mk3) i.e. the ability to output 16 channels of analogue audio.

In the scenario of multiple machines and one DA, the audio sample clocks of the master and understudy both need to be synchronised with the DA converter.

How to set up multiple systems

Your external DA will be the audio sync clock master so make sure the clock source is internal You will probably also have to set your correct sample rate and bit depth.

Your RME settings in your machine should be set to Clock source: ADAT IN, however, it should auto-detect if not otherwise specified.

Both of the optical cables needs to be connected; one is for signal and one is for sync.

The bottom outlet (grey) is the signal output from the Disguise system and goes into the input on the DA converter.

The output on the DA converter (sync) is going into the top input on the Disguise system (Black).

You should see in the RME settings menu on the Disguise system that it is receiving sync signal over the optical cable.

Repeat this step for the understudy as well and you should be good to go.

Troubleshooting

Audio playing in Designer/windows but no audio is converted in the DA convertor or very small sporadic instances of audio is coming out of the DA.

- Check the sample rate and bit depth of the entire signal path and make sure they are all set the same parameters (44.1/48 16 bit)

Clicks and pops are heard in the audio from either of the machines

- The audio sampling is not synced correctly, please check the entire signal path for synchronization e.g. ADAT clock internal on, clock receive ADAT in.

Audio Overview

Disguise works with audio in two distinct ways: audio can be inserted directly onto the Track or added to a layer on the timeline.

To achieve PA audio quality (including per machine patching) it is recommended to embed uncompressed audio within a video file or to use the Audio Layer

Track audio (.mp3, .wav, or .aiff) can be quantised and used as a guide audio track, allowing a show to be sequenced to the beat.

For file format information, see supported file formats.

Quantising a track and sequencing to the beat

An audio file can be attached directly to the Track. It is then possible to quantise the audio track. Quantising involves editing a beatgrid to snap Track events to the beat, enabling content to be sequenced to the beat.

For step-by-step instructions on how to quantise an audio track please see the below sub-chapter Quantising an audio track.

> **Note**
>
> Please note: at present only music with a 4/4 time signature is supported. These deficiencies will be addressed to in a future release.

Outputting high quality audio

The 4U, Pro Range and Gx Range hardware can output balanced stereo from its professional RME audio card.

For more information please see the sub-chapter Outputting audio.

AudioAnalyser

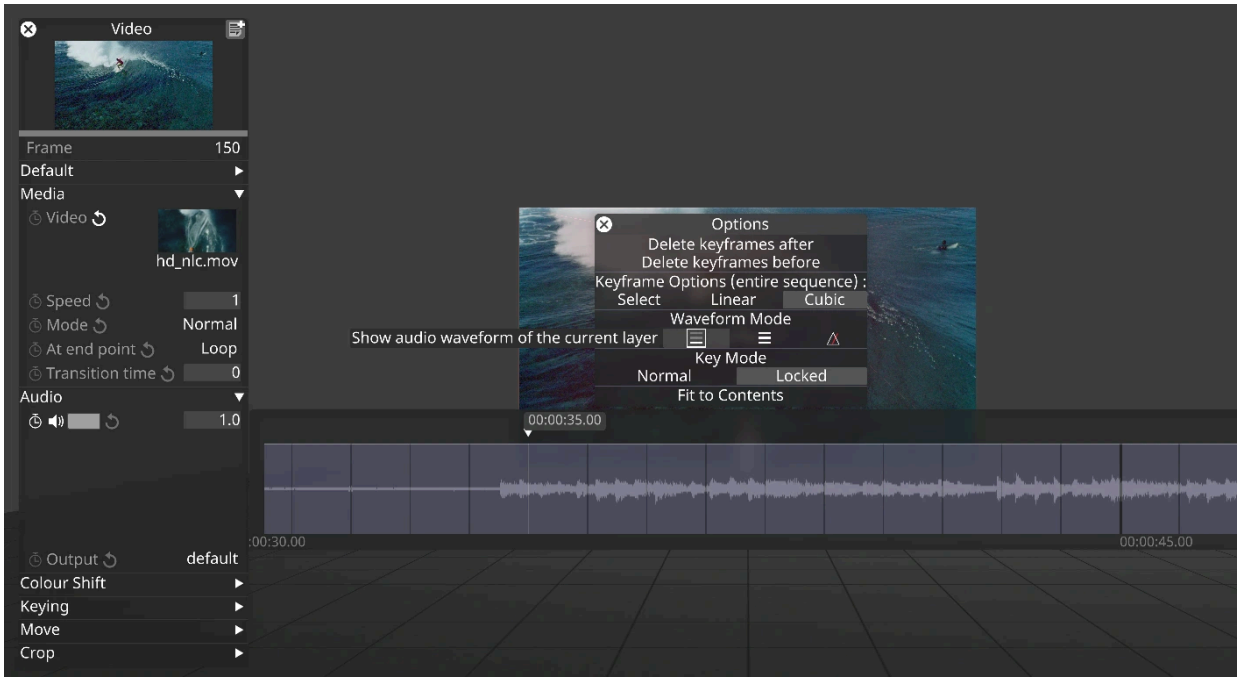
The AudioAnalyser displays the audio waveform. For more information on using the AudioAnalyser, visit this page.

Audio Waveform View

The audio waveform allows users to visualise the audio output of a single layer, a collection of layers or the quantized audio track while working in the keyframe editor. This permits them to add keyframes while taking audio output as a consideration at a glance.

The Waveform viewer supports both Audio layers, and Video layers where the content has embedded audio.

To visualize the audio waveform of one or more layers:



1. Create one or more layers.
2. Set the video clip or audio track of the layer(s).
3. Open a keyframe editor.
4. Right-click in the keyframe editor area to access keyframe Options.

The available options are:

- Delete keyframes after
- Delete keyframes before
- None
- Layer

- Combined
- Quantised

5. Select one of the following options:

   a. Layer to visualize the waveform of the currently opened layer

   b. Combined to visualize the collective waveform of multiple layers

To visualize the audio waveform of the quantized audio

1. Add an audio track to the Track.
2. Open a keyframe editor.
3. Right-click in the keyframe editor area to access the options
4. Select Show quantised audio waveform to visualize the waveform of the timeline audiotrack.

Output Multichannel Audio

The RME audio card in the VX range, GX range (not GX 1), plus range (optional) and classic range machines supports up to eight channels of audio via ADAT over an optical TOSLink cable.

The ADAT outputs present themselves in stereo pairs. For example **ADAT (1+2) (RME HDSP 9632)**.

The process explained in the previous sub-chapter, Outputting audio can be used to output multi-channel audio. However, each Video layer can only output two channels. Therefore, four Video layers will need to be created to output the eight audio channels.

Known limitations

- Audio files do not currently support versioning.
- Audio embedded in video files does not support more than two channels.
- We cannot re-mix the channels inside Designer.
- To output true multi-channel audio you need to set the RME interface into multi-channel mode. This is done externally to Designer.

Outputting multi-channel audio with the Video layer

1. Separate the audio track into 4 different video files, one for each stereo pair.
2. Map each channel depending on which ADAT channel the audio is to be assigned.
3. Render out a video for each stereo pair. The video file format is outlined in the previous sub-chapter Outputting audio.
4. Follow the steps explained in the previous sub-chapter Outputting audio for each of the four video files.

Outputting multi-channel audio with the Audio layer

1. Change the ADAT mode in the audio card software to multi-channel.
2. Select the now visible, multi-channel ADAT device from the audio output patch.
3. Add an Audio layer and define your multi-channel audio file.

ASIO multi-channel audio with the Audio layer

1. Select the ASIO audio device in the audio output patch editor.
   - For 5.1 audio use Adat 1 => Adat 6
   - For 7.1 audio use Adat 1 => Adat 8
2. Select output channels.

WASAPI multi-channel audio with the Audio layer

1. Select the WASAPI audio device in the audio output patch editor, it will have the name ADAT 1-8.
2. Select output channels.

WASAPI channel numbering

- LEFT - `ADAT 1`
- RIGHT - `ADAT 2`
- CENTER - `ADAT 3`
- SUB - `ADAT 4`
- SIDE LEFT - `ADAT 7`
- SIDE RIGHT - `ADAT 8`
- BACK LEFT - `ADAT 5`
- BACK RIGHT - `ADAT 6`

Output professional audio

Designer can play back a quantised audio file attached to the Track. However, to achieve PA audio quality, it is recommended to embed uncompressed audio within a video file and play that audio back as a Video layer. The audio can be either embedded in the same video file as the video content, or as a separate 16x16px DXV video file.

Audio format restrictions when embedding audio into a video file (pre r15.2)

44.1kHz, 16bit samples, stereo, uncompressed .wav embedded into a 16x16 pixel Quicktime .mov (DXV preferably)

Playing back audio in a separate video file

The advantage of rendering the audio into a separate low-res video file, as opposed to embedding it in the same video file as the video content, is that if the audio or video is updated the embedded video file does not have to be re-rendered.

To play back audio in a separate video file:

1. Render the audio into a 16x16px black DXV video using for example Adobe After Effects. Make sure to have the DXV codec installed.
2. Copy the video file with the embedded audio to the VideoFile folder in the specific Project folder. See the Placing media files for a project topic to understand where to copy a video file.
3. Create a Video layer.
4. Select the video file containing the audio and drop it onto the Video key-frame editor.
5. Create a new screen of the type Screen and rename it to Audio dummy screen.
6. Set the resolution of the screen to 16x16px and set the offset values so it's positioned far away from the other video screens in the Stage. This screen will only be used for audio output and has therefore no visual function.
7. Select the mapping type used for theAudio dummy screen for the Video layer. This will direct the Video layers output to the Audio dummy screen screen.
8. In the Output Feed level, add a Feed rectangle to the Audio dummy screen screen. This will copy the Audio dummy screen screens content from the Stage level to a Feed scene in the Feed level. Hit Enter or select the Play button to output the audio to a PA.

To play the audio in sync with video content, create a second Video layer, position the video file at the same position on the Video key-frame editor as the video file containing audio, and map the second Video layer to a separate screen.

Output Video-Embedded Audio

Disguise can play back a quantised audio file attached to the Track to a single audio device. However, for more flexible control of volume, timing, and output routing, it is recommended to use an Audio layer.

Audio format restrictions when embedding audio into a video file

PCM 16bit.

Playing back video-embedded audio

By default, audio embedded in video files is only played back when the video layer is mapped to an active screen on a given machine. If you wish to play back audio regardless of mapping settings, either render a separate audio file and use the Audio Layer, or following the steps in the section below.

1. Copy the video file with the embedded audio to the VideoFile folder in the specific Project folder. See the Placing media files for a project topic to understand where to copy a video file.
2. Create a Video layer.
3. Select the video file containing the audio and drop it onto the Video keyframe editor.
4. Select the audio output or outputs (as of r17.4, Disguise supports multi-channel audio from video files) and ensure the audio outputs are patched in the Audio Output Patch Manager.

Playing back video-embedded audio without a mapping

1. Content can be mapped to screen with a special “Audio dummy screen” mapping, which causes the video’s audio content to be permanently output. As this is a “dummy screen”, it is recommended that you render it as a 16x16 black video. This would likely be most useful only if audio embedded in content, or use of a dedicated audio track with the Audio layer, is not an option.
2. Create a new screen and rename it to Audio dummy screen.
3. Set the resolution of the screen to 16x16px and set the offset values so it’s positioned far away from the other video screens in the Stage. This screen will only be used for audio output and has therefore no visual function.
4. Select the mapping type used for the Audio dummy screen for the Video layer. This will direct the Video layers output to the Audio dummy screen screen.

5. In the Output Feed level, add a Feed rectangle to the Audio dummy screen screen. This will copy the Audio dummy screen screens content from the Stage level to a Feed scene in the Feed level.

Hit Enter or select the Play button to output the audio to a PA.

Quantised Audio

Copying an audio file to the correct folder

To set up for quantising your audio, the audio files need to be copied into the **AudioFile** folder in the specific Project folder. See the Placing media files for a project sub-chapter to understand where to copy an audio file. Also save the file to a supported file format.

Adding an audio file to a track

A track containing non audio regions will display its bars in red and/or blue.

Non-audio regions for a track are displayed in red and/or blue

To add an audio file to the track

1. Right-click the first bar of the track and select set audio track from the popup menu. You will then get an AudioTracks manager.
2. Left-click the audio file you want and the display will change: the audio file becomes the guide audio for the track. To indicate this, the bars will colour green and the name of the audio track will be displayed on the title bar :

Quantising Audio

> **Note**
>
> **Please note**: Before proceeding with the steps listed below for quantising audio, please see the sub-chapter **Setup Quantising**.

> **Note**
>
> **Please note**: a handy tip when you are quantising an audio track is to use the keyboard shortcuts [and] to navigate the quantiser window left and right. To learn more useful shortcuts please see the sub-chapter **Keyboard Shortcuts**.

Quantising an audio track

Quantising means dragging beatmarkers over the audio track to tell Designer where the beats are. To quantise an audio track you need to open the quantiser window.

To open the quantiser window for the current audio track:

1. Hit Alt-Q. Hitting Alt-Q again closes the quantiser window once it is open.
2. Play the track until you find the first beat and drag the closest marker to it.
3. Then drag the next marker to the following beat.
4. Now play forward; you will see a series of dotted markers that gradually drift offtime. The dotted markers are autogenerated by Designer.
5. At any point, you can grab a dotted marker and drag it to bring it in line with the nearest beat. At this point it becomes a solid line. Dotted markers between your manually positioned markers move to space themselves equally.
6. At any time, you can zoom in or out using the mouse scroll wheel. This allows you to see more detail and thus position the markers more accurately.
7. The metronome button plays each marker as an audible beat to check how well the beatgrid lines up. The Metronome button has a Volume control next to it. Left-click the white volume bar or text field to modify the Metronome volume. You can fill in any number between 0 (mute) and 255 (full) in the text field. These are the minimum and maximum values.
8. Hit Alt Q to close the quantiser when you have finished quantising your track.

> **Note**
>
> **Please note**: that the metronome will only output on the Director machine in a Director/Actor/Understudy environment due to the quantiser only being drawn on the Director.

Quantiser properties

The quantiser contains further editing options.

To open the Quantiser menu:

Right-click the quantiser windows title bar.

The editing options are:

Unquantise : This option will delete any markers previously positioned over the track and close the quantiser window.

Shift all markers one frame left : This option will take all of your positioned markers and move them one frame to the left. This is useful if your markers are positioned too late in relation to the beats in the track but you want to move all of the markers uniformly.

Shift all markers one frame right : This option will take all of your positioned markers and move them one frame to the right. This is useful if your markers are positioned too early in relation to the beats in the track but you want to move all of the markers uniformly.

Replace audio : This option will replace the current audio file in the track with another audio file. This is useful if, for example, you are rehearsing a music show and the rehearsal crew want to test different versions of the same song.

To replace audio:

1. Left-click replace audio from the Quantiser editor. This will open the AudioFiles manager which displays a list of all of the audio files saved on your local hard-drive in the AudioFile folder.

See the **Placing media files for a project** sub-chapter to understand where to copy an audio file. Also save the file to a **supported file format**.

2. Left-click the audio file you want to replace the current audio file. The name of the audio track will be updated on the Track Player and quantiser windows title bars.

Set bpm : This option will reset the current tracks beats per minute to whatever value the user sets.

Advanced Quantiser Settings

Inserting bars of silence

At any point, you can insert extra bars into your Track (for example if the audio file changes, but you don’t have access to a new version).

To insert bars of silence:

1. Right-click the bar at the point where you want to insert time. This will open the Track bars menu.
2. Type the number of bars you want to add in the Insert Bars text field and hit Enterdisguise will insert the appropriate number of silent bars for you. In this example we have inserted five bars of silence.

Adding more than one audio file to a track

For some applications (for example rock shows), it makes sense to have one audio file per track. For other shows (such as theatre) it makes more sense to have multiple audio files on

the same track, separated by silences. This allows smooth transitions from one musical section to another.

To add an audio track:

1. Extend the length of the track. For information on how to extend the length of the track, see the **Editing tracks** sub-chapter.
2. Right-click an audio free section (shown as red or blue bars) to open the Track bars menu.
3. Left-click Insert Audio Track. This will open the Audio Tracks Manager.
4. Left-click the Audio Tracks Manager to add the audio file to the point of the currently selected Track bar.
5. Move the cursor in that region and hit ALT Q to open the quantiser window.

> **Note**
>
> **Please note**: It is recommended that you quantise the audio file before you start animating content layers in the region. The software will re-time content events, but may not do so perfectly accurately.

Duplicating Track bars

You can also select any number of bars and duplicate them:

1. Select a Timeline region by holding down the left Shift key and then dragging the cursor across the bars at the bottom of the window.
2. Right-click the grey region and select Duplicate Bars:

Removing bars

Select a timeline region by holding down the left Shift key and dragging the cursor across the bars you want to remove, as illustrated in the previous section. Then rightclick the grey region and select **Remove Bars**.

> **Note**
>
> Removing bars will remove all content layers and events within the removed region. The undo function, **CTRL-Z**, is your friend.

Setup Audio Output

Output devices

Disguise offers the ability to patch timeline audio to various devices with flexibility.

- Patching can be done per machine on a d3Net setup.
- Particular patches can be monitored on local headphones/speakers.
- External sound cards are auto-detected and made available to the patch.

> **Note**
>
> **Please note**: At this stage audio input, LTC and quantised audio tracks cannot be patched.

Concepts

Audio output is managed by the **Audio Output Patch Manager**, accessible via the **Devices menu** item.

Audio Patches are essentially 'virtual slots' from which you can patch to physical audio for each machine in your Disguise setup. You can have as many **Audio Patches** as you wish. Each **Audio Patch** is two channels; a stereo pair.

Each **Audio Patch** (columns) can be configured per machine (rows) in the d3Net Manager set up.

Clicking a cell in the table, presents you with the physical stereo pairs available on the machine. Audio output devices listed are auto-detected over d3Net, including external audio devices. If the remote machine is not currently connected, the list is derived from the **Machine Type** selected in **d3Net Manager** and will present the outputs of the internal sound device.

If the local machine is not part of a d3Net network, a single row for the local machine will be presented.

Configuration - Step by Step

To configure an Audio Patch follow these steps:

1. Ensure your audio output device source is connected correctly. (XLR connection etc.)
2. Right-click devices in the State editor.

3. Left-click Audio Output Patch.
4. Create an Audio Patch by pressing the + icon.
5. Enter a name for the patch and click OK. A new column will have been created in the Audio Patch Manager.
6. In the cells under the column, use the drop down to select the audio output on the physical audio device you wish to map the audio to.
7. You can now pipe Video Content Layer audio on the timeline into the Audio Patch which will accordingly output it to the physical audio device output from the mapping.

> **Note**
>
> **Please note**: You can monitor **Audio Output Patches** using the **Monitor Audio** menu item in the **State** menu. This will pipe the selected patch to the local machines Primary Audio Device (as set by Windows).

Working with audio on the timeline

Audio can either be embedded in videos or added in an audio layer to be played back.

If embedded in a Video, then in the **Video Layer** under **Audio**, the **Output** field allows you to select the Audio Patch you wish to output the audio to.

Sample rates

All audio outputs' sample rates should be set to match that of the content (and conversely, when the output sample rate is fixed the content should be rendered to match).

The currently configured sample rate for the patched audio output is displayed in the Audio Output Patch for each machine.

Below are details of how to change the sample rate on the RME audio interfaces in servers and generic instructions for devices that use the Windows audio settings (which applies for most consumer audio devices). For other professional audio devices, please consult the manufacturer's documentation.

Changing the sample rate

As of r15.2, changing the sample rate must be done outside of Designer in the RME audio device settings. Pre r15.2, the sample rate is set in Designer audio patch editor.

> **Warning**
>
> Warning: It is important to set the sample rate to be the same across all machines

1. Right-click on the **Hammerfall DSP** icon in the System Tray and select **Settings**.
2. Select the desired sample rate from the drop down menu.
3. Right-click on the audio icon in the System Tray and select **Playback devices**.
4. Double click on the relevant audio device
5. On the Advanced tab, select the desired sample rate from the drop-down list.

ACES

> **Note**
>
> ACES workflows can now be achieved using OCIO. For new projects, we recommend using OCIO mode, as future development of colour workflows will focus on OCIO rather than ACES mode. For example, ACES 2.0 is supported in OCIO mode after r32.3.

The Academy Colour Encoding System (ACES) is a colour space management workflow specifically designed to make capturing and displaying video in the correct colour format easier to achieve in film pipelines.

ACES (Academy Color Encoding System) is an open device-independent color management and image interchange system. It enables creation of digital masters suitable for long term archiving. It is also a set of developer tools: a suite of encoding specification, transform definitions and guidelines, archive-ready image data and metadata container specification. In simple language - it allows color transformation/conversion across screens.

Supporting ACES inside of Designer allows Disguise to be used as part of a colour-managed workflow alongside other ACES-compatible software such as Davinci Resolve, Autodesk Maya, Foundry Nuke and Unreal Engine.

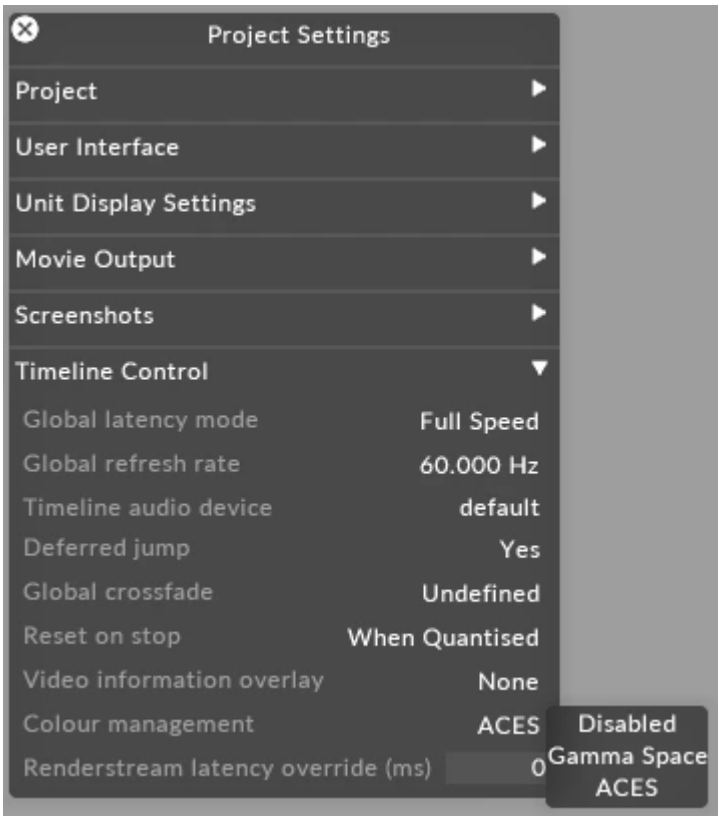
For more information on colour spaces and colour management please visit the colour management page.

Workflows

Within Designer

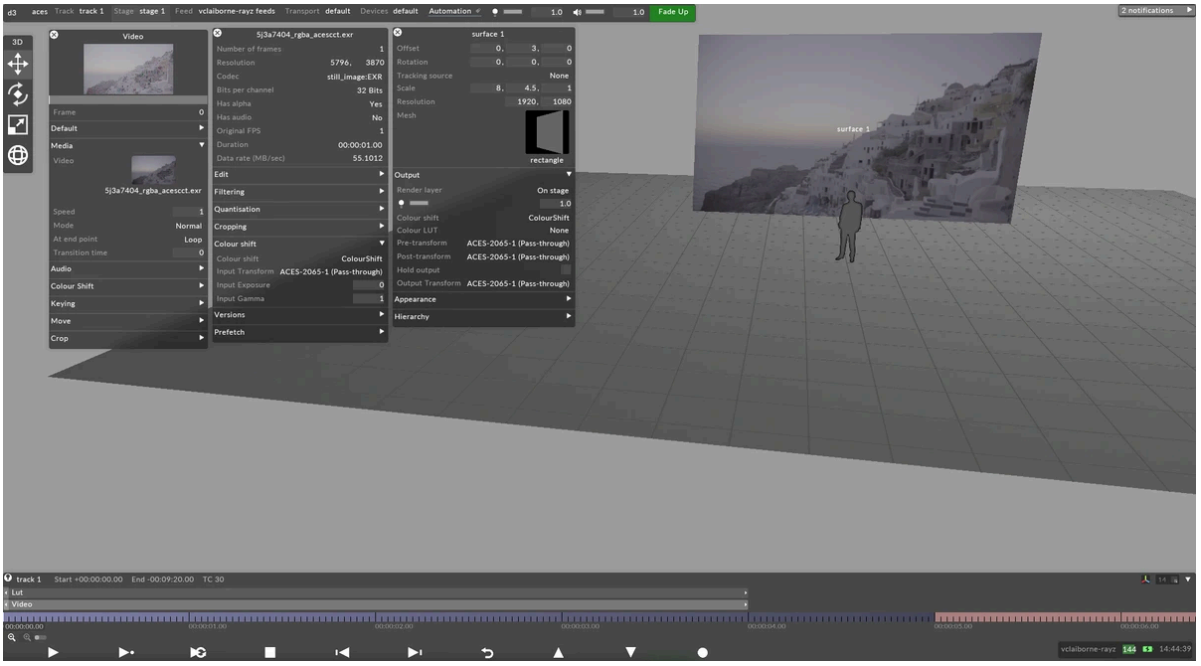
1. Right-click the d3state editor in the dashboard and select **Project Settings**.

2. Set the **Colour Management** option to **ACES**. The transform options will not be available unless the project is set to ACES mode.

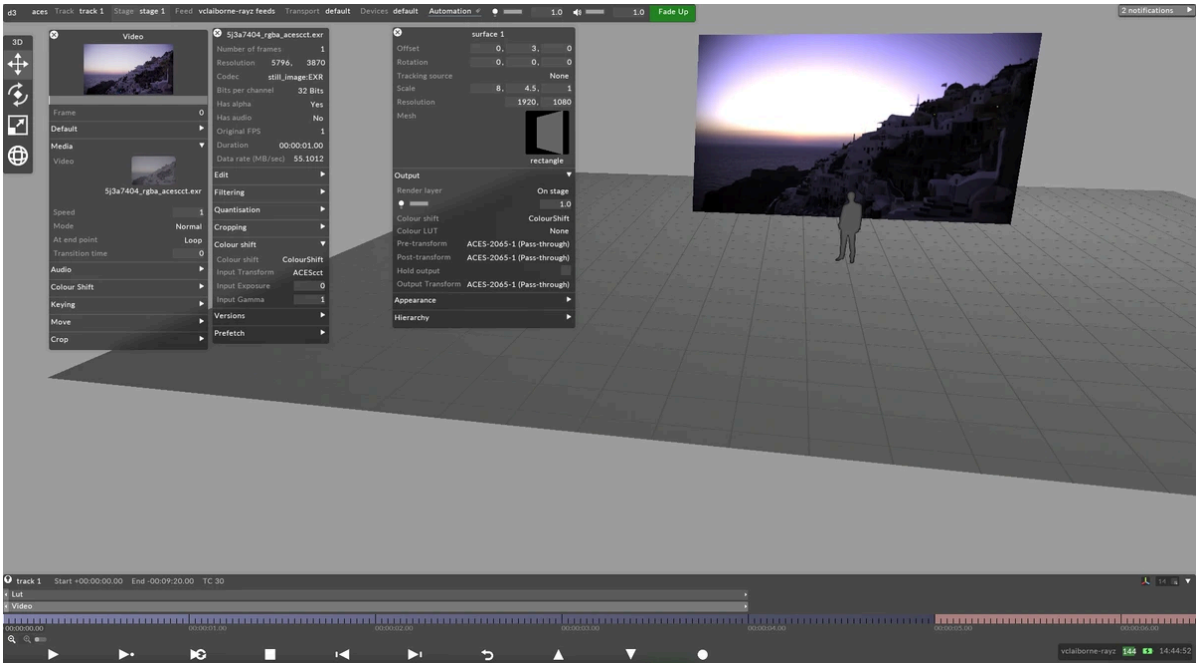


3. On every video clip/asset, right-click on the thumbnail from the Media field of any content layer.
4. Expand the **Colour shift** tab.

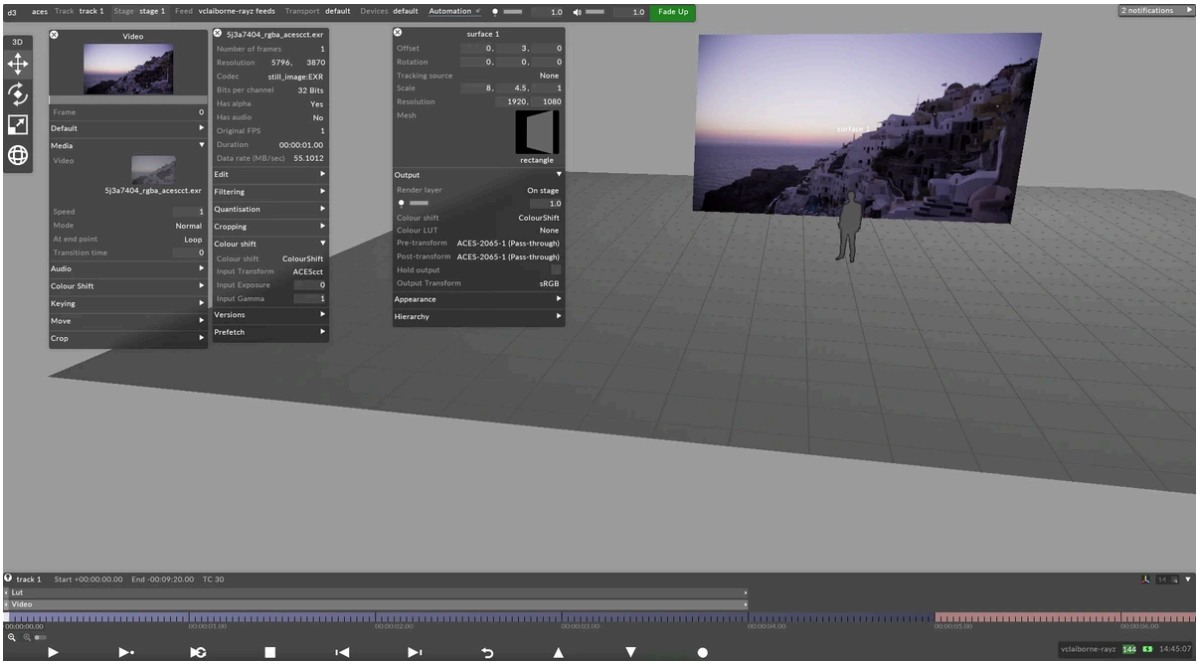
5. Set the **Input transform** to the format that the content was authored in.



6. The content should reflect more accurately in the visualizer. Note that you can view the content library in table form and use **Select All** to bulk change a whole folder.



7. On all LED screens in the visualizer, right-click and set the **Output transform** to the desired format for the LED processors. Note that all screens can be bulk selected from the stage editor and edited at once.



8. Optional: A LUT file can be applied using a LUT layer.

> **Note**
>
> In previous versions of Disguise, LUTs had to correspond with the colour space of the project. Now in the LUT layer, a pre and post transform can be applied to mix LUTs and colour spaces by conforming to the ACES workflow.

On the connected hardware

Set the output transform to match the chosen format set on the LED screen objects.

> **Note**
>
> Note that Disguise does not embed any HDR metadata in the video signal so the display device must be set at the other end to the matching format.

Additional notes:

- Author any static video content in the colour space and gamma curve that you are intending to use.
- For true HDR video playback from video content, a DPX 10-bit image sequence is best.

- For Generative Layers there is no Input Transform to pick.

RenderStream - Render Engine Workflow

If the Disguise project is configured for ACES transforms, the incoming RenderStream content from a third party render engine can be configured to HDR for compatibility. In this example we demonstrate with Unreal, but the ACES workflow may also be used with other render engines.

In the Unreal project

1. Choose your colour space in Unreal.
2. Set Execute Console Command nodes:

   - `r.HDR.Display.OutputDevice`
   - `r.HDR.Display.ColorGamut`

3. Set after Event BeginPlay in the project blueprint: these settings tell the project to output in this format when the stream begins.

In the Disguise project

1. In the **Project Settings**, set the **Colour management** option to **ACES**.
2. In the RenderStream Layer layer in Designer, right-click the asset to enable ACES Colour Management and set transform to the incoming format as determined in the Unreal output settings.

> **Note**
>
> The ACEScg format is tested in house and supported by Unreal for 10bit and HDR.

3. On all LED screens in the visualizer, right-click and set the output transform to the desired format for the LED processors.

> **Note**
>
> Note that all screens can be bulk selected from the stage editor and edited at once.

On the connected hardware

- Set the output transform to match the chosen format set on the LED screen objects.

Note that Disguise does not embed any HDR metadata in the video signal so the display device must be set at the other end to the matching format.

ACES and the colour-managed workflow

- ACES intends to provide a universal base for a colour-managed workflow, replacing individual bespoke systems, to allow for accurate interchange between organisations as well as within, and for archival purposes.
- ACES makes use of two important core concepts, “display-referred content” and “scene-referred content”. Before your content enters an ACES pipeline, generally, it is “scene-referred”. Once it has left the ACES pipeline, generally, it is “display-referred”.
- Content which is produced by a camera or by a 3D renderer is “scene-referred”; that is, the values stored in the image are interchangeable only with other images from that camera or renderer using the same settings.
- By contrast, “display-referred” content has a direct relationship between the values stored in the image and the expected colour and intensity of the image when displayed on a calibrated display.
- As a user of imaging software outside of a colour-managed workflow, there are some unintuitive aspects of using a colour-managed workflow. The ACES pipeline is designed to bring your content from designated input or intermediate formats, such as ARRI LogC, Canon CLog3, or ACEScg to designated display output formats such as sRGB, rec2020 or P3-DCI. While ACES provides transforms for bringing output content back into ACES space, and these transforms are often necessary (e.g. if you have a camera that outputs rec709 content), the intention is that the pipeline is end-to-end with a single output stage. Bringing display-referred content into ACES and putting it through a pipeline again is not transparent.

Visit this **link** for a helpful ACES colourspace to RGB converter.

CDL

The ASC-CDL, more commonly expressed and known simply as the CDL, was created through a joint operation between the American Society of Cinematographers' Technology Committee, production / post production vendors, and colour scientists to standardize the exchange of primary colour adjustments. The specification was first released in 2007 and is now widely adopted among several software and hardware manufacturers.

The CDL stands for Colour Decision List. Just like how an EDL communicates basic edit data, a CDL carries a subset of colour-correction data.

Although all colour-correction systems offer their own basic grading controls, **Lift**, **Gain**, and **Gamma** are implemented differently from vendor to vendor. Their definitions of LGG can vary in sensitivity and response. The strength of a CDL- based workflow is its software-agnostic nature. CDL compliant hardware and software can create, modify, and reproduce consistent colour results exported from any other supported platform. In other words, it's all about the perfect interchange of colour modifications.

The parameters of a CDL replace the traditional Lift, Gamma, and Gain you're probably used to manipulating. However, each set of CDL controls behave very differently from one another

- `Slope` is to `Gain`
- `Offset` is to `Lift`
- `Power` is to `Gamma`

Workflows

All these workflows should be performed with the colour management option in the project setting set to **ACES** or **OCIO**.

LUT workflow

Previously pre- and post-transform were set on the layer editor. Now the fields exist on the LUT object instead.

CDL workflows

1. Create a **CDL** layer:
2. Either create a CDL object, or add a .cc .ccc or .cdl file to the **LutFiles** folder in the project directory.
3. Select your **CDL** in the layer.
4. See that layers arrowed into the CDL layer have an effect applied.

5. Adjust the scale, offset, power and saturation parameters on the CDL object and see that the image outputted changes.

Blackmagic Gen5 CDL Workflow

1. Acquire footage from a Blackmagic camera recorded with Gen5 colour.
2. Place the footage in a d3 project in a format d3 can read.
3. Open the VideoClip editor for the footage.
4. Change the input transform to **Blackmagic Gen5**.
5. See that the footage displays correctly when mapped to a display.

Linear exposure and gamma controls on video layer

1. Create a video layer.
2. Set a video clip.
3. Adjust the exposure and gamma fields on the video layer and see that they have effect.
4. Adjust the exposure and gamma fields on the videoclip editor and see that they have cumulative effect with those on the layer.

RGBColour layer IDT

1. Create an RGBColour layer
2. See that there is an input transform field.
3. Set a value for the colour on the layer.
4. Change the IDT and see that the colour changes.

Non-stylised primaries and transforms

1. Create a video layer.
2. Set a video clip.
3. Open the video clip editor and find the input transform.
4. Set the input transform to one of the options under **Utility**. See that both a transform and a colour space can be set + mixed and matched.
5. Create an LED screen and open the editor.
6. Find the output transform.
7. Set the output transform to one of the options under **Utility**.

See as above. N.B. with the colour insider changes, output transforms no longer affect the stage visualiser.

Colour Inspector

The Colour Inspector can be opened in various places in Designer to inspect the specific colour values of pixels within an image. It is useful for verifying content and colour workflows.

> **Note**
>
> The Colour Inspector is only available in ACES and OCIO colour management modes.



Workflows

To open the Colour Inspector

The Colour Inspector can be opened from the following places in Designer:

- **Layer Editors**: Click the Colour Inspector button in the Default separator.
- **Displays/Cameras/Projectors**: Click the Colour Inspector button in the Output separator.
- **Feed Rects**: Right-click on the feed rect and click the Colour Inspector button.

Using the Colour Inspector

After opening the Colour Inspector, the following settings can be changed to inspect a pixel's colour values:

- **Pixel**: The coordinates of the pixel which is being inspected. This can be set by clicking on the image preview, or by editing the field to precise coordinate values. The chosen pixel is shown by a circle in the image preview.
- **Pause**: Press this button to pause the current video frame so that its pixel values can be inspected.
- **Number format**: This can be changed to control how the numeric value of the colour is displayed. Choose between floating-point and 8/10/12 bit options.
- **Colour space**: The colour space to measure the pixel values in. This can be chosen from the following options:
  - **Working**: The current working space.
  - **Input/Output**: Where available, the relevant input space (e.g. the video clip's input transform for a video layer) or output space (e.g. the output transform for a display).
  - **CIE spaces**: Various space colour coordinates defined by CIE standards.
  - **Custom**: Choose a custom colour space from all available spaces.

> **Note**
>
> Pixel values are transformed from the working space to the selected space. This means that if an Input space is selected, the inverse of the input transform will be applied. This may not give exactly the same values as the original input, as some operations such as saturations cannot be inverted.

Colour Checker

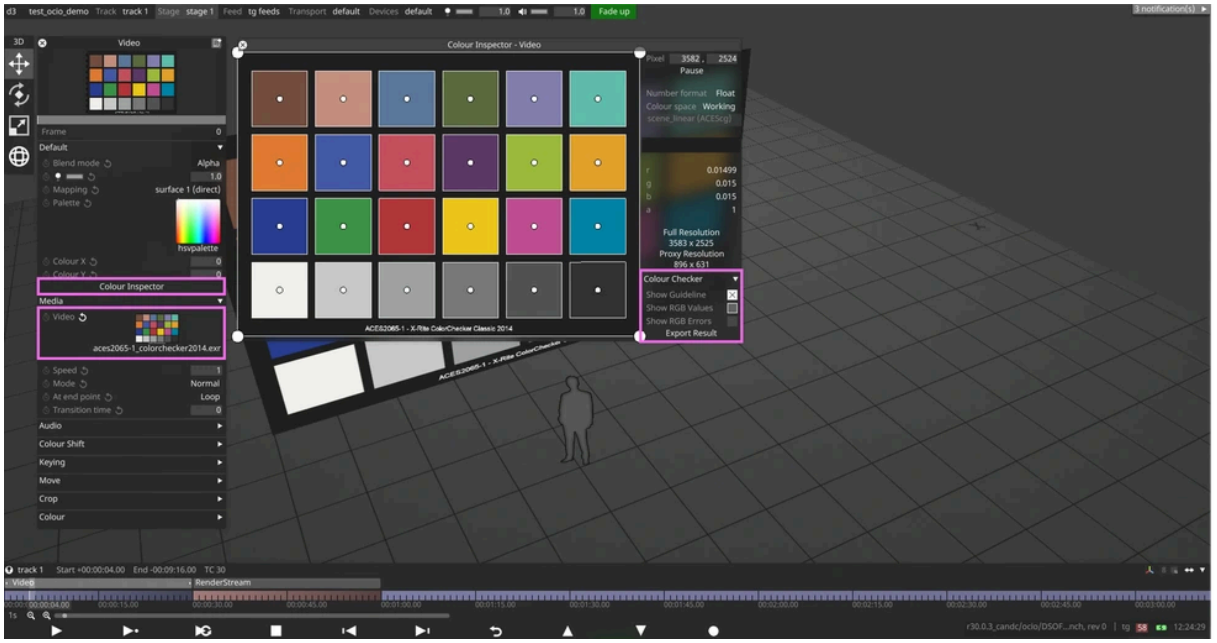
The Colour Checker Chart (also known as the **Macbeth ColorChecker**) is a tool used for colour calibration. It has 24 coloured squares arranged in a frame (See: **ColorChecker Wiki**).

The **Colour Checker** allows you to validate the colour pipeline using a colour checker. This enables you to inspect the colour of multiple sample points in a colour checker. It works similarly to the Colour Inspector, extracting values based on the colour space defined in the **Colour Space** field. It will display either RGB values, errors or both depending on your selection.

Workflow

Follow these steps to use the **Colour Checker**:

1. Assign Colour Checker content to the desired layer:
   - This applies to any layer supporting content ingestion, such as RenderStream or Video Layer.
   - For RenderStream, refer to the Unreal OCIO Setup to configure the Colour Checker with Unreal Engine RenderStream.
   - For the video layer, assign the Colour Checker image in **Media | Video**.
2. Open the **Colour Inspector** widget from the desired stage of rendering (See: How to Open the Colour Inspector).
3. Expand the **Colour Checker** field in the Colour Inspector.
4. Enable **Show Guideline** to start sampling and calculating the transformed colour of each colour box.
5. Enable **Show RGB Values** to display transformed RGB values in each colour box.
6. Enable **Show RGB Errors** to display the error between the expected colour and the incoming colour.

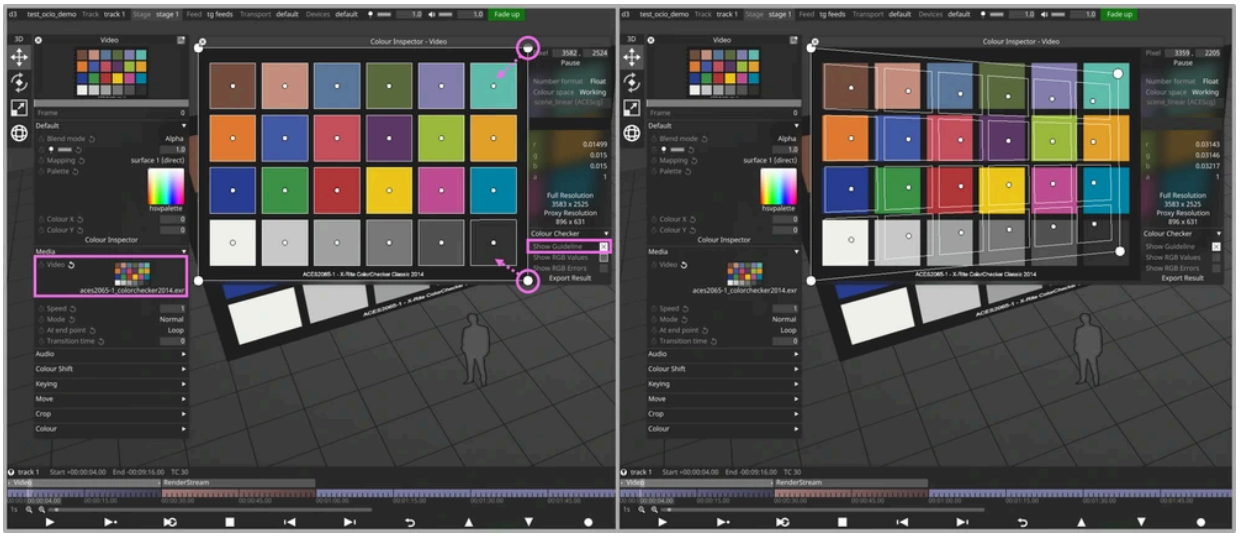


Colour Checker

Show Guideline

When **Show Guideline** is enabled, the **Colour Inspector** samples pixels from each colour box in the Colour Checker and calculates their transformed colour values. If **Show Guideline** is disabled, all other fields will become greyed out.

- Four white control points appear at the corners of the guideline. Drag these points to adjust the colour checker and sampling areas.



Displayed guideline (left), adjusted guideline (right)

> **Note**
>
> **Performance Impact**: Enabling this feature may affect frame rate. Optimisation is planned for a future release.

Show RGB Values

Enabling **Show RGB Values** displays the transformed RGB values for each colour box at the top left corner. These values are based on the colour space defined in the **Colour Space** field.



RGB values of each colour

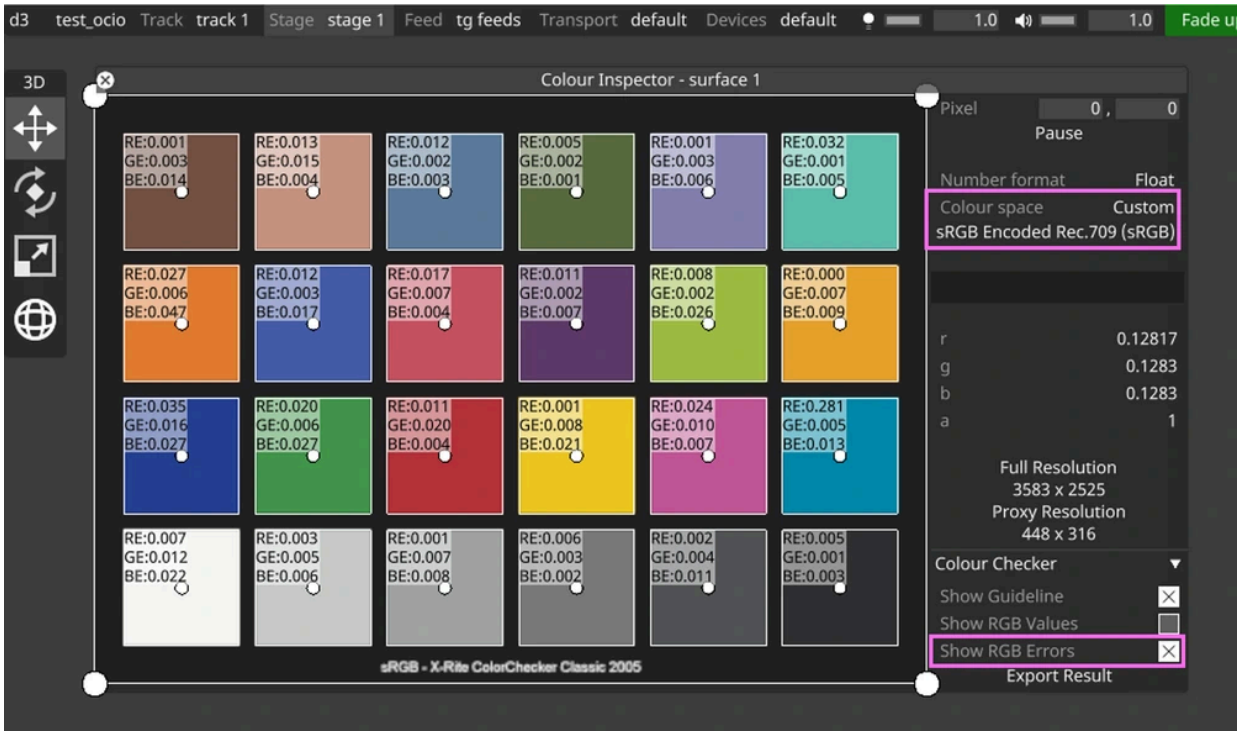
Show RGB Errors

> **Warning**
>
> To ensure the error values are meaningful, set the Colour Space to **sRGB Encoded Rec.709 (sRGB)** (or **sRGB - Texture** if using OCIO version lower than 2.4).

Enabling **Show RGB Errors** displays the error between the expected and incoming colours. You can identify discrepancies with this feature. The error is calculated using the following formula:

```
error = abs(colourExpected - colourContent)
```

- **Expected Colour**: The reference value defined in sRGB colour space and are sourced from the ColorChecker Wiki (See: Designer Colour Inspector).
- **Content Colour**: The sampled value from the content.



RGB error values of each colour

> **Note**
>
> The expected colour values are lifted from the X-Rite Colour Checker specification.
>
> See: X-Rite specification.

Colour Management

Designer has powerful colour management tools to ensure that your content plays back exactly as it was created.

What is Colour Management?

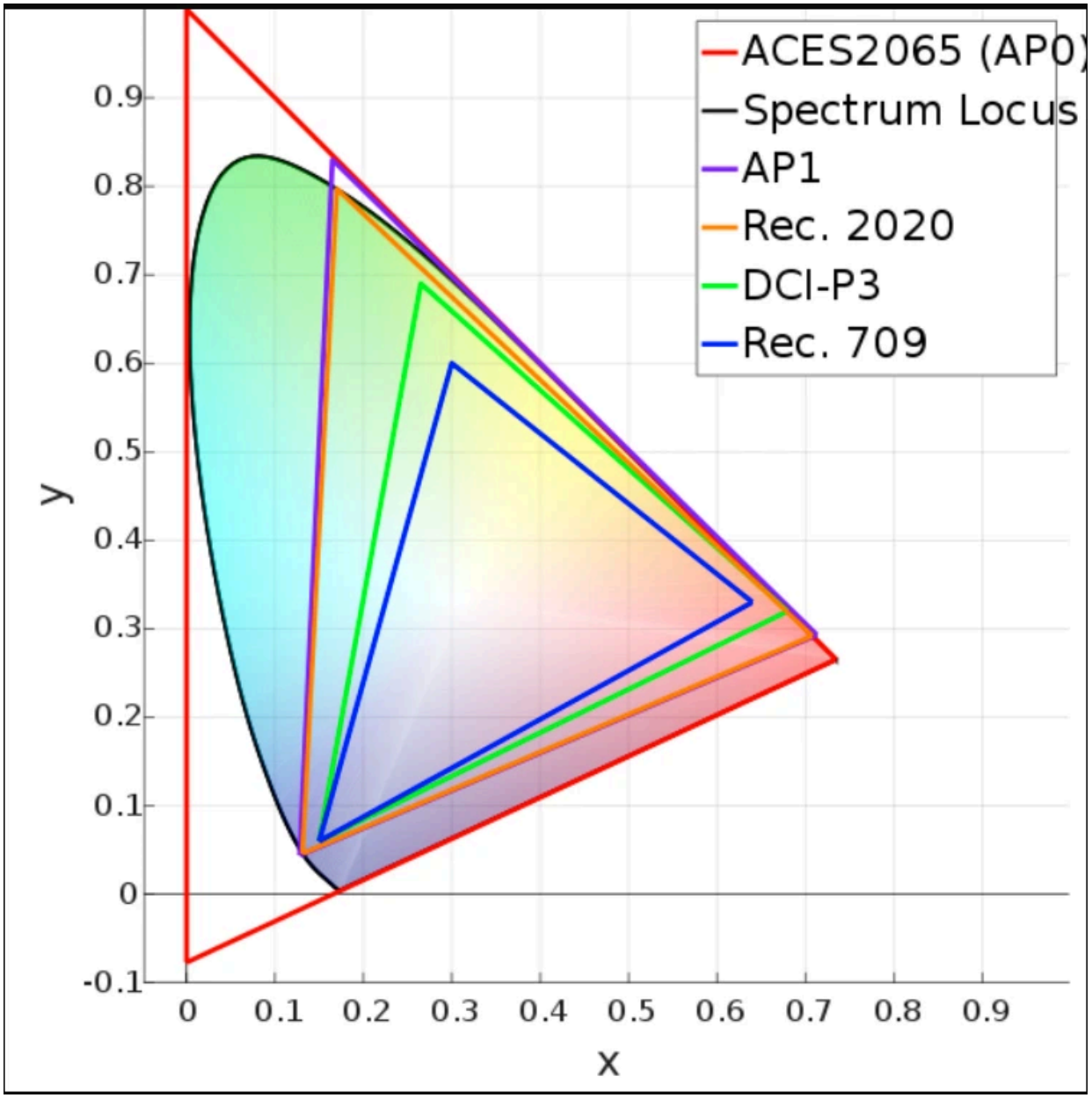
Colour management refers to the workflow for preserving the colour space that the content was created in throughout the entire creation to playback pipeline.

What is a Colour Space?

A colour space, in simplistic terms, is a mathematical definition of how a triple of red, green and blue values (or X, Y, Z, or Y, U, V, or L, a, b or any other three-way breakdown) interact to produce a specific colour.

Colour is derived from different wavelengths of lights hitting our eyes. While each pure wavelength has a distinct colour, the blending of different wavelengths produces more colours still. The CIE colour space diagram provides a visualisation of all possible colours at a given intensity of light (or brightness, although the word has other meanings in this context.)

The colours that a particular colour space can represent can be displayed as a triangle drawn onto the CIE diagram:



Here we can see that sRGB, the standard colour space computer monitors operate in, is a relatively small triangle compared to rec2020, or ACES AP0/AP1.

Colour Bit Depth

The reason a relatively small space was chosen is that using 8-bit values, only **255-255-255** values are available to specify a colour location. To be able to display smooth gradients, more extreme greens, reds and blues were excluded. Now, as 8+bit displays become more widespread, wider colour spaces which capture more of the possible colours become viable. rec2020 and P3-DCI are two widely used industry standards.

The default working colour space in Designer is sRGB, and it is capable of storing 16bit colour values, which allows for bit depths to always be preserved throughout the colour-managed

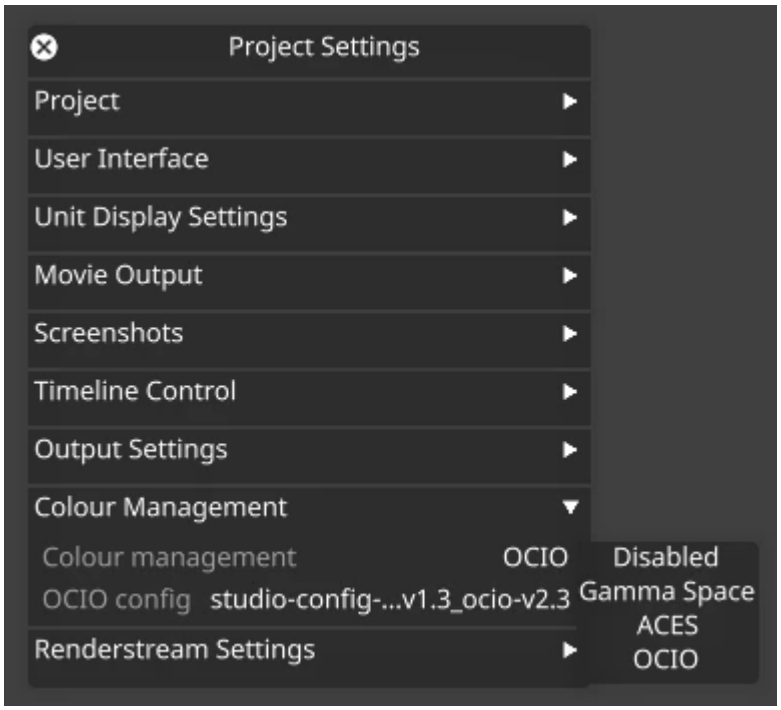
workflow.

Colour-managed workflow

Broadly, a colour-managed workflow is a workflow that can maintain and interchange accurate colour information between different stages in a process that brings image data from the point at which it is generated to the point at which it is displayed. This process might involve one application such as Designer, or it might involve several.

These workflows were pioneered for the visual effects industry, to ensure that images scanned from a camera could be combined, edited, composited, graded and printed back onto film in a way that did not corrupt or alter the colours contrary to artistic intent.

Modes



Designer currently supports four separate modes for colour management, selectable from inside project settings. These are **Disabled**, **Gamma Space**, **ACES**, and **OCIO**, with **Gamma Space** being the default.

> **Note**
>
> ACES workflows can now be achieved using OCIO. For new projects we recommended using OCIO mode, as future development of colour workflows will focus on OCIO rather than ACES mode.

Disabled

Disabled mode removes all colour transforms from Designer pipeline. This is useful when you want to bring content into Designer and have no colour processing applied as it goes out to displays.

- Colour values of content are not altered, gamma curves are baked in, and the type of output device is not specified.
- This option can't support HDR properly.
- Perfect for sRGB/~Rec.709 all in/out situations
- Zero cost in GPU time.

Gamma Space

Gamma Space mode is the existing colour management workflow within Designer. It has a range of input and output transforms, broken down into colour space and gamma function. All content is maintained internally as sRGB.

- This colour management option also means all content is blended with its gamma space applied (sRGB gamma curve). However mixed content (like Rec.709 and Rec.2020) will be more 'correctly' blended and converted to the output transform specified.
- Supports HDR and Wide Colour Gamut displays.
- Only leverages the GPU when the content or display isn't sRGB.

ACES

ACES mode enables the ACES pipeline.

- Only **ACES** colour space has linear gamma 1.0, where e.g. sRGB content will have the sRGB gamma curve removed and colour space rotated to AP0 i.e. extended to the widest possible area.
- All content is blended in ACES and then transformed back out to the selected output transform.

For more information on ACES, visit this link.

OCIO

OCIO mode enables the OCIO pipeline.

- Colour spaces and transforms are configured by artists or studios and stored in a .ocio file.
- The .ocio file is loaded into Designer and used to configure the colour transforms for input content and output sources.

For more information on OCIO, visit this link.

Colour Profiles

A colour profile is an object within Designer that allows you to specify what colour space the content was produced in, and what colour space the content is output in which allows Designer to convert between the two colour spaces, to preserve colour detail as required.

A feature of Designer is the ability to apply a colour profile to both screens as well as pieces of content.

A colour profile consists of a colour space specification and a gamma curve.

Colour profiles are supported on LED Screen, DMX Screen and DMX Lights screen objects.

Colour Space

A colour space defines the range of colours achievable with a particular signal chain (content source -> display device). Different signal chains enable different colour spaces - this is not directly related to the colour depth (8 bit or 10 bit), but there is a relationship - you can think of the colour depth as increasing the resolution of the available colour space.

Colour space becomes important when considering content chains, as the colour space which the content is produced in should be preserved throughout the chain to ensure it can be output in the same colour space.

Designer's colour space is sRGB - also known as Rec.709.

Gamma

When expressing a color in RGB (red, green, blue), what we are specifying is the amount of light which will be emitted from each phosphor, as a fraction of full power. What we are actually specifying is however the voltage which will be applied to pixel on the output device (projector, LED processor, etc). These devices don't respond linearly to the voltage, and the gamma curve is a way to correct for the non-linear relationship between content and display.

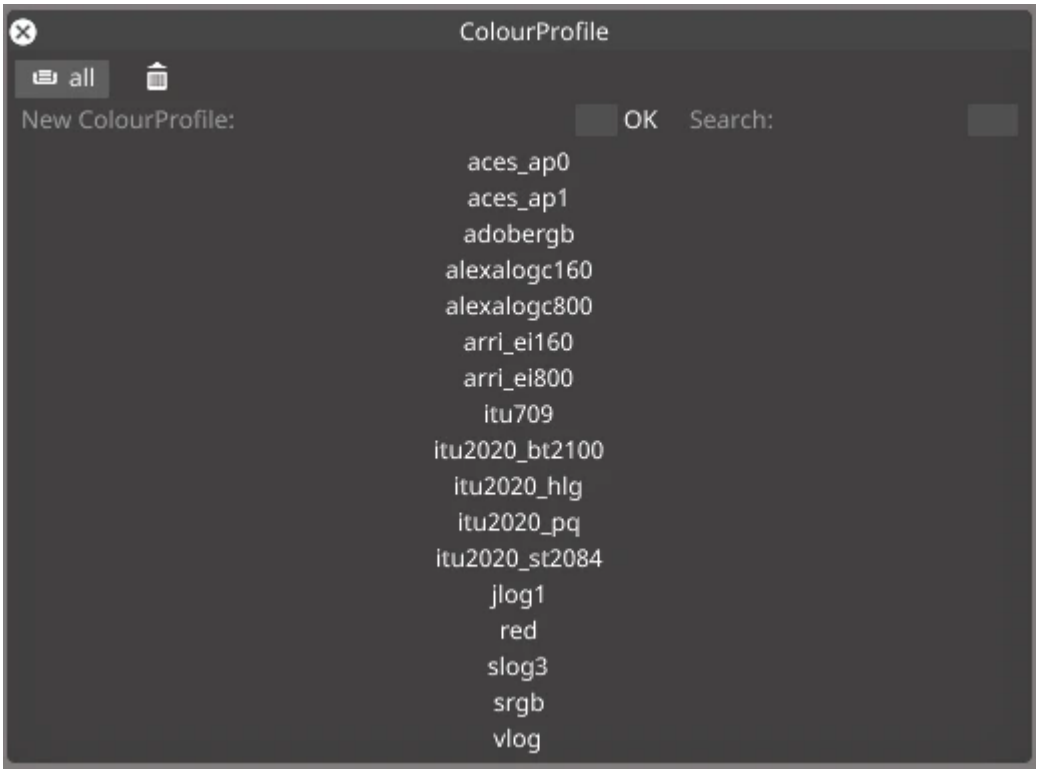
Workflow

A colour profile is a discrete object within Designer that can be applied to a piece of content. The workflow consists of two parts, creating a new colour profile in the colourprofile manager, and applying that profile to the content.

Applying a colour profile to content

1. Open your content layer.
2. Right-click the content thumbnail.

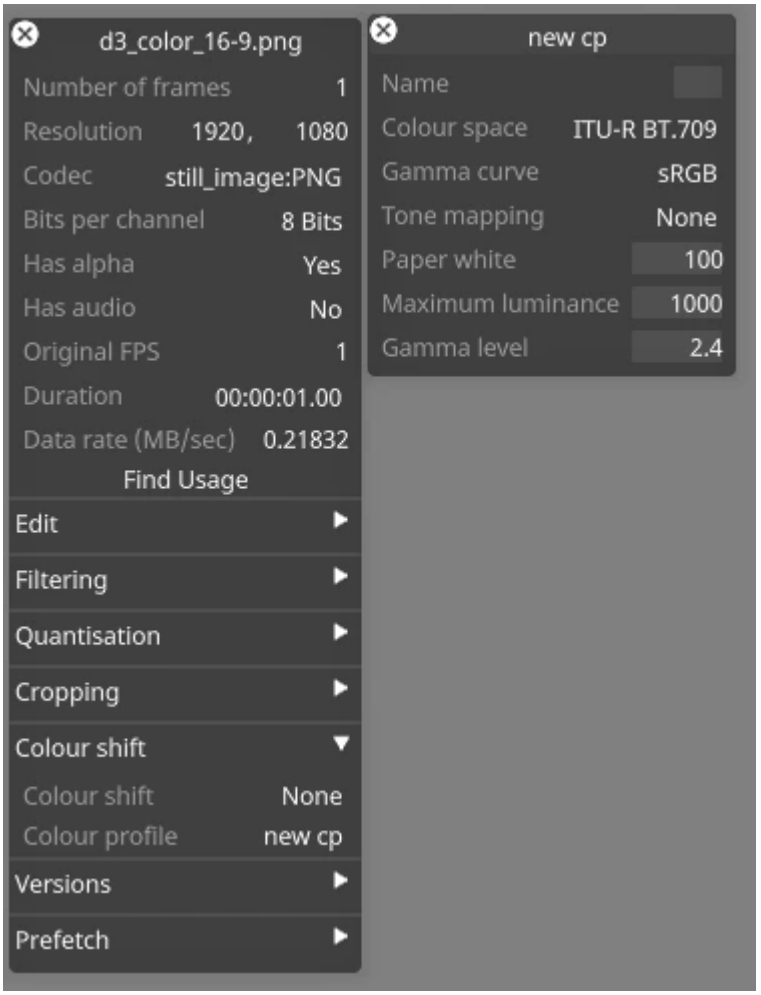
3. Navigate to the **Colour shift** tab.
4. Apply a new Colour profile to the clip using the Colour profile property.



Creating a colour profile

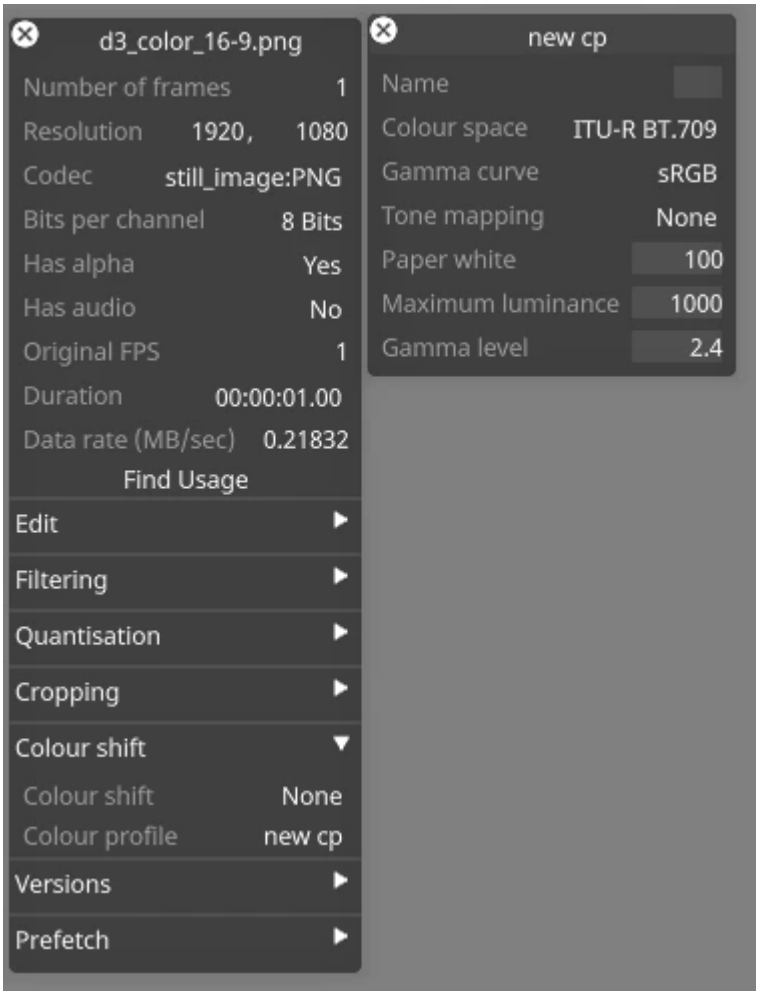
1. Open a Video layer and apply a piece of content.
2. Right-click on the Media thumbnail and expand the Colour shift tab.

3. Create a new Colour profile.



4. Enter a the name for your new profile in the naming field.
5. Press Enter or click OK.

6. In the profile editor, specify your Colour space and Gamma curve.



Colour Shifts

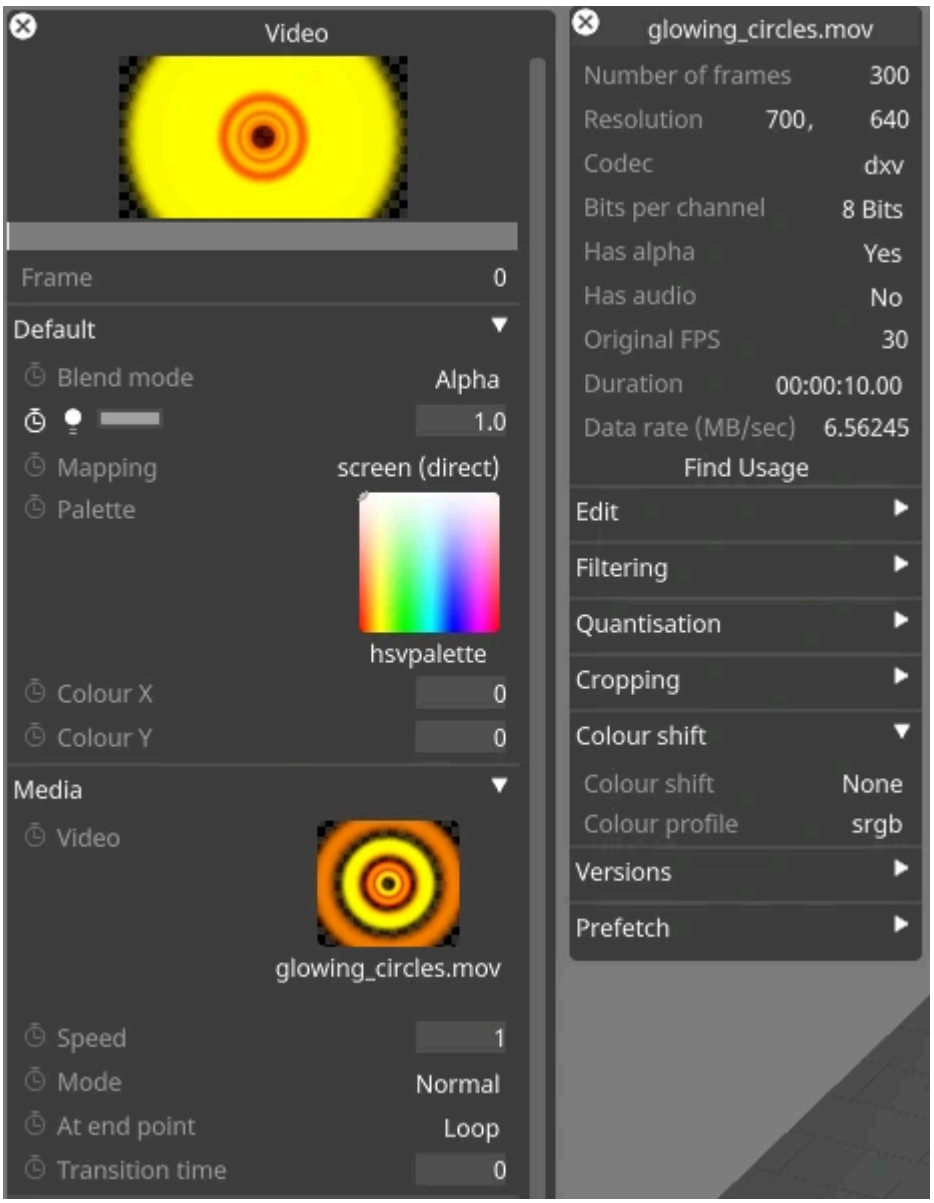
A colour shift is a discrete object within Designer that allows you to alter the colour properties of a piece of content.

Applying colour shifts to video clips

It is possible to attach a colour shift object to an individual video clip so that every time you use that video clip it will colour shift in the same way. You can then place these video clips onto the key-frame editor and sequence these video clips. To do this:

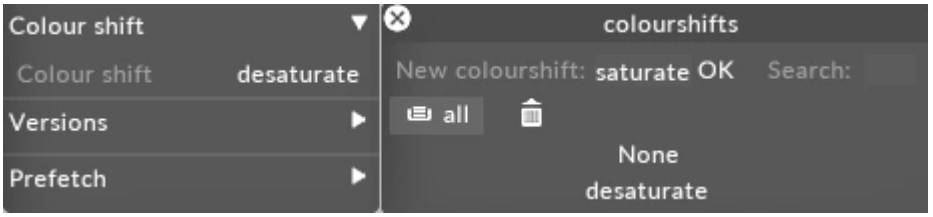
1. Create a Video layer.

2. Open the Video Clip editor by right-clicking on the media thumbnail in the layer editor.

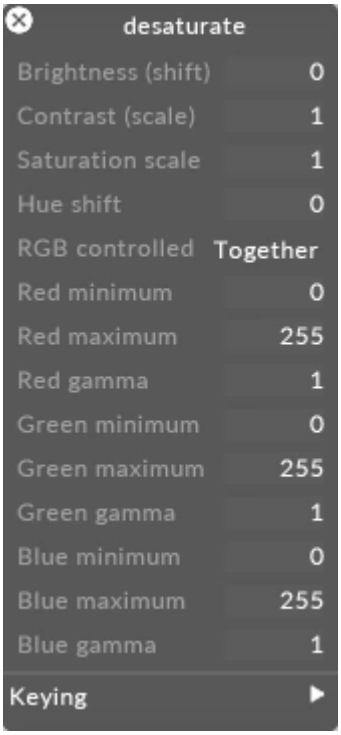


3. Note: making changes to properties of a clip alters the state of the clip, and any changes made will appear in each instance where the clip is used. For this reason, it is recommended to make a duplicate of the clip and then make changes to the duplicate, keeping the original in its unaltered state. To duplicate the video clip, begin by right-clicking the header of the clip options and typing the name of the new video clip into the duplicate text field and hitting Enter. You will notice the title bar of the Video Clip editor change; it is now the object editor for your new video clip. The video clip will also be added to the Video keyframe editor at the current playhead position.

4. Left-click **colour shift** from the Video Clip editor. This will open the Colour Shift manager showing a list of colour shift objects. The colour shift object assigned to a video clip may be untitled, in which case it is unique to that clip. Renaming the colour shift object will add it to the ColourShift manager, allowing it to be used by multiple clips.



5. Create and attach the colour shift object to the video clip by typing the name of the new colour shift object, for example **desaturate**, into the **new colourshift** text field and hitting **Enter**. This will open the Colour Shift editor.



For information on the Colour shift properties please visit the section 'Colour Shift' in the Common Layer Properties sub-chapter.

6. Edit the properties. In this example we have desaturated the video clip by decreasing the saturation scale property to 0.

Colour Transforms

Transforms are used to transform an image from one colour space to another.

Input and Output transforms

Input transform

A formula or LUT mapping the values from a camera or stored in a file into the ACES colour space. Also known as the IDT.

Output transform

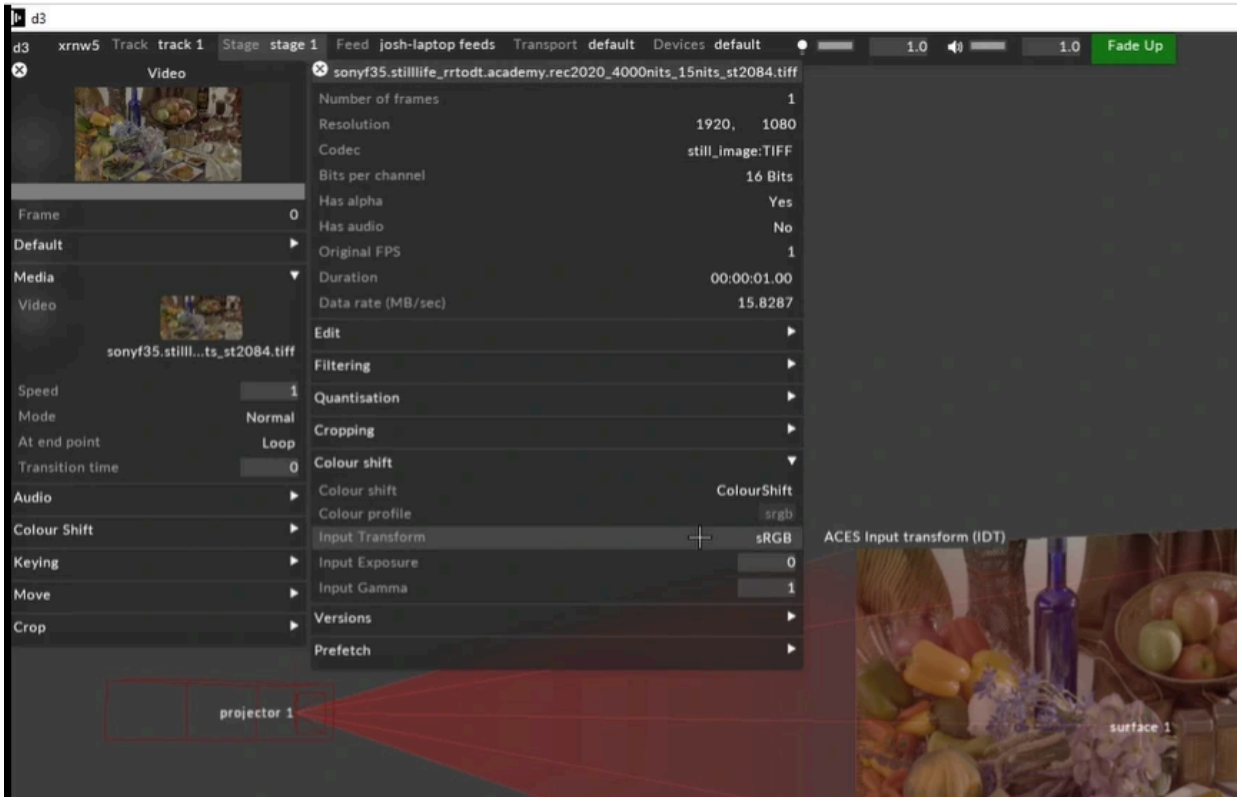
A formula or LUT mapping values from the ACES colour space to the output of a specific device or device specification, e.g. to PQ or HLG or rec709. The output transform is the collective name for the RRT and ODT.

By using transforms, you can ensure that your content will be displayed correctly on the displays.

Workflow

Input Gamma and Exposure Transforms

For video inputs it is possible to enter a number to specify a gamma transform (in Input Gamma field), or enter an amount in stops (in Input Exposure field) to make an image more or less exposed.



1. Open a Video layer.
2. Right-click on the media clip used on the layer.
3. Open the video clip editor
4. Enter the number for Input Gamma or Input Exposure.

All content inputs i.e. video files, RenderStreams, anything that is coming into Designer that has colour and has image data has an “Input Transform” field. Upon configuring the input, you will see a dropdown list with the ACES standard list of colour spaces that are supported for input. This includes both scene-referred content derived from cameras (such as ARRI LogC), and display-referred content mastered to an output standard (such as ST 2084).

All display outputs have an “Output Transform” field. You will see a dropdown box with the ACES standard list of colour spaces that are supported for output; and you simply choose the appropriate one for your display.

Output Transform - ACES ODT (added on virtual devices such as camera and projector: Output → OT) Input Transform - ACES IDT (beneath: Video → Media → Edit media menu → Colour Shift → IT)

For video module: 2 fields were added:

Input Gamma Transform (IGT) - control the brightness (user can set less or more contrast using numbers)

Input Exposure Transform (stops) (IET) - changing the brightness of the image accordingly:

- less exposure darker, more exposure: brighter,
- users can specify the level of exposure by entering the number.

Additional Information

Differences between a Colour Tranform and a Transfer Function

A given piece of content will have both a relationship to a colour space, which will be independent of intensity, and a function of some kind that describes how intensity is encoded into the colour values. So a colour transform will affect how colour is represented relative to the CIE colour diagram, while a transfer function will not. A transfer function will change the perceived intensity or contrast of an image, where a colour transform will not.

In addition to this, there are specifications such as rec709 and sRGB that define a colour space as well as a transfer function, as well as transfer functions that are independent of colour space and colour spaces that are used independently of transfer functions.

Linear Transfer Function

When we say an image is ‘linear’, we mean that the transfer function is linear, i.e. there is no curve applied and a value that is twice another value will be twice as intense. This is useful for mathematical accuracy in visual effects, but is inefficient for display.

Curves

The sRGB and rec709 curves are closely related but different, although they’re often used interchangably with each other as well as with a 2.2 gamma curve. This is the most common curve in graphics and is the current ‘default’ curve in Designer, which content is assumed to be in if no other choice is specified.

The PQ and HLG curves are for displaying HDR content on HDR displays.

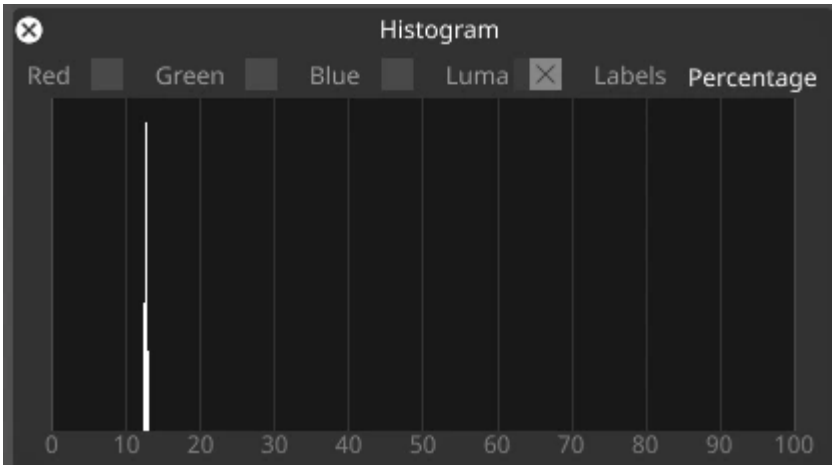
Camera-specific formats, as well as ACEScc, are “log” formats that use a log curve on intensity.

Histogram

Overivew

The histogram shows the number of pixels that are a certain value.

Histograms are mainly used to verify the end-to-end signal of an image. This is particularly useful when there is a known value in the content, and we want to make sure that it remains at that value throughout the signal chain.



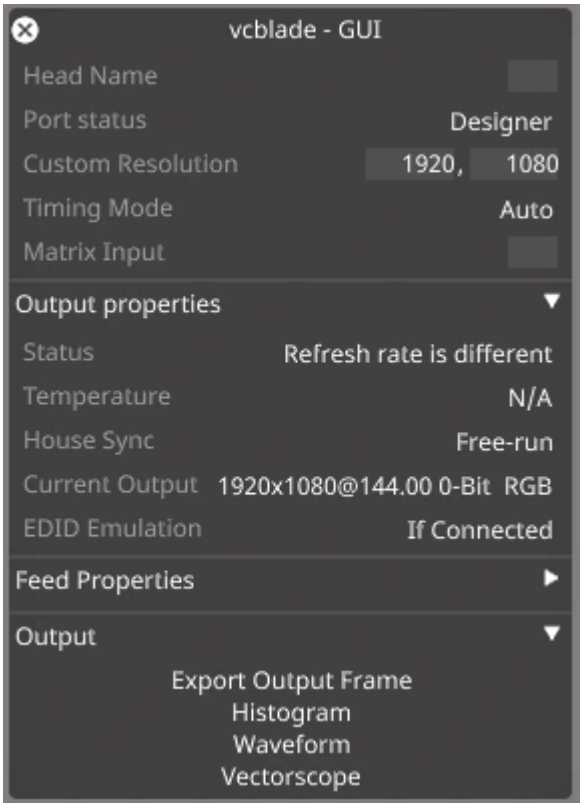
Opening the Histogram

A histogram can be used to verify the signal chain at these points:

- On a Video Input within the Video Input patch Editor- After capture into Disguise and any layer stack modifications.
- The feed output - after being transformed into the final 8- or 10-bit format going to the display.

1. Open the Feed Output window by clicking on Feed in the dashboard

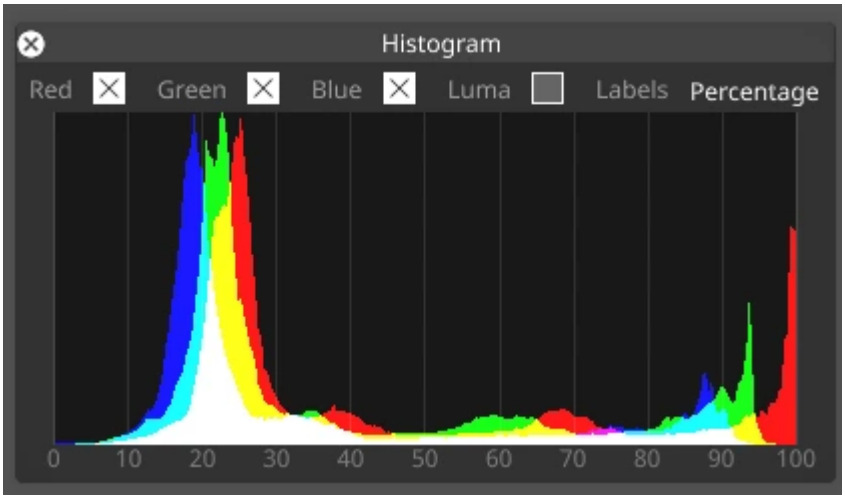
2. Right-click on the border of an output to open the **Output Properties** window.

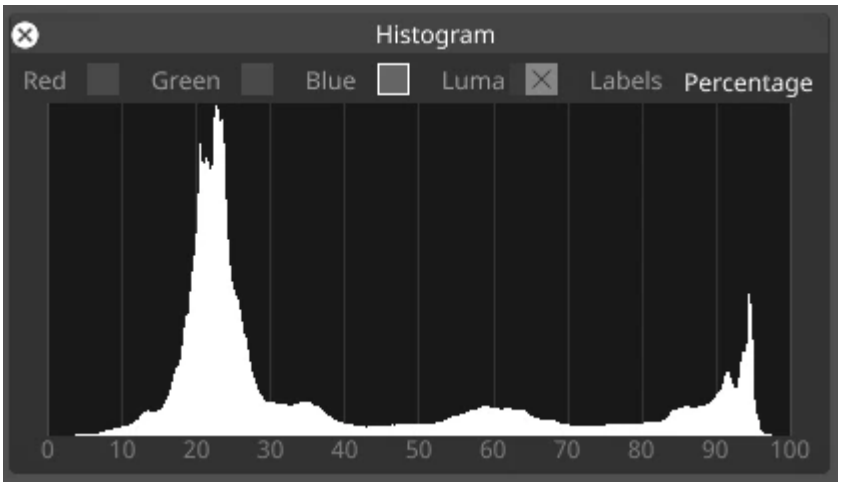


3. Click on **Histogram** in the Output tab.

Understanding the Histogram

The histogram can take its value either from the red, green or blue channels, or from the combined luma value i.e. brightness:





- The horizontal axis shows the value
- The vertical axis is the percentage of pixels at that value.
- The left side of the histogram is the lowest value (e.g. black)
- The right hand side is the highest value (e.g. white).
- A peak means that the majority of the image is at that value

The horizontal axis can be :

- Unlabelled
- Labeled by raw value (0...255 for 8-bit images, 0-1023 for 10-bit images, 0..1 for floating point images).
- A percentage from 0 to 100.
- A nit value on the Perceptual Quanitizer (PQ) scale – which is common for HDR outputs.

Livegrade Studio Integration

Pomfort Livegrade Studio comes with support for interactive CDL control of Disguise systems. This feature enables you to grade content such as a video layer in a Disguise system via a network connection.

Pomfort Livegrade Studio is a **Mac** only product. This feature is only available in **Livegrade Studio**.

Livegrade Studio comes with support for interactive CDL control of Disguise systems. This feature enables you to grade content like a video layer in a Disguise system via a network connection.

You can control CDLs in a Disguise Designer project on a machine in a network you connect to via IP (LAN or Wifi depending on your connection).

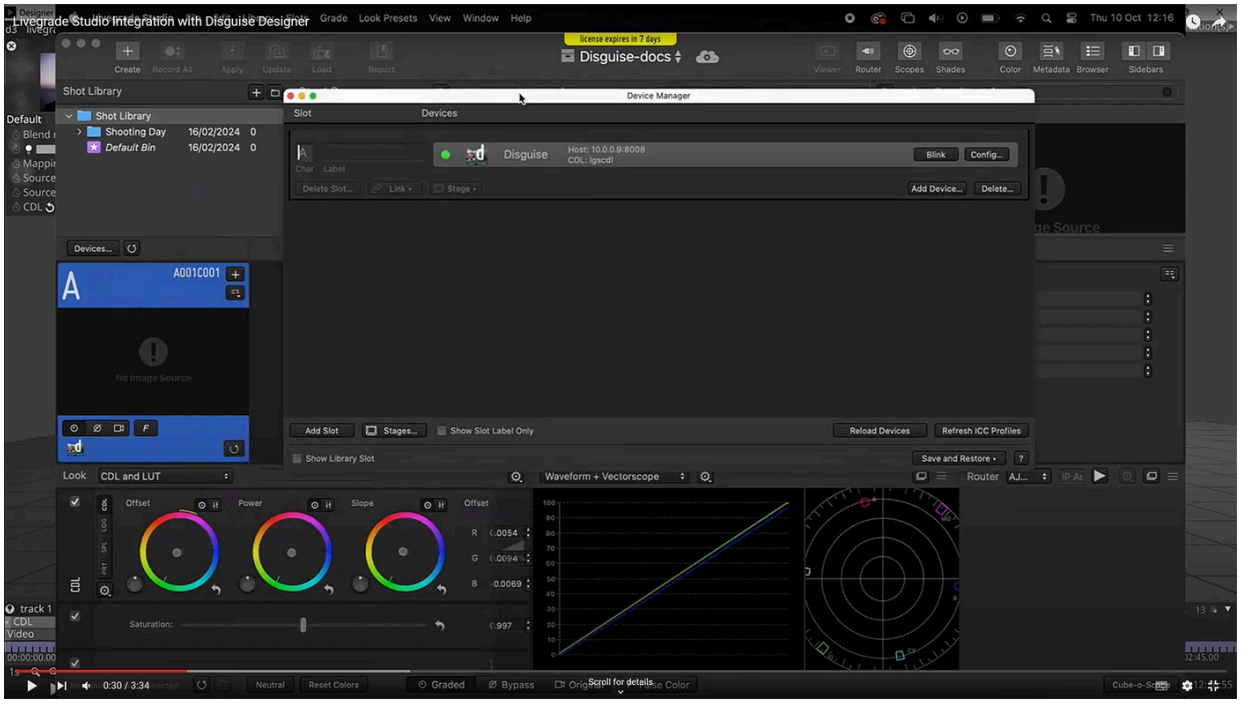
Make sure there is at least one CDL (or multiple CDLs) set up in your Disguise Designer project. You can choose the CDL you want to grade from a CDL list loaded upon adding the Disguise system to a slot.

When working with Livegrade and CDLs, the Pre Transform and Post Transform of the CDL should be set to the working space of Livegrade, which is ACEScc or ACEScct.

For more information on the ACES CDL Grading Mode, see the **Pomfort Aces Grading Mode documentation**.

With the introduction of the Livegrade Studio 6.5, the Port of a Disguise device can be set manually.

Connecting Livegrade Studio to Disguise



Click the video image to watch in YouTube

Workflow

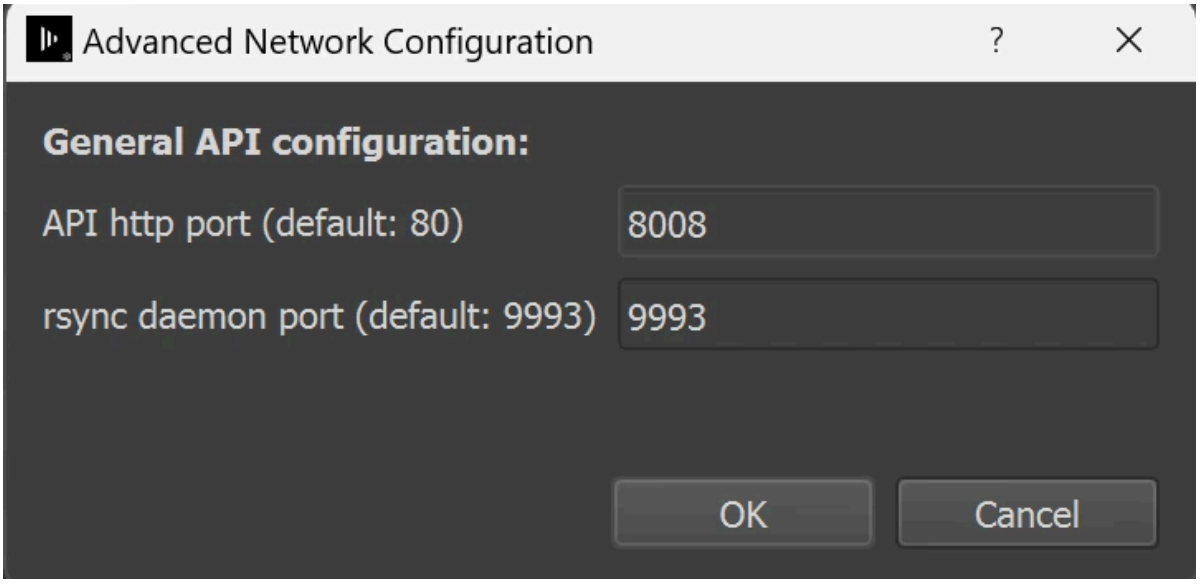
Prerequisites

- At least one Colour Decision List (CDL), or multiple CDLs, set up in your Disguise Designer project.
- Livegrade Studio installed on a Mac. Free trials are available for a short period of time, once this has expired you will need to purchase a license from Pomfort.

Setting up the connection

1. Set up a CDL in Designer by following the CDL worflow steps on the CDL page.
2. Ensure Designer is running on a machine in your network.
3. Using a Mac on the same network, open the **Livegrade Studio** application.
4. From the main menu, click **Slots > Add Device** and select **Disguise System**. Alternatively, add the device using the **device manager**.
5. In the **Add Disguise System** dialog window, add the IP address of the Disguise system running Designer.

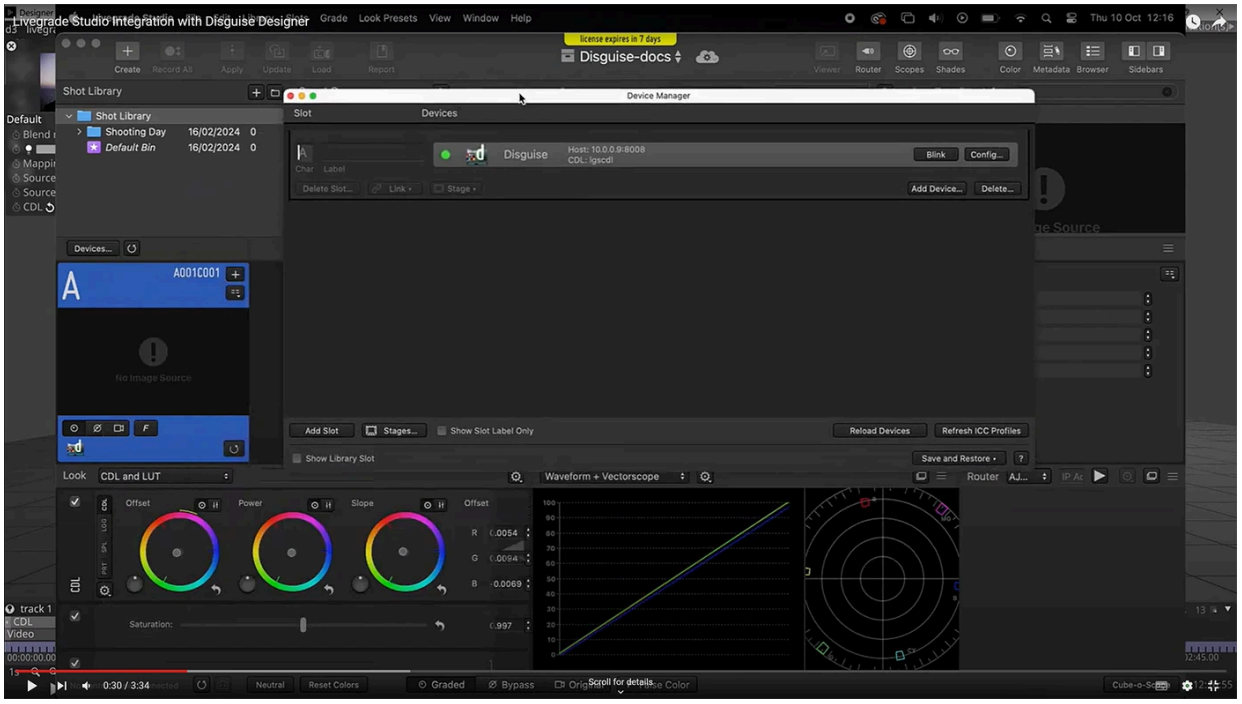
6. Add the port number. In our example we use Port 8008, but with the introduction of Livegrade Studio 6.5, the Port number is customisable. The port specified in Livegrade must match the API configured in Disguise under **d3Manager > Machine Setting > Advanced Network Configuration**.



7. In the **Remote CDLs**, select the CDL that you are using in Designer.
8. Next, select the grading type as required. There are two types of grading are available to send the *look* to the Disguise system:

- **Interactive**: is used for grading the look of the Designer image interactively
- **Manual**: is used to upload the image look manually. To do this use the **Upload** button in the toolbar.

10. Confirm the configuration settings by clicking **Add Disguise System**.



Active connection in device manager

> **Note**
>
> **Please note**: If you want to control multiple Disguise CDLs, you can add each CDL you want to grade to a separate slot.

Once the set up is complete, the device manager can be reopened at any time and will show a connected Disguise system under Devices.

> **Note**
>
> The integration only supports CDL-based look modifications. Consequently, loading a LUT into Livegrade's LUT node will not affect the look in the Disguise system.

Please refer to the article **Color Controls and Grading Modes** for more information on grading controls in Livegrade Studio.

For more help with Livegrade Studio visit the **Pomfort documentation: Setting up Disguise System**.

LUT Files

A LUT can be used as a Pre or Post transform.

LUTs

From r21 onwards, Designer's LUT Format Support has expanded.

When calibrating LED screens for large VP volumes, industry-standard solutions use two sets of LUT files - a 1D LUT for adjusting brightness, contrast, and gamma, and a 3D LUT file for adjusting colours. Initially, only 3D LUT was supported, and meant that manual adjustments still had to be made on the LED processor to achieve a linear colour reproduction.

From r21, Designer also supports 1D LUT files. View the Workflow tab on this page for more details.

Prior to r18, LUTs were essentially defined by the context they were used in. A user entering a LUT layer on the timeline was expected to have authored the LUT to transform from whatever space the image they were connecting to was in, and the output was expected to either be in sRGB or some other colour space that the user was going to manually preserve through Designer to output.

With ACES enabled, LUTs now have a pre- and post-transform option, so the user can specify which space the LUT expects to receive and which space will be output from the LUT, and Designer will be able to convert that content safely back into the ACES-2065-1 space Designer uses internally, for output via any one of the output transforms.

Applying a pre- and post-transform has now moved from the LUT layer to the LUT itself.

Supported LUT file types

Disguise supports:

- `.spi1d` and `.lut` for 1D LUTs
- `.spi3d` and `.3dl` for 3D LUTS
- `.cube` files which can be 1D or 3D

Interpolation

3D LUTs can be applied using one of two interpolation methods, selectable on each LUT resource. Choose the method the LUT was authored against, so the result in Designer matches the preview in your colour grading tool.

- **Tetrahedral** (default) — select this if the LUT was authored against tetrahedral interpolation. This is the standard default in most colour grading tools.
- **Trilinear** — select this if the LUT was authored against trilinear interpolation, or to reproduce the output of earlier Designer releases, which always applied LUTs trilinearly.

The interpolation method is set per LUT resource — inspect the LUT object (for example, by inspecting the LUT assigned to a LUT layer's **Colour LUT** property) to access the **Interpolation** dropdown.

Interpolation only affects 3D LUTs; 1D LUTs are unaffected.

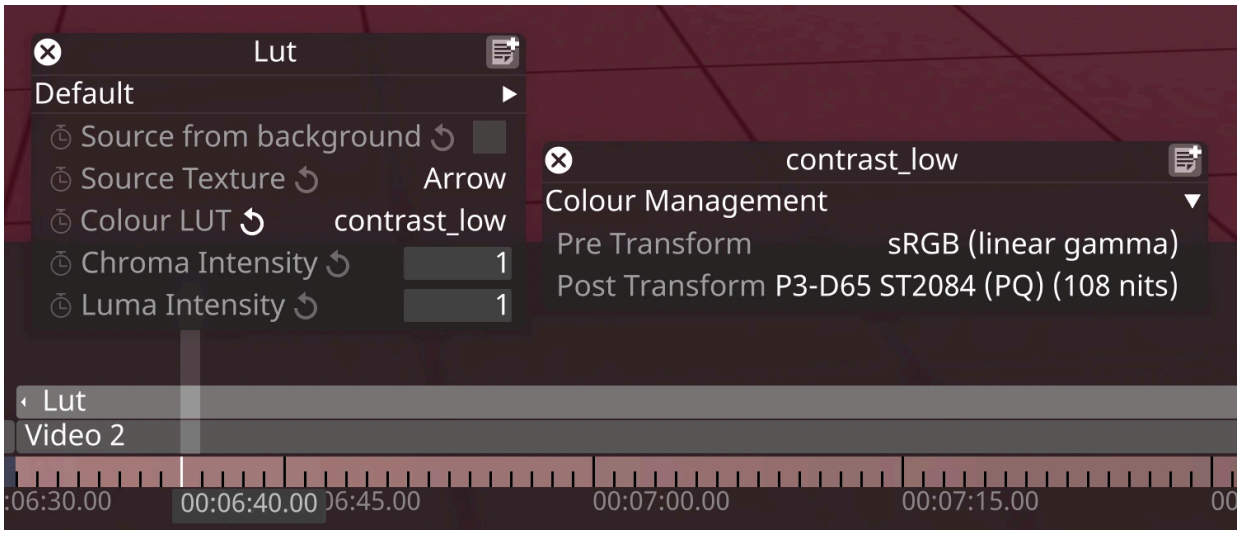
Workflow

Expanded LUT Format Support:

1. Acquire a LUT in each of the new file formats and place them within the lutfiles folder within a d3 project.
2. Launch a Designer project.
3. Create a LUT layer and open the editor.
4. Confirm that the files placed within the LutFiles folder have appeared as LUT objects.
5. Create a video layer, assign some content and arrow it into the LUT layer.
6. Assign each LUT in turn to confirm that the expected LUT effect appears on the targeted display.

LUT Layer Colour Management

Inspect the LUT layer, and then inspect the LUT assigned to the layer, and there access the Colour Management options.



Example 1

LUTs generated from Davinci Resolve in ACES mode operate on the ACEScc colour space.

So, a user can generate a cube LUT from Resolve, then specify the pre- and post- transforms in the LUT within Designer to “ACEScc”.

Designer will transform the content from the ACES-2065-1 space to ACEScc, apply the LUT, then transform the output content from ACEScc back to ACES-2065-1 space.

OCIO

Open Color IO (OCIO) is a colour management solution designed for seamlessly sharing colour spaces and transforms between applications, across an entire production pipeline. Artists and studios can author their own colour transforms, which are encoded within a .ocio file which is used to ensure consistent colours across all supported applications.

The **OpenColorIO** website contains various open source tools and instructions for building your own .ocio config files. Standard configs such as ACES can also be downloaded, although some of these are already included as built-in configs within Designer. Alternatively, studio provided configs can be loaded into Designer to maintain consistency with other production tools.

Supporting OCIO inside of Designer allows Disguise to be used as part of a colour-managed workflow alongside other OCIO-compatible software such as Adobe After Effects, Autodesk Maya, Foundry Nuke and Unreal Engine.

For more information on colour spaces and colour management please visit the colour management page.

Core Principles

- The colour spaces and transforms are stored in a .ocio **Config** file. For instructions and tools for authoring config files, see the **OpenColorIO** website.
- **Colour Spaces** can be selected on input content and output sources to define the space to read from or write to.
- The **Working Space** can be set within the config editor to define the colour space in which compositing operations in Designer are carried out.
- Transforms may have configurable parameters such as exposure and gamma which are provided via **Dynamic Properties**.
- **LUTs** and **CDLs** can be applied in various places in Designer to transform the colours of an image. OCIO can be used to define what colour spaces these are applied in.

Support

It's important to ensure your OCIO workflow is compatible with the OCIO library used in your specific version of Designer.

OCIO support within Designer is summarised in the table below:

Designer Version	OCIO version
r32.2 or higher	2.5.0

Designer Version	OCIO version
r29.1 to r32.1	2.4.1
< r29.1	Not supported

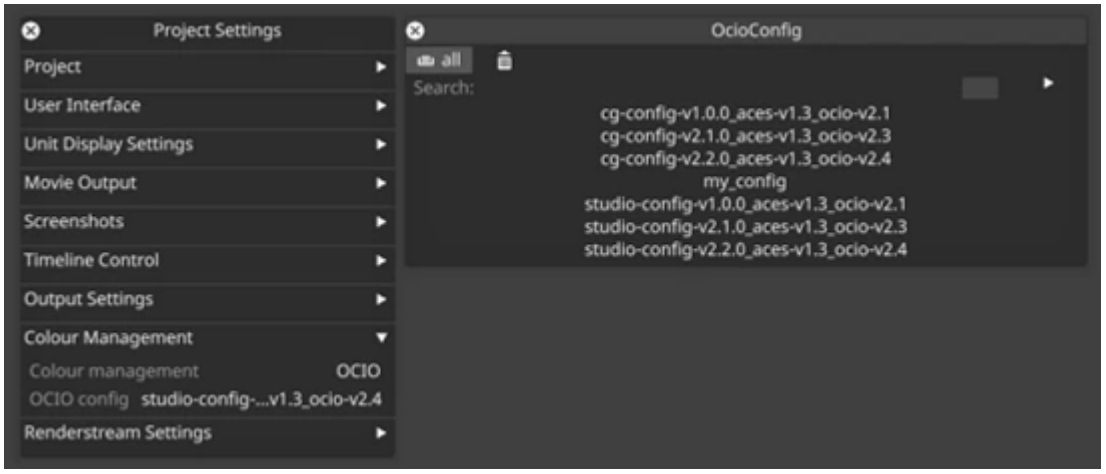
> **Caution**
>
> If you intend to use a custom OCIO config within Designer, it's important to ensure its `ocio_profile_version` does not exceed the OCIO library version used within your Designer instance. Doing so could result in serious configuration incompatibilities and errors.

Workflows

Configs

To set an OCIO config in Designer

1. Right-click d3 in the dashboard and select **Project Settings**.
2. Under **Colour Management**, set the Colour management option to **OCIO**.
3. By default, the **OCIO config** field is set to the latest ACES studio config. Several other built-in configs are also available.
4. To use a custom .ocio config file, copy the file into the project's objects/OCIO folder, then select this from the list of available configs.

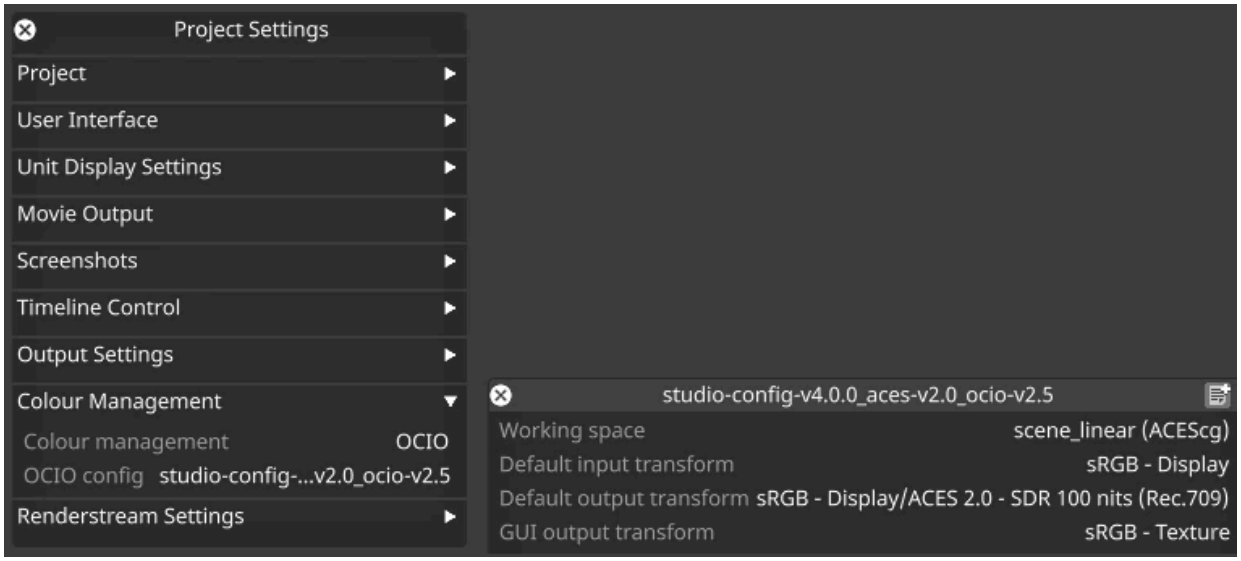


> **Note**
>
> .ocio files will automatically be synchronised from Director to Actor machines. They will not be synchronised from Actors or Editors.

The **OCIO config** resource in Designer has options to allow users to set the working space and default input and output spaces.

To set the working and default colour spaces

1. Right-click on the **OCIO config** to open its editor.
2. Change the working space in the **Working space** field.
3. Change the default input/output spaces in their respective fields. Note that these defaults are dynamic - anything which has its colour space set to Default will always resolve to whatever is currently set in these fields.



> **Caution**
>
> We recommend that a scene-linear colour space is used as the working space, otherwise certain compositing operations may not perform as intended

To set the GUI output transform

The **GUI output transform** property in the OCIO config editor can be used to set the colour space of the user interface. This enables colours to be viewed properly on monitors with wider colour gamuts than standard sRGB displays. Note that this property does not change any colours in the machine outputs.

1. Load an **OCIO config** which has a colour space matching your monitor's specifications.

2. Right-click on the **OCIO config** to open its editor.
3. Change the **GUI output transform** to the required colour space.

Colour spaces

Input and output colour spaces can be set on Resources to define the colour space a particular piece of content or output hardware is expecting. Content is transferred from input colour spaces to the working space before any compositing is done, and from the working space to output colour spaces when content is applied to the outputs.

Input colour space fields are added to the appropriate content sources in Designer, including:

- VideoClip
- DxTexture
- LogicalVideoInDevice
- RenderStreamAsset

Output colour space fields are added to the relevant outputs, including:

- LedScreen
- DmxScreen
- Camera
- Projector

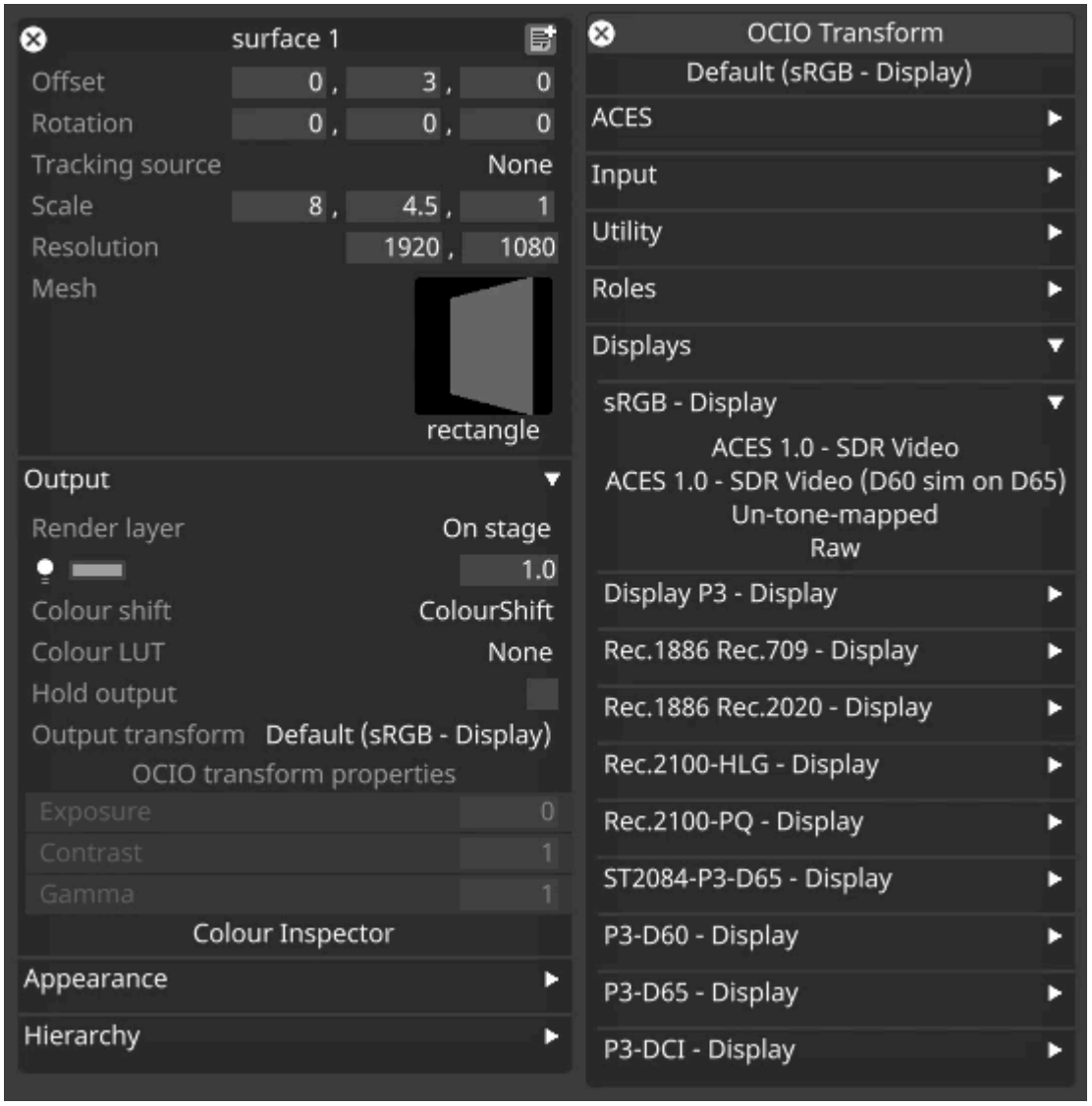
To select the input colour space for a video clip

1. Set the colour management mode to OCIO and set up the config.
2. Create a Video layer and select a VideoClip from the video folder.
3. Right-click on the VideoClip to open its editor.
4. Under **Colour shift**, click to select the Input colour space.
5. By default this will be set to **Default**, which resolves to the default input transform set in the config.
6. Select a different transform if required to match the media encoding.



To select the output transform for an LED screen

1. Set the colour management mode to OCIO and set up the config.
2. Open the editor for the LED screen.
3. Under **Output**, click to select the Output colour space.
4. By default this will be set to **Default**, which resolves to the default output transform set in the config.
5. Select a different colour space or display/view combination if required to match the colour space the LED processor is expecting.



> **Note**
>
> Changing the output transform of a display will not make any noticeable difference in the Designer visualiser. The output transform will only be applied to the image as it goes out to the screen.

Dynamic Properties

Several OCIO transforms provide a number of modifiable parameters which can be used for live adjustment, similar to the exposure and gamma controls in ACES mode. These are known as **Dynamic Properties** and are applied using an **ExposureContrastTransform**. Designer exposes three values from this transform:

- Exposure
- Contrast

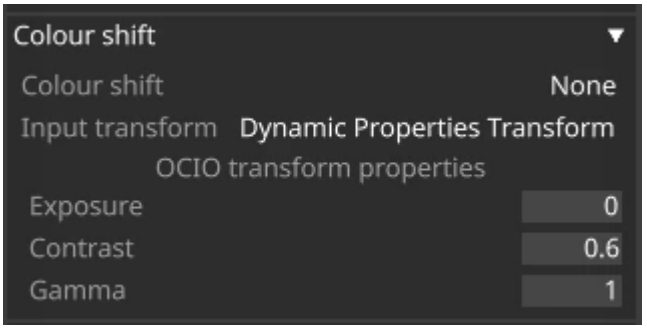
- Gamma

If the selected colour space does not contain an ExposureContrastTransform in the config, Designer will add one internally, placed after an input transform or before an output transform to apply the properties in working space. If an ExposureContrastTransform is included in the colour space defined in the config, the properties of this transform will be exposed. This allows users to control where in the chain of operations the properties are applied.

> **Note**
>
> If a colour space contains an ExposureContrastTransform, and a fixed value is defined for one of the properties in the config, the dynamic property will be greyed out and the fixed value will be used. To make the property editable, remove the fixed value in the config file.

To use dynamic properties

1. Navigate to an appropriate editor in Designer, e.g a Video Clip editor.
2. Select the desired colour space.
3. The dynamic properties will be added to the editor in Designer when available. Adjust these fields to change the values of these properties in that particular instance of the colour space.



> **Note**
>
> We currently do not provide any interfaces or support for Grading controls in Designer. We will be looking to include these in a later version.

Layers

Certain layers have fields which can be used to define the colour management settings in OCIO mode. Layers which don't have any explicit colour management settings will generally render in sRGB space, and will automatically be transformed into working space.

The following layers apply colour management in OCIO mode:

- Video layer: Uses the Input colour space defined in the VideoClip to transform the video into working space
- Notch layer: Notch blocks authored in Notch version 1.0 or greater can be set up to render in one of several available colour space. Older blocks are always rendered in sRGB. The Notch layer communicates with the block to ensure that the correct colour space transforms are applied, with no user input required.
- RenderStream layer: Uses the Input colour space defined in the RenderStream Asset to transform the received streams into working space. This space should be set to match the colour space set up for the asset in the render engine.
- 2.5D layer: Videos and images applied to 2.5D plates are transformed from the Input colour space defined in the VideoClip to working space. The stage render of the 2.5D plates is then done in working space, to ensure no colour information is lost.
- LUT layer: See **below**
- CDL layer: See **below**

LUTs

The LUTs in OCIO mode follows the conventional LUT workflow of d3 (LUT).

When OCIO is enabled, LUTs will include an **OCIO transform** field. This field indicates the color space where the LUT transform happens. The transformation process involving the LUT will follow these steps:

1. Apply a color space transform from **Working space** defined in the OCIO config to the **OCIO transform**.
2. Apply LUT transform.
3. Apply a color space transform from the **OCIO transform** back to the **Working space** defined in the project settings.

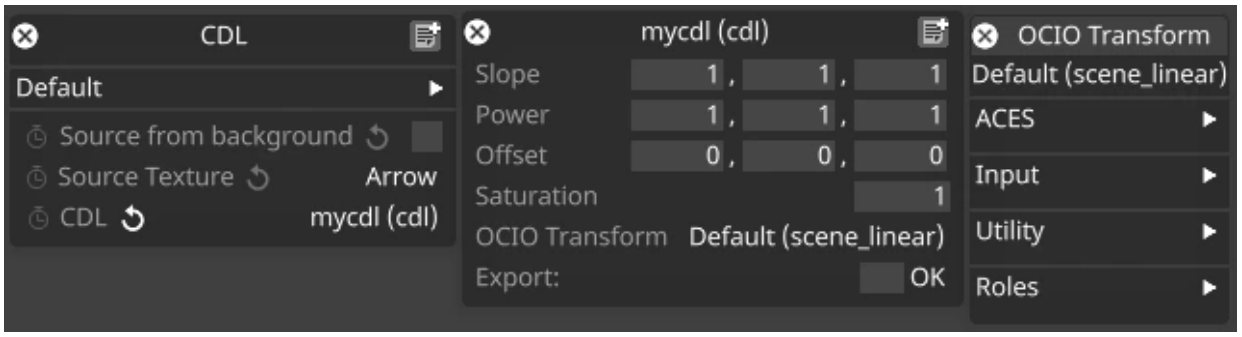


CDL

The handling of CDL in OCIO mode follows the conventional CDL workflow of d3 (CDL).

Note that there is a field named **OCIO transform**. If the **OCIO transform** is set to default, it will apply the CDL transform without any colour space transform; however, if the **OCIO transform** is set to a value other than the default, the colour transform process will follow these steps:

1. Apply a colour space transform from the **Working space** defined in the OCIO config to the **OCIO transform**.
2. Apply a CDL transform using the **Slope**, **Power**, **Offset**, and **Saturation** parameters.
3. Apply a colour space transform from the **OCIO transform** back to the **Working space**.



Custom Gamut Output Transform

If a non-standard gamut is required for an output device such as a monitor or LED wall, this can be configured through the `.ocio` config file. The required colour space for the custom gamut can be added in the `.ocio` config file, which will be populated in the OCIO Output transform widget once the config file is selected from Designer project settings. Disguise provides an open-source utility tool, **ocio-custom-gamut**, that helps convert custom gamuts into OCIO config files.

Vectorscope

The Vectorscope plots the chroma of the image. Chroma is the colour information that is left when you remove the luma. This would typically be used to confirm colour accuracy against known test patterns, or to colour correct images objectively.

Vectorscope Overlays

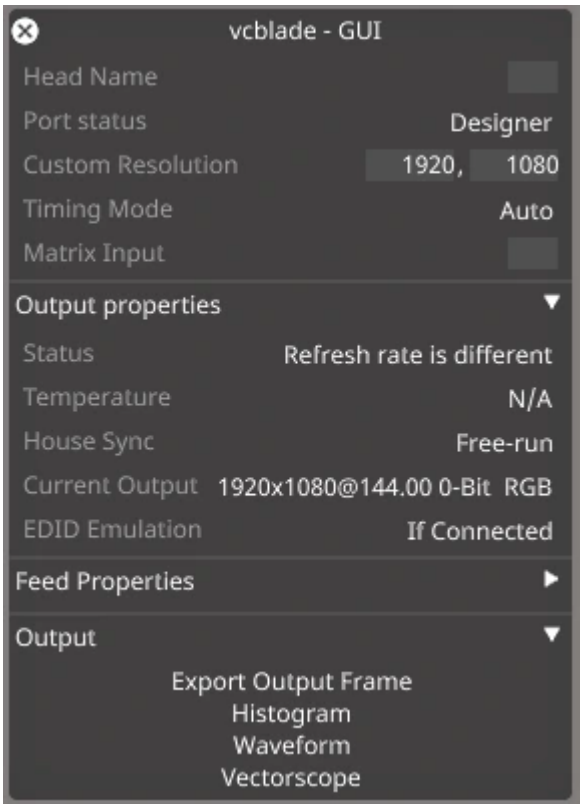
The Vectorscope has two overlays that can be combined or used separately:

- RGBCMY - red, green, blue, cyan, magenta, and yellow markers at 75% or 100% saturation
- IQ lines - aka the “skin tone” line, which can be used to correct skin tones

Workflows

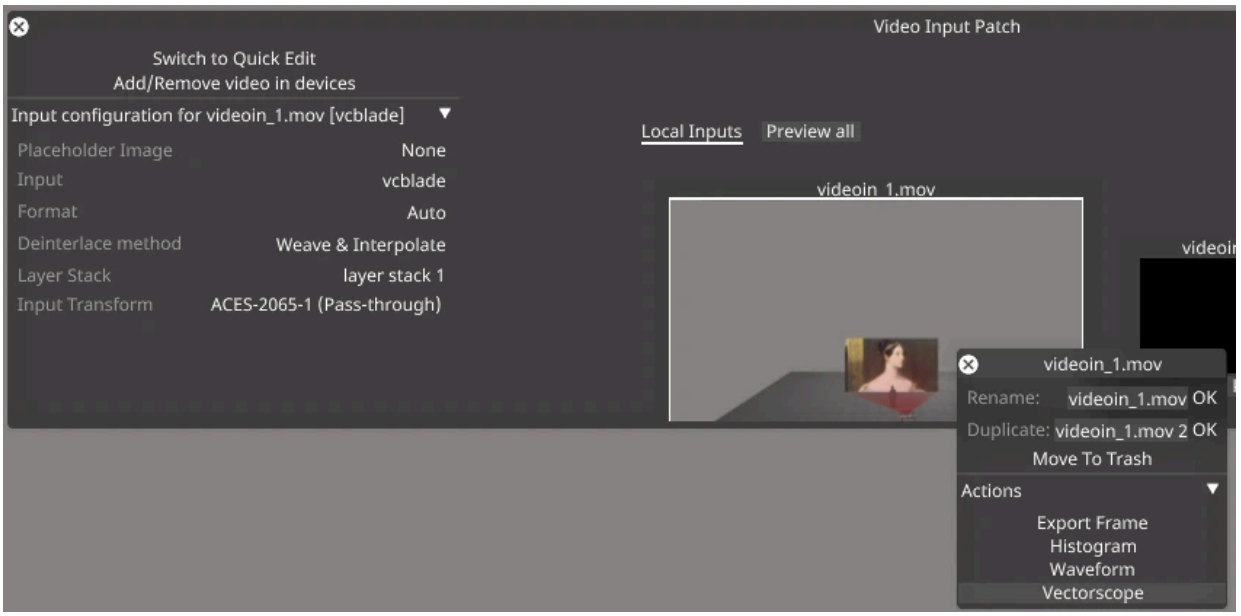
To open the Vectorscope on an Output

1. Open the Feed Output window by clicking on **Feed** in the d3 dashboard.
2. Right-click on the border of an output to open the **Output Properties** window.



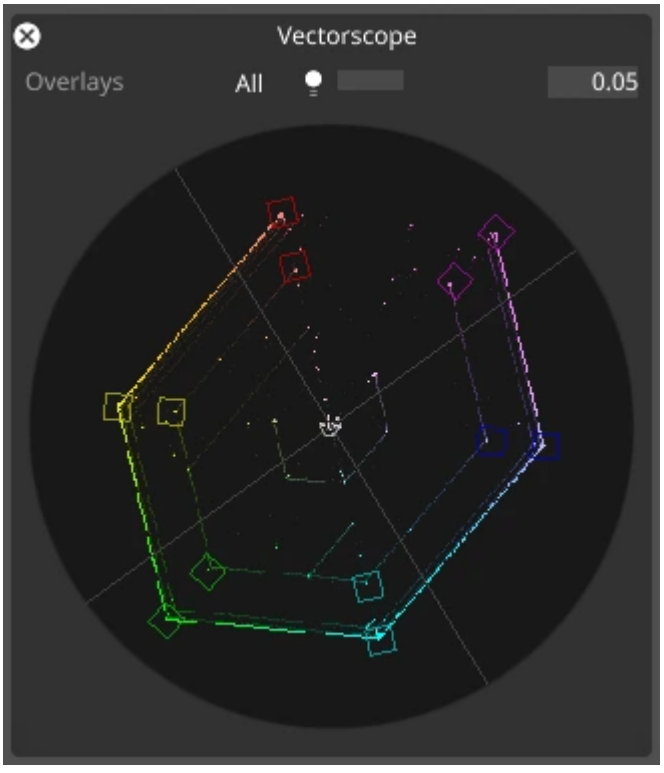
3. Click on **Vectorscope** in the Output tab.

The Vectorscope may also be opened on a video input by opening the Video Input Patch Editor and then right-clicking on a local input's thumbnail.



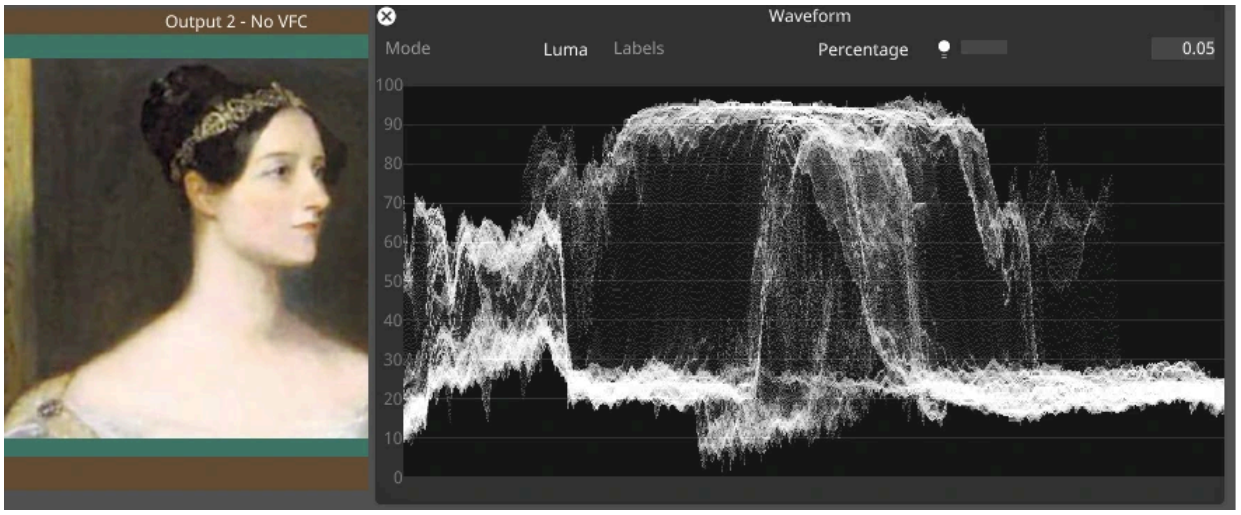
How to use Vectorscope

This graph is a circular UV plot indicating where each additional pixel hitting at the same point additively increases intensity.



Waveform

The waveform is a histogram for each column of pixels in the image.



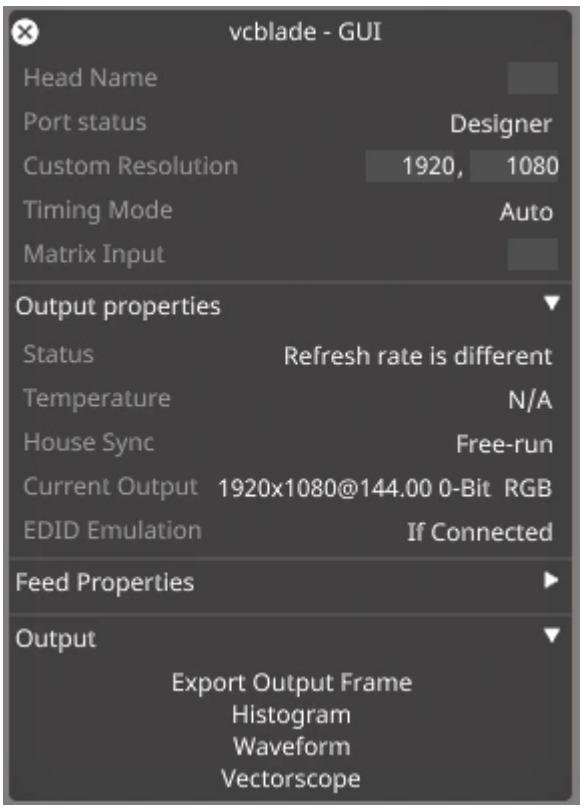
Opening the Waveform scope

A waveform scope can be used to verify the signal chain at these points:

- On a Video Input within the Video Input patch Editor.
- After capture into Disguise and any layer stack modifications.
- The feed output - after being transformed into the final 8- or 10-bit format going to the display.

1. Open the Feed Output window by clicking on **Feed** in the dashboard.

2. Right-click on the border of an output to open the **Output Properties** window.

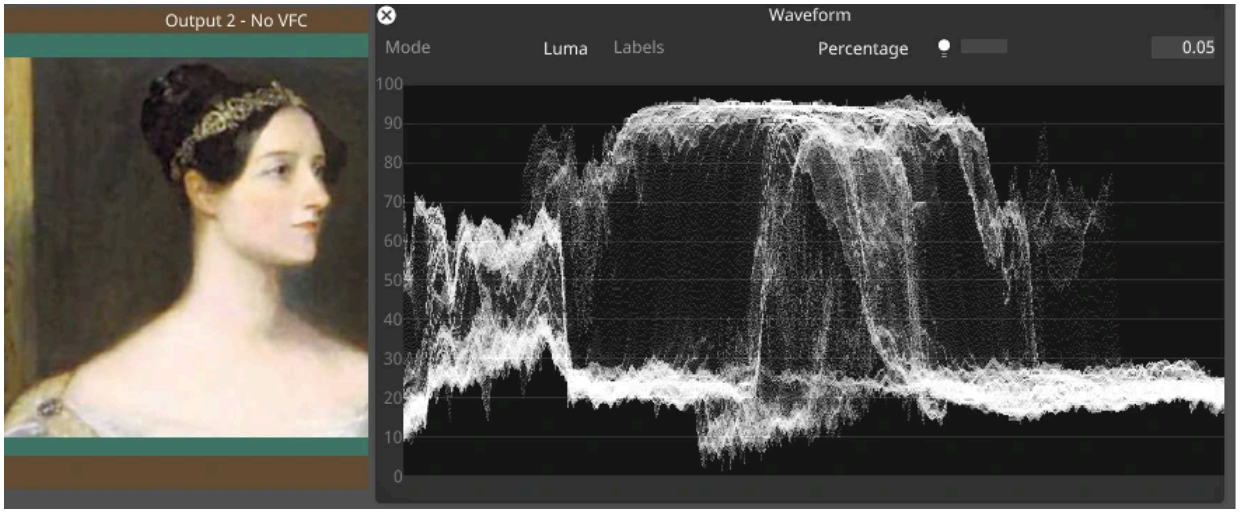


3. Click on **Waveform** in the Output tab.

For more information on Histograms, please visit this link.

Understanding the Waveform

Waveforms are typically used to ensure that the image is within safe limits i.e. above a minimum black level or below a maximum white level, and are also used to balance the red, green and blue channels.

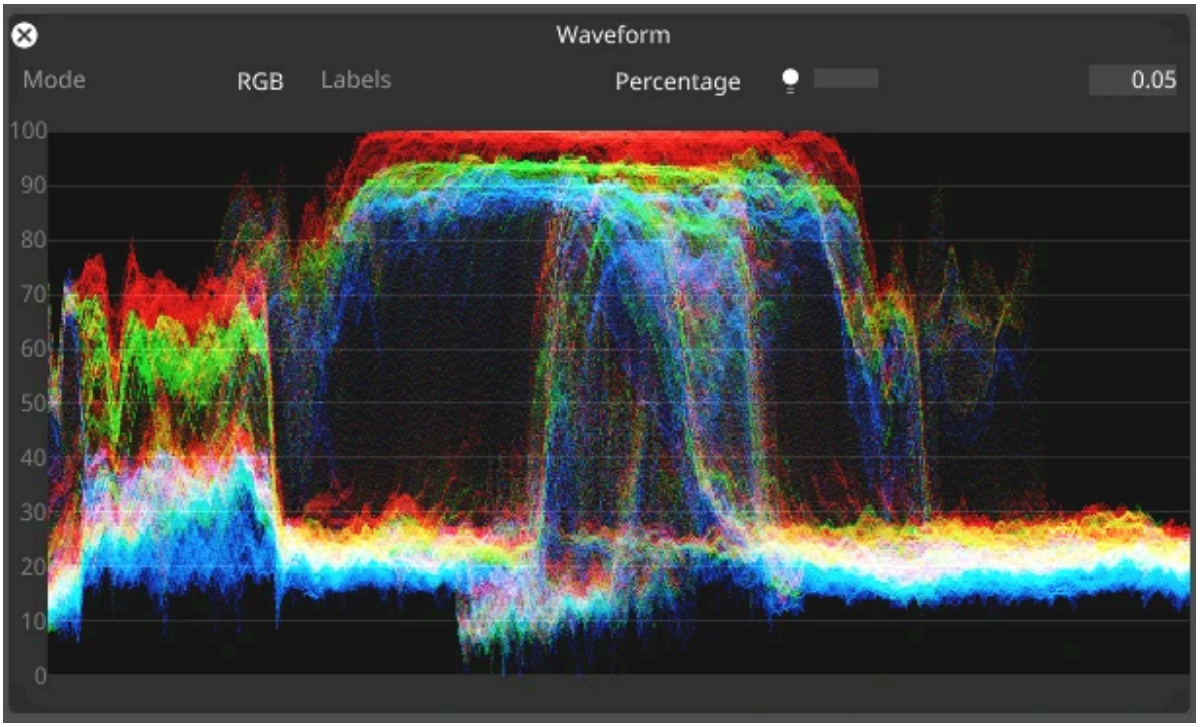


- The horizontal axis is the same as the image's horizontal axis i.e. left of the waveform is the left of the image, and right of the waveform is the right of the image. This means that panning the image will have the same pan effect on the waveform.
- The vertical axis is the value of the pixel. Down on the waveform vertical axis is the lowest value (e.g. black), and up is the highest value (e.g. white).
- The brightness at each point in the waveform is the amount of pixels at that value.

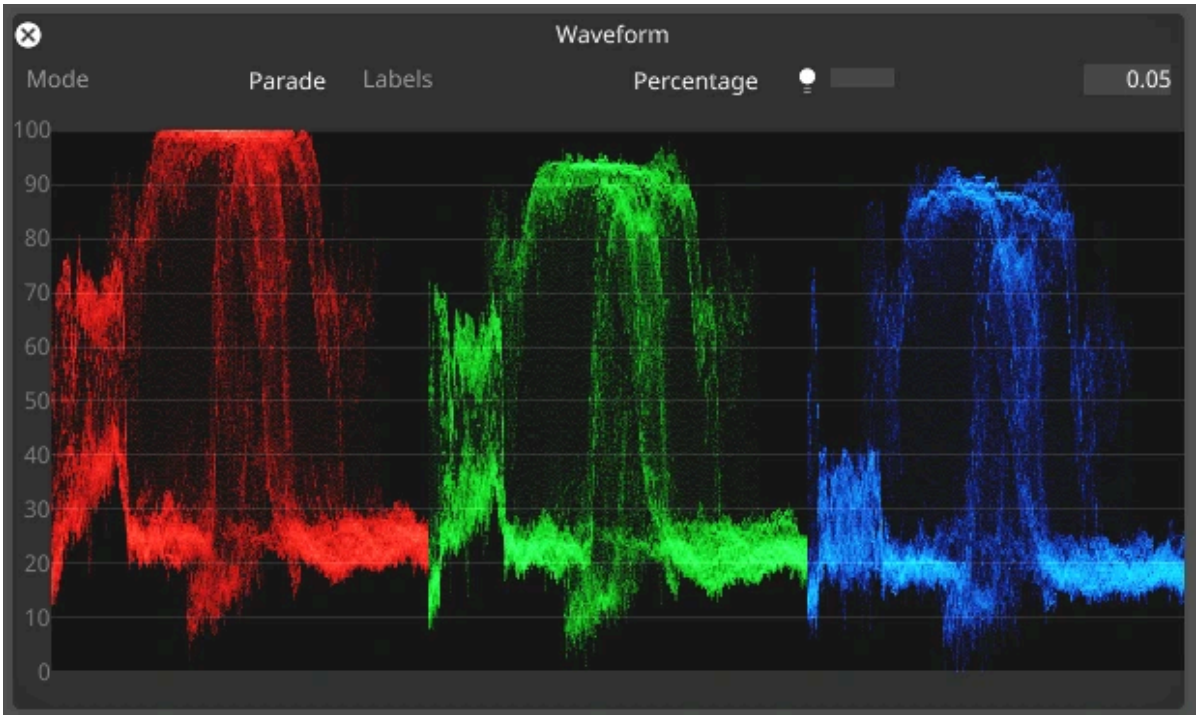
The waveform has three modes which can be accessed by clicking on the 'Mode" button on the waveform:

- Luma - (shown above) the same brightness value from the histogram

- RGB - red, green and blue values are overlaid on each other



- Parade - red, green and blue values side-by-side



The values of the waveform can be presented as a value, a percentage or as PQ nits.

BlackTrax Integration Setup

BlackTrax (BT) is a vision-based tracking system available from CAST, capable of tracking both objects and people. Tracking data from BT can be input into Disguise software and mapped to objects or props within the Disguise visualiser.

The BT system uses an array of cameras placed on the stage rig to observe IR markers (small LEDs) placed on the talent or prop. These active markers generate rigid body information that is sent to Disguise as they are observed by an array of cameras mounted on the truss/staging. As long as the marker is observable by two cameras, an accurate positional fix is possible.

The markers are attached to a small BT Beacon unit (usually attached to the talents belt). This unit provides power and control to the IR markers.

BlackTrax can integrate in two ways:

- Actor/talent tracking
- Prop/screen tracking (used for movable scenic pieces)

A BlackTrax server contains the software programs required for configuring a BT system, including BTWYG, BlackTrax, and Motive.

⚠️ Please be aware that the workflow outlined below may be outdated workflow outlined below may be outdated. This section is under review, and updated information will be added as newer workflows are evaluated and confirmed.

For additional information and training on using BlackTrax, please visit the CAST website

Disguise Project Setup

Your visualiser must be set up to resemble the real world environment as closely as possible to avoid any issues that may occur when calibrating. Follow these steps to set up your project in Designer.

1. Create a project and enable tracking

1. Create a project.
2. In the d3 project, the project's **internal** folder.
3. Open the **dlls** and open **dlls.txt**.
4. Add **tracking.dll**, then save the text file.

2. Open the project and add a tracking point

1. Open the project, then open the visualiser camera by right-clicking **Stage > Camera > Visualiser camera > Visible**
2. Open the visibility tab and make **tracking point** and **tracking labels** visible.

3. Set the projector properties

Set the projector's properties such as resolution, lens, and position. Also, set the resolution on the feeds; if not set correctly this can influence the calibration process. **The real-world projector must not have any warping, Keystone, lens shift or zoom.**

4. Add a visual reference

Add a mesh of known dimensions (e.g., a rectangular mesh) at the origin (0,0,0) of the stage within the visualizer. This mesh will act as a visual reference to assess any orientation discrepancies of objects and will later serve as a datum point for calibration procedures.

Integration

Environment Registration

After setting up and configuring the BlackTrax system, the next step is to register a BlackTrax device within your project. Follow the steps below to integrate and align the device for accurate positional tracking:

1. **Create the BlackTrax Device** In the dashboard, right-click within the device list and select Add Automation Device. Choose BlackTrax from the available options.
2. **Assign the Driver** Once the device is created, its editor window will open automatically. Navigate to the Driver tab and assign the **BlackTraxDriver**. **Note**: Upon successful creation, provisional BlackTrax tracking data will begin streaming into the system. This is visually represented in the visualizer as green points, corresponding to beacon string positions.
3. **Prepare the Registration Area** Begin the environment registration process to align coordinate systems between BlackTrax and Disguise:

- Mark a 90-degree angle centred on the stage using the same dimensions as the reference mesh created earlier.
- Position tracking stringers at the centre stage (CS) point, and at both endpoints of the right angle (defining the X and Z directions).

Note: Ensure the physical markings precisely match the dimensions and orientation of the virtual datum mesh.

4. **Open the Registration Tool** Right-click on the existing BlackTrax device and open its editor. Go to the **Registration** tab.

5. **Place Reference Points** The cursor will change to a placement tool, indicating readiness to define registration points. Drop three reference points onto the datum mesh:

- Center Stage (CS)
- Positive X direction
- Positive Z direction

6. **Link Virtual and Real-World Points** Using the registration UI, link each of the dropped reference points to their corresponding live BlackTrax beacon positions. After successfully registering all three points, proceed to finalization.
7. **Finalize the Registration** Select the Finalise field in the registration UI. This step applies the computed transformation, aligning the virtual space with the real-world BlackTrax coordinate system.

Once complete, the GUI will display aligned reference and tracking points, confirming a successful calibration.

Note: The system receives positional data from BlackTrax at a frequency of 100 Hz, enabling real-time tracking accuracy.

Note: receives positional information from the BT system at a rate of 100Hz.

OSC Setup

At this point all the basic setup of the project will be done. The next section demonstrates how to integrate the OSC external hardware required. The reason for this is because it is the easiest way to control the calibration process in Disguise (note in older versions of the software the only way to calibrate the system is with an OSC interface). Follow these steps to set up OSC:

1. Create an OSC device in Disguise by right-clicking on the “device” in the dashboard. Once open there will be a plus and minus field, use this to add and remove devices from the project.
2. Select the **+**, this will then give you the option to select from a list of commonly used devices. In this list there will be a device called OSC1. Select this device to add it to the project.

3. Once added ensure all the fields in the device are filled incorrectly (use the below table for help):

OSC Hardware	Disguise OSC
Host	d3net port address
Port (Outgoing)	Port receive
Port (incoming)	Port send
Local IP address	OSC hardware IP

4. Sync the OSC layout to the hardware with the **TouchOSC editor**. Now if you change something on the OSC controller you will see the OSC device indicator in the dashboard emit green to show it is receiving a signal.

TouchOSC layout explained

The TouchOSC layout for BlackTrax-based projector calibration can be downloaded from the **OSC section of the Resources page**.

- **Start:** Starts the calibration process.
- **Cancel:** Cancels last placed point so it can be redone.
- **Done:** Finishes calibration process.
- **Skip:** Used in case a projector will not be calibrating a point at this time; for instance because it does not have coverage onto the current position of the stringer. Gets used when frustum extremities of singular projectors are being calibrated.
- **Trackpad:** Used for quick rough placement of the crosshair.
- **Directional key**Used for fine control per click, or movement of the crosshair on a single axes. Crosshair will move faster the longer the button is held.
- **Rotate left & right:** Used for aligning the movement direction of the crosshair to the orientation of the user that is calibrating.
- **Previous & Next:** Used to jump between modes of operation.

Projector Calibration

1. Open the BT device, at the bottom of the editor select the field called “BtProjectorCalibrator” this will then open the BT calibration editor.
2. Assign the OSC device that will be used to calibrate. (Note: set this device even if not being used).
3. Assign the tracked point; this is the string that will be used for the calibration process.
4. Assign the projectors used in the BT system.
5. Now open touch OSC with the given layout. (or the GUI interface, which can be found under the tab “Remote Calibrator”)

6. Press start on the OSC to start the process (A test pattern will flash on the output to show the full output size this is normally the colour of the projectors wireframe)
7. Place the stringer in the projectors output. (for example, bottom right of the coloured output)
8. Press next on the OSC app, this will now launch a line up grid
9. Move the cross-air in the OSC editor to move the cross-air in the projector output. Line this up with the string to calibrate the space.
10. When in the correct position click next on the OSC app.
11. The software will now show the second projector line up grid and overlap. If the point is in the next projectors field of view, then use the string as a reference point. When lined up push next.
12. Repeat step 7 to 11 and create at least 6 reference points per-projector.
13. Several points will now be seen in the GUI; these points represent the calibration points.
14. When you have finished placing points push Done on the OSC app.

Note: Same steps are used for the GUI interface as it works with the same process.

Note: Calibrate point at different heights and depths to gain the best calibration possible. The more information the system has to process the better to calibration will be.

Now you will see the projector values greyed out, now the space is calibrated, and video will be able to track objects.

Some points may affect the calibration in a bad way in the same way a badly calibrated point in QuickCal can ruin a line up. This can be checked with the following steps:

1. Open the editor for one of the projected used for the BlackTrax process.
2. Open the projector calibration.
3. View the calibration scores, if the sore is poor try muting point to improve the calibration results.

Rigid bodies

The next step is to assign objects to strings so the object can be tracked. To start this process, follow the steps below:

1. Open the BlackTrax device by right-clicking on the device in the device list, this then will open the device editor.
2. Open the tab “Rigid Body” this will then present you with a plus and minus field, use this to add and remove objects.
3. Once you have created a rigid body an editor will open. This will contain the fields seen on the next page:
4. Select the desired object.
5. The cursor will be a point to represent that it is ready to drop points, drop four reference points on the object. This will be used a static reference points.

6. Under the points tab, add as many fields as you would like to track.
7. Set your static points and set the tracked points which will be the BlackTrax beacons that are being used.
8. Select “calibrate: snap to fixed point” field.
9. Now the real-world object should match the orientation and position of the object in the GUI. When the real-world object moves the visualised object should follow
10. Edit the different thresholds to make the movement smoother.

Terminology

Object: Select the object intended to become a RigidBody.

Engaged: Enable or disable tracking for the RigidBody.

Status: Not Calibrated means the object will not be tracked. Can be manually set to calibrated to enable tracking of the body onto the object. When done so the object selected will jump to line up its fixed points to the selected tracked points.

Secondarily, the Calibrated option will be the result of pressing the Calibrate button explained under Points.

Skip: Used in case a projector will not be calibrating a point at this time; for instance because it does not have coverage onto the current position of the stringer. Gets used when frustum extremities of singular projectors are being calibrated.

Iterations: The RigidBody solver is iterative, meaning that for `n` iterations (max number iterations being defined by this number) will attempt to resolve a position rotation matrix which best represents where the RigidBody should be in the co-ordinate system.

Solver mode RigidBody or Actor.

Set to **RigidBody** will allow tracking of X, Y, Z position and rotation.

Set to **Actor** will allow for X, Y, Z position tracking, but no rotation. Both solver modes will technically track from 1+ visible stringers and up, though this is not a great idea for rigid bodies in most cases. In case of RigidBody solver multiple stringers are required to be seen to calculate rotation. Actor solver will average incoming and reference positions and calculate the difference on each update. We update at 100Hz, as per the refresh rate of the Motive settings.

Movement Threshold: Keeps Dynamic Blend from recomputing when set to a non-zero value. This is used when static oscillation on almost static objects becomes an issue.

Rotation Threshold: Keeps Dynamic Blend from recomputing when set to a non-zero value.

This is used when static oscillation on almost static objects becomes an issue.

Points: Points are where you select a number of fixed points, placed by clicking on vertices of your rigid body models, and tie them to stringers. Simply select the correct points and set

offsets where required.

Tweak: Tweak is used to more accurately align projection onto your rigid body. Use its offsets on XYZ position and rotation until projection lines up. It should be noted that sometimes you may be better off rescaling your model instead, depending on your results.

Constraints: Set these on all axes where you would like to restrict movement. 1 turns on, 0 turns off.

Tracking lost: On tracking lost settings allow you three forms of behaviour in case tracking data is lost.:

Do nothing: Does nothing.

Reset allows you to define a position that rigid bodies will jump to in case tracking data is lost.

Follow sequencing means will follow any ScreenPositionModule programmed on the timeline as a form of redundancy.

BlackTrax Motive Setup

This page describes the BlackTrax hardware setup, and the Motive setup and calibration.

⚠️ Please be aware that the workflow outlined below may be outdated. This section is under review, and updated information will be added as newer workflows are evaluated and confirmed.

Hardware Setup

1. Plug the BlackTrax server into the switch (using the BTnet Port which is normally port 1)
2. Plug the Timekeeper and eSync Controller into the network switch. The Timekeeper will also need linking to the eSync with the provided din cable. (This will ensure that all the system works in time)
3. Plug in the BlackTrax Router into the network switch
4. Plug in the Charging Station to the network switch (this is not virtual and is only used to configure the beacons)
5. Install the BlackTrax cameras, these will then need to be linked back to the network switch.
6. The network switch is a Power Other Ethernet (POE). This means that most of the external hardware will receive its power from the switch.
7. Once the above is done the BlackTrax hardware is setup. The next section covers how you set up different aspects of the system.

Motive Setup

Motive is the software used to calibrate space and track objects. To set this up, follow these steps:

1. Select the Aiming layout in the drop down tab.
2. Select the group and set the camera's exposure to full.
3. Set the gain to level 8
4. Set the image type to High Quality MPEG 4. Now you should be able to see a black and white image from the BlackTrax cameras.
5. Change the Filter Switching to Visible Spectrum.
6. To aim the cameras, push the button on the back of the camera this will make the camera view fullscreen and change the image to a high quality grayscale.

Now in this mode you should be able to point the camera and get a good quality focus.

Repeat step 5 and 6 for each camera in the BlackTrax system.

At this point the system should be reset to its original state:

- Exposure: 4000
- Gain: Medium (4)
- Image type: Object mode
- Filter Switching: InfraredFilter

Motive Calibration

The process of calibration is called *wanding*. See steps below to start the process.

1. Open the Calibration window in the dropdown tabs.
2. Once open turn the active marker labeling from true to false (this now sets the system to track a continues IR light source from the wand).
3. Set the size of your wand.
4. Select the field labelled “start wanding”; this will then prompt you to save the calibration. Once saved all the cameras will have a red board to show that the process has started.
5. Plug in and turn on the BlackTrax wand. Move it in a figure 8 motion throughout the space, this should show as sample in the Motive GUI (the software will only sample if it is seen by 3 or more cameras) .
6. When the system can see a good amount of coverage in all cameras you can tell the Motive system to calibrate the information it has received from the process. Do this by selecting the Calibration field.

Once done it will score your calibration to let you know if the wanding was poor. If good you can continue to the next step.

7. The system will now require you to set a ground plane, to do this place the BlackTrax ground plane in the center of your space (what would be 0,0,0) then select the calibrate option.
8. Turn the active marker labeling back to True once finished.

BlackTrax Overview

BlackTrax connects to different third-party applications, such as robotic lights, media servers, and any other third party that accepts the RTTrPM open protocol.

BlackTrax (BT) is a vision-based tracking system available from **CAST**, capable of tracking both objects and people. Tracking data from BT can be input into and mapped to objects or props within the Disguise visualiser.

The BT system uses an array of cameras placed on the stage rig to observe IR markers (small LEDs) placed on the talent or prop. These active markers generate rigid body information that is sent to Disguise as they are observed by an array of cameras mounted on the truss/staging. As long as the marker is observable by two cameras, an accurate positional fix is possible.

The markers are attached to a small BT Beacon unit (usually attached to the talent's belt). This unit provides power and control to the IR markers.

BlackTrax can integrate with Disguise in two ways:

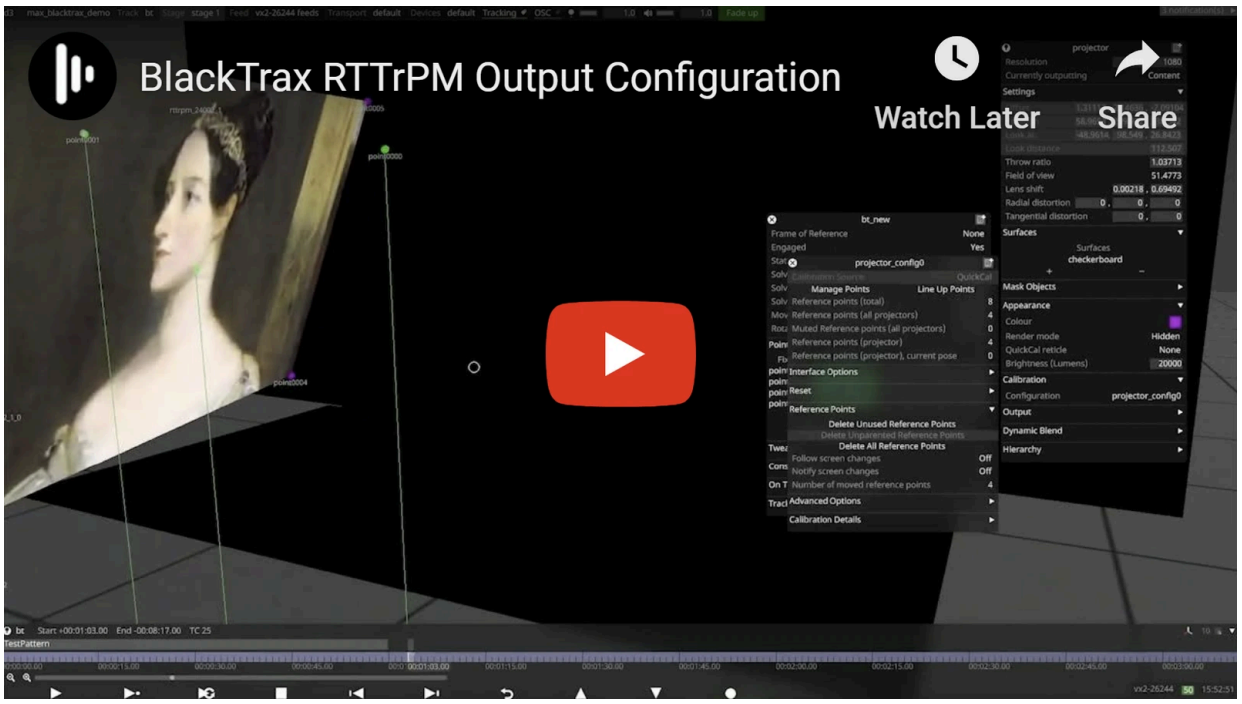
- Actor/talent tracking
- Prop/screen tracking (used for movable scenic pieces)

A BlackTrax server contains the software programs required for configuring a BT system, including BTwyg, BlackTrax, and Motive.

For additional information and training on using BlackTrax, please visit the **CAST** website

RTTrPM

BlackTrax RTTrPM Output Configuration



Applications like the BlackTrax real-time tracking system use RTTrPL and RTTrPM to interface with other lighting and third-party applications (such as media servers, robotic cameras, and spatial audio systems) to provide tracking for automated lights and projection mapping. With BlackTrax, RTTrPM is sent at a fixed rate of 100Hz.

BlackTrax RTTrpm

- BlackTrax sends out RTTrPM packets at a rate of 100Hz.
- BlackTrax by default sends out a heartbeat, or an empty RTTrP header with an RTTrPM signature if no Beacon or LED data is available in the current frame.
- BlackTrax can add and remove different modules at any given time.
- In the BlackTrax implementation of the Trackable module with Timestamp, the Timestamp value is equal to the frame ID of the cameras in the BlackTrax system, as determined by the TimeKeeper.
- Euler Orientation modules always send with an order of `0x0123 (X1, Y1, Z1)`.
- The Tracked Point modules correspond to the LEDs on a BlackTrax Beacon (trackable), the Index is either `0x01`, `0x02` or `0x03`.
- The context field in the RTTrP header is always set to the value of the current BlackTrax chapter (0x00000001, etc.), regardless of whether the current Trackable is present in the chapter, or if no Trackables are present in the RTTrPM packet (i.e. just the heartbeat is being sent). When in standby, the Context field is set to 0xFFFFFFFF.

- The Zone Collision Detection module should only send Zone Sub-Modules that the Trackable is actively colliding (inside) with. If a Zone Sub-Module is not sent, it is assumed the collision is not happening and the Trackable is outside of the Zone.

Further Reading

BlackTrax Output Options and Configuration Wiki page

The BlackTrax Implementation of RTTrPM and RTTrPL in GitHub

Accessing External Protocols

There are many protocols supported by Designer, and expressions are one method to access that data in a way which can enhance interactivity and creativity.

It is quite common to use the data sources described here to control layers.

OSC

OSC is a common, versatile method for transmitting data within production environments. Designer interacts with OSC via OSC devices. OSC devices build a series of addresses which can be referenced by expressions.

> **Note**
>
> If the user wishes to directly control many fields on a Layer from an OSC controller, OSC Sockpuppet may be a more appropriate choice than manually entering expressions.

OSC works in terms of addresses and data values. One or more data values are stored at each address, in an array.

For example an external tool may send an OSC value to address `/container/parameter` and the value may be `5.0` - meaning, the value at `/container/parameter` is the floating point number `5.0`.

In order to access the value at that OSC address, the user must translate that address into expression-compatible syntax, as well as identifying the lookup as a request to find something from the OSC devices.

There are several expressions which would find the data in the example above:

- `osc:.container.parameterName` - The leading `.` character represents the leading `/` in the address. While this is not necessary, it can be convenient to remember that `/` characters are replaced by `.`s in OSC expressions.
- `osc:container.parameterName` - The leading `.` character is omitted in this example.
- `oscdevice_1:container.parameterName` - In this case, the specific device (“oscdevice 1”) is specified - if the user has multiple OSC devices set up, this helps disambiguate which OSC device specifically the user wants to gather the value from. Note that only OSC devices whos name begins with “osc” can be supported using this scheme.

OSC value arrays

Expressions also support more than one OSC argument per address. This allows the user to use things like XY touchpad to control colour X and colour Y values.

This uses array indexing syntax, e.g. `osc:my.address[0]` - this returns the first value sent to the address in a single message. Note this does not refer to values sent one after the other, the values need to be grouped together in a single OSC message to be addressable in this way.

In order to refer to both elements in an example scenario with a touchpad, the user would need to create two expressions:

- `osc:my.touchpad.xy[0]` - refers to the X component
- `osc:my.touchpad.xy[1]` - refers to the Y component

Missing OSC addresses

Before an OSC value has ever been sent to Designer on a specific OSC address, an expression which looks up that address will evaluate to `0.0`. That is, the expression `osc:this.was.never.sent` will evaluate to `0.0`. This is convenient in a number of circumstances, but sometimes finer-grained control is needed. For example in the case of string or text parameters, or where 0 is not the desired default value.

To achieve this, the same `osc:` syntax above can be changed to `valid_osc:` (or `valid_oscdevice_1:`) to check whether the OSC address has data associated with it.

For example: `valid_osc:my.address` will return `0.0` if the local instance of Designer has never received a value for that address, and `1.0` if it has.

> **Tip**
>
> `valid_osc:` can be used in `if` function calls to switch between behaviours based on whether the incoming OSC address is available.
>
> For example `if(valid_osc:my.address, osc:my.address, 1.0)` returns a default value of `1.0` if the OSC address `/my/address` has never been received, and the value at that address if it has.
>
> This allows the value at `/my/address` to reach `0.0` without ambiguity between receiving `0.0` and evaluating to `0.0` due to never being received.
>
> Large blocks of conditional logic using `valid_osc` can be abstracted and made easier to read using an expression variables device to build a function variable.

DMX

DMX512-derived network protocols are well supported by Designer. Designer interacts with DMX protocols using DMX Devices and associating them with the internal universe map held within Designer. Expressions use internal Designer universe numbers, which start from 1.

> **Note**
>
> If the user wishes to directly control many fields on a Layer from a DMX controller or lighting desk, DMX Sockpuppet may be a more appropriate choice than manually entering expressions.

It is useful to access DMX data from one of these internal universes using a variety of expressions. All addresses in expressions are 1-based (i.e. universe 1 is the first universe, and channels range from 1 to 512.) This is in opposition to other indexing within expressions, which are 0 based, so needs to be kept in mind.

The given `universe` and `channel` placeholders in the syntax demonstrations below are always integer literals (no variables.)

- `dmx:universe.channel` - Read 8 bit dmx value.
  - For example: `dmx:1.28` reads a single byte (0-255) from universe 1, channel 28.
- `dmx16:universe.channel` - Read 16bit dmx value (2 channels are used.)
  - For example: `dmx16:1.28` reads two bytes (0-65,535) from universe 1, channel 28 and universe 1, channel 29.
  - 16 bit data is read as coarse data in the first channel, and fine in the second. This is often referred to as “big endian”.

As with all name lookups, it is possible to continue to extend the expression with functions and operators to compute the desired result. e.g. `dmx:1.28 / 255` returns the same value scaled down to lie between 0 and 1.

When the expression has been accepted the layer property will turn green.

Missing DMX universes

Sometimes, expressions need to consider whether DMX has been received by Designer recently. For example, a desk may be offline, and the show should fall back to timeline-based sequencing.

To achieve this, the same `dmx:` syntax above can be changed to `valid_dmx:` to check whether the DMX channel has recent (within the last 10 seconds) data associated with it.

`valid_dmx:1.1` will return `0.0` if the local instance of Designer has not received any data on universe 1, regardless of whether any values actually changed, within the last 10 seconds. Note this is per universe, even though the syntax specifies the channel number.

> **Tip**
>
> `valid_dmx:` can be used in `if` function calls to switch between behaviours based on whether the incoming DMX is being received.
>
> For example, on a layer field `if(valid_dmx:1.1, dmx:1.1, self)` uses the field's sequencing if there was no DMX received on universe 1 recently, and the value of universe 1, channel 1 if there was.

MIDI

MIDI is often used as a control interface for some shows. It is possible to use MIDI devices as a source of data for expressions. All MIDI expressions are based on CC (Control Change) MIDI messages,

`mididevice:name.c[0]` - Get float value from mididevice control 0 (the first control in the device.)

For example, you have a MIDI device named bcf2000, which has a total of 32 controls. You want to read the third control value and multiply it by the animated value coming from the timeline.

The correct expression to use would be:

```
self * mididevice:bcf2000.c[2]
```

Note that the control values are the damped values provided by the midi device.

Audio Expressions

Using the Audio analyser device, it is possible to include audio-reactive elements within expressions. Once the audio analyser is set up to analyse an audio line, the audio line is available to provide frequency analysis to expressions.

`audioline:name.c[lower..upper]` - Get the max damped level from a selection of frequency ranges, inclusive of the `lower` value, and exclusive of the `upper`.

For example, a project contains an audio analyser set up with the line_left audio line selected. The lowest 10 (out of 127) frequency buckets are queried for the maximum damped value using the following expression. This would check for bass frequencies.

`audioline:line_left.c[0..10]`

What does the expression mean?

The diagram below is broken up into sections with a letter underneath. A description of each section is located below the diagram.



A: `255` = Multiplies the result by 255 (audioline frequency responses are in the range of `0.0` to `1.0`)

B: `audioline` = identifies the following text as an audio expression

C: `line_left` = which audio line to use

D: `.c[0..10]` = the frequency range to analyse

How do I choose which frequencies to analyse?

The audio spectrum has 127 steps across the frequency range.



The audio analyser builds 127 frequency buckets across the full frequency range of the line in.

Any frequency from 0 to 127 or a range of frequencies can be analysed using part D of the expression described above. For example,

- To analyse just the bass frequencies select a range similar to `[0..10]`.
- To analyse just the high frequencies select a range similar to `[100..127]`.

It is recommended to experiment with the range based on a range of recordings of expected live inputs to ensure the result is robust.

Accessing Resources

Disguise uses a concept called Resources to represent everything from a Layer to a Feed Rectangle in Designer. It is often useful to reference fields on various Resources within the system inside expressions.

Once a specific Resource has been identified, it can be referenced in order to access fields (and sub-fields) of that Resource, allowing the user to access almost all aspects of the designer system.

It should be noted that not all fields are documented, nor can they be definitely relied upon to continue to use the same name over versions of the software. This is because expressions expose a raw access to the internal data model used in designer, and it is possible that new features and improvements change the name of fields. It is rare that a feature is totally lost, and this document provides some guidelines on how a user can find the fields they require.

Once a value has been accessed from one or more Resources, then the values can be combined or modified futher using the functions and operators of the expression system. The text which makes up the reference to the Resource can be treated as any other variable held by the expression system.

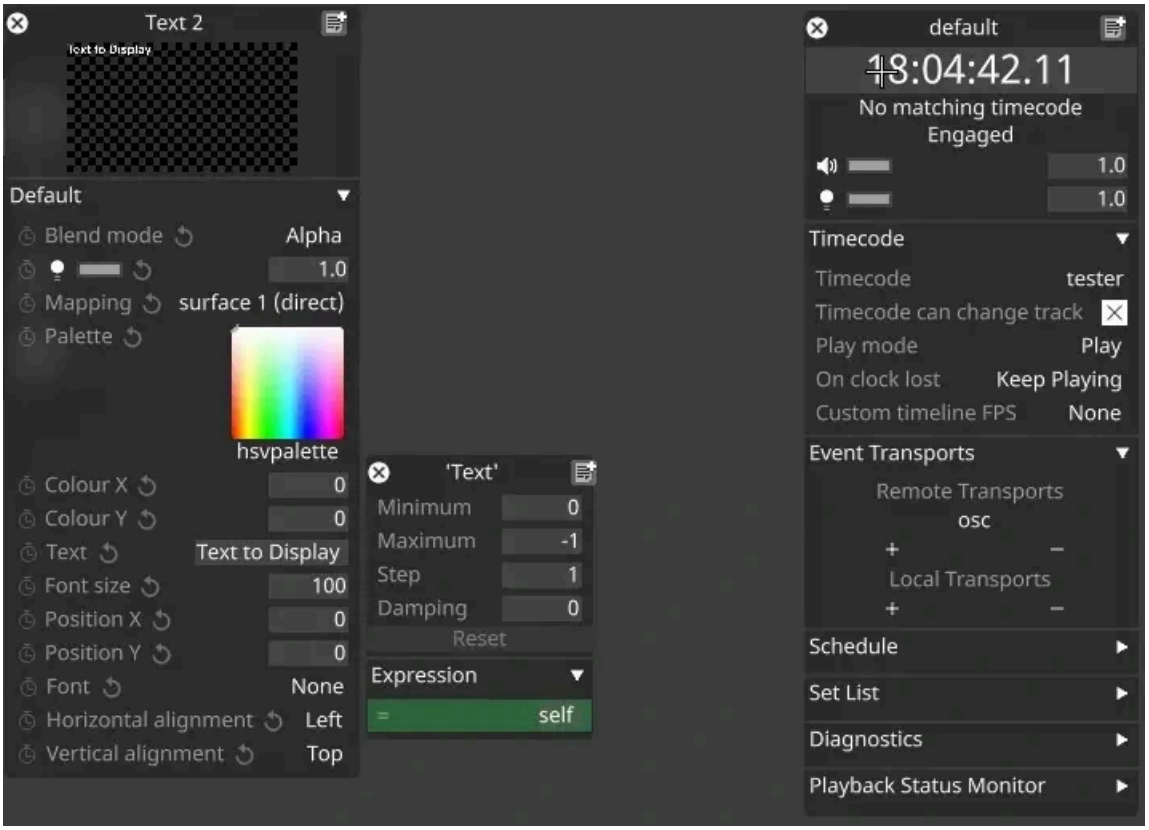
In summary, the general flow of accessing other part of Designer using expressions goes as follows:

1. Identify a piece of information in the designer user interface.
2. Create a connection to an expression field by using Alt + Left mouse drag from the element in the user interface.
3. Understand the reference expression that Designer builds.
4. Continue to add other expressions referencing other data needed to build the desired result.
5. Edit the expression to build the desired value from the various expressions noted earlier in the process.

Creating a connection using mouse drag

Often simply linking a value from another part of the user interface is enough for the expression writer to accomplish their goal.

There is a shortcut to build the expression using the user interface, accessed by holding the **alt** key and left-dragging the mouse from the field of interest to the field which can accept expressions.



> ⚠ **Warning**
>
> It is rare, but not all fields are valid for access in this way. Some fields in the user interface are not backed by real Resource fields, and therefore are not accessible via expressions.

Identifying Resources

In order for the expression to use whichever Resource the user wishes to, we first need to identify the Resource in question. There are two methods for doing this:

1. By type and name
2. By UID

Accessing Resources by name

The simplest and most readable method for building a reference to a known Resource in the system is to use the `type:name` syntax to refer to a Resource.

This is the technique used by Designer when the user asks it to write an expression for them by holding Alt and dragging the mouse from a field of interest to the expression. This is the recommended method used to learn the names of Resources and the general naming convention for fields of interest to the user.

For example, to reference a Projector, the expression `projector:"projector 1"` is used to refer to the Projector itself. To reference a video clip which originates from a file in a subfolder, `videoclip:"sample/george.jpg"` can be used.

> ⚠ Warning
>
> In older versions of Designer, the quoted name syntax is not available. It is instead possible to reference names using a “sanitised” identifier.
>
> The name of “projector 1” referenced in the expression above would be sanitised to `projector_1`. Names in expressions are unable to contain spaces, dashes and other characters, which are valid for names in Designer. Any character which is not a letter in the alphabet, a number or an underscore must be replaced by an underscore (`_`). In older versions, this is not available for `/` characters.

Accessing Resources by UID

UID stands for Unique IDentifier. The identifier is unique across the project and does not change when renaming the Resource. It is also used when the Resource is “unnamed” - this is when the Resource is embedded within another, larger Resource.

One use case for this technique is to have a persistent method for creating a reference to a Layer, even if that Layer were to be renamed. Note this will not follow any duplication or copying of Resources referenced this way.

In order to build a reference in this way, the user must follow the steps outlined here:

1. Open the editor for the Resource in question (e.g. click on a Layer.)
2. Right-click on the titlebar of the editor window which pops up.
3. Click “Copy UID” in the menu which appears.
4. Create an expression using the following function call: `getByUID(<paste the copied number here>)`

The end result is an expression which looks like `getByUID(0x123875234)` - this is an immutable reference to the Resource the editor was opened, and will only fail if the Resource in question is deleted.

Using this technique, it is useful to store these difficult to read expression in a function-type variable, instead of using them directly. The user can create an expression variables device or layer to hold the difficult to read `getByUID(...)` text. This allows easier named references to the Resource in the users other expressions. This is especially useful if the user wishes to refer to the same Resource in multiple locations.

Accessing Resource fields

Once the user has found the Resource they wish to reference for data, then accessing fields is accomplished by using the `.` operator. This operator acesses a named field on a Resource or most other objects in the system.

For example, all Resources have a `description` field, which is sometimes useful to validate that the user has accessed the Resource they intended to. In that case, the user would type the expression `projector:projector_1.description` - this produces a text result which contains the real name of the Resource (without the `_` character decoration.) i.e. “projector 1”.

Common Resource fields include:

- `offset` - the position of an object in the stage, relative to its parent. Further specify the x, y or z coordinates by using the `.` operator again e.g. `projector:projector_1.offset.x`
- `rotation` - the rotation of an object in the stage, relative to its parent. Available as individual euler angles e.g. `projector.projector_1.rotation.y`

Many other fields exist on Resources in the system, and while no guarantee can be given to their long-term stability, the data provided is exactly what designer uses internally, so there can be no doubt as to its accuracy.

Accessing fields set to None

In some cases, it is possible to access fields which are set to None in the user interface. This means that there is no object to find in that field. Attempting to access properties when there is no object will fail and the expression will not evaluate. It is recommended to ensure this does not occur.

It is possible to test if an object is valid by using an `if`, for example `if(transportmanager:default.timecode, "has timecode", "no timecode")` but there is no method to conditionally access fields - i.e. the expression `if(transportmanager:default.timecode, transportmanager.default.timecode.description, "no timecode")` would fail.

Expression Backward Compatibility

In release r27.10, a number of backwardly-incompatible changes were made to the expressions system. This page provides a reference for any projects which used expressions (specifically variable assignment) before that release.

r27.10 changes

- Expression variables are cleared at the start of every frame. This ensures that variables are never stale values from other parts of the timeline or the results of previous frames evaluation.
- It is no longer possible to redefine a variable multiple times within the same frame - this is now an error and the expression error will inform you which object defined it earlier in the frame.
- Expressions are no longer case-insensitive - variables, fields and functions are looked up in a case-sensitive manner, and the identifiers test and Test are different.
- Expressions which format strings now require a `format::` prefix (which is automatically added during upgrades of previous projects, and added when dragging arrows to populate expressions.)
- It is now possible to call functions on Resources within expressions. This is an advanced feature and not intended for normal use. For example you can use the expression `track:track_1.sectionToBeat(1)` to return the time in beats for the second section on track 1. These functions are not documented due to the internal and potential for change in future.

Handling undefined variables

The most-impactful change described above is the change to the lifetime of variables. Previously, it was possible to define a variable at the start of an early checkout track and leave it active for the rest of the show run. This was dangerous for a number of reasons, including stale data, extra latency, failure if machines left & rejoined the session, etc.

To work around cases where variables were used this way, Disguise recommends the following:

Using an expression variables device

Expression variables devices define variables and ensure they are always available. This is useful to ensure the variables are always available, but for dynamically changing values, this can pose some issues. To get started, create an expression variables device.

- For static values, select the type (usually float) and enter the desired value.

- For dynamic (e.g. externally controlled) values, select the function type, and enter the expression which controls the dynamic value. Everywhere the variable was previously used, it now needs to be called (since it is a function.) i.e. `myvar` becomes `myvar()`

Using an expression variables layer

Expression variables layers define variables for the duration they exist on the timeline. This can be easy to work with in a multi-transport or a single-track show during the upgrade process. To get started, create an expression variables layer.

Expression variables layers need to be below all uses of the variables in the composition stack.

The variables are only available while the layer is under the the playhead.

Updating existing assignments in other layer types

Variable assignment continues to work, but care must be taken to ensure the variables are defined before they are used.

Variables are defined in layer composition order, and from top to bottom in field order within each layer. Therefore a layer which uses a variable which it defines itself must define that variable in a field closer to the top of its layer editor.

Note composition order is bottom to top for Layers and Transports (when using multi-transport.) Within layers, the fields are evaluated top-to-bottom.

Related changes

In addition to the changes to the core expression system, the new expression variables layer and device was added. This allows you to:

- Create any number of groupings of global variables within multiple expression variable devices within the device manager. These variables will be available across all timelines.
- Create time-dependent variables using any number of expression variable layers on tracks. The variables are available to layers above the expression variable layer in the compositing order.
- Create string variables which contain predefined text values which you want to refer to elsewhere.
- Create float variables which contain predefined numeric values which you want to refer to elsewhere.
- Create function variables which can be called using `myVariable()` calling syntax, which are evaluated at the point they are called at, to provide shared expression logic.

Common Datatypes

There are a number of common datatypes available in expressions. These allow users to work with compound values more easily.

Colour

The function `Colour(r, g, b, a)` allows the creation of a `Colour` object. This object has `r`, `g`, `b`, `a` fields, which are floating point values, which are expected to be between 0 and 1.

`Colour.mix(otherCol, ratio)`

Mixing Colour values is a common operation. The `mix` function performs a lerp on each of the `r`, `g`, `b`, `a` components using the given `ratio`. An example expression should help explain how it is used:

```
Colour(1, 0, 0, 1).mix(Colour(0, 1, 0, 1), 0.5)
```

This produces a `Colour` value which contains `r=0.5, g=0.5, b=0.0, a=1.0`, which can then be referenced elsewhere in the system.

`ColourFromHSL(hue, saturation, lightness)`

This function is convenient for creating a colour value from a Hue, Saturation, Lightness wheel representation of colour. It produces a regular `Colour` object which contains RGB components which correspond to the HSL values. For example `ColourFromHSL(0.0, 1.0, 1.0)` is equivalent to `Colour(1.0, 0.0, 0.0, 1.0)` because the 0 degree hue is a red primary.

- Hue is a float value representing the number of degrees around the edge of a colour wheel. The value is between 0 and 360 (which are equivalent to one another).
- Saturation is a float value from 0 to 1. As the value approaches 0, the resulting colour approaches the Lightness value in grey.
- Lightness is the intensity of the colour. It is also a value from 0 to 1, where 0 is black, and 1 is full intensity. This is also called ‘value’ in some software.

Vec2 (float2)

The function `Vec2(x, y)` allows the creation of a `Vec2` object. This object has `x`, `y` fields, which are floating point values.

`Vec2` is aliased by `float2` for convenience.

Vec3 (float3)

The function `Vec3(x, y, z)` allows the creation of a `Vec3` object. This object has `x`, `y`, `z` fields, which are floating point values.

`Vec3` is aliased by `float3` for convenience.

Vec4 (float4)

The function `Vec4(x, y, z, w)` allows the creation of a `Vec4` object. This object has `x`, `y`, `z`, `w` fields, which are floating point values.

`Vec4` is aliased by `float4` for convenience.

Vector functions

The `Vec<N>` family of data types have a number of convenience functions exposed:

`v1.dot(v2)`

Performs the dot product between 2 vectors.

`v1.abs()`

Provides the absolute value of the components.

Vector properties

Vector types have computed properties, as well as functions. These are accessed without calling.

`v1.minComponent`

Provides the minimum value of the components

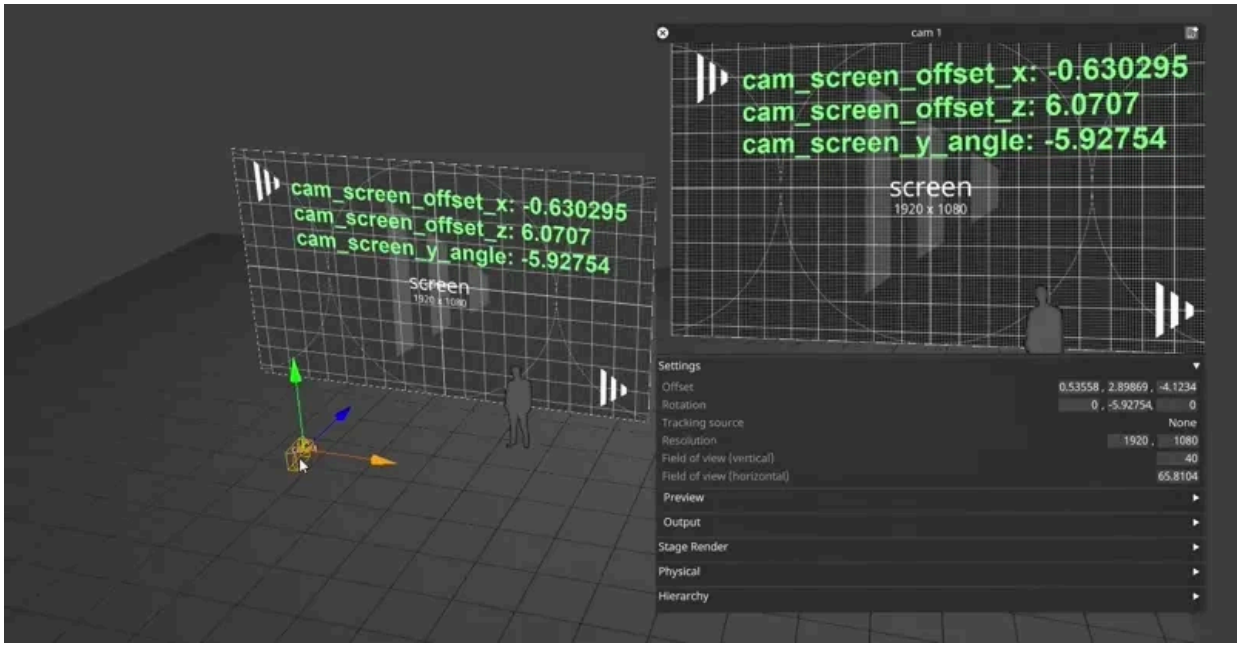
`v1.maxComponent`

Returns the minimum value of the components.

Using Expressions to drive camera angle

In this example, we will build a system which drives the rotation of a camera to always point at a specific screen.

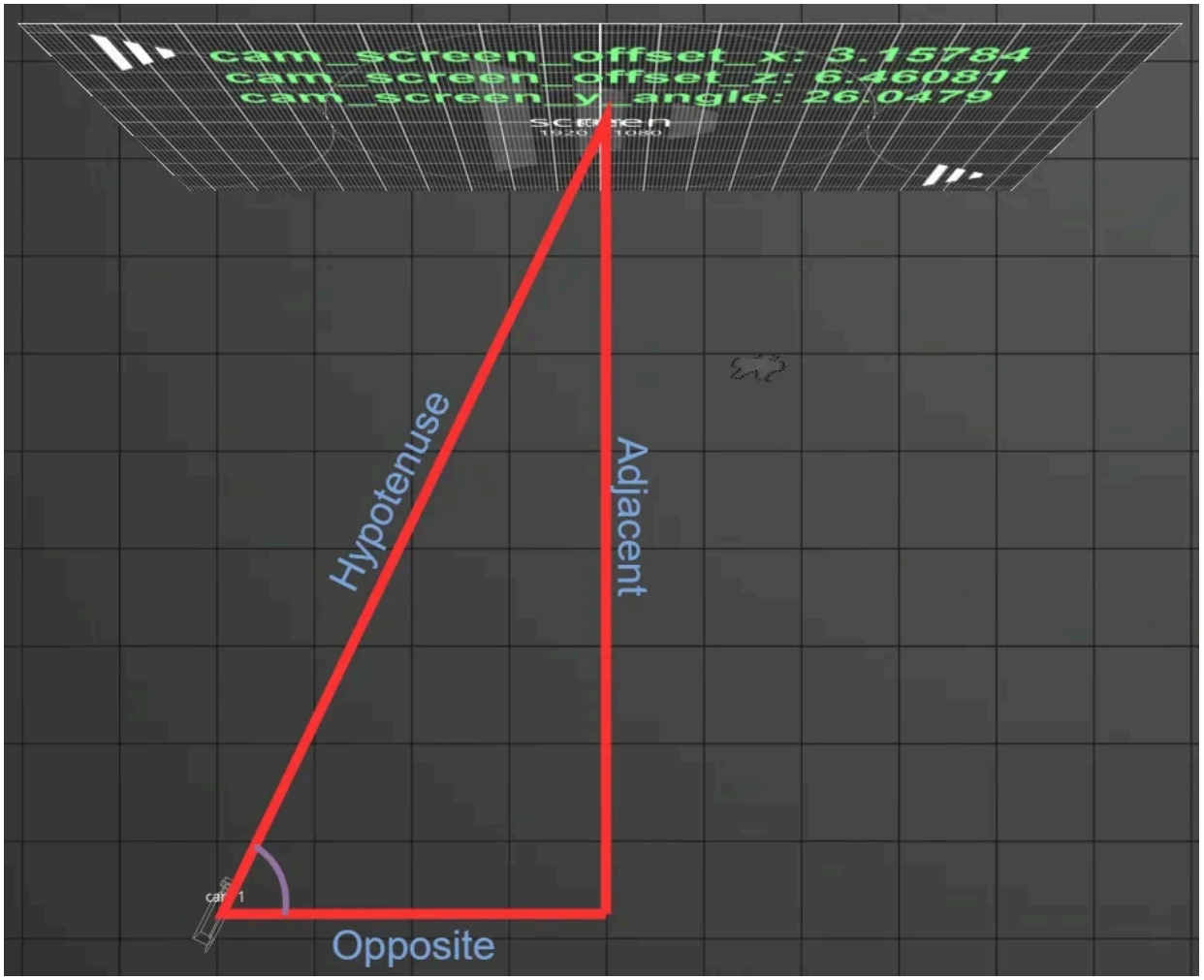
The goal is to ensure that a camera will always point at a given screen, no matter where either one moves along the floor. The example doesn't attempt to compensate for changes in height, only position changes on the X and Z axis within the stage.



How the example works

The idea is to build a right-angled triangle laying on the floor between the camera and the target screen. Using trigonometry, we are able to calculate the angle from the camera to the screen.

The basic functionality of this example is provided by the function `atan2`. We use it to calculate the opposite angle of the triangle we construct from the relative positions of the camera and target screen.



Determining the angle

In order to construct the triangle above, we must build the two straight sides, one for the X axis (side to side) and one for the Z axis (forward and back.) We will do this by first creating an ExpressionVariables device to hold our variables, and define each side individually.

Constructing the triangle sides

The two expressions will be named `cam_screen_offset_x` and `cam_screen_offset_z`. These will be function variables, that is they are small expressions which can be used later in other expressions to aid readability, validate the results are as expected and show the thought process which built the system.

Let's look in detail at how to calculate `cam_screen_offset_x`

```
ledscreen:screen.offset.x - camera:cam_1.offset.x
```

This is the difference between the camera's position on the X axis compared to the screen's X position. This creates the opposite side of the triangle above.

We can repeat this for the Z axis by simply replacing the `.x` with `.z` for both the screen and camera. This creates the adjacent side of the triangle.

> **Tip**
>
> The expressions above use object-space offsets. If the expression writer needs to consider the object hierarchy, the sub-expression `offset` could instead be substituted with `world.getTranslation()`. This produces the position of the object in world space, which is comparable across object hierarchy positions.
>
> The result of `world.getTranslation()` is the same as `offset` if the objects are parented to the stage.

Calculating the angle

Once the sides of the triangle are constructed, we are able to use trigonometry to build the desired angle. We will again use an expression variable to calculate this and give it a name we can use elsewhere, in this example, we will use `cam_screen_y_angle`.

This expression needs to convert from the side lengths to the desired angle. This is accomplished by using the `atan2` function, which takes 2 arguments, `x` and `y`. It computes the inverse of the tangent which would be created by `x / y`, however it is also aware of the sign of these values and can compensate for that, giving accurate values for any inputs.

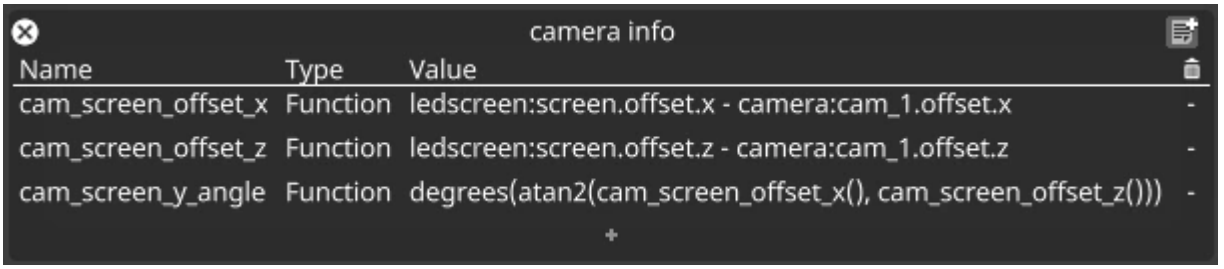
Since we know that the tangent of the angle is equal to opposite / adjacent, we can use the `cam_screen_offset_x()` as the opposite, and `cam_screen_offset_z()` as the adjacent. Therefore:

`atan2(cam_screen_offset_x(), cam_screen_offset_z())` will return the opposite angle, in radians. Since we want to convert to degrees we can wrap that further in a call to `degrees`, like so:

```
degrees(atan2(cam_screen_offset_x(), cam_screen_offset_z()))
```

The expressions in place

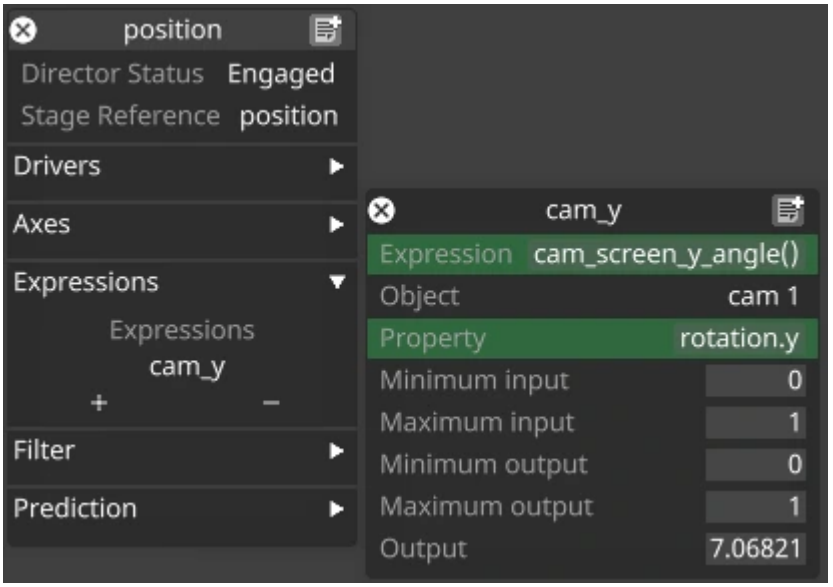
Once the above expressions are determined, the expressions variable device will look something like the following:



Applying the angle

Once the angle has been determined, the expression `cam_screen_y_angle()` would evaluate to the angle the camera's Y rotation field would need to be set to in order to point at the target screen.

We can accomplish this by creating a position receiver device, and an axis expression to control the camera's Y rotation.



Further work

It can be possible to extend systems like this, for example the target of the camera can be switched by replacing the `ledscreen:screen` with yet another function variable which returns the target screen. This itself could be driven by an External protocol and an `if` function to select which screen is returned.

Alternatively, the system could be duplicated to allow for targeting upon changing the relative height of the camera & screen.

Expressions Overview

Expressions can be used to build dynamic behaviour and link parts of Designer together. Expressions are evaluated every frame and result in "values" which are either numbers or text. The value is used in the context of the expression. For example, in layers the value is used to populate the property the expression is attached to.

Expressions are a small programming language which allows the user to build custom behaviours into the software.

They are used in a number of areas, such as layers and automation.

When you type in an expression, the property field turns green when the expression has been correctly understood. If there is a mistake, the property field turns red; moving the mouse over the property field will open up a text message telling you what went wrong.

An expression can also be temporarily disabled, in which case the field turns a muted green to show that the formula is retained but not currently being evaluated. See Enabling and disabling an expression.

Creating Expressions without writing code

It is possible to create some basic expressions which reference other parts of Designer by Creating a connection using mouse drag. This is the easiest way of getting started with expressions.

Expression syntax

Expressions mimic common syntax found in many programming languages. Expressions consist broadly of:

- constants (a number like `123` or text such as `"hello world"`.)
- variables (a symbol e.g. `my_value` which refers to a value defined elsewhere.)
- functions (a behaviour which generates a value from other inputs e.g. `max(1, 2)` which results in the higher value, 2.)
- operators (a mathematical operator which performs arithmetic on values, e.g. `+` or `-`.)

There are a number of predefined functions and variables documented in the relevant locations.

It is also possible to define your own functions and variables by using an expression variables device or expression variables layer.

Expressions are case-sensitive, so a variables or functions called `hello` are distinct from another called `HELLO` or yet another called `Hello`, and so on.

Prefixes

Prefixes are used to alter the result of an overall expression. They take the form of a word, followed by two colon characters, followed by an expression, like so:

```
scale::<expression>
```

Apart from text formatting, below, layer expressions also use prefixes.

Text formatting

Text-type expressions may wish to forego mathematical evaluation and instead want to embed values within plain human readable language. It is possible to change the expression syntax from evaluating variables to 'string interpolation' scheme. This is a piece of text with placeholders. Upon evaluation, the placeholders are evaluated as expressions and formatted in-place in the text.

For example, the following expression is mostly text, but a dynamic expression is embedded within it. The focus changes from evaluation to presentation.

```
format::This is my information: The system has been running for {int(uptime / 60)} minutes and {int(uptime % 60)} second
```

Would result in

```
This is my information: The system has been running for 2 minutes and 15 seconds
```

Text formatting is documented here

Functions Reference

Functions help perform actions with values in expressions, this page documents the predefined functions to help with a variety of tasks.

Logic Functions

These functions are useful for building conditional logic into expression results.

They are paired with 2 constant values `true` and `false` to represent positive and negative logic signals, mostly used for testing your expressions behave as you expect.

Values evaluate to true if they result in a non-zero result. That is, only `0` evaluates to false. Comparison operators return true or false as expected from their mathematical definitions.

`if` - Conditional evaluation

Usage: `if(cond, if_true, if_false)`

- `cond` (boolean) : The value to check
- `if_true` (anything) : The value to return if `cond` is true
- `if_false` (anything) : The value to return if `cond` is false

Evaluates the condition `cond` and returns one of the 2 following values, depending on if it evaluates to true or not.

For example, this function can be used as a part of a larger expression to 'switch' between different values. For example `if(osc:myaddr > 0, osc:myaddr, self)` only allows the animated values in a layer if the value at OSC address `/myaddr` is greater or equal to `0`.

The graph shows the result of `if(x > 0.5, 1, -1)`

`and` - Logical AND operation

Usage: `and(x, y)`

- `x` (number) : The first value to check
- `y` (number) : The second value to check

Returns 1 if both `x` and `y` test as true.

The graph shows the result of `and(x, 1)`

`or` - Logical OR operation

Usage: `or(x, y)`

- `x` (number) : The first value to check
- `y` (number) : The second value to check

Returns 1 if either `x` or `y` test as true, or both.

The graph shows the result of `or(x, 0)`

`step` - Activation function

Usage: `step(x, y)`

- `x` (number) : The first value to compare
- `y` (number) : The second value to compare

Returns 1 if `x >= y`, otherwise returns 0.

Can be used as a part of a larger expression to 'turn on' a source of data. For example `step(osc:myaddr, 0.5) * self` only allows the animated values in a layer if the value at OSC address `/myaddr` is greater or equal to `0.5`.

The graph shows the result of `step(x, 1)`

Trigonometric functions

These functions are useful for working with angles and geometry.

A predefined constant `pi` contains the value of PI, approximately `3.14159`.

`sin` - Trigonometric sine

Usage: `sin(x)`

- `x` (radians) : The angle to convert

Returns the sine of the given angle

`cos` - Trigonometric cosine

Usage: `cos(x)`

- `x` (radians) : The angle to convert

Returns the cosine of the given angle

`tan` - Trigonometric tangent

Usage: `tan(x)`

- `x` (radians) : The angle to convert

Returns the tangent of the given angle

`asin` - Trigonometric arcsine

Usage: `asin(x)`

- `x` (sine) : The sine to convert

The arcsine, or inverse of sine. Converts from the sine of an angle (x) to the initial angle, measured in radians.

The sine of an angle can be thought of as the y coordinate of a point on the circumference of a unit circle.

`acos` - Trigonometric arccosine

Usage: `acos(x)`

- `x` (cosine) : The cosine value to convert

The arccosine, or inverse of cosine. Converts from the cosine of an angle (x) to the initial angle, measured in radians.

The cosine of an angle can be thought of as the x coordinate of a point on the circumference of a unit circle.

`atan` - Trigonometric arctangent

Usage: `atan(x)`

- `x` (tangent) : The tangent value to convert

The arctangent, or inverse of tangent. Converts from the tangent of an angle (x) to the initial angle, measured in radians.

`atan2` - Trigonometric arctangent (2-argument variant)

Usage: `atan2(x, y)`

- `x` (distance) : The position along the X axis to build an angle from
- `y` (distance) : The position along the Y axis to build an angle from

This is equivalent of `atan(y / x)`, but in the case where x is 0 or either values could be negative, this provides an accurate angle.

The graph shows the result of `atan2(x, -4)`

This function is useful to determine the angle between two objects on the plane of a given axis.

`radians` - Convert from degrees to radians

Usage: `radians(x)`

- `x` (degrees) : The angle to convert

This converts from degrees to radians, which is then suitable for use in the above functions.

The conversion is a linear function - simply multiply by `pi / 180`.

`degrees` - Convert from radians to degrees

Usage: `degrees(x)`

- `x` (radians) : The angle to convert

This converts from radians to degrees, which is then suitable for displaying to humans who are used to working in degrees.

The conversion is a linear function - simply divide by `pi / 180`.

Mathematical functions

`exp` - Exponent

Usage: `exp(x)`

- `x` (number) : The exponent

Raise `e` (Euler's number, approximately equal to `2.71828`) to the power of `x`. Note `e` is also a constant in disguise expressions.

`log` - Natural logarithm

Usage: `log(x)`

- `x` (number) : The value

Takes the logarithm of the input number `x` against the base `e`. This means this is the inverse of `exp`.

`log10` - Base 10 logarithm

Usage: `log10(x)`

- `x` (number) : The value

Takes the logarithm of the input number `x` against the base `10`. This can be used to get the number of digits after the most significant number (e.g. `log10(1000)` returns `3`.)

`sqrt` - Square root

Usage: `sqrt(x)`

- `x` (number) : The value

Returns the value which, when multiplied by itself, results in the input.

`pow` - Power function

Usage: `pow(x, y)`

- `x` (number) : The base
- `y` (number) : The exponent

Returns a value which is x raised to the power of y. To implement `exp`, one would write `pow(e, x)`.

`abs` - Absolute value

Usage: `abs(x)`

- `x` (number) : The signed value

Returns the absolute (positive) number, no matter the sign of the input value.

`floor` - Rounding down

Usage: `floor(x)`

- `x` (number) : The value

Returns the input value, rounded down to the integer value below it.

`ceil` - Rounding up

Usage: `ceil(x)`

- `x` (number) : The value

Returns the input value, rounded up to the integer value above it.

`max` - Maximum value

Usage: `max(x, y)`

- `x` (number) : A candidate value
- `y` (number) : A candidate value

Returns the maximum of the 2 inputs provided.

The graph shows the result of `max(x, 2)`

`min` - Minimum value

Usage: `min(x, y)`

- `x` (number) : A candidate value
- `y` (number) : A candidate value

Returns the minimum of the 2 inputs provided.

The graph shows the result of `min(x, 2)`

`clamp` - Restrict within the given range

Usage: `clamp(x, min, max)`

- `x` (number) : The value to clamp
- `min` (number) : The minimum bounds of the operation
- `max` (number) : The maximum bounds of the operation

Returns the input value `x` if it is between `min` and `max`, otherwise it remains at those values.

The graph shows the result of `clamp(x, -1, 2)`

`lerp` - Remap a value to a new range

Usage: `lerp(low, high, amount)`

- `low` (number) : The value returned when `amount` is 0
- `high` (number) : The value returned when `amount` is 1

When `amount` is between `0` and `1`, the function returns some fraction between low and high. When `amount` is outside the range of `0` and `1`, the function linearly interpolates outside the range of low and high.

The graph shows the result of `lerp(2, 4, x)`

Integer operations

Normal operators like `%` and `/` are performed using floating point. This means for example that `3 / 2` would result in approximately `1.5`.

However there are cases where we want to consider the operations in terms of whole numbers.

`%` - Remainder operator

Usage: `x % y`

- `x` (number) : The numerator
- `y` (number) : The denominator

Operator for getting the remainder after integer division of two numbers (e.g. `5 % 2 == 1`)

The graph shows the result of `x % 2`

`int` - Integer conversion

Usage: `int(x)`

- `x` (number) : The number to convert

Returns a rounded-down version of the input value. This is equivalent to `floor`.

The `int()` function can also convert a string to an integer. For example, `int("42")` returns `42`. Additionally, `int()` accepts an optional second argument that specifies the base of the number in the given string. This is useful when working with non-decimal representations, for example:

- Hexadecimal (base 16): `int("FF", 16)` returns `255`
- Octal (base 8): `int("77", 8)` returns `63`
- Binary (base 2): `int("101", 2)` returns `5`

`idiv` - Integer division

Usage: `idiv(x, y)`

- `x` (number) : The numerator
- `y` (number) : The denominator

Returns an integer version of the numerator divided by an integer version of the denominator, returning an integer value.

The graph shows the result of `idiv(x, 2)`

Timecode functions

These functions convert a time value in seconds into a human-readable timecode string. They are particularly useful when combined with video layer properties such as `tSecElapsed` and `tSecRemaining` (see using video layer time in expressions).

`formatTimecode` - Format seconds as timecode

`formatTimecode(seconds, fps)`

- `seconds` (number) — the time in seconds to format
- `fps` (number) — the frame rate to use for the frames component

Converts a time value in seconds to a timecode string in `hh:mm:ss.ff` format, where `ff` is the frame number derived from the given `fps`.

For example, to display the elapsed time of a video layer named `video` as a timecode string:

```
formatTimecode(module:video.tSecElapsed, module:video.video.fps)
```

`formatTimecodeDF` - Format seconds as drop-frame timecode

```
formatTimecodeDF(seconds, fps)
```

- `seconds` (number) — the time in seconds to format
- `fps` (number) — the frame rate to use for the frames component

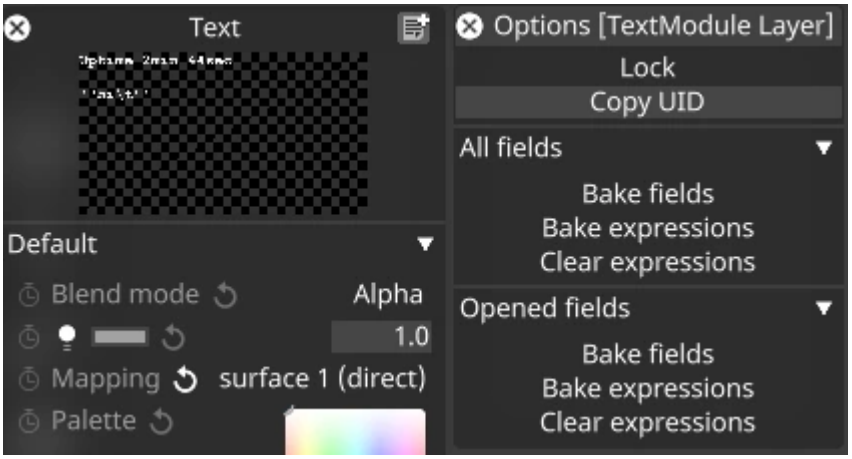
Converts a time value in seconds to a drop-frame timecode string. This is intended for use with 29.97fps drop-frame workflows (SMPTE 2997DF).

Resource access function

`getByUID` - Resource access

Accessing properties from Resources in the system is a very powerful method for enhancing expressions. Referencing resources is normally performed by name. However, it's possible to refer to Resources by UID instead. This allows for a strong reference to the original Resource, at the expense of readability. The benefit of this less readable approach is that the reference remains even if the Resource (e.g. a Layer) is renamed. Expressions are not updated in response to rename operations. This is described further in Accessing Resources by UID.

A user will right-click the title bar of a Resource editor, and select `Copy UID`. They will then paste that UID as the argument of this function.



For example: `getByUID(0x123456789012345).description` returns the name of the Resource the user right-clicked on.

The set of properties on Resources is subject to change. See Accessing Resources for more information.

Using Expressions in Layers

To set up an Expression, right-click the property you want to control in the Layer editor.

This will open up the Metafield which shows min/max/step, which allows you to edit the limits of the property and the value step used while animating.

Below the min/max/step properties is a field called Expression, which initially contains a single word: `self`. This is the expression we will be editing.



The default expression: `self`

`self` is a special variable defined in the context of Layer expressions. It is not valid or may mean something different in other places which accept expressions. `self` refers to the normal animated value of the property the expression is controlling. The default expression being `self` means that by default the value set on the Layer property is used as-is, without modification.

`self` is a number for numeric properties, and text for text properties.

By deleting the value completely, disguise will auto-fill `self` as the value of the expression. Therefore, simply deleting the text in the Expression field is a quick way of resetting back to the default behaviour of using the Layer property as-is.

Using `self` in expressions

`self`, like many other variables can be built into more complex expressions. A simple expression might be `self * 2`, which doubles the animated value of the property.

Other variables in layer expressions

Some variables are defined by the system for convenience. In the case where the expression is evaluated by a layer, the following variables are available:

- `time` - track time in seconds since the start of the track.
- `self` - the keyframed value, as described above.
- `self.min` - minimum value for this field.
- `self.max` - maximum value for this field.

Example: Emergency layer fade down

A common use case is to use an expression for the brightness property on a Layer. For example, it may be necessary to have a fader or other live control have an emergency cut-out option for live video. In this example, we will say that this control is implemented using OSC, but could be done with any live input protocol supported by disguise.

```
self * (1 - osc:video.emergency_cut_out)
```

In this example, we take the normal animated value of the property (`self`) and multiply it by 1 - the value sent on OSC address `/video/emergency_cut_out`. Normally, that OSC value would be `0`, and so `1 - 0` is `1` and `self * 1` is just `self`, so normal animated values are respected.

However, if `/video/emergency_cut_out` is set to `1`, then the expression will evaluate to `self * 0` which, since any number multiplied by 0 is 0, would ensure the brightness of the layer is 0 and therefore will not be shown.

Using expressions to control layers

> **⚠ Warning**
>
> Warning: Expressions need special handling for Resource names that have spaces in them, for example a Layer called “video explosions”. Expressions require the user to refer to it as “video_explosions” instead (replacing the space with an underscore `_`).
>
> Names can only contain the characters `a-z A-Z 0-9 _`.
>
> This can cause conflicts when two Resources share the same name after normalisation, and it may be necessary to rename layers to ensure they are uniquely identifiable if they are being used in expressions.

It is possible to have designer write simple linking expressions automatically. The method is to hold the Alt key and drag the mouse from the desired value in the designer GUI to the layer field you wish to control. It is possible to do this from most places in the GUI, including other layers. (To open multiple layers at the same time, hold Ctrl and click on the Layers you wish to open simultaneously.) See Creating a connection using mouse drag for more information.

Example: Link brightness between multiple layers

Open an editor for the 2 layers the user wishes to link, and Alt+Drag from one layer's brightness property to the other's. Designer will write an expression referring to the first layer's brightness into the second (destination) layer.

From that point on, animation and edits of the layer the user dragged from controls both layers. The process can be repeated (we recommend dragging from the same first layer every time, not in a chain.) to control as many layers as the user desires.

Note that layer references are only valid for the period of time that the layer is active on the timeline. Attempting to access a layer property for a layer which is not currently under the playhead will fail. This is because there is no coherent value for a layer property outside its timeline extents.

Using video layer time in expressions

Video layers expose time-based properties that can be accessed in expressions. For a video layer named `video`, the following properties are available on the module:

- `module:video.tSecElapsed` — time in seconds since the current clip started playing
- `module:video.tSecRemaining` — time in seconds until the current clip ends

These return values in seconds, which can be used directly in calculations or formatted as timecode using the `formatTimecode` and `formatTimecodeDF` functions.

For example, to display the elapsed time of a video clip as a timecode string in a text expression:

```
format::Elapsed: {formatTimecode(module:video.tSecElapsed, module:video.video.fps)}
```

Or to trigger an action when less than 5 seconds remain:

```
if(module:video.tSecRemaining < 5, 1, 0)
```

Example: Using a video layer frame number to animate brightness

Video Layer's `frameNumberDisplay` provides the current frame readout at the top of the video layer. This isn't something the user needs to remember - instead, open the Layer editor for a video module named `video`. Alt + Drag from the frame readout at the top of the layer, and drop it onto the brightness property of another layer (e.g. a chevron layer.)

This will result in the following expression being written into the brightness property of the Chevron layer: `module:video.frameNumberDisplay`.

That property can then be used as a variable by the expression. For example, set the brightness to 0 until the video reaches frame 50, then snap to 1:

```
if(module:video.frameNumberDisplay < 50, 0, 1)
```

Or to smoothly fade up over the first 50 frames:

```
min(1, lerp(0, 1, module:video.frameNumberDisplay / 50.0))
```

Enabling and disabling an expression

Every expression field has an `=` button beside its text box. Click it to temporarily disable the expression: the label changes to `//`, evaluation is suspended, and the field falls back to its underlying keyframe value. The formula itself is preserved, so you can switch it back on at any time by clicking the button again. While an expression is disabled, the field is tinted a muted green to distinguish it from an active, evaluating expression.

This is a non-destructive alternative to clearing the formula or baking the expression — both of which would lose the original expression or strip its external control.

To toggle every expression on a layer at once, right-click the layer's title bar. A single **Enable expressions** / **Disable expressions** button appears under each grouping — All fields, Opened fields and Visible fields — and its label reflects the current state of the expressions in that grouping.

The disabled state is saved with your project, so it is preserved across save and reload.

Layer prefixes

Layer prefixes make the job of targetting a potentially unknown range of values expected by a given field easier. They are used by the built-in alt+drag functionality for building readable expressions from common components like DMX or MIDI inputs.

The field range is available as variables in `self.min` to `self.max`.

- `limit::` - Limits result to the field range. This is equivalent to `clamp(expr, self.min, self.max)`
- `scale::` - Scales 0 - 1 values to the field range, ignoring limits. This is equivalent to `lerp(self.min, self.max, expr)`

Linking Layers with Expressions

Use this Expression to link one layer to another:

Navigate to the expressions text field of any numerical property and type in:

```
module:NameOfModule.brightness*0.5
```

This expression will take the brightness value of the other layer called NameOfModule and multiply it with 0.5.

> **Note**
>
> **Please note**: You cannot have any spaces in the layer name when using the name in the expression. This will generate a syntax error marked by a brown expressions field.

Alternately, there are additional methods for using Expressions to link layers:

- Open a field on the source layer and type in the name of the attribute `= self` (for example `posy = self`)
- Open the properties window for the layer to be linked and type in the name of the attribute (example: `posy`)
- Now, when you change the numeric value on the source layer, the same attribute in the linked layer will also be adjusted at the same time.

See Creating a connection using mouse drag to create the Expression automatically.

Note: Hold down **Ctrl** to open up multiple layers or keyframe editors.

Operators

Operators allow the expression writer to perform mathematical operations on numbers, compare values, and work with variables within an expression.

There are standard expressions used by many programming languages which are available in Designer expressions. This page provides an overview and brief description of the available operators.

Comparison operators

Comparison operators are useful when working with Logic functions.

- *less* `<` - (`a < b`) returns true if `a` is strictly less than `b`
- *less equal* `<=` - (`a <= b`) returns true if `a` is less than or equal to `b`
- *greater* `>` - (`a > b`) returns true if `a` is strictly greater than `b`
- *greater equal* `>=` - (`a >= b`) returns true if `a` is greater than or equal to `b`
- *not equal* `!=` - (`a != b`) returns true if `a` is not equal to `b`
- *equal* `==` - (`a == b`) returns true if `a` is exactly equal to `b`

Note that for non-integer numeric values (i.e. floating point values) comparisons can be surprising. When comparing floating point values, consider reworking the comparison to be fuzzier. For example, `a == b` could be rewritten to be `abs(a-b) < 0.01` which ensures that even if there is a tiny difference between the numbers, the comparison does what the expression writer would expect.

Comparing text

The comparison operators also work on text (string) values. `==` and `!=` compare two strings by their exact contents, while `<`, `>`, `<=` and `>=` compare them alphabetically (lexicographically). For example, `"apple" < "banana"` returns true.

Text and numbers cannot be compared with each other. An expression such as `"5" == 5` results in an error, as there is no automatic conversion between the two. Text values also only support the comparison operators. Arithmetic operators such as `+` cannot be used to combine strings.

This is useful for reacting to incoming text, such as a string sent to an OSC address. For example, `if(osc:.address == "go", 1, 0)` returns `1` when the value received at the OSC address `/address` is the text `go`, and `0` otherwise.

Logical operator

The logical not operator is useful when working with Logic functions.

- *not* `!` - (`!a`) flip the truth value of the variable or sub-expression following the operator (true->false, and false->true)

Index operator

The index operator allows indexing into arrays of data.

- *square brackets* - `[]` - (`array[i]`) returns the `i` th value within the `array` variable

It is also possible to index into arrays using negative indexes - `array[-1]` would select the last item in the array, and `array[-2]` would select the second from last. Note that the array must contain enough elements to support this, otherwise the expression will result in an error.

Arithmetic operators

Arithmetic operators allow the writer to combine numeric values within expressions using common arithmetic operations.

- *addition* - `+` - (`a + b`) returns the sum of `a` and `b`
- *subtraction* - `-` - (`a - b`) returns the result of subtracting `b` from `a`
- *multiplication* - `*` - (`a * b`) returns the product of `a` and `b`
- *division* - `/` - (`a / b`) returns the quotient of `a` divided by `b`
- *modulus* - `%` (`a % b`) returns the remainder of `a` divided by `b`

> **Tip**
>
> Division and Modulus are useful together.
>
> An expression writer may want to write `int(a / b)` to get the whole number quotient of the division operation. To get the remainder, they can write `a % b`.
>
> This can help display division-related information more clearly to readers, e.g.
> `format::There are {int(apples / kids)} apples per kid, with {apples % kids} apples remaining.`
> (where apples and kids are variables defined by an ExpressionVariable layer, for example)

String Manipulation

String manipulation is separate to text formatting, which is a more common use case. String manipulation alters a string value in some way to change the contents of the text. It is possible to use string manipulation functions to enhance text formatting operations in more advanced use cases.

To compare two strings rather than alter them, use the comparison operators.

`split(text, delimiter)`

Splits the `text` at every instance of `delimiter`, returning an array of strings. For example, `split("hello world", " ")` returns an array of two text objects: `["hello", "world"]`. Use array indexing with `[]` brackets to access an element. For example `split("hello world", " ")[0]` returns `"hello"`.

`replace(text, old, new)`

Replaces every instance of `old` in `text` with `new`. `old` and `new` do not have to be the same length. For example, `replace("myfile.png", ".png", "")` returns `"myfile"`.

`strip(text)`

Removes any instance of blank spaces or tabs at the beginning or end of the string. `strip(" abc ")` returns `"abc"`.

`title(text)`

Replaces characters at the beginning of the word, or immediately after any space character with the uppercase version. For example, `title("lorem ipsum")` returns `"Lorem Ipsum"`.

`upper(text)`

Replaces all characters with the uppercase version. For example, `upper("lorem ipsum")` returns `"LOREM IPSUM"`.

`lower(text)`

Replaces all characters with the lowercase version. For example, `lower("LOREM IPSUM")` returns `"lorem ipsum"`.

Text Formatting

All text formatting expressions start with the prefix `format::` to switch the expression engine into "string interpolation" mode. This only makes sense to use in expressions which are intended to evaluate to text values. All formatting expressions allow multiple lines.

Motivation

Text typed directly into a format expression shows as-is in the output. For example the expression `format::Hello world` would result in the text "Hello world" with no modification.

In order to make format expressions useful, string interpolation is used to embed expressions within the text. This is done by inserting *replacement fields* into the text. For example `format::Running for {uptime / 60}min` would result in "Running for 20.563min" (if the system had been running for approximately 20 minutes.)

Usually, when working with values defined by computers there is a lot of extra detail which the expression writer doesn't want to include. In the example above, the extra decimal places after the whole number of minutes are probably not wanted. To fix this, the writer can include replacement fields to change how the content is formatted.
`format::Running for {uptime / 60:.0f}min` would result in "Running for 20min", as desired.

Non-formatted text expressions

Text fields which are driven by an expression which does not include the `format::` prefix will simply convert the result to text using the default formatting rules. In some cases, it is not possible to convert a result to text (for example a function name on its own does not evaluate to a value which can be converted to text.) This results in an expression error.

Replacement field syntax

Formatting is using the same language as C++ std::format.

Replacement fields are identified by the surrounding braces (`{}`.) If the expression writer needs to surround text with a literal `{}`, double the braces, like so:
`format::{{ hello, no evaluation happens here }}` ->
`{{ hello, no evaluation happens here }}`

Within a replacement field normal expression evaluation syntax is used to call functions, read variables, use operators and everything else available to all expressions.

Additionally, after the expression syntax, an optional `:` is added to the field. This separates the expression from the format specification, and controls how the value is converted to text.

Format specification

The power of the text formatting system is the degree of control over how the value is converted to text. This is accomplished through a small DSL (domain specific language) which has a focus on a compact representation of common text formatting operations.

Width, fill and align

It is sometimes useful to fill and align the text within a certain number of characters.

The alignment and fill behaviours have a series of defaults - the default fill is space ( ) and the default alignment is to the right. By default, there is no width to apply this fill or alignment to.

For all formatting examples here, we enclose the replacement field in single quote marks, to clarify the exact behaviour of the replacement field. This is not necessary in normal usage.

Therefore all of the following expressions result in the identical text " 123".

- `format::'{123:6}'`
- `format::'{123:>6}'`
- `format::'{123: >6}'`

The space between the `:` and `>` is the *fill* character. In the final example above, this can be replaced with an arbitrary other single character (e.g. `format::'{123:x>6}'` results in "xxx123")

Similarly, the `>` character is the *align* operator, which can be any of:

- `>` - right alignment (`format::'{123:x>6}'` -> "xxx123")
- `<` - left alignment (`format::'{123:x<6}'` -> "123xxx")
- `^` - center alignment (`format::'{123:x^6}'` -> "x123xx")

Finally, the `6` is the *width* and can be any integer. If the width is specified to be less than the number of characters needed to represent the value, the width is ignored.

Normally, the order of these operators is extremely important, but there is one exception - when the fill character is a `0`, the align operator can be skipped. That means that `format::'{123:06}'` results in "000123". Note that there are no other numeric fill characters - an attempt to write `format::'{123:16}'` results in a 16 character width, rather than a fill using `1` characters within a 6 character space.

While the examples here use integer values, string and floating point values also work with this feature. e.g. `format::'{"hello":^10s}'` -> "" hello ""

> **Note**
>
> Text layer will not render multiple consecutive spaces, so testing this functionality with text layer and a space fill character may be confusing.

Precision

In addition to the *width* above, for numbers which have decimal places, the *precision* specifier allows the writer to limit the amount of detail presented.

Precision is a number following a period `.` after the optional *width*. It must always be followed by the floating point specifiers `f` or `g` (discussed below.) For example:

`format::'{123.456:.1f}'` -> ""123.5"" (note the rounding is correct)

Width does not change meaning or in any way affect the number of places before the decimal point.

So for example, `format::'{123.456:1.1f}'` -> ""123.5"", but extending the *width* to beyond the 5 characters the field replacement rendered to begins to insert padding as discussed above - `format::'{123.456:6.1f}'` -> "" 123.5"". All fill and alignment rules above apply equally. Precision changes the text which is rendered for the given number, whereas width, fill and align adjust where it is presented within the specified *width* characters.

> **Note**
>
> Precision is only valid for numeric values which are floating point numbers. It will not function correctly for integer values. The expression `format::'{123:.1f}'` is an error, because there is no decimal precision for the integer `123`.

Sign

Inserting a `+` in front of the width (or on its own without a width) ensures the sign of the number is always written. e.g. `format::'{123:+6}'` results in "" +123"", whereas `format::'{-123}'` would always result in "'-123"". `format::'{123:+}'` results in "'+123""

`-` is also a valid sign operator, but that simply marks the default behaviour as being in some way expected.

Base prefix

For some types (see below) the base of the integer being formatted is changed. It is often useful to use a standard *base prefix* to identify the base of the number. This is accomplished by inserting the `#` character before the *width*. See **integer types** for more details.

Type

The type specifier is the final character in the format specification. Based on the type of the value the expression evaluates to, it can change the representation of that value to be useful in different circumstances.

The type specifier is therefore grouped into sections based on the type of the value the expression evaluates to:

Integer types

- `b` or `B` (base prefix: “0b” or “0B”). Formats the integer as a binary number (base 2). e.g. `format::'{256:#16b}'` -> ““0b0000000100000000””
- `o` (base prefix: “0”). Formats the integer as an octal number (base 8). e.g. `format::'{256:#o}'` -> ““0400””
- `x` or `X` (base prefix: “0x” or “0X”). Formats the integer as a hexadecimal number (base 16, using characters 0-9 and a-f). e.g. `format::'{256:#x}'` -> ““0x100””
- `d` (no base prefix). The default behaviour - does not need to be specified. Formats the integer as a decimal number (base 10). e.g. `format::'{256:#d}'` -> ““256““

Floating point types

- `g` - the default behaviour (used when not specifying a type or format specification at all) Formats the number in a compact representation, up to *precision* characters. When the number exceeds *precision* (default 6) characters in decimal notation, it shifts to scientific notation and rounds. e.g. `format::'{1.5:g}'` -> ““1.5””.
- `f` - format with “fixed” formatting, without using scientific (exponent) notation. e.g. `format::'{1.5:f}'` -> ““1.500000”” *precision* can help tune the result of this format option.
- `a` - format with precise machine readable hexadecimal formatting, used by some computer systems to transfer floating point numbers without loss of precision due to string conversion. e.g. `format::'{1.5:a}'` -> ““0x1.8p+0““

String types

- `s` - the default behaviour. Formats the text by simply rendering the text as-supplied. e.g. `format::'{"hi\nthere":s}'` -> ““hi
there””
- `?` - format text with escaping and quoting. Useful if there are strange characters or the string is otherwise unexpected. e.g. `format::'{"hi\nthere":?}'` -> ””“hi\nthere””“

Expression Variables

Variables in expressions are powerful tools for sharing values between multiple expressions. They are also very useful to split up complex expressions into more easily understood and manageable chunks.

Variables are a named storage location for a value to be used by expressions. In order to have a place to store the value represented by a variable, they need to be defined. Variable definition can happen in a number of different ways.

Note that variables are not considered defined if they were only evaluated on an earlier frame. Variables are defined as the frame progresses within Designer, which means that things that happen earlier in a frame (such as device evaluation) cannot access variables defined later in the frame (such as during layer composition.) This is especially true when working with stacks of Layers - Layers can only define variables which are used by other Layers which would composite on top of the Layer which defined a variable.

Variable definition locations

Global constants

While these are technically variables, these constants do not change.

- `pi` - the mathematical constant π, often used with trigonometric functions.
- `e` - the mathematical constant e (Euler's constant), often used with mathematical functions.

Global system variables

Designer defines one variable which is accessible everywhere.

- `uptime` - the time of the current frame, which is synchronized across all servers and is therefore equal (within approximately 2ms) in a multi-machine session. This is also referred to as frame time in some places.

Local system variables

Some variables are defined only for certain contexts. For example, when working with layers, the `self` variable is defined to be the current value of the animated property the expression is controlling.

Variable assignments

When evaluating an expression, it is possible to save the value it evaluates to, as well as using it. For example, the user may enter a complex expression for brightness, but then want to share it across multiple layers. They could enter `myvar = sin(uptime / 20)`, and then, in another layer (which must appear later in the composition stack) they could then set brightness to be simply `myvar`.

It is important to note that the variable is only defined for as long as the layer (or other expression which defines the variable) is active. As soon as the layer becomes inactive (i.e. not under the play head) the variable is no longer defined, and references to it will no longer be valid.

To reference the variables defined by an assignment, the user must ensure the layer is below the user of the variable in the composition stack. i.e. The variables defined by variable assignment are only available to layers which would composite on top of the defining layer. Similarly, if the assignment is performed by some other Resource in the system, then the variable is defined only after that Resource has run within the frame.

ExpressionVariable layers

There are cases where the user wishes to create animated variables on the timeline, but does not want to explicitly tie them to a layer which is used for content (perhaps they are concerned that the layer may be moved or otherwise reprogrammed without consideration of the variable.)

The user can create an ExpressionVariable layer as they would any other layer. The configuration section allows them to create new variables and change their properties, and then animate them as they would any other property on a layer in the timeline.

In order to reference the variables defined by an ExpressionVariable layer, the user must ensure the layer is below the user of the variable in the composition stack. i.e. The variables defined by ExpressionVariable layers are only available to layers which would composite on top of the ExpressionVariable layer.

ExpressionVariable devices

In some cases, the variable the user wants to define is more global, and isn't limited by a specific location on the timeline or does not need to be animated.

An ExpressionVariable device can be created in the device manager and used to create variables there.

Variable definition behaviour

Variables are defined every frame by the various locations described above.

If those locations are no longer run, the variable is no longer defined, and expressions which used it are no longer valid. An example is when a layer which defined a variable is not under the play head anymore, or a device is removed from the device manager.

If there are multiple locations which define the same variable on a frame, the second location which attempts to define the variable will be in an error state, and be unable to define the variable. It will indicate where the variable was first defined, for the user to determine how to resolve this conflict.

Variable naming

Variables must be named according to the syntax of the expression language. Some key points are:

1. **Case-sensitivity** - variables named `hello` and `Hello` are distinct variables which can have very different or even incompatible values (e.g. a number or text)
2. **No special characters** - variables must start with an underscore (`_`) or an English alphabet letter, and consist of letters, underscores or numbers thereafter. This means no spaces or other special characters are valid. Unfortunately, at present this means non-English characters are not supported.

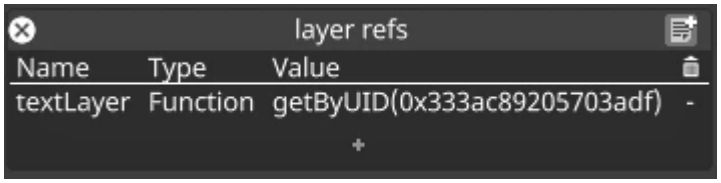
Users should also take care to use a consistent naming scheme when building projects with many variables. It is easy to create many variables with different meanings and purposes. Organization using devices and layers are useful for grouping variables into common locations for definition.

Function variables

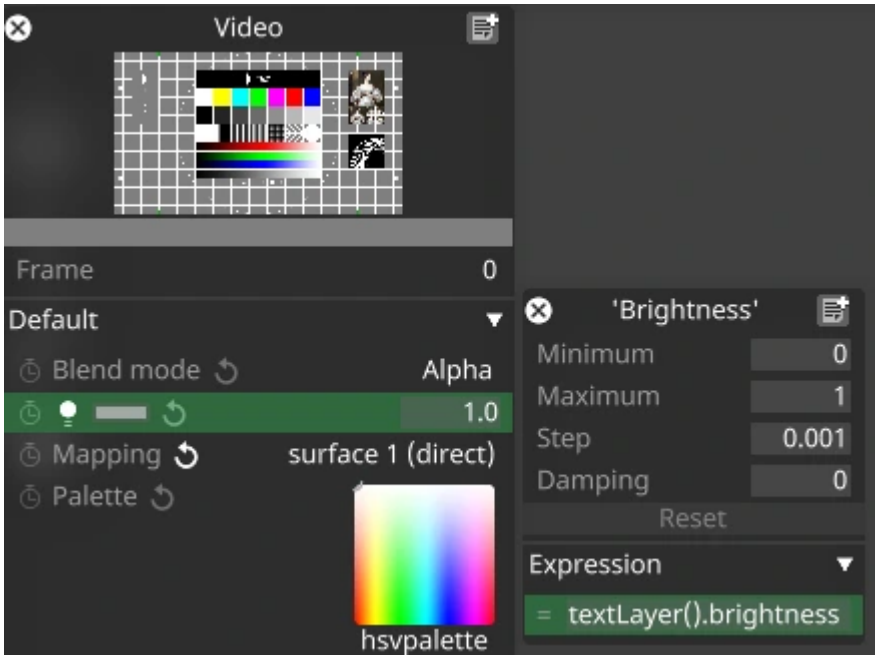
Sometimes, when working with more complex or verbose logic functions such as `if`, it is useful to break out parts to be reused or simply to make the process of reading the expression easier.

For example, one use of function variables is to return the result of accessing a Resource using `getByUID`:

To build a function variable, the writer should create an expression variables device or layer. A variable defined this way can be switched to *Function* type, and the desired expression can be written.



Copy the UID of the Layer (or other Resource) as required and write the `getByUID` expression. There is no need to access a specific property, but that may make reusing the function elsewhere easier. The writer should consider what they are attempting to abstract when creating the function variable. In this example, the function `textLayer` will return the chosen layer.



When using the function variable, the call syntax is required to evaluate the function, in this case that is `textLayer()` which evaluates to the same value as the expression within the function variable. When returning Resources, this means that properties can be accessed directly from the returned value. If the expression evaluates to a number or text, it can be used directly as-is.

Passing parameters to functions

In advanced use cases, it is possible to create a parameter (or argument) to function variables. This is done by changing the name of the function variable to include the parameter names the user wishes to use.

For example, a user creates a function `maybe_override` which performs some override behaviour if a condition is met, or alternatively will fall back to regular sequencing. The override needs to be different for every field which uses the function. We can therefore define the function as follows:

Name	Type	Value
`maybe_override(value)`	Function	`if(osc:show.override, value, self)`

The function above is designed to be applied to a layer. It provides `value` if the OSC address `/show/override` is non-zero, otherwise it falls back on existing sequencing.

When applying this, the user would enter different expressions on each applicable field, for example, `maybe_override(osc:show.field1)` on one field and `maybe_override(osc:show.field2)` on another field.

Context dependent evaluation

Functions are evaluated in the context of the calling expression. This means that the function variable can use a variable or other context which is defined after the function variable is, as long as the calling expression has access to that variable.

`self` in function variables

One useful implication of this is that function variables can access the `self` variable. `self` has its normal meaning according to the location the function is evaluated at. This can be used for example when working with OSC expressions in function variables. The following function expression can be written:

`if(valid_osc:my.address, osc:my.address, self)` - this uses normal sequencing until a value is received on the OSC address `/my/address`.

`this` in function variables

The `this` variable is also available in function variables and refers to the Resource currently evaluating the expression. This is particularly useful when you want a function variable to access properties of the Resource it is used on.

Unlike typical variables, `this` is accessed using the resource access syntax. For example, to reference the `brightness` property of the current layer (module), use `module:this.brightness`. This ensures the expression always refers to the property of the Resource that is executing the expression, regardless of where the function variable is used.

`this` is also a useful shortcut to avoid needing to pass the Resource as a parameter to the function variable, and is robust against issues like a Layer being renamed or duplicated.

Genlock Configuration

Genlock, from the phrase *generator locking*, is a common technique where a specific reference signal from a signal generator is used to synchronise other image or video sources together.

At Disguise, we use genlock as a mechanism to sync multiple Disguise Media server outputs. The Sync Card on each server receives a **Genlock Signal** from a central **Clock Source** (usually a dedicated piece of hardware) and individually locks the outputs of all of its heads to that incoming genlock signal. Genlock keeps multiple Disguise servers in sync and also allows external integration with cameras/LED devices.

Framelock is a mechanism within GPUs that keeps individual outputs of the same server in sync. **Internal Sync** is a mechanism within GPUs to individually lock to a locally generated genlock source.

Genlock synchronises the refresh intervals of all displays to an external signal. While framelock synchronises the frame rate of each display to a signal generated internally by the hardware.

Configuring Genlock

Genlock and framelock can be configured directly in the following ways:

- Using the Feed View in Designer (Recommended)
- Using the Graphics Card control panels directly

In general, genlock should always be configured within the Designer software. We recommend using this workflow because you can apply genlock across all your machines with one button press.

In rare circumstances, such as custom workflows, or if you encounter a bug, you may need to configure synchronisation using the AMD or NVIDIA Control Panel directly. We have outlined both workflows below.

The genlock status of Disguise servers can be monitored in the Network Status Widget and is generally configured from the Feed View.

There are 2 types of genlock signals that Disguise Media servers support:

- BlackBurst
- Tri-Level

> **Note**
>
> **BlackBurst** (also known as bi-level sync) originated as a standard-definition reference signal, whereas **Tri-Level** sync was developed for high-definition formats. For this reason, we generally do not recommend BlackBurst as a genlock reference at resolutions above 1080p. It may work in some setups, but a stable lock cannot be guaranteed at these resolutions. For resolutions above 1080p, opt for a Tri-Level sync source instead.

Applying Genlock in Designer

To lock to genlock in Designer you should first access the Feed View

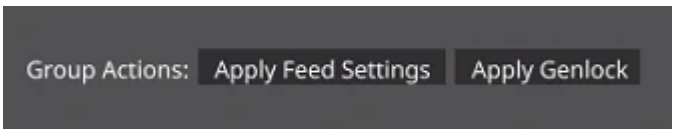
To genlock a Disguise Media Server correctly the following conditions must be met:

- VFC slot resolutions across all output heads must be the same
- VFC slot refresh rates across all output heads must be the same
- VFC slot timing modes across all output heads must be the same

These are requirements imposed by AMD and NVIDIA Hardware and apply to all graphics cards.

To apply genlock using Designer:

1. Ensure that a genlock cable with a valid genlock signal is plugged into the BNC port marked “Genlock” on the back of the server.
2. In the Dashboard, left-click on **Feed** to access the **Feed View**.
3. Validate that the genlock signal is being received by the server by looking for a message underneath the Machine name in the Feed View. This should say “Genlock: Present (unused)”.
4. Left-click **Apply Genlock** to configure all machines in the session. **A machine does not need to be running Designer to have feed settings applied**.

   Group Actions Buttons
5. Disguise will now begin configuring the GPU on all machines to accept the correct genlock signal. The screen will go black and there will be status text explaining the process.

6. Wait for the process to finish. This may take a few minutes. Once finished, you will see a coloured icon within each VFC card header indicating whether that VFC card is genlocked. If the indicator is green, this means that the machine has locked successfully.



Genlocked Feed Scene Example

You can follow the same process to apply genlock to a single machine without affecting the others by right-clicking on the Machine name in the left of the output heads in the Feed View and selecting the **Apply Genlock** button.

When genlock is not present on a system the **Apply Genlock** button is replaced with an **Apply Framelock** button which only applies framelock. This is also true on systems that do not support genlock, like the Solo.

> **Note**
>
> Pressing **Apply Feed Settings** will also apply genlock. Pressing **Apply Genlock** will not apply feed settings. Pressing **Apply Feed Settings** will not do anything to Non-Dedicated Directors, but pressing **Apply Genlock** will.

Applying Genlock outside of Designer

We always recommend applying genlock in Designer because you can do it across multiple machines and it is less error-prone.

If you encounter issues with this workflow sometimes a good fallback is to use the NVIDIA or AMD-provided genlock configuration.

For AMD this will be via the **AMD Software: Pro Edition** Control panel.

For NVIDIA this will be via the NVIDIA driver Control Panel settings.

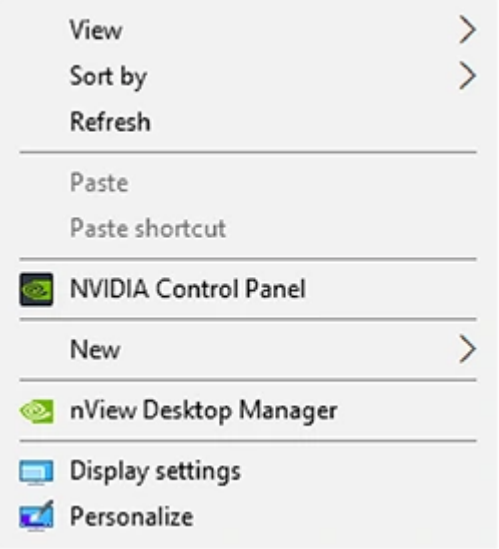
For assistance with configuring genlock please contact **Support**.

Configuring Sync using Graphics Card-Provided Control Panels:

Genlock

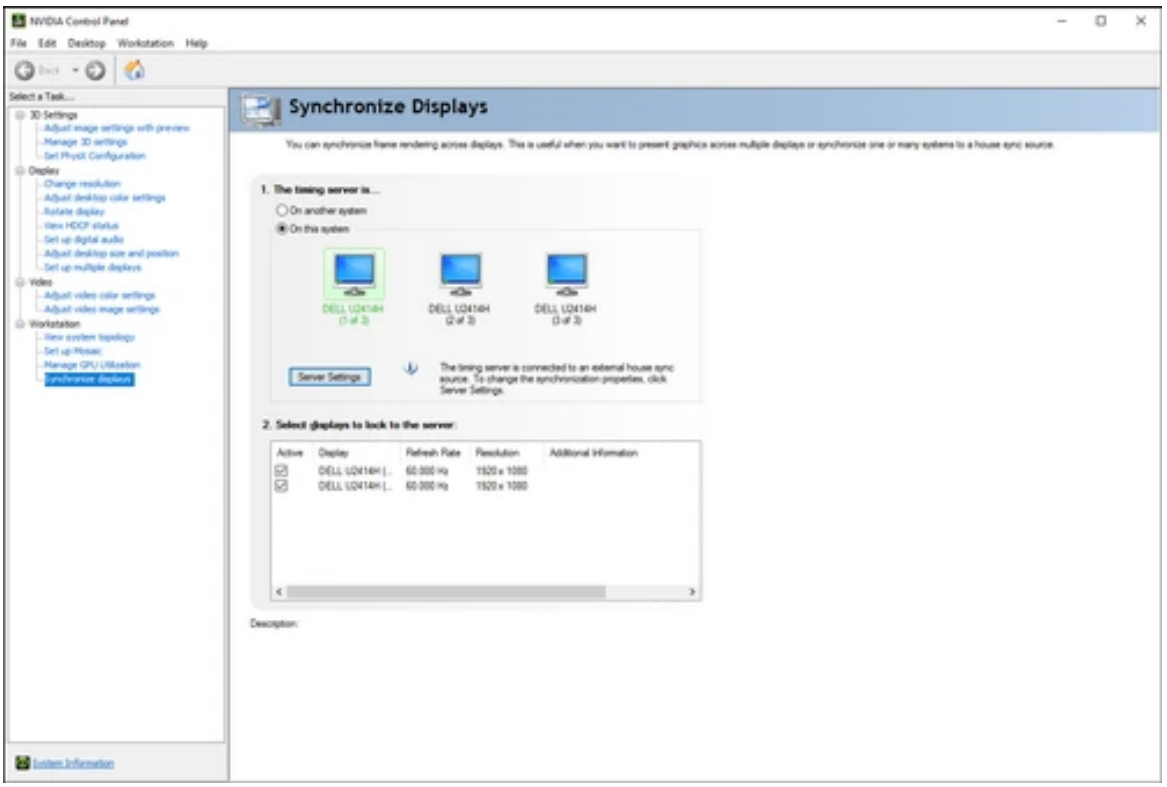
To apply genlock on NVIDIA Machines:

1. Right-click on the desktop and open the **NVIDIA Control Panel**.

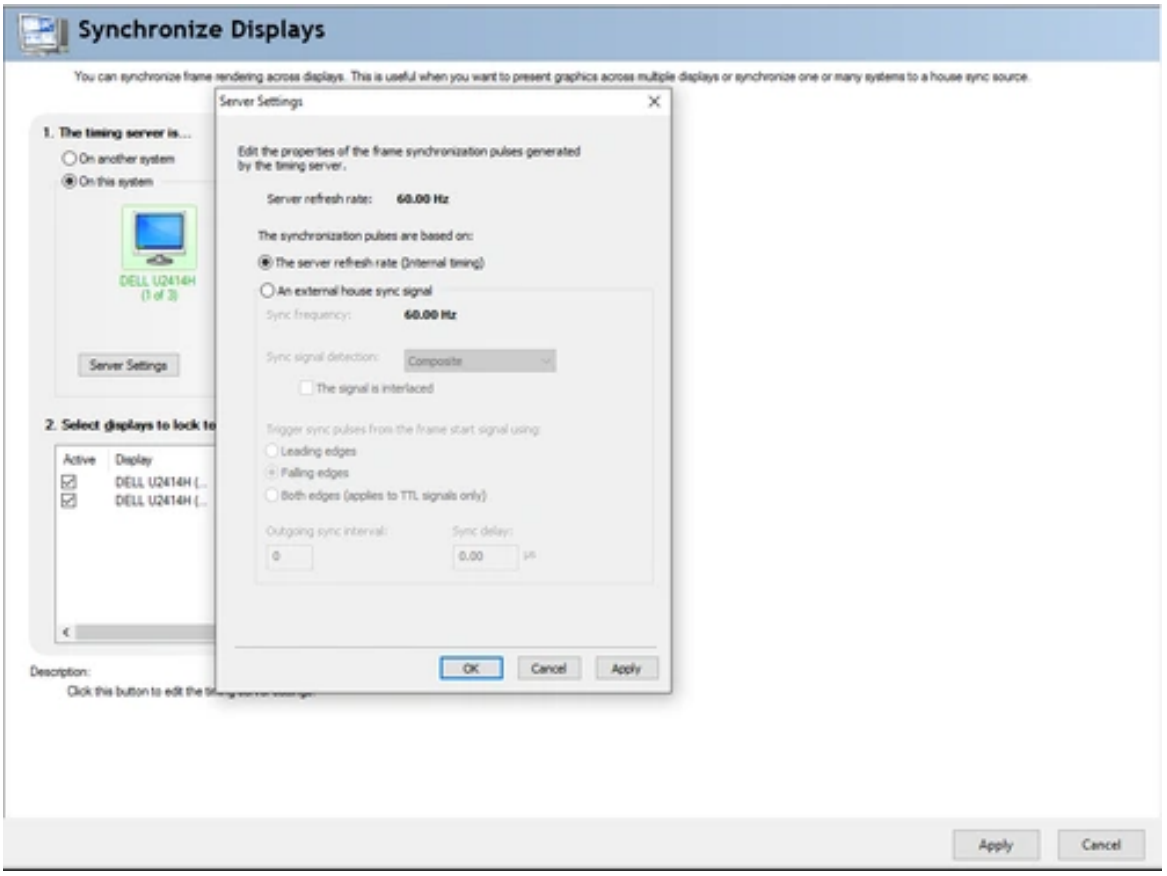


2. Click **Synchronize Displays** under Workstation.
3. In the open **Synchronize Displays** tab, under **1. The timing server is...** select **On this system**.
4. Select the displays to genlock to the server and ensure that the checkboxes are ticked below under **Select displays to lock to the server:**.

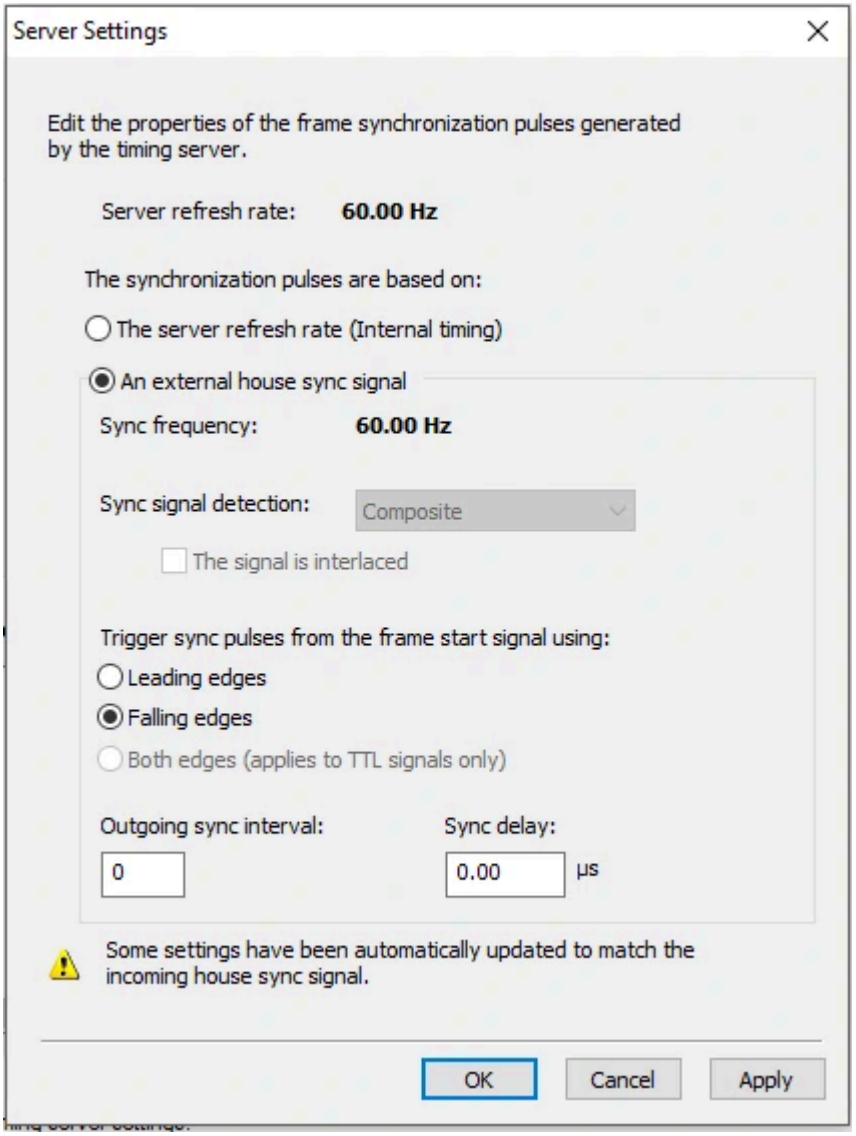
5. With all displays selected, select your main display and click the **Server Settings** button.



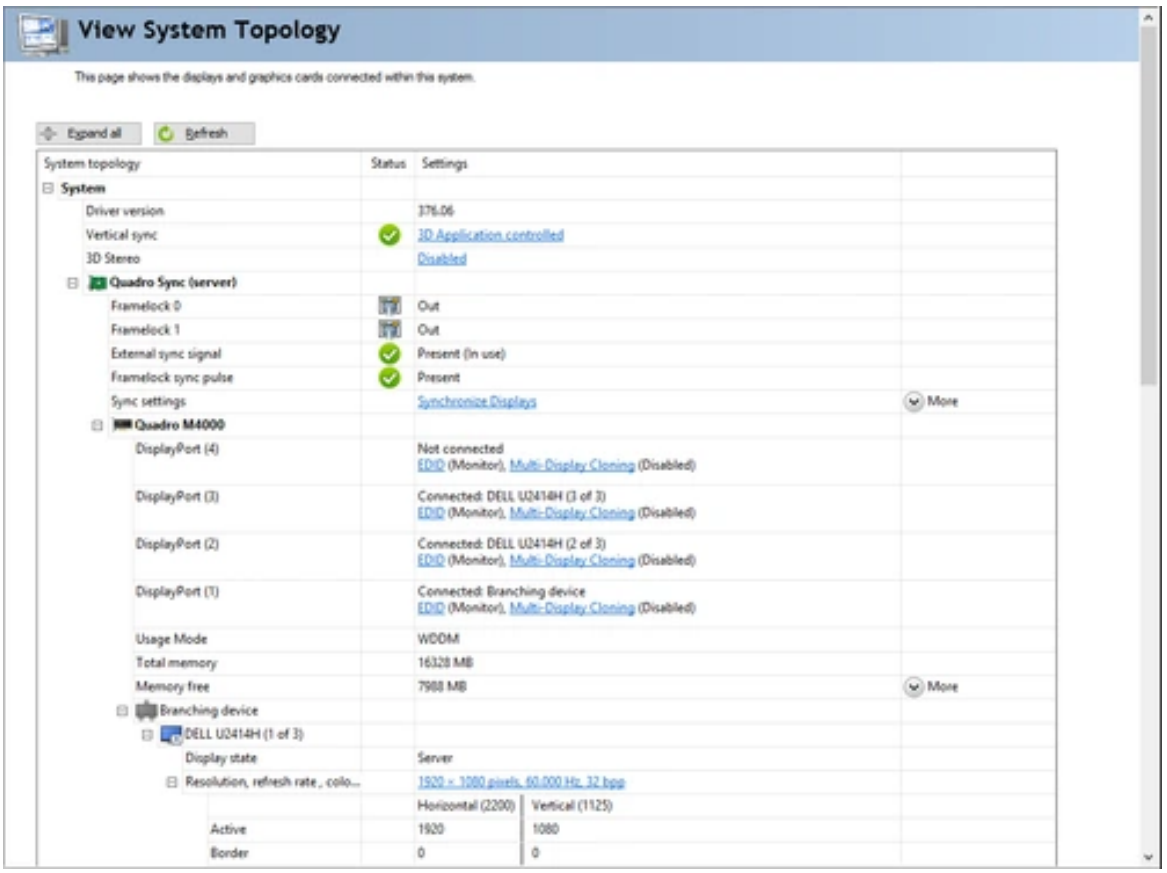
6. The Server Settings pane shows the current synchronisation settings. Under **The sychronization pulses are based on:**, select **An external house sync signal** and click **Apply** to confirm the changes before clicking **OK**.



7. Select **View System Topology** under Workstation. Genlock has been completed if the **External sync signal** has a green tick next to it and the settings are **Present (In use)**.



8. Click **Refresh** to update the configuration.



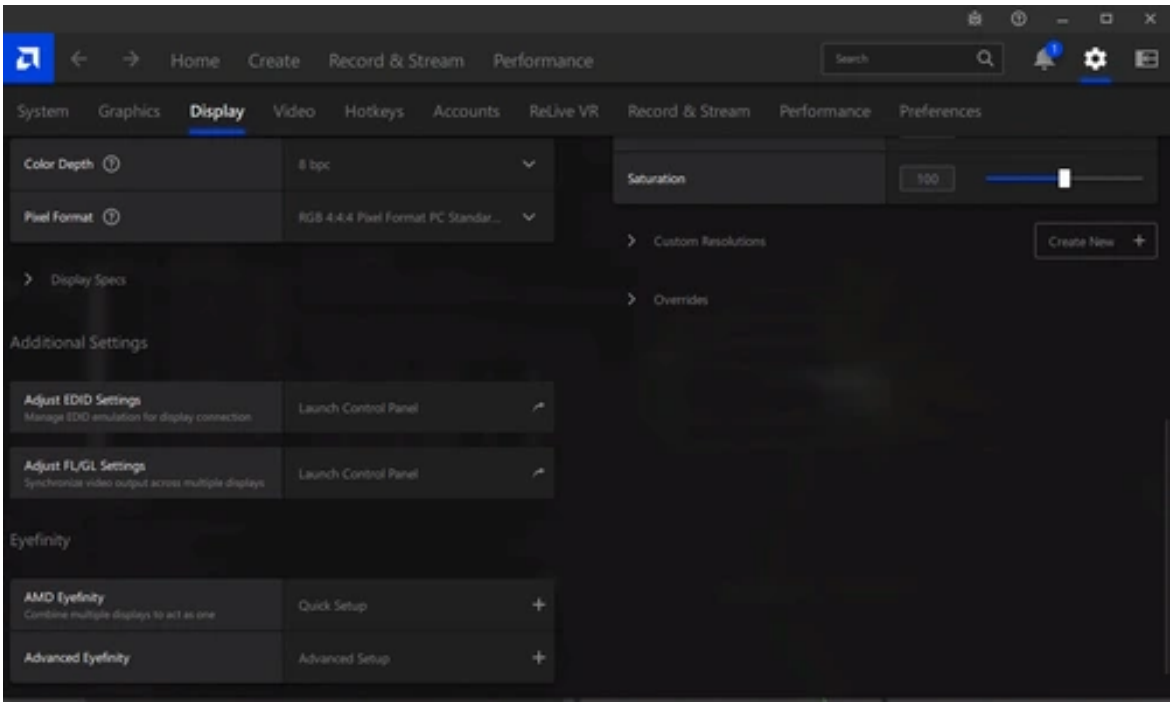
> **Note**
>
> The VX 4 OS and VX 4+ OS both have different driver options but do have almost identical workflows, the images below should help clarify, but if you have issues please contact **support**

Accessing Genlock settings is different for the VX 4 and VX 4+:

Right-click on the desktop and select **AMD Radeon Pro Advanced Settings**.



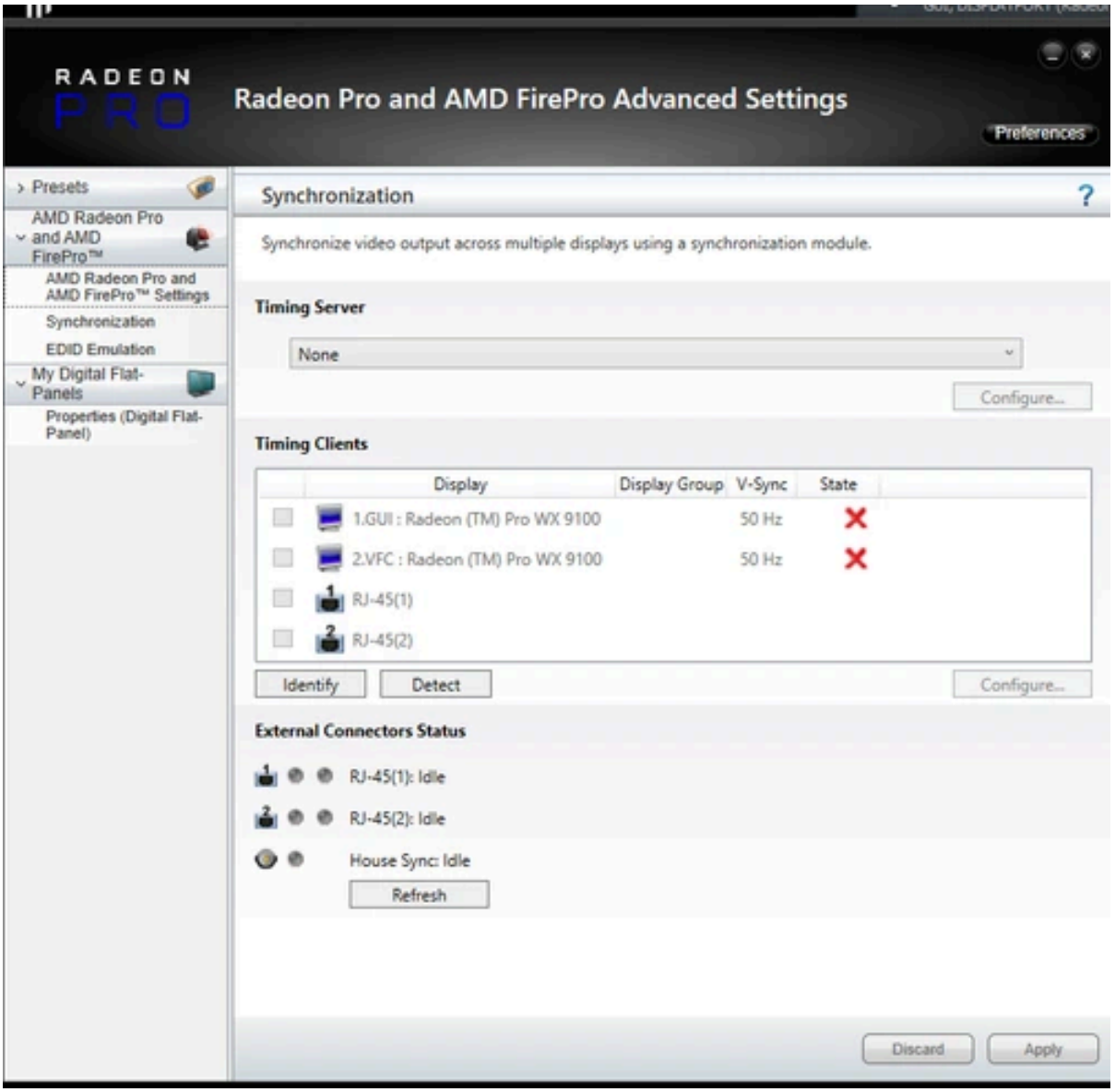
This will open up a reskinned version of the AMD Control Panel.



1. Right-click on the desktop and open the VX 4+ AMD Driver.
2. Select the **Displays** tab.
3. Scroll down and select the Adjust FL/GL **Launch Control Panel**.
4. This will open up a reskinned version of the AMD control panel in Blue workstation graphics branding.

Once you've got the correct GUI open follow these instructions:

Shared Advanced Pages and Syncronisation



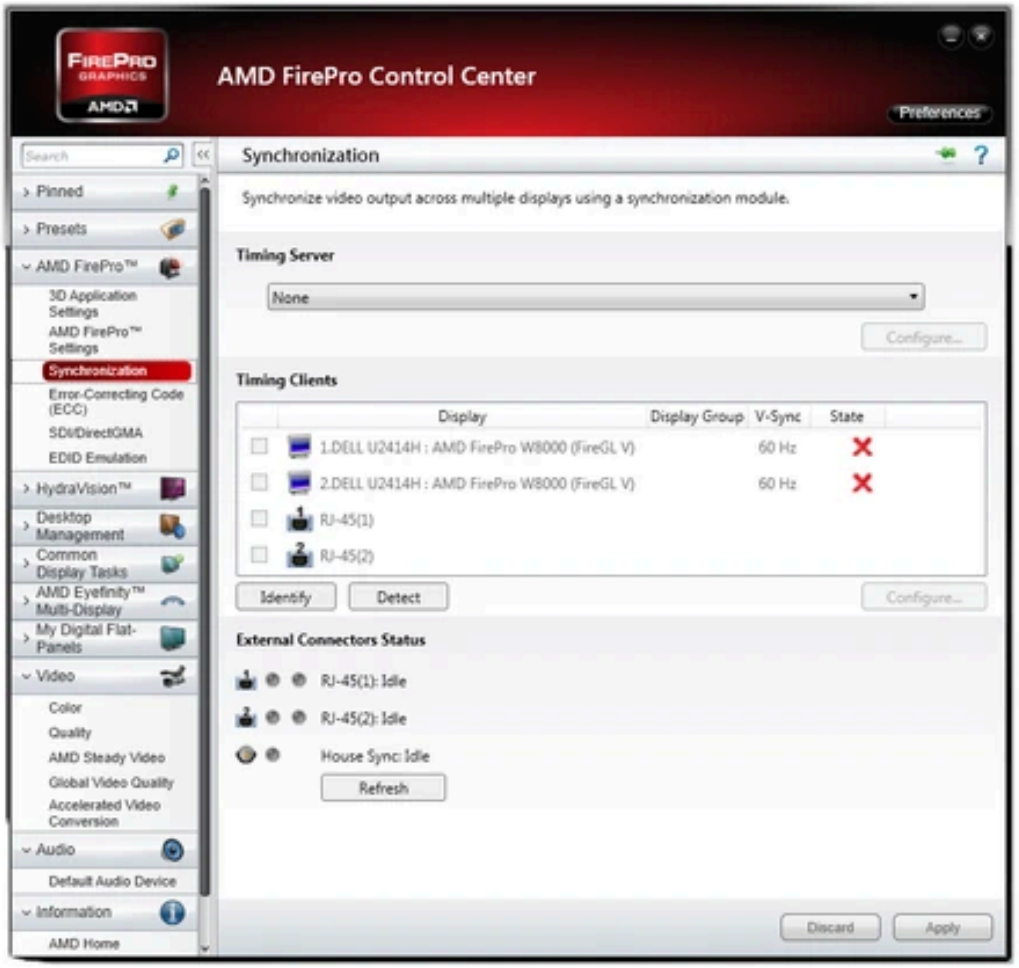
1. Under the syncronisation tab, left-click **Refresh** under House Sync.
2. Wait for the House Sync indicator to go green, indicating displays are receiving Genlock.
3. Select each display under **Timing Clients** that you wish to lock to the Genlock source and click **Apply**.
4. Your selected displays are now genlocked.
5. Under the syncronisation tab, click refresh under House Sync.

For any AMD machines that were released before the VX 4 follow these steps:

1. Right-click on the desktop and select **AMD Fire Pro Control Center**.



2. Open the **AMD Fire Pro** tab and click on **Synchronization**.



3. Under the **Syncronisation** tab, left-click refresh under House Sync.

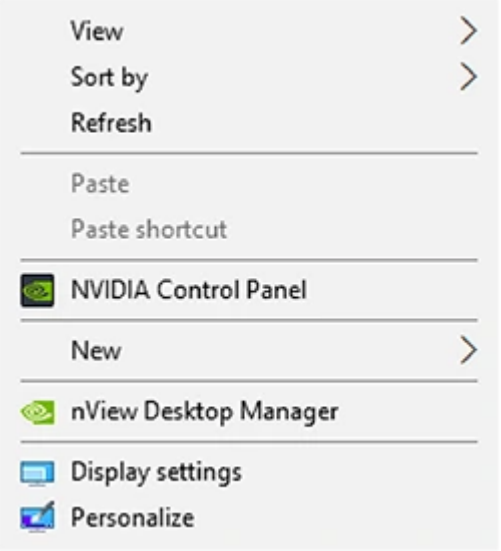
4. Wait for the House Sync indicator to go green, indicating displays are receiving genlock.
5. Select each display under **Timing Clients** that you wish to lock to the genlock source and click **Apply**.
6. Your selected displays are now genlocked.
7. Under the **Syncronisation** tab, click **refresh** under House Sync.

Framelock

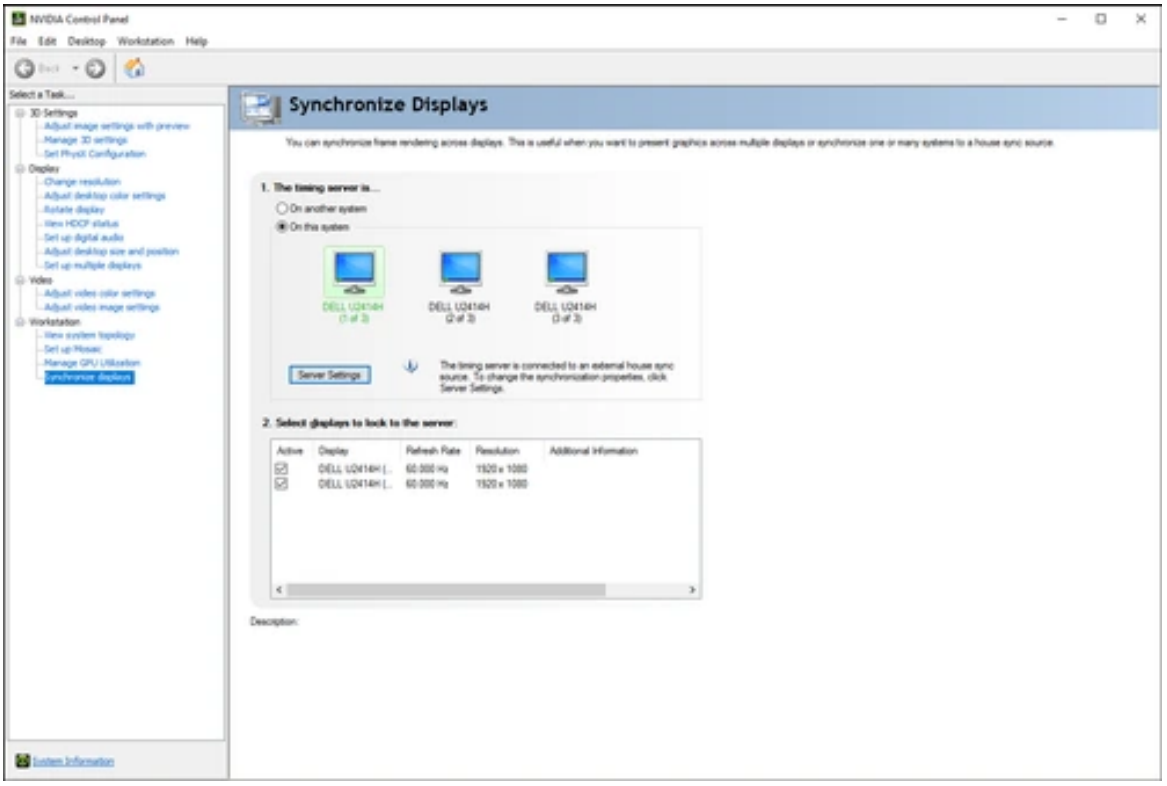
You can also apply Framelock directly in the NVIDIA or AMD software.

To access the Nvidia Control Panel for Internal Timing:

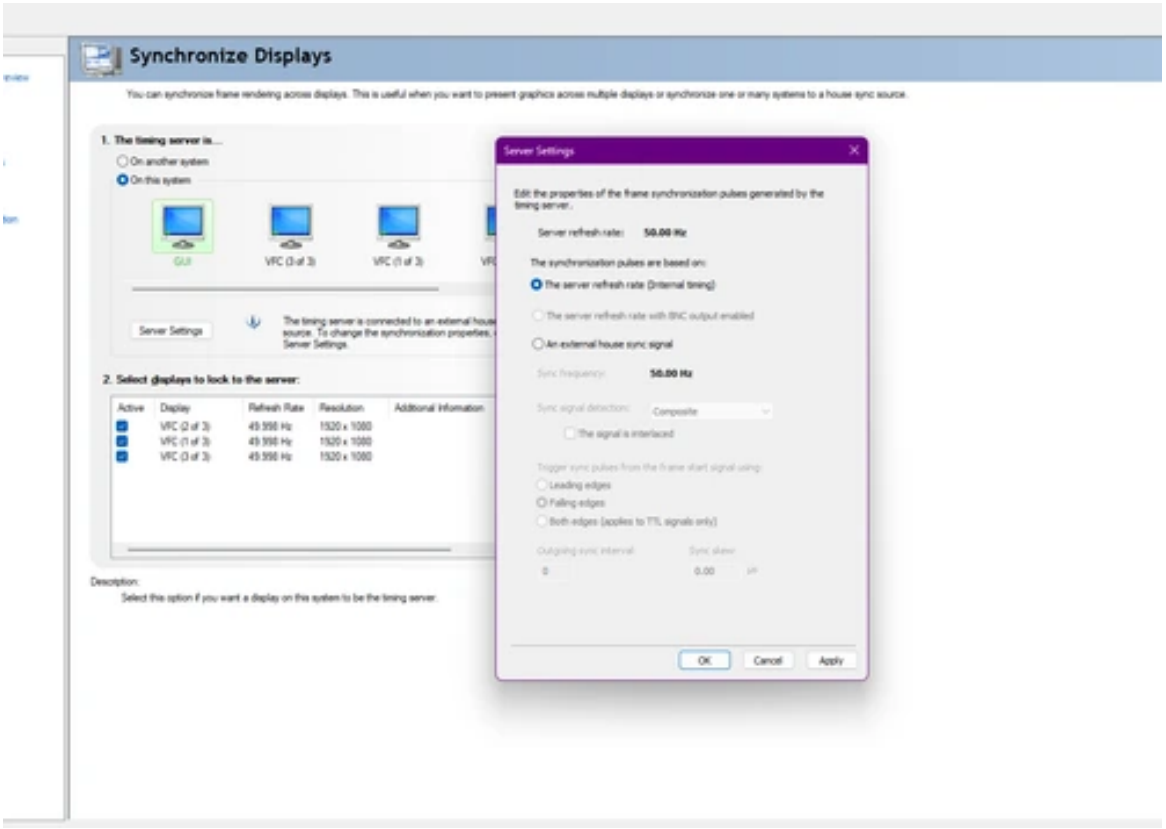
1. Right-click on the desktop and select the **NVIDIA Control Panel**.



2. The Synchronize displays tab should automatically open. Ensure that the boxes are ticked below. After all displays are selected go back to highlighting your main display and select the **Server Settings** button.



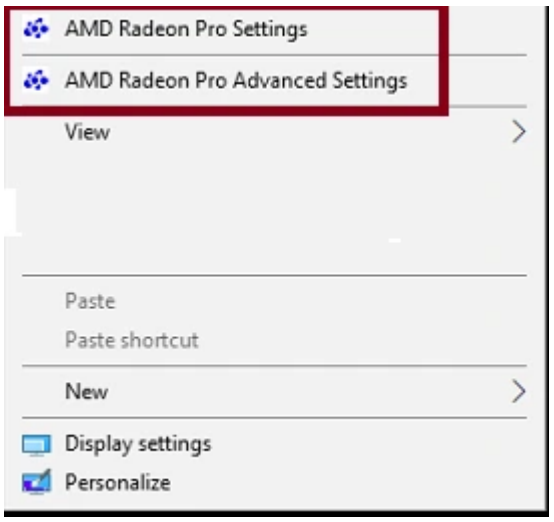
3. The Server Settings popup will show what the current Synchronization is. Change the selection from Internal timing



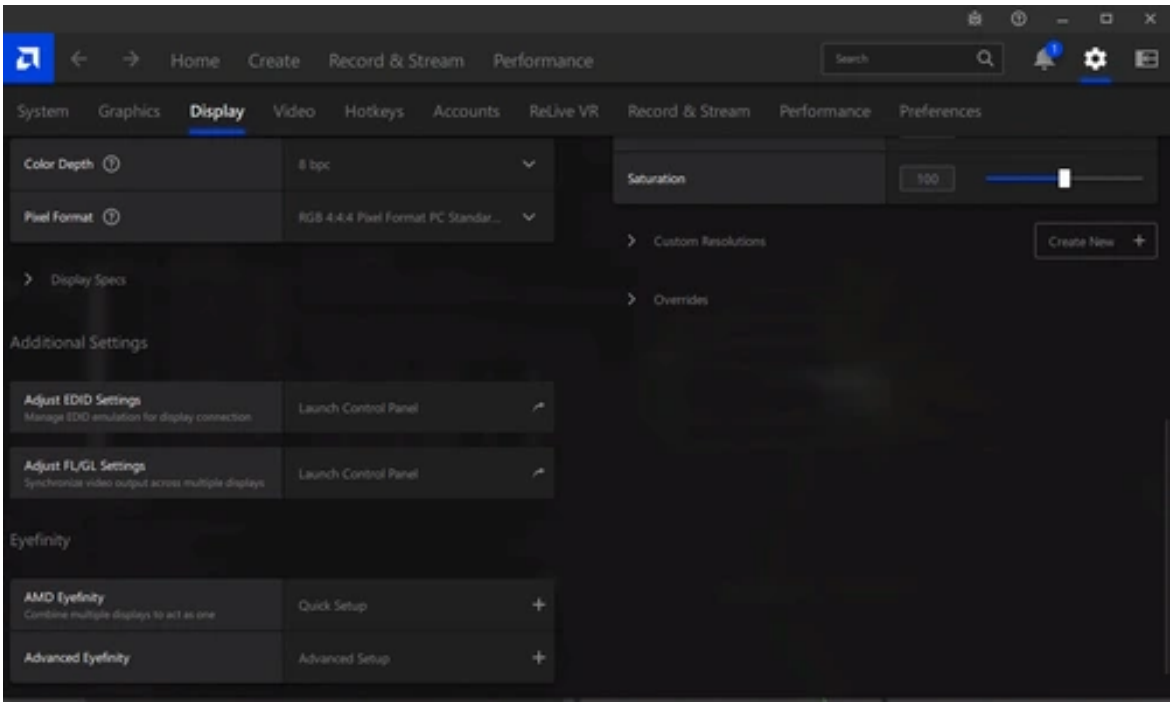
> **Note**
>
> The 4X4/VX 4/VX 4+ have different driver options with almost identical workflows, the images below should help, but if you have issues please contact support

To access the driver settings, please see the relevant machine types below:

1. Right-click on the desktop and select **AMD Radeon Pro Advanced settings**.



This will open up a reskinned version of the AMD control panel

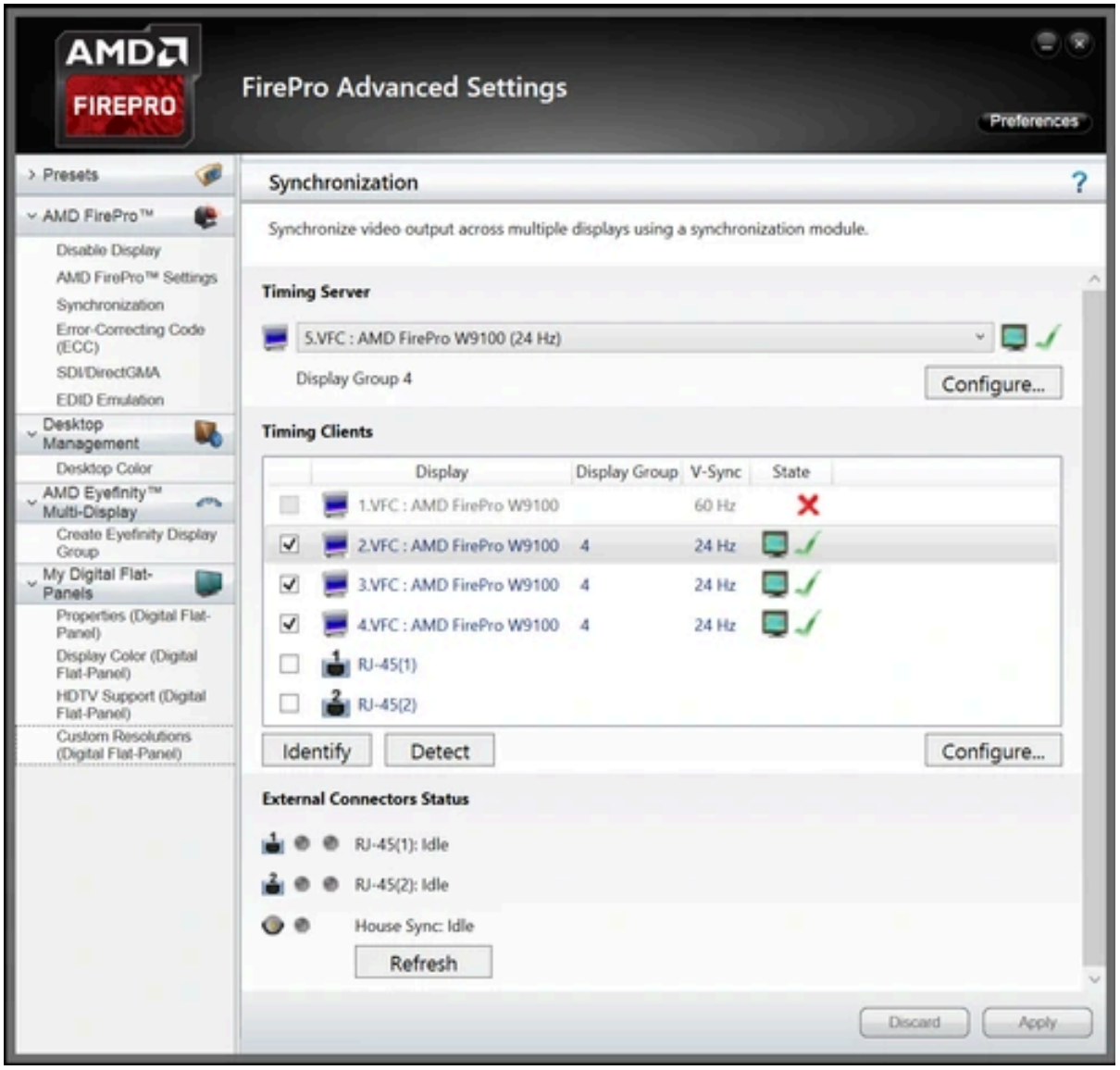


1. Right-click on the desktop and open the VX 4+ AMD Driver.
2. Navigate to displays.
3. Scrolling down, select the Adjust FL/GL **Launch Control Panel**.
4. This will open up a reskinned version of the AMD control panel in Blue workstation graphics branding.

Once the driver has been accessed below, please see the following images and instructions:

1. Click on **Synchronization**.
2. Under the Timing Server tab, select the last listed display, (for example in the image shown it is number 5.)
3. Tick all screens that you wish to sync in the list below.
4. Your selected displays are now Internally Framelocked.

Use the reference image below to see how the correct setup will look.



System Configuration Recommendations

To ensure output and data synchronisation across your cluster of machines, Disguise Media servers should be genlocked where possible.

When to Genlock Machines?

We recommend genlocking your machines whenever possible. Here are some examples of instances where it is particularly critical to performance and synchronisation:

- **Multi-Machine Setups**: When you are using multiple disguise media servers or machines in a synchronized environment, genlocking is essential to ensure that all machines output frames at the same time, preventing/reducing tearing. While it is not strictly required to also genlock a Dedicated Director in a multi-machine setup, it is still recommended.
- **Camera-Server Configurations**: If you are working with a camera-server setup, genlocking is crucial to synchronize the camera's output with the server's frame output. This synchronization helps to ensure the camera and output are capturing the same frames consistently while also reducing camera latency.
- **External House Sync Requirements**: If your production environment requires synchronization with an external House Sync signal, you should Genlock your machines to ensure they are in sync with the house signal.

When to Internally sync machines?

We recommend Genlocking your machines whenever possible. Here are some examples of instances where internal sync may also be sufficient:

- **Singular-Machine Setups** When you are using one or two disguise servers or legacy machines such as the Solo / Machines without Genlock cards, you may find that framelock keeps the outputs of a server in sync. A good example of this would be a singular Director/Understudy, since only one machine is outputting, machines do not need to be frame accurate between each other.
- **No Camera Input Shows** If no cameras are being utilised and timing with external systems is not needed you may find that Genlock is not required and framelock will keep outputs consistent.

Interlaced Genlock and VFC Behaviour

When using the SDI VFC cards with an interlaced video signal there is a chance that the output signal from the VFC card will not match the field of the incoming Genlock signal. To correct this state it is necessary to repeat the **Apply Feed Settings** process, this will re-sync the VFC card and reset which field is being output.

Due to GPU genlock limitations, this process may need to be repeated until the VFC card field sync matches that of the incoming genlock signal. In a session with multiple machines, this should be repeated across all machines at the same time to ensure they are locked to the same field together.

Glossary terms

- **Genlock**: A mechanism to synchronise multiple devices to a “clock source,” allowing them to coordinate with each other and external equipment. Genlock keeps multiple Disguise servers in sync allowing external integration with cameras/LED devices
- **Framelock**: A mechanism within GPUs that keeps individual outputs of the same server in sync.
- **Internal Sync**: A mechanism within GPUs to individually lock to a locally generated Genlock source.

Indirections

Indirections are primarily used for switching out pre-programmed content on the fly. They can be used for situations where the user may wish to change objects under certain scenarios such as triggering of an external system or changing playback to match different talent performing on stage.

Indirections are controlled by Indirection Controllers, which are available in the following types:

Manual

Holds a single resource that the Indirection uses. They can be manually controlled via the UI or via the new Indirections API, documentation for which can be found at **http://localhost/docs/v1/index.html** when Designer is installed.

List

The list controller type holds a list of objects and has an index for which object they refer to. The list can be controlled manually via the UI or via the Indirections API.

SequencedIndirectionController

The Indirection Control layer allows indirections to be sequenced on the timeline. Users can sequence indirection changes on the timeline. One Indirection Control layer controls one indirection. This is controlled by keyframes in an IndirectionControl layer.

Learn more about the IndirectionControl layer **here**.

OSC

The OSC controller holds an address, for example - “/d3/indirection/name” and an OSC device. It’s controlled by sending a string to Designer via OSC in the following format:

Address: /d3/indirection/nameOfIndirectionToControl

Message: sample/george.jpg

Sending a message with an empty string will set the value to **None**. We expect to only receive OSC messages when the string changes. Sending the same path repeatedly will incur a performance cost.

DMX

The DMX controller holds a channel and a universe. It's controlled by sending a value on that channel/universe that corresponds to a DMX bank & slot.

> **Warning**
>
> OSC and DMX Indirection controllers can be set to any object that you've specified or put in a bank/slot which means you must take care to select the correct type of object. If you set a keyframe indirection to an object that does not match the key sequence it is sequenced in (i.e. you set your Indirection to reference a mapping when it expects a videoClip) the indirection will instead switch to holding None.

UDP & TCP

The UDP & TCP controllers hold a string-keyed list of objects. They are controlled by sending a raw UDP or TCP message with the specified string to select the associated object.

UDP sockets can only be bound to one port, this means that a UDP ports can only be used by one Indirection controller at a time.

> **Warning**
>
> OSC, DMX, UDP and TCP Indirection controllers do not hold their values through restarts of Designer.

Workflow

- An Indirection acts like a "dynamic" keyframe.
- The dynamic keyframe has a controller attached to it.
- The controller gets values sent to it.
- Based on those values the resulting output can be changed temporarily.

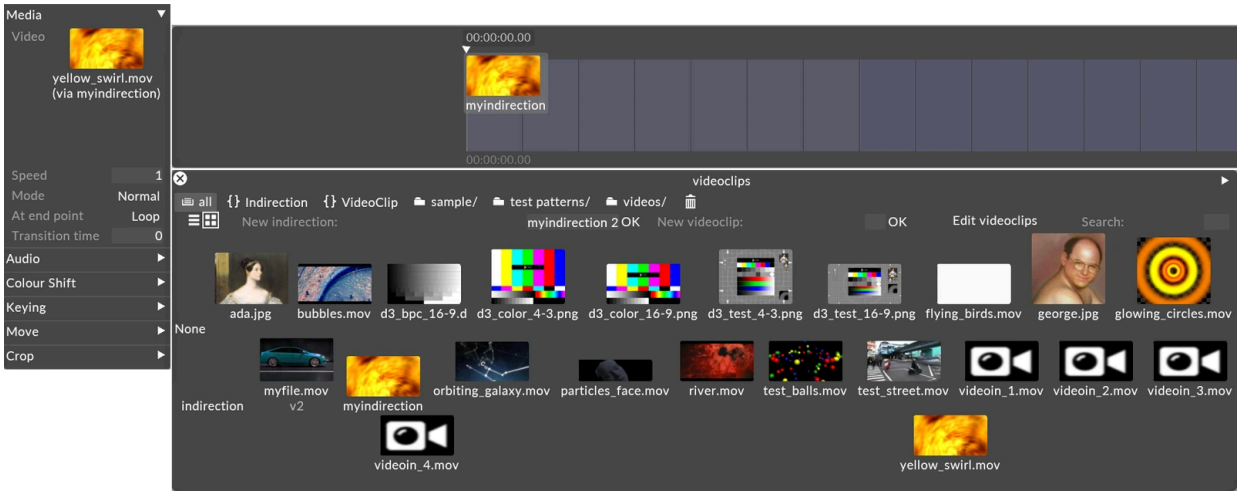
Examples

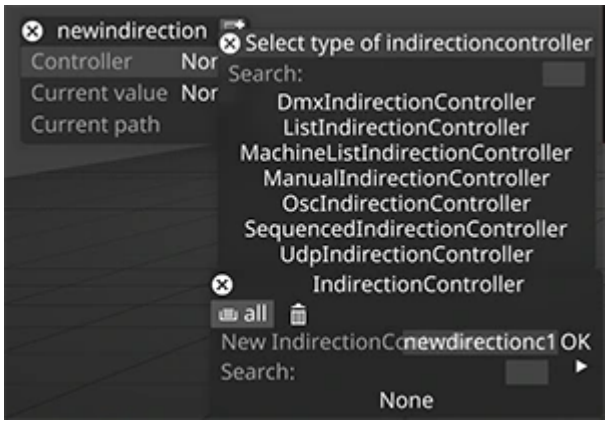
Manual

Manual indirections are extremely useful if you want to make a quick change to a defined resource via Designer user interface. For example, swap out a logo during a corporate event.

1. Open a content layer, such as Video.
2. Open the keyframe editor for the resource you wish to change, i.e. videoClip.

3. Create a new Indirection.
4. Give the Indirection a unique name.
5. In the Indirection create a controller.
6. Choose the manual controller type.
7. In the manual controller, choose a resource to assign to the controller.
8. Once this is done, the resource can be changed and the layer is updated.







List

List is a useful controller for when you have a small selection of resources you wish to change out or swap between. For example toggling between two pieces of media for when a different performer is covering for someone during a show.

1. Open a content layer, such as Video.
2. Open the keyframe editor for the resource you wish to change, i.e. videoClip.
3. Create a new Indirection.
4. Give the Indirection a unique name.
5. In the Indirection create a controller
6. Choose the list controller type
7. In the list controller, choose resources to assign to the controller. a. Resources can be re-ordered like other lists in Designer. Drag the items up and down to re-order. b. The index value cycles through resources, so the ordering of the list is important. c. The Index value can have an expression which can be linked to an external device, for example a midi controller. This expression can be temporarily switched off and on with the `=` / `//` button beside it, in the same way as a layer expression.
8. Once this is done, the resource can be changed and the layer is updated.



OSC

The OSC indirection is useful if you want to create a more complex front end interface on a device such as an iPad, or apply logic to your Indirections.

1. Open a content layer, such as Video.
2. Open the keyframe editor for the resource you wish to change, i.e. videoClip.
3. Create a new Indirection.
4. Give the Indirection a unique name.
5. In the Indirection create a controller.
6. Choose the OSC controller type.
7. In the OSC controller, choose values to assign to the controller.
    - Set the OSC device that the controller is receiving data from.
    - Set the OSC address that the controller is listening to.
8. Once this is done, the resource can be changed and the layer is updated.



DMX

DMX is useful for being able to change Indirections via a lighting desk, much in the same way sockpuppet works, but without needing to set up a full sockpuppet programming workflow.

1. Open a content layer, such as Video.
2. Open the keyframe editor for the resource you wish to change, i.e. videoClip.
3. Create a new Indirection.
4. Give the Indirection a unique name.
5. In the Indirection create a controller.
6. Choose the DMX controller type.
7. In the DMX controller, choose values to assign to the controller.
    - Set the universe & address.
    - Ensure the resources you wish to control are exposed in the bank assignments, much like sockpuppet.
8. Once this is done, the resource can be changed and the layer is updated.



UDP & TCP

The UDP Indirection is useful for more complex use cases where an external system is running logic to decide which Indirections are being used.

1. Open a content layer, such as Video.
2. Open the keyframe editor for the resource you wish to change, i.e. videoClip.
3. Create a new Indirection.
4. Give the Indirection a unique name.
5. In the Indirection create a controller.
6. Choose the UDP or TCP controller type.

7. In the UDP or TCP controller, choose resources to assign to the controller.
    - Set the key(s) for your resource(s).
8. Once this is done, the resource can be changed and the layer is updated.



Scheduling Events

A **Schedule** is useful for long-term running or permanent installations. It allows you to schedule track change events that occur regularly over long periods of time (days, weeks or even months).

> **Note**
>
> **Please note**: the Scheduler is merely a device for switching tracks based on the specified time. It is not a mechanism for powering down hardware or quitting Designer. It is possible to schedule a time for Designer to exit and close using the **Scheduled Exit** feature. For more information please see the Exiting a project sub-chapter.

How the Scheduler works

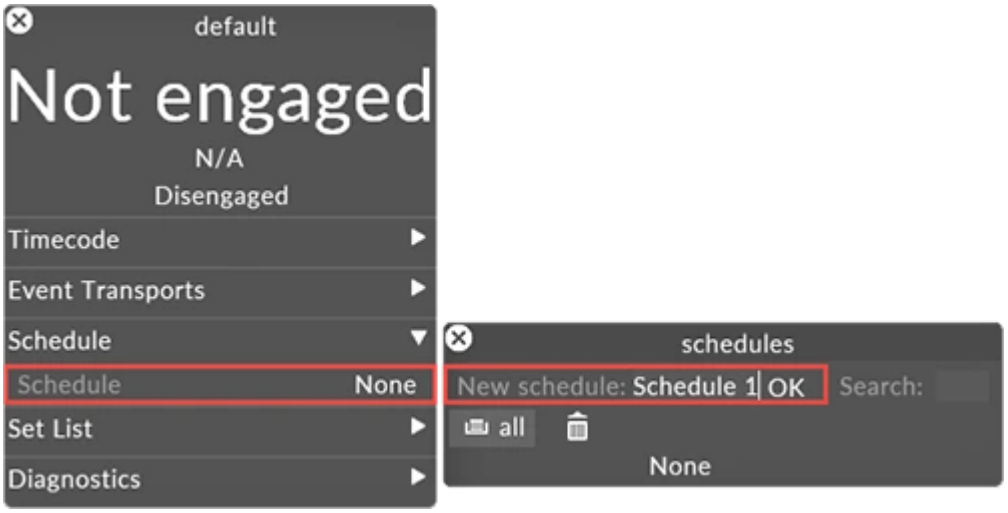
The scheduler behaves in the following manner:

1. The scheduler will go down the list of events to see what to do
2. The scheduler will keep going down the list until it finds an active event
3. As soon as it finds an event that is active it will switch to it
4. Repeat the above steps.

To move the events up/down the scheduler list, simply drag and drop them

Create a schedule

1. Left-click the schedule property in the Transport Editor. This will open the Schedules manager which contains a list of all of the schedules available.
2. Type the name of the new Schedule into the new schedule text field.
3. Hit Enter. This will create the new schedule, add it to the Schedules manager, and open the Schedule manager. The Schedule manager consists of an ordered list of events.



Events are also referred to as schedule items. A schedule item specifies a track trigger event. For example, a schedule item can say: trigger track X for a set duration, repeating on a chosen interval, between the hours of A and B and on dates C to D.

Schedule properties

On startup

The playmode the Schedule sets when the project starts: **Stop**, **Play**, **Play to end section**, or **Loop section**.

Transition

How the Scheduler switches between tracks:

- **Cut** — a hard cut straight to the new track.
- **Fade** — fades to black between tracks.

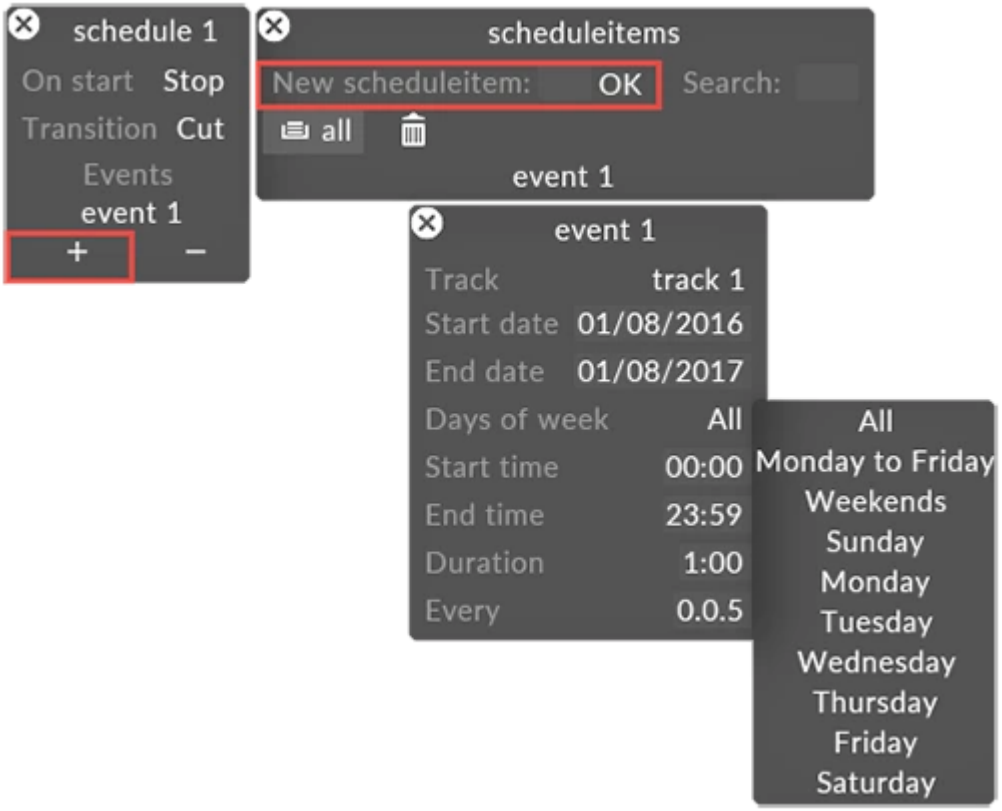
Events

The ordered list of schedule items. The first active item in the list wins, so place higher-priority items (for example, a track that must play on the hour) nearer the top.

Add a schedule item to the Schedule

1. Left-click **+**. This will open the scheduleitems manager which contains a list of all of the schedule items.
2. Type the scheduleitem name into the new scheduleitem text field, in this example the event morning.

3. Hit Enter. This will add the schedule item to the schedule menu and open the Scheduleitems editor.



As an example, the Schedule object called schedule 2 has been edited to contain one event called morning. Morning will be active for five minutes every hour, starting at 9am and ending at 4pm, between the 1st of November and the 15th of December, all days of the week.

Schedule item properties

Track

Specifies the track that will be triggered.

Start date, end date

Specifies the date range over which the event is active. The format is `dd/mm/yyyy` (a two-digit year is also accepted).

Days of week

Specifies which days the item applies on: **All**, **Monday to Friday**, **Weekends**, or a single day (**Sunday** to **Saturday**).

Start time/end time

Specifies the time range during the day that the event will be active. The format must be `hh:mm`.

Duration

Specifies how long the track stays active each time the event triggers. The format is `hh:mm`.

Every

Specifies how often the event re-triggers within its time window — the repeat interval. The format is `hh:mm`.

10-bit Content

10-bit content is a newly supported feature in r16. This topic aims to show some of the known workflow challenges to be aware of.

- 10-bit content is added to project just like any other content. See placing media files for more information.
- 10-bit content can be played back regardless of whether is in 8-bit or mode.
- Only DPX content has received a full performance test.
- DPX files cannot have alpha channels.
- NotchLC is supported. This is technically the highest performance format supports.
- Embedded HDR data is not currently supported. Tone maps (LUT file's) must be applied on the output.
- The bit depth of DPX sequences is not given when in 8-bit mode.

10-bit file format support is as follows:

- Files loaded from objects/DxTexture are downgraded to 8-bit in r16 regardless of original bit depth or current bit depth of d3.
- Files loaded from objects/VideoFile are downgraded to the current bit depth of d3.
- PNGs may be subject to some processing during downgrade.

Alembic Files

Alembic (.abc) files are animated 3D mesh objects that can be imported and used in Designer.

Configuring an Alembic file within Disguise

1. Open your project folder.
2. Copy your working Alembic file into the Mesh folder.
3. Run your project.
4. Right-click on the **Stage** menu.
5. Left-click on the venue to assign one to the project. If the default 'none' is selected, create a new venue.
6. Right-click on the venue name and click on the **+** symbol to add a new prop. A prop can be a regular mesh or Alembic file located in the Mesh folder.
7. Right-click on the name of the newly created prop and under the Mesh property, select the Alembic file.

Playing back an animated Alembic Mesh

The recommended way to play back an animated Alembic Mesh is using the scene animation layer.

Alternatively, the legacy workflow is as follows:

1. In the timeline, create an **AnimateObjectPreset** layer.
2. Left-click on the layer to open it's layer editor, and open the keyframe editor for the Config tab.
3. Create a new screen configuration named "off" and hit the + icon to add the Alembic prop to the layer. Leave all fields at the default `0`.
4. Duplicate this configuration and name it "on"
5. Right-click on the header bar to open the "on" configuration's properties menu, and set the **Animate** field to 1.
6. Keyframe these two configurations to have the Alembic file animate in the visualizer. The time between the "on" and "off" configurations will determine the speed the animation plays back.
7. Enter a playmode in the timeline to see the file animate.

Recommended Blender settings for object animation and export

> **Note**
>
> If you have any questions about the UI or specific animation workflow of Blender, it is best to contact Blender support. This guide is intended only for the specific export settings needed with the Disguise workflow.

1. Set the project's units to **Meters**.
2. Import or create the mesh of your prop object in Blender.
3. Create an empty and animate it with either the keyframe or graphs editor.
4. Attach this null to your object using an object constraint or modifier.
5. Play your animation to ensure that the object is now attached to the null.
6. Select the null and the object.
7. Export the Alembic file using the below settings:
   - Renderable Objects Only
   - UVs
   - Pack UV Islands
   - Normals

Important Notes about Alembic Files

Alembic files can be used both as prop objects and as content screens. As with OBJ files, an Alembic file used as a content screen must be UV-mapped.

There are some restrictions on the types of Alembic files supported in Disguise. Please refer to these recommended Alembic export settings if your custom Alembic file is not rendering within Disguise.

The object must not contain:

- Curves
- Points
- Camera
- SubD
- NuPatches
- FaceSet
- Light
- Material
- Custom data

Archive Unused Objects

Archive Unused Objects is a legacy tool designed to provide utilities to quickly remove unused files from a project. It allows you to do 2 things:

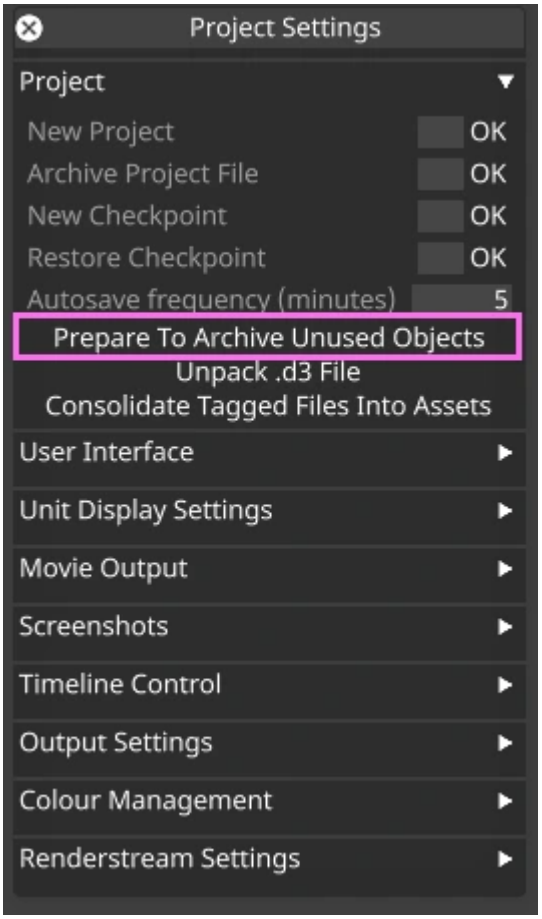
- Move all unused media out of your objects folder and into an archive folder.
- Copy your project to a clean folder with only the used media.

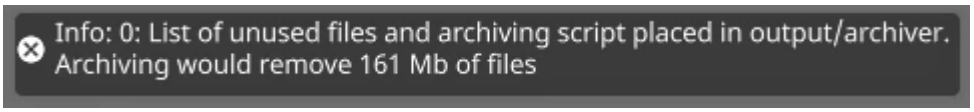
“Media” refers to anything in the `objects` folder, including video files, audio files, notch blocks, images, meshes, etc. A piece of media is considered “Unused” if it is in the `objects` folder but is not sequenced anywhere on any track or any layer (including exported or saved layers). Old versions of media are still considered “Used” if that media is sequenced somewhere. If you want to remove old versions of media, you can use the manage old media workflow.

Preparing to Archive Unused Objects

To archive unused objects, follow these steps:

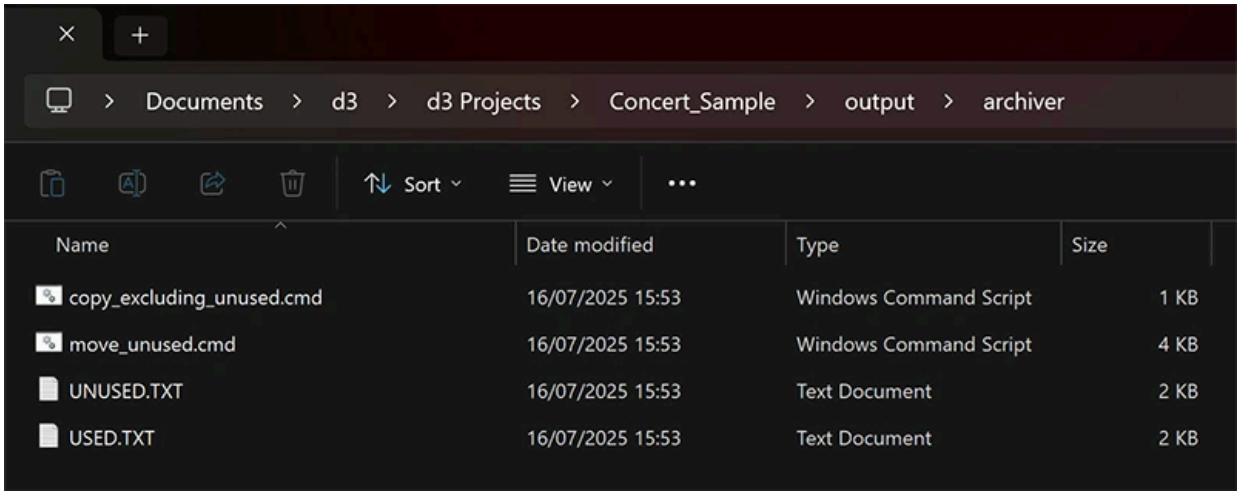
1. In Designer, right-click **d3** to open the **d3 State** menu in the dashboard.
2. Left-click **Project Settings**.
3. Left-click **Prepare to Archive Unused Objects** under the **Project** drop-down.





This causes Designer to create a new folder within the project folder called `output/archiver`, which contains two text files:

- **USED.TXT**: a list of all the media that is currently used somewhere in the project
- **UNUSED.TXT**: a list of all the media that is present in the `objects` folder but is not used in the project.



It also contains two scripts for performing the two available actions:

- **move_unused.cmd**: This will move all of the unused video files within the `objects` folder to a new `archive` folder next to the project file. This will remove them from the `objects` folder if Designer is closed.
- **copy_excluding_unused.cmd**: This will make a full copy of the project folder in a location of your choosing and will exclude anything that was identified as `unused`.

> **Note**
>
> The scripts and text files are generated when you click **Prepare to Archive Unused Objects** and are not dynamically updated as changes happen to the project, so you must press the button each time you want to perform either archive script action after new content has been sequenced or ingested.

Running the Archive Scripts

To use each script, follow these steps:

Running the “Move Unused” Script

To remove all unused media from the `objects` folder with the **move_unused.cmd** script, complete the following steps:

1. Close Designer.
2. Double-click on **move_unused.cmd**.

Running **move_unused.cmd** with **Designer open** will **NOT** remove the files from the `objects` folder but will still copy them to the `archive` folder. Running the command with **Designer**

closed will only remove objects that are **NOT** already in the `archive` folder, so it is best to run this script with an empty `archive` folder.

Running the “Copy Excluding Unused” Script

To make a copy of the project folder with all the unused media removed using the **copy_excluding_unused.cmd** script, complete the following steps:

1. Create a folder in Explorer that you want to make the copy in.
2. Make sure that **UNUSED.TXT** and **USED.TXT** are still in place (the script will read these).
3. Drag that folder on-top of the **copy_excluding_unused.cmd** script in Explorer to run the script.

Content Management Overview

Content management is divided into three broad areas which consist of content version control, proxy management and frame replacement.

Content Version Control

- The software understands version tags in video filenames (_vXXX where XXX is one or more numerals, optionally followed by a letter).
- You can copy new content versions to actors while the software is running (as long as you're not trying to overwrite a file that's currently being played).
- When a new version of a file arrives, the software will automatically replace older versions on the timeline wherever they occur.
- You can drop any asset back to an older version instantly.
- Once new content arrives on a machine, it becomes available instantly, without having to refresh.
- If content is unavailable on actors, will warn you by colouring layers on the timeline (yellow for wrong version, red for no content).

Proxy Management

- In order to sequence large shows with multiple large video files on a laptop, you can substitute them with low-resolution versions (proxies).
- Proxy files are indicated by adding '_proxyXYZ' to the video filename, where XYZ is any number. Higher numbers indicate lower resolutions.
- In the visualiser, use your camera position (in stage view) or view position and zoom (in feed view) to select which proxy level to display.

Frame Replacement

- A new version of a video file can replace a subset of frames of the overall video file.
- Add the tag '_frameXYZ' after the Version Control tag ('XYZ' should be a frame number), and Designer will interpret the video file as a 'patch' to the file.
- This saves time when you want to replace single corrupted or erroneous frames in a clip, or short runs.

The Frame Replacement feature requires a Version Control tag greater than the file that's being replaced.
For example, to replace content from frame 130 of a file called "Video_v1.mov" one would need to name their replacement file as follows: "Video_v2_frame130.mov".

Media Ingestion History Tool

- Disguise analyses new content and displays them in the Media Ingestion History Tool.
- This is used to find and fix naming or spelling errors in filenames when they occur.

Content Versioning

Content versioning is a powerful feature of Designer that allows you to easily version and subsequently replace media files based on their file name. This is useful for shows where content development continues throughout rehearsals and Disguise programmers need a quick way of changing between different versions of an asset.

For more information on where to put media files, including video content see Placing Media Files.

New files may either contain :

- no version tag `myfile.mov`
- a numeric version tag `myfile_v2.mov`
- a date version tag `myfile_v20210602a.mov`.

Date version tags should be formatted **YYYYMMDDL**, where L is a, b, c... and so on.

Date version tags can also be extended to **YYYYMMDDHHMM** where **HH** is hour and **MM** is minute.

Version tags are sorted alphabetically, i.e. `_v20210602b` is considered a more recent version than `_v20210602a`.

Designer will remove the version tag to create a stem filename, and create a new VideoClip with the stem name.

There may be more than one occurrence of the version tag in the overall pathname, i.e. it is permissible to create a folder for each version date, if you wish. However, please note that this introduces the risk of errors, i.e. if you make a mistake and add a different version tag to the filename, the result will be indeterminate.

To add a new version of a file, simply copy it into the VideoFile folder alongside the older versions. Designer will automatically match the stem filename with the existing clip and load the new version, which will play immediately.

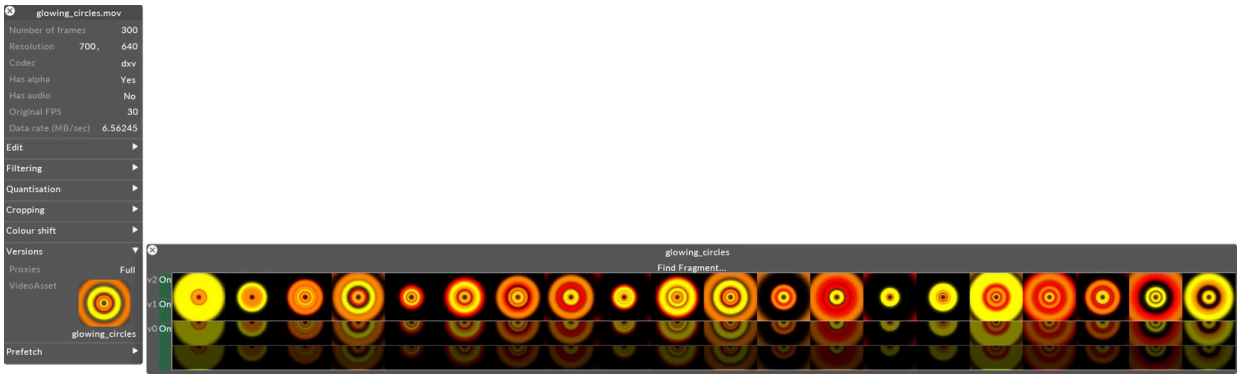
Designer will automatically replace older versions of the file wherever it occurs in the timeline.

Examples

File Path	Read File Name	Version	Notes
myfile.mov	myfile.mov		No version supplied
myfile_v1.mov	myfile.mov	1	You can prefix the version with either '_v'
myfile.v1.mov	myfile.mov	1	... or '.v'
myfile_1.mov	myfile_1.mov		But without those the version will just be part of the stem
/v1/myfile.mov	myfile.mov	1	Alternatively, you can put the version in a folder (without the '_' or '.')
/v1/myfile_v1.mov	myfile.mov	1	You can even include it multiple times if you wish
/v1/myfile_v2.mov		ERROR	...but if the versions don't match, it will cause an error
/1/myfile.mov	/1/myfile.mov		If you're putting the version into a folder name, but if it doesn't start with 'v' then it will just be part of the stem
myfile_v1b.mov	myfile.mov	1b	Version tags can include letters too

Viewing an assets version

1. Open the Video layer editor, expand the Media tab, and right-click on the Video thumbnail.
2. Expand the Versions tab and right-click on the Video asset to view a simple graphical view of the file contents.



VideoClip and VideoAsset editors for glowing_circles.mov', after adding'glowing_circles_v2.mov

> **Note**
>
> You can drop back to previous versions of the file by opening the **VideoAsset** editor and clicking **On** next to each version, and setting it to **Off**.

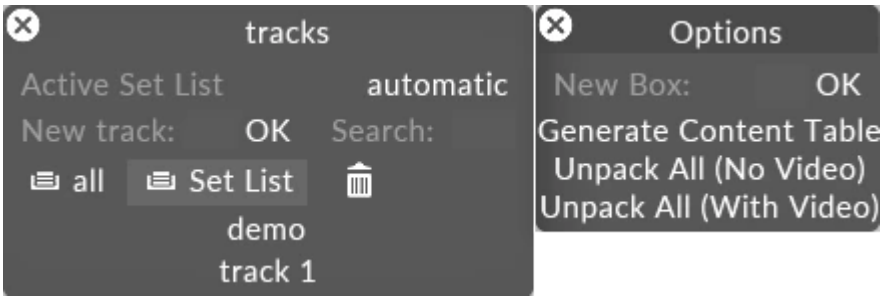
Content version information is also contained in a content table. For more information on how to generate a content table, see Generate Content Table.

Generate Content Table

Generate Content Table allows users to export a list of content used in the project.

Generating a content table

1. Open the track manager by left-clicking **Track** from the dashboard.
2. Right-click the **All** box (or whichever box you wish to export a table of).



3. Click the **Generate content** table option.
4. A notification will appear upon successful generation of the content table.



Viewing a content table

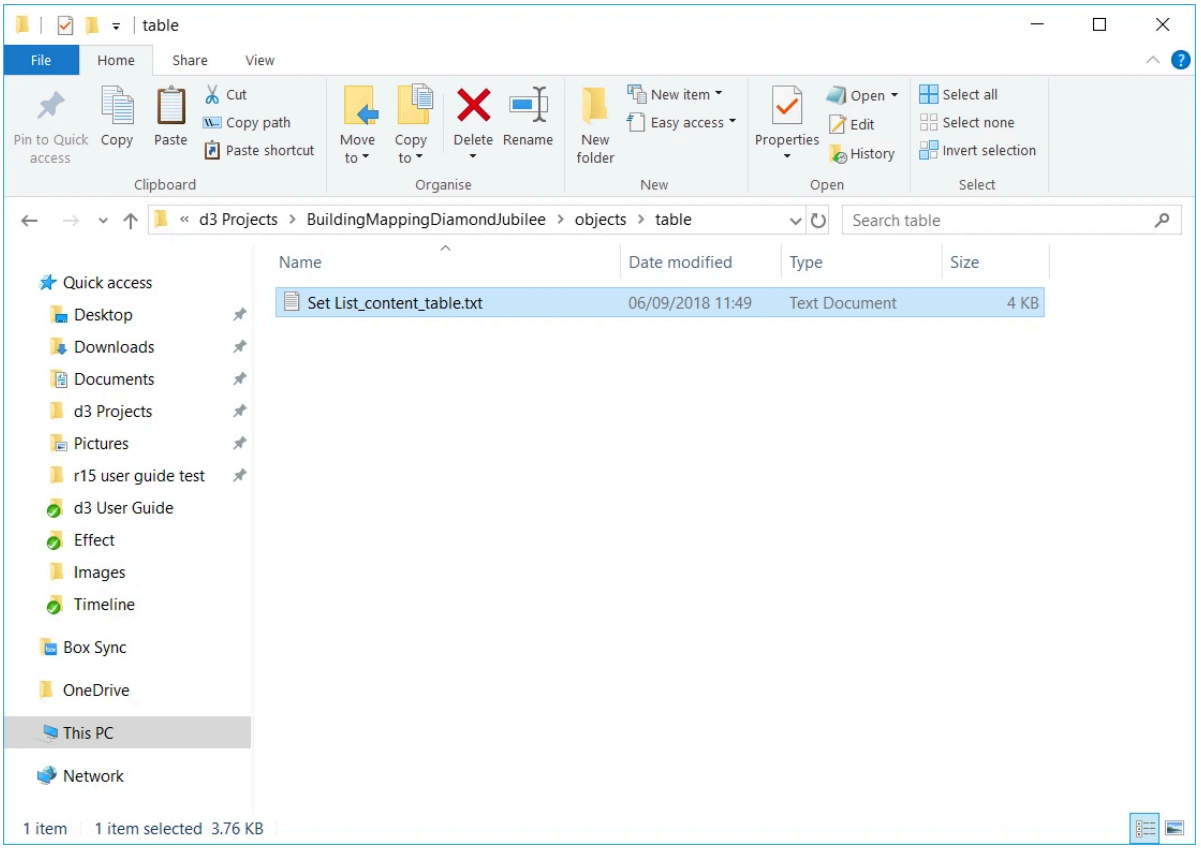
The content table is written as a text file (.txt) to a newly created **Table** folder inside the **Objects** folder of the project.

Open your project folder by navigating through the windows file structure to its location.

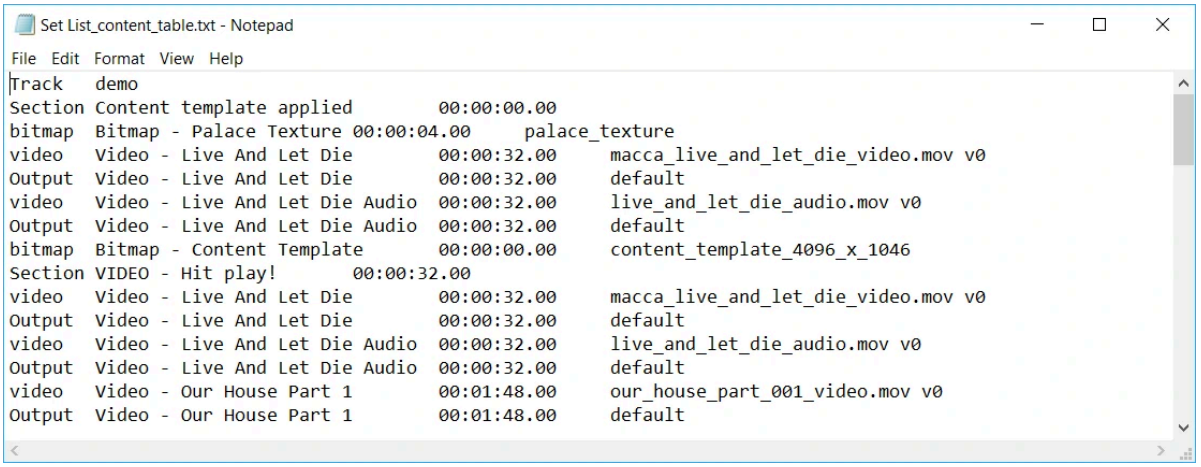
For more information see Project structure.

1. Open the **Objects** folder.

2. Open the **Table** folder.



3. Open the newly created .txt file in the Table folder.



Content table structure

The content table is arranged by **Track**. Within each **Track**, it is arranged by **Section**. The **Section** name (if there is a **Note** on the same beat as the section break) and the **Section** start time (in Timecode format) are listed on the same line.

Under a **Section**, each row describes a content file used in that section, and is laid out as:

Sequence name	Layer name	Timecode of keyframe	Content description

For video files, the content description includes the most recent enabled versions of the file. The versions include all versions up to the latest non frame-replacement version. For more information about frame replacements, see Content Management.

> **Note**
>
> For a **Layer** that span across multiple **Sections**, each **Section** lists the contents of that **Layer**. This way every **Section** is a self-contained list of content.

Generating a Proof of Play

Proof of Play is a method of generating a record of video files played by the timeline.

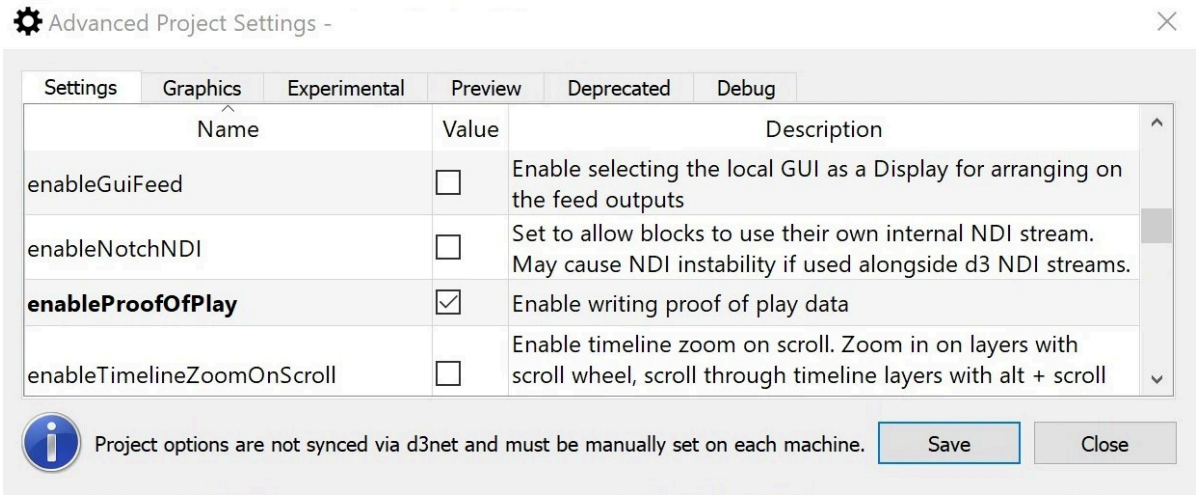
Proof of Play is available in all Designer versions after and including r17.1. It is a tool for producing a .csv file which contains a list of video files that were played in the timeline. This feature is valuable for installations or venues where ad revenue is received as a proof of exactly how long a video has played, or to check which content files are dropping frames.

> **Note**
>
> Proof of Play tracks video files only. It is not available for RenderStream or other non-video content types.

How to enable Proof of Play

Proof of Play is an Advanced Project Setting and must be enabled on each machine in the system.

1. Right-click on the name of the project folder in d3manager.
2. Select **Advanced project settings**.
3. Under the **Settings** tab, set `enableProofOfPlay` to on by ticking the box. Proof of Play is now enabled.

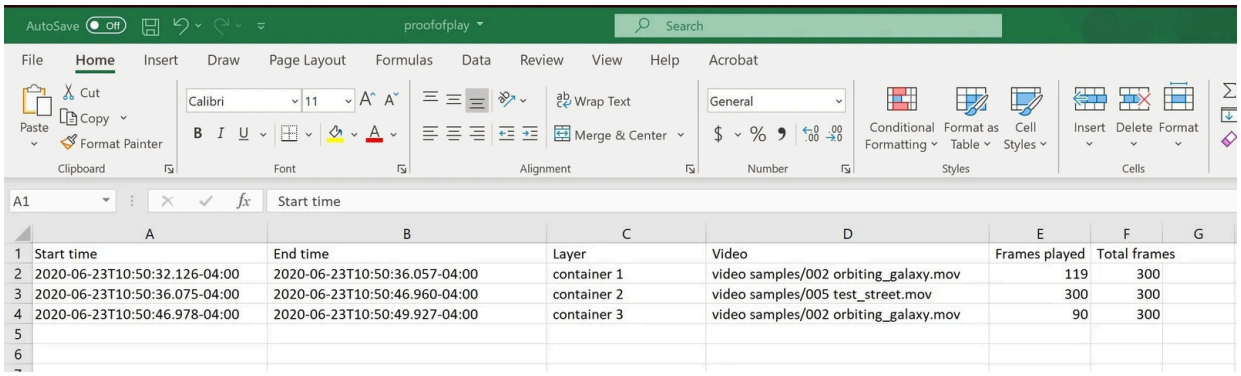


> **Note**
>
> In a network with multiple servers, Proof of Play will only write a csv of content that an individual machine outputs. If one screen is being fed by only one server, the *proofofplay.csv* will only record the pieces of content that were sent to the individual screen by that individual machine. The .csv file does not compile a list of all media within the project.

4. Open the project and enter a play mode in the Timeline.
5. Quit the project and open the project folder at the Windows level.
6. In the **output** folder there will now be a **proofofplay.csv** file containing information about all of the videos that were played in the project session.

> **Note**
>
> The *proofofplay.csv* file is written as the content plays in the Designer project. If the file is open while running the project, it will not update.

Example: proofofplay.csv details



	A	B	C	D	E	F	G
1	Start time	End time	Layer	Video	Frames played	Total frames	
2	2020-06-23T10:50:32.126-04:00	2020-06-23T10:50:36.057-04:00	container 1	video samples/002 orbiting_galaxy.mov	119	300	
3	2020-06-23T10:50:36.075-04:00	2020-06-23T10:50:46.960-04:00	container 2	video samples/005 test_street.mov	300	300	
4	2020-06-23T10:50:46.978-04:00	2020-06-23T10:50:49.927-04:00	container 3	video samples/002 orbiting_galaxy.mov	90	300	
5							
6							

proofofplay.csv open containing details about 3 videos

Each line is a discrete video entry:

Start time - Time file began playing.

End time - Time file finished playing. This is based off computer time.

Layer - The container on the timeline the video was played back in.

Video - Name of video file, including path to access it.

Frames played - How many frames of the video were played. If you drop frames during playback, this will be less than total frames even if the video plays to completion.

Total Frames - Total video length in frame.

Accessing Proof of Play data via API

The same playback data is also available in real time via the Disguise Developer API, without needing to wait for the session to end or the CSV to be written. This is useful for integrating with content management systems or third-party reporting platforms.

See the **Proof of Play API guide** on the Disguise Developer site for details.

Image Sequences

An Image Sequence enables the playback of a contiguous sequence of images as a video.

Enabling image sequences

Any folder inside VideoFile with a name ending in **.seq** will be ingested as an image sequence. As long as it matches the requirements described in this topic, it will behave just like a conventional video file.

Supported Formats:

- TGA
- TIFF
- DPX

8-bit and 10-bit are supported where applicable. All formats support the use of an alpha channel (with the exception of 10-bit DPX), and any framerate.

> **Note**
>
> Although other formats may work, only those listed above are formally supported.

Sequence Requirements

Alongside supported formats, there are rules that must be followed when creating image sequences for them to be recognised by Designer. These rules are in place to ensure reliable and predictable playback performance.

- The names of images within the folder must end with their frame number. For example: `My_video_00035.tif` would be the 36th frame in the sequence.
- As an additional precaution, the name of the images should be prefixed with the folder name.
- Eg: `My_video.seq\My_video_00035.tif`.
- The numbering must start from 0.
- There must be no gaps in the numbers between frame 0 and the final frame of the sequence.
- File formats cannot be mixed within the same image sequence folder.

Ingesting image sequences

Image sequences will always be imported at 30fps. The playback fps can be changed in the clip properties.

Additional frames can be added to a sequence while it is running and will be available for playback immediately. We do not recommend playing back the sequence while receiving extra frames, as this will affect playback.

In much the same way, gaps in image sequences can be filled in while it is running, and once complete, the sequence will become available.

Frames cannot be removed from a sequence without first exiting the project.

Any errors in image sequence formatting will be announced by a notification.

Content management

Version, frame replace, and proxy tags behave in the same way as with regular videos, as long as the **.seq** portion of the folder name stays at the end.

For example: `My_video_v2_frame150.seq` would be a frame replacement for `My_video.seq` starting from frame 150. Tags are only ever applied to the .seq folders, never the image files themselves.

The rules for frame numbering are the same for frame replacements - the frames inside `My_video_v2_frame150.seq` must still be numbered from 0.

If a sequence is accidentally imported without **.seq** at the end of the file name, the several thousand image files ingested can be removed by taking the following steps:

1. Exit the project.
2. Add the missing **.seq** to the folder name.
3. Start the project.
4. Right-click the **missing** tab in the videoclips editor and select **Remove Missing**. After a brief pause, the images will be removed.

Performance

Due to specific performance optimisations, the preferred settings for TGA and TIFF are as follows.

TGA

- Do not use RLE compression
- Render at 24-bits per pixel. Only include an alpha channel if required.

TIFF

- Use IBM PC byte order
- Do not use LZW compression
- Segment size should be equal to the height of the frame (this is often the default and not editable).
- Render at 24-bits per pixel. Only include an alpha channel if required.

DPX

- Render at 8-bits per channel unless working in a fully 10-bit pipeline.

> **Tip**
>
> EXR image sequences can technically be loaded and played; however, if they are HD resolution and higher they require significant machine resources to play, which makes them unsuitable for most production use cases.

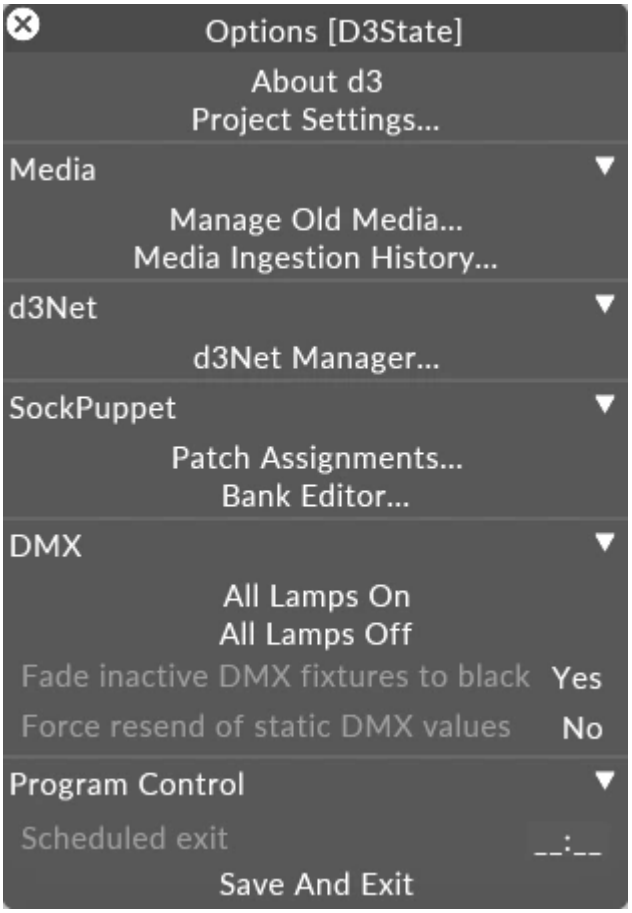
Manage Old Media Editor

Manage old media is a tool within Designer that allows the user to generate a list of unused versioned media within the project and archive it. As this tool only works specifically with versioned content files, it is generally used to clean up the project and remove 'old' versions of content that are no longer used.

Versioned content uses tags such as `File_v1` or `File_20170602a`. For more information, please refer to the Content Versioning topic.

Accessing 'Manage Old Media' Editor

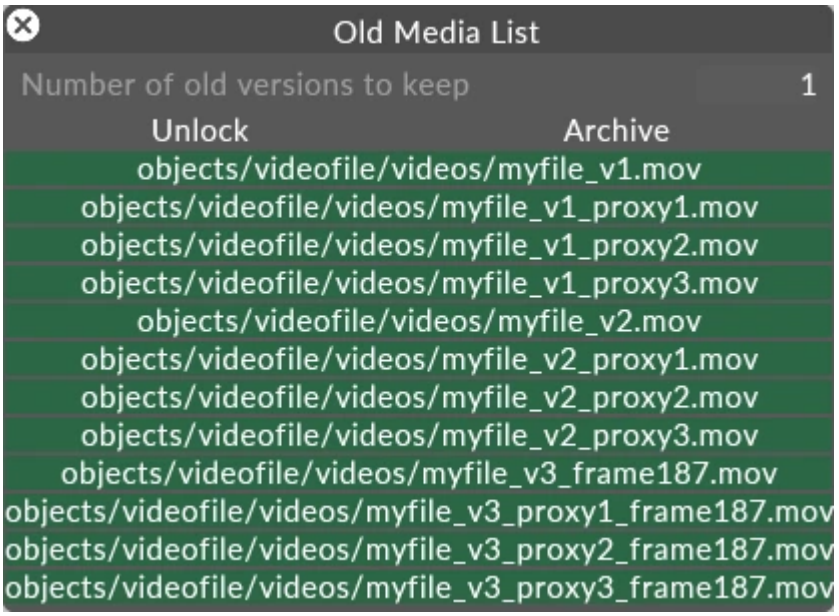
1. Right-click the d3 state menu in the dashboard.
2. Left-click **Manage Old Media.**



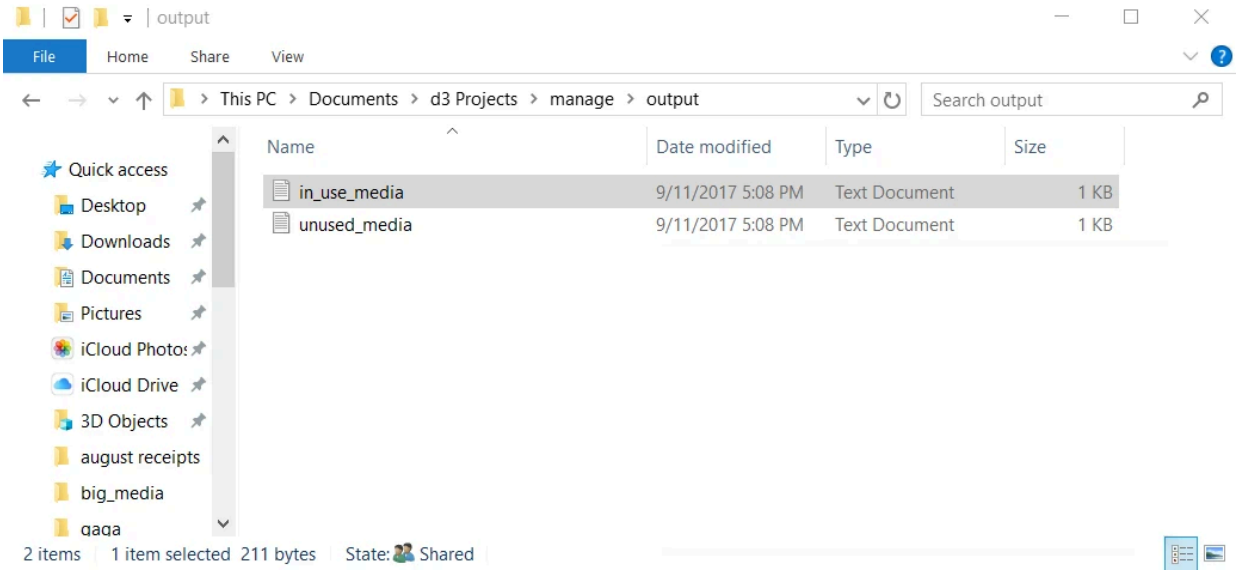
Manage old media option

Using the 'Manage Old Media' Editor

1. Left-click the **Unlock** button in the Manage Old Media Editor. The button will generate two lists, **in use media** and **unused media**, in the output folder of the project file. These are for manual reference and deletion.
2. Left-click the archive button and an automated process will move unused media to the **Archiver** folder in your project's **output** folder. This can be deleted or transferred to a new location or external storage location.



Manage old media editor, with all files selected.



Text files written to the output folder, following an archive process.

> **Note**
>
> You can specify a number of old versions to keep in the Manage Old Media editor.

Media Distribution

The Media Distribution feature provides a built-in mechanism to easily ensure that the exact required media files are present on each d3 machine involved in a d3 session. There are two parts to the Distribute system:

1. Sync/copy missing media - copying media used by the d3 project and needed by a machine's feed mapping.
2. Delete unused media - removing media that is not used by the d3 project.

To use the Media Distribution feature

1. Access the GUI of the Director machine. Only the Director machine can access the Media Distribution interface.
2. Right-click on the d3 menu and select **Media Distribution...** to open the Media Distribution Widget.
3. Expand both collapsible widgets to see the details of what media files are missing and unused copies.
4. **Include Mobile Editors** is defaulted OFF as they may wish to manage their own files, but the option is available.
5. Either click on **Sync** or **Delete** next to each item to sync or delete individual files on the target machines, or alternatively click **Sync All** or **Delete All** to action all the items in the respective tables.
    1. For copying large files, it will display the copy progress as a percentage.
    2. At the end of a copy, it will display the task state as either **Success** or **Failed**. For
6. Click on **Clear Finished Tasks** above the sync table to remove syncs that completed successfully and reset the status on syncs that failed.

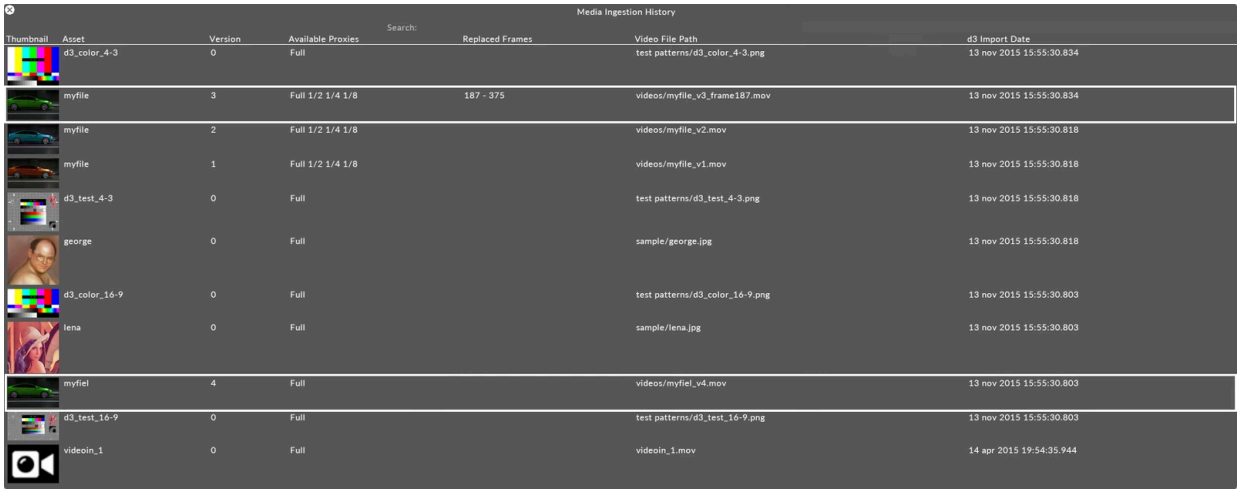
Media Ingestion History

There are two ways to access the Media Ingestion History:

- Right-click the d3 state menu in the dashboard and select Media Ingestion History
- In the VideoAsset editor (by pressing the 'find fragment -' button).

In the latter case, the media import history editor is brought up with the search field pre-populated with the name of the asset.

The Media Ingestion History can highlight any spelling or version number mistakes with the file naming which may affect the Content Version Control.



Media Import History showing misspelled file stem name myfiel instead of myfile

There is a search feature for finding files. The search is fuzzy, so it will find all misspellings as well as correct files.
Errors can be fixed directly in the Media Ingestion History by doing the following:

1. Right-click incorrect asset name.

2. Select the option ‘move to asset’ and click the correct asset.



Correcting an erroneous import caused by the spelling mistake

> **Note**
>
> **Please note**: You can clear the media ingestion history from a project prior to running the project; right-click on the project file in the d3Manager and select “Clear Ingestion History”. This will cause Disguise to rescan all media when the project is launched.

Missing and Unused Media

In large projects, it is common to end up with lots of iterations of things like videos, meshes, notch blocks and other on-disk media. All on-disk media that you place in the `objects` folder of your Designer project will generate an in-designer representation of that object. This is very convenient, but because these objects are generated automatically, it is common for them to become a pain over time on more complex projects with lots of media revisions.

Designer has some special tools to allow for the management of the in-Designer representations of this on-disk media and keep your projects simple and un-cluttered. For this guide we will focus on Video Clips which are the in-Designer representation of on-disk media files, but the same principals apply to all objects.

The relationship between Video Clips and Video Files on-disk

Whenever a video file is placed in the `objects/VideoFiles` folder on disk of a Designer project on **ANY** machine in session, Designer will automatically create an in-project representation of that media called a Video Clip. This clip has a range of user configurable settings, but it also is the in-project representation of the on-disk media, and as such it can be in a few different states based on the state of your on-disk media and your project file:

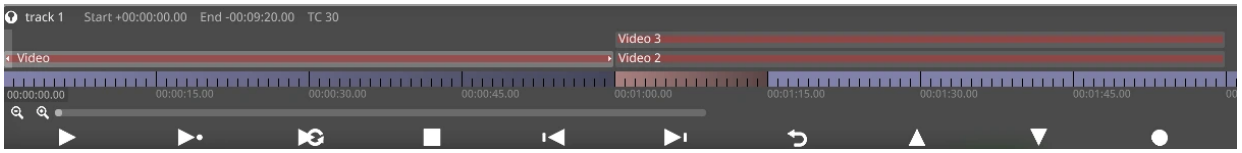
- **Missing** - At least one machine in the session that **NEEDS** that media does not have it on-disk.
- **Unused** - No video layers, layer stacks, video inputs, or other parts of Designer need this Video Clip to do their function (It's not sequenced anywhere).

Missing Media

Missing media means that an on-disk asset is missing on a particular server but it is needed by that server to play that content. For example:

In a 2 server session with a Director and an Actor, I have a single video layer where I have **Ada.jpg** as my video clip. The **Ada.jpg** file only exists on the Director, so this content is **Missing** on the Actor.

When media is missing the layer that uses it will be highlighted in red like this and if you mouse-over the layer a tooltip will explain which content is missing on which machine:



Missing Media Example

The Director machine reports the missing status of any media missing on Undertudies and Actors only. Editor machines are not included, however they do report their own missing media on their own GUIs, but this information does not get shared with other Editors or the Director to avoid visual clutter.

When media is **Missing** AND the media is not **Unused** you should make sure to sync that content to the machines where it is missing. This can be done via the Designer native Content Management tool, or can be performed with 3rd party tools like **Free File Sync** for more granular control.

Unused Media

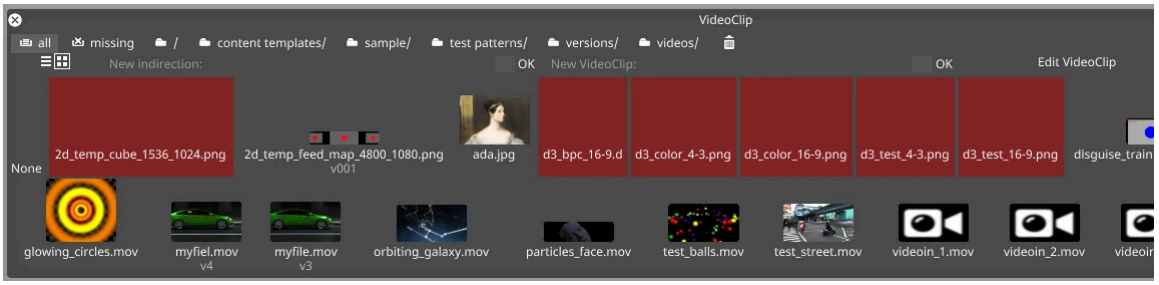
Unused media means that a Video Clip exists, but no machines in your session need that media for anything. For example:

In a 1 Non-Dedicated Director setup, I have a video in my folder called **George.jpg** but I only have 1 video layer and it has a different video seqenced, so this content is **Unusued** on my Non-Dedicated Director and indeed across my session.

Designer does not explicitly report unused media like we do for missing media, but we do provide a few tools for identifying it and removing it:

- Archive Unused Media is a legacy workflow for moving unused media to another folder location.

- Once **Unused** media has been archived, it will now also be **Missing** and you can **Remove Missing Resources** following these steps:
  1. Open any video layer.
  2. Left-click on the **Video** thumbnail to open the **Video Clip** library.

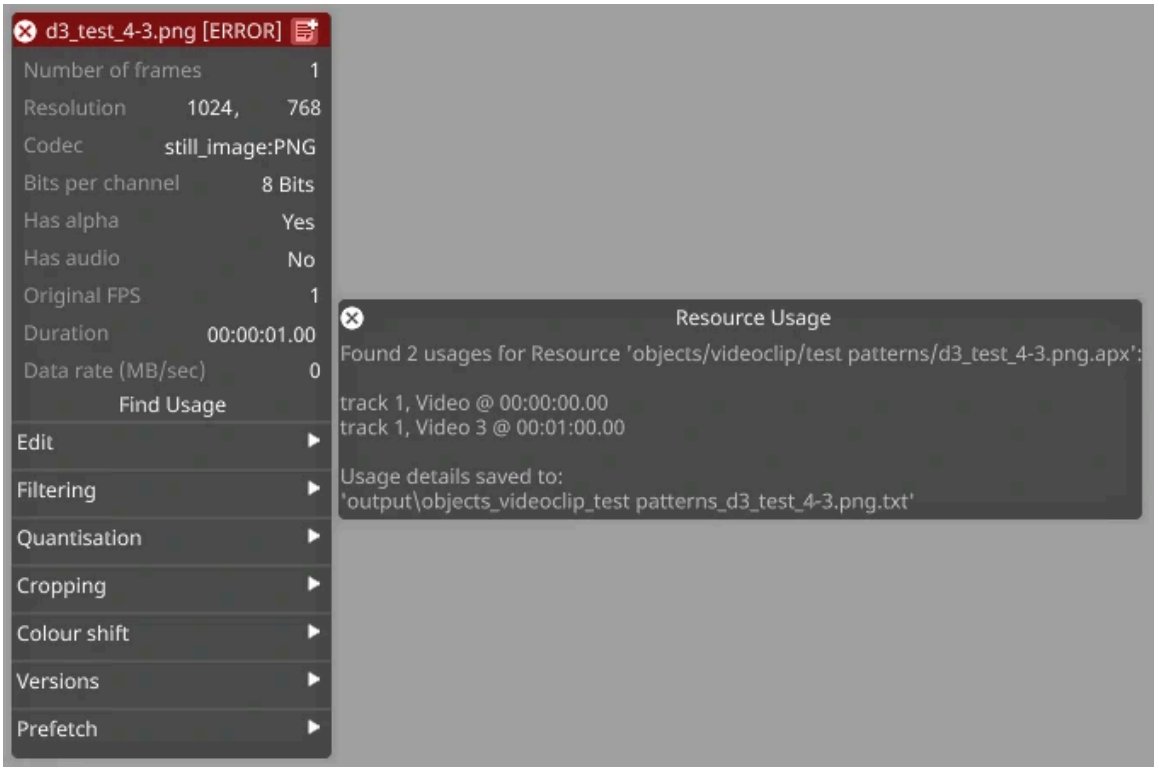


  3. Right-click on the **missing** box at the top of the VideoClip library window.



  4. Left-click on **Remove Missing Resources**. All missing media that is not referenced in any layer within the project will be removed from the VideoClips library.

5. If missing media is not removed from the VideoClips library at this point, this means that the clip is being referenced elsewhere in the project. Right-click on the red box for that media, and then left-click on **Find Usage** to locate the instances where the media is still being referenced in the project.



Placing media files

Where do I place the media files for my project?

The media files for a project are stored inside the **objects** folder. The **objects** folder is located inside the specific Project folder.

For information on where your specific Project folder is located pleasesee the above sub-chapter Projects. location/structure. To read about the exact specifiation of the media formats read the Supported file formats page.

Within the **objects** folder are the following sub-folders:

- **AudioFile** which contains all audio files (.mp3 .wav, .aiff). Notice that this audio is just for audio which is to be quantised on the timeline.
- **DxTexture** which contains all texture files (.png .jpeg .bmp .tif) including pixel masks and palette files.
- **LutFile** which contains LUT files used in the project. Visit this link for information on LUT files.
- **Mesh** which contains all 3D object meshes (.obj)
- **Notchfile** which contains notch blocks exported from Notch.
- **RecordingFile** which contains device recording files generated by Designer's Device Recording feature.
- **sdpfile** Session Description Protocol; these are network files that are used to send and request information from a network stream
- **textfont** stores all fonts used by them Text layer.
- **VideoFile** which contains all video files (.mov).

  > Still images can be placed in the **Objects/VideoFile** folder and they'll work just like video files. A benefit of this is when you have to work with proxy content while waiting for the real content to arrive; when you ingest the real content into the system, the content manager will make sure it supersedes the proxy.

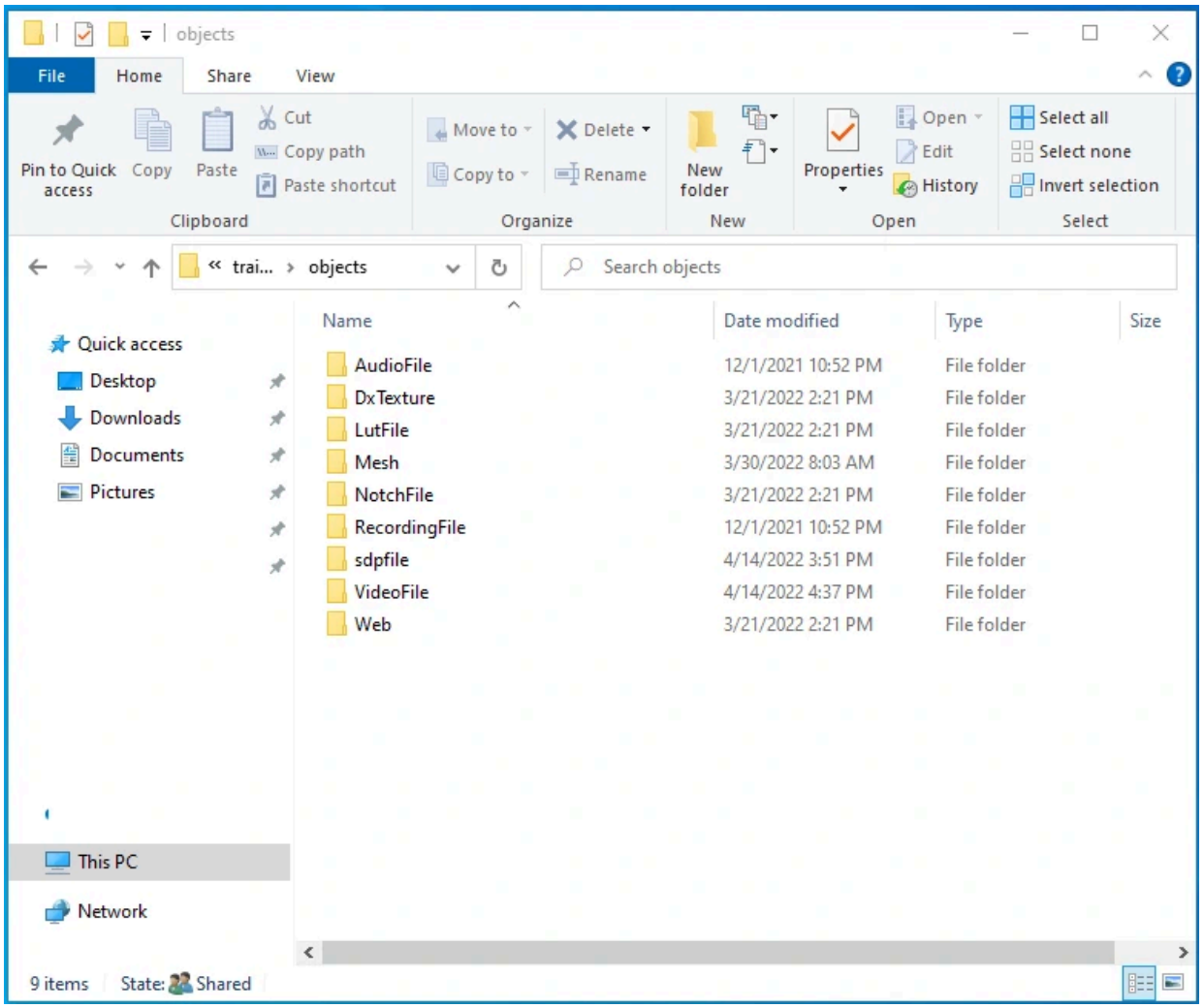
- **Web** which stores custom html files used by the Web layer.

Using Stills as Textures on props

Still images intended to be used as textures should be placed in the **Objects/DXTexture** folder.

The maximum texture size supported is 16k x 16k.

Still image files can be stored in either the DxTexture or VideoFile folder. Files stored in the DxTexture folder are available for use only in the Bitmap Layer. Files stored in the VideoFile folder are available for use only in the Video Layers.



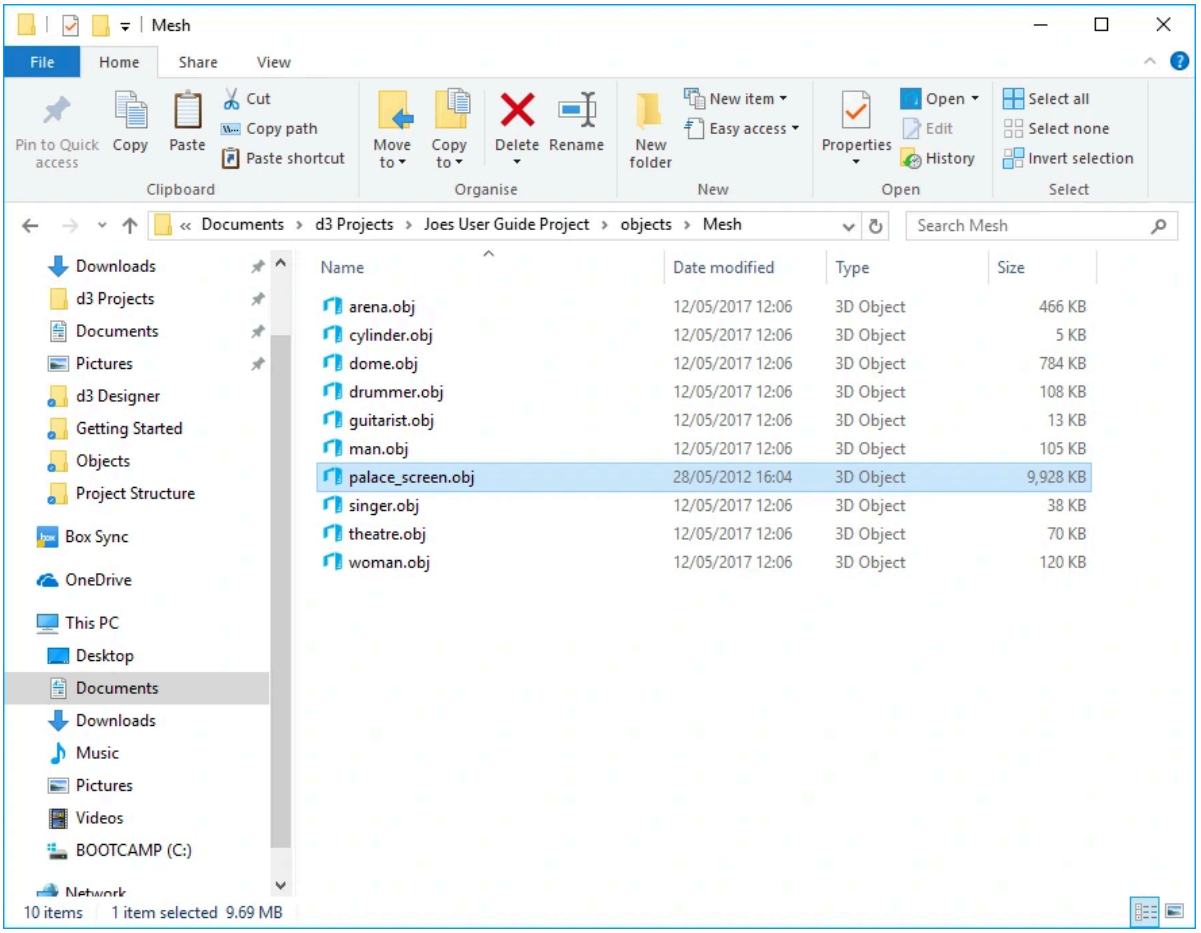
Object folder contains by default sub-folders which are used to store the media files for a specific project.

By default a new project contains a series of media files. For example, the **mesh** folder contains mesh files. For more information on the mesh folder please see the sub-chapter Venues/props overview.

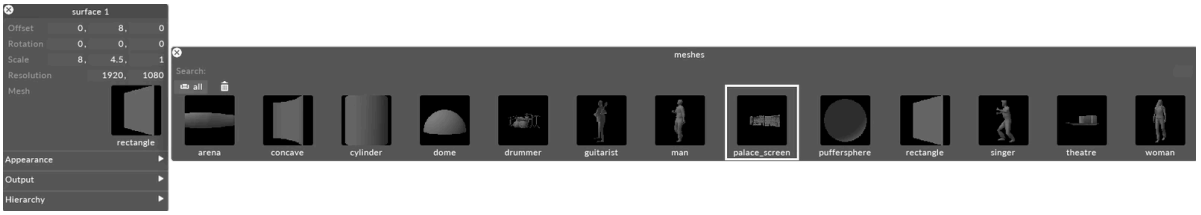
How to place media files and access them in your project

1. Ensure the media file is saved to a supported file format.
2. Open the **objects** folder.

3. Place the media file inside the appropriate sub-folder depending on the media file type. Once the media file has been added to the folder it will be added to the corresponding object library in the software. In this example a custom mesh file called **palace_screen** has been placed inside the **mesh** folder.



4. Run the software.
5. Select the media file from the appropriate [object library]



Palace screen mesh file can now be accessed in the software from the Mesh object library of the specific project.

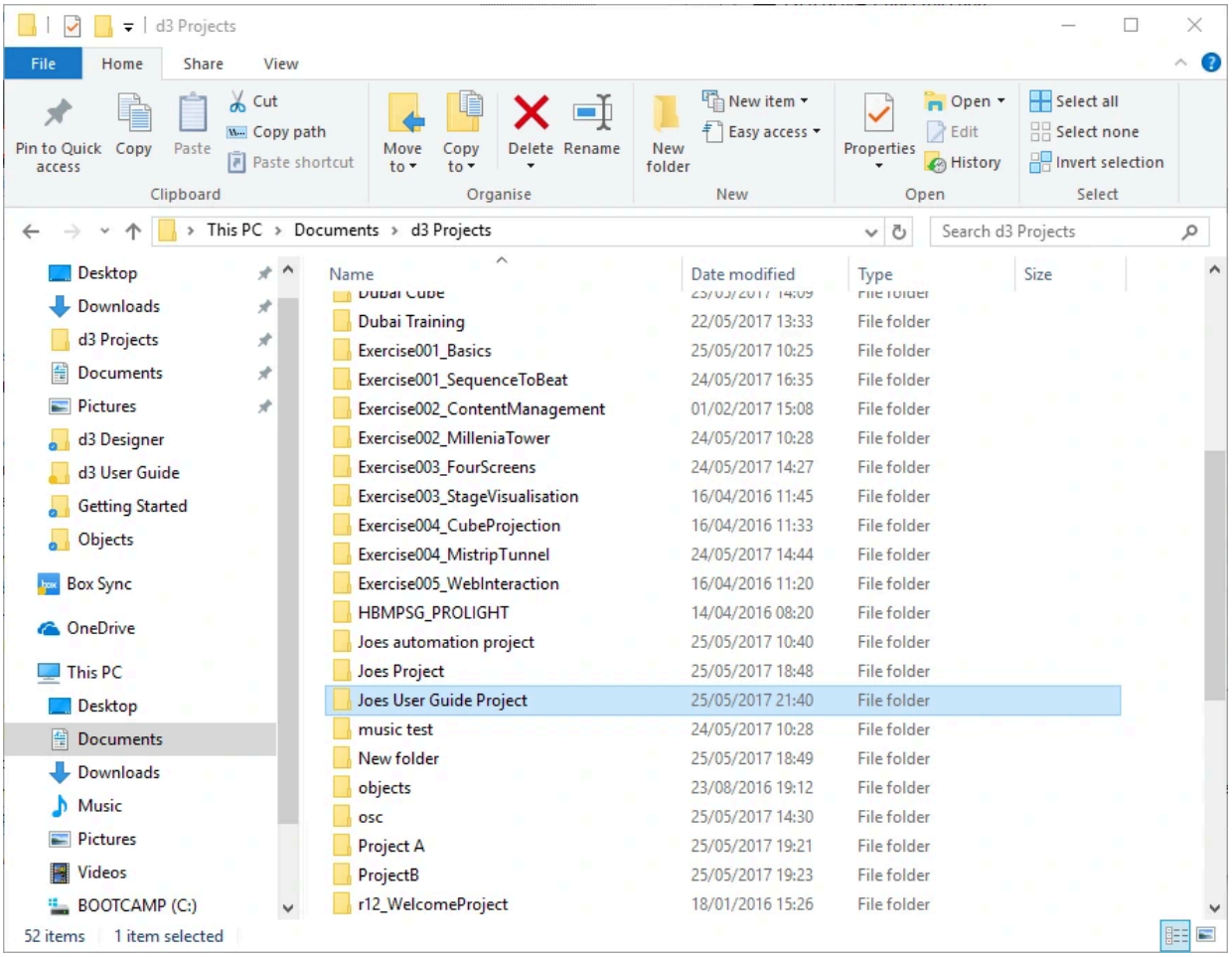
> **Note**
>
> All media files for a project must be stored in the specific Project folder. This ensures that when you copy the specific Project folder from one device to another, all relevant files will be copied as well.

Project Location

Where are all of my projects stored?

All of the specific project folders are stored in the assigned **d3 Projects** folder which is set during the installation of Designer. The default location is **My Documents/d3 Projects**

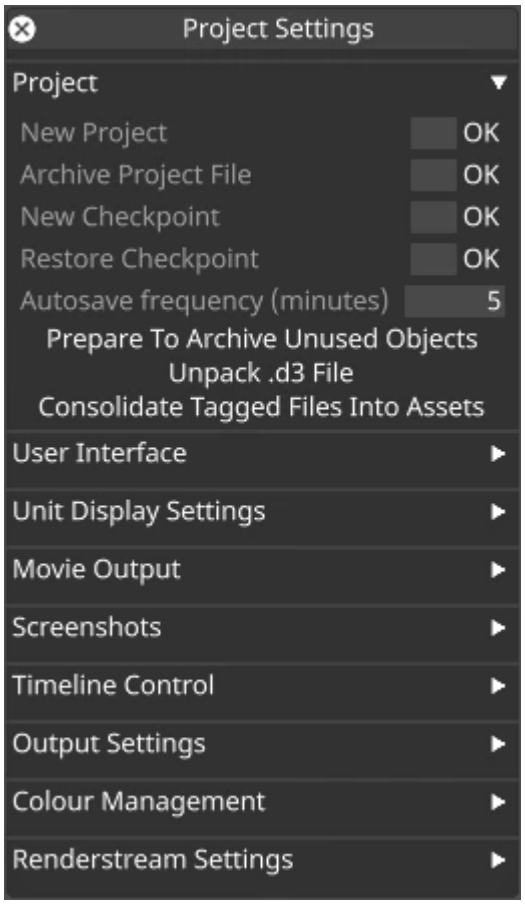
Alternatively, you assign a project folder in a different location on the server from within the d3Manager window. For more information on how to assign a new project folder location, please visit this [Managing Project Folders]



Project Settings

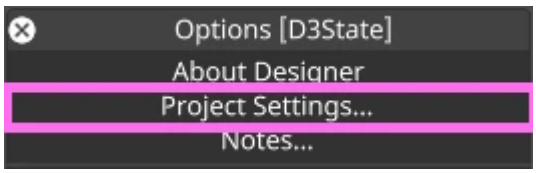
Designer provides some standard project settings which can be accessed through the state menu.

This page provides an explanation for each setting in the menu, as well as how to access it.



Project Settings editor with first tab open

Accessing the Project Settings



*Button to open **Project Settings** highlighted in pink*

1. Right-click on “d3” in the top left corner of the interface on the dashboard; this will open the d3State Options window.

2. Left-click **Project Settings** from the menu to open the Project Settings menu.

Project tab

New Project

Creates a new Project

Archive project file

Essentially a “save as”. Type in a name and it creates a project file in the history folder with the name you defined..

New Checkpoint

Creates a Checkpointed project. Checkpointed projects are frozen in time and locked to a specific Disguise version.

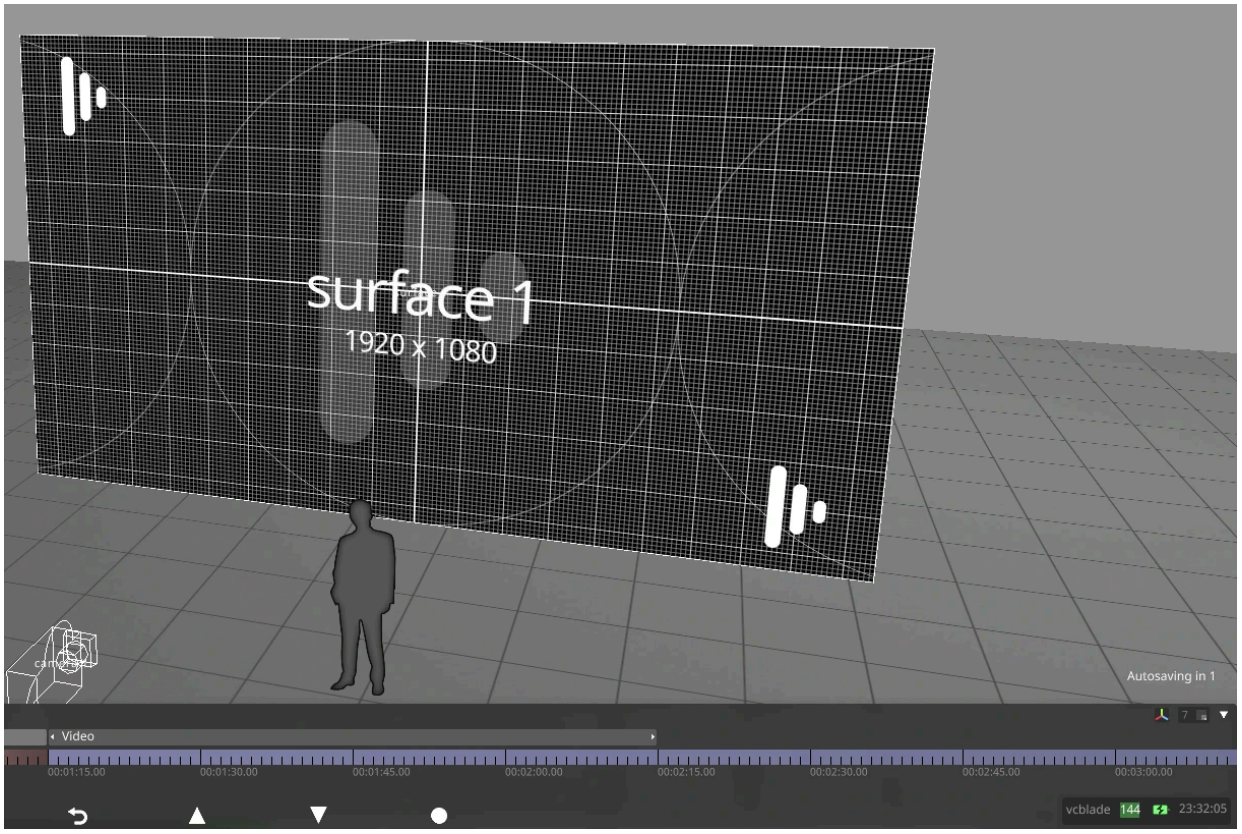
Restore Checkpoint

Restores a previously made Checkpoint.

Autosave Frequency

Defines the autosave frequency expressed in minutes. This defaults to 5 minutes.

A new ‘Autosaving’ indicator with a 5 second countdown has been added in the bottom right hand corner above the timeline.



Autosaving Example

Prepare to archive unused objects

Generates a batch file for you to then define an archive directory outside of the project file, thus releasing the files from Designer. See Archive old media topic for more information.

Unpack d3 file

Unpack the contents of the .d3 project file into a new 'unpack' folder, for advanced use cases. For further information, see importing and exporting objects.

Consolidate tagged files into assets

This is used to upgrade old projects to use versioning.

User Interface tab

Framerate fraction

The fraction of the framerate that the GUI renders at. This option is used to sacrifice responsiveness for performance. This option is not suitable for lower latency modes.

Options for this setting are:

- **1** represents full framerate
- **1/2** represents half framerate
- **1/3** represents one third framerate

DPI Scale

The DPI scale determines the font and icon size in Designer. The `Default` option follows the Windows DPI scale, while other options apply the selected scale directly.

Options for this setting are:

- `Default`
- `100%`
- `125%`
- `150%`
- `175%`
- `200%`
- `225%`
- `250%`

Maximum visualiser proxy

Designer uses a proxy system to render content at the level of detail (LOD) required on each machine. For displays which are not mapped to the current machine's feed outputs, navigating the visualiser camera or zooming in and out will change the LOD the display is rendered at. This can increase the load on the machine resulting in reduced framerate, particularly for high-resolution displays.

The **maximum visualiser proxy** setting limits the LOD of displays viewed in the GUI only, i.e. visualiser, feed previews, editors etc. Displays which are mapped to feed outputs are not affected, and are always rendered at full resolution. This setting is applied across all machines in the session.

Options for this setting are:

- **1:1**: Display LOD can match its full resolution
- **1:2**: Display LOD is capped at half resolution
- **1:4**: Display LOD is capped at quarter resolution
- **1:8**: Display LOD is capped at one eighth resolution
- **1:16**: Display LOD is capped at one sixteenth resolution

The **maximum visualiser proxy** can also be edited from the 3D manipulators toolbar

Tooltips

Controls when tooltips appear in.

Options for this setting are:

- Only when F1 is pressed
- After 1 second **(default)**
- After 2 seconds
- After 3 seconds

Persistent Key Widgets

When enabled, key widgets will remain open on creation or on selection of a new layer with the same property.

Disable UI Transparency

Untick this setting to turn off transparency for UI windows to save performance.

Disable key frame editor film strip

Untick this setting to turn off rendering intermediate frames of videos inside keyframe editors which can increase performance when viewing video clips.

Global layer colour rules

Select the default rules that will determine the colours of layers on any tracks that do not have their own Layer colour ruleset. For more information about layer colour rules see the Layer Colour Rules page.

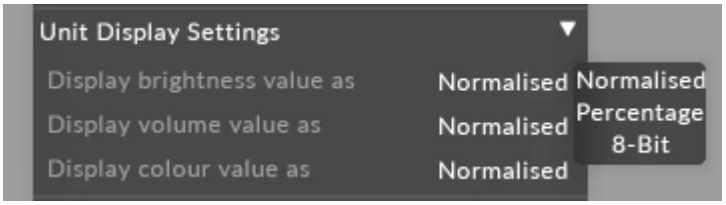
Unit Display Settings tab

Display value as

Defines the way the numerical values are displayed for Brightness, Volume, and Colour.

The options are:

- Normalised (0-1)
- Percentage (0-100%)
- 8-bit (0-255)



Unit Display

Measurement unit

Determine the units that measurements are displayed in.

The options are:

- Metric
- Imperial

Movie Output tab

Output movie format

Defines the output format for Stage & Feed movies. For more information about outputting Stage & Feed movies see our Stage and Feed Movies page.

Options for this setting are:

- Photo-JPEG (no audio)
- Animation (no audio)
- MPEG-4 (with audio) **(default)**
- Photo-JPEG mov (OLD QuickTime players)
- HAP (no audio)
- DPX image sequence (no audio)
- WEBM vp9 (audio as Vorbis output)

Output movie FPS

Sets the FPS the output movies should be rendered at.

Stage movie size

Sets the resolution Stage movies should be rendered at.

Below, the actual output movie size is displayed after licensing restrictions are applied.

Add head to output movie

Adds additional seconds to the start of the output movie.

Add tail to output movie

Adds additional seconds to the end of an output movie.

Animation movie format

Select the 3D format to use when writing an Animation movie.

Encoding Options

Bitrate (Kb)

Sets the target bitrate of your output movies. Setting this to 0 will allow Designer to use it's best-guess per codec.

Screenshots tab

Output format

Defines the output format for Screenshots.

Options for this setting are:

- JPEG
- BMP
- PNG **(default)**
- TIF
- DPX
- EXR

Timeline Control tab

Global latency mode

Defines the levels of buffering and the rendering interval of the video output system.

Options for this setting are:

- Full speed ultra low latency (no buffering)
- Full speed low latency (one frame buffer)
- Full speed **(default)** (two frame buffers)

- Half speed low latency (halves the frame rate, one frame buffer)
- Half speed (halves the frame rate, two buffers)

Frame buffers are on the video output system, other system processing will add further latency.

Sometimes it is very useful to use half speed mode to swap between 2 framerates quickly without needing to re-apply genlock. In this case, always make sure you are genlocked to the full framerate. If you genlock to the half-framerate you may get tearing between machines when in half speed mode.

Global refresh rate

Sets the project refresh rate. For more information see the Setting Project Refresh Rate topic.

Project bit depth

Sets the bit depth the project will output at. This setting will not take effect until Feed Settings have been applied. For more information about applying feed settings visit our Configuring Output Settings page.

Timeline audio device

Sets the default timeline audio device.

Deferred jump

With this feature activated, you can now hit the left or right Arrow keys (while playing) to jump Track bars without losing sight of the original bar you jumped from (this bar will also continue to flash).

Global crossfade

Sets the Universal crossfade mode for all tracks and sections by default. This can be overridden on a per track and per section basis.

Reset on stop

This defines the behaviour of the Stop button. You can either reset to the start of the bar, or stay where you are.

Options for this setting are:

- Always
- When Quantised **(default)**
- Never

Output Settings tab

Video information overlay

Overlays debug information on the content of video layers.

Options for this setting are:

- None **(default)**
- Resolution
- Smoothness - A white line that moves across the image to assess playback smoothness.
- Frame/Time - A readout of what frame is currently displayed.
- Regions/Tiles - Each mapping region in SLC.

Fade up/down duration (seconds)

Sets how long, in seconds, the Fade up and Fade down controls take to complete.

Colour Management tab

Colour Management

This defines what model for colour management disguise uses.

Options for this setting are:

- Disabled
- Gamma Space **(default)**
- ACES
- OCIO

More information about colour management can be found on our Colour Management page.

Default ingest profile

This defines the default colour profile that will be applied to all media when it is ingested. This does not apply retroactively to media that has already been ingested or had another colour profile set.

Default display profile

This defines the default colour profile that will be applied to all displays when they are created. This does not apply retroactively to displays that have already been created or had another colour profile set.

RenderStream Settings tab

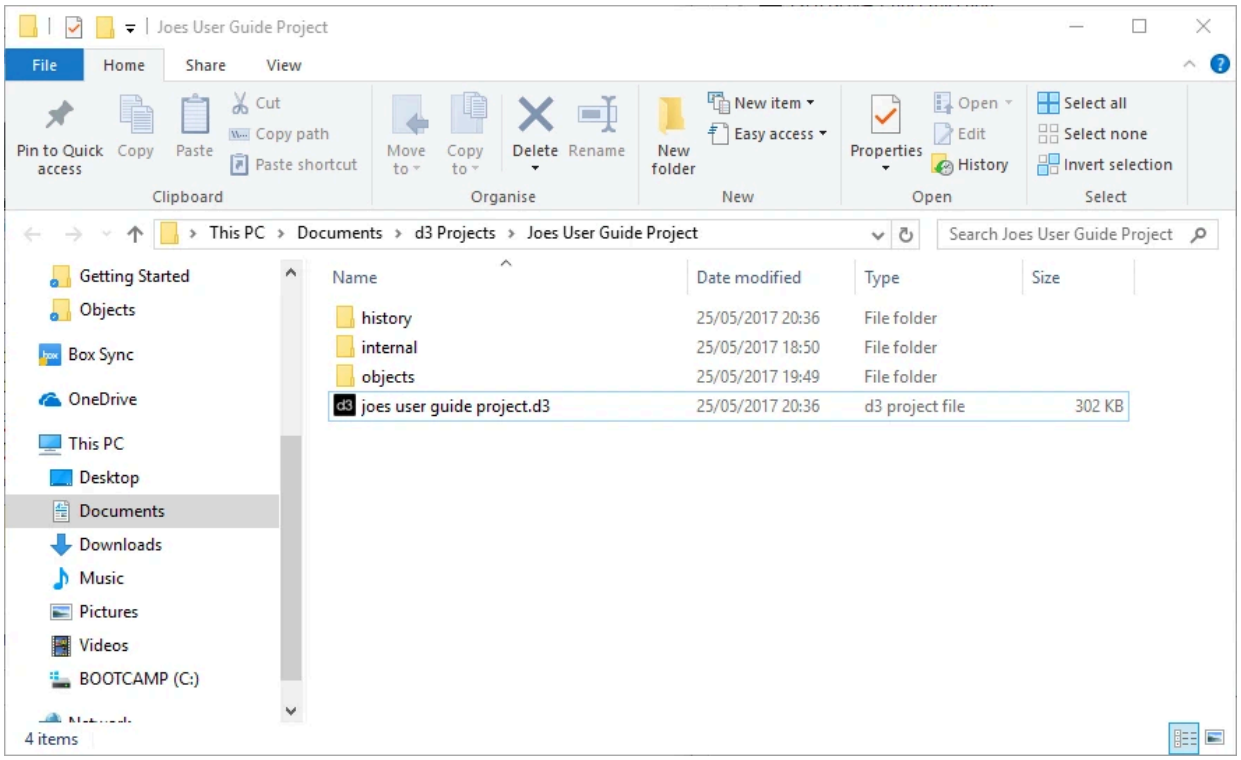
RenderStream latency override (ms)

This can be set to define a fixed latency for all RenderStream workloads in the project. Frames received more than this latency after the previous frame will always be dropped. Leaving this setting at 0 will allow Designer to automatically measure and set an optimal RenderStream latency for your specific network configuration.

Project Structure

Each specific Project folder contains the **.d3** project file. For example, if you have a project called **my project**, the Project file will have the name: **my project.d3** and a number of sub-folders:

- **History**: contains auto save files and shows after a project has been running long enough for auto save to occur.
- **internal**: contains files internal to the software, such as thumbnails.
- **objects**: contains all media files.
- **Packages**: used to package data and move it between projects, this is a user-created folder and is not present by default.



By default, each Project folder contains the Project file and two sub-folders, Internal and Objects.

> **Note**
>
> All media files for a project must be stored in the specific Project folder. This ensures that when you copy the specific Project folder from one device to another, all relevant files will also be copied.

Read more about Managing Project Folders and how to use history files.

Rendering Feed Movies

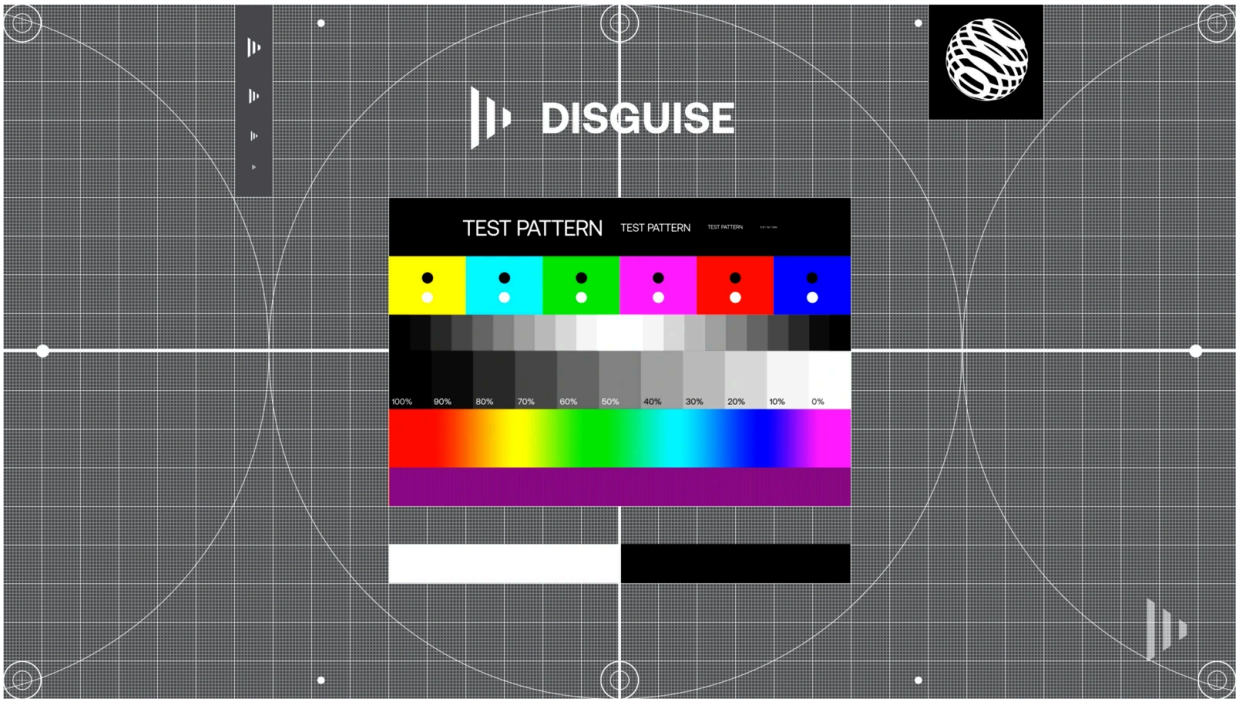
Feed movies render the feed outputs in the Feed level, allowing rendered project content to be played back on a conventional media server.

For more information on configuring outputs please see the chapter Feed Outputs.

Feed movies generated from **Designer Starter** are watermarked and limited to a maximum resolution of 2160x2160 pixels (2K UHD).

Feed movies generated from **Designer Full** are watermarked and limited to a maximum resolution of 4096×2160 pixels (4K UHD), when using a Designer Pro license. On Disguise servers there is no watermark.

The watermark is a semi-transparent Disguise logo with a size of approximately one-tenth of the movie's vertical resolution that appears in the bottom right corner.

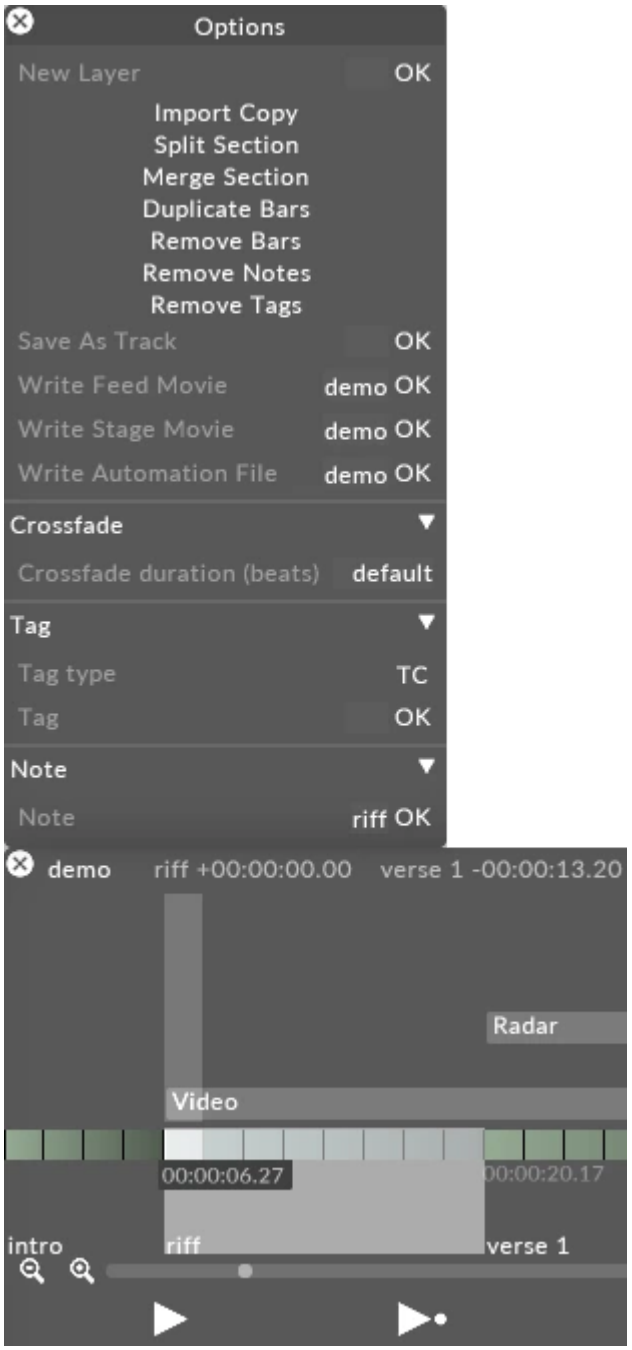


Watermark

How to render Feed movies

1. Specify the settings of the Feed movie as described in the previous sub-chapter video output settings.
2. Hold down the left **Shift** key and click-drag a rectangle across the Track bars to be rendered.

3. Open the Track bars menu by right-clicking the selection rectangle.
4. Type in the name of the Feed movie into the **write feed movie** text field.
5. Hit **Enter** to render the Feed movie. The Feed movie will be saved in a new folder called **output** inside the specific Project folder. For information on where the specific Project folder is located please see the sub-chapter Project structure.



Write Feed Movie option from the Track bars menu is used to render a Feed movie, opened by right-clicking the grey selection rectangle.

Rendering Media Overview

Stage/Feed movies

Stage movies and Feed movies can be rendered in Designer. Stage movies can be used to provide the client or production team with the latest update on the project, and Feed movies allow rendered project content to be played back on a conventional media server.

Before rendering the Stage or Feed movies please specify the video output settings, you can learn how on the video output settings page.

The table below shows the distinctions between different Stage and Feed movies.

Designer	Watermarked Feed Movies	Watermarked Stage Movies	Resolution Limit
Designer Starter	Yes	Yes	Max resolution: 2K (2160×2160)
Designer Full (Pro)	Yes	No	Max resolution: 4K (4096×2160)
Server Starter	Yes	Yes	Max resolution: 2K (2160×2160)
Server Full	No	No	None

Screenshots

If there is not enough time for rendering a movie, screenshots can be made. See the Rendering Screenshots topic to see how.

Rendering Screenshots

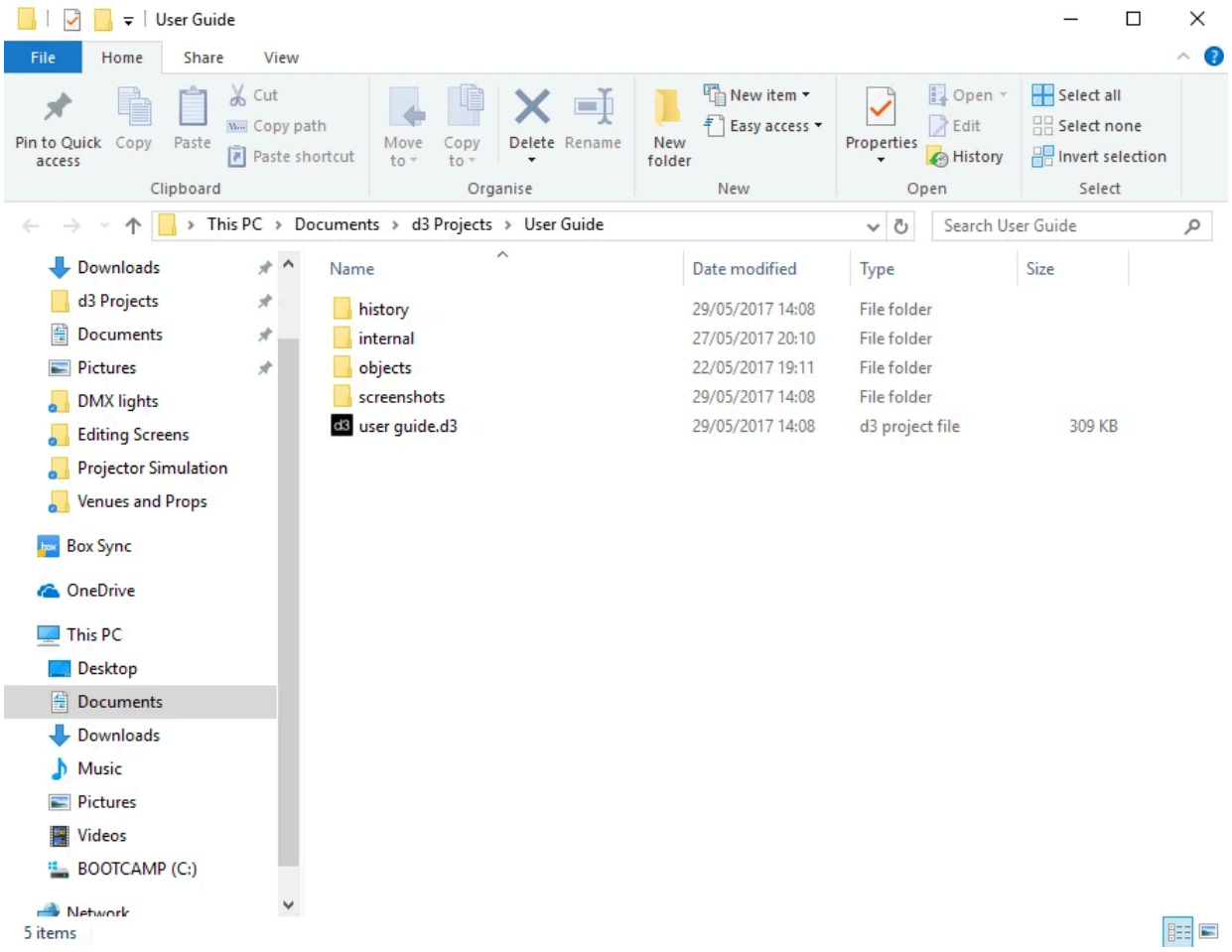
Screenshots can be made of the Stage or Feed levels.

These can be used for:

- Allowing the client or entire production team to know exactly what the latest update is on the project, particularly if there is not enough time for rendering Stage movies.
- matching the position of the Feed rectangles in their Display heads to an LED processor when configuring outputs.

How to make a screenshot:

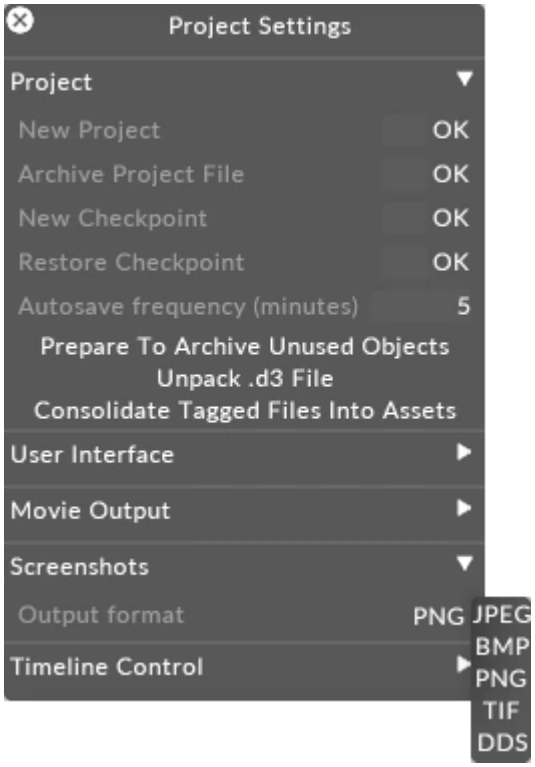
1. Specify the file format used for saving screenshots as described in the section below.
2. If the Track Player is obscuring part of the shot close it by left-clicking the x icon in the top left corner of the Track Player. To re-open the Track Player, left-click **track** in the d3 State editor (bar at the top of the screen).
3. Hit **Alt-X** . The screenshots are saved in a new folder called **screenshots** inside the specific Project folder. For information on where the specific Project folder is located please see the sub-chapter Projects location/structure.



If screenshots are renamed or deleted, the continuity of the file numbering could be lost. For example, if you have 3 screenshots `screenshot_00000`, `screenshot_00001`, and `screenshot_00002`, then delete `screenshot_00001`, the next screenshot will be called `screenshot_00001`, and then the next one after that will be called `screenshot_00003`.

Specifying the screenshot file format

1. Open the Projects Settings menu by right-clicking **d3** from the dashboard (bar at the top of the screen) and selecting project settings.
2. In the **Screenshots** tab, Select an option from the menu of file formats by left-clicking **output format**. There are five file formats to choose from: **.png .jpeg .bmp .tif .dds**.



Output Screenshot Format property within the Program Settings menu points to the five screenshot file saving formats

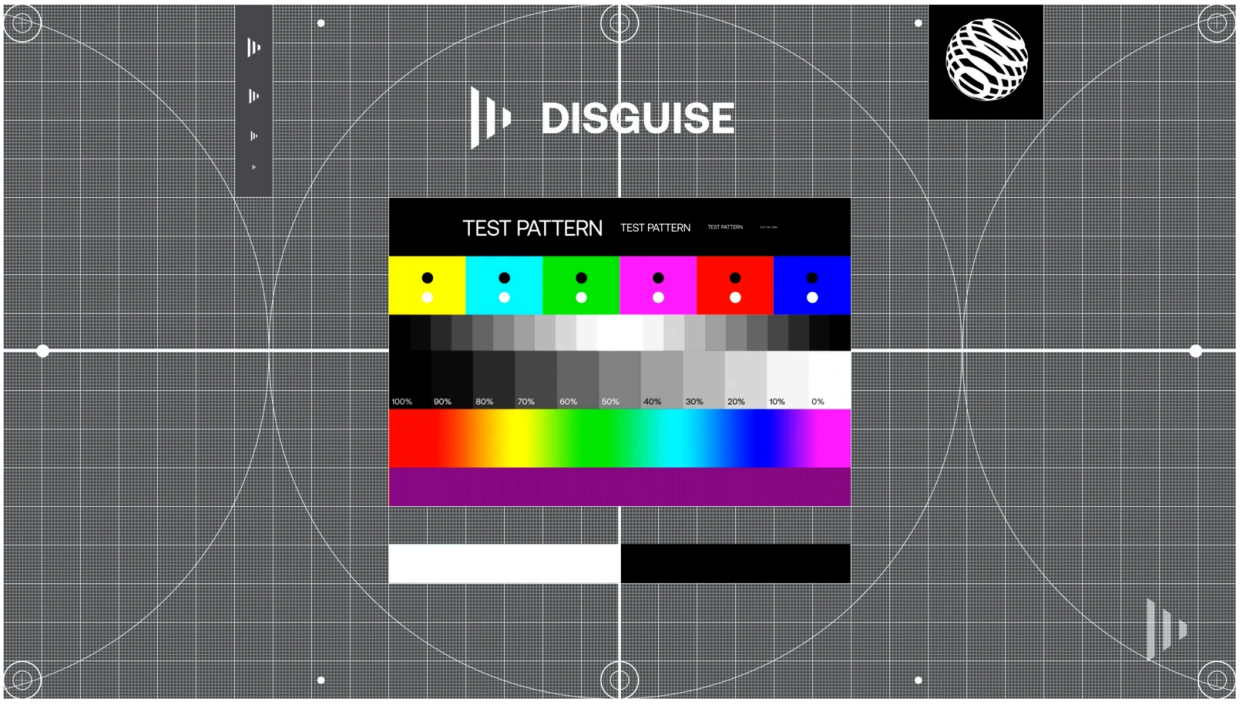
Rendering Stage Movies

Stage movies render the content in the Stage levels Stage Visualiser, allowing the client or entire production team to know exactly what the latest update is on the project.

Stage movies generated from **Designer Starter** are watermarked and limited to a maximum resolution of 2160x2160 pixels.

Stage movies generated from **Designer Full** are not watermarked, but limited to a maximum resolution of 4096×4096 pixels.

The watermark is a semi-transparent Disguise logo with a size of approximately one-tenth of the movie's vertical resolution that appears in the bottom right corner.

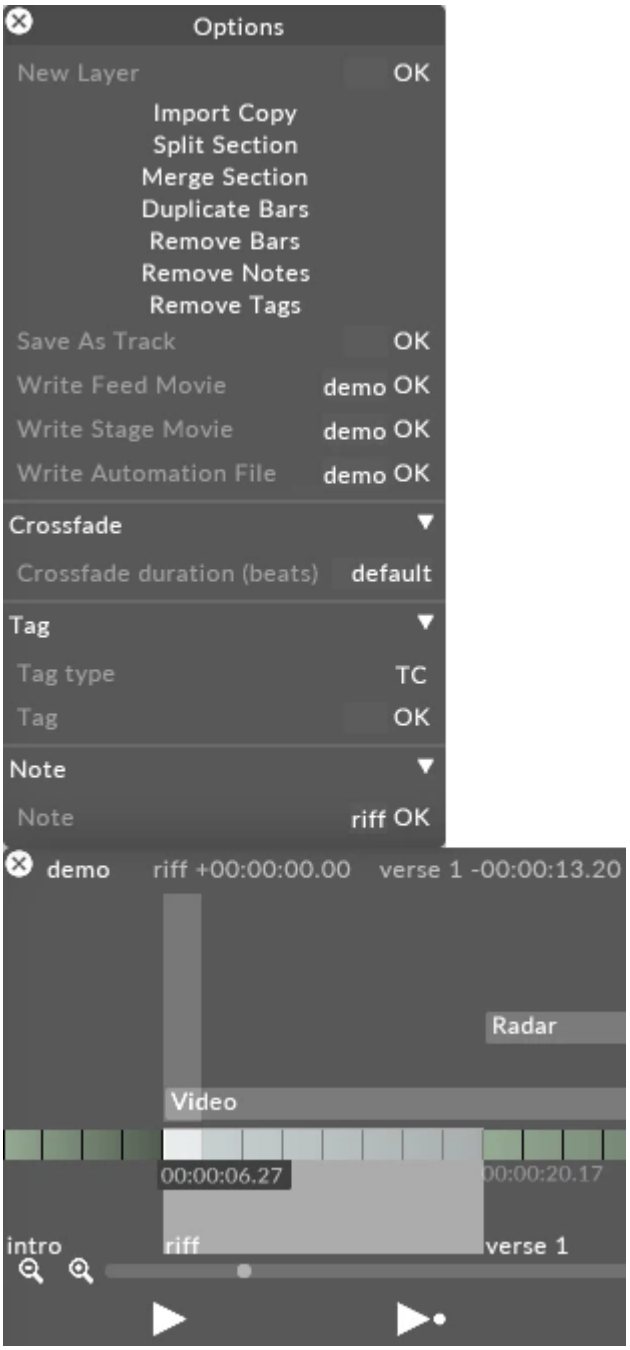


Watermark

> **Note**
>
> Before rendering a Stage movie, the AnimateCamera2 layer can be used to create camera flythroughs of the show. Please see the AnimateCamera Preset layer subchapter for more information.

How to render Stage movies

1. Specify the settings of the Stage movie as described in the previous sub-chapter [video output settings](#).
2. Hold down the left **Shift** key and click-drag a rectangle across the Track bars to be rendered.
3. Open the Track bars menu by right-clicking the selection rectangle.
4. Type in the name of the Stage movie into the **write movie (stage)** text field.



5. Hit **Enter** to render the Stage movie. The Stage movie will be saved in a new folder called **output** inside the specific Project folder. For information on where the specific Project folder is located please see the sub-chapter Project structure.

If there is not enough time to render a Stage movie screenshots of the stage may suffice. For more information on this useful feature please see the rendering screenshots sub-chapter.

Slideshows

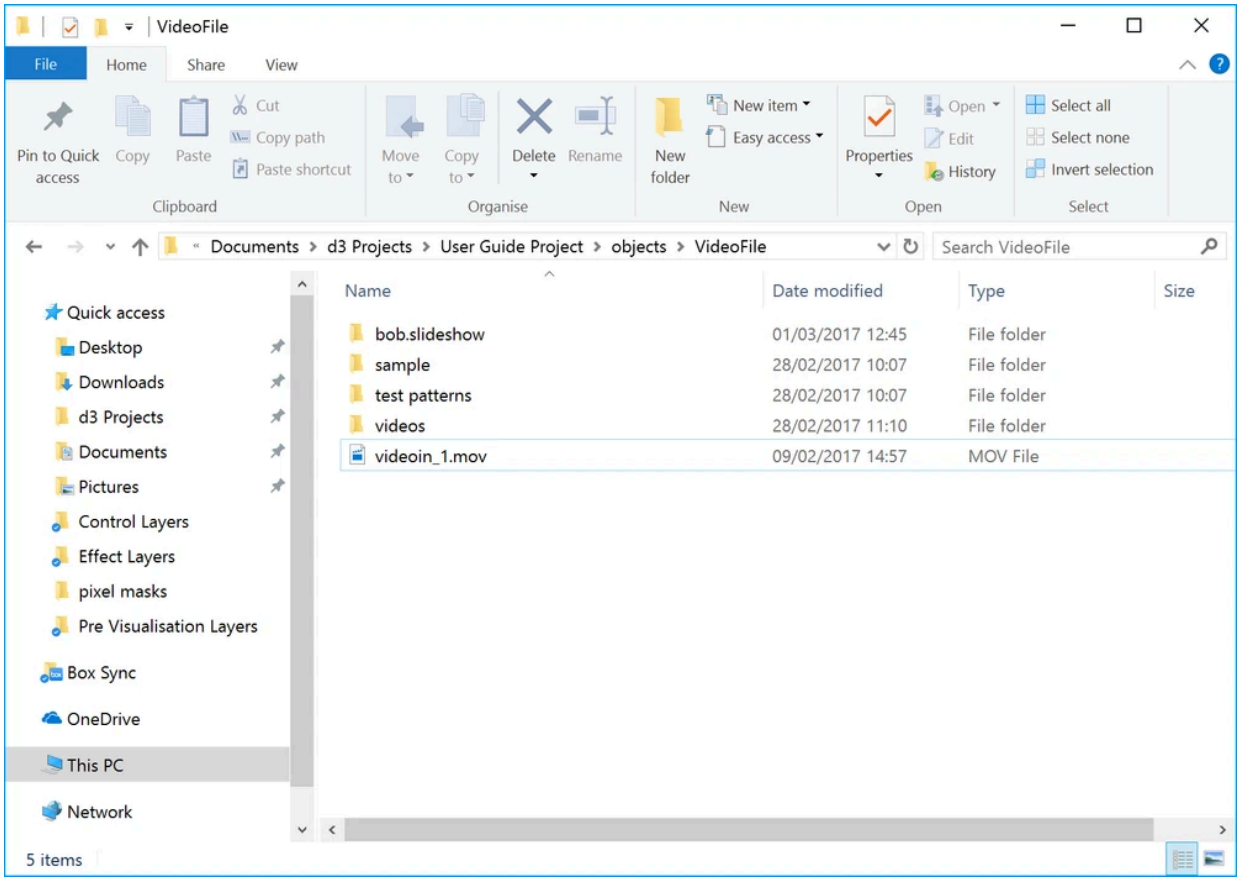
Slideshow is a new feature of r14.1 that enables fast and easy output of a sequence of content with a minimum of sequencing time.

Although these sequences rely on file location and name, they can be edited while the software is running.

They allow an automated slideshow style operation of video or still images within the software. A good example of this is running advertisements pre-show. It would take too long to sequence the adverts individually within , so utilising a slideshow allows you to place one piece of content within that may consist of many pieces of content in reality. It also allows you to change the content outside of without affecting the sequencing.

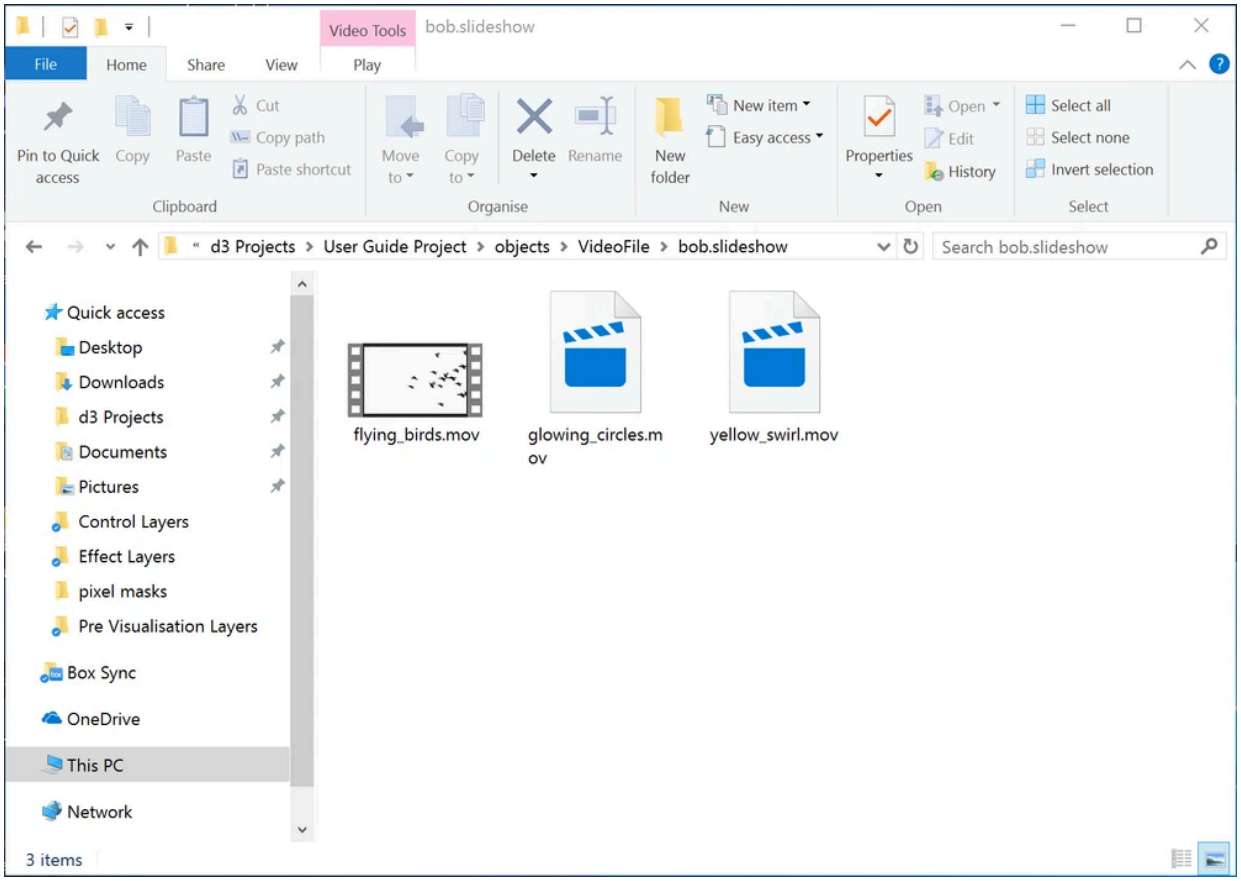
Creating slideshows

A slideshow is any folder within VideoFile that ends in ".slideshow". This functions similarly to the versioning or proxy tags, and tells d3 that the contents of the folder is to work as a single clip made up of multiple files.



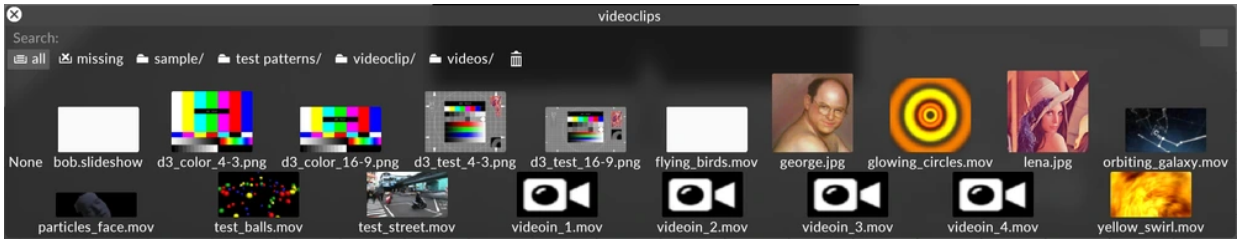
Video file folder

Slideshows can be populated with any filetype that could be placed inside the VideoFile folder, in any combination. The order that the slideshow plays back these pieces of content is determined by their filenames - slideshow works in alphabetical order.



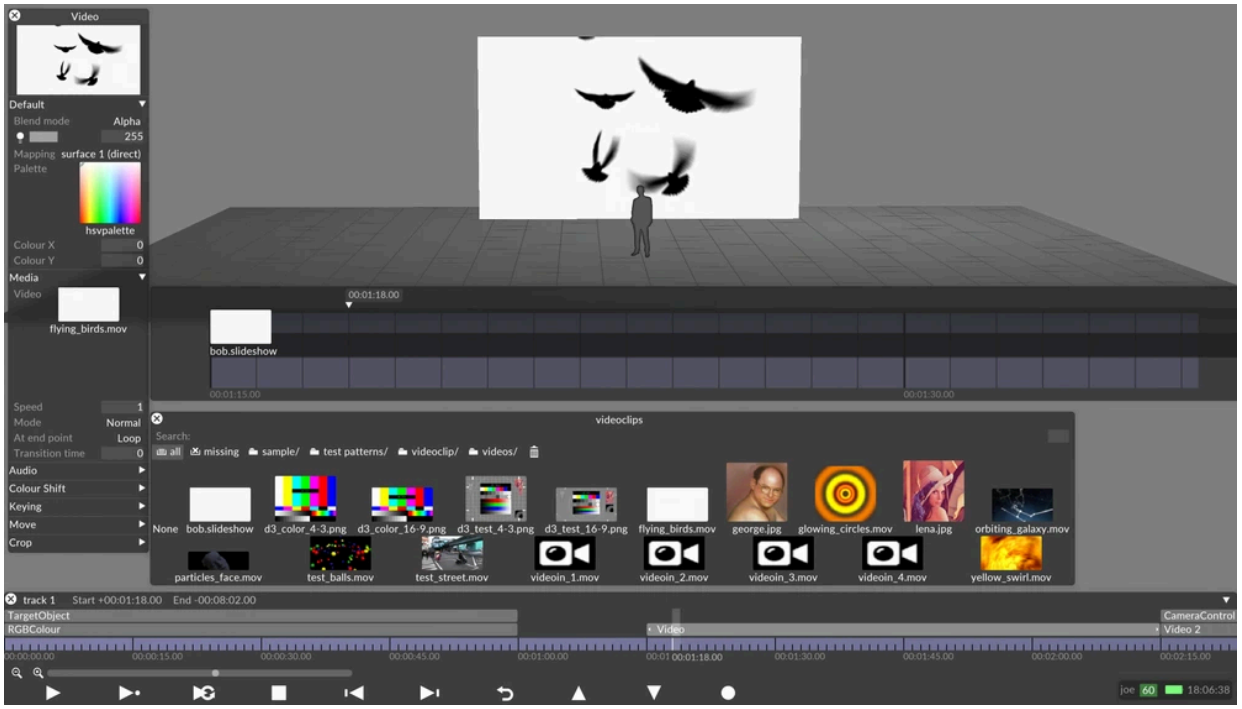
bob.slideshow showing 3 videos

Slideshows are accessed inside , just in the way normal videofile content is. On the video layer, open your media object keyframe and select your slideshow.



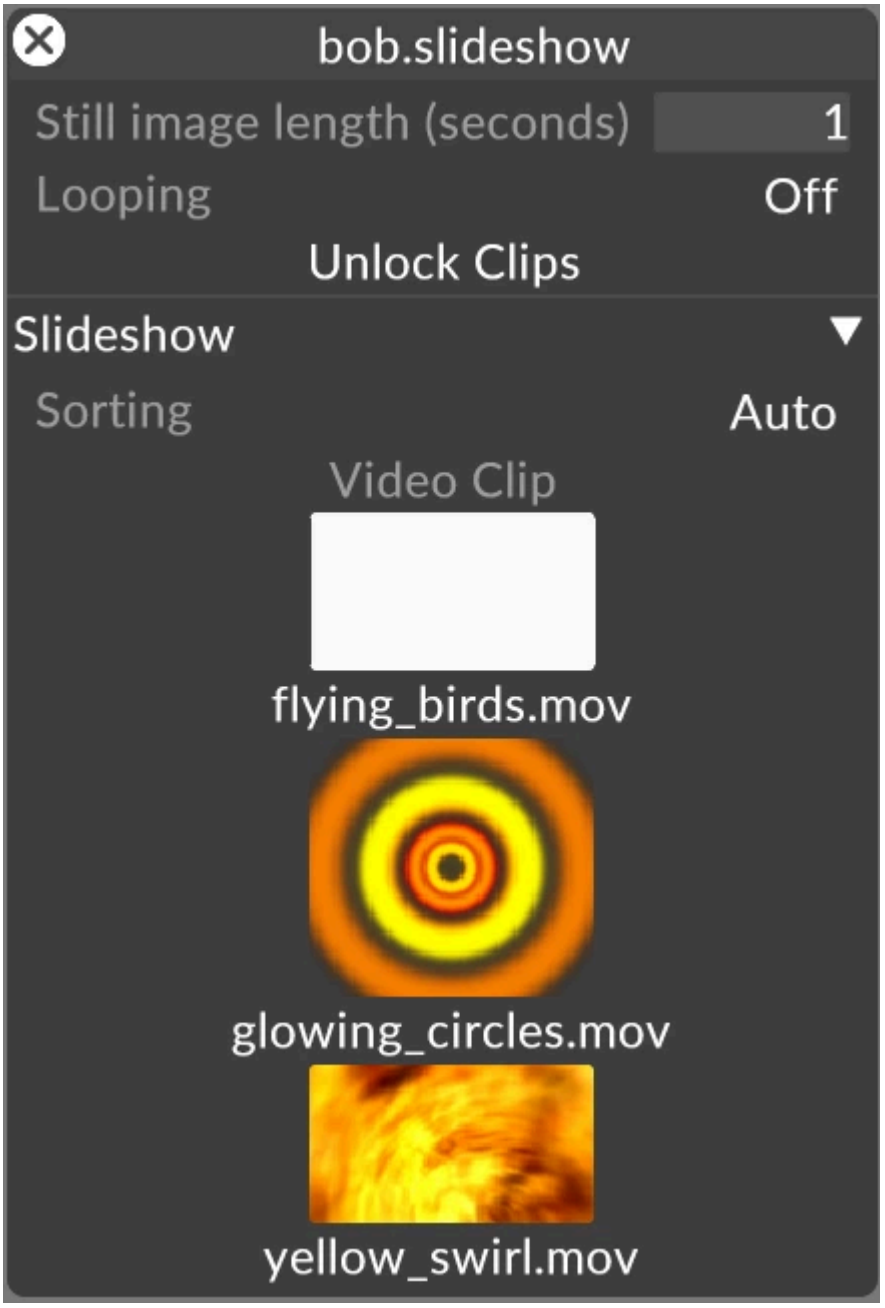
bob.slideshow now available as standard video content

The slideshow behaves just like a regular video file in , so playmodes, colourshift, audio routings, etc are all applicable. Transition Time will enable a crossfade between each piece of content, as if each piece of content were separately keyframed into the module.



bob.slideshow on the video keyframe editor

Clicking unlock clips will allow you to rename (ie: reorder), and delete slideshow clips without having to restart d3. When in unlocked mode, the slideshow cannot be played back.



Content management and slideshows

Versions, proxies and frame replacements are all compatible with slideshows. Versions can exist within the same .slideshow folder. The software will automatically use the highest version content it can find.

VideoClip Object

When sequencing video files in Designer, you are actually sequencing VideoClip objects, which are the container Designer uses to identify the media file, its properties, versions as well as other specific propertie

VideoFile is the piece of content you place in the VideoFile folder which lives inside your Objects folder in your project file.

VideoClip is an object inside Designer that contains the VideoFile (or VideoFiles when versioning is being used) as well as properties that you can apply to that file, outside of the normally keyframable parameters. These properties are things such as FPS, In & Out frames and are covered in more detail in the content properties topic.

Duplicating VideoClip objects

Sometimes it's useful to have a single video file that has different settings for different parts of the show. For example, you may wish to have Video 1 with in and out frames at default in one part of the show, but change the in and out frames to a different setting later one. Instead of making a hard copy of the file in the VideoFile folder of the project, you can simply duplicate the VideoClip object in Designer and change the VideoClip object properties. This saves media drive space, and also allows for better internal handling of the media files.

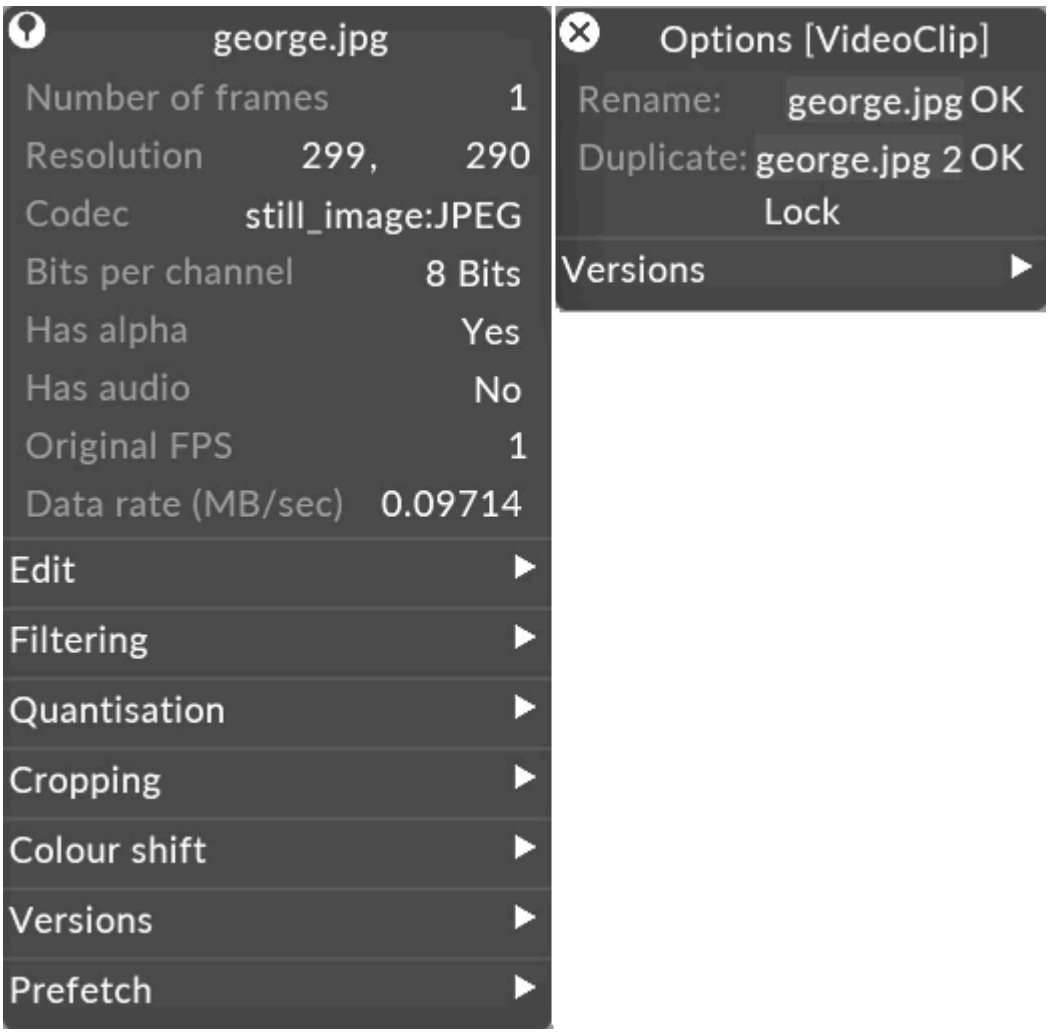
To duplicate a VideoClip object

1. In the VideoClips editor, which can be accessed via the Video, Legacy video or VideoTrigger layers, left-click the Video property under the media tab. The VideoClips manager opens.

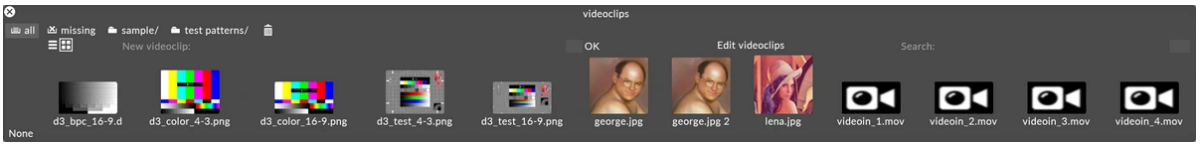


2. Right-click a **VideoClip**. The VideoClip editor will open, containing the properties of that VideoClip.
3. Right-click the header of the VideoClip editor

4. Select **Duplicate**, give the duplicate a name, and then hit Enter or OK.



5. You will now see the duplicate VideoClip available in the manager, but only one piece of content will be in the VideoFile folder. You can edit the settings of the duplicate clip to be different to the original.



Multi-Editing VideoClip objects

Its possible to Multi-Edit most objects in Designer, but due to the VideoClip objects being items used for sequencing, the method to multi-edit them is slightly different.

To multi-edit a VideoClip

1. In the VideoClips editor, which can be accessed via the Video, Legacy video or VideoTrigger layers, left-click the Video property under the media tab. The VideoClips manager opens.



2. Left-click the Edit VideoClips button.
3. The Multi Editor opens, select clips by using CTRL or SHIFT and alter their properties accordingly.

VideoClip

Name	FPS	Start	End	In	Out	Bilinear filtering	Frame blending	Colour profile	Colour shift	Deinterlace method
d3_bpc_16-9.d	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
d3_color_4-3.png	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
d3_color_16-9.png	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
d3_test_4-3.png	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
d3_test_16-9.png	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
george.jpg	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
george.jpg 2	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
lena.jpg	1	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
videoin_1.mov	0	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
videoin_2.mov	0	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
videoin_3.mov	0	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate
videoin_4.mov	0	0	1	0	0	On	Auto	itu709	ColourShift	Weave & Interpolate

See the Multi-Edit topic for more information.

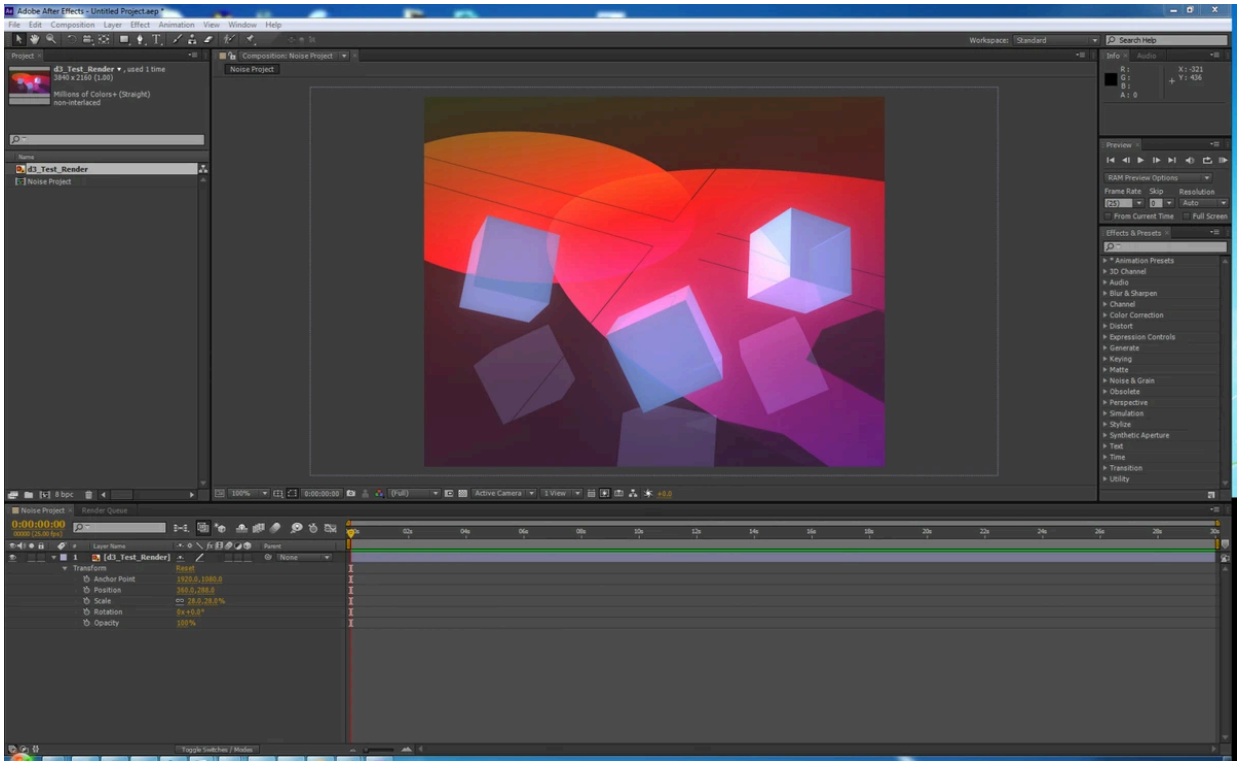
Adding Noise in After Effects

Adding a small amount noise before converting media to any codec is a good way to reduce compression artifacts.

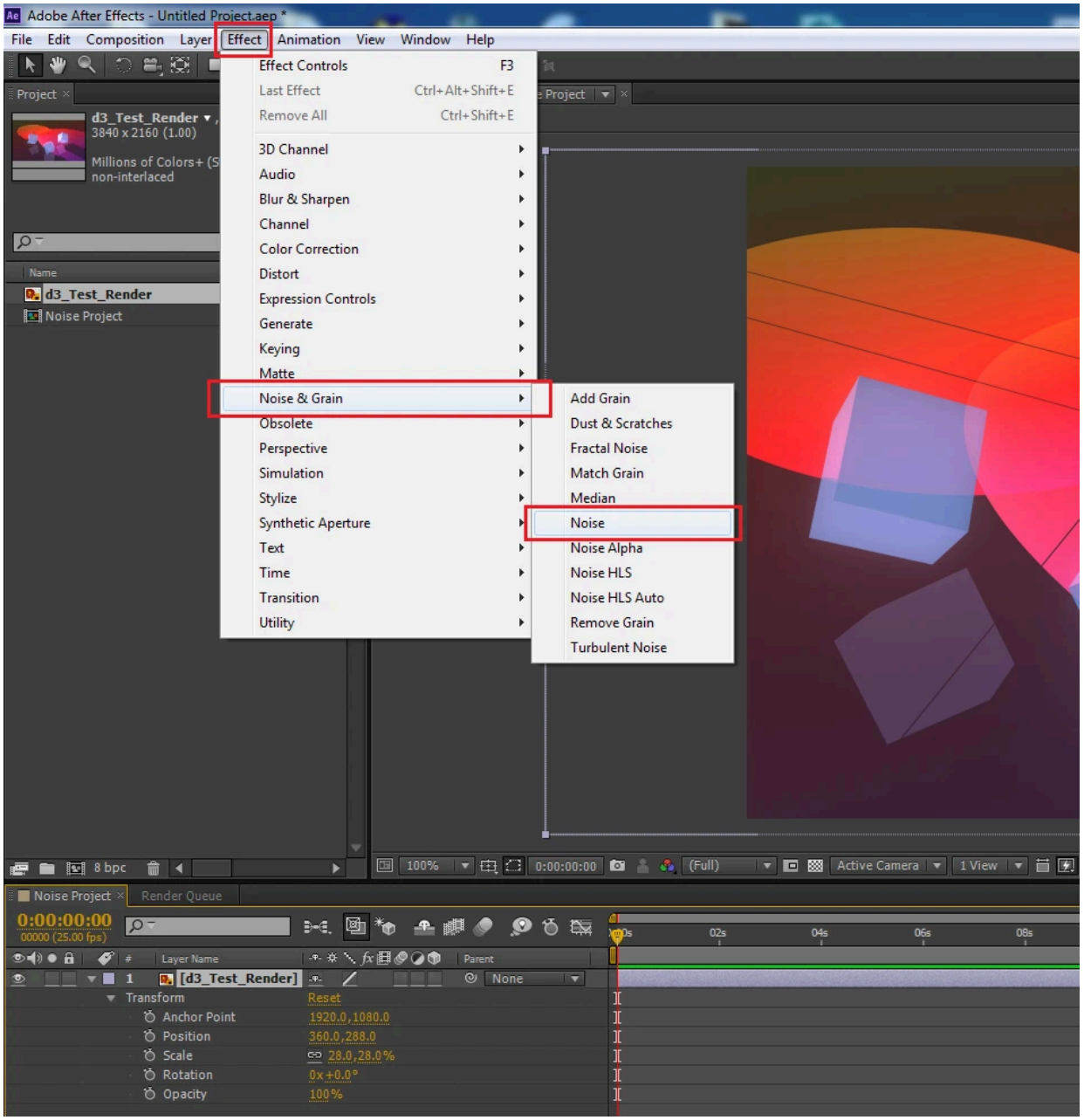
The easiest way is to use the noise effect in After Effects.

Example

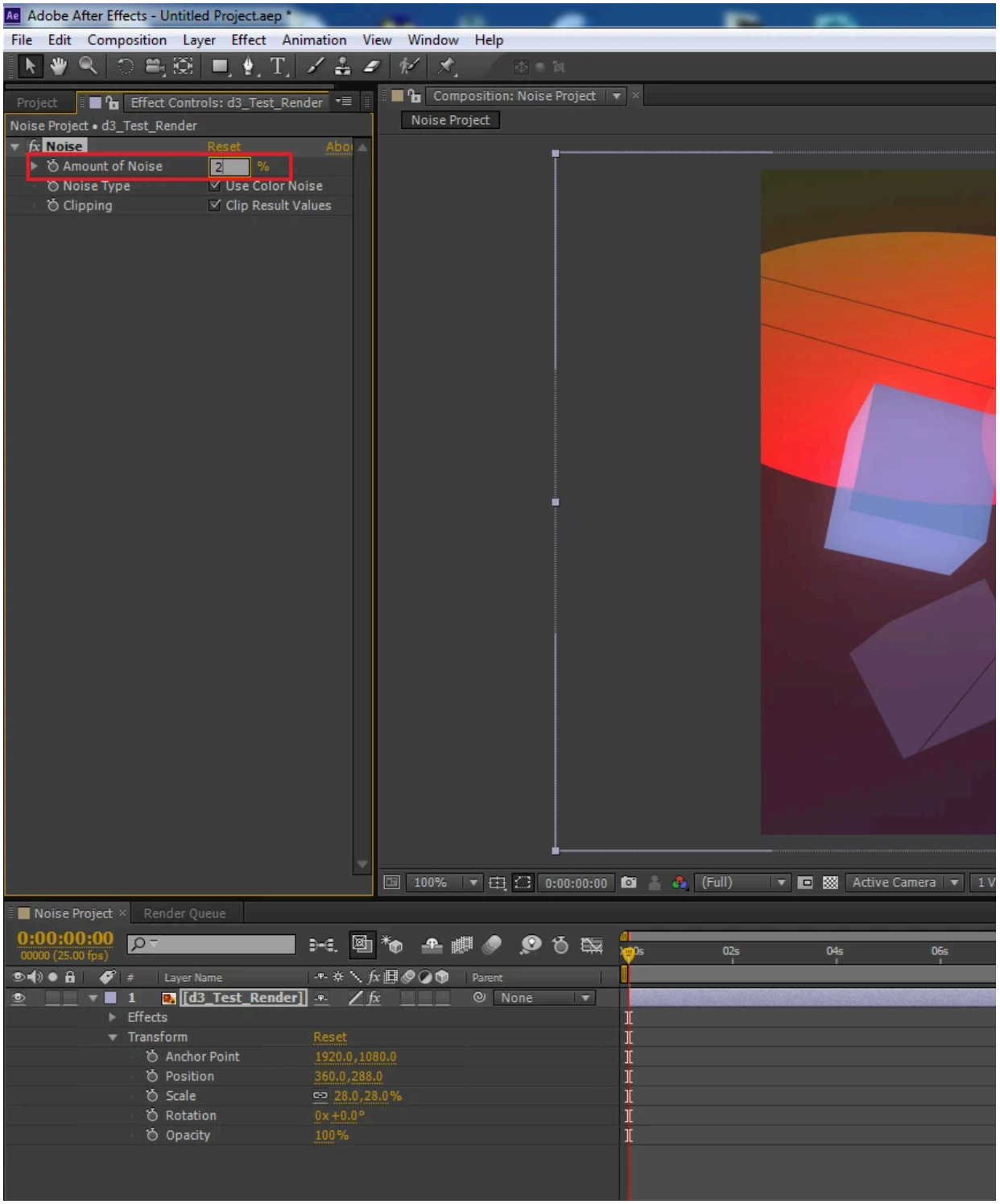
1. Create a new After Effects project and composition, and add your content as a layer.



2. Next, select your content layer. and from the toolbar choose **Effect > Noise & Grain > Noise**. Or apply a preset to your content by clicking here and importing it into the After Effects composition.



3. Now in the effects property box, set the amount of noise to be applied. Settings the noise to 2 - 3% works well.



4. Now you can render out your content.

DXV 2.1.1 Codec

The DXV 2.1.1 codec performs all decompression on the GPU. All codecs have unique performance characteristics due to the various compression methodologies and DXV 2.1.1 is no exception.

DXV 2.1.1 provides excellent results and quality to size ratio. When playing back **filmed video** content, it performs very well without any changes to workflow. See the **Filmed Video** visual comparison section below.

When playing back **graphics with strong gradients**, noise can be added to the video during render to reduce compression artefacts. See the **Graphics & Gradients** visual comparison section below.

Download the DXV 2.1.1 Codec

Download the DXV 2.1.1 Codec on our **Resources page**.

> **Note**
>
> **DXV3 is not supported.**

Filmed Video

Stills from the short film **Tears of Steel**. Source media, 1920 x 800 PNG.



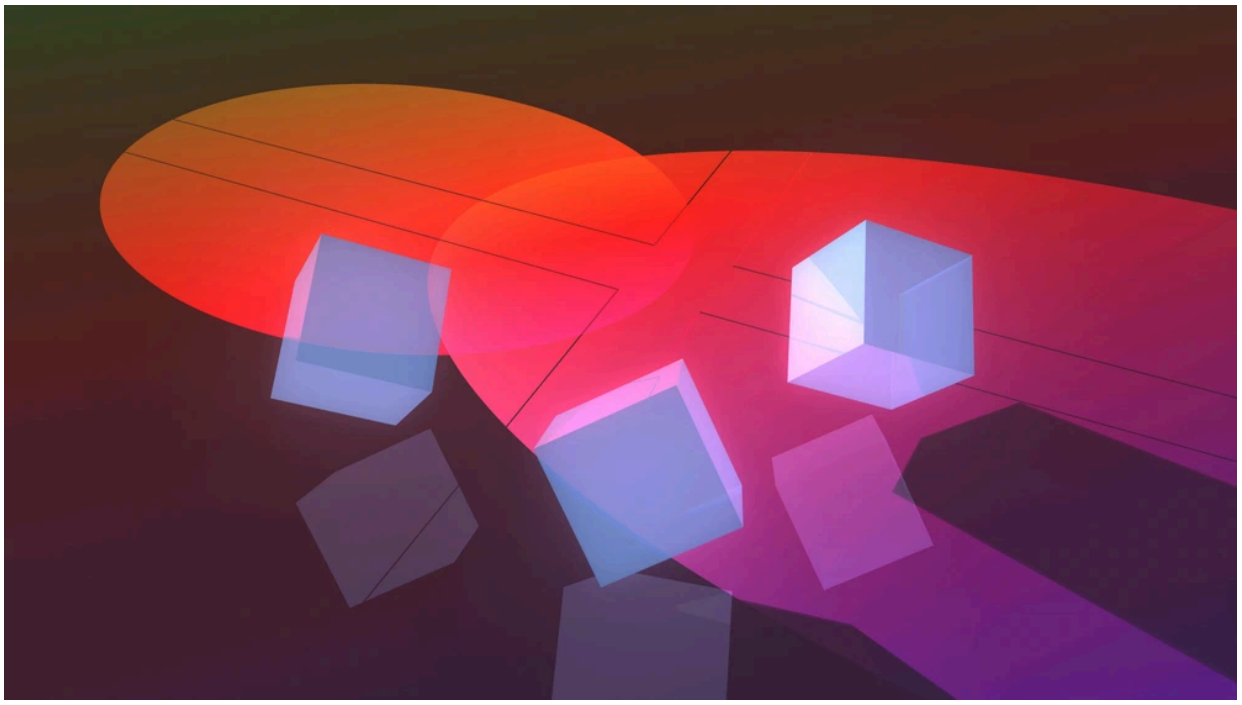
DXV 2.1.1



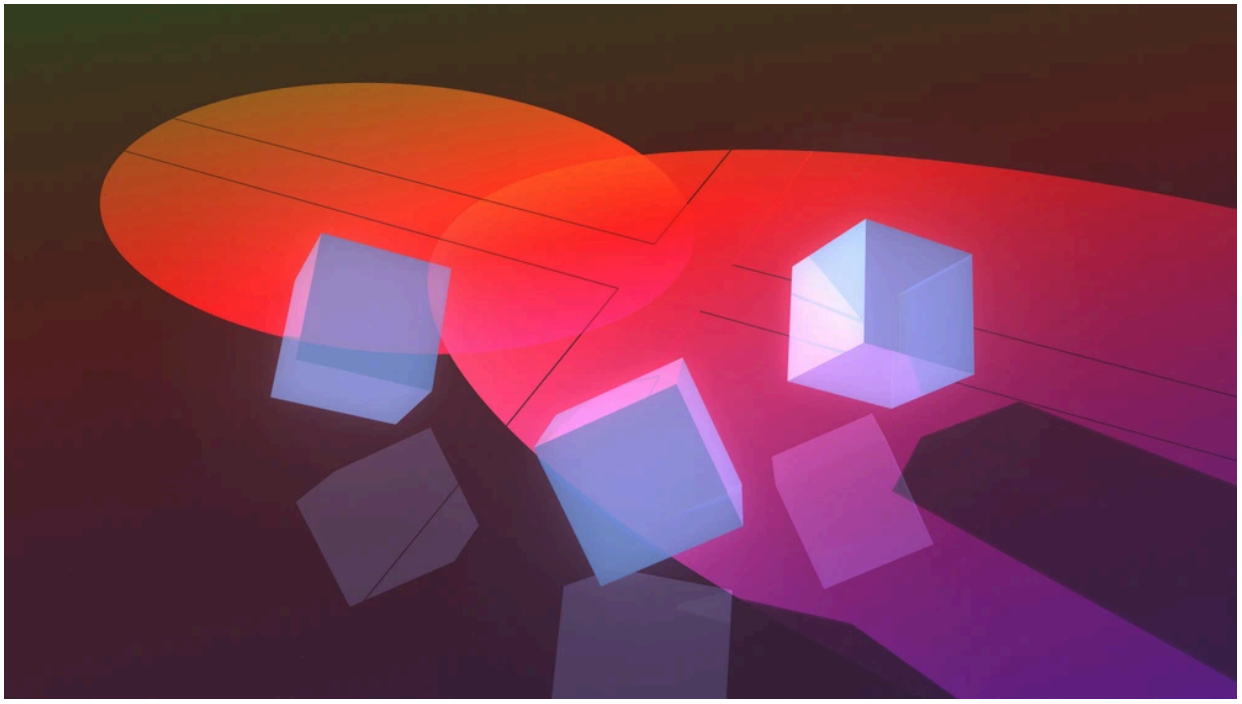
Photo JPEG

Graphics with Gradients

With the DXV 2.1.1 codec there can be artefacts after compression in certain cases. One issue that can occur is *banding* in gradients, however this can be eased by adding a small amount of noise to the media before conversion.



DXV



DXV + 3% Noise

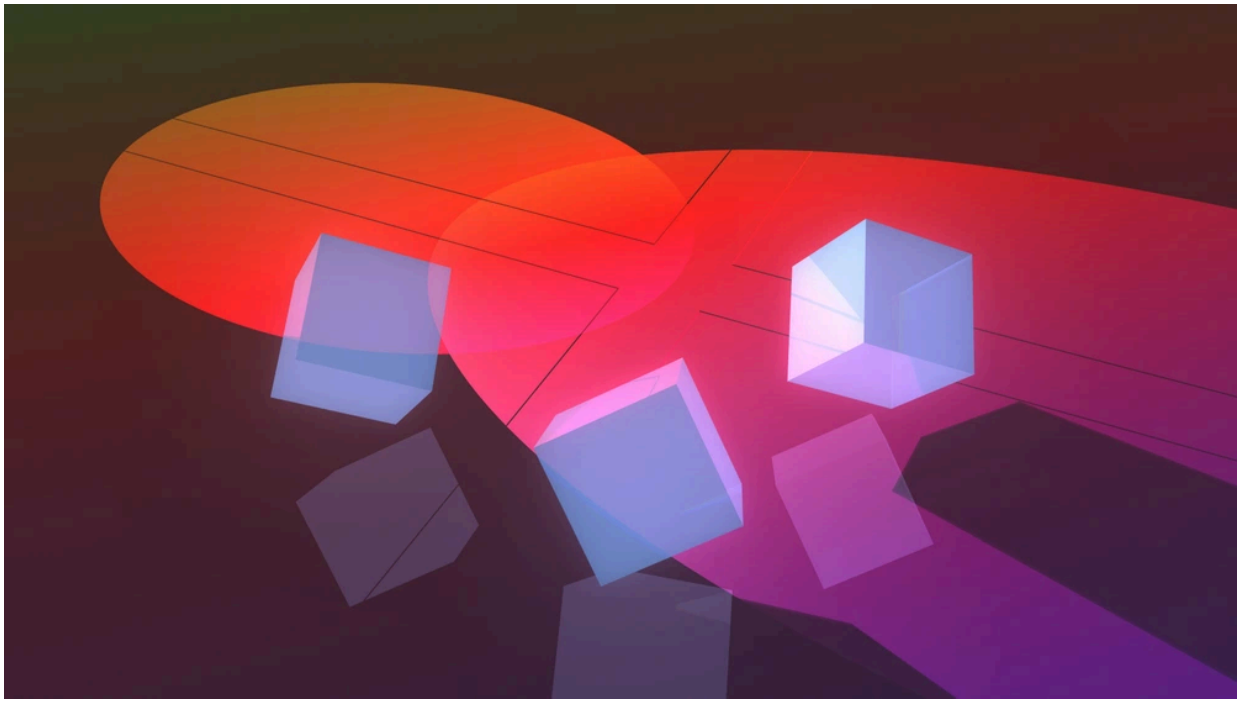


Photo JPEG

HAP / HAP-Q Codec

The HAP family comes in multiple flavours for different purposes.

HAP

Enables very large canvases at lower bitrates, with some trade-off for compression. HAP is very similar to DXV in terms of compression profile, but allows much larger canvases. If you are preparing canvases over HD, we recommend using HAP. When preparing shot footage, HAP is often the go to choice for bandwidth and compression.

HAP-Q

Utilises twice the bandwidth of HAP, but offers much better detail in tone, which is especially important in rendered content where tone gradients are utilised.

HAP Alpha

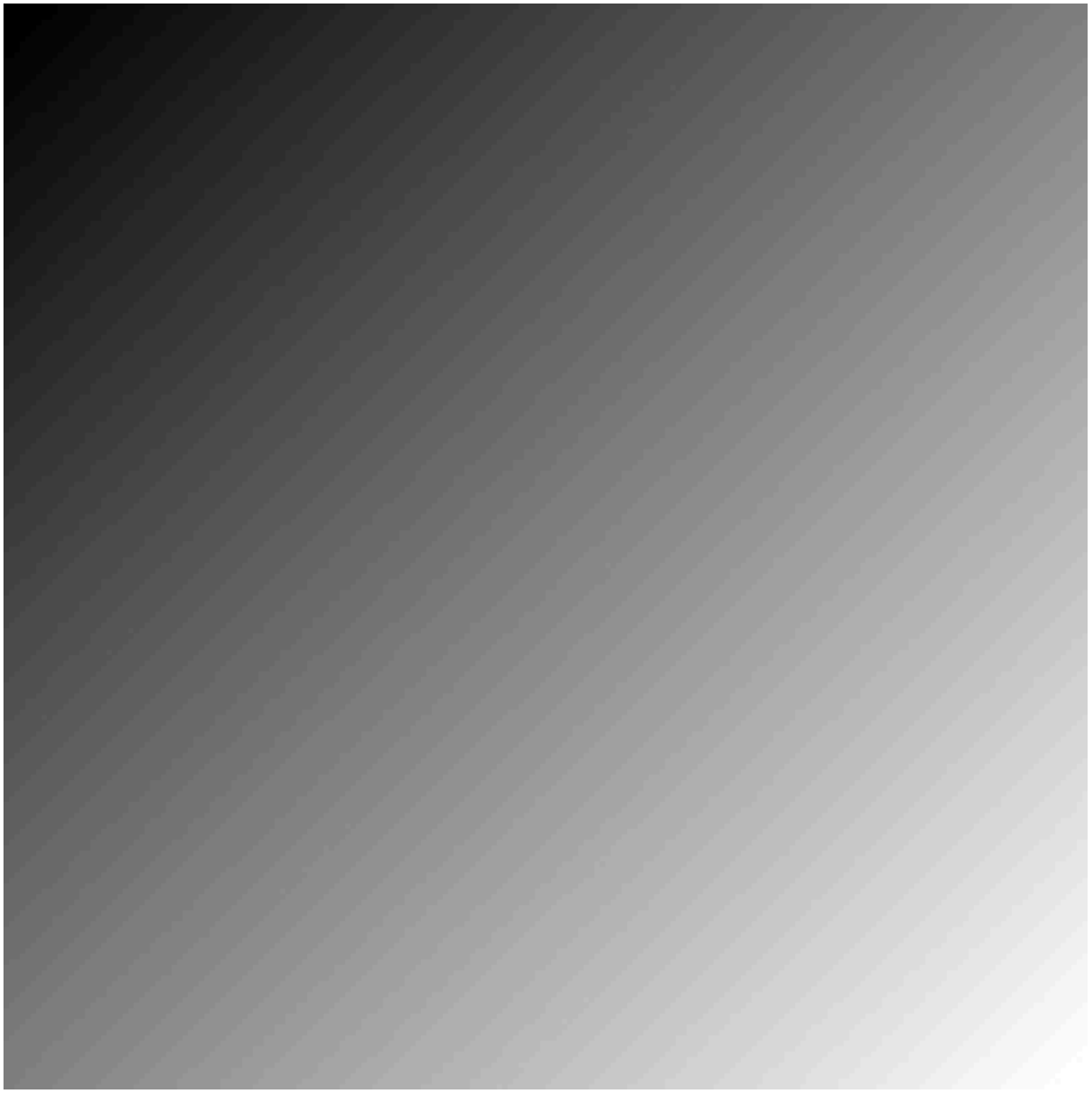
HAP Alpha has the same image quality as HAP, and supports an Alpha channel. HAP Alpha has roughly the same bandwidth as HAP-Q.

> **Note**
>
> Download the HAP/HAP-Q Codec here.

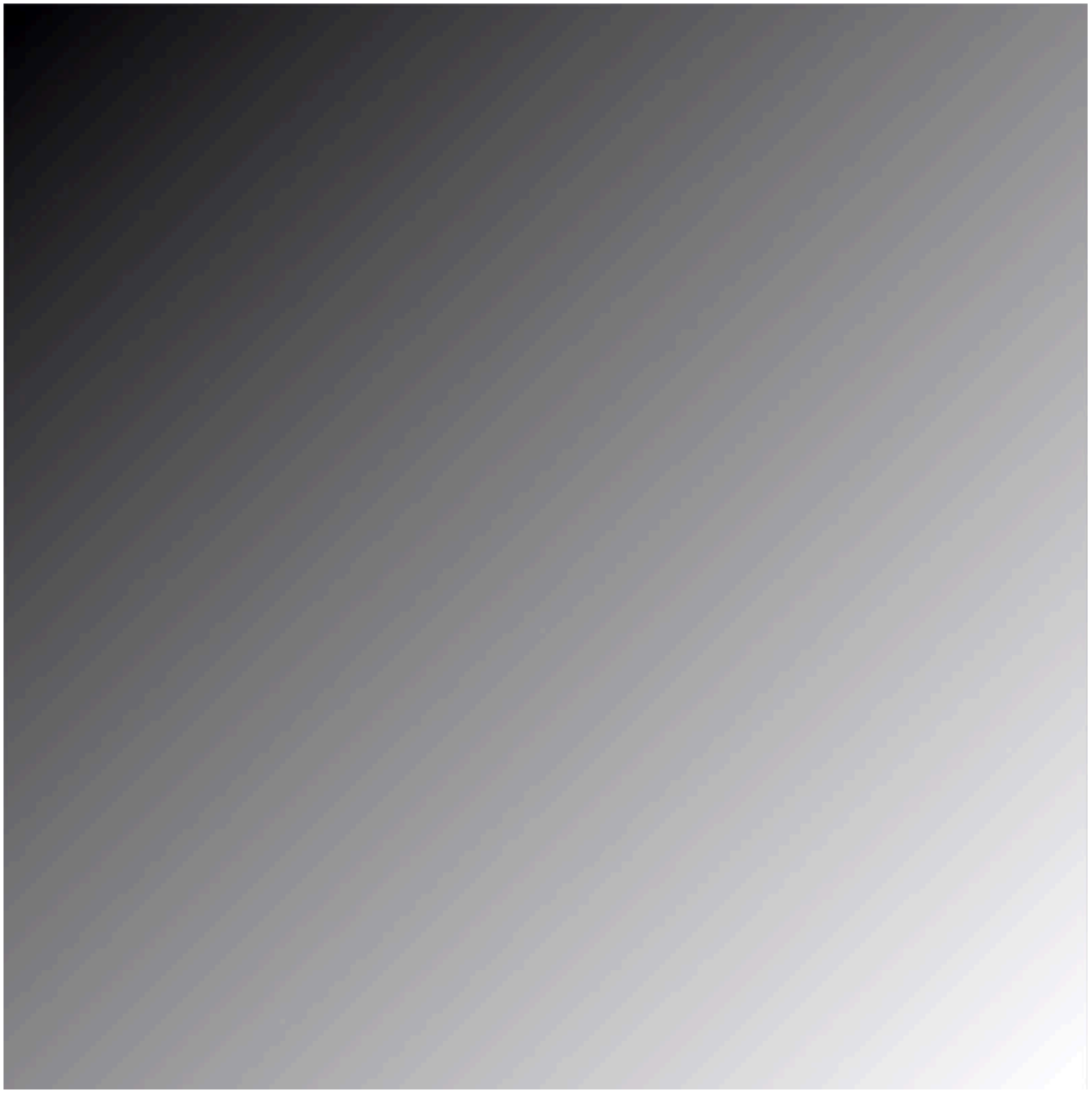
> **Warning**
>
> Designer does not support Hap-Q Alpha.

Graphics with Gradients usage of HAP-Q

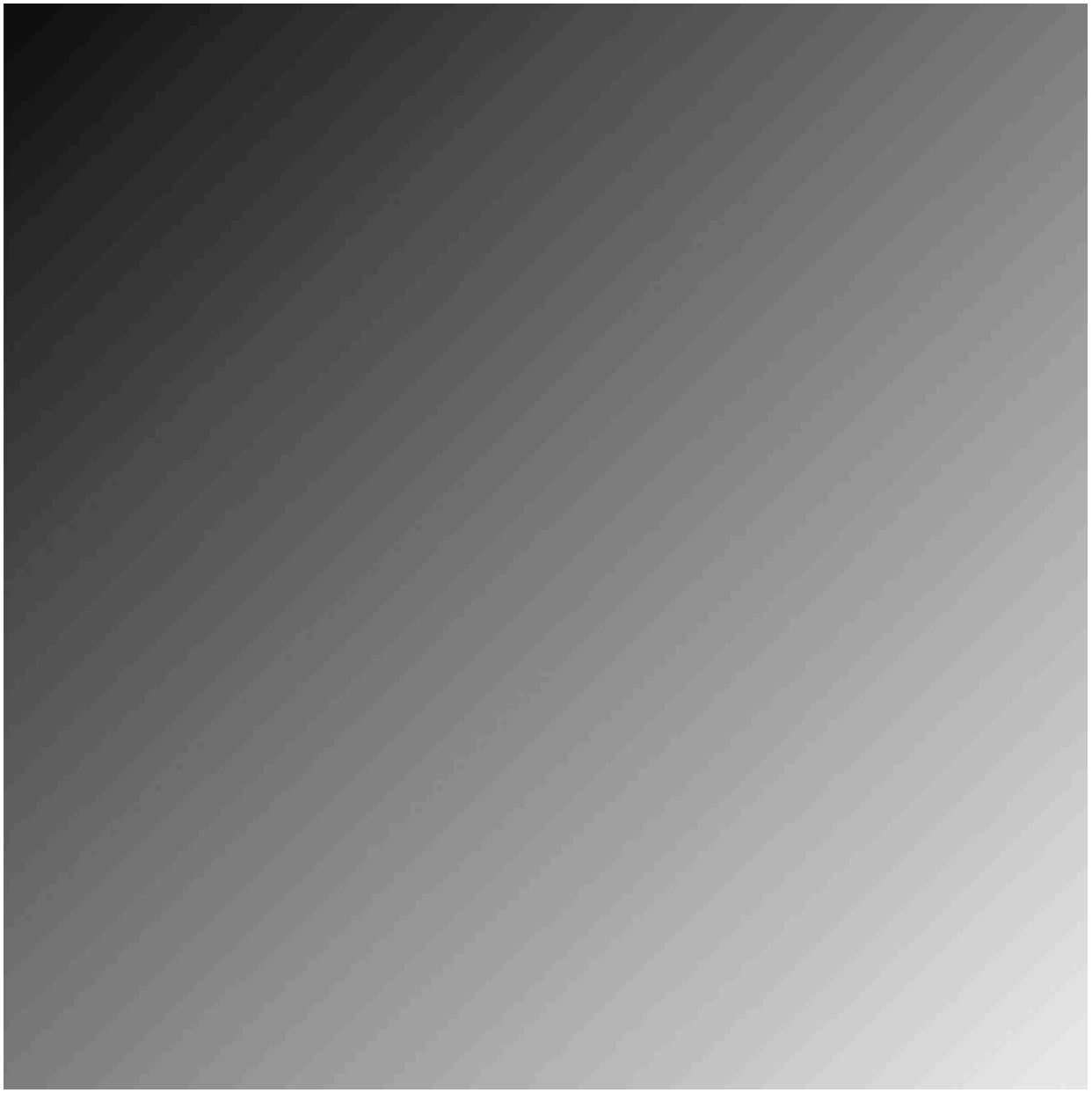
Most lossy codecs are very sensitive to gradients through tone. Below is a comparison of HAP-Q and HAP performance on a gradient through tone in order of quality. Click the image for full size.



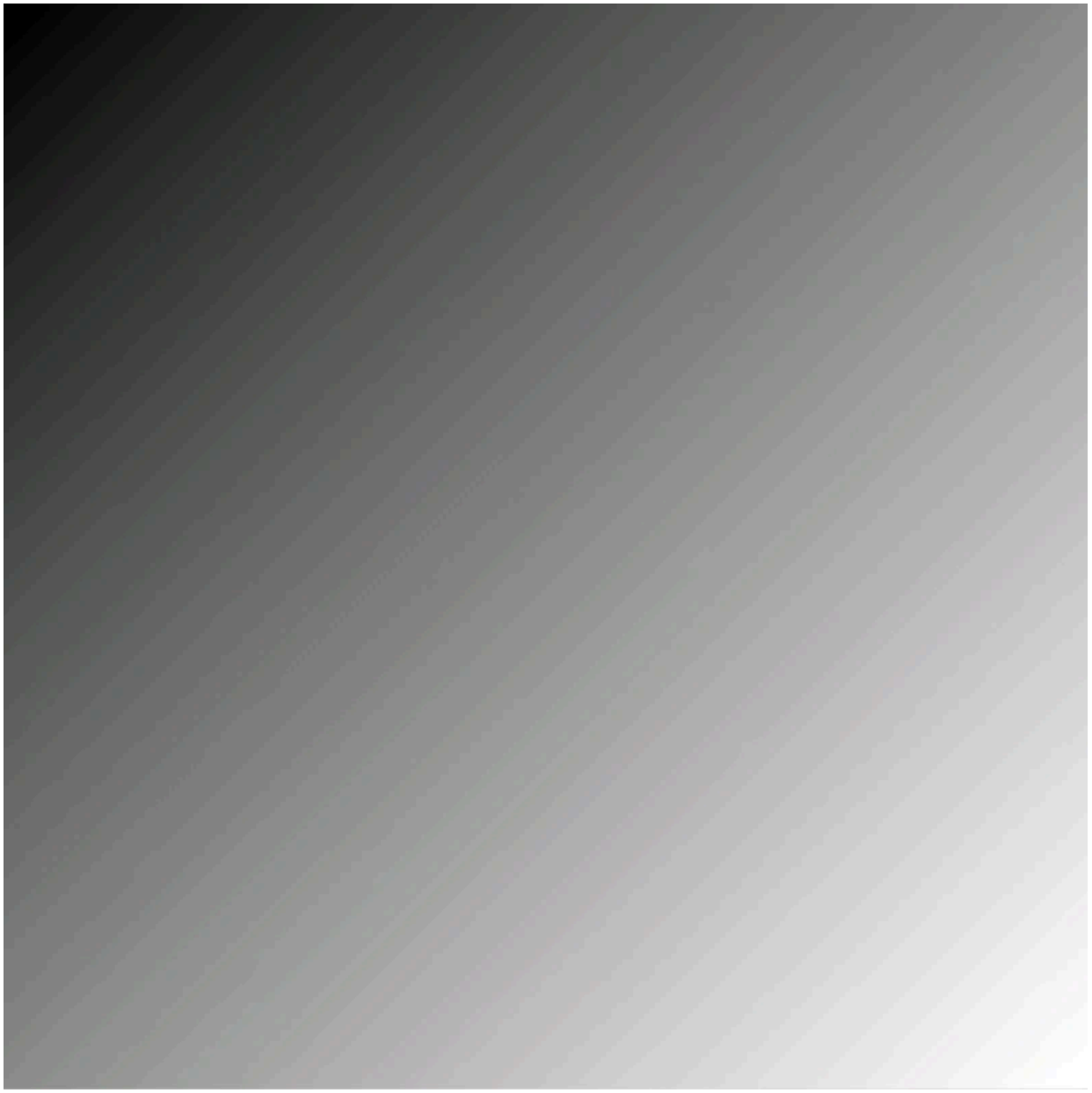
Original



HAP-Q



PhotoJPEG



HAP/DXV

ProRes Codec

The Apple ProRes family is a suite of high-quality codecs developed for professional video production. It delivers excellent image fidelity while keeping file sizes manageable. Designer supports multiple ProRes variants tailored to different quality bandwidth requirements.

ProRes 422

ProRes 422 is the standard variant that provides excellent quality for most professional video applications. It offers a good balance between file size and image quality, making it ideal for broadcast and post-production workflows. ProRes 422 supports up to 10-bit colour depth and is ideal for most video content.

ProRes 4444

ProRes 4444 is the highest quality variant in the ProRes family, supporting up to 12-bit colour depth and an alpha channel for transparency. This codec is designed for visual effects work and high-end post-production where maximum image quality is required. ProRes 4444 provides virtually lossless compression with larger file sizes.

ProRes HQ (High Quality)

ProRes HQ offers higher quality than standard ProRes 422 while maintaining reasonable file sizes. It provides enhanced detail preservation and is particularly useful for content that will undergo multiple generations of processing or when the highest quality is needed within the 422 colour space.

ProRes codecs are widely supported across professional video applications and provide excellent quality for high-end video production workflows.

> ⚠ **Performance Consideration**
>
> Check the performance capabilities of the individual server you intend to playback ProRes on, as performance may be more limited than GPU accelerated codecs like HAP/DXV and NotchLC.

Best Practices

- Use ProRes 422 for standard broadcast and streaming content.
- Choose ProRes 4444 when alpha channel support or maximum quality is required.
- Select ProRes HQ for content requiring enhanced detail preservation.

Quality Comparison

ProRes codecs are designed to maintain high image quality across different compression levels and file size:

- **ProRes 4444**: Highest quality, supports alpha channel, largest file size,.
- **ProRes HQ**: Enhanced quality over standard 422, moderately larger file sizes.
- **ProRes 422**: Standard quality, a good balance of quality and file size.

Choose the appropriate variant based on your quality needs, storage capacity, and whether alpha channel transparency support is required.

Further Information

Read more about Apple ProRes on the **Apple Support website**.

Transcoding Software

Designer supports playing back a range of video codecs. A common part of any production is encoding or transcoding your content in to the correct format. We recommend using standard rendering applications such as Adobe Media Encoder or the freeware MPEG Streamclip for transcoding and encoding.

The following codecs are supported in the standard install of most media transcoding applications:

- ProRes
- TIFF
- DXV
- EXR

Other Codecs typically require a plugin to transcode. These include:

- HAP/HAP-Q
- NotchLC

You can find quick links to transcoding plugins and codecs for all of our supported formats on our Resource page.

Video Codec Overview

Designer uses the QuickTime .mov video container for playing back various codecs, and advanced GPU codecs DXV/HAP/HAP-Q which allow for excellent quality/ performance trade-offs.

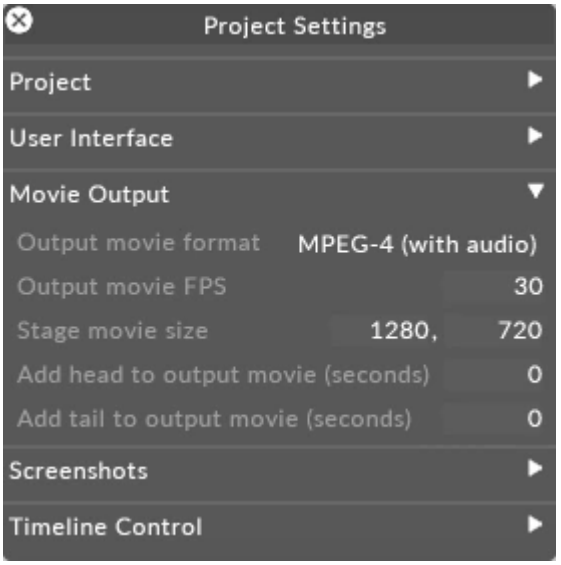
- HAP / DXV : Two very similar GPU based codecs that allow for high numbers of simultaneous video to be played at a good quality. Utilise HAP for resolutions greater than HD.
- HAP-Q : Utilises twice the bandwidth of HAP/DXV, but delivers higher tonal fidelity especially in rendered content, or content with tonal gradients (such as skylines)
- **Animation** - A totally lossless, but very high bandwidth codec.
- ProRes : A high-quality suite of Apple codecs—ProRes 422, 4444, and HQ—fully supported by Designer.
- **Notch LC** - 10bit ltd have developed a new video codec which is intended to fit in between HAP and lossless image sequences in terms of both visual quality and performance. All users who are currently unsatisfied with HAP, but are unable to justify the cost of lossless playback will benefit from this addition.

View the **Resource page** for Video Codec download information.

Video Output Settings

Before rendering a Stage or Feed movie it is important to set the size, frames-per-second and codec used for the output video. To do this:

1. Open the Program Settings menu by right-clicking **d3**from the dashboard (bar at the top of the screen).
2. Select **Project settings...**
3. The **Movie Output** section contains the properties used to specify the settings of the Stage/Feed movie.



Movie Output Properties

Output movie format

This selects the codec for the video.

Options are:

- **Photo- JPEG (no audio)**
- **Animation (no audio)**
- **MPEG-4 (with audio)**
- **Photo- JPEG mov (OLD quicktime players)**
- **HAP (no audio)**
- **DPX image sequence (no audio)**

- **WEBM vp9 (audio as Vorbis output)**

Only the **MPEG-4** option writes audio to the file. In general, the first two options are used for writing Feed movies for playback since they do not need audio. The **MPEG-4** option is used mainly for Stage movies since Stage movies most likely need audio and also need to be as compact as possible to be sent via the internet.

Output movie fps

The output movie speed, in frames-per-second. Any frame-rate can be used, but common values are 24, 25, 29.97 or 30.

Output movie size

The output movie size, in pixels.

Add head to output movie (in seconds)

This option will add an extra number of seconds to the beginning of the file. This can be useful when writing out short sections for playback on other systems.

Add tail to output movie (in seconds)

This option will add an extra number of seconds to the end of the file. This can be useful when writing out short sections for playback on other systems.

Advanced Machine Settings

Colloquially known as **option switches**, Advanced machine settings allow you to alter the default state of a project and enable behaviour not available in the core product.

Option switches can be enabled on a per machine or per project basis.

Advanced machine settings take precedence over project settings.

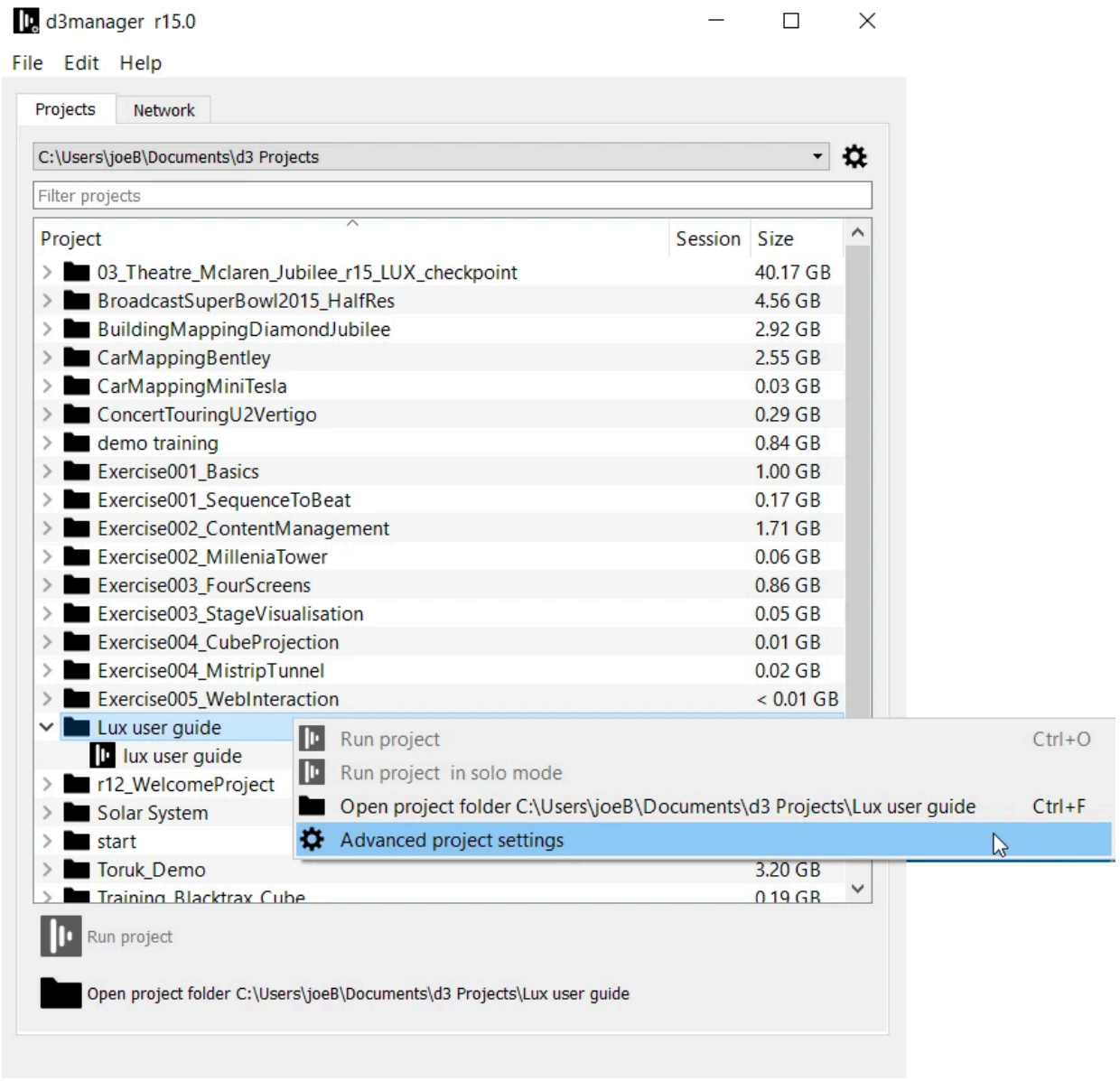
Advanced machine settings are roughly the same as setting a `machine.ini` text file containing option preferences prior to r15.

Setting project options is roughly the same as editing the options.ini file in a project folder prior to r15.

Accessing Advanced project settings

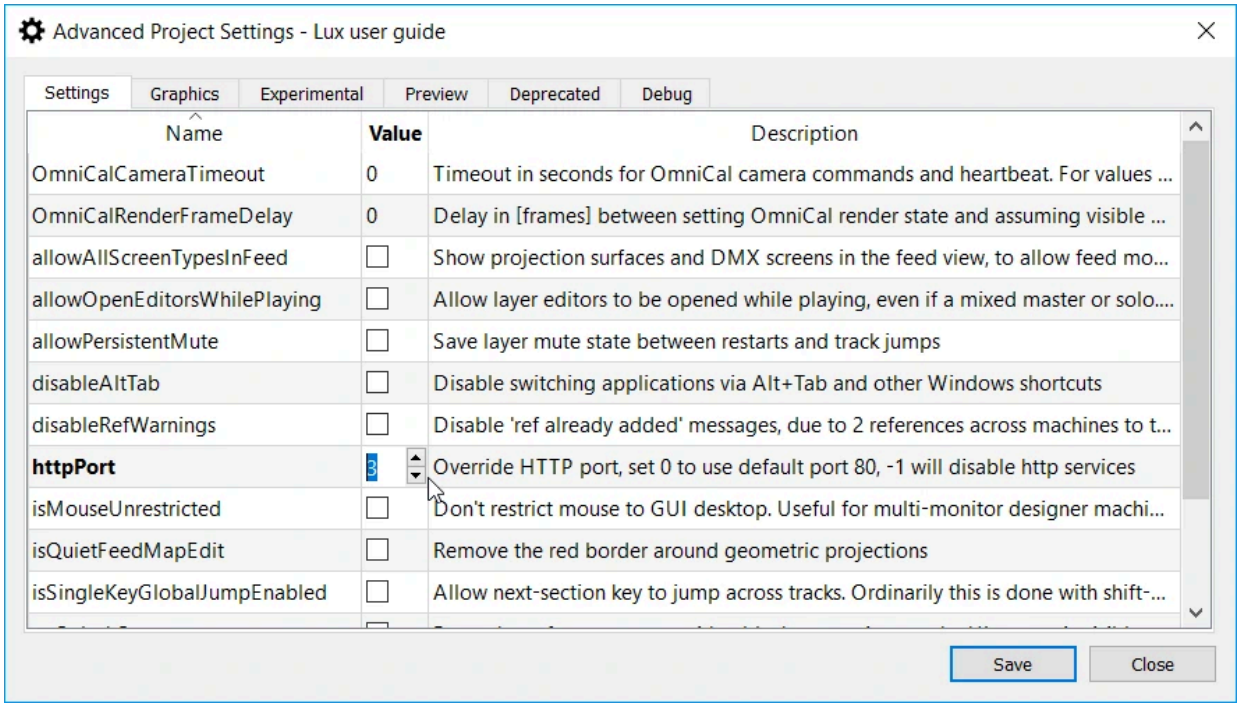
1. In Manager, right-click on a project folder.
2. Select **Advanced project settings** from the list.

> **Note**
>
> It is important to right-click the project folder as options are set per folder, not per .d3 file.



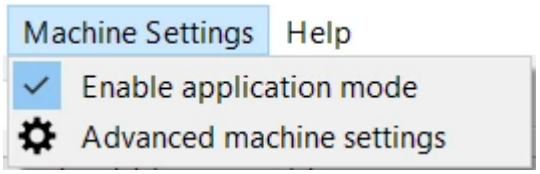
Applying Advanced project settings

1. Access the **advanced project settings** dialogue.
2. Select tick boxes to enable Boolean options, or double-click on Integer value options to set them to the desired value.
3. Click **Save** to close and save the desired settings. Or click Close to close the window without saving.



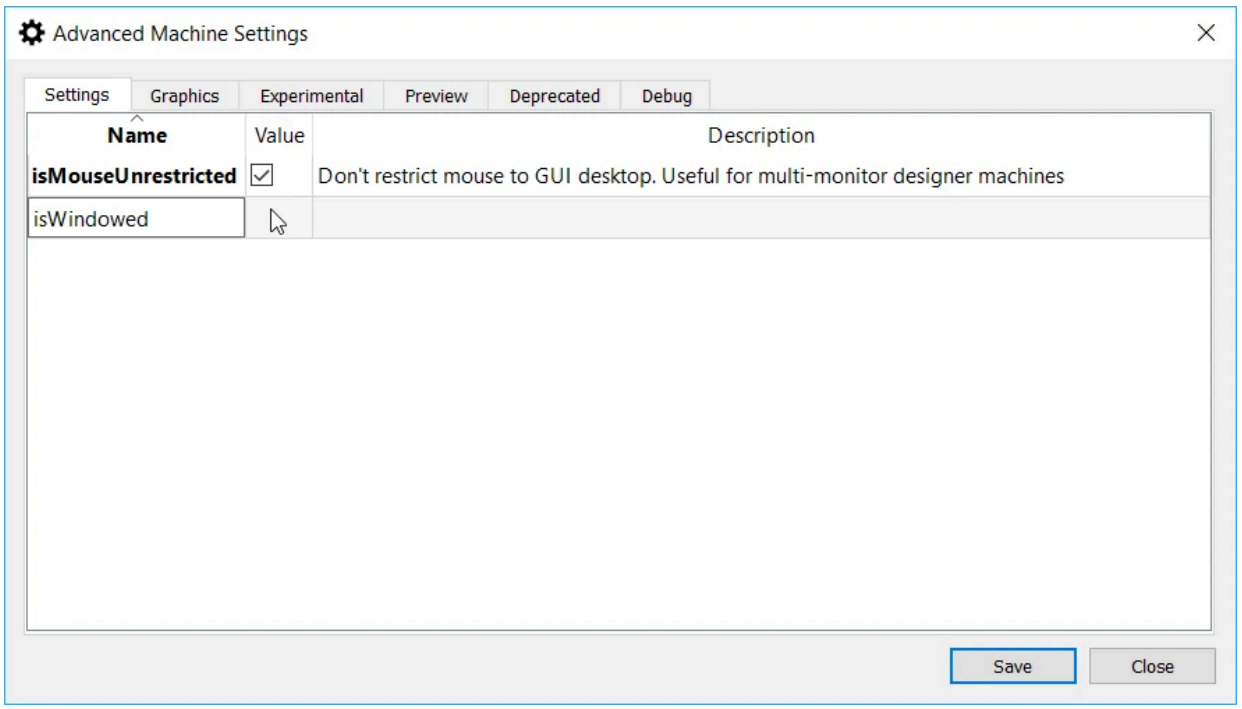
Accessing Advanced machine settings

1. In Manager, expand the **Machine Settings** menu.
2. Left-click **Advanced machine settings** to open the editor.



Applying Advanced machine settings

1. Open the **Advanced machine settings** editor.
2. Double-click on a name cell.
3. Enter the value from the defined list of settings.
4. Click save to **save** settings, or **close** to exit without saving settings



Application mode

Under the Machine Settings menu, there is an Enable Application Mode button from r17.2 onwards. This is simply a shortcut to pre-set the following options:

- `isMouseUnrestricted`
- `isWindowed`
- `maxHeads`
- `useApplicationWindow`

Application mode allows Designer to run in a windowed mode with access to minimise, maximise and close buttons, as well as keeping the windows taskbar visible. This is default on Designer machines, but not rackmount machines.

> **Warning**
>
> Windowed mode should not be used during a running production; doing so can negatively impact your system's performance.

Option Switches

Name	Type	Category	Description
`disableOverlayMessages`	Boolean	Debug	Suppress pop-up overlay messages on startup
`disableConfirmationDialog`	Boolean	Debug	Suppress confirmation di on mass actions
`enableSLC`	Boolean	Preview	Enable support for larger canvases
`enableProjectorDeviceRetries`	Integer	Debug	Enable support for retryin projector device comman Enter number of retries (e the first call to device). -1 disable.
`enableProjectorDeviceLogging`	Integer	Debug	Enable logging level for pr device commands. 0 = disable, 1 = enable
`enableSeparateRotationAndSpatialDelays`	Boolean	Settings	Add a field to the Camera allows you to set a separa delay for position and rota data
`projectorDeviceThreadPoolSize`	Integer	Debug	Override the number of w threads for servicing proje device comms.
`projectorDeviceMaxActiveTasks`	Integer	Debug	Override the max number tasks which task manage run on each process call servicing projector device comms. Set to 0 to use sy default. System default =
`enableVicon`	Boolean	Preview	Enable Vicon Datastream driver
`allowOpenEditorsWhilePlaying`	Boolean	Settings	Allow layer editors to be o while playing, even if a no dedicated director or solo default to prevent frame d that can happen when th is opened
`allowPersistentMute`	Boolean	Settings	Save layer mute state bet restarts and track jumps
`audioLinePcmSize`	Integer	Experimental	Increase size of window f in the audio analyser

Name	Type	Category	Description
`audioStreamBufferSize`	Integer	Experimental	Set the audio file buffer si bytes
`audioMinFadeRamp`	Integer	Settings	Minimum audio volume fa ramp in milliseconds. Default is 50
`debugMediaManager`	Boolean	Debug	Enable detailed console lo about video file loading.
`defaultDetachedBankEditorResources`	Boolean	Experimental	Open the bank editor with objectView detached by d
`disableUnsupportedEmbeddedAudioNotification`	Boolean	Settings	Disable notification for unsupported audio forma video files
`disableAltTab`	Boolean	Settings	Disable switching applicat Alt+Tab and other Windo shortcuts
`disableActiveLatencyPhaseAdjustment`	Boolean	Graphics	Do not adjust active laten render streams to the clo frame time
`disableOutputModeHotkeys`	Boolean	Settings	Disable keyboard shortcu toggle the global output r (Fade, Hold)
`disableAudioInput`	Boolean	Settings	Disable audio input in cas conflicts with other applic
`audioInputDriver`	Integer	Debug	Sets the audio input drive 0 = WASAPI, 1 = Legacy DirectSound, 2 = Both
`disableAudioASIODriver`	Boolean	Settings	Disable ASIO support in c conflicts with other applic
`disableDllVersionCheck`	Boolean	Debug	If dll exports have not cha allow dlls to load with mismatching version num DANGEROUS.
`disableFullscreenCheck`	Boolean	Graphics	Disable the attempt to ma fullscreen mode
`disableInputInCameraEditor`	Boolean	Settings	The small preview in the d editor ignores all input if th set
`disableProxyMaker`	Boolean	Deprecated	Disable the proxy maker

Name	Type	Category	Description
`disableRefWarnings`	Boolean	Settings	Disable 'ref already added messages, due to 2 refere across machines to the sa on-disk resource
`enableShadowResourceDomain`	Boolean	Debug	To use the resources API endpoint. Warning may ha performance side-effects complex projects.
`disableTelnetNotification`	Boolean	Debug	Disable the notification fo out telnet connections
`disableTrackSanityChecks`	Boolean	Debug	Disable the track sequenc sanity checks
`disableVideoclipThumbnailVersions`	Boolean	Settings	Hide version numbers underneath video clip thu
`disableVFCConfigOnStartup`	Boolean	Experimental	Prevent reconfiguration of outputs when d3 starts
`disableDmxPacketSendWait`	Boolean	Debug	Disable waiting for DMX p to be sent and instead dr Can improve performance remote node does not ex network.
`disableVR`	Boolean	Settings	DebugOptionsDescriptior
`enableGuiFeed`	Boolean	Settings	Enable selecting the local a Display for arranging on feed outputs
`enableIPSDIExperimentalModes`	Boolean	Experimental	Allow the use of Quad mo and 720p resolutions in S mode on an IP VFC
`enableMultiview`	Boolean	Preview	Enable a multi-view style input. Subdivides a single input into multiple inputs. for pure director or editor scenarios
`enableNotchNDI`	Boolean	Settings	Set to allow blocks to use own internal NDI® stream. cause NDI® instability if us alongside d3 NDI® stream
`enableProofOfPlay`	Boolean	Settings	Enable writing proof of pla
`enableRenderStreamNDI`	Boolean	Settings	Set to allow RenderStrear the NDI® transport. Does work with image paramet

Name	Type	Category	Description
`enableTimelineZoomOnScroll`	Boolean	Settings	Enable timeline zoom on s Zoom in on layers with sc wheel, scroll through time layers with alt + scroll whe
`enableUnusedMediaManagement`	Boolean	Settings	Enable Unused Media Management part of Mec Distribution widget
`etwLevel`	Integer	Debug	ETW log level. 0 = default value(= 4); 1=Critical, 2=Error, 3=Warning, 4=Informational, 5=Verbose
`forcePIDTimecodeChase`	Boolean	Experimental	Force timecode chase to use PID correction instead BangBang
`forceOutputBitDepth`	Integer	Debug	Force output window bit-d (0 = auto, 8 or 10 for bit de
`forceVsyncOnPrimary`	Integer	Graphics	Force vsync behaviour for primary desktop. 0 = Auto, -1 = Force Off, 1 = Force On
`enableCrashReporting`	Boolean	Settings	Enable crash dump captu unhandled exception by c
`GPUFanSpeedPercentOverride`	Integer	Debug	Override the fan speed se for rackmount machines.
`isMouseUnrestricted`	Boolean	Settings	Don't restrict mouse to GU desktop. Useful for multi-m designer machines
`isQuietFeedMapEdit`	Boolean	Settings	Remove the red border ar geometric projections
`isSingleKeyGlobalJumpEnabled`	Boolean	Settings	Allow next-section key to across tracks. Ordinarily th done with shift-key comb
`isWindowed`	Boolean	Settings	Run in windowed mode ir of fullscreen. Useful for de machines
`maxHeads`	Integer	Settings	Limit the number of outpu Useful for designer machi with multiple monitors. Re

Name	Type	Category	Description
			option or set 0 to restore outputs
`mouseOrbitInvertY`	Boolean	Settings	Invert Y mouse movemen orbiting the Camera.
`multicastSACNTTL`	Integer	Settings	Set the TTL for multicast s packets. Default=1 Max=255
`noSplashScreen`	Boolean	Settings	Force the software to sta black screen, in case the output is visible to the auc
`noStartupStatus`	Boolean	Settings	Force the software to sta black screen, in case the output is visible to the auc
`notchCameraSwitchingResetInstances`	Boolean	Settings	Reset the notch scene du camera switching
`notchDisableLiveLoading`	Boolean	Debug	Disable live reloading of N blocks
`notchLazyLoading`	Boolean	Debug	Disable preloading of Not blocks on startup
`notchMaxFramerateFraction`	Integer	Graphics	Useful for setting on mac which are unable to keep their Notch workload, whi keeping output machines controlled via the timeline Recommended to be set machine-wide, rather tha project-specific options. Set to 2 for all Layers to ru most 1/2 rate, for example
`notchLCKeepAlive`	Integer	Debug	Keep NotchLC decoders a N frames (0 for default of
`notchLCMinBuffers`	Integer	Debug	Minimum no. CPU decom buffers to keep around at times (default 0)
`notchUseDisguiseClippingPlanes`	Boolean	Settings	Use the clipping planes d in disguise, not the notch Useful in AR/XR effects to the scene in depth.

Name	Type	Category	Description
`notchAutoPurgeVram`	Boolean	Debug	Purge block VRAM pool a module is not in use is deactivated. May save me but also causes stutters
`omniCalBackupCapturesEnabled`	Boolean	Debug	Backup capture folder ea a capture completes. Help order to send OmniCal de info back to HQ.
`omniCalEnableBlobDetectionMasks`	Boolean	Experimental	Enables hidden feature to per-camera mask images are applied during Blob Detection. Mask images r be placed in the plan fold named '_mask.png'.
`omniCalEnableResumeCaptures`	Boolean	Experimental	Enables ability to resume partial captures which fail to device timeout errors c cancellation. Should be us caution as it assumes cap settings and physical cam and projectors have not c since last capture.
`omniCalEnableProjectorCalibrationRetry`	Boolean	Experimental	Enables OmniCal initial pr calibration to retry with di algorithms to select best
`omniCalIgnoreMeasuredCameraIntrinsics`	Boolean	Experimental	If pre-measured camera i parameters are ignored in OmniCal initial calibration
`omniCalCameraDistance`	Integer	Experimental	Camera distance in [m] us when choosing from pre-measured initial intrinsic parameters. Possible values: 3, 8 (default), 130.
`omniCalCameraTimeout`	Integer	Settings	Timeout in seconds for O camera commands and heartbeat. For values <= 0 default of 10s is used.
`omniCalMaxThreadsPng`	Integer	Settings	Maximum number of CPU threads to use for encodi images in the machine vis capture process. Default i of CPU hardware threads on a VX 4 server), and ma is 50%.

Name	Type	Category	Description
`omniCalMaxBlobDetectionConcurrency`	Integer	Settings	Maximum number of CPU threads to use for blob de For debugging CPU starva issues. Default is 50% of (hardware threads (e.g. 8 c 4 server).
`omniCalUseProjectorDevicesInSimulation`	Boolean	Debug	Send shutter and warp commands to projectors simulated captures. Helpf order to test projector dev stacking simulations.
`overrideUnpatchedMediaFields`	Boolean	Settings	When fields pertaining to in the SockpuppetVideoM are un-patched, use clip f values instead of sequenc ones. Effected Fields: Fram index, Trim frames, Loop I Loop Outframe
`pythonApiExecutionTimeout`	Integer	Experimental	Any python script receive python execute api endpo interrupted if its executior exceeds this amount in m negative to disable.
`pythonApiOutputRequestsToProject`	Boolean	Experimental	Save python api executio requests to project.
`renderstreamActiveLatencyOffset`	Integer	Settings	Number of extra frames a the calculated active later Default is 0
`renderstreamActiveLatencyPercentile`	Integer	Settings	Permille (0-1000) of the la histogram used for active calculation. Lower values yield a more stable active but may underestimate th required latency — use renderstreamActiveLatenc to compensate. Default is (99.5%).

Name	Type	Category	Description
`renderstreamOutputSyncDelay`	Integer	Settings	Number of frames to wait actors are ready to start presenting a workload. Th additional delay is used to compensate for network communication latency. S to disable RenderStream sync (each fragment of a workload starts presentin soon as possible). Default
`reportMainThreadHangMsec`	Integer	Experimental	Interval [ms] for timeout to for hanging main thread
`rmaxReceiverPool`	Boolean	Settings	Used if uncompressed str are started and stopped r show.
`useLegacySLCRegionTag`	Boolean	Settings	Use legacy video tag for identifying SLC region slic
`useLegacyMaskBlendModeBehaviour`	Boolean	Settings	Mask blend modes apply every layer above the ma layer in the mapping, inste only the layer directly abo Default: off (single-layer behaviour).
`useLegacyProjectViewBlending`	Boolean	Settings	Use legacy projector view blending behaviour.
`sessionStartNodeDiscoveryDelay`	Integer	Debug	Time to wait [seconds] fo discovering sessions on t network
`sessionSyncTimeout`	Integer	Debug	Time to wait [seconds] fo and understudies to sync the director before the dir carries on without them. - wait forever, 0 is a default minutes.
`smoothVideoInputFramesDelay`	Integer	Experimental	Video input in video layers forced to be delayed by th many frames to maintain playback. Default 0. Off -1
`suppressActorsAtStartup`	Boolean	Debug	Don't start actors when st director

Name	Type	Category	Description
`useApplicationWindow`	Boolean	Settings	Use standard application window instead of border requires isWindowed to b
`useApproximateGamma`	Boolean	Graphics	Use faster approximate (l accurate) gamma curve f
`useAutomaticProfiling`	Integer	Experimental	Use automatic detection drop to generate d3 performance profiles. Valu percentage threshold of frames that should trigge profile. Default is 0.
`lockMouseWhileOrbiting`	Boolean	Settings	Lock mouse to point you' orbiting around the stage
`enableChromaKeyModule`	Boolean	Experimental	Enable basic Chroma Key module for testing purpos intended for production u
`commsProcessingTime`	Integer	Debug	Time in ms to process co messages
`forceDXGISwapEffect`	Integer	Experimental	Debug swap effect. 0 = Auto, 1 = Flip Discard, 2 = Flip Sequential, 3 = No Flip
`useSwapGroup`	Boolean	Experimental	Use nvidia swap group fo synchronisation
`deferActorStartup`	Boolean	Debug Defer actor startup until director has fully started	
`generateWorkloadHTTPCommands`	Boolean	Experimental	Generates HTTP commar RenderStream workloads project start
`profileGPUPoolFromLaunch`	Boolean	Debug	Start profiling GPU pool allocations from launch (d false)
`blackMagicMatrixSendDelay`	Integer	Deprecated	For BlackMagic matrix de delay in milliseconds betv establishing Telnet conne and sending command. S 10ms for 12G matrix devic Default is 0ms.

Name	Type	Category	Description
`additionalCommandLatency`	Integer	Debug	Additional latency (in fram wait for synchronisation b issuing transport comma (default: 0)
`forcePrimaryOutputTo8Bit`	Boolean	Settings	Force gui to 8-bit colour e outputs are 10-bit
`copyIPVfcMulticastOnFailOver`	Boolean	Settings	On failover when the und copies the failed machine configuration it will includ VFC multicast IP addresse (default off)
`enableResourceFileDeletion`	Boolean	Experimental	Allow deletion of files on filesystem, e.g. video files

Checkpointing projects

Once you have finalised your show, you can lock it to the version of the software that you built it with, by creating a “checkpoint”.

Checkpoints are useful if you want to lock your project to a specific software version for portfolio purposes, to have a known-working state you can go back to, e.g. for demos. We recommend to create checkpoints only after a project has been finished.

Checkpoints are intended for archiving / demonstration purposes, not for running shows.

> **Note**
>
> Checkpoints are not intended for - running shows - they are intended for archiving / demonstration purposes and saving **project file** backups; Designer automatically saves your **project file** regularly and on exit.

> **Warning**
>
> At present, Director/Actor operation is not guaranteed to work for projects with active checkpoints. Disable the checkpoint if you encounter issues starting a Director/Actor session.

> **Warning**
>
> Generated checkpoints do not make backup copies of media files (audio files, still images, mesh files and video files). You should make regular backup copies of the entire specific Project folder(s) and store them on an external hard drive or network store.

What a checkpoint does

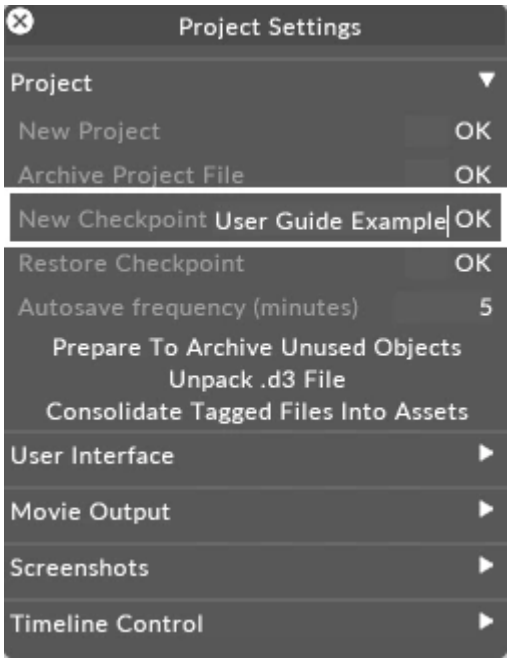
A checkpoint means that:

- A backup of the .d3 file is stored in the checkpoints folder.
- A backup of the entire software install is stored in the checkpoints folder.
- The project is “locked” to the version of software that you built it in. Instead of the installed version (e.g. r21), the one from the checkpoint (e.g. r18) is executed.
- Therefore you can freely upgrade to the newest version of the software, knowing that the show will continue to run exactly the same way as the day you built it.

- You can still upgrade the show later on (See “How to disable a checkpoint” below).

How to create a checkpoint

1. Right-click d3 from the dashboard (bar at the top of the screen), and select **Project Settings**.
2. Type the name of the new checkpoint into the **new checkpoint** text field and hit **Enter**.
3. Wait until a label saying d3 checkpoint complete pops up. This should not take more than a few seconds but may be longer depending on the size and number of resources of the project.



This will create a new folder called **checkpoint** in the specific Project folder. For information on where the specific Project folder is located please see the sub-chapter **Projects location/structure**. Assuming that you do not rename this folder the project will now run from this local folder, rather than the main Disguise installer.

Opening a checkpointed project created in an old release

1. All checkpointed projects created in an earlier release than r11 **need** to be copied to `c:/blip/data/d3`.
2. Open the project from the d3Manager but make sure to add a projects folder that links to `c:/blip/data/d3`.

How to disable a Checkpoint

1. Make a copy of the **.d3** file.
2. Rename the **checkpoint** folder, for example `_checkpoint_old_`.

The Disguise project will now run from the main Designer installer on your system.

> **Note**
>
> When you upgrade a .d3 project file, it may become incompatible with older versions of Disguise (such as the checkpointed version). If you want to go back to the checkpoint (by restoring the “checkpoint” folder) you may also need to restore a backup copy of your .d3 project file from your history folder.

Creating a new project

You can create a new project either outside Disguise in Windows using the d3manager, or within the software itself.

Create a new project in d3manager

1. Run **d3manager**.
2. Click **File** followed by **New Project**. Or alternatively, use the keyboard shortcut **CTRL+N**.
3. Enter a name for the project and click **Create**.

[Animated GIF: Creating a project in d3manager]

Create a new project in Designer

1. Run Designer.
2. Right-click d3 from the dashboard (bar at the top of the screen) and left-click Project Settings...
3. Type in the name of the new project in the new project text field and hit Enter.
4. Exit the software, go to the new folder and run the new .d3 file.

[Animated GIF: Creating a new project in Designer]

Creating snapshots

Project Snapshots allows users the ability to save the state of a project at a time as a Snapshot. Users can then recall these snapshots to compare different points in time within a project.

Project snapshots are an advanced saving function of Designer. They are intended to allow users to restore a known state of the project in a single action (a snapshot). The use case for this feature was for recording “shots” on a film set, but they can be used for many other functions.



Workflow

Snapshots are created in a similar way to saving the project

1. Press CTRL + S to save a snapshot, or use the Snapshot manager.
2. Name the snapshot if needed (this is recommended).
3. Restore the snapshot later to restore the entire project state and revert once you wish to go back to the current state.

Example

Creating New Snapshots

Using Shortcut

Snapshots saved with a shortcut are applied with a default name, to save with default names open the snapshot manager.

To save a Snapshot press [CTRL+S] (Saving a snapshot will save the projects current state and all resources)

Using Snapshot Manager Saving a Snapshot with the snapshot manager allows users to give snapshots custom names

1. To save a snapshot first open the snapshot manager [CTRL +O]
2. Type a name of the snapshot into the snapshot name entry field at the top of the snapshot manager. (Designer will automatically timestamp the saved Snapshot name).
3. Press the OK button. (The snapshot will be added the list below).

Browsing Snapshots

The previously saved Snapshots will be added to the Snapshot List within the Snapshot Manager. Snapshots are filtered by their timestamp of the creation. To browse a Snapshot created at a certain time simply expand the corresponding separator to view the Snapshots contained. Snapshots are filtered by the following:

- **Restored Snapshot** - The last snapshot you restored.
- **Restore Backup** - Revert to the state before the last snapshot was restored
- **Last Hour** - Snapshots created in the last hour
- **Last 24 Hours** - Snapshots created today
- **Last 48 hours** - Snapshots created yesterday
- **Last 7 Days** - Snapshots created this week
- **Last 30 Days** - Snapshots created within the last month
- **Older** - Snapshots created older than a month ago

Restoring a Snapshot

A saved Snapshot can be recalled to return to another state of the project.

Left-click on a Snapshot within the Snapshot List to restore to that state.

The Snapshot List will update to show the current restored snapshot.

Recover Backup

A backup of the current project state occurs every time a snapshot is restored.

Left-click on Recover Button to revert to a backup.

Backups are overwritten when a new snapshot is restored.

> **Note**
>
> When a project snapshot is restored on another machine in the d3Net session, the sequencing changes made as part of that project snapshot do not transfer over to the other machines running in the d3Net session. To fix this, manually restart the session after restoring the snapshot.

Renaming a Snapshot

1. Right-click on a Snapshot within the Snapshot List to open an options widget
2. In the rename field type a new name.
3. Click **OK**.

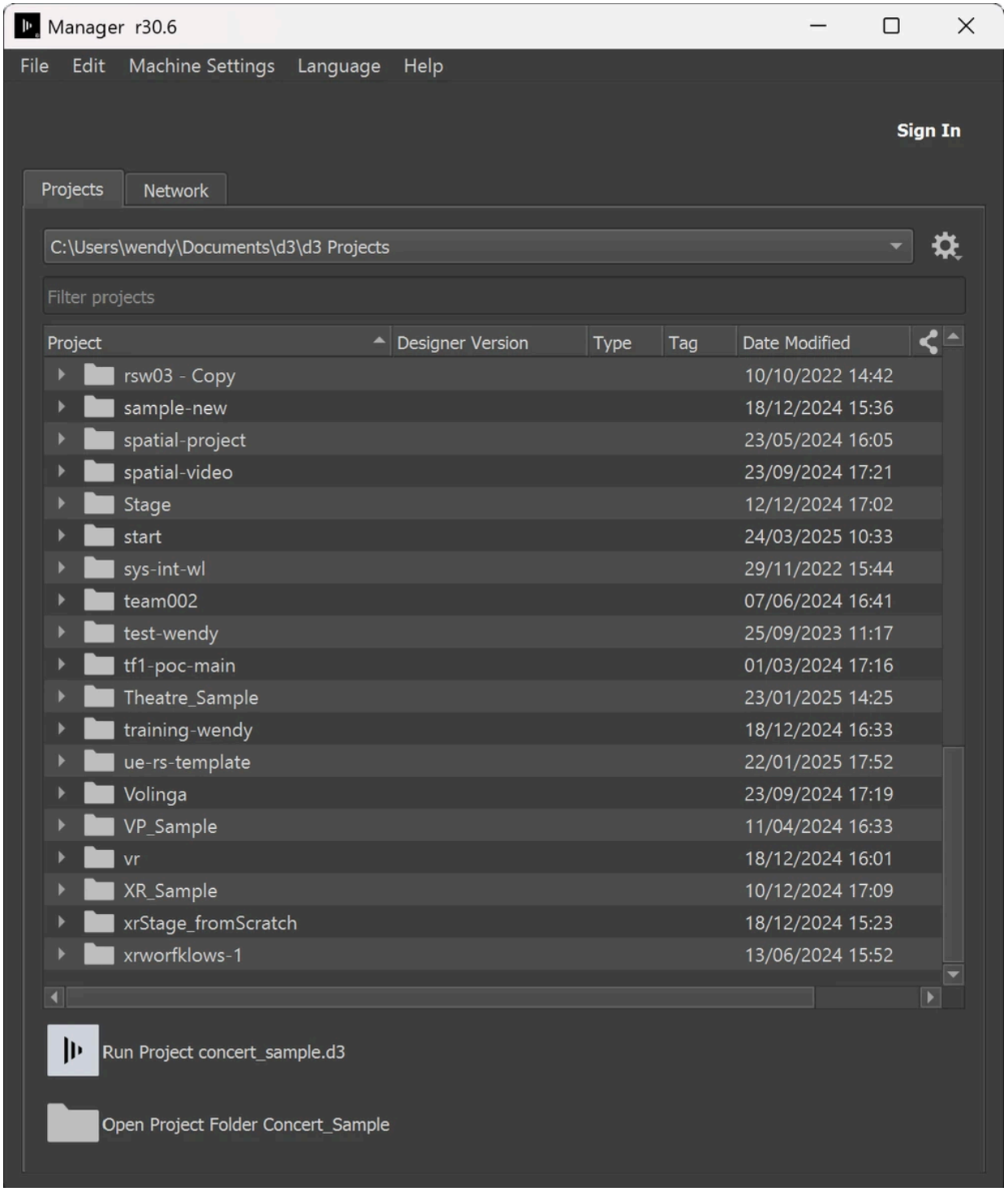
Archiving a Snapshot

1. Right-click on a Snapshot within the Snapshot List to open an options widget.
2. Click **OK** on Archive Snapshot.

(Archiving a snapshot will move the snapshot file on disk to an archive folder, archived snapshots will be removed from the archive list).

d3Manager

The installation of Designer also includes the installation of d3Manager. d3Manager allows users to organise their d3 Projects and launch the Designer application. However, d3Manager is far more than a project management tool and a launcher with many more menu options and settings available for users.



Manager

With the introduction of the new Designer licensing changes, d3Manager now shows projects that your licensing type supports. Projects that do not share the same license are greyed out. Designer Starter allows you to open both Starter and Pro files, however will only save projects as `.d3starter`. However, Designer Pro does not allow users to open Designer Starter .d3starter projects.

d3Manager functionality

The following menu options are available:

File menu

- Create a new project
- Open the projects folder
- Exit the application.

Edit menu

- Expand or collapse the folders in the project view.

Machine Settings menu

- Enable application mode
- Edit the Advanced Machine Settings
- Access the Advanced Network Configuration settings such as add a custom API http port, and rsync daemon port.
- Advanced Machine Settings allow users to, for example, enable/disable Option Switch Settings.

Language menu

- Select from a language from the list.

Help menu

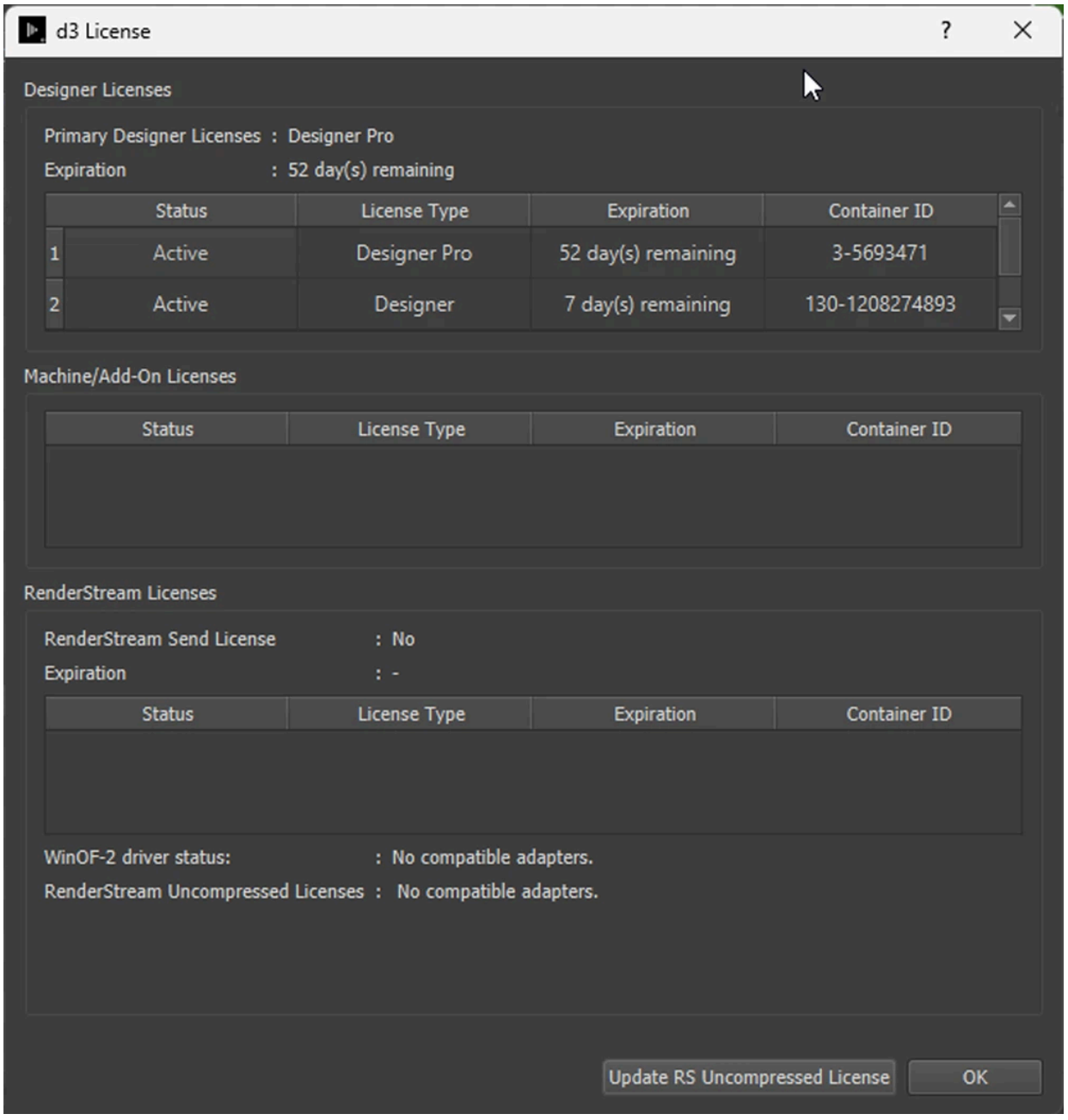
Quick links:

- User Guide
- Disguise Learn
- Disguise Release Notes

Also:

- Open a project in assistance mode
- Open API documentation
- Create a Project diagnostic
- Create a System diagnostic
- Create System diagnostics on selected machines
- Open Bluefish tools folder
- Open Console
- Open Console folder

- d3 Licenses
- Notch Licenses
- Licenses Acknowledgements
- About qt
- About Manager



Designer Licenses

Sign in

Clicking on Sign in opens a browser tab so you can confirm your Disguise Cloud account using a code. This is a Device Confirmation.

Projects tab

- File path of d3 Projects
- Filter projects
- Settings icon
  - Add d3 Projects folder
  - Remove d3 Projects folder

The contextual menu found by right-clicking a project:

- Open folder
- Advanced project settings
- Set as template for new projects
- Show history
- Rename project
- Duplicate project
- Delete project

The contextual menu found by right-clicking a file:

- Open project
- Open project in solo mode
- Open folder
- Set as current project
- Clear ingestion history
- Rename project
- Duplicate project
- Duplicate project file
- Delete project
- Delete project file

Additional Quick links:

- Run Project [project name]
- Open Project Folder [project folder]

Network tab

- Set Network Adapter
- View machine name (Channel), IP Address, d3 version, Machine type, Status

Plus quick links:

- Install d3 remotely
- Advanced machine settings

Summary

In summary, d3Manager lets you do the following things:

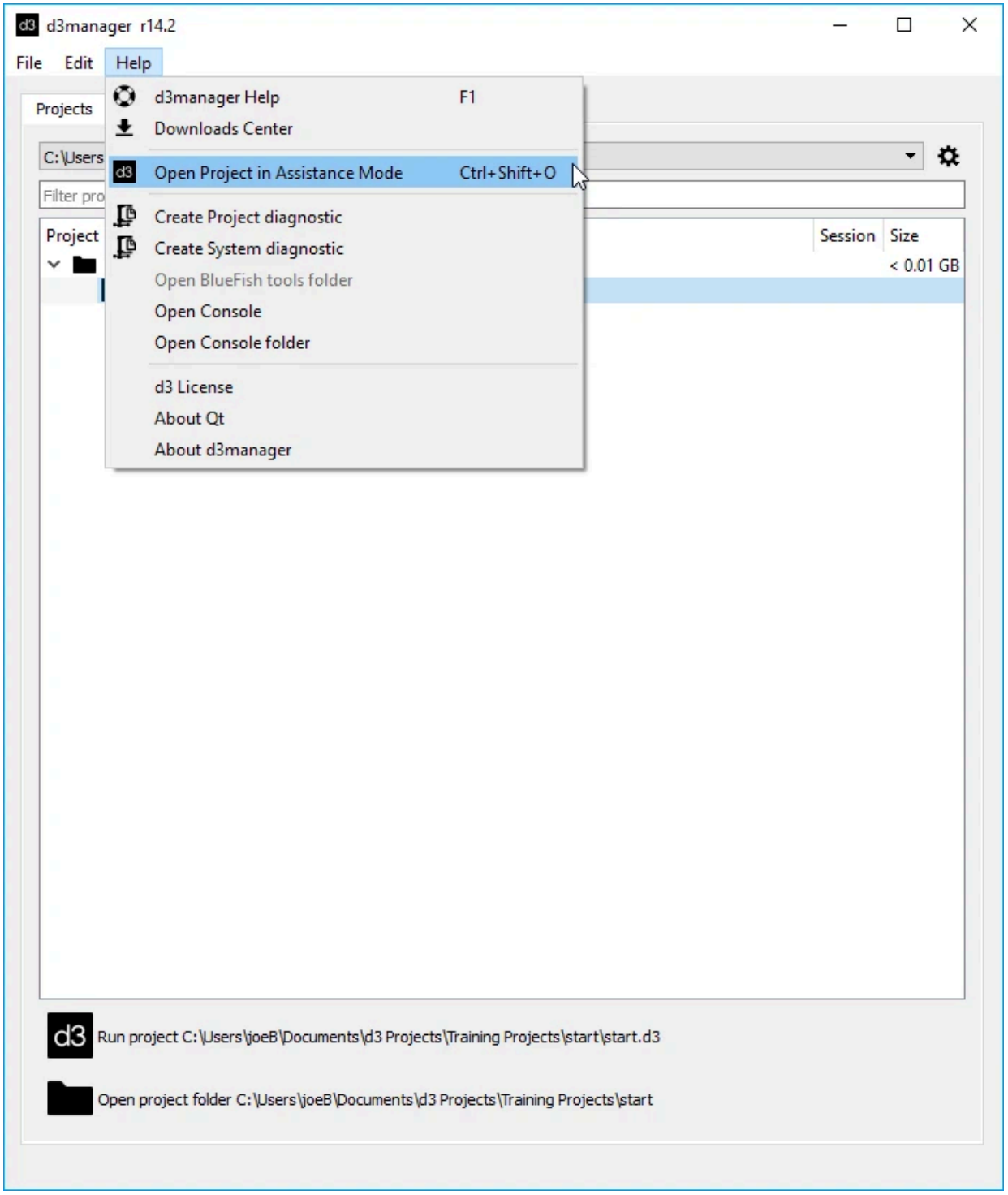
- See which version of Designer you're running in the d3Manager title bar.
- See what projects are installed on your machine.
- See what multi-machine sessions are running on the network.
- See which machines on the network are running Designer and which version they are running.
- Remote install d3 on media servers on the network.
- Navigate quickly to any local project folder.
- Run any local project.
- View the projects folder size.
- Run a local project in assistance mode (for remote diagnostic sessions, for example over Skype).
- Join a multi-user editing session as an editor.
- Create a diagnostic archive (containing the project, non-media files, consoles and telemetry) to send to **support@disguise.one**

Enabling Assistance Mode

This allows the user to join a network session as an editor and allow remote support for the user if a problem occurs.

To open a project in assistance mode

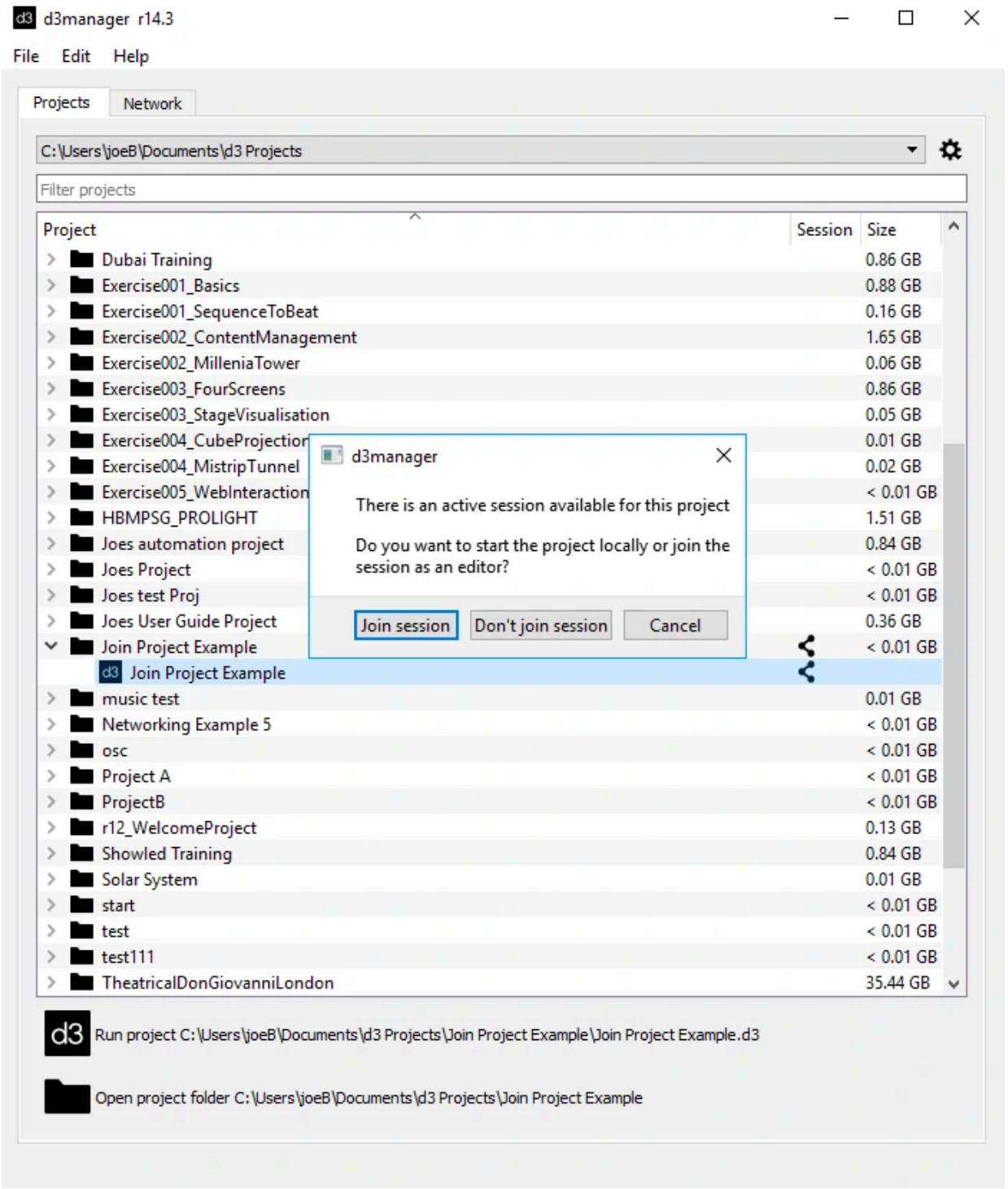
1. In the projects list, first select the project you would like to open.
2. Select **Help** from the menu bar.
3. Select **Open project in assistance mode** from the drop down selection.



To join session in assistance

1. Ensure that the session icon is visible in the session column. If not you may have a networking issue or you haven't set up your **Director-Actor network** correctly.
2. Select the project name in the project list.

3. Under the **Help** menu select the **Select Join session in assistance mode** from the drop down selection.



Quitting a Project

Option 1: using the keyboard shortcut

- Hold down **Esc** , then hit **Enter**

This will save your project, and exit the software.

Option 2: using the interface

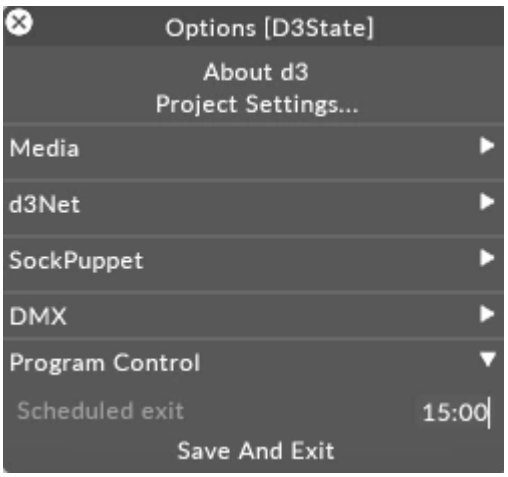
1. Right-click the d3 icon at the top left to open the Program Settings menu.
2. Left-click save and exit.

Scheduled exit

If you want to schedule exit at a certain time do the following:

1. Right-click the d3 icon at the top left to open up the Program Settings menu.
2. Left-click scheduled exit to highlight the text field.
3. Type in the time when you would like Designer to close, using the format `hh:mm`.
4. To remove the scheduled exit, delete the entered data so the field is empty, it will reset to `__:__`

For example, the below image shows it is scheduled to close at 15:00.



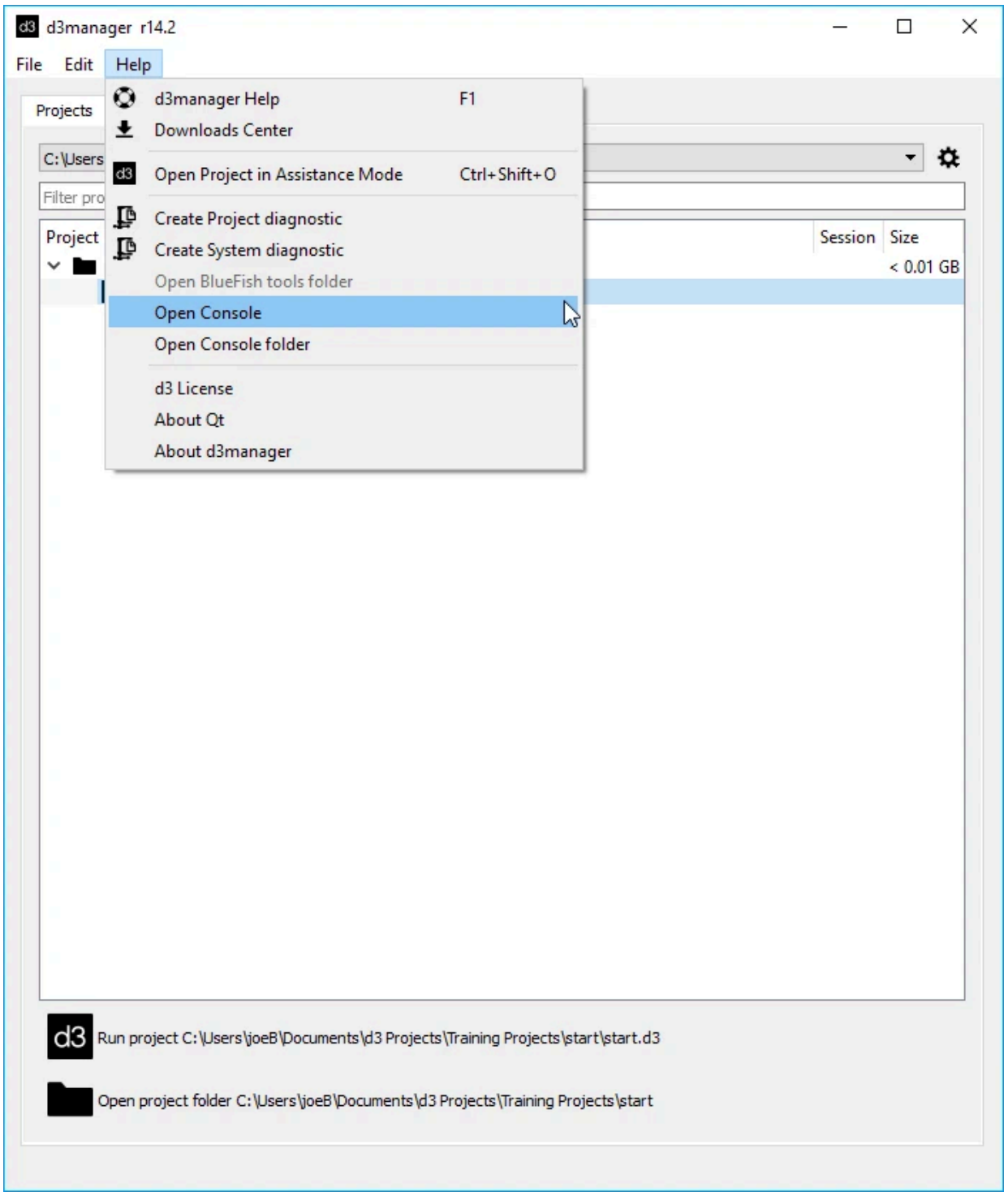
Quitting using the Project Settings menu

Generating console files

If any unpredicted problems arise during pre-production of your show just send the auto-generated console file, i.e. the “blackbox” data of your session, to the Support team. By reading the console file, the support team can quickly decipher what may have caused the problem and immediately respond with an appropriate solution.

Finding the console

1. Open the d3Manager.
2. Open the help menu and choose **open console**.



> **Note**
>
> It is also possible to view the console within the software itself. Simply hit **Alt-C** to bring up the console. For other shortcuts please see the Shortcuts sub-chapter.

> **Warning**
>
> The console file gets overwritten every time the software runs! If you experience a problem, quit Designer, save the console file to a unique name and then re-run the project.

Opening the latest console file

The console file is a background file that records the load up and running of Disguise. This is often requested for support calls.

To open the latest console file

1. Select Help from the menu bar.
2. Select Open console from the drop down selection.

Opening the console folder

The console folder contains all the console files from running Designer. Each session creates a new console file with the old one being archived here.

To open the console folder

1. Select **Help** from the menu bar.
2. Select **Open console folder** from the drop down selection.

Generating Diagnostic Archives

d3Manager allows you to create **diagnostic zip archives**, which bundle together the files from the last 30 days. These are required by Disguise Support to investigate software, system, and project-related issues.

When contacting Disguise Support, we recommend sending a **Project Diagnostic** wherever possible, as this also includes a **System Diagnostic**.

Diagnostic types

System Diagnostic

A **System Diagnostic** contains machine-level information and logs, including:

- Designer console logs
- Designer software crash dumps
- Windows Event Logs
- Installed applications
- License logs
- Disguise OS information
- `sysinfo` data

> **Note:** System Diagnostics do **not** include Windows memory dump or minidump files due to their potentially large size.

Project Diagnostic

A **Project Diagnostic** includes **everything in a System Diagnostic**, Console files, plus:

- A skeleton Designer project file

The skeleton project **excludes** the following large media directories:

- `VideoFile`
- `DxTexture`

If media may be relevant to your issue, please **zip and send these folders separately**.

Important note on Windows Blue Screen errors

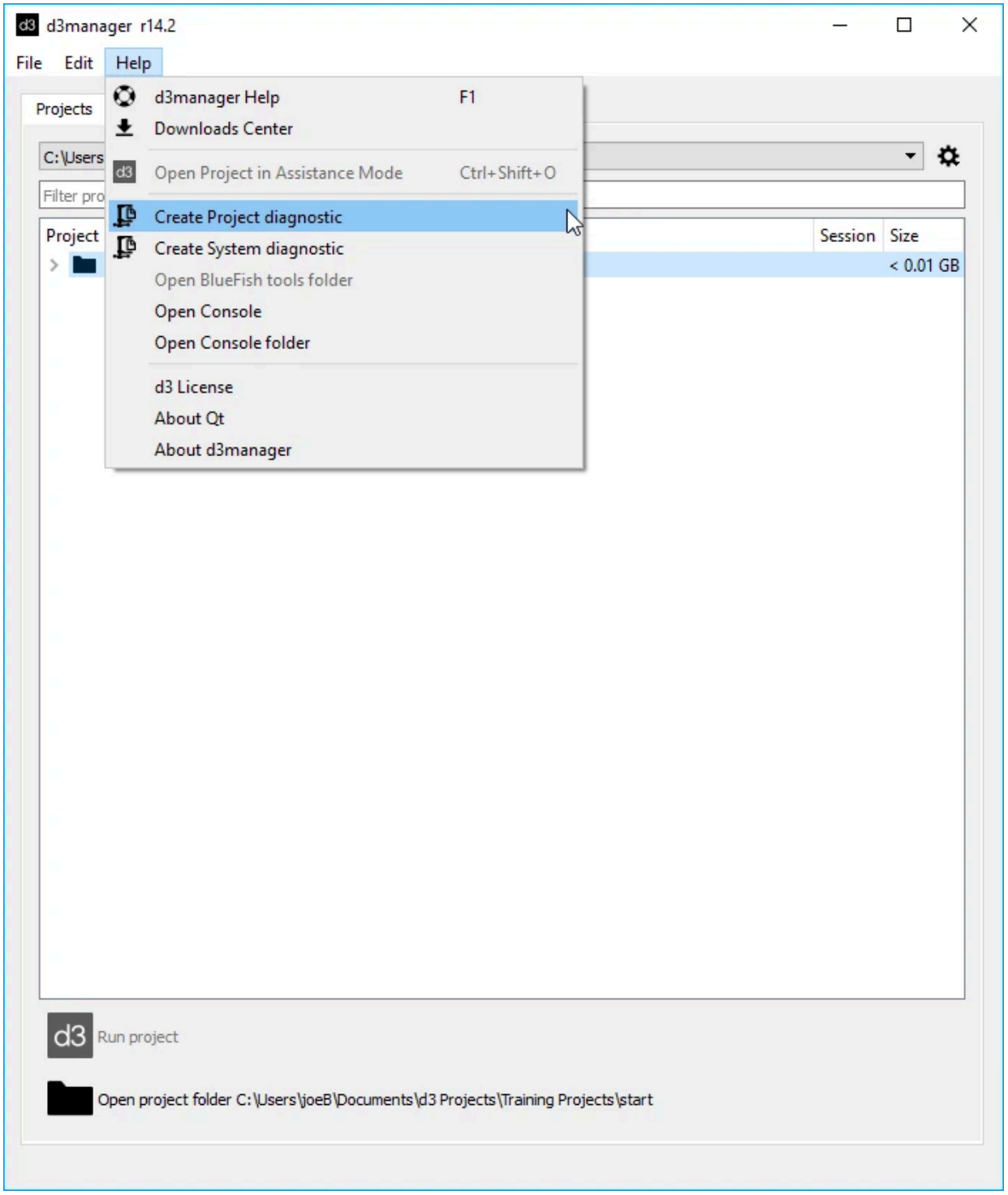
Our diagnostic archives **do not include Windows memory dump files**.
If you experience a **Windows Blue Screen**, please also zip and send the following files

separately, if present:

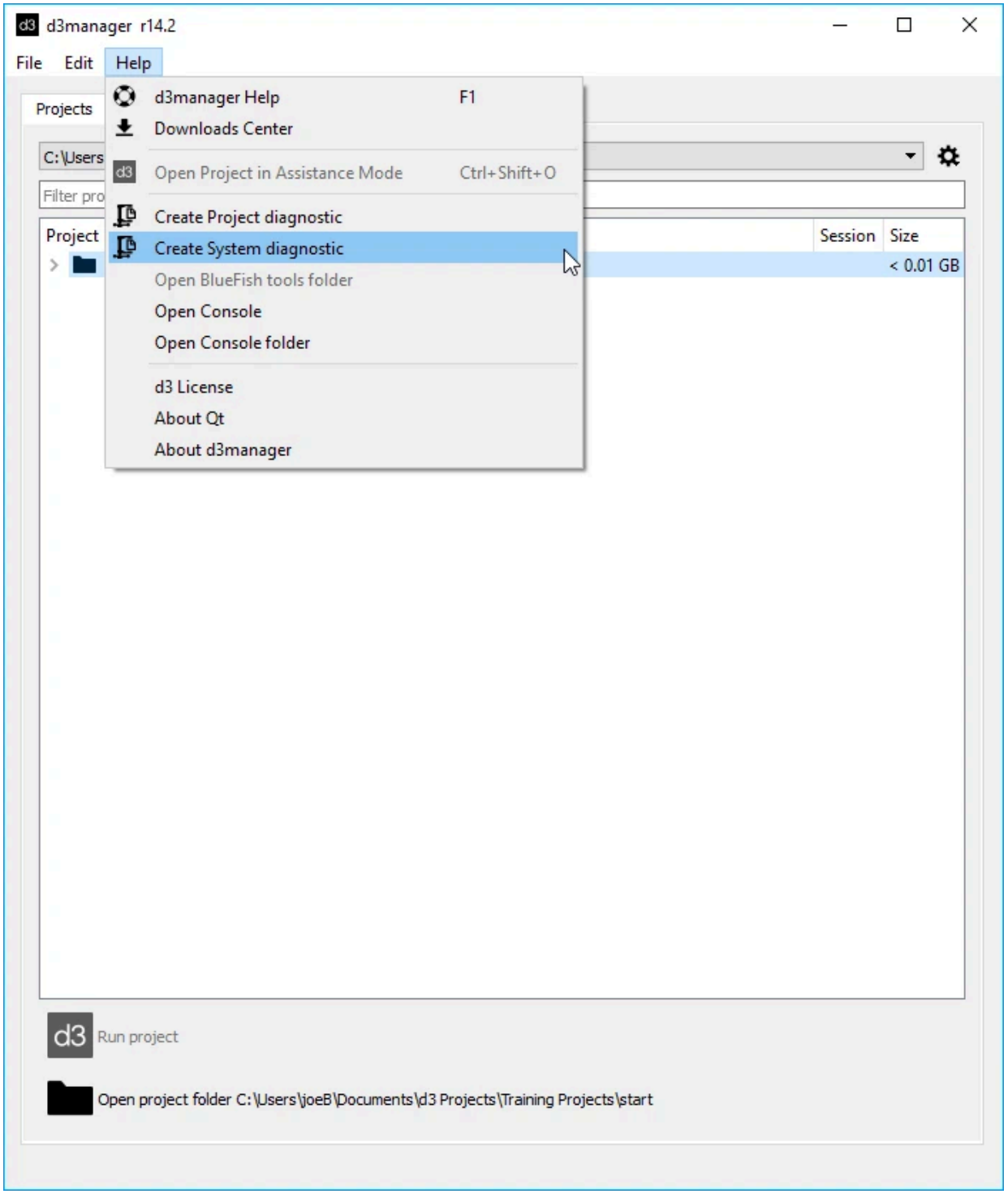
- `C:\Windows\MEMORY.DMP`
- `C:\Windows\Minidump`

Create a diagnostic zip on your local machine

1. Open **d3Manager**.
2. Select the relevant project (for Project Diagnostics).
3. Go to the **Help** menu and choose **Create project/system diagnostic**.
4. The diagnostic zip file will be created automatically.



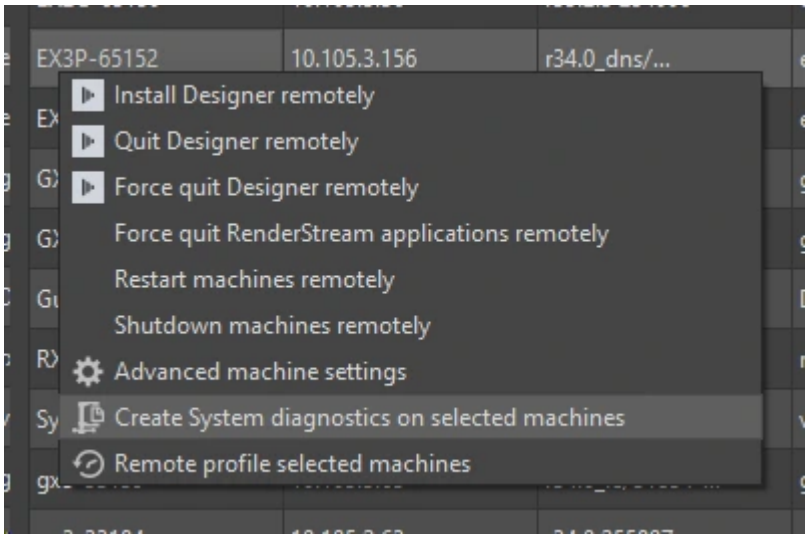
Create project diagnostic



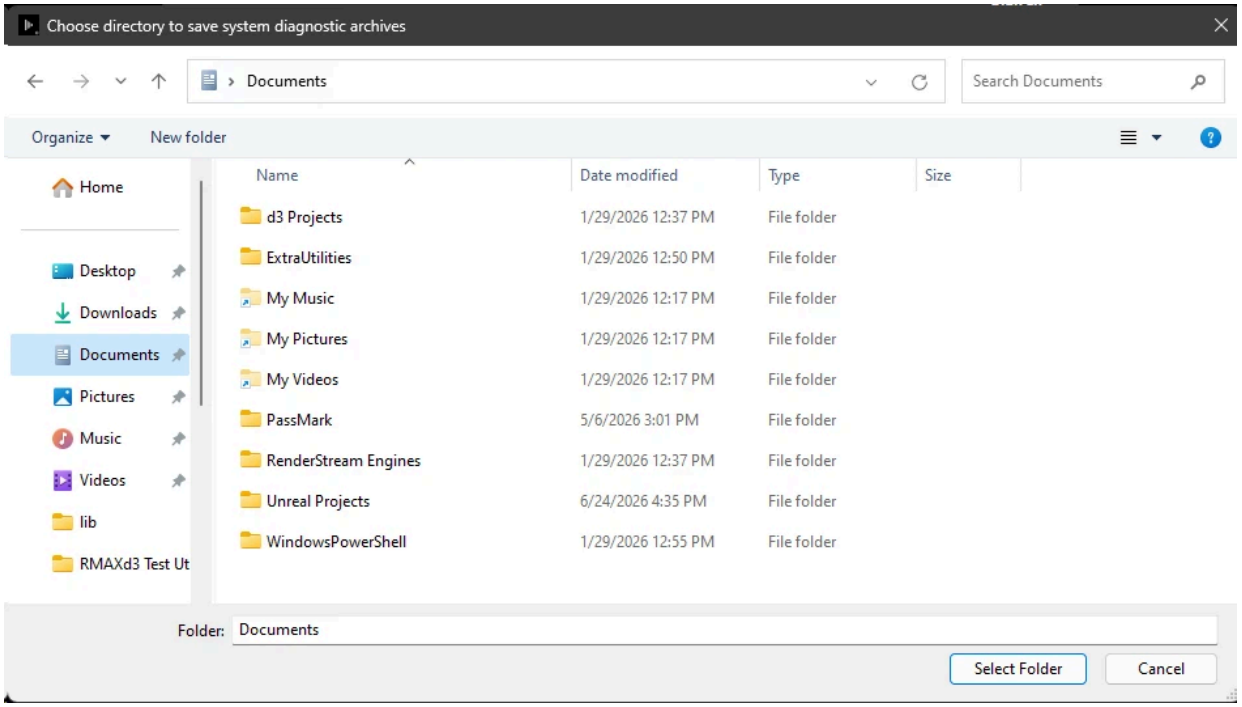
Create system diagnostic

> **Note**
>
> Take note of the filename and location of the generated diagnostic zip.
> This information is displayed in the command window during creation.
>
> System Diagnostics are typically saved in your local AppData directory. You may need to adjust Windows Explorer settings to view hidden folders.

Create a system diagnostic for a remote machine



1. Open d3Manager.
2. Go to the **Network** tab.
3. Select one or more machines you would like to create diagnostics from.
4. Right-click on the selection.
5. Click **Create System Diagnostic on selected machines**.
6. Select a folder on the local machine for the diagnostics to be downloaded to.



The diagnostic zip file will also be placed in the local AppData directory on the remote machine:

```
%localappdata%/d3/SystemDiagnostics
```

Accessing the remote System Diagnostic

The quickest way to get to this is as follows:

1. In the **Network** tab of d3Manager, double-click the machine where you created the remote System Diagnostic.
2. Navigate to the **d3 Logs** section.
3. Open the **System Diagnostic** logs.

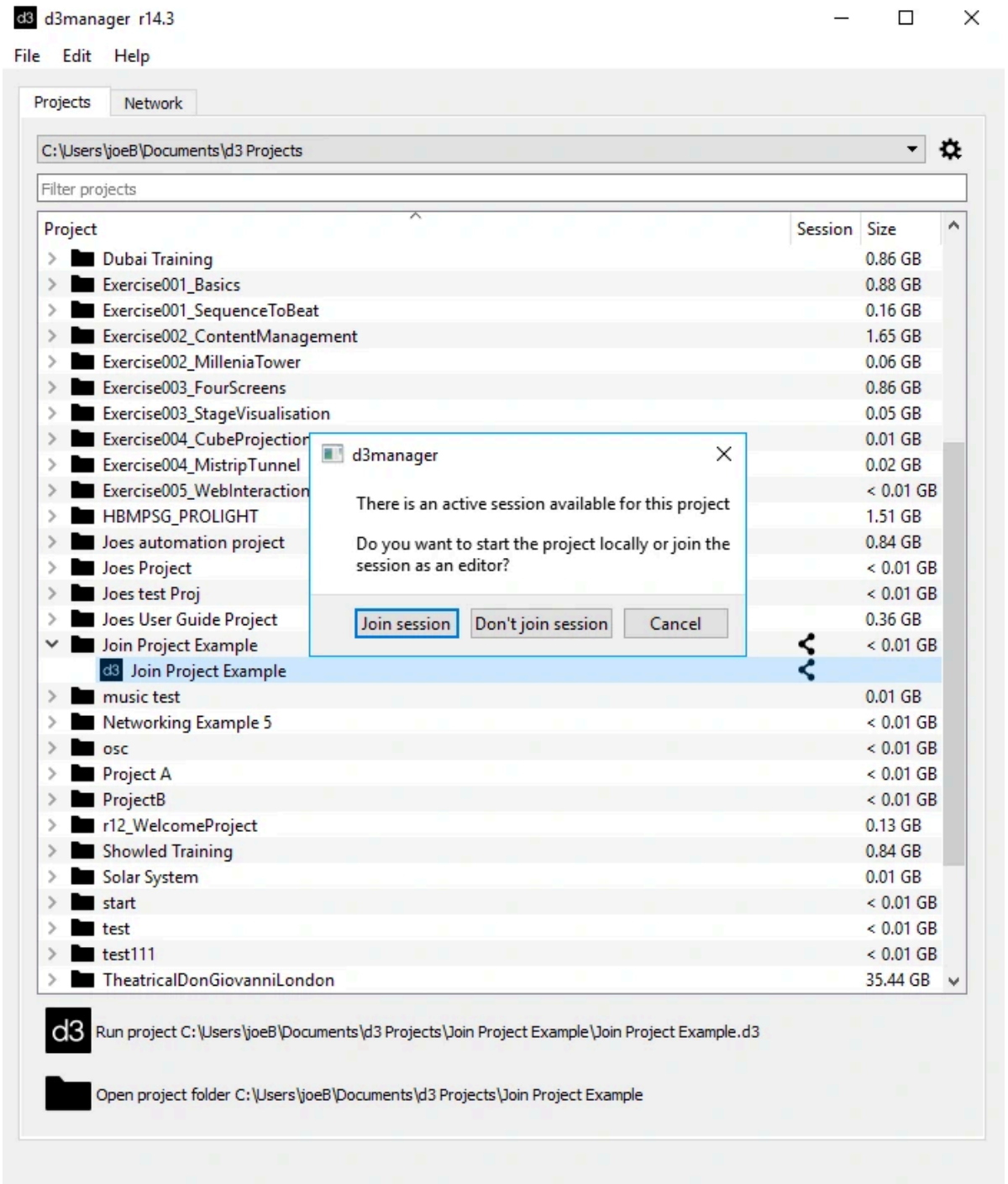
Joining a session from file list

Join session allows users with to access projects over the network for multi-user editing.

To join a session from the file list

1. Ensure that the session icon is visible in the session column. If not you may have a networking issue or you haven't set up your Director/Actor network correctly.
2. Double-click the project in the file list.

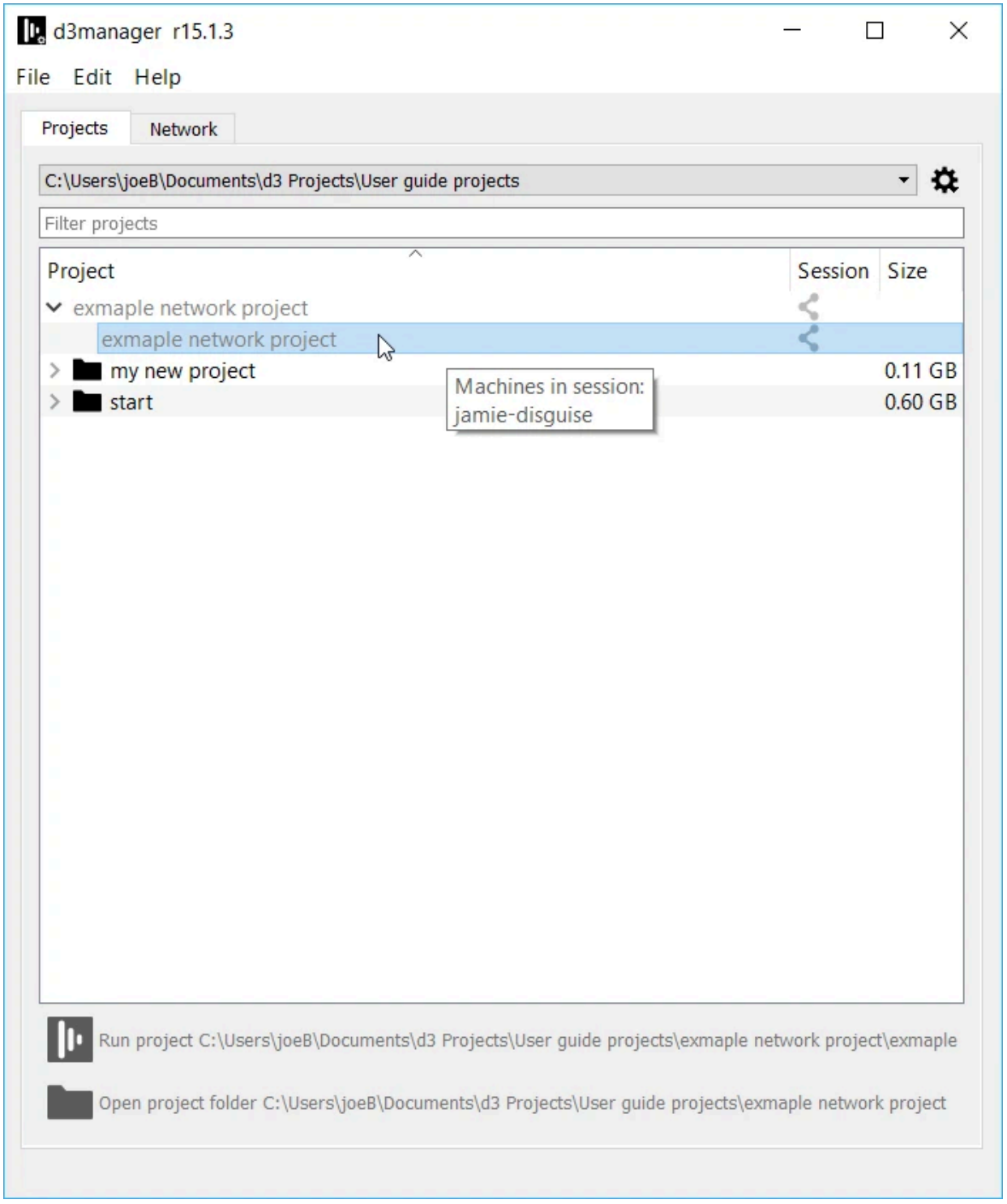
3. Select **Join session** from the popup selection.



Viewing machines in a session

It's possible to view which machines are in a session, without joining it.

Hover your mouse over the **.d3** file in **Manager** to see the machine names currently in that session.



Hovering over the file shows the name of machines in that session.

Manage Networked Machines

Manage Networked Machines

d3manager network view

You can view: The machines name, the version of software it currently has installed, the type of hardware the machine is, and the status.

Install Designer remotely

It is possible to install the current build you have installed on your machine onto another machine on the network through the d3manager. This can be useful for updating software on slave machines from a Director or editor.

d3manager network view

You can view: The machines name, the version of software it currently has installed, the type of hardware the machine is, and the status.

1. Select the machine you wish to install Designer on.
2. Select the **install remotely** button.

d3manager Accessing project folders on networked machines

To access the projects folder on a networked machine via the d3Net manager, follow these steps:

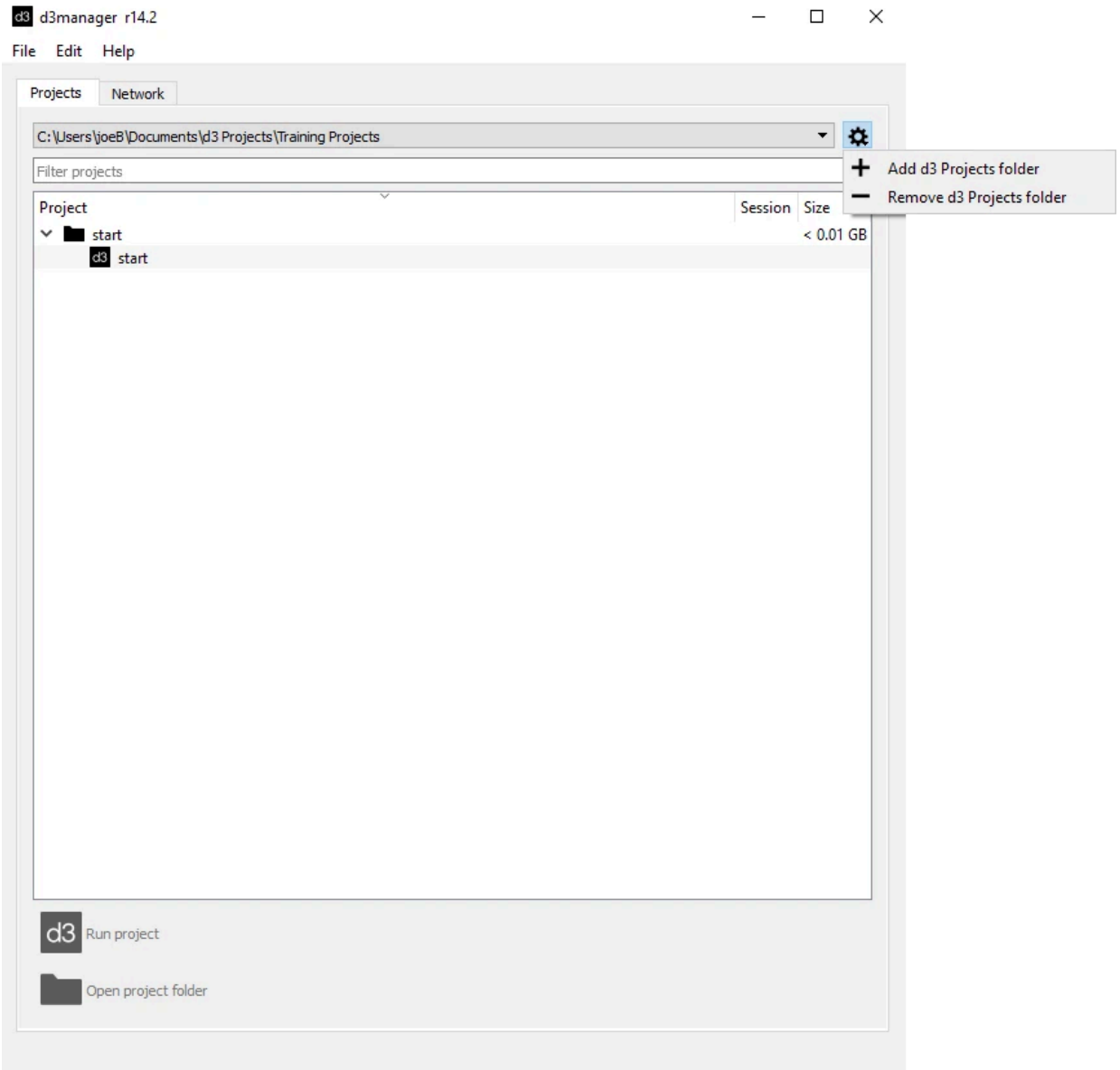
1. Navigate to the network tab in the d3Net manager.
2. Select the desired active machine.
3. Double click on the machine name to open the projects folder.

Managing project folders

Adding and removing project folders allows you to add or remove multiple project folder locations, enabling you to have multiple project locations simultaneously.

Adding a project folder

1. Click the settings icon +
2. Click + Add Disguise Projects folder in the drop down selection and select a new folder.



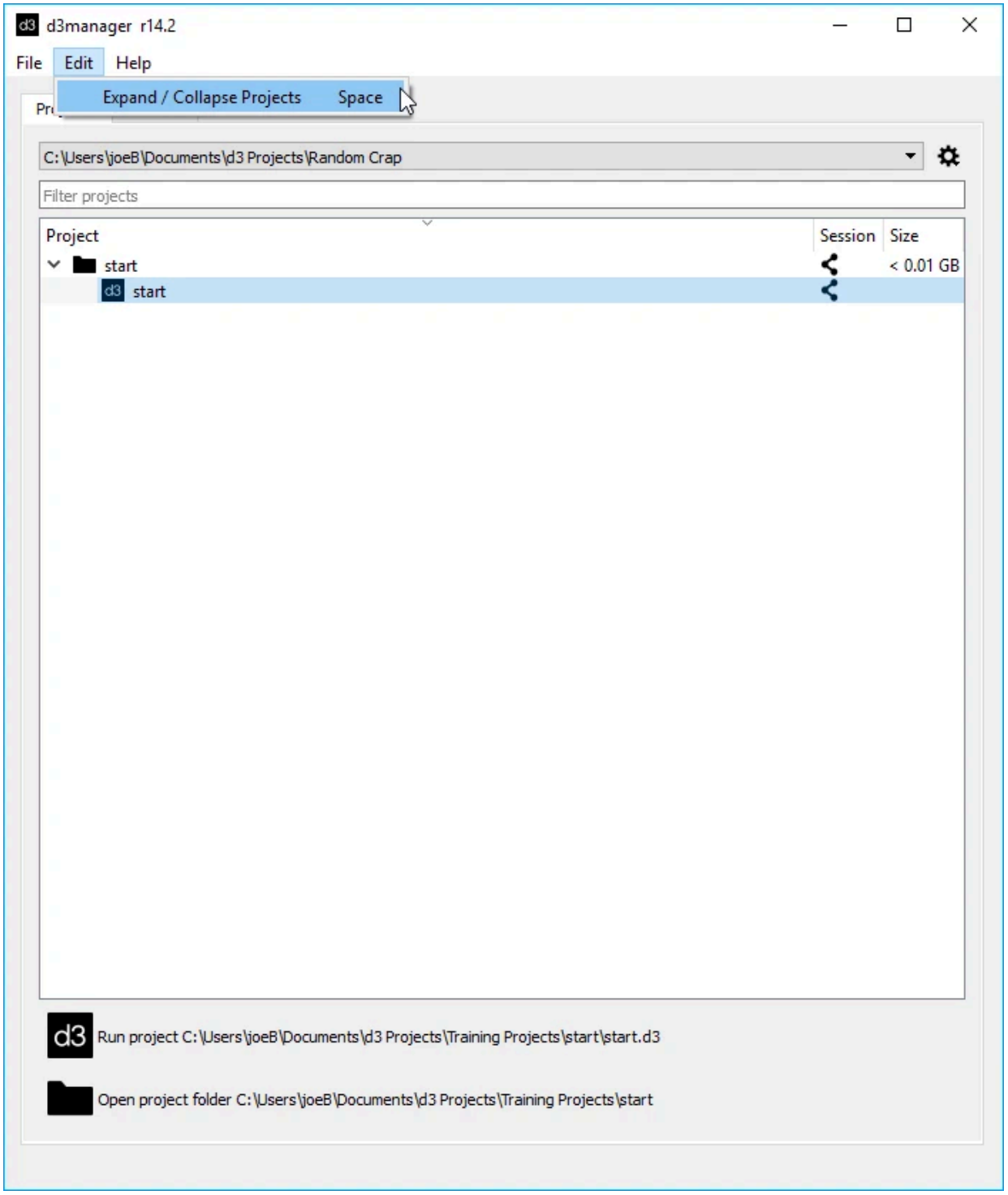
Removing a project folder

1. Click - Remove Disguise Projects folder. Notice that this will not delete the actual content of the folder, it just gets removed from the d3manager.

Expanding and collapsing projects folders

This allows you to expand and collapse your project folder which enables you to see multiple project files within your project.

1. Select **Edit** from the menu bar.
2. Select **Expand / Collapse** from the drop down selection.



Project history files

Every time you run Designer, the .d3 project file (for example, myProject.d3) is automatically copied to a folder called History in your project folder.

Backup files location for a project, used in case the current .d3 project file becomes corrupted or fails to load

The file name of the backup copy is stamped with the date and time. The software manages the files in your history folder so that you always have ten versions created within the last hour, 24 within the last day, 7 within the last week, 4 within the last month, and 12 within the last year. If you should happen to lose or corrupt your project file for any reason, therefore, you can always access the project as it was five minutes ago (or whatever your auto save duration is; see the next section on 'configuring auto save').

Restoring an backed up .d3 project file

To restore a backup version of the project: 1.Copy the .d3 project file from the History folder up into your project folder. 2.Remove the date suffix and double-click it to run it.

> **Note**
>
> Please note: if you do not rename the copied .d3 file without the date suffix the auto-backed up .d3 file will create two date suffixes after each other.

> **Note**
>
> Please note: All timestamps are in UTC and not the current timezone of the machine.

Restoring an object after permanently deleting it

Objects emptied from the trash-can are permanently deleted in the current .d3 project file. To retrieve an object, restore a previous .d3 project file in the History folder. It is even possible to rollback an object to a previous version.

> **Warning**
>
> Automated saves do not make backup copies of media files (audio files, still images, mesh files and video files). You should make regular backup copies of the entire specific Project folder(s) and store them on an external hard drive or network store.

Autosave

By default, the software saves the complete project every 5 minutes, as long as video is not playing (this is because saving takes time, which interrupts video playback). Autosave also generates a snapshot of the current project in the history folder contained within the project folder.

Changing the frequency of autosave

1. Right-click the State tab to open up the Program settings menu. Select **Project Settings**.
2. Edit the **autosave frequency (min)** property to the number of minutes between saves.

Autosave Frequency (Minutes) property of the Program Settings menu is used to edit the number of minutes between saves.

Manual save

To force the software to save all objects, press **Alt+w**. Only objects that have changed will be saved.

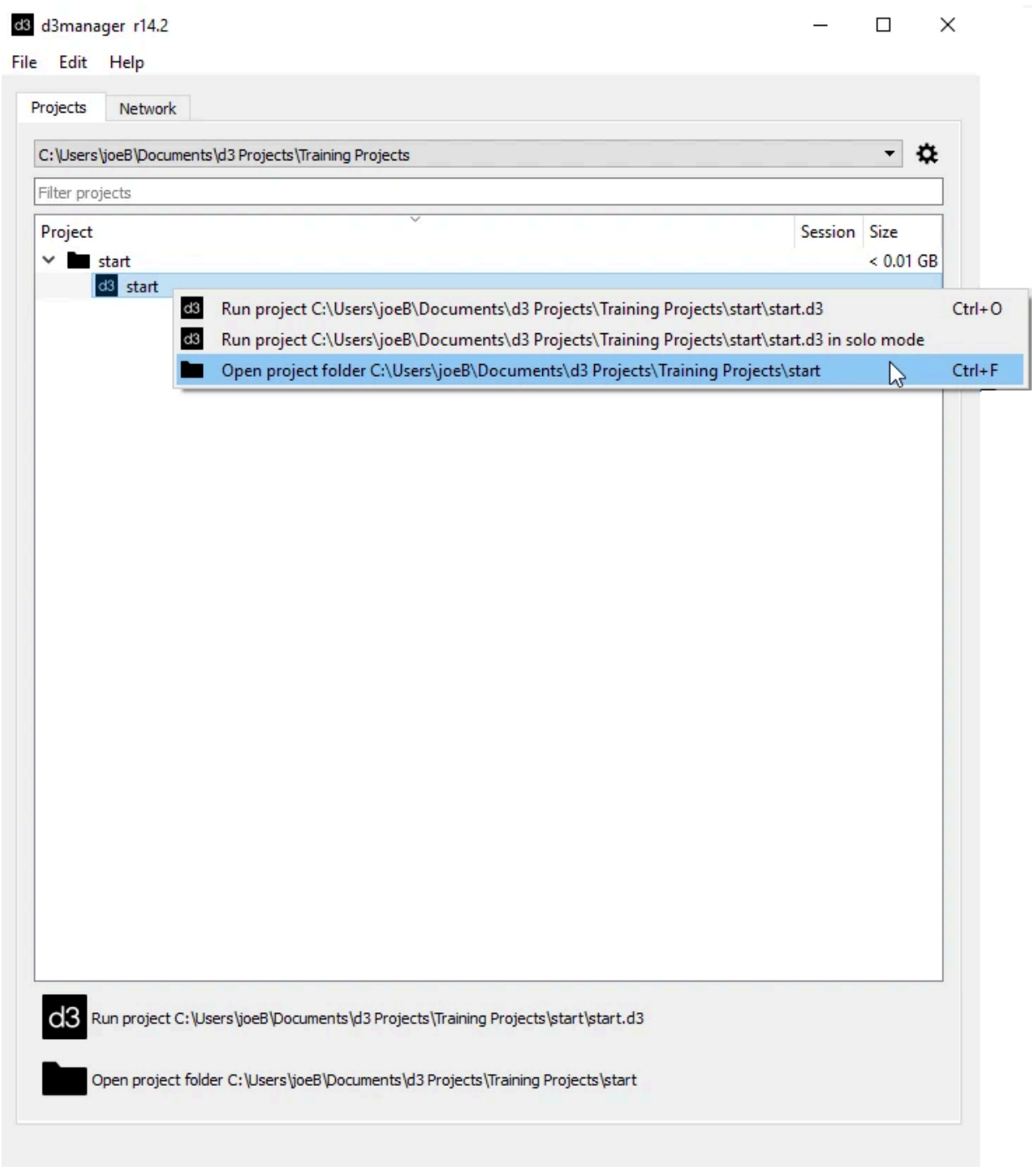
> **Warning**
>
> Warning: automated saves do not make backup copies of media files (audio files, still images, mesh files and video files). You should make regular backup copies of the entire specific Project folder(s) and store them on an external hard drive or network store. For more information on where your specific Project folder is located please see the sub-chapter Projects location/structure.

Opening a project from the file list

This opens the project from the file list allowing access to the media files and other files associated with the project. If nested expand the project folder by clicking on it or pressing the spacebar.

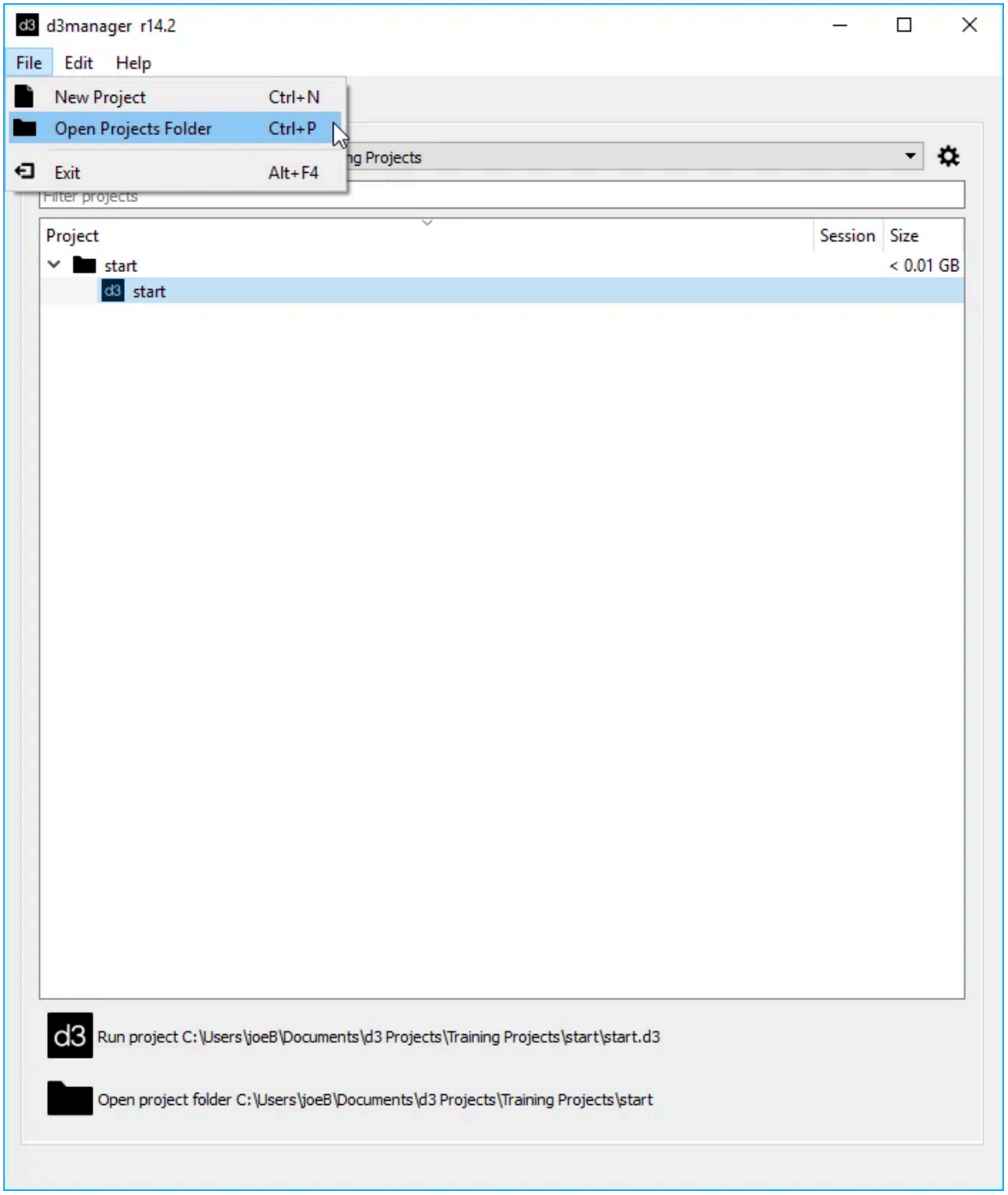
To open the project from the file list

Double-click on the project in the file list.



Or alternatively:

1. Right-click the project in the file list.
2. Select **Open project folder** from the drop down selection.



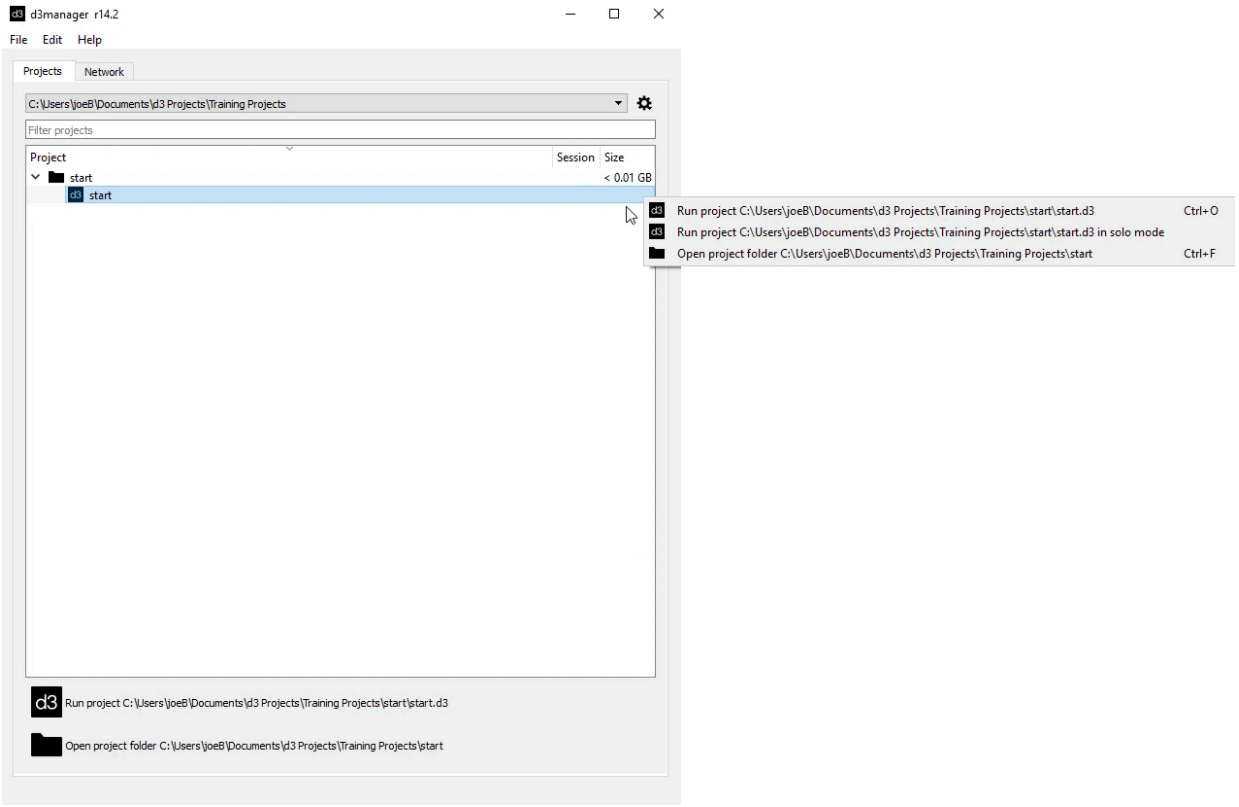
To run the project from the file list

Double-click on the project in the file list.

Or alternatively:

1. Right-click the project in the file list.

2. Select **Run project** from the drop down selection.



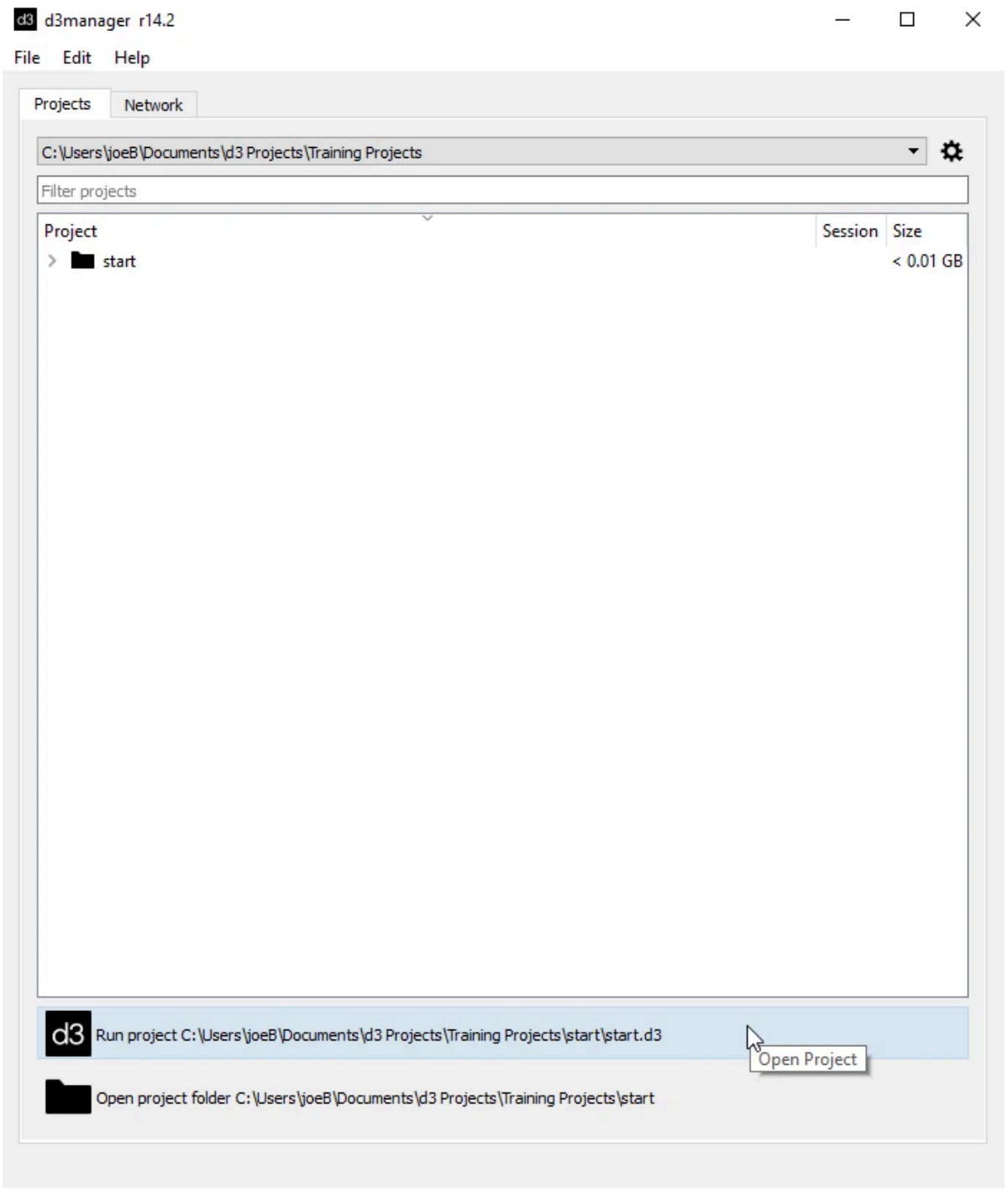
Relaunching the last active project

This allows you to relaunch the last active project that was open.

To open the last active project

1. Open the d3manager.

2. Click the Disguise Icon at the bottom.



Notice that as soon as you select any project in the list the last active project can no longer be opened using the **Disguise Icon**.

Creating a Remote Profile

A remote profile is a JSON file that helps developers understand where the program is spending most of its time. If you experience performance issues, our Support team may ask you for a remote profile to share with our developers. The file is not very useful for non-developers, but it can be opened using Google Chrome's tracing tool if you're curious.

Follow these steps to create a remote profile in d3 manager:

1. Run **d3Manager**.
2. Click the **Network** tab.
3. Select all of the machines you wish to profile.
4. Right-click on one of the machines selected.
5. Click **Remote profile for selected machines**.
6. Select a destination folder.
7. Set the desired Child threshold value (or leave it at the default)

[Animated GIF: Creating a remote profile in d3Manager]

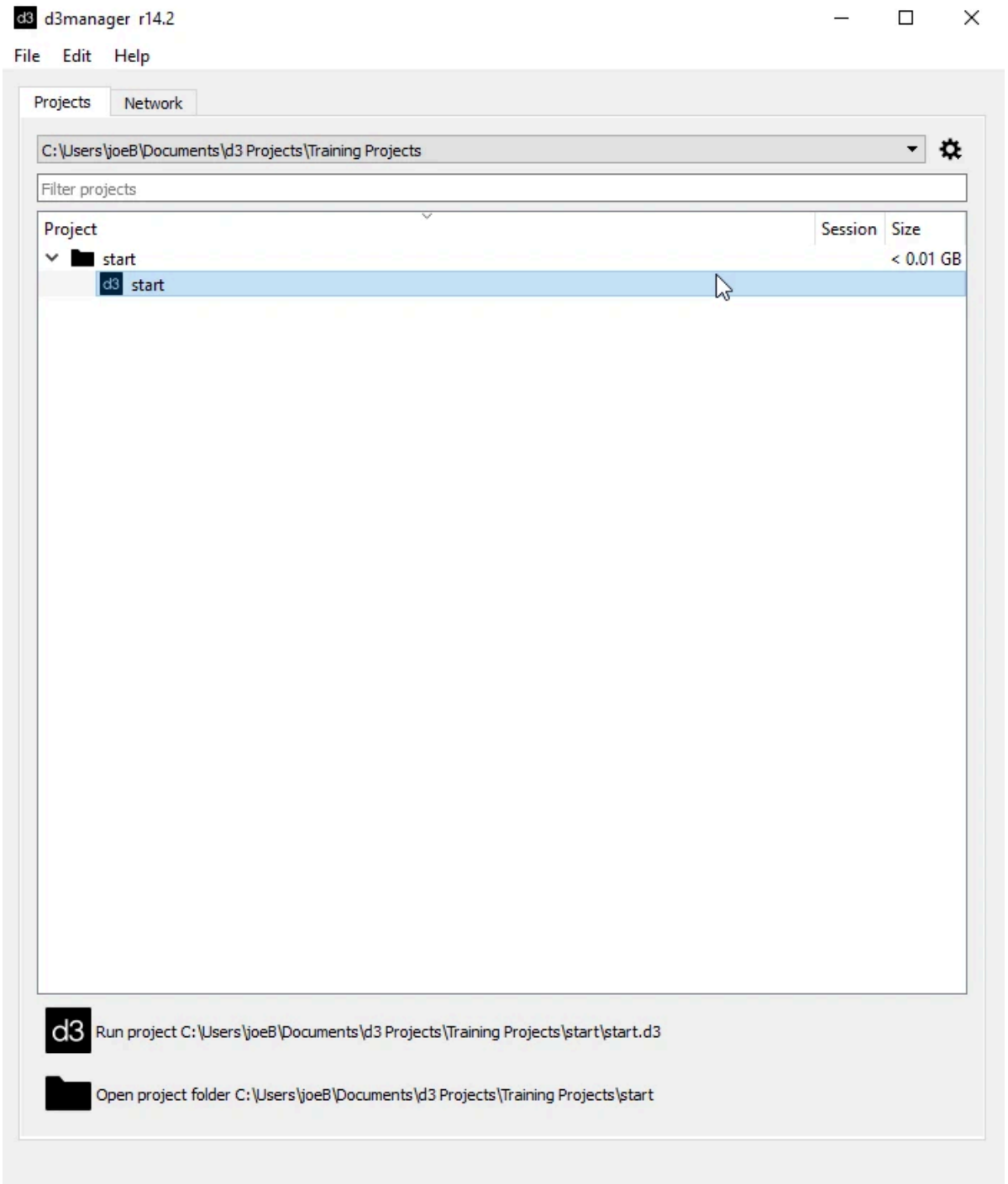
Designer will profile the selected machines for 100 frames, and then create a JSON file for each of these inside of the chosen destination folder.

Starting an existing project

To start an existing project

1. Select the project name in the projects list.
2. Click the arrow next to the project name to view all the project files inside the projects folder.

3. Double-click a project file to launch the project.



Alternatively, select the project and click the Disguise icon at the bottom of d3manager. d3manager will now launch the selected project file.

Upgrading and downgrading Designer projects

Designer projects can be opened in any version of Designer newer than the version it was built in and in some cases can be opened in older versions too. Any time a designer project is opened it will be automatically updated to the version that it is opened in.

Upgrading projects to newer versions of Designer

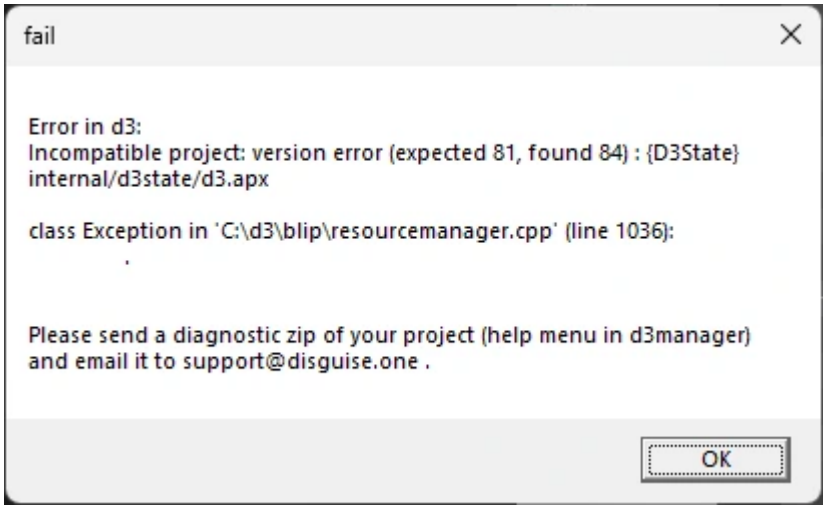
We always support upgrading a project to a newer version of Designer. This can be accomplished by simply opening the project in the newer version. If you encounter any problems when upgrading, please contact support. We always produce a history file before updating to the new version so you can always revert back to that history file.

> **Note**
>
> We recommend always updating directly to the newer version that you intend to use, rather than updating incrementally. Updating the versions incrementally can mean that if there are any update issues with intermediate versions you will be impacted by them.

When working with Disguise media servers you can upgrade to a minor or hotfix version for the same major version without compatibility concerns. When updating to a new major version (e.g. r29.2.2 -> r30) please read the release notes for the new major version carefully. Some major versions require an update the OS on one or all server models. If this is the case, installing the new Designer version will require you to reimage your server to the compatible OS.

Downgrading projects to older versions of Designer

In most cases we do **NOT** support opening a project file in an older version of Designer. If you attempt to do this you will be met with a cryptic message about an “Incompatible project: version error” which looks like this:



Example of a project downgrade error

There is one **EXCEPTION** to this rule which is that we **DO** support downgrading to older version of Designer on the same minor version. For example, you can open a project created in r28.7.3 in any of the following versions:

- r28.7
- r28.7.1
- r28.7.2

But you cannot open that same project in r28.6.5 because it is on a lower minor version.

For more information about Designer versions and their meaning see our page on release versioning conventions

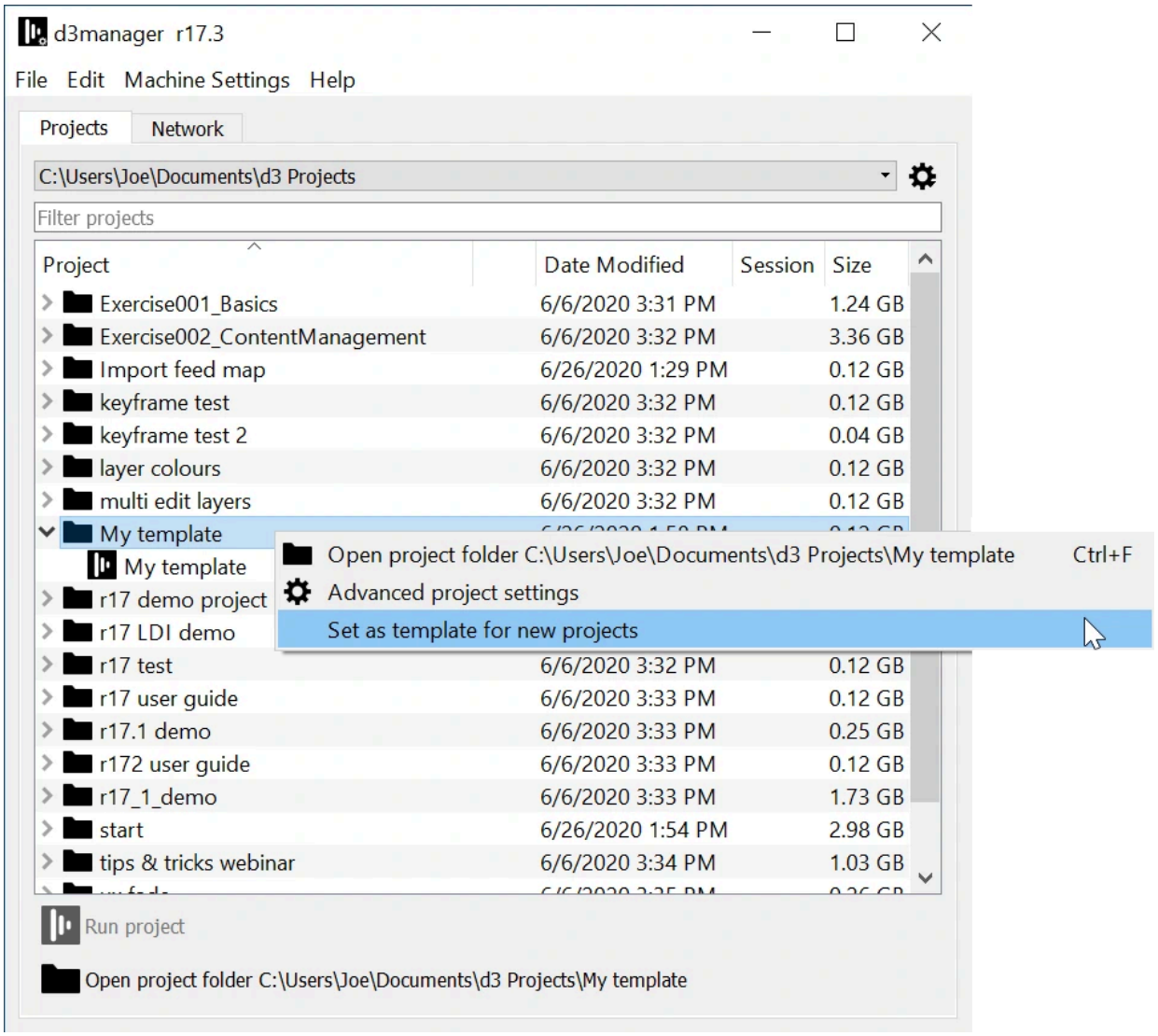
Working with Templates

You can define a template project that all new projects are created from.

A template project can be any project that you have already created in the d3manager. Whenever you define a template project, next time you create a new project, the template project will be copied. Once you have created the new project, the template is not referenced in any way, and changes in either project will need to be updated manually.

Define project template

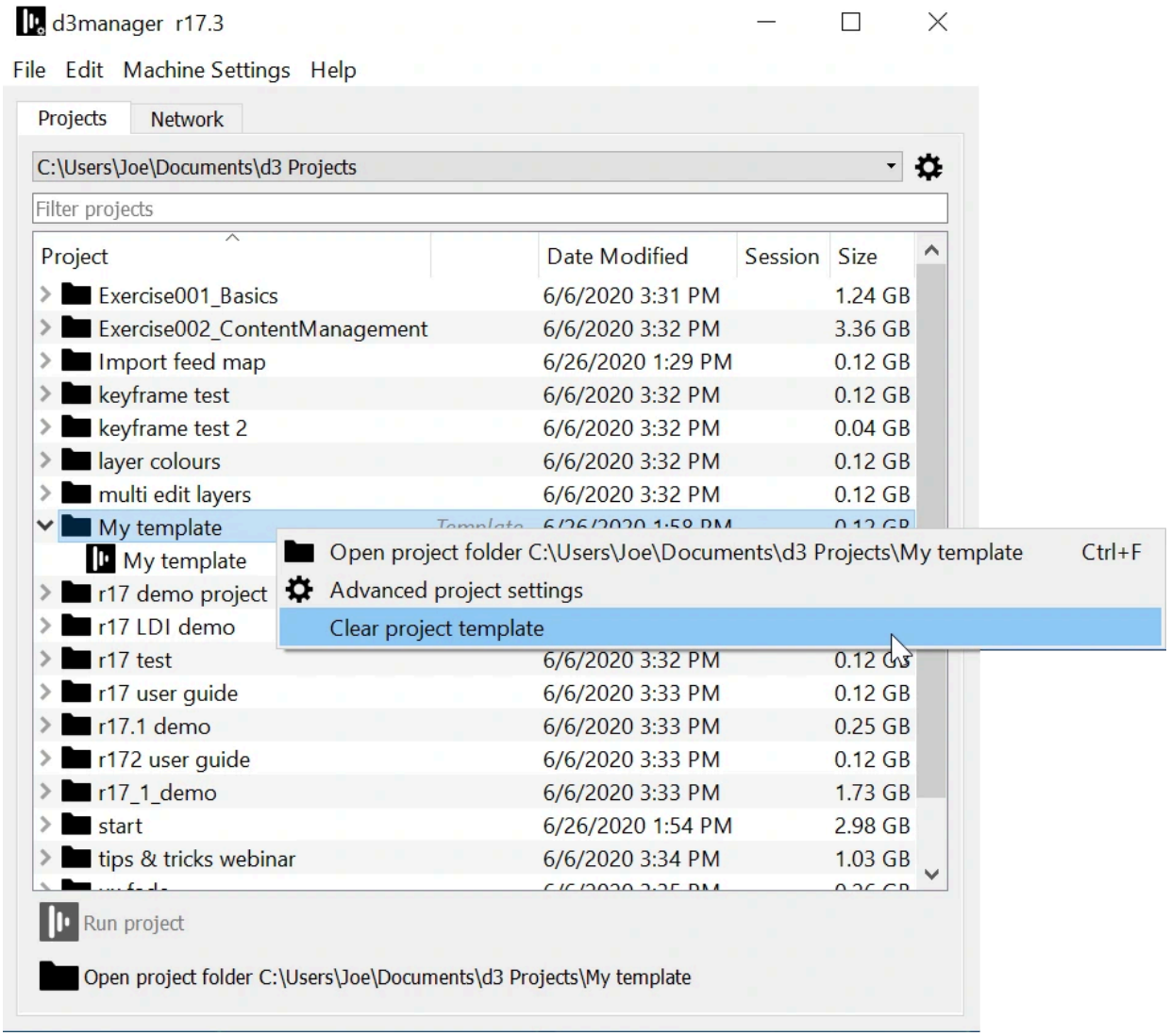
1. Right-click a project folder in d3manager.
2. Choose the **Set as template for new projects** option.



The project will now have a template indicator in Manager.

Remove template

1. Right-click the template project folder in d3manager.
2. Left-click the **Clear project template** option.



Manager will no longer use this project as the template for new projects.

Agile Camera Device

This topic outlines the Agile ARC 360 camera setup using a Disguise media server.

Agile Camera Setup

Ensure you can meet all of the requirements, and follow the workflow steps below to complete the Agile Camera Setup.

Requirements

- Agile Camera that supports IP connectivity and SDI output.
- Optional Agile HW Controller.
- PoE switch (for supplying power to the camera).
- Optional Disguise machine with a capture card (only if you want to use the camera as a live video input).

Currently the Agile Camera doesn't support absolute PTZ (Pan, Tilt and Zoom) commands. Therefore, in order to send the camera absolute PTZ values, it's necessary to create presets.

Workflow

The following steps outline the Agile Camera Setup workflow.

1. Create a UDP device from Device Manager.
   - Set the IP Address
   - Set the Port on the UDP device
2. Create an Agile Camera device from Device Manager.
   - Set the Address.
   - Set the Control Device to the UDP device.
   - Set the Camera Model.
3. Create a CameraControl layer on the timeline.
   - Set the Camera field to the camera that was created earlier.
   - Click the Command field to open up the keyframe editor.
   - Create and keyframe your desired commands for the camera.
4. Map the Camera to the video input.

1. Create a UDP device

1. Right-click **devices** in the dashboard. This will open the Device Manager, which contains a list of active devices.
2. Select **+** to open the Device library. This lists which internal or external devices are available.
3. Type in the name of the new device into the **new device** text field.
4. Hit **Enter**. This will open a list of device types available in .
5. Select the appropriate device type. In the case of Agile camera, a UDP device is needed.



The new device will be added to the Device Manager's active device list, and to the Device library. The device's editor will also open.

Always right-click on the **default** device object to add devices to it. If left-clicking you will be prompted to create a whole new device manager which is rarely required.

2. Create an Agile camera device

1. Right-click **devices** from the dashboard. This will open the Device Manager, which contains a list of active devices.
2. Select **+** to open the Device library. This lists which internal or external devices are available.
3. Type in the name of the new device into the **new device** text field.
4. Hit **Enter**. This will open a list of device types available in .

5. Select the **AgileCamera** device type.



3. Controlling the camera

1. Create a CameraControl layer and add it to the timeline. For more information see Creating layers.
2. Create presets & keyframe accordingly.

For more information, see CameraControl layer.

4. Mapping the camera to a video input

To bring the camera's live video feed through Designer and output it to a physical screen:

1. Patch the capture input to a Video Input Clip (e.g. `videoin_1`) in the Video Input Patch manager.
2. Create a Video layer.
3. Set the layer's **media** property to the Video Input Clip from step 1.

Agile Camera properties

The following properties are available to configure the Agile Camera device.

Address

The device ID used when sending commands to the camera. Range **1–255**. Use **255** to broadcast — also set the IP in the UDP device to `255.255.255.255` so messages are broadcast on the network.

Control Device

Defines which device in the device manager is communicating with the physical camera.

Camera Model

The type of camera using the Agile UBus protocol. Currently only **ARC360** is supported.

New Address

Lets the user change the camera address.

1. Enter a new value in the new address field.
2. Left-click **Set**.

Preset

Specifies which preset is saved or recalled. There are 256 preset slots, 0–255.

Left-click **Recall** to manually recall the selected preset number.

Presets are saved within the camera device, and only support Pan, Tilt, and Zoom.

Presets can also be triggered from the CameraControl layer, using the `CameraRecallPreset` command.

Pan Tilt Jog

Left-click and drag in the jog control to manually position the camera.

Zoom Jog

Left-click and drag in the jog control to manually change the zoom of the camera.

Invert Pan

Flips the value sent to the camera during jog for the pan axis. Boolean (Normal / Inverted).

Invert Tilt

Flips the value sent to the camera during jog for the tilt axis. Boolean (Normal / Inverted).

Invert Zoom

Flips the value sent to the camera during jog for zoom. Boolean (Normal / Inverted).

Supported commands

The following commands are supported for use with the CameraControl layer.

- `CameraAutoFocus` — Enables automatic focus. When on, manual focus via `CameraFocus` is disabled.
- `CameraBlack` — Black level (0–1).
- `CameraBlueGain` — Blue channel gain (0–1). Only takes effect when `CameraExposureMode` is set to Manual.
- `CameraExposureMode` — Exposure mode: **Auto**, **Manual**, **Iris priority**, or **Shutter priority**. Manual gain, black level and white-balance commands only take effect outside Auto mode.
- `CameraFocus` — Manual focus (0–1). Only applies when `CameraAutoFocus` is off.
- `CameraGain` — Camera gain (0–1). Only takes effect when `CameraExposureMode` is set to Manual.
- `CameraGammaMode` — Gamma curve: **Straight** or **Standard**.
- `CameraGoToPreset` — Recalls a preset slot (0–255). Pan, Tilt and Zoom are stored in the camera's preset memory and recalled together.
- `CameraImageMirrorMode` — Image orientation: **Desktop Normal**, **Desktop Mirror**, **Hanging Normal**, **Hanging Mirror**.
- `CameraIris` — Iris aperture (0–1).
- `CameraNightMode` — Toggles night mode on the camera.
- `CameraOnOff` — Toggles the camera power on or off.
- `CameraRedGain` — Red channel gain (0–1). Only takes effect when `CameraExposureMode` is set to Manual.
- `CameraShutter` — Shutter speed (0–1).
- `CameraVideoOutputMode` — Sets the SDI output format: NTSC/PAL analogue, or 1080i / 1080p / 720p at various refresh rates. The camera must be power-cycled using `CameraOnOff` after changing this value.
- `CameraWhiteBalanceMode` — White balance mode: **Auto**, **Indoor**, **Outdoor**, **One Push**, **Auto Tracing**, **Manual**, **One Push Trigger**, plus Auto/Outdoor variants that include sodium lamp sources, and a fixed Sodium Lamp Source mode.

Audio Analyser

The **AudioAnalyser** device captures audio from a connected source and exposes its level and frequency content for use in expressions, letting audio drive parameters in Designer.

Before starting ensure an audio source is connected to the line inputs on the RME breakout. Please see the Hardware sub-chapter Audio breakout for more information. Make sure that there is a good signal level.

Setting up an audio analyser

1. Create an AudioAnalyser device. Please see the earlier sub-chapter Creating devices for step-by-step instructions on how to create a device, and select **AudioAnalyser** from the menu of different device types.
2. Open the AudioAnalyser device editor which contains an empty list to select audio lines. This can be used to add audio lines to analyse.



AudioAnalyser menu contains two audio lines

3. Right-click on an audio line, in this example **line left**, to open the audio line editor. The audio line editor is used to specify how the audio is to be inputted.
4. Open the audio device selection list by left-clicking the **line** property.
   - Audio device selection list is used to specify how the audio is to be inputted
5. Select an appropriate audio device from the audio device selection list. An audio spectrum should now be displayed.



Audio spectrum should now be displayed for the audio device selected

6. To achieve an appropriate level it may be necessary to adjust the gain level. To adjust the gain level, adjust the **gain** field. 1 means no adjustment, < 1 reduces gain and > 1 increases gain.
7. To check the gain level left-click the audio spectrum; this will switch the display to an audio waveform. If the audio waveform has red in it the audio level is too high and is 'peaking.
8. Adjust the gain level until the audio waveform has no red in it.
9. Once the level is clean, left-click the audio waveform and the display will return to an audio spectrum.

Using Audio Analyser in Expressions

Once the Audio Analyser is set up, it is available for use in expressions (for example controlling a field on a Layer), using special syntax to gather damped levels over a number of frequency ranges. The exact method is discussed under Audio expressions

Camera Tracking Device

Camera tracking allows the position and lens characteristics of Camera objects to be driven by the values of a real-world camera, allowing virtual scenes to be rendered from the camera's point of view. This is particularly important for xR and VP workflows.

Disguise Designer has integrations with many different camera tracking and automation systems. See the Devices Index for the full list of available drivers. These can be used to apply tracking data to the positional and/or lens properties of a camera.

Workflows

Add a tracking source to a camera

1. Under **Devices** add a **PositionReceiver**.
2. In the **PositionReceiver** under Drivers, add the relevant tracking driver and set it up to receive tracking data.
3. Engage the position receiver.
4. Create a **Camera** in the **Stage**.
5. Under the Camera's Settings, select the tracking source. This should have been automatically generated by the driver once tracking data started to be received.
6. Data from the Tracking Source should start overwriting the values in the camera.

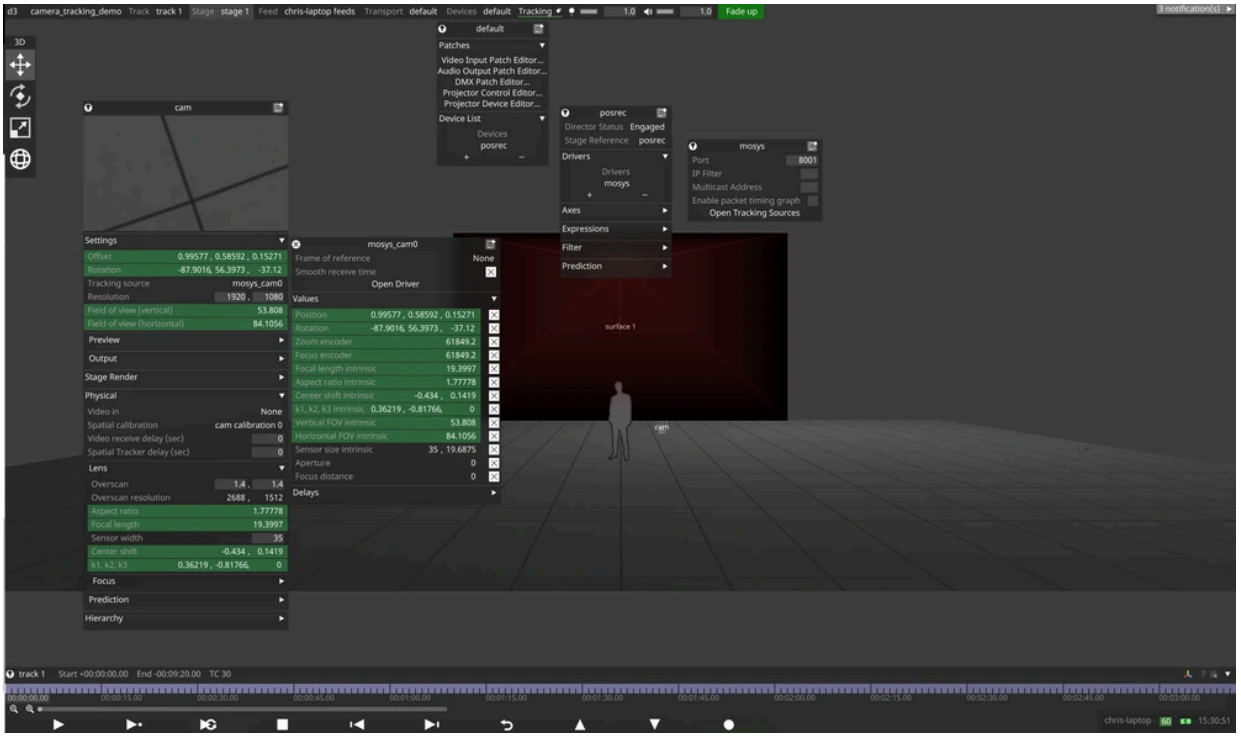
> **Note**
>
> Values received from the tracking system may not align with the Designer coordinate system, unless the tracking system has been calibrated to achieve this. Designer provides a spatial calibration workflow which can be used to align positional and lens tracking data with the positions of LED screens represented in Designer.

Toggle values applied from the tracking source

1. From the **Camera**, open the **Tracking Source** editor.
2. Expand the Values section.
   - Values highlighted in green are being received from the tracking source.
   - Values with a dark grey background are not being received.
   - Values with a light grey background are received but toggled off.
3. Untick the checkbox to stop the value being applied in the camera.
4. Tick the checkbox to apply values again.

Toggle receive time smoothing

To toggle receive time smoothing, check or uncheck the **Smooth receive time** box in the tracking source. Turning this on should result in smoother tracking data, but may add a small amount of latency.

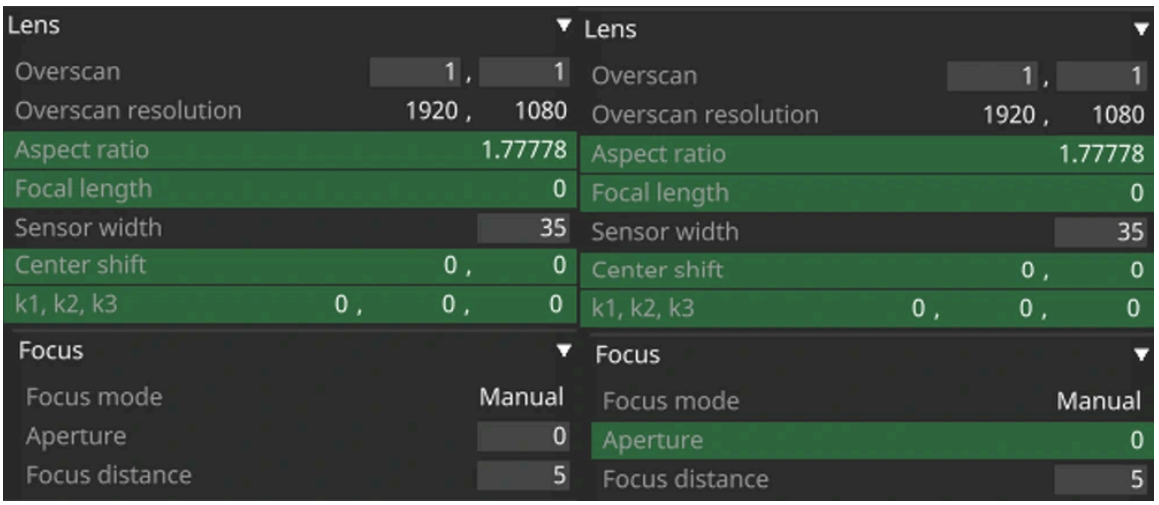


Camera Tracking Widget

Use lens focus parameters in Unreal Engine

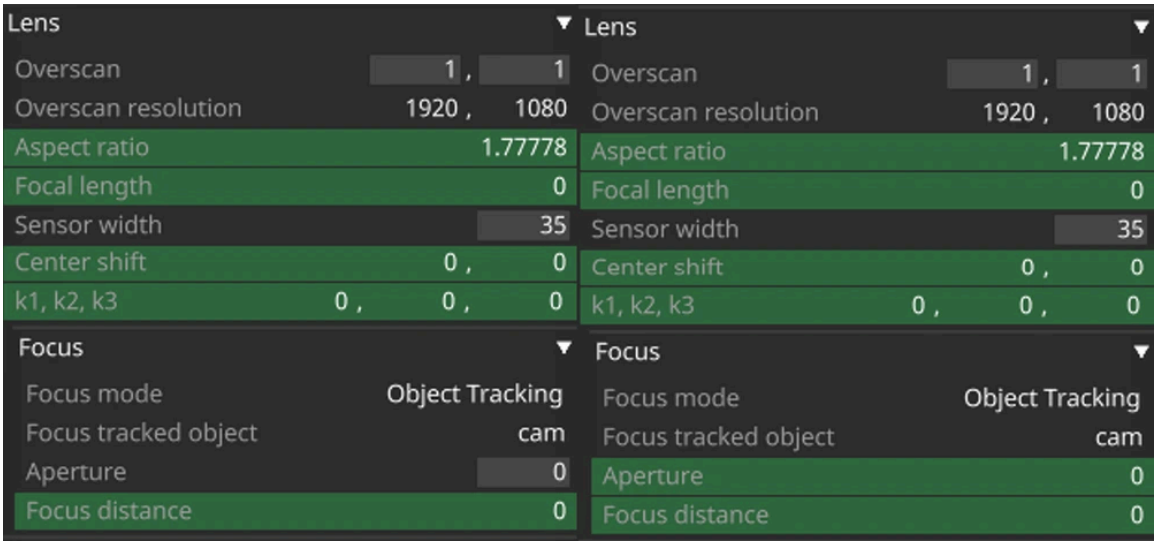
1. Set up a **RenderStream** layer using an Unreal asset that has a channel created from a CineCamera. Map the channel to a Camera or MR set's backplate or frontplate.
2. Start the **RenderStream** workload.

3. Adjust the **Focus mode** under **Camera > Physical > Lens > Focus**. There are three options:
   - **Disabled**: no depth of field.
   - **Manual**: set the focus distance and aperture manually to adjust the depth of field. If the tracking data contains a focus distance or aperture value, the tracked value overrides the manual setting.



Manual focus mode

   - **Object tracking**: select an object in Designer to use as the focus target. The focus distance is calculated from the camera to this object. The aperture can be set manually, but if the tracking data contains an aperture value, the tracked value is used instead.



Object tracking focus mode

4. Adjusting the lens focus parameters on the camera updates the depth of field effect in Unreal Engine.

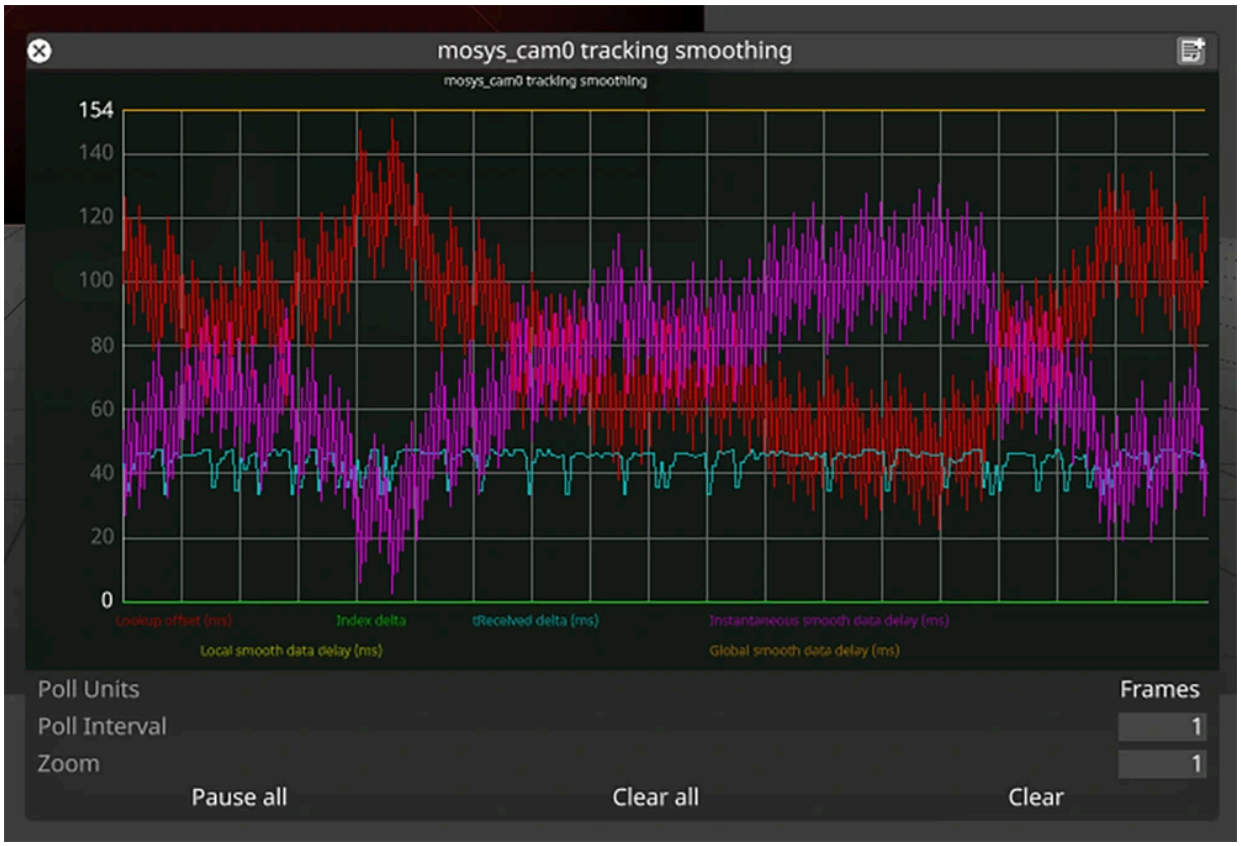
Troubleshooting

FAQs

What should I do if the logs contain 'Attempted to access tracking data beyond end of buffer'?

We dynamically adjust the point at which we look back in the buffer to find smooth data, based on the history of tracking data receive times. You may occasionally see this message if tracking data comes in later than expected. You should find that the message stops after a second or two as the buffer lookup updates dynamically to account for the latest data. If this error appears constantly, then most likely the incoming tracking data is not reliable. Double-check the sender device and network routes to resolve the problem. If the issue persists, please take a Device Recording and send it to Disguise support for further investigation.

How do I read the tracking smoothing graph?



New tracking smoothing graphs have been added to help debug tracking issues. The lines in the graph can be interpreted as follows:

- **Lookup offset**. This is the time in ms between the smooth tracking data we are looking up and the latest data received. This should almost never go below zero, as that would mean we received tracking too late to be able to smooth it. If it is consistently much greater than zero, that means we are adding unnecessary additional latency while waiting to receive smooth data.
- **Index delta** is the change in index of the tracking data we look up in the buffer each frame, e.g. if the tracking frame rate is twice the frame rate this would be around 3. The smoothness of this line shows the success of the receive time smoothing - we are aiming for a consistent index offset between each packet of tracking data we look up.
- **tReceived delta** is the change in the receive time of the tracking data each frame. This shows us how smooth the tracking data would be without receive time smoothing - it can be compared against the index delta line to check that receive time smoothing is working.
- **Instantaneous smooth data delay** tells us how far we would have to look in the buffer to ensure we have received tracking, based on the latest received packet. This is aggregated over time to give a stable lookup time.
- **Local smooth data delay** is a maximum over time of the instantaneous smooth data delay, for this machine. It shouldn't change often.
- **Global smooth data delay** is the maximum smooth data delay over all machines, which is particularly relevant when we are redistributing tracking data across machines. It should provide a consistent period to look back in the buffer to ensure we have smooth tracking data.

CITP Device

CITP (Controller Interface Transport Protocol) is an open network protocol used by lighting consoles, media servers, and visualisers to exchange information, such as the transfer of thumbnails and asset-specific naming for media previewing during programming. Designer supports the integration of CITP-enabled lighting consoles for media preview and thumbnail distribution.

Using CITP

- grandMA2 3.1.2.5 supported. Version after 3.2.2.3 should also work.
- Hog OS 3.5.0 supported.
- CITP devices join with both multicast addresses, 224.0.0.180 and 239.224.0.180, and in that order.
- Only thumbnail exchange is supported.

In Designer

1. Right-click on **Devices**.
2. Create a new DMX Device.
3. Insert the desk's IP Address (this should ideally be set up on an isolated Art-Net switch).
4. Create a CITP Device and assign the DMX Device to it.
5. Add a Video layer, assign a DMX patch to it.
6. Open the Bank Editor and populate the Video banks.

In grandMA2

1. Go to **Setup > CITP Network Configuration**.
2. In the top-right corner of the windows that opens, ensure you set CITP to **Enabled** (the box should look green once you click it).
3. Right-click on **New** under the MediaServers tab.
4. The Disguise machine should appear in the list here. Click to select it.
5. Select a fixture layer (one with a Video layer fixture patched to it).
6. Select a Library SubAttribute (any sub-attribute seems to work as Disguise doesn't use this.)
7. Select an Image SubAttribute (this needs to be set to Video Slot).
8. Click on **Update Thumbnails**.
9. Select the Video layer fixture and navigate to the Video Slot attribute.
10. Clicking on the attribute should now display clickable thumbnails and file names on the lighting desk software.

> **Note**
>
> If the machine does not appear in the MediaServers list, double-check connection settings (use the DMX Monitor to ensure DMX is being received) and ensure the CITP Device is in the Device List.

Creating Devices

1. Right-click devices from the dashboard. This will open the Device Manager, which contains a list of active devices.
2. Select + to open the Device library. This lists which internal or external devices are available.
3. Type in the name of the new device into the new device text field.
4. Hit Enter. This will open a list of device types available in Designer.
5. Select the appropriate device type.

The new device will be added to the Device Manager's active device list, and to the Device library. The device's editor will also open.

[Animated GIF: Creating a device]

> **Note**
>
> Always right-click on the **default** device object to add devices to it. If left-clicking you will be prompted to create a whole new device manager which is rarely required.

Device Monitor

The device monitor lists every source that the local machine is currently receiving data from — for example, every MIDI port, OSC sender, DMX universe or tracking system feeding that recorder. It allows the user to easily inspect the incoming data and is available whenever the data is present, regardless of whether the recorder is in Live, Play or Record mode.

Each row in the monitor shows:

- **Name** — the name of the source.
- **Monitor** — a live preview of the most recent value received.
- **Receiving** — whether the source is currently sending data.
- **Last Received** — the timestamp of the most recently received command.

Opening the monitor

To open a device monitor:

1. Right-click the data monitor heading for the relevant data type (for example, **MIDI** or **OSC**) in the d3state bar at the top of the Designer window. A list of the devices associated with that data type appears.
2. Select the device whose data you want to inspect.
3. Click **Monitor**.

Filtering, sorting and clearing

Over a long session the monitor can build up many sources, including ones that have stopped sending. The following controls make it easier to find a specific source:

- **Filter** — type into the Filter box at the top of the monitor to show only rows whose Name contains the entered text. The match is case-insensitive and the list updates as you type.
- **Clear** — removes any sources that are no longer receiving data, leaving only those currently active. Sources that resume sending will reappear automatically.
- **Sort** — click a column header to sort by that column. Click the same header again to reverse the direction. The **Last Received** column sorts newest-first by default, which is the quickest way to find the most recently active source. The **Monitor** column is not sortable. The active sort column is highlighted while the other column headers appear dimmed.

The current filter text, sort column and sort direction are retained for that monitor window across sessions.

Device Recording

Device Recording is a tool to record the incoming data streams of different Devices (DMX, Automation and MIDI) for later playback without needing the device attached.

Once a device recording is deleted, it **cannot** be retrieved. This is because Designer treats recording files as content.

This is useful for recording specific automation control data so a programmer can play it back into the system without the operator needing to be on hand.

> **Note**
>
> Device recordings only exist on the bottom-most transport in multi-transports.

Using device recording

There are three modes for Device Recording; Live, Play and Record.

- **Live**: Only the incoming 'Live' data will be actively allowed into Designer.
- **Play**: Only the recorded data will be actively played back into Designer.
- **Record**: That device is primed to record the incoming data into Designer.

To set it up:

1. Add either a MIDI, DMX, or Automation Device to your device list and set it up appropriately.
2. Observe the change to the GUI:



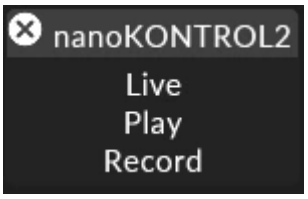
These headings are created in the d3state bar to show that there are devices that are able to be recorded. There is a little symbol next to each indicating the mode the device is currently sitting in. As shown in the image above, these are currently set to live and will react to the incoming data. A small triangle *play* symbol indicates the device is set to playback the recordings available, and a small circle indicates it is primed for recording.

3. If you right-click on the heading of the device you would like to set up for recording, a new window appears.



Here you see the list of MIDI devices that are ready for recording. The devices are listed to the left, with the current mode on the right.

4. A right-click on the mode for each device will bring up another window where you can change the mode of the device.

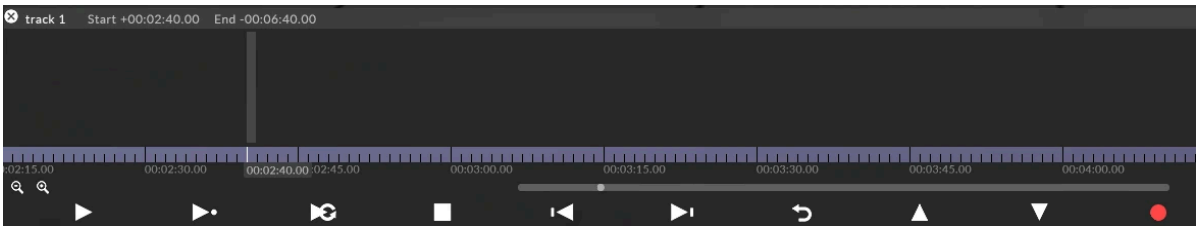


Whereas, the buttons along the bottom of the window are the global mode controls for the device type (changes all modes for the recorder).

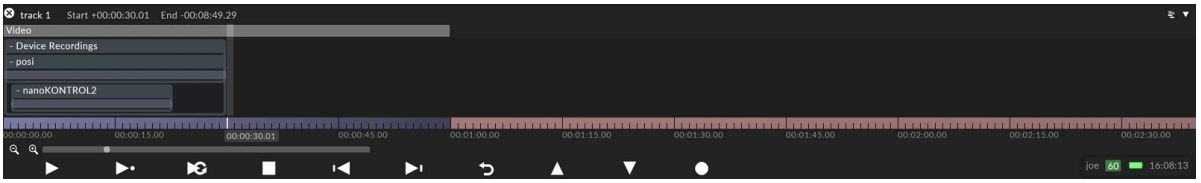
5. If we take the nanoKONTROL2 for example, it is currently set to **Live** and we want to record this device's input. To do this, right-click on the mode for the device and set it to record. This will tell Designer we want to record this device's input.



6. If you look to the transport controls on the timeline, you will notice an addition to the UI. A Small circle has been added next to the track change controls, this is the record button for Device Recording. With the device set up as above, this can be selected to prime the recording fully. If no device has been set to record, a pop up will appear alerting that this cannot be used as no devices are ready for recording. When it is primed successfully, it will turn red to show the change.



7. Now the track is ready to record the input so simply hitting play will start the recording and you will notice a new layer being created as the input stream is being received. This will grow as the recording grows with it. When you have captured all the data you want to record, hitting stop will cease the recording. All device recordings are saved under this tab and individual tabs are created for each device that has made a recording. The recordings that have been made cannot output yet as they need to be set to 'Play' in the mode of the recorder.



8. Each recording that is made has 3 settings when right-clicked on;
   - **Disable** — stops outputting the recording.
   - **Reset** — puts the recording back to where it originated if it has been moved or edited.
   - **Delete** — removes the recording.

Delete removes the recording entirely — this **cannot** be undone.

Recordings are saved as `.rec` files and stored in the object folder under `recordingfiles`. These are treated like any other asset, but they are highly reliant on project-specific settings such as sections, cues, notes, and so on — so they may not work in other projects. As with any asset, they will need copying over to other machines in the same network environment (for example, an Actor) for them to function correctly.

Devices Index

Designer supports a number of devices. The Devices section includes documentation about how to create, use and record devices. It also covers information about all of the devices we support, including motion control systems, automation devices, matrices, routers, and video inputs.

Using Devices

The following pages describe how to create and record devices.

- Creating Devices
- Device Recording

Using Motion Control Systems

The following pages describe how to use Motion Control System with Designer.

- Motion Control Systems
- Position Drivers
- Creating a New Motion Controller
- Axes
- Creating Driver Axes
- Tracking Source
- Position Axis Expressions

Devices

To find the list of devices available in Designer, right-click **Devices** in the dashboard. This opens the **Device Manager**, where the full menu of active devices is listed.



Device menu listing the devices, including Matrices available in r32.1.2

- Agile Camera : A virtual camera device enabling programmable and keyframed camera moves within Designer.
- Audio Analyser : Analyses an audio source so its level and frequency content can drive parameters in Designer.
- CITP Device : Supports the integration of CITP-enabled lighting consoles for media preview and thumbnail distribution.
- DMX Device : Sends and receives DMX channels for lighting, automation, or external control. Supports protocols Art-Net, Enttec, ezDMX, KiNET v1, KiNET v2, sACN, and SoundLight.
- DMX Machine Control : Sends remote and shutdown commands to Designer to remotely shutdown Disguise machines.
- DMX Projector Control : Provides DMX-based control for external projectors.

- Expression Variables : Defines variables that can be used in Designer to build dynamic, custom behaviours.
- JSON Machine Control : Allows for the querying of machine list and machine status via JSON.
- MIDI Device : Allows triggering, automation, and control through standard MIDI messages.
- OSC Device : Sends and receives OSC messages for flexible, network-based control.
- OSC Machine Control : Allows restart and shutdown commands to be sent from an external OSC device.
- OSC Tester : Allows users to test incoming and outgoing OSC messages from Designer.
- Position Receiver : Receives real-time positional data for tracking objects or performers.
- Projector Calibrator : Automatically aligns projectors to physical surfaces using tracked reference points.
- Shot Recorder : Allows users to record and export parameters from within Designer, ready for use in post-production workflows.
- String Projector Control : Used to control external devices while optionally simulating their behaviour inside the visualiser.
- Telnet Device : Used to send commands over a TCP network connection to 3rd party products.
- UDP Device : Used to send commands over a network via UDP to 3rd party products.
- Visca Camera : Controls VISCA-compatible PTZ cameras over network connection.

Matrix Switches

Designer supports the following Matrix Switches:

- Analog Way OPS300 : Supports routing control for the Analog Way OPS300 switcher.
- Barco Encore (External Link)
- Barco MatrixPro : Enables routing operations for Barco MatrixPro systems.
- Gefen Matrix (External Link)
- Lightware Matrix : Integrates with Lightware matrices for video routing and monitoring.
- PureLink Matrix : Provides control for PureLink AV matrix devices.
- Telnet Matrix : Generic matrix control using Telnet-based command sets.

Routers

Designer supports the following routers:

- Blackmagic Smart Videohub : Controls Videohub routing and crosspoint configurations.
- Riedel MediorNet : Communicates with MediorNet systems for routing and management.

Tracking

A number of tracking and automation drivers are supported in Disguise. They appear in the driver picker when you add a driver to a Position Receiver device.



The driver picker shown when adding a driver to a Position Receiver. Picker contents may change with Designer releases.

Here, drivers are grouped by function — see the **Position Drivers** and **Generic Receivers** sections in the sidebar. The full list, organised by what each driver does, is below. Note: DMX-family protocols (Art-Net, sACN, KiNET, etc.) are output options on the DMX Device rather than standalone drivers — they appear under **DMX Device** in the sidebar.

Position Drivers

Position Drivers decode positional data from a motion control system and emit it onto PositionAxis objects inside a Position Receiver device. Grouped below by what they sense.

Tracking System Drivers

Camera, object, and people tracking systems.

- Camera Tracker Observations Tester : Used for validating and troubleshooting observation data received from external camera-tracking systems.
- Camera Tracker Tester : A type of PositionDriver that can be used to simulate camera tracking data.
- EzDriver : Receives tracking data over the network via the EZ protocol.
- FreeD Driver : Receives FreeD camera-tracking protocol data.
- LDS Driver : Receives lens aperture and focus distance from ARRI cameras via the LDS protocol.
- Mo-Sys F4 Driver : Connects to Mo-Sys F4 tracking hardware.
- MoveAI Driver : Real-time markerless motion-capture data from MoveAI systems.
- NatNet Driver : Receives tracking data using the NatNet protocol.
- Ncam Driver : Supports Ncam camera tracking for virtual production.
- NG360 Driver : Receives positional data from NG360 tracking systems.
- RTTrPM Driver : Connects to RTTrPM real-time BlackTrax tracking systems.
- Skeleton Tracker Tester : Simulated skeleton tracking.
- Stype Driver : Integrates Stype camera-tracking data.
- Trackmen Driver : Trackmen camera tracking.
- Vicon Datastream Driver : Vicon tracking data stream.

Stage Automation Drivers

Stage motion, rigging, and screen-positioning systems.

- CPS Driver : Interfaces with CPS automation systems (motor positions).
- D3SSI Driver : Receives single-axis encoder position data over the D3SSI protocol via UDP.
- DCS Driver : Interfaces with DCS stage automation/control systems.
- DMX Screen Position Driver : Tracks screen or object position via DMX.
- HMC Driver : Integrates with Hudson Motion Control systems over UDP.
- Kinesys Driver : Controls Kinesys motion systems for lifts, winches, and rigs.
- LCPUSB Driver : USB-based industrial PC controller for automation.
- Movecat Driver : Interfaces with Movecat kinetic systems.
- Navigator Driver : Integrates with Navigator automation controllers.
- PosiStageNet Driver : Tracks performer or object motion via PSN.
- Posital Driver : Posital encoder/sensor positional input.

- PRG Driver : Integrates with PRG motion systems.
- PRG Stage Command Driver : Supports Stage Command for PRG automation.
- SIMOTION Driver : Interfaces with Siemens SIMOTION controllers.
- SKV Driver : SKV control system driver (varies by setup).
- Stage Kinetics MoveCat Driver : Controls Movecat motion via Stage Kinetics protocol.
- STS Driver : Connects to STS automation hardware.
- Unican Open Cue Driver : Receives position data from Unican Open Cue (OpenPosIP) automation systems over UDP port 16000.
- VisualAct Driver : Communicates with VisualAct winches and lifts.

Generic I/O Drivers

Generic protocol carriers that operate as Position Drivers.

- OSC Driver : Enables automation control using OSC routing.

Generic Receivers

Generic I/O and data receiver drivers — protocol carriers for custom integration or testing.

- gRPC Receiver Driver : Receives structured gRPC data.
- Test Receiver Driver : Internal test data receiver.
- UDP Receiver Driver : Generic UDP packet input.

Video Input

Video Inputs supported by Disguise include:

- 4K Quad Link Capture : Allows ingest of 4K video over quad-link SDI.
- ST 2110 Video Capture : Receives uncompressed IP video signals using ST 2110.
- Setup Video Input : Walkthrough for configuring and routing video inputs.
- Video De-Interlacing Methods : Explains how Designer de-interlaces video.

DMX Device

This topic explains how to configure Disguise to prove DMX input and output, using an Art-Net device as an example.

> ⚠ **Warning**
>
> It is possible to map a DmxDevice to conflicting address ranges. This will result in unpredictable behaviour.

Designer also uses a number of other converter device types: sACN, Enttec, SoundLight, EzDMX, KiNET v1 and KiNET v2.

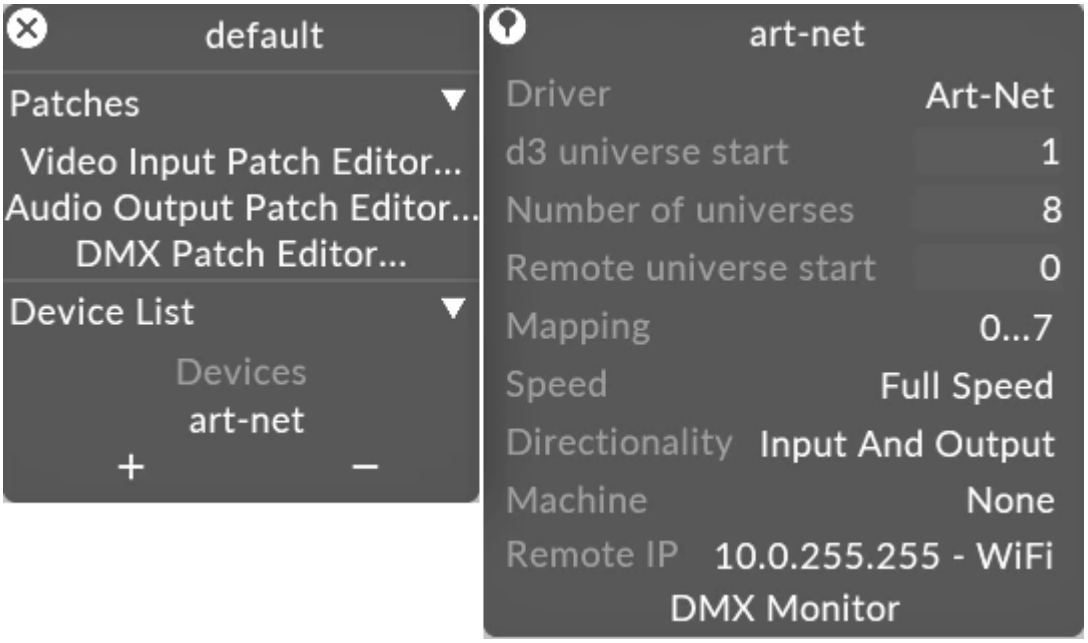
To setup the Art-Net connection you first need to create a DmxDevice. A DmxDevice represents a physical output device that connects to the computer (via USB or ethernet) and outputs and/or receives DMX to/from physical devices. Designer supports a number of such DMX converters and protocols. You will need to create a separate DmxDevice for each physical converter device.

Create a DMX Device

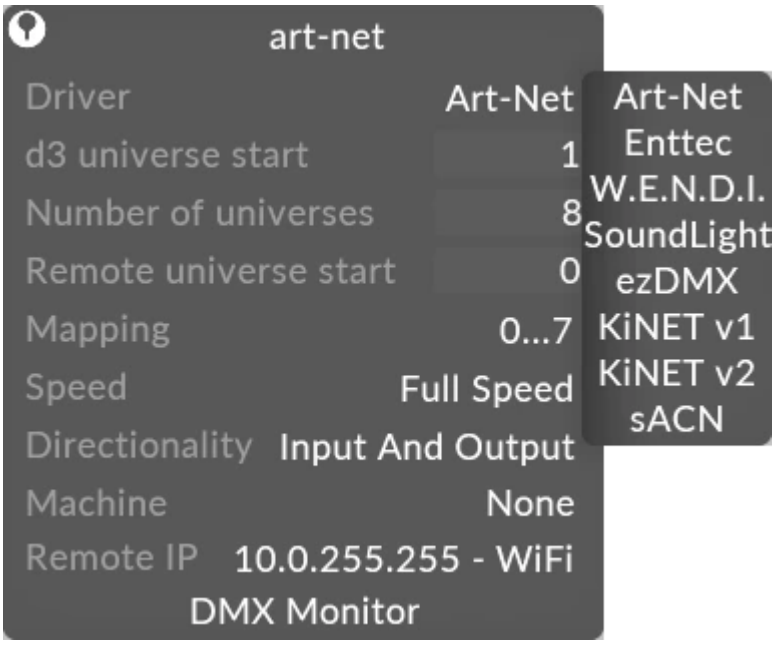
A DmxDevice is created in the same way as any other device type. Please see Creating devices for step-by-step instructions on how to create a device, and select DmxDevice from the menu of different device types.

Edit the DMX Device

1. Right-click the new DmxDevice, in this case Art-Net, to open the DmxDevice editor.



2. Left-click **driver**. This is an option switch that selects the converter device type.



Driver property points to different options of converter device types

Protocols Supported

The following options are supported:

Art-Net

An Art-Net device acts as a bridge between a standard Ethernet network and traditional DMX lighting systems, handling both input and output. This is the most commonly used DMX-over-ethernet protocol. Art-Net can transmit up to 32,768 Universes of data via a single ethernet cable.

Art-Net Broadcast

Art-Net broadcast is the initial transmission method for the Art-Net lighting protocol, where a signal is sent to all devices on a network to discover and configure lighting nodes. To do Art-Net Broadcast, set the remote IP of the device to be the broadcast address of the network. For example, if the node's IP is `2.0.0.1` and the subnet mask is `255.0.0.0` then the broadcast IP will be `2.255.255.255`.

Art-Net IP Address Filtering

We've modified the way we manage Art-Net/sACN connections to allow for more precise layering of DMX data. This means that Disguise is now more strict regarding which IP address it will receive data from, as opposed to the previous behaviour in which it would listen to the entire subnet. In light of this change, users will now need to be more specific when entering remote IP addresses, ensuring that either the correct unicast address or the subnet's broadcast address is used.

sACN

Streaming-ACN, also known as ANSI E.1 31-2016, is an alternate DMX-over-Ethernet protocol that is supported by Disguise. Unlike Art-Net, which is a broadcast (or unicast) protocol, sACN is a multicast protocol and can transmit up to 63,999 Universes of control data via an ethernet network.

When selecting an adapter for multicast traffic in Designer, it loads the list of the adapters present on the local machine. Note that the name of the adapter that is being used to transmit the sACN signal must be labelled the same way on each of the servers in the network in order to connect properly.

Incorrect example:

```
Server A (Director) NIC B labeled "B - sACN 1Gbit"
Server B (Actor) NIC B labeled "B - Artnet 1Gbit" (NIC B will not receive DMX)
```

Correct example:

```
Server A (Director) NIC B labeled "B - sACN 1Gbit"
```

```
Server B (Actor) NIC B labeled "B - sACN 1Gbit"
```

ENTTEC

This is the protocol supported by the popular ENTTEC Datagate conversion devices.

SoundLight

This is a USB-based protocol communicating with DMX devices made by SoundLight Inc.

EzDMX

This is a USB-based protocol communicating with Avolites EzDMX devices.

Kinet V1 and V2

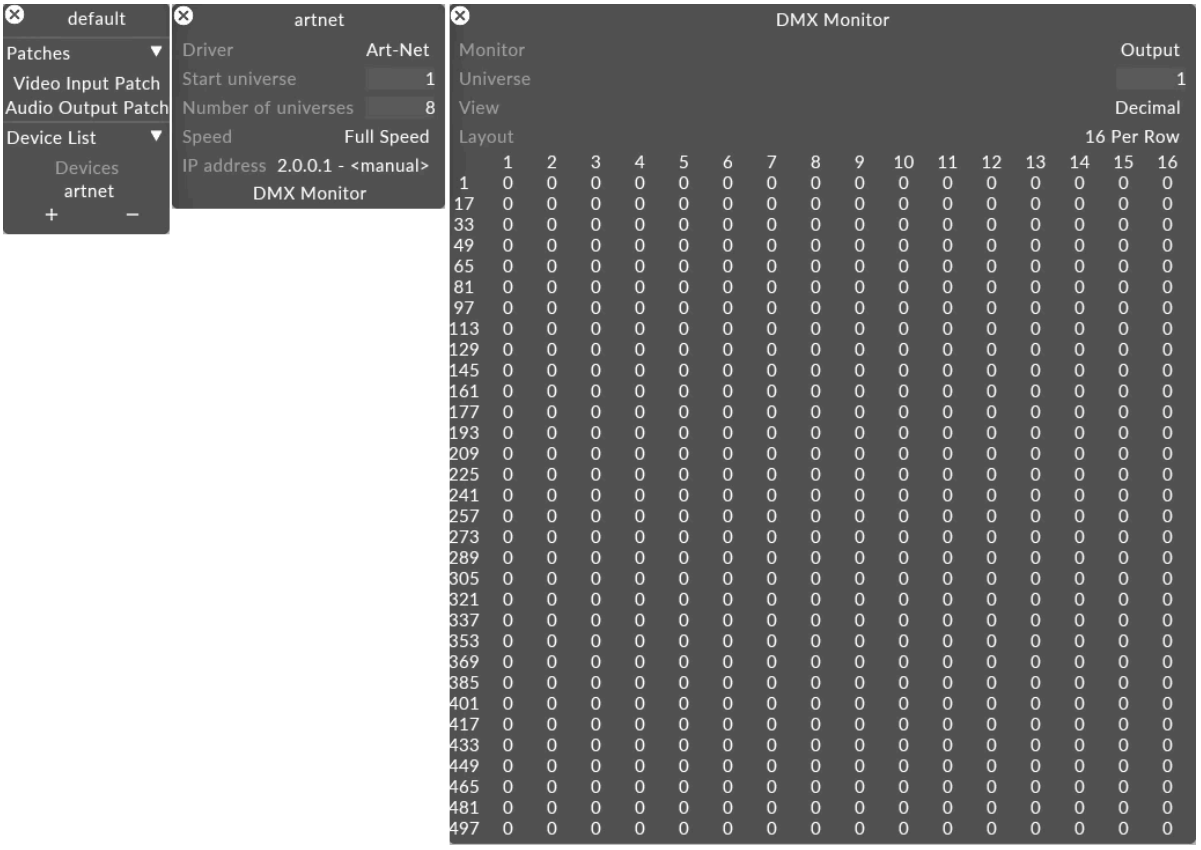
This is a lighting control protocol supported by Color Kinetics devices.

For this example:

- Select **Art-Net** from the list of driver converter types.
- Left-click **IP-address** to open the IP address editor. Ethernet-based protocols (Art-Net, ENTTEC, WENDI) identify each physical device with a different IP address. This property has no function for USB-based protocols (SoundLight, EzDMX).
- Left-click **Manual address** to open the **Select Remote Node** window and type in the IP address of the device. In this example, the IP address for a GrandMA lighting desk is being typed in.
- Left-click **OK** when you have finished typing in the IP address.
- Type in the **start universe** value; universe numbers always start from 1. The **start universe** property specifies the first universe number of the device. Designer makes an arbitrary number of DMX universes available to you and maps ranges of universes to individual DMX converter devices. This number specifies the universe number of the first universe mapped to this device.
- Type in the **universes** value. This specifies the number of universes to be mapped to the DMX device. In the example above, universes 1 through 8 are mapped to the Art-Net device located at 10.0.0.83.

Prove DMX input/output

1. Open the DMX monitor by left-clicking DMX monitor in the Device editor. The DMX monitor is used to prove DMX input and output, in this example for an Art-Net device.



DMX monitor is used to prove DMX input and output, opened by left-clicking DMX Monitor from the DmxDevice editor

2. Type in the universe value to prove DMX input on that specific universe.
3. Left-click on **Monitor** to change the value from Output to Input.
4. Check if the values are coming into Designer.

Art-Net Driver

The **Art-Net Driver** enables Disguise to send and receive DMX-style control data over IP using the **Art-Net protocol**. Art-Net is one of the most commonly used lighting network standards and provides a flexible way to manage large numbers of DMX universes across Ethernet-connected devices.

Disguise uses the Art-Net Driver whenever DMX values need to be transmitted to lighting fixtures, media servers, or automation hardware, or when external systems need to control parameters within Designer.

Uses

Use the Art-Net Driver when your show requires:

- DMX output from Disguise to lighting fixtures, dimmers, LED controllers or automation gateways.
- DMX input from lighting desks to control layers or drive parameters in Designer.
- Integration with lighting networks where Art-Net is the primary protocol.
- Routing DMX universes over IP, reducing cabling and simplifying show distribution.
- Synchronisation between media and lighting, allowing lighting desks to control timeline elements.
- Testing or visualising DMX data coming from or going to external equipment.

Art-Net Broadcast

To send Art-Net data using **broadcast**, set the Remote IP of the device to the **broadcast address** of the network.

Example: If a device has:

- IP: **2.0.0.1**
- Netmask: **255.0.0.0**

Then the broadcast address is:

- **2.255.255.255**

Broadcast sends data to all devices on the network segment.

Use this only when required, as it can increase network load in busy environments.

Art-Net IP Address Filtering

Disguise now uses **strict IP filtering** for Art-Net (and sACN) to allow more precise layering of DMX data.

This means:

- Disguise **only listens to the specific IP address** configured in the Remote IP field.
- It no longer automatically listens to the entire subnet.
- You must specify either:
  - the **correct unicast address**, or
  - the **broadcast address** if using broadcast mode.

This improves reliability in multi-source DMX networks and prevents accidental data conflicts.

Driver Properties

Port

The UDP port for Art-Net communication (typically **6454**).

This should match the configuration of any connected Art-Net device.

Remote IP

The IP address from which Disguise will accept Art-Net data.

- Use a **specific device IP** for unicast.
- Use the **network broadcast address** if broadcasting.
- Required due to Disguise's strict IP filtering behaviour.

Universe Assignment

Specifies which Art-Net universe Disguise will use for DMX input or output.

Art-Net supports up to **32,768 universes** (Net / Subnet / Universe format).

Mode

Determines whether the driver is outputting DMX, receiving DMX, or disabled.

- **Output** — Disguise sends Art-Net
- **Input** — Disguise receives Art-Net
- **Disabled** — No DMX activity

Broadcast / Unicast Setting

Defines whether Art-Net packets are transmitted:

- **Broadcast** — to all devices in the network segment
- **Unicast** — to a single destination IP

Unicast is recommended for large or complex networks.

Developer Documentation

Enttec Driver

The **Enttec Driver** allows Disguise to receive automation or control data from Enttec-compatible devices.

This driver is commonly used in workflows where Enttec hardware is transmitting DMX or serial-based values that need to be interpreted and applied within Disguise. These values can be used to drive automation axes or provide real-time parameter control.

In most setups, the default driver settings provide reliable operation. Adjustments should only be made when your Enttec device or network is configured differently, or when troubleshooting communication issues.

Uses

The **Enttec Driver** is used whenever DMX data from an Enttec device needs to influence automation behaviour inside Disguise. By reading raw DMX values from a connected controller, the driver allows lighting desks, faders, and hardware interfaces to control parameters or movement in real time.

This driver is especially useful when:

- Connecting an Enttec DMX USB Pro or Enttec DMX-over-Ethernet device to Disguise.
- Driving automation axes using DMX values.
- Driving behaviours or presets from a lighting console.
- Testing or monitoring DMX input from Enttec hardware.
- Integrating small-scale, low-cost DMX controllers into interactive workflows.

Driver Properties

> **Note**
>
> Enttec devices primarily supply DMX values. Unlike position-tracking drivers, they do not expose specialised properties, just the basic input configuration required to receive DMX correctly.

Port

Specifies the Enttec device or interface port being used for DMX input.

This determines which connected Enttec unit the driver listens to.

Universe

The DMX universe being read from the Enttec device.

Channel

The starting DMX channel where the incoming value will be read.

Additional channels may be read depending on how many bytes your automation mapping requires.

Input Mode

Determines how the incoming DMX bytes are interpreted—for example:

- **Single Channel** (0-255)
- **2-byte value**
- **4-byte value**

(Available modes may vary depending on the Enttec device used.)

Developer Documentation



ezDMX Driver

The **ezDMX Driver** enables Disguise to receive DMX-based positional or control data using the ezDMX protocol.

This driver is typically used when integrating DMX-driven automation sources that transmit multi-channel values requiring interpretation inside Disguise.

In most configurations, the default driver settings offer reliable operation.

Adjust the settings only if your ezDMX device or network requires specific port, channel, or addressing changes.

Uses

This driver is especially useful when:

- Integrating ezDMX-compatible devices that transmit positional or movement data.
- Receiving DMX values from lighting desks or controllers that use ezDMX format.
- Driving automation axes or parameters using direct DMX input.
- Testing and monitoring DMX streams during installation or calibration.
- Using cost-effective DMX controllers in smaller or decentralised automation setups.

The driver provides a straightforward way to convert incoming DMX channels into meaningful numerical values that Disguise can use in real-time workflows.

Driver Properties

Universe

The DMX universe from which data is received.

Channel

The starting DMX channel containing the value to be interpreted.

Port

Specifies the ezDMX device or network port used as the data source.

Input Mode

Determines how many DMX bytes are read and how the value is formed.

Examples may include:

- Single Channel
- 2-byte value
- 4-byte value

(Exact modes displayed depend on the ezDMX hardware in use.)

Developer Documentation

KiNET v1 Driver

The **KiNET v1 Driver** enables Disguise to receive data from devices that communicate using the **KiNET Version 1 protocol**.

KiNET is commonly used by lighting and LED control hardware to transmit real-time control or positional information over an IP network.

This driver allows Disguise to interpret incoming KiNET v1 messages and use them within automation or control workflows.

In most configurations, the default driver settings are appropriate, and changes are only required when working with custom port assignments, IP restrictions, or specific network topologies.

Uses

Use the KiNET v1 Driver when integrating lighting or LED control systems that transmit control data using the KiNET Version 1 protocol. This driver allows Disguise to receive structured KiNET messages and convert them into automation or control values that can influence content, behaviours, or visual logic inside a project.

This driver is especially useful when:

- Receiving real-time lighting control data from fixtures or processors using KiNET v1.
- Synchronising LED system states or parameters with media playback or automation in Disguise.
- Building interactive experiences where lighting hardware influences virtual content.
- Monitoring KiNET traffic during setup or troubleshooting.
- Bridging lighting and media workflows for tightly coordinated installations.
- Working with legacy or KiNET v1-only controllers still used in permanent or touring systems.

As KiNET v1 is widely adopted in LED and lighting infrastructure, the driver offers a reliable way to connect physical lighting behaviour to real-time media systems.

Driver Properties

Port

The port number the automation data is coming in on.

IP Filter

The remote IP that the data is coming in on (optional).

Multicast Address

The multicast address the data is coming from (optional).

Developer Documentation



KiNET v2 Driver

The **KiNET v2 Driver** allows Disguise to receive data from devices that use the **KiNET Version 2 protocol**.

KiNET v2 is widely used in advanced lighting and LED control systems to transmit structured control data over IP networks.

This driver enables Disguise to interpret incoming KiNET messages and convert them into usable automation or control values.

In most setups, the default configuration is sufficient unless your lighting controller or network infrastructure uses custom port or addressing settings.

Uses

Use the KiNET v2 Driver when integrating lighting or LED control systems that transmit data using the KiNET Version 2 protocol. This driver allows Disguise to receive and interpret KiNET messages as automation or control values, enabling tight synchronisation between lighting systems and real-time media or virtual environments.

This driver is especially useful when:

- Receiving real-time control data from lighting consoles, LED processors, or media servers that output KiNET v2.
- Synchronising lighting system states with content or automation inside Disguise.
- Monitoring KiNET data streams to drive effects or interactive elements.
- Bridging lighting data into Disguise workflows for media-light integration.
- Creating installations where lighting positions, intensities, or parameters influence generative or reactive content.
- Testing or validating KiNET network output in controlled environments.

As KiNET v2 is IP-based and supports structured, high-throughput messaging, the driver is suitable for productions requiring precise coordination between lighting and visual content.

Driver Properties

Port

The port number the automation data is coming in on.

IP Filter

The remote IP that the data is coming in on (optional).

Multicast Address

The multicast address the data is coming from (optional).

Developer Documentation

sACN Driver

The **sACN Driver** allows Disguise to transmit and receive DMX data using the **Streaming ACN (E1.31)** protocol. sACN is a widely used, network-based lighting control standard that supports large channel counts and multiple universes over Ethernet.

Disguise systems use the sACN driver whenever DMX data needs to be shared with lighting consoles, media servers, or other devices that support the E1.31 protocol.

Uses Notes

Use the sACN Driver when your workflow involves:

- **Sending DMX values** from Disguise to lighting desks, fixtures, media servers, or stage automation receiving sACN.
- **Receiving DMX control** from lighting consoles to drive parameters, timelines or triggers inside Disguise.
- **Synchronised multi-universe output**, ensuring all connected systems update simultaneously.
- **Redundant or multi-source DMX environments**, where packet priority can decide which device controls output.
- **Lighting, projection, or show-control networks** that rely on a unified DMX-over-IP protocol.

sACN is particularly suitable for productions requiring scalable DMX output, network efficiency, and sync-safe delivery across many devices.

Driver Properties

Force Synchronisation

When enabled, Disguise will wait for sACN synchronisation packets before updating any DMX values.

If synchronisation stops, receivers will continue holding their last valid state even after the usual 2.5s timeout.

Use this when working in **fully synchronised lighting networks** where frame-accurate updates are required.

Priority

Defines the DMX packet priority when multiple sACN sources send data to the same universe.

Higher values take precedence.

Useful in systems that include **fallback, backup consoles, or layered DMX control**.

Sync Address

The sACN universe number used for synchronisation messaging.

When a sync packet is received on this universe, Disguise will apply buffered updates to all relevant universes.

Enable Synchronisation

When enabled, Disguise sends an sACN sync packet at the end of each DMX frame.

This ensures all receivers update **simultaneously**, reducing visible stepping or lag.

Sync Packet Delay

The delay (in seconds) between finishing DMX output for a frame and sending the synchronisation packet.

This allows network traffic to settle before distributing the sync message.

Example: `0.02` sends the sync packet 20ms after DMX output completes.

Developer Documentation

SoundLight Driver

The **SoundLight Driver** allows Disguise to communicate with SoundLight DMX interfaces.

SoundLight devices are commonly used as compact DMX output or input nodes, enabling DMX data to be sent from or received into a Disguise system as part of a wider lighting or show-control workflow.

Use this driver whenever your production relies on SoundLight hardware for DMX connectivity, patching, or bridging between physical fixtures and the Disguise project.

Uses

The SoundLight Driver is typically used for:

- **Outputting DMX from Disguise** to lighting fixtures via a SoundLight interface
- **Receiving DMX control** from a lighting console or external controller
- **Integrating small or distributed DMX nodes** into larger networked lighting systems
- **Testing, monitoring, or routing DMX universes** in show workflows
- **Providing hardware-level DMX connectivity** for installations or compact production setups

SoundLight interfaces offer simple, reliable DMX-over-IP bridging, making them suitable for both small and large DMX deployments.

Driver Properties

Depending on the SoundLight device model and configuration, the driver may expose:

DMX Input / Output Mode

Defines whether the connected device is used to receive DMX into Disguise, output DMX from Disguise, or both.

Universe Assignment

Specifies which DMX universe the SoundLight interface will transmit or receive.

Device Address / Network Configuration

IP and network configuration for discovering and communicating with the SoundLight hardware.

Refresh Rate / Update Frequency

Controls how frequently DMX packets are transmitted when outputting from Disguise.

> **Note**
>
> Specific options may vary depending on the SoundLight hardware connected and firmware version in use.

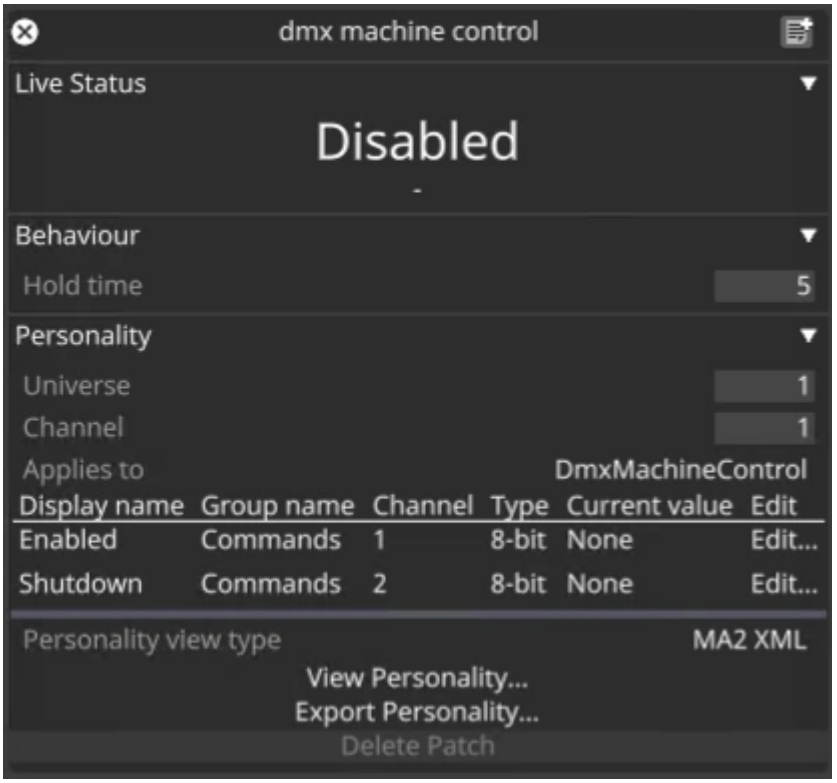
Developer Documentation

DMX Machine Control Device

The DMXMachineControl Device allows restart and shutdown commands to be sent to Designer from an external DMX device, such as a lighting console.

The DMXMachineControl Device is used for remote shutdown and restart of Disguise machines using DMX commands.

1. Create a DMX device from the Device Manager. See Creating Devices for more detailed information.
2. Create a **DMXMachineControl** Device.
   - Set the **Universe** and **Channel** values.
   - Configure the command and personality ranges to suit personal preference, or use the default settings.
3. Export the personality to the lighting console in either .txt, GDTF or MA2 XML format from the Export tab of the device.
   - The exports will be written to the output folder of the project folder.
4. Send values from the lighting console to remotely trigger a machine restart or shutdown.



Live Status

Monitors the status of DMX commands being received.

Behaviour

Hold Time

The Hold time, specified in seconds, defines how long Designer will wait before acting on a Restart or Shutdown command.

Personality

Universe

The Universe property defines the Universe number that the commands will come from.

Channel

The Channel property defines the Channel number that the commands will come from.

Enable Channel

The Enable channel defines which DMX channel will send the Enable command to the Disguise machine — this allows the command to be triggered. The enabled range can be viewed and edited by clicking on the **Edit...** button on the Enabled row.

Shutdown Channel

The Shutdown channel defines which DMX channel will send the shutdown command to the Disguise machine. The Idle, Restart, and Shutdown ranges can be viewed and edited by clicking on the **Edit...** button on the Shutdown row.

Personality view type

Here, we can select whether to view and export the personality as a GDTF file, a text-formatted chart, or a (deprecated by MA) MA2 XML file.

View Personality

Opens a window displaying the personality with the chosen Personality view type.

Export Personality

Exports the personality as a file with the chosen Personality view type.

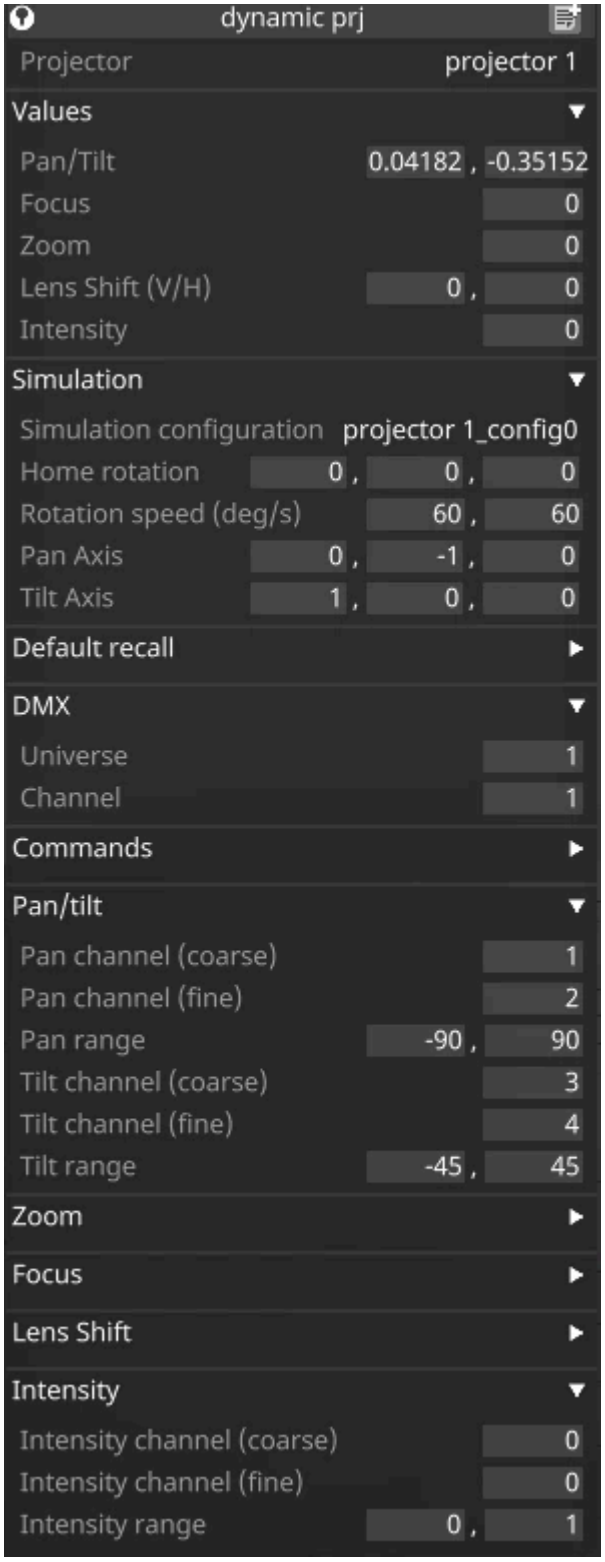
DMX Projector Control Device

The DMX Projector Control Device is intended for controlling external devices via DMX while optionally simulating their behaviour inside the visualiser.

Projector control can be simulated as well as output to real projectors. The intention is to be able to recall presets for the projectors that contain pan/tilt, zoom, focus, lens shift, intensity and projector configuration objects (for recalling different calibration states).

Workflow

1. Create a DMX device from the Device manager — see DMX Device for details.
2. Create a **DmxProjectorControlDevice**.
   - Set the Universe and Address values.
   - Configure the command and personality ranges to suit personal preference, or use the default settings.


dynamic prj
Projector
projector 1
Values
Pan/Tilt
0.04182 , -0.35152
Focus
0
Zoom
0
Lens Shift (V/H)
0 , 0
Intensity
0
Simulation
Simulation configuration
projector 1_config0
Home rotation
0 , 0 , 0
Rotation speed (deg/s)
60 , 60
Pan Axis
0 , -1 , 0
Tilt Axis
1 , 0 , 0
Default recall
DMX
Universe
1
Channel
1
Commands
Pan/tilt
Pan channel (coarse)
1
Pan channel (fine)
2
Pan range
-90 , 90
Tilt channel (coarse)
3
Tilt channel (fine)
4
Tilt range
-45 , 45
Zoom
Focus
Lens Shift
Intensity
Intensity channel (coarse)
0
Intensity channel (fine)
0
Intensity range
0 , 1

Properties

Projector

The virtual projector object in the visualiser.

Values

Pan/Tilt, Focus, Zoom, Lens Shift (V/H), Intensity: the current values being sent to the external device. Modifying these values will cause the device to send out commands to the external device.

Simulation

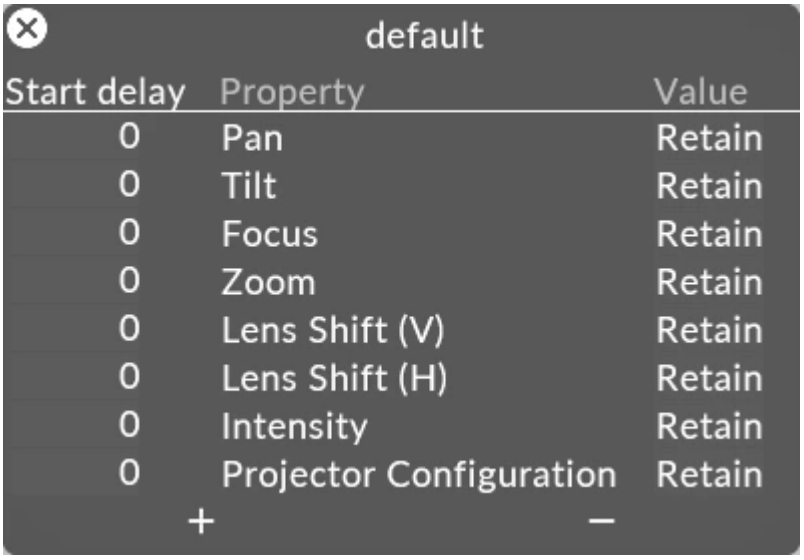
- **Simulation configuration** - the projector configuration that the device modifies to simulate the behaviour of the external device. Always use a dedicated projector configuration for this as its settings will be overwritten by the simulation.
- **Home rotation** - the starting rotation when the device's pan/tilt are at zero.
- **Rotation speed** - the animation speed of rotation between different pan/tilt values.
- **Pan axis** - the axis controlled by the pan value.
- **Tilt axis** - the axis controlled by the tilt value.

Default recall

- **Recall** - the default order of the commands sent to the device. This allows delays between starting the pan/tilt, focus, zoom and other actions.

For example, you may want to delay intensity moves for a set period of time to allow zoom, focus and position to be set before the projector is visible. The delay value is expressed in seconds.

The editor is capable of multi-edit functionality, so does not behave in the same way as a normal editor. See multi-edit for more information.



DMX

Universe and channel of the external DMX device.

Commands

- **Default commands** - DMX commands sent to the DMX device for each action in addition to the specific actions' DMX commands.
- **Startup commands** - DMX commands sent to the DMX device when the projector control device is started or added to the device manager.
- **Shutdown commands** - DMX commands sent to the DMX device when the projector control device is stopped or removed from the device manager.

Common properties

Coarse and fine channels for each projector control action. The range will be used to map the current value to a 16-bit DMX value. A channel of 0 will disable that slot.

Zoom

Focus

Lens Shift

Intensity

Dynamic Projection Integration

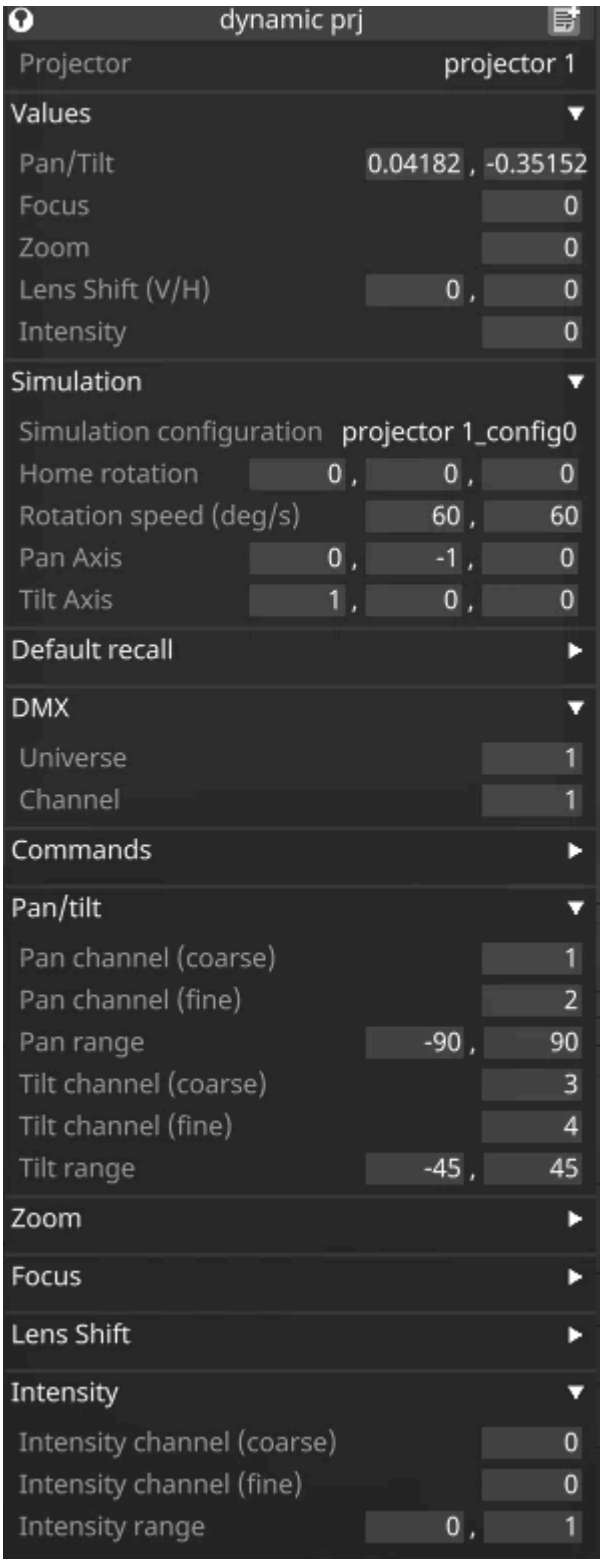
The DmxProjectorControlDevice can be used for controlling moving mirrors and projector yokes using the following steps:

1. Add an Art-Net device to your scene and set it up accordingly for universe etc.



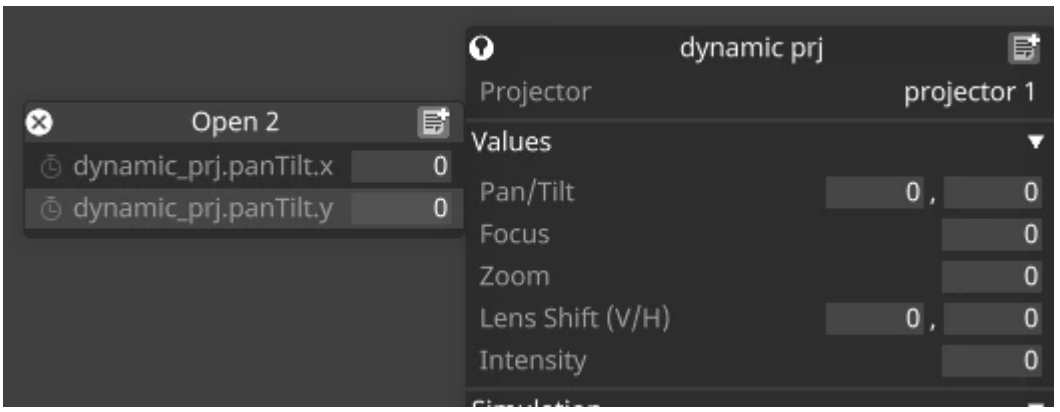
2. Set up the dynamic mirror unit following the recommended settings from the manufacturer and assign Universe and Start Address for Art-Net control.
3. Add a projector to your scene.
4. Add a **DmxProjectorControlDevice**.
5. Set the DMX for the Universe and DMX start channel for your chosen device.
6. Set the Pan/Tilt DMX addresses — for example on a unit with start address 1, the settings are as below in the image.
7. Assign your projector to the simulation configuration.
8. Assign the projector and set the rotation speed deg/s.

9. When the unit is in Normal mode the settings for pan and tilt ranges are as follows:



The unit does have an extended mode which is a total of 160 degrees of tilt.

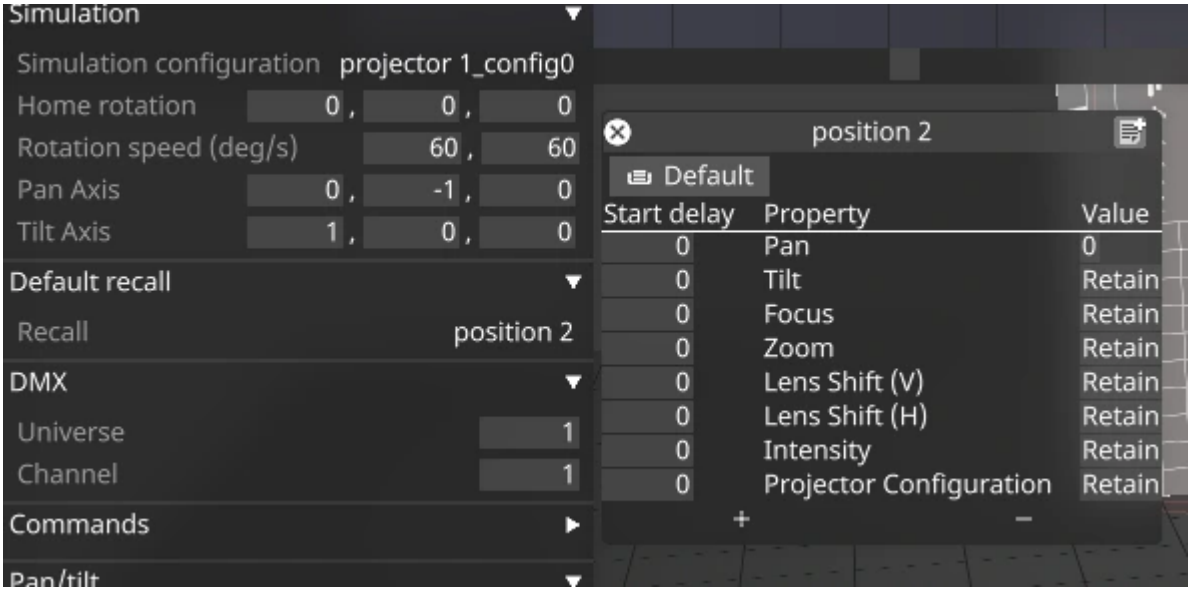
10. Using a Control layer you can keyframe values:



Position Recall

You can save positions by creating a position:

1. Right-click the Recall field and create a new position.
2. In the GUI window that opens, enter values in the value column.
3. This Default recall can then be linked to an open layer and the positions recalled on the timeline.

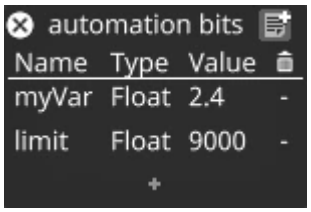


Expression Variables Device

The ExpressionVariables device defines variables for use in expressions which are made available to the vast majority of the locations expressions can be used.

Each ExpressionVariables device is used to define a group of variables. It is expected that the device is used to group the variables to be used for different purposes.

Using the ExpressionVariables device



Variables are presented in a list format for editing within the device. Users press the + button to add a new variable, and every row has a - button at the end to remove the variable from the device.

Variables must be named correctly (see variable naming) and have the desired type selected before the desired value for the variable can be entered.

Value ranges

It is possible to edit the range and granularity of `Float` type variables in the device. To do this, right-click on the value to bring up a MetaField. Altering the MetaField allows the user to change how the value is edited within Designer.

Arranging variables

The variables defined in the device can be rearranged by left-mouse dragging the rows in the device up or down. This allows variables to be reordered to improve readability or because some variables may depend on others, and need to be defined in a specific order.

Using variables defined by the device

Variables defined by the ExpressionVariables device are valid for use in devices which appear later (further down) in the device manager devices list, and become invalid if the device is not

present in the active device manager. They are available everywhere else that expressions are accepted.

GrpcReceiver Driver

The **GrpcReceiver Driver** enables Disguise to receive automation or tracking data over **gRPC**, a modern, high-performance communication protocol commonly used for real-time systems.

This driver allows external applications or services that expose gRPC endpoints to stream structured data directly into Disguise, where it can be used to drive automation, positional values, or other dynamic behaviours.

This method is particularly useful when integrating custom software tools, middleware, or services that require efficient, low-latency communication with Disguise.

In most cases, the default driver configuration provides reliable operation, but settings may require adjustment depending on the gRPC server implementation or network setup.

Uses

The **GrpcReceiver Driver** is ideal for scenarios where structured, low-latency data needs to flow from custom software into Disguise. It provides a flexible way to integrate bespoke control systems, middleware, or data services using modern streaming communication.

This driver is especially useful when:

- Integrating custom-built tools or applications that output gRPC telemetry.
- Receiving tracking or automation values from real-time services.
- Streaming structured parameter data into Disguise for interactive or adaptive workflows.
- Building installations where high-frequency, low-latency data updates are required.
- Prototyping or testing new control systems without needing DMX, FreeD, or hardware-based protocols.
- Connecting cloud or local services to drive automation behaviour in real time.

As gRPC supports structured message types, it is well suited to transmitting multiple parameters or data fields in a single, efficient stream.

Driver Properties

Port

The port number on which the driver listens for incoming gRPC connections.

This must match the output configuration of the gRPC server.

IP Filter

(Optional) Limits accepted connections to a specific IP address.

Useful when multiple services operate on the same network or when isolating trusted sources.

Service Definition / Message Format

Determines the structure of the incoming gRPC messages.

This is defined by the gRPC server and must match the expected format used by the driver.

Connection Mode

Specifies whether the driver should accept a single connection or multiple connections, depending on workflow requirements.

Timeout Settings *(if exposed)*

Defines how long the driver should wait for data before considering the connection inactive.

Used mainly for troubleshooting or ensuring consistent behaviour in unstable networks.

Developer Documentation

Test Receiver Driver

The **Test Receiver Driver** is a diagnostic and development tool used within Disguise to simulate incoming automation or positional data. It behaves like a standard screen position receiver, allowing users to test automation behaviour, axis mapping, and content responses without requiring a live hardware controller or third-party automation system.

This driver is typically used during development, troubleshooting, or training where synthetic motor or axisdata is helpful for validating a workflow.

Uses

Use the Test Receiver Driver when you need to:

- Simulate automation data without a physical device.
- Verify how Disguise maps motor or axis channels.
- Test content behaviour as if real automation were connected.
- Train operators on automation workflows in a safe, offline environment.
- Debug timelines and conditional logic that depend on automation input.
- Prototype automation-driven interactions before hardware arrives on site.

As it emulates the behaviour of a real receiver, the Test Receiver Driver is ideal for early-stage development or internal testing.

Driver Properties

Number of Motors

Specifies how many simulated motors or axes the driver should expose.

Each motor behaves like a standard automation channel inside Disguise, allowing users to test mapping, logic, and motion-driven content.

Developer Documentation

UDP Receiver Driver

The UDP Receiver Driver provides a simple way for Disguise to ingest raw data sent via UDP. It is commonly used for lightweight custom integrations, device triggers, telemetry streams, or any workflow where external systems broadcast or multicast small packets of information.

Uses

Use the UDP Receiver Driver when you want to:

- Receive custom UDP messages from third-party devices or scripts.
- Listen for broadcast or multicast data on the network.
- Filter incoming packets by sender IP.

Driver properties

Port

The UDP port the driver listens on for incoming data.

This must match the port configured on the device or system sending the UDP packets.

IP Filter

An optional network filter that limits incoming data to a specific sender IP address.

Use this when multiple devices are active on the network and you want to ensure only one source is accepted.

Leave blank to allow data from any IP.

Multicast Address

The multicast group the driver should subscribe to when receiving multicast UDP traffic.

Only required when your workflow involves multicast delivery, leave blank for standard broadcast or unicast setups.

Developer Documentation

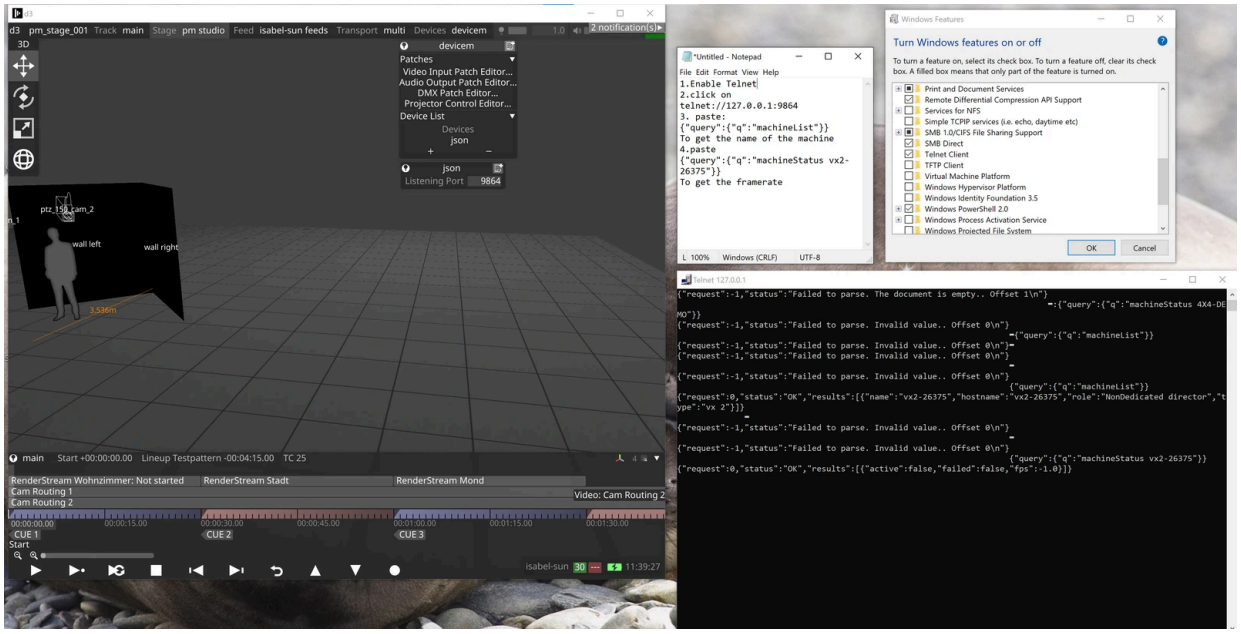
JSON Machine Control Device

JSONMachineControl Device allows for the querying of machine list and machine status via JSON.

Telnet setup

A JSONMachineControl Device requires the use of Telnet. Follow these steps to properly configure the Disguise server for Telnet communication:

1. Enable Telnet by navigating to **Control Panel > Programs > Turn on Windows Features > Telnet Client**.
2. Click on the link **telnet://127.0.0.1:9864**.
3. To get the name of the machine, enter: `{"query":{"q":"machineList"}}`.
4. To get the framerate, enter: `{"query":{"q":"machineStatus hostName"}}`.



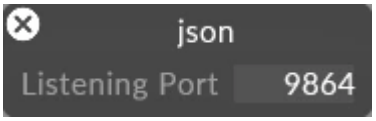
Using Live framerate is recommended. The following Python script can be used to retrieve the Live framerate:

```
import json
from telnetlib import Telnet
from socket import gethostbyaddr
hostIP = "127.0.0.1"    # stick the server IP here
port = 9864
host_name = gethostbyaddr(hostIP)
print(f'd3 name is: {host_name[0]}')
q = '{"query":{"q":"machineStatus ' + host_name[0] + '"}}'
print(f"sending - {q.encode('ASCII').decode('ASCII')} -  to {host_name[0]}")
def readFPS():
    with Telnet(hostIP, port) as tn:
        tn.write(q.encode('ASCII') + b'\r\n')
        buf_as_dict = json.loads(tn.read_until(b"}]}"))
    return buf_as_dict['results'][0]['fps']
if __name__ == '__main__':
    while True:
        fps = readFPS()
        print(fps)
```

Creating a JSONMachineControl Device

A **JSONMachineControl device** is created in the same way as any other device type. See Creating Devices for step-by-step instructions on how to create a device, then select **JSONMachineControl** from the menu of different device types. This will open the device editor (explained below).

JSONMachineControl Device properties



Listening Port

The TCP port the device listens on for incoming Telnet queries. Defaults to **9864**.

JSONMachineControl queries

Machine list: `{"query":{"q":"machineList"}}`

Returns a list of dictionaries containing information about each machine: d3 name, hostname, role, and machine type.

Example return:


```
{"request":0,"status":"OK","results":[{"machine":"4x4-DEMO","hostname":"4X4-DEM
O","role":"Dedicated director","type":"4x4pro"}]}
```


Machine status: `{"query":{"q":"machineStatus 4X4-DEMO"}}`

Returns extra information about a machine: session status, failover status, and current FPS.

Example return:


```
{"request":0,"status":"OK","results":[{"active":true,"Failed":false,"fps":32.345
558166503909}]}
```

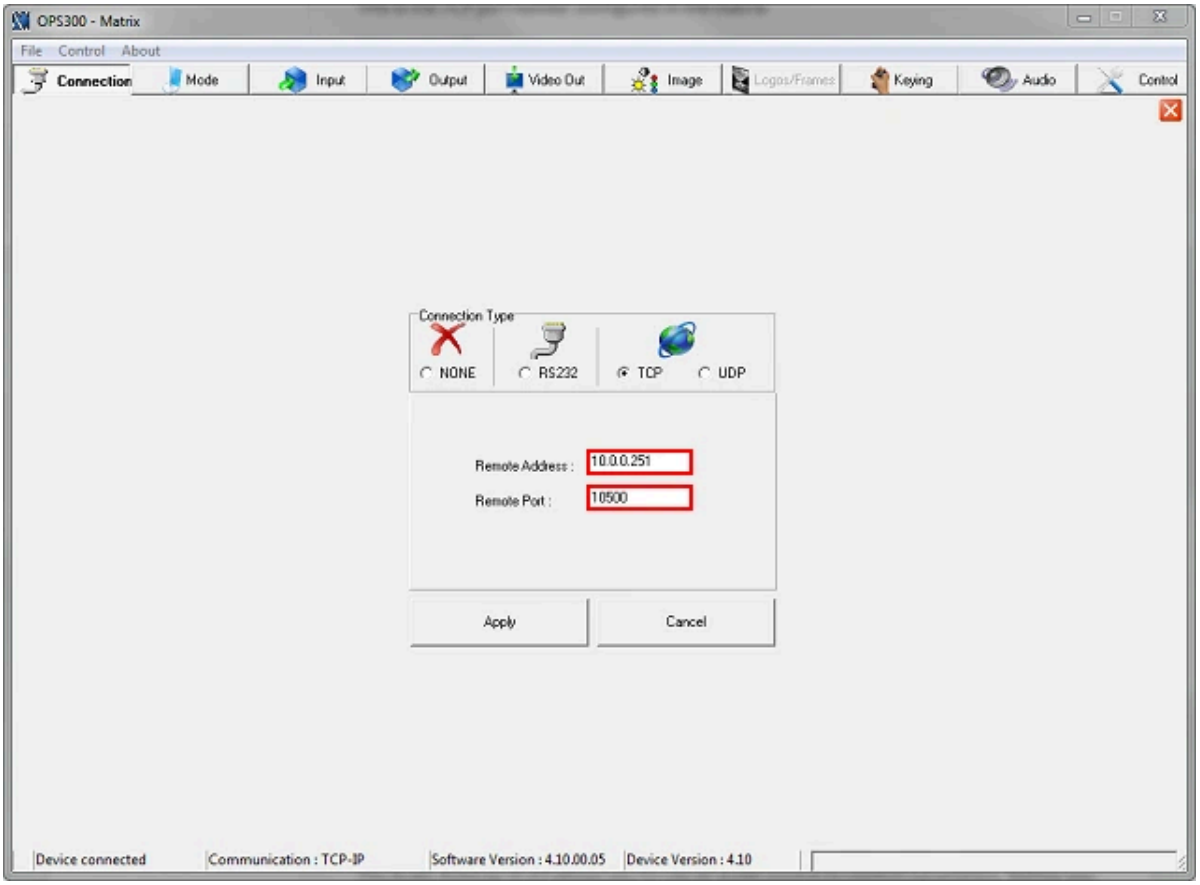
Analog Way OPS300 Matrix Setup

In Designer, the Analog Way OPS300 matrix device supports routing control for the Analog Way OPS300 switcher.

The Analog Way OPS300 is a multi-layer mixer, scaler, and seamless switcher designed for professional audio-visual (AV) environments. It offers seamless switching between digital and analog sources, multiple live effects like picture-in-picture (PiP) and keying, and flexible output options. It can be configured in a **Multi-Layer Mixer** mode for live shows or a **Seamless Native Matrix** mode, supporting up to six layers of content simultaneously.

Setting up an Analog Way OPS300

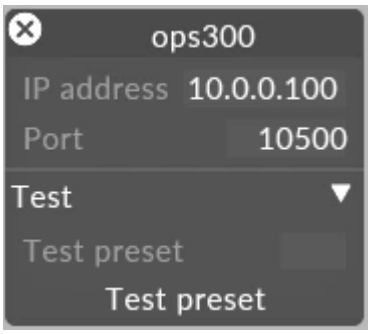
1. Navigate to the **Network Settings** page of the Analog Way OPS300 interface. Note down the **Remote Address** and **Remote Port** numbers used or set your own. Please see your device manual for more instructions.



2. Note down the Remote Address and Remote Port numbers used or set your own from the Analog Way OPS300 Network Settings page
3. Set the matrix to be in the same IP range as the system.

4. In Designer, create an **AnalogWayOPS300** device. An AnalogWayOPS300 device is created in the same way as any other device type. Please see Creating devices for step-by-step instructions on how to create a device, and select **AnalogWayOPS300** from the menu of different device types. This will open the AnalogWayOPS300 device editor.
5. Configure the AnalogWayOPS300 device editor by referring to the device properties below.

AnalogWayOPS300 device properties



AnalogWayOPS300 device editor

IP address

The IP address of the matrix.

Port

The TCP port number configured in the matrix. Defaults to **10500**.

Test preset

The test preset number

Test

This button will set the matrix to the preset set in the **test preset #** property.

Barco MatrixPro Setup

Barco MatrixPro is a line of professional video matrix switchers that route digital and analog video signals. It can either be controlled via Serial or TCP-IP. If creating a Serial Device it will take priority over the IP configuration.

Setting up a Barco MatrixPro

- In Designer, create a **BarcoMatrixPro** device. A BarcoMatrixPro device is created in the same way as any other device type. Please see the Creating devices section for step-by-step instructions on how to create a device, and select **BarcoMatrixPro** from the menu of different device types. This will open the BarcoMatrixPro device editor.

Serial control

- In the **Port** property create a new **SerialDevice**. Use the same process as that for creating the BarcoMatrixPro device, but select **SerialDevice** from the menu of different device types. If creating a Serial Device, it will take priority over the IP configuration.

TCP-IP control

1. Configure the Barco MatrixPro to the same IP network as the Director/Actor network.
2. Configure the BarcoMatrixPro device editor by referring to the device properties below.

BarcoMatrixPro device properties



BarcoMatrixPro device editor

Port

The TCP (Telnet) port to send commands on. Defaults to **23**.

IP address

The IP address of the matrix.

Test preset

The test preset number.

Test

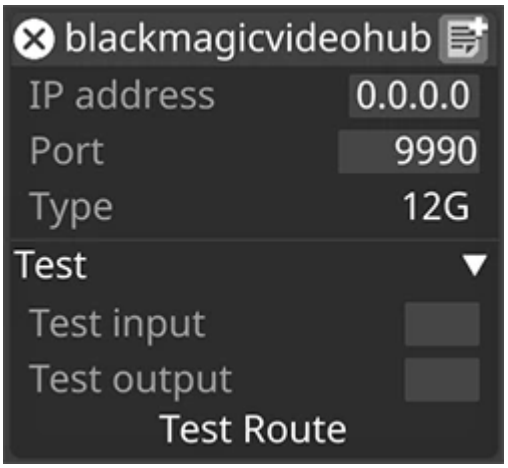
This will set the matrix to the preset set in the **test preset** property.

Blackmagic Smart Videohub Setup

The Blackmagic Smart Videohub is used within a Disguise workflow as an external video router or matrix switch that allows the Disguise media server to electronically switch between multiple SDI video sources and direct them to different destinations (screens, recorders, LED processors, etc.) without manually re-cabling.

Blackmagic Videohub models 3G, 6G and 12G are all supported.

Options



IP address

The IP of the target Blackmagic Smart Videohub to interact with through this device.

Port

The port of the target Blackmagic Smart Videohub to interact with through this device.

Type

Whether the target Blackmagic Smart Videohub model is 3G-SDI or 12G-SDI. If it is a 6G-SDI model then setting this setting to 3G will yield the expected behaviour.

Using a Blackmagic Smart Videohub for failover in a Director and Understudy setup

1. Add a **BlackmagicVideoHubMatrix**.

2. Add the IP address and port number.
3. Test the routing working by entering an input/output routing.
4. In d3Net Manager, assign the Director and Understudy.
5. Then assign the patch accordingly in the **matrix inputs**.
6. On Failover, this will switch the device routing as specified.



Known issues and workarounds in older versions of Designer

Use the tabs below to find out the expected working behaviour for the various previous versions of Designer as well as any workarounds possible.

- Upgrading to r32.2 and newer
- r27.2.2 to r32.1.3

- r26.2.2 to r27.2.1
- r26.2.1 and older

When upgrading a project from a version that has the option switch available (r27.2.2 to r32.1.3) Designer will attempt to upgrade existing `BlackMagicVideoHubMatrix` devices smartly. This means that if:

A project has got the option switch set to `10`

All existing devices will automatically have their type set to 12G.

A project has got the option switch set to `0` (default)

All existing devices will automatically have their type set to 3G.

But all new devices will still default to 12G.

Direct Matrix Routing

What is Direct Matrix Routing?

Designer supports direct matrix routing, which sends individual routing instructions ("map input X to output Y") to the matrix. Designer allows multiple matrix devices to be controlled, and allows fanout (a single feed output can be mapped to more than one physical output, for backup).

When a feed is assigned to a machine, Designer generates an appropriate set of routing instructions and sends this to all connected matrix devices.

Using Direct Matrix Routing

To set it up, you need to tell two things:

- For each machine, which matrix input each physical head connects to.
- For each feed, which matrix output(s) drive each feed head.

When a feed is assigned to a machine, Disguise generates an appropriate set of routing instructions and sends this to all connected matrix devices.

Setting up Direct Matrix Routing

1. Add one or more matrix devices to your Devices list and set them up appropriately. Note that the order these devices are in the **Device Manager** is what defines them as Matrix 1, Matrix 2 etc. You can drag matrices up & down in the Device Manager to re-order them.
2. Access your feed scene by left-clicking **Feeds** from the dashboard.
3. Right-click the coloured border of a feed output.

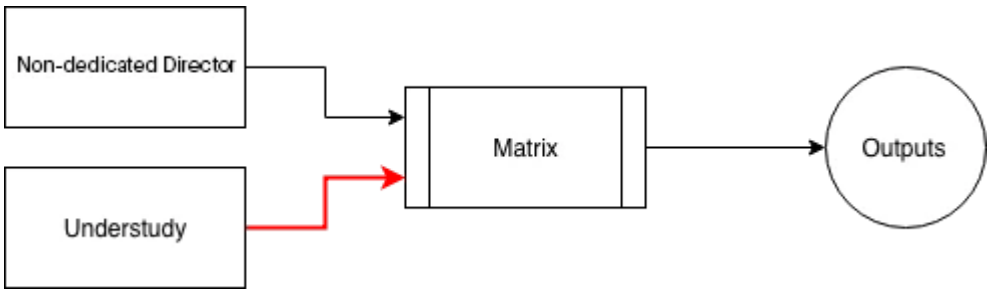
4. For the Matrix input & Matrix output parameter, write in a comma-separated list of (matrix number, input number),eg. “1.1,1.2” means “outputs 1 and 2 of matrix 1”.



> **Warning**
>
> There should be no spaces between matrix routing strings, except around the pipe `|` operator where they are required. Any other spaces in the input field will cause the routing to fail.

For more information on supported DVI matrices, see the Matrix switches overview.

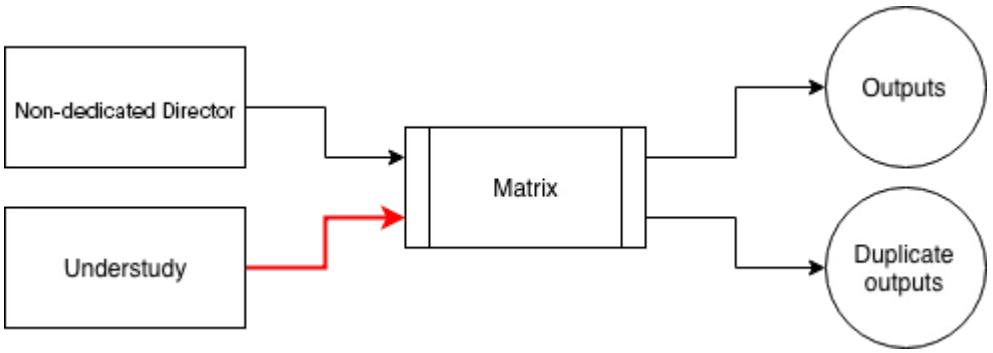
Basic routing example



Machine	Routing	Routing	Routing	Routing
Director In	1	2	3	4
Director Out	1	2	3	4
Understudy In	5	6	7	8

This is the easiest configuration to work with. In its most basic form, matrix routing will use a single matrix to swap the inputs on failover. This notation is as simple as typing each input and output number into the feed properties of each machine. This matrix is using a 1-to-1 routing, and on failover inputs 5-8 are used to receive from the Understudy.

Matrix DA routing example

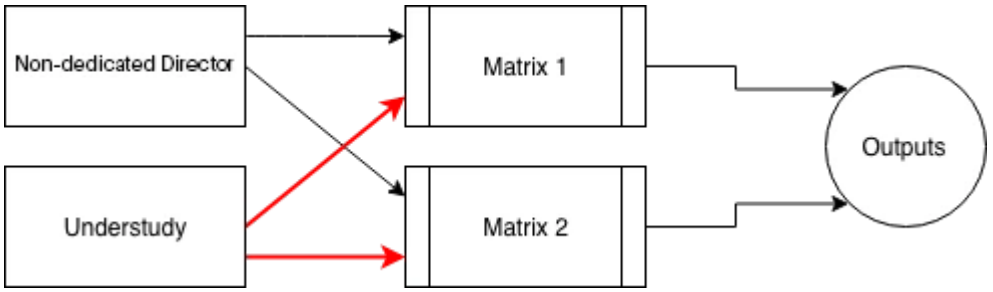


Machine	Routing	Routing	Routing	Routing
Director In	1	2	3	4
Director Out	1,5	2,6	3,7	4,8
Understudy In	5	6	7	8

In this example, each matrix output is doubled up and sending a duplicate output. In Designer the notation for this is to comma separate the output numbers. This example shows input 1

being sent to outputs 1 and 5, 2 to 2 and 6, and so on. On failover, 5 is routed to 1 and 5, etc. The comma only works in the output field of each routing

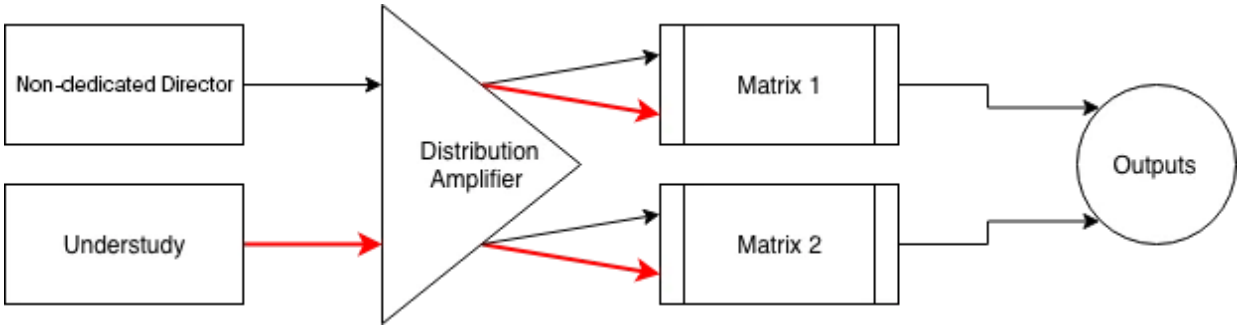
Multiple matrices routing example



Machine	Routing	Routing
Director In	1.1 1.2 1.3 1.4	2.1 2.2 2.3 2.4
Director Out	1.1 1.2 1.3 1.4	2.1 2.2 2.3 2.4
Understudy In	1.5 1.6 1.7 1.8	2.5 2.6 2.7 2.8

This is the same 1-to-1 routing as the first example, except doubled-up. The Director and Understudy each have 8 outputs, sending 4 of each to the 2 matrices. In order to delineate between the 2 matrices, which are separate devices in the **Device Manager**, the above **Dot** notation is used. The number before the dot is the matrix's ID, and the number after is the input or output routing number on that specific matrix. The ID number is determined by the order of the matrix-type devices in the device list, starting from the top.

Cascading matrices routing example



Machine	Routing	Routing	Routing	Routing
Director In	1.1 | 2.1	1.2 | 2.2	1.3 | 2.3	1.4 | 2.4

Machine	Routing	Routing	Routing	Routing
Director Out	1.1 |1.2	1.3 | 1.4	2.1 | 2.2	2.3 | 2.4
Understudy In	1.5 | 1.6	1.7 | 1.8	2.5 | 2.6	2.7 | 2.8

This more complex notation is able to send two or more commands for each input or output routing. In this example, a distribution amp or similar is doubling every signal before it reaches the matrices, so each output from Designer reaches more than one matrix at once.

The **Pipe** notation is able to send multiple whole commands per feed output. The order the routing is written in is important: one routing is before the pipe, the other is after. On failover, the understudy would route 1.5 to 1.1 and 2.5 to 2.1 at the same time, and so on.

Note that the Pipe operator requires a space either side of it (`|`), unlike other operators.

This needn't stop at two routings per output; a second pipe can be used if a third matrix needed to be controlled **(1.1 | 2.1 | 3.1)**. The dot notation is also in use because more than one matrix is being controlled. All three - comma, dot and pipe - can be mixed and matched to suit the exact configuration of matrices in use.

Lightware Matrix Setup

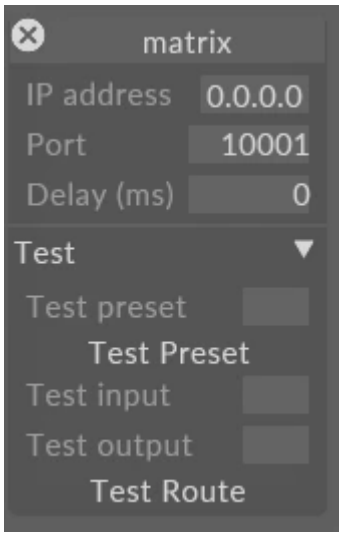
The Lightware Matrix device is designed to be a virtual representation of a physical Lightware Matrix within Designer. It defines how Designer should send messages to this Matrix during failover. It also allows you to send test commands to make sure everything is connected properly. During failover the commands that Designer sends will be determined by the input/output routing configured in the Feed View.

Setting up a Lightware matrix

1. Configure the real Lightware Matrix to be on the same IP network as the Director/Actor network.
2. Choose port `10001` in the real matrix configuration. (Other ports can be used, provided the same port is configured in Designer).
3. In Designer, create a **LightwareMatrix** device. A LightwareMatrix device is created in the same way as any other device type. Please see the Creating devices section for step-by-step instructions on how to create a device, and select **LightwareMatrix** from the menu of different device types. This will open the LightwareMatrix device editor.
4. Configure the LightwareMatrix device to have the correct IP address and Port.
5. Test the connection using the controls in the “Test” section of the LightwareMatrix editor.

Once the device is configured

LightwareMatrix device properties



Lightware Matrix device properties

The LightwareMatrix device has these controls that control it's behaviour on failover:

- **IP Address**: The IP address of the real matrix.
- **Port**: The TCP port number configured in the real matrix. We suggest using `10001`.
- **Delay (ms)**: Number of milliseconds to wait after failover to send the Matrix commands. This can be set higher than 0 to allow for other failover operations to occur before triggering a matrix preset or route switch.

Test

This section allows you to test the Lightware behaviour. Note that the values entered here are not stored between project restarts. There are two ways to test: either send **Preset** commands, or send specific **Routes**. Here we describe these fields:

- **Test Preset**: The index of the preset on the Lightware Matrix to trigger.
  - Test this control by pressing the **Test Preset** button.
- **Test input**: The index of the input to route to the output.
- **Test output**: The index of the output to route the input to.
  - Test this control by pressing the **Test Route** button.

Matrix Switches Overview

Designer can switch presets of various matrices and switchers. Presets can be animated using the MatrixControl layer but in a Director/Actor environment the presets can be changed through an automated process using the d3Net manager.

Which matrix switches are supported?

Designer has built-in drivers for the following matrices and switchers:

- Analog Way OPS300
- Barco MatrixPro
- Barco Encore (External link).
- Blackmagic Smart Videohub
- Gefen Matrix (External Link)
- Lightware Matrix
- Riedel MediorNet Matrix : Communicates with MediorNet systems for routing and management.
- PureLink Matrix : Provides control for PureLink AV matrix devices.
- Telnet Matrix : Generic matrix control using Telnet-based command sets.

Other devices to be controlled

For devices that currently do not have built-in drivers can also send serial commands using the Control layer assuming you first set up the Serial Device.

PureLink Matrix Setup

The PureLink Matrix device provides control for PureLink AV matrix devices in Designer.

Setting up a PureLink matrix

1. Configure the PureLink matrix to the same IP network as the Director/Actor network.
2. Choose **port 23** in the matrix configuration.
3. In Disguise, create a PureLinkMatrix device. A PureLinkMatrix device is created in the same way as any other device type. Please see the Creating devices section for step-by-step instructions on how to create a device, and select PureLinkMatrix from the menu of different device types. This will open the PureLinkMatrix device editor.
4. Configure the PureLink matrix device editor by referring to the device properties below.

Pure LinkMatrix device properties

IP address

The IP address of the matrix.

Port

The TCP port number configured in the matrix. Set it to 23.

Router ID

The ID number set on the matrix.

Test Input

This input allows you to specify a test input.

Test Output

This input allows you to specify a test output.

Test route

Once you have selected a test input & output, click the **Test route** button to confirm whether the routing works.

Riedel MediorNet Matrix Setup

In Designer, the Riedel MediorNet device can be configured to communicate with MediorNet systems for routing and management.

Riedel MediorNet is a real-time media network platform that transports and routes broadcast-quality video, audio, and data signals over a fibre-based infrastructure. It is used in broadcast facilities, stadiums, and live events to create a unified and flexible signal backbone, simplifying signal management and reducing the need for external processing devices. The system is modular and scalable, with a decentralised approach that provides redundancy and low latency.

Setting up a Riedel MediorNet device

Prerequisites

This topic assumes you have already configured the matrix via the Riedel web interface. It is important to enable the Ember+ 3rd Party interface and assign IDs to the inputs and outputs, as these will be the indices used in Designer. Remember to do both **Directions**, **In** and **Out**. For more information, refer to the **Riedel Matrix documentation**.

There is a known limitation where only video channel connections can be modified.

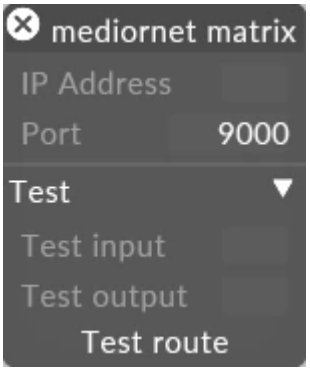
Create the Riedel MediorNet device

- In Designer, create a **MediorNet Matrix** device. A Riedel MediorNet device is created in the same way as any other device type. Please see Creating devices for step-by-step instructions on how to create a device, and select **MediorNet Matrix** from the menu of different device types. This will open the MediorNet Matrix device editor.

Configure TCP-IP control

1. Configure the MediorNet Matrix to the same IP range as the Director/Actor network.
2. Configure the device using the properties contained in the MediorNet Matrix device editor.

MediorNet Matrix device properties



MediorNet Matrix device editor

IP address

The IP address of the matrix.

Port

The TCP port to send commands on. The Ember+ protocol uses port **9000** by default.

Test input

The test input number.

Test output

The test output number.

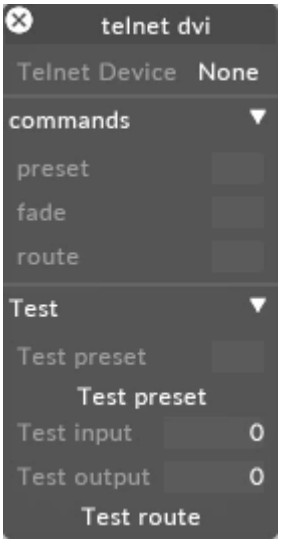
Telnet Matrix Setup

In Designer, the Telnet Matrix device can control any matrices that support Telnet-based commands.

Setting up a TelnetMatrix

- In Designer, create a **TelnetMatrix** device. A TelnetMatrix device is created in the same way as any other device type. Please see Creating devices for step-by-step instructions on creating a device, and select **TelnetMatrix** from the menu of different device types. This will open the TelnetMatrix device editor.

TelnetMatrix device properties



TelnetMatrix device editor

Telnet Device

Defines the Telnet device to send commands to.

Commands

- **Preset** - Defines the command sent for changing a preset.

  This is used in the Failover of the `DVI matrix preset` field is set on a Machine.

- **Fade** - Defines the command sent for executing a fade.

  This is used when triggering a fade via the DVIMatrixControl layer.

- **Route header** - This is data sent as a prefix to the body of the route command.
- **Route** - Defines the body of the route command.

  This is sent when using Direct Routing and Failover.
- **Route footer** - Defines the data sent as a suffix to the body of the route command.

The TelnetMatrix uses the same syntax for the preset, route, and fade commands as the control layer except for the following constants:

- **Preset** : `$1` = preset as ASCII, `%1` = preset as binary
- **Route** : `$1` = input as ASCII, `%1` = input as binary, `$2` = output as ASCII, `%2` = output as binary
- **Fade** : `$1` = transition time as ASCII, `%1` = transition time as binary

When sending a route command, the header is prepended to the data generated by the route command, and the footer is appended to the data.

For example:

- **Route header** = `START\n`
- **Route** = `$1 $2\n`
- **Route footer** = `END\n\n`

When executed with the inputs 1, 2, 3, 4 and outputs 4, 3, 2, 1; the final output would be:

```
START\n
1 4\n
2 3\n
3 2\n
4 1\n
END\n
\n
```

Common strings for TelnetMatrix device

- **Kramer DVI Matrix** - `#35PRST-RCL $1\n`
- **Extron DMS 3600 Matrix** - `$1.`
- **Gefen 8x8 DVIKVM DL** - `#callpreset $1\n` would send `#callpreset 6\n` if you recalled preset 6.

`#doroute $1 $2\n` would send `#doroute` 3 5\n" if you switched input 3 to output 5.

- **Extron Matrix Switcher** - `\27R$1PRST\13\10`

- **Barco Encore2 (E2)** - `PRESET -a $1\r\n`

`ROUTE $1 $2` Where 1 is input, 2 is output.

- **Barco MatrixPro** - `RPRST $1\r`
- **IDK Matrix** - `Preset - @RPM,$1\r\n`

`Route - @IOS,$1,$2\r\n`

> **Note**
>
> **Please note**: Typically, using **\13\10** or **\r\n** (Carriage Return) at the end of a command string is required. More examples of ASCII and Hex command strings can be found here.

Test

This section provides utility functionality for testing the previously defined commands.

- **Test preset** - Enter the preset to test, and click the **Test Preset** button to send a preset command.
- **Test input** - A comma-separated list of inputs for a route command. E.g. `1,2,3,4`.
  It must have the same number of inputs as outputs specified in **Test output**
- **Test output** - A comma-separated list of outputs for a route command. E.g. `4,3,2,1`.
  It must have the same number of outputs as inputs specified in **Test input**

The above example will route input 1 to output 4, 2 to 3, 3 to 2 and 4 to 1.

- **Test Route** - Once the input and output are defined, click the **Test Route** button to test the matrix routing.

MIDI Device

The MIDI Device allows triggering, automation, and control through standard MIDI messages.

Setting up a MIDI device

Designer includes the following pre-built MIDI control surfaces:

- Behringer BCF 2000
- M-Audio Oxygen 8
- M-Audio UC-33

If you wish to use a MIDI control surface other than the ones provided by default, you can use the **MidiDevice** device type to create a virtual replica of the real-world MIDI control surface. This control surface can then be used to send MIDI to and from Designer.

1. Create a **MidiDevice**. A MidiDevice is created in the same way as any other device type. See Creating Devices for step-by-step instructions, then select **MidiDevice** from the menu of different device types. The MidiDevice is initially just a title bar displaying its name as the device currently has no features or properties.

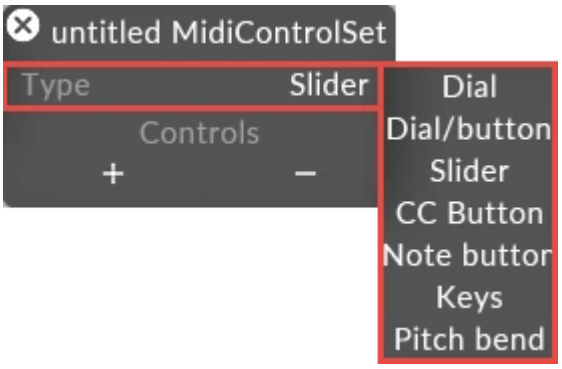
   

   New MidiDevice, in this example Midi_creation; currently the device has no properties.
2. To open the MidiDevice editor, right-click on the title bar and select **edit**. The MidiDevice editor is used to create the MIDI control surface.

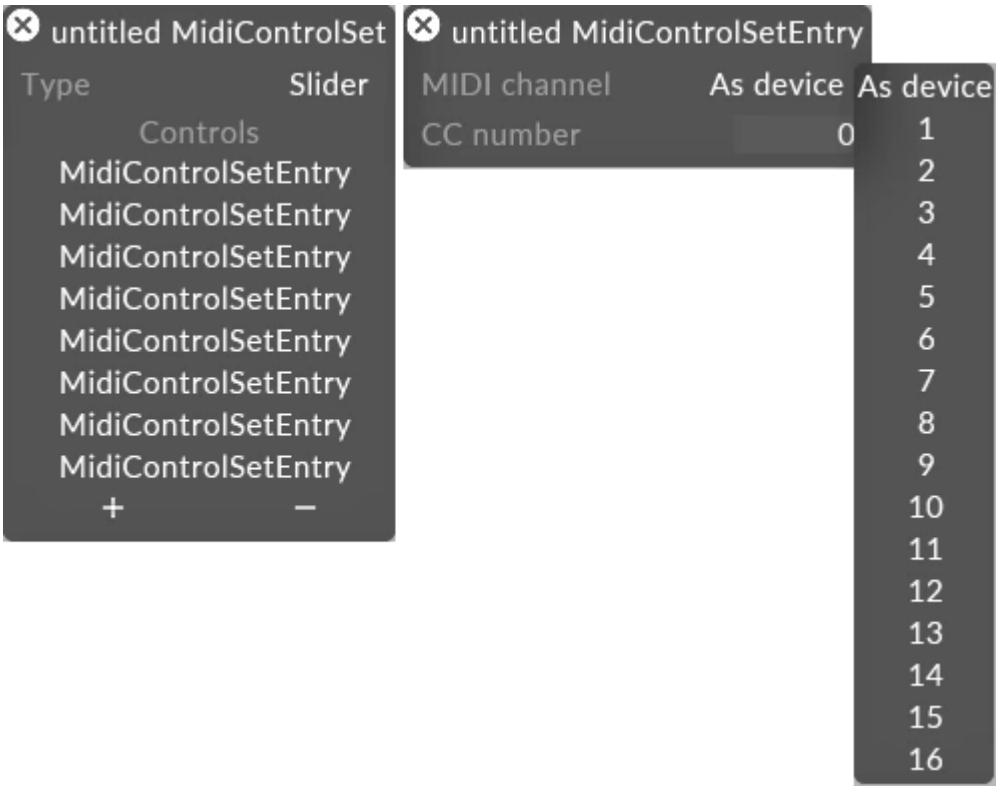
   

3. Set the **midi in/midi out** properties to the appropriate MIDI port. HDSP9632 are the MIDI ports on the RME breakout cable, or AOI Midi on newer systems.

4. Under **control sets**, select the **+** button to open the MidiControlSets manager. The MidiControlSets manager contains a list of all the control sets. Note that Designer comes with a series of control sets by default.
5. To create a new control set, type the control set name into the **newmidicontrolset** text field, in this example **sliders**, and hit **Enter**.

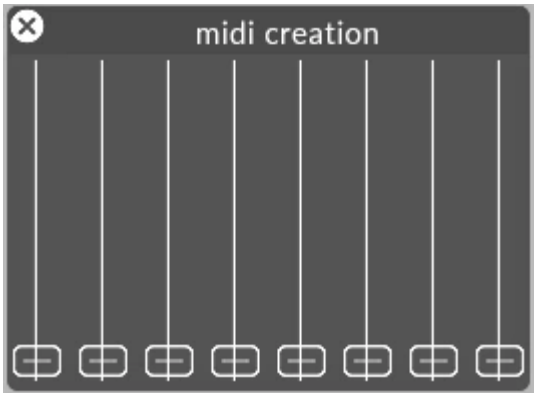


The new control set will be added to the list of control sets in the MidiDevice editor and MidiControlSets manager, and the Control Sets editor will open.



6. To specify the type of control set, right-click **type** and select a control set type from the menu. Options are **dial**, **slider**, **button**, **keys** and **dial/button**. This example uses the **slider** control set type.
7. Select the **+** button to add the desired number of control objects. In this example ten sliders have been created.

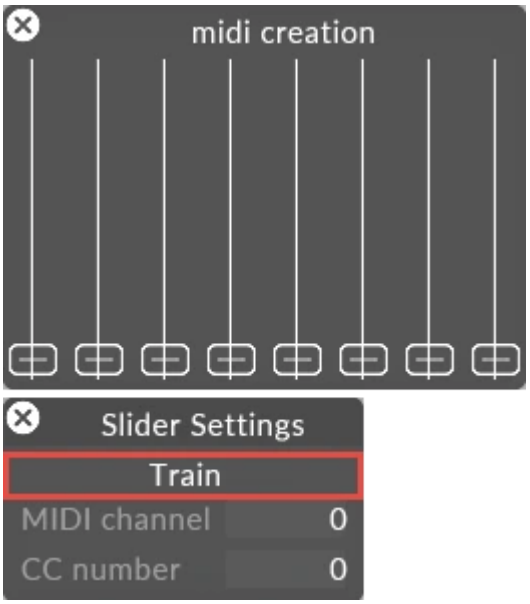
8. Set the **mode** property to **in**, **out** or **bidirectional** depending on how the MIDI data should be sent. **bidirectional** will set the MIDI data to be sent to Disguise as well as from Designer.
9. Repeat the above steps to create the required number of dials/sliders/buttons/keys.
10. Once all of the required controls have been created, close and reopen the MidiDevice by right-clicking the device from the Devices menu. Notice that the MidiDevice is no longer a title bar, but is now a virtual replica of a MIDI control surface.



Assigning controls to a control surface

The next task is to assign the controls to a control surface.

1. To link a control to a control surface, right-click on the specific control, for example **slider 1**.

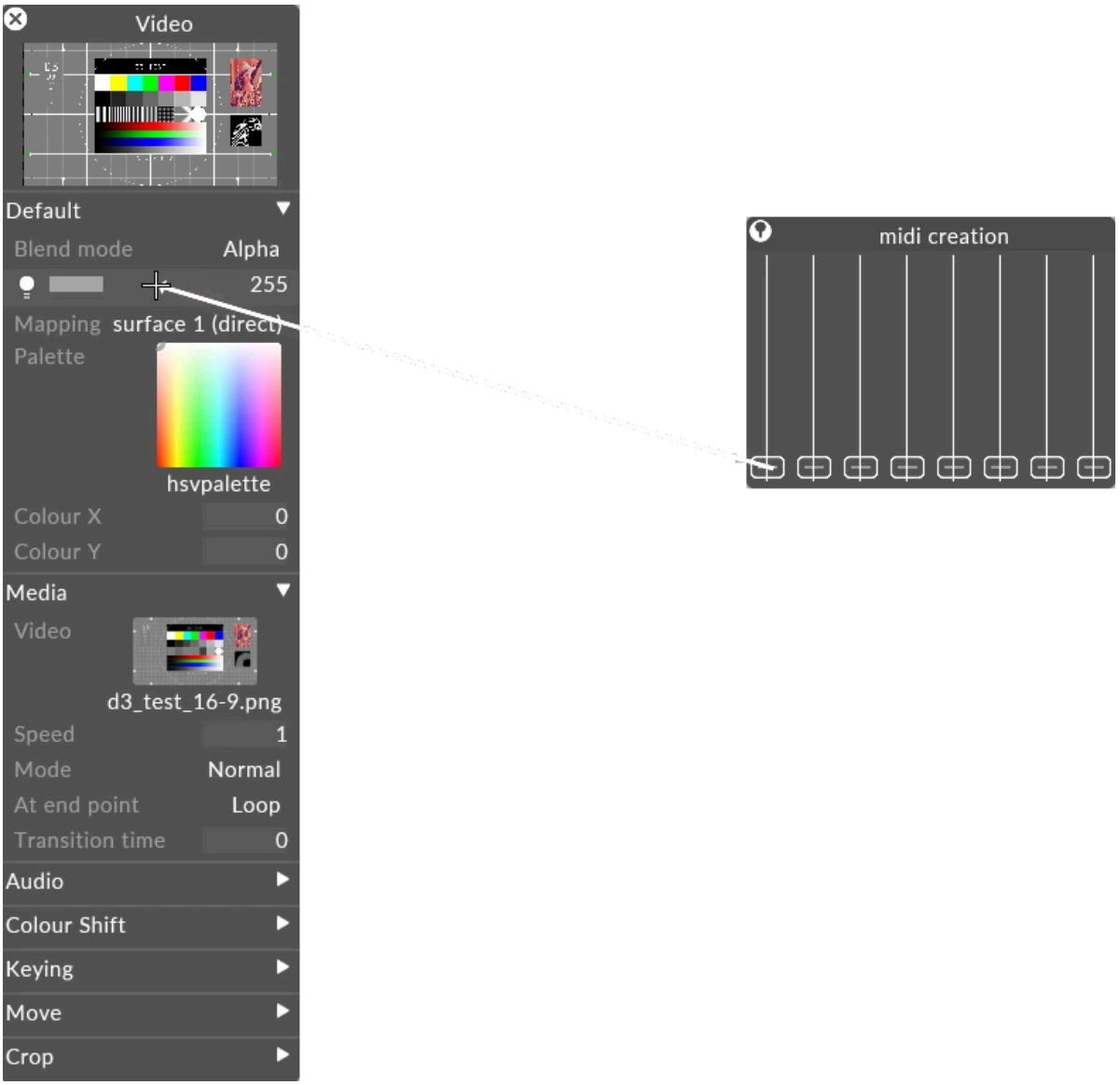


Dial Settings being used to link a control to a control surface, opened by right-clicking on the specific control.

2. Move or change the encoder value on the control surface. Disguise will learn the encoder and store it. Repeat this step for the encoders that are to be used.

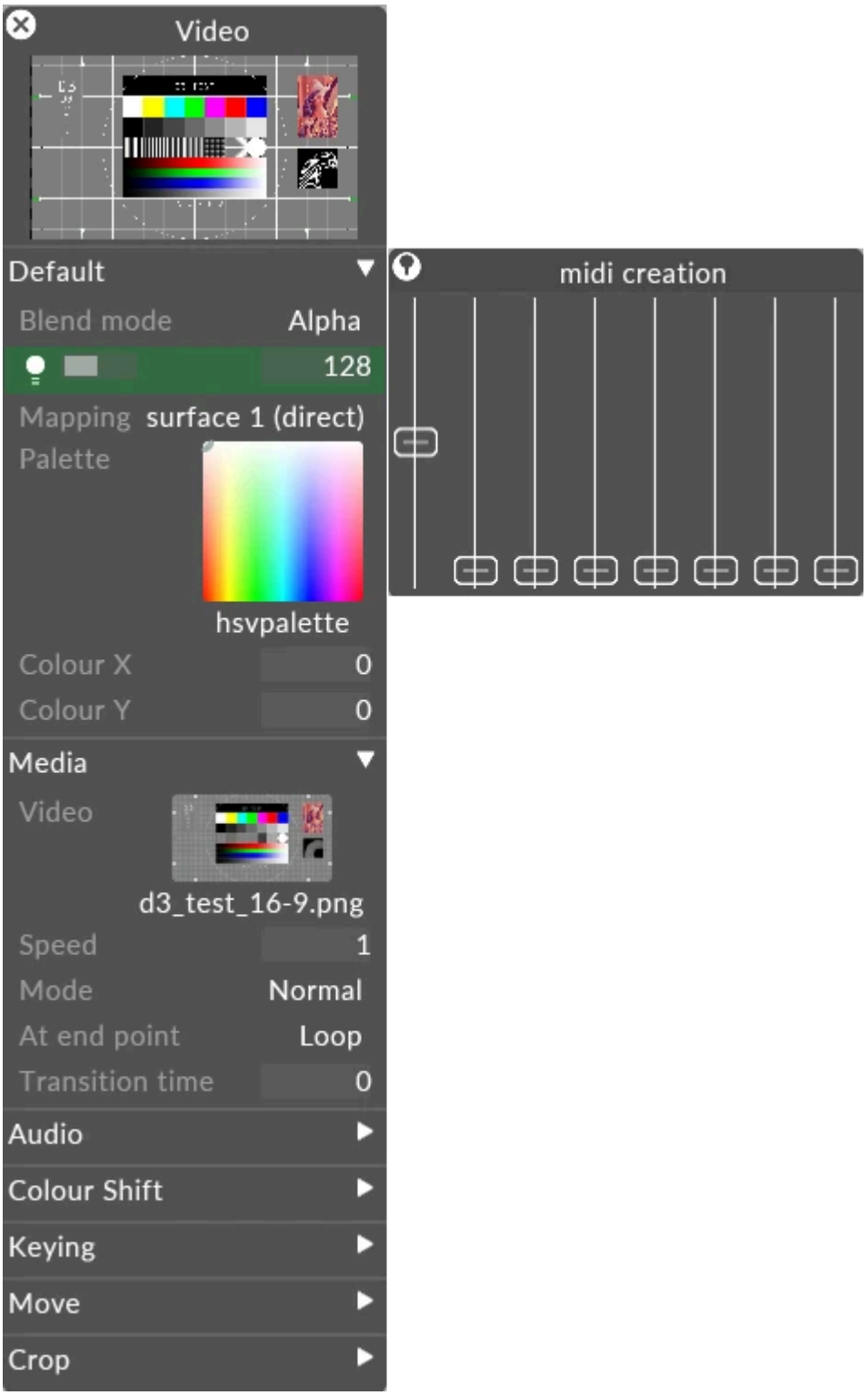
Assign a MIDI control to a layer property

1. Hold **Alt** and left-click and drag from the encoder to a layer property to apply MIDI control to that property. This will draw a white arrow. For more information on Arrows, see [Compositing layers using Arrows](#).



Arrows being used to assign a MIDI control to a layer property.

2. Release the mouse button to assign the encoder to the specific layer property. The layer property will turn green once the link has been successfully created.



The Brightness property of the Colour layer has turned green, indicating that this property has successfully been assigned to a MIDI control.

3. To check the expression that is being used by a layer property, right-click on the specific property. This will open a small editor containing the expression.

For more information on expressions see Expressions.

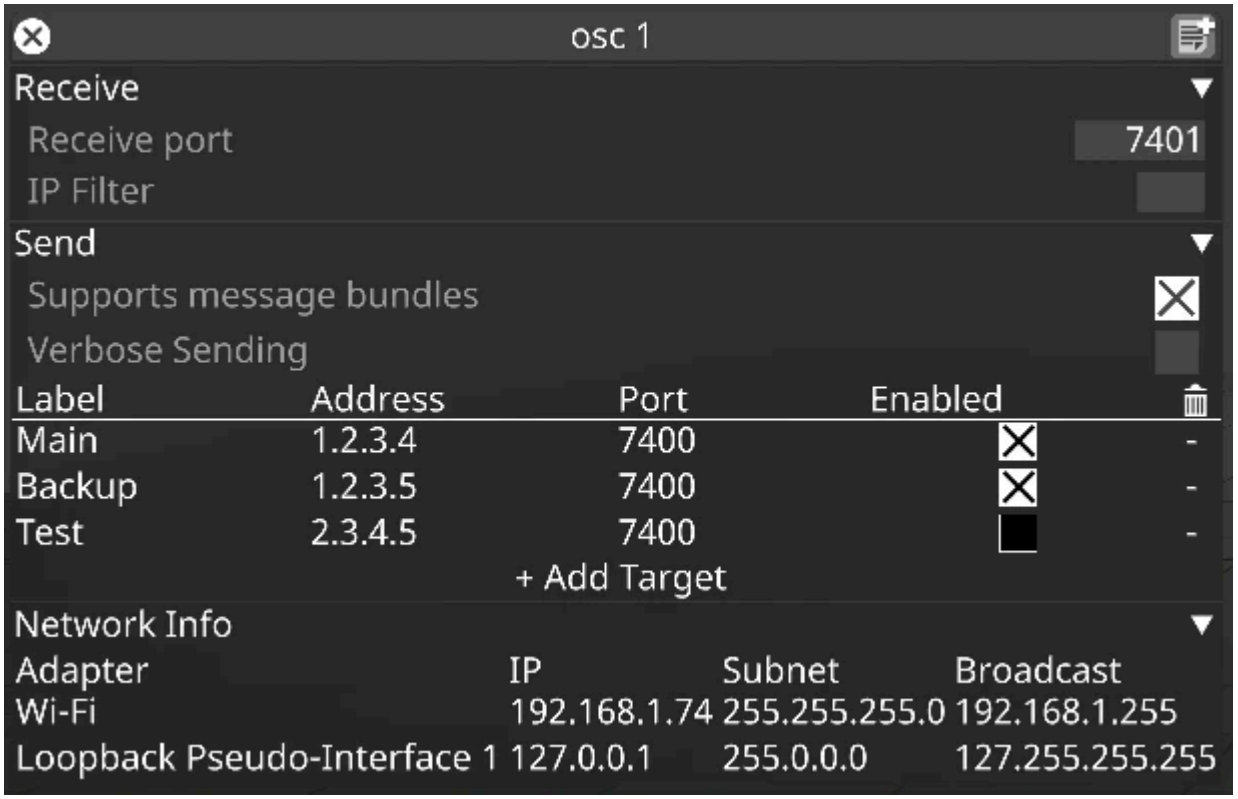
OSC Device

The OSC Device sends and receives Open Sound Control (OSC) messages for flexible, network-based control.

Creating OSC Devices

An OSC Device is created in the same way as any other device type. Please see Creating Devices for step-by-step instructions on how to create a device, and select **OscDevice** from the menu of different device types. Alternatively, by default Disguise contains an OSC Device called `osc 1`, which can be selected from the Devices manager.

OSC Device properties



Receive

The OSC Device can receive incoming messages on one port, from any number of devices.

Receive port

This property specifies the port number for incoming messages. By default this is port 7401.

For more information on setting the IP address, please see Set up IP addresses.

IP Filter

This property filters incoming OSC messages by IP address; if set only messages from the given address will be processed. If left blank no filtering is performed.

Send

The OSC Device can send to any number of devices, which can be specified via the Send Targets widget. Messages are queued and sent once per frame.

Supports Message Bundles

If set, the Device will send all queued messages in one bundle instead of sending them separately.

Verbose Sending

If set, the Device will log every outgoing message to the console. It is recommended that you turn this off for Devices which you expect to send on most or every frame.

Send Targets

This table lets you specify one or more targets to send OSC messages to.

Label

This is a human-readable name for convenience; it is not a hostname and is not used for addressing.

Address

The IP address of the machine to send messages to.

Port

The port of the machine to send messages to. By default this is set to 7400.

Enabled

When checked, this target will be sent messages.

Trash

This column lets you delete a send target from the Device.

Network Info

This table shows the adapter name and IP addresses of all connected Network Interface Cards on the local machine for reference.

OSC Transport Control

For information on how to use OSC expressions on the timeline, see the OSC Transport Control page.

OSC Applications

There are several applications available for iOS that are capable of sending OSC messages. Two applications that we recommend are **Liine by Lemur** and **TouchOSC by hexler.net**.

To download examples of TouchOSC and Lemur layouts, visit the **OSC Downloads** page.

> **Note**
>
> The sliders within the TouchOSC application are set as float values between 0 and 1.

Controlling layer properties with OSC

For information on how to use OSC expressions to control layer properties please see the Controlling layer properties with OSC page.

Example Workflow

Setting up a device to control Disguise through OSC

1. Download the example Lemur layout from the **Disguise Resources** page.
2. Download the Lemur application to the iPhone device that will be sending commands to Designer.
3. Import the Lemur layout to your iPhone. If you are using a Mac computer you can AirDrop the layout to the iPhone and it will automatically import to Lemur. Otherwise, you can do it manually from the Lemur app settings.

4. If you are using a Disguise server, configure your network settings to assign the IP of the server the OSC device will send commands to. If you are using a Designer machine, you can have it connected to a WiFi connection.
5. Run your Disguise project.
6. Right-click on the Devices editor.
7. Press the + icon to create a new device, or to add the default loaded `osc 1` device.
8. Right-click on the device name to open its network configuration settings.
9. Under the Send tab, add a Send Target for Disguise to send commands to. In the Lemur application, this IP can be accessed through the app's settings as the "Lemur IP".
10. In the Lemur settings, set the OSC host as the IP address of your machine. This will be reflected under the Adapter tab in the OSC device window.
11. Under the Receive tab's Port field, assign the port number the Lemur app will send commands to. This is the number reflected in the Lemur OSC settings.
12. Toggle an OSC command from the Lemur profile to see if the OSC device indicator turns green. That will verify the connection has been made.
13. You can also create an OSC Tester device linked to your OSC device to verify the connection has been made.

OSC Machine Control Setup

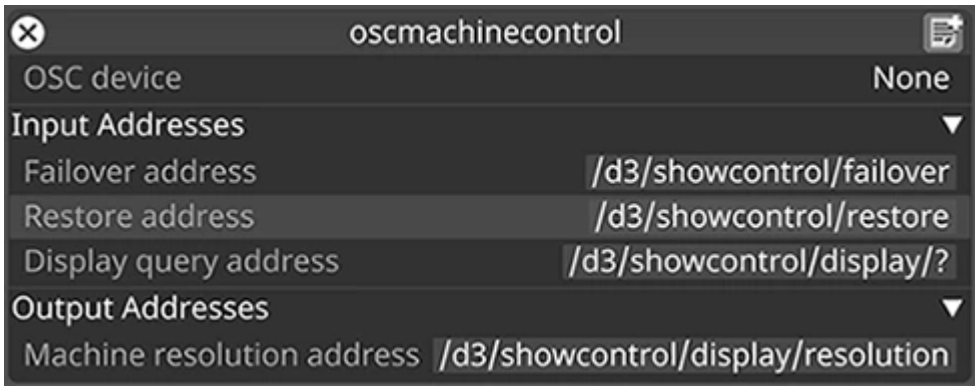
The OSCMachineControl device allows restart and shutdown commands to be sent to Designer from an external OSC device.

This topic outlines the setup steps for the OSCMachineControl device, which is used for remote failover and restore of machines using OSC commands.

Setting up OSC Machine Control

1. Create an OSC device from the device manager — see OSC Device for details.
2. Create an OSCMachineControl device from the device manager.
   - Set the OSC device to an existing OSC device (or create a new one).
   - Configure the input and output message strings to your preferences, or use the default strings.
   - The exports will be written to the output folder of the project folder.
3. Send values from the OSC device to remotely trigger a machine restart or shutdown.

OSC Machine Control properties



OSC Device

Defines the OSC device that the commands will be sent to and from.

Input Addresses

Failover address

Causes a machine failover. Accepts a string parameter — the machine host name that should be failed over.

Restore address

Restores a machine from failover. Accepts a string parameter — the machine host name that should be restored.

Display query address

The string used to query display resolutions using the machine name.

Output Addresses

Machine resolution address

The string used to define the response to the Display query, with two integer values for x and y resolution. For example:

```
/d3/showcontrol/display/resolution/myMachine/0/0 1920 1080
```

OSC Tester Device

OSC Tester is a device that allows users to test incoming and outgoing OSC messages from Designer. It exists as a standard device.



Creating a new device

1. Right-click devices from the dashboard. This will open the Device Manager, which contains a list of active devices.
2. Select + to open the Device library. This lists which internal or external devices are available.
3. Type in the name of the new device into the new device text field.
4. Hit Enter. This will open a list of device types available in Designer.
5. Select the appropriate device type.

The new device will be added to the Device Manager's active device list, and to the Device library. The device's editor will also open.

[Animated GIF: Creating a device]

> **Note**
>
> Always right-click on the **default** device object to add devices to it. If left-clicking you will be prompted to create a whole new device manager which is rarely required.

Testing incoming messages

1. Set the OSC device to be the OSC device you are expecting to received messages from.

2. Set the Receive address filter, if you wish to filter only specific OSC messages.
3. Send the values from the OSC device.
4. Values received should be shown in the Received Messages area at the bottom of the widget.

Testing sending messages

1. Set the OSC device to be the OSC device you are expecting to send messages to.
2. Set the message limit, or use the default setting.
3. Define the OSC string by typing it into the **OSC Message** field.
4. Send the values to the OSC device by clicking **OK**.

Camera Tracker Observations Tester

The **Camera Tracker Observations Tester** is designed for validating and troubleshooting observation data received from external camera-tracking systems.

It allows you to view, inspect, and verify the positional and rotational data being sent into Disguise, ensuring the information is accurate and updating as expected.

Uses

This tool is especially useful when:

- Integrating a new tracking system.
- Diagnosing issues with unstable or incorrect tracking data.
- Confirming that observations are arriving on the correct port or data channel.
- Reviewing how real-time camera motion is being interpreted by Disguise.

By monitoring the incoming data, you can quickly identify configuration errors, malformed observations, or inconsistencies that may affect virtual camera alignment, AR workflows, or xR calibration.

Driver Properties

Observation

Selects which observation packet to read from the tracking system.

Source Camera

The target camera that will receive pose updates from the observation.

View

Identifies which view index the data belongs to (e.g., stereo left/right, multi-camera setups).

Developer Documentation

Camera Tracker Tester

The CameraTrackerTester driver is a type of PositionDriver that can be used to simulate camera tracking data. The Camera Tracker Tester is useful whenever you need to simulate or prototype a camera-tracking workflow without a physical tracking system connected. It allows you to drive a virtual camera using the position and movement of another camera in the scene.

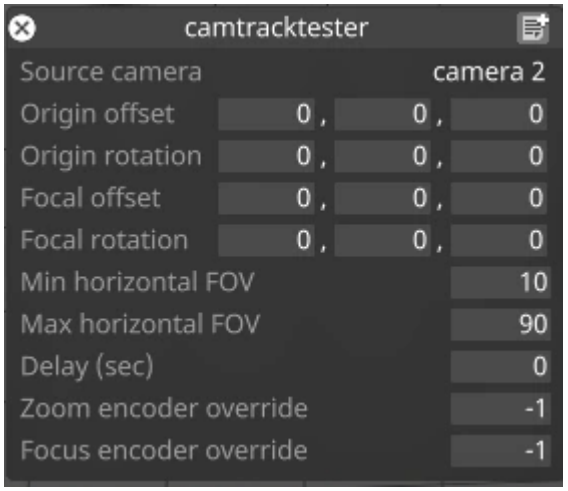
Uses

This tool is especially helpful when:

- Testing camera-tracking behaviour before hardware is available.
- Prototyping AR, xR, or virtual production setups in an offline environment.
- Validating how positional or rotational offsets affect the final camera output.
- Simulating tracking latency using adjustable delays.
- Developing or tuning workflows for zoom/focus response without requiring real encoder data.
- Demonstrating camera-tracking behaviour in training or educational environments.

By simulating tracking output from another camera in the Stage view, the Camera Tracker Tester provides a safe and convenient way to experiment with tracking behaviour, understand FOV dynamics, and fine-tune camera behaviour before integrating real-world tracking hardware.

Driver Properties



Source camera

Camera used as the source of the positional data.

Origin Offset/Rotation

Offset/Rotation to be applied to the source camera's position.

Focal offset/Rotation

Offset/Rotation to be applied to the camera's focal plane.

Min/Max Horizontal FOV

Min/Max values of the range used to scale the camera's FOV.

Delay (sec)

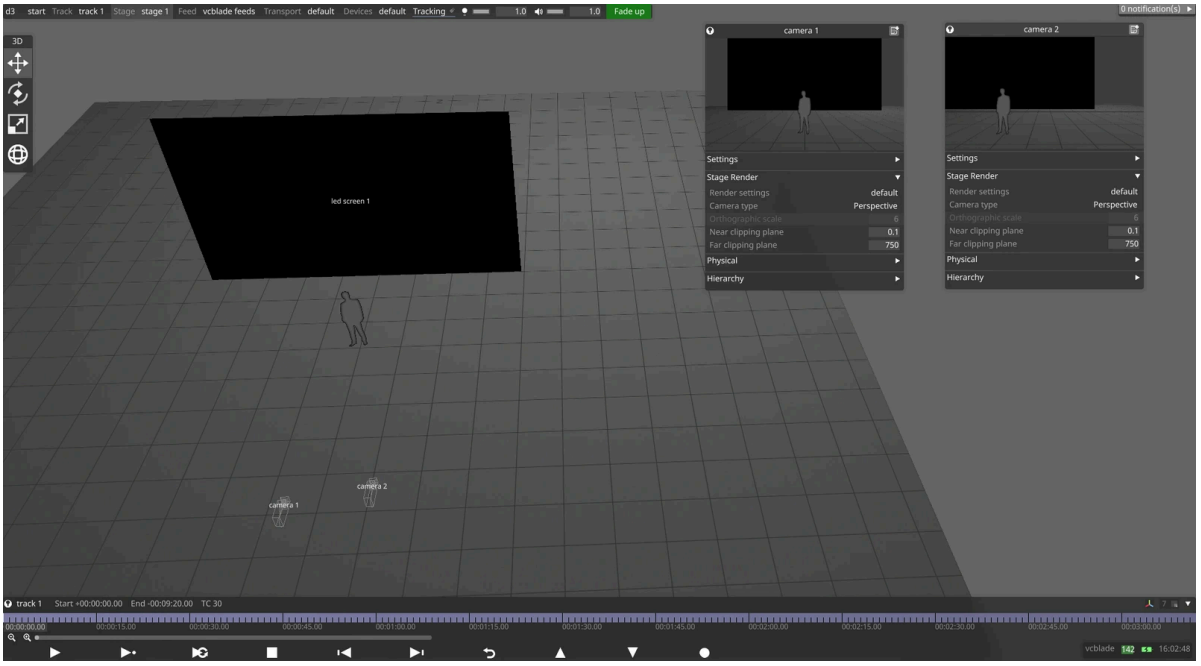
Artificial delay time that can be added to the source camera tracking data.

Zoom/Focus Encoder Override

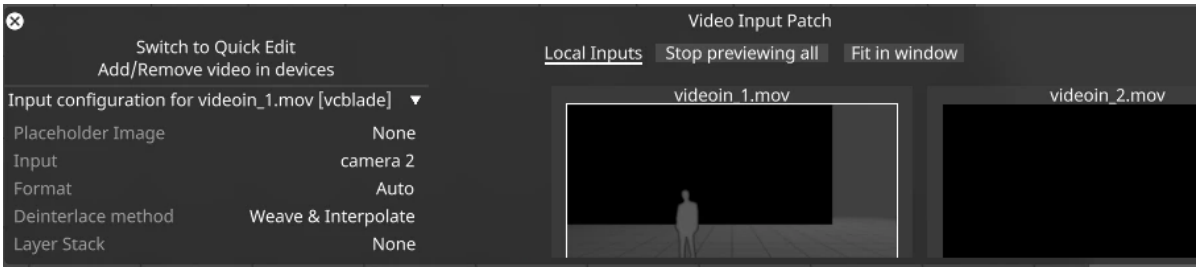
Overrides for the Zoom/Focus encoder value.

Setup a Camera Tracking Simulation

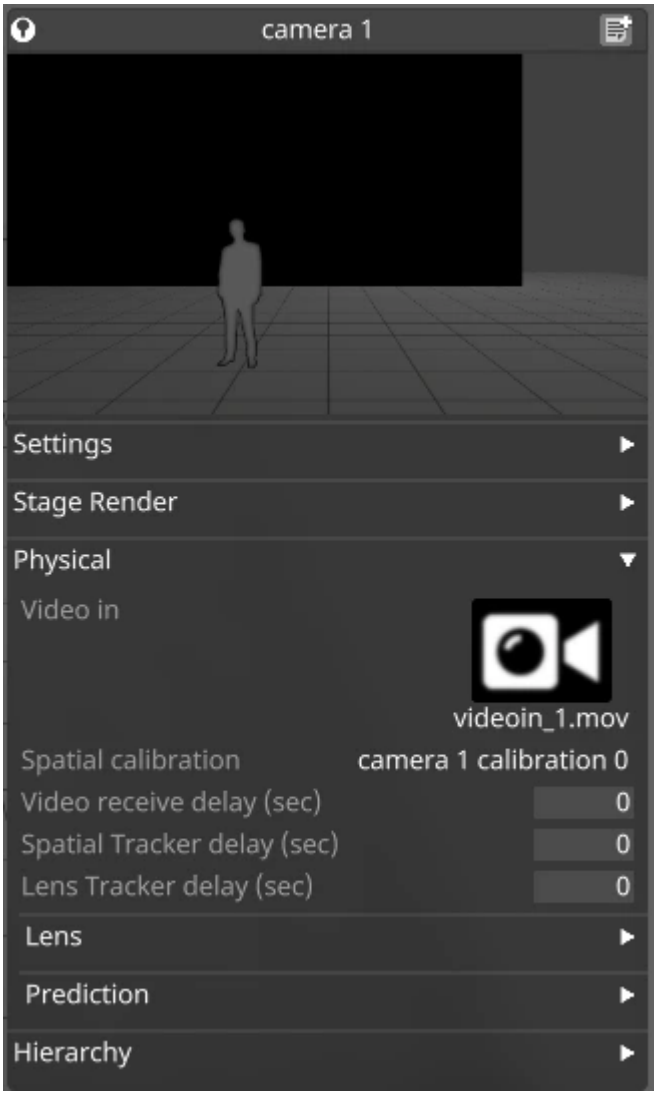
1. Create two new cameras in the Stage menu; camera 2 will be used to represent the camera tracking system that sends tracking data to camera 1.



2. Open the **Video Input Patch Editor**.
3. Patch Camera 2 to an empty video input (the image below shows Camera 2 mapped to video input 1).



4. Open the camera 1 properties menu, expand the Physical tab, and assign the **Video in** field to **videoin_1.mov**. You should now see the output of camera 2 within the camera 1 preview thumbnail.



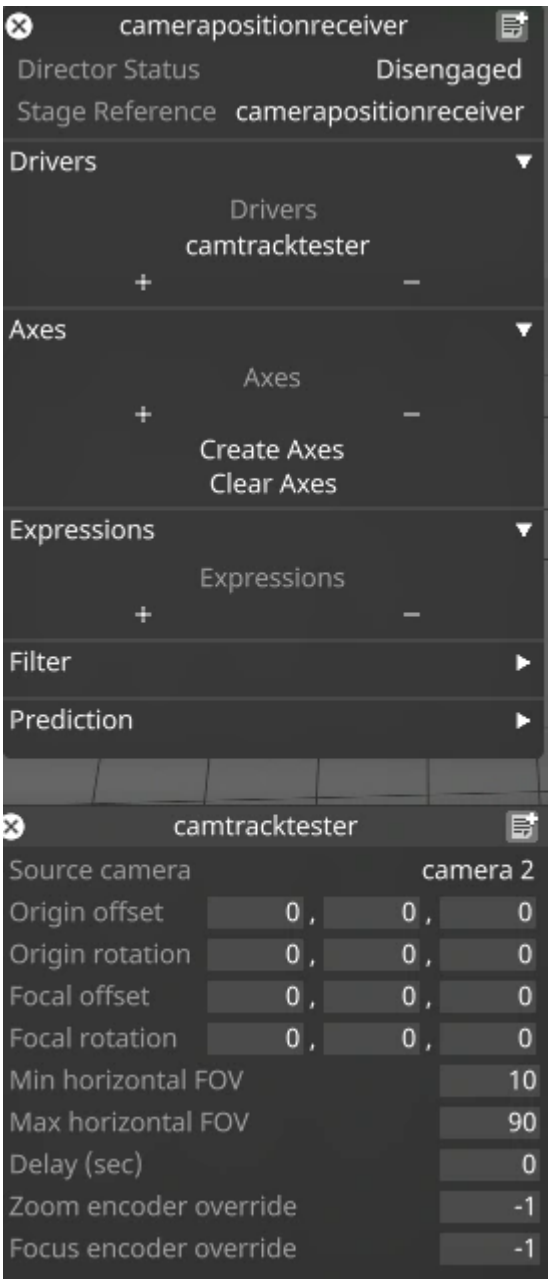
5. Open the Devices menu and add a new **PositionReceiver Device**.



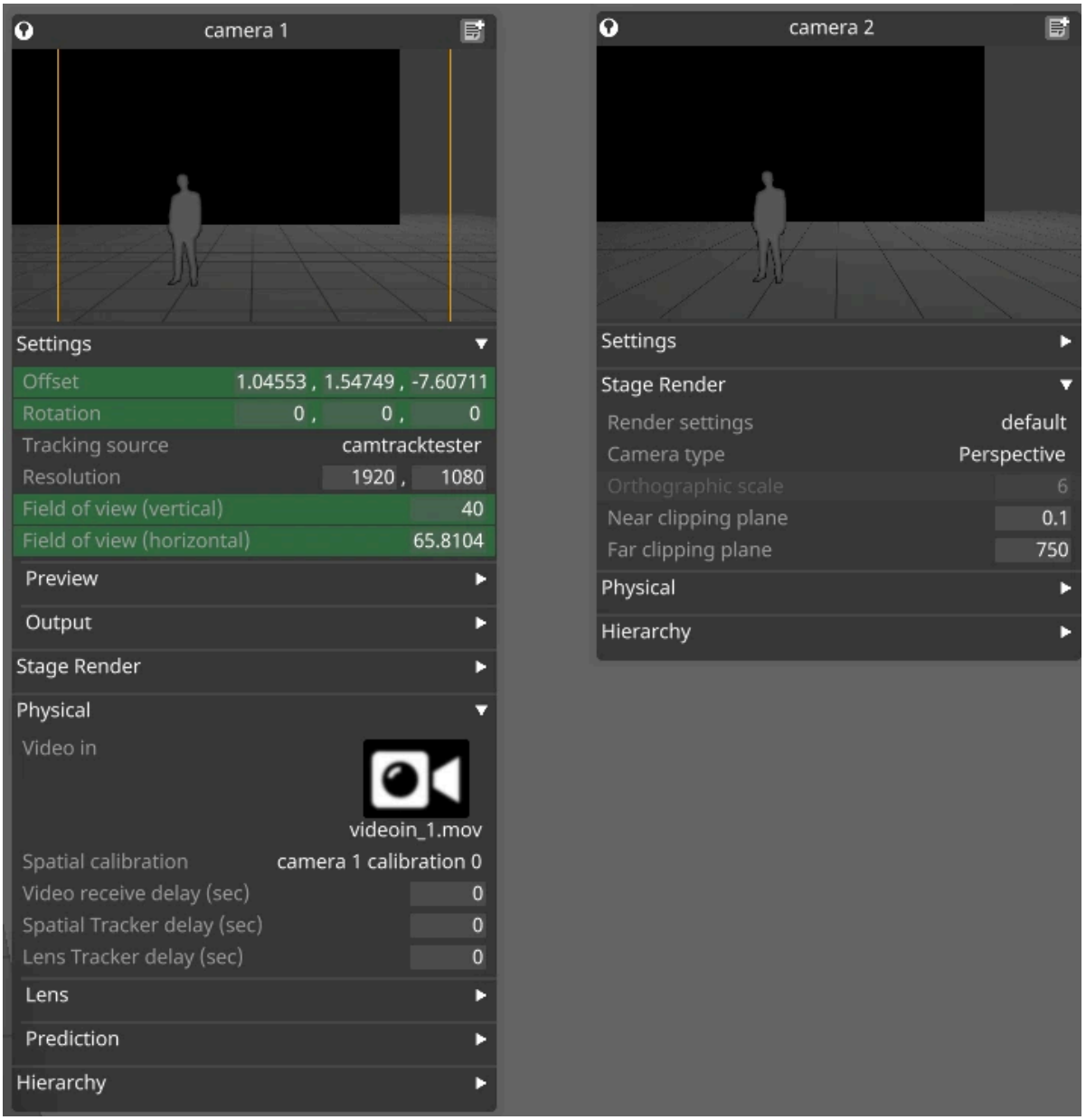
6. Add a new driver to the and choose the PositionReceiver Device from the list of Position Drivers.



7. Assign the source camera for the CameraTrackerTester to Camera 2.



8. Return to the properties menu of Camera 1 and in the **Tracking source** field, assign the **CameraTrackerTester** as the source. The Offset, Rotation, and Fields of view will now appear green.



9. Now, as you move Camera 2 in the Stage view, Camera 1 will automatically track along.

Developer Documentation

CPS Driver

The **CPS Driver** receives automation data from systems that communicate using the **CPS protocol**. CPS is used by certain motion-control and automation devices to send positional or status information that can drive content alignment or provide positional feedback inside Disguise.

In most cases, the default driver settings are sufficient. Only adjust these settings if your automation network requires specific ports, multicast addressing, or IP filtering.

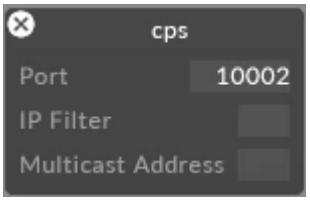
Uses

Use the CPS Driver when your production involves:

- **Automation devices or controllers** that output motion or position data using the CPS protocol
- **Synchronising content** with real-world movement such as lifts, winches, or tracked scenic elements
- **Triggering timeline behaviour** based on machine motion
- **Monitoring automation positions** directly inside Disguise
- **Lightweight motion feeds** where only core positional or state data is needed

CPS is commonly used in installations or productions requiring simple, reliable position updates.

Driver Properties



This driver listens on UDP port **10002** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation



D3SSI Driver

The **D3SSI Driver** receives encoder position data over the D3 Synchronised System Interface (D3SSI) protocol. The protocol carries a `MessageFromEncoder` packet — Designer consumes the **angle** field (mod 1800°) as a single position axis.

In most setups, the default driver settings are sufficient. Only adjust these values if your system or network has been configured differently.

Uses

Use this driver when:

- Integrating a D3SSI-compatible rotary encoder into a Disguise workflow.
- Driving content alignment, screen positioning, or stage automation from a single rotary axis.
- Working within installations or productions that standardise on the D3SSI protocol.
- Testing or validating D3SSI-based data streams within a controlled environment.

Driver Properties



This driver listens on UDP port **8989** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation

DCS Driver

The **DCS Driver** receives automation data from systems that communicate using the DCS protocol.

It allows Disguise to interpret incoming positional and control information so it can be used within automation workflows.

In most instances, the driver requires minimal configuration, but settings may need adjustment depending on the controller or network setup being used.

Uses

This driver is especially useful when:

- Integrating hardware that outputs DCS-formatted tracking or sensor data.
- Receiving positional information from external controllers.
- Feeding real-time sensor values into Disguise for automated behaviour.
- Testing, validating, or monitoring DCS data streams during setup.
- Working with systems that require minimal-latency UDP-based communication.

Driver Properties

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Sensor Width

Defines the physical width of the sensor (in millimetres).

This value is used by the system to correctly interpret incoming DCS data based on the sensor's real-world dimensions.

Developer Documentation

DMX Screen Position Driver

The **DMX Screen Position Driver** receives positional values over DMX to drive screen or object movement within Disguise. Each value is read from a specific universe and channel, then decoded according to the selected encoding format.

This allows Disguise to interpret multi-byte DMX data as signed or unsigned integers for use in automation workflows.

Uses

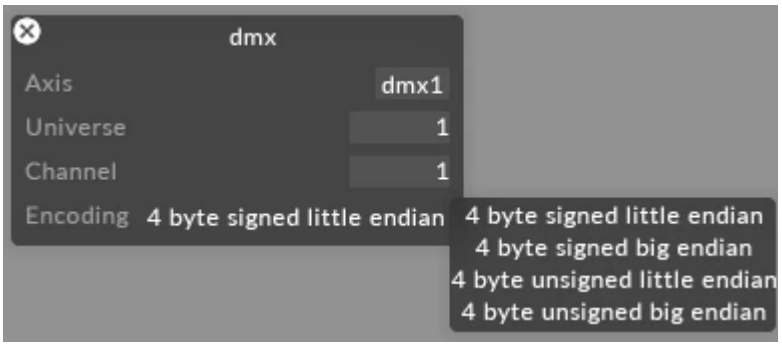
The **DMX Screen Position Driver** is used to translate incoming DMX values into positional information that can influence screens, objects, or stage elements inside Disguise. It enables DMX-based control systems or lighting consoles to send movement data directly into an automation workflow.

This driver is especially useful when:

- Integrating DMX motion controllers or lighting consoles with Disguise.
- Driving real-time movement of screens or scenic elements.
- Receiving multi-byte positional data over DMX.
- Monitoring or testing incoming DMX values during setup.
- Creating hybrid workflows where lighting desks send positional cues.

By selecting the correct encoding type, the driver accurately converts raw DMX bytes into usable positional values.

Driver Properties



Axis

User defined axis name.

Universe

The universe address of the automation system.

Channel

The channel address of the automation system.

Encoding

Determines how the incoming DMX bytes are interpreted and converted into a numerical value. Choose the encoding type that matches the format used by your DMX controller or automation system.

4-byte Signed (Little Endian)

Reads 4 bytes **from right to left** (least significant byte first).
Range: **-2,147,483,648** to **2,147,483,647**

4-byte Signed (Big Endian)

Reads 4 bytes **from left to right** (most significant byte first).
Range: **-2,147,483,648** to **2,147,483,647**

4-byte Unsigned (Little Endian)

Reads 4 bytes **from right to left** (least significant byte first).
Range: **0** to **4,294,967,295**

4-byte Unsigned (Big Endian)

Reads 4 bytes **from left to right** (most significant byte first).
Range: **0** to **4,294,967,295**

Developer Documentation

EzDriver

The **EzDriver** enables Disguise to receive automation data from systems using the EZ protocol.

It provides a simple interface for accepting positional or control values, allowing them to be used within Disguise's automation workflows. In typical installations, the default driver settings are sufficient, and adjustments are only required when working with custom network or device configurations.

Uses

This driver is especially helpful when:

- Receiving continuous positional or parameter data from EZ-compatible hardware.
- Integrating lightweight tracking devices or controllers that output EZ protocol messages.
- Monitoring real-time value changes from external systems for use in automation.
- Testing or validating EZ data streams during setup or troubleshooting.
- Building custom automation workflows that require low-latency UDP-based communication.

Driver Properties

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Packet Timing Graph

Enables logging of incoming packet timing to a graph.

This is primarily a diagnostic tool used to analyse data rate stability or troubleshoot irregular packet delivery from EZ protocol devices.

This tool helps with troubleshooting EZ device connectivity, and verifying consistent UDP transmission.

Developer Documentation

FreeD Driver

The **FreeD Driver** allows Disguise to receive positional and rotational camera-tracking data using the FreeD protocol.

FreeD is widely used in broadcast, virtual production, and augmented reality environments to transmit real-time camera movement information.

The driver enables Disguise to interpret this data and apply it to virtual cameras or automation workflows.

In most setups, the default driver configuration is sufficient. Adjust settings only when integrating hardware that uses custom ports, addressing, or communication parameters.

Uses

The **FreeD Driver** is used whenever Disguise needs to receive real-time camera tracking information from FreeD-compatible systems. It provides a direct way to map physical camera movement into the virtual scene.

This driver is especially useful when:

- Integrating broadcast camera-tracking systems that output FreeD.
- Driving virtual cameras in AR, xR, or virtual studio environments.
- Synchronising live camera movement with 3D content.
- Receiving lens parameters such as zoom, focus, or FOV.
- Testing or validating FreeD data streams during setup or troubleshooting.
- Working in mixed reality workflows where low-latency positional tracking is required.

By interpreting positional and rotational data accurately, the FreeD Driver helps ensure real-world camera motion aligns correctly with virtual content.

Driver Properties

> **Note**
>
> FreeD devices generally transmit data over UDP. Only a small number of user-facing settings are required for successful communication.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Enable packet timing graph

Logs the timing of incoming packets to a graph in the monitoring manager. Useful for diagnosing latency or dropped packets during setup or troubleshooting.

Developer Documentation

HMC Driver

The **HMC Driver** receives axis position data from systems using the **Hudson Motion Control (HMC)** protocol, originally developed for Hudson scenic and stage automation systems. The protocol (header `HATx`) can carry position, speed, motor-status, and cues-running information — Designer consumes only the position value for each axis.

In most cases, the default settings are suitable; adjustments are only required when your automation system or network uses non-standard ports, IP filters, or multicast addressing.

Uses

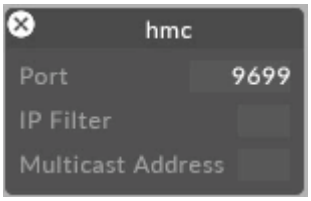
The **HMC Driver** is used when Disguise needs to receive axis position data from hardware that transmits using the HMC protocol. It enables real-time positional input from Hudson-style automation systems, which can be mapped to PositionAxis objects to drive content alignment or screen positioning.

This driver is particularly useful when:

- Integrating Hudson-controlled scenic automation hardware into a Disguise workflow.
- Receiving continuous axis position updates over UDP.
- Driving content alignment or screen positions from real-world stage motion.
- Monitoring or validating HMC data during setup or troubleshooting.

As HMC is lightweight and network-friendly, it is well suited for real-time automation where consistent, low-latency position updates are essential.

Driver Properties



This driver listens on UDP port **9699** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation



Kinesys Driver

Kinesys is a motion control system that provides **six axes of freedom** (X, Y, Z translation and X, Y, Z rotation). It sends positional and rotational data over the network to Disguise using the **UDP protocol**.

Designer supports both **Vector** & **K2** products.

> **Important**
>
> Ensure that your system is connected to the Kinesys controller via a **network switch or direct connection**.
>
> Routing through a firewall or router may cause data loss, latency, or inconsistent behaviour.

Uses

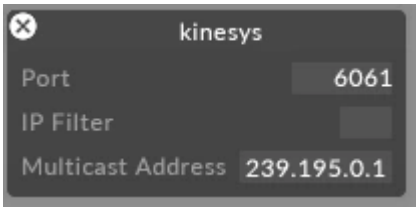
The **Kinesys Driver** is used to receive real-time motion data from Kinesys motors and controllers, allowing physical movement to drive automation or virtual objects inside Disguise. This enables seamless synchronisation between real-world rigging systems and virtual or media-driven elements.

This driver is especially useful when:

- Integrating Kinesys motion systems with virtual production or stage automation.
- Synchronising physical movement (hoists, trusses, screens) with media playback.
- Visualising real-world Kinesys motion in real time within Designer.
- Creating interactive or reactive environments that depend on live motor positions.
- Testing and validating axis behaviour before committing to full show programming.
- Monitoring Kinesys data streams during installation, rehearsal, or operation.

By receiving engine and parameter data directly from K2 or Vector, the driver allows each axis of a Kinesys system to be mapped to corresponding screen or object movement inside Disguise.

Driver Properties



This driver listens on UDP port **6061** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

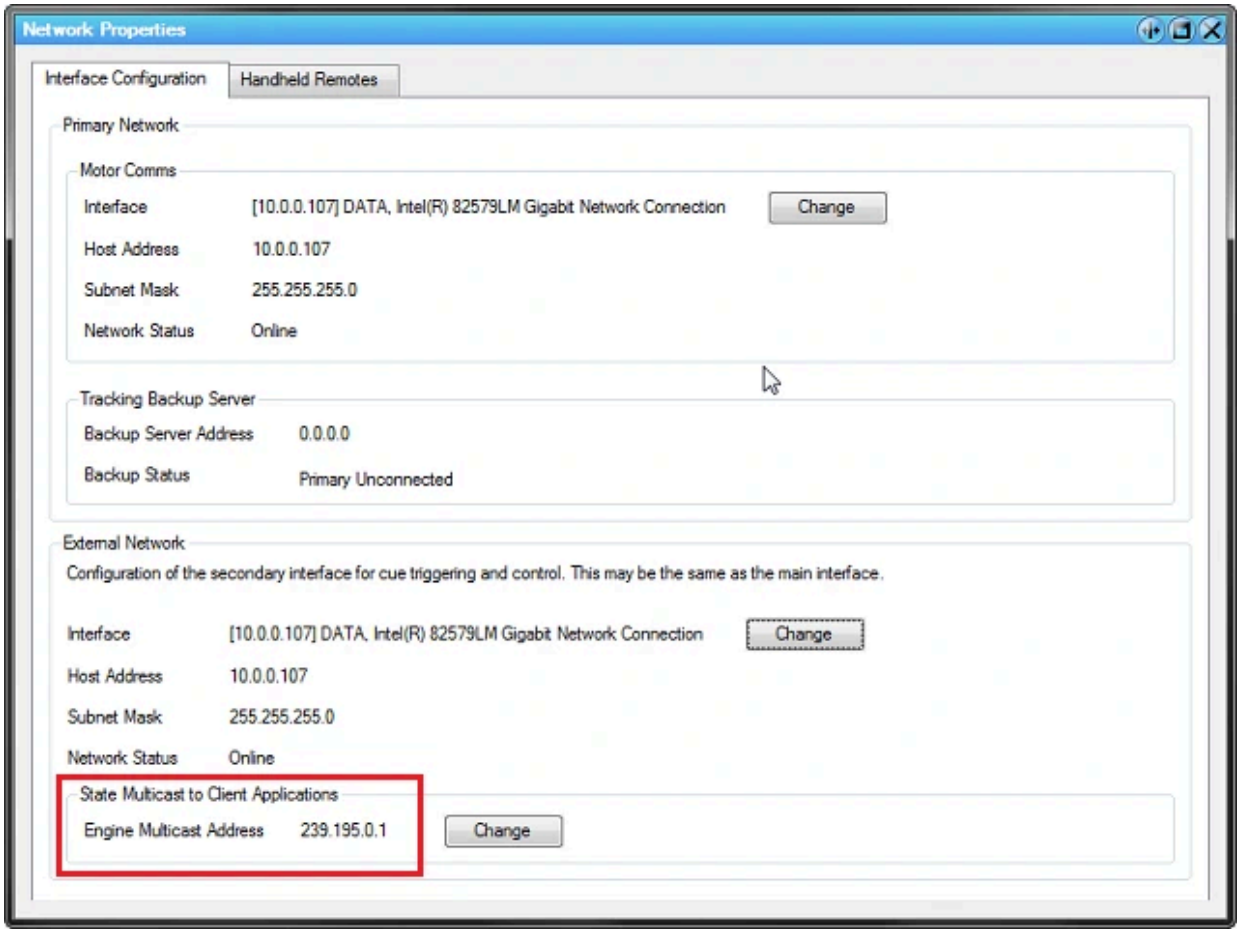
Finding Multicast and Parameter Addresses in Kinesys K2

Outside of Disguise, use the **K2 software** to locate the engine multicast address and parameter addresses. If you are unfamiliar with the K2 interface, consult your Kinesys representative or operator.

Engine Multicast Address

This is the address used by K2 to broadcast positional data.

It appears in the K2 interface as shown below:

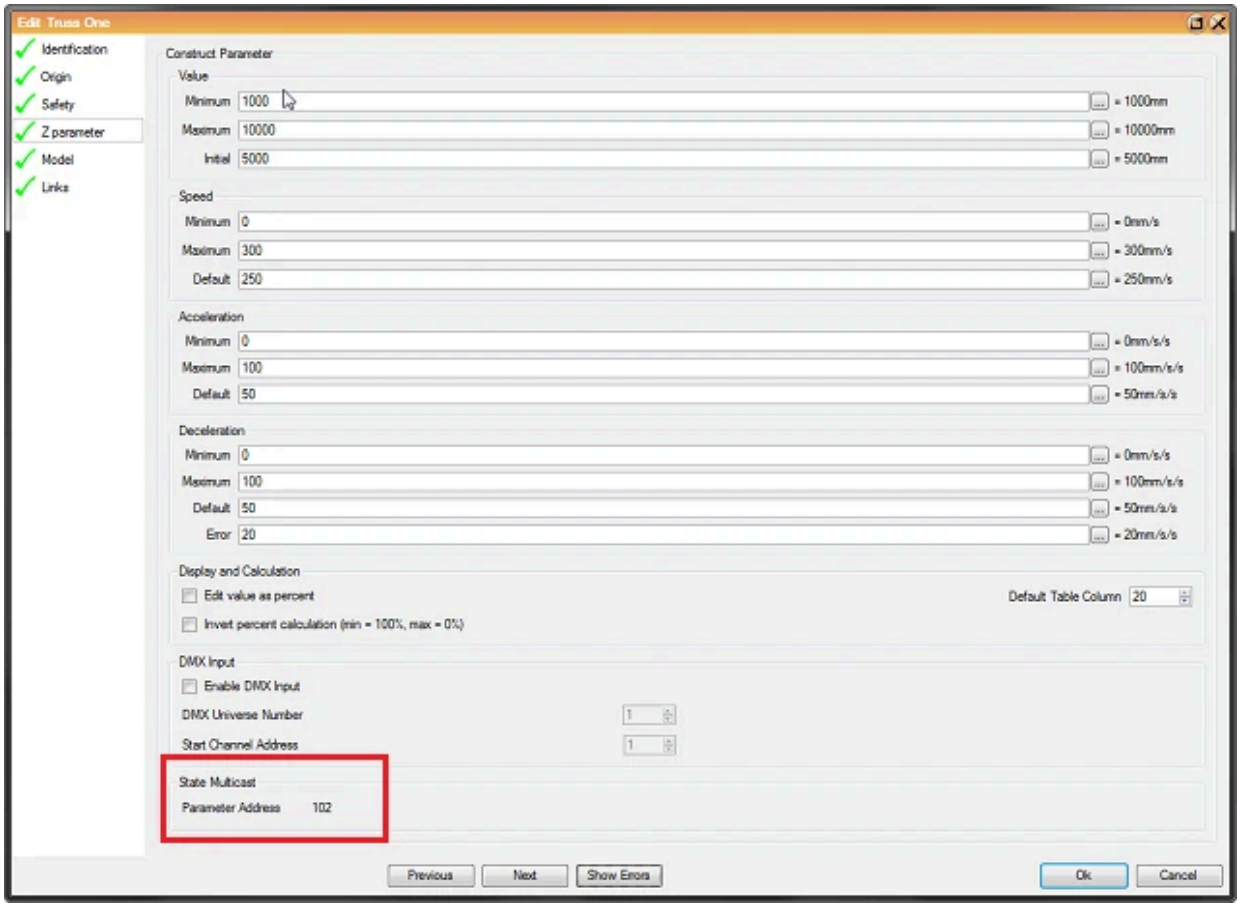


The Engine Multicast Address is highlighted in the red rectangle.

Parameter Address

Each motion parameter (e.g., X, Y, Z, rotation axes) has an individual **parameter address**.

This acts as the data identifier for each axis.



The Parameter Address is highlighted in the red rectangle.

Configuring the Kinesys Driver in Disguise

1. Enter the **Engine Multicast Address** into the **Multicast address** field of the Kinesys Driver.
2. Create a **ScreenPositionAxis** object for each axis you wish to control (e.g., Position X, Rotation Z). See Creating PositionAxis objects for more information.
3. Copy the **K2 Parameter Address** for each parameter and paste it into the **id** field of the corresponding ScreenPositionAxis.

Developer Documentation

LCPUSB Driver

> ⚠ **Specialist driver — limited support**
>
> The **LCPUSBDriver** is provided for specialist USB-based hardware integration and falls outside Disguise's generally-supported driver set. For new productions, we recommend using a network-based driver where possible.

The **LCPUSBDriver** is used to receive automation data from LCPUSB-compatible hardware connected directly to the machine via USB. This driver listens to data transmitted by the device and converts it into automation values that can be used within Disguise. As the driver handles USB communication directly, it does **not** require any network configuration such as ports, IP filters, or multicast settings.

In most cases, the default settings provide stable operation. Adjustments should only be made when working with custom hardware behaviour or filtering requirements.

Uses

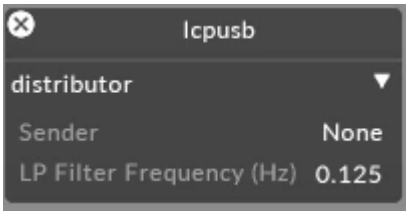
Use the **LCPUSBDriver** when working with automation devices that communicate directly over USB rather than through a network connection. The driver reads positional, sensor, or control data from LCPUSB-compatible hardware and makes those values available inside Disguise for automation, logic, or interactive behaviours.

This driver is especially useful when:

- Connecting USB-based motion controllers, sensors, or custom hardware interfaces.
- Receiving low-latency data from devices that do not support network protocols.
- Prototyping or testing custom automation hardware in a controlled environment.
- Integrating compact or embedded microcontroller devices into automation workflows.
- Applying smoothing to noisy signals using the built-in low-pass filter.
- Ensuring stable communication when working without network infrastructure.

As LCPUSB communicates directly via USB, it is ideal for setups where reliability, simplicity, or portability is required—such as laboratory environments, small installations, or rapid prototyping workflows.

Driver Properties



Sender

Displays the **active USB device** acting as the data source.

If no compatible LCPUSB device is connected, this field will show **None**.

Select the appropriate device from the dropdown if multiple supported devices are available.

LP Filter Frequency (Hz)

Applies a **low-pass filter** to the incoming automation data.

Use this to smooth noisy or rapidly fluctuating values from the hardware device.

- Higher values → less smoothing, faster response

The default value is suitable for most workflows, but it can be tuned depending on the behaviour of the connected hardware.

Developer Documentation

LDS Driver

The **LDS Driver** allows Disguise to receive camera and lens metadata such as **aperture** or **focus distance** from ARRI cameras that support the **Lens Data System (LDS)** — part of ARRI's Electronic Control System. LDS-capable lenses report their current settings to the camera body, which can then forward that data onto the network for Disguise to consume.

For the current list of LDS-compatible cameras and lenses, see the **ARRI Lens Data System FAQ**.

Designer supports LDS protocol versions **1.02** and **1.03**. Note that while the LDS protocol can carry a lot of additional camera and lens metadata, the Disguise LDS Driver currently exposes only the following features:

- focal length and the encoder zoom position value
- aperture, but not the encoder iris value
- focus distance and the encoder focus value

In Designer the LDS Driver is a **position driver** — it is configured inside a Position Receiver device rather than as a standalone device.

Uses

Use the LDS Driver when:

- Synchronising a Disguise virtual camera's aperture and focus distance to a live ARRI camera.
- Driving depth-of-field and focus effects on a virtual camera from the physical lens.
- Recording live aperture/focus-distance values alongside content for post-production reference.

Workflow

1. Connect your ARRI camera's LDS output to the Disguise machine so that lens data can be received on the network.
2. In Designer, add a **Position Receiver** device.
3. Inside the Position Receiver, add a new driver and select **LdsDriver**.
4. Configure the driver properties below to match your camera and network setup.
5. Map the incoming values (aperture, focus distance) to the axes or virtual camera parameters that need to track them. See Creating Driver Axes for how to wire the data through.

Driver Properties

This driver listens on UDP port **5432** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Sensor width (mm)

The camera sensor's width in millimetres.

Set this to match your camera body's sensor size so that the driver can interpret incoming LDS values correctly.

Open Tracking Sources

Configure or inspect the camera tracking data source.

Developer Documentation

Mo-Sys F4 Driver

The **Mo-Sys F4 Driver** is used to receive camera tracking data from Mo-Sys F4 systems.

This driver integrates directly with the Mo-Sys tracking workflow to provide real-time positional and rotational camera information for use in Disguise's virtual production, xR, and AR environments.

Most installations work reliably using the default settings. Adjust the driver properties only when working with multi-camera setups or when your Mo-Sys system requires specific configuration.

Uses

Use the Mo-Sys F4 Driver when receiving live camera tracking data from Mo-Sys F4 systems for virtual production, xR, and broadcast environments. The driver provides a direct link between the physical camera and Disguise, ensuring accurate alignment between real-world camera movement and virtual scene elements.

This driver is especially useful when:

- Integrating Mo-Sys F4 camera tracking for AR graphics, virtual studios, or xR workflows.
- Synchronising real camera movement with virtual content, environments, or set extensions.
- Working with multiple tracked cameras, each requiring unique identifiers.
- Calibrating or validating Mo-Sys positional and rotational data within Disguise.
- Ensuring lens and camera motion is correctly interpreted for real-time rendering.
- Monitoring tracking performance during live production or rehearsal.

The Mo-Sys F4 Driver allows Disguise to interpret incoming tracking data with minimal configuration, making it suitable for both high-end broadcast installations and flexible real-time production setups.

Driver Properties

This driver listens on UDP port **8051** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Enable packet timing graph

Logs the timing of incoming packets to a graph in the monitoring manager. This is useful for diagnosing latency or dropped packets.

Developer Documentation

MoveAI Driver

The **MoveAI Driver** integrates real-time markerless motion-capture data from MoveAI systems into Disguise.

MoveAI generates high-quality skeletal tracking data using computer vision, allowing performers' movements to drive virtual characters, animation systems, and automation workflows within a Disguise project.

The driver provides controls for how Disguise interprets and visualises incoming skeletal data, including optional automatic creation of tracked points for each joint.

The workflow includes configuring the **Position Receiver** device and adding a **Position Driver > MoveAI**.

Uses

Use the **MoveAI Driver** when bringing MoveAI's markerless performance capture into Disguise for real-time animation, visualisation, or interactive control.

This driver is especially useful when:

- Driving **virtual characters** or digital doubles using live performer movement.
- Controlling **scene objects, effects, or logic** with joint-based motion.
- Integrating MoveAI tracking into **AR, xR, or virtual production** workflows.
- Previewing live skeletal poses inside Disguise during rehearsal or setup.
- Creating interactive systems where body motion triggers events or behaviours.
- Recording movement sequences for Previz or real-time playback.

MoveAI's skeletal data is well-suited for high-precision movement, full-body performance capture, and real-time character animation.

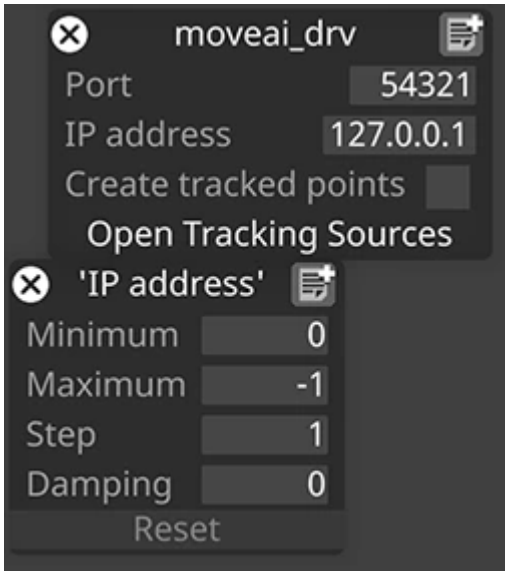
Workflow

Connecting MoveAI to Disguise involves both Designer-side and MoveAI-side configuration:

1. **Add a** Position Receiver device in Disguise.
2. **Add a MoveAI Position Driver** to the Position Receiver — select **MoveAI** from the driver picker.
3. **Configure the driver** — see Driver Properties below.
4. **Configure MoveAI** — in MoveAI Studio/Live, enable network streaming, set the **Destination IP** to the Disguise machine, and ensure the **output port** matches the **Port** property below.

5. **Verify the connection** — check the Position Receiver status to confirm packets are arriving. With **Create tracked points** enabled, skeleton joints appear in the Stage tree and update in real time.

Driver Properties



Port

Default: **54321**

The UDP network port on which Disguise receives MoveAI skeleton data.

This must match the port configured in the MoveAI streaming settings.

IP address

Specifies the **source IP address** of the MoveAI system streaming skeletal data.

Set this if you want to filter incoming data to a specific device — leave blank to accept data from any IP on the network.

Create tracked points

When enabled, Disguise automatically creates a **Tracked Point** for every joint in the MoveAI skeleton.

This allows you to:

- View and inspect each joint position directly within Disguise.
- Reference individual joints in **automation**, **logic**, or **timeline** sequence.

- Drive scene objects, alignment markers, or VFX elements based on skeletal data.
- Visualise the entire body structure within the stage environment.

Disable this option if:

- You only need body-level/global movement.
- You want to reduce scene clutter.
- You want to optimise performance for complex scenes.

Open Tracking Sources

These settings define how incoming tracking values are processed before being applied to axes or objects.

IP address

Specifies which MoveAI source IP is used for this tracking entry.

Minimum / Maximum

Sets the **input value range** used to normalise incoming motion data.

Useful when calibrating individual joints or limiting movement ranges.

Setup

Configures the **initial alignment** or offset between the incoming data and your scene setup.

Damping

Reduces sudden or rapid movements by applying smoothing to the incoming data.

Useful for stabilising jittery joint motion.

Developer Documentation

Movecat Driver

The **Movecat Driver** receives automation data from Movecat motion control systems. Movecat systems are commonly used for stage hoists, kinetic movement, and automation elements that require precise positional and motion feedback. The driver allows Disguise to receive real-time movement data over the network and use it to drive automation axes within a project.

In most installations, the default driver settings are sufficient. Configuration changes should only be made if your Movecat system uses custom network parameters or you need to limit incoming data to a specific device.

Uses

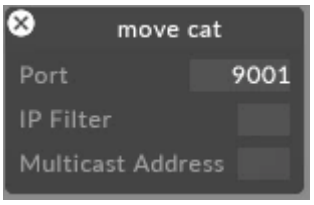
Use the Movecat Driver when integrating Movecat motion control systems with Disguise to synchronise real-world movement with virtual or media-driven elements. Movecat systems provide precise positional and motion feedback from hoists, winches, and kinetic stage machinery, allowing Disguise to react dynamically to physical movement in real time.

This driver is especially useful when:

- Receiving live positional data from Movecat hoists, trolleys, or kinetic systems.
- Synchronising virtual objects or content with physical scenic movement.
- Visualising real-world motion inside Designer for alignment, rehearsal, or pre-programming.
- Driving automation axes based on continuous movement feedback.
- Monitoring multiple Movecat devices during complex motion cues.
- Ensuring media, lighting, and virtual elements track accurately with stage automation.

Thanks to Movecat's reliable high-frequency updates, the driver is well-suited for productions requiring smooth, accurate motion synchronisation between physical and virtual systems.

Driver Properties



This driver listens on UDP port **9001** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation

NatNet Driver

The **NatNet Driver** receives real-time tracking data from OptiTrack systems using the NatNet protocol. NatNet is a widely used motion-capture streaming API that transmits rigid body positions, markers, skeletons, and metadata over a network for use in virtual production, xR, and real-time environments.

The driver allows Disguise to subscribe to an OptiTrack server and stream incoming tracking data directly into your project. Most setups require only the correct multicast address and data port, while additional connection information helps verify communication and server status.

Uses

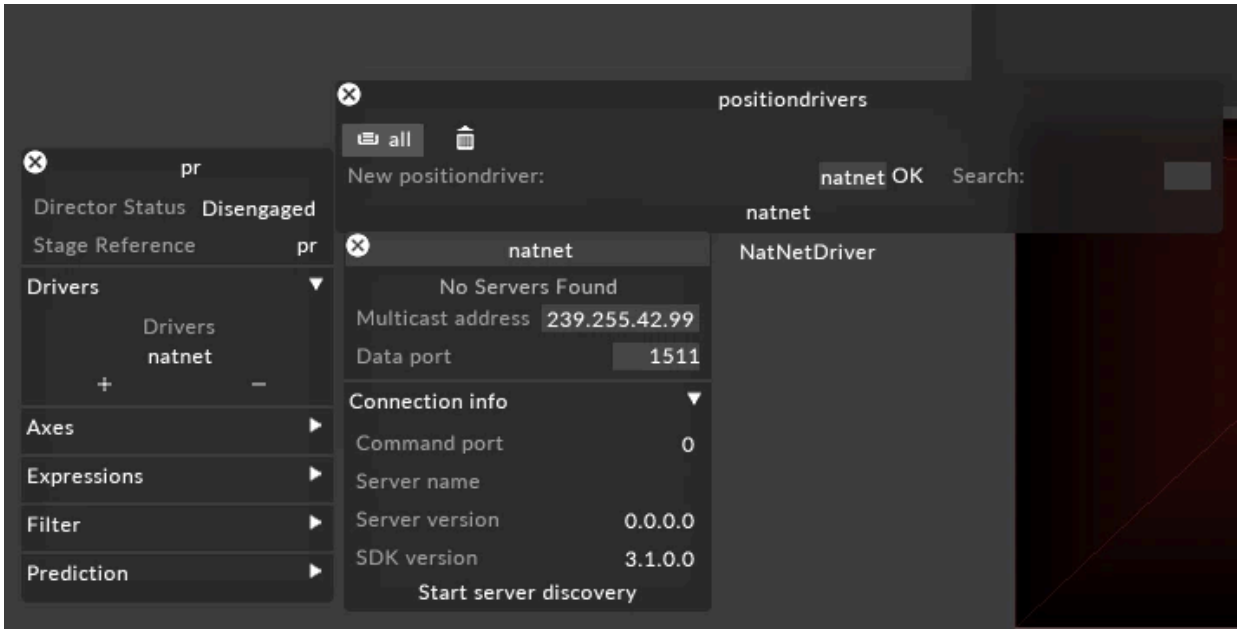
Use the NatNet Driver when integrating OptiTrack motion-capture data into Disguise for virtual production, xR workflows, or real-time automation. The driver streams rigid body tracking data directly from Motive, allowing virtual objects, cameras, characters, or environments to follow real-world motion with high precision.

This driver is especially useful when:

- Bringing OptiTrack rigid body tracking into virtual production or xR scenes.
- Driving virtual cameras using motion-capture camera rigs.
- Tracking performers, props, or handheld objects for real-time interaction.
- Synchronising physical motion with 3D environments or media playback.
- Testing or validating NatNet streaming using Motive's live mocap data.
- Monitoring server connection details (versions, ports, discovery status) to ensure stable network communication.

As NatNet supports high-frequency, low-latency data streaming, this driver is well suited for fast, precise tracking where real-world motion must match virtual content accurately.

Driver Properties



Multicast Address

Specifies the **multicast group address** from which NatNet tracking data is received.

This should match the multicast address set in your OptiTrack Motive configuration.

Data Port

The **UDP port** on which NatNet sends its motion data stream.

Ensure this matches the “Data Port” configured in Motive.

Connection Info

This section displays diagnostic information about the connection between Disguise and the NatNet server.

- **Command Port** — The port used for command/control communication with the NatNet server.
- **Server Name** — The name of the connected Motive/OptiTrack server.
- **Server Version** — The NatNet server version currently in use.
- **SDK Version** — The NatNet SDK version supported by the driver.
- **Start Server Discovery** — Initiates a scan to automatically detect available NatNet servers on the network.

Use this information to verify that Disguise is correctly connected to your OptiTrack system and running compatible versions of Motive/NatNet.

Developer Documentation

Navigator Driver

The **Navigator Driver** receives axis data from FTSI Navigator motion control systems.

Navigator sends real-time positional and velocity information over UDP, which Disguise converts into automation axes. The driver requires the incoming data to follow a specific packet structure to ensure correct parsing and axis updates.

Uses

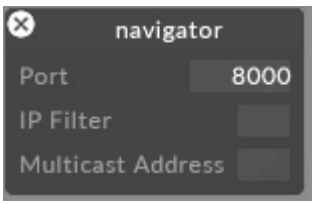
Use the Navigator Driver when integrating FTSI Navigator motion control systems with Disguise. The driver converts real-time positional and velocity data into automation axes, allowing physical movement to drive virtual objects, scenic elements, or synchronised media playback.

This driver is especially useful when:

- Receiving live axis data from FTSI Navigator-controlled winches, hoists, or tracked systems.
- Synchronising virtual objects or content with physical stage machinery.
- Visualising Navigator motion data inside Designer for rehearsal or alignment.
- Driving complex automation behaviours based on continuous motor position and velocity.
- Testing or validating Navigator output formatting during setup or troubleshooting.
- Handling multi-axis systems where several motion channels are streamed in a single packet.

As Navigator supports high-frequency updates, this driver is well suited for accurate, real-time motion tracking in media-driven or interactive production environments.

Driver Properties



This driver listens on UDP port **8000** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

FTSI Navigator UDP Packet Format

Designer requires the Navigator system to send data in a specific format. Each axis should send data in the following format.

```
ID:POS,VELOCITY;
```

ID = Axis ID

POS = Axis position as a floating point number

VELOCITY = Axis velocity as a floating point number

Example (single axis)

```
1:-24.034,1.323;
```

Example (multiple axes in a single message)

Navigator messages may contain multiple axis entries in sequence:

```
ID:POS,VELOCITY;ID:POS,VELOCITY;ID:POS,VELOCITY;.....
```

```
1:-24.034,1.323;2:5.346,12.098;3:9.064,2.511;
```

> ⚠ **Warning**
>
> A common formatting mistake is omitting the **final semicolon**.
>
> If the last `;` is missing, the final axis entry **will not be processed** by Disguise.

Developer Documentation



Ncam Driver

The **Ncam Driver** receives real-time camera tracking data from an Ncam system.

Ncam is widely used in virtual production, AR, and broadcast environments to provide high-precision positional, rotational, and lens metadata.

The driver connects directly to the Ncam server using the configured IP address and port, translating incoming data into automation values within Disguise.

The driver also includes diagnostic tools to help monitor packet timing and assess the health of the network data stream.

Uses

Use the **Ncam Driver** when you need to bring real-time camera tracking information from an Ncam system into Disguise. This enables virtual cameras, AR graphics, and xR scenes to remain perfectly aligned with the physical camera.

This driver is particularly useful when:

- Integrating Ncam tracking for **AR**, **xR**, or **virtual studio** productions.
- Receiving **positional, rotational, and lens metadata** from the Ncam server.
- Ensuring accurate spatial alignment between real and virtual cameras.
- Monitoring the performance and stability of the tracking data stream.
- Diagnosing issues such as packet loss, jitter, or inconsistent update rates.
- Synchronising tracked camera movement with realtime content playback.

Whether you are using Ncam for high-end real-time rendering or simple alignment tasks, the driver provides a direct and reliable link between Ncam hardware and Disguise.

Driver Properties

IP address

Specifies the **IP address** of the Ncam server supplying tracking data.

This must match the address configured on the Ncam system.

Port

The **Port** used by Ncam to transmit tracking data to Disguise.

Set this to the same port number configured in the Ncam server settings.

Enable packet timing graph

Enables detailed logging and visualisation of incoming packet timing.

Useful for diagnosing:

- dropped or delayed packets
- inconsistent tracking data
- network jitter
- timing irregularities in the data stream

When enabled, Disguise displays a timing graph to assist with troubleshooting.

Developer Documentation

NG360 Driver

The **NG360 Driver** receives automation data from NG360 encoder devices.
These devices typically provide rotational or positional encoder values that can be used to drive automation axes inside Disguise. The driver supports both standard network configuration and additional NG360-specific properties used to identify the encoder, define the serial communication port, and manage axis distribution.

Most installations operate correctly with the default configuration. Update the settings only when your NG360 device is using custom addressing or connected via a specific COM port.

Uses

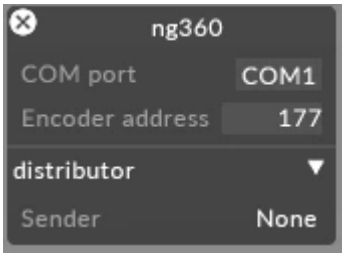
Use the NG360 Driver when integrating NG360 encoder hardware that outputs precise rotational or positional data for automation workflows inside Disguise. NG360 devices are commonly used in mechanical systems, robotics, motion rigs, optical encoders, and installations requiring accurate real-time movement tracking.

This driver is especially useful when:

- Receiving continuous encoder values for driving automation axes.
- Synchronising virtual objects or content with physical rotation or motion.
- Monitoring encoder behaviour during rehearsal, calibration, or system testing.
- Differentiating between multiple NG360 devices through unique encoder addresses.
- Using serial-connected NG360 units when working without network infrastructure.
- Creating feedback-driven systems where encoder movement influences logic or scene behaviour.
- Controlling or validating mechanical movement in interactive or media-driven installations.

As NG360 devices deliver highly stable encoder readings, this driver is well suited for workflows that require precise rotation, incremental motion tracking, or synchronisation between physical hardware and virtual content.

Driver Properties



Network Properties

Port

The **UDP port** on which NG360 data is received.

Modify this if your encoder system broadcasts on a non-default port.

IP Filter *(optional)*

Limits incoming data to a specific **source IP address**.

Useful when multiple devices are broadcasting on the same network or to ensure data is received only from the intended encoder.

Multicast Address *(optional)*

The **multicast group** from which NG360 data is transmitted.

Set only if your system is explicitly configured for multicast routing.

NG360-Specific Properties

Encoder Address

Identifies the encoder address that this driver instance should listen to.

Use this when multiple encoders are active or when addressing is required to differentiate units on the network.

COM Port

Specifies the **serial COM port** used by the NG360 device when connected locally.

Required when the NG360 encoder communicates via USB/serial rather than over the network.

Distributor

Controls how incoming NG360 encoder data is routed to automation axes inside Disguise.

In most cases, the default option (**None**) is sufficient and passes values directly to the configured axes.

Some versions of the interface may display a **Sender** field, which represents the internal routing method used by the distributor.

If **None** is the only available option, no alternative routing modes are supported for this driver.

Use this setting only when working with advanced setups that require custom routing or value distribution.

Developer Documentation

OSC Driver

The **OSC Driver** receives Open Sound Control (OSC) messages from external devices or applications and converts them into automation values within Disguise. OSC is a flexible, network-based protocol widely used in show control, lighting, interactive media, audio systems, and real-time visual environments.

The driver exposes two key properties: the OSC device that provides the messages, and an optional address filter that determines which OSC messages should be processed.

Uses

Use the OSC Driver when you need to bring real-time OSC messages into Disguise to control automation axes, trigger behaviours, or drive interactive elements. OSC is a flexible protocol used across creative, live, and interactive industries, making this driver ideal for workflows that rely on external systems sending numerical or event-based data.

This driver is especially useful when:

- Driving automation axes from software such as TouchDesigner, Max/MSP, QLab, Unreal, Unity, Ableton, or other OSC-capable tools.
- Triggering cues, animations, or logic events through OSC messages.
- Integrating interactive installations where sensors, cameras, or custom scripts output OSC.
- Bridging media servers, lighting consoles, sound systems, or control devices into Disguise.
- Prototyping and testing real-time data streams without specialised hardware.
- Filtering and routing OSC messages when multiple devices share the same OSC network.

As OSC supports arbitrary data structures and address paths, the driver is well-suited for custom workflows, creative prototyping, and interactive designs where flexible control is required

Driver Properties



OSC Device

Selects the **OSC device** that Disguise should listen to.

This may represent:

- A software source (e.g., TouchDesigner, QLab, Max/MSP, Unreal).
- A hardware controller that outputs OSC messages.
- Any OSC-capable system configured as a sender.

Disguise will receive all messages routed from the chosen device, subject to the address filter.

Address Filter

Allows you to specify the **OSC address path prefix** for messages Disguise should process.

- Enter the OSC address *excluding the axis name*.
- Leave this field **empty** to receive **all OSC messages**.

Examples:

- `/d3/oscspr/`
- `/stage/pos/`
- `/camera/zoom/`

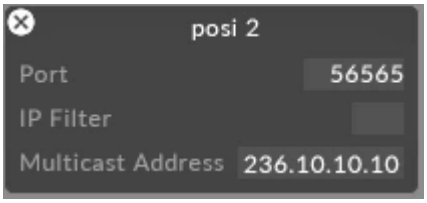
This filter is useful for isolating a subset of OSC messages when multiple systems or scripts share the same OSC network.

Developer Documentation

PosiStageNet Driver

The **PosiStageNet (PSN) Driver** receives real-time positional data transmitted using the PosiStageNet protocol.
PSN is a widely adopted standard in the live events and motion control industry, providing accurate 3D position and velocity data for automation, tracking, and synchronisation workflows. Disguise uses this information to drive automation axes, track objects, or integrate motion data into virtual production environments.

Most installations function correctly with the default configuration. Adjust network settings only if your PSN system uses custom addressing or multiple tracking devices operate on the same network.



Uses

Use the PosiStageNet (PSN) Driver when integrating real-time positional data from motion tracking systems that support the PSN protocol. PSN provides precise 3D coordinates and velocity information, making it ideal for synchronising virtual objects, media, or automation with physical movement on stage.

This driver is especially useful when:

- Tracking performers, props, cameras, or scenic elements in live events.
- Synchronising virtual production or xR environments with real-world movement.
- Controlling automation axes using continuous 3D positional data.
- Integrating tracking workflows from systems such as BlackTrax, Stype, zactrack, or any PSN-capable emitter.
- Driving interactive or reactive content that needs to follow real-time stage positions.
- Aligning lighting, visuals, or projection-mapped elements with tracked objects.
- Monitoring, testing, or validating incoming PSN data streams during setup or calibration.

As PSN is highly accurate and low-latency, it is widely used across touring productions, installations, theatres, broadcast studios, and virtual production stages where motion-to-media synchronisation is essential.

Driver Properties

This driver listens on UDP port **56565** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation



Posital Driver

The **Posital Driver** receives data from Posital encoders, supporting multiple encoder inputs through polling and network communication. Posital encoders are commonly used for motion tracking, position feedback, and automation workflows requiring precise rotational or linear encoder measurements.

The driver allows configuration of encoder lists, polling intervals, timestamp behaviour, and debugging options. It also provides functions for adding and removing encoders dynamically.

Driver Properties

Bridge IP

The IP address of the **Posital bridge device** that aggregates encoder data or communicates with multiple encoders on the network.

Encoder IDs

A list of encoder **identifiers** associated with this driver. Each ID corresponds to a specific Posital encoder device.

Used together with the `ips` property when addressing multiple encoders.

Encoder IPs

A list of **IP addresses** for each encoder connected to the system.

Each entry pairs with the corresponding encoder ID in the `ids` list.

Polling Interval (ms)

Defines how frequently (in milliseconds) the driver polls encoders for updated position data.

Shorter intervals produce faster updates but increase network and processing load.

Timestamp Mode

Selects the timestamp source used for encoder data.

Options include:

- **0 — Time of Receipt**
  Timestamp applied when Disguise receives the packet.

- **1 — Incoming Timestamp**
  Uses timestamp embedded in the encoder's transmitted data.
- **2 — Time of Poll**
  Timestamp generated at the moment the driver polls the encoder.

Choose the mode based on your synchronisation workflow and encoder capabilities.

Trace Logging

Enables or disables diagnostic tracing of encoder communication.

Options:

- **0 — Off**
- **1 — On**

Useful for debugging encoder communication or timing issues.

Developer Documentation

Position Drivers

A **PositionDriver** is an object in Designer that decodes positional data transmitted from a motion control system. Typically, each driver is bespoke to a particular system or protocol, translating its proprietary data stream into values that Designer can apply to `PositionAxis` objects.

For the architectural context — how a PositionDriver fits between a `PositionReceiver` device and `PositionAxis` objects — see Motion Control Systems.

Supported position drivers

The following drivers are supported for automation integration with Designer. Each entry links to its full driver reference page.

- Camera Tracker Tester — simulated camera-tracking data for development and validation.
- CameraTrackerObservationsTester — validates observation data received from external camera-tracking systems.
- CPS Driver — CPS automation systems (legacy driver).
- D3SSI Driver — internal D3SSI positional tracking driver.
- DCS Driver — DCS stage automation and control systems.
- DMX Screen Position Driver — generic positional data over DMX.
- Ez Driver — generic EZ-series data/DMX device driver.
- FreeD Driver — FreeD camera-tracking protocol.
- HMC Driver — Hudson HMC motion-control protocol.
- Kinesys Driver — Kinesys Vector and K2 rigging/motion systems (**manufacturer**).
- LDS Driver — LDS positional input.
- LCPUSB Driver — USB-based industrial PC controller (inclinometer).
- Mo-Sys F4 Driver — Mo-Sys F4 tracking hardware.
- MoveAI Driver — real-time markerless motion-capture data from MoveAI systems.
- Movecat Driver — Movecat kinetic systems (**manufacturer**).
- NatNet Driver — tracking data using the NatNet protocol.
- Navigator Driver — Tait Navigator automation (**manufacturer**).
- Ncam Driver — Ncam camera-tracking for virtual production.
- NG360 Driver — positional data from NG360 tracking systems (**manufacturer**).
- OSC Driver — positional data routed over OSC.
- PosiStageNet Driver — performer/object motion via PSN (**protocol**).
- Posital Driver — Posital encoder/sensor positional input.
- PRG Driver — UDP receiver for PRG screen automation protocol.

- PRG Stage Command Driver — PRG Stage Command system (**manufacturer**).
- RTTrPM Driver — RTTrPM real-time BlackTrax tracking (**protocol**).
- Simotion Driver — Siemens SIMOTION controllers (**manufacturer**).
- Skeleton Tracker Tester — simulated skeleton tracking.
- SKV Driver — SKV control system driver.
- Stage Kinetics MoveCat Driver — MoveCat motion via Stage Kinetics protocol.
- STS Driver — STS automation hardware (**manufacturer**).
- Stype Driver — Stype camera-tracking data.
- Trackmen Driver — Trackmen camera tracking.
- Unican Open Cue Driver — Open Cue automated cueing (**manufacturer**).
- Vicon Datastream Driver — Vicon tracking data stream.
- VisualAct Driver — VisualAct winches and lifts (**manufacturer**).

PRG Driver

The **PRG Driver** allows Disguise to receive positional or automation-related data over UDP using the **PRG Screen Automation protocol**.

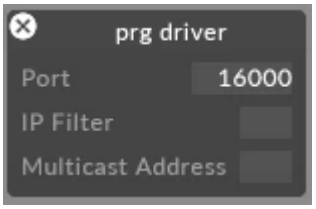
This protocol is used in certain PRG workflows for sending screen-related or positional information, and is separate from the more advanced **PRG Stage Command System (SCS)** protocol.

Use this driver when your PRG system outputs lightweight positional data for tasks such as:

- Tracking or aligning moving screens
- Receiving simple positional feedback
- Triggering state changes based on PRG data

This driver does *not* interface with the PRG Stage Command System. For SCS-based automation (winches,hoists, deck movement, etc.), use the PRG Stage Command driver instead.

Driver Properties



This driver listens on UDP port **16000** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation

PRG Stage Command Driver

The **PRG Stage Command Driver** enables Disguise to receive real-time motion-control data from the **PRG Stage Command System (SCS)**, PRG's flagship automation platform used to control winches, hoists, tracks, revolves, lifts, and other multi-axis scenic elements.

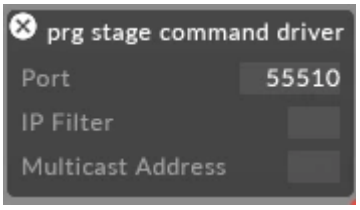
Unlike the simpler PRG Screen Automation protocol, the **Stage Command System** provides structured, high-resolution positional data and operational status for multiple axes of movement.
This driver should be used whenever your production relies on PRG automation hardware controlled through SCS and needs Disguise content to synchronise with the actual physical motion on stage.

Typical use cases include:

- **Flying screens or LED walls** operated by PRG SCS
- **Automated scenic pieces** (portals, set pieces, moving architecture)
- **Deck automation** such as **tracks, elevators, and revolves**
- **Multi-axis movement** requiring accurate positional feedback
- **Synchronising media playback with live stage motion**
- **Reacting to PRG machinery state changes** as the machinery reaches specific positions or states

The PRG Stage Command Driver listens for structured SCS network messages and exposes them in Disguise as automation axes that can drive tracking, camera calibration offsets, or timeline logic.

Driver Properties



Port

The UDP port that the PRG SCS system outputs its automation data to.

This must match the port configured by the PRG automation team.

IP Filter

The specific SCS controller IP address that data will be accepted from (optional).

Useful in large network environments or multi-controller setups.

Multicast Address

The multicast group the SCS system is publishing positional data to (optional).

Required only if your PRG SCS configuration uses multicast distribution.

Additional Notes

- SCS may expose **multiple axes**, each corresponding to a physical device or motion group.
- Axes can be mapped in Disguise to drive screen positions or content tracking.
- For simple PRG UDP feeds *not* originating from SCS, use the standard PRG Driver, not this one.

Developer Documentation

RTTrPM Driver

RTTrPM (Real-Time Tracking Protocol – Motion) is an open-source protocol used to transmit real-time tracking information. It is the protocol used by **BlackTrax** and several other tracking systems.

Disguise systems can use RTTrPM data to drive real-time positional information inside a project, enabling content to follow performers, props, cameras or other tracked objects.

The RTTrPM Driver is a type of Position Receiver and is added through the standard workflow for a Position Receiver device.

Once an RTTrPM Position Receiver has been added to the project, Disguise can receive tracking data from any third-party manufacturer that supports the RTTrPM specification.

For a current list of devices that support RTTrPM, visit:
https://rttrp.github.io/RTTrP-Wiki/index.html

What RTTrPM Data Includes

RTTrPM provides a structured set of motion-related values. Depending on the tracking system, an RTTrPM stream may include:

- **3D position** (X, Y, Z coordinates)
- **Orientation** (directional facing or rotation of the tracked object)
- **Tracking confidence or quality metrics**
- **Unique object identifiers**
- **Timestamps** for synchronising data across systems

Not all devices output every field, but all RTTrPM-compatible systems provide core 3D positional data.

Uses

- **Performer and Object Tracking**

  RTTrPM can drive content that needs to follow a moving performer, prop or scenic element. This is commonly used for interactive media, spatial content alignment and dynamic projection mapping.

- **Camera Tracking**

  When used with compatible tracking systems, RTTrPM can feed positional data into Disguise for virtual production or AR workflows that require accurate camera movement.

- **Multi-Object Support**

  RTTrPM streams may include several tracked objects at once. These appear in Disguise as individual axes or tracked points, enabling multi-character or multi-prop workflows.

- **Confidence Handling**

  Some systems provide tracking confidence values. These can be used within Disguise to influence logic, blending, or fallback behaviour.

- **Coordinate Alignment**

  Ensure the tracking system's coordinate space matches the Disguise stage space. Adjustments may be made within the Position Receiver or via project calibration.

Driver Properties

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation

Siemens SIMOTION Driver

The **Siemens SIMOTION Driver** allows Disguise to receive positional data from **Siemens SIMOTION** motion controllers. Siemens SIMOTION systems are commonly used in industrial automation, robotics, and precision motion-control applications.

When connected to Disguise, they can supply axis position information that drives content alignment or positional offsets.

We recommend using the default driver settings unless your system requires a specific network configuration.

Uses

Use the Siemens SIMOTION Driver when your workflow includes:

- Motion-controlled scenic elements driven by Siemens SIMOTION hardware.
- Linear or rotary axes where real-world motion must inform content movement in Disguise.
- Industrial or engineering-grade automation systems integrated into a live environment.
- Synchronising content with machinery, such as lifts, tracks, arms, or precision-driven components.

Siemens SIMOTION is typically used in environments where **high positional accuracy** and **deterministic motion** are required. The driver allows these axes to be represented inside Disguise as automation sources.

Driver Properties



ID prefix

If set, this string is added to the beginning of each incoming axis ID.

This is useful when naming conventions are required, or when working with multiple SIMOTION sources whose axis identifiers need differentiation.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation

Skeleton Tracker Tester

The **Skeleton Tracker Tester** is a diagnostic and development tool within Disguise used to test and validate skeleton-based tracking workflows. It allows users to supply or simulate skeletal tracking data for evaluation, calibration, and content testing without requiring a live external tracking system.

This tool is commonly used during setup or development to confirm that skeleton data is mapped correctly, that joints behave as expected, and that content responds accurately to tracked body motion.

Uses

Use the Skeleton Tracker Tester when you need to:

- **Test skeletal tracking behaviour** without a live tracking feed
- **Preview how content reacts to tracked body joints**, e.g. head, hands, feet, or custom markers
- **Debug or validate joint mapping** before integrating a real tracking system
- **Apply positional and rotational offsets** to align a skeleton with stage coordinates
- **Prototype motion-driven content** when hardware is not available
- **Verify skeleton compatibility** with your project's tracking configuration

This tool is especially helpful for virtual production, AR workflows, and interactive performances that rely on rigid body-based tracking.

Driver Properties

Origin Offset

A positional offset applied to the skeleton's source camera position.

Use this when aligning the skeleton's origin with the Disguise stage space or adjusting its placement relative to your scene.

Origin Rotation

A rotational offset applied to the skeleton's source camera orientation.

Useful for correcting orientation mismatches or adapting the skeleton to a different coordinate basis.

Source Skeleton

The skeleton asset used as the input data source.

This determines which joint hierarchy and naming structure the tester will emulate or interpret.

Developer Documentation

SKV Driver

The **SKV Driver** enables Disguise to receive positional and status data from SKV-compatible motion or automation systems.

It exposes incoming motor positions and system state information as axes inside Disguise, allowing content to follow physical movement or respond to hardware status changes.

This driver also includes optional smoothing controls to stabilise noisy or rapidly changing position data.

Uses

Use the SKV Driver when your production involves:

- Motion-controlled scenic elements driven by SKV-compatible systems.
- Receiving multiple motor positions as tracked axes inside Disguise.
- Filtering or smoothing incoming positional values to ensure stable content motion.
- Monitoring automation system status for safety logic or system health.
- Synchronising content with real-world mechanical movement.

The driver is suitable for both high-precision tracking and general-purpose automation integration.

Driver Properties

Interface

UDP Listen Port

The UDP port on which Disguise listens for incoming SKV data. This must match the sending configuration of the SKV controller.

Smoothing

These properties help stabilise the positional data coming from SKV motors, especially if the values update rapidly or contain noise.

Use Smoothing

Enables or disables smoothing for incoming motor data.

Jump Threshold

The maximum allowed instantaneous change before the system treats the update as a “jump.”

Useful for preventing sudden spikes in the data from affecting content.

kP / kI / kD / kF

PID/F filter parameters used to shape how smoothing behaves.

These values determine how strongly the driver reacts to changes in incoming data, allowing you to fine-tune responsiveness versus stability.

Status

Motors Received

The number of motor channels currently being received from the SKV controller.

Status

A numerical code representing the general state of the SKV data connection or controller.

Interpretation may vary depending on the originating SKV system.

Developer Documentation

Stage Kinetics MoveCat Driver

The **Stage Kinetics MoveCat Driver** allows Disguise to receive positional and status data from **MoveCat** stage automation systems. MoveCat systems are widely used for precise movement of hoists, lifts, trolleys and other scenic elements in live events.

Using this driver, Disguise can synchronise content with real-world motion or drive timelines based on incoming axis positions.

We recommend using the default driver settings unless your MoveCat or network configuration requires specific adjustments.

Uses

Use the Stage Kinetics MoveCat Driver when your production includes:

- **MoveCat-controlled hoists or chain motors**
- **Tracking or synchronising content to flown scenic objects**
- **Dynamic video surfaces** that move in 3D space
- **Show automation systems** where Disguise must follow or react to live mechanical movement
- **Multi-axis movement** that needs to be represented inside Disguise in real time

This driver enables accurate content alignment and automation-driven behaviour whenever MoveCat is part of the show environment.

Driver Properties

This driver listens on UDP port **16000** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Protocol version

Specifies the MoveCat protocol version used by the driver.

The default setting is **V2**, which is the current standard for MoveCat automation data.

Only change this if your MoveCat installation requires a different protocol version.

Developer Documentation



STS Driver

The **STS Driver** allows Disguise to receive position or status information from systems using the **STS automation protocol**. STS is used in certain stage-control environments to transmit lightweight automation data for moving scenic elements, providing real-time positional updates that can be used to drive content alignment inside Disguise.

We recommend using the default driver settings unless your installation requires specific network configuration changes.

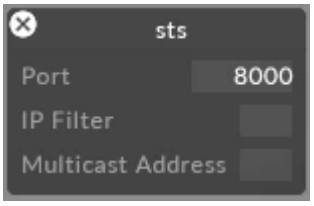
Uses

Use the STS Driver when your production includes:

- Basic stage automation systems outputting STS position data.
- Moving scenic elements such as lifts, trolleys, or simple motorised objects.
- Synchronising content with known positions of mechanical elements.
- Triggering content changes based on automation movement.
- Lightweight or legacy automation hardware that outputs STS rather than a more complex protocol.

STS is suitable for productions where motion data is relatively simple, and where Disguise needs only positional or movement status rather than advanced multi-axis automation information.

Driver Properties



This driver listens on UDP port **8000** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation



Stype Driver

The **Stype Driver** allows Disguise to receive real-time camera-tracking data from **Stype** systems, including Stype RedSpy, StypeLand and other encoders using the Stype protocol. Stype provides precise camera position, rotation, lens metadata and timing information for virtual production, augmented reality and camera-tracked workflows.

We recommend using the default driver settings unless your Stype system or network setup requires custom configuration.

Uses

Use the Stype Driver when your workflow requires:

- **Real-time camera tracking** for xR, AR or virtual production
- **Accurate lens metadata** including zoom, focus and distortion parameters
- **Synchronising CG environments** with live-action camera movement
- **Virtual set extensions** that follow the tracked camera
- **Motion capture or encoded crane tracking** (e.g., Stype's encoded heads and jibs)
- **Latency and timing analysis** using the packet timing graph option

Stype data is commonly used in LED volumes, green-screen stages, broadcast AR, and any workflow where a tracked camera must drive rendered content inside Disguise.

Driver Properties

Enable packet timing graph

When enabled, Disguise logs the timing of all incoming Stype packets and visualises them as a graph.

This is useful for diagnosing network jitter, dropped packets or inconsistent tracking frequency.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation

Trackmen Driver

The Trackmen Driver allows Disguise to receive real-time tracking data from Trackmen systems. It converts incoming tracking packets into camera and object transforms that Disguise can use for virtual production, broadcast graphics, and other real-time workflows.

Uses

Use the Trackmen Driver when you want to:

- Drive virtual or AR cameras in Disguise using a physical camera tracked by Trackmen.
- Synchronise real-world camera movement with a virtual set or scene.
- Monitor the quality and timing of tracking data coming from a Trackmen system.
- Troubleshoot latency or jitter issues in your tracking network.

Driver Properties

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Enable packet timing graph

- **Purpose:** Turns on a diagnostic graph that logs the timing of incoming tracking packets.
- **When to use:**
  - You want to verify that data is arriving regularly from the Trackmen system.
  - You are diagnosing latency, jitter, or dropped packets in the tracking feed.

Recommended for testing and troubleshooting. You can disable it again during normal operation once the tracking feed is stable.

Developer Documentation

Unican Open Cue Driver

The **Unican Open Cue Driver** receives position data from Unican Open Cue (OpenPosIP) automation systems over UDP. Each packet carries multiple drive IDs with their position values (in millimetres); the driver decodes each as a tracking axis inside Designer.

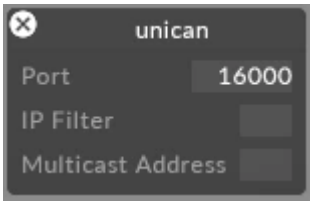
In most setups, the default settings are suitable; adjustments are only required when your Unican system uses non-standard ports, IP filters, or multicast addressing.

Uses

Use this driver when you need to:

- Receive position data from Unican Open Cue automation hardware over UDP.
- Map drive positions to PositionAxis objects for content alignment or stage motion synchronisation.
- Integrate Unican-controlled motion into a Disguise workflow.
- Support both unicast and multicast network configurations.

Driver Properties



This driver listens on UDP port **16000** by default.

Port

The UDP port on which the driver receives data. Set this to match the port configured on the sending device or controller.

IP filter *(optional)*

Restricts incoming data to a specific source **IP address**. Useful when several sources are present on the network, or to isolate a single sender. Leave blank to accept data from any IP.

Multicast address *(optional)*

The multicast group address used by your system. Only required when the sender is configured for multicast — enter the exact multicast address used by the emitter. Leave empty for unicast or broadcast configurations.

Developer Documentation



Vicon DataStream Driver

The Vicon DataStream Driver allows Disguise to receive real-time tracking information from Vicon motion-capture systems.

This tracking data can be used to drive virtual cameras, objects, or characters within Disguise, enabling highly accurate virtual production and motion-tracking workflows.

> **Note**
>
> The Vicon DataStream driver is a **Preview** feature. Enable the `enableVicon` option switch in d3Manager's advanced machine settings for the driver to appear in the driver picker.

Uses

Use this driver when you need to:

- Receive live mocap or object tracking data from a Vicon system.
- Synchronise a physical camera's movement with a virtual camera in Disguise.
- Integrate Vicon tracking into xR stages, AR graphics, or complex choreography.
- Connect to a Vicon DataStream server over the network using its IP address and port.

Driver Properties

IP endpoint

The IP address and port of the Vicon DataStream server to connect to.

Logging

Enables logging for the driver.

Developer Documentation

VisualAct Driver

Introduction

The VisualAct Driver allows Disguise to receive positional data from VisualAct systems.

This enables synchronised motion control workflows where moving scenic elements, lifts, or tracking systems send real-time data directly into Disguise.

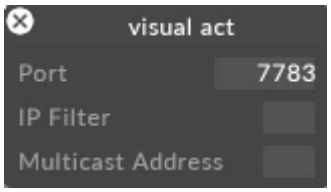
Default settings are suitable for most installations unless your VisualAct system is configured with custom network parameters.

Uses

Use this driver when you need to:

- Receive movement or automation state data from VisualAct hardware.
- Synchronise motion-controlled elements with virtual scenes or content.
- Integrate scenic automation into Disguise timelines or triggering systems.
- Support multicast or unicast delivery depending on your VisualAct setup.

Driver Properties



Port

The UDP port used to receive VisualAct automation data.

This must match the port configured on the VisualAct system that is transmitting the data.

IP filter

An optional filter that restricts incoming packets to a specific sender IP address.

Use this when multiple devices are on the network and you want to ensure only the intended VisualAct source is accepted.

Multicast address

The multicast group the driver listens to when receiving VisualAct data via multicast.

Only required if your workflow uses multicast delivery, leave blank for standard unicast setups.

Developer Documentation



Position Receiver Device

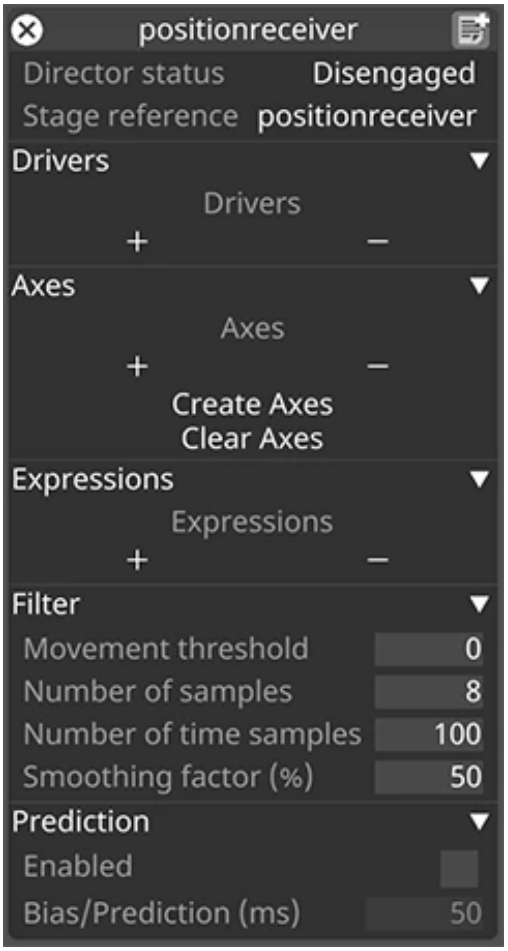
The Position Receiver device receives real-time positional data for tracking objects or performers.

Creating a Position Receiver Device

A Position Receiver Device is created in the same way as any other device type.

See Creating Devices for step-by-step instructions on how to create a device, then select **PositionReceiver** from the menu of different device types. This will open the editor (explained below).

Position Receiver Device properties



PositionReceiver Device editor

Director Status

Toggles whether the device is active — **Engaged** or **Disengaged**.

Stage Reference

Sets the frame of reference for the incoming data, such as `d3`.

Drivers

The object that decodes the data sent from the motion control system. Most of the time a driver is bespoke to a particular system.

See Position Drivers for more information on the types of position drivers supported by Designer.

Axes

A list of objects that control the movement of individual objects along each axis. Includes **Create Axes** and **Clear Axes** controls.

Expressions

A list of PositionAxisExpression objects. An AxisExpression object evaluates the data from the PositionAxis objects using an arithmetic expression and sends the result to the objects.

For example:

```
((Axis A + Axis B) @/ 2)
```

Filter

- **Movement threshold** — minimum change needed before updating the output value. Helps when data has unwanted movement when intended to be static. `0` disables the threshold.
- **Number of Samples** — number of position samples to filter.
- **Number of Time Samples** — number of time samples to filter.
- **Smoothing Factor** — smooths the data. Use caution when setting higher values as this can increase latency.

Prediction

- **Enabled** — used to predict tracked positions at a later time.

- **Bias/Prediction (ms)** — compensates for time latency between received data and projector output.

For information on configuring a tracking source, see Tracking Source.

Projector Calibrator Device

The **Projector Calibrator Device** is used to calibrate projectors by pairing tracked reference points in the scene with their projected positions on the physical surface. Once calibrated, Designer knows each projector's position, orientation, focal length and lens shift, so content can be accurately mapped onto the target surfaces. The **Projector Calibrator Device** uses similar algorithms to QuickCal, but can achieve more accurate calibration results because the 3D input data comes from external tracking systems instead of a 3D model.

The device relies on tracking data — a Position Receiver Device or equivalent tracking source typically provides the real-world 3D coordinates for the reference points used during calibration. For an overview of Designer's calibration methods (Manual, QuickCal and OmniCal), see the Projector Calibration overview.

Uses

Use the Projector Calibrator Device when:

- Aligning one or more projectors to a 3D space using tracked reference points.
- Iteratively refining projector positions by stepping through reference points with remote controls.
- Working with tracking systems that deliver real-world coordinates for calibration markers.

Workflow

1. Add the **Projector Calibrator Device** in Designer.
2. Under **Projectors**, click **+** to add each projector to be calibrated.
3. Provide tracked point data — typically via a connected tracking system routed through a Position Receiver.
4. Select a **Reference point** and pair its 3D **Tracked point position** with its corresponding 2D **Projector position**.
5. Use the **Remote Calibrator** controls to step through reference points, adjusting and confirming each placement and 2D lineup.
6. Enable **Draw test lines** and adjust **Test blob size** to visually verify the alignment.

Projector Calibrator Properties

Add Projectors

Adds a projector to the device's projector list.

OSC

OSC integration for remote control of the calibrator.

Tracked point

The currently selected tracked reference point.

Mode

The active calibration mode.

Test blob size

The size of the on-screen test pattern used during visual alignment.

Draw test lines

Toggles the display of test lines used to verify projector alignment.

Projectors

Projectors list

The list of projectors currently managed by this device.

Tracked point position

The 3D position of the tracked reference point in the stage.

Projector position

The computed position of the projector, derived from the current calibration.

Reference point name

An identifier for the current reference point.

Remote Calibrator

Controls for performing calibration remotely, without direct access to Designer's interface.

- **Start** — Begin a remote calibration session.
- **Done** — End the current remote calibration session.
- **Prev Step** / **Next Step** — Move backwards or forwards through the reference points.

- **Rotate Left** / **Rotate Right** — Rotate the current calibration pattern.
- **Up** / **Down** / **Left** / **Right** — Nudge the current calibration pattern.
- **Undo Reference Point Placement** — Revert the last reference point placement.

Related pages

- Projector Calibration overview
- Using Manual Calibration
- Position Receiver Device

Shot Recorder Device

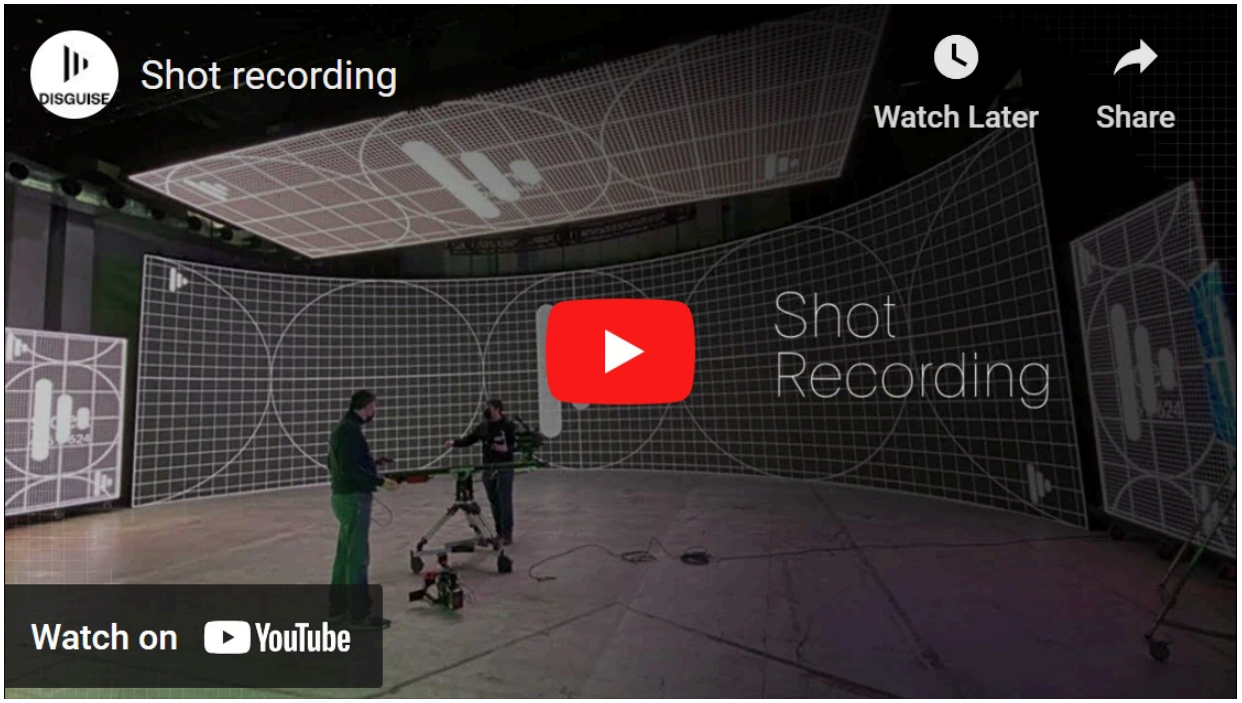
The Shot Recording system allows users to record and export parameters from within Designer, ready for use in post-production workflows.

What is the Shot Recording System?

The Shot Recording system is designed as a generic system to allow users to record any fields or properties displayed in the GUI. Users can build up their own collections of parameters they want to record. In addition, the system has a quick and easy workflow for recording commonly-used sets of parameters, such as camera tracking.

Unlike device recordings, which are played back within Designer, the data recorded by the ShotRecorder Device can be used by external applications.

See How it Works



Components of the Shot Recorder

The main components of the ShotRecorder Device are:

- The **ParameterCollection** containing the parameters to be recorded.
- A **TimecodeTransport** used to assign timestamps to the recorded parameters.
- Recording and export settings.

Parameter Collection

ParameterCollection is a resource that allows users to create several different collections and switch between them when selecting which parameters to record. It contains an array of ParameterSources, each of which is one **parameter** (i.e. field or property to record).

ParameterCollections can also contain a list of nested ParameterCollections, allowing users to build up collections in a modular way and add them all to one outer collection which is used for recording.

Some ParameterCollections are auto-created with sets of parameters which are commonly required. For example, each Camera auto-creates a **tracking** collection containing all the parameters commonly required for recreating camera tracking data. Similarly, each **SpatialMap** also creates a similar tracking ParameterCollection - the main difference is that this accounts for offsets of the world zero point in the spatial map. It also references the currently active camera if using an MR set.

Parameter Sources

ParameterSources contain a list of field ParameterSources for compound types (e.g. Vec contains x, y, and z, Resource can contain its fields). For compound types, the value of the ParameterSource is found by populating the values of its fields. By contrast, the values for basic types are populated using the expression system, which can return floats or strings. Any limitations of the expression system, or particular fields which cannot be accessed by expressions, will also be limitations of the shot recording system.

Setting up the Shot Recording system

1. Create a **ShotRecorder Device** in the current Device Manager. This device will become the master of the shot recording system.
2. Name the **Slate** for the current shot.
3. Create a new ParameterCollection in the **Parameters** field and add the desired parameters. ParameterCollections are a collection of different parameters that we are interested in recording and getting the data out of — for example, camera tracking, MR set, etc.
4. Add the desired Timecode provider to the **Timecode** field.
5. The **Take Snapshot** and **Take Screenshot** options can be selected to take a project snapshot and/or screenshot at the end of each take.

To add parameters to a ParameterCollection for recording

1. Open the ParameterCollection editor.
2. Alt+drag from the Sources **+** button to any field in the UI to add it as a parameter source

3. Several ParameterCollections are automatically created for convenience, such as camera tracking collections. These, or other user-created ParameterCollections, can be added to the ParameterCollections list in the editor to allow the parameters to be organised into smaller separate collections.
4. Click the arrow on the right hand side of a parameter to expand it and view its fields. Resource parameters do not have their fields added by default, but they can be added by clicking the plus button on the right hand side of the parameter.
5. Timecode can be set up inside the shot recorder in order to reference timecode in the recordings using **TimeCodeTransport**.

To make a recording

1. To start a recording, click the button displaying **Disengaged** to engage the recorder and start recording.
2. Click the same button again to stop the recording. The take number will automatically increment, or it can be changed manually.
3. Alternatively, use the API commands documented at `http://localhost/docs/v1/index.html` to start and stop recordings externally
4. Slates will be listed under the **Recordings** separator. Right-click on a slate to see the takes for that slate.

To export recordings

1. Select the desired formats under the **Export** tab.
2. Either click **Export all recordings**, or export recordings individually under the **Recordings** tab
3. Select **Auto-export** to automatically export in the selected formats when each take is finished.
4. Click **Export comparison table** to export a CSV table comparing the first value of each parameter for each recording
5. You can also enable to take a snapshot or a screenshot of each recording if desired.

Recordings can currently be exported in the following formats

- **JSON**: A compact JSON representation which contains the changed parameter values for each timestamp, similar to the .shot file
- **CSV (Compact)**: A compact CSV representation which contains only the changed parameter values for each timestamp
- **CSV (Dense)**: A dense CSV representation which contains all values for each parameter at each timestamp

- **FBX**: An FBX file containing meshes and pose information (position, rotation, scale etc.) of all recorded objects, where available. Any additional properties not represented within the FBX specification are recorded as custom properties.

A new sub-folder will be created in the project called ‘output’. Within there we have ‘shots’ and in there will be the slate. In the slate, there will be the .shot recording in addition to the recording in the chosen format

Limitations

- The shot recording system only writes data out of Designer. There is no capability to read recordings back into Disguise directly to replay the data. This is what device recordings should be used for.
- The shot recording system and the device recording systems do not interact with each other. They can still both be used at the same time.
- There is not currently an easy way to get all the recorded camera tracking data into Unreal Engine to re-render shots. Epic have outlined an **FBX import/export workflow** which allows camera positions, rotations, and FoV to be imported.

String Projector Control Device

The String Projector Control Device is intended for controlling external devices while optionally simulating their behaviour inside the visualiser.

Projector control can be simulated as well as output to real projectors. The intention is to be able to recall presets for the projectors that contain pan/tilt, zoom, focus, lens shift, intensity and projector configuration objects (for recalling different calibration states).

Configure the String Projector Control Device

Device setup

1. Create a **StringProjectorControlDevice**.
2. Associate the device with a projector.
3. Create a control device if using the string control version.
4. Assign the simulation configuration to the selected projector config.
5. Create presets either via the ProjectorControl Editor or the layer preset editor. The former is the preferred workflow, as it allows for multi-edit.

Timeline keyframing

1. Create a projector control layer.
2. Create a mapping (group of projectors to control).
3. Create presets for the projectors to recall as the timeline plays.

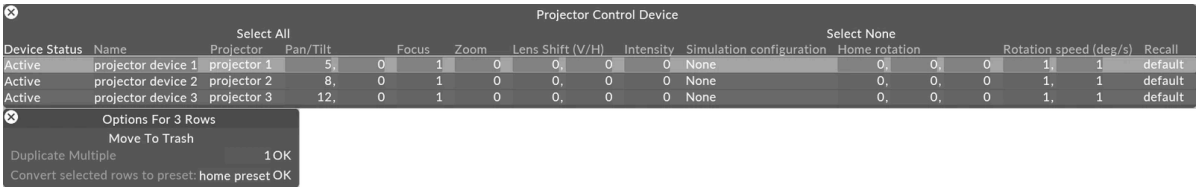
Configure the device

1. Define which projector is controlled by the device.
2. Choose whether simulation configuration is enabled or disabled. This controls whether the projector will move in the stage or not.
   - In the case of the String Projector Control Device, define a control device and create a corresponding serial, telnet or UDP device to send the data out of Designer.
3. Configure any Default, Startup and Shutdown commands, as appropriate.

Configure presets

ProjectorControlPresets can be created either through the ProjectorControl layer or through the String Projector Control Device Editor. Performing this functionality through the editor is a better choice as this editor fully supports multi-edit functionality, as well as converting hard values to presets for more time saving functionality.

1. Open the String Projector Control Device Editor from the Device manager.
2. Select each projector and apply the desired values. Either individually or by using the multi-edit functionality.
3. Select multiple rows and use the **Convert Selected Rows to Preset** function, to store the contents of the selected rows into a preset that can be recalled later. For example - Home position, Position 1, Position 2 and so on.



Control the projector

See ProjectorControl layer for more information.

Properties

Projector

- The virtual projector object in the visualiser.

Values

- Pan/Tilt, Focus, Zoom, Lens Shift (V/H), Intensity: the current values being sent to the external device. Modifying these values will cause the device to send out commands to the external device.

Simulation

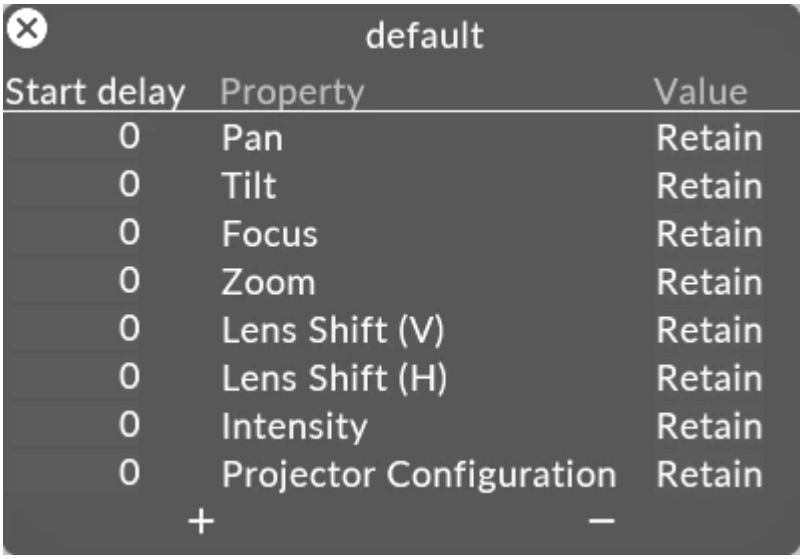
- **Simulation configuration** — the projector configuration that the device modifies to simulate the behaviour of the external device. Always use a dedicated projector configuration for this as its settings will be overwritten by the simulation.
- **Home rotation** — the starting rotation when the device's pan/tilt are at zero.
- **Rotation speed (deg/s)** — the animation speed of rotation between different pan/tilt values, in degrees per second.
- **Pan Axis** — the axis controlled by the pan value.
- **Tilt Axis** — the axis controlled by the tilt value.

Default Recall

- **Recall** — the default order of the commands sent to the device. This allows delays between starting the pan/tilt, focus, zoom and other actions.

For example, you may want to delay intensity moves for a set period of time to allow zoom, focus and position to be set before the projector is visible. The delay value is expressed in seconds.

The editor is capable of multi-edit functionality, so does not behave in the same way as a normal editor. See multi-edit for more information.



Device

- **Control device** — the network device (Serial, Telnet, UDP) that commands are sent over.

Commands

- **Default commands** — string commands sent to the network device before any specific actions' DMX commands.
- **Startup commands** — string commands sent to the network device when the projector control device is started or added from the device manager.
- **Shutdown commands** — string commands sent to the network device when the projector control device is stopped or removed from the device manager.

Common properties

Control strings for each of these projector control actions can be created. The range will be used to scale the current value before exposing it as a binary (%) or decimal ($) number.

Pan/tilt

- **Pan command** — the string sent to the control device when the pan value changes.
- **Pan range** — the scaling range applied to the pan value before it is exposed to the command. Defaults to -90 to 90 degrees.
- **Tilt command** — the string sent to the control device when the tilt value changes.

- **Tilt range** — the scaling range applied to the tilt value before it is exposed to the command. Defaults to -90 to 90 degrees.

Zoom

- **Zoom command** — the string sent to the control device when the zoom value changes.
- **Zoom range** — the scaling range applied to the zoom value before it is exposed to the command.

Focus

- **Focus command** — the string sent to the control device when the focus value changes.
- **Focus range** — the scaling range applied to the focus value before it is exposed to the command.

Lens Shift

- **Vertical shift command** — the string sent to the control device when the vertical lens shift value changes.
- **Vertical shift range** — the scaling range applied to the vertical lens shift value before it is exposed to the command.
- **Horizontal shift command** — the string sent to the control device when the horizontal lens shift value changes.
- **Horizontal shift range** — the scaling range applied to the horizontal lens shift value before it is exposed to the command.

Intensity

- **Intensity command** — the string sent to the control device when the intensity value changes.
- **Intensity range** — the scaling range applied to the intensity value before it is exposed to the command.

Telnet Device

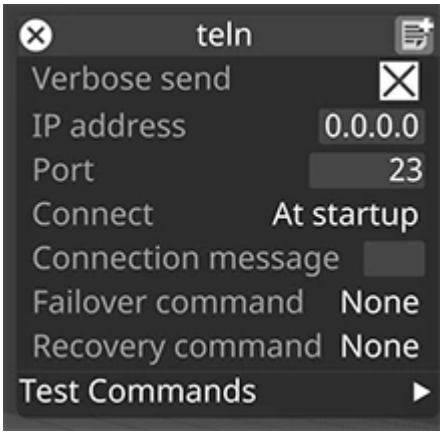
TelnetDevice sends commands to 3rd party products over a TCP network connection using the Telnet protocol — typically on port 23. It is used to remotely control hardware that exposes a text-based command interface.

TelnetDevices are used by the Control Layer and the Matrix Control layer.

Creating a Telnet Device

A **TelnetDevice** is created in the same way as any other device type. Please see the earlier sub-chapter Creating devices for step-by-step instructions on how to create a device. This will open the **TelnetDevice** editor (explained below).

Telnet Device properties



Verbose send

When enabled, the device logs every message sent over Telnet to the console. This option is intended for debugging and troubleshooting only. We recommend disabling it for devices that send messages frequently, as it can generate excessive console output.

IP address

The IP address of the destination 3rd party hardware. You must ensure that your network topology is configured to allow communications between the two machines.

Port

The network port of the destination 3rd party hardware. Telnet is traditionally port 23.

Connect

The Telnet port can be opened once **At startup** of Designer and held open or can be opened for **Every send** of a command.

Connection message

A message sent when the Telnet connection is established. Leave blank to disable.

Failover command

A control string sent to the device over Telnet when failover is triggered.

Recovery command

A control string sent to the device over Telnet when failover recovery is triggered.

Test Commands

The following Test Commands are available:

- **Send Failover**
- **Send Recovery**

Axes

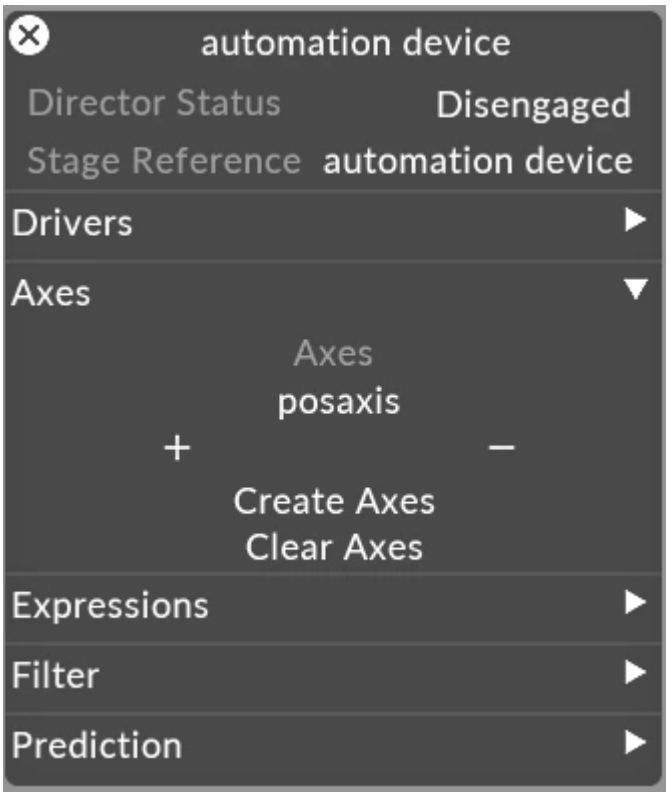
The Axes section of the PositionReceiver Device editor is used to create PositionAxis objects which control the movement of individual screens or props along each axis.

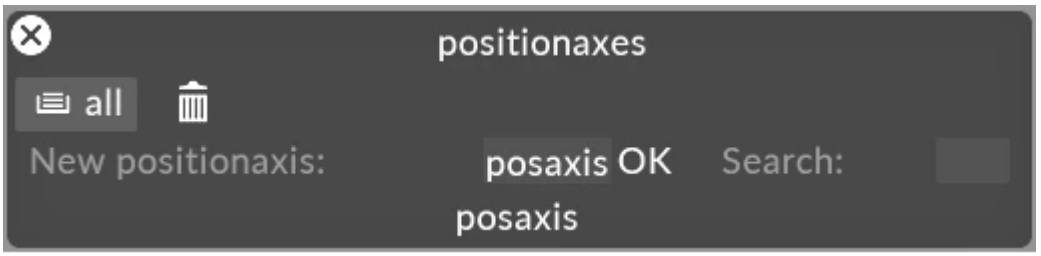
Axes are discrete objects themselves, but can be automatically created by reading the axis data the automation system is sending to Designer.

Creating PositionAxis objects

To create a object:

- Select the + button within the **Axes** section of the editor, type the name of the new object into the text field and hit **Enter**.

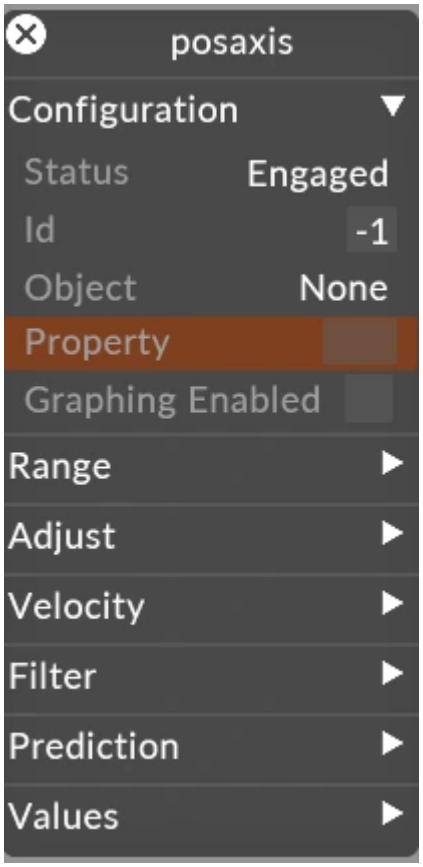




- Click the **Create Axes** button to automatically read the incoming axes from the Automation driver.

Axis Properties

Configuration



Status

Axis 'Engage' and 'Disengage' options. Allows the user to allow/disallow stage objects being updated in the visualiser. Can also be used during calibration to prevent automation data passing through to the stage objects.

ID

The unique identifier for the axis normally being sent by the automation system. In r14.2 onwards you shouldn't have to edit this field

Object

The Screen that the automation is affecting, ie Surface 1.

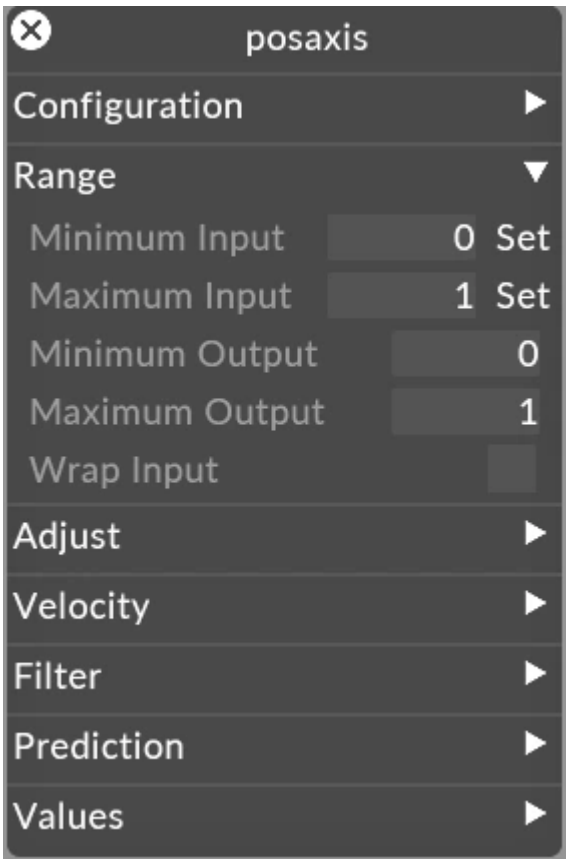
Property

Which property of the stage object will be automated. E.g. **offset.x**, **offset.y**, **offset.z**, **rotation.x**, **rotation.y**, **rotation.z**.

Graphing Enabled

Allows the user to switch on/ off the graphing/ monitoring of incoming packet data (position/ velocity) and filtered position data.

Range



Minimum/Maximum Input

Maximum/ Minimum Input: Set the Min and Max Input in Designer to the real world values coming into the software from the automation system. The set button for Maximum and Minimum Input fields can be used to mark the in and out positions (range) of the automated object. This will reference the current Input Value and therefore when pressed it will paste the current input value into the field. Therefore, making it easier to set these values. Designer works in metres and degrees so the user should set appropriate scaling if the received values are not in metres.

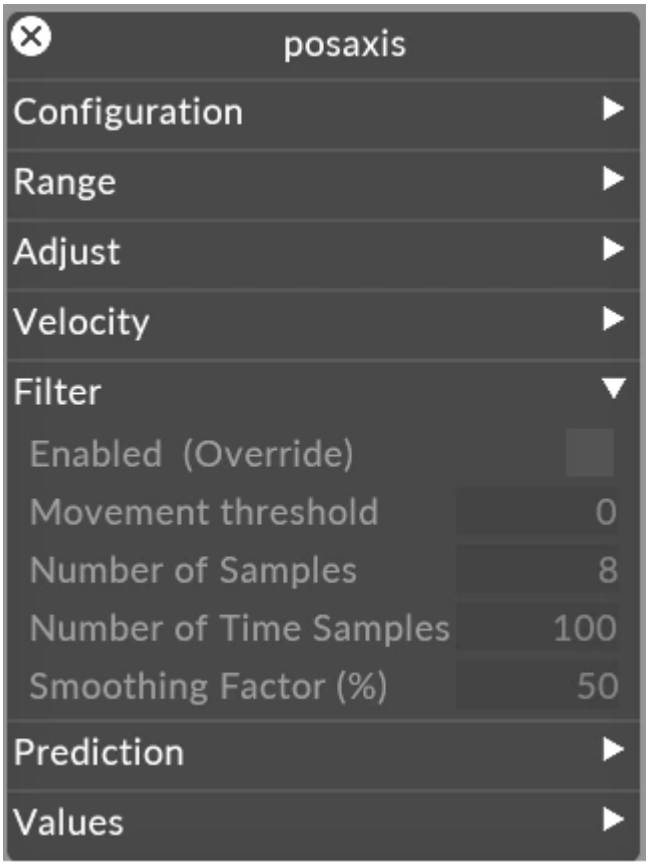
Minimum/Maximum Output

The Minimum and Maximum Output fields allow the user to scale the input range to a local range in the visualiser.

Wrap Input

Wrap input allows the user to specify that the automated object has rotary motion and the data will wrap. For example, a revolve going from 0-359 and wrapping back to 0.

Filter



Enabled (override)

Default - Off

When switched on, filter parameters override the parent devices parameters.

Movement threshold

Minimum change needed before updating output value. This helps when data has unwanted movement when intended to be static. 0 means no threshold (disabled).

Number of samples

Number of samples to filter. Use 0 to disable. More samples will introduce higher latency with more smoothing effect. Fewer samples will introduce less latency with less smoothing effect.

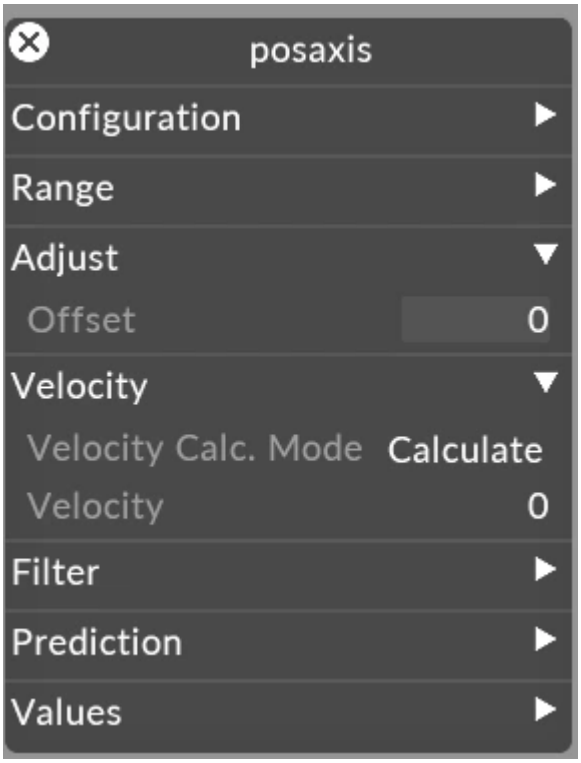
Number of time samples

Number of time samples to filter. Use 0 to disable. More samples will introduce higher latency with more smoothing effect. Fewer samples will introduce less latency with less smoothing effect.

Smoothing factor

Smoothing factor %. Higher values will smooth the data more but will increase latency and therefore the need for prediction.

Velocity



Velocity Calc Mode

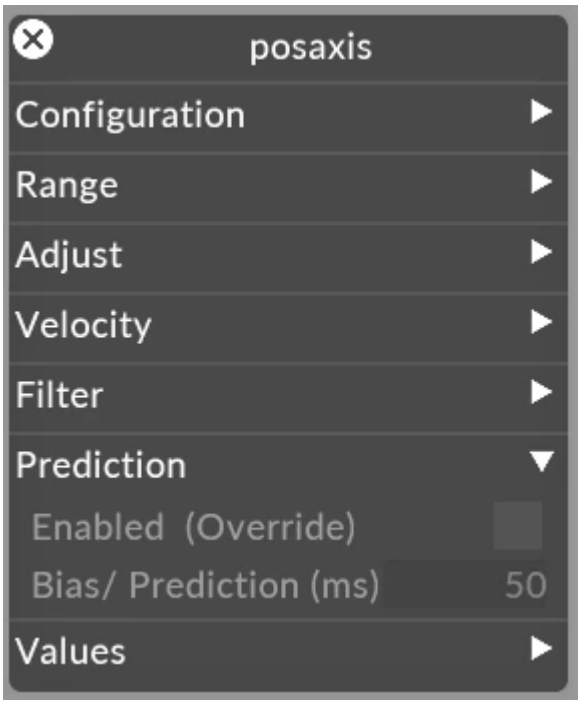
This is for prediction and determines the method for calculating the speed between samples within Designer in order to predict the position ahead of time. When in Calculate mode, Disguise will calculate the speed between the latest and previous packet. When From Packet is selected, the speed information should be received within the packet itself.

> **Note**
>
> : Note that the velocity units will be calculated/ received in the units in which the source is sending position and/ or velocity. E.g. If the source is sending position/ velocity in mm/s2 then the velocity is calculated in mm/s2 or when From Packet is selected, the velocity received would be in mm/s2. Therefore, any scaling (min/ max values for input/ output) is applied after the velocity prediction step. The scaling is used in order to scale input values into metres which is what Disguise uses. Disabled sets velocity to 0 and consequently turns prediction off.

Velocity

Updates only when in Calculated or From Packet modes and displays the velocity that is being calculated/ received from the automation system for the axis.

Prediction



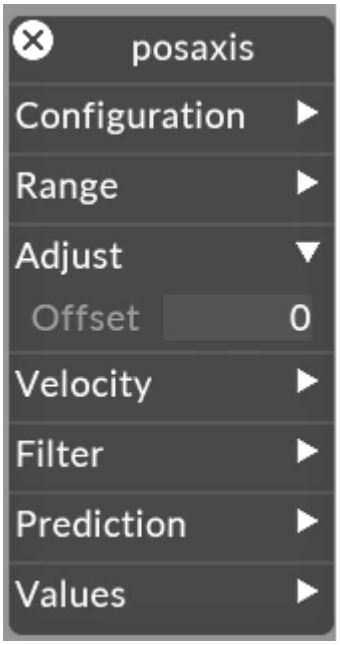
Enabled (override)

When switched on, prediction uses the **bias** roperty to predict tracked positions at a future time.

Bias/Prediction (ms)

Compensate for time latency between received data and projector output. Use 0 to disable.

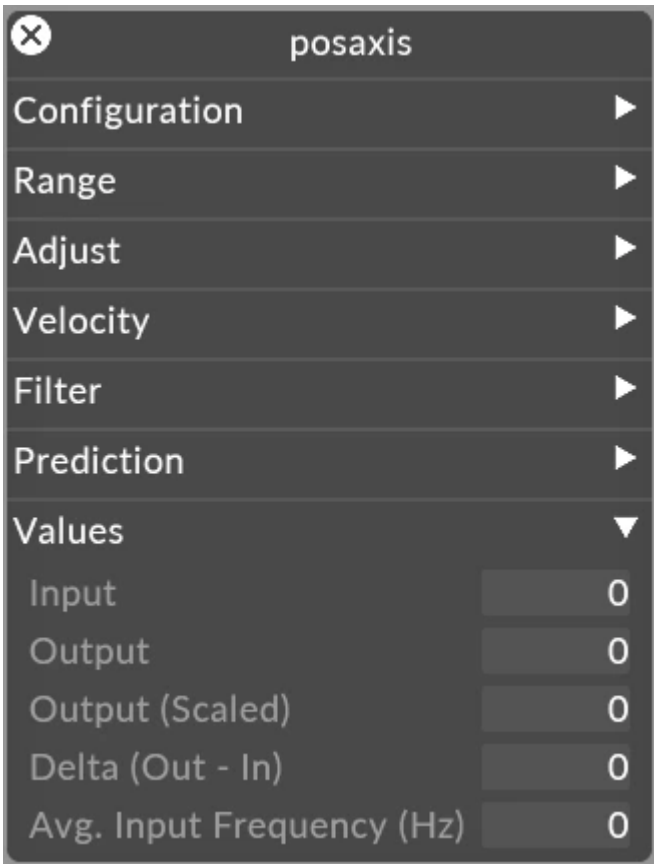
Adjust



Offset

Allows the user to offset the position of the object relative to the incoming position data.

Values



Input

The values of the incoming data, from here one can determine the Min and Max Input of data.

Output

The output including any prediction.

Output Scaled

Scaled output velocity comparing the Input and Output levels.

Delta (in - Out)

The difference between the incoming position data and output position data. For good output should be twitching between -0 and 0 value.

Avg Input Frequency (hz)

The field displays the average frequency that automation data is being received for the axis. It's important to monitor this field and ensure that the rate is at least 30 Hz or higher and

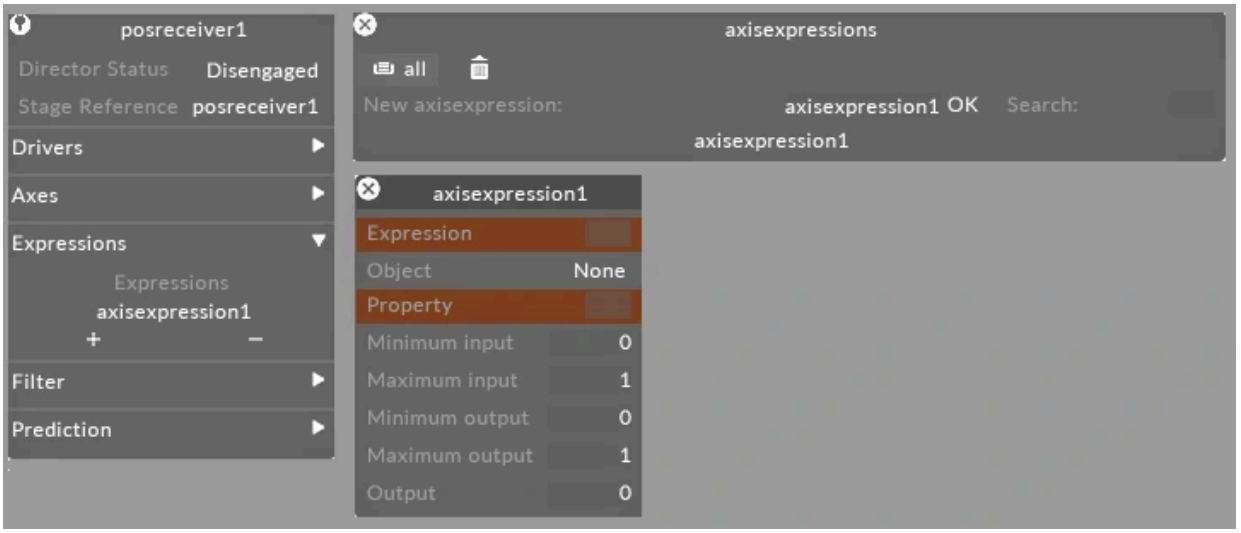
consistently at the rate specified by the automation system. I.e. avoid large swings/ fluctuations in the input frequency.

Screen Position Axis Expressions

Screen Axis Expressions can be used to perform arithmetic on values outputted from ScreenPositionAxis objects and sent to a property of a defined screen.

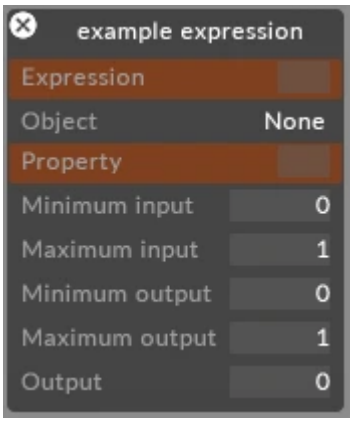
Creating expressions

To create an expression, select the **+** button within the **Expressions** section of the PositionReceiver editor, type the name of the new object into the text field, and hit **Enter**.



The Expressions editor

Expressions properties



Expression editor is used to perform arithmetic on values outputted from ScreenPositionAxis objects to a property of a defined screen

Expression

These are the arithmetic expressions performed on the defined axes. The **ScreenPositionAxis** objects are defined by their name. For example,

```
(ledscreenx*ledscreeny)/2
```

Where **ledscreenx** and **ledscreeny** are ScreenPositionAxis objects.

Screen

The screen you want to move and rotate. You should leave the property field of the object blank if you want to use the output of the expression rather than the axis.

Min input

The minimum input value that will be received from the ScreenPositionAxis objects.

Max input

The maximum input value that will be received from the ScreenPositionAxis objects.

Min output

The minimum output value of the defined property.

Max output

The maximum output value of the defined property.

Output

The current output value.

Creating a New Motion Controller

A Motion Controller is the device type that is necessary to receive positional data from a motion control system.

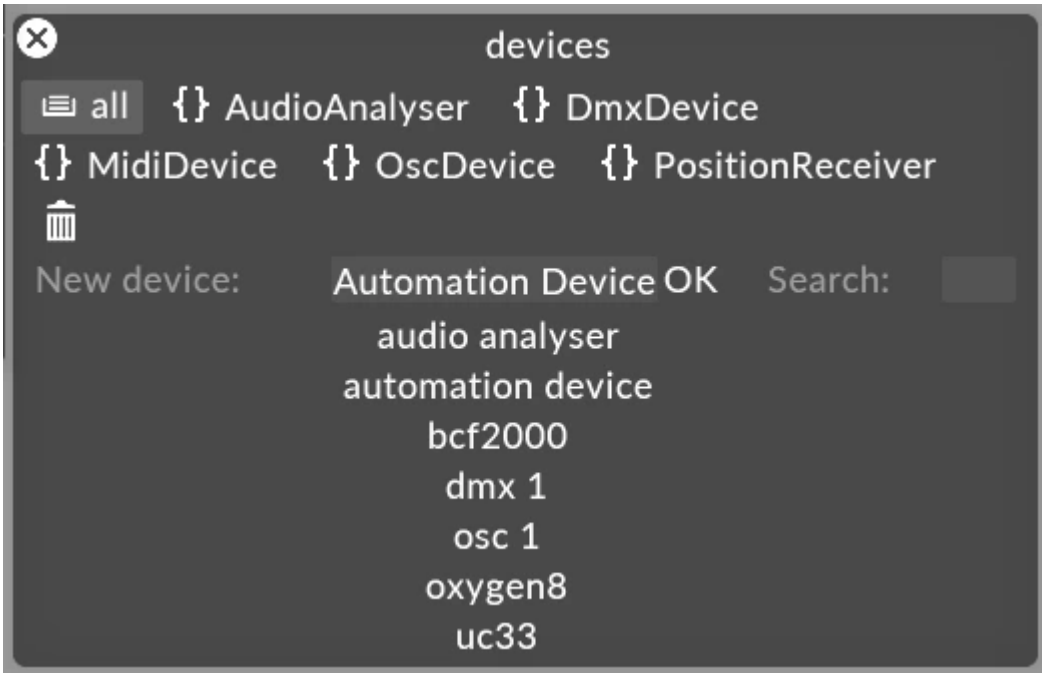
The process for creating a new motion controller is the same, no matter what kind of driver is being used.

Automation Devices

Creating an Automation Device

For example, to create a connection between PosiStageNet and , we would do the following:

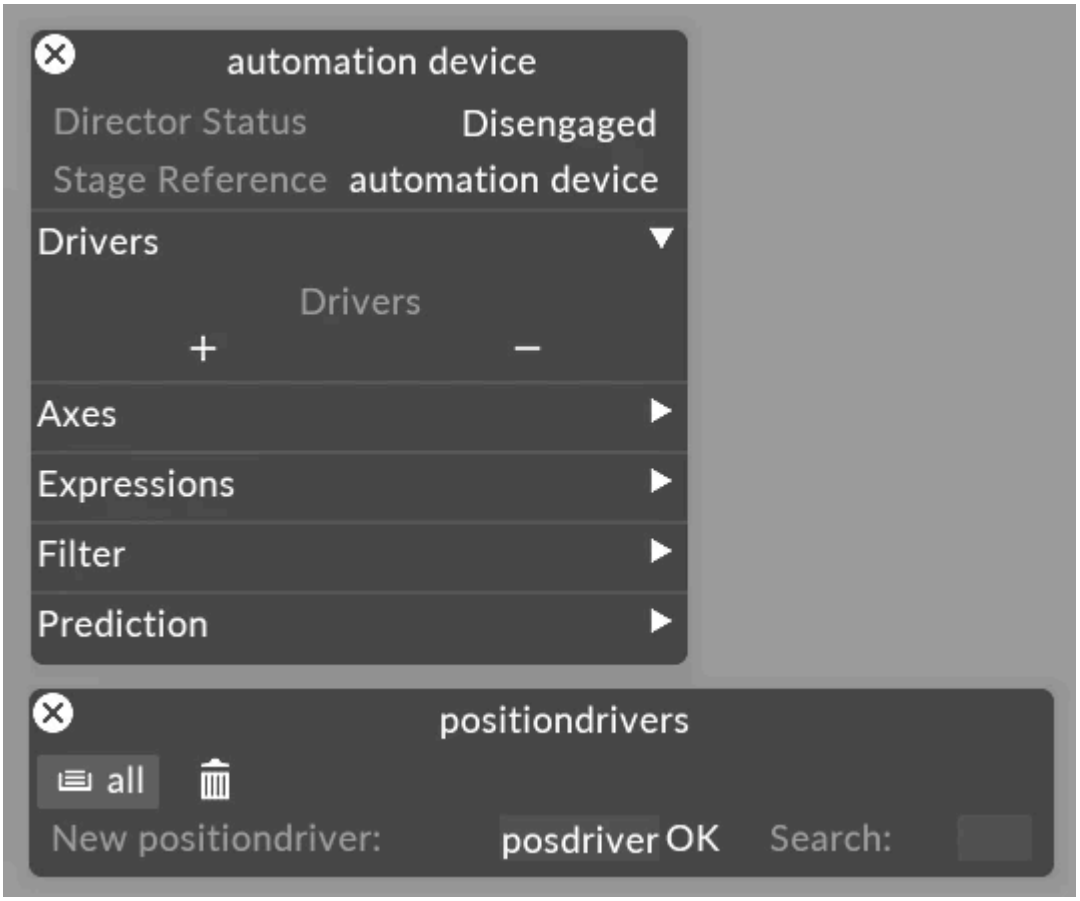
1. Right-click the **Devices menu** on the dashboard and create a new device. Call it **Automation**.



2. The software will ask what kind of device this is, select **PositionReceiver Device** as the type.

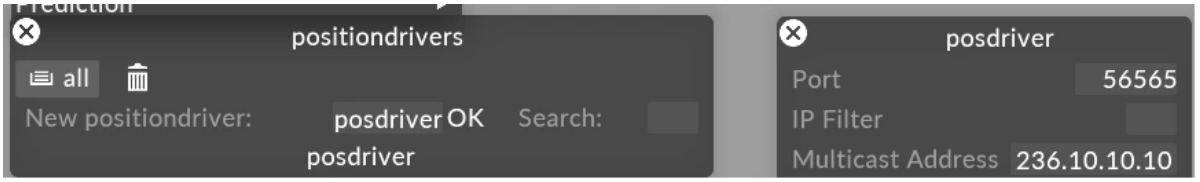


3. The Automation Device now needs a **Driver** added. The Driver is the connection that receives data from the external system.
   Under the 'Driver' tab of the Automation device, press the **+** button to add and name the relevant driver.
   Additional information may be required, such as the IP Address the data is coming from.


automation device
Director Status
Disengaged
Stage Reference
automation device
Drivers
Drivers
+
−
Axes
Expressions
Filter
Prediction
positiondrivers
all
New positiondriver:
posdriver
OK
Search:



4. Input the port that is set on the sending Automation system. Further filtering can be done by IP if necessary.



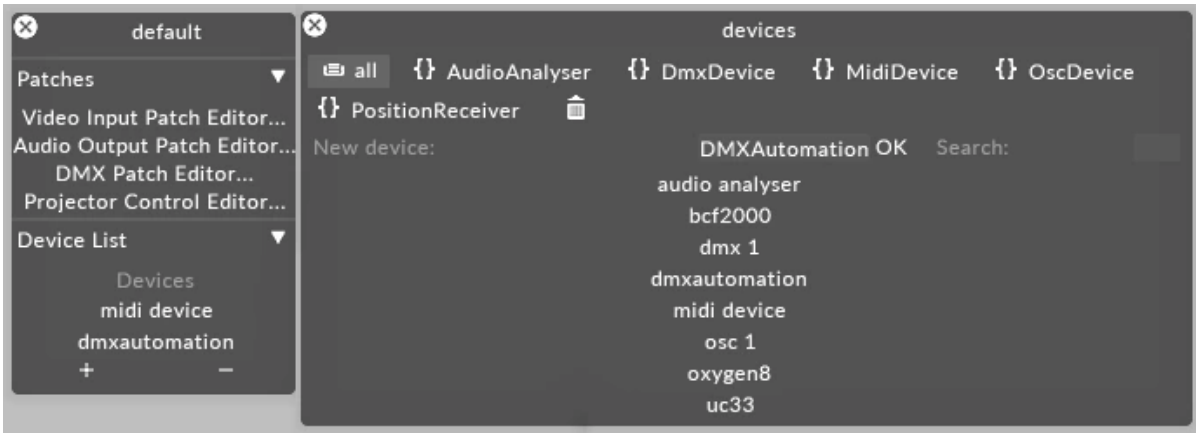
5. If Designer is receiving data from the device, the device recording menu will show a green bar, as shown here:

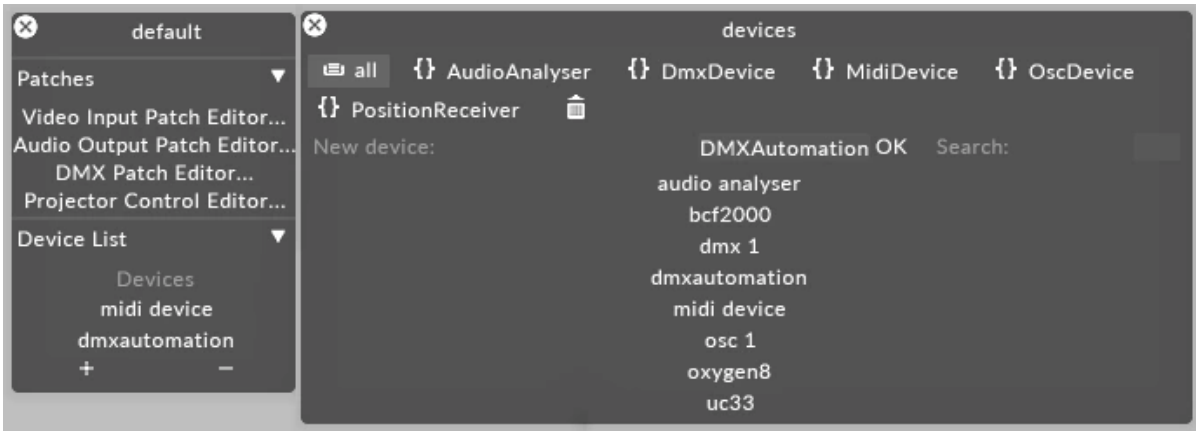


DMX Screen Position Receiver

To create an Automation device that can be controlled by DMX, follow these steps:

1. Open the devices menu and create a new type of device.





2. Next, expand the Drivers section and left-click on the + to add a new driver.



3. Select DMXScreenPositionDriver from the list.



4. Edit the properties of the driver as needed.



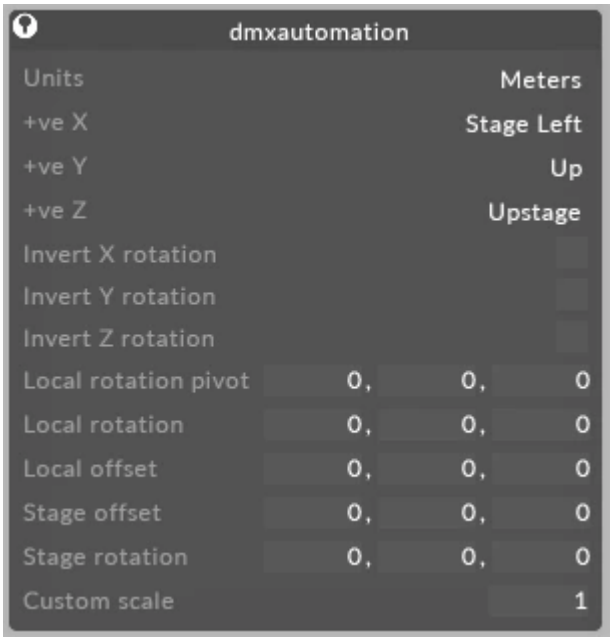
For additional information on these DMX Screen Position Driver properties, visit DMX Screen Position Driver.

> **Note**
>
> **Please note::**DMX Screen Position Driver supports 32bit, so when using a DMX console that outputs just 16bits, set the 3 and 4 bytes to 0 and use little endian encoding.

5. Ensure the device is engaged, and if needed, access additional properties of the DMX Screen Position Receiver by right-clicking on the name of the device in the Stage Reference field.

To create axes click on the + or use the Create Axes if the data is being detected within Designer. For additional information on Axes, please visit Axes.

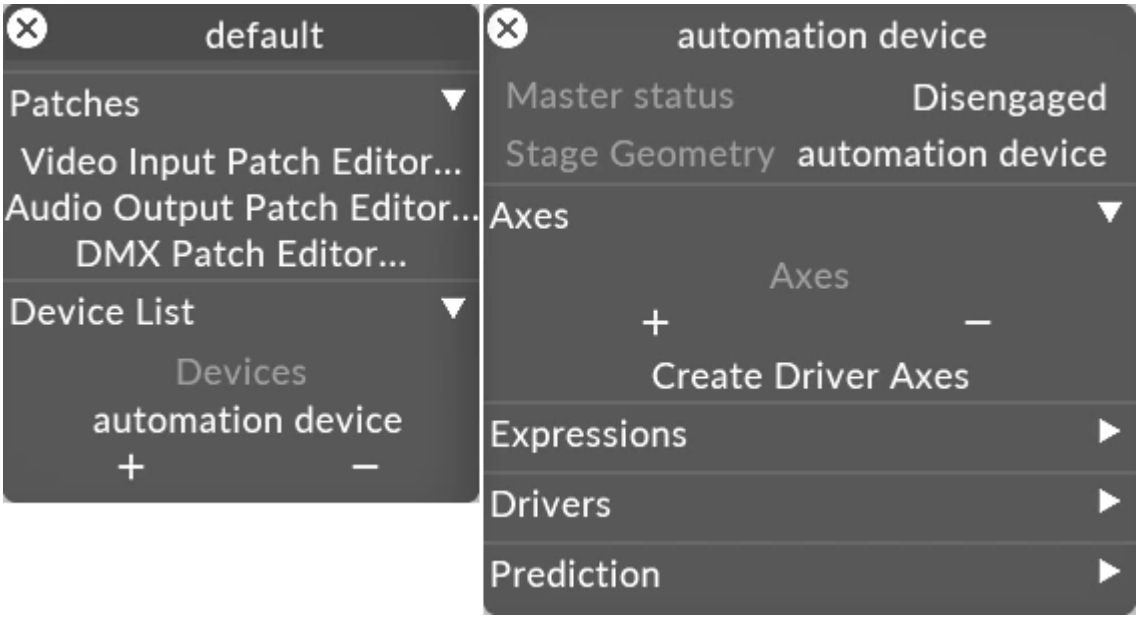

dmxautomation
Director Status
Engaged
Stage Reference
dmxautomation
Drivers
Drivers
dmxpr
Axes
Axes
Create Axes
Clear Axes
Expressions
Expressions
Filter
Movement Threshold
0
Number of Samples
8
Number of Time Samples
100
Smoothing Factor (%)
50
Prediction
Enabled
Bias/ Prediction (ms)
50


dmxautomation
Units
Meters
+ve X
Stage Left
+ve Y
Up
+ve Z
Upstage
Invert X rotation
Invert Y rotation
Invert Z rotation
Local rotation pivot
0, 0, 0
Local rotation
0, 0, 0
Local offset
0, 0, 0
Stage offset
0, 0, 0
Stage rotation
0, 0, 0
Custom scale
1

Creating Driver Axes

Create Driver Axes is a function that allows an automation device to automatically detect what axes the connected device is sending data for and thus save the user from manually creating all of the axes for the automation system

1. Once you successfully add & configure an automation device with its associated driver, clicking the Create Driver Axes button will show all the axes that automation driver is sending into Designer.



2. Right-clicking an Axis allows you to link that Axis to an object, for example Surface 1 and then to assign it a property, for example Offset.x' so that surface 1 is linked to the x offset of that axis.



3. Another piece of useful functionality, is the ability to set minimum & maximum inputs. For example, set the Automation system to the minimum point of reference, press **Set**, Disguise will read that value and input it for you, and repeat for the maximum.

> **Note**
>
> Note that when an axis is controlled by a driver, the driver always defines the position, even when overridden.

Motion Control Systems

Disguise has the ability to receive positional data from various motion control systems using the PositionReceiver Device. This data can be used to animate screens or props within the Stage level. This device will be the main interface between Disguise and the various motion control systems that are currently supported. It is possible to have multiple PositionReceiver Device devices. Depending on the system used objects in a stage can be moved and rotated in all three axes, matching the real world positions of the actual objects. This provides an accurate toolkit for previsualising a project.

Components of a motion control system

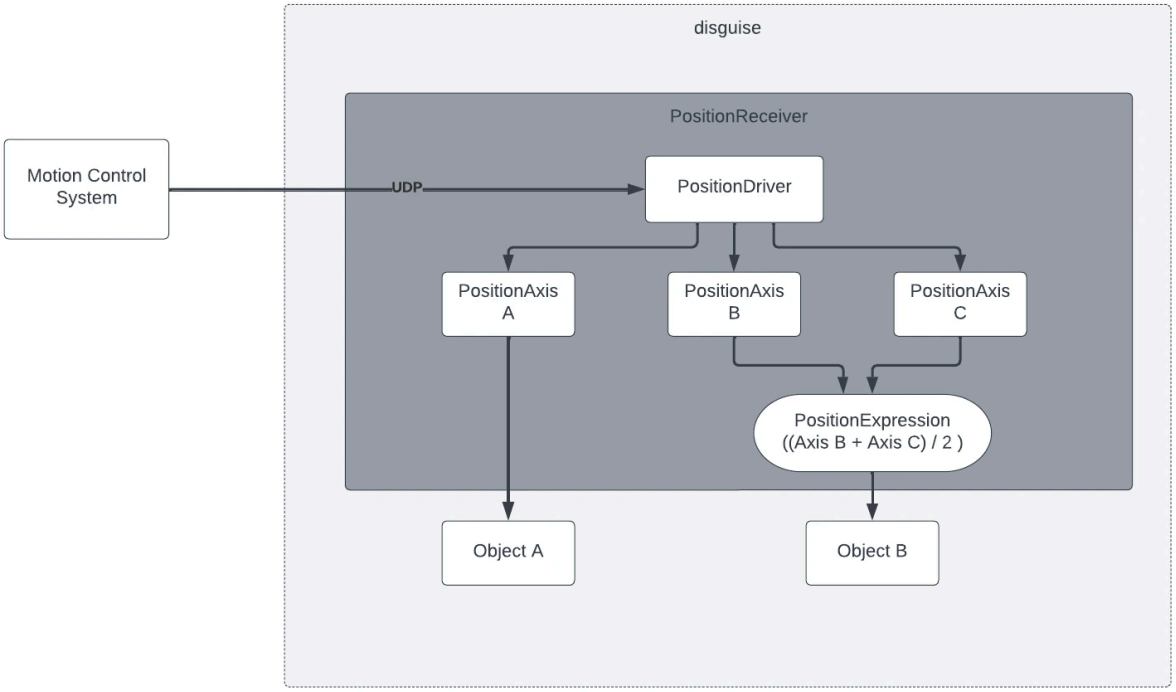


Diagram illustrating the flow of data from a motion control system to objects in.

Diagram illustrating the flow of data from a motion control system to screens/props in.

The motion control system sends data over the network (via UDP).

1. The system receives the data and passes it to the position receiver device and onto the PositionDriver.
2. The PositionDriver decodes the data and passes it onto the PositionAxis objects.
3. The Axis , named ‘A’, sends the position straight to thedefined parameter of Screen / Prop A .

4. The PositionExpression takes the values from both axes, ‘B’ and ‘C’, and evaluates it using the expression ((Axis B + Axis C) / 2) and sends the result to the defined parameter of Screen / Prop B .

Tracking Source

This field allows users to set up relationships between automation axes and objects in the stage.

All objects have a field called **Tracking Source** that allows the object to be controlled by a automation source. Follow these steps to configure the **Tracking Source**:

Begin by creating a PositionReceiver device

1. Right-click **devices** from the dashboard. This will open the Device Manager, which contains a list of active devices.
2. Select **+** to open the Device library. This lists which internal or external devices are available.
3. Type in the name of the new device into the **new device** text field.
4. Hit Enter. This will open a list of device types available in Designer.
5. Select the appropriate device type.

The new device will be added to the Device Manager's active device list, and to the Device library. The device's editor will also open.

[Animated GIF: Creating a device]

> **Note**
>
> **Please note**: Once the PositionReceiver device has been created correctly, then it can be used to link automation data to an object in the stage. There are two options for how this can be configured:

Once the **PositionReceiver** device has been created correctly, then it can be used to link automation data to an object in the stage. There are two options for how this can be configured:

Assign Tracking Source to Stage Objects

1. Right-click a surface (or puck, a venue, or anything that's an object)
2. Click the **Tracking Source** field.
3. Assign a **Tracking Source** to a surface.
4. Offset and Rotation fields should turn green to indicate that they are being controlled by automation, and the surface will be moved by the position and rotation information received from the tracking source

5. To clear, click the **Tracking Source** field and select **None**.

Assign Tracking Source to Stage Objects - Per Axis Workflow

1. Ensure axes have been created in the **PositionReceiver** device.
2. Right-click a surface (or puck, a venue, or anything that's an object)
3. Click the **Tracking Source** field.
4. Enter a new **objecttrackingsource** name and click OK.
5. An editor will open that allows you to assign individual axes from the **PositionReceiver** device to Position XYZ and/or Rotation XYZ on the object. Assign any axes that have been created in the **PositionReceiver** device to Pos XYZ and Rot XYZ in the required order.
6. The surface should then respond to the assigned axes motion and move as selected in step 5. For example, if axis 1 is assigned to position X for an object, moving that axis will cause the object to move in the X direction.
7. Offset and Rotation fields should turn green to indicate that they are being controlled by automation.
8. Try different axes/ automation data combinations to test further.
9. To clear, click the **Tracking Source** field and select **None**.

UDP Device

UdpDevices can be used to send commands over a network via UDP to 3rd party products.

UdpDevices are used by the Control Layer and the MatrixControl layer.

Creating a UdpDevice

A **UdpDevice** is created in the same way as any other device type.

See Creating Devices for step-by-step instructions on how to create a device, then select **UdpDevice** from the menu of different device types. This will open the **UdpDevice** editor.

UdpDevice properties



Verbose send

When enabled, the device logs every UDP message sent to the console. This option is intended for debugging and troubleshooting only. We recommend disabling it for devices that send messages frequently, as it can generate excessive console output.

IP address

The IP address of the destination 3rd party hardware. You must ensure that your network topology is configured to allow communications between the two machines.

Port

The network port of the destination 3rd party hardware. The 3rd party vendor will need to specify this value.

Failover command

A control string sent to the device over UDP when failover is triggered.

Recovery command

A control string sent to the device over UDP when failover recovery is triggered.

Test Commands

The following Test Commands are available:

- **Send Failover**
- **Send Recovery**

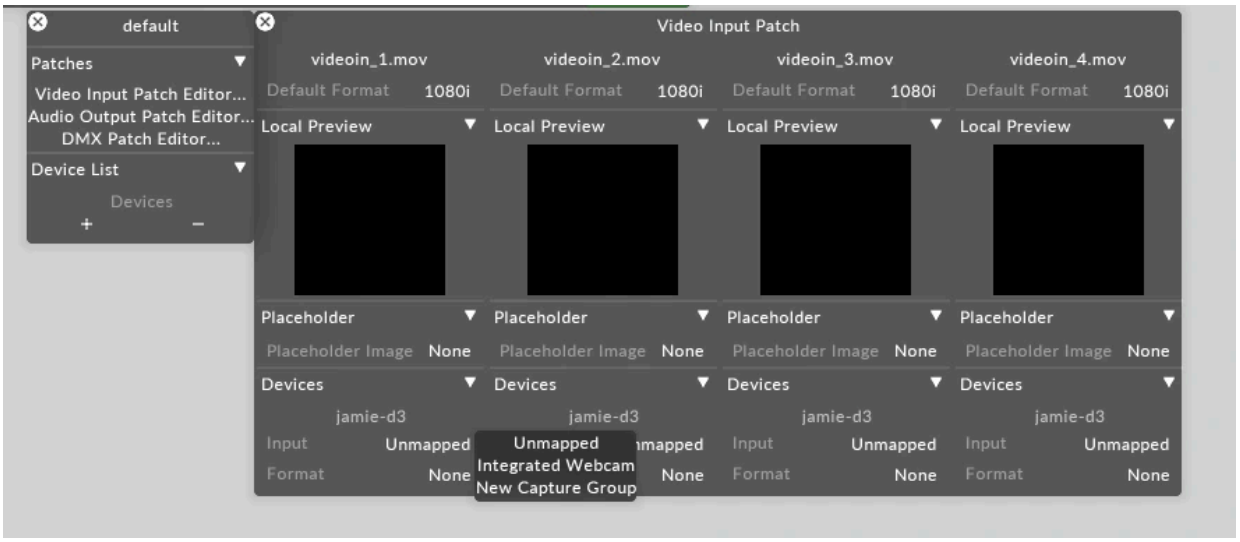
4K Quad Link Capture

r14.3 introduced additional video capture functionality to enable 4K Quad Link Capture over SDI.

> ⚠ **Warning**
>
> 4K Quad Capture is only supported on Pro and GX machines, with the exception of GX 1.

Setting up Quad Link 4K Capture

Right-click on **Devices** and then click onto **Video Input Patch Editor...**. When opening the editor and left-clicking on Input on one of the Video In Patches, there is the option for **New Capture Group** in the **Input** field.



When selecting this you will get an unmapped quad capture group.



From there you can select and choose the input for that quad capture group i.e. Bluefish 1A/1B/1C/1D.

> **Note**
>
> *Please note**:you cannot choose the integrated Webcam or any external capture cards for this feature.

To be able to do dual capture group, press the minus - symbol at the bottom of the capture group to make it Dual rather than Quad.

A key part to remember is to respect the Bandwidth of the Capture card.

For more information contact **Disguise Support**.

HDMI Video Capture

The EX 3+ and EX 2C servers support 4K DCI HDMI 2.0 video capture, in addition to 12G-SDI capture. This enables flexible combinations of HDMI and SDI inputs, depending on the server model and licensing.

Supported Input Configurations

That means the EX 3+ can support simultaneously:

- 1x 4K DCI HDMI 2.0 capture (HDMI connector)
- 2x 12G SDI inputs via Ports A and C (HD-BNC connector), or 4x 3G SDI inputs (HD-BNC connector)

That means the EX 2C can support simultaneously:

- 1x 4K DCI HDMI 2.0 capture (HDMI connector)
- 1x 12G SDI inputs via Port A (HD-BNC connector), or 4x 3G SDI inputs (HD-BNC connector)

or

- 2x 12G SDI inputs via Ports A and C (HD-BNC connector)

Requirements

To enable HDMI video capture, all of the following requirements must be met:

- Designer **r32.2.4** or later
- The appropriate **25Q3 OS image** or later must be installed for the server model, as specified in the Product Compatibility table.

Server Support Summary

The table below summarises the input and output capabilities for HDMI.

	EX 2C	EX 3+	Solo (Legacy)
4K Inputs	1x HDMI 2.0 and 2x 12G inputs for 2x 4K inputs, or 4x 3G inputs (HD-BNC)	1x HDMI 2.0 and 2x 12G inputs for 3x 4K input, or 4x 3G inputs (HD-BNC)	2x HDMI 1x 4096x2160 @30 Hz or 2x 1920x1080p @60Hz

	EX 2C	EX 3+	Solo (Legacy)
4K Outputs	2x 4K outputs (DisplayPort 1.4)	3x 4K outputs (DisplayPort 1.4)	N/A

Licensing Considerations

Licensing imposes the following limitations:

EX 2C

The EX 2C is licensed to accept up to two **4K / 12G input** at a time.

If both **12G-SDI inputs** are active, any **4K HDMI** signal presented to the HDMI capture input will be rejected.

EX 3+

The EX 3+ supports three concurrent 4K / 12G inputs, which may be any combination of **HDMI 2.0**, and **12G-SDI**.

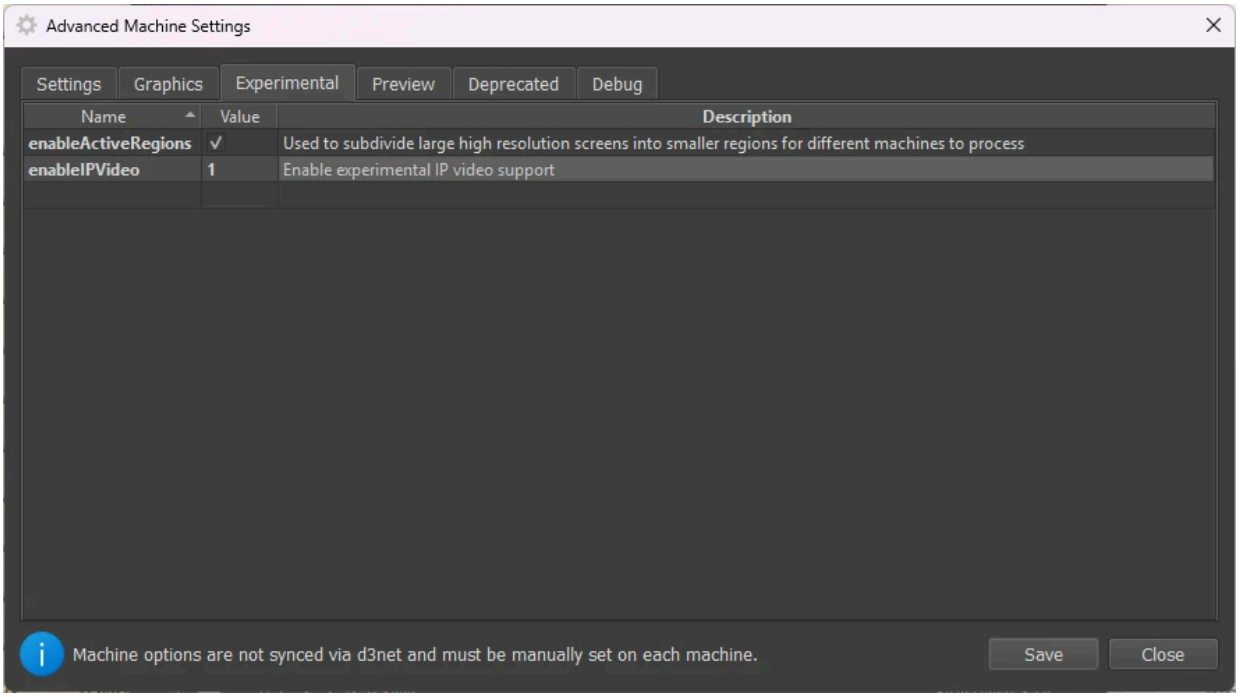
These limits are enforced at runtime and cannot be overridden.

ST 2110 Video Capture (Prerelease)

ST 2110 video capture is currently in prerelease and may have unresolved performance issues or instability. The feature allows capturing ST 2110 content over the network via the Mellanox network card included with VX and GX range machines. EX range machines are not supported.

Enabling IP Video

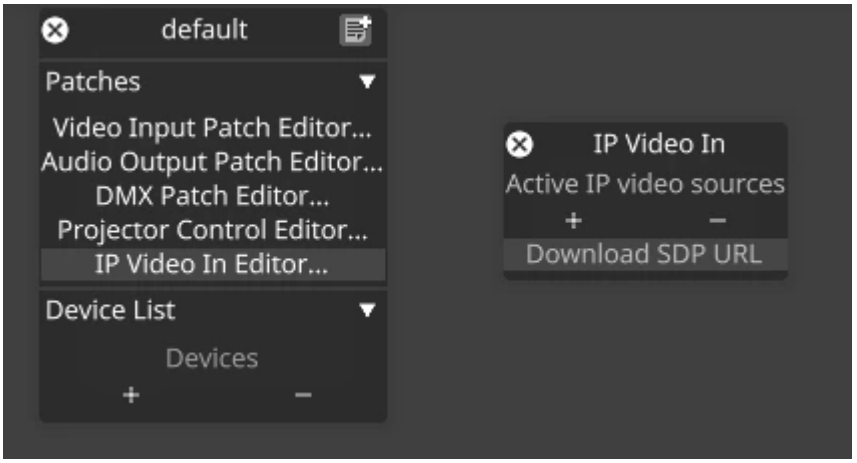
Before using ST 2110 video capture in Designer you must set the `enableIPVideo` option switch to 1.



Enable the option switch

Capturing ST 2110

ST 2110 capture devices are configured using the **IP Video In Editor** available in the device manager menu when the option switch is enabled.

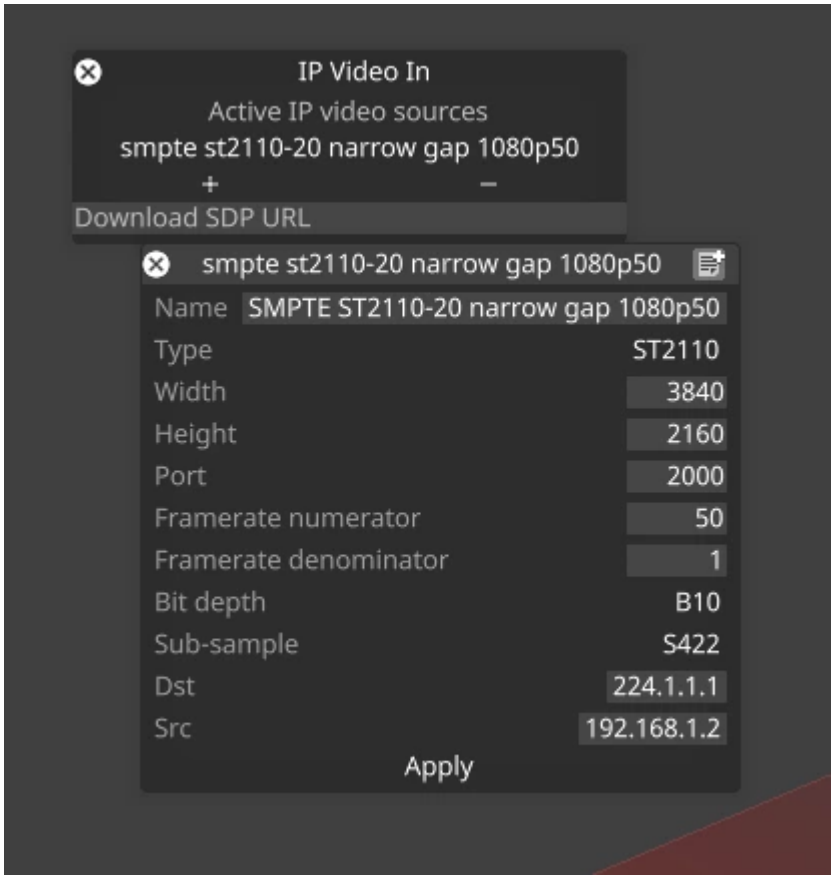


IP Video In Editor window

There are currently three functions to this editor:

- The list of enabled IP video sources can be added to or removed from. These objects (of type `PersistentIPVideoIn`) contain the definition of an ST 2110 video source in Designer.
- A URL to an SDP file can be pasted into the grey box at the bottom of the editor. When the 'enter' key is pressed, the URL will be downloaded and the SDP file parsed into a new `PersistentIPVideoIn` object. This is the primary means of registering an ST 2110 video source in Designer currently.
- If using NMOS a list of NMOS senders can be displayed for the user to select from. This will download the SDP file from the sender and connect the two.

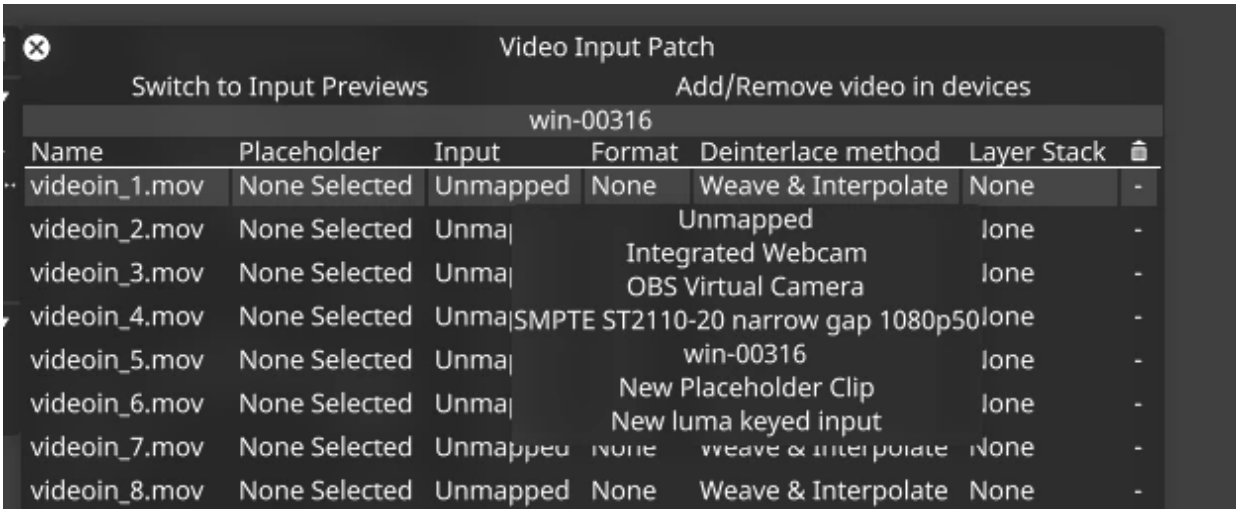
It is also possible to create a `PersistentIPVideoIn` object by placing a `.txt` SDP file in the `SDPFile` directory of the Designer project. Once a source has been registered, it can be right-clicked to open an editor where the details of the ST 2110 video stream can be checked:



The persistent IP Video Editor with ST 2110 options displayed

The fields are used as follows:

- **Name**: this is used to label the stream in the video input patch editor.
- **Type**: this should be set to “ST2110” or “NMOS”. Using NMOS means the other details will be set when a sender connects via NMOS.
- **Width**: the expected width of the incoming stream in pixels.
- **Height**: the expected height of the incoming stream in pixels.
- **Port**: the port to receive the multicast stream on.
- **Framerate numerator and denominator**: the expected rate of the incoming stream. This is only used for validating the timestamps on the received frames.
- **Bit depth**: the expected bit depth of the incoming stream.
- **Sub-sample**: the expected sub-sample format of the incoming stream.
- **Dst**: the multicast address that the incoming stream is being broadcast on.
- **Src**: the source address of the device sending the incoming stream. If present this is used to filter the packet flow.
- **Apply**: the apply button will update any active instances of the video capture with any changed values in this editor. Once a `PersistentIPVideoIn` object has been created (and so long as it remains in the active IP video sources) it will then appear to select in the video input patch editor to be patched like any other source:



The video input patch editor with a ST 2110 source mapped

Designer does not perform any active synchronisation of 2110 inputs. If Designer's output is synchronised to the same timing source (e.g. PTP via an IP-VFC) as the inputs, ST 2110 timing will ensure that input frames finish being received immediately before Designer begins drawing a new frame, allowing for minimal latency. If inputs are free-running or Designer is not locked to the same source as the inputs, an additional frame of latency may be incurred and input frames may not be displayed in alignment.

NMOS

If using NMOS, Designer will create an NMOS receiver for each IP Video instance which is of a type ST2110 or NMOS. If one is created as an NMOS type the other fields will be made read only. The NMOS receiver will be advertised with its full capabilities, allowing any sender to connect to it. When connected, the properties of the sender will be updated in the IP Video fields. This allows users to create a disconnected IP Video, where the sender and SDP file will be assigned later.

Debug view

The status of the ST 2110 capture can be viewed in the **VideoIn** section of the debug window. Some number of dropped packets is expected on beginning to receive the stream and on dropped frames in Designer, but the number should remain mostly static. Any dropped packet will result in a bad frame. The 'corrupt' and 'zero' counters are not used.



The video in debug widget with an ST 2110 capture active

Limitations

- ST 2110 captures will compete for bandwidth with RenderStream Uncompressed streams. Care should be taken that the total bandwidth required does not exceed the capability of the network adapter.
- Testing was performed with both the ST 2110 source and the Disguise server directly attached to a Disguise Fabric switch. Other switches and brands have not been tested. Receipt of a stream depends on the ability to correctly request receipt of the multicast packets via IGMP.
- Receipt of redundant ST 2022-7 streams is not currently supported. This feature is planned; in the meantime it is possible to create the two redundant streams as separate `PersistentIPVideoIn` objects and switch between the two to provide non-seamless redundancy.
- 8, 10 and 12 bit sources are supported. 16 and 16f are not.

- 4:2:2, 4:4:4 and RGB subsample formats are supported. The YCbCr transformation is performed using the BT.709 matrix. All YCbCr formats are limited-range, RGB is full-range.
- Interlaced and pSF sources are not supported.
- Framerate must be expressed with a denominator of either 1 or 1001.
- ST 2110 capture cannot be enabled on EX range machines.

Known issues

- If no network connection is made to the Mellanox card, mapping a ST 2110 capture device will result in a repeating “Unable to create video capture stream” notification.
- If packets are not being received to the network adapter once the IGMP request has been made, a message “RiverMax: RMAXd3 stream stall recovery., status = RMAX_ERR_UNKNOWN_ISSUE” will repeat in the console.
- An irregular notification about timestamp errors may appear in the notification zone; if no other issue is observed this can be safely ignored.
- Actors restarting their project may lose their ST 2110 capture devices. Removing and readding the device to the active IP video group should restore them.
- Adding SDP files to the SDPFile folder may not result in a device being created.

Setup Video Input

This topic covers how to set up video inputs in Designer, including SDI and NDI® sources.

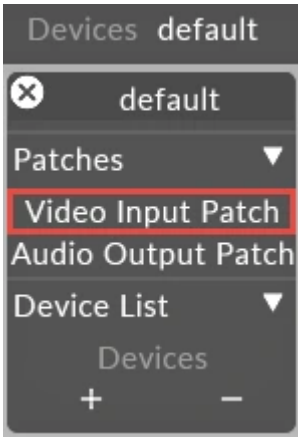
Sources

Disguise offers the ability to capture video from a number of sources.

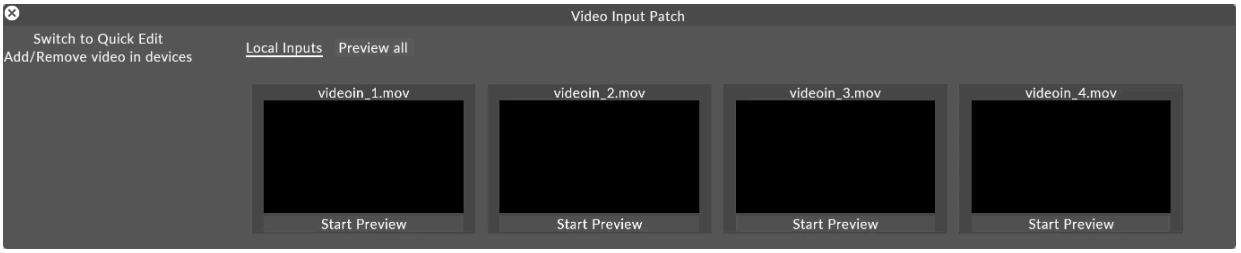
- 3G/HD/SD-SDI capture sources on hardware. See hardware manual for capabilities.
- DirectShow devices (intended for testing only, limited support, not for use on shows)
- NDI® sources, when an NDI® source is present on the network.

Concepts

Video capture is managed by the Video Input Patch manager, accessible via the Devices menu item.



Video Input Clips are essentially 'virtual slots' into which you can patch physical capture inputs for each machine in your Designer setup. You can have as many Video Input Clips as you wish, they are labelled **videoin_1.mov** and upwards by default.



Local inputs: shows only the local incoming signals on the selected machine.

Preview all: shows all incoming signals on the selected machine.

Switch to quick edit: changes the format of the editor to a list view, for quick group editing of properties.

Add/Remove video in devices: opens the logicalVideoIn editor, allowing you to create new inputs and duplicate existing ones.



A Video Input Clip can be selected by left-clicking its thumbnail in the editor, this will display the following properties:

Placeholder image: If no capture device is mapped locally for this video input clip, the placeholder image will be shown instead. This is useful for pre-site sequencing.

Input: The physical input that the source is coming through on the machine.

Format: The desired format that you wish to capture for this Video Input Clip. If the desired capture format is not supported on the mapped capture device, Disguise will attempt to find the closest match.

Deinterlace method: Deinterlacing method to use on incoming video, details of available methods can be found here.

Process HDMI RGB Limited as Full: Only shown on servers with HDMI capture. Sometimes a video source sending RGB Full doesn't state this correctly and will be detected as RGB Limited. Selecting this option will process it as the RGB Full data it really is, so no colour depth is lost.

Layer stack: The layer stack to apply to the incoming video, to apply time-independent visual effects. More information on layer stacks can be found here.

Crop size: The crop rectangle size in pixels to apply to the incoming video. The applied crop will be centered on the frame e.g. a horizontal crop of 1600px on a 1920px original frame will remove 160px on the left hand side and 160px on the right hand side.

Crop offset: The offset in pixels to apply to the crop rectangle. Offsetting the crop rectangle more than half the crop size in an axis will cause the crop rectangle to shrink in order to stay within the original frame.

Local Preview: A preview of the input selected on the local machine. You can start and stop the preview using the button below the thumbnail.

Start/Stop preview: this button below the thumbnail will toggle from showing nothing, to showing the current input. When you select **stop preview**, the thumbnail will return to black,

but the video input is still being received.

Configuration

To configure a Video Input Clip execute the following steps

1. Ensure your video source is connected correctly (via SDI etc).
2. Right-click **devices** in the dashboard.
3. Left-click **Video Input Patch**. By default, four Video Input Clips will be presented to you. Or if you are on a piece of Disguise hardware, whatever number of physical inputs the hardware has, will be displayed. In the **Devices** section, you will find your local machine as the first item. Select the input source connection for your local machine (e.g. Bluefish 1A or Phoenix 1A).
4. For 4U v2.5 and older systems, you will need to select the **Format** of the source signal. On Pro and GX range machines, the signal will be auto-detected.

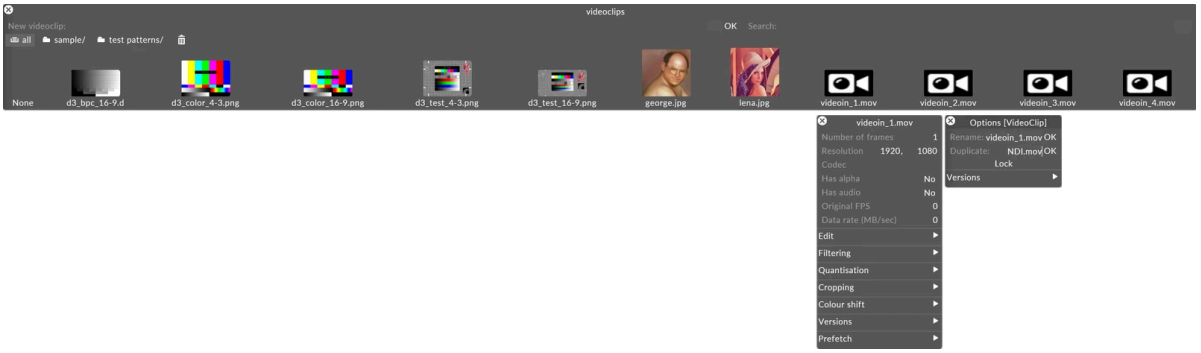
The live picture from this capture source will now show in the **Local Preview** section (only once you have clicked **start preview**).

You can now use the videoin_1.mov clip as a live source in the Video Content Layer on the timeline (see below).

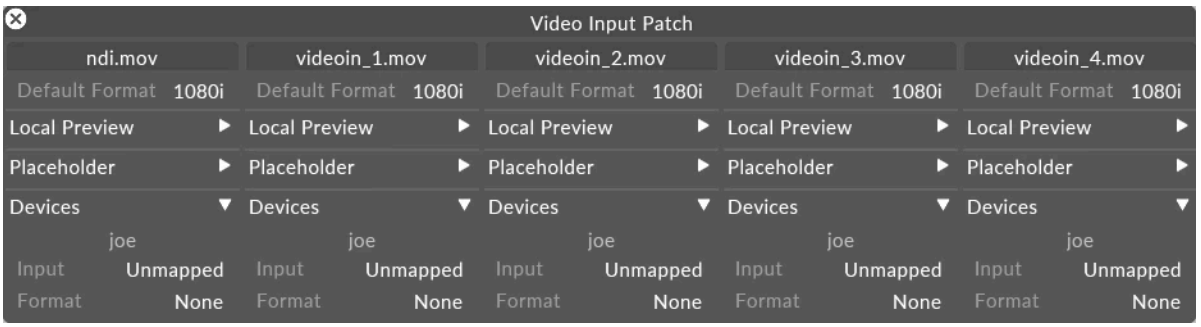
Duplicating video input sources

Sometimes it may be necessary to duplicate the video input sources, to gain additional virtual capture 'slots'. This can be useful for looping back internal cameras or for use with NDI®.

1. Open the video clip editor by right-clicking a video clip from the media picker.
2. Select **duplicate** and give the new input a name.



3. The new video input will now be available in the video input patch editor.



Working with live video on the timeline

Live video is applied to the video keyframe editor using the special Video Input Clips: **videoin_1**, **videoin_2**, **videoin_3** and **videoin_4** respectively. As soon as the video inputs are configured, they are treated just like normal video clips.

- For example, drop **videoin1** onto the keyframe editor to route video from the first sampler in the device manager, and so on.
- Use the appropriate Mapping type to map the camera input to the screens.
- Right-clicking the **videoin** thumbnail lets you edit colour correction and other clip properties, just like normal clips.

Input latency

By default, Designer delays incoming video by one frame in order to ensure smooth playback across inputs.

This figure can be adjusted using the `smoothVideoInputFramesDelay` options switch.

Video De-Interlacing Methods

Designer is able to de-interlace incoming interlaced video.

While Disguise does not recommend interlaced formats, there are a number of options to attempt to reduce the visual artifacts which are visible with these legacy formats. For the majority of cases, using a 720p signal results is better quality imagery.

Interlaced formats consist of time and space separated fields which are half the height of the full progressive frame. These fields contain even or odd lines from different points in time. They are offset from each other by one pixel vertically and by the field rate in time.

De-interlacing methods attempt to reconstruct as close to a true progressive frame as possible from this reduced data. As with all systems which create new data, this may not be what was truly captured in the first instance.

The following de-interlacing methods are available:

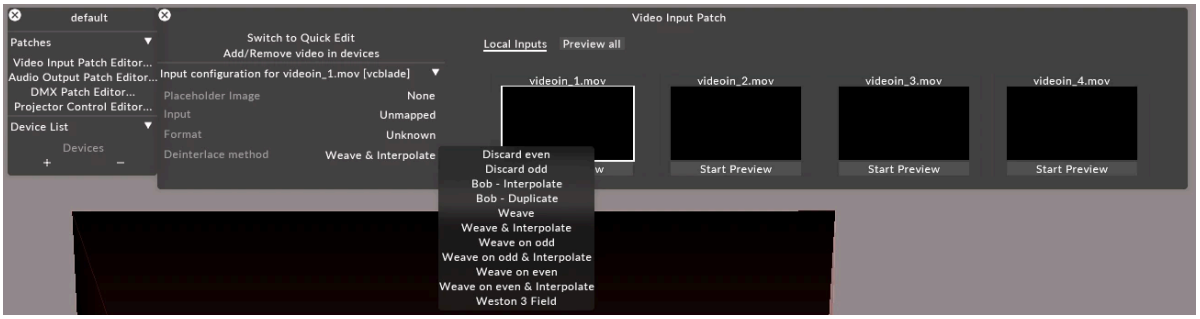
- Discard even
- Discard odd
- Bob - Interpolate
- Bob - Duplicate
- Weave
- Weave & Interpolate
- Weave on odd
- Weave on odd & Interpolate
- Weave on even
- Weave on even & Interpolate

Each of these methods has a tradeoff with different types of content, depending on vertical detail frequency, and horizontal movement.

Accessing the de-interlacing methods

1. Right-click on the **Devices** tab in the dashboard.
2. Left-click on the Video Input Patch Editor.
3. Select the desired Video Input and expand its properties menu.

4. Expand the **Deinterlace method** tab.



Discard methods

The discard methods discard either the even or the odd field, thus removing 50% of the received data. If this option looks best with the captured data, then consider switching to a lower frame rate progressive signal, as the effective frame resolution is half height and half field rate. Slowly scrolling thin horizontal features can ‘disappear’ into the other field using these techniques, leaving a low frame rate flickering result in the worst case.

Bob methods

The bob methods render every field one by one, enabling full field rate display of the data, but can result in a vertical bobbing motion, especially visible at high contrast edges. The interpolate method is generally less noticeable, due to the fuzzing of these edges. The vertical bobbing motion comes from the contrast between the two fields - if there are a series of red lines, followed by a series of white lines, the area which transitions from red to white will flicker due to the last red line only being visible 50% of the time.

Weave Methods

The weave methods use 2 fields to reconstruct the progressive frame. These methods resolve issues with high frequency vertical features disappearing between fields, but introduce issues with horizontal motion. When horizontal motion is active, and the weaved fields are separate in time (i.e. not PSF) then the change in position during that time creates a comb-like effect, showing the horizontal movement. Against a high contrast background, this is not pleasant.

The interpolating variants of the weave methods attempt to reduce this combing by combining 50% of the most recent field with the older field. When working with moving images, this blurs out the combing effect, and it’s possible to believe the effect is similar to motion blur. However, this method shares similar issues with the bob methods, in that if the most recent field does not have the same information as the line it is being blended with, a darkening effect can occur.

Weave takes the 2 most recent fields, even across different frames, and presents them immediately. This can result in some flickering artifacts with the interpolating method, as the most recent field which was received takes precedence. This is mitigated with Weave on even, which always takes the most recent full frame, and weaves pairs of fields in the same way every frame. The cost here is frame rate, which is halved by waiting for both pairs to become available before showing them.

Weave on even is useful for interpreting PSF formats. Interpolation should not be necessary with PSF, as PSF is effectively an interlaced transport for a progressive frame - there is no temporal offset between the fields.

Weave on odd can be useful if at some point in the upstream signal chain, the interlaced fields have been switched to the wrong order.

Weston 3 Field also known as W3FDIF, is a 3-field vertical-temporal de-interlacing method developed by the BBC and included in ffmpeg.

Visca Camera Device

A VISCA camera is a professional video camera that uses the VISCA protocol (Video System Control Architecture), to allow external devices to remotely control its functions. This protocol is used to adjust settings like zoom, focus, and white balance, and is common in pan-tilt-zoom (PTZ) cameras used in broadcasts, video conferencing, and live streaming. The control can be sent over serial connections or, more commonly now, over an IP network.

Disguise supports controls sent over an IP network only.

This topic outlines the setup steps in order to control VISCA-compatible PTZ cameras over network using a Disguise media server.

Visca Camera Setup

Requirements

- VISCA Camera that supports IP connectivity.
- Optional Disguise machine with a relevant capture card (only if you want to use the camera as a live video input).

Workflow

1. Create a UDP device from Device Manager.
   - Set the IP Address
   - Set the Port on the UDP device
2. Create a Visca Camera device from Device Manager.
   - Set the Address.
   - Set the Control Device to the UDP device.
   - Set the Camera Model.
3. Create a CameraControl layer on the timeline.
   - Set the Camera field to the camera that was created earlier.
   - Click the Command field to open up the keyframe editor.
   - Create and keyframe your desired commands for the camera.

Creating a UDP device

For detailed steps on creating a UDP device, see UDP Device.

Create a ViscaCamera device

1. Right-click **devices** from the dashboard. This will open the Device Manager, which contains a list of active devices.
2. Select **+** to open the Device library. This lists which internal or external devices are available.
3. Type in the name of the new device into the **new device** text field.
4. Hit **Enter**. This will open a list of device types available in Designer.
5. Select the **ViscaCamera** device type. Type the name exactly — one word, capital V and C — variations such as “Visca Camera” will not match.

Controlling the camera

1. Create a CameraControl layer and add it to the timeline. For more information see Creating layers.
2. Create presets and keyframe accordingly. For more information, see CameraControl layer.

Mapping the camera to a video input

To bring the camera’s live video feed through Designer and output it to a physical screen:

1. Patch the capture input to a Video Input Clip (e.g. `videoin_1`) in the Video Input Patch manager.
2. Create a Video layer.
3. Set the layer’s **media** property to the Video Input Clip from step 1.

Visca Camera properties


Select type of device
Search:
AgileCamera
AnalogWayOPS300
AudioAnalyser
BarcoEncore
BarcoMatrixPro
BlackMagicVideoHubMatrix
CITPDevice
DmxDevice
DmxMachineControl
DmxProjectorControlDevice
ExpressionVariablesDevice
FolsomMatrixPro16x16
GVGMatrix
GefenMatrix
JsonMachineControlDevice
LightwareMatrix
LightwareMatrixLW3
MediorNetMatrix
MidiDevice
OscDevice
OscMachineControl
OscTester
PositionReceiver
ProjectorCalibratorDevice
PureLinkMatrix
SerialDevice
ShotRecorder
StringProjectorControlDevice
TelnetDevice



Address

The VISCA address of the camera being controlled. Multiple cameras on the same network are distinguished by address.

Control Device

The device in the device manager that communicates with the physical camera — typically the UDP Device created earlier.

Camera Model

Select the type of camera that supports the VISCA protocol. Currently supported models: **300H** and **360SHE**.

10-Bit Displays

Requirements

- A display that is capable of outputting 10-bit.
- A machine capable of outputting 10-bit such as the VX, GX or EX ranges.

Workflow

1. Bit depth can be set globally for the whole project in the **Feed View > Global Settings > Project Bit Depth**. The options are 8-bit or 10-bit.
2. Bit depth can be set per machine, independent of the project bit depth in the machine editor widget.
   - Right-click on the machine and navigate to the Display Management separator.
   - Select from Use Project Bit Depth, 8 bit and 10 bit.
3. Click **Apply Feed settings** after changing bit depth.

HDR

In order to enable HDR within Disguise, follow these steps:

1. DO NOT set HDR in Windows or on the graphics card; this is not necessary.
2. Set and apply 10-bit bit depth as described in the section above.
3. Apply output transform or colour profile according to the display requirements.

> **Note**
>
> **Please note**: Disguise does not send metadata - ensure the output device is set to match the profile.

> **Note**
>
> **Please note**: HDR displays must be set to force their profile due to the InfoFrame not being set by Designer and therefore is not able to be detected by the screen.

10-Bit Test Pattern

The test pattern we use is a greyscale consisting of multiple rows, each with a gradient of greyscale blocks that represent different steps between black and white. Each row is designed to contain more steps than the last, corresponding to higher bit depths. The 8th row has 256 steps, while the 10th row represents 10-bit with 1024 steps. If your media server and output devices are set up correctly to handle 10-bit, you will be able to distinguish between each of the steps in the 10-bit row. The 8th row will therefore be visually distinct from the rows above it.

Note, ensure you are applying the 10-bit test pattern without scaling. Scaling could squash the graduated steps making it difficult to see the difference in rows.

Known Issues

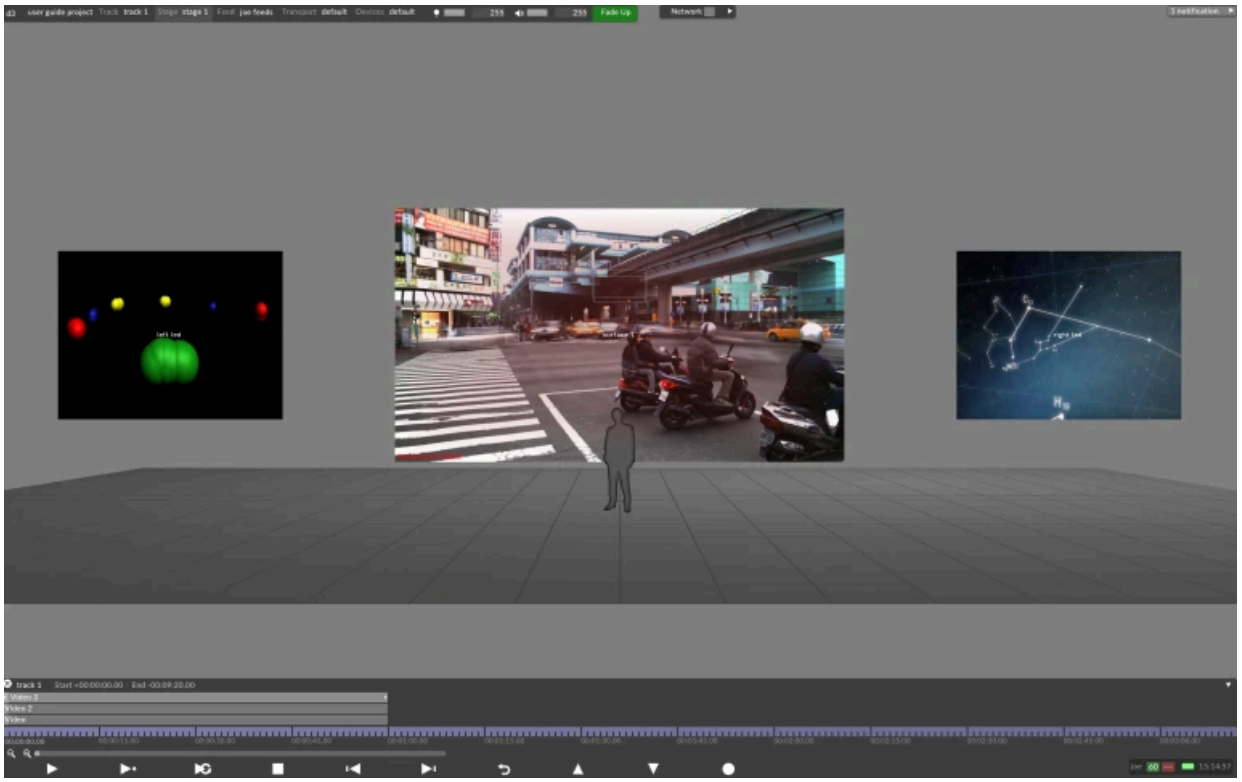
- DVI VFC cards cannot run 10-bit content or input and so will not function when 10-bit mode is enabled.
- When using 4K 50hz/60hz with HDMI 2.0, the HDMI available bandwidth means you need to make use of 4:2:2 chroma subsampling. Currently Designer only creates 4:4:4 EDIDs when applying feed settings, so this setting will need to be set in the GPU control panel. View the Managing EDIDs page for more information.
- Depending on what the display device is, it may need to be in a specific mode to enable 10-bit. This could be known as high performance, high colour mode or true colour mode. Refer to the manufacturer specifications on how to enable the 10-bit mode for your display of choice.

For more information on 10-bit workflows, please contact **Support**.

Adding a Feed Rectangle for Screens

> **Warning**
>
> Feed rectangles flash blue, every 5 minutes in the GUI. This is to prevent the GUI head being used as an un-authorised output. The blue flash is not visible on the outputs.

The image here shows a Screen in the Stage Visualiser:

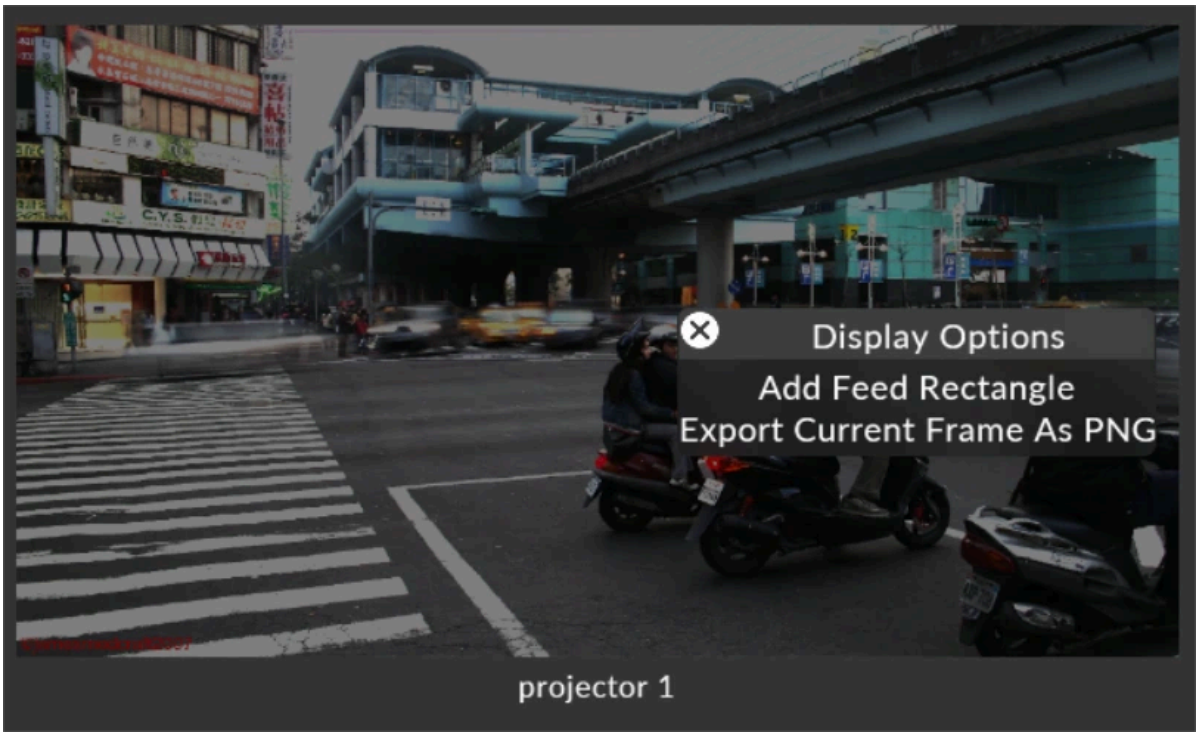


1. Left-click feed in the State editor (bar at the top of the screen). This will switch the Stage level with the Feed level. The Screen section (top half of the Feed level) now shows a simplified view of the Screen or the virtual projector output, depending on the type.

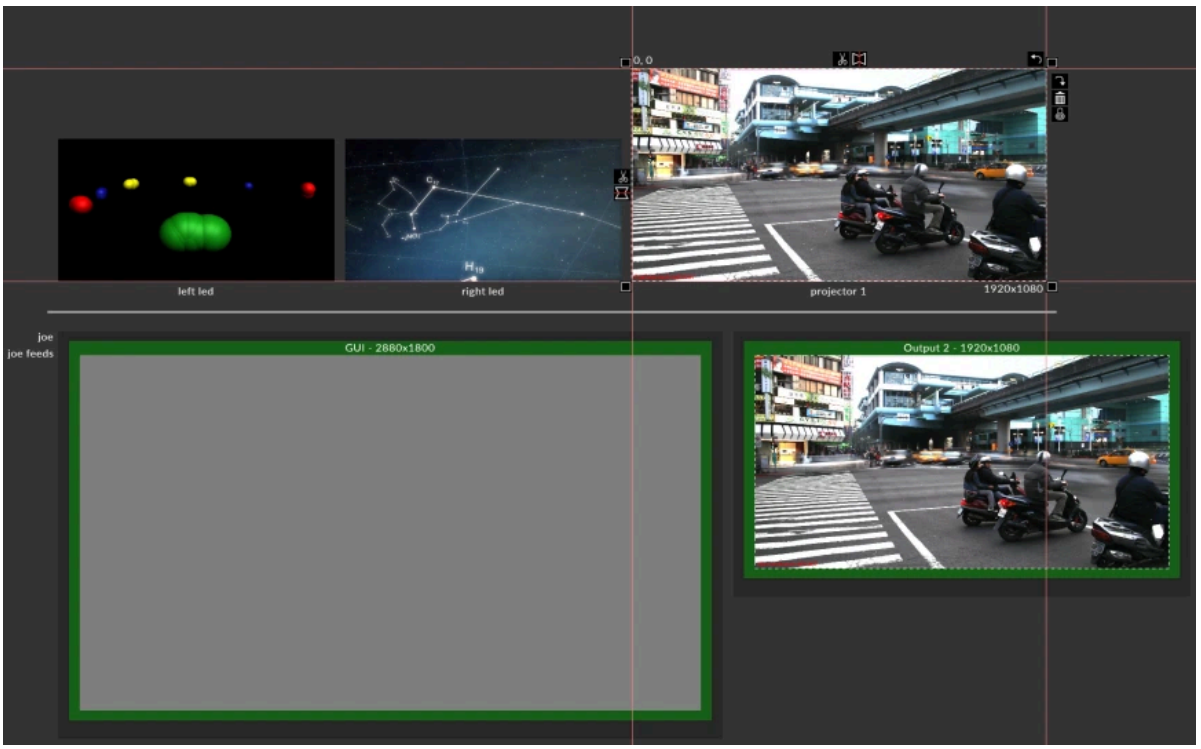


   Screens from the Stage level are displayed in the Screen section (top half of the Feed level)

2. Right-click the Screen you want to create a Feed rectangle for. This will open the Feed rectangle menu.



3.Left-click add feed rectangle. This will create the Feed rectangle.



Feed rectangle samples content from the Screen you right-clicked to the output head, in this example Output 2

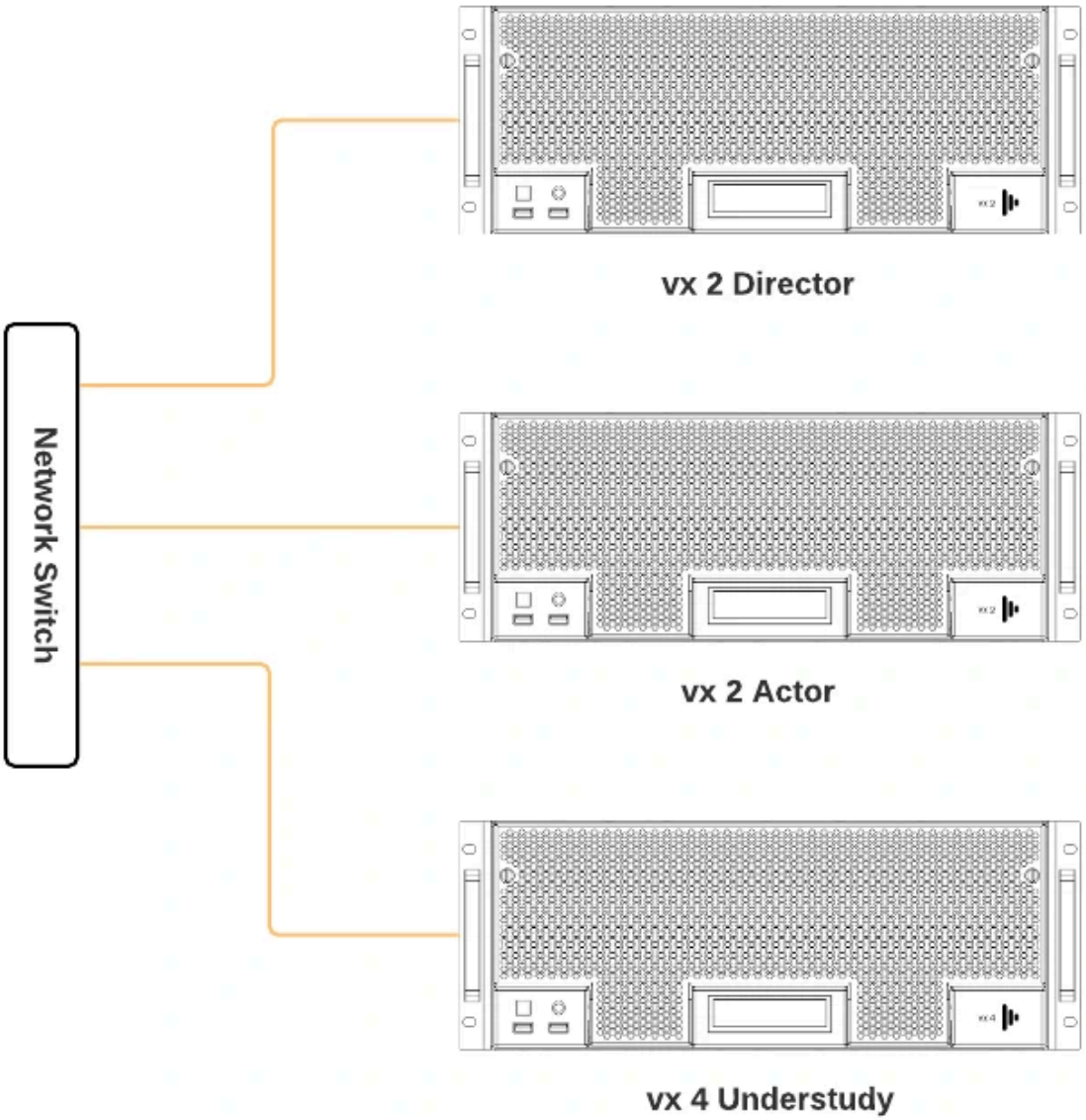
The Feed rectangle samples the whole of the Screen you right-clicked. The output head of the Feed rectangle, in this example Output 2, represents the area of the output display the content is copied to.

> **Note**
>
> Feed rectangles can also be easily and quickly created using the Alt+Left Click shortcut to drag an arrow from a screen onto an output. To do this, simply press and hold the Alt key as you left-click, hold and drag the mouse from a stage screen above the line to a desired output below it.

Alternate Feed Scenes

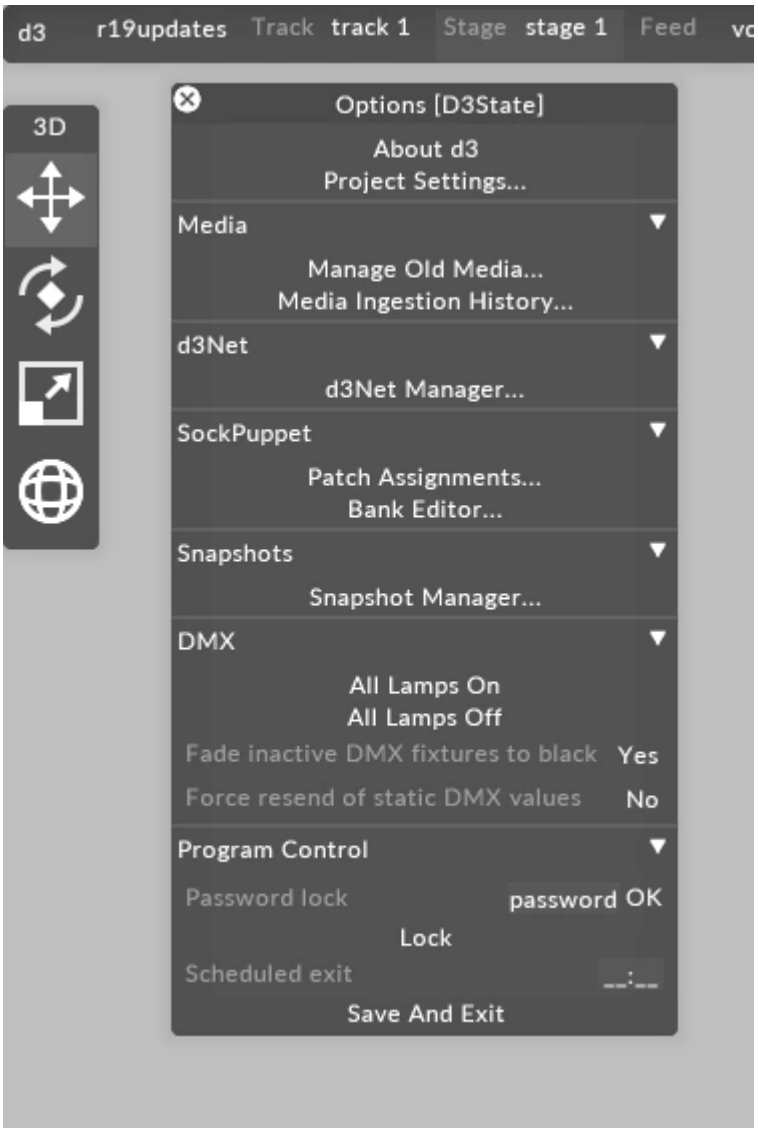
In the scenario where you may have several types of Disguise servers serving as Director, Actor, and Understudy roles in a single d3net network, then it may be necessary to use an alternate feed scene to direct the content of certain screens to the correct outputs on the Understudy depending on the role that it takes on during a failover.

For example, this system is using 2 vx 2 machines as Director and Actor, and a vx 4 as an Understudy.



The vx 2 Director has 2 HDMI VFC Cards but the vx 2 Actor has 1 HDMI card and 1 Quad SDI card. For the vx 4 to properly be able to take on either role during failover, we will need to create two Feed Scenes in order to correctly map the outputs for both Director and Actor vx 2 servers to the correct outputs on the vx 4 Understudy. Here's how to set this up:

1. Right-click **d3** in the dashboard to open the **d3State - Options** window, then navigate to the **d3net Manager**:



2. In the **d3Net Manager**, add and configure a Director, Actor, and an Understudy to match the types of Disguise servers being used:



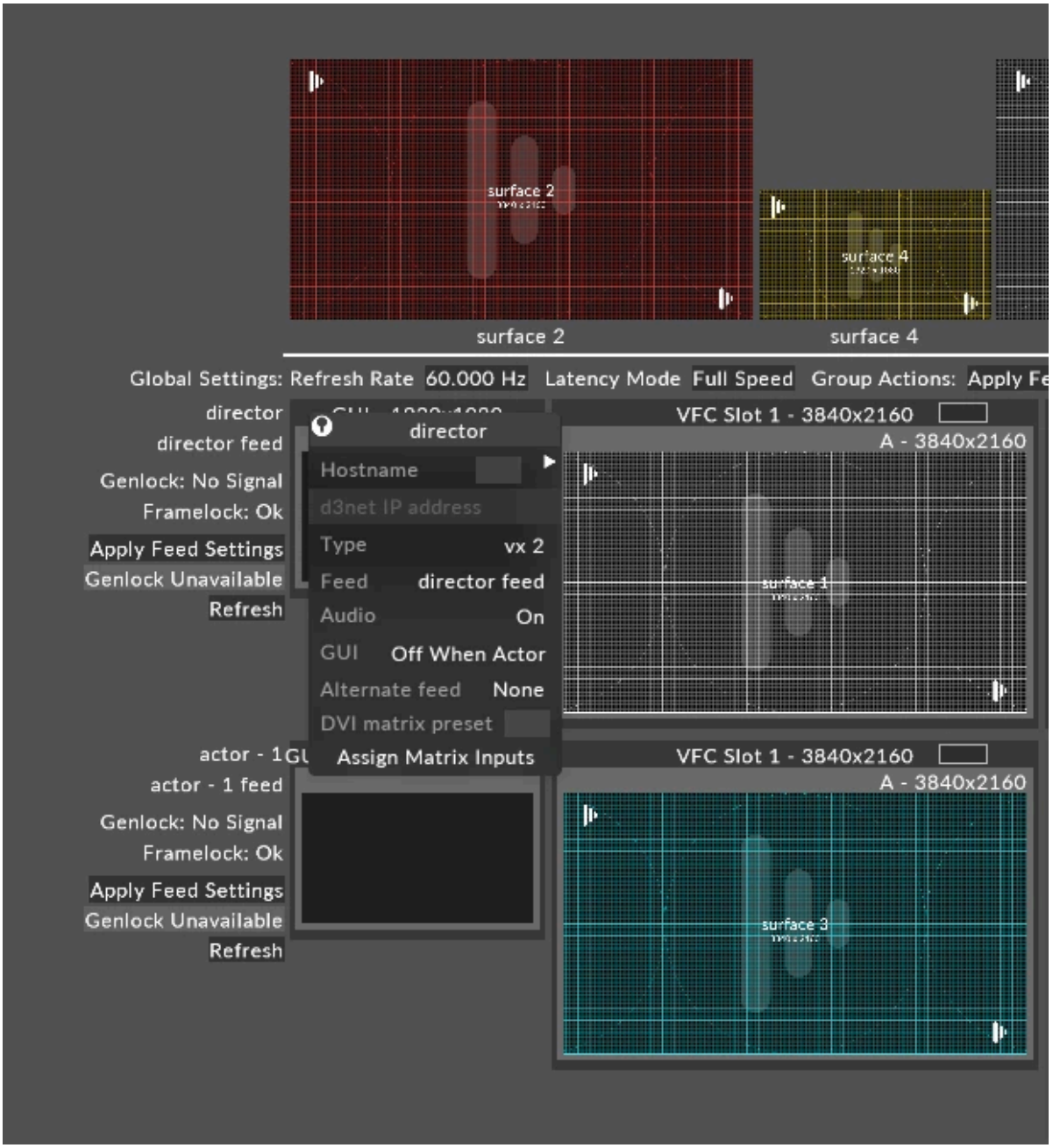
d3Net machines

3. Left-click on **Feed** in the dashboard to switch to the Output Feed Level.
4. Configure the VFC slots for each of the vx 2 machines according to the types of VFC cards in each machine.
5. Configure the feed scenes to assign the screens to outputs as desired.

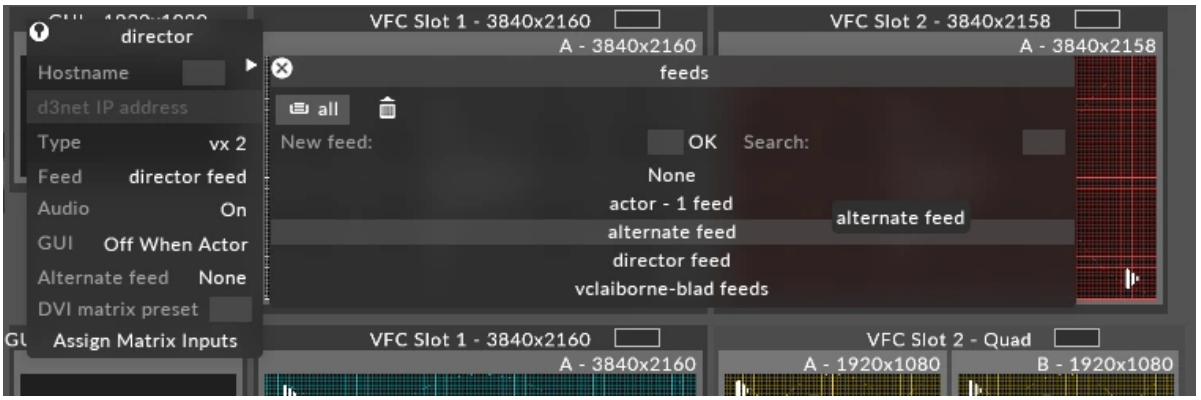
Note: The Director and Actor will each have their own unique feed scene.

To create the Alternate Feed Scene

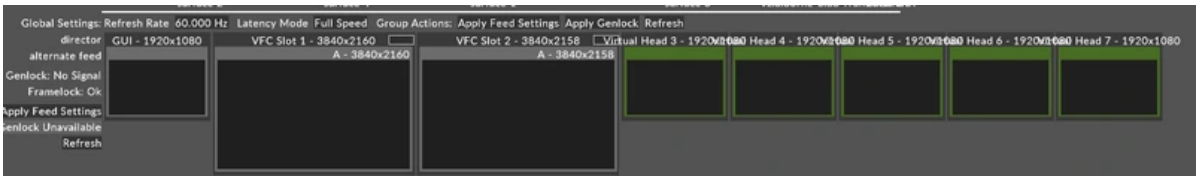
1. First, right-click on the name of the Director machine (to the left of the Director GUI); this will open the d3Net Machine manager for the Director.



2. Once open, left-click on the Director feed name to open the feeds list. Create a new feed in this window (in our example we have used the name alternate feed):

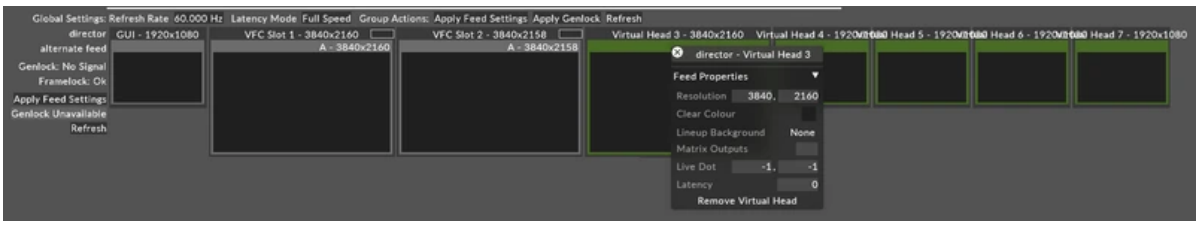


3. Add additional virtual heads to the alternate feed scene (on the Director) to match the number of outputs available across the entire Director/Actor system. In this example we've added 7 total outputs to our Director feed because of the Quad SDI VFC card being used in the Actor. These outputs are indexed numerically from left to right as Outputs 1-7.

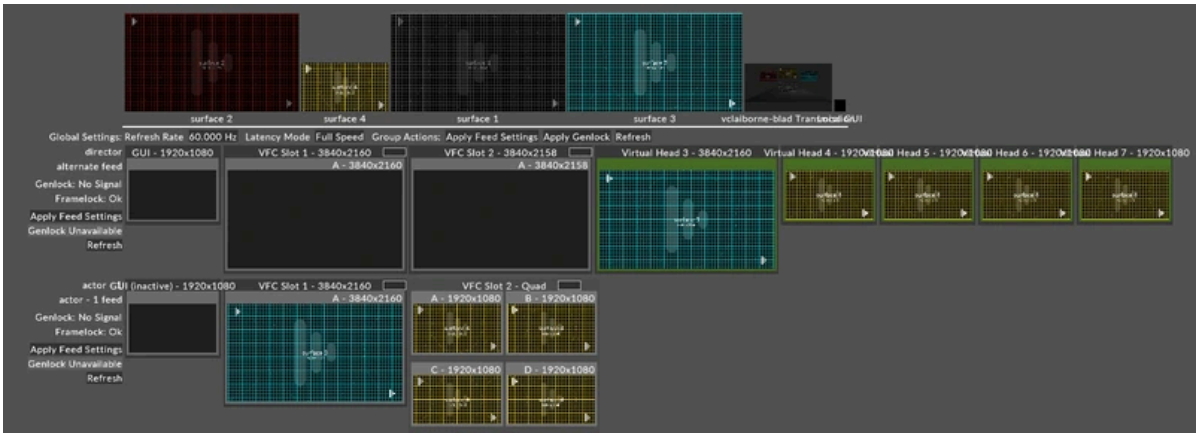


> **Note**
>
> **Please note**: Virtual heads are used because the vx 2 has 2 physical outputs while the vx 4 has 4 outputs.

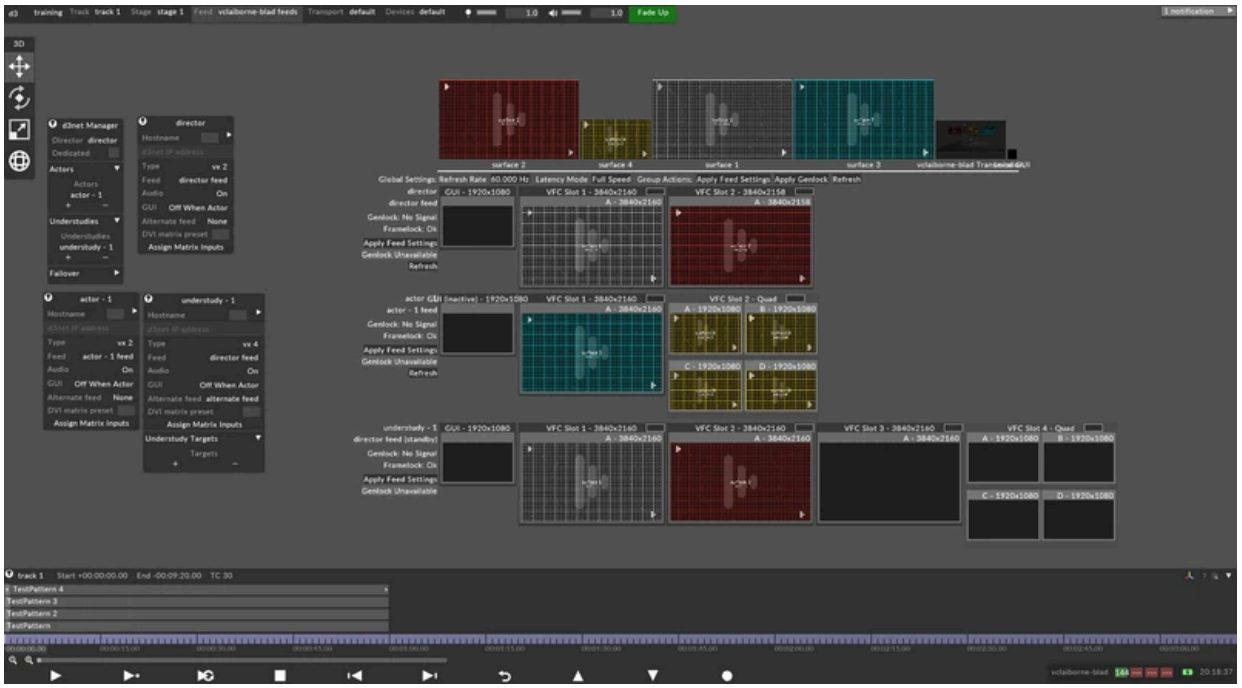
4. The first VFC card in our Actor vx 2 is an HDMI card, so we will change the resolution of virtual head 3 on the Director to 3840x2160 px.



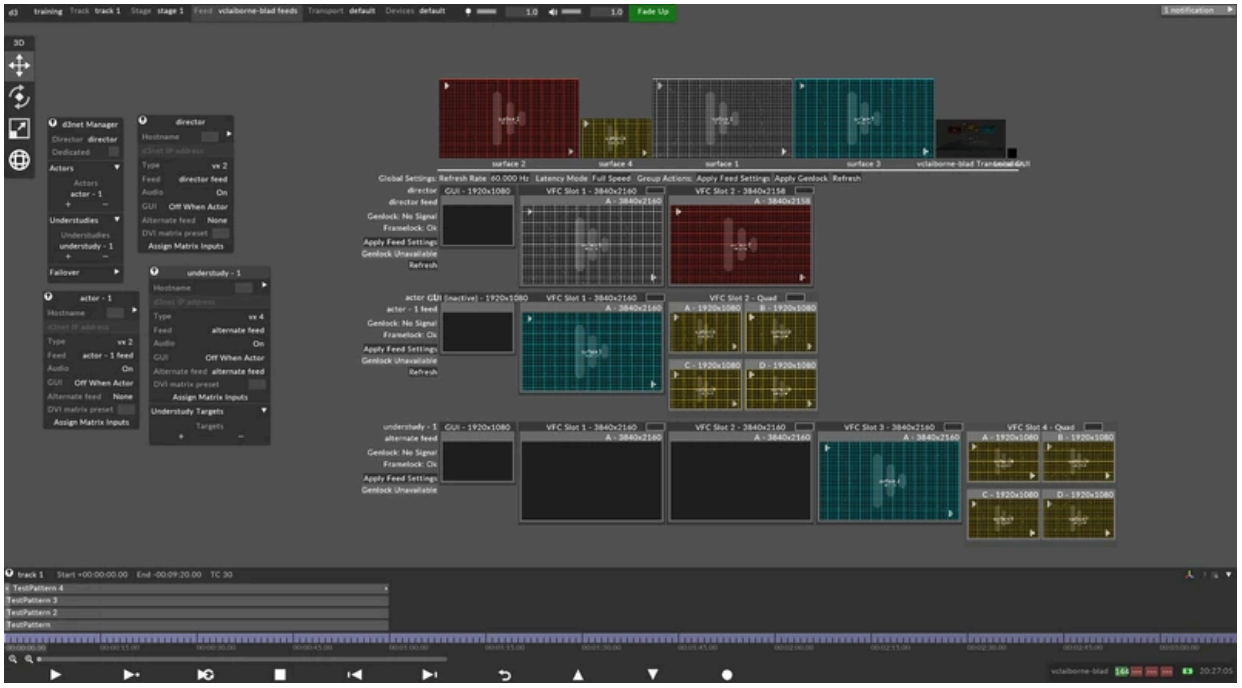
5. Next, create Feed Rectangles on outputs 3 -7 in the Director Feed scene. The screen to output mappings for these feed rectangles should be identical to the feed scene configuration for the Actor outputs 1 & 2:



6. Reset the Director's feed scene back to the primary Director feed and set the Understudy to the Director feed scene as well. Then, in the Understudy machine manager select the alternate feed scene from the list. In this example the alternate feed scene is called alternate feed. At this point, the Understudy is setup to take on the feed scene for the Director and Actor machines along with the required screen to output mappings.



Understudy configured to Director Feed



Understudy configured to Alternate Feed

Apply Feed Settings

Applying feed settings pushes a machine's pending output changes, such as a new resolution or timing mode, to its physical outputs so they take effect. Designer holds these hardware-level changes until you apply them. Applying briefly interrupts the outputs, so you can set up a head fully and commit everything in one step rather than disrupting them with each edit.

Applying feed settings is the final step of configuring an output. First edit a head's resolution, timing or feed properties on the Head Configuration page, then apply the settings to commit those changes to the hardware.

> **Warning**
>
> Applying feed settings will cause the GUI and outputs to refresh several times as the settings are applied, and may take longer than 10 seconds to complete. Please be patient while the process completes!

When you need to apply feed settings

Most feed changes update live and need no action. These include rearranging Feed Rectangles, background colour, live dot, head naming and similar feed-scene properties.

Changes that reconfigure the **physical output**, however, must be manually applied before they take effect:

- **Resolution**
- **Timing mode / refresh rate**
- **Bit depth**, which also requires a reboot (see **Changes that require a reboot** below)

A head with unapplied changes of this kind is shown in orange in the feed view. The full head colour status system is documented under Output Head Colour on the Head Configuration page.

Applying feed settings

To apply the settings for a single feed, left-click the **Apply Feed Settings** button to the far left side of that feed.



To apply the settings for every machine in the current feed scene at once, use the global **Apply Feed Settings** button in the feed toolbar. You will be asked to confirm before the settings are applied.

While the settings are being applied, the head shows an **Applying Feed Settings...** status and flashes blue and grey in the feed view.

> **Note**
>
> Designer machines and dedicated Directors have no feed settings to apply, so the global **Apply Feed Settings** button is unavailable when only those machines are present.

Applying feed settings to another machine

When applying feed settings to another machine (for example, applying feed settings on an Actor from a Director), the output heads of the other machine will flash blue and grey in the local machine's feed view for the duration of the process.

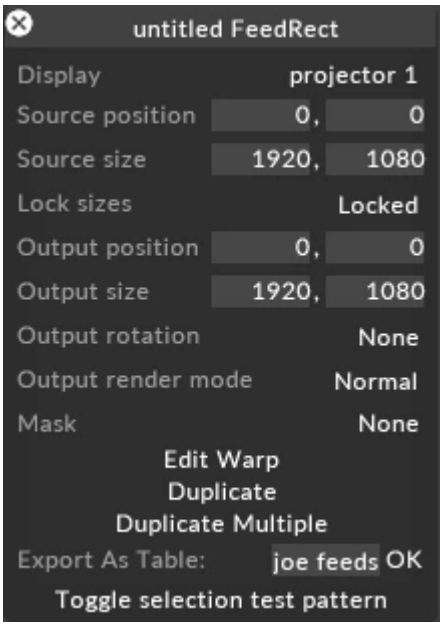
Changes that require a reboot

If applying feed settings changes a machine's output **bit depth**, Designer warns that the change requires a reboot. The machine must be manually rebooted for the new bit depth to take effect.

Blending and Masking Outputs

Designer allows the user to generate custom softedge textures and masks inside it. You can then apply the softedge texture directly on the output and update the shape, gradient and gamma settings in real-time.

Create a softedge mask on the output

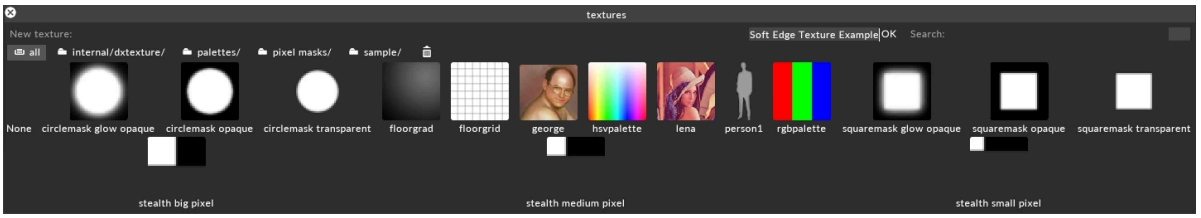


Select Mask option is used to create a custom SoftEdgeTexture mask

This will open the Texture object library which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder. For more information on the **DxTexture** folder and other folders please see the sub-chapter Placing media files for a project.

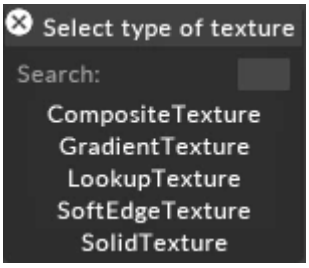
1. In the top-left corner of the library, where it says **new texture**, type in the name of the softedge mask, for example **Output1_softedge**.
2. Hit **Enter** and select the texture type **SoftEdgeTexture**.

3. Open the Feed level by left-clicking **Feed** from the dashboard (bar at the top of the screen), right-click the appropriate output and select select mask from the options list.

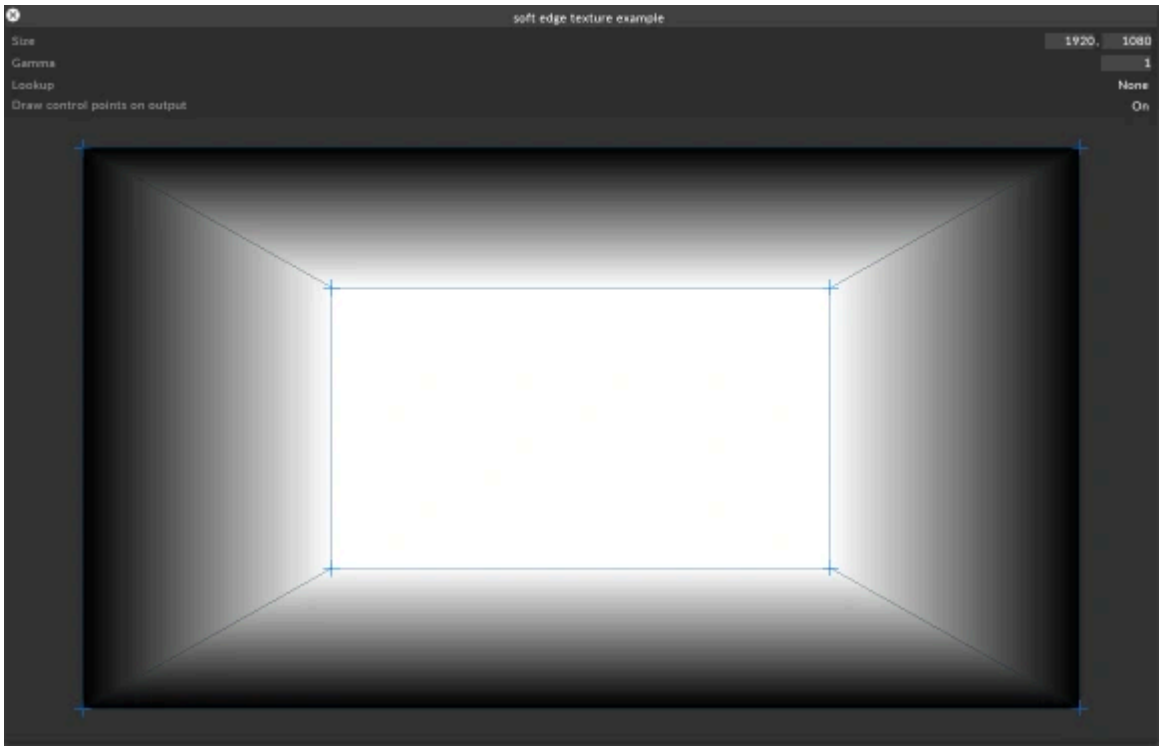


Texture object library being used to create a SoftEdgeTexture mask.

4. Create a new Texture, and choose SoftEdge Texture when prompted.



Softedge editor



Resolution

The resolution values are shown in the top right corner of the softedge editor. The resolution is automatically set to the resolution of the output head.

Adjust global gradients through gamma

The gamma value adjusts the global gradient between the inner and outer points in the softedge mask.

Select and move points

Select individual points, pairs of inner and outer points, or drag-select multiple points to adjust the blend level.

Add and remove points

- Add more points by holding down **Ctrl** and left-clicking between existing points.
- Remove points by right-clicking a point.

Adjust local gradients

Adjust the gradient between an inner and outer point by dragging them further apart, or closer together.

> **Note**
>
> **Please note**: press Esc to exit texture editing. Right-click the output feed and select 'Edit mask (Name) to edit the texture again.

Create a mak rather than a softedge

To create a mask rather than a softedge, set either **gamma** to 0 (this will set a sharp edge between the inner and outer points regardless of spacing between them) or move the inner and outer points closer together.

Composite multiple textures

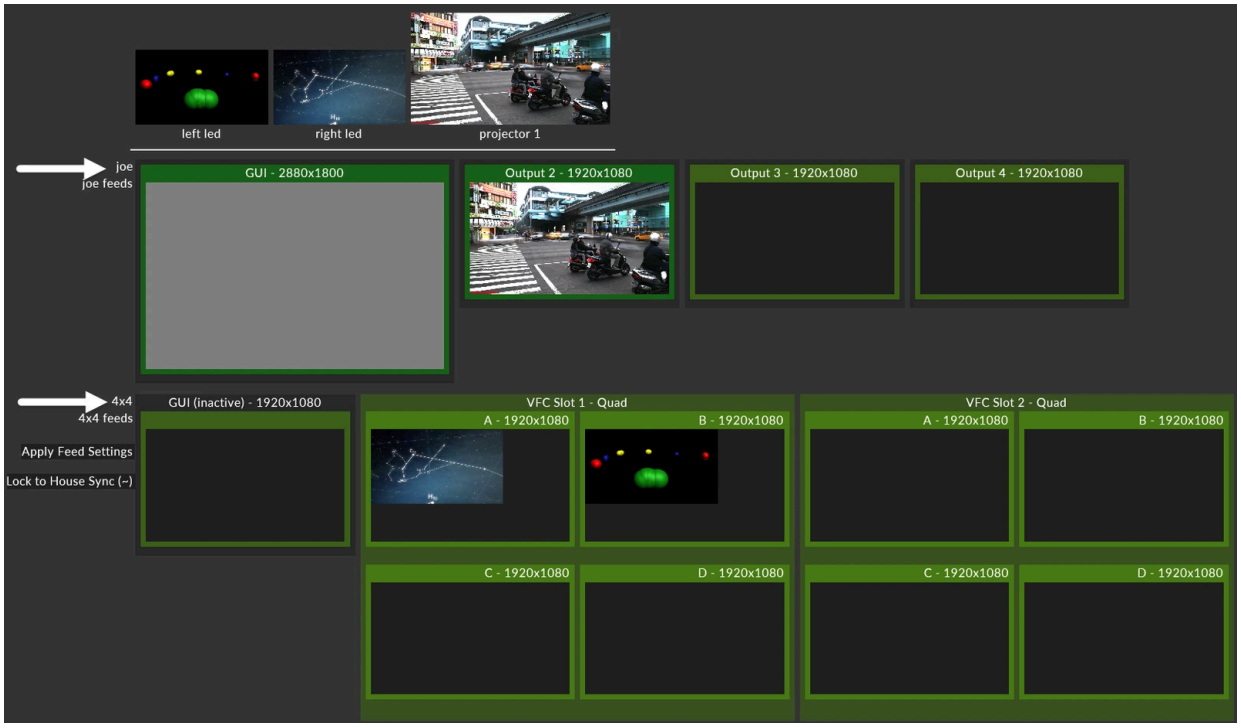
Disguise allows the user to generate two different textures and composite them into one single texture.

To do composite multiple textures:

1. Create two different textures. They do not have to be of the type **SoftEdgeTexture** but can also be of the types **GradientTexture** and **SolidTexture**.
2. Repeat the same process as above when creating a texture but this time choose the texture type **CompositeTexture** and name it, for example, **SoftEdge_output1** and **Gradient_output1**.
3. After creating the the CompositeTexture texures, their corresponding outputs will turn grey. This is because the CompositeTexture textures need to be told what textures they contain.
4. Right-click the output head and select edit mask **(SoftEdge_output1)** and edit mask **(Gradient_output1)** in the options window.
5. Set the resolution of the CompositeTexture texture.
6. Add the first texture by left-clicking **add new layer**, and then selecting the image from the Texture library.
7. Click **add new layer** again and select the second image.
8. To multiply the two images together, set the blend mode of image two to **multiply**.
9. Press **Esc** to exit texture editing.

Configuring d3Net Feed Settings

The feed view closely links d3Net settings with the Feed Scene, allowing users to quickly access d3Net settings and assign feeds by simply right-clicking a machine's name.

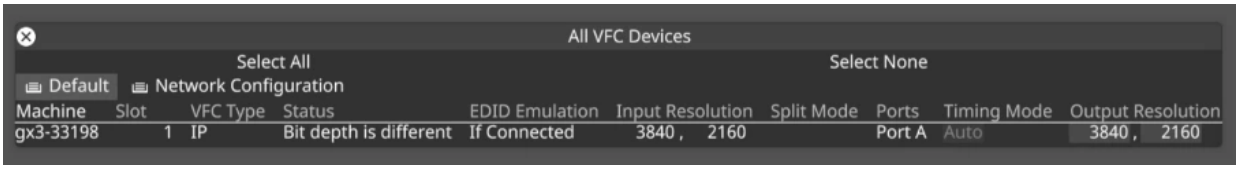


From those settings, you can assign and create new feeds for each machine connected to the network.

For more information on how to set up and configure d3Net, please refer to our d3Net overview section and sub-sections.

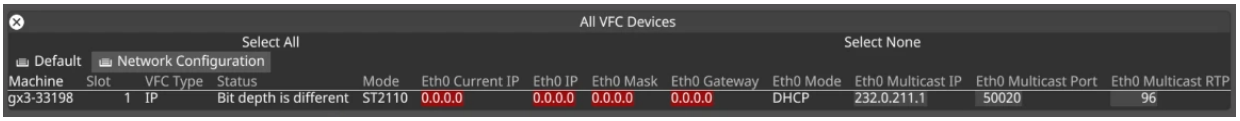
Configuring Multiple VFC Cards

As well as configuring individual VFC Card slots and ports via their editors, it's also possible to configure multiple VFC cards at the same time via the **All VFC Devices Editor**. This is accessible via the **Edit** button in the main button row.



Like all List Editors this widget lets you configure multiple VFC cards at the same time by multi-selecting.

Network Configuration



If a machine has one or more IP-VFC cards present, then a second **Network Configuration** tab will appear. This lets you set the same settings as the IP-VFC's port editor.

Non-IP-VFC cards and IP-VFC cards outputting in SDI mode are still shown in this editor but cannot be edited.

You can also use this widget to import and export configurations via the standard steps for all List Editors.

Configuring Output Settings

Output settings control how each physical output head is driven: its resolution, timing, sync status and feed properties.

An **output head** is a single physical video output that the server sends a feed to, for example a port on a VFC card or a standard graphics output. Heads are named Output 1, 2, etc. on non-VFC machines, and A, B, C and D for each Quad VFC card. Each head is configured independently.

Configuring an output is a two-part workflow: edit a head's settings, then apply those settings to the hardware so they take effect.

1. **Configure each head**: set its resolution, timing mode, latency and matrix routing, and monitor its colour-coded status.
2. **Apply the feed settings**: push resolution, timing and bit-depth changes to the physical outputs so they take effect.

Head Configuration

Each output head has a settings menu for monitoring its status and editing its resolution, timing mode, latency and feed properties. The feed view also shows a colour-coded status for every head; this **Output Head Colour** system is documented on the Head Configuration page.

Apply Feed Settings

Resolution, timing mode and bit-depth changes must be applied to the physical outputs before they take effect; most other changes update live. The Apply Feed Settings page covers the full rule and the orange "unapplied" status.

Related

- Setting the Project Refresh Rate
- Video Timings

Configuring VFC Card Ports

Individual ports on each VFC slot can be further configured. To access this menu for any port, simply right-click the VFC port's displayed name or the coloured box containing the port.

For more information on configuring VFC slots, please visit this link. It's also possible to configure multiple VFC cards via the All VFC Devices editor.

For an overview on VFC cards, please visit this link.

General Options

Head Name

Allows the user to give each port a friendly name as seen in the feed view.

Display Mode

Allows the user to select the desired output modes (resolution, interlaced/progressive scan, bit rate, colour format) from a list of available modes at the current project refresh rate. The list of modes will vary between different VFC card models.

Custom Resolution

Allows the user to override the Display Mode resolution. For Mirror/Quad modes, the total resolution tiled across all the ports should fit within a maximum output resolution of 4096x2400. For Quad 4K, the resolution should fit within the same limit.

> **Note**
>
> The Quad SDI VFC and IP VFC cards do not support setting custom resolutions.

Timing Mode

Allows the user to force timing mode of the output signal, e.g. SMPTE, CVT. Setting it as AUTO works out the best timing in the following order:

1. DMT
2. CEA
3. CVT
4. CVT-RB

5. CVT-RBv2

Matrix Input

Allows the user to directly route inputs when connected to a video matrix. On machine failover, Designer sends a command to the matrix to route the understudy's outputs to the matrix's outputs. For more details on setting up matrix routing, please see this page.

Output Properties

> **Note**
>
> The Output Properties fields do not apply to Quad DVI and SDI cards.

Port Status

View the current status of the port. The status will indicate if a configuration field is different from the card's current settings, e.g. 'Refresh rate does not match project refresh rate', or if there is an error, e.g. 'Incompatible VFC'.

Temperature

View the current temperature of the port in degrees Celsius.

House Sync

View the current status of the Genlock signal.

Current Output

View the current output format (resolution interlaced/progressive scan, bit rate, colour format etc.) of the port. If this differs from the selected Display Mode, the Port Status field will tell the user what is different. Apply feed settings to resolve the difference.

EDID Emulation

Allows the user to select how Designer manages EDID emulation of this port. For more details please see this page.

Feed Properties

Background colour

Allows the user to set a background colour on the port. This can be used for identifying individual output ports and slots. It can also be used to validate that there is output from Designer.

Lineup Background

Allows the user to select a background texture to help with lining up feed rectangles.

Matrix Outputs

Allows the user to directly route outputs when connected to a video matrix. For more details on setting up matrix routing, please see this page.

Live Dot

Allows the user to set the xy coordinates of a flashing pixel that gives confidence that outputs are working correctly.

Latency

Allows the user to delay the output of the port by a number of frames. Negative values delays all other heads.

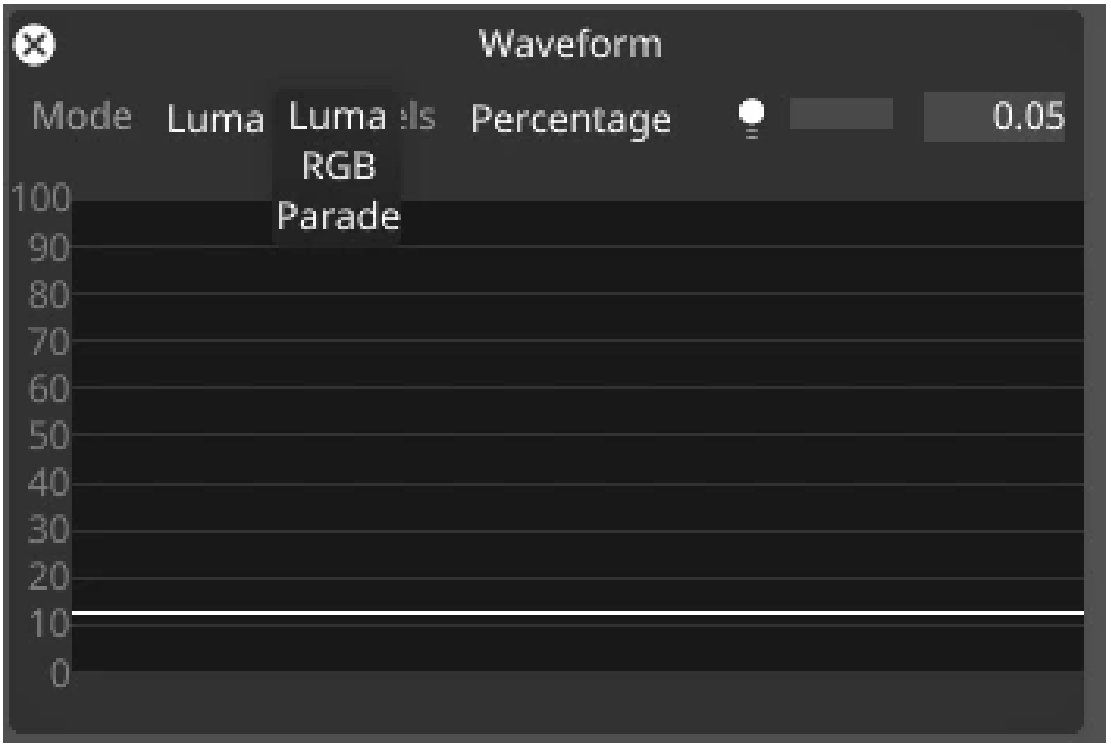
Output Options

Export Output Frame

Exports the port's current output as an image. The image format can be changed under Project Settings. For more details please see this link

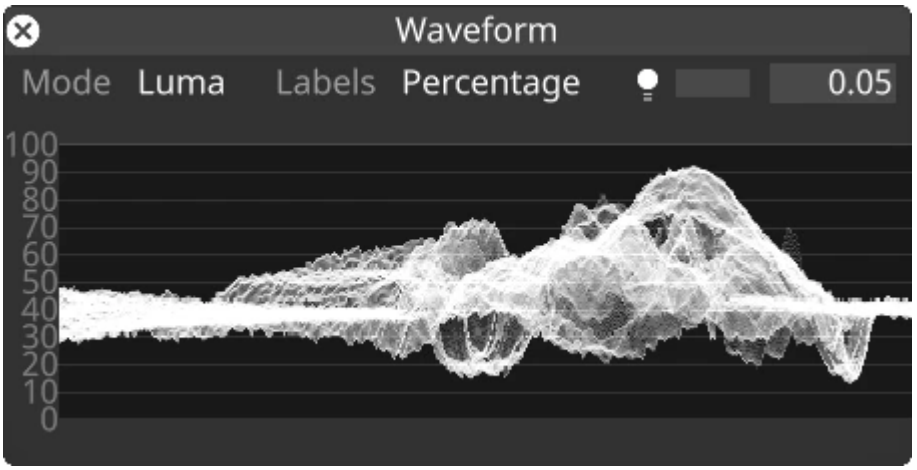
Histogram

Opens a live histogram, displaying the distribution of colour and luma, of the current output.



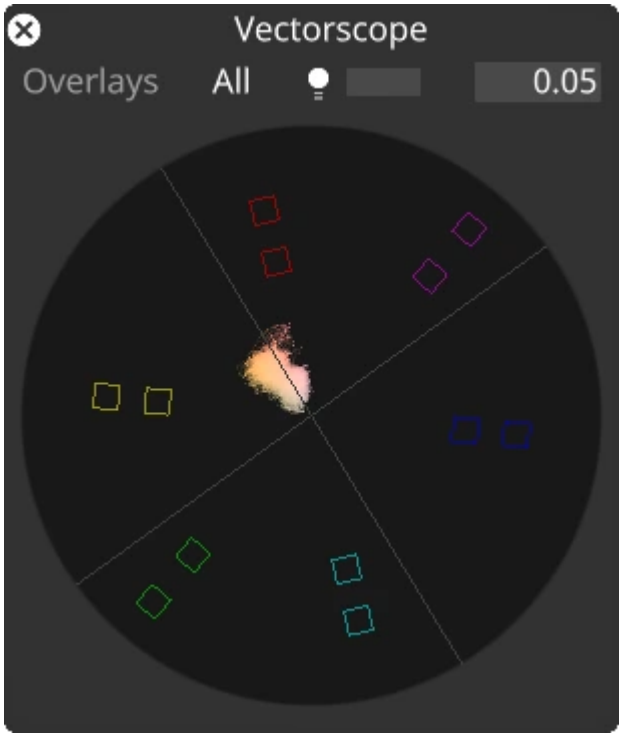
Waveform

Opens a live waveform diagram, displaying intensity of colour and luma, across the current output.

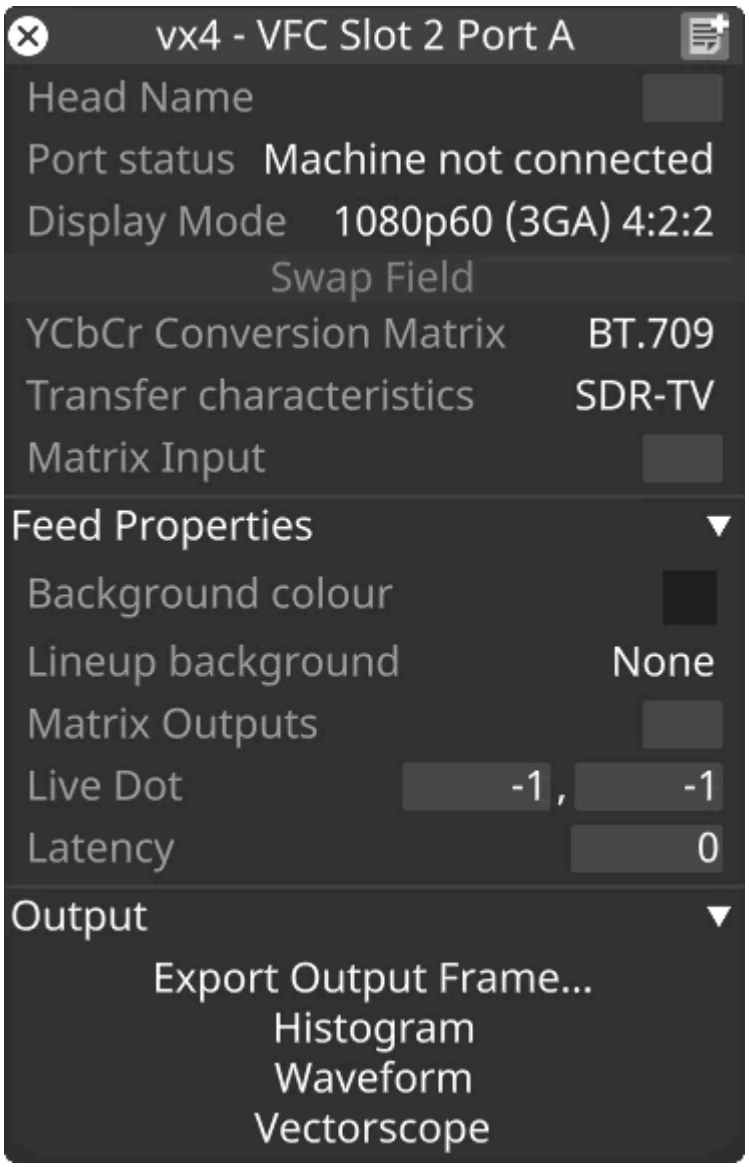


Vectorscope

Opens a live vectorscope, displaying the UV chroma channels on an x-y plot, of the current output.


Vectorscope
Overlays
All
0.05

Options Specific to Quad SDI Card



Swap Field

For interlaced output, this button allows the user to swap between aligning the odd or even fields with the incoming genlock signal.

Colour Conversion Matrix

Allows the user to define a colour conversion matrix (e.g. Rec.709, Rec.2020). This field is included in the SMPTE-425 video Payload Identifier. For outputting HDR video, Rec.2020 is required, combined with Transfer Characteristics field described below.

Transfer Characteristics

Allows the user to define the transfer characteristics (e.g. SDR, HLG, PQ). This field is included in the SMPTE-425 video Payload Identifier. For outputting HDR video, HLG or PQ is required, combined with the Rec.2020 Colour Conversion Matrix described above.

> **Note**
>
> **Please note**: For HLG and PQ transfer characteristics with Rec.2020 colour space, the SDI VFC card utilises the full video data range, including 'super white' and 'super black'. See the bottom of Table 5 of the BT.2020 standard for more details.

Options Specific to HDMI Card

Reset HDMI Card

This button power cycles the HDMI card. This could help resolve issues such as an intermittent loss of card detection by Windows.

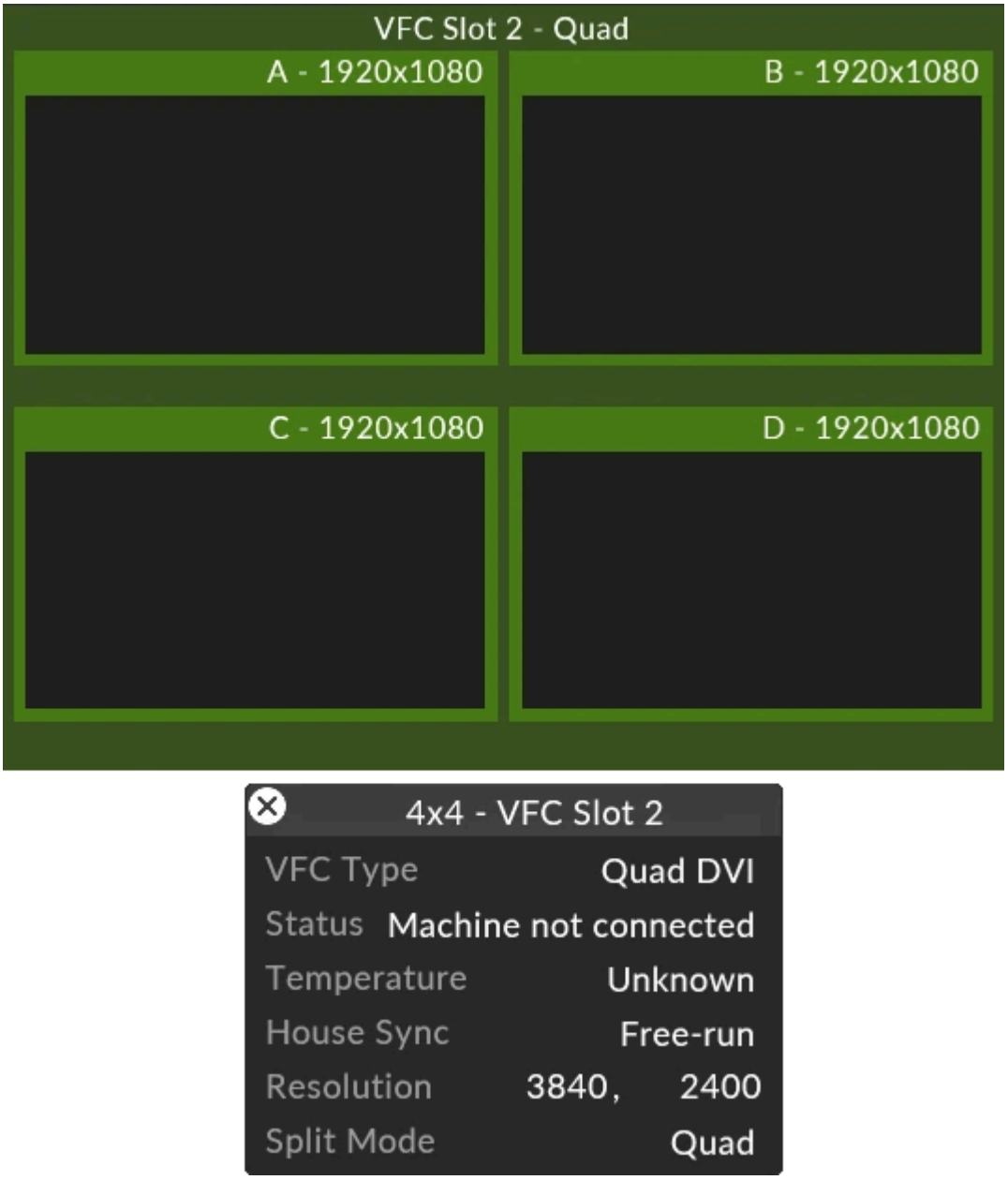
Options Specific to IP VFC Card

There are a number of options specific to the IP VFC card. For more details please see this page.

Configuring VFC Card Slots

Thanks to the new Feed UI, VFC card users are now able to configure and monitor each individual card slot through the VFC slot configuration menu.

To access this menu for any VFC slot, simply right-click the VFC card's displayed name or the outer box containing the output heads (which represents the VFC slot):



For more information on configuring VFC ports, please visit this link. It's also possible to configure multiple VFC cards via the All VFC Devices editor.

For an overview on VFC cards, please visit this link.

VFC type

Allows the user to select which type of VFC card a virtual machine is using prior to the machine being connected. Useful when working on a show off-site from a designer machine. These settings are auto-detected and do not need to be selected while a machine is connected.

Status

Allows the user to monitor the current status of the card. Issues such as display mode differences and connection problems are displayed here. If no issues are found, the status will appear as Normal.

Resolution

Displays the overall resolution of the VFC slot. This setting can only be changed manually on DP Passthrough cards.

Split mode

Enables the user to split the VFC card output in three different ways:

Mirror: One identical HD output repeated on all screens connected to the slot. Only one screen is displayed in the feed when in Mirror mode.

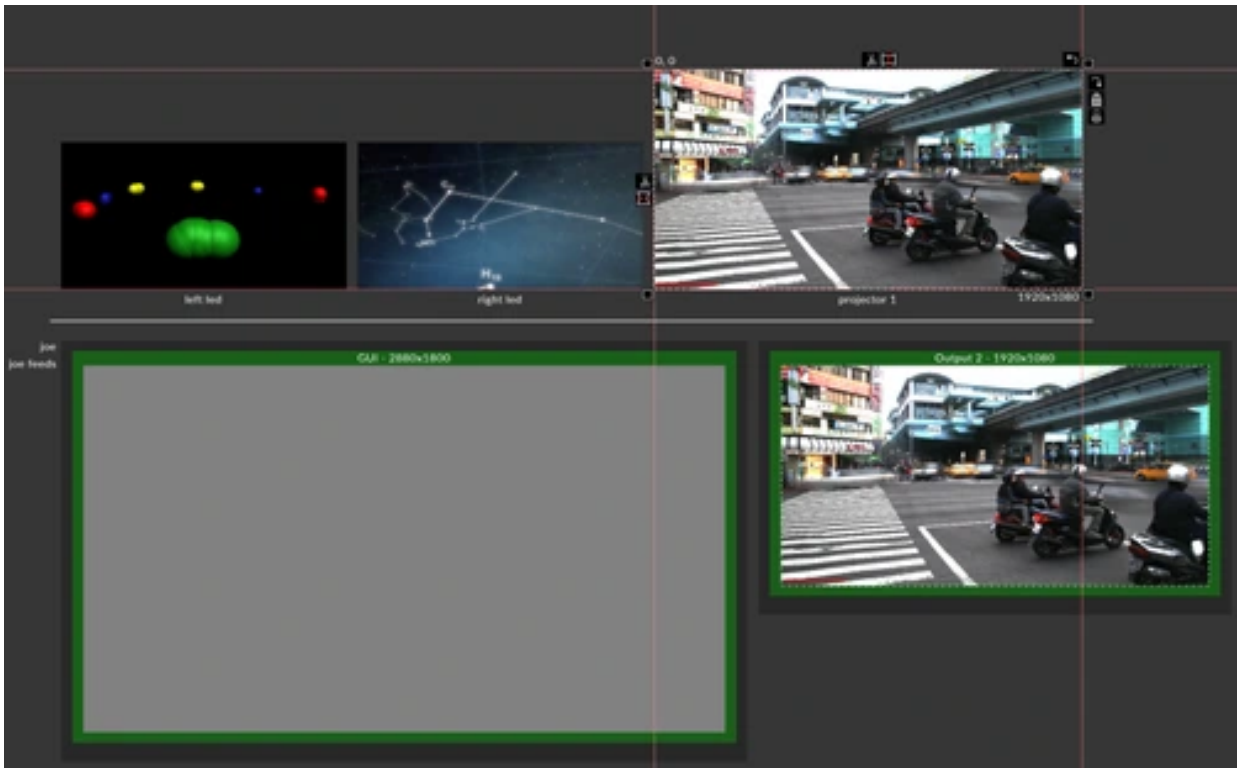
Quad: Four different HD capable screens, each with their own content

Quad 4k: Four HD “panels” arranged into a single 4k output.

> **Note**
>
> **Please note**: The split options are only available with Quad DVI or SDI cards.

Editing a Feed Rectangle

Left-click the Feed rectangle. This will select the Feed rectangle and show a series of controls.



Quick editing controls for a Feed/sample rectangle, opened by left-clicking a Feed/sample rectangle

Resize

The square shaped controls enable you to resize a Feed rectangle.



Square shaped controls are used to resize a Feed/sample rectangle

> **Note**
>
> **Please note**: hold Shift whilst resizing to maintain the rectangles aspect ratio.

Lock

The Lock control locks the current scale factor between the source and destination rectangles.



Lock control is used to lock the current scale factor between a sample rectangle and a Feed rectangle

Resize while unlocked

When the Feed rectangle is locked, resizing the Feed rectangle resizes the Sample rectangle and vice versa.

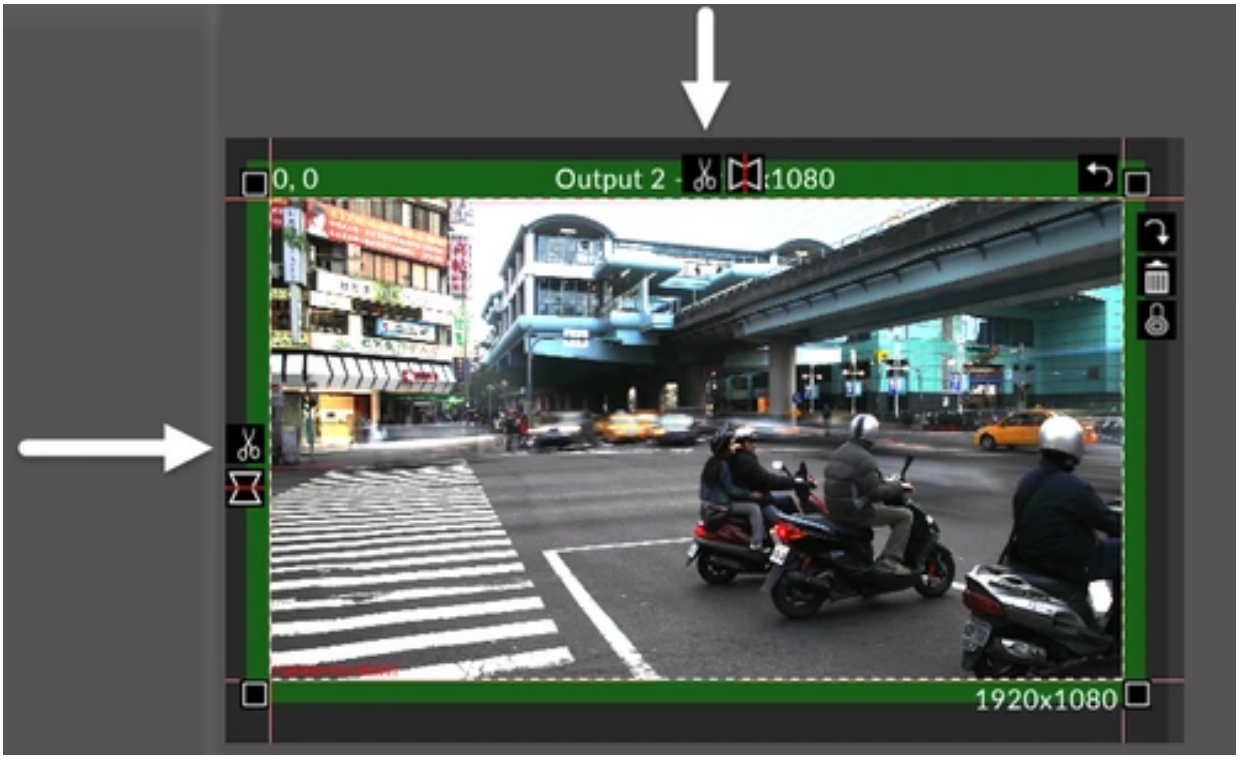
Left-click and drag a square shaped control to resize the Feed rectangle. In this example, we have used the right middle control to reduce the size of the Feed rectangle.



Lock control is locked causing the sample rectangle to resize when the Feed rectangle is resized, and vice versa

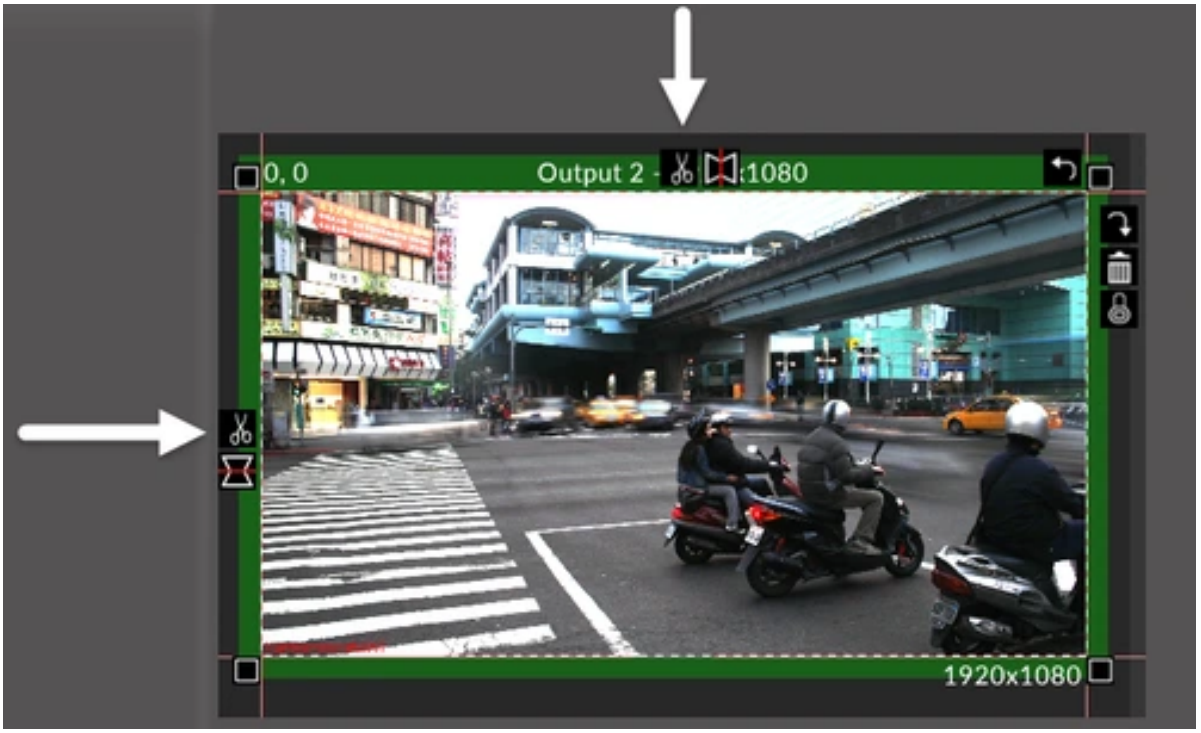
Split

The Scissor control enables you to split a Feed rectangle into smaller Feed rectangles.



Scissor controls are used to split a Feed/sample rectangle into smaller Feed/sample rectangles

1. Left-click and drag the scissor. You will see a dashed white line that represents the line where the Feed rectangle will be split.



Splitting a Feed rectangle by click-dragging a Scissor control, the white dashed line represents where the Feed rectangle will be split

2. Release the left mouse button when you are happy with the position of the splitting line. The Feed rectangle will now be split into two rectangles.

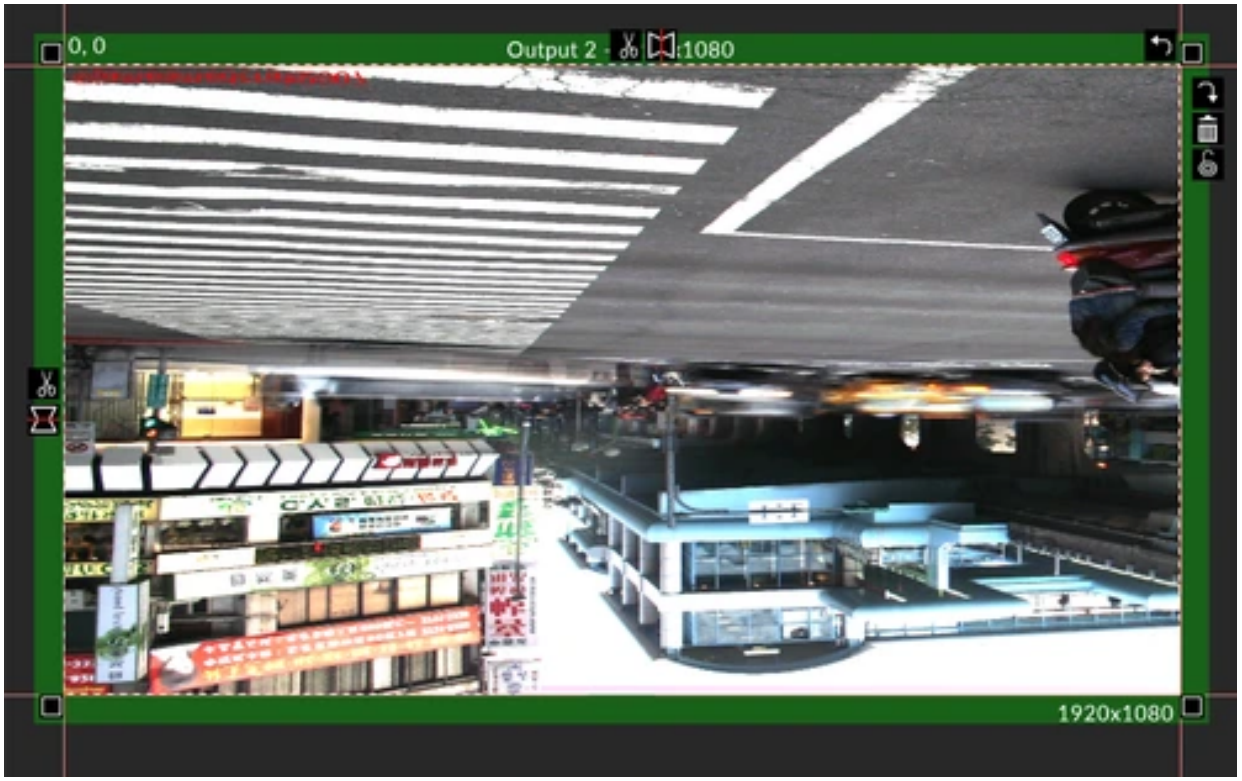
Mirror

The Mirror control enables you to flip the Sample rectangle or Feed rectangle horizontally or vertically.



Mirror controls are used to flip a Feed/sample rectangle horizontally or vertically

- Left-click a Mirror control to mirror the Sample rectangle or Feed rectangle. In this example, we have used the top Mirror control to mirror the Feed rectangle horizontally. The left Mirror control will mirror the Sample rectangle or Feed rectangle vertically.



Mirroring a selected Feed rectangle, in this example horizontally, by left-clicking the top Mirror control

Trash can

The Trash can control allows you to delete Sample rectangles or Feed rectangles.

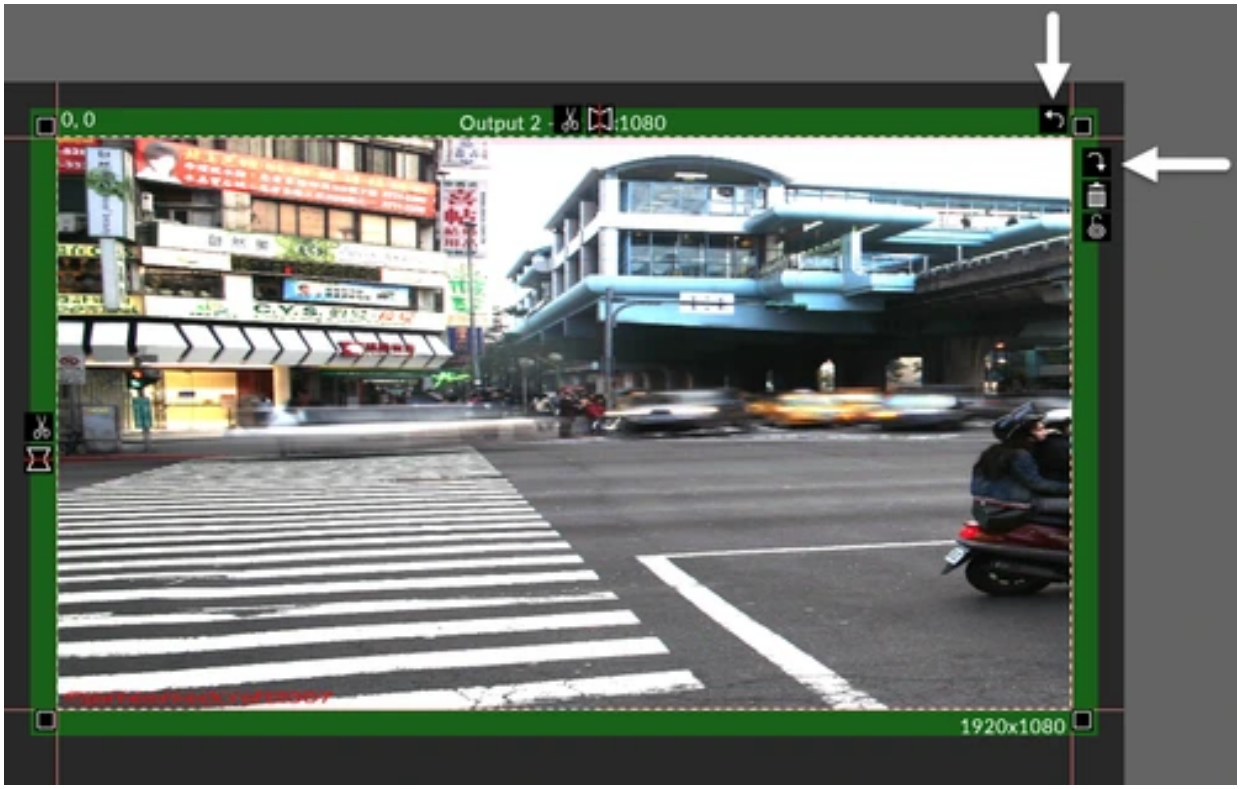


Trash can control is used to delete Feed/sample rectangles

1. Left-click the Feed rectangle or Sample rectangle you want to delete to open the rectangles controls.
2. Left-click the Trash can icon or hit delete.

Rotate

The Rotate controls enable you to rotate the selected Sample or Feed rectangle(s) by 90 degrees clockwise or anti-clockwise.



Rotate controls are used to rotate a Feed/sample rectangle 90 degrees clockwise or anti-clockwise

- Left-click a Rotate control to rotate the Sample rectangle or Feed rectangle.

Positioning - click and drag

1. Left-click the Feed rectangle to select it.

2. Position your mouse cursor over the middle of the Feed rectangle; arrow heads will appear on the edges of the cross shaped cursor.



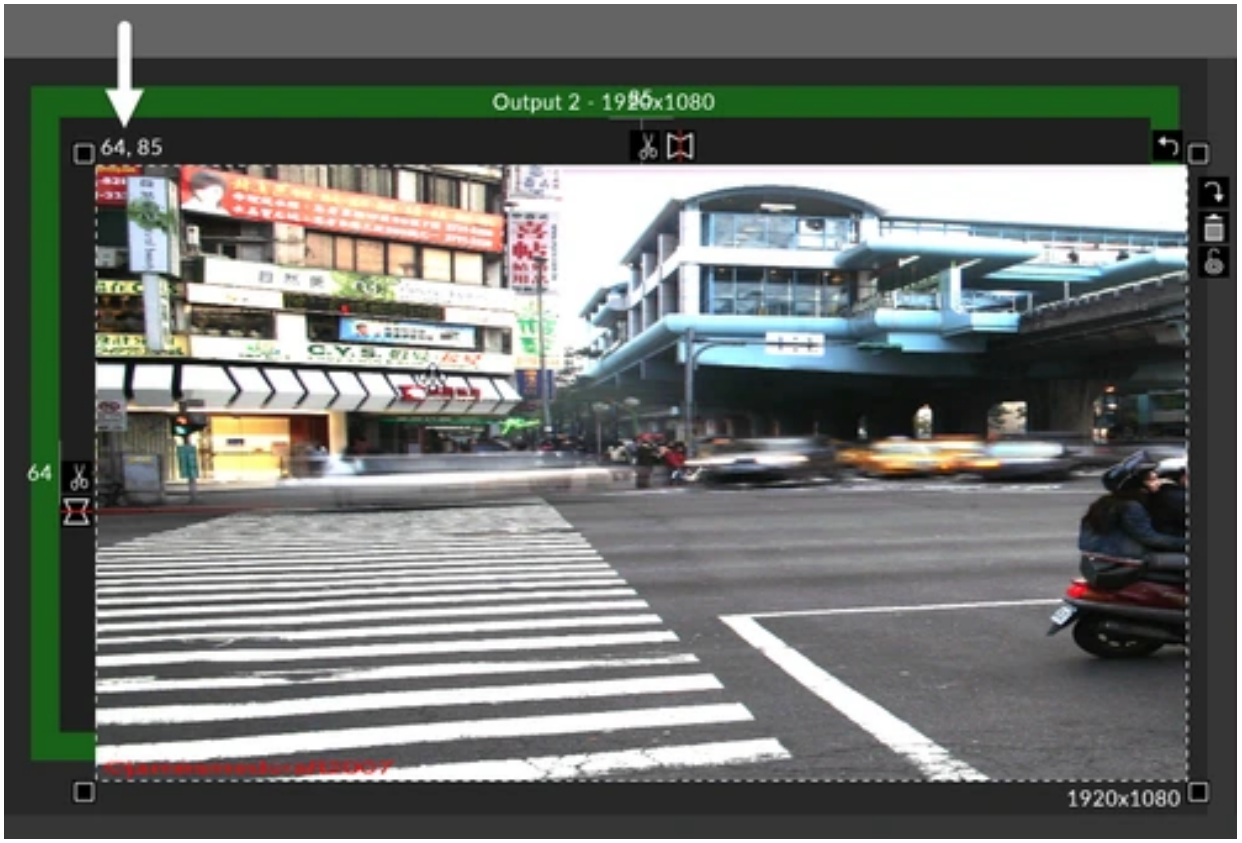
3. Left-click and drag the Feed rectangle to the desired position. Note how Disguise displays the distance of the Feed rectangle from the top, left and bottom edges of the Display head in 3 separate boxes. These boxes measure the distance in pixels between the top, left and bottom edges of the Display head and Feed rectangle. The top left of the Display head starts at 0, 0



> **Note**
>
> **Please note**: zoom in for a finer control over moving the Feed rectangle by clicking and dragging. Alternatively, read the two other options below.

Positioning - insert coordinates

The top left of the Feed rectangle displays the x and y coordinates of the top left corner of the Feed rectangle. These coordinates are measured in pixels.



Inserting x,y coordinates, measured from the top left of the display head, is another method for repositioning a selected Feed/sample rectangle

> **Note**
>
> **Please note**: you can also edit the resolution of your Feed rectangle, displayed in the bottom right hand corner, in exactly the same way as how you edited the Feed rectangles x and y coordinates.

To insert co-ordinates:

1. Left-click the x and y coordinates to highlight their text fields.
2. Type the new coordinates. The Feed rectangle will now move to the new coordinates specified.

Positioning - nudge

1. Left-click the Feed rectangle to select it.
2. Use the keyboard arrow keys. Each press of the arrow key will nudge the Feed rectangle by 1 pixel.

Background colour

1. Right-click the Head.
2. Select a background colour using the colour picker accessed through the **Background Colour** property.
3. Feed level options window being used to open the Feed editor, opened by right-clicking the background of the Feed level

This will open the Feed editor. The Feed editor is explained in the sub-chapter Configuring Feed scenes.

Feed Level Navigation

Panning the viewport

- Hold down the mouse scroll wheel and drag.
- Hold down the **Tab** key and move the mouse left/right/up/down.

> **Note**
>
> **Please note**: do not hold down either mouse button; this will only work when the Feed level has focus.

Zooming in and out

Option 1

Scroll the mouse wheel up/down to zoom in/out.

Option 2

- Hold down the right mouse button and drag the mouse down to to zoom in.
- Hold down the right mouse button and drag the mouse up to to zoom out.

More options

- Hit **1** to go to 1:1 zoom level (where each pixel on the monitor is equal to one pixel on the actual output head).
- Hit **F** to focus on selected rectangles.
- Hit **A** to view all of the Screens and output heads

Toggling between Display heads

Hit Alt-F to view the Feed rectangles in your Display heads pixel-perfectly.

Repeat hitting Alt-F to toggle each display head in pixel-perfect full screen mode in chronological order. This is very useful for when you want to make a pixel-perfect screenshot of the output display. To do so, first toggle to the output display and click Alt-X . You can also export the position and pixel dimension data as a table (readable in for example Excel). For

more information please scroll down to the section Export as table in the Feed rectangle editor sub-chapter.

> **Note**
>
> **Please note**: these will only work if the Feed level has mouse focus; i.e. you should have clicked the background before these will work.

Selecting Feed Rectangles

Select a rectangle

Left-click a rectangle to select a rectangle. When you continue clicking, you uncover more rectangles that may overlay each other.

Selecting multiple rectangles

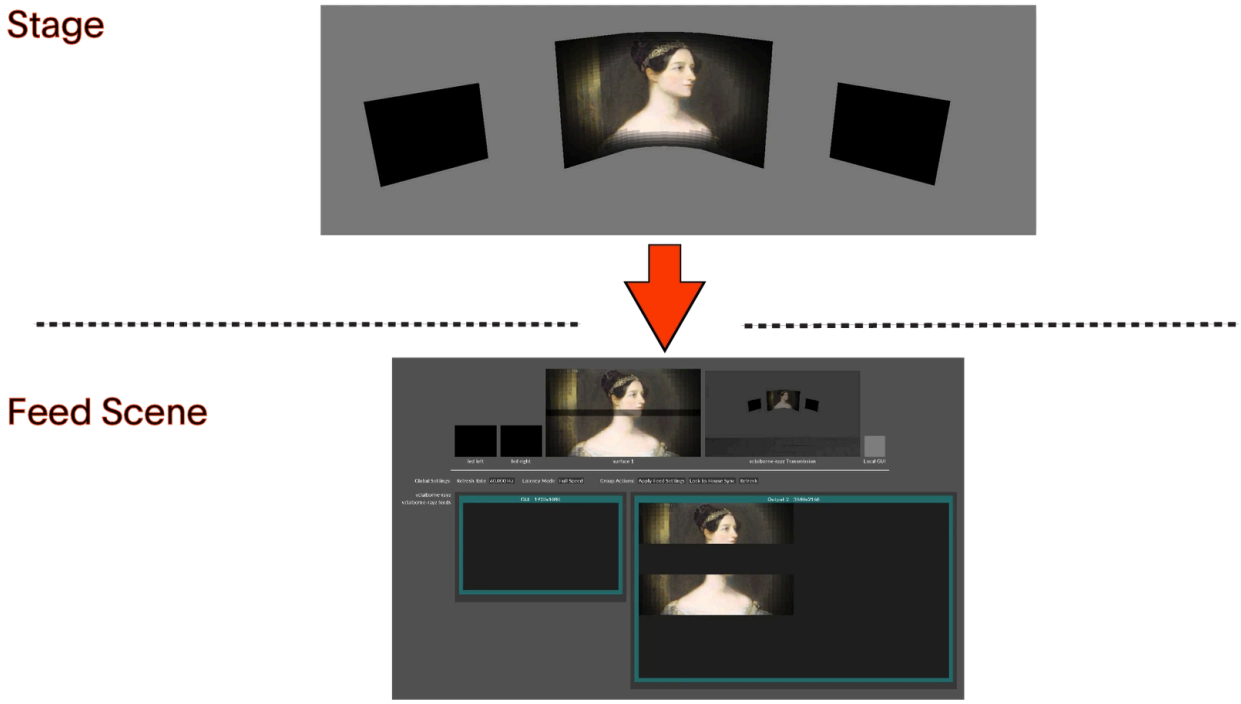
Working with more than one Feed rectangle at a time is very common. Multi-select the rectangles by holding down the left-mouse button and drag.

Toggling through rectangles

Ctrl -clicking Feed rectangles toggles their selection, allowing you to extend the selection across areas which are not next to one another.

Feed Outputs Overview

The **Feed View** contains **Feed Scenes**, which determine how content from the Stage is arranged and delivered to your physical output heads.



Conceptual diagram illustrating how Feeds Scenes in the Feed level are used to copy content arranged from screens in the Stage level.

What is a Feed Scene?

A **Feed Scene** defines how visual content is transferred from Screens in the Stage level to your system's output heads.

It acts as a mapping layer that extracts portions of Stage content and positions them precisely on the output devices.

Each Feed Scene contains multiple **Feed Rectangles**, which specify:

- **Source Screen** – where the content originates.
- **Content region** – which area of the Screen is being used.
- **Transformations** – crop, scale, rotate, and position.
- **Destination** – where the content appears on the output head.

This enables Designer to copy and re-arrange content flexibly, accommodating a wide range of display configurations.

Why use multiple Feed Rectangles?

A single Feed Scene can contain multiple Feed Rectangles for each Screen. This allows you to:

- Divide a Screen into multiple content regions.
- Reassemble Screen content in a different order.
- Map cropped Screen areas to LED processors.
- Adapt visuals for unconventional display layouts or projector setups.

Whether you are working with LED walls, projection systems, or complex multi-output designs, Feed Rectangles provide fine-grained control over what is sent to each output.

> **Note**
>
> All blending and compositing of content in Designer is configured in the track and the 3D stage via mappings. The Feed View cannot be used to composite feeds together in 2D, as it does not support blending or consistent ordering of Feed Rectangles. This is a major difference between 3D compositing engines like Designer and other 2D compositing tools.

Rendering Feed Movies

Designer can also render the output of Feed Scenes into **Feed Movies** which is useful when pre-rendered content is required for installation, playback or pre-visualisation.

For more information, see the Rendering Feed Movies and Rendering Media pages.

Feed Outputs documentation

The following pages explain how to view and navigate the Feed view, configure hardware-related feed settings, set refresh rates, and adjust video signal behaviour. They focus on understanding the Feed view environment and configuring the system components that influence how outputs are generated.

Feed level and system configuration

- Viewing the Feed Level
- Feed Level Navigation
- Configuring d3Net Feed Settings
- Configuring VFC Card Slots

- Configuring VFC Card Ports
- Configuring Multiple VFC Cards
- Setting the Project Refresh Rate
- Video Timings
- 10-bit Displays

Output settings

The following pages describe the tools and workflows used to define Feed Rectangles, map screen content to outputs, duplicate or modify rectangles, and adjust the output geometry through blending, masking, and warping. They focus on hands-on output layout, editing, and manipulation.

Configuring an output head is a two-part workflow, documented across three pages: Configuring Output Settings is an overview of the process, Head Configuration covers monitoring and editing each head's settings (including the head colour status), and Apply Feed Settings explains how to push resolution and timing changes to the physical outputs.

- Configuring Output Settings
- Head Configuration
- Apply Feed Settings
- Selecting Feed Rectangles for Screens
- Editing a Feed Rectangle
- Adding Feed Rectangles for Screens
- Using Duplicate Multiple
- Alternate Feed Scenes
- Importing and Exporting Feed Scenes
- Blending and Masking Outputs
- Warping Outputs

Head Configuration

An **output head** is a single physical video output on a server, such as a port on a VFC card or a standard graphics output. Each head is configured on its own from its settings menu, and you can check its status at a glance from the colour-coded feed view.

To configure a head:

1. Right-click the head's name, or anywhere in its coloured box, to open its settings menu.
2. Edit the properties you need, such as its resolution, timing mode or latency (see **Output Head Properties** below).
3. Apply the feed settings to push any resolution or timing changes to the physical output. Other changes take effect live.
4. Check the head's colour in the feed view to confirm its status.

Output Head Colour

The Feed UI enables users to maintain a visual reference of the status of each head through a simple, colour-coded system. This means users are now able to quickly and easily identify which display needs attention, as well as the severity of any issue encountered, simply by looking at the head's colour.

Green - Head configured

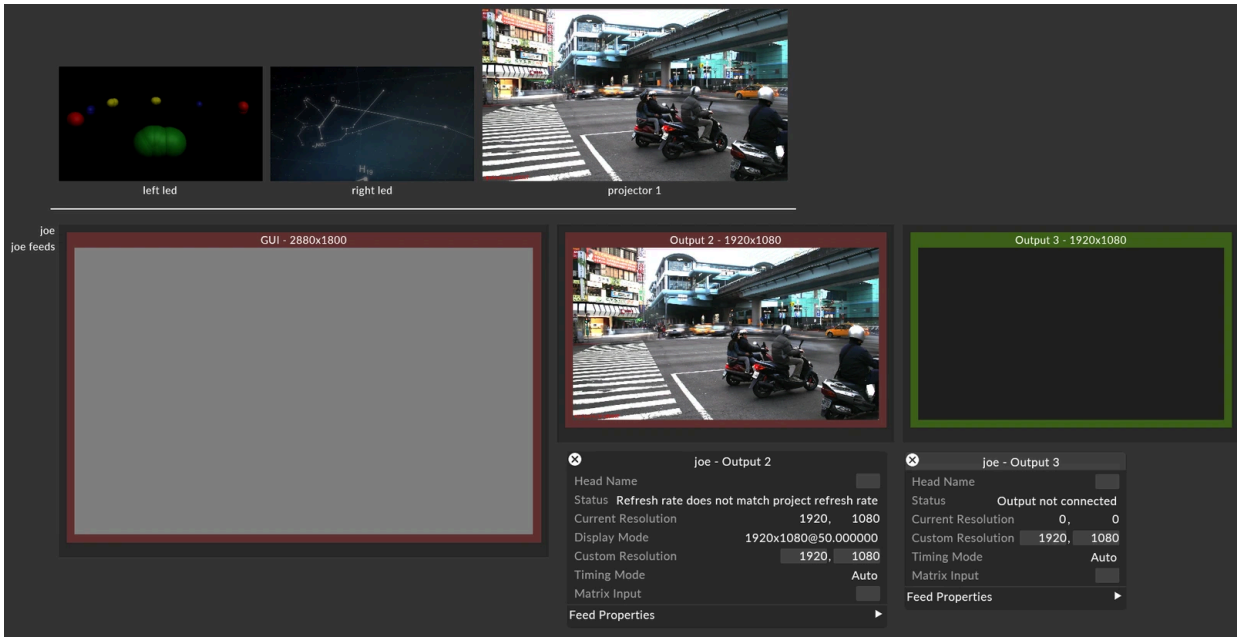
Red - Refresh rate is different

Orange - Head settings have changed, you must apply feed settings for the changes to take effect

Blue - Designer machine

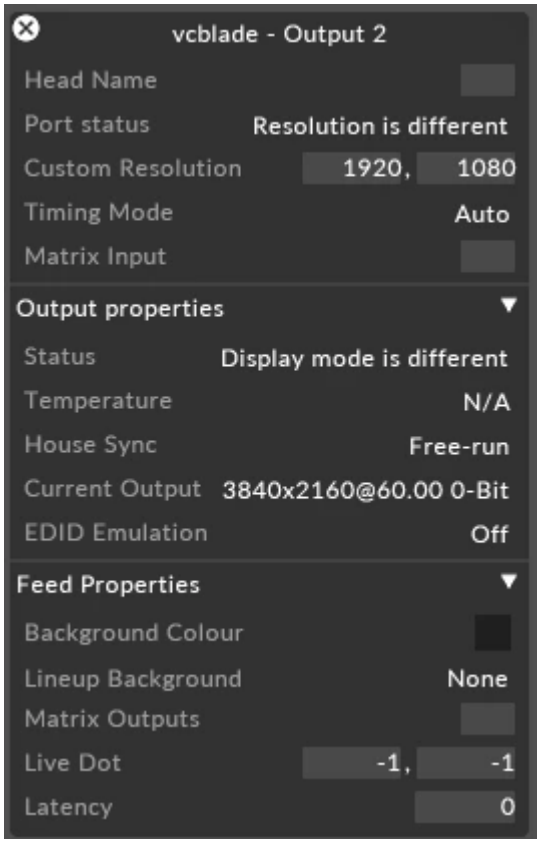
Grey - output not connected or no machine present

Flashing Blue and Grey - Machine is currently applying feed settings



Output Head Settings

Each output head's settings menu lets you both monitor and modify the head's settings. The properties available are described below.



> **Note**
>
> For optimal performance, all output heads should be configured with identical refresh rate and resolution, with all heads **genlocked** if a sync signal is present, or set to **none/internal** if no sync signal is present.

Output Head Properties

Head Name

Allows users to type in specific names for each output head. Those names are set as Output 1, 2, etc by default on non-VFC machines, and as A, B, C and D for each individual Quad VFC head.

Port Status

Allows users to monitor the status of each head. Any problems encountered will be listed here (see above section on Output Head Colour). If no problems are detected, it will say **Normal**, and the head colour will be green.

Custom Resolution

This field is used to set a custom resolution for ports that support it.

> **Note**
>
> Any resolution changes need to be applied by using the **Apply Feed Settings** button to the left of the feed scene. See Apply Feed Settings.

Timing Mode

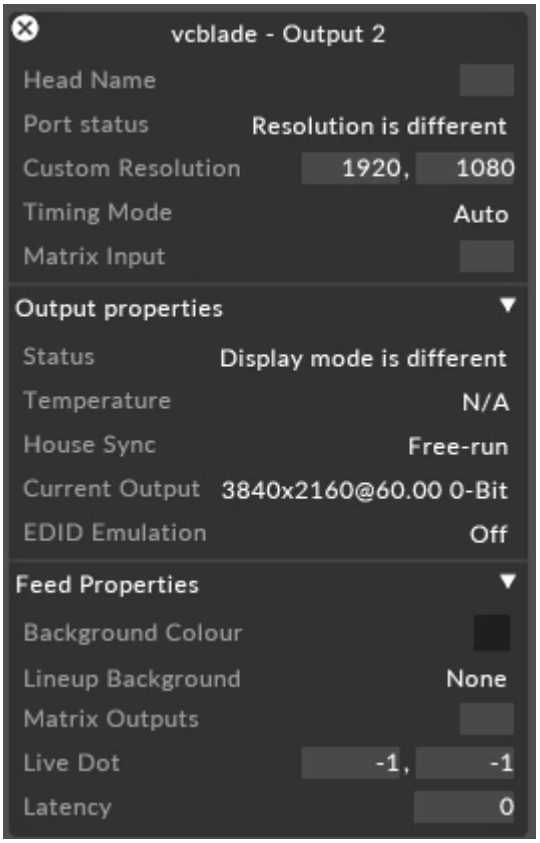
Sets how the output's video signal timing is determined:

- **Auto**: Designer uses the standard timing for the output's resolution and refresh rate.
- **SMPTE**: forces a standard broadcast (SMPTE) signal timing for SDI outputs that must conform to a specific broadcast specification.

Matrix Inputs

Allows users to directly route inputs when connected to a matrix. For more information, please refer to the Direct Matrix Routing page.

Output Properties



Status

Indicates the status of the output's configuration and reports any issues if detected

Temperature

Displays the current operating temperature for the output

House-Sync

Shows whether this output is **genlocked**, meaning it is locked to an external "house sync" reference signal so its frame timing stays aligned with every other output and machine sharing that signal. Frame-accurate synchronisation across machines requires all outputs to be genlocked to a shared reference.

Current Output

The current Resolution and Refresh rate for this output.

EDID Emulation

EDID is the data a display sends back to identify itself and the resolutions and timings it supports. Media-server outputs often drive LED processors or displays that don't present a usable EDID, or need to hold a fixed resolution regardless of what is connected. Designer can therefore present a stored ("emulated") EDID to the GPU, so the output stays stable even when no display is plugged in.

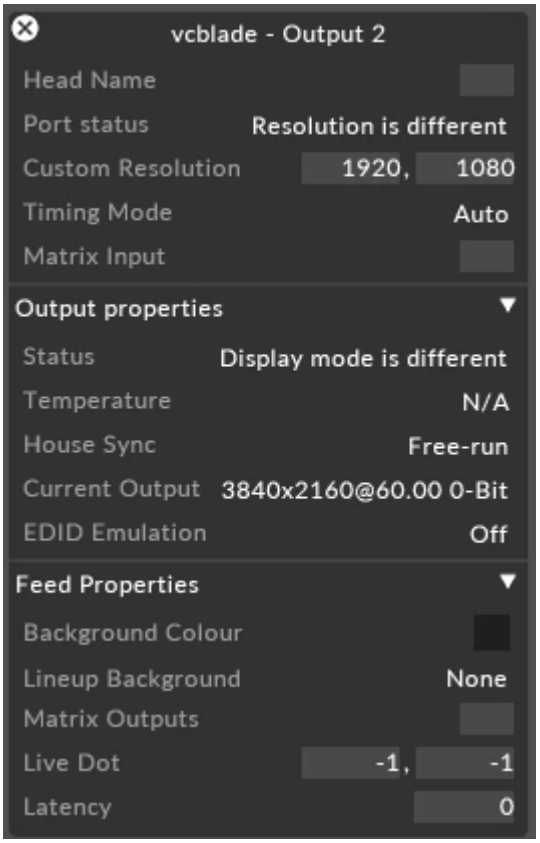
The available EDID emulation modes are:

- **Always**: emulate the EDID at all times, even when no display is connected.
- **If Connected**: emulate the EDID only while a display is connected to the output.
- **Unmanaged**: leave the current EDID emulation untouched.
- **Force Off**: don't emulate an EDID, and remove an existing emulated one if set.

> **Note**
>
> Outputs cannot genlock if their resolutions match but their EDIDs differ, so keep EDID emulation consistent across heads you intend to synchronise.

Feed Properties

The Feed Properties drop-down menu contains changes that are mostly related to the way a head appears in the feed scene:



Background Colour

This option allows users to change the background colour of each head by using a colour from the colour picker. It is output to the connected display.

Lineup Background

Allows the user to put a background image on the output to line up feed rectangles to. It is NOT output to the connected display.

Matrix Outputs

Allows users to directly route outputs when connected to a matrix. For more information, please refer to the Direct Matrix Routing page.

Live Dot

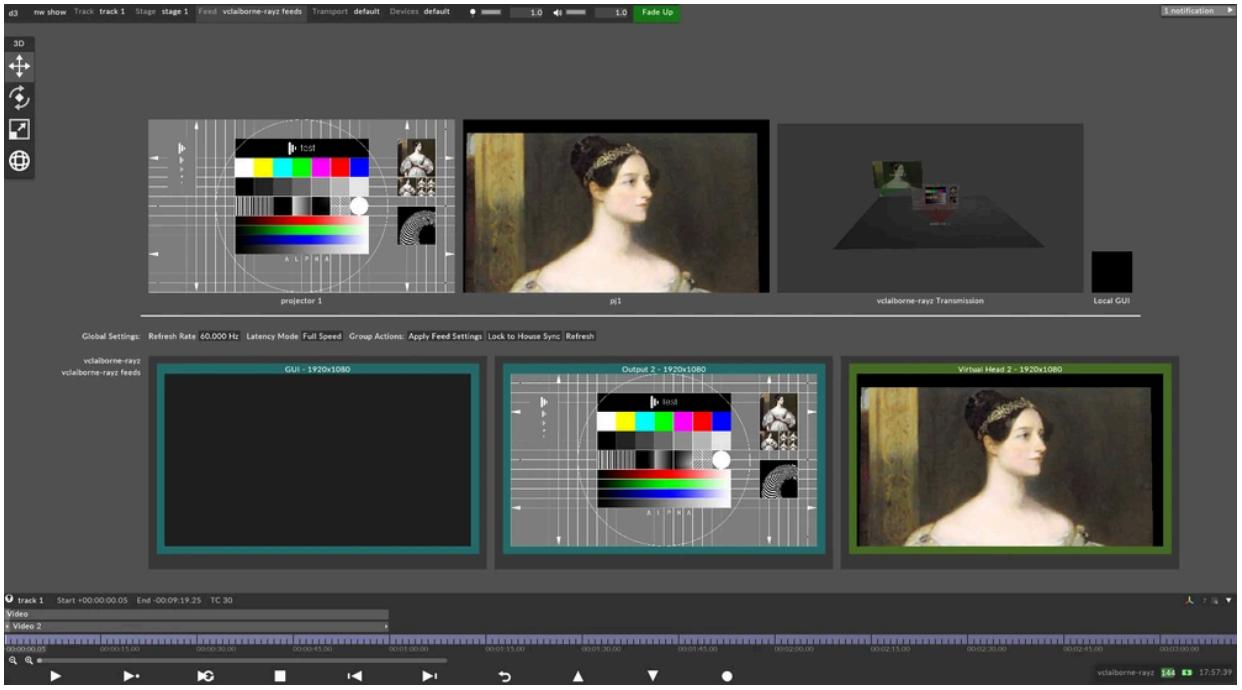
Allows users to add a single flashing pixel to provide visual reassurance that the output is in working order. Useful when outputting black or still content.

Latency

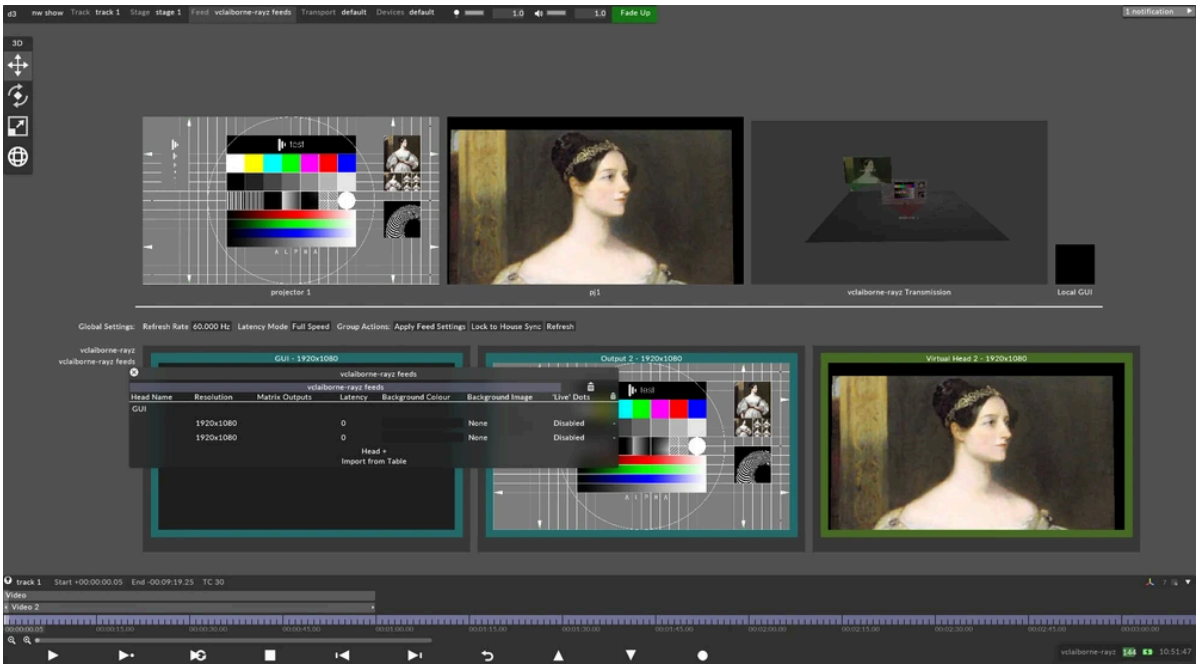
Delays this output head by a number of frames, so you can align it with other heads or downstream equipment. The range is −30 to +30 frames. A positive value delays this head; a **negative value instead delays all other heads**, which is useful when this head is running late and you want to hold the others back to match it.

Importing & Exporting Feed Scenes

A Feed rectangle layout, known as a Feed Scene can be exported and imported between projects:

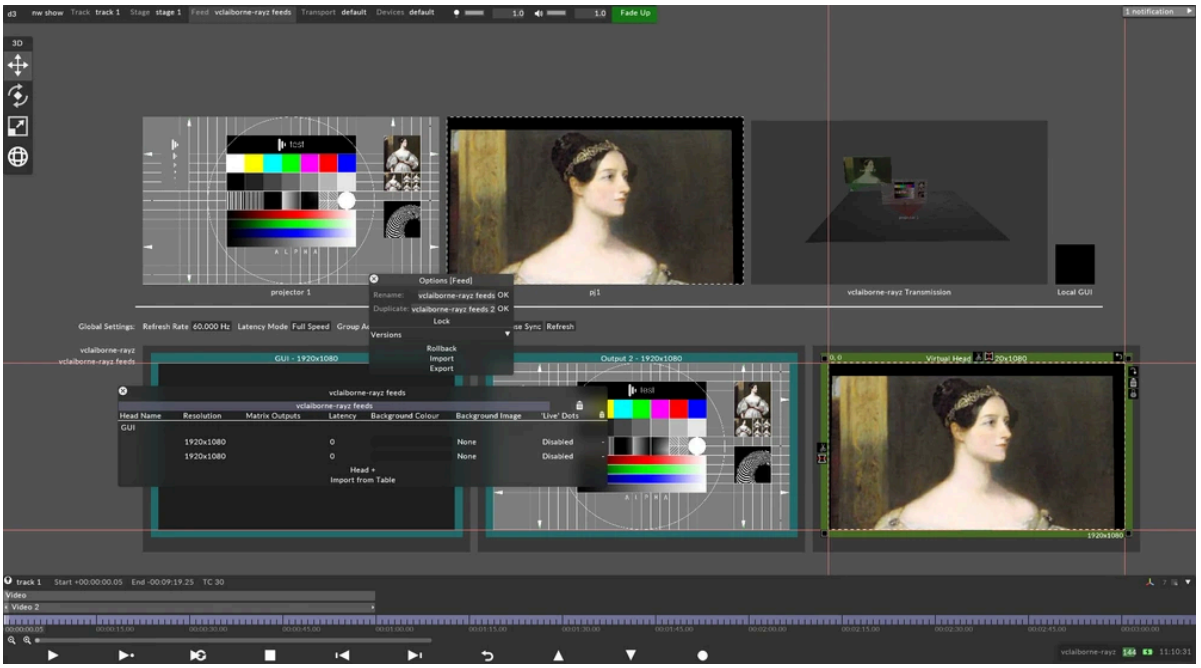


1. To open the editor for the current Feed Scene, right-click on the current Feed Scene; this is located to the left of the GUI in the Feed level.

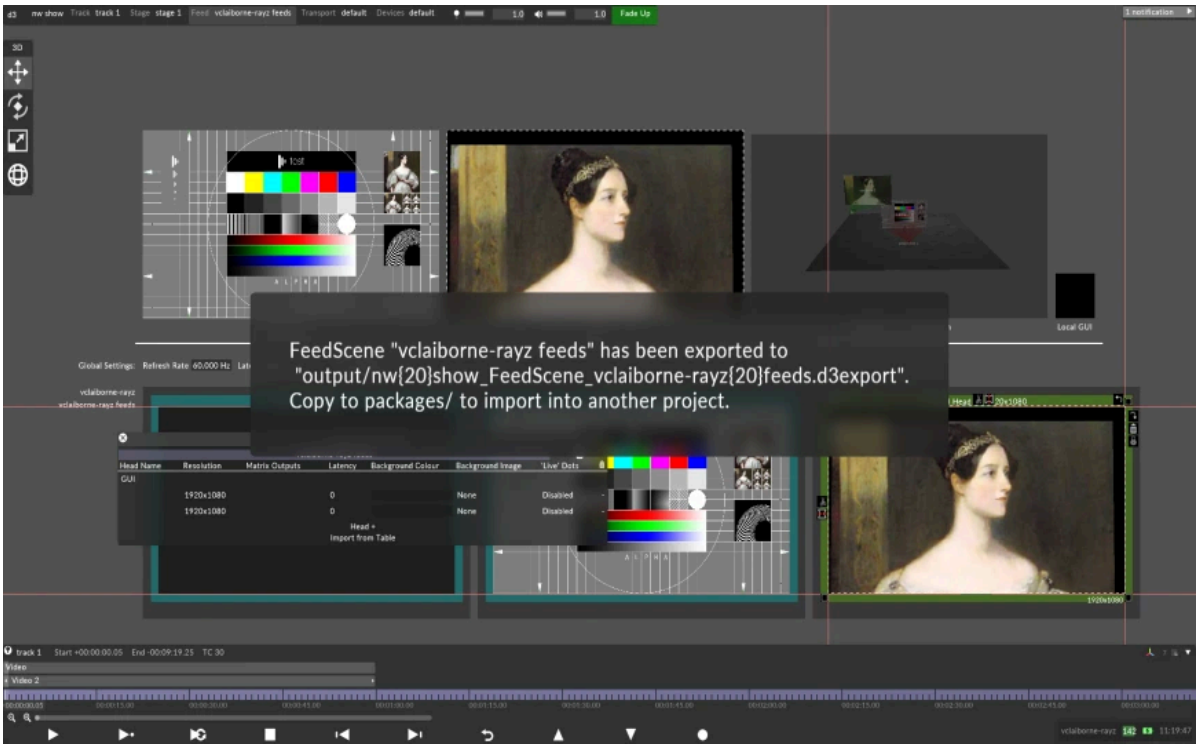


Screen configuration shown is for the active Feed Scene

2. To export the current Feed Scene, right-click on the header of the Feed Scene editor:

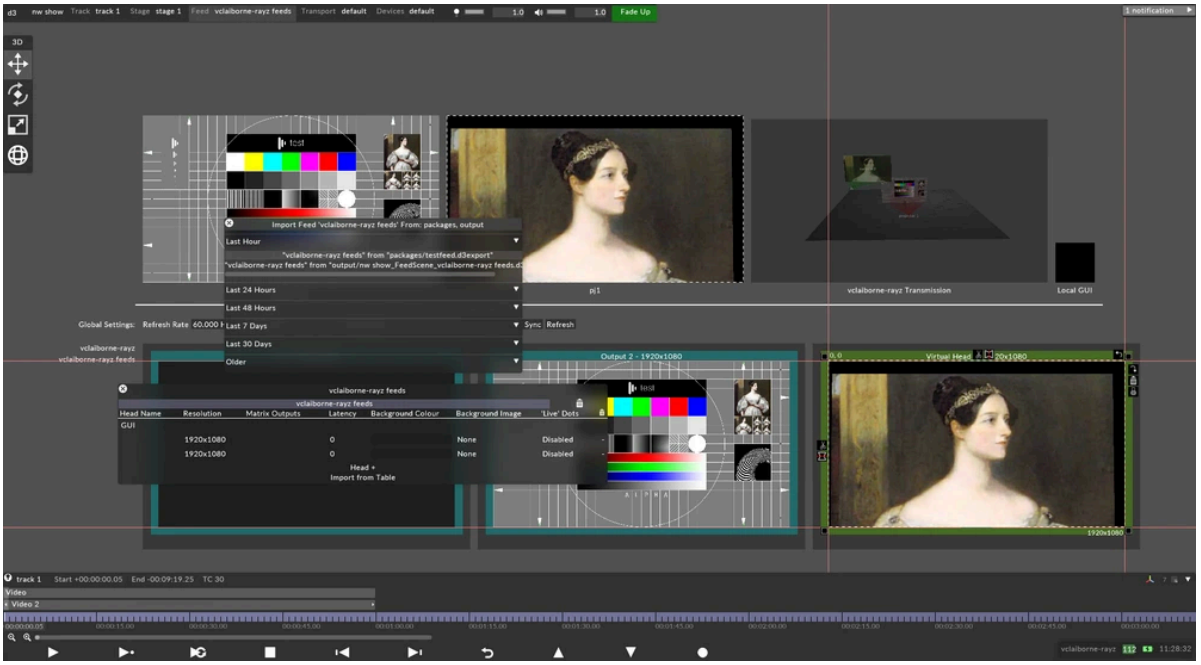


3. Left-click Export. This will export the Feed scene and place it into the Output folder of your project.



Confirmation of Feed scene export including location and instructions for importing As the confirmation message explains, if you wish to use this Feed Scene in another project, then you will need to place a copy into the Packages folder of the desired project (this folder is not created automatically).

4. To import a Feed Scene that has been exported, begin by right-clicking on the header of the Feed Scene editor; then left-click on Import in the list. In the window that opens, select the Feed scene that you wish to import from the list:



Notes

- If the scene does not appear in the list, then it is not placed in the Packages folder within the project.
- Feed scenes can also be created in a .csv file and imported from a Table.

Selecting Feed Rectangles

There are three techniques for selecting rectangles:

Uncovering Rectangles

Left-click a Rectangle to selects one rectangle. When you continue clicking, you uncover more rectangles that share the same position but are hidden behind another rectangle.

Selecting multiple Rectangles

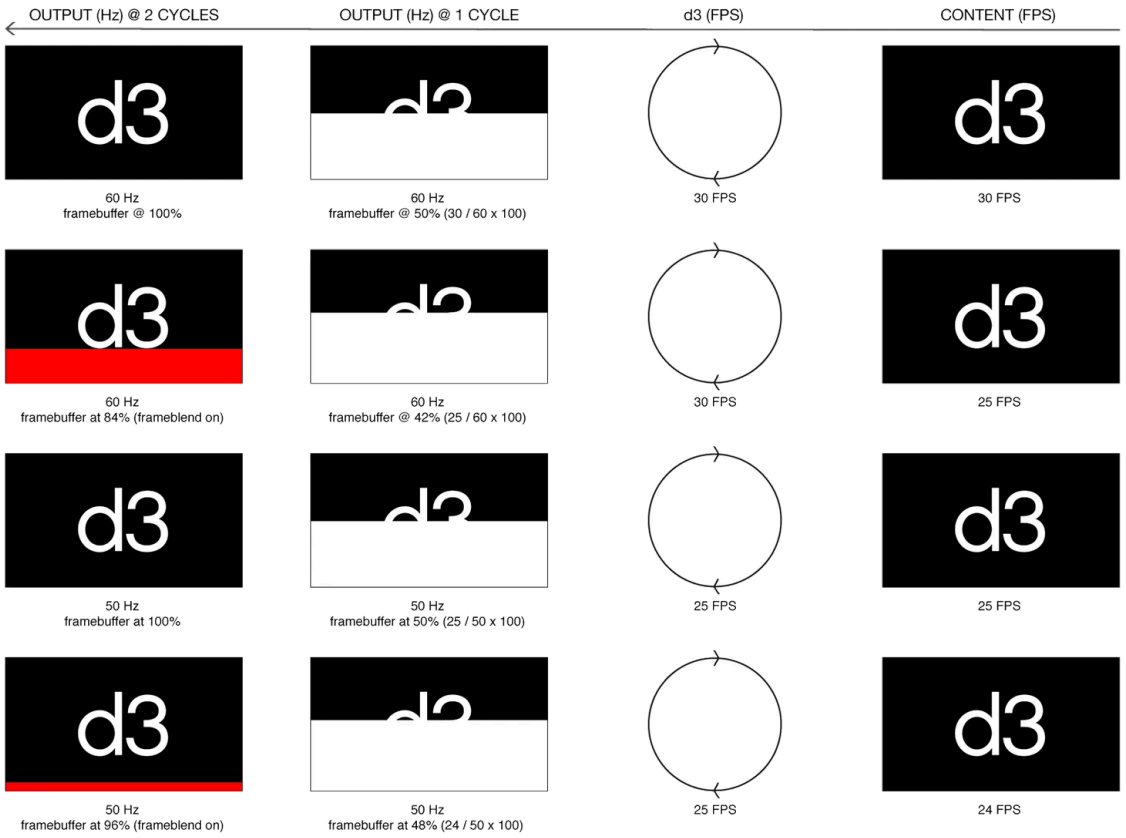
Working with more than one Feed Rectangle at a time is very common. Left-clicking and dragging the mouse will selects all rectangles which touch the area dragged over by the mouse.

Toggling through Rectangles

Ctrl + clicking Feed Rectangles toggles their selection, allowing you to extend the selection across areas which are not next to one another.

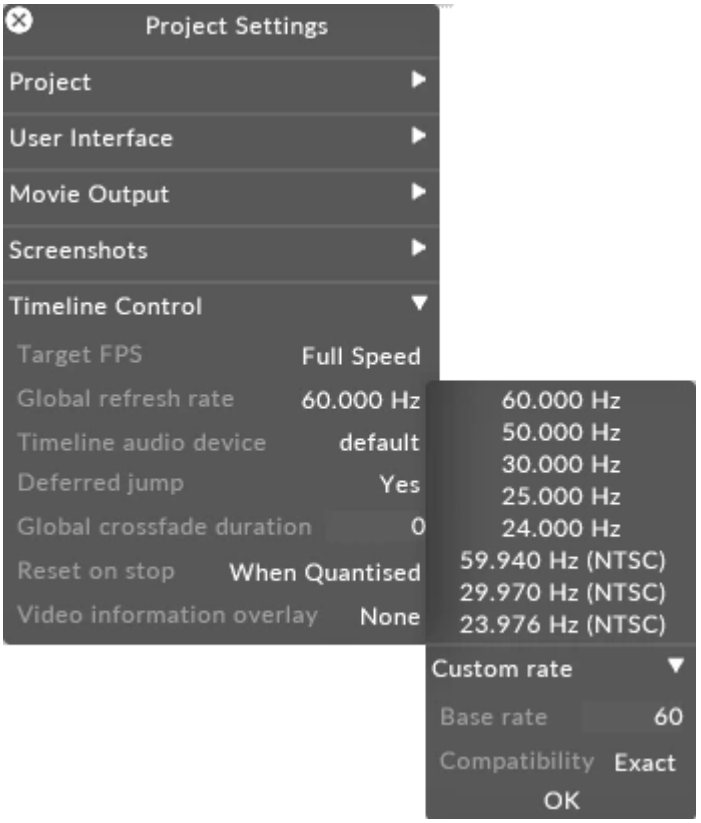
Setting Project Refresh Rate

The refresh rate that a project is set to is inherently important for maintaining optimal d3 performance. The image shows the relationship between project refresh rate, content, timeline and Disguise's frame buffer.



Setting the project refresh rate

1. Open the state editor by right-clicking the d3 icon in the left handside of the dashboard.
2. Open the Project Settings menu by left-clicking the option in the state menu.
3. Set the project refresh rate to the desired setting.
4. In the feed view, click apply feed settings to apply the new project refresh rate.



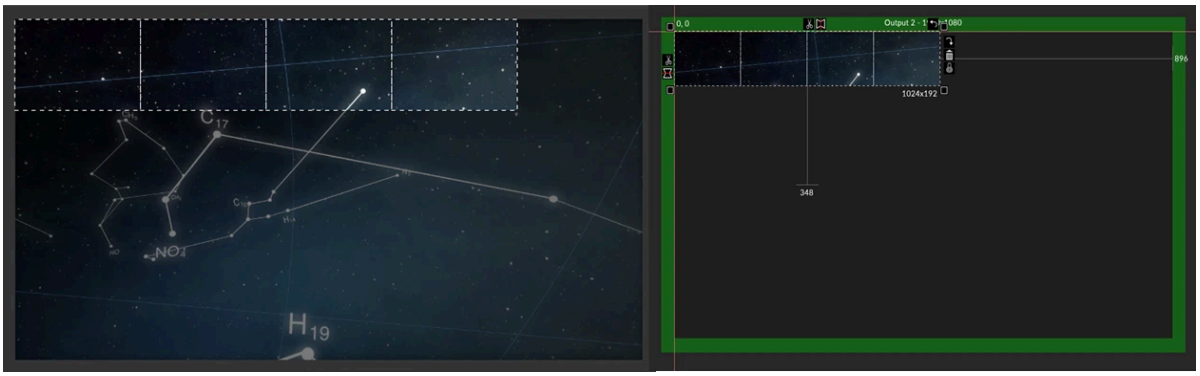
Setting a custom project refresh rate

1. Open the state menu by right-clicking the d3 icon in the left handside of the dashboard.
2. Open the Project Settings menu by left-clicking the option in the state menu.
3. Set the custom project refresh rate to the desired setting and click OK.
4. In the feed view, click apply feed settings to apply the new project refresh rate.

Using Duplicate Multiple

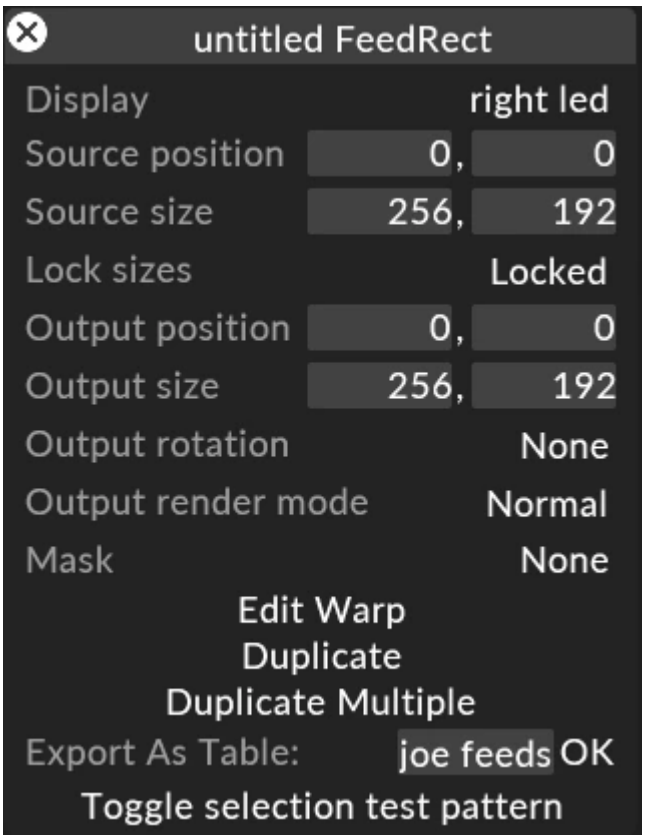
Using duplicate multiple is an effective way of creating lots of Feed rectangles that follow a pattern.

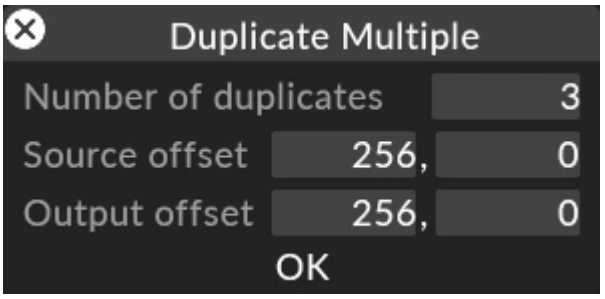
1. Add a Feed rectangle with a size of 256x192 at the position 0,0 on both the source and the output.



2. Right-click the Feed rectangle. This will open up the Feed Rectangle Editor .

3. Left-click duplicate multiple in the Feed rectangle editor.





Duplicate Multiple option is used as a quick method of creating lots of Feed rectangles that follow a pattern

This will open up a window with the following options:

Number of duplicates

This is the number of times you want to duplicate the Feed rectangle.

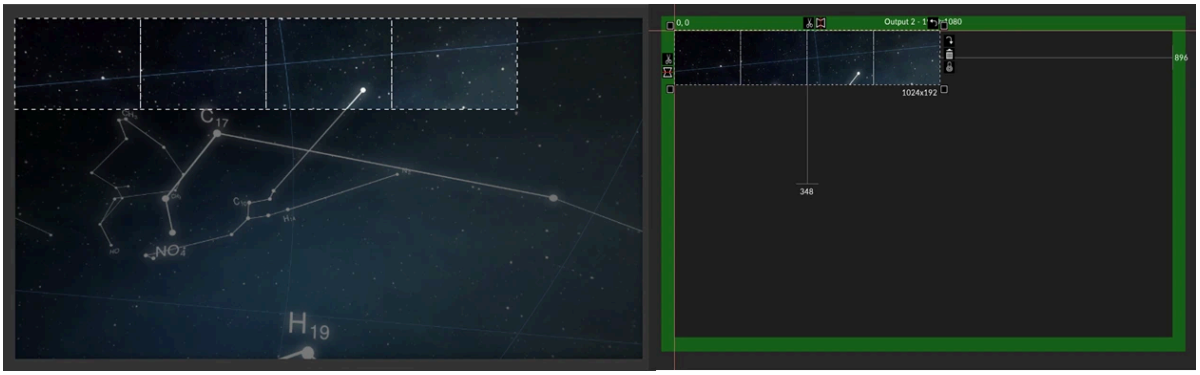
Source offset

This is the offset from the original Feed rectangle in the source that you want to increment. The input is x, y.

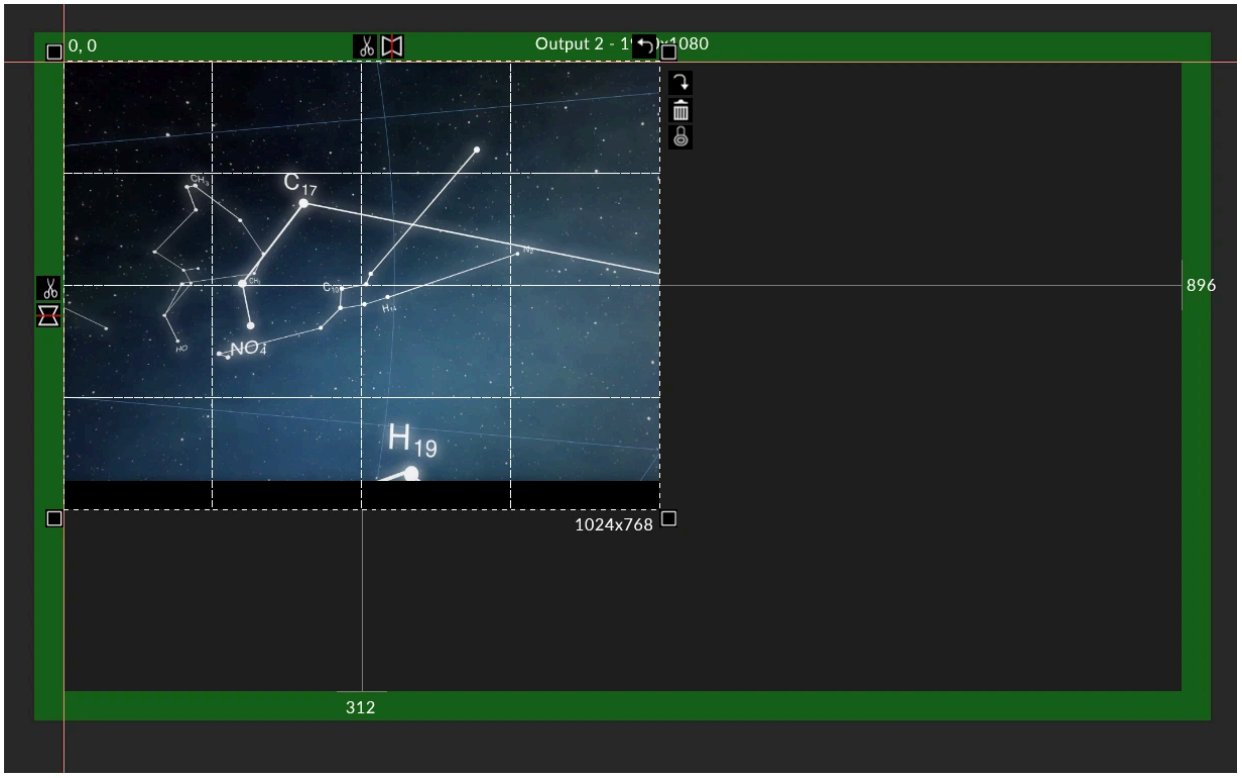
Destination offset

This is the offset from the original Feed rectangle in the feed output that you want to increment. The input is x, y.

1. Set the **number of duplicates** to 3 to duplicate it 3 times.
2. Set the x coordinate of the **source offset** and **output offset** to 256 and the y coordinate to 0.
3. Left-click **ok**. This will create 3 Feed rectangles at x + 256 (with x being the x coordinate of the previous Feed rectangle) and at y + 0, placing them directly next to each other. This will create your first row.



4. Select all the feed rectangles in the first row.
5. Set the **number of duplicates** to 3 to duplicate it 3 times.
6. Set the x coordinate of the **source offset** and **output offset** to 0 and the y coordinate to 192.
7. Left-click **ok**. This will duplicate each row below the previous row, completing the grid of Feed rectangles. As you can see, Designer will name the feed rectangles sequentially in the order they are created.


0, 0
Output 2 - 1
1080
896
1024x768
312

Video Timings

When outputting video from d3, we can use various timing methods. A timing method is a set of parameters that define aspects such as:

- **Horizontal blanking**: The interval between the end of one line and the start of the next.
- **Vertical blanking**: The interval between frames.

The values for these parameters can vary depending on the chosen method.

Considerations for video timings

- The type of timing used may need to be compatible with downstream devices to ensure a specific type of timing will be understood at the other end. For example, some monitors may not display the video at all if the timing format is unsupported.
- The video timing will adjust the amount of data the video stream requires, so if devices are limited on bandwidth, then some timing modes may not be able to be used.

> **Caution**
>
> When using IP-VFC cards, we recommend only using IP-VFC cards and not mixing these with other VFC cards, as we cannot guarantee genlock with other cards. We are aiming to address this in future releases.

Timing mode selection in the Feed screen

In the Feed screen, users can select the timing mode for each output, provided it's an HDMI or DisplayPort VFC, or a direct output (e.g. from the EX range). The available timing modes are:

- SMPTE
- CVT
- CVT Reduced Blanking (CVT-RB)
- CVT Reduced Blanking 2 (CVT-RB2)
- AUTO

> **Note**
>
> What we refer to as SMPTE in d3 is actually CEA timing. However, it is widely used in the film industry under the SMPTE standards - especially for devices using SDI input/output, where fixed bandwidths are expected.

How AUTO timing works

When AUTO is selected for one or more outputs, d3 will attempt to find a common timing method across all outputs. This provides more chance of achieving genlock across different VFC types and generally smoother output requiring less single output adjustments to stay synchronised. We do this in two passes.

First pass

The first pass will simply find the best timing method for each single output by testing each method in the following order until one fits within the bandwidth constraints of the output type:

- DMT (not directly selectable)
- SMPTE (CEA)
- CVT
- CVT-RB
- CVT-RB2

Each output type has a different bandwidth limit. For example:

- DisplayPort 1.4: ~26 Gbps
- DisplayPort 1.2: ~17 Gbps
- HDMI 2.0: ~14.4 Gbps
- DVI: ~8 Gbps

Higher resolutions, frame rates, bit depths and colour formats require more bandwidth, which can affect the timing mode the first pass selects.

Second pass

On the second pass d3 will find the best timing method, which was chosen in the first path and which is within the bandwidth limit for all AUTO outputs and assign all of them that method.

Combining AUTO timing with chosen timings

If there are outputs with chosen (non-AUTO) timings mixed with outputs using AUTO timing, d3 will use the chosen timing on each AUTO output where it fits within the bandwidth limit of that output. If it exceeds the bandwidth limit, we fall back on choosing a timing using the first pass process.

If more than one specific timing method is used, d3 will choose the higher-ranking method for the outputs using AUTO. Higher ranking is decided by how many outputs are using it, and then the order of best to worst is described above. For example, if we have four outputs and two are assigned CVT-RB and one is assigned SMPTE and one AUTO, the AUTO output will be

assigned CVT-RB. If we have four outputs and one is CVT-RB, one SMPTE and two AUTO, d3 will assign the AUTO outputs to SMPTE because it's ranked higher than CVT-RB.

Bandwidth and colour format

The colour format also affects bandwidth usage:

- RGB Full (RGB 4:4:4), RGB Limited, YCbCr 4:4:4: ~3 bytes per pixel
- YCbCr 4:2:2: ~2 bytes per pixel
- YCbCr 4:2:0: ~1.5 bytes per pixel

> **Important Note**
>
> A downstream device may reject a signal if the required timing mode isn't supported.
>
> As of version r30.5, d3 now logs the selected AUTO timing mode in the console when feeds are applied. Previously, this was not recorded.

Passthrough vs non-passthrough VFCs

- With passthrough VFCs (e.g. HDMI, DP), the timing mode set on the GPU output via EDID is passed directly to the connected device.
- With non-passthrough VFCs (e.g. QSDI, QDVI, IP), we convert the GPU timing mode:
  - **QSDI**: The GPU uses CVT-RB, while the QSDI VFC outputs use SMPTE/CEA, which is standard for SDI devices.
  - **IP cards**: Typically use CVT-RB2, unless running under 25fps, where CVT or AUTO might be used.

We do not currently support genlocking IP outputs with other VFCs, but this is a planned improvement that we hope to make available in future.

Genlock Basics

Genlock is the process of synchronising the display of each frame on each output of a machine to an external clock signal. This external signal is typically distributed to multiple machines, allowing them to stay in perfect sync — essential for multi-display or multi-machine setups.

A similar concept applies to **internal genlock**, also known as **framelock**, where one output on a machine acts as the timing master, and the other outputs synchronise to it.

Key Points:

- **Synchronisation Scope**: Genlock applies only to outputs that are outputting nearly identical amounts of data. This means the resolution, frame rate, and format must match across all outputs being genlocked.
- **Resolution Limitations**: Attempting to genlock outputs using different resolutions usually results in failure — typically, only one will successfully genlock while others will not.
- **Output Type**: Genlock operates at the GPU output level, not at the VFC (Video Format Converter) output level. So synchronisation happens before any format conversions are applied downstream.

Genlock ensures that multiple displays or machines present frames in lockstep, which is crucial for seamless visuals in video walls, immersive environments, or high-end simulation systems. But to work properly, all genlocked outputs must match in resolution and timing characteristics.

Read more about Genlock Configuration here.

Timing Differences

When using different timings across outputs, the amount of data being transmitted can vary enough that genlock no longer works — even if the resolution is the same. This is because genlock relies not only on resolution, but also on how data is clocked out of the outputs.

It's common to encounter genlock issues when using different VFCs in the same machine. Different VFCs often default to different timing modes depending on the output type, which can disrupt genlock synchronisation.

Troubleshooting

1. Avoid Mixing Incompatible Timing Modes

Genlock requires outputs to use very similar timings, not just the same resolution and frame rate.

If one output is using SMPTE and another uses CVT, genlock may fail even if the resolutions match.

Solution: Manually set a consistent timing mode (e.g. CVT or CVT-RB2) across all outputs.

Do not leave any outputs on AUTO if you are using different VFC types.

2. Be Cautious When Mixing VFC Types

Some VFC types (e.g. **QSDI** or **IP-VFC**) use fixed timing modes internally (such as CVT), while others (like HDMI or DP) allow timing selection.

If mixing passthrough cards (e.g. HDMI + DP):

- Choose a specific timing manually for each.

If mixing passthrough and non-passthrough cards:

- Try aligning GPU timings manually to match the known default of the non-passthrough card (e.g. CVT for QSDI).

3. SMPTE Timing May Not Genlock with Some Cards

If you're using SMPTE timing on an HDMI or DP output and cannot genlock with other VFCs (e.g. QSDI), try switching to:

- **CVT-RB when pairing with QSDI**
- **CVT-RB2 when pairing with IP-VFC**

4. Check for Bandwidth Conflicts

For high resolutions (especially with DP1.4 or 4K outputs), the selected timing mode must also be within the bandwidth limits of the VFC.

A timing mode that exceeds the card's capabilities will fail silently or block genlock.

> **Tip**
>
> If unsure, start testing with lower-bandwidth formats (e.g. 1080p60) and scale up once genlock is successful.

5. Use Consistent Output Settings Across Machines

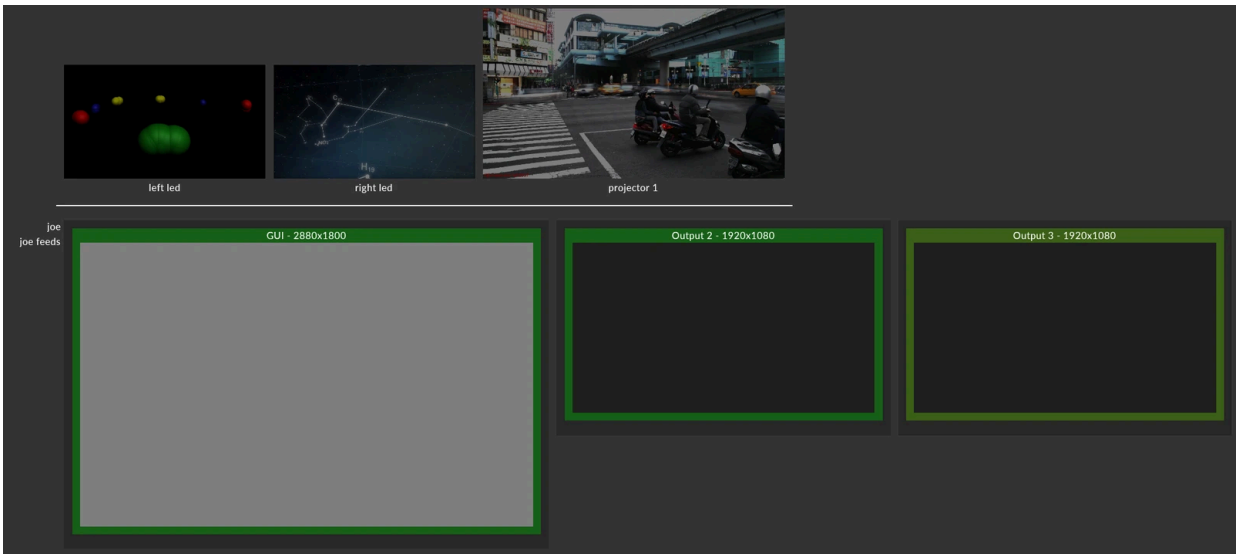
If synchronising multiple machines, make sure:

- The **same timing mode**, **resolution**, and **framerate** is used across all outputs that require genlock.
- Avoid **AUTO** timing modes in multi-machine setups unless fully matched.

Viewing the Feed Level

To see what the current Feed scene looks like, left-click Feed in the dashboard. This swaps the Stage Visualiser with the Feed Visualiser view.





The Feed level is split into two sections: Screen section and Feed scenes, separated by a white horizontal line

The display is split into two sections, separated by a thick white horizontal line which separates the screen rectangles in the current stage above the line from the physical outputs below the line.

Screen section

Above the line, you see a simplified view of the Screens in the Stage. Each Screen is represented by a rectangle containing its content. In the Screen section, the screen rectangle represents the area of the screen the rectangle copies content from.



Feed scene

Below the white line, you see a virtual view of each of the output heads on your machine, or a virtual machine if you are using Designer, for example. In this Feed scene below the line, the green rectangles represent the area of the output display the content is to be copied to.

Each Feed rectangle is visible in both sections.

The Feed section is made up of a series of different displays.

GUI (Graphial User Interface)

The GUI always represents the first display in the Feed scene and is therefore visually represented as the output display to the very left of the Feed scene. Note that the GUI can also be used as an output display if you add one (or more) Feed rectangles to the GUI display.

Display/Virtual Displays

The Display always represents the second or more displays in the Feed scene and is therefore visually represented as the output display to the very right of the Feed scene. Designer will automatically detect the graphic capabilities of the machine it's connected to and create output heads based on that information.

Warping Outputs

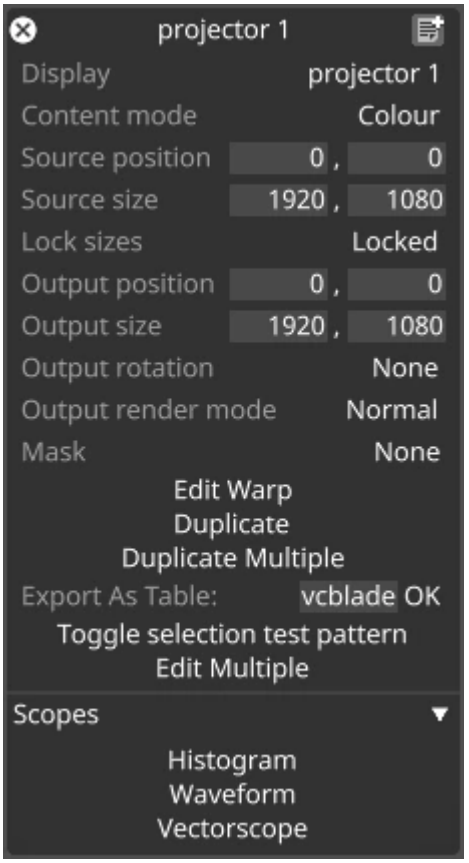
In cases where the projection surface does not match the virtual 3D model (i.e. where the lineup from the manual or automatic calibration needs a slight fine-tune), Designer provides a number of powerful warping layers that can be applied directly to the output. By using these tools, there is no requirement for projector keystoning or any other warping inside the physical projector.

> ⚠ **Warning**
>
> If you're considering warping due to poor calibration, double-check that no warps were active on the projector during calibration, as this can affect the results. Also, consider whether warping is necessary for your setup.

Adding and Using Warping Layers

To add a warping layer to an output:

1. Left-click **Feed** in the dashboard at the top of the screen.
2. Right-click the relevant output.
3. Select **Edit Warp** from the context menu options list.

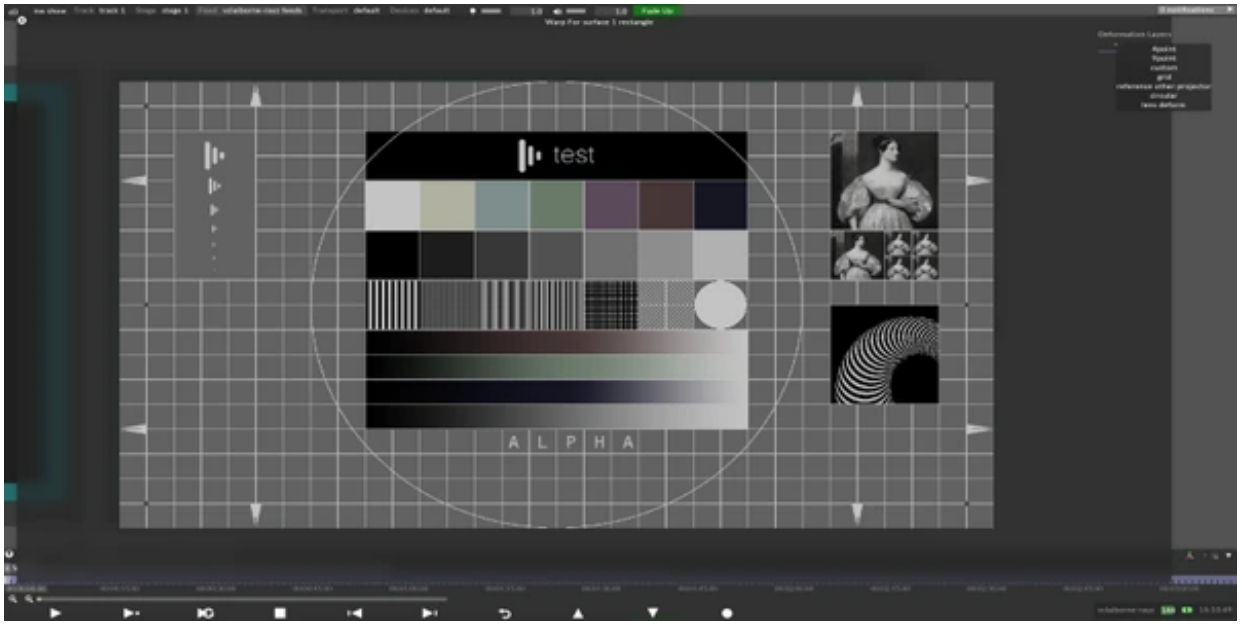


For more information on the dashboard layout and functionality, refer to the Designer User Interface section.

Deformation Layers for Warping an Output Feed

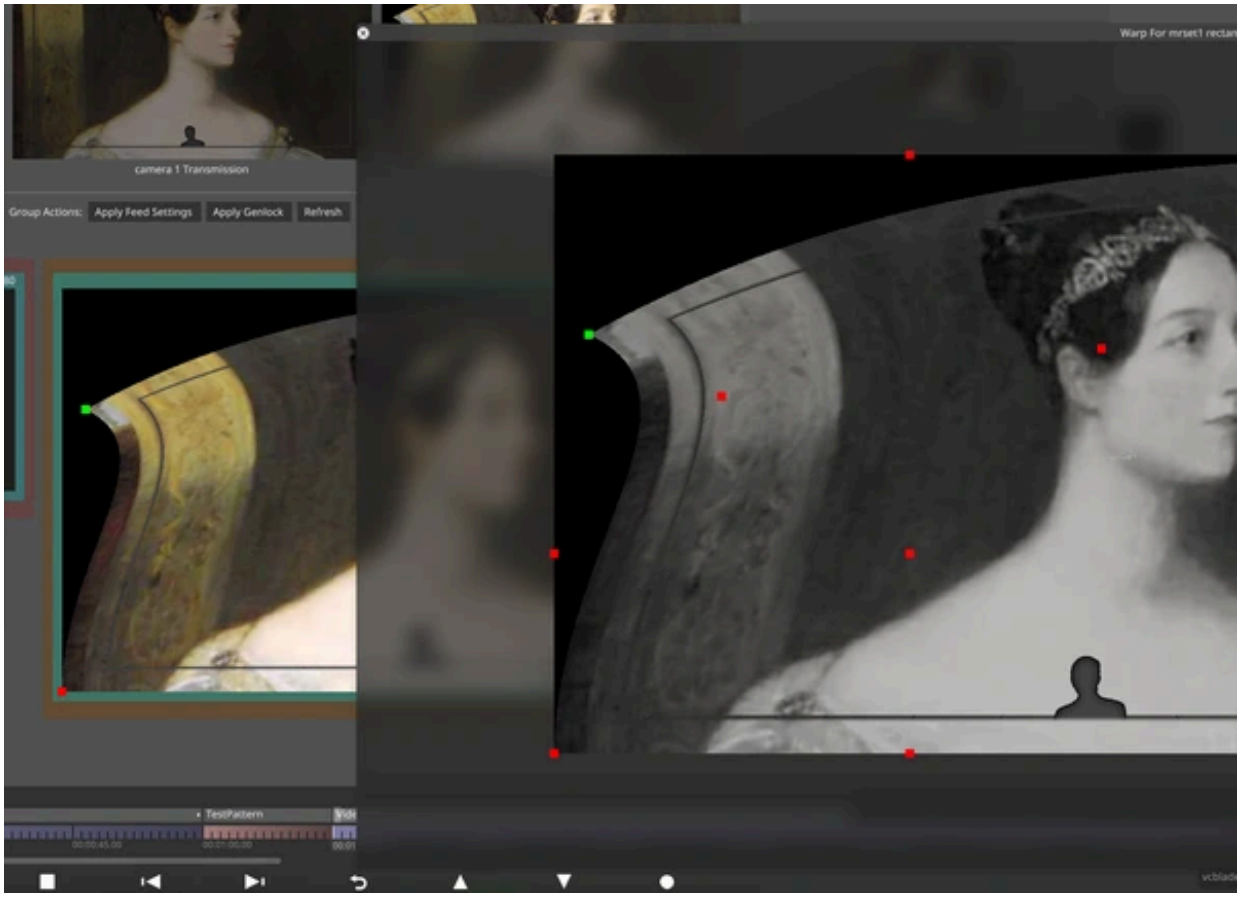
In the editing window, left-click the + button under the **Deformation layers** title.

This will display a list of deformation layers.



Deformation layers for warping an output feed, opened by left-clicking + under the Deformation Layers title

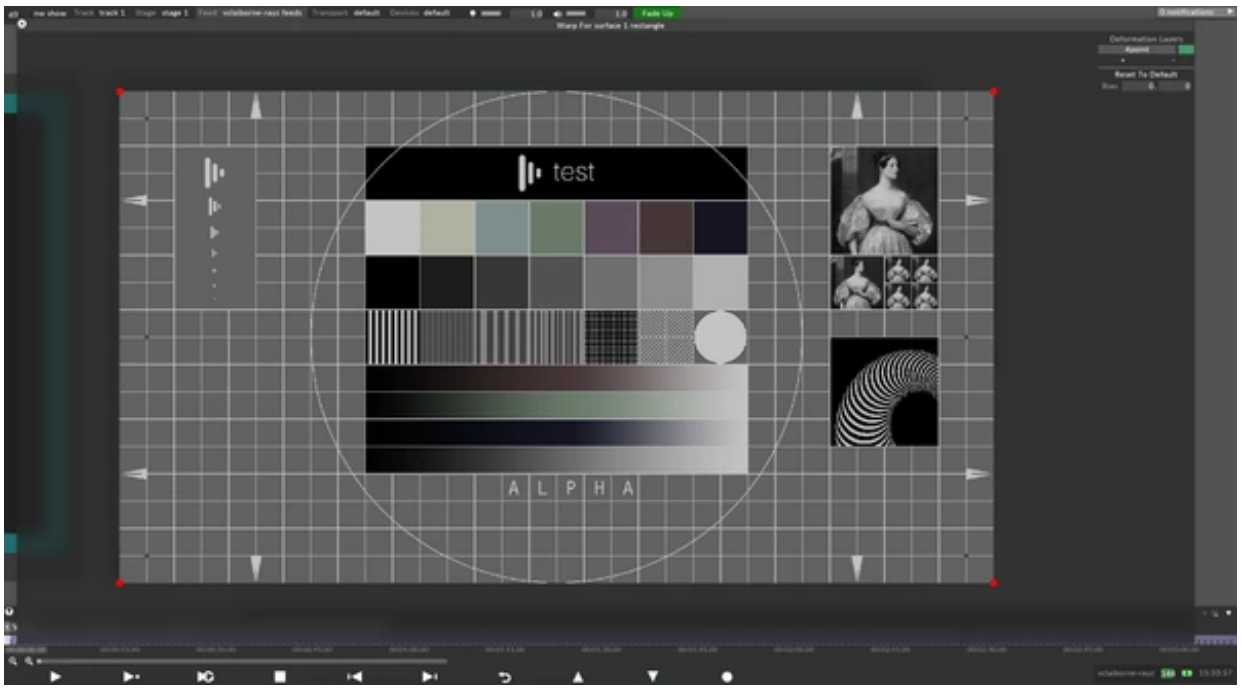
> **Tip**
>
> Warp points can be added to the output so you can see exactly which part of the output is being manipulated.



Warp points being added to an output

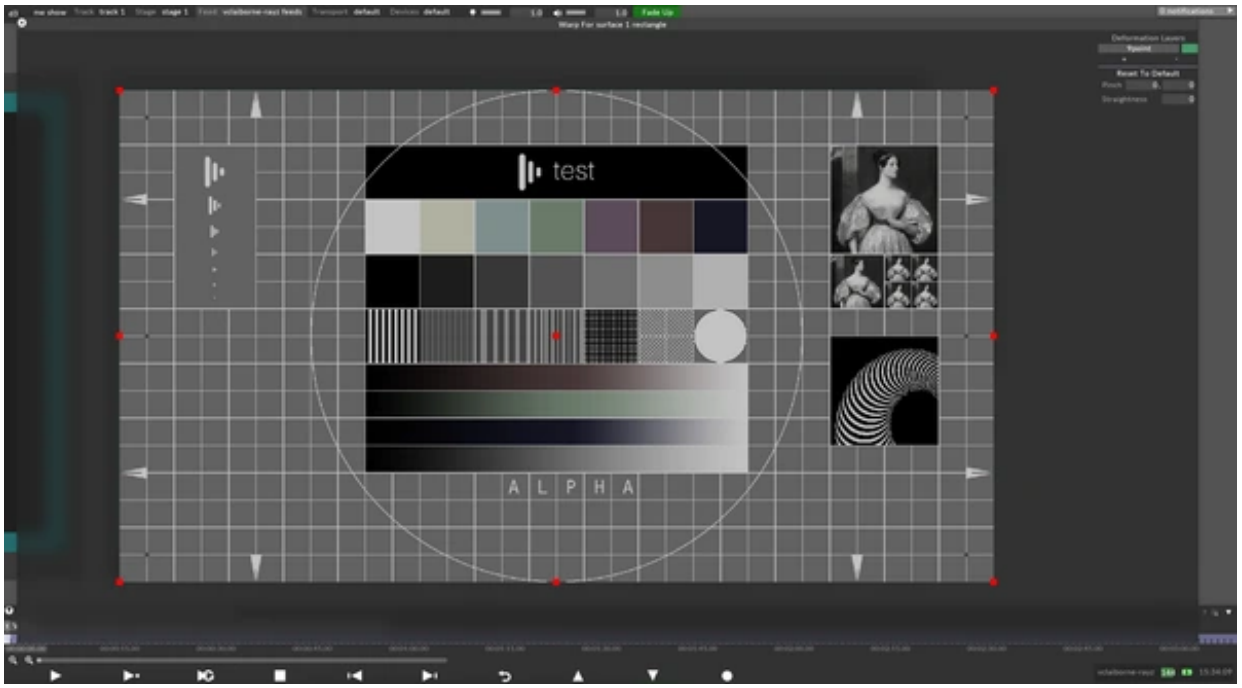
Warping Layer Types

4point



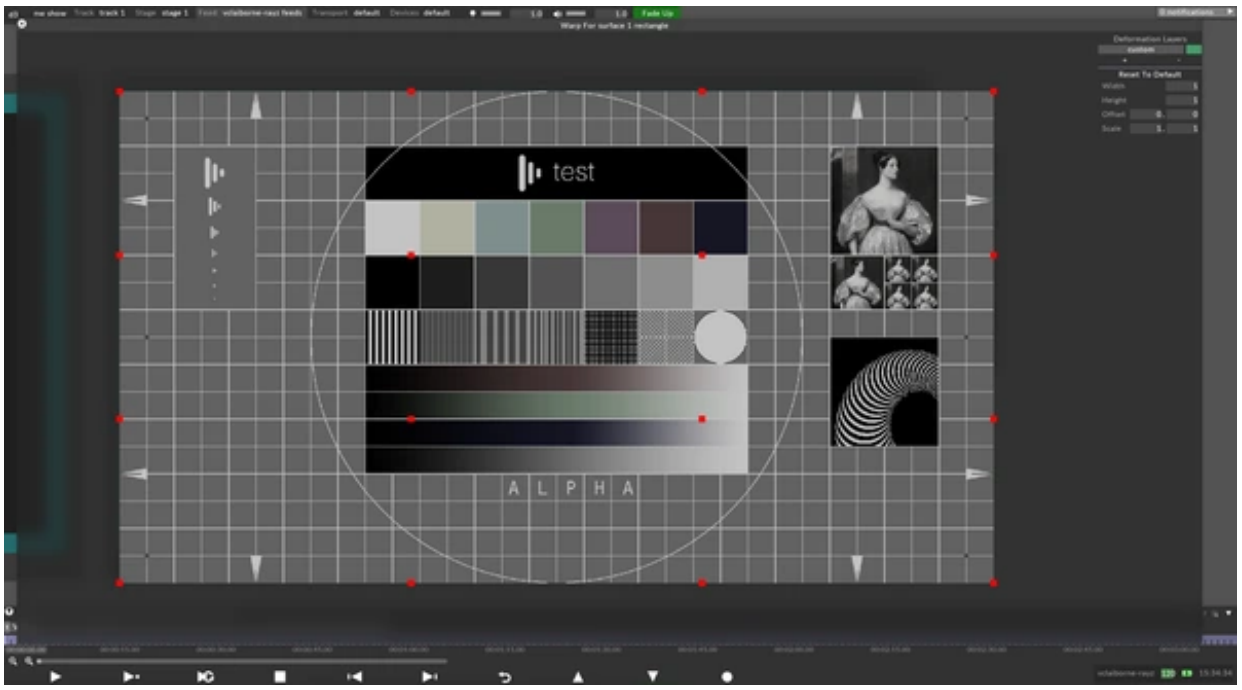
Drag any of the 4 points inwards to globally adjust the warping of the output. Adjust the horizontal and vertical bias to shift-scale the content.

9point



9point warp allows you to drag 9 points inwards and adjust the pinch and straightness between them. This feed warp is useful when projecting onto a cylindrical screen when not using Projector Simulation. It easily conforms a rectangular output to fit to a cylindrical screen.

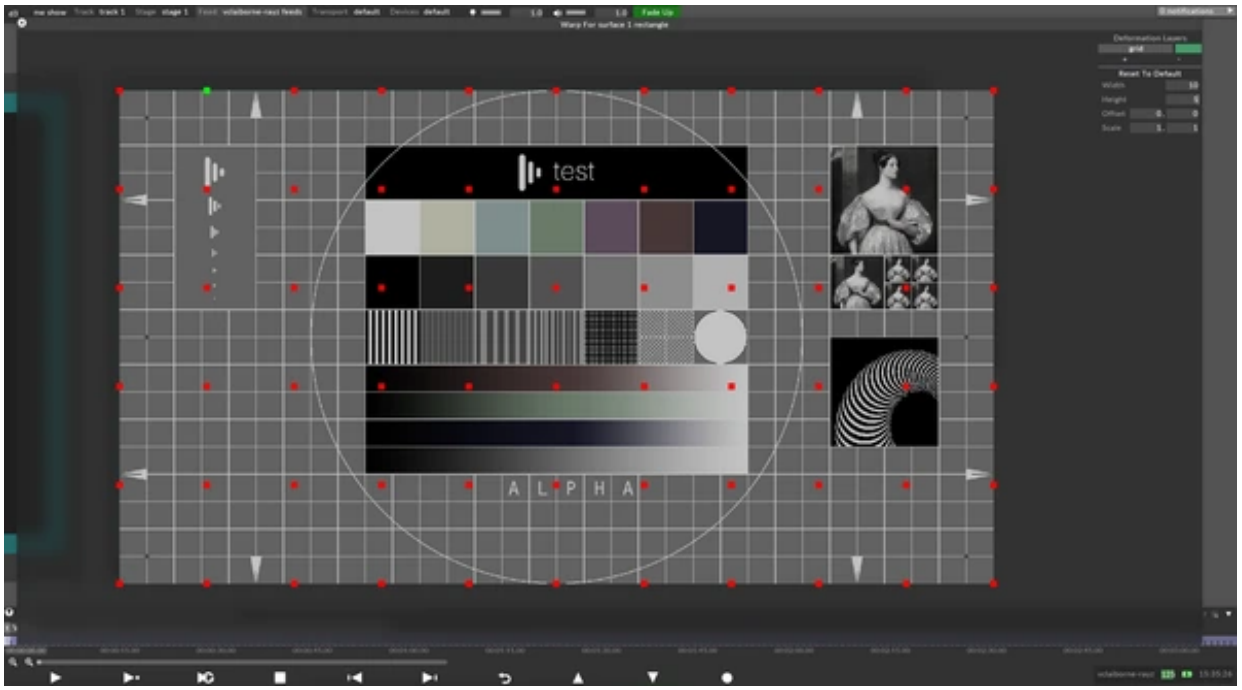
Custom



Creates an arbitrary number of grid points on the output that can be individually or group-selected. You can use this when local warping on an object is required.

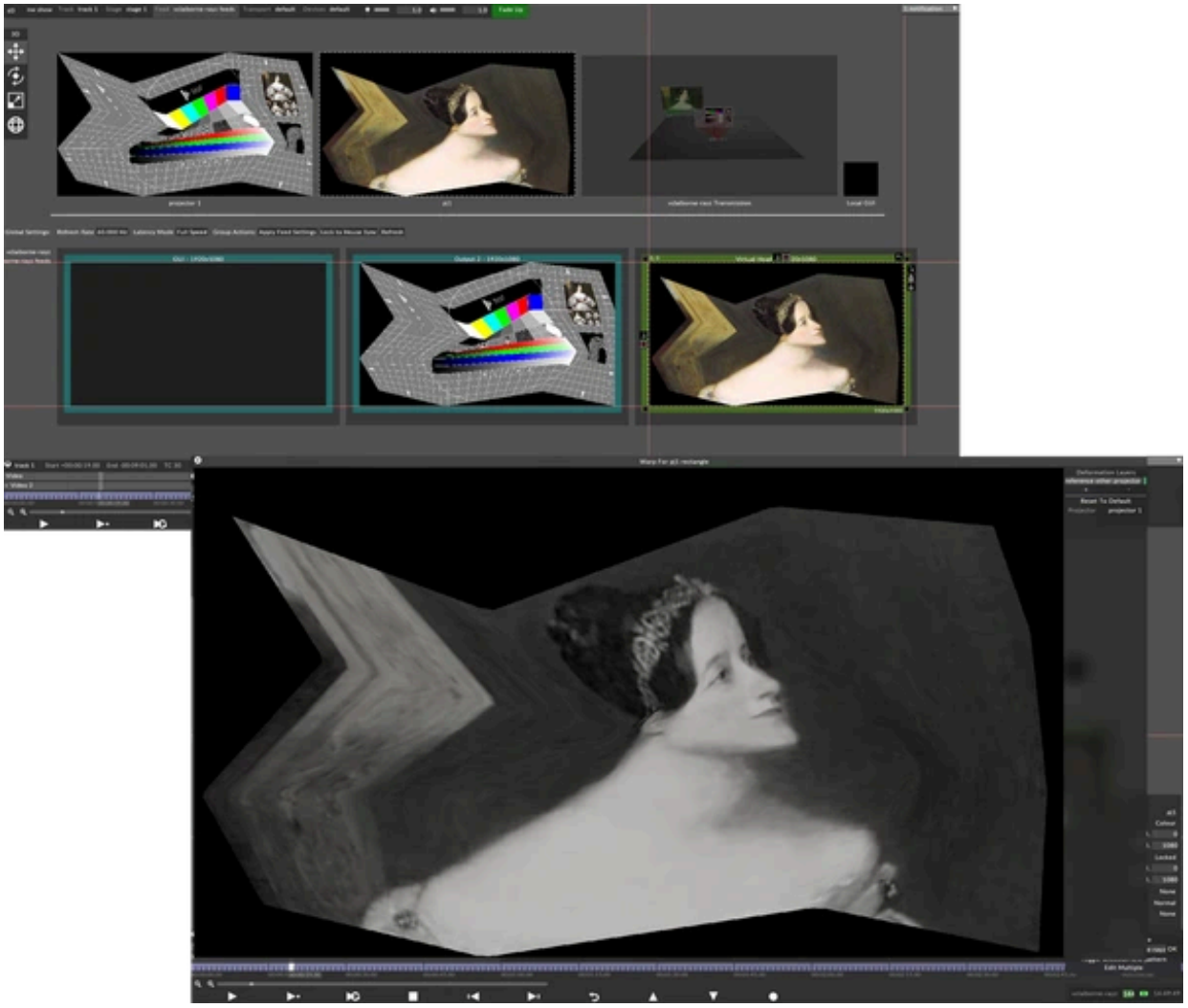
Grid

Provides a regular grid of points for more structured and uniform warping adjustments across the output



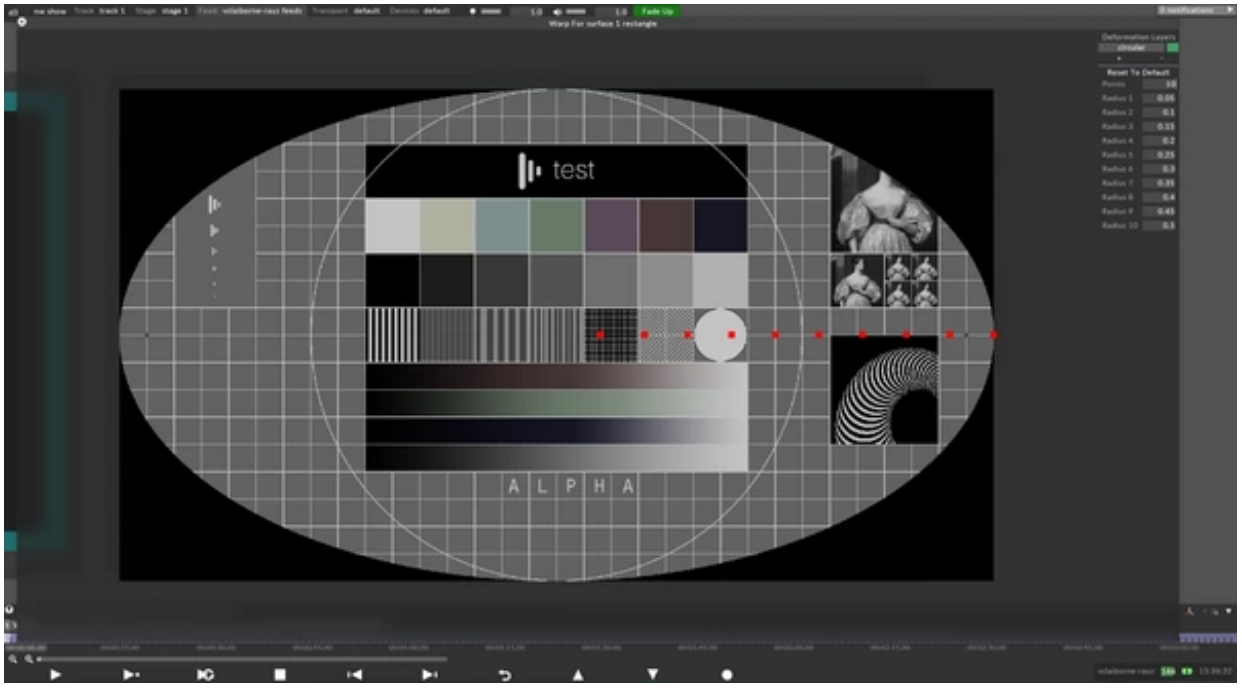
Reference other projector

Uses the deformation of another projector as a reference to synchronise output warping across multiple devices.



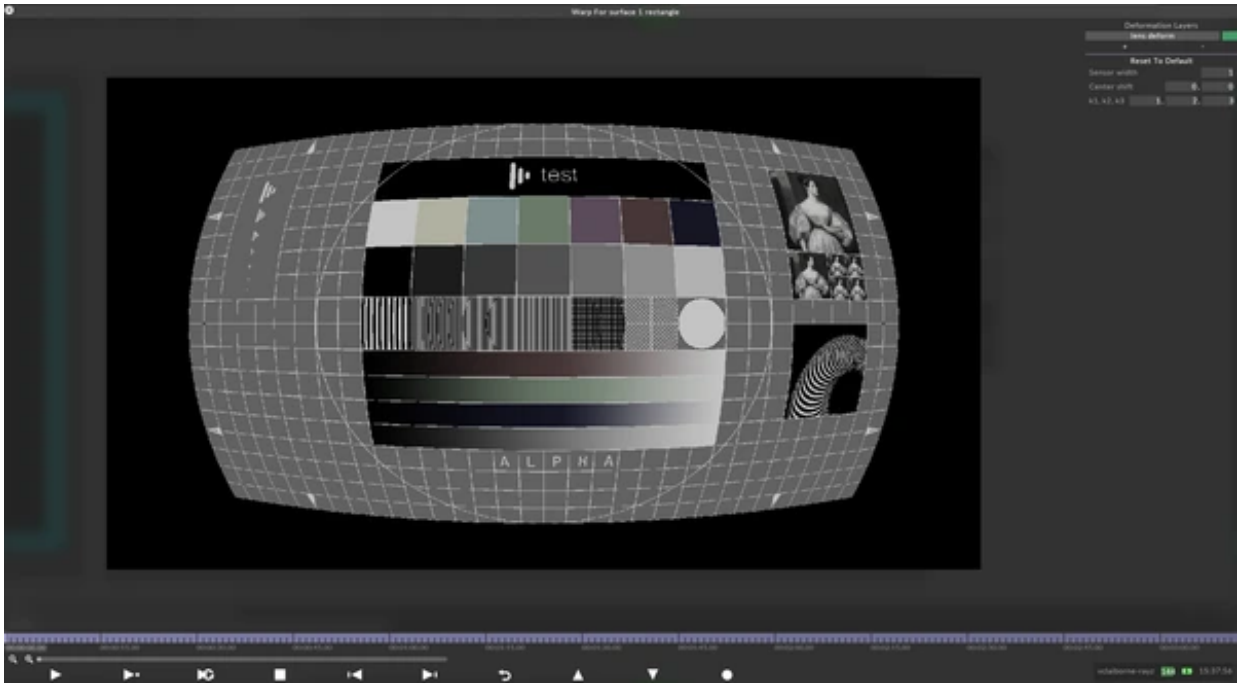
Circular

Applies circular deformation for radial-based warping needs, useful for dome or spherical projections.



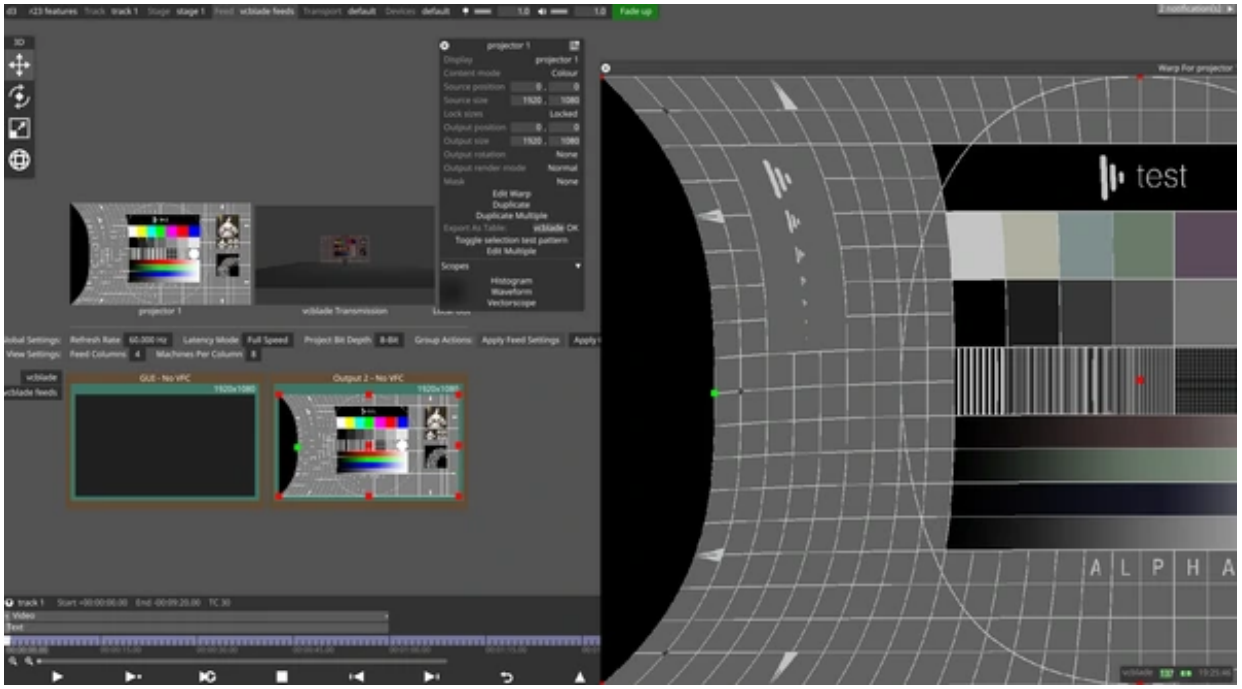
Lens Deform

Simulates lens distortion effects, allowing correction or emulation of barrel or pincushion distortion.



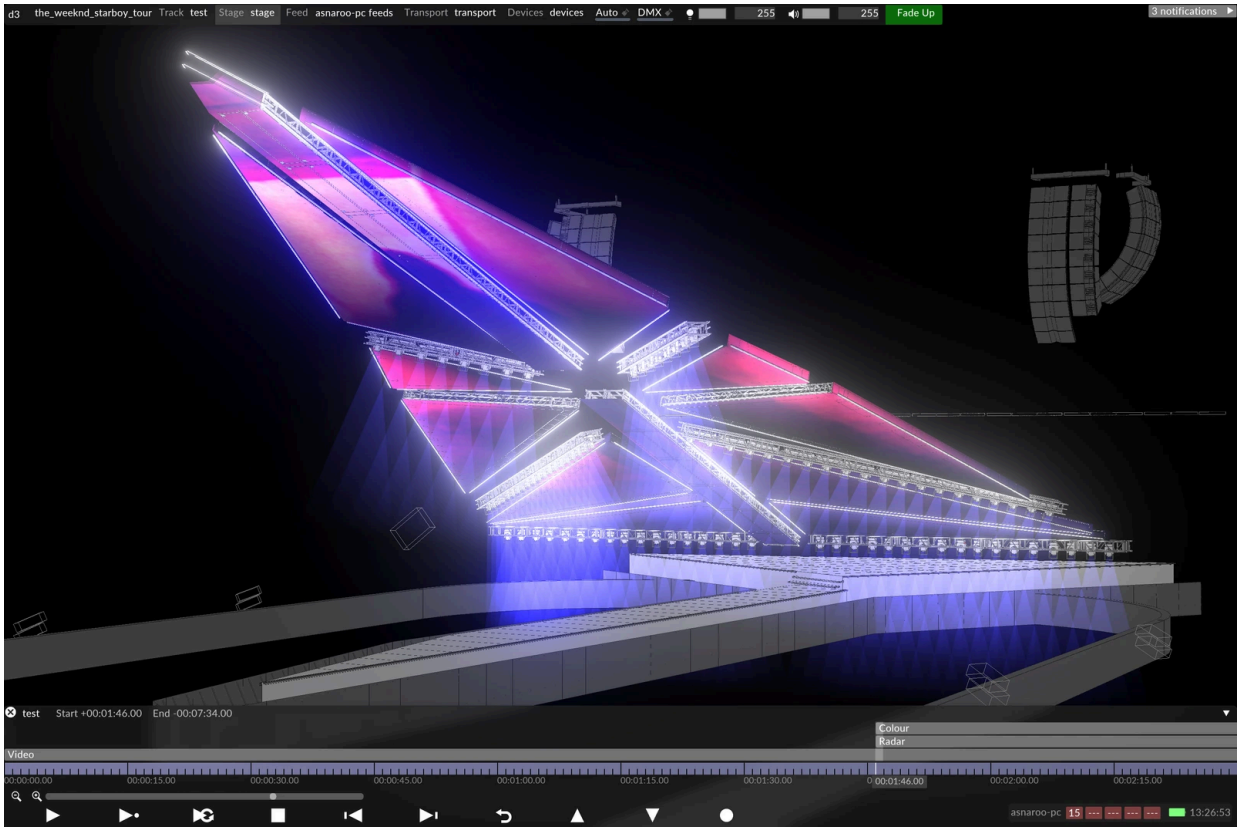
Draw control points on output

Visually place and adjust control points directly on the output for precise manipulation.



Designer Overview

Designer is the Disguise software to design, visualise, sequence and run visual experiences for creative industries including live, location based experiences and virtual production.



Designer enables you to design, configure, and present your show using your own laptop or desktop computer, and then transfer to a Disguise media server for showtime. In production rehearsals, Designer also allows you to multi-edit the show from your laptop. For more info about the Designer product see the **Designer** page on the **Disguise website** where you can download the latest version.

Designer on Disguise Servers

Designer is the core software which powers the Disguise media servers. Disguise servers are supplied fully licensed for Designer. Designer can be upgraded on Disguise servers using the Designer Full installer.

Designer for PC or laptop

There are two Designer options available for users working on a PC or laptop:

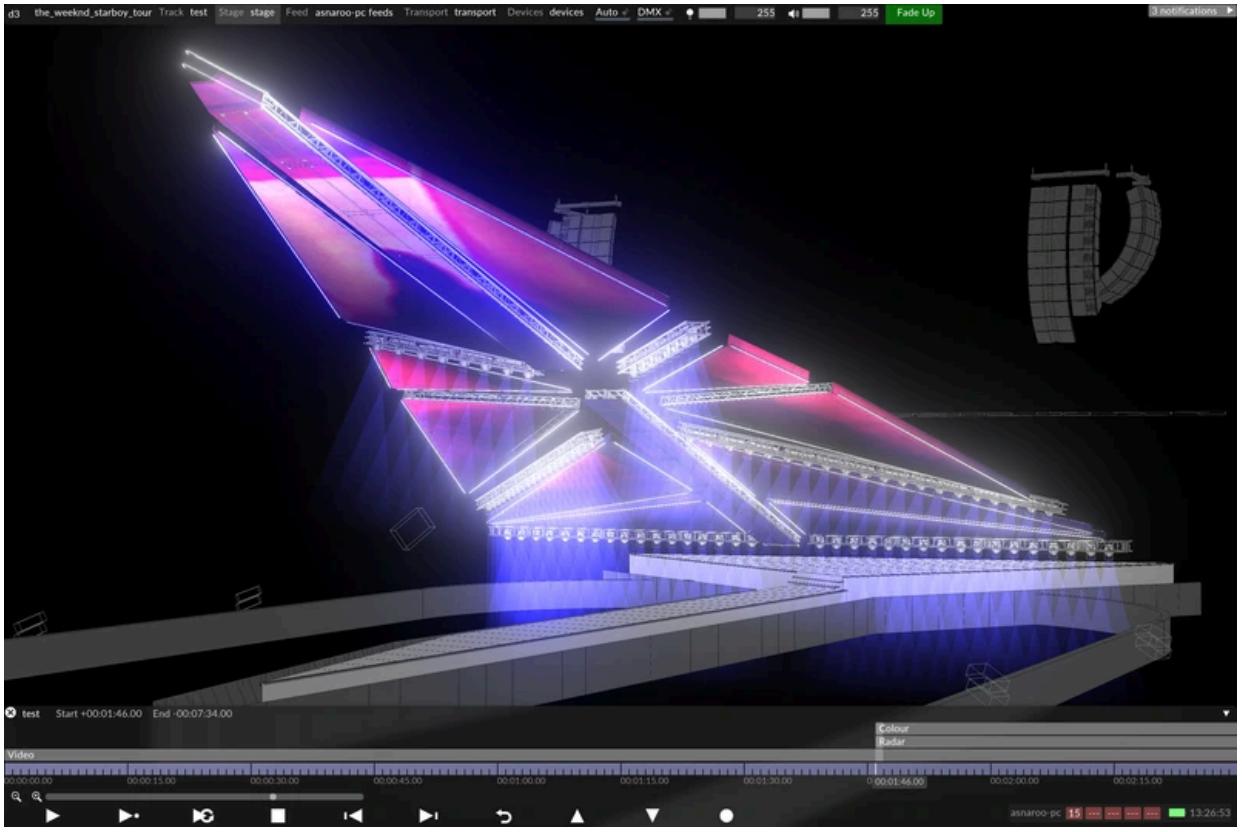
- Designer Starter, which is ideal for learning and evaluating. It is free to use, provided you have a Disguise Cloud account which is used to sign in to d3Manager, the Designer launcher. Designer Starter has a specific Designer Starter installer.
- Designer Pro, which is for programming and editing projects that will be running on a Disguise server. This requires a paid license subscription which is obtained through Disguise Cloud. Designer Pro uses the Designer Full installer.

You can read more about Designer Starter here, and Designer Pro here.

The Designer website has a comparison chart **here**, and Designer Licensing FAQs here.

Designer Elements

Disguise Designer is a real-time 3D simulation and pre-visualisation tool that allows users to design, program, and simulate complex multimedia productions before deploying them in real-world environments.



The Weeknd Starboy Tour stage visualiser

Key Features of Designer

- Integrates lighting, LED screens, and projection mapping into a single workflow.
- Real-time 3D simulation for show pre-visualisation.
- Compatible with Disguise media servers for live event execution.
- Used in concerts, theatre productions, corporate events, and virtual production.

Disguise Ecosystem

- Disguise Media Servers (e.g., VX and GX series) power large-scale live productions.
- Disguise Designer is the software for pre-visualisation and programming.
- Disguise's XR & Virtual Production tools are widely used in film and broadcast.

Pre-production

Disguise integrates a real-time 3D stage visualiser, media playback, and a timeline. It lets you model the stage, view it instantly from any angle, drop video or still content onto the timeline and play it back onto the stage, without time-consuming re-renders. It is therefore a very useful communication tool in the early stages of a project. Showing a real-time simulation of a proposed design is faster, cheaper and more effective than traditional renderings and fly-throughs. In the preproduction stage, it allows designers, clients and artists to quickly visualise content and make artistic decisions, without having to actually build the stage. Stage visualiser used as an essential 3D visualisation and simulation tool in the pre-production phase.

Rehearsals and live production

However, Disguise goes further than mere visualisation. It is designed to integrate with the traditional tools of show delivery (lighting desks, audio and automation systems). Designer contains all the video playback functions you would expect to find in a conventional media server, together with a sophisticated timeline-based show control mechanism. Coupled with the Stage Visualiser, Disguise allows the designer to edit and sequence a complete show, present it to the client and get a sign-off, long before the real stage is built.

Once the real stage is set up, you bring Disguise (with the completely sequenced show) into the production rehearsal, plug it in, and press play. Thanks to the Stage Visualiser, a highly realistic simulation of the actual stage, you are guaranteed that the show will look the same on the real screen as it does in the Stage Visualiser, aside from a bit of tweaking (and we give you an arsenal of tools to do this).



Disguise being used in the production rehearsals of The Weeknd Tour 2017.

The added value of this is simple it saves time, and therefore money. Disguise allows you to shift crucial work forward in time, so you can spend time on making the right decisions before you go into production rehearsals and start spending money. Disguise acts as a central focus for the production team, making sure that everyone can review everything so that mistakes are caught early, aesthetic blind avenues are identified and avoided, and content is made to maximise the potential of the stage.



Disguise used as an essential tool to successfully deliver The Weeknd show onto the stage, on time and on budget.

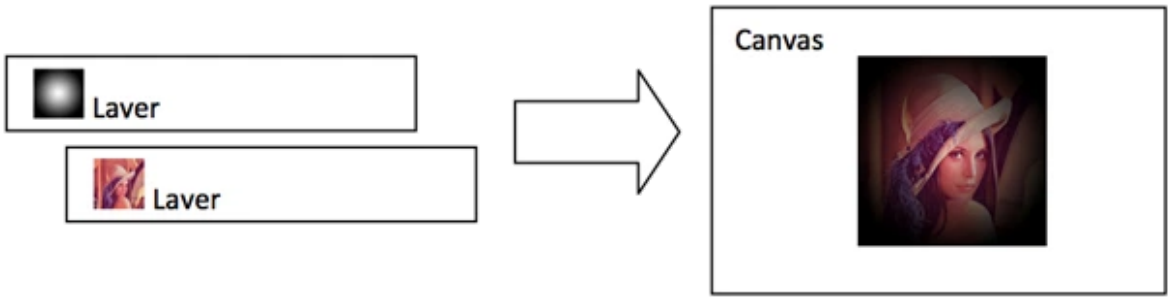
Main Elements

Designer comprises three main elements: the Timeline level, the Stage level and the Feed level.

Timeline level

The Timeline level consists of a timeline containing a number of content layers. On the timeline, you can create multiple layers of video or generative content and position it on the timeline. By adding keyframes you can control properties such as playback speed, brightness, colour, etc. Multiple layers can be combined onto one single output canvas by using a selection of blending modes. This environment is familiar to users experienced with commercial video editing software tools.

Disguise's key insight is to separate these three levels and to perform the mapping between them in real time. Changes to any level can be made independently of the others; a change in the screen layout or output formatting does not require a change of content.



Timeline Concept _



Timeline level sequencing video and generative content

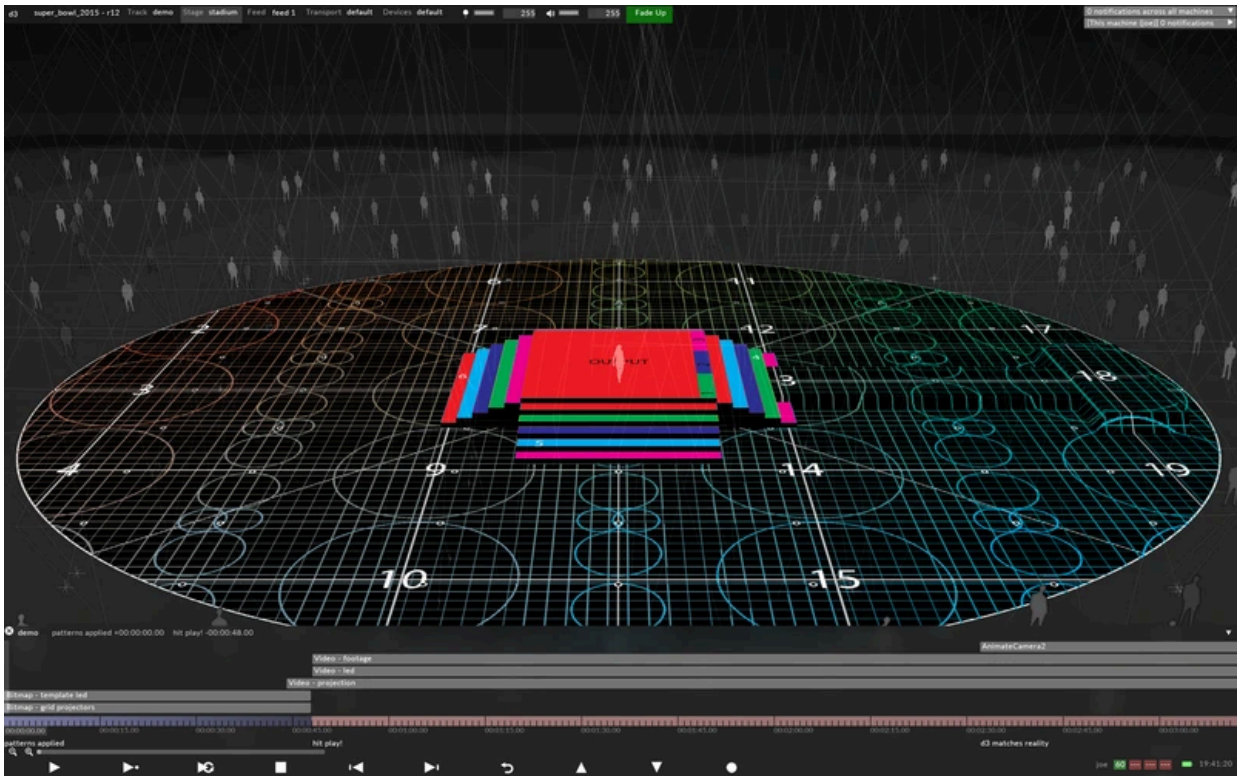
Stage level

The Stage level simulates your stage. It allows you to create any number of screens in all kinds of shapes. Each screen can be placed at any position, orientation, scale and set to any resolution (up to 8k in one direction) within the 3D scene. In addition, each screen has its own target canvas with an adjustable resolution. You can turn anything you want into a screen, even entire 3D buildings, and design your content with projectors, LED screens, or DMX lighting fixtures in mind.

The Stage can be created to precisely simulate the real stage that disguise will be connected to, with each and every pixel represented. Content generated by the layers in the Timeline is mapped onto the target canvases of the screens, allowing you to visualise the content in 3D from any point of view.



Stage level concept

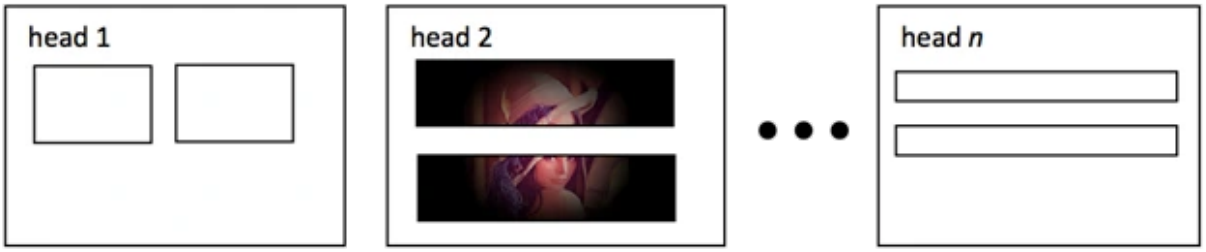


Stage level visualising and simulating the set of the Superbowl.

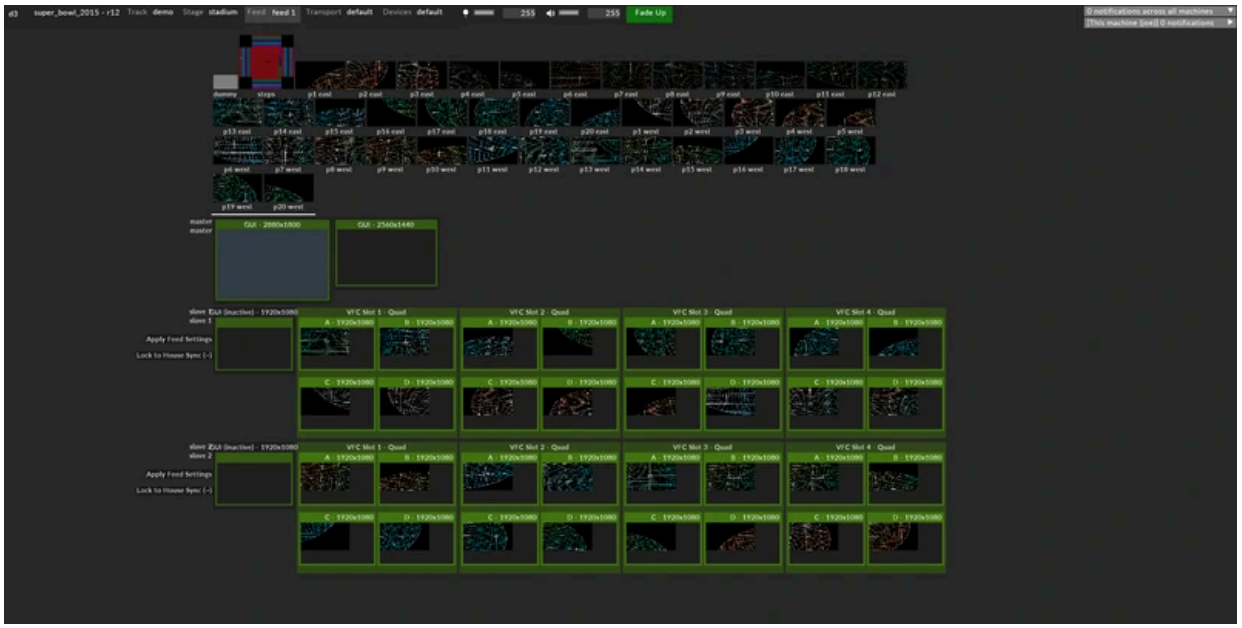
Feed level

The lowest level, the Feed level, comes into play when you connect d3 to the real world: the LED screens, projectors, plasma displays, or DMX lights on your stage. It allows for the 2D

output screen content to be formatted according to the requirements of the receiving LED processor, projector, or lighting system.



Feed level concept



Feed level formatting the screen content to a projector system for the Superbowl.

Real-time mapping

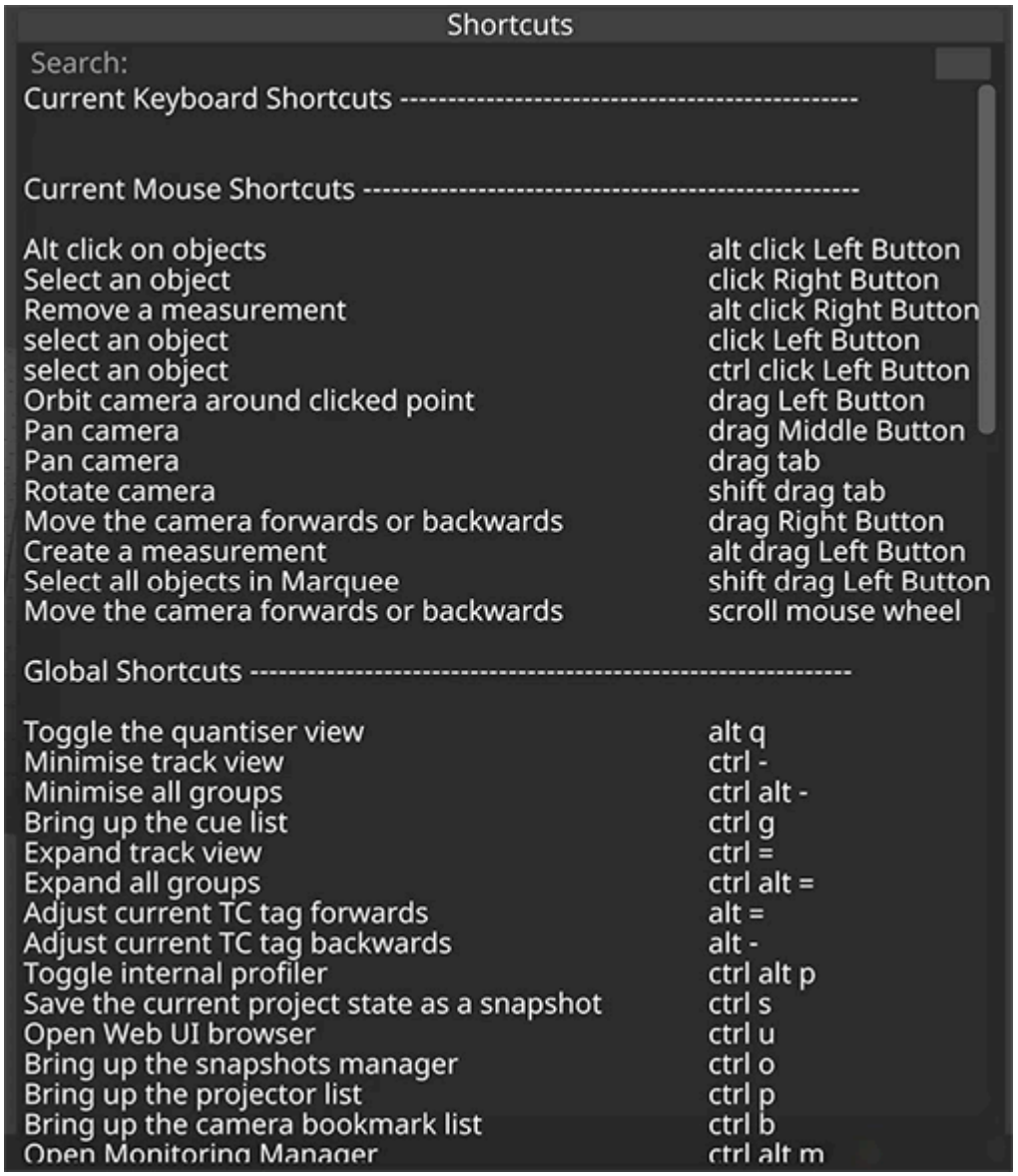
Disguise's key insight is to separate the Timeline level, Stage level and Feed level and perform the mapping between them in real time. Changes to any level can be made independently of the others; a change in the screen layout or output formatting does not require a change of content.

Designer Keyboard Shortcuts

Many of the functions within Designer are mapped to keyboard shortcuts.

To display a full list of keyboard shortcuts:

- Press F1. Use the Search field at the top to quickly find the shortcut needed.



Shortcuts window within the Stage level accessed by pressing F1

- Press F1 to close the shortcuts window.

Please note: The F1 window is context sensitive and will change depending on the currently active level. For example, the Feed level will display a different list than the Stage level.

> **Note**
>
> This is not a definitive list, but is generated to the local machine so may have local and language variants

Pressing F1 will also enable Designer to display explanations of object properties. For more information on this feature scroll down to the section 'Object property explanations in the Editing objects sub-chapter.

Shortcuts

General

Action	Shortcut
Quit	ESCAPE ENTER
Save	ALT W
Console*	ALT C
Debug Console*	ALT D
Profiler*	CTRL ALT P
Hold/Unhold	ALT P
Sticky Window (pin)**	CTRL + Left-click X on Header
Close Last Window	ESCAPE
Close All Windows (Except pinned)	SHIFT + ESCAPE
Screenshot***	ALT + X
Lock	CTRL ALT L
Unlock	Type (lowercase)- hydrogen
Copy	CTRL C
Cut	CTRL X
Paste	CTRL V
Help Menu	F1
Show Options	Right-click
Force GUI	ALT G

Action	Shortcut
Preview Output Feeds 1:1	ALT F
Undo Last Action	CTRL Z
Redo Last Action	CTRL Y
Fade up/Fade down	BACKSPACE
Measurement Tool	ALT + Drag from vertices of meshes and objects
Undo Measurement Tool	ALT + Right-click on the numeric text of the measurement
Save Snapshot	CTRL S
Toggle Focussed Button	CTRL Enter

`*` See the Diagnostics chapter for more information.
`**` Scroll down to the section 'Making windows sticky in the Objects/object editor overview sub-chapter for more information.
`***` See the Making screenshots sub-chapter for more information.

Editors

Action	Shortcut
Change field value	Scroll or Keypad Up/Down
Change field value by small amount	CTRL + Scroll or Keyboard Up/Down
Change field value by large amount	SHIFT + Scroll or Keyboard Up/Down
Submit entered text	Enter
Select all text	Double Left-click or CTRL A
Toggle Alpha background	Left-click on Preview Thumbnail in a layer
Add Keyframe node	Left-click
Remove Keyframe node	Right-click
Remove Selected Keyframes	Delete
Select all Keyframes	CTRL A
Select Keyframes	SHIFT + Left-click & Drag
Edit Selected Keyframes	Right-click

Action	Shortcut
Jump to Next Keyframe	]
Jump to Previous Keyframe	[
Adjust the previous and following keyframes at the same time (works when scrolling in the parameter field, not directly in the keyframe editor)	CTRL + SHIFT
Zoom In and Out	ALT + Mouse Scroll
Change to Next Sequence in Field Editor	Keypad Up/Down
Open Multiple Keyframe Editors	CTRL Left-click Parameter

Stage view

Action	Shortcut
Tab Pan	Hold tab, move mouse
Shift tab orbit	Hold shift + tab, move mouse
Rotate around an object	Left-click and drag
Pan Middle	Click or Hold Tab
Zoom In	Q (or Scroll Middle Mouse Button In)
Zoom Out	A (or Scroll Middle Mouse Button Out)
Go to Camera Bookmark	F2 through F12
Store Camera Bookmark	ALT + F2 through F11
Select Object	Left-click
Edit Object	Right-click
Zoom to Object	Left-click object and press F
Enable Manipulators	CTRL + M
Toggle world/object space	G
Manipulators Offset mode	E
Manipulators Rotate mode	R

Action	Shortcut
Manipulators Scale mode	T

Timeline

Action	Shortcut
Play	Enter
Play to end of section	Spacebar
Play and loop	Right Shift
Jump to next section	>
Jump to previous section	<
Jump forward one frame	’
Jump back one frame	;
Next bar (or time amount)	Keypad Right
Previous bar (or time amount)	Keypad Left
Jump to selected bar	Enter
Split Section	ALT S
Merge Section	ALT M
Add Note	CTRL N
Add Timecode Tag	CTRL 1
Add DMX Tag	CTRL 2
Add MIDI Tag	CTRL 3
Add Tag of Last-Added Type	CTRL T
Open Quantiser	ALT Q
Create Layer	CTRL L
Copy/Paste Layer	CTRL C / CTRL V
Split Layer	CTRL K
Isolate Layer	Hold I and click Layer
Rename Layer	CTRL R
Mute Layer	Hold M and click Layer

Action	Shortcut
Disable Layer	Hold D and click Layer
Delete layer	Delete
Duplicate Layer	CTRL D
Duplicate & Rename Layers	CTRL SHIFT D
Select Layers	Hold shift and Left-click & drag selection box
Open/Close Groups	G (toggle to open/close)
Select bars	Hold shift and Left-click & drag selection box
Jump to start of selected layer	i
Jump to end of selected layer	o
Assorted layer clipping/moving	with [ ] < >
Insert track	ALT + T
Minimise/Maximise track	CTRL -CTRL +
Open Layer Library	CTRL SHIFT L
Scroll to look ahead in Timeline while track is playing	HOLD SHIFT while adjusting SCROLL wheel on mouse

Playhead

Action	Shortcut
Extend/Trim the start of the selected layers to the playhead position	CTRL + [
Extend/Trim the End of the selected layers to the playhead position	CTRL +]
Move the start of the selected layers to the playhead position while maintaining the length of the layers	CTRL + ALT + [
Move the end of the selected layers to the playhead position while maintaining the length of the layers	CTRL + ALT +]

Quantiser

Action	Shortcut
Jump to next marker	]
Jump to previous marker	[

Action	Shortcut
Set beat to be first in bar	Shift and Left-click

Feed view

Action	Shortcut
Isolate Selected Feed Rectangle	Hold I and Left-click
Delete Selected Feed Rectangle(s)	Delete
Frame Selection in Viewport	F
Frame all in Viewport	A
Nudge Selection	Keypad Left/Right/Up/Down
Select all Feed Rectangles	CTRL A
Copy Feed Rectangles	CTRL C
Paste Feed Rectangles	CTRL V
Duplicate Feed Rectangle	CTRL D
Cycle between Feed Outputs	TAB
Lock Selected Rectangles	CTRL W

d3Net - Director/Actor

Action	Shortcut
Refresh Actors	ALT R
Restart Actors	CTRL ALT R
Start all Actors	CTRL ALT S
Quit all Machines	CTRL ALT Q
Quit all Machines without Prompt	SHIFT ESC ENTER
Force Quit all Machines	CTRL ALT X

Designer Licensing Comparison

The table below summarises Designer licensing limitations based on combinations of Starter or Full release types, and Pro, X1 or server licenses.

Capability	Designer Starter on Non-Disguise Hardware	Designer Full (Pro) on Non-Disguise Hardware	Designer Full (X1) on Non-Disguise Hardware	Designer Starter on a Disguise Media Server	Designer Full on Disguise Media Server
Can be a Director[1]	✗	✗	✓[2]	✓	✓
Can be an Actor[1]	✗	✗	✗	✓	✓
Can be an Understudy[1]	✗	✗	✓[2]	✓	✓
Can be an Editor[1]	✓	✓	✓	✓	✓
Feed outputs are not watermarked	✗	✗	✓	✗	✓
DMX outputs are not watermarked	✗	✗	✓	✗	✓
Feed movies are not watermarked	✗	✗	✓	✗	✓
Stage movies are not watermarked	✗	✓	✓	✗	✓
Feed movies max resolution	2K (2160×2160)	4K DCI (4096×2160)	4K DCI (4096×2160)	2K (2160×2160)	4K DCI (4096×2160)
Stage movies max resolution	2K (2160×2160)	4K DCI (4096×2160)	4K DCI (4096×2160)	2K (2160×2160)	4K DCI (4096×2160)

Designer Pro

Designer Pro brings a host of powerful new features. It offers the complete functionality of the software, enabling seamless programming and real-time editing of live projects. Users can collaborate within a session alongside Disguise servers or other Pro license instances, unlocking improved creative control and efficiency. Activation of the Designer Pro license is required.

Features

Functionality

- Fully featured Designer software.
- Programme and pre-visualize projects beyond the Starter ecosystem.
- Real-time project editing with other Disguise servers and Designer Pro instances.
- Access to the new Plugin Framework and AI Workflow Assistant.
- Support for uncompressed RenderStream without watermarks (requires RenderStream license and compatible hardware).

Activation and Installer

- Installed via the standard Full Designer installer used on Disguise media servers.
- CodeMeter-based license, can be installed on a dongle or as a software license.
- No d3Manager Cloud login is required.
- An internet connection is required only for initial license activation. Subscriptions require periodic online verification to automatically download monthly/annual license updates.
- Designer Pro subscription for yourself or your team can be managed in Disguise Cloud.

Watermarks and Restrictions

- You can open any Designer project file except one authored in Disguise Starter.
- Designer projects created and saved in Designer Pro can be used with Pro or Starter. However, once opened in Starter, Designer projects created or saved in Starter cannot be used by Designer Pro.
- If you click on an object in Designer and export it from Designer Starter, it is not possible to import it into Designer Pro.
- Designer Pro project files are saved as .d3, whereas Designer Starter project files are saved as `.d3starter`.
- Feed outputs include an intermittent blue flash watermark.

- Feed and Stage movies are watermarked with a semi-transparent Disguise logo with a size of approximately one-tenth of the movie's vertical resolution in the bottom right corner.
- Feed and Stage movies have a maximum resolution of 4096×2160 pixels (4K UHD).
- Designer Pro and Designer Starter cannot join the same session or recognise each other on a network.

Learn more about license activation here, and Designer Starter here.

The Designer website has a comparison chart here, and Designer Licensing FAQs here.

Designer Pro License Transfer

A Disguise license is stored in a CodeMeter Container (CmContainer), which can reside either on your computer or a USB dongle. In some cases, you may need to transfer a Disguise license to another container, for example, when moving a **Designer Pro** license from one laptop to another.

To do this, you must first **deactivate** the license on the current CmContainer then **re-host** it on the WebDepot and then **reactivate** it on the new CmContainer. The following steps will guide you through this process.

> **Note**
>
> The following licenses are not eligible for transfer:
>
> - Disguise hardware licenses
> - Disguise X range licenses
> - RenderStream licenses
>
> Designer Starter licensing is built into the installer and no activation or transfer is necessary.

Re-host an existing license

On the computer that has the relevant license activated (either on a physical USB dongle or a software CmAct container) follow the steps below to re-host the existing license. This will move the license back to the WebDepot, where you can activate it later on another container.

Requirements

To re-host a license you will need:

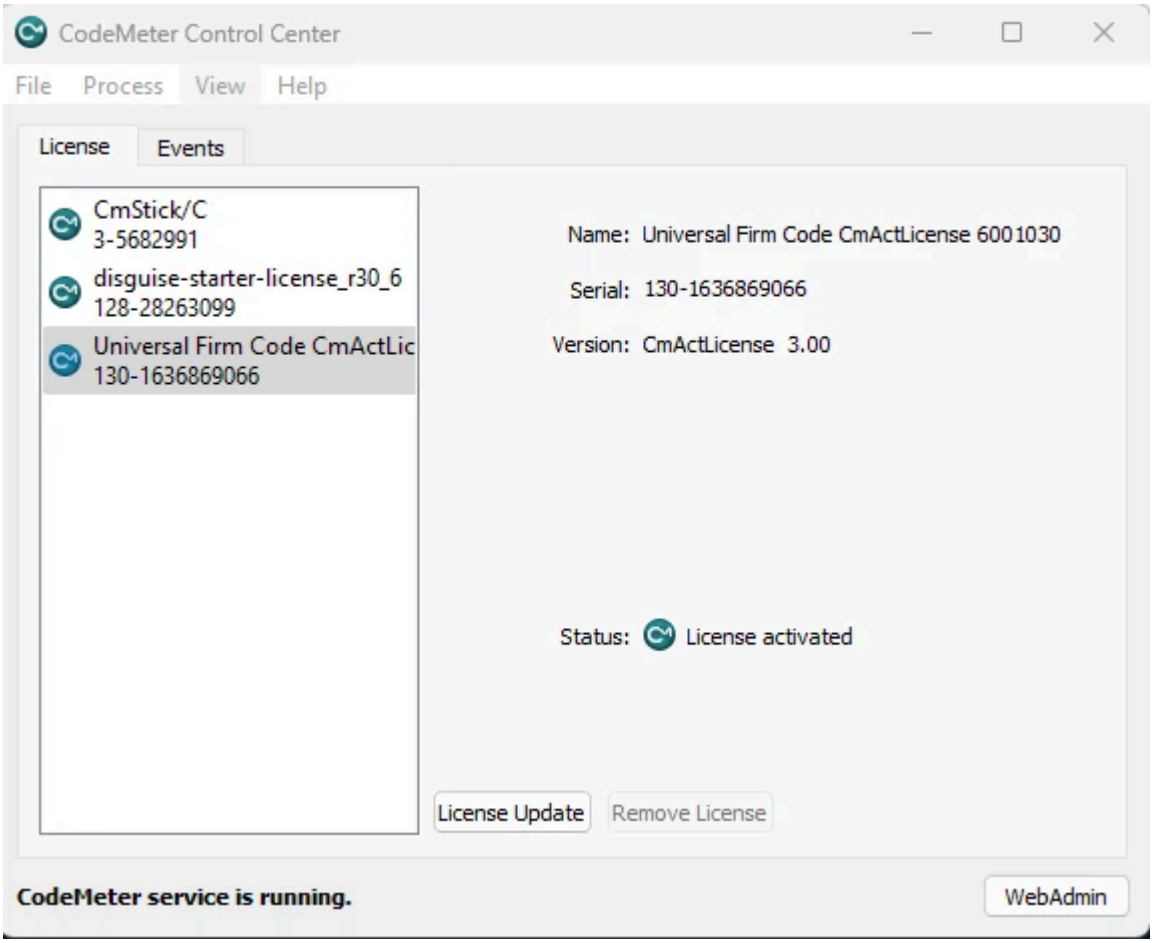
- Access to the computer or CodeMeter container which holds the license.
- The **License Ticket ID** for the license you want to transfer.

Find the Ticket ID for the license

A **License Ticket ID** uniquely identifies a license (e.g. for a Designer Pro subscription). It consists of 5 groups of 5 alpha-numeric characters each, e.g.:
`1ABCD-2EFGH-3IJKL-4MNOP-5QRST`

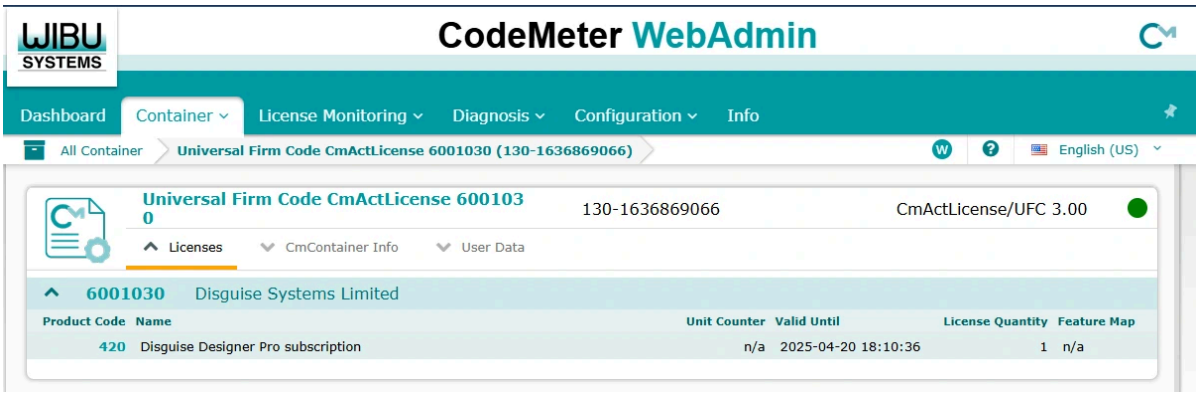
Follow these steps to find your **License Ticket ID**:

1. Using the computer that has the license you want to transfer, Open **CodeMeter Control Center** via the Windows Start menu. This was installed automatically when you installed Designer.
2. Select the CmContainer in the left panel that contains the license you want to transfer.



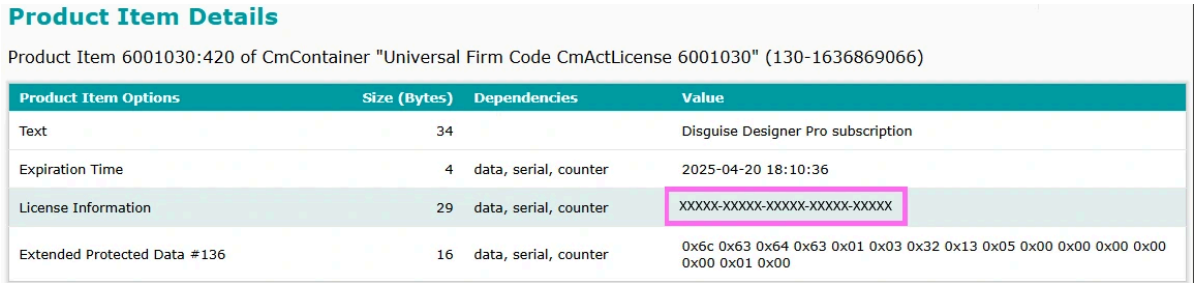
CodeMeter Control Center

3. Open **WebAdmin** by clicking the button in the bottom right in CodeMeter Control Center. This will open in your web browser.
4. Click on the Product Code of the license you want to transfer, e.g. “420” for Designer Pro.



CodeMeter WebAdmin

5. The **License Ticket ID** can be found in the **License Information** row and **Value** column. Copy this to a safe place, you will use it later.



Product Item Details

Product Item 6001030:420 of CmContainer "Universal Firm Code CmActLicense 6001030" (130-1636869066)

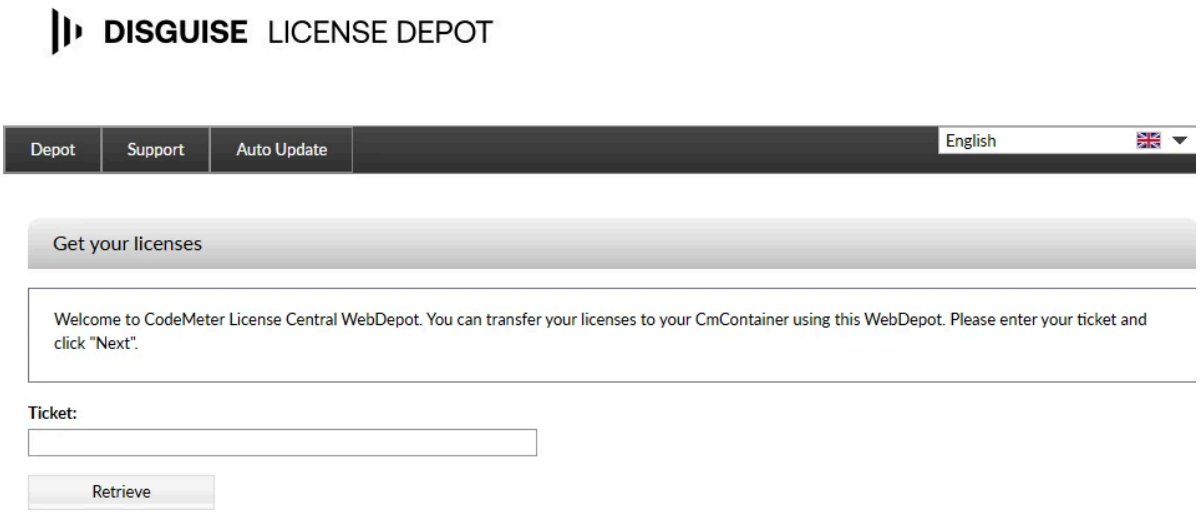
Product Item Options	Size (Bytes)	Dependencies	Value
Text	34		Disguise Designer Pro subscription
Expiration Time	4	data, serial, counter	2025-04-20 18:10:36
License Information	29	data, serial, counter	XXXXX-XXXXX-XXXXX-XXXXX-XXXXX
Extended Protected Data #136	16	data, serial, counter	0x6c 0x63 0x64 0x63 0x01 0x03 0x32 0x13 0x05 0x00 0x00 0x00 0x00 0x00 0x00 0x01 0x00

License Ticket ID highlighted in pink

Deactivate and Re-host the license back to the WebDepot

Follow these steps to deactivate and re-host your license:

1. On the machine that has access to the CodeMeter container with the relevant license, navigate to the Disguise CodeMeter License Central Web Depot.



Disguise CodeMeter License Central Web Depot

2. Enter the **License Ticket ID** that you got from the previous section in to the **Ticket** field and select **Retrieve**.
3. Ensure your ticket details are listed, then click **Re-Host Licenses**.
4. Select the licenses you want to re-host and click **Deactivate Selected Licenses Now**.
   Please note that some licenses may not be eligible for re-hosting.
   This will only work if the container with the license is on the current machine.
5. Wait a few seconds for the WebDepot communication to complete.
6. Once the process has completed you will see a **License transfer completed successfully!** message. Click **OK** to continue.

Reactivate the license from the WebDepot

After re-hosting a license you can leave it deactivated on the WebDepot until you are ready to activate it again on another machine or CodeMeter dongle. The clock will continue to count down whether the license is activated or not.

To activate your license follow the steps on the Designer Licenses and Activation Process page.

Finding your License Ticket ID without a CmContainer

If you don't have access to the CodeMeter container with the license, then you can find your **License Ticket ID** in one of these alternative ways:

- In the original email when the license was first issued.
- In your Disguise Cloud Dashboard

How to find License Ticket IDs in Disguise Cloud

To view the **License Ticket ID** in your Disguise Cloud Dashboard follow these instructions:

1. Login to Disguise Cloud.
2. Click on your organisation in the top-right, and select **Subscriptions** from the menu.
3. Under **Active Subscriptions** find the tile for the product you want and click **View**.
4. Next to each License you can find the **License Ticket ID** by selecting the eye icon on the right.

Designer Starter

Designer Starter is a free version ideal for learning and exploring the features of Designer. It can be easily downloaded and installed through Disguise Cloud using a dedicated Starter installer. Starter users must log in to Disguise Cloud in d3Manager for authentication before launching Designer. There is no need to activate a license because it is already included in the installer.

Features

Functionality

- Feature-rich Designer software including all current functionality such as APIs, RenderStream, and access to the new Plugin Framework.
- Programme and pre-visualise projects in the Starter ecosystem.
- Real-time project editing with other Designer Starter instances.
- Support for uncompressed RenderStream without watermarks (requires RenderStream license and compatible hardware).

Activation and Installer

- Users must log in to d3Manager with their Cloud account to activate the license. While d3Manager remains functional without logging in, you will be unable to open a project without a Disguise Cloud account login.
- The dedicated Designer Starter installer already includes the license required to run Starter. There is no individual Designer Starter license, and Starter does not interact with Designer Pro licenses.
- Designer Starter runs regardless of whether or not a Pro license is present on the server.

Watermarks and Restrictions

- Designer Starter supports the new Plugin Framework, but does not include the Ask AId3n AI Workflow Assistant.
- Designer projects created or saved with Designer Starter cannot be opened with the Pro license. However, Designer Pro projects can be opened with Designer Starter, but can only be saved as Designer Starter projects.
- Designer Starter files are saved as .d3starter, rather than .d3. Designer Pro project files continue to use .d3.
- Feed outputs have an intermittent blue flash watermark.

- Feed movies and Stage movies are watermarked with a semi-transparent Disguise logo with a size of approximately one-tenth of the movie's vertical resolution in the bottom right corner.
- Feed and Stage movies have a maximum resolution of 2160×2160 pixels (2K UHD).
- If you click on an object in Designer and export it from Designer Starter, it is not possible to import it into Designer Pro.
- Supports watermarked RenderStream if Designer Starter is installed on the render nodes.
- A Designer Starter can only join a d3 session with other Starter Designer instances. Designer Pro machines will not be visible on the network.

Upgrading to Pro

To upgrade from the Designer Starter to Designer Pro, you will need to purchase a Designer Pro license and install the Full version of Designer. Once upgraded, you will have access to all the advanced features, including the Ask AId3n AI Workflow Assistant.

Please refer to our **Designer Starter v Pro comparison page on the Disguise website** for more information.

If you have any specific queries, please refer to the Designer Licensing FAQ page or contact our **support team**.

Training Courses

If your training course does not require a Disguise server, Designer Starter is the ideal choice, as it provides full access to Designer's core functionality without restrictions. Students should sign up for Disguise Cloud, install Designer Starter, and log in to d3Manager using their Disguise Cloud account.

For courses that do involve a Disguise server, you have two options:

1. Using Designer Starter: Install Designer Starter on the Disguise server and log in to d3Manager on the server with a Disguise Cloud account. Additional Starter instances can then join a d3 session with the server. Note that outputs will display an intermittent blue flash.
2. Using Designer Pro: If students require Designer Pro, please contact your account manager to discuss options for obtaining Pro licenses for the training course.

Learn more about Designer Pro here.

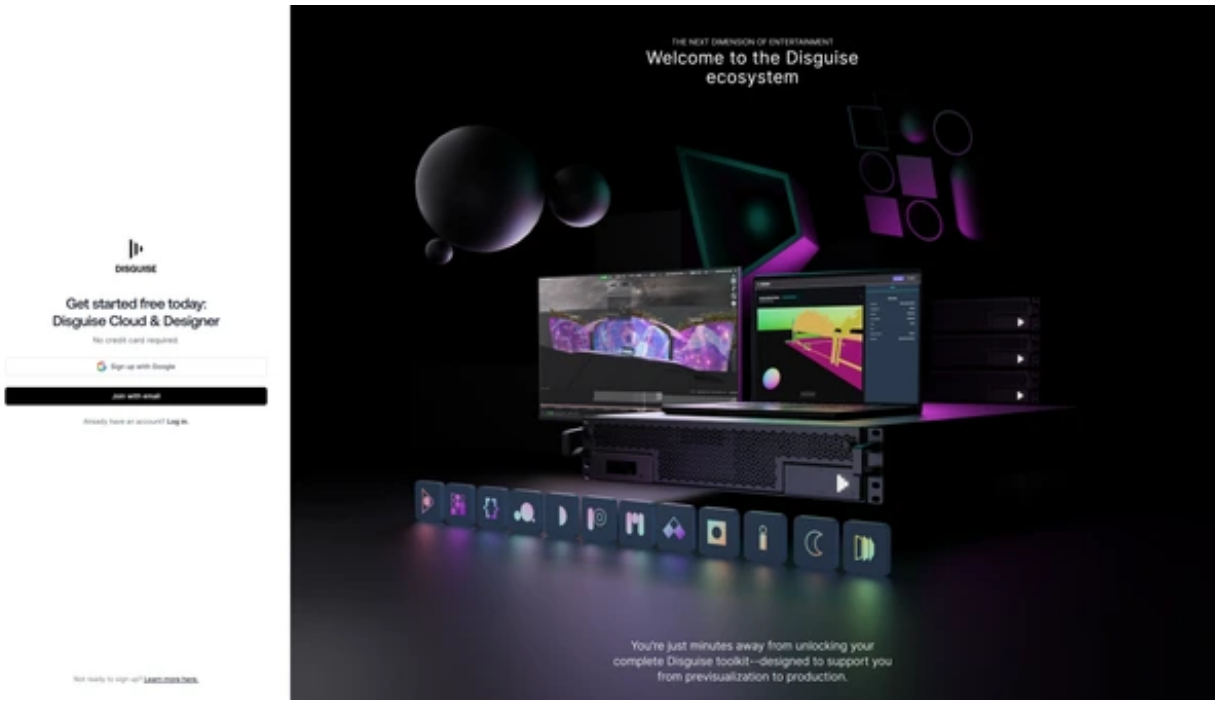
The Designer website has a comparison chart **here**, and Designer Licensing FAQs here.

Designer Pro Subscriptions

Subscribe to Designer Pro

To subscribe to Designer Pro, you need a Disguise Cloud account and an organisation to associate with the Designer Pro subscription.

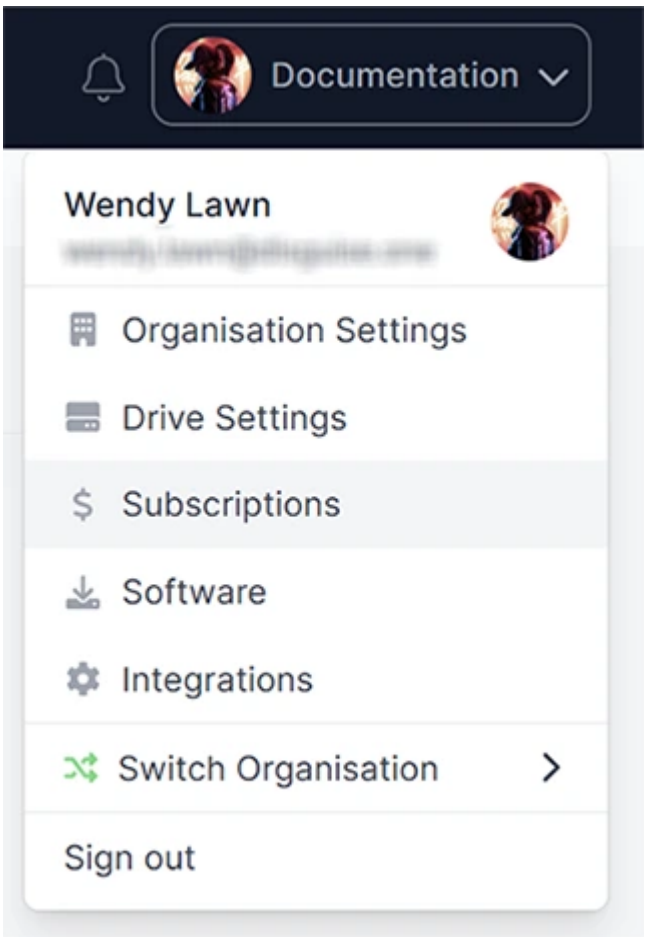
If you do not have a Disguise Cloud account, you can sign up for one here.



Sign up to Disguise cloud

1. Log in to Disguise Cloud.
2. In Cloud Dashboard, the name of the organisation that you are are currently using is displayed on the top-right corner profile menu. If this is not the organisation that you wish to purchase under you can switch organisation. To switch organisations, click on the organisation name and open the Profile menu. Then select **Switch Organisation**.

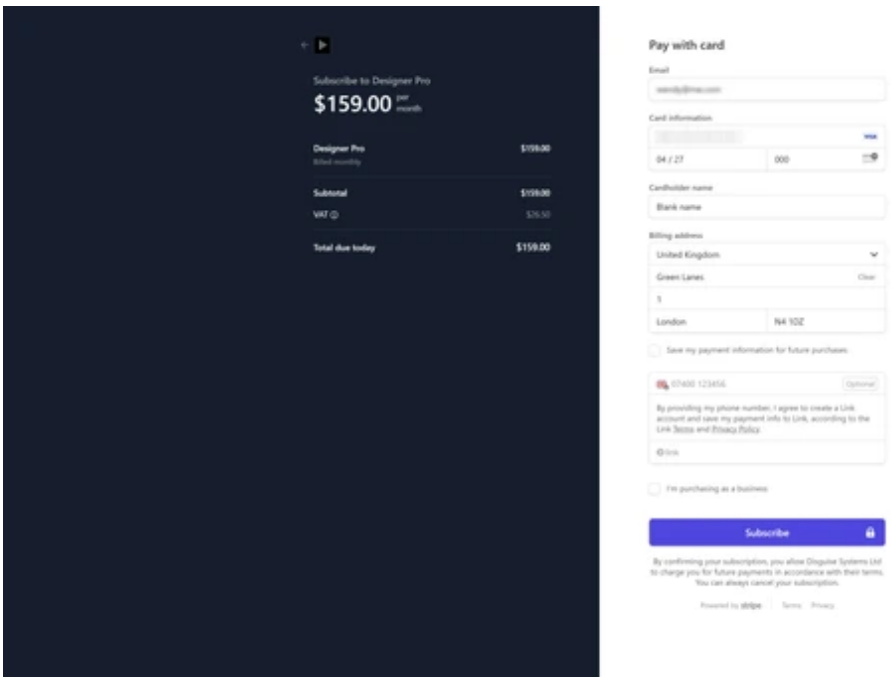
3. Click **Subscriptions** in the profile menu.



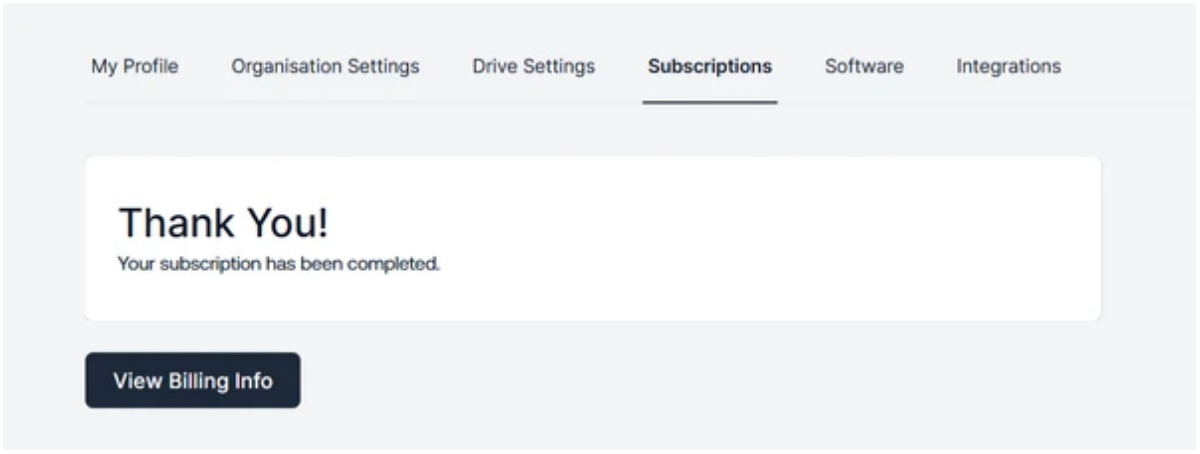
Profile menu

4. Navigate to the **Designer Pro** subscription listed under **Designer Software** and click **Subscribe**.
5. Select your license type (monthly or yearly) and the number of license you require and proceed to checkout.
6. If you have a coupon to redeem, paste the code into the **Add Promotion Code** field.

7. Enter your payment details and click **Subscribe**.



8. Once you receive the confirmation that the subscription has been completed, you can navigate to the **Software** tab to download Designer Pro's *Full installer*. You can also click **View Billing Info** to check the details.



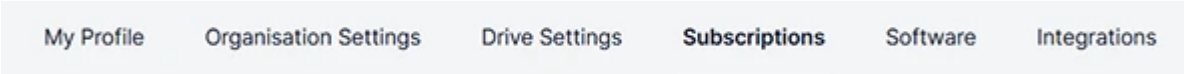
Alternatively, you can click **Subscribe to Pro**, in the Cloud Dashboard.

Select Monthly or Yearly, and the number of licenses you require. Then proceed to the checkout.

You will also receive an email confirmation of your Designer Pro subscription.

View your active subscriptions

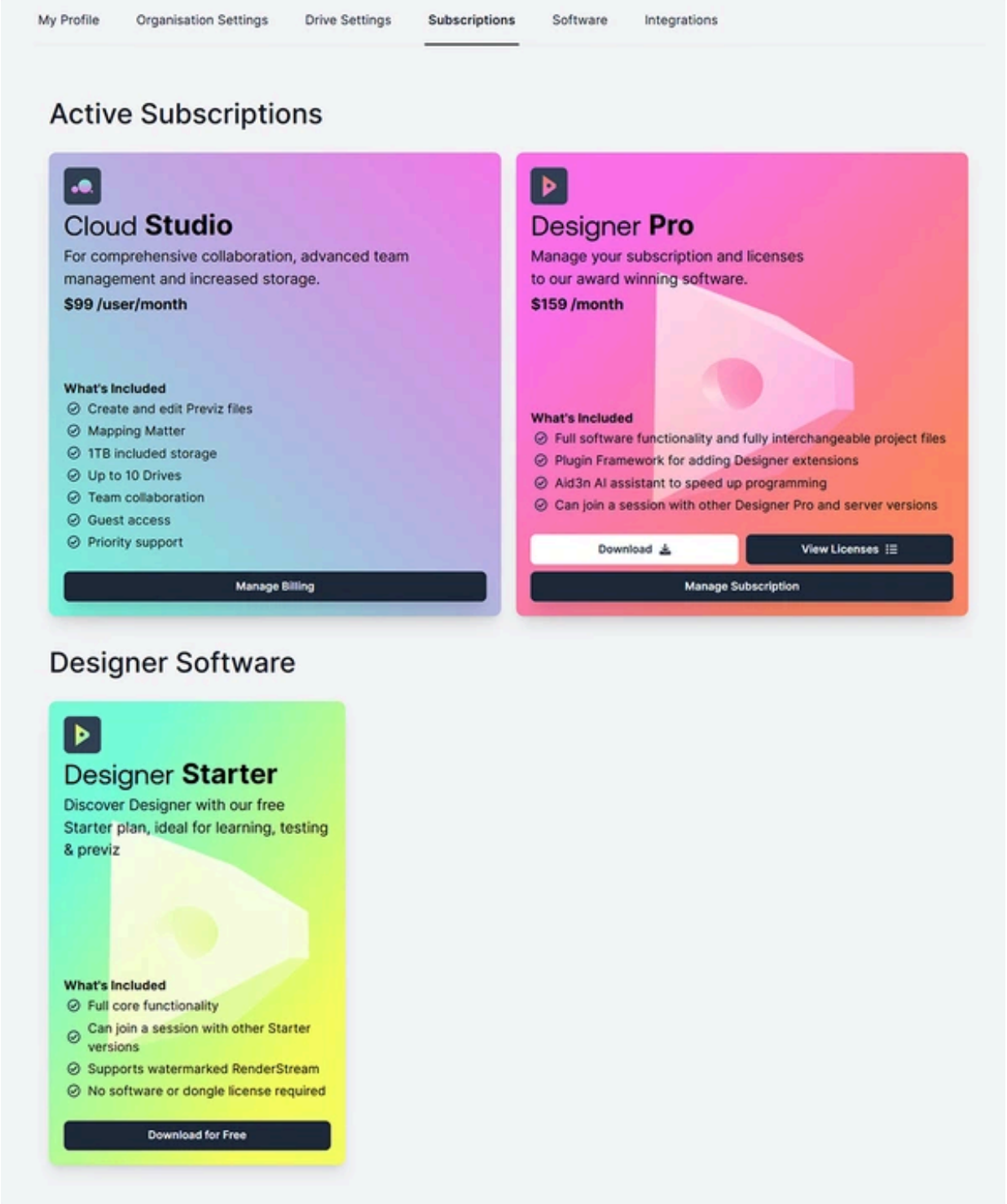
Ensure that you are managing the correct organisation, then click the **Subscriptions** tab.



Subscriptions tab

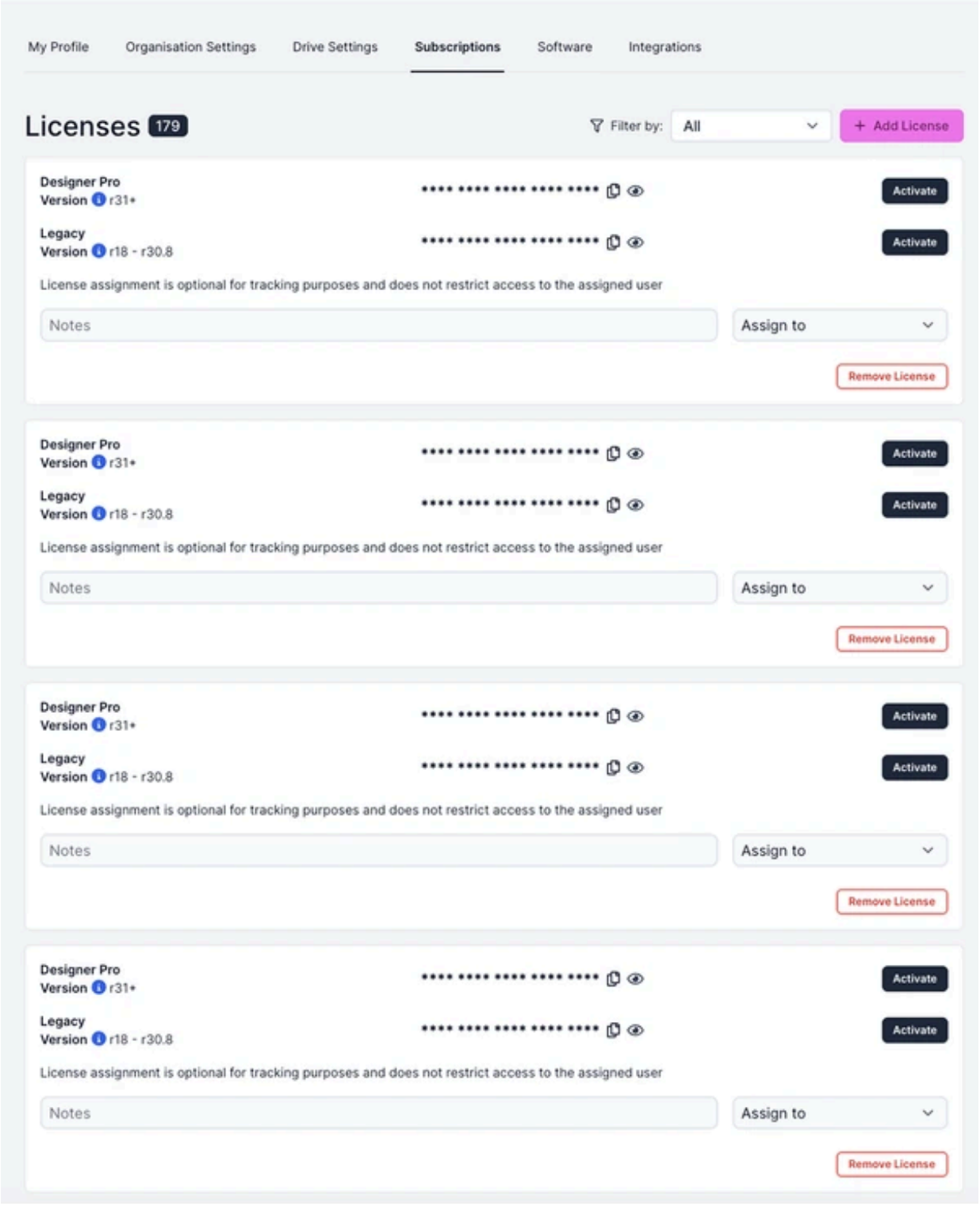
Manage licenses

From the Subscriptions page, click **View Licenses** under Designer Pro.



On the licenses page you will have the following options:

- **Activate** – begins the license activation process in CodeMeter.
- **Add license** – allows you to add another license to your subscription.
- **Assign to** – assign a license to yourself or a team member, and optionally reassign it later.
- **Remove license** – removes the license from CodeMeter immediately and adjusts your billing accordingly.

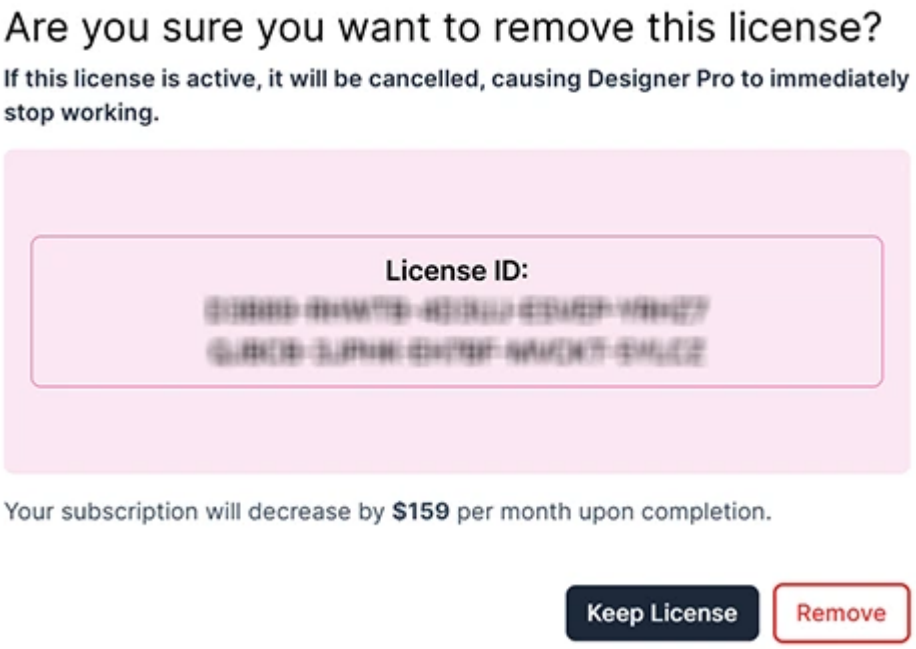


Licenses page

Designer Pro and Legacy licenses are both listed on the License page. To read more about legacy licenses, view this page.

Remove license

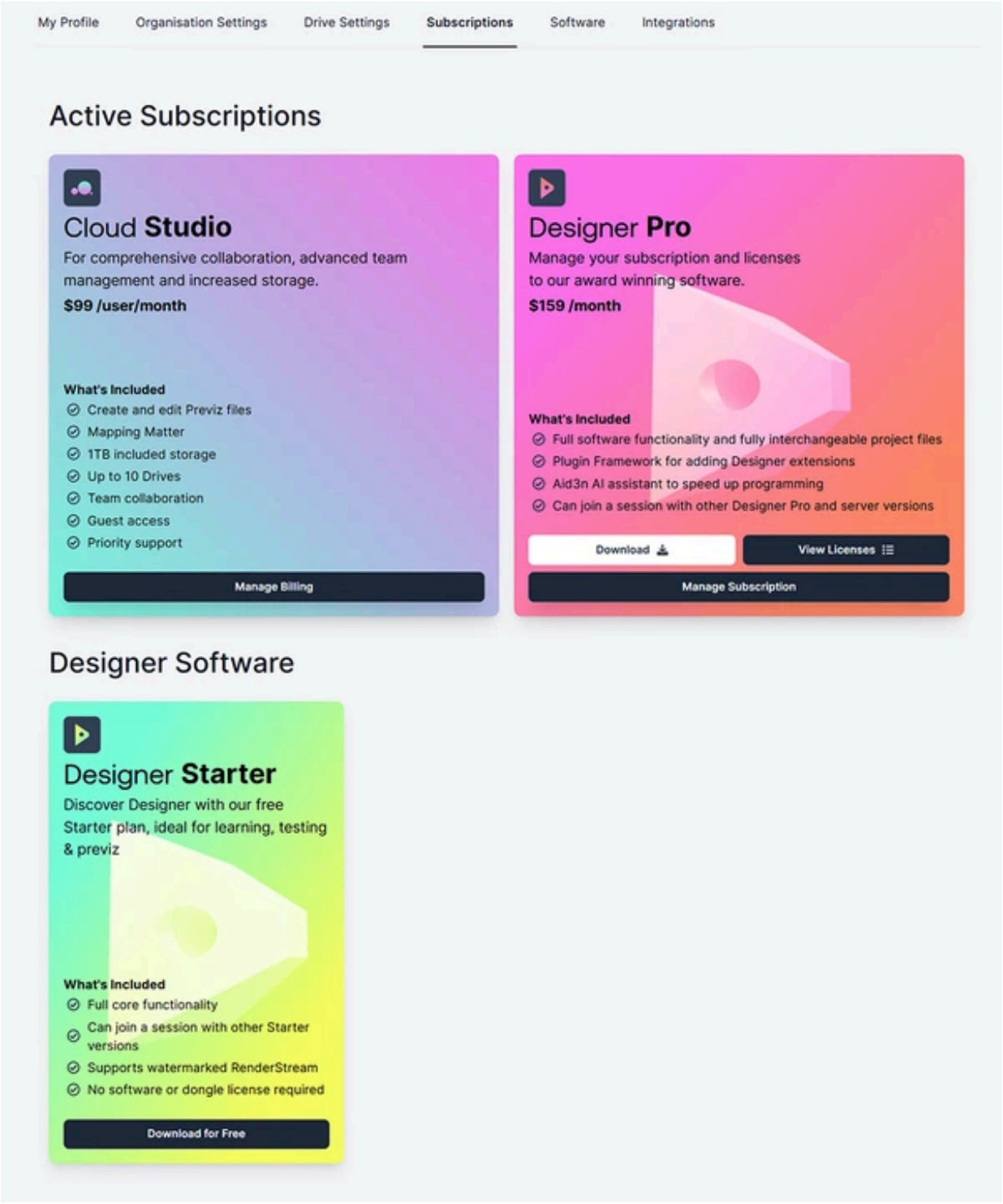
1. To remove a license, click **Remove License**.
2. Click **Remove** to confirm that you wish to remove the license, or click **Keep license** to return to the license page.



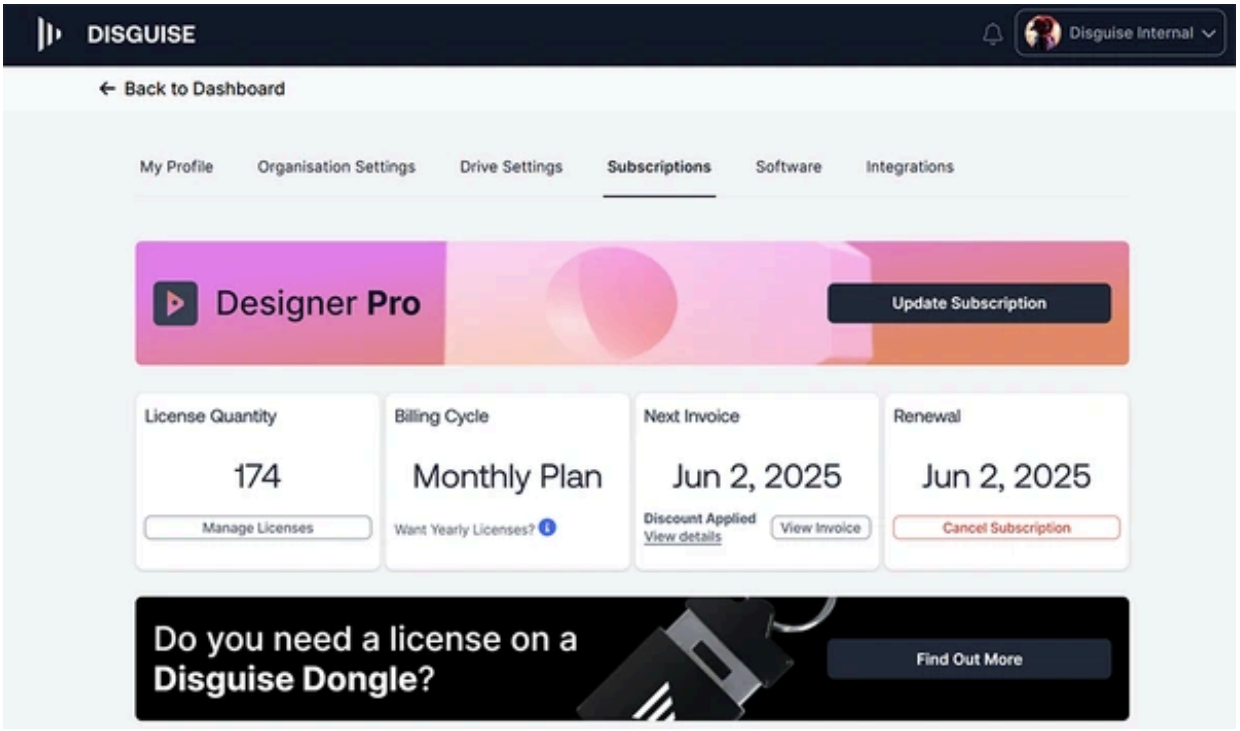
> **Note**
>
> When you remove a license, this immediately withdraws the license from CodeMeter. If you would prefer to cancel the subscription, you will have the option to resume the subscription until the end of the billing cycle. See the **Cancel subscription** section shown below.

Cancel subscription

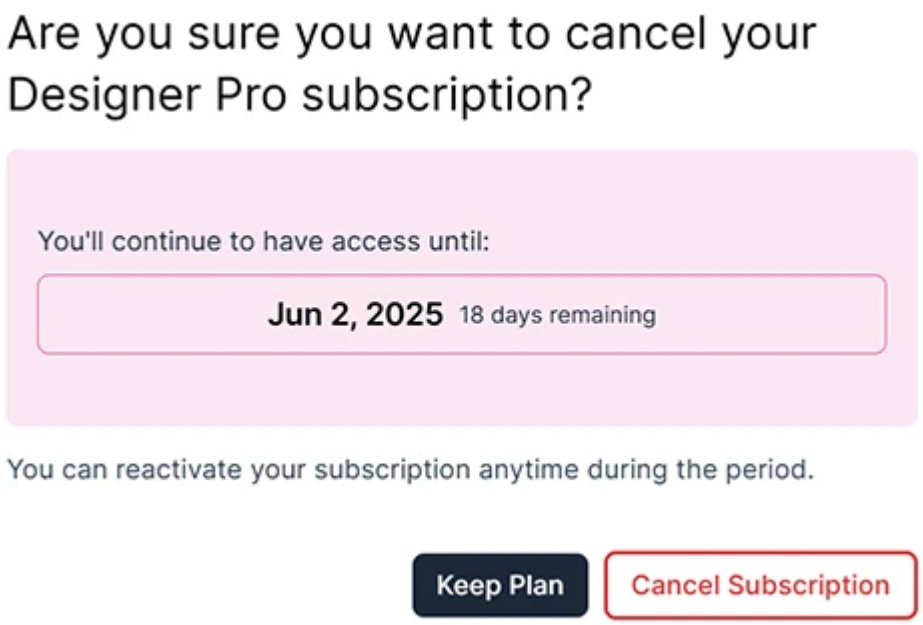
1. From the Subscriptions page, click **Manage Subscription** under Designer Pro.



2. Click **Cancel subscription**.



3. Click **Cancel subscription** again to confirm you wish to cancel, or click **Keep plan** if you want to keep your subscription.



> **Note**
>
> Cancelling a subscription allows the CodeMeter license to remain active until the end of the current billing cycle (monthly or yearly). During the grace period, you will have the option to resume the subscription. If you prefer to remove the license immediately from CodeMeter, please see the **Remove license** section above.

Order a Physical Dongle

The USB Dongle can be purchased through the **Disguise Store**.

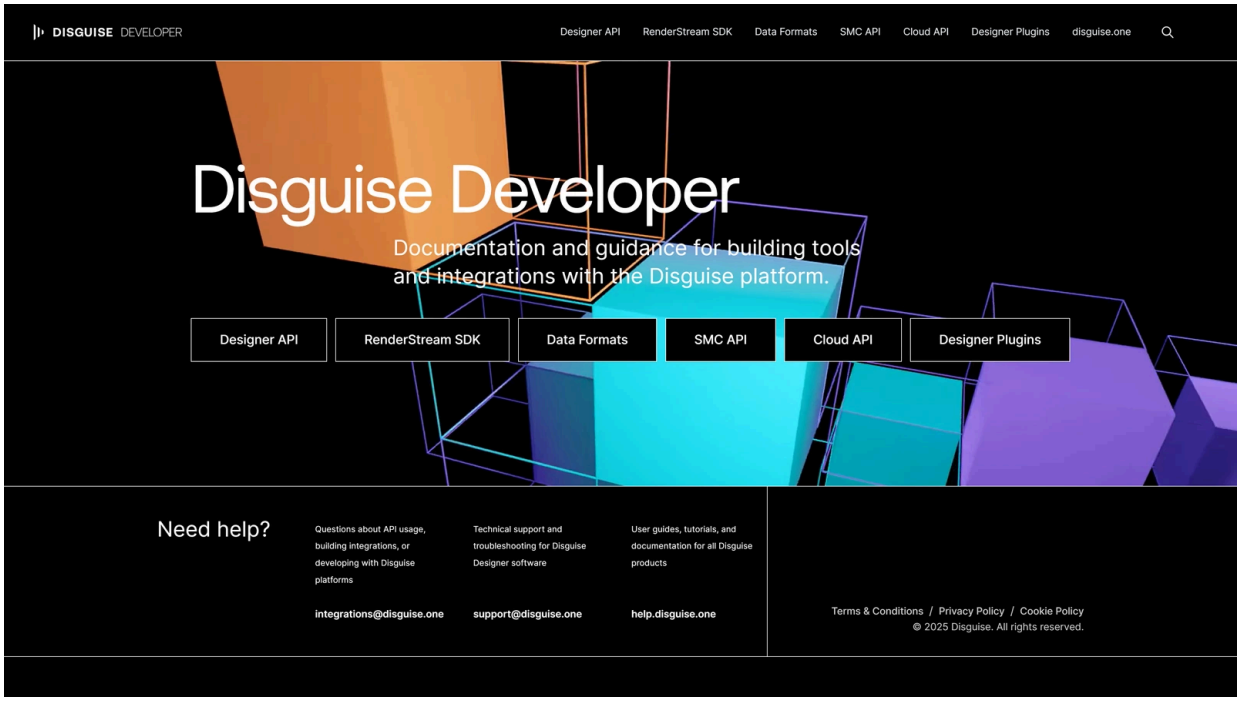


Disguise USB Dongle

Disguise Developer Portal

What is the Disguise Developer Portal?

Documentation and guidance for building tools and developing integrations for Disguise products.



You can find documentation for all of Disguise's Designer APIs at the developer portal, **developer.disguise.one**. The developer portal supports the control and monitoring of Disguise media servers and Designer software using a comprehensive HTTP API. An HTTP API is an API that uses Hypertext Transfer Protocol as the communication protocol between the two systems. HTTP APIs expose endpoints as API gateways for HTTP requests to have access to a server.

The Disguise approach to APIs

Workflow Centric

APIs and SDKs designed to compliment and integrate with Disguise workflows.

Developer Focused

The developer portal has been designed with the developer experience in mind.

Integration Support

We are happy to support integrations with our products. Contact us for integration support and partnerships.

d3manager OpenAPI Documentation

Documentation for our Disguise Designer APIs is also hosted within Designer.

To access API documentation from d3manager navigate to **Help > Open API Documentation**.

Note that this documentation uses the OpenAPI format which means that you can execute APIs from within the documentation.

Designer Download & Installation

There are two installers available for Designer: Starter and Full. The Starter installer is used for Designer Starter only. All other uses of Designer require the Full installer: media servers, Designer Pro and X1.

For details of Designer license types see here, or dive into the details of Designer Starter, Designer Pro and X1.

Designer Starter uses a `.d3Starter` project file format, whereas Full Designer uses the `.d3` project file format. Designer Starter can open `.d3` files, but only save `.d3Starter` files. The Designer Starter file format cannot be opened by Full Designer with any license type.

> **Note**
>
> Before updating the software make a manual backup copy of your .d3 project file (not the whole projects folder), which is located in the specific Projects folder. If there is a problem running the new release you will need to revert to the backed up .d3 file.

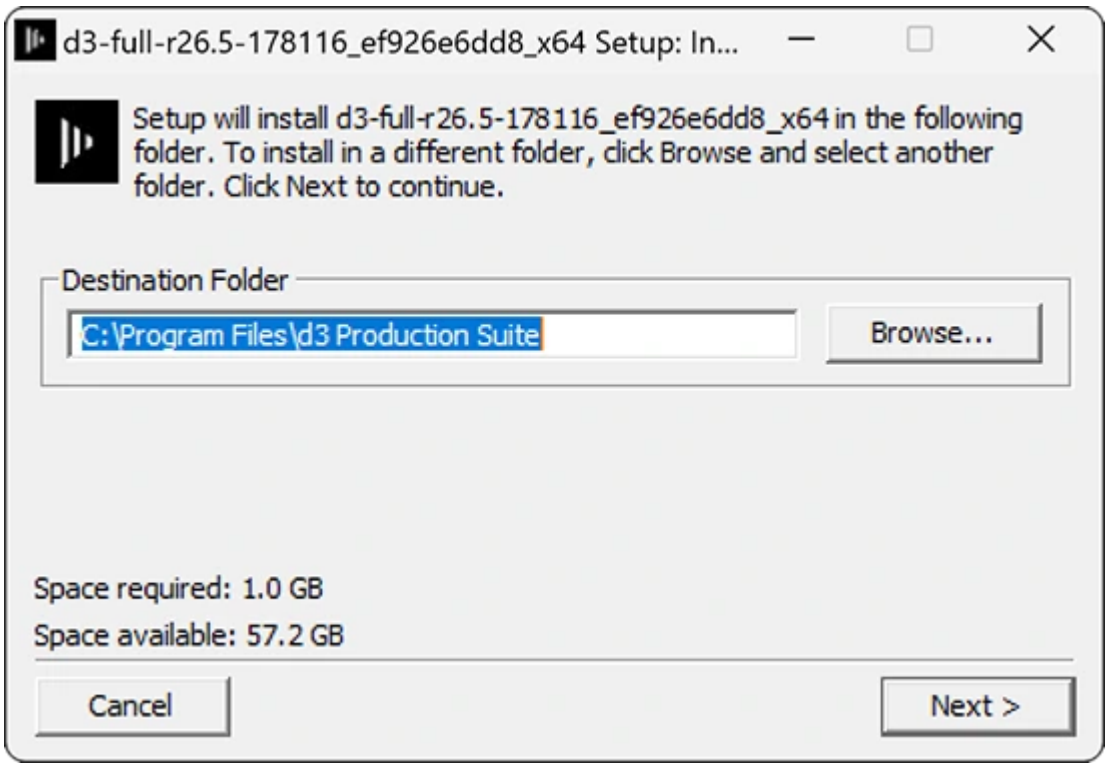
Downloading the installer

1. Ensure your PC is connected to the internet.
2. Download the latest Designer release installer from **Disguise Cloud**.
3. Run the downloaded installer.

Install location

On the first screen you will be prompted to select an installation directory for the program files.

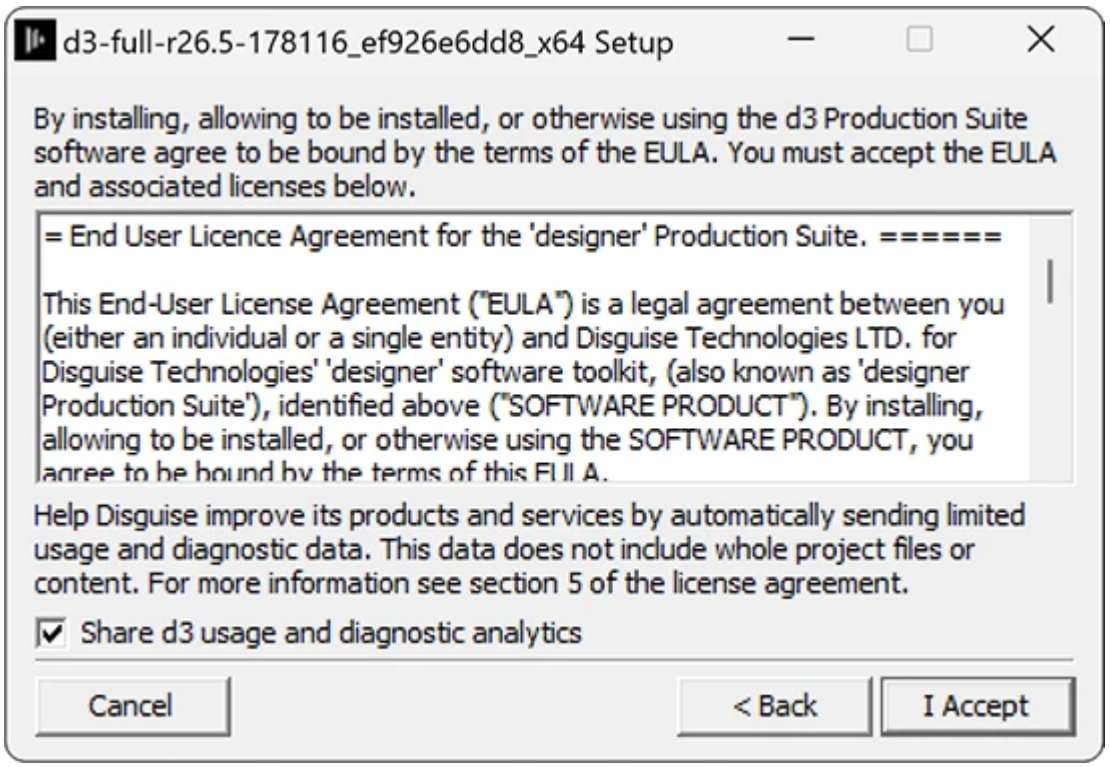
1. Select **Browse** to change your installation directory.
2. Select **OK** to return to the Designer installer window.
3. Select **Next** once you are happy with the installation directory. If you are upgrading an existing installation of Designer, the installer will detect and use your current installation directory.



Selecting an installation directory for the Disguise program file

End User License Agreement (EULA)

1. Read the EULA and all associated license information.
2. You may optionally choose to Share d3 usage and diagnostic analytics. This setting will persist through re-installs and remote installs of Designer.
3. Click **I Agree** to continue.



Accept the End User License Agreement for the Disguise Production Suite

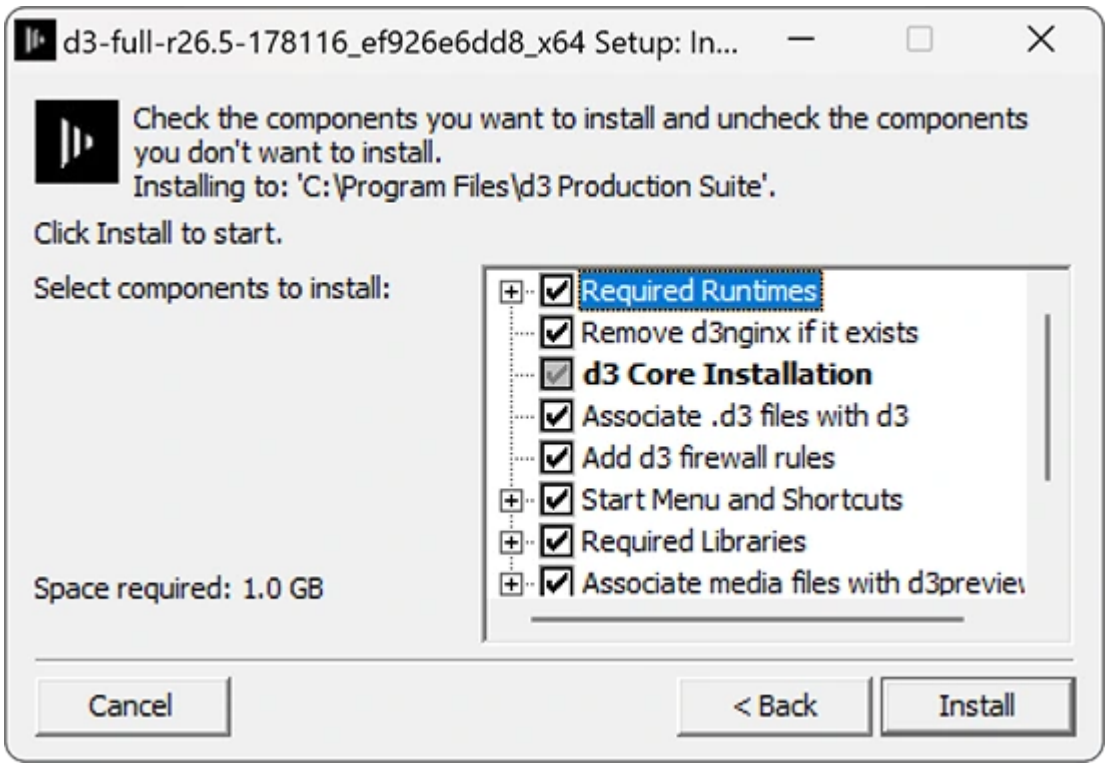
Component selection

Next, you will be prompted to select which components you wish to install. Designer installs several required runtime libraries and drivers, including:

- Microsoft Visual C++ Redistributable (x64)
- CodeMeter Runtime
- NewTek NDI® Runtime

If the installer detects that you already have a given supporting component installed (e.g. CodeMeter drivers), the installer may deselect that component to avoid unnecessary re-installation.

1. Select the boxes to tick or untick components.
2. Select **Next** once you are happy with the selected components.



Select the components to install

Leaving the **Share d3 projects folder** ticked will cause the installer to share the d3 projects folder. If it is unticked, no share settings will be modified. On a remote install, the installer will behave as the previous full installer did, i.e. if the check box was checked last time the installer was run, the remote installer will act as if its checked and vice versa. In the situation that a full installer has never been run, a remote installer will act as if the box has been checked.

Installation

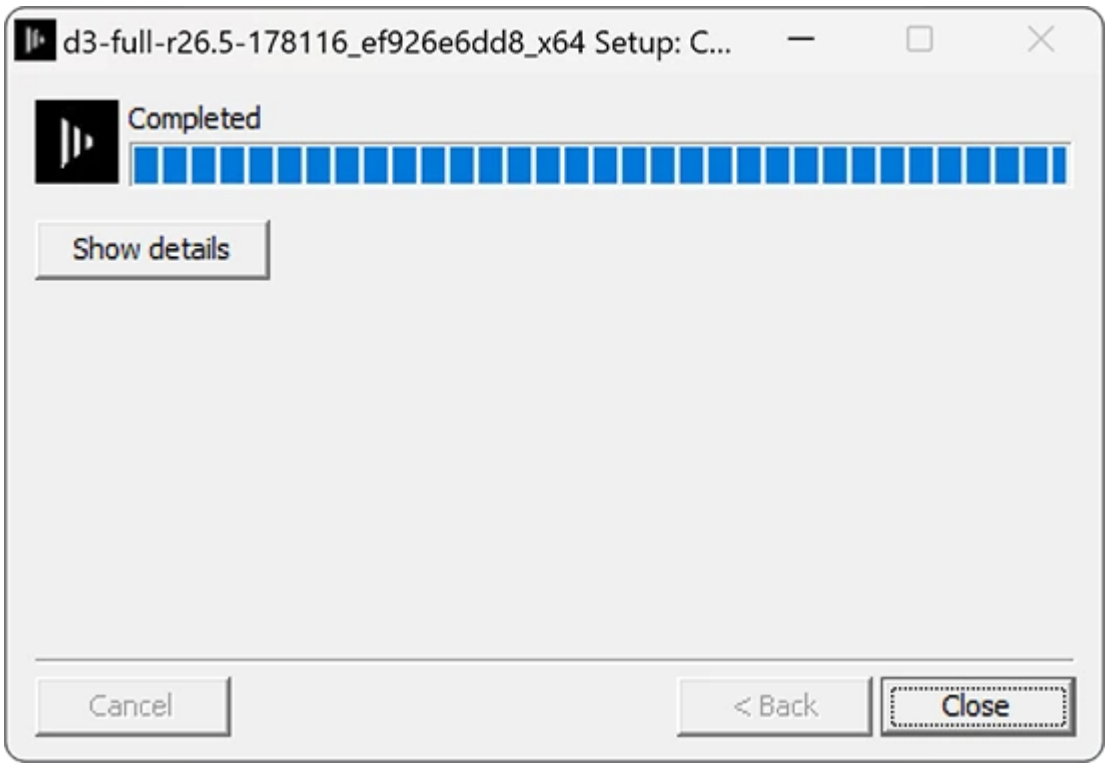
The Designer files will now install into their appropriate location.

The installer also adds Windows Start Menu shortcuts, Windows Firewall rules and file associations for Disguise-related file types.

Installing for the first time: if you are installing Designer for the first time you will prompted to choose a directory for your Designer projects. By default, this is placed in your Documents folder but you may prefer to place it in another fast storage drive like an SSD drive.

Upgrading from a previous version: if you are upgrading from a very old version of Disguise (pre-r10) the system will automatically detect and use the current Projects folder and you will not see the screen where you can change your Project folders directory. From r10 onwards you are free to choose the location of your Projects folder.

Click **Close** once the installation is complete.



Installation complete

Uninstalling Designer

Any third-party programs installed by Designer (e.g. CodeMeter drivers, QuickTime or NDI®) will **not** be removed during the uninstall process. These applications will need to be uninstalled separately, if necessary.

> **Note**
>
> We don't recommend uninstalling the CodeMeter Runtime. Always keep the latest version of CodeMeter installed, see also here.

1. Open the Windows Start menu (bottom left of screen).
2. Type **Installed apps** and open the Windows Settings page of that name. In older Windows versions, this may be called "Apps & features" or "Programs & Features".
3. Click on the three dots next to **Disguise Designer** and select "Uninstall". Note: Older Designer versions were listed as "d3".
4. Follow the on-screen instructions.

> **Note**
>
> If any unexpected errors or problems arise during installation/uninstallation, please create a System Diagnostic archive and send it to **support@disguise.one**. For step-by-step instructions on how to do this please see the Generating diagnostics page.

Automatic Installer backup

After a successful Designer installation, the installer is automatically backed up.

- On a **Disguise server**, the backup is stored in the Media drive at: **D:\d3\installers**
- On any **non-Disguise server**, the backup is stored in: **C:\Program Files\d3\installers**

These backups are used during the re-imaging process and allow Designer to be restored to the previously installed version.

From r32.2, all backups are stored on the D drive.

> **Note**
>
> The automatic backup can be skipped by providing /noinstallerbackup flag when running the installer.

Educational Designer Licenses

For several years, Disguise offered Educational Designer Licenses configured for local network environments. These licenses allowed institutions to validate a set number of seats without the hassle of distributing, monitoring, or managing multiple physical dongles for students.

With the introduction of Designer Starter and Designer Pro this has changed. You can use Designer Starter by downloading the Starter installer from Disguise Cloud and use it for learning Disguise. There is no fee for this. However, Designer Starter applies a watermark to content.

Disguise servers can also be set up for use with the Starter ecosystem, if needed. All media servers should then install the same Designer Starter release as the other PCs in the session. Educational institutions will still need Pro licenses to create watermark-free content.

Training Courses

If your training course does not include the use of a Disguise server, then Designer Starter is ideal, as there is no restriction on core functionality. Students should sign up for Disguise Cloud, install Designer Starter, and then log in to d3Manager with their Disguise Cloud account.

If your training course includes the use of a Disguise server, then there are two options:

1. Install Designer Starter on the Disguise server and log in to d3Manager on the server with a Disguise Cloud account. All other Starter instances can then join a d3 session with the server. Note that an intermittent blue flash will be present on outputs.
2. Students use Designer Pro. Please contact your account manager to discuss options for obtaining Pro licenses for your training course.

If you teach Disguise at an educational institution and would like more information, please contact **sales**.

For more information about the capabilities of Pro and Starer licenses, please see the following pages:

- Designer Starter
- Designer Pro
- Designer Download and Installation
- License Activation

The Designer website has a comparison chart **here**, and Designer Licensing FAQs **here**.

Identifying the Designer Version

Designer varies with Designer license types, release versions, installer versions, and build versions.

Designer configurations vary based on installer versions, license types, release versions, and build versions:

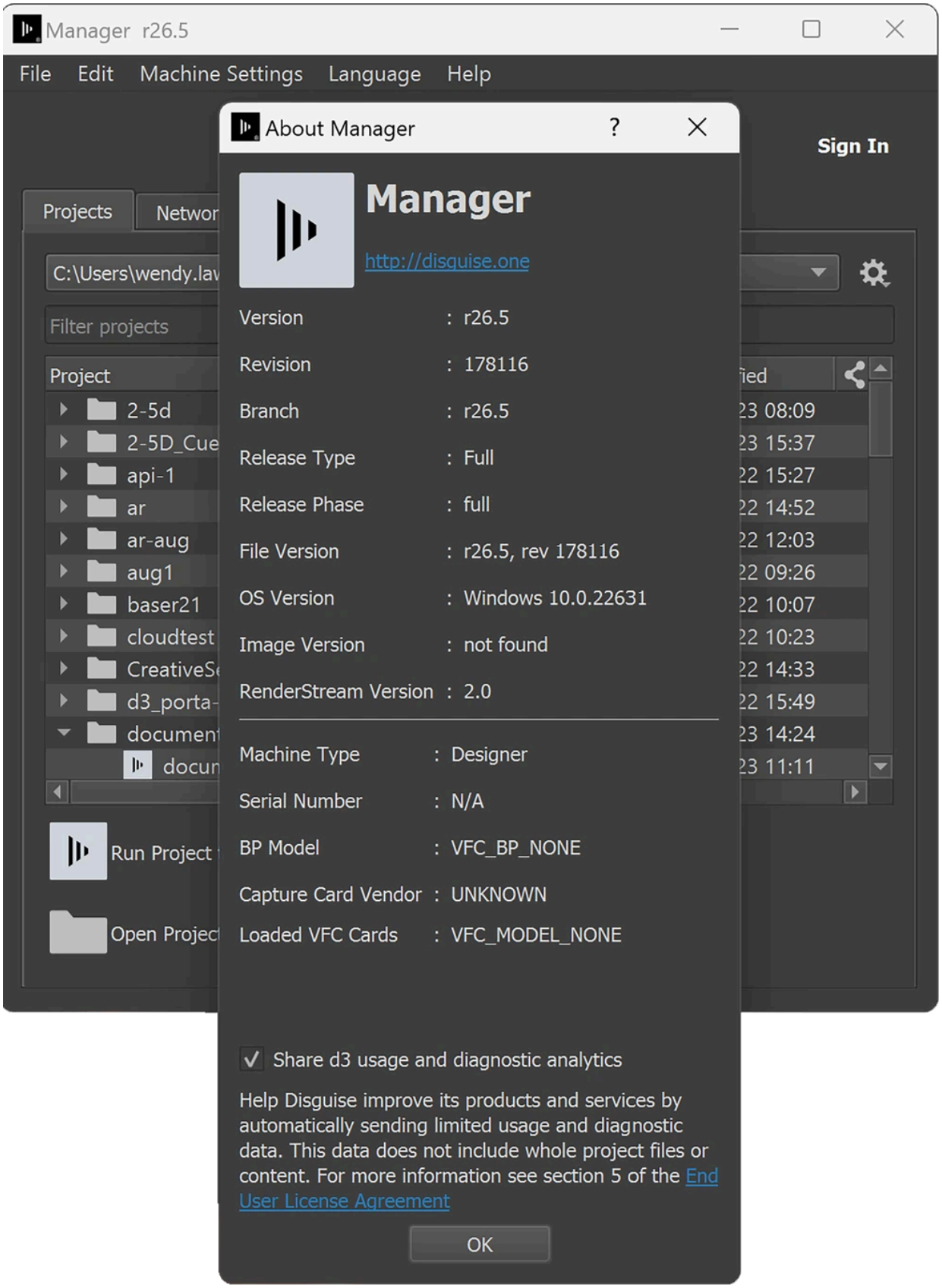
- Installer versions – Available as either a Full installer (for Designer Pro and Disguise media servers) or a Starter installer.
- License types – There are several license options:
  - Designer Starter only uses its built-in license bundled in the installer.
  - The Full installer supports Designer Pro, as well as the built-in license of any Disguise server that is supported in a given release.
- Release versions – Regular product releases introducing new features, improvements, and fixes. Learn about our versioning conventions here.
- Build versions – Can differ even within the same release version. These may include beta releases for a specific show or feature.

The information provided on this page will enable you to identify the version of Designer you are running in a number of different ways.

> **Note**
>
> Please note that you may only have one version of Designer installed at a time.

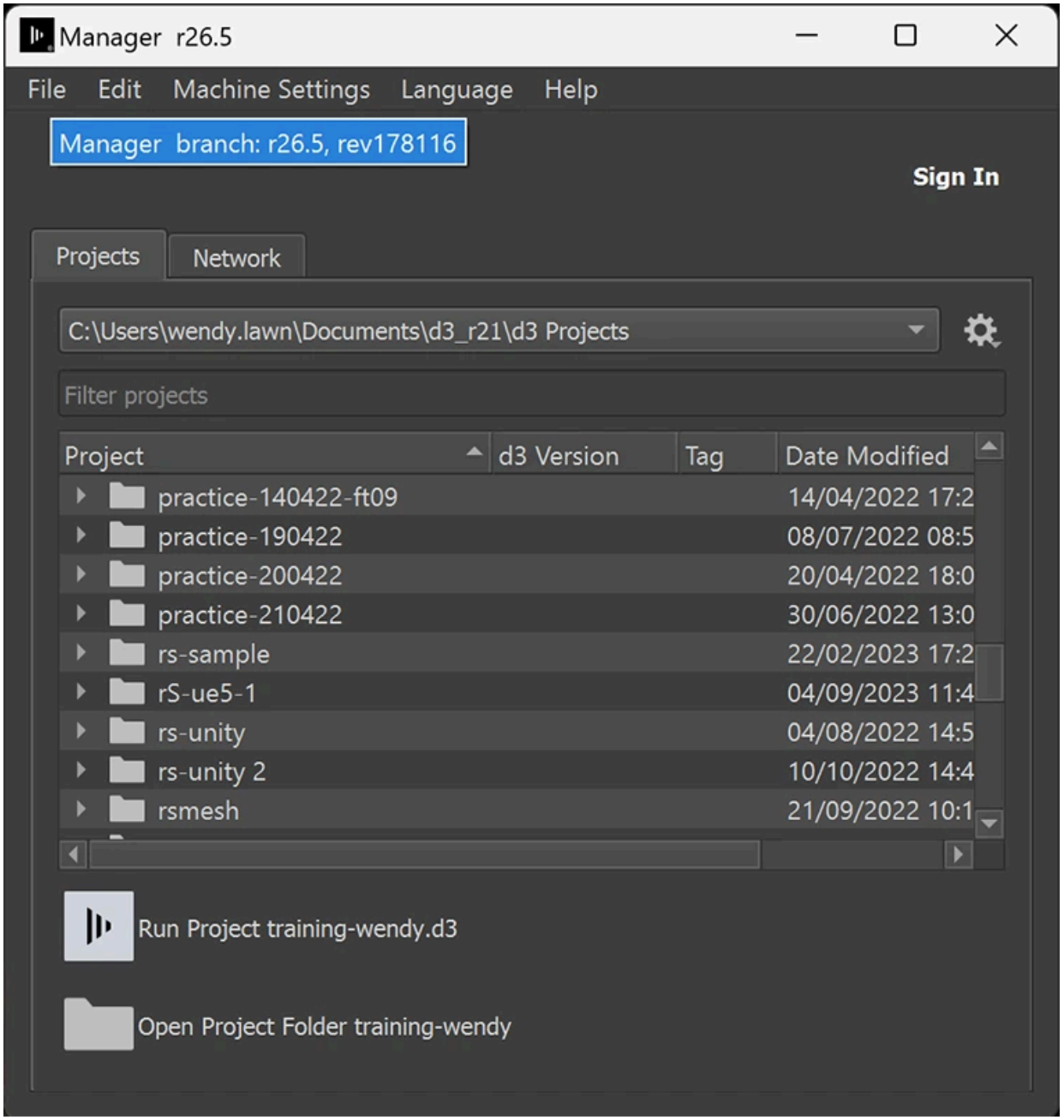
Option 1

To see what current release you have installed on your system, in Designer, go to **Manager > Help > About Manager**.


Manager r26.5
File
Edit
Machine Settings
Language
Help
Sign In
Projects
Project
Run Project
Open Project
About Manager
Manager
http://disguise.one
Version : r26.5
Revision : 178116
Branch : r26.5
Release Type : Full
Release Phase : full
File Version : r26.5, rev 178116
OS Version : Windows 10.0.22631
Image Version : not found
RenderStream Version : 2.0
Machine Type : Designer
Serial Number : N/A
BP Model : VFC_BP_NONE
Capture Card Vendor : UNKNOWN
Loaded VFC Cards : VFC_MODEL_NONE
Share d3 usage and diagnostic analytics
Help Disguise improve its products and services by automatically sending limited usage and diagnostic data. This data does not include whole project files or content. For more information see section 5 of the End User License Agreement
OK

Option 2

Additionally, in d3Manager you can hover the mouse over the menu bar to reveal a tooltip box displaying the current version number.



A tooltip box with the version number activated by placing the mouse over the menu bar.

Option 3

Alternatively, when you start Designer, it displays a startup screen while loading the project. This consists of the logo at the bottom right of the screen, along with the version identifier.

This consists of two numbers: the major release (such as Release 13, 14 and 15 etc) and the build revision (for example revision 35000, 36000, etc).



Current release and build revision number displayed whilst project is loading

Option 4

You can also see which release and build revision you are running in the d3 Options menu.

To open the d3 Options menu:

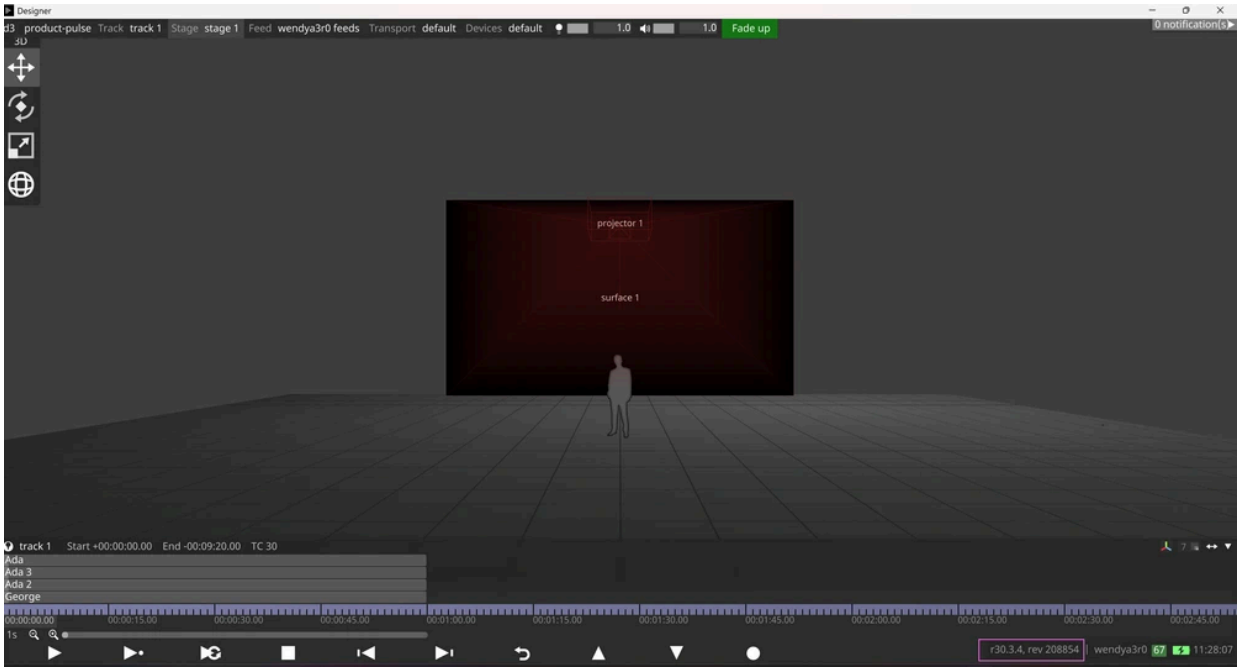
1. Right-click d3 from the Dashboard (bar at the top of the screen).
2. Left-click **About d3**.



Current release and build revision number displayed in the d3 Options menu.

Option 5

The release version and build number appears in the bottom right of the Designer GUI.



Current release and build revision number displayed in the Designer GUI.

Known Issues

There are known issues when running Designer on some machines.

Macbook Pro Retina driver issues

In 2012 Apple released a range of Macbook Pro's with Retina displays containing the NVidia 650M. Apple shipped a set of Bootcamp drivers (used to support Windows on a MBP) with these machines and have since released updates. The Bootcamp drivers that ship with the Macbook Pro present varying screen resolutions to the program as it tries to start. This can cause failure to start issues for Designer.

Solution

Install the latest NVidia Drivers for the 650M from **http://www.nvidia.co.uk/page/drivers.html**

Disable Aero Theme:

1. Right-click on the Windows Desktop.
2. Click Personalize.
3. Select the 'Windows 7 Basic' theme.

Disable Aero Peek Preview (in Windows 7)

1. Right-click the Windows task bar and choose Properties.
2. Disable the check box: Use Aero Peek to preview the desktop.

Completing these three actions should solve the majority of issues with the Retina Macbook Pro. However, if you are still facing issues, please contact the **Support Team**.

Viruses and malware

Viruses and other malware are potential problems that should be considered when using any software.

Recommended virus scanner

One option you can use to scan your machine for viruses and malware without reducing performance is **ClamWin**. ClamWin is an open source virus scanner that does not have any

active background scanning and can be run from a USB pen drive or other. You can also download ClamWin Portable, which is a very handy portable app.

Licensing for Older Designer Versions

Designer licensing for non-Disguise servers changed in April 2025 to the Designer Starter and Designer Pro scheme.

Older versions of Designer require the legacy licensing scheme.

For those who currently have one or multiple legacy software licenses, you will be issued with new legacy licenses matching the ones you held before, and with the same expiry date as your current Designer Pro license. All you need to do is activate these new legacy licenses, following the exact same steps as your Pro license activation.

> **Important**
>
> From Designer r30.5, Designer automatically checks for license changes in the background, so if you're on a monthly license you don't need to manually update your license each month when the expiry gets extended for another month after the monthly subscription payment is taken.
>
> However, earlier versions of Designer (r30.4 and below) do not support automatic license updates. If you're using one of these versions, you'll need to manually update your license each month (or annually, if you're on an annual plan) to apply the new expiry date.

Designer versions and their license requirements

The table below shows which Designer versions require which license, and how to obtain this license.

Version	Licensing Requirement	Requires Dongle	How to Obtain a License
r17.6.2 and earlier [1]	pre-r18 Legacy license (predating any modern licenses)	Yes [2]	Contact **Disguise Support**.
r18.0 to r30.8	Supports the legacy [3] Designer license	No	Issued automatically when subscribing to Designer Pro [4]
r29.3 & r30.5 to r30.8.6	Supports *both* the legacy Designer license and Designer Pro license	No	Subscribe via Disguise Cloud

Version	Licensing Requirement	Requires Dongle	How to Obtain a License
r31 and later	Supports Designer Pro license only	No	Subscribe via Disguise Cloud

[1] For pre-r18 licensing requests and any queries, please reach out to **Disguise Support**. There is no charge for issuing these legacy licenses, and this process will not change.

[2] Support for software-based licenses (CmAct containers) was first introduced in r18.0. Earlier versions require a physical USB CodeMeter dongle to activate licenses to. Dongles can be **purchased in our online shop**. Note that old CodeMeter dongles cannot hold any modern Disguise licenses (see **table below**).

[3] The legacy licensing scheme displayed two product codes in CodeMeter: one with a Product Code of 400, this previously had no expiry date, however the 400 license on its own does not enable Designer to run, it was used as an identifier for Designer to differentiate it from other license types; another with a Product code of 100, this is the license which enables Designer to run, and usually has a time limit, displayed in the Valid Until field in CodeMeter. Older Disguise servers also use Product Code 100, but without a time-limit. Going forwards, any legacy licenses issued will also set an expiry date for the Product Code 400 license to avoid confusion. Note that Designer Pro only uses one ProductCode license entry in CodeMeter.

[4] An additional legacy license for r18.0 to r30.8 is issued automatically when subscribing to Designer Pro, matching the duration of Designer Pro. Legacy licenses are retrieved from the Subscriptions tab of Disguise Cloud, using the same activation procedure as the Designer Pro license.

For more information on subscribing to Designer Pro through Disguise Cloud, visit Designer Subscriptions

CodeMeter Container Support

Licenses issued by Disguise can be activated on different types of CodeMeter containers. Physical containers, called `CmDongle` exist in various form-factors, see the **manufacturer's website**. The most common physical container is a USB dongle.
Dongle-less licensing is enabled via software-based `CmAct` containers that are bound to a particular machine.

Physical Container Hardware Revisions

Physical containers come in different hardware revisions, which are indicated by the first digit in their serial number. Each new hardware revision adds new features, so older dongles will not have the same capabilities as newer ones.

When Designer was first released in March 2012, all Designer licenses required a physical CodeMeter dongle. A newer dongle hardware revision was issued since 2016, enabling support for the CodeMeter feature “Universal FirmCode” (UFC), that simplifies license handling for both `CmDongle` and `CmAct` containers. In 2020, with the release of r18.0, Disguise introduced dongleless CmAct licenses, based on the UFC feature. Since June 2023 all Designer licenses (except the pre-r18 Legacy license) are exclusively based on UFC, and so require a newer CodeMeter dongle (or activation on a `CmAct` container).
Dongles can be **purchased in our online shop**

Container Type	Hardware Revision	Serial Number	Issued since	Issued until	Can hold pre-r18 legacy license	Can hold modern licenses
CmDongle	2	`2-xxxxxxx`	2012	2015	Yes	No
CmDongle	3	`3-xxxxxxx`	2016	-	Yes	Yes
CmAct	-	`130-xxxxxxxxxx`	2020	-	Yes	Yes

Further information

- License Activation
- Offline License Activation
- Transfer a Designer Pro License

Designer Licenses and Activation Process

A license activation process is required for Designer Pro, however it is not necessary for Designer Starter. Designer Pro requires a license to launch projects, whereas Designer Starter requires a Cloud log in to authenticate the user when using Designer.

Starting with Designer r30.5, the software automatically checks for license updates in the background. If you're on a monthly license, there's no need to manually refresh it — your license will be extended automatically each month once your subscription payment is processed.

However, earlier versions of Designer (r30.4 and below) do not support automatic license updates. If you're using one of these versions, you'll need to manually update your license each month (or annually, if you're on an annual plan) to apply the new expiry date.

Designer installers

Designer has two different installers and so it is important that you use the correct one, either the Designer Full installer, or the Designer Starter installer.

The Designer Full installer is the correct installer to use for Designer Pro and Disguise servers.

License deployment

Designer Pro licenses have two license deployment mechanisms available: USB dongle-based license and software-based license. Each requires a slightly different activation process.

1. USB dongle-based licenses

The physical dongle is USB-based and can also host other supported licenses obtained from third parties such as Notch and TouchDesigner, as well as Designer. The USB Dongle can be purchased through the **Disguise Store**.

Using a dongle may be preferable if the license is to be shared in the same physical location.



Disguise USB Dongle

2. Software-based licenses

The software-based option is tied to your physical machine. It can be moved between machines by following license transfer process. The software-based option is ideal for customers who do not often switch machines or are looking to share a license between geographically separate locations.

Software-based licenses (dongle-less) do not require a physical USB dongle and can be activated on a computer as soon as they are generated in Disguise Cloud. No purchase of the physical dongle is necessary.

Note that a license deployed to a USB dongle can later be converted into a software license and vice versa.

If you are unsure which license deployment method is best for you, the table below compares the two license deployment methods.

Feature	USB Dongle-based License	Software-based License
Portability	Yes	Yes
Notch pre-visualisation	Yes	No
Run Designer without a dongle	No	Yes

Once you have your license and have chosen your deployment method, you can proceed to activate your license. Follow the activation instructions below for each license deployment type.

> **Warning**
>
> Licenses for Notch playback and pre-visualisation still require a physical CodeMeter dongle. This is due to a Notch licensing limitation.

Other types of Disguise Licenses

The Designer Pro license uses expiration time. This means that once the Designer Pro subscription is purchased, the license is valid for the duration purchased from the date of purchase.

By contrast, RenderStream is a Usage Period license. This means that the duration of the license starts when the license is first used, regardless of the date of purchase. In addition, a RenderStream license cannot be moved to other machines once the license period has started. This is a technical limitation of the Usage Period mechanism.

Obtaining a Designer license

The Designer Pro license is available as a subscription from Disguise Cloud, and can be stored on your dongle or on your physical machine.

Sign up or sign in to Disguise Cloud to obtain your license **here**.

Once signed in, navigate to the Subscriptions tab for your Organisation. Here you can subscribe to Designer Pro.

Note that Designer Starter does not require a license, but does require you to have a Disguise Cloud account which you use to log into d3Manager in order to launch Designer Starter projects.

> **Note**
>
> If you are using Designer for the first time, please check system requirements here.

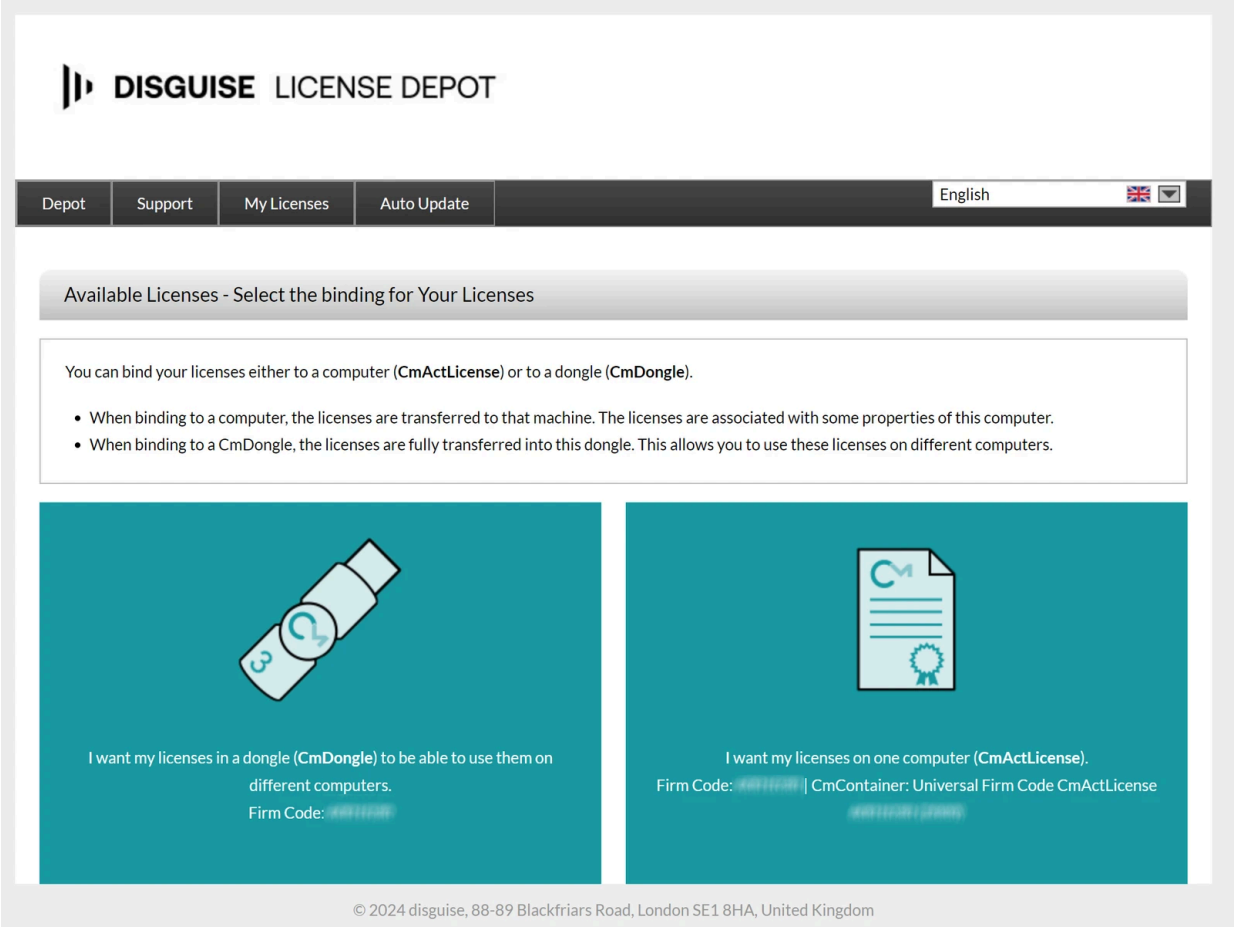
How to obtain a USB Dongle

If you wish to use a USB Dongle to host your license, it can either be purchased from the **Disguise Store**, or users can add the license to another CodeMeter dongle such as one for Notch, or TouchDesigner. The Designer license can then be activated on your dongle by following the steps below.

Activation

License activation requires the CodeMeter Runtime (bundled with every Designer installer to be installed.

The activation method is very similar for each license type. However, the important difference is how the license binding is applied, whether you want your license in a dongle, or on a computer.



Selecting the binding type for your license

1. Activating a license on a USB dongle

1. Download and install the latest version of the Designer software. This is available in the Disguise Cloud **Software** tab of your profile. Sign in required.
2. Ensure your USB dongle is plugged in.
3. Go to **Disguise Cloud** and navigate to the Subscriptions tab for your Organization. Here you can manage and view your licenses.
4. The ticket ID format will be XXXXX-XXXXX-XXXXX-XXXXX-XXXXX. Click **Activate** next to the license. This will bring you to a **CodeMeter management** page.

5. Select the binding for your license. To bind it to a USB dongle, select “I want my licenses in a dongle”.
6. Click **Activate Selected Licenses** to begin Online License Transfer.
7. When your license transfer has been completed successfully click **OK**.
8. Your license is now activated.

Your Designer license is now on the USB dongle.

2. Activating a license on your physical machine

1. Download and install the latest version of the Designer software from Disguise Cloud. Sign in and navigate to the **Software** tab of your profile.
2. Go to **Disguise Cloud** and navigate to the Subscriptions tab for your Organization. Here you can manage and view your licenses.
3. The ticket ID format will be XXXXX-XXXXX-XXXXX-XXXXX-XXXXX. Click **Activate** next to the license. This will bring you to a **CodeMeter management** page.
4. Select the binding for your license. To add it to your physical machine, select **Physical Machine (CmAct)**.
5. Click **Activate Selected Licenses** to begin Online License Transfer.
6. When your license transfer has been completed successfully click **OK**.
7. Your license is now activated.

⏱️ Your Designer license is now attached to your local machine.

Launching Designer

Once your license is activated, you can proceed to launch or create a project to load Designer.

Viewing your license information

License information is available in d3Manager by navigating to **Help > d3 licenses**.

Troubleshooting

Contact the **Disguise Support Team** team if you are experiencing any licensing issues.

CodeMeter Runtime versions

It is recommended to always keep the latest version of the CodeMeter Runtime installed. Do not uninstall or overwrite any newer CodeMeter Runtime versions when downgrading to an older Designer version!

CodeMeter is backwards-compatible, but not always forwards-compatible:

Some older versions are e.g. unable to recognise CmAct software license containers modified by newer CodeMeter Runtime versions. If your license was activated on a CmAct container (see **above**) then CodeMeter Runtimes v7.51 and older may not see your licenses. To fix this, install CodeMeter Runtime version 7.60 or higher, either via a newer Designer installer, or from the **official Wibu Systems website**.

Further information

- Legacy Licenses
- Offline License Activation
- Transfer a Designer Pro License

Designer Licensing FAQs

I. Designer Licensing Overview

How is Designer licensed?

Disguise media servers come with a perpetual Designer license. For Designer on non-Disguise media servers, there are several license options available:

- Designer Starter is free and does not require a license. It is aimed at learning, training and evaluating.
- Designer Pro requires a subscription, which can be purchased via Disguise Cloud.
- Disguise X1 requires a subscription, which can be purchased via a Disguise Account Manager.

II. Transition for Users on Older Designer licenses

I have a license which was issued previously for free. Will this still work?

Licenses for Designer issued before April 2025 expired at midnight on March 31st, 2025. You will have to select a new license type (either Starter or Pro). Designer Pro and Starter installers and subscription options can be found in Cloud dashboard. Designer Pro will be available from March 17th and managed through the Disguise Cloud dashboard. If you don't already have a Cloud account, you'll need to create one to continue using Designer. Read more about subscribing to Designer Pro here.

You will also need to activate your Designer Pro license using your Cloud account. Designer Starter does not require activation, but you must log in to Disguise Cloud in d3Manager when using Designer. License activation information can be found here.

Why do I need to activate a new Designer license if I already have one?

Previously, Designer licenses required renewal every six months. These licenses expired at midnight on March 31st, 2025, marking the transition to our new licensing model. All users will need to activate a new license to continue using Designer.

Why do I need a Disguise Cloud account to access and activate my Designer license?

Managing licenses through Disguise Cloud allows for easier access, streamlined renewals, and better integration with other tools and services within the Disguise ecosystem, including Mapping Matter.

I'm already paying for Disguise Cloud. Will there be a Disguise Cloud plus Designer Pro package?

We will be announcing Disguise Cloud and Designer Pro bundles later this year.

III. License Types and Features

What is the difference between Designer Starter and Designer Pro?

Designer Starter is designed for training and learning purposes and includes the current functionality of our Designer software with the exception of joining a session with Full Designer instances (Disguise media servers or machines with Designer Pro licenses). Designer Pro will also cover the full functionality of the software but with the ability to programme live projects, as well as edit them in real-time in a session with other Disguise servers or Pro license instances.

For more info on Designer Pro, view the Designer Pro page. For more info on Designer Starter, view the Designer Starter page.

If I have a Disguise server, will my server license be impacted by these new pricing changes?

No. This new licensing model applies strictly to the Designer instance running on a laptop or PC. It **will not** impact the versions of Designer running directly on your Disguise servers.

What license do I need to join a session as an editor with a Disguise media server that has reached the end of support and/or end of life i.e. the 4x4 or the Solo?

As outlined in the Product Lifecycle page, we will move hardware products that are no longer produced to end of support and/or end of life. This involves moving a product to a long-term release model where we only fix show-critical issues that do not require large changes for 1 year.

Users will need to use a Pro license instance on a Disguise media server that has reached end of support and/or end of life in order to join a session as an editor when running a Designer software version later than the last supported version for that product. A table that outlines the compatibility on Disguise hardware and software products can be found here.

Will I lose access to my existing projects if I don't purchase a Pro license?

No, your existing projects will remain accessible. If you switch to the Designer Starter, you'll still be able to open and work on your projects using the software's core features, however once saved in Starter, the project cannot be opened in Pro.

If I mistakenly open up a Designer project in Designer Starter, is there a way to recover it so it can be used on a server or in Designer Pro?

Designer will automatically take a backup of a non-Designer Starter project when it is first opened in Designer Starter, so you can easily revert to your previous project as it was.

IV. Education Use Cases

I work in Education and own Disguise products, has my license changed?

This new licensing model applies strictly to the Designer instance running on a laptop or PC. It **will not** impact the versions of Designer running directly on your Disguise servers. For licenses running on a laptop or PC please speak to your Account Manager about your change or email support@disguise.one.

I run Disguise training courses. What options do I have with this new scheme?

If your training course does not include the use of a Disguise server, then Designer Starter is ideal, as there is no restriction on core functionality. Students should sign up to Disguise Cloud, install Designer Starter, and then log in to d3Manager with their Disguise Cloud account.

If your training course includes the use of a Disguise server, then there are two options:

1. Install Designer Starter on the Disguise server and log in to d3Manager on the server with a Disguise Cloud account. All other Starter instances can then join a d3 session with the server. Note that an intermittent blue flash will be present on outputs.

2. Students use Designer Pro. This will be required if you have a Disguise server, which is an integral part of the teaching, and watermarked output is not practical, for example, because of use in assessments, productions, coursework, etc. In this case, please contact your account manager so we can issue the appropriate licenses.

I'm a Certified Disguise Trainer and run courses on Disguise, am I expected to pay for Designer Pro?

All Disguise Certified Trainers will be given a Designer Pro subscription free of charge.

V. Managing Your License

Does Designer Pro require a dongle?

Designer Pro works with both a hardware dongle or software deployment for the license. There are pros and cons for each deployment method.

The software-based license has the benefit of not needing to manage physical keys, but transferring a license between machines requires checking a license in and out of the license depot. The physical dongle is easier to move between machines if they are co-located, but can make sharing licenses more difficult across multiple locations.

If you deploy a license as software, it can be moved to a dongle later and vice versa.

USB license dongles can be purchased at the **Disguise Store**.

Will my existing dongle still work?

The Designer Pro license can be either loaded onto a dongle or used as a software license. In other words, your existing dongle is compatible to load on a Designer Pro license. If you have an existing dongle with a license that has been activated through the current free Disguise Cloud mechanism, then this will expire on April 1st. If you have a pre-existing license on your dongle, then it depends on the type of license which is loaded on. You can reach out to **support@disguise.one** to check this, giving the name of the license as listed in CodeMeter WebDepot.

Note that CodeMeter dongles with serial numbers starting with 2- are no longer supported, those starting with 3- are compatible for loading on the Designer license.

If I buy several licenses for my company, does everyone using the licenses need to be signed up to Disguise Cloud and in my Disguise Cloud organisation?

Once the licenses have been purchased, they can be managed in the Subscriptions section of Disguise Cloud by those with Admin, Owner, or Billing roles.

Admin, Owner, or Billing roles can share the Activation Code with a user outside their Cloud organisation via another method, this is not restricted.

There is a convenient **Assign** button in this tab to indicate which users in the Disguise Cloud organisation the license is for. However, this functionality is strictly for labelling purposes and does not restrict license usage to the assigned user.

Do I need to manage the license keys myself or will Disguise Cloud help me do this?

Disguise Cloud helps management of the license keys with the **Notes** and **Assign** features in the Subscriptions tab; however it is not mandatory to use these features.

Does the Assign function in Disguise Cloud lock that license to the user it has been assigned to?

No, the Assign feature is only available to Admin, Owner, and Billing roles for labelling and tracking purposes. It therefore does not restrict the license to only that user.

I was given a perpetual license in the past. Will that still work?

Perpetual licenses were not commonly provided, and so it is unlikely that your license is perpetual. The old licensing system displayed two product codes in CodeMeter:

- One with a Product Code of 400. This had no expiry date, however, the 400 license on its own does not enable Designer to run. It was used as an identifier for Designer to differentiate it from other license types.
- One with a Product code of 100. This is the license which enables Designer to run, and usually has a time limit, displayed in the Valid Until field in CodeMeter. Older Disguise servers also have this code, but without a time limit.

Going forwards, Designer Pro will have only one license entry in CodeMeter.

VI. Software Version Compatibility

What versions of Designer support the Designer Pro license?

The following Designer versions support the Designer Pro license: r29.3 as the latest supported legacy version, and any version since r30.5.

I need to use a version of Designer between r18 and r29.2, what do I do?

When subscribing to Designer Pro, your Designer Pro license activation codes will be available in your Disguise Cloud account. In addition, you will automatically receive an email with a second license which is valid for Designer versions between r18 and r29.2. At launch, this license will be valid until June 30th; we will later send out a legacy license with an expiry to match the duration of your Pro subscription.

I need to use Designer r17 or earlier, what do I do?

Designer r17 and earlier releases use the older Designer Legacy license structure. This is not compatible with any license issued via Disguise Cloud. In this case, you will need to continue to use the Legacy license on a physical CodeMeter dongle. This process remains unchanged. Read more about older licenses on our Legacy Licenses page.

Please contact **Disguise Support** if you need to request or extend a Legacy license. These licenses are issued on a request-only basis.

VII. Renewing licensing across multiple servers

What happens if you miss the 2-day renewal window?

Subscription renewals are issued 48 hours before the license expires. If the machine using the license does not connect to the internet within that period, the local license will expire.

As soon as the machine connects to the internet again, the license's expiry date will be automatically updated.

We therefore recommend keeping machines with Designer Pro or X1 licenses connected to the internet around the time of the subscription renewal, to prevent issues when they are later used in offline show environments.

What happens if you have multiple dongles? How do you update them all?

Connect each dongle to a machine with internet access so the updated expiry date can be applied. You can confirm the update in d3Manager or CodeMeter WebAdmin.

There is no limit to how many dongles can be connected at the same time. For example, you can connect all dongles to one machine and restart it. Shortly after d3service starts during Windows boot, it checks for license updates and applies them to each dongle in turn.

VIII. Support

Where can I find support if I have questions during the transition?

Our team is here to help! You can reply to any of our communications, reach out to your account manager, or contact our support team at **support@disguise.one** for assistance with licensing, activation, or understanding the new licensing changes.

Offline License Update

Disguise licenses can also be updated and activated without an internet connection. This applies to any machines, but is typically relevant for RenderStream subscriptions where the RX server that should receive the license is airgapped without internet access.

License files must be transferred between the receiving server and a separate machine with internet access for offline license updates. This transfer can happen using a LAN or physical drive, such as a USB drive or an external HDD/SSD.

To complete the update, 3 files need to be exchanged:

- A **request file** (`.WibuCmRaC`):
  - This must be uploaded to generate the license update file.
- The **license update file** (`.WibuCmRaU`):
  - This must be downloaded to activate the license.
- The license **receipt file** (also uses `.WibuCmRaC` extension):
  - This must be uploaded as proof of an activated license.

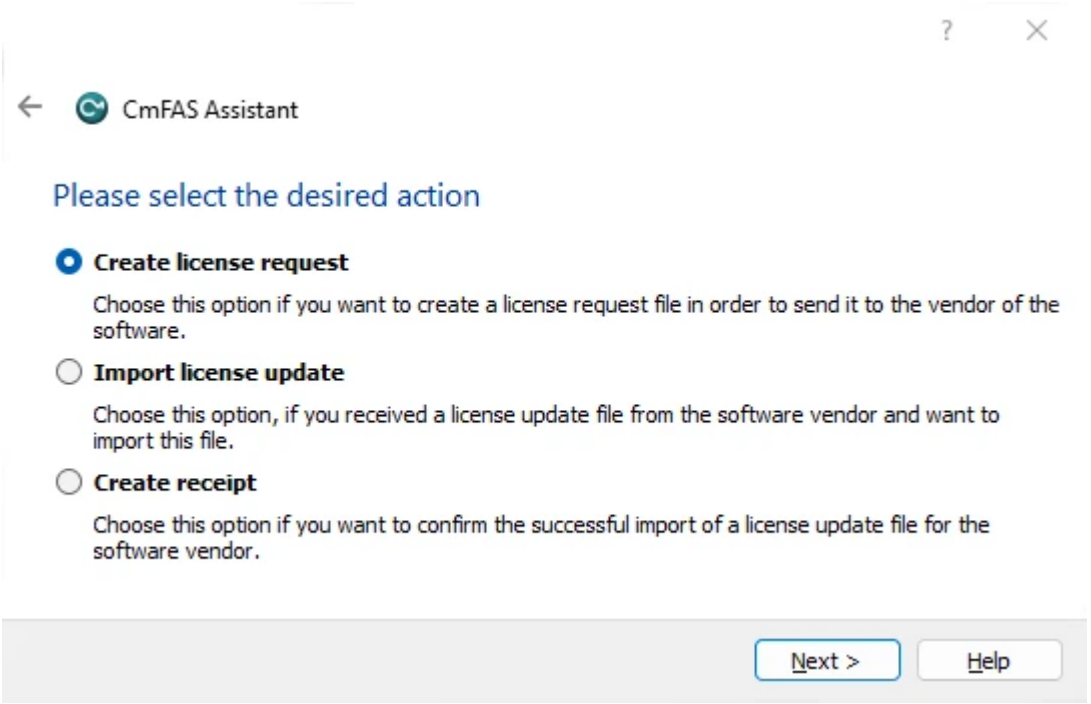
> **Note**
>
> By default, *CodeMeter Control Center* will use the serial number of the license container for the filename. When activating multiple servers, you may want to use a more descriptive name (e.g. the machine hostname), so it's easier to see which file needs to be copied to which server.

Offline License Updates

Follow the steps below to update your license.

1. Create a license update request on the server without an internet connection

1. Open **CodeMeter Control Center**.
2. Click **License Update** and click **Next**.
3. Select **Create license request** and click **Next**.
4. Select **Extend existing license**.



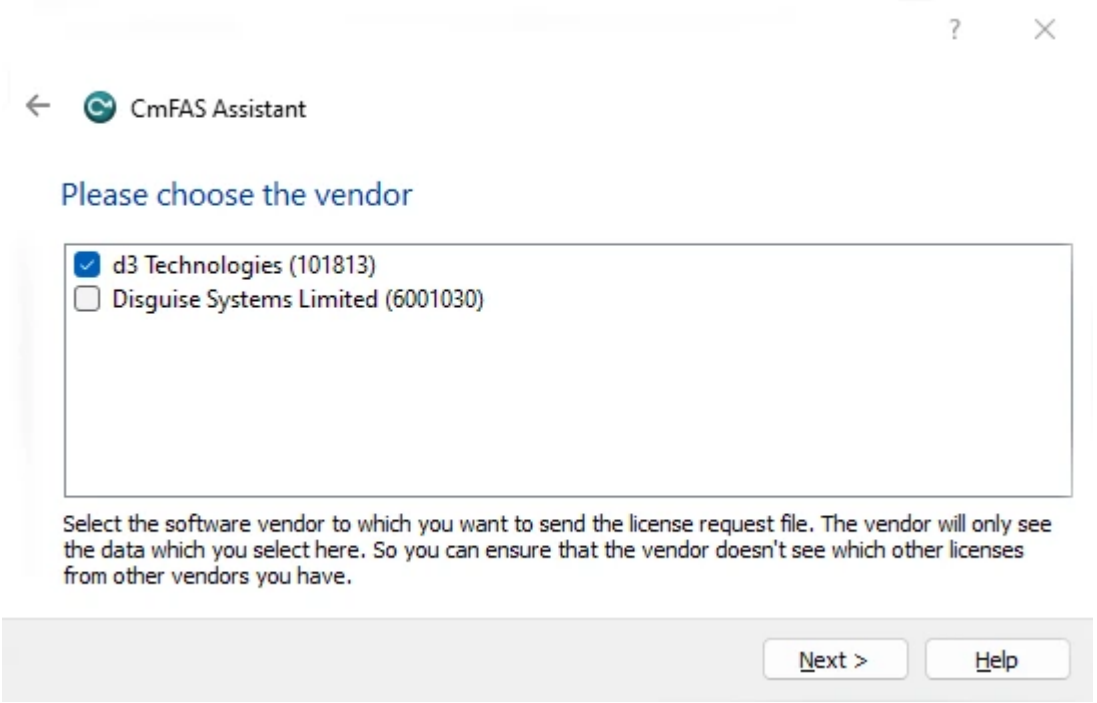
5. Select the appropriate FirmCode

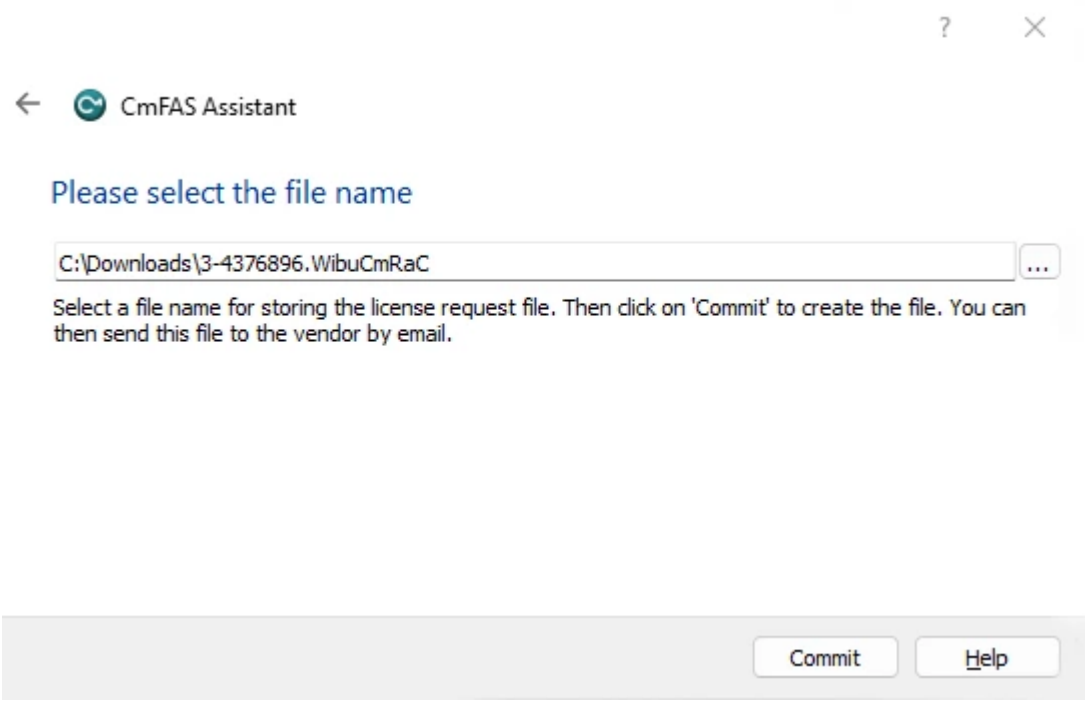
If you have multiple licenses installed, select the appropriate Disguise FirmCode to update. Note that instead of “Disguise”, the description may say “d3 Technologies”.

You can only create one license request at a time, for example:

- `101813` for current RenderStream licenses
- `6001030` for Designer licenses

6. Click **Next**, select a memorable filename for the request, then click **Commit**.
7. Copy this `.WibuCmRaC` file to the computer with an internet connection.

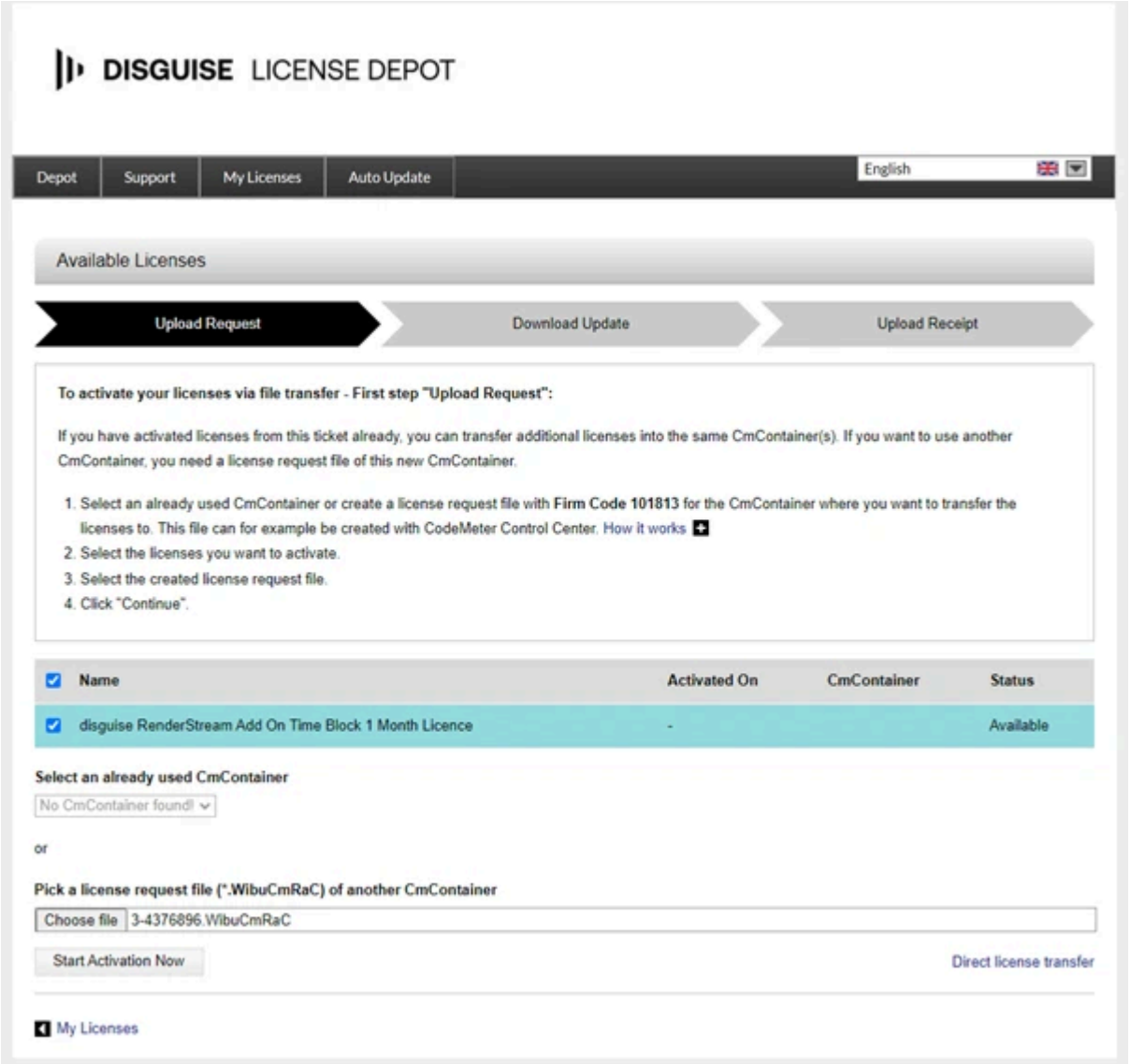




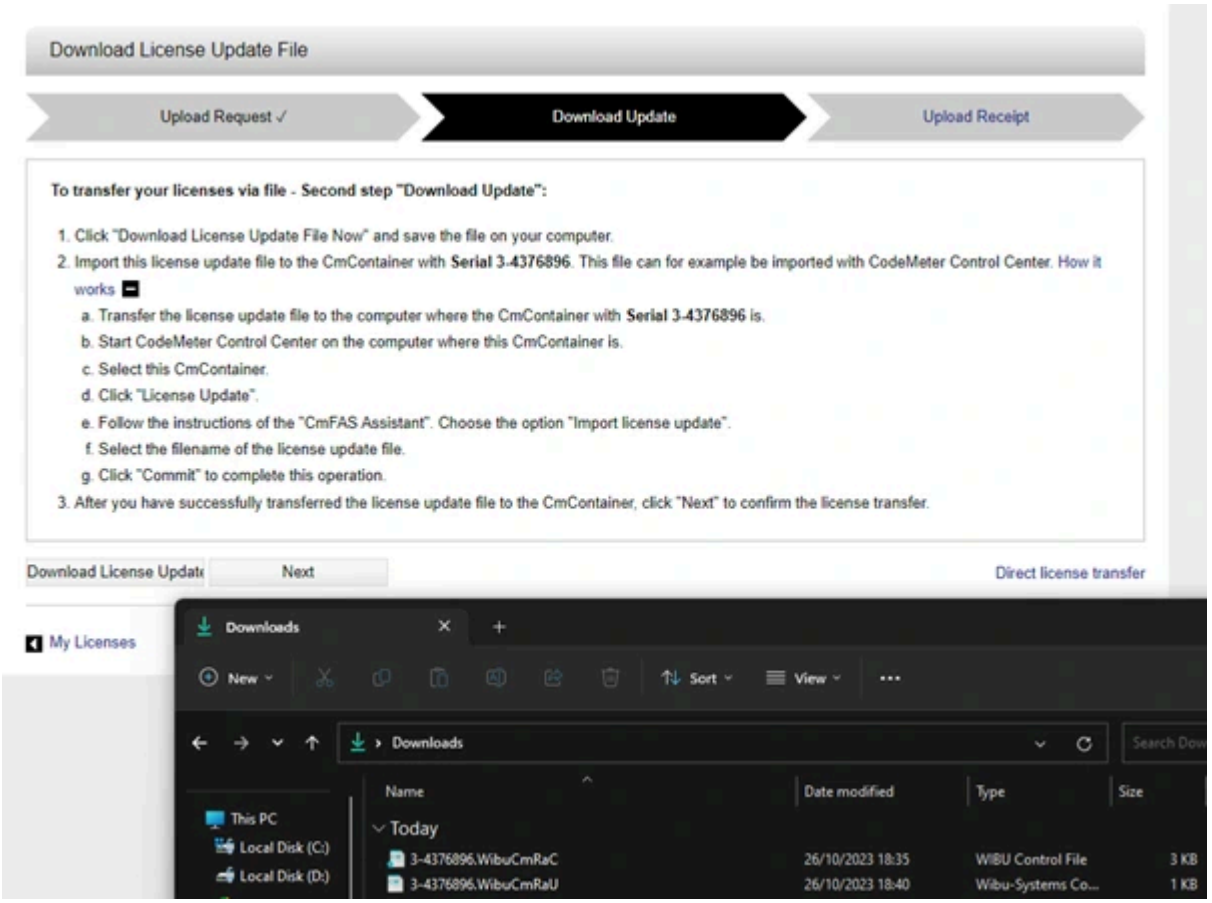
2. Create a license update file on a machine with an internet connection

1. Open the URL for the file-based transfer in a browser, https://lc.codemeter.com/64700/depot/autoUpdate.php.
2. Click **File-based license transfer** in the bottom right of the window.

3. Select the `.WibuCmRaC` request file you copied from the offline machine.
4. click **Start Activation Now**.
5. This will take a short time to process.

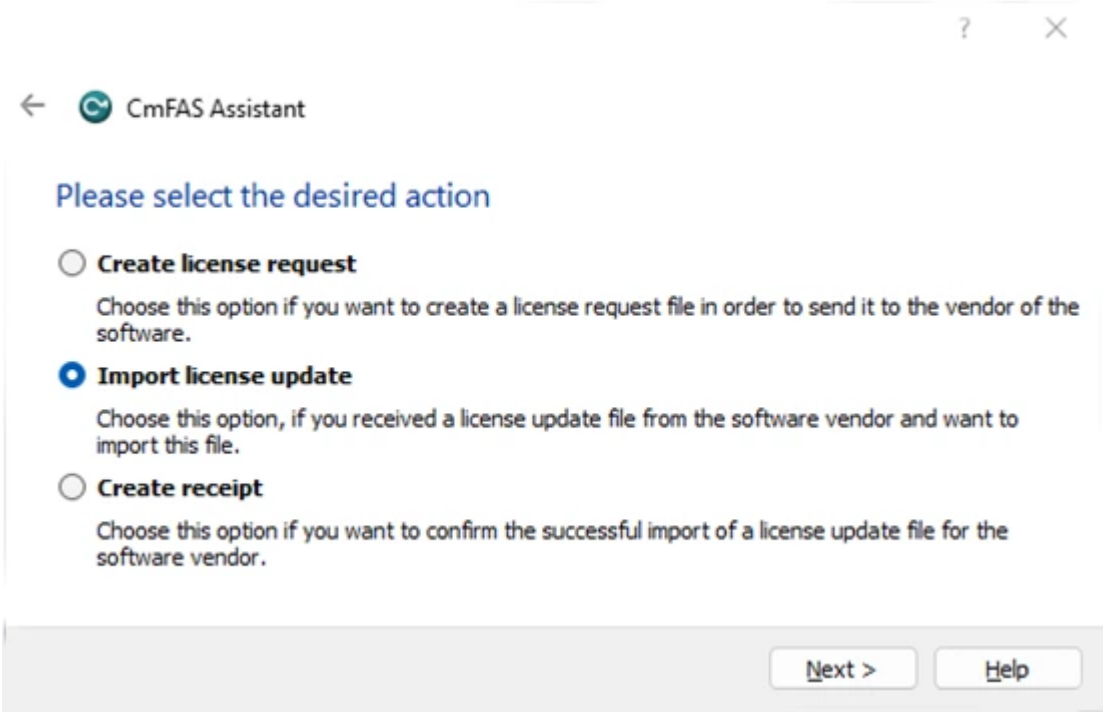


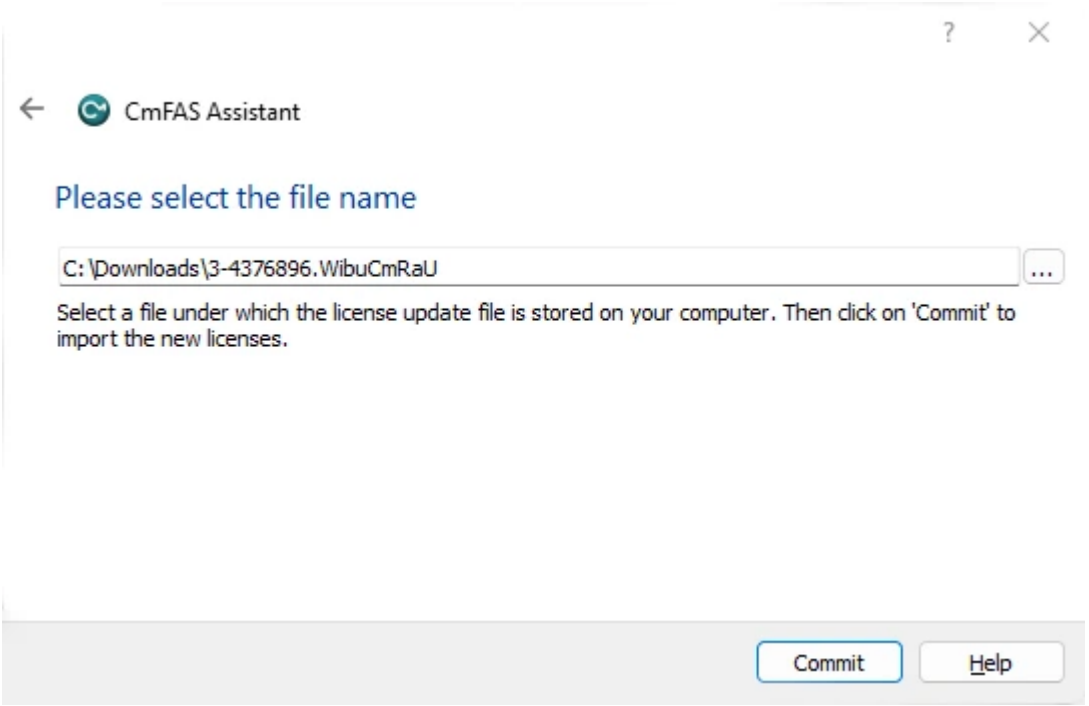
6. On the next screen, click **Download License Update**. This downloads the license update file ending with a `.WibuCmRaU` extension.
7. Keep the browser window open until the download has completed.
8. Copy the `.WibuCmRaU` update file to the offline server.

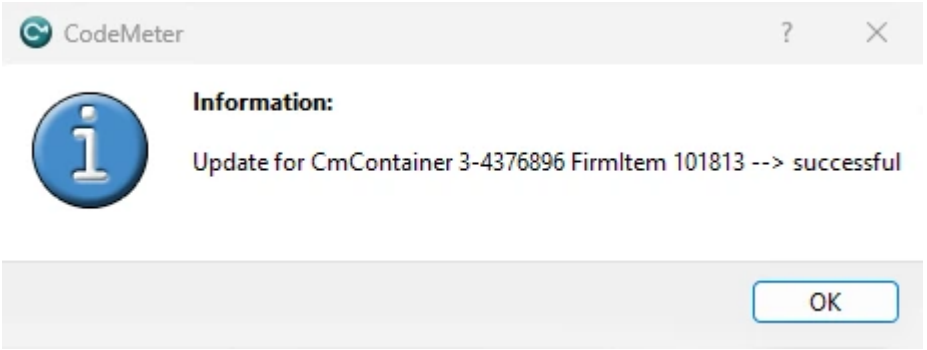


3. Import the license update on the server to create a receipt

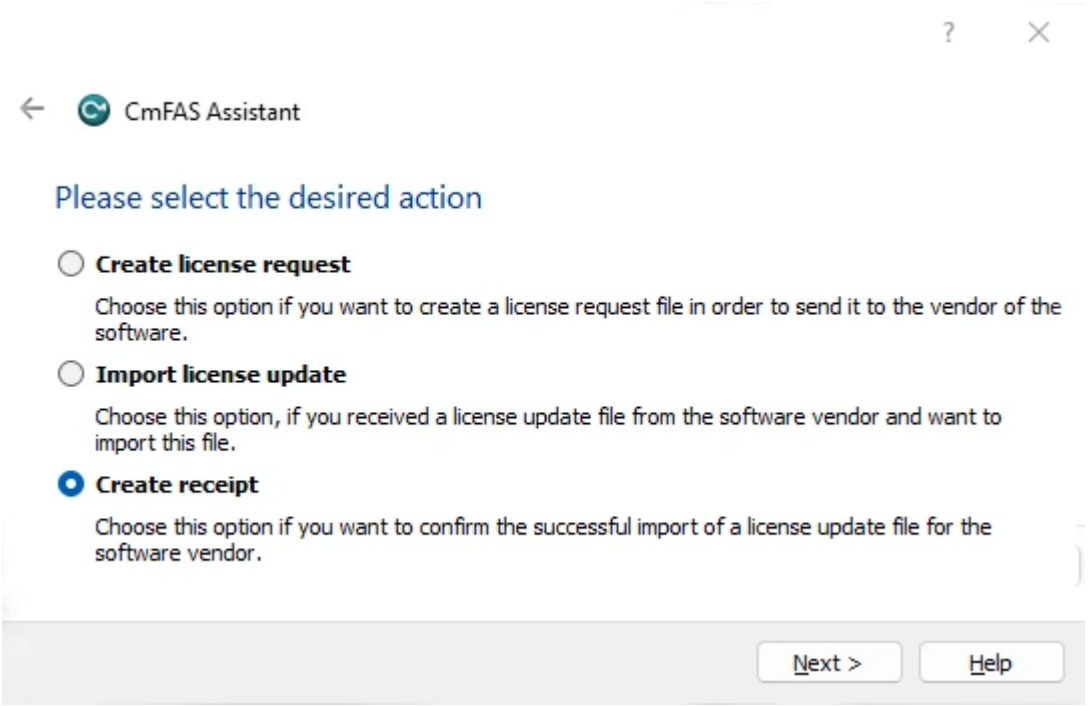
1. Reopen the **CodeMeter Control Centre**.
2. Click on **License Update**.
3. Click **Next**.
4. Select **Import license update** and click **Next**.
5. Select the `.WibuCmRaU` update file you copied from the online machine.
6. Click **Commit** to activate the license on the offline server.

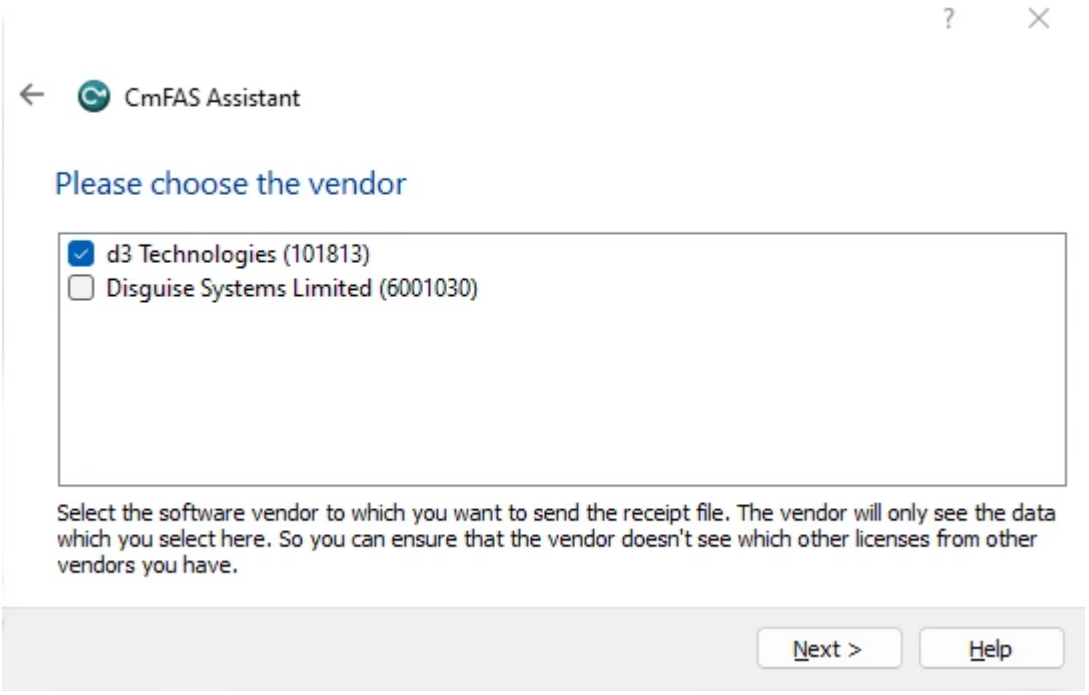

CmFAS Assistant
Please select the desired action
Create license request
Choose this option if you want to create a license request file in order to send it to the vendor of the software.
Import license update
Choose this option, if you received a license update file from the software vendor and want to import this file.
Create receipt
Choose this option if you want to confirm the successful import of a license update file for the software vendor.
Next >
Help

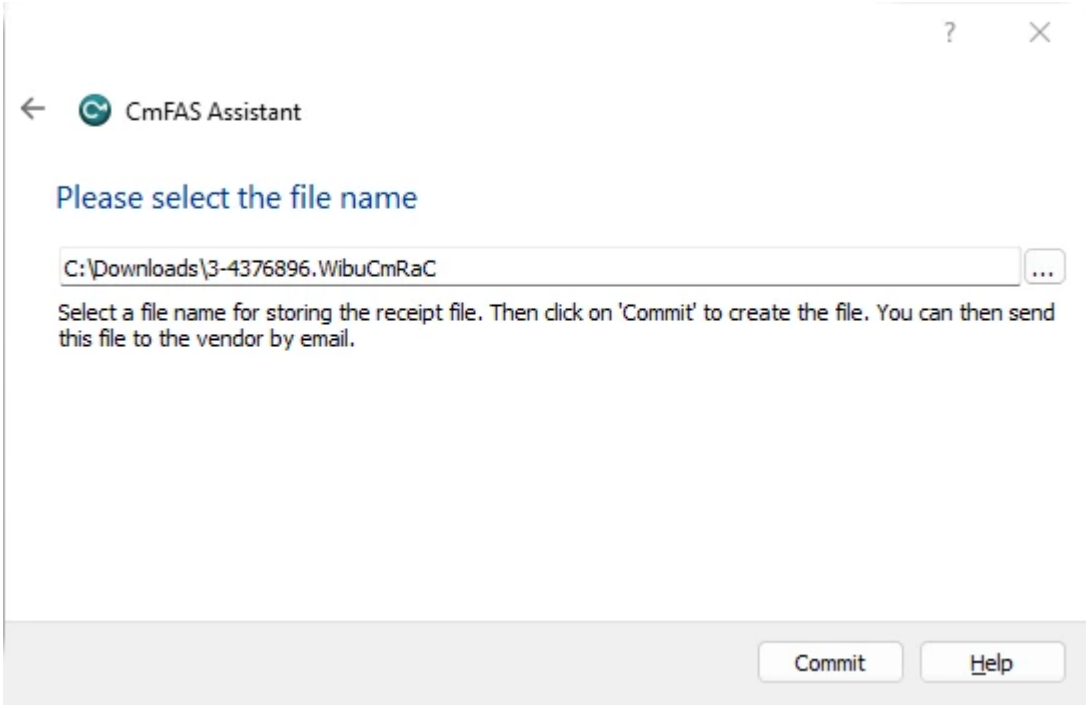

CmFAS Assistant
Please select the file name
C:\Downloads\3-4376896.WibuCmRaU
...
Select a file under which the license update file is stored on your computer. Then click on 'Commit' to import the new licenses.
Commit
Help



7. Still in **CodeMeter Control Centre**, click **License Update** and **Next**.
8. Select **Create receipt** and click **Next**.
9. Select the same FirmCode as earlier and click **Next**.
10. Select a file to save the receipt to: The default process overwrites the earlier `.WibuCmRaC` file. But you can choose a new name if you prefer.
11. Click **Commit**.
12. Copy this new `.WibuCmRaC` receipt file to the computer with an internet connection.

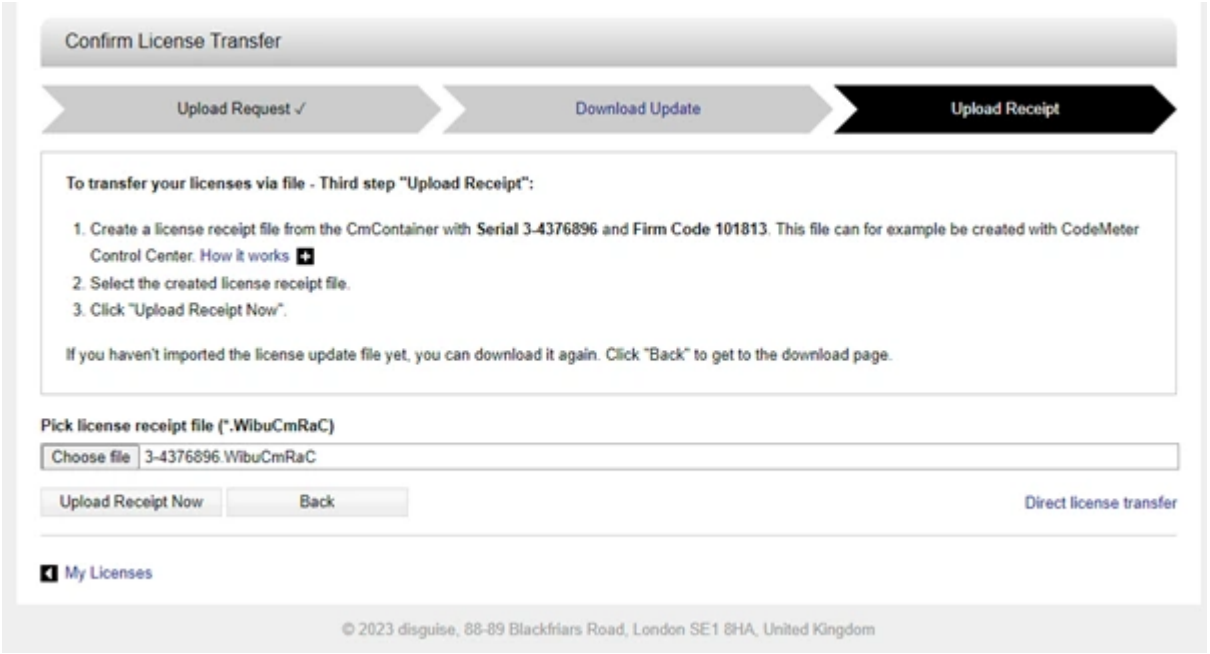

CmFAS Assistant
Please select the desired action
Create license request
Choose this option if you want to create a license request file in order to send it to the vendor of the software.
Import license update
Choose this option, if you received a license update file from the software vendor and want to import this file.
Create receipt
Choose this option if you want to confirm the successful import of a license update file for the software vendor.
Next >
Help


CmFAS Assistant
Please choose the vendor
d3 Technologies (101813)
Disguise Systems Limited (6001030)
Select the software vendor to which you want to send the receipt file. The vendor will only see the data which you select here. So you can ensure that the vendor doesn't see which other licenses from other vendors you have.
Next >
Help



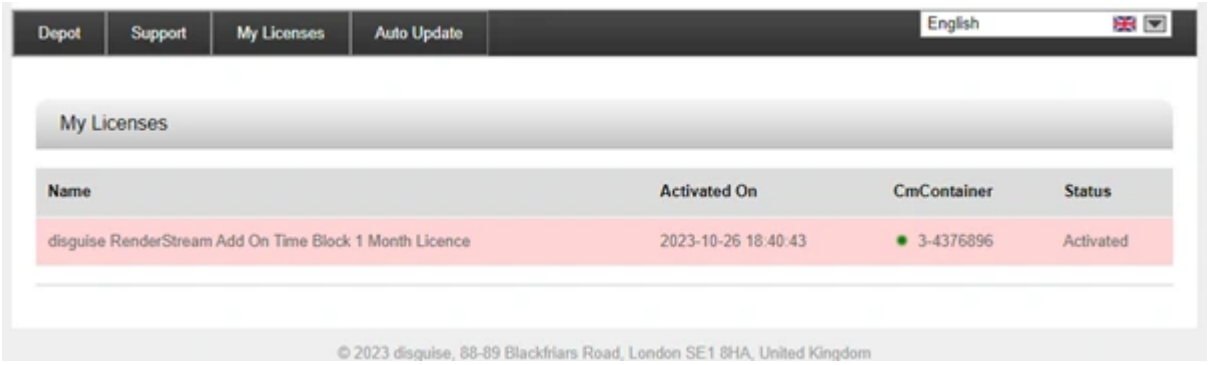
4. Apply the license receipt on a machine with an internet connection

1. Return to your browser and ensure you have the option to **Download License Update File** in WebDepot.
2. Click **Next**.
3. Select the `.WibuCmRaC` receipt file you copied from the offline machine.
4. Click **Upload Receipt Now**.





5. Click **OK** on the next screen.
6. Finally, you should see that the license now has a red background in WebDepot. This indicates that the WebDepot and the CodeMeter License Central database have received the update and confirmed the license activation.



Restoring a CodeMeter License

Sometimes users may need to restore CodeMeter licenses, for example if a dongle was lost, or a software license got accidentally deleted while formatting a hard drive. The Disguise Support team has a process to restore licenses in such circumstances. To avoid abuse, this process requires approval and needs to be actively trigged by our Support team, upon a user request.

> **Note**
>
> Please note that our Support team can only restore licenses provided and controlled by Disguise. To restore any 3rd party licenses, please get in touch with the Support team of the license provider.

Why the license may need restoring

The following sections describe possible scenarios where a license may be eligible for restoration. It also covers how these issues can appear or can be identified by users.

Lost license due to Windows re-install

A typical case of a lost license happens when a user forgets to deactivate a license from their (dongleless) CmAct container before doing a complete wipe or re-image of their PC. Re-formatting the drive where Windows resides, or re-installing Windows can destroy the CmAct container, and all licenses on it are lost.

To prevent his, please always deactivate all licenses from your dongleless CmAct containers before formatting your hard drive. Then you can simply reactivate them afterwards without the need to contact Disguise Support.

Lost or stolen CodeMeter dongles

Theft or loss of a physical CodeMeter container (dongle) is another obvious use case for license restoration. Restoring a license and activating it on another container will also invalidate the license instance on the lost/stolen container.

In case of theft it may also be desirable to add the container serial number to a global block list, which will make the dongle itself unusable. That way the thief gets no benefit at all from the stolen dongle.

Non-returned rental license

As of 2025, Disguise does not yet offer a rental process to lease or borrow licenses; but this is planned as a future feature.

At the moment license borrowing relies on all parties adhering to the terms agreed between each other. This is especially important for returning licenses after the end of the rental period. The license receiver needs to return the borrowed licenses back to the owner using the deactivation process, which requires access to the container where the license currently is activated on.

If a license is not returned in time to the owner (e.g. rental house) using the re-hosting mechanism, then this may also be a valid use case to restore the license.

> **Note**
>
> The rental house must contact the current license holder before contacting **Disguise Support**.

It is important to note, however, that restoring the license should be seen as a *last resort*, since it may affect somebody actively using the license in that very moment.

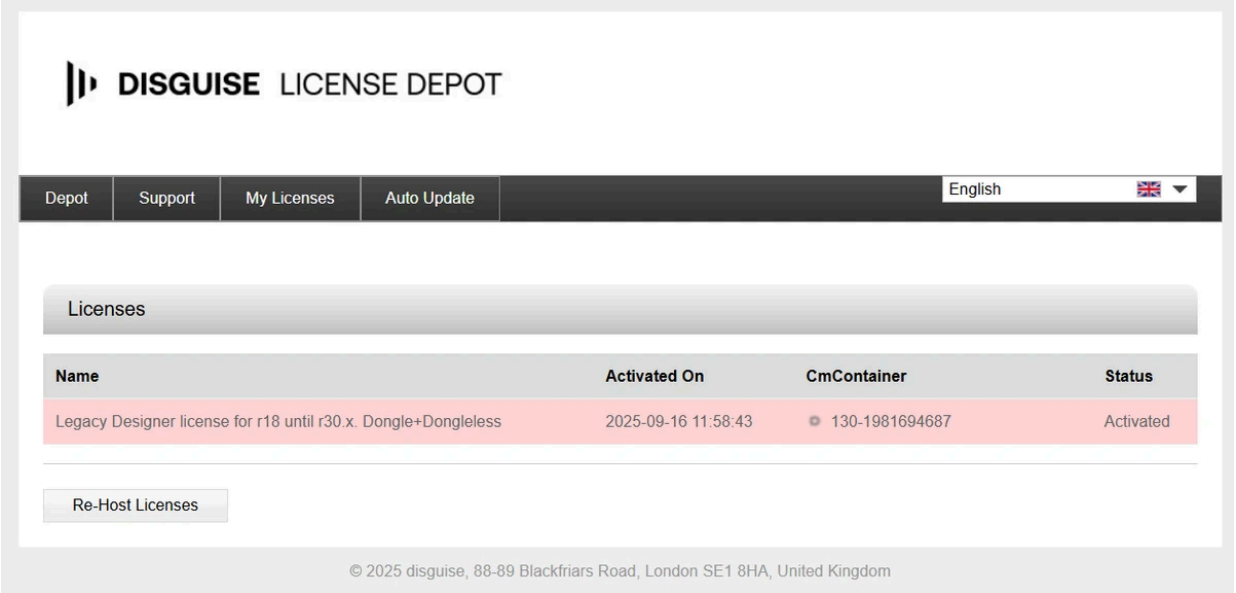
Restoring a license

Restoring a license is very similar to normal license activation, but there are also some key differences:

- The CodeMeter management interface looks slightly different.
- Restoring licenses comes with some additional conditions (see **step 2. below**). Users should carefully read these before proceeding.
- When a license gets restored, the old instance of the license will get automatically withdrawn from its current container. Other licenses on that container will remain unaffected.

Before requesting to restore a license

1. Find the Ticket ID for the licenses that need restoring in the **Disguise Cloud** account.
2. Go to the **CodeMeter management** activation page and enter the Ticket ID.
3. If the license is not currently activated (i.e. it is ready to be activated or re-hosted), then there is no need to restore it. It can be activated as usual.
4. If the license is currently activated, then the **CodeMeter management** will not allow another activation of this TicketID. It will show a page similar to this:



Requesting to restore a license

To get a license restored please email **Disguise Support** with any relevant information, including:

- Required:
  - Ticket ID of the license(s) to restore.
  - Reason for restoring, e.g. loss, theft, accidental deletion of software license, etc.
- If possible:
  - Serial number of the affected CodeMeter container. This is particularly relevant for stolen dongles, since it may be necessary to add those to a global block list.

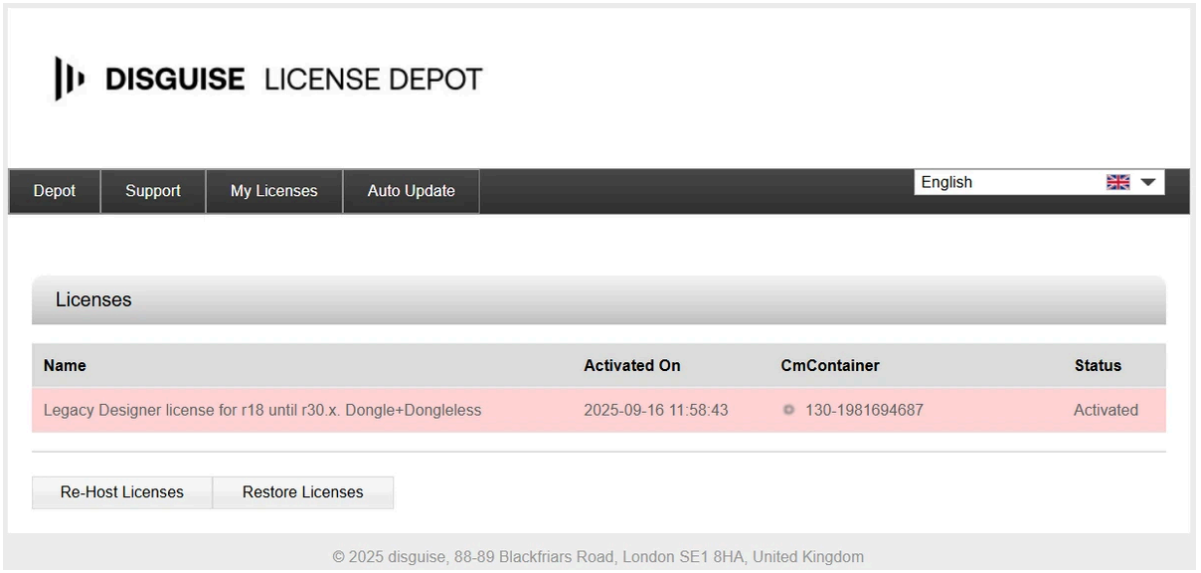
The Support team will then check this information against our database and enable restoration for the affected licenses.

> **Note**
>
> Please note that restoration works on a per-license level. If multiple licenses need to be restored from a CodeMeter container, then provide the TicketID for all these licenses.

License restoration steps

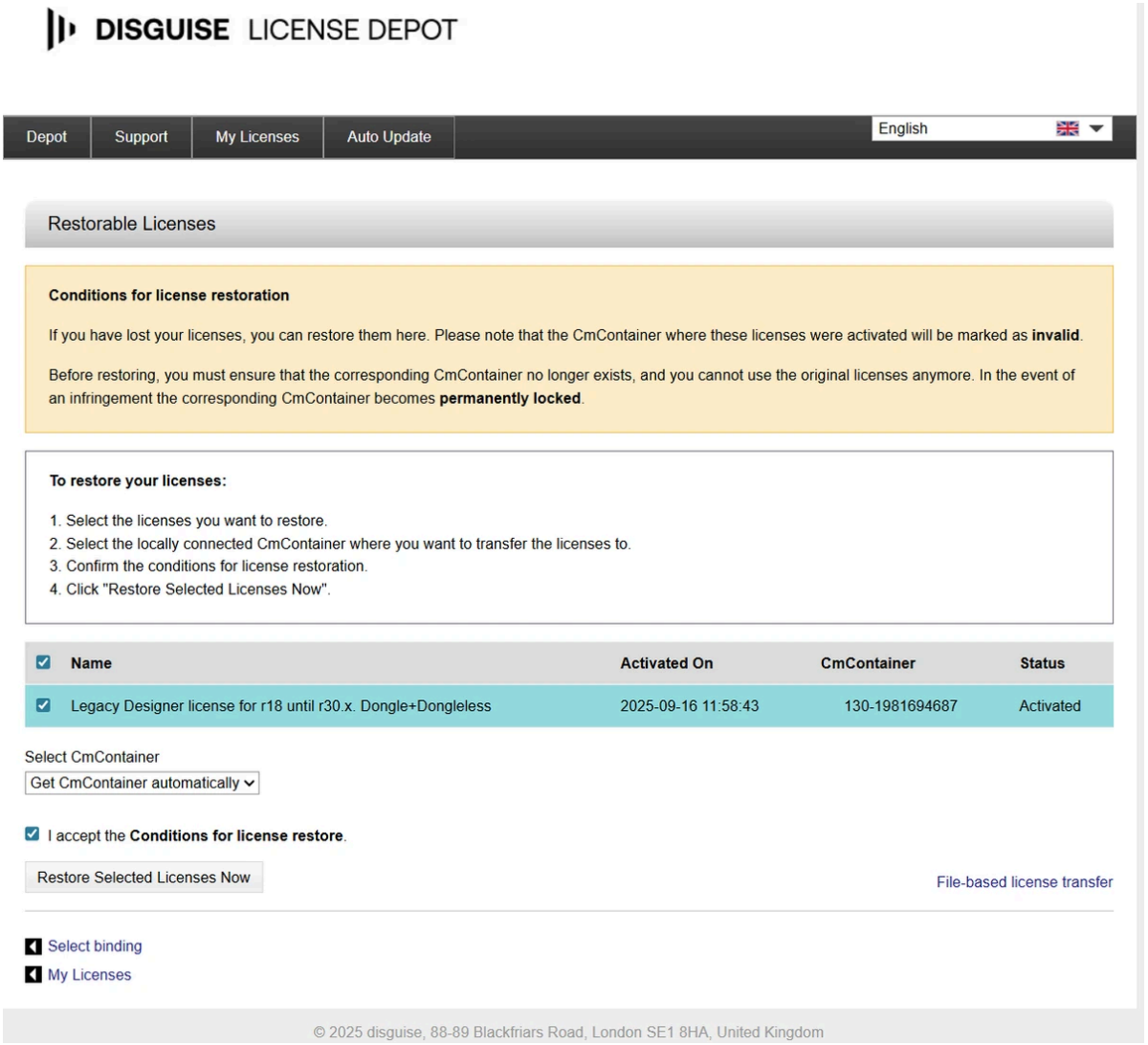
1. Open the **CodeMeter management** and enter the Ticket ID.

2. The activation screen will now have a new **Restore Licenses** button.



3. Click **Restore Licenses** to progress to the usual “container binding” screen.
4. Select dongle or CmAct license binding, as desired.
5. The **Restorable Licenses** screen is shown.
6. Select the licenses from the list that need restoring (in case the Ticket ID contains more than one license).
7. Read and accept the “Conditions for license restoration” by ticking the respective box.

8. Click the **Restore Selected Licenses Now** button. The activation process will progress as usual.



Repeat this process for every Ticket ID that has licenses to be restored.

Creating Support Cases

We understand that things can occasionally go wrong, but rest assured, the Disguise Support team is here to help you as much as possible to resolve any issues you encounter. This page outlines the information we need to troubleshoot more efficiently, allowing us to identify and resolve issues as quickly as possible.

Throughout the user guide we mention contacting support. The best method for doing this is by email to **support@disguise.one**.

The key information we need is:

- Error
- Diagnostic file
- Setup
- Additional project files
- Critical deadline
- Other useful information

Error

- What was the actual error message you received?
- What happened that caused the error?
- Can you reproduce the error?
- If you're able to provide a video showing the steps it will be extremely helpful.
- Can you recreate this error in a new project or the 'start' project?

Diagnostic Log File

The log file is a critical part of the troubleshooting process as it helps us determine what may have caused the error. Disguise support will always ask for a diagnostic file so you can help us by providing the log file when you contact us.

How to create a d3 diagnostic file

1. Open the manager and select the project name.
2. Run your project to generate the error.
3. If possible, provide us with the time the error occurred. This will help us quickly locate the error in the logs.

4. Go to the **Help** menu in d3Manager and choose **Create project diagnostic** which contains both project and system diagnostics, or **Create system diagnostic** which specifically includes system information.

The diagnostic zip file will be generated in your **projects** folder.

> **Tip**
>
> If you experience a Windows Blue Screen, these files will not be included in a system diagnostic. If you experience a Windows bluescreen please include the dump files MEMORY.DMP found in C\Windows along with any dump files found in C:\Windows\minidump

Setup

Understanding your setup is extremely useful.

Providing us with:

- Short description of your setup / hardware
- Output resolution
- d3 version
- Does the error occur with other versions of d3?

Project Files

A skeleton project file is included with your Project diagnostic this will help give us your basic setup however this will not include any content. If you are experiencing a specific issue with a piece of content (for example frame drops in a specific video layer) this content will need to be provided separately to us.

Critical Deadlines

We understand that errors happen at the most inconvenient times and we are here to help you. Please let us know in advance if your issue is urgent and has a tight deadline so that we can prioritise accordingly.

Other Useful Information

- Key deadlines
- Impact the issue is causing

- Details of the show:
  - Show title
  - Production status (pre production, live etc)
  - Type of show (eg stage, tour, xr, location experience)
  - Region of the show so we can ensure your case is handled in the right time zone.

For more information on what happens to a support case once it has been created, please see this article in the Support Portal.

Supported file formats

Designer supports multiple content formats for Video, Audio, Still image and 3D model files. It is important that these formats are used for optimal performance. Only formats listed here are officially supported.

Video files

Designer supports Quicktime .mov files using the following codecs:

- **QuickTime DXV version 2.**

> Download the DXV codec for Mac or Windows from the *Content tools and codecs* section of the **Resource section**

- **QuickTime HAP, HAP Alpha and HAP-Q.**

> Download the HAP codec for Mac or Windows from the *Content tools and codecs* section of the **Resource section**.

- **QuickTime Animation**

> **Warning**
>
> We do not support Delta frames. Videos need to be exported with keyframes at every frame..

- **NotchLC**
- **ProRes**

> A high-quality suite of Apple codecs—ProRes 422, 4444, and HQ—fully supported by Designer.

Filename Tag Issues

Please note that if you use any of the following filename tags, you may encounter issues in Designer. These tags are reserved for media file versioning, and proxy functionality.

- `_region`
- `_slc_region`
- `_v`
- `_frame`
- `_proxy`

Premultiplied vs. straight/matted alpha

Alpha can be rendered into videos and images with subtle differences which can affect how they appear when composited upon output. Premultiplied vs straight alpha will require different blend modes depending on which is used. There is no preference in Designer to either one, but if using content with premultiplied alpha, it should utilize the **Premult Alpha** blend mode, rather than **Alpha**, which should be reserved for straight alpha.

Also note that **Premult Alpha** is usually the only option available when creating fuzzy edges against an alpha background, as the pure alpha workflow requires the colour which is being faded from to be available at full intensity throughout the gradient, while only fading the alpha component. That sort of thing is tricky to create in content creation packages, so falling back on **Premult Alpha** makes more sense in those cases.

Maximum resolutions of video files and still images

Designer supports video files and still images up to 16384x16384.

For audio embedded in video files:

- Uncompressed
- Stereo 16 bit
- 44.1 KHz. Currently d3 **only** supports 44.1 KHz, any other frequency will generate an error.

Audio files prior to r14.3

Quantised tracks option 1:

- .mp3
- Stereo 16 bit
- 44.1 KHz, constant bitrate. Currently d3 only supports 44.1 KHz, any other frequency will generate an error.
- 256 Kb/sec is a recommended balance between quality and file size.

Quantised tracks option 2:

- .wav
- Stereo 16 bit
- 44.1 KHz

Quantised tracks option 3:

- .aiff
- Stereo 16 bit
- 44.1 KHz. Currently d3 only supports 44.1 KHz, any other frequency will generate an error.

> **Note**
>
> To read about multi-channel audio support, see the Output multi-channel audio page.

Audio files after r14.4

These audio file formats can be used on the audio layer.

Uncompressed WAV files with the following properties

- Unsigned 8 bit, Signed 16 bit, 24 bit or 32 bit PCM, 32-bit or 64-bit floating point encoding
- Sample rates up to 192 kHz
- 1 or 2 channels

Uncompressed AIFF files with the following properties

- Unsigned 8 bit, Signed 16 bit, 24 bit or 32 bit PCM, 32-bit or 64-bit floating point encoding
- Sample rates up to 192 kHz
- 1 or 2 channels

MP3 with the following properties

- CBR up to 320kps (variable bit-rate not supported)
- 8 kHz, 11.025kHz, 12kHz, 16kHz, 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz sample rates
- Stereo, joint stereo or mono

> **Note**
>
> The software internally uses a 32-bit floating point audio pipline, so best performance can be achieved by using 32-bit uncompressed WAV encoding, at a sample rate that matches your audio output.

Audio files after r15.2

These audio file formats can be used on the audio layer.

Uncompressed WAV files with the following properties

- Unsigned 8 bit, Signed 16 bit, 24 bit or 32 bit PCM, 32-bit or 64-bit floating point encoding
- Sample rates up to 192 kHz

Uncompressed AIFF files with the following properties

- Unsigned 8 bit, Signed 16 bit, 24 bit or 32 bit PCM, 32-bit or 64-bit floating point encoding

- Sample rates up to 192 kHz

MP3 with the following properties

- CBR up to 320kps (variable bit-rate not supported)
- 8 kHz, 11.025kHz, 12kHz, 16kHz, 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz sample rates
- Stereo, joint stereo or mono

Still images

Disguise supports several still image formats that are listed below:

- .png (supports alpha-channel)
- .jpeg (does not support alpha-channel)
- .bmp (supports alpha-channel)
- .tiff (supports alpha-channel)
- .exr (supports alpha-channel, no support for image sequences)

> **Note**
>
> Loading large still images can be slow, and Disguise does not provide benchmarks or measure load time. This means that when swapping between large still images you may experience a brief flash to black while the new image loads. The best way to mitigate this is to re-encode the image in to a more performant format, like a single frame of a Video Format.

Image sequences

- TGA
- TIFF
- DPX

8-bit and 10bit is supported where applicable. All formats support the use of alpha channel (with the exception of 10bitDPX), and any framerate.

> **Note**
>
> Although other formats may work, only those listed above have received enough testing to formally support.

For more information, see Image Sequences.

3D meshes - .abc, .fbx, and .obj

.abc

Designer supports Alembic (.abc) files, which are particularly useful for animated meshes. Place the file in the project's mesh object folder and select it as you would an OBJ. Like an OBJ, an Alembic file can be used either as a prop or as a UV-mapped video screen.

.fbx

- .fbx files without materials, textures, and animations. For more information, contact support@disguise.one.

.obj

- .obj files used as the mesh file for video screens need to be UV mapped.
- .obj files used as the mesh file for Props do not need to be UV mapped.

> **Note**
>
> To read more about preparing 3D meshes for Designer, see the 3D Fundamentals sub-chapter.

Currently supported:

- Xform
- PolyMesh

Not currently supported

- Curves
- Points
- Camera
- SubD
- NuPatches
- FaceSet
- Light
- Material
- Custom data
- Writing Alembic files

System Requirements

The following table lists the recommended system configuration for running Designer, along with the minimum requirements:

Component	Specification
Operating System	Windows 10 or 11, 64-bit
GPU	Discrete GPU with at least 16 GB video memory (min. 8 GB), DX11 compatible
CPU	At least 4 cores, 8 threads and 3.4 GHz base frequency (min. 2 cores, 4 threads and 1.9 GHz base frequency)
Memory	16 GB (min. 8 GB)
Audio	Any permitted
Storage	50+ GB (min. 20 GB)

> ⚠ **Caution**
>
> Disguise requires a 64-bit operating system.

Operating system

To run the latest version of Designer your system needs to have a Designer license. Licenses can be obtained via the Disguise Cloud, and either installed directly on the machine (dongle-less solution), or they may be installed on a USB Codemeter dongle, available for purchase from the Disguise webstore.

Virtual Machines - Parallels

Virtual Machines like Parallels do not run Designer, since Disguise requires DirectX11. Bootcamp may be used, but only if you are working on a pre-M1/M2 Mac platform.

Designer software

For information on how to install the latest version of Designer please see the sub-chapter Updating the software.

If you encounter any issues with the installation of the Designer software or license, please contact the **Support Team** for assistance.

Sharing Designer Usage Analytics

When installing Designer using either the Starter installer or Full installer, you have the option to share usage analytics with us. This helps us understand how you use Designer so we can prioritise and design tools that best support your workflows.

You can toggle this option on or off at any time by going to `d3Manager > Help > About Manager` and clicking the checkbox at the bottom labelled **Share Designer usage and diagnostic analytics**. This setting, whether set in the installer or via d3Manager, will persist through machine restarts and Designer re-installs, but with **NOT PERSIST THROUGH RE-IMAGES** (like all of our other settings!).

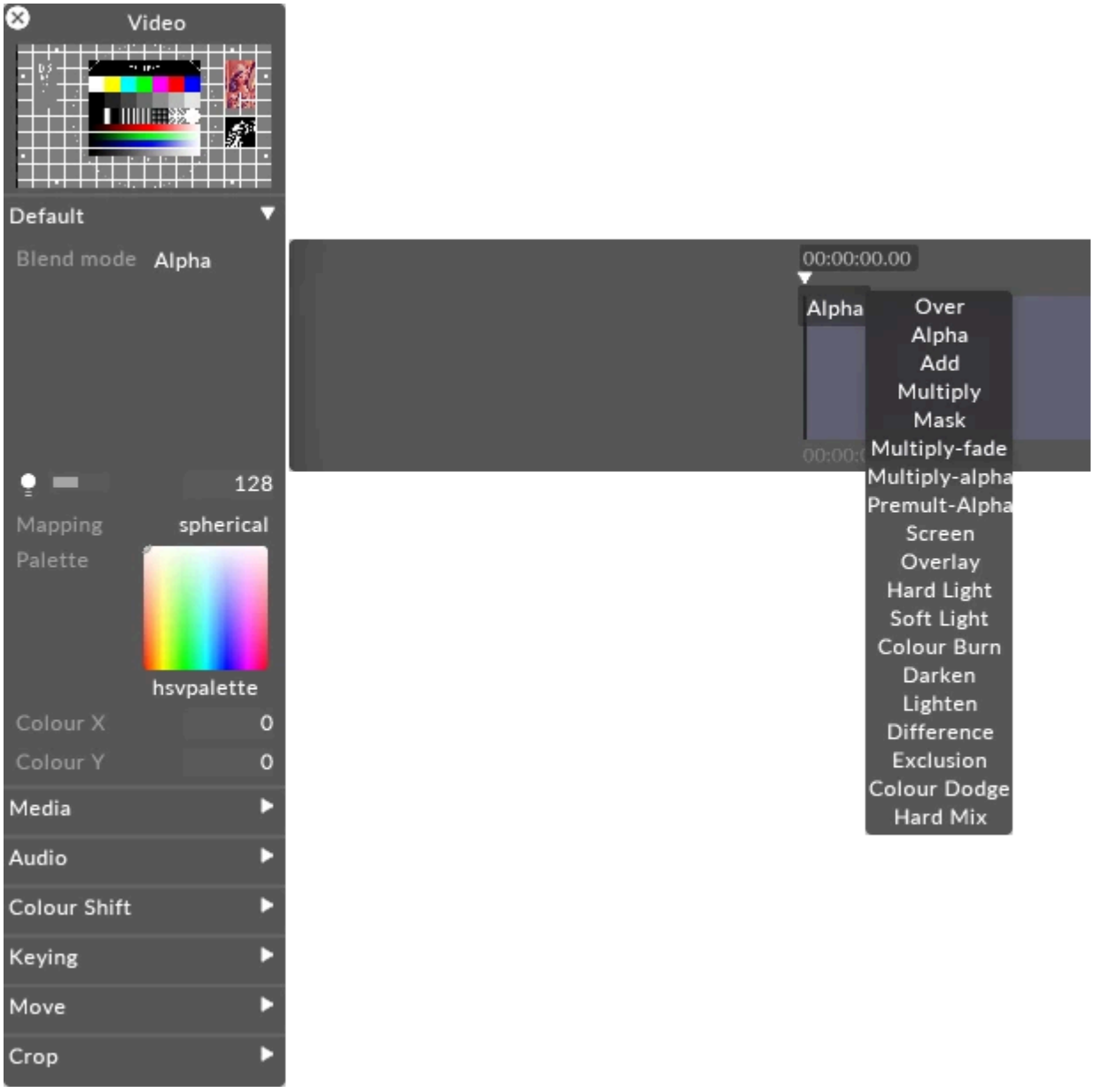
We understand that in some cases our users are building projects under strict NDAs or have other reasons to turn this feature off. For this reason, we will describe the data that this feature shares with us, so you can make an informed decision about whether to disable this option.

Toggling the option **ON** will share with us:

1. Minimal event logs in the system that tell us things at the system level, such as:
   - What time Designer was launched and closed.
   - When a user logs in via d3Manager.
   - What Disguise media server model is being powered on or off.
   - What Designer software version has been installed.
   - What CodeMeter License is being used to license Designer.
   - etc.
2. Specific user events and actions while programming such as:
   - When a layer was added or removed from the timeline and what type it was.
   - When a track is added or removed from the project.
   - When certain device drivers are started and stopped.
   - etc.
3. A project summary which includes a snapshot of the project on the close of a Director and/or Editor.
   - This includes a list of most serialized objects and what they link to. This allows us to infer information like:
     - `Media File: <MyVideo> is sequenced on Track: <MyTrack> in Video Layer: <MyLayer>`
     - etc.
   - This data is **FULLY ANONYMIZED** via hashing, so no project, media or user-configurable text is identifiable to us.
     - So what we can infer from the example above is **ACTUALLY**:
     - `Media File: ANON17272503146233135311 is sequenced on Track: ANON15467174445949765117 in Video Layer: ANON1895260`
     - This allows us to analyse and understand **how** our users are building projects, without being able to know anything about the **specifics** of the project itself.
     - After r32.3, this anonymization happens when the file is written. Before r32.3, this anonymization happens after it is uploaded.

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

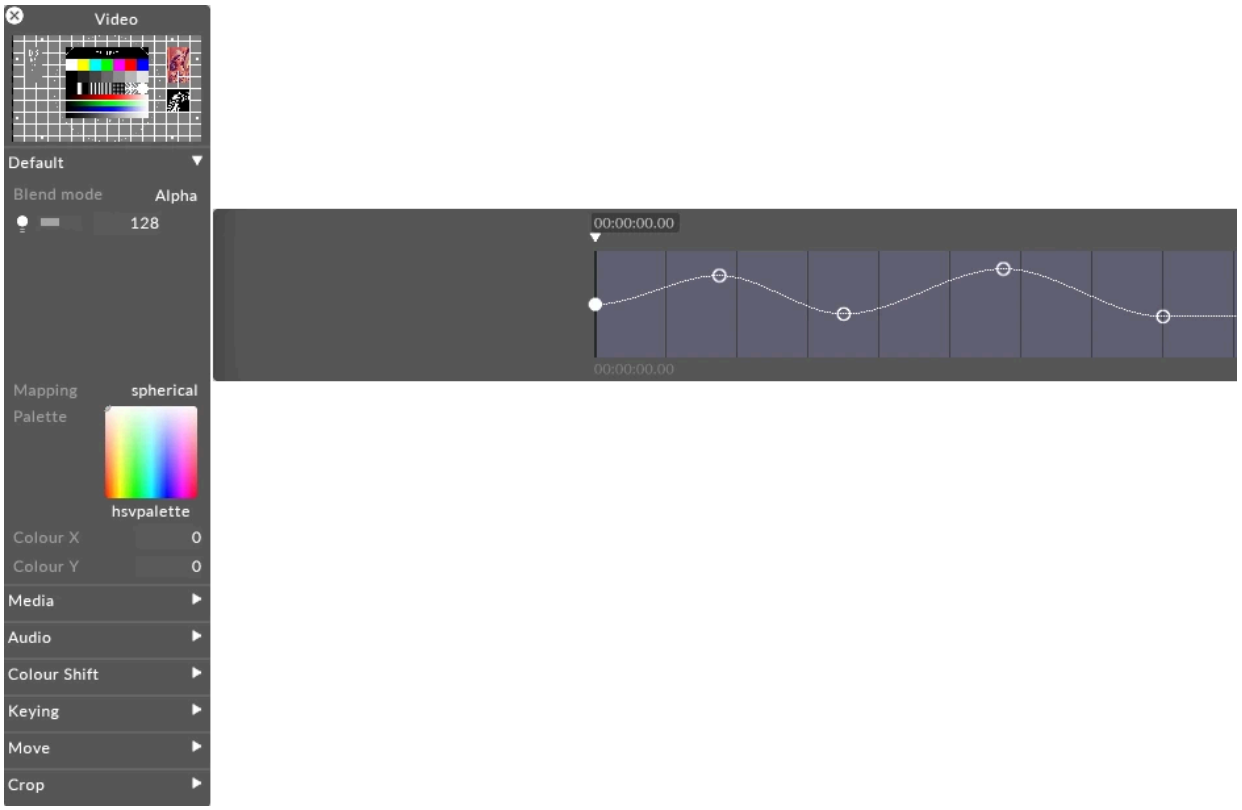
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: Sequencing with Sockpuppet. Layers without a sockpuppet patch do not behave in this way.

Colour Shift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Gain

Multiplies the RGB output of the layer by a constant, leaving the alpha channel untouched. Use **Gain** to dim or boost the brightness of a layer multiplicatively.

When set to 1, no change is applied to the image. When set to 0, the output is solid black while the layer remains compositionally present, so a layer with reduced alpha still blends normally with the layers below. When set to 2, the image is brightened, with any pixel values above 1 clipped to white.

Gain is applied after **Brightness (shift)** and **Contrast (scale)**, so the multiplier acts on the result of those adjustments.

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` set to *Together* (from left to right): 0, 0.3, 0.8



With `RGB controlled` set to *Separate*, red min (from left to right): 0, 0.3, 0.8

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` set to *Together* (from left to right): 1, 0.7, 0.2



With `RGB controlled` set to *Separate*, red max (from left to right): 1, 0.7, 0.2

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` set to *Together* (from left to right): 0.1, 1, 4



With `RGB controlled` set to *Separate*, red gamma (from left to right): 0.1, 1, 4

Common Layer Properties

Most of the Disguise layers share the same properties.

These are:

- Preview Thumbnail
- Blend mode
- Brightness
- Mapping
- Palette
- xCol, yCol
- Content
- Colourshift

To see a comparison table of each layer type, view the following pages:

- Content
- Control
- Effect
- Generative
- Legacy
- Previsualisation

Content

This points to the still image/video file (depending on the layer type) that defines the Bitmap/Video layers content. Selecting this property will open the Texture/Videoclip object library, which shows all of the still image/video files saved on your local hard-drive in the **DxTexture/VideoFile** folder.

To change the content inputted into the layer:

1. Left-click bitmap / video (depending on the layer type) to open the Texture/Videoclip object library.
2. Left-click the still image/video file you want to input into the layer.

> **Note**
>
> Please note: Designer does not provide video clips by default. If you want to use video or content other than the standard still images provided in Designer, you will need to import a custom still image/video file.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file/video file andhow to access it in . Also save the file to a supported file format.

Content properties

Content properties are sometimes known as Video clip properties and can be accessed be right-clicking a content file thumbnail from a layer.

Content properties are unique to a content file. So, by changing the content properties on a piece of content, these properties will apply whenever that clip plays on **any** layer. The exception to this is if you've duplicated the clip instance within the VideoClip library.

Accessing content properties

Content properties can be access by right-clicking an asset from acontent layer such as:

- Video
- LegacyVideo
- Bitmap
- Audio
- Web.

[Animated GIF: Opening layer properties]

General properties

All properties displayed at the top of the editor are read only.

Number of frames

Specifies the number of frames within the file.

Resolution

Specifies the file resolution.

Codec

Specifies the Codec for the file.

Bits per Channel

Specifies the bits per channel of the file.

Has Alpha

Specifies whether the file has an Alpha channel or not.

Has Audio

Specifies whether the file has embedded Audio or not.

Original FPS

Specifies the original Frames Per Second of the file.

Data rate

Specifies the data rate in megabytes per second of the file.

Edit

The Edit properties can all be altered to suit user requirements.

FPS

Sets the Frames Per Second for the content. For example, doubling the FPS will cause to display the same frame twice in a row, and half the FPS would cause to display every other frame.

Start

Clip start: Specifies the start frame.

End

Clip end: Specifies the end frame.

In

Loop in: Specifies the in frame.

Out

Loop out: Specifies the out frame.

Filtering

Bilinear filtering

Specifies whether Bilinear filtering is on or off for that content.

Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.

Frame blending

Specifies whether frame blending is On, Off or Auto for the content.

Auto will enable frame-blending if the FPS of the content in the clip, after speed is applied from the layer, is lower than the project refresh rate.

Quantised video clips always frame blend when Auto is selected.

Deinterlace method

This option is only available for live video inputs and allows you to specify a deinterlacing method. For more information, see Interlaced video capture.

Quantisation

Quantised

When set to No, the content will play at its defined frame rate. When set to Yes, the content will play at the specified number of beats.

Beats

The number of beats the content should play back to when the Quantised property is set to Yes.

Cropping

Clip type

Specifies the clip type the content should use. This property used to be held in the direct mapping in previous versions of .

Clip to canvas: Clips the content to the canvas.

Fit into canvas: Fits the content to the canvas, but can result in 'black bars' of empty space along one axis of the content.

Stretch to canvas: Stretches the content so it fits the whole canvas, while ignoring aspect ratio.

Pixel-perfect: Displays the content, pixel perfect and does not stretch or scale in any way.

Zoom point

Crop left/right/top/bottom

Crop can be used to crop the canvas manually. Entering minus values creates additional black space around the content.

Colour shift

Colour shift

Defines the colour shift for the clip. Colour shifts allow you to specify brightness (shift), contrast (scale), saturation scale, Hue shift, RGB control as well as Keying threshold, Hardness and Key colour. See Colour shifts for more information.

Colour profile

This property allows you specify a colour profile for the content. Colour profiles consist of a colour space and gamma curve specification. See Colour profiles for more information.

Versions

Proxies

This property shows the available proxy files for the content. For example Full, 1/2, 1/4 and 1/8 resolution.

VideoAsset

This defines which video file is being played. Right-clicking this thumbnail will open the version control editor which allows for specifying which version of content is being used. For more information see Content versioning.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

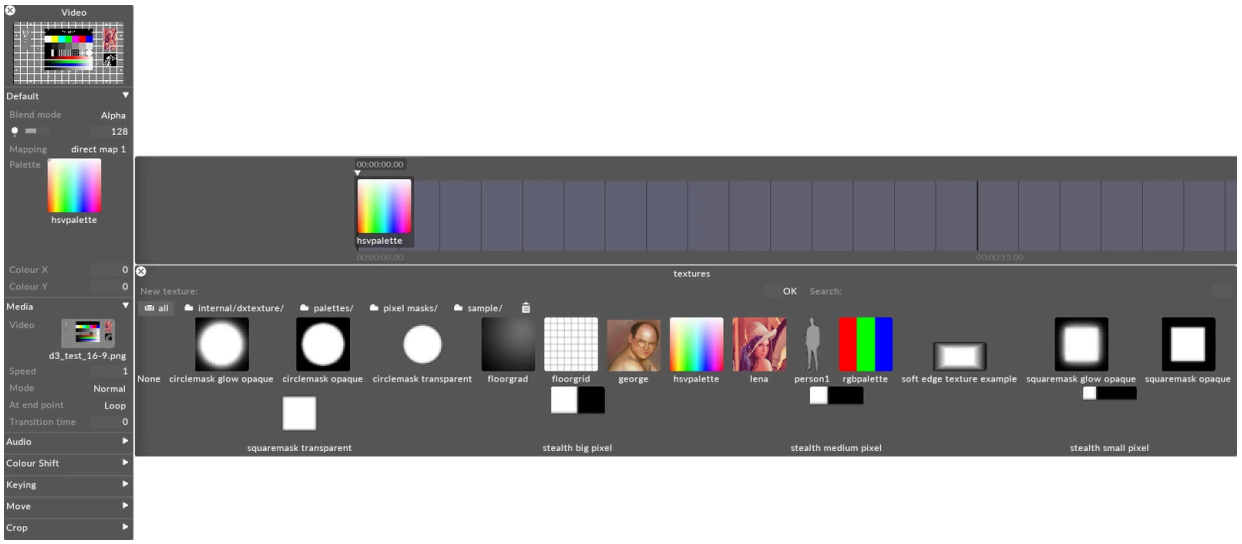


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter Content Mapping.

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

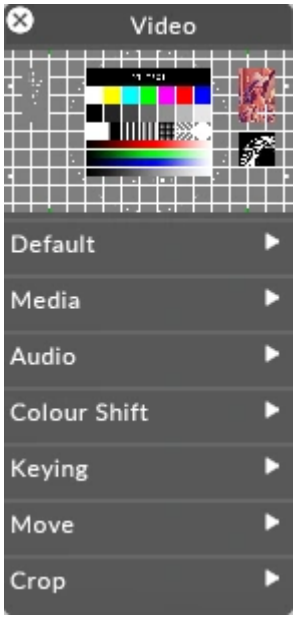
1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a supported file format.

Preview Thumbnail

This property is a small preview window at the top of the editor showing you what the layer output looks like.

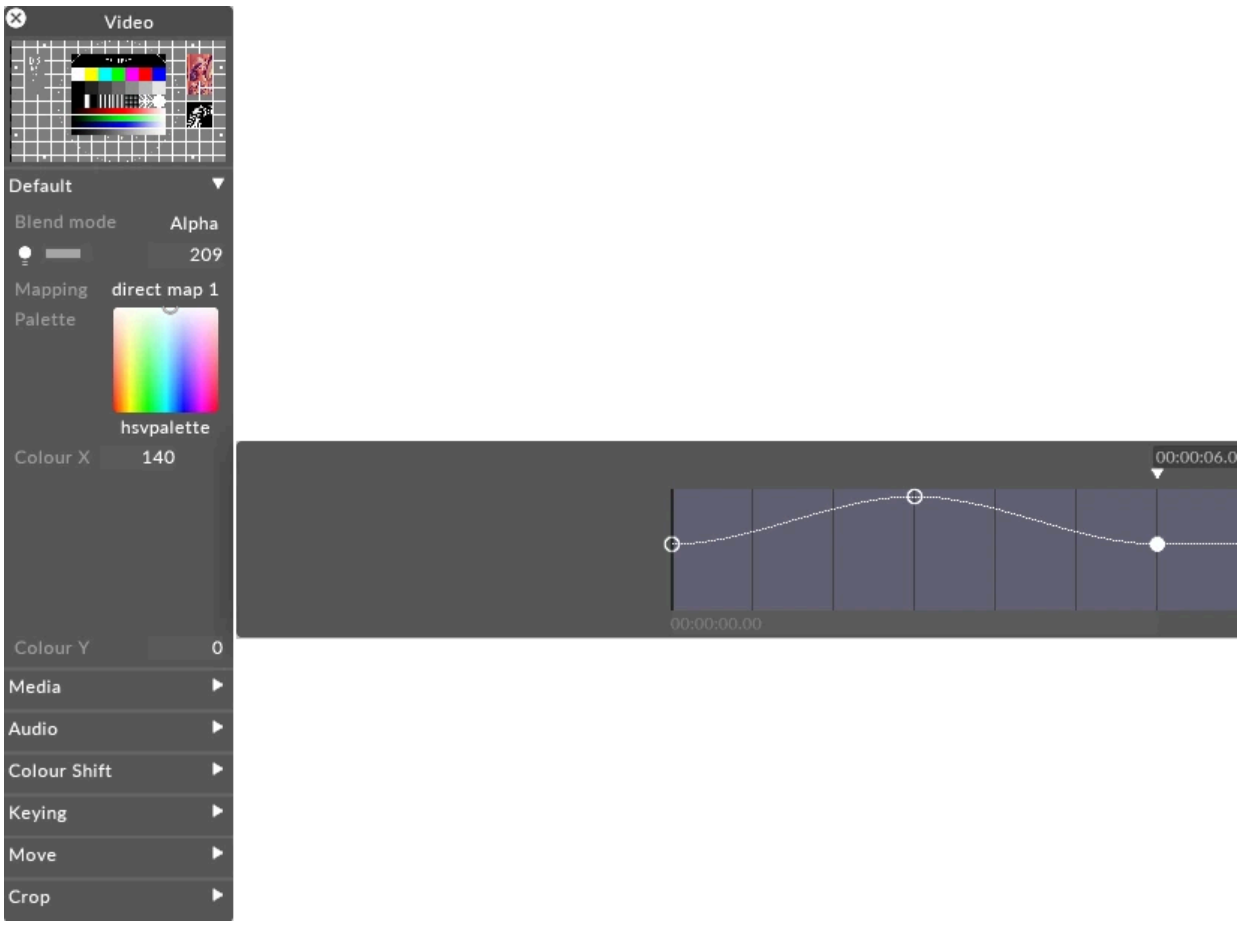


xCol yCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.

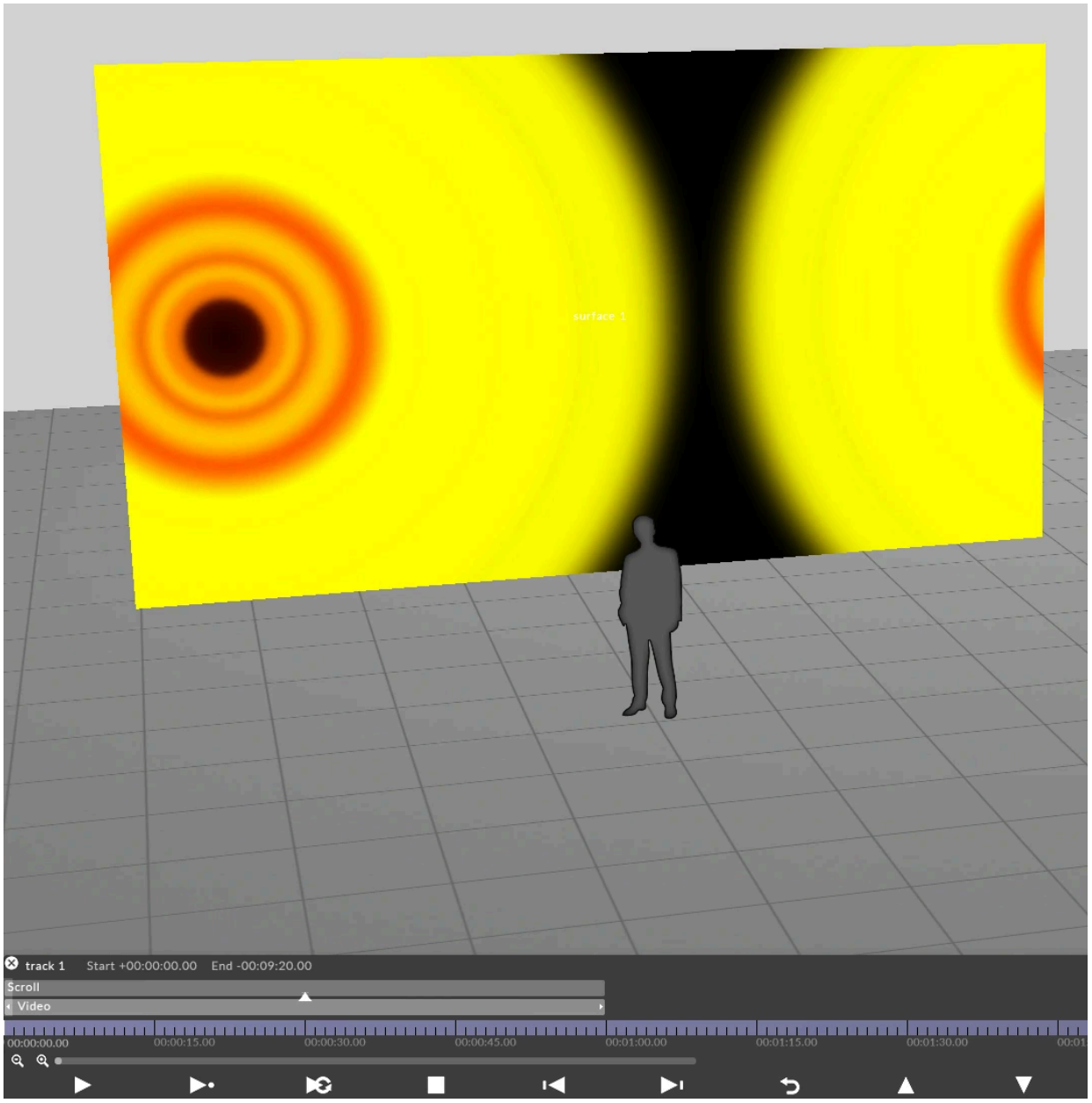


Compositing Layers

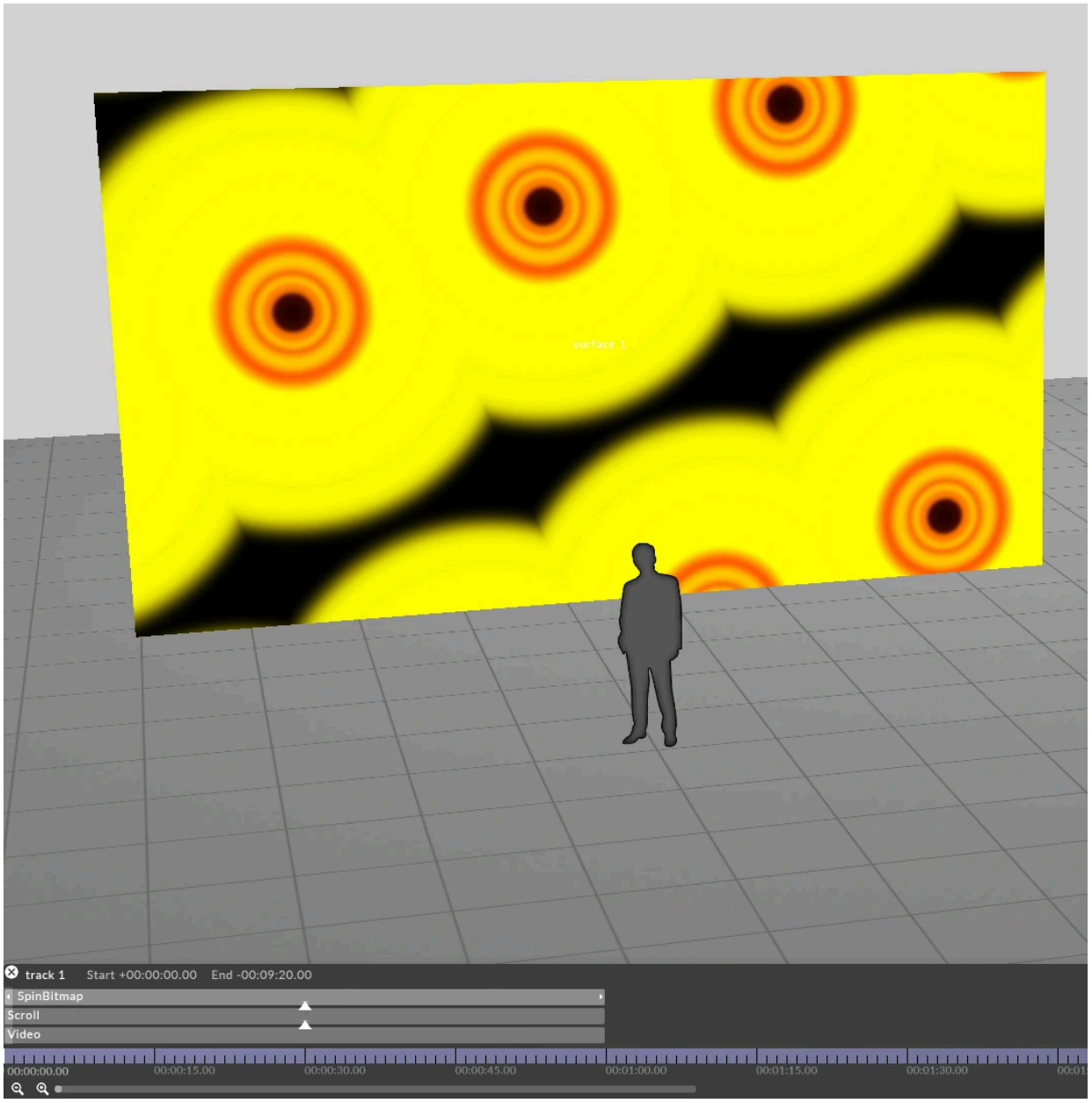
Arrows provide a way of compositing multiple layers together. For instance, you could take the output of a Video layer and pipe it into a Scroll layer, to scroll the video from side to side.

Multiple layers can be chained together, so for example, you could take the output of the Scroll layer and pipe it into a SpinBitmap layer.

1. To create an arrow between two layers, make sure the source layer is below the destination layer in the layer stack (because layers are rendered from the bottom up).
2. Position the cursor over the source layer, hold down the Alt key, press the mouse button and drag away from the source layer. You will see an arrow appear that is following the cursor.
3. Now move the mouse cursor to the destination layer and release the mouse button. This will create a new arrow between the source and destination layers.



Scrolling video content created by using an Arrow to pipe a Video layer into a Scroll layer.



To remove an arrow, hold down the Alt key and right-click the root of the arrow.

Arrow-supported layers

All content layers can be used for piping in content into another layer. However, not all layers support being piped into.

Currently, only the Bitmap and Effect Layers can be piped into.

Copying & Pasting Layers

A layer can be copied and pasted in the current track or even copied and pasted onto another.

Copying a layer

1. Right-click the layer to open the Layer menu.
2. Left-click **copy**.

[Animated GIF: Copying a layer]

[Animated GIF: Copying a layer]

Copying a layer will copy all of the layers keyframe events. It is recommended that you rename the layer to avoid future confusion. However you cannot copy and paste groups of layers. To do this, you can export and import layers. Please read the section Exporting / importing layers for more information on this feature.

Pasting a layer

1. Right-click the Track bar where you want to insert the layer on the Timeline. This will open the Track bars menu.
2. Left-click **paste layer 'LayerName'** to insert the layer copy at the currently selected point on the Timeline.

[Animated GIF: Pasting a layer]

[Animated GIF: Pasting a layer]

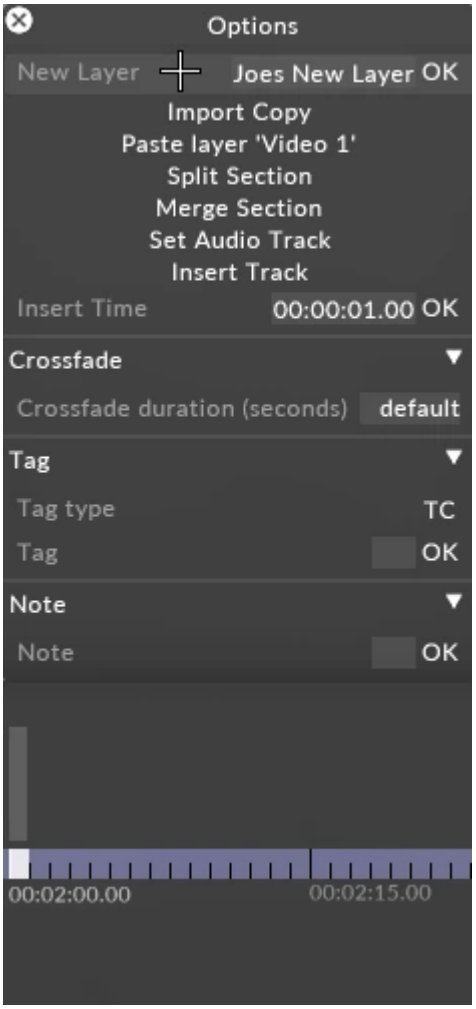
Creating Layers

A layer can be created using two methods.

You can create a layer without a name, but it is recommended that you name your layers so that the Timeline is easier to understand.

Option 1

1. Right-click the Track bar at the point on the Timeline where you want to create the layer. This will open the Track bars menu.
2. Type the name of the layer in the **new layer** text field and hit **Enter**.



A good format for naming your layers is **Layer-type description**, for example **Bitmap-layer front screen projection**. This will open a list of all of the layers available in Designer.

3. The layer menu is separated into different layer categories (content, control, effects, generative and previsualisation) with each category grouped under a collapsible separator.

4. Typing into the search box opens up separators automatically to show you matching layer types.
5. Left-click the layer you want to create. This will create the new layer at the point on the Timeline you selected. The layers editor should also open in the top-left corner of your screen. You can now edit the layer or restructure the layer.

[Animated GIF: Creating a group]

Option 2

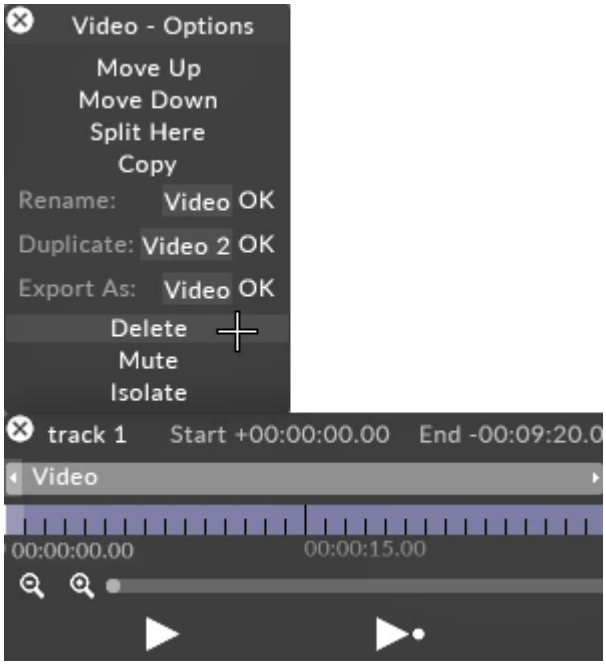
1. Select a Track bar at the point on the Timeline where you want to create a layer.
2. Hit **Ctrl+L**. A list of all of the layers available in will open.
3. Left-click the layer you want to create. This will create the new layer at the point on the Timeline you selected. You can now edit the layer or restructure the layer.

[Animated GIF: Creating a layer shortcut]

Deleting Layers

Deleting a layer

1. Right-click the layer to open the Layer menu.
2. Left-click delete. The layer will be immediately deleted from the Content Layer section.



Deleting multiple layers

1. Hold down the left Shift key and left-click and drag a selection rectangle in the Content Layer section over the layers you want to select.
2. Right-click the selection rectangle to open the Multiple Layer menu.
3. Left-click delete. The selected layers will be immediately deleted from the Content Layer section.

Disabling Layers

You can disable a layer to exclude it from rendering, sequencing, and state updates. Unlike muting, which is a temporary session-level control, disabling a layer is a project-level setting that persists across track changes, project saves, and restarts.

Use disable when sequencing isn't currently needed by the show, but took significant time to implement and may be needed again later. This allows you to preserve your work without it affecting show playback or performance.

Disabled layers are excluded from:

- Rendering and prefetch operations
- Sequencing and state updates
- Timecode-related transport behavior
- Layer stack processing

Visual indicators

When a layer is disabled:

- The layer appears with dimmed colour in the timeline
- **[DISABLED]** text is appended to the layer name
- The layer remains visible in the timeline but does not affect output

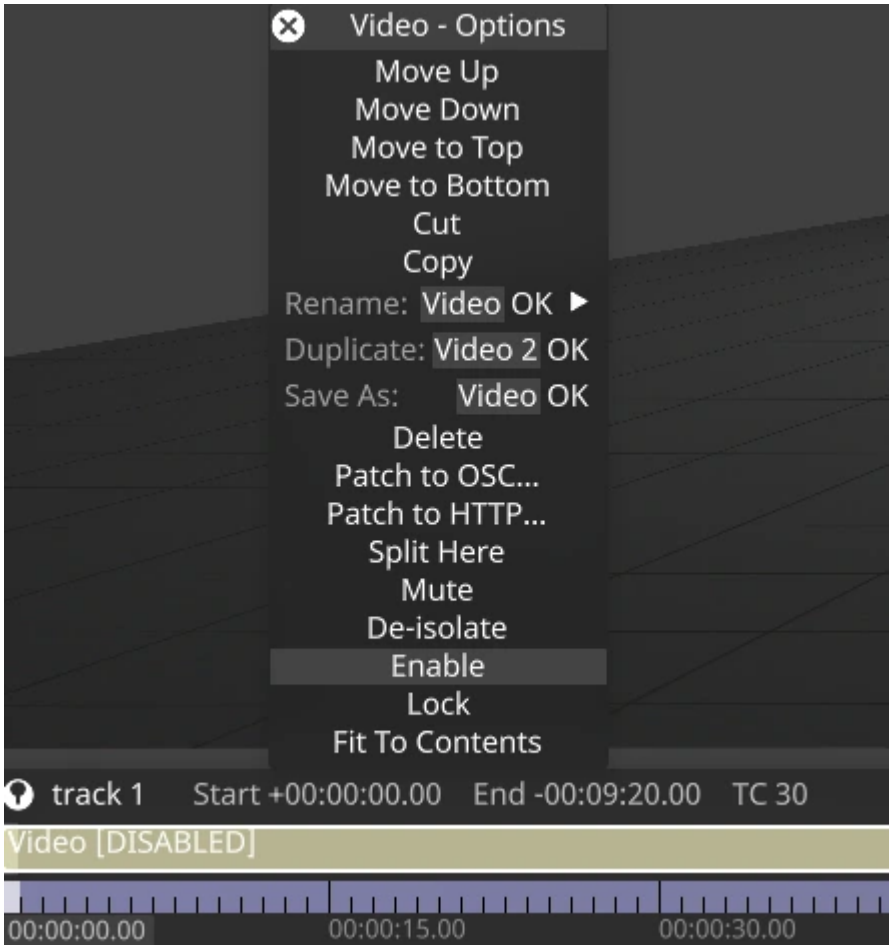
Disabling a layer

1. Hold down the **D** key and left-click the layer.

Or alternatively

1. Right-click on the layer to open the Layer menu.
2. Select **Disable**.

The layer will display with dimmed colour and show **[DISABLED]** in the timeline.



Enabling a layer

1. Hold down the **D** key and left-click the disabled layer again.

Or alternatively

1. Right-click on the disabled layer to open the Layer menu.
2. Select **Enable**.

The layer will return to its normal appearance and resume normal operation.

Disabling group layers

When you disable a group layer, all child layers within that group are also disabled. This allows you to quickly disable entire sections of your timeline structure.

Disabled vs Muted

Disabled and muted layers serve different purposes:

Feature	Disabled	Muted
Purpose	Persistent exclusion from rendering and sequencing	Temporary visual toggle
Scope	Project-level (affects all machines)	Session-level (per machine)
Persistence	Saved with project, survives track changes and restarts	Resets on track change or restart
Visual indicator	Dimmed colour + [DISABLED] text	Dark grey colour
Activation	D + click or right-click > Disable/Enable	M + click or right-click > Mute

Use **Disable** when you need to preserve complex sequencing that isn't currently needed by the show but may be required later. Use **Mute** or **Isolate** when troubleshooting to check whether specific layers are behaving as expected.

Temporary layer control

If you need a quick temporary toggle to hide a layer during the current session without affecting the project file, use the **Mute** or **Isolate** features instead of Disable. These are particularly useful for troubleshooting and checking whether specific layers are behaving as expected during show development. See Muting Layers and Isolating Layers for more information.

Duplicating Layers

Right-click the layer to open the Layer menu.

Type the new layer name in the duplicate text field (if different from the default layer name) and hit Enter. The default layer name in the text field will be the name of the layer you are duplicating with a number added to the end.

[Animated GIF: Duplicating a layer]

Dynamic Layer Naming

This feature allows users to rename layers with tags that will be automatically replaced in the rename process by specific values in the layer.

> **Note**
>
> The feature does not keep updating the names as you sequence, the rename is a one-time action.

Workflow

When renaming a layer either by right-clicking on the layer or pressing Ctrl+r this feature is available.

1. In the layer's Rename field insert words between curly braces { } to create a dynamic tag.

2. Press **Enter** or click **OK**. The text is automatically replaced with special values based on the tags entered.



Example using "blend mode" as a tag

The tags that are supported are:

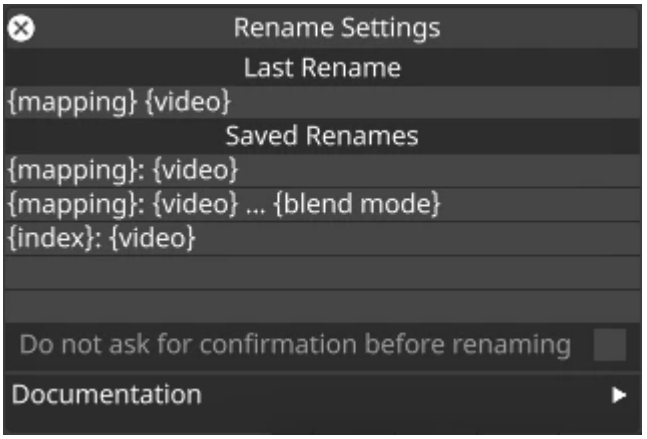
- `{type}` is replaced by the type of the layer.
- `{index}` is replaced by an incrementing index starting from 1.
  - You can append a number after "index" as the start number (e.g. `{index5}`).
- `{currentname}` is replaced by the current name of the layer.
- `{field}` will be replaced with the name of the first keyframe in the field specified.
  - **Examples**: `{mapping}`, `{speed}`, `{blend mode}`.
  - If any field in the rename is not present in the layer the `{field}` text will be removed from the final name.

> **Note**
>
> Typing in a layer name with mismatching { } tags will stop renaming and make the 'Rename' widget turn **red** with the error explained in a tooltip.

Reusing rename patterns

Sometimes you might want to reuse the same rename tag pattern for several layers as you are working.

Clicking on the arrow next to the rename field will open the "Rename Settings" widget:



Rename Settings widget

This widget is auto-populated with the last rename pattern and includes some user-editable text boxes for the user to store renames that they would like to reuse. The contents of these text boxes will persist through closing the widget and restarting the project.

Renaming multiple layers

When renaming multiple layers the user is presented with a confirmation dialogue showing a preview of the renames to be generated. At this stage, the user can either abort or finish renaming the layer.

This dialogue can be toggled off with a toggle.

Documentation

You can find in-app documentation of the supported tags in the Rename Settings widget at the bottom for quick reference.

Editing Layers

Editing layers involves using the Layer editor and the Keyframe editor

What is the Layer editor?

The Layer editor contains a series of properties which are specifically set for each individual layer. All of these properties can be edited.

Opening / closing the Layer editor

To open the Layer editor:

- Left-click the layer from the Timeline.

For information on how to create a layer please see the sub-chapter Creating layers.

If the currently selected Track bar is underneath the extent of the layer (not including the extender tabs on either side), the Layer editor will open at the top left of your screen. If the currently selected Track bar is outside the extent of the layer, Designer will close the editor. This is to ensure that you only see editors for layers that are active.

The layer editor looks like a standard object editor, except that it has a small preview window at the top of the editor showing you what the layer output looks like.

To close the Layer editor:

- Left-click the layer in the Timeline, or left-click the close button (x icon) in the top-left corner of the Layer editor.

Hit Ctrl whilst left-clicking a layer in the Timeline to view multiple Layer editors simultaneously.

Layer properties

Each layer in Designer has a specific set of properties. Please read the chapter Layer types to understand each layer types individual properties. In addition, please read the next sub-chapter Common Layer Properties which explains the properties that are shared by most layers that produce visual output.

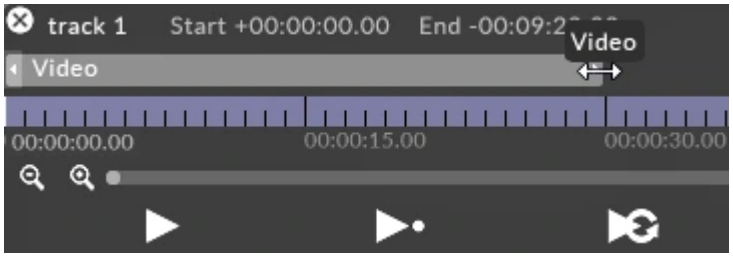
Extending Layers

You may want to extend a layer so that it renders content for a longer section of the Timeline.

Extending a layer

1. Left-click the layer to open two small tabs at the layers edges.
2. Hover your mouse cursor over the layers edges. You will notice the cursor change from a cross hair to a double ended arrow.
3. Left-click and drag the layers extender tabs to the left or right to extend the layer.

[Animated GIF: Extending a layer]



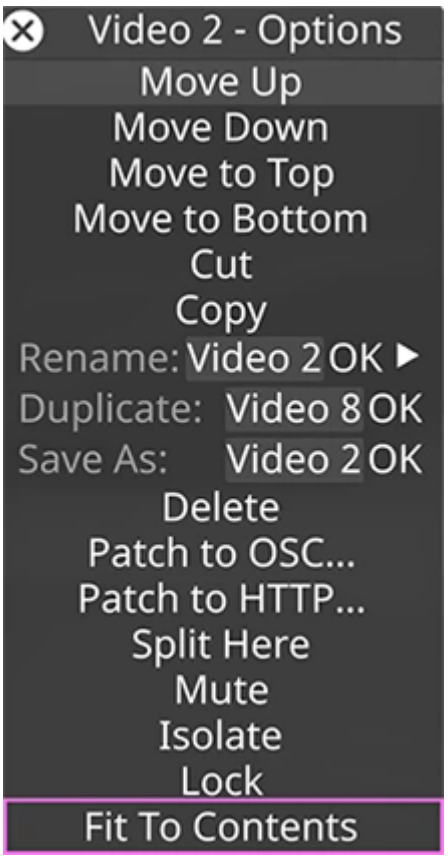
Extending a layer does not modify its keyframe events, they remain in the same position. If you reduce the extent of a layer, any key-frame events outside the layers extent remain there; if and when you extend the layer again, those key-frame events become accessible again.

A Layer that is currently Locked or Anchored cannot be extended.

Fit To Contents

To fit the layer to its contents:

Right-click the layer to open its context menu, then select the appropriate option.



This action updates both the clip's duration and the visual length of the layer on the timeline.

- If the media clip is shorter than the current layer duration, the layer will shrink to match the actual duration.
- If the media clip is longer than the current layer duration, the layer will extend to fully display its content.

Grouping Layers

When working with large numbers of layers, it is convenient to group related layers together. This reduces the vertical height of the Timeline and makes it easier to move large numbers of layers.

To arrow a layer in to an existing group, the layer needs to be on top of the group in the compositing order before arrowing. Arrowing a layer from elsewhere on the timeline will not work.

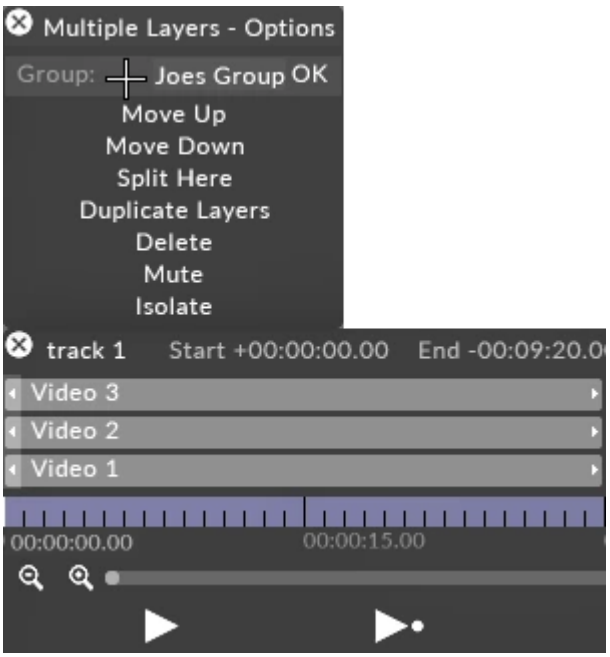
You can also import and export a group of layers to the current track, or even onto another track in the Timeline. Please read the 'Importing and exporting layers section above for more information on this very useful feature.

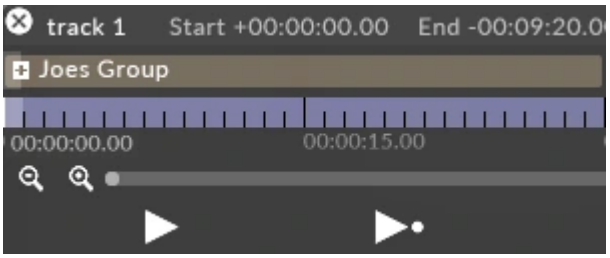
How to group layers

1. Hold down the left **Shift** kkey and left-click and drag a selection rectangle in the Content Layer section over the layers you want to group.
2. Right-click the highlighted layers to open the Layer menu.

3. Type the name of your group into the **group** text field and hit **Enter**. The grouped layers will turn orange.

[Animated GIF: How to group layers]





Editing grouped layers

Left-click the + to expand the group layer.

The layers are revealed below the group layer and can be edited in the normal way.

Collapsing a group of layers

Click the - button on the Group layer.

Ungroup a grouped layer

1. Right-click the Group layer to open the Layer menu.
2. Left-click **ungroup**.

Removing a layer from the group

1. Make sure the group is expanded
2. Right-click on the layer you wish to remove from the group
3. Left-click on **Extract**

Adding a layer to a group

Hold down the **Alt** key and left-click drag an arrow from the layer to be group, to the group layer.

The layer will be added to the group layer.

Isolating Layers

Sometimes it is useful to only see the output of a single layer when you have a stack of layers.

To see the output of a single layer:

1. Hold down the **I** key and left-click the layer. The other layers turn grey to indicate that the selected layer has been isolated.
2. Left-click anywhere in the Content Layer section to return the screen to the normal view.

Or alternatively

- Right-click on the layer and select the Isolate option.

Layer Colour Rules

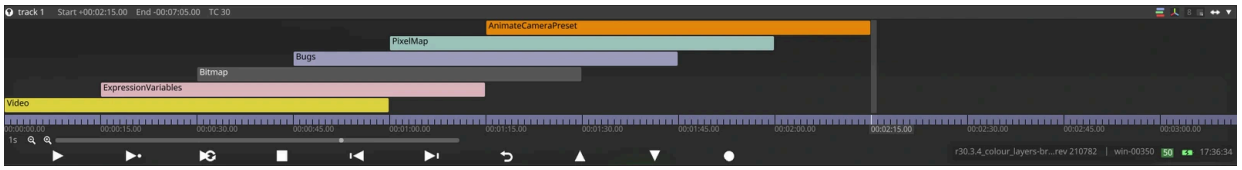
This feature allows users to setup rules that will determine the colour of layers on the timeline based on the specific properties of the layer.

The Colour Layer Rules feature is available in designer versions r30.8 and above.

There is a global layer colour ruleset which can be found under in the dashboard under **d3 > Project Settings > User Interface**. For convenience, we have supplied a default layer colour ruleset based on the category of each layer called “categories” here. If you want to use a different default you can do so by setting up a new template project in d3Manager.

Each track can also be assigned it’s own layer colour ruleset which will override the global one. This can be found under **Track > Special Settings**. You can always access the layer colour ruleset used by the current track by clicking on the new layer colour ruleset button next to the 3D manipulators button to the right of the Track widget.

Both global and track rulesets can be set to **None** to disable the feature.



Coloured Layers

If you want to customize your layer colours you can follow these workflows.

Selecting and Creating Rulesets

Layer colour rulesets are like any other object in Designer. You can select, edit, create and delete them by left/right-clicking on them either in project settings or in a specific track.

If a track has a ruleset assigned it will apply it’s own ruleset instead of the global one. If it has None assigned it will use the global one. The same ruleset can be assigned to multiple tracks and globally at the same time. Layerstacks always use the global ruleset.

Editing Rulesets

To edit a layer colour ruleset, right-click on it. A ruleset is composed of a set of individual rules. These rules apply in order from top-to-bottom in the editor. If a rule is found to be true for a particular layer it will take that colour, prioritising the rules at the top of the ruleset. To re-order the priority of rules simply left-click and drag to change their order in the editor. The priority change will only apply after the dragged rule is released.

Rules are added to rulesets by selecting the ”+” button at the bottom of the ruleset editor and can be removed by pressing the ”-” button on the far right of each rule.

Editing Rules

Each rule can be edited by clicking on the fields in the ruleset editor. They have the following fields:

- **Enabled** - Turns the rule on or off (which will persist)
- **Key** - This determines the “Key” of the layer that will be evaluated by the rule. Options for this are:
  - **Name** - Name of the layer
  - **Property** - The first keyframe of a property the layer (e.g. brightness)
  - **Type** - The type of the layer (e.g. “VideoLayer”)
  - **Category** - The category the layer falls under (e.g. “Content”)
- **Property** - If **Property** is selected as the key, this determines the name of the property to test.
- **Comparison** - The comparison function to match the key against. Options for this are:
  - **Contains** - (e.g. “video”, “background” etc.)
  - **Equals** & **!=** (Not Equals) - approximate when using numerical values
  - **>**, **<**, **<=**, **>=** - Only valid for numerical values
- **Value** - This is the user-entered values to match the key against. If the key matches this value, then the rule applies.
- **Colour** - The colour to apply if the key matches the value.

Importing and Exporting Ruleset

Layer colour rulesets can be exported and imported like normal resources. You can learn about how to do this here. Layer colour rulesets have no dependent resources to exporting them is very easy.

Rulesets in Multi-Machine Sessions

Rulesets are shared between all machines in a multi-machine session and are editable by any user like all other resources. They can also be locked and unlocked like normal resources. This allows you to setup a consistent colour layer look for all users in your project.

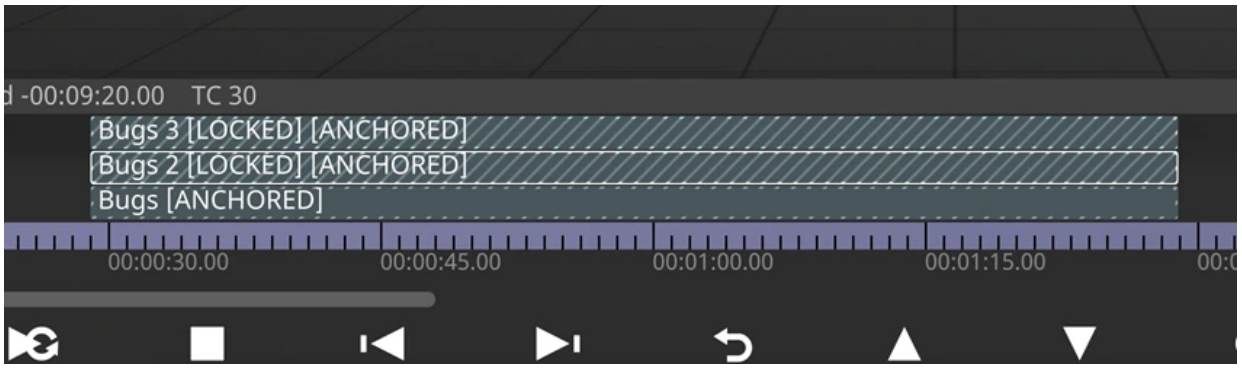
Other Layer Colours

Layer colours are not solely determined by ruleset. When a layer is coloured for another reason it will override the colour of the ruleset.

Here are some examples of rule overrides:

- Externally controlled layers are always green.
- Group layers are always beige and do not react to layer colour rulesets.
- Muted layers are always black.
- Colours that are in error are always red.
- Layers will missing media or missing versions will have the error colour overlaid on top of the ruleset colour.

Locking and Anchoring Layers



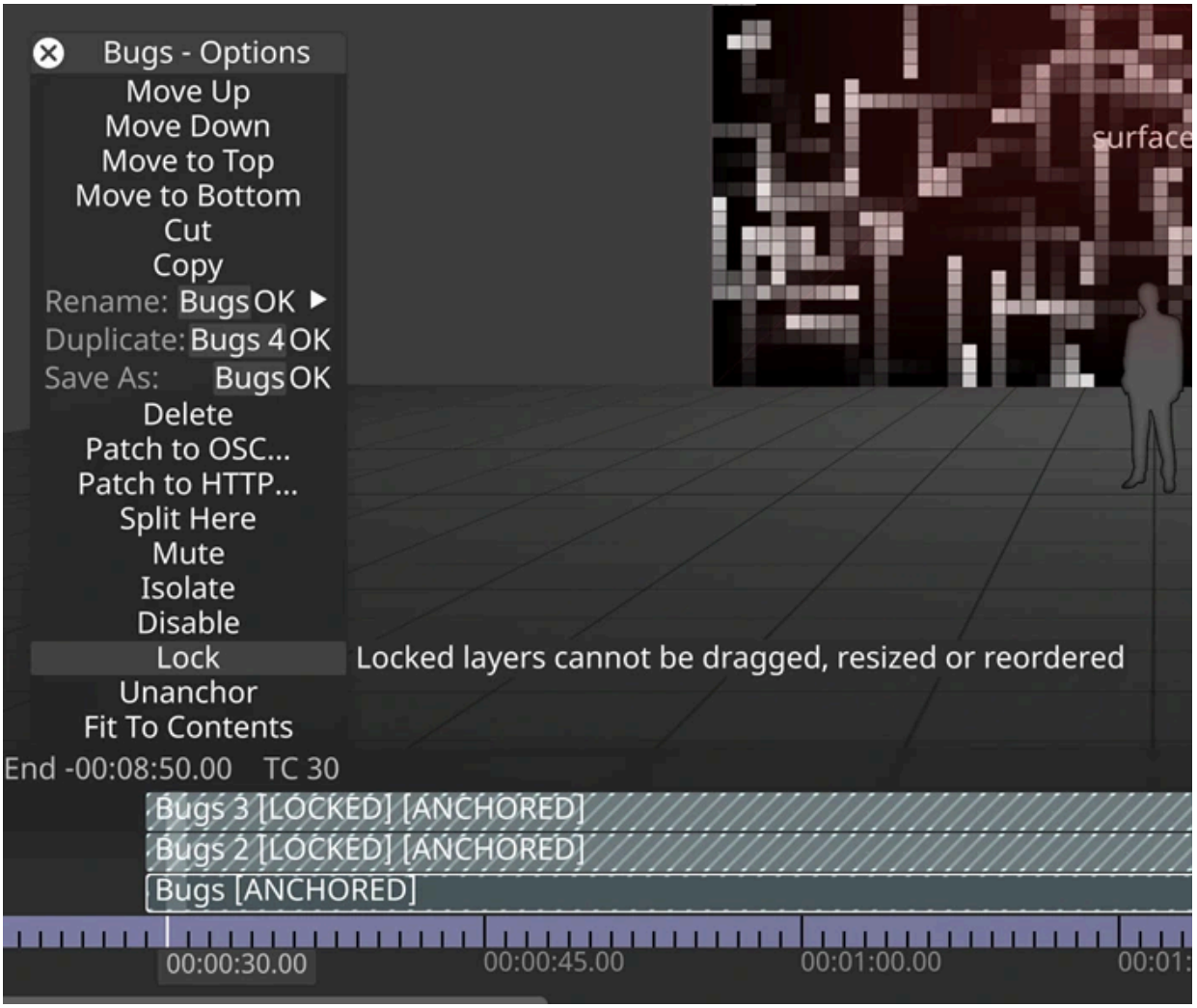
To prevent accidentally changing sequenced layers, Designer supports two different forms of restriction: Locking and Anchoring.

A Locked layer cannot be edited at all until unlocked, while an Anchored layer cannot be moved, resized or split but can otherwise be edited as normal. Locking a layer does not modify any values or keyframe events.

A Layer can be both Locked and Anchored; this has no effect beyond Locking, but a Locked Anchored Layer remains Anchored if unlocked.

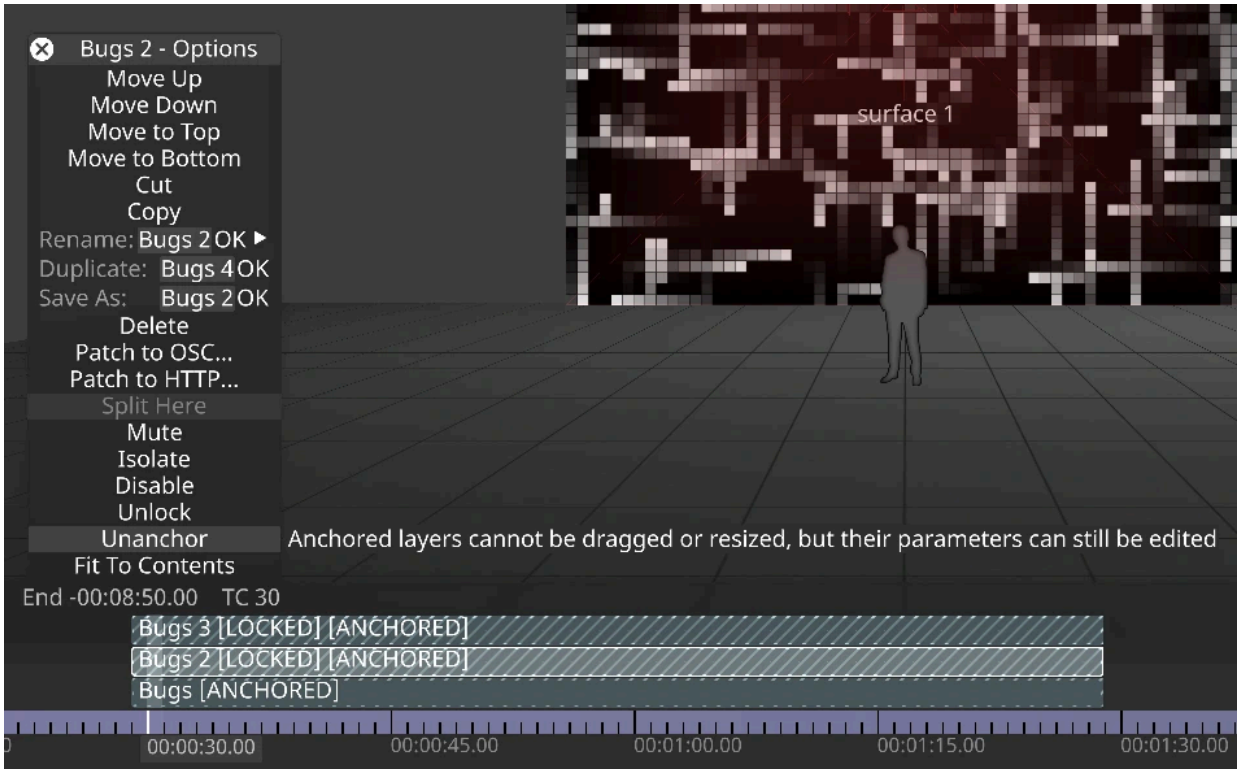
To lock or anchor a layer

1. Right-click the layer to open the **Layer** menu.
2. Left-click **Lock** or **Anchor**.



To unlock or unanchor a layer

1. Right-click the layer to open the **Layer** menu.
2. Left-click **Unlock** or **Unanchor**. This will unlock the layer and allow the user to edit it again.



Layers can also be locked and anchored from the main Layer Editor by right-clicking the header.

Moving Layers

Moving and re-ordering layers is particularly useful when you have a stack of layers.

Layers arranged in a stack are rendered in bottom up order: layers at the top are composited over layers at the bottom.

Moving/re-ordering a layer can be done in three ways.

Option 1

- Left-click and drag the layer left or right. You cannot drag the layer up or down. This method can be used to move multiple layers when you have a selection rectangle. Please read the Selecting layers section for more information on selection rectangles.

Option 2

1. Right-click the layer to open the Layer menu.
2. Left-click **move up** or **move down**.

Option 3

- Left-click the layer and hold **Ctrl**+ **Alt**whilst using the keyboard arrow keys to move the layer up, down, left or right. Moving a layer moves all keyframe events.

A Layer that is currently Locked or Anchored cannot be moved along the timeline, but an Anchored layer can be reordered within the layer stack.

MultiLayer Editor

In r17.3 multiple layers can be edited simultaneously making it easier to assign common values or objects across a selection of layers in one action.

Using the MultiLayerEditor

1. Hold **Shift**, left-click and drag a selection over multiple layers
2. Left-click your selection and a MultiLayerEditor will open that contains all common values to the layers selected.

[Animated GIF: MultiEdit Layers]

Tips for using the MultiLayerEditor

- Shift + Click to add an un-selected layer to the selection, or remove a layer from the selection.
- A MultiLayerEditor is created for a layer selection, when more than one layer is selected.
- A MultiLayerEditor is also created when a single GroupLayer is selected.
- If a selection contains only GroupLayers, a MultiLayerEditor is not created.
- If a selection contains Layers and GroupLayers, a MultiLayerEditor is created for the Layers only.
- Opening a MultiLayerEditor will not close existing Layer editors for the selected layers.
- Adding a layer to the selection or removing one from the selection will create a new MultiLayerEditor with the new selection.
- A MultiLayerEditor can only be opened for layers when the track cursor is within all of the selected layers.
- The MultiLayerEditor will show all the common fields of all selected layers. The fields will be under the same tabs.
- The fields in the MultiLayerEditor show an aggregation of all the values of the selected layers.
- The tooltip of the ValueBox will contain the current values and associated layer names.
- Dropping a new keyframe will create a new keyframe in all selected layers.
- Modifying an existing keyframe will modify the keyframe in the layers where the keyframe exists.
- Deleting a keyframe will delete the keyframe in the layers the keyframe exists.
- Popup menu actions in the keywidget, like changing interpolation type apply to all selected layers.

- Keyframe navigation is the same as the Layer editor.

Limitations

- Keyframes for each layer are all visible in the same keyframe editor, which can make it hard to know which keyframe belongs to which layer. There is no preview in the MultiLayerEditor
- Keyframes for layer are all visible in the same keyframe editor, which can make it hard to know which keyframe belongs to which layer.
- Some fields may have the same display name but different internal names and will therefore not appear. Some fields may also have the same name but different values, these should not appear. An example is: multi-selecting audio and video layers misses volume control and at-endpoint control.
- The MultiLayerEditor cannot aggregate fields that are dynamically created by a custom layer editor. Therefore OpenModule is not compatible and neither are dynamic fields of a notch block.
- Some fields may have the same name, but represent different things and therefore appear when they shouldn't. An example is: TimecodeReadout and Gradient Position X and Position Y parameters are incompatible with one another.

Muting Layers

You can mute a layer to temporarily disable it, allowing you to see layers behind it in a stack of layers.

Mute is a **session-level control** that affects only the current machine. The mute state remains active while the corresponding track is selected. Each time the track is changed or the project is restarted, all layers are reset to the default unmuted state.

Muting a single layer

1. Hold down the **M** key and left-click the layer.

Or alternatively

1. Right-click on the layer and left-click the Mute option.

The layer will turn dark grey to indicate that the selected layer has been muted.



Unmuting a single layer:

1. Hold down the **M** key and left-click the layer again.

Or alternatively

1. Right-click on the layer and left-click the unmute option.

The layer will return to its original colour.

Persistent layer exclusion

If you need a layer to remain excluded from rendering and sequencing across track changes, project saves, and restarts, use the **Disable** feature instead of Mute. See Disabling Layers for

more information.

Renaming Layers

To rename a layer:

1. Right-click the layer to open the **Layer** menu.
2. Type the new layer name in the **rename layer** text field and hit **Enter**. The layers name will update instantly. A good layer naming format is Layer-type + description.

Save as and importing layers

Layers can be saved to the layers library, from where they can be imported back onto the Timeline in another location.

Importing a layer makes a copy of the saved layer; changing the layer that you saved to the layer library does not change the copies.

This allows you to transfer layers or groups of layers in the current track, or even from one track into another track. This is extremely useful when sequencing, as you can store these saved layers in the Layers Library as templates to avoid having to repeat actions when creating layers

This functionality used to be called Import & Export in previous releases.

Saving a layer

1. Right-click the layer to open the Layer menu.
2. Type the name of your exported layer (if different from the defaultlayer name) in the **Save as** text field and hit **OK**. This will save the layer in the Layers Library.

   [Animated GIF: Saving a layer as a group]

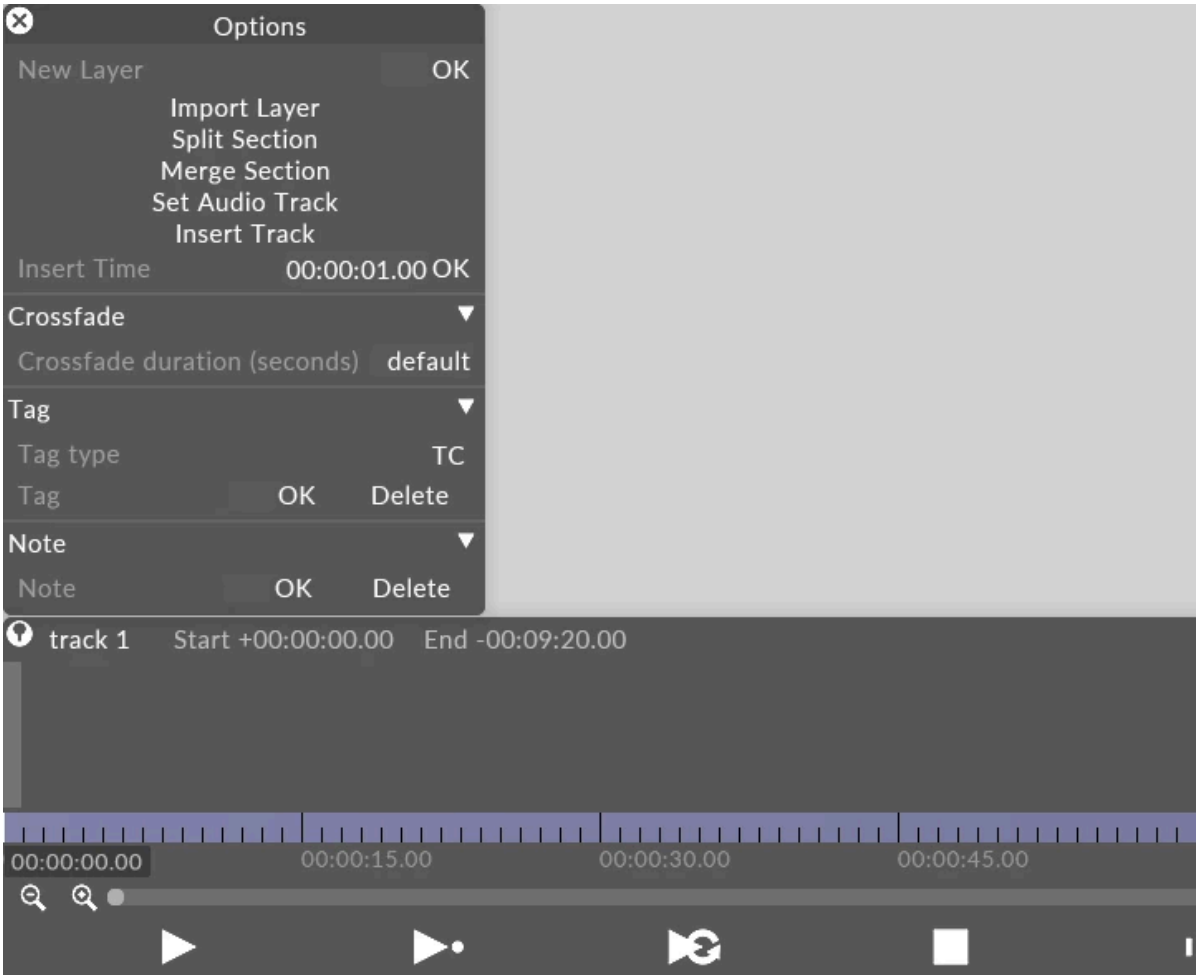
   Saving a layer will copy all of the layers keyframe events.

   [Animated GIF: Saving a layer as a group]

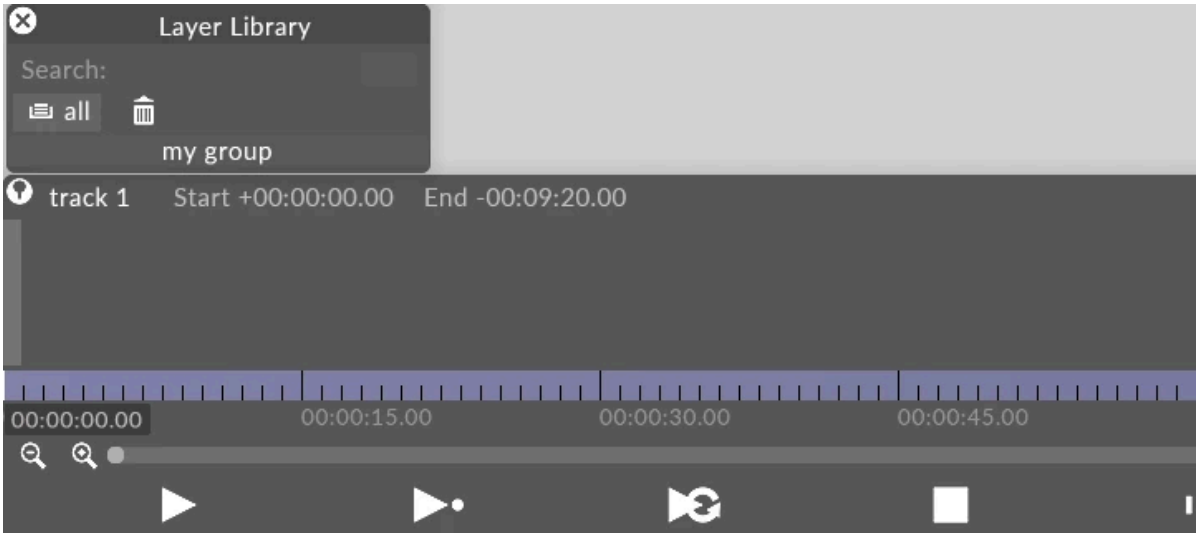
Importing a layer

1. Right-click the Track bar at the point where you want to import the layer on the Timeline. This will open the Track bars menu.

2. Left-click **import layer**. This will open the Layers Library.



3. Left-click the saved layer from the Layers Library.

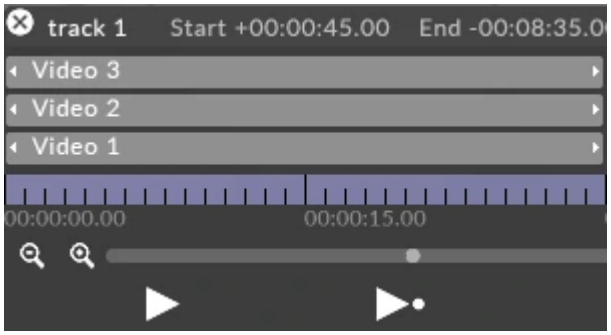


The layer will be added to the track at the currently selected point on the Timeline.

Selecting Multiple Layers

To select multiple layers:

- Hold down the left **Shift** key and left-click and drag a selection rectangle in the Content Layer section over the layers you want to select. This allows you to select a range of layers.



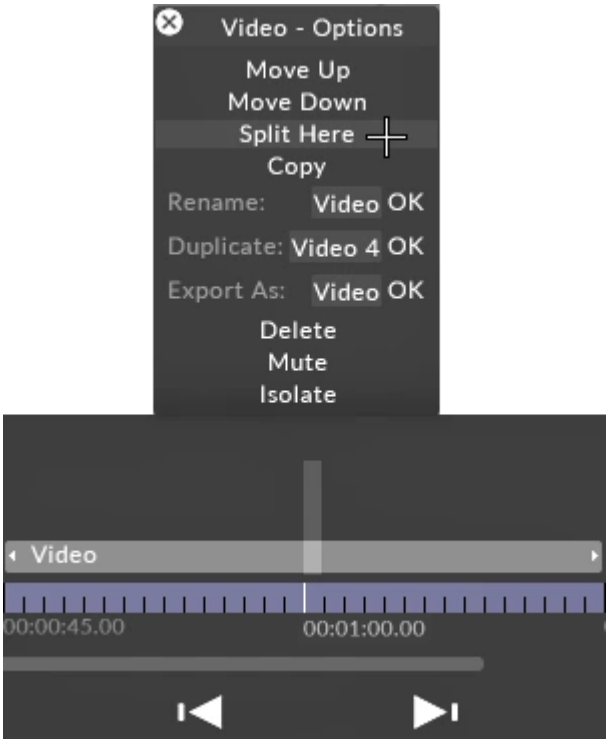
Selecting multiple layers will copy the selected layers keyframe events.

- Left-click anywhere in the Content Layer section to clear the selection rectangle.

Splitting Layers

To split a layer

1. Left-click a Track bar at the point on the Timeline where you want to split the layer.
2. Right-click the layer to open the Layer menu.
3. Left-click **split**. This will split the layer at the currently selected Timeline position into two shorter layers.



Splitting a layer does not modify its keyframe events, they remain in the same position. If you split the layer, any key-frame events outside the layers extent remain there; if and when you extend the layer again, those key-frame events become accessible again.

A Layer that is currently Locked or Anchored cannot be split.

Working with Layers

This section includes:

- Editing Layers
- Multi Layer Editing
- Creating Layers
- Deleting Layers
- Copy & Pasting Layers
- Duplicating Layers
- Moving Layers
- Extending Layers
- Saving and Importing Layers
- Isolating Layers
- Muting Layers
- Disabling Layers
- Locking Layers
- Renaming Layers
- Selecting Multiple Layers
- Splitting Layers

For more information about structuring layers, see the following pages:

- Compositing Layers
- Grouping Layers
- Layer Stacks

To learn about keyframing layers, see the following pages:

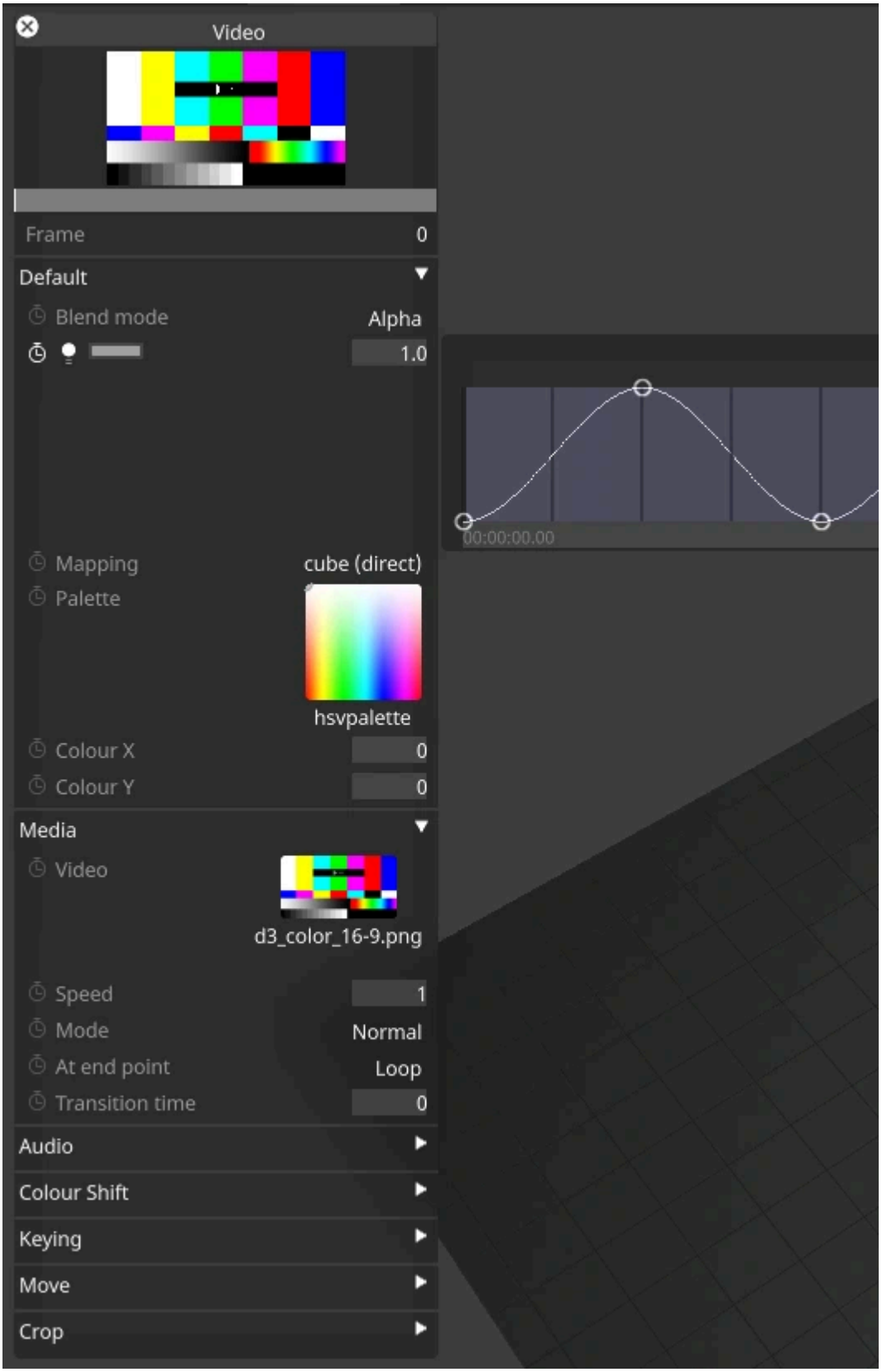
- Keyframing Overview
- Numeric Keyframes
- Object Keyframes
- Option Keyframes
- Multiple Keyframes
- Keyframe Toggle

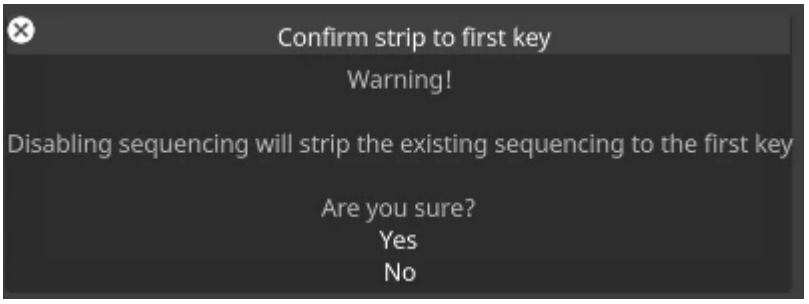
Keyframing Toggle

Keyframes can easily be stripped from a keyframe editor with the click of a button.

Keyframe Toggle

With the new Keyframe toggle available for every keyframable attribute on a layer, you can quicky clean up your sequencing on the timeline by simply toggling timeline keyframes off.


Video
Frame
0
Default
Blend mode
Alpha
1.0
00:00:00.00
Mapping
cube (direct)
Palette
hsvpalette
Colour X
0
Colour Y
0
Media
Video
d3_color_16-9.png
Speed
1
Mode
Normal
At end point
Loop
Transition time
0
Audio
Colour Shift
Keying
Move
Crop


Confirm strip to first key
Warning!
Disabling sequencing will strip the existing sequencing to the first key
Are you sure?
Yes
No

Keyframing Overview

Keyframing is used to animate a layer's property over time.

What is the Keyframe editor?

Keyframing enables you to animate a layer's property over time. A layer's property can be accessed from its layer editor.

If you are unfamiliar with the Layer editor, we recommend reading Editing layers.

Opening a Keyframe editor

To open a Keyframe editor

- Left-click a Layer property to open the Keyframe editor. Opening a Keyframe editor will close any other open Keyframe editors.

Keyframe toggles

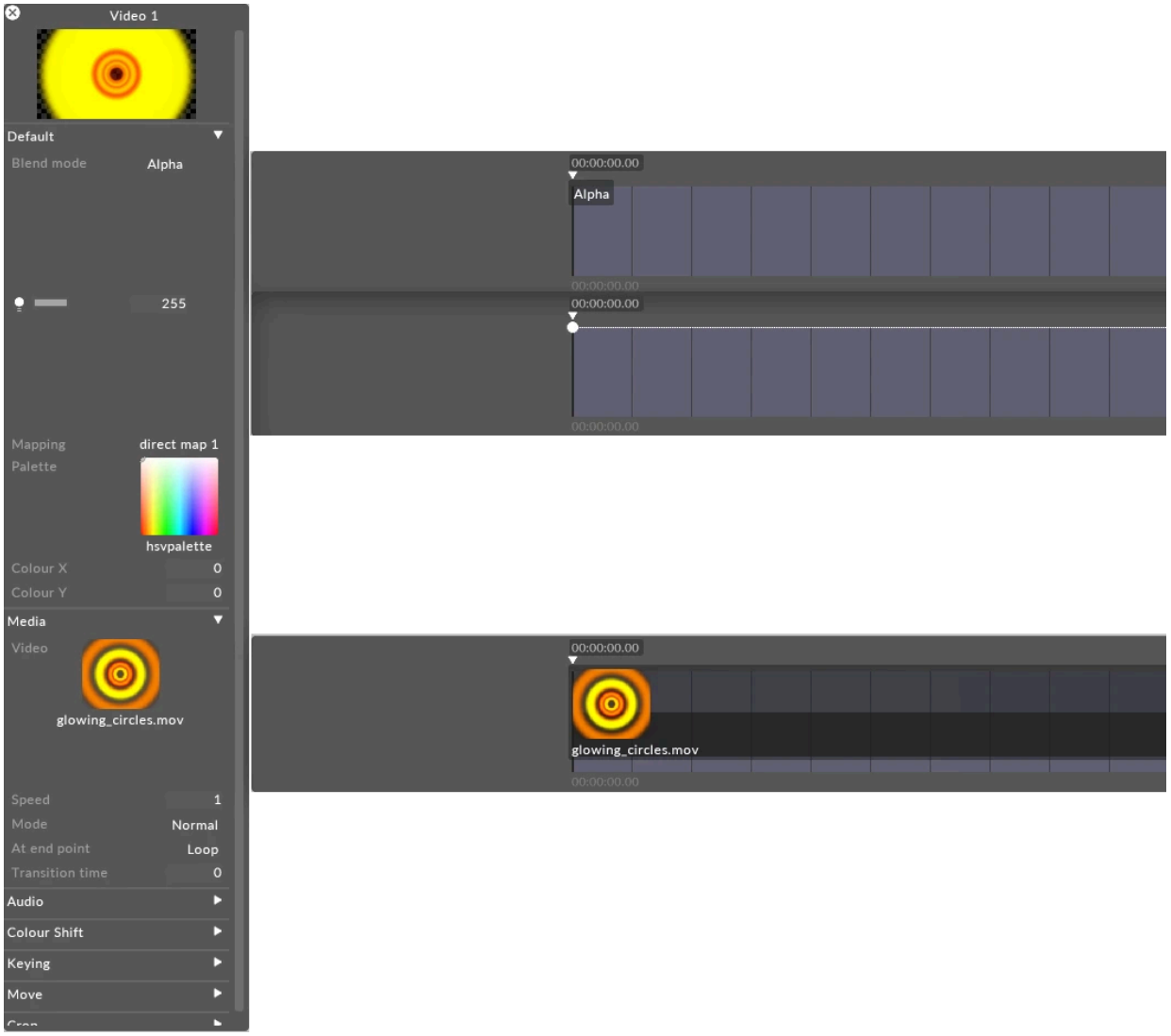
- Beginning with r20, Keyframe toggles have been added, allowing you to reset all keyframes for an attribute within a layer. Enable and disable keyframes easily by clicking on the keyframe toggle icon. For more information on Keyframe Toggles, please visit this link.

Opening multiple Keyframe editors

- Hold **Ctrl** whilst left-clicking the properties of a layer editor to open multiple Keyframe editors.

Keyframe editor types

There are three different types of Keyframe editors. Examples of these three types are described below using the example of a Bitmap layer and its editor, and in the three following sub-chapters. Please read the Editing objects sub-chapter for more information on object property types.



Keyframe types

Numeric

A numeric Keyframe editor allows you to animate a numeric value when editing a numeric property, in this example, **brightness**.

Option

When animating an option-based property, the Keyframe editor restricts you to a fixed **option** list of valid values. For example, when animating blendMode, you can only choose from the supported blend modes.

Object

An object Keyframe editor refers to another object when animating an object property.

Navigating Keyframe editors

1. Left-click a Track bar in the Timeline to play forwards or backwards in the currently selected Track. Notice that as you navigate the Timeline, the currently open Keyframe editor will adjust accordingly. The Keyframe editor shows a bar of time just before the current Timeline position and a certain number of bars after it. The number of bars depends on the screen width and the current zoom factor.
2. Left-click the Keyframe editor and hold **Alt** whilst moving the mouse scroll wheel to zoom in or out (you can also use the - and = keys while the Keyframe editor is selected). The mouse must remain focused on the Keyframe editor to successfully zoom.

Snapping

The snapping behaviour in the Keyframe editor is relative to the zoom level of the editor. By default, this zoom level will be in sync with the Timeline zoom level unless you have manually adjusted it as explained above. Snapping behaves in 3 different ways based on your zoom level:

Zoom Level	Snapping Behaviour	Example
`1s`, `2s`, `5s`, `15s`, `Max`, and quantised tracks regardless of zoom level	**Quarter Second** Keyframes will snap to the nearest* quarter second interval in frames.	With a 30fps Timeline keyframes will snap to the 0th, 7th, 15th and 22nd frame of a each second.
`15f`, `10f`, and `5f`	**Half Timestep** Keyframes will snap to the nearest* interval determined by the half of the zoom level. So if the zoom level is `10f` the snapping will be every 5 frames.	With a 30fps Timeline and a zoom level of 5f keyframes will snap to the 0th, 2nd, 5th, 7th, 10th, 12th, etc... frame of a each second.
`1f`	**One Frame** Keyframes will snap to every individual frame defined by the Timeline's frame rate.	N/A

** Snapping of all types is relative to the frame rate of the Timeline and will always round **down** when the interval lands in the middle of two frames.*

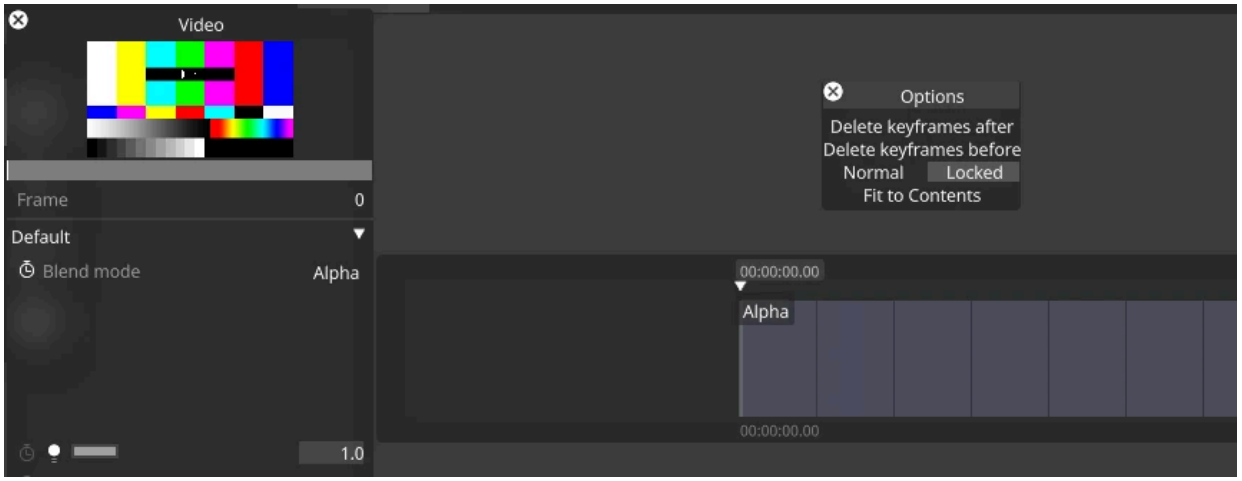
Common Keyframe properties

All three Keyframe editor types have the following things in common:

- They consist of a sequence of **Keyframe** or **key values**, which can be either **option** choices, **numeric** values or **objects**. In the case of numeric properties, the value between the keyframes is generated according to a line or curve that passes through the keyframes.
- A beat of time appears as a single vertical line. Each group of four lines represents a single Track bar and is marked with a bar number just below it. The background colour of the Keyframe editor matches the colour of the corresponding Track bar in the Timeline.

- Just above the Keyframe editor is a small triangle with a timecode just above it. This is the 'Now' pointer; it indicates the Timeline position that is currently being rendered to the stage. Editing a Keyframe moves the now pointer to the time of that Keyframe, thus allowing you to instantly see the effect of changing the value.

Keyframe Options



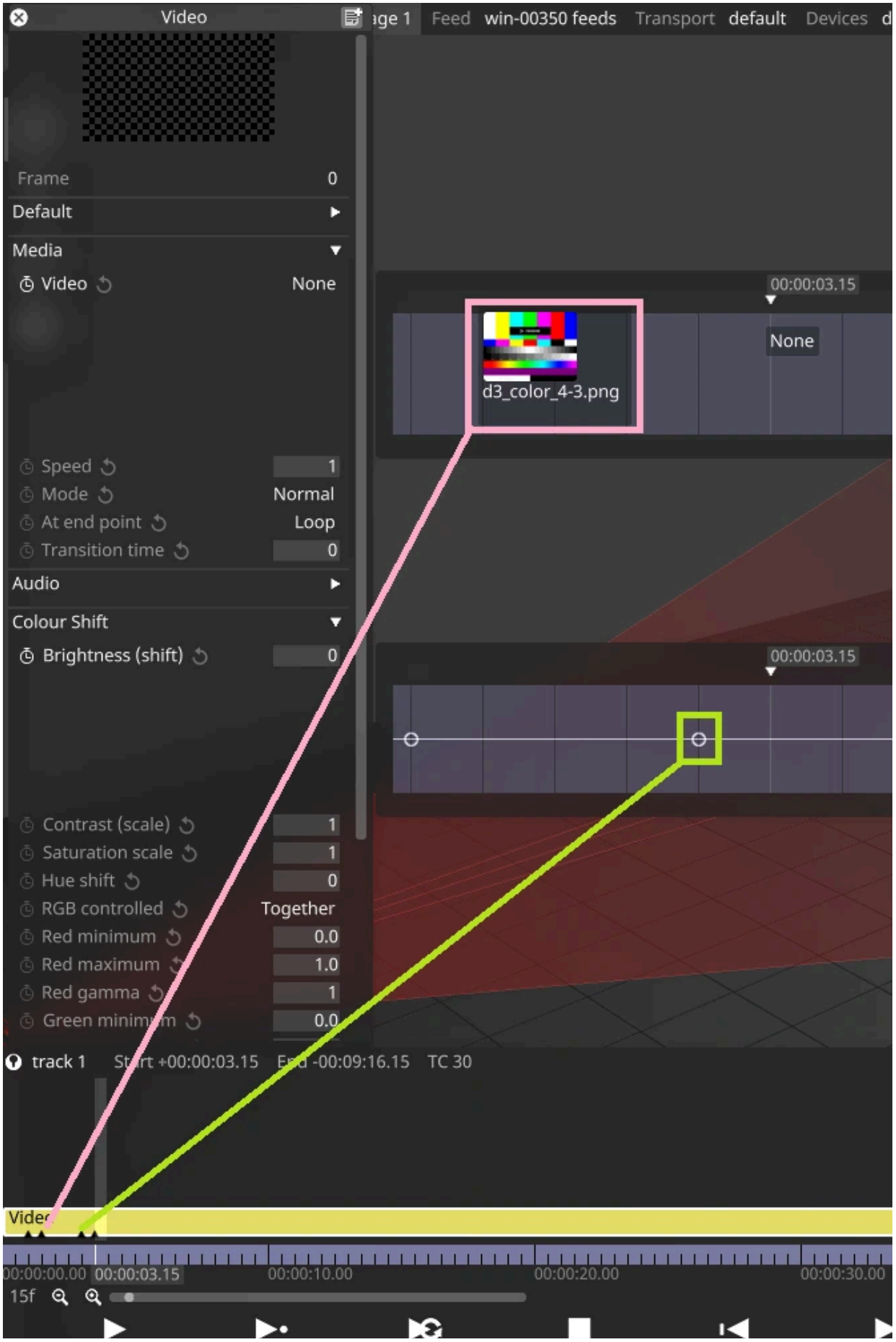
Keyframe options

Right-click on the border of a keyframe timeline, and the Options window will appear with the following options:

- **Delete keyframes after**
- **Delete keyframes before**
- **Normal:** When there are looping keyframes after a section break and the playhead hits that section break, it will play the keyframes after the section break anyway.
- **Locked:** When there are keyframes after a section break and the playhead hits that section break, it respects the section break and will not play the keyframes.
- **Fit to Contents**: Shortens the layer length to the same length of time as the last keyframe of that layer.

Keyframes in the Track Widget

From r30.8, all keyframes on layers will appear in the timeline as small ticks at the bottom of each layer.


Video
Feed
win-00350 feeds
Transport
default
Devices
Frame
0
Default
Media
Video
None
00:00:03.15
d3_color_4-3.png
None
Speed
1
Mode
Normal
At end point
Loop
Transition time
0
Audio
Colour Shift
Brightness (shift)
0
00:00:03.15
Contrast (scale)
1
Saturation scale
1
Hue shift
0
RGB controlled
Together
Red minimum
0.0
Red maximum
1.0
Red gamma
1
track 1
TC 30
00:00:00.00
00:00:03.15
00:00:10.00
00:00:20.00
00:00:30.00
15f



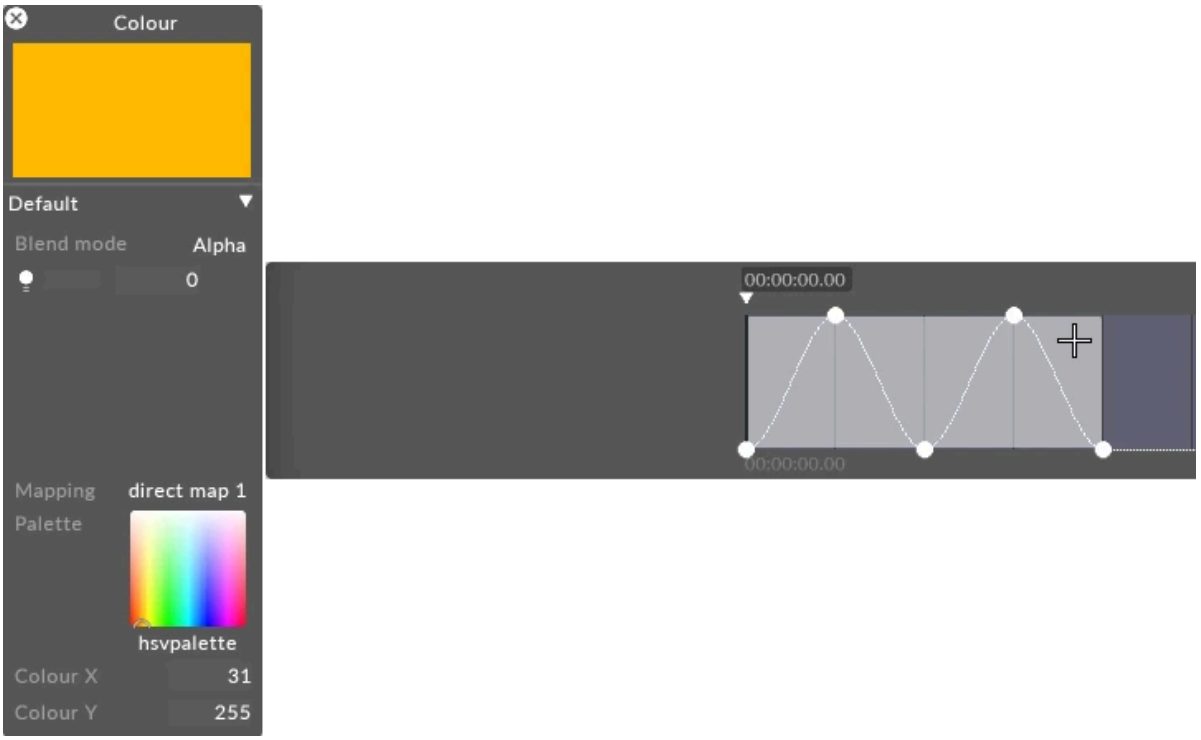
Keyframes and their indicators on the track

Multiple Keyframes

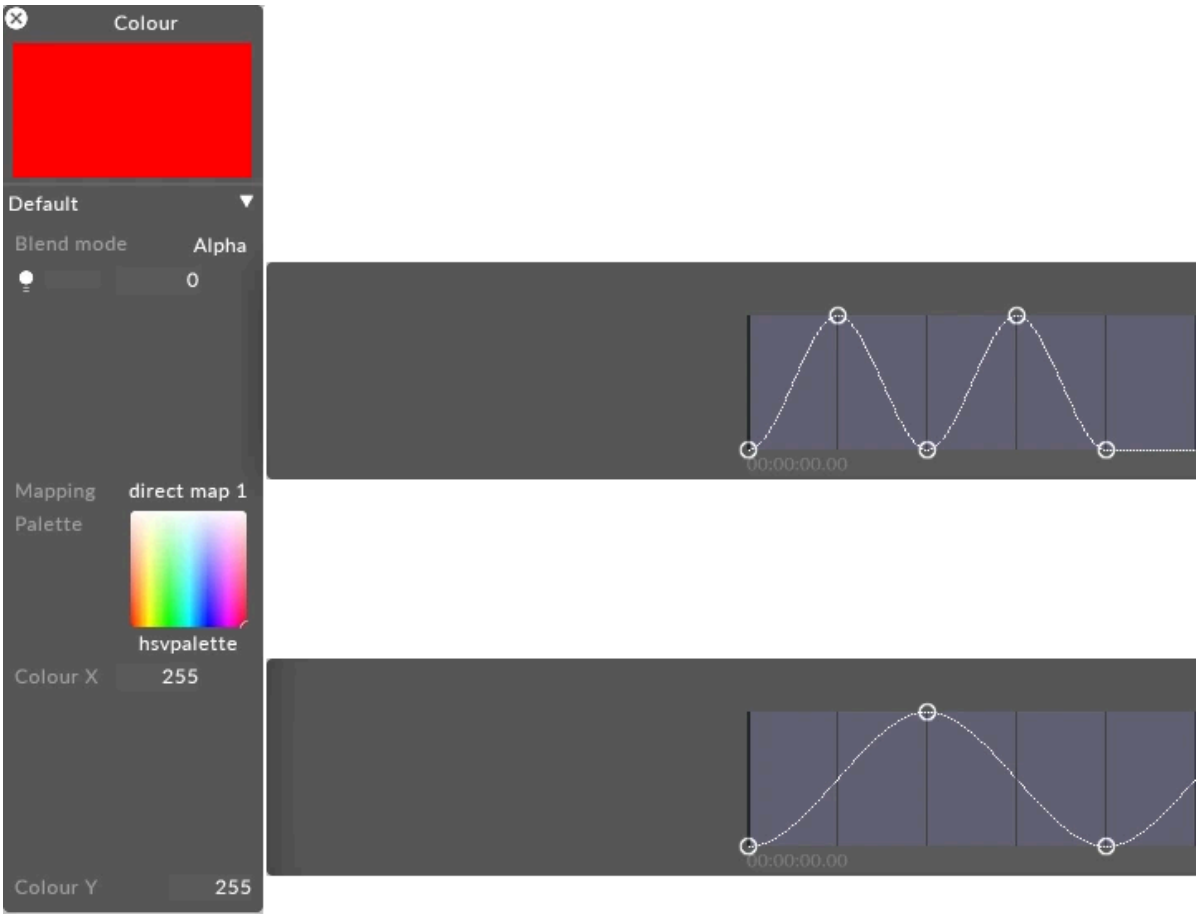
Editing actions apply to all three types of keyframe editors mentioned above and can be applied to a single keyframe editor or multiple keyframe editors of multiple layers.

Selecting a range of keyframes

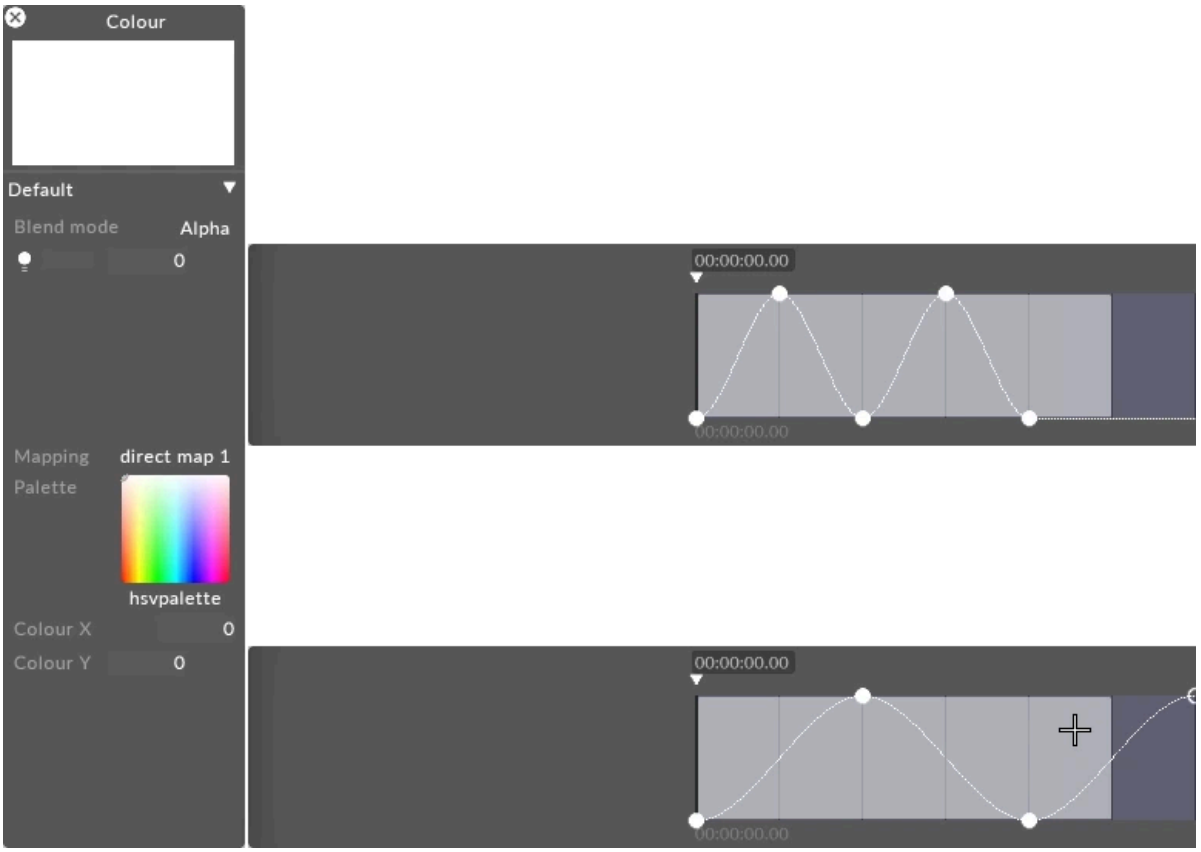
1. Hold down the left **Shift** ey and drag a rectangle around the keyframes you want to select inside the keyframe editor. Keyframes that fall under the selection rectangle are displayed as solid white dots.



2. To open more than one keyframe editor, hold down the **Ctrl** key when selecting the properties.

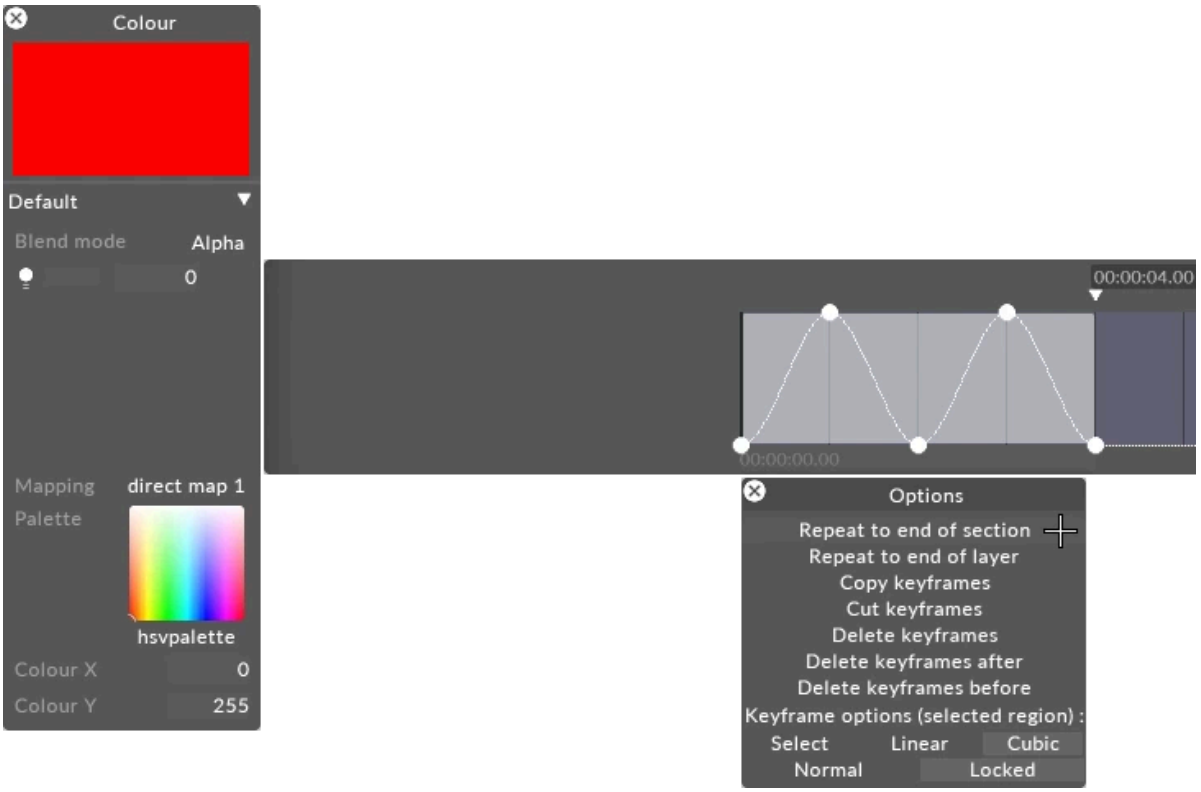


3. With multiple keyframe editors open, you can now select and edit keyframes from more than one keyframe editor simultaneously.



Editing a range of keyframes

- Right-clicking inside the keyframe editor with a selected range of keyframes allows you to change the interpolation type between only the selected keyframes. The popup menu gives you a list of options to choose from.



Repeat a range of keyframes

1. Hold down the left **Shift** key to select a whole number of bars.
2. Right-click the keyframe editor.
3. Select either **repeat to end of layer** or **repeat to end of section** .

Cut / copy / paste

1. Hold down the left **Shift** key to select a range of keyframes.
2. Right-click the keyframe editor and select **cut keyframes** or **copy keyframes** .
3. Move to a different section of the timeline, rightclick the ribbon and select **paste keyframes** .

Clear a range of keyframes

1. Hold down the left **Shift** key to select a range of keyframes.
2. Right-click the keyframe editor and select **delete keyframes** .

Numeric Keyframes

Numeric keyframes are used for properties that use a numeric range such as 0-255 or 0-1.

Workflow

Create a numeric keyframe

- Left-click the keyframe editor of a layer at the point where you want to create a new keyframe. This will create a keyframe with the same value as the previous keyframe in the timeline.

Move a numeric keyframe

1. To move a keyframe, click it and drag it upwards, downwards, left or right. You can also adjust the keyframe using the mouse scroll wheel.
2. You can add a keyframe and position it in a single action; just click in the timeline and drag the new keyframe without releasing the mouse button.

Remove numeric keyframes

- To remove one keyframe, rightclick it.
- To remove multiple selected keyframes, hold down **Shift** and drag-select the keyframes. Hit the **Delete** button on the keyboard.

Editing min/max values

As with standard numeric properties, you can set min/max constraints to limit the positions of your Keyframes to a certain range.

1. Right-click a numeric property from the Layer editor to open the Numeric property editor.



2. Type the min/max values you want to set in the **min** / **max** fields.

3. Edit the value in the numeric propertys text field in the Layer editor. If you input a value beyond the range specified in the min/max text fields, the value will automatically default to the min/max value (whichever is nearer) when you click anywhere on the screen. However, you can override this by manually moving the Keyframes on the Keyframe editor.

This will apply to all the layers of that type across the whole project.

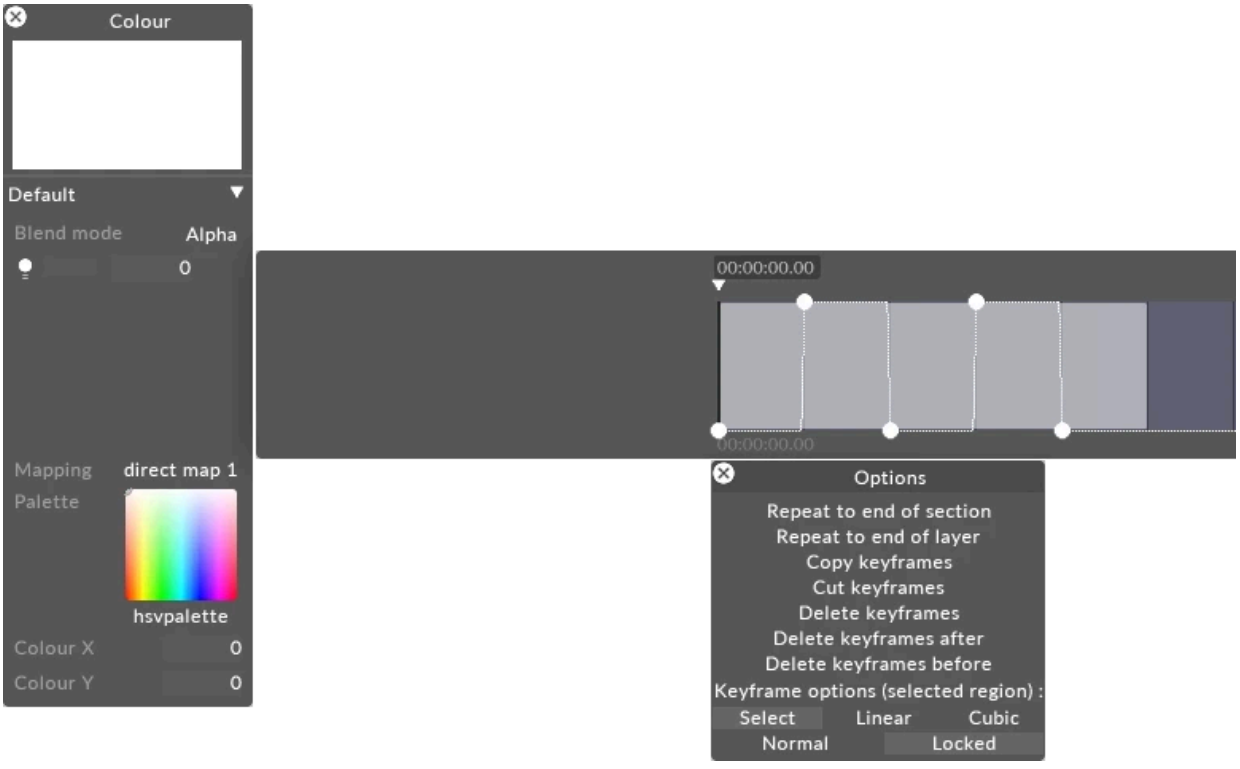
For more information on **step**, **damping**, and editing numeric properties in general please read the 'Editing numerical properties section in the Editing objects sub-chapter.

Numeric keyframe options

Right-click the keyframe editor to set the curve for all keyframes, or select a subset by holding shift and dragging a selection box over them. This will open an option menu that allows you to change the interpolation type (i.e. the shape of the curve that goes through the key values). There are three options:

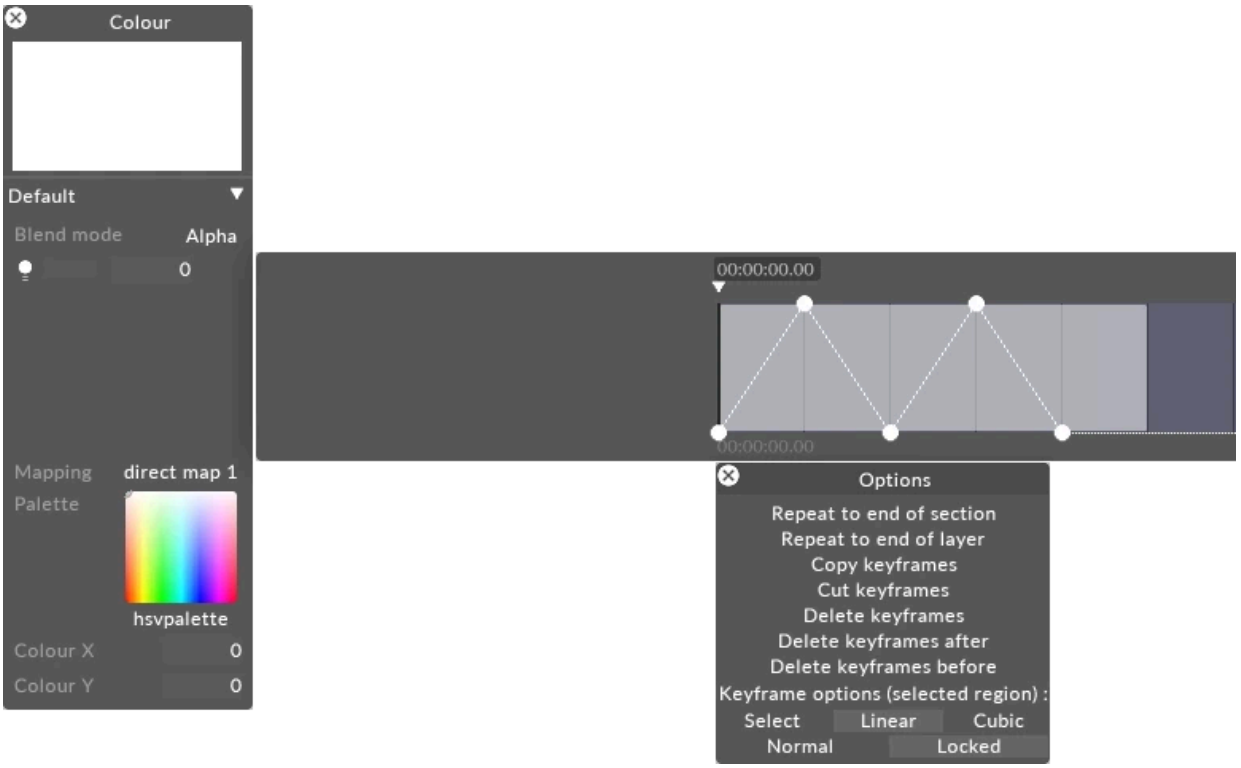
Select

The output value remains static until the next keyframe.



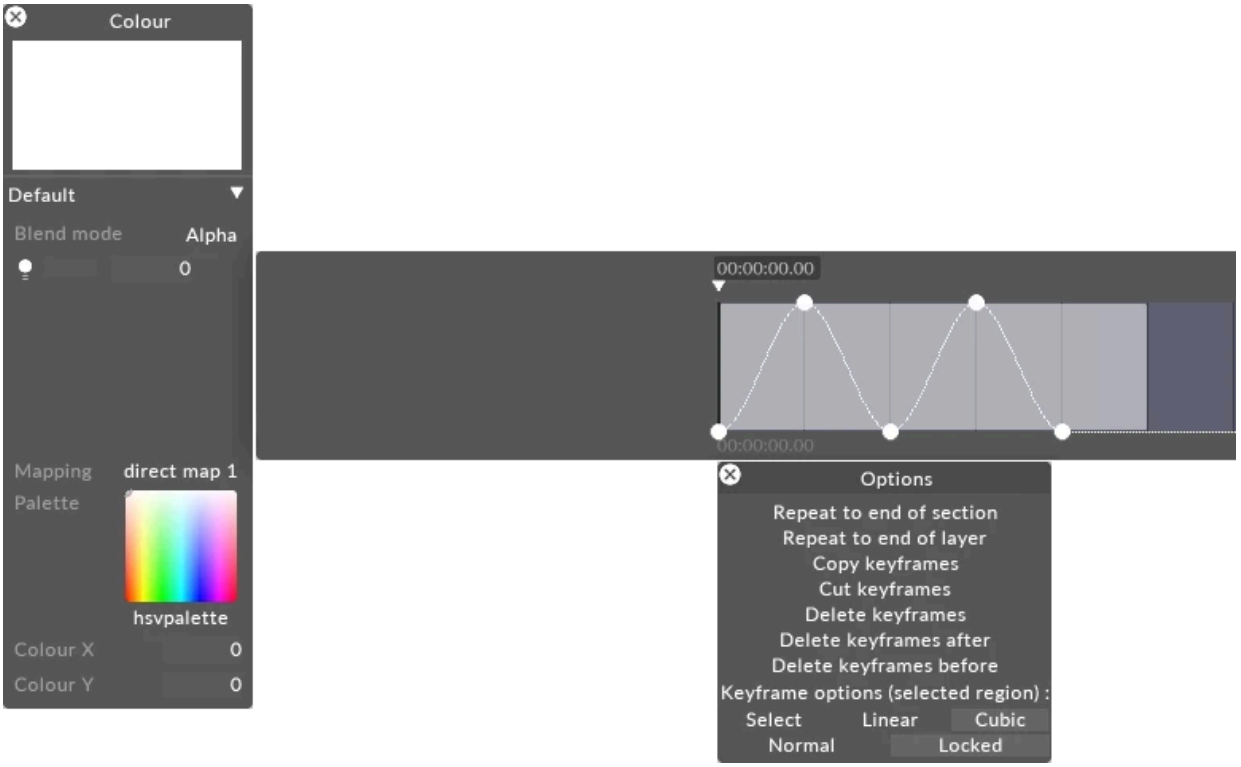
Linear

The output follows a straight line between adjacent keyframes.



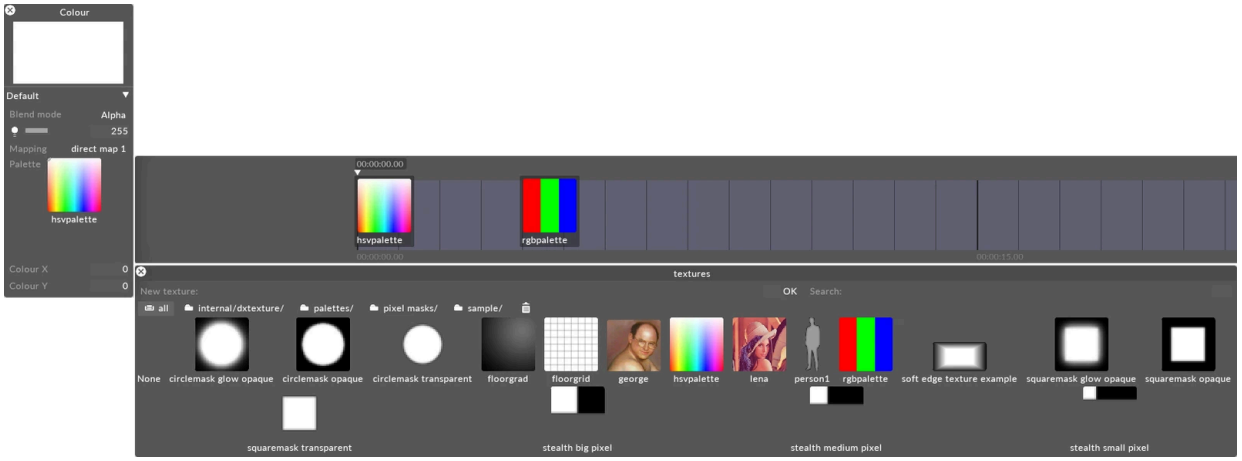
Cubic

The output value follows a cubic curve with zero in and out speed.


Colour
Default
Blend mode
Alpha
0
Mapping
direct map 1
Palette
hsvpalette
Colour X
0
Colour Y
0
00:00:00.00
00:00:00.00
Options
Repeat to end of section
Repeat to end of layer
Copy keyframes
Cut keyframes
Delete keyframes
Delete keyframes after
Delete keyframes before
Keyframe options (selected region) :
Select
Linear
Cubic
Normal
Locked

Object Keyframes

The object keyframe editor consists of keyframes appearing as object thumbnails. The object library for that type opens up just below the keyframe editor, allowing you to drag thumbnails onto it.



Creating an object keyframe

- Either drag a thumbnail from the object library onto the keyframe editor or left-click a thumbnail in the library to create a new keyframe at that current position.

Moving an object keyframe

- Left-click the thumbnail in the keyframe editor and drag it left or right.

Removing object keyframes

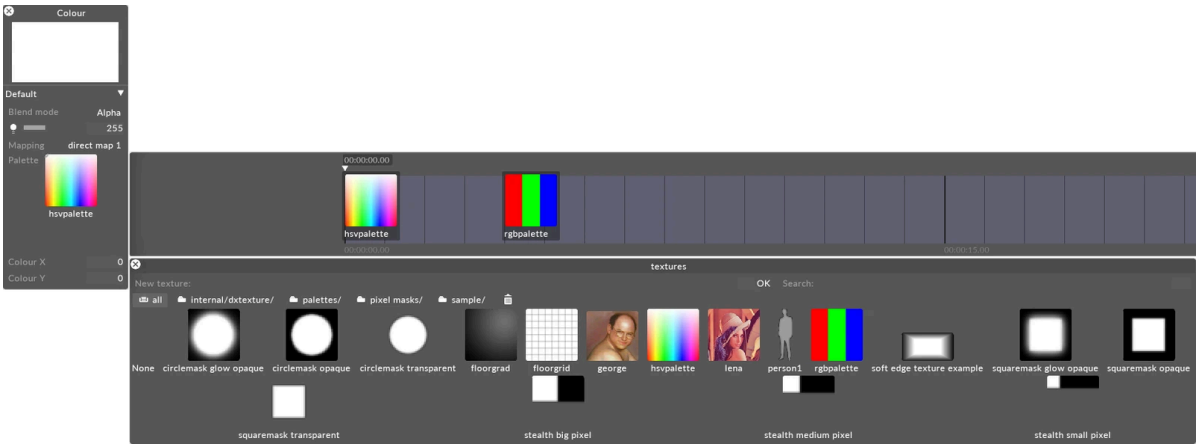
- Right-click the object thumbnail in the keyframe editor.

Option Keyframe

Option property keyframe editors also consist of a series of keyframes, but each keyframe has an option choice. Option property keyframe editors behave similarly to numeric keyframe editors.

Creating an option keyframe

- Left-click the keyframe editor at the point where you want to create a new keyframe. This will create the keyframe and open an options menu for edting the keyframe.



Modifying an option keyframe

1. Left-click the keyframe and drag it left or right to change its time.
2. To select a different option, left-click the keyframe and release the mouse button immediately to open up the option list so you can choose a different value.

Removing an option keyframe

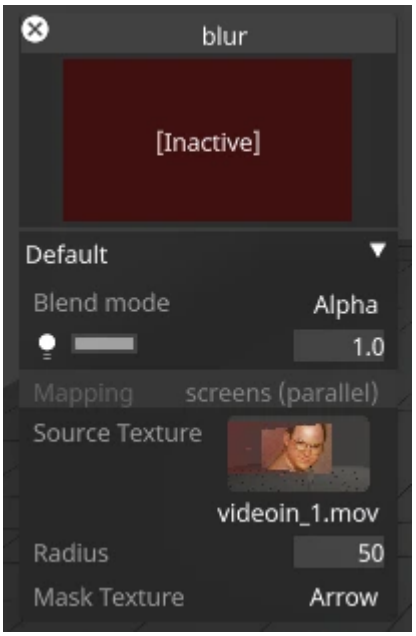
- Right-click the keyframe to remove it.

Layer Stacks

As of r20, there is a new time-independent feature designed to allow you to easily assign and manage layers of treatments to a live video input.

Workflow

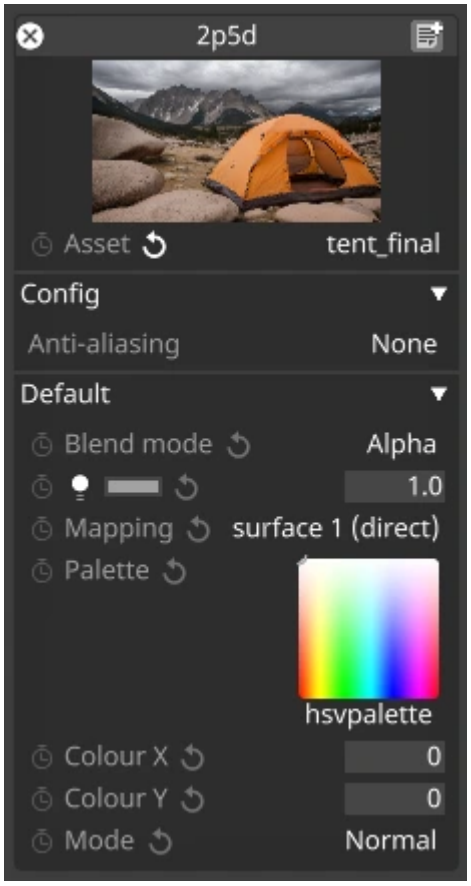
1. Open the Video Input Patch Editor and assign a camera to the Input field of a video input.
2. Click **Start Preview** to confirm your input is connected.
3. In the Layer Stack field, create a new by left-clicking the **None** field and adding a new to the list.
4. Next, right-click on the and add a new layer.
5. Once the new layer has been added, left-click on the layer to open its **Layer Editor**.
6. Select the video input that you are creating the for as the **Source Texture** and then edit the properties of the layer as needed.



7. Add additional layers to the as desired.
8. Once all layers in the stack have been configured, close the **Video Input Patch** editor and add a new Video layer to the timeline. In the new Video layer, simply select the same Video input that you configured as the Media source. At that point, you will see the composition of the Video Input with its layer stack.

2.5D Layer

The 2.5D layer creates parallax scenes from layered image or video plates with depth, bridging 2D video and full 3D workflows. See 2.5D workflow for an overview of workflows that can be achieved using this layer.



2.5D layer

Workflow

The 2.5D layer holds a 2.5D **Asset** and maps its rendered output onto the stage. There are two common ways to get started.

Use an existing .2p5d asset

Use this path when receiving assets from Cuebric or another project.

1. Copy the **.2p5d** file to **objects/2p5DFile** in the project folder.
2. Add a 2.5D layer to the timeline.

3. In the 2.5D layer editor, click the **Asset** field and select the copied asset. It will load and become visible in the stage.
4. In the **Mapping** property, select the desired 3D mapping, e.g. MR set backplate.

Create a new asset

Use this path to build a layered parallax scene from scratch.

1. Add a 2.5D layer to the timeline.
2. In the 2.5D layer editor, click the **Asset** field and create a new 2.5D asset.
3. Add and compose plates in the asset, then set the **Mapping** as above.

For detailed asset and plate configuration, depth of field, and advanced workflows, see the 2.5D workflow.

2.5D layer properties

Asset

The **Asset** property holds the 2.5D asset rendered by the layer. Click the field to select an existing 2.5D asset or create a new one. The asset is a separate Object that acts as the container for all plates; its properties (origin, field of view, maximum depth, mode, and the plates themselves) are edited in the asset editor and described in the 2.5D workflow.

Depth of field can be applied to the rendered asset when the layer is mapped to a camera or MR set frontplate/backplate, using the camera's focus settings. See Camera Properties for more information.

Anti-aliasing

Use this property to apply mean-square anti-aliasing (MSAA) to the layer. This smooths the edges of rendered plates to avoid a jagged appearance. The available options are:

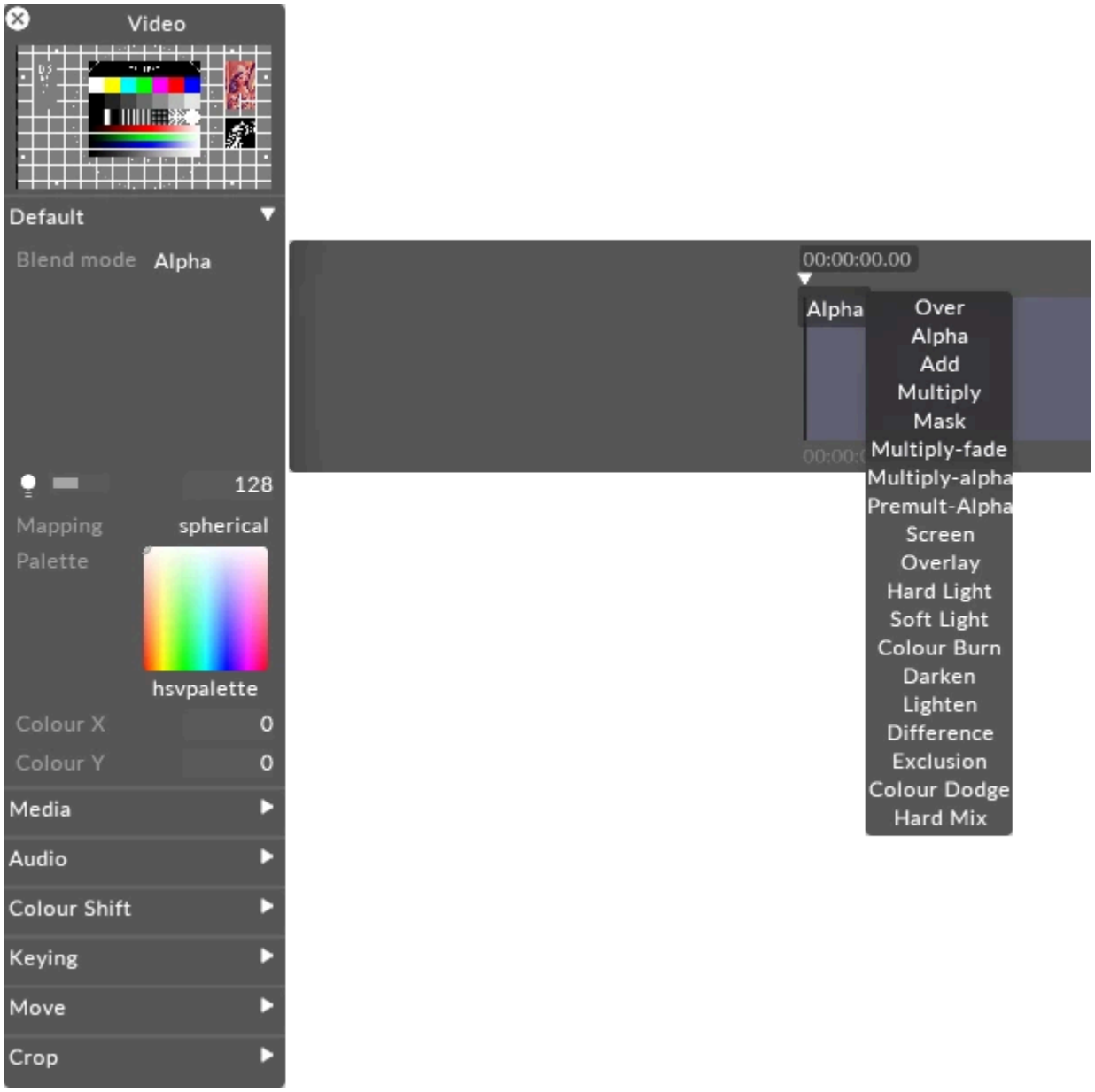
- **None**
- **MSAA 2X**
- **MSAA 4X**
- **MSAA 8X**

The multiplier relates to the number of samples taken per output pixel - increasing this can improve edge smoothness but comes at a performance cost.

Common layer properties

Blend mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

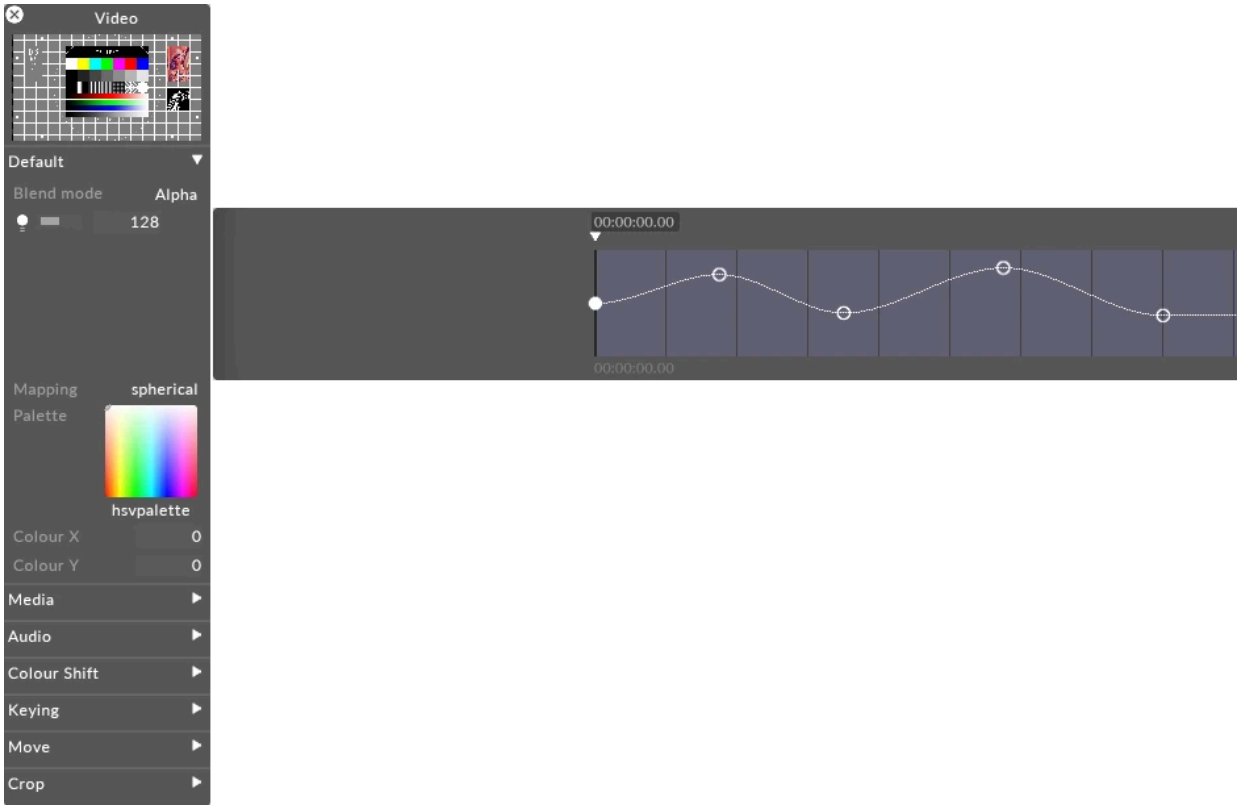
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

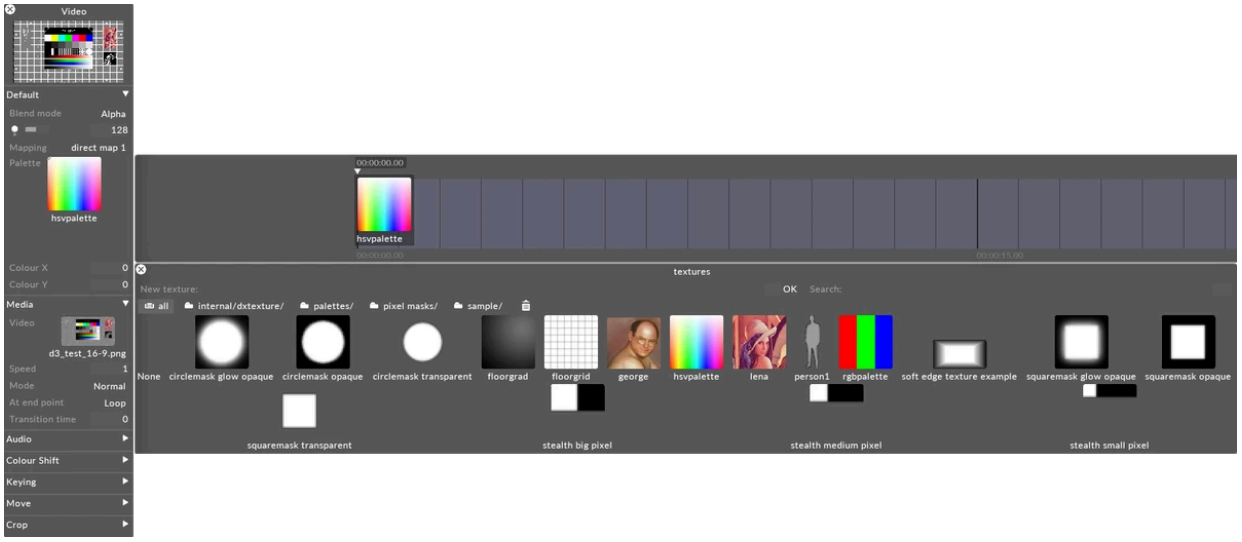


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

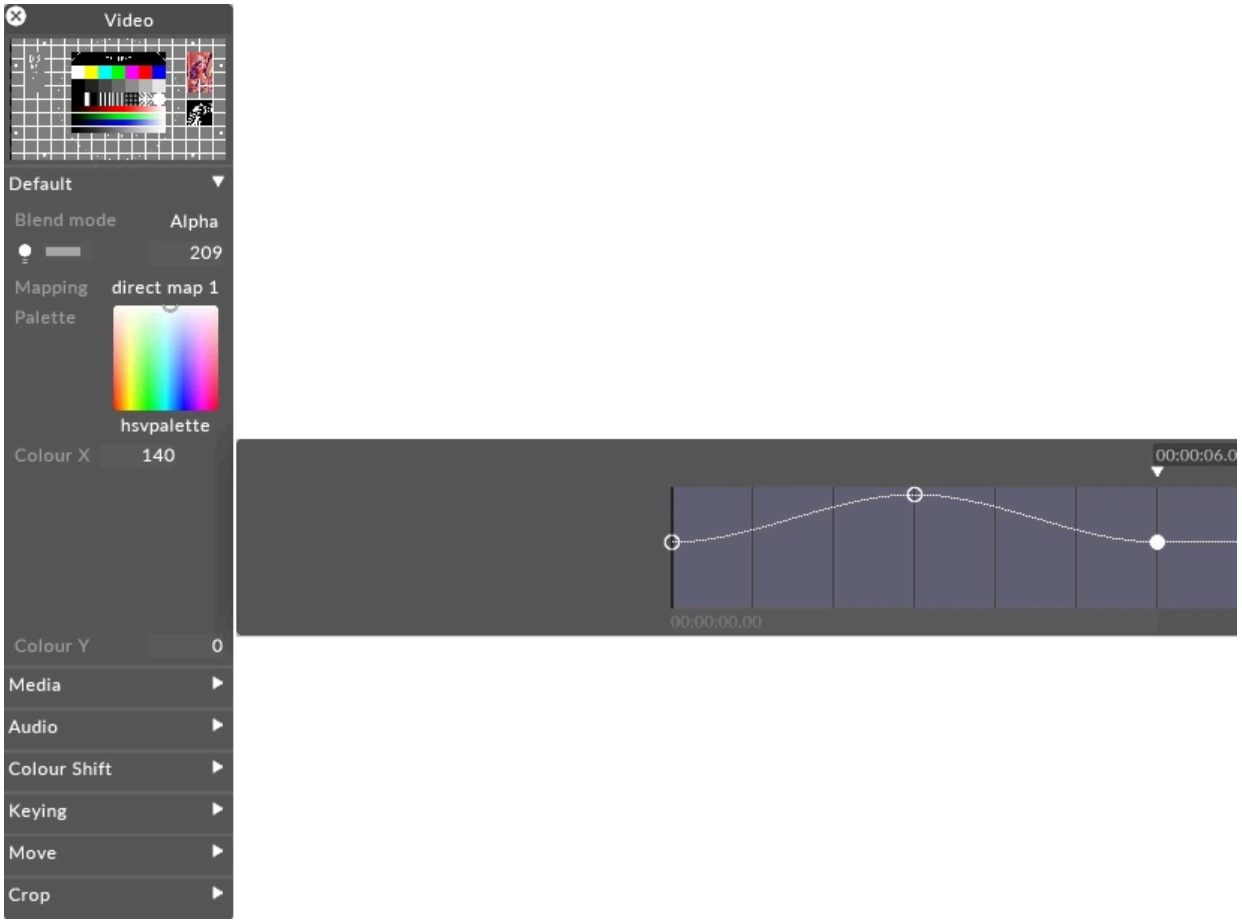
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.

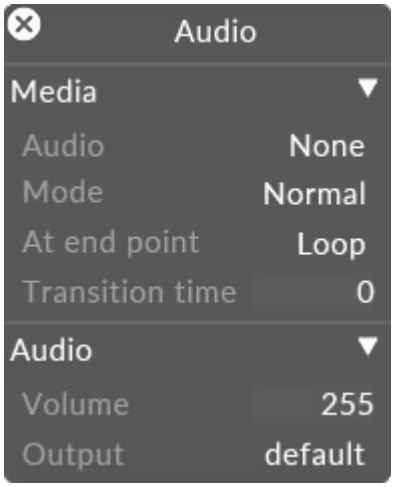


Further information

- Read more about the 2.5D workflow
- MR set
- Cuebric Integration
- Depth Workflows
- Depth Map Mesh

Audio Layers

The Audio layer allows you to play audio files from Disguise, without the need for embedding those files into a video file first.



Workflow

1. Add the audio files to the AudioFile folder in the Designer project folder.
2. Add an audio layer to the timeline.
3. Assign the layer an audio patch (assuming a logical audio out has already been configured).

Audio Layer Properties

Media

Audio

Opens the audio file list.

Mode

Normal

When the play head stops, the audio will also stop and the frame number will lock to the timeline position. When the play head continues to play or holds at the end of a section, the audio will play continuously. Jumping around the timeline while playing does not affect which part of the audio is being played.

Locked

If the play cursor continues to play or stops at the end of a section, the audio locks to the timeline and thus stops playing.

At End Point

Loop

When playback reaches the end of the video clip, the clip will loop immediately back to the beginning and will start playing again from there.

Ping-pong

When playback reaches the end of the video clip, the clip will play in reverse back to the beginning.

Pause

When playback reaches the end of the video clip, the clip will pause on the last frame.

Transition Time

The transition property specifies the dissolve time, in seconds, when switching from one audio clip to the next on the timeline. By default, this is set to 0, so the player cuts immediately from one clip to the next. Setting this value to 1 causes the player to dissolve from one clip to the next over 1 second.

Audio

Volume

You can specify any number between 0 (mute) and 255 (full) in the text field to set a constant volume, or open the properties key-frame editor to fade volume in or out.

Balance

You can balance the playback of a file to either right or left by altering the value of the parameter.

Output

This controls which audio output device the audio is played to.

Content Layers Overview

In Designer, the function of content layers is to play back pre-rendered content. The following content layers are available:

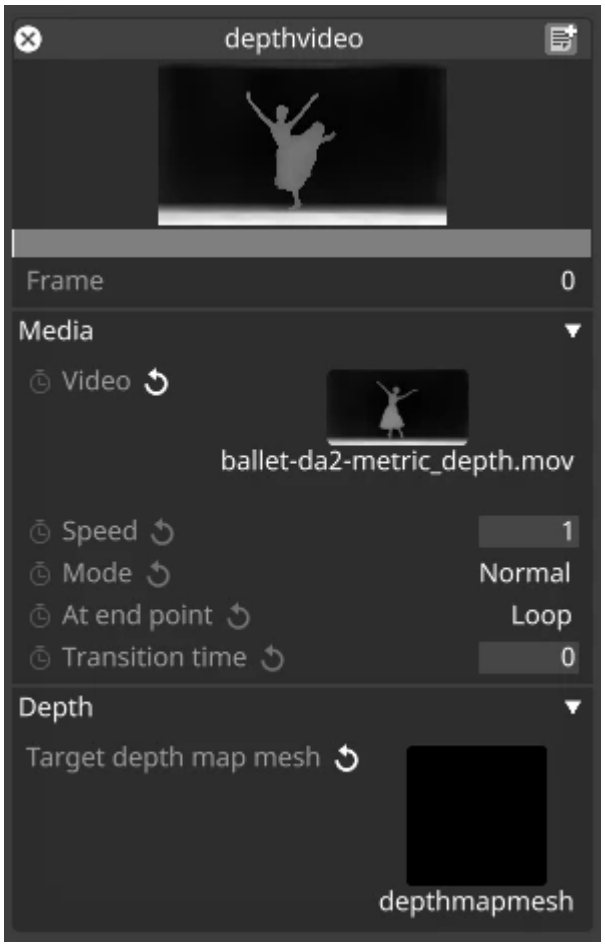
- Audio
- DepthVideo
- RenderStream
- RenderStream Local
- StageRender
- Video
- VideoTrigger
- VirtualLineup
- Web

Depth Video Layer

The Depth Video layer applies a depth map video directly to a Depth Map Mesh. The video should be a black and white depth map defining relative depths of objects in an image. The z positions of the vertices of the Depth Map Mesh will adjust dynamically based on the content mapped to it using the Depth Map Mapping.

The Depth Video layer is a subtype of the Video Layer.

> **Caution**
>
> The recommended workflow for applying content to a Depth Map mesh is to use a Depth Map Mapping, which is more flexible and can be used with different layers. However, the Depth Video Layer can be useful for cases where a mapping is not available, such as within a Layer Stack.



The Depth Video Layer

Workflow

1. Create a new Depth Map Mesh and assign it as the mesh of a stage object such as a screen.
2. Add a depth-map image or video to the project's `objects/VideoFile` folder.
3. Create a new **Depth Video Layer** and choose the Depth Map Mesh as its **Target depth map mesh**.
4. The stage object's geometry now deforms in real time based on the values in the depth-map content.

Properties

Developed as a subclass of the Video layer, most properties in the Depth Video Layer match those of the standard Video Layer.

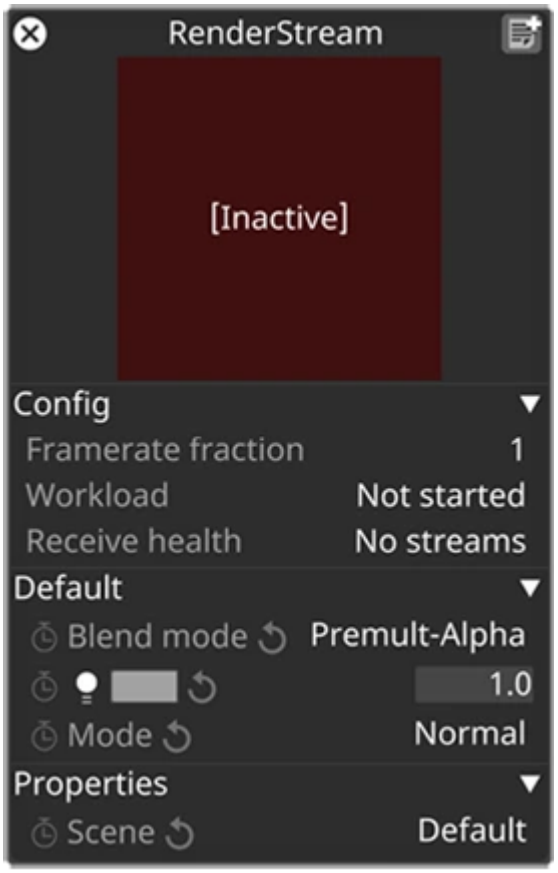
The key difference is that instead of using a **Mapping**, the Depth Video Layer exposes a **Target depth map mesh** property. This determines which mesh receives the video-driven depth deformation.

Related information

- Depth Map Mapping
- Depth Map Mesh Object
- Depth Workflows

RenderStream Layer

The RenderStream Layer is used to control third party render engines running externally to Designer.



Layer properties

There are six main sections within the RenderStream layer, and several subsections:

- Options
- Media Thumbnail

- Config
  - Framerate fraction
  - Workload
    - Cluster Workload
      - Configure
      - Channel mappings
      - Texture parameters
      - Bandwidth estimate
      - Control
      - Machine
      - Actions
  - Receive health
- Default
  - Blend mode
  - Brightness
  - Mode
- Properties
  - Scene

Additionally, as parameters in the Render Engine scene are exposed, those properties will also appear listed in the RenderStream layer.

1. Options section

These options include:

- Lock
- Copy UID
- All fields
  - Bake fields
  - Bake expressions
  - Clear expressions
- Opened fields
  - Bake fields
  - Bake expressions
  - Clear expressions

2. Media Thumbnail section

This area will display an image of the active stream being received. When there is no stream, it will show `[Inactive]`.

Note that in a multi-channel environment, this will only show the Camera in UE that has the RS component attached to it.



Media Thumbnail

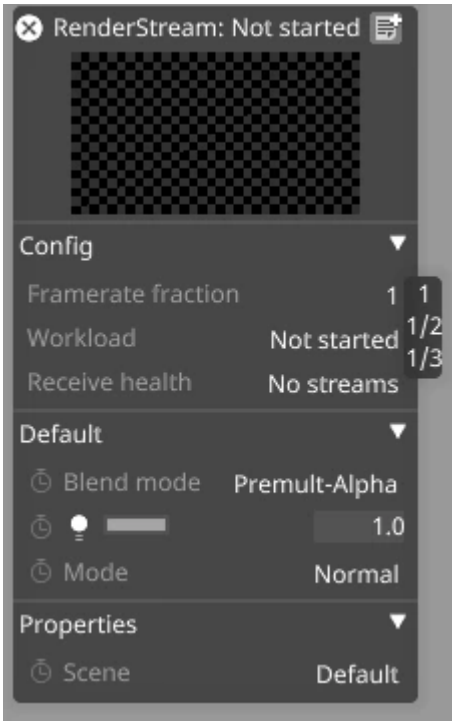
3. Config section

This section of the is where you will configure properties such as **Asset** and **Cluster Pool**, as well as monitor workload and engine health in real time.

- **Framerate fraction**

The framerate of each stream is determined by the global refresh rate set within d3. The Framerate Fraction setting indicates the fraction of the framerate this layer renders at.

The options are 1, 1/2, 1/3, and 1/4.

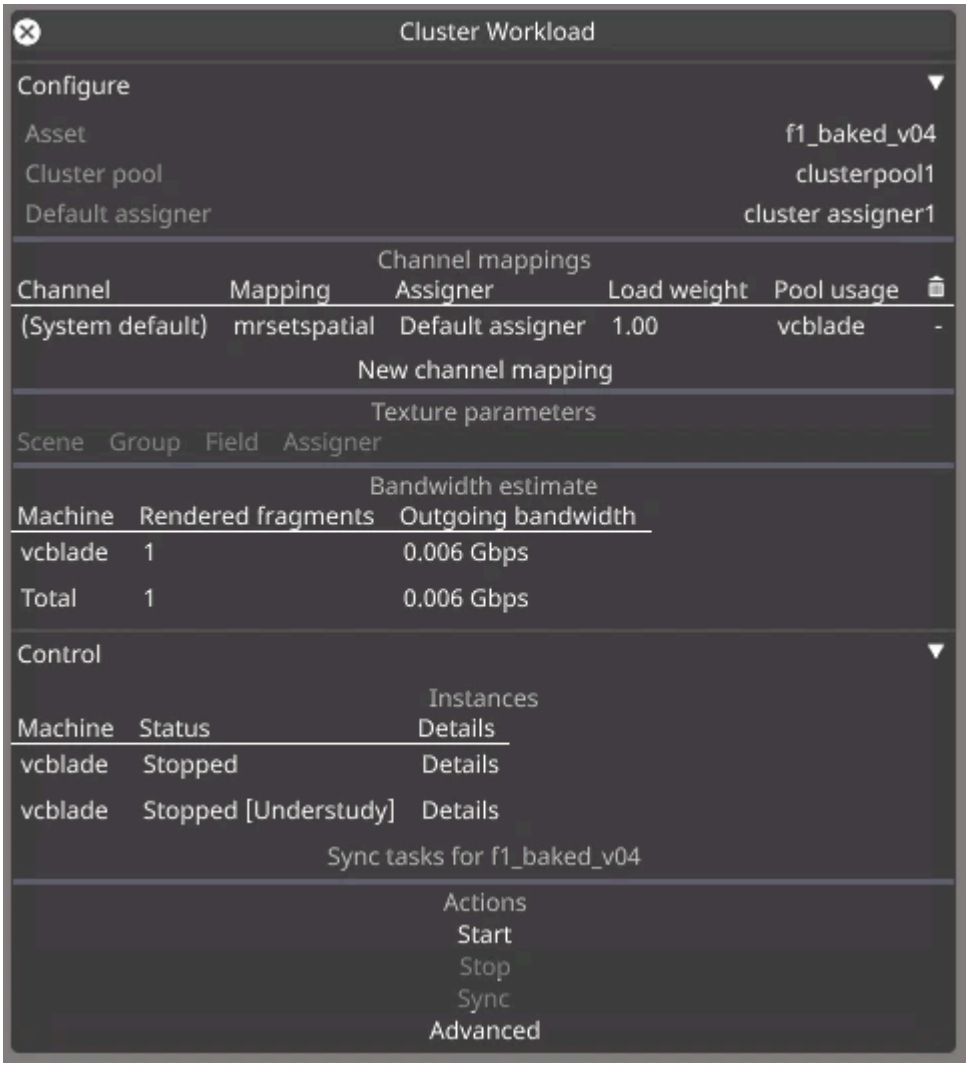


Framerate fraction

4. Workload section

- **Cluster Workload**

The Cluster Workload window contains the elements required for configuring a Cluster.



It contains the following sections:

- **Configure**

> The Configure section contains these elements of a Cluster:
>
> - `Asset`
>   - RenderStreamAsset
> - Cluster pool
>   - Cluster pool - New ClusterPool, Search
>   - Render machines, RenderStream understudies

- `Default`
  - Splitting strategy
  - Splitting overlap (pixels)
  - Padding (pixels)
  - Maximum tile size (pixels)
  - Effective tile size (pixels)
  - Transport format
  - Alpha
  - Scale factor
  - Proxy streams
  - Preferred Network
- `Channel mappings`
  - Channel
  - Mapping
  - Assigner
  - Load weight
  - Pool usage
- `Texture parameters`
  - Scene
  - Group
  - Field
  - Assigner
  - Channel
  - Controller
- `Bandwidth Estimate`
  - Machine
  - Rendered fragments
  - Outgoing bandwidth
  - Incoming bandwidth

- `Asset`

This Asset is the Render Engine project or Notch block that will be controlled by the layer. In order for the asset to be visible here, it must be present in the RenderStream projects folder.

Right-click on the asset name listed in RenderStreamAsset to open the **Asset** properties editor:

Properties include:

- Asset Discovery Name: Name of UE folder/project.
- Target Engine: Name of the Render Engine.
- Engine Settings: Engine version.
- Colour shift: Apply colour correction to entire asset.
- Content Source Machine: The render node that is running the render engine project. This is the machine that the project will be synced from.
- Available: Status indicator displaying if the Asset is available. Not a tick box.
- Channels: displays active channels defined by the CameraActors in your UE project.

- `Cluster Pool`

The **Cluster Pool** will automatically detect all available machines on the same network. Once detected, you can assign as many machines to the **Cluster Pool** as needed and inspect each machine in the pool to see network status, IP address, current Streams and available Assets.

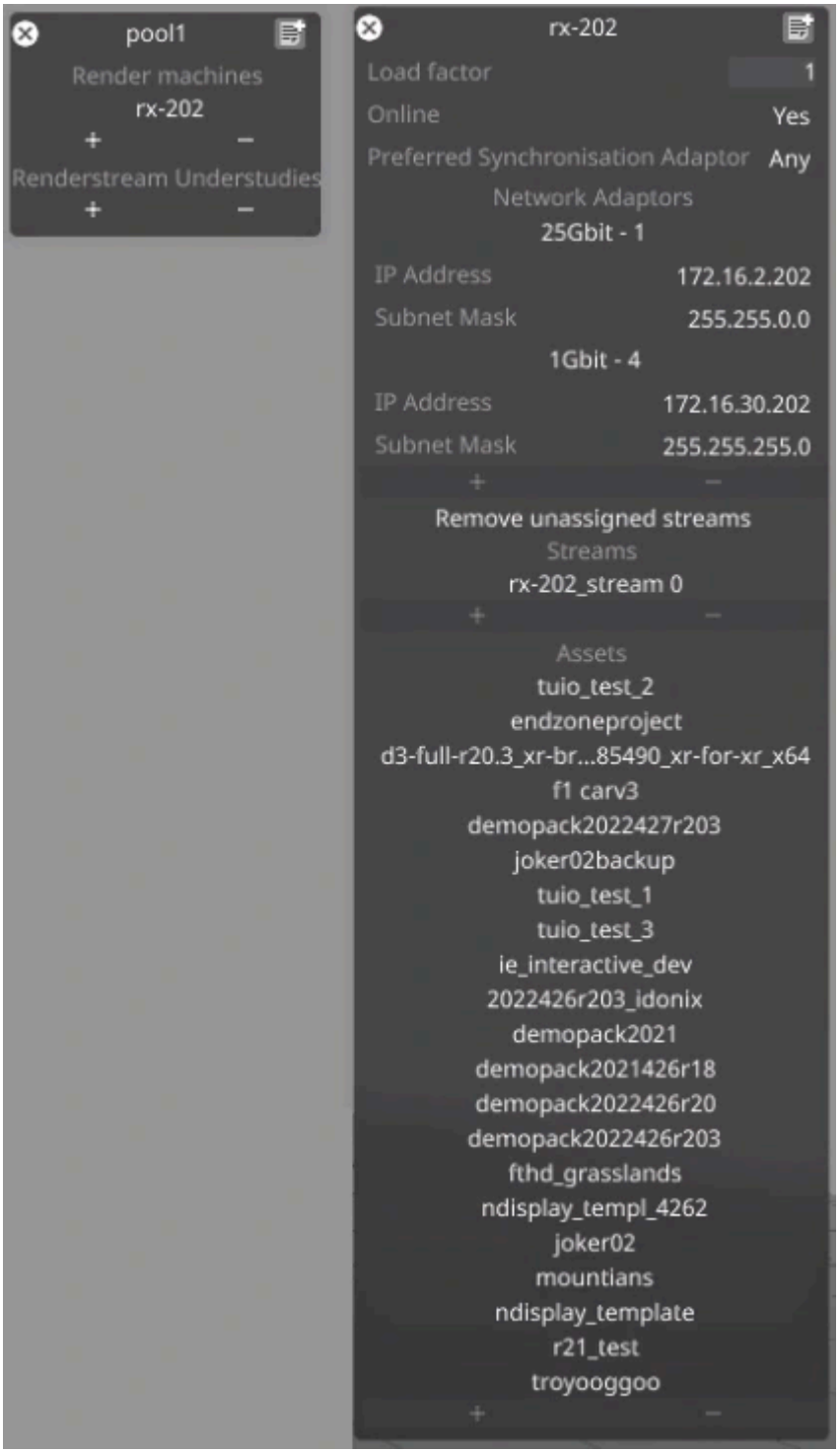


Cluster Pool

Properties include:

- Render Machines: The list of render nodes that the content will be distributed across.
- Understudies: Backup nodes in case of failover.

Right-click on the name of a machine in the **Cluster Pool** to edit additional properties related to that machine:



`Cluster Pool Machine`

Properties include:

- **Load Factor**: Relative load weight this machine can handle. Weight is relative to other nodes in pool. The workload can be spread evenly across the cluster by the user using a load factor. This allows you to take into account each machine's spec and assign loads accordingly.

- Online status
- **Preferred Synchronisation Adaptor**: This setting allows you to pick a subnet to use for Renderstream asset synchronization. You should pick something fast - preferably capable of 100Gbps or more. It is also used by nDisplay inter-machine communication when using Unreal Engine.

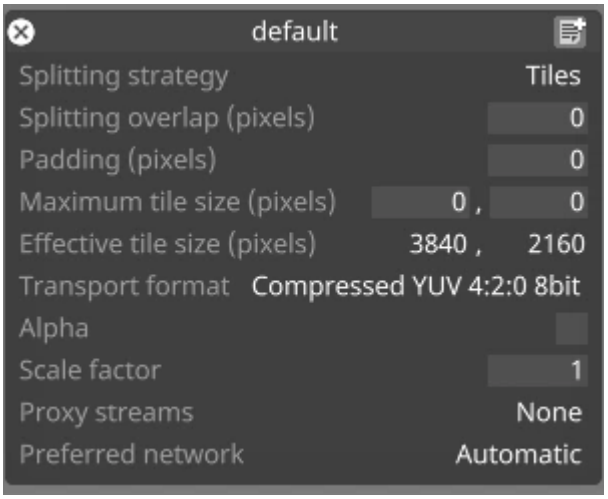
> **Note**
>
> We recommend selecting a specific `Preferred Synchronisation Adaptor` rather than defaulting to `Any` as it may produce unpredictable results.

- **Network Adaptors and settings**: Non-editable list of network adaptors available on the node. To configure the system for Cluster Rendering, all machines within a Cluster Pool must be on the same subnet. If a machine is reporting an unexpected IP address (e.g. loopback address), make sure to select the specific network adaptor within the 'Network' tab of d3manager.
- **Streams**: non-editable list of RS output from the node.
- **Assets**: non-editable list of assets resident on the node.

Default Assigner

The **Default Assigner**, also known as *Cluster Assigner*, is where we control the settings for the distribution of the content across all the machines in the **Cluster Pool**.

Cluster Assigners are used to create definitions as to how channels are delivered from the nodes. You can create as many Cluster Assigners as needed.

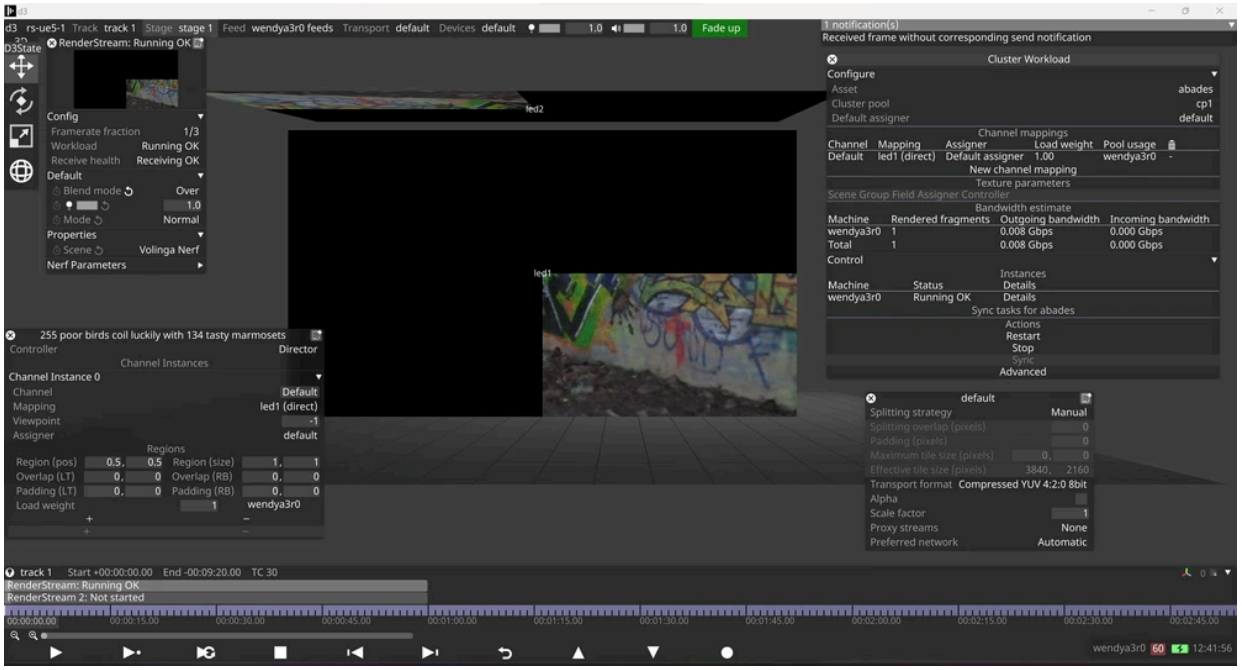


Cluster Assigner

Properties include:

- **Splitting Strategies**

- These are used to generate the sub-regions needed for distributing content across a set of render nodes.
- There are 3 types of splitting strategies:
  1. **Tiles** - lets Designer split up the content as it sees fit to the mapped channels. Note: this splitting strategy DOES NOT work with Mesh Policy.
  2. **Full frame** - Sends the entire stream to the mapped channel.
  3. **Manual** - splits each Viewport according to user specified instructions. When using the 'Manual' splitting strategy, the options for specifying how to split frames can be found within the Advanced workload settings.



In Advanced workflow settings, note that region pos. has a range between 0 and 1. The screenshot shows both regions (pos) set to 0.5. Other property values in this editor also range from 0 to 1.

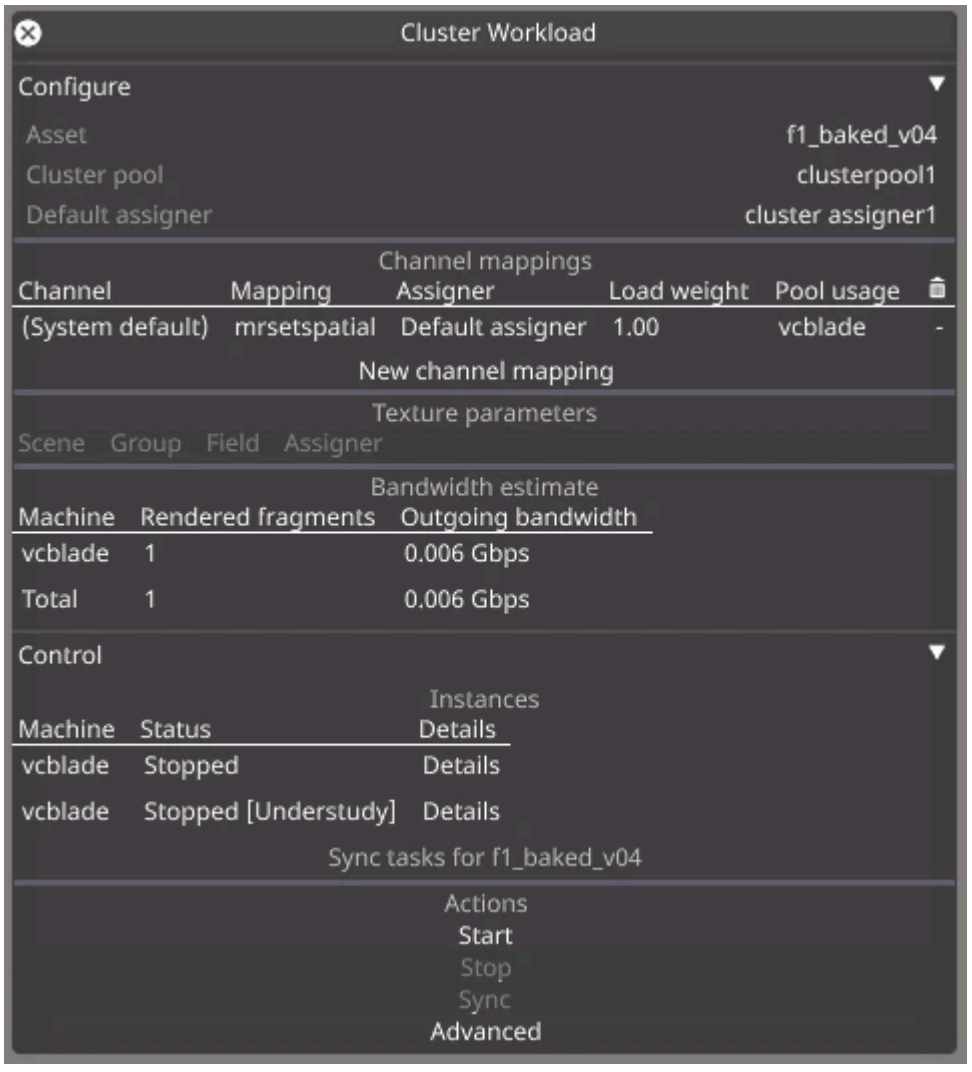
- **Splitting Overlap**: The Splitting Overlap option can be used to define a blend region at each split that hides imperfections at the seams.
- **Padding (Pixels)**:The Padding option enlarges the rendered area at each split, but does not stream the padded area, cutting off edge artifacts.
- **Load Weight**: Load Weight allows you to set a priority for the Cluster Assigner. The higher the weight of the assigner, the more machines will be assigned to render the content and thus more splits will be made.
- **Transport format**:The options to pick between 'Compressed' and 'Uncompressed' , 'RGB 4:4:4', 'YUV 4:2:2', and 'YUV 4:2:0', and 8-bit, 10-bit and 12-bit transport bit-depths are available.
- **Alpha**: The option to enable or disable the Alpha channel on the content is available.
- **Scale factor**: Scale factor for the resolution.

- **Proxy Streams**: A compressed stream at a lower quality or resolution used for providing a preview on ma chines where receivingthe full-quality stream is undesirable or impossible.
- **Preferred network**: Select the adaptor to use for video transport on any channel the assigner is associated with.

> **Note**
>
> We recommend that the `preferred adaptor` is not left as the default: `Any` and is instead set to a specific network. It should be configured to match the network interface you wish to receive RS streams over. For uncompressed RenderStream this must be a port on your high bandwidth Network Interface Card (NIC). In our servers, this is the Mellanox brand NIC.

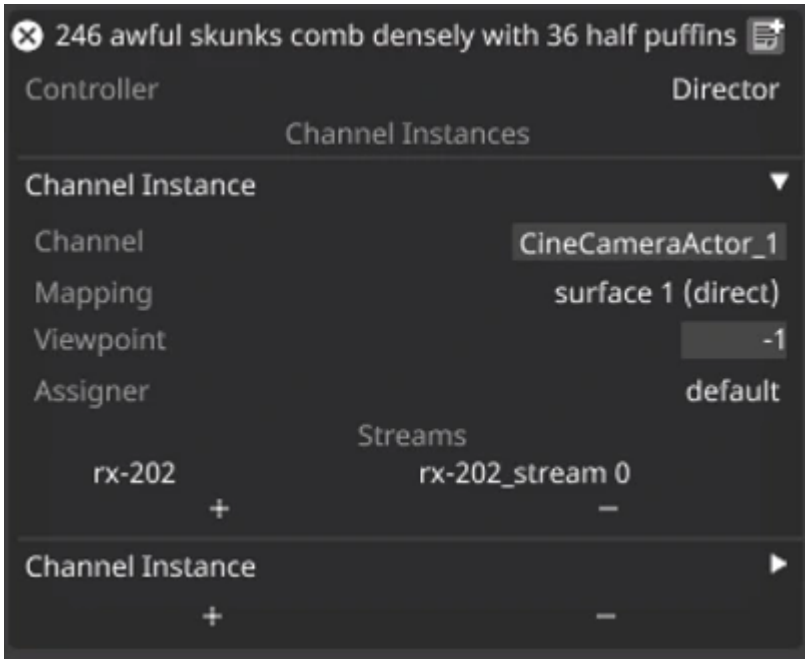
- **Control**

> Once the cluster has been configured, the stream's playback is managed via the Cluster Workload controls.



The options for managing the workload are:

- **Instances:** there can be only one workload instance running at a time in the same cluster pool. When started, the Instances table will be populated with the machines that have been sent the start signal.
- **Start:** sends signal to all machines in the pool to launch the Asset according to config settings
- **Stop:** Sends signal to cease outputting a stream and quit the process sending it. The workload log can be opened by left-clicking on the status within the Instances table
- **Sync:** begins the process of content sync. Content is synced from the source machine to all other machines available within the cluster pool; copies only the necessary directories and files needed.
- **Advanced:** right-click to open the workload's advanced options:

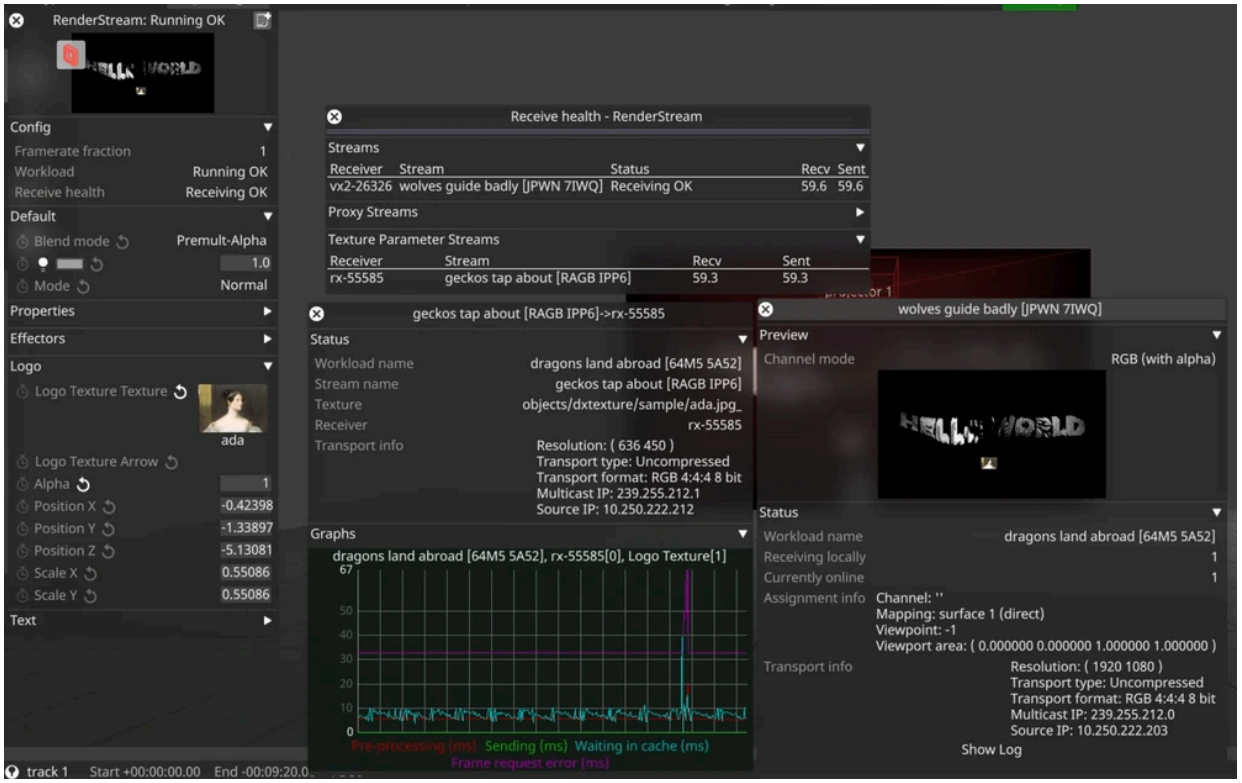


> **Note**
>
> **Please note**: Any changes to the Assigner require a restart of the workload

Receive Health

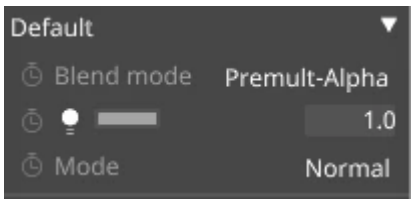
Status of entire cluster receiving streams, dynamically reported while stream is running.

Right-click on **Receive health** to open the machine-specific window:



4. Default section

In the Default section of the RenderStream Layer, there are four Common Layer Properties:



- **Blend Mode**: Premult-Alpha is needed for content that contains alpha data.
- **Brightness**: Layer intensity.
- **Mode**: This is used to determine the timeline's playback behavior as the layer is playing.

5. Properties section

The last section of the RenderStream layer is asset specific and will display all exposed parameters from the asset as well as their keyframe editors



Workflow overview

Set up your environment including installation of the Render Engine and required plugin.

Use the RenderStream Layer to control the third party render engine.

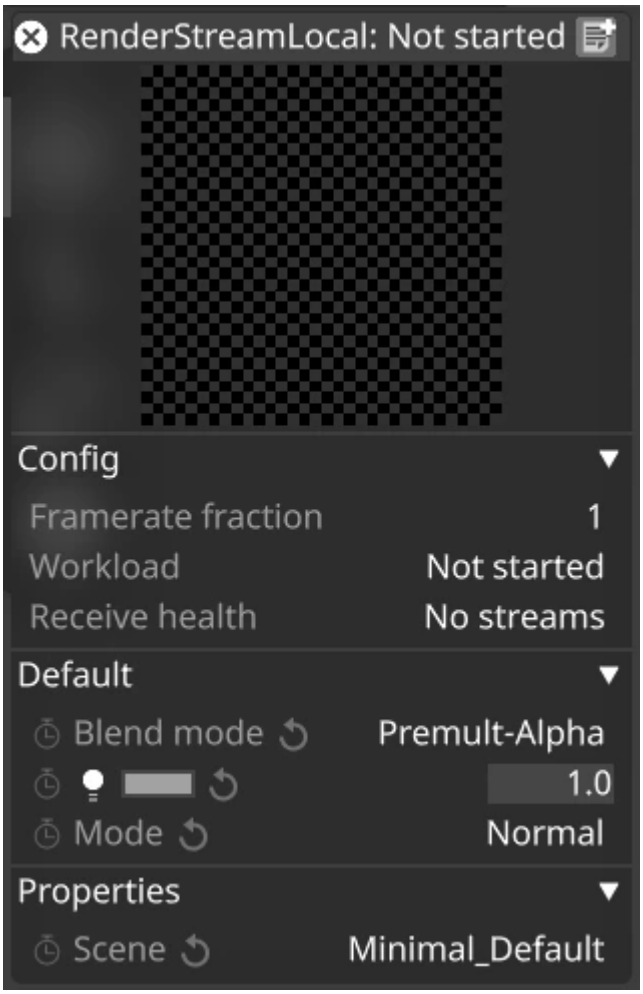
- Notch
  - Plugin - included in Designer.
  - Documentation
- Touch Designer
  - Plugin
  - Documentation
- Unity
  - Plugin
  - Documentation
- Unreal Engine
  - Plugin
  - Documentation

RenderStream Local Layer

The RenderStream Local Layer is used to control third-party render engines running externally to Designer locally on a VX or GX server. The RenderStreamLocal layer is a local RenderStream mode used to sequence instances of Unreal Engine, Unity, and TouchDesigner using the same RenderStream plugins as RenderStream in remote mode. Support for Notch is built into Designer.

The VX 4 and VX 4+ do not currently support RenderStream Local.

TouchDesigner is the only RenderStream plugin type which is enabled on the EX range via RenderStream Local. Notch block playback is currently not supported using the RenderStream Local layer, and should use the Notch layer instead.



There are four main sections within the RenderStreamLocal Layer:

- Media Thumbnail
- Config

- Default
- Properties

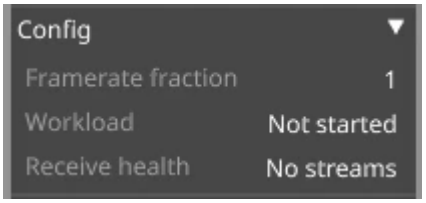
Media Thumbnail

This area will display an image of the active stream being received. Note that in a multi-channel environment, this will only show the Camera in UE that has the RS component attached to it.

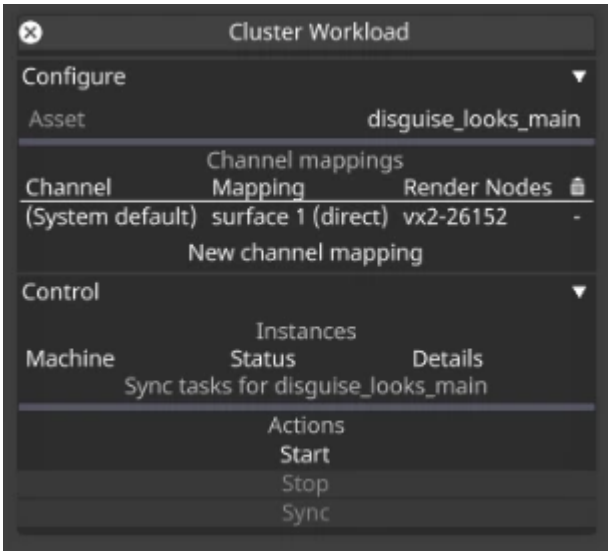


Configuration

This section describes the configuration properties, real-time workload monitoring and engine health monitoring.



Cluster Workload



The Cluster Workload window contains the elements required for configuring a workload. It contains **Configure** and **Control** sections.

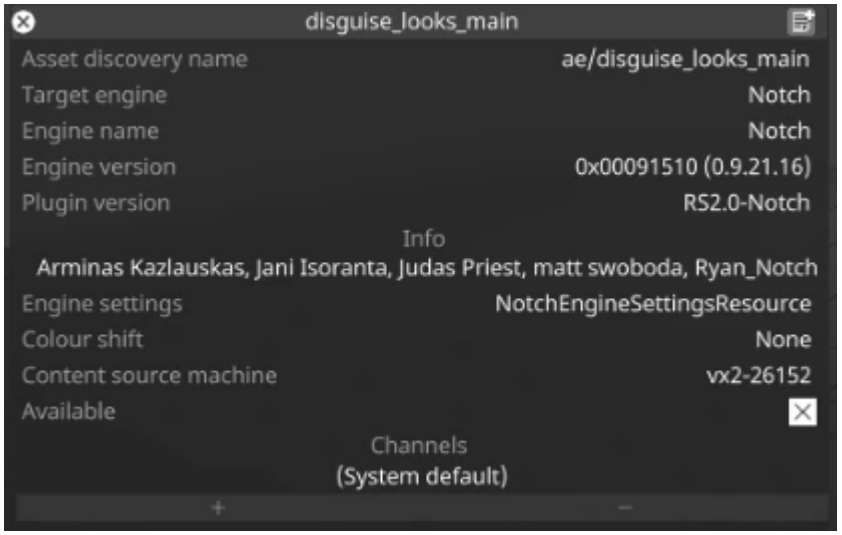
Configure

The Configure section contains elements to set up a workload.

Asset

This is the Render Engine project or Notch block that will be controlled by the layer. In order for the asset to be visible here, it must be present in the RenderStream projects folder of the render machines.

Right-click on the asset name to open the **Asset** properties editor:



Properties include:

- **Asset discovery name**: Name of the folder/project.
- **Target engine**: Name of the Render Engine.
- **Engine version**: Engine version.
- **Plugin version**: Plugin version.
- **Engine settings**: Engine-specific settings.
- **Colour shift**: Apply colour correction to entire asset.
- **Content source machine**: The render machine that is running the render engine project. This is the machine that the project will be synced from.
- **Available**: Status indicator displaying if the Asset is available. Not a tick box.
- **Channels**: Active channels defined in the render engine project.

Channel Mappings

Channel Mappings include properties such as:

- **Channel:** active channel, editable field.
- **Mapping:** active mapping, editable field.
- **Render Nodes:** non-editable list of render machines.

> **Note**
>
> The Render Nodes field is empty by default. A machine will be automatically added to the list when the content is mapped to the machine's output display head in the Feed Editor.

Control

The Control section allows to manage the workload.

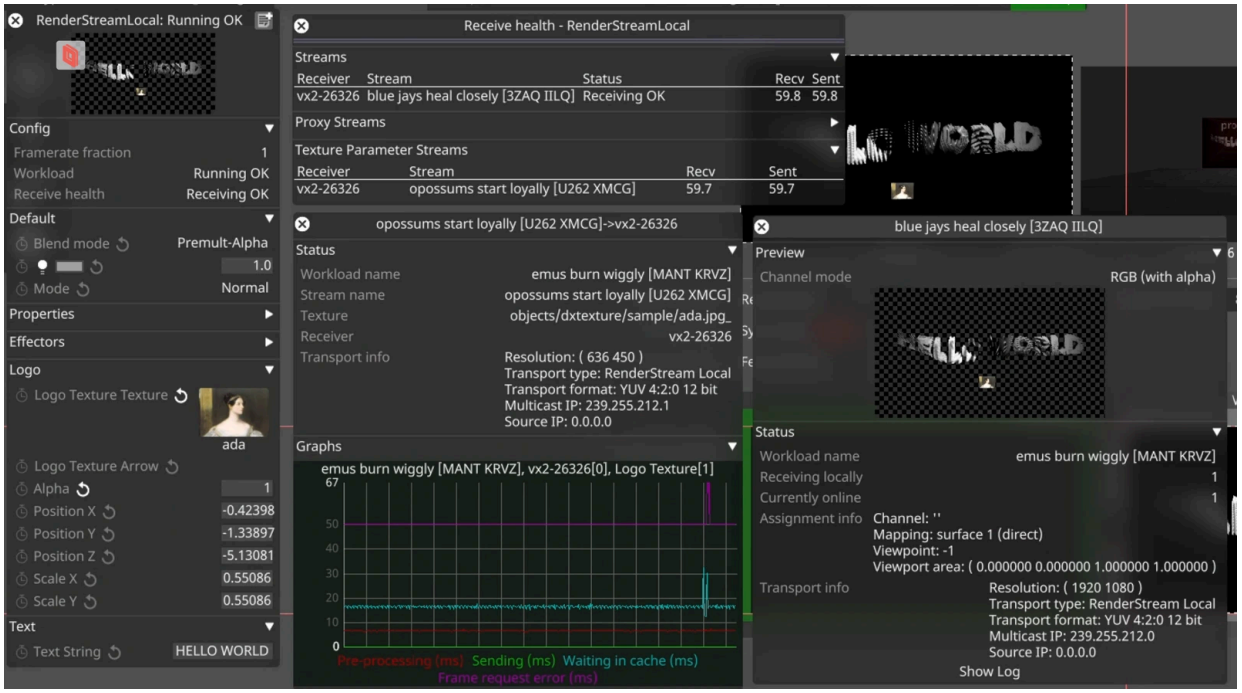
- **Instances:** when started, the Instances table will be populated with the machines that have been sent the start signal.
- **Start:** sends signal to all machines in the Render Nodes list to launch the Asset according to config settings.
- **Stop:** Sends signal to cease outputting a stream and quit the process sending it. The workload log can be opened by left-clicking on the status within the Instances table
- **Sync:** begins the process of content sync. Content is synced from the source machine to all other available Render Nodes; copies only the necessary directories and files needed.

> **Note**
>
> Any changes to the settings require a restart of the workload.

Receive Health

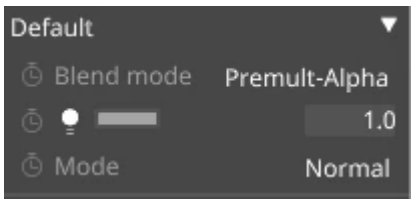
Status of all render machines are dynamically reported while stream is running.

Right-click on **Receive health** to open the machine-specific window:



Default

In the Default section of the RenderStreamLocal Layer, there are four common layer properties:



- **Blend Mode**: Premult-Alpha is needed for content that contains alpha data.
- **Brightness**: Layer intensity.
- **Mode**: This is used to determine the timeline's playback behaviour as the layer is playing.

Properties Section

The last section of the RenderStreamLocal layer is asset specific and will display all exposed parameters from the asset as well as their keyframe editors



> **Note**
>
> Current release version does not support remote texture sharing.

Workflows

View the RenderStream Local section to learn about RenderStream Local workflows.

StageRender Layer

Using the StageRender layer, you can assign any type of content to your virtual wall while being able to control the position of where the content will be rendered.

The StageRender layer is a 3D layer type, like the RenderStream Layer and the Notch layer. It is used to render backplate stage objects that are also mapped to an MR set.

This layer is created to improve a workflow. Prior to r19, if any other content was added to the MR set backplate, it would render on top of the virtual screen, regardless of the order of the layers in the timeline. Using the StageRenderlayer, you can utilize normal content and assign it to your virtual wall while being able to control the position by changing the order of the layers.

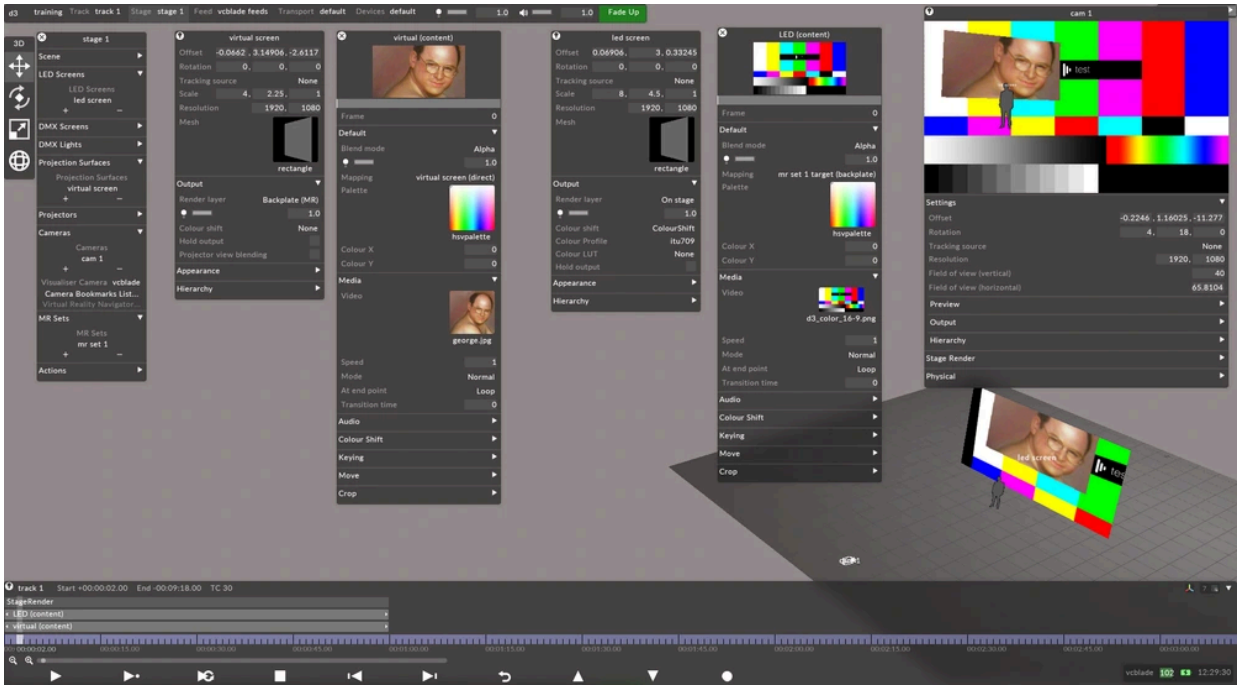
Workflows

Backplate workflow

1. Create an MR set with a camera and an LED screen.
2. Check that the Render layer is set to **On stage**.
3. Create a Video layer and map content to the LED screen using the mapping type **mrset target (backplate)**.
4. Create a new projection surface and change the render layer of the surface from **On stage** to **Backplate (MR)**. It will not be rendered.
5. Create a Video layer and map content to the virtual surface using the surface's Direct mapping.
6. Create a **StageRender** layer, and map it to the **mrset target (backplate)**.
7. The position the **StageRender** layer appears in the layer stack determines its composite order, like other layers.
8. Move the video layer below the virtual screen content in the timeline in order for the virtual screen to appear in front of the LED screen.

Result: The Video layer will respect the position of the layer in the timeline. It can be placed in front of or behind the virtual content in the LED by changing the order of the layers.

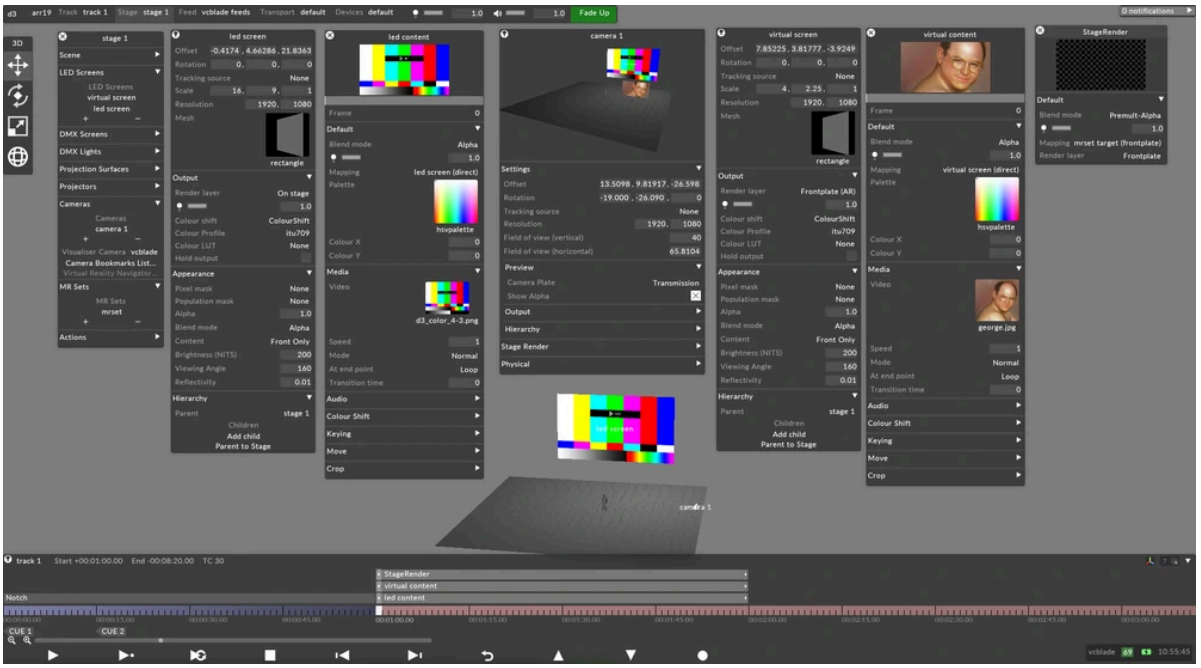
> **Note**
>
> Please note: Individual layers rendering to the virtual screen do not get interleaved - they are all rendered to the virtual screen in one go before the on-stage screens and backplate are composited.



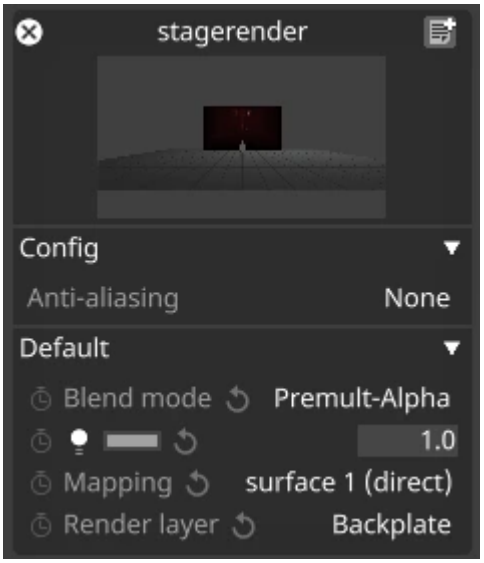
Frontplate workflow

1. Create an MR set with a camera and an LED screen.
2. Check that the Render layer of the LED screen surface is set to **On stage**.
3. Create a Video layer and map content to the LED screen using the Direct mapping type.
4. Create a new projection surface and change the render layer of the surface from **On stage** to **Frontplate (AR)**. It will not be rendered.
5. Create a Video layer and map content to the virtual surface using the surface's Direct mapping.
6. Create a **StageRender** layer, and map it to the **mrset target (frontplate)**.
7. The position the **StageRender** layer appears in the layer stack determines its composite order, like other layers.

8. Move the video layer below the virtual screen content in the timeline in order for the virtual screen to appear in front of the LED screen.



StageRender layer properties



Anti-aliasing

Use this property to apply mean-square anti-aliasing (MSAA) to the layer. This smooths the edges of rendered objects to avoid a jagged appearance. The available options are:

- **None**

- MSAA 2X
- MSAA 4X
- MSAA 8X

The multiplier relates to the number of samples taken per output pixel - increasing this can improve edge smoothness but comes at a performance cost.

Render layer

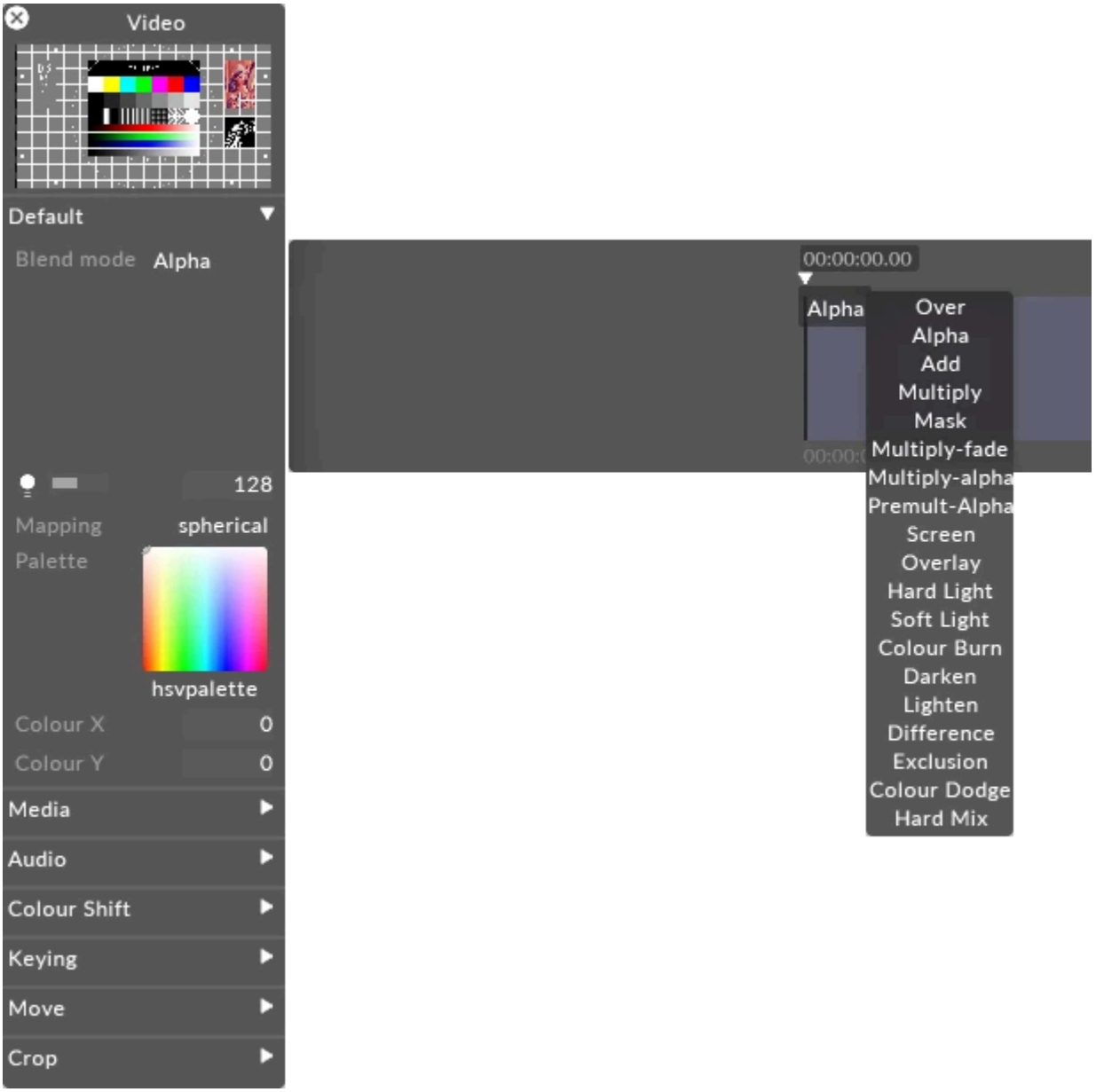
Choose **Frontplate** to render all screens whose **Render layer** is assigned to **Frontplate**, or choose **Backplate** to render all screens whose **Render layer** is assigned to **Backplate**.

Common Layer Properties

The Stage Render layer has the following Common Layer Properties:

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

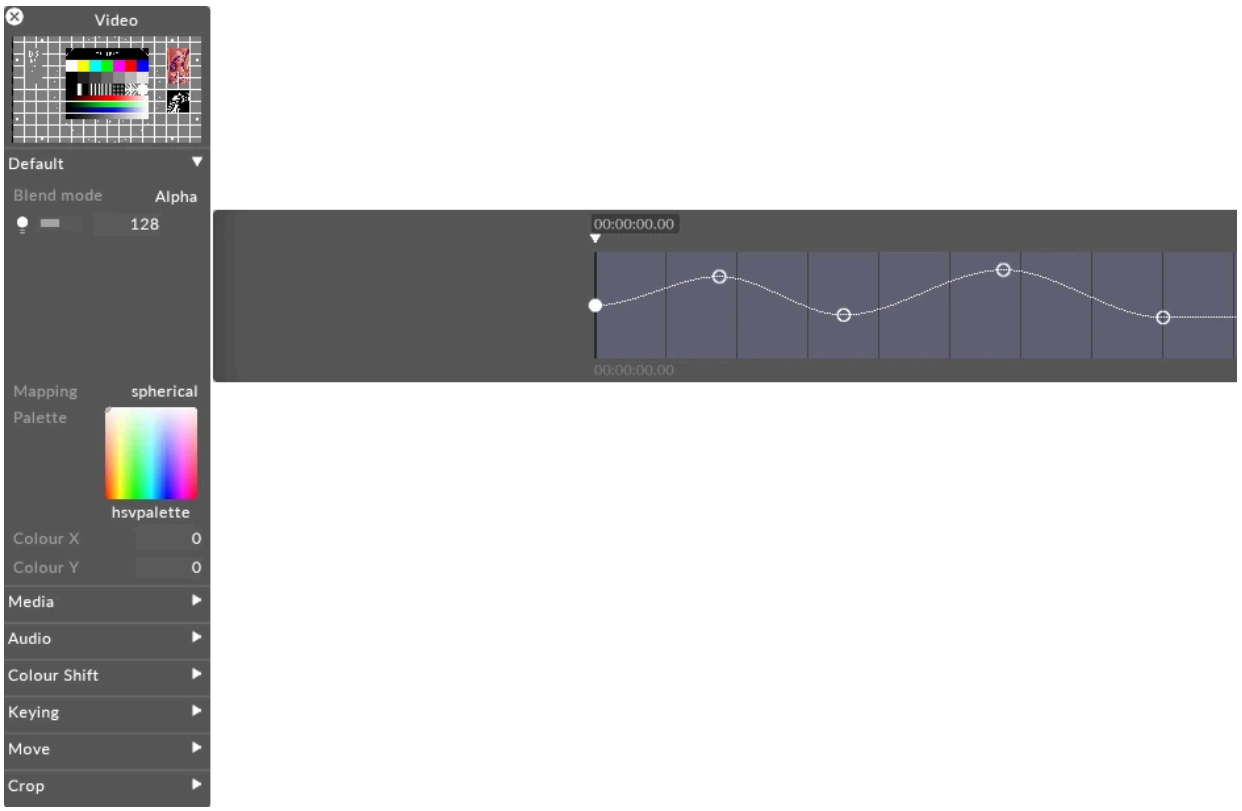
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Video Layer

The Video layer plays pre-rendered video files and can include embedded audio.

It provides editable colour and effects controls, along with keying, movement, cropping, and timeline control.

Playback speed can be adjusted while the clip is playing. Unlike the legacy Video layer, speed can vary between keyframes.

Video layer properties

Media

Video

The Video property points to the still media file that defines the content to be used on the layer. Selecting this property will open the VideoClip object library, which shows all of the still image files saved on your local hard-drive in the VideoFile folder.

To change the current piece of content:

1. Left-click Video to open the VideoClip object library.
2. Left-click the media file you want to use.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a supported file format.

Speed

Selects playback speed. When this is set to 1, the video is played at its normal framerate; when set to 2, the video is played at double speed, when set to -1, the video is played at normal framerate in reverse and so on.

Mode

This specifies the playback mode. There are two modes - **Normal** and **Locked**. Each one has a specific behaviour that is useful for a different situation:

- **Normal**: When the play cursor stops, the video will also stop and the frame number will lock to the timeline position. When the cursor continues to play or holds at the end of a section, the video will play continuously. Jumping around the timeline while playing does not affect which frame is being played.
- **Locked**: If the play cursor continues to play or stops at the end of a section, the video frame number is locked to the playhead position on the timeline.

At end point

This specifies what happens when playback reaches the end of the video clip. There are three options to choose from:

- **Loop**: When playback reaches the end of the video clip, the clip will loop immediately back to the beginning and will start playing again from there.
- **Ping-pong**: When playback reaches the end of the video clip, the clip will play in reverse back to the beginning.
- **Pause**: When playback reaches the end of the video clip, the clip will pause on the last frame.

Transition Time

The transition property specifies the dissolve time, in seconds, when switching from one video clip to the next on the timeline. By default, this is set to 0, so the player cuts immediately from one clip to the next. Setting this value to 1 causes the player to dissolve from one clip to the next over 1 second.

Volume

Some video clips may contain audio. You can fill in any number between 0 (mute) and 255 (full) in the text field to set a constant volume, or open the propertys key-frame editor to fade volume in or out.

Output

If the video has an audio track, this controls which audio output device the audio is played to.

Threshold

The threshold of the keying. Colours closer than (threshold) to the key colour become transparent.

Hardness

The hardness of the keying. Lower numbers produce softer edges and higher numbers produce harder edges between transparent and opaque areas.

Key colour rgb

The value of the key colour, 0 255, causing the key colour to become transparent.

Scale

Controls the size of the video.

Aspect

Controls the aspect ratio of the video, higher numbers make the frame taller.

Pos xy

Position of the video:

- x = horizontal position
- y = vertical position
- 0 = centre of canvas
- -1 = top edge of canvas
- +1 = bottom edge

Rotation

Rotation (in degrees) of the video.

Crop left, right, top, bottom

Crops the frame from the respective edge. 0 = no crop, 1 = entire frame crop.

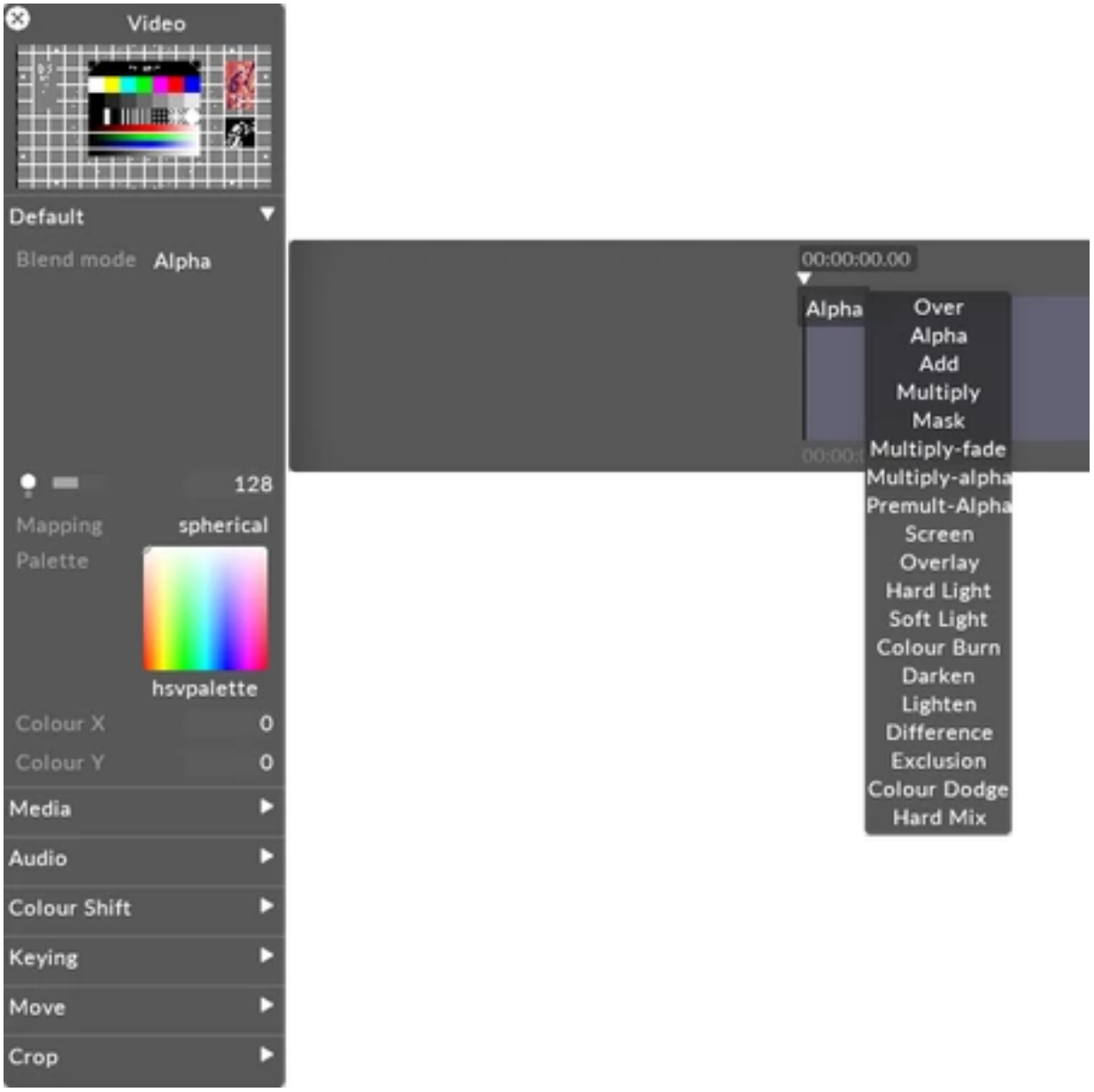
Vignette

Adds a vignette effect by softening the edges of the crop.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

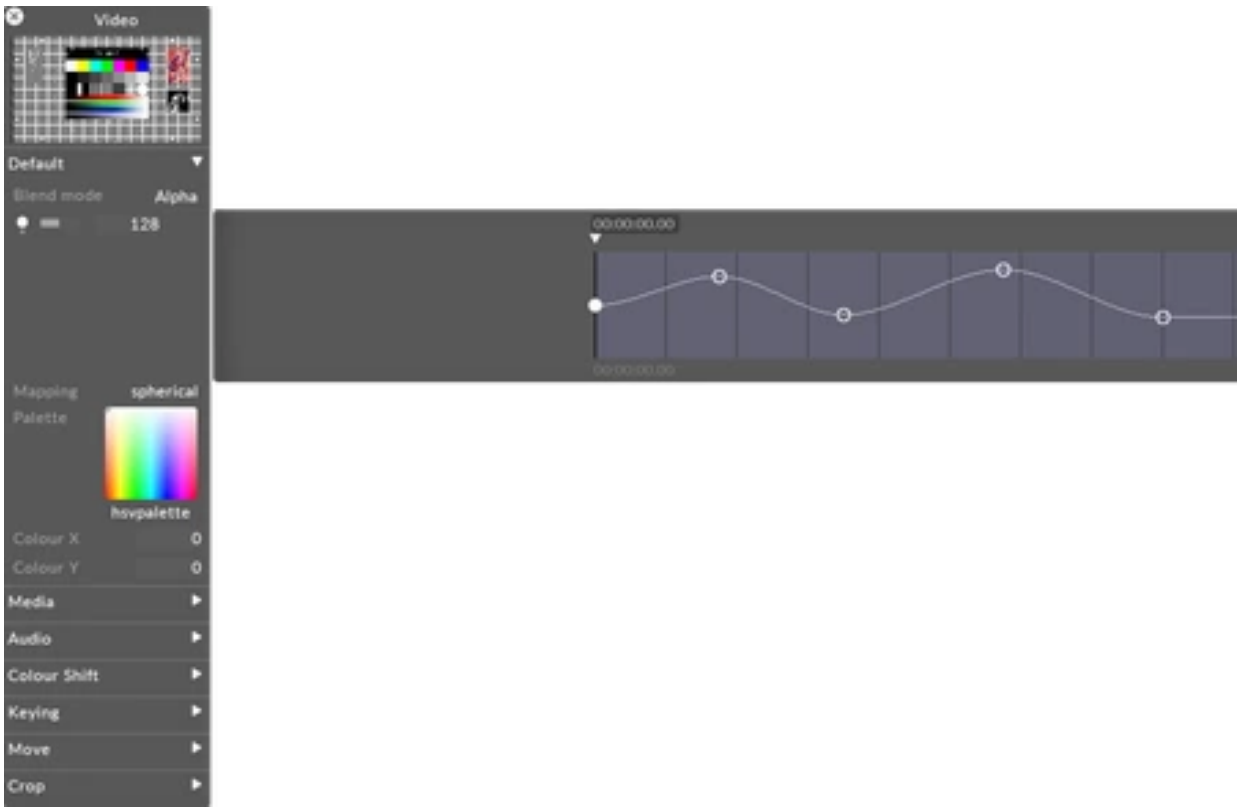
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.

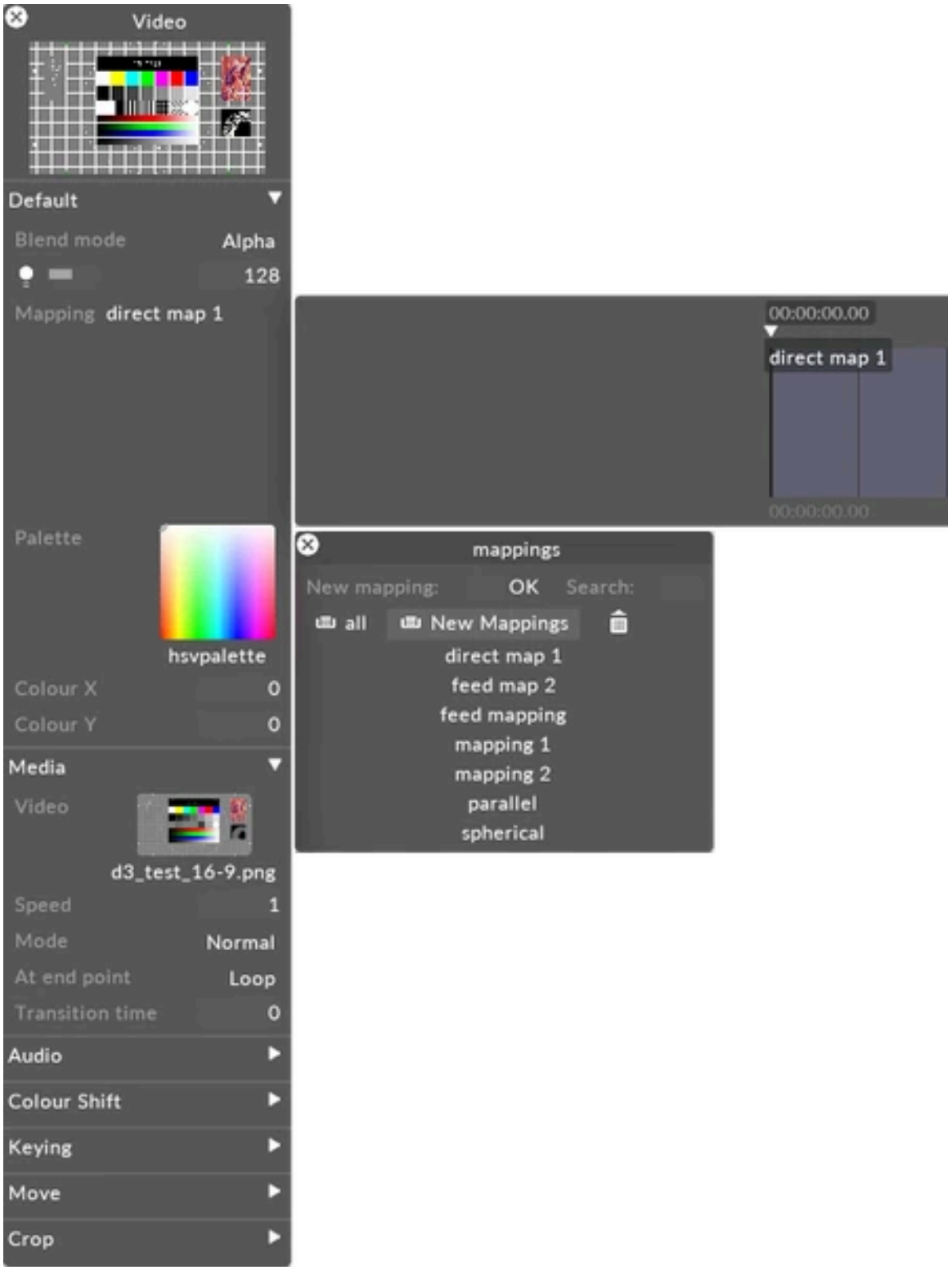


If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

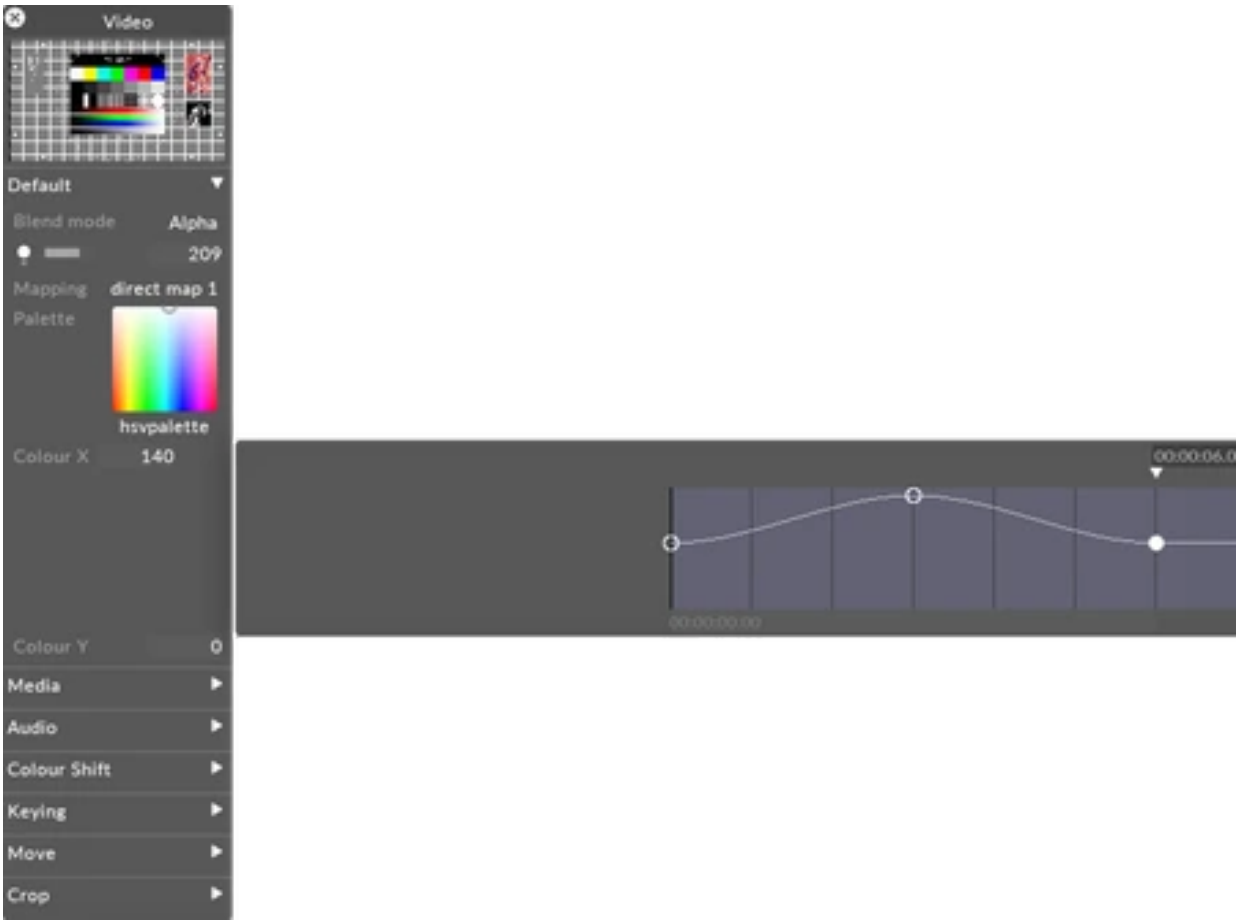
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Colour Shift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

This property changing the hue of colours in an image, design, or graphic while maintaining other colour properties like saturation and brightness.

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` *set to Together (from left to right): 0, 0.3, 0.8*



With `RGB controlled` *set to Separate, red min (from left to right): 0, 0.3, 0.8*

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` *set to Together (from left to right): 1, 0.7, 0.2*



With `RGB controlled` *set to Separate, red max (from left to right): 1, 0.7, 0.2*

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` *set to Together (from left to right): 0.1, 1, 4*



With `RGB controlled` *set to Separate, red gamma (from left to right): 0.1, 1, 4*

Sockpuppet

When running a layer in sockpuppet mode there are a number of behaviour changes and additions to the video layer.

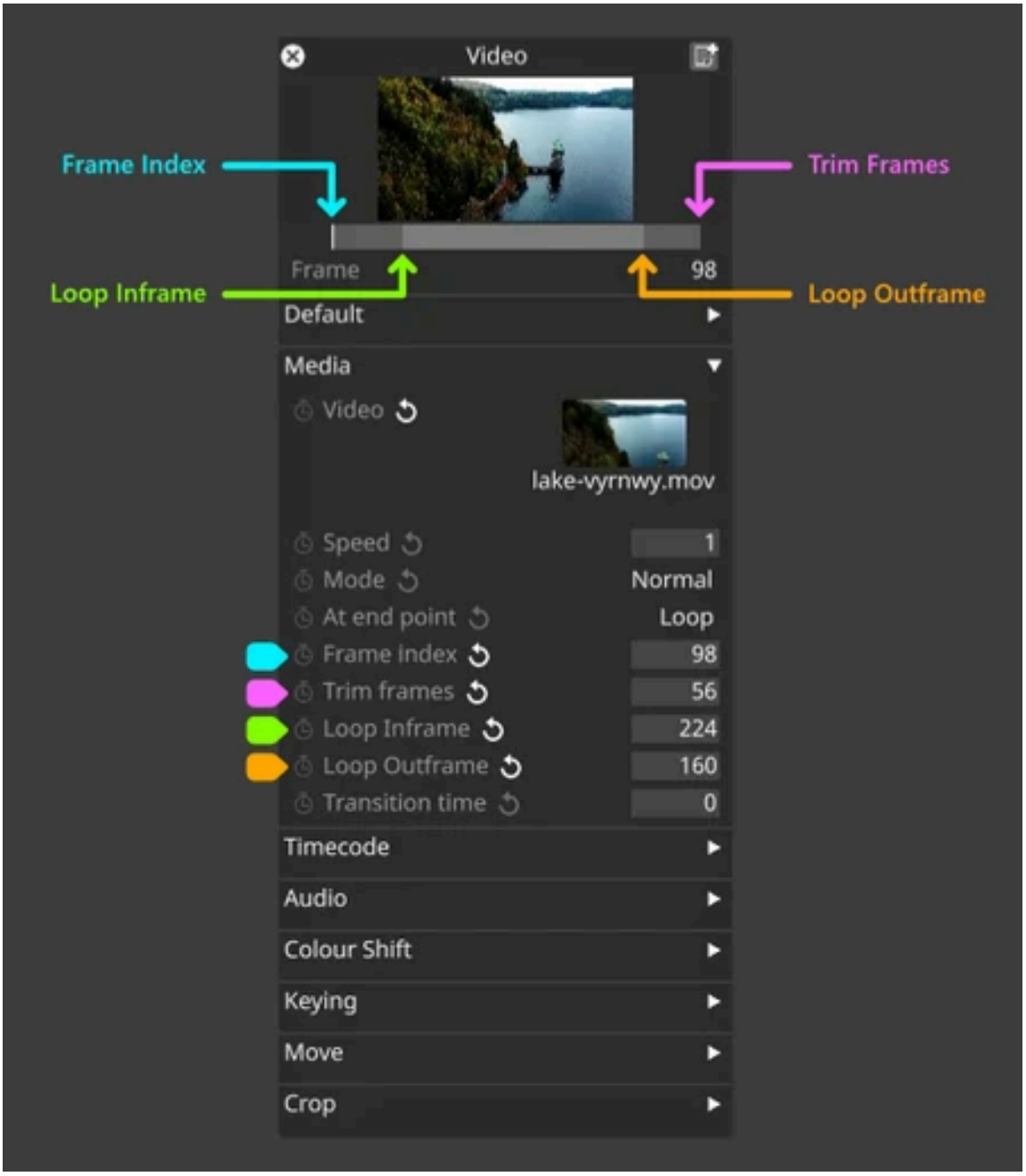
Mode

There are various different play modes when the video layer is sockpuppeted, they are detailed in the following table:

Mode	Effect
Normal	Play forward
Locked	This is the same as setting the mode to Normal, Sockpuppet does not care about track time.
Reset	Reset to the **Frame Index** or the first frame in the clip and hold
Pause	Pause at the current frame
Inframe	Go to the **Frame Index** and hold
Outframe	Go to the **Trim Frame** and hold
Reverse	Play the clip backwards, this is the same as setting the **Speed** field to -1
Timecode	Playback will trigger on the timecode set in the **Timecode section**
LoopInFrame	Go to the **Loop Inframe** and hold
LoopOutFrame	Go to the **Loop Outframe** and hold

Frame Controls

Along with the new play modes, there are additional fields to control where the playback starts, ends and loops.



Frame Index

This field sets where in the video the playback should start from in frames.

Trim Frame

This field sets where the playback of the clip should end if the endpoint behaviour is set to Pause.

It is calculated as frames from the end of the clip e.g. if a clip is 200 frames and it should stop at frame 150 then the value set should be 50 = 200 - 150.

Loop Inframe

This field sets where in the video playback a loop should continue from if the end point behaviour is set to Loop or Ping-Pong.

If the **Frame Index** is greater than this then it will be used instead.

Loop Outframe

This field sets where in the video playback a loop should start from, if the end point behaviour is set to Loop or Ping-Pong.

This is calculated the same as **Trim Frame** where this value should be a positive number subtracted from the total frames in the video clip.

If the **Trim Frame** is greater than this value then it will be used instead.

Timecode

On Clock Lost

This new field can override the behaviour of the Transport Manager On Clock Lost field for this layer. It will do nothing if left at default.

Hours, Minutes, Seconds, Frames

When the **Play Mode** is set to `Timecode` these fields will act as a trigger once valid timecode has played past the specified time.

Move

Clip Type

This new field can override the Video Clip's Clip Type field for this layer. It will do nothing if left at default.

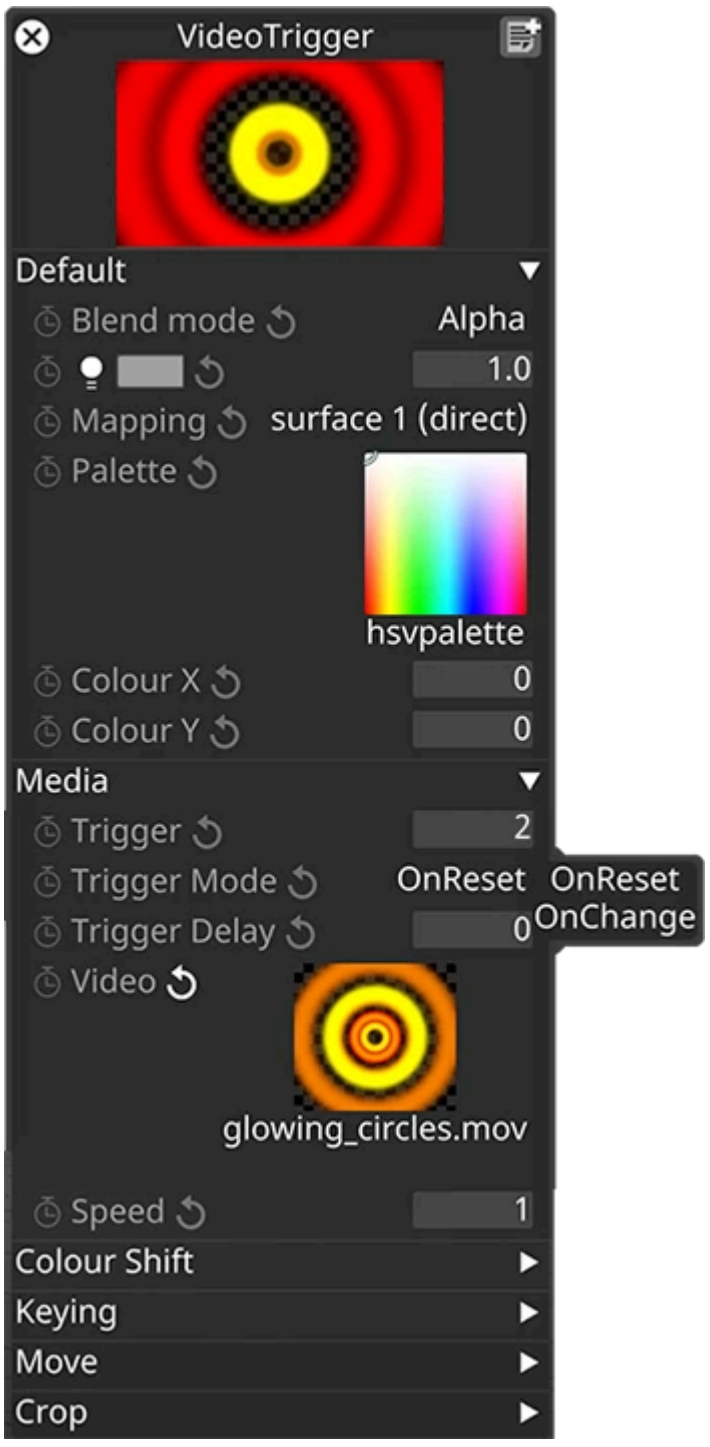
VideoTrigger Layer

The VideoTrigger layer triggers pre-rendered videos using timecode or cues.

The VideoTrigger layer works in the same way as the Legacy Video layer, with the main exceptions being that it does not support audio playback, and does not have a play mode, at end point, or transition time property.

VideoTrigger Layer Properties

Media



The trigger property allows for a video file to be triggered for playback either when a value changes from 0-1 (or 255 if using a DMX lighting console) (OnReset), or changing to another value (OnChange).

OnReset will cause the video file to playback once before returning to no content being shown. If you wish to trigger the file again, the trigger value needs to be reset to 0 before another value of 1 can be sent.

OnChange will cause the video file to playback when the trigger value changes to a new value.

Trigger Delay time can be added to delay the start of the video until a specific frame count.

Video

The Video property points to the still media file that defines the content to be used on the layer. Selecting this property will open the VideoClip object library, which shows all of the still image files saved on your local hard-drive in the VideoFile folder.

To change the current piece of content:

1. Left-click Video to open the VideoClip object library.
2. Left-click the media file you want to use.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a supported file format.

Speed

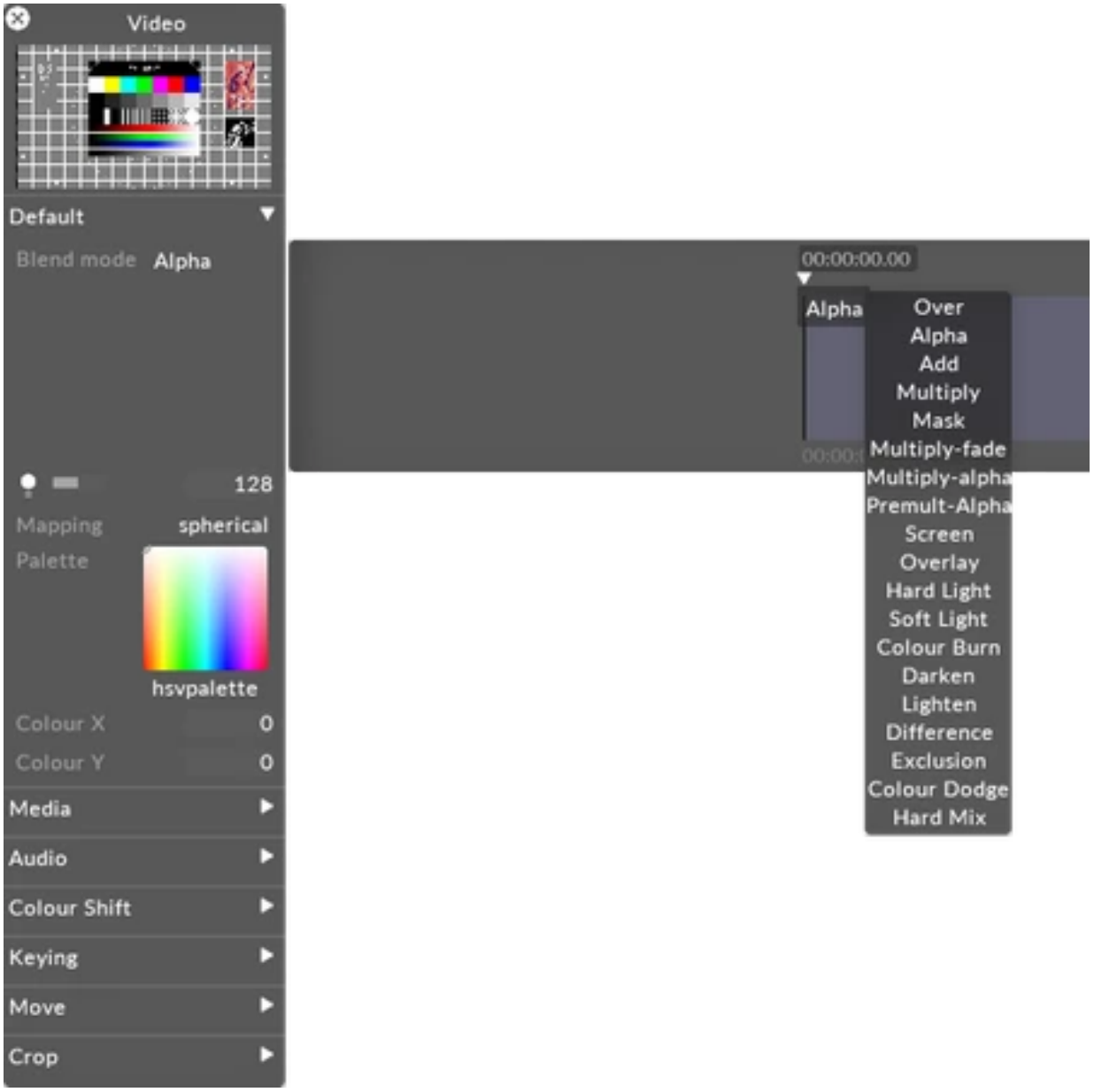
Selects playback speed. When this is set to 1, the video is played at its normal framerate; when set to 2, the video is played at double speed, when set to -1, the video is played at normal framerate in reverse and so on.

Common Layer Properties

The VideoTrigger layer has the following Common Layer Properties:

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

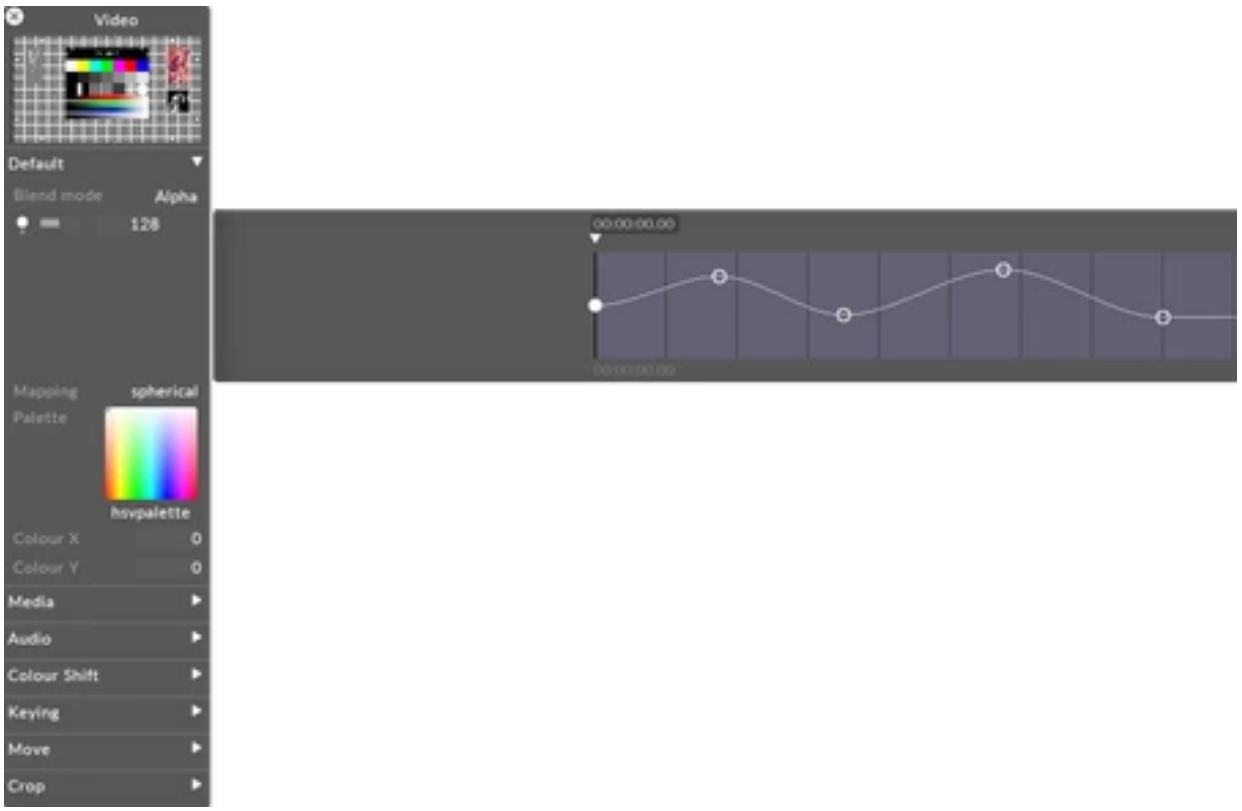
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.

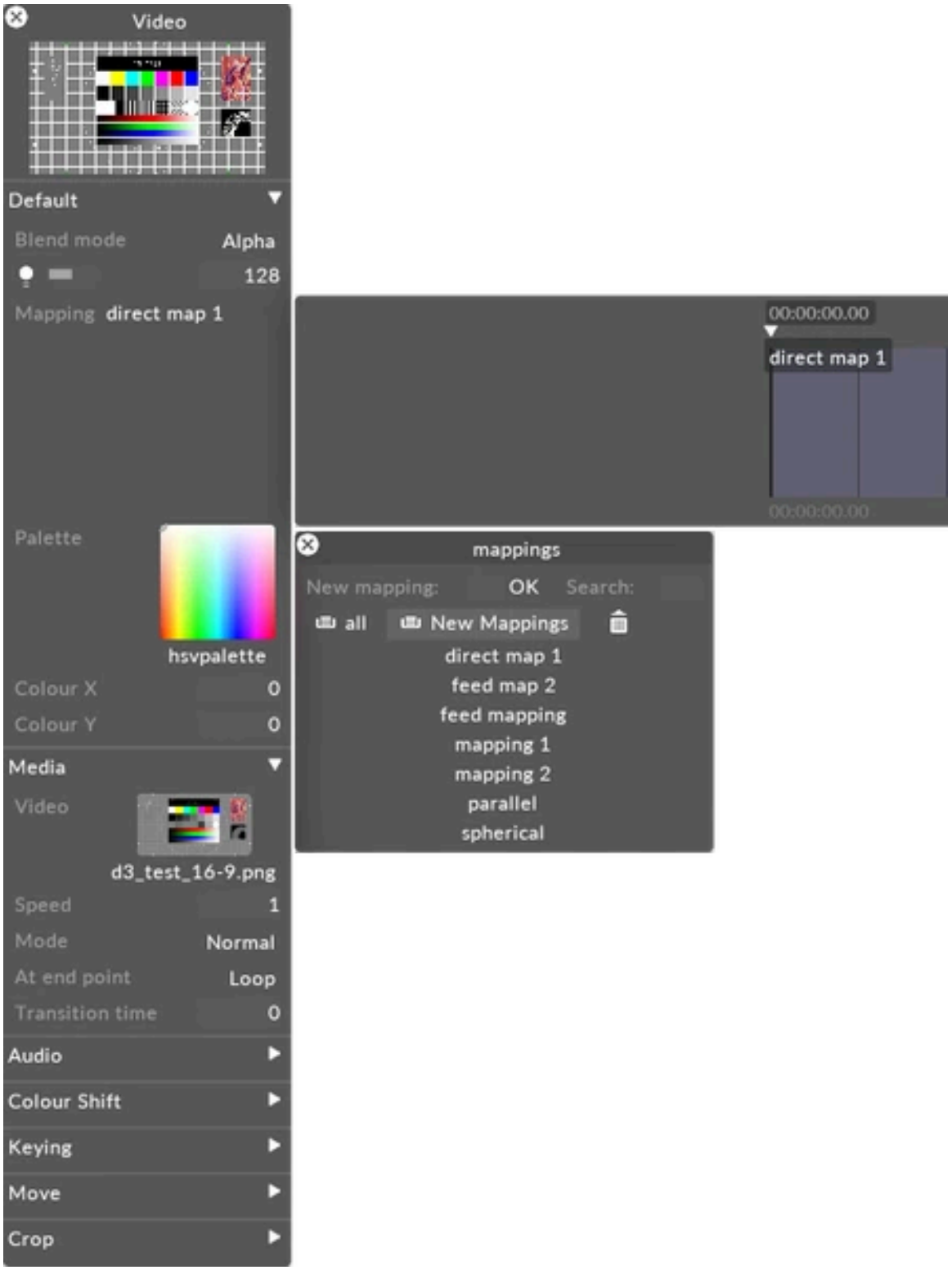


If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

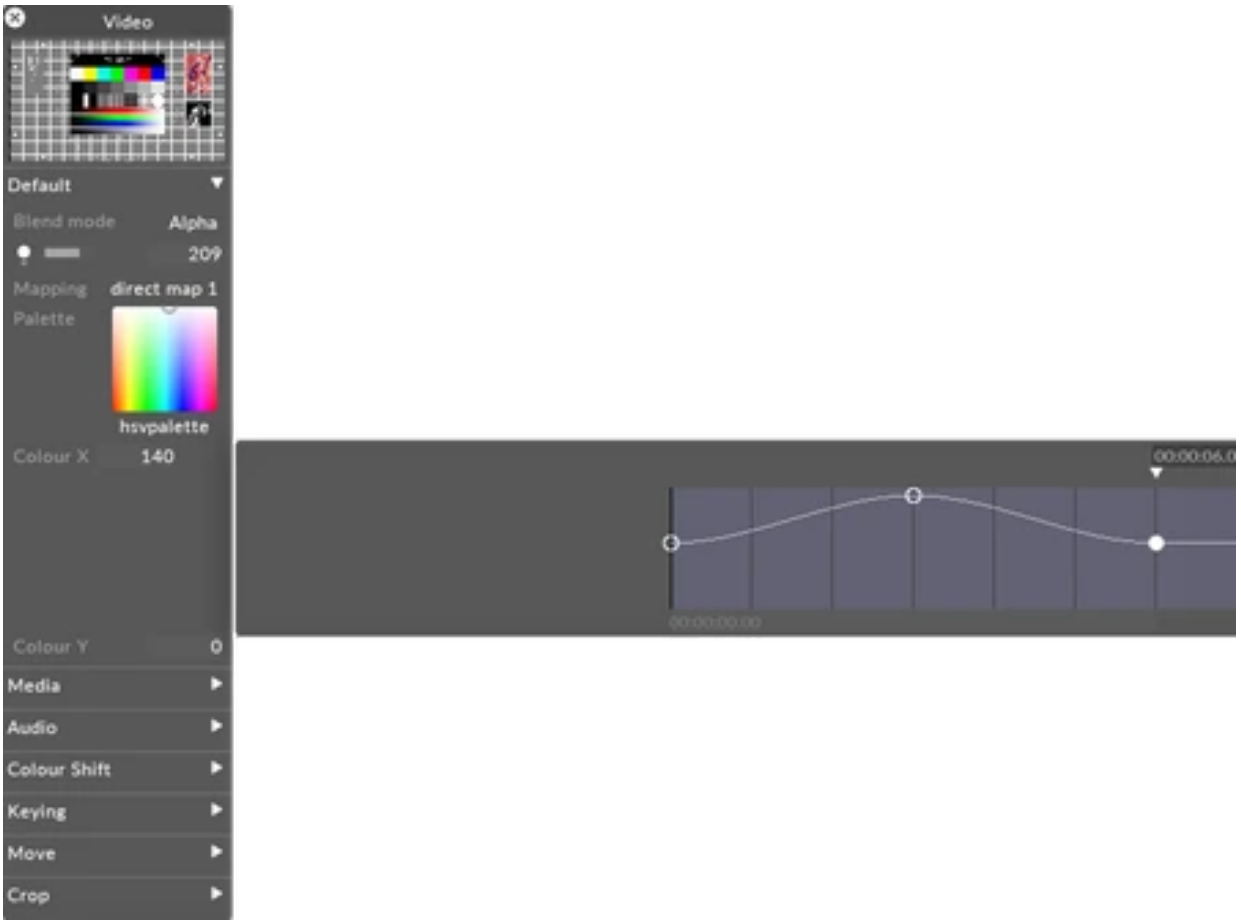
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



ColourShift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

This property changing the hue of colours in an image, design, or graphic while maintaining other colour properties like saturation and brightness.

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` *set to Together (from left to right): 0, 0.3, 0.8*



With `RGB controlled` *set to Separate, red min (from left to right): 0, 0.3, 0.8*

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` *set to Together (from left to right): 1, 0.7, 0.2*



With `RGB controlled` *set to Separate, red max (from left to right): 1, 0.7, 0.2*

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` *set to Together (from left to right): 0.1, 1, 4*



With `RGB controlled` *set to Separate, red gamma (from left to right): 0.1, 1, 4*

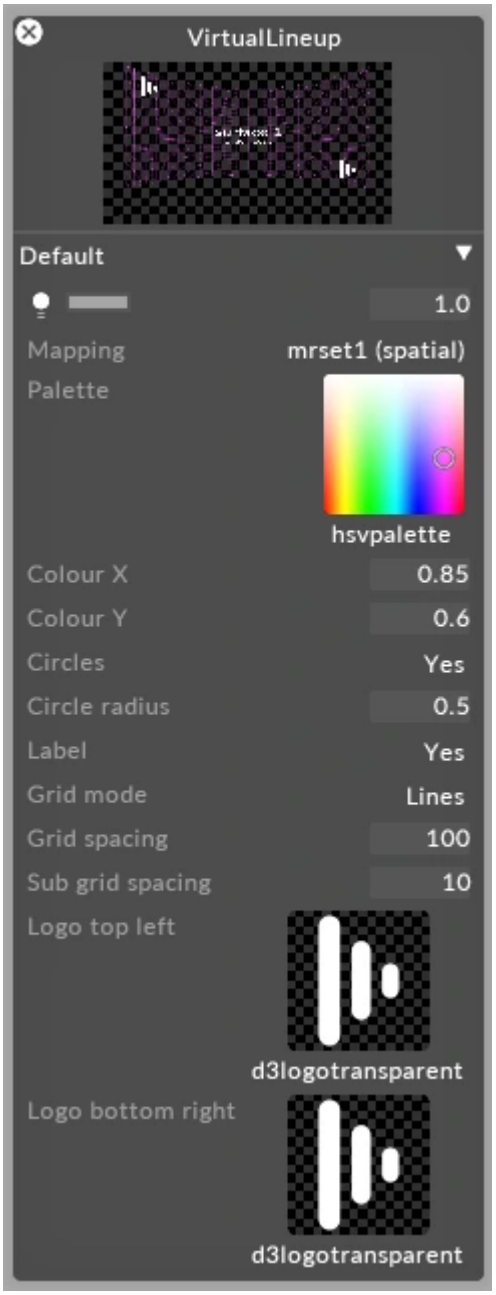
VirtualLineup

The VirtualLineup layer is used to line up the virtual world to a test pattern that is simultaneously displayed on the LED walls of an MR set.

An MR set is used for spatial mapping. Read about MR sets here.

Workflow

1. Create a new **VirtualLineup** layer.
2. Map the layer to the MR set using a spatial mapping.



VirtualLineup layer properties

The VirtualLineup layer has the following additional properties:

- Circles
- Circles Radius
- Label
- Grid mode
- Grid spacing
- Sub grid spacing

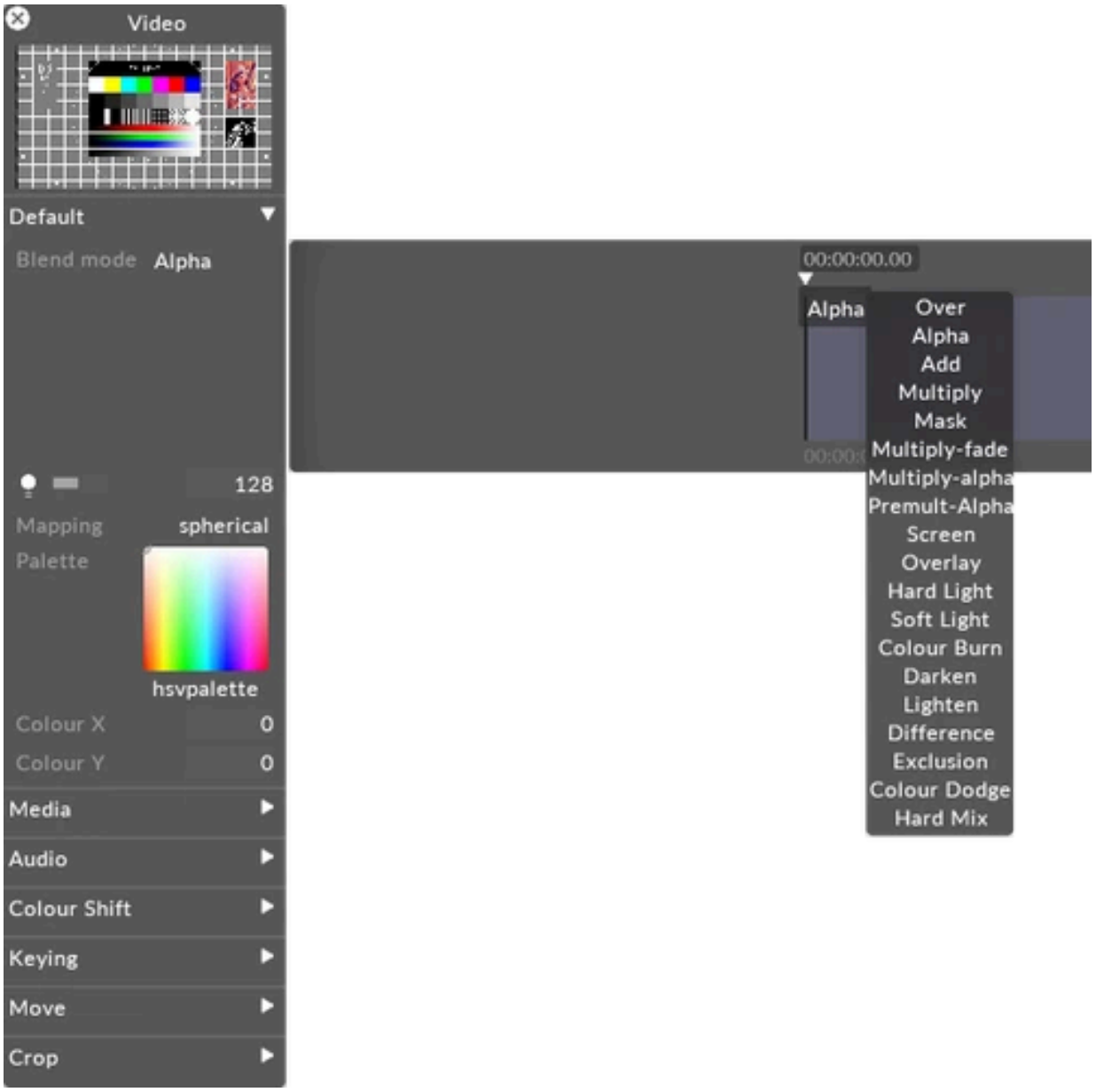
- Logo top left Logo top right

Common Layer Properties

The VideoLineup layer has the following Common Layer Properties:

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a

controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting

multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

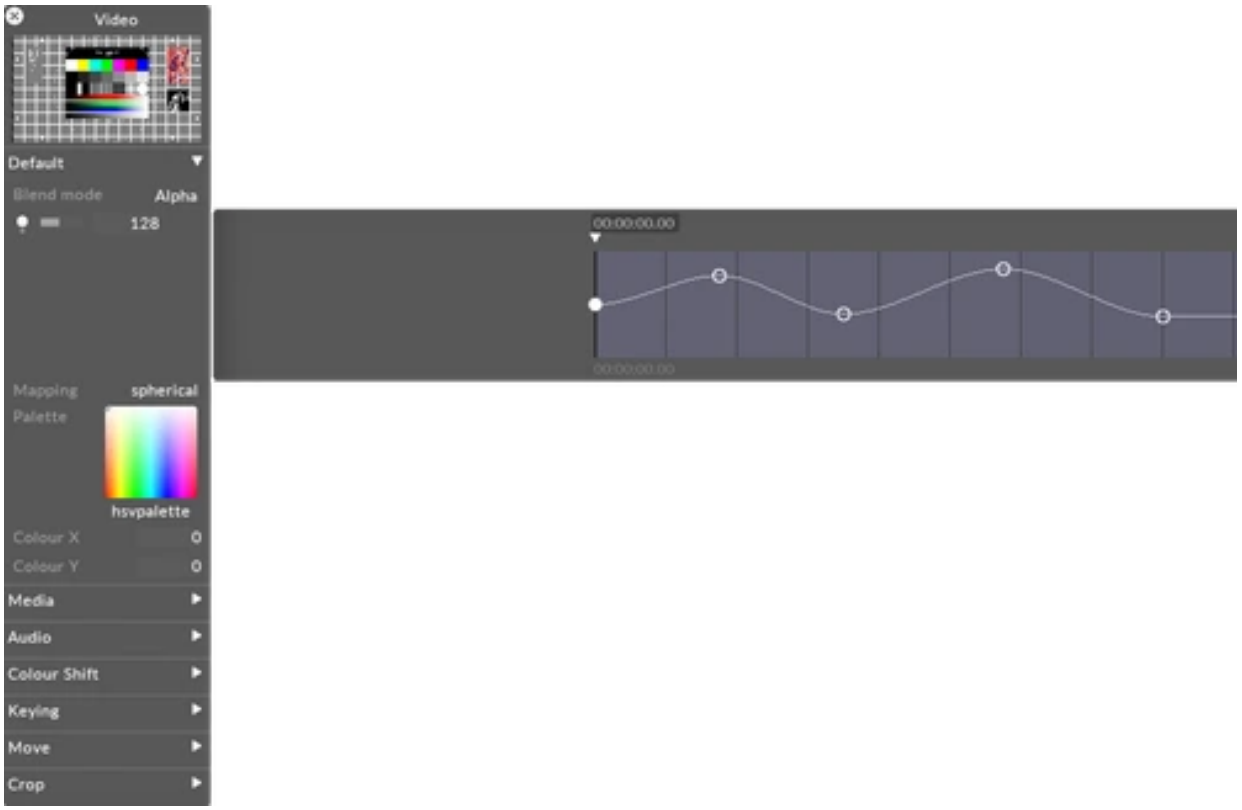
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the

next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

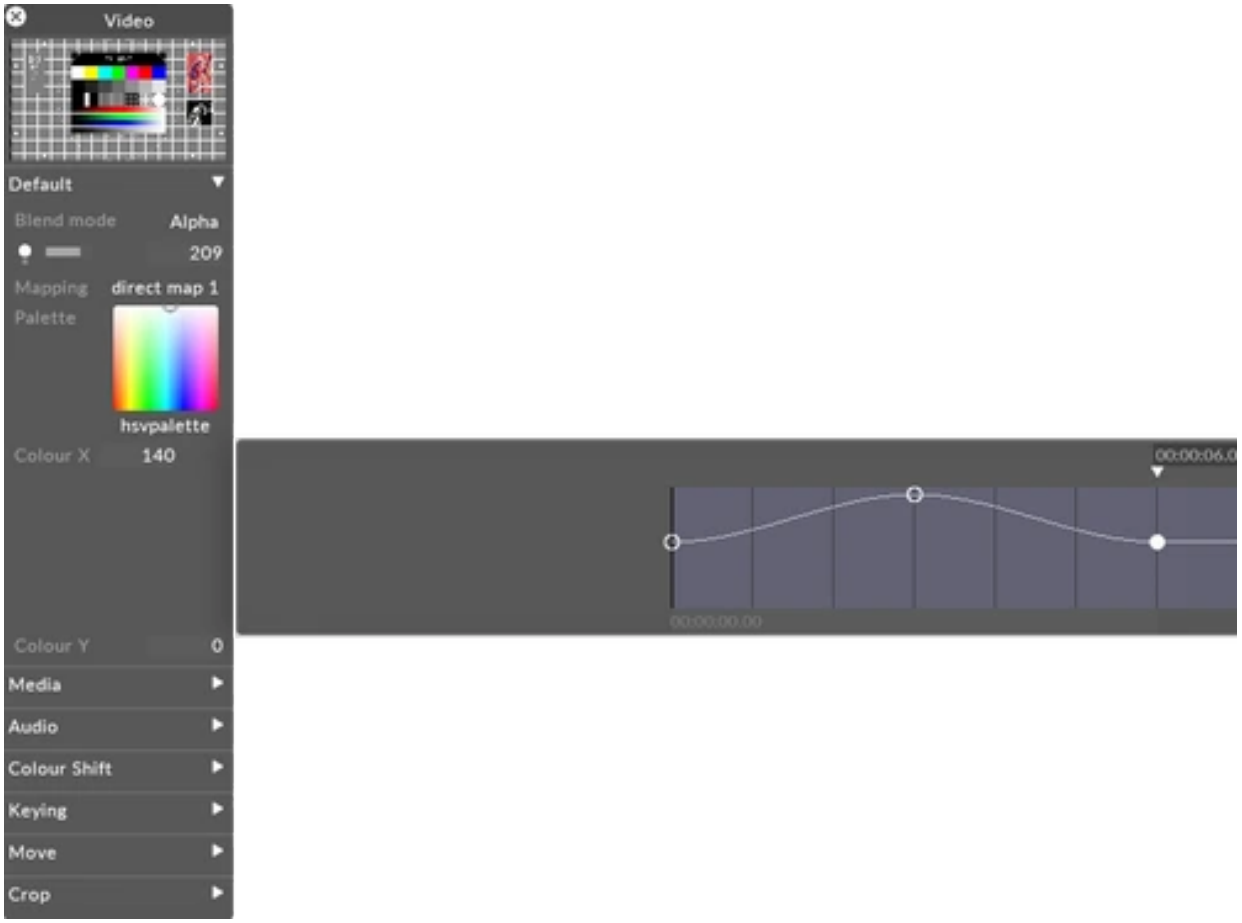
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



ColourShift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



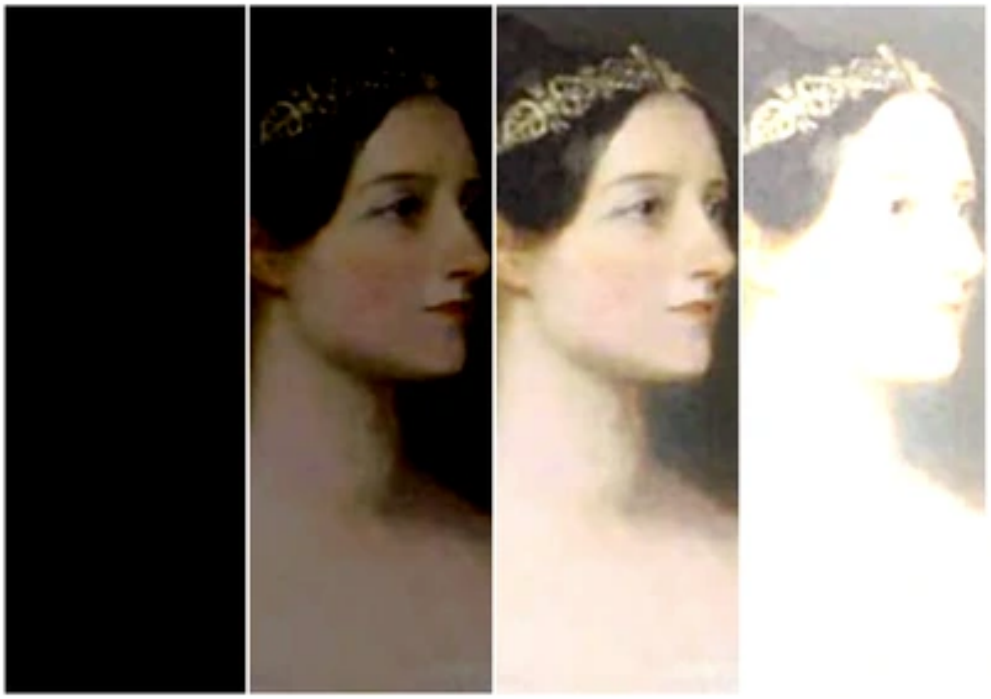
Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

This property changing the hue of colours in an image, design, or graphic while maintaining other colour properties like saturation and brightness.

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` *set to Together (from left to right): 0, 0.3, 0.8*



With `RGB controlled` *set to Separate, red min (from left to right): 0, 0.3, 0.8*

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` *set to Together (from left to right): 1, 0.7, 0.2*



With `RGB controlled` *set to Separate, red max (from left to right): 1, 0.7, 0.2*

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` *set to Together (from left to right): 0.1, 1, 4*



With `RGB controlled` *set to Separate, red gamma (from left to right): 0.1, 1, 4*

Web Layer

The Web layer provides the ability to render HTML5 webpages as content in Designer. However, Disguise goes further and allows you to 'hook' and integrate your web pages to the time.

Key features of the layer

- Bookmarks for navigation (with thumbnails).
- Ability to send **JavaScript Commands** to the open web page (see field called Command) i.e. PageTransitions.nextPage(2, 1).
- Ability to send 5 custom timeline float values into the page via JavaScript. Provides the ability to animate items in your web page in sequence with the timeline, or change font sizes.
- Ability to send various standard timeline clock information into the page via JavaScript.
- Support for transparent background pages. E.g. `body { background-color: rgba(0, 0, 0, 0); }`, hence allowing you to composite items into (like a twitter feed).
- Support for simple user interaction with the page from 3 (see the **Interact** button at the top of the Web Layer).
- Locally hosted HTML5 pages.

Browser feature support

The browser has the following attributes:

- Utilises software renderer (as Designer has exclusive lock of the GPU).
- Browsers are 'sand boxed' in separate processes to prevent negative impact on Designer.
- Supports HTML5.
- Utilises WebKit -> Based off Chromium (check "about:version" URL for exact version using this path: Interact → URL: "about:version" → go).
- Adobe Flash is not supported, but the system is capable of running limited Flash Plugin functionality. Flash must be installed independently on the machine in question.
- WebGL is not supported.
- three.js and other libraries that utilise hardware GPU rendering are not supported.

> **Warning**
>
> Layer instances reset every time universal crossfade is triggered. This means that web layers will fade out/into themselves even if the same page is used across sections.

> **Note**
>
> For more information about the browser and specific feature support, visit our Chromium Web Integration page here.

Web Layer Properties

Interact

Opens an interaction window so that you can control the web page in real time.

Bookmark

The bookmark for the web page you wish to browse. If you change the bookmark along the timeline, the new webpage will load in the background and then be presented.

Command

The JavaScript command you wish to issue. You can fire commands along a timeline that manipulate the site, such as turning the page, etc.

Size

Two modes:

Match Mapping - this sets the size of the website canvas to match that of the Mapping it is being applied to.

Custom - allows you to manually set the size (Width/Height) of the web browser. The browser canvas will then be scaled up to match the Mapping.

Custom Parameters

Name X: The name of the JavaScript function you wish to call every frame. The function name in JavaScript will be `d3.*customParam1*(x)`.

Value X: The value you wish to pass into the JavaScript function.

Clear Cache

Clears the web browsers cache.

Reset Browser

Tears down and resets the web browsing session.

Bookmarks

Bookmarks are the way you select your web layers content.

The options in a bookmark are:

URL

This address can be a web address or file address.

- Web addresses are prefixed with `http://` or `https://`
- File addresses relate to HTML5 files contained within your d3 project folder structure. All locally stored html5 files should be under project_folder/objects/Web/sub_folder. For example, a sample page is located in every new project at “file:///sample pages/slide heading.html”.

Background

The web layer is capable of rendering pages with transparent backgrounds to allow you to composite, or with white backgrounds.

For transparent backgrounds to function correctly, the web page must set its background to be transparent.

Example CSS: ** `body { background-color: rgba(0, 0, 0, 0); }`

Zoom

Allows you to text zoom with correctly rendered fonts. This is similar to pressing Ctrl+/- in a regular browser.

Interact

You are able to directly interact with web pages using a small browser. To open the browser, click the interact button.

While this window has focus, you are able to interact with the webpage including:

- Typing
- Clicking links

- Scrolling with the mouse wheel

You can change the size of the interaction window with the Scale or 50%/100% buttons.

JavaScript Commands

Creating JS commands is very straightforward.

1. Create a JS Command and fill in the JavaScript you want executed in the browser.
2. Place the command on the timeline at the time you want it executed.

When the timeline is playing and crosses over the keyframe for the command, it will be executed.

JavaScript Functions

The Web layer contains five pairs of Name/Value.

Every frame will call a function in your web page with **Name** entered in that string (in the 'd3.' namespace), passing it a single float 'Value'.

d3.customParam1(1.0)

Essentially is 'pushing' the data into your webpage.

You can then write the corresponding function to do with as you please.

NB: functions must be in the d3 namespace.

```
var g_size = 0 // here's an example global variable which d3 will set
```

```
var d3 =

{
    /* You can specify the names of custom functions in d3. Below are some defau
lts. */
    /* Every function is called every frame */

    customParam1: function(myVal) { g\_size = myVal }, // set the global
    variable in this function

    customParam2: function(myVal) {},
    customParam3: function(myVal) {},
    customParam4: function(myVal) {},
    customParam5: function(myVal) {},

    /* Below are the inbuilt d3 functions that give your custom HTML5 content a
context*/

    lockedTime: function(tBeats) {

    },

    normalTime: function(tBeats) {

    },

    globalTime: function(tBeats) {

    },

    bpm: function(tBeats) {

    },

    status: function(statusString) {

    },

    dmxUniverses: function(universe, data) {

    }
}


    function setup() {
        createCanvas(1920, 1080);
        background(222);
    }

    function draw() {
    ellipse(mouseX, mouseY, 50 + 50 \* g\_size, 50 + 50 \* g\_size);
    // use the global variable to modify content.
}
```

You can download an example project using JS/HTML from our Resources page in the Web Interaction section at this link.

Standard JavaScript Functions

These JavaScript functions are designed to allow the web page to respond to changes to the Disguise timeline. They are called every frame on the web browser. If the HTML5 page has been coded to respond to these functions, then it will according

`d3.lockedTime(float)` — Time in beats within the current layer.

`d3.normalTime(float)` — Time in beats within the current layer, but carries on counting up. (See video player behaviour to get the idea).

`d3.globalTime(float)` — Time in beats within the whole track.

`d3.bpm(float)` — Current BPM of the track.

`d3.status(string)` — Provides the play head status. Either: “playing”, “holding”, “stopped”.

`d3.dmxUniverses(array[int], array[array[int]])` — Provides a dump of the universes selected in the layer editor.

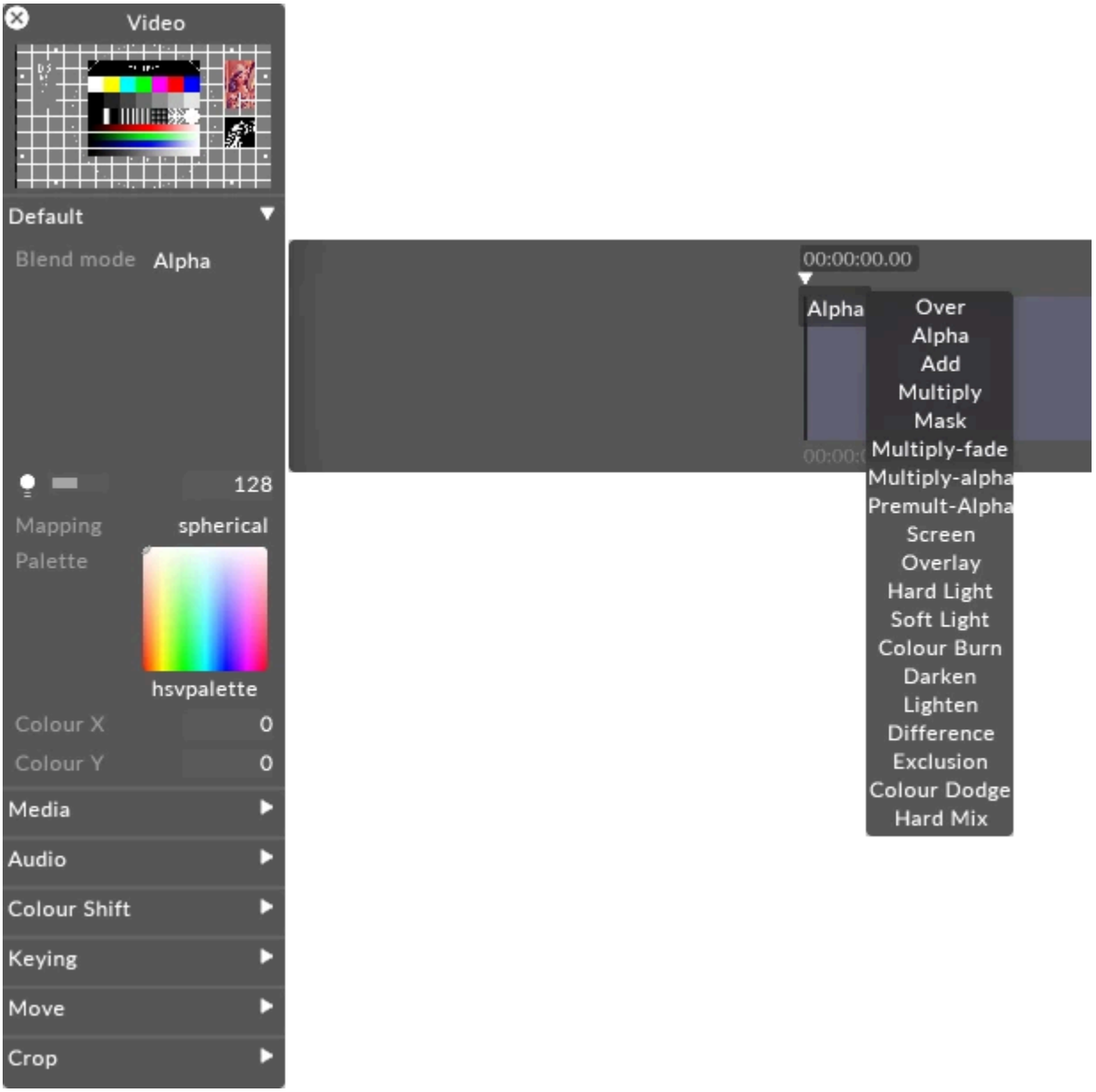
Proprietary video codecs (like h264) are not supported currently.

Common Layer Properties

The Web layer has the following Common Layer Properties:

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

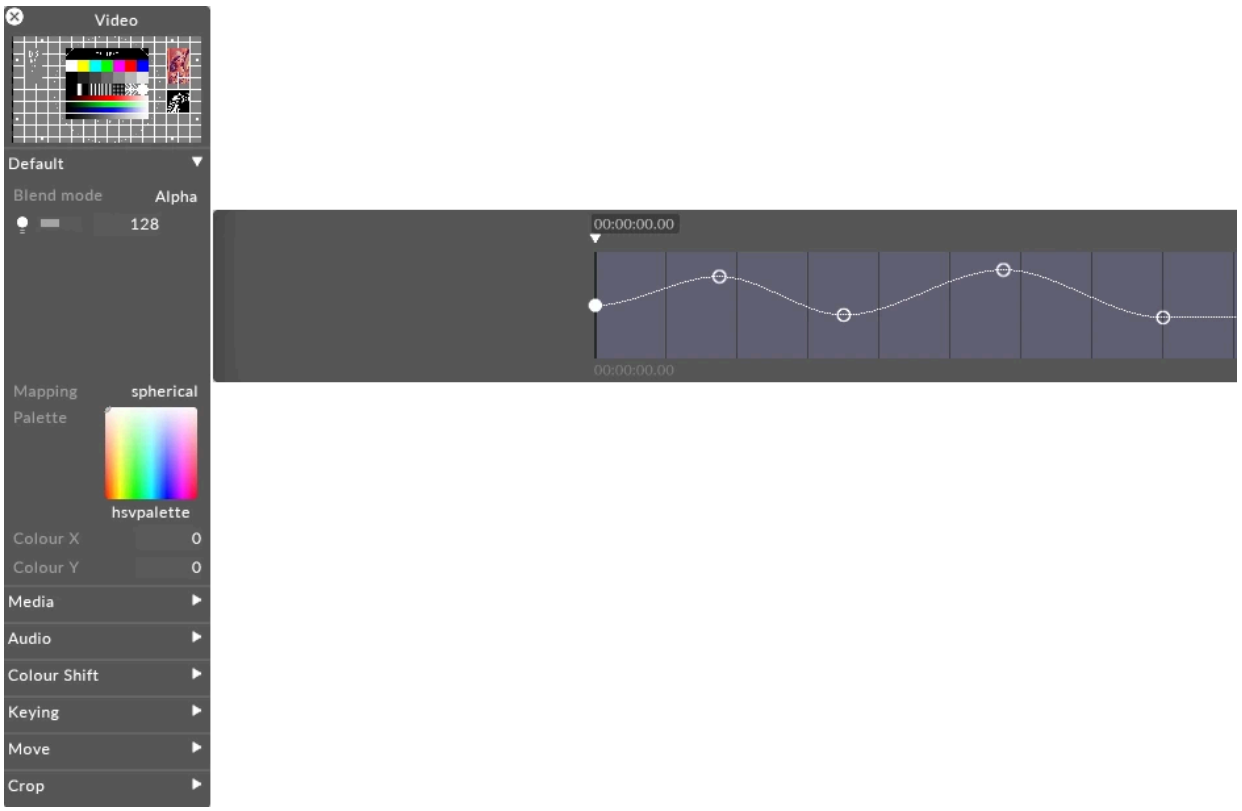
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

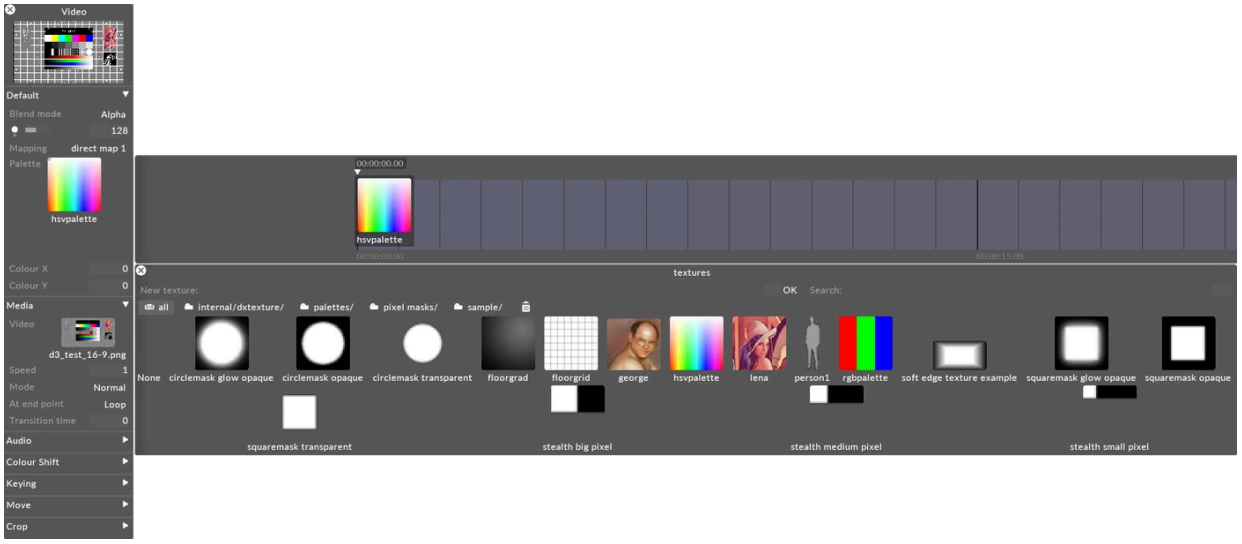


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

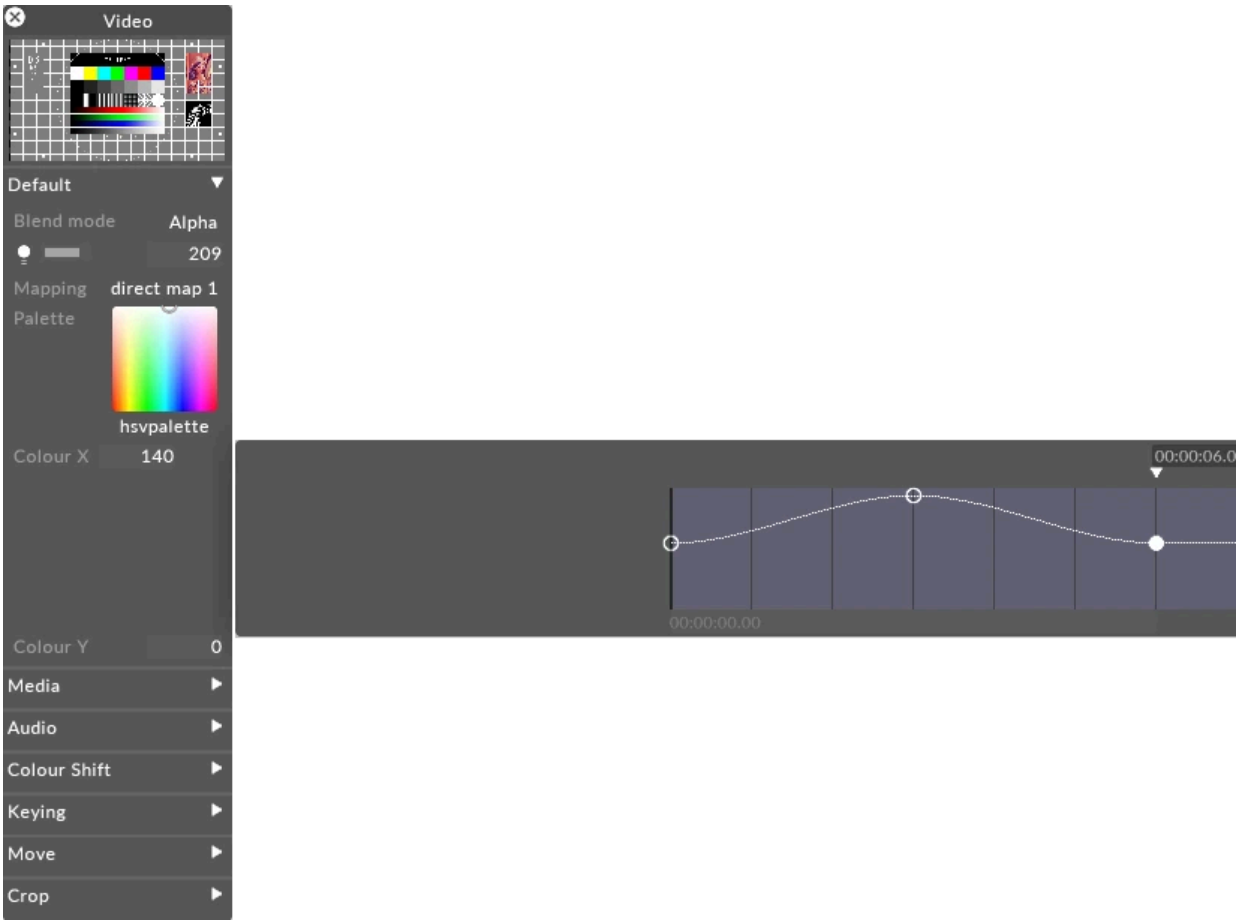
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

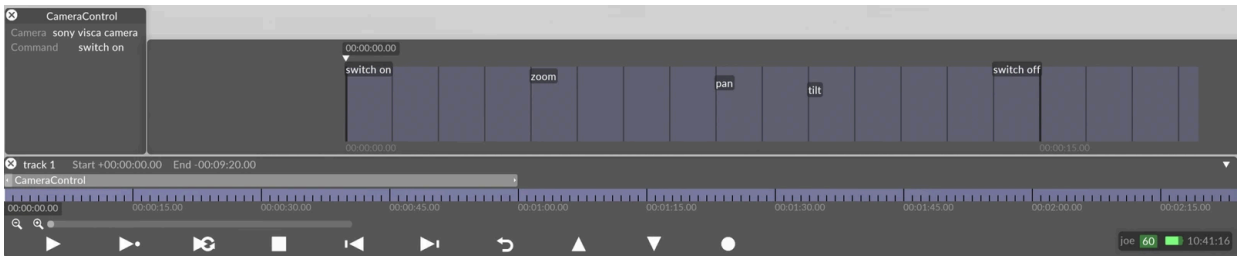
For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



CameraControl

The CameraControl layer controls Sony Visca Cameras configuration



CameraControl layer properties

Camera

The camera object to use.

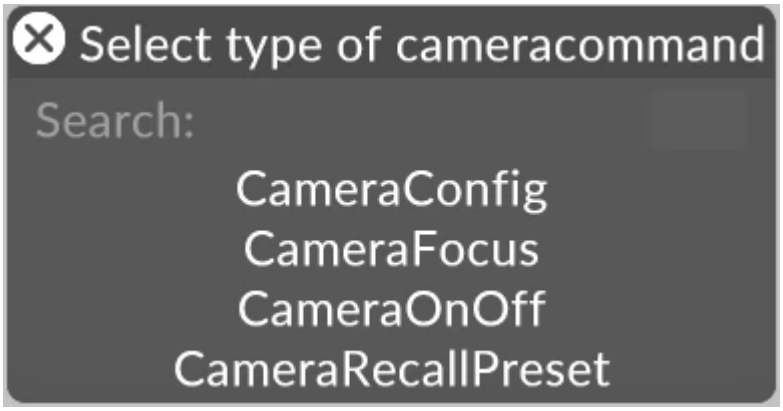
Command

The camera command to send.

Creating/sequencing CameraControl commands

The process used to create/sequence CameraControl commands is done by placing key-frames onto the Command key-frame editor, and is therefore the same as any other layer type that uses key-frame editors, for example the AnimateCameraPreset layer. For an example on how to create and animate key-frames using the key-frame editor please follow the step-by-step instructions in the AnimateCameraPreset sub-chapter.

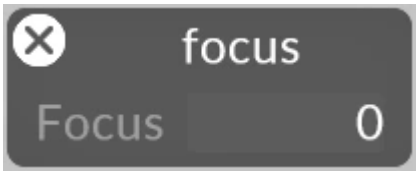
There are three types of CameraControl commands:



Editing CameraControl commands

Each CameraControl command type opens a specific camera command editor.









CameraConfig editor

Zoom : sets the cameras zoom, 0 100%

Focus : sets the cameras focus, 0 100%

Exposure mode : sets the exposure mode to auto, manual, iris or shutter.

Shutter : sets the shutter value, 0 100%. Only valid in shutter mode.

Iris : sets iris value, 0 100%. Only valid in iris mode.

Gain : sets the cameras gain, 0 100%.

Pan : sets the cameras pan, in degrees.

Tilt : sets the cameras tilt, in degrees.

Camera Focus

sets the cameras focus, 0 100%

CameraOnOff editor

Switch : turns the camera on or off .

CameraRecallPreset editor

Preset : sets the preset number assigned to the Sony Visca Camera. A Sony Visca Camera can have up to four presets.

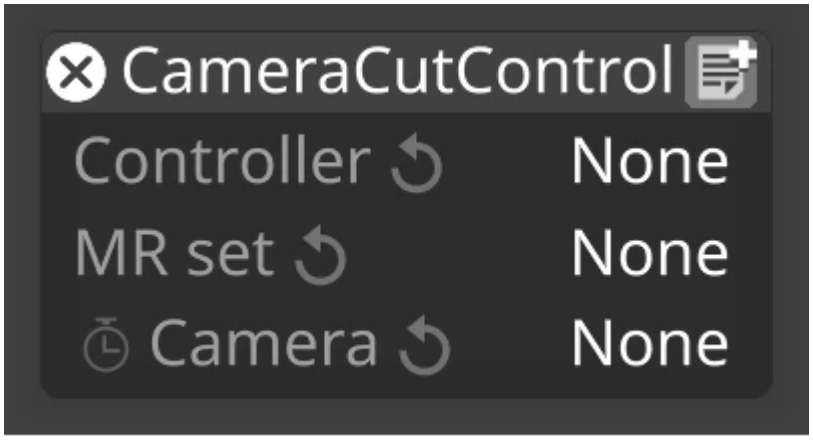
CameraCutControl

The camera cut control module allows camera switches to be sequenced on the timeline for XR workflows. It takes account of the calibrated delays to ensure that the switch happens on the keyframed beat

The CameraCutControl module is a subclass of the Indirection Control Module. It calculates the total switching delay for any given frame, and uses that to work out when to trigger the indirection change so that it lands on the correct beat. The most complex scenario occurs when modules are rendering at fractional frame rates. Ordinarily switches are not possibly on every frame in this case.

Therefore the CameraCutControl module uses `MixedRealitySet::applySwitchRenderOffset` to tell the MR set to delay the switch until the correct frame.

CameraCutControl Layer Properties



Request

This requires a new HttpControlRequest. When a new HttpControlRequest is created, it has the properties Url, Method, Headers and Body.

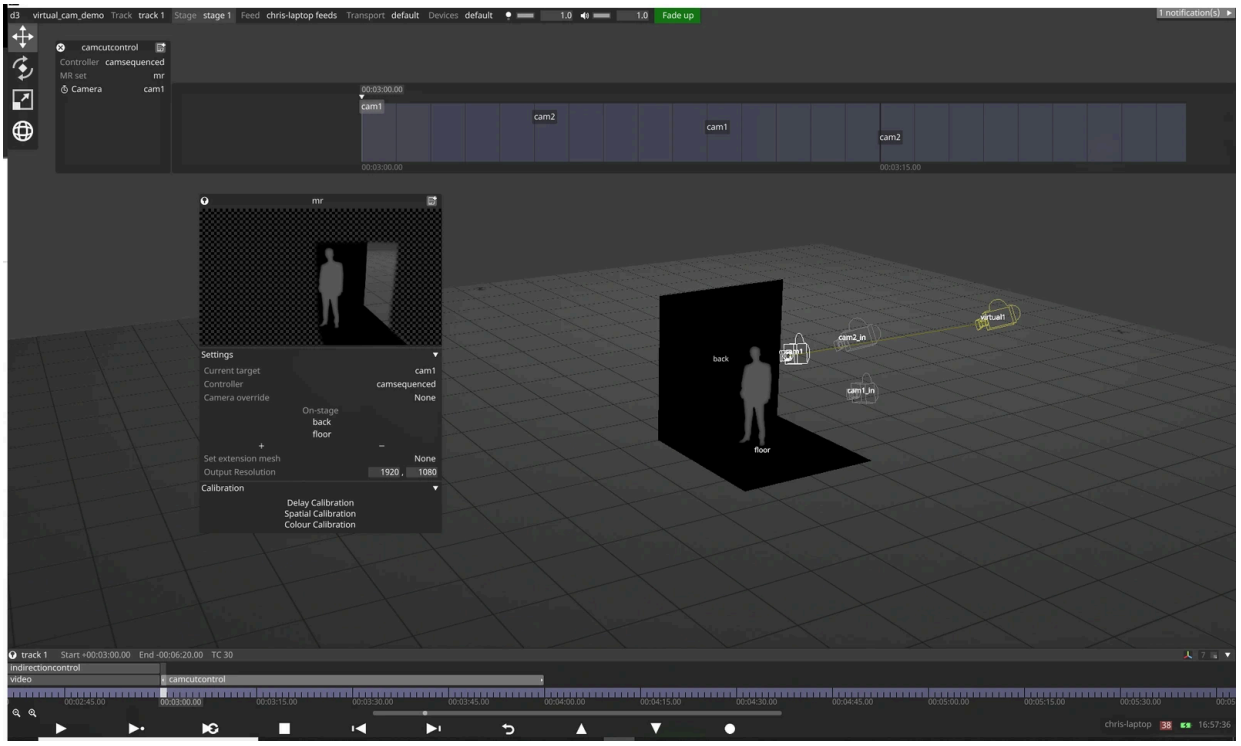
Trigger

The trigger options available are **Always** and **When Playing**. Expressions can also be used to extend the functionality.

Creating CameraCutControl commands

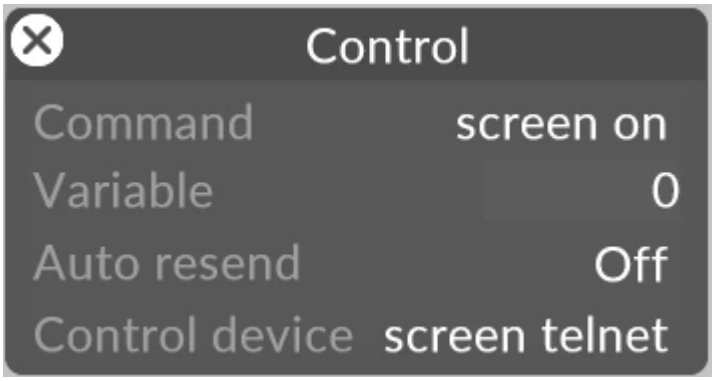
To sequence camera switches:

1. Set up and fully calibrate an XR stage.
2. Add a SequencedIndirectionController as the camera indirection controller in the MR set.
3. Add a CameraCutControl module to the timeline.
4. Select the controller and MR set.
5. Add keyframes to the Camera property.



Control

The Control layer allow for the definition of custom commands that can be sequenced on the timeline to perform functions at certain times. The custom commands are command strings which can be written in normal character format (ASCII) or in Hex.



Command

The selected command to be executed at this point on the timeline.

The **variable** to be passed into the command, if the command syntax contains the use of variables. The values can be sequenced on the timeline. Use **Auto Resend** to control when values are sent.

Auto resend

When set to 'On' the command will be executed everytime the **variable** changes, as well as on normal command issuing.

Control Device

The protocol device through which the command should be issued, either a Serial device, Telnet or UDP device.

> **Note**
>
> Ensure you that your protocol device is in the Device manager. Often it is better to create the devices from the manager and then select them in your layers, to avoid confusion.

Command Syntax



Commands are made up of a string. The string can be ascii or hex. The \ escape character is used to send special data.

The command can contain a variable set in the Control Layer, which is a timelined event.

Special Characters	Description
$	Variable value as string
%	Variable value as binary byte
\13	Carriage return
\10	New Line
\xYY	Send YY as hex value, example, \xF5
\	Send special ASCII character (0-255). Used to send characthers outside the normal range, e.g 1-31, 96 and up. Example, \37 will send '%' character.

A useful ASCII/Hex lookup table can be found **here**.

Ascii examples

- To send the command "START 568" followed by the enter key we would use the command string: `START 568\13`
- To send the command "CUE XXX" where XXX is the variable value, we would use the command string: `CUE \$`

Hex examples

- To send the byte values of 42, 62, 93 in sequence, you would use the string: `\x2A\x3E\5D`
- If you wished for the last value to be the variable value in a byte/uchar fashion you would use: `\x2A\x3E\%`

Real World Example

To control a Lightware matrix you would use the following examples:

- Load preset (using a variable) via telnet: `{%\$}`
- To route a particular input (using a variable) to output 1: `{1@\$}`

Control Layer Overview

The Control layer is tool for executing custom commands on 3rd party products via the following protocols - Serial, Telnet or UDP.

Types of Control layers

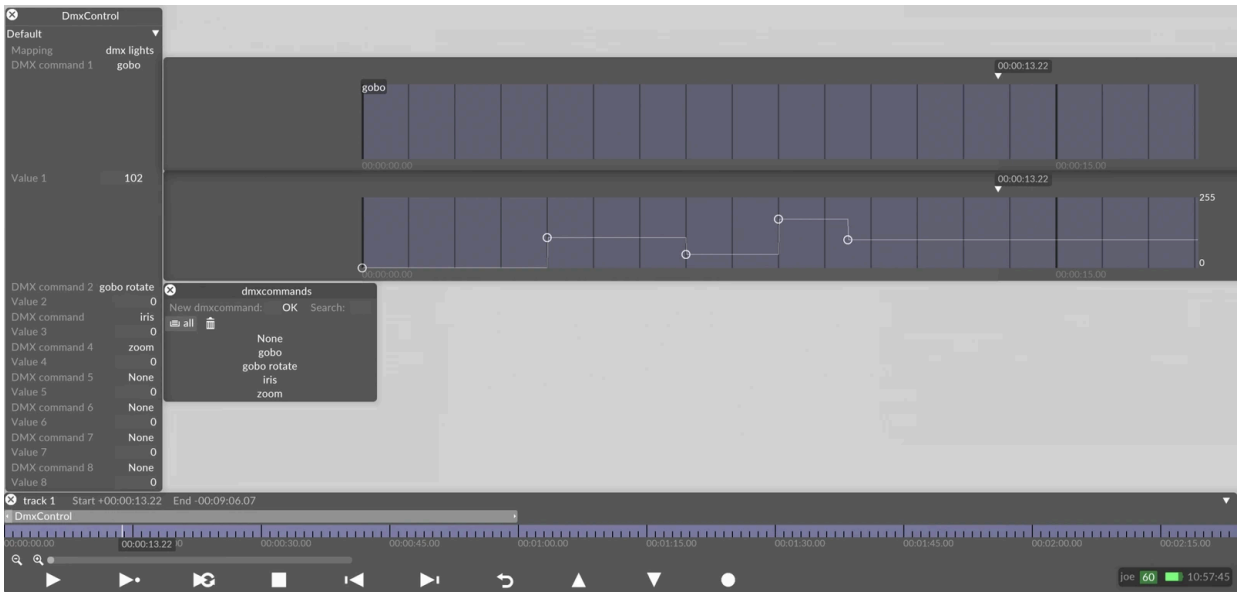
There are several types of Control layers available within Designer:

- Camera Control
- CameraCutControl
- Control
- DMXLightsControl
- DMXShare
- ExpressionVariables
- HTTPControl
- IndirectionControl
- MDC
- MTC
- MasterBrightness
- MatrixControl
- MidiNote
- Open
- OscControl
- PlayMode
- ProjectorControl
- TargetObject
- TimecodeMode
- TrackJump
- TransportBrightnessLocal
- TransportControl
- TransportVolumeLocal

DMXLightsControl

The layer can add DMX commands and animate their values using a key-frame editor.

> **Warning**
>
> The layer can only output DMX when a DMX device is set up. See DMX device for information on setting up a device.



DMXLightsControl layer properties

Dmx Command 1-8

The DMX command to send.

The image above shows that the DMXLightsControl layer has eight dmx command properties. By left-clicking the property a key-frame editor will open. It is important to note that only one DMX command can be added per key-frame editor, so a maximum of eight different DMX commands can be added in one DMXLightsControl layer.

However, multiple DMXLightsControl layers can each contain a set of specific DMX commands. For example, one DMXLightsControl layer can include DMX commands that control the beam effects of a particular fixture, whilst another DMXLightsControl layer can control the strobe options, etc.

Value 1-8

The animated value to substitute into the command.

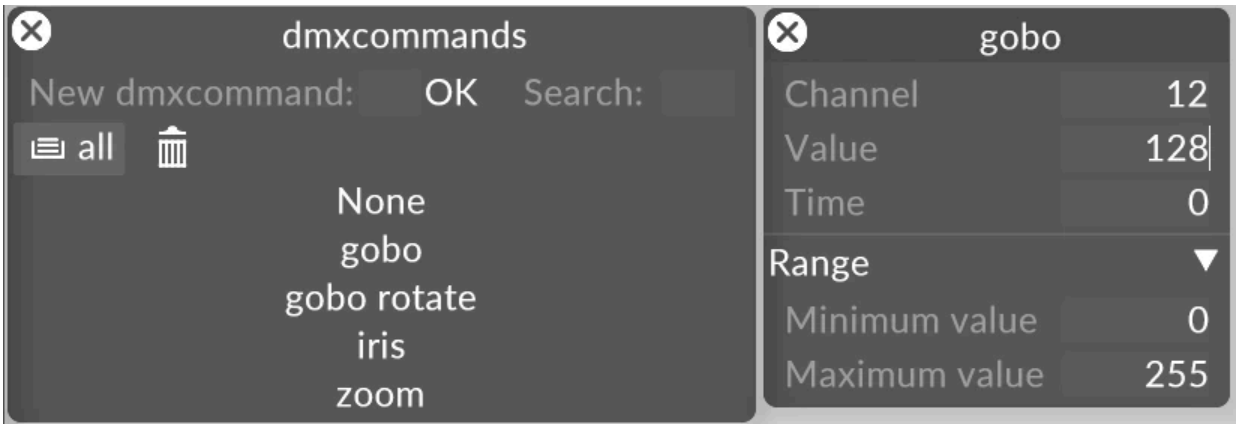
The image below shows that the gobo DMX command is set to send a value of 128 on channel 8 to the mac2k lighting fixtures. However, by using the Value 1 key-frame editor, as shown in the image above, the value of the gobo DMX command is able to change over time.

Creating commands

The process used to create DMX commands is done by placing key-frames onto the Dmx Command key-frame editor, and is therefore the same as any other layer type that uses key-frame editors, for example the AnimateCameraPreset layer. For an example on how to create and place key-frames using the key-frame editor please follow the step-by-step instructions in the AnimateCameraPreset topic.

Editing commands

- Right-click a DMX command from the DmxCommands manager to open the DmxCommands editor.



Lamp or fixture commands require you to send a particular value on a particular channel to, for example, control the focus, iris or gobo. These commands are created using the DmxCommands manager which displays a list of all of your DMX commands, and configured using the DmxCommands editor inside the driver editor of the fixture. Therefore for information on the properties of the DmxCommands editor please scroll down to the section DmxCommand in the GenericLampDrivers section.

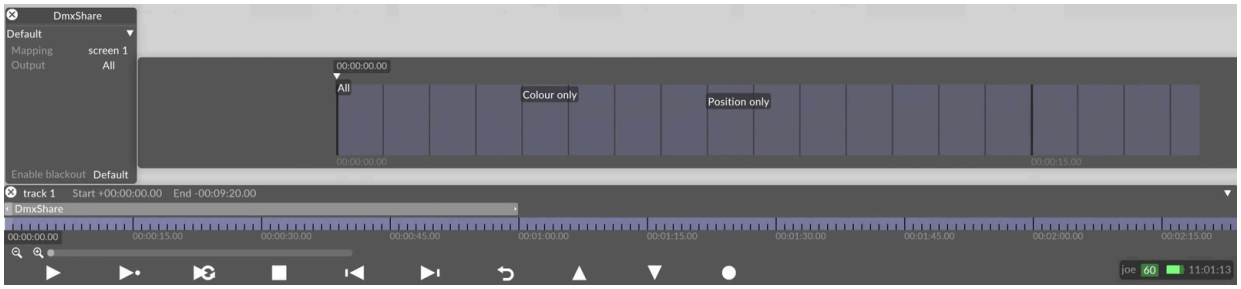
DMXShare Layer

The DMXShare layer enables you to specify whether you want to:

- control all DMX channels from
- control the colour of the DMX fixture only
- control the position and orientation of the DMX fixture only

The advantage of the DMXShare layer is that in some shows you may want to control lights using both a conventional lighting desk and Designer. For example, Disguise is an extremely useful tool for creating pixel mapping content for the lights using the advanced content mapping system, but also for sequencing lights exactly to the beat by quantising an audio track.

Designer is also very good for controlling the movements of groups of lights. However, lighting desks give you more control over the movement of individual lights and are specialised to control lights very quickly. Based on these facts, there is a requirement to share the control of the lights between Designer and a lighting desk.



DMXShare layer properties

Output

Controls what properties of a DMX fixture should control and output.

Options are:

- **all** control all properties of the fixture;
- **colour only** control the colour of the fixture only
- **position only** control the position and orientation of the fixture only (applies to moving head fixtures).

Enable blackout

Controls whether the DMX fixture/screen is muted (blacked out) from within Designer.

For advice on what hardware to use for merging DMX, please contact the **Support team**.

ExpressionVariables Layer

The ExpressionVariables layer defines variables for use in expressions later in the composition on a given frame.

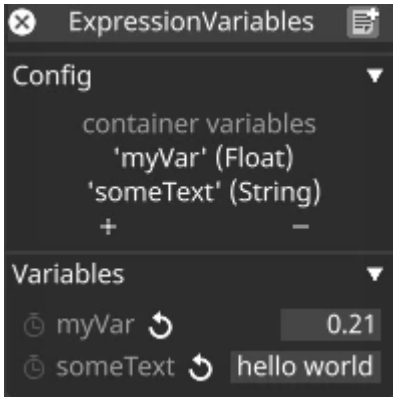
Variables defined by the ExpressionVariables layer are only valid for layers composited after the layer, and are also only valid for the duration of the layer on the timeline. They are useful in 'control' style transports in multi-transport workflows, and for animating common values on the timeline.

ExpressionVariables layer properties

The layer is split into two sections, representing the different phases of use:

1. Configure - define which variables the layer should be responsible for creating, and information about what they are and how they are edited.
2. Control - sequence and otherwise manipulate the variables defined in the first phase.

The intent is that users are able to collapse the 'Config' section after defining the variables they need, and focus entirely on controlling the values of those variables by editing or animating their values.



Config

This section of the layer editor allows the user to create new variables for use elsewhere.

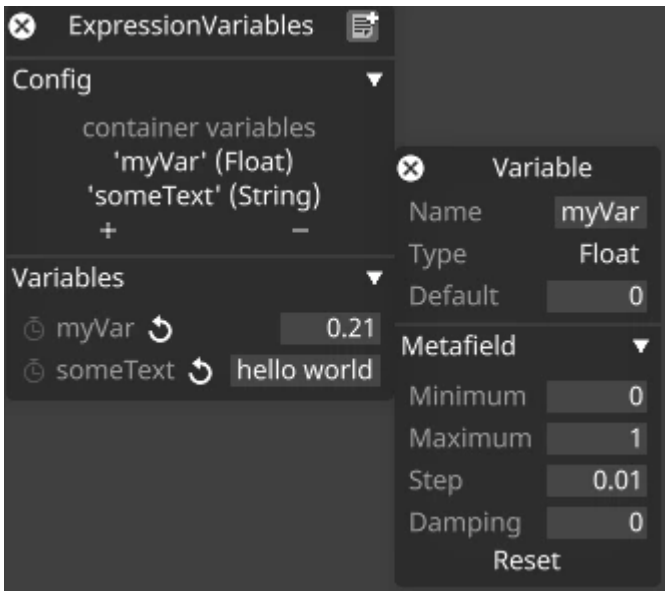
Variables are added, removed and edited in the usual array management workflows.

Editing variable properties

By adding a new item to the 'container variables' list in the editor, the metadata associated with a variable definition can be edited.

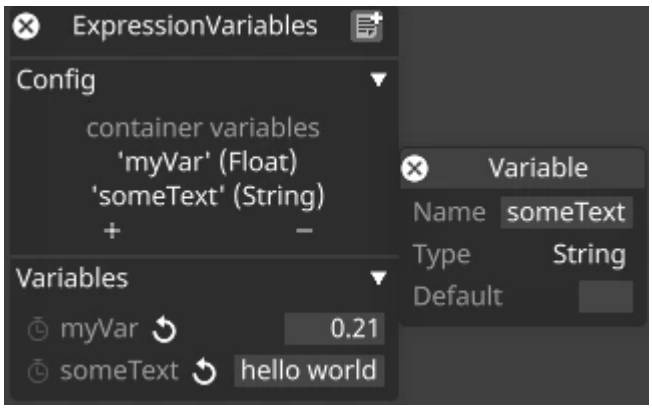
All variables have a name and a type. The name is the name of the variable as used elsewhere, and the type determines how and where the variable can be used.

Defining numeric variables



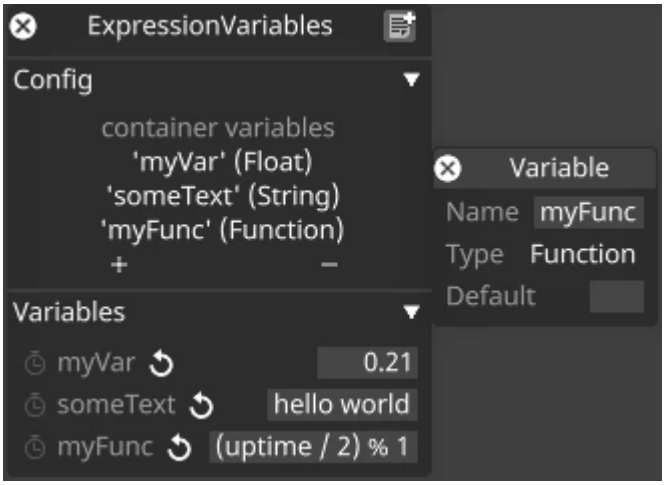
Numeric variables store a number, and can be used with numeric expressions or string formatting. The definition of the metadata for numeric variables includes setting minimum and maximum values for the expected range the variable should take, as well as a step to aid in editing the variable value. The numeric variable also includes a default value which can be used to reset the value of the variable to a default in the control portion of the user interface.

Defining string variables



String variables store text, and can be used with string formatting expressions or other text fields, such as in a text layer. The metadata for string variables only includes the default value which can be used to reset the control portion of the interface, if required.

Defining function variables



Function variables store an expression which can be evaluated in another expression. This can be used for more complex behaviour changes. When using a function variable, the expression which uses the variable should use the call syntax `()` (e.g. `myFunc()`.) Function variables also has metadata for the default value which users can reset the function text to, if required in the control section.

Variables

Every variable defined in the Config section appears as an editable, animatable value in the Variables section.

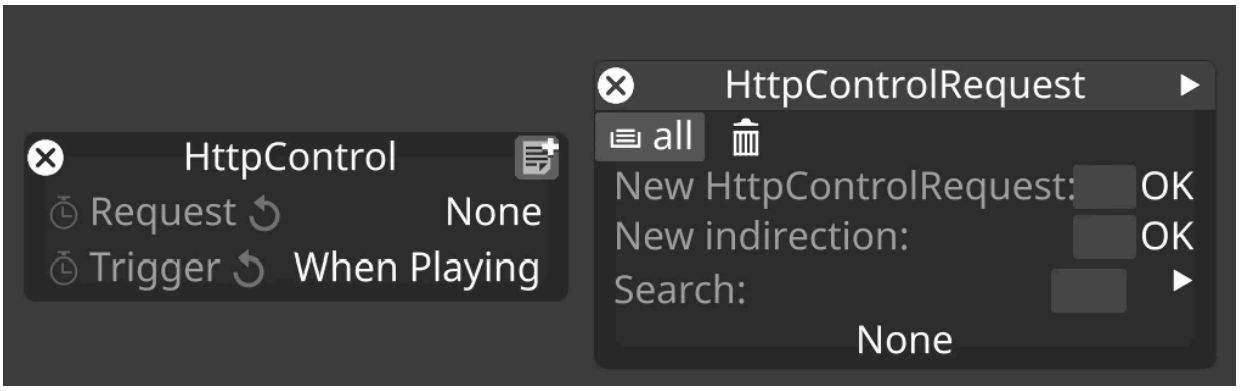
Variables can be edited and animated as with any other layer field.

The value in the editor shows the active value the variable resolves to at any given time.

HTTPControl Layer

HTTPcontrol module is designed to interface with APIs.

HTTPcontrol module is designed to interface with APIs. The Http Patch within the HttpControl module has been enabled to support the integration with partner APIs.



HTTPControl Layer Properties

Request

This requires a new HttpControlRequest. When a new HttpControlRequest is created, it has the properties Url, Method, Headers and Body.

Trigger

The trigger options available are **Always** and **When Playing**. Expressions can also be used to extend the functionality.

IndirectionControl Layer

The Indirection Control layer allows indirections to be sequenced on the timeline. One Indirection Control layer controls one Indirection.

The Indirection Control layer is implemented with two new classes:

- **SequencedIndirectionController:** The controller added to control the Indirection.
- **IndirectionControl layer:** The layer used for sequencing the Indirection on the timeline.

The Indirection Control layer updates the selected SequencedIndirectionController when it hits a new keyframe.



IndirectionControl Layer Properties

Controller

The SequencedIndirectionController.

Resource

The content, such as video or 2D image.

Sequencing IndirectionController commands

The process used to create/sequence IndirectionControl commands is done by placing keyframes on the Resource keyframe editor.

1. Add a video layer.

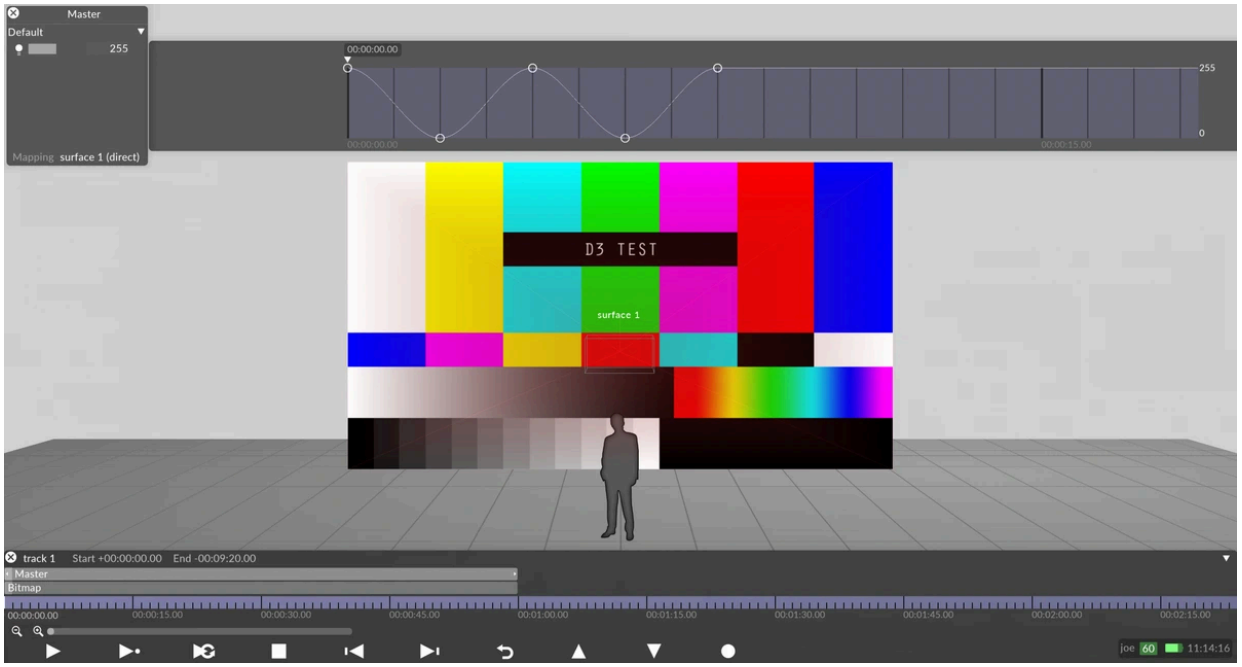
2. In the video layer editor, expand the **Media** section and left-click **None** to open the VideoClip editor.
3. Create a **New indirection** by typing in the input field and clicking OK.
4. Add a controller by clicking **None** and by typing in the input field and clicking OK.
5. Select **SequenceIndirectionController**.
6. Create an **IndirectionControl** layer on the timeline in the same section as the video layer.
7. Select the **SequenceIndirectionController.**
8. Activate the **Resource** property keyframe editor.
9. Add media to the keyframe editor.

Learn more about configuring Indirections **here**.

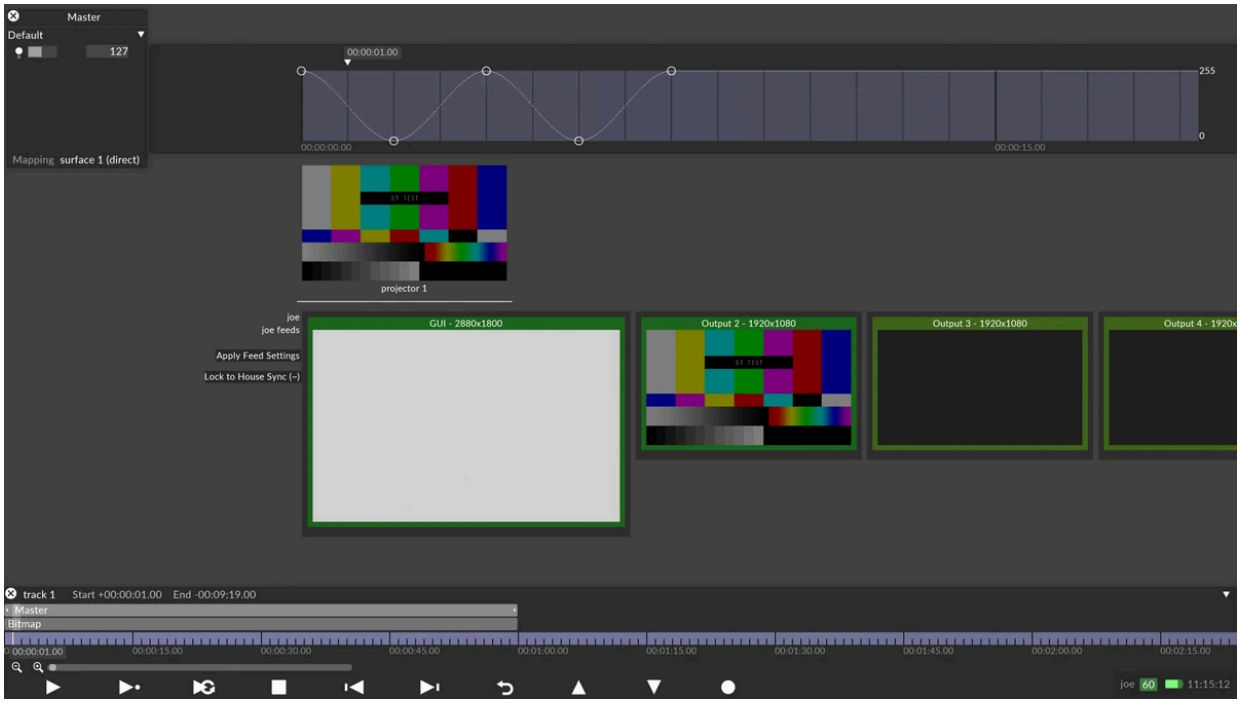
MasterBrightness Layer

The MasterBrightness layer allows you to control the output (master) brightness of a number of layers without having to individually change their brightness levels. You can also use it to control the output brightness of any Screen or collection of Screens.

> ⚠ **Warning**
>
> Once he master brightness of a screen is set, it will retain that value until another MasterBrightness layer resets it. A common mistake is to set the master brightness of a screen to 0, then jump to another part of the timeline without a MasterBrightness layer and wonder why there is no output on the screen. For this reason, the use of the MasterBrightness layer is discouraged except in emergencies.



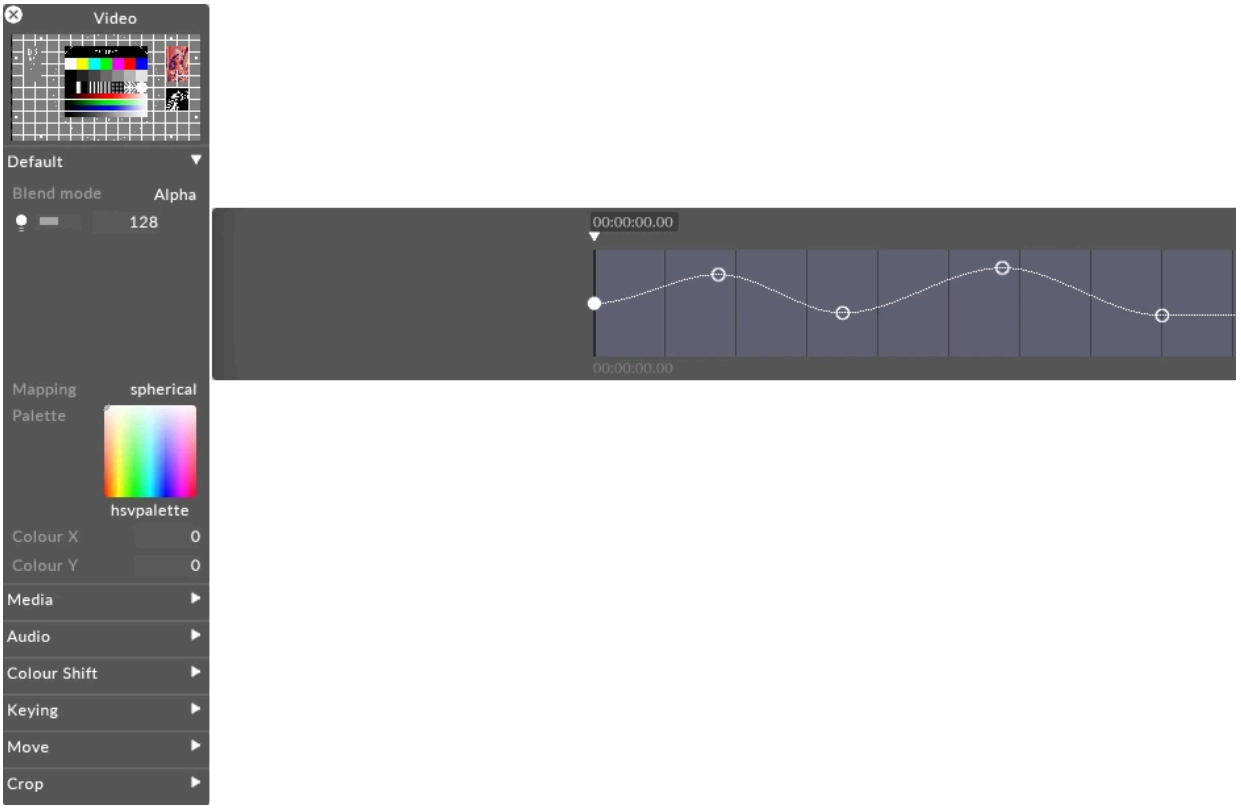
As you can see below, the output brightness is only visualised in the Output Feeds level.



MasterBrightness layer properties

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter Content Mapping.

MatrixControl Layer

The MatrixControl layer allows you to animate matrix presets on the Timeline. Currently, Designer has built in matrix devices for a number of matrix.



MatrixControl layer properties

Matrix

The matrix device you want to control.

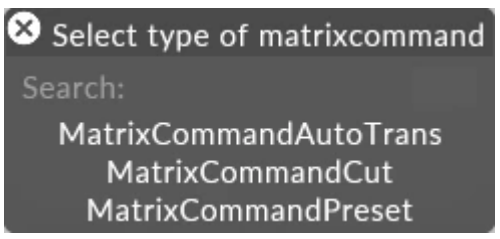
Command

The preset you want to trigger.

Creating & sequencing MatrixControl commands

The process used to create/sequence DVI matrix presets is done by placing keyframes onto the Command keyframe editor, and is therefore the same as any other layer type that uses keyframe editors, for example the AnimateCameraPreset layer.

There are three types of matrix presets:



Editing MatrixControl commands

Each command type opens a specific command editor.

MatrixCommandAutoTrans

Transition with a specified **transition time**. Only applicable for the Barco Encore.



MatrixCommandCut

Transitions with a hard cut. Only applicable for the Barco Encore.



MatrixCommandPreset

Changes the **preset** of the matrix. This will only work if you already configured a DVI matrix.



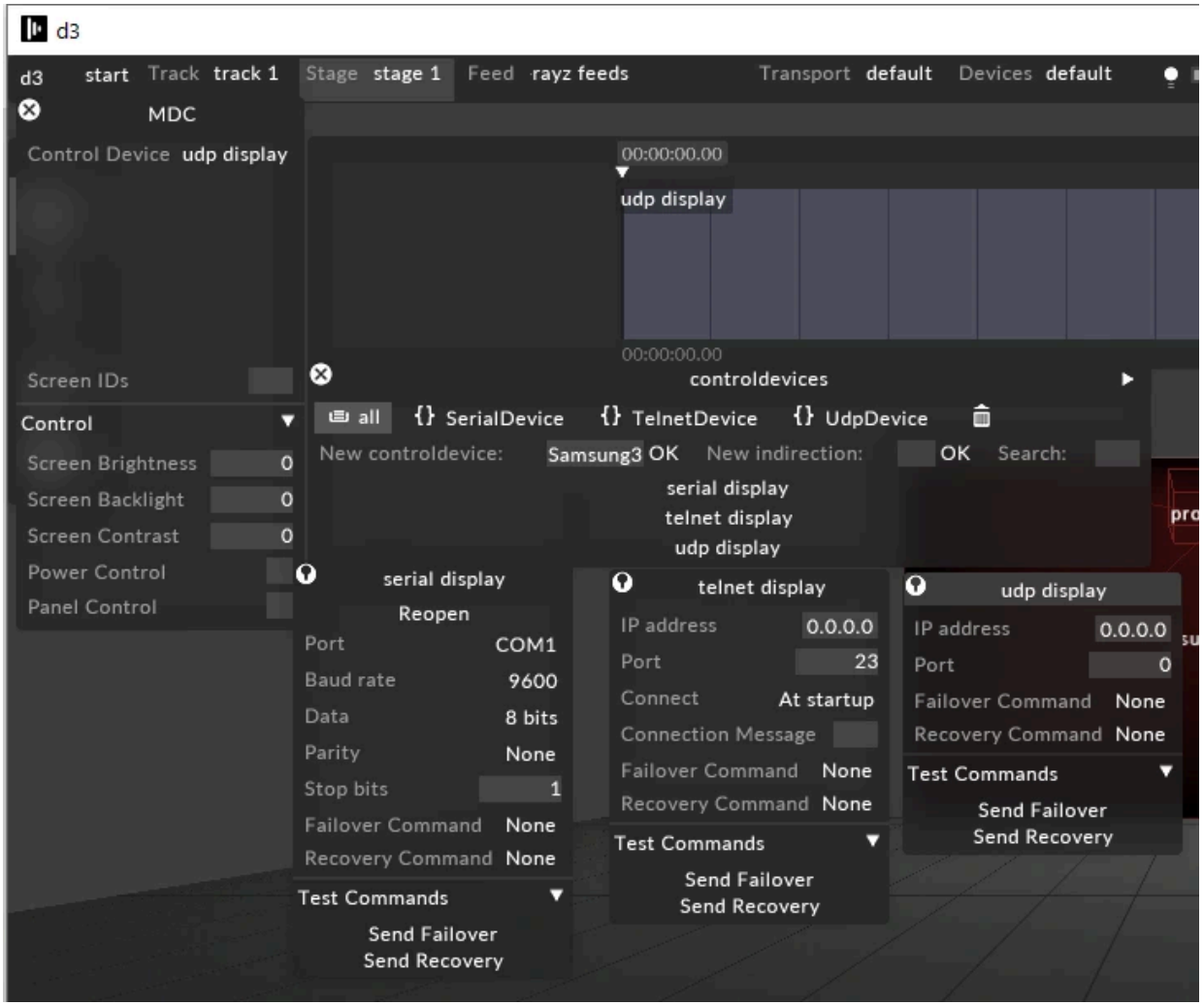
Using the MatrixControl layer

1. First, create a new matrix device in the Device manager, for example Lightware matrix or BarcoMatrixPro. Make sure the ip-address of the matrix device is in the same network as your Director/Actor network.
2. Create a new layer.
3. Choose the matrix device you just created.
4. Create a new command. For a matrix preset, choose the **MatrixCommandPreset**.
5. Type in the number of the preset.
6. To animate presets, drag and drop them onto the keyframe editor.

MDC Layer

The MDC layer allows you to control a system of multiple displays over a serial connection, TelNet or UDP from within Designer.

MDC, the free multi-display control software created by Samsung, is used to control and exchange information between a variety of different sources including Samsung displays and the networked computers used to control the displays.



Three types of devices can be configured from the MDC layer:

- Serial
- TelNet
- UDP

MidiNote Layer

The MidiNote layer sends a midi note.



MidiNote layer properties

Device

The midi port to use.

Channel (1-base)

The channel to send the note.

Note

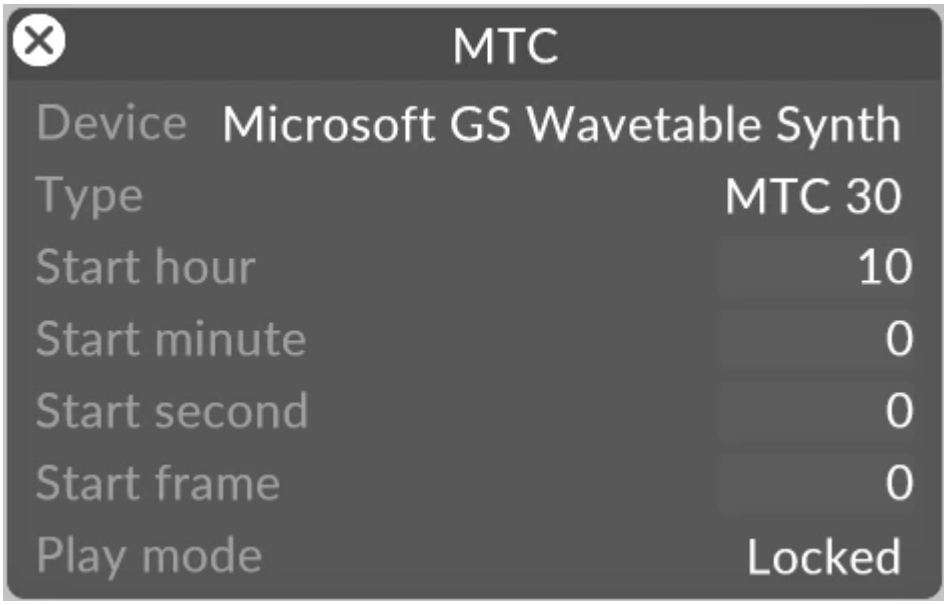
The note to send, in decimal format.

Velocity

The velocity value of the note.

MTC Layer

The MTC layer allows you to output MIDI timecode in a controlled way so that external devices such as lighting desks can be synchronised precisely with events on the timeline.



The MTC layer lets you set a timecode start value from the time posititon on the timeline, a frames-per-second value and an output device. When the play cursor first enters the extent of the layer, Designer starts a clock at the value specified and then outputs timecode as long as the play cursor remains under the layer extent.

If moving the play cursor away from under the extent of the layer will stop the output clock. When the play cursor re-enters the layer extent, the clock will restart.

MTC Layer Properties

iDevice

This specifies the index of the MIDI device used to output timecode. In the standard machine, this should always be set to **AIO Midi**. The other option is **Microsoft GS Wavetable Synth** .

Type

Choose from the following options: 24, 25, or 30 frames per second.

Start Hour, Min, Sec, Frame

This specifies the start time of the output clock. Whenever the play cursor enters the layer extent, the output clock is reset to this value.

Play mode

There are two options:

Locked: sets the timecode value to the position of the play cursor on the Timeline.

Normal: allows the time to ticks upwards regardless of cursor position on the Timeline. For example, if the play mode is set to Play-to-end-of-section, where the Play cursor will only progress untilit reaches the end of a section (i.e. just before the next cue point) and enters in a holding state, the time code will still tick upwards.

Open Layer

The Open layer is the Swiss army knife of layers. It allows you to control any property of any object in Designer, even if that object was not previously animatable using a Key-frame editor. This ability to use a Key-frame editor for properties which were not previously animatable is the key advantage of the Open layer.

> **Warning**
>
> Use the Open layer carefully. A common mistake is to have a short Open layer on the Timeline that changes the value of that property and then move the play cursor somewhere else on the Timeline. You might, for example, change the output master brightness to 0, then move the cursor to another location and wonder why there is no output.

When you first create an layer, all you will see is a title bar, with no properties beneath it.



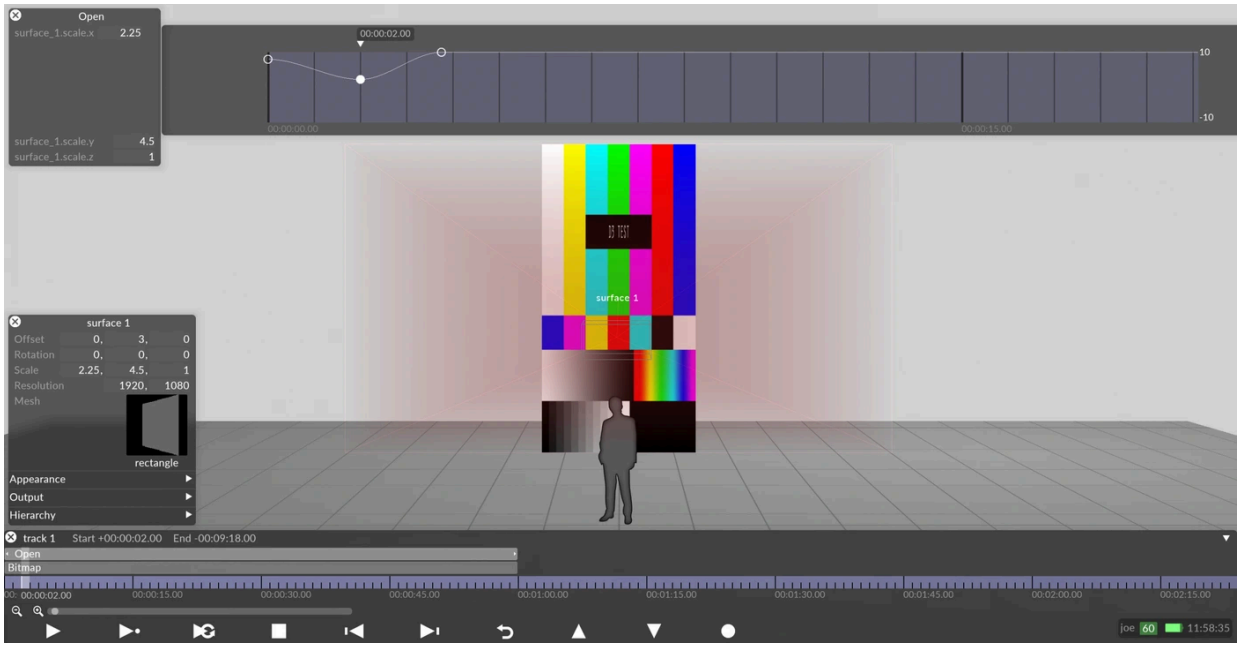
To control a property of another object:

1. Right-click an object to open its object editor, in this example Screen 1.
2. If you want to open multiple editors click **Ctrl** on the objects of interest.
3. Hold down **Alt**, left-click and drag from the Open layer titlebar, you will see a white arrow appear. For more information on Arrows please see the Composing layers with Arrows topic.

4. Drag the arrow-head over the property you want to control, in this example **scale**.



5. Release the mouse button and **Alt** ; the Open layer now has a new property named after the property you dragged the arrow to. By left-clicking the property a key-frame editor will open. This can be used to animate the property.



Scale property has now become a property of the Open layer

OscControl Layer

The OscControl layer is a tool for sending custom commands to 3rd party products via Open Sound Control (OSC).

The layer allows for the definition of custom commands that can be sequenced on the timeline to perform functions at certain times. The custom commands are OSC messages defined by a fixed OSC address and any amount of OSC arguments (Integer, Float, String, Blob).



Command

The selected command to be executed at this point on the timeline.

Variable 1-4

The **variable** to be passed into the command, if the command syntax contains the use of variables. The values can be sequenced on the timeline. Use **Auto Resend** to control when values are sent.

Auto resend

There are three possible modes for triggering commands:

1. 'On command keyframe' triggers when the playhead starts playing, as well as when the command keyframe changes.
2. 'Whenever a variable changes' triggers every time a **variable** changes.
3. 'Command keyframe or variable changes' triggers when the conditions for either modes 1. or 2. is met.

OSC Device

The protocol device through which the command should be issued.

> **Note**
>
> **Please note**: Ensure you that your device is in the Device manager. Often it is better to create the devices from the manager and then select them in your layers, to avoid confusion.

Command Syntax

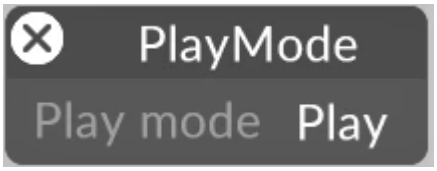
Commands are made up of an OSC address and any number of OSC arguments. The arguments have a type (Integer, Float, String or Blob) and a string value.

The string value of Integer and Float arguments can contain a variable set in the Control Layer, which is a timelined event, or a fixed numerical value. 4 define which variable to use.

The string value of a Blob argument should be in hex.

PlayMode Layer

The PlayModelayer overrides the current play mode set in the Timeline.



PlayMode Layer Properties

Play Mode

The play mode to be in. The options are:

Any : this mode has no effect; the current play mode specified in the Timeline will not be overridden.

Play: this mode does not respect section boundaries; when the end of a section is reached, the cursor continues into the next section, stopping only at the end of the track.

Play to end of section: in this mode the Play cursor will only progress until it reaches the end of a section (i.e. just before the next cue point).

Loop section: in this mode,the Play cursor will progress until it reaches the end of a section, i.e. just before the next cue point. At this point, the cursor will loop back immediately to the beginning of the section and will continue playing from there.

For more information on these play modes see the sub-chapter Navigating the Timeline

ProjectorControl Layer

The ProjectorControl layer animates projector parameters in the stage, and in turn, those parameters can be output to real projectors.

ProjectorControl layer properties

Mapping

The projector(s) being controlled by the layer.

Presets

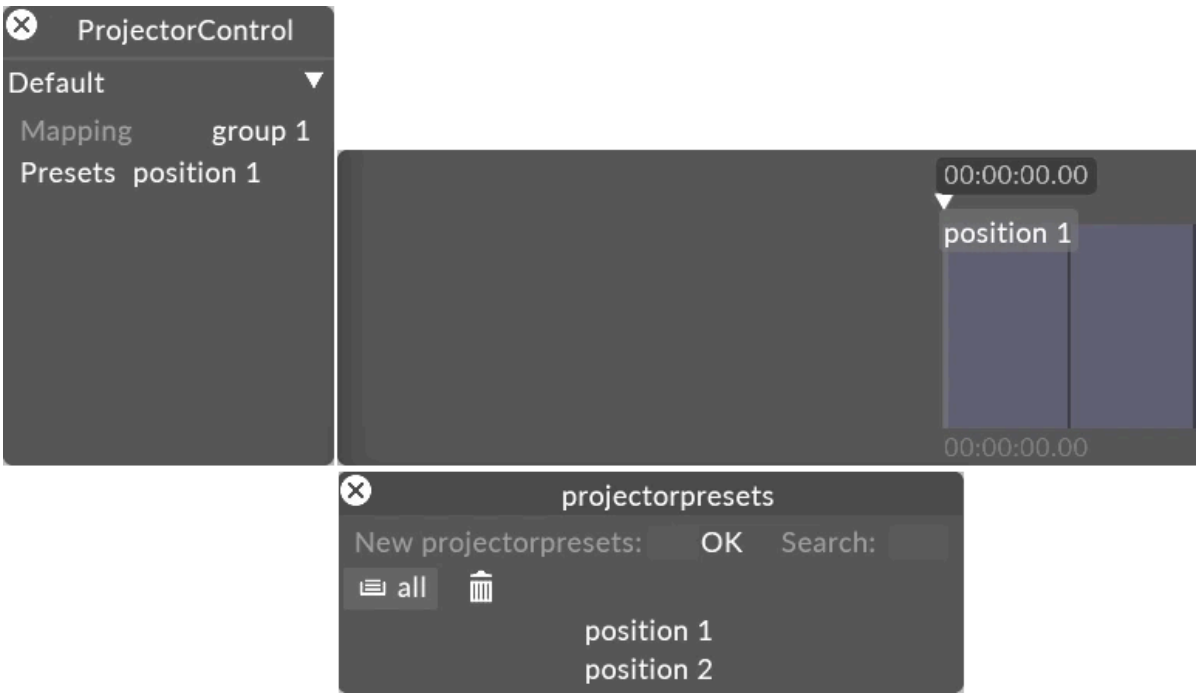
The preset the projector(s) get their data from.

Creating a preset

The preferred workflow is to create presets in the projector control editor, as detailed in the ProjectorControl device topic. However, this functionality can also be achieved directly through the layer if required.

1. Open the layer.
2. Choose which mapping (group of projectors) you wish to control using the mapping property.
3. Left-click the **presets** parameter.
4. The presets manager will open.

5. In the **New projectorpresets** field enter a name for the preset. For example, position 1.



[Animated GIF: Projector presets]

6. Add the desired projectors to the preset using the + and - buttons in the preset editor.
7. Choose values for their Pan/Tilt, Focus, Zoom, Lens Shift (V/H), Intensity, Recall and Configuration properties.

Outputting to a projector

Once your layer is animating projectors, the output to the physical projector is controlled via the ProjectorControl device.

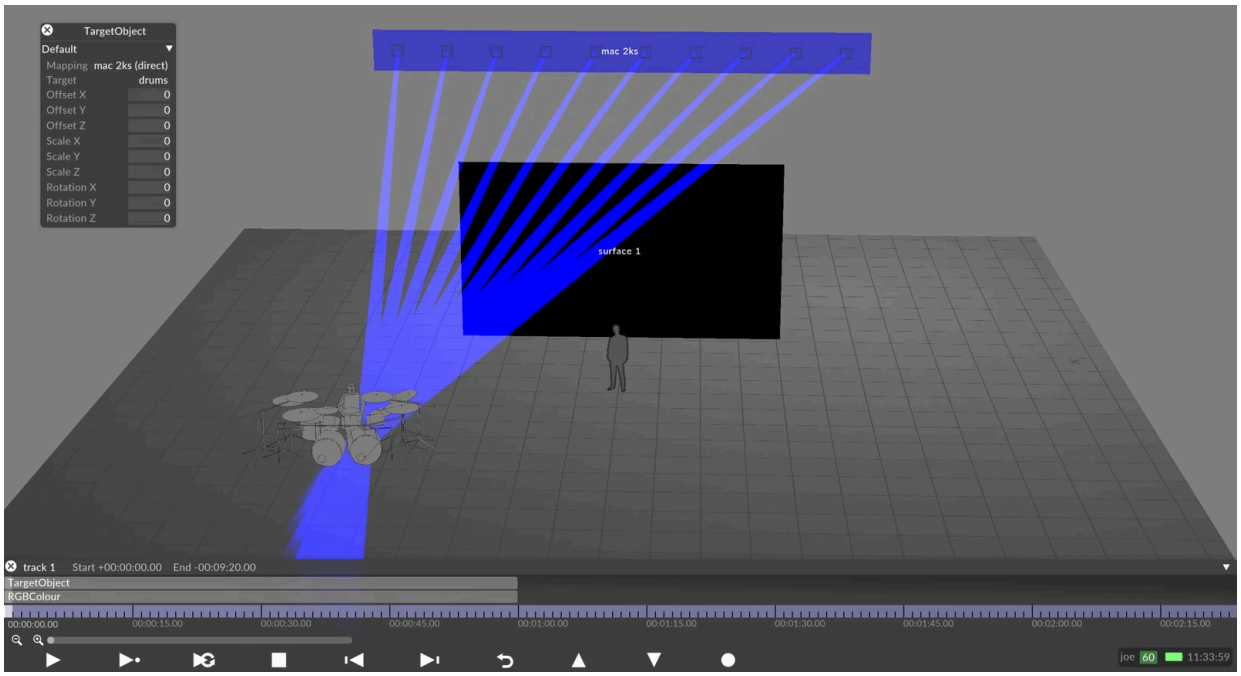
TargetObject Layer

The layer is similar to the TargetControl iin that it allows to control the movement of moving head lights. The only difference being that instead of using virtual target points the TargetObject allows you to use an object as the target.

> ⚠ **Warning**
>
> **Warning**: The fixture defined in the DMXLight needs to set to **aimable**. If not, the layer will have no effect.

Please read the sub-chapter Creating DMX Lights for information on how to create a DmxLights screen. Afterwards please read the sub-chapter [Creating a fixture (../../../stage-setup/dmx-screens-lights/dmx-lights/creating-a-fixture) for information on how to add a fixture to a DmxLights screen.

For step-by-step instructions on how to control moving head lights using the Target layer please see the sub-chapter Targeting fixtures



TargetObject Layer Properties

Mapping

Determines what mapping of DMXLight screens to use. Notice that any Mapping Type can be created using DMXLight screens.

Target

This property allows you to select the object that you want to use as the target.

Offset

This value is added to the (x, y, z) stage position of each fixture. To move the fixture targets left and right, change the x property, to move them up and down, change the y property and to move them in and out, use the z property.

Scale

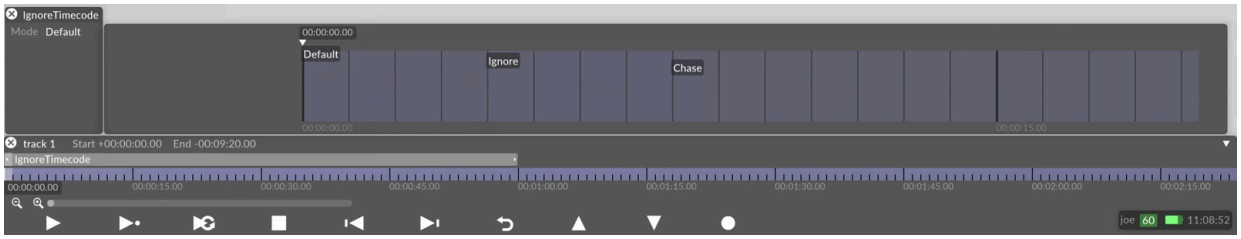
This scales the target points in each of the three axes x, y and z. Values higher than 1 increase the size of the target grid, causing the beams to splay outwards; values lower than 1 reduce the size of the target grid and setting the scale to 0 causes all beams to converge.

Rotation

This rotates the target grid around each of the x, y and z axes (angles specified in degrees).

TimecodeMode Layer

The TimecodeMode layer controls whether the system chases timecode or ignores timecode. If it is set to **default**, then the layer will have no effect.



The layer allows you to change between the following timecode modes:

Default - The layer will have no effect.

Ignore - The layer will ignore incoming timecode for the duration of where the layer covers.

Chase - The layer will chase timecode. The chase mode is effectively saying, “The timecode tags on this area of the timeline will be triggered”.

TrackJump Layer

The TrackJump layer allows you to automatically jump between tracks. This can be useful in situations where you have a permanent or semi-permanent fixed installation that needs to continue running all day, switching from one track to the next or jumping between sections within the same track.

This layer works as follows: whenever the play cursor enters the extent of the layer and the cursor continues to move forward (and thus does not stop), Designer will jump to the Track and Cue specified in the TrackJump layer and perform the specified action.

TrackJump Layer Properties

Track

This specifies which track should jump to. If set to **None** or left empty, no track jump is issued and stays in the same track.

Cue

When the Play Head is positioned beneath a Track Jump Layer and the layer is selected, a widget will appear. At the bottom of this widget, you can select the Cue within the track that you would like the Playhead to jump to once it reaches the layer.

> **Note:**
> You can move individual tags/notes by holding `Alt` and dragging with the left mouse button. To move the entire Cue, hold `Ctrl + Alt` and drag.
>
> If you move a Cue after selecting it in the Track Jump Layer, the jump will still function as expected—the Playhead will jump to the Cue's new beat position.

Play mode

This specifies the transport control mode that should enter when jumping to its destination. The options to choose from are **stop, play, play-to-end-of-section**, and **loop** section.

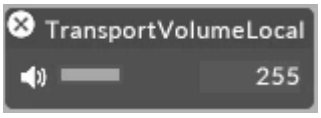
TransportBrightnessLocal Layer

The TransportBrightnessLocal layer replaces the need to use the Open layer to control the master brightness via keyframes changes on a track. The layer will work whenever it is on a track which is being played by the currently active Transport.



TransportVolumeLocal Layer

The TransportVolumeLocal layer replaces the need to use the open layer to control the master volume control via keyframes changes on a track. The layer will work whenever it is on a track which is being played by the currently active Transport.



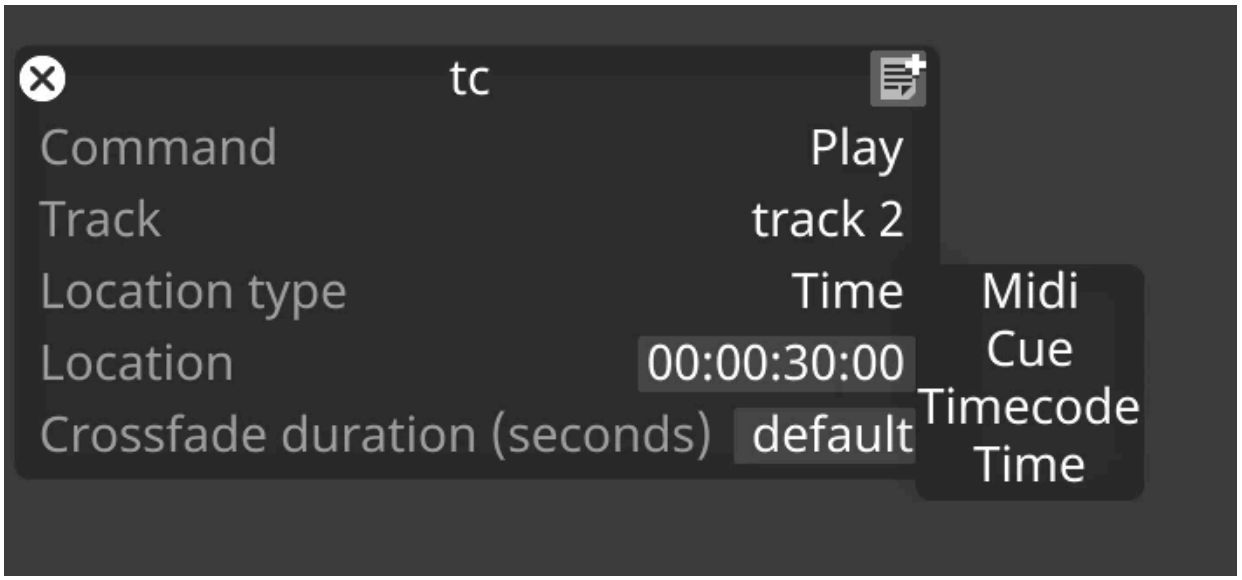
TransportControl Layer

The TransportControl layer is a tool for triggering secondary transports from another transport.

The TransportControl layer is used for triggering other transports from the timeline. One important factor to be aware of with this layer is that it cannot control its own transport. Use of this layer requires multiple transport managers, assigned to a different Set List with different sets of tracks with different sets of tracks within each Set List.

As of r26.0, an additional **Location Type** field has been added to the**Transport Jump Commands**. Previously, you would enter a prefix of **CUE** to specify the location is a cue tag, otherwise it would default to a time relative to the start of the track.

From r26 onwards, the **Location Type** allows you to specify that the property is **MIDI**, **Cue**, **Timecode** or **Time**.



The *Location type* properties work as follows:

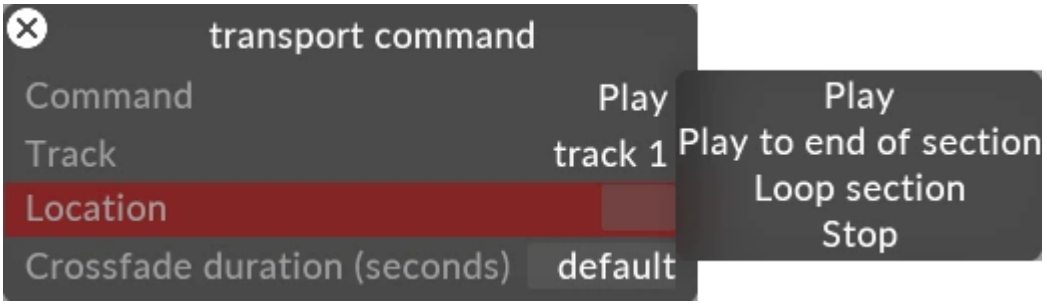
- **MIDI**: jump to midi tag <x>
- **Cue**: jump to cue tag <x>
- **Timecode**: jump to track timecode, relative to TC tags `hh:mm:ss:ff`
- **Time**: jump to absolute track timecode, unaffected by TC tags `hh:mm:ss:ff`

Also, prior to r26.0, any timecode values entered in the location field were absolute track time.

TransportControl properties

Transport - defines the transport manager that should be triggered (cannot be the transport manager that contains the track that this layer is on).

Command - Allows for sequencing of TransportJumpCommand keyframe objects. This object specifies the Command (Play, Play to end of section, Loop section and Stop), the track to target, the location within the track (by specifying a cue number or timecode tag) and a crossfade duration.



Trigger - Defines whether the command is triggered **Always** or **When playing**.

Blur Layer

The Blur layer blurs the content coming from another layer's output.

Blur layer properties

Source texture

The input content to blur. Select an Arrow source or a Texture.

Radius

The amplitude of the blur effect. The default value is 6. The min/max values are 0 and 50. Decreasing the value from 6 to 0 will sharpen the content, whilst increasing the value from 6 to 50 will gradually amplify the blurriness of the content. Setting the radius of the blur above 50 will result in banding and degredation of the output image. This is a limitation of the blur method.

Mask texture

Applies blur based on a grey-scale still image. White areas will generate maximum blur; black areas will ignore blur.

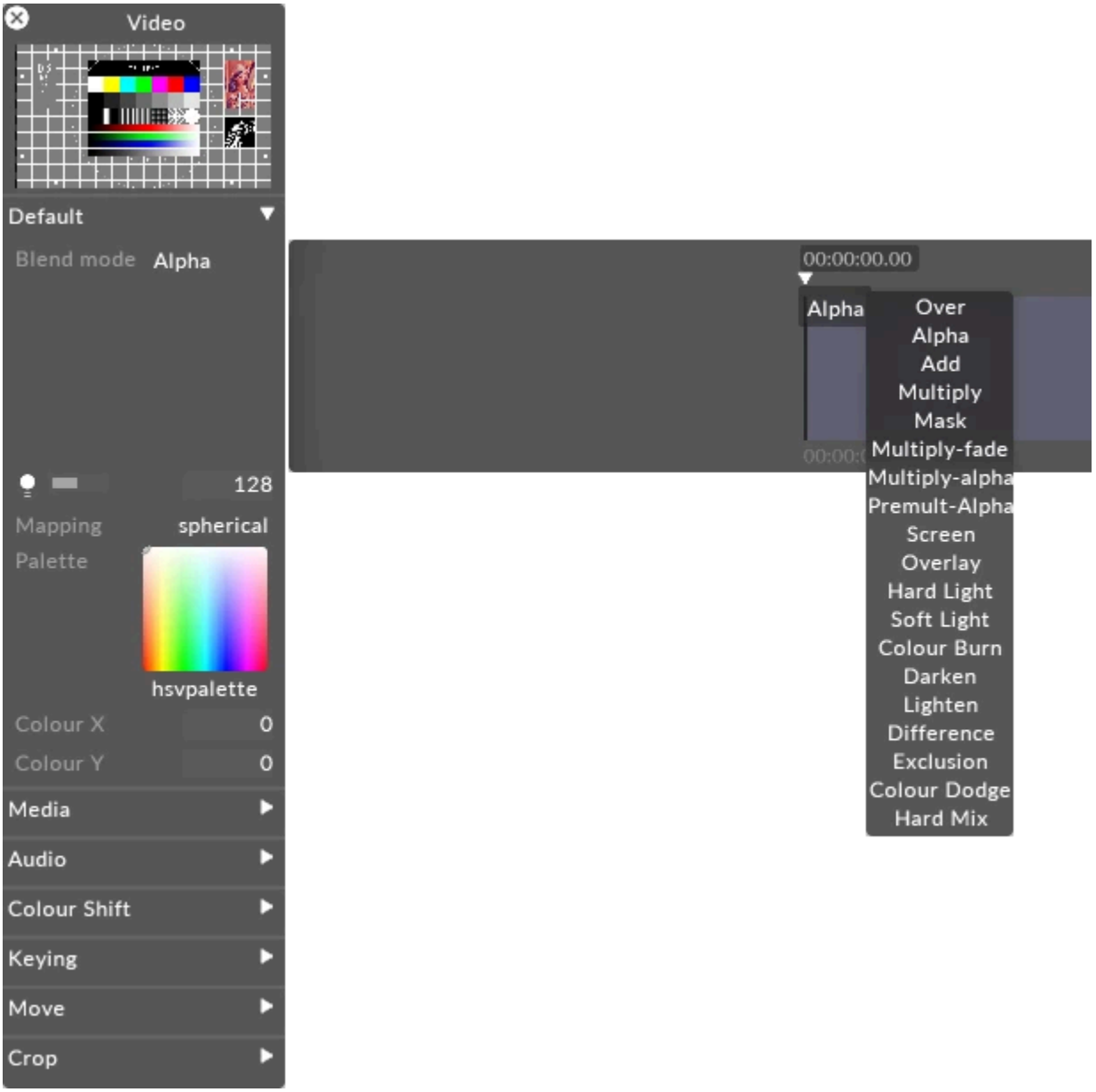
Wrap around

Wraps the blur effect around the horizontal edge of the image, blurring the left and right edges into each other.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

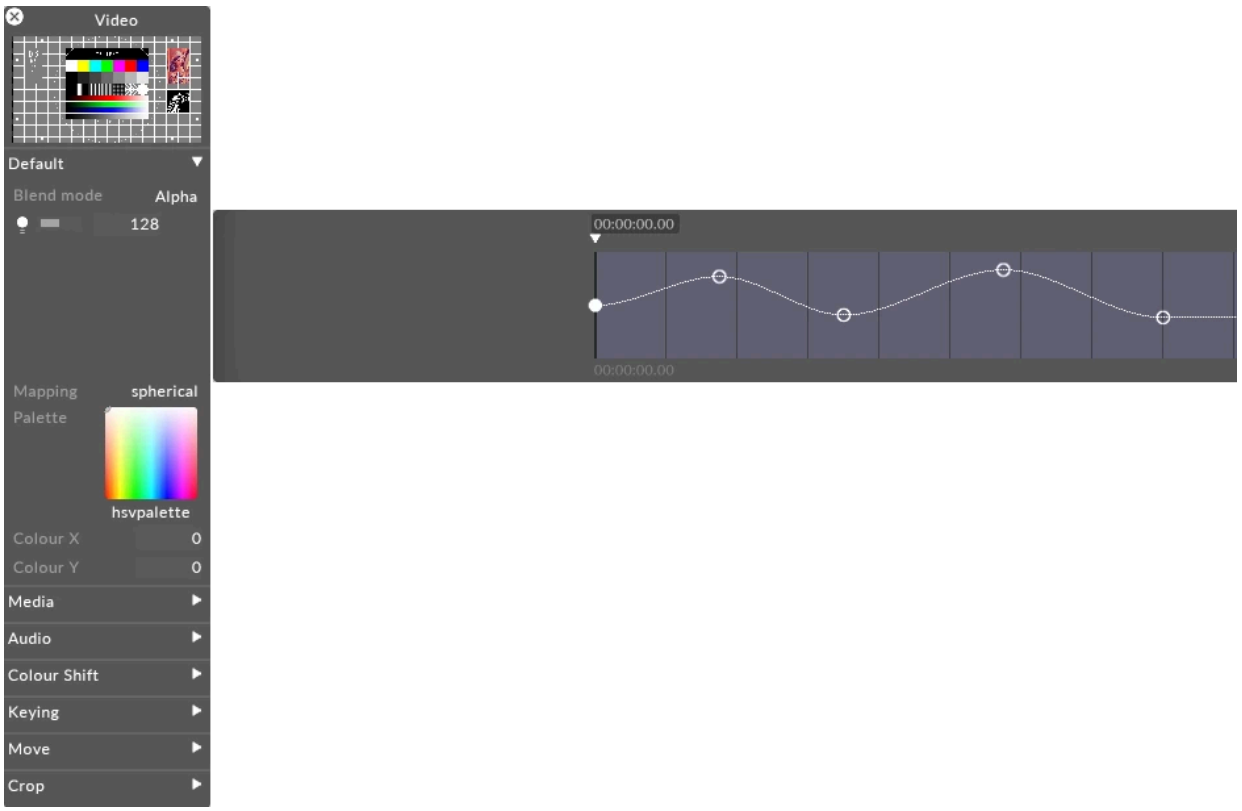
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

CDL Layer

The CDL (Colour Decision List) layer applies CDL colour correction. A CDL carries a defined subset of colour-grading data that can be shared consistently across pipelines.

The CDL layer supports both **ACES** and **OCIO**.

Workflow

1. Create a **CDL** layer.
2. Create a CDL object, or add a `.cc`, `.ccc`, or `.cdl` file to the **LutFiles** folder in the project directory.
3. Select the required CDL in the layer properties.
4. Confirm that layers routed into the CDL layer have the correction applied.
5. Adjust **Slope**, **Offset**, **Power**, and **Saturation** on the CDL object and observe the resulting image changes.

See CDL and the Colour Management section for more information.

CDL layer properties

Source from background

When enabled, the background is used as the source texture.

Source texture

Source selection — either Arrow source or a Texture. It is useful to select a PreCompTexture here.

CDL

ASC CDL format colour grading in **Slope**, **Offset**, **Power** and **Saturation** controls.

New CDL

Create a new CDL.

New Indirection

Create a new Indirection.

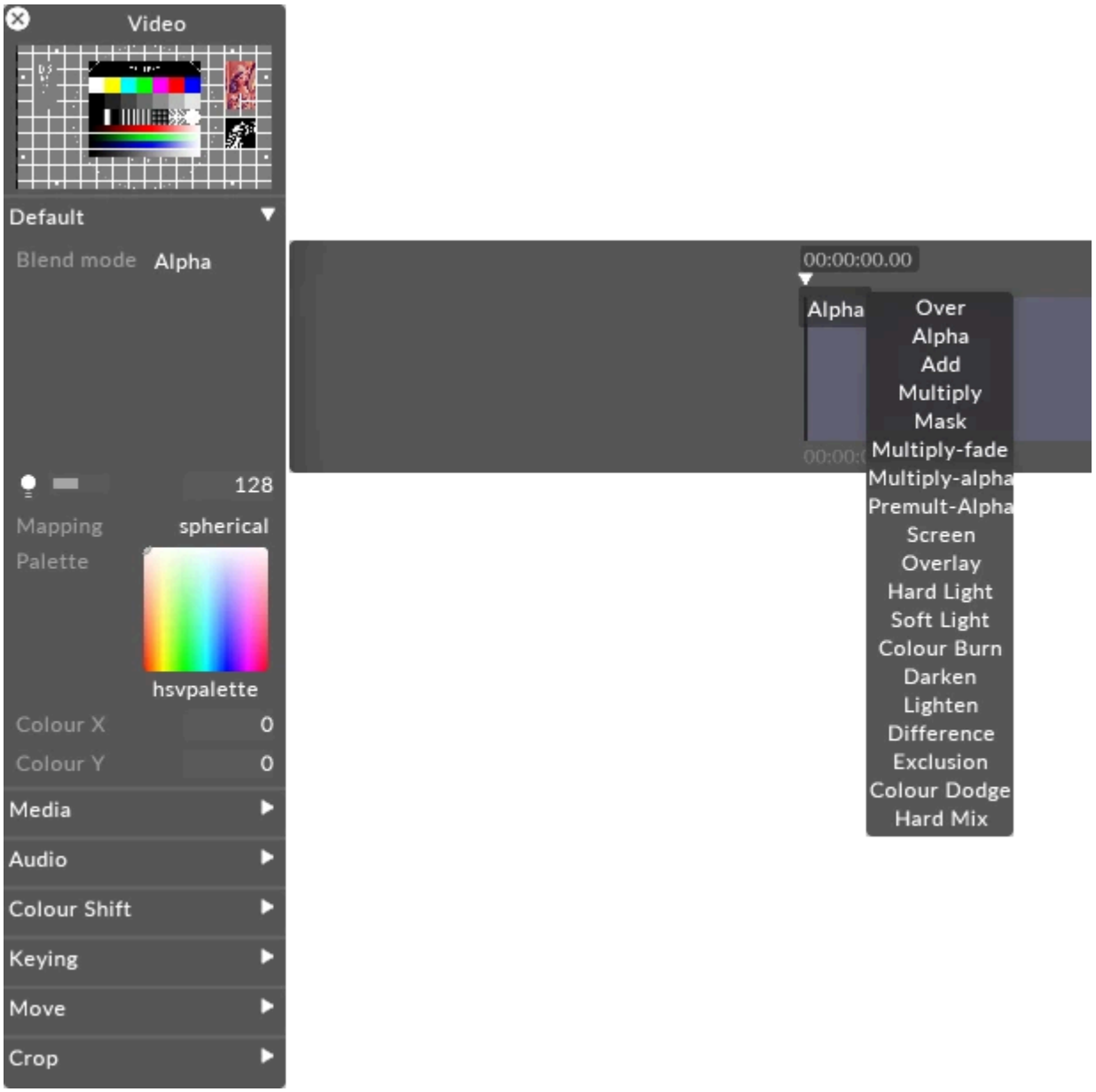
Search

Search for an existing CDL.

Common layer properties

Blend mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting

multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

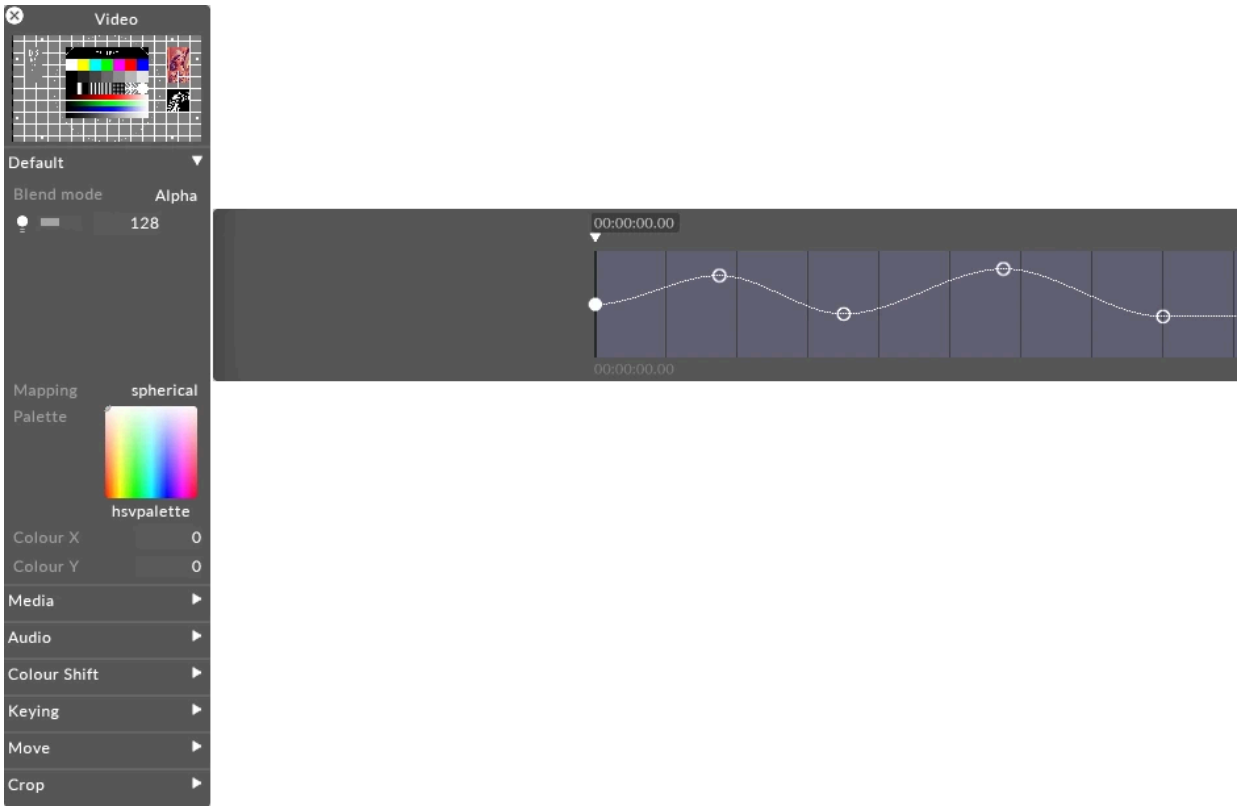
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the

next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



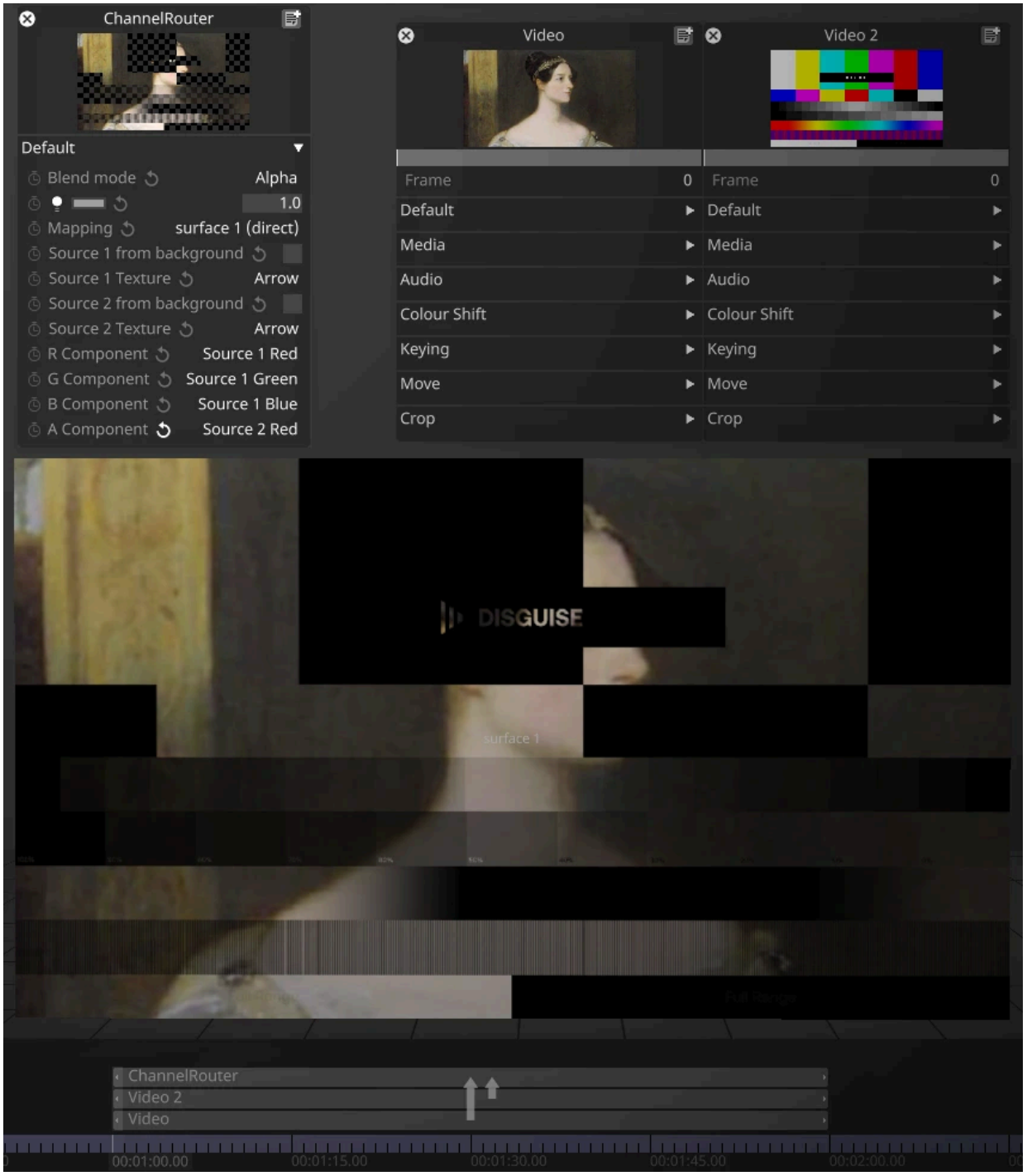
For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

ChannelRouter Layer

The ChannelRouter layer creates an RGBA image made up from any combination of the RGBA components from up to two input sources. This can be used to correct problems with a source image, to verify the components of the input sources or for many artistic purposes.

All Effect layers take their source from other layer types - either content or generative - by use of an arrow. Linking two layers with an arrow defines the arrowed from layer as the source, and the arrowed to layer as the destination. If you have an arrow between a content layer and effect layer, it is said that the content layer is being 'piped in' to the effect layer. For more information on arrows, see the Compositing layers.

To draw an arrow between two layers, hold down **ALT** and left-click & drag between the source and destination layer.


ChannelRouter
Default
Blend mode
Alpha
1.0
Mapping
surface 1 (direct)
Source 1 from background
Source 1 Texture
Arrow
Source 2 from background
Source 2 Texture
Arrow
R Component
Source 1 Red
G Component
Source 1 Green
B Component
Source 1 Blue
A Component
Source 2 Red
Video
Video 2
Frame
0
Default
Media
Audio
Colour Shift
Keying
Move
Crop
DISGUISE
surface 1
ChannelRouter
Video 2
Video
00:01:00.00
00:01:15.00
00:01:30.00
00:01:45.00
00:02:00.00

> **Note**
>
> The order and direction of arrowing between layers is important. `Source 1` will always be the first layer to be piped into the ChannelRouter layer, `Source 2` will always be the second. Any further layers that are piped in will be disregarded.
>
> In the above screenshot the layer named `Video` was piped in first, then the layer named `Video 2` piped in second. Then the ChannelRouter layer has been set to use the Red Channel of `Video 2` as the Alpha Channel, thus creating the block effect.

Potential uses for the ChannelRouter Layer

Alpha channel substitution

- Take the alpha from one input and apply it to the other. This can be used for artistic masking effects. Settings: R=Source 1 Red, G=Source 1 Green, B=Source 1 Blue, A=Source 2 Alpha.

Alpha channel removal

- Remove the alpha channel from a source image by setting the layer's alpha component to a constant value of 1. Settings: R=Source 1 Red, G=Source 1 Green, B=Source 1 Blue, A=Constant 1

Synthesising an alpha channel

- Input sources that you require to have an alpha channel but do not can often have satisfactory alpha channels synthesised from their luma channel. Settings: R=Source 1 Red, G=Source 1 Green, B=Source 1 Blue, A=Luma 1

Channel correction

- An image supplied in BGR format can be fixed by rearranging it to RGB. Settings: R=Source 1 Blue, G=Source 1 Green, B=Source 1 Red, A=Alpha 1

Image debugging

- Separately view each component from an input source to verify that they are all appear as expected. Settings: R=Source 1 Red, G=Source 1 Red, B=Source 1 Red, A=Constant 1.

ChannelRouter Layer Properties

R Component

Determines which input component appears in the red channel of the layer's output.

G Component

Determines which input component appears in the green channel of the layer's output.

B Component

Determines which input component appears in the blue channel of the layer's output.

A Component

Determines which input component appears in the alpha channel of the layer's output.

Source 1 from background

When enabled, all the layers that are below the UVLookup layer on the timeline and also share the same mapping as the UVLookup layer, are used as the source texture.

Source 1 Texture

This can be a texture applied directly in this field or by using an arrow from another content source layer as described above in the **overview**.

Source 2 from background

When enabled, the existing screen content is used as the source texture. If **Source 1 from background** is also enabled then this will be the same content.

Source 2 Texture

This can be a texture applied directly in this field or by using an arrow from another content source layer as described above in the **overview**.

R Component

Determines which input component appears in the red channel of the layer's output.

G Component

Determines which input component appears in the green channel of the layer's output.

B Component

Determines which input component appears in the blue channel of the layer's output.

A Component

Determines which input component appears in the alpha channel of the layer's output.

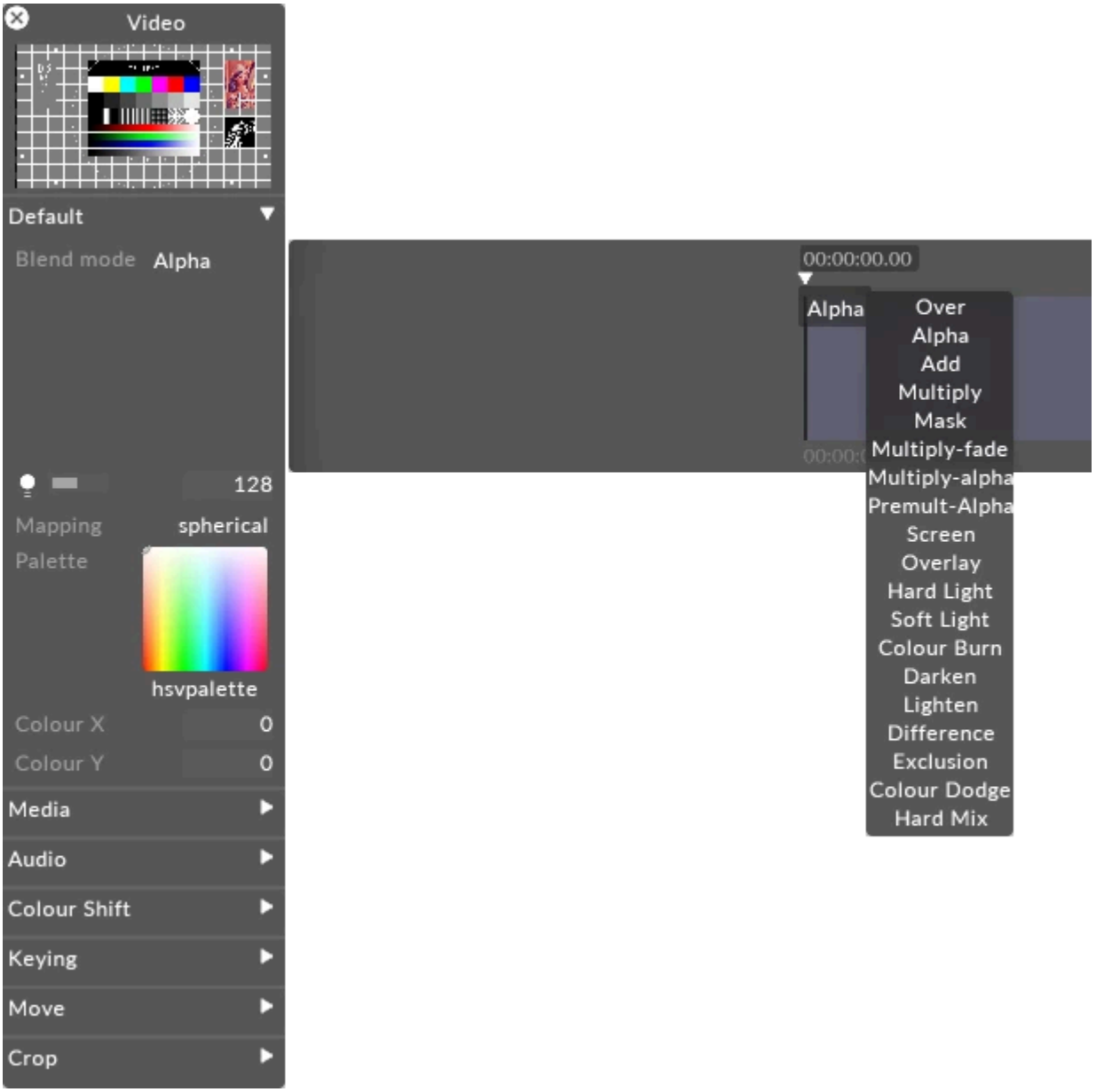
The value for each of the four component properties above can be selected from the following list:

- Source 1 Red - Red component of source 1
- Source 1 Green - Green component of source 1
- Source 1 Blue - Blue component of source 1
- Source 1 Alpha - Alpha component of source 1
- Source 1 Luma - Luma (effectively similar to greyscale) value of source 1
- Source 1 Max RGB - Strongest of source 1's red, green and blue components
- Source 1 Min RGB - Weakest of source 1's red, green and blue components
- Source 2 Red - Red component of source 2
- Source 2 Green - Green component of source 2
- Source 2 Blue - Blue component of source 2
- Source 2 Alpha - Alpha component of source 2
- Source 2 Luma - Luma (effectively similar to greyscale) value of source 2
- Source 2 Max RGB - Strongest of source 2's red, green and blue components
- Source 2 Min RGB - Weakest of source 2's red, green and blue components
- Constant 0 - A constant value of 0
- Constant 1 - A constant value of 1

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

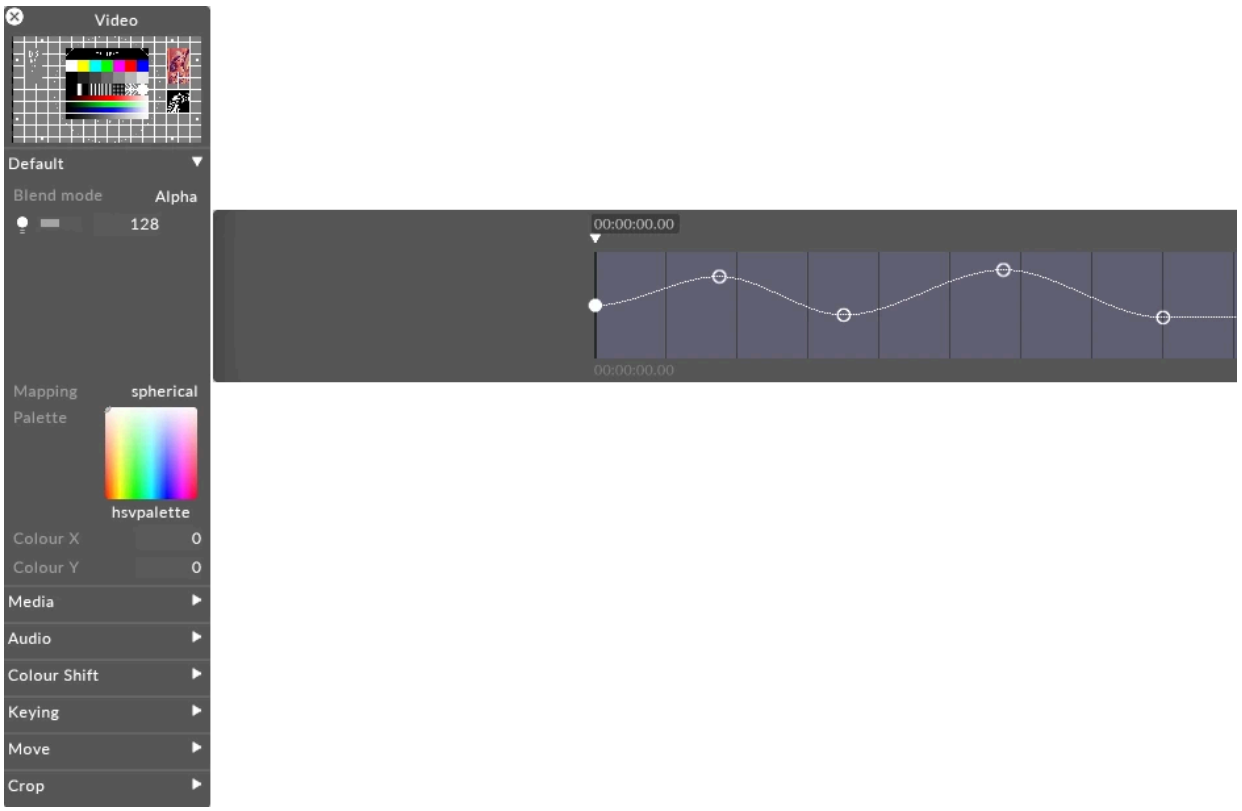
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

ColourAdjust

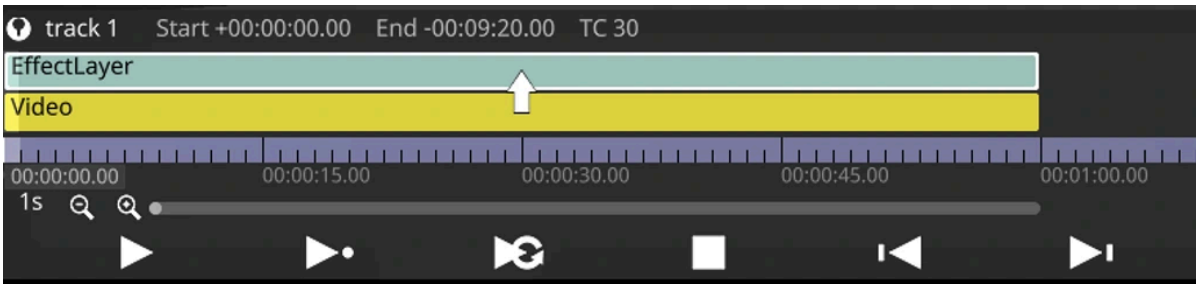
The ColourAdjust layer is best suited to changing colour properties in a familiar set values. It is designed to control white balance and tint either through presets or discrete amounts.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

ColourAdjust layer properties

White balance preset

This property defines which White balance preset is used.

The following options are available.

- None
- Custom
- Daylight
- Shade

- Cloudy
- Tungsten
- Florescent
- Flash

Once you have selected a preset, you cannot keyframe Kelvin & Tint.

Kelvin

This property controls the Kelvin in degrees kelvin.

Tint

This property controls tint and allows you to fine-tune the green/magenta balance. The scale on the slider represents the actual Kelvin value, which is subject to slight variations from camera to camera.

Contrast

This property controls contrast.

Brightness

This property controls brightness.

Saturation

This property controls saturation.

Levels

Levels is a tool in the **ColourAdjust** layer which can move and compress the brightness levels of an image histogram. It has the power to adjust brightness, contrast, and tonal range by specifying the location of complete black, complete white, and midtones in a histogram. Since every piece of content's histogram is unique, there is no single way to adjust the levels for all your content. A proper understanding of how to adjust the levels of an image histogram will help you better represent tones in the final image.

Shadow

Shadow defines the lowest brightness value in the source image. Any pixels at or below this value are pushed towards `0.0`.

Midtone

The midtone can be considered as a gamma adjustment. It adjusts the midtone response or overall curve between black and white, allowing to brighten or darken mid-level tones without heavily altering the extremes.

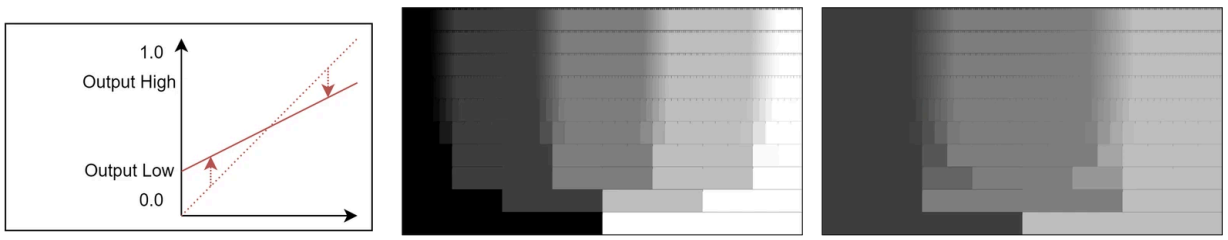
Highlight

Highlight defines the highest brightness value in the source image. Any pixels at or above this value are pushed towards `1.0`.

Compress

The colour level can be compressed using **Output Low** and **Output High**. For example, the colour range of `[0.0, 1.0]` will be compressed into `[Output Low, Output High]`. This shifts the entire colour range while minimising the loss of detail in the darkest and brightest regions.

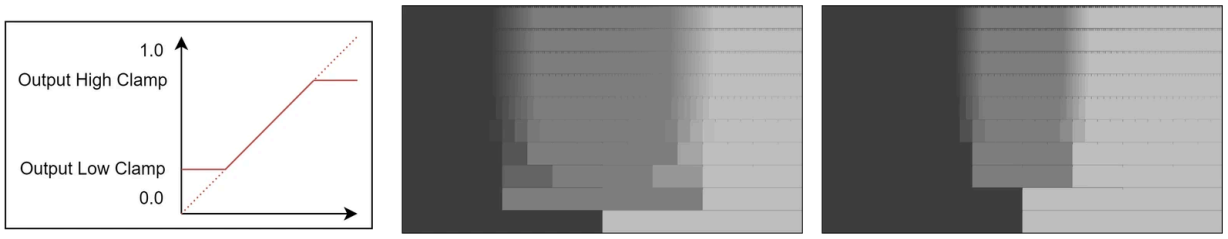
- **Output Low** sets how dark the darkest pixels in the result will be.
- **Output High** sets how bright the brightest pixels in the result will be.



Graph (left), Original (mid), With compress [0.2, 0.8] (right)

Clamp

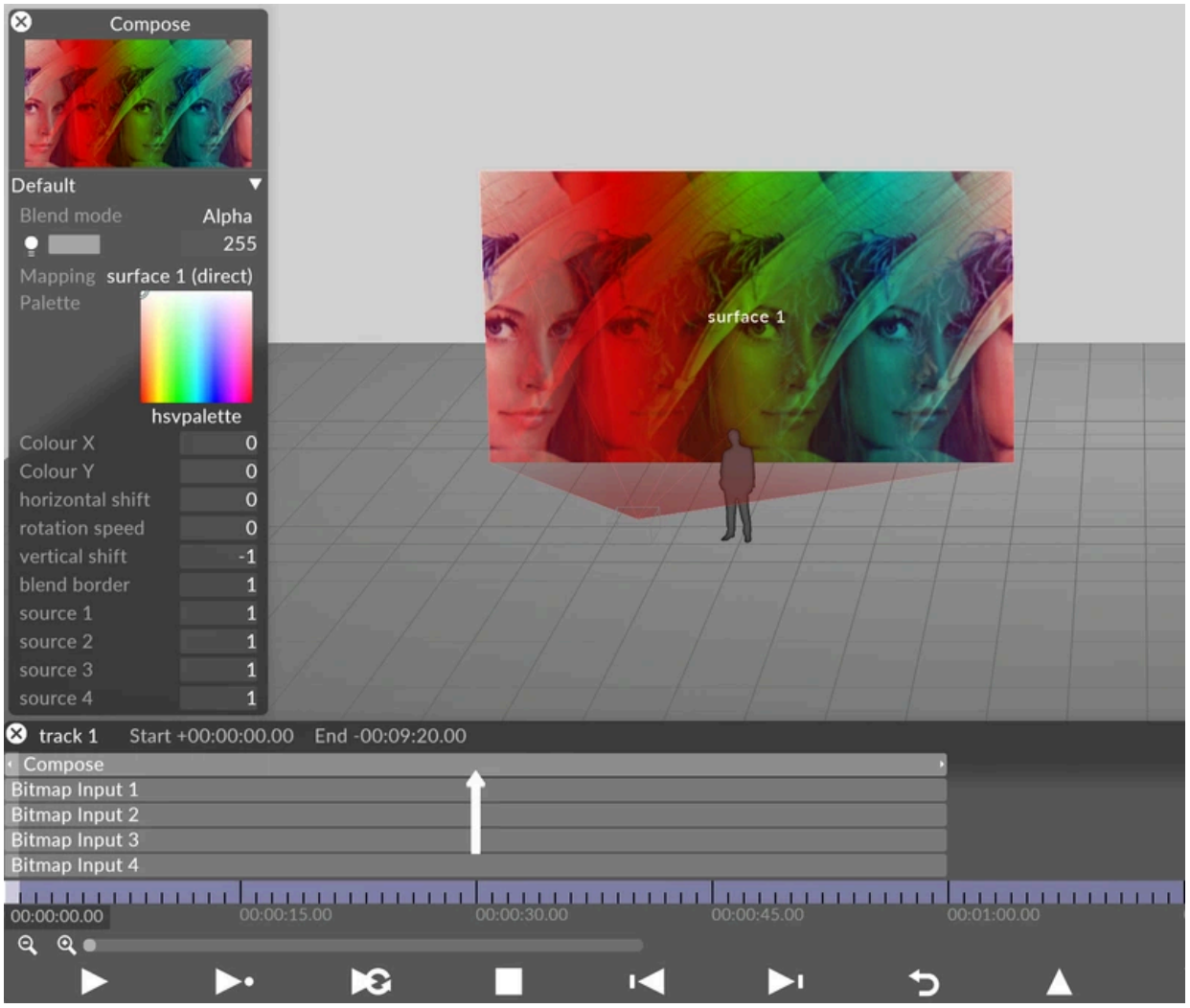
To prevent colour shift, clamping can be applied. As the name suggests, colours will be restricted within the range of `[Output Low Clamp, Output High Clamp]`. This means that colours within the clamp range will be preserved, while colours outside the range will be capped and lost.



Graph (left), With compress [0.2, 0.8] (mid), With clamp [0.2, 0.8]

Compose Layer

The Compose layer takes multiple inputs, for example live camera input, and composes the inputs next to each other on a screen. The Compose layer can also blur the edges between the inputs enabling seamless edges.

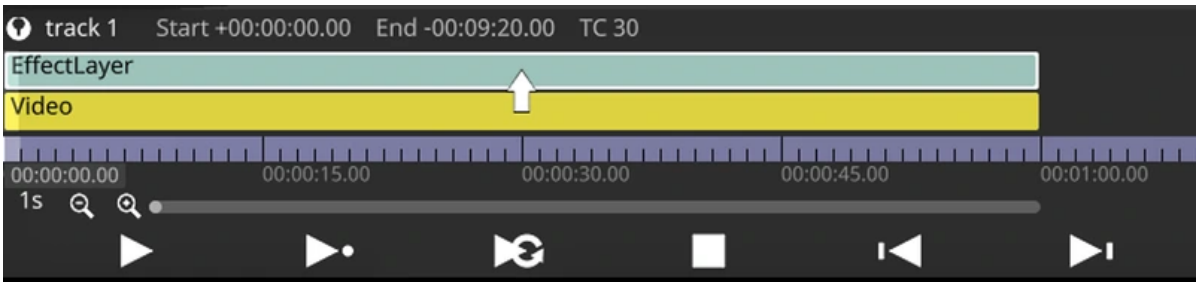


Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the compositing layers topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see creating layers.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.

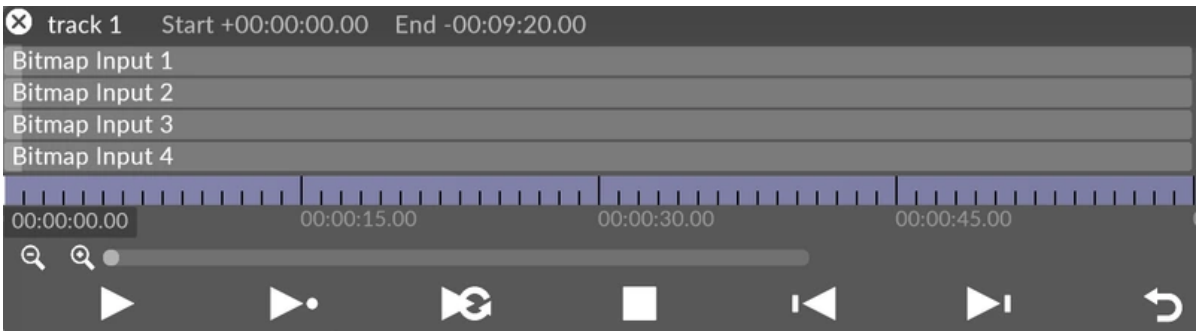


A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Using the Compose layer

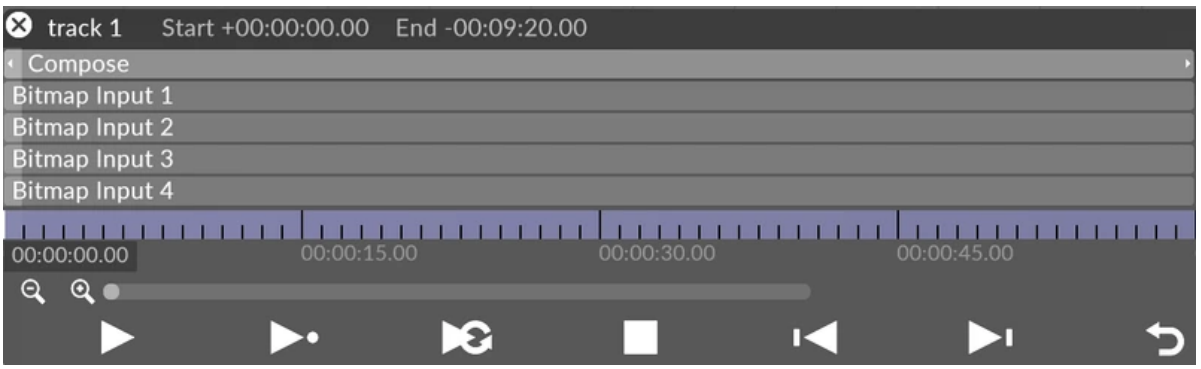
1. Create the input layers. These can be any content layer (Bitmap layer, Video layer , etc) or a combination. For the example here we are using Bitmap layers.



Content layers, in this example four Bitmap layers, will be used as input into a Compose layer

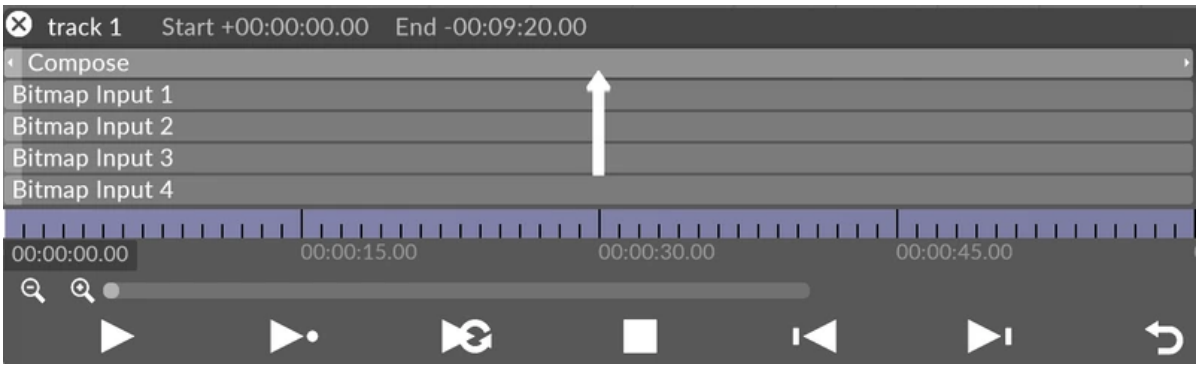
2. Edit the s properties as you wish. The content layers used in this example have had their Colour Shift properties edited. For more information on editing Colour Shift properties scroll down to the section Colour Shift in the Common Layer Properties chapter.
3. Create a Direct mapping with the same resolution as the source content. For example, if the image in the Bitmap layer is 256x256 pixels, create a Direct mapping type with a 256x256 resolution . As the mapping type only acts as a temporary container which is piped into the Compose layer, there is no need to add a screen.

4. Create a Compose layer. Make sure this layer is positioned at the top of your layer order.



The Compose layer should be positioned at the top of the input layers

5. Drag an Arrow from each input layer into the Compose layer. For information on Arrows please see the sub-chapter Composing layers using arrows. In the Compose layers preview window you can now see the inputs composed next to each other.



Input layers piped into the Compose layer using Arrows and mapped onto Screen1 using a Direct mapping

6. Edit the Compose layer properties as you wish. It is also possible to blur the edges between the inputs enabling seamless edges, as shown in the first image of this sub-chapter.

Compose Layer Properties

Horizontal shift

Moves the composed content left or right.

Rotation speed

Adjusts the horizontal rotation speed of the content.

Vertical shift

Moves the content up or down.

Blend border

Adjusts the blending level between the input sources.

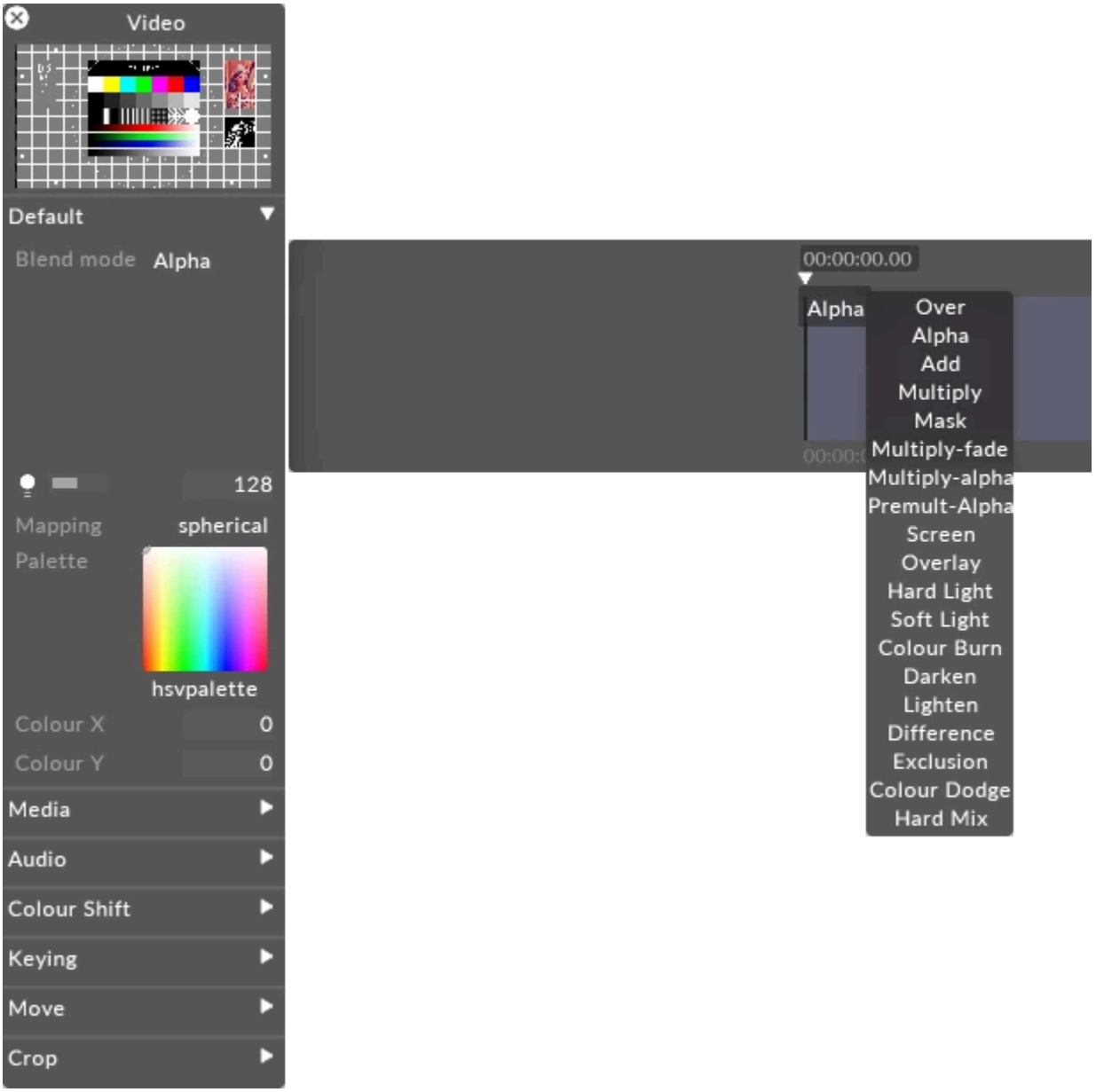
Source 1,2,3,4

Adjust what inputs to show, hide or partially show. When you set the value to 1, it shows the input, 0 hides the input. As inputs are being hidden, note that Designer maintains the aspect and therefore scales the inputs on the screen.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

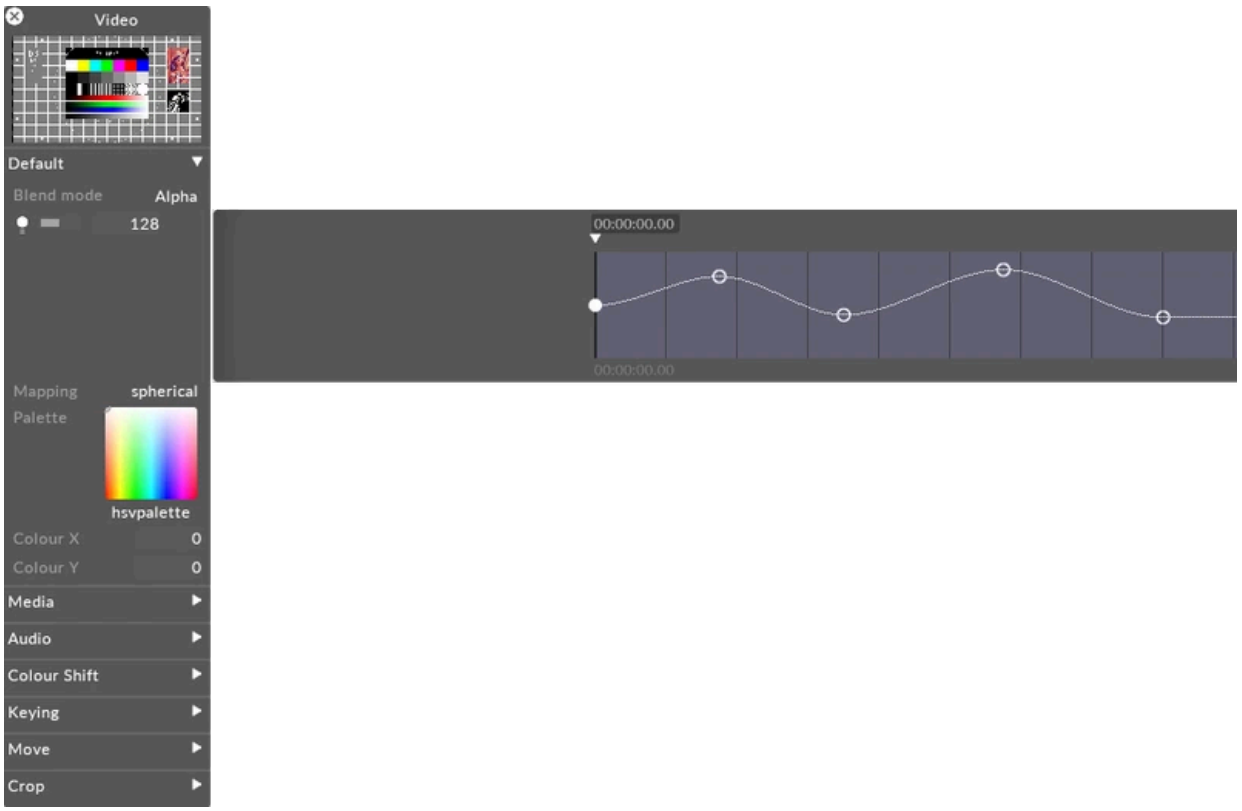
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

EdgeFilter Layer

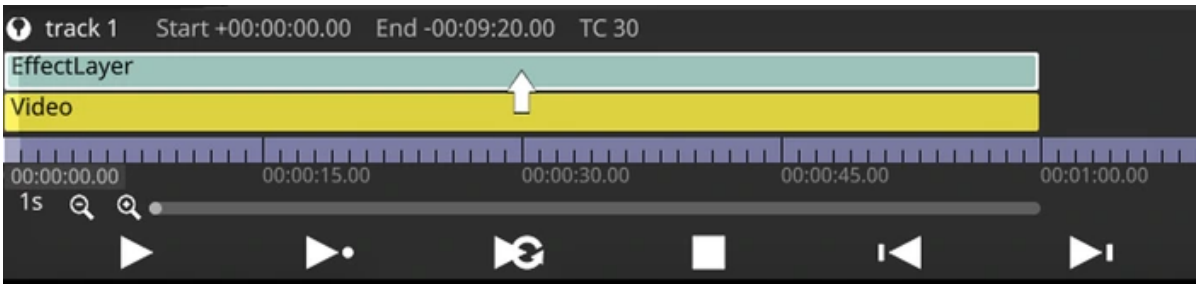
The EdgeFilter layer filter can be used to detect the edges within a video/bitmap.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.

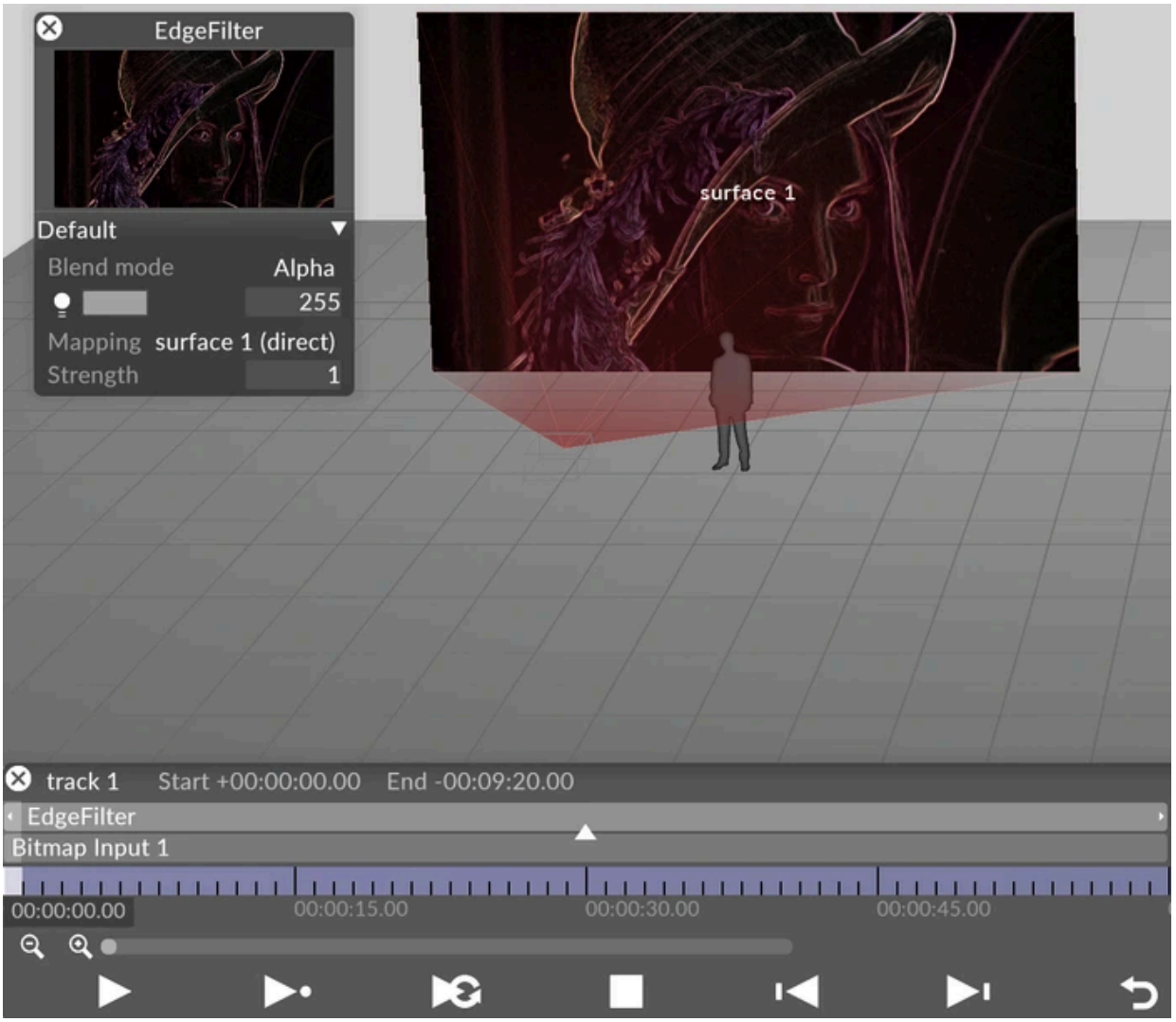


A Video layer piped into an Effect layer on the timeline.

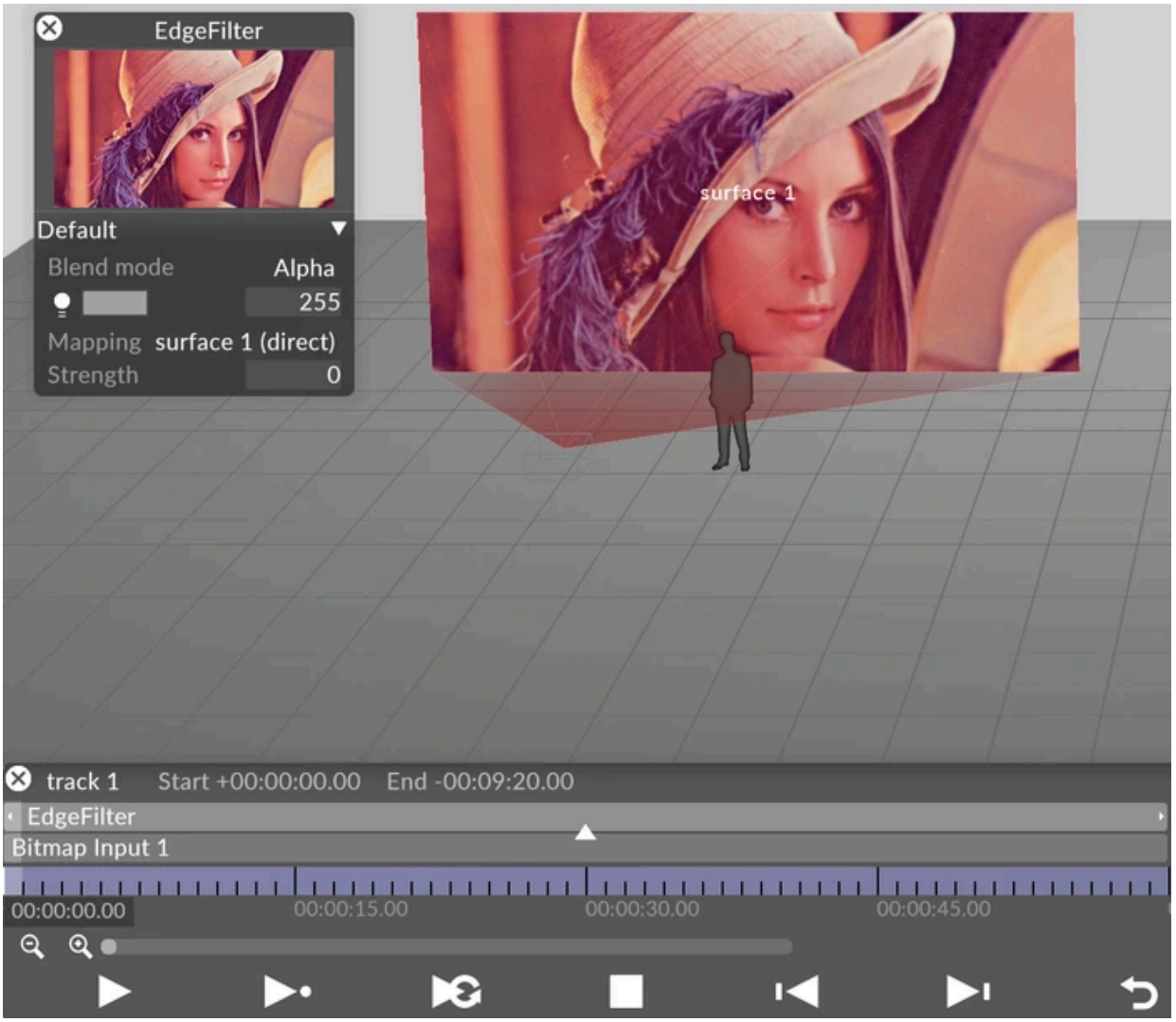
3. Adjust the Effect layer properties to achieve the desired result.

Configure Properties

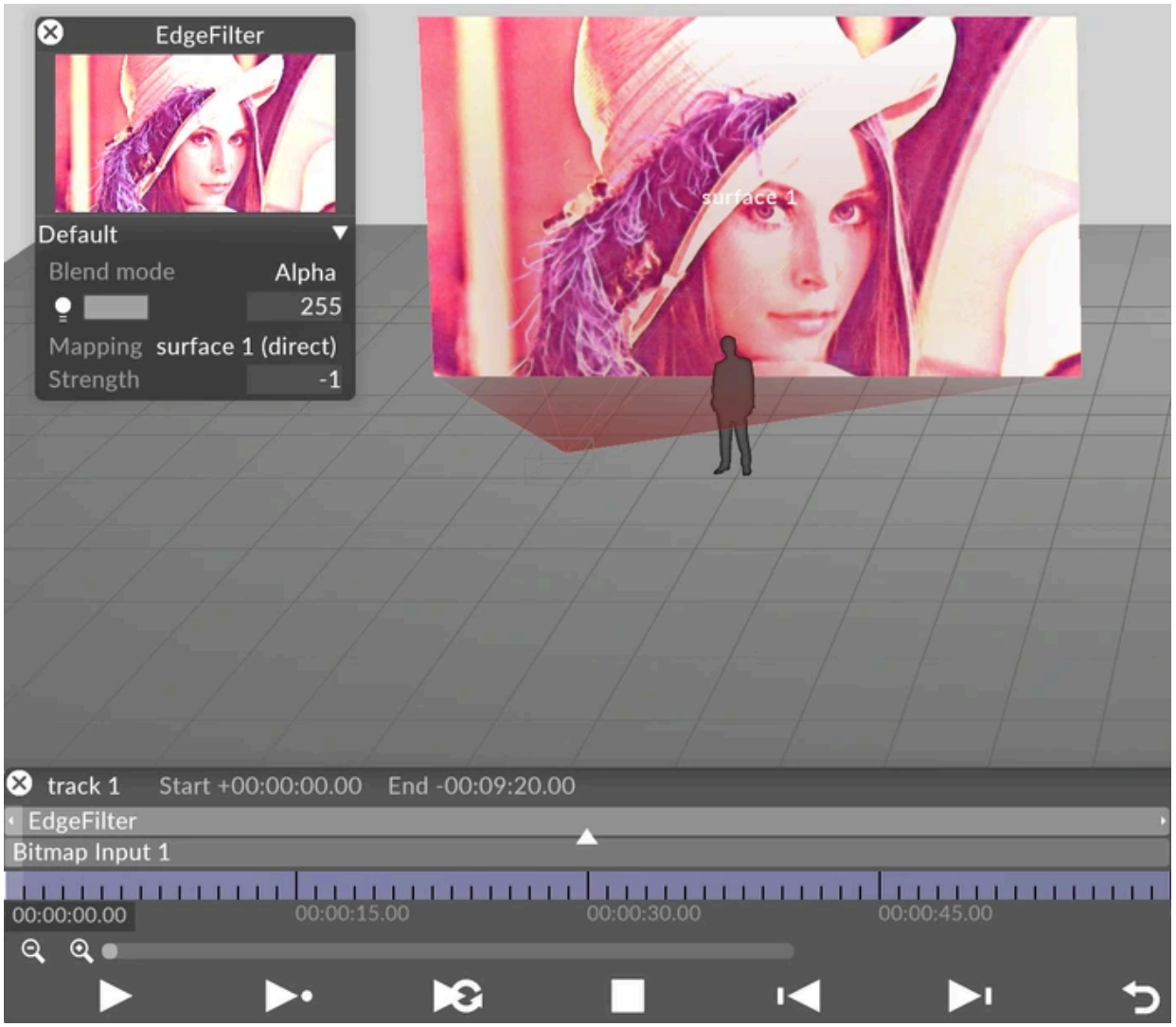
By adjusting the stength parameter you can change how the layer affects the image. Setting the stength to 0 will have no effect. Setting the strength to 1 will highlight the edges and exclude the rest of the image. Setting the strength to -1 will exclude the edges and highlight the rest of the image.



layer set to 0.



layer set to 1.



layer set to -1.

EdgeFilter layer properties

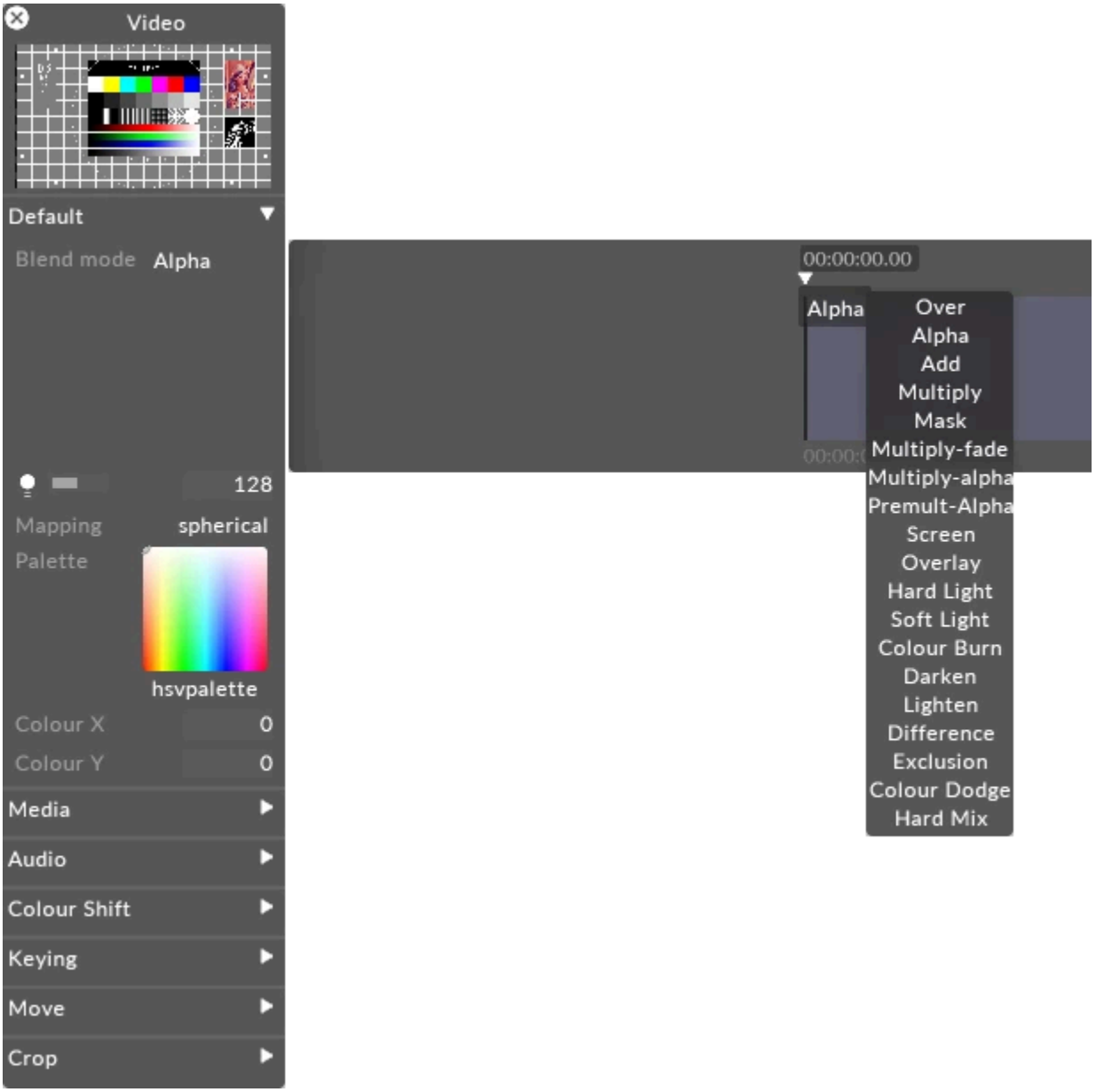
Strength

Strength controls how strong the edge filter is applied.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

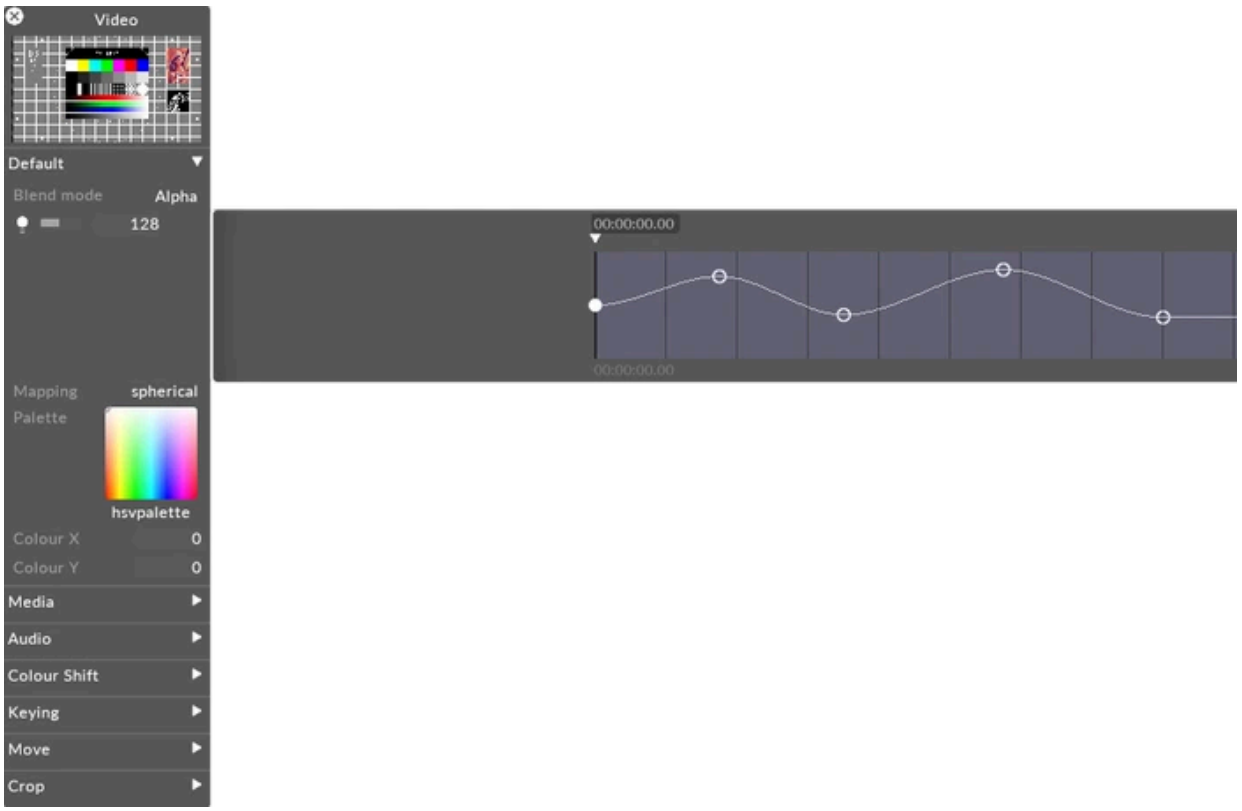
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Effect Layers Overview

Effect Layers can be used to apply visual effects to other layer types such as Video layers.

Types of Effect layers

There are several types of Effect layers available within :

- Blur
- ChannelRouter
- ColourAdjust
- Compose
- EdgeFilter
- Fade
- FilmicGrain
- Kaleidoscope
- Lut
- MotionBlur
- Noise
- OCIO
- PixelMap
- Pixelate
- Scroll
- SpinBitmap
- Trigger
- UVLookup
- VideoTransition

Common Layer Properties

The symbols in the tables below indicate whether a specific layer shares a common property (✔) or not (✘).

Effect Layers Part (i) A - D

	Blur	CDL	Channel Router	Colour Adjust	Compose
Blend modes	✔	✔	✔	✔	✔

	Blur	CDL	Channel Router	Colour Adjust	Compose
Brightness	✓	✓	✓	✓	✓
Mapping	✓	✓	✓	✓	✓
Palette Col-X, Col-Y	✗	✗	✗	✗	✓
Framerate Fraction	✗	✗	✗	✗	✗
Logo Top Left & Right	✗	✗	✗	✗	✗
Dynamic Properties	✗	✗	✗	✗	✗
Indirection Controller	✗	✗	✗	✗	✗
Command (Grouped Conceptually)	✗	✗	✗	✗	✗
Volume	✗	✗	✗	✗	✗
Source Texture from BG	✓	✓	✓	✓	✓

Effect Layers Part (ii) E - N

	Edge Filter	Fade	Filmic Grain	Kaleidoscope	Lut	Motion Blur	Noise
Blend modes	✓	✓	✓	✓	✓	✓	
Brightness	✓	✓	✓	✓	✓	✓	
Mapping	✓	✗	✓	✓	✓	✓	
Palette Col-X, Col-Y	✗	✓	✗	✗	✗	✗	✗
Framerate Fraction	✗	✗	✗	✗	✗	✗	
Logo Top Left & Right	✗	✗	✗	✗	✗	✗	
Dynamic Properties	✗	✗	✗	✗	✗	✗	
Indirection Controller	✗	✗	✗	✗	✗	✗	
Command (Grouped Conceptually)	✗	✗	✗	✗	✗	✗	
Volume	✗	✗	✗	✗	✗	✗	

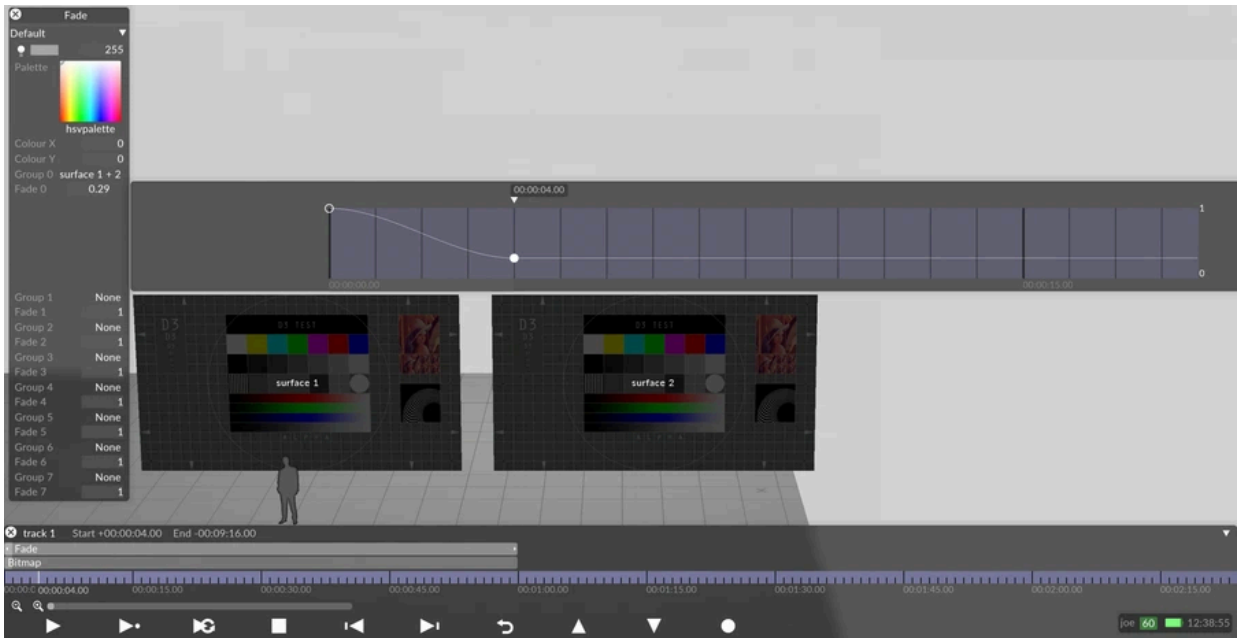
	Edge Filter	Fade	Filmic Grain	Kaleidoscope	Lut	Motion Blur	Noise
Source Texture from BG	✔	✘	✔	✔	✔	✔	

Effect Layers Part (iii) O - Z

	OCIO	Pixel Map	Pixelate	Scroll	Spin Bitmap	Trigger	UV Lookup	Video Transition
Blend modes	✔	✔	✔	✔	✔	✔	✔	✔
Brightness	✔	✔	✔	✔	✔	✔	✔	✔
Mapping	✔	✔	✔	✔	✔	✔	✔	✔
Palette Col-X, Col-Y	✘	✔	✘	✔	✔	✔	✔	✔
Framerate Fraction	✘	✘	✘	✘	✘	✘	✘	
Logo Top Left & Right	✘	✘	✘	✘	✘	✘	✘	
Dynamic Properties	✘	✘	✘	✘	✘	✘	✘	
Indirection Controller	✘	✘	✘	✘	✘	✘	✘	
Command (Grouped Conceptually)	✘	✘	✘	✘	✘	✘	✘	
Volume	✘	✘	✘	✘	✘	✘	✘	
Source Texture from BG	✔	✔	✔	✔	✘	✔	✔	

Fade Layer

The Fade layer allows control of the brightness of all screens within a mapping.



Fade Layer Properties

Group 0..7

The mapping to use as the group.

Fade 0..7

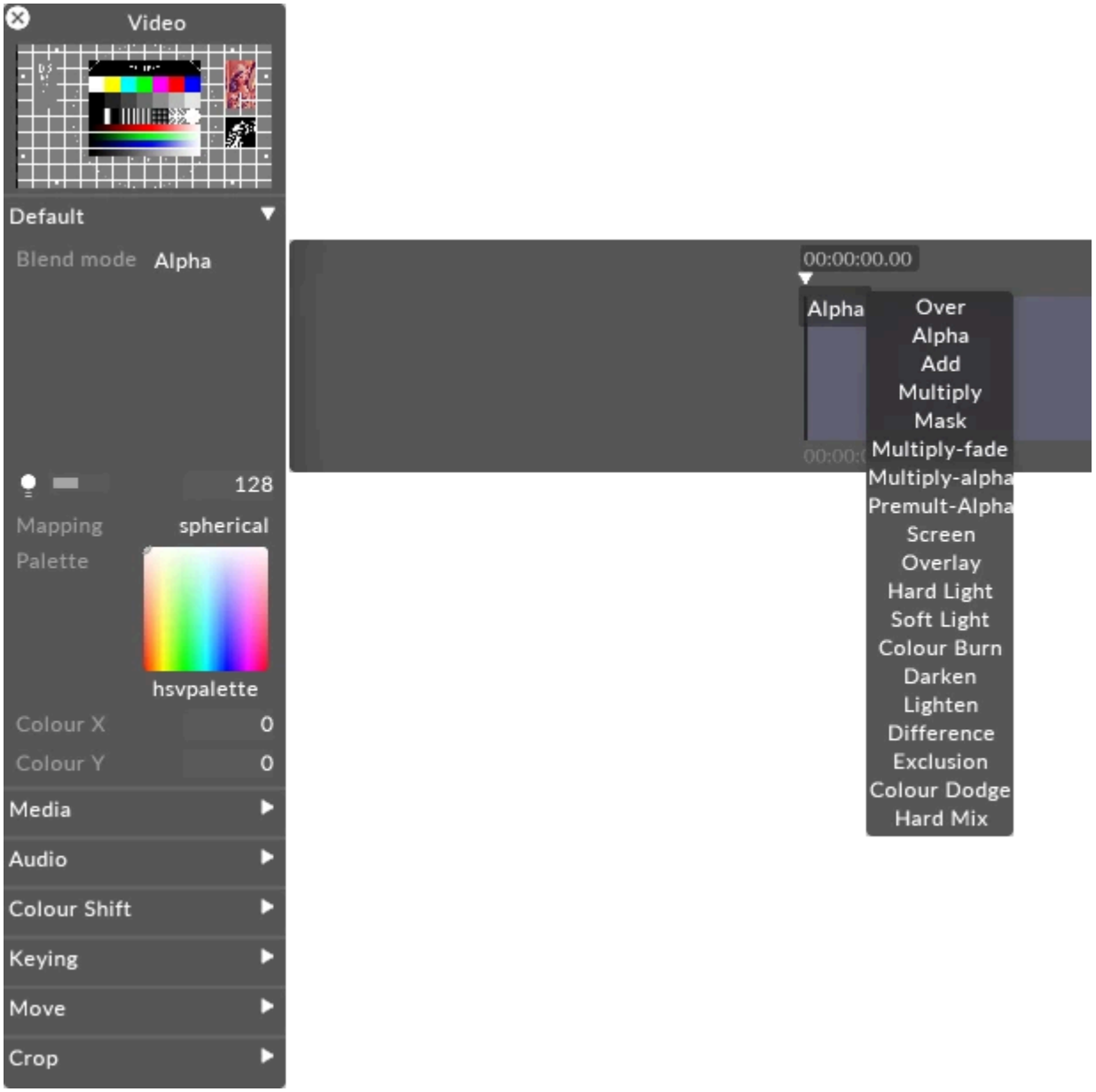
The brightness of all layers outputting to the mapping. 0 is black, 1 is maximum brightness. The example above shows the Fade layer being used to fade the brightness of two screens.

Colour x, colour y, and fade are applied to all screens within all groups.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

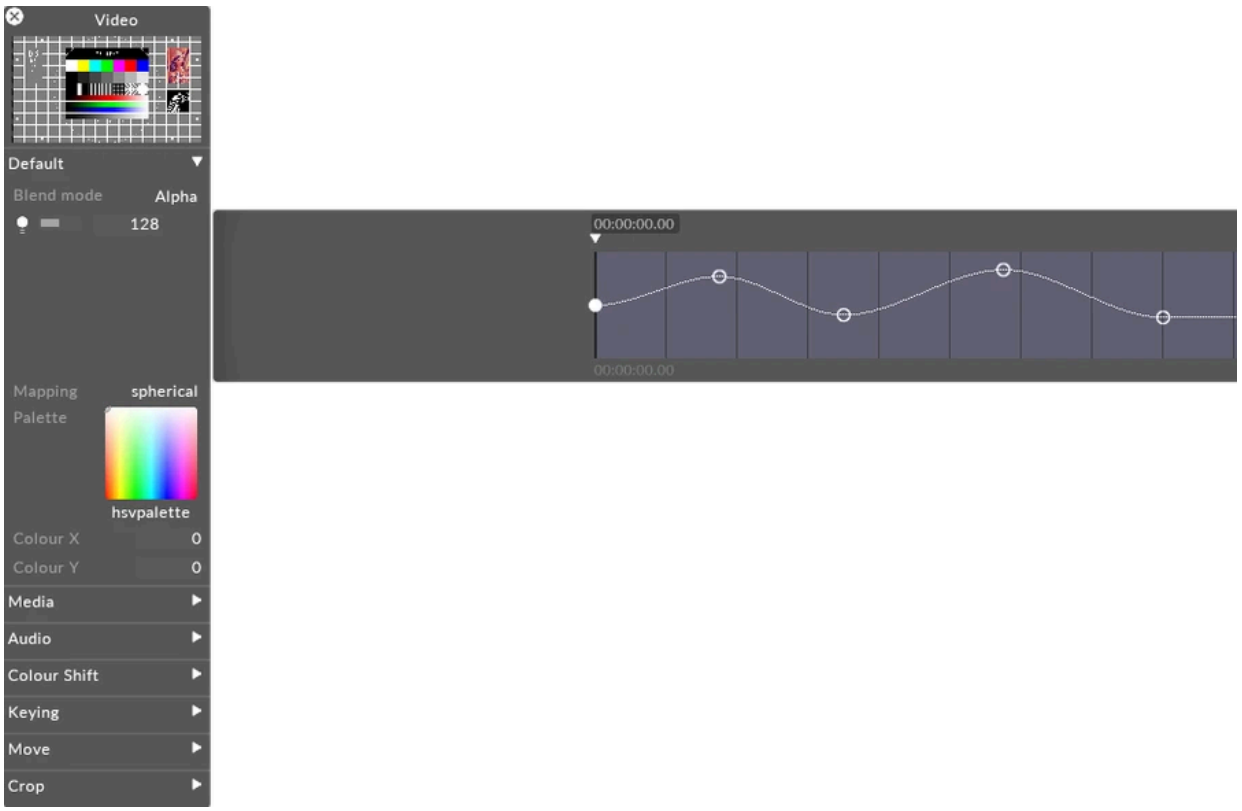
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

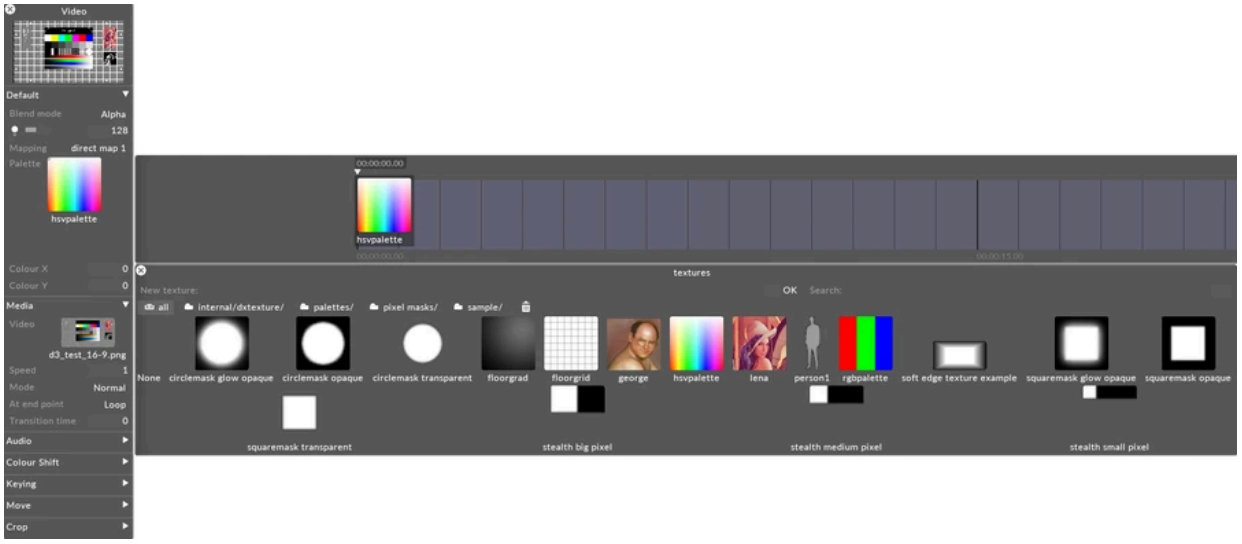


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

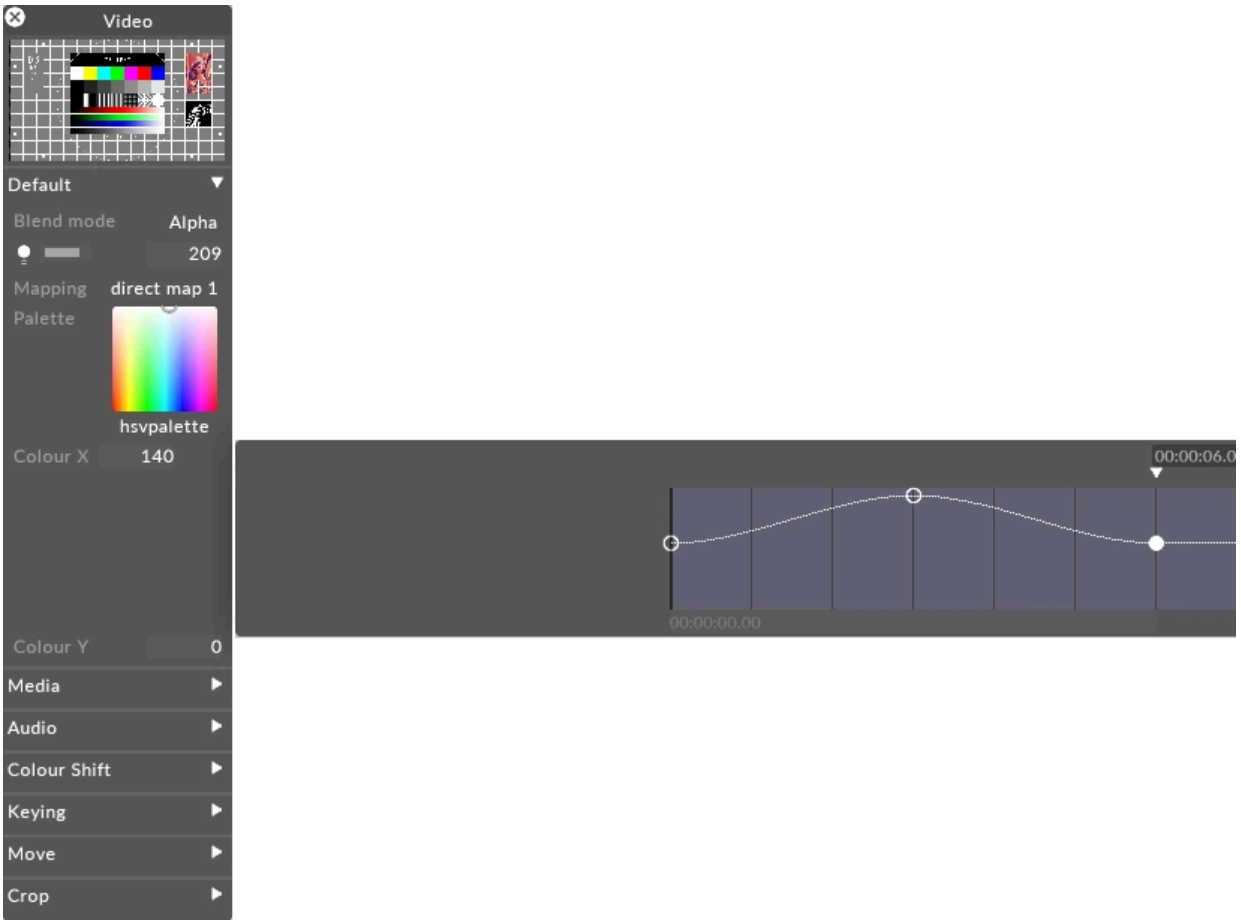
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

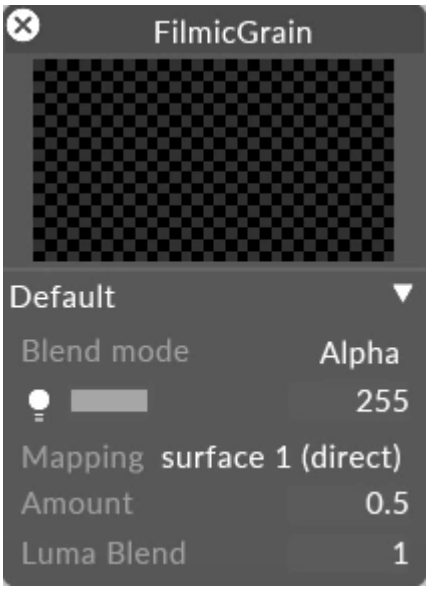
edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



FilmicGrain Layer



The FilmicGrain layer is designed to add animated, film grain style noise to a piece of content.

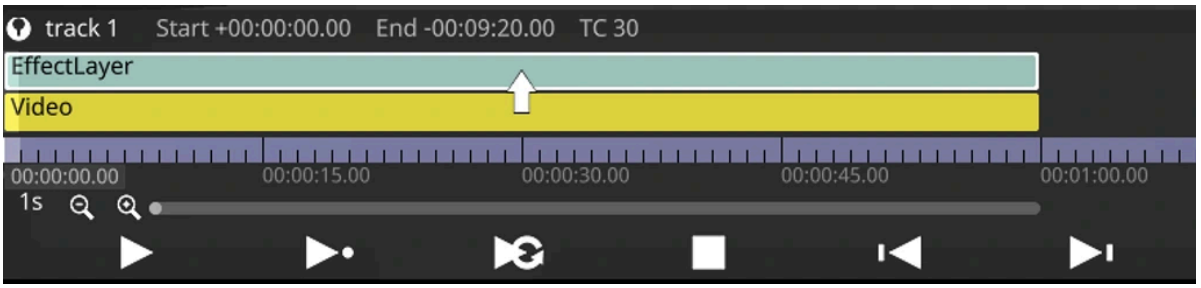
Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.

2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

FilmicGrain Layer Properties

Amount

This property controls the amount grain added to the original content.

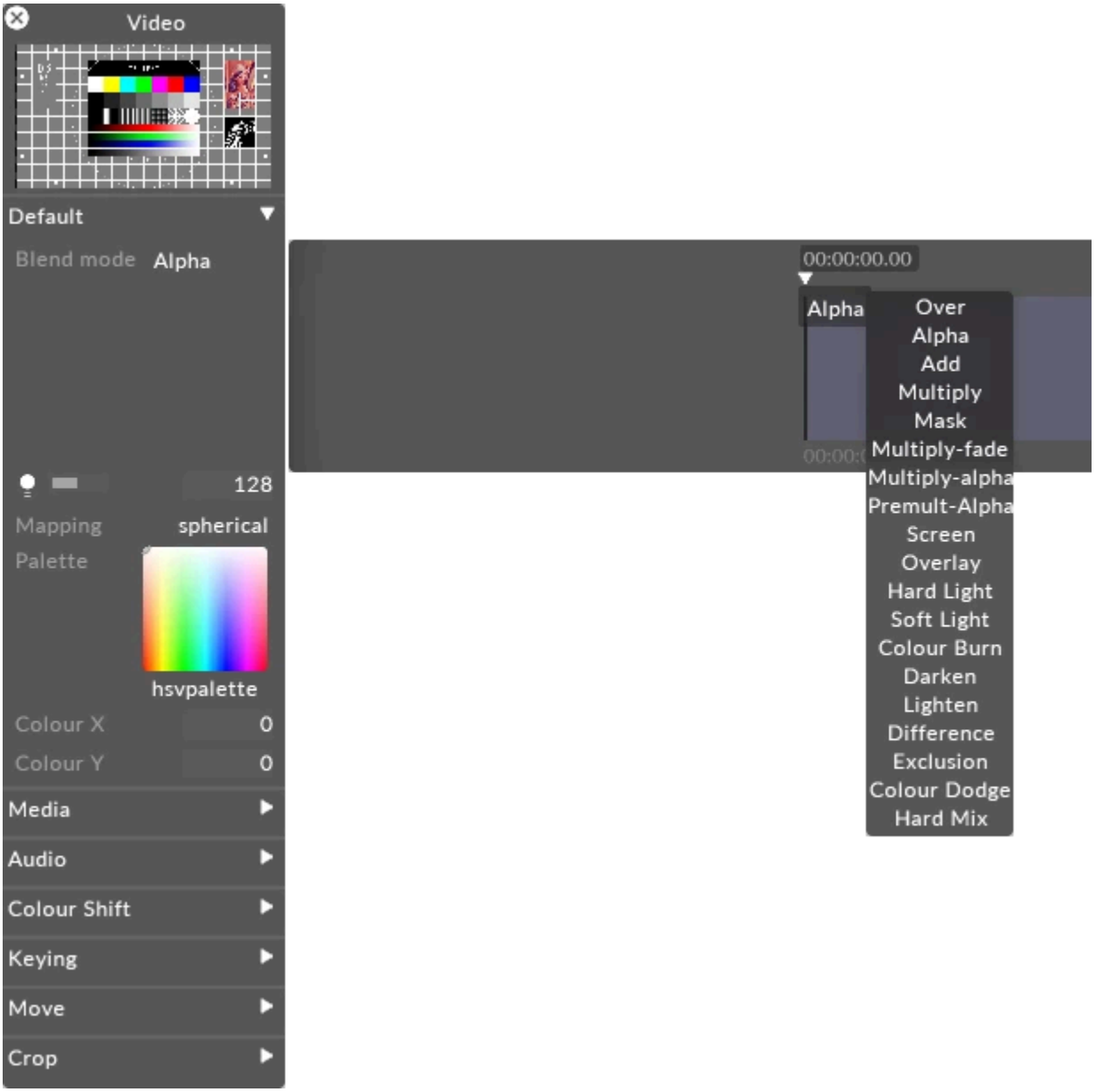
Luma blend

This property controls the Luma blend. The Luma controls whether the grain is applied to the mid tones only and not applied in bright highlights. In other words, if it is white, there will be no grain whereas if it is very dark content then it will have lots of grain.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

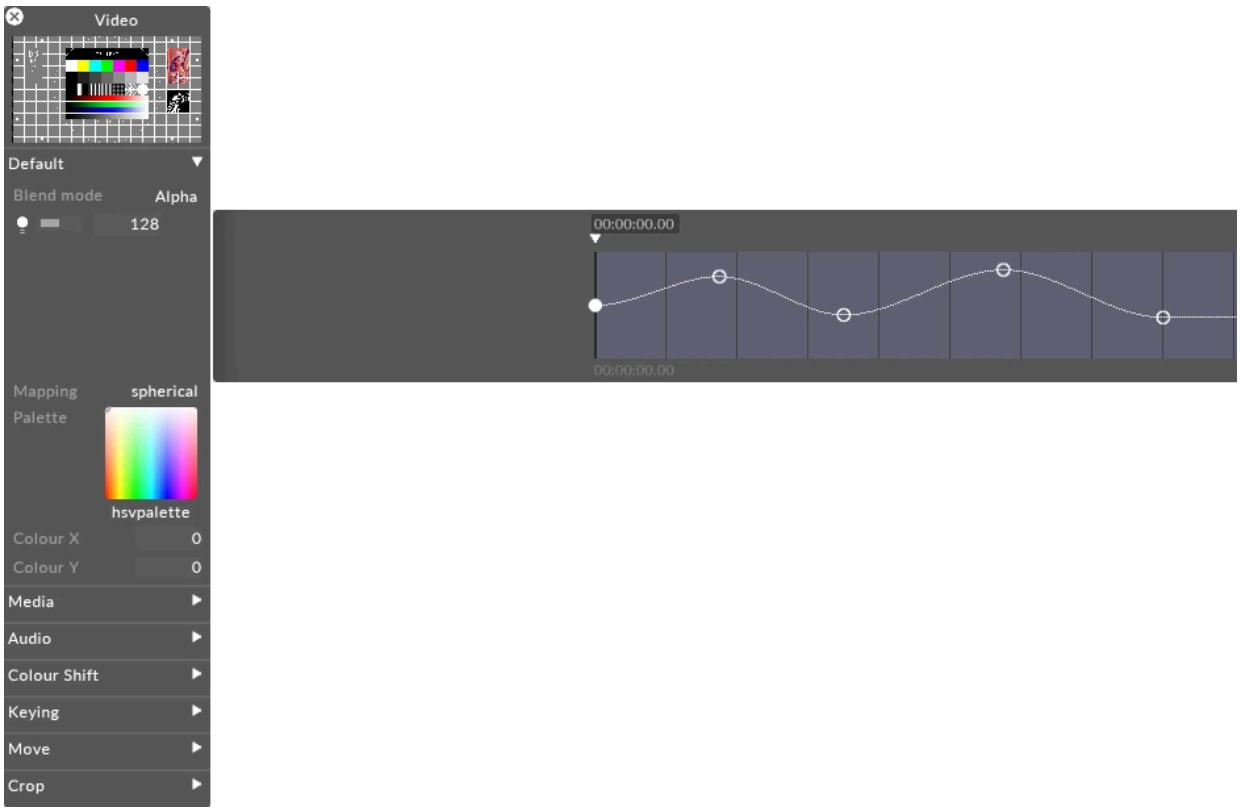
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Kaleidoscope Layer

The effect layer can be used to create style patterns when it is composed with another content layer.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
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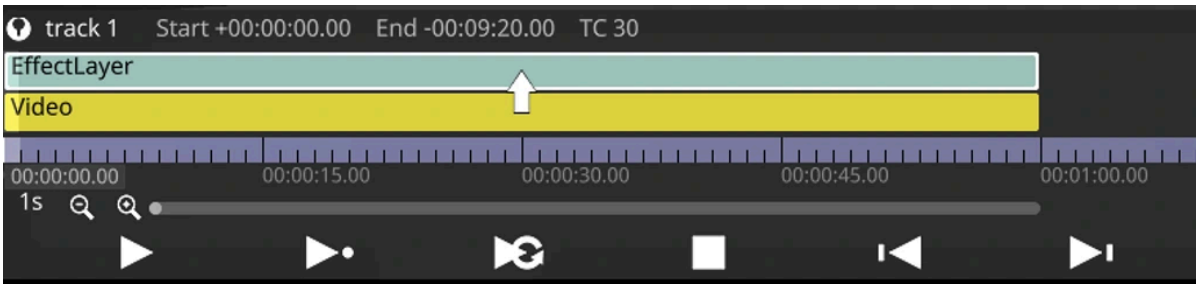
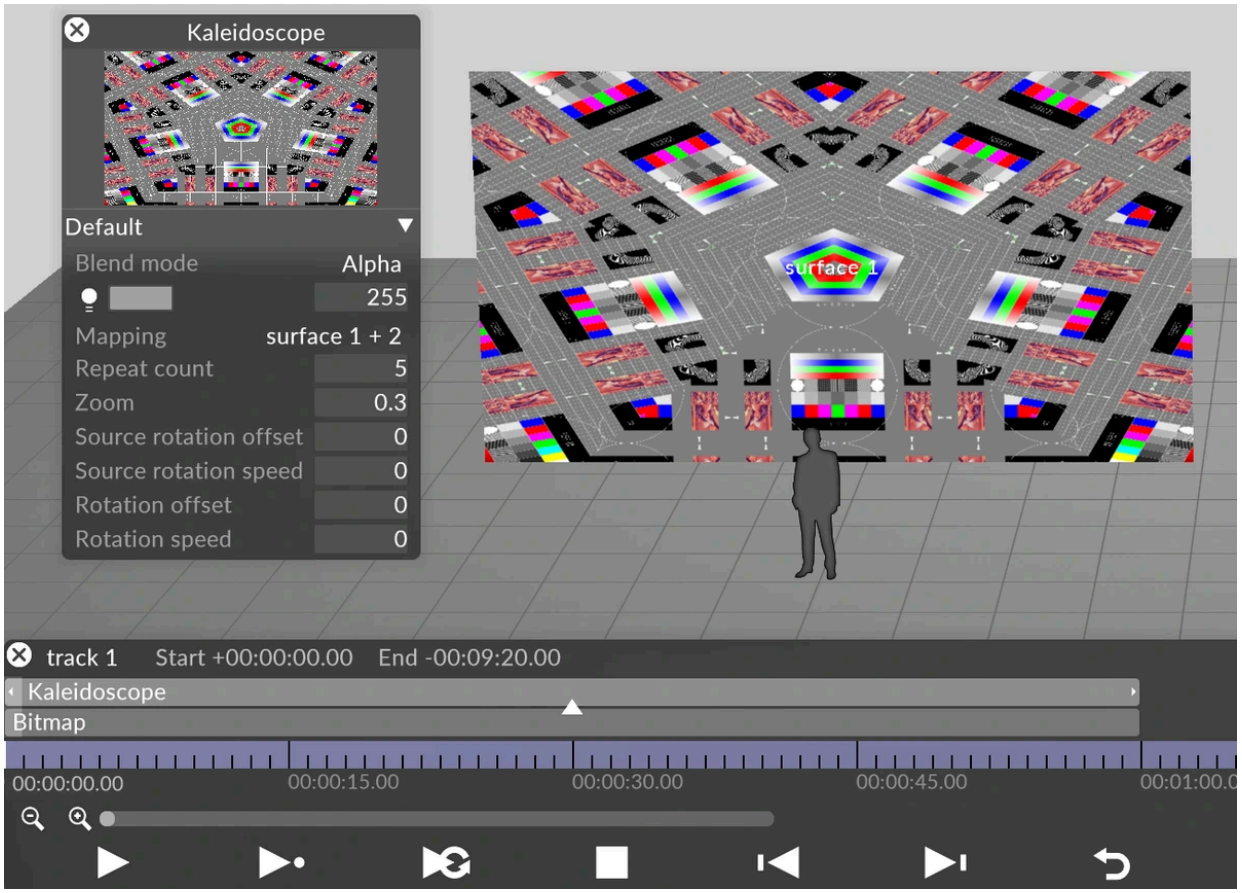


A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Kaleidoscope Layer Properties



Repeat count

The number of times the content is repeated in the pattern

Zoom

Increase value to zoom in on the content

Source rotation offset

Increase value to rotate the content offset

Source rotation speed

The speed of the rotation of the content

Rotation offset

The rotation offset for the kaleidoscope effect

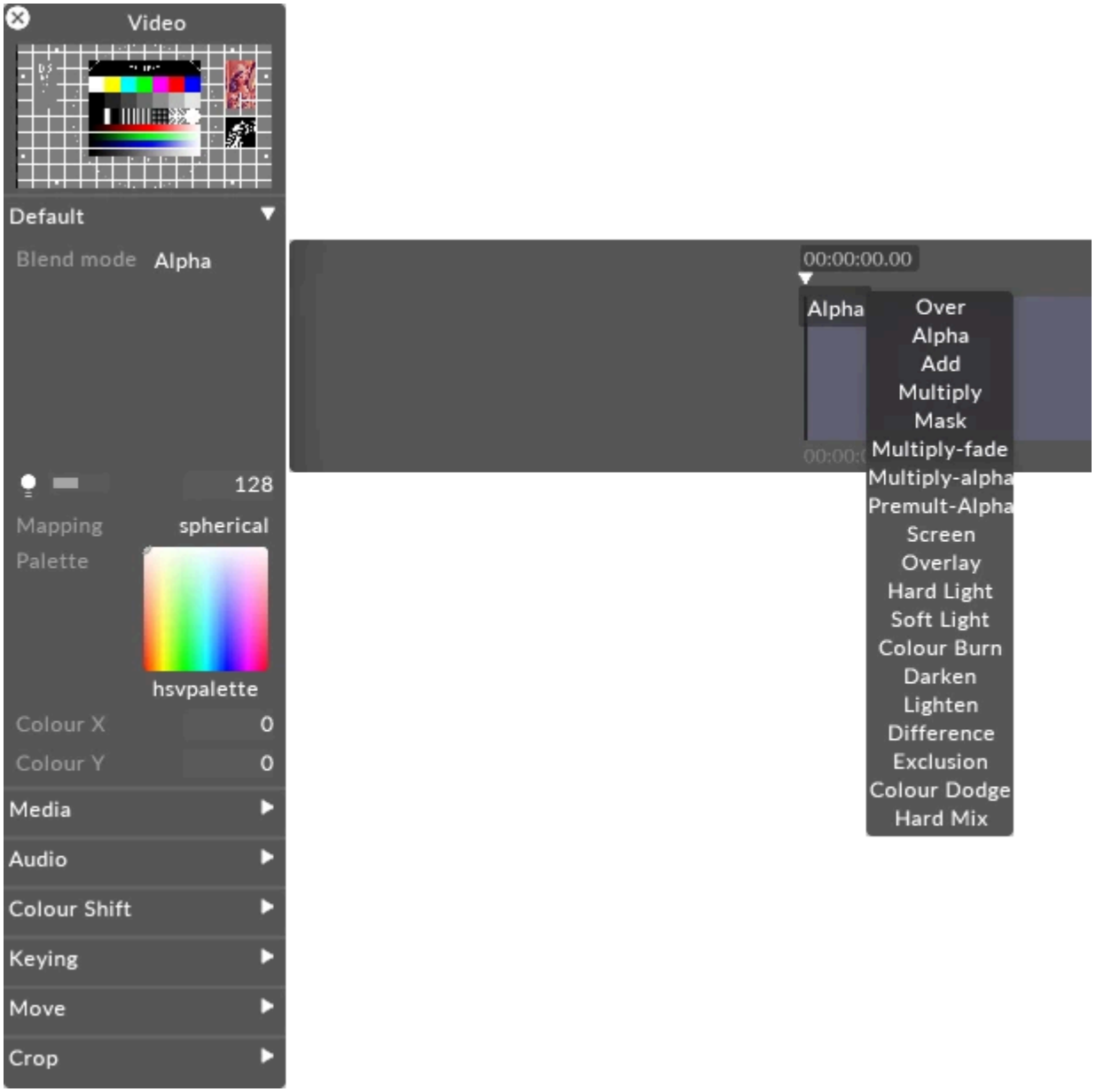
Rotation speed

The rotation speed of the kaleidoscope effect

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

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Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

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Colour Burn

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Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

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Soft Light

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Darken

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Lighten

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Difference

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Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

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Hard Mix

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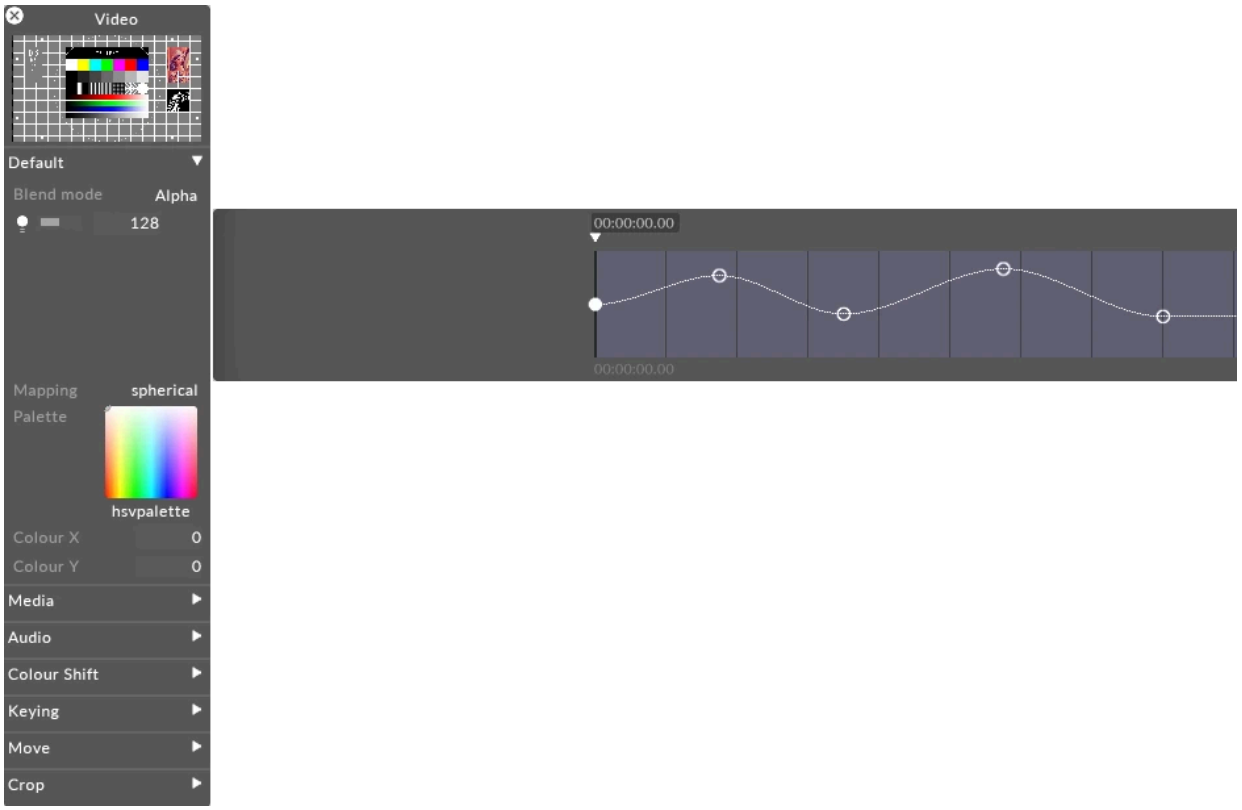
Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the

next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

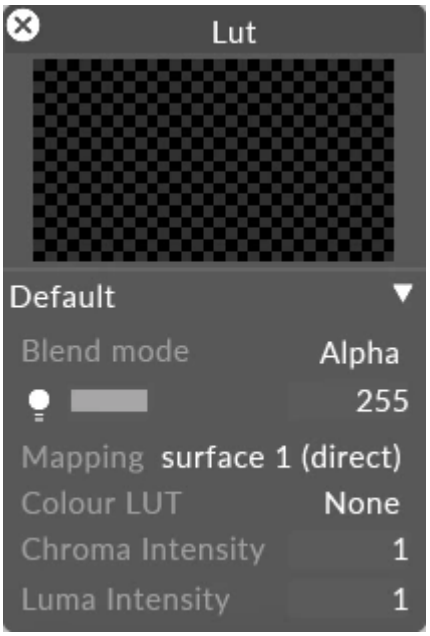
Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

LUT Layer



The Lut layer is designed to create movie style looks & for technical Luts to support conversion workflows. Lut files are commonly created and exported from image editing programs and have a .cube file extension.

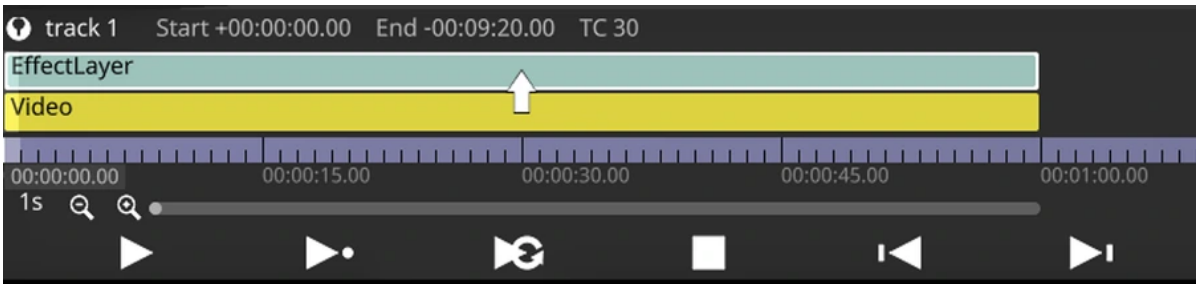
Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.

2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.

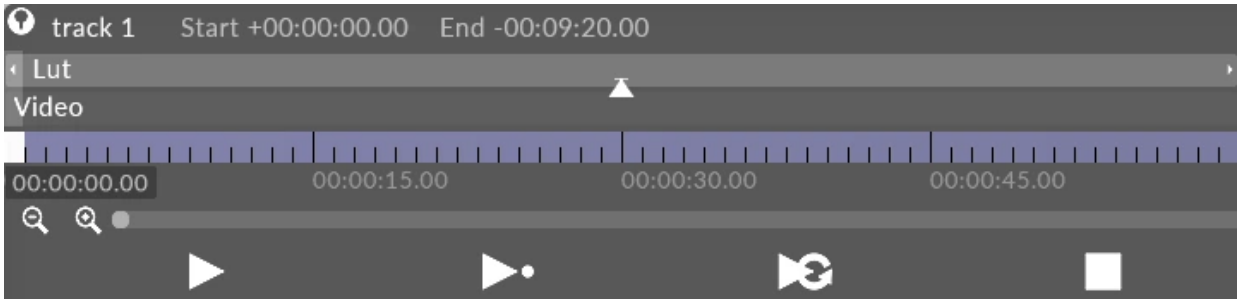


A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Configure LUT

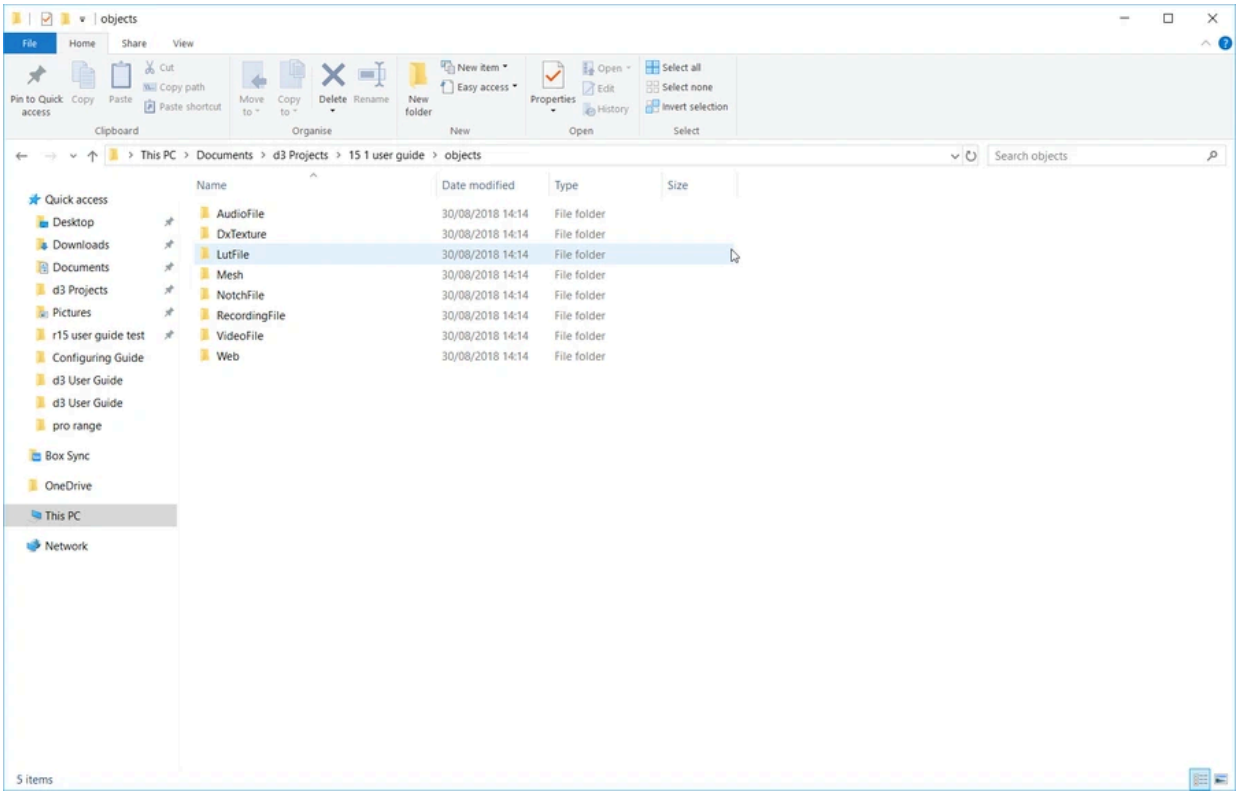
1. Add your Lut files to the LutFile folder inside your project folder. The LutFile folder is contained within the Objects folder. For more information see placing media files.
2. Add a Lut layer to your track. For more information about adding layers see creating layers.
3. Arrow from your media layer to the Lut layer so the compositing order looks something like the following image. Video layer piped into a Lut layer on the timeline.
4. Adjust the Lut layer properties to suit your desired sequencing.

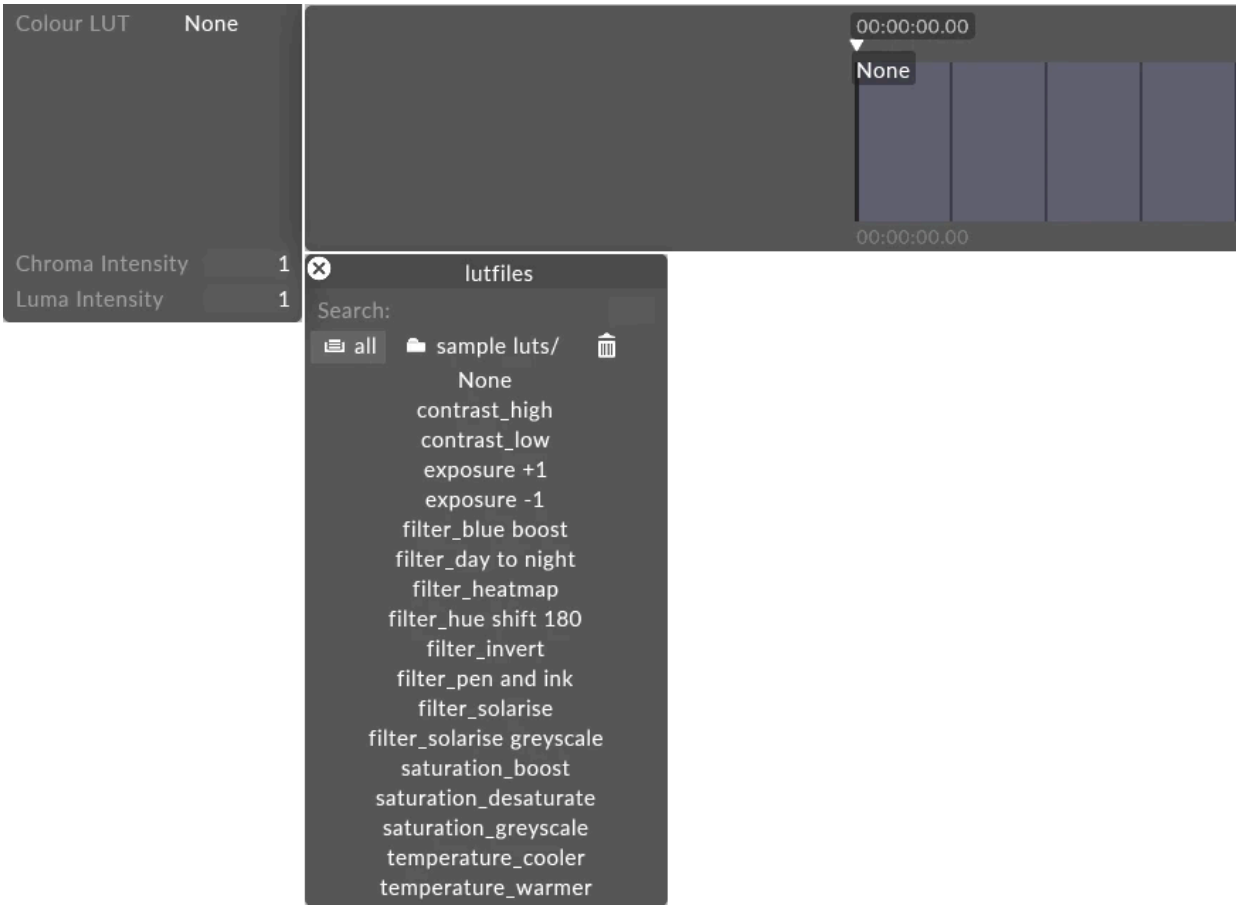


LUT Layer Properties

Colour LUT

This property allows you to select a lut file from the project folder. Lut files live in a specified folder inside the Objects folder. For more information see Project Structure.


objects
File
Home
Share
View
Pin to Quick access
Copy
Paste
Cut
Copy path
Paste shortcut
Clipboard
Move to
Copy to
Delete
Rename
Organise
New folder
New item
Easy access
New
Properties
Open
Edit
History
Open
Select all
Select none
Invert selection
Select
This PC > Documents > d3 Projects > 15 1 user guide > objects
Search objects
Quick access
Desktop
Downloads
Documents
d3 Projects
Pictures
r15 user guide test
Configuring Guide
d3 User Guide
d3 User Guide
pro range
Box Sync
OneDrive
This PC
Network
Name
Date modified
Type
Size
AudioFile 30/08/2018 14:14 File folder
DxTexture 30/08/2018 14:14 File folder
LutFile 30/08/2018 14:14 File folder
Mesh 30/08/2018 14:14 File folder
NotchFile 30/08/2018 14:14 File folder
RecordingFile 30/08/2018 14:14 File folder
VideoFile 30/08/2018 14:14 File folder
Web 30/08/2018 14:14 File folder
5 items


Colour LUT
None
Chroma Intensity
1
Luma Intensity
1
00:00:00.00
None
00:00:00.00
lutfiles
Search:
all
sample luts/
None
contrast_high
contrast_low
exposure +1
exposure -1
filter_blue boost
filter_day to night
filter_heatmap
filter_hue shift 180
filter_invert
filter_pen and ink
filter_solarise
filter_solarise greyscale
saturation_boost
saturation_desaturate
saturation_greyscale
temperature_cooler
temperature_warmer

Chroma intensity

This property controls the chroma intensity. If the Chroma intensity is at 0, then the content is using the original chroma, whereas if it is at 1 its the chroma specified in the lut file. You can alter the max value by right-clicking the property which will simply multiply the original Chroma value by the new max value.

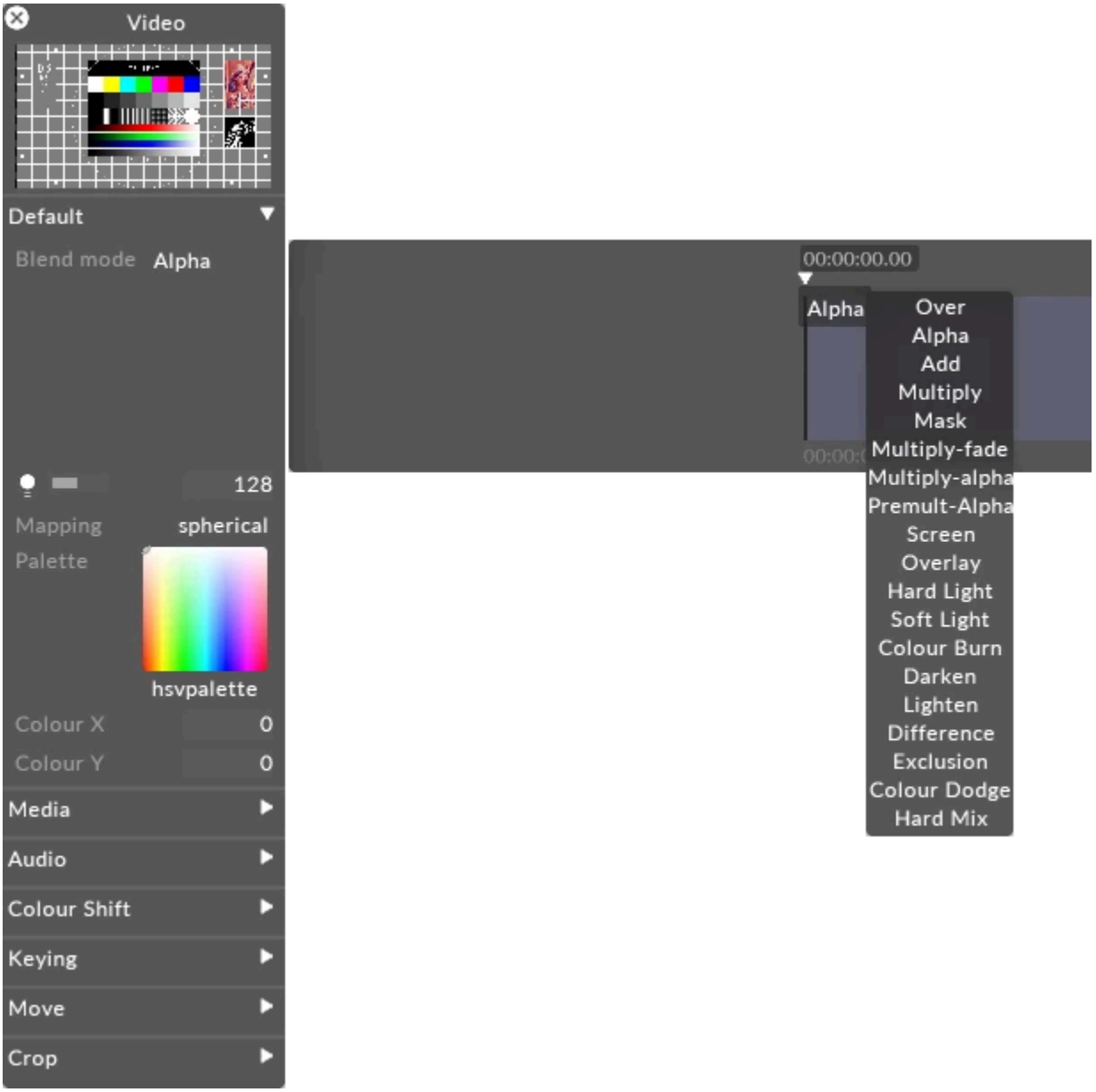
Luma intensity

This property controls the Luma intensity. If the Luma intensity is at 0 then the luminosity will be the same as the original content, where as if it is at 1 then it will be the Luma specified in the lut file. You can alter the max value by right-clicking the property which will simply multiple the original Luma value by the new max value.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

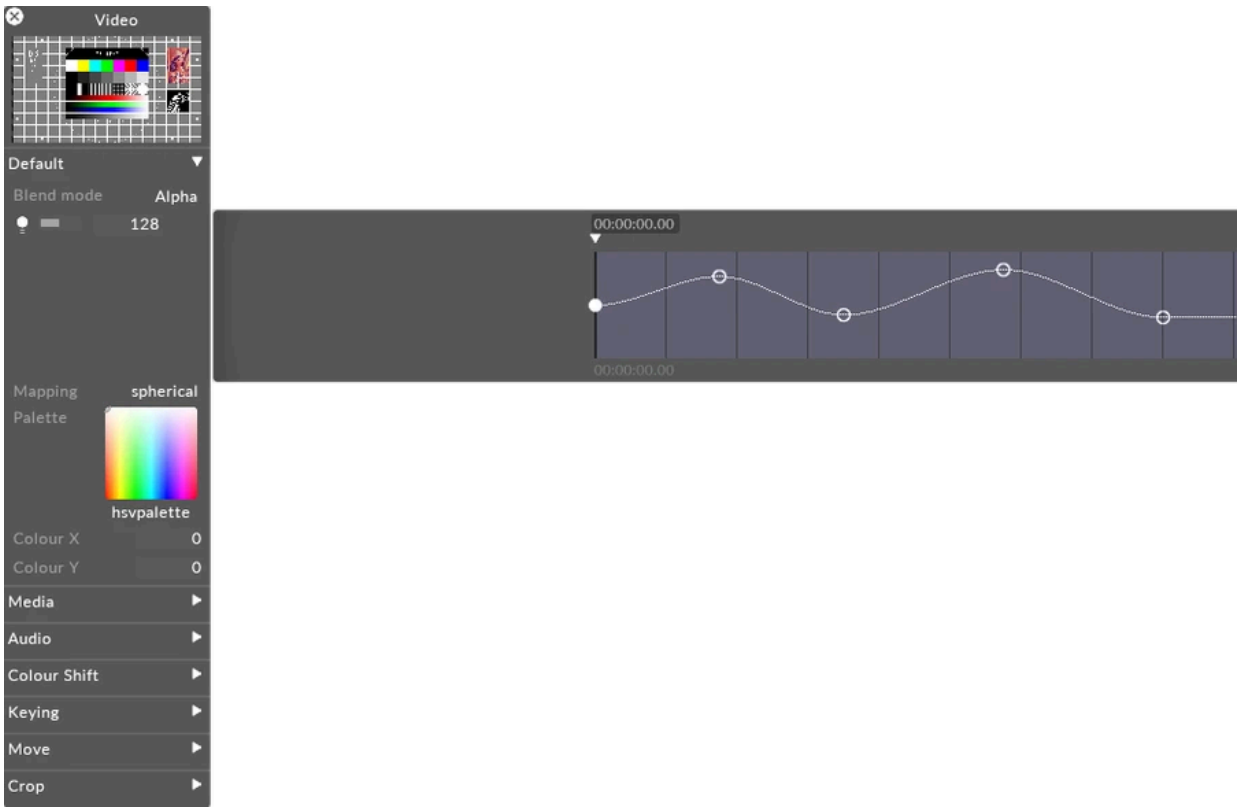
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

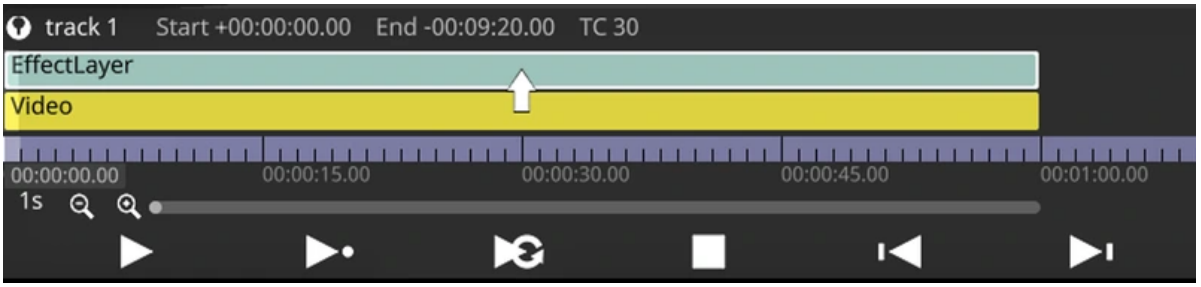
MotionBlur Layer

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the compositing layers topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

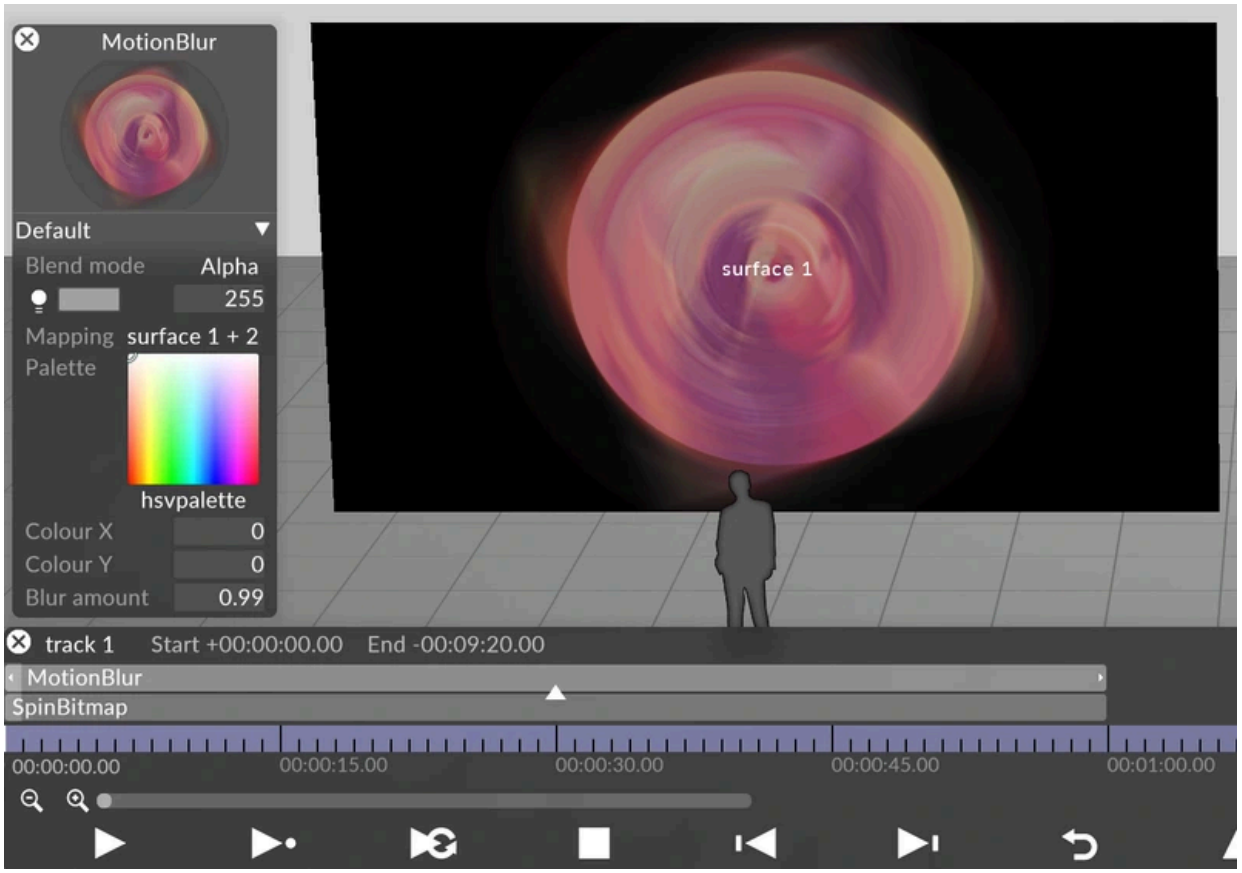
1. Add an Effect layer to your track. For more information about adding layers, see creating layers.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

MotionBlur Layer Properties



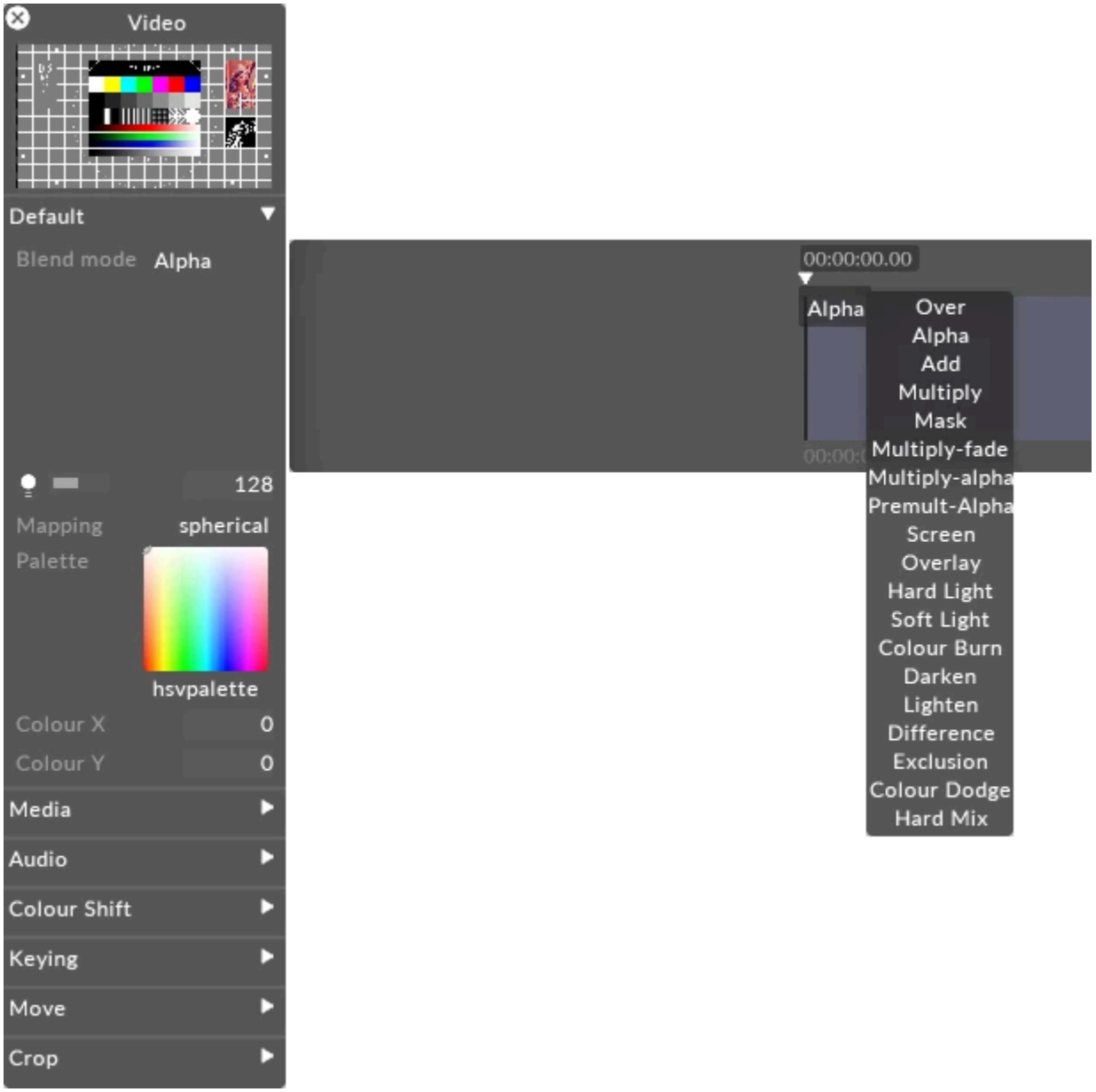
Blur amount

The amplitude of the blur effect. Default value is 0.5. The min/max values are 0 and 1. Decreasing the value from 0.5 to 0 will sharpen the content, whilst increasing the value from 0.5 to 1 will gradually amplify the blurriness of the content.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

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Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

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Colour Burn

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Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

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Soft Light

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Darken

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Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

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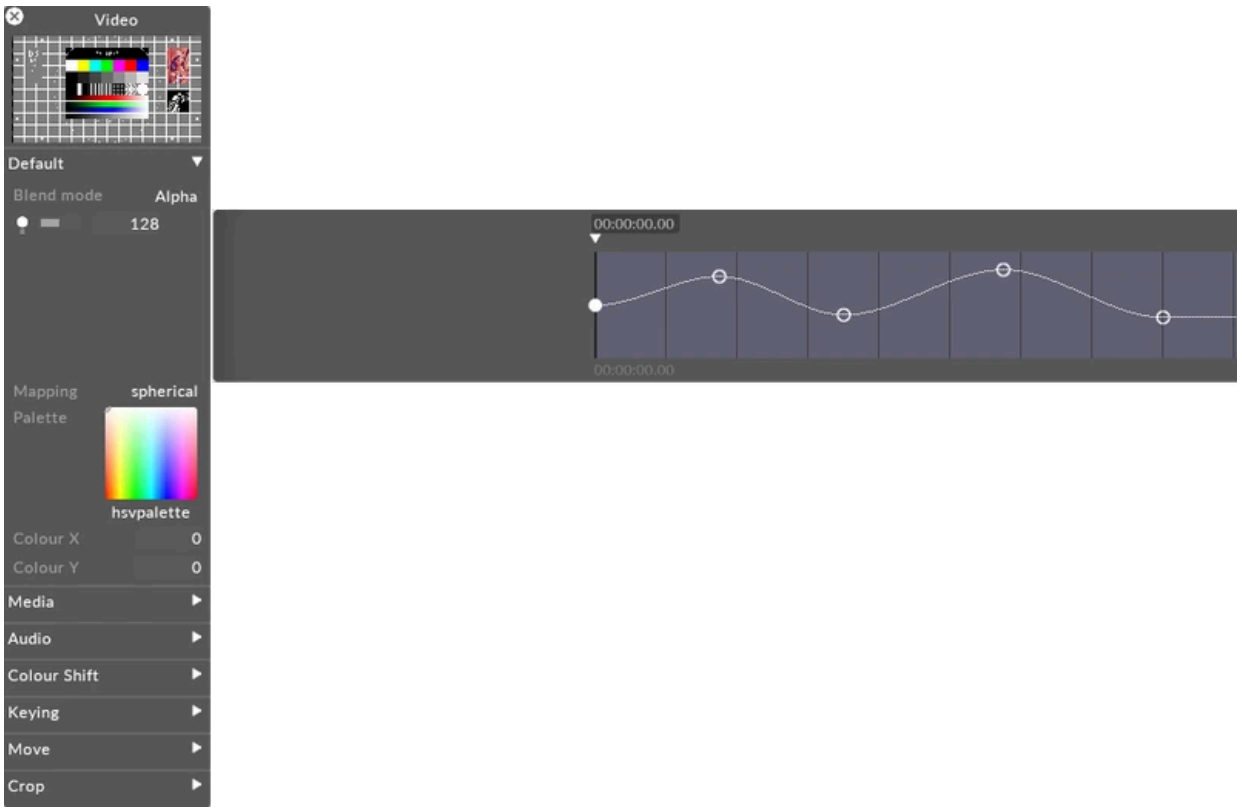
Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

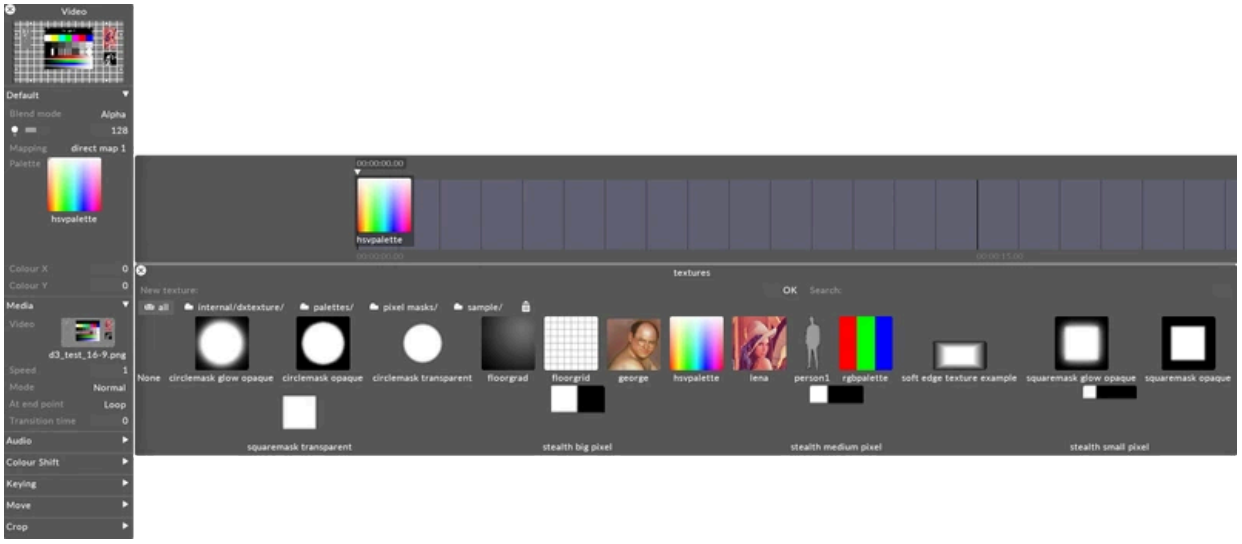


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

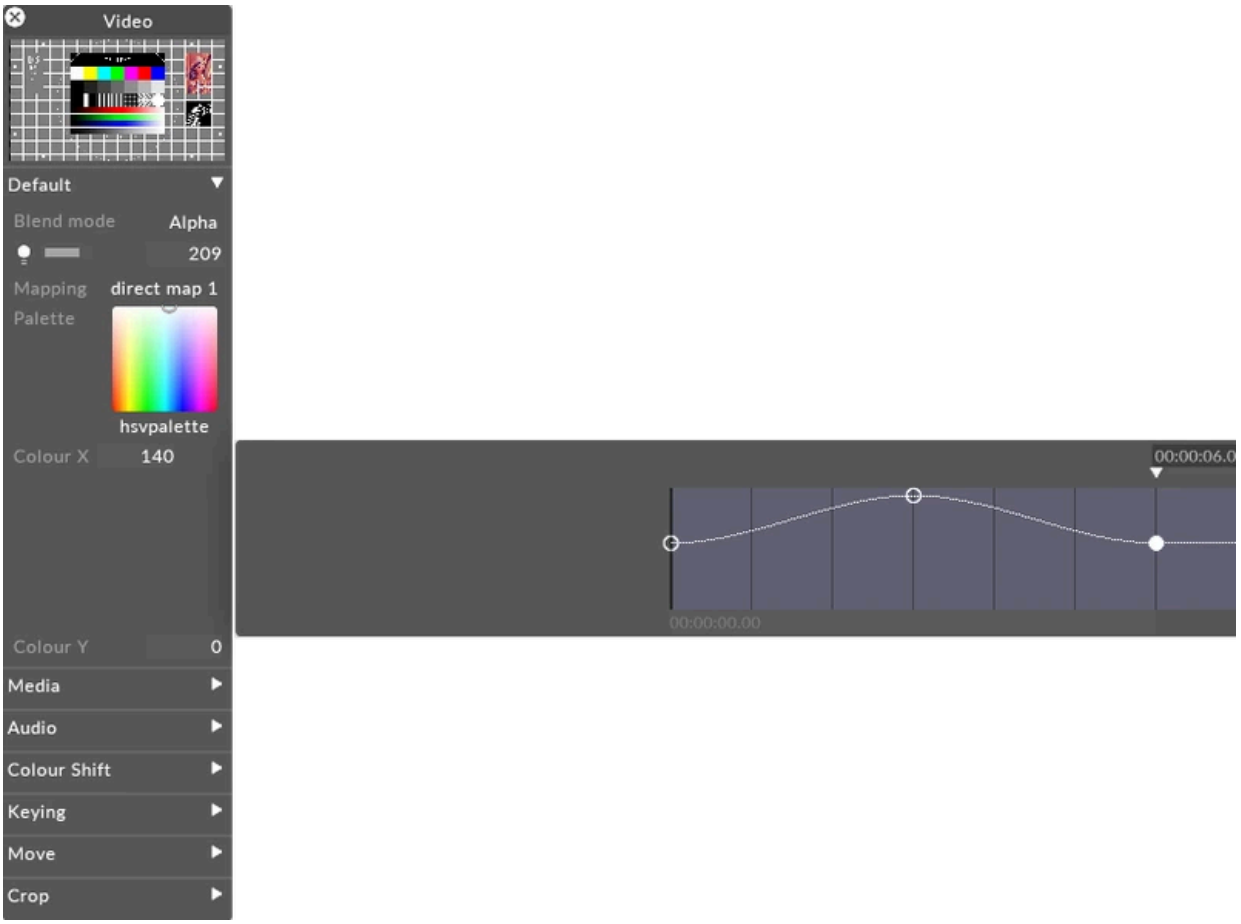
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Noise Layer

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the compositing layers topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see creating layers.
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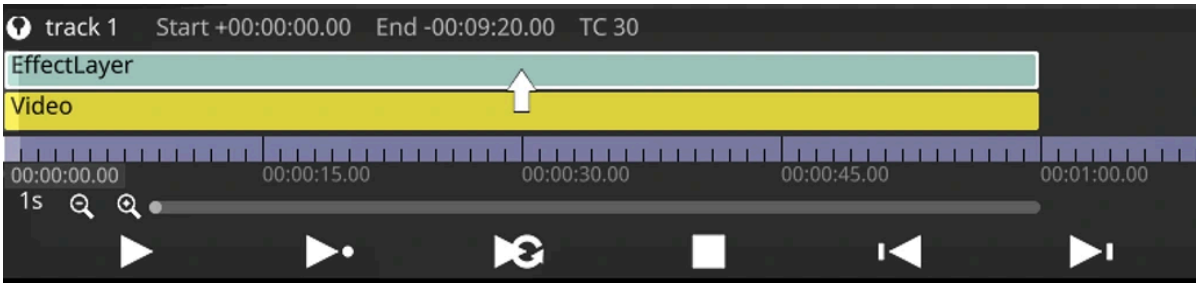
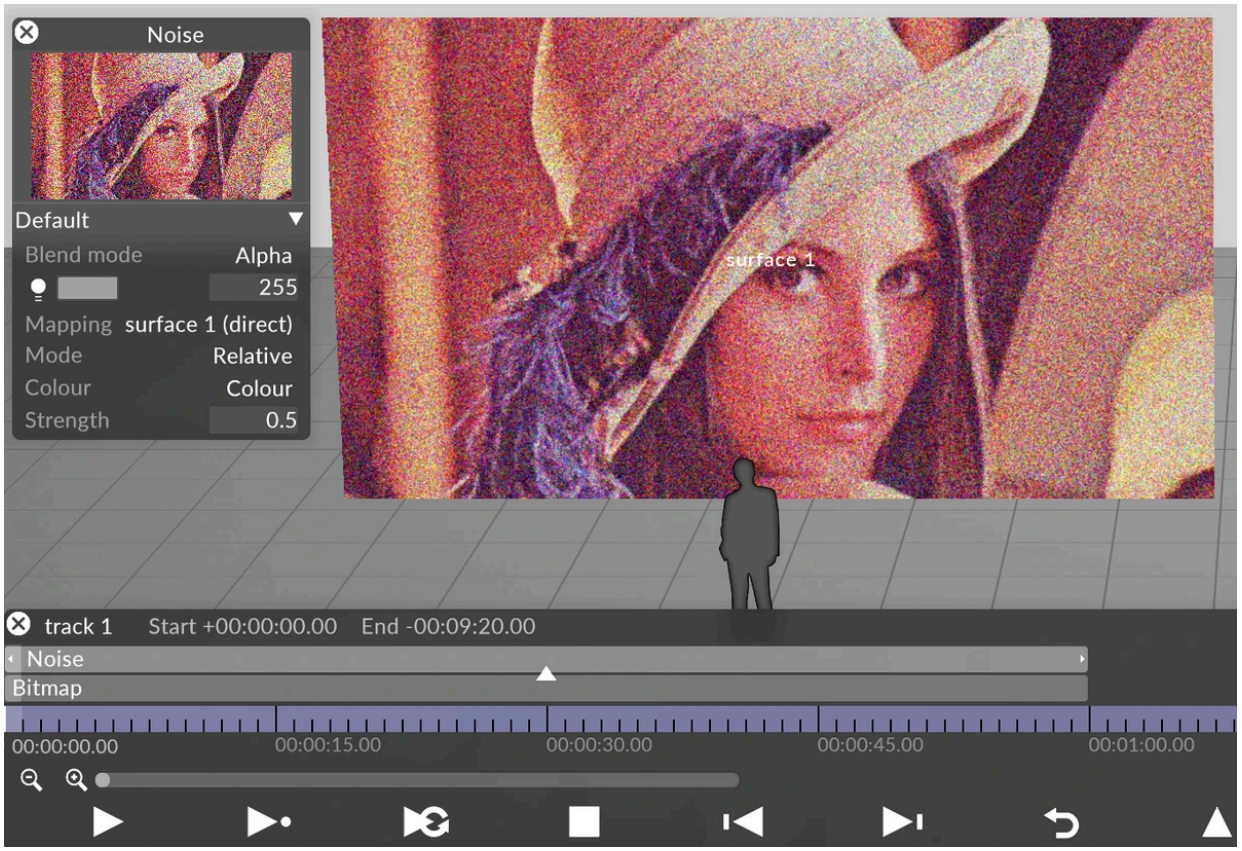


A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Noise Layer Properties



Mode

- **Relative**
- **Absolute** - Noise value is added to the source image

Colour

- **Colour** - Noise is composed of random colour values
- **Greyscale** - Noise is composed of random greyscale values

Strength

Adjust the strength of the noise

Common Layer Properties

Blend Mode

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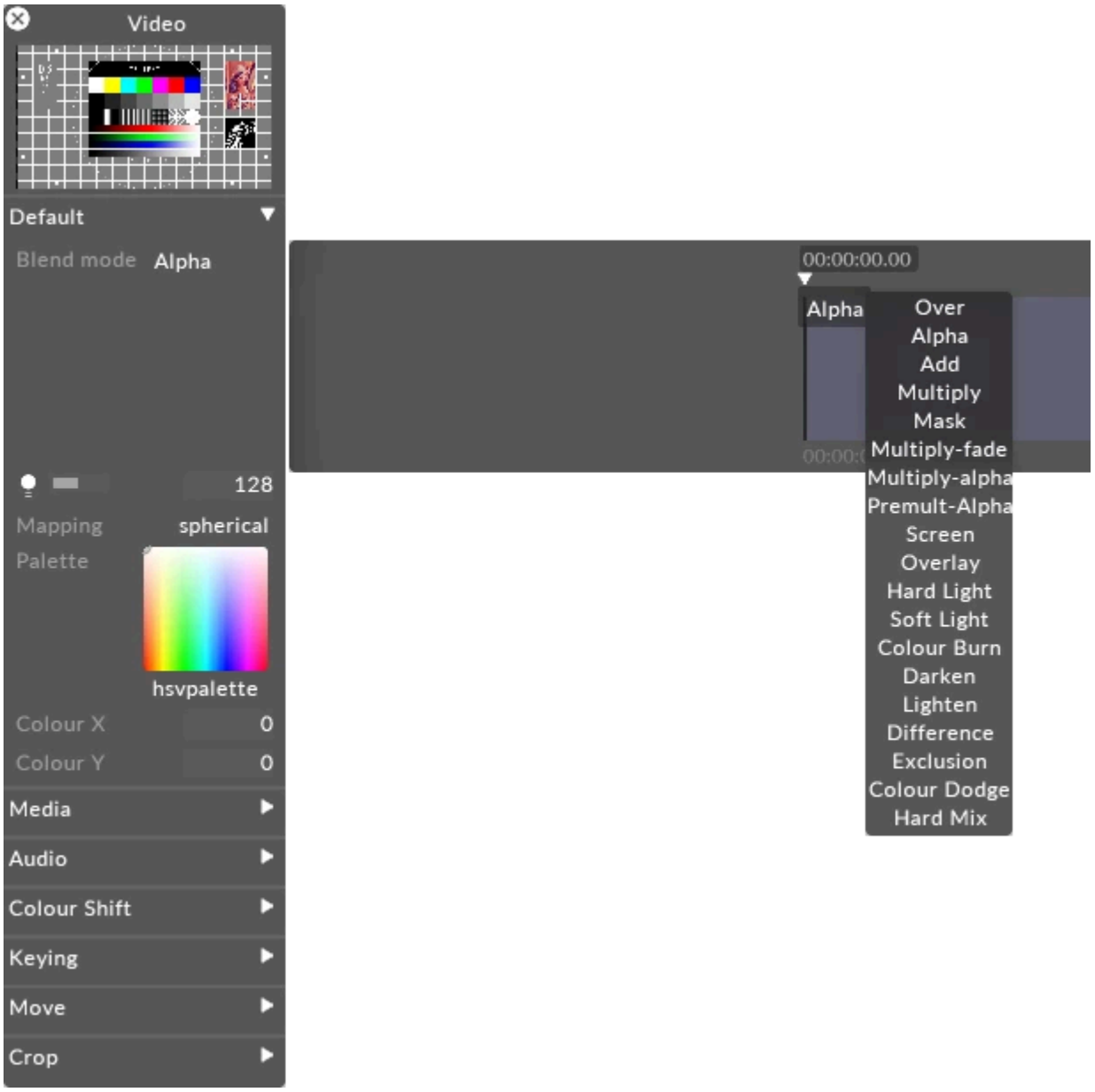

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Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

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Colour Burn

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Overlay

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Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

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Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

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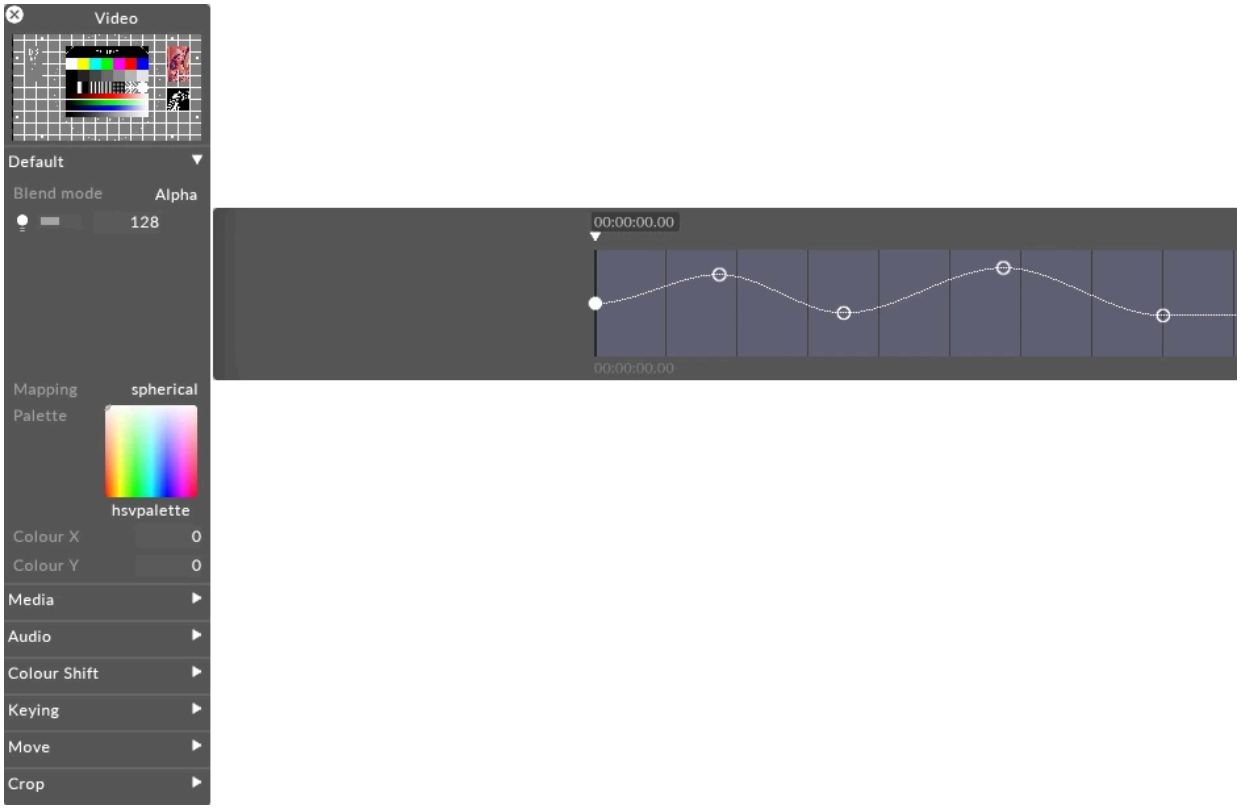
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
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> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

OCIO Layer

The OCIO layer is an effect layer that applies a stacked list of OCIO transforms in an optimised manner. All supported OCIO transform types can be created, configured, and stacked to achieve a customised colour pipeline as needed.

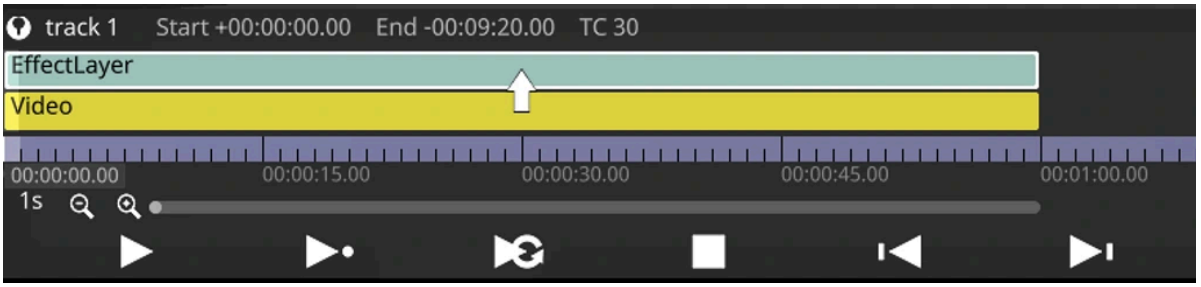
> **Note**
>
> For most simple cases we recommend using the standard OCIO workflow with an OCIO field on each component (e.g. **Input transform** in Video layer or **Output transform** in Display). See OCIO for further details.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

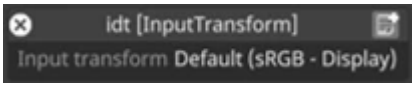
3. Adjust the Effect layer properties to achieve the desired result.

OCIO layer properties

OCIO transforms

The list of OCIO transforms to define the colour pipeline can be configured here. The order of the transforms matters, and it is bottom-to-top (the bottom of the list is applied first, and the top of the list is applied last). Each transform shows the order by index number as a prefix of the transform name, and the transform type is added as a postfix (e.g. `1. myTransform [ColourTransform]`). The transform is a `Resource` type, so you can create one and reuse it across other OCIO layers. Stacking duplicate OCIO transform resources in the OCIO layer is also allowed.

InputTransform



InputTransform applies a colour transform from the selected **Input transform** colour space into the currently selected **Working space** in the OCIO config (see OCIO Configs).

- **Input transform**: the source colour space to transform from.

OutputTransform



OutputTransform applies a colour transform from the currently selected **Working space** into the selected **Output transform** colour space in the OCIO config (see OCIO Configs).

- **Output transform**: the destination colour space to transform to.

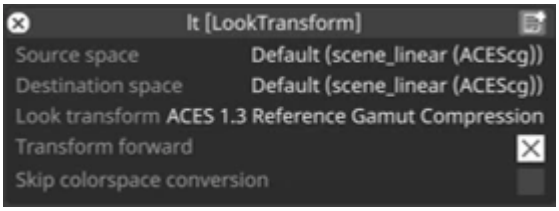
ColourSpaceTransform



ColourSpaceTransform applies a colour transform from the **Source colour space** to the **Destination colour space**.

- **Source colour space**: the source colour space to transform from.
- **Destination colour space**: the destination colour space to transform to.

LookTransform

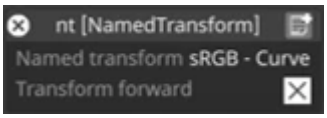


LookTransform applies a creative colour transform using a defined **look** from the OCIO config file. A look modifies the appearance of an image in a creative way, rather than performing a technical colour space conversion. It typically works alongside a viewing transform. For example, a look could be a neutral grade applied to film scans before VFX work, or a per-shot grade chosen by the director.

> See: OCIO's Looks Example

- **Source space**: source colour space to transform from.
- **Destination space**: destination colour space to transform to.
- **Look transform**: look transform to apply.
- **Transform forward**: transform from source space to destination if enabled, reversed direction if disabled.
- **Skip colourspace conversion**: skip the colour space transform if enabled.

NamedTransform



NamedTransform provides a set of colour transforms that are independent of the colour space being processed. For example, a utility curve transform where there is no need to convert to or from a reference space.

- **Named transform**: the named transform to apply.
- **Transform forward**: apply transform forward if enabled, inverted if disabled.

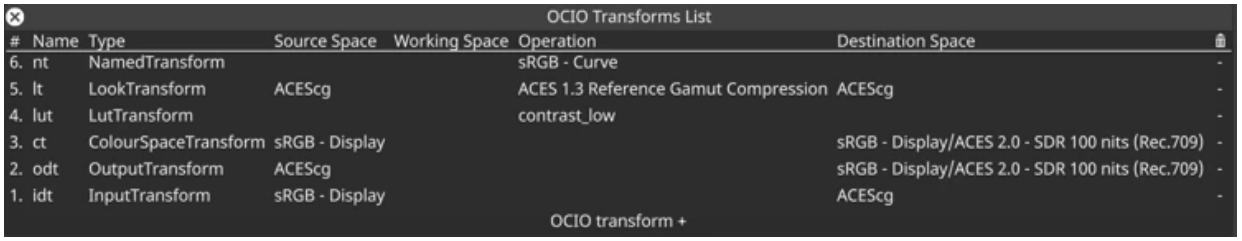
LutTransform



LutTransform allows applying a LUT between other OCIO transforms. The LUT file can be located like any other LUT in Designer (see LUT Layer). In addition to the traditional interpolation method of the LUT Layer in Designer, LutTransform offers various OCIO-supported methods.

- **LUT transform**: the LUT to apply, discovered from `objects/LutFile`
- **Transform forward**: apply LUT if enabled, apply inverse LUT if disabled.
- **Interpolation**: interpolation method to use:
  - `Nearest`: nearest neighbour
  - `Linear`: linear interpolation (trilinear for Lut3D)
  - `Tetrahedra`: tetrahedral interpolation (Lut3D only)
  - `Cubric`: cubic interpolation (not supported)
  - `Default`: the default interpolation type
  - `Best`: the 'best' suitable interpolation type

OCIO Transforms Lists



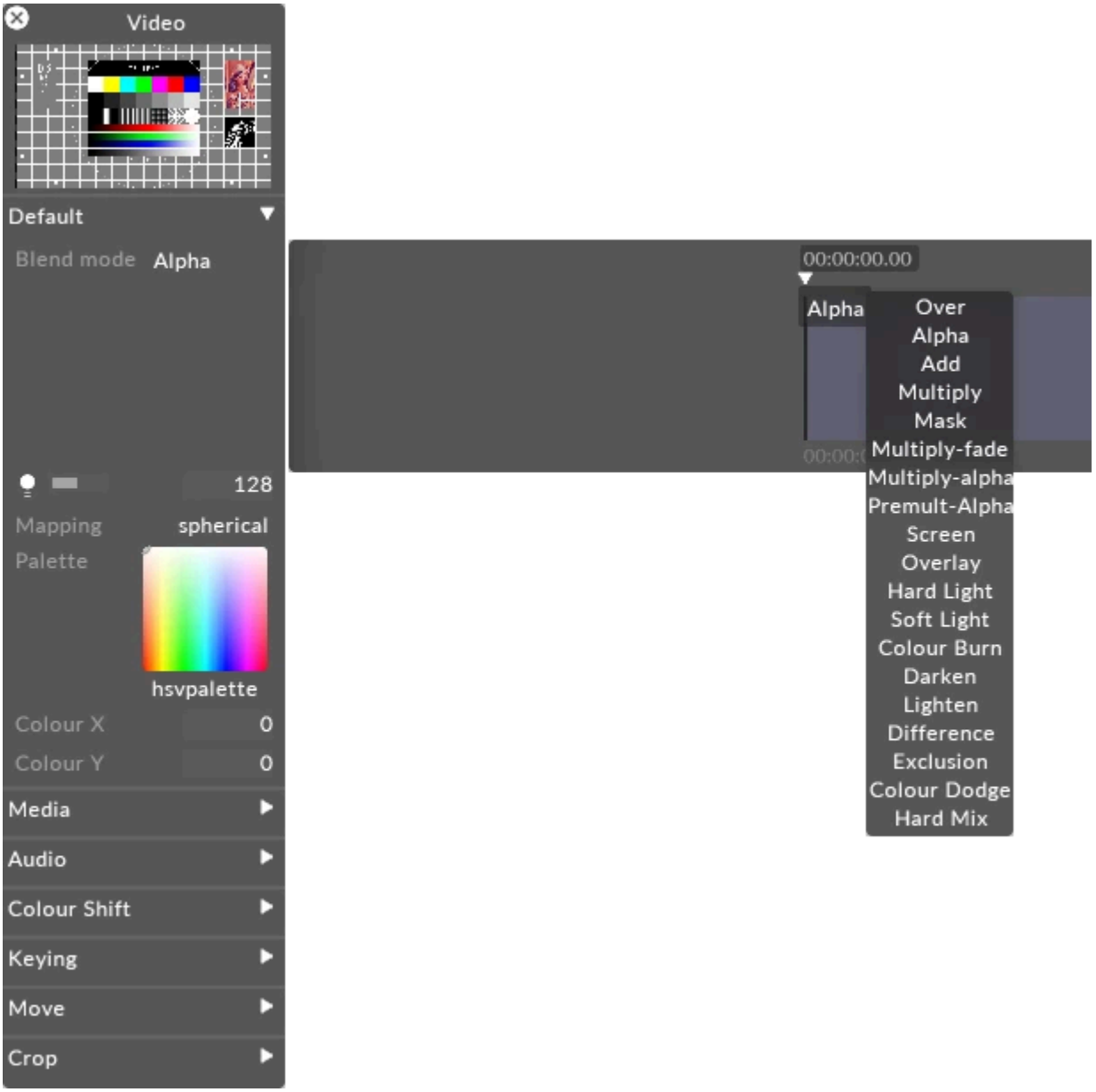
The OCIO transform table can be used to visualise and edit the list of OCIO transforms. There are a few actions you can use to edit your colour pipeline:

- Swap the order by dragging the transforms.
- Open the OCIO transform widget by right-clicking the row.
- Edit the transform element (e.g. source colour space) by left-clicking the field.
- Add a new OCIO transform by clicking **OCIO transform +**.
- Remove an OCIO transform by clicking the trash button **-**.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

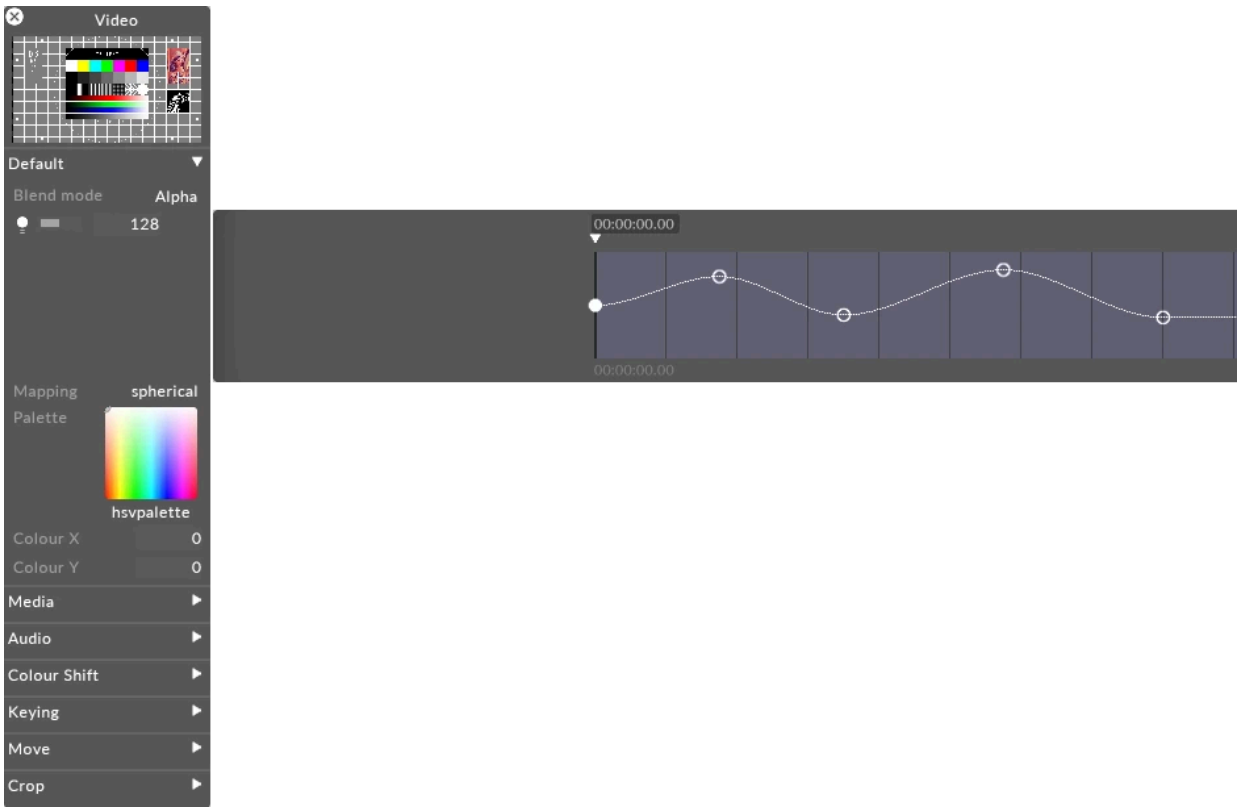
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Pixelate Layer

The Pixelate layer supports the use of Arrows, allowing content layers to be piped into the Pixelate layer.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

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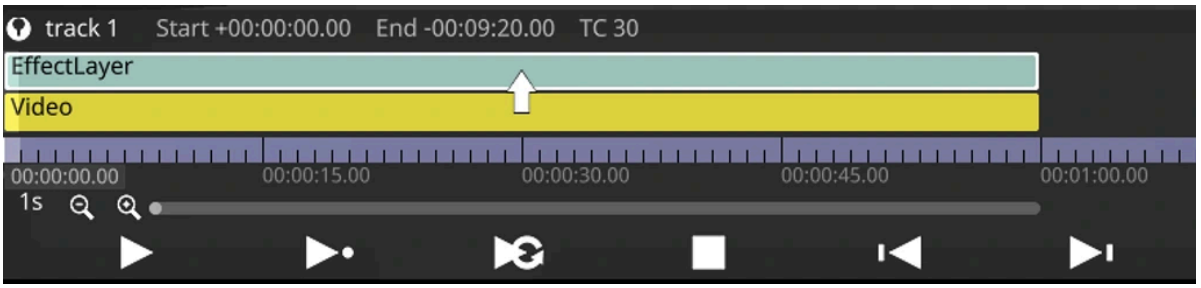
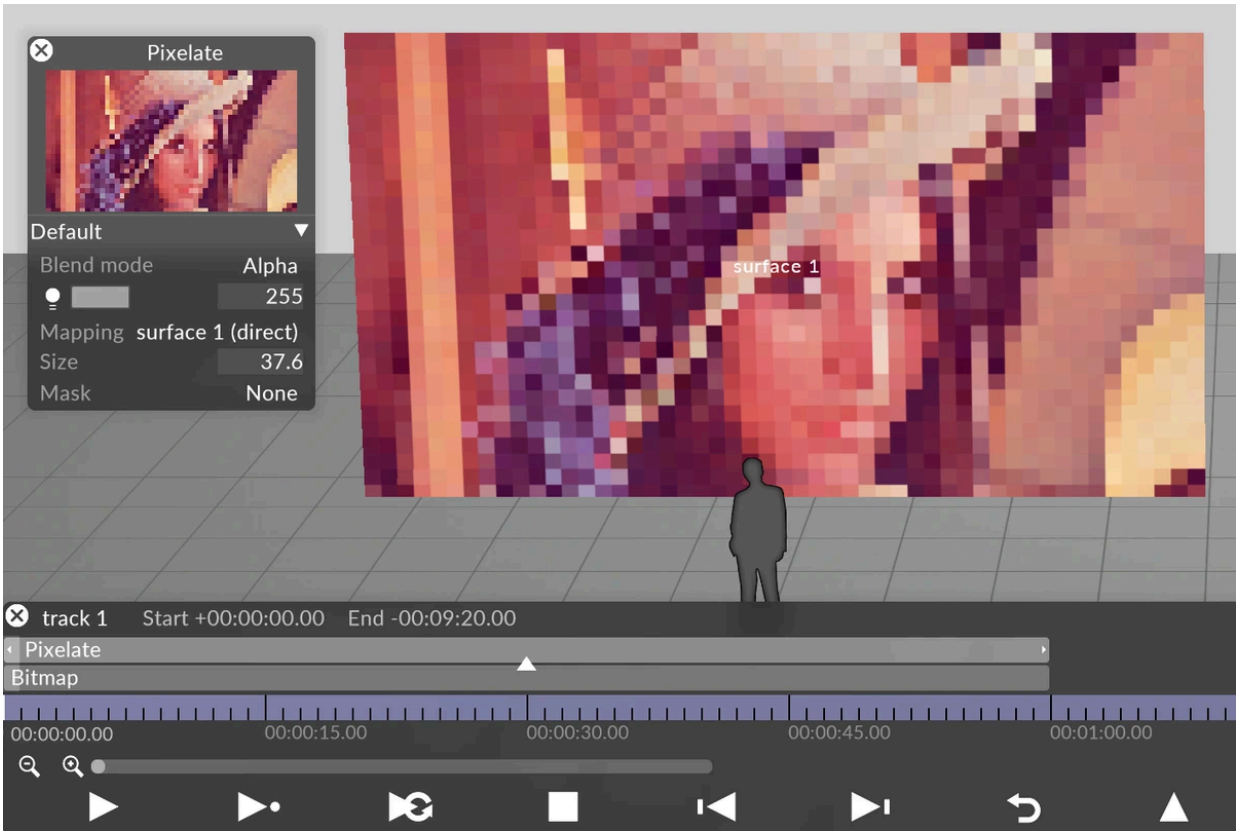


A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Pixelate Layer Properties



Pixelate layer and editor

Size

The size of each pixel.

Mask

Optional bitmap to mask the pixelate effect.

Common Layer Properties

Blend Mode

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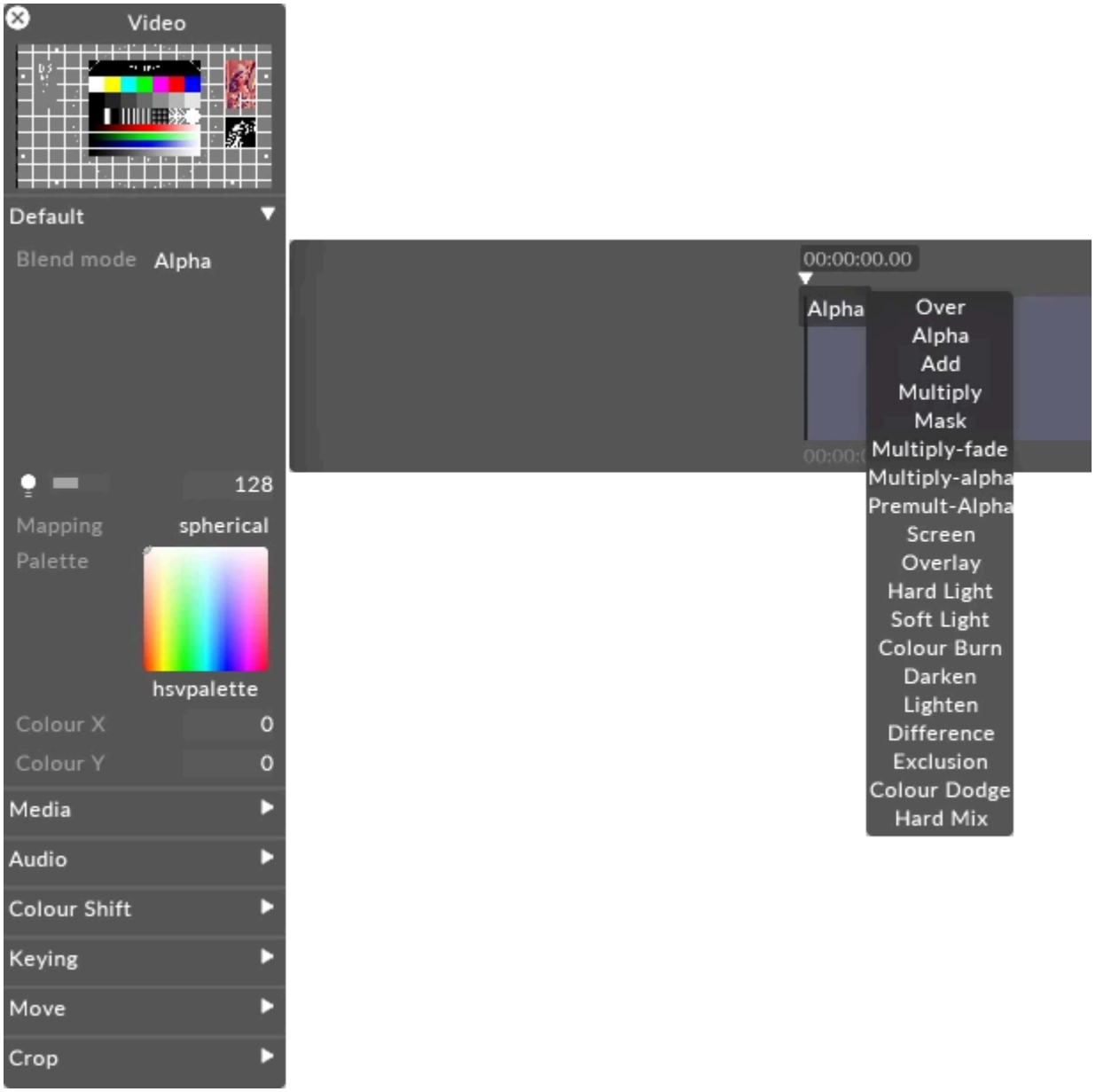

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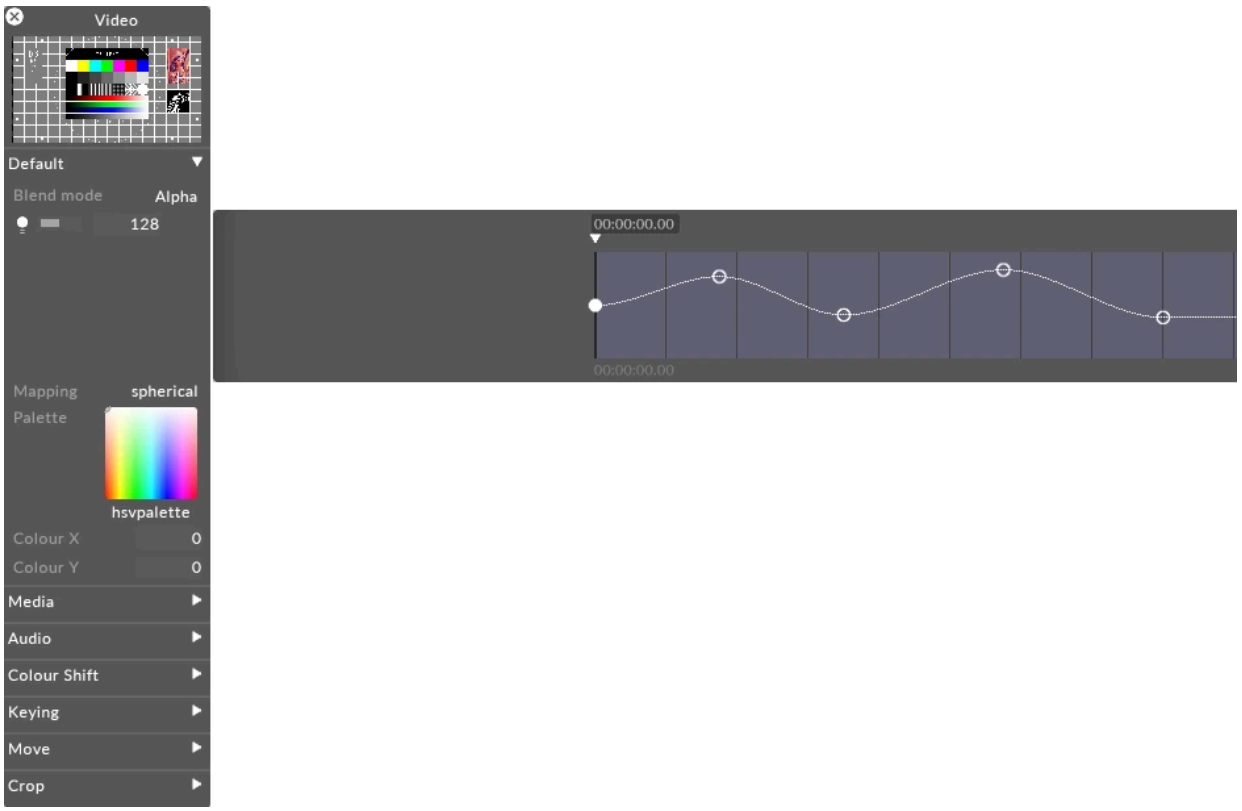

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Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

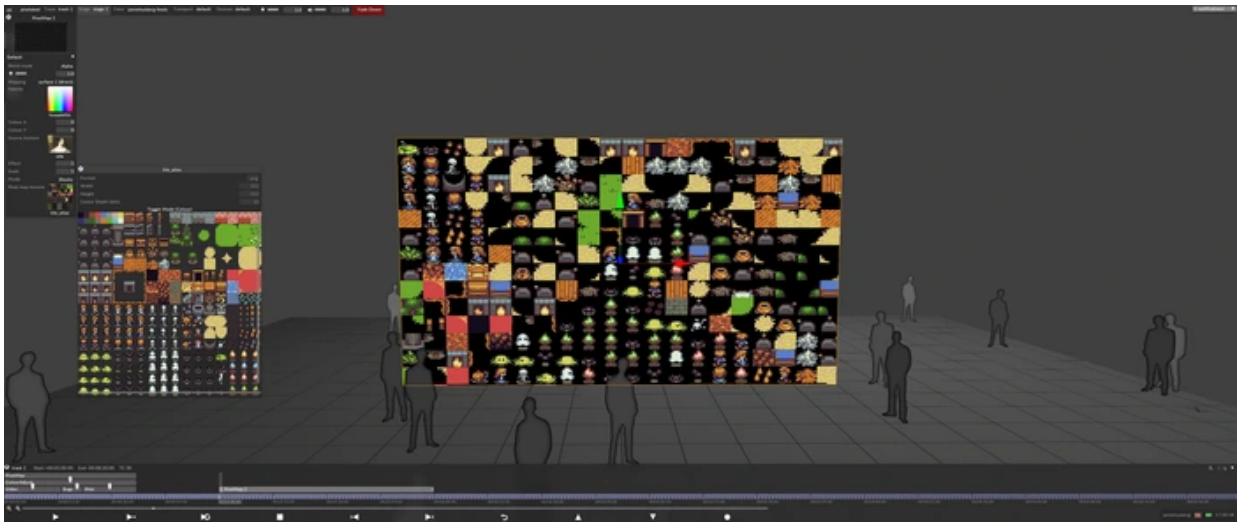


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

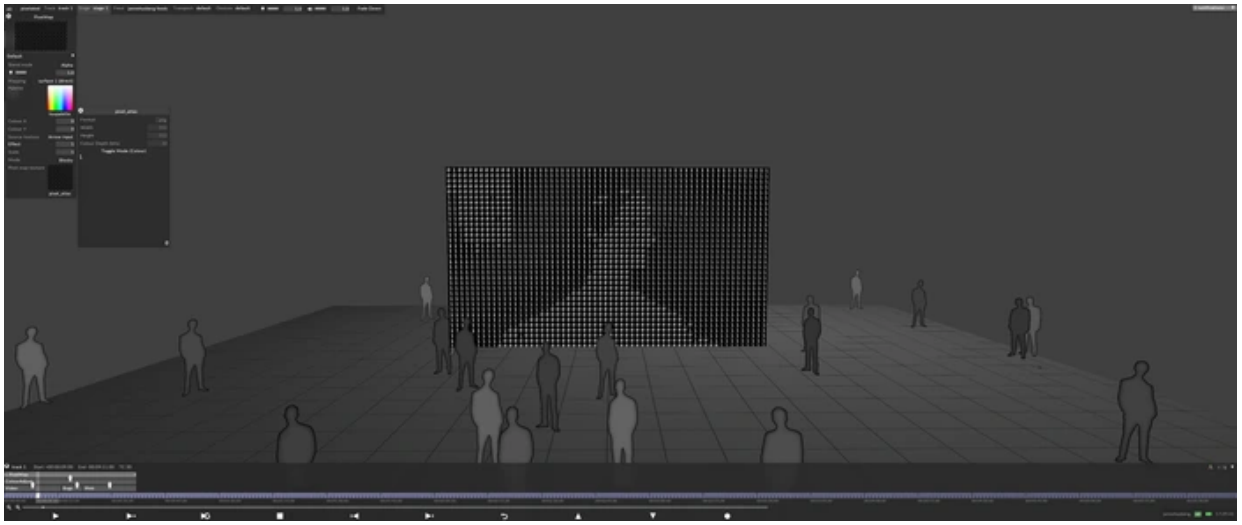
Pixelmap Layer

The PixelMap layer allows for a pixelmap input to be used to create a pixelating effect. The pixel map can be created from an external program, for example Photoshop, allowing you to create and customise your own pixel maps.

The **Pixelmap** EEffect layer is used to create a pixelating effect that is based on the input of a pixelmap. The pixelmap determines the tile atlas for the max value of each pixelated pixel which is fixed to a 16 x 16 grid.



pixel atlas



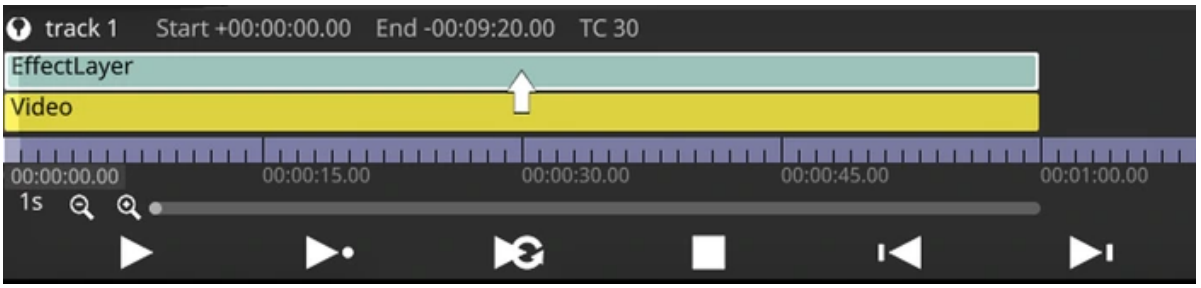
tile atlas

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

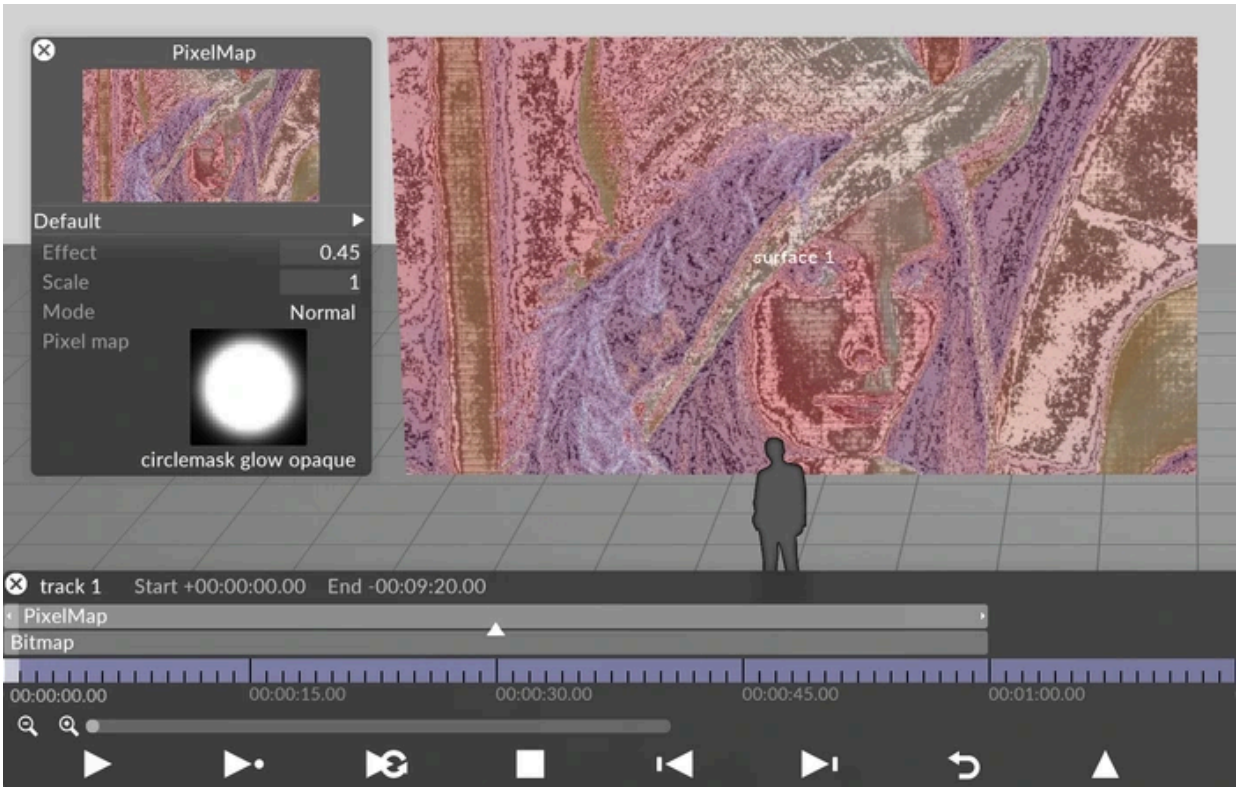
1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

PixelMap Layer Properties



The **Pixelmap** Effect layer is used to create a pixelating effect that is based on the input of a pixelmap. The pixelmap determines the tile atlas for the max value of each pixelated pixel, which is fixed to a 16 x 16 grid.

Effect

Default value is 1. The min/max values are 0 (no effect) and 1 (maximum effect). Decreasing the value from 1 to 0 will reduce the effect of the Pixel map on the content.

Scale

Default value is 1. The min/max values are 1 and 16. Increasing the value from 1 to 16 will increase the size of the Pixel map by a specific scale factor. For example, a value of two means the PixelMaps width and height will double, a value of three means the Pixel maps width and height will triple etc.

Mode

- **Normal**
- **Blocky**

Creating a PixelMap

This points to the still image file that defines the PixelMap. Selecting this property will open the Texture object library, which shows all of the Texture still image files saved on your local hard drive in the **DxTexture** folder. However, before placing a Pixel map you will need to create it.

To create a Pixel map:

1. Create a .png image using a program such as Adobe Photoshop. The Pixel map can only be increased by a maximum scale factor of sixteen, so if it is going to be applied to the whole screen, make sure the Pixel maps resolution is high enough.
2. Make the areas to be see-through in the screen see-through in the Pixel map.
3. Make the areas to be illuminated in the screen white in the Pixel map.
4. Make the areas to be black in the screen black in the Pixel map.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer Also, save the file to a supported file format.

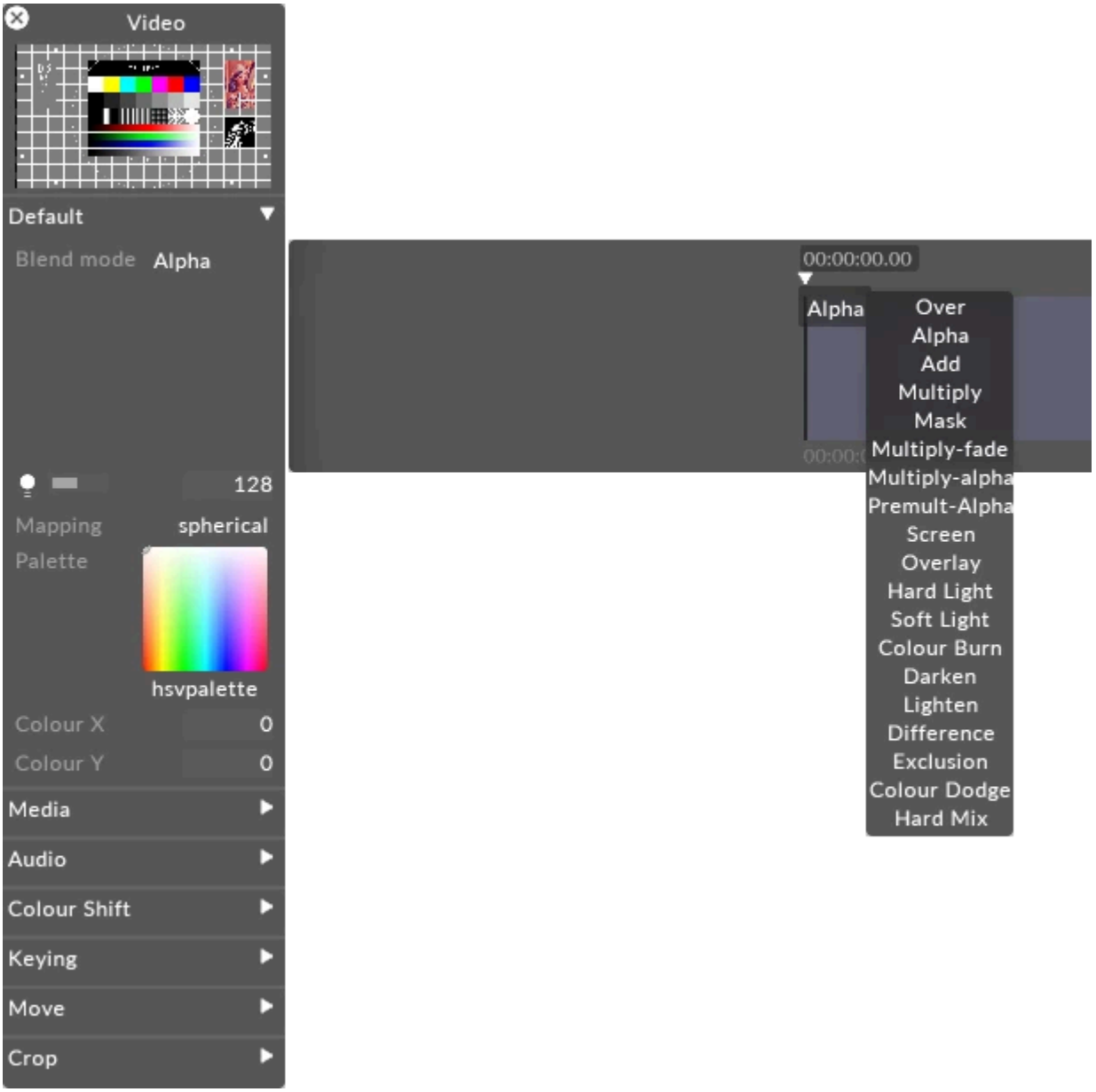
The Pixel map will be applied to the screen on a pixel-by-pixel basis. Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it. Also, save the file to a supported file format.

The Pixel map will be applied to the screen on a pixel-by-pixel basis.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

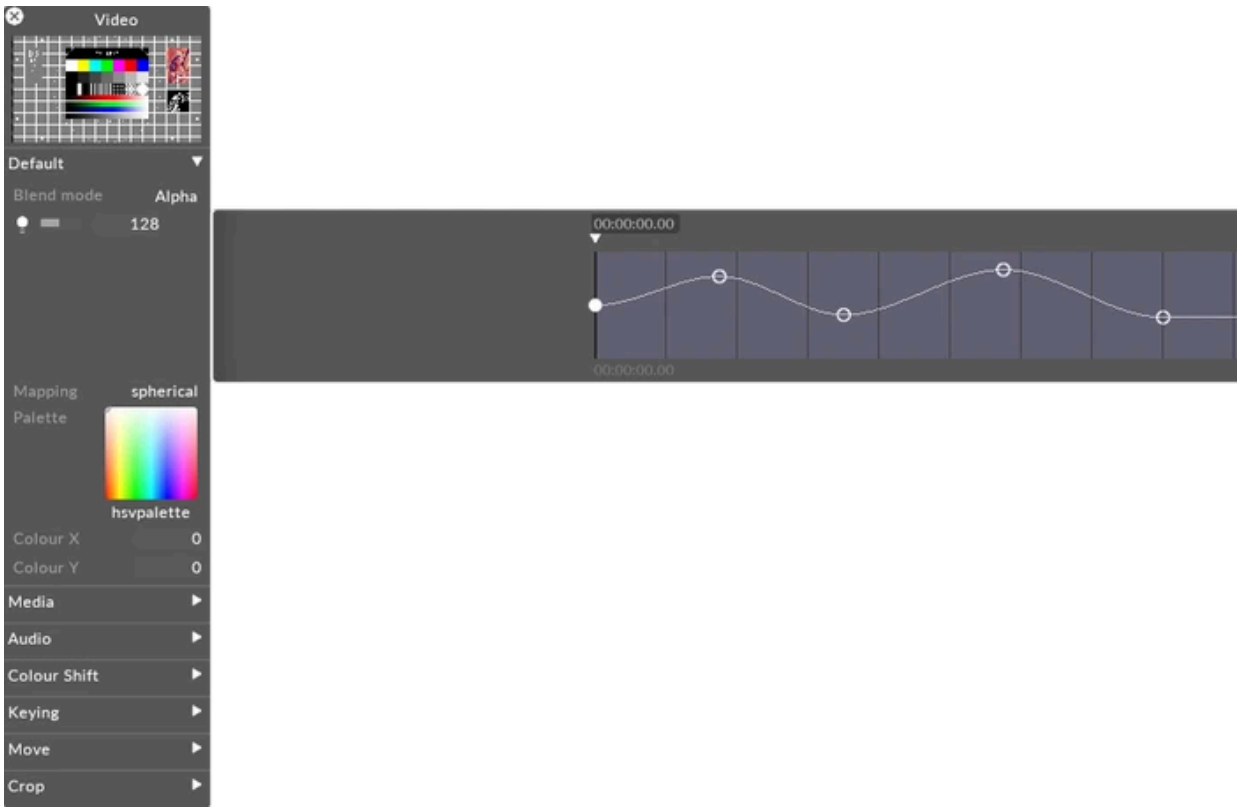
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

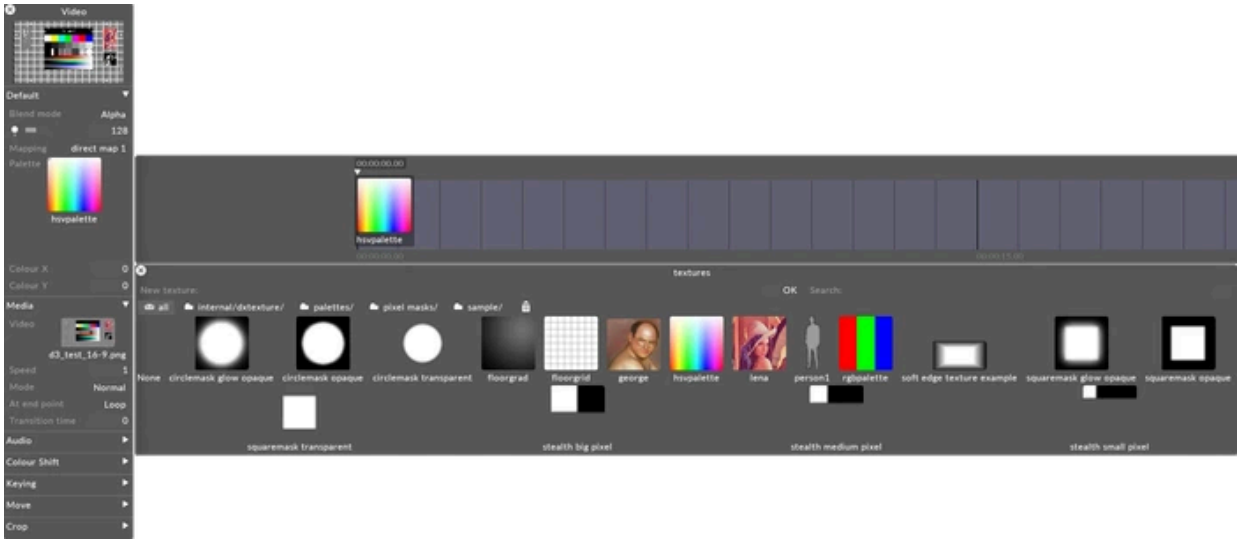


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

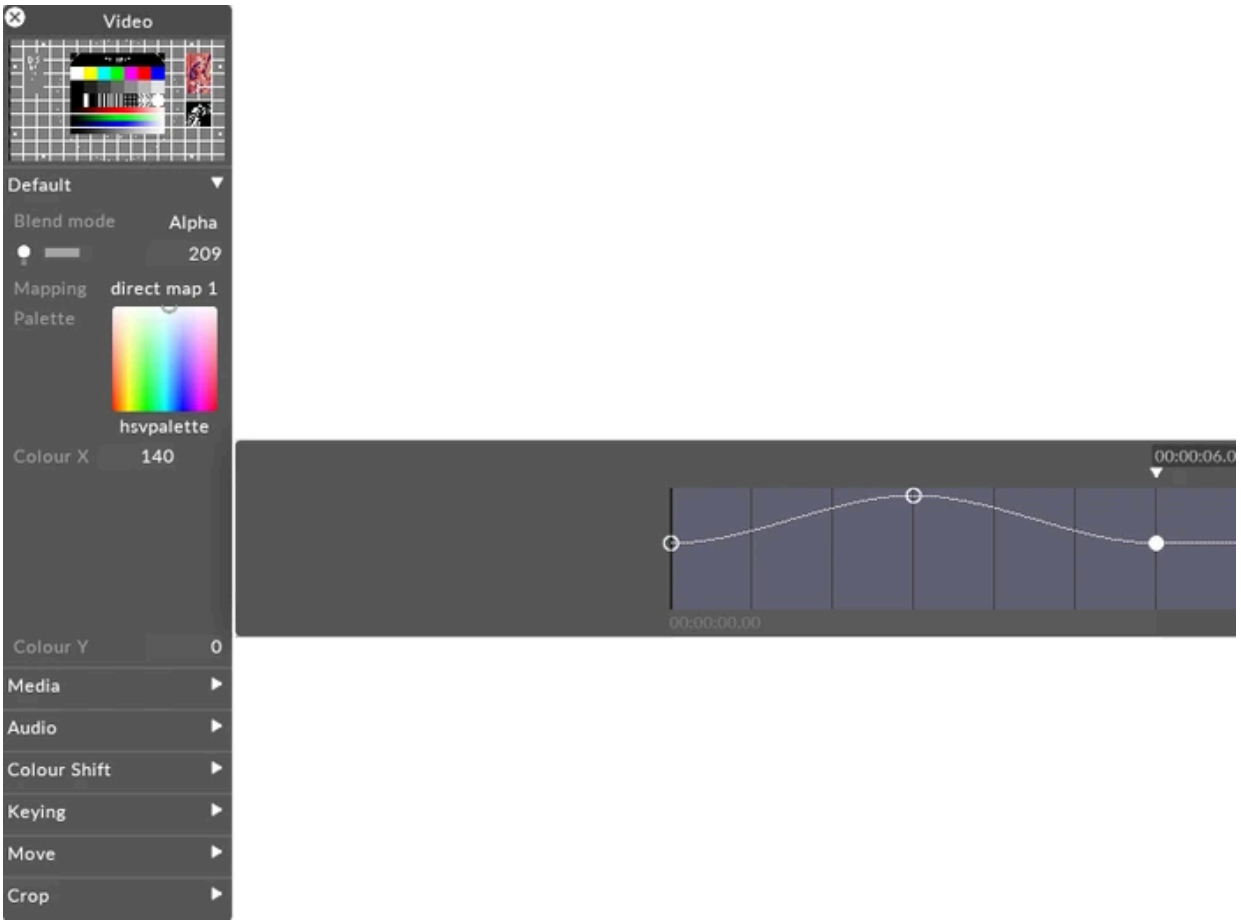
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Scroll Layer

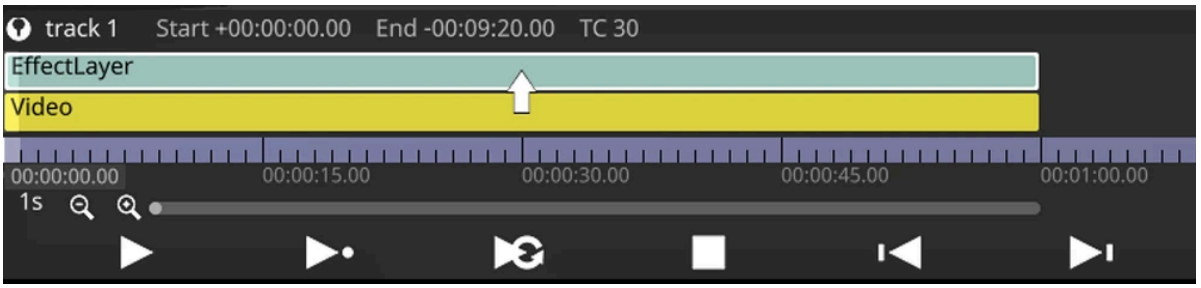
The Scroll layer takes any bitmap and scrolls it in a horizontal direction across the output canvas, repeating it when necessary. It is particularly useful in situations where you want to generate scrolling content and want to modulate the scrolling speed in real time (for instance, so that content moves at the right speed for television cameras). In these situations, the process of making a video containing scrolling content is too slow.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

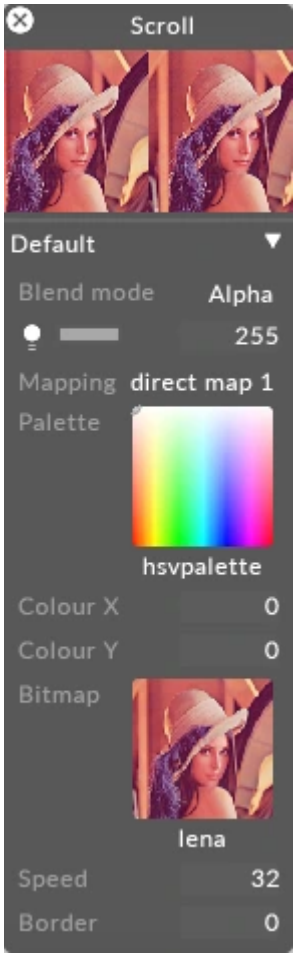
1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Scroll Layer Properties



Speed

This controls the horizontal scrolling speed, measured in pixels per beat. Positive numbers scroll the image to the left; negative numbers scroll it to the right.

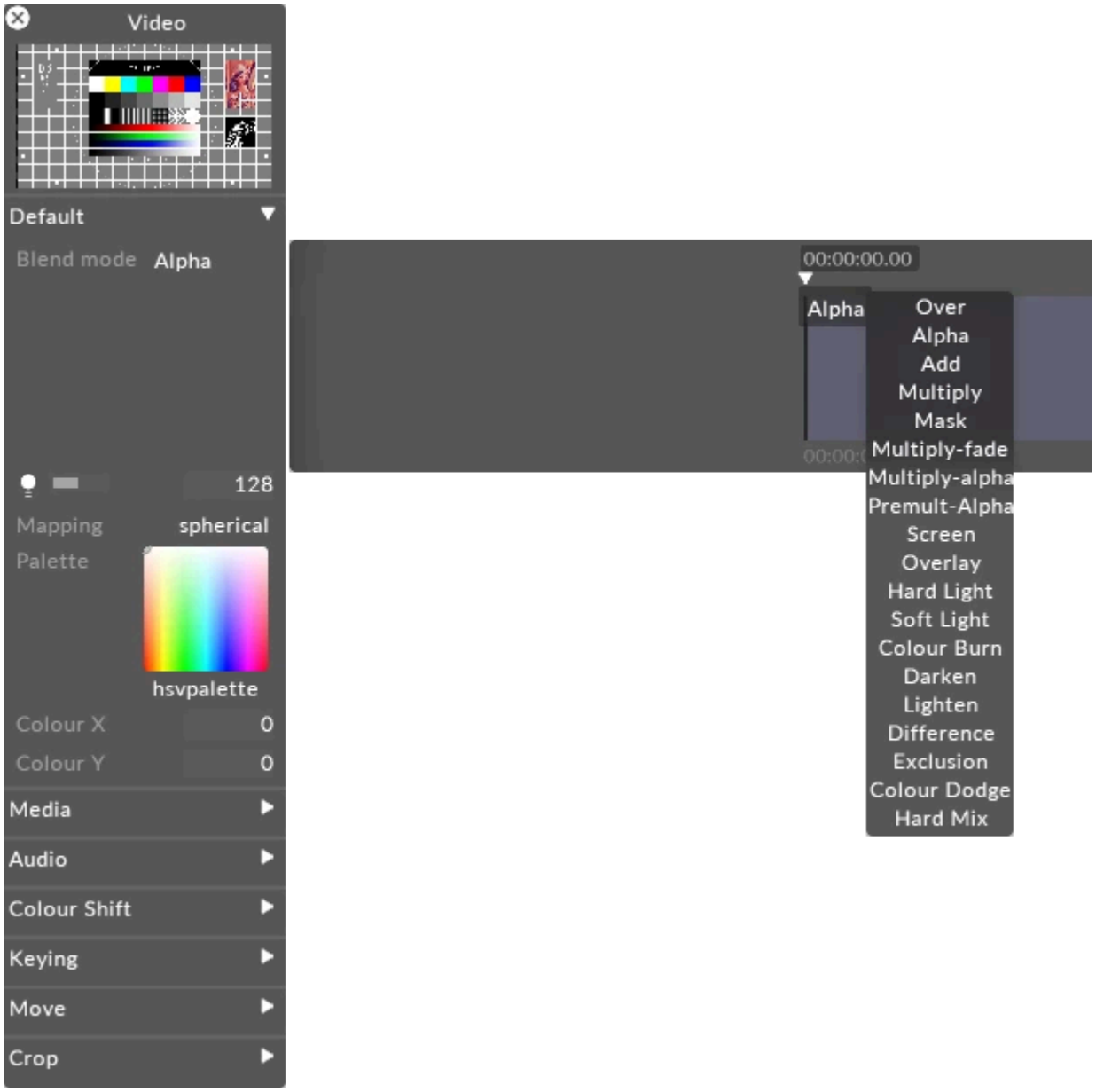
Border

The Scroll layer can generate a black border above and below the image, scaling the image down in the process. The **border** property controls the height of this border, in pixels.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

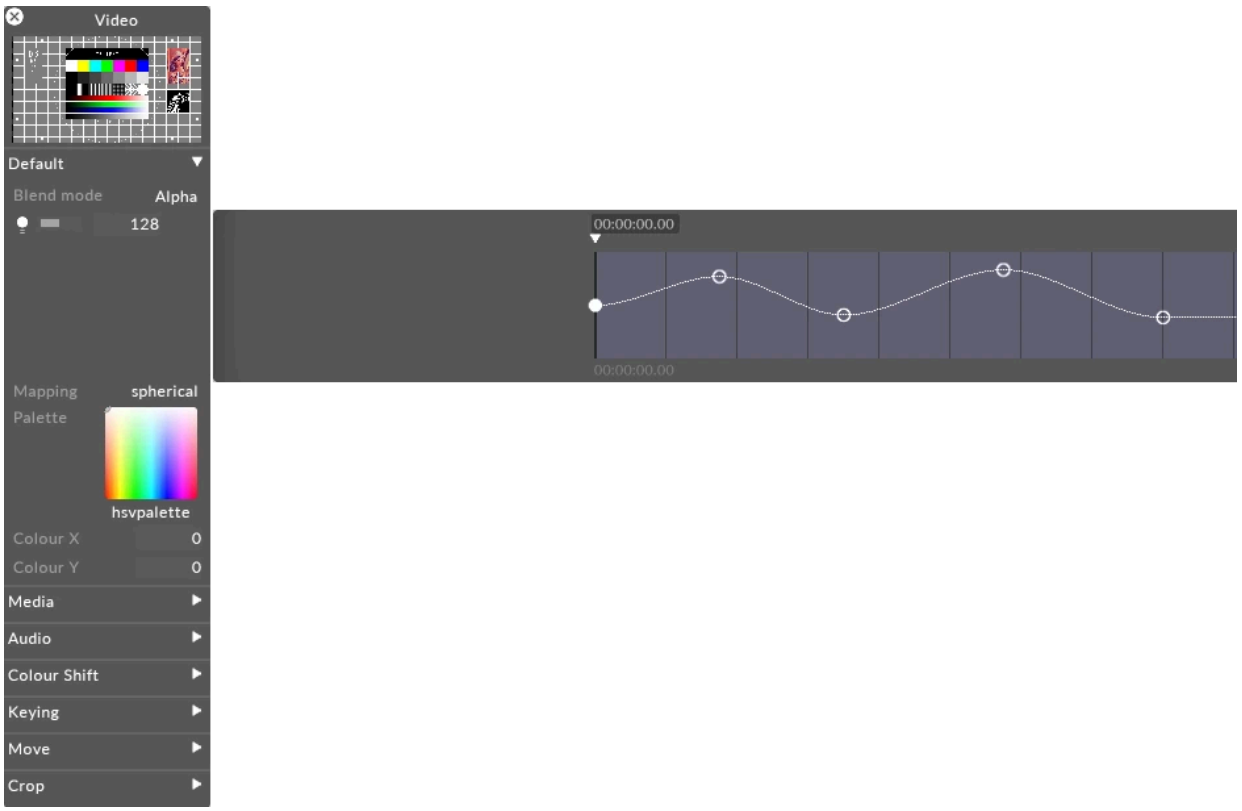
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

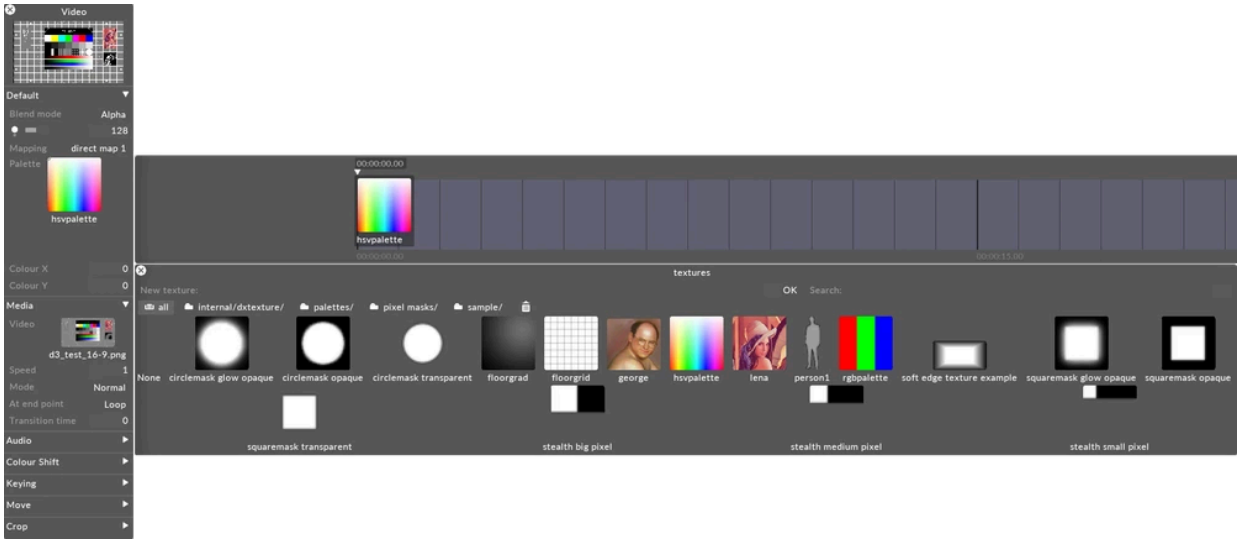


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

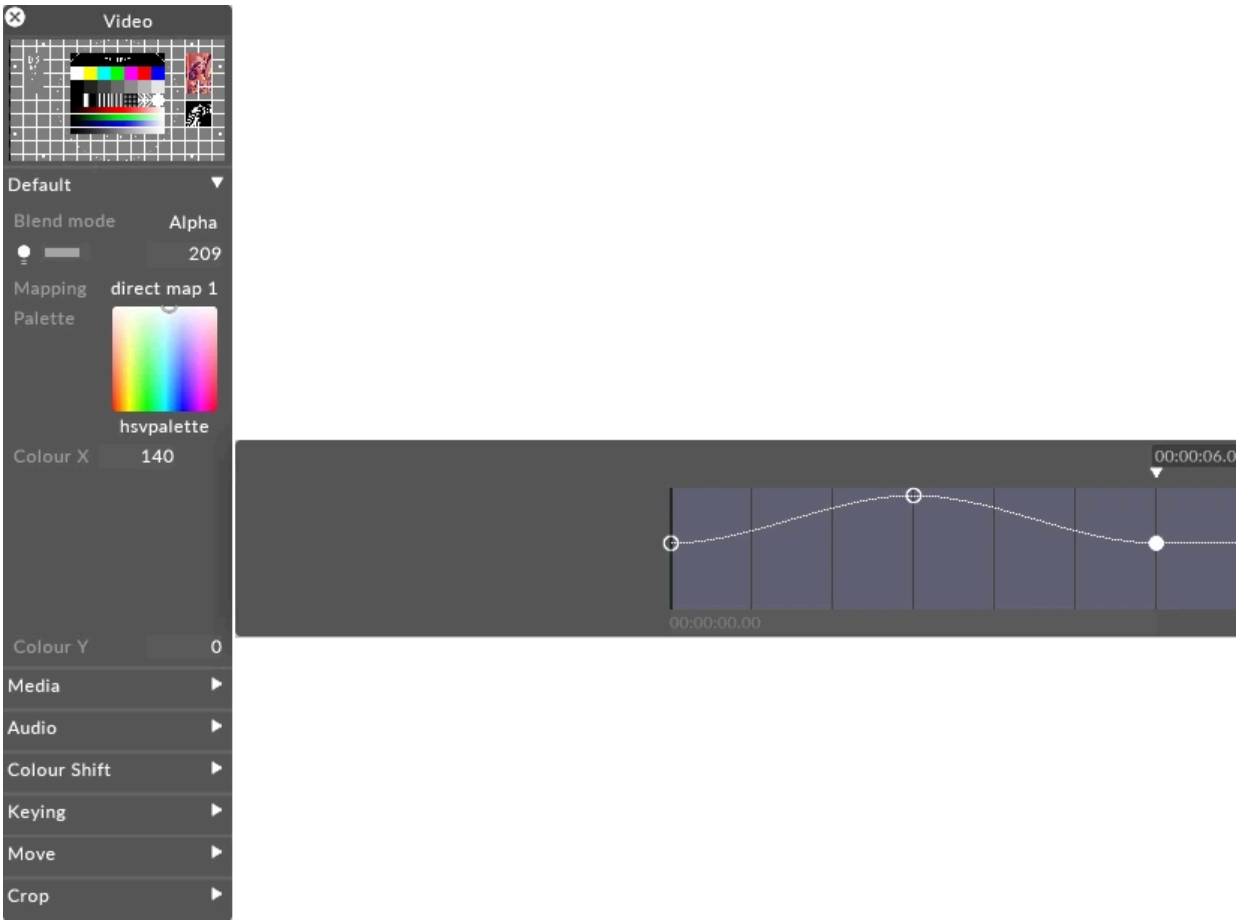
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



SpinBitmap Layer

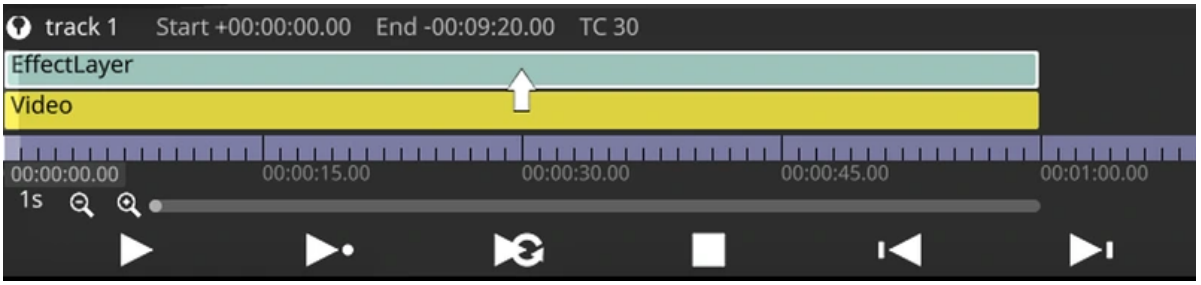
The SpinBitmap layer displays a moving, rotating bitmap. It is able to perform continuous rotation and can tile its image. Since a bitmap contains an alpha channel, this layer can display up to three layers of images, one behind the other.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

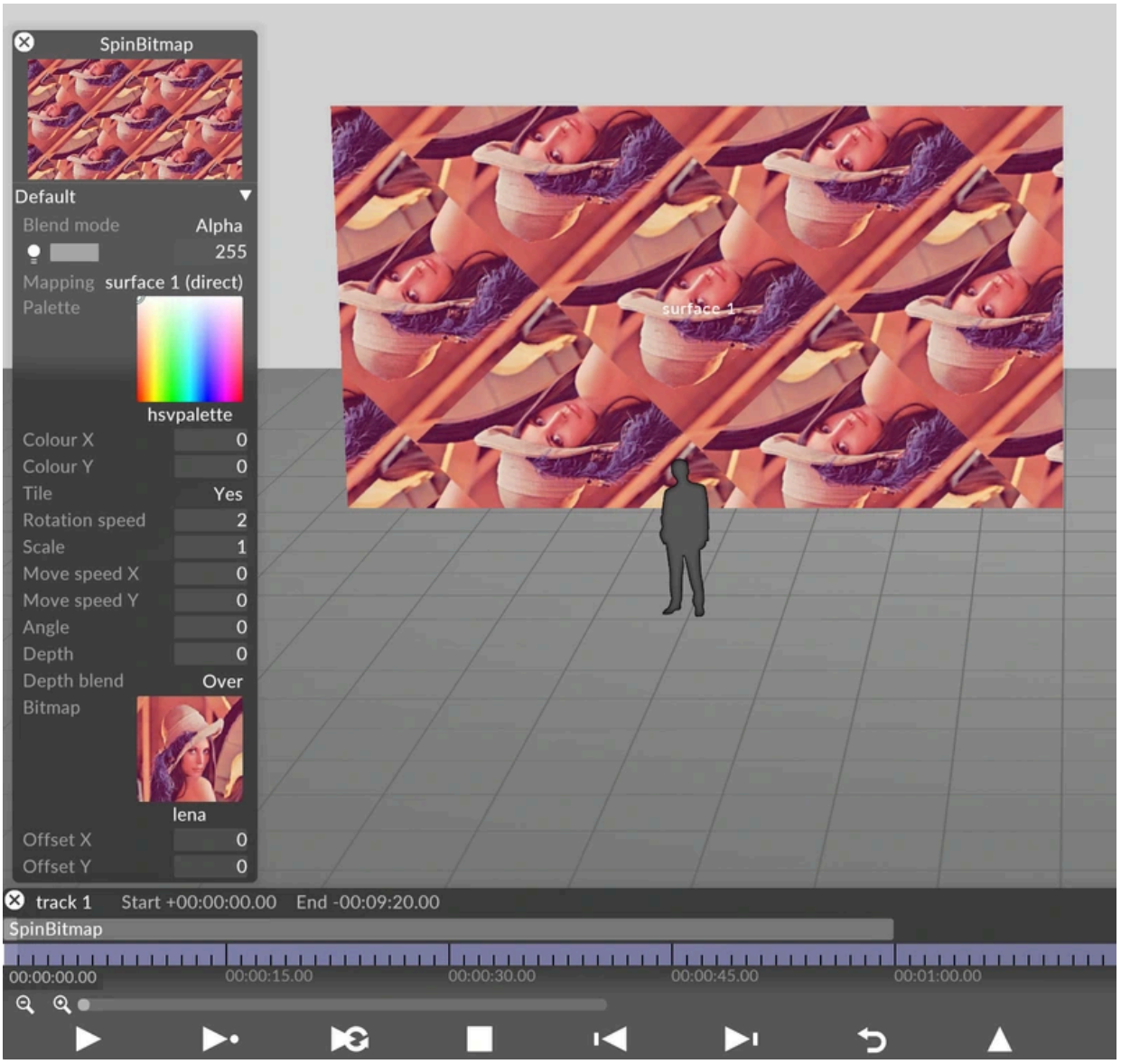
1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Spinbitmap Layer Properties



Tile

If set to **off** , the central image is not tiled and the **move speed** property has no effect.

Rotation speed

If this is set to 0, the rotation angle is controlled by the **angle** property. Otherwise, this property controls the rotation speed in degrees per beat.

Scale

This controls the scaling of the bitmap. Somewhat counter-intuitively, increasing the number reduces the size of the bitmap and increases the number of tiled copies.

Move speed

This controls the movement speed of the image, in each of the x and y axes, in pixels per beat.

Angle

If **rotation speed** is set to 0, this property controls the **angle**. Otherwise, it has no effect.

Depth

With values ranging from 0 to 2, **depth** controls the number of layers displayed. This only results in a visual effect if the bitmap is partially transparent, i.e. contains an alpha channel.

Depth blend

This controls the blend mode applied between the multiple layers. The options to choose from are **add**, **over**, **alpha**, or **multiply**. For more information on blend modes, please see the blendMode section.

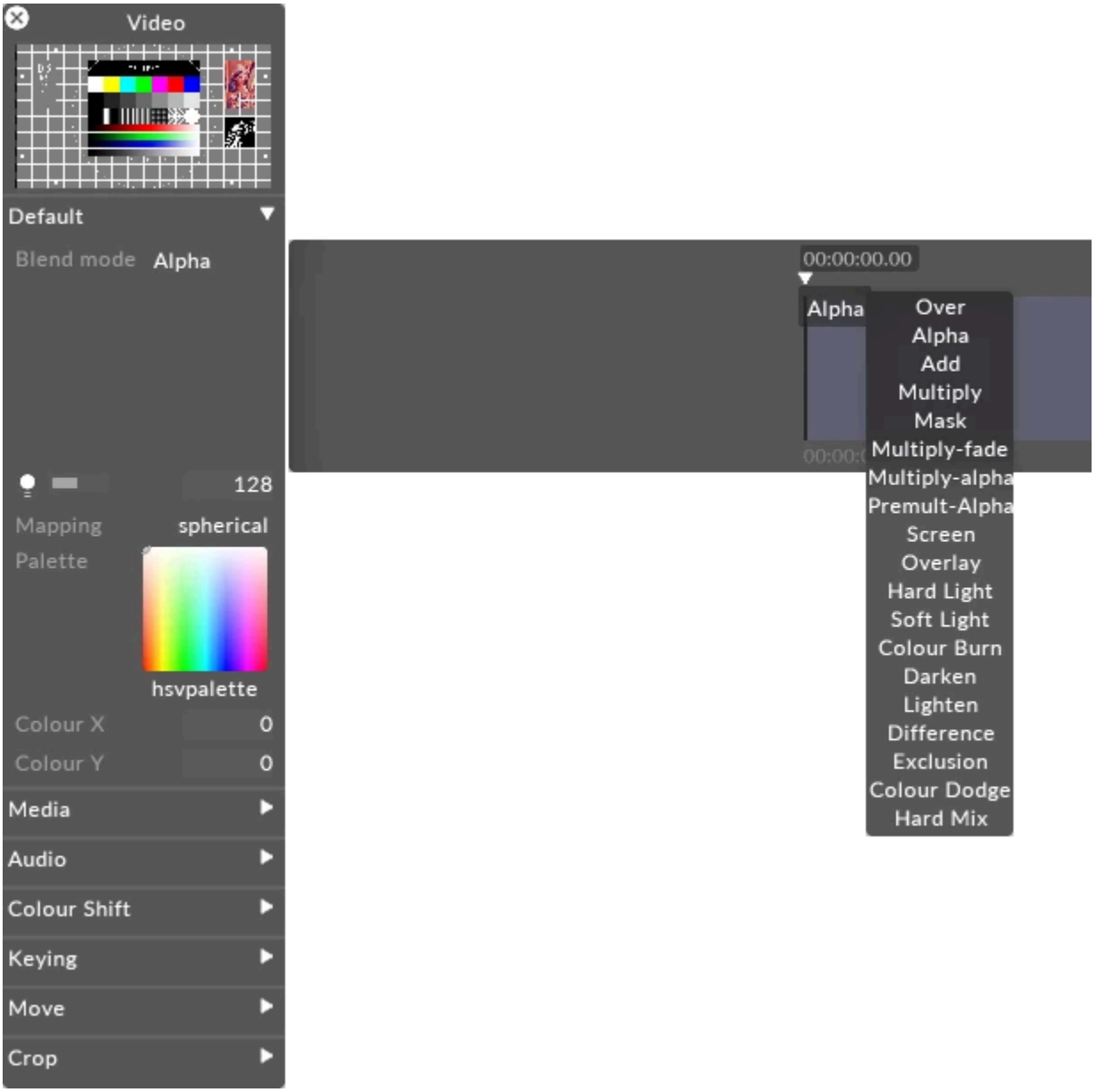
Offset

This shifts the entire field left or right, and is measured in pixels.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

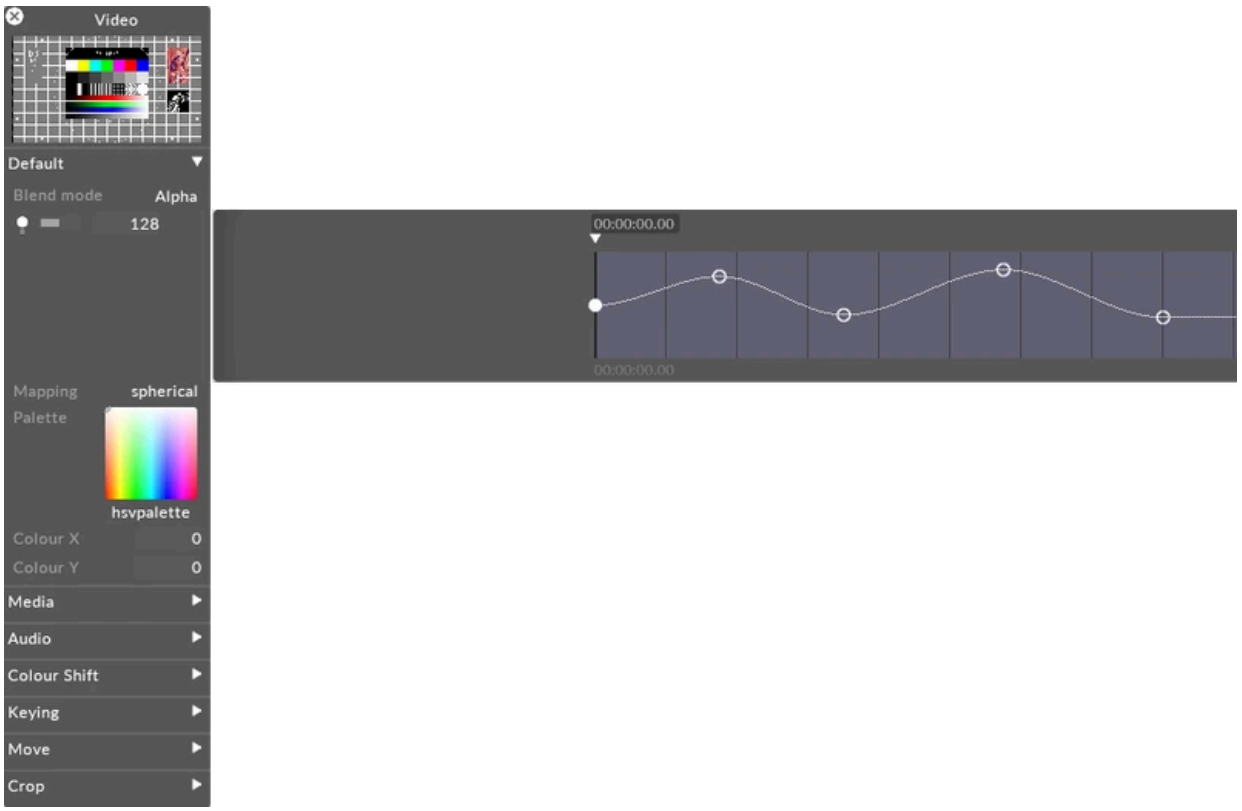
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
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> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

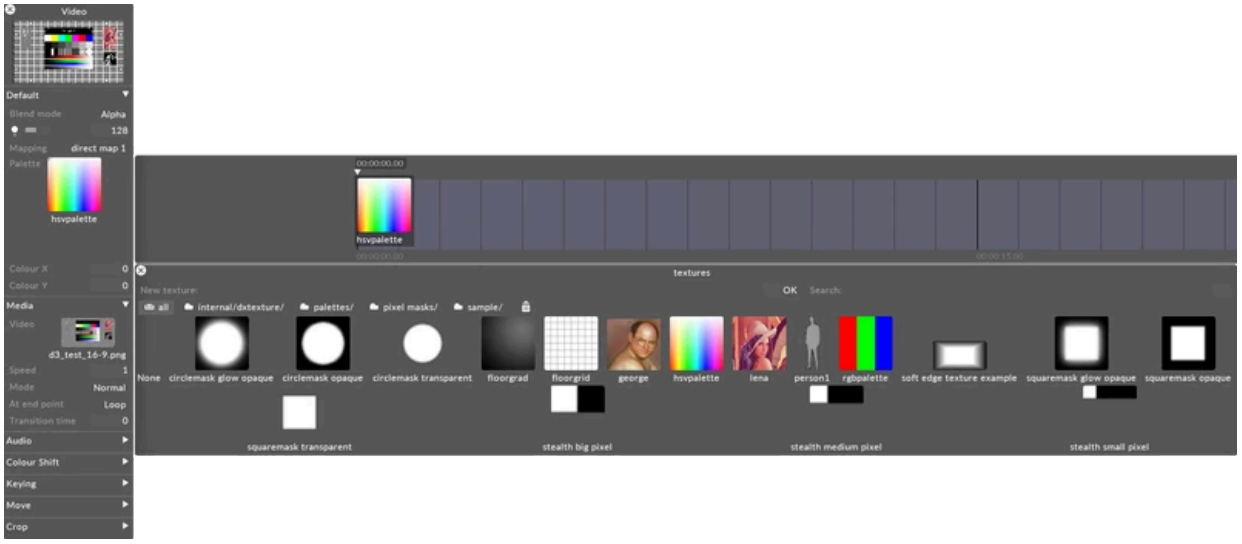


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

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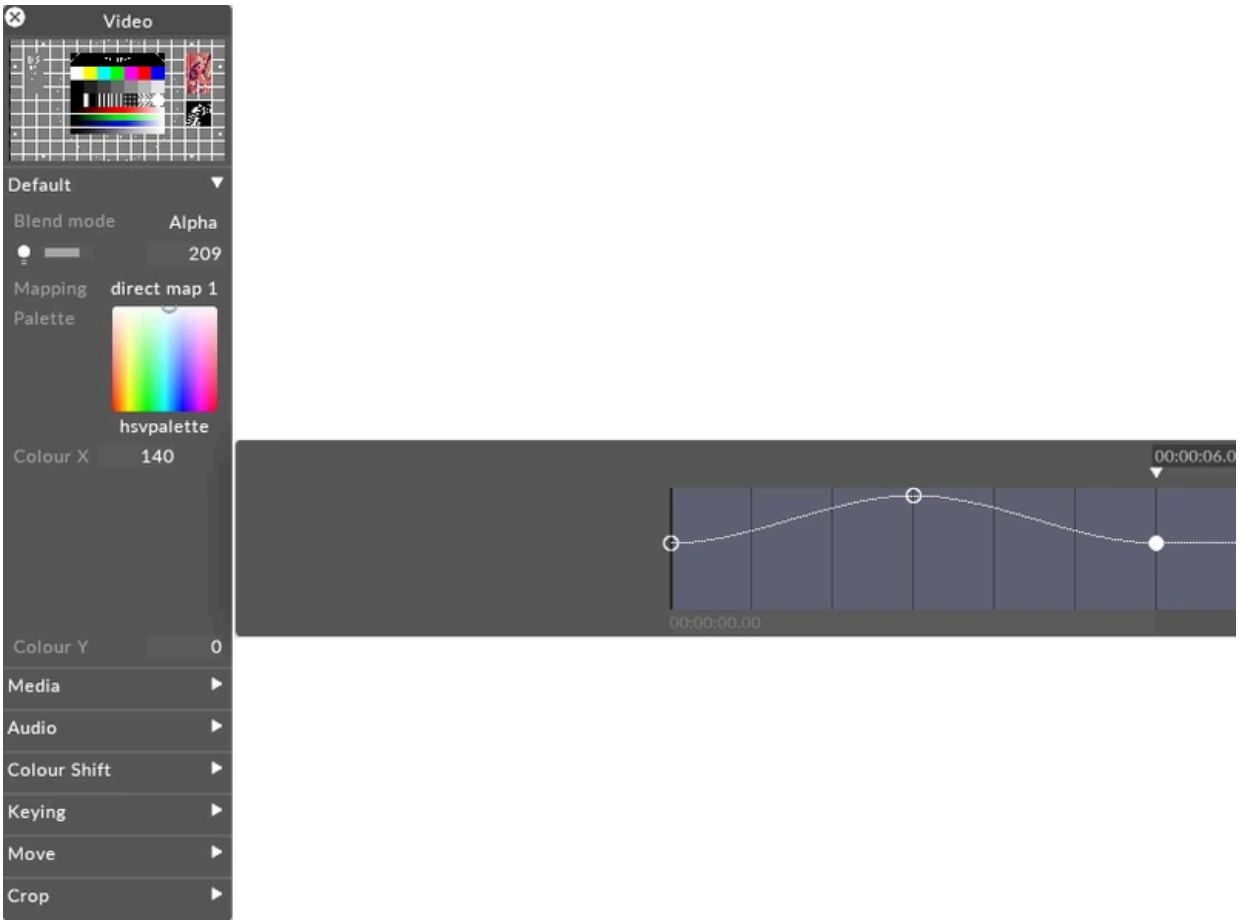


Trigger Layer

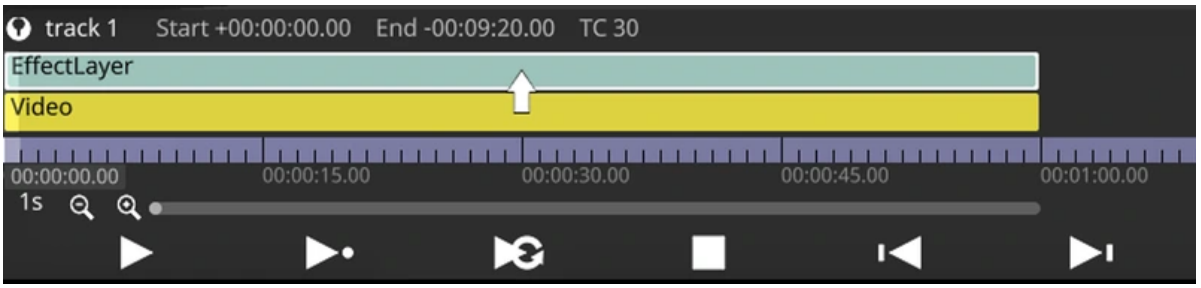
The Trigger layer allows you to trigger still image content at specific points of time on your screen(s).

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Trigger Layer Properties



Bitmap

Still image file to be placed in the key-frame editor.

Speed

The transition speed of the triggered content. Positive = bottom to top, negative = top to bottom.

Size x, y

The pixel size of the image.

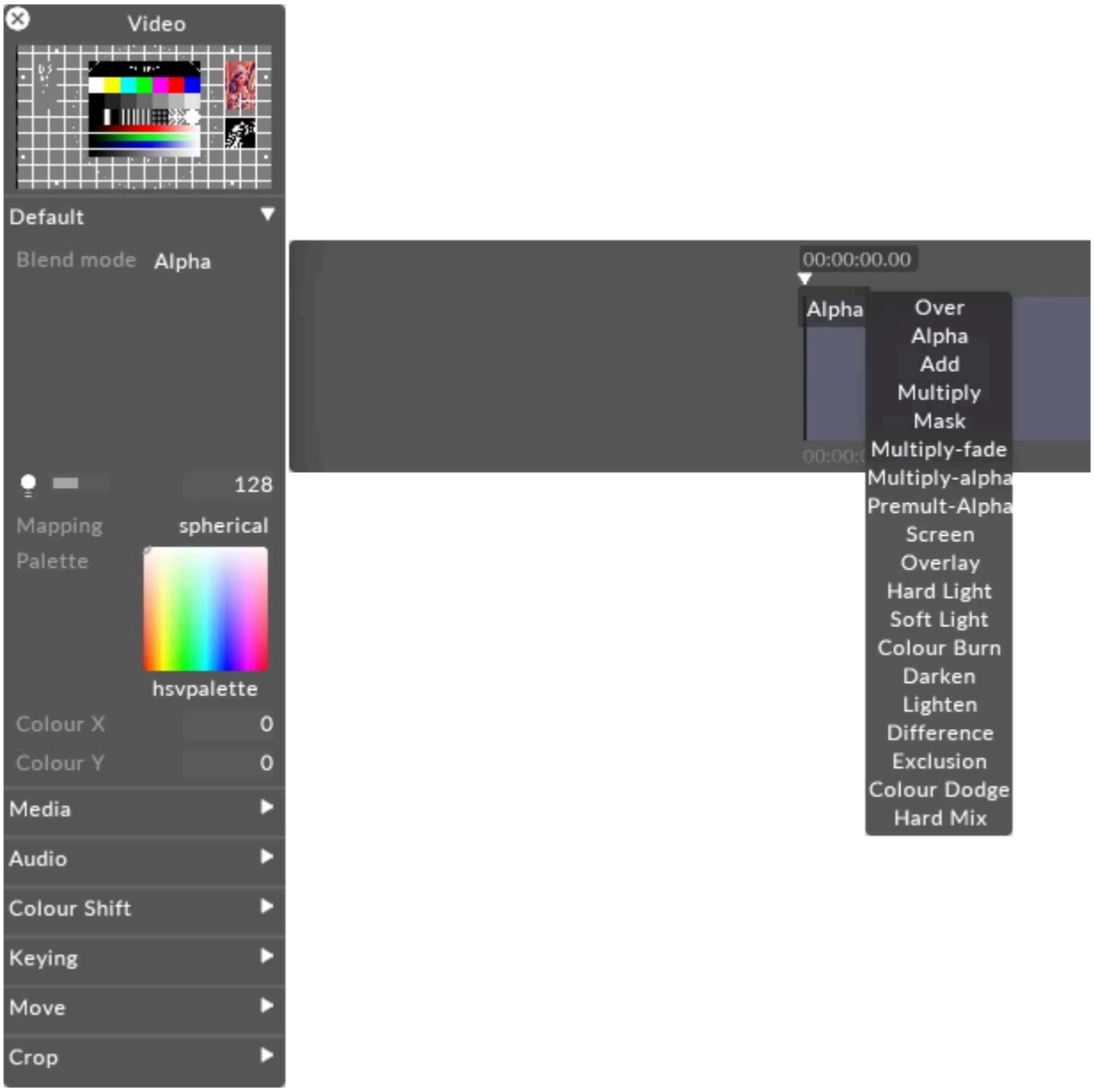
Trigger

Every trigger keyframe triggers the chosen image.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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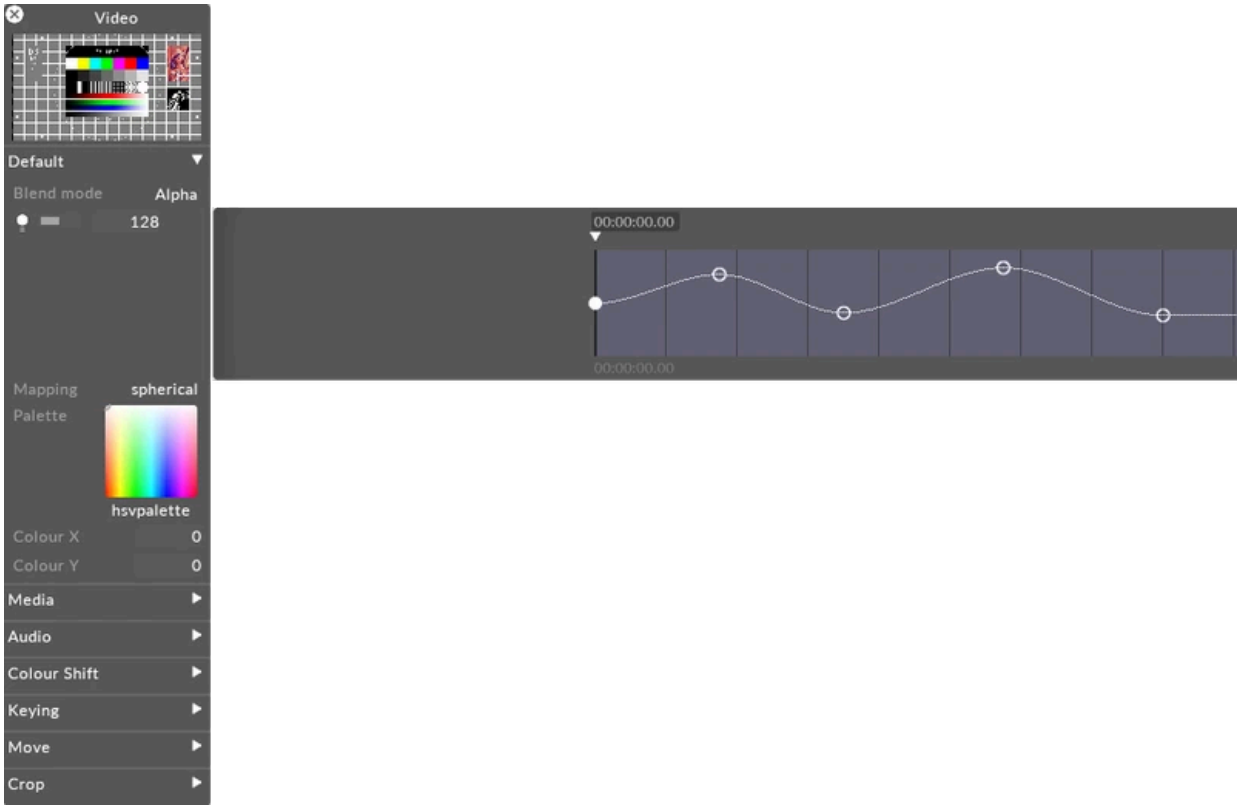
Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



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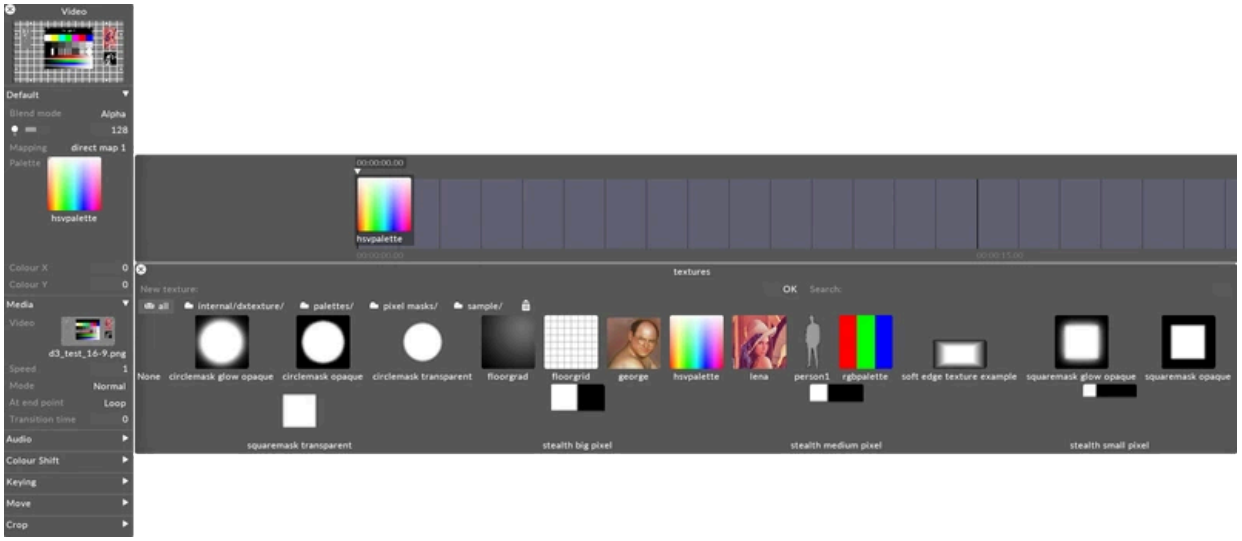

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2. Left-click the still image file you want to use for the palette bitmap.

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Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

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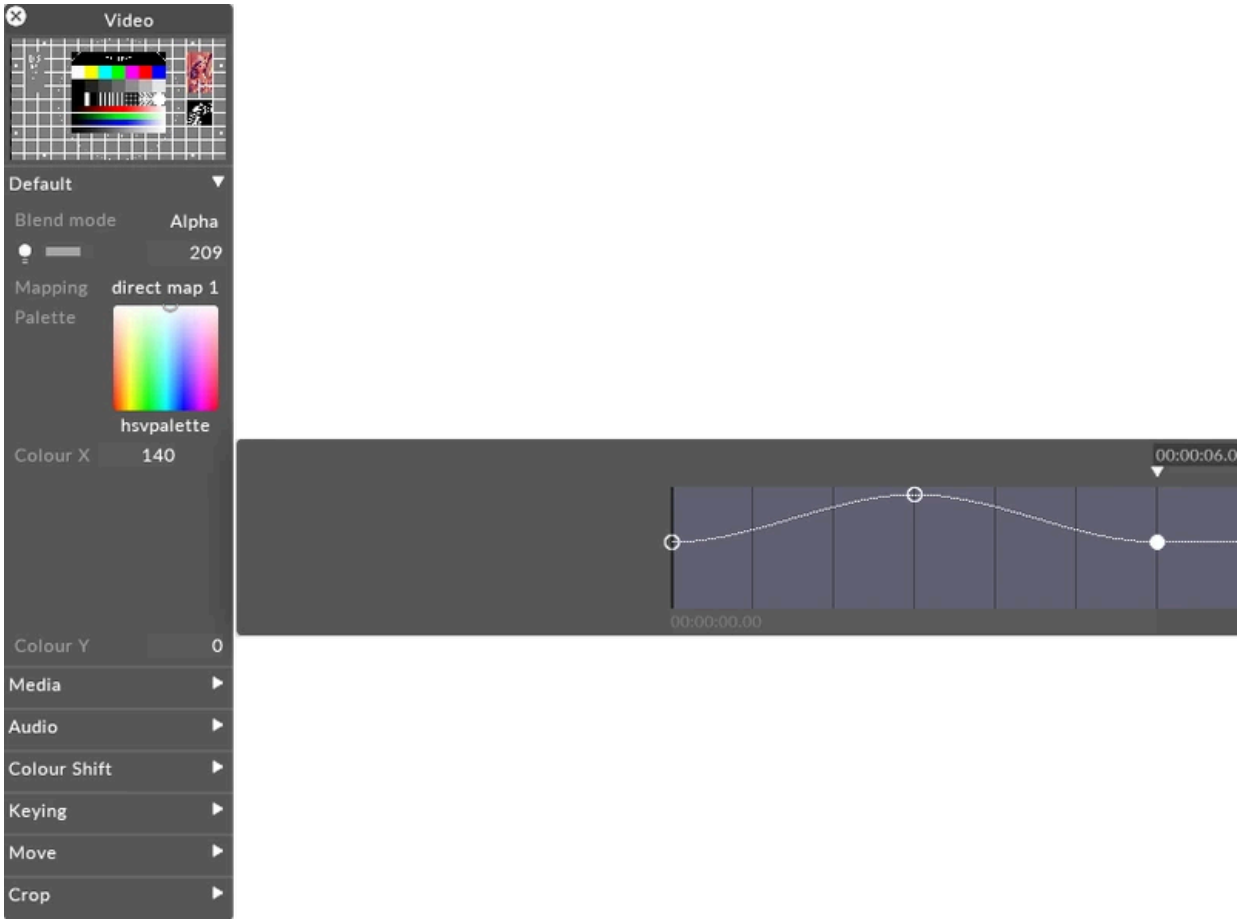
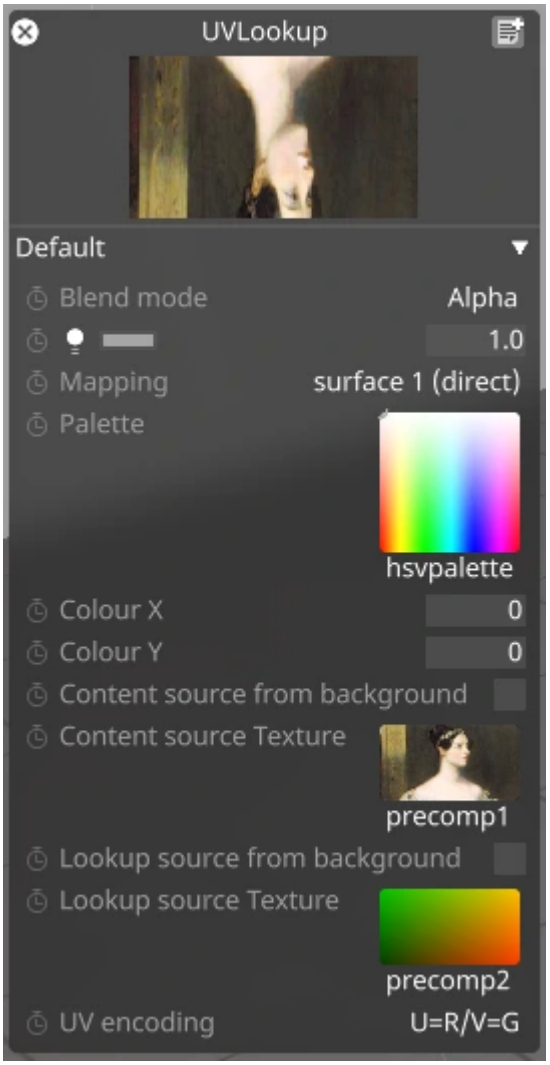


UVLookup Layer

The UVLookup layer allows you to to change the UV mapping of a source texture applied to an object based on colour information contained in a lookup texture Overview



Similar in function to *Youveelizer*, the plugin for After Effects that allows you to replace textures by using a UV map, the UVLookup layer is an effects layer available directly in Designer.

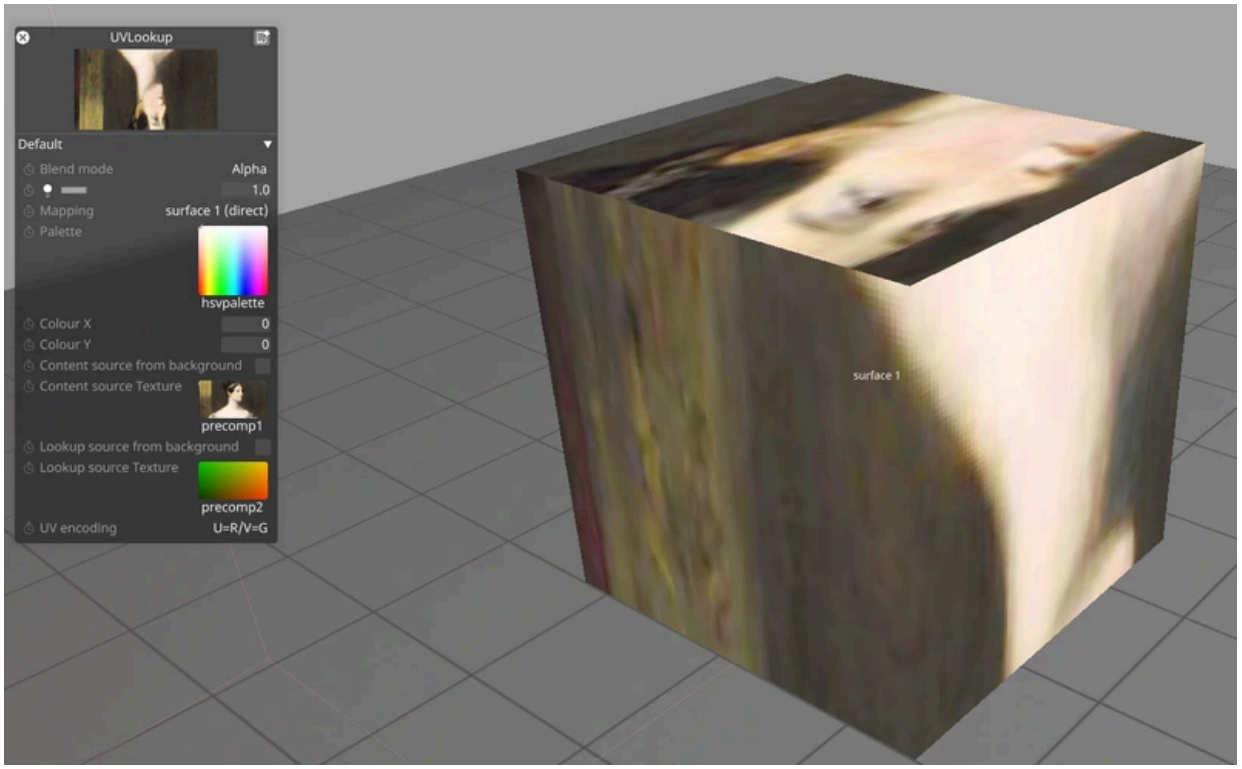
The data is packed as two 12bit coordinates, U & V, into a 24-bit RGB video.

Workflow

The UVLookup layer requires a Content source texture and a Lookup source texture. It is recommended to create PreComp textures and use these textures as the source textures within the UVLookup layer. For information on creating a PreComp visit thi link.

To configure the layer, follow these steps:

1. Open a UVLookup layer
2. Create a new PreComp texture, “PreComp 1”, and assign this as the Content source texture
3. Create a Video layer directly under the UVLookup layer, set the mapping of the layer to ” PreComp 1”, and select a piece of media for the Video layer.
4. Return to the UVLookup layer editor and create a second PreComp texture, “PreComp 2”
5. Add a second Video layer directly beneath the UVLookup layer, map it to “PreComp 2”, and select a piece of media for the Video layer. Ideally this content will be a UV pass rendered specifically for this application
6. In the UVLookup layer editor, change the UV encoding setting to match the desired UV mapping coordinates; U=R/V=G is shown in the image shown below:



UVLookup Layer Properties

Content Source

The texture that is mapped to the object. There are two options:

- **Lookup source from Background**- when enabled, the existing screen content is used as the source texture.
- **Content source Texture**-this can be a texture applied directly in this field or by using an arrow from another content source layer

Lookup Source

The texture that is to be used as the UV map for the content source.

There are two options:

- **Lookup source from Background**- when enabled, all the layers that are below the UVLookup layer on the timeline and also share the same mapping as the UVLookup layer, are used as the source texture.
- **Lookup source Texture**-this can be a texture applied directly in this field or by using an arrow from another content source layer

UV encoding

The UV mapping coordinates for the RGBA channels in the Lookup source texture.

There are 4 options:

- **U-R/V=G**
- **U=R/V-B**
- **UV=RGB (Packed)**
- **U=RG/V=BA**

Common Layer Properties

Blend Mode

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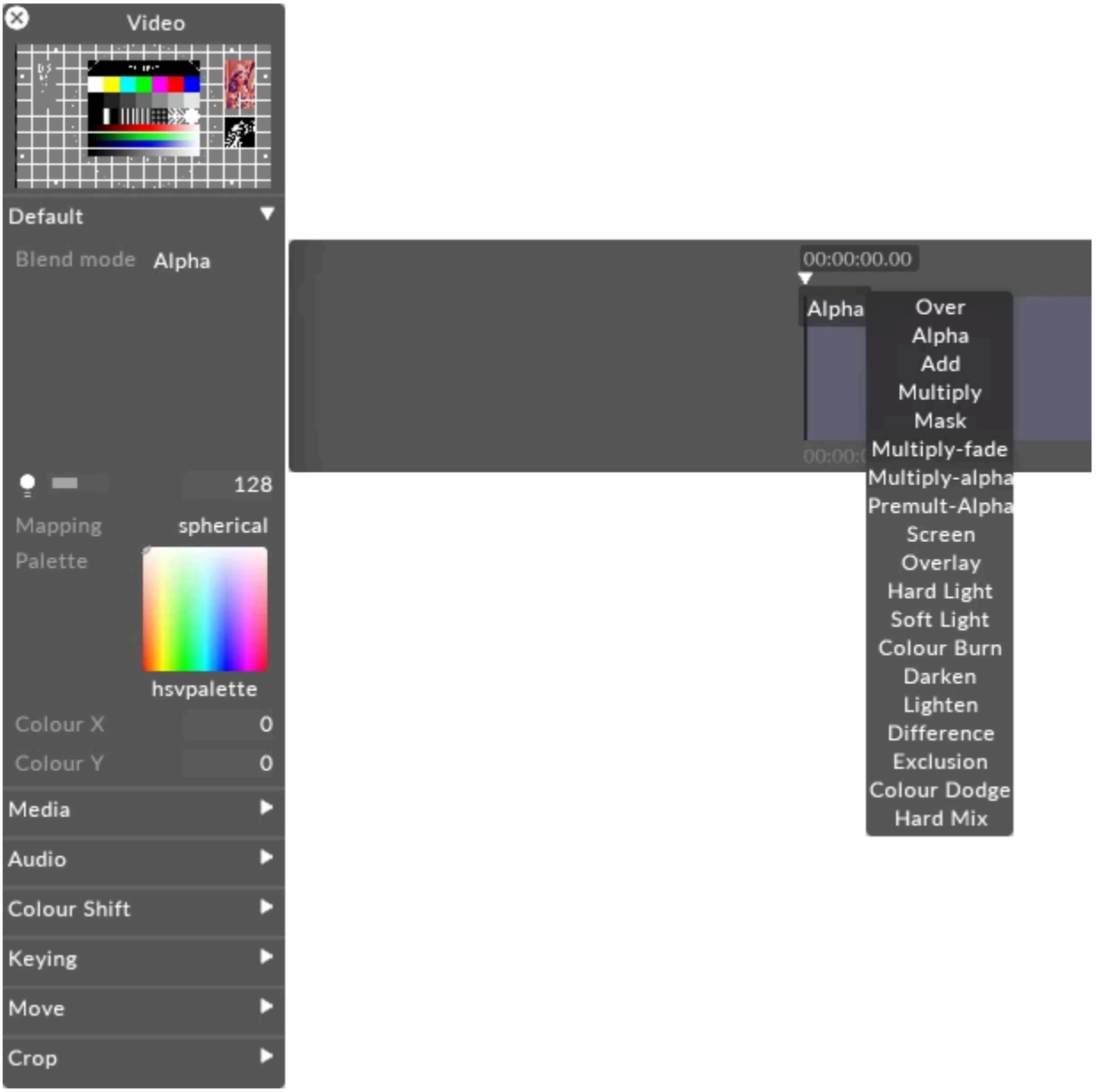

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Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

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Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

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Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

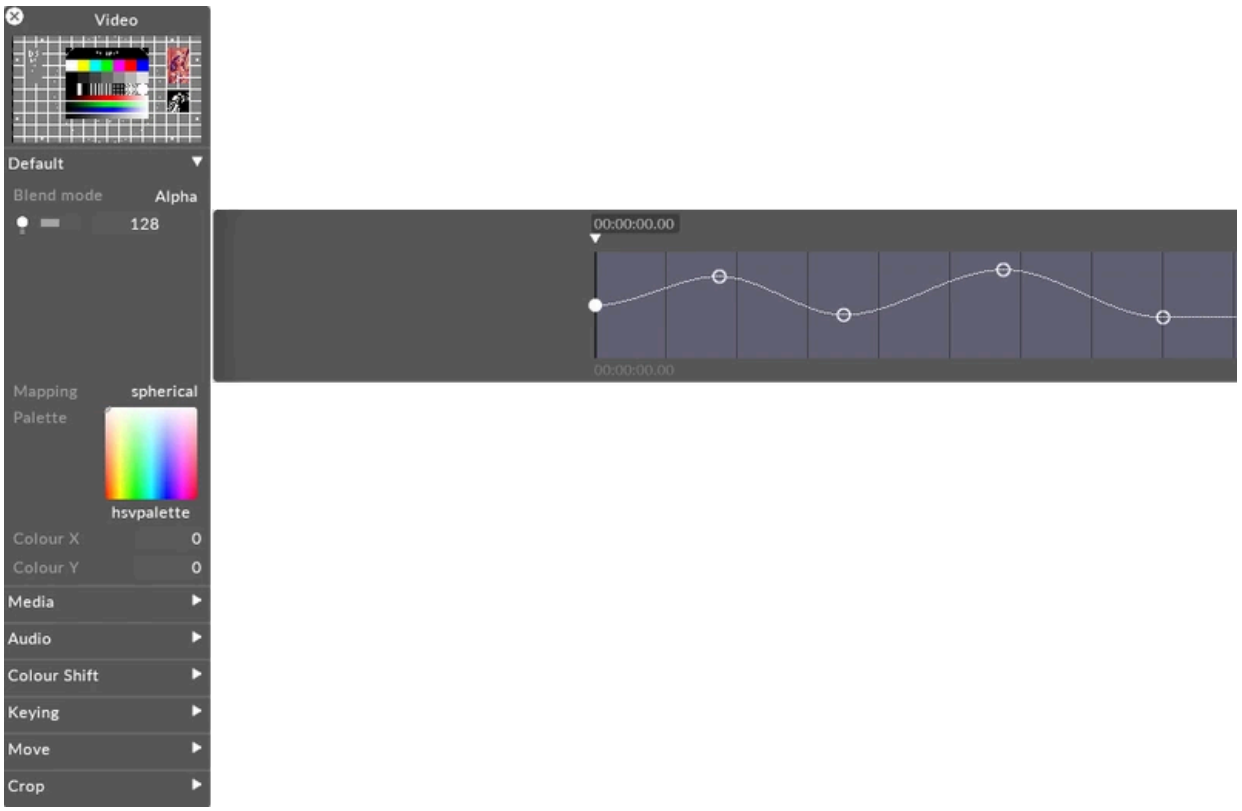
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

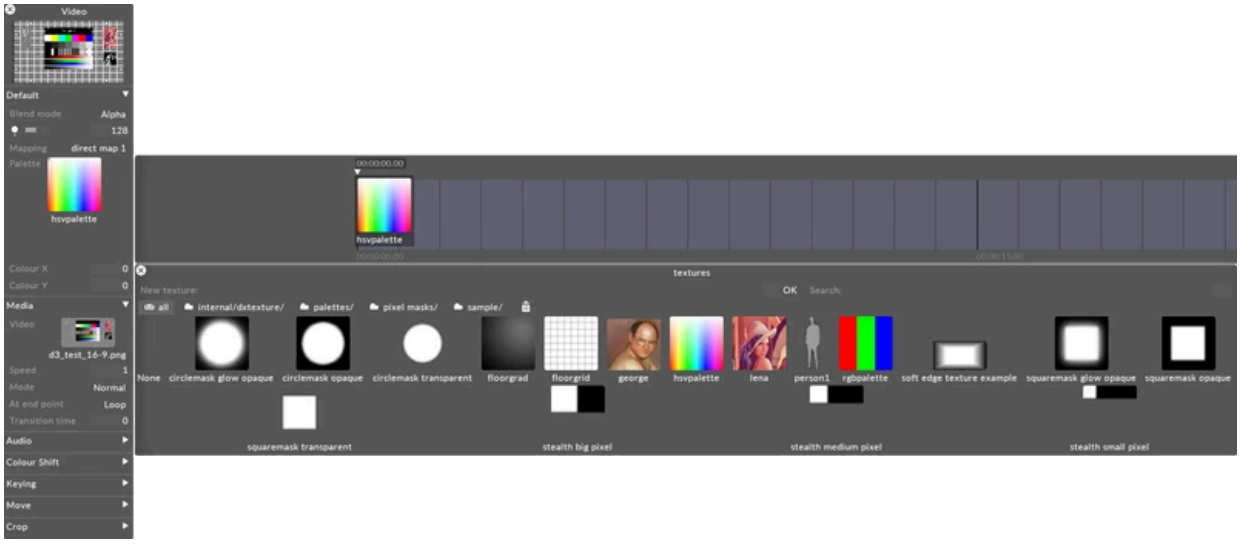


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

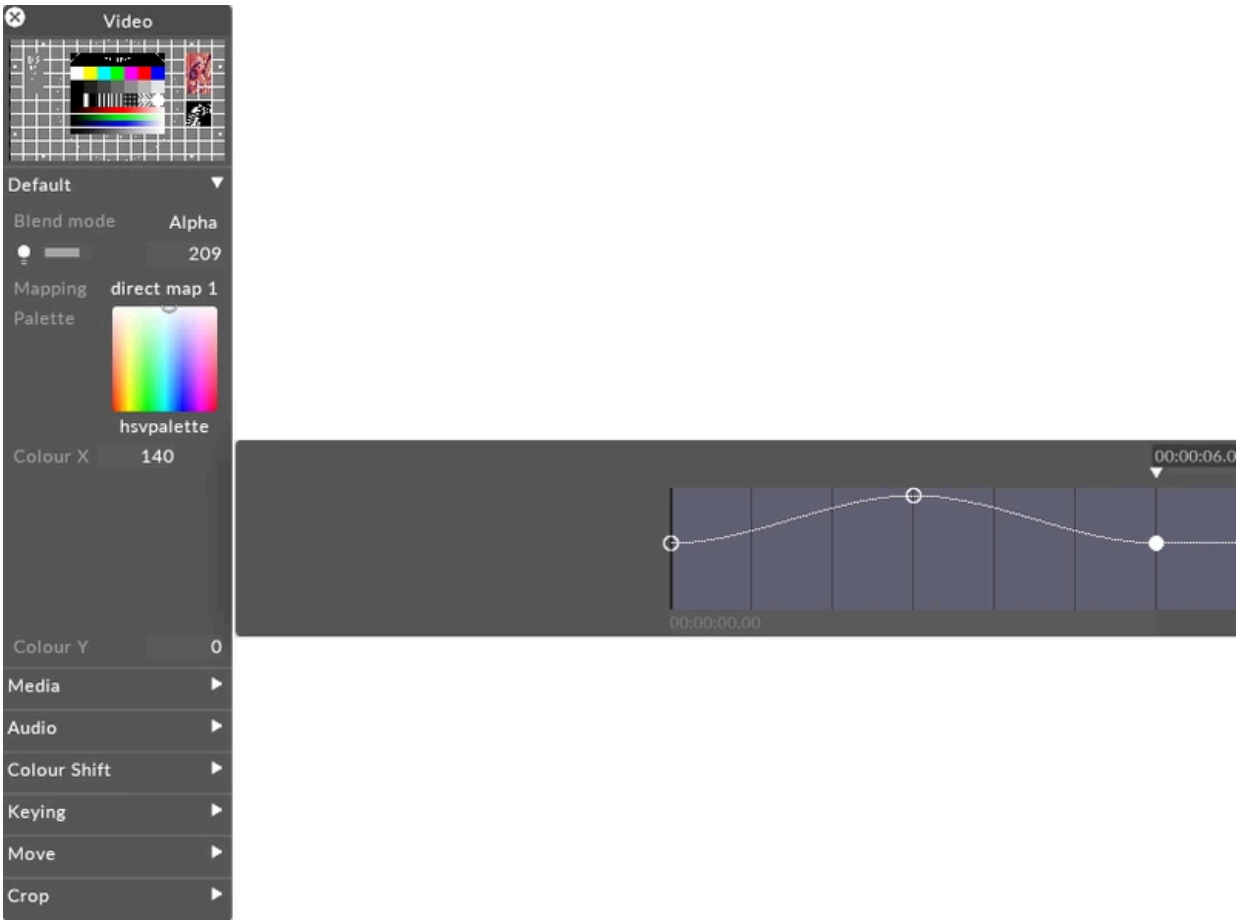
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



VideoTransition

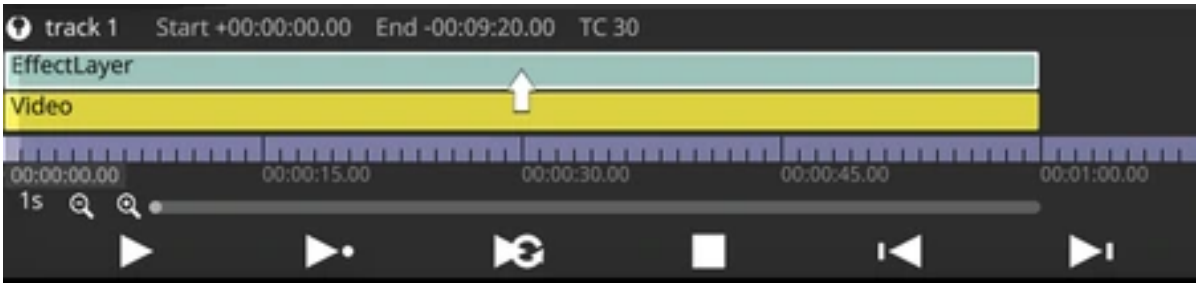
The VideoTransition layer is used as a quick and easy way to perform graphical video transitions between two sets of content. For example, the transition can be a left-to-right wipe or a star wipe. This is very similar functionality to that found on vision mixers.

Workflow

Effect layers receive their source from other layer types - either content or generative - through arrows. An arrow connects a source layer to a destination layer; the source layer is said to be “piped in” to the destination Effect layer. For more information on arrows, see the **compositing layers** topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag from the source layer to the destination layer.

1. Add an Effect layer to your track. For more information about adding layers, see **creating layers**.
2. Draw an arrow from your content layer to the Effect layer so the compositing order looks something like the following image.



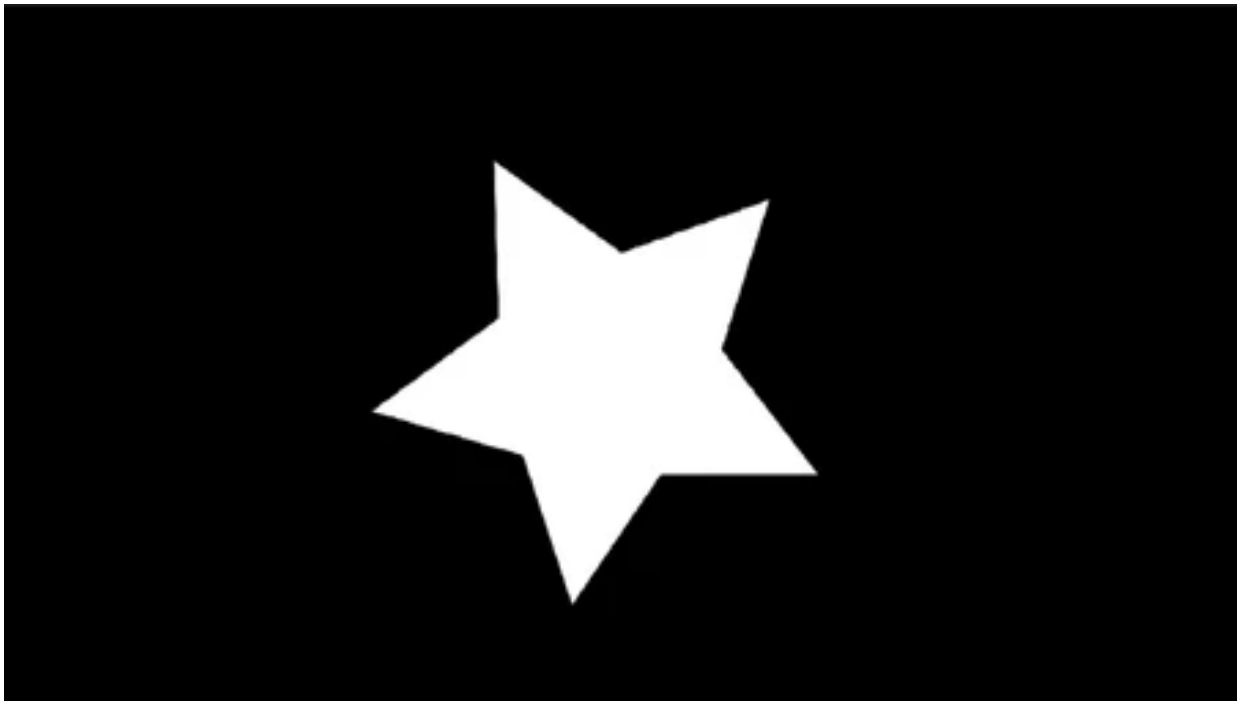
A Video layer piped into an Effect layer on the timeline.

3. Adjust the Effect layer properties to achieve the desired result.

Video Transition File Requirements

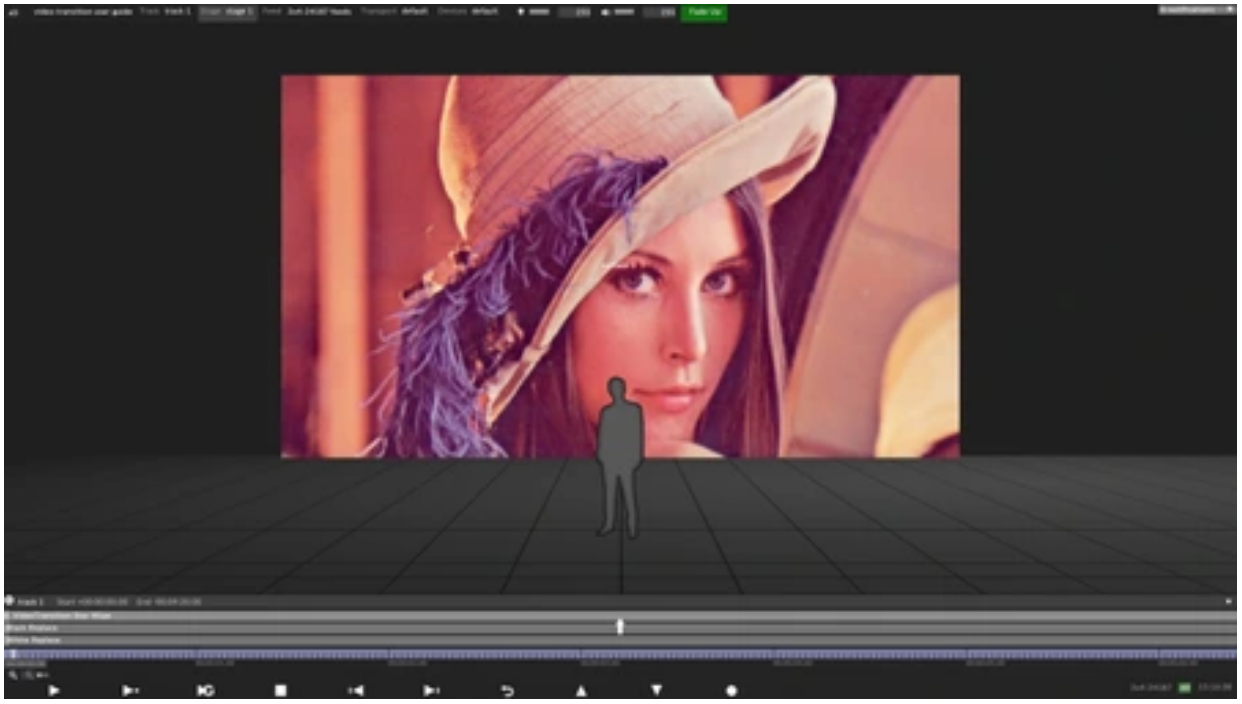
The transitions will need to be black and white, where video 1 will replace the white, and video 2 will replace the black. **These must be a movie** and **not a still image** like PNG or JPEG.

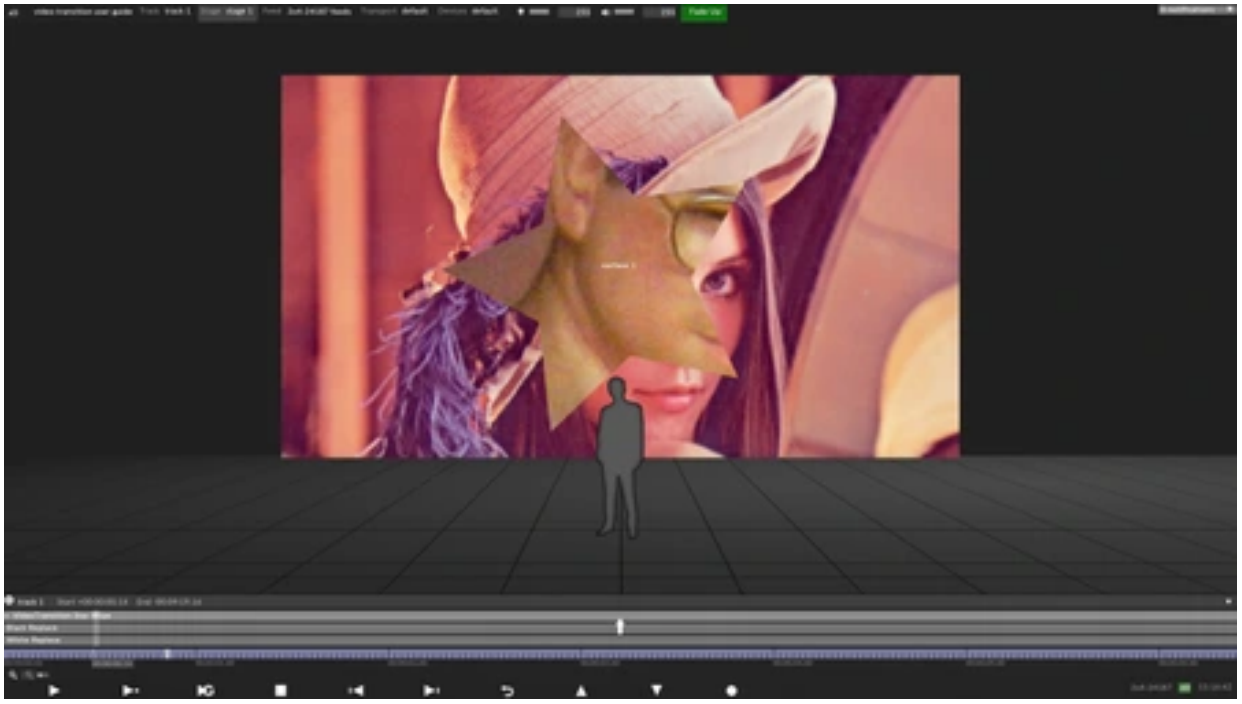
See screenshots here of how an example Video Transition looks using George, Lena and a greyscale Star.



End Result

After arrowing video layers into the Video Transition Layer, this is the effect produced.



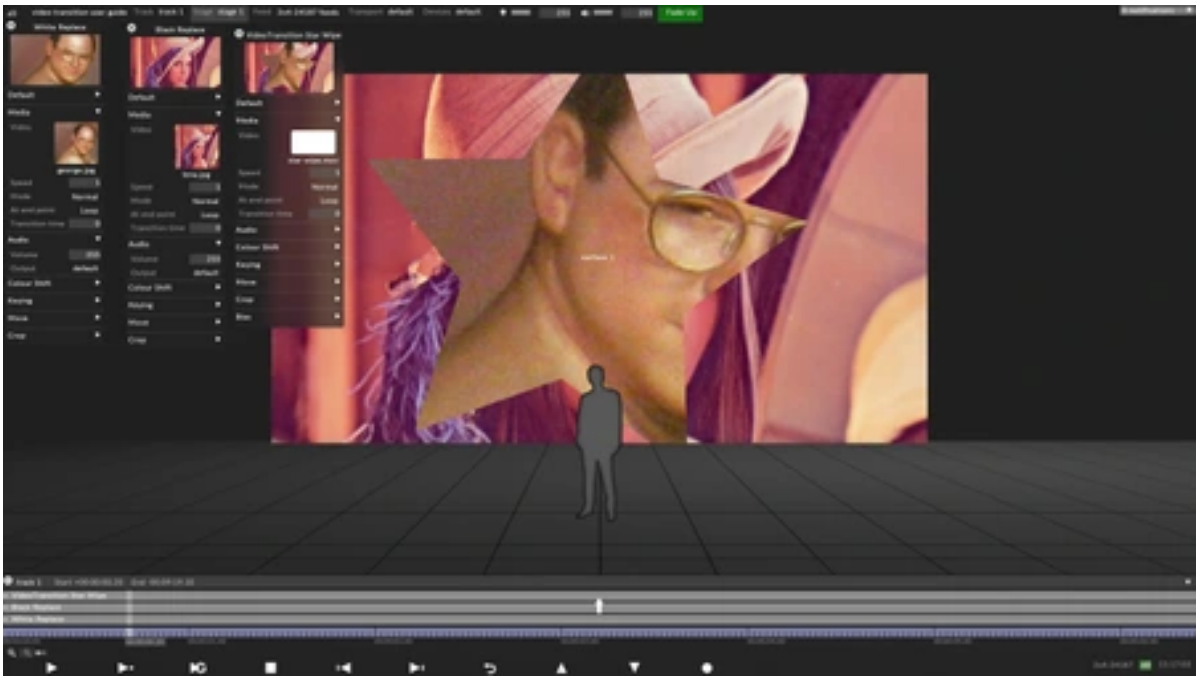




Example

1. Firstly, create two video layers and populate them with content. This can be any valid video file, including the Video Input.

2. Then add a **VideoTransition** layer above the two video modules. Next, hold down the Alt key and click on what video is replacing the Black of the video Transition, and drag that arrow to the Video Transition layer. Likewise, do the same for the video, replacing the White part.
3. Next, add your Video Transition Video into the Video Transition Layer.
4. If you hit play, you will see your desired effect. Here is an image of the Layers used and how they are populated

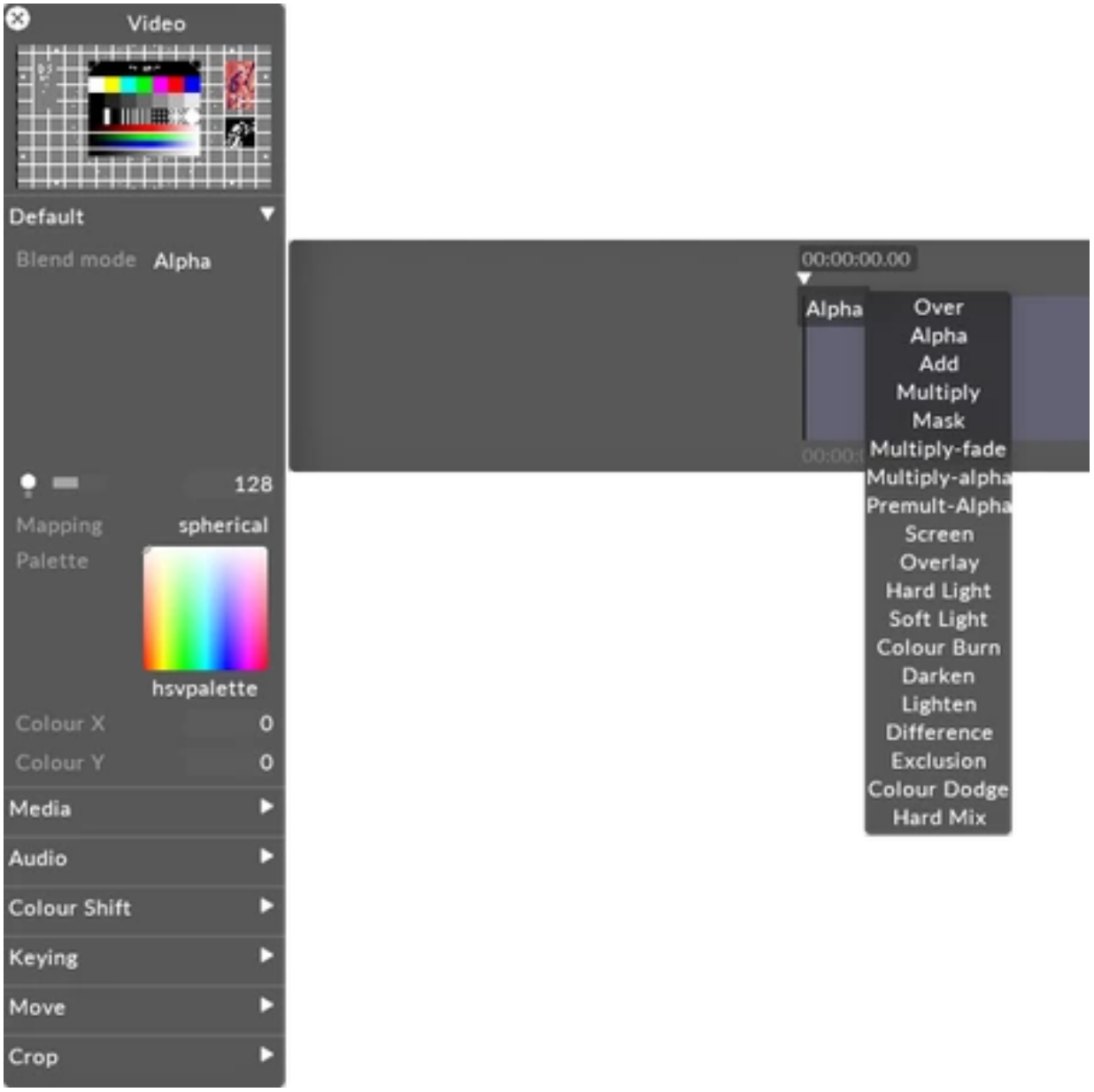


If you would like to reverse the Black and White of the Video Transition, then simply go into the 'Colour Shift' dropdown of the Layer and swap the RGB Maximum and Minimum values, so that the Minimum is now 255 and the Maximum is 0.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

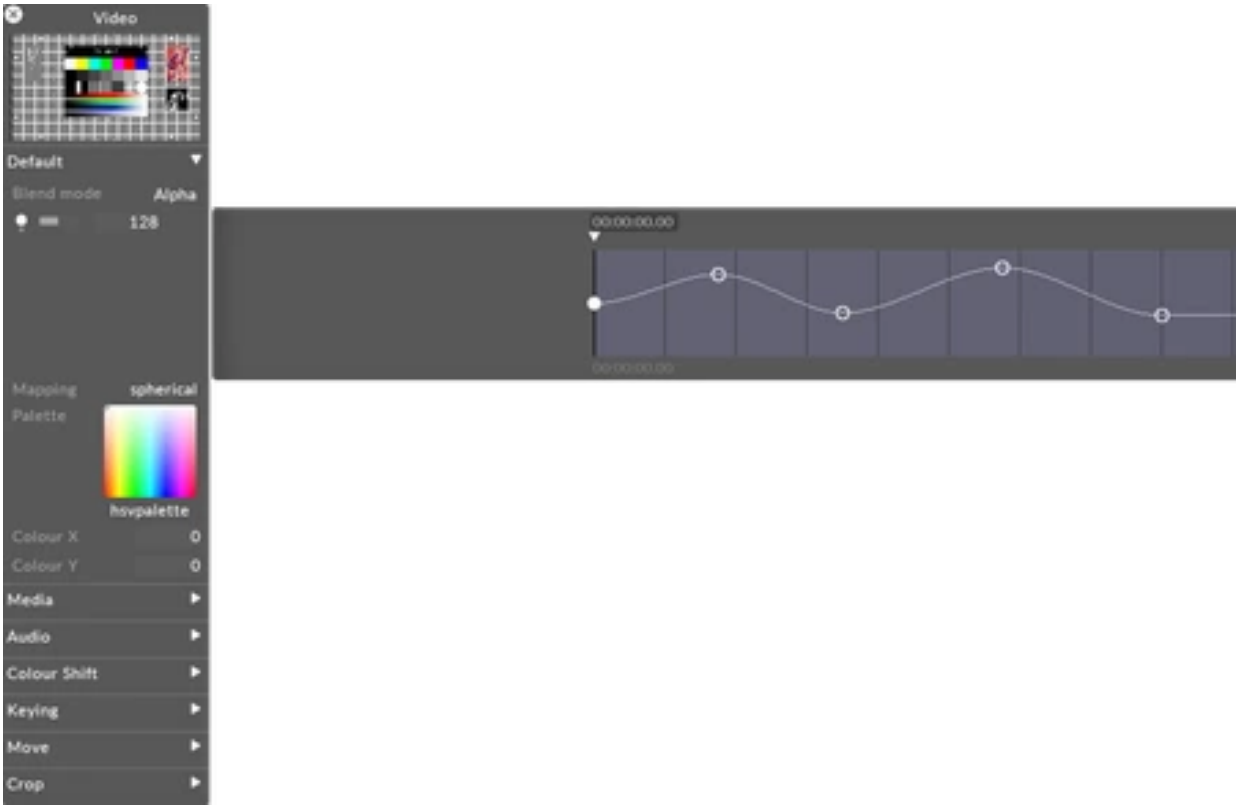
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.

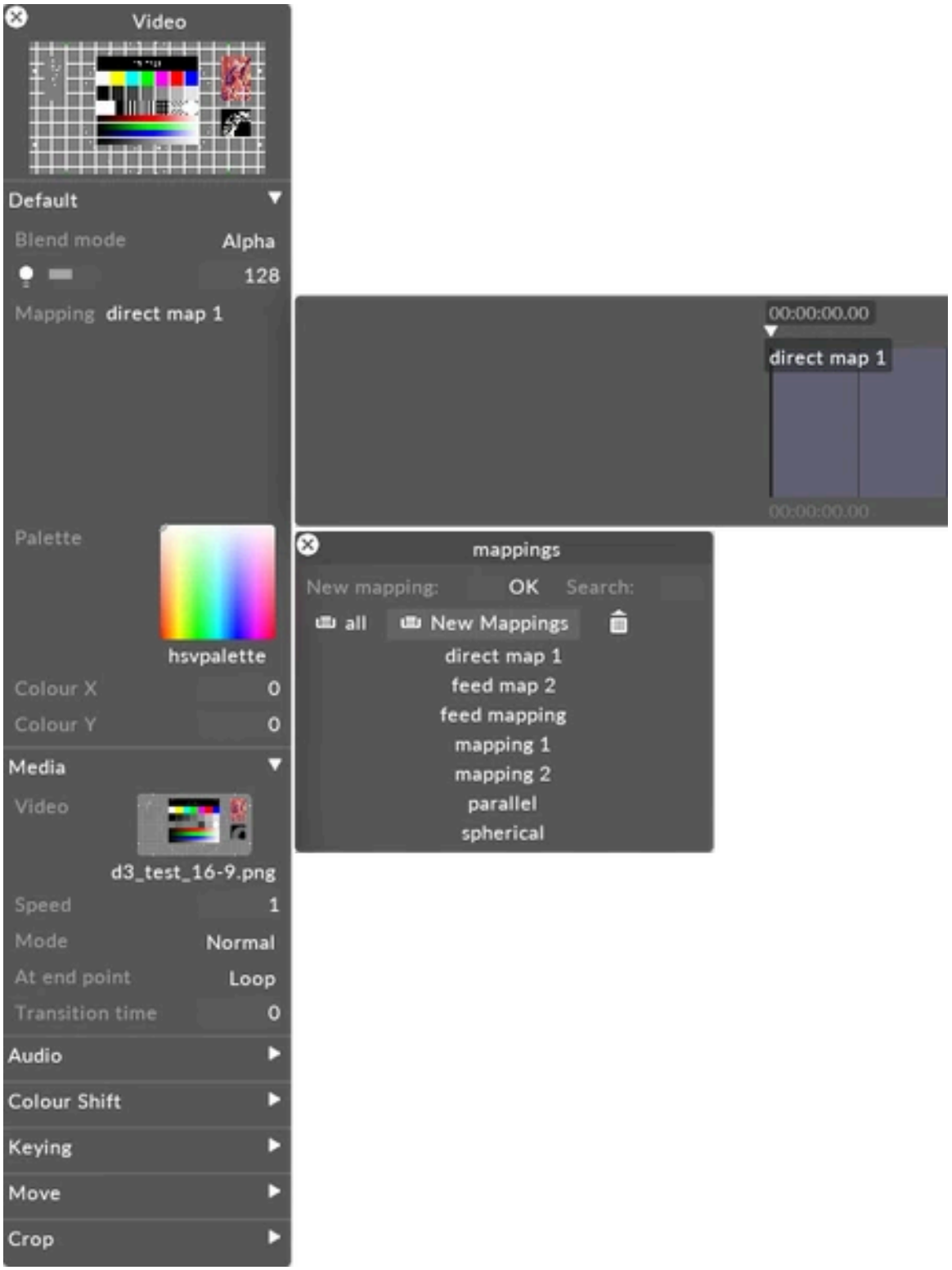


If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

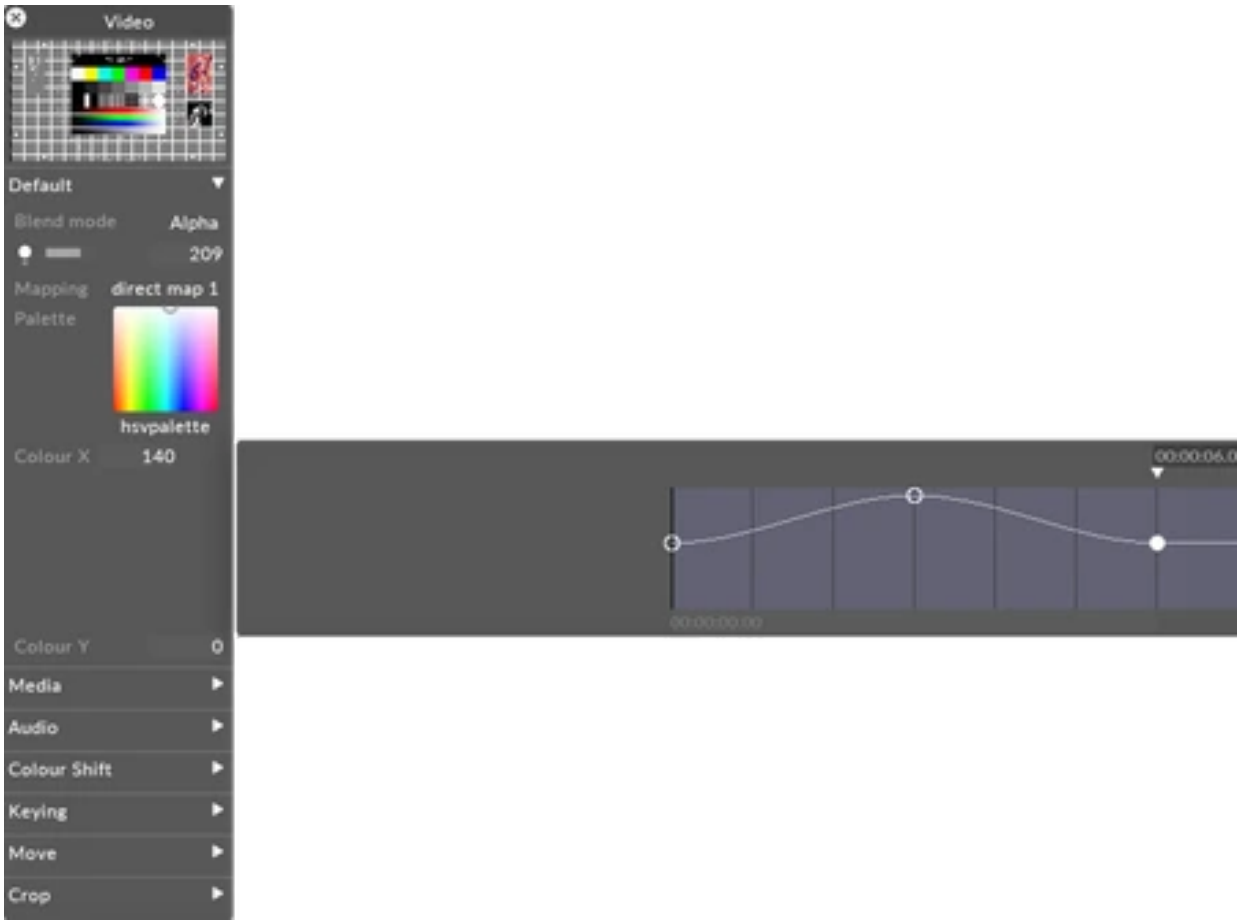
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



ColourShift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

This property changing the hue of colours in an image, design, or graphic while maintaining other colour properties like saturation and brightness.

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` *set to Together (from left to right): 0, 0.3, 0.8*



With `RGB controlled` *set to Separate, red min (from left to right): 0, 0.3, 0.8*

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` *set to Together (from left to right): 1, 0.7, 0.2*



With `RGB controlled` *set to Separate, red max (from left to right): 1, 0.7, 0.2*

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` *set to Together (from left to right): 0.1, 1, 4*

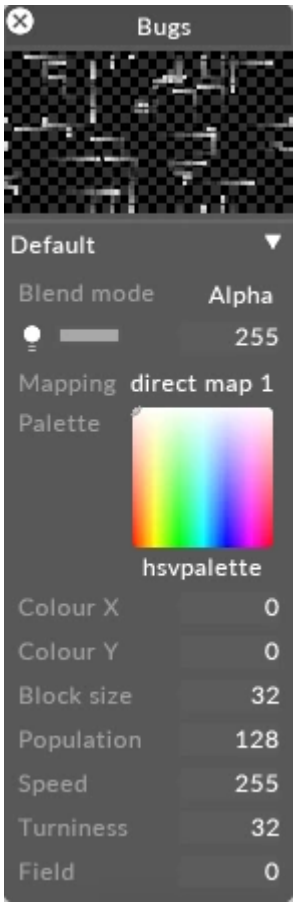


With `RGB controlled` *set to Separate, red gamma (from left to right): 0.1, 1, 4*

Bugs Layer

The Bugs layer is a simple generative layer that simulates a number of bugs.

A bug is a block of colour that moves across the canvas, leaving behind a fading trail of blocks. With each step, the bug may decide to change its direction or continue in the same direction.



Bugs Layer Properties

Block size

This controls the size of each bug, in pixels. When the block size is higher than 1, a one pixel black border is drawn around each bugs square. The smaller the size, the finer the pattern generated.

Population

This controls the number of bugs. When set to 255, the maximum number of bugs is drawn.

Speed

This controls how many times per beat the bugs update their position.

Turniness

This controls the ability of each bug to change direction at each step. When set to the minimum value 0, the bugs will move in straight lines and never change direction; when set to the maximum value 255, the bugs will turn at every opportunity.

Field

This controls the number of directions the bugs can choose from. The min/max Field values are 0 and 9. Different Field values control the directions the bugs move in in different ways.

The following Field values cause the bugs to move in the following directions:

0 : horizontally right and left + vertically up and down

1 : horizontally right and left

2 : vertically up and down

3 : diagonally up and down

4 : diagonally down into horizontal right and left

5 : vertically up

6 : vertically down

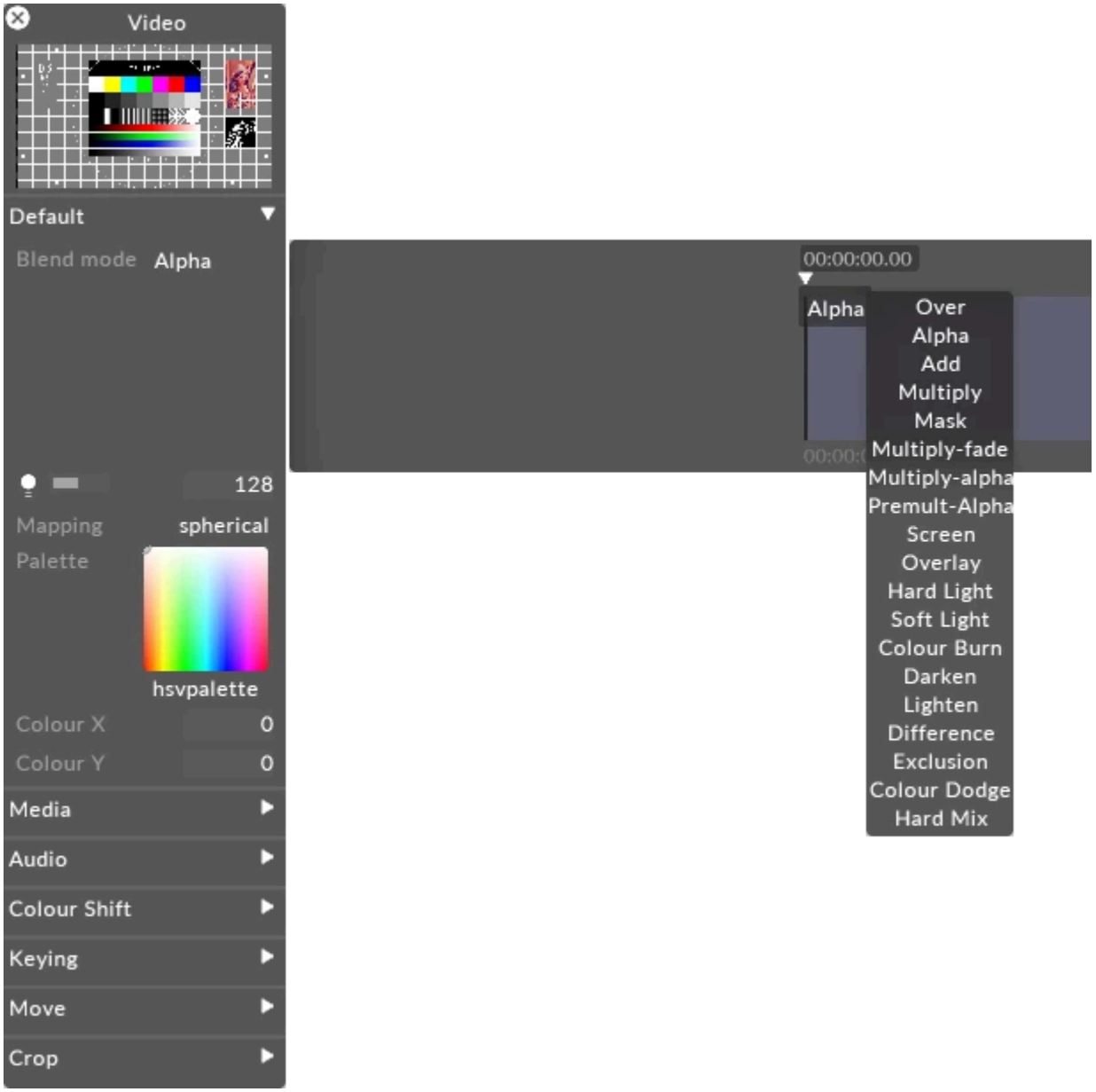
7 : horizontally right

8-9 : horizontally left

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the Luma Matte mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

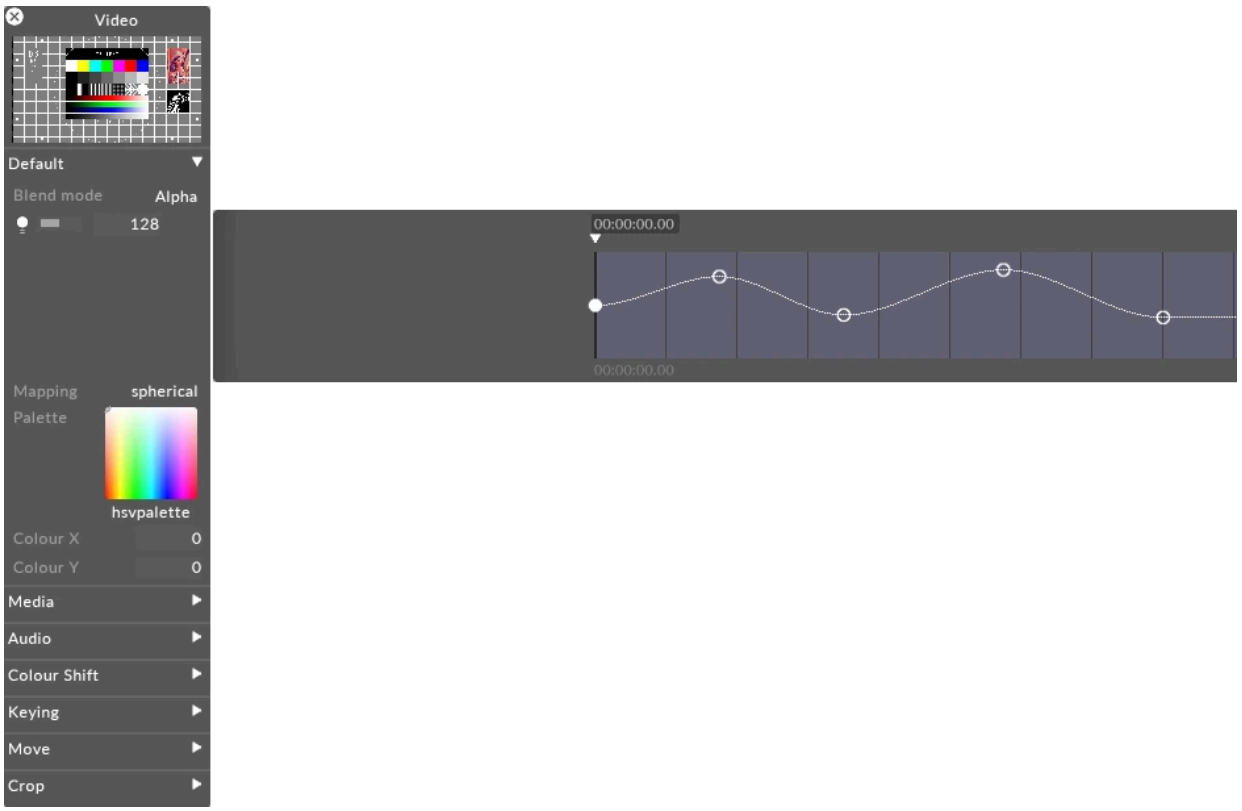
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

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The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



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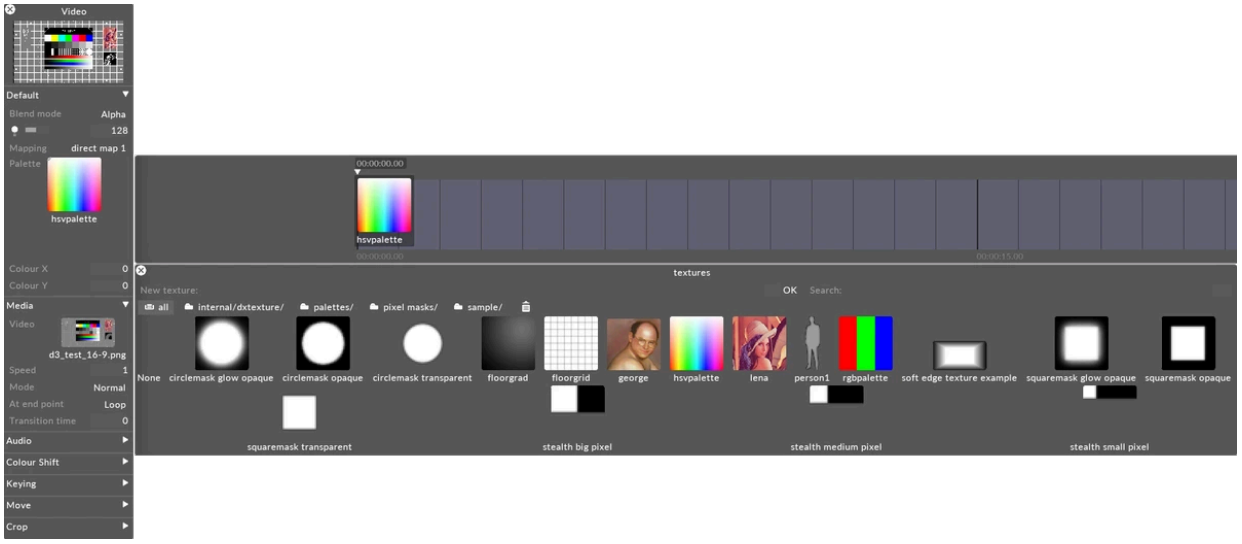
To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



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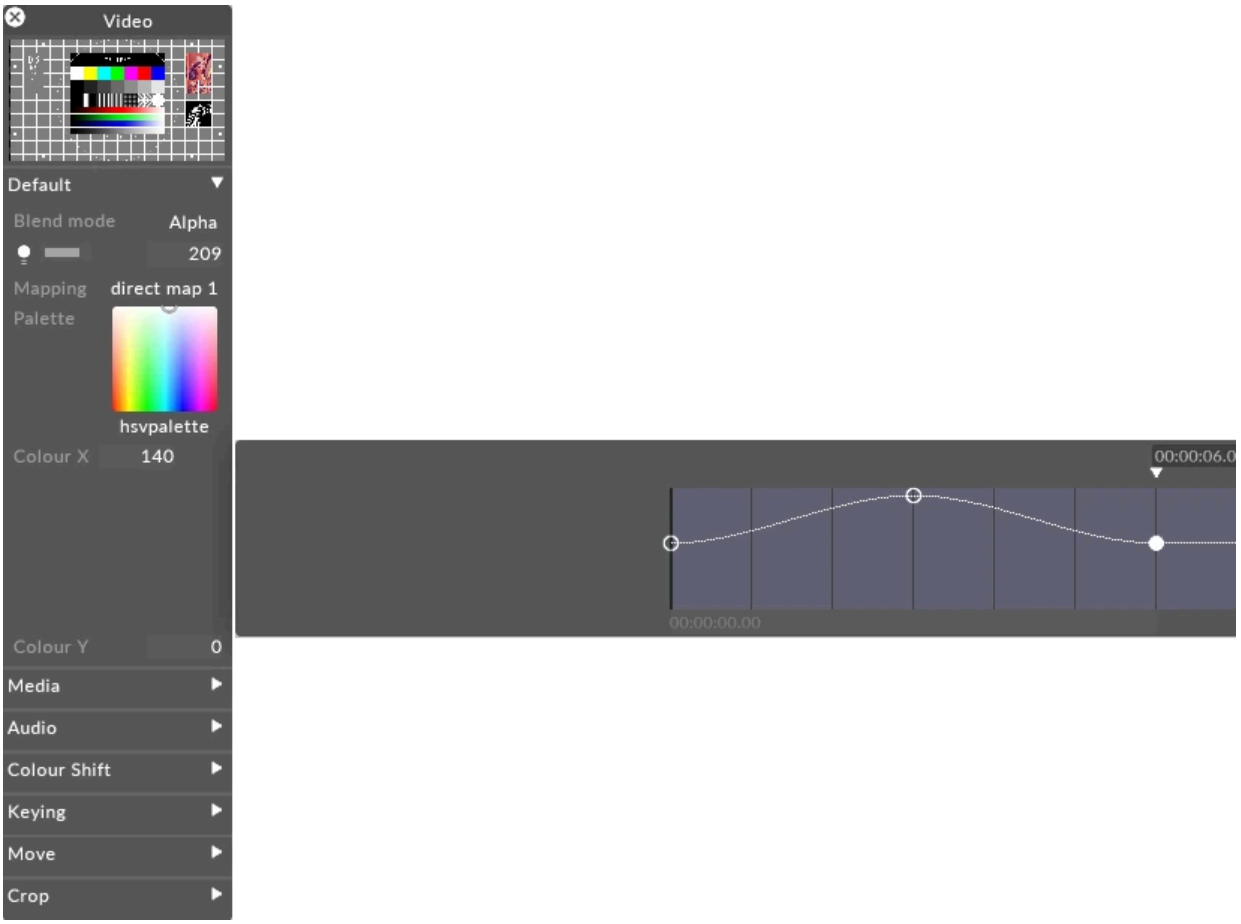
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

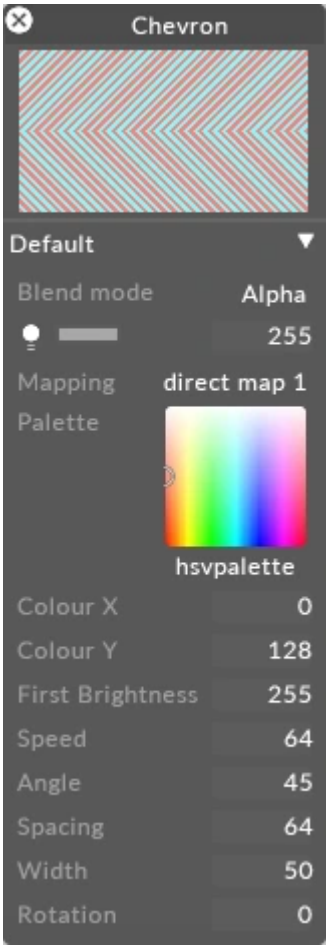
For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Chevron Layer

Sooner or later, everybody needs chevrons. Recognising this fact of life, Designer includes a Chevron layer for all of your chevron needs



Chevron Layer Properties

Speed

This controls the speed of the chevrons, in pixels per beat. Positivenumbers move the chevrons to the left; negative numbers move the chevrons to the right.

Angle

This controls the angle of the chevron fins, in degrees. Smaller numbers move the angle closer to horizontal.

Spacing

This controls the spacing between the chevrons, in pixels.

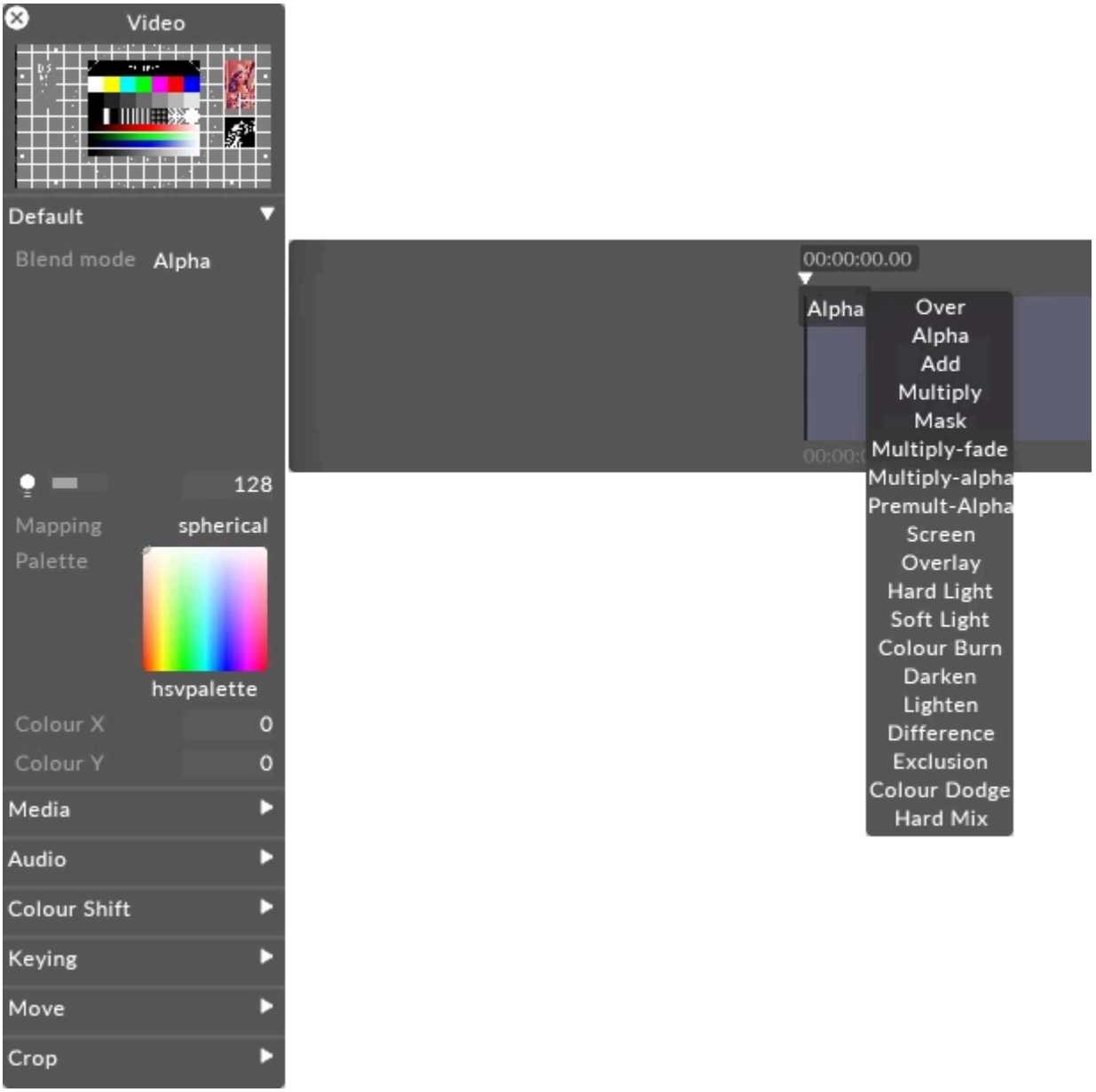
Width

This controls the width, as a percentage of the spacing, of the first colour band.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

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Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

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Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

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Darken

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Brightness

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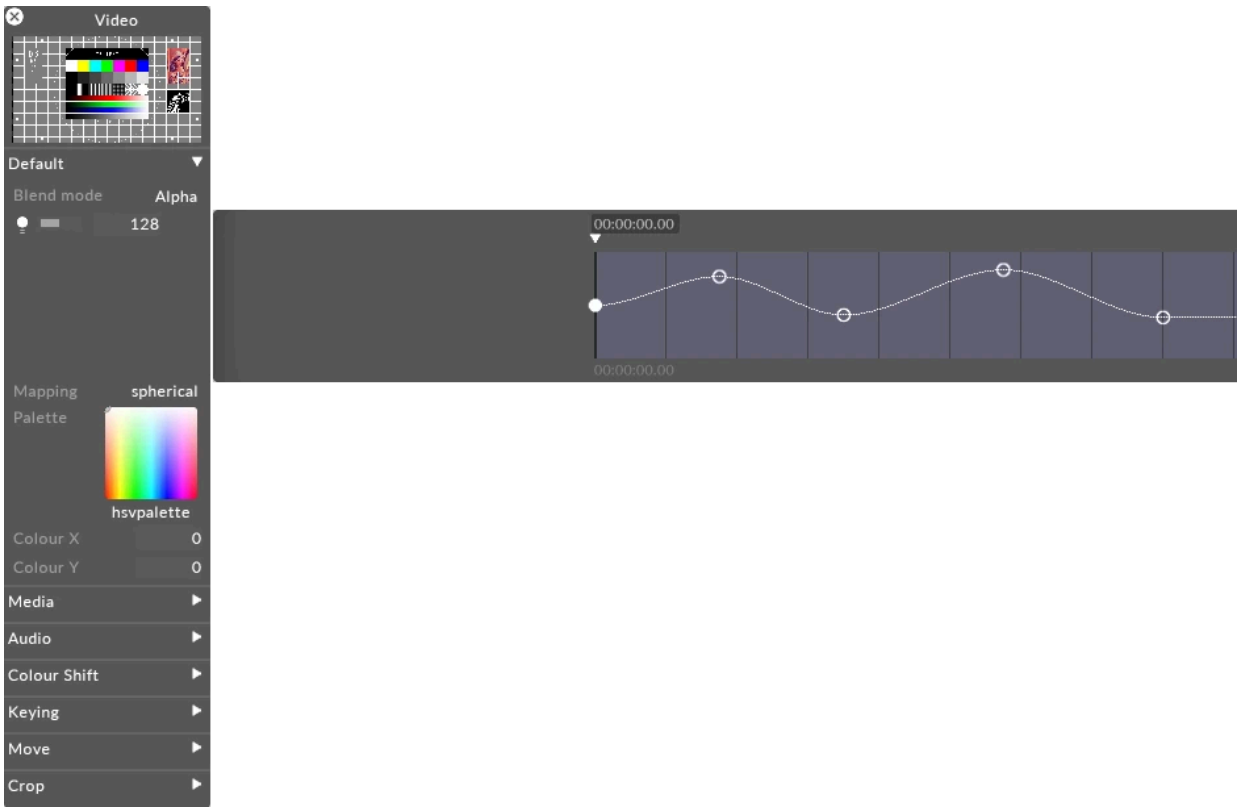

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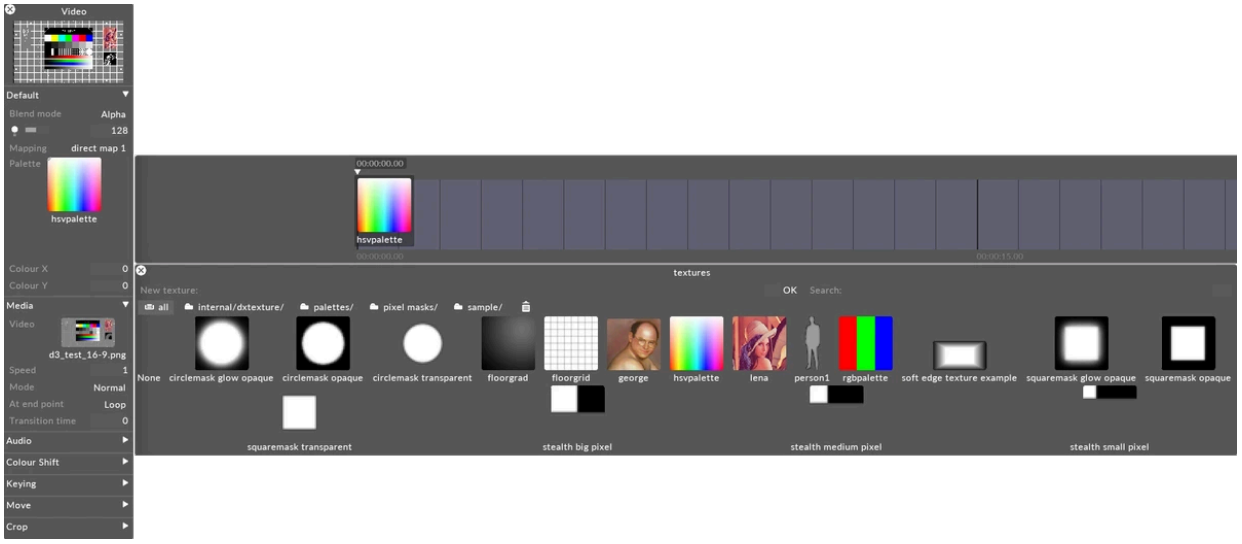

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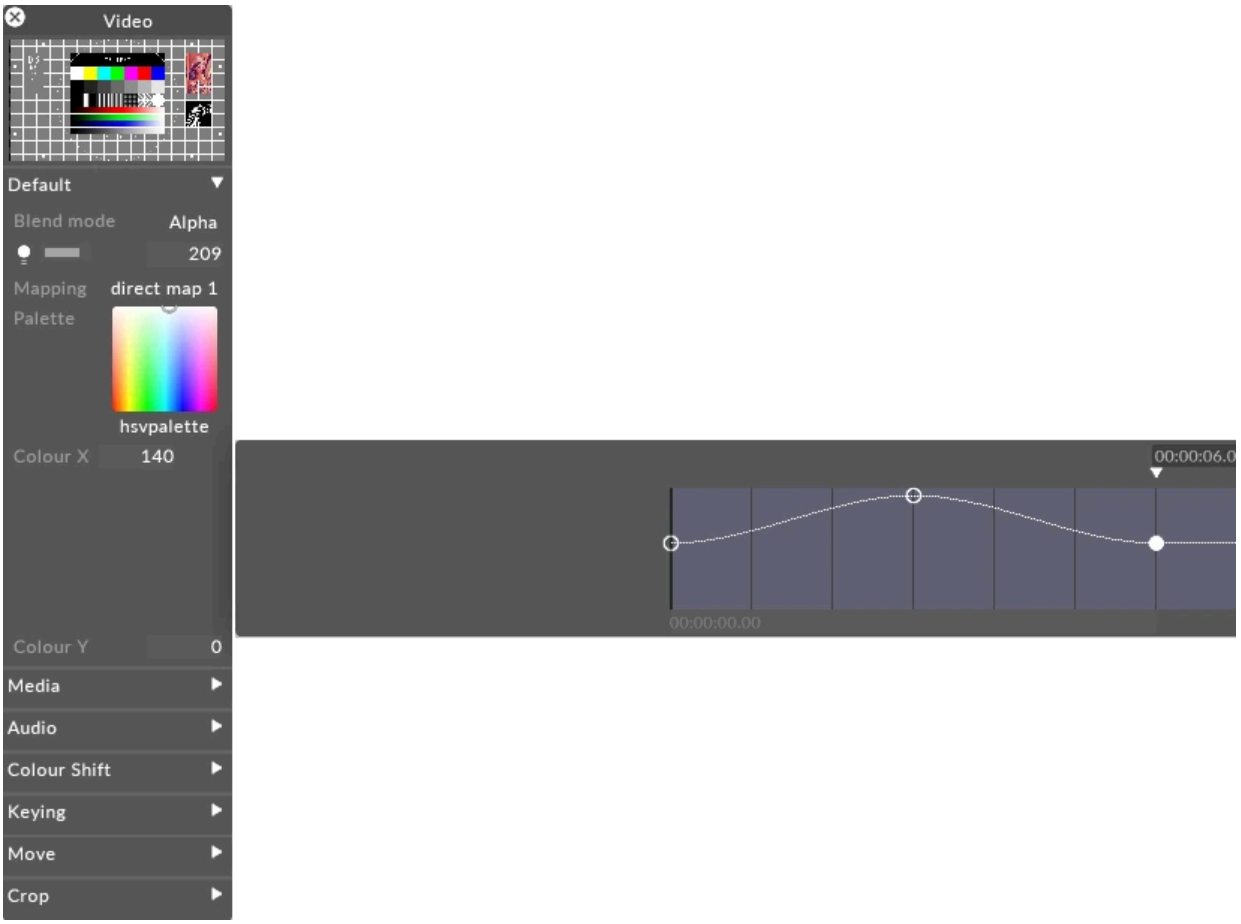
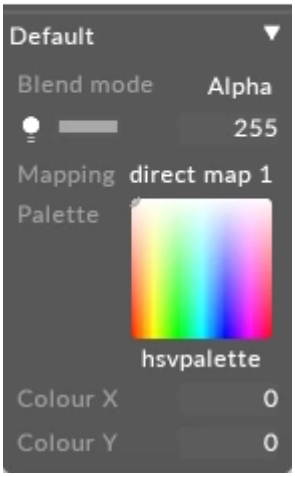


Colour Layer

The Colour layer is a generative layer that generates a flat colour.

The Colour layer can be used in combination with other layers such as the Video layer and the RenderStream layer, and is used to tint the image being output from that layer.





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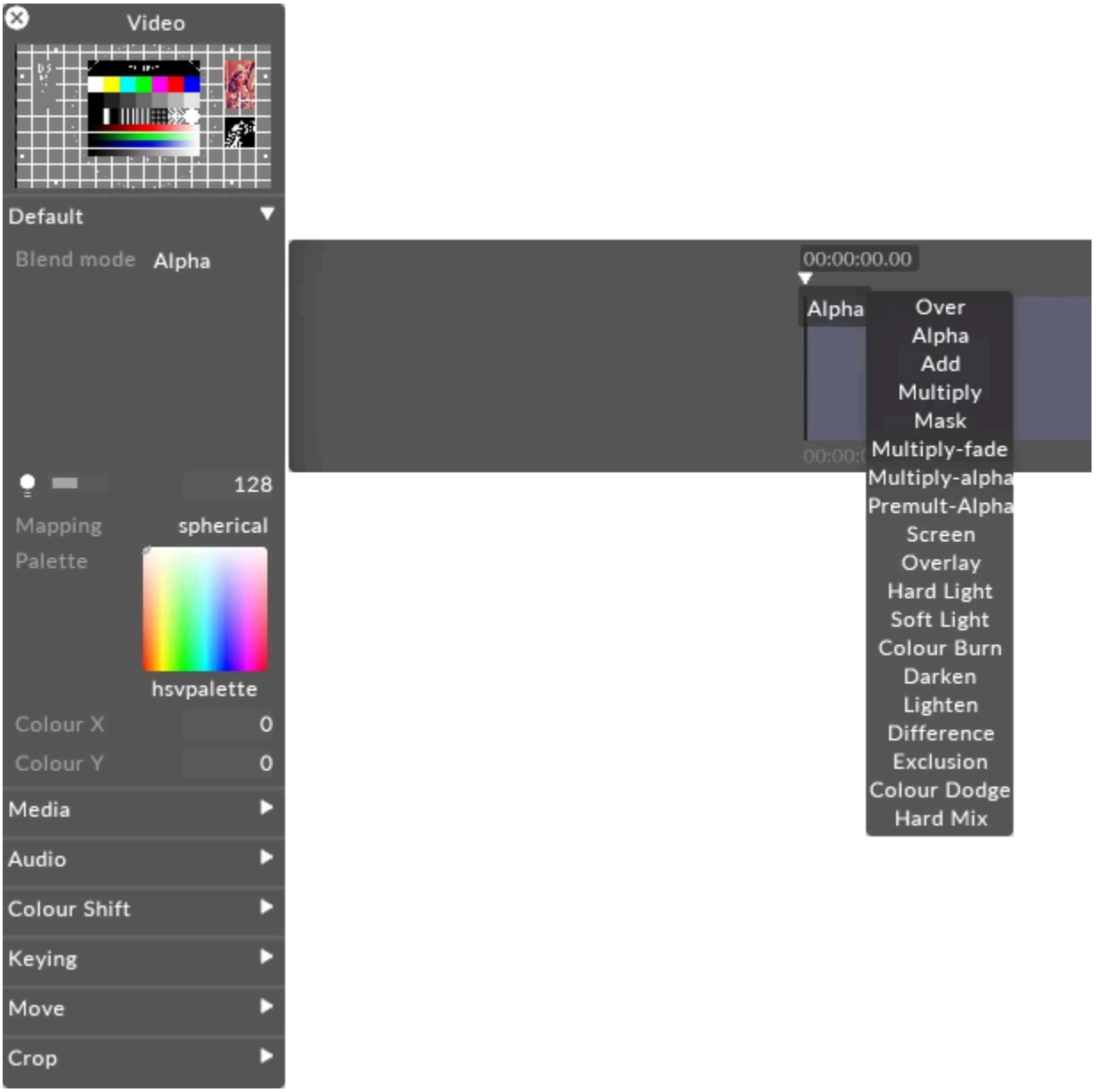

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Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

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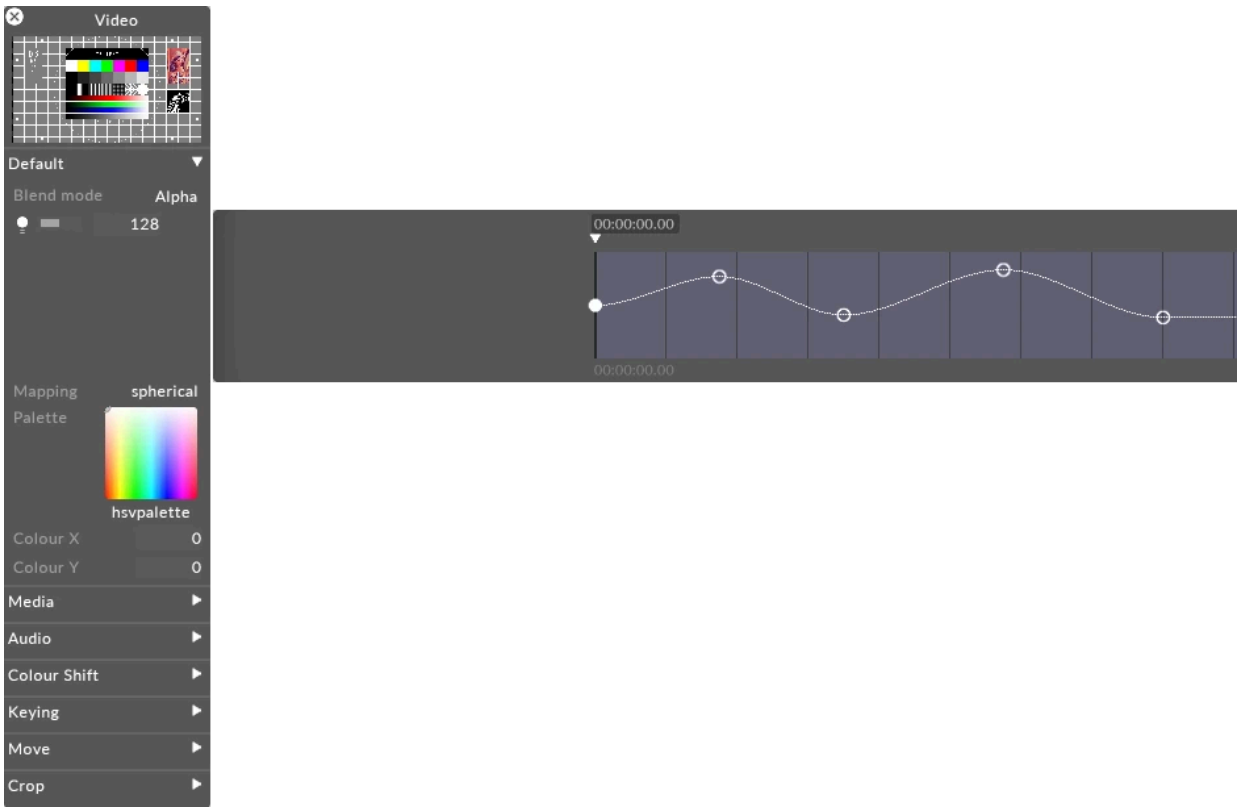

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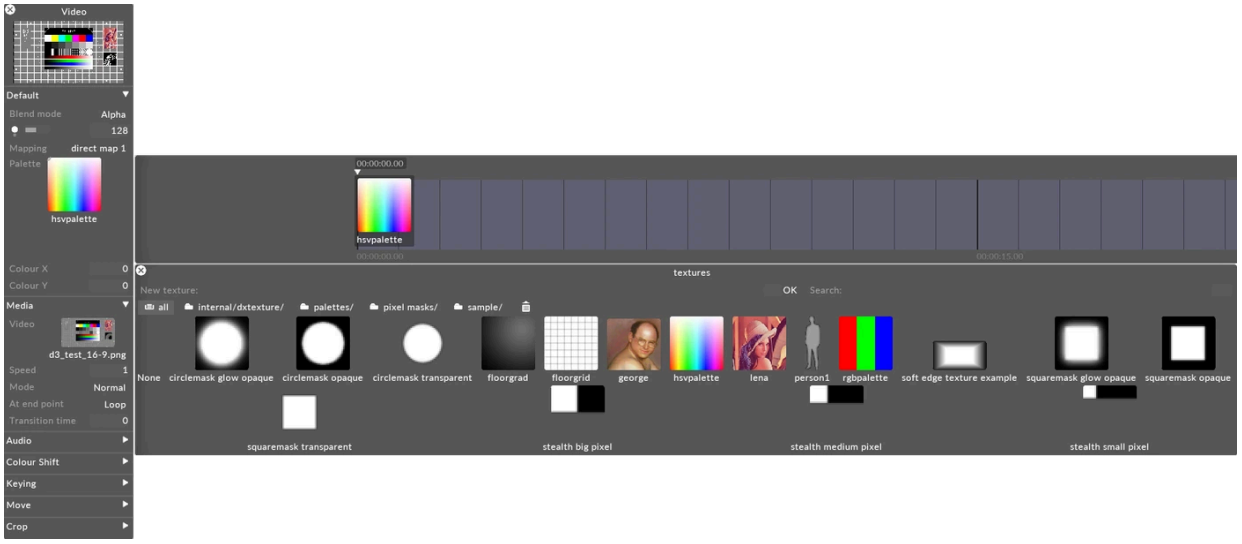


To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

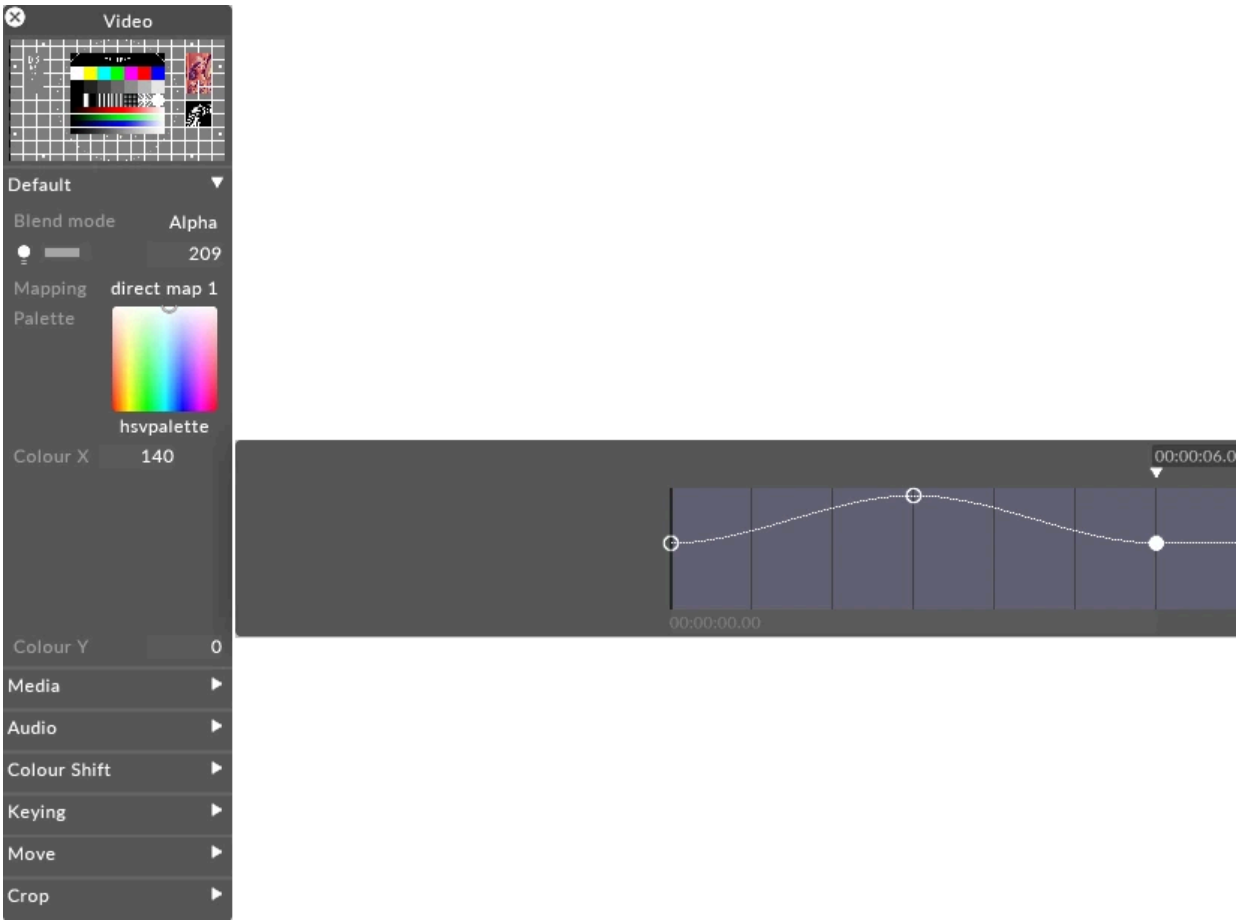
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Generative Layers

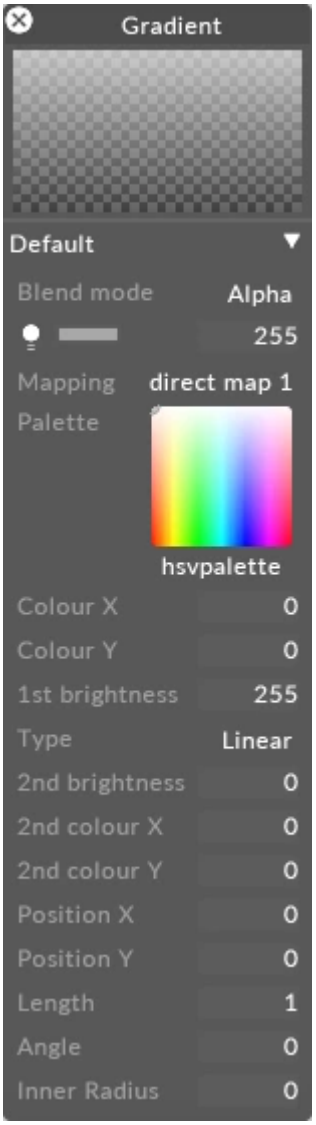
Designer has several types of layers that can be used to generate content in real-time known as Generative layers.

Types of Generative Layers

- Bugs
- Chevron
- Colour
- Gradient
- Notch
- Radar
- RGBColour
- Readout
- Scan
- Strobe
- Tennis
- Testpattern
- Text
- TrackingMarker

Gradient Layer

The Gradient layer draws real-time gradients composed of two colours. This means that the colours contained in the gradients can be keyframed and sequenced to change instead of being rendered into the content.



Layer Properties

Type

Either **linear** or **radial** .

2nd Brightness

This controls the brightness of the second colour in the gradient.

2nd xCol, 2nd yCol

This controls the second colour in the gradient (both colours must be taken from the same palette bitmap).

Position x, y

This controls the position (ranging from 1 to +1 on both axes) of the the gradient. In case you are using the **linear** gradient, this is the midpoint of the line; If you are using the **radial** gradient, this is the center of the circle.

Length

Length can have a value ranging from 0 to 1 (1 = complete canvas width) and controls the width of either the linear gradient or the radius of the circle.

Angle

This is only meaningful when using linear gradients. It controls the angle of the line, in degrees.

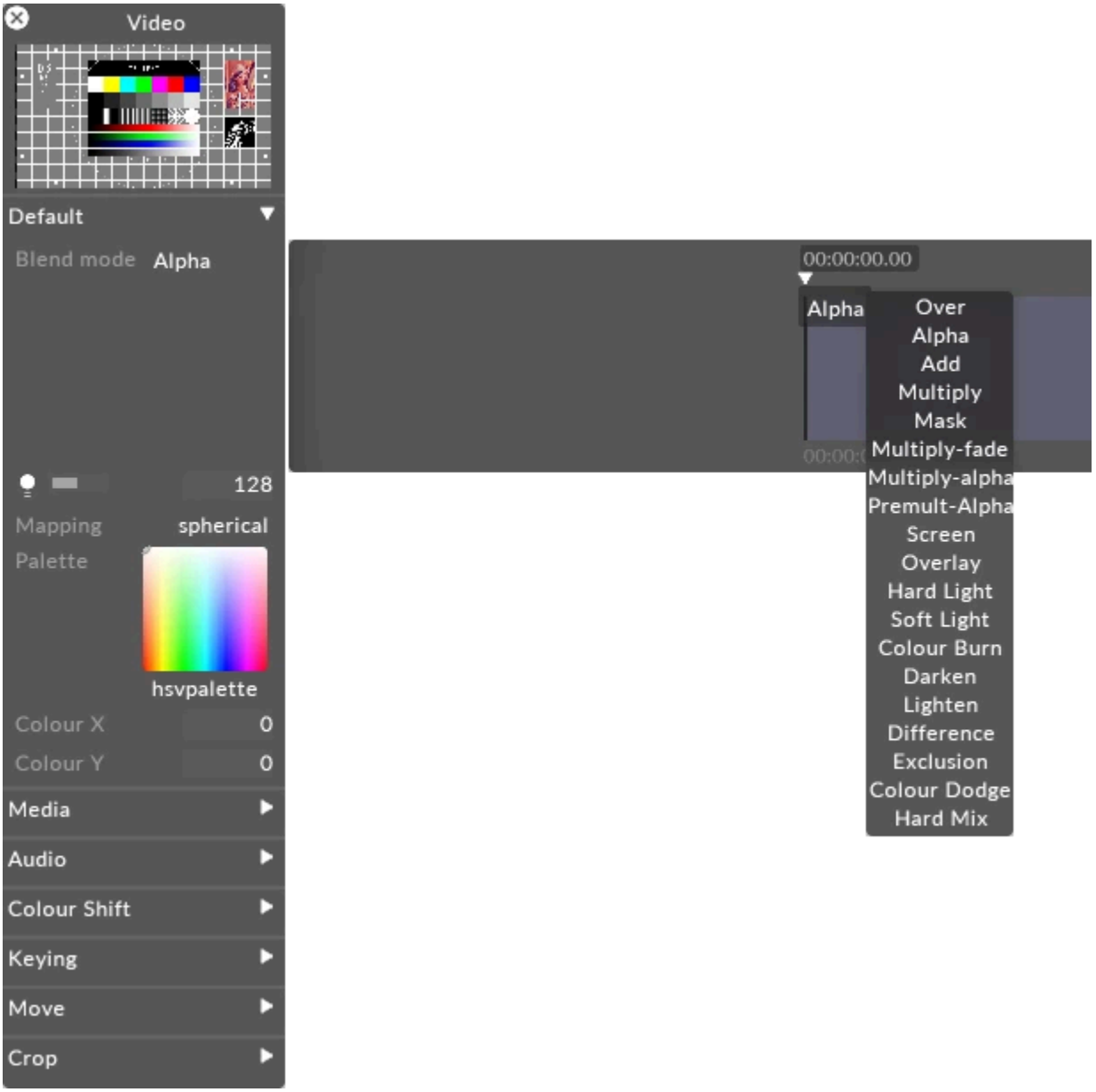
Inner Radius

Radial offset before the gradient occurs. Only applies when the gradient **Type** is **Radial**.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the Luma Matte mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

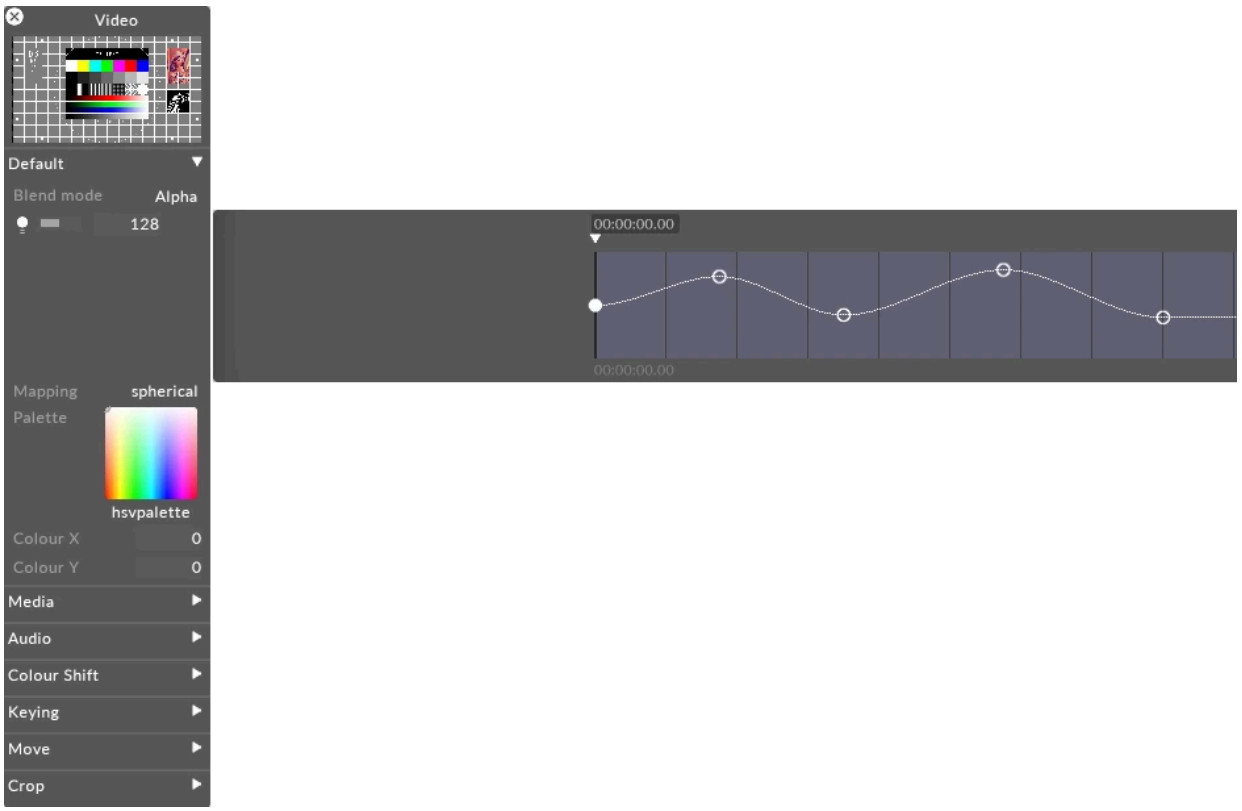
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

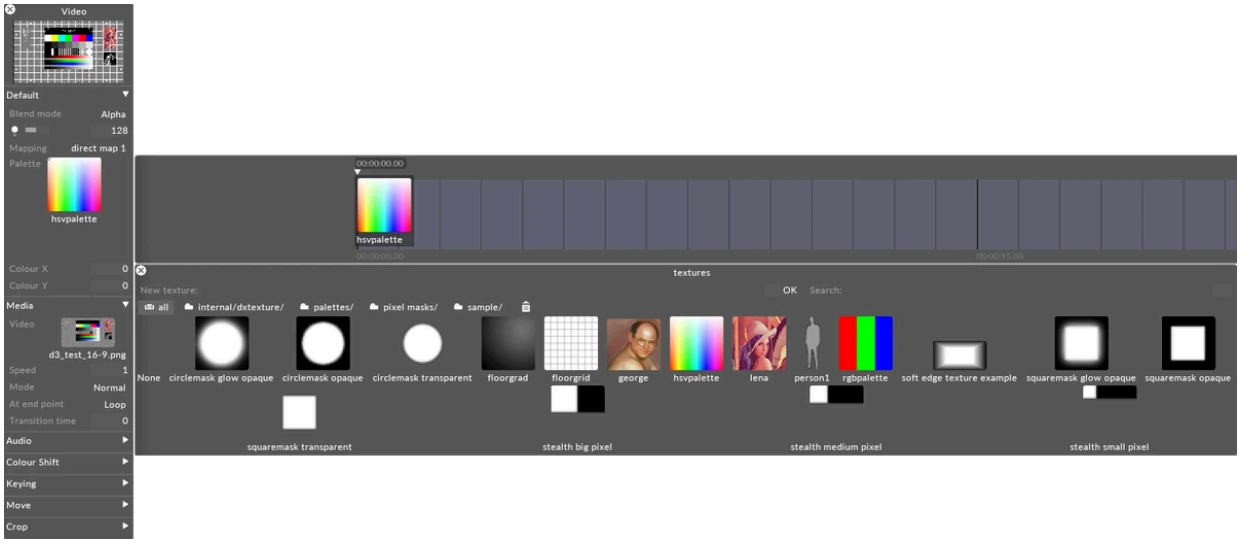


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



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Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

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For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

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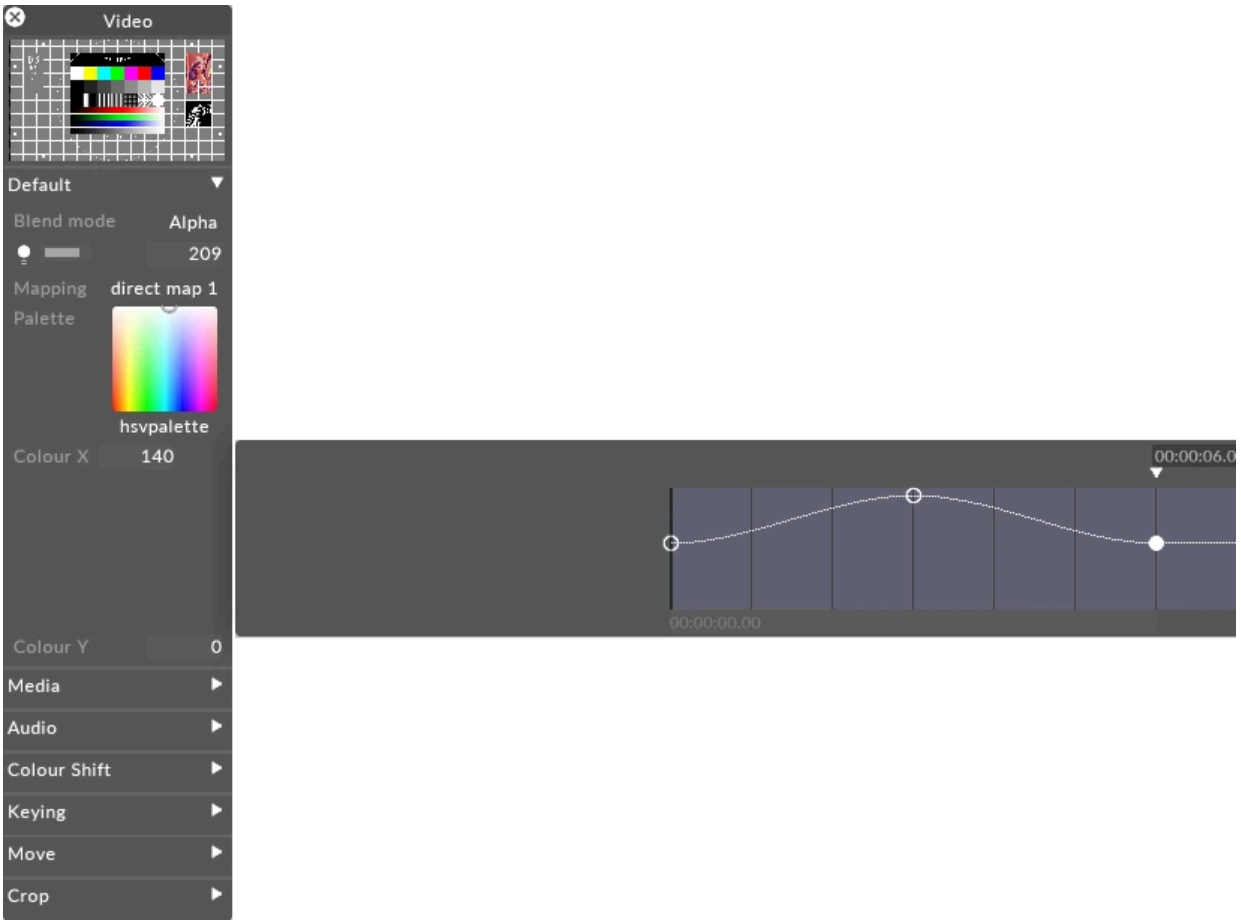


Notch Layer

The Notch layer allows users to use **Notch Blocks** exported from **Notch Builder**.

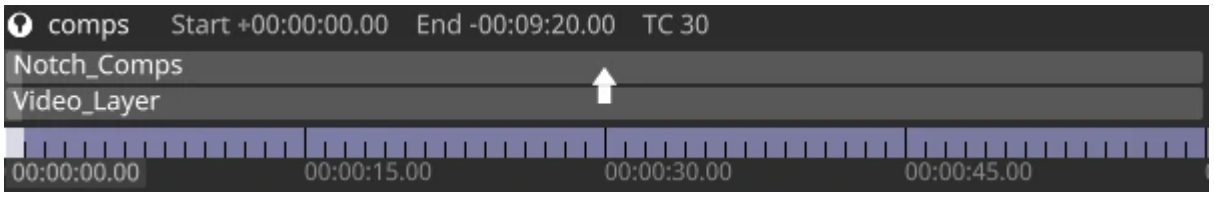
Notch content creation should be approached from a similar standpoint to that of rendered content, whereby the user specifies as much in advance as possible and tests the content on a real world system before show time to reduce the likelihood of performance related issues.

> ⚠ **Warning**
>
> Extremely demanding Notch blocks can cause an oversubscription of available memory resources - click **here** for full advisory.

Some Generative layers take their source from other layer types - either content or generative - by use of an arrow. Linking two layers with an arrow defines the arrowed from layer as the source, and the arrowed to layer as the destination. If you have an arrow between a content layer and effect layer, it is said that the content layer is being 'piped in' to the effect layer. For more information on arrows, see the compositing layer topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag between the source and destination layer.

On the Notch layer, you can specify which source the layer is using (either texture or an arrowed layer) by using the Video Loader parameter. The Video parameter of the layer will show a thumbnail of either the texture chosen, or the content coming from the arrowed layer (depending on the selection made).



Notch v1.0+

In 2024 Notch has released Notch v1.0 private beta. Designer officially supports notch v1.0+ beta blocks from Designer version r27.7 released on 12/06/2024.

We support for Notch's new colour management pipeline. You can find more information about Notch colour management at the bottom of this page.

> **Warning**
>
> While Notch v1.0+ beta blocks can be loaded and run on select servers with Designer r27.7+, Notch v1.0+ is still in beta, so care should be taken using them in real show environments. Please contact Notch support about your plans to use their beta tools.

The following limitations affect Notch v1.0 beta blocks:

1. Windows OS must be Windows 10 1607 or higher.
2. Notch v1.0 only supports Nvidia GPUs with Maxwell architecture or newer.
3. Notch v1.1 only supports Nvidia GPUs with Turing achitecture or newer.

Please see the compatibility table to work out if your machine supports Notch v1.0+ blocks:

Notch advice

> **Note**
>
> It's always recommended to combine multiple Notch blocks into one block, as opposed to using lots of small blocks in your project. Notch has functionality to combine blocks in Notch builder.

- Notch renders to the size of the resolution of the mapping being used on the Notch layer within Designer.
- Rotation is displayed in degrees within Notch, but shown as radians once exposed within Designer.
- The Y and Z axes are different in Notch and Designer, and need to be flipped/converted manually using an expression.
- The general consensus is that one should NOT use Universal Crossfade alongside Notch. Using Universal Crossfade adds twice as much load, and depending on the effect used it is unlikely to generate the desired effect.
- Only ever have one dfx file connected to a Kinect.
- When using a Notch block with Kinect input, to see this input the machine will need the Kinect SDK installed. You will also need to enable Kinect input via Devices in Notch Builder.
- For audio reactive, it's worthwhile to define the audio device being used on the server in your notch projects audio device (device > audio device).
- When using sockpuppet please advise the Notch content creators to create unified naming conventions for all exposed parameters (ie: FX1, FX2, Speed1, Speed2, Color1, Color2, Color3, etc.) otherwise end management will be difficult to manage.

- Any block that stores frames (i.e. frame delay) needs to be managed extremely carefully or it may eat up all memory resources. If VRAM resources are being eaten up inexplicably, it's worth checking whether the Notch block is storing frames for use anywhere.
- Also, as Notch blocks are not user-definable in terms of DMX assignment order, so it is always best to pre-determine the number of attributes one wishes to have exposed in the Master block.

Workflows

The layer is specifically for playing back Notch blocks. Depending on your application and production needs, there are several workflows you can employ to integrate Notch effects into Designer. Below are a few recommended workflows for their respective applications. Bear in mind that these are stripped to the bare minimum elements for simplicity, and users are required to have a valid Notch Builder software with export capabilities to follow along.

For more information on Notch Builder, see **here**.

IMAG effects

These are probably the most straight forward effects to implement on a show, as blocks are usually designed to be plug and play, with a video source and exposed parameters to control and interact with the effect. Below we denote the workflow.

In Notch

- Create a Notch effect with a node that accepts a video (usually Video Loader).
- Expose the Video property in the Video Loader and compile the block.

In Disguise

1. Create a Notch layer, load the IMAG Notch block into it.
2. Create a Video layer (or any layer you wish to output content from, i.e. generative layers).
3. Set Video Source to **Layer**.
4. Move the Notch layer above the other layer in the stack, then arrow the video layer to it.

You should now be able to see the IMAG effect applied to any content from the layer below. You can change the effects being applied under the parameter group's Notch Layer parameter if the effect is set up to use layers as individual effects.

Notes

- Designer does not yet support Video selection without layer arrowing. The Video parameter under Video Sources is mostly unused, though it can still be used for placeholder images. The images displayed under Video Sources are taken from the DxTexture folder.

- If multiple Notch layers are used and you wish the arrowed video to be the same for all of them, you will need to set up the exposed parameter's Unique Identifier in Notch to be the same for all exposed video sources.
- If multiple layers are arrowed into an effect that accepts multiple sources, the source layer is chosen in order of selection (i.e. the first layer selected will be the first Video source, the second will be the second, etc) regardless of the order of the parameters themselves within the list.

3D virtual lighting simulations

These workflows often involve a 3D mapped object with projectors simulating light sources moving and affecting the object in real-time. These effects rely on the virtual 3D space to match the real space and object, along with the coordinates systems of Designer and Notch.

In Notch

1. Add a 3D object node (or a Shape 3D node, etc) and add it to the scene.
2. Add a light source.
3. Create a UV camera node to output the lit textures onto the object's UVs.
4. Expose the appropriate parameters (light positions, object positions, etc).
5. Compile and export the block.

In Disguise

1. Create a surface with the same object used in Notch.
2. Calibrate the projectors to the surface with your preferred calibration method.
3. Create a Notch layer.
4. Apply the Notch layer via Direct mapping to the object.
5. Move the lights around to see the object UVs being affected.

Notes

> **⚠ Warning**
>
> While it's often advised to enable Deferred Rendering in Notch, it might negatively impact performance depending on the complexity of the scene. Use this functionality cautiously.

- For the Notch scene to match the scene within Designer, accurate measurements need to be taken on stage and an origin point reference needs to be determined from the start. Setting an origin point early in the process will make the line-up process easier.
- Lights can be linked to MIDI, OSC, or DMX controls like every parameter in Designer, or can be keyframed and sequenced on the timeline.
- The mapped object's movement can be linked to automation or tracking systems, and the positional data can then be used to drive the exposed position and rotation parameters.

- If multiple objects are in a scene, you will need to create a larger UV layout that accommodates each object in a separate UV area, and then match the overall lightmap resolution by setting the surface resolution within Designer. You can use the UV Output section of the 3D objects node in Notch to determine where in UV space a specific mesh will be output within the overall canvas.

Particles systems and tracking regions

A very common application of Notch is to use it alongside tracking systems such as BlackTrax to generate particles from specific points in space, to be either projected on a surface or displayed on an LED screen. Below is a broad outline of the workflow using an LED screen, the BlackTrax system, and region camera to specify the tracking regions:

In Notch

1. Create a particle system (Minimum required: Particle Root, Emitter, Renderer).
2. Create a Region Camera.
3. Expose the position parameters of the Particle Emitter, as well as the Region Camera's Top Left X and Y, and Bottom Right X and Y.
4. Compile the block, and export to Disguise.

In Disguise

1. Create an LED screen. This can be placed anywhere in the virtual stage, though it is recommended to place the LED in the correct position to match the physical space.
2. Ensure the BlackTrax system is connected and tracking data is being received from the beacons, then select a stringer to use as a tracked point for the Notch particles.
3. Create a Notch layer and load the exported block into it.
4. Set the Play Mode to Free-run, or press play on the timeline for the particles to begin spawning. They are a simulation and only spawn over a span of time.
5. Right-click on the BT point being tracked to open a widget that displays the point's current coordinates in 3D space.
6. With the Notch layer open and the Particle Emitter position parameters visible, navigate to the tracked point's widget, hover over one of the position values, then Alt + left-click and drag an arrow from there to the corresponding position parameter in the Notch block.
7. You should now see the particle effect either disappearing off-screen (if the beacon is not in range of the LED screen) or moving towards it.
8. If the world coordinates of Notch and Disguise do not match, and the particle effect is limited to a particular screen or mapped area, a Region Camera can be used to mark the boundaries of the tracking region instead.
9. To set the region camera, simply measure the XY position of the top-left corner of the LED screen, and do the same for the bottom-right, and enter these values in the exposed Region Camera parameters.

Notes

- An often quicker method of finding out the region camera values is to place a tracked BT point on the top left of the screen, and then the bottom right, and manually enter the xyz coordinates displayed on the tracked point's widget, as they are sure to match precisely.
- A common mistake that leads to oddities with tracking regions is when the wrong axes are used. As a rule of thumb, for vertical surfaces you'll need to take the X and Y position of the top left and bottom right corners, whereas for horizontal surfaces (i.e. for effects built to be displayed on the ground) you will need X and Z. This is also dependant on how the Notch block itself was built and the orientation chosen in the region camera node, so it's important to double-check these details beforehand.
- When using the region camera, particle size plays a fairly important role. It may be advisable to expose emitter size, particle size, and camera distance to achieve the desired result.
- If multiple machines are outputting the same set of particles but are seeing a different result, it is because both particle roots are running separate instances of the simulation on two machines. You can fix that by setting the Particle Root node for that emitter to Deterministic by ticking the box in the node editor in Notch Builder.

Notch Layer Properties

Notch layers are comprised of a set of default properties (detailed here) and additional properties that appear depending on what is actually in the Notch block. For explaination of properties beyond the default, please refer to your Notch content creator.

Effect

The Effect parameter defines which Notch DFX File the layer is looking at.

Blend Mode

Blend Mode controls how the output of the layer is composited with the layers below.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter Content Mapping.

Processing Size

There are two options:

Output size - The resolution of the screen the effect is mapped to (not the mapping itself)

Input size - The resolution of the effect as set in the Notch Builder.

Dry-Wet Blend

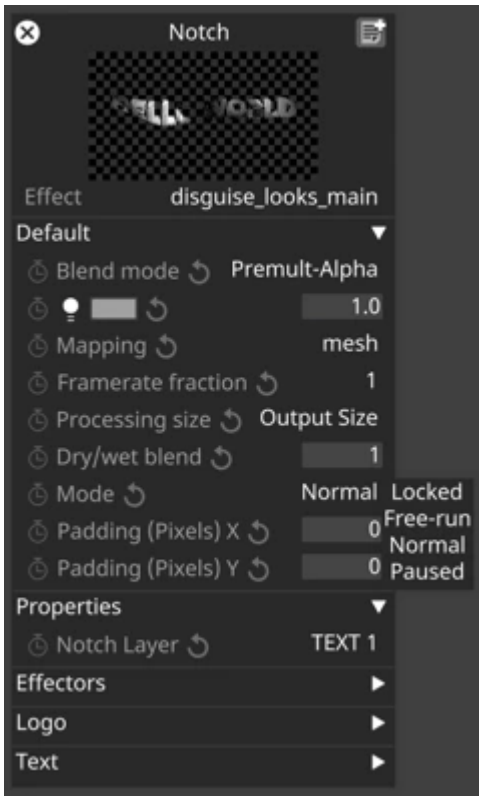
Global Intensity level for the effect on a scale of 0-1.

Framerate Fraction

The Framerate Fraction setting indicates the fraction of the project refresh rate this layer renders at. For example, if project refresh rate is 50Hz, and this setting is 1/2, the layer will be rendered at 25Hz, every other frame.

The options are 1, 1/2, and 1/3.

Mode



This specifies the playback mode.

There are four modes; each one has a specific behaviour that is useful for a different situation.

- **Locked**

When the play cursor stops, the block will also stop and the frame number will lock to the timeline position. When the cursor continues to play or holds at the end of a section, the block will also stop. Jumping around the timeline while playing will cause the block to jump to its corresponding point on its own internal timeline. Note, locked behaviour does not apply to effect type nodes in the Notch block.

- **FreeRun**

If the play cursor continues to play or stops at the end of a section, the block will play continuously. Jumping around the timeline while the cursor is playing or has stopped does not affect which frame is being played.

- **Normal**

When the play cursor stops, the block will also stop and the frame number will lock to the timeline position. When the cursor continues to play or holds at the end of a section, the block will play continuously. Jumping around the timeline while playing does not affect which frame is being played.

- **Paused**

The block will pause on the frame at which the **Paused** playmode was selected. Moving the play cursor around the timeline in any way will not affect which frame is held. Leaving the layer and re-entering the layer will also not affect which frame is held.

Padding X, Padding Y

This specifies the number of pixels to add in the X and Y directions for rendering, but cut off before compositing. This is useful for removing any screen-space edge artifacts. The pixels added are symmetrical to both sides.

Notch Colour Management

This section outlines Notch colour management tools and conventions in Notch.

Before Notch v1.0

Before Notch v1.0 all blocks expect inputs and output in sRGB Gamma 2.2 (x^2.2) colour space. This cannot be changed.

Notch v1.0+

Notch v1.0 introduces colour management options. You can now set the input/output format of a notch block to one of the following settings before exporting the Notch block:

- sRGB Linear
- sRGB 'Gamma 2.2' (Note: This actually uses the standard sRGB curve, not Gamma22 as the name might suggest)
- ACEScg

When Designer is set to **Disabled** or **Gamma** Colour modes, Designer will pass all textures in as sRGB Gamma 2.2. When Designer is in **ACES** or **OCIO** Colour modes, Designer will automatically detect the input and output transforms that the Notch block expects and will convert between Notch and Designer's working space when passing textures in and out of the block. This conversion is free when setting the Notch block to ACEScg mode as Designer also uses an ACEScg working space.

For more information about colour management in Designer see our colour transforms page.

For more information about colour management in Notch see Notch's colour management documentation here.

Notch v1.0+ Compatibility Table

Below is a compatibility table that outlines Notch v1.0+ compatibility with different Disguise media servers on their Current OS:

> ⚠ **Warning**
>
> Notch blocks built in 2026.1 can be loaded and run on select servers with Designer software version r27.7 onwards.

Server	Windows version in Current OS (as of r27.7 release date)	GPU (Generation shown in brackets)	Can I playback a Notch block exported from 2026.1 or later?
4x4pro	Windows 8.1	AMD (GCN 2.0)	✗
4x2pro	Windows 8.1	AMD (GCN v1.0)	✗
2x4pro	Windows 10 1607	Nvidia (Maxwell)	✓
2x2plus	Windows 8.1	Nvidia (Maxwell)	✗
Solo	Windows 10 1607	Nvidia (Pascal)	✓
EX 2	Windows 11 23H2	Nvidia (Ada)	✓
EX 2C	Windows 11 23H2	Nvidia (Ada)	✓
EX 3	Windows 10 1809	Nvidia (Ampere)	✓
EX 3+	Windows 11 23H2	Nvidia (Ada)	✓
GX 1	Windows 10 14393	Nvidia (Pascal)	✗
GX 2	Windows 10 1607	Nvidia (Pascal)	✓
GX 2C	Windows 10 1809	Nvidia (Turing)	✓

Server	Windows version in Current OS (as of r27.7 release date)	GPU (Generation shown in brackets)	Can I playback a Notch block exported from 2026.1 or later?
GX 3	Windows 10 1809	Nvidia (Ampere)	✔
GX 3+	Windows 11 23H2	Nvidia (Blackwell)	✔
VX 1	Windows 10 1809	Nvidia (Turing)	✔
VX 2	Windows 10 1809	Nvidia (Turing)	✔
VX 2+	Windows 11 23H2	Nvidia (Ampere)	✔
VX 3	Windows 11 23H2	Nvidia (Ampere)	✔
VX 4	Windows 10 1809	AMD (GCN 5.0)	✘
VX 4+	Windows 10 1809	AMD (GCN 5.1)	✘
RX	Windows 10 1809	Nvidia (Turing)	✔
RX II	Windows 10 1809	Nvidia (Ampere)	✔
RX III	Windows 11 23H2	Nvidia (Ada)	✔

AI model support (Notch 2026.2)

ONNX AI models run through Notch's AI Model Post-FX node (new in Notch 2026.2) need an NVIDIA GPU that supports CUDA 12.9 and features sufficient video memory (VRAM). A NVIDIA graphics driver 576.02 or later must also be used. AMD GPUs are not supported as they do not support CUDA.

Server	GPU (Generation shown in brackets)	ONNX AI models supported?
4x4pro	AMD (GCN 2.0)	✘
4x2pro	AMD (GCN v1.0)	✘

Server	GPU (Generation shown in brackets)	ONNX AI models supported?
2x4pro	Nvidia (Maxwell)	✗
2x2plus	Nvidia (Maxwell)	✗
Solo	Nvidia (Pascal)	✗
EX 2	Nvidia (Ada)	✗
EX 2C	Nvidia (Ada)	✗
EX 3	Nvidia (Ampere)	✗
EX 3+	Nvidia (Ada)	✗
GX 1	Nvidia (Pascal)	✗
GX 2	Nvidia (Pascal)	✗
GX 2C	Nvidia (Turing)	✗
GX 3	Nvidia (Ampere)	✗
GX 3+	Nvidia (Blackwell)	✗
VX 1	Nvidia (Turing)	✗
VX 2	Nvidia (Turing)	✗
VX 2+	Nvidia (Ampere)	✗
VX 3	Nvidia (Ampere)	✗
VX 4	AMD (GCN 5.0)	✗
VX 4+	AMD (GCN 5.1)	✗

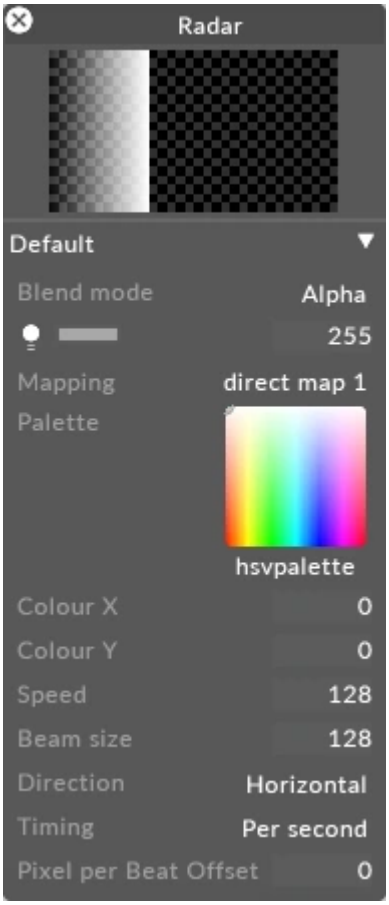
Server	GPU (Generation shown in brackets)	ONNX AI models supported?
RX	Nvidia (Turing)	✗
RX II	Nvidia (Ampere)	✗
RX III	Nvidia (Ada)	✓

> **Note**
>
> Check your server's current driver on the hardware OS images page.

Radar Layer

The Radar layer is one of the simplest generative layers. It generates a moving beam with a bright leading edge that fades to a black trailing edge.

Workflow



Radar Layer Properties

Speed

This controls the speed of the beam movement. Positive numbers go rightwards/downwards; negative numbers go leftwards/upward

Beam Size

This controls the size of the beam. When set to 255, the width of the beam is the same as the width of the canvas.

Direction

This is an option property; the two options are **horizontal** and **vertical.**

Timing

This controls how the **speed** property is interpreted. The options are:

Per sec : the radar beam moves at x pixels per second, regardless of how the play cursor moves. This means that the radar beam position is not predictable anywhere on the timeline.

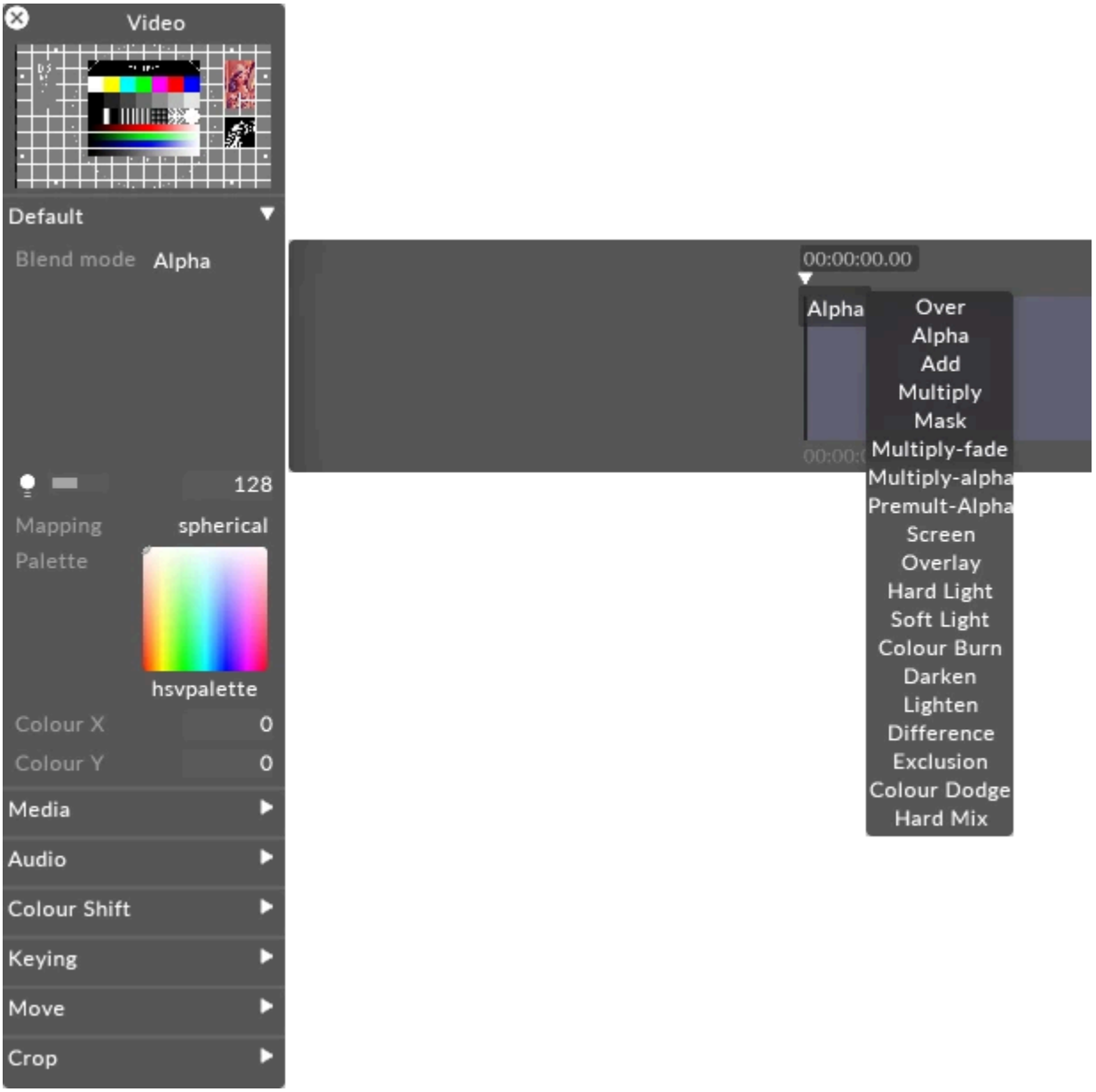
Per beat : the radar beam moves at a speed related to the current bpm, so that it moves an integer number of complete sweeps per beat. Furthermore, the position of the beam depends on the timeline position, so the beam is guaranteed to be at the same position at the start of every beat.

Per frame : the radar beam moves x pixels every frame.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

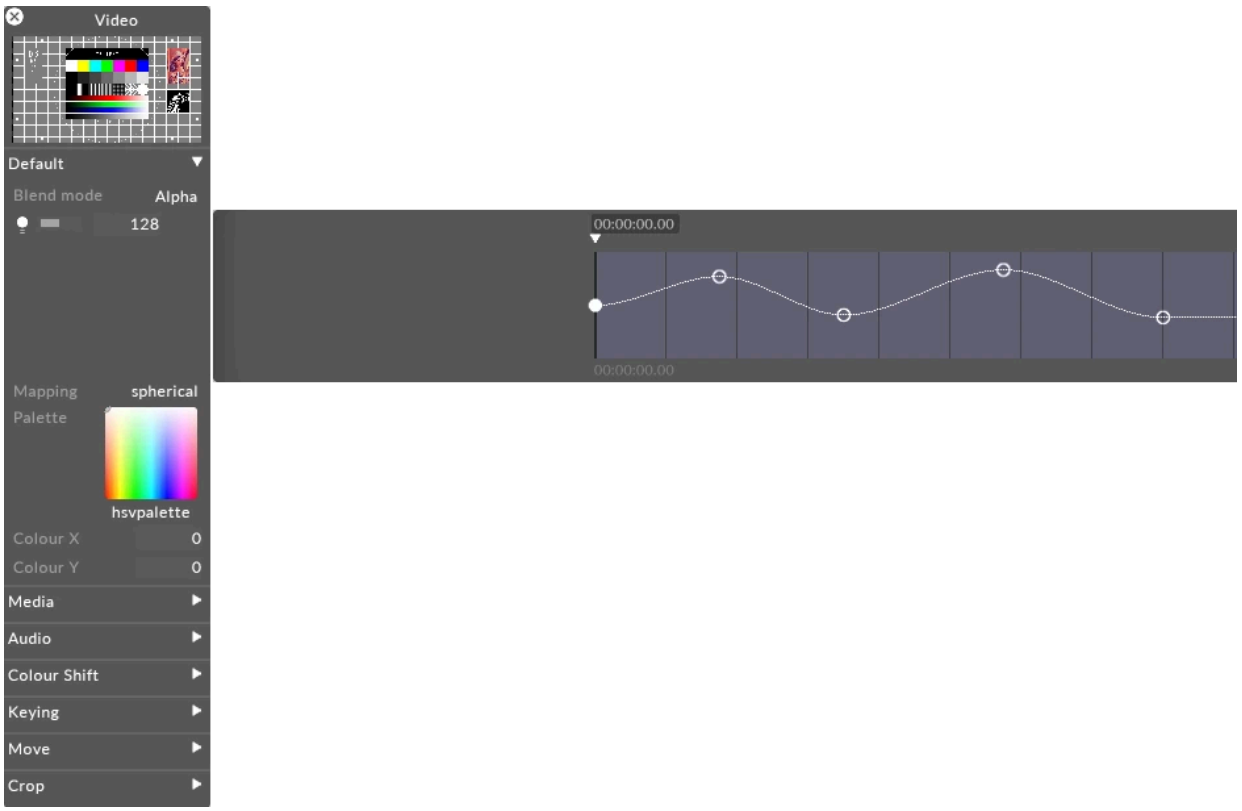
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

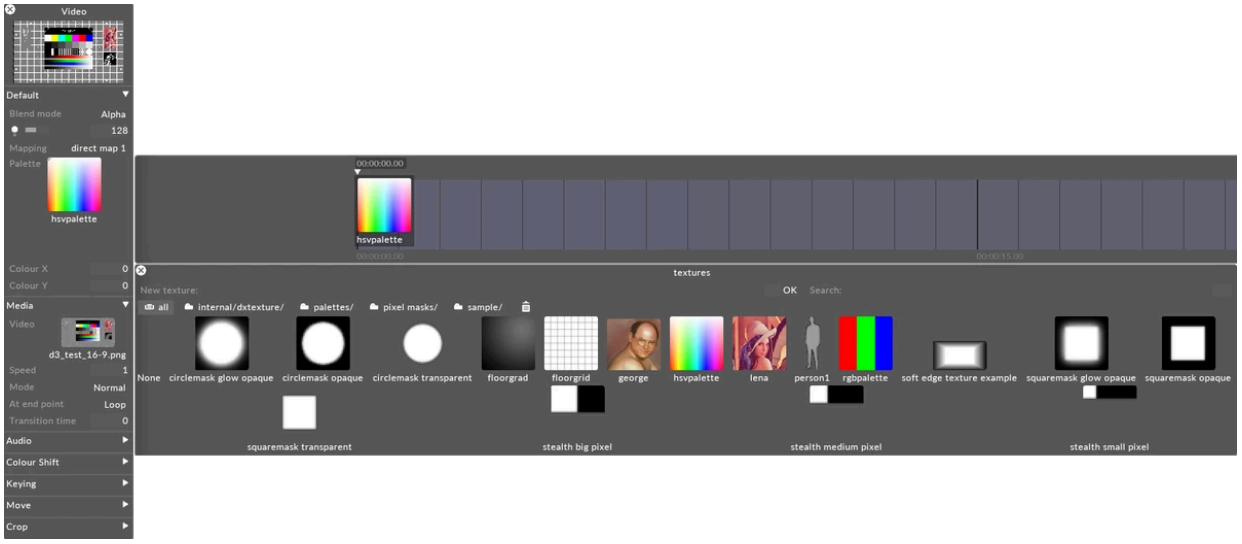


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

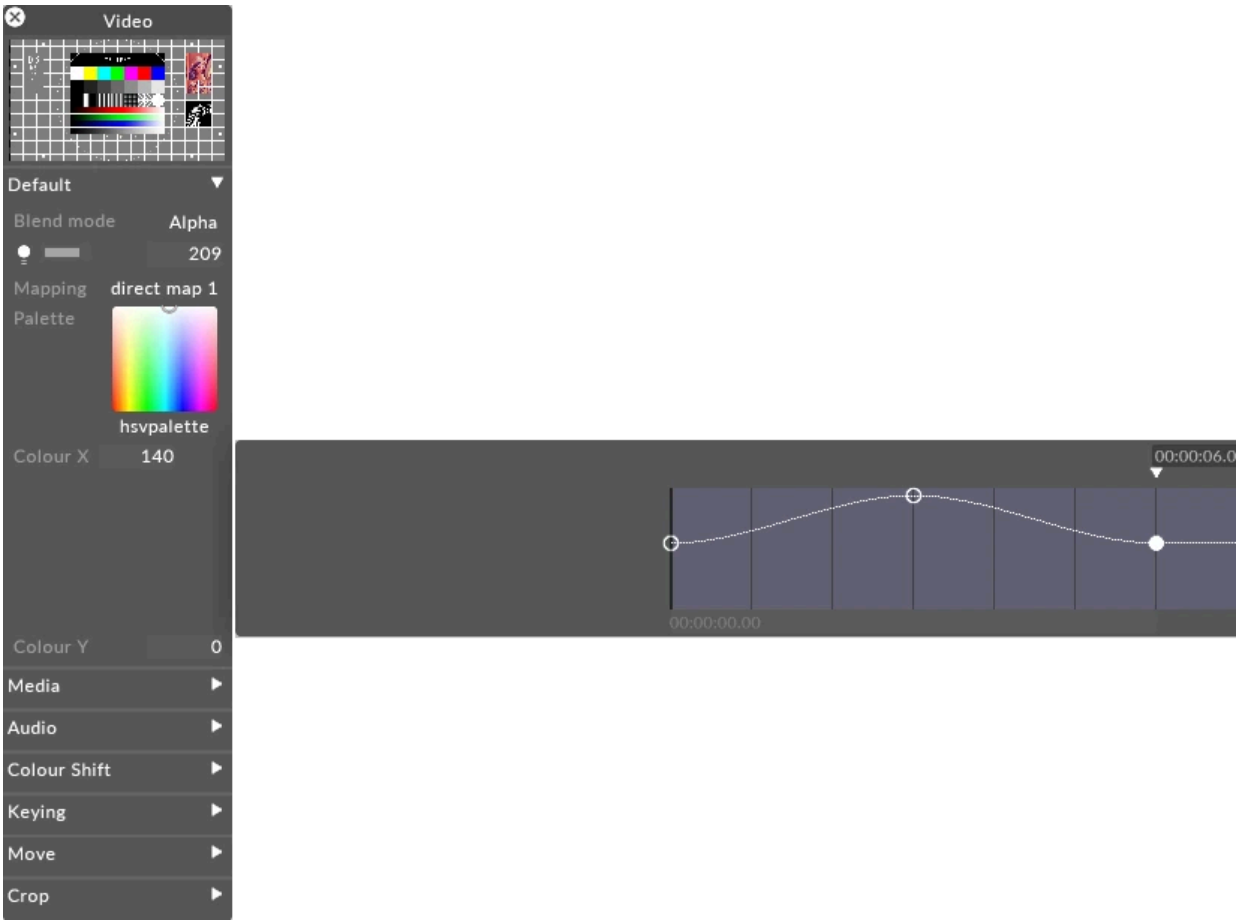
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.

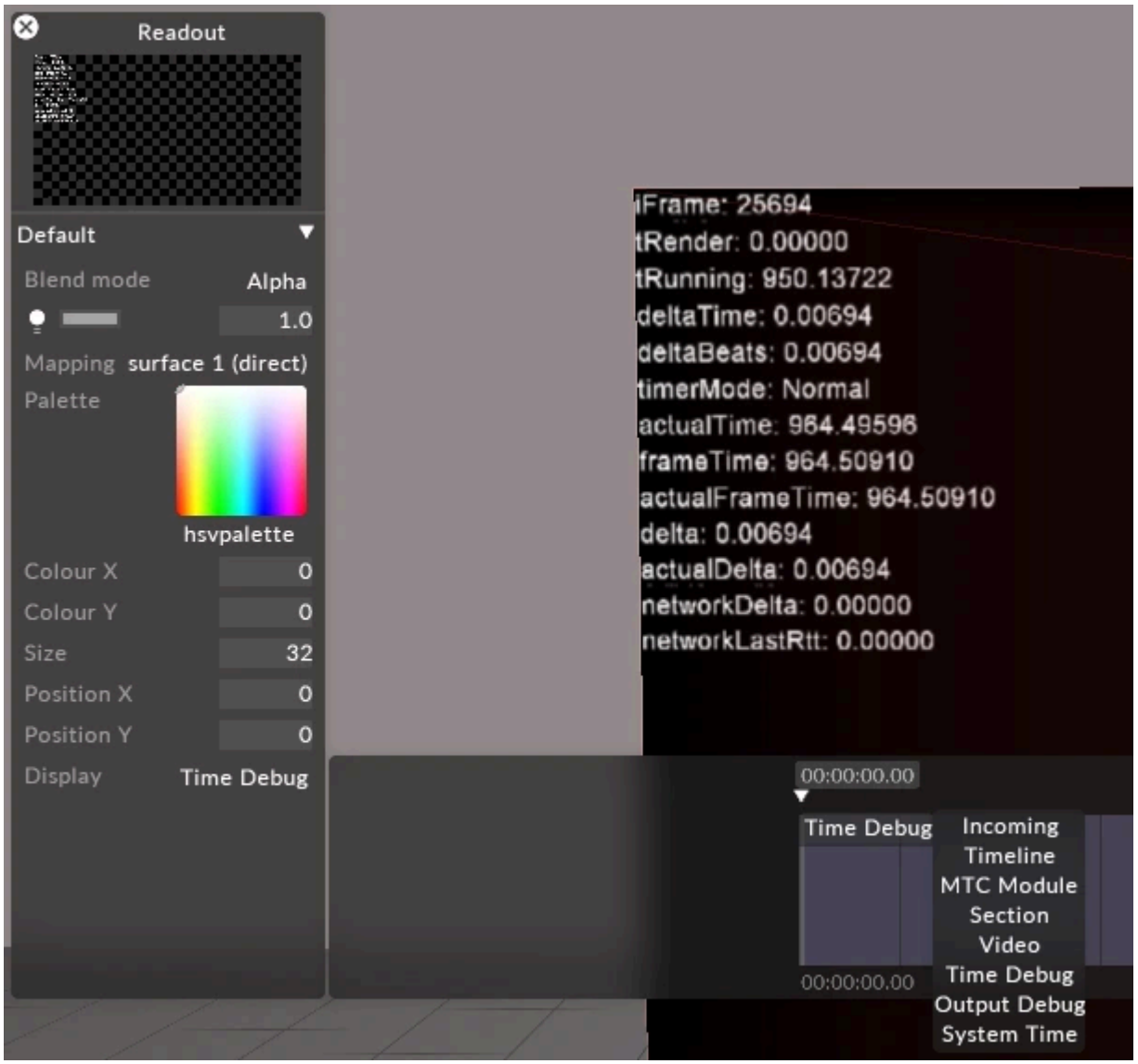


Readout Layer

The Readout layer allows you to assign the incoming timecode, remaining section time, or system time to a screen via a mapping to show on the output as well as in the stage.

Display property

The Display property allows you to switch between readouts for the incoming timecode, MTC layer, Timeline, Section, Video timecode, Time and Output Debuggers, and System time readouts.



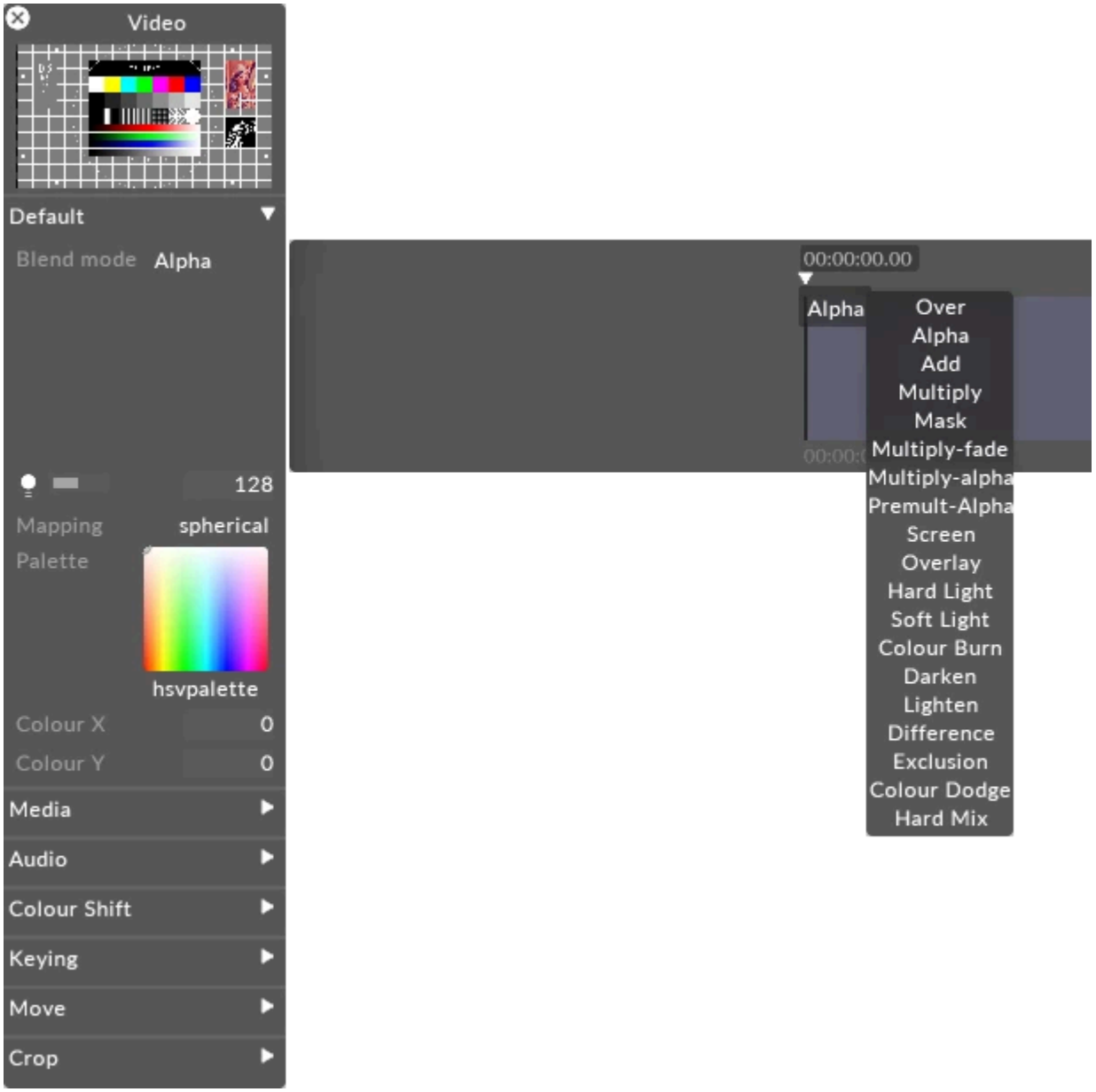
Common Layer Properties

For information on the Common Layer Properties “Mapping:, “Palette”, ” Colour x/y”, “Size”, and “Position x/y”, please visit this link.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting

multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

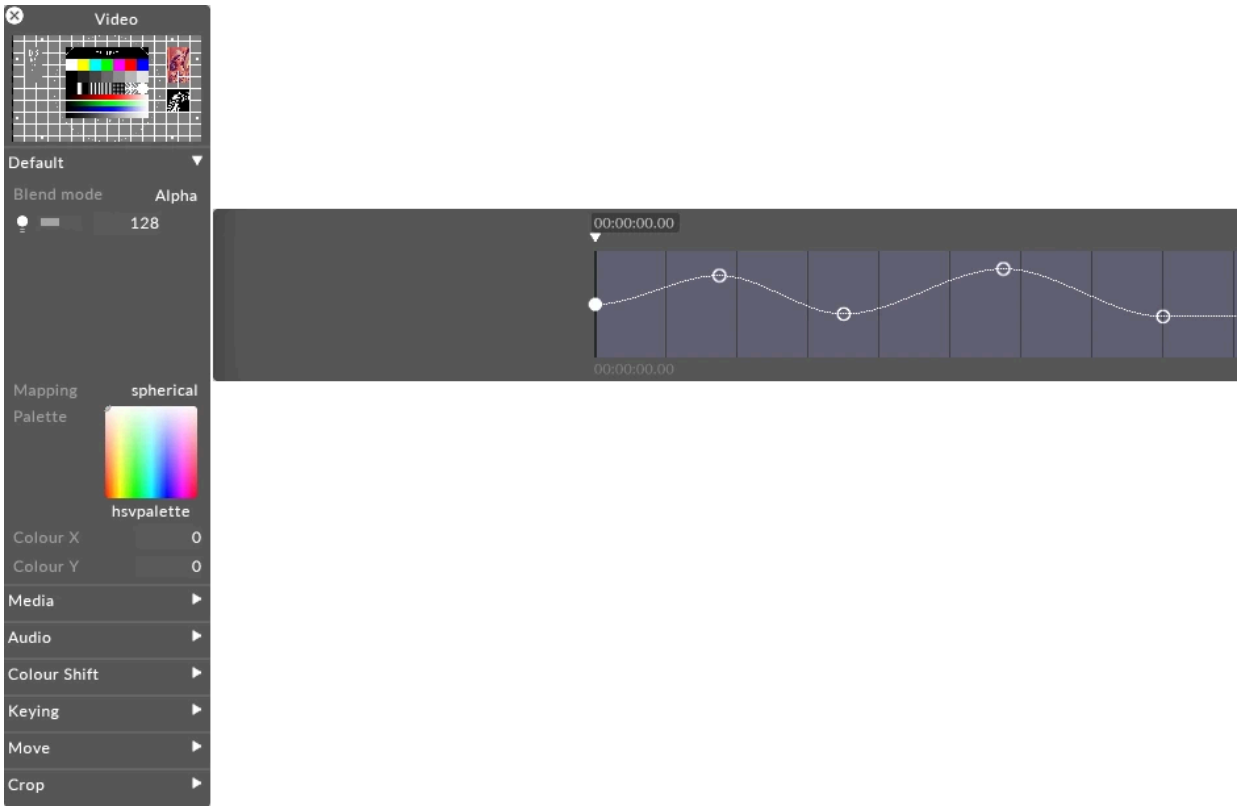
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the

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> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

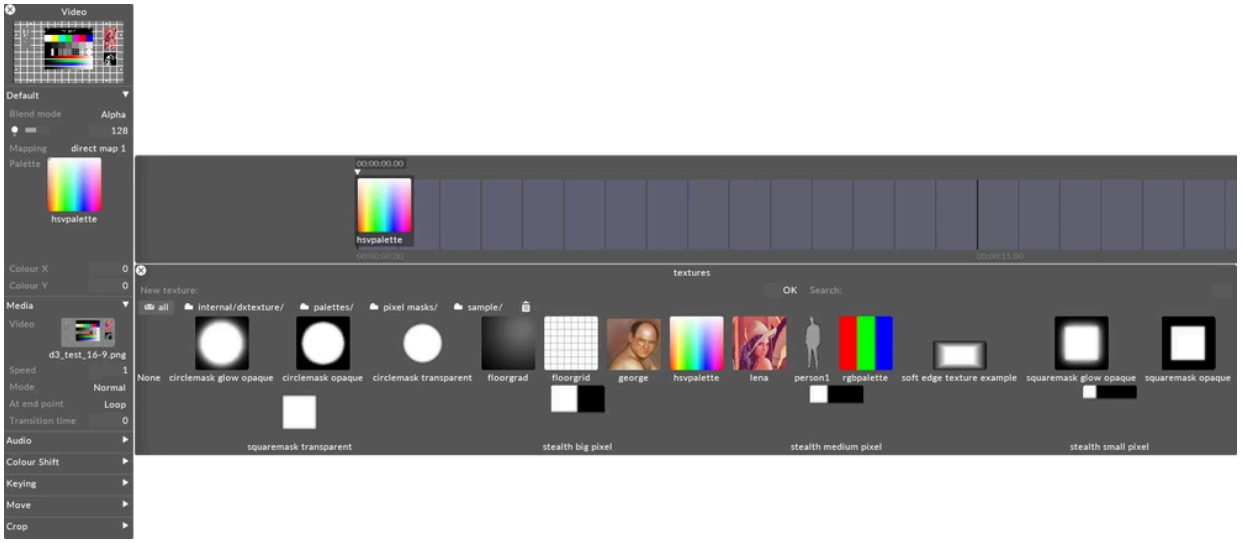


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

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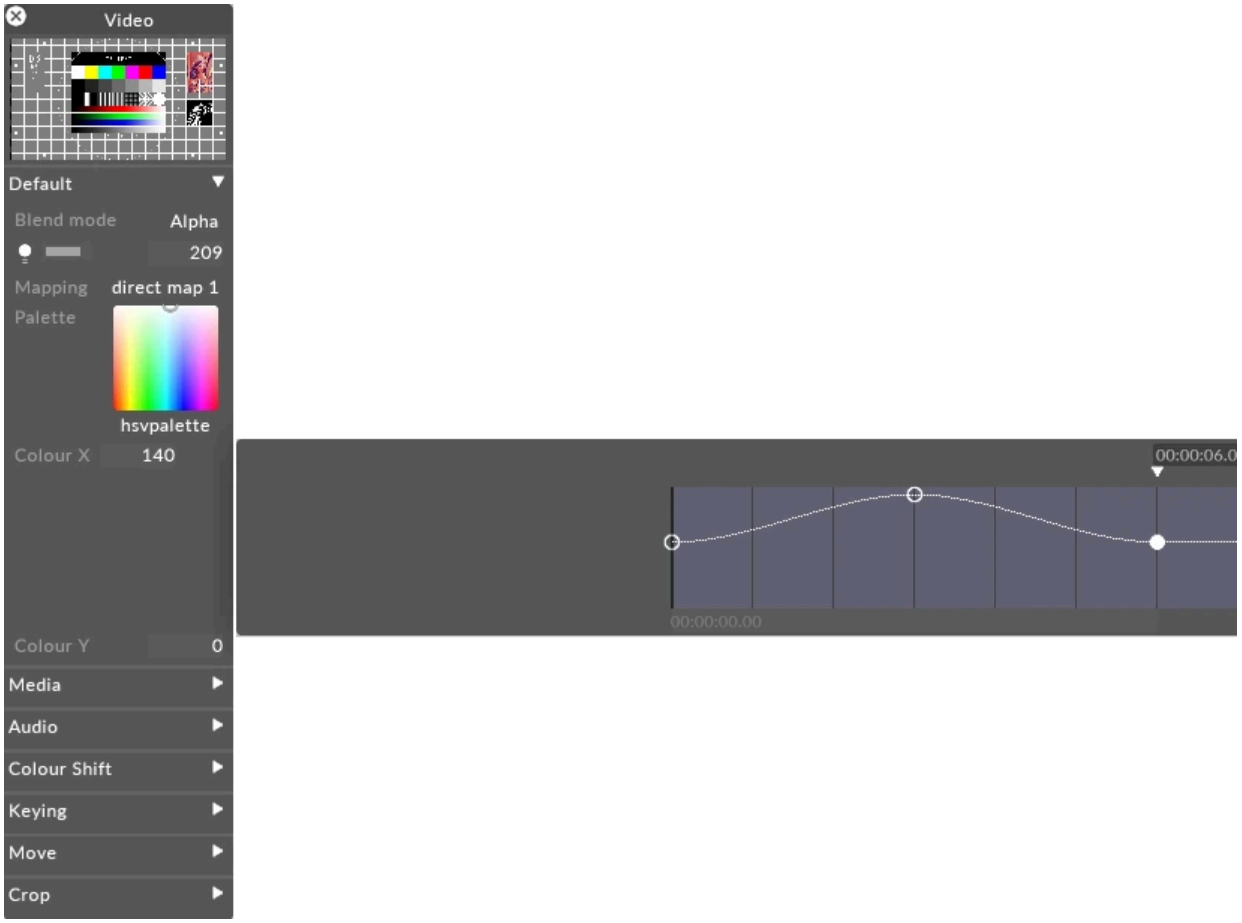
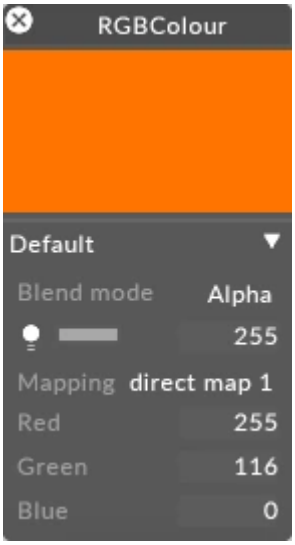
When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



RGB Colour

The RGBColour layer is one of the most basic layers. It behaves in a very similar way to the Colour layer. Quite simply, it allows you to manually set RGBColour values to display a solid colour.



RGBColour Layer Properties

Red

Controls the Red additive colour mix.

RGreen

Controls the Green additive colour mix.

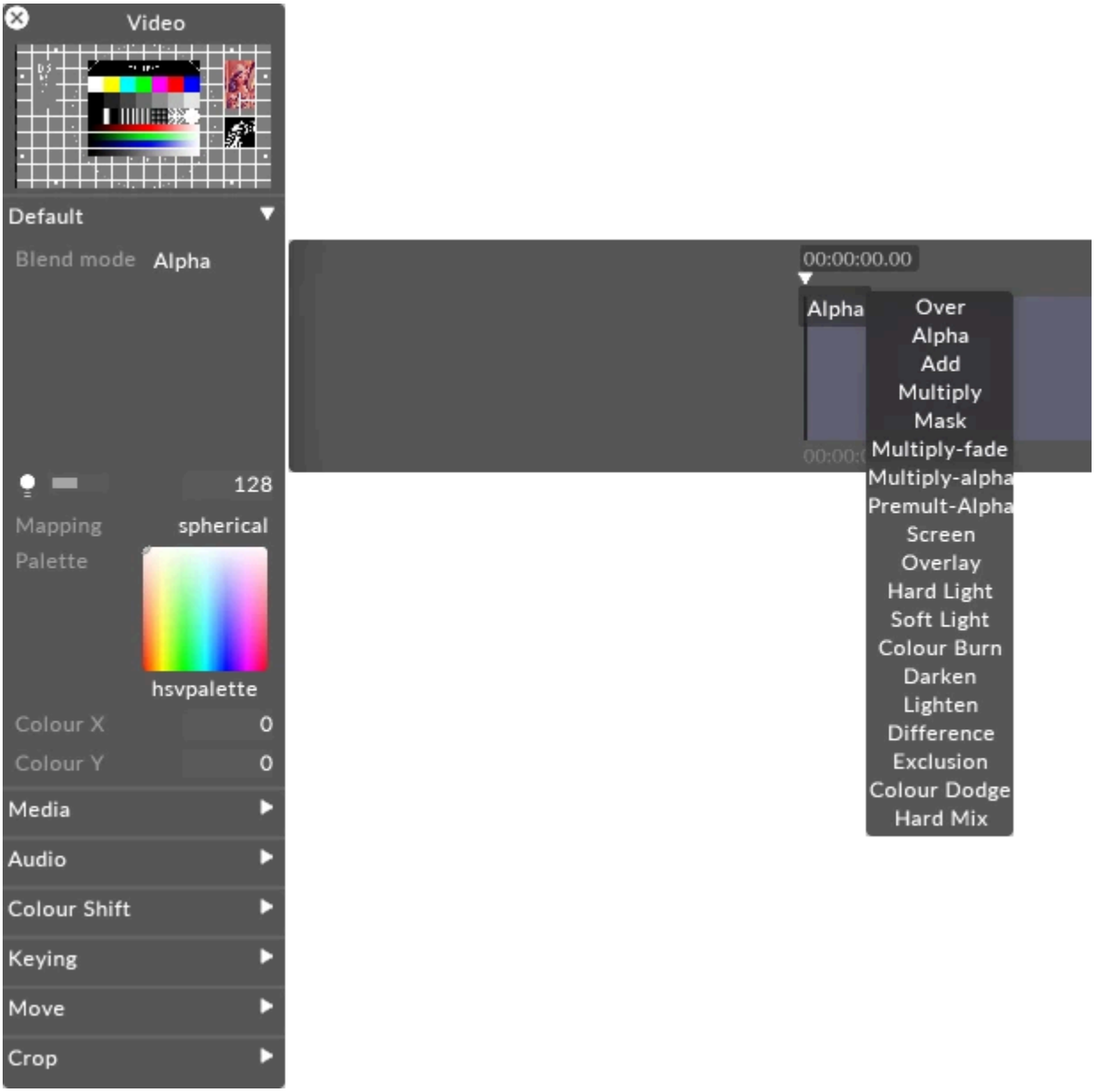
RBlue

Controls the Blue additive colour mix.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the Luma Matte mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

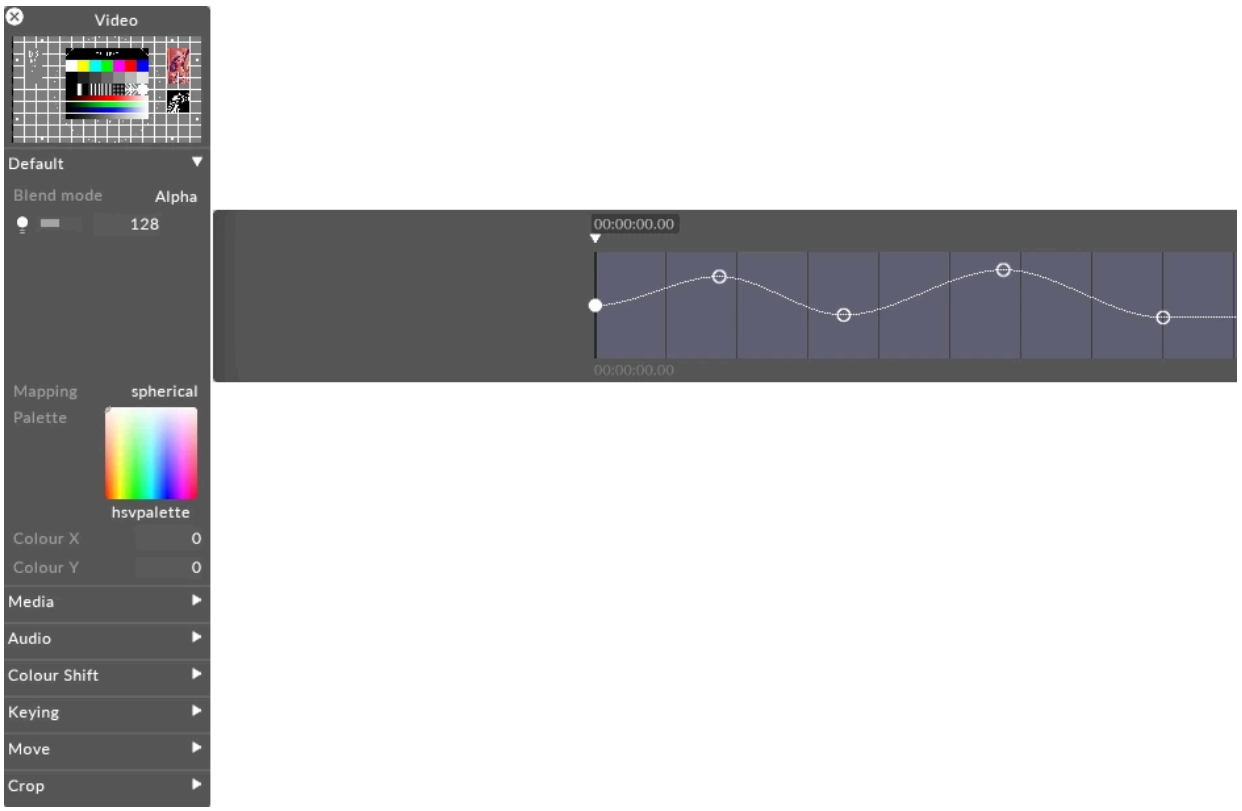
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

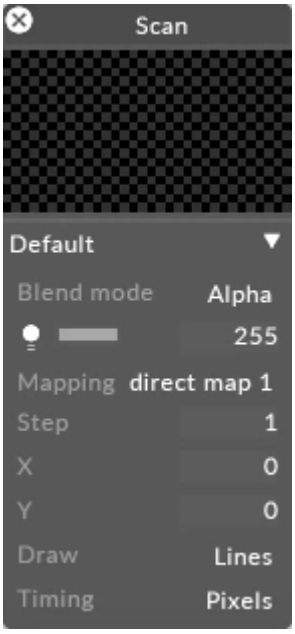
The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Scan Layer

The Scan layer is a simple test pattern generator that is useful for checking output signal timings. It generates a single-pixel wide horizontal red line and a single-pixel wide vertical blue line. Each line moves forward by a single pixel per frame.



It sometimes happens that downstream DVI processing devices such as switchers, scalers or LED processors skew the timing of the DVI signal, causing the appearance of jerky playback. At such times it is useful to be able to generate a visual signal that is visibly smooth on the computer, but clearly shows signal skews on the output devices.

The Scan layer is also useful for checking if the 3D screen models have been correctly imported into Designer. If the model has incorrect texture coordinates, you will see a single row or column either disappearing or spanning two separate sub-objects.

Scan Layer Properties

Step

This controls the movement speed of the lines. The number you fill is is the number of frames the lines moves forward per pixel. Increasing this number slows the line down. Setting **step** to 0 allows you to control the position of the lines manually using the **x** and **y** properties.

x, y

When **step** is set to 0, you can directly control the position of the lines by adjusting **x** and **y** . The position of the vertical blue line is controlled by **x** , while the position of the horizontal red line is controlled by **y** . Both are measured in pixels.

Draw

There are two options:

Lines : this shows red and blue lines which intersect to form a crosshair (useful for LED screens).

Dot : this shows a single white dot at position x, y. This option is more useful when calibrating singlepixel strings (useful for linear fixtures).

Timing

There are two options:

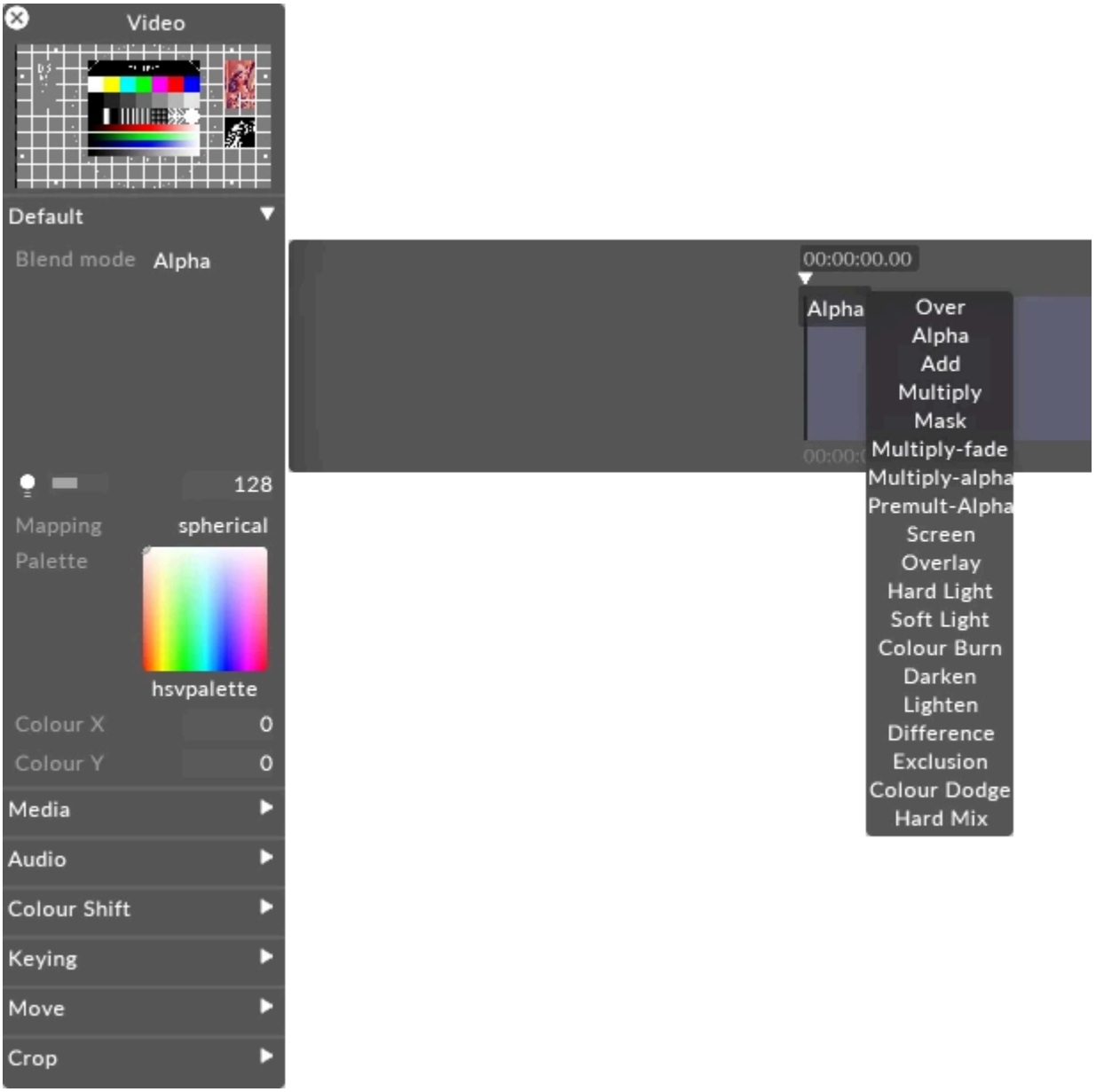
Pixels : if set to this, the crosshair moves one pixel every (step) frames.

Time : if set to this, the crosshair moves at (1/step) pixels per second.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

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Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

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Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

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Colour Burn

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Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

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Darken

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Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

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Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

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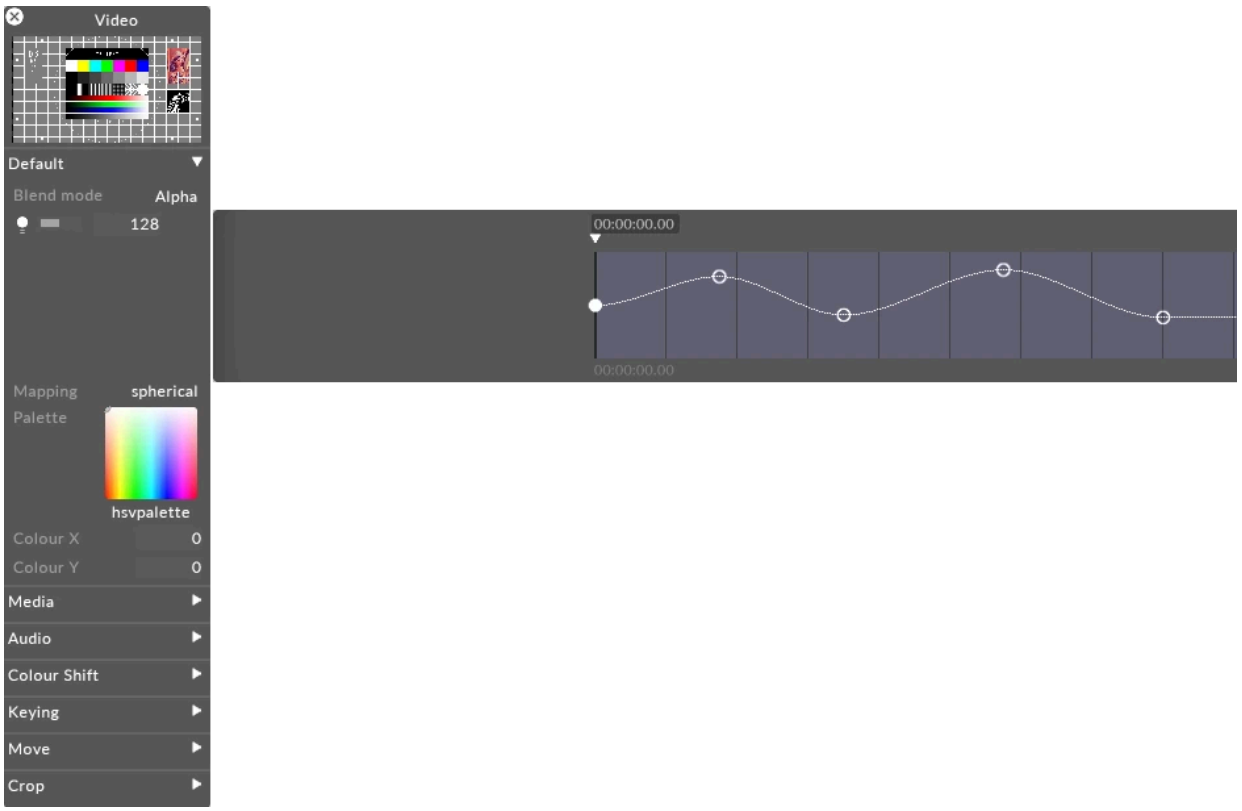
Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

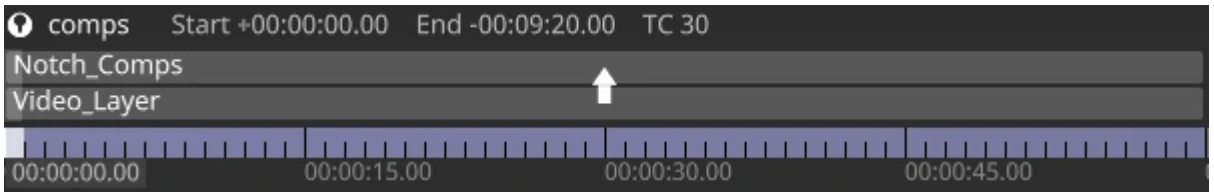
Strobe Layer

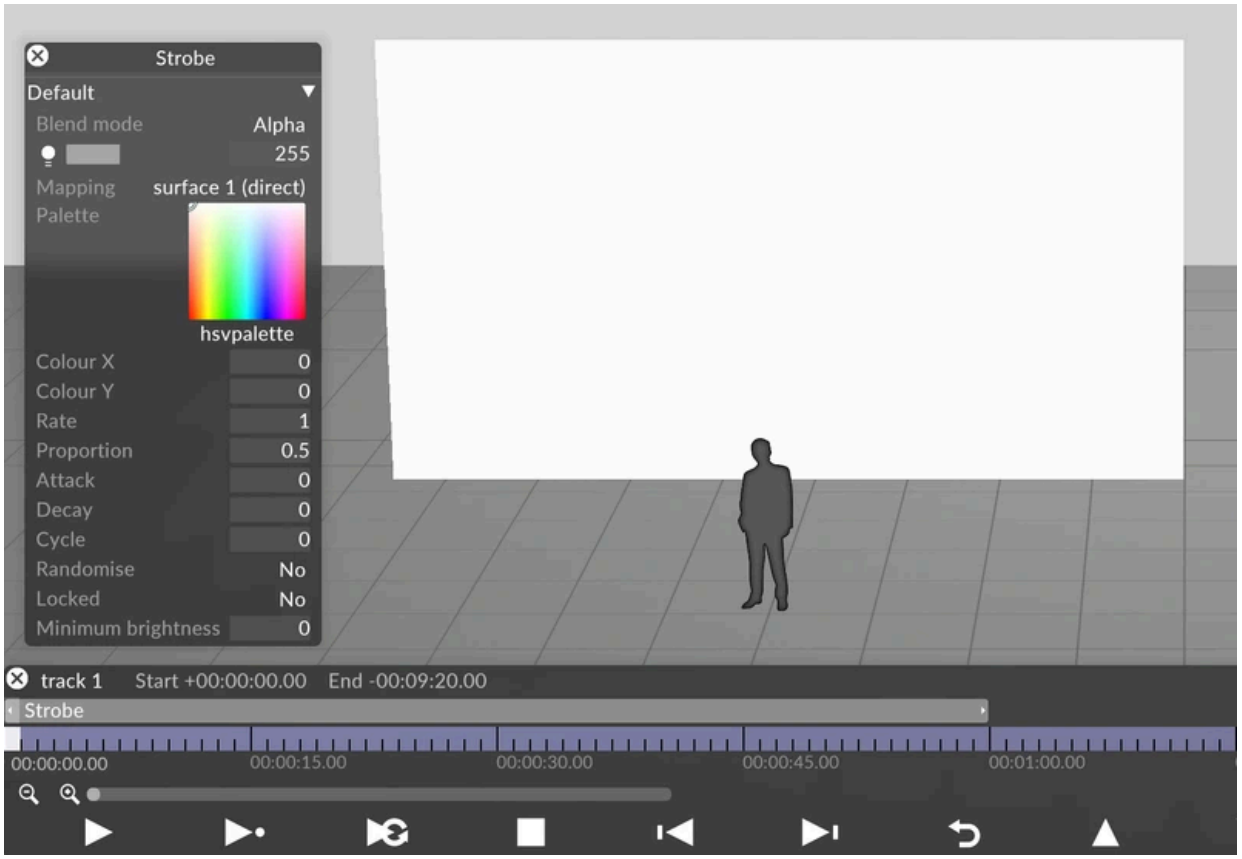
The Strobe layer creates a flashing strobe effect over multiple screens.

> **Warning**
>
> The layer only works using a Feed map. In order to turn each screen into “one flash”, scale each feed rectangle to 1 pixel and place each screen’s feed rectangles next to each other on the Mapping canvas.

Some Generative layers take their source from other layer types - either content or generative - by use of an arrow. Linking two layers with an arrow defines the arrowed from layer as the source, and the arrowed to layer as the destination. If you have an arrow between a content layer and effect layer, it is said that the content layer is being ‘piped in’ to the effect layer. For more information on arrows, see the compositing layers topic.

To draw an arrow between two layers, hold down **ALT** and left-click & drag between the source and destination layer.





Strobe Layer Properties

Rate

Speed of strobing, in cycles per beat. 0 = stop flashing.

Proportion

The amount of time within the cycle that the strobe is on. 0.5 = half the cycle time is white.

Attack

Speed of attack (ramping from 0 to full brightness). 1 = instant, 0 = slowest.

Decay

Speed of decay (raming from full brightness down to 0). 1 = instant, 0 = slowest.

Cycle

The cycle of the strobe. 0 = all screens flash together, 1 = screens flash in turn.

Randomise

The randomness of the cycle order. Yes = order of the screens is randomised, No = order of the screens is not randomised.

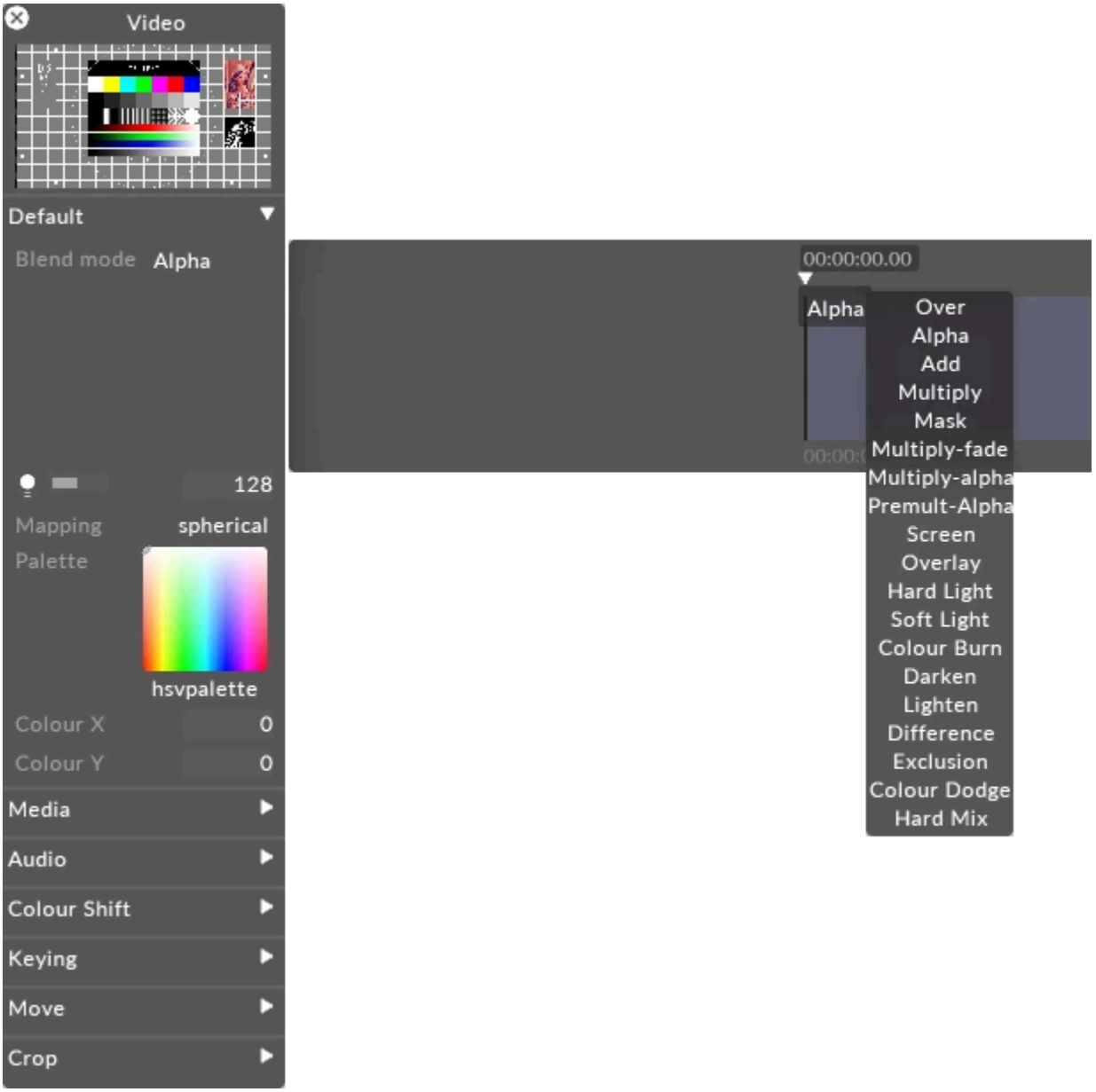
Min brightness

The minimum brightness outputted by the layer. 0 = 0%, 1 = 100%.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



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Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

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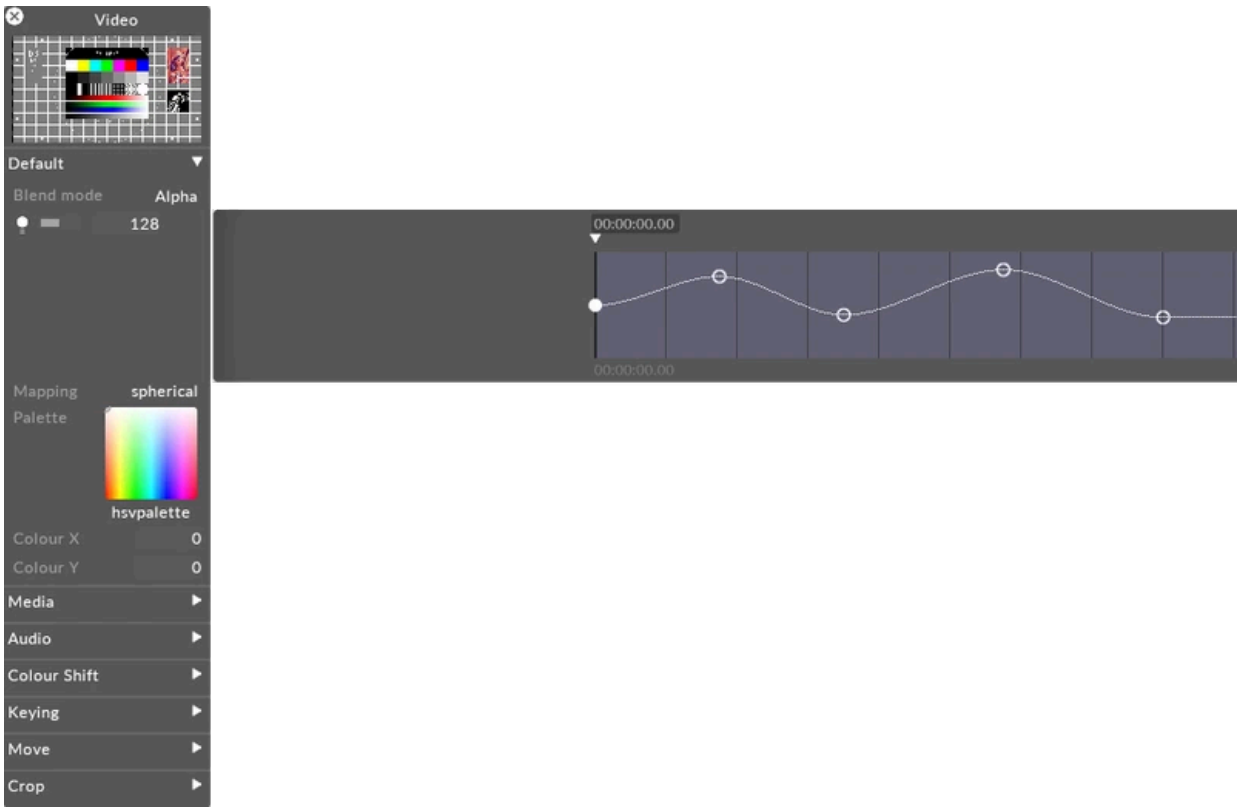

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Mapping

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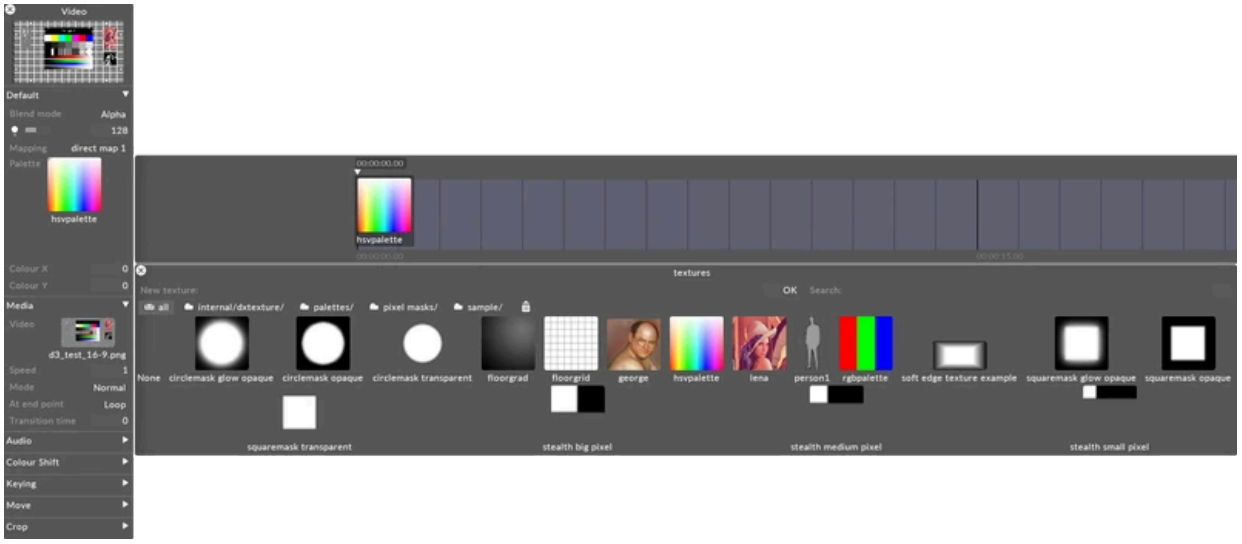
Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

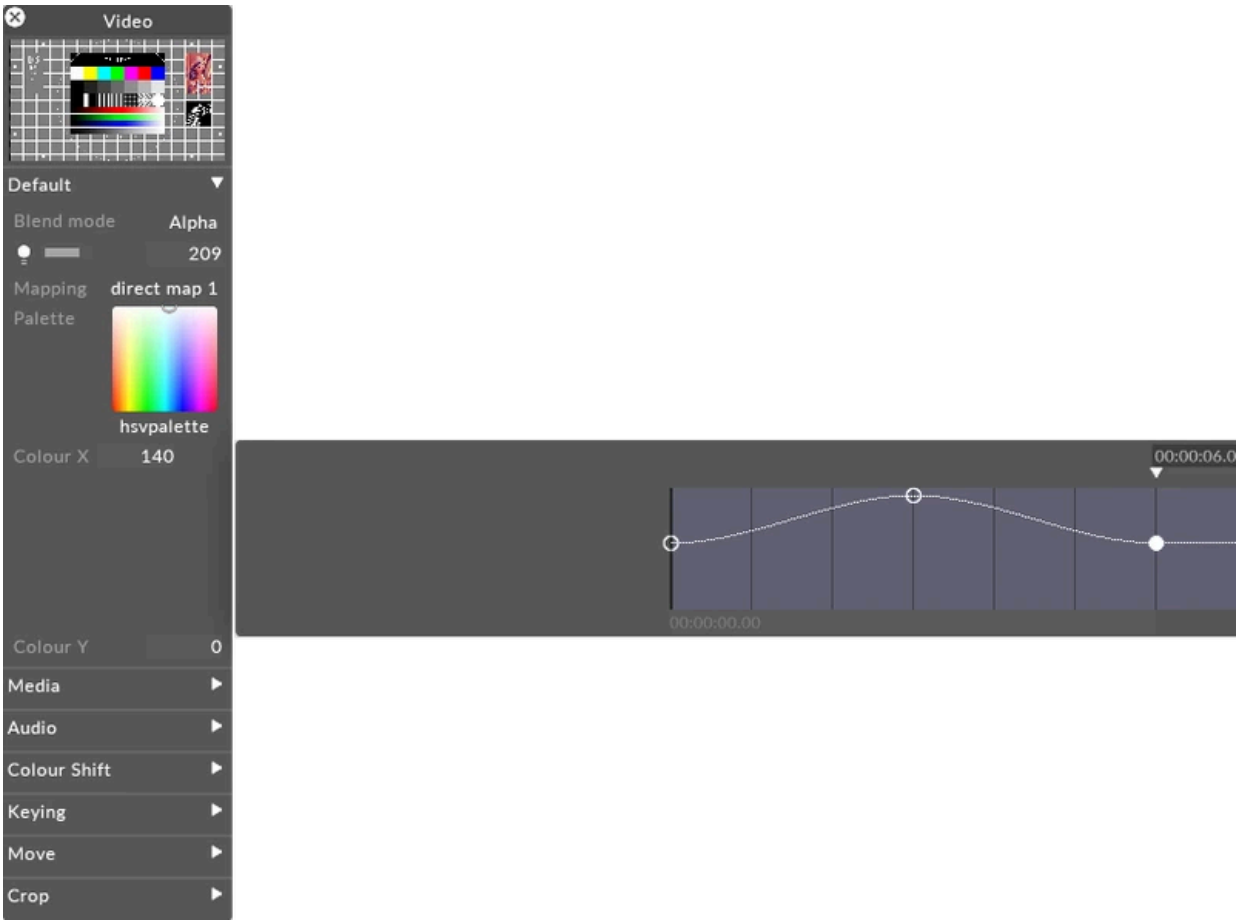
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Tennis Layer

Tennis has been a staple of Designer since the early days, hidden until r17 and previously called Pong but renamed due to legal reasons. Best played using a midi controller.

Tennis Layer Properties

Preview Thumbnail Blend Mode Brightness Mapping Palette xCol y Col

Options

Ball speed

This controls the speed of the generated ball, in pixels per beat.

Bat size

This controls the size of each bat.

Bat padding

This controls padding on each bat.

Control

> **Note**
>
> **Please note**:We recommend using an external controller (such as a midi device with faders) to control the bats.

Left bat position

This controls the vertical location of the left bat.

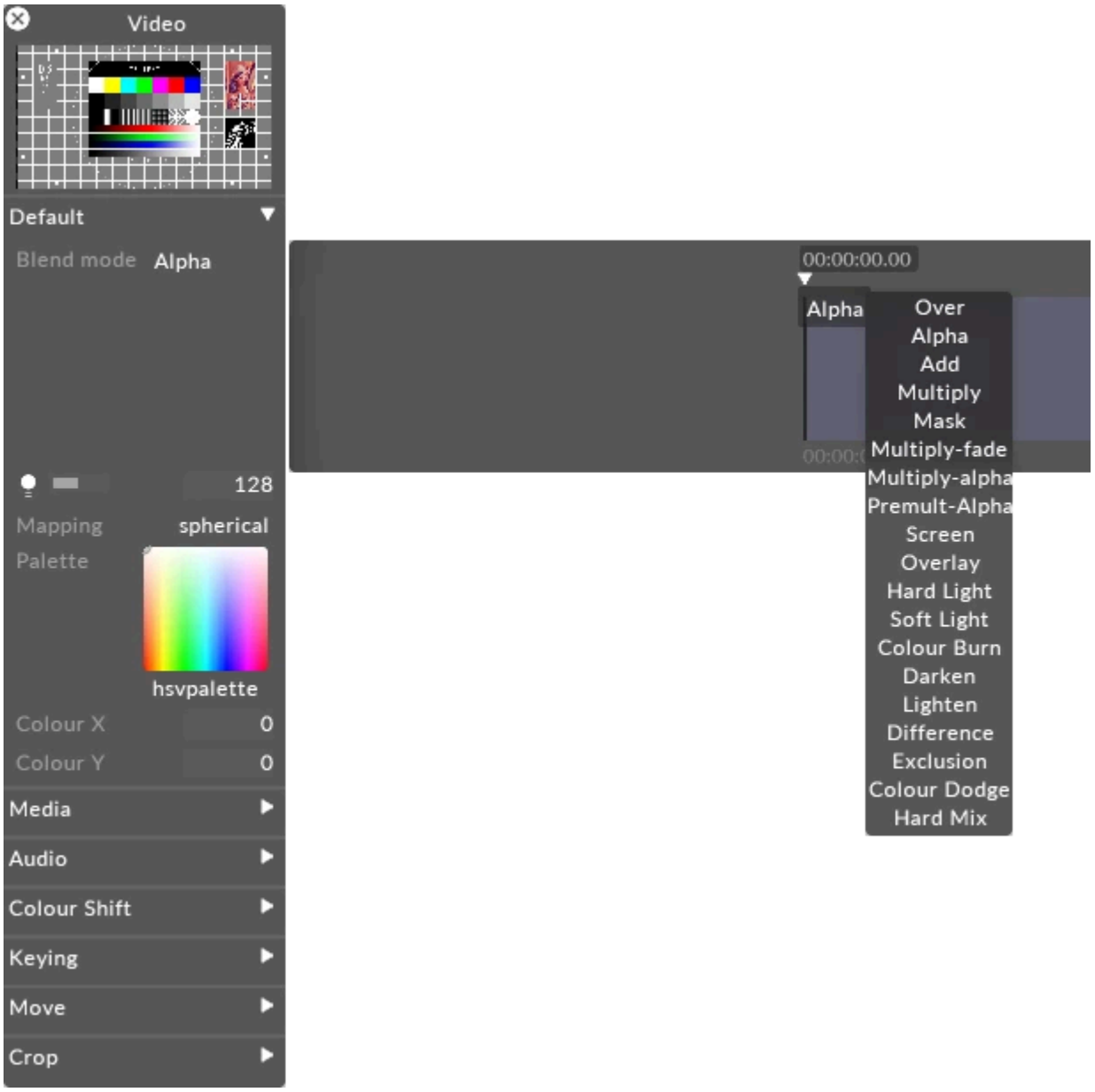
Right bat position

This controls the vertical location of the right bat.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

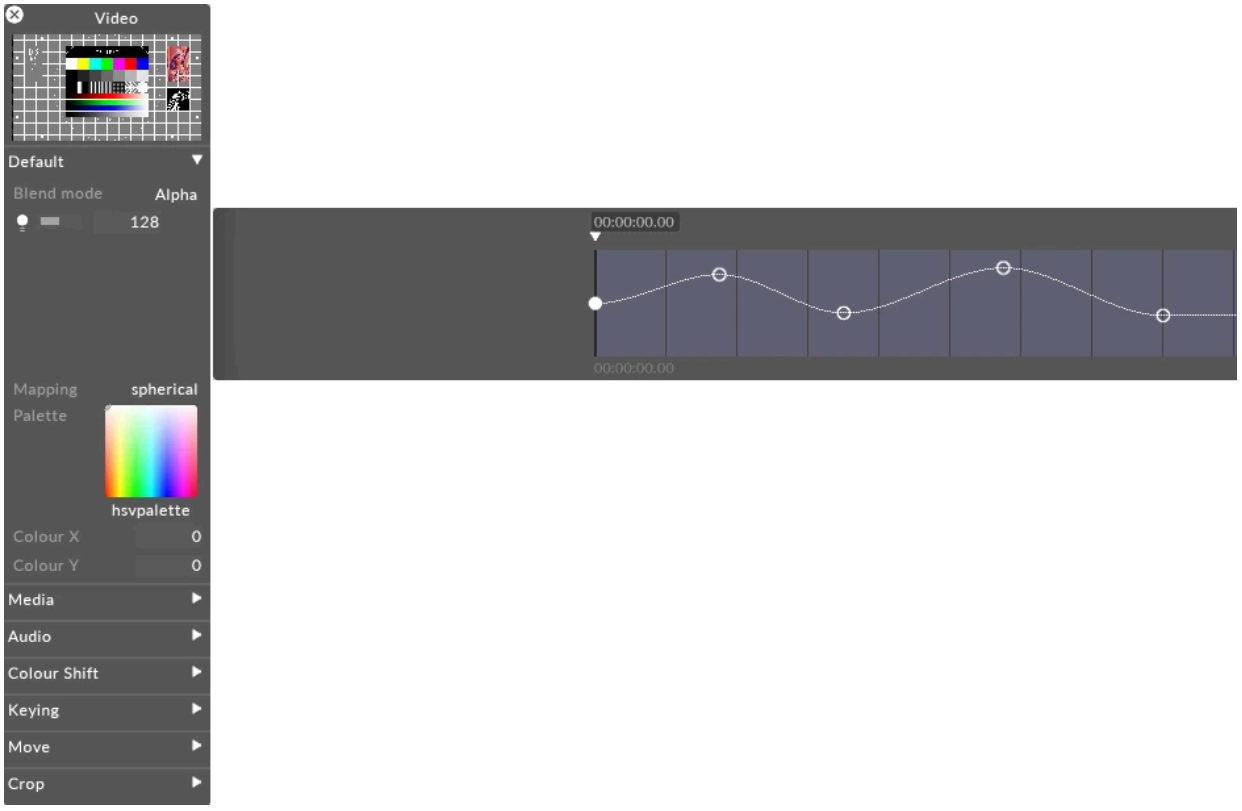
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

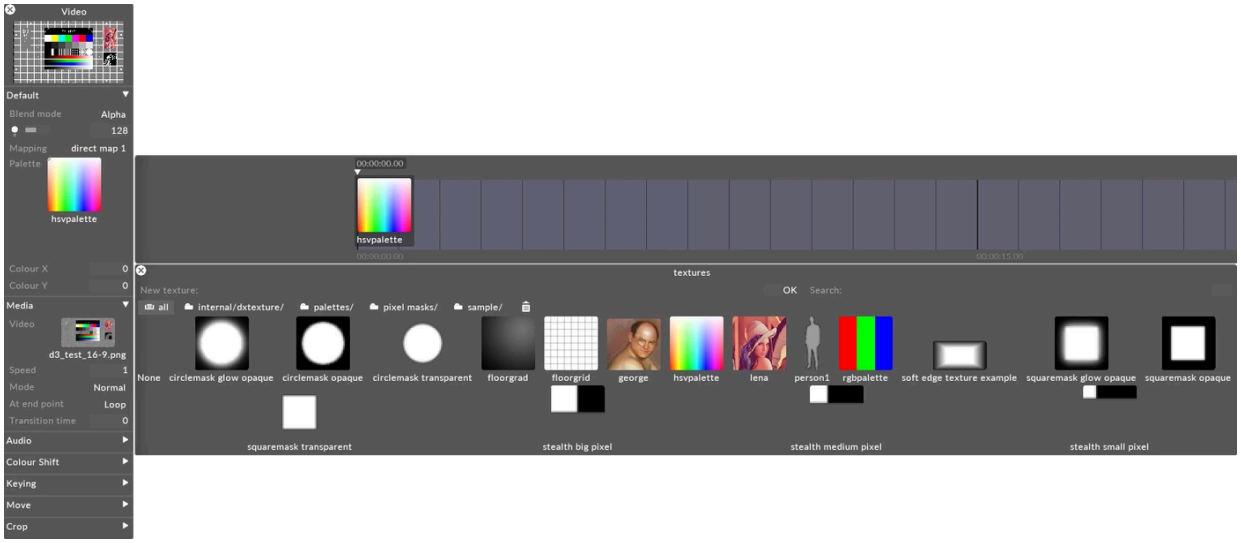


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

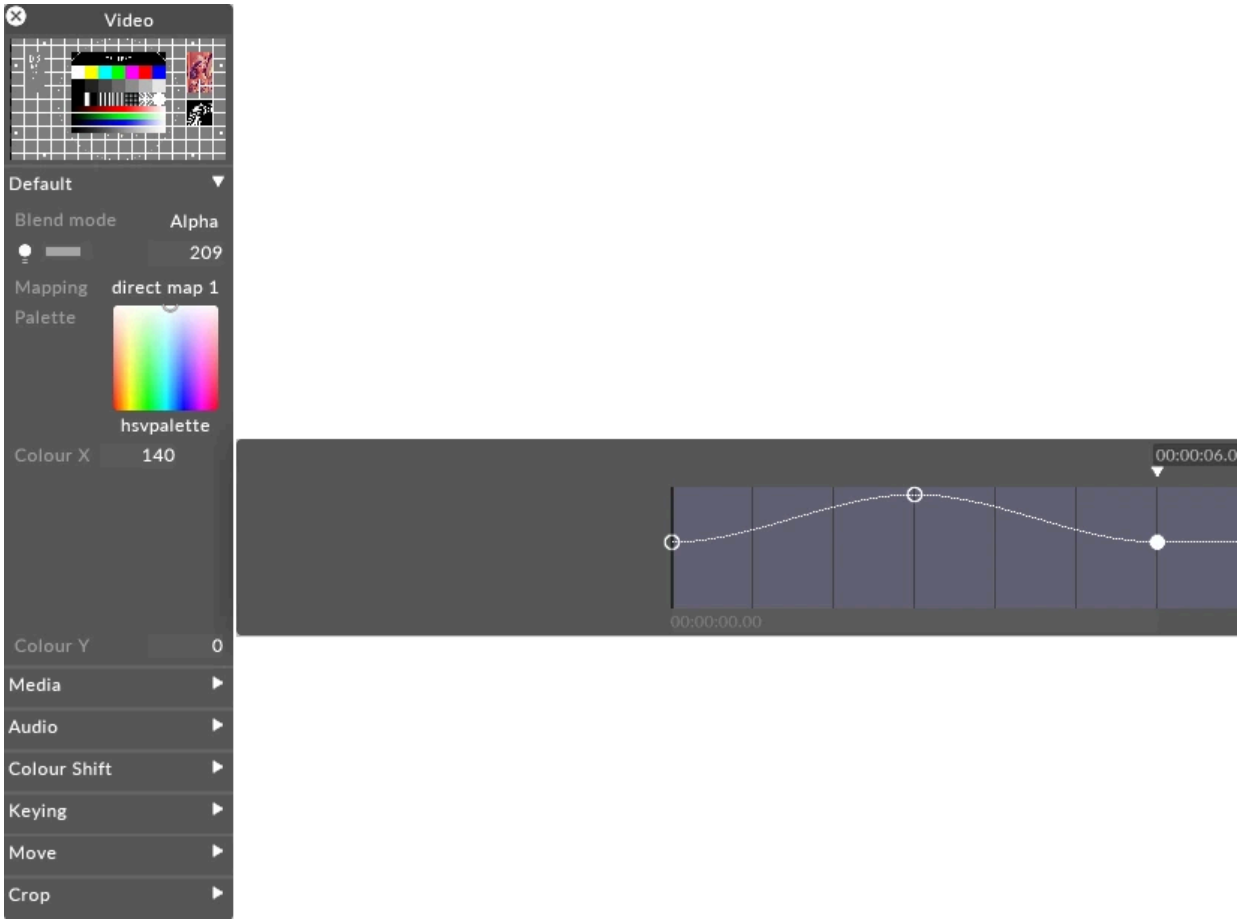
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



TestPattern Layer

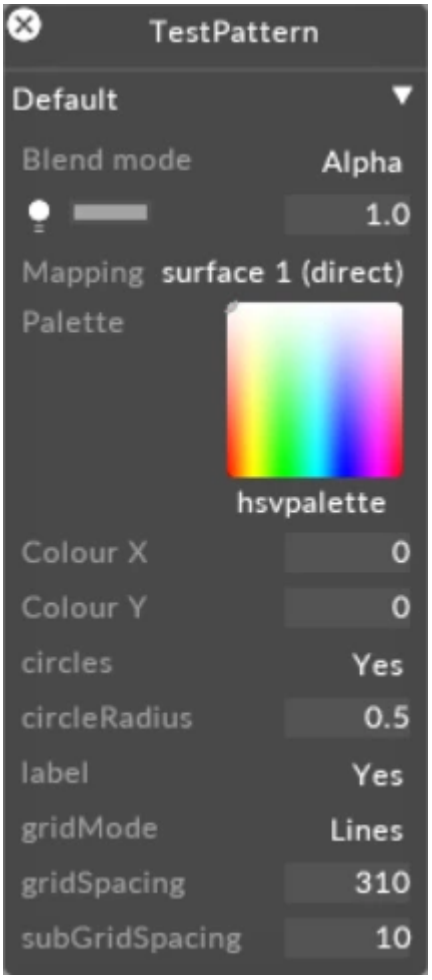
The TestPattern layer renders a calibration pattern made up of a configurable grid, concentric circles, the screen's label with its resolution, and corner logos. The pattern helps verify screen output, alignment, mapping, and resolution during setup, before content goes live.

Workflow

- Create a new layer
- Assign the layer to a mapping

> **Note**
>
> **Please note**: The TestPattern layer is unique in that it fills the entire area of the surface it's mapped to, thus any mapping type applied to this layer will function as a direct map.

- Define the circles, grid, and other parameters to suit



TestPattern Layer Properties

Circles

Defines whether the test pattern displays circles. Default: yes.

Circle radius

Defines the radius of the circles. Range: 0-1 (step 0.0125). Default: 0.5.

Label

Defines whether the screen or projector label is shown in the centre of the pattern. The label is followed by the screen's resolution (e.g. `1920 x 1080`). Default: yes.

Grid mode

Selects the grid style: **Off** or **Lines**. Default: **Lines**.

Grid spacing

Spacing between major grid lines, in pixels. Range: 1-1000. Default: 100.

Sub grid spacing

Spacing between minor grid lines (subdivisions within each major grid square), in pixels. Range: 1-1000. Default: 10.

Logo top left

Texture slot for the logo rendered in the top-left of the pattern. Defaults to the Disguise logo.

Logo bottom right

Texture slot for the logo rendered in the bottom-right of the pattern. Defaults to the Disguise logo.

Input Exposure

Input exposure transform applied to the test pattern, in stops. The available range depends on the active colour management mode — ACES: -5 to 5 (step 0.1); OCIO: -10 to 10 (step 0.1).

Input Contrast

Input contrast transform. Range: 0-5 (step 0.01). *OCIO mode only.*

Input Gamma

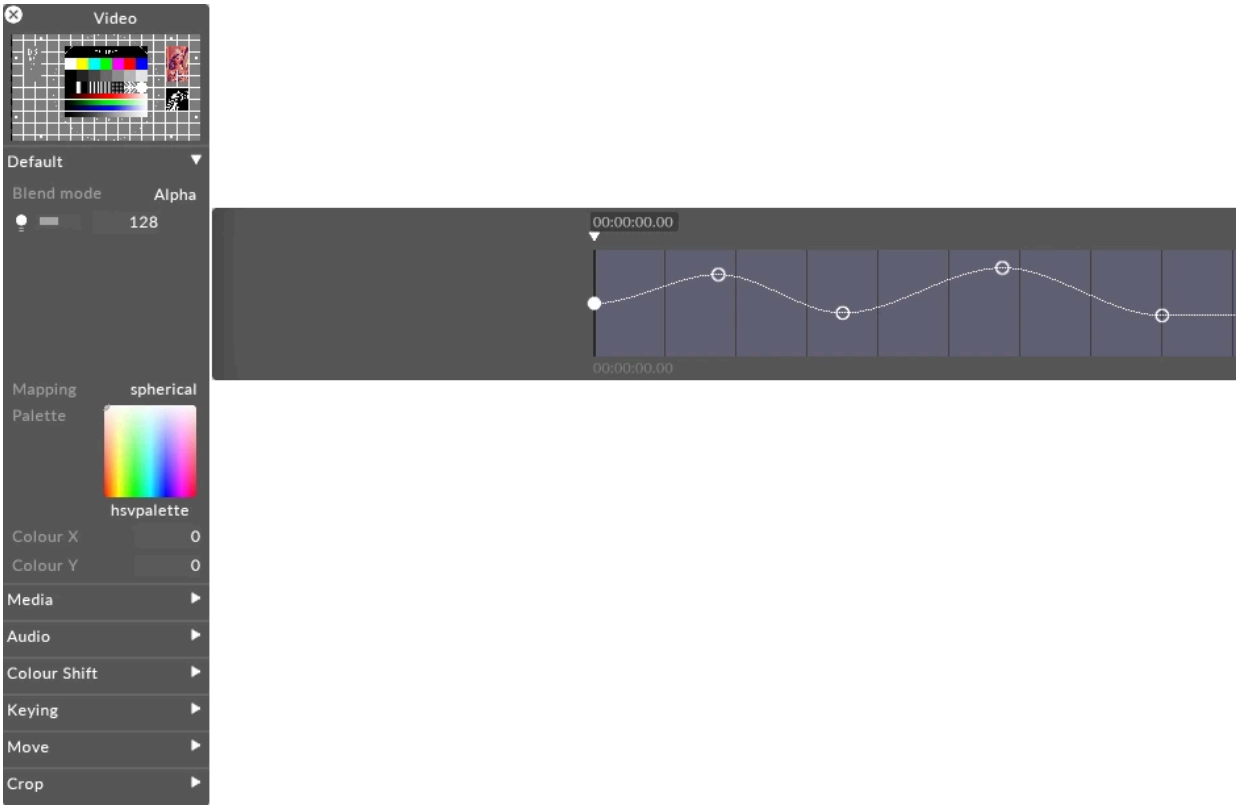
Input gamma transform. Range: 0-5.

Common Layer Properties

> **Note**
>
> The TestPattern layer does not expose **Blend Mode**.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
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Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



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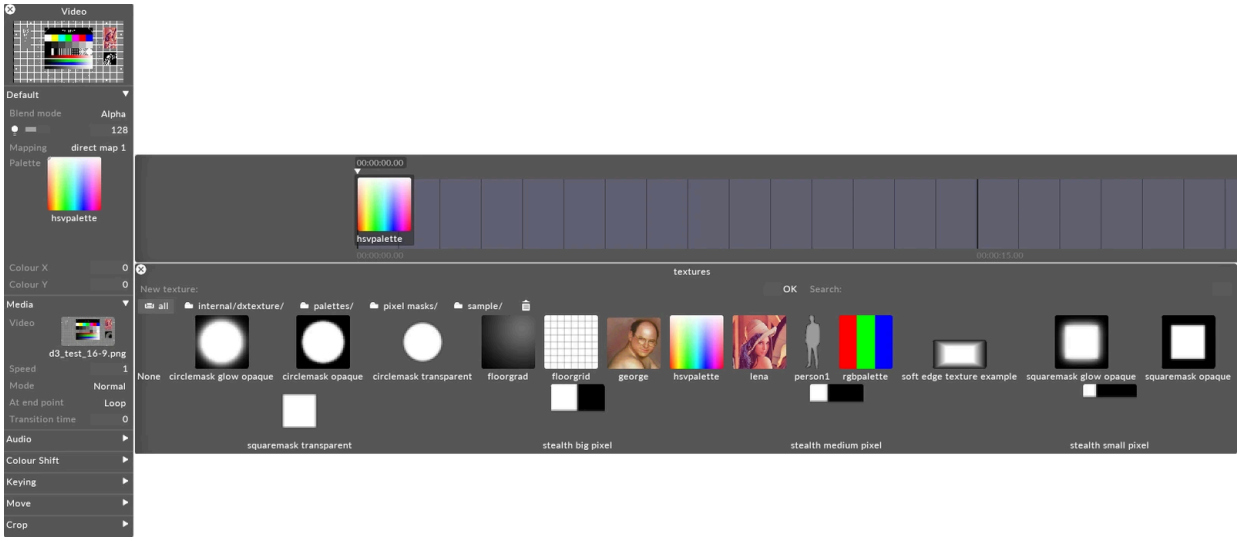
This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



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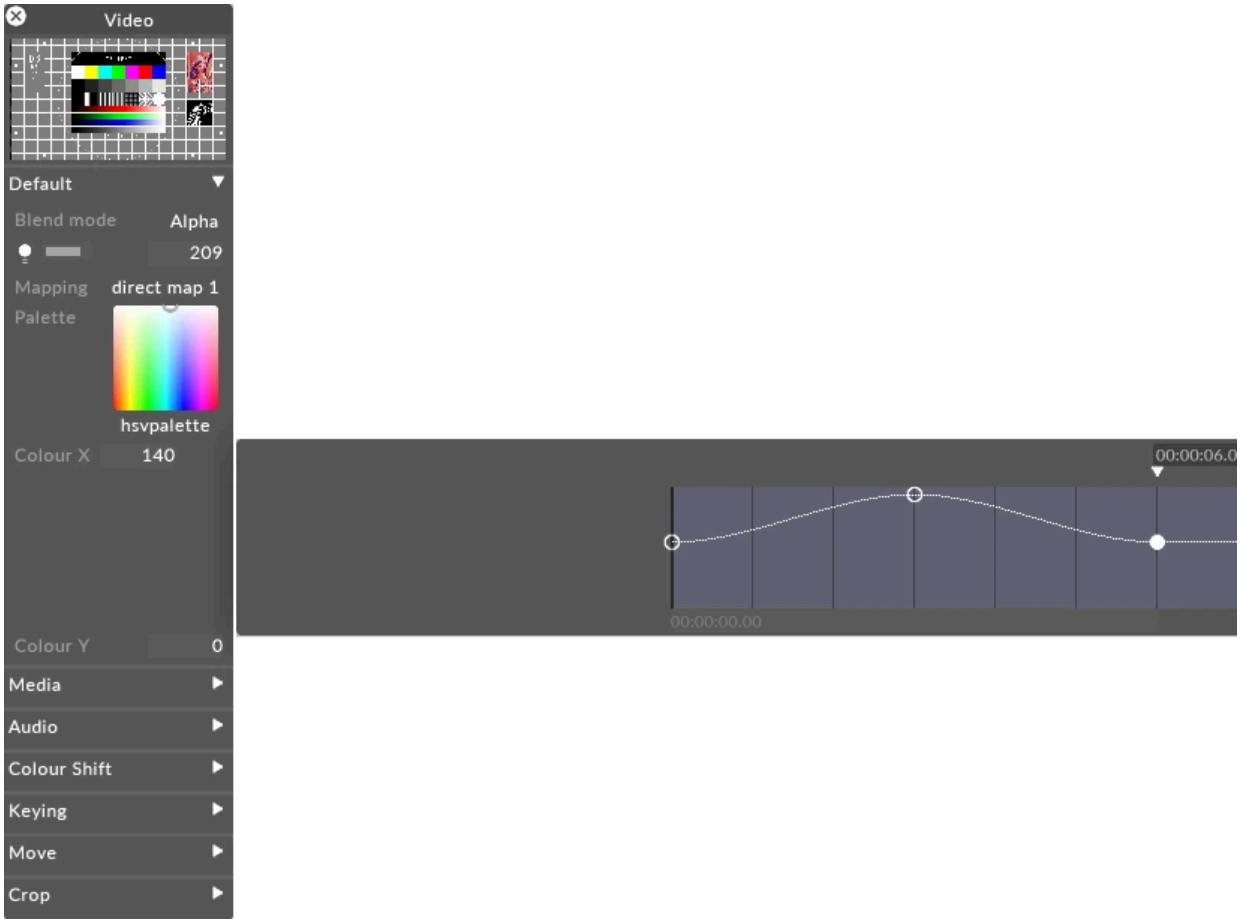
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

with the colors of the existing content.

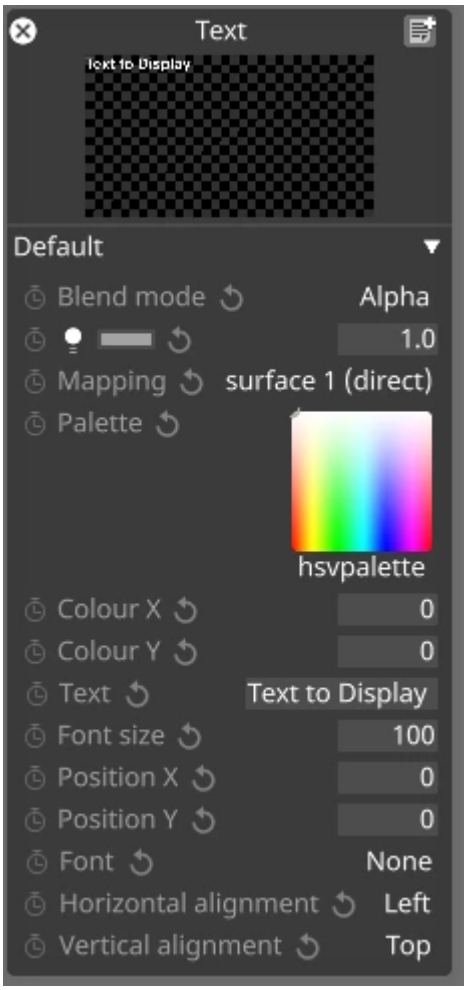
When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Text Layer

The Text layer renders configurable text on a surface or screen. The content, font, size, position, and alignment can be controlled directly or driven by keyframes — useful for labels, captions, on-screen titles, and any timeline-driven text content.

Text Layer Properties



Text

The text to display. Multi-line content is supported — newlines in the input are rendered as line breaks. Default: `Text to Display`.

Font size

Text size in pixels. Range: 0-500. Default: 100.

Position X

Horizontal pixel offset from the alignment anchor. Range: 0-1920. Default: 0.

Position Y

Vertical pixel offset from the alignment anchor. Range: 0-1080. Default: 0.

Font

Selects the font used to render the text. Arial and Times New Roman are pre-loaded; additional fonts can be added by placing TTF files in the project's `objects/textfonts/` folder, after which they become selectable in this dropdown.

Horizontal alignment

Horizontal placement of text on the surface. Options: **Left**, **Center**, **Right**. Default: **Left**.

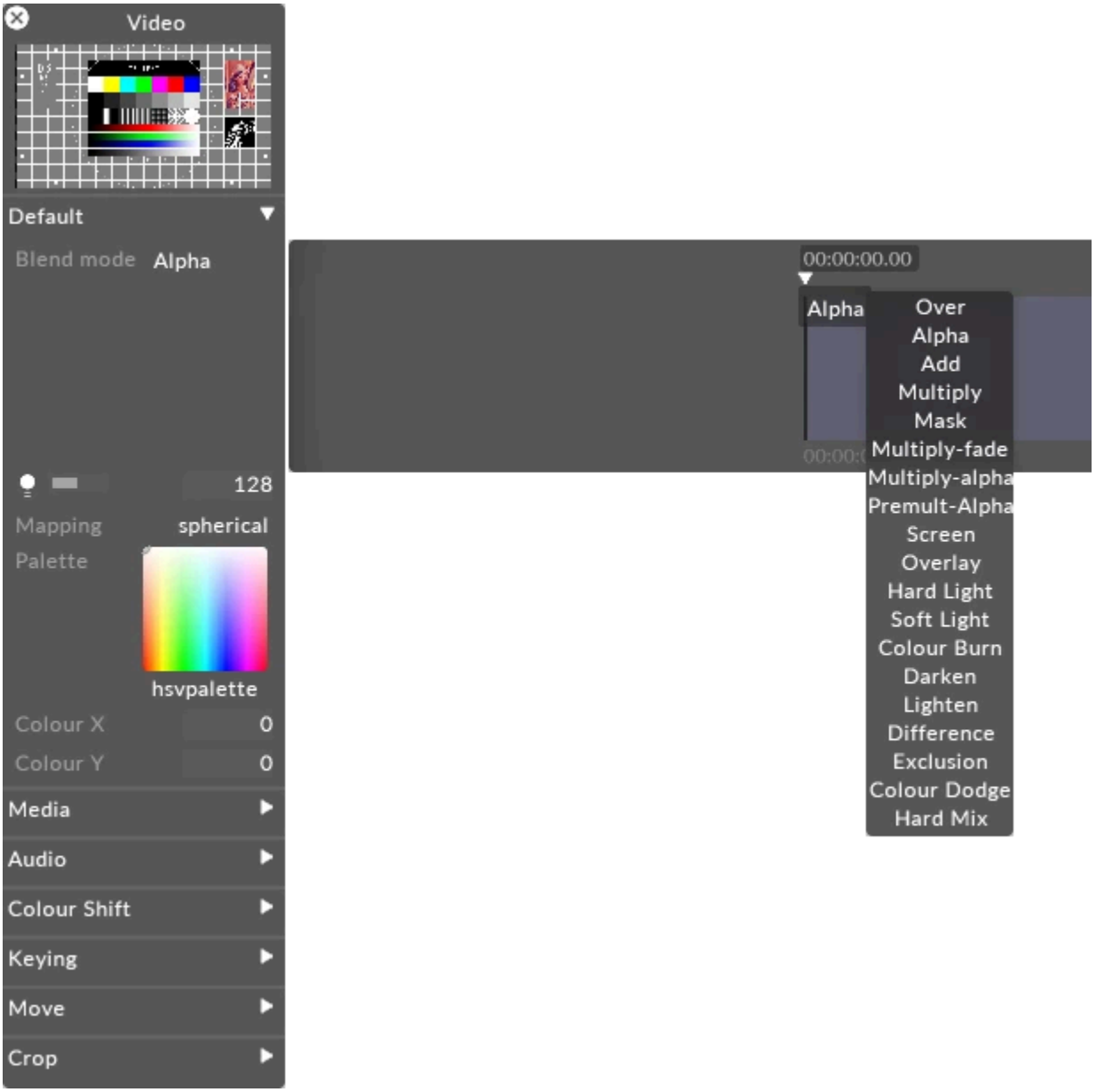
Vertical alignment

Vertical placement of text on the surface. Options: **Top**, **Center**, **Bottom**. Default: **Top**.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

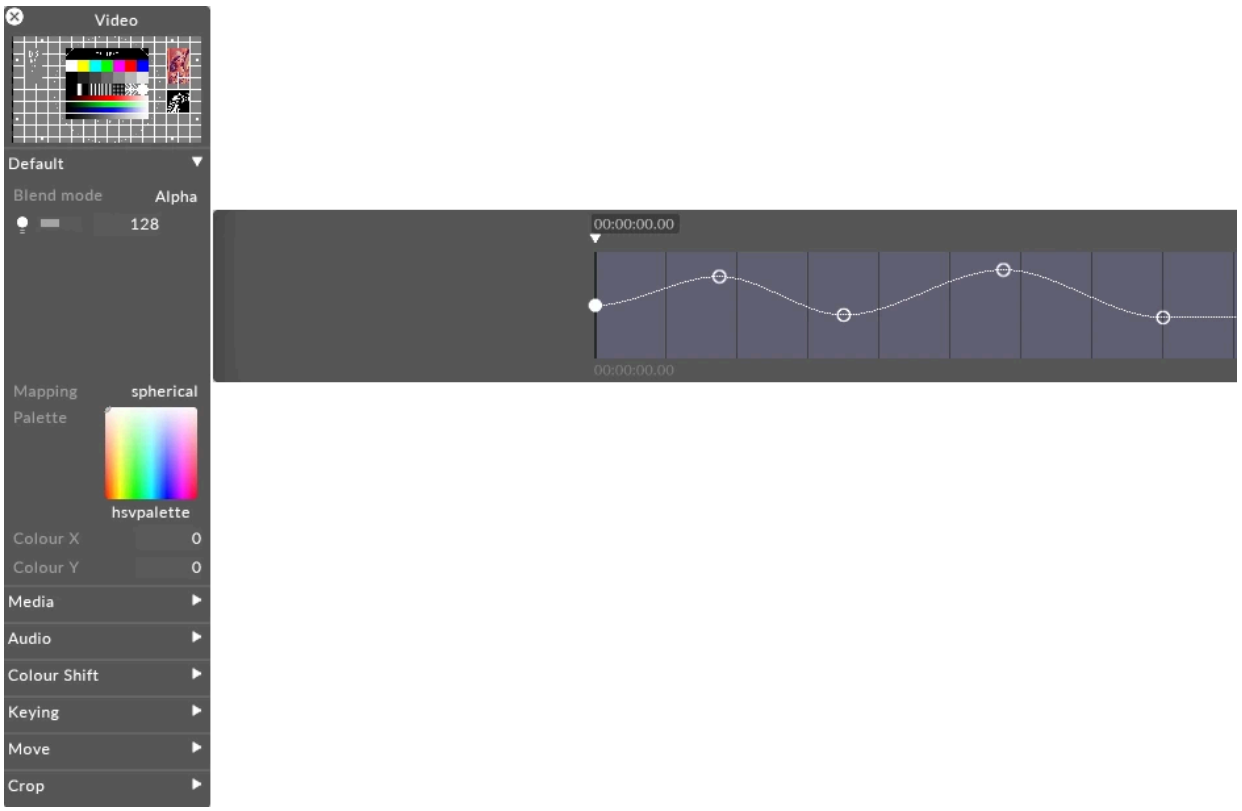
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



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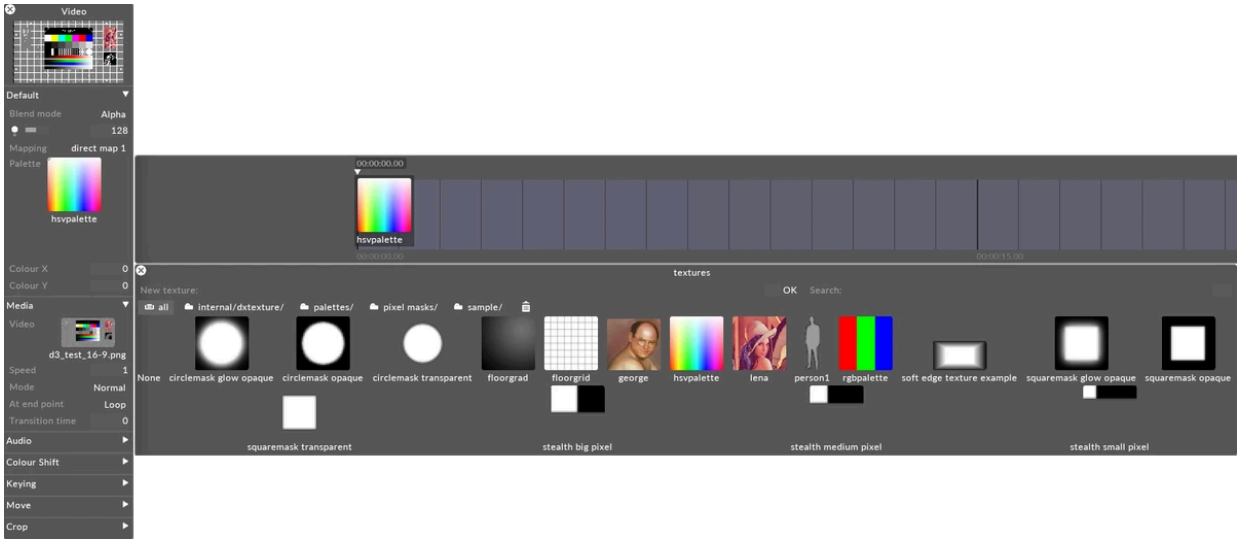

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See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

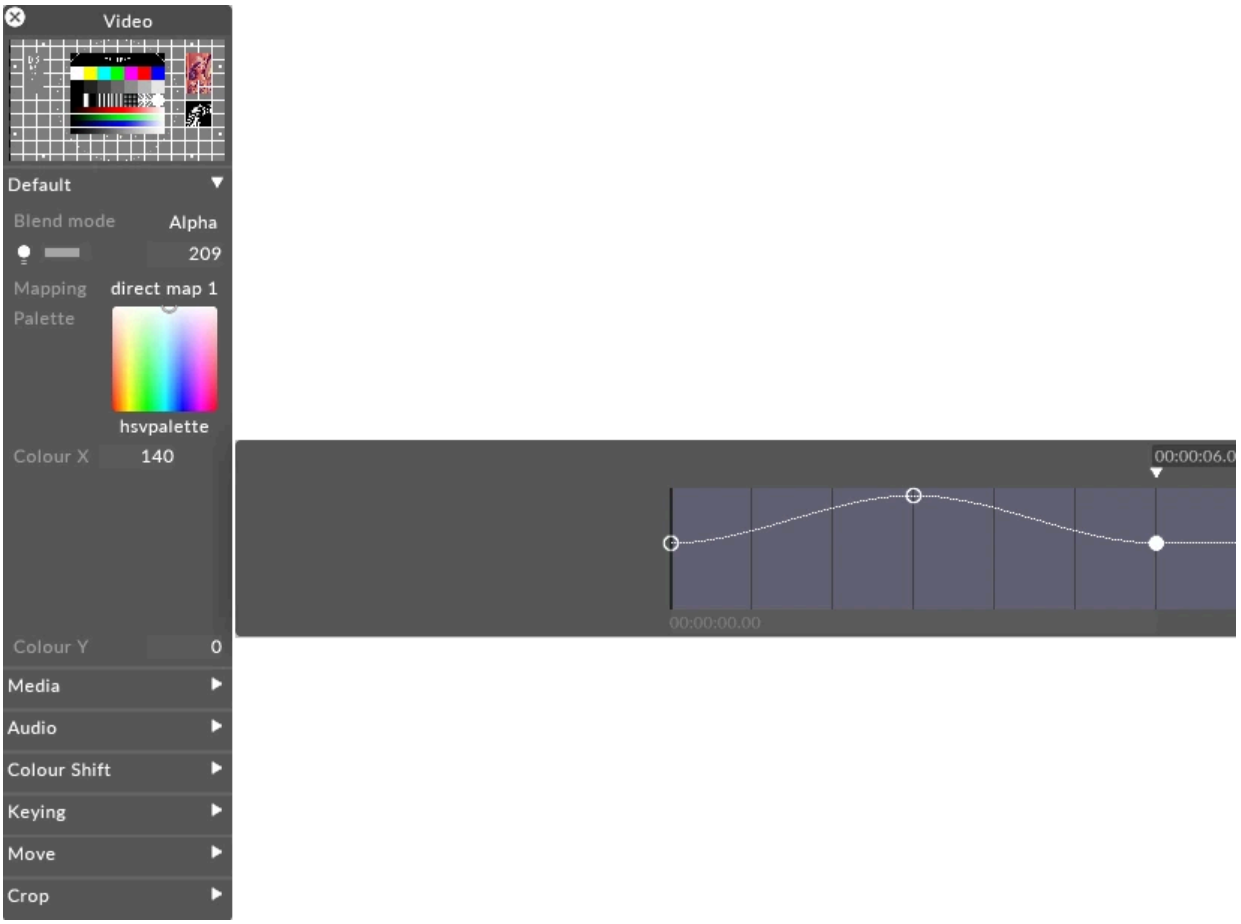
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.

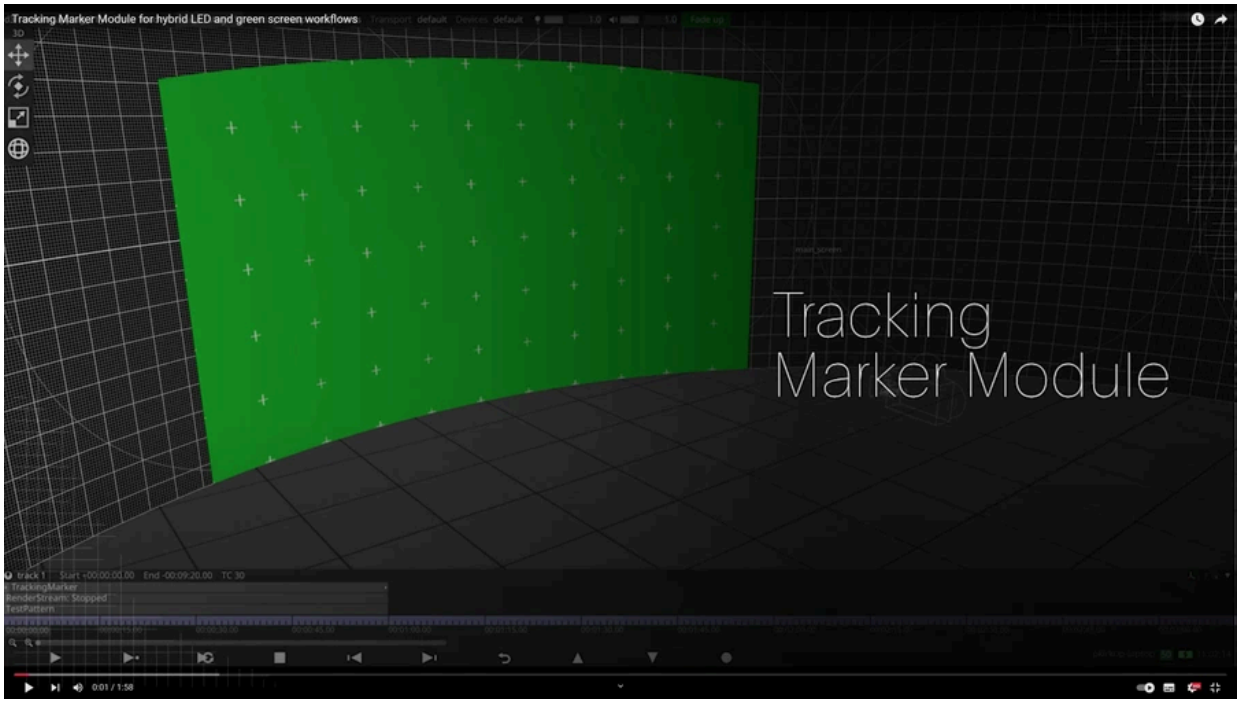


TrackingMarker Module

The TrackingMarker module is useful for virtual production workflows where some scenes require a green screen, either just within the camera frustum or on the whole of the LED screen.

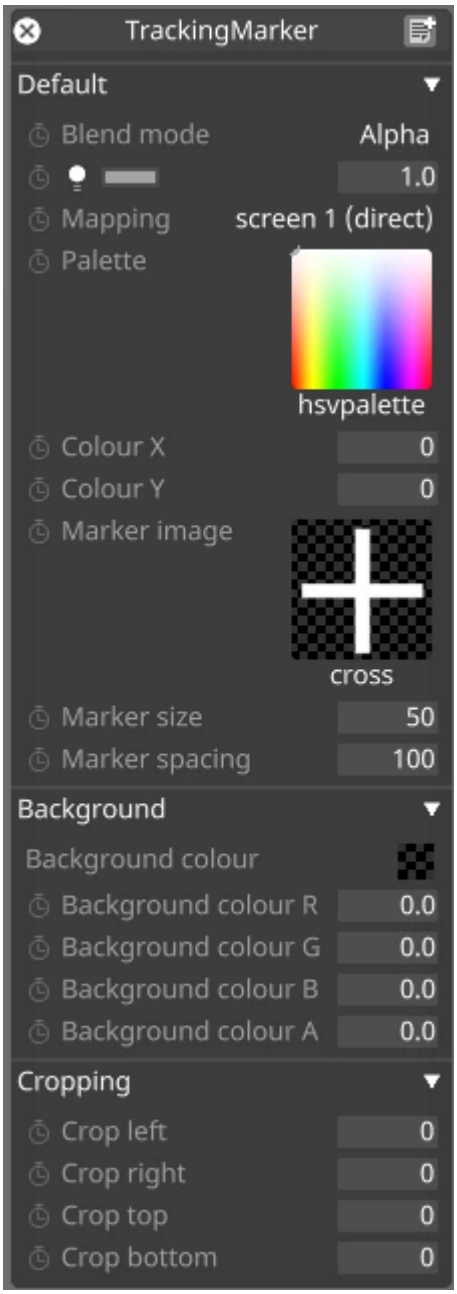
The tracking marker module generates a repeating pattern of markers on a coloured or transparent background. It is useful for virtual production workflows where some scenes require a green screen, either just within the camera frustrum or on the whole of the LED screen. It can be used for both 2D and 3D mappings, and the markers will appear fixed to the screens in both cases.

See How It Works



Click on the image to see the video in Youtube

TrackingMarker Layer Properties



Marker Image

The image used for the onscreen marker.

Marker Size

The size of the onscreen marker.

Marker Spacing

The spacing between each onscreen marker image.

Background Colour

Colour Controls for the background colour when Alpha is enabled

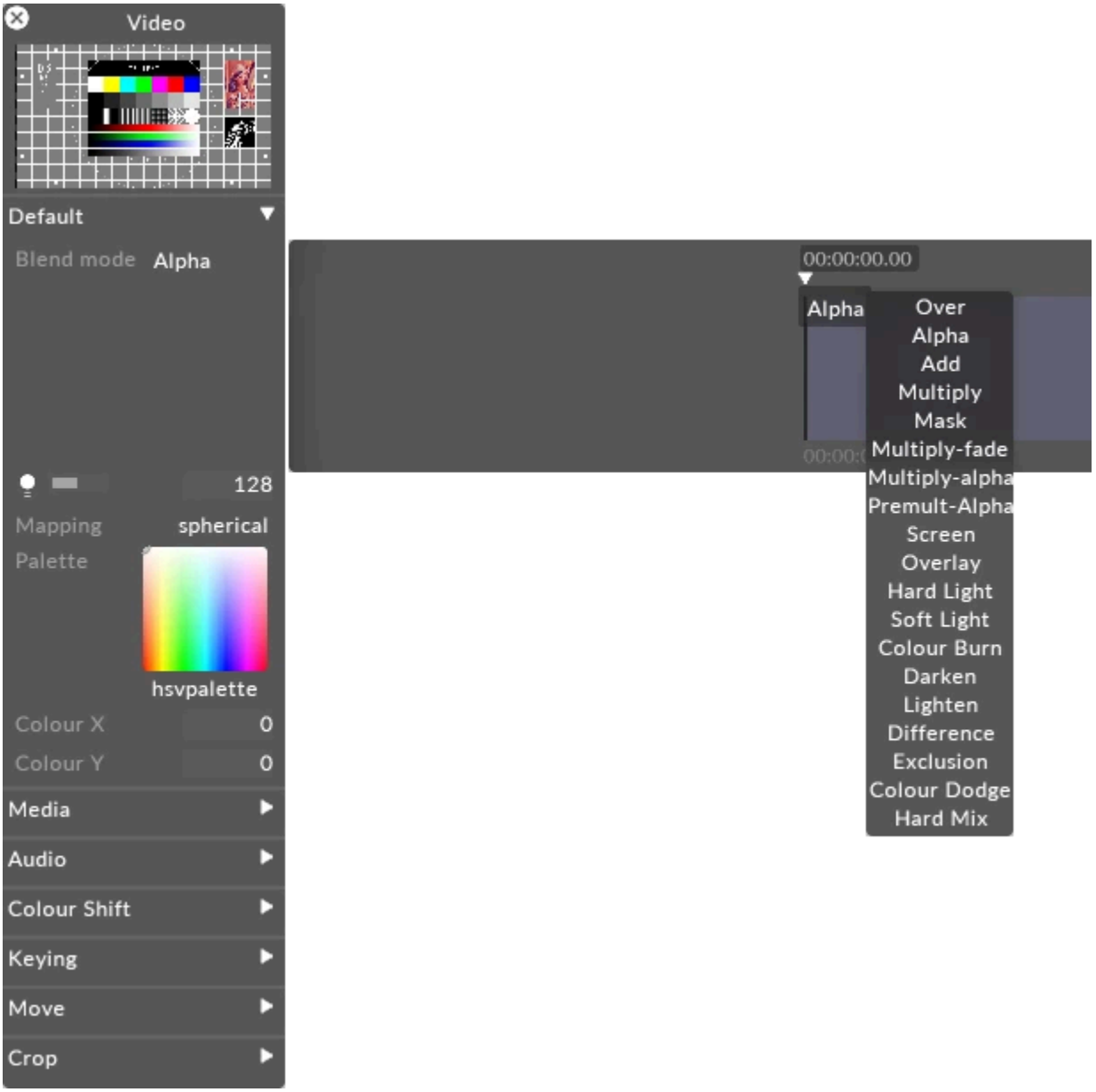
Cropping

Crops left, right, top and bottom of the marker overlay.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the Luma Matte mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than

50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

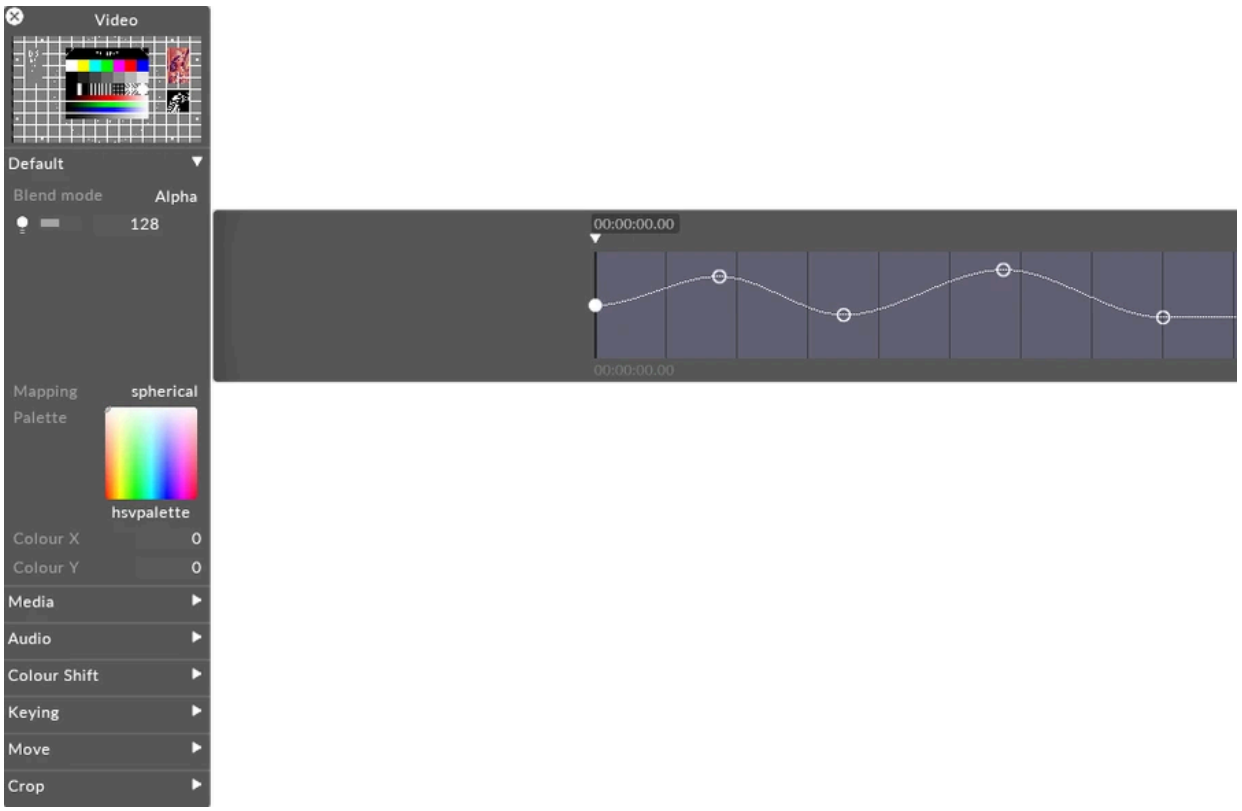
Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it

receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.

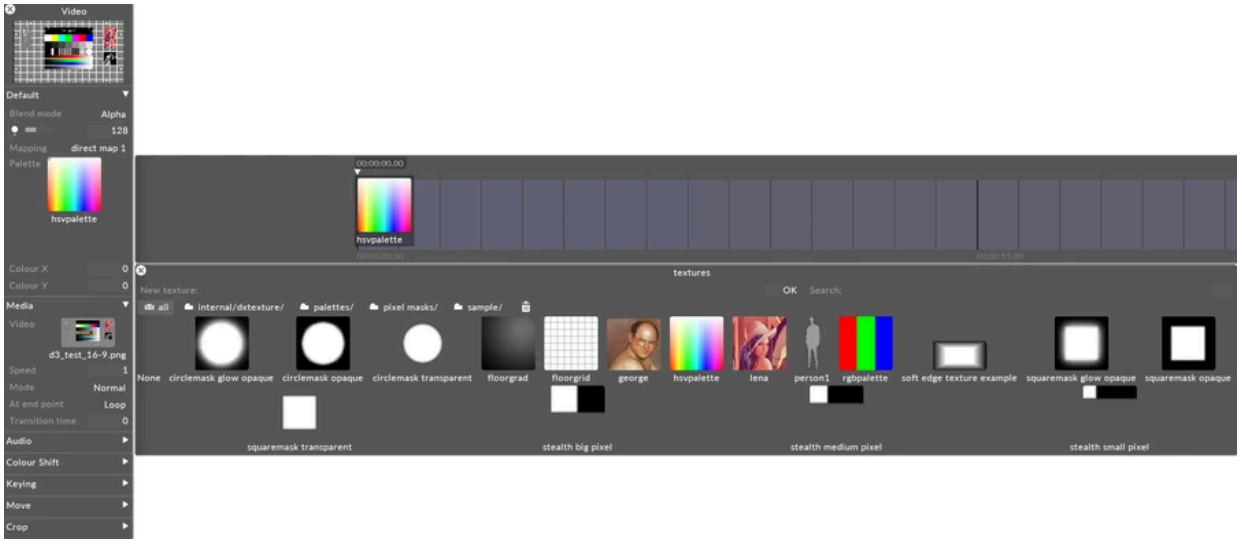


For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

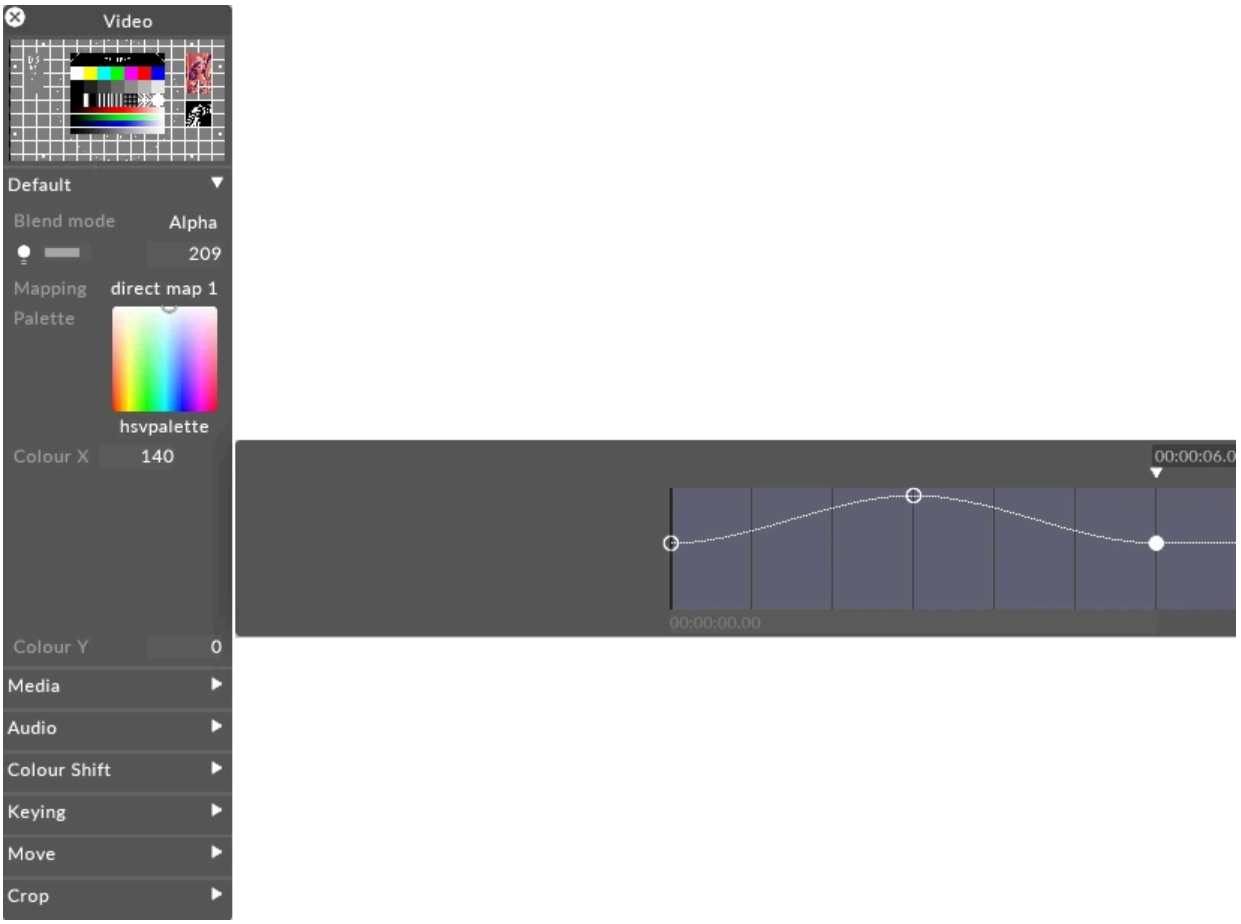
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost

edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



Layers Types Index

Designer includes six main layer types:

- Content layers
- Control layers
- Effects layers
- Generative layers
- Legacy layers
- Previsualisation layers

This section provides an overview of each type, explains their functions and features.

For guidance on creating and editing layers, see the working with layers section.

Content layers

The function of content layers is to play back pre-rendered content, map them onto screens and, if needed, apply a number of effects built into the layer.

- 2.5D: Creates parallax scenes from layered image or video plates with depth, bridging 2D video and full 3D workflows.
- Audio: Plays back audio files inside your Designer timeline, routed through Disguise's audio output system.
- Depth Video: Applies a depth-map video directly to a Depth Map Mesh, deforming its geometry in real time based on the content's depth values.
- RenderStream: Used to control third party render engines running externally to Designer.
- RenderStream Local: Used to control third party render engines running locally on a VX or GX range media server.
- StageRender: Renders surfaces assigned to **Frontplate** or **Backplate** render layers from a camera's point of view.
- Video: Plays pre-rendered video files, combining editable colour, effects, optional audio, keying, movement, and cropping functionality, with full timeline control.
- VideoTrigger: Plays pre-rendered video files triggered by a value change (OnReset or OnChange) rather than timeline playback.
- VirtualLineup: Aligns and calibrates camera views for xR stages using virtual tracking and calibration workflows.
- Web: Displays and interacts with HTML-based content or browser-rendered pages inside the Designer timeline.

Control layers

Control layers are technical layers that control other equipment in the show. For example, DVI matrices, switchers or DMX controlled equipment.

- Camera Control: Sends commands to control physical or virtual cameras, such as zoom, focus, or position.
- CameraCutControl: Sequences camera cuts on the timeline with calibrated delay compensation for xR workflows.
- Control: Sends custom serial, Telnet, or UDP commands to third-party devices directly from the timeline.
- DMXLightsControl: Controls DMX lighting fixtures by outputting DMX values.
- DMXShare: Shares and synchronises DMX values between layers or systems.
- ExpressionVariables: Animates or sets numeric variables that drive expressions or dynamic behaviours.
- HTTPControl: Sends HTTP requests (GET/POST/etc.) to trigger actions on web-enabled devices or APIs.
- IndirectionControl: Allows indirections to be sequenced on a timeline.
- MDC: Sends Motion Data Control commands to devices and systems using the MDC protocol.
- MTC: Sends MIDI Timecode to synchronise external devices with Designer.
- MasterBrightness: Sets the brightness level of all displays of a given projection.
- MatrixControl: Sends commands to video or signal routing matrices for switching sources and destinations.
- MidiNote: Sends MIDI note messages to trigger cues or behaviours.
- Open: Controls any property of any object in Designer from the timeline, even if not normally animatable.
- OscControl: Sends OSC messages to OSC-compatible systems and software.
- PlayMode: Changes the project's play state between modes like Play, Play to end of section, Loop section.
- ProjectorControl: Animates projector parameters in the stage, and in turn, those parameters can be output to real projectors.
- TargetObject: Sets the target used by other control layers that need to reference a specific object or device.
- TimecodeMode: Sets the timecode chase mode of the current transport manager to either Default, Force Chase, or Force Ignore.
- TrackJump: Jumps the playhead to a specific cue on a specific track.
- TransportBrightnessLocal: Adjusts the brightness of the current transport manager.
- TransportControl: Sends transport jump commands to a given transport manager.
- TransportVolumeLocal: Adjusts the volume for the current transport manager.

Effect layers

Effect layers can be used to apply visual effects to other layer types such as Video layers.

Input a bitmap, a video or an output from another content layer into Designer effects layers. For example, you can spin, pixelate, blur images or video, or add any effect to other inputs to create a new look.

- Blur: Softens the input image by applying a blur filter with adjustable strength.
- CDL: Applies ASC-CDL colour corrections (Slope, Offset, Power, Saturation) for standardised colour grading across pipelines.
- ChannelRouter: Re-routes colour channels or alpha channels from the input to create customised channel outputs.
- ColourAdjust: Adjusts brightness, contrast, gamma, saturation and other colour characteristics.
- Compose: Combines multiple inputs spatially on a single screen with optional edge blurring for seamless composition.
- EdgeFilter: Detects and highlights edges in the input image for stylised or technical looks.
- Fade: Fades a layer or input in and out over time using timeline-driven parameters.
- FilmicGrain: Adds film-style grain to the input for a textured or cinematic look.
- Kaleidoscope: Applies a kaleidoscope effect by mirroring and repeating the image.
- Lut: Applies a 1D or 3D LUT to recolour the input based on a lookup table.
- MotionBlur: Applies motion-based blur using velocity or temporal sampling to smooth movement.
- OCIO : Applies OpenColorIO (OCIO) colour space transformations to the input, ensuring consistent and standardised colour management (such as ACES) across your display pipeline.
- Noise: Overlays procedural noise for texture, distortion, or stylisation.
- PixelMap: Remaps pixels from one coordinate space to another using a pixel mapping texture.
- Pixelate: Reduces resolution to create a blocky, pixelated appearance.
- Scroll: Moves the input horizontally or vertically for looping or animated motion.
- SpinBitmap: Rotates the input bitmap around a pivot point over time.
- Trigger: Triggers still image content at specific points on your screens.
- UVLookup: Re-maps image pixels using UV coordinates from another texture.
- VideoTransition: Applies transitions (such as wipes, dissolves, or slides) between two video inputs.

Generative layers

Generative layers are packets of algorithms inside Designer that produce visuals based on a number of animatable properties. They share some of the same properties as all the other

layer types such as the Mapping property.

- Bugs: Generates swarming particle-based visuals with animatable motion properties.
- Chevron: Produces repeating angled chevron shapes with controllable colours and speed.
- Colour: Outputs a solid colour that can be animated or mapped like any other layer.
- Gradient: Generates multi-stop gradients with animatable direction and colour values.
- Notch: Plays real-time Notch Blocks for complex graphics, effects, or simulations.
- Radar: Creates radar-style sweeping graphics with rotating arms or pulses.
- RGBColour: Generates RGB colour bars or blocks for testing or stylised visuals.
- Readout: Displays numeric values or data readouts dynamically from variables or inputs.
- Scan: Produces a scanning bar or sweep effect similar to a sensor or line scan.
- Strobe: Generates rapid flashing or strobing patterns based on adjustable timing.
- Tennis: Creates bouncing animated “ball” visuals used mainly for testing and calibration.
- Testpattern: Outputs test pattern grids for calibration and system verification.
- Text: Renders vector text that can be animated, styled, and mapped.
- TrackingMarker: Generates a repeating pattern of tracking markers for xR, calibration, and virtual production workflows.

Legacy layers

Legacy layers remain for backwards compatibility with older projects.

- Bitmap: Displays still images. Still used with precomps, but for general use the Video layer is recommended.
- Legacy Video: Plays pre-rendered video files. Replaced by the modern Video layer.

Previsualisation layers

Previsualisation layers are usually used during the design and pre-production phases of the project when accurate visualisation is required, for example animating screens or creating camera fly-throughs.

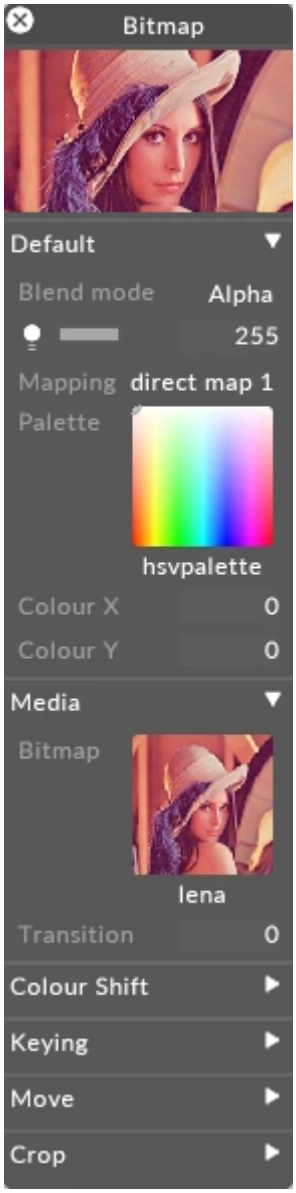
- AnimateCameraPreset: Animates transitions between saved camera presets for previz or fly-throughs.
- AnimateCameraControl: Drives camera movement directly using animatable timeline properties.
- AnimateObjectPreset: Animates transitions between object position/rotation presets.
- SceneAnimation: Plays back imported 3D scene animations (such as Alembic caches), allowing you to sequence stage automation, moving screens, or object movements directly on the timeline.
- TargetControl: Moves a camera or object to track or look at a specific target point.
- TargetPreset: Stores and animates transitions between different target positions.

Bitmap Layer

Using the Bitmap layer is the easiest way to display still images. The Bitmap layer takes over certain properties from the Colour layer and the Legacy Video layer. To see where to place media files in Windows see the Placing media files for a project page. To see what video file formats support see the Supported file formats page.

In release r13 onwards it is recommended to use a video layer for still images. For more information see the Placing media files for a project page.

The Bitmap layer supports the use of Arrows, allowing content layers to be piped into the Bitmap layer. For more information please see the sub-chapter Composing layers using Arrows.



Bitmap Layer Properties

Transition

Determines the crossfade (in seconds) between two adjacent bitmaps placed in the keyframe editor of the Bitmap layer.

Threshold

The threshold of the keying. Colours closer than (threshold) to the key colour become transparent.

Hardness

The hardness of the keying. Lower numbers produce softer edges and higher numbers produce harder edges between transparent and opaque areas.

Key colour rgb

The value of the key colour, 0 255, causing the key colour to become transparent.

Scale mode

Provides mapping options to apply to content of a certain resolution which does not match the resolution of the targeted canvas.

Scale

This controls the size of the image. When set to 1, the image is displayed at its normal size. Increasing the scale increases the size of the image; to display at double size, set **scale** to 2. To halve the image size, set **scale** to 0.5.

Aspect

This controls the aspect ratio of the image. When set to 1, the image is displayed at a 1:1 aspect ratio. Increasing the **aspect** value increases the height of the image in relation to its width.

Position

This controls the horizontal (x) and vertical (y) position of the image. When both are set to 0, the centre of the image is centred in the output canvas. Setting x to 1 moves the center to the left edge of the canvas; setting it to +1 moves the center to the right edge of the canvas. Setting y to 1 moves the center to the top edge of the canvas; setting it to +1 moves the center to the bottom edge of the canvas.

Rotation

This controls the rotation of the bitmap, in degrees.

Crop

The **crop** pulldown tab contains a set of properties (**top**, **left**, **bottom**, **right**) that allow you to remove pixels from the edges of the bitmap. Each property specifies the number of pixels you want to remove from the corresponding edge. For example, setting top to 10 will clip 10 pixels off the top edge.

Common Layer Properties

Blend Mode

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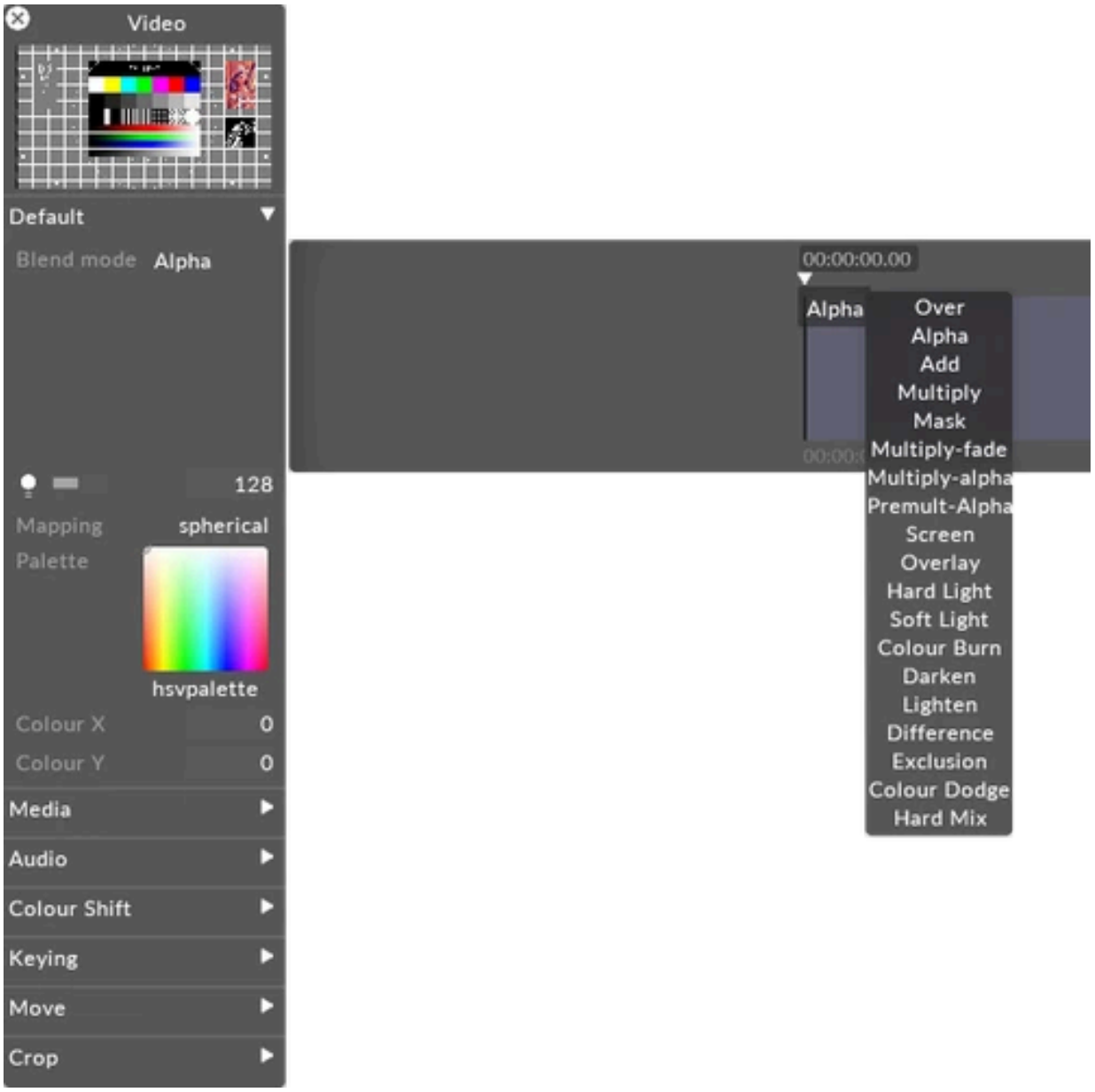

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Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

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Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

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Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

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Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

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Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

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To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

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The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

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Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

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Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

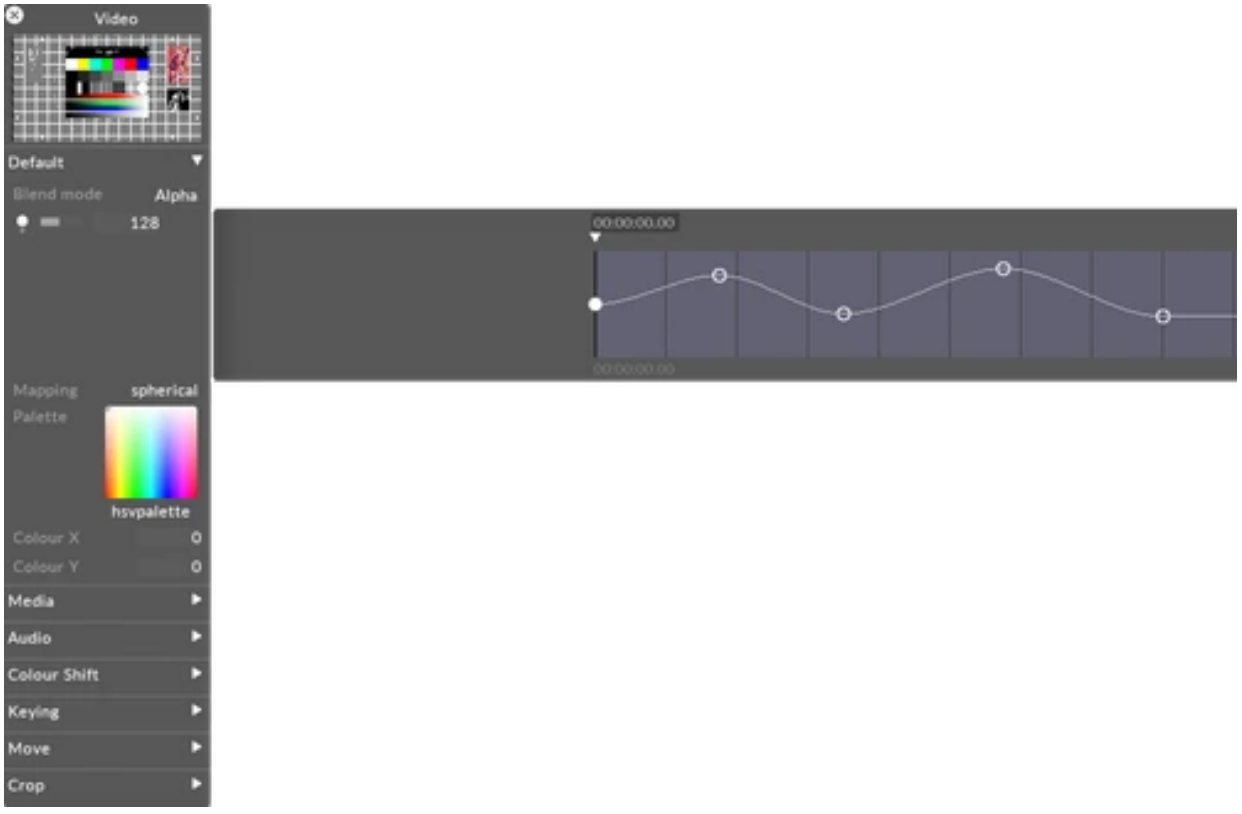
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

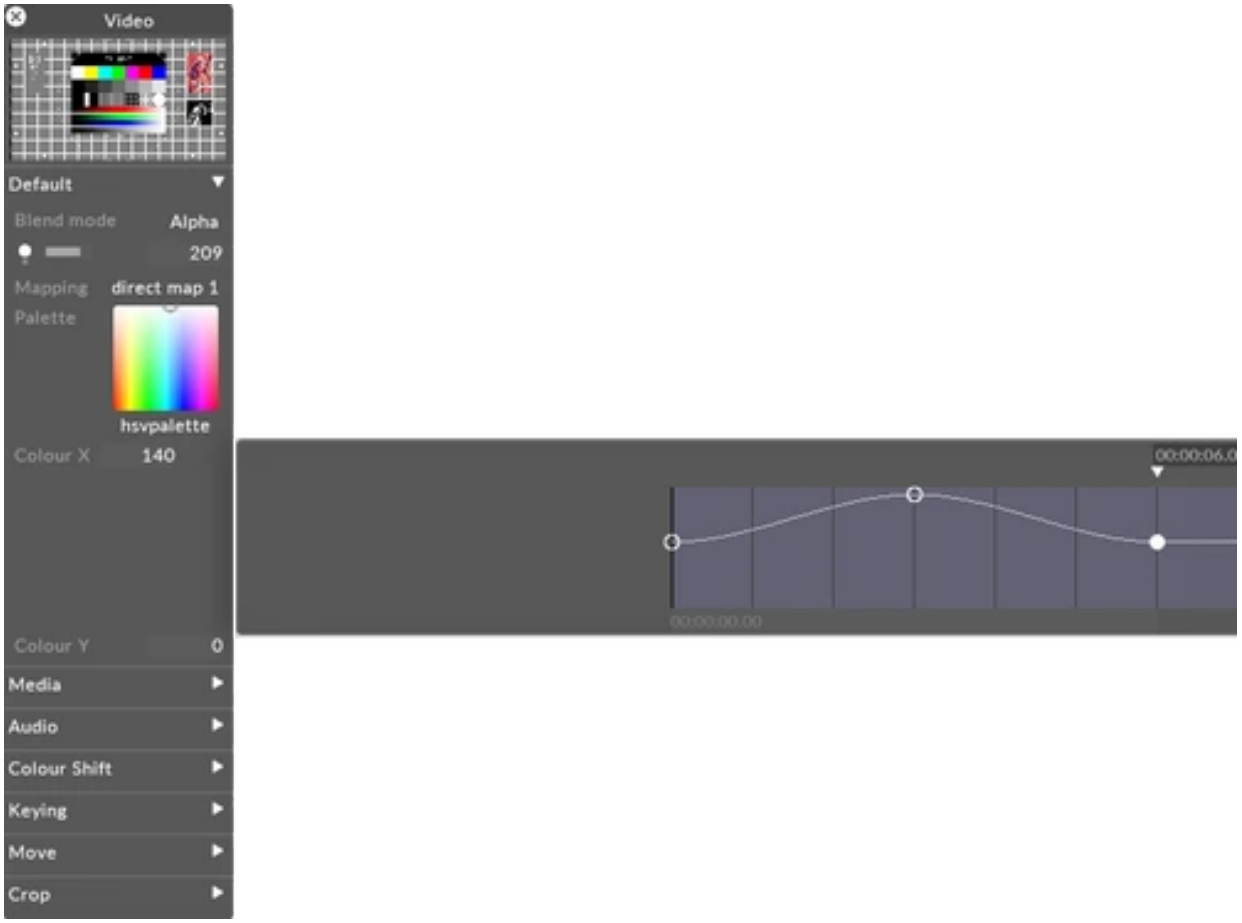
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



ColourShift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



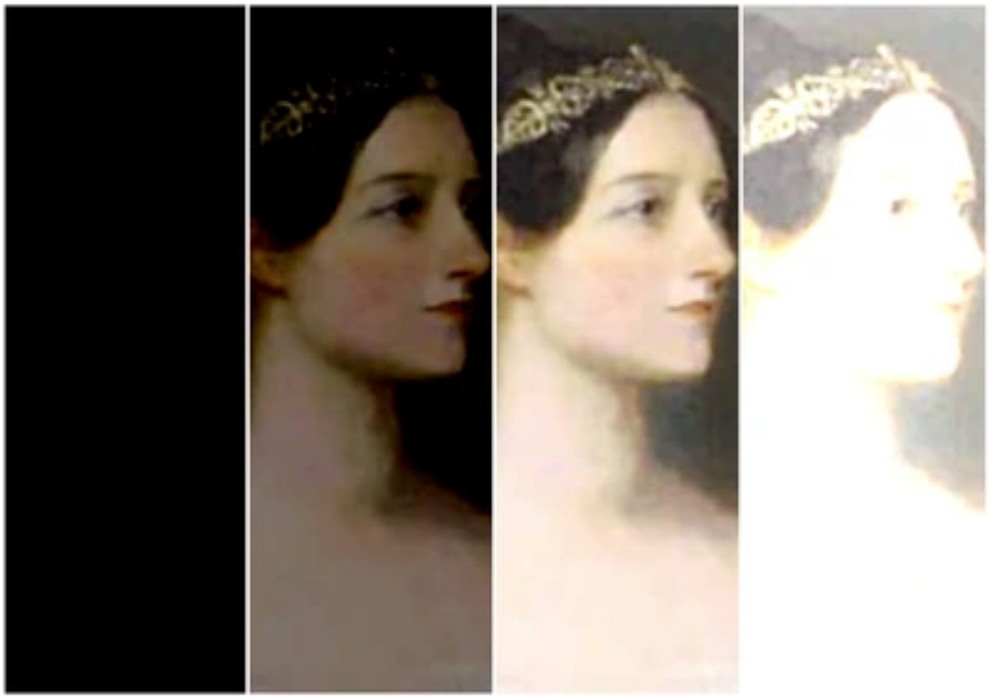
Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

This property changing the hue of colours in an image, design, or graphic while maintaining other colour properties like saturation and brightness.

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` *set to Together (from left to right): 0, 0.3, 0.8*



With `RGB controlled` *set to Separate, red min (from left to right): 0, 0.3, 0.8*

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` *set to Together (from left to right): 1, 0.7, 0.2*



With `RGB controlled` *set to Separate, red max (from left to right): 1, 0.7, 0.2*

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` *set to Together (from left to right): 0.1, 1, 4*



With `RGB controlled` *set to Separate, red gamma (from left to right): 0.1, 1, 4*

Legacy Layers Overview

Legacy layers are available in Designer. These include:

- Bitmap layers
- Legacy Video layers

Legacy Video Layer

The Legacy video layer is used to play pre-rendered Quicktime video files.

To see what video file formats support see the Supported file formats page.

To see where to place media files in Windows see the Placing media files for a project page.

Legacy Video Layer Properties

Media

The Video property points to the still media file that defines the content to be used on the layer. Selecting this property will open the VideoClip object library, which shows all of the still image files saved on your local hard-drive in the VideoFile folder.

To change the current piece of content:

1. Left-click Video to open the VideoClip object library.
2. Left-click the media file you want to use.

Speed

Selects playback speed. When this is set to 1, the video is played at its normal framerate; when set to 2, the video is played at double speed, and so on.

Playback speed is set at the point where the video keyframe is encountered in the video keyframe editor. Once this is set, the playback speed does not change, even if it varies over time. To change the playback speed, drop a speed keyframe at the point where the video thumbnail appears in the video keyframe editor.

Mode

This specifies the playback mode. There are three modes - **Normal**, **Free-Run** and **Locked**.

Each one has a specific behaviour that is useful for a different situation.

Normal

When the play cursor stops, the video will also stop and the frame number will lock to the timeline position. When the cursor continues to play or holds at the end of a section, the video will play continuously. Jumping around the timeline while playing does not affect which frame is being played.

Locked

If the play cursor continues to play or stops at the end of a section, the video frame number locks to the timeline. When the play cursor holds at the end of a section, the video will play continuously.

Freerun

If the play cursor continues to play or stops at the end of a section, the video will play continuously. Jumping around the timeline while the cursor is playing or has stopped does not affect which frame is being played.

At end point

This specifies what happens when playback reaches the end of the video clip. There are three options to choose from:

Loop

When playback reaches the end of the video clip, the clip will loop immediately back to the beginning and will start playing again from there.

Ping-pong

When playback reaches the end of the video clip, the clip will play in reverse back to the beginning.

Pause

When playback reaches the end of the video clip, the clip will pause on the last frame.

Transition time

The transition property specifies the dissolve time, in beats, when switching from one video clip to the next on the timeline. By default, this is set to 0, so the player cuts immediately from one clip to the next. Setting this value to 1 causes the player to dissolve from one clip to the next over 1 beat.

Volume

Some video clips may contain audio. You can fill in any number between 0 (mute) and 255 (full) in the text field to set a constant volume, or open the propertys key-frame editor to fade volume in or out.

Output

If the video has an audio track, this controls which audio output device the audio is played to.

Threshold

The threshold of the keying. Colours closer than (threshold) to the key colour become transparent.

Hardness

The hardness of the keying. Lower numbers produce softer edges and higher numbers produce harder edges between transparent and opaque areas.

Key color RGB

The value of the key colour, 0 255, causing the key colour to become transparent.

Scale

Controls the size of the video.

Aspect

Controls the aspect ration of the video, higher numbers make the frame taller.

Pos x y

Position of the video:

- x = horizontal position
- y = vertical position
- 0 = centre of canvas
- -1 = top edge of canvas
- +1 = bottom edge

Rotation

Rotation (in degrees) of the video.

Crop left, right, top, bottom

Crops the frame from the respective edge. 0 = no crop, 1 = entire frame crop.

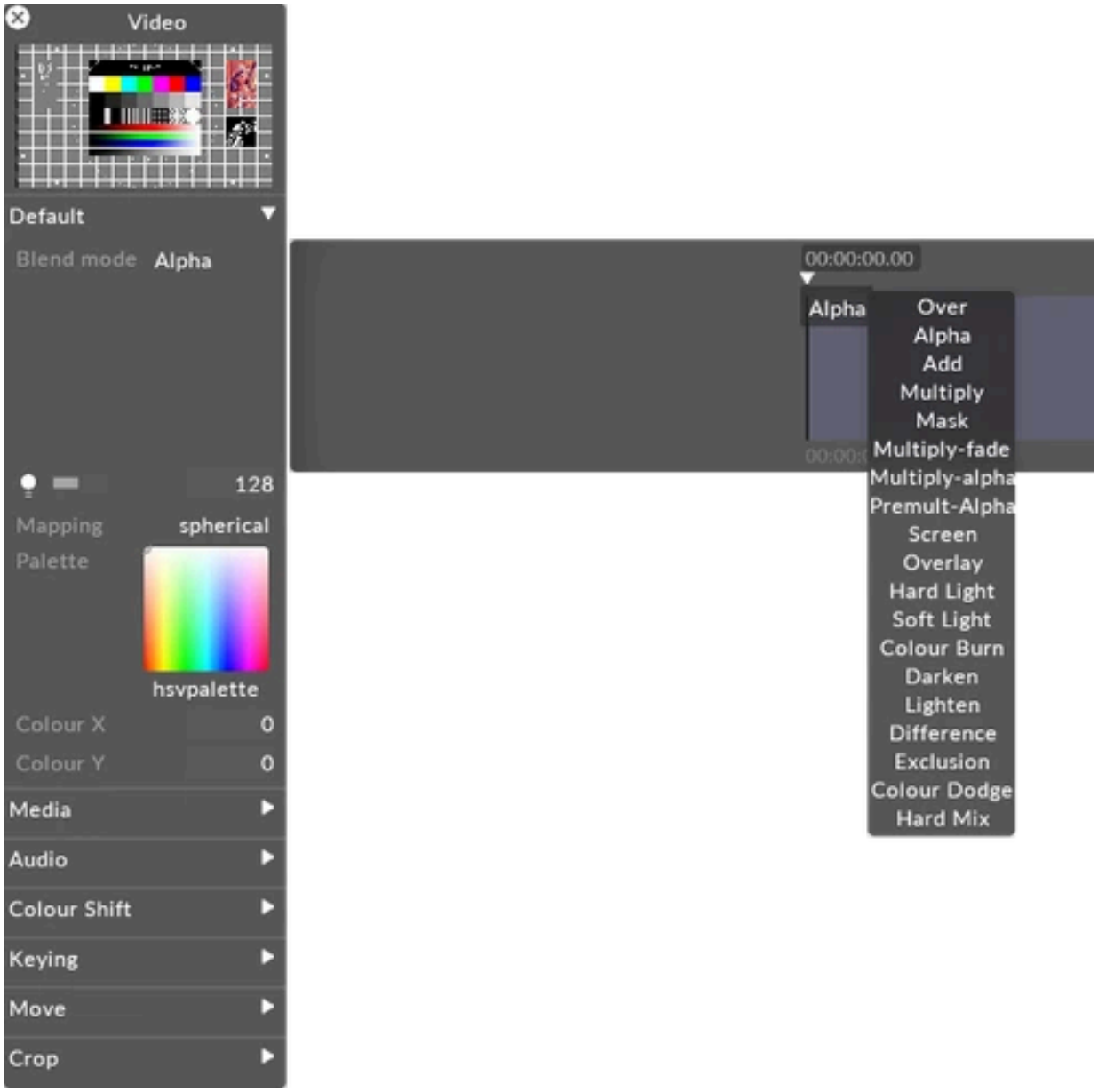
Vignette

Adds a vignette effect by softening the edges of the crop.

Common Layer Properties

Blend Mode

BlendMode controls how the output of the layer is composited with the layers below. Layers are rendered in a bottom-up order: layers at the top can modify the output of the layers below.



Changing brightness of a content layer in Designer is actually controlling the value of the alpha of the layer. Even when displaying a HAP video, the software will composite the layer with a

controllable layer of alpha - one per layer.

There are two ways of expressing alpha in an image:

Straight alpha is an alpha channel which functions just like RGB. Alpha acts as a fourth channel of information per pixel which is as independent of the other three as R, G and B are of each other. For example, with straight alpha it is possible to have RGB = 255 (white) and alpha = 0 (fully transparent) on the same pixel. Internally generated content, such as gradient layer, are generated with straight alpha. This is the preferable style of alpha and considering the cleaner method of the two.

Premultiplied alpha takes the alpha and applies it to the values of the RGB channels per pixel. The more transparent something gets with premultiplied alpha, the closer it gets to black - as if the content is sitting on a black table. Premultiplied is the default output of Adobe Photoshop or AfterEffects. The result is our pixel at 255 RGB (full white) with 0 alpha would be calculated as a black pixel in the final image.

Here are explanations of what each individual blend mode will do.

Over

Makes a layer fully opaque. Premultiplies all alpha onto the RGB value of each pixel. Alpha = black, so adjusting the brightness of a layer in Over blend mode makes it darker.

Alpha

Default blend mode. It will apply alpha values as a transparency if the alpha is present. Brightness changes will make the layer more or less transparent.

Add

Adds the value of each RGB pixel together. Always creates a brighter result. Values clamp at 255.

Multiply

Reads the level of each subpixel as a level between 0.0 and 1.0, and multiplies source with blend. The result is always a darker image overall. For example: white x grey = 0.5. White turns transparent, black takes precedence. Alpha is applied in the same fashion as the Over Blend mode.

Mask

Applies a mask to the single layer **above** in the stack, irrespective of mapping. See **Mask blending** for more information.

Luma-Matte

This mode creates a Luma Matte by using a layer's **Rec. 709 luminance** to control the alpha channel of the layer **above**, irrespective of mapping.

To determine transparency, the luminance of each pixel is calculated using a weighted average of its red, green, and blue channels. The luminance value is then used as the alpha (opacity) value for the corresponding pixels in the upper layers.

As a result, white areas render the layer above fully opaque, black areas make them fully transparent, and grey areas create proportional semi-transparency. This is a specialized **Mask** blend mode; for more details on the underlying behaviour, see **Mask blending**.

Inv-Luma-Matte

The Inverse Luma Matte mask works the same as the **Luma Matte** mask but the transparency is inverted meaning white regions are transparent and black regions are opaque.

Multiply-Fade

The same as Multiply, but will make use of the alpha channel to calculate transparency in the source and blend layers. Since maximum transparency is premultiplied, alpha results in black. This will ignore black created through premultiplying.

Multiply-Alpha

Multiply with straight alpha. This mode assumes that the alpha has not been premultiplied onto the RGB values and will not apply a correction to the semi-transparent pixels.

Premultiply Alpha

Like how Multiply-fade will ignore the darkening caused by premultiplying, this blend mode will do the same with Alpha.

Colour Burn

Blend mode increases the contrast to darken the base colour while reflecting the blend colour. The darker the blend colour, the more intensely the colour will be applied in the base image. White as the blend colour produces no change. Using the colour burn blend mode can produce some harsh results at full opacity. The colour burn blend mode can be used to make tonal and colour adjustments to a layer.

Screen

This blend mode looks at each channels colour information and multiplies the inverse of the blend and base colous. The result is always a lighter colour. Screening with black leaves the colour unchanged. Screening with white produces white. The effect is similar to projecting

multiple images on top of each other - where bright white is fully opaque, black is fully transparent and 50% grey is 50% transparent.

Overlay

Multiplies or screens the colours, depending on the base colour. Patterns or colours overlay the existing pixels while preserving the highlights and shadows of the base colour. The base colour is not replaced, but mixed with the blend colour to reflect the lightness or darkness of the original colour.

Hard Light

Multiplies or screens the colours, depending on the blend colour. The effects is similar to shining a harsh spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as if it were screened. This is useful for adding highlights to an image. If the blend colour is darker than 50% grey, the image is darkened as if it were multiplied. This is useful for adding shadows to an image. Painting with pure black or white results in pure black or white.

Soft Light

Darkens or lightens the colours, depending on the blend colour. The effect is similar to shining a diffused spotlight on the image. If the blend colour (light source/top layer) is lighter than 50% grey, the image is lightened as it if were dodged. If the blend colour is darker than 50% grey, the image is darkened as if it were burned in. Painting with pure black or white produces a distinctly darker or lighter area, but does not result in pure black or white.

Darken

Looks as the colour information in each channel and selects the base or blend colour - whichever is darker - as the result colour. Pixels lighter than the blend colour are replaced and pixels darker than the blend colour do not change.

Lighten

Looks at the colour information in each channel and selects the base or blend colour - whichever is lighter - as the result colour. Pixels darker than the blend colour are replaced and pixels lighter than the blend colour do not change.

Difference

Looks at the colour information in each channel and subtracts either the blend colour from the base colour or the base colour from the blend colour depending on which has the greater brightness value. Blending with white inverts the base colour values and blending with black produces no change.

Exclusion

Creates an effects similar to but lower in contrast than the difference mode. Blending with white inverts the base colour values. Blending with black produces no change.

Colour Dodge

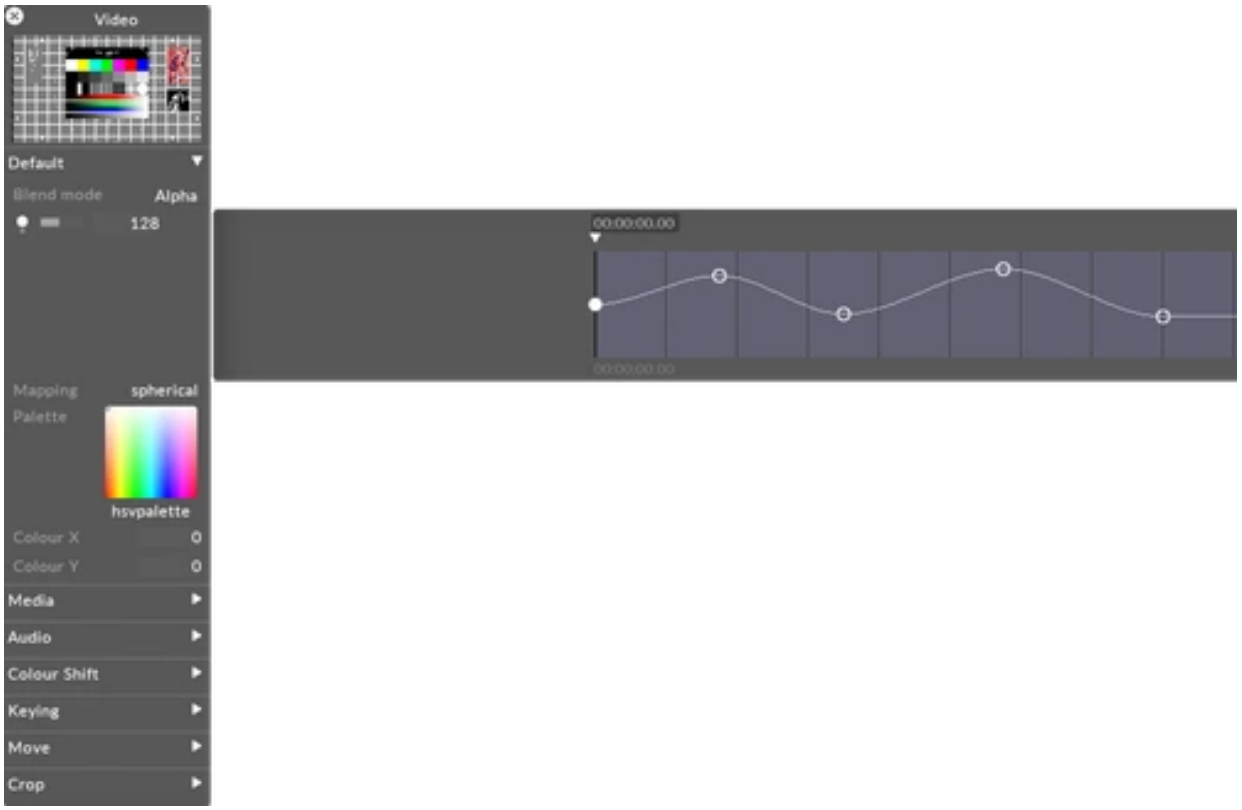
Looks at the colour information in each channel and brightens the base colour to reflect the blend colour by decreasing contrast between the two. Blending with black produces no change.

Hard Mix

Adds the RGB channels of the blend colour to the RGB values of the base colour. If the resulting sum for a channel is 255 or greater, it receives a value of 255; if it is less than 255 it receives a value of 0. Therefore all blended pixels have RGB channels of either 0 or 255. This changes all pixels to primary additive colours (RGB), white or black.

Brightness

This property (which appears as a light bulb icon) controls the brightness of the layer output.



If the layers blend mode is set to Alpha, then reducing the brightness to 0 also reduces the opacity of the layer to 0. This can be useful when you want to dissolve from one layer to the

next. In that case, you can place the new layer above the old layer and increase its brightness level.

> **Note**
>
> Layers that are patched to Sockpuppet (DMX, OSC or HTTP) are made Dormant when their brightness is set to 0. This means they will not do any rendering or consume any resources until their brightness is changed to > 0. You can find more information about this here: **Sequencing with Sockpuppet**. Layers without a sockpuppet patch do not behave in this way.

Mapping

The mapping property controls how the layer output is mapped onto the screen(s) in the Stage level.



For information on mapping, including how to use the different mapping types offered by Designer, please see the chapter **Content Mapping**

Palette

This points to the still image file that defines the bitmap from which the tint colour is taken. The default palette (HSVPAL) consists of the complete range of hues and saturations. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** older.

To control the location within the current palette bitmap, and thus control the colour, you have to edit the **xCol** and **yCol** values (see the section for xCol, yCol).



To change the current palette bitmap:

1. Left-click **palette** to open the Texture object library.
2. Left-click the still image file you want to use for the palette bitmap.

If you want to use a palette bitmap other than the standard still images provided in Designer, you will need to use a custom still image file.

See the **Placing media files** for a project sub-chapter to understand where to place a custom still image file and how to access it in Designer. Also save the file to a **supported file format**.

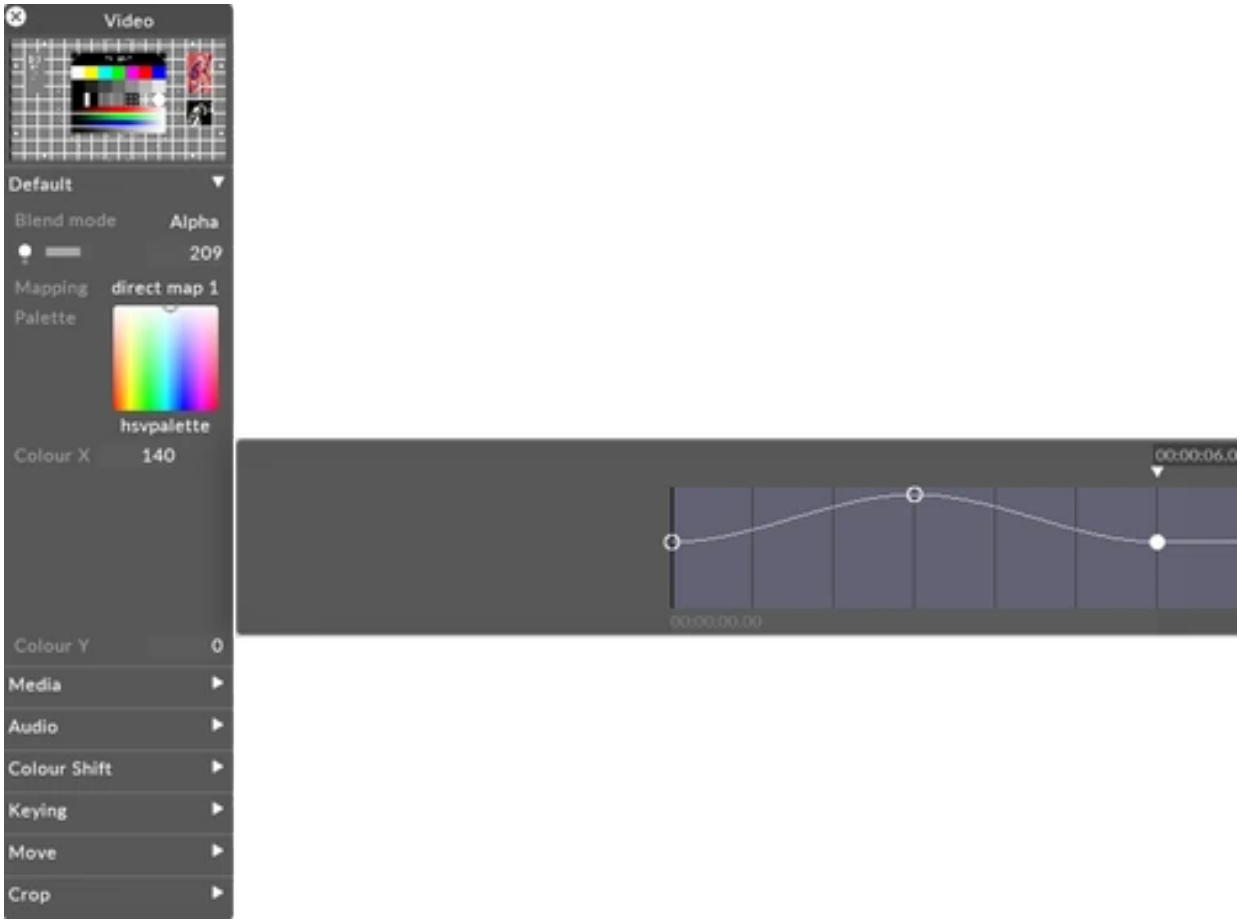
Xcol, YCol

These properties control the coordinates within the current palette bitmap where the output colour is sampled from. The default value is 0,0 which points at the color white (if you are using the HSVPAL palette). Multiplying white with the colors of the chosen content simply generates the original content colors. **Colour X** controls the horizontal position, where 0 is the leftmost edge and 255 is the rightmost edge. **Colour Y** controls the vertical position, where 0 is the top edge and 255 is the bottom edge.

For example, to saturate the video clip red, change the **Colour Y** value to 255 and use 0 for the **Colour X** value. These coordinates refer to the color red in the palette which is being multiplied

with the colors of the existing content.

When you are using the default palette HSVPAL , Colour Y controls saturation, and Colour X controls hue.



ColourShift

The colour shift property allows you to perform a number of colour-correction operations on the output of a layer.

Colour Shift objects can also be attached to individual video files within the Video layer.



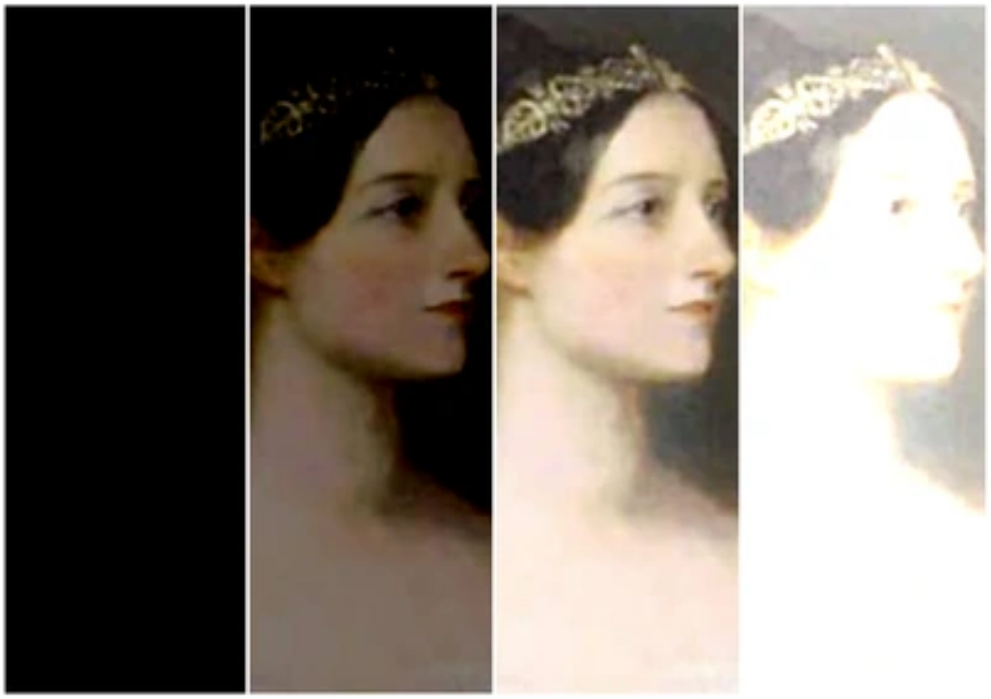
Colour Shift property performs colour-corrections on the output of a visual layer

Colour Shift properties are:

Brightness (shift)

Changes the floor of brightness to the constant given.

When set to 0, the range of brightness is 0 to 1, thus no change is applied to the image. When set to -1, the range of brightness is -1 to 0, thus the entire image is black. When set to 1, the range of brightness is 1 to 2, thus the entire image is white.



Brightness (shift) (from left to right): -1, -0.5, 0, 0.5, 1

Contrast (scale)

When set to 1, no change is applied to the image. When set to 0, all values have been pulled together to 50% grey, thus the image is entirely grey. When set to 2, the values are pulled in the opposite direction to meeting at mid grey, thus resulting in crushed white and black values.



Contrast (scale) (from left to right): 0, 0.5, 1, 1.5, 2

Saturation scale

When set to 1, no change is applied to the image. When set to 0, the image is desaturated to black and white. When set higher than 1, the image is hypersaturated.



Saturation scale (from left to right): 0, 0.5, 1, 2, 4

Hue shift

This property changing the hue of colours in an image, design, or graphic while maintaining other colour properties like saturation and brightness.

RGB controlled

This property controls how the min/max levels and gamma corrections are applied. If set to together, then the min, max and gamma values set for the red channel are mirrored to the green and blue channels, values set on the green and blue channels will be ignored. If set to separate , the min,max and gamma values can be controlled separately for red, green and blue. The latter setting allows you to apply fine colour balance controls to the image.

Min

This sets the lowest brightness level found in the image. All pixels at this level are scaled down to zero brightness. Increasing this value enforces shadows and dark levels in the image and can be used to reduce low-level compression artifacts in an image or video frame.

Increasing min equally across red, green and blue enforces shadows, whereas increasing min on an individual channel has the effect of shifting the colour balance away from that colour. For example, increasing red min shifts the image towards cyan.



With `RGB controlled` *set to Together (from left to right): 0, 0.3, 0.8*



With `RGB controlled` *set to Separate, red min (from left to right): 0, 0.3, 0.8*

Max

This sets the highest brightness level found in the image. All pixels at this level are scaled up to the maximumm level, i.e. 1. Decreasing this value brightens any highlights in the image. This is useful when the source image is too dark.



With `RGB controlled` *set to Together (from left to right): 1, 0.7, 0.2*



With `RGB controlled` *set to Separate, red max (from left to right): 1, 0.7, 0.2*

Tip

If you set min to 255 and max to 0, the image (or single channel) will be inverted.



Invert all (left), invert red (right)

Gamma

When gamma is set to 1, no change is made to the image. Reducing gamma brightens highlights while increasing gamma darkens lowlights. The maximum and minimum brightness levels remain the same.



With `RGB controlled` *set to Together (from left to right): 0.1, 1, 4*

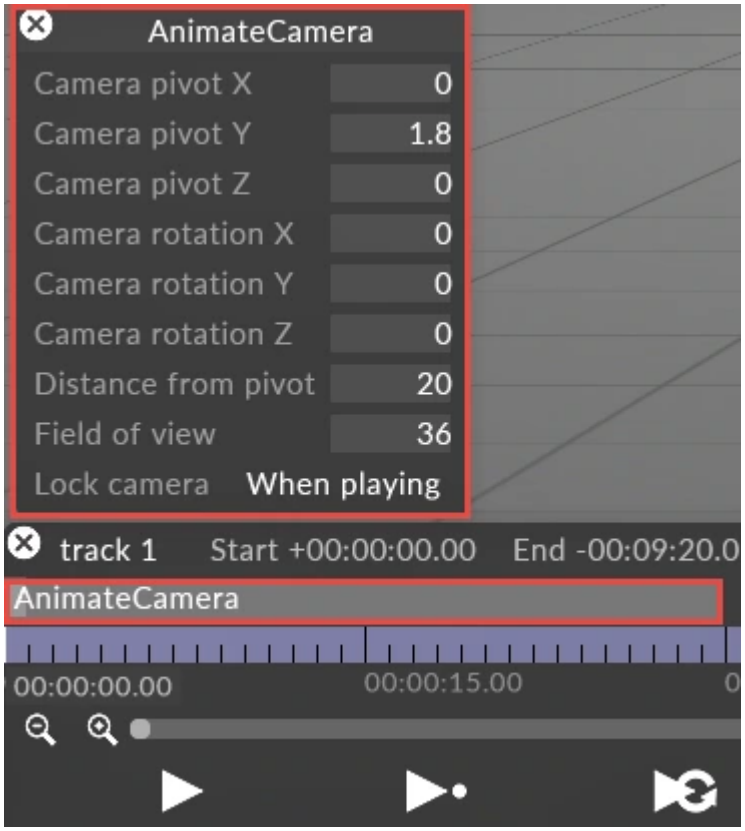


With `RGB controlled` *set to Separate, red gamma (from left to right): 0.1, 1, 4*

AnimateCameraControl

This layer allows you to script a fly-through of the stage so that you can create presentation videos, with or without audio.

> **Note**
>
> **Please note** While the Timeline play cursor is under the layers extent, the AnimateCameraControl layer overrides normal Stage navigation. To regain control of the normal Stage navigation, move the play cursor away from under the layer (or move the layer).



> **Note**
>
> **Please note**: AnimateCameraControl layer gives you full control of keyframes but is also more complex and harder to operate than the AnimateCameraPreset layer, which is based on animating between a number of pre-made configurations.

AnimateCamera Layer Properties

Camera pivot

This controls the position of the **pivot** the point where the camera is looking at. This is a 3 dimensional position, i.e. it has x, y and z components. These are all stage space coordinates, expressed in meters.

> **Note**
>
> **Please note**: in most cases the best approach is to have a static pivot point throughout the camera fly-through animation. Set the pivot point to the point of rotation, then animate the other properties. If not, you may get a sliding effect of the camera.

Camera rotation

This controls the rotation of the camera around the pivot point, in degrees around each of the x, y and z axes. Rotation around the x axis is equivalent to elevation, around the y axis is equivalent to heading, and the z axis rotates the camera around its viewing axis.

Distance from pivot

This controls the distance (in meters) from the camera to its pivot point. Increasing this number takes the camera away from the pivot point; decreasing it moves the camera closer to the pivot point.

View angle

A higher view angle will show more of the stage from a given point of view. View angle is measured in degrees.

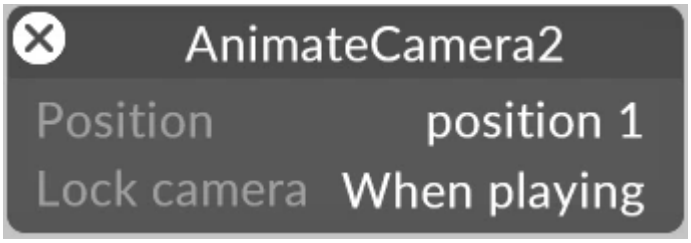
Camera locked

This manipulates how the layer controls the camera.

- Left-click **camera locked** to open the **camera locked** keyframe editor.
- Left-click **always** to open the option properties.
- Left-click **when playing** to set the layer so that it only controls the camera when the keyframe editor is playing, allowing you to move freely when the keyframe editor stops.
- Left-click **always** to set the layer so that it always control the camera.

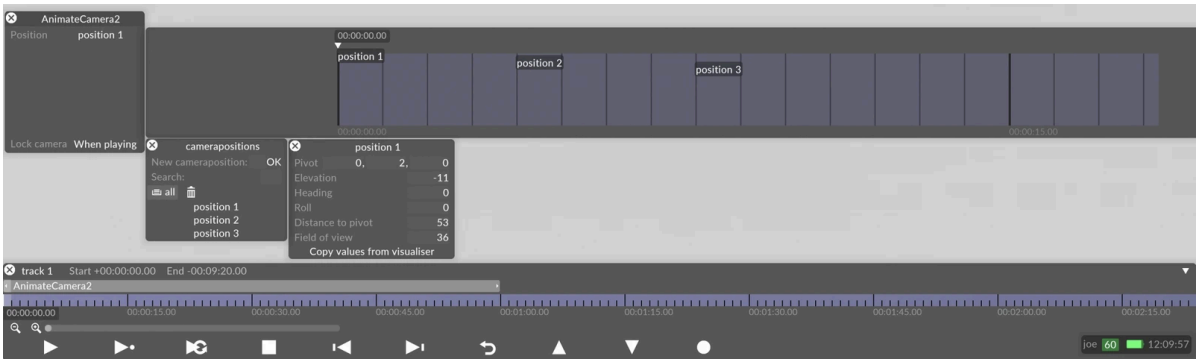
AnimateCameraPreset

The AnimateCameraPreset layer lets you create a camera fly through using a number of configurations which can be dropped onto the timeline. Designer will then animate the camera between the configurations.



Creating a camera position animation

1. Left-click **position**. This will open the **position** keyframe editor and a window where you can create a new camera position.
2. Left-click **new cameraposition** to highlight the text field.
3. Type in the name of your new camera, for example **east**.
4. Hit **Enter**. This will create the new camera position, add it to the **position** key-frame editor at the position of the currently selected Track bar, and open the Camera Position editor. The camera position key-frames can also be click-dragged from the Camerapositions manager to a specified point on the Position key-frame editor.



Process used to create a camera position, in this example position 1, and place it on the Position key-frame editor

5. Edit the values within the Camera Position editor (properties explained below).
6. Repeat the steps listed above to create as many new camera positions as required.
7. Hit **Shift** and **<** to jump to the first second of the track.
8. Hit **Enter** to trigger normal play mode and watch the camera animation.

Position

This property lets you create a new configuration of cameras you want to animate. Please see the section below **Creating a camera position animation** for step-by-step instructions on how to do this.

Camera locked

This manipulates how the layer controls the camera.

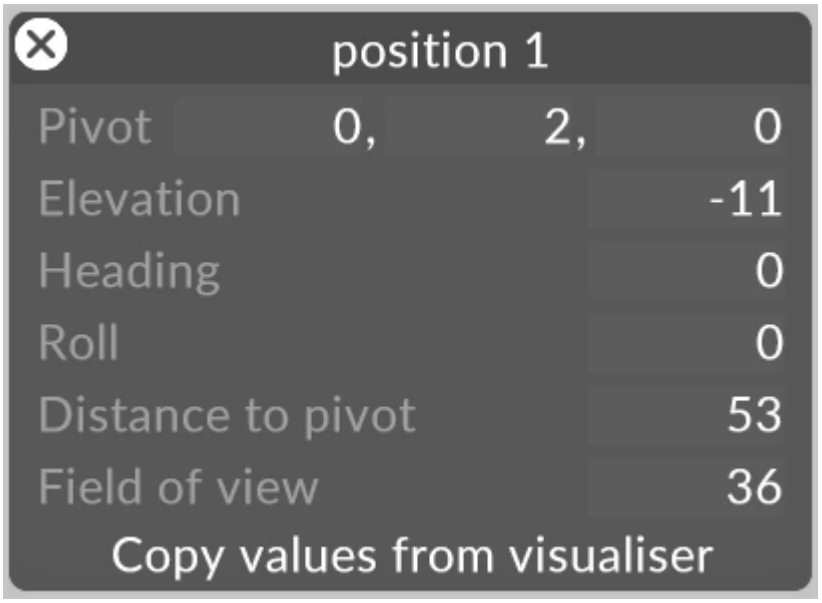
- Left-click **camera locked** to open the **camera locked** keyframe editor.
- Left-click **always** to open the option properties.
- Left-click **when playing** to set the layer so that it only controls the camera when the keyframe editor is playing, allowing you to move freely when the keyframe editor stops.
- Left-click **always** to set the layer so that it always control the camera.

As demonstrated above, you need to use the Camera Position editor as part of the process to animate a camera position.

Camera Position Properties

To open the Camera Position editor

Right-click a camera position in the Camerapositions manager.



Pivot

This controls the position of the pivot the point where the camera is looking at. This is a 3 dimensional position, i.e. it has components x, y and z; all are stage space coordinates, expressed in meters.

> **Note**
>
> **Please note**: in most cases the best approach is to have a static pivot point throughout the camera fly-through animation. Set the pivot point to the point of rotation, then animate the other properties. If not, you may get a sliding effect of the camera.

Elevation

This rotates the camera up and down and is expressed in degrees. Note that the Elevation value is based around the cameras pivot point.

Heading

This rotates the camera left and right, in degrees. Note that the Heading value is based around the cameras pivot point.

Roll

This rotates the camera around its own z-axis, in degrees.

Distance to pivot

This moves the camera closer to or further away from its pivot point, in meters.

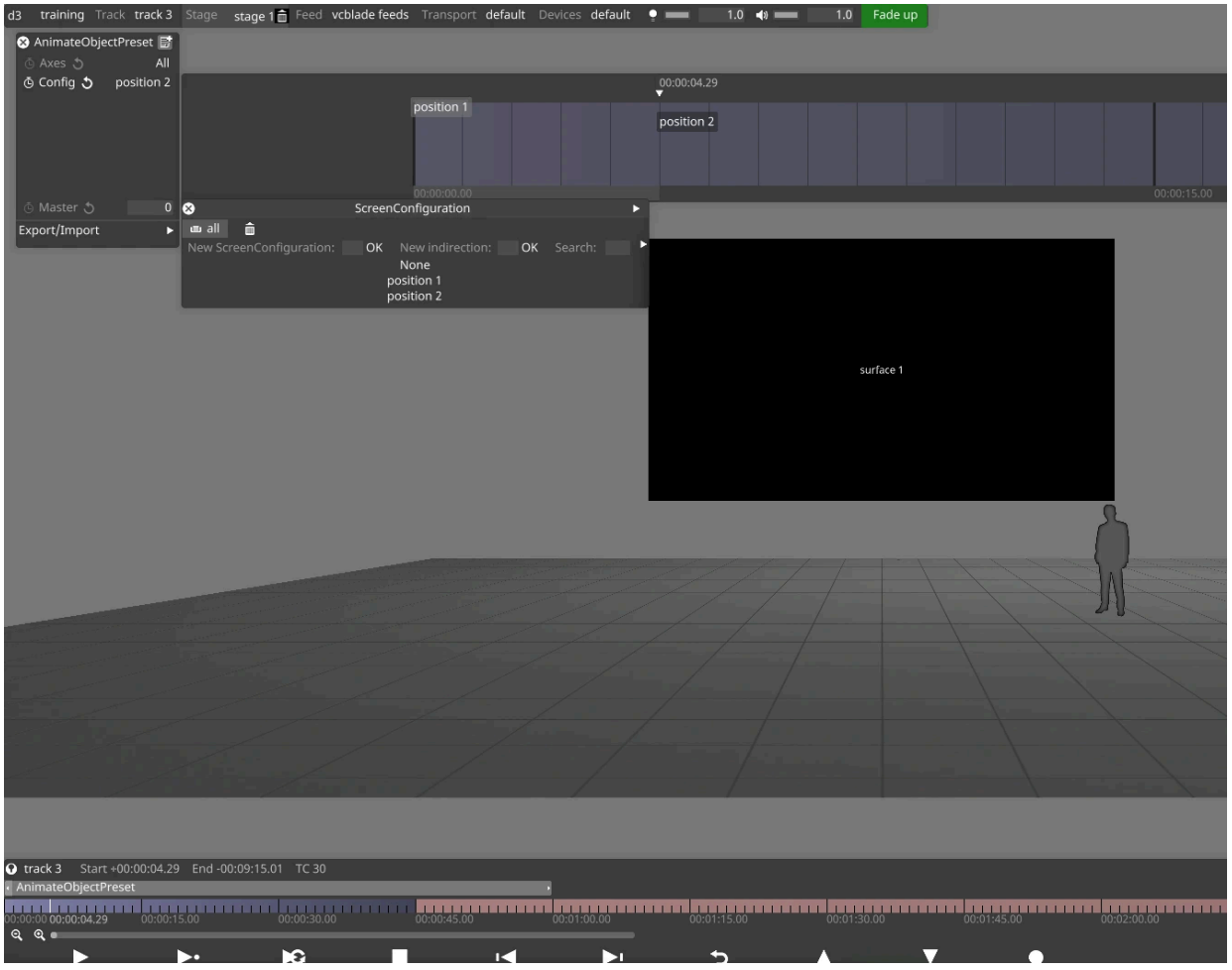
View angle

A higher view angle will show more of the stage from a given point of view. View angle is measured in degrees.

AnimateObjectPreset Layer

The AnimateObjectPreset layer allows you to simulate moving objects such as screens within the Stage Visualiser by placing key-frames onto the key-frame editor. Designer will then animate the object(s) between the configuration key-frame positions.

> **Note**
>
> **Please note**: Disguise does not output control instructions to automation systems. The AnimateObjectPreset layer is for previsualisation purposes only.



Workflow

1. Create an AnimateObjectPrese layer.
2. Create Position configurations.

3. Add screens or objects to the configurations.
4. Configure the properties of the configurations.
5. Playback the configuration keyframes on the keyframe editor timeline to animate objects around the stage.

Creating a animation

1. Create an AnimateObjectPrese layer and assign a mapping type that contains all of the screen or objects that you want to control. For information on mapping types please see the chapter Content Mapping.
2. Open the Config key-frame editor by left-clicking the keyframe editor icon next to **Config**, then create and place a Configuration keyframe. The process used to create/sequence Configuration keyframes is the same as any other layer type that uses keyframe editors, for example the AnimateCameraPreset.
3. Use the Configuration editor to edit the position of the screen or object.
4. Create as many Configuration key-frames as required and place these on the Config keyframe editor. Once all keyframes have been placed on the keyframe timeline, press the Play button and will animate the screen or objects between the Configuration keyframe positions.

Axes



There are five options to choose from:

All: this affects the properties **position**, **rotation** and **animate**.

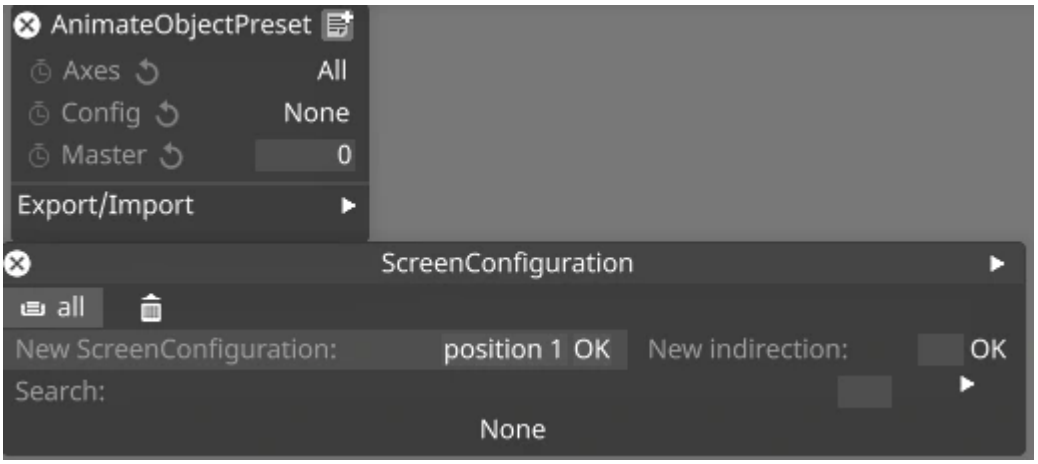
Position only: this affects only the **position** property.

Rotation only: this affects only the **rotation** property.

Animate only: this affects only the **animation** property of the screen type **Moving mesh** which is currently not in an official release.

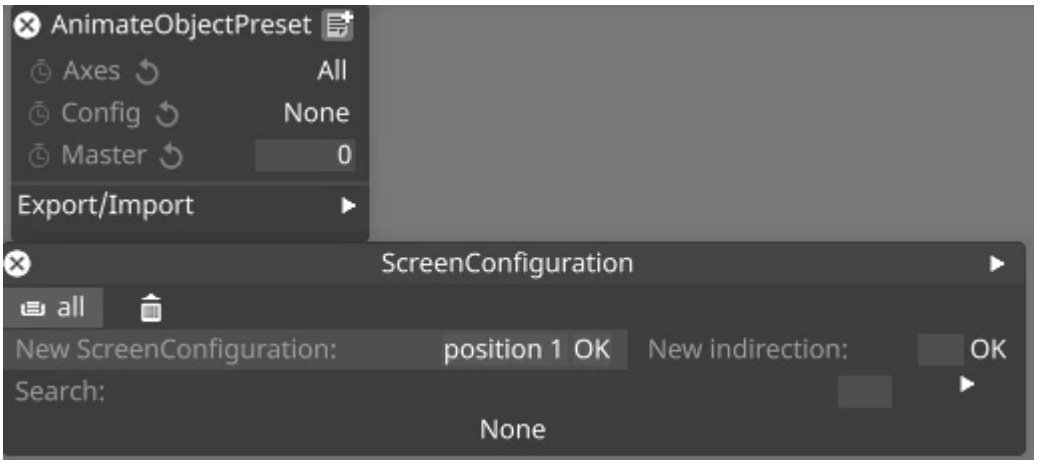
Position and rotation: this affects only the **position** and **rotation** properties.

Config



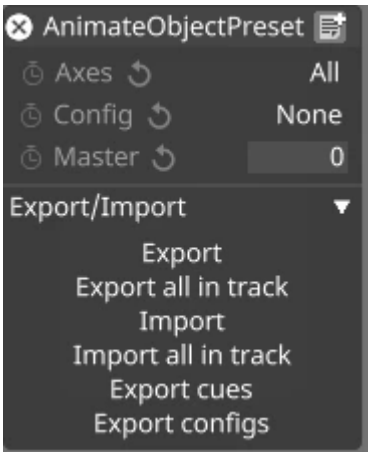
This property lets you create a new configuration of screens or object that you want to animate.

Master



The **Master** property allows you to exert fine control of the movement speed between configuration positions. By default, Designer generates a linear animation between configuration points. However, if there are any keyframes on the master timeline between the configuration endpoints, Designer will use the master curve to animate between the endpoints.

Export/Import



There are six options to choose from:

Export: makes a list of time based positions of screens when they change. This list is saved as a **.txt** file called **screenpos_yourlayername**.

Export all in track: Export all points from the track.

Import: Imports all previously exported points.

Import all in track: Imports all points for a specific track.

Export cues: makes a time list of when specific configuration names are key-framed. This list is saved as a **.txt** file called **screencues_yourlayername**.

Export configs: makes a list of configurations. This list is saved as a **.txt** file called **screenconfigs_yourlayername**.

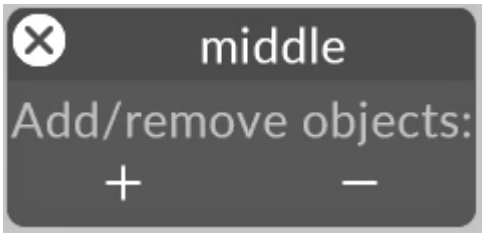
The **.txt** files are saved in a new folder called **table** inside the specific Project folder. For more information on where the specific Project folder is located please see the sub-chapter Projects location. You can open the **.txt** file with Microsoft Excel or Office.

> **Note**
>
> **Please note**: when using the layer import properties make sure your layer names and object names have no spaces or characters such as dashes or slashes etc otherwise the layers and screens will not import.

You need to use the Configuration editor as part of the process to animate a screen or object.

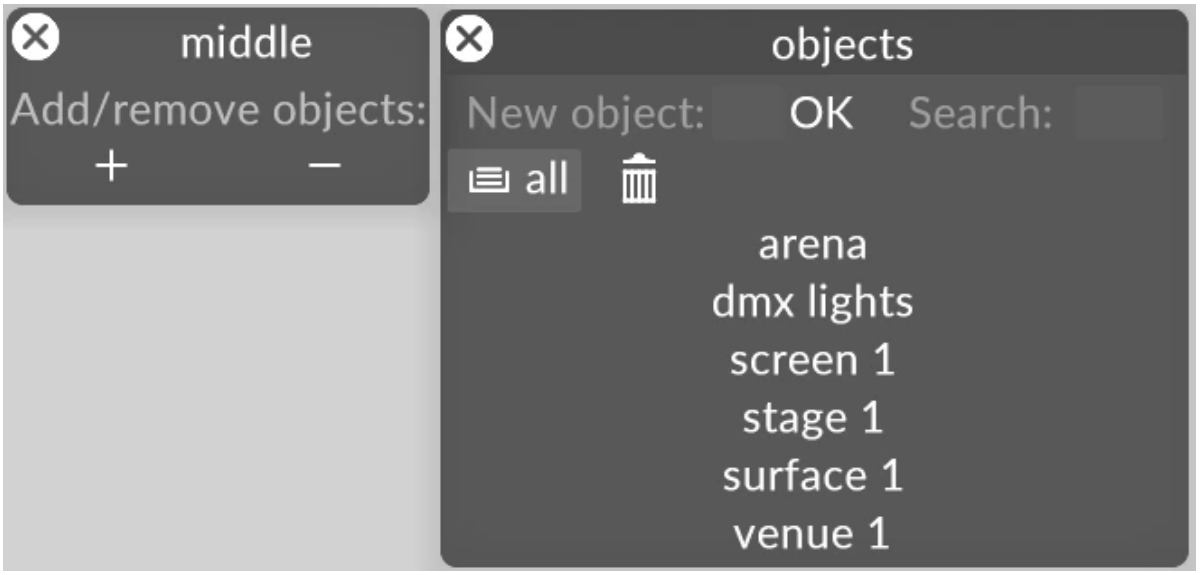
To open the Configuration editor

- Right-click a configuration from the Configurations manager

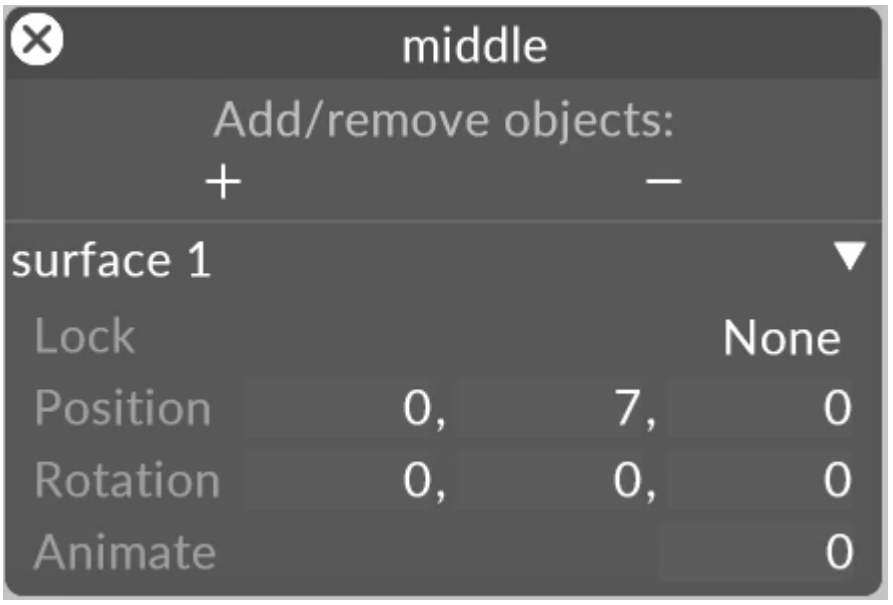


Add / Remove Screens or objects

1. To add a screen to the Configuration editor left-click the **+** button. This will open the Objects list manager.



2. Left-click the object you want to add, in this example Surface 1. This will add Surface 1 to the Configuration editor.



3. Edit the Configuration editors **position** or **rotation** properties.
4. To remove a screen from the Configuration editor left-click the button and select the corresponding screen from the Objects manager.

Position

This controls the object's **position** in the 3D space. There are three numbers laid out horizontally: respectively the x (left/right), y (up/down) and z (into/out of the screen) coordinates.

Rotation

This controls the **rotation** of the object, in degrees. The x component controls the rotation around the x axis; the y component around the y axis; and the z component around the z axis.

Animate

This property is used to control the animation of a 3D object such as an Alembic File.

Previsualisation Layers Overview

Previsualisation Layers allow virtual objects within the Stage view to be animated via keyframes.

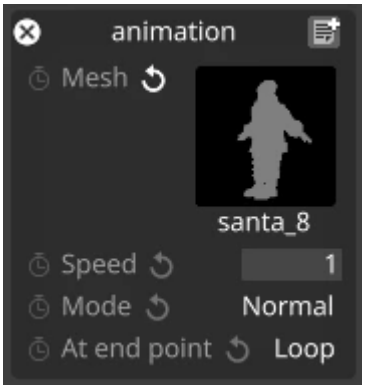
Types of Previsualisation layers

There are several types of Previsualisation layers available within :

- AnimateCameraPreset
- AnimateCameraControl
- AnimateObjectPreset
- SceneAnimation
- TargetControl
- TargetPreset

Scene Animation Layer

The SceneAnimation layer allows an animated Alembic or FBX scene to be controlled from the timeline. Animations are played back from the start of the layer, with similar controls to the video layer.



Controlling a scene animation

1. Add an animated Alembic or FBX file to the project's `objects/Mesh` folder.
2. Assign the mesh to a screen or other object you wish to animate.
3. Add a SceneAnimation layer at the point on the timeline where you wish the animation to play back.
4. Adjust the playback using the properties described below.

SceneAnimation layer properties

Speed

Selects playback speed. When this is set to 1, the animation is played at its normal speed; when set to 2, the animation is played at double speed, when set to -1, the animation is played at normal speed in reverse and so on.

Mode

This specifies the playback mode. There are two modes - **Normal** and **Locked**. Each one has a specific behaviour that is useful for a different situation:

- **Normal**: When the play cursor stops, the animation will also stop and the animation time will lock to the timeline position. When the cursor continues to play or holds at the end of a section, the animation will play continuously. Jumping around the timeline while playing does not affect which animation time is being played.

- **Locked**: If the play cursor continues to play or stops at the end of a section, the animation time is locked to the playhead position on the timeline.

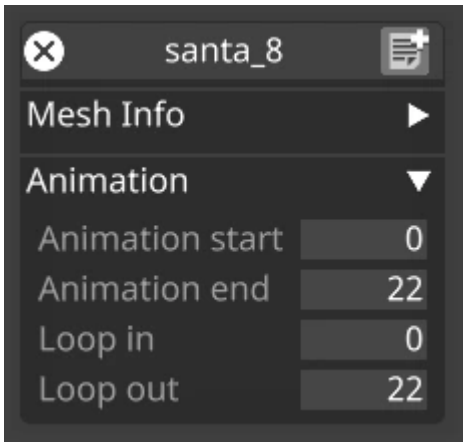
At end point

This specifies what happens when playback reaches the end of the animation. There are three options to choose from:

- **Loop**: When playback reaches the end of the animation, the animation will loop immediately back to the beginning and will start playing again from there.
- **Ping-pong**: When playback reaches the end of the animation, the animation will play in reverse back to the beginning.
- **Pause**: When playback reaches the end of the animation, the animation will pause on the last frame.

Mesh properties

There are several properties in the Mesh editor for FBX and Alembic meshes which can be used to control animation playback in a similar way to designer/content-management/video-clip-object video clips.



Animation start

The start time in seconds of the animation playback. Adjust this value to crop time off the start of the animation.

Animation end

The end time in seconds of the animation playback. Adjust this value to crop time off the end of the animation.

Loop in

Where in the animation playback a loop should continue from if the end point behaviour is set to Loop or Ping-Pong.

Loop out

Where in the animation playback a loop should start from, if the end point behaviour is set to Loop or Ping-Pong.

TargetControl Layer

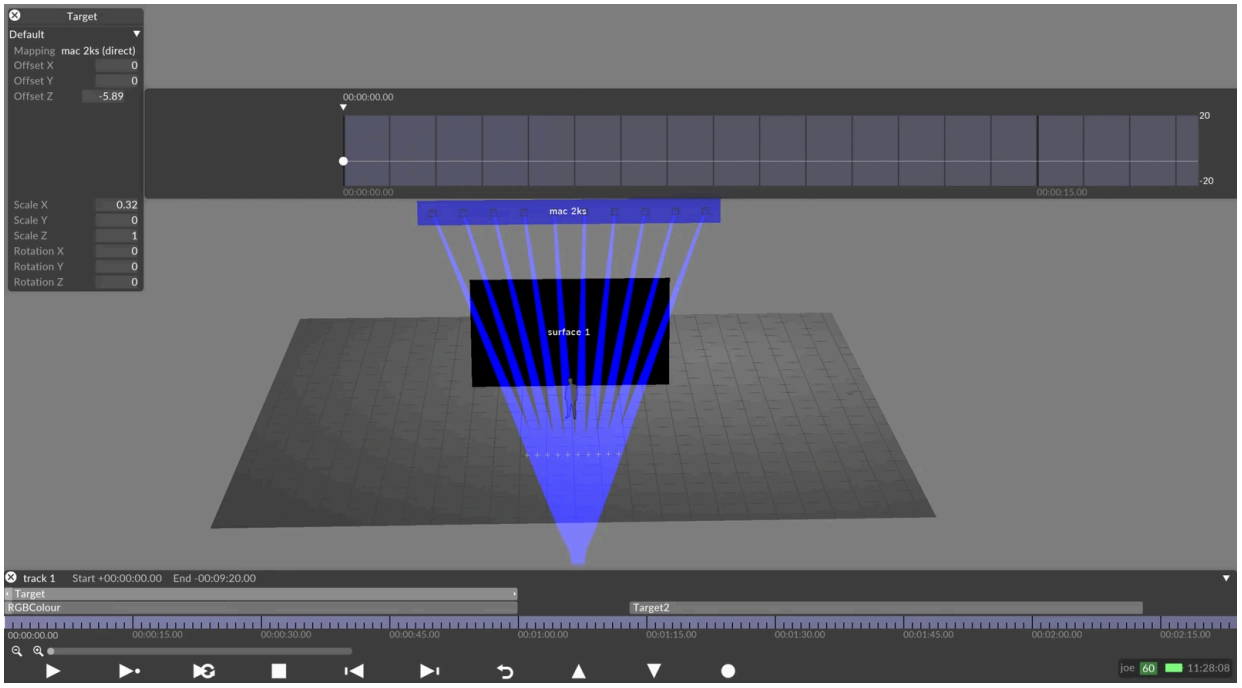
The layer is similar to the TargetPreset iin that it allows to control the movement of moving head lights. Each light in the target screen (which must be of the screen type DmxLights) has its own target point.

> ⚠ **Warning**
>
> **Warning**: The fixture defined in the DMXLight needs to set to **aimable**. If not, the layer will have no effect.

Workflow

The TargetControl layer allows you to control how these target points are generated from the lights base positions. The main difference is that while the TargetPreset layer is based on setting a number of configurations of the target offset, scale and rotation and then interpolate the movements between the configurations, the TargetControl layer allows to keyframe every frame of the offset, scale and rotation values. This gives the user more precise control of the movements but may be more diffucult to use for an inexperienced user. Notice that the fixture defined in the DMXLight needs to set to aimable. If not, the TargetControl layer will have no effect.

Please read the sub-chapter DmxLights for information on how to create a DmxLights screen. Afterwards please read the sub-chapter Creating a fixture for information on how to add a fixture to a DmxLights screen.



TargetControl Layer Properties

Offset

This value is added to the (x, y, z) stage position of each fixture. To move the fixture targets left and right, change the x property, to move them up and down, change the y property and to move them in and out, use the z property.

Scale

This scales the target points in each of the three axes x, y and z. Values higher than 1 increase the size of the target grid, causing the beams to splay outwards; values lower than 1 reduce the size of the target grid and setting the scale to 0 causes all beams to converge.

Rotation

This rotates the target grid around each of the x, y and z axes (angles specified in degrees).

For step-by-step instructions on how to control moving head lights using the Target layer please see the sub-chapter Targeting fixtures.

TargetPreset Layer

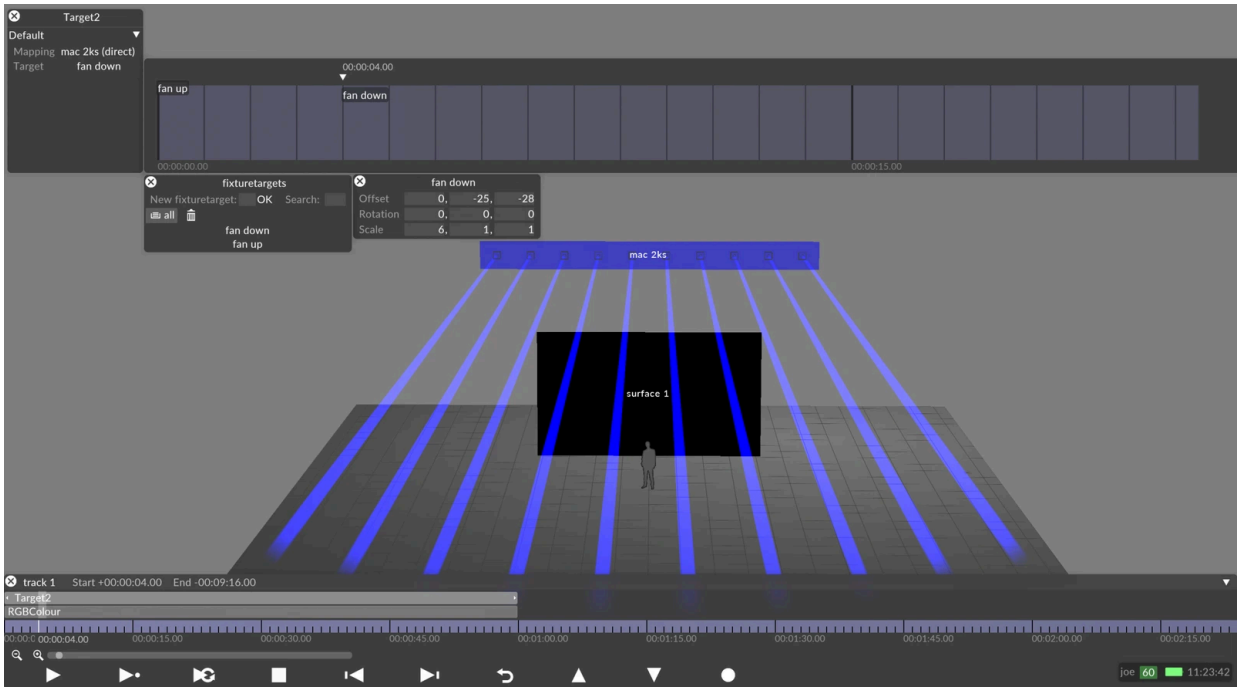
The TargetPreset layer is similar to the TargetControl in that it allows to control the movement of moving head lights. Each light in the target screen (which must be of the screen type DmxLights) has its own target point.

> **Warning**
>
> The fixture defined in the DMXLight needs to set to **aimable**. If not, the layer will have no effect.

Workflow

The TargetPreset (and TargetControl) layer allows you to control how these target points are generated from the lights base positions. The main difference is that while the TargetControl layer allows to keyframe every frame of the offset, scale and rotation values, the TargetPreset layer is based on setting a number of configurations of the target offset, scale and rotation and then interpolate the movements between the configurations. Notice that the fixture defined in the DMXLight needs to set to **aimable**. If not, the Target layer will have no effect.

Please read the sub-chapter DMXLights for information on how to create a DmxLights screen. Afterwards please read the sub-chapter Creating a fixture for information on how to add a fixture to a DmxLights screen.



Targeting/animating fixtures

1. Create a layer.
2. Target the fixtures by assigning a mapping type with the DMXLights you want to control. Make sure to set the fixture defined in the DMXLight to **aimable**.
3. Open the keyframe editor by left-clicking **target** and create and drag/drop a Target keyframe (configuration). The process used to create and sequence Target keyframes is the same as any other layer type that uses key-frame editors, for example the AnimateCameraPreset layer.
4. Right-click the the Target keyframe to edit the position of the fixture targetsm see below for more info.
5. Create as many Target keyframes as required and place these on the keyframe editor.
6. Press the Play button. The software will now animate the light's movements between the Target positions.

TargetPreset Layer Properties

Mapping

Determines what mapping of DMXLight screens to use. Notice that any mapping type can be created using DMXLightscreens.

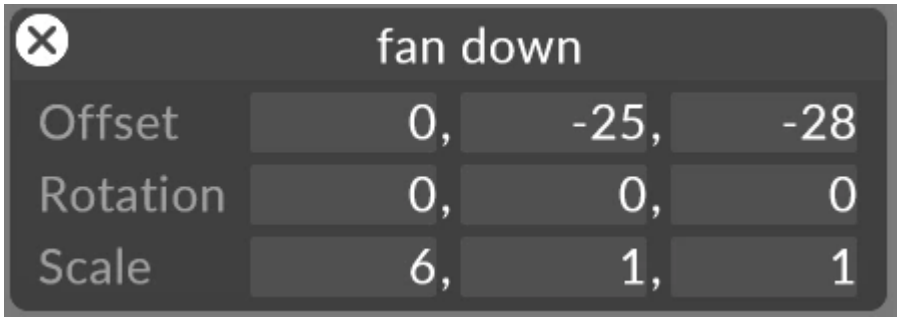
Target

This property lets you create a new configuration of fixture targets, each specifying a target position (offset, rotation, scale) set which can be animated. Please see the section below for step-by-step instructions on how to do this.

You need to use the Target editor as part of the process to animate movinghead fixtures.

Opening the Fixture Targets editor

- Right-click a target in the Targets manager.



Offset

This controls the **offset** of the fixture target, in meters, from the base light position.

Rotation

This controls the **rotation** of the fixture target, in degrees. The x component controls the rotation around the x axis; the y component around the y axis; and the z component around the z axis.

Scale

This controls the **scale** of the fixture target. 1 = no change, >1 = scale up. If all are set to 0, the lights will focus on a point; if two are set to zero, the lights will focus on a line.

Layers Overview

In Designer, a layer is an object which renders content in response to certain inputs.

Layers can generate colours or gradients, play video or display still bitmap images. Content is generated by creating layers, placing them on the Timeline, and animating their properties using Disguise's keyframe editor within the layer editor.

Designer uses mappings to control how layer content is copied from the Timeline to the screens in the Stage level. Please see the chapter Content Mapping for a full explanation of this powerful feature.

To learn how to work with layers, see the working with layers section.

Types of layers

There are five main layer types in Disguise: content layers, generative layers, previsualisation layers, effects layers and control layers. For more detailed information on layer types please read the sub-chapter Overview of layer types.

To see more information about the different types of layers, see the layer types section.

Controlling layer properties with DMX

Disguise can be configured to control layer properties with DMX (ArtNet or sACN) in two ways:

1. Using DMX expressions.
2. Using the DMX Sockpuppet workflow.

Controlling layer properties with OSC

Disguise can be configured to control layer properties with OSC (ArtNet or sACN) in two ways:

1. Using OSC expressions.
2. Using the OSC Sockpuppet workflow.

Mask Blending

Mask blend modes are a unique type of blend mode within Designer that applies a mask to the layer above it in the stack, unlike standard blend modes, which affect content below them. This mode enables blending operations that are independent of previously composited layers, providing granular control over masking elements. Mask blending applies across mappings.

In the following example, Ada has been composited on top of the chevron background and did not have an alpha channel of its own, but was correctly blended with the background:



Pre-r34 behaviour

In releases prior to r34, mask blending applies to **all** layers above the masking layer in the stack and would **only** affect layers within the same mapping.

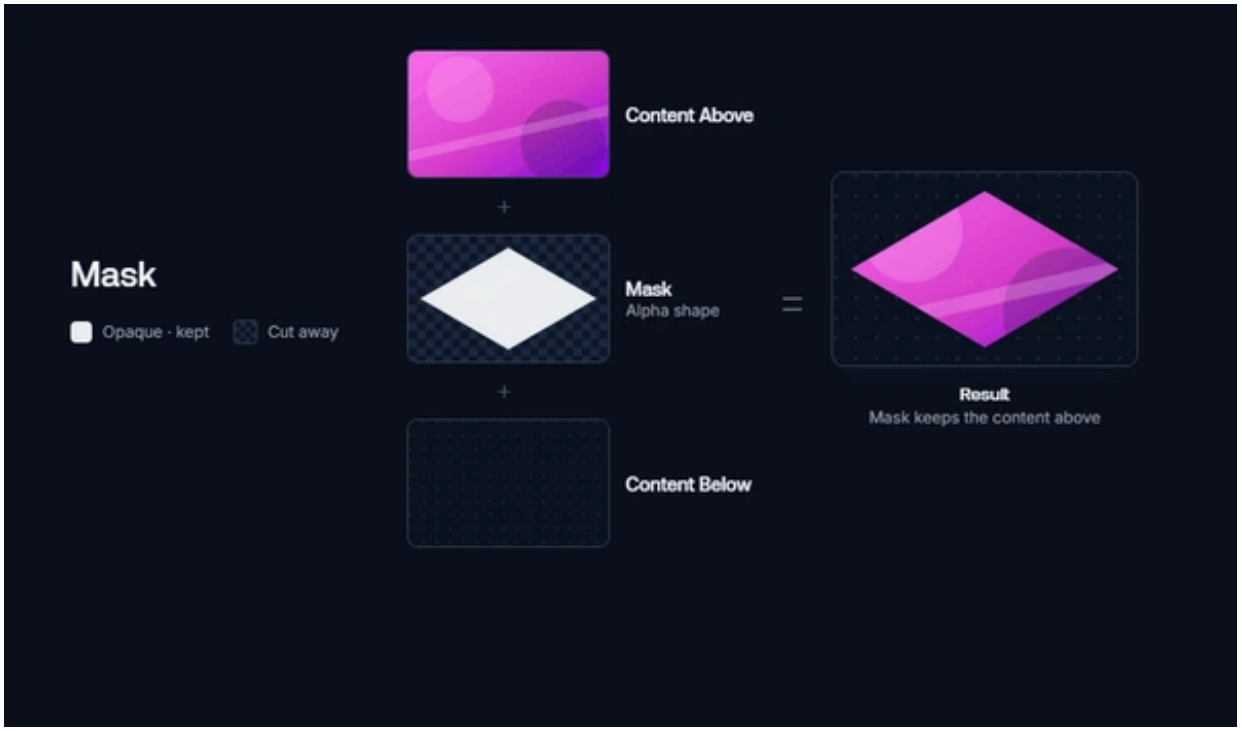
To use pre-r34 mask blend mode behaviour in later releases, enable the advanced setting useLegacyMaskBlendModeBehaviour.

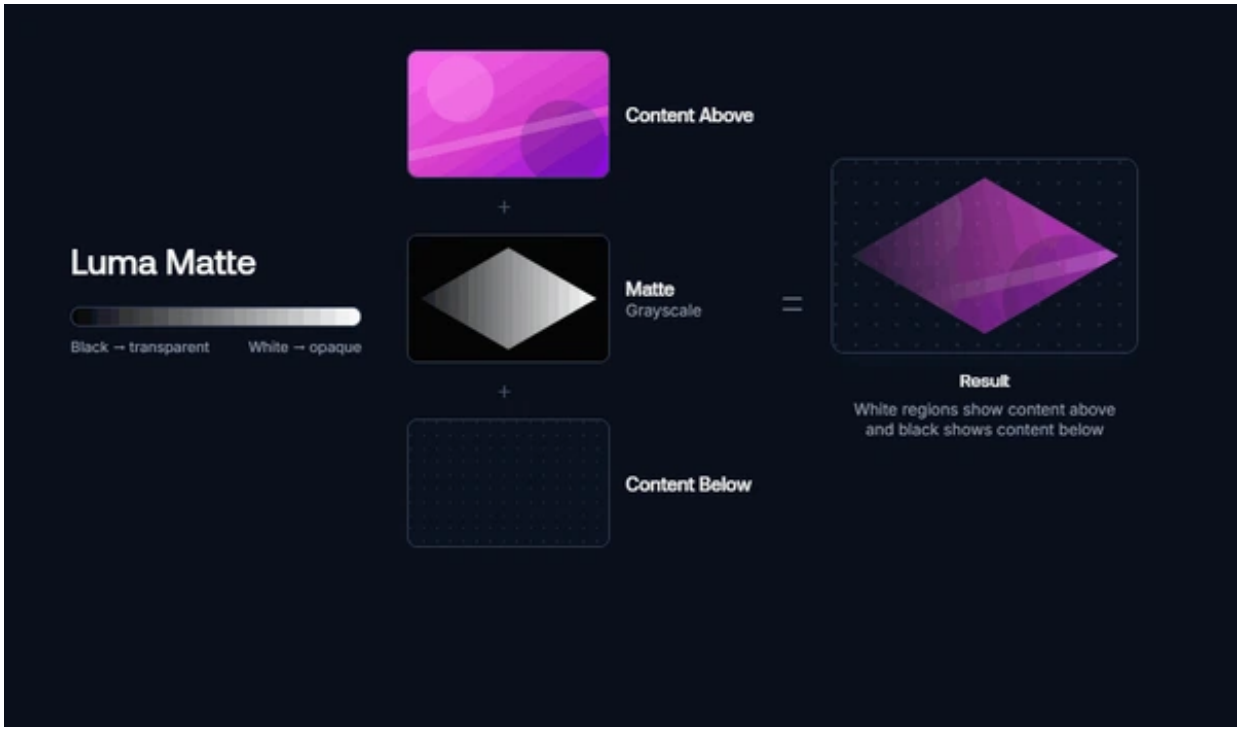
Masking mechanism

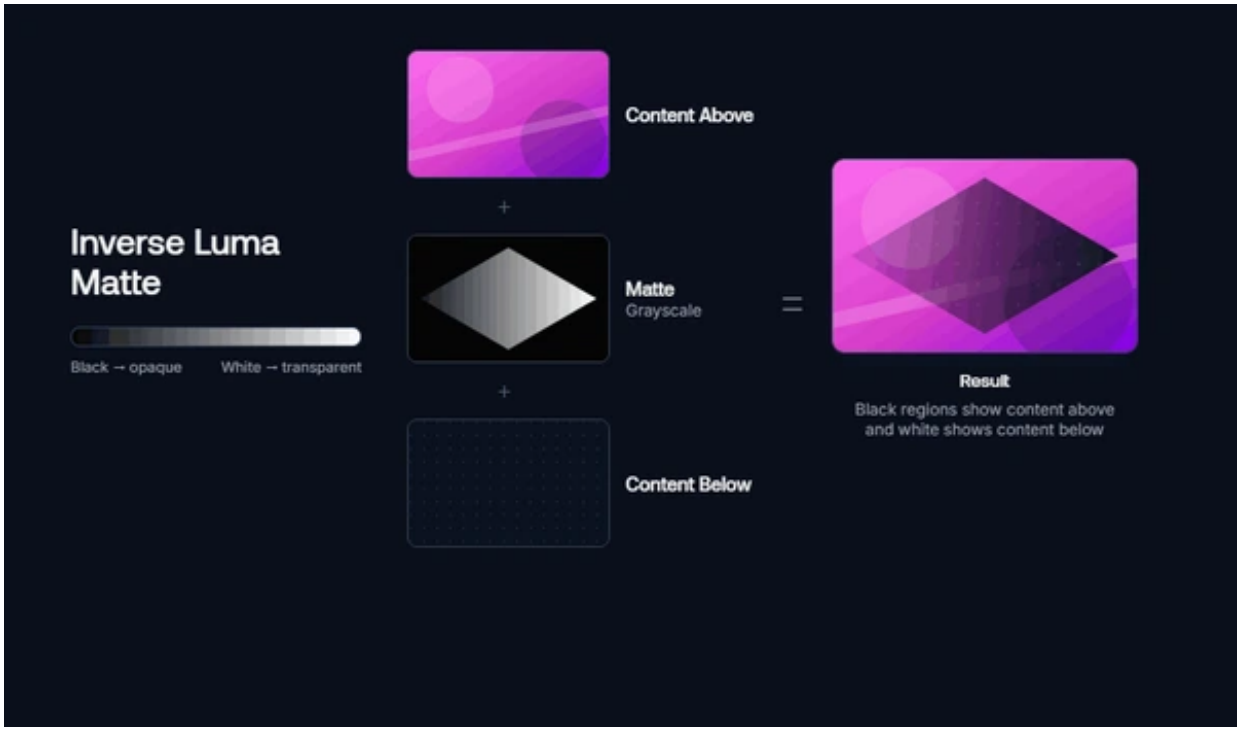
Mask blend modes provide a temporary override to a layer's mapping's mask. This override lasts for a single layer in a given track but it does not spill over between transports in multi-transport.

The way that mapping masks work is that every channel is combined with the content - a red mask with no green and blue components and full opacity alpha would isolate just the red and alpha channels of any subsequent content applied, setting the green and blue channels to 0.

Designer currently supports 3 types of Mask Blend Mode, these are shown below:





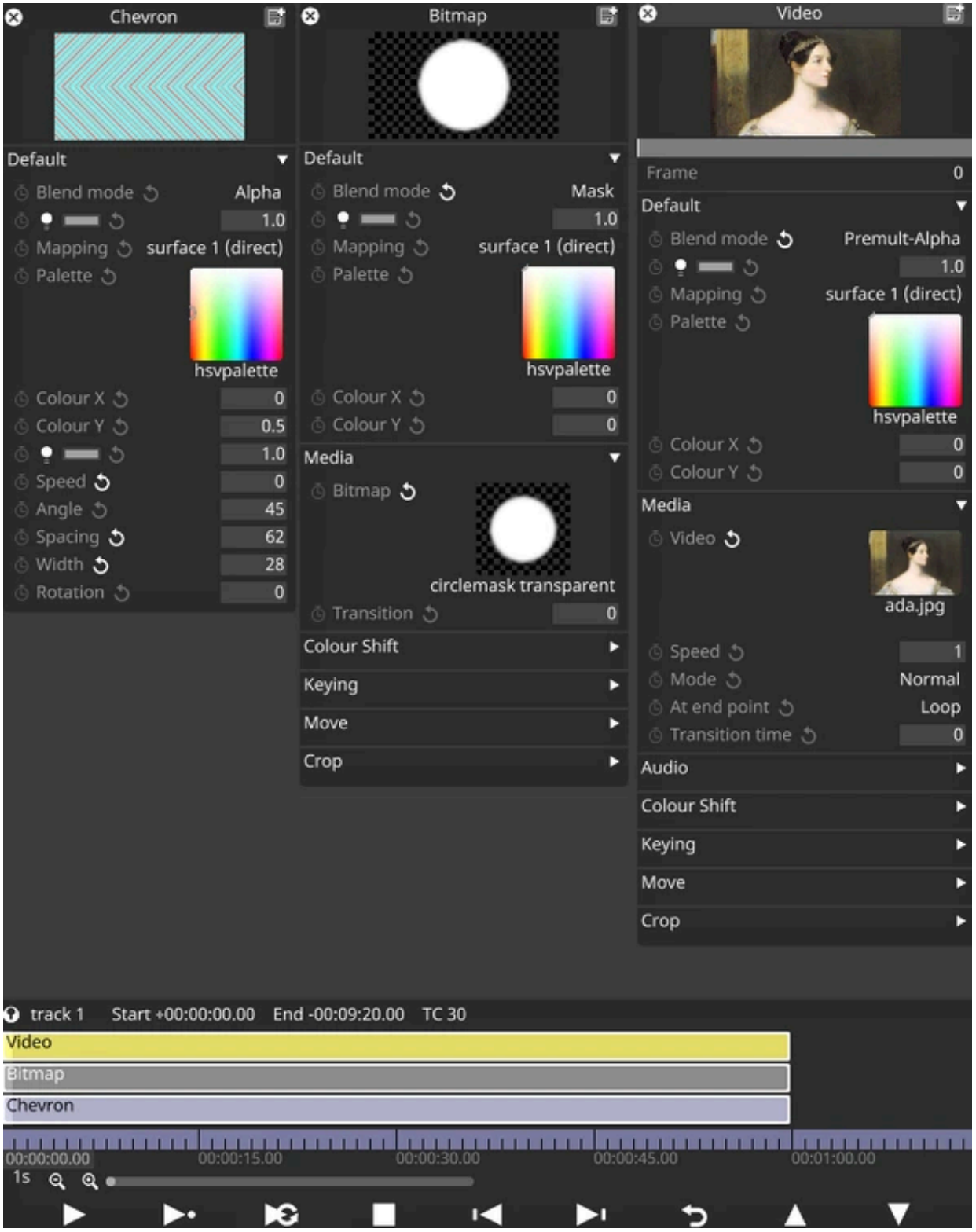


Examples

Mask blending

For the isolated Ada example above, the following layer configuration was used.

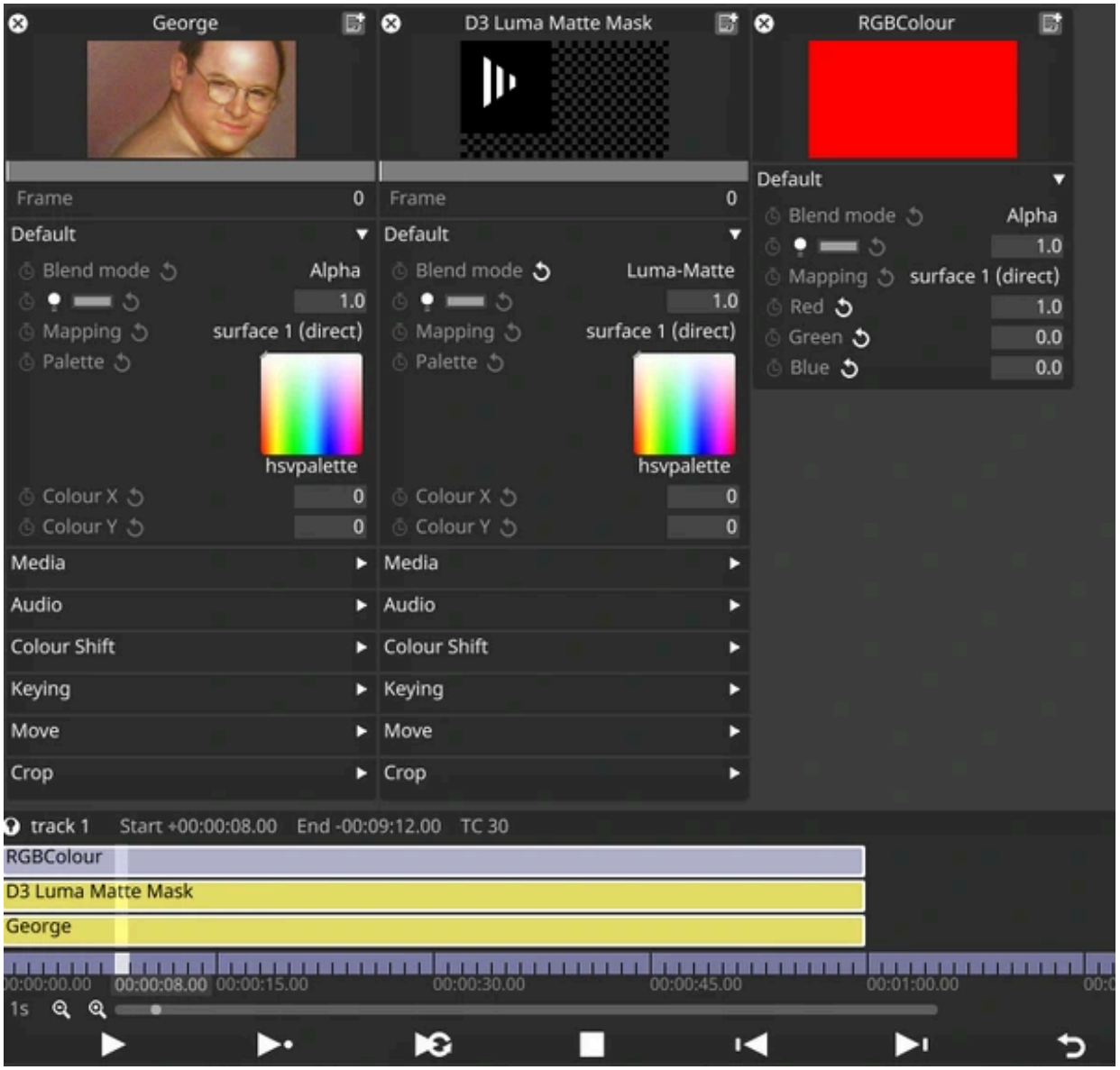
Note the Bitmap layer is above the Chevron but below the Video layer, its mapping is set to “surface 1”, and is set to Mask blend mode, so it is setting the mapping’s mask.


Chevron
Default
Blend mode
Alpha
1.0
Mapping
surface 1 (direct)
Palette
hsvpalette
Colour X
0
Colour Y
0.5
1.0
Speed
0
Angle
45
Spacing
62
Width
28
Rotation
0
Bitmap
Default
Blend mode
Mask
1.0
Mapping
surface 1 (direct)
Palette
hsvpalette
Colour X
0
Colour Y
0
Media
Bitmap
circlemask transparent
Transition
0
Colour Shift
Keying
Move
Crop
Video
Frame
0
Default
Blend mode
Premult-Alpha
1.0
Mapping
surface 1 (direct)
Palette
hsvpalette
Colour X
0
Colour Y
0
Media
Video
ada.jpg
Speed
1
Mode
Normal
At end point
Loop
Transition time
0
Audio
Colour Shift
Keying
Move
Crop
track 1
Start +00:00:00.00
End -00:09:20.00
TC 30
Video
Bitmap
Chevron
00:00:00.00
00:00:15.00
00:00:30.00
00:00:45.00
00:01:00.00
1s

Luma Matte blending



Another example of a mask blend mode is the Luma Matte Mask. In the example above the brightest regions of the matte are made opaque to the layers below (with the above layers are layered on top) whilst the black regions become transparent.

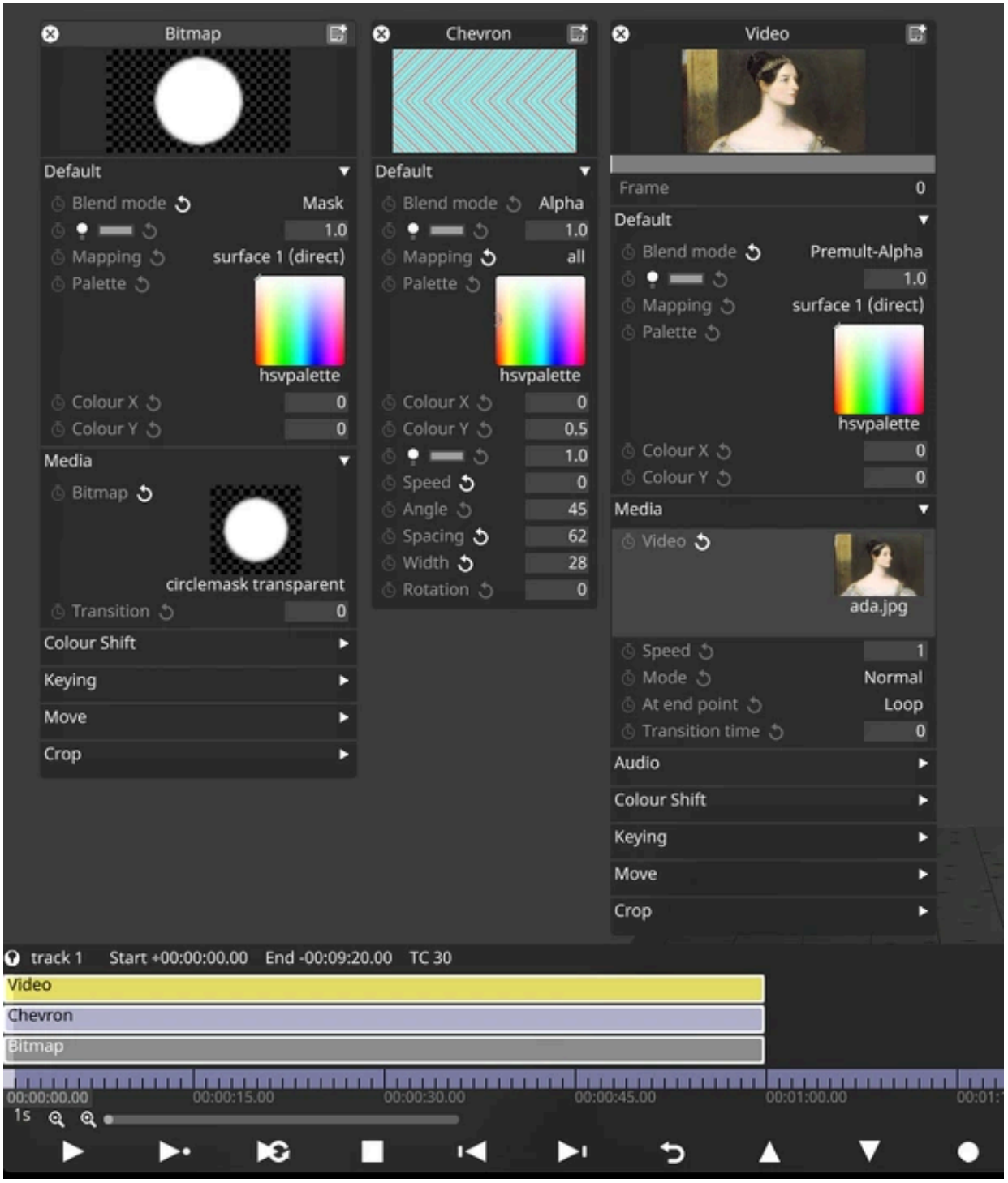


Pre r34 remarks

Ada example setup

For the isolated Ada example above, the following layer configuration is used in pre r34.

The Bitmap layer is **below both** the Chevron and the Video layer, its mapping is set to “surface 1”, and is set to Mask blend mode, so it is setting the mapping’s mask. As the chevron layer is using the “all” mapping it is unaffected by the mask.

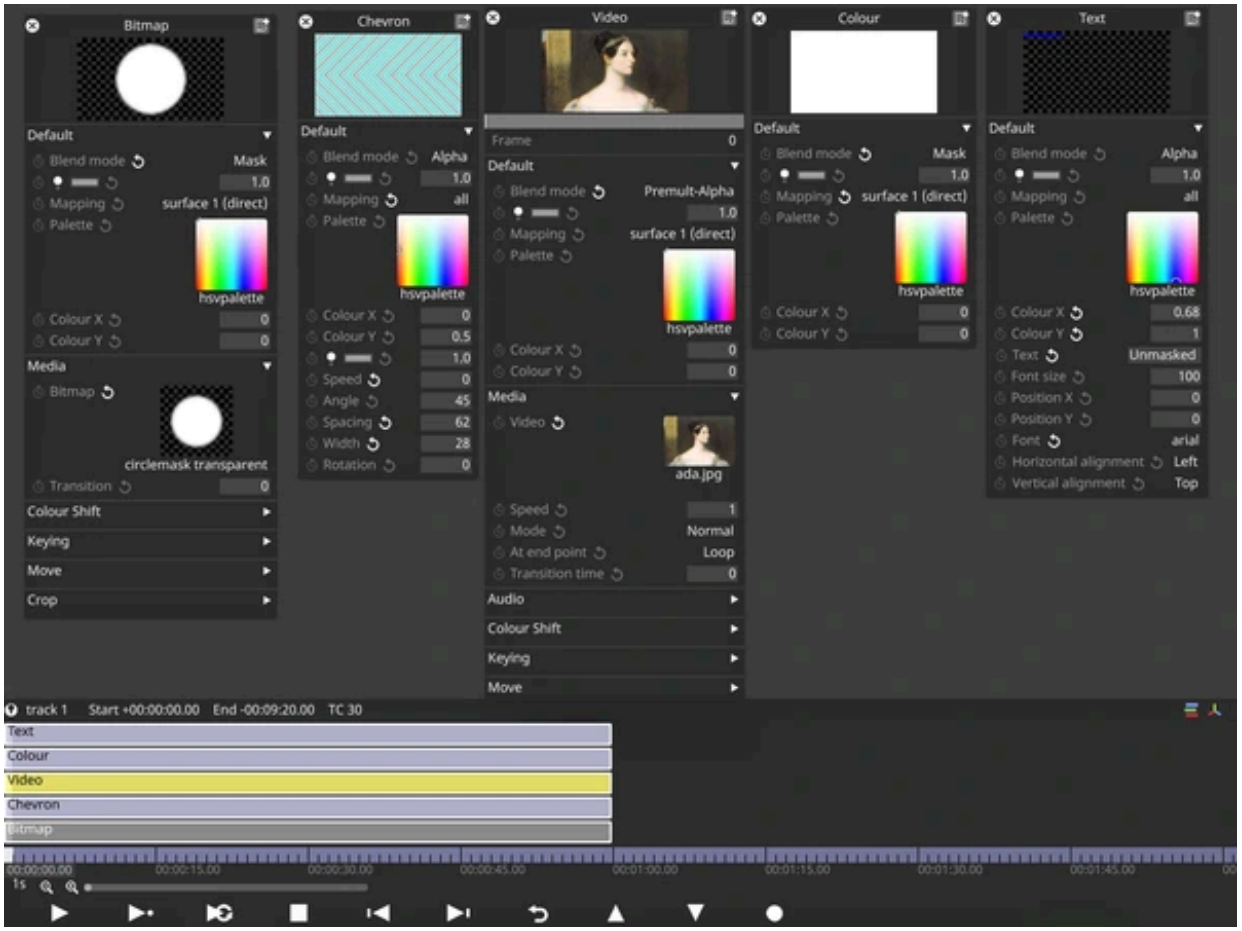


Resetting the mask

While it's not possible to reset the mask to the mask set originally on the mapping, it is possible to reset the mask's effect by inserting a white Colour layer into the layer stack, set to Mask blend mode and selecting the target mapping.

In this example, the Colour layer mapping is set to "surface 1" and Mask Blend mode. It outputs full opacity white.

The text layer also uses mapping “surface 1”, and is able to appear outside the originally masked area.




Unmasked

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to **-**. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Clip outside region

Clips pixels outside of rendered region, preserving existing colour. If not set, pixels outside the rendered region are set to the border colour.

BorderExpansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

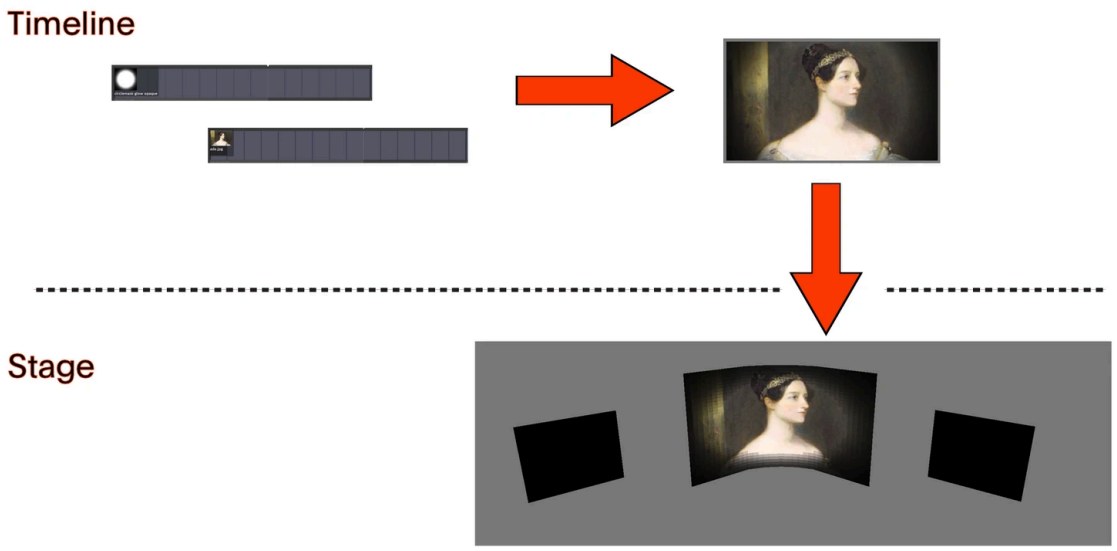
Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Content Mapping Overview

Mapping is the process of copying content from the Timeline level to the screens in the Stage level.



Conceptual diagram illustrating how mapping is used to control how content is copied from the Timeline to the Stage level.

All visual layers contain the property mapping, which is used to direct the layer output to the screens on the stage. For information on how to use the mapping property, please see the sub-chapter creating a new mapping.

Types of mappings

Several mapping types in Designer:

- Direct mapping
- Feed mapping
- Parallel mapping
- Perspective mapping
- Cylindrical mapping
- Radial mapping
- Spherical mapping

- CameraPlate mapping
- Spatial mapping
- Spherical mapping
- Depth Map mapping
- PreComps

These mapping types are able to: sample content across single or multiple screens with pixel perfect accuracy; map content onto 3D objects of any form; accurately project content onto static or moving screens; and project geometrically from virtual cameras in a number of different ways. For more detailed information on the mapping types please read the following topic Mapping types overview.

All visual layers contain the property **mapping**, which is used to redirect the layer output to the screen(s) in the stage. For information on how to use the **mapping** property please see the topic Creating a new mapping.

Creating a New Mapping

This guide covers how to create a new mapping, assign multiple mappings, and remove any mappings.

Creating a New Mapping

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.
3. Under the **Default** tab, left-click the **Mapping** parameter. This shows a list of all of the available mappings in the project. By default, **screens** are assigned a **Direct Mapping** with the same name. **Cameras** are assigned a **Perspective Mapping** with the same name.
4. In the **New Mapping** text field, type a name for your new mapping. Select a **mapping type** from the list.
5. In the **Mapping Editor**, assign the screens to be used for the mapping, and specify the resolution of the content.
6. Adjust the mapping properties as needed.
7. Finally, assign a piece of content to the layer in your track. The content will be displayed on the **assigned screens** in both the **stage** and **feed output window**.

[Animated GIF: Creating a mapping]

Creating a mapping

Assigning multiple mappings

In the Mapping keyframe editor that will appear across the screen, move the play head and assign multiple mappings sequentially for each layer by left-clicking in the editor.

Removing mappings

Remove mappings from your project by left-clicking on the name of the mapping and dragging to the trash can icon within this menu. All mappings that are assigned to a screen or camera within the project but have been moved to the trash will appear highlighted in red.

> **Note**
>
> **Please note**: It is useful to organise the different mappings in boxes, particularly if there are a very large number of mappings. For information on how to create, edit and organise objects within boxes, please see the section 'Organising objects in boxes' in the Object libraries.

Generating Textures

Texture types

Composite Texture

Combines multiple textures into one. To blend the textures together, you can select different blend modes.

Gradient Texture

Gradient texture allows for generative gamma and gradient length options.

Soft Edge texture

Create as many points as you want and configure what gamma level and level of gradient you need to achieve the perfect blend between your projector outputs.

Solid texture

Texture that only allows one solid colour.

Lookup texture

This texture allows you to edit the brightness curve of a softedge texture.

PreComp Texture

This texture acts as a virtual screen that content can be written to. See the PreComp topic for more information.

Creating textures

To create a texture:

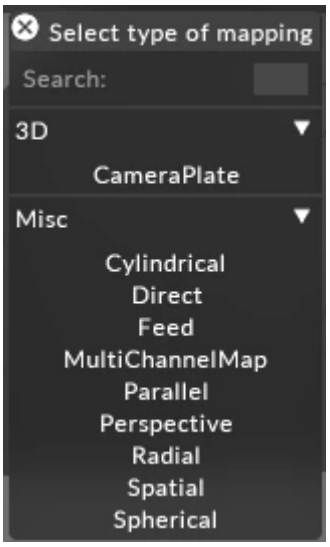
1. Open a **Bitmap** layer, a **Spinbitmap** layer or any other texture based layer.
2. Left-click **palette** from the layer editor.
3. Left-click **new texture** to highlight the text field.
4. Type in the name of your texture, for example **theatre surface** .
5. Click **Enter**. This will open a menu of five different types of textures.

Exporting textures

To Export a texture:

1. Open your texture from the **DxTexture** editor by right-clicking on it.
2. Left-click the **Actions** tab at the bottom of the editor.
3. Alter the name if needed, and then click **Enter** or left-click OK. The texture will be written to the output folder of the Project folder.

Mapping Types Overview



Direct mapping

Direct mapping is the easiest form of mapping. Simply select a piece of content and apply it directly onto some or all of your screens. If the content aspect is different from the screen aspect ratio, you can choose to crop, fit, stretch or apply the content pixel-perfect onto the screens.

Feed mapping

Feed mapping lets you specify an arbitrary number of rectangles within your content frame and map them to arbitrary rectangles on your screens. With Feed mapping, all your screens can easily be turned into one canvas, with pixel-perfect content applied. Individually move, scale, crop, chop or flip your sample rectangles to compensate for differences in pixel-density or to create interesting mapping effects.

Fisheye mapping

Fisheye mapping is used to map content generated using a fisheye lens. This mapping type is typically used for dome surfaces.

Parallel mapping

Parallel mapping allows you to position your content in a virtual emitter rectangle anywhere within the stage and to choose which screens and fixtures this affects. Designer then virtually projects the content out onto those fixtures. The content keeps the same size as it gets further away from the emitter.

Perspective mapping

Perspective mapping is similar to Parallel mapping, except that the content originates from an emitter point and gets larger as you get further away from the emitter, similar to a real projector. You can use perspective mapping to map 3D content onto a surface that looks perfect from the specified point of view.

Cylindrical mapping

Cylindrical mapping is similar to Parallel mapping, except that the Cylindrical mapping wraps content around a cylinder and fires it outwards (or inwards) at the screens you assign to it. It does not matter if the screen is moving or expanding, the Cylindrical mapping feature re-maps the content in real-time.

Radial mapping

Radial mapping is similar to the Cylindrical mapping, except that the emitter surface runs from the central axis to the cylinder rim, rather than being wrapped around the outside of the cylinder. The pixels inside the cylinder will therefore be mapped according to their height within the cylinder and their distance from the central axis.

Spherical mapping

Spherical Mapping works similarly to the Cylindrical mapping, except the top and bottom are ‘pinched’ to create a sphere.

CameraPlate mapping

A CameraPlate mapping is a 3D Camera based mapping that is fixed to the plate of the camera. Using a CameraPlate mapping is necessary when doing color adjusts on the set extension.

Spatial mapping

A Spatial mapping is a 3D Camera based mapping that maps into 3D space; it has a “space” or location so it can be moved around 3D environments.

Mesh mapping

A Mesh mapping is a 3D mapping that maps into the UVs of a mesh; it has a “space” or location so it can be moved around 3D environments and fills the full UVs of the mesh with content.

CameraPlate Mapping

The CameraPlate mapping always targets a specific camera.

The CameraPlate mapping was added for the Augmented Reality (AR) workflow, where virtual objects can be mapped within the scene. The CameraPlate mapping will essentially “stick” the content to the perceived lens of the camera and adjust the content to always appear in proportion despite the position or movement of the camera.

Creating a CameraPlate Mapping

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.
3. Under the **Default** tab, left-click the **Mapping** parameter to display the Mappings manager which list all of the mappings in the project. By default, all screens are assigned a **Direct mapping** with the same name. All cameras are assigned a **Perspective Mapping** with the same name.
4. In the **New Mapping** text field, add a name for your new mapping. A list will appear prompting to you select a mapping type.
5. Select CameraPlate from the list. The CameraPlate Mapping editor will appear.
6. In the **Mapping editor**, assign the screens to be used for the mapping, and specify the resolution of the content.
7. Adjust the mapping properties as needed.
8. Finally, assign a piece of content to the layer in your track. The content will be displayed on the **assigned screens** in both the stage and feed output window.

Common Mapping Properties

This section explains the properties that are shared by the six different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to **-**. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Clip outside region

Clips pixels outside of rendered region, preserving existing colour. If not set, pixels outside the rendered region are set to the border colour.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

CameraPlate mapping properties

Camera plate

Camera plate options include:

- Front Plate
- Back Plate
- Horizontal Back and Front Plates
- Front Plate Undistorted
- Back Plate Screens
- Back Plate Set Extension

Reprojection distance (m)

The reprojection distance in metres is a measure of the accuracy and real-world alignment of your virtual camera and the physical set. It indicates how closely the digital content is matching the real-world geometry from the camera's perspective.

Cylindrical Mapping

The Cylindrical mapping type wraps content around a cylinder and fires it outwards (or inwards) onto the selected screens. Similar to the Parallel mapping and the Perspective mapping types, the content is being virtually projected from the surfaces of the cylinder, both inwards and outwards.

Cylindrical mapping wraps content around a cylinder and emits it inward or outward towards the screens assigned to it. It does not matter if the screen is moving or expanding, the Cylindrical mapping re-maps the content in real-time to accommodate for the movement, similar to parallel mapping.

Creating a Cylindrical mapping

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.
3. Under the **Default** tab, left-click the **Mapping** parameter to display the Mappings manager which list all of the mappings in the project. By default, all screens are assigned a **Direct mapping** with the same name. All cameras are assigned a **Perspective Mapping** with the same name.
4. In the **New Mapping** text field, add a name for your new mapping. A list will appear prompting to you select a mapping type.

   [Animated GIF: Create a new mapping]

5. Select Cylindrical from the list. The Cylindrical Mapping editor will appear.
6. In the **Mapping editor**, assign the screens to be used for the mapping, and specify the resolution of the content.
7. Adjust the mapping properties as needed.
8. Finally, assign a piece of content to the layer in your track. The content will be displayed on the **assigned screens** in both the stage and feed output window.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

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- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to **-**. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
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Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Cylindrical mapping properties

Output

By default, this is set to **colour**. This implies that red, green and blue content channels are sent to the red/green/blue colour output channels of the screen (or converted to cyan, magenta and yellow if the output fixtures are CMY). However, content can also be channelled to other channels in the case of DMX-based fixtures. Currently, this is a beta functionality, so for the moment you are advised to leave this set to **colour**.

Anchor

As with the Parallel mapping type, you can anchor the cylinder around the centre, or the top or bottom points. Resize and rotation operations will keep the anchor point in the same place. With the anchor, the cyclinder can be moved/rotated around the top, middle, or bottom.

Select from the following:

- Centre
- Top
- Bottom

Projection mode

In cylindrical mapping, the projection mode determines the direction from which the texture is projected onto your 3D object.

Options are:

- Outside: Used for texturing the exterior of objects like pillars, bottles, cans, tree trunks, and character arms.
- Inside: Used for texturing the interior of hollow objects, such as the inside of a pipe, a tunnel, a cup, or a panoramic sky dome that surrounds your scene.

Position

This property is the position in X, Y, Z space.

Rotation

This rotates the cylinder around the anchor point; specified in degrees of rotation around the x, y and z axes respectively.

Size

This controls the size of the cylinder in metres, on the x, y and z axes respectively. The y property (the second value) controls the height; the two other properties control the radii in the x and z axes. Setting x and z to the same value keeps the cylinders cross section circular; setting them to different values makes it elliptical.

Using the cylindrical mapping type

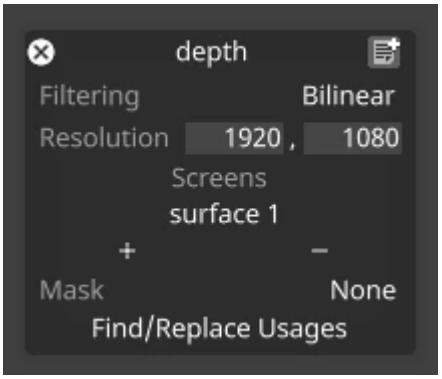
In addition to the property explanations provided above, it is important to:

- Base the resolution of the Cylindrical mapping on the aspect between the circumference of the cylinder and the height of the screen. The circumference can be calculated by taking the **diameter * pi, = size* 3.14** . Set the size x and z to the same value to establish as perfect circular shape.

Depth Map Mapping

A **Depth Map Mapping** applies a depth-map image or video to a Depth Map Mesh.

The input must be a **black-and-white depth map**, where pixel brightness encodes the **relative depth** of objects in the image. When mapped, the z-positions of the mesh's vertices deform dynamically based on the depth values.



Depth Map mapping

Using the Depth Map Mapping

1. Create a new Depth Map Mesh and assign it for the target screen.
2. Add a layer to the track which produces a depth map, for example a Video layer.
3. Add the target screen to the **Screens** list within the mapping configuration.
4. Verify that the screen's mesh dynamically updates based on the applied depth map content.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click + to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Related information

- Depth Video Layer
- Depth Map Mesh

- Depth Workflows

Direct Mapping

Direct mapping is the default mapping applied to all screens and is a 1:1 ratio of content to screen. The content will stretch and shrink to the size and resolution of the assigned screen. You can choose to crop, fit, stretch or apply the content pixel-perfect onto the one or multiple screens, all within one direct mapping.

When you create a new screen, Designer automatically creates a new Direct mapping with the same name as the screen and only includes that screen.

The resolution of the Direct mapping type is automatically set to the highest resolution screen of the screens included in the Direct mapping.



Creating a Direct mapping

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.

3. Under the **Default** tab, left-click the **Mapping** parameter to display the Mappings manager which list all of the mappings in the project. By default, all screens are assigned a **Direct mapping** with the same name. All cameras are assigned a **Perspective Mapping** with the same name.
4. In the **New Mapping** text field, add a name for your new mapping. A list will appear prompting to you select a mapping type.
5. Select Direct from the list. The Direct Mapping editor will appear.
6. In the **Mapping editor**, assign the screens to be used for the mapping, and specify the resolution of the content.
7. Adjust the mapping properties as needed.
8. Finally, assign a piece of content to the layer in your track. The content will be displayed on the **assigned screens** in both the stage and feed output window.

Common Mapping Properties

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- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
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- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.

3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

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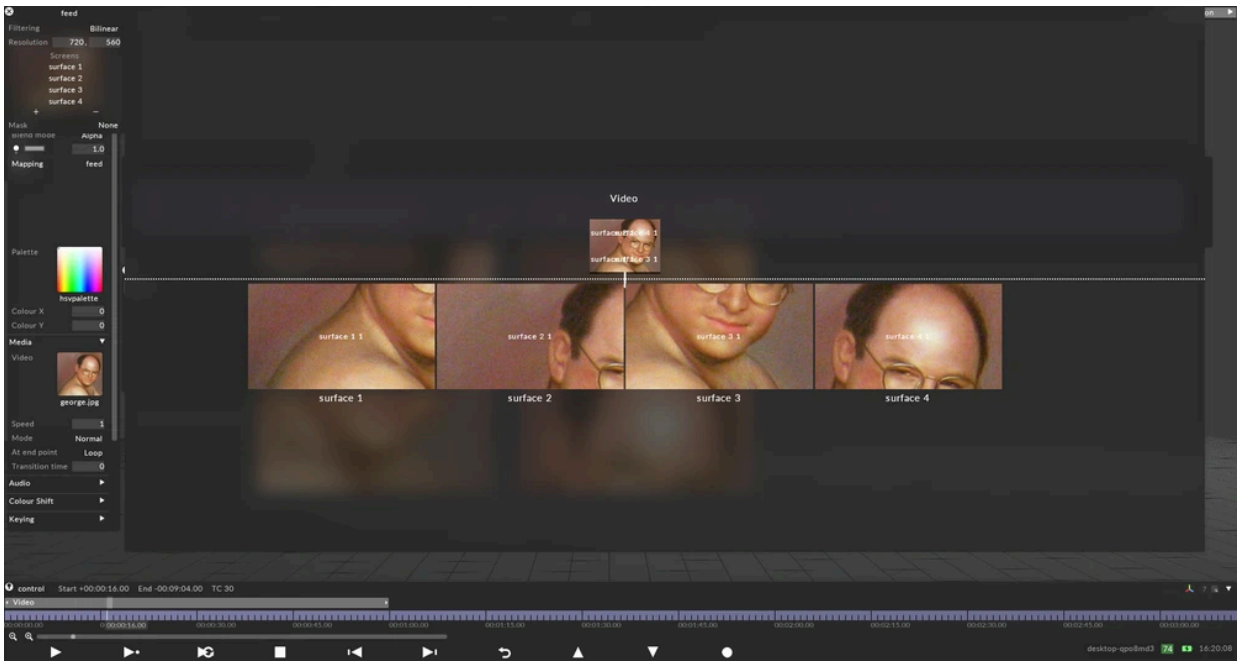
Find/Replace Usages

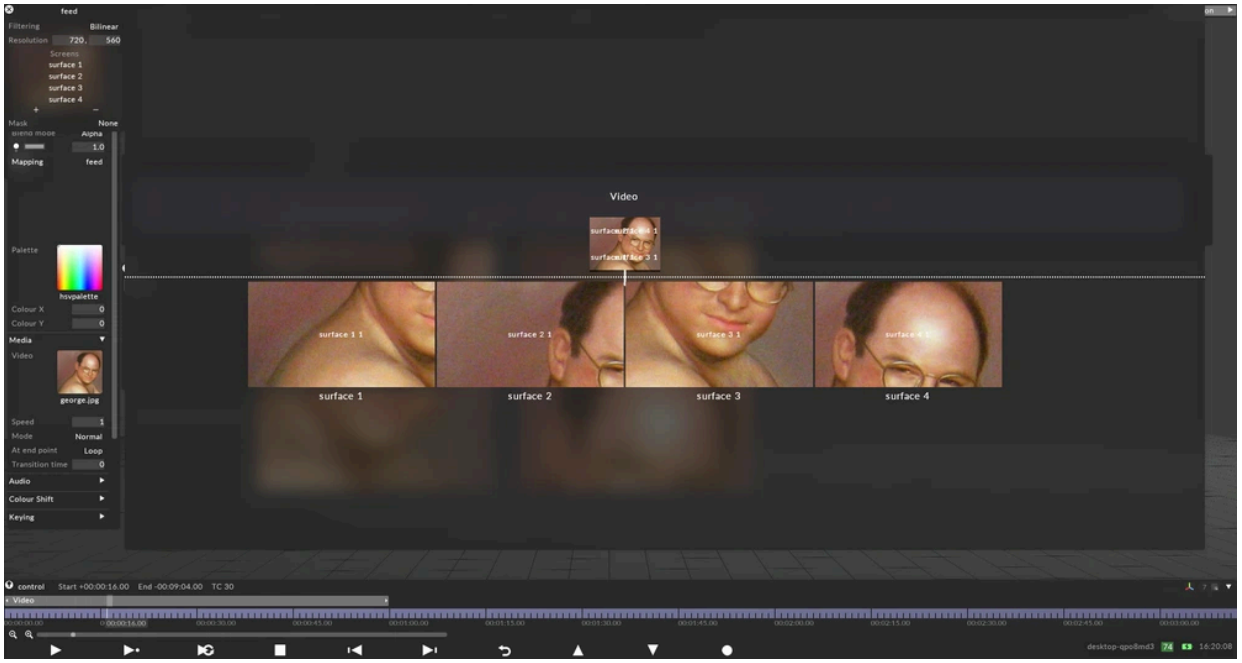
Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Feed Mapping

The Feed mapping type allows you to sub-sample rectangular areas in a content area (referred to as the Mapping canvas) and copy that content onto rectangles inside one or multiple screens.

Feed mapping lets you specify any number of source rectangles within your content and map them individually to multiple surfaces. With Feed mapping, all your screens can easily be turned into one overall raster, and content applied to each surface with pixel-perfect accuracy. Individually move, scale, crop, chop or flip your source rectangles to compensate for differences in pixel density or to create interesting mapping effects..





Creating a Feed Mapping

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.
3. Under the **Default** tab, left-click the **Mapping** parameter. This shows a list of all of the available mappings in the project. By default, **screens** are assigned a **Direct Mapping** with the same name. **Cameras** are assigned a **Perspective Mapping** with the same name.
4. In the **New Mapping** text field, type a name for your new mapping. Select a **mapping type** from the list.
5. In the **Mapping Editor**, assign the screens to be used for the mapping, and specify the resolution of the content.
6. Adjust the mapping properties as needed.
7. Finally, assign a piece of content to the layer in your track. The content will be displayed on the **assigned screens** in both the **stage** and **feed output window**.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.

- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to **-**. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Feed Mapping Properties

This section explains the properties that are shared by all the different mapping types.

Import from Table

Allows feed settings to be imported and update feed mappings.

See the **Import and Export feed maps** section below.

Feed View

Feed View provides a visual representation of the feed mapping for screens and content.

Using the Feed Mapping type

Feed Mapping guidelines

In addition to the property explanations provided above, it is important to:

1. Set the resolution of the Feed mapping to the same resolution as the content intended to be used for that Feed mapping. If the content is of a higher resolution than the resolution of the Feed mapping mapping canvas, Designer will by default crop away the sides of the content. If the content is of lower resolution, Designer will scale up the content inside the mapping canvas.
2. Add the screens to the Feed mapping in the same order as they appear in the visualiser, from left to right. If the screens are not listed in that order yet, you can re-order the screens in the screens list by selecting and dragging a screen up or dow

Adding a Feed rectangle to the mapping canvas

To add a Feed rectangle to the mapping canvas:

1. Right-click the red screen canvas and select **Add feed rectangle**.



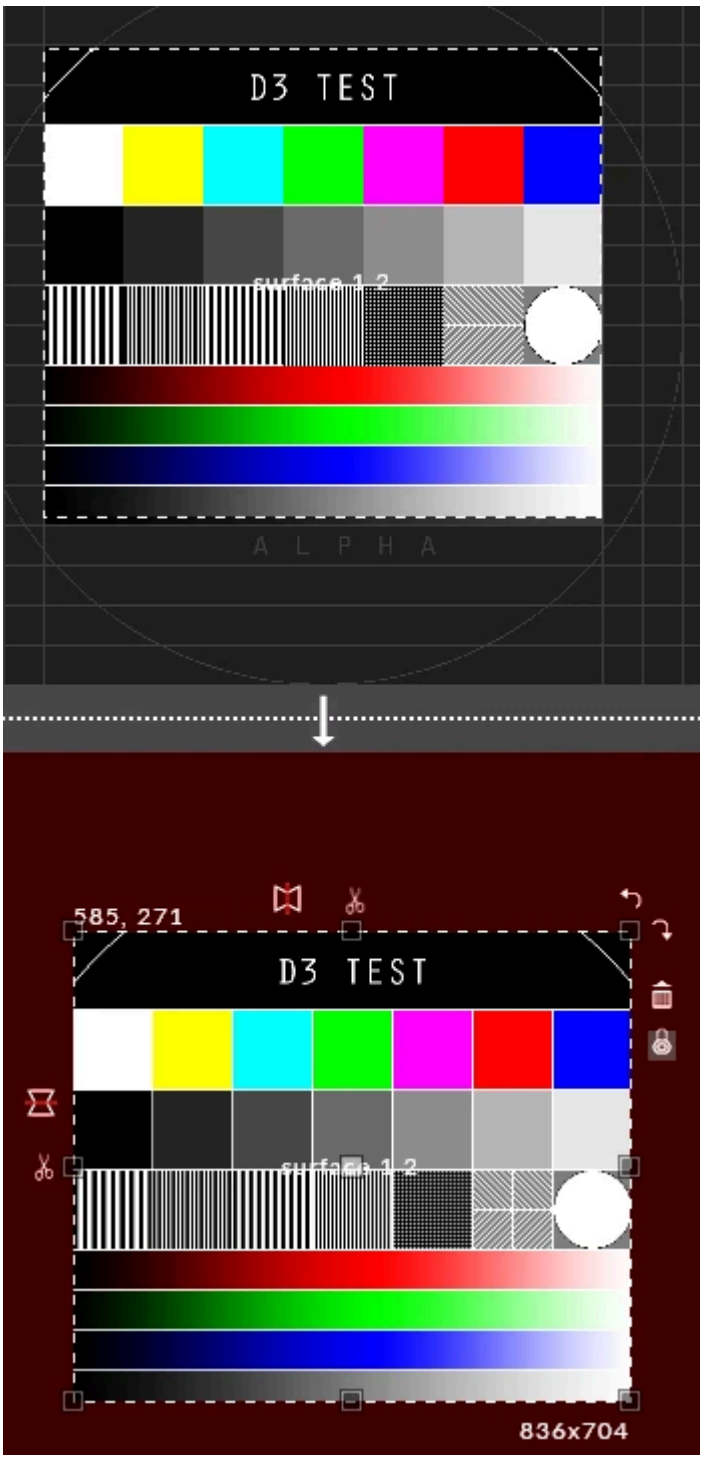
View of the Feed mapping editor when adding a new Feed rectangle

Note that the Feed rectangle is by default positioned in the top left corner of the mapping canvas. To change the position of the Feed rectangle, left-click it once, place the cursor in the middle and start moving it.

Editing a Feed rectangle

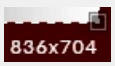
The Feed rectangle has a number of options for scaling, flipping and chopping the rectangle. These options are very similar to those used when editing a Feed rectangle in the Output Feeds level. For more information please see the sub-chapter Quick editing controls.

This image explains the various options associated with a Feed rectangle in the Stage level.



Feed rectangle quick editing controls

Item	Explanation
	The position of the sample rectangle placed on the Mapping Canvas, in pixels.

Item	Explanation
	The Scissor tool on the sample rectangle for vertical cuts. Left-click and hold down the mouse button to move the cut horizontally.-
	The Scissor tool on the sample rectangle for horizontal cuts. Left-click and hold down the mouse button to move the cut vertically.-
	The Bin . Left-click the bin icon once to delete the sample rectangle (and the Feed rectangle).-
	The size of the sample rectangle in pixels.
	The Flipping tool to flip the sample rectangle horizontally.
	The Scissor tool on the Feed rectangle for vertical cuts. Left-click and hold down the mouse button to move the cut horizontally.-
	The Rotate tool on the Feed rectangle for rotating the Feed rectangle 90 degree clock/anti-clockwise.-
	The Scissor tool on the Feed rectangle for horizontal cuts. Left-click and hold down the mouse button to move the cut vertically.-
	The Flipping tool to flip the sample rectangle vertically.
	
	The Lock button locks the size of the sample rectangle to the size of the Feed rectangle and vice versa. Left-click the Lock button once to unlock the dependency.
	The name of the screen.
	The size of the Feed rectangle in pixels.

Using these tools gives you a lot of freedom for configuring the Feed mapping on the screens in the Stage. Below, you can see an extreme example of this (for demonstration purposes

only). Note that the red color in the background on the left hand side will only show up if the Feed mapping editor is open. When closed, the background will remain black.

Using Feed Rectangle properties

Right-clicking a feed rectangle offers the following properties.

Add feed rectangle

This option adds another feed rectangle to the canvas.

Export current frame as PNG

A PNG of the feed rectangle is exported to the **screenshots** folder of your project folder. For more information see project structure.

Edit feed warping

This option allows you to draw a 2D warp on an individual feed rectangle. Useful for warping within the mapping layer as oppose to the feed level.

Select mask

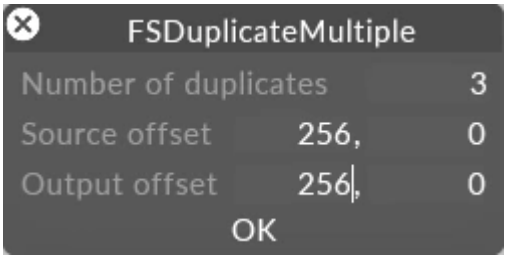
This option allows you to add a mask to the feed rectangle. Masks are read from the **DxTexture** folder of your Objects folder within your project folder. For more information see project structure.

Duplicate

This allows you to create a duplicate of the feed rectangle.

Duplicate multiple

This allows you to duplicated multiple source and destination feed rectangles to create arrays of feed rectangles within the mapping.



The duplicate multiple editor.

Turn snap off

This option toggles feed rectangle snapping on and off. When on, feed rectangle edges will snap to one another, and when off they do not do this (note the rulers still show with snapping off).

Import & Export feed maps

The easiest way to import and export feed maps from projects is via a table. A feed map can be exported to a text file from Designer and then imported to another project.

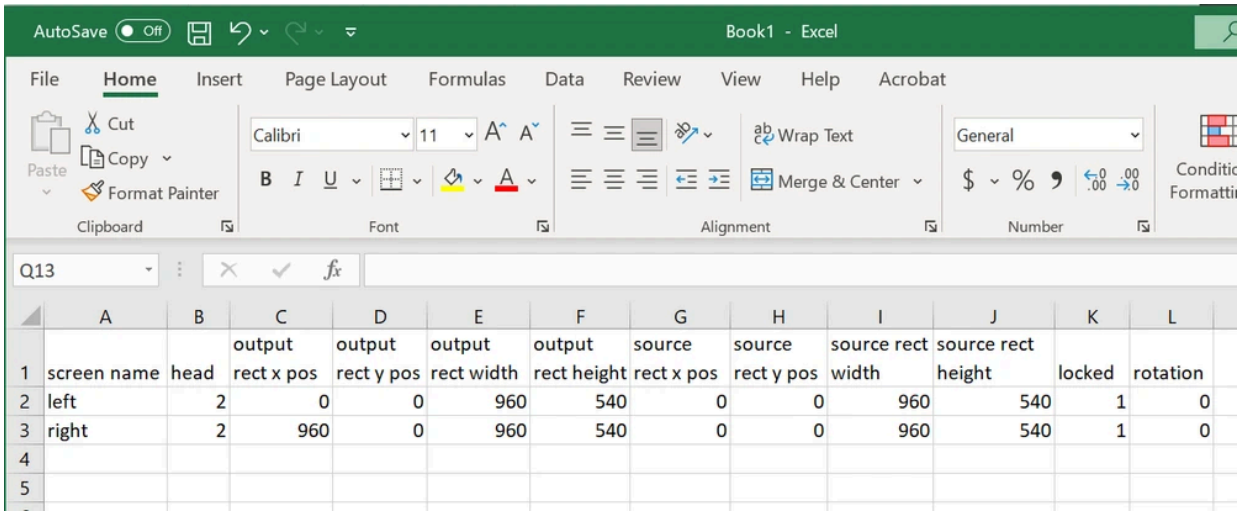
Export

1. In your Feedmap, right-click and choose **Export to table**.
2. Enter a name.
3. Click **OK**.



4. The feed map is now exported to a newly created table folder in the objects folder.

The table that is exported will look similar to this example:

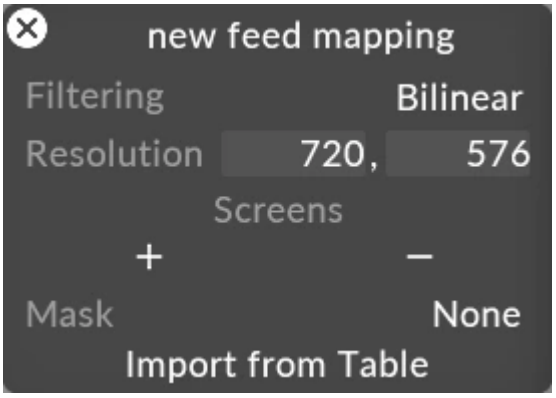


	A	B	C	D	E	F	G	H	I	J	K	L
1	screen name	head	output rect x pos	output rect y pos	output rect width	output rect height	source rect x pos	source rect y pos	source rect width	source rect height	locked	rotation
2	left	2	0	0	960	540	0	0	960	540	1	0
3	right	2	960	0	960	540	0	0	960	540	1	0
4												
5												

“Screen Name” refers to the name of the feed rectangle while “Head” refers to the number of the output slot.

Import from a table

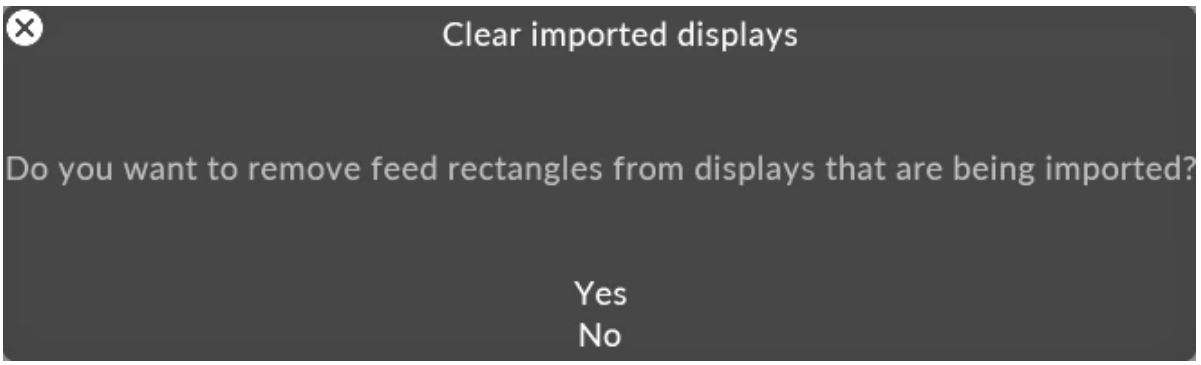
1. In your new project, create a feed mapping. The mapping does not need to share the same name as the one you are importing.
2. Left-click the Import from table option, this will only appear if there is a table folder present in the project folder.



3. Left-click your table from the available list.

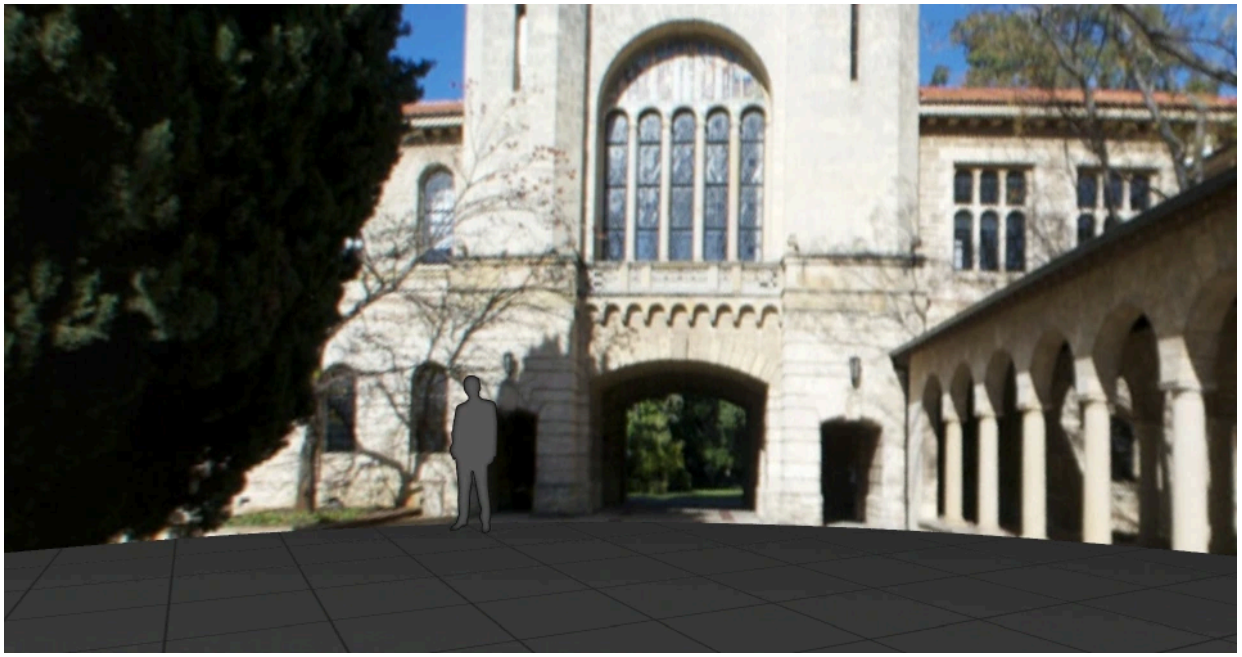


4. Choose yes when prompted to overwrite existing feed rectangles.



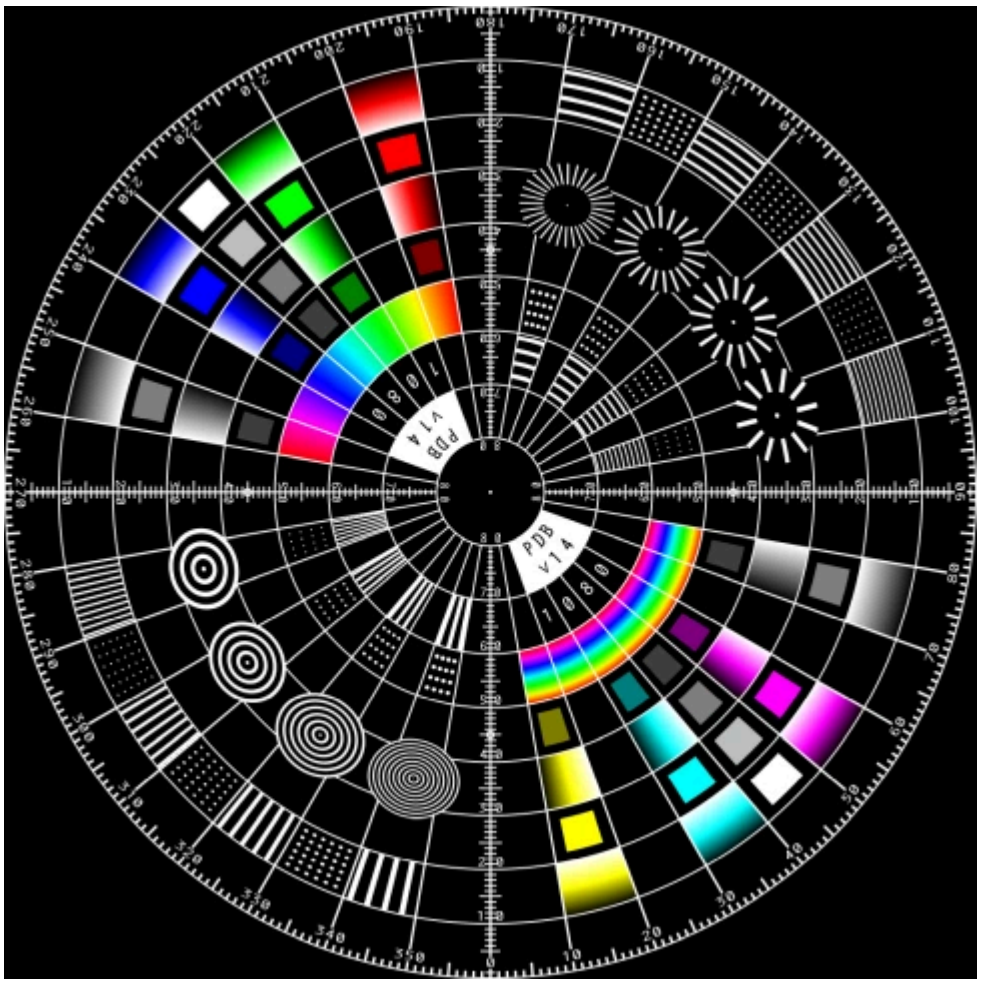
Fisheye Mapping

Fisheye mapping projects content onto screens using a fisheye projection, simulating the effect of a hemispherical lens. This mapping type is ideal for domes, curved surfaces, or any scenario where content needs to be distributed radially from a central point.



Fisheye mapping treats all assigned screens as a unified canvas, projecting a single fisheye-warped image over all surfaces. This eliminates the need for manual calculations of pixel density or screen spacing; Designer automatically handles the correct sampling and alignment, even as surfaces move or change orientation.

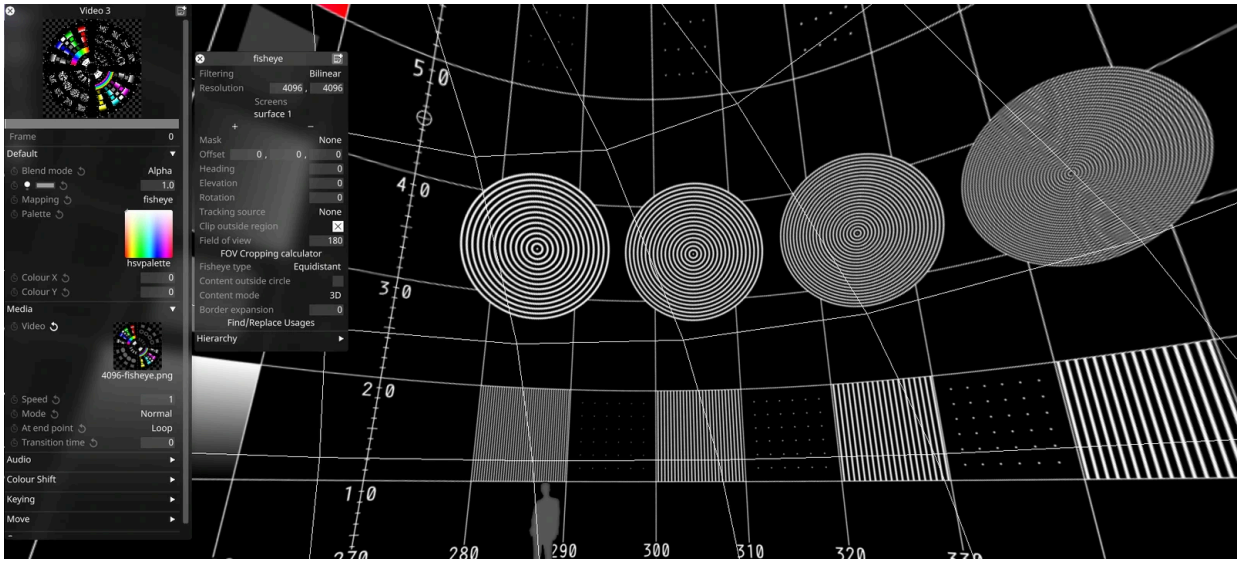
An example of fisheye content:



With credit to Paul Bourke. Fulldome test pattern by Paul Bourke. The images may be freely used under the condition it is not modified in any way. The image may be freely distributed as long as this license statement is included.

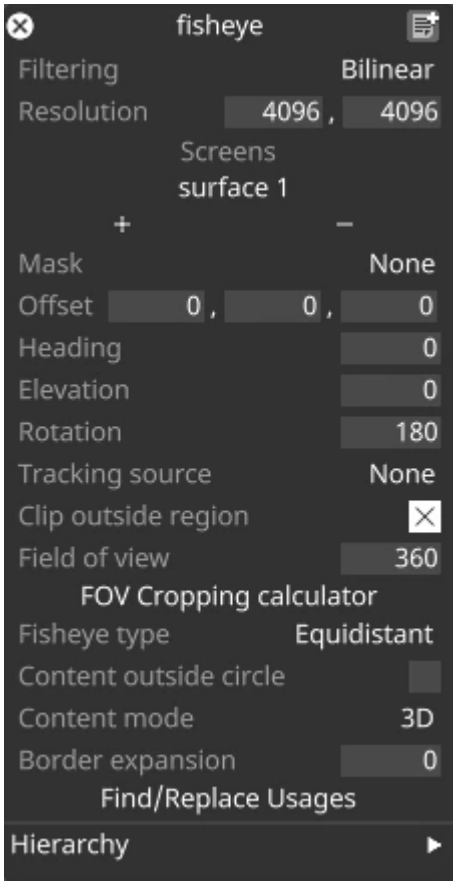
Creating a Fisheye Mapping

1. In your track, create a new visual layer (content, generative, or effect).
2. Select the layer to open the Layer Editor.
3. Under the Default tab, click the Mapping parameter to display available mappings.
4. In the mappings manager, create a new mapping and select **Fisheye** as the type.
5. An editor for the new fisheye mapping will appear.
6. Assign all screens to be used and enter the intended content resolution.
7. Assign content to the layer; it will be displayed fisheye-mapped across the assigned screens in the stage and feed output.
8. Adjust the specific fisheye mapping properties as needed.



When the Fisheye mapping editor opens, Designer highlights areas outside the mapped region and provides controls for projection parameters and cropping.

Mapping Properties



Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to **-**. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Offset

Sets the position of the fisheye projection's anchor point in stage space (meters). This is relative to any parent object if the mapping is in a hierarchy.

Heading

Rotates the fisheye projection horizontally (degrees).

Elevation

Tilts the projection vertically (degrees).

Rotation

Rotates the content within the fisheye projection (degrees).

Tracking source

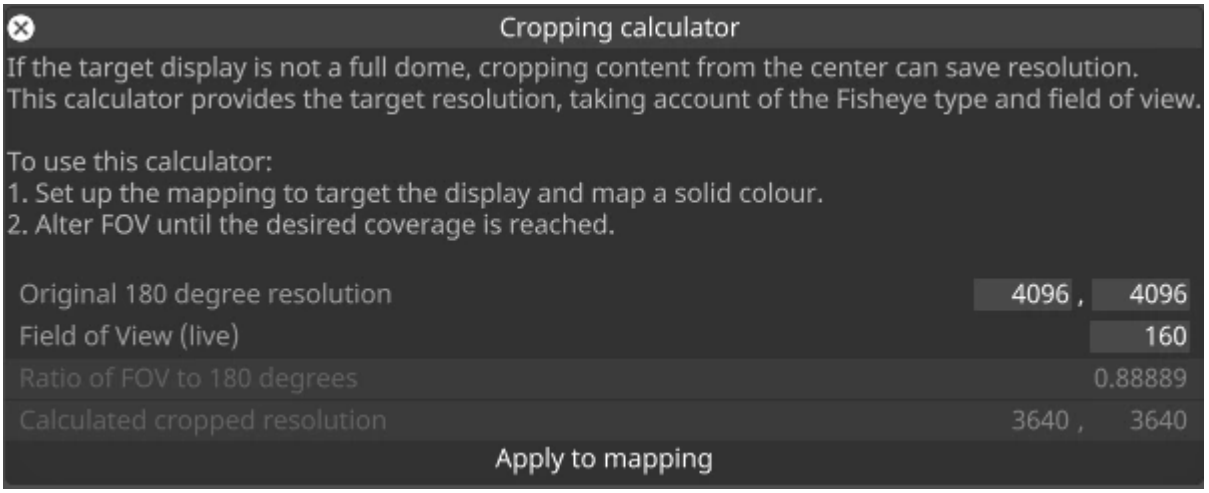
Attach the mapping to a tracked object.

Clip outside region

Clips pixels outside of rendered region, preserving existing colour. If not set, pixels outside the rendered region are set to the border colour.

Field of view & cropping calculator

Sets the angular extent of the fisheye projection (degrees). Increasing the FOV captures a larger area, and can extend to 360° for full spherical content. Decreasing the FOV focuses the mapping on a smaller area, and can be used to reduce file sizes. The default value is 180°.



The cropping calculator helps tune the FOV and its relationship with the mapping resolution. It provides live control over the FOV and calculates the resulting resolution as a factor of the original mapping resolution. This helps ensure that the content is sampled correctly for the intended display area.

Note that the fisheye type (below) also affects the resolution calculation, as different projection algorithms have varying sampling behaviour at different FOVs.

Fisheye type

Select the fisheye projection algorithm. Each type has different characteristics in terms of resolution distribution.

- **Equidistant**: Maps angles linearly to radius, providing a balanced distribution of resolution across the FOV. This is a common choice for general fisheye applications.
- **Equisolid**: Preserves area relationships, making it suitable for applications where equal-area representation is important, such as in planetarium projections.
- **Orthographic**: Projects points onto a plane, resulting in a more compressed image towards the edges. This can be useful for artistic effects or specific display requirements.
- **Stereographic**: Preserves angles, resulting in a larger apparent size of objects near the edge of the FOV.

Content outside circle

When disabled, content outside the circular fisheye area is clipped. When enabled, the entire rectangular mapping area is used. This can be useful if only small parts of the screen are outside of a given FOV, as the usually wasted area can be filled with content.

Content mode

Choose between 2D or 3D content mapping. In 3D mode, the lens is converted to a camera and sent to the 3D engine, allowing for true 3D perspective and parallax effects. In 2D mode, the content is always treated as a flat image, with no camera information.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Mesh Mapping

Mesh mapping enables you to project 3D content onto the entirety of one or more screens, automatically adjusting to the extent of the surfaces it targets. It can be very useful for mapping 3D content onto large projection installations, or rendering out-of-frustum content for VP/xR shoots.

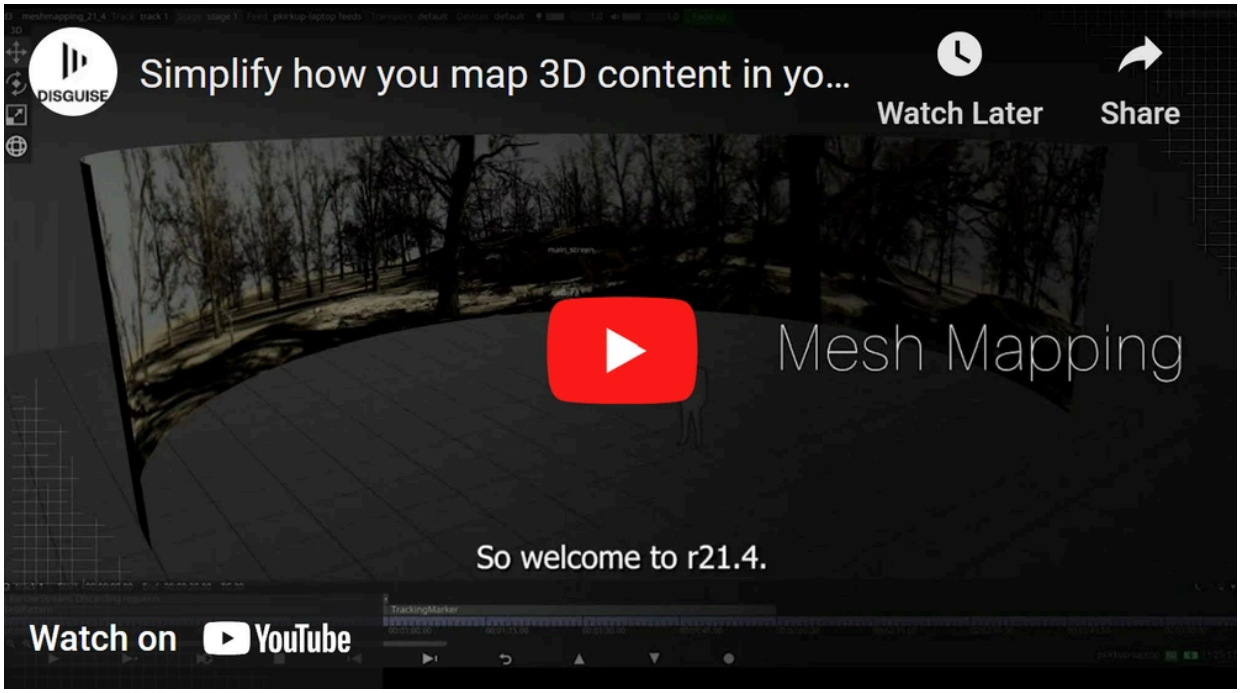
Mesh mapping is similar to a Perspective mapping, in that it projects content onto the screens from an eyepoint, and sends the projection viewpoint to 3D content engines so that the rendered content matches the viewpoint frustum.

The main differences between mesh and perspective mappings are:

- The mesh mapping viewpoint frustum is automatically calculated to tightly bound the extent of the screen, whereas the perspective mapping frustum properties (rotation, field of view etc.) must be set manually.
- When using RenderStream, mesh mapping applies the projection to the screen on the render node, then transports the image in UV space. This is more efficient as it avoids transporting pixels which will be lost in the projection. Perspective mapping transports the rendered image, then projects into UV space on the receiving machine.

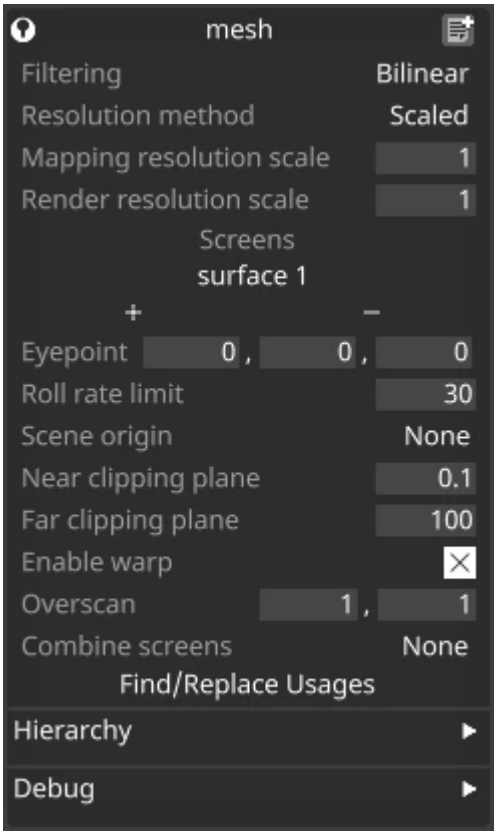
> **Caution**
>
> Mesh mapping isn't generally appropriate for 2D content, as it can apply unintended angles or cropping to the content. This is compensated for in 3D content by the viewpoint sent to the render engine.

See How it Works



Click the image to watch the video on YouTube

Mesh mappings are created like any other mapping type, from within a layer's **Mapping** field. Screens should then be added and other properties configured in the mapping editor.



Mesh mapping editor

Creating a Mesh Mapping

Mesh mappings can be created in a similar way to other mappings, however, once created, they must be further configured for 3D content.

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.
3. Under the **Default** tab, left-click the **Mapping** parameter to display the Mappings manager which lists all of the mappings in the project.
4. In the **New Mapping** text field, add a name for your new mapping. A list will appear prompting you to select a mapping type.
5. Select Mesh from the list. The Mesh Mapping editor will appear.
6. In the **Mapping editor**, assign the screens to be used for the mapping, and specify the resolution of the content.

Add 3D content by following the RenderStream Workflows below.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click + to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Mesh Mapping Resolution Properties

Resolution method

Since mesh mapping creates different viewpoints for each screen it renders to, it has several different options for deciding how to set the mapping resolution for each viewpoint:

- **Constant**: Each viewpoint is rendered at the same constant resolution, defined in the mapping's **Resolution** property.
- **Scaled**: The resolution of each viewpoint is equal to the resolution of the screen it is mapped to, multiplied by the **Mapping resolution scale**.
- **Pixels Per Degree**. The resolution of each viewpoint is calculated based on the horizontal and vertical field of view of the frustum, to maintain a consistent angular resolution set in the **Pixels per degree** property.

Resolution

When the **Resolution method** is set to **Constant**, this property controls the resolution of all viewpoints, in pixels.

Mapping resolution scale

When the **Resolution method** is set to **Scaled**, the resolution that the content is rendered and projected for a given screen is equal to the screen's resolution, multiplied by the mapping resolution scale.

Pixels per degree

When the **Resolution method** is set to **Pixels Per Degree**, this property defines the angular resolution of the mapping.

Render resolution scale

When using mesh mapping with RenderStream, the render engine first renders a view of the scene at resolution *A*. This view is then projected onto the screen and transported over the network in UV-space, at resolution *B*. Occasionally helpful for screens with complicated UV maps, render resolution scale can be set to adjust the render resolution *A* relative to the mapping resolution *B*, so that:

- Resolution *B* is equal to the screen resolution multiplied by the **Mapping resolution scale**, as described above.
- Resolution *A* is equal to resolution *B* multiplied by the **Render resolution scale**.

Other Mesh Mapping Properties

Other properties which are specific to mesh mapping include:

Eyepoint

The point from which the 3D content is rendered and mapped to the screens. This is the point in the world from which the perspective of the 3D content will look correct.

Scene origin

This can be used to offset the origin of the 3D content from the Designer coordinate space, to modify the alignment of the scene relative to the screens.

Roll rate limit

It is possible to add the mesh mapping to a parent object, such as a camera, so that the eyepoint follows that camera (see **below**). Following a tracked camera can cause sudden jumps in the roll of the frustum, which can result in artefacts in the rendered content. Roll rate limit avoids these jumps by limiting how quickly the roll of the frustum can change.

Near clipping plane

The distance (in metres) from the eyepoint of your frustum's near clipping plane. Objects in the content closer than this are not rendered.

Far clipping plane

The distance (in metres) from the eyepoint of your frustum's far clipping plane. Objects in the content further than this are not rendered.

Enable warp

Mesh mappings render views of a 3D scene from the eyepoint, and then apply a perspective warp onto the meshes of the selected displays. If **Enable warp** is ticked, when using Renderstream the perspective warping will be applied on the render node, saving performance on the machine receiving the streams and avoiding streaming pixels which will ultimately be cut off in the perspective warping. If **Enable warp** is unticked, RenderStream will stream the rendered views, and the perspective warp will happen on the receiving machine. This option has no effect for locally rendered modules.

Overscan

Renders extra content outside the original canvas to compensate for edge effects. 1 means 100 % of the original size, 2 means 200 %, etc. Note that the resolution of the total rendered content doesn't change even though the field of view is increased. You may wish to increase the mapping resolution to account for the overscan added.

Combine Screens

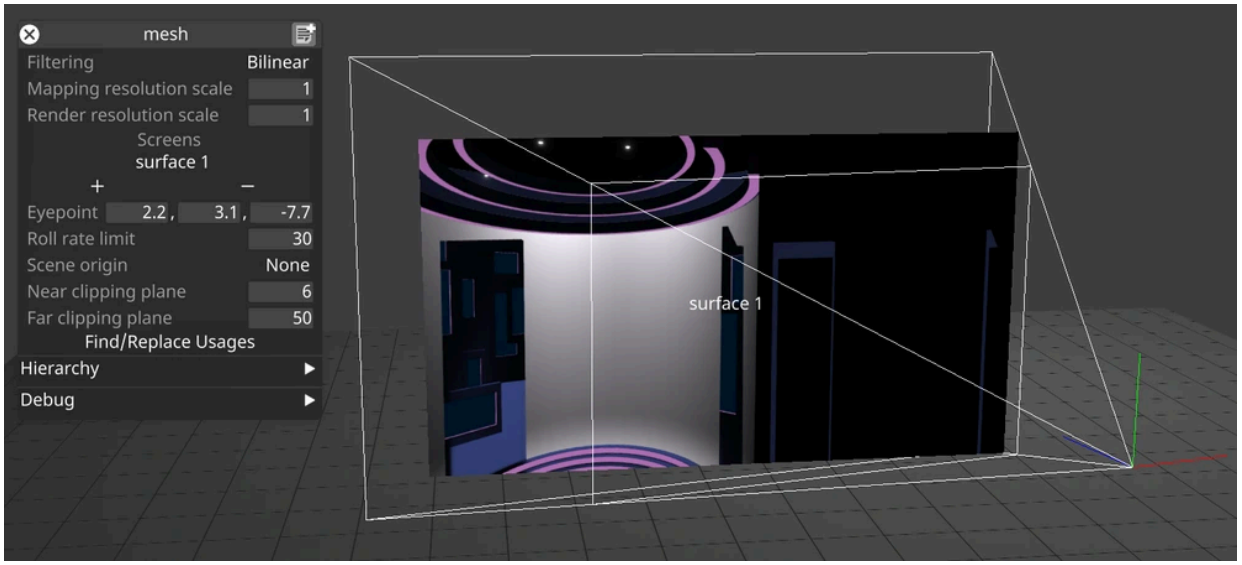
By default, Mesh Mapping renders a separate content viewpoint for each screen in the mapping. However, the **Combine Screens** option can be used to cover multiple screens with a single viewpoint. This can be helpful for improving performance in setups with lots of screens close together. The available options are:

- **None**: Each screen has its own separate viewpoint frustum (default).
- **All**: All screens share a single combined viewpoint frustum.
- **Non-Output**: Viewpoints are combined on non-output machines (e.g. Editor, Dedicated Director), separate on output machines (e.g. Actor, Non-Dedicated Director).
- **All Active**: Each machine combines its locally active screens into a single viewpoint. Note that this option does not work with RenderStream; RenderStream modules will render a separate viewpoint per screen as in **None** mode.

> ⚠ **Caution**
>
> When combining screens (using any option other than **None**), selecting **Scaled** for the **Resolution method** will use the first screen's resolution for the combined viewpoint. Using **Constant** or **Pixels Per Degree** instead is recommended for combined screen viewpoints.

Frustum Visualisation

When the mesh mapping editor is open, the viewpoint frustum(s) are drawn in the stage, which can be helpful for understanding how the content is projected.



Mesh mapping frustum

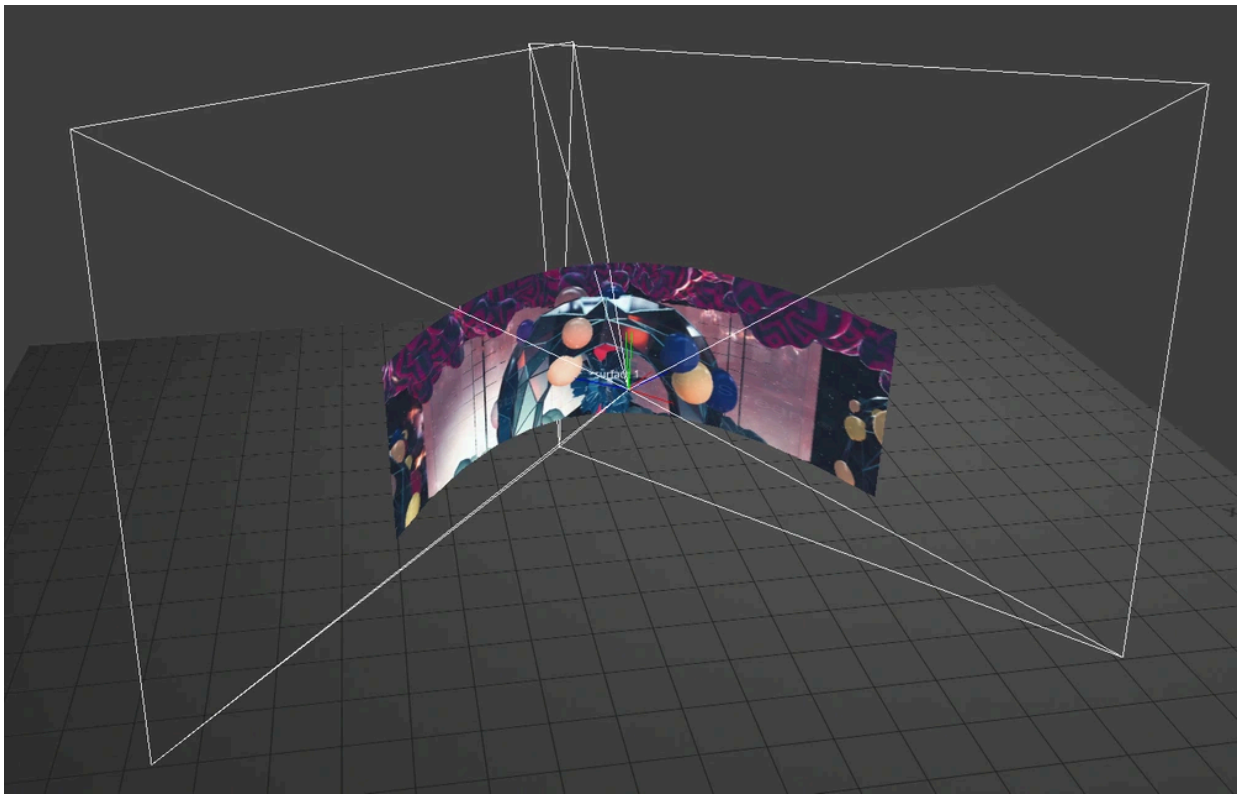
> ⚠ **Caution**
>
> Mesh mapping can only generate a viewpoint frustum with a field of view up to 180 degrees. For example, a curved screen may not render correctly if the eyepoint is within the curve of the screen. To get around this, split the screen content into fragments as discussed below.

RenderStream Workflows

Mesh mapping can be very helpful for 3D content workflows using RenderStream. As described above, mesh mapping projects content onto screens on the render node side, avoiding sending pixels over the network, which will subsequently be discarded. It also automatically creates a viewpoint frustum which tightly bounds the screen, maximising the efficiency of each rendered pixel.

RenderStream allows rendering of large canvases to be clustered across multiple render nodes (see RenderStream overview). Mesh mapping supports this workflow, generating a separate viewpoint frustum for each screen fragment, and combining the resulting renders together to give a single continuous view of the 3D scene. Padding and overlap can be used as normal to blend between the fragments.

Clustered rendering also allows mesh mapping to be used for screens which wrap around the eyepoint with a field of view over 180 degrees. Since a separate viewpoint is generated for each fragment, the mapping will look correct as long as each individual viewpoint has a field of view less than 180 degrees.



Mesh mapping with multiple fragments

RenderStream clustering can also be used to render in-frustum and out-of-frustum content simultaneously.

Cluster rendering workflow

To use a mesh mapping within a Cluster Workload for an in-frustum and out-frustum setup:

1. Set up a single channel within your **Cluster Workload** that is targeting **MR set (backplate)**
2. Create another channel that targets a mesh mapping. For a pool size of 2, this will generate 2 streams for the mesh when it is started.
3. Be sure to use the same scene origin object in both so that they have the same reference point.
4. Start the workload. You will see 3 total streams across the network as it receives the renders for both in-frustum and out-frustum.

> **Note**
>
> It's advisable not to place the mesh and the eyepoint at the exact same location as this can result in a frustum with an infinite field of view. If you want to reproduce the view on the origin 0,0,0, you may either place the mesh offset a bit within the Disguise stage or offset the eyepoint and use scene origin to 're-align' the offset.

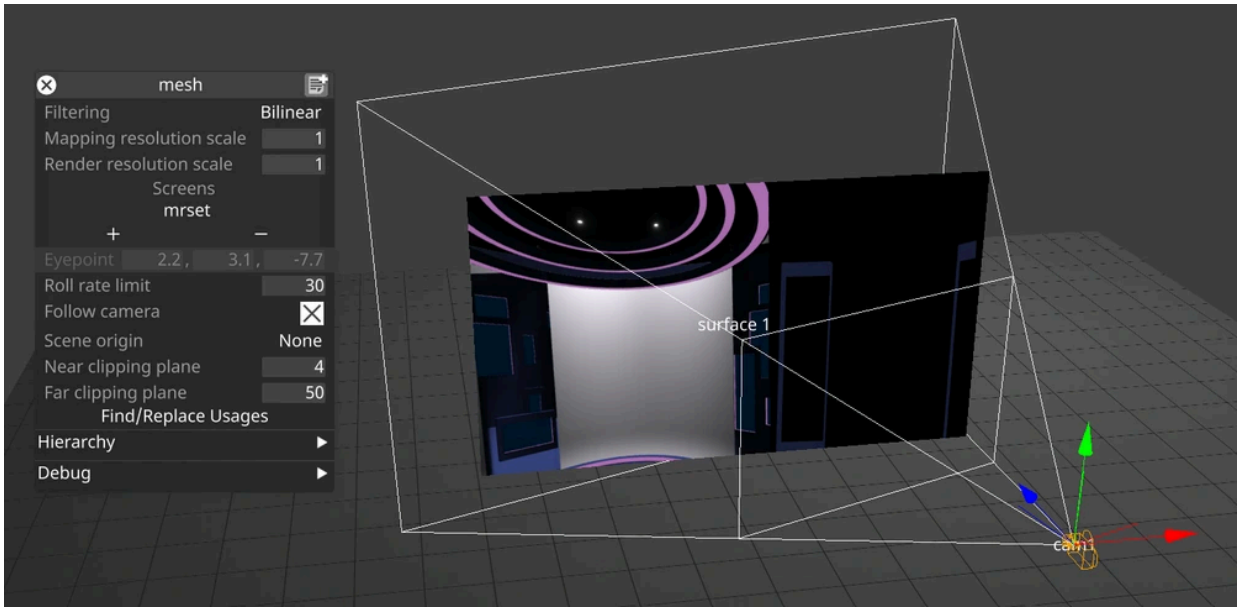
Following a camera

It is possible to set up a mesh mapping so that the eyepoint follows the position of a camera. This gives a mapping which adapts to the perspective of the camera like a Spatial or Camera Plate backplate mapping, but fills the whole screen rather than just the camera frustum.

> **Caution**
>
> Camera Plate and Spatial mappings use reprojection techniques to minimise perceived latency in the projected image. Mesh mapping doesn't do this, so it may appear to lag slightly when viewed through the camera, compared with these other mappings.

To set up a mesh mapping to follow a camera in an MR set:

1. Create an MR set, and add screens and a camera.
2. Create a mesh mapping and add the MR set to the list of screens. The mesh mapping will then automatically target the screens in the MR set.
3. The **Follow camera** field will appear in the mesh mapping editor. Tick this to make the eyepoint follow the camera position.
4. Alternatively, similar behaviour can be achieved by adding a camera to the list of screens in the mesh mapping, or by parenting the mesh mapping to any other object.



Mesh mapping following a camera

Troubleshooting

As the eyepoint moves around, the mesh mapping frustum can suddenly jump as it finds a more efficient way to bound the screen. This can cause blurriness or other artefacts in the rendered content. To compensate for this, set the **Roll rate limit** to reduce the speed at which the frustum is allowed to roll.

Moving the mesh mapping eyepoint can also result in sudden changes in focal length, which can cause blurriness if depth of field effects are enabled in the render engine (e.g. Unreal). Depth of field should not be enabled on cameras when using them for mesh mapping. Click here for instructions on how to do this in Unreal Engine.

Parallel Mapping

Parallel mapping projects content geometrically into the scene, as if virtually shooting content from an emitting rectangle. The mapped image does not increase in size the further away you go from the emitting rectangle. Instead, the image remains the same size, hence the term parallel.

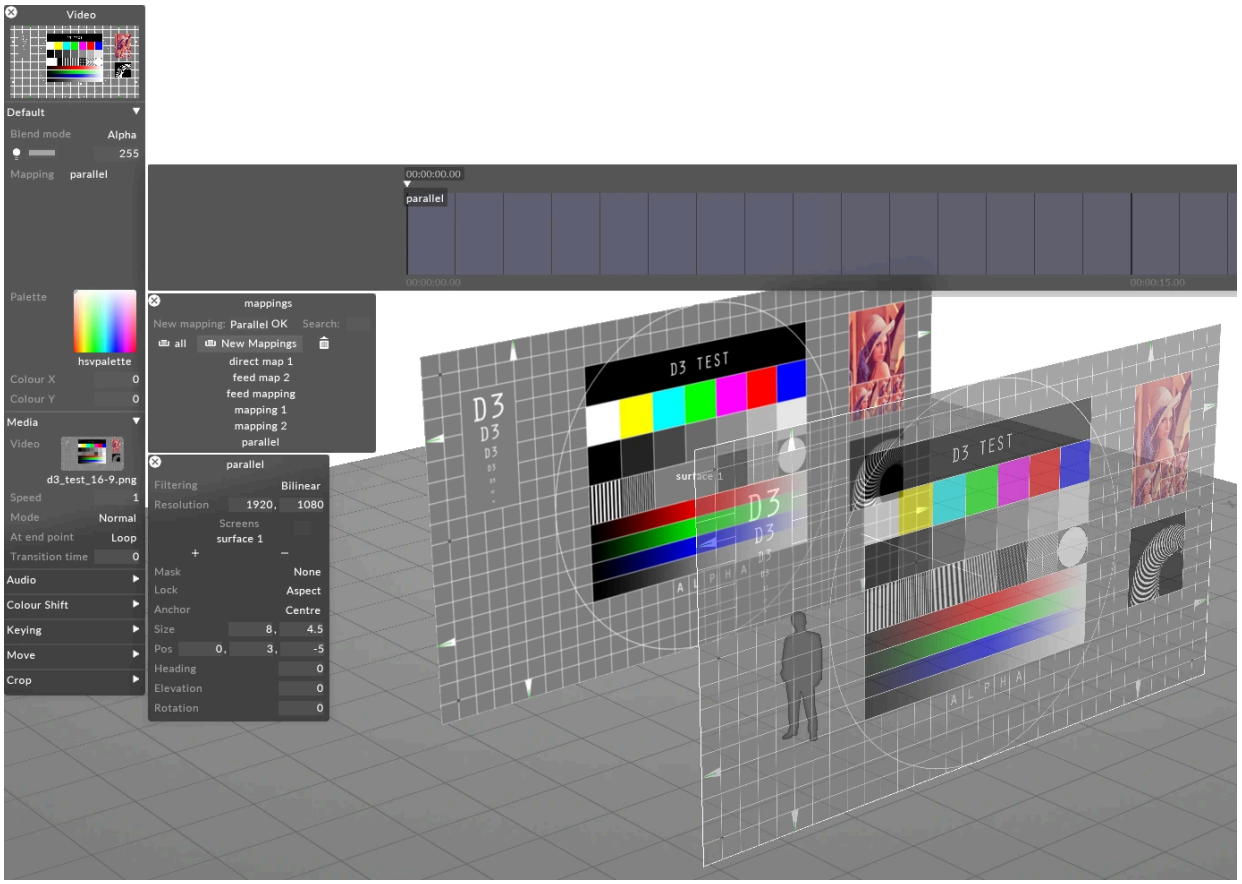
Parallel mapping will emit content over multiple screens and treat the configuration as a single canvas, projecting one unified image over all assigned surfaces. There is no more need to calculate the exact distance and pixel density of the empty space between screens, Designer will maintain the correct content sampling even across moving surfaces.



Parallel mapping is also very useful when you want to apply content onto moving screens. As long as Designer receives the correct tracking signal, the system will automatically map the content onto the moving screens. See more about screen tracking in the sub-chapter Motion control systems.

Parallel mapping is a versatile method for integrating multiple display technologies—including LED systems with varying pixel pitches, projection, and DMX-based lighting—into a unified canvas. Since Disguise represents all outputs as pixel-based surfaces, whether LED, projection, or DMX fixtures such as moving heads, it enables precise spatial alignment and seamless blending of these diverse display types within a single coordinate space.

> **Note**
>
> Parallel mapping may not be useful when the screens are facing awkward angles in relation to the emitting rectangle of the Parallel mapping. The more they rotate away from the emitting rectangle, the more stretched the pixels will be on the screens. Ideally, the Parallel mapping should be used for straight-facing rectangular screens. For low-res sculptural screens, this is however not a problem.



Creating a Parallel Mapping

1. In your track, create a new visual layer. These layer types can include content layers, generative layers, and effect layers.
2. Left-click on the layer in the track to open the Layer Editor on the left side of the GUI.
3. Under the Default tab, left-click on the Mapping parameter to display a list of the mappings in the project.
4. A manager titled mappings will appear - this is a list of all mappings within your project. By default, all screens will be populated with a direct mapping sharing the same name, and all cameras will be populated with a perspective mapping sharing the same name.

5. Type directly into the 'New mapping:' text field to create a new mapping. A list will appear prompting to you select the mapping type.

   [Animated GIF: Create mapping]

6. An editor with the user assigned name of the mapping will appear once a mapping type is selected.
7. Assign all screens that will be used for the mapping and enter the resolution of the content that will be displayed on the screens.
8. Edit the specific properties of the chosen mapping type.
9. Assign a piece of content to the layer in the track, and the content will be displayed on the assigned screens of the mapping in the stage and the feed output window.

When the Parallel mapping editor initially opens, and assuming that the screens have been added, Designer will colour the region outside the projected image red and will give you the location and orientation details of the image source.ce.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.s.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.

2. Left-click + to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Clip outside region

Clips pixels outside of rendered region, preserving existing colour. If not set, pixels outside the rendered region are set to the border colour.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Parallel Mapping Properties

Lock

For convenience while editing, the mapping can either maintain its aspect ratio, which changes vertical size or resolution when you change horizontal size or resolution, and vice versa. The pixel density, which changes the vertical or horizontal size when you change the vertical or horizontal resolution can also be locked.

> **Note**
>
> If the aspect or the density of the source content is not locked the Parallel mapping may project stretched pixels onto the screens

Anchor

This controls the anchor point around which the mapping surface moves, scales and rotates. Select either **centre** to specify the position of the centre of the projection image or select **corner** to specify the bottom left corner of the image.

Size

This controls the size of the mapped image, in meters (horizontal and vertical).

Angle mask start (°)

This sets the starting point of the visible texture projection, measured in degrees around the axis. For example, a start angle of 0 degrees would typically be the “front” or a predefined reference direction.

Angle mask end (°)

This sets the ending point of the visible texture projection. The texture will only be visible between the start and end angles.

Position

The position, in stage space (in metres) of the anchor point of the mapping source. This can be either the centre of the image or the bottom left corner of the image.

Heading

This controls the direction of the mapping in the horizontal space, in degrees. Increasing the angles will make the direction to rotate clockwise.

- 0 degrees points North (positive z axis direction)
- 90 degrees points West (negative x direction)
- 180 degrees points South (negative z direction)
- 270 degrees points East (positive x direction)

Elevation

This controls the vertical elevation, in degrees, of the projection direction: 0 degrees is horizontal (i.e. parallel to the floor), 90 degrees is straight up and 90 degrees is straight down.

Rotation

This controls the rotation of the image around the mapping axis, clockwise in degrees.

Content mode

This defines the mode of content, either 2D or 3D.

Frame of reference

This setting dictates how the projected texture behaves when your object or the camera moves.

This is set to **None** by default.

Using the Parallel mapping type

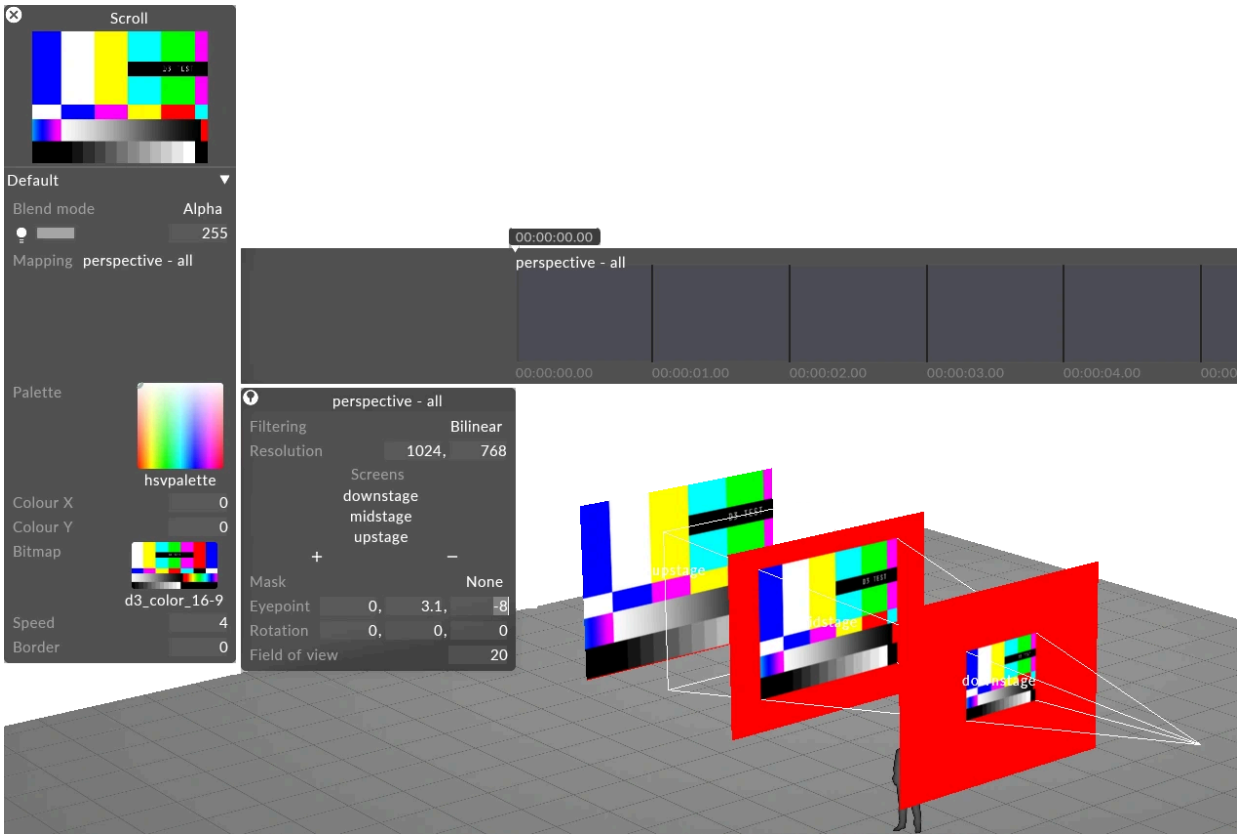
In addition to the property explanations provided above, it is important to:

1. Set the **aspect** property to **off** and set the resolution to match the resolution of the content intended to be used for this specific Parallel mapping.
2. Set the size of the emitting rectangle of the Parallel mapping to match the aspect of the resolution (and thereby the aspect of the content) and then set the aspect to **locked** . For example, if your content is 1920x1080, set the size to 19.2 10.8 and then set the aspect to **lock** . If the aspect or the density of the source content is not locked the Parallel mapping may project stretched pixels onto the screens.
3. Re-size the x or y coordinates to cover all areas of the screens (the red areas will gradually disappear as you re-size the emitting rectangle).
4. Make sure to specify content which has the same, or a slightly higher pixel density than the screen with the **highest** pixel density.

Perspective Mapping

Perspective mapping is similar to Parallel mapping, except that the content originates at an emitter point and gets larger in size as you go further away from the emitter, similar to a real projector. You can use Perspective mapping to make 2D content appear as 3D (not stereoscopic but rather as a 3D effect), but only from a specific point of view which is the same point as the position of the emitter.

Perspective mapping can map 3D content onto a surface from a specified vantage point of a virtual camera. This camera can be linked to a virtual camera in a generative software such as Notch to create an immersive 3D environment. The content being displayed by the mapping will begin emitting at the vantage point and get larger as that surfaces moves farther from it, similar to a real projector.



Perspective mapping type being used to project content onto three Screens, notice the content becomes larger as the Screens move further away from the emitter point

Creating a Perspective Mapping

1. **Add a New Layer**: In your track, create a new visual layer. This can be a content, generative, or effect layer.

2. **Open the Layer Editor**: Left-click on the newly added layer in the track. The Layer Editor will open on the left side of the interface.
3. **Access the Mapping Settings**: In the Default tab, left-click the Mapping parameter. A list of available mappings in your project will appear.
4. **View the Mapping Manager**: A panel titled Mappings will open. This displays all mappings in the project.

- By default, all screens have a direct mapping with matching names.
- All cameras have a perspective mapping with matching names.

5. **Create a New Mapping**: In the New Mapping field, type a name for your new mapping. A list of mapping types will appear, select **Perspective mapping**.
6. Open the Mapping Editor: After selecting a mapping type, an editor with your custom mapping name will open automatically.
7. **Configure Screen Assignments and Resolution**:

- Assign the screens that will use this mapping.
- Enter the resolution of the content that will be displayed on those screens.

8. **Edit Mapping Properties**: Adjust the specific settings related to the selected mapping type.
9. **Assign Content to the Layer**: Drag and drop a piece of content onto the layer in the track. The content will now appear on the assigned screens in both the Stage and Feed Output windows.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click + to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Perspective Mapping Properties

Eyepoint

The Eyepoint specifies the source point (emitting point) of the Perspective mapping.

Rotation

The Rotation parameter specifies the rotation of the frustum of the Perspective mapping (i.e. the aiming point of the Perspective mapping).

Field of view

Defines the field of view of the Perspective mapping, in degrees (i.e. the size of the mapping coverage).

Content outside frustum

Enabling this option prevents the texture from repeating (tiling) outside the projection area, instead stretching the edge pixels to fill the rest of the object's surface.

- Enable/Disable checkbox

Overscan

Overscan extends the texture projection beyond its original boundaries to prevent visual artifacts like black edges or seams at the projection's edge.

Content mode

This defines the mode of content, either 2D or 3D.

Frame of reference

This setting dictates how the projected texture behaves when your object or the camera moves.

This is set to **None** by default.

PreComps

A PreComp (or pre-composition) in Designer acts as a virtual screen for you to write content to which can then be used as an input to another effect or composition. It also provides an alternative to the arrowing system which was limited to a one to one input, whereas a PreComp can be many inputs to many sources.

Creating a PreComp

A PreComp is created like other textures in Designer such as masks, from the Textures menu, which can be accessed from any layer that utilizes a texture input. Like any other texture, once it is created, it will be stored in the Textures menu and can be used in other locations.

1. Create a new layer and select a layer type that has a **Texture source** property. The Bitmap layer is the simplest one to use.
2. In the new texture field, enter a name for your PreComp. Choose PreComp Texture as the texture type.
3. Set the desired resolution for the PreComp, just as you would do if this was a real, physical screen. This should correspond to the resolution of the screen it will be mapped to.



Creating a PreComp

Render to PreComps

Once you have created a PreComp, a new default Direct mapping will now be present in the Mappings Manager, allowing you to route content into the PreComp from a content layer.

1. Create a layer and left-click on the content layer in the timeline to open the layer's properties.
2. Set the layer to display the desired content.
3. Under the Mapping properties field, select the mapping with the same name as the newly created PreComp.

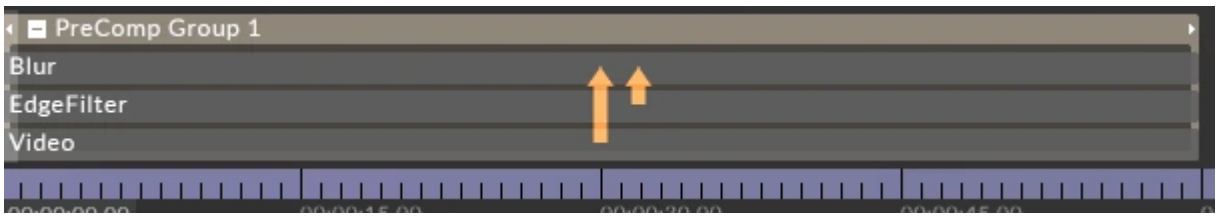
Now your layer is targeting the PreComp just like it would any screen in the project. PreComps can also be added to other mappings as if they were screens.

> **Note**
>
> A PreComp cannot be chained, i.e. a PreComp cannot feed into another PreComp.

Using PreComps as a source for an Effect Layer

The PreComp can be used as the Source texture input to an effect layer.

1. Create an Effect layer and position it above the source layers.
2. Set the Effect layer mapping to the screens the content will be shown on. **You may not select a mapping that targets another PreComp**.
3. Set the source layer mappings to target PreComp textures.
4. Set one or more source input fields on the effect layer to take the PreComp texture as input.
5. Once you do this you will see an orange arrow pointing from each layer rendering to a PreComp to the effect layer. This tells you your PreComps are configured correctly.



PreComp Stack

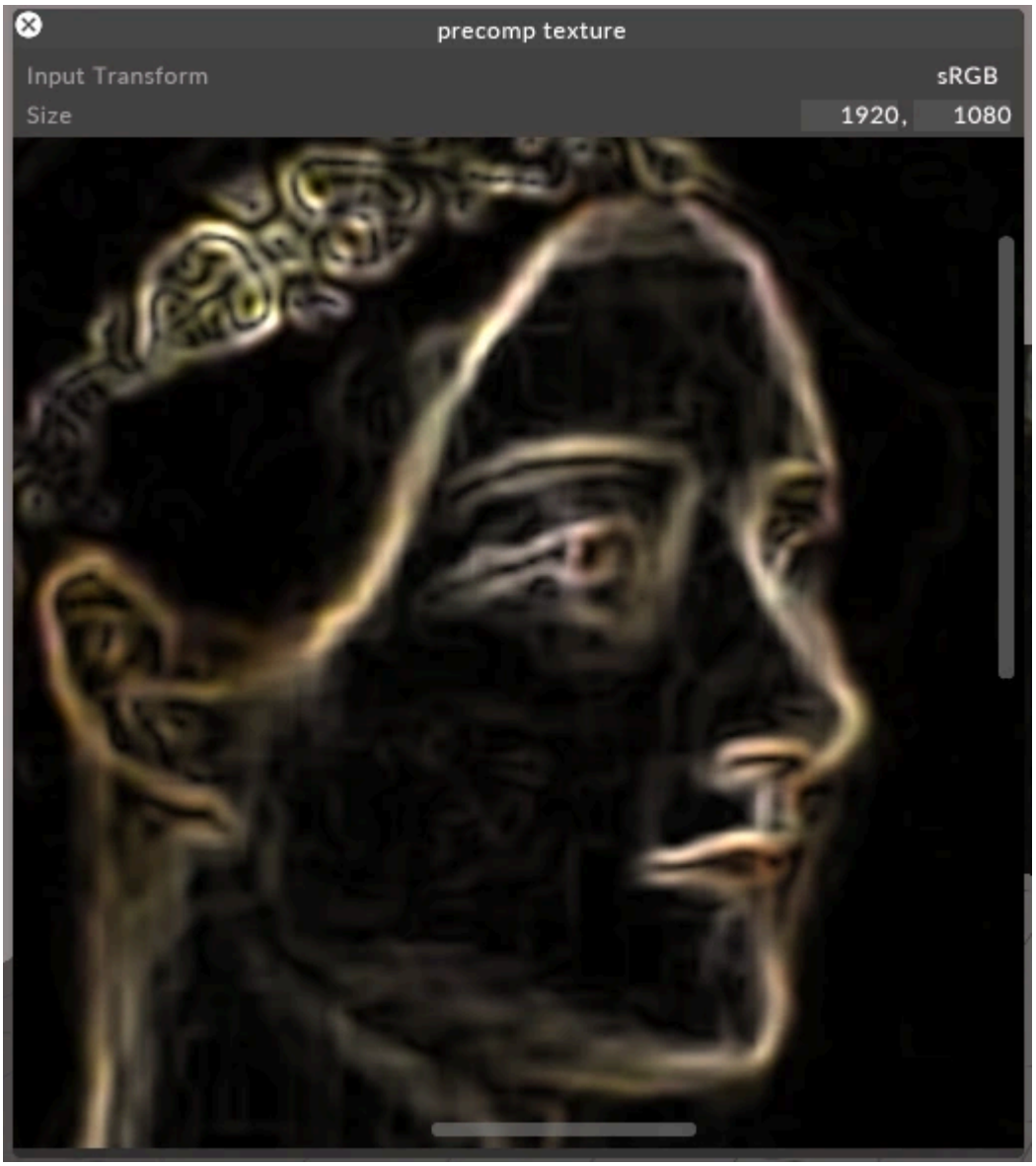
> **Note**
>
> **Please note**: The source layers that make up the PreComp have to be positioned under the Layer that is referencing the PreComp texture. The PreComp itself is a placeholder texture, so if you move elsewhere on the timeline and nothing is rendering to it, it will not have any content in it, and so the input to the effect layer will be empty.

Using PreComps in multiple tracks

Designer supports sharing PreComp textures between tracks. So long as one track has a layer targeting the PreComp under it's playhead, all other transports can utilize that PreComp. The tracks will composite to the PreComp in the same order they would to any screen, from bottom to top of the multi-transport.

Previewing a PreComp

1. Right-click on the thumbnail in the Layer properties window.
2. Use middle mouse button to pan around the expanded preview.

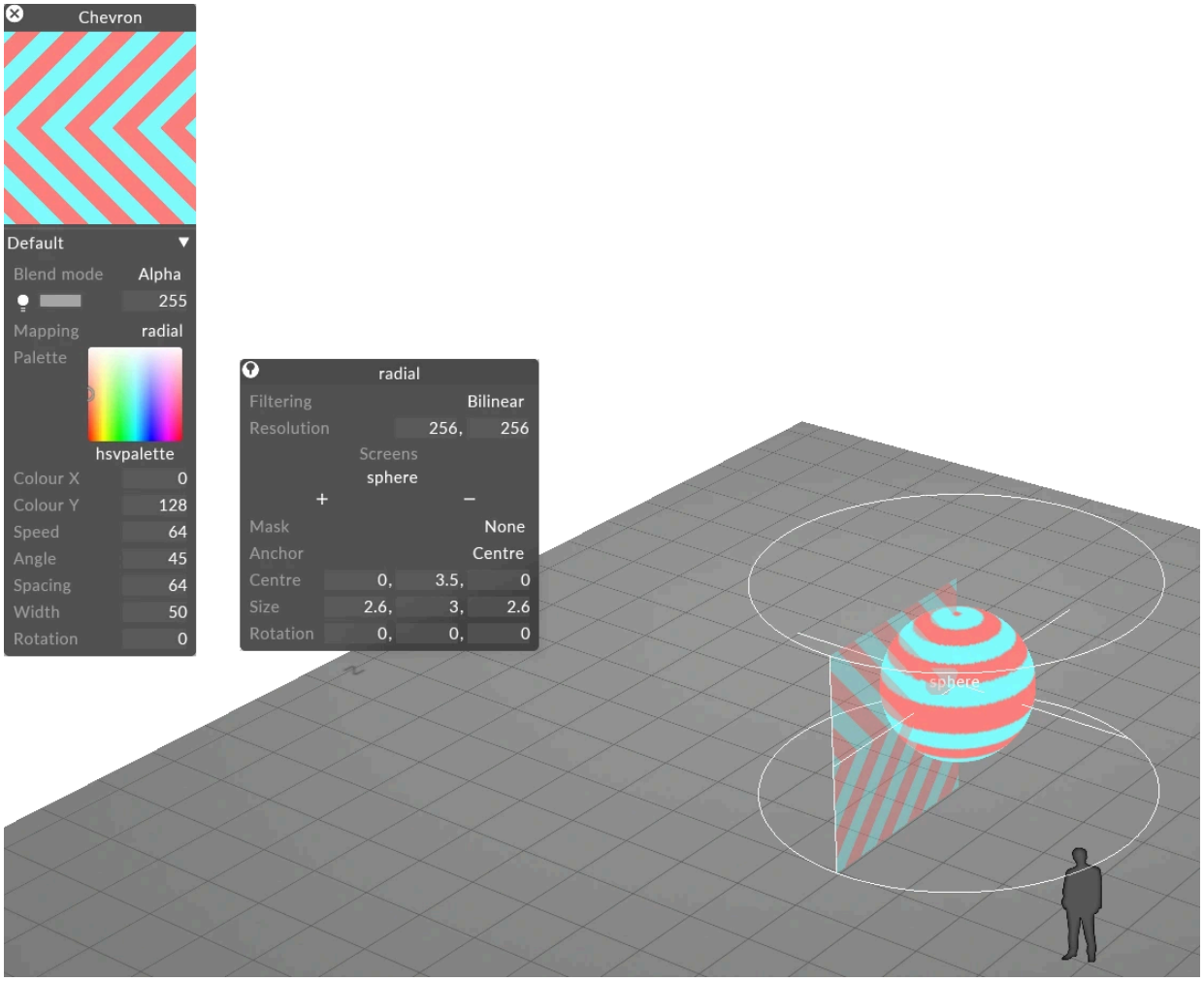


PreComp Texture Preview Interface

Radial Mapping

The Radial mapping is similar to the Cylindrical mapping type, except that the content surface runs from the central axis to the cylinder rim, rather than being wrapped around the outside of the cylinder. Any fixtures or pixels inside the cylinder will therefore be mapped according to their height within the cylinder (y coordinate) and their distance from the cylinders axis (x coordinate). Fixtures outside of the cylinder are not affected.

Radial mapping is similar to the Cylindrical mapping, except that the emitter surface runs from the central axis to the cylinder rim, rather than being wrapped around the outside of the cylinder. The pixels inside the cylinder will therefore be mapped according to their height within the cylinder and their distance from the central axis.



Radial mapping type is similar to Cylindrical mapping except that the content surface runs from the central axis to the cylinder rim

Creating a Radial Mapping

1. In your track, add a new visual layer. This can be a **content layer**, **generative layer**, or **effect layer**.
2. Left-click the new layer in the track to open the **Layer Editor**.
3. Under the **Default** tab, left-click the **Mapping** parameter to display the Mappings manager which list all of the mappings in the project. By default, all screens are assigned a **Direct mapping** with the same name. All cameras are assigned a **Perspective Mapping** with the same name.
4. In the **New Mapping** text field, add a name for your new mapping. A list will appear prompting to you select a mapping type.
5. Select Radial from the list. The Radial Mapping editor will appear.
6. In the **Mapping editor**, assign the screens to be used for the mapping, and specify the resolution of the content.
7. Adjust the mapping properties as needed.
8. Finally, assign a piece of content to the layer in your track. The content will be displayed on the **assigned screens** in both the stage and feed output window.w.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.

2. Left-click + to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Clip outside region

Clips pixels outside of rendered region, preserving existing colour. If not set, pixels outside the rendered region are set to the border colour.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Radial Mapping Properties

Anchor

Base point from which the scale of the Radial mapping has its origin.

- Centre
- Top
- Bottom

Position of the Radial mapping based on the centre point of the cylinder.

Position

The x, y, z position of the cylinder.

Rotation

The x, y, z rotation of the cylinder.

Size

The size of the Radial mapping. The x and z values represent the diameter of the cylinder.

Spatial Mapping

The Spatial map targets an MRset so it understands camera tally, and also allows for world offset between the d3 world and the content world.

The Spatial mapping was introduced for the AR & xR workflows, and allows for the camera's perspective and position to be relative to the virtual scene. The camera can travel around the 3D environment and accurately render it from any perspective.

Creating a Spatial Mapping

1. In your track, create a new visual layer. These layer types can include content layers, generative layers, and effect layers.
2. Left-click on the layer in the track to open the Layer Editor on the left side of the GUI.
3. Under the Default tab, left-click on the Mapping parameter to display a list of the mappings in the project.
4. A manager titled mappings will appear – this is a list of all mappings within your project. By default, all screens will be populated with a direct mapping sharing the same name, and all cameras will be populated with a perspective mapping sharing the same name.
5. Type directly into the New mapping: text field to create a new mapping. A list will appear prompting to you select the mapping type.

   [Animated GIF: alt text]

   An editor with the user assigned name of the mapping will appear once a mapping type is selected. Assign all screens that will be used for the mapping and enter the resolution of the content that will be displayed on the screens. Edit the specific properties of the chosen mapping type. Assign a piece of content to the layer in the track, and the content will be displayed on the assigned screens of the mapping in the stage and the feed output window.

Common Mapping Properties

This section explains the properties that are shared by the different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.

- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.
3. Left-click and drag the Screens listed in the mapping object editor to **-**. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Clip outside region

Clips pixels outside of rendered region, preserving existing colour. If not set, pixels outside the rendered region are set to the border colour.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Spatial Mapping Properties

Camera plate

Camera plate options include:

- Front Plate
- Back Plate
- Horizontal Back and Front Plates
- Front Plate Undistorted
- Back Plate Screens
- Back Plate Set Extension

Reprojection distance (m)

The reprojection distance in metres is a measure of the accuracy and real-world alignment of your virtual camera and the physical set. It indicates how closely the digital content is matching the real-world geometry from the camera's perspective.

Scene origin

This can be used to offset the origin of the 3D content from the Designer coordinate space, to modify the alignment of the scene relative to the screens.

Engine Camera possible

- Active camera: Default is **None**. Select the active camera.
- Camera offset: x, y z
- Camera rotation: x, y, z

Initial

Initial Origin

Defines the origin of the bounding box before any offset is applied.

Initial Rotation

Defines the rotation of the bounding box before any rotation is applied.

Initial Size

Defines the size of the bounding box before any scaling is applied.

Spherical Mapping

The Spherical Mapping projects content outwards from an eye point in all directions. It can be used with 3D modules to project a complete spatial render of a virtual scene, or with 2D content to emit equirectangular images and videos from the surface of a sphere. It works similarly to the Cylindrical mapping, except the top and bottom are 'pinched' to create a sphere.



Creating a Spherical Mapping

1. In your track, create a new visual layer. These layer types can include content layers, generative layers, and effect layers.
2. Left-click on the layer in the track to open the Layer Editor on the left side of the GUI.
3. Under the Default tab, left-click on the Mapping parameter to display a list of the mappings in the project.

4. A manager titled mappings will appear – this is a list of all mappings within your project. By default, all screens will be populated with a direct mapping sharing the same name, and all cameras will be populated with a perspective mapping sharing the same name.
5. Type directly into the New mapping: text field to create a new mapping. A list will appear prompting to you select the mapping type.

   [Animated GIF: Create]

6. An editor with the user-assigned name of the mapping will appear once a mapping type is selected.
7. Assign all screens that will be used for the mapping and enter the resolution of the content that will be displayed on the screens.
8. Edit the specific properties of the chosen mapping type.
9. Assign a piece of content to the layer in the track, and the content will be displayed on the assigned screens of the mapping in the stage and the feed output window.

Common Mapping Properties

This section explains the properties that are shared by the six different mapping types.

Filtering

- **Nearest**: Nearest neighbour filtering. Use nearest-neighbour sampling, to disable blending between pixels when scaling. Can be used to create pixellated looks, or to ensure hard edges on certain types of content.
- **Bilinear**: Bilinear filtering is a texture filtering method used to smooth textures when displayed larger or smaller than they actually are.
- **2x Multi-sample**: Multi-Sample filtering can help fix issues with scaled content, but can introduce some blurriness.

Resolution

This controls the canvas size the layer renders into, in pixels. The Direct mapping type starts with a 256x256 pixel canvas and automatically sets the canvas size to that of the first screen you add.

Screens

This is a list of screens that the selected mapping type can copy content to.

1. Left-click + to open the Screens manager.
2. Left-click **+** to add the Screens you want to map. This will copy the individual canvas content onto these three Screens simultaneously and will add the Screen names to the mapping object editor.

3. Left-click and drag the Screens listed in the mapping object editor to -. This will remove the canvas content from the Screens and delete the Screen names from the mapping object editor.

Mask

This points to the Texture file that defines a Mask bitmap. You can use this property to apply a Mask bitmap to the mapping canvas. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.

To apply a mapping mask you will need to create and import a custom still image file.

- The step-by-step instructions on how to create and import a custom Population mask can be used to create a custom mapping mask. The only difference is that the mapping masks resolution should be the same as the mapping canvas. For step-by-step instructions on how to create and import a Population mask into a d3 project visit to the section Population mask in the **Editing screens** sub-chapter.
- Alternatively, set any layers blend mode to **mask** to channel the layer content into the mapping mask.

Border Expansion

UV islands on screens are expanded by this many pixels to cover edge sampling artifacts such as black fringing. Note that there must be an equivalent amount of empty space in the screen UV map to take advantage of this.

Find/Replace Usages

Finds all usages of the current mapping in the project, and allows these to be replaced with an alternative mapping. Note that replacement only works for sequenced, non-sockpuppeted mappings.

Hierarchy

The hierarchy section allows the mapping to be set as a parent or child of another object, like any other object. See Object Overview for details.

Spherical Mapping Properties

Horizontal arc

Defines the angular arc that the horizontal dimension of the content is mapped over, in degrees. 360 maps over a whole sphere, 180 renders over half a sphere.

Vertical arc

Defines the angular arc that the vertical dimension of the content is mapped over, in degrees. 180 maps from the North to South poles, 90 maps from the North pole to the equator.

Projection mode

Defines the direction that the content is mapped, **Outwards** or **Inwards**. This can be thought of as a spherical equivalent of mirroring the content.

Content mode

This can be set to 2D or 3D. The 2D content mode treats whatever image it is receiving from the modules as an equirectangular image. The 3D content mode sends the required content viewpoints to 3D modules, updating based on the positional properties of the mapping, and then stitches together the returned content into a spherical image.

Padding

Only available for 3D content, padding is extra pixel data added around the edges of your texture map to prevent visual artifacts like seams and pinching, especially at the poles.

Overlap

Only available for 3D content, overlap renders extra content for each rendered viewpoint, blending the extra content to reduce the appearance of seams.

Frame of reference

This setting dictates how the projected texture behaves when your object or the camera moves.

This is set to **None** by default.

Avoiding seams in content

Rendering of the spherical content is achieved under the hood by rendering the 6 faces of a cube, then combining and warping them to the correct spherical output. Certain screen-space effects used when rendering the virtual scene can cause visible seams between the faces. See UE scene optimisation for tips on how to avoid this in Unreal Engine.

If some screen-space effects are required for creative reasons, it is possible to mitigate their effects and avoid seams by setting **Padding** and **Overlap** in the spherical mapping:

- **Padding**: This value sets a number of additional pixels which are rendered outside each face, then cut away when combining the faces. This can be used to mitigate effects such as blur which exhibit edge effects on the extremities of the rendered image.
- **Overlap**: This value also renders additional pixels outside each face, then smoothly blends between the pixels of adjoining faces on each edge. This reduces the appearance of seams between faces by smoothing over the join, so you don't get a hard line.

> ⚠ **Caution**
>
> Both padding and overlap will increase the render resolution of each face, and therefore will increase the GPU resources required to render the content. It is recommended to set these to the smallest values required to remove visible seams.

Create a ProSet Team CMDLet

What is a VLAN?

A Virtual Local Area Network (VLAN) is a virtual network adaptor that operates over a physical network interface, such as a 1Gb, 10Gb, 25Gb, or 100Gb Ethernet port found on the back of a Disguise media server.

VLANs allow a single switched network to be segmented into multiple virtual networks using tagging. This eliminates the need for separate physical networks for different use cases, improving efficiency and flexibility.

A typical set of VLANs configured for a Disguise media server in a production or live experience may include:

- **d3Net**
- **KVM Net**
- **Media Net**
- **Automation Net (PSN)**
- **NDI® Net**
- **Internet**
- **sACN/Artnet**
- **OSC/Control**
- **OmniCal**
- **PTZ Camera Control**
- **MGMT**

The distinct separation of each network allows devices in:

- d3Net to be set in a `192.0.X.X` range.
- Whilst Artnet/SACN being in the Common `2.X.X.X` or `10.X.X.X`.

Yet both exist on the same network interface.

As outlined in the initial example, network protocols have different requirements and network settings.

This allows all data to exist in a singular physical interface but be be routed by a network switch.

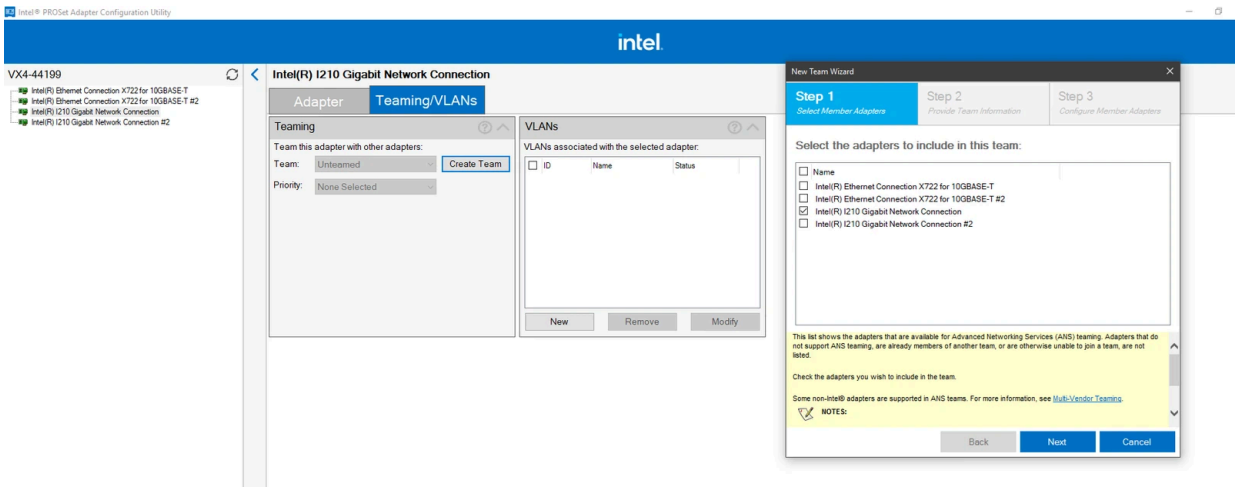
> **Note**
>
> OmniCal and Dante should be assigned to their own separate network interfaces. This ensures optimal performance and reduces the risk of network congestion or interference, which affects the precision and reliability of these systems.

Configuring VLANS and Teams

Within Disguise servers, VLANs can be created using different tools depending on the operating system:

- **Windows 10**: VLANs can be configured at the driver level using Intel PROSet.
- **Windows 11**: VLANs can be configured at the software OS level using Hyper-V.

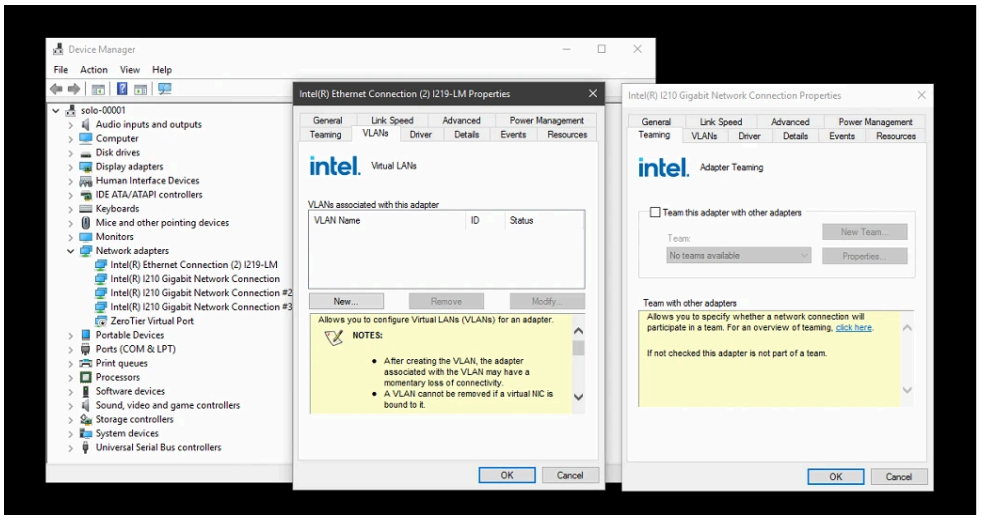
> ### Create PROSet Team Via GUI
>
> If your system supports the Intel PROSet GUI for Windows Device Manager, you can use its graphical interface to configure VLANs and NIC Teams easily.
>
> - **Sacrificial NIC**: At least one Intel integrated NIC or server-grade adapter must be part of the team to allow configuration. - You may notice X722 Network 10GB interfaces require the use of L210 network port to allow configuration via PROSet.
> - **VLAN Restrictions**: Ensure your switch supports the configured VLAN IDs and is set up accordingly.
>
> **Open the Intel PROSet GUI**:
>
> Machines such as the GX 2C/VX 1/2 have PROSet installed as an application



Intels PROSet interface

Older Servers such as the solo have PROSet built in to the NIC adaptor settings

- Launch Windows Device Manager.
- Navigate to the properties of an Intel-supported NIC.



Intels PROSet interface within devicemanager

2. **Create a Team**:
    - In the **Team/VLAN tab**, click on **Create Team**.
    - Select the adapters you want to include in the team. (X722 require an additional 1gb)
    - Choose a team mode (e.g., Adaptive Load Balancing, Static Link Aggregation). - Modes are outlined above the the guide.
3. **Configure VLANs**:
    - After creating the team, go to the TEAMEd interface and select the **VLANs tab**.
    - Scroll down and Select New Vlan
    - Click on **Add VLAN** and specify:
        - VLAN IDs (e.g., 10, 20, 30).
        - VLAN Name
    - Save your settings.

Create PROSet Team via CMDLETS

For systems without Intel PROSet GUI support (Intel X722), use the `IntelNetCmdlets` module to configure NIC Teams and VLANs.

Identify Adapters: Use the following command to list available adapters:

```
Get-IntelNetAdapter
```

Create a Team: Execute the command to create a NIC Team:

```
New-IntelNetTeam -TeamMemberNames "Adapter1", "Adapter2" -TeamMode AdaptiveLoadBalancing -TeamName "MyTeam"
```

Replace `Adapter1` and `Adapter2` with the actual adapter names obtained from `Get-IntelNetAdapter`.

Such as
`New-IntelNetTeam -TeamMemberNames "Intel(R) I210 Gigabit Network Connection","Intel(R) I210 Gigabit Network Connectior`

Check the team configuration:

Verify the Team:

```
Get-IntelNetTeam

**Set Team Properties (Optional)**:
Modify team settings using:
```powershell
Set-IntelNetTeam -TeamName "MyTeam" -Property "PropertyName" -Value "PropertyValue"
```

Steps to Create VLANs with PowerShell

Add VLANs to the Team: Use the `Add-IntelNetVLAN` cmdlet to create VLANs:

```
Add-IntelNetVLAN -ParentName "MyTeam" -VLANID 10,20,30
```

- Replace `"MyTeam"` with your team name.
- Replace `10,20,30` with the desired VLAN IDs.

View VLANs: Verify the VLAN configuration:

```
Get-IntelNetVLAN -ParentName "MyTeam"
```

Remove VLANs: Delete unwanted VLANs using:
```

```
Remove-IntelNetVLAN -ParentName "MyTeam" -VLANID 10

#### **Script Example for Automated Configuration**
Below is a sample PowerShell script to create a team and VLANs on Intel NICs:

```powershell
# Load IntelNetCmdlets module
Import-Module "C:\Program Files\Intel\Wired Networking\IntelNetCmdlets"

# List available adapters
Get-IntelNetAdapter

# Create a NIC team
New-IntelNetTeam -TeamMemberNames "Intel(R) Ethernet Connection X722 for 10GBASE-T", "Intel(R) I210 Gigabit Network Connect
ion" `
              -TeamMode AdaptiveLoadBalancing -TeamName "10GB_Team"

# Add VLANs to the team
Add-IntelNetVLAN -ParentName "10GB_Team" -VLANID 10,20,30,40

# Verify configuration
Get-IntelNetTeam
Get-IntelNetVLAN -ParentName "10GB_Team"
```
```

- **Sacrificial NIC**: At least one Intel integrated NIC or server-grade adapter must be part of the team to allow configuration.
- **VLAN Restrictions**: Ensure your switch supports the configured VLAN IDs and is set up accordingly.

This guide outlines both GUI and scripting methods, offering flexibility based on your system's capabilities.

▼ Details
>

Steps to Create VLANS with HYPER V

For Windows 11 Servers such as the RX3/EX2C/VX3

With Intel PROSet and Advanced Network Services (ANS) no longer supported on Windows 11, managing VLANs and network redundancy requires new workflows. This guide shows how to configure basic VLANs on Disguise media servers using Hyper-V and PowerShell.

Install Hyper-V

1. Open **Windows Features**:
   - Press `Win + S`, type **Windows Features**, and select **Turn Windows features on or off**.
2. Enable **Hyper-V**:
   - Check:
     - **Hyper-V Management Tools → Hyper-V Module for Windows PowerShell**
     - **Hyper-V Platform → Hyper-V Hypervisor**
3. Click **OK** and restart if prompted.

Identify Network Adapters**

To configure VLANs, you first need to identify the available network adapters.

1. Open PowerShell as Administrator.
2. Run the following command:

   ```
   GET-NETIPCONFIGURATION
   ```

   This will list all network adapters and# their details.

Example Output:

```
InterfaceAlias  : Ethernet 1
InterfaceIndex  : 4
IPAddress       : 192.168.1.100
...
```

Step 2: Create a Virtual Switch

Create a virtual switch in Hyper-V to route traffic through a specific network adapter.

1. Run the following command in PowerShell:

```
New-VMSwitch "disguise" -AllowManagementOS $true
```

   - Replace `"disguise"` with your desired switch name.
   - The `-AllowManagementOS $true` flag allows Windows to communicate through this switch.
2. When prompted, enter the name of the network adapter you identified in Step 1 (e.g., `Ethernet 1`).

> **Note**
> Do not attempt to assign multiple adapters to the switch. This can cause the setup to fail after a reboot.

Add a VLAN to the Virtual Switch

Now, create a VLAN on the newly created virtual switch.

1. Use this command:

```
Add-VMNetworkAdapter -ManagementOS -Name VLAN1-D3NET -SwitchName "disguise"
```

   - Replace `VLAN1-D3NET` with the desired VLAN name.
   - Replace `"disguise"` with the name of the virtual switch you created.

Hyper V Limitations and Considerations

No NIC Teaming: Windows 11 does not support NIC teaming, so redundancy for network port failure is not included. **Single Adapter**: Configure VLANs on only one adapter per virtual switch for stability. **Redundancy Options**: Consider using hardware redundancy with stacked switches.

By following this guide, you can successfully configure VLANs on a Disguise server using Windows 11.

OmniCal Networking

Disguise OmniCal is a calibration system designed to enhance projection mapping and screen alignment. It uses camera-based technology to:

- Automatically calibrate projectors using all visible physical surfaces.
- Correct for distortions and misalignments in projection.
- Allow flexible alignment, scaling and reshaping of projection surfaces.
- Ensure seamless visuals in complex setups, such as:
  - Large-scale projection mapping
  - Multi-projector configurations

OmniCal uses machine vision cameras that have specific requirements for network infrastructure. For more information, please refer to the detailed OmniCal Networking Guide.

RenderStream Networking

Disguise RenderStream is a protocol and technology developed to enable real-time streaming of rendering data between systems, such as media servers and rendering engines.

It is designed for synchronized, high-quality, and low-latency workflows, commonly used in applications like:

- Virtual production
- Live events
- Immersive experiences

Bandwidth Considerations

- RenderStream handles high-resolution, high-frame-rate content, including textures, video, and rendering data.
- Uncompressed data significantly increases bandwidth demands.

Uncompressed Streams: Require much higher bandwidth, especially for:

- High bit depths (e.g., 10-bit, 12-bit)

- Broad color gamuts and fidelity

Compressed Streams: Use codecs like H.264 or H.265 to reduce size while preserving quality, lowering bandwidth needs.

Hardware Considerations

- **Practical Throughput**:
  - Even with 100Gb Ports, actual throughput is typically around **80Gb** due to protocol overheads, error checking, and operational processes. Using the Assigner and predictions on workload traffic you can aim to calculate the expected throughput needed per workload.
- **Clustered Rendering**:
  - Distributing rendering tasks across multiple RX servers improves processing efficiency.
  - However, it also increases network traffic, which must be carefully managed to prevent bottlenecks

By using a structured and distributed system like **Fabric**, high-bandwidth, low-latency workflows become more manageable as this is included in our system designs, especially in complex rendering scenarios.

See RenderStream Networking Information

Create a VLAN with Hyper-V

For Windows 11 Servers such as the RX III/ EX 2C/ VX 3

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1. Open PowerShell as Administrator.
2. Run the following command:

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```

   This will list all network adapters and# their details.

Example Output:

```
InterfaceAlias  : Ethernet 1
InterfaceIndex  : 4
IPAddress       : 192.168.1.100
...
```

Create a Virtual Switch

Create a virtual switch in Hyper-V to route traffic through a specific network adapter.

1. Run the following command in PowerShell:

```
New-VMSwitch "disguise" -AllowManagementOS $true
```

   - Replace `"disguise"` with your desired switch name.
   - The `-AllowManagementOS $true` flag allows Windows to communicate through this switch.
2. When prompted, enter the name of the network adapter you identified in Step 1 (e.g., `Ethernet 1`).

> **Note**
>
> Do not attempt to assign multiple adapters to the switch. This can cause the setup to fail after a reboot.

Add a VLAN to the Virtual Switch

Now, create a VLAN on the newly created virtual switch.

1. Use this command:

```
Add-VMNetworkAdapter -ManagementOS -Name VLAN1-D3NET -SwitchName "disguise"
```

- Replace `VLAN1-D3NET` with the desired VLAN name.
- Replace `"disguise"` with the name of the virtual switch you created.

Hyper V Limitations and Considerations

- **No NIC Teaming**: Windows 11 does not support NIC teaming, so redundancy for network port failure is not included.
- **Single Adapter**: Configure VLANs on only one adapter per virtual switch for stability.
- **Redundancy Options**: Consider using hardware redundancy with stacked switches.

By following this guide, you can successfully configure VLANs on a Disguise server using Windows 11.

Troubleshooting: How to Prevent Hyper-V from Reserving Specific Ports

When Hyper-V is enabled on a Windows machine, it automatically reserves multiple port ranges within the dynamic port range upon startup. This can cause conflicts if Windows happens to reserve a port required by another application—such as port `56565`, the default PSN port needed for a d3 project.

Prerequisites

- You must be logged in as an Administrator.
- **Important**: Disabling and re-enabling Hyper-V usually requires a system restart. Please save any open work before proceeding.

How to exclude ports

1. **Open PowerShell as an Administrator.** Right-click the Start button and select Windows PowerShell (Admin) or Terminal (Admin).
2. **Check currently reserved ports.** Run the following command to see which UDP ports are already reserved:
   `netsh interface ipv4 show excludedportrange protocol=udp`
3. **Temporarily disable Hyper-V.** Run the command below to disable the hypervisor. (Note: You may be prompted to restart your computer here. If so, restart, then reopen PowerShell as Administrator to continue).
   `Disable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V-Hypervisor`
4. **Exclude your required port.** Run the following command to exclude your port.
   `netsh int ipv4 add excludedportrange protocol=udp startport=<port> numberofports=<number> store=persistent`
5. **Re-enable Hyper-V.** Once the port is successfully excluded, turn the hypervisor back on:
   `Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Hyper-V-Hypervisor`
6. **Restart your machine.** If you aren't automatically prompted to do so, restart your computer one final time to ensure Hyper-V is fully active and the new port rules have taken effect.

> **Note**
>
> In this example, we are setting startport=56565 and numberofports=1 to exclude exactly one port. Change these values if you need a different port or a wider range).

> **Tip**
>
> Once your computer has restarted, open PowerShell as an Administrator again and run the check command:
> `netsh interface ipv4 show excludedportrange protocol=udp`
>
> Look for your port (e.g., `56565`) in the list. It should appear with an asterisk (`*`) next to it, which indicates that it is a manually added, persistent exclusion.

Create a VLAN with PowerShell

Add VLANs to the Team:

Use the `Add-IntelNetVLAN` cmdlet to create VLANs:

```
Add-IntelNetVLAN -ParentName "MyTeam" -VLANID 10,20,30
```

- Replace `"MyTeam"` with your team name.
- Replace `10,20,30` with the desired VLAN IDs.

View VLANs**:

Verify the VLAN configuration:

```
Get-IntelNetVLAN -ParentName "MyTeam"
```

Remove VLANs:

Delete unwanted VLANs using:

```
Remove-IntelNetVLAN -ParentName "MyTeam" -VLANID 10

#### **Script Example for Automated Configuration**
Below is a sample PowerShell script to create a team and VLANs on Intel NICs:

```powershell
# Load IntelNetCmdlets module
Import-Module "C:\Program Files\Intel\Wired Networking\IntelNetCmdlets"

# List available adapters
Get-IntelNetAdapter

# Create a NIC team
New-IntelNetTeam -TeamMemberNames "Intel(R) Ethernet Connection X722 for 10GBASE
-T", "Intel(R) I210 Gigabit Network Connection" `
              -TeamMode AdaptiveLoadBalancing -TeamName "10GB_Team"

# Add VLANs to the team
Add-IntelNetVLAN -ParentName "10GB_Team" -VLANID 10,20,30,40

# Verify configuration
Get-IntelNetTeam
Get-IntelNetVLAN -ParentName "10GB_Team"
```
```

- **Sacrificial NIC**: At least one Intel integrated NIC or server-grade adapter must be part of the team to allow configuration.
- **VLAN Restrictions**: Ensure your switch supports the configured VLAN IDs and is set up accordingly.

This guide outlines both GUI and scripting methods, offering flexibility based on your system's capabilities.

d3Net Overview

Director/Actor operation allows you to sequence shows whose output requirements are greater than a single machines maximum.

The goal of Director/Actor operation is to allow you to sequence the entire show on a single machine (possibly a laptop) and then run the show on a network of machines. This network is called d3 Net.

There are 4 types of machine roles within a d3Net setup:

- **Director** - Director Machine
- **Actor** - Output Machine
- **Understudy** - Backup Machine
- **Editors** - Any machine used to edit the scene that doesn't have an output role (typically a PC or Laptop running Designer).

Only one Director is allowed on a network. Multiple Actors, Understudies and Editors are permitted.

Every Director & Actor is configured to output video to its assigned Feed scene. Please see the chapter Output Feeds for more information on Feed scenes. For example:

- The Director machine is outputting to 1 GUI monitor and 3 projectors.
- Actor 1 outputs to projectors 4,5,6,7, no GUI. Actor 2 outputs to projectors 8, 9.
- The understudy machine should not have any specific Feed scene assigned to it as it should be able to take over from any other machine.

The Director machine

A Director machine can either be Dedicated or Non-Dedicated. If a Director is not outputting to any screens other than the GUI, it should be set to Dedicated.

If a machine is Non-Dedicated, that means the machine controls all other Actors in the network but also outputs video through its remaining outputs. Dedicated means that the machine controls Actors, but does not output video to the stage; it is used only for visualisation and show sequencing.

The distinction is important because a Director that is Non-Dedicated will only play content destined for its output feed, the so called Feed Scene, for efficiency purposes. If you need to see all content in the visualiser, set the Director to Dedicated, or else ensure that all content in the project appears in the feed assigned to the Director.

Actor machines

Actor machines automatically follow the Director machine's timeline, regardless of what the Director is doing. Therefore, there is no need to input any MIDI timecode (or any other external trigger signal) to the Actors; the Director is responsible for passing these on.

If an Actor relies on external automation signals or audio inputs, you will need to ensure that these signals are also sent to the machines; at present the Director will not distribute these signals automatically. The same is true for live video signals.

Understudy machines

Designating a machine as an Understudy allows it to take over from any machine in the network if that machine fails, including the Director machine. The Understudy can be set to do this automatically or manually. It can also send a matrix present command to a matrix as it replaces the other machine. This can be useful for shows that need to run unattended but cope with potential machine failure.

Editors

MultiEdit allows multiple people to edit a project simultaneously, without manually merging projects. Edits from each Editor are propagated to all other machines via the Director in real time. Each editor machine can work on a different track, or on different regions of the same track, at the same time; Editors can also take control of the Director timeline position and control the stage.

Distributing signals

- The Understudy machine should also receive MIDI timecode or any other external trigger signal that the Director receives, in case it is needed to replace the Director machine.
- If controlling the timeline with DMX, there is no need to split the DMX signal to any other machine other than the Director's understudy - d3Net will automatically send the correct frames to all other machines.
- If you are recieving tracking data from a tracking or automation system, you should send that data to all machines in the network.
- If inputting SDI, split and distribute the SDI signal to all servers in the network.
- If inputting MIDI from a control surface such as the BCF2000, split the signal into all servers.

Redundancy

Redundant networking strategies can be implemented on the network architecture being used to host d3Net. M-LAG is commonly used to enable two or more network switches to appear

as a single logical device, and enables d3Net to still flow through the other active links in the event of network switch failure. MC-LAG can also be used with d3Net to provides redundancy at the switch level, so if one switch in the MC-LAG fails then the other switch continues to function without interruption. We strongly recommend testing this functionality before applying it to a show environment, and setting up monitoring tools and/or push notifications to observe the behaviour of the switches.

In the event of failure on the network architecture being used to host d3Net, all Actor machines running in the session will continue to output from their current position on the playhead. d3Net will reestablish a connection to any machines running in session once the network is restored.

Disguise System Network Configuration

Within the Disguise Ecosystem, live shows can increase in complexity and require large amounts of integration with third-party systems. The information below outlines workflows and best practices developed by our dedicated show support teams and freelancer community.

Creating a robust, efficient, and secure network infrastructure is a critical aspect of designing a show system. Disguise Video System designers often need to integrate with a wide variety of devices and technologies. A well-planned network ensures flexibility, precise control, and smooth collaboration across different teams and equipment.

When designing a system, careful consideration should be given to traffic management and access permissions. For example, guest stage engineers might not need access to NDA-protected content on the content network, while lighting engineers may require access to camera streams or internet connectivity. Balancing these requirements is key to ensuring a secure and streamlined operation.

Given that Disguise machines, as part of a video infrastructure, typically utilise large network traffic, especially with protocols like ST2110 or Consistent Media Transfers, it is important to accommodate their significant data demands.

Fast, stable, and secure connections are the cornerstone of effective network design.

What Can Go Wrong in shows?

1. Physical Failures: Network cables are susceptible to physical damage (e.g., tripping hazards, accidental unplugging, or wear and tear). Redundant cabling ensures continuity if a primary cable fails.
2. Seamless Failover: With properly configured redundancy (e.g., using LACP or failover policies), the transition between primary and secondary cables can occur without interruption, ensuring event continuity.

Utilizing both VLANing and teaming, along with switch stacking, can help mitigate risks and enhance network resilience in the event of issues.

Below, we outline some of the major network types and their use cases within a live show environment.

Key Networks in a Show System

In the tables below, there is a brief description of a range of common network devices you will most likely encounter in a larger Disguise system.

This information provides an outline of each use case and bandwidth considerations.

1. d3Net

Aspect	Details
Purpose	*Facilitates communication between Disguise machines and editors.*
Traffic	*Low, but speed is crucial (1Gb/10Gb networking recommended).*
Requirements	*Dedicated network to ensure quick and reliable machine-to-machine communication.*

2. KVM Net

Aspect	Details
Purpose	*Supports KVM (keyboard, video, mouse) systems with high PoE requirements.*
Traffic	*High; can saturate a network switch backbone.*
Usage	*Often shared across departments or used locally in large installations.*

3. Media Net

Aspect	Details
Purpose	*Handles large video file transfers (200–300GB or more).*
Traffic	*Extremely high; 25Gb/100Gb networking or trunked 10Gb uplinks are ideal.*
Requirements	*Critical for time-sensitive file transfers, often shared with third-party designers.*

4. Automation Net (PSN)

Aspect	Details
Purpose	*Used for communication with automation systems.*
Traffic	*Low, but reliability is essential.*

Aspect	Details
Usage	*Typically shared with automation teams for precise control.*

5. NDI® Net

Aspect	Details
Purpose	*Manages multicast streams like NDI® (Network Device Interface).*
Traffic	*Very high; a few 4K streams can saturate a 1Gb uplink.*
Requirements	*Requires a high-capacity network to support demanding video streams.*

6. Internet

Aspect	Details
Purpose	*Provides internet access for editors, utility equipment, and guests.*
Traffic	*Variable, depending on usage.*
Access Control	*Often restricted for Disguise machines to maintain security.*

7. sACN/Artnet

Aspect	Details
Purpose	*Shares data with lighting systems.*
Traffic	*Moderate to high; up to 64 universes (100Mb traffic).*
Characteristics	*Traffic can be spammy; requires careful management.*

8. OSC/Control

Aspect	Details
Purpose	*Facilitates control interfaces for lighting, stage management, iPads, and other devices.*
Traffic	*Low (TCP/UDP messages).*

Aspect	Details
Requirements	*Needs visibility across all connected networks.*

9. OmniCal

Aspect	Details
Purpose	*Supports the Omnical calibration system.*
Traffic	*Moderate but complex; best kept on a separate network.*
Usage	*Requires precise communication for accurate calibration.*

10. PTZ Camera Control

Aspect	Details
Purpose	*Manages pan-tilt-zoom camera systems.*
Traffic	*Similar to other control networks.*
Usage	*Can often share resources with OSC or control networks.*

11. MGMT (Management)

Aspect	Details
Purpose	*Provides access to network switches and third-party devices.*
Traffic	*Low; primarily used for configuration and monitoring.*
Requirements	*Best kept secure and separate to avoid interference.*

12. RenderStream

Aspect	Details
Purpose	*Used for Disguise communication and streaming with rendering engines.*
Traffic	*High bandwidth for uncompressed streams; lower with reduced bit depth and frame rates.*
Requirements	*25Gb/100Gb fibre recommended for uncompressed streams, typically using Disguise Fabric.*

d3Net Backbone

d3Net is a core component of Disguise's infrastructure, serving as the backbone for networked communication within a Disguise session. It plays a crucial role in synchronising

multiple Disguise servers, ensuring frame-accurate playback across a connected system.

d3Net enables:

- Remote communication between Disguise media servers. (Launch, Quit, Reboot etc.)
- Remote display management.
- Timeline and playback synchronisation.
- Failover and redundancy.
- Resource Transport to keep the project state in-sync between editors, actors, understudies and directors.
- Content synchronisation within Disguise.
- Renderstream workload control (Launch, Stop etc.)
- Multi-editor workflows.

d3Net must be configured to enable all Disguise servers and editors to access the same d3Net network. We suggest keeping the d3Net isolated from other networks to ensure seamless communication between all machines and to prevent any surrounding network issues from affecting Disguise operation. This also means that after a re-image, network settings can be recreated quickly, and as a result, network issues are simpler to debug and support.

Read more about d3Net on the d3Net Overview page.

Disguise System Network Configuration Guide

Recommended Practice

We have created a guide to networking recommended practice with Disguise systems which includes the following information:

- An Introduction to Disguise System Network Configuration
- What can go wrong in Shows?
- Key networks in a Show System
  - d3Net
  - KVM Net
  - Media Net
  - Automation Net (PSN)
  - NDI® Net
  - Internet
  - sACN/Artnet
  - OSC/Control
  - OmniCal
  - PTZ Camera Control
  - MGMT (Management)
  - RenderStream
- d3Net Backbone
  - NMOS
- Hardware Design
  - Server Storage and Ports
    - GX 3+
    - VX 1 / VX 2/ VX 4
    - GX 3 / VX 2+ / VX 3 / VX 4+
    - EX 2C / EX 3+ / RX III
    - GX 1 / GX 2 / GX 2C
    - Solo (Base)
    - RX / RX II

- Teaming
  - What is Teaming?
  - Common Teaming Modes
    - Active Load Balancing(ALB)
    - Static Link Aggregation (SLA)
    - Dynamic Link Aggregation (LACP)
    - Switch-Independent
    - Failover)
  - Implementing Redundancy at a Hardware Switch Level
  - What is Switch Stacking?
  - Advantages Over LACP
- VLAN
- Create a VLAN with Hyper-V
- Create a VLAN with PowerShell
- OmniCal Networking
- RenderStream Networking

Failover

Failover is the mechanism by which Understudies can take over from other machines in the network if a machine should fail. Failover can be triggered in 4 different ways:

- Automatically when a machine times out (For more information on automatic failover see Failover Timeout)
- Manually by a remote transport command
- Manually by a button in the Session widget
- Via the Failover API

Failing over a machine

Manual failover

Manual failover of a machine to its Understudy is conducted by pressing the **replace** button next to the machine that has failed.

> **Note**
>
> The replace buttons will only be visible when the replace action is available, i.e. the understudy is online, targeting the machine and has not already replaced another machine. For example, if the director has been replaced, the director will no longer be able to send failover commands.

What happens when I press replace?

The machine being replaced is now “failed”. The understudy replacing the failed machine will take on the characteristics of the failed machine, including role and feeds. If matrix routing has been configured, the understudy will automatically send the routing commands to the matrix to switch outputs from the failed machine to the Understudy. Matrix routing is sent as soon as the Understudy has been configured for its new role.

Designer cannot know why the machine has been replaced or assume to know what the failure condition might be. Designer therefore ignores any communication with the failed machine as it can’t make assumptions about its current state. No further communication from the failed machine is accepted by the rest of the session while it is marked as failed.

The failed machine is instructed to stop sending out any network data, but depending on how the machine failed Designer cannot guarantee that message will be received and acted upon; for example a networking related failure.

Failover and live update

Live update is the d3net network layer responsible for the distribution of showfile edits to all machines in session.

During failover live update is disconnected on the machine that failed to prevent it from sending or receiving edits while it's in a bad state.

> **Note**
>
> Restoring any machine does NOT reconnect Live Update for the previously failed machine. Live Update will remain disconnected for any machines until the project is launched anew in to the session.

Actors and Directors have different live update behaviours when failed over.

Actor failover and live update

When an actor is failed over, live update is disabled on that machine. The understudy that takes over for it is still in the live update session and continues to receive edits as normal.

Director failover and live update

When a dedicated or non-dedicated director is failed over, live update is disabled on that machine and for all machines in session. This is because the director is responsible for marshalling all the live update data in the session, and if it's in a bad state an understudy can't reliably take over this responsibility.

All edits made on any machine will no longer be transfered to any other machine in the session until the session is restarted. As such these edits should be avoided until live update can be reconnected.

Restoring after failover

Previously replaced machines can be restored to their original role by pressing "restore" next to the machine in the Session widget.

> **Warning**
>
> Live Update will not be restored. See details here

When can I restore a failed machine?

What happens between pressing replace and restore will depend on the nature of the failure. Depending on the circumstances in which the failover occurred, it may be possible to restore

without re-launching Designer on the failed machine, after re-launching Designer on the failed machine, or rebooting the machine. It is recommended to turn the server off and on again before restoring if there is any doubt as to the state of the machine.

What happens when I press restore?

The Understudy relinquishes its assumed role, and is reconfigured back as an Understudy. It then sends the matrix routing command (if matrix routing is configured) to switch the outputs back to the restored machine.

If edits are made on the acting Director and then the replaced machine is brought back into session, any edits already made on the acting Director will be synchronised to the machine joining the session as part of project sync. This will ONLY be the changes as captured at that moment in time.

Considerations and recommendations

In the scenario where an understudy is targeting multiple machines and has replaced a machine, Disguise does not recommend restoring back to the failed machine mid-show unless there is a good reason to do so, for example if another machine fails and you now need the understudy to replace that.

The act of reconfiguring a machine role and sending matrix commands over the network is additional work outside of normal show operation in a system which potentially is already non-normal, and is therefore not something recommended unless required.

If appropriate, the failed machine can be investigated, fixed and brought back into session, but remain as replaced until there comes a need for the understudy to take over another role. Should the need come, the returned machine can be restored and the newly failed machine replaced. Any scenario in which this would be needed is incredibly rare.

Hardware Network Design

Disguise servers typically follow the standard of a couple of 1Gb/10Gb network ports consisting largely of general Cat 5e/Cat 6e ports and a higher bandwidth fibre 25Gb/100Gb SFP set of ports in newer systems.

This configuration typically provides 2 lower bandwidth network ports and 2 higher bandwidth network ports, ensuring a balanced and efficient network setup.

Inside our operating systems, this is usually labelled as:

- **A - D3NET** (typically found on a 1Gb port)
- **B - ARTNET** (typically found on a 1Gb port)
- **C - MEDIANET** (typically found on a 10/25/100Gb port)
- **D - MGMT** (typically found on a 1Gb port or internal use)

Some servers have:

- E 25/100Gb (Typically allocated for Content / RenderStream)
- F 25/100Gb (Typically allocated for Content / RenderStream)

This means most servers have 4 Ports available, with some having 6 ports

Our modern systems currently follow higher bandwidth NIC Design and no longer have default IP names.

- **10Gb - 1**
- **10Gb - 2**
- **100Gb -3**
- **100Gb - 4**

This should encapsulate most simple show scenarios, providing high speed backbones for media content, and general access for both Disguise d3Net and general art-net uses.

Some users additionally choose to deploy ‘utility’ computers in racks, which host things like network management pages and remote management interfaces, this reduces traffic on the core d3 network where possible.

Server Storage and Ports

The following tables show port and storage options by server type.

VX1 / VX2 / VX4

Option	Storage	Ports
1GB	✓	1 User 1 SMC
10GB	✓	2
25GB	✓	2

GX 3+

Option	Storage	Ports
1GB	✓	1 SMC
10GB	✓	4
100GB	✓	2

GX 3 / VX 2+ / VX 3 VX 4+

Option	Storage	Ports
1GB	✓	1 User 1 SMC
10GB	✓	2
100GB	✓	2

EX 2C / EX 3+ / RX III

Option	Storage	Ports
10GB	✓	2
100GB	✓	2
SMC	✓	1

GX 1 / GX 2 / GX 2C

Option	Storage	Ports
1GB	✓	2

Option	Storage	Ports
10GB	✓	2

Solo (Base)

Option	Storage	Ports
1GB	✓	4

RX / RX II

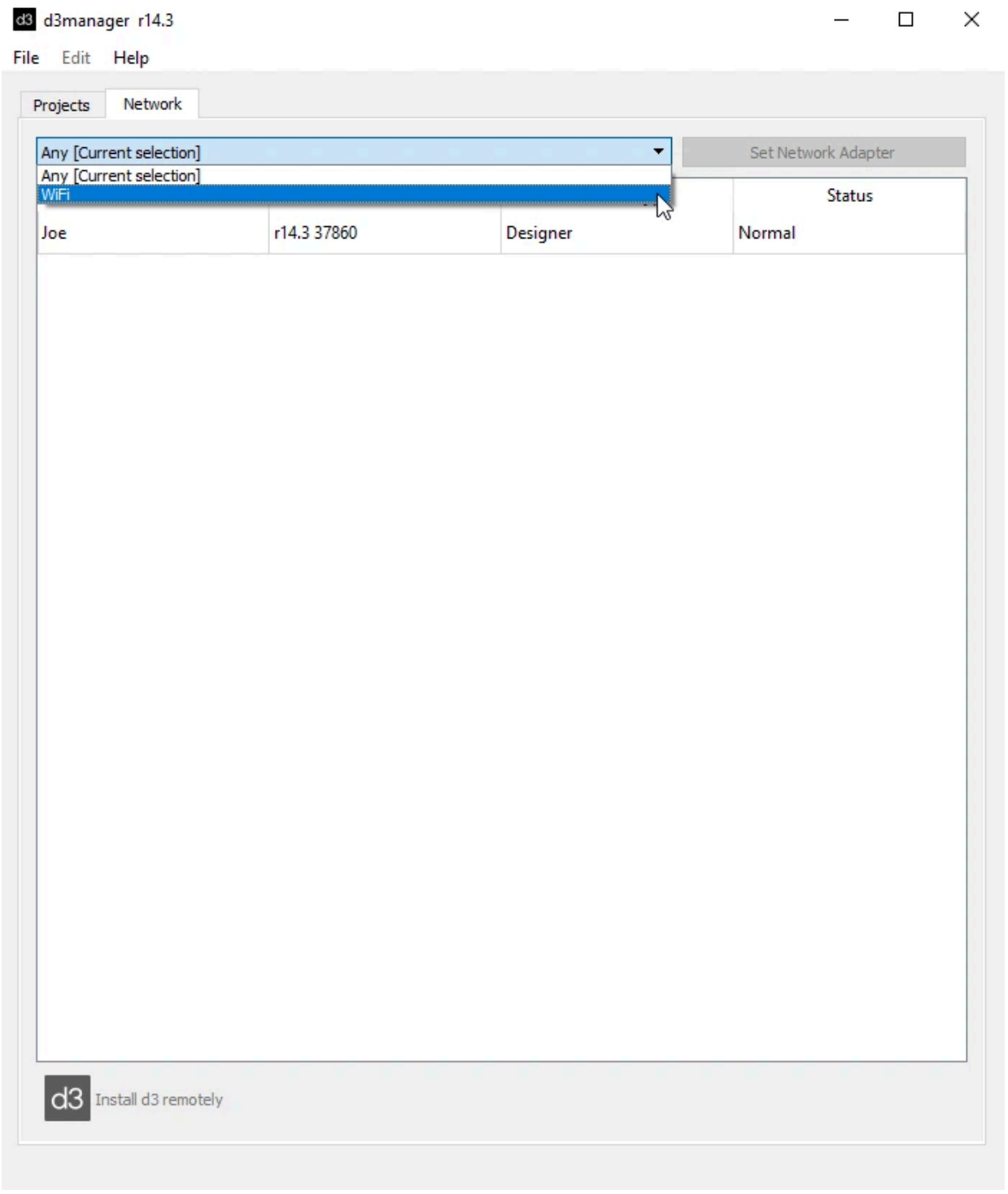
Option	Storage	Ports
10GB	✓	2
1GB	✓	2
25GB	✓	2

Network Adaptor

It may be necessary to manually assign a network adaptor to Designer in complex network scenarios, or with machines that have multiple network connections.

This can be done in d3Manager before starting a project. Selecting a network adaptor will then ensure d3Net always uses that connector.

To select the adaptor, choose it from the dropdown list and then click the **Set Network adaptor** button. Once you have selected a network adaptor, Designer will prompt you to restart your machine.


d3manager r14.3
File
Edit
Help
Projects
Network
Any [Current selection]
Any [Current selection]
WiFi
Set Network Adapter
Status
Joe
r14.3 37860
Designer
Normal
Install d3 remotely

Network Ports and Activity

Networking is a very important part of any Disguise system. Servers need to be in constant communication with each other and also with third-party software and hardware products. A well-configured network can save time and money on-site. To help our users configure their networks more effectively to run Disguise systems, here we will provide a general overview of how Designer and other Disguise systems communicate both internally and externally over a network.

Designer internal communication

Multiple computers running the same project on the same network are referred to as “In Session”. While in session, these servers are in constant network communication with each other. To facilitate this network communication we use both TCP and UDP transport layer protocols.

Disguise systems primarily rely on TCP (Transmission Control Protocol) for most d3Net communications. TCP ensures reliable, ordered, and error-checked delivery of data between applications running on hosts communicating over an IP network. This protocol is well-suited for the majority of d3Net functionality, where data integrity is crucial.

For timing-critical operations Disguise systems employ UDP (User Datagram Protocol). UDP is low latency and lower overhead compared to TCP. In Disguise systems UDP is used for:

- QTP (Quantized Time Protocol) messages in non-genlocked sessions (port 7542 and 7543)
- VSync messages in genlocked sessions (port 7968)
- Network time sync between machines (port 7892)

Quality of Service (QoS) Recommendation

In a managed network environment, it’s highly recommended to assign a high Quality of Service (QoS) priority to the UDP sync messages that Designer relies upon. This ensures that these critical timing packets are given preferential treatment in the network, minimizing latency and jitter. By prioritizing these sync messages, you can maintain tight synchronization between Disguise machines, which is essential for seamless multi-machine playback and output.

Tracking Systems and UDP

Tracking systems, which provide real-time positional data for objects or performers in a live environment, typically use UDP for data transmission. This choice is made for similar reasons as our sync packets:

1. **Low latency**: UDP’s lightweight nature allows for faster data transmission, crucial for real-time tracking.

2. **High frequency updates**: Tracking systems often send updates many times per second, making UDP's lower overhead beneficial.
3. **Tolerance for packet loss**: In tracking scenarios, getting the most recent data quickly is often more important than ensuring every packet arrives.

Given the critical nature of tracking data in many Disguise workflows, it's recommended to treat these UDP packets with the same high priority as our sync messages in your network configuration. This means:

- Assigning high QoS priority to the UDP ports used by your tracking system.
- Ensuring minimal network hops between the tracking system and Disguise machines.
- Monitoring and minimizing network congestion on the paths used by tracking data.

By prioritizing tracking system UDP traffic alongside Disguise sync messages, you can ensure the most responsive and accurate real-time tracking integration in your projects.

OmniCal network usage

The Disguise OmniCal system requires local network communication between the Director (or Solo) server and the machine vision cameras on a separate isolated network for exclusive use of GigEVision streaming. It also uses three ports for internal server communication between the Designer process and our camera capture application `VimbaCamServer`. These ports are only active if OmniCal is in use, i.e. any of the OmniCal windows are open on the Director.

For more information please see the OmniCal Networking Guide.

Network Ports and Activity

Below is a list of ports that Designer uses and a description of the activity we expect over that port.

Port	Protocol	Application	Description
80	TCP	d3nginx.exe	Web server, used for API commands (default, user configurable)
873	TCP	d3.exe	Used by rsync process spawned by Designer for project file synchronization between machines
3207	HTTP	d3.exe / nmos-node.exe	Used by Designer to send display updates to the NMOS node
3212	HTTP	nmos-node.exe	NMOS Node Query API
3215	HTTP	nmos-node.exe	NMOS Connection API
3216	HTTP	nmos-node.exe	NMOS Events API

Port	Protocol	Application	Description
3217	HTTP	nmos-node.exe	NMOS Events WS API
3218	HTTP	nmos-node.exe	NMOS Control API
3219	HTTP	nmos-node.exe	NMOS Channel Mapping API
4809	UDP	d3.exe	CITP service discovery
5568	UDP	d3.exe	sACN (streaming ACN)
5670	UDP Broadcast	Any d3Net application including RenderStream clients	Used by Designer for discovering new machines when joining a network
6454	UDP	d3.exe	Art-Net
7400	UDP	d3.exe	OSC output (default, user configurable)
7401	UDP	d3.exe	OSC input (default, user configurable)
7542	UDP Broadcast	d3.exe	Used for QTP (Quantized Time Protocol) messages
7543	UDP Broadcast	d3.exe	Used for QTP (Quantized Time Protocol) messages
7892	UDP Broadcast	d3.exe	Network time sync between machines
7968	UDP Broadcast	d3.exe	Used for VSync messages in genlocked sessions
8888	UDP Local	d3.exe	Used by Designer and spawned process for local communication with project file synchronization process
8889	UDP Local	d3.exe	Used by Designer and spawned process for local communication with project file synchronization process
9001	UDP Local	d3.exe	Used by Designer and spawned VimbaCamServer.exe process for local OmniCal discovery (OSC)
9864	TCP	d3.exe	Telnet JSON machine control (default, user configurable)
9993	TCP	rsync.exe	rsync daemon for project file synchronization (default, user configurable)
10101	UDP Local	d3.exe	Used by Designer and spawned VimbaCamServer.exe process for local OmniCal discovery (OSC)

Port	Protocol	Application	Description
10101	TCP Local	d3.exe	Used by Designer and spawned VimbaCamServer.exe process for local OmniCal communication
10102	TCP Local	d3.exe	Used by Designer and spawned VimbaCamServer.exe process for local OmniCal communication
10741	HTTP	nmos-node.exe	NMOS System API
49152-65535	TCP	d3.exe and other d3Net applications such as RenderStream clients	Used for d3Net functionality, dynamically negotiated and allocated
50500	UDP	RenderStream clients	Used for high bandwidth, uncompressed RenderStream video streams
50501	UDP	RenderStream clients	Used for compressed RenderStream video streams
54321	TCP	d3.exe	Remote transport controls (default, user configurable)
60668	TCP	d3.exe	CITP, spawns additional TCP connections on ports declared by connected CITP devices

In addition to the above, vendor specific protocols (such as tracking systems, matrix drivers, etc) may use additional ports. Disguise provides user configurable port numbers where possible and allowed by the protocol / SDK.

DNS-SD

Designer instances after r30.4 support DNS-SD discovery. This allows you to discover Designer instances on your network and connect to them, without prior knowledge of the hostname or port number. This includes access to both the Service and Session APIs. Learn more about the Discovery API in our **developer documentation**.

NDI®

NDI® is a network transport protocol for streaming video over the network. You can read more about it on the official **NDI® website**. Designer supports capturing NDI® streams as video inputs.

If you're using NDI® for video inputs, their SDK uses a variety of ports. See **NDI® Port usage** for more information.

Genlock and network time synchronisation

Starting in Designer version r28.0 Designer will broadcast and receive UDP messages over several different ports to maintain session-wide output synchronisation. Below is a summary of this behaviour:

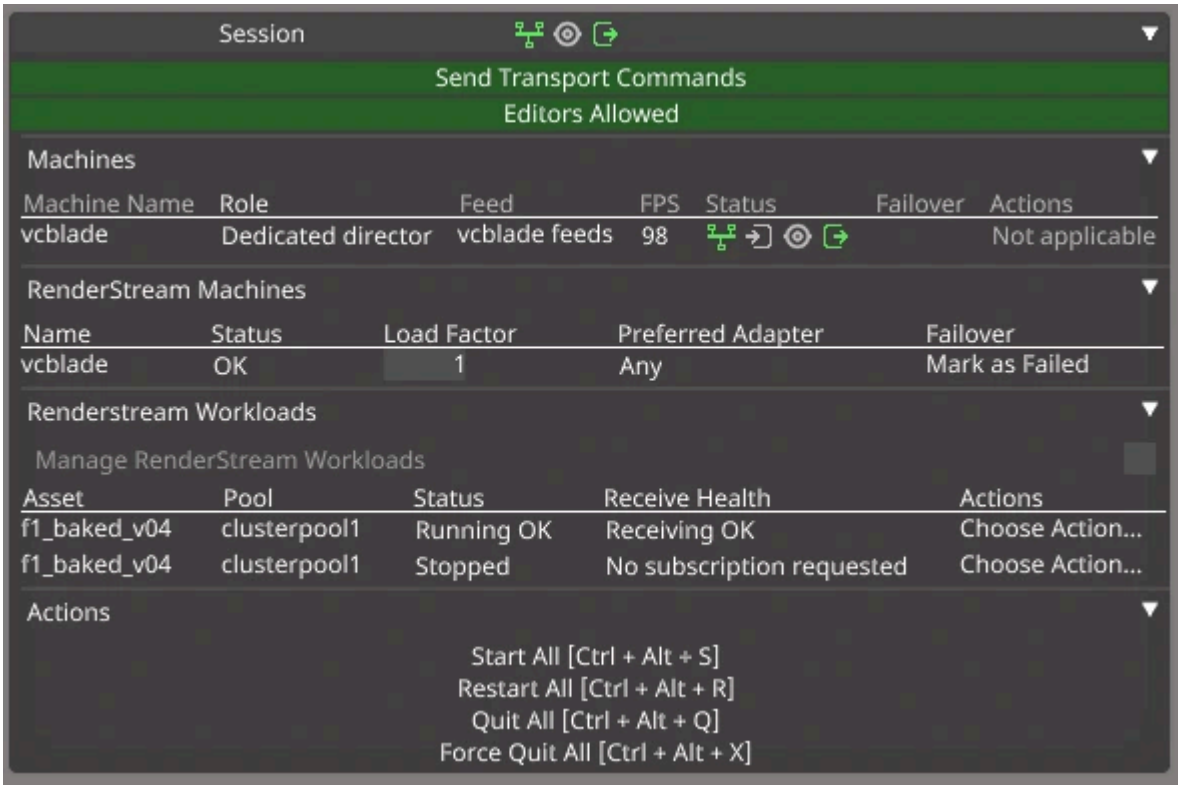
- **In non-genlocked sessions**: QTP messages are broadcast from the director on port 7542 and 7543.
- **In fully genlocked session**s: VSync messages are broadcast from the director on port 7968.
- **In partially genlocked sessions**: Both QTP (from director) and VSync (from first genlocked machine) messages are broadcast.
- To minimize network traffic, it's recommended to genlock all machines in the session.
- On larger networks, each machine should specify a specific network adapter in d3Manager rather than "Any" to avoid unnecessary broadcasts.

Network Status Widget

The Network Status widget monitors the status of the d3Net network, including RenderStream status and machine health.

The Network Status widget opens automatically when d3Net is configured.

Network Status Widget properties



Network Status Widget

Send Transport Commands

Toggles the ability for machines to start/stop playback on the tracks of other machines.

Editors Allowed

Toggles whether editors are allowed to join the session. It will not effect editors that are already in session.

Machines

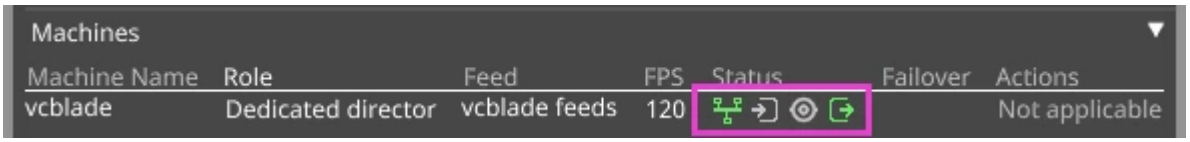
Lists all machines actively connected to the session and all actors and understudies specified in the d3net manager GUI even if they are offline. Each machine has 4 status icons which tell you about the status of that machine

Machine Status Icons

The Network Status Widget includes colour-coded status icons that indicate the status of the following for each machine (Icons listed in order from left to right):

- Network Status
- Devices Status
- Genlock Status
- Video Output Status

The Network, Genlock and Output icons are shown again at the top of the session widget at all times. These icons at the top summarise the statuses of all the machines.



Highlighted Machine Status Icons

These icons can be several colours which each represent the status of that aspect of the machine.

The colours are:

- Green: OK
- Orange: Warning
- Red: Error
- Blue: Busy
- Grey: Offline

The colour of the status icon is determined by the most important status of all the sub-statuses associated with that status icon.

You can hover over each status icon to see details of each sub-status that determines the colour of the status icon.

Network status icon

The network status icon indicates whether the machines can communicate with one another correctly over the network. It's colour is determined by up to 4 different sub-statuses:

Live update status:

This is the mechanism by which machines keep each other up-to-date with changes to the project file. The options it can have are:

Status	Description
Connected	Live update is running normally on this machine.
Director	Live update is running normally on this machine, and it's the director.
Not Connected	Live update has been intentionally disconnected. This is typically due to failover.
Blocked	This machine is unable to receive Live update changes; this could be due to a network error or due to a logic error in Designer (this state will also be accompanied by a large pop-up)
Director - Blocked	This machine is unable to receive Live update changes and it is the director, so no machines will be able to communicate live update changes.

Project sync status:

When Designer launches, the project is automatically copied from the director to all other machines. This can be in one of 4 states:

Status	Description
Succeeded	Project sync completed successfully.
Not Attempted	Project sync has not been initiated, but the machine is launching. This can be because project sync has been disabled with the `isSyncProjectFromDirectorDisabled` option switch.
Failed	Project sync has not been initiated, but the machine is launching. This can be because project sync has been disabled with the `isSyncProjectFromDirectorDisabled` option switch.
In Progress	Project sync is actively happening.

Transport control status:

This is the mechanism by which the playheads across multiple machines are kept in-sync with each other. This can be in one of 3 states:

Status	Description
In sync	Transport commands are being received regularly (at least once every 1/4 second).
Late	Transport commands are being received intermittently (at least once every second). This could indicate a network issue.

Status	Description
Out of sync	Transport commands have not been received for over 1 second. This could indicate a serious network issue or disconnect.

Remote status:

This indicates if all the other statuses have been updated recently for this machine or if you're looking at old data.

Status	Description
Up to date	The status you're looking at was updated in the last 2 seconds.
Stale	The status you're looking at was updated in the last 5 seconds.
Invalid	The status you're looking at has never been updated.
Offline	The status you're looking at was last updated more than 5 seconds ago.

Devices status icon

When the machine has started up, the devices status icon reflects whether or not each device capable of receiving data over the network is actively receiving that data. Mousing over the icon will list the devices and their statuses.

Each device configured to receive data has 2 possible statuses:

Status	Description
Receiving	This device is actively receiving data.
Idle	This device has not received data recently.

> **Note**
>
> OSC devices are not expected to constantly be receiving data so they always report that they are receiving as long as they are active.

Genlock status icon

The genlock status icon represents whether genlock is applied working correctly on each server. This has 4 possible statuses:

Status	Description
OK	Genlock is present and all connected outputs are genlocked.

Status	Description
Present, Not in use	Genlock is present but it is not all connected outputs have genlocked correctly, or genlock has not yet been applied.
Not present	A genlock signal cannot be detected.
Not supported	This machine does not support genlock (typical of editor laptops).

> **Note**
>
> The GUI head is not treated as a "connected output" for the purposes of this status icon, unless it is the only connected output.

Output status icon

The output status icon represents that status of your outputs from each server. It's colour is determined by up to 4 different sub-statuses:

Framelock: Whether or not the outputs of the machine are in-sync with each other.

Status	Description
OK	All output heads are presenting frames in sync with each other.
Out of sync	Outputs on the same machine are being presented at least more than 2ms out of sync with each other. This can be caused by genlock problems, outputs of differing resolution or other GPU issues.

Settings: Advanced project or machine settings which affect video output.

Status	Description
OK	No advanced project or machine settings that affect outputs are set.
Application window	`useApplicationWindow` is enabled. Outputs will not be in-sync and may not appear the way you expect.
Max heads limited	maxHeads is set to a value > 0. Some output heads may be disabled.
Windowed mode	`isWindowed` is enabled which means Designer won't be able to take Fullscreen which is required for synchronized outputs.

Status: When applying feeds the output icon is unreliable until the apply feeds process has completed, so it will turn blue.

Status	Description
Applying Feed Settings	Feed settings are currently being applied.

GUI: Whether the GUI is enabled or disabled on the machine. This is useful for troubleshooting performance problems on actors that should have their GUIs turned off.

Status	Description
GUI Off	The GUI is disabled.
GUI On	The GUI is enabled. On an actor this will appear Orange, on other machines this will appear Green.

RenderStream machines

Lists all render nodes visible to the session over d3net.

RenderStream Workload

Lists each RenderStream workload that this session has started and their current statuses.

Actions

Actions let you control all the machines in your session at once.

Networking Overview

Networking is essential for Disguise systems in most productions, enabling the key benefits in scalability and redundancy of the system. By connecting multiple servers together, Disguise enables users to handle larger projects and distribute processing power, allowing for easy expansion of capabilities as production demands grow. Simultaneously, this networked approach facilitates the implementation of failover systems, ensuring show continuity and minimizing the risk failures. These networking capabilities empower Disguise to deliver robust, scalable, and fault-tolerant solutions that can adapt to the most demanding show environments.

Disguise utilizes a proprietary networking system called d3Net, which allows for Director/Actor operation. This setup enables you to sequence shows whose output requirements exceed the capabilities of a single machine. With d3Net, you can design and sequence an entire show on one machine (such as a laptop) and then run it on a network of machines for the actual performance.

d3Net consists of different machine roles:

1. **Director**: The main control machine that manages the show and synchronizes all other machines.
2. **Actors**: Output machines that follow the Director's instructions and render content.
3. **Understudies**: Backup machines that can take over if any other machine fails.
4. **Editors**: Additional machines used for simultaneous project editing.

This networked approach offers several benefits:

- **Scalability**: Easily expand your setup to accommodate larger shows or more complex content.
- **Redundancy**: Implement backup systems to ensure show continuity in case of hardware failure.
- **Collaborative workflow**: Allow multiple team members to work on different aspects of the project simultaneously.
- **Distributed processing**: Spread the computational load across multiple machines for improved performance.

To fully leverage the power of networked Disguise servers, it's essential to set up your network correctly. This involves proper IP configuration, subnet management, and following best practices for network security and performance.

Network Configuration Recommended Practices

When setting up a network of Disguise media servers, it's crucial to follow recommended practices to ensure optimal performance and security. Here are the key points to consider:

1. **Set individual subnets for each interface**
   - Assign a unique subnet to each network interface on your media servers.
   - This helps in organising and isolating network traffic, improving overall network management.
2. **Set unique IP addresses for each machine**
   - Ensure that every machine in your network has a unique IP address, either via a static IP address or DHCP.
   - This prevents IP conflicts and allows for proper communication between devices.
3. **Ensure all machines are on the same subnet and can communicate via UDP and TCP on that subnet**
   - Ensure that all machines in your network can communicate with each other via UDP and TCP on the same subnet.
4. **Isolate d3Net traffic on a separate subnet**
   - If possible, isolate the d3Net traffic on a separate subnet from your other event networks.
   - This helps in preventing potential security risks and network congestion.

Network Isolation and Security:

Disguise is a media platform focussed on video playback and realtime rendering applications. If you need to use Disguise in a secure environment, please see Security, and for specific guidance on ports and firewalls, see this guide.

> **Note**
>
> Disguise will not provide support for, nor be liable for, any security issues arising from exposing these machines to public networks. Proceed with caution and at your own risk.

By following these guidelines, you can create a robust and secure network environment for your media servers, ensuring optimal performance while minimizing potential security risks.

NMOS in Disguise

Designer will now support using NMOS for ST 2110 video output from IP-VFC cards. We've taken the open source code solution developed by Sony named nmos-cpp and extended it to receive display updates from Designer when IP-VFC cards are outputting in ST 2110 format. This will run on each Disguise server when Designer runs to advertise the server as an NMOS node with each IP-VFC card an NMOS device and each ST 2110 stream an NMOS sender.

In summary, each Disguise server runs an NMOS node service that:

- Registers the server itself as an NMOS Node.
- Exposes each IP-VFC card as an NMOS Device.
- Publishes each ST 2110 stream as an NMOS Sender.
- Publishes each IP Video Capture instance as an NMOS Receiver for each machine in the session (e.g. if there are three machines, three NMOS Receivers will be seen for each IP Video to show that an ST 2110 stream can be received by any of those machines)

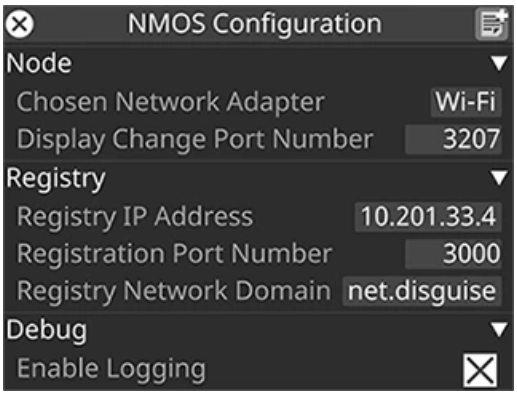
An active NMOS registry must be available on the network for node discovery and registration.

The NMOS Node, Device and Sender information sent to the registry will be presented according to the registry software, but it will look something like this:



Configuration

There's now an NMOS Configuration widget accessible from the d3 menu. This allows for specific NMOS registry details if the user wants to override the mDNS discovery.



Parameters

Chosen Network Adapter - This will be the network adapter that the NMOS node uses to communicate with the registry. It'll also use the IP address of this to advertise its APIs. If this is left blank, it will default to the user selected

network adapter in d3Manager.

Display Change Port Number - This is the port Designer uses to send the NMOS node updates in the display. It defaults to 3207 but can be changed if this clashes with something else.

Registry IP Address - If the NMOS node's auto discovery can't find the NMOS registry, or is connecting to a registry you don't want to use, this can be used to specify the IP address of the registry you want to use. If you want to use auto discovery, leave this empty.

Registration Port Number - Once the NMOS node finds the NMOS registry, it will register itself using the registration API. This will be on a specific port number. The default port of 3211 will be used, but depending which NMOS registry it is this can differ, so it can be set here.

Registry Network Domain - If the Disguise server is on a different domain to the registry it can be specified here. If you want to use auto discovery on the same domain, leave this empty.

Enable Logging - Used for debugging but off by default.

> **Note**
>
> After changing these values d3 needs to be restarted for them to take effect.

Troubleshooting

1. Check that the NMOS node is running and correctly configured:

- If the node is displaying the error *"An error occurred reading the nmos-config.json file"*, ensure that the file is in correct json format. If there's a comma missing, or a single quote " it will mean the whole file will be rejected. This file shouldn't be edited by users.
- The **nmos-node.exe** application is run by Designer on start up with the settings in the NMOS configuration widget. You can check various elements of this with a web browser by logging into the node's APIs.
- Check the node settings in a browser with `http://localhost:3209/settings/all/`.
  - If nothing comes up and it says the site can't be reached then either the node isn't running or the settings port has been changed from `3209` in the json config file.
  - If it does display the settings, ensure the registry_address and registration_port and domain are what you configured them to be in the NMOS configuration widget. If they aren't, restart Designer and they should be passed through on start up.
- Check that Designer is sending messages to the node in a web browser with `http://localhost:3207/displaychange/`.
  - The port number `3207` is configurable, so ensure this is correct in the NMOS Configuration widget.
  - If it says null or is empty the node hasn't received any updates from Designer yet.
    - This could be because it has no ST 2110 outputs. Make sure IP-VFC cards are in ST 2110 mode.
    - The IP-VFCs should also have a green border in the feed screen to indicate they're active and ready. If they don't, try applying feeds.
  - If it does have data it'll be the last message sent from Designer.
    - A field named **"last_update_date_time"** will show when it received this message.
    - It will also show the **"hostname"** it came from. This message should only ever be sent from Designer running on the same machine as the node.
    - It will include a list of NMOS devices, which in this case are IP-VFC cards. Each card can have up to four ports which equate to NMOS senders

- Check the node API is advertising its data correctly in a web browser with `http://localhost:3212/x-nmos/node/`
  - This will show the possible schema versions it's on. By default we use the latest, v1.3
  - After selecting the version you'll see all the device, flow, sender, receiver and source data it's storing.
  - Using `http://localhost:3212/x-nmos/node/v1.3/self/` will show the endpoints it's advertising to the registry.
- Check the SDP file in a web browser with `http://localhost:3215/x-nmos/connection/v1.1/single/senders/<sender id>/transportfile`
  - The `sender id` will look like this `803d9129-0000-1000-a000-401175c00600`. The second digit, in this case `0`, is the port number of the IP-VFC card and the last 12 characters are the IP-VFC's first mac address. The other numbers will always be the same.
  - The SDP file is a text based configuration file so it's human readable. You'll see properties like these which should match the current output of your IP-VFC card: `width=3840; height=2160; exactframerate=60; sampling=YCbCr-4:2:2; depth=10; colorimetry=BT709;`
  - For more detail on what's expected in these files, see https://en.wikipedia.org/wiki/Session_Description_Protocol

2. NMOS Registry not discovered

- Verify that an NMOS registry service is running and reachable on the network.
- Confirm that mDNS is permitted across your network. If mDNS is blocked, specify the registry's IP address and registration port manually in the NMOS Configuration widget and restart Designer.
- Check firewall rules on both the registry host and the Disguise server to ensure the correct ports are open.
- The NMOS settings for auto discovery should have a registry_address of `0.0.0.0` and a domain of `local.`. If these fields are empty in the NMOS Configuration widget, the node will default to these.

3. Node not appearing in registry

- Are you using ST 2110 video output or input? This could either be with IPVFC cards or IP Video In. The node will only be created in NMOS once there's a device to advertise.
- Check that the node is running correctly first following the instructions in step 1.
- Ensure the correct Chosen Network Adapter is selected. If left blank, it defaults to the adapter selected in d3Manager, which may not be on the registry subnet.
- If neither the Chosen Network Adapter or the User Selected network adapter in d3Manager are set, the node will advertise itself on all network adapters on that machine. This can have mixed results, as the registry may detect it more than once and become confused about where it's running. Setting a Chosen Network Adapter will prevent this.
- Confirm that the Registration Port Number matches the registry's API port.
- Restart d3 after changing configuration settings.

4. NMOS Senders missing or inactive

- Verify that the IP-VFC card is correctly configured for ST 2110 output in Designer
- It will have an NMOS sender for every active VFC port, so if it's in Quad mode in Designer there will be four corresponding NMOS senders
- Make sure all ports in Designer have a green background in the feeds screen. If they don't, try applying feeds

5. Streams appear but do not connect

- Confirm PTP synchronization is running correctly on the network. Without PTP lock, ST 2110 senders may register but not pass valid video
- Verify multicast routes are configured correctly on the switch.

NMOS specification coverage

IS-04 - Discovery and Registration

- The NMOS node application will run with Designer and connect to an NMOS registry on the network either by multicast DNS “Auto” discovery or to a specific IP Address and registration port number set in the NMOS configuration widget
- The NMOS node will advertise all Designer’s ST 2110 video senders and receivers
  - each Disguise server will be listed as an NMOS node
  - within that node each IP-VFC card will be listed as an NMOS device
  - each IP-VFC port set to output ST 2110 video will be listed as an NMOS sender
  - if Designer is using IP Video Capture it will create an NMOS device named IP Video Capture
  - under this each IP Video Capture instance will be listed as an NMOS receiver. If they’re created from a sender’s SDP file they’ll use the sender name in their own label. If they’re created with no SDP file they’ll advertise themselves as being capable of receiving a wide range of display properties to allow any NMOS sender to connect to them

IS-05 - Device Connection Management

- The NMOS node will propagate its local device information to the NMOS registry and connections can be made between senders and receivers on the network
- The node has a Connection API which the registry can push updates to
  - If it receives a request from a sender to connect to an IP Video Capture instance it will pass the SDP file contents to Designer, making it immediately ready to use as a logical video input that can be mapped accordingly
  - If it receives a request from a receiver to subscribe to a senders output and the request contains multicast IP addresses these will be sent to Designer to update those address on the IP-VFC card. Note that although you’ll see the values change in the VFC port editor, you’ll still need to apply feeds to actually push them to the card itself
- Also, if an IP Video Capture instance is created from an SDP url or from selecting a sender from the NMOS sender list, it will update the connection API on the node to propagate to the registry and the node of the sending device

Schema versions

- The NMOS node can support various schema versions depending on the schemas used by the NMOS registry
- Supported registry query schemas: v1.2 and v1.3
- Supported IS-04 schema: v1.2 and v1.3
- Supported IS-05 schema: v1.0 and v1.1

OmniCal Networking

Disguise OmniCal is a calibration system designed to enhance projection mapping and screen alignment. It uses camera-based technology to:

- Automatically calibrate projectors using all visible physical surfaces.
- Correct for distortions and misalignments in projection.
- Allow flexible alignment, scaling and reshaping of projection surfaces.
- Ensure seamless visuals in complex setups, such as:
  - Large-scale projection mapping
  - Multi-projector configurations

OmniCal uses machine vision cameras that have specific requirements for network infrastructure.

Further information

For more information about setting up OmniCal networks, please refer to the detailed OmniCal Networking Guide.

For information about used network ports, please see Network ports and activity.

Output Sync Test

Understanding Output Synchronisation

Output synchronisation ensures that multiple outputs from a Disguise server, and outputs from multiple servers, render in perfect alignment. It is essential for delivering a seamless visual experience, particularly in live events and XR applications.

When servers are not correctly synchronised this will often appear as tearing as illustrated in the image below:



Tearing between two outputs as viewed on a screen

Understanding the two key methods for achieving output synchronisation is important. These are Framelock and Genlock.

Additionally, if issues arise, it is crucial to follow a precise and scientific testing methodology to ensure accurate troubleshooting.

Key Components

- **Framelock**:A GPU-based mechanism that synchronises individual outputs within the same server to prevent visual inconsistencies. See the Network Status Widget page.

- **Genlock**: A synchronisation method that aligns multiple devices to a shared clock source, enabling coordination between Disguise servers and external equipment such as cameras and LED displays. See the Genlock Configuration page.

Testing Methodology

Disguise offers a few simple, easy and effective methods to test output synchronisation, troubleshoot issues, and ensure a flawless performance

Disguise Network Widget

Next to each server in the Network Status Widget there are indicators for Network Status, Genlock Status and Framelock Status. You can hover over each icon to see the sub-status that determines it's colour. All these status icons should be green in a correctly synchronised system.

The Network Status icon will indicate several statuses. The one most relevant to output synchronisation is "Transport control status". This must be "In sync" to ensure output synchronisation.

Server FPS

In the bottom right-hand side of the Designer GUI you will see the current FPS of each server in your cluster. If any of these values are not at the target refresh rate this means that that server is "dropping frames" because it is working too hard to keep up. While dropping frames, outputs will not be synchronised.

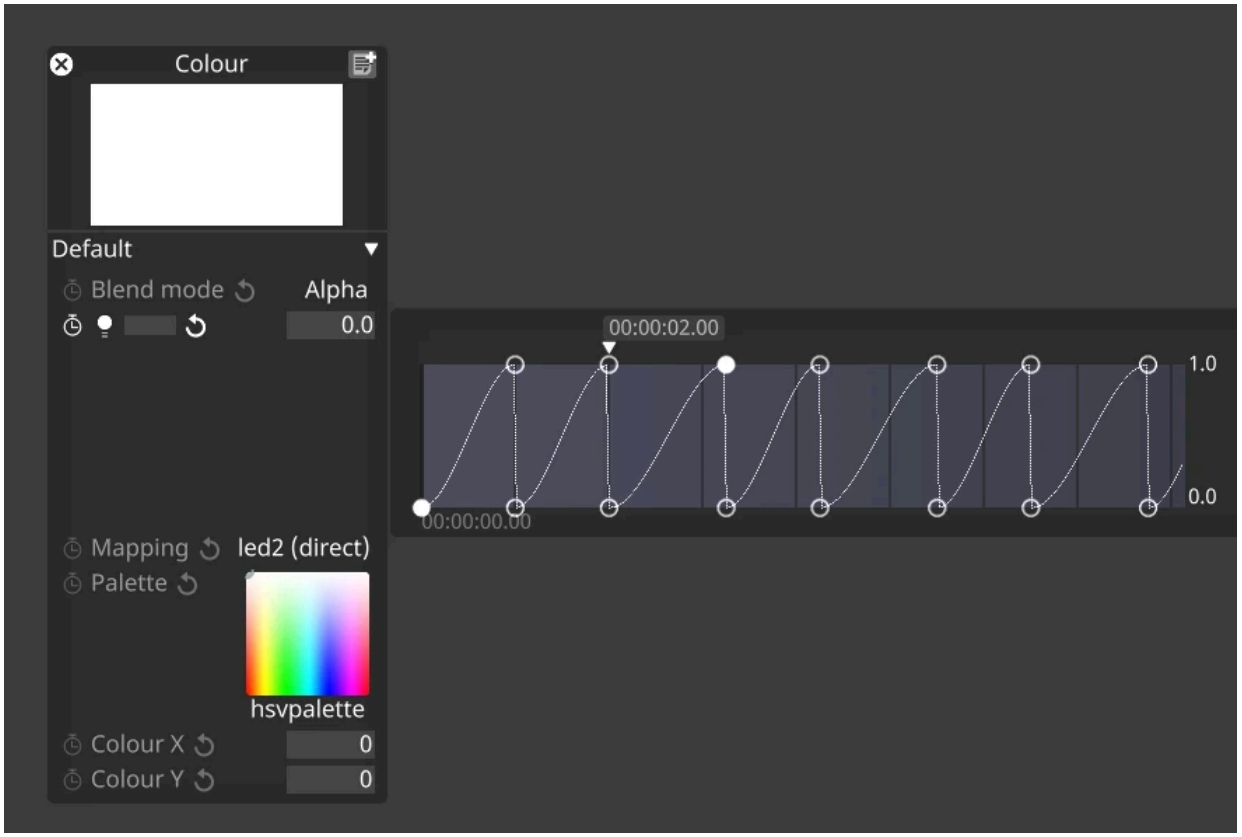
You can hover over any FPS value to see which server it is referring to. You can also see a list of swerver FPS values in the Network Status Widget.

Basic Colour Layer Test

This test can be used to eliminate variables outside of the XR workflow and verify that a simple shape is outputted across all outputs of a server and additionally check upstream systems such as LED Processors.

To run the Basic Colour Layer Test:

Create a simple colour layer with a keyframe of brightness repeating up and down.



When the output is directed to a range of monitors, it demonstrates the Disguise system's capability to synchronise video playback. However, if the video appears out of sync across multiple machines, it could indicate an improper Genlock configuration."

Reducing Variables

To ensure synchronisation, every device in the chain must be Genlocked or Framelocked. If the Disguise system can output video in sync to 2, 3, or 4 LED monitors, but issues like tearing or out-of-sync playback occur when connected to your XR stage or LED processors it indicates that either a converter or an LED processor is not correctly Genlocked. By reducing the number of converters and variables, we can identify which device is not correctly configured.

Performing due diligence here will help validate the core video architecture in your system before moving on to advanced workflows.

XR Workflow Testing

Once video playback has been guaranteed as part of our previous test, we can begin to look at XR workflows. See the Video Receive Delay page.

Completing the Delay Calibration in the XR workflow should now be possible with a single frame of white.

- **Camera/LED Genlock**: Verify that the camera and LED devices are correctly Genlocked. Most devices usually refer to this a G/LOCK or EXT SYNC. Please see your devices manual in how to observe if its receiving external lock
- **Frame Rates**: Ensure that all devices are operating at the same frame rate. Ensure that camera devices are setup to the same Genlock source.
- **Camera Settings** Shutter speed and angle are important to ensure that only a single frame of delivery is captured. These workflows are outlined in the XR workflow guides.
- **Clustered rendering**: If RX nodes or clusters of Engines are rendering different frames, this can also look like tearing.

It is important to narrow down whether this is the Disguise Video playback, core servers or the render nodes.

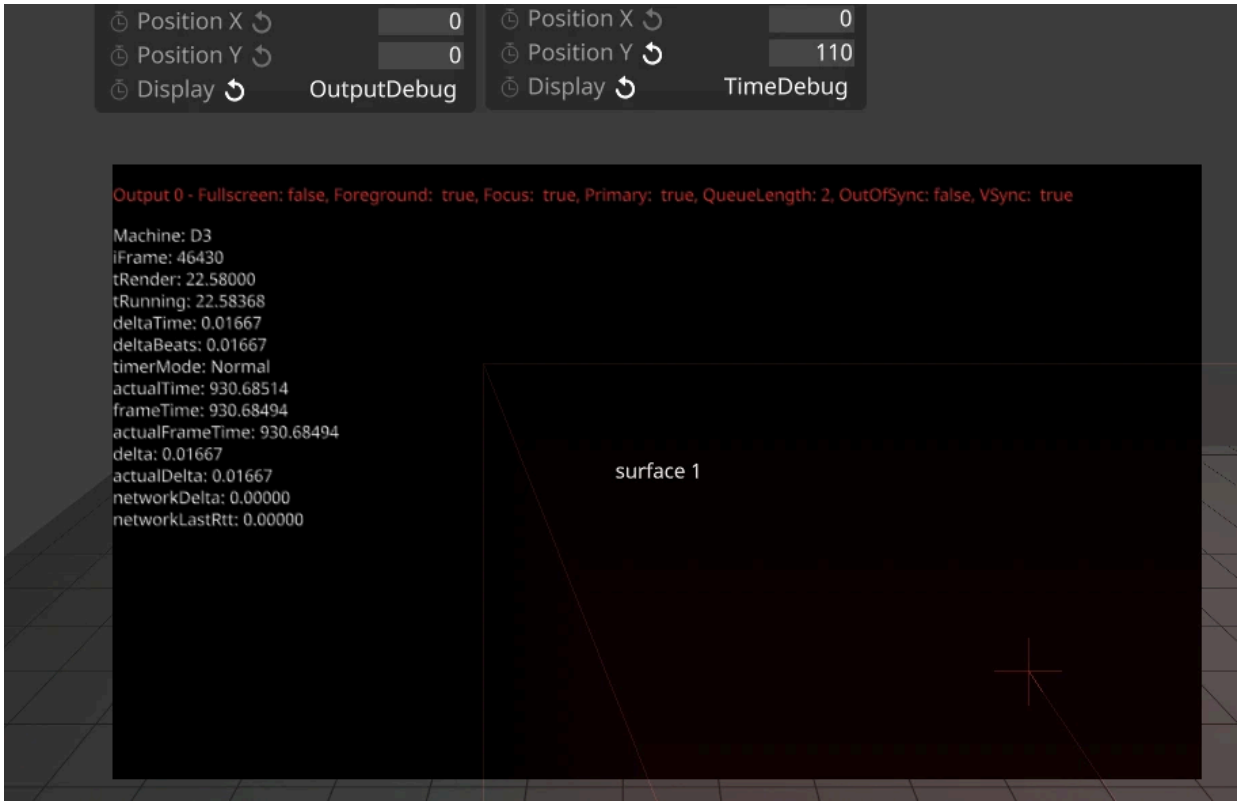
Narrowing this down to the colour test will then help you determine if engines are out of sync or if its simply the core system.

Troubleshooting

- **Tearing**: If tearing occurs, it suggests synchronisation issues. Check frame rates, Genlock settings, and network connections. Is this down to a render node or a core video output system?
- **Strobe Layers and Generative Effects**: Be aware that these effects may not synchronize across Disguise machines. You should avoid using STROBE/RADAR and CHEVRONS as a method of sync testing.
- **Disguise Readout test**: Whilst we eluded to both Framelock and Genlock, Disguise also communicates between machines to verify what the current time/frame is and whether displays are in Framelock.

A support engineer may ask you to use the **READOUT** layer mapped to each screen, filming this in slow motion can be used to provide more scientific data for our team to observe and look at.

Please contact **support@disguise.one** if you are having issues with output sync.



	Definition	Must be the same to sync
`iFrame` *(Frame number)*	Frame index d3 start since d3 start.	No
`tRender` *(Seconds)*	The frame on the playhead that the local machine is currently rendering.	Yes
`tRunning`	Starts counting up once you hit play, & resets when you transition from stop to play – similar/same to tRender.	Yes, must be same unless dropping frames
`deltaTime`	Difference between now and last frame in time, this should equal to 1 fps.	Yes, must be same, unless dropping frames
`deltaBeats`	Difference between now and last frame in beats, similar/same to deltaTime.	Yes, must be same, unless dropping frames
`timerMode`	- Network Mode - Normal Mode - Fixed Mode	Yes, must be set as Network
`actualTime`	Local timer since startup.	No, does not need to be same
`frameTime`	The time of the last frame update.	Yes, should always be in sync when Genlocked. If not, ensure Genlock is still working on all servers.

	Definition	Must be the same to sync
`actualFrameTime`	The time of the last frame update in local machine time.	No, does not need to be same

RenderStream Networking

Disguise RenderStream is a protocol and technology developed to enable real-time streaming of rendering data between systems, such as media servers and rendering engines.

It is designed for synchronised, high-quality, and low-latency workflows, commonly used in applications like:

- Virtual production
- Live events
- Immersive experiences

Bandwidth Considerations

- RenderStream handles high-resolution, high-frame-rate content, including textures, video, and rendering data.
- Uncompressed data significantly increases bandwidth demands.

Transport types

Streams in RenderStream can either be **compressed** or **uncompressed**.

Uncompressed streams

RenderStream Uncompressed Streams (sometimes shortened to RSUC) are low latency, high-quality, and require much higher bandwidth.

Uncompressed streams require specific hardware:

- **Network Interface Cards (NICs)**: 25Gb or 100Gb Mellanox network interface.
- **Multiple Machines**: dedicated render nodes render and send content via uncompressed streams to actor and director machines.
- **Genlock**: required when rendering multiple fragments that are output by multiple actor machines.

Supported uncompressed formats:

- RGB 4:4:4 8bit
- RGB 4:4:4 10bit
- RGB 4:4:4 12bit
- YUV 4:2:2 8bit
- YUV 4:2:2 10bit
- YUV 4:2:2 12bit

The transport format can be configured in the cluster assigner settings of the workload: RenderStream Layer

Compressed streams

Compressed streams use H.265 compression to reduce bandwidth needs while providing consistent content quality. Compressed streams use an order of magnitude less bandwidth than uncompressed and can be used on the 1G, 10G, or 25G+ networks. A limited number of streams can be encoded and decoded by the hardware on the cards.

Supported compressed formats:

- YUV 4:2:0 8bit

The transport format can be configured in the cluster assigner settings of the workload: RenderStream Layer

RenderStream Network Configurations

RenderStream remote mode requires a high-bandwidth network to connect the dedicated render node(s) to the VX and/or GX range media server(s) being used to composite and output the content.

We have standardised on Mellanox ConnectX-5 (25GbE) or ConnectX-6 (100GbE) network interface cards (NICs) on our products. This is because they support Rivermax, which we use to enable RenderStream Uncompressed.

Fabric is a preconfigured network switch that works with RenderStream or ST 2110 video if using the IP-VFC and is sold by Disguise. Fabric is recommended as a known-good solution to work with RenderStream.

We recognise that users may already have access to a high-speed network switch, or have requirements to accessing a network switch with their own configuration. The following minimum requirements must be met for any network switch being used alongside RenderStream:

- The network switch must be able to support the bandwidth being used by the NICs on the render node(s) and the VX/GX range media servers being used. For example, if the NICs are 100GbE then the network switch must be able to deliver up to 100GbE per port or the use of breakout cables (i.e. 4x 100GbE). If the NICs are 25GbE then the network switch must be able to support 25GbE per port or the use of breakout cables (i.e. 4x 25GbE)
- IGMP snooping must be enabled on the required network ports used to connect to each render node and VX/GX range media server being used in order to manage and control the flow of Layer 3 multicast traffic.
- If you intend to quad-split a 100Gb port to 4x 25GbE links then forward error correction (FEC) must be disabled on each port that has been quad-split

- Jumbo packets should be disabled on the required network ports used to connect to each render node and VX/GX range media server being used.
- RDMA over Converged Ethernet (RoCE) version 2 must be supported, specifically lossless mode.
- Quality of Service (QoS) must be maintained to prioritise media streams over control traffic.

Known-good SFP and Fibre for RenderStream

Below is a table of recommended SFP types to use with RenderStream.

Mellanox NIC port speed	SFP Connector Type	Validated SFPs
25GbE	SFP28	Mellanox MMA2P00-AS FS SFP28-25GSR-85
100GbE	QSFP28	Mellanox MMA1B00-C100D FS 71009

We strongly recommend the usage of OM4 fibre, which is a high-bandwidth multimode optical fibre.

LC to LC OM4 fibre cables should be used for 25GbE networking and MTP to MTP OM4 fibre cables should be used for 100GbE networking.

MTP to Quad LC OM4 breakout fibre cables should be used for connections between 100GbE and 4x 25GbE.

Additional Considerations

NIC Throughput

Even with 100Gb Ports, actual throughput is typically around **80Gb** due to protocol overheads, error checking, and operational processes.

Using the Assigner and predictions on workload traffic you can aim to calculate the expected throughput needed per workload.

Cluster Rendering

Cluster Rendering increases cluster management network traffic, which at very large scales can become a bottleneck. Please refer to the RenderStream Network Configurations section.

Network Security Overview

Disguise is a media platform specialised in video playback and real-time rendering applications. This page covers the use of Disguise in a secure IT environment, such as a corporate network, and provides recommended practices and mitigation strategies to ensure the goals of both systems are met.

Introduction

Disguise provides high-performance media platforms optimised to meet specific performance benchmarks as defined by the factory shipping configuration. Modifying this configuration can compromise system integrity, lead to degraded performance, and can cause the system to deviate from its designed characteristic. For this reason, our support team may request a system restore to its original factory settings during the course of troubleshooting performance-related issues.

Disguise and Network Security

A media playback tool like Disguise is designed to provide graphics on-screen in real-time, with minimal latency and a focus on system performance. On the other hand, a secure IT environment, such as a corporate network, is intended to provide a closed, safe environment for the exchange and storage of sensitive information.

These two goals can be seen as being in opposition to each other. Security strategies typically applied to secure IT environments include the use of antivirus software, regular patching of system components, and highly restrictive network behaviors. However, real-time media playback systems like Disguise actively discourage the use of these strategies due to the significant performance reduction they cause, which negates the real-time aspects of the media system. Below, we explain the specifics which should be taken into account when deploying Disguise into a secure IT environment.

Recommended Practices

Air-Gapped Networks

Disguise strongly recommends that real-time media playback systems should always be installed on a dedicated LAN network that is air-gapped from the main IT network. This isolation is crucial to maintain the performance and integrity of the Disguise system while preventing potential security risks to the main network. For any necessary data interchange between the dedicated LAN network and the main IT network, we recommend using a DMZ

network as an intermediary. This approach provides a balance between maintaining system performance and adhering to security protocols.

AntiVirus

Disguise does not recommend the installation or deployment of any sort of persistent AntiVirus software onto the media platforms we provide. The installation of such software can cause inconsistent and unpredictable performance impacts, significantly hindering our ability to deliver on the performance characteristics the system is designed around. However, we understand the importance of security and can recommend that virus scans be conducted during system maintenance windows. These scans should be run without being installed onto the media platforms, or if installation is necessary, the software should be immediately uninstalled once the scan is completed. This approach allows for periodic security checks without compromising the system's performance during operation.

Windows Updates

Disguise servers ship with long term supported Windows builds, such as *Windows 10 SAC* or *Windows 11 IoT Enterprise GAC* editions, on our servers. Updates via Windows Update or other patching mechanisms are disabled by default. The OS image which Disguise supplies should be thought of as firmware, with a complete set of patches, drivers, and OS updates tested as a complete unit. While Disguise does issue intermittent updates to the OS, it's important to note that the OS version selected is chosen for performance, and so may not be the latest available set of patches. We strongly advise against deviating from our distributed OS images in any way, as doing so can cause unknown performance impacts on the system's designed and sold characteristics. This approach ensures consistent performance across all Disguise systems.

Driver Updates

Disguise does not recommend or support the installation or update of any component drivers found within the system. Our development team meticulously tests drivers alongside one another and issues them as part of a complete OS image, with interoperable versions from various vendors used within the systems. We don't always select the latest driver version, as sometimes newer drivers can disable or break functionality we rely on. You should not manually install or update any driver on the Disguise systems unless explicitly instructed by Disguise to do so. This policy helps maintain system stability and ensures that all components work together as intended, preserving the performance characteristics the system is designed and sold with.

Network Topology

Disguise media servers are optimized for high-performance media playback and real-time rendering, which requires a specific network environment to function at their best. For optimal performance and security, we recommend operating these systems on dedicated, isolated

networks. This approach ensures that the Disguise systems can deliver their full capabilities without potential conflicts with corporate network security measures. Our systems are designed to operate effectively offline, focusing on their core media playback and rendering functions. When internet connectivity is necessary, we advise using a separate, controlled network environment rather than connecting directly to a main corporate network. This strategy helps maintain the integrity and performance of both your Disguise systems and your secure corporate networks.

Firewalls

While Disguise systems are designed to operate in isolated environments and ship with their Windows Firewall **Disabled**, understanding the network activity and required ports is crucial for proper system configuration and troubleshooting. Firewalls can play a role in securing your Disguise network, but they must be configured correctly to avoid impacting system performance.

For a detailed breakdown of the ports used by Disguise and the expected network activity, please refer to our Network Ports and Activity page. This resource provides essential information for network administrators and IT professionals working with Disguise systems, helping to ensure smooth operation while maintaining appropriate security measures.

Remember that any firewall implementations should be thoroughly tested in a non-production environment before being applied to live systems, as improper configuration could significantly impact the real-time performance of your Disguise setup. Ultimately, any changes made to your local firewall configuration may not remain effective after software updates, as we may add or remove additional ports as needed.

> **Note**
>
> Any custom settings or modifications made to Windows Firewall will be removed when the OS image is reimaged. Reimaging a server can be recommended as a troubleshooting step by Disguise Support, so if you intend on configuring your Firewall make sure you have an automated method of recovering your settings after a reimage.

Domains

As Disguise is not intended to be connected to a corporate network, we do not expect you to perform any domain joins or install Disguise as part of a wider group IT policy. Our Windows image has specific features disabled and enabled to ensure performance benchmarks of the systems are achievable in our environment. Altering these configurations via domain policies or manual adjustment can cause unknown performance impacts on the system's designed characteristics. By keeping Disguise systems separate from domain policies, we can ensure consistent performance and behaviour across all installations.

User Authentication

Disguise systems are shipped with a default configuration that includes a single active user on the machines - the root user (called 'd3') with administrator privileges. For air-gapped systems that are completely isolated from external networks, this default setup can be maintained to facilitate smooth operation and quick troubleshooting, especially in multi-machine setups and live event scenarios where rapid system access is crucial.

However, we strongly recommend adopting zero trust security best practices where possible for any system that isn't completely air-gapped or where physical access to the system is not restricted and monitored. Consider implementing security measures such as:

1. Changing the default 'd3' user password to a strong, unique password.
2. Implementing multi-factor authentication where possible.
3. Regularly auditing and rotating credentials.

Remember, the most robust security for your Disguise system is achieved through network isolation. When connectivity is required, always implement stringent security measures while maintaining operational efficiency. This approach ensures optimal protection without compromising the high-performance capabilities that Disguise systems are renowned for.

> **Note**
>
> Any custom settings or modifications made to use authentication settings will be removed when the server is reimaged. Reimaging a server can be recommended as a troubleshooting step by Disguise support, so if you intend on configuring your user authentication settings make sure you have an automated method of recovering your settings after a reimage.

Encryption

The Disguise application uses a secure license system which encrypts our executable and DLL files, decrypted by a license key found inside the servers. However, Disguise systems are designed for performance and as such must not be used with encryption of the media involved in our playout. We strongly advise against enabling any additional form of encryption on the systems, as this will impact performance and prevent the machine from meeting its designed performance characteristics. This approach ensures that the system can deliver the real-time performance it was designed for.

Remote Access

Disguise occasionally offers remote assistance via third-party remote access tools (such as TeamViewer, SimpleHelp, Parsec, etc.) when requested by customers for support and troubleshooting scenarios. While participation in this is optional, it can help streamline diagnosis and support in certain cases. Wherever possible, we recommend the use of

portable clients for these remote sessions, rather than permanently opening the system to remote access. This approach allows for necessary support while minimizing potential security risks.

Conclusion

As outlined above, please do not connect Disguise media servers to a network unless it is a dedicated LAN network that has been air-gapped from the main IT network. If any data interchange needs to take place between the dedicated LAN network and the main IT network, then this should be completed via a DMZ network. This approach balances the performance needs of Disguise systems with the security requirements of corporate environments.

> ⚠ **Warning**
>
> Disguise will not provide support for, nor be liable for, any security issues arising from exposing these machines to public networks. Proceed with caution and at your own risk.

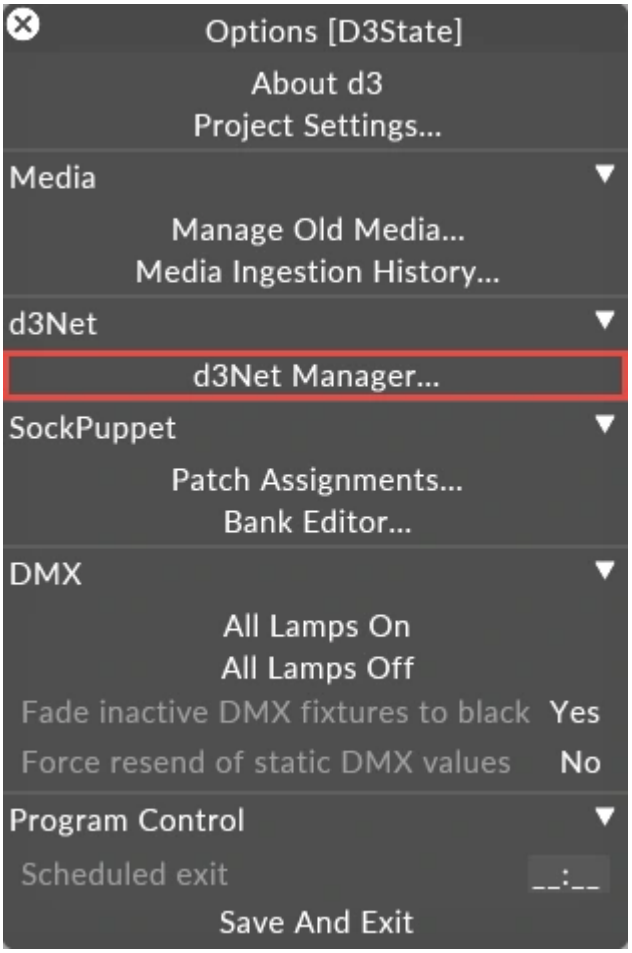
d3Net Setup

d3Net Manager

d3Net Manager is a UI widget in Designer that is used to setup a Director/Actor/Understudy network.

To open d3Net Manager:

1. Open the Program Settings menu by right-clicking **d3** from the d3 State editor (bar at the top of the screen).
2. Left-click **d3Net Manager** in the d3Net tab.



d3Net Manager properties



d3Net Manager can be configured to contain all of the Disguise servers in the Director/Actor network. These machines are represented by virtual machine objects.

The **Actors**, **Understudies** and main sections of the d3Net Manager (described in greater detail below) are used to create an Actor, Understudy or Director machine.

Disguise media servers can act as any of the roles in combination with any other media servers, except for the following models which have some restrictions (outlined on their respective pages):

- EX Range
- Solo

Designer Starter and Full (Pro) in session

Machines running Starter and Full versions are isolated on the network and cannot connect to each other's sessions. As a result, Starter machines can only detect and join sessions with other Starter machines, while Full machines can only detect and connect with other Full machines.

Both Full and Starter versions of Designer can assume any machine role depending on the hardware they are running on. The table below illustrates which roles each license supports:

	Designer Starter on Non-Disguise Hardware	Designer Full (Pro) on Non-Disguise Hardware	Starter on a Disguise Media Server	Full (Pro) on a Disguise Media Server
Director	✗	✗	✓	✓

	Designer Starter on Non-Disguise Hardware	Designer Full (Pro) on Non-Disguise Hardware	Starter on a Disguise Media Server	Full (Pro) on a Disguise Media Server
Actor	✗	✗	✓	✓
Understudy	✗	✗	✓	✓
Editor	✓	✓	✓	✓

Director

The role of the Director is to control any Actors and Understudies running within the session. Any session with multiple machines (even editors) must have a director assigned.

Dedicated vs Non-Dedicated Directors

Directors can either be **Dedicated** or **Non-Dedicated**. This changes the way the director will display content.

- A **Dedicated Director** will render content on all screens in the visualiser and all displays included in it's assigned Feed Scene. This is intended for previsualisation.
- A **Non-Dedicated Director** will only render content on displays included in it's assigned Feed Scene. This is an optimisation feature to maximise performance of output content.

Non-Dedicated Directors are not as performant as Actors, because they are also responsible for managing the session and rendering the GUI.

Actors

The role of the Actor is to output video from the project timeline of the Director running in session. Each Actor will output according to its assigned Feed scene. The first output on the Actor machine, which is usually used for a GUI monitor on the Director machine, can also be used as a display output.

Understudies

The role of the Understudy is to take over from either the Director or Actor in the event of failure. The machines the Understudy should take over can be chosen from the **Understudy targets** section of the machine editor. For more information please scroll down to the section **Understudy targets** below.

Editors

The role of the Editor is to make edits to a project that are then shared to the Director in real-time. Read more about setting up Editors in the **Setup Editors** chapter.

Failover Timeout

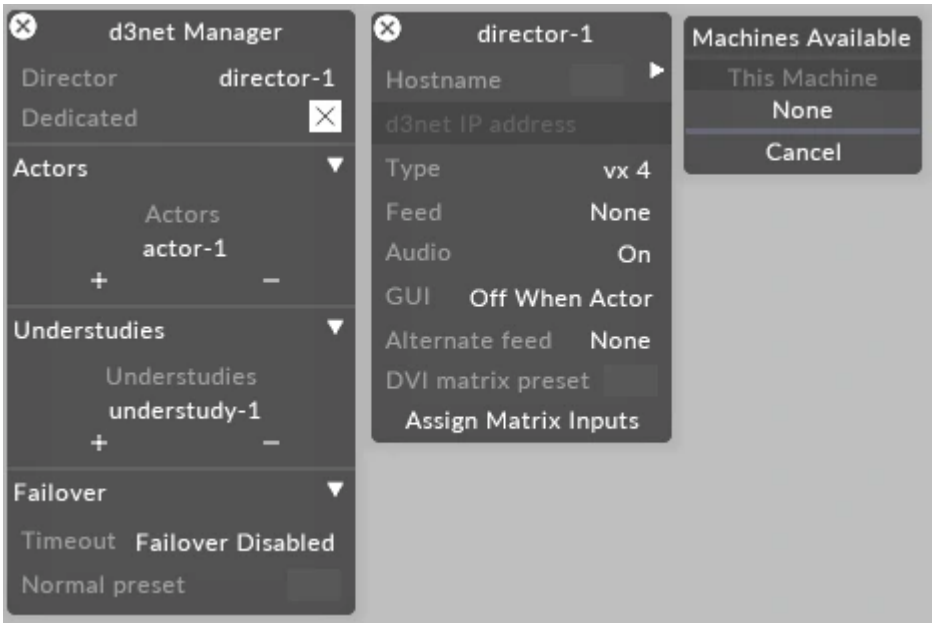
The amount of time in seconds until the Understudy automatically takes over from a non-responsive machine. Note that the value 0 disables this function.

Failover Normal preset

The default matrix preset when all machines are functional and outputting their assigned Feed scenes. Read more about matrix presets in the Matrix & Switches subchapter.

Machine editor

To open the Machine editor, right-click the machine from the Machines manager or the d3Net manager.



Host Name

The Hostname of the machine. This can be selected from a list of discovered machines in the d3Net network, opened by left-clicking the arrow.

> **Note**
>
> The Actor and Understudy machines must have Designer installed in order to appear in the list.

The Network manager monitors the health of the Actors using their frame rates

The **failover** section of the Network manager monitors the health of the Director and all of its Actors using frames-per-second readouts. For more information on frame-rate readouts please scroll down to the section 'Monitoring Actors' below.

Type

Each machine can be set as a certain type. Changing this value sets the capabilities of the machine for Video Input Patch and Audio Output. The value is auto-detected when the Disguise machines are connected. When machines are disconnected (for example when building your project in Disguise Designer) you can specify the type manually.

Feed

Assigns a specific Feed scene to the machine. The Feed scene contains specific outputs and can be created directly from the d3Net manager. Alternatively, Feed scenes can be created and configured before assigning them to a machine using the Output Feeds level. Please see Switching Feed scenes for more information.

Audio

Controls how audio is outputted from the machine.

- `off` disables all audio from the machine
- `timeline only` plays audio from the Timeline
- `video files only` plays audio from video clips only
- `on` enables all audio.

Typically, this property is used to allow audio from video clips to play through a PA whilst suppressing the Timeline audio, which is used for reference purposes on the Director only.

> **Note**
>
> In order to output audio in a Director-Actor network, the video file containing the audio needs to be mapped to a screen. The screen then needs to be assigned to a Feed scene, which in turn needs to be assigned to the machine which will output the audio. If using a separate low-res DXV video file (16x16 pixels), which only contains audio and no video, create a low-res screen and assign it to the Feed scene. This is not required if you use the audio layer. Read more about outputting audio in the Outputting audio page.

GUI

Controls whether to start up with the GUI; options are **off when Actor**, **always on** and **always off**.

Matrix Control

This is a preset number to be automatically sent to the Matrix by the Understudy when one of the machines fails. A preset number should **only** be set in the Director and Actor machines. In case of a machine failure, that machine's preset number will be sent to the matrix by the Understudy.

You can also enter the information for which input on the matrix each head on the machine is connected to for Direct Matrix routing. For more information please see the Direct Matrix routing subchapter.

If there are multiple matrix devices Designer will send the same preset to all matrix devices in the Devices manager list. For step-by-step instructions on how to create a device, please see the Creating devices subchapter.

Limitations of preset-based switching

⚠️ **Automatic preset switching is only possible when using one Understudy per failover target. If using multiple Understudies, either switch the matrix manually or use Direct Matrix routing.**

Preset-based switching has implications regarding multiple understudies:

As presets are built into the matrix, presets only allow for one pre-defined route for failover. If you have multiple Understudies, a single preset can't account for all of them simultaneously. For example, if you set up Preset 1 for Understudy A, it will only route from Understudy A's matrix inputs.

Workflow with Understudy Groups

If preset based routing is required when working with multiple Understudies, one approach is to set up "Understudy groups".

1. **Group your Understudies and actors**: For example, "Understudy A" covers "Actor 1" and "Actor 2," while "Understudy B" handles "Actor 3" and "Actor 4."
2. **Create a unique preset for each Understudy group**: These presets define the specific routing for failover, directing inputs to the correct Understudy.
3. **Manually activate the relevant preset when an actor fails:** This triggers the pre-configured routing, letting the designated Understudy take over.

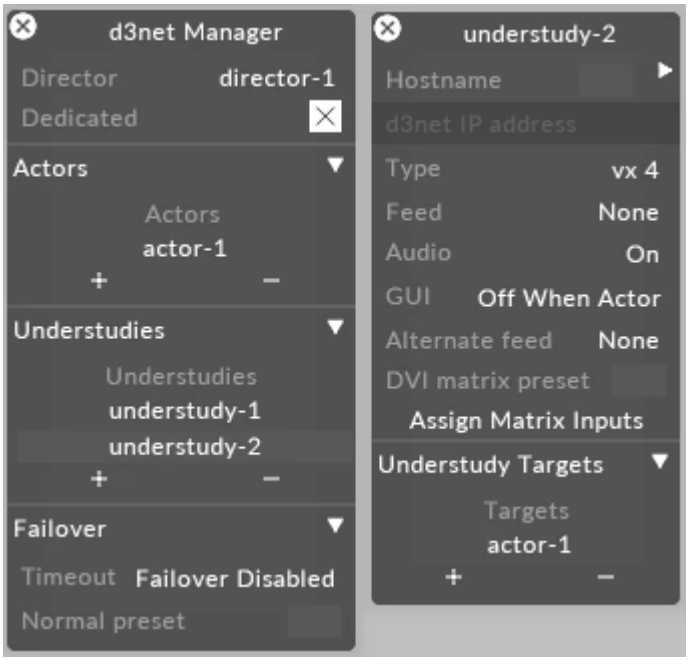
Alternate feed

Specifies the alternative Feed scene the Understudy should switch to if one of the machines fail. If set to None, the Understudy will switch itself to the standard Feed scene specified in the previous property. This is mainly used if the Understudy's Feed scene has different output head size settings than the machine it is replacing. Please see the explanation of the Feed property above for information on how to create Feed scenes using the Output Feeds level.

Understudy targets

The machines the Understudy should take over can be chosen from the Understudy targets section of the Machine editor. However, in order to see this section:

1. Create an Understudy Machine. When creating an Understudy, leave the Feed property (described below) blank. This is because it should be able to use any other Feed scene assigned to the failed machine.
2. Close and reopen the Machine editor. A new section called **Understudy targets** will now exist at the bottom of the editor.



Understudy targets section of the Machine editor is used to add machines that the Understudy should take over.

If no machines are added to this list, then the Understudy will take over from any machine on the network.

If a Matrix device has been added to the system, the Understudy can be configured to send a preset command to the connected Matrix device.

File distribution in a Director-Actor network

Once the d3Net manager has been set up correctly, copy the specific Project folder to all of the Actor and Understudy machines in the network. The video files must be distributed in such a way that every machine has all of the content files it will need to play during the show. For information on where the specific Project folder is located, please see the subchapter Projects location.

Remote control service

The Disguise machines are installed with a Windows service, named **d3Service**. When starting Designer on the Director, the Director automatically sends out a start Disguise network command, which attempts to start the Actor(s) with the specific project. When the Actor machine starts, it looks at the d3Net manager, identifies itself in the list and switches automatically to its assigned role and Feed scene.

> **Note**
>
> **Please note**: d3Service installs as part of the installer and no activation is required.

Monitoring Actors

The Director machine can monitor the health of all of its Actors. By default, the bottom right corner of the Disguise screen contains a frame-rate readout showing the number of frames Designer is outputting per second (fps).

- `60 fps` is the optimum frame rate and indicates a healthy machine by showing in green;
- `<60 fps` is unhealthy and shows in red.

If you select a 50Hz output mode, a smooth 50 fps shows as green.

The Number of frames in Designer is outputting per second in this example, is a healthy 60 fps.

In Director mode, the frame readout will be accompanied by a readout for each Actor. If the Actor is not running for any reason, the readout will be in red with a - instead of a number.

In Director mode, the Director machine's readout will be accompanied by a readout for each Actor.

Setup Editors

MultiEdit allows multiple people to edit a project simultaneously, without manually merging projects.

Edits from each machine are propagated to all other machines in real time. Each editor machine can work on a different track, or on different regions of the same track, at the same time; editors can also take control of the Director timeline position and control the stage.

There are a few ground rules for MultiEdit that must be observed:

The Director must be running

The Director machine is authority for show state; therefore, Designer must be running on the Director for a multiedit session to work. If you shut down Designer on the Director, all connected editors will be kicked out of the session. If you're uncertain how to set up a Director/Actor read the setup d3net page.

The Director is the authority over show state

When an editor joins a session, it copies the project file over to the local machine. Any edits made on the local machine while it was offline will be overwritten. Therefore, if an editor makes edits to the project while disconnected, the only way to get the edits into the main project is to run a standard project merge.

Edits are first-come, first-serve

When an editor attempts to make a change to any object, it locks that object for a short time (a tenth of a second). During this time, if another editor tries to change that object, the change will be locked out. Locking is 'fine-grained' - it is, for example, possible for two people to edit different properties of the same layer at the same time; but edits to the same property will be first-come-first-served.

Director session control

The Director is the final authority on show state, and is responsible for show safety. Since unsupervised connection of editors at showtime introduces a risk, the Director has the ability to disallow any editors from connecting. It also has the ability to prevent editors from taking control of transport (the position of the cursor on the timeline). This is done using the network status widget on the Director.

Send Transport Commands

This means that Actors are following the Director's timeline position. Clicking on this button changes the setting to disabled; show state will be propagated to Actors, but they will not follow if the Director jumps to a different part of a track, or jumps to a different track. This allows you to 'park' your Actors at a static position while editing continues on the Director.

Editors are allowed

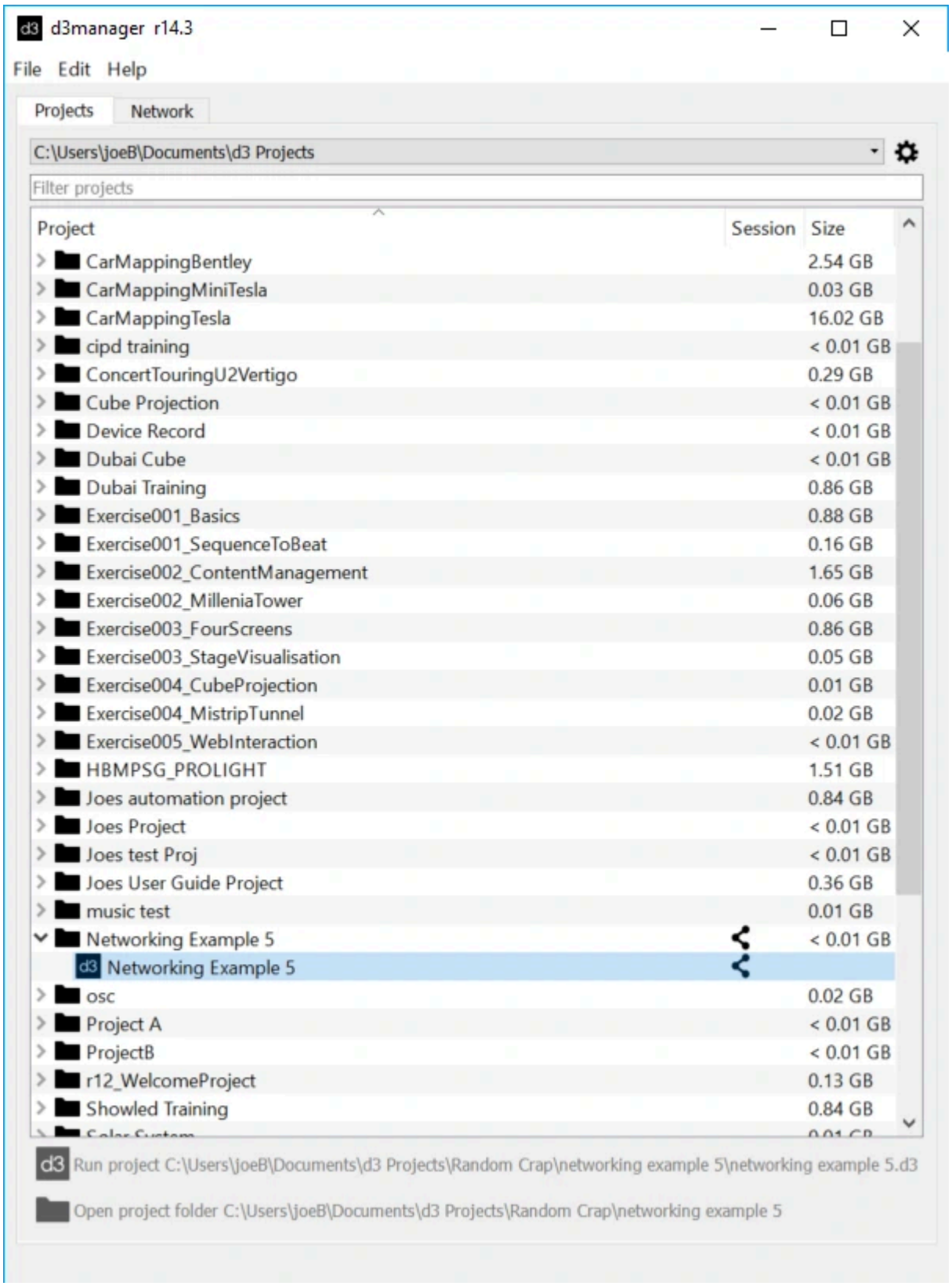
Means that editors are allowed to join the session. Clicking on this button changes the state to editors blocked; existing editors will be kicked off the session, and new editors will be disallowed.

Synchronising the project

To join a session, the editor machine needs to first copy the entire project folder from the Director machine (including all media assets). Once this is done, the .d3 project file will be synchronised automatically; however any new media files must currently be synchronised manually using a third-party synchronisation utility.

Joining a session

To join a session, open the d3Manager and find the project session in the project list. If the session is running, you'll see the session icon next to the project name.



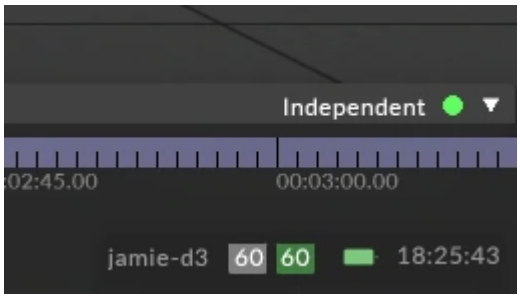
- Double-click the project to launch, and when prompted, choose Join Session.

Or alternatively;

- Right-click on the project name, and select Join Session. This will pop up a dialog box warning you that any local edits will be overwritten (they will be copied into the history folder, so they're safe); clicking OK will start Designer in editor mode and synchronise the project file; you'll see synchronising project file in the startup sequence.

For more options how to join a session see the Manager page.

Once you're running, you'll know you're an editor if you see the independent button at the bottom right of the Disguise GUI.



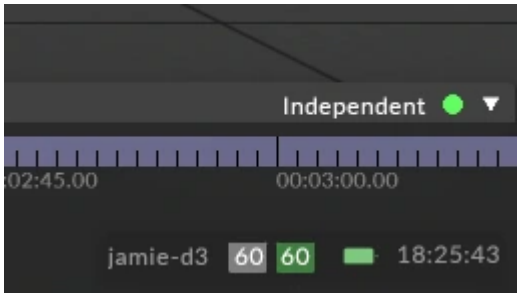
Editing objects

Once you're in the session, you'll find editing is pretty much the same as when you're running as a Director or solo machine, with a couple of exceptions:

- You can't edit the Director/Actor configuration itself.
- You can't control any of the Director properties in the (dashboard).

Timeline control

By default, the editor machine maintains its own transport position (position on timeline, and which track is selected). This means that you can freely jump from one track to another, making edits, without affecting the Director or the Actors. Sometimes, however, you'll want to take control of the transport from the editor.



To do this, press the **independent** button on the timeline title bar. If the Director has allowed editors to take transport control (see **Director session control** above), the button will show

locked to Director and flash green.

Clicking on a different bar of the track, pressing play/stop or next/prev section, or switching to another track, will be reflected on the Director and the Actors. Conversely, any transport control movements (including those generated by other editors, or external transport devices such as lighting desks or OSC) will be followed by the local editor machine, on a first-come, first-served basis.

Teaming

What is Teaming?

Teaming, also known as VLAN Teaming, NIC Teaming, or link aggregation, combines multiple physical network adapters into a single logical interface. This approach provides **increased bandwidth**, **redundancy**, and **improved performance**. By ensuring failover protection in case one adapter or connection fails, teaming optimises traffic distribution for better network efficiency.

Common Teaming Modes

- Dynamically balances outgoing traffic among all team members.
- Does not require switch configuration, but inbound traffic is limited to a single adaptor.
- Best for environments needing a simple, efficient performance boost.

- Combines multiple links into one logical connection using manual configuration.
- Requires switch support and static configuration (e.g., EtherChannel).
- Ideal for static environments with predictable traffic patterns.

- Automatically negotiates link aggregation with a switch using the IEEE 802.3ad protocol.
- Offers automatic failover and load balancing for high performance and reliability.
- Recommended for environments where switch-side configuration is feasible.

- Works without specific switch configuration by balancing traffic across team members.
- Provides redundancy, but load balancing may be less efficient compared to LACP.

- One adaptor is active, while others remain on standby for failover.
- Ensures maximum redundancy but does not increase bandwidth.
- Suitable for critical systems prioritizing uptime over throughput.

> **Note**
>
> Hyper-V currently supports only switch-independent mode, which does not enhance network bandwidth.

Implementing Redundancy at a Hardware Switch Level

Switch stacking offers an effective redundancy solution, serving as an alternative to Link Aggregation Control Protocol (LACP).

What is Switch Stacking?

Switch stacking involves physically connecting multiple switches to form a single logical unit. These switches share a unified control plane and are managed through a single interface. Dedicated stacking cables ensure high-speed communication between cables and ports, allowing them to function as a cohesive system.

Advantages Over LACP

- **Simplified Management**: The entire stack operates as a single switch, reducing configuration complexity.
- **Resilience**: If one switch in the stack fails, the others continue to function without disruption.
- **Redundant Paths:** Traffic between devices connected to different stack members remains internal, eliminating the need for external links.
- **Higher Throughput**: Stacking links typically offer greater bandwidth than LACP aggregated links, enhancing overall network performance.

Virtual Local Area Network (VLAN)

What is a VLAN?

A Virtual Local Area Network (VLAN) is a virtual network adaptor that operates over a physical network interface, such as a 1Gb, 10Gb, 25Gb, or 100Gb Ethernet port found on the back of a Disguise media server.

VLANs allow a single switched network to be segmented into multiple virtual networks using tagging. This eliminates the need for separate physical networks for different use cases, improving efficiency and flexibility.

A typical set of VLANs configured for a Disguise media server in a production or live experience may include:

- **d3Net**
- **KVM Net**
- **Media Net**
- **Automation Net (PSN)**
- **NDI® Net**
- **Internet**
- **sACN/Artnet**
- **OSC/Control**
- **OmniCal**
- **PTZ Camera Control**
- **MGMT**

The distinct separation of each network allows devices in:

- d3Net to be set in a `192.0.X.X` range.
- Whilst Artnet/SACN being in the Common `2.X.X.X` or `10.X.X.X`.

Yet both exist on the same network interface.

As outlined in the initial example, network protocols have different requirements and network settings.

This allows all data to exist in a singular physical interface but be be routed by a network switch.

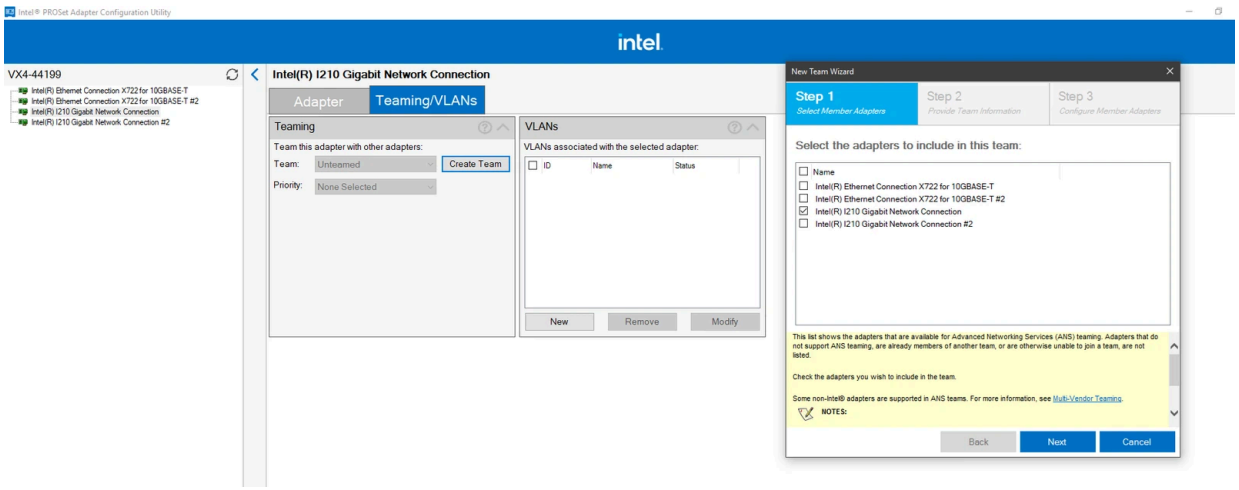
> **Note**
>
> OmniCal and Dante should be assigned to their own separate network interfaces. This ensures optimal performance and reduces the risk of network congestion or interference, which can affect the precision and reliability of these systems.

Configuring VLANS and Teams

Within Disguise servers, VLANs can be created using different tools depending on the operating system:

- **Windows 10**: VLANs can be configured at the driver level using Intel PROSet.
- **Windows 11**: VLANs can be configured at the software OS level using Hyper-V.

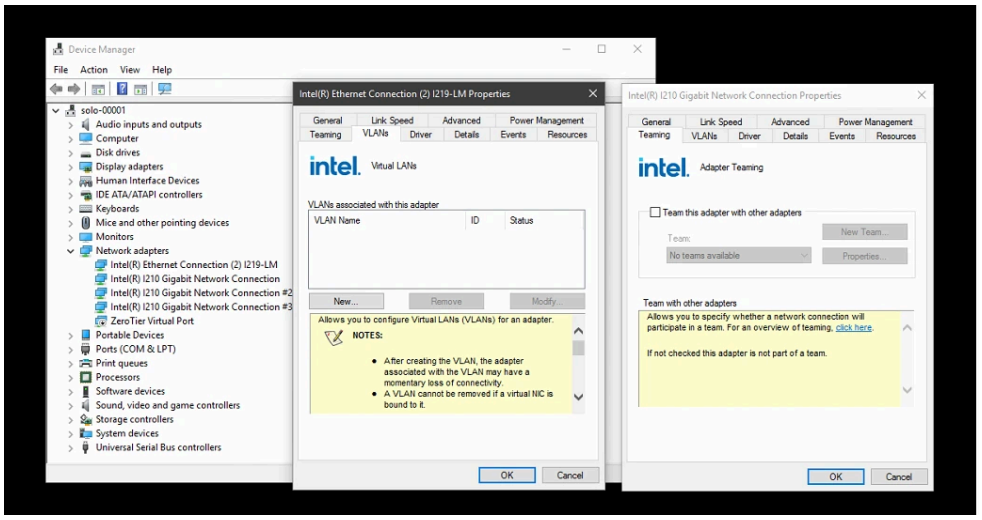
> ### Create PROSet Team Via GUI
>
> If your system supports the Intel PROSet GUI for Windows Device Manager, you can use its graphical interface to configure VLANs and NIC Teams easily.
>
> - **Sacrificial NIC**: At least one Intel integrated NIC or server-grade adapter must be part of the team to allow configuration. - You may notice X722 Network 10GB interfaces require the use of L210 network port to allow configuration via PROSet.
> - **VLAN Restrictions**: Ensure your switch supports the configured VLAN IDs and is set up accordingly.
>
> **Open the Intel PROSet GUI**:
>
> Machines such as the GX 2C/VX 1/2 have PROSet installed as an application



Intels PROSet interface

Older Servers such as the solo have PROSet built in to the NIC adaptor settings

- Launch Windows Device Manager.
- Navigate to the properties of an Intel-supported NIC.



Intels PROSet interface within Device Manager

2. **Create a Team**:
   - In the **Team/VLAN tab**, click on **Create Team**.
   - Select the adapters you want to include in the team. (X722 require an additional 1gb)
   - Choose a team mode (e.g., Adaptive Load Balancing, Static Link Aggregation). - Modes are outlined above the the guide.
3. **Configure VLANs**:
   - After creating the team, go to the TEAMEd interface and select the **VLANs tab**.
   - Scroll down and Select New Vlan
   - Click on **Add VLAN** and specify:
     - VLAN IDs (e.g., 10, 20, 30).
     - VLAN Name
   - Save your settings.

Create PROSet Team via CMDLETS

For systems without Intel PROSet GUI support (Intel X722), use the `IntelNetCmdlets` module to configure NIC Teams and VLANs.

Identify Adapters: Use the following command to list available adapters:

```
Get-IntelNetAdapter
```

Create a Team: Execute the command to create a NIC Team:

```
New-IntelNetTeam -TeamMemberNames "Adapter1", "Adapter2" -TeamMode AdaptiveLoadBalancing -TeamName "MyTeam"
```

Replace `Adapter1` and `Adapter2` with the actual adapter names obtained from `Get-IntelNetAdapter`.

Such as

```
New-IntelNetTeam -TeamMemberNames "Intel(R) I210 Gigabit Network Connection","Intel(R) I210 Gigabit Network Connectior
```

Check the team configuration:

Verify the Team:

```
Get-IntelNetTeam

**Set Team Properties (Optional)**:
Modify team settings using:
```powershell
Set-IntelNetTeam -TeamName "MyTeam" -Property "PropertyName" -Value "PropertyValue"
```

Additional Information

See the following pages to learn more about creating VLANs:

- Create a VLAN with Hyper-V
- Create a VLAN with PowerShell
```

Windows File Sharing

General preparation

1. Download and install both the latest Designer software version, and Disguise OS version onto all machines in the network.
2. Run the same Disguise installer on all machines.
3. Do not run a checkpointed version of the Designer project when you are working in a Director/Actor configuration. For information on checkpoints, including how to disable a checkpoint, please see the Running a project from a checkpoint sub-chapter.
4. Ensure that the Disguise machines have no third-party programs installed as this may cause a reduction in performance or other unwanted actions.
5. Disable all popup windows and auto-update functions.

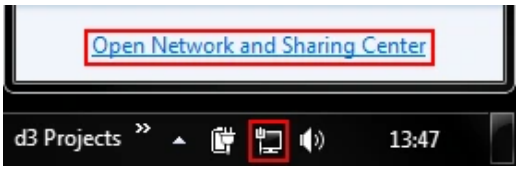
Set up IP addresses

To use Designer in a Director/Actor configuration, every Disguise machine needs to be set to a static IP address within the same network.

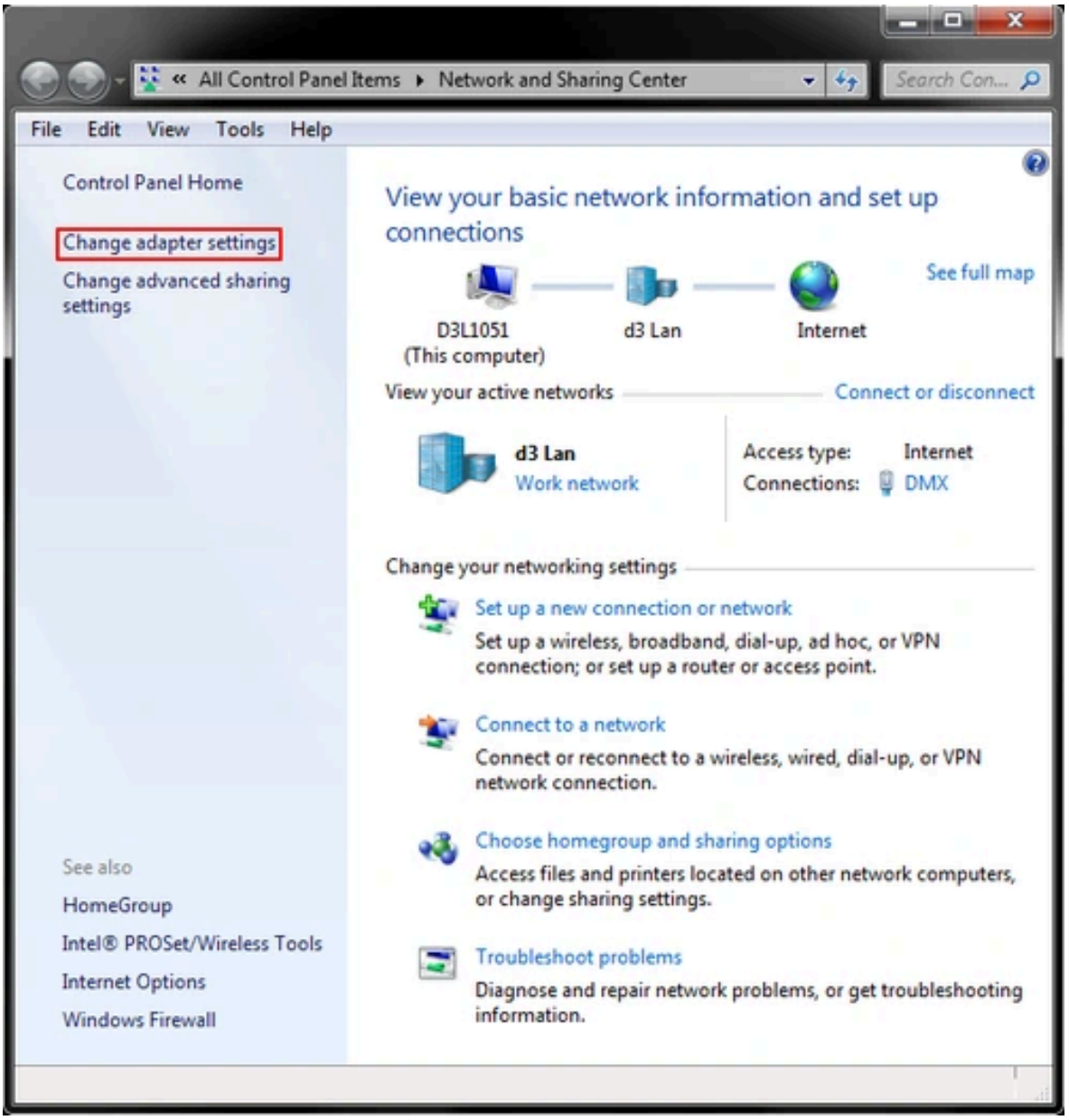
1. Open the Windows Network and Sharing Center (**Start menu > Control Panel > Network and Sharing Center** 8).

> Pressing **Windows + R** and running `ncpa.cpl` will also open this window.

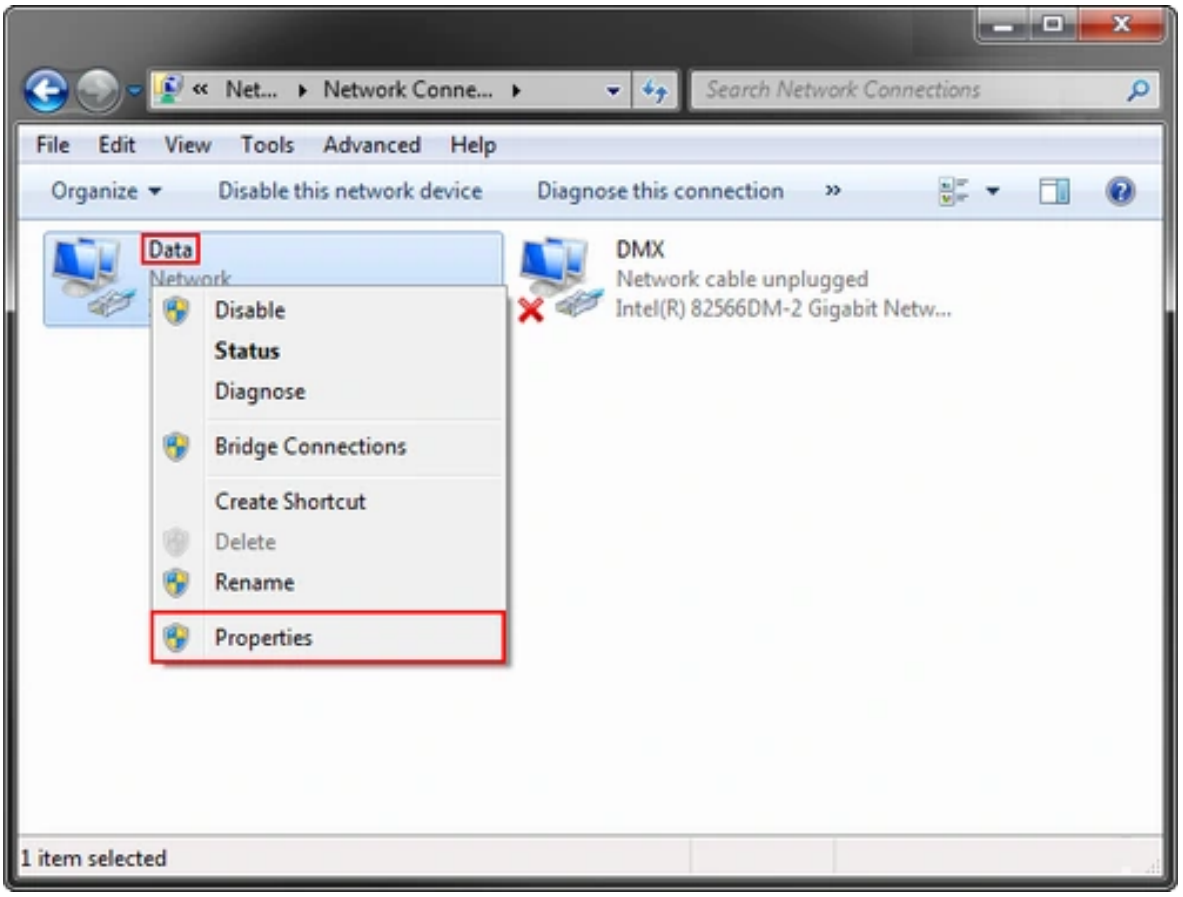
This window can also be opened by selecting the network icon in the task-bar (bottom right-hand corner of the screen) and selecting **Open Network and Sharing Center**.



2. Select **Change Adapter Settings** in the left hand panel.

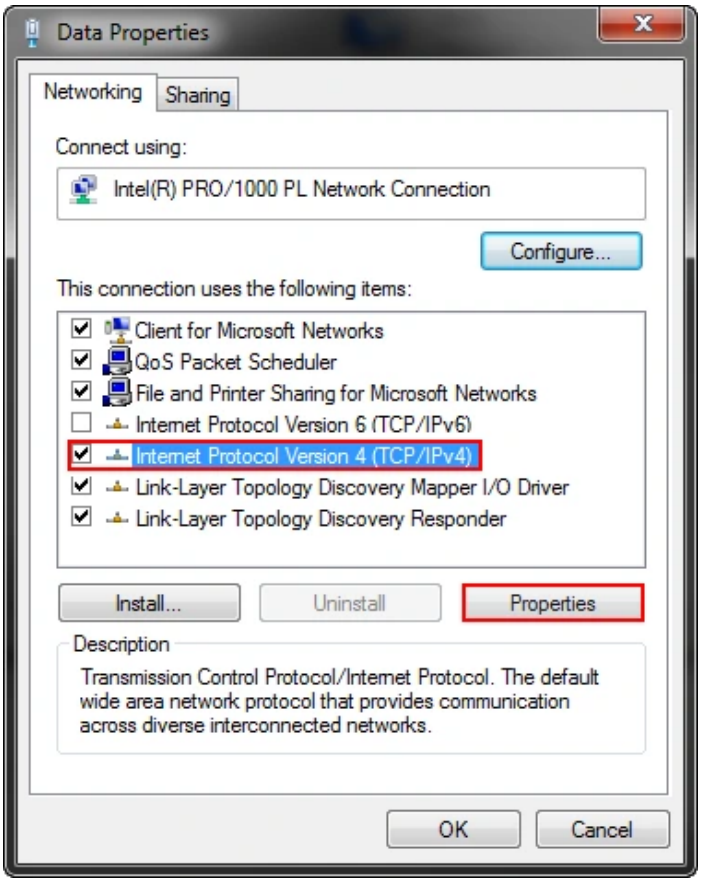


3. Right-click the Data port and select properties.



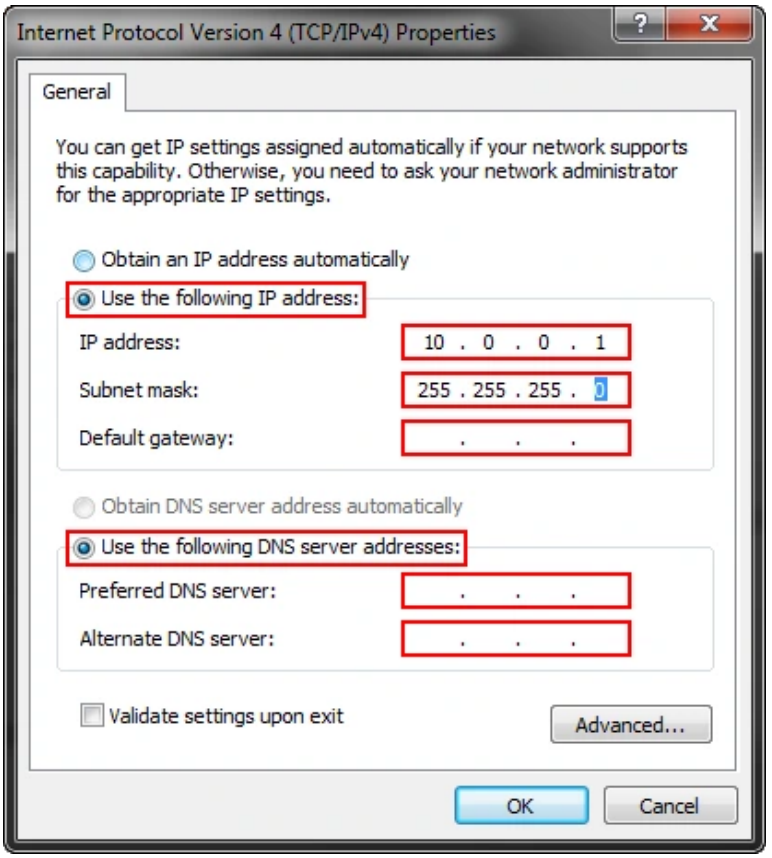
4. Untick the TCP/IPv6. This disables IPv6.

5. Select **Internet Protocol Version 4 (TCP/IPv4)** and select Properties.



6. Select **Use the following IP Address** and use something appropriate, like 10.0.0.1 or 192.168.0.1, and set the **Subnet Mask** to `255.255.255.0`.
7. Make sure to keep all Disguise machines on the same range, for example `10.0.0.xxx` or `192.168.0.xxx`, where xxx is any number from 1-254.

8. Leave the DNS server fields blank.

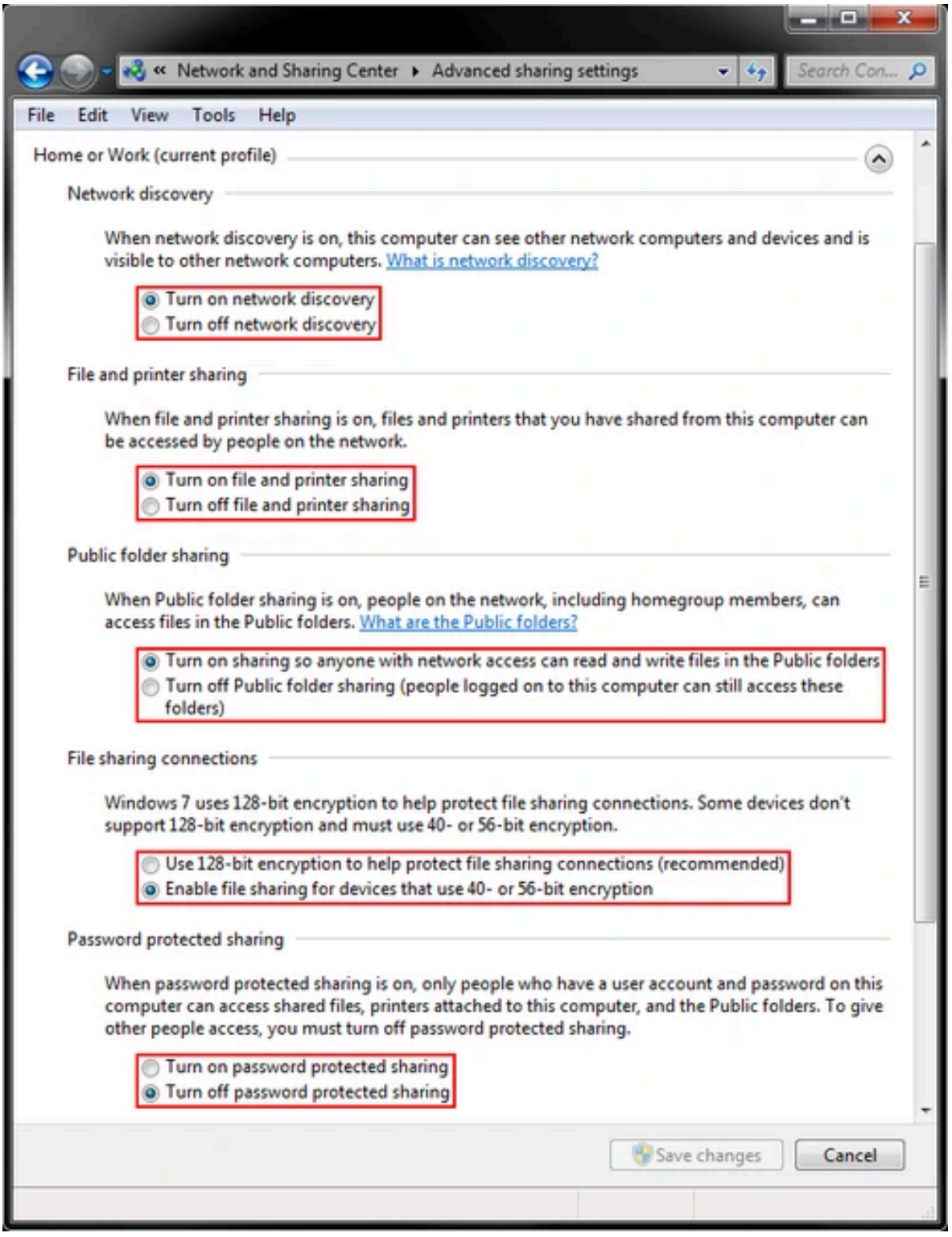


Set up sharing (Windows 8-10)

Set the same time, date and timezone to all machines in the network. To do this:

1. Open the Date and Time window (**Start menu > Control Panel > Date and Time**).
2. Select Change date and time to open the Date and Time Settings window, adjust the date and time accordingly and select **OK**. It may be useful to rename all computer names to what they represent in the Director/Actor network. For example, Actor 1 may be outputting to projectors 1 to 4 and should have a computer name **Actor 1** . In addition, all computers should be set to the same Workgroup.

3. To change a computer's name and workgroup open the System Properties window (**Start menu > Control Panel > System > Change settings**)

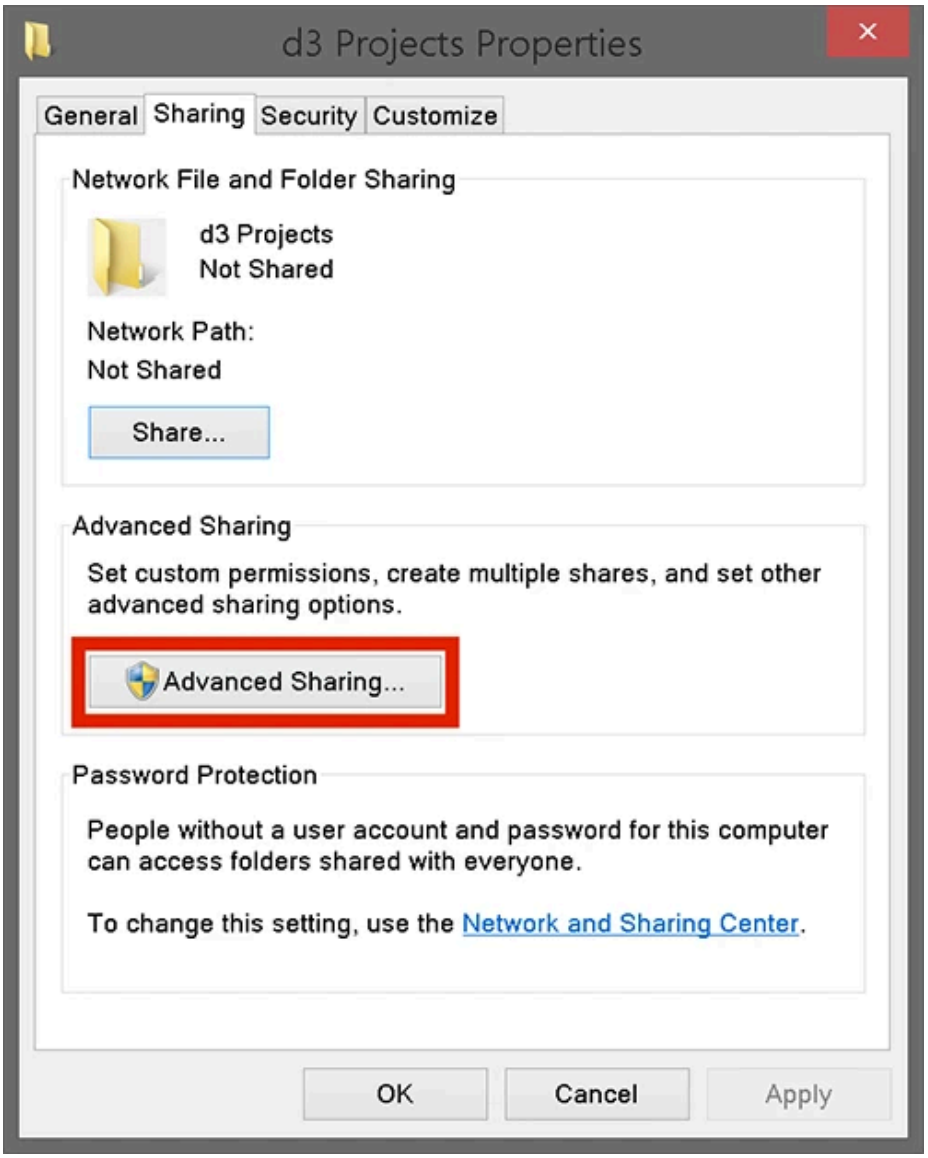


System Properties window is used to change the computers name and workgroup

In addition, the computer's sharing settings should be configured. To do this:

1. Open the Network and Sharing center (Start menu > Control Panel > Network and Sharing Center).

2. Select **Change Advanced Sharing Settings**.
3. Change the settings to those shown below and select **Save changes**.



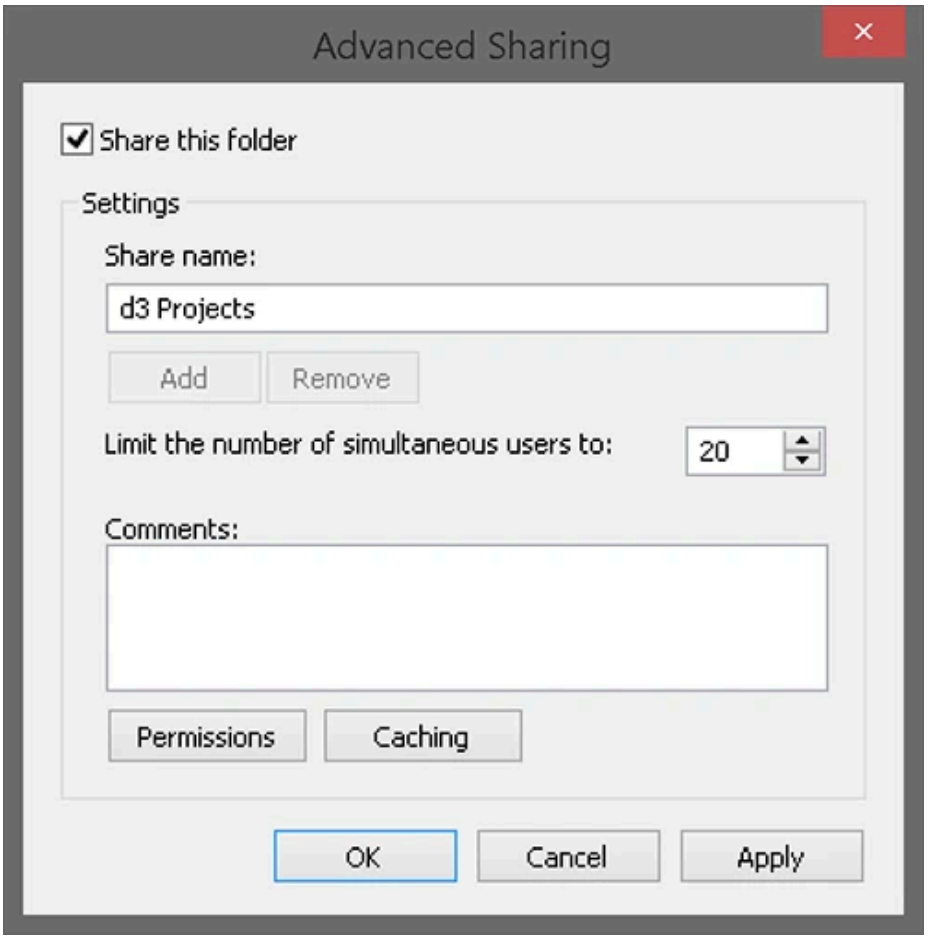
Share folders

It is very important that the specific Disguise Project folder is shared with the other computers on the network. When Installing Disguise, the shares should be built automatically however we can create these manually.

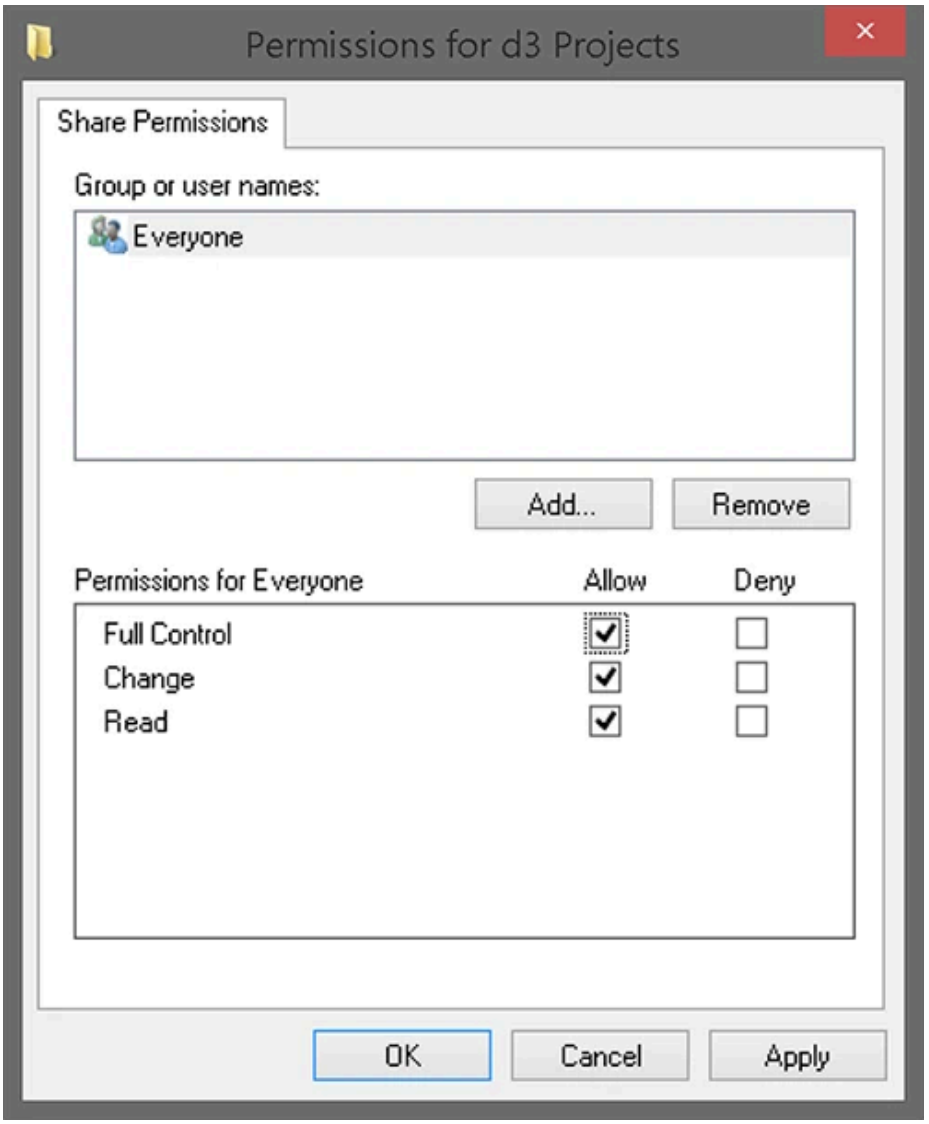
Follow the steps below to set up sharing permissions.

1. Open the File Sharing window by right-clicking the specific Project folder and selecting **Properties > Sharing > Advanced Sharing**. For information on where the specific Project folder is located please see the sub-chapter Projects location.
2. Set the Permission Level of the users **d3** , **Everyone** and **Guest to Read/Write**.

3. Right-click the d3 Projects folder and select properties from the context menu.



4. Click **Advanced Sharing...** under the sharing tab.



5. Tick the **Share this folder box** and set an appropriate share name.
6. Ensure sharing permissions are set to Read/Write for the users which have access. Please add a dedicated user if you want more granular control.

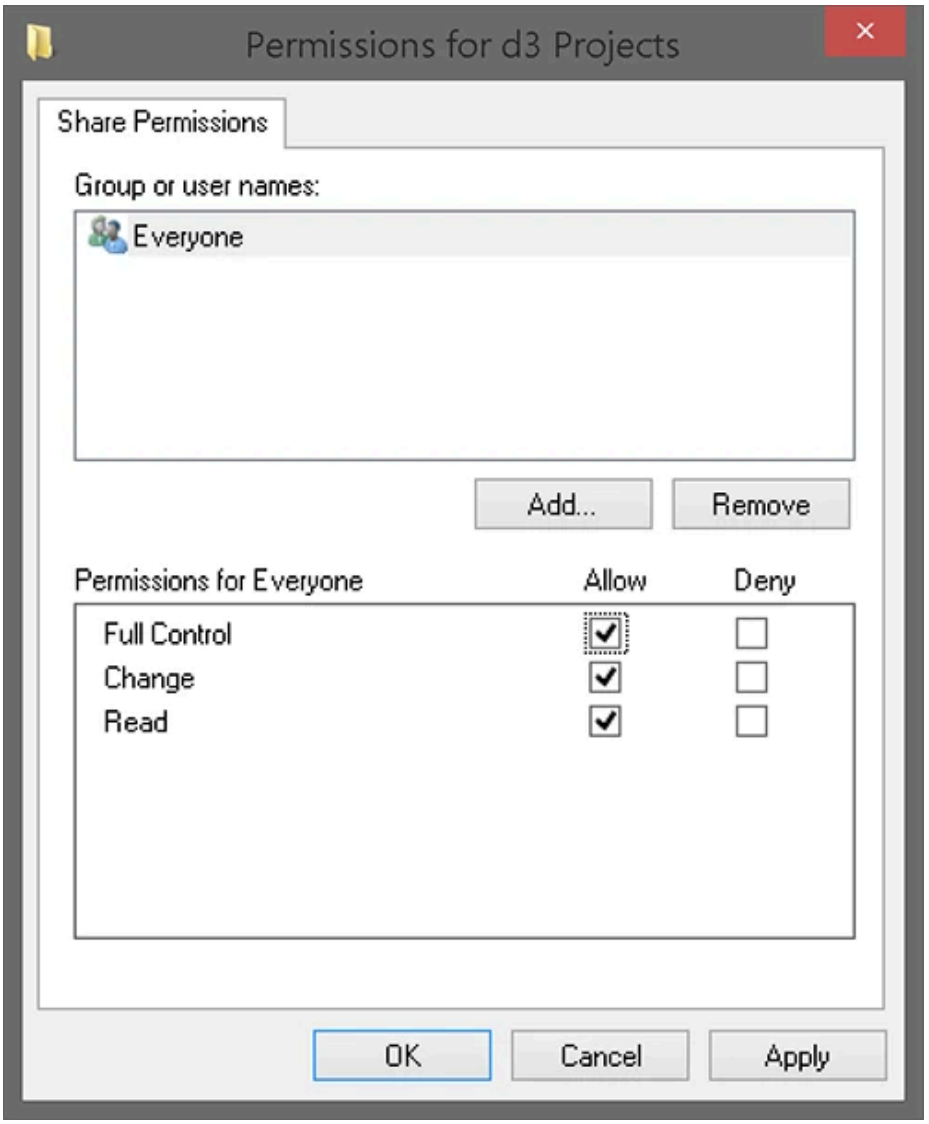
Home Group Settings

Please ensure that the HomeGroup of the computers is set to the same network. This will make it easier when using a Director/Actor configuration, as it will enable files to be shared between the computers on the network.

To change the HomeGroup:

1. Open the Network and Sharing center (**Start menu > Control Panel > Network and Sharing Center**).

2. Select HomeGroup (bottom left corner of screen) > What is a network location? > Work network.



3. Ensure that the computers are set to the same network.

Verify connections

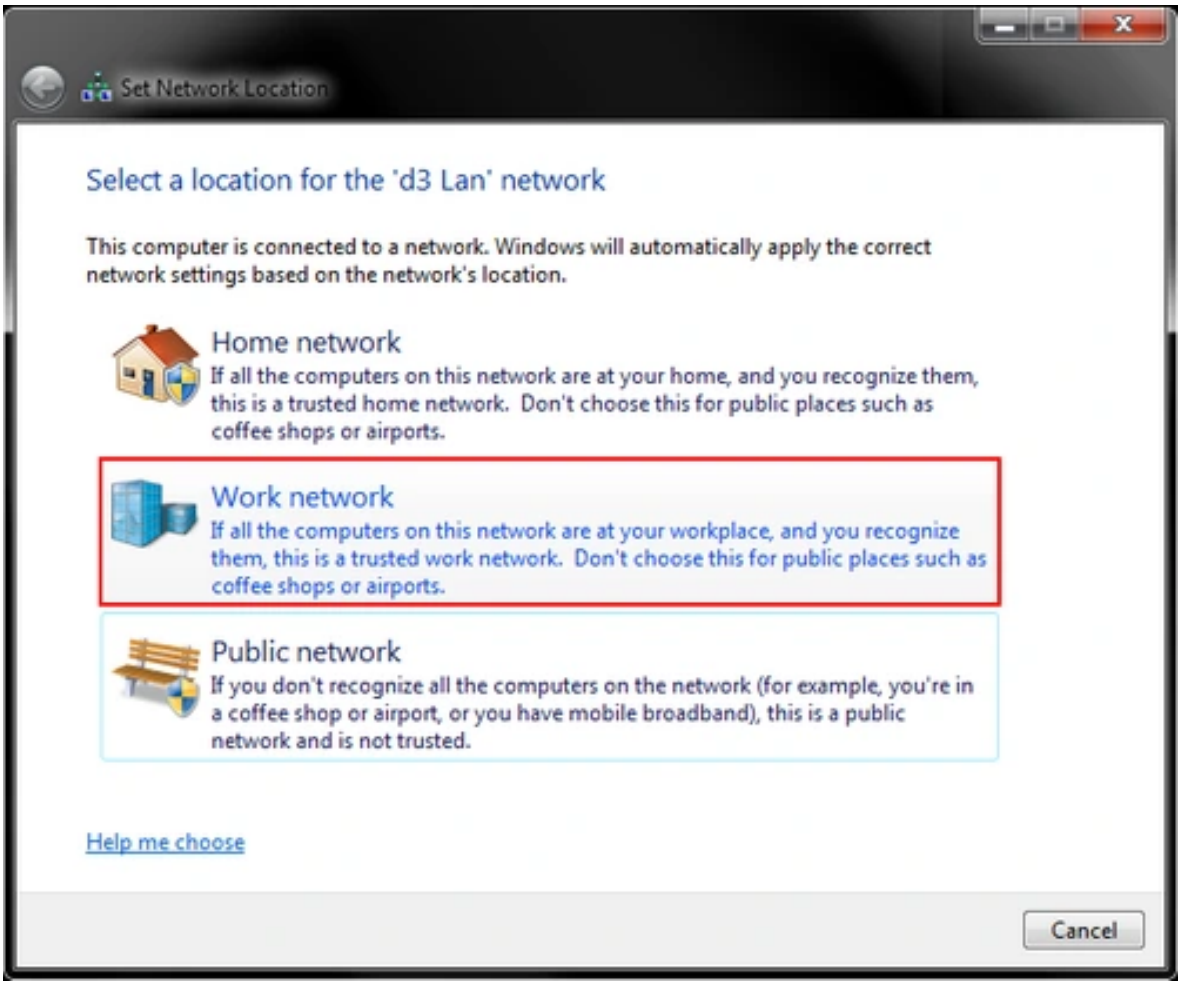
The Windows Command Prompt can be used to check the connections of the machines. To check the connections:

1. Open the Windows Command Prompt by selecting the Start menu (bottom left corner of screen), typing **cmd** into the text field, and selecting **cmd.exe**.
2. Use one of the Disguise machines, preferably the Director machine, to verify that all of the machines are responding by typing in a prompt according to the format:

- `ping[space]IPAddress`
- For example, `ping 10.0.0.65`

3. Hit **Enter**.

4. If the machines are responding correctly, the line **Reply from 'IP address: bytes=32** etc will appear. If there is an error, it will prompt **Request timed out**.



5. On the Director machine type Ping followed by its IP address and hit Enter, if the machines are responding the reply line as shown in this example will appear.
6. To check the current machines IP address type ipconfig/all and hit Enter.

> **Note**
>
> If using a Mac/OS X, you may access the shared folders on another machine by using the hotkey combination CMD+K and then typing in the connection server address using this syntax:
>
> `smb://Guest:@<d3_server_name>/d3 Projects`

Create shortcuts

1. Use the Director machine to access the specific Project folder for all of the Actor and understudy machines. For information on where the specific Project folder is located please see the Project location section.

2. Create a shortcut of the specific Project folder onto the Director machines desktop, clearly labelled with the project name and machine function. An example of a short-cut name would be **MyProject on Actor 11** and **MyProject on Understudy**.
3. Repeat the process for all of the Actor machines in the network, i.e. create a shortcut to the Director machines specific Project folder onto the desktop of every Actor machine. A quick way to access the machines in the local network is by selecting the Windows Start menu and typing in the machines IP address into the text field and hitting **Enter**.
4. On the machine's desktop, remove all of the icons that are not needed. Ideally, the only icons showing will be the machine name at the top left and the Windows bin (which cannot be removed). You may also want to create a custom background to the Directors desktop to highlight all of the shortcut folders.
5. Set the desktop background of all of the Actor to black to hide the Disguise logo at least during showtime.

Windows 11 Access permissions

Within Windows 11, when opening the network shares, it is common to see that the editor/remote PC will now open up a local copy of the d3 projects folder, instead of pointing to the correct network share. This is because guest authentication is no longer enabled by default.

The below registry changes can be deployed to enable the previous network share behaviour.

Set Windows permissions on non-Disguise servers.

Enable Insecure Guest Authentication via Registry Editor

1. Press **Win + R**, type **regedit.exe**, and press Enter to open the **Registry Editor**.
2. Navigate to the following path:
   `HKEY_LOCAL_MACHINE\SYSTEM\**CurrentControlSet\Services\LanmanWorkstation\Parameters`
3. Locate or create a **DWORD** (32-bit) Value named `AllowInsecureGuestAuth`.
4. Set its value to `1` to enable insecure guest authentication, or `0` to disable it.
5. Close the Registry Editor and restart your computer for the changes to take effect.

Disable Digital Signing Requirement via Group Policy

1. Press **Win + R**, type `gpedit.msc`, and press **Enter** to open the Local Group Policy Editor.
2. In the left-hand pane, navigate to: **Computer Configuration > Windows Settings > Security Settings > Local Policies > Security Options** Locate and double-click Microsoft network client: Digitally sign communications (always).
3. Select **Disabled**, then click **OK** to apply the change.
4. Close the Local Group Policy Editor. A system restart may be required for the changes to take effect.

Further information

- Project Location
- Advanced Network Settings

Ask AId3n

Ask AId3n is a sophisticated and versatile AI service powered by Google's cutting-edge Gemini 3 model series. This foundation provides a significant boost in performance, particularly in complex reasoning for scientific and technical fields, as well as advanced code generation for developers. Its most powerful feature is being natively multimodal, allowing it to seamlessly understand and interpret combined inputs from text, images, audio, and video. This makes the service highly adaptable for various business needs, all while offering flexible and cost-efficient options suitable for different scales of operation.

Here are its key capabilities:

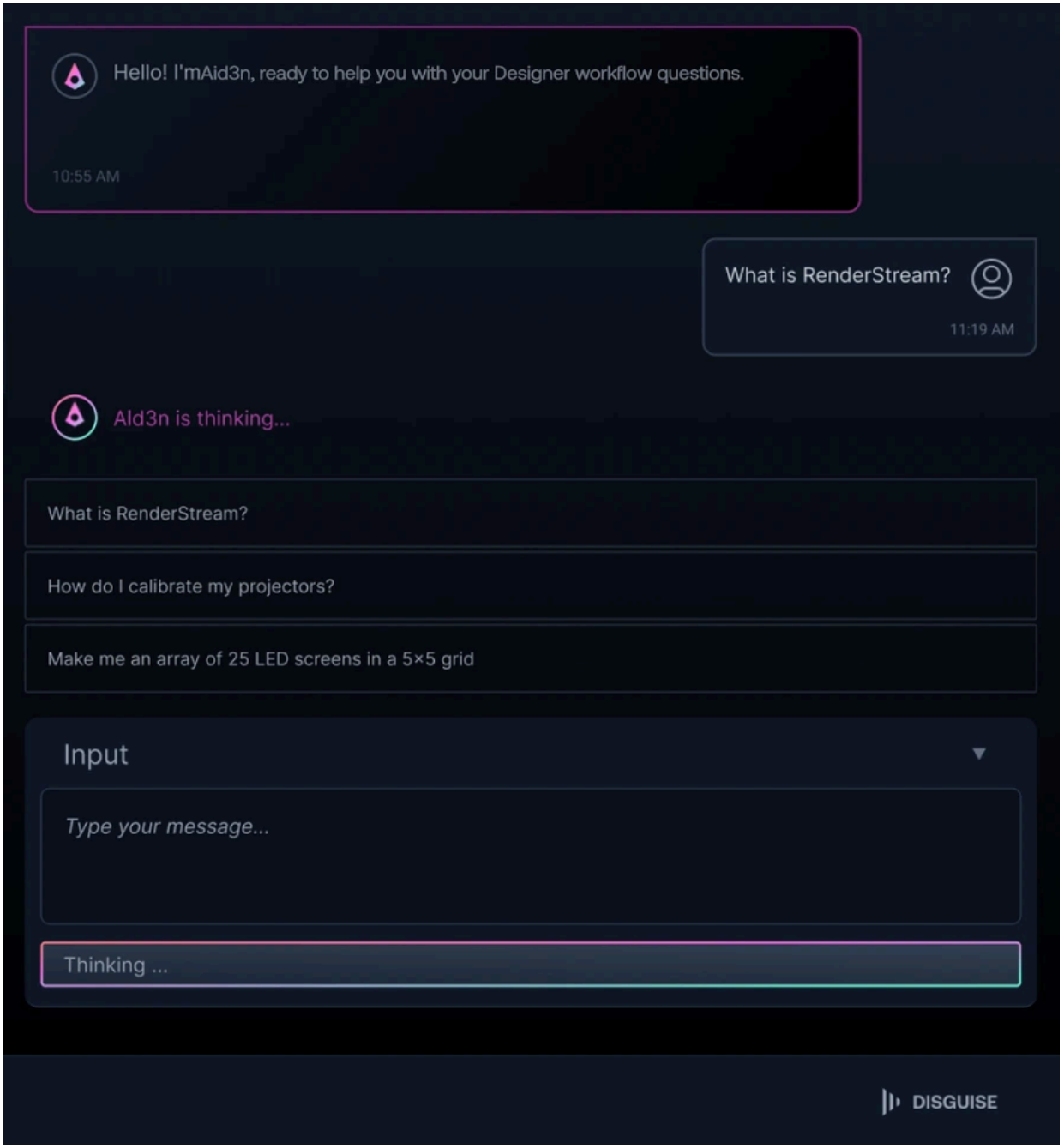
- Advanced AI Engine: Utilises the Google Gemini 3 model series, ensuring state-of-the-art performance and access to the latest AI advancements.
- Superior Reasoning and Coding: Demonstrates enhanced logical capabilities, excelling at math and science benchmarks, and can generate functional code for web development tasks with ease.
- Native Multimodality: Can process and understand a mix of inputs simultaneously across text, audio, images, and video, allowing for more complex and context-rich interactions.
- Optimised for Key Tasks: Ideally suited for a range of practical applications, including high-quality summarization, powering intelligent chat applications, automated media - captioning, and precise data extraction.
- Cost-Efficient and Scalable: Offers different model tiers, like Flash and Flash lite, providing flexible and budget-friendly solutions for businesses of all sizes.

You can ask questions like:

> *"What is RenderStream?"*

> *"How do I calibrate my projector?"*

> *"Create a grid of screens displaying rainbow content."*

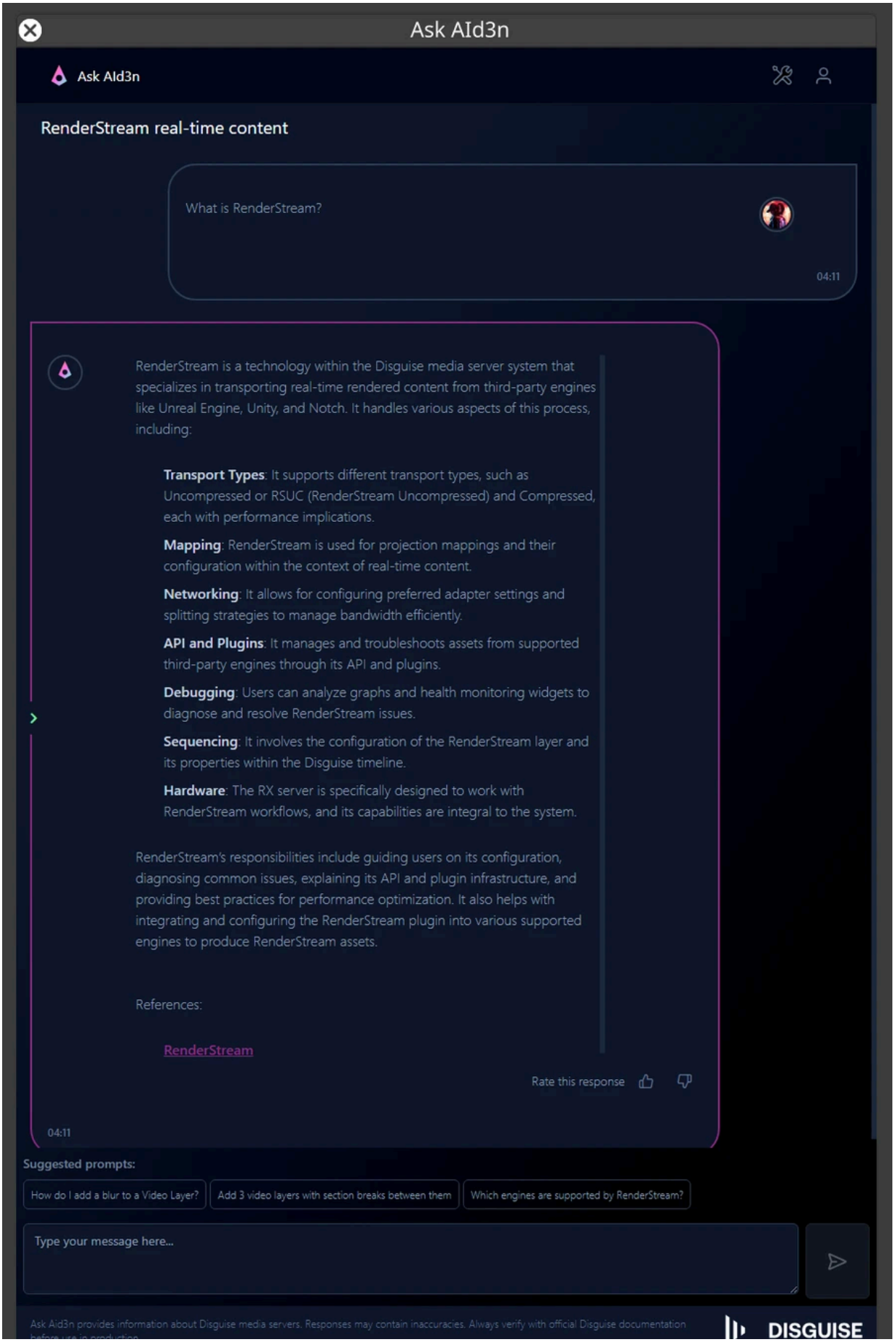


Ask AId3n

Features

Interactive Chat

Natural language conversation is a way for computers to understand and respond to human language in a conversational manner about Designer. It provides context-aware responses drawing from Disguise's help documentation, common workflows, best practices and technical specifications. Ask AId3n has the ability to ask follow-up questions and seek clarification.


Ask AId3n
Ask AId3n
RenderStream real-time content
What is RenderStream?
04:11
RenderStream is a technology within the Disguise media server system that specializes in transporting real-time rendered content from third-party engines like Unreal Engine, Unity, and Notch. It handles various aspects of this process, including:
Transport Types: It supports different transport types, such as Uncompressed or RSUC (RenderStream Uncompressed) and Compressed, each with performance implications.
Mapping: RenderStream is used for projection mappings and their configuration within the context of real-time content.
Networking: It allows for configuring preferred adapter settings and splitting strategies to manage bandwidth efficiently.
API and Plugins: It manages and troubleshoots assets from supported third-party engines through its API and plugins.
Debugging: Users can analyze graphs and health monitoring widgets to diagnose and resolve RenderStream issues.
Sequencing: It involves the configuration of the RenderStream layer and its properties within the Disguise timeline.
Hardware: The RX server is specifically designed to work with RenderStream workflows, and its capabilities are integral to the system.
RenderStream's responsibilities include guiding users on its configuration, diagnosing common issues, explaining its API and plugin infrastructure, and providing best practices for performance optimization. It also helps with integrating and configuring the RenderStream plugin into various supported engines to produce RenderStream assets.
References:
RenderStream
Rate this response
04:11
Suggested prompts:
How do I add a blur to a Video Layer?
Add 3 video layers with section breaks between them
Which engines are supported by RenderStream?
Type your message here...
Ask Aid3n provides information about Disguise media servers. Responses may contain inaccuracies. Always verify with official Disguise documentation
DISGUISE



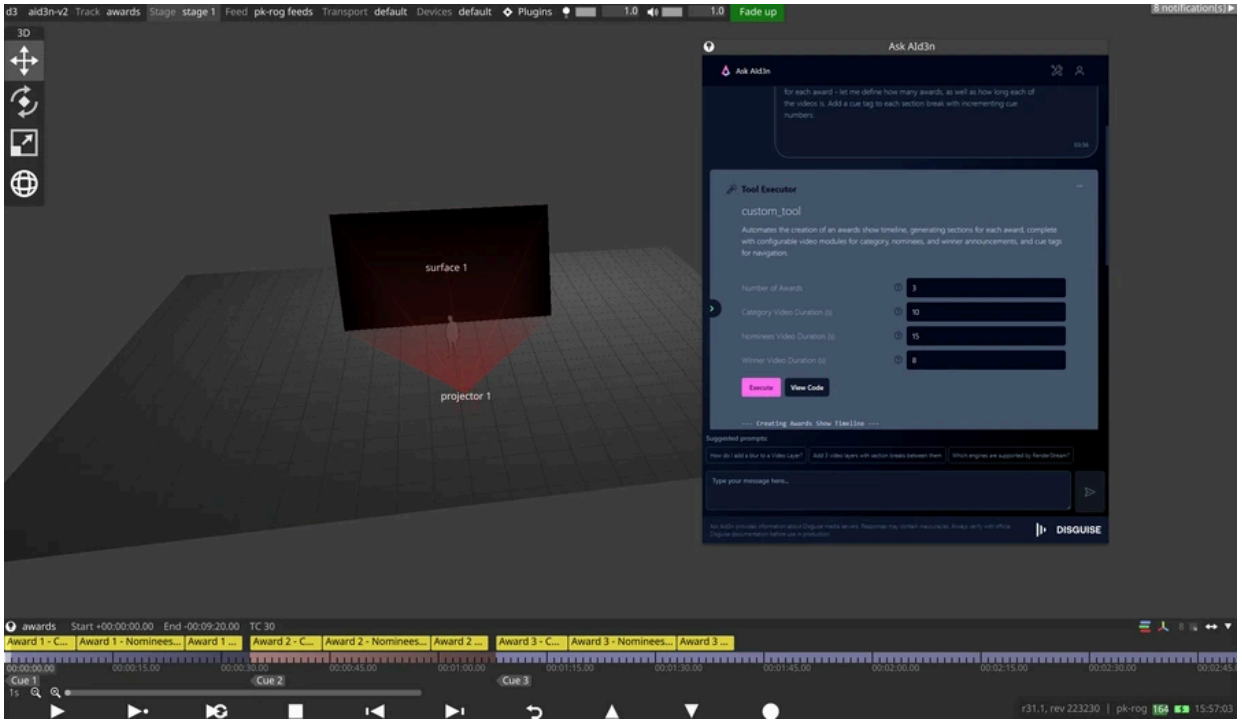
Ask AId3n provides sources for the knowledge it shares, linking back to the Disguise user guide.

Help Documentation Integration

Ask AId3n offers intelligent search through Disguise's documentation, providing quick access to relevant information. During chat interactions, it suggests helpful articles and provides direct links for easier navigation. Additionally, it leverages documentation context to enhance log analysis, ensuring more accurate insights. For convenience, AId3n is also cached, allowing offline access or use within a local network.

Tool Generation

Ask AId3n is able to generate tools which interact with Designer. Tools can be generated by prompting - things like 'make me a script' or 'write a tool' will result in a tool approval, followed by the tool itself being generated. Tools are written using Python - you can view the code inside the UI as well.



Access your custom tools via the Tool Browser

Prerequisites

- Internet connection
- Designer Pro license

- Sign-in to Disguise Cloud using d3Manager

Install the Plugin

It is not necessary to install the Ask AId3n plugin on the same machine running Designer. However, it should not be a Disguise server.

1. Download the plugin from the Plugin Gallery.
2. Unzip the folder into your plugins folder - this can be installed either in the projects folder `plugins` or inside your `common` folder to make it work for all projects on that machine.

The plugin will automatically become available in Designer once copied into the project. When you open the project, it will use your Disguise Cloud account to authenticate and activate the plugin.

Using Ask AId3n in Designer

To use the plugin, open it from the Plugin Launcher by clicking the Ask AId3n icon. The plugin will load and you can ask questions using the chat box at the bottom of the window. Responses will be generated, and the response fed back in the interface.

Uninstall Ask AId3n v1.0.0

Ask AId3n v1.0.0 ran locally - this application can now be removed since v2.0.0 is powered by Disguise Cloud. To uninstall:

1. Close Designer.
2. Quit Ask AId3n.
3. Open **Add or remove programs**.
4. Search for Ask AId3n.
5. Right-click ..., then click **Uninstall**.
6. Restart your machine.

If you find any Ollama files, we recommend checking for and deleting files from the following locations:

- `C:\Users[username]\AppData\Local\disguise\assistant`
- `C:\Program Files\Ask AId3n`

Plugin Gallery

View all of the available Designer Plugins in the Plugin Gallery.

Latest Release

The latest release of Ask AId3n is v2.4.1, available for download here.

Ask AId3n Release Notes

Release notes (v2.4.0)

- Code view now shows inline Python definitions of Disguise Python elements.

Previous Releases

> ### Release notes (v2.2.0)
>
> - Now uses Google Gemini 3 - a more powerful AI model series.
> - General performance improvements.

> ### Release notes (v2.1.0)
>
> - Introduces a new tool called `Interact with Designer` which allows AId3n to run short snippets of Python in your project to interrogate the project and make small changes, without needing to generate a full user tool.
> - General performance and bug fixes.

> ### Release notes (v2.0.2)
>
> - Prompt improvements to assist AId3n with answering queries and generating tools.
> - AId3n will now perform knowledge retrieval multiple times if needed.
> - UI improvements to assist with consistent look and feel across the app.

> ### Release notes (v2.0.1)
>
> - Now uses Google Gemini 2.5 - a more powerful AI model.
> - Includes Tool Generation - AId3n can generate code to interact with your d3 project.
> - Credits are required - tool credits are allocated to all Pro (paying) customers.

> ### Release notes (v1.0.1)
>
> - Added more logging to Ask AId3n standalone app.
> - Improved the suggested next prompts when interacting with Ask AId3n.
> - Added EULA to the Ask AId3n installer.
> - Updated the icon to Ask AId3n plugin.
> - Refined some under the hood prompts to provide better knowledge retrieval.
> - When upgrading Ask AId3n, the knowledge is rebuilt.

- Added status information about knowledge building in the Ask AId3n UI.
- Made the installer simpler to use by removing the prompt to download Ollama.
- Fixed links in the Ask AId3n responses so they generate proper usable URLs.

Chromium Web Integration

To add Web-based functionality for our Web layer and Plugin Framework, Designer embeds a version of the Chromium web browser via libCEF (Chromium Embedded Framework).

Support for features in HTML, CSS, JavaScript and other web standards is dependent on the particular version of Chromium integrated within a given release.

To ensure compatibility, it's vital to know which version of Chromium your plugin or webpage is targeting and whether it's supported in a given Designer release.

Version information

Designers Chromium support can be viewed in the table below:

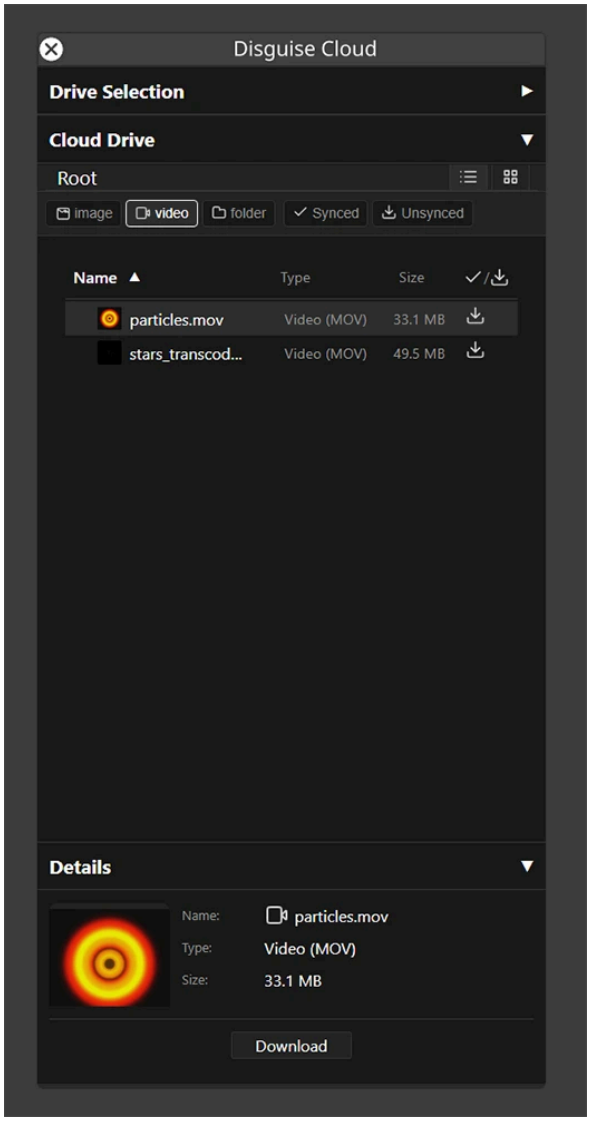
Designer Version	Chromium version
r31.2 or higher	137.0.7151.121
r30.4 to r31.1	132.0.6834.161
r23.0 to r30.3	106.0.5249.61
r21.3 to r22.3	101.0.4951.54
Less than r21.3	71.0.3578.80

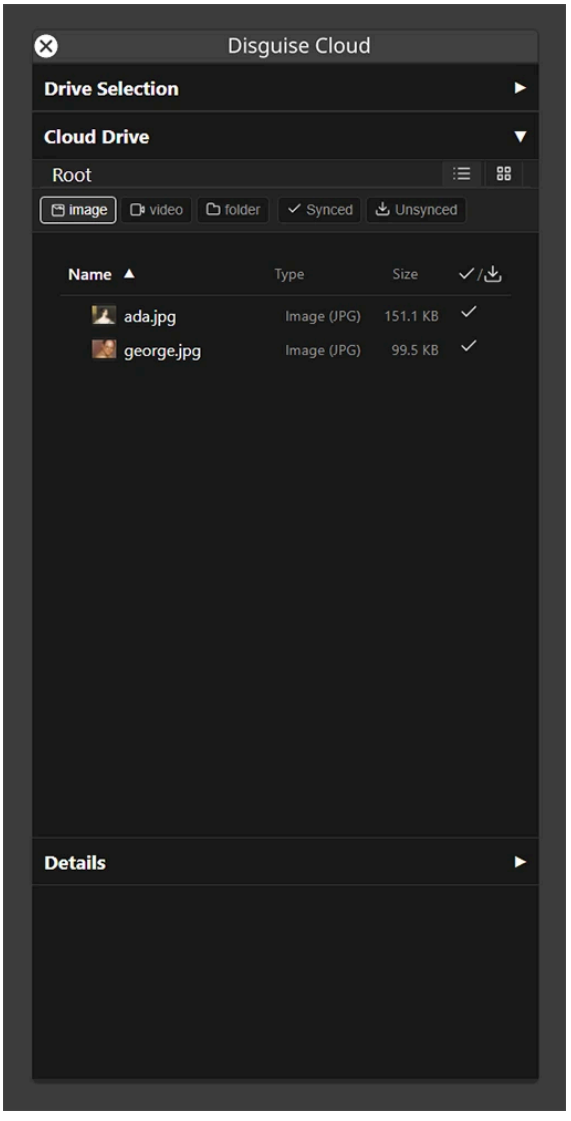
Selecting a version by feature

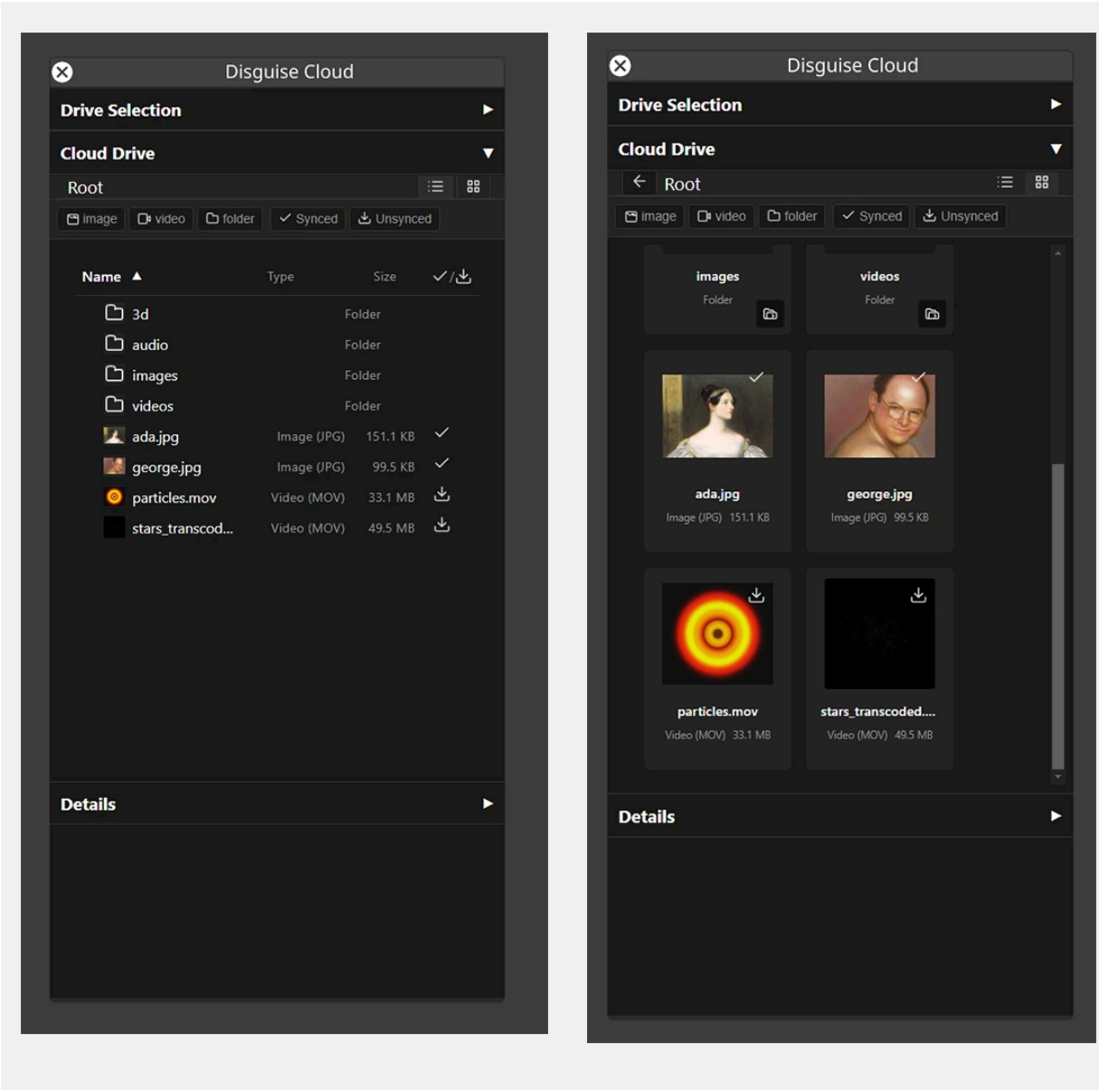
If you want to use a specific feature, these can be found on the **Chrome Status** page, where you can search for a particular HTML/CSS feature and determine which version of Chromium supports it.

Disguise Cloud Media Browser Plugin

Disguise Cloud Media Browser Plugin enables media browsing from your Disguise Cloud Drive to streamline media asset imports. You can browse and download media assets directly from Disguise Drive to your Designer project. Downloaded files automatically import to the appropriate folders ready for you to implement in your creative projects.





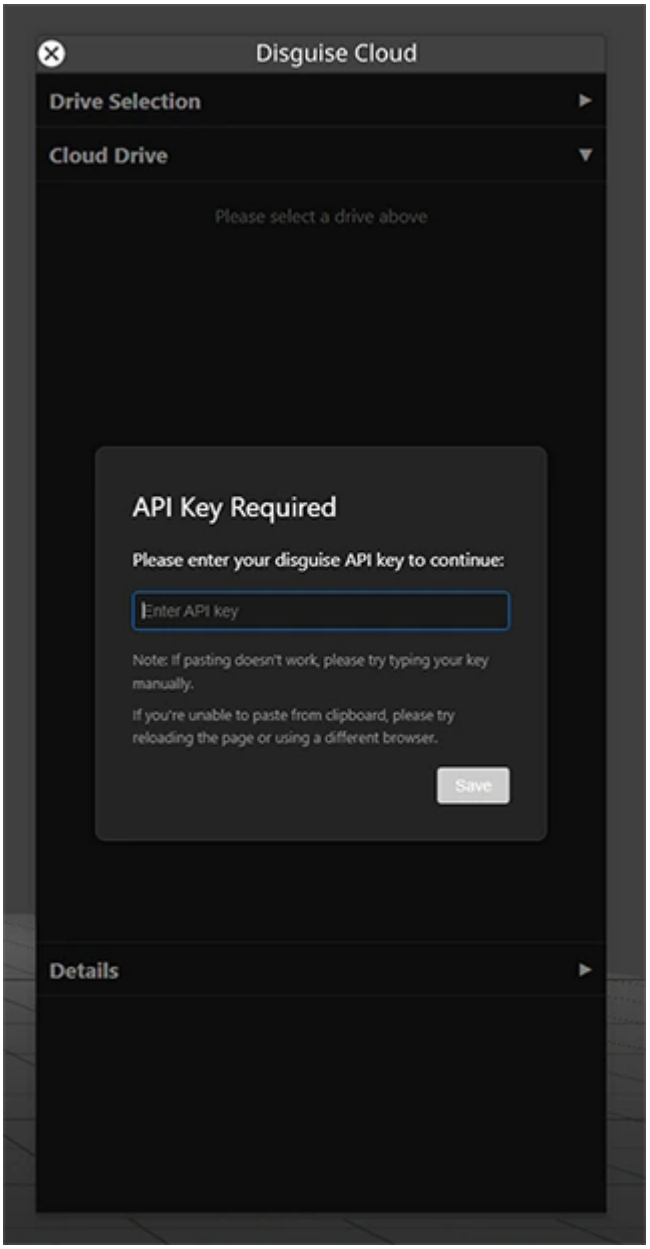


Install the Plugin

To configure this plugin:

1. Log in to your Disguise Cloud account.
2. Generate an API key by opening the Profile Menu and selecting **Organisation Settings > Integrations > Create New Token**.
3. Name the key, and click **Create**.
4. Copy the API Token.
5. Open **Designer**.
6. Click **Plugins** to access the Plugin Launcher.

7. Click **Disguise Cloud** to open the Disguise Cloud Media Browser Plugin.



8. Enter your API key.
   This will be stored as a Note (`disguise-drive_api_key`) in your d3 project. To open **Notes**, right-click **d3** and click **Notes**.
9. Click **Disguise Cloud** to open the Disguise Cloud Media Browser Plugin.
10. Browse and manage your Cloud media.

Using the Plugin

With this plugin, you are able to browse your media and you can select media and it downloads into your project and automatically be added to the correct d3 Project folder. You

can view this list of media in grid view in list view.

You can also see which media that already exists in your project, or which do do not have in your local d3 project.

This only downloads these files onto your current machine, and it will not sync across the network automatically. Read more about our standard media distribution method here.

Designer Plugins

The Designer Plugin Framework is a powerful system that enables extensions to the Designer GUI through HTML-based plugins, which are able to call into the underlying code for Designer using a Python API. These are also documented **here**.

These plugins appear as widgets within the Designer interface and can:

- Process commands from Designer's own API, enabling two-way interaction with the Designer system to get and set values as required throughout your project.
- Integrate with third-party equipment such as LED processors and tracking systems, to allow local control of devices throughout your project network.
- Create seamless user experiences and custom workflows, linking together common functions to save you time and customise your workflow.

Plugin Interface

Plugins appear as widgets inside Designer, with each widget hosting an HTML page which is rendered and updated when needed. Each Plugin widget in Designer can be:

- Opened and closed as needed.
- Pinned to the interface.
- Moved and resized like other Designer widgets (as long as the plugin implementer has enabled this).
- The notification bar shows the download progress of files retrieved by the plugin.

Plugin Launcher

The Plugin Launcher is where you access Plugins from within Designer. It displays all available Plugins in your project, including:

- First-party Plugins (published by Disguise).
- Third-party Plugins (developed by users or equipment vendors).

Each plugin will display as an icon (supplied by the plugin implementer) within the Plugin Launcher.

Usage

To access the Plugin Launcher, click the **Plugins** button in the dashboard. The Plugin Launcher will open and show you the available Plugins.

To open an individual plugin, just click it's icon.



Plugin Types

There are two main types of Plugins, determined by where they are installed.

Local Plugins

- Local Plugins are installed in the d3 projects folder within the server you're operating on. These typically consist of only HTML and Javascript, and do not have a back end service talking to other devices or performing processing outside of the javascript and API calls.
- Typically, these are downloaded as packages and unzipped into the `\Plugins\` directory of the project folder (the same level as `\Objects\`)
- If you want Plugins to be available across all d3 projects on a machine, you can install them to a `\Plugins\` folder within the `\Common\` folder in d3 Projects, to make them appear in all d3 projects on your system.

Remote Plugins

- Remote Plugins are plugins which have been discovered over the network using DNS-SD.
- These plugins can be stand alone and installed on a separate machine, or integrated into a piece of hardware - for example an LED processor vendor may choose to implement a Designer Plugin within their LED processor, meaning that their plugin will appear in Designer whenever a Designer session is connected to the processor on a network.
- No manual installation is required, these Plugins will dynamically appear and disappear as the device hosting the plugin comes onto the network.
- Plugins are automatically available when discovered.

Available Plugins

Please refer to the Designer Plugin Gallery for a list of available Plugins.

Installing Plugins

Installing Local Plugins

1. Download the plugin package.
2. Unzip into your project's `\Plugins\` directory.
3. Follow the steps included in each Plugin's documentation to add any required API key.

Installing Remote Plugins

All available plugins are automatically discovered on your network.

To explore all available plugins, access documentation, and download plugins, visit the Plugin Gallery.

Disguise Plugins on iPhone and iPad

You can download and install the Disguise Plugins iOS App from the App Store. Learn more here.

Development

Requirements

- Designer installation required for both development and use.
- Knowledge of HTML/JavaScript is needed for front-end development. Sample code is provided for Vue.js.

- For developing a back-end application, the platform you choose is up to you. Sample code is provided in Python.

For detailed development documentation and code samples, please refer to the **Developer Portal**.

Disguise Plugins iOS App

The free Disguise Plugin iOS App remotely controls Designer plugins from an iOS device such as an iPhone or iPad.

This enables the creation and triggering of media assets, such as AI-generated video, directly from a remote interface and allows for rapid content iteration and on-the-fly adjustments without direct access to the Designer workstation. The system is designed for production environments where roles are distributed, such as in virtual production stages or live event scenarios.



Disguise Plugins iOS App open on and iPhone

System Requirements & Prerequisites

Before proceeding, ensure the following conditions are met:

- Designer r30.7 or later installed on a licensed machine.
- iOS Device: iPhone or iPad running iOS 18.4 or later.

The Designer machine and the iOS device must be on the same secure, stable local area network (LAN).

The specific plugin you wish to control (e.g., Pulse Plugin) must be installed and activated within the Designer project. For more information about plugin setup, see Designer Plugin Overview.

Installing the App

1. Click here to go to the Disguise Plugins in the Apple App Store, or search for **Disguise Plugins**.
2. Click **Get** to download and confirm that you wish to install the app.

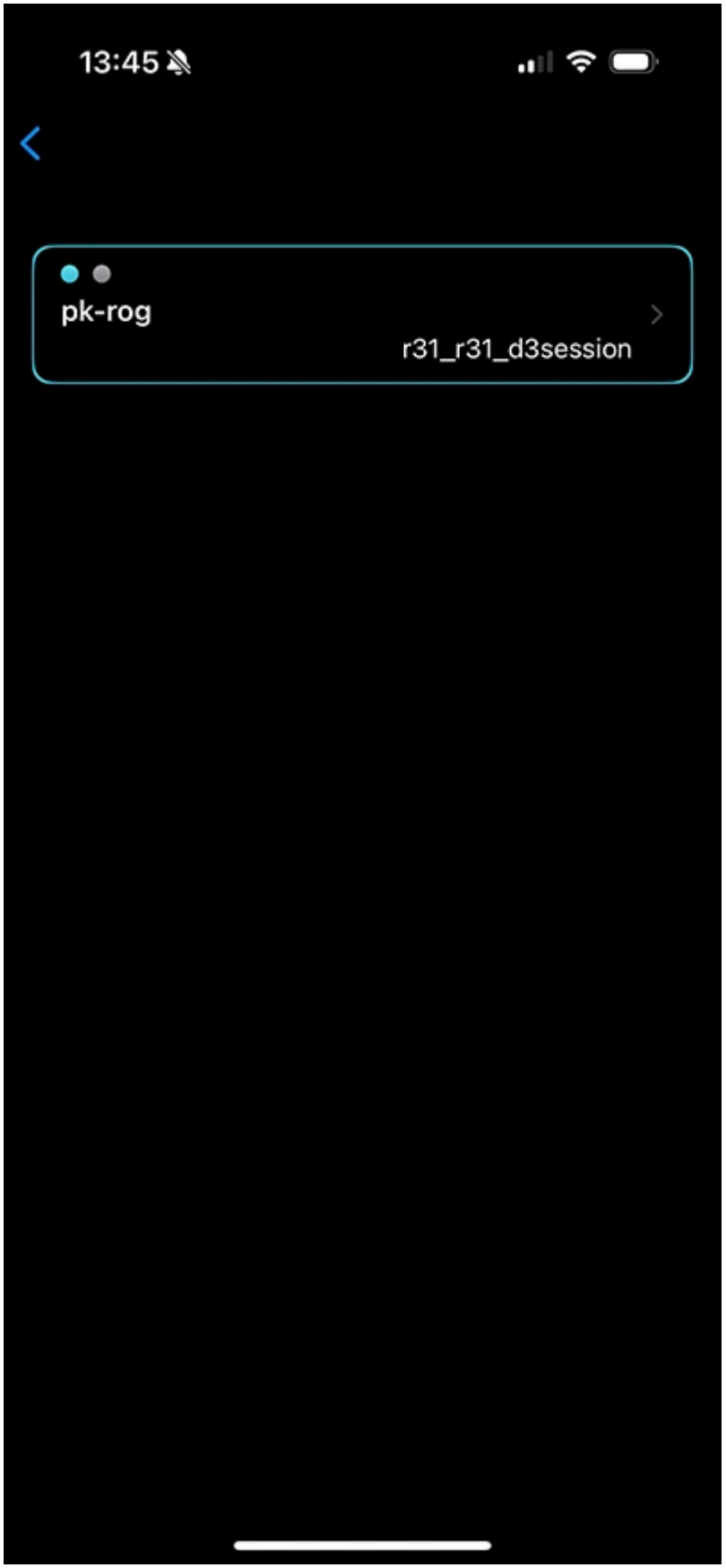


3. Click **Install**.

4. Click **Open**.
5. Click **Allow** to allow the app to find devices on local networks.

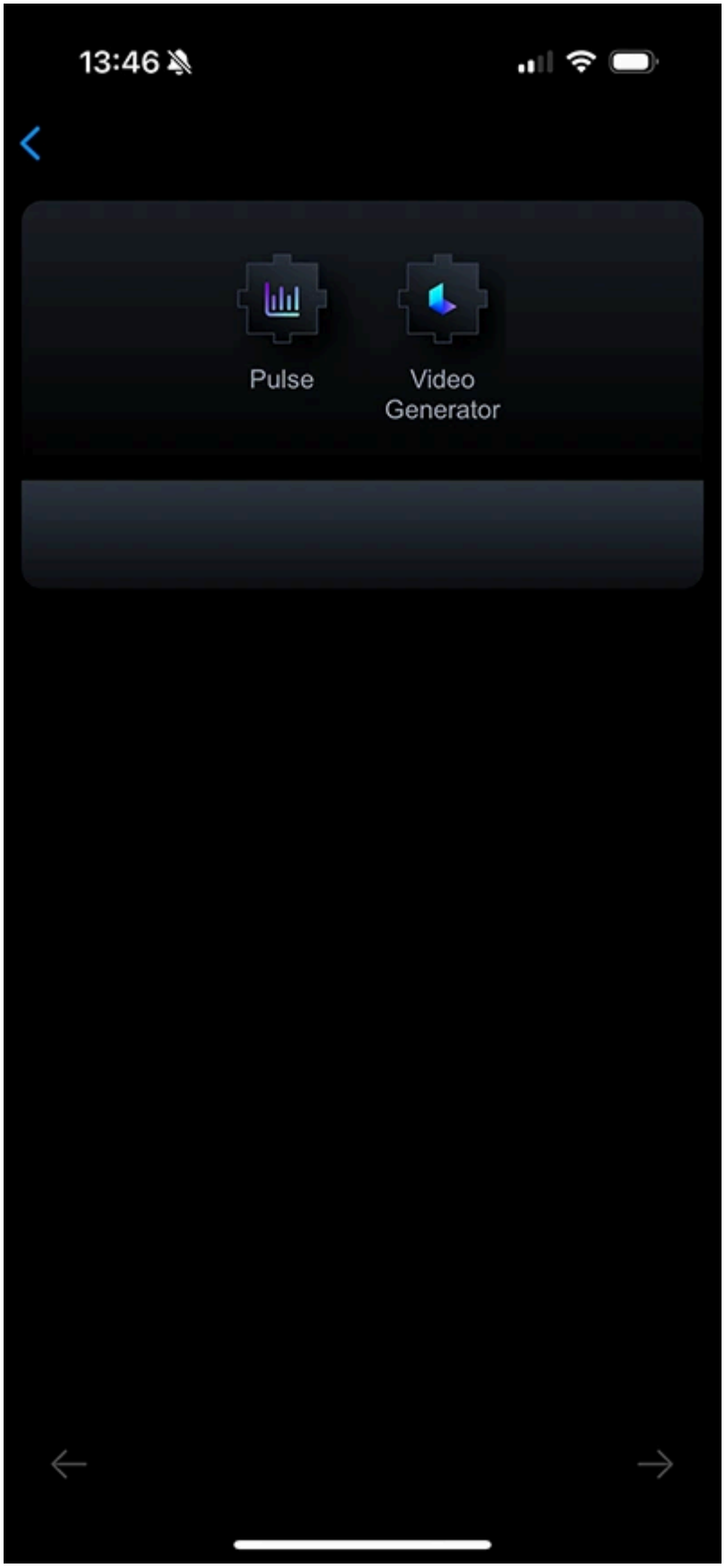
Using the App

1. Click **Connect** to discover Disguise machines on your local network.



2. The app will display a list of machines with active d3Net sessions for you to connect to.

3. Touch on a session to connect to it, and display the Plugin Launcher

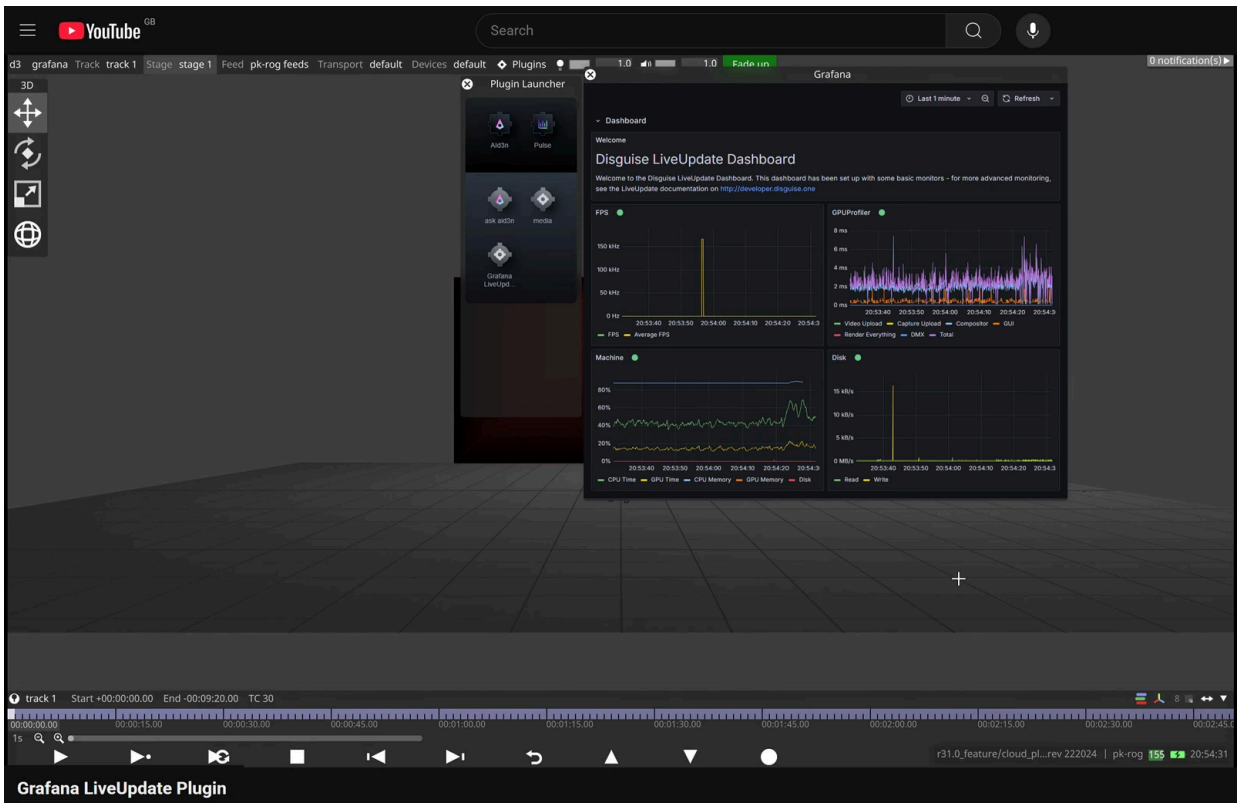


4. From there any plugin can be launched and interacted with as if you were working natively in the Designer Plugins native UI.

Grafana LiveUpdate Plugin

The Grafana LiveUpdate plugin enables real-time streaming of Disguise performance metrics and system data to Grafana dashboards using **Grafana Live**'s WebSocket-based streaming capabilities.

Built to leverage the **Live Update** web sockets introduced in Disguise r31.0, this plugin provides seamless integration with Grafana's observability platform, allowing teams to monitor their Disguise systems in real-time alongside other infrastructure metrics.



Click on the image to watch the video demo in YouTube.

Features

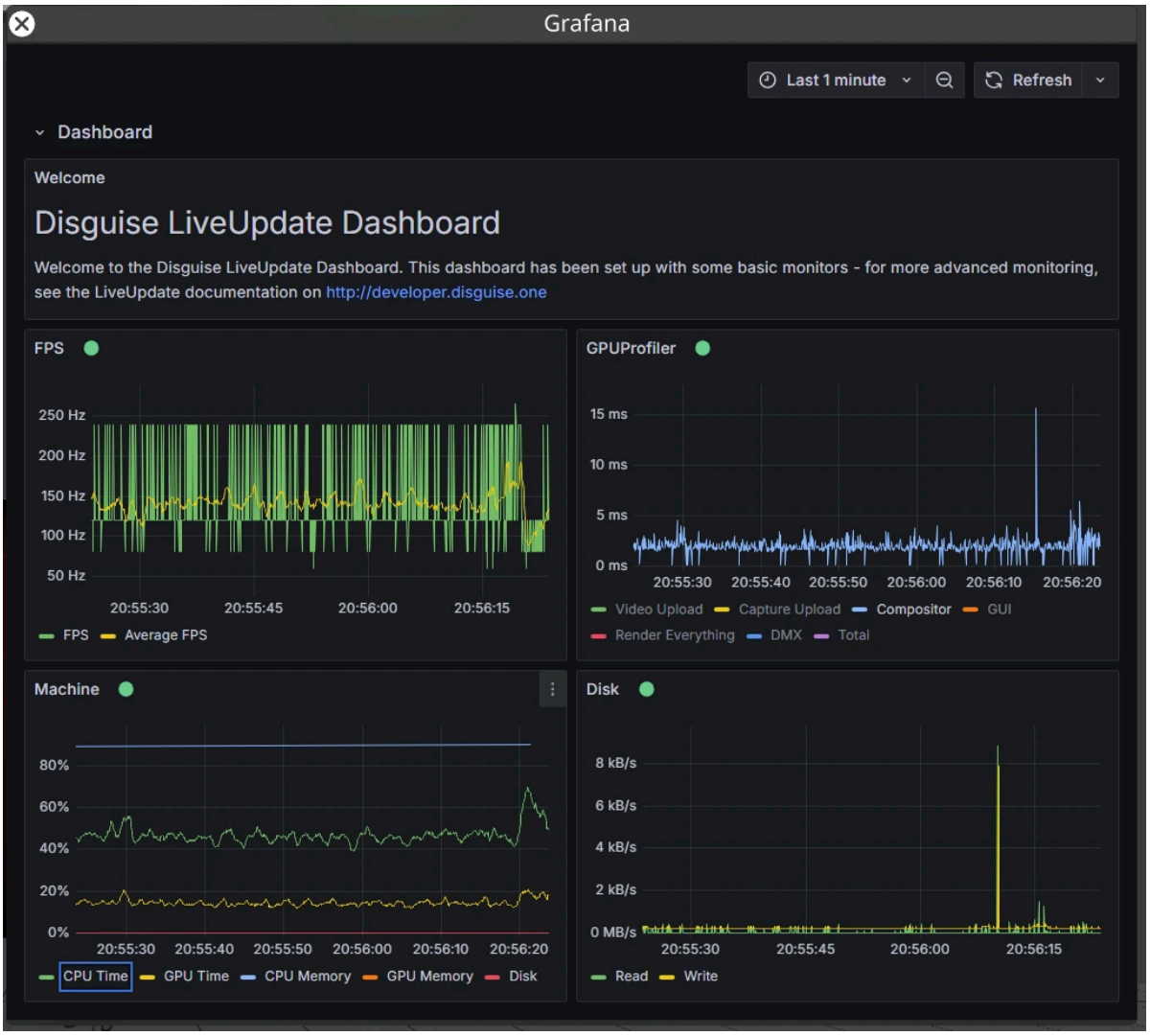
- Real-time streaming of Disguise metrics to Grafana dashboards.
- WebSocket-based live data updates with sub-second latency.
- Integration with Grafana Live streaming API.
- Support for custom metric collections and alerting.
- Historical data retention and analysis capabilities.
- Multi-machine monitoring in distributed setups.
- Custom dashboard templates for Disguise workflows.
- Compatible with Disguise r31 and newer.

Install the Plugin

System Requirements: The Grafana LiveUpdate plugin requires Disguise r31 or newer and a Grafana instance with Live streaming enabled.

To install this plugin:

1. Ensure you are running Disguise r31 or newer, and have Docker installed on your computer.
2. Download the **Grafana LiveUpdate** plugin package from the Designer Plugin Gallery.
3. Unzip the plugin.
4. Double-click the “start grafana” batch script.
5. Open **Designer**.
6. Click **Plugins** to access the Plugin Launcher.
7. Click **Grafana LiveUpdate** to open the plugin and view graphs.



After installation, you can open your web browser at `http://localhost:3030` and configure the DataSource connection settings to point to your director IP if you're not running it on the same machine.

Monitor System Performance

1. Access your Grafana dashboards to view real-time Disguise metrics.
2. View streaming data including:
   - CPU and GPU utilisation.
   - Memory usage and allocation.
   - Frame rate and rendering performance.
   - Network throughput and latency.
3. Create custom dashboards for specific monitoring needs.

Multi-Machine Monitoring

The Grafana LiveUpdate plugin supports monitoring multiple Disguise machines from a single Grafana instance, providing centralised visibility across distributed setups and show networks.

Best Practices

- Use Grafana's templating features to create reusable dashboards.
- Implement proper data retention policies to manage storage costs.
- Set up regular health checks for the streaming connection.
- Monitor the plugin's own performance impact on the Disguise system.
- Use Grafana's annotation features to correlate events with performance data.

Release Notes

Grafana LiveUpdate Plugin v1.0.1

- Initial release of the Grafana LiveUpdate Plugin.
- Real-time streaming of Disguise performance metrics using WebSocket.
- Integration with Grafana Live API.
- Support for multi-machine monitoring from a single Grafana instance.
- Includes custom dashboard templates and alerting features.

Luma AI Video Generation Plugin

Luma AI's Dream Machine is an advanced AI-powered video generation tool that transforms text prompts into high-quality, realistic videos.

Text-to-Video functionality allows users to input descriptive text and generate dynamic videos with natural motion and accurate physics. Users can select clip length, resolution (up to 4K), and aspect ratios to suit their project needs.

The Luma AI Video Generation plugin provides users with a powerful and intuitive tool to bring their creative visions to life.

Features

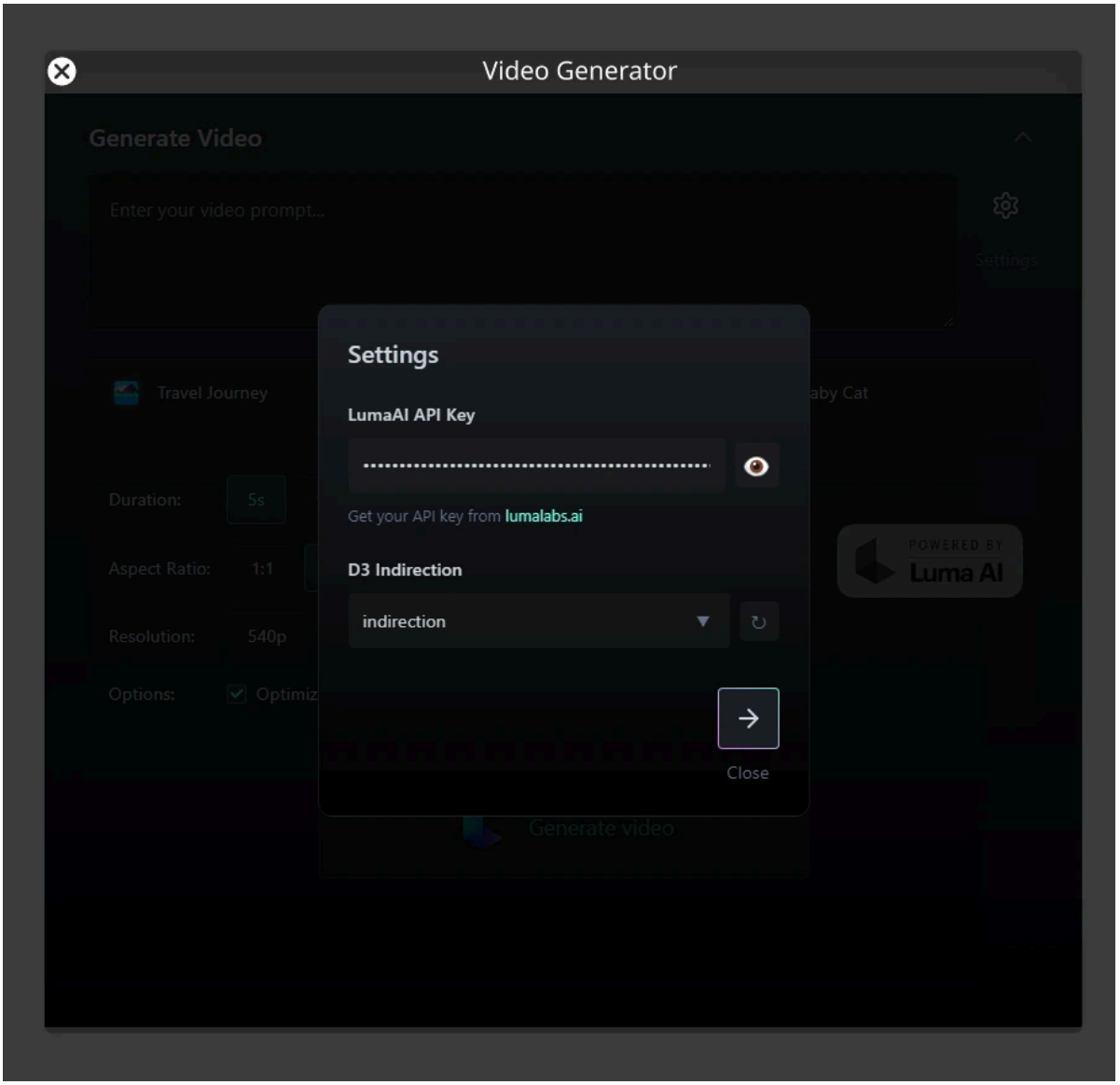
- AI-powered video generation using Luma AI
- Prompt optimisation and validation
- High-quality video output with customisable settings
- Seamless plugin integration with Designer
- Example prompts for quick starts
- Easy API key management

Install the Plugin

To configure this plugin:

1. Sign in to your **Luma labs** account, or sign up for an account.
2. Ensure you have some Luma AI credits available. Luma AI credits can be purchased from the **Luma AI website**.
3. Click **+Create Key**, enter the name of your key and click **Create Key**.
4. Copy the **API Key**.
5. Open **Designer**.
6. Click **Plugins** to access the Plugin Launcher.
7. Click **Luma AI** to open the Luma AI Video Generation Plugin.

8. Enter your API key.

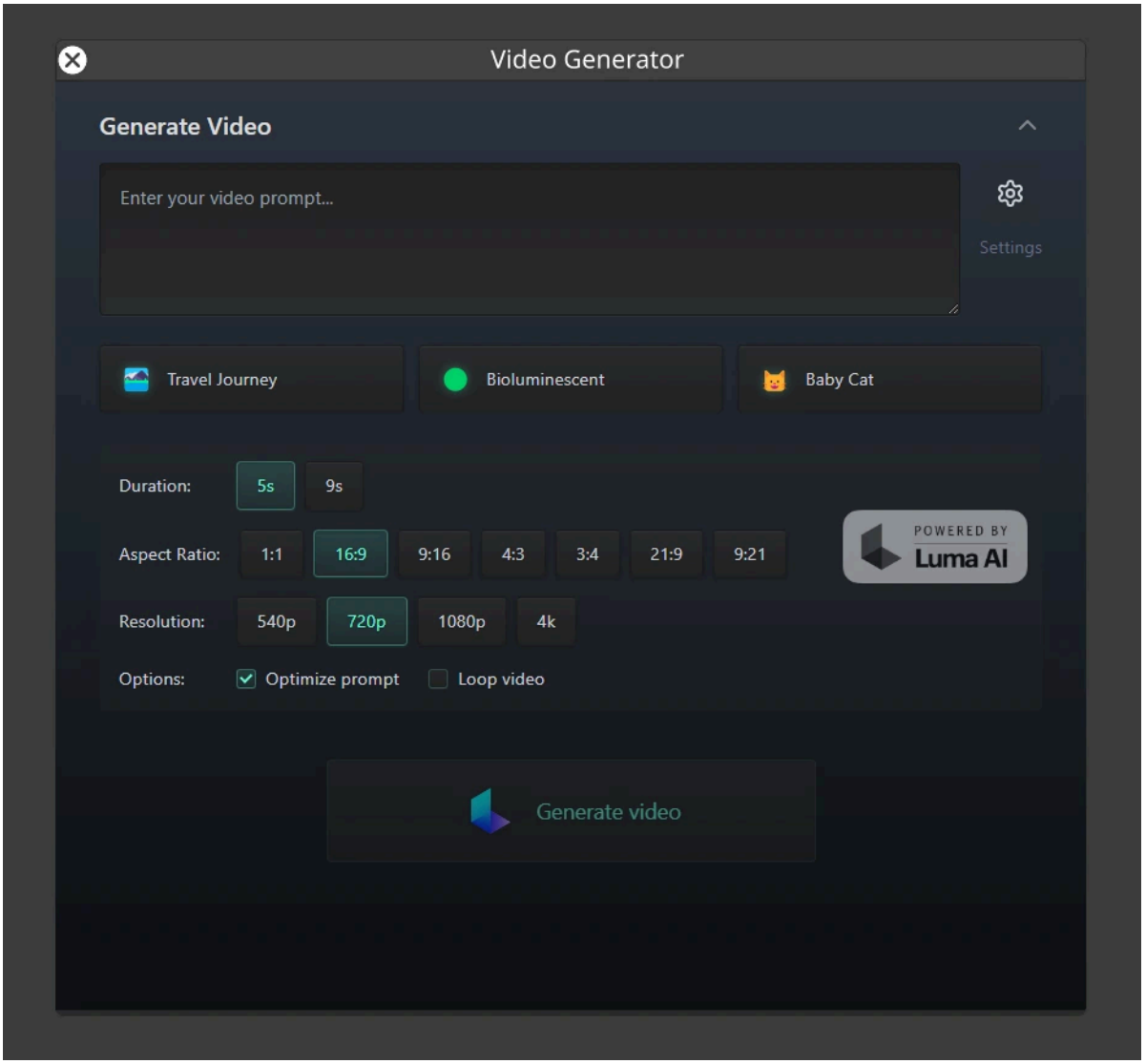


This will be stored as a Note in your d3 project. To open **Notes**, right-click **d3** and click **Notes**.

After installation, the Luma AI plugin icon is displayed in the Windows system tray, so you can access logs or manually quit at any time.

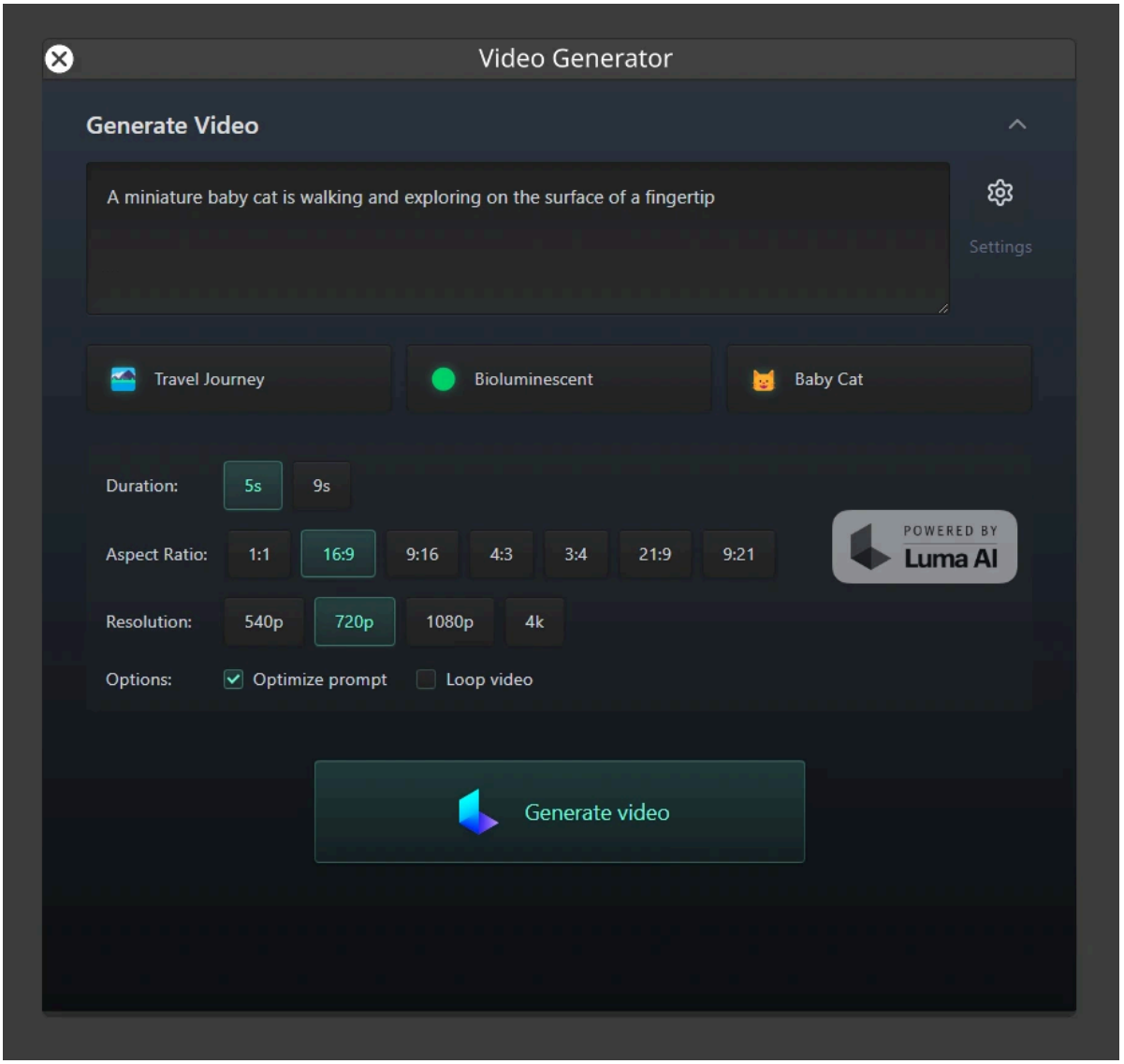
Generate a Video

1. Enter a video prompt, or select from one of the three sample prompts - *Travel Journey*, *Bioluminescence*, *Baby Cat*.



2. Adjust the duration, aspect ratio, and resolution. You can also choose to optimise or loop the video.

3. Click **Generate Video**.



4. The video will be automatically generated by FFmpeg and placed in `d3 Projects\[project name]\objects\VideoFile`.

Release notes (v1.0.1)

- The plugin no longer requires an indirection, and just copies the content into the project file.

OpenVPCal Plugin

The OpenVPCal plugin solves the problem of LED colour being recorded differently by the camera which is observing it, due to the inherent technical differences between the two technologies (a phenomenon called metameric failure).

Therefore the OpenVPCal plugin is useful for colour pipelines in any LED and camera scenario, such as in-camera visual effects pipelines or live events which use LED and cameras for IMAG or onwards transmission.

Use this plugin to generate calibration patterns, produce analysis data, calibrate LED walls, and create OCIO (OpenColorIO) configurations with colour calibration results. The created OCIO config can be loaded in Designer to apply the colour calibration results to LED walls.

Calibration is powered by **OpenVPCal** (developed by Netflix), and Disguise project control is provided through **Designer Plugins**.

Features

- Generate SPG patterns for pre-calibration setup.
- Generate calibration patches for colour calibration.
- Camera-LED analysis and calibration.
- OCIO config import/export with calibration result.

Requirements

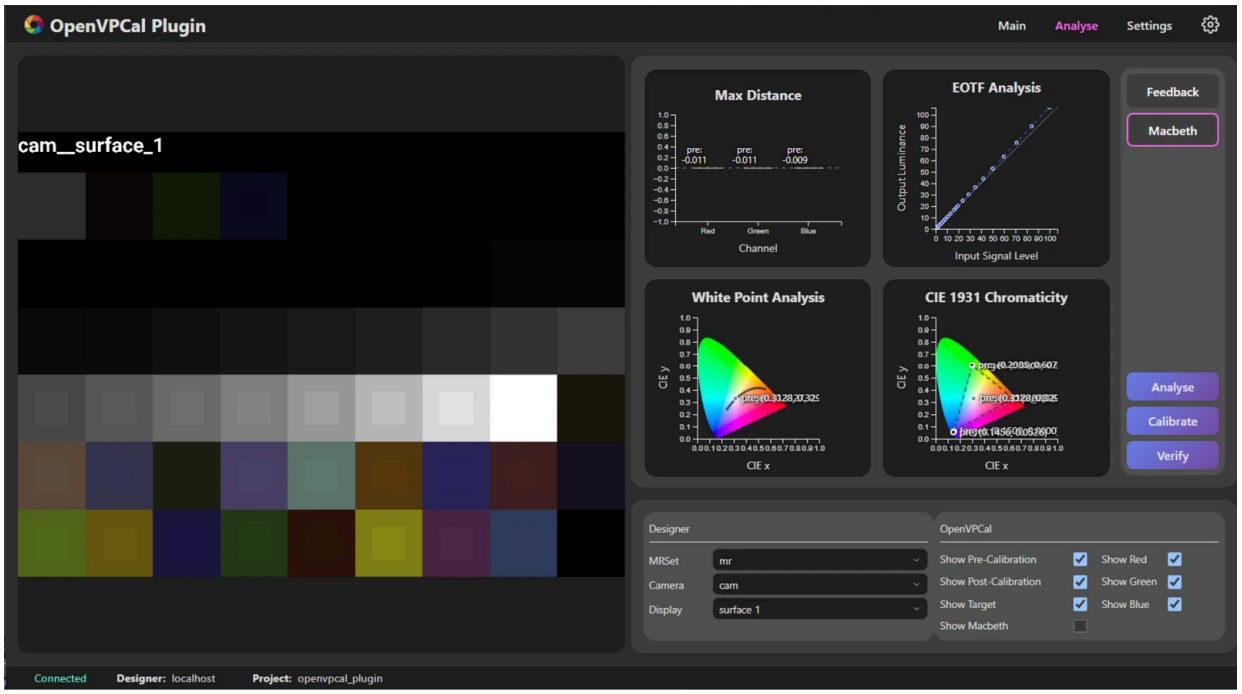
You need the following before starting:

- Disguise Designer installed and licensed
  - Designer:
    - **Solo mode**: **r31.4** or higher.
    - **Director and Actor setup**: **r32.4.7** or **r33.1.4** or higher (bundles OpenVPCal plugin **v1.2.0**).
    - **Download**.
  - License: Designer Starter, Pro or Designer running on a Disguise server - License.
- OpenVPCal plugin installed
- A compatible OCIO configuration
- A Disguise server
- A configured LED wall with stable video output from Disguise
- A camera for capture process of the calibration

Install the Plugin

To install this plugin:

1. Download the OpenVPCal Plugin package from the Designer Plugin Gallery.
2. Unzip the plugin in any folder you'd like.
3. Launch **OpenVPCalPlugin.exe**.
4. Open **Designer**.
5. Click **Plugins** to access the Plugin Launcher.
6. Click **OpenVPCal** to open the OpenVPCal Plugin.



After launching, the plugin icon appears in the Windows system tray for accessing logs or quitting.

OpenVPCal Plugin Guides

- Quick Start
- Best Practice
- Plugin Reference

OpenVPCal Plugin Release Notes

Release notes (v1.2.0)

- Fixed actors missing uploaded files after an OpenVPCal upload session

- Fixed actors showing missing contents after colour patches or SPG patterns are regenerated
- Added support for calibration with a **Director** and **Actor** setup; previously only **Solo mode** was supported. Requires Designer **r32.4.7** or **r33.1.4** or higher.

Previous Releases

Release notes (v1.1.1)

- Added the **Verify** button to the Analyse tab to re-capture and analyse with the calibrated output transform applied.
- Added the **Update OCIO Config on Capture** option to control whether the OCIO config is reverted to the pre-calibration config on capture start.

Release notes (v1.1.0)

- Fixed **Generate Calibration Patches** and **Generate SPG Patterns** failing when write access to the **d3 projects** folder is disabled.
- Fixed an issue where clicking the system tray icon opened the WebUI even when the plugin server had failed to start.
- Improved warning messages on calibration process failure.
- Display the region of interest (ROI) used for analysis and calibration in the canvas area of the main tab.
- Renamed the **Generate Colour Patches** button to **Generate Calibration Patches**.
- Limited the number of displays for the capture process to one.
  - Captures must be performed one at a time with the correct camera exposure settings.
- Added the **Add Video Layers** button to the main tab.
  - This populates **OpenVPCal Pre-Calibration Patch** and **OpenVPCal SPG Patterns** layers in Designer.
- Populates the **OpenVPCal Pre-Calibration Patch** layer in Designer when **Generate Calibration Patches** completes.
- Populates the **OpenVPCal SPG Patterns** layer in Designer when **Generate SPG Patterns** completes.
- Updates the video for **OpenVPCal Pre-Calibration Patch** and **OpenVPCal SPG Patterns** when the selected display is changed from the plugin.
- Updates the displays of **OpenVPCal Calibration (Direct)** Mapping when the selected display is changed from the plugin.
- Reverts the OCIO config to the pre-calibration config when a calibrated OCIO config is selected (`post_calibration..._.ocio`) and the capture process restarts.
- Added rsync support for Windows.
- Added **Analyse** and **Calibrate** buttons to the Settings tab for convenience.

- Switches to the Analyse tab automatically when the **Analyse** or **Calibrate** process completes.
- Moved analysis feedback from the main tab to the Settings tab.

Release notes (v1.0.0)

- Initial release
- Support calibration workflow:
  - Generate colour patches
  - Generate SPG patterns
  - Capture sequence
  - Analyse
  - Calibration
- Support analysis graphs of calibration results
- Support import/export of OpenVPCal settings
- Support Designer property control for calibration via Designer Plugin

Reference

- OpenVPCal: **GitHub**

OpenVPCal Plugin - Best Practice

This page provides best practices to achieve optimal colour calibration results with the OpenVPCal Plugin. Following these recommendations will help you avoid common issues and ensure reliable, high-quality calibration results.

Hardware Setup

Proper hardware setup is critical for achieving accurate colour calibration results. The calibration process uses the camera as a colourimeter, so precise configuration of both camera and LED wall settings is essential for reliable calibration data.

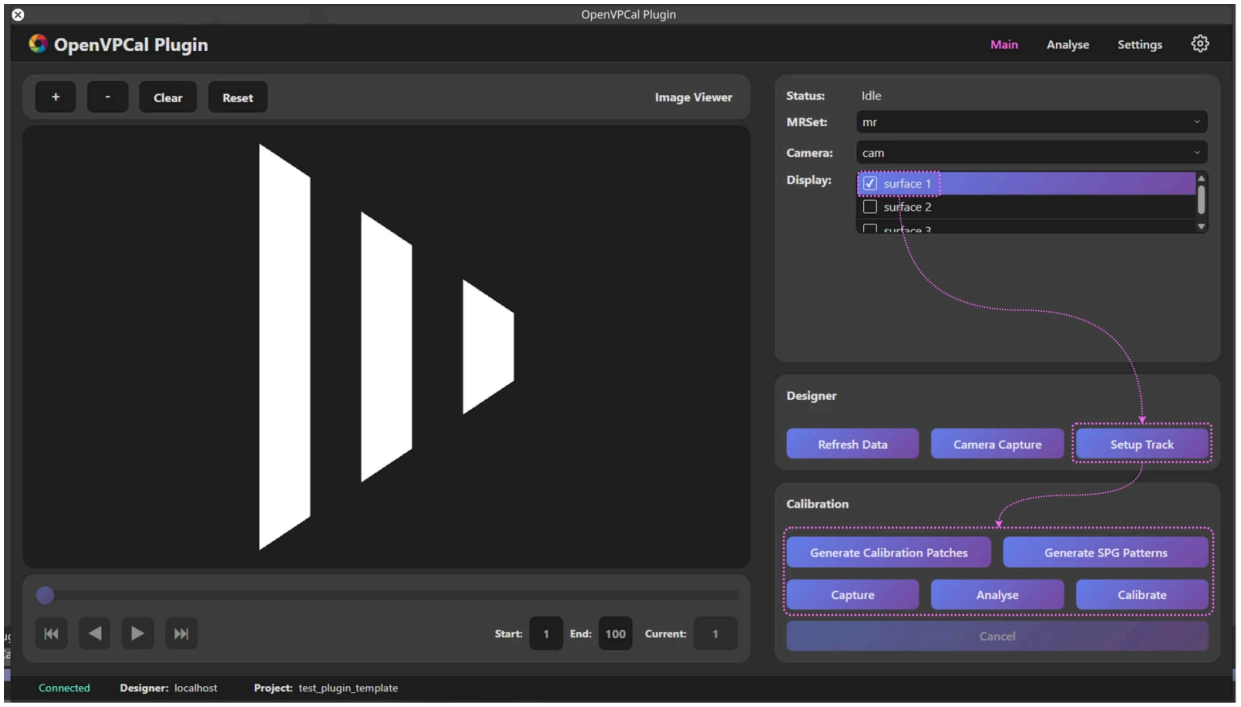
LED Wall Configuration

1. **Warm up LED panels** - Display a flat grey colour for 20-40 minutes before capture and note physical temperature (most Image Processors should provide this figure).
2. **Set LED processor to PQ (ST2084)** - Strongly recommended over sRGB for better calibration accuracy.
3. **Configure custom gamut settings** on LED processor to match wall primaries if using custom target gamut. Make sure this is reflected in the `Add Custom Gamut` section of the Settings Tab.
4. **Check Legal vs Full range settings** - Ensure consistent video data range throughout the pipeline. Use the Data Range Verification SPG pattern to verify. See Data Range Verification for the complete instructions.
5. **Set LED panels to maximum gain** allowed by the image processor calibration (do not override).
6. **Turn off unused LED sections** to avoid flare from panels not directly in front of the camera. Remove any additional potential disturbances/occlusions.

Camera Configuration

To ensure the best camera configuration, follow these instructions aided by those provided on the first generated patch.

1. **Use the production camera** - Use the same camera model and firmware that will be used in final production to avoid any discrepancies after calibration.
2. **Set exposure to 18%** using the camera's false colour tool - the centre grey square should hit 18% of camera sensitivity. Use the 17% and 19% reference patches to fine-tune.



3. **White balance settings**:
   - **Auto white balance** if `Auto WB Source` is enabled in the plugin settings.
   - **Otherwise set to 6500K** (LED wall white point) or manual white balance to the centre grey square.
   - **No tint adjustment** - keep tint settings neutral.
4. **Use no additional exposure adjustments** - If your camera has additional exposure controls aside from the traditional ones, ensure they are zeroed before proceeding.
5. **Use a clean prime lens** (35-65mm focal length recommended).
6. **Defocus slightly** to prevent moiré - focus just in front of the panel (rather than behind), just enough to blur the edge lines of the centre square.
7. **Use an appropriate t-stop** (T4-T8 range) matching production requirements.

Capture Setup

1. **Position camera flat to wall** - Ensure centre grey square covers 60-70% of vertical camera field of view.
2. **Centre camera on wall** using first patch alignment guides.

OpenVPCal Plugin - Quick Start

This page will guide you through running calibration with the OpenVPCal Plugin. While the plugin makes calibration as easy as possible, it is important to understand what can prevent you from achieving the best calibration results. You can learn how to interpret the analysis results in the Analyse tab. The key components to consider are hardware settings and colour space settings in Designer.

> **Note**
>
> Proper hardware setup is crucial for achieving accurate calibration results. See the Hardware setup section to prepare for calibration.

Calibration Checklist

Before running OpenVPCal calibration, confirm:

Hardware

- ☐ LED wall is connected and mapped in Designer.
- ☐ LED panels are warmed up (20-40 minutes displaying grey) and at show brightness.
- ☐ LED processor is set to desired colour space and transfer function.
- ☐ Unused LED sections are turned off to avoid flare.
- ☐ Camera settings (exposure, white balance, ISO, shutter) are configured for production.

Designer Configuration

- ☐ Colour Management is set to OCIO.
- ☐ Camera, LED Screen, and MR Set are created and linked.
- ☐ Delay Calibration is completed for the MR Set.
- ☐ No creative colour looks or LUTs are applied to the signal path.
- ☐ `enableResourceFileDeletion` is enabled in Designer options (See: Advanced Machine Settings).

Launch OpenVPCal Plugin

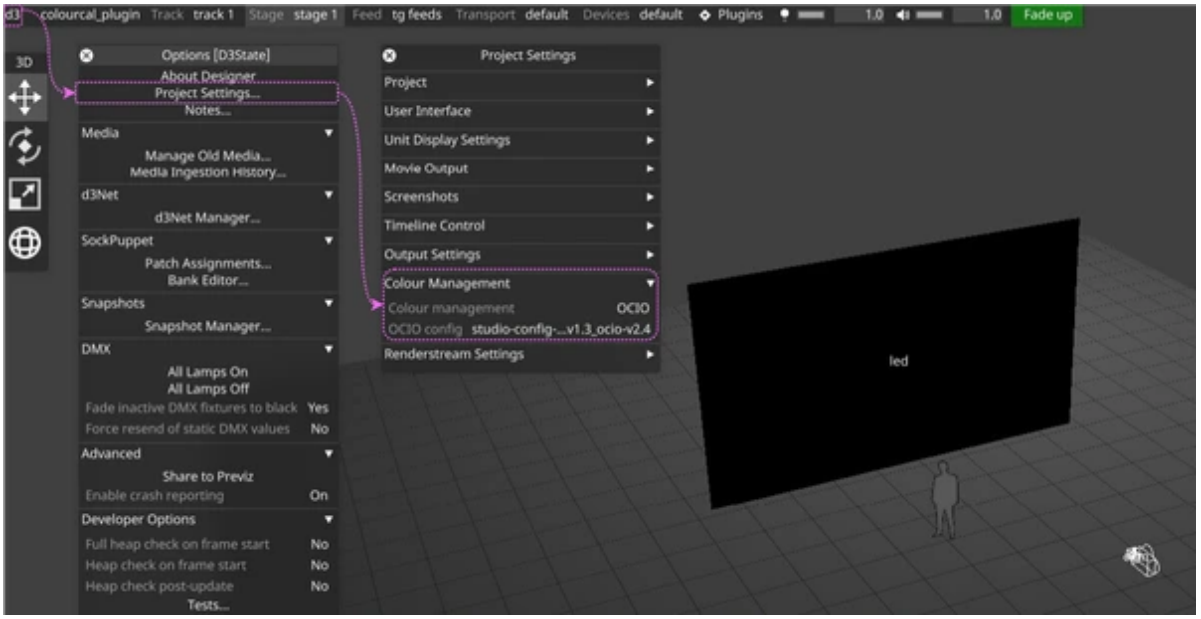
Launch **OpenVPCalPlugin.exe** to make the OpenVPCal Plugin available in the Designer Plugin widget. Once launched, check the system tray icon to confirm the server is running:

- **Coloured icon**: Server is running correctly.
- **Greyed-out icon**: Server has failed. See System Tray to troubleshoot.

Designer Setup

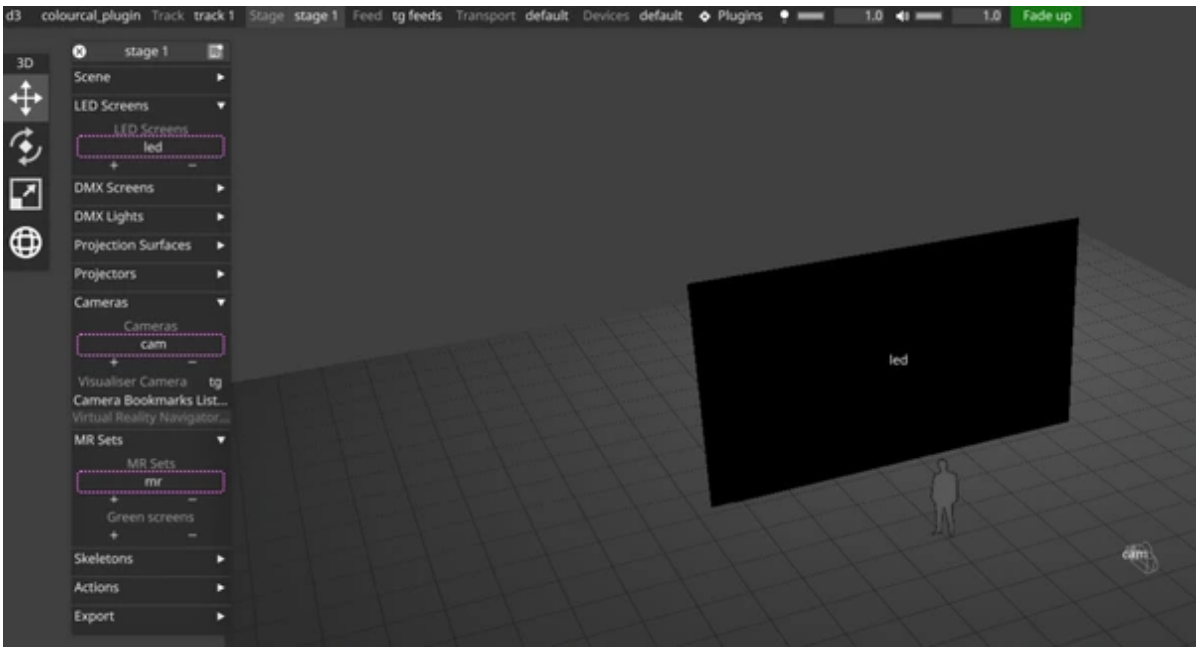
Configure Designer's colour management, stage components, and calibration prerequisites. This setup creates the foundation for OpenVPCal Plugin to perform OpenVPCal-based calibration.

1. **Set Colour Management settings**



- Navigate to `d3 > Project Settings > Colour Management > Colour management`.
- Set **Colour management** to `OCIO`.
- Select **OCIO config**: Use your project's base OCIO config (NOT `pre_calibration_openvpcal` or `post_calibration_openvpcal` configs if they exist from previous calibrations).

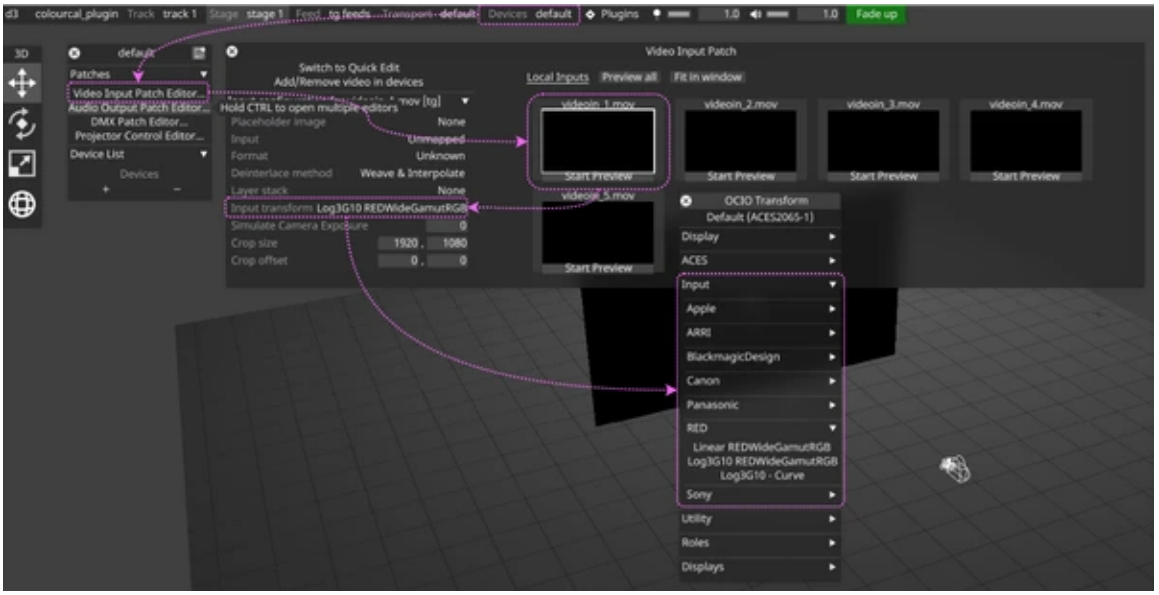
2. Add LED Screen, Camera and MR Set to the Stage



- Add components that will be used for calibration:
  - `Stage > Cameras` - Camera for capturing calibration images.
  - `Stage > LED Screens` - LED wall(s) to calibrate.
  - `Stage > MR Sets` - Container linking camera and LED screens.

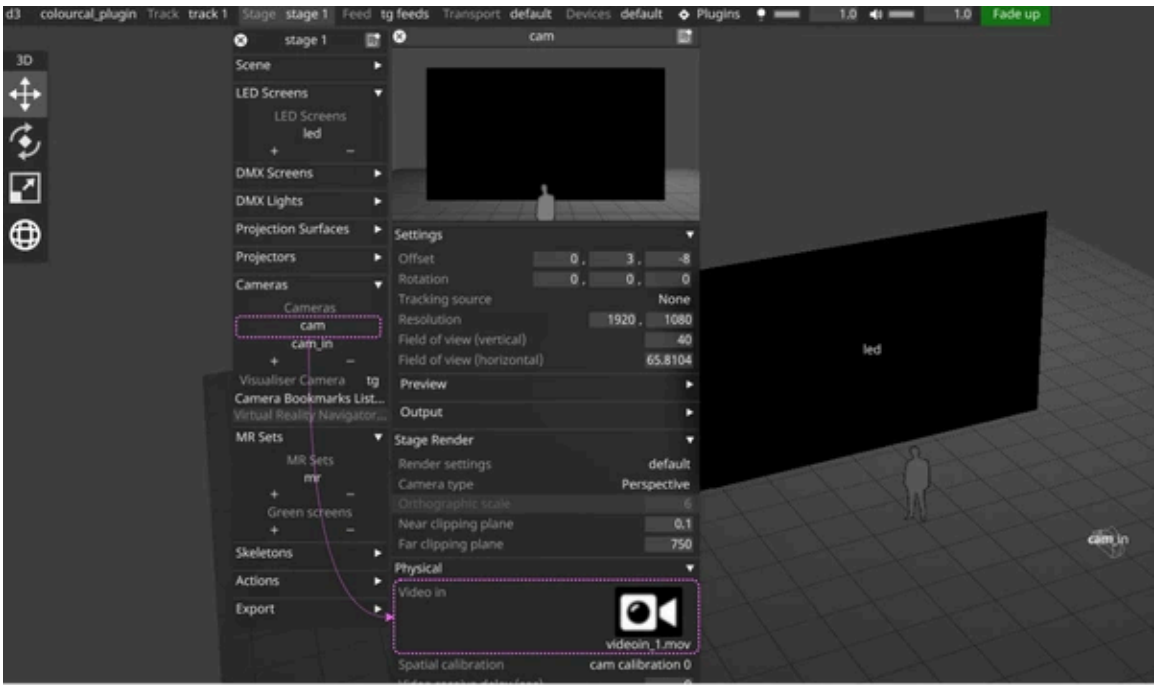
3. Configure Camera settings

- **Set the Input Transform in the Video Input Patch Editor**



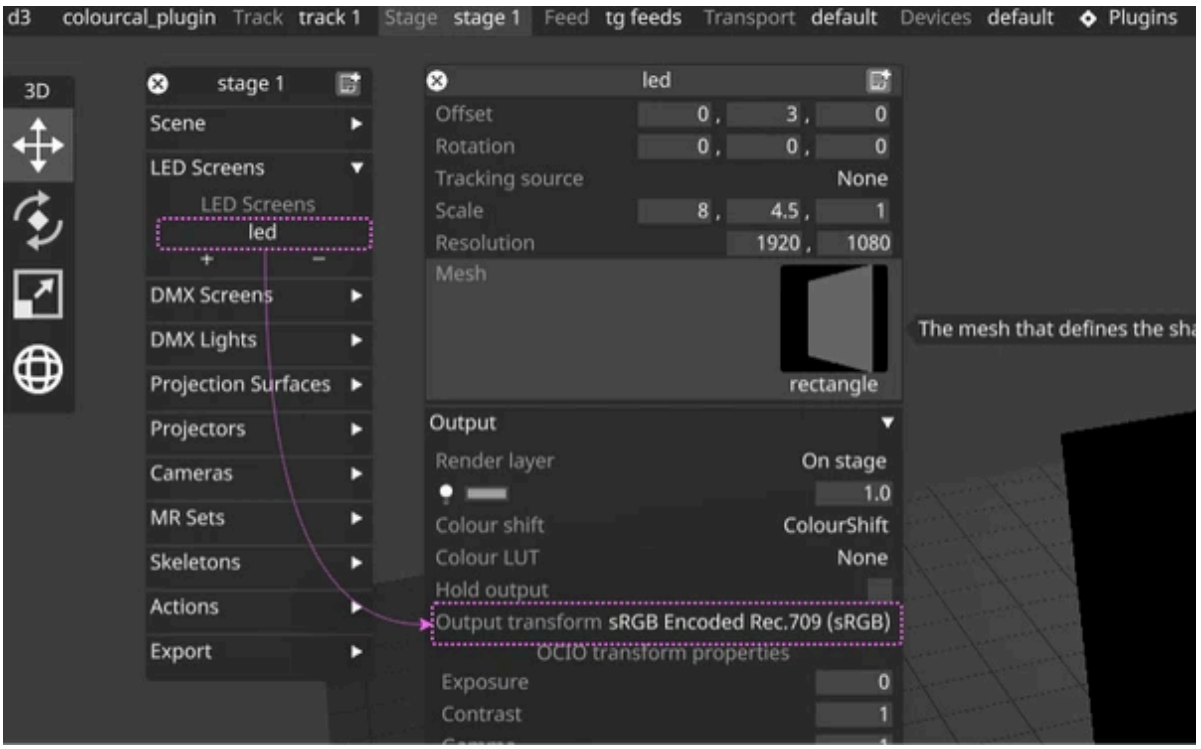
- Navigate to `Devices > Video Input Patch Editor...`.
- Select `videoin_[0...9].mov` to assign to Camera.
- Set **Input transform** to match your camera's colour space (e.g., `Log3G10 RedWideGamutRGB` for RED cameras).
- This ensures captured images are correctly interpreted in the colour pipeline.

- Assign the Video Input to the Camera



- Open **Camera** widget in Stage.
- Assign **Video in** with the `videoin_[0...9].mov` source configured above.

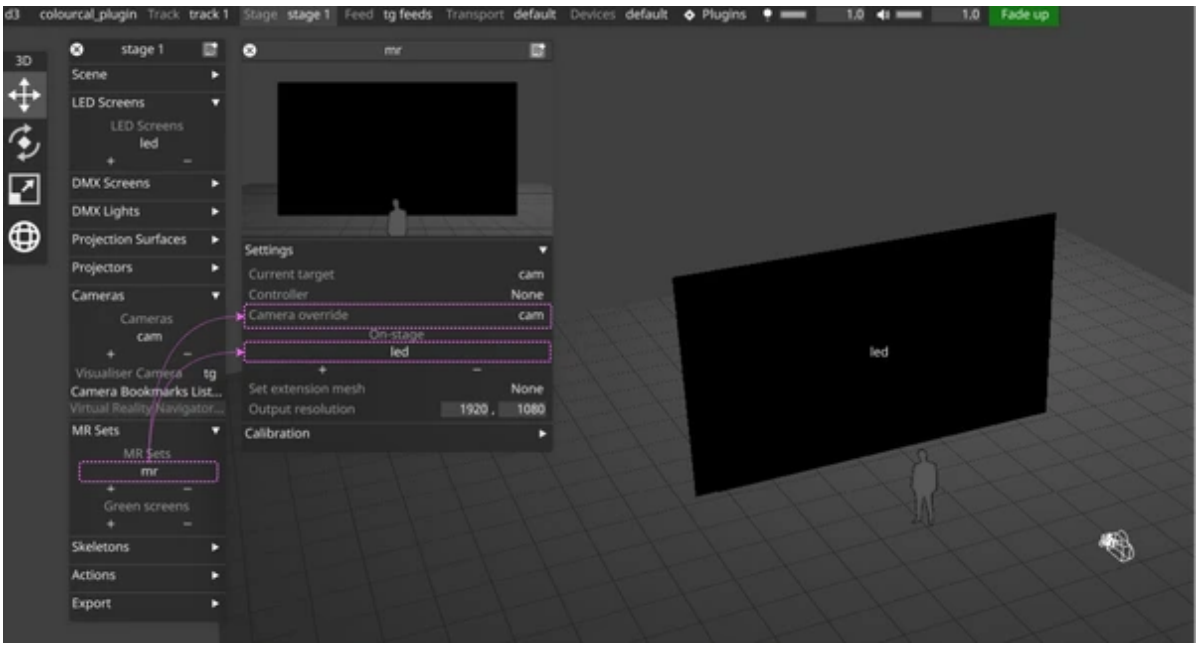
4. Configure LED Screen settings



- Open **LED Screen** widget in Stage.
- Set **Output transform** to your target gamut (e.g., Rec.2020, P3).

> **Note**
>
> This can be configured or adjusted later in OpenVPCal Plugin Settings Tab.

5. Configure MR Set settings



- Open **MR Set** widget in Stage.
- Assign a **Camera** (under `Camera override`).
- Assign an **LED Screen** (under `On-Stage` section).
- This links the camera and LED screen for calibration.

6. Complete Delay Calibration

- Run Designer Delay Calibration for your MR Set.
- This synchronizes camera capture timing with LED display refresh, which is essential for OpenVPCal Plugin to capture accurate calibration images.
- Follow the linked guide to complete Video Receive Delay and Tracker Delay calibration.

7. Complete Pre-Calibration Steps

- Follow the Designer Colour Calibration workflow.
- This prepares the stage and validates the camera/LED configuration before OpenVPCal calibration.

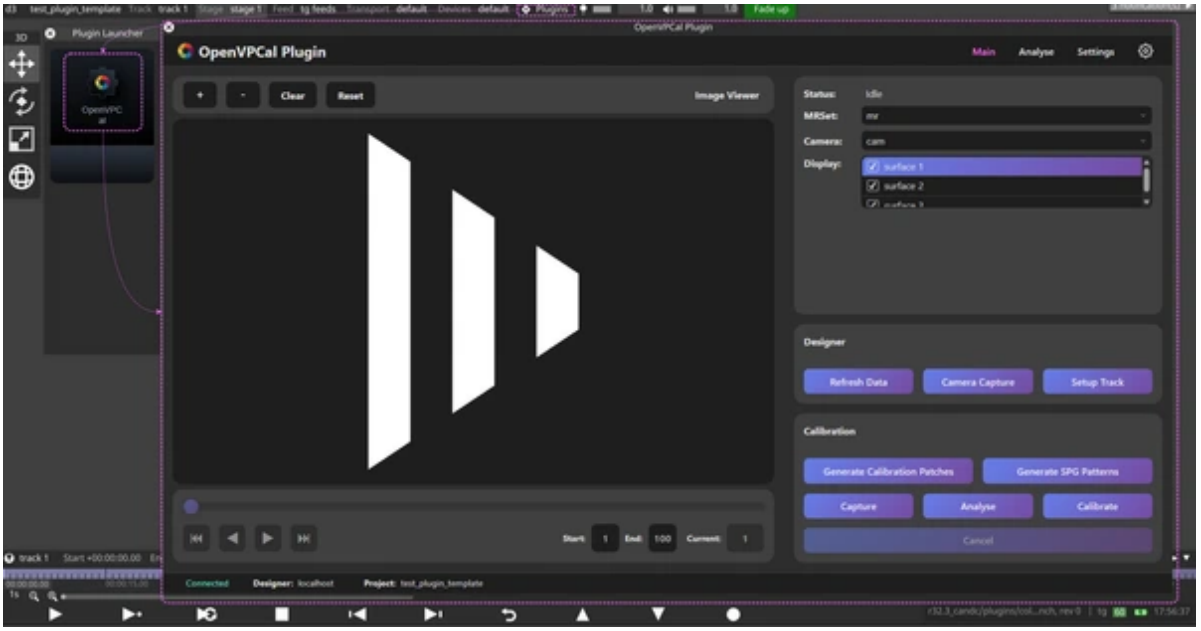
8. Verify Setup

- OCIO config is set to your project's base config.
- Camera, LED Screen, and MR Set are created and linked.
- Delay Calibration and Pre-Calibration completed successfully.

> **Note:** Overwriting existing calibration patterns generated by the plugin may fail if the `enableResourceFileDeletion` option switch is disabled. If this is the case, enable it from Designer's Advanced Machine Settings.

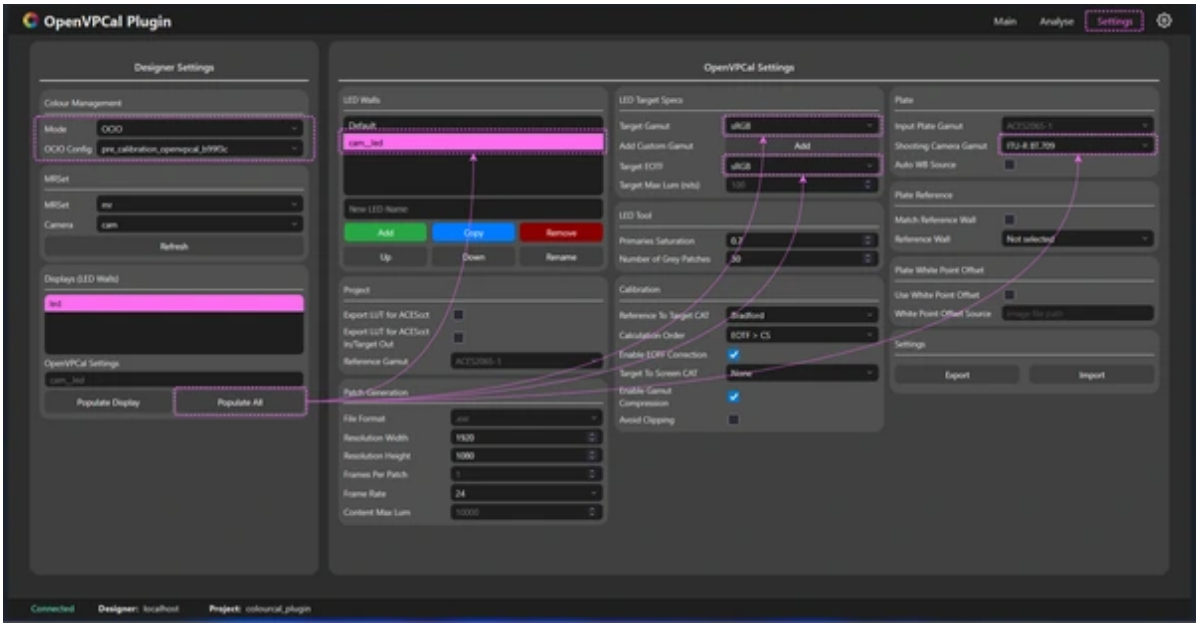
OpenVPCal Plugin Setup

1. Open Plugin Interface



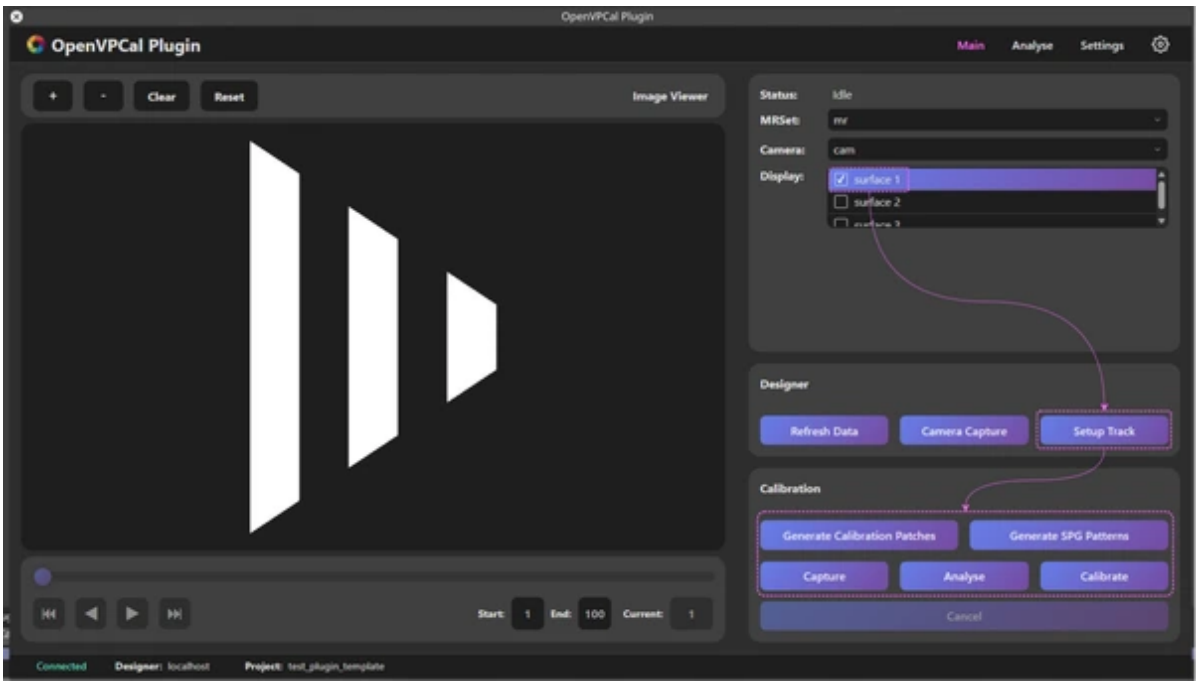
- `Plugins > OpenVPCal Plugin` in Designer.
- Or open in browser: `https://localhost:8000`.
- Verify connection: status footer should show “Connected” with project name.
- If disconnected: Check Designer is running, or set Designer IP in Settings if on different network.

2. Configure Settings Tab

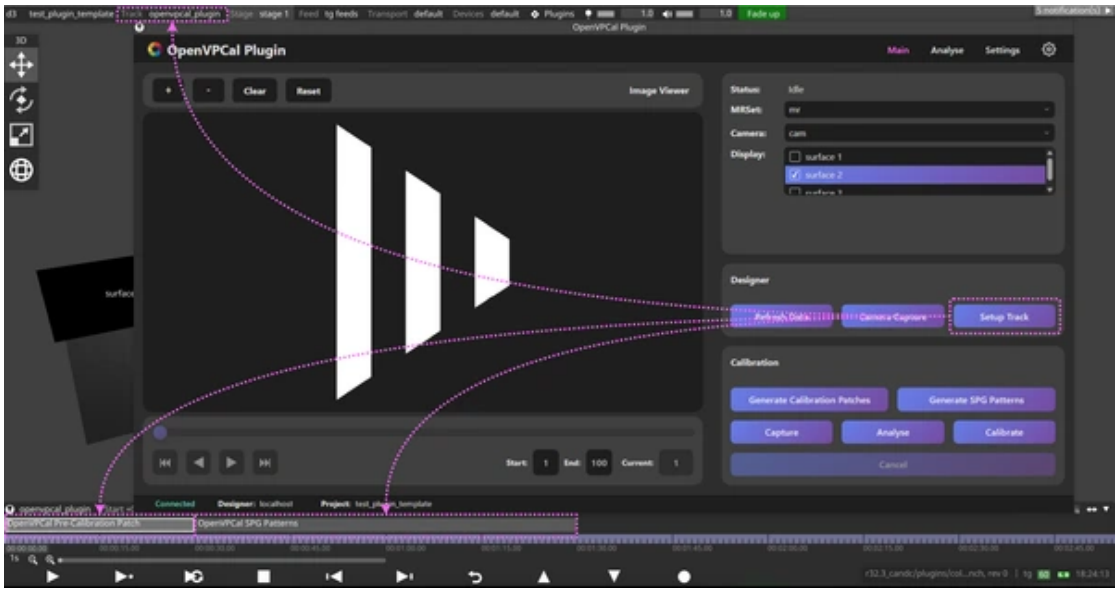


- Verify **Mode** is `OCIO` and **OCIO Config** shows your project config.
- Select **MRSet**, **Camera**, and verify **Displays** list.
- Click **Populate All** to create OpenVPCal LED Wall settings from Designer colour spaces.
- Verify each display shows OpenVPCal Settings name (not “Missing”).
- Optional: Review and adjust settings in LED Walls dropdown (see Settings Tab).

3. Operate Calibration (follow in order)



- **Select Displays**
  - In the Main Tab, check the checkboxes for displays to calibrate.
  - Note: Checked = calibrated, Highlighted = canvas preview only.
- **Setup Track**
  - Click Setup Track to switch to **openvpcal_plugin** track that will prepare two video layers **OpenVPCal Pre-Calibration Patch** and **OpenVPCal SPG Patterns** in Designer.
  - See [Setup Track]



- **[OPTIONAL] Validate with SPG Patterns**
  - Generate and inspect SPG patterns on LED wall.
  - See **OpenVPCal SPG Guide** and Generate SPG Patterns.
- **Generate Calibration Patches**
  - Generates patches and updates Designer OCIO config to `pre_calibration_openvpcal_<hash>.ocio`.
  - The first calibration patch is displayed on the LED wall if the track was prepared using **Setup Track**.

> **⚠ Caution**
>
> Follow the instructions shown in the first patch before proceeding to the capture step.

  - See Generate Calibration Patches for details.
- **Capture**
  - Captures 255 images per checked display.
    - 5 frames per pattern × (21 pattern images + 30 grey patches)
  - If fewer than 255 images were captured, re-run capture (see Navigation Panel to find the number of captured images).
- **Analyse**
  - Processes captured images and generates calibration feedback.
  - Once analysis is complete, the plugin switches automatically to the **Analyse** tab and show the **Analysis Feedback**.
  - Review feedback before proceeding.
  - See Analyse Tab for interpretation.
- **Calibrate**
  - Computes calibration and updates Designer OCIO config to `post_calibration_openvpcal_<hash>.ocio`.
  - Automatically applies calibrated output transforms to displays.
  - Once calibration is complete, the plugin switches automatically to the **Analyse** tab and show the **Analysis Feedback**.
  - See Calibrate for details.

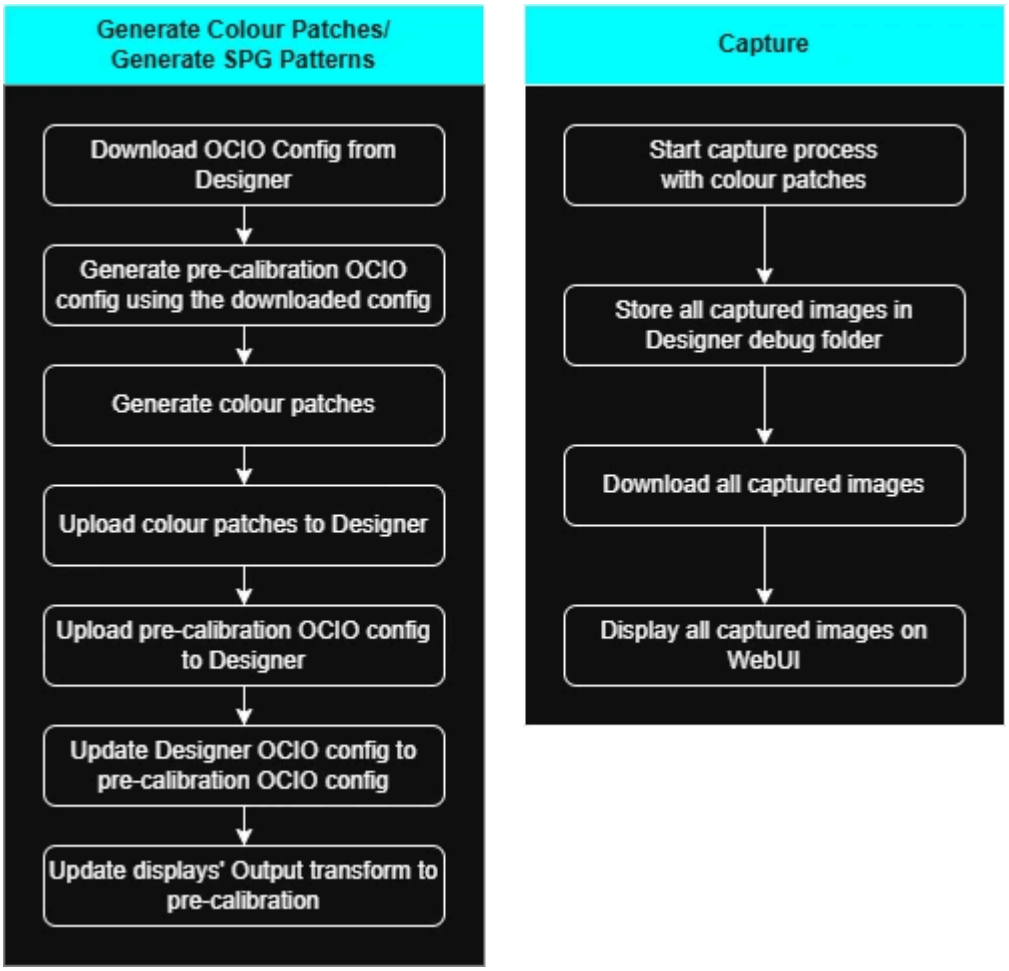
4. Check Calibration Results
    - Review **Analyse** tab to compare pre-calibration vs. post-calibration improvements.
    - Run Verify process in the Analyse tab to re-capture and analyse with the calibrated output transform applied.
    - Designer now uses `post_calibration_openvpcal_<hash>.ocio` with calibrated display transforms.

> **Understanding What Gets Modified**
>
> To understand exactly which fields and settings are modified by each button operation, see the Updated Fields reference table in the Reference guide.

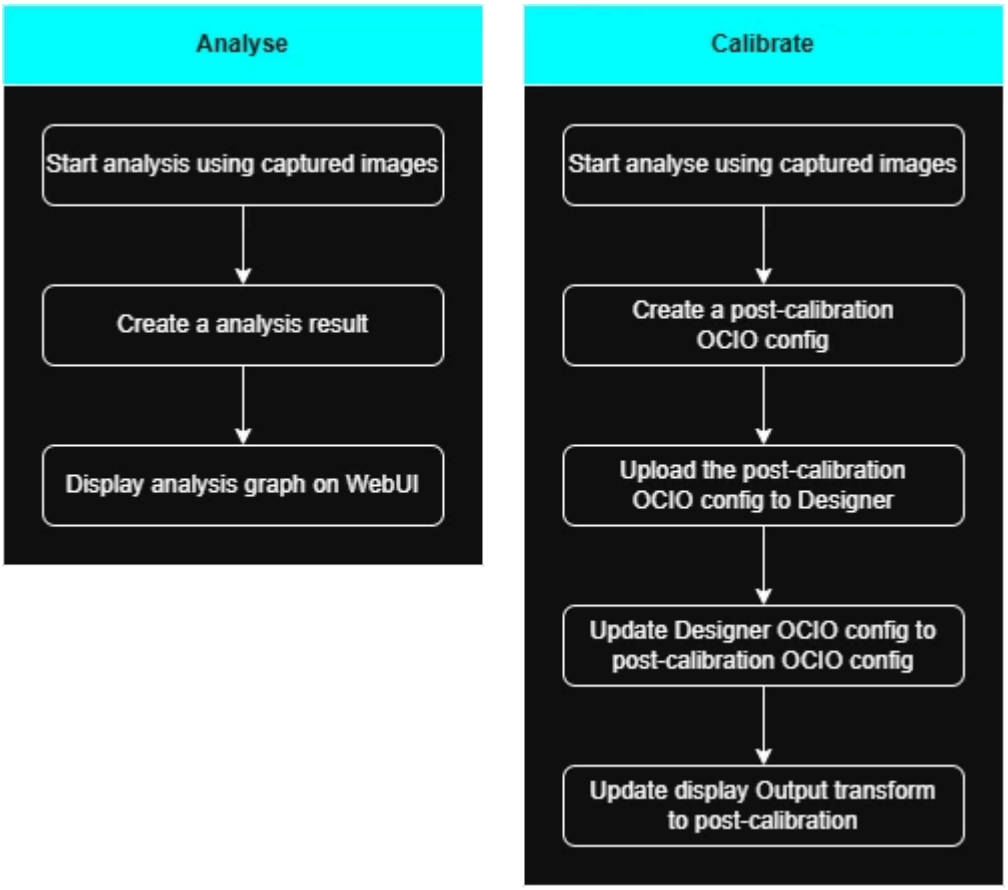
Workflow Overview

The following flowcharts provide a high-level overview of the processes triggered by each button in the Main tab.

- **Download**: Transfers data from Designer to Plugin
- **Upload**: Transfers data from Plugin to Designer



OpenVPCal Plugin Flowchart Overview 1



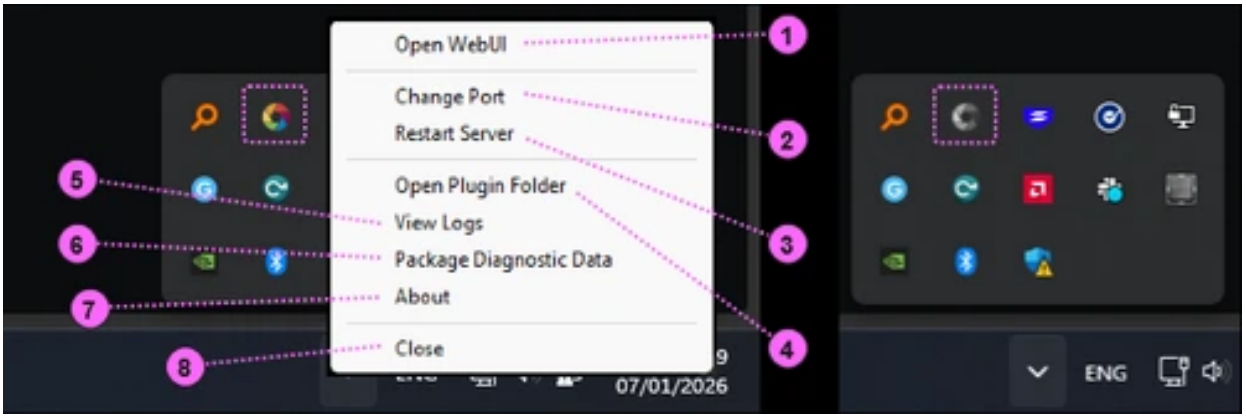
OpenVPCal Plugin Flowchart Overview 2

OpenVPCal Plugin - Reference

This page provides comprehensive reference documentation for the OpenVPCal Plugin interface. It contains every control, setting, and feature available in each tab of the plugin: Main tab, Analyse tab, and Settings tab.

Use this reference to understand what each control does, how to interpret calibration analysis graphs, and how to configure OpenVPCal settings for your specific workflow. For step-by-step calibration instructions, see the Quick Start guide. For optimal setup recommendations, see the Best Practice guide.

System Tray



OpenVPCal Plugin System Tray

When you launch `OpenVPCalPlugin.exe`, an icon appears in the system tray. The icon colour indicates server status:

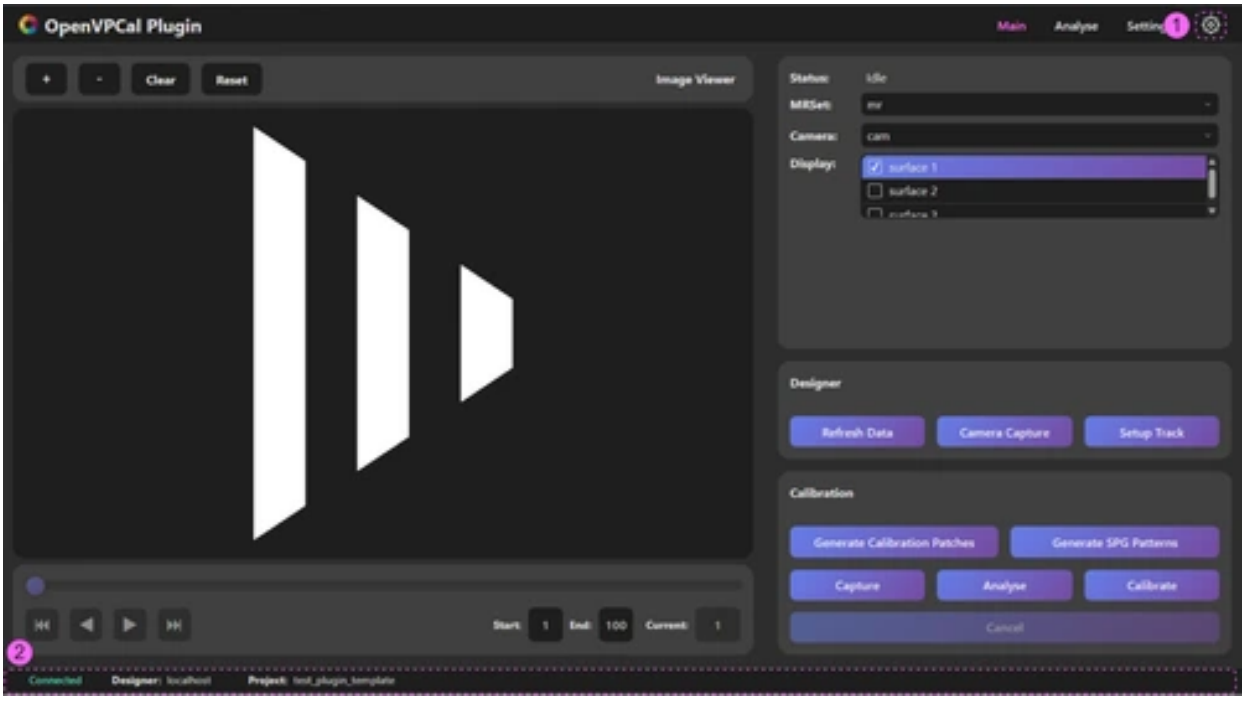
- **Coloured icon**: Server is running correctly (left side of *OpenVPCal Plugin System Tray*)
- **Greyed-out icon**: Server has failed or is not running (right side of *OpenVPCal Plugin System Tray*)

If the server fails to launch, a port conflict is the most likely cause. To resolve this, use **Change Port** to assign a different port number.

1. **Open WebUI:**
   - Opens the OpenVPCal Plugin WebUI in your default browser. The typical workflow involves interacting with the OpenVPCal Plugin UI within Designer via the Plugin widget. However, if Designer is running on a different machine, you can open the WebUI to interact with Designer over the network.
2. **Change Port:**
   - If the server is not running (greyed-out icon), a port conflict between the OpenVPCal Plugin and another application is likely. Use **Change Port** to assign a different port number. The OpenVPCal Plugin server will automatically restart with the new port.
3. **Restart Server:**
   - If the server has failed for a reason other than a port conflict, use this option to restart the server with the same port number.

4. **Open Plugin Folder:**
   - Opens the folder containing all calibration-related settings and assets.
5. **View Logs:**
   - Opens the log file in your default text editor.
6. **Package Diagnostic Data:**
   - Creates a timestamped `.zip` archive file containing diagnostic data for troubleshooting.
   - The packaged data will be stored in:
     - `Documents/d3plugins/diag_openvpcal_<timestamp>.zip`.
7. **About:**
   - Displays the plugin version.
8. **Close:**
   - Terminates `OpenVPCalPlugin.exe`.

Landing Page



OpenVPCal Plugin Landing

1. Settings

When you click the settings icon, the plugin settings widget will be displayed.

Designer IP Address

If the OpenVPCal plugin is running on a server or laptop that is connected to the Designer session network, an IP address does not have to be assigned. The plugin will be able to discover the Director in the session and establish the connection. However, when the OpenVPCal Plugin is running on a different

network, you must set the IP address to the Director's IP address, so the plugin can discover the session and establish the connection.

Designer Port

This is the HTTP port of Designer. You can find the port in d3 Manager.

- `Machine Settings > Advanced Network Configuration > HTTP Port (default: 80)`

Rsync Port

When the OpenVPCal Plugin is running on Windows, the Windows file system will be used to transfer files for the calibration process and rsync will not be used. However, if the OpenVPCal Plugin is running on Linux or Mac, this must be correctly configured. The rsync port must be identical to the rsync daemon port of Designer. You can find the port in d3 Manager.

- `Machine Settings > Advanced Network Configuration > rsync daemon port (default: 9993)`

Enable All OpenVPCal Settings

Designer expects a few OpenVPCal settings to have certain values for the calibration process. Therefore, a few OpenVPCal settings in the **Settings tab** are disabled to prevent changing settings that can cause issues during the calibration process. If you would like to take full control over all OpenVPCal settings, you can check **Enable All OpenVPCal Settings**.

Update OCIO Config on Capture

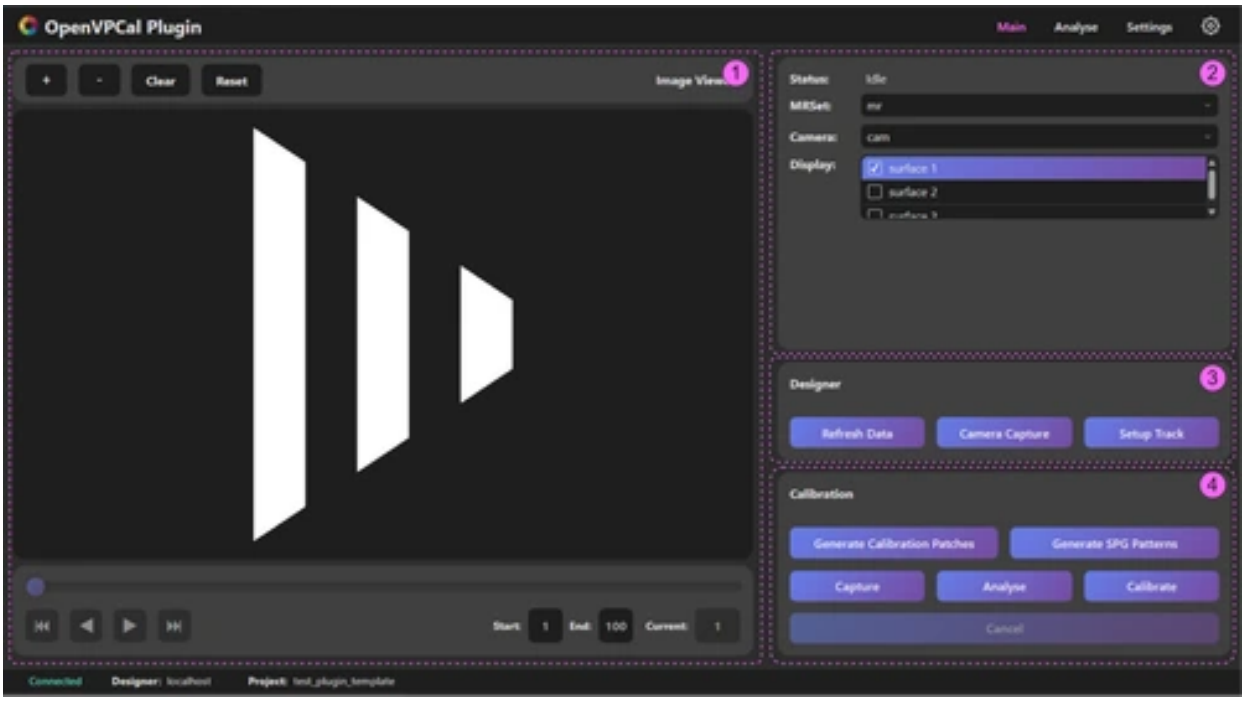
Designer expects to have the pre-calibration config selected for the capture process. When **Update OCIO Config on Capture** is enabled, the plugin will update the Designer OCIO config to the pre-calibration config on **Capture** start.

2. Status Footer

The status footer shows the state of the connected Designer. From the left, it will display:

1. Connected/Disconnected: The connection state between the plugin and the target Designer.
2. Designer: The IP address of the connected Director in the Designer session.
3. Project: The Designer project name of the connected Designer session.

Main Tab



OpenVPCal Plugin Main Tab

Main Tab Elements

1. Main canvas
2. State area
3. Designer area
4. Calibration control area

1. Main Canvas

The main canvas area is where you can inspect captured images and draw a region of interest (ROI) to run the calibration on. The canvas consists of three parts: control, canvas and navigation.

Canvas Control Panel

The header has basic canvas control buttons on left and status text on right. The status text will show the loading state once calibration capture is finished.

- `+` **Button**: Zoom in
- `-` **Button**: Zoom out
- **Clear**: Clear the ROI from the Canvas
- **Reset**: Clear the ROI and reset the zoom level

Canvas Panel

The canvas will display the captured image. Both **Camera Capture** under the **Designer** area and **Capture** under the **Calibration** area will update the displayed image in the canvas. Several mouse actions are

supported for easy image inspection.

Mouse Control

- **Left-click+drag**: Pan/move the view.
- **Right-click+drag**: Draw ROI.
- **Wheel-up**: Zoom in.
- **Wheel-down**: Zoom out.
- **Wheel-click (MMB)**: Reset zoom level and position to default.

Navigation Panel

You can control the frame to display on the main canvas using the navigation area. The navigation area will be enabled once the calibration capture process is finished and captured images are loaded.

- **Playhead**: You can scrub through to change the displayed frame quickly
- **Arrow button**: You can inspect images one by one with the arrow buttons
- **Double arrow button**: Move the playhead to either the beginning or end of the sequence
- **Start**: Start of sequence
- **End**: End of sequence
- **Current**: Current frame. You can move to a specific frame by updating this field

2. State Area

Status

The status will show the high-level state of the plugin:

- **Disconnected**: Designer is disconnected.
- **Running**: A calibration process is running.
- **Idle**: The calibration process is ready to be run.

MRSet

MRSet contains the list of MRSets in Designer. Changing the current MRSet using the dropdown menu will update the current MRSet in Designer.

Camera

Camera has a list of cameras in Designer. Changing the camera using the dropdown will update the camera of the selected MR Set.

Display

Display has a list of selected displays for the selected MR Set. You can control which displays to run capture, analyse and calibration by using the checkboxes. The selected and highlighted display will be used to display the capture sequence on the main canvas area.

3. Designer Area

Refresh Data

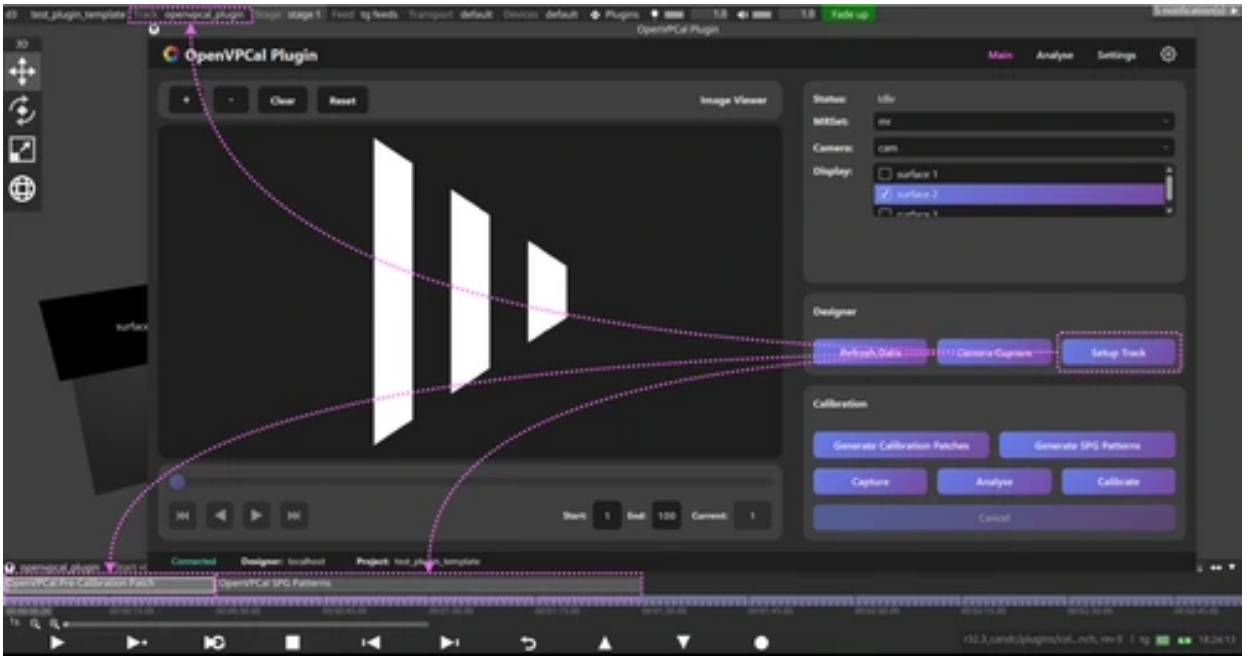
The OpenVPCal plugin does not fetch the Designer state in real-time. If you made a change in Designer, you must update the Designer state using the **Refresh Data** button.

Camera Capture

When a capture sequence has not been done, **Camera Capture** can be used to get the camera preview from Designer.

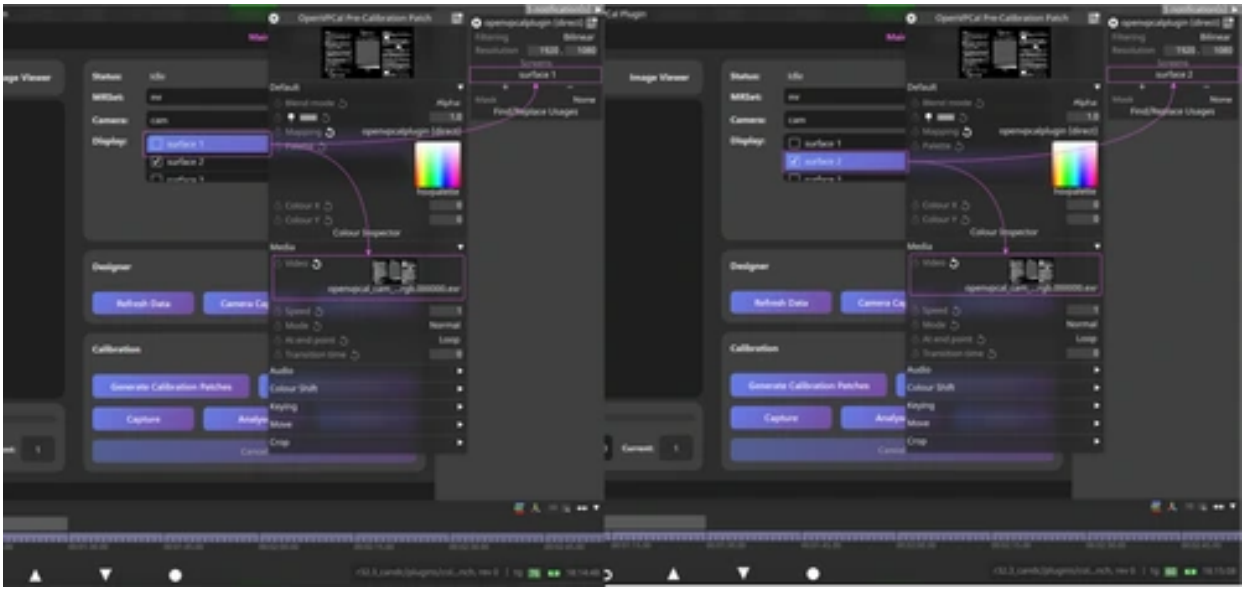
Setup Track

Creates and switches to the **openvpcal_plugin** track for the calibration process, then prepares two video layers: **OpenVPCal Pre-Calibration Patch** and **OpenVPCal SPG Patterns**.



These layers act as placeholders for the generated OpenVPCal images. When you change the selected display in the plugin, the video content and assigned displays in Mapping update automatically. For example, when you select LED A:

- **OpenVPCal Pre-Calibration Patch** is assigned the calibration patches for LED A.
- **OpenVPCal SPG Patterns** is assigned the SPG patterns for LED A.
- LED A is selected as a display in the **openvpcalplugin (Direct)** mapping.



4. Calibration Control Area

Generate Calibration Patches

Generate Calibration Patches will:

1. Generate the calibration patches to use for the calibration of checked displays in the **State area**.
2. Upload the calibration patches to Designer.
3. Download the current OCIO config in Designer.
4. Create `pre_calibration_openvpcal_<config>.ocio` based on the downloaded config.
5. Upload the created OCIO config.
6. Update the Designer OCIO config to the pre-calibration OCIO config.
7. Update the LED display colour space to the pre-calibration colour space.

Make sure to populate and configure the OpenVPCal settings for all LED displays in the **Settings** tab.

Generate the calibration patches to use for the calibration, then upload the calibration patches to Designer. Make sure to update the OpenVPCal settings in the **Settings** tab before generating the calibration patches. The generated calibration patches will be stored in:

- `objects/videofile/<camera_display>/colour_patches`

The OCIO config generated by the OpenVPCal Plugin should not be used for Generate Calibration Patches. Otherwise, it may fail to create an OCIO config with the desired colour space.

If you would like to change the colour space of displays or the camera, you can update them after the Generate Calibration Patches process is finished. Neither Analyse nor Calibrate will overwrite OCIO-related settings. However, it is advised to use the prepared OCIO settings as they are.

Generate SPG Patterns

Generating SPG (Synthetic Pattern Generator) Patterns creates a comprehensive set of synthetic test patterns designed to validate your LED wall setup before running colour calibration. These diagnostic patterns help identify potential issues in your imaging pipeline that could affect calibration accuracy. They

are essential for ensuring your LED wall and imaging pipeline are properly configured before investing time in the calibration process.

When to Use SPG Patterns:

- Before shooting calibration patches to verify your setup.
- To diagnose sync, mapping, or colour pipeline issues.
- When troubleshooting LED wall display problems.
- To validate your imaging chain after making configuration changes.

How to Use SPG Patterns:

1. Go to the plugin's **Main Tab** and click **Generate SPG Patterns**. Once generation has completed, the patterns will be stored in `objects/videofile/<camera_display>/spg_patterns`.
2. In Designer, create a video layer.
3. Ensure the video layer is direct mapped to the display you wish to debug.
4. Under `Video Layer > Media`, select the SPG pattern you wish to display.
5. Certain SPG patterns like the **Frame Sync Count** are available as `.seq` frame sequences, that can be directly mapped to the display and played back like normal video.

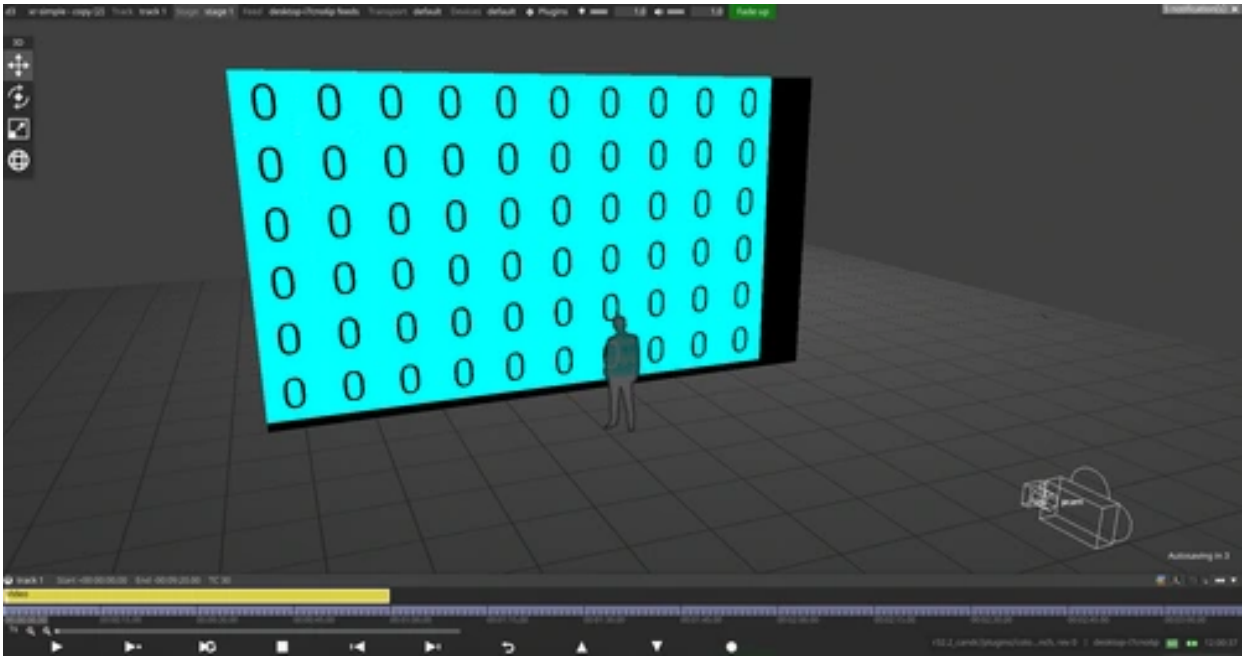
The SPG generator creates test patterns in the same colour space and EOTF as your LED wall target settings. Each pattern tests specific aspects of your LED wall and imaging pipeline:

Frame Sync Count

Displays sequential frame numbers to verify proper synchronisation between your camera recording frame rate and LED wall playback. Any ghosting, blending, or missing numbers indicates sync issues that must be resolved before calibration. To permit correct playback and capture of the patterns, ensure the following:

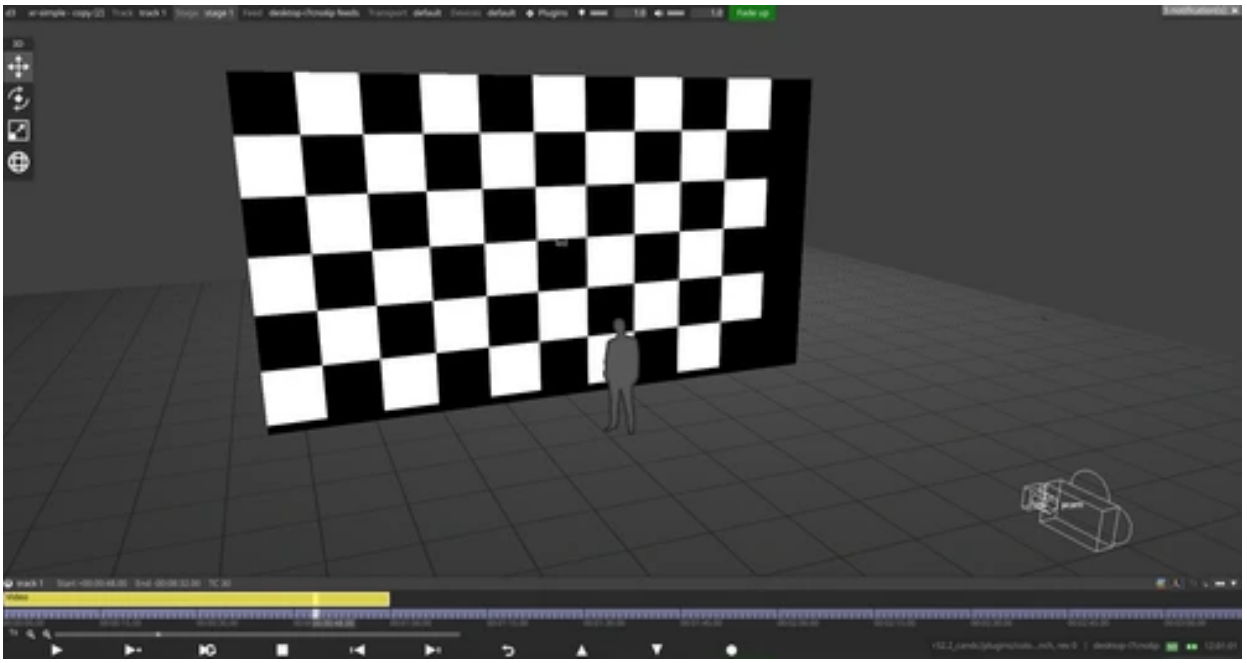
- Go to `Video Layer > Media > Video > Edit`
  - Set playback frame rate (`FPS`) to 1/10 of camera recording FPS for single-frame patterns.
- Go to `Video Layer > Media > Video > Filtering`
  - Disable frame blending (`Frame Blending > Off`) and ensure the sequence stops at the last frame.

Note that since the capture of the colour patches is automatically handled by Designer when the capture process is launched from the plugin, verifying frame synchronisation is redundant.



Checkerboard Patterns

Multiple checkerboard sizes test for scaling, aspect ratio, and mapping issues. When displayed 1:1 with your LED wall resolution, squares should appear undistorted and properly aligned.



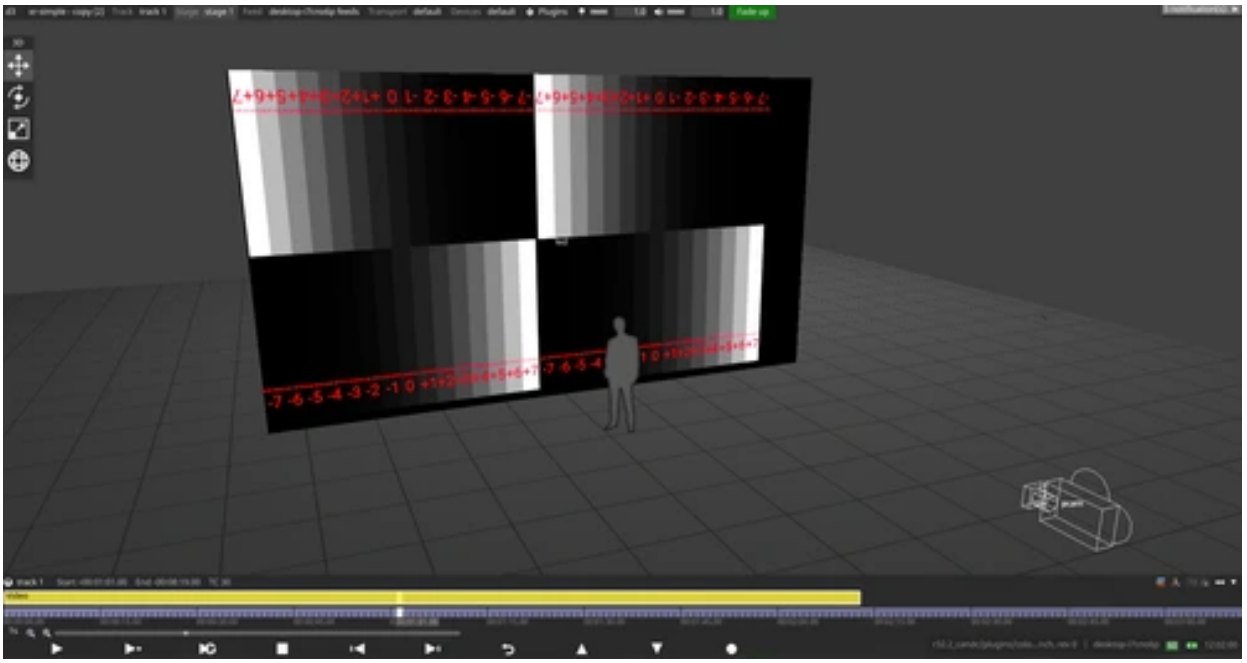
Linear Steps

Absolute brightness steps (in nits) for PQ (ST2084) workflows. You should see clearly distinguishable bands up to your wall's peak luminance, with no visible bands beyond that limit. These patterns help verify correct brightness mapping throughout your pipeline. The exact values can be further verified using a light metre. Ensure the peak luminance value is reflected in the `Target Max Lum` field within the plugin's OpenVPCal Settings.



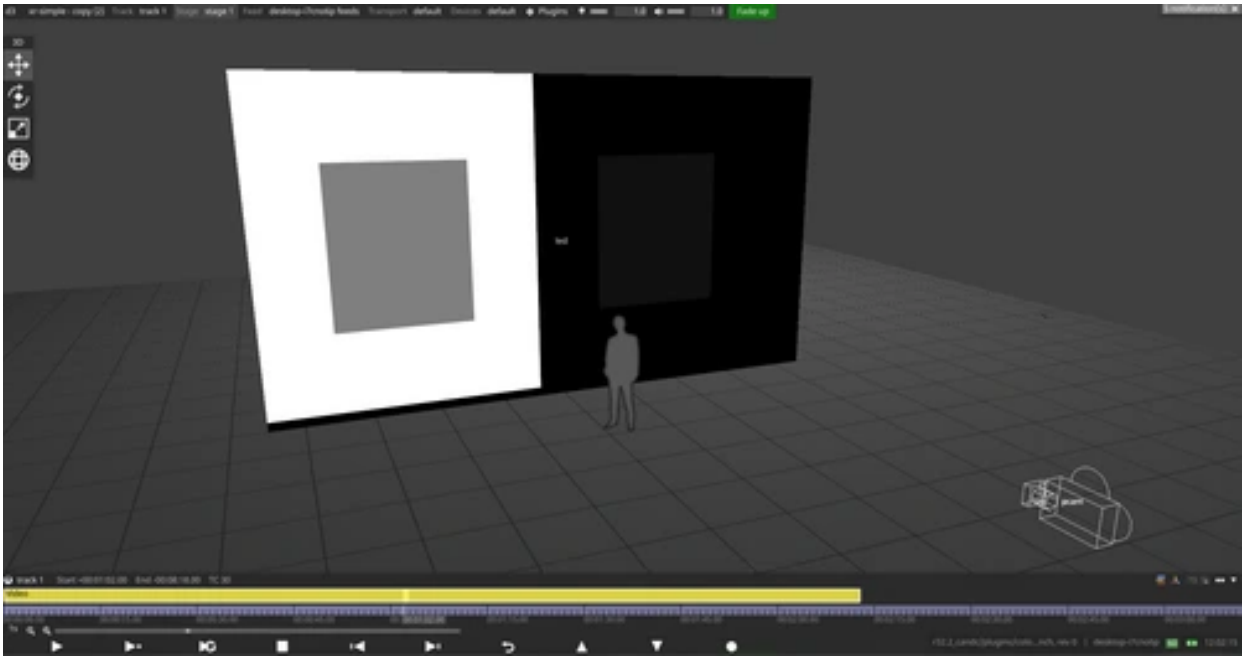
Exposure Stops

Test patterns that, when viewed through your camera's false colour display, allow you to verify linear lighting response by adjusting camera exposure settings in one-stop increments.



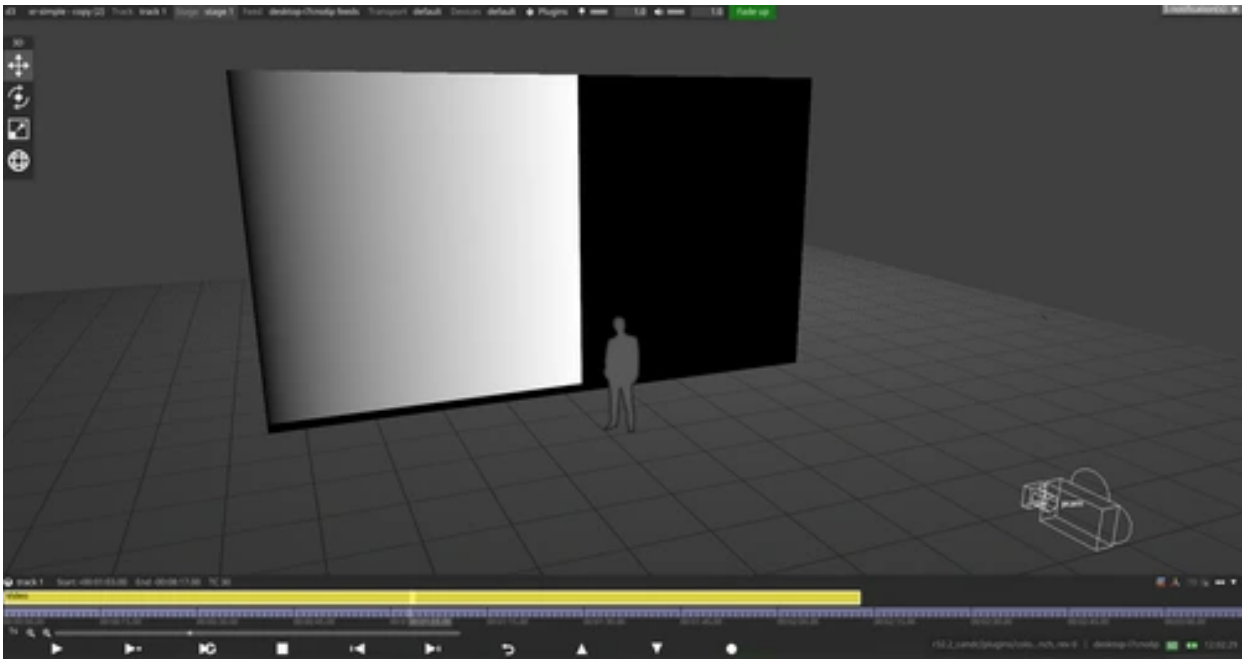
Data Range Verification

Ensures your imaging chain operates in extended (full) range rather than legal range. Inner squares within test patches should be clearly distinguishable when configured correctly.



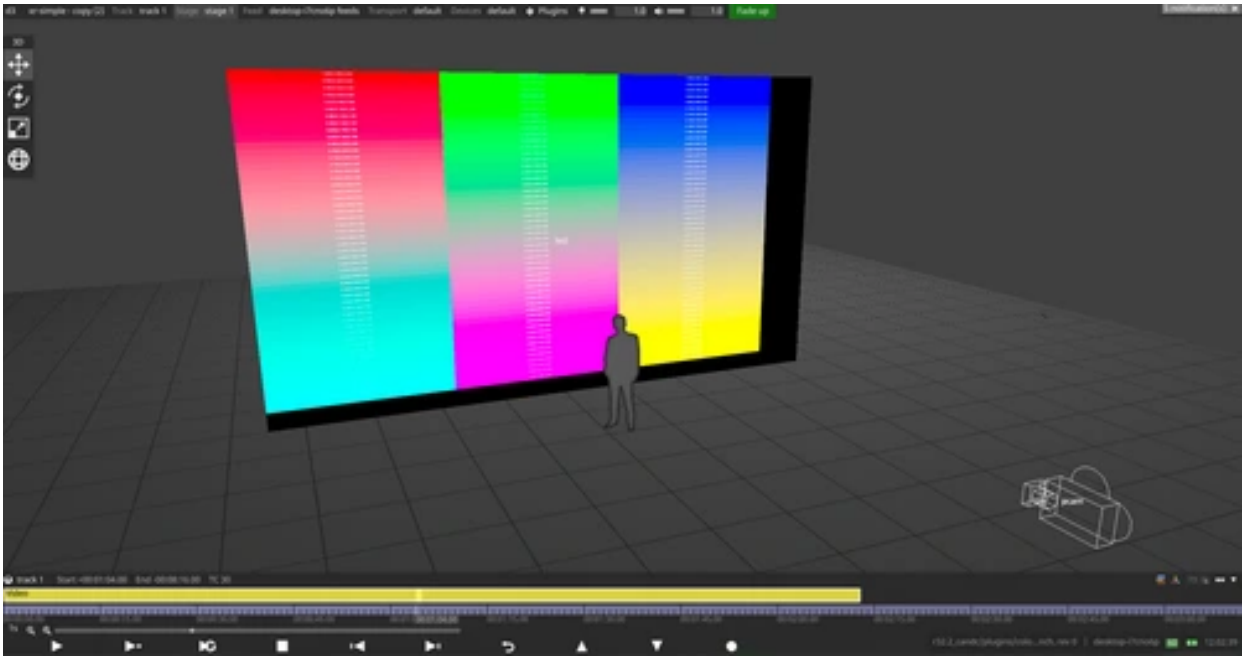
Bit Depth Testing

Grey ramp patterns reveal whether your imaging chain maintains 10-bit processing. Any visible vertical banding indicates 8-bit limitations that could affect calibration quality.



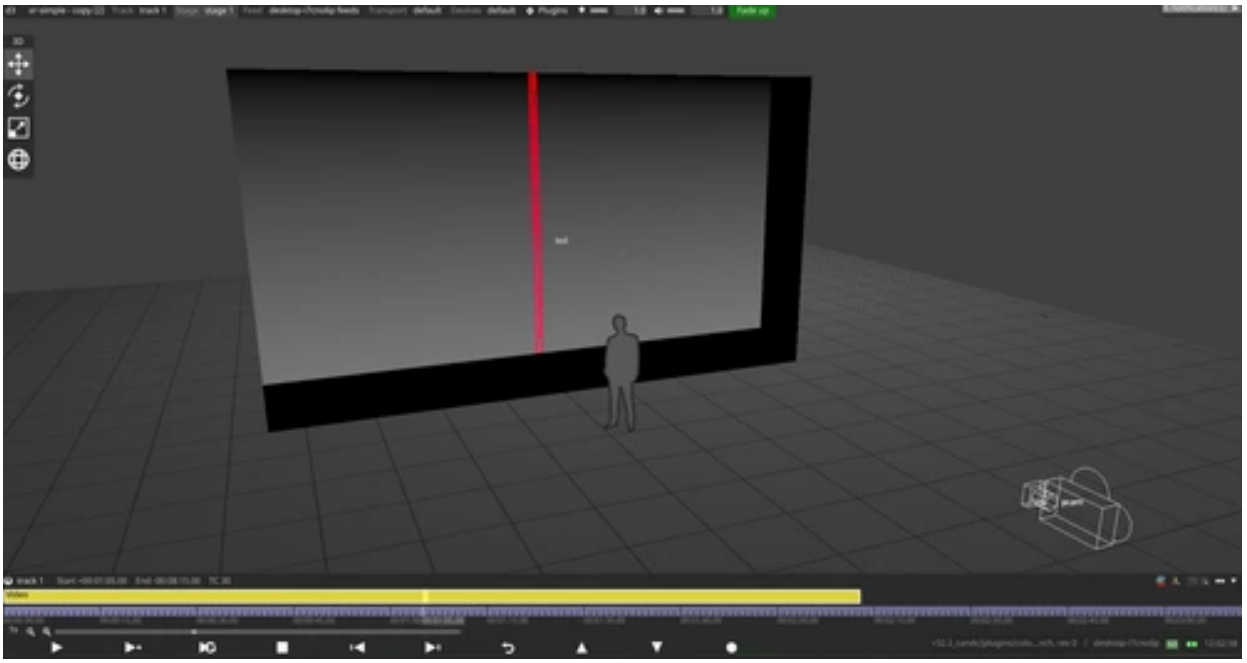
Colour Steps

Graduated colour patterns test for colour clipping and verifying proper colour space handling throughout your pipeline. Smooth gradations without black bands or indistinguishable steps indicate correct configuration.



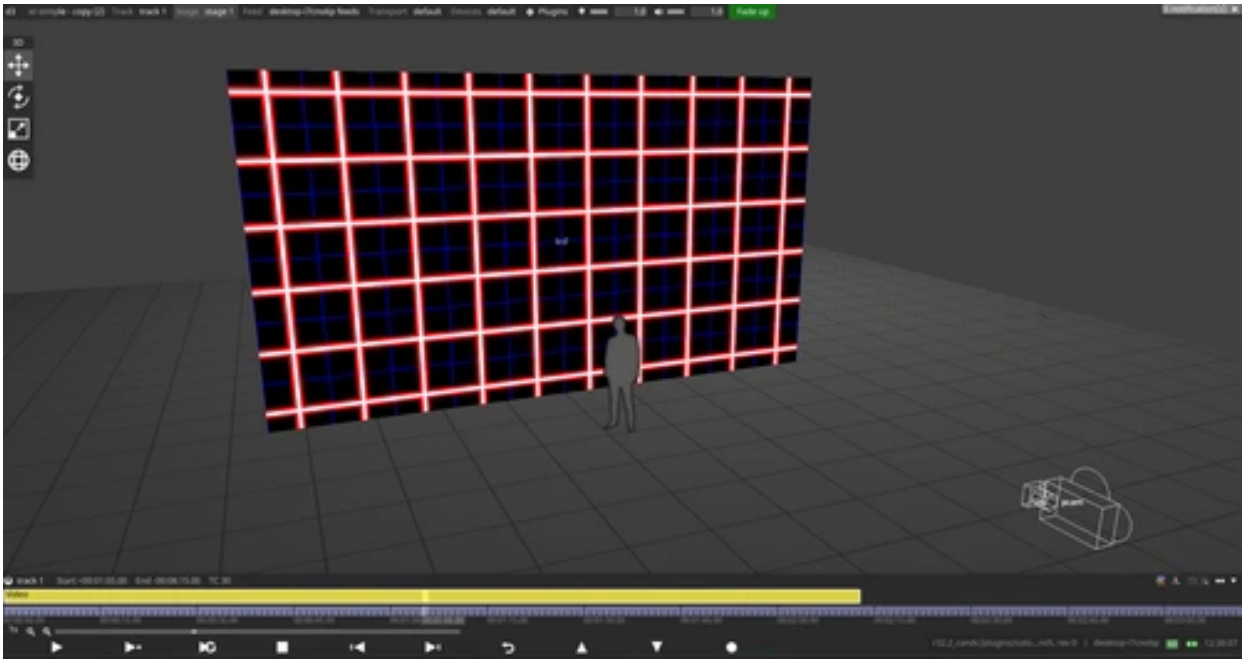
Real Black Level

Determines your LED panels' true black capabilities before multiplexing artifacts become visible in camera. This helps establishing the practical black level limits for your calibration.



Alignment Grids

Cross patterns and grids verify physical construction alignment and content mapping accuracy. Misaligned patterns indicate hardware or mapping configuration issues.



Best Practices for SPG Pattern Testing

- View patterns through your production camera setup.
- Check all sections of multi-processor LED walls for consistency.
- Resolve any identified issues before proceeding to calibration patch generation.

Capture

The Capture button will trigger the Designer image sequence capture process for selected displays in the **State area**. Note that the capture process will be done sequentially (i.e. capture for display 1 will be done first, then move on to display 2).

1. Update the Designer OCIO config to the pre-calibration OCIO config `pre_calibration_openvpcal_<config>.ocio`.
   - This will be skipped if **Update OCIO Config on Capture** is disabled.
2. Start the image sequence capture for each display.
3. Download all captured images from Designer. The downloaded images will be saved in:
   - `Documents/d3plugins/openvpcal/assets/<project>/<camera__display>/capture`
4. Convert all downloaded EXR (ACES2065-1) images into PNG (sRGB) for preview. They will be saved in:
   - `Documents/d3plugins/colourcal/assets/<project>/<camera__display>/preview`
5. Load all preview images on the frontend.

> **Note**
>
> - If a post-calibration OCIO config is selected in Designer, the capture process will revert it to the pre-calibration OCIO config.
> - Designer's GUI will be disabled during the capture process to prevent frame drops.

Analyse

The Analyse button will start the analysis process using the captured images and produce analysis result data. This process will not interact with Designer. Instead, the plugin will run the analysis using the downloaded captured images. The analysis results can be monitored from the **Analyse tab**.

You can set an ROI to run calibration on in the **Main Canvas** to make the analysis process faster. When an ROI is not set, the detection algorithm will try to find the ROI to run the calibration on, then begin the analysis process. The detected ROI will be displayed on the main canvas.

When the analysis is finished, feedback will be provided in **Calibration Result**. All analytical data will also be provided in the **Analyse tab**.

Calibrate

When you are happy with the analysis results, you can run the calibration. The calibration process will:

1. Create a new **OCIO config**, `post_calibration_openvpcal_<hash>.ocio` with the Output Transform from the calibration result.
2. Upload the newly created **OCIO config** to Designer.
3. Set the **OCIO config** of Designer to `post_calibration_openvpcal_<hash>.ocio`.
4. Set the **Output transform** of the LED Display to the calibrated **Output transform**.

Cancel

You can cancel **Generate Calibration Patches**, **Generate SPG Patterns**, **Capture**, **Analyse** and **Calibrate**. Note that when the process is running a file I/O task with a potential race condition, the cancel button will be disabled.

Updated Fields

This table summarises the fields and settings that are modified when executing each button operation in the Main tab.

Action	Updated Data in Plugin	Updated Data in Designer
Generate SPG Patterns	• Base OCIO config	• OCIO config (pre_calibration) • LED screen output transform • Generated SPG patterns input transform
Generate Calibration Patches	• Base OCIO config	• OCIO config (pre_calibration) • LED screen output transform • Camera input transform (colour patches)
Capture	• Preview images	• Camera input transform
Analyse	• Result graphs in Analyse tab	

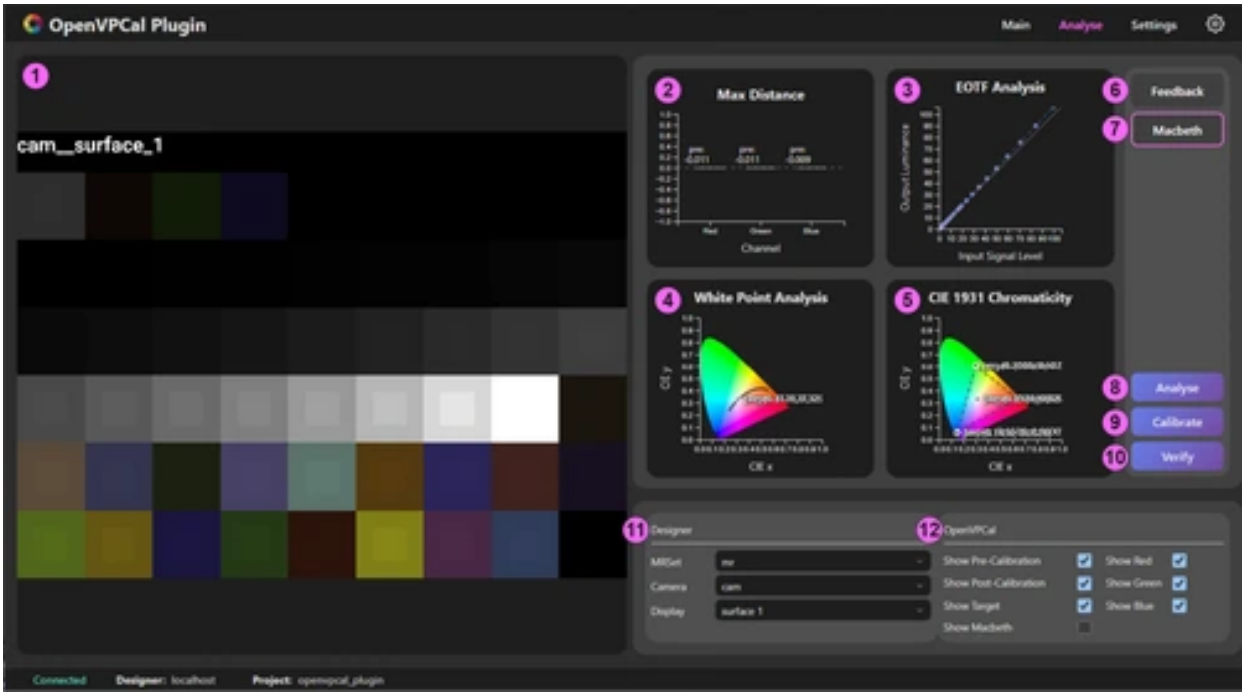
Action	Updated Data in Plugin	Updated Data in Designer
Calibrate	• Result graphs in Analyse tab	• OCIO config (post_calibration) • LED screen output transform (calibrated)

Field Definitions:

- **Base OCIO config**: The baseline OCIO configuration file from which pre-calibration and post-calibration configs are derived.
- **OCIO config**: The active OCIO configuration selected in Designer under `Project Settings > Colour Management`.
- **pre_calibration**: Generated config file with naming pattern `pre_calibration_openvpcal_<hash>.ocio`. Applied during pattern generation and capture to prepare the display for calibration.
- **post_calibration**: Generated config file with naming pattern `post_calibration_openvpcal_<hash>.ocio`. Contains the calibrated output transform applied after successful calibration.
- **Generated SPG Patterns**: SPG pattern VideoClip resource uploaded to Designer in `.seq` format.
- **Camera input transform (colour patches)**: Input transform for the calibration colour patch VideoClip, located at `objects/videofile/<camera_display>/colour_patches`.
- **LED screen output transform (calibrated)**: The calibrated display transform applied to the LED screen after successful calibration.

Analyse Tab

The Analyse tab provides comprehensive visual feedback on calibration quality, displaying analysis results from the calibration. This tab shows how well your LED display matches the target colour specifications before and after calibration. To see the analysis results, you must complete either the **Analyse** or **Calibrate** process from the Main tab.



Analyse Tab Elements

1. Analyse Main Cavas
2. Max Distance Graph
3. EOTF Analysis Graph
4. White Point Analysis Graph
5. CIE 19331 Chromacity Diagram
6. Feedback
7. Macbeth Chart
8. Analyse
9. Calibrate
10. Verify
11. Designer Control
12. Analysis Graph Control

Mouse Control

All graphs support interactive exploration with the following controls:

- **Left-click+drag**: Pan/move the view.
- **Wheel up**: Zoom in.
- **Wheel down**: Zoom out.
- **Wheel-click (MMB)**: Reset zoom level and position to default.

1. Analyse Main Canvas

The main canvas displays the currently selected graph for detailed inspection.

- Shows the graph that is selected by clicking thumbnails from the grid (items 2-6).

- Provides zoom and pan capabilities for close examination.

2. Max Distance Graph

This bar chart displays the maximum colour error in each RGB channel, providing a quick assessment of overall colour accuracy.

What it shows:

- **Red, Green, Blue bars**: Maximum distance of each colour channel between the target and captured image.
- **Pre-calibration bars**: Wider bars showing errors before calibration.
- **Post-calibration bars**: Narrower bars showing errors after calibration.
- **Numeric values**: Error of each colour channel between the target and captured image.

Interpreting results:

- **Shorter bars = better accuracy**: Values close to zero indicate excellent calibration.
- **Compare heights**: Post-calibration bars should be shorter than pre-calibration bars.
- **Large remaining errors**: May indicate LED hardware limitations or calibration issues that need investigation.
- **Negative distance**: Captured image is darker than intended.
- **Positive distance**: Captured image is brighter than intended.

3. EOTF Analysis Graph

This graph displays the Electro-Optical Transfer Function (EOTF), showing how input signal levels translate to output luminance. This reveals whether the display reproduces brightness correctly across the full brightness range.

What it shows:

- **White diagonal reference line**: Represents a perfect linear response (input = output).
- **Pre-calibration lines**: Dashed lines showing the luminance response for each RGB channel before calibration.
- **Post-calibration lines**: Solid lines showing the corrected luminance response after calibration.

Interpreting results:

- **Lines close to the diagonal = accurate**: Minimal deviation means proper luminance reproduction
- **Curved lines**: Indicate gamma or tone curve issues
- **Post-calibration improvement**: Solid lines should track closer to the reference diagonal than the dashed lines
- **Smooth curves**: Indicate a good tonal response without banding or clipping
- **Curves above the diagonal**: Display is brighter than intended
- **Curves below the diagonal**: Display is darker than intended
- **Non-smooth curves**: May indicate bit depth or processing issues

4. White Point Analysis Graph

This graph shows white point accuracy on the CIE 1931 chromaticity diagram, showing colour temperature and tint characteristics.

What it shows:

- **Planckian locus**: Black curved line showing blackbody radiation at different colour temperatures.
- **Target white point**: Reference target marker.
- **Pre-calibration white point**: Marker showing initial measured white point.
- **Post-calibration white point**: Marker showing corrected white point.

Interpreting results:

- **Markers closer together = better white balance**: Distance indicates a colour temperature shift.
- **Post-calibration near target**: Indicates successful white point correction.
- **Distance from target**: Shows the magnitude of colour cast (green/magenta or blue/yellow shift).
- **Common target**: D65 (6500K) for LED walls in ICVFX workflows.
- Large separation after calibration may indicate camera white balance issues.

5. CIE 1931 Chromaticity Diagram

This graph displays the colour gamut on the standard CIE 1931 colour space, showing the range of colours the display can reproduce.

What it shows:

- **Colour triangles**: RGB primaries connected to form the achievable colour gamut.
  - **Target gamut**: Dashed line showing the desired target gamut.
  - **Pre-calibration gamut**: Initial display capabilities.
  - **Post-calibration gamut**: Corrected display capabilities.
- **White point**: Circle inside the triangle showing the neutral colour location.
- **Macbeth samples** (optional): Coloured dots showing measured ColourChecker patch locations.

Interpreting results:

- **Larger triangle = wider gamut**: More colours the display can reproduce.
- **Triangle shape matters**: The post-calibration triangle should closely match the target shape.
- **Perfect match often impossible**: Hardware may not physically reach the target primaries.
- **Small mismatches acceptable**: Calibration optimises within hardware constraints.
- **Coverage check**: The triangle should enclose colours important for your content.
- Triangle vertices show RGB primary chromaticities.
- Triangle interior contains all reproducible colours.
- Area outside the triangle represents out-of-gamut colours (cannot be displayed accurately).

6. Feedback



Once an Analyse or Calibrate process completes, this section displays feedback about the results. It highlights any issues detected during analysis or calibration and provides guidance to help you achieve the best calibration output.

Common OpenVPCal Analysis and Calibration Feedback

- **Measured Exposure Validation**
  - **Issue**: The camera exposure is incorrect (e.g., measuring 5.0% instead of the required 18%).
  - **Solution**: Re-expose the camera using these steps:
    1. Display the first calibration patch (with the grey center square).
    2. Use your camera's false colour display or a light meter.
    3. Adjust camera settings until the entire center grey square reads exactly 18%.
    4. Use the 17% and 19% reference patches at the bottom of the frame to fine-tune exposure.
    5. Re-shoot all calibration patches with the corrected exposure.
- **Measured EOTF Peak vs Target Peak Failed**
  - **Issue**: Significant mismatch between measured peak luminance and target luminance.
  - **Solution**: Check your complete imaging pipeline:
    1. Use SPG Linear Steps patterns to validate brightness mapping throughout your pipeline.
    2. Verify the Target Max Lum setting in the plugin matches your LED wall's actual peak capability.
    3. Confirm Designer is applying the correct EOTF transform (e.g., ST2084 for HDR content).
    4. Check LED processor settings - ensure peak luminance is set correctly and not clamped.
    5. Verify no unexpected gain or brightness adjustments are applied in the imaging chain.
    6. Re-shoot patches after correcting the imaging chain configuration.

- **EOTF Validation**
  - **Issue**: The display's brightness response curve deviates from the expected target EOTF.
  - **Solution**: Troubleshoot your imaging pipeline:
    1. Verify EOTF settings match between plugin Target EOTF and LED processor configuration.
    2. Check Designer colour management - ensure only the required EOTF transform is applied to patches.
    3. Disable any tone mapping or creative colour grading in the imaging chain.
    4. Confirm video data range is consistent (Full/Extended vs Legal range) throughout the pipeline.
    5. Use SPG Bit Depth patterns to verify 10-bit processing is maintained.
    6. Test with SPG Exposure Stops patterns to confirm linear lighting response.
    7. Re-shoot calibration patches after resolving imaging chain issues.

7. Macbeth Chart

The Macbeth button switches the main canvas to display the captured Macbeth ColourChecker reference image.

What it shows:

- The actual calibration target image captured during the analysis process.
- 24 colour patches arranged in the standard Macbeth ColourChecker layout.
- Reference patches used for colour accuracy measurements.

Interpreting results:

- Click to toggle between the Macbeth chart view and graph views.
- Verify that the colour patch detection worked correctly during analysis.
- Visual confirmation that the calibration patches were captured properly.
- If the Macbeth chart is not visible, the detection algorithm may have failed, but this does not prevent calibration from succeeding. The primary calibration patches are still analysed correctly.

8. Analyse

This is the same button as the **Analyse** button in the **Main tab**. Clicking it switches to the Main tab and starts the analysis process.

9. Calibrate

This is the same button as the **Calibrate** button in the **Main tab**. Clicking it switches to the Main tab and starts the calibration process.

10. Verify

Once the calibration is finished, and the OCIO config of Designer is updated to the post-calibration config, you can verify the calibration result with this button. The button will capture the calibration patches with the calibrated output transform on the target display, then run the analysis on them. On clicking **Verify**, the plugin will:

1. Start the image sequence capture for the target display.

2. Download all captured images from Designer. The downloaded images will be saved in:
   - `Documents/d3plugins/openvpcal/assets/<project>/<camera__display>/capture`
3. Convert all downloaded EXR (ACES2065-1) images into PNG (sRGB) for preview. They will be saved in:
   - `Documents/d3plugins/colourcal/assets/<project>/<camera__display>/preview`
4. Load all preview images on the frontend.
5. Run analysis on the captured images as the **Analyse** button does.

11. Designer Control

This section allows you to select which calibration data to display from your Designer project.

Controls:

- **MRSet**: Select the Mixed Reality Set containing the calibration data you want to analyse.
- **Camera**: Choose which camera's calibration results to view.
- **Display**: Select which LED display's calibration to analyse.

Behaviour:

- Changing any dropdown automatically refreshes all graphs with the selected calibration data.
- Data must exist from a completed **Analyse** or **Calibrate** process.
- Allows the comparison of calibration results across different camera/display combinations.

12. Analysis Graph Control

This section controls the visibility of data series and channels across all graphs, allowing you to focus on specific aspects of the calibration.

- **Show Pre-Calibration**
  - Displays measurements taken before calibration.
  - Shown as dashed lines and wider bars (semi-transparent).
  - Use this to understand the initial display state and calibration starting point.
- **Show Post-Calibration**
  - Displays measurements taken after calibration.
  - Shown as solid lines and narrower bars (more opaque).
  - Use this to verify calibration improvements and final accuracy.
- **Show Target**
  - Displays the target colour space specification.
  - Shows ideal reference goals (e.g., Rec.2020, P3, custom gamut).
  - Use this to compare actual performance against calibration objectives.
- **Show Macbeth**
  - Displays Macbeth ColourChecker sample points.
  - Only visible on the CIE 1931 Chromaticity diagram (item 5).
  - Shows the measured locations of colour reference patches.

- **Show Red**
  - Toggle the red channel data visibility of the EOTF Analysis Graph (item 3).
- **Show Green**
  - Toggle the green channel data visibility of the EOTF Analysis Graph (item 3).
- **Show Blue**
  - Toggle the blue channel data visibility of the EOTF Analysis Graph (item 3).

Workflow Guide

Follow this workflow to effectively analyse calibration results:

1. **Select your data source**: Use the Designer Control (7) to choose MRSet, Camera, and Display.
2. **Review overview**: Examine all four graph thumbnails (2-5) for a quick assessment.
3. **Deep dive**: Click any thumbnail to enlarge the view in the main canvas (1) for detailed inspection.
4. **Compare results**: Use the visibility toggles (8) to compare pre-calibration, post-calibration, and target data.
5. **Zoom for details**: Scroll to zoom and drag to pan for close examination of specific regions.
6. **Verify patch detection**: Click the Macbeth button (6) to confirm the colour patch detection worked correctly.
7. **Interpret findings**: Use the guidelines below to determine calibration quality.

Interpreting Calibration Results

Indicators of Good Calibration:

- **Max Distance**: Bars near zero across all RGB channels.
- **EOTF**: Lines closely follow the diagonal reference line.
- **White Point**: Post-calibration marker very close to target marker.
- **Gamut**: Post-calibration triangle overlaps closely with target triangle.

Common Issues and What They Mean:

- **Uneven Max Distance bars**: One or more channels have calibration errors.
  - Check if a specific channel needs attention.
  - May indicate LED ageing or hardware issues in that channel.
- **Curved EOTF lines away from the diagonal**: Gamma or tone response problems.
  - Display is not reproducing brightness linearly.
  - May need EOTF correction settings adjusted.
- **Separated white points**: Colour temperature mismatch.
  - White balance needs correction.
  - Check camera white balance settings.
- **Small gamut triangle**: LED hardware cannot reach the target primaries.
  - Physical limitation of LED panels.
  - Consider whether the target gamut is achievable with your hardware.

When to Re-calibrate:

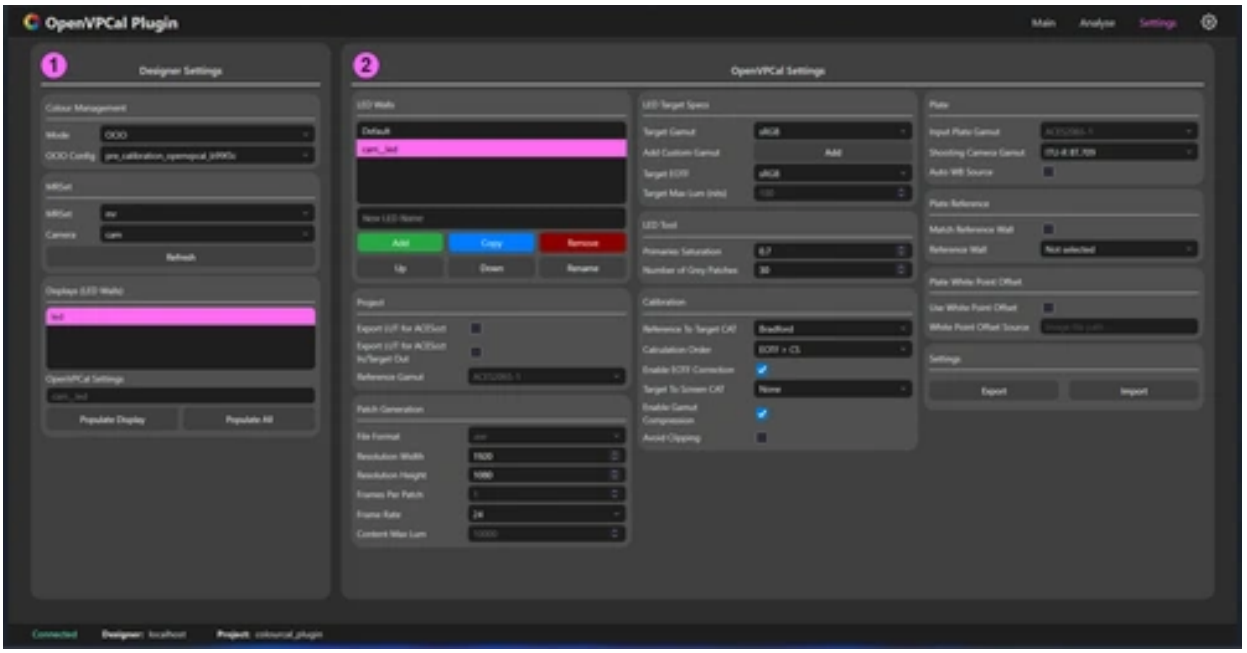
- Post-calibration errors remain large relative to pre-calibration.
- Significant visual differences remain between pre and post measurements.
- White point is far from the target after calibration.
- Calibration feedback messages suggest issues or warnings.
- LED wall hardware has been changed or serviced.

Acceptable Tolerances:

- Small deviations from perfect are normal due to hardware constraints.
- Post-calibration should show significant improvement over pre-calibration.
- Target match depends on LED hardware capabilities.
- Consult the calibration feedback messages in the Main tab for specific recommendations.

Settings Tab

The Settings tab contains all the configuration options for the colour calibration process. These settings control how calibration patches are generated, how the analysis is performed, and how the final calibration is computed and applied.



Settings Tab Elements

1. Designer Settings
2. OpenVPCal Settings

1. Designer Settings

The Designer Settings section integrates OpenVPCal with Designer's colour management system, allowing you to apply calibrations within your mixed reality set.

Colour Management Settings

Configure the OCIO colour management pipeline that will be used as the foundation for calibration.

Colour Management	Description
Mode	Selects the colour management mode for the Designer project.
OCIO Config	The OCIO config currently selected as the base to create a new config with the calibration results.

Mixed Reality Set Configuration

Select and configure the MR Set and camera that will be used for calibration.

MR Set	Description
MR Set	The currently selected MR Set.
Camera	The target Camera selected for the current MR Set.

LED Display Management

Manage the LED displays assigned to your MR Set and their associated OpenVPCal settings.

Displays (LED Walls)	Description
Displays	A list of the displays assigned to the current MR Set.
OpenVPCal Settings	The OpenVPCal settings associated with the selected camera/display pair (calibration asset).
Populate Display	Populates the OpenVPCal settings for the selected display.
Populate All	Populates the OpenVPCal settings for all listed displays.

2. OpenVPCal Settings

The OpenVPCal Settings gather calibration data for specific camera and display combinations. Each set of settings is used to generate a unique calibration that can be applied to content in the Designer timeline.

LED Wall Configuration and Management

Create, organize, and manage different LED wall configurations for your calibration workflow.

LED Walls	Description
New LED Name	Text field to enter a name for a new LED wall configuration.
Add	Creates a new set of OpenVPCal settings with the name specified in the “New LED Name” field.
Copy	Duplicates the currently selected LED wall configuration, creating a copy with all the same settings.
Remove	Deletes the currently selected LED wall configuration and all associated OpenVPCal settings.
Up	Moves the currently selected LED wall configuration up one position in the list order.
Down	Moves the currently selected LED wall configuration down one position in the list order.

LED Walls	Description
Rename	Allows you to change the name of the currently selected LED wall configuration.

Project Settings

Global project settings that affect how calibration data is processed and exported.

Project	Description
Export LUT for ACEScct	Modifies the calibration LUT export so that the LUT expects ACEScct input and produces a calibrated ACEScct output. The user will have to apply the colour space conversion and EOTF transform from ACEScct to the target independently.
Export LUT for ACEScct In/Target Out	Modifies the calibration LUT export so that the LUT expects ACEScct input and produces a calibrated target output (with both the colour space and EOTF transform to the target applied).
Reference Gamut	Colour space used as the common computational foundation for all colour transformations and calibration calculations between different input and target colour spaces. Typically `ACES-2065-1`.

Calibration Patch Generation

Configure the technical specifications for generating colour calibration patches and test patterns.

Patch Generation	Description
File Format	The file format for export. If EXR is chosen, the patches will export in linear (e.g. Linear Rec 2020), scaled such that 1=100 nits. Otherwise, patches will export in the target space and EOTF (e.g. ST 2084 - Rec 2020).
Resolution Width	Width resolution of the exported patches.
Resolution Height	Height resolution of the exported patches.
Frames Per Patch	How many frames per patch the tool will export.
Frame Rate	The frame rate for the shooting camera, used in certain SPG pattern sequences.
Content Max Lum	The maximum luminance of the content, which is used to produce three variations of creative roll-off, which gently rolls off the maximum value specified to the peak luminance of the LED wall. Defaults to 10,000 nits, which is the maximum for PQ.

LED Display Target Specifications

Define the target colour space, brightness, and gamma characteristics that your LED wall should reproduce.

LED Target Specs	Description
Target Gamut	The target gamut for the calibration. Choose between predefined standard gamuts (sRGB, P3, Rec.2020), or select a custom one that matches the LED wall primaries.

LED Target Specs	Description
Add Custom Gamut	A pop-up widget allows you to add a new custom gamut for the calibration by inserting a custom gamut name and its CIE 1931 x,y primaries and white point coordinates.
Target EOTF	Select the target EOTF of the LED panel. **Note that when switching between ST2084 and power gamma (sRGB/BT1886), the MaxLum will automatically reset.**
Target Max Lum (nits)	Select the content peak luminance (only available if the EOTF is ST2084).

Colour Patch Configuration

Fine-tune the characteristics of the colour patches used in the calibration process.

LED Tool	Description
Primaries Saturation	The saturation intensity for the colour primaries (default to `0.7`).
Number of Grey Patches	The number of grey steps to be generated/analysed (default to `30`).

Calibration Settings

Control how the calibration transforms are calculated and applied.

Calibration	Description
Reference To Target CAT	Choose from a standard list of Chromatic Adaptation Transforms or select NONE for the Reference to Target 3x3 matrix (defaults to `Bradford`).
Calculation Order	Edit the order of operations for the calibration transforms.
Enable EOTF Correction	If checked, enables the EOTF correction.
Target To Screen CAT	Choose from a standard list of Chromatic Adaptation Transforms or select NONE for the Calibration matrix. None is set as the default.
Enable Gamut Compression	If checked, enables gamut compression.
Avoid Clipping	If checked, scales the entire calibration transforms to avoid highlight clipping (on by default).

Camera Plate Configuration

Specify the colour space characteristics of your camera's captured footage for accurate calibration processing.

Plate	Description
Input Plate Gamut	The input colour space of the pre-processed camera plate sequence (defaults to `ACES-2065-1`).

Plate	Description
Shooting Camera Gamut	The native colour space of the camera used for the calibration.

Reference Calibration Settings

Configure automatic white balancing and cross-referencing between multiple LED wall setups.

Plate Reference	Description
Auto WB Source	If enabled, the input plate will be white-balanced prior to performing the analysis and calibration.
Match Reference Wall	If checked, the selected LED wall will be matched to the selected reference wall.

White Point Correction

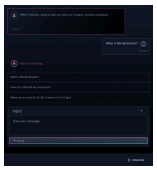
Adjust the white point of captured plates using a reference image to improve calibration accuracy.

Plate White Point Offset	Description
Use White Point Offset	If checked, the plate's original white point will be shifted towards the measured white point of the indicated file, prior to performing the analysis and calibration.
White Point Offset Source	The path to an image file with the white point offset source.

Designer Plugin Gallery

Ask AId3n

Ask AId3n is our AI-powered workflow assistant built into Designer, created to optimise your production experience. It comes with a deep understanding of Disguise workflows, designed to help you navigate Designer faster and more intuitively.



⬇️ Download Ask AId3n - 722 KB

📘 Configure and use the plugin.

Disguise Cloud Media Browser

Disguise Cloud Media Browser Plugin enables media browsing from your Disguise Cloud Drive to streamline media asset imports. You can browse and download media assets directly from Disguise Drive to your Designer project.

Powered by Disguise Cloud APIs



⬇️ Download Disguise Cloud Media Browser - 67.3 KB

📘 Configure and use the plugin.

Grafana LiveUpdate

Stream real-time Disguise performance metrics to Grafana dashboards using WebSocket-based live data updates. Monitor CPU, GPU, memory usage, and frame rates with sub-second latency. Includes Docker integration for easy setup and supports multi-machine monitoring across distributed setups.

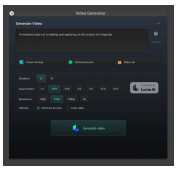
Built with Grafana Live streaming capabilities from Disguise r31



Grafana LiveUpdate repo

📘 Configure and use the plugin.

Luma AI Video Generator



Luma AI's Dream Machine is an advanced AI-powered video generation tool that transforms text prompts into high-quality, realistic videos. Text-to-Video functionality allows users to input descriptive text and generate dynamic videos with natural motion and accurate physics. Users can select clip length, resolution (up to 4K), and aspect ratios to suit their project needs.

⬇️ Download the Plugin - 51.8 MB

📘 Configure and use the plugin.

Pulse Plugin

Get real-time health checks on your Disguise project without interrupting your workflow. Pulse provides instantaneous performance monitoring with live graphing data for CPU load, GPU load, memory usage, and frame rate. Features proactive alerting with webhook integration for services like Slack and Teams.

Built with live update web sockets from Disguise r31



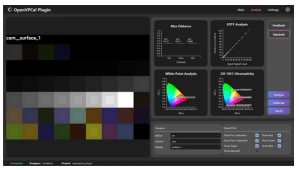
⬇️ Download Pulse Plugin - 290.2 KB

📘 Configure and use the plugin.

OpenVPCal Plugin

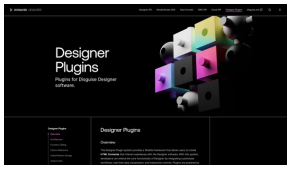
Analyse and calibrate your LED wall with a simple and straightforward workflow. The OpenVPCal Plugin provides comprehensive analysis of LED wall colour performance and generates calibrated OpenColorIO (OCIO) configs that can be easily loaded in your Designer project.

Built with OpenVPCal and Designer Plugins from Disguise r31.4



⬇️ Download OpenVPCal Plugin

📘 Configure and use the plugin.



If you are a Plugin implementer, please see the **Developer Portal** Plugin Distribution documentation to learn how you can develop and submit your plugin to the Designer Plugin Gallery.

Pulse Plugin

The Pulse plugin provides real-time performance monitoring for your Disguise projects without interrupting your workflow.

Built to leverage the live update web sockets introduced in Disguise r31, Pulse provides instantaneous monitoring of your project's performance metrics with integrated alerting and webhook notifications.

Features

- Real-time monitoring of CPU load, GPU load, memory usage, and frame rate
- Live graphing with expandable detailed views
- Advanced performance graphs with CPU/GPU timing comparisons
- Disk I/O activity monitoring
- Custom threshold configuration with alerting system
- Webhook integration for external notifications
- Remote monitoring via Disguise iOS app
- Compatible with Disguise r31 and newer

Install the Plugin

System Requirements: The Pulse plugin requires Disguise r31 or newer to function.

To install this plugin:

1. Ensure you are running Disguise r31 or newer.
2. Download the Pulse plugin package from the Designer Plugin Gallery.
3. Unzip the plugin into your project's `\Plugins\` directory (the same level as `\Objects\`).
4. Open **Designer**.
5. Click **Plugins** to access the Plugin Launcher.

6. Click **Pulse** to open the Pulse Plugin.



After installation, the Pulse plugin icon is displayed in the Windows system tray, so you can access logs or manually quit at any time.

Monitor Performance

1. Open the Pulse plugin from the Plugin Launcher.
2. View real-time performance metrics including:
   - CPU Load
   - GPU Load
   - Memory Usage
   - Frame Rate
3. Click on any metric to expand into a detailed time-based graph.
4. Use advanced graphs to compare CPU and GPU timings and view disk I/O activity.

Configure Alerts

1. Set custom thresholds for monitored parameters.
2. Configure warning levels (e.g., CPU load exceeds 80%).
3. Set critical alert levels (e.g., CPU load exceeds 90%).
4. Enable webhook notifications for external alerts.
5. Connect to services like Zapier for notifications to Slack or Microsoft Teams.

Remote Monitoring

The Pulse plugin can be accessed remotely via the Disguise iOS app, allowing you to monitor system performance from anywhere in the venue using your iPhone or iPad.

Release notes (v1.0.0)

- Initial release with real-time performance monitoring
- Support for CPU, GPU, memory, and frame rate metrics
- Expandable time-based graphing functionality
- Custom threshold alerting with webhook integration
- Remote monitoring via Disguise iOS app

Designer r14 Release Notes

r14.5 (32-bit)

Download r14.5 Full

Release build: 51416
Released: July 5th, 2018

Fixes

- [Automation / Encoders] Restore behaviour of PSN frames sent across multiple frames [Automation / Encoders] Movement threshold does not work unless prediction is on
- [Automation / Encoders] Tracked points disappearing from view reappear by animating into view [Device Control] Large amount of GVG route switching causes issues with AJA switchers [Device Recording] Scrubbing device recording not functioning correctly
- [Device Recording] Reduced performance encountered at the end of a device recording [Infrastructure] Project specific upgrade from r11 to r14.x.x relating to disk monitor
- [Projector Calibration] Reference point placement not always correct if the cursor is slightly off the mesh being calibrated to
- [Projector Calibration] Manage Reference points at surface extremes in particular models not handled well [Sockpuppet] Unexpected jumps while looping video via Sockpuppet

Current known issues

Upgrading 32-bit to 64-bit Sockpuppet shows

- There may be issues upgrading Sockpuppet projects from 32-bit to 64-bit in 14.x builds. If your project falls into this category, please contact Disguise support who can arrange a project upgrade for you.

Permissions error after installing

- On a small number of machines, a python-based permissions error will prevent software from starting.
- This issue can be solved by restarting Windows

Potential UI performance regression with long and busy timelines

- With either long or busy timelines containing e.g. a plethora of notes/cues, the UI may suffer a degradation in performance
- Minimising the timeline negates this

Slideshows transition time

- The transition time between slides in slideshows is currently broken
- The fix for this makes fundamental changes to timeline operations, so will take a while to work its way into future releases

r14.4.7

Download r14.4.7 Full

Release build: 50324
Released: May 29th 2018

Notes:

- This release is primarily to enable support for future hardware releases.
- There is one software fix for intermittent crackling when playing back audio files.
- The big difference in build numbers is due to our internal code structure and not indicative of a large number of changes.

New features

HDMI-VFC

- Support for new HDMI-VFC cards
- N.B. this requires OS 4.2 on 4x4pro. OS 4.2 is scheduled to be released in conjunction with r15)

Solo server

- New license type to support solo server

Improvements

Video Output

- Better EDID management to cope with updated AMD driver (this driver is to be released in the OS image 4.2 for the 4x4pro update which is scheduled to coincide with the release of r15)

Fixes

Audio

- Intermittent crackling when playing back audio files

Current known issues

Upgrading 32-bit to 64-bit Sockpuppet shows

- There may be issues upgrading Sockpuppet projects from 32-bit to 64-bit in 14.4.x builds. If your project falls into this category, please contact **support@disguise.one** who can arrange a project upgrade for you

Permissions error after installing

- On a small number of machines, a python-based permissions error will prevent the software from starting.
- This issue can be solved by restarting Windows.

Potential UI performance regression with long and busy timelines

- With either long or busy timelines containing e.g. a plethora of notes/cues, the UI may suffer a degradation in performance
- Minimising the timeline negates this

Slideshows transition time

- The transition time between slides in slideshows is currently broken.
- The fix for this makes fundamental changes to timeline operations, so will take a while to work its way into future releases.

Fixes

[Audio] Intermittent crackling when playing back project specific audio files

Improvements

[Video Output] Better EDID management to cope with updated AMD drivers (to be released in the next OS image update)

Please contact **support@disguise.one**for feedback and issues.

Designer r15 Release Notes

r15.3.5

Download r15.3.5 Full

Release build: 59085
Released: June 20th 2019

Fixes

Content Mapping

Content mapped directly to projector incorrectly used both dynamic blend & feather masks.

Video Output

Extremely rare condition when querying display modes causes potential failure on startup.

Audio

- Large audio files may cause the audio layer to stutter as it processes the files. Workarounds:
- use video files with embedded audio.
- employ smaller, compressed audio files types such as MP3.
- or try staggering multiple audio files on the timeline to save overdue, instant demand by multiple files.
- Potential audio crackles with multiple, multichannel files.
- Embedded audio in video goes out of sync when video is played in ping-pong mode.
- Playing to Loop section in Locked mode when section has been resized ignores the section break .

These four have potential fixes identified, but need to go through the process of code review and verification

- Audio layer may go out of sync from the playhead over a long period of time
- note: this has been observed only intermittently and is of the order of 15 frames over a 12 hour period
- Audio does not start again when encountering a new keyframe of the same audio track

- `when the same audio track is sequenced multiple times in the audio layer, it does not start again on the new keyframe as the video layer does`

r15.2.5

Download r15.2.5

Release build: 56254
Released: March 11th 2019

r15.1.8

Download r15.1.8 Full

Release build: 54682
Released: December 11th 2018

r15.0.6

Download r15.0.6 Full

Release build: 52148
Released: August 5th, 2018

r15

Download r15 Full

Release build: 50985
Released: June 19th 2018

New features

- [d3Manager] New mechanism for processing Options.ini and Machine.ini files [Device Control] Support for matrix switching using GVG protocol
- [Device Control] Support for AJA KUMO Matrix
- [Feed Outputs] Ability to apply alpha gradients in softedge textures
- [Layers] Promotion of previously under the hood layer DmxTableScreen to core product status [OSC] Support for multiXY OSC (trackpad) strings for use in layers
- [Projector Calibration] Greater control of the Wireframe Mesh cleanup angle (previously fixed at 5 degrees between edges) for Projector Config / QuickCal

- [Video Output] Add mechanisms for improving the usability and safety of Apply Feed Settings
- [Video Output] Add ability to independently manage GUI EDID emulation in the feed view on pro range machines on dedicated GUI heads
- [Visualiser] Add diffuse map to screens

Improvements

- [Audio] Audio pan now an option ('Balance') in the Audio layer [Automation / Encoders] Compensate for Visual Act driver scaling in mm
- [Automation / Encoders] Improve the best guess solver for Rigid Body with just one or two points [Automation / Encoders] Ignore duplicate data from STSDriver
- [Blank Project] Auto is now the default method for Quick-Cal, replacing Zhang
- [d3manager] Provide prompt for users if older firmware or OS image are detected via d3manager [DMX / Artnet] Rename DMX Device's 'Speed' parameter to 'Rate' and provide explanatory tooltip
- [DMX / Artnet] New monitor in Patch Assignments widget that combines the DMX monitor values with the Patch Assignments
- [DMX / Artnet] Fade Up should be "00..10" rather than "10...20"
- [DMX / Artnet] Employ consistent Transport State Ranger for Play and Fade Down. Now starts from 11 not 10 as previously
- [Expressions] New 'Track Time' variable available for us in expressions [Expressions] Support for integer arguments for OSC expressions [Feed Visualiser] Project refresh rate settings added to Feed view.
- [Feed Visualiser] Permit screenshots of the visualiser or individual cameras without showing the accompanying d3 GUI [Feed Visualiser] Throw up an alert instead of notification when a screenshot is exported from the feed view
- [GUI] Ability to display lens focal length millimetres
- [GUI] Modify the AnimateCamera default text to 'Local visualiser instead of 'None" to avoid confusion [GUI] Employ a thumbnail of placeholder image for logical video in when selecting the video in clip
- [GUI] Add an indicator that a layer field is keyframed or externally controlled by e.g. Sockpuppet or an expression
- [GUI] Ability to cycle between the main/root windows in the GUI using CTRL-TAB (forward) and CTRL-SHIFT-TAB (backwards)
- [GUI] Move MatrixControl layer from Misc to Control section of the layers list
- [GUI] Provide notification explaining the failure to open Editors while playing a mixed Master [GUI] Machines' matrix inputs now in an editable list, similar to matrix outputs for each feed [GUI] Mark as read' and 'Mark all as read' options to clear notifications
- [GUI] Ability to select set list from Active Set List field in d3state tracks list [GUI] Ability to name Camera export screenshots
- [Keyframe editor] Provide a better indication of the drop location for keyframes editing

- [Layers] Changes to LegacyVideo layer speed keyframing will incorrectly change to Cubic/Linear to Select when upgrading
- [Layers] Rename Video layer to LegacyVideo and move to Legacy section; also rename VariableVideo layer to just Video
- [Layers] Rename layers to better capture their characteristics:
- AnimateCamera -> AnimateCameraControl
- AnimateCamera2-> AnimateCameraPreset
- TargetModule -> TargetControl
- Target2Module -> TargetPreset
- [Layers] Web layer custom parameters increased
- [Layers] Addition of Scale X and Y to Bitmap layer to ease application of gradients [Layers] Include -1 in the Video default range to make it easier to mirror-flip content [Licensing & Security] Update CodeMeter dialogs with Disguise branding
- [Movie Writer] Make the Open layer enabled by default when in Hold mode [Notch] Accept DMX channel hinting for sockpuppet
- [Sockpuppet] dmx universe occupancy masked off for transport control to avoid the potential for an overlap in patching [Sockpuppet] Ability to add dummy or placeholder patches into Patch Assignments
- [Sockpuppet] Ability to Alt drag individual media content to Bank Editor
- [Stage] Camera bookmarks now include the local visualiser's orthographic or perspective state [Stage] Allow the user to omit the .obj extension from the filename when performing an obj export
- [Stage] Notify users when meshes are exported (new export location projectfolder/output/mesh instead of projectfolder/)
- [Timeline] Play mode not correctly accounted for when playing forward, leading to potential for the next section start to be the previous or current one
- [Timeline] Rename DVI Matrix Control Layer to MatrixControl to indicate wider matrix control usage [VFC] Emulated EDID labelling to make it easier to identify to the GUI or passthrough outputs [Video Capture] - Multiview video input now available as an additional option for capture input
- [Video Capture] Potential for "Unable to create video capture stream" notification at startup due to incorrect NDI startup sequence
- [Video Capture] Ability to sequence capture placeholder video clips in event of signal loss

Fixes

- [Audio] Potential playback failure if jumping out and back into a Sockpuppet video layer after removing Audio LineOut
- [Audio] Edge case of Audio sample rate conversion exception when Slaves and Understudies render frames with the same time
- [Audio] Mono MP3 files incorrectly play at double speed [Audio] Prevent WASAPI initialisation error on RDP connection

- [Automation / Encoders] Axis smoothing does not work with wrapped automation axes e.g. turntables
- [Automation / Encoders] ScreenPositionAxis/Expression incorrectly allow property references to types that are convertible to float, but directly casts to float
- [Automation / Encoders] Provide 'None' as an object in Automation Axis and ScreenPositionExpression for better editing in case of error
- [Automation / Encoders] When tracked points disappear from stage and reappear, they animate into view [Automation / Encoders] Movement threshold does not work unless prediction is turned on
- [Automation / Encoders] Duplicate PSN frames are not dropped, but processed [Automation / Encoders] Fixes for automation filtering and interpolation
- [Blank Project] Exception when deleting processes from the list in Monitor Manager [Camera] DMX lights cones incorrectly displayed when output is at 0
- [Content Mapping] Unexpected feed maps positioning after project specific manipulation
- [Content Mapping] Duplicating a feed map incorrectly positions the newly opened editor on top of the track widget [d3manager] Alternate d3manager project library path on a Slave not properly processed until project start [d3manager] Retain highlight on last selected project upon restarting d3manager
- [d3manager] Remove unnecessary license expiration text from the Trial version of d3manager [Device Control] LightwareMatrix commands may time out due to inefficient queuing
- [Device Control] Ctrl + z to undo after creating a device causes a 'recvFrom returned error'
- [Device Recording] Unable to open media - still copying?' appears when trying to immediately play back a freshly created device recording
- [Device Recording] Performance hit with Device Recording across multiple section breaks and beyond those section boundaries
- [DMX / Artnet] dmx screen RGB -> RGBW colour conversion incorrect
- [DMX Lights] DmxTableScreen unable to output if it uses more universes than available devices [DMX Lights] DmxTableScreen does not resample the table when reselected
- [DMX Lights] Lights are rendered black only in Hap exported stage movies, losing their original colouring [DMX Lights] Employing a population mask hides DMX pixel addresses when restarting the project
- [Expressions] Alt + dragging the horizontal FOV of the visualiser camera to a layer parameter produces a notification while the equivalent typed expression works
- [Feed Outputs] Feed warps assigned to differing projectors that reference the other may cause black output
- [Feed Outputs] Hold, Fade Up & Fade Down commands do not pass over on Editors when going between 'Independent' and 'Lock to Master'
- [Feed Visualiser] The solo's GUI head is incorrectly placed at the right-most head in its feedscene out of the three [Feed Visualiser] Alt-F for 1:! preview output feeds in feed view not operative

- [File Management] d3 creates unnecessary empty duplicate folders within the objects directory [GUI] Misreporting of Notch video parameters in some blocks
- [GUI] Keyframe being affected by ctrl+scroll is not properly telegraphed [GUI] TC tags edited from the set list only get saved when hitting Enter [GUI] Restore mesh export command to the mesh editor widget
- [GUI] Ensure correct right-click behaviour when selecting a Sockpuppet video clip, both assigned and unassigned [GUI] Anomalous icon on top left corner next to d3State menu when VariableVideo layer editor is open
- [GUI] Master output brightness and master output volume have both lost their tooltips [GUI] UI dirt visible in some pre r15 video Layers
- [GUI] Mouse location can lose its bearings when using a secondary display of differing resolution to show the stage view [GUI] Labels' darkened background is white and obscures the actual label text when over a white colour
- [GUI] Add a tooltip in the d3Net menu to better explain Master type
- [GUI] Reported fps is rounded to the nearest 5, producing misleading feedback on 24/48 fps systems
- [GUI] Changing an Understudy to an Editor by removing it from Master does not update the now Editor's track UI correctly
- [GUI] Cue set list does not adapt itself to cater for lengthy notes while editing
- [GUI] Duplicating a renamed Master Brightness/Volume results in a notification on project restart [GUI] Cleaned up minor visual glitch above the d3State button
- [Installer] Installer now correctly logs the precise installed version e.g. 15.x.y
- [Keyframe editor] Upgrading video to variable video incorrectly causes the speed keyframe to be locked in 'Select' mode
- [Keyframe editor] Dragging a new keyframe over another placed at the start of a layer causes the original to be dragged beyond the start
- [Live Update] An Editor joining a Master in Hold mode, will incorrectly force the Master into Fade up
- [Machine Roles] Editors can become Masters and lock to themselves after unnecessary hacking of hostnames [Machine Roles] Master is still available as an option to be setup as an understudy or a slave
- [MIDI] Improved the consistency of MidiNote output
- [Layers] Improved handling of Web layer for smoother animations
- [Layers] Blend Mode applied via an open layer would scroll through the different blend modes when trying to keyframe it [Layers] Exception in TimecodeReadout layer if more than one video layer is present
- [Layers] Bounds check error when deleting keyframes relating to exposed text strings
- [Layers] None' as Video or VariableVideo input to blur layer incorrectly blurs the previous frame rather than black zero alpha frame
- [Layers] TrackJump is ignored when in Hold Output Mode

- [Layers] Access Violation encountered in min/max Brightness widget after editing other objects [Movie Writer] When Recording a Stage Movie whilst in Feed View, d3 incorrectly records a feed movie of the GUI head [Networking] Network lag can prevent Editors from joining a session without a failed to sync warning being issued [Networking] Ensure that the machine's IP address is taken from host name resolution instead of Zyre
- [Notch] Patched Notch layers now have a Timecode section enabling locking to timecode as videos [Package] Files stored in internals/objects that do not have extensions inadvertently get deleted on startup [Package] An exported group loses its arrow assignments on import.
- [Project Upgrade] Project specific upgrade problem from pre r12 to r15
- [Projector Calibration] Wireframe view incorrectly ignores z-values so renders parts of a model that should not be seen [Projector Calibration] DSE include/exclude list is not updated to match the type between corresponding projectors [Sockpuppet] Returning to a timecode chasing state from a LoopInframe state will incorrectly offset timecode chase [Sockpuppet] Editing ranges on fields in Sockpuppet does not update the range in the DMX personality
- [Sockpuppet] A playback delay in Sockpuppet can make Master & Slave drift out of sync [Sockpuppet] No right-click option to open a video clip in Sockpuppet grid and half-size grid
- [Sockpuppet] Changing camera Inputs using Sockpuppet causes 'BlueFishThread 1X capture dropped field(s)' notification
- [Sockpuppet] Alt-arrow dragging a folder to a slot in Bank Editor places the media in a differing order from that shown in resources
- [Sockpuppet] Changing play mode from Timecode to Pause causes an incorrect jump to the wrong frame [Sockpuppet] Failure to refresh Bank Editor when modified by an Editor
- [Sockpuppet] Video information overlay does not appear on Sockpuppeted Video layers [Stage] AnimateCamera does not work during Hold mode
- [Stage] Unable to draw Projector measurements to vertices on a Projector's box
- [Stage] Camera bookmarks do not recall a saved FOV, incorrectly recalling the FOV set in the stage properties menu [Startup] Improve time to quit a project
- [Timeline] Alt-tab from or to d3 while playing forward causes playhead to incorrectly jump to the end of a track or to last section
- [Transport Controls] A TC tag at track start followed by a Cue tag one frame causes timecode to stop chasing and ignore timecode
- [VFC] Notification when changing VFC split mode from Mirror to Quad or Quad 4K
- [VFC] Black output from legacy Video layer in free-run on project load when content placed at track beginning
- [Video Capture] Exception when repeatedly capturing and changing signal resolution
- [Video Capture] Spurious notification when jumping out and back into a video layer with video input
- [Video Capture] Corrupted output following particular set of steps in assigning 4k video in, replacing mapping with grouping and replacing signal in to capture group

- [Video Output] Specifying a bad clip rectangle may cause a DirectX exception [Video Output] Notify the user on the detection of passive DP dongles
- [Video Output] Projector less than 1m away from an object incorrectly render black in the feeds

Current known issues

VR

- VR entails on additional render overhead
- This may result in a poor performance

Upgrading 32-bit to 64-bit Sockpuppet shows

- There may be issues upgrading Sockpuppet projects from 32-bit to 64-bit in 14.4.x builds. If your project falls into this category, please contact **support@disguise.one** who can arrange a project upgrade for you

Permissions error after installing

- On a small number of machines, a python-based permissions error will prevent software from starting.
- This issue can be solved by restarting Windows

Potential UI performance regression with long and busy timelines

- With either long or busy timelines containing e.g. a plethora of notes/cues, the UI may suffer a degradation in performance
- Minimising the timeline negates this

Slideshows transition time

- The transition time between slides in slideshows is currently broken
- The fix for this makes fundamental changes to timeline operations, so will take a while to work its way into future releases

Please contact **support@disguise.one** for feedback or if you have any issues.

Designer r16 Release Notes

r16.1.2

Download r16.1.2 Full

Full build: 62867
Released: 4 December 2019

r16.1.1

Download r16.1.1 Full

Full build: 62240
Released: 13 November 2019

r16.1

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Full build: 61826
Released: 06 November 2019

r16.0.8

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Full build: 61473
Released: 23 October 2019

r16.0.7

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Full build: 61298
Released: 16 October 2019

r16.0.6

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Full build: 61009
Released: 02 October 2019

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Full build: 60932
Released: 25 September 2019

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Full build: 60742
Released: 18 September 2019

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Full build: 60516
Released: 04 September 2019

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Full build: 60384
Released: 28 August 2019

r16.0.1

Download r16.0.1 Full

Full build: 60308
Released: 20 August 2019

r16

Download r16 Full

Release build: 60037
Released: August 7th 2019

New Features

- [DSOF-6288] - Image sequences become a Gold feature
- [DSOF-8092] - Sockpuppet over OSC
- [DSOF-8373] - OmniCal Multipose QuickAlign
- [DSOF-9353] - OmniCal Rig Check improvements
- [DSOF-10237] - Cue List - Redesign
- [DSOF-10609] - vx 4 playback performance
- [DSOF-10623] - Projector Yoke Control
- [DSOF-10650] - NotchLC support
- [DSOF-10679] - ObjectTrackingSource for controlling object positions
- [DSOF-10757] - Cue Set List Beta Process
- [DSOF-10897] - Full 10-bit pipeline introduction support
- [DSOF-6289] - Indirection support for DMX Banks
- [DSOF-6543] - External way to create projector information and import (via CSV/Table)
- [DSOF-8426] - OptiCal: BlobDetection UI that shows effect of settings, masks etc
- [DSOF-8469] - Update ScreenPositionModule Configurations from referenced Screen's position
- [DSOF-9575] - OmniCal: Add multi-pose to Quick Align
- [DSOF-9576] - OmniCal: Automatically disengage SPR device when alignment is in progress and add switch for disabling Screen Position Module interference with SPR device.
- [DSOF-9577] - OmniCal: UI in QuickAlign window to copy position to min/max values in screen position axis
- [DSOF-10152] - Add ncam support to ScreenPositionReceiver
- [DSOF-10307] - Add ability to export (parts of) the current Stage as a 3D file format
- [DSOF-10311] - Omnical: Load blob detection masks from file
- [DSOF-10471] - ProjectorControl: a layer that moves physical projectors and changes their configurations
- [DSOF-10491] - Canon CLog2, CLog3 Log video, Canon Cinema Gamut support
- [DSOF-10524] - Auto Scroll option within Cue Set List
- [DSOF-10683] - Define and test ImageSequenceFormat::extractFrameNumber
- [DSOF-10736] - Image Sequences: Add gold support for .dpx files
- [DSOF-11099] - Notify user on use of the same 'Tag' number
- [DSOF-11273] - Add Camera Tracking drivers (stype & mo-sys) which affect Camera lens

- [DSOF-11453] - Expanded support for further versions of SDI firmware.

Improvements

- [DSOF-753] - Some form of communication to inform when checkpointing
- [DSOF-883] - Zoom to object
- [DSOF-971] - “Force quit all” should give a pop-up notification or warning.
- [DSOF-1397] - OSC event transport: osc expression for “hold”
- [DSOF-2630] - User experience: Enable the preferred tag to persist after project restart
- [DSOF-2745] - Keyboard shortcut for splitting layers
- [DSOF-2987] - OmniCal: use faster and more flexible iOS logging framework
- [DSOF-4387] - Shortcut to minimise track
- [DSOF-5009] - Other method to bring up Cue Set List
- [DSOF-5393] - Cue list per Track
- [DSOF-6844] - OmniCal: button to rotate input camera images in CaptureSetup
- [DSOF-6940] - Add Weston 3-field deinterlace method
- [DSOF-7920] - Optical: Single Click an Alignment point to confirm placement
- [DSOF-7926] - Optical: Ability to Hold an alignment point and use scroll wheel at the same time
- [DSOF-8777] - Allow selection of reduced blanking level when generating EDID
- [DSOF-8892] - OptiCal: Update displayed blobs in capture setup when changing blob filter settings
- [DSOF-9037] - OptiCal: Alignment doesn’t work when resolutions of cameras are different
- [DSOF-9041] - OptiCal: Rig check should not be dependent on an alignment first
- [DSOF-9081] - OptiCal: View capture blobs always outputs every projector
- [DSOF-9090] - Identify Notch license expiry date via d3manager (including networked machines)
- [DSOF-9178] - OptiCal: Rig check should support mesh deform as part of the workflow
- [DSOF-9179] - OptiCal: Rig check doesn’t utilise screen space well with 10+ cameras
- [DSOF-9338] - Camera labels should have their own visibility option.
- [DSOF-9402] - ScreenPosition: Rename to ObjectPosition
- [DSOF-9491] - OmniCal: Show un-cropped camera view in iOS camera app
- [DSOF-9529] - Active projector list needs a vertical scroller in capture setup window
- [DSOF-9623] - OmniCal: iOS app should display Auto/Locked state for Exp/WB/Focus

- [DSOF-9642] - OmniCal: Allow naming and duplication of alignment poses
- [DSOF-9706] - OmniCal: Allow Rig Check of cameras with different names
- [DSOF-9758] - Remember State for SPR Device's Engaged Status When Using QuickAlign
- [DSOF-9764] - OmniCal: iOS app UI updates very slowly for changes in focus, ISO etc
- [DSOF-9780] - OmniCal: Automatically override SP Module when alignment is in progress and vice versa, remembering original state.
- [DSOF-9781] - OmniCal: Add ability to select SPR device in Quick Align's Automation Section.
- [DSOF-9819] - OmniCal: Selecting or changing automation device should automatically disengage and remember state
- [DSOF-9866] - OmniCal: Persist Quick Align Settings
- [DSOF-9868] - OmniCal: All screens in pose which have automation axes assigned should participate in set max/ min workflow.
- [DSOF-9869] - OmniCal: Programmatically call Align to Alignment Points when setting max/ min.
- [DSOF-9880] - OmniCal: When duplicating a plan also copy its capture and results
- [DSOF-9896] - Ability to set Min and Max for all Screens in the Current Pose
- [DSOF-9901] - OmniCal: Ability to use props (or any Objects) as alignment surfaces in quick align.
- [DSOF-9903] - OmniCal Rig Check Aligner: Display the current screen being Rig Checked for Alignment
- [DSOF-9909] - OmniCal: Improve disabling of screen position modules when quick align is open.
- [DSOF-9914] - OmniCal: Allow user to adjust opacity of alignment points.
- [DSOF-9915] - OmniCal: Respect locked flag in OmniCal Stage Plan editor.
- [DSOF-9955] - OmniCal: warn before changing the master screen
- [DSOF-9962] - OmniCal: AlignmentPoints should have default names (labels)
- [DSOF-9968] - Bring back the zoom in the timeline without pressing alt (option switch)
- [DSOF-9988] - Tooltip for TC adjust
- [DSOF-9992] - OmniCal: Remember the discovery adapter.
- [DSOF-10050] - OmniCal QuickAlign: import reference points does not import all points
- [DSOF-10057] - OmniCal: Rename "camera #" in QuickAlign to "view #" to avoid confusion with actual cameras
- [DSOF-10058] - OmniCal: make MobileCam UI read-only, so that changes always go through Plan workflow

- [DSOF-10067] - OmniCal: warn about dubious aspect ratio calculation for projectors
- [DSOF-10104] - OmniCal: make CaptureSetup options widget scrollable
- [DSOF-10129] - Integrate the options switch omniCalRenderFrameDelay into omniCal UI
- [DSOF-10151] - OmniCal: Allow opening Capture Setup even with no cameras or projectors
- [DSOF-10309] - Add support for 25mm Lens Intrinsics for MV Cameras (for future implementation).
- [DSOF-10360] - Upload 24-bit RGB as packed textures and decode on the GPU
- [DSOF-10375] - LivePP is not using a parameter for conan path, instead it is hardcoded
- [DSOF-10410] - 10-bit support on the gx 2c
- [DSOF-10451] - Tooltips for everything in clip properties
- [DSOF-10465] - Add the ability to query the list of active transports from multi-transport event transport
- [DSOF-10467] - OmniCal: Allow mix of iPods and machine vision cameras in same plan
- [DSOF-10469] - ListEditor: copy-paste rows
- [DSOF-10494] - HDR: d3 isn't handling scene linear values well (sRGB looks incorrect)
- [DSOF-10510] - Strategically add margin to cue set list to improve clarity
- [DSOF-10517] - OmniCal: Don't request images from mobile cameras which are not in a plan
- [DSOF-10536] - OmniCal: Persist camera image orientation
- [DSOF-10541] - OmniCal: Make View Capture only show blobs from selected projectors
- [DSOF-10543] - OmniCal: Add confirmation dialog before executing plan
- [DSOF-10547] - GVG Matrix should notify when errors are returned by the device
- [DSOF-10549] - OmniCal: Add plan name to camera study report
- [DSOF-10574] - OmniCal: Don't crop images in UI when they are un-distorted
- [DSOF-10579] - OmniCal: Limit camera gain settings in UI
- [DSOF-10580] - Give specific error when selected network adaptor is unavailable on d3 start
- [DSOF-10583] - Ability to Add Reference points on LED surfaces
- [DSOF-10585] - Simulate pitch/tilt/zoom projector control in visualiser
- [DSOF-10592] - Standardize camera omnical white balance gain values to be in dB
- [DSOF-10593] - OmniCal: handle user abort appropriately, don't treat as error
- [DSOF-10625] - OmniCal: make aspect ratio calculation from DLT even clearer in Report
- [DSOF-10634] - OmniCal: Rig Check Aligner UI should be consistent with Quick Align
- [DSOF-10642] - Change Default Brightness of LED

- [DSOF-10653] - Import Projector: support new MappingMatter CSV that contains UUIDs
- [DSOF-10707] - OmniCal: Remove reference to ScreenPositionAxis in alignment poses
- [DSOF-10719] - Automation: Add support for latest simotion driver
- [DSOF-10728] - Notify user when projection surface has more than 12 (Dynamic soft edge limit) projectors assigned
- [DSOF-10734] - Add re-image logs to system diag
- [DSOF-10738] - Ignore Timecode Module still shows 'Chasing Timecode' in transport widget
- [DSOF-10745] - Change word Clear for Colour in Head Configuration widget.
- [DSOF-10752] - The name IgnoreTimecode is misleading for the layer's actual function
- [DSOF-10761] - Warn user when an image sequence has gaps
- [DSOF-10832] - Update Movecat protocol to version 3.
- [DSOF-10842] - Projector Control: Allow user to show/ hide columns
- [DSOF-10843] - Projector Control: Allow user to display multiple projector control editors which can be configured differently.
- [DSOF-10848] - List Editor: show/hide columns
- [DSOF-10851] - OmniCal: Add option to keep showing content on displays which are not part of a capture
- [DSOF-10905] - Optimise CONTEXTN usage in Widget update/render functions
- [DSOF-10913] - GradientTexture: generate gradient in 10-bit if in 10-bit mode
- [DSOF-10914] - SoftEdgeTexture: generate gradient in 10-bit if in 10-bit mode
- [DSOF-10922] - DSE: generate a 10-bit gradient in 10-bit mode
- [DSOF-10954] - OmniCal: camera bandwidth limit should ignore non-MV cameras (e.g. iPods)
- [DSOF-10965] - List Editor: Review short-term changes made to some list editor in r15.2
- [DSOF-10975] - OmniCal: Add ability to apply plan and result alignments from open module
- [DSOF-10994] - Change behaviour of Cue Set List "Go" button from double click to one click
- [DSOF-11017] - Rename CueSetList
- [DSOF-11039] - OmniCal: Improve UI for pose editor.
- [DSOF-11042] - OmniCal: Allow correction of focal lengths without having to redo capture
- [DSOF-11049] - Fix build dependency for auto-generated RC files
- [DSOF-11051] - Trial license Product Code should be set automatically

- [DSOF-11077] - minor Build System improvements around inconsistencies and dependencies
- [DSOF-11079] - Explicitly mark tests that involve throwing (expected) exceptions with a Catch tag
- [DSOF-11081] - OSC sockpuppet Address and strings Export and visualize.
- [DSOF-11098] - d3_test: load test DLLs via explicit names, rather than wildcard *_test.dll to avoid branch conflicts
- [DSOF-11116] - build: reduce unused 3rd party dependencies in conanfile
- [DSOF-11126] - OmniCal: add advanced option for Auto/Manual bandwidth management to vmap
- [DSOF-11184] - build: “install” project does not re-run, even if output folder is deleted
- [DSOF-11326] - Log file and line number when exceptions are thrown by NVAPI and ADL
- [DSOF-11459] - OmniCal: “Check Cameras” window opens far top left of the screen
- [DSOF-11483] - ListEditor: use Resource description for popup menu title
- [DSOF-11488] - OmniCal: “Execute plan” throws “master screen not set” error if QuickAlign was never done
- [DSOF-11575] - Expose m_updateNumber to python - allowing for easier programmatic detection of when machines have finished applying feed settings

Bugs

- [DSOF-1475] - Per projector output mode GUI problem
- [DSOF-1579] - BMP, TIFF screenshot formats don’t work
- [DSOF-5932] - Cue Set List show wrong information for TC Tags
- [DSOF-9082] - Introducing earlier frames to an already ingested image sequence can cause access violations
- [DSOF-9442] - OmniCal: Uncaught exception when exiting d3 whilst blob is been detected
- [DSOF-9505] - OmniCal: Remove legacy code in editor_aligner.py
- [DSOF-9582] - Can not delete capture plans
- [DSOF-9770] - OmniCal: multi-pose automation only works when input values are in metres
- [DSOF-9775] - OmniCal: screen positions set by automation are inconsistent with alignment poses
- [DSOF-9870] - OmniCal: Master Screen is still selected as the current screen when creating poses
- [DSOF-9879] - OmniCal: Don’t show notification when creating poses without automation device selected.
- [DSOF-9906] - QuickAlign: changing camera removes pose-specific label

- [DSOF-9965] - OmniCal: Setting Min and Max Output using MultiPose can cause unexpected rotation.
- [DSOF-10011] - d3 start is delayed if image sequences are present in videoFile folder
- [DSOF-10039] - OmniCal QuickAlign: disallow reshape tools when not in base pose
- [DSOF-10106] - Widget inconsistencies with maxSize and pos
- [DSOF-10122] - Removing camera from OmniCal list requires a restart to take effect
- [DSOF-10162] - d3module.dll not running
- [DSOF-10206] - Changing between different Drivers will make all ASIO outputs go “Unknown”
- [DSOF-10243] - QuickCal correspondence point rendering doesn’t work with feed-proxied Projectors
- [DSOF-10269] - List Editor: Fix scrolling
- [DSOF-10295] - Changing bit depth via NvAPI fails occasionally depending on current display mode
- [DSOF-10323] - Video in 5 to 16 get lost forever after send them to the trash until project restart
- [DSOF-10332] - ObjectView items remain at previous size after deleting long text
- [DSOF-10339] - OmniCal: VimabCamServer writes temp files to project directory
- [DSOF-10365] - Root cause vx 4 stall on quit
- [DSOF-10371] - Omnical. Enable discovering mobile cameras stops working after changing several times from yes to no
- [DSOF-10386] - ‘Audio Error in createSound’ notification when audio file is missing on slave
- [DSOF-10405] - Excessive console spam, input does not display when coupled input signal is lost/stopped
- [DSOF-10423] - OmniCal: Reshape Scaling and Screen Scaling options in QuickAlign not saved as json
- [DSOF-10436] - When a video layer’s speed is linked with an expression to another video layer’s speed, the speed of the controlled video layer is doubles when it hits an intersection.
- [DSOF-10437] - Screen Position Receiver. DMX channels of axis created with a DMX screen position receiver driver overlaps
- [DSOF-10446] - Audio will stop and Video skips frames if the mode is changed from timecode to normal via sockpuppet.
- [DSOF-10454] - Asio Driver will not live update.
- [DSOF-10456] - Blend Gamma and Sharpness doesn’t grey out when opening Omnical
- [DSOF-10462] - VR Camera rotation incorrect
- [DSOF-10484] - ListEditor: cannot undo an edit of multiple rows
- [DSOF-10488] - Notch License Distributor is not responding to requests sent via d3manager
- [DSOF-10498] - Projector names don’t get updated in OmniCal studies after renaming in the stage

- [DSOF-10504] - Video: Changing 'at the end point' from Ping-Pong to Loop doesn't work
- [DSOF-10509] - Adding or deleting long strings of text in Notes column breaks rendering of CueSetList editor
- [DSOF-10512] - Investigate why Cue Set List editor's performance is low
- [DSOF-10516] - Selecting a row in a ListEditor then pressing up or down raises an exception
- [DSOF-10519] - Cue Set List cannot be locked open
- [DSOF-10525] - Horizontal Scroll Bar Appears in Cue Set List
- [DSOF-10535] - List Editor in Feed cannot properly toggle test pattern
- [DSOF-10546] - Regression - Unable to Multiselect then duplicate feed rectangles
- [DSOF-10554] - strobe: Doesn't work as an arrow source into other layer types
- [DSOF-10564] - ListEditor: use field name instead of display name when looking up columns
- [DSOF-10568] - log useful error when d3 crashes; due to free disk space alert
- [DSOF-10573] - Error trying to use Realtek ASIO device due to incorrect buffer size
- [DSOF-10582] - d3 fails to start on designer machine when opening some projects
- [DSOF-10587] - List Editor: Unable to duplicate multiple feed rectangle via list editor
- [DSOF-10591] - NDI® BirdDog is causing d3/NDI® applications to crash
- [DSOF-10594] - OmniCal: silently ignoring potential errors during Capture (e.g. file handling)
- [DSOF-10595] - OmniCal - When OmniCal not setup, 'NoneType' notification when user clicks "Resets plan projectors"
- [DSOF-10599] - EDID emulation control on GUI and non-VFC heads is error prone and difficult to find
- [DSOF-10601] - Multi Transport Track selection doesn't work in 15.2
- [DSOF-10603] - Broken UI for "Export Current Camera View"
- [DSOF-10626] - Changing tracks via track bin causes GUI errors when pinned
- [DSOF-10682] - Projectors controlled by a projector device controller sometimes do not send DMX commands on input.
- [DSOF-10686] - When a layer crashes, we have to restart d3 to retry running the layer
- [DSOF-10696] - OmniCal: Mesh deform changes surface to use subdivided mesh even if no deform is performed
- [DSOF-10726] - MultiTransport: 'NoneType' object has no attribute 'findWidgetByName'
- [DSOF-10732] - Project upgrade from r15.x to r15.4 causes corruption
- [DSOF-10737] - Audio Lock mode doesn't behave as expected when using 'loop section' play mode
- [DSOF-10746] - Upgrade of Buckingham palace project fails
- [DSOF-10750] - Bounds check notifications after upgrading EdSheeran_MultiplyWorldTour2014 project
- [DSOF-10774] - 10-bit DPX screenshot generated from d3 cannot be loaded in d3
- [DSOF-10797] - Errors while playing back an image sequence while its gaining extra frames
- [DSOF-10799] - List Editor: Display on Feed rectangle is editable

- [DSOF-10800] - Unable to open DMX Patch Editor
- [DSOF-10804] - DxShaderHeaderCompiler: cannot parse cs_5_0 shaders
- [DSOF-10805] - OmniCal: Visualise Calibration draws points in red most of the time, even for good calibrations
- [DSOF-10813] - moveColumn failed. No column exists for “Name” error for Projector multi-selection
- [DSOF-10839] - ListEditor: primary selection row does not support multi-row actions when selected using keyboard
- [DSOF-10856] - Audio crackles and pops with multiple multichannel files and audio layer
- [DSOF-10857] - OmniCal: View capture can only show white level and grid images of first projector in list
- [DSOF-10862] - Access violation when updating projector control device when using simulation config
- [DSOF-10864] - List Editor: Unable to lock multiple camera bookmark by clicking the first selected camera bookmark
- [DSOF-10865] - List Editor: Multi-select and multi-edit does not work with MultiTransport Manager
- [DSOF-10870] - Cue set list: Long Cue set list severely degrades frame rate
- [DSOF-10872] - OmniCal: RigCheck fails to open if original plan data is not available
- [DSOF-10873] - installer: include VimbaCamServer.exe in ‘minimal’ installer
- [DSOF-10880] - video in Inputs are auto assigned in swapped order
- [DSOF-10881] - gx 2c can only use 5 video inputs at a time
- [DSOF-10886] - Cue Set List: Adding a track to a new setlist gives ACCESS VIOLATION
- [DSOF-10889] - Weston 3-field deinterlacing method produces bobbing
- [DSOF-10890] - Cue Set List: Adding a track to a new setlist gives Pure Function call
- [DSOF-10901] - Weave deinterlace method causes bobbing
- [DSOF-10906] - OmniCal: camera thumbnails show question mark after a capture
- [DSOF-10909] - List Editor: Double-clicking Projector under Display in Feed rectangle List Editor gives ‘NoneType’ notification
- [DSOF-10910] - Projector FXAA downgrades output to 8-bit
- [DSOF-10911] - Blur and MotionBlur layers downgrade content to 8-bit
- [DSOF-10912] - Notch: Using Input processing size or notchRenderInterval downgrades image to 8-bit
- [DSOF-10916] - Adding latency to a feed head downgrades output to 8-bit
- [DSOF-10917] - Hold downgrades output to 8-bit
- [DSOF-10921] - ImageSequences: 16-bit TIFFs cause access violations
- [DSOF-10926] - Regression: Starting project with all video inputs connected and assigned causes OS-level hang
- [DSOF-10934] - DeviceRecording: Using restricted filename characters in section notes breaks recording.

- [DSOF-10936] - OmniCal: OpticalCalibrator::activate fails due to SlaveManSystem not being initialised
- [DSOF-10938] - List Editor: d3 freezes when trying to hide the last visible column
- [DSOF-10944] - OmniCal: QuickAlign shows old base pose alignment images after doing a new full capture
- [DSOF-10946] - OmniCal: unsupported camera commands crash iPods
- [DSOF-10948] - OmniCal: Access violation when attempting to open module the currently selected plan.
- [DSOF-10949] - Error message on OSC sockpuppet (Type mismatch - can't assign from 'Resource::RP' to 'VideoClip::RP')
- [DSOF-10959] - OmniCal: bring back vmap changes after machinevision_fixes merge (in r15.4)
- [DSOF-10995] - Display re-ordering may be incorrect on vx 4
- [DSOF-10998] - Embedded audio can pop when jumping to a new location in the same clip in locked mode, or changing clip
- [DSOF-11027] - OmniCal: Projector lens distortion lookup calculation stalls main thread
- [DSOF-11029] - List Editor: d3 freezes when sorting on certain columns in list editor
- [DSOF-11033] - Cannot export DPX screenshot while in 8-bit mode
- [DSOF-11040] - OmniCal: Focal lengths not set correctly in a plan when creating it from a folder
- [DSOF-11059] - BlueFish: capture group downgrades 10-bit capture to 8-bit
- [DSOF-11063] - Content from previous section is visible for first frame of new section
- [DSOF-11076] - Error when selecting a mapping through sockpuppet osc
- [DSOF-11078] - various unit/integration test fixes and improvements for r15.4
- [DSOF-11080] - Image constructor overwrites adjacent memory
- [DSOF-11082] - OmniCal: Error finding camera plan during simulated calibration when no mobile device is set
- [DSOF-11109] - ListEditor: Incorrect number of arguments to call when sorting
- [DSOF-11112] - OmniCal: Auto reset of screen meshes when opening Quick Align UI should revert to reshaped meshes if they exist
- [DSOF-11121] - ACCESS_VIOLATION using OSC
- [DSOF-11122] - ACCESS_VIOLATION: user-mode DEP violation
- [DSOF-11155] - Undoing a full drag instead of individual moves
- [DSOF-11158] - Timeline widget sizing breaks when expanding groups of layers, when it's height reaches the top of the bounds of screen
- [DSOF-11174] - Broken layer overlap and contains logic
- [DSOF-11183] - OmniCal: Renaming a pose makes it disappear from list of poses in QuickAlign
- [DSOF-11194] - build: PCH compilation wrongly use blip_base precompiled header in several projects

- [DSOF-11211] - OmniCal: duplicate camera plan names are allowed
- [DSOF-11212] - clicking ‘quit all’ causes notification, machines do not quit all.
- [DSOF-11222] - Exclude vx 4 MGMT network interface from being used by session.
- [DSOF-11232] - OmniCal - Cannot perform capture due to file “being used by another process”
- [DSOF-11238] - GUI never appears on d3 start
- [DSOF-11250] - OmniCal: Cannot toggle guidelines in Rig Check Alignment UI due to python error
- [DSOF-11251] - OmniCal: Arrow key controls don’t work for moving points in Rig Check UI
- [DSOF-11261] - Undo can drop frame rate significantly
- [DSOF-11270] - ObjectView doesn’t work in List Editor
- [DSOF-11274] - Multitransport bounds check
- [DSOF-11280] - Multitransport bounds check
- [DSOF-11311] - Sockpuppet: OSC-controlled layers don’t go dormant
- [DSOF-11322] - Sockpuppet: OSC input isn’t restricted by limits or number of options
- [DSOF-11330] - Cue List re-sizes itself larger after pinning and project restart
- [DSOF-11346] - OmniCal: Calibrator does not send BW setting to cameras when changing BW value
- [DSOF-11348] - OmniCal: Stage Plan should use cameras in the current plan in order to determine nAliveMVCameras.
- [DSOF-11351] - GPU memory occupied by NotchLC videos is never released
- [DSOF-11357] - Large surge in GPU memory usage if system starts regularly dropping frames on GPU while playing NotchLC videos
- [DSOF-11358] - Unable to open ‘Check Camera...’ in the attached project
- [DSOF-11363] - Error in zip_d3_project_for_debug.py
- [DSOF-11385] - Tracking: MoSysF4 driver displays name twice in data monitor.
- [DSOF-11386] - Tracking: MoSysF4 driver only updates tracking sources for camera 0
- [DSOF-11420] - Changing screen type while in the feed view produces an error
- [DSOF-11421] - Fullscreen switching causes genlock to be dropped on vx4
- [DSOF-11425] - Trial version installer fails due to missing license file
- [DSOF-11430] - Cue list: Remaining timestamps get compressed if cue list is not it its widest
- [DSOF-11433] - Slowly horizontally decreasing the window size of a ResizableWidget causes the window contents to shudder
- [DSOF-11434] - OSC sockpuppet: editing patch multiple times causes UI glitch
- [DSOF-11441] - OmniCal: Multi-Pose rotations are not normalised automatically
- [DSOF-11442] - AR camera drivers with no lens file loaded set camera FOV to 0
- [DSOF-11445] - Cue list: Double colon after a search tag returns no results
- [DSOF-11451] - Cue list: Tag column gets shortened when resizing cue list

- [DSOF-11458] - OmniCal: Cameras and pose names do not get updated on the QuickAlign window when creating a new pose
- [DSOF-11468] - Unable to set 10-bit mode on gx 2c with d3 EDIDs
- [DSOF-11469] - OmniCal: Validation messages need to be swapped when clicking the “Check Cameras” button for simulated and live cameras capture plan
- [DSOF-11475] - Audio does not playback in the audio layer using sockpuppet OSC
- [DSOF-11482] - OmniCal: Camera settings not applied to cameras when opening the Rig Check / Camera Check window
- [DSOF-11485] - Omnical: blob detection masks lock up capture when images mismatch in resolution to the camera
- [DSOF-11489] - Stringify EEPROM data when logging it to console
- [DSOF-11490] - d3service does not correctly handle HDMI cards with invalid EEPROM data or data that can’t be read
- [DSOF-11498] - OmniCal: Renaming a pose does not update camera image text in QuickAlign
- [DSOF-11499] - OmniCal: Device name mismatch error when opening Check Cameras UI
- [DSOF-11500] - Tag type changes to Midi when changing the tag entry in Cue List
- [DSOF-11518] - OSC Patch editor fields does not have user friendly display name or tooltips
- [DSOF-11521] - ListEditor - removing all columns and then re-adding them breaks the window
- [DSOF-11530] - Error when Test route button is pressed and test input or test output field is empty
- [DSOF-11534] - Access violation on shutdown when closing all widgets / GuiSystem
- [DSOF-11548] - TelnetConsole: Some commands are not properly propagated through resource Transport
- [DSOF-11549] - PQ colour space outputs incorrectly low values
- [DSOF-11550] - Mosys lens data reports incorrect PA width
- [DSOF-11565] - Venue contains Tracking Source field
- [DSOF-11572] - Setting a 10-bit EDID for SDI VFC on a vx4 crashes d3service
- [DSOF-11578] - vx4: d3service and d3buddy intermittent crash due to remora HTTP post error
- [DSOF-11613] - Unable to set 10-bit mode on gx 2c with d3 EDIDs

Other

- [DSOF-11195] - Revised T&Cs for Trial only
- [DSOF-11507] - Update default test pattern images

Designer r17 Release Notes

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Release build: 66257

Release day: 22nd April 2020

- DSOF-13268 - MultiEventTransportRemote - requesting player list results in an exception

r17.1.2

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Release build: 66023

Release day: 15th April 2020

- DSOF-13264 - New installs of 17.1 on systems running i7 processor give CPU error
- DSOF-13406 - Changing the roll angle in a projector results in wrong Y offset movement.

r17.1.1

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Release build: 65644

Release day: 1st April 2020

- DSOF-13264 - License activation may fail on some machines
- DSOF-13303 - d3.exe no longer marked as DPI aware in r17.1, causing DPI scaling issues on some displays

r17.1

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Release build: 65313

Release day: 26th March 2020

New Features

- DSOF-12898 - New Feature: DMX Screen type - GBR
- DSOF-12301 - New Feature: DMX Screen type - BRG
- DSOF-3599 - New Feature: Export list views to CSV files.
- DSOF-11096 - New Feature: OmniCal: Improvements to network performance in busy network environments.
- DSOF-11650 - New Feature: OmniCal: Significant performance improvements to capture & bundle adjustments on large quantities of projectors.
- DSOF-12102 - New Feature: Import projectors from CSV files
- DSOF-12702 - New Feature: TelnetMatrix devices can now have header and footer messages appended to the routing commands. This is to allow batch scripting of large quantities of matrix routes from a single device.
- DSOF-7796 - New Feature: Ability to send custom UDP/TCP strings when failover occurs.
- DSOF-13064 - New Feature: Improvements to the OmniCal Camera Stats user interface.
- DSOF-12693 - New Feature: Proof Of Play - enabled via an Advanced Project Option, this will write a text log file for every clip played.
- DSOF-12674 - New Feature: Added support for FreeD protocol and BlackTrax Helios system as camera tracking sources

- DSOF-12433 - New Feature: Machine Status is now available via Telnet Json commands using JsonMachineControl device.
- DSOF-12580 - New feature: Tracks now display timecode format in their header
- DSOF-12651 - New Feature: TelnetMatrix devices now automatically zero-pad variables when the variable is preceded with a number of 0s.
- DSOF-12747 - New Feature: d3 now prompts when your licence is nearing expiry
- DSOF-12878 - New feature: Sequenced Transitions
- DSOF-6419 - New Feature: Video Clip editor now shows the total length in H:M:S:F format as well as frames.
- DSOF-8088 - New Feature: Ability to define the OSC heartbeat rate
- DSOF-8624 - New Feature: VR now allows you to stand on venue mesh objects
- DSOF-11259 - New Feature: User-selectable value ranges for brightness, volume and colour properties. These are selectable from Project Settings.
- DSOF-11979 - New Feature: DMX Universe 1 now outputs without watermark on Designer licences - to enable EVO capabilities.
- DSOF-9694 - New Feature: Props now have an option to select if they cast a shadow, and the scale factor of that shadow.
- DSOF-12633 - New Feature: Tab/Shift+Tab now work in Object views to select objects from the keyboard.
- DSOF-12759 New Feature: Projector Masks now simulate in the stage simulator as well as affecting outputs.
- DSOF-8088 - New Feature: Ability to define the OSC heartbeat rate
- DSOF-8624 - New Feature: VR now allows you to stand on venue mesh objects
- DSOF-12052 - New Feature: Support for 48fps CEA timing modes
- DSOF-13095 - New Feature: GUI now supports ultra-wide monitors.
- DSOF-10497 - New Feature: Play Status as an OSC stream.

Improvements

- DSOF-8852 - Notch: Performance improvements due to memory allocation changes.
- DSOF-12377 - Improved tools for debugging issues with display devices.
- DSOF-12432 - System Diagnostics now contain advanced windows network configuration to aid in support.
- DSOF-12517 - Manipulators now remember their status when you restart d3
- DSOF-12671 - Multi-editor now shows a splash screen when certain objects have been exported to a CSV
- DSOF-7353 - Added support for Unicode keyboard character input directly into d3.
- DSOF-9646 - Notch: Added Render Interval settings to enable Notch blocks to be run at 1/2 or 1/3 of the machine frame rate.
- DSOF-9765 - Camera Wireframes can now be hidden from stage visualisers.
- DSOF-10569 - OmniCal: Performance improvement with bundle adjustments.

- DSOF-11223 - Notch: Support for Unicode characters in text parameters.
- DSOF-11225 - Notch: Exposed parameters are now refreshed when remotely live-edited in Notch Builder.
- DSOF-11651 - OmniCal: Speed improvement of capture due to white-level masks being used to take projector images in parallel.
- DSOF-11702 - Alt Dragging selected ranges now allows bulk addition of objects to a list (for example, adding multiple screens to a mapping)
- DSOF-11794 - OmniCal: Added ability to resume captures after timeout errors.
- DSOF-12045 - Emulated EDIDs now use the disguise VID
- DSOF-12288 - Resolved an issue where exported layers which were locked at the time of export would be imported to the same time in the new track.
- DSOF-12592 - Improved the handling of sort ordering when opening certain array boxes
- DSOF-12941 - Added new buttons to the ProjectorDevice editor
- DSOF-12942 - Improved shutter response times when using ProjectorDevice
- DSOF-12442 - List arrow sources in layer DMX Personalities
- DSOF-12928 - The firmware version field will no longer be shown for VFC cards which do not have firmware (HDMI and DP VFCs)
- DSOF-4015 - CITP: Added a “None” option when selecting a DMX Device
- DSOF-12241 - Improved the UI of the multi-edit editor

Bugs

- DSOF-10411 - Fading Down could sometimes cause warped feeds to lose their warping
- DSOF-11622 - Improvements to 10-bit behaviour on AMD-based servers.
- DSOF-12704 - When failing over from DMX trigger, the playhead of the understudy could sometimes jump backwards in time.
- DSOF-12940 - When starting up d3 with an MST monitor connected, the GUI output would move to a VFC head on AMD-based systems. This has now been resolved. Note that d3 does not support MST for outputs.
- DSOF-12947 - Resolved an access violation when Notch blocks were deleted.
- DSOF-2543 - Resolved an issue with video layers not outputting the correct frame when clip and output fps were adjusted
- DSOF-10091 - Multi-editor renaming a device didn’t take effect until enter was pressed, but was immediately reflected in the UI. This has now been made consistent.
- DSOF-11687 - Notch: “Error caught in block...” errors could sometimes occur when clicking on Notch blocks.
- DSOF-11737 - SockPuppet: Resolved access violation when deleting a SockPuppet patch
- DSOF-11917 - Audio: Improved accuracy of seeking in VBR audio files (MP3/MOD/S3M/XM/IT)
- DSOF-12041 - VFC: Configuring VFC cards could sometimes lead to an “Index outside bounds” error when setting Quad 4K mode.

- DSOF-12063 - DMX: When deleting DMX patches, the DMX Patch Settings window would stay open. It now closes automatically.
- DSOF-12095 - Notch: When opening a block from an editor, it would sometimes get reset.
- DSOF-12122 - SockPuppet: UI for setting bank allocations wouldn't allow for mappings to be mapped to slots.
- DSOF-12513 - Manipulators now syncronise their status between different widgets
- DSOF-12542 - Resolved an issue where locked layers would incorrectly split when timelines were split.
- DSOF-12565 - Text fields now filter disallowed characters when pasting content from 3rd party applications.
- DSOF-12586 - Multi-editor: fixed an issue where copied rows were not saved properly
- DSOF-12588 - Fixed an issue where toggling locked to master caused the 3D manipulator controls to appear on the editor
- DSOF-12622 - Fixed an issue where Notch layers did not upgrade properly from specific projects
- DSOF-12650 - Added support for coupled capture inputs 2x as well as 4x on gx 2c.
- DSOF-12661 - Fixed an issue where control devices which had been removed from the device manager could still send commands
- DSOF-12665 - Fixed an issue that presented grey artefacts around pixel & population masks that had Alpha
- DSOF-12666 - Resolved an issue with DSE and soft shadows which didn't blend correctly.
- DSOF-12673 - Multi-editor sometimes does not export if the file extension gets deleted
- DSOF-12696 - Fixed an issue that caused the GUI to be rendered in place of a missing diffuse map
- DSOF-12738 - Fixed an issue where understudy failover commands could be sent before matrix routing commands were sent, resulting in mistimed failovers.
- DSOF-12810 - Fixed a rare issue that caused an error when using the F1 help widget
- DSOF-12812 - Fixed an issue that caused an error when copying multiple keyframes into multiple keyframe editors
- DSOF-12822 - Resolved an issue where masking objects on projectors disabled DSE on blends between active regions
- DSOF-12844 - Resolved an issue with repatching Notch layers which would result in them losing all their properties.
- DSOF-12847 - Agile Camera device now has Invert Pan and Invert Tilt functionality
- DSOF-12872 - Resolved an issue where certain Windows permissions could cause d3.exe to fail to launch.
- DSOF-12882 - Fixed an issue that caused a hang when moving a large amount of layers
- DSOF-12888 - Resolved an issue where DSE caused there to be an outline around mask objects.
- DSOF-12911 - Fixed an issue that caused field duplication when importing projectors

- DSOF-12948 - Fixed an issue where an error was thrown if a notch layer was deleted before the playhead
- DSOF-12959 - Fixed an issue where some DPI settings could cause errors on startup
- DSOF-12972 - Fixed an issue where loading a Notch block without a notch license would cause a layer to become corrupt
- DSOF-13097 - Fixed an issue that altered the default mouse wheel steps for editing keyframable parameters
- DSOF-7048 - Fixed an issue that caused exposed parameters to re-appear after an undo action
- DSOF-8094 - Resolved an issue where SockPuppet Video layers with Speed toggled off would not play video.
- DSOF-10442 - Screenshots on a Solo now correctly screenshot the GUI head.
- DSOF-10508 - Typing in the search bar in CueSetList no longer resizes the Notes column.
- DSOF-11242 - Fixed an issue where excessive copying and pasting a notch block could sometimes cause a crash
- DSOF-11695 - Resolved an issue where it was possible to Bake/Clear fields on a locked layer.
- DSOF-12103 - Half Speed Low Latency mode now has improved latency behaviour.
- DSOF-12243 - Disabling and re-enabling manipulators would always reset the mode to Transform, now they will remember their mode.
- DSOF-12264 - Resolved an issue where deleting an EventTransportDMX patch from the DMX Patch window would have no effect.
- DSOF-12431 - Fixed text overlapping issue in the ProxyMaker
- DSOF-12583 - Multi-editor: rows outside of the scroll view were incorrectly ignored for actions
- DSOF-12584 - Multi-editor: fixed an issue where pasted values could show disallowed characters
- DSOF-12619 - Improvements to the Auto Z clipping algorithm
- DSOF-12631 - Right-clicking on Blend modes no longer shows an expression field, since expressions can't be applied to Blend modes.
- DSOF-12743 - Resolved an issue with EventTransportDMX where Brightness would be set if any DMX on the same universe was received.
- DSOF-12818 - Improved support for Swedish keyboard character usage
- DSOF-12843 - Resolved a bug related to the UV maps of alembic files as projection surfaces.
- DSOF-12935 - Fixed an issue that sometimes occurs when deleting a group of layers
- DSOF-12937 - Improved tooltips to reflect new 10-bit-based values
- DSOF-12976 - Fixed an issue where the multi-edit dialogue would not open for feed rectangles
- DSOF-12977 - Fixed an issue where changing device manager could sometimes create a stall

- DSOF-13052 - Fixed an issue that sometimes hung the main thread when moving a camera in the stage
- DSOF-12610 - Added support for longer projector names in Identify test pattern mode.
- DSOF-12742 - Failover Test field in EventTransportDMX does not pulse blue when the value changes
- DSOF-12758 - Trial no longer shows 'VR Navigator' menu, since VR is not supported in Trial.
- DSOF-12839 - Fixed an issue in the video layer that sometimes occurs when baking keyframes
- DSOF-12880 - Fixed an issue in the UI rendering of projector mask preview
- DSOF-12919 - Resolved some memory leaks related to manipulators.
- DSOF-12921 - Fixed an issue where the quantiser volume was not shown as a slider
- DSOF-10871 - Fixed an error when attempting to use a notch layer with no name
- DSOF-11246 - OmniCal: Mesh deform improvements on points seen by two cameras.
- DSOF-11638 - 8-bit display modes were sometimes displayed in the VFC configuration properties despite the output being connected to a 10-bit monitor
- DSOF-12370 - Quantiser metronome now supports 0-1 values rather than 0-255
- DSOF-12701 - Fixed an issue where notes could sometimes span two lines

r17.0.7

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Full build: 64872
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r17.0.6

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Full build: 64572
Released: 04 March 2020

r17.0.5

Download r17.0.5 Full

Full build: 64458
Released: 26 February 2020

r17.0.4

Download r17.0.4 Full

Full build: 64319
Released: 19 February 2020

r17.0.3

Download r17.0.3 Full

Full build: 63775
Released: 29 January 2020

r17.0.2

Download r17.0.2 Full

Full build: 63572
Released: 22 January 2020

r17.0.1

Download r17.0.1 Full

Full build: 63540
Released: 16 January 2020

r17

Download r17 Full

Full build: 63364
Released: 8 January 2020

Designer r18 Release Notes

r18.1.15

Download r18.1.15 Full

Full build: 186467
Released: 2 May 2024

r18.1.14

Download r18.1.14 Full

Full build: 179736
Released: 14 February 2024

r18.1.13

Download r18.1.13 Full

Full build: 175640
Released: 13 December 2023

r18.1.12

Download r18.1.12 Full

Full build: 171491
Released: 25 October 2023

r18.1.11

Download r18.1.11 Full

Full build: 91447
Released: 22 July 2022

r18.1.10

Download r18.1.10 Full

Full build: 84524
Released: 15 December 2021

r18.1.9

Download r18.1.9 Full

Full build: 81046
Released: 18 August 2021

r18.1.8

Download r18.1.8 Full

Full build: 80867
Released: 11 August 2021

r18.1.7

Download r18.1.7 Full

Full build: 80540
Released: 23 July 2021

r18.1.6

Please contact **support@disguise.one**

r18.1.5

Download r18.1.5 Full

Full build: 186467
Released: 02 May 2024

r18.1.4

Download r18.1.4 Full

Full build: 179736
Released: 14 February 2024

r18.1.3

Download r18.1.3 Full

Full build: 175640
Released: 11 December 2023

r18.1.2

Download r18.1.2 Full

Full build: 171491
Released: 25 October 2023

r18.1.1

Download r18.1.1 Full

Full build: 91447
Released: 22 July 2022

r18.1

Download r18.1 Full

Full build: 79263
Released: 03 June 2021

r18.0.6

Download r18.0.6 Full

Full build: 79127
Released: 26 May 2021

r18.0.5

Download r18.0.5 Full

Full build: 78770
Released: 19 May 2021

r18.0.4

Download r18.0.4 Full

Full build: 78631
Released: 12 May 2021

r18.0.3

Download r18.0.3 Full

Full build: 78354
Released: 05 May 2021

r18.0.2

Download r18.0.2 Full

Full build: 78115
Released: 28 April 2021

r18.0.1

Download r18.0.1 Full

Release build: 66257

Release day: 22nd April 2020

- DSOF-13268 - MultiEventTransportRemote - requesting player list results in an exception

r18

Download r18 Full

Designer r19 Release Notes

r19.1.8

Download r19.1.8 Full

Full build: 83616
Released: 17 November 2021

r19.1.7

Download r19.1.7 Full

Full build: 83172
Released: 03 November 2021

r19.1.6

Download r19.1.6 Full

Full build: 82952
Released: 27 October 2021

r19.1.5

Download r19.1.5 Full

Full build: 82618
Released: 13 October 2021

r19.1.4

Download r19.1.4 Full

Full build: 82282
Released: 6 October 2021

r19.1.3

Download r19.1.3 Full

Full build: 82053
Released: 29 September 2021

r19.1.2

Download r19.1.2 Full

Full build: 81665
Released: 15 September 2021

r19.1.1

Download r19.1.1 Full

Full build: 81488
Released: 08 September 2021

r19.1

Download r19.1 Full

Full build: 81382
Released: 01 September 2021

r19.0.1

Download r19.0.1 Full

Full build: 80825
Released: 11 August 2021

r19

Download r19 Full

Workflows for Unreal Engine & Unity

- Remote Texture Parameters
- String Parameters
- 3D Object Transforms

RenderStream enhancements

- RenderStream failover / Understudy
- RS Compressed: HEVC compression (H.265), implemented in r19, replaces NDI® when used in RenderStream compressed workflow.

Designer r20 Release Notes

r20.1.3

Download r20.1.3 Full

Full build: 87272
Released: 09 March 2022

r20.1.2

Download r20.1.2 Full

Full build: 86992
Released: 02 March 2022

r20.1.1

Download r20.1.1 Full

Full build: 86719
Released: 23 February 2022

r20.1

Download r20.1 Full

r20.0.8

Download r20.0.8 Full

Full build: 86261
Released: 9 February 2022

r20.0.7

Download r20.0.7 Full

Full build: 85926
Released: 02 February 2022

r20.0.6

Download r20.0.6 Full

Full build: 85620
Released: 26 January 2022

r20.0.5

Download r20.0.5 Full

Full build: 85280
Released: 19 January 2022

r20.0.4

Download r20.0.4 Full

Full build: 85036
Released: 12 January 2022

r20.0.3

Download r20.0.3 Full

Full build: 84705
Released: 22 December 2021

r20.0.2

Download r20.0.2 Full

Full build: 84533
Released: 15 December 2021

r20.0.1

Download r20.0.1 Full

r20

Features

- Localisation
  - Learn or use disguise Designer in your local language. The Designer software, training materials and user guide is now available in 6 new languages including Spanish, Simplified Chinese, French, Japanese, German and Korean.
  - r20 downloads will default to these system languages
  - Change language easily with the language switcher and easily control the language you want to use.
- AR Spatial Calibration
- API for xR Calibration
- Keyframe toggles
- Layer Stacks

Designer r21 Release Notes

r21.4.10

No build available.

r21.4.9

Download r21.4.9 Full

Full build: 95025
Released: 02 November 2022

r21.4.8

Download r21.4.8 Full

Full build: 94723
Released: 26 October 2022

r21.4.7

Download r21.4.7 Full

Full build: 94485
Released: 19 October 2022

r21.4.6

Download r21.4.6 Full

Full build: 94285
Released: 12 October 2022

r21.4.5

Download r21.4.5 Full

Full build: 94042
Released: 05 October 2022

r21.4.4

Download r21.4.4 Full

Full build: 93597
Released: 28 September 2022

r21.4.3

Download r21.4.3 Full

Full build: 92787
Released: 24 August 2022

r21.4.2

Download r21.4.2 Full

Full build: 92384
Released: 17 August 2022

r21.4.1

Download r21.4.1 Full

Full build: 92179
Released: 10 August 2022

r21.4

Download r21.4 Full

New Features

- Mesh Mapping for RenderStream
- TrackingMarker Module

r21.3.3

Download r21.3.3 Full

Full build: 91490
Released: 13 July 2022

r21.3.2

Download r21.3.2 Full

Full build: 91210
Released: 06 July 2022

r21.3.1

Download r21.3.1 Full

Full build: 90991
Released: 29 June 2022

r21.3

Download r21.3 Full

Fixes Only, no new features

r21.2

Download r21.2 Full

New Features

- vx4+ Support

r21.1.2

Download r21.1.2 Full

Full build: 90068
Released: 01 June 2022

r21.1

Download r21.1 Full

New Features

- Shot Recorder
- Virtual Camera workflow improvements

r21.0.5

Download r21.0.5 Full

Full build: 89440
Released: 11 May 2022

r21.0.4

Download r21.0.4 Full

Full build: 89205
Released: 4 May 2022

r21.0.3

Download r21.0.3 Full

Full build: 88904
Released: 27 April 2022

r21.0.2

Download r21.0.2 Full

Full build: 88695
Released: 20 April 2022

r21.0.1

Download r21.0.1 Full

Full build: 88204
Released: 06 April 2022

r21

Download r21 Full

Full build: 87976
Released: 22 March 2022

New Colour Workflow Tools

We have added a number of colour tools to Designer including:

- Histogram
- Vectorscopes
- Waveform/RGB Parade

New Usability features

RenderStream UI

RenderStream has been used on some of the largest shows on the planet, which has led to a host of stability and performance improvements and to help push its capabilities further.

Notes Tool

We have created a notepad tool within Designer. These notes can be stickied to specific parts of the project - for example, a note in the feed view to tell the operator to check specific things, or a warning note to not do something.

New Keyboard Shortcuts

- A new shortcut to bring up the layer library to import Superlayers: CTRL + SHIFT + L.
- The ‘esc’ key is now used to close the current active/focused widget, and SHIFT + ESC closes all.
- A new shortcut lets you quit all machines in the session without asking for a confirmation: SHIFT + ESC + ENTER.
- Layers can now be cut and pasted into another section of a track.
- A new shortcut to rename selected layers: CTRL + R.
- A new Search Function is now available in the keyboard shortcut widget (F1)

UI improvements

- UI Transparency settings have been relocated to d3State->Project Settings options.
- A new ‘Autosaving’ indicator with a 5 second countdown has been added in the bottom right hand corner above the timeline.
- Improved Network Status widget indicators give a broader indication of machine status as well as allowing you to monitor the Genlock status while in stage view

Colour workflow improvements

ACES 1.3 Implementation

- A new dropdown named “Utility” has been added to the ACES transform widgets for input transforms and output transforms.

- Spatial maps are now assignable within the AnimateObjectPreset layer.
- Colour decision list (CDL) files - a format developed by the American Society of Cinematographers (ASC) - can now be imported and exported
- Expanded LUT file support including ID Luts
- Linear Exposure and Gamma Controls available on a layer in ACES mode
- Colour Dropper Tool has been added to the Colour Picker in Stage->Ambient Colour

xR Workflow improvements

- A new ClusterAssigner type that automatically generates multiple default ClusterAssigners based on the most common use cases.
- Overscan in xR is used to compensate for both lens distortion and image reprojection and in r21 has been separated to improve performance

RenderStream Workflow improvements

- Remotely install or update Unreal Engine on all rx machines in a cluster from a single PC over a network, ensuring that updates can be completed much easier
- The pre-compiled ShaderCache has been moved into the project folder so that it is available on all machines in the session.

Feed Scene improvements

- New tooltips for the feed rectangle buttons, visible when hovering the mouse over the button.
- A new EDID Emulation method: ‘Always’.
- The current output chroma subsampling information is now visible in the feed scene, which previously were only available in the GPU settings.
- Warp points can now be added to the output so that users can see exactly which part of the output is being manipulated.

Quality of Life (QoL) improvements

- The last opened project is now clearly indicated within the d3 manager (Current).
- For sequencing, we have created a new mode called OnChange in the VideoTrigger layer.
- Screenshots can now export images to EXR.
- Export lossless images from:
  - Video inputs - 8 or 10 bit images (16-bit if a layer stack is applied)
  - The compositor - 16-bit floating point images using EXR (before ACES transforms)
  - The feed output - 8 or 10-bit images (after ACES transforms)
- Gradient Layer and Gradient Texture have an additional interpolation method called ‘Smoothstep’.

Designer r22 Release Notes

r22.3.1

Download r22.3.1 Full

Full build: 97919
Released: 27 January 2023

r22.3

Download r22.3 Full

Full build: 96094
Released: 30 November 2022

r22.2.2

Download r22.2.2 Full

Full build: 95980
Released: 23 November 2022

r22.2.1

Download r22.2.1 Full

Full build: 95741
Released: 16 November 2022

r22.2

Download r22.2 Full

Full build: 95501
Released: 09 November 2022

r22.1.6

Download r22.1.6 Full

Full build: 95051
Released: 02 November 2022

r22.1.5

Download r22.1.5 Full

Full build: 94724
Released: 26 October 2022

r22.1.4

Download r22.1.4 Full

Full build: 94488
Released: 19 October 2022

r22.1.3

Download r22.1.3 Full

Full build: 94288
Released: 12 October 2022

r22.1.2

Download r22.1.2 Full

Full build: 94124
Released: 06 October 2022

r22.1.1

Download r22.1.1 Full

Full build: 93827
Released: 28 September 2022

r22.1

Download r22.1 Full

Full build: 93749
Released: 21 September 2022

r22.1 Cloud Integration

New Features

Disguise Cloud Integration

Designer r22.1 offers users the ability to log in to Disguise Cloud through d3manager by clicking on the new “Sign In” button. When you sign in, you will be prompted to link your machine to your Disguise Cloud account by following the on-screen instructions.

If you have previously signed up for Disguise Cloud, you can link your Designer install to an existing Disguise Cloud account. If you’re new to Disguise Cloud, you can sign up for a new account.

If you do not have a Designer license you can acquire a Designer license via the Designer integration with Disguise Cloud.

To return to license activation click “Account” in the d3manager cloud menu. This will take you to your Disguise Cloud account details page which includes Designer license activation functionality.

Further Disguise Cloud integration functionality in Designer will be rolled out over the coming months.

r22

Download r22 Full

Building on recent developments from landmark projects, this release introduces features that will scale your projects like never before. Whether you’re looking to enhance the resolution of your content, your production set-up, or the amount of media files you manage, r22 will enable you to unlock creativity and efficiency at scale.

- Intelligent media distribution
- Single Large Canvas
- TouchDesigner integration
- RenderStream Validation Framework
- Vulkan API Support

- Faster spatial calibration
- d3 Manager Dark Mode

Media Distribution

Media Distribution will sync and distribute only the media files in your video layer that are needed across each Disguise server. Unused content can then be removed with a click of a button.

Single Large Canvas

Let your creativity go beyond the power of a single GPU, and use bigger content. Single Large Canvas seamlessly combines multiple video fragments into a single view output when used alongside multiple projectors.

RenderStream 1.3

RenderStream 1.3 brings us a host of new features including:

- TouchDesigner integration
- RenderStream Validation Framework
- Vulkan API support
- RenderStream backwards compatibility

Improvements

Faster Spatial calibration

We have reduced spatial calibration time to less than half the amount taken in previous software releases. For studios with multiple cameras for example, this can result in a time saving of several hours. Fast Spatial Calibration is enabled by default.

Dark Mode

d3Manager improvements include the launch UI for Designer is now available in dark mode, the ability to add a global delay to audio, project rollback and a project version comparison tool.

Designer r23 Release Notes

r23.4.2

Download r23.4.2 Full

Full build: 154174
Released: 22 February 2023

r23.4.1

Download r23.4.1 Full

Full build: 153580
Released: 15 February 2023

r23.4

Download r23.4 Full

Quality of Life Improvements & Fixes

- Fixed an issue where applying 10 bit feed settings on Nvidia Disguise only applied to the GUI and not to VFC cards
- Fixed an issue where changing SLC region sizes resulted in error
- Fixed an issue where frames would be dropped when camera switching unless patch editor preview was enabled
- Fixed an issue where Resource Transport was blocked on the director when deleting MidiNote or Playmode Module
- Fixed an issue that occurred when the shelved packet debug widget was open, live update was blocked when splitting a rect in a feed map on editor
- Fixed an issue where RT was blocked when importing a layer that overlaps the end of the timeline
- Fixed Shader compile error when using Live Action Volume with virtual camera
- Fixed an Access Violation when selecting none when importing feeds from table
- Fixed an error when moving feed rectangles between output heads
- Fixed an issue where quickly duplicating a text layer twice and then deleting one on an editor could cause Live Update to become blocked
- Fixed an issue where the patch assignment widget does not update after clicking “Unpatch All Layers” until the DMX patch settings widget was closed

- Fixed an issue where Live Update was blocked after unpatching DMX sockpuppet layer
- When Live Update is blocked on the director this error is now visible in the Actor Status Widget.

r23.3

Download r23.3 Full

New Features

IP-VFC Support

Support for IP-VFC cards outputting in SMPTE ST2100.

SDI functionality will be added in a future release.

Read more about IP-VFC here.

r23.2.1

Download r23.2.1 Full

Full build: 152551
Released: 01 February 2023

r23.2

Download r23.2 Full

New Features

Developer Portal

Disguise Developer portal documentation and guidance website has launched to support building tools and integrations with the Disguise platform. The new website has been specifically made with developers and system integrators in mind, and includes Designer APIs and RenderStream SDK documentation.

API v2

Control and monitor Disguise media servers using a comprehensive HTTP API. Learn more here

API documentation is also available within Designer.

The new APIs fall into two categories:

- The **Service APIs** relate to functionality provided by thed3service runtime and are available whenever Disguise is installed on a machine.
- The **SessionAPIs** relate to the currently running session and as such are only available when the d3 runtime isrunning.The previously existing V1 API, found at /api/v1, should be considered deprecated as of the launchof the stable API set under the Service and Session APIs.New API integrations should not target the V1 API and should instead use the APIs documentedunder /api/service and /api/session. No new APIs or functionality will be added to V1, however theV1 API will be maintained for the foreseeable future and we will give notice if we plan to remove it in the future.

Previz link

Previz allows the user to export their stage and content from Designer, and upload it to Disguise drive as a Previz Scene. With a URL to the uploaded Previz Scene, users and Disguise show programmers can share the current state of the Disguise show without restricting the end customers with baked-in camera angles, or having to install Designer themselves.

Improvements

- Support exporting stage from Designer in glTF format.
- Improved asset uploads to the Disguise cloud portal.

r23.1.3

Download r23.1.3 Full

Full build: 97965
Released: 25 January 2023

r23.1.2

Download r23.1.2 Full

Full build: 97610
Released: 18 January 2023

r23.1.1

Download r23.1.1 Full

Full build: 97354
Released: 11 January 2023

r23.1

Download r23.1 Full

Improvements

RenderStream project upgrading fix to prevent removal of scene keyframes.

r23.0.2

Download r23.0.2 Full

Full build: 96975
Released: 04 January 2023

r23.0.1

Download r23.0.1 Full

Full build: 96894
Released: 15 December 2022

r23

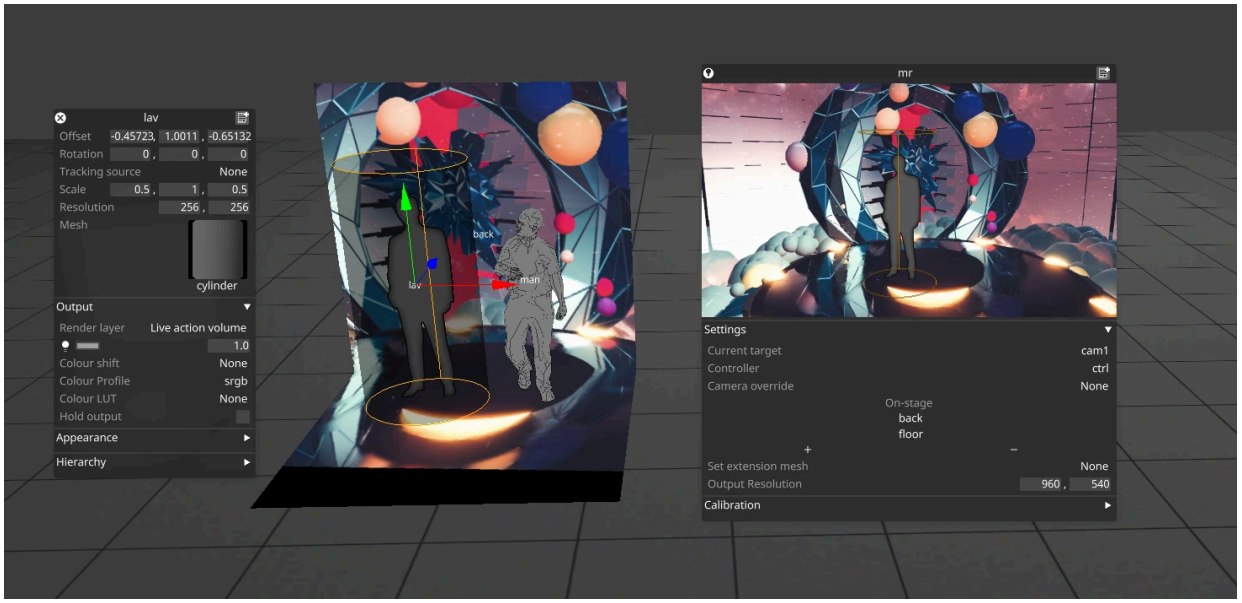
Download r23 Full

New Features

Live Action Volume

Live Action Volume allows the masking of on-stage objects outside the performance region such as cameras, and lights. It also allows more of the frame to be taken up by virtual content, which seamlessly blends with the filmed screens within the live action volume.

This feature is especially useful for xR stages with set extensions, typically within Live, Broadcast and Corporate environments. Live Action Volume can be used as a workaround to solve on-set issues such as an inaccurate mesh or colour problems.



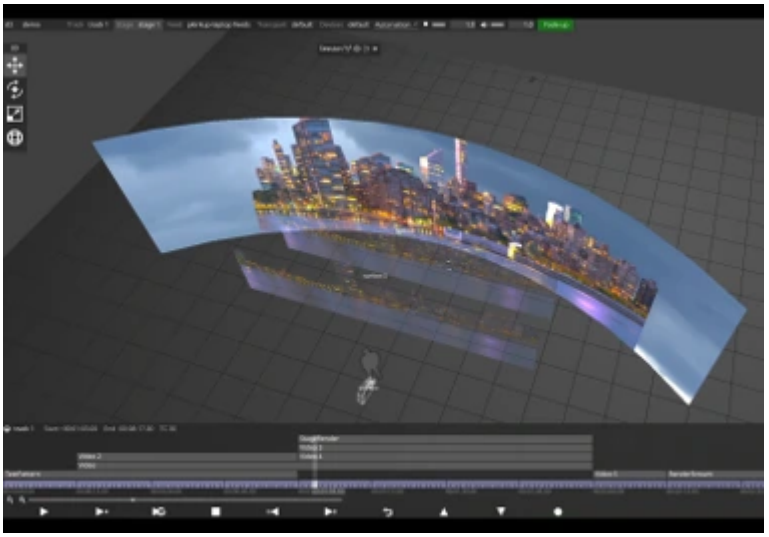
Improvements

Other enhancements for flexibility and versatility include

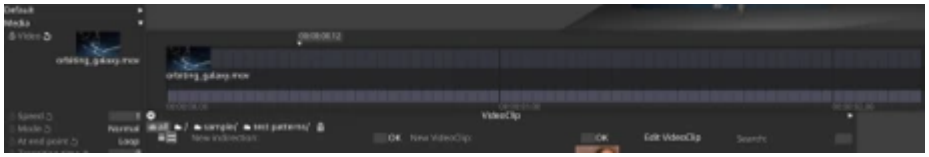
- 3D content from spherical mappings
- All objects can be used as set extension masks/additions without adding as an on-stage object in the MR set.

Enhanced usability features include

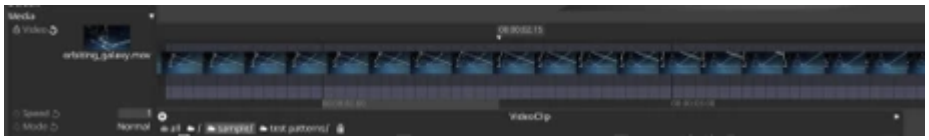
- Virtual Camera objects now have a visibility setting.



- Users can view a filmstrip of a clip in the keyframe editor.



Without filmstrip keyframe



With filmstrip keyframe

Disguise Community-focused features

- Ability to render 3D content from spherical mappings over RenderStream.
- Ability to Add non-SMPTE Timecode in any framerate.
- XR performance improvements when set extension is faded out.
- Export cue table reports table has been exported
- Remove blue flash watermark from feed view
- Notify user of new or mismatching VFC firmware

Designer r24 Release Notes

r24.4.1

Download r24.4.1 Full

Full build: 159584
Released: 25 May 2023

- DSOF-22798 - Video Input Patch Editor: Fixed an issue where the format field was not refreshed upon project startup.
- DSOF-23179 - Video Input Patch Editor: Fixed an issue where the format field did not save the correct value with a director/actor setup.

r24.4

Download r24.4 Full

In this new release, we have improved some of the most used features by working closely with industry experts and Disguise Insider groups.

- Fixed an issue where the proxy maker made proxies 1 frame short for videos 1 frame short of rounded duration to fps.
- Fixed an issue where video inputs dropped out with timeout error.
- Fixed an intermittent `kMvSynchroStatusCancelledLate` error which stopped capture.
- Fixed option switch for overriding nDisplay config file in Unreal Renderstream.

r24.3.1

Download r24.3.1 Full

Full build: 158605
Released: 10 May 2023

r24.3

Download r24.3 Full

In this new release, we have improved some of the most used features by working closely with industry experts and Disguise Insider groups.

- Fixed an issue where the rsync port conflicted with VPN.

- Fixed an issue where the proxy generated by the proxy maker was not recognized.
- Improved Camera Switching performance.
- Fixed an issue where the Inner Frustum was not visible when using Backplate and Mesh Mapping.
- Fixed Access Violations and a crash to desktop when trying to stream 3 channels over RenderStream.
- Fixed an issue where OmniCal cameras could not be added to a project on the EX 3.

r24.2.2

Download r24.2.2 Full

Full build: 157795
Released: 26 April 2023

r24.2.1

Download r24.2.1 Full

Full build: 157444
Released: 19 April 2023

r24.2

Download r24.2 Full

New Features

Added EX 3 Support. Learn more about the EX 3 here.

r24.1.1

Download r24.1.1 Full

Full build: 156889
Released: 05 April 2023

r24.1

Download r24.1 Full

New Features

The improved GPU memory management system shipped in r2.0 behind the option switch useGpuPool is now enabled by default. It provides reliable stability for demanding video playback loads and other high-memory-usage scenarios. [DSOF-23365]

Fixes

AV in Upload assets test case in test_cloudserver. [DSOF-23038]

r24.0.4

Download r24.0.4 Full

Full build: 156441
Released: 29 March 2023

r24.0.3

Download r24.0.3 Full

Full build: 155917
Released: 22 March 2023

r24.0.2

Download r24.0.2 Full

Full build: 155361
Released: 15 March 2023

r24.0.1

Download r24.0.1 Full

Full build: 154927
Released: 8 March 2023

r24

Download r24 Full

New Features

Ability to view waveform of audio in modules

The audio waveform allows users to visualise the audio output of a single layer, a collection of layers or the quantized audio track while working in the keyframe editor. In this way, keyframes can be used to adjust audio output at a glance.

Dynamic Layer Naming

This feature allows users to rename layers with dynamic tags that will be automatically replaced in the rename process by specific values in the layer.

Other features

- Support for YUV 4:4:4 modes from the Quad-SDI VFC card at 1080p when using Firmware 1.9.0.
- Bank Editor detach and attach resource view options.
- “Apply Matrix Feed Routing” button added to Feed Output.
- Tell the user which Expression doesn’t match any known Resources.

Improvements

- RenderStream has been significantly refactored internally to provide more stability.
- Projector editor should use checkboxes
- Improve soft edge gradient with S curve
- Sockpuppet: auto populate error message to include bank and slot for easy navigation
- OSC output data for ‘trackposition’ should match Designer timeline
- Inconsistent Tag notification should tell users to amend their naming
- Ability to override alpha rendering order
- Ability to override un-sockpuppeted controls in video layers to take from the video clip instead off rom the timeline
- Improve input/output transform widget usability
- Allow user to export compositor and output frames to content directory
- Add hotkey for jumping to the end of the track
- Detect when d3service is not running on Disguise servers and advise
- Add inverse transform for RED Wide Gamut
- Add Gamma 2.6 utility transforms
- Profiler widget should not bring up the text write-out and graphs on default

- Searching in media lists should have the option to behave like a filter
- BRG + White (BRGW) fixtures within Designer
- Make sure receive health widget keeps updating between launch of RenderStream
- 6 Transport Manager: Incoming clock should be displayed even when transport disengaged

Designer r25 Release Notes

r25.3.1

Download r25.3.1 Full

Full build: 168878
Released: 20 September 2023

r25.3

Download r25.3 Full

build: 167949 (released September 06 2023)

Improvements

- **DSOF-24101 - Unified “dropped frames” counting across all videoin classes
- **DSOF-24349 - Implemented IMvVideoConnectorNotification for inputs to receive status updates in console

Fixes

- **DSOF-24301** - Fixed an issue where consecutive timeouts on capture cards would abort the thread and not restart it
- **DSOF-24443** - Fixed an issue that occurred when a capture card input was unplugged and replugged, all inputs would freeze for a few seconds before recovering
- **DSOF-24549** - Fixed Matrox thread 1A Aborting thread due to repeated time out
- **DSOF-24552** Fixed an issue where output would get stuck if the video input signal was lost and recovered
- **DSOF-24693** - Fixed an issue where checkInputSignalChanged was causing main thread to hang
- **DSOF-25115** - Fixed an issue where the capture thread could occasionally crash with an Access Violation while configuring a quad input
- **DSOF-23828** - Fixed an issue where setting EDIDS to unmanaged/force off did not work as intended
- **DSOF-25064** - Fixed an issue where Mellanox licence failure was not reported as an error on gx3 servers

r25.2.3

Download r25.2.3 Full

Full build: 167492
Released: 30 August 2023

r25.2.1

Download r25.2.1 Full

Full build: 166280
Released: 16 August 2023

r25.2

Download r25.2 Full

Fixes

- **DSOF-24386** - Fixed an issue where an error stating permission was denied [Error13] when opening project from d3Manager
- **DSOF-24424** - Fixed a delay when launching a project from d3 Manager and Designer opening
- **DSOF-24594** - Improved the speed of NDI® source discovery
- **DSOF-24758** - Fixed an issue where missing dependencies caused Notch Blocks to not load: “Unable to load error: Error 0x7e: The specified module could not be found”
- **DSOF-24808** - Fixed an issue where 12G SDI input limit was reached even using 3G
- **DSOF-24814** - Improved audio prefetching limit logging
- **DSOF-24816** - RenderStream: Fixed an issue where framerate plummets and/or workload crashes when un/assigning texture parameters
- **DSOF-24928** - FFixed a memory leak in RenderStream Uncompressed with Texture Parameters

Full build: 165620
Released: 09 August 2023

r25.1.4

Download r25.1.4 Full

Full build: 164520
Released: 26 July 2023

r25.1.3

Download r25.1.3 Full

Full build: 164135
Released: 19 July 2023

r25.1.2

Download r25.1.2 Full

Full build: 163502
Released: 12 July 2023

r25.1.1

Download r25.1.1 Full

Full build: 162852
Released: 05 July 2023

r25.1

Download r25.1 Full

build: 162408 (released June 28 2023)

Fixes

- **DSOF-22915** - Fixed a crash on exit when DxDevice was lost
- **DSOF-24500** - d3service no longer crashes on close
- **DSOF-24507** - Fixed an issue where ResourceTransport blocked on Actor / Understudy machines after FeedRect edits
- **DSOF-24523** - Fixed ACCESS_VIOLATION 0x280 while renaming the stage from an Editor
- **DSOF-24558** - Fixed an issue where Heap Corruptions caused a crash to desktop
- **DSOF-24560** - Fixed an Access Violation when using the 'Removing Virtual Head' option in the FeedHead widget

r25.0.3

Download r25.0.3 Full

Full build: 161701
Released: 21 June 2023

r25.0.2

Download r25.0.2 Full

Full build: 161015
Released: 14 June 2023

r25.0.1

Download r25.0.1 Full

Full build: 160825
Released: 07 June 2023

r25

Download r25 Full

New Features

Camera tracking updates

In r25, we have introduced improvements to the lens tracking source workflows within Designer.

The main changes are:

- Under the hood refactoring to reduce code complexity
- Adding receive time smoothing to object tracking sources, rather than just cameras
- Additional graphs and logging
- Added the ability to disable particular axes in tracking sources
- Added lens focus parameters (focus distance and aperture) for tracking sources which support them
- General UI improvements.

Read more about the improvements **here**.

Further featured changes include:

BlackTrax: Implement BlackTrax Centroid calculations

We have implemented centroid tracking sources into the RTTrPMDriver within the PositionDriver.

Add ARRI LDS as a device driver for receive lens data native from Arri Cameras

We have added Arri LDS within the PositionReceiver devices so that users can receive metadata from Arri cameras into Disguise - that being focal length, aspect ratio, vertical and horizontal field of view, sensor size, aperture, and focus distance.

Improvements

- **DSOF-22279** Ensure Quad-SDI VFC output signal is not interrupted after configuration

In previous releases, the output from a Quad-SDI VFC card would be interrupted if a project would be restarted within Designer.

In r25, if a user was to restart a project within Designer then the output from a Quad-SDI VFC card would be the same resolution as it was before the project was restarted. This prevents the signal being interrupted upon restarting a project within Designer.

The only time that an output will be interrupted from a Quad-SDI VFC will be if a Disguise media server was restarted or powered off, or when apply feed settings is executed.

- **DSOF-22410** Support focus and iris data in FBX export from shot recorder

In r25 we have added both aperture and focus distance to the default parameter collection for new cameras within the Shot Recorder feature. These properties can also be set within the Shot Recorder FBX export.

- **DSOF-22460** Keep last-known camera position if camera tracking drops

In previous releases, when camera tracking is lost, the camera will revert back to 0,0,0. In r25, the camera tracking will remain at the last tracked camera position.

- **DSOF-22672** Make common base project for d3api and d3service
- **DSOF-22837** Write functionality to clear up exported glb, movie and metadata files

We have added an improvement to the Previz Link within Designer in r25 to clear up disk space by deleting old export files related to Previz that are no longer being used by any other application. Any export file that is still being used will not be deleted until the next time a clean-up takes place, where again we will only delete export files that are no longer being used by any application.

DSOF-22937 Move nginx logs to d3 app data directory instead of in program files

In r25, nginx logs have been moved from the program files path to

C:\Users\d3\AppData\Local\d3\nginx

- **DSOF-22995** GUI: The layer editor should move to front open keyframe editors when it gains focus

In previous releases, when working on a large timeline that overlaps on-screen with a layer editor, if a user was to click on the layer editor to focus on it, the layer editor widget would be foreground but the keyframe editor would be behind the timeline. In r25, when a user brings a layer editor into focus, the keyframe editor will now foreground with it.

- **DSOF-23002** Sequencing: On project upgrade, disable sequencing for all fields which are not sequenced

In previous releases, if a project was upgraded from a version of Designer that did not support the Keyframe Toggle (before r20.0), all fields were set to have Keyframes enabled. This required a significant amount of tidying to be able to benefit from the Keyframe Toggle. In r25, we have enabled any fields that only have 1 frame and therefore no sequencing should have the Keyframe Toggle automatically set to off on project upgrade.

- **DSOF-23110** Videoins with placeholder images should have the resolution of the placeholder.

In previous releases, when adding a Videoin for a placeholder image, the video would be set to the last resolution of the video input received by Disguise. In r25, if a Videoin is added with a placeholder image, the video will be set to the resolution of theplaceholder image that is used. The Videoin will override the placeholder image resolution when it is available.

- **DSOF-23245** Optimize DmxScreenRead layer

In previous releases, it was reported that the DmxScreenRead layer was impacting the performance of Designer. We have now optimised the layer.

- **DSOF-23336** IP VFC SDP file paths should be discoverable

We have added a ‘Copy SDP path to clipboard’ button within the IP-VFC settings menu. This includes the SDP path that can be copied and added onto a ST 2110 receiver device, such as the MegapixelHelios.

- **DSOF-23646** GET activetransport API should return the selected track for each transport

We have enabled the ActiveTransport API to return the currently selected track for each transport. This can be found within the GET activetransport API, where we have included a currentTrack property that indicates the current selected track of a given transport.

- **DSOF-23756** Add double dot RS plugin version to schema JSON

We have added a new RenderStream release naming convention to include double dots for plugin-specific hotfixes. This can now be seen within the Designer GUI.

- **DSOF-23808** Implement support for Arri Alexa LogCv4 to ACES workflow
- **DSOF-23927** Allow user to copy/paste notifications

Users can now copy and paste notifications from Designer without having to open the console.

Fixes

- **DSOF-19735** - Fixed an issue where snapshots failed to create after the snapshot widget was closed
- **DSOF-19736** - Fixed: If a snapshot has failed to create, an access violation was displayed if a widget was opened while taking a snapshot
- **DSOF-20435** - Fixed an issue where the CPUMonitor did not respect poll unit/interval settings
- **DSOF-20791** - Fixed an issue where “Edid port invalid errors” on applied feed settings
- **DSOF-21510** - Improved the efficiency of Text Layers
- **DSOF-21687** - Fixed an issue where Media Distribution did not report correct size for image sequences
- **DSOF-21694** - Fixed an issue that occurred when undoing a creation of a group with the widget open displayed a “not in list” error
- **DSOF-21839** - Fixed an issue where projects started with a Masking object appearing until the stage is brought into focus
- **DSOF-21988** - RenderStream: Fixed an issue where Designer would hang when stopping a workload
- **DSOF-22109** - Fixed an issue where list indirections were not triggering multitransport
- **DSOF-22756** - Fixed an issue that occurred after deleting a SkeletonClosed object from Stage and its Stick Man was still visible
- **DSOF-22780** - Fixed an issue where it was not possible to open the rollback window of 2 objects at the same time
- **DSOF-22781** - Fixed an issue where duplicating group with video transition layer
- **DSOF-22798** - Video Input Patch Editor: Fixed an issue where the format field was not refreshed upon project startup
- **DSOF-22846** - Fixed an issue that occurred when disengaging the Position Receiver, the status didn’t work as expected
- **DSOF-22916** - Fixed framerate drops on solo with section on the timeline
- **DSOF-23030** - Fixed an issue where a new section break was not dropped on the exact frame when zoomed out and using ; `shortcut to move playhead
- **DSOF-23103** - Fixed an Access Violation when using ctrl+z to undo deleting a layer
- **DSOF-23107** - Fixed incorrect timestamps on a newly created project within d3manager
- **DSOF-23127** - Mosys Driver: Fixed an issue where it was possible to edit lens values in the GUI when using Mosys GeneratedCameraTrackingSource
- **DSOF-23153** - Fixed an issue where Video Inputs was not scrollable
- **DSOF-23157** - Fixed an issue where Udp::connect error didn’t specify which port it failed to bind to
- **DSOF-23159** - Fixed an issue where ObjectView did not expand according to buckets / subdirectories

- **DSOF-23179** - Fixed an issue where the VideoIn format field was not serialising correct value with director/actor setup
- **DSOF-23180** - Fixed an issue where Layer Stack did not affect placeholders in LogicalVideoInDevice
- **DSOF-23215** - Fixed an issue where Movie Output > Output movie size had options for 2K and 4K exporton the MPEG-4 drop-down list despite Designer reporting errors that “d3 designer can only export resolutions up to 2160 pixels” and then failed any export attempt
- **DSOF-23264** - Fixed an Access Violation when taking a Snapshot after closing Snapshot manager
- **DSOF-23287** - Fixed an issue where a calibrated camera with no tracking source silently overwrote lens intrinsics
- **DSOF-23303** - Fixed an issue where the console was spammed when Designer was minimised while running in application mode
- **DSOF-23328** - Fixed an issue where many (Save) Actions were not unsubscribed at d3 shutdown
- **DSOF-23331** - Added detailed logging on shutdown for still subscribed Actions
- **DSOF-23332** - Fixed an error at ‘MissingMediaDomain: checkMissing’
- **DSOF-23333** - Fixed an issue that occured when changing SLC sizes would result in an error after configuring feed
- **DSOF-23342** - Fixed an issue where copying and pasting a layer at the end of the timeline did not extend the track
- **DSOF-23358** - Fixed an issue where keyframes outside of the highlighted grouping area were not deselected and not included in the keyframe grouping
- **DSOF-23361** - Fixed an issue when assigning empty VideoInTexture caused a parameter size error
- **DSOF-23368** - Fixed an issue when selecting a group of keyframes whilst there was already an active group selection in the keywidget added the new selection to the old
- **DSOF-23422** - Fixed [XR] Spatial Cal not working as expected
- **DSOF-23429** - Fixed an issue where a “‘NoneType’ object has no attribute ‘**base**’” notification was displayed when right-clicking on proxy maker with disableProxyMaker option switch enabled
- **DSOF-23513** - Fixed iPod 6 showing as an option in OmniCal
- **DSOF-23550** - Fixed an issue where the Patch Assignments Widget could not be opened
- **DSOF-23558** - Fixed an issue where Telemetry would fail with error “queryLogs failed: Can’t find manifest”
- **DSOF-23566** - Previz link: Fixed an issue where props didn’t handle alpha material and textures properly
- **DSOF-23575** - Fixed an issue where Rotational X value flickered between two numbers in Tracking Source Data when Smooth Receive Time unchecked

- **DSOF-23581** - Fixed an issue where 'Cannot create a link without a Resource' error was displayed when adding the new depth of fieldparameters to the shot recorder **DSOF-23595** - Fixed an issue where the 'enable Depth of Field (DOF)' option check-box in Camera settings has changed to a number field input box
- **DSOF-23598** - Fixed mesh fragment artefacts in a mesh mapping
- **DSOF-23611** - Fixed an issue where upper and lower-case letters in names of the Camera Settings were mixed up
- **DSOF-23613** - Fixed an issue where it was not possible to do secondary observations with trackmen camera tracking system as zoom encoder is always 1.f
- **DSOF-23620** - Fixed an issue where the prop mesh could not be assigned 'None'
- **DSOF-23629** - Fixed an issue where Mesh Mapping would jump the camera for a few frames to a different position
- **DSOF-23666** - Attribute Error: Fixed 'NoneType' object having no attribute 'hidden' when adding aspherical camera
- **DSOF-23685** - Fixed the Focus field inside Camera widget not working as expected
- **DSOF-23716** - Fixed a VirtualCam notification error when starting RenderStream with MR set mapping
- **DSOF-23740** - Fixed an m_renderPoseHistory.empty() Error Notification upon re-opening a project with RenderStream layer
- **DSOF-23751** - Fixed an error spamming whenever opening the Tracking Source widget of a SkeletonClosed
- **DSOF-23754** - Fixed an issue where a camera with a tracking source selected and no videoin, opening the camera widget showed an error
- **DSOF-23777** - Fixed Open Tracking Sources widget not working as expected with Skeletons
- **DSOF-23783** - Fixed an issue where VariableVideoPlayer: "Invalid frame calculated"/ "start != end" notification was shown on sharp speed changed - check
- **DSOF-23811** - Removed SkeletonClosed Scale
- **DSOF-23893** - RTTrPM driver - Fixed an issue where centroid positions had Y / Z positions swapped
- **DSOF-23899** - Fixed an issue where the Inner Frustum was not visible when using Backplate and Mesh Mapping
- **DSOF-23963** - Fixed NGINX being set to Manual instead of Automatic in Services
- **DSOF-23978** API: - Fixed an issue where boolean properties in result of /service/system/detectsystems never returned to 'false'
- **DSOF-24042** - Fixed an issue where alembic mesh centroid did not match when mesh is far away from origin
- **DSOF-24049** - Fixed a typo on response to **http://localhost/api/session/status/health**
- **DSOF-24083** - Fixed multiple Access Violations and crashes to desktop when trying to stream 3 channels over RenderStream.

Designer r26 Release Notes

r26.5.3

Download r26.5.3

Release build: 183434
Released: March 22nd 2024

Fixes

- DSOF-26466 - Fixed an issue where RenderStream Proxy did not show up on Director if both 25g connectors were active
- DSOF-26550 - Fixed an issue where a duplicate process was started when clicking quickly on the start or restart workload button

r26.5.2

Download r26.5.2

Release build: 178116
Released: February 14th 2024

Fixes

- DSOF-25851-Fixed Manage RenderStream Workloads not working reliably

r26.5.1

Download r26.5.1

Release build: 178116
Released: January 31st 2024

Fixes

- DSOF-26273 - Fixed console spam with 'Updating Scene Due to Change in Resource' every time feed scene is changed

r26.5 - Improvements & Fixes

Download r26.5

Release build: 178116
Released: January 24th 2024

New Features

- DSOF-25410 - Updated the way proxy and non-proxy streams are filtered in health status widget
- DSOF-25448 - Receive Health status in the RenderStream layer editor should no longer report “Frames Dropped Recently” for Proxy streams.

Fixes

- DSOF-23229 - Fixed an issue where the current status of RenderStream was not shown under ‘Network’ tab within d3manager
- DSOF-23266 - RenderStream Workload widget does now automatically shrinks
- DSOF-23889 - Fixed an issue where d3manager did not update network share location when changing d3 projects folder
- DSOF-23890 - Fixed an issue where d3manager did not update network shares if not running as admin / elevated
- DSOF-24449 - Fixed an issue where eRenderStream uncompressed streams intermittently only rendered black
- DSOF-24474 - Fixed an issue where Heap corruption in Rivermax cleanup code caused a crash in TouchDesigner
- DSOF-24475 - Fixed a CL_OUT_OF_HOST_MEMORY error on vx using RenderStream
- DSOF-24622 - Fixed an issue where workloads could occasionally get stuck in awaiting requests
- DSOF-24648 - Fixed an intermittent flickering issue when starting RenderStream
- DSOF-24706 - Fixed an issue that occurred when using an uncompressed Unreal RenderStream, some actors showed RECV 0
- DSOF-24707 - Fixed an issue where an exception occurred when trying to remove a channel mapping
- DSOF-24715 - Fixed an issue where actors crashed whilst starting and stopping workload
- DSOF-24838 - Fixed an issue where pool usage was not shown for assets using the default channel name
- DSOF-24855 - Fixed d3 heap corruption and a crash to desktop with RenderStream compressed in LibGpuVideoCodec (AMD 22.Q2)
- DSOF-24918 - Fixed an issue that occurred If the drive that d3manager was pointed at disappeared, launching d3 remotely on that machine would default to another drive

- DSOF-24943 - Improved RenderstreamSystem system speed when updating statistics about many streams
- DSOF-24974 - Fixed an issue where starting and stopping a render stream workload reduce performance of the director
- DSOF-24984 - Fixed an issue where launching d3manager with a missing d3 projects folder would result in the next project folder from the list being launched
- DSOF-25009 - Fixed an issue where adding samples to an uninitialized graph descriptor caused an exception
- DSOF-25023 - Fixed a crash on director when receiving proxy streams
- DSOF-25028 - Fixed an issue where if d3service crashed while RenderStream is running, all RenderStream processes on that machine will no longer be controllable via d3net
- DSOF-25039 - Fixed an intermittent issue where streams were occasionally never received
- DSOF-25096 - Fixed an issue where calling an invalid API endpoint can intermittently caused a crash to desktop
- DSOF-25113 - Fixed an issue where 16K or higher screen couldn't use blur layer even using enableSLC switch
- DSOF-25136 - Fixed an Access Violation can occur when moving the playhead out of a RenderStream layer after the GUI had been reloaded during development.
- DSOF-25137 - Fixed an issue where Renderer Graph was not accessible via the Workload details GUI
- DSOF-25183 - Fixed an issue where a video layer missing media highlight no longer updated as frequently to changes in sequencing
- DSOF-25185 - Fixed an issue where a vx occasionally dropped all received frames with RenderStream Uncompressed
- DSOF-25237 - Fixed an issue where missing media scenarios with a Bitmap layer caused notification spam: Corrupt keyframe, please check sequencing
- DSOF-25327 - Fixed an issue where Feed Mapping Editor still opened is interactable even if the feed mapping is "Locked"
- DSOF-25338 - Reduced active time of "Packets dropped recently"
- DSOF-25556 - Fixed an issue where editing Feed Warps intermittently did not take effort on actor machines in session, but the control points did move
- DSOF-25568 - Fixed an issue where RenderStream failed to initialise due to an exception, rs_initialise returns success
- DSOF-25629 - Fixed an error when launching project on actor, "Current d3projects folder not available on machine..."
- DSOF-25631 - When opening d3 manager "Run Project" button is now populated with the "current" project
- DSOF-25765 - Fixed an issue where Understudy takes over but does not indicate on director, sometimes failing to trigger matrix failover
- DSOF-25829 - Fixed RenderStream Failover

- DSOF-25892 - Improved Track widget updates when RenderStream workload status is updating
- DSOF-25893 - Improved receive health widget
- DSOF-25932 - Fixed an issue where workload state intermittently got stuck in “Launching”
- DSOF-26095 - Fixed an issue where some RenderStream uncompressed streams failed to start on the director when using an actor controller to run many streams
- DSOF-24245 - Fixed an indefinite hang/crash due to exhausting video memory
- DSOF-25905 - Fixed an issue where mesh mapping fragments teared when the engine origin is changed in real-time

r26.4.2

Download r26.4.2

Release build: 177453
Released: January 17th 2023

Fixes

- DSOF-25476 - Fixed an issue where Projection Screens could be inactive on Editors when animated with Animate Object Preset
- DSOF-25569 - Fixed stYpe Focus Distance not being used
- DSOF-25930 - Fixed an issue where 2.5D assets did not auto-extract on Actors
- DSOF-25983 - Fixed Black Magic Video Hub 3g no longer receiving commands
- DSOF-26026 - Fixed a topological sort error for 2.5D assets and plates
- DSOF-26093 - Fixed an issue where 2.5D had an error parsing depth map when an image was fully transparent

r26.4.1

Download r26.4.1

Release build: 177175
Released: January 10th 2023

Fixes

- DSOF-21902 - Fixed an issue where projects failed to load with error: m_delayDsp
- DSOF-23674 - Fixed an issue where video layers used in Layer Stacks were previewing the second to last requested media
- DSOF-25485 - Fixed an issue where pop-ups from session widget flickered back and forth between being on top and behind of the session widget - DSOF-25499-Fixed an issue with NCAM tracking

- DSOF-25880 - 2.5D assets no longer have lower selection priority than displays
- DSOF-25912 - Fixed an issue where Device Recordings did not play back captured PSN data correctly
- DSOF-25943 - Fixed an issue where d3 was unable to import proxy files it had just made of versioned fragment replacement video clip
- DSOF-25949 - 2.5D-Depth maps no longer interpreted incorrectly - DSOF-25976-Fixed an issue where Perspective Mappings only appeared n Director, not Actors
- DSOF-25990 - Moved Variable Timecode implementation behind the option switch `forcePIDTimecodeChase`
- DSOF-26027 - Fixed an issue that occurred when using sockpuppet bank editor, using NONE did not respect transition times
- DSOF-26028 - Fixed an issue that occurred when switching from a NONE clip in a sockpuppet video layer the frame counter did not reset on the clip
- DSOF-26051 - Fixed an issue where machines with capital letters in their hostname did not show VFC status information

r26.4 - VX 2+ Support

Download r26.4

Release build: 176069
Released: January 10th 2023

New Features

- Added support for VX 2+. Read more about VX 2+ here.

Fixes

- DSOF-25920 - 2.5D - Fixed an issue where changes in z-offset for plates with depth maps don't get saved to 2p5d file.

r26.3.1

Download r26.3.1

Release build: 175636
Released: December 13th 2023

Fixes

- DSOF-24939 - Fixed an Access Violation when selecting the tracker delay calibration thumbnail

- DSOF-25649 - Video mode Inframe- Fixed an issue where a sockpuppet video layer playing audio caused d3 performance to drop
- DSOF-25869 - Fixed an issue where transparent screens had a black background in non-UV regions in an upgraded project
- DSOF-25898 - Fixed an issue when using 2.5d where an artifact was present in parsed depth maps containing narrow non-alpha columns
- DSOF-25926-Fixed an issue where the GUI was black when starting Designer on a server when Parsec Virtual Display Adapter is installed

r26.3

Download r26.3

Release build: 175110
Released: December 6th 2023

New 2.5D Workflow

The new 2.5D workflow is also covered here with a new demo video.

What is 2.5D?

2.5D workflows bridge the gap between traditional 2D video plates and full 3D generative scenes. By building up a scene with layers of images or video plates, with the possibility to add depth or shaping to the plates, users can quickly create a realistic-looking scene with parallax. 2.5D assets can be saved as .2p5d files and shared across projects or created using external integrations such as Cuebric to harness the power of generative AI to optionally create the image or just to speed up the process of image segmentation using AI.

What has changed?

2.5D has been possible with Designer prior to r26.3, however, it required the manual creation of plates using a projection surface per plate, manually applying specific settings to each plate, and the use of a StageRender layer. With r26.3, 2.5D has been made a first-class citizen in Designer with its own layer type and the concept of a 2.5D asset. This dramatically increases the usability and speeds up the workflow, as well as making it more intuitive and less error-prone.

In addition, the Cuebric integration speeds up the pipeline between the creative and volume control stages of the end-to-end workflow.

Cuebric Integration

Cuebric is a web-based tool for creating 2.5D scenes with the help of AI. For more information visit **https://cuebric.com/**.

With r26.3, 2.5D scenes can be exported from Cuebric and imported into Disguise. At launch, the Cuebric scene is exported from Cuebric by clicking on Plug & Play 3D in the Segmentation view under the Depth option. Once exported, follow the 2p5D workflow to set up a 2.5D asset from an existing .2p5d file.vWhen the Cuebric export includes AI-generated depth mapping information, Designer will auto-generate a 3D mesh from the depth data to add shape to the plates. To remove the depth mapping from the plate, you can simply select the standard rectangle mesh instead in the plate properties.

Read more about 2.5D and the new workflow here and the Cuebric integration here.

For a video explanation of the Cuebric to Disguise end-to-end workflow, visit https://vimeo.com/890469715.

r26.2.2

Download r26.2.2

Release build: 174130
Released: November 29th 2023

Fixes

- DSOF-24356-Fixed an issue where inserting time that would push layers beyond the end of a track did not extend the track
- DSOF-25007-Fixed 'Invalid t: > track length' error when dragging to the end of timeline that had a video that was a frame long at the end
- DSOF-25595-Fixed an issue that occurred when global crossfade pairing with audio layers caused stuttering and hangs when jumping around timeline
- DSOF-25637-Fixed an issue where "Director is under heavy load" notification did not always clear
- DSOF-25663-Fixed an issue where the compose layer would sometimes display black when being shifted horizontally
- DSOF-25691-Fixed an issue where matrix commands sent to a Blackmagic Smarthub 12g sometimes didn't set the configuration correctly

r26.2.1

Download r26.2.1

Release build: 173945
Released: November 22nd 2023

Fixed

- DSOF-23262 - Fixed an issue where the Bank Editor widget resized when adding a new bank, hiding all of the slots in the top half of the widget
- DSOF-24284 - Fixed an issue where the RenderStream Assets List text was drawn partly outside of widget
- DSOF-25151 - Fixed an issue where using some blend modes while SLC was active stretched and compressed the content - DSOF-25644Fixed audio not looping when Locked and Paused At end point
- DSOF-25685 - Fixed API issue where a malformed d3 version would cause an internal error
- DSOF-25701 - Fixed an issue where a brighter line of content showed in some SLC configurations
- DSOF-25711 - Fixed an issue where Mesh Policy rendered black frames when the Unreal Project in film/video & live events mode

r26.2

Download r26.2

Release build: 173464
Released: November 16th 2023

Improvements

- DSOF-24937 - Fixed an issue where SaveOnDelete Resource Transport commands shouldn't blocked Resource Transport if a resend failed
- DSOF-25413 - Default Variable Timecode Implementation

Fixes

- DSOF-25050 - Fixed an issue where right-clicking a Screen of DMX lights on an editor while in a 2 machine or more session stopped DMX outputting
- DSOF-25186 - Fixed an issue where remote installation occasionally failed to start d3service with 'Entry Point Not Found' errors on RX servers
- DSOF-25420 - Fixed an issue where the Position Receiver Axis could not use "Set" button for input ranges

r26.1.1

Download r26.1.1

Release build: 172420
Released: November 8th 2023

Fixes

- DSOF-25507 - Fixed an issue seen in AMD machines, where SLC affected output when using Stage Render layer

r26.1

Download r26.1

Release build: 171936
Released: November 1st 2023

Fixes

- DSOF-22666 - Fixed an issue where d3 would hang due to a network security sweep
- DSOF-24346 - Added logging to Live Update option switch
- DSOF-24360 - Fixed an issue where RenderStream Uncompressed only received texture parameters on the first adapter
- DSOF-24786 - Fixed an issue where installing HDMI VFC REV E cards in a system after having QSDIVFC cards installed caused d3 to stall when loading
- DSOF-25156 - Added DCS sensor width manual column
- DSOF-25283 - Fixed an issue where project templates caused an error during install
- DSOF-25440 - MatroxApi now warns the user when there is driver and SDK version are mismatched
- DSOF-25468 - Fixed an issue where ARRI LDS device was not parsing raw encoder values for zoom or focus distance
- DSOF-25527- lenscalibrator.exe is now code-signed

r26.0.5

Download r26.0.5

Release build: 170952
Released: October 18th 2023

Fixes

- DSOF-25401 - Fixed an issue where it was not possible to select objects after opening ‘Points’ separator in Rigid Body Tracking Source editor
- DSOF-25423 - OmniCal: Fixed an issue where editing the camera plan in upgraded pre-r23 projects froze d3
- DSOF-25450 - OmniCal: Fixed Rig Check workflow

r26.0.4

Download r26.0.4

Release build: 170952
Released: October 18th 2023

Fixes

- DSOF-24126 - Fixed an issue where MidiBeatClock jumped backwards in the timeline when set to Loop Section
- DSOF-25089 - ARRI Lens Data System version 102 is supported in addition to version 103.
- DSOF-25244 - Fixed an issue where the Sockpuppet video layer media did not turn black when 'None' is selected
- DSOF-25335 - Fixed existing TransportJumpCommands being broken broken when upgrade to r26.0
- DSOF-25401 - Fixed an issue where it was not possible to select objects after opening 'Points' separator in Rigid Body Tracking Source editor

r26.0.3

Download r26.0.3

Release build: 169912
Released: October 4th 2023

Fixes

- DSOF-24932-Fixed an issue where Deltacast vx4+ video input group 2 is duplicated

r26.0.2

Download r26.0.2

Release build: 169539
Released: September 27th 2023

Fixes

- DSOF-17119-Fixed an issue where the PSN receiver assigning to rotation.x and rotation.z would not doing full 360
- DSOF-24221 - Fixed an issue where it was not possible to open the port editor of QSDI with 'NoneType' error
- DSOF-25068 - Fixed an issue with installing fonts when the user had a space in their user folder name

- DSOF-25120 - Fixed an issue where RenderStream download_buffers did not release its download queue on destruction
- DSOF-25121 - Fixed an issue where starting and stopping a RenderStream workload reduces performance of WorkloadManager on the director

r26.0.1

Download r26.0.1

Release build: 168872
Released: September 20th 2023

Improvements

- DSOF-25123 - We have implemented a preview feature that allows d3 to chase timecode at non-standard frame rates. This can be used for example to adjust the playback speed of video in line with a DJs adjustments to the BPM of a track. To utilise this preview feature you can enable the option switch “forcePIDTimecodeChase”. Chasing LTC or any kind of timecode will smoothly follow adjustments to timecode playback while this is set. If you perform large timecode jumps you may find that the playhead will fast-forward to get to the new timecode rather than immediately jump to that point.

If you have feedback about this new preview feature please let us know via our **support@disguise.one** email so that we can take that into account for the finished implementation.

Fixes

- DSOF-23668- PreComps-Fixed an issue where clicking Effect or Generative layer caused feed blur
- DSOF-24802-Fixed an issue where a video layer with speed ‘0’ was interpreted ambiguously.
- DSOF-24835-Fixed an issue where deleting a VirtualLineup layer mapped to a camera’s perspective after timeline focus was taken away from the layer and then returned causes Access Violations
- DSOF-24921-Fixed an issue where an Object Tracking error blocked Spatial Calibration when not receiving Tracking data

r26

Download r26

Release build: 168310
Released: September 14th 2023

Improvements

- **DSOF-16666** - Simple FBX mesh support:

The FBX file format can now be successfully imported into Designer as a single mesh. These can be used in the schematic, lux and heatmap renderers. Any FBX mesh will be imported with global positions, and non-triangulated meshes are triangulated on import. FBX files are imported with UV maps.

It is important to note the following mitigations with this feature:

- Object hierarchies found within the FBX file in Designer are currently not supported
- FBX files imported with up to 3x UV maps are supported. Designer uses the first UV map only and there is currently no way to switch between each UV map.

FBX file format support can be used with the option switch enabled. To access, right-click on a project folder in d3manager, select 'Advanced project settings' and then select 'enableFbxMeshImport'. Please contact product-team@disguise.one for feedback on this feature.

- **DSOF-22271** - TransportJumpCommand locations should use time adjusted by timecode tag when using timecode location.

When making a TransportJumpCommand in the TransportControl module, the location value has the option of being set with CUE or timecode.

In previous releases, when there are timecode tags on the track that a user wants to specify a location on, the timecode displayed in the GUI is based on the timecode tags, but the location that the TransportJumpCommand uses does not take the timecode tags into account.

In r26, the location for TransportJumpCommand now uses the time adjusted by timecode tags when using the timecode location.

- **DSOF-23321** Show RenderStream proxy stream status in the GUI.

We have added RenderStream proxy information in the RenderStream Editor widget.

- **DSOF-23699** Make list/grid view selection for media/texture browsers persistent.

In previous releases, the behaviour of the media and texture browser in Designer was not persistent when a user would switch between grid view and list view. In r26 we have made the selection of grid or list view in the media/texture browser to remain persistent across all machines running in a session.

- **DSOF-23810** - Add FBX ASCII format for Shot Recorder export.

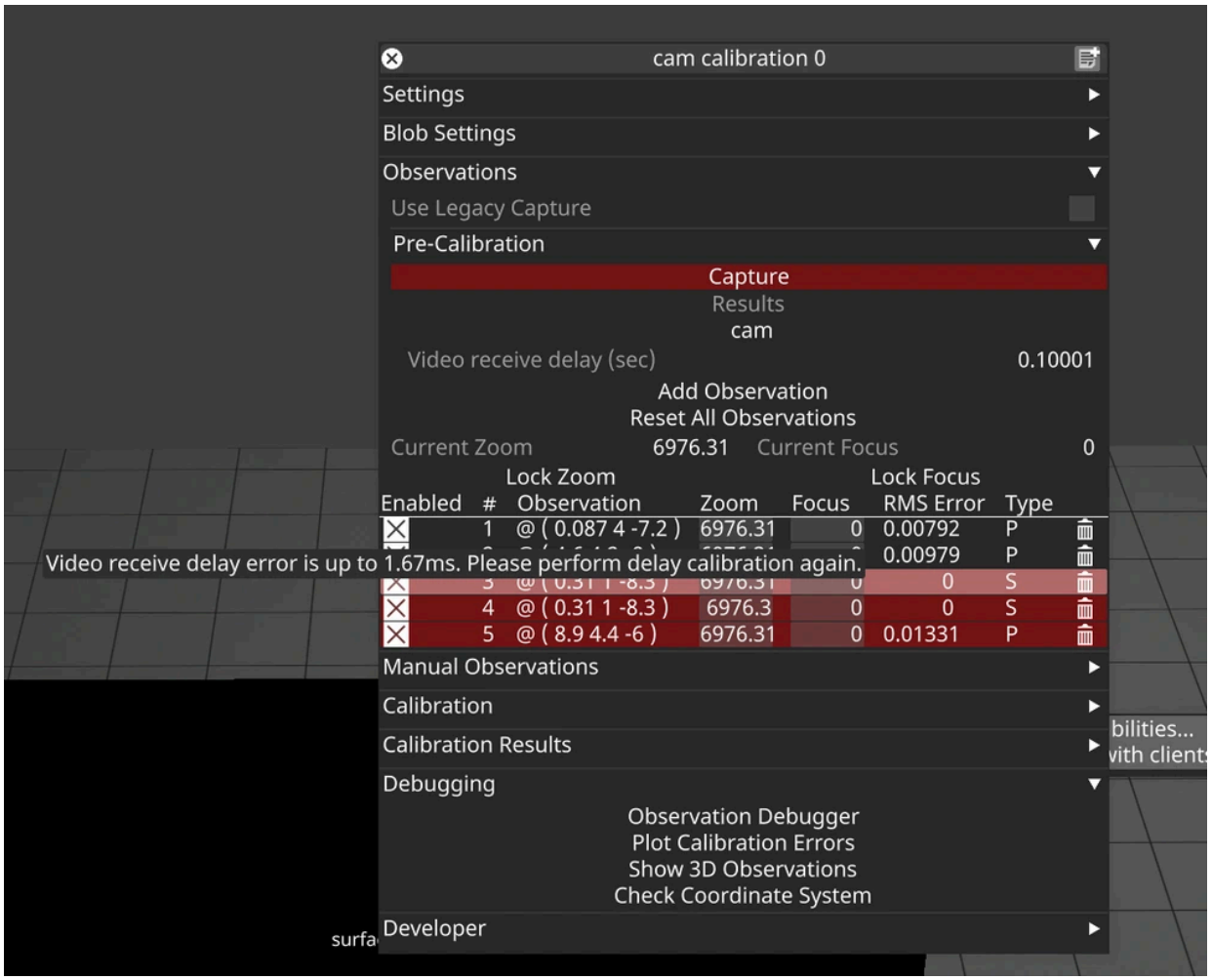
Users can now export data from the Shot Recorder to the FBX ASCII format.

- **DSOF-24041** - XR: improve usability of Tracker Delay UI.

We have made a number of changes to the Tracker Delay UI. These include changing the overlay colour from magenta to red to signify when no tracking data was captured, or the delay is set to too low or too high. We have also introduced help text in a number of areas of the UI to provide instruction on the Tracker Delay process.

- **DSOF-24066** - Alert the user when video lookup times becomes unstable or if errors are high.

We have added a visible notification within the UI to notify users that the video receive delay is set incorrectly during the spatial calibration process when working with MR Sets. The calibration will be highlighted in red, and hovering over the row with a mouse will explain that there is a video receive delay error and to perform the delay calibration again.

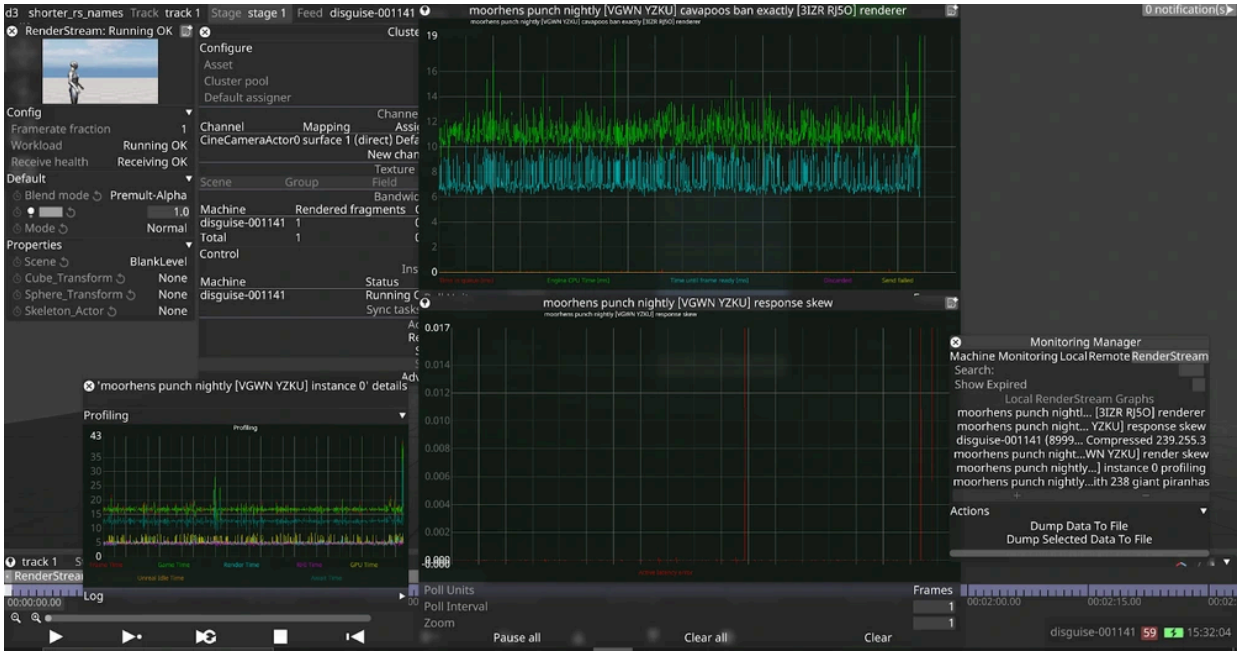


Video receive delay notification during spatial calibration

- **DSOF-24089** - DSV capture: minor performance optimisations.
- **DSOF-24090** - DSV capture: add dropped frames detection.
- **DSOF-24099** - Shorten RenderStream workload/stream friendly names for the UI.

In previous releases, RenderStream workloads and streams were identified within the UI through a 64 bit unique ID to enable users to reference each stream. In r26 we have shortened

the RenderStream workload names to make it more straightforward for a user to reference each RenderStream workload.



RenderStream workload name shortened

- **DSOF-24153** - Expressions: if expressions are broken, the layer they are used in should change colour as well as the parameter.

In previous releases, if an incorrect Expression had been written then this would be flagged to the user by turning the parameter orange in colour.

In r26 we have included the layer that is using the Expression to also change to red in colour so that the user is notified that the Expression is incorrect. If the layer is in a group, then the group will turn red when the layer it contains turns red.

We have also included an error message on the layer via a tooltip. If a user corrects the Expression then the layer will return to its default colour.

- **DSOF-24160** - Better texture buffer management for LogicalVideoInDevice.
- **DSOF-24166** - Make list editors stickyable.

In r26 we have enabled users to pin ListEditors to the Designer UI by clicking the pin in the top left hand side of each ListEditor as seen in the image below.



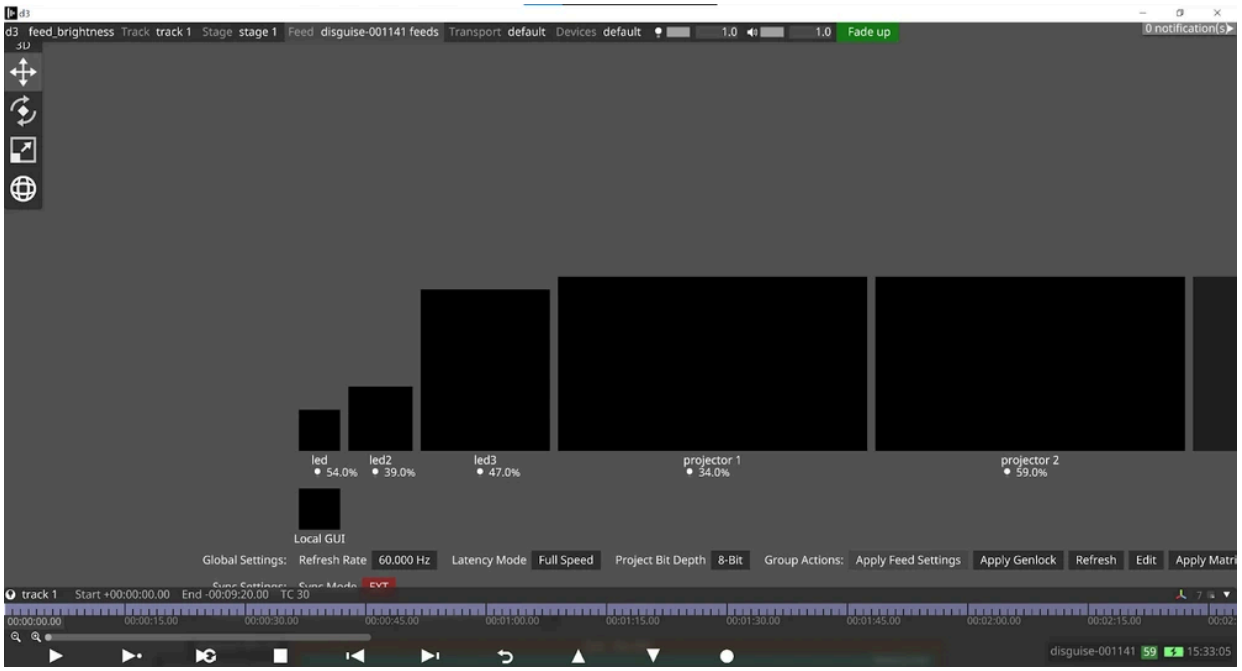
Editor windows pinned

- **DSOF-24271** Change default location for d3 Projects to **D: Drive** after reimaging a Disguise media server.

In r26 we have changed the default location for d3 Projects to be in the **D: Drive** after reimaging a Disguise media server. In previous releases, a user would be pointed towards the Documents folder whereas all Designer projects should be located in the **D: Drive**.

- **DSOF-24375** - Include display master brightness in the feed UI.

We have included the master brightness of LED screens and projectors within the feed UI. This can be seen as a percentage underneath the name of each screen, as shown in the screenshot below.



Brightness setting feed view

Fixes

- **DSOF-11028** - Fixed an issue where an embedded audio in a video layer would drift out of sync from the playhead either over time or due to frame drops.
- **DSOF-17926** - Fixed an issue where setting a value with '=' in an expression locked the value to the conditional value.
- **DSOF-21117** - EventTransportMidiNote Personality Train is no longer offset in GUI.
- **DSOF-21827** - MultiTransport Manager: Fixed an issue where Editors would respond to timecode cues when the Director's transport had been disengaged.
- **DSOF-22783** - Clarified active latency mismatch error.
- **DSOF-22876** - RenderStream: Fixed a stall / crash to desktop when modifying ClusterAssigner options while sending remote texture.
- **DSOF-22900** - Fixed an issue where pre-capture in spatial calibration did not work when multiple cameras are using same video input.
- **DSOF-23276** - It is no longer possible to rename a group to an empty name, which then prevented opening group options widget.
- **DSOF-23281** - Fixed an Access Violation in the input manager when using keyframe editor with multi-layer selection.
- **DSOF-23315** - API: Fixed /sequencing/change indirections only matching classes not subclasses.
- **DSOF-23367** - Fixed the keywidget timeline repositioning to the timeline playhead rather than the time indicator when moving between control parameters, thus losing view of keyframes being edited.
- **DSOF-23645** - Fixed an issue where Actors and Understudies were not showing frame rate at Startup until open the session widget.
- **DSOF-23661** - Fixed an issue where the missing media window could go off screen.
- **DSOF-23710** - Fixed an issue where FBX data from Disguise shot recorder doesn't import correctly in 3rd party software (UE, Maya).
- **DSOF-23749** - Fixed being unable to filter by resolution in list editor.
- **DSOF-23841**- Monitoring manager improvements.
- **DSOF-23848** - OmniCal: Fixed an issue where NUL was logged instead of integer value 0 for "projectorSimulationOptions".
- **DSOF-23898** - Fixed an issue where user made video-in resource used in layers would generate content table fails.
- **DSOF-23934** - Fixed an issue where d3 switching between full screen and windowed would sometimes caused a crash to desktop.
- **DSOF-23955** - Inconsistent version tags no longer cause a crash to desktop.

- **DSOF-24036** - Fixed DSE not work with Face Culling.
- **DSOF-24088** - DSV capture: Fixed capture failure leading to shortening of capture buffer.
- **DSOF-24093** -Stop on TC Lost Behaviour is now consistent between director and editor.
- **DSOF-24105** - Fixed an issue where timecode tags where the frame number is the same as the number of frames per second caused the playhead to show the wrong time.
- **DSOF-24116** - Fixed an issue where versioning down a file used in smart group versions down every file used in that smart group, regardless of version number.
- **DSOF-24127** - OmniCal: UI Clarified when Multi-Pose is disabled because of missing cameras.
- **DSOF-24133** - Fixed an Access Violation when attempting to Empty Trash for LED Screen and Projection Surface.
- **DSOF-24168** - Fixed an issue where users could not create string literals in expressions.
- **DSOF-24176** - Fixed an issue where a project with StageAnnotationLabels of size zero can caused font rendering issues in GUI.
- **DSOF-24189** - Fixed an issues where Go To Timecode (Ctrl + /) went to timecode plus a frame when used after a timecode tag.
- **DSOF-24204** - Fixed video is not being in sync when an actor rejoined the session.
- **DSOF-24209** - Fixed frame drops when moving between multiple video clips with audio.
- **DSOF-24214** - Fixed remote installs of d3 stalling.
- **DSOF-24269** - Fixed an Access violation when trying to write more than one mpeg-4 feed movie if using an unsupported resolution.
- **DSOF-24278** - Fixed an Access Violation in VideoInSystem::render when GPU driver had crashed.
- **DSOF-24343** - Fixed an issue where sockpuppet changes were not actually being applied to an audio layer.
- **DSOF-24384** - Trial: Fixed an issue where a write compacted package on exit will leave project file empty.
- **DSOF-24385** - Fixed an issue where an unreadable shader source directory could stop shader cache creation.
- **DSOF-24429** - Fixed an issue where audio underran at the start of videoclip with audio.
- **DSOF-24439** - Fixed Text Module failing to update text on project restart.
- **DSOF-24445** - Groups are now red when they are created containing layers which are already red.
- **DSOF-24454** - Installer: Fixed d3 Installer hanging when d3 is running the background.
- **DSOF-24462** - Fixed an issue where every string rendered to screen was copied 1x more than required.

- **DSOF-24466** - Fixed RSCompressedVideoIn not calling shutdown(), bypasses videoInShutDown actions.
- **DSOF-24507** - Fixed an issue where ResourceTransport was blocked on Actor / Understudy machines after FeedRect edits.
- **DSOF-24520** - ResourceManager: search() now includes matching files on disk.
- **DSOF-24521** - ResourceManager: Fixed remove() calling removeResourceAction twice.
- **DSOF-24529** - Fixed an issue where the List View and Grid View highlight icons were reversed.
- **DSOF-24553** - Fixed widget suggestion text being unnecessarily copied.
- **DSOF-24573** - Fixed an issue where ObjectDeformationSettings::remove used single parameter erase call when used with std::remove_if.
- **DSOF-24588** - Fixed a virtualCam error when starting a RenderStream workload.
- **DSOF-24605** - Fixed an error notification “m_cameras.front() == cam” being produced during spatial calibration.
- **DSOF-24805** - XR: Fixed being unable to create a Legacy Observation.
- **DSOF-24806** - Fixed an issue when removing feed rectangle on output threw error: ‘Machine’ object has no attribute ‘feeds’.
- **DSOF-24807** - Fixed errors thrown when trying to duplicate a feed rectangle.
- **DSOF-24815** - RenderStream: Fixed Uncompressed workloads failing to start.
- **DSOF-24819** - Fixed an issue where users were unable to duplicate multiple feed rectangles in the feed vie
- **DSOF-24841** - Fixed remote install failing on RX
- **DSOF-24847** - Improved LED Screen List Editor duplicate names handling.
- **DSOF-24956** - Fixed an issue where a combination of Matrox VX2 director and Deltacast VX4 or VXUnderstudy caused “Unable to create video capture stream” error notifications.
- **DSOF-25099** - Fixed an issue d3preview caused an Access Violation on opening file.

Designer r27 Release Notes

r27.10.3 - Fixes

Download r27.10.3

Release build: 193894
Released: August 7th 2024

Due to some issues discovered during the release process, we have delayed our recent releases. We are now releasing r27.10.3 which includes the Fixes listed below.

Fixes added in r27.10.1, r27.10.2 and r27.10.3

- **DSOF-27660** - Fixed an issue where the HardwareList instance had no attribute 'close' error when closing Video Input Patch Editor
- **DSOF-27688** - Fixed an Access Violation when using RenderStream with Notch Blocks
- **DSOF-27844** - Fixed an issue where enabling VITC on Matrox cards causes console spam failing to signal surface read completion
- **DSOF-27885** - Fixed an issue where a black frame was present on a RenderStream layer when move section to next section
- **DSOF-27894** - Fixed an issue where a new track select widget opened on every click in MultiTransport
- **DSOF-27935** - Fixed a crash to desktop when failing to setup topology
- **DSOF-27796** - Fixed a crash to desktop in d3 when jumping to cue on another track
- **DSOF-27854** - Fixed an issue where the Video asset editor did not show file versions

r27.10 - Expressions

See r27.10.3

New Features

DSOF-24626 - Expression Variables

Expression variables enable the sharing of values between Designer expressions.

A number of backwardly-incompatible changes were made to the expressions system. This page provides a reference for any projects which used expressions (specifically variable assignment) before that release.

For details on Expressions, visit here.

Improvements

DSOF-23702 - API - Failover API for Understudies

New APIs have been added to failover a machine using the API. The following endpoints have been added and are documented at **https://developer.disguise.one** as well as in the documentation bundled with Designer which can be accessed from d3Manager at **Help > Open API Documentation**.

- `/failover/applydefaultrouting`
- `/failover/restoremachine`
- `/failover/failovermachine`
- `/failover/settings`
- `/failover/understudytargets`

Fixes

- **DSOF-27090** - Fixed an issue where string formatting did not allow `module:name.field` syntax
- **DSOF-27229** - Fixed a machine hang in `MatroxTopology::cleanupSurfaceBufferPool`

The d3Manager License dialogue (accessible from d3Manager->Help->d3 Licenses) now contains a section detailing the serial number(s) of local CodeMeter license containers.

- **DSOF-27586** - Fixed spherical mapping rotation being incorrect
- **DSOF-27644** - Fixed an issue where the Sockpuppet Notch layer moved the Effect field under Timecode Separator
- **DSOF-27692** - Fixed Web browser-based layers not limiting to the max texture size available to the renderer

r27.9 - Improvements and Fixes

Download r27.9

Release build: 192216
Released: July 16th 2024

Notice

> **Notice**
>
> All Notch blocks flickered when they were not being rendered at full frame rates when a user upgraded their project file to r27.8. As a result we removed r27.8 (build number 191665). This has now been resolved in r27.9, which includes a number of additional fixes and improvements.
>
> The original release notes for r27.8 are also listed.

Improvements

DSOF-11388 - More Zoom Steps when Zoom In

Additional zoom levels have been added to zoom in and out of the timeline, for example using Alt Scroll or the timeline magnifier icons.

DSOF-27451 - Move 'Collapse All Groups' and 'Clear Arrows' into a dropdown

The Track Editor menu now contains a new Actions section which contains the following: - Clear Arrows (if the option `switchisClearArrowsEnabled` is enabled) - Toggle Groups - Close Layer Editors (see next item)

DSOF-26612 - Add way to close all open layer editors

The Actions section of the Track Editor now contains a Close Layer Editors function, which ensures that the list of layers which would open when the timeline scrubs over them is cleared.

DSOF-27484 - 'Collapse all Groups' Should toggle to expand all groups

The "Collapse all Groups" button in the Track Editor has been renamed to Toggle Groups, and it now collapses or expands all Groups across the whole track. If even one group is open then clicking the button will close the group(s). Expanding will only happen if there are no open groups on the entire track. The shortcuts Ctl Alt + and Ctrl Alt - also perform this action.

DSOF-27207 - QuickAlign option to disable adding new points

In order to easily move existing points without accidentally adding new points when doing QuickAlign, a checkbox has been added to toggle on or off adding new alignment points. The checkbox is under the Interface Options menu.

DSOF-27246 - Support multiple OSC floats in OSC position receiver

The OSC Position Receiver can now use multiple arguments in the same OSC message. This means that one message can be received for the three arguments x, y, and z, rather than three separate messages.

DSOF-27420 - Transport “engaged” button should have a tooltip explaining when it’s allowed and when it’s not allowed to engage/disengage

The Transport Engaged / Disengaged button now has a more helpful tooltip to inform as to why it cannot be engaged and/or disengaged.

DSOF-24911 - Notes API - to be able to GET and POST notes

A new HTTP API to get and set notes has been added. For details, see the documentation at **https://developer.disguise.one** or the API documentation bundled with Designer, which can be found by navigating to: **d3manager > Help > Open API Documentation**

DSOF-27204 - Manager to show list of locally connected (physical) CodeMeter containers in “d3 License” window

The d3Manager License dialogue (accessible from d3Manager > Help > d3 Licenses) now contains a section detailing the serial number(s) of local CodeMeter license containers.

Fixes

DSOF-25823 - Fixed an issue that occurred n project launch, where d3manager warned “No valid Designer licence detected from d3service!” but continued to open the project

DSOF-26562 - Fixed an issue where head names did not appear in the feed view

DSOF-26726 - Fixed an issue where remote graphs sometimes failed to be sent to the director

DSOF-26909 - Fixed an issue where DMX screens appeared inactive when the position was controlled with automation data until the visualiser camera was moved

DSOF-27074 - Fixed undo (Ctrl + Z) not working work when deleting a tag

DSOF-27144 - Sped up the timeSlideShow setup takes on projects with large number of video clips

DSOF-27262 - Fixed an issue where WSAWaitForMultipleEvents was seen when using ArtNet

DSOF-27280 - d3 installer now sets the d3.exe file properties to disabled for Windows versions later than 1809

DSOF-27282 - API Docs page no longer returns blank white screen

DSOF-27289 - Fixed an issue where a Note did not unsubscribe ResourceActions when deactivated

DSOF-27290 - Fixed an issue where ObjectView did not unsubscribe ResourceActions before adding new ones

DSOF-27315 - Fixed a hang that occurred when on adding / removing from timeline

DSOF-27359 - Fixed an issue where live update was blocked blocked after long hangs on director

DSOF-27382 - Fixed access violation when two machines on network have duplicate hostnames

DSOF-27553 - OmniCal: Fixed an issue where a number of Projector inliers and total points were not serialised

DSOF-27567 - Fixed shadow artefacts in dynamic blend with three projectors

r27.8 - ProRes Support

Download r27.8

Release build: 191665
Released: July 10th 2024

New Features

- **DSOF-17036** - ProRes Support

  ProRes video codecs are now supported for playout on Disguise. ProRes is a visually lossless codec that uses intra-frame compression, where each frame is stored independently and can be decoded with no dependencies on other frames. Users are now able to playout the following ProRes codecs from Disguise:

- ProRes 422
- ProRes 422 HQ
- ProRes 422 LT
- ProRes 422 Proxy
- ProRes 4444
- ProRes 4444 XQ

ProRes RAW playback in Disguise is not supported.

ProRes video codecs are CPU-based. We recommend checking the video playback performance for the Disguise media server(s) when deciding whether ProRes is appropriate for your show or production.

Improvements

DSOF-22928 - Allocate buffers through GpuPool

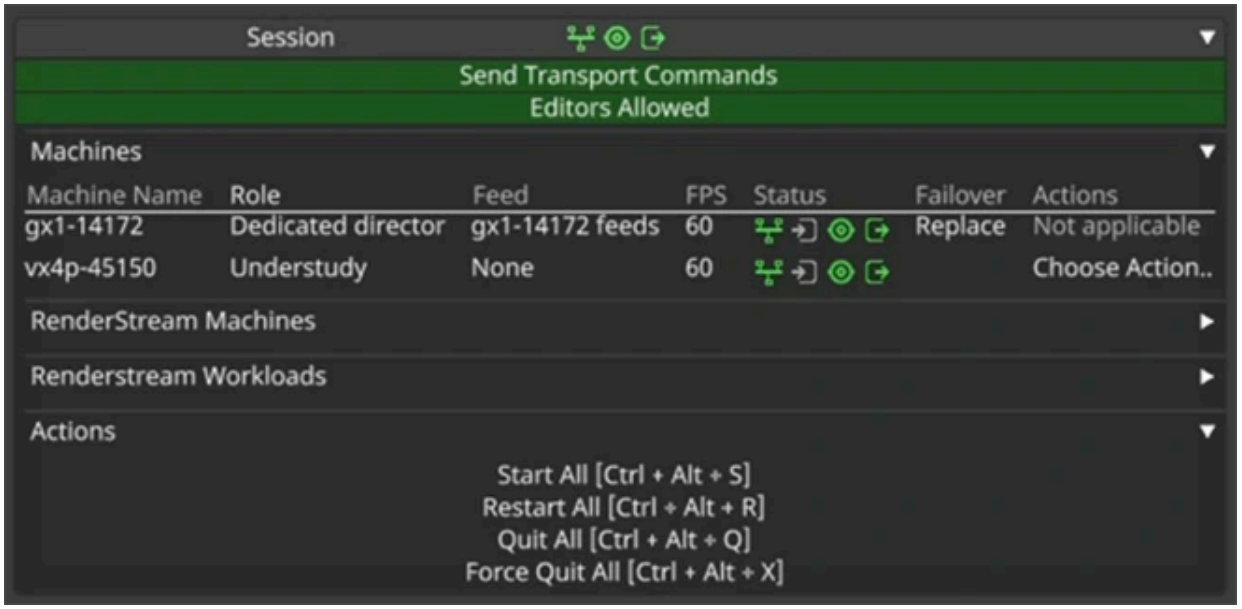
This improvement prevents an error message outlining that access to the GPU device was lost on the actor machine when many high-resolution Notch LC video layers are used.

- **DSOF-25479** - Export profiles of GPU memory allocation

We have added profileGPUPoolFromLaunch as an option switch to enable users to trigger the creation of a memory profile so that they can understand the behaviour of a GPU pool for debugging purposes. This is exported as a .json file to a project folder called 'output'.

- **DSOF-27549** - On Understudy machines, don't set output status to orange in the network status widget if the GUI is on

In r27.5.1 we introduced DSOF-26887, which added GUI status to the 'Output' indicator on the Network Status Widget. The GUI icon follows the same convention as the other icons, namely if the GUI is on a Disguise media server running in session that the icon will be green. If it is off then the icon will be grey. The icon became orange if the GUI was on the understudy machines running in session. In r27.8 we have changed the icon to become green if the GUI was on the understudy machines running in session as seen in the screenshot below:



Fixes

- **DSOF-19231** - Fixed an issue where the debug console jittered when Video Prefetcher Report is visible during video playback, and the widget could not be resized
- **DSOF-24304** Fixed a BSOD when Scrubbing Timeline
- **DSOF-24583** - Fixed new textures pool not responding to scrubbing
- **DSOF-24584** - Fixed scrubbing detection failing during lengthy system hangs or in low frame rate scenarios
- **DSOF-24608** - Fixed console logging omitting timestamp on some lines
- **DSOF-24662** - Fixed an issue where the prefetcher created many unnecessary prefetch jobs while scrubbing
- **DSOF-25240** - Lowered the GPU usage of Discovery ndirelay instance

- **DSOF-25395** - Fixed an issue where overly active 'Strict mode' caused prefetch to miss and exhibit many errors
- **DSOF-25712** - Requests in freelist no longer appear in the debug widget
- **DSOF-25718** - Fixed an issue where VariableVideoModule held a reference to the last frame used even when not active
- **DSOF-27157** - Texture parameters no longer switch places when using multiple texture parameters
- **DSOF-27261** - Fixed an issue where CPU textures were constantly re-allocated while playing NotchLC blocks.
- **DSOF-25035** - Fixed an issue where the Shot Recorder with a note in parameter collection caused a problem on project restart
- **DSOF-25743** - Fixed an issue where EventTransportDmx did not highlight "Stop" in blue when it was selected, and Brightness was permanently highlighted when DMX is connected.
- **DSOF-27361** - Fixed an issue wherelLayers with missing media did not update the red highlight when the layer start is dragged earlier
- **DSOF-27468** - DMX SockPuppet: 'DmxPersonality' object is not callable when attempting to 'View Personality' in Patch Settings widget
- **DSOF-27518** - 'GroupLayer' object has no attribute 'controlPatch'
- **DSOF-27653** - Using UX fade with a UVLookup module results in an error and the playhead won't advance beyond the section break.

r27.7.4

Download r27.7.4

Release build: 190369
Released: July 9th 2024

Fixes

- DSOF-27746-Fixed a critical issue where Notch blocks were getting 'LOGIC ERROR' in r27.7.3

r27.7.2

Download r27.7.2

Release build: 190369
Released: June 26th 2024

Fixes

- DSOF-26647 - Fixed an issue where a duplicate process started when clicking on the start workload button from the timeline while the workload was already launching
- DSOF-26766 - Fixed an issue where timecode playmodes for layers were behaving inconsistently when playing to end of section with RenderStream
- DSOF-26953 - Fixed an Access Violation after closing the RenderStream widget
- DSOF-27243 - Fixed an issue where the debugLiveUpdate option switch was non-functional
- DSOF-27251 - Fixed an issue where Colour Calibration returned a black LUT and an .cube file with null values - DSOF-27363 - Fixed an issue where extending the start of a layer using ctrl+< with the end of the layer at the end of track resulted in track lengthening
- DSOF-27466 - OSC/HTTP SockPuppet: Fixed an issue where Designer threw an error when attempting to display an alert box after exporting personality
- DSOF-27472 - Fixed errors being raised when attempting to drag the heading in the RenderStream cluster workload window
- DSOF-27485 - Fixed an AccessViolation when patching RenderStream layer to sockpuppet
- DSOF-27498/DSOF-27500 - Fixed an issue where slideshows did not load
- DSOF-27523 - Fixed an Access Violation on startup relating to QuickProfiler
- DSOF-27271 Notch instances that get prefetched but never end up being played through don't return to Sleeping state

r27.7.1

Download r27.7.1

Release build: 189739
Released: June 20th 2024

Fixes

- DSOF-21378 - Render nodes marked as failed are now notified to prevent them contributing to network traffic
- DSOF-25240 - Discovery ndirelay instance now has a lower CPU usage
- DSOF-26705 - Fixed an issue where RenderStream Layers connected to sockpuppet may not have initialised personality types leading to Exceptions
- DSOF-26899 - Fixed an issue where the first command to an OSC Indirection did not change the resource
- DSOF-27329 - Fixed an issue where a capture group config can't be saved on bluefish card

r27.7 - Improvements & Fixes

Download r27.7

Release build: 189205
Released: June 12th 2024

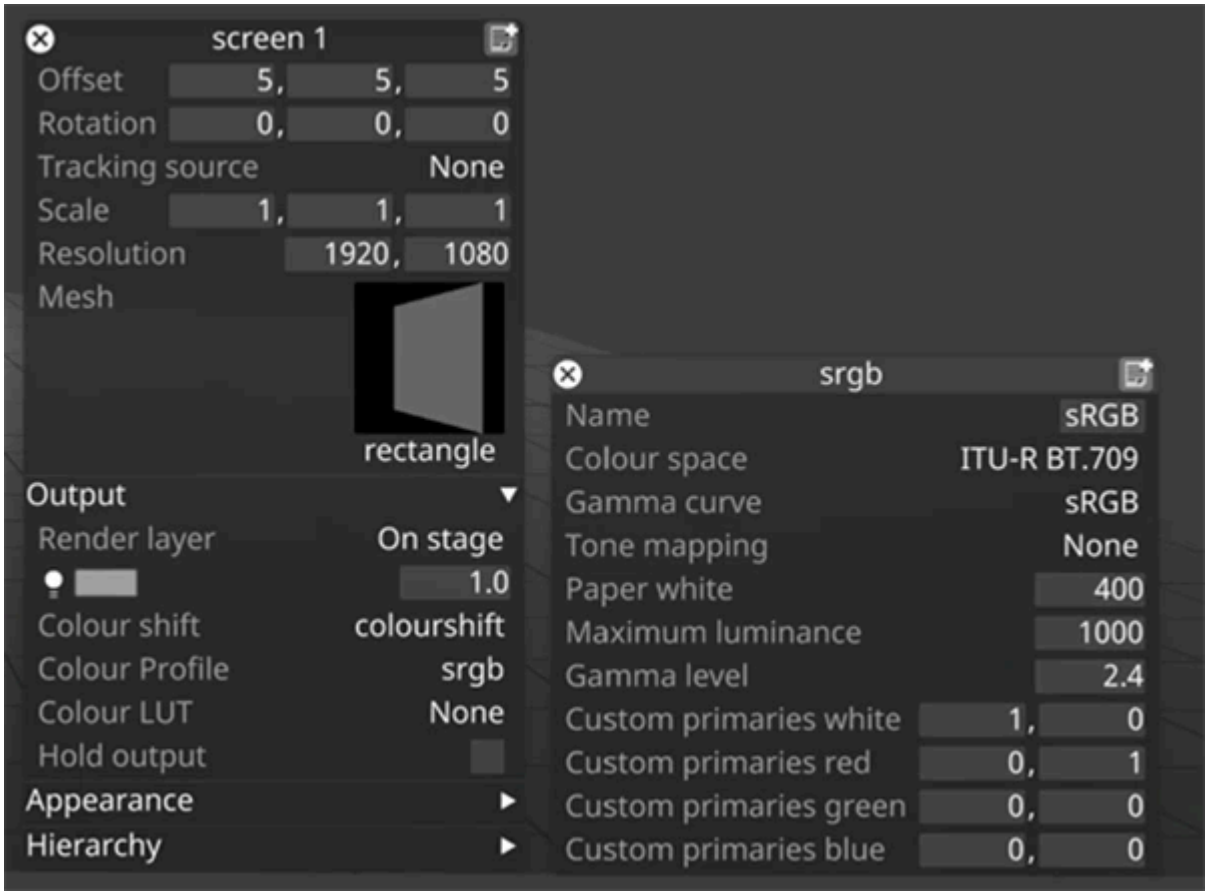
Improvements

- **DSOF-27010** - Add a link to learn.disguise.one in d3manager
- **DSOF-22053** - Upgrade to Vimba X SDK for OmniCal

For more information about Vimba X, please see our OmniCal Camera Setup page.

- **DSOF-25066** - Custom colour primaries in Gamma Space mode

We have added the option to add custom output colour primaries from Designer to enable high performance colour transforms for LED panels. This is available when Gamma Space mode is selected as the colour management mode in Project Settings. This can be found by right-clicking an LED Screen found in a project and right-clicking Colour Profile underneath the Output dropdown menu.



- **DSOF-25138** - Designer will now respect the clipping planes defined in notch blocks. Note: Notch blocks which do not define a clipping plane will have a default one set by Designer.

- **DSOF-25646** - OmniCal will check and notify the user if the wrong Vimba SDK is installed for use with the latest version of Designer.
- **DSOF-26353** - Implement colour management interface with Notch version 1.0

We now support colour management settings included in a Notch block exported from version 1.0 or later to a Notch layer in Designer.

- **DSOF-26356** - Raise warning about Notch version 1.0 compatibility on unsupported servers.

Notch Blocks that have been exported in version 1.0 or later have a number of requirements in order to run on a Disguise media server:

Windows OS: must be Windows 10 1607 or higher

GPU: support for Nvidia GPUs only (Maxwell Architecture or later)

Notch Blocks that are exported in version 1.1 or later will have the following requirements in order to run on a Disguise media server:

Windows OS: must be Windows 10 1607 or higher

GPU: support for Nvidia GPUs only (Turing Architecture or later)

We have created a notification in Designer to warn a user that attempts to run a Notch block that has been exported in version 1.0 or later on a Disguise media server that is not supported.

A compatibility table can be found here

More information about Notch layers can be found here.

- **DSOF-26694** - Upgrade nsis to 3.10
- **DSOF-27009** - Prewarm notch instances

We have reduced the load time when a user adds a Notch layer to a project for the first time, or starts a project with a Notch layer already assigned to a track. We have enabled this as default behaviour.

- **DSOF-27056** - Add support for double to rational conversion
- **DSOF-27095** - Update to latest FastBuild version v1.13
- **DSOF-27152** - Update NDI® SDK to NDI® 6

We have updated the NDI® SDK to support NDI® 6.0. This includes improvements to the 16-bit colour formats that are supported (P216/PA16) and a new specification for NDI® HDR metadata. More information on NDI® 6.0 can be found in their release notes here (link). It is important to note that NDI® 5.0 video inputs continue to work as expected.

- **DSOF-27247** - Add pagination for Porta and the media API
- **DSOF-27306** - Include AudioFiles in the media/get api

Fixes

- **DSOF-24822** - Fixed an issue where VideoAsset SLC Region Regex checked full path instead of just the filename, causing a blue screen of death
- **DSOF-25043** - Fixed an issue where VimbaCamServer used the incorrect ID for non-GigEVision cameras
- **DSOF-25481**- Fixed an issue where “display as” was broken for all unit types
- **DSOF-25571**- Fixed an issue where a ‘NoneType’ object had no attribute ‘positionNear’ when clicking on MIDI Personality names in Event Transport MIDI Note
- **DSOF-26367** - Fixed an issue where Notch pass-through blocks gave a black texture when transforming with Gamma2.2 curve
- **DSOF-26589** - Fixed an issue where there was no anti-aliasing on a set extension when feather is under 10
- **DSOF-26595** - Designer now proiles automatically when performance is low
- **DSOF-26633** - Improve Actor performance drops when running RenderStream
- **DSOF-26648**- Fixed an issue where RenderStream error notifications caused network spam
- **DSOF-26650** - Fixed an issue where bringing the brightness up on Renderstream layers caused unsynchronised pop-in across Actors
- **DSOF-26897** - Fixed and issue where d3killer failed to kill nginx
- **DSOF-27006** - Fixed an Access Violation in QuickProiler subsystem when shutting down Designer
- **DSOF-27034** - Fixed an issue where setting centre shift turned overscan red with zero distortion
- **DSOF-27047** - Standardised HTTP sockpuppet API endpoints are in /experimental/ namespaces
- **DSOF-27064** - Fixed an issue where Protoc router plugin was not generated at build time
- **DSOF-27131** - Fixed an issue where removing all keyframes on a RenderStream custom event displayed a long value number
- **DSOF-27153** - Fixed an issue where corrupt stage objects causes visualiser to fail to render anything
- **DSOF-27244** - Fixed an issue where Undo / Redo of measurements resulted in NULL objects and drop to 2 FPS
- **DSOF-27245** - API: Fixed an issue where a session did not return director status when in solo mode
- **DSOF-27269** - Fixed an Async error notification not registering due to uninitialised pointer
- **DSOF-27309** - Fixed an issue where Designer failed to load images in VideoFile folder with incorrect file extension
- **DSOF-27338** - Fixed an issue where sorting scenes in the unreal project schema broke applications that rely on index
- **DSOF-27370** - Fixed Unreal RenderStream failover in UE5.3/UE5.4

r27.6.3

Download r27.6.3

Release build: 188543
Released: June 5th 2024

Fixes

- DSOF-24431 - Fixed an issue where LUT files created textures directly rather than through the GpuPool
- DSOF-24747 - Textures allocate less memory
- DSOF-24909 - Fixed an error message when patching strobe/radar layer to Sockpuppet
- DSOF-25308 - Designer no longer tries to reload unsupported audio files
- DSOF-25449 - Fixed an “Error 500” loading consoles or projects URLs
- DSOF-26833 - Fixed an issue where RenderStream custom event keyframes did not trigger on f irst frame when running timeline on loop
- DSOF-26994 - Fixed an OmniCal Crash
- DSOF-27040 - Reverts DSOF-26131, which was introduced in r27.4. The change caused playback modes in a Sockpuppet video layer to behave incorrectly. As a result of the revert, DMXsockpuppet triggers will no longer be in sync between machines, however, sockpuppet inframe/outframe will once again work as intended.
- DSOF-27237 - Fixed an issue where Actors failed to load MeshDeform deformed mesh
- DSOF-27310 - Fixed an issue where Natnet driver editor failed to populate with ‘onClose’ error

r27.6.2

Download r27.6.2

Release build: 188006
Released: May 29th 2024

Improvements

- DSOF-26045API: session/status/health does not return statuses from solo mode machines

We have enabled the Designer APIs to return status information when the machine(s) that has been queried is running in solo mode.

- DSOF-26527 - Update test cards with new logo

We have updated both the colour and test patterns included as part of the Designer installer and made available in both 16:9 and 4:3 versions. We have added the following:

- Full or limited colour test pattern -

- Chroma subsampling test pattern to prove 4:2:2 or 4:2:0
- Updated Disguise branding
- DSOF-27199 - API: session/gototag returns 200 even when tag isn't found

In previous releases, the session/gototag endpoint returned a 200 OK HTTP status code even if a transport tag was not found. This has been resolved by returning a 400 bad request status code instead.

Fixes

- DSOF-26587-Fixed an issue where video receive delay would drift during time in a Matrox server with OS24Q1 in r27.0
- DSOF-26898-Fixed an m_file->codec error when ingesting content
- DSOF-27051-Fixed an issue where Matrox Videoin Hardware Identifiers got card-swapped
- DSOF-27124-Fixed an issue where DSE mask could be not updated properly on Animate Objects
- DSOF-27139"Adding machine media" console logging is now less verbose
- DSOF-27206-Fixed an error where mesh deform gives out of bounds error when deformed mesh already exists
- DSOF-27219-Fixed acrash to desktop on shutdown, if shutdown was triggered during startup
- DSOF-27225-Autosave: Fixed an issue where only the current selected Transport Manager was considered when checking if we're currently in show
- DSOF-27226-Fixed an issue where mesh deform applied maxDistance in local rather than global screen scale
- DSOF-27230-Fixed an issue where the ProxyMaker did not unsubscribe removeResourceAction

r27.6.1

Download r27.6.1

Release build: 187488
Released: May 22nd 2024

Improvements

- DSOF-26801P - Promote propSelectionPriority == 10 as default behaviour

Selection of objects in the Designer visualiser is prioritised based on the type of object. For example, if a camera is behind a projector, the camera will be selected even if the projector is visually in front. In previous releases, the Prop object had the lowest selection priority of all object types. This could be changed with the option switch propSelectionPriority. In this release, the default selection priority of Props has been changed so it is the same priority as a

projector, puck, skeleton and 2.5D asset. It is still possible to use the option switch to change this, whereby setting propSelectionPriority to 0 is the lowest priority and 25 is the highest priority.

- DSOF-27059 - Add async error notification to Matrox API Async notifications from Matrox are now logged to the console which helps debug any problems with the Matrox card or driver.

Fixes

- DSOF-26510 - Fixed an issue where it was not possible to duplicate a 2.5D asset
- DSOF-26878 - Fixed an issue where the MessageBox popped up under Designer, causing the system to appear as though it were hanging
- DSOF-26993 - Change of “RenderStream Projects Folder” registry key caused the RenderStream workload to use an incorrect nDisplay file
- DSOF-27088 - Fixed an issue where the Video Asset Editor went out of alignment when version strings were different lengths

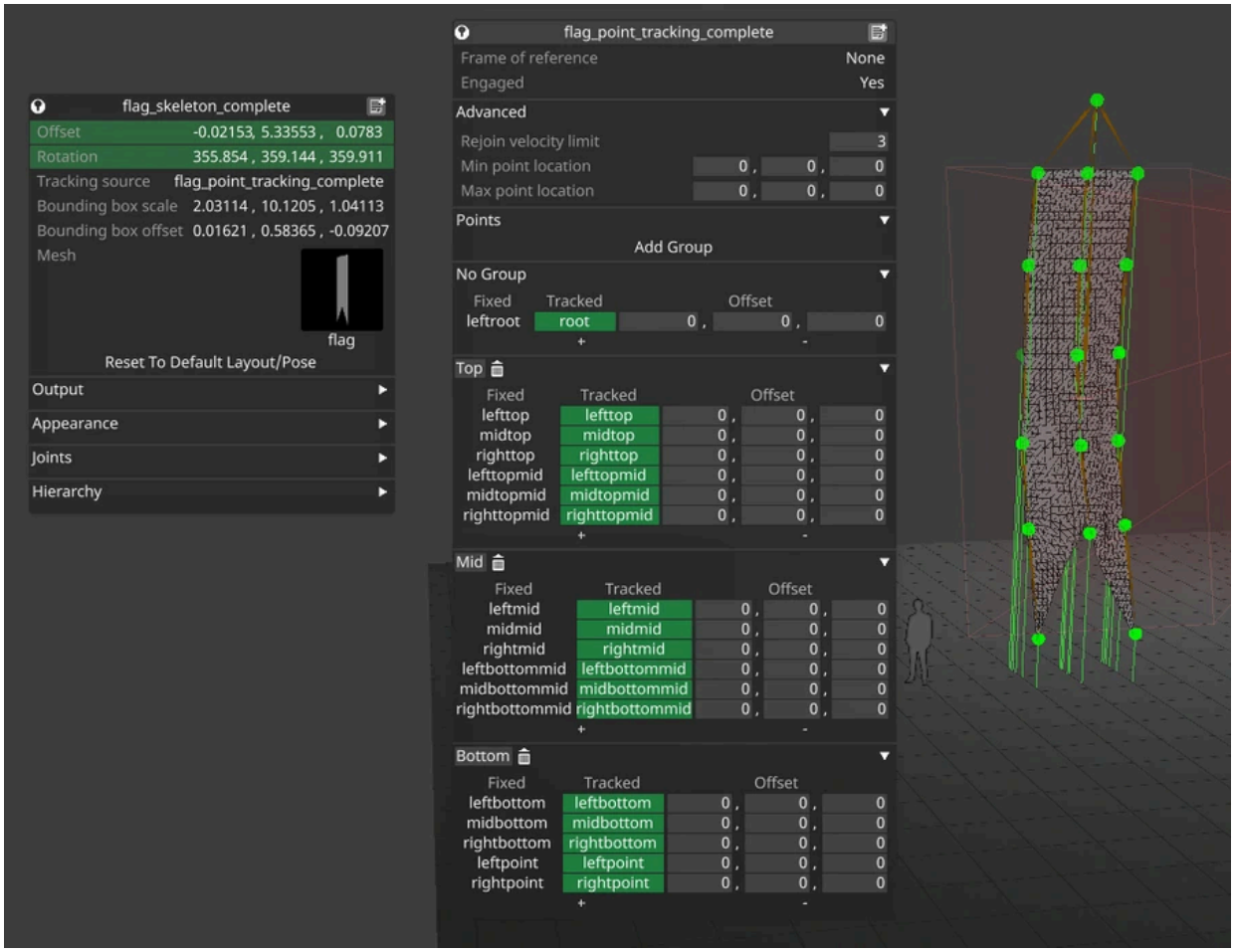
r27.6 - New Features, Improvements, & Fixes

Download r27.6

Release build: 187180
Released: May 16th 2024

New Features

Skinned Mesh Workflows



Summary

The skinned mesh workflow allows a rigged mesh to be selected in a Skeleton, so that the mesh can be deformed based on the positions of the skeleton's bones. This can be used to represent deforming surfaces, so that they can be used across other standard workflows within Disguise.

In this release the two main features are:

- Skinned mesh support for Skeletons
- A new SkeletalPointTrackingSource for controlling skeleton bones based on tracked points

Taken together, these features allow us to deform a mesh based on tracked marker positions from a system such as Blacktrax or Optitrack.

Workflow

Creating and editing a new skeleton

1. In the stage editor, under **Skeletons**, click the **+** button to add a new skeleton with a default bone structure.

2. Use the Mesh field to select an FBX rigged mesh for the skeleton. In this example, a flag mesh has been used.
3. In the Appearance separator options can be set to control the rendering of the skeleton in the visualiser, for example showing or hiding the bones and the mesh.
4. In Joints separator allow the skeleton to be posed manually by adjusting bone offsets and rotations.

Setting up a skinned mesh for a projection surface

1. Find or create an FBX file which contains a single rigged mesh and copy this into the project's **objects/Mesh** folder.
2. Create a new skeleton and select the FBX mesh in the skeleton's mesh field.
3. Create a new projection surface and select the mesh named after the skeleton (not the original FBX mesh).
4. Try moving the skeleton's bones using the manual posing controls in the skeleton editor. The mesh should deform in both the skeleton and the projection surface.
5. To align the projection surface exactly with the skeleton, add the projection surface as a child of the skeleton and set the surface's offset and rotation to zero.
6. If you want to hide the skeleton mesh, set the Display mode under Appearance to **Hidden**.

Controlling a skeleton using tracking data

To use tracking data to control a skeleton's bones, you will need to create a skeletal tracking source or driver.

Setting up a skeletal point tracking source to control a skeleton

1. Set up a suitable tracking system and driver to receive tracked points in Disguise.
2. Create a rigged mesh with joints at each tracked marker position, export as FBX and select in a skeleton.
3. Under Hierarchy in the skeleton, click **Create Reference Points** to create a reference point for each joint.
4. Create a new **SkeletalPointTrackingSource** and set it as the skeleton's tracking source.
5. In the tracking source editor, add points to link each tracked point to its corresponding reference point.
6. Points can be sorted into groups. If a point stops receiving tracking data, its position will be estimated based on a rigid body transform from other receiving points in the same groups.
7. Each point can also have an offset applied relative to the fixed point and can have **Twist** ticked to calculate the twist of that joint based on the positions of points within the same group.
8. Adjust the **Rejoin velocity limit** to change the speed at which points catch up with the tracked position when tracking is received again after being lost.

To learn more about the Skinned Mesh Workflows see the Skeleton and Skeletal Point Track Source pages.

Skinned skeletal mesh support

- **DSOF-25206** - Add deformable mesh functionality to skeleton
- **DSOF-25221** - Ability to import skeleton rig from FBX file
- **DSOF-25307** - Make skeleton layout persistent
- **DSOF-25409** - Render mesh when it is selected in a Skeleton
- **DSOF-26074** - Add retargeting to control skeletal mesh with tracked skeleton data
- **DSOF-26599** - Instance skeleton-controlled deformable meshes so the same mesh can be used multiple times
- **DSOF-27004** - Expose skeleton joint pose manual controls to users

SkeletalPointTrackingSource for marker-based skeleton control

- **DSOF-25223** - Ability to add tracked points to Skeleton
- **DSOF-26734** - Add option to clear reference points in Skeleton
- **DSOF-25366** - Account for non-receiving tracked points in Skeleton control
- **DSOF-25407** - Automatically detect and control duplicate joints
- **DSOF-25484** - Skeleton tracking - avoid points jumping when they stop receiving
- **DSOF-25497** - Skeleton tracking - avoid points jumping when they start receiving again
- **DSOF-25498** - Skeleton tracking - calculate bone twist angle from rigid body group

Improvements

- **DSOF-24875** - Add API call to indicate GUI state/selected option
- **DSOF-25528** - Add API call to set GUI mode

The above two items are in a new API endpoint `/session/status/setguimode`

- **DSOF-25063** - Add API call to query timecode receive status of a transport

A new receivingTimecode field has been added to TransportIndo in the Session API.

- **DSOF-25088** - Add API endpoints to query QuickCal pixel error and overwrite manual calibration

Two new endpoints have been added:

- `quickcal/overwritemanualcalibration` which overwrites the manual calibration for the given projector

- `quickcal/projectorcalibration` which returns information about the projector config including the error values
- **DSOF-25222** - OmniCal - ability to mesh deform without adding verts

It is sometimes desirable to deform with OmniCal without adding extra vertices. This is now configurable in MeshDeform in the new Topology Behaviour setting. Selecting “Discard inserted vertices” will result in a deformed mesh without added complexity. The number of vertices and triangles before/after MeshDeform will remain the same.

- **DSOF-25351** - OmniCal: minor MeshDeform performance improvements

Performance of the OmniCal mesh deform feature has been improved.

- **DSOF-25367** - Add prediction to tracked points

A new section for Prediction has been added to the natnet driver. This can help to minimise lag. The new fields in the Prediction section are as follows:

- **Prediction time (sec)**: How much time to predict
- **Sample interval threshold (sec)**: This is the threshold of time intervals between samples to filter out noise. If the interval time between samples is bigger, detection will be ignored.
- **Sample size**: The number of samples to use for prediction. More samples will make prediction less prone to the noise.
- **Terms**: This is the term of curve that is used for curve fitting. The Value can be set to either 1 or 2.
- **DSOF-26057** - Add user facing option to render normals

Mesh normals can now be toggled on in the Designer visualiser. To turn on normals, go to **Stage -> Visualiser Camera -> Render settings -> Object visibility -> Mesh normals**. Normals will then be displayed for any mesh which is selected.

Fixes

- **DSOF-23836** - Fixed an issue where feeds dragged over a GUI could no longer be suppressed by Alt+G or Alt+F
- **DSOF-24884** - Fixed an issue where toggling the GUI with ALT+G persisted the state through a project restart
- **DSOF-25021** - Fixed an issue where NatNet driver could introduce subtle rotation errors in Rigid Bodies
- **DSOF-25331** - Fixed an issue where unlabelled markers in Motive created infinite unnamed TrackedPoints in Designer
- **DSOF-26190** - Fixed an issue where a dormant Sockpuppet Video Layer briefly became active when changing media slot
- **DSOF-26622** - Fixed FBX mesh collisions mesh being generated incorrectly
- **DSOF-26704** - Fixed FBX mesh thumbnail being empty

- **DSOF-26901** - Fixed an issue where Alt+G GUI Is Disabled splash was not always in bottom right of screen
- **DSOF-27011** - Offline editors no longer affect aggregate status in the session widget

For more information about new APIs, please visit the Developer Portal.

r27.5.1 - Changelog

Download r27.5.1

Release build: 187180
Released: May 14th 2024

Notice

> **Notice**
>
> The range finder option was toggled on by default when a user upgraded their project file to r27.5. In addition, an access violation was reported during the OmniCal calibration process which led to the project freezing. As a result, we removed r27.5 (build number 186871) from the website. These have now been resolved in r27.5.1, which is otherwise identical to r27.5.

Fixes

- **DSOF-27185** - Fixed an issue where the range finder option was toggled on by default when upgrading projects to r27.5
- **DSOF-27186** - Fixed a Renderer Access Violation during OmniCal calibration that locked up Designer

r27.5 - RX III Support

Build removed from the website - see r27.5.1 which also contains the following features and improvements.

Release build: 186871
Released: May 9th 2024

New Features

- Added support for RX III server type

We have added support for the RX III render node. Read more about the new RX III here

Improvements

DSOF-11797- Improve DMX screen position receiver to enable reception of other byte formatting

The DMX Screen Position Driver now has the option to specify the number of DMX channels to use per axis, allowing the use of 16-bit (2 channels) and 24-bit (3 channels), up to 64-bit (8 channels).

The following fields were added:

Number of Channels per Axis - number of 8-bit DMX channels per axis

Signed - signals whether the value is a signed integer. Toggle on for yes and toggle off for no. This allows the value to be negative

Little Endian - signals whether the value is in Little Endian (toggle on) or Big Endian (toggle off). This is the order the channels are used to create the value.

- **DSOF-25698** - Add a modifier to locking to director, which first jumps the director to the editor playhead before locking

When using an Editor that is running in session, users can now press **ALT + SHIFT** + click **'Lock to Director'** to jump the Director to the Editors' time location before locking.

- **DSOF-25854** - Add range finder option to camera visualiser

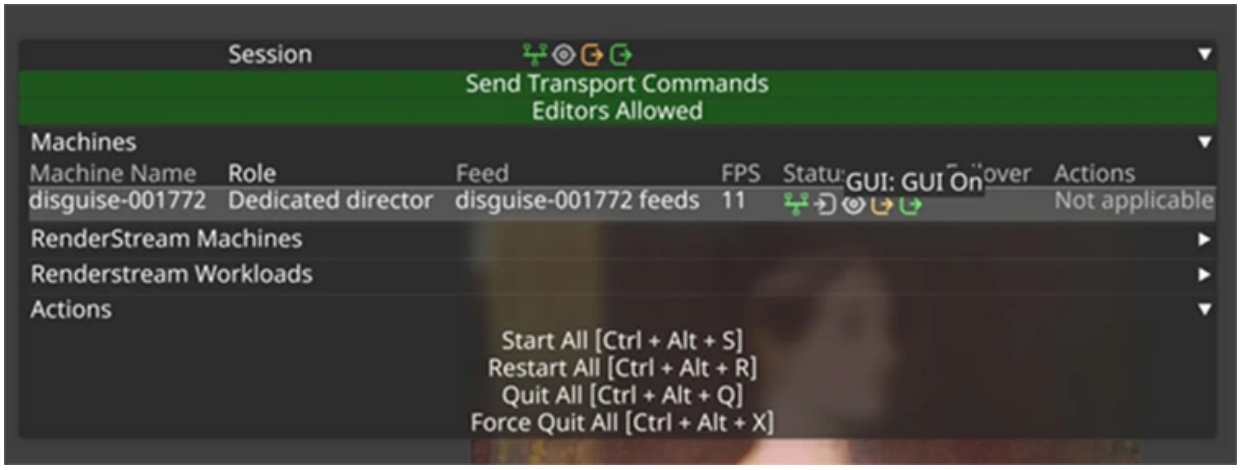
We have added a range finder option to the camera visualiser to enable users to know how far away from a screen when completing pixel pitch calculations. This can be turned on by right-clicking anywhere in the stage view, and then right-clicking the Render settings. The Range finder can be toggled on and off from this menu and will appear as an overlay in the stage view.

- **DSOF-26839** - Allow padding outside of RenderStream full-frame renders

When the Splitting Strategy is set to **'Full-Frame'** mode in the Cluster Assigner menu - found within the Config section the RenderStream layer - the Padding value is now applied to the outside of the full frame. This can also be used with Mesh and Direct Mappings if using the RenderStream layer.

- **DSOF-26887** - Remote GUI status and toggle for actors

We have added GUI status to the **'Output'** indicator on the Network Status Widget as seen in the screenshot below. The GUI icon follows the same convention as the other icons, namely if the GUI is on a Disguise media server running in session then the icon will be green. If it is off then the icon will be grey. A tooltip also states this information if the user hovers over the icon.



Network Status Widget

- **DSOF-26890** - Add hotkeys to next/last through the tracks in the setlist

We have introduced hotkeys to allow users to jump between tracks in the setlist. This can be completed by pressing **'PgDn'** to go to the next track in the setlist, and **'PgUp'** to go to the last track in the setlist.

Fixes

- **DSOF-25041** - Fixed an issue where the package destructor would try and compact the project file even when opened in write disabled mode
- **DSOF-26121** - Fixed an issue where media distribution failed because the incorrect path was used
- **DSOF-26871** - Remove VideoFile references (RPs) when a resource is removed

r27.4.3

Download r27.4.3

Release build: 186729
Released: May 8th 2024

Fixes

- DSOF-26229-Fixed an issue where levels were marked as invalid when using an actor as a controller
- DSOF-26291-Fixed an issue where 2.5d depth maps were unnecessarily included in the project diagnostic
- DSOF-26446-Fixed an error message "wasn't expecting a frame receipt for a never-subscribed stream" when stopping RenderStream compressed
- DSOF-26708-Fixed an issue where Dynamic Blend edge had jagged edge on dome with QuickCal

- DSOF-26793-Fixed an issue where feed warp ‘draw control points on output’ did not work in Custom mode - DSOF-26870-Machine List in Monitoring Manager is now sorted correctly
- DSOF-26874-Fixed an issue where a projector mask surface with population mask in Alpha blend mode renders incorrectly in Feed output
- DSOF-26911-Fixed an issue where Stage Movie recordings audio was 2 frames offset from video
- DSOF-26943-Fixedincorrect blend implementation for Projector Alpha Mask
- DSOF-26949-Fixed an Access Violation when receiving 16-channel ArtNet data

r27.4.2

Download r27.4.2

Release build: 186339
Released: May 2nd 2024

Improvements

- DSOF-26760-Receive health widget is now resizable
- DSOF-26933-Resized d3manager columns in the ‘Network’ tab

Fixes

- DSOF-25916-Fixed an issue where device recordings with multiple states played back packets out of order
- DSOF-26271-Fixed an issue where the d3 version of projects was not visible in in d3manager
- DSOF-26379-Fixed an issue where the frame counter incorrectly changed when jumping on from a section using a direct map to one using a precomp
- DSOF-26447-Fixed an issue where late joining Actors could be out of sync when in play to end of section mode - DSOF-26467-Fixed acrash to desktop when shutting down on Gx3
- DSOF-26840-Fixed an issue where RX nodes published a display adapter list every 10 seconds
- DSOF-26958-Fixed an issue where Frame Blend could become reversed when changing speed, causing jerky motion
- DSOF-26961-Fixed aRenderStream Uncompressed crash

r27.4.1

Download r27.4.1

Release build: 185492
Released: April 24th 2024

Improvements

- DSOF-26926-BlueFish card temperature is now logged on startup

Fixes

- DSOF-25176-Fixed an issue where the Videoin preview widget failed to open when using GUI fractional framerate - DSOF-26000-Fixed an issue where the input configuration menu caused the Videoin preview widget to crash while using GUI fractional framerate

r27.4 - Improvements & Fixes

Download r27.4

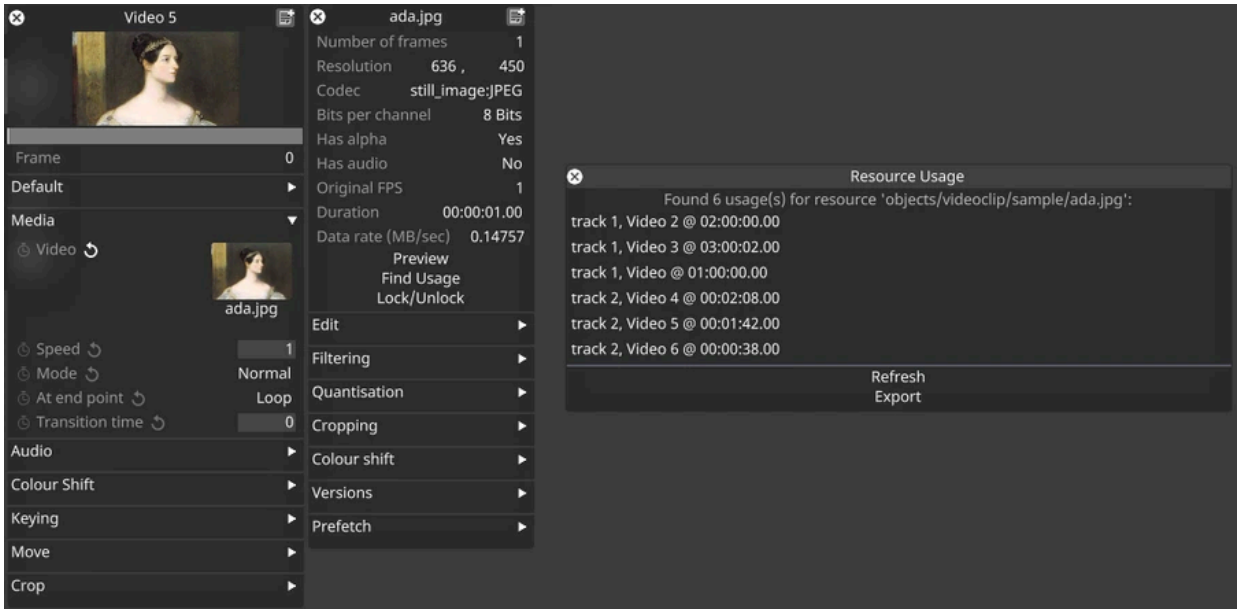
Release build: 185066
Released: April 10th 2024

Improvements

DSOF-17967 - Make “Find Usage” more useful (jump to usage etc).

We have improved the **Find Usage functionality** in the **VideoClip**, **DfxFile**, and **AudioTrack layer editors**.

This can be found by right-clicking on the respective pieces of media and left-clicking on the **Find Usage** button in the layer editor for **VideoClip**, **DfxFile** and **AutoTrack**. This will open a window with all occurrences of the current piece of media across all tracks and layers. An example can be found here:



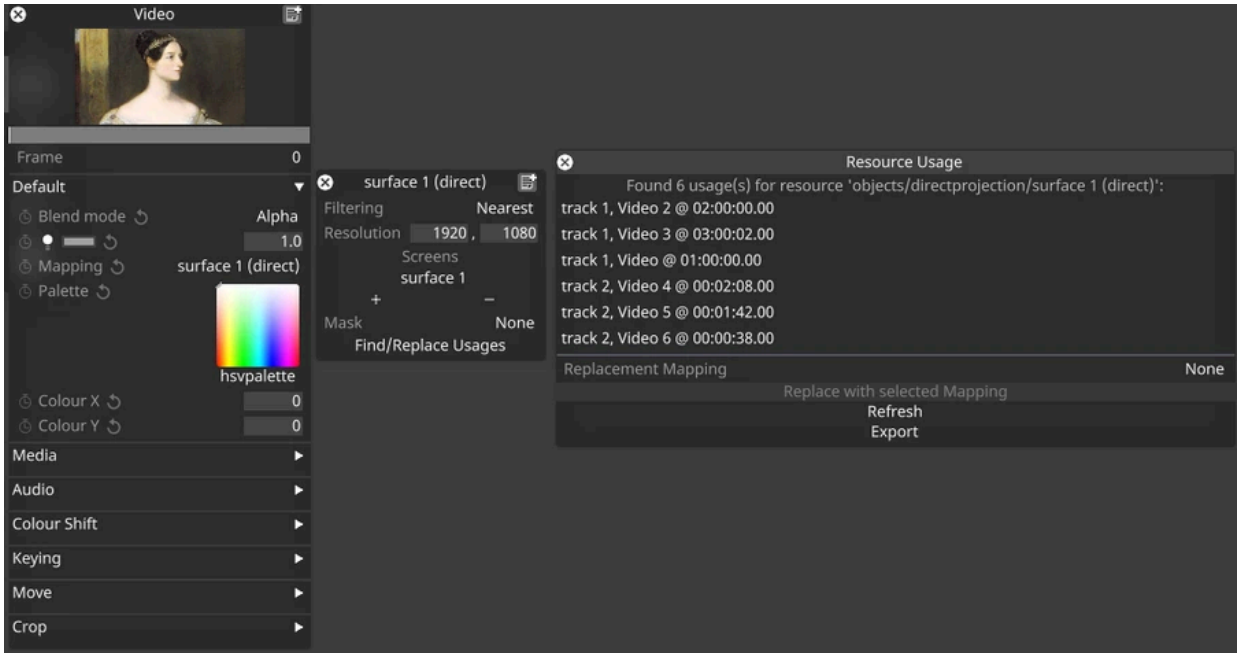
Each entry will contain the Track, Layer and usage location, shown as the timecode time from the timeline. A left-click on the entry will jump the playhead to the start of the layer that uses that piece of media.

All Find Usage information can now be exported as a **.txt** file.

The same functionality has been added to the **Find/Replace Usages** button in the Mapping editor,

which was introduced in r27.1 for sequenced mappings only. From r27.4, the window shown will display all occurrences of the mapping.

In the menu, to the side of **Replacement Mapping**, click **None** and select a different mapping. Then click **Replace with selected Mapping** to assign the new mapping as seen here:

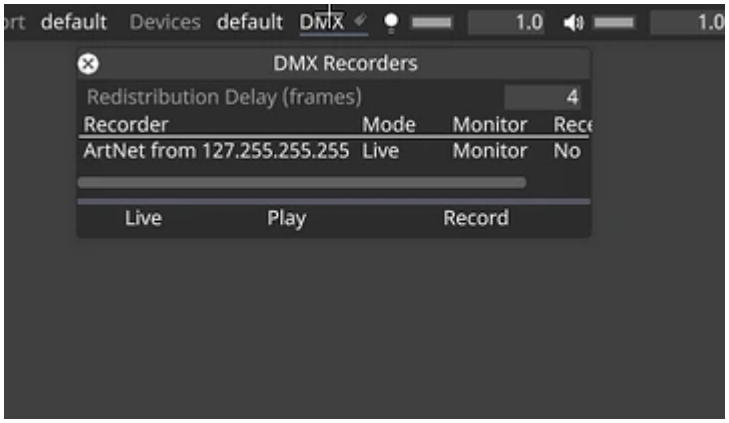


DSOF-22572 - Redistribute DMX and OSC data to allow for synchronisation

In previous releases, both DMX and OSC packets were received independently and actioned by each Disguise media server running in the session. We have changed this behaviour so that both DMX and OSC packets are now received by the Director machine running in the session and distributed to the actors. This means that all DMX and OSC packets are executed at the same timestamp.

This improvement allows for the DMX and OSC protocols to be used in situations which require operations to happen in synchronisation, such as triggering DMX or OSC changes on a screen split across multiple actors.

For example, if Disguise is receiving DMX or OSC packets, right-click DMX or OSC on the state tab at the top of the Designer GUI to open the DMX Recorders or OSC Recorders editor menu. This includes a **Redistribution Delay** field where the frame delay can be customised to enable the redistribution of the DMX or OSC packets to take place. A higher frame delay will compensate for a high-latency network as it allows more time for the DMX or OSC packets to get from the director machine to the actor machines.



Fixes

- **DSOF-24757** - Fixed an issue where focus distance showed negative values in the object tracking mode.
- **DSOF-15782** - Sockpuppet : Fixed an issue where sACN Sockpuppet playback could be out of sync
- **DSOF-23659** - Fixed an issue where the tracking axis filtered value of zoom and focus failed send to system
- **DSOF-24426** - Fixed an indefinite hang on mapping a bluefish input to video input
- **DSOF-26481** - Fixed an issue where OSC expressions did not re-evaluate after a project restart
- **DSOF-26520** - Fixed an issue where LocaleMetaData was missing from diagnostics, meaning events logs were not completely readable
- **DSOF-26773** - Fixed a DMX/OSC-related error when right-click on the Devices
- **DSOF-26775** - Fixed an issue where “redistributionDelay” field under the Devices was written in an incorrect style
- **DSOF-26819** - RMAXd3: logging now handles 3 error codes

r27.3.3

Download r27.3.3

Release build: 184464
Released: April 10th 2024

Fixes

- DSOF-25391-TheMIDIBeat Clock Timecode Transport, when set to Metronome mode, now holds at the end of a section when in Playing to End of Section playmode
- DSOF-26439-Fixed an Access Violation that sometimes occurred when starting a project with pre-configured video ins

- DSOF-26631-More than 8 RenderStream streams in Mesh Mapping no longer cause black outputs
- DSOF-26721-Fixed an issue where RenderStream duplicated one stream across outputs

r27.3.2

Download r27.3.2

Release build: 184112
Released: April 3rd 2024

Improvements

- DSOF-26759-Added the machine name to time readout in the Readout module
- DSOF-26760-TheRenderStream Receive health widget is now resizable
- DSOF-26674-Increase I/O limit for Designer licence to 6 GB/s

Fixes

- DSOF-26632-Fixed an issue where UV mappings were not applied accurately in Mesh Mapping mode
- DSOF-26677-Fixed an issue where arrowing a Blur layer into video layer degraded the quality of the arrowed media
- DSOF-26678-Fixed an issue where we, 'Timed out while transmitting Art-Net packet' when setting Tracking Recorders mode to Play
- DSOF-26737-Made Artnet packet sequence count per universe instead of globally
- DSOF-26756-Fixed an issue where Prop surfaces were masking surfaces behind them when in Add blend mode

r27.3.1 - Improvements & Fixes

Download r27.3.1

Release build: 183598
Released: March 27th 2024

Notice

> **Notice**
>
> The size of the Designer installer for r27.3 (build number 183205) and a number of custom branches exceeded the available RAM permitted as part of the reimaging process. This caused the reimaging process to stop and prevented the user from booting the Disguise media server into Windows.
>
> We removed r27.3 (build number 183205) from our website. This has now been resolved in r27.3.1, which is otherwise identical to r27.3.

New Features

DSOF-9390 - Lux Transparency Support

Non-opaque blend is now supported in Lux mode.

DSOF-24027 - TCP Indirection Controller

There is now a TCP variant of the Indirection Controller, in addition to the existing variant which uses UDP. It works like a UDPIndirectionController with a key value pair list and when the user sends a TCP message with a new key it causes the indirection to switch.

DSOF-24933 - HTTP Sockpuppet

In addition to control via OSC, Sockpuppet now supports control via the HTTP protocol. This makes Sockpuppet more easily controllable by web-based control interfaces and other networked components that utilize HTTP protocols.

The sockpuppet commands are sent to the director, from which the animation values are applied in sync across all machines in the session.

Patching a layer

1. Create a layer in Designer that you wish to patch.
2. Right-click on the layer and select **Patch to HTTP**.

API Overview

HTTP sockpuppet exposes the following HTTP API endpoints, currently under the experimental namespace and not yet documented at **developer.disguise.one**. See **http://127.0.0.1/docs/experimental** for the Swagger documentation. Note that as these APIs are in the experimental namespace, they may be subject to change before promotion to the non-experimental namespace.

API Usage Workflow

Expected usage of APIs are as follows:

1. Call `sockpuppet/easingfunctions` to get list of possible easing functions.
2. Call `sockpuppet/patches` to get list of possible patches.
3. Using data from `sockpuppet/patches`, use `/sockpuppet/live` to make changes to the patch, and therefore the layer. Send to the director only, or use for controlling understudy.

Live changes sent to the director will be played back in sync across the session with a 2 frame delay.

Improvements

DSOF-4156 - Shortcut to Expand all/Collapse all groups

The following keyboard shortcuts expand and collapse all groups:

- **Ctrl Alt =** (expand)
- **Ctrl Alt -** (collapse)

In addition, there is a new Collapse All Groups button in the right-click menu of the track which collapses all supergroups and smart groups.

DSOF-19079 - Make strobe layer less intense when created

When a strobe layer is created the rate is now 1hz by default.

DSOF-23033 - Sequencing: Add hot key for layer ‘fit to contents’

When a layer is selected using the key bind ‘CTRL + SHIFT + F’ it will fit layer to contents

The key bind is noted in the ‘F1’ Shortcut menu.

DSOF-23439 - FolderWatcher abort logs are unclear (e.g. if d3service fails to clean up)

DSOF-25049 - Add text to manual observation alignment widget explaining initial alignment

We have added text in the Manual Observation widget that explains to users that if a wireframe is not visible, then the user should increase the Stage Render Opacity and adjust the Solved Position and Rotation until the alignment objects are in view.

DSOF-25224 - DSE accounting for surface normal relative to projector

We have added functionality to the Dynamic Blend workflow which accounts for the surface normal relative to the projector. When users edit the ‘Cutoff angle’ in the Dynamic Blend section of each projector and the relative angle of the projector and the surface normal exceeds this value, then we remove the contribution of that projector and use projectors with a better view instead.

DSOF-25614 - DSE: promote “dynamicSoftEdgeFullRes” to user-editable per-projector option

The option switch dynamicSoftEdgeFullRes has been promoted to a user-editable per-projector option.

This enables the soft edge resolution to vary per projector rather than set across the whole project. In the projector settings, the “Dynamic Blend” section has a “Resolution factor” field 1/16, 1/8, 1/4, 1/2 and Full. 1/16 is the default for best performance. The “Resolution factor” changes DSE resolution,affecting blend quality (it is visible).

DSOF-25623 - DSE: re-organise Dynamic Blend section to hide less-used settings

The Projector Dynamic Blend section now has an Advanced Blend Setting sub-section with less frequently used options, to save on screen real estate.

DSOF-25657 - Make crash reporting disabled by default

Crash dumps are created when an unhandled exception occurs. This incurs a brief stall while the dump is generated. This behaviour is now opt-in and disabled by default. It can be enabled by one of the following two methods:

- Option in Designer. d3 > Advanced > Enable Crash Reporting > On / Off

When On, it generates a dump file on the local machine when an Access Violation thrown.

When Off, it doesn’t generate a dump file on the local machine when an Access Violation thrown.

- Advanced Project Setting > Option Switch: `enableCrashReporting` is Project Wide and depending which machine has the Access Violation thrown, it will generate a dump file on that specific machine.

DSOF-25922 - Keyboard modifiers for fine and coarse control of feed warp points

When on a KVM or on a laptop trackpad it tends to be easier to use a keyboard than use the cursor.

Using the keyboard means the points move really slowly though. Adding modifiers means easier control of points without the movement being forced to be one slow speed. The following modifiers have been added:

- Holding Ctrl while moving feed warp points with arrow keys causes them to move in smaller increments
- Holding Shift while moving feed warp points with arrow keys causes them to move in larger increments

DSOF-26395 Allow users to use field of view for XR calibration when focus encoder unreliable

If a tracking system is not sending a reliable focus encoder value, it can be preferable to disable it and use the field of view instead as a basis for XR calibration. Now, when the focus

encoder value in the camera tracking source is disabled, it will be overwritten by the horizontal field of view if the focal length value is enabled.

This value is shown as the zoom value when doing XR spatial calibrations, and is also used as the zoom encoder value when interpolating calibrated lens poses during operation

When overriding, the field in the tracking source is highlighted red, with the help text explaining why it is overridden. Similar highlighting and help text is also shown when the field is locked from the spatial calibration. All the equivalent of above is also true for focus encoder, overriding with focus distance where available.

Fixes

DSOF-7470 Removing resources doesn't work in session (previously Remove missing media on editor machines resets on reconnecting to session)

DSOF-8134 - Fixed an issue where population masks with alpha gradients were not respected in the Lux renderer

DSOF-23636 - Dynamic Soft Edge: Fixed an issue a banding effect on blended region when brightness changed

DSOF-23747 - fixed a CHECK_LOGIC error when launching RenderStream for mesh mapping with no screens

DSOF-23788 - Fixed an issue where mesh mapping frustum jitters when following a camera

DSOF-24891 - Fixed an issue where Tracking History would cast time to float and back, potentially causing minor issues for long running projects

DSOF-25012 - Fixed an issue where the installer had no 25G/100G rivermax licence files i offline

DSOF-25036 - Fixed an issue where mesh projection would give strange viewpoints when a camera is very close to screen

DSOF-25046 - Fixed an issue where graphics semaphores would not be released properly onNvidia machines.

DSOF-25101 - Fixed an issue where 'StageEditor' object had no attribute 'onResourceChanged' error when opening Stage Editor Menu.

DSOF-25157 - Fixed an issue where the QuickAlign/AR alignment tool would inaccurately select vertices

DSOF-25195 - ARRI Lds driver: removed "sensor height" field to avoid overwriting aspect ratio

DSOF-25358 - Fixed TrackedPoint labels being incorrectly offset

DSOF-25576 - Dynamic Soft Edge: Fixed an issue where a profile would not be created if the empty project was created after d3 version was updated

DSOF-25648 - Fixed an issue where OscDevice 'receiving' attribute did not match the true state

DSOF-25856 - Fixed GraphicsDebugger log missing newline

DSOF-25859 - QuickCal: Fixed an issue where rendering lineup was very slow for large meshes

DSOF-25871 - QuickCal: Fixed an issue where occlusion calculation for hidden markers was incorrect

DSOF-25878 -QuickCal: Fixed an issue where mouse-over help text was not shown for some settings

DSOF-25919 - d3service: Fixed an issue where getThisMachine() would mix up machine Range and Model in API v1 response

DSOF-25940 - Improved the resolution of the disguise logo in the installer

DSOF-26162 - Quest 3 headset now works properly with d3

DSOF-26199 - Improved performance of DMX screen

DSOF-26580 - Fixed a RenderStream workload crash on launch with Exception:ILLEGAL_INSTRUCTION

r27.3

Replaced by r27.3.1

r27.2 - Improvements & Fixes

Download r27.2

Release build: 182700
Released: March 13th 2024

Improvements

- Added support for VX 3 server type. Read more about the VX 3 media server here.
- **DSOF-26613** - "d3-events" EventLog now included in System Diagnostics.

Fixes

- **DSOF-24757** - Fixed an issue where focus distance showed negative values in the object tracking mode.
- **DSOF-26575** - Fixed an issue where 2.5D assets incorrectly said it was at zero dept.

r27.1.4

Download r27.1.4

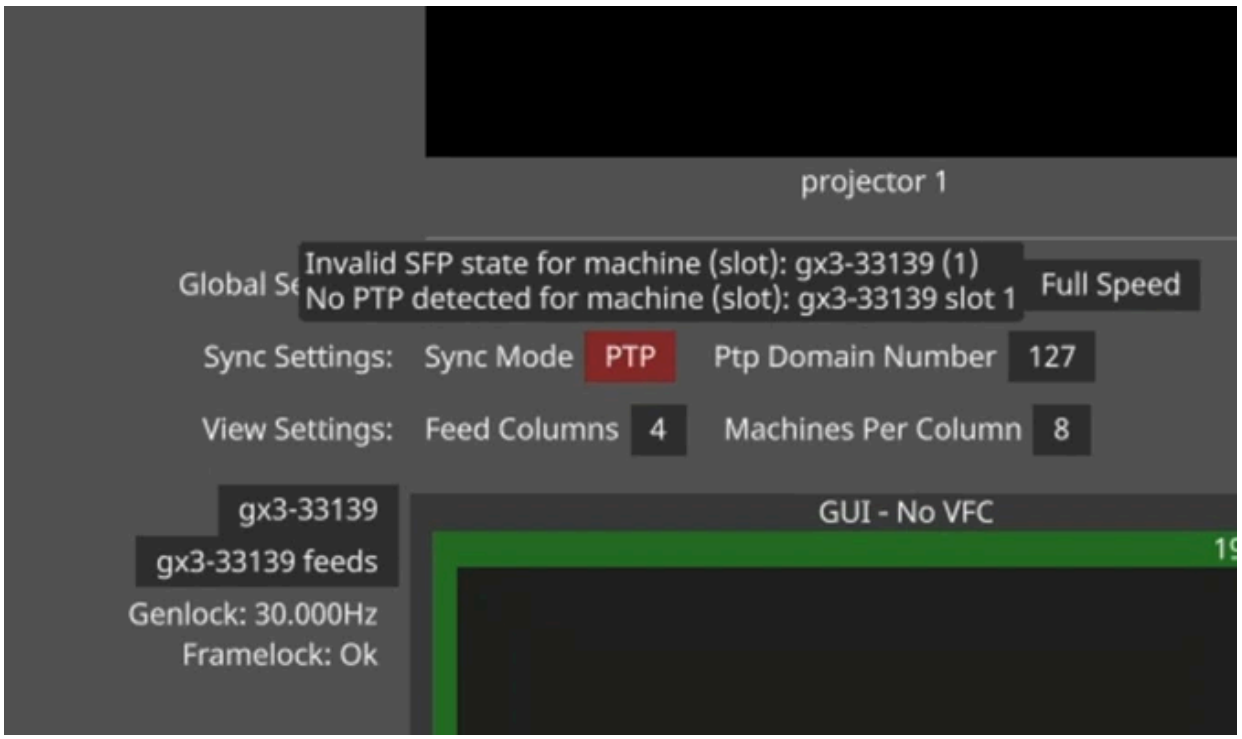
Release build: 181698
Released: March 7th 2024

Improvements

- DSOF-26470 - IP-VFC - inform a user when no SFPs are connected

When using an IP-VFC card, we have added error reporting into the feed scene in the form of a tooltip for the `Sync Mode` button.

When a user is using the PTP option in sync mode, if there is no compatible 25Gb SFP in Port 1 on the IP-VFC then the sync mode button will turn red and a message will state the Disguise media server and VFC slot number which has the invalid configuration as seen below:



When a user is using the EXT option in sync mode, if there is no compatible single or dual SDI SFP in

Ports 3 and/or 4 on the IP-VFC then the sync mode button will turn red and a message will state the Disguise media server and VFC slot number which has the invalid configuration.

- DSOF-26538 - IP-VFC - Change `PTP_LOCKED` mode name to `PTP_SYNC`

When using IP-VFC, we have changed the name of the PTP sync mode located under the Sync Info tab in the IP-VFC control widget from `PTP_LOCKED` to `PTP_SYNC`

- DSOF-26571TrackJump-increase maximum section number from 32 to 1000

r27.1.3

Download r27.1.3

Release build: 180975
Released: February 28th 2024

Improvements

- DSOF-26139 - Changed the wording of “Replace with another Mapping” button to “Replace with selected Mapping”, and a tooltip with further explanation has been added to video layers

Fixes

- DSOF-22638-Fixed a video memory leak when mapping/unmapping video inputs
- DSOF-24199-Fixed ahang that could occur on shutdown due to in-flight HTTP requests
- DSOF-24760-Fixed an issue where object tracking mode for camera focus distance did not account for object hierarchy
- DSOF-25317-Fixed occurrences of `toFree.addr4 != 0` error messages when using RenderStream
- DSOF-26140-Fixed an issue when key-framed, Mapping Replacement names only updated after refresh of layer
- DSOF-26168-Stage Render Layer- Fixed an issue where screens in ‘Frontplate’ layer mapped to the backplate showed up red
- DSOF-26339-Fixedanissue where Dynamic Soft Edge did not affect Actors in session
- DSOF-26361-Fixed an issue where the ‘Find/replace usages’ widget did not have a scrollbar when it extended offscreen
- DSOF-26377-Fixed ashader errors being thrown when using radial mapping
- DSOF-26410-Fixed an Access Violation using Blur layer

r27.1.2

Download r27.1.2

Release build: 180269
Released: February 21st 2024

Improvements

- DSOF-23937 - IP-VFC: Device names in NMOS are more descriptive

When using the IP-VFC in ST 2110 mode, we have changed the NMOS device label so that it clearly states the slot that it is occupying on the Disguise media server, for example 'Slot 1'. In previous releases, the NMOS device label of each IP-VFC would be 'Disguise Port 0'. Wehavealso changed the NMOS node label to be the user-defined name, which is often changed from the Windows name to match the role in which it occupies within the d3net session i.e. Actor01.

Fixes

- DSOF-25640 - Fixed an issue that occurred when as an Editor, you were not prompted to join a session when opening project file
- DSOF-26138-Fixed an issue where asset sync in RenderStream did not sync deleted files
- DSOF-26350-Fixed console spam caused by setting a placeholder clip on a videoin
- DSOF-26391-Fixed an issue where LayerStack was not being applied to video input

r27.1.1

Download r27.1.1

Release build: 179597
Released: February 14th 2024

Fixes

- DSOF-25853-Fixed an Access Violation that occurred after changing plates meshes within a 2.5d asset, and then undoing changes with CTRL + Z clicked quickly several times
- DSOF-25991-Fixed an issue where malformed PSN data when recorded could not be played back and caused other device recordings to fail
- DSOF-26094-Fixed an issue where RenderStream Compressed caused d3 framerate drops
- DSOF-26097-Fixed an issue where Device Recordings would intermittently appear empty if continuously receiving data and jumping through sections on the timeline
- DSOF-26157-Fixed an issue where the Editor moved forward in the timeline rather than following the Director's timeline after unlock and lock to Director

- DSOF-26185-Fixed issue where itu709 setting in gamma mode corrupted the display of certain files
- DSOF-26208-Fixed 2.5d assets included in project diag resulting in very large file sizes
- DSOF-26288-Fixed an issue where the DPX feed export yielded an unexpected colour space shift
- DSOF-26305-Fixed an OmniCal lenscalibrator crash on startup due to a DLL issue
- DSOF-26319-Fixed an issue where d3 could intermittently crash to desktop if a connection was lost while sending a failed HTTP Request

r27.1 - Improvements & Fixes

Download r27

Release build: 178972
Released: February 7th 2024

Improvements

- **DSOF-23762** Ability to see usages of mappings
- **DSOF-25935** Replace all usages of a mapping The above two improvements are accessible via the 'Find/Replace Mapping Usages' button in the Mapping editor.
- **DSOF-23946** Remove "CodeMeter USB Mode" check from installers
- **DSOF-24291** Show Designer software version in UI We have added the Designer software version in the bottom right of the UI next to the machine name.
- **DSOF-25256** Machine List in Monitoring Manager should be alphabetical We have made the Machine List alphabetical within the Monitoring Manager window, found by left-clicking on the FPS in the lower right hand corner of the track.
- **DSOF-25700** Warn the user when the audio codec in their embedded audio is not supported We have added a notification to warn the user that an unsupported audio codec is recognised when using embedded audio, and to convert the audio codec to either 'sowt' or 'twos'.
- **DSOF-25873** Define a certain degree of a cylinder mapping When using cylindrical mappings, we have added a red highlight to any areas that extend past the top and/or bottom of the cylindrical mapping wireframe.
- **DSOF-25936** Auto-select first enabled layer in feed warp editor In previous releases, when a user left-clicked the + button under Deformation layers - found within the Edit Warp Menu in the feed view - the first deformation layer was selected, even if the deformation layer had been disabled. In r27.1 the first deformation layer that is selected is the first one within the stack that is enabled.

- **DSOF-26029** OmniCal: export unstructured point clouds (without invalid points) We have enabled users to be able to export unstructured point clouds when using OmniCal. Structured point clouds directly correspond to the 2D grid output by projectors, and will include invalid points as NaN values. These values are usually those that were not visible to enough cameras or where 3D reconstruction failed. Unstructured point clouds provide no invalid points as NaN values within the export.

  This can be found in the Advanced section in OmniCal Calibration and clicking on 'Save PointCloud'. This will save four PCD files for each projector grid within the Optical Stage Plan folder:

  - Aligned and unaligned (as captured)
  - Structured and unstructured
- **DSOF-21670** DMX String: Now defaults to 1 fixture

  We have changed the default behaviour of new DmxStrings to one fixture.

Fixes

- **DSOF-24032** - Fixed an issue where an 'Indirections' object had no attribute 'role' - d3net Manager
- **DSOF-24561**- Fixed an issue when starting a RenderStream workload, RMAX receiver was being attached/detached several times
- **DSOF-25904** - Sockpuppet: Fixed an issue where moving the Frame Index value caused stuttering and jumping of playhead in Video Clip
- **DSOF-25950** - Asset preview for 2.5D beach asset no longer clashes
- **DSOF-25987**- Fixed an issue where adjusting prediction would break spatial mapping
- **DSOF-26146** - Added feedback when active latency automatic calculation is higher than the manually set active latency override
- **DSOF-26247** - Fixed an Access Violation when starting DSV video in preview
- **DSOF-26251** - Fixed an Access Violation opening Virtual Reality Navigator editor
- **DSOF-26290** - Fixed an issue where MAC addresses stored in NetworkAdapter were wrong
- **DSOF-26137** - Fixed an issue where UE would crash on launch when a single fragment was too large
- **DSOF-26250** - Fixed an Access Violation when using VR headset

r27 - Matrox SDI Improvements

Download r27

Release build: 178488
Released: January 31st 2024

Improvements

r27 introduces a number of improvements specific to Disguise media servers with a Matrox SDI capture card installed. These include:

- Mixed frame rate support - users can now work with any combination of video resolution formats and refresh rates across each video input. This resolves the outstanding **TA-19: Matrox Video capture cards** advisory.
- Ultra-low latency mode - we have reduced the video latency when running in ultra low-latency mode from 4 frames per second to 3 frames per second at 30Hz, 50Hz and 60Hz.
- General performance improvements.

These improvements are only available when running Designer software version r27 and above alongside the following OS builds - all of which are available to download on **disguise.download/#hardware** or **https://disguise.cloud/account/software/os-downloads**:

Disguise Media Server	OS
VX 1	vx1_vx2_24Q1
VX 2	vx1_vx2_24Q1
VX 4	vx4_24Q1
VX 4+	vx4+_24Q1
GX 3	gx3_24Q1

Fixes

- **DSOF-21761** - Support for mixed frame/ refresh rates which are not related
- **DSOF-24646** - Fixed an issue where 1080psf 29.97 VideoIn on a gx3 gave half quadrant artefacts
- **DSOF-24666** - Fixed an issue with interlacing modes other than discard did not work
- **DSOF-25337** - Fixed capture buffer delay sporadically being too large resulting in tearing
- **DSOF-25394** - Fixed interlaced capture on driver 10.4.101.1269 having fields in the wrong order
- **DSOF-25460** - Fixed an issue when using Quad coupled mode, losing inputs 2-4 would result in a black frame
- **DSOF-25465** - Fixed an issue where only the 12G-enabled ports hold onto the last frame if input was removed.

Designer r28 Release Notes

r28.1.1 - Fixes

Download r28.1.1

Release build: 196020
Released: September 4th 2024

Fixes

- **DSOF-27052** - Projects that specify extra dlls like d3labs.dll in their dlls.txt file will not longer fail to open if the dlls.txt file has mixed line endings.
- **DSOF-27831** - Layers with mappings that target no screens which apply affects to PreComp textures no correctly force the layers rendering the PreComps to become active.
- **DSOF-27839** - Video layers patched to Sockpuppet that have a live video input sequenced now correctly show the placeholder video clip (if one is selected for that video input) when the video input is disconnected. This matches the behaviour of normal video layers.
- **DSOF-27869** - Updated the test patterns that come with Designer in the following ways:
  - Fixed the 100% -> 0% greyscale to have correct colour values
  - Fixed the “Full Range” text to be the correct limited range colour values
  - Re-centred the content

r28.1 - QoL and Fixes

Download r28.1

Release build: 195634
Released: August 28th 2024

Improvements

- **DSOF-11562** & **DSOF-24738** mp4 video format files will now correctly be reported as unsupported when loaded, instead of reporting a cryptic error.
- **DSOF-17285** Include link to release notes webpage in help tab in d3manager
- **DSOF-24890** Performance improvement when modifying custom parameters for web layers

- **DSOF-27989** Shortcuts added to move selected layers/groups where the Playhead is
  - CTRL + [Extend/Trim the start of the selected layers to the playhead position
  - CTRL +] Extend/Trim the End of the selected layers to the playhead position
  - CTRL + ALT + [Move the start of the selected layers to the playhead position while maintaining the length of the layers
  - CTRL + ALT +] Move the end of the selected layers to the playhead position while maintaining the length of the layers
- **DSOF-28080** OSC SockPuppet: Sending an empty string will now assign `None` to a resource field
- **DSOF-27793** - Hierarchy->Add Child now allows you to select grandchildren objects. For example consider the following object hierarchy:

```
Stage → Screen 1 → Screen 2 → Screen 3
                            → Screen 4
```


Now when selecting children for Screen 1 you can select Screen 3 and Screen 4, whereas previously you could only do so if you removed Screen 2 as the parent of screens 3 and 4.

Fixes

- **DSOF-11057** - Fixed an issue where low resolution screens appeared blurry in the visualiser. (Does not affect video output)
- **DSOF-24353** & **DSOF-24890** - Fixed some performance issues in the web module
- **DSOF-26516** - The Format field of a video input will now always update to the correct format instantly upon assignment of a new capture source.
- **DSOF-26802** - Fixed an issue where Designer would sometimes not automatically create a share for the d3 projects folder if sharing settings had been manually edited.
- **DSOF-27748** & **DSOF-27814** - Layer editors for groups now properly close all related keyframe widgets when closing
- **DSOF-27972** - Mousing over the session icon in d3manager for a project will now correctly show the list of servers participating in that session again.
- **DSOF-28043** - Notch and Renderstream Notch layers can now have their custom parameters controlled correctly by HTTPSockpuppet.
- **DSOF-28045** - Renderstream layers can now have their scene field controlled correctly by HTTPSockpuppet.
- **DSOF-28072** - The warning about expiring Notch licenses has been reworded to not say the word “Warning” twice. (unlike this note, ironically)
- **DSOF-28081** - Designer will no longer intermittently fail to quit fully when using ProRes video content, causing remote start-up to fail.

- **DSOF-28136** - The UVLookup module will no longer sometimes show artifacts where there are large discontinuities in the UV lookup texture.

r28.0.1 - Fixes

Download r28.0.1

Release build: 195062
Released: August 21st 2024

Fixes

- **DSOF-20204** - Fixed an issue where VFC Firmware and Generation would not be visible for remote machines in the feed view
- **DSOF-27491** - Fixed an issue where the CameraControl layer did not send strings on playback
- **DSOF-27593** - Fixed an issue where the CameraControl layer could not send a Preset above 15
- **DSOF-27720** - Fixed an issue where BlackTrax with RTTrPM device did not snap points to tracked points correctly
- **DSOF-27767** - Fixed an Access Violation when using RigidBody tracking workflow
- **DSOF-27864** - Fixed an issue where adding a DMX screen with labels rendered to the stage would cause parallel and cylindrical mapping to no longer render their outlines
- **DSOF-28004** Fixed an Access Violation when viewing the Machine properties for any unconfigured/newly created Machine
- **DSOF-28025** - Fixed an issue where running an xR or VP project that was using an NDI® source caused the input to stutter once a RenderStream layer is started
- **DSOF-28039** - Fixed an issue where max() and min() expressions had the same behaviour
- **DSOF-28069** - Fixed an issue where Nginx couldn't start after installation if d3 nginx log folder is missing

r28 - EX 2, EX 2C, & EX 3+ support

Download r28

Release build: 194541
Released: August 14th 2024

New Features

- EX 2, EX 2C, and EX 3+ Product Support. (Read more about the EX Range here.

Improvements

- **DSOF-24180** - Added confirmation dialogue to global apply feed settings button
- **DSOF-26244** - Right-clicking on a projector from the projector list view now opens the projector editor. This now behaves the same as other right-click behaviour.
- **DSOF-26719** - When dropping frames, outputs between machines, and on the same machine will now re-synchronize faster. This also means the output will no longer stutter intermittently on VX 3 and VX 2+ machines.
- **DSOF-26937** - EX range: Outputs in the feed view are no longer labelled as “No VFC”
- **DSOF-27365** - Improved performance when using multiple HTTP Sockpuppet video layers
- **DSOF-27908** - OSC SockPuppet: Text fields now have examples in their personality viewer

Fixes

- **DSOF-24265** - Fixed an issue where multiple feed rectangles in the same output feed could misalign by 1 pixel in certain scenarios.
- **DSOF-25102** - Fixed an issue where LUTs applied to DMX Screens did not apply to DMX output.
- **DSOF-25165** - Fixed an issue where d3manager could sometimes report understudy machines are still in session after they were quit remotely from Designer.
- **DSOF-25217** - EX3/Solo: Fixed an issue where EDID emulation set to ‘always’ did not work unless displays were connected.
- **DSOF-26788** - Fixed an issue where projector config from projector list editor could not be changed
- **DSOF-27209** - Fixed an issue where FPS in the network status widget does not match FPS in the HUD
- **DSOF-27801** - Fixed an issue where Windows 11 reported as Windows 10 22631 in Disguise Manager

Designer r29 Release Notes

r29.3 - Designer Pro License Support

Download r29.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 220701
Released: July 2nd 2025

New Features

r29.3 brings support for Designer Pro licenses to r29. This will allow users to open r29.3 with either a Designer Legacy License or a Designer Pro License. For more information, see **legacy licenses**.

This allows projects that include Disguise Solo servers to use Editor machines with Designer Pro licenses.

Improvements

- **DSOF-29184** - There are now new `writeStageMovie()` and `writeFeedMovie()` endpoints in the Plugins API. You can learn more about our Developer APIs in the **Developer Portal**.
- **DSOF-28981** - In d3Net Manager “Pro” range servers have been renamed to “VX” range.
- **DSOF-23588** - d3Service will now automatically check CodeMeter WebDepot for updated licenses and will update them for you. This will mean that monthly and yearly Pro subscriptions, as well as updates to expiry dates on any legacy licenses, will be updated automatically on your machine without you needing to manually activate a new license each time it renews. License update checks happen every 12 hours, and only if Designer is not running.
- **DSOF-29305** & **DSOF-29372** & **DSOF-29423** - Improve performance of d3service when querying licenses (this should improve d3Manager startup time in most cases).
- **DSOF-30348** - Designer now has better debug logging to detect issues with bulk modifications of QuickCal Reference Points.
- **DSOF-29307** - System diagnostics now include a detailed summary of all CodeMeter Container details for easier troubleshooting.
- **DSOF-29300** - The term “d3” will now appear as “Designer” or “Disguise” in the EULA text.
- **DSOF-29862** - Solo range servers now correctly report that they are supported up to r29.3.

Fixes

- **DSOF-29660** - Designer will no longer fail to launch on RX range machines even when they have a valid Designer or Pro license.
- **DSOF-29315** - System Diagnostics now include more detailed licensing logs for faster diagnostics.
- **DSOF-4950** & **DSOF-29613** - Licenses will no longer be incorrectly reported as Perpetual in d3Manager in certain rare cases.
- **DSOF-30377** - Disguise servers equipped with Bluefish capture cards will no longer excessively log errors in rare scenarios when dropping frames.

r29.2.3 - Hotfix

Download r29.2.3

- **DSOF-28433** - Designer will no longer treat MTC as lost when running at lower than 55 FPS.

r29.2.2 - Hotfixes

Download r29.2.2

Release build: 200373
Released: October 30th 2024

- **DSOF-25006** - Shortcuts in the d3 project folder now show content in sub-folders.
- **DSOF-28214** - These objects are also correctly considered for missing media notifications and highlighting
- **DSOF-25713** - Designer no longer fails to process multiple Midi notes controlling an event transport if the notes are sent very close together.
- **DSOF-27426** - FBX skeletons with multiple root bones now load correctly. (A root bone is automatically added as the parent of all roots).
- **DSOF-28041** - The expressions “self.min” and “self.max” no return the min and max values of a Metafield correctly again.
- **DSOF-28208** - RenderStream: channel mappings list now automatically updates when adding and removing channel mappings.
- **DSOF-28224** - Controlling an Open Layer field by pick-whipping another field to make an expression will now work correctly again.
- **DSOF-28290** - In OCIO mode, arrowing a Layer into a LUT layer and then undoing the creation of the arrow will now correctly break the link and un-apply the LUT.
- **DSOF-28423** - OCIO options are no longer visible in the PreComp Texture Widget when in Normal Gamma Colour Space mode.
- **DSOF-28456** - Renderstream assets that are configured to have a custom gamma in ACES mode, and then are turned back to gamma mode will no longer spam the console.

- **DSOF-28460** - Editing multiple layers at once now correctly displays OCIO fields and the fields correctly affect the layers.
- **DSOF-28539** - Certain 2.5D assets when updated from r29.1.1 to r29.1.2 will no longer render in GUI colour space when it should be rendering in working space.
- **DSOF-28590** - Spatial mapping outlines now correctly turn invisible when their editors are closed.

r29.2.1 - Hotfixes

Download r29.2.1

Release build: 199832
Released: October 23rd 2024

- **DSOF-23165** - Texture Widget: Type filters are now always visible for all created texture types
- **DSOF-27913** - Non-functional Lock/Unlock Files button removed from **VideoClip** object
- **DSOF-28311** - The Test Pattern layer now renders consistently across colour management modes
- **DSOF-28323** - Tracking marker layer now displays the correct colours when using different OCIO input transforms.

r29.2 - OSC Output Expression, QoL

Download r29.2

Release build: 199175
Released: October 16th 2024

Improvements

- **DSOF-21329** - Support non-16:9 camera aspect ratios with “region of interest”
  - Video input configuration now supports the ability to crop the image with two new configuration fields:
  - **Crop size**: The crop rectangle size in pixels to apply to the incoming video. The applied crop will be centered on the frame e.g. a horizontal crop of 1600px on a 1920px original frame will remove 160px on the left-hand side and 160px on the right hand side.
  - **Crop offset**: The offset in pixels to apply to the crop rectangle. Offsetting the crop rectangle more than half the crop size in an axis will cause the crop rectangle to shrink in order to stay within the original frame. This functionality is useful for use cases such as when a camera produces non-16:9 output over SDI which is restricted to 16:9, resulting in black bars. The black bars can be cropped out with this feature. Productions using anamorphic lenses will also benefit from this feature. For more information about video in cropping, see setup-video-input.

- **DSOF-26311** - OSC output with customisation using Expressions
  - In addition to existing functionality to receive commands over OSC, Designer now supports outputting OSC for monitoring purposes with a flexible approach using Expressions. For detailed documentation on this feature, see OSC Monitoring and OSC Custom Monitoring.
- **DSOF-27760** - OSC Output Expressions: Ability to output via OSC what Timecode is coming into Disguise
  - Using the new OSC output expressions functionality described above, timecode coming into Designer can be outputted over OSC using the expression `transport.timecode.current.__str__()`
- **DSOF-24047** & **DSOF-27975** - It is now possible to resize the track widget horizontally instead of only vertically and there is a useful button for restoring the default size.
- **DSOF-27356** - The quit and quit-all confirmation pop-ups will now appear above splash messages to make closing Designer easier.
- **DSOF-28297** - The title of the Blend Profile graph has been renamed from “Blend Region Black Level” to “Dynamic Blend Region Black Level” so that it is more obvious that it is referring to the black of the blend zone, not to the projector black.

Fixes

- **DSOF-27813** - Sockpuppet protocol text no longer extends past the end of layers.
- **DSOF-28243** - DMX lights will no longer produce an “INTEGER_DIVIDE_BY_ZERO” exception when deleted from the stage.
- **DSOF-28399** - When double-clicking on a project file in D3Manager, the project name will no longer be editable by default.
- **DSOF-28412** - A sockpuppet layer controlled from Porta no longer displays a single frame at the default value before setting controlled parameters.
- **DSOF-28439** - The time synchronisation between multiple Designer machines will no longer break under specific network configurations involving multiple VPNs.
- **DSOF-27357** - Designer will no longer extend an inserted layer beyond the timeline end.
- **DSOF-28459** - The CDL setting in Video module now works correctly in OCIO.

r29.1.2 - Hotfix

Download r29.1.2

Release build: 198643
Released: October 9th 2024

- **DSOF-24905** - Setting the placeholder of a VideoIn to **None** will no longer retain the last placeholder image selected until a system reboot.
- **DSOF-27970** - HDMI VFC cards will no longer occasionally be detected as DP 1.2.

- **DSOF-28223** - Designer now displays a friendly warning instead of an Access Violation when arrowing from an Open Layer to a Metafield (min, max, step etc.).
- **DSOF-28237** - Zoom & Focus data is now correctly captured in the shot recorder again.
- **DSOF-28327** - Designer will no longer intermittently hang after boot or applying feed settings when in very noisy networks.
- **DSOF-28336** - Custom OCIO configs which do not define the built-in transform to be sRGB now display correctly in the visualiser.
- **DSOF-28372** - The SpinBitmap layer now correctly shows dynamic OCIO transform fields.
- **DSOF-28389** - Actor status icons now show tooltips again.
- **DSOF-28417** - Resolved an issue where d3 could crash to desktop during apply feeds or when in certain rare GPU states.
- **DSOF-28437** - Designer will no longer log lots of errors to the console when entering the feed scene while colour management is set to Gamma space.

r29.1.1 - Hotfix

Download r29.1.1

Release build: 198080
Released: October 2nd 2024

Fixes

- **DSOF-28283** - Transitioning between content targeting a Precomp Display using TrackFade transitions will now fade correctly. The content in the Precomp will not snap to black regardless of the TrackFade transition content.
- **DSOF-28295** - Designer now properly accepts variables in the `selected index` field of list indirection controllers.
- **DSOF-28338** - OCIO - Editing the dynamic properties of a video clip's or video module's OCIO colour space will no longer affect all video clips and modules that share that colour space.

r29.1 - OCIO

Download r29.1

Release build: 197552
Released: September 25th 2024

New Features

OCIO

OCIO is a widely adopted open-source colour management solution. For more details on OCIO, visit **https://opencolorio.org**. For details on how OCIO is implemented in Designer, see the detailed documentation here

Known issue: When using an identical colour space transform on multiple different resources (videos, textures, LEDScreen, etc.), changing the OCIO dynamic properties (exposure, contrast and gamma) on a resource will also affect all other resources which use the same colour space and transform. This issue will be resolved in a subsequent hotfix. For more information on OCIO dynamic properties, refer to the user guide link above.

Colour Inspector

The Colour Inspector is a new tool in Designer for inspecting the specific colour values of pixels within an image. It is useful for verifying content and colour workflows.

See the Disguise User Guide for detailed documentation on the Colour Inspector.

Improvements

- **DSOF-22938** - Make XR Color Calibration work with ACES/OCIO
  - Colour calibration for XR now supports ACES and OCIO modes.
- **DSOF-26828** - Notch colour management in OCIO
  - Using Notch with Designer now supports both ACES and OCIO modes.
- **DSOF-26830** - OCIO working space selection
  - In OCIO mode, the working colour space is configurable. See the user guide OCIO section for details on how to set the working colour space.
- **DSOF-26832** - Implement OCIO for RenderStream module
  - OCIO supports the RenderStream layer. Sharing OCIO information with content engines over RenderStream was out of scope for this improvement.
- **DSOF-26927** - Selectable default input and output transforms in OCIO config
  - In OCIO mode, default input and output transforms can be configured so they are automatically applied to media and output devices. See the user guide OCIO section for details on how to set the default input and output transforms.

- **DSOF-24246** - Ability to duplicate and rename projects from within d3Manager
  - Right-clicking on a project or project file within d3Manager now provides options to:
  - Duplicate project
  - Duplicate project file (option is disabled if right-clicking the project rather than the project file))
  - Delete project
  - Delete project file (option is disabled if right-clicking the project rather than the project file) Projects and project files can now also be renamed via d3Manager.
- **DSOF-28287** - Improve or explain the new VimbaX pop up in r29.0
  - The notification “Vimba X SDK/Driver not installed” now only appears when using the OmniCal workflow.

Fixes

- **DSOF-19120** - Logging now contains a full stack trace for certain error conditions
- **DSOF-23972** - Sockpuppet: Fixed an issue where exporting generic DMX personality for VIDEOTRIGGER produced divide by zero error
- **DSOF-28251** - Fixed an issue where selecting masks in feed rectangles made 1 pixel of gradient
- **DSOF-27635** - Content now looks correct in the visualiser in ACES mode
- **DSOF-28011** - The ACES transform box is now properly aligned with other fields
- **DSOF-28060** - Gamma space profile no longer applied to feed rects in the UI
- **DSOF-28227** - The tracking marker module is now properly applied the IDT of the palette

r29.0.1 - Hotfix

Download r29.0.1

Release build: 197126
Released: September 16th 2024

Fixes

- **DSOF-28225** - CTRL + SHIFT + D now correctly duplicates and renames layers again!
- **DSOF-28267** - Designer will no longer report an access violation on launch when certain rare configurations of history files exist on disk.
- **DSOF-28292** - The visualiser camera will no longer stop rendering when an LED screen is added to the stage and no default gamma space has been set.

r29 - IP-VFC Improvements

Download r29

Release build: 196648
Released: September 11th 2024

Improvements

We have made a number of significant improvements to the IP-VFC. Due to changes to the IP-VFC firmware, any user wishing to use the IP-VFC on a Designer project built-in software version r29.0 onwards must also update the IP-VFC firmware version to 23.0.7. The firmware version on an IP-VFC can be upgraded and downgraded, but must be used with a compatible Designer software version. Please refer to the following compatibility table in order to understand which IP-VFC firmware versions are compatible with which Designer software versions:

Designer version	IP-VFC firmware version
r23.3 to r28.1.1	1.0
r29.0+	23.0.7

All IP-VFCs being used in the session must be updated to run on the same firmware version. The IP-VFC firmware updater tool and a guide to updating the firmware can be found under the **VFC Firmware Update** tab here.

IP-VFC SDI mode changes

- **DSOF-22892** - You now no longer need to enable the `enableSDIIPVFC` option switch to use your IP-VFC with SDI SFPs
- **DSOF-23731** - The IP-VFC card's list of supported formats now correctly hides unsupported formats.
  - 720p and QUAD video output modes on the IP-VFC when running in SDI mode are greyed out by default as they are not currently fully supported. They can be enabled for testing via the `enableIPSDIExperimentalModes` option switch, however they are not fully supported and if you do plan to use them please reach out to **support** to discuss the limitations and risks.
- **DSOF-27405** - IP-VFC cards will now output an SDI video stream correctly if only a single SFP is attached to the 2nd output port.
- **DSOF-25602** - IP-VFC cards now no longer expose a **TPG** field when in SDI mode
  - In previous releases, when an IP-VFC was in SDI mode, there was a field in the output port properties called **TPG**, which stands for Test Pattern Generator. We have removed this field as the functionality is replicated by rendering a test pattern via a video layer.

- **DSOF-25603** - IP-VFC cards in SDI mode can no longer independently be set to “Frame Replay”.
  - In previous releases, when an IP-VFC was in SDI mode, there was a field in the output port properties called “Frame Replay”. We have removed this field as the functionality is replicated by the ‘Hold output’ function, which allows the user to freeze the output on one or a selection of screens.

IP-VFC ST 2110 mode changes

- **DSOF-26523** - You can now select your PTP profile on the IP-VFC from the Designer interface when in ST 2110 output mode.
  - The options we support are:
    - SMPTE2059-2015
    - SMPTE2059-2021
- **DSOF-26546** - You can now fully configure your IP-VFC card without requiring SFPs to be connected first.
- **DSOF-26999** - IP-VFC cards in an understudy machine will no longer take on the network port configuration of the IP-VFCs in the machine they are taking over from during failover.
- **DSOF-27487** - IP-VFC cards now Startup network interfaces on boot much more quickly.
- **DSOF-22772** - IP-VFC cards will no longer intermittently hang indefinitely when you modify their network configuration.
- **DSOF-23944** - Selecting PTP sync in the feed view will now automatically set all installed IP-VFCs in ST 2110 output mode to PTP sync mode (you can change them manually later, but this configuration is the most reliable for sync).
- **DSOF-26532** - The Genlock indicator in the feed view no longer intermittently reports that IP-VFC cards in ST 2110 output mode are PTP locked when they are not.
- **DSOF-26541** - Manual changes to the IP VFC cards network configuration are now correctly undoable.
- **DSOF-26542** - IP addresses in the IP-VFC editor will no longer react erratically to the scroll wheel.
- **DSOF-26543** - IP-VFC cards in ST 2110 mode will now correctly stay in EXT sync mode when it is set.
- **DSOF-23860** - The IP-VFC editor will now warn you if you enter an invalid multicast address.
- **DSOF-26700** - The IP-VFC editor will now highlight your network settings in red if the IP address supplied is not on the same subnet as your gateway.
- **DSOF-27392** - IP-VFC cards in ST 2110 mode will no longer intermittently fail to create a video stream.

IP-VFC General changes

- **DSOF-26574** - The IP-VFC will now display a grey-pink border in the feed view if it is non-responsive.

- **DSOF-24968** - d3service and Designer now log more verbosely about the state of IP-VFC when it's being configured to help us better diagnose problems in the field.
- **DSOF-26641** - Designer will no longer display an access violation when joining a session with an IP-VFC card and loading directly into the feed view.
- **DSOF-26651** - The IP-VFC GUI will now always update with the correct PTP clock ID after applying genlock or feed settings.
- **DSOF-26666** - Machines will no longer hang indefinitely when applying feed settings if the first IP-VFC card in the server cannot detect a genlock source.
- **DSOF-26679** - Designer will no longer intermittently display an access violation when inspecting a machine that has IP-VFC cards attached.
- **DSOF-26685** - Once configured, the IP-VFC will now wait less time to output a video stream.
- **DSOF-26803** - Designer will no longer display an access violation when opening the editor of a machine that had IP-VFC cards installed but is now offline.
- **DSOF-27404** - IP-VFC cards will no longer intermittently fail to initialize properly on machine boot.
- **DSOF-27424** - Genlocking a machine via the IP-VFC card is now much more reliable.
- **DSOF-28012** - EX range director machines will now correctly apply IP-VFC configuration to actor machines with IP-VFC cards connected.
- **DSOF-24289** - Servers with IP-VFC cards installed that are set to genlock in EXT sync mode now respond correctly to upstream genlock signal changes.
- **DSOF-24868** - You no longer need to apply feed settings on every system reboot to output from IP-VFC cards.

Other Improvements

We've been working on things other than the IP-VFC too.

- **DSOF-28200** - You can now specify a default gamma space colour transform for all new ingested media and all newly created displays.
  - In Project Settings under 'Colour Management' you will find two new entries when the mode is set to 'Gamma Space' which each accept a colour profile object:
    - 'Default ingest profile'
    - 'Default display profile'
- **DSOF-28053** - For DMX Screens you can now select the new GRBW Fixture type (one step closer to having all the permutations!)

Fixes

- **DSOF-20707** - Selecting a new feed scene for a machine will now correctly update the feed name displayed in the feed view.

- **DSOF-22779/22970** - Changing the split mode of a Quad-split capable VFC card from **Mirror** to **Quad** or **Quad 4K** will no longer randomly create or delete virtual heads erroneously.
- **DSOF-22969** - When changing the split mode of a VFC card it will no longer move the Matrix Routing settings of subsequent VFC cards onto their neighbors.
- **DSOF-23271** - Changing Quad-split to Mirror mode will no longer intermittently display an access violation in specific projects.
- **DSOF-24035/28127/26713** - We have made various improvements to tooltip behaviour in this release:
  - Tooltips will now be slower to display and display more consistently across the UI.
  - We have improved a range of tooltips to make them more explanatory and helpful.
  - Tooltips for broken expressions now better explain what's wrong and how to fix it.
- **DSOF-25733** - All OSC Event Transport messages now correctly highlight in blue when triggered.
- **DSOF-28138** - d3service logs are now simpler to assist with troubleshooting.

Designer r30 Release Notes

r30.8.6 - Hotfixes

Download r30.8.6 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 221470
Starter build: 221471
Released: July 7th 2025

Improvements

- **DSOF-28616** - Changing warp markers on a Feed Map will no longer cause excessive console logging.

Fixes

- **DSOF-30580** - Starter Designer will no longer fail to launch with a missing license error.
- **DSOF-23546** - RenderStream workloads will no longer crash when reconfigured with 0 size and instead a helpful error message is displayed and the workload is not reconfigured until a valid size is set.
- **DSOF-30581** - Using **Export Compositor Frame** in the feed view will now always produce an image at full resolution regardless of the level of zoom in the GUI.
- **DSOF-30565** - The list of network adaptors displayed in the SMC UI will no update in realtime when adaptor settings change.

r30.8.5 - Hotfixes

Download r30.8.5 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 220156
Starter build: 220157
Released: June 18th 2025

Fixes

- **DSOF-30453** - Text Layers now render correctly with text with carriage return characters.

- **DSOF-30233** - Designer no longer respond to transport commands slowly when out of focus.
- **DSOF-30337** - Changes to the Offsets in a `SkeletalPointTrackingSource` object are now properly reflected on actor machines in real time.
- **DSOF-30430** - VideoTrigger layers patched to Sockpuppet will now properly respect the **Speed** field before the video is re-triggered.
- **DSOF-30222** - Using a parallel mapping with transparent content will no longer display a ghostly diagonal line across content.
- **DSOF-30455** - MIDI sliders in the Designer GUI with midi input assigned no longer move jerkily.
- **DSOF-30320** - The Readout layer now displays the correct section note when chasing timecode.
- **DSOF-30312** - Designer will no longer report a spurious error when clicking on a missing media notification.
- **DSOF-28228** - The **Brightness** field on the Tracking Marker layer will now correctly dim the layer.
- **DSOF-29510** & **DSOF-29512** - Certain cases where projects can become corrupted will no longer occur.
- **DSOF-30449** - On project close Designer will no longer throw a spurious error if a temporary file exists that begins with “d3”.
- **DSOF-30454** - Designer will no longer report an Access Violation when creating a Virtual Camera or an MR Set under certain circumstances.
- **DSOF-30463** - FBX files with embedded textures will no longer cause Designer to create a sub-folder for every embedded texture sub-folder.
- **DSOF-30431** - Video Transition layers will no longer stop playing when holding on a section break when playback speed is patched to Sockpuppet.
- **DSOF-30444** - Video layers will no longer stop playing when holding on a section break when an expression is used to control their speed.
- **DSOF-30468** - HTTP Sockpuppet API endpoints now accept either a full 64-bit integer OR a hex value for the UID of the layer you want to control.

r30.8.4 - Hotfixes

Download r30.8.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 219136
Starter build: 219134
Released: June 4th 2025

Fixes

- **DSOF-29712** - RenderStream workloads will no longer intermittently get stuck in *Awaiting requests (not requested)* on launch if packets are dropped on startup.
- **DSOF-30414** - Performance has generally been improved when modifying objects. (no more small hangs while editing!)
- **DSOF-30374** - Designer will no longer report an Access Violation when creating an MR set for the first time.
- **DSOF-30344** - Intermittent video input signals on Matrox machines will no longer lead to performance stutters.
- **DSOF-28436** - Newly created reference points will now appear on the actor's feed view immediately upon creation.
- **DSOF-30377** - Disguise servers equipped with Bluefish capture cards will no longer excessively log errors in rare scenarios when dropping frames.
- **DSOF-30413** - Designer will no longer trigger OSC events multiple times if their addresses start with the same string of characters.

r30.8.3 - Hotfixes

Download r30.8.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 218797
Starter build: 218798
Released: May 28th 2025

Fixes

- **DSOF-30362** - When transitioning in to a new section after holding at the end Designer will no longer occasionally play a single frame from the middle of the upcoming video.
- **DSOF-30341** - Video layers in quantized tracks now play back at the correct speed.
- **DSOF-30232** - In certain hardware configurations machines with a Matrox capture card will no longer intermittently drop frames on input.
- **DSOF-30306** - Specific projects will no longer report an exception on shutdown.
- **DSOF-28645** - EX range understudies can now be used to understudy an EX range Dedicated Director even if the actors are non-EX range machines without reporting an error.
- **DSOF-30281** - Receiving anomalous timecode while chasing will now never put Designer in to "Ignoring Timecode" mode.
- **DSOF-30234** - Projectors that are renamed before a machine CTDs will no longer be corrupted when the project is re-opened.
- **DSOF-30363** - EventTransportDMX Brightness is no longer sent every frame if it's not changing.

- **DSOF-30297** - Machines that fail to properly release certain telemetry files no longer fill up their memory with temp copies of those files.

r30.8.2 - Hotfixes

Download r30.8.2 Full (Pro)

Release Notes PDF

Full (Pro) build: 217911
Starter build: 217912
Released: May 21st 2025

Fixes

- **DSOF-30106** - The API endpoint `service/project/startlocalproject` will no longer fail to launch the project.
- **DSOF-29867** & **DSOF-30020** - The API endpoint `/system/projects` now correctly returns the list of projects on a system, including .d3starter projects if they are present.
- **DSOF-30310** - Large projects will no longer drop frames when jumping on the timeline under within-spec load conditions if crossfade is configured anywhere on the timeline.
- **DSOF-30305** - Projects that include certain projector calibration configurations will no longer report an ACCESS_VIOLATION on launch.
- **DSOF-30292** - Starter projects will no longer produce corrupted project files the first time they are saved. (The next time they are saved, they would save an uncorrupted file).
- **DSOF-30291** - Very long timelines will no longer sometimes degrade in performance when jumping to certain sections.
- **DSOF-30260** - Rendering the wireframe of a mesh projection is now slightly more performant.

r30.8.1 - Hotfixes

Download r30.8.1 Full (Pro)

Release Notes PDF

Full (Pro) build: 217342
Starter build: 217340
Released: May 14th 2025

Fixes

- **DSOF-30211** - When the Plugin Manager can't find the project plugin folder it will no longer cause d3service to crash.

- **DSOF-27448** - The API endpoints `/system/gpuoutputs` and `/system/vfcs` now longer respond with an error.
- **DSOF-30195** - Reading a corrupted mesh file will now report a helpful error instead of potentially causing a CTD.
- **DSOF-29689** - Shift selecting nothing on timeline no longer displays a useless blank error window.

r30.8 - Coloured Layers, Sockpuppet Sync and ST 2110 Capture Prerelease

Download r30.8 Full (Pro)

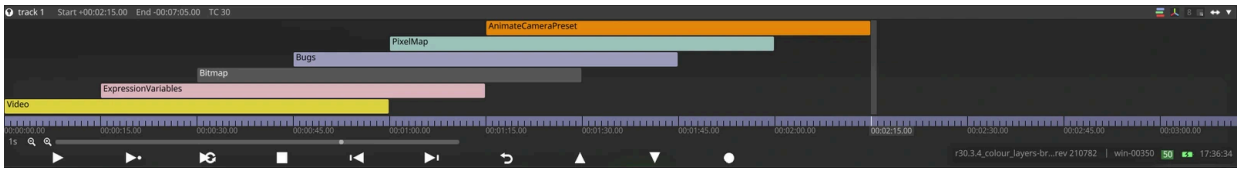
Full (Pro) build: 216685
Starter build: 216683
Released: May 7th 2025

New Features

r30.8 adds support for several new features:

- **Coloured Layers**

Layers on the timeline and in layer stacks can now be coloured based on a range of user-definable criteria. You can read more about this feature here. There are several more improvements to the look and feel of the timeline including a new highlighting look to better distinguish selected layers. Keyframes are now also visible directly on the timeline.



Example of Coloured Layers

- **Sockpuppet Synchronisation**

We can also now guarantee synchronisation in a Sockpuppet workflow for the first time! Now even if machines drop frames, when they recover from frame drops, Sockpuppet layers will return to an in-sync state regardless of what transport commands have been sent.

- **ST 2110 Network Video Capture (Prerelease)**

Finally, we're releasing our first beta test for ST 2110 network video capture! You can access this feature in Gold by turning on the option switch `enableIPVideo`. Please do reach out to us if you'd like to use it on a show so we can help support you and gather any feedback. You can read more about the workflow here.

- **X1 Support**

Designer r30.8 introduces support for our new Disguise X1 USB License Key enabling users to run a single node on their own hardware provided it meets the recommended technical specification.

Read more about the Disguise X1 here.

Improvements

- **DSOF-29743** - The ColourAdjust layer now has several new fields to allow for output clamping. More information on these fields can be found here.
- **DSOF-29610** - VP and XR Colour Calibration performance has been slightly improved.
- **DSOF-29843** - The 'About Designer Starter' popup will now only display once on first install.
- **DSOF-30014** - Plugins opened inside Designer will default to a dark mode scheme if one is available.

We've made a range of improvements in this release to the plugin developer experience to increase the power and usability of Designer plugins:

- **DSOF-29967** - There is now a new plugin function available for evaluating expressions: `evaluateFromString` which enables expression evaluation of any string.
- **DSOF-30111** - There is now a new plugin function to access domains via `domain:<type>` to access things like mapped media or shadow resources.
- **DSOF-30087** - The plugins LiveUpdate API now allows users to subscribe to custom dictionaries.
- **DSOF-29981** & **DSOF-30005** - Plugin authors can now provide a json file to share metadata about their plugins. This can also be configured to be fully DNS-SD compliant. You can read more about how to setup this meta-data **here**

Fixes

- **DSOF-30161** - Designer will no longer sometimes CTD after editing lots of cameras or spatial maps after a very long time.
- **DSOF-30072** - Expressions now allow access to resources in folders and with dots in their name.
- **DSOF-29870** - Launching starter projects via the `/project/startlocalproject` API now always requires the user to be logged in in d3manager before launching.
- **DSOF-29822** - The MultiTransportManager now allows you to select "None" as a transport (and will no longer highlight in red if None is selected).
- **DSOF-29816** & **DSOF-29815** - The Web layer now allows you to select "None" as a bookmark or command keyframe (and will no longer highlight in red if None is selected).
- **DSOF-15283** - The control points when warping in a feed mapping now always warp the correct part of the image.

- **DSOF-29856** - Launching a Pro project with Starter via the `/project/startlocalproject` API now correctly transforms Pro Projects into Starter Projects (instead of failing to open the project).
- **DSOF-29984** - It is now possible to drag the scrollbar in the plugin launcher.
- **DSOF-29927** - Plugins launched via the plugin launcher now launch close to the mouse cursor.
- **DSOF-29354** - Switching colour management modes while the colour inspector is open no longer reports notifications until the inspector is closed.
- **DSOF-28303** - Layers now properly apply the content input transform of source textures whether a texture is manually set or arrowed in to the layer.
- **DSOF-30162** - Plugin Launcher text no longer overflows if plugin names are long.
- **DSOF-29886** - Improved some logging around RenderStream workflows for quicker debugging.

r30.7.5 - Hotfixes

Download r30.7.5 Full (Pro)

Full (Pro) build: 216640
Starter build: 216645
Released: May 7th 2025

Fixes

- **DSOF-30135** - Running RenderStream texture parameters in OCIO mode is now slightly more performant.
- **DSOF-30157** - Designer will no longer report “No Valid d3projects folder is specified” on launch when a folder is specified.
- **DSOF-30143** - d3Manager will now correctly display the version of projects again.

r30.7.4 - Hotfixes

Download r30.7.4 Full (Pro)

Full (Pro) build: 216140
Starter build: 216138
Released: April 30th 2025

Fixes

- **DSOF-30142** - 2x4 servers are now correctly detected as Disguise servers again.
- **DSOF-30070** - Right-clicking on a non-numeric field now correctly opens the meta field editor again.

r30.7.3 - Hotfixes

Download r30.7.3 Full (Pro)

Full (Pro) build: 215806
Starter build: 215804
Released: April 23rd 2025

Improvements

- **DSOF-30124** - Designer installers are now ~20% smaller.

Fixes

- **DSOF-30053** - RenderStream texture parameters will no longer intermittently fail with an access violation in rare circumstances.
- **DSOF-29524** - Designer will no longer drop frames when switching tracks or distributing media is very complicated projects.
- **DSOF-30071** - Users can now use dot notation to subscribe to sub-resources with the LiveUpdate API.
- **DSOF-30100** - Starter licenses will no longer occasionally fail to be installed on machines that have never had Designer installed before.
- **DSOF-30082** & **DSOF-29922** - Installer logs are now more detailed to help with finding and fixing errors.
- **DSOF-29873** - When installing a new version of Starter, old Starter CodeMeter containers are now correctly removed.
- **DSOF-29853** - The **About Designer Starter** dialogue box now correctly displays in all DPI scales.
- **DSOF-30089** - Designer uninstaller now correctly removes temp files that you don't need any more.
- **DSOF-30127** & **DSOF-30128** - Stopping a RenderStream workload in a high latency environment will no longer display spurious notifications and console logging.

r30.7.2 - Hotfixes

Download r30.7.2 Full (Pro)

Full (Pro) build: 215456
Starter build: 215454
Released: April 16th 2025

Fixes

- **DSOF-30084** & **DSOF-30096** - Running Designer on a Windows 10 machine in a network where some Designer machines cannot see each other over d3net but can see each other over another network will no longer result in excessive console spam which can fill up the C drive.
- **DSOF-29987** - Designer Starter sessions now support more than 2 machines.
- **DSOF-29807** - Disguise Media Servers running Designer Starter can now correctly join sessions as Actors and Understudies. Remember, these sessions can only include other machines running Starter and all machines running Starter will output with watermarks.
- **DSOF-29969** - Opening the Plugin Launcher with no plugins installed now has a helpful link for installing new plugins.
- **DSOF-29611** - Network traffic between machines in session has been reduced slightly.
- **DSOF-30010** - Sockpuppet video layers that transition to content that is only needed by some actors no longer leave the old content in place on actors that do not need the new content.
- **DSOF-29877** - CDL objects that are locked can no longer be modified via the CDL API endpoints.

r30.7.1 - Hotfixes

Download r30.7.1 Full (Pro)

Full (Pro) build: 214307
Starter build: 214304
Released: April 9th 2025

Improvements

- **DSOF-29890** - Added a new Plugins method: `Editor.exportResource` for exporting .d3export files. You can find our extensive developer documentation for the Plugins API here.
- **DSOF-29767** & **DSOF-29874** - Various error messages about opening Starter and Full versions of the software are now clearer.

Fixes

- **DSOF-29934** - Playing into the first VideoClip keyframe on a video layer will no longer start the video from 0.
- **DSOF-29930** - Starter can now open projects normally on machines running Windows Home.
- **DSOF-29825** - Modifying the joints of skeletons on Editor machines now correctly updates on the Director machine.
- **DSOF-29879** - Quantised timelines now respect their transport's "On Clock Lost" setting.

- **DSOF-29990** - Installing multiple versions of Designer in the same network will no longer produce notification spam in rare circumstances.
- **DSOF-29537** - Resizing plugin windows no longer causes the content in the window to flash.
- **DSOF-29861** - Full versions of Designer can now make checkpoints again.
- **DSOF-29765** - Layers that do not require prefetching (like Control layers) will now no longer be prefetched.

r30.7 - Plugins and Expressions

Download r30.7

Full (Pro) build: 213337
Starter build: 213335
Released: March 31st 2025

New Features

r30.7 brings new support for user created plugins! With this new feature you can load user-created plugins directly within the Designer GUI.

We are also launching the following Disguise-developed Designer Plugins:

1. Ask Aid3n - Our Disguise AI workflow assistant.
2. Disguise Cloud Media Browser - Access and download media from Disguise Drive into your d3 project.

- Luma AI Video Generator - Text-to-video generation that imports directly to your d3 project. You can find detailed information on accessing, installing, and managing plugins here.

Documentation of our Plugins Framework can be found **here**.

Plugins are not supported in the Starter version of Designer. To use plugins, ensure you have the Full (Pro) version of Designer.

Improvements

- **DSOF-29317** - We've made a range of improvements to expressions. You can find the extensive documentation on common datatypes, variables, string manipulation, and monitoring using custom messages.
  - **DSOF-28577** - A variable for "Fade up" and "Fade down" is now exposed for use with OSC Output Expressions.
  - **DSOF-27706** - A variable for Pre-Roll in TC Status is now exposed for use with OSC Output Expressions.
  - **DSOF-28310** - Float expressions in the Expressions Variable Device now have a settable min and max.
  - **DSOF-28501** - Expression function variables can now have parameters defined.
  - **DSOF-28657** - Expression variables are now re-orderable by left-click and drag.
  - **DSOF-28666** - Expressions now support returning an array of composite vector types. Note that to use them in a field you still need to access the individual floats. These are:
    - Colour
    - Vec2 (alias float2)
    - Vec3 (alias float3)
    - Vec4 (alias float4)
  - **DSOF-28734** - Expressions now have a range of string manipulation functions:
    - split
    - replace
    - strip
    - title
    - upper
    - lower
    - combine
- **DSOF-29656** - When renaming a project or folder via d3manager the previous name is now editable as the starting-point for your rename.
- **DSOF-28794** - OSC Event Transports now highlight in red if no OSC device is selected.
- **DSOF-28623** - Mesh Mapping now has adjustable zNear and zFar clipping planes.
- **DSOF-28634** - Solo machines will now notify clearly that versions of Designer above r30 are not supported.
- **DSOF-29330** & **DSOF-29331** & **DSOF-29643** - Designer now sends us additional telemetry data about plugin usage. Remember, if you want to opt-out of telemetry you can do so in the installer or at any time in d3Manager by going to Help > About Manager. We still do not include whole project files or content.
- **DSOF-29023** - Web Layers interactable windows can now receive numpad events.

Fixes

- **DSOF-26526** - Designer will no longer intermittently CTD after playing back video with embedded audio for a very long time.
- **DSOF-26545** - Transparent projection surfaces will no longer cast shadows on objects behind them as if they were opaque.
- **DSOF-28529** - Large list views will no longer have input boxes that can detach and float around the GUI like a ghost.
- **DSOF-28929** - Text in the feed mapping visualizer now scales correctly with DPI so it's actually visible.
- **DSOF-29020** - Opening the metafield editor of two identical fields will no longer show the first fields metafields for the second ones.
- **DSOF-29209** - ExpressionVariables module has moved to it's correct place under the Control header in the layers library.
- **DSOF-29715** - Opening the Colour Calibration widget will no longer automatically add a rogue MRset to the sets being calibrated. Now if there is only a single MRset associated with that calibration it will set the MRset to that one, otherwise it will leave the list un-changed.

r30.6.1 - Hotfixes

Download r30.6.1

Full (Pro) build: 213321
Starter build: 213320
Released: March 31st 2025

Fixes

- **DSOF-29785** - After holding at the end of a section for a while, Designer will no longer occasionally display the wrong frame of upcoming content when moving to the next section.
- **DSOF-29936** - d3service will no longer crash under rare circumstances executing tasks.
- **DSOF-29660** - Designer will no longer fail to launch on RX range machines even when they have a valid Designer or Pro license.

r30.6 - Starter

Download r30.6 Full

Release build (Full): 212444
Release build (Starter): 212442
Released: March 25th 2025

New Features

With r30.6 we have introduced the new Starter version of Designer! With Starter you can use all the key features of Designer, **for free**! Starter is designed for learning and so it will always output with watermarks, but it will run on servers, laptops, PCs and can do full network and session control, including RenderStream and OmniCal. Starter comes with its own free perpetual license built in, but it does require that you log in to your Disguise Cloud account in d3Manager to launch projects.

Remember, Starter projects use the file extension: `.d3starter` and cannot be opened in the un-watermarked Full version of Designer, so if you're working on a production that will eventually output from a server, you'll need a Pro license and to use Full.

You can read more about Starter here.

Improvements

- **DSOF-29226** - d3Manager now highlights which projects were built with Starter and Full versions of Designer.
- **DSOF-29231** - We've improved the Help -> Disguise Licenses page within d3Manager to be more user friendly to view the status of all your licenses.
- **DSOF-29316** - The /status/project API endpoint now also returns whether the project is Starter or Full.
- **DSOF-29313** & **DSOF-29402** - We've added additional details to our telemetry about how users use Designer. Remember, if you want to opt-out of telemetry you can do so in the installer or at any time in d3Manager by going to Help > About Manager. We still do not include whole project files or content.

r30.5.3 - Hotfixes

Download r30.5.3

Release build: 212395
Released: March 25th 2025

Fixes

- **DSOF-29304** - VX 4+ servers will no longer struggle to maintain Genlock under certain uncommon Windows states.
- **DSOF-29693** - VX 3 servers now correctly map video capture inputs 11 and 12 to K and L when first configured.
- **DSOF-29704** - Keyframing a projection surface's **Render layer** parameter via an Open layer now works properly.

- **DSOF-29774** - Unreal assets running via RenderStream will no longer report multiple errors when they have multiple levels and a level using texture parameters is not the first level represented in the Schema.

r30.5.2 - Hotfixes

Download r30.5.2

Release build: 211696
Released: March 19th 2025

Improvements

- **DSOF-29727** - Consoles now have improved logging about renewed licenses for easier debugging.

Fixes

- **DSOF-29694** - Consoles will no longer be filled with irrelevant logging when running an RS workload without texture parameters.

r30.5.1 - Hotfixes

Download r30.5.1

Release build: 211194
Released: March 12th 2025

Improvements

- **DSOF-23588** - d3Service will now automatically check CodeMeter WebDepot for updated licenses and will update them for you. This will mean that monthly and yearly Pro subscriptions, as well as updates to expiry dates on any legacy licenses, will be updated automatically on your machine without you needing to manually activate a new license each time it renews. License update checks happen every 12 hours, and only if Designer is not running.

Fixes

- **DSOF-27234** - Pressing the button **Prepare to archive unused objects** will now correctly identify props as in use.
- **DSOF-28930** - Applying feed settings on an IP-VFC card in SDI mode is now more reliable in some circumstances.
- **DSOF-29535** - Setting the **Colour format** field of a VFC slot to **Auto** or setting the **enableColourFormat** option switch to **False** will no longer always select a CVTRBv2 timing and will now correctly select the timing that best fits within the bandwidth available.

- **DSOF-29420** - Logs about expired licenses are now easier to understand.

r30.5 - xR for VR

Download r30.5

Release build: 210251
Released: March 5th 2025

New Feature

DSOF-22123 - xR for VR - r30.5 adds native support for VR workflows when working with XR stages. To read more about this feature see our documentation here.

Improvements

The following improvements relate to the above xR for VR workflow, but are also generally applicable to spherical camera workflows:

- **DSOF-22124** & **DSOF-28753** - Designer now supports virtual spherical cameras.
- **DSOF-22125** & **DSOF-28588** - Spherical cameras now support backplate and frontplate mappings.
- **DSOF-28492** & **DSOF-28628** - Spherical cameras can now output 180 degree lat/long format (previously only 360° lat/long was supported)
- **DSOF-28548** - Spherical cameras now have a button which allows you to toggle between a lat/long view and a spherical interactive view.
- **DSOF-28655** - Virtual cameras now highlight the field for the **Live action position marker** if it is not set.
- **DSOF-29028** - Fields that should not be set to **None** under normal operation are now highlighted in red when they are set to **None** to make them easy to spot.
- **DSOF-28776** - Spherical camera cube-map faces now have settable **Padding** and **Overlap** fields.
- **DSOF-29017** - Spherical mappings now have settable **Padding** and **Overlap** fields.

The following improvements are unrelated to the xR for VR workflows but are still cool:

- **DSOF-28981** - In d3Net Manager “Pro” range servers have been renamed to “VX” range.
- **DSOF-29300** - The term “d3” will now appear as “Designer” or “Disguise” in the EULA text.
- **DSOF-29305** & **DSOF-29372** & **DSOF-29423** - Improve performance of d3service when querying licenses (this should improve d3manager startup time in most cases).
- **DSOF-29307** - System diagnostics now include a detailed summary of all CodeMeter Container details for easier troubleshooting.
- **DSOF-20755** - Designer now has a user-defined DPI scale which can be accessed under **Project Settings > User Interface**.

Fixes

- **DSOF-4950** & **DSOF-29613** - Licenses will no longer be incorrectly reported as **Perpetual** in d3Manager in certain rare cases.
- **DSOF-29291** - RenderStream streaming to a spherical map now is rendered at the correct resolution instead of 36x higher than expected.

r30.4.1 - Hotfixes

Download r30.4.1

Release build: 210246
Released: March 5th 2025

Fixes

- **DSOF-29389** - 2.5D assets from modern versions of Cuebric no longer load with unexpected depths between plates.
- **DSOF-29526** - EX range servers will no longer display NDI® video feeds in the wrong order in the Video Input Patch editor.

r30.4 - Prefetcher Improvements and QoL

Download r30.4

Release build: 209578
Released: February 26th 2025

Improvements

- **DSOF-13670** & **DSOF-29213** - Changing any Indirection will now wait to swap content for a few frames to allow for that content to be loaded. This means you should never see a flash to black when swapping a live indirection. We have also removed the **Indirection delay (frames)** field from indirection controllers as the correct delay is now computed automatically.
- **DSOF-23779** - The implementation of CEF and Chromium used in Disguise are now more modern. We now support CEF 132.3.2+g4997b2f and chromium 132.0.6834.161. This means you get more features, stability and performance in the following layers:
  - Web Layer
  - Text Layer
- **DSOF-26455** & **DSOF-25328** & **DSOF-28943** & **DSOF-28387** - Content played on the timeline will now always load before the playhead jumps when jumping on the timeline. This will mean you should not see intermittent flashes to black or performance spikes when jumping on the timeline via the mouse, LTC or other transport control mechanism.

Because Designer now prefetches content only when the jump command is issued, we have also significantly reduced the overhead of playing the normal timeline as Designer will no longer decode video frames from other parts of the track unnecessarily. This means that you should see performance improvements when entering new sections, jumping to new tracks or playing simple sections that lie just ahead of busy sections.

- **DSOF-28949** & **DSOF-28523** & **DSOF-28524** - Video playback at speeds other than 1 or for videos with a higher content FPS than the timeline, now only decode the frames necessary for playback, improving performance in these states.
- **DSOF-28515** - The debug section for the prefetcher under ALT + D is now easier to read.
- **DSOF-29056** - The Find Usages button for media now displays the track, beat AND the Cue that the content is sequenced at if a cue exists.
- **DSOF-29429** - You can now define a set of environment variables to launch an RS asset under by placing a file named: `assetname_variables.env` next to the RS asset in the RenderStream Projects folder.
- **DSOF-28865** - FFMPEG has now been updated to 7.1 from 5.0.1. FFMPEG is used for:
  - Rendering Feed Movies
  - Rendering Stage Movies
  - Rendering Animation Movies
  - Uploading to Previs
    These workflows will now be a bit faster and more stable.
- **DSOF-29085** - Mesh Mapping now has a new field called **Render resolution scale** which allows you to render the content at a higher or lower resolution than the mapping is resolution is warped to.
- **DSOF-29123** - The **Find/Replace Usages** button has moved to be above the “Hierarchy” tab for mappings.
- **DSOF-29085** - Mesh Mapping now has a new field called **Render resolution scale** which allows you to render the content at a higher or lower resolution than the mapping is resolution is warped to.
- **DSOF-29123** - The **Find/Replace Usages** button has moved to be above the “Hierarchy” tab for mappings.
- **DSOF-29383** - An additional graph is now available for each RenderStream texture parameter which displays the difference between request and receive time for each frame.

Fixes

- **DSOF-29071** - Receiving tracking data over an extended period of time (5+ days) will no longer result in glitchy or jumpy tracking.
- **DSOF-29303** - 3rd party tools can now correctly pick up the DNS-SD record published by d3service.

r30.3.5 - Hotfixes

Download r30.3.5

Release build: 209573
Released: February 26th 2025

Fixes

- **DSOF-21826** - Assets assigned to a bank/slot in a bank editor no longer appear in the "unused.txt" file when pressing the **Prepare To Archive Unused Objects** button.
- **DSOF-24396** - The remote status of Disguise servers in d3Manager's Network tab is now more responsive when machines launch or close Designer.
- **DSOF-28373** - VFC cards that fail to initialise but are present will no longer be reported as missing.
- **DSOF-28419** - d3service will no longer intermittently fail to detect all IP-VFC cards if the cards were previously configured to a different FPS than the one currently configured in the Designer project.

r30.3.4 - Hotfixes

Download r30.3.4

Release build: 208854
Released: February 19th 2025

Fixes

- **DSOF-28855** - Using a Designer license to launch Designer on a Solo as an editor will no longer cause the Solo to initiate a count-down and quit the software due to licensing restrictions. (This will still happen if you try to use the server in other roles with its Solo license in versions after r30.0).
- **DSOF-29365** - Setting the "Camera plate" setting of a spatial map to "Horizontal Back and Front Plates" setting will now work correctly again.
- **DSOF-29463** - Jumping to a timecode cue on a different track will no longer fail to jump if the time jumping to happens to be very close to the current playhead.

r30.3.3 - Hotfixes

Download r30.3.3

Release build: 208330
Released: February 12th 2025

Fixes

- **DSOF-28985** - Duplicating projectors will no longer cause an ACCESS_VIOLATION when certain GUI elements are open.
- **DSOF-29315** - System Diagnostics now include more detailed licensing logs for faster diagnostics.
- **DSOF-29352** - You can now copy and paste text in to the interactable window of web modules.
- **DSOF-29378** - Mousing over the software version in the bottom right of the Track widget now shows the full version of Designer in a tooltip.

r30.3.2 - Hotfixes

Download r30.3.2

Release build: 207901
Released: February 5th 2025

Fixes

- **DSOF-29205** - Editing a ClusterPool on one RenderStream layer on top of other RenderStream layers will no longer report spurious notifications.
- **DSOF-29216** - Reduced idle traffic sent over d3Net while RenderStream layers are under the Playhead.
- **DSOF-29219** - RenderStream layers will no longer report a spurious error and fail to update properly when the cluster assigner of a texture parameter is set to a non-default value.
- **DSOF-29324** - Long-clicking on a project in d3Manager will no longer open a rename box over the project name. You have to rename from explorer.

r30.3.1 - Hotfixes

Download r30.3.1

Release build: 207286
Released: January 24th 2025

Improvement

- **DSOF-26577** - After searching for a Cue in the Cue List and selecting it the GUI focus is now moved from the search box to the Track widget to enable faster, more intuitive programming.

Fixes

- **DSOF-29173** - Various improvements to IP-VFC **Colour Format** behaviour:
  - Applying feeds on an IP-VFC will now attempt to apply the selected colour format and not force the output to RGB.
  - The feed outline will now correctly highlight in green when the colour format set in the GUI and the active output of the GPU match.
  - With the `enableColourFormat` option switch enabled Designer will no longer display a **Sub Sampling** option in the IP VFC GUI as it is now replaced with **Colour Format**.
  - Colour format options now specify in the GUI whether they are RGB or YCbCr to make it easier to select the correct format.
- **DSOF-26872** - Designer now correctly responds the POST `indirections/set` endpoint again. For information about our public APIs can be found **here**.
- **DSOF-29207** - Designer will no longer occasionally produce an Access Violation error when in OCIO mode and the input source to a layer changes from an Arrow source to a Texture.
- **DSOF-29309** - Actor machines are able to receive tracking data again.

r30.3 - QoL and Hotfixes

Download r30.3

Release build: 205609
Released: January 15th 2025

Improvements

- **DSOF-6438** & **DSOF-25483** - We have added a 'Border expansion' field In the Mapping editor for all geometric mapping types. This can be used when there is an empty space within the screen UV map to stop black pixels blurring into visible screen space. The units are pixels in pixels. The following mappings have this field:
  - Spherical
  - Perspective
  - Cylindrical
  - Camera Plate
  - Parallel
  - Mesh
- **DSOF-26513** - The Shot Recording HTTP API has been updated to comply with the other V2 APIs. You can find more information about this by visiting our developer site **here**

- **DSOF-28542** - You can now mix Green screen and LED screen objects in your MR sets, and camera calibration will work correctly on Luma-keyed inputs. Additionally:
  - Set extension will be applied outside of the LED screens and around any Luma-Keyed performers in front of Green screens.
  - We now only account for keying specifically within the green screen object so content being used by the LED screen with green in will no longer be keyed out.
- **DSOF-28978** - Designer will now log when a resource is set on a layer via HTTP sockpuppet within the console file to enable faster debugging.
- **DSOF-29037** - Our OCIO implementation has been updated to support v2.4! You can read more about OCIO 2.4 release **here**.
- **DSOF-27857** - Designer and d3Services API V2 endpoints are now discoverable via Windows DNS-SD. You can learn more about API discovery with DNS-SD **here**.
- **DSOF-28714** - You can now adjust output phase offset by lines and pixels in Designer with the option switches: `genlockPhaseAdjustLines` and `genlockPhaseAdjustPixels`. This is the same as setting a phase offset within the Nvidia or AMD interface, but will re-apply these settings during Apply Feed Settings.
- **DSOF-25575** - Designer will now include additional information from the Mellanox NIC (when present) within System Diagnostic package to enable faster debugging.

Fixes

- **DSOF-27602** - Non-English keyboards can now reliably use Ctrl shortcuts.
- **DSOF-28361** - Projects with Tables will no longer hang when saving takes longer than expected.
- **DSOF-28382** - NatNet device recordings are no longer much larger than they need to be.
- **DSOF-28388** - The Remove Media API endpoint will no longer sometimes fail to delete the file from disk.
- **DSOF-28614** - Designer will no longer sometimes delete media from the disk on startup when the `enableResourceDeletion` option switch is enabled.
- **DSOF-28904** - XR calibrations now work when using a Luma keyed video input.
- **DSOF-29031** - Device recordings no longer load incorrectly when a track with same name as your current track is in the trash.
- **DSOF-29109** - Frame counters on the timeline will now be correct when Custom Timeline FPS is set to Global.
- **DSOF-26779** - RenderStream compressed streams will no longer fail to be received properly in very rare circumstances.
- **DSOF-28540** - Render machines are no longer shown as Offline on Editor machines.
- **DSOF-28784** - RenderStream streams from renderers using Vulkan (e.g. TouchDesigner) will no longer be out of sync when using Mesh Mappings.
- **DSOF-29006** - Versions in the version selector will no longer be coloured unless SLC is enabled.

- **DSOF-29016** - New tracks will no longer sometimes fail to appear in the tracks list until a project restart.
- **DSOF-29044** - 2x4Pro no longer incorrectly reports that the latest Designer versions are not supported. You can find our product compatibility table **here**.

r30.2.2 - Hotfixes

Download r30.2.2

Release build: 205609
Released: January 8th 2025

Improvement

- **DSOF-29041** - Designer API documentation now has a useful dropdown for selecting a scheme.

Fixes

- **DSOF-28368** - Changing camera render mode to Lux on a camera used in an MR set no longer affects the projected content in the MR set spatial map when using 2.5D assets.
- **DSOF-28522** - Mapping a RenderStream layer to a camera plate mapping targeting the visualiser camera will no longer cause Designer to crash to desktop.
- **DSOF-28654** - Outputting Sockpuppet layer values with the option switch `isSockpuppetBidirectional` will no longer invert numerical properties.
- **DSOF-29019** - Texture parameters shared to Unreal via an uncompressed transport are now displayed in the correct colour space.

r30.2.1 - Hotfixes

Download r30.2.1

Release build: 205166
Released: December 18th 2024

Fixes

- **DSOF-23680** - Media distribution will no longer fail if the reg key for the d3 Projects folder path is changed.
- **DSOF-28232** - Running in windowed mode will now be more reliable in the following ways:
  - Framerates will no longer spike to very high values.
  - Machines will no longer intermittently fail to join sessions.
  - Moving the playhead will now respond immediately.

- **DSOF-28505** - Designer will no longer sometimes hang indefinitely after scrubbing the Playhead through many video layers with embedded audio.
- **DSOF-28859** - RenderStream texture parameters now work correctly with colour transforms in ACES and OCIO modes.
- **DSOF-28919** - Removing EDIDs via a Four Finger Salute shortly after applying feed settings will no longer result in black outputs on V1 backplane machines.
- **DSOF-28955** - Fields on a camera that were previously controlled by a tracking source are now editable again after the tracking source is removed.
- **DSOF-28995** - CDL layers now look correct in OCIO mode using the default transform.

r30.2 - Quality of Life Improvements

Download r30.2

Release build: 204302
Released: December 13th 2024

Improvements

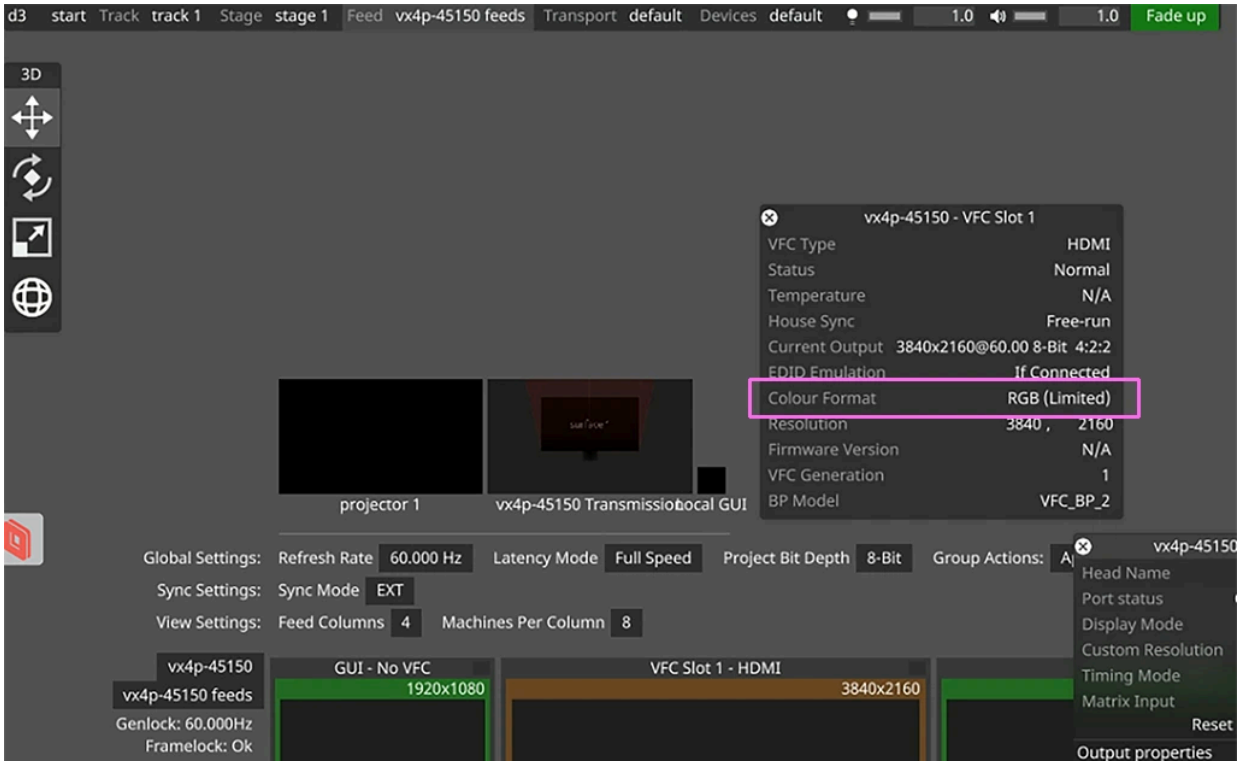
- **DSOF-23236** - Add support for HDMI & DP VFCs to output in 4:2:2 or 4:4:4

Setting HDMI and DisplayPort VFC cards to 4:2:2 or 4:4:4 is available behind the option switch `enableColourFormat`. It will stay behind the option switch until we are certain the EDID changes have no adverse downstream effects. The options available are **RGB**, **RGB Limited**, **4:4:4**, **4:2:2**, and **Auto**.

Auto Behaviour varies by VFC card:

- IP -> Selects YUV 4:2:2
- HDMI -> Selects RGB unless bandwidth Exceeds HDMI 2.0 spec at which point it will drop down to YUV 4:2:2
- DP -> Selects RGB

DVI and SDI VFCs do not have this option. The colour format for DVI cards is always RGB (and that is all they support) and for SDI VFCs it is determined by the SMPTE standard format selected.



Select Colour Format

- **DSOF-24079** - Designer now has the option to skip setting d3 projects share on installation. There is now an option during d3 installation to share the d3 projects folder. When it is ticked, the d3 projects folder is shared and `Everyone` is given read and write permissions (This is the current default behaviour). If it is un-ticked the user-configured sharing settings are not changed. You can find more information about this feature here.

Un-ticking this will mean that you can no longer access the shared folders via Manager and several features like content distribution won't work unless you manually configure sharing settings.

- **DSOF-26889** - Designer now has various ways of using the CTRL modified to interact with text fields. Here is a comprehensive list:
  - CTRL + Delete to delete the word to the right of the cursor
  - CTRL + Backspace to delete the word to the left of the cursor
  - CTRL + Left-click to move the cursor left to the next word boundary
  - CTRL + Right-click to move the cursor right to the next word boundary
  - CTRL + SHIFT + Left-click to extend the selection left to the next word boundary
  - CTRL + Shift + Right-click to extend the selection right to the next word boundary
- **DSOF-28149** - Designer will now warn the user in the UI when understudies are set up in an invalid configuration in the following ways:
- An understudy that has no target will be highlighted orange and show a helpful tootip.
- Two understudies with the same target will be highlighted red and show a helpful tooltip.

- **DSOF-28342** - On launch, Designer will now auto-update expressions that fail due to case sensitivity. In r29.2 we changed expressions to be case-sensitive to make them more powerful. This unfortunately left some old projects relying on case insensitivity to have broken expressions. We'll fix that for you now when you update so you don't have to!
- **DSOF-28716** - You can now control the float fields of Expressions Variable Layers with DMX Sockpuppet. These values are 16-bit, so each variable gets assigned 2 DMX Channels : A broad value, and a fine value. Strings and function fields are not controllable.
- **DSOF-28829** - Designer now allows you to independently set the Bit Depth of the GUI to 8-bit regardless of the setting for the rest of the project. To do this you simply enable the option switch `forcePrimaryOutputTo8Bit` on each machine you want to behave in this way. This is to help in scenarios where you want to output 10-bit but the KVM you have only supports 8-bit.

Fixes

- **DSOF-8398** - Setting TC Adjust to offset timecode on a track now applies correctly to TimecodeTester and TimecodeSystemTime transports.
- **DSOF-27341** - Designer will now provide a helpful warning during installation if the CPU is an older generation than what we support.
- **DSOF-28185** - We have updated our automated log file management to only delete old files, and only start deleting files if logs exceed a certain total size. This should generally mean we can gather and review older log files more easily.
- **DSOF-28673** - Detect systems API will no longer intermittently fail with a 5000 error code. See our **developer documentation** for more information about our APIs.

r30.1.2 - Hotfixes

Download r30.1.2

Release build: 204302
Released: December 11th 2024

Improvement

- **DSOF-28483** - Added a new Colour Inspector for validating OCIO and ACES colour workflows. Documentation on the new tool can be found **here**

Fixes

- **DSOF-27941** - Designer will no longer produce an Access Violation when making a precomp in a Layer whose mapping contains no screens.
- **DSOF-28286** - Shutting down Designer on a laptop in fullscreen mode is now much faster.
- **DSOF-28335** - Accessing the Designer API documentation via Manager > Help > Open API Documentation now correctly shows the v1 documentation again.

- **DSOF-28360** - Designer will no longer leak memory when not in focus on a Director.
- **DSOF-28527** - VFC Device editors now open correctly again.
- **DSOF-28787** - Tabbing between GUI fields once again loops to the top of the editor when you get to the bottom
- **DSOF-28908** - d3preview now opens files correctly again.
- **DSOF-28909** - Global crossfade now correctly overrides a track crossfade when the track crossfade duration is set to 0.
- **DSOF-28912** - Layers with Square Brackets [ ] in their names can now we used in Expressions again with the same syntax as normal.
- **DSOF-28923** - You can now output the value of a layer parameter via custom OSC output expression even when it is keyframed.

r30.1.1 - Hotfixes

Download r30.1.1

Release build: 203629
Released: December 4th 2024

Improvement

- **DSOF-27786** - Manager will now display whether or not you have a Realtime Connector License on EX range machines under “Help > d3 Licenses”.

Fixes

- **DSOF-27372** - Loading an H.264 encoded file will now give you a helpful error message explaining that the codec is unsupported instead of an access violation.
- **DSOF-28364** - Designer will now correctly detect new files that are added to sub-folders within shortcuts in the objects folder.
- **DSOF-28768** - Designer will now correctly output the value of a layer parameter via custom OSC output expressions and will no longer report a “recursion limit” error. Examples of values that can now be sent include:
  - `module:video.brightness`
  - `module:video.speed`
  - `module:video.volume`
  - etc.
- **DSOF-28769** - Single-layer Notch blocks no longer fail to load if they do not expose a layer parameter.

r30.1 - SDI/HDR Video Capture and Output

Download r30.0.3

Release build: 203052
Released: November 27th 2024

New Features

- **DSOF-28258** - Designer now supports full SDI HDR video capture and output via the Quad 3G VFC.
- **DSOF-21271** - Quad 3G VFC Cards now support Rec.2020.
- **DSOF-28179** - Quad 3G VFC Cards now support super black/white luma with HDR transfer characteristics (HLG and PQ).
- **DSOF-28397** - Designer will not allow the user to select HLG or PQ when outputting with Rec.709 or Rec.601.

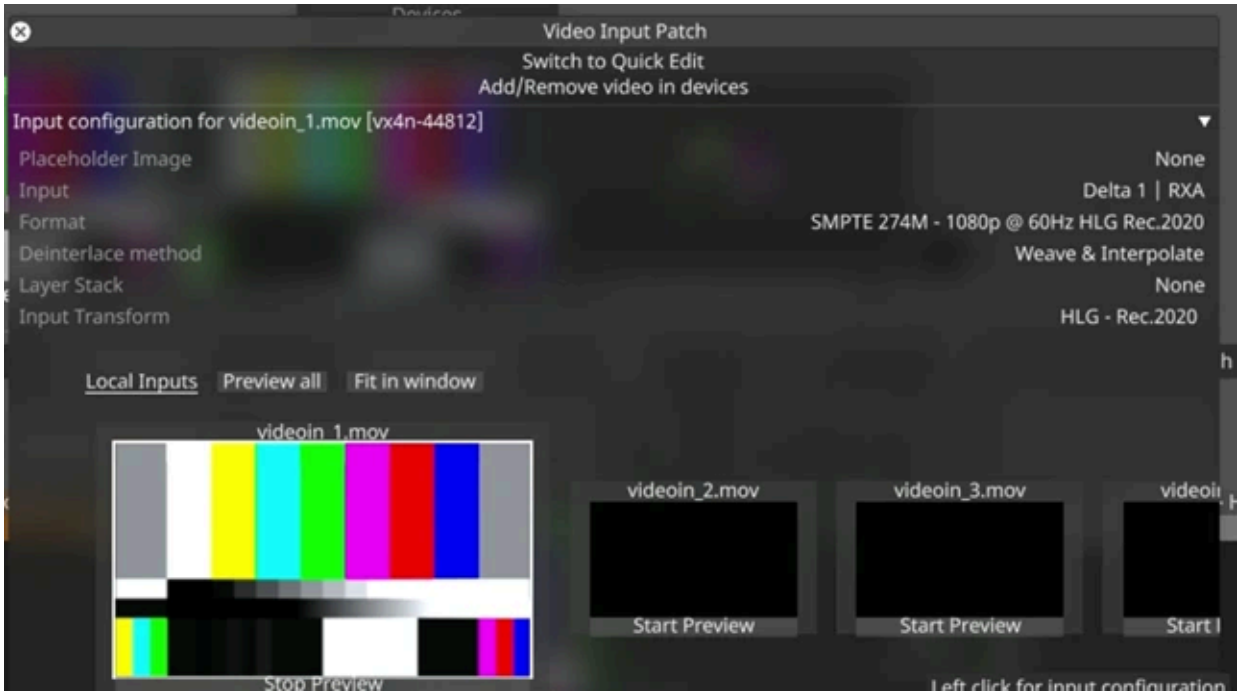
Dynamic range describes the ratio between the brightest and darkest parts of an image. High Dynamic Range (HDR) is a technology that represents an increased dynamic range in an image to provide a greater level of contrast, brightness and colour.

Both Hybrid Log-Gamma (HLG) and Perceptual Quantiser (PQ) transfer functions for HDR video are supported for SDI HDR capture.

We now support HDR video capture on all Disguise media servers with SDI capture cards. For the signal to be captured properly as HDR it must be:

- In the REC.2020 (also known as BT.2020) colour space.
- Set to 10-bit.

In the Video Input Patch Editor, the Input Transform needs to be changed to HLG - Rec.2020 or PQ - Rec.2020. The format field will then show the colorimetry and transfer characteristics as seen in the screenshot below:



We also support SDI HDR video output using the Quad 3G VFC card. In the Feed View we have added the option to change the YCbCr Conversion Matrix to Rec.2020 (BT.2020). The Transfer Characteristics setting will then need to be changed to either HLG or PQ depending on the transfer function being used.



Improvements

- **DSOF-27428** - You can now link tracking axes to skeletal joints of skinned meshes more easily.
- **DSOF-27536** - A range of fields that were previously not settable via an expression are now settable. Specifically Skeleton joint rotations. These values can also now we arrowed in to parameter collections to correctly capture their value.
- **DSOF-28500** - Designer will now more gracefully handle high-GPU-memory scenarios to avoid dropping frames.
- **DSOF-28537** - The spec of the .2p5d file format has an added a new optional field `mean_depth` which can be used to define the depth of the planes. You can find more information about this under our developer documentation **here**.
- **DSOF-28554** - Removing missing media from Designer via the resource management API is now much faster.
- **DSOF-27396** - Designer will now notify you if it detects that NDI® Tools 5 has been installed, as this software has been tied to multiple BSOD events on D3 servers. Our recommendation is not to use NDI® Tools 5 at this time.
  - Please see **TA-54** for more information.

Fixes

- **DSOF-13435** - The Multi-mapping feature in d3labs will now render multiple parallel maps correctly.
- **DSOF-28015** - The MR set Output Resolution field is now nested under the Settings separator in the UI. Right where it belongs.
- **DSOF-28531** - Loading .avdn codec encoded files will no longer incorrectly report the file as a supported format and fail to play it. Designer will now give a useful error message explaining that the format is not supported.
- **DSOF-28561** - Changes made to objects via the **Mixed Reality** and **QuickCal** APIs are now distributed to Actors and Editors correctly.

r30.0.3 - Hotfixes

Download r30.0.3

Release build: 203189
Released: November 27th 2024

Fixes

- **DSOF-25924** - V1 api calls to `netconf` and `content\remotesources` endpoints now work correctly again. (These APIs are deprecated so we may not guarantee functionality going forward)

- **DSOF-27929** - Clear Media Ingestion History will no longer fail with an access violation in projects that use projectors.
- **DSOF-28511** - Analysing GPU pool usage with the `profileGPUPoolFromLaunch` option switch will now be easier to use to diagnose GPU memory issues.
- **DSOF-28553** - Exception logs are now more useful to our developers by correctly identifying the memory address of the module.
- **DSOF-28632** - The expressions: `currentFeatureName`, `currentFeatureTime`, `nextFeatureName` and `nextFeatureTime` now correctly report about upcoming Tags as well as Notes.
- **DSOF-28732** - OSC output expressions now display helpful tooltips when there is an expression error.
- **DSOF-28805** - Actors will now correctly receive RenderStream streams again.

r30.0.2 - Hotfixes

Download r30.0.2

Release build: 202184
Released: November 20th 2024

Fix

- **DSOF-28576** - RenderStream engines rendering with Vulkan (including TouchDesigner) no longer crash when launched with a Mesh Mapping.

r30.0.1 - Hotfixes

Download r30.0.1

Release build: 201424
Released: November 13th 2024

Fixes

- **DSOF-28160** - Actors will no longer sometimes fail to receive correct timings from director understudies after failover.
- **DSOF-28576** - RenderStream engines rendering with Vulkan (including TouchDesigner) no longer crash when launched with a Mesh Mapping.
- **DSOF-28636** - Controlling a field of an open layer via Sockpuppet when in a session of machines will now properly update projector blending if the field you are controlling impacts projector blending.

r30.0 - Solo Support Deprecation

Download r30

Release build: 201424
Released: November 13th 2024

Changes

- **DSOF-28407** Move solo to a long-term Designer software version release
  - Users will be unable to run and install any Designer software version from r30.0 onwards on a Solo. The final Designer software version to run on the Solo will be r29.2. This will become a long-term release model, with fixes only for show-critical issues that do not require large changes, for a duration of 1 year. We have released final video playback performance metrics for the Solo that are measured in r29. We have put together an overview of the product lifecycle which explains each of the phases in more detail. This can be seen here.

Improvements

- **DSOF-26046** - API: Include Setlist in Active Transport endpoint.
  - We have included both the name and the UID of the setlist within the Active Transport API endpoint. This is described in detail in our developer documentation **here**.
- **DSOF-28313** - Remove OCIO shader properties from layers that don't require them. These layers are:
  - RGB Colour
  - Tracking Marker
  - LUT
- **DSOF-28324** - The Video Version selector is now better formatted and easier to use. Versions will now be presented with friendly colours and you can shift-click to enable and disable all the fragments within a particular version at once.
- **DSOF-28401** - You can now disable notifications about unsupported audio codecs embedded in videos by setting the option switch: `disableUnsupportedEmbeddedAudioNotification`
- **DSOF-28365** - The HTTPSockpuppet API now supports selecting resources by full path, not just filename. This means:
  - You can now specify `objects/videofile/sample/ada.jpg` instead of just `ada.jpg`.
  - If you have two files with the same filename but are in a different path you can now disambiguate them by selecting the full path.

- **DSOF-27658** - Add `uid` field for identifying patches in HTTPSockpuppet API. Deprecate `address` field
  - `address` was not unique across tracks. Multiple HTTP patches could exist with the same name (layers with same name across track) causing issues when HTTPSockpuppet was used with MultiTransports.
  - `uid` was added and should be used. `uid` is unique per patch. You can find the updated API documentation for HTTPSockpuppet **here**

Fixes

- **DSOF-22931** - Setting a CDL parameter via the API will now properly clamp the value on input to the min/max of the field in the GUI (you can still change the min/max in the GUI to change the clamping behaviour)
- **DSOF-24076** - "ALT+G" GUI hidden splash screen text is no longer repeated and is now simpler
- **DSOF-24154** - Playing in Loop XFade mode with a fade duration of 0 will now correctly loop with 0 fade instead of playing right through the section break.
- **DSOF-25883** - QSDI VFC cards can now output 1080i at 50, 59.94 & 60 fps with the correct VPID so they are now correctly consumable by downstream devices.
- **DSOF-26351** - The `detectsystems` API endpoint now always correctly returns the d3net adapters IP address.
- **DSOF-27985** - Exporting frame as screenshot from an LED screen now works correctly when the `enableSLC` option switch is set.
- **DSOF-28084** - Deleting the time string from a TC tag will no longer generate a notification.
- **DSOF-28250** - In ACES mode, rendering 2 layers on the timeline targeting the same surface where one has content in ACEScg and another in ACEScct will not longer result in black sparkles on output.
- **DSOF-28358** - Omitting the easing value from an HTTPSockpuppet API command will now default to easing linearly rather than returning an error.
- **DSOF-28386** - Changing the GUI Mode for a machine via the API now works correctly and behaves the same way setting it in the GUI does.
- **DSOF-28395** - Notch layers patched to HTTP sockpuppet will no longer display a spurious notification.
- **DSOF-28402** - status/session API no longer returns an error when a machine in session is offline
- **DSOF-28440** - HTTPSockpuppet patches no longer expose some fields which are not visible in the GUI.
- **DSOF-28433** - Changing the refresh rate of d3 will no longer cause MTC transports to think that timecode has been dropped.
- **DSOF-28484** - Texture streams over RenderStream is now correctly sent from the controller machine instead of always from the Director media server.

- **DSOF-28602** - Changing the type of a surface, LED screen or DMX screen will no longer report an error and fail to change the surface type.
- **DSOF-28638** - Using Porta to delete video clips in Designer will now happen much faster.
- **DSOF-28643** - Holding tab and Shift+Tab while moving the mouse now correctly pan and rotated the visualiser camera again.

Designer r31 Release Notes

r31.3.4 - Hotfixes

Download r31.3.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *228566*
Starter build: *228567*
Released: *September 24th 2025*

Fixes

- **DSOF-31173** - Playing back video very slowly with frame blending is now smoother.
- **DSOF-31181** - Designer will no longer hang for long periods when inserting time on the timeline in projects with hundreds of layers on the same track.
- **DSOF-29883** - Selecting `Show History` on a project folder in Manager will now always display a consistent list of versions in the correct order, and opening a project from this menu will open the project in the installed version of Designer.
- **DSOF-31211** - The pyi stub file now has the correct return types for several methods of `ResourceManager`.
- **DSOF-31242** - Notes can now be deleted again by clearing the text field for the note and pressing `OK`

r31.3.3 - Hotfixes

Download r31.3.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *228168*
Starter build: *228169*
Released: *September 17th 2025*

Fixes

- **DSOF-31183** - Python method `Track.splitSectionAtBeat()` now accepts an optional second argument for specifying the transition setting for the new section, as it did before r31.3. For more information about the `Track` class, please refer to the Developer Documentation.

- **DSOF-31138** - When switching from a track with a geometric mapping to another track without geometric mappings, Designer no longer reports an Access Violation error. This restores the behaviour prior to r31.3.1.
- **DSOF-30770**, **DSOF-30769** - DMX Channels in the DMXPatch Editor can now be reordered to lower Channels again, as they could be before r31.0. Once reordered, the properties are correctly editable.

r31.3.2 - Hotfixes

Download r31.3.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *227560*
Starter build: *227561*
Released: *September 10th 2025*

Fixes

- **DSOF-31126** - Editing Cues on duplicated tracks will no longer be reflected across other duplicated copies, as it was before r31.3.
- **DSOF-31118** - VX 1 and VX 4/4n/4+ servers with Matrox capture cards will no longer crash to desktop when capturing using certain input ports, as it did before r31.0.3.
- **DSOF-30093** - Designer will no longer occasionally hang indefinitely on shutdown from handling API requests.

> **Note**
>
> Frequent polling of API endpoints is strongly discouraged. It can lead to reduced system performance. To receive real-time updates, we recommend using the Live Update API for streaming data from Designer. This ensures your app always has the latest data without extra overhead. A more detailed explanation can be found under **Recommended: Use Live Update Instead of Polling REST APIs** on the Developer Portal.

- **DSOF-30931** - Duplicating time at the end of a track no longer reports a spurious error, as it did before r30.8.
- **DSOF-31124** - Inserting time in **Layers, sections and audio** and **Layers and sections only** modes no longer leaves section breaks behind, as it did before r31.3.
- **DSOF-31059** - HTTP Sockpuppet `listPatches` endpoint no longer returns an empty 'type' and `stringValue`. The type is now 'string', and if a value had been previously sent via the 'live' endpoint, `stringValue` now displays the last value sent. This restores the behaviour before r31.0.
- **DSOF-30562** - RenderStream workloads using Texture Parameters no longer reports a spurious "RenderStream Send Failed" error.

r31.3.1 - Hotfixes

Download r31.3.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *226904*
Starter build: *226905*
Released: *September 3rd 2025*

Improvements

- **DSOF-30889** - The `api/service/project/startlocalproject` API endpoint can now accept the `projectPath` parameter as either a relative or absolute path, rather than just a relative path.

Fixes

- **DSOF-31097** - Designer no longer fails to start up on GX 1 and GX 2 servers with a "Error calling '`pOutput->QueryInterface<IDXGIOutput6>(&output6)`'" error message, as it did before r31.2.
- **DSOF-31075** - On Windows platforms older than version 1809, calling the `/api/service/media/provision` API endpoint no longer fails to create hard links between files downloaded from the same source.
- **DSOF-31018** - Layers starting and ending on a section break no longer have their content duplicated across multiple sections in the generated content table.
- **DSOF-31076** - Applying feed settings with an IP-VFC card no longer fails when the card isn't generating a genlock signal (e.g., due to misconfiguration or missing external genlock). This restores the behaviour prior to r31.2.
- **DSOF-31073** - Designer no longer blocks users from adding LumaKey and Placeholder video inputs when all the physical video inputs are also being used.
- **DSOF-24778** - The `api/service/system/projects` API endpoint now correctly handles Designer versions that match the `rXX.Y-name` custom branch format, and the ancient `release_XX` format.

r31.3 - Stacked Tags

Download r31.3 Full (Pro)

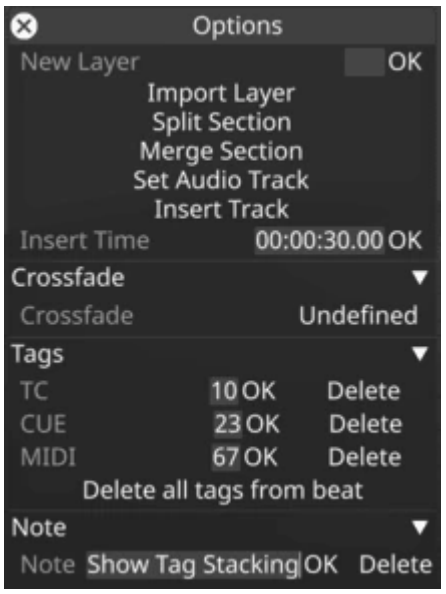
Download Release Notes as PDF

Full (Pro) build: *226529*
Starter build: *226530*
Released: *August 27th 2025*

New Features

Stacked Tags

We refactored the Cues and Tags system in Designer. This allows multiple Tags to be assigned to the same beat, as part of a single Cue. Up to one Tag of each Tag type (Timecode/DMX/MIDI) can be added to that Cue. When the user right-clicks on the Track, the menu now looks like this:



This menu can also be accessed using the following shortcut keys:

- `CTRL+1` - open the menu and focus on the Timecode Tag
- `CTRL+2` - open the menu and focus on the DMX Tag
- `CTRL+3` - open the menu and focus on the MIDI Tag
- `CTRL+T` - open the menu and focus on the *last-editted* Tag type

Individual Tags and Notes can be moved along the Track as usual by holding `Alt` and Left Mouse Button Dragging. Dragging in this mode allows users to merge Notes and Tags onto existing Cues. Holding `Ctrl` and `Alt` and Left Mouse Button Dragging now moves an entire Cue along the Track. Cues cannot be merged in this mode. Instead, it will slip to the next available beat.

For users of the Python API, the `Track` object now has additional methods, e.g.

- `cueBeats` - returns an array of beats where Cues are placed.
- `cueAtBeat` - returns a `Cue` object located at the specified beat.
- `setNoteAtBeat` - sets the Note at the specified beat.

For more details on the new `Track` methods, please see the **Developer guide**.

The Cue List has been modified to accommodate multiple Tags on the same beat. Empty Note and Tags columns are automatically hidden in the Cue List for performance reasons. Users can now create Notes and Tags directly from the Cue List, as long as the relevant column is visible. Inserting a blank string in the Note or Tags columns will automatically delete it from the Track.

The Track Jump module has been modified so it no longer references a Section index, but rather a Cue in the selected track. The reference is preserved when Sections are added or removed, or if the selected Section break is moved around on the Track.

Improvements

- **DSOF-30179** - A new `api/service/media/list` API endpoint gets a list of files under the requested directory.
- **DSOF-30992** - Enable `guisystem.selectedlayers` in Python API.
- **DSOF-9985** - Tooltip added for OmniCal Calibration.
- **DSOF-26192** - The 'Reconfigure Workload' button in the RenderStream layer now has a more descriptive tooltip.

r31.2.2 - Hotfixes

Download r31.2.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *226526*
Starter build: *226527*
Released: *August 27th 2025*

Improvements

- **DSOF-31053** - Python API users can create parameters for Open Layers without needing a Playhead over the Layer.

Fixes

- **DSOF-31066** - v1 API 'list Resources' endpoint no longer returns an empty response, as it did before r31.2.
- **DSOF-31064** - A machine not connected to the internet will no longer disable API functionality, as it did before r31.1.
- **DSOF-31074**, **DSOF-30960** - The 'Find/Replace Usage' button no longer reports an error and fails to open the usages menu, as it did before r31.1.
- **DSOF-30864** - Arrowing into a UVLookUp layer no longer reports errors, as it did before r21.3.2.

- **DSOF-30699** - The Designer installer now warns users about requiring CodeMeter Runtime, if it is not already installed, before continuing with installation.
- **DSOF-31045** - When using the Python `Track.makeArrow` function to create an arrow between two layers not under the current Playhead, Designer will no longer report an error.
- **DSOF-30930** - When removing time at the end of a track, Designer will no longer report a spurious error.

r31.2.1 - Hotfixes

Download r31.2.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *225580*
Starter build: *225581*
Released: *August 20th 2025*

Fixes

- **DSOF-30993** - Cameras no longer stutter in their movement when the parent prop is animated, as they did before r31.0.3.
- **DSOF-30650** - Servers with IP-VFC cards in PTP Sync Mode no longer report errors when changing the PTP profile, as they did before r30.7.2.
- **DSOF-30850** - Using Border Expansion with Spherical Mapping no longer distorts the final results with certain meshes.
- **DSOF-30999** - The Python API method `overlayMessage` no longer misses some of its parameter names.

r31.2 - Skeleton Tracking Improvements

Download r31.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *225152*
Starter build: *225153*
Released: *August 13th 2025*

Improvements

- **DSOF-30700** - Tracked points in `SkeletalPointTrackingSource` are now bound between settable upper and lower limits.
- **DSOF-30613** - The Chromium Embedded Framework (CEF) package, used for the web layer and plugins, has been updated to version 137.0.19, which contains Chromium version 137.0.7151.121.

- **DSOF-30587** - Notch layers now have Padding X and Padding Y fields to help remove screen-space effects e.g. vignettes. See the **Notch layer** page for more details.
- **DSOF-30684** - In Stage Render Settings for a Camera, users now have the option to hide skeletons on stage. See the **Stage Render Settings** page for more details.
- **DSOF-30649** - Projector objects now have a mask field to apply a mask to the projection surface(s) it hits. See the **Editing Projectors** page for more details.
- **DSOF-30400** - IP-VFC cards will now behave more reliably on machine boot when they are configured to use external Genlock but are currently not receiving an external Genlock signal.
- **DSOF-30804** - Sockpuppet patch widgets are now titled with their owning layer or object, and the name of the patch, instead of generic names 'DMX Patch' or 'OSC Patch'.
- **DSOF-30803** - Users are now notified when there is a DMX channel conflict without needing to open the DMX Patch Assignment Widget.
- **DSOF-2970** - Track zoom in/out buttons now have tooltips explaining the keyboard shortcuts to perform the same actions.

Fixes

- **DSOF-30929** - Luma-Matte and Inverse-Luma-Matte blend modes, added in r31.1, are now moved to the end of the list of blend modes, which restores the original order of modes for DMX personalities. See the **Blend Mode** page for more details.
- **DSOF-30694** - Skeletons now stay in place when individual points rejoin after losing tracking.
- **DSOF-30739** - RenderStreamLocal now supports Front Plate mappings.
- **DSOF-30573** - Skeleton points no longer suffer from gimbal lock when objects rotate through 360 degrees.
- **DSOF-30530** - Multi-machine sessions now are better synchronised when the director is not genlocked.
- **DSOF-27407** - Machines that failed to join a session no longer spam RenderStream error notifications.
- **DSOF-26254** - Changing a project between 8- to 10-bit output modes will now wait to configure the GPU with the correct bit-depth until feed settings are applied (like all other feed settings).
- **DSOF-24103, DSOF-21289, DSOF-30714** - RenderStream workloads no longer reports spurious errors when removing channels or changing mappings.
- **DSOF-30661** - SkeletalPointTrackingSource tracking is no longer influenced by the initial pose of the Skeleton.
- **DSOF-25852** - Tooltips for Fade Up/Fade Down/Hold are now corrected.
- **DSOF-24383** - Feed rectangle tooltips are now corrected.

r31.1.1 - Hotfixes

Download r31.1.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *225126*
Starter build: *225127*
Released: *August 13th 2025*

Improvements

- **DSOF-29296**, **DSOF-28954** - The EULA for Pro and Starter installers are now the same.

Fixes

- **DSOF-30866** - Layers that are resized from the left will now properly report their content in Exported Content Tables.
- **DSOF-30863** - Designer will no longer fail to import FBX meshes with null attributes, and will instead ignore the null attributes.
- **DSOF-30826** - In performance-limited situations, XR colour calibration will no longer occassionally fail to capture all colours.
- **DSOF-30785** - Mesh Mapping with 'Tiles' Splitting Type correctly warps DX12 RenderStream workloads again, as it did before r31.0.
- **DSOF-30725** - The first VFC output of a VX4+ will no longer fail to framelock with the other outputs.
- **DSOF-30784** - Viewing a video layer patch assignment in a Patch List or Global Patch List view will no longer report a spurious error.
- **DSOF-30652**, **DSOF-30873** - Director machines running large projects, especially with lots of projectors, will no longer suffer from performance issues.
- **DSOF-30921** - Designer APIs are now case-insensitive to input option names, as they were before r30.8.
- **DSOF-30681** - `SkeletalPointTrackingSource` now filters out duplicated tracking points for improved tracking stability.
- **DSOF-30676** - `SkeletalPointTrackingSource` now correctly handle non-zero root node offsets from the FBX mesh.
- **DSOF-30712** - Now RenderStream Projects network share settings will always be configured upon installation of Designer, same as the d3 Projects network share.

r31.1 - Luma Matte Mask and 2.5D Improvements

Download r31.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 224006
Starter build: 224007
Released: July 30th 2025

Improvements

- **DSOF-30571** - Designer plugins can now check if a user is logged in to Designer Cloud via d3Manager.
- **DSOF-30560** - Layers now have a "Luma Matte Mask" Blend Mode. You can read about how to use it **here**.
- **DSOF-26841** - 2.5D layers now can be played back locked to the timeline.
- **DSOF-26908** - ReferencePoints manager now includes a list of TrackedPoints.
- **DSOF-30671** - The default step value boxes in `SkeletalPointTrackingSource` is now `0.1`.
- **DSOF-30641** - The cue list widget now retains it's size after closing and reopening the widget.
- **DSOF-30366** - The Media Provisioning API now only accepts absolute paths for file provisioning and removal.
- **DSOF-30585** - Media Provisioning API endpoints can now be given a list of paths to files to provision and/or remove instead of accepting only 1 path at a time.
- **DSOF-30555** - The RenderStream Latency graph now has more details about what in the render pipeline is causing the latency.

Fixes

- **DSOF-30470** - Designer will no longer occasionally experience video capture drops in rare circumstances.
- **DSOF-30703** - Upgrading specific projects with specific expressions past r31.0 will no longer crash with an ACCESS_VIOLATION.
- **DSOF-30369** - Remote textures shared with UE over RenderStream when UE is set to have a working colour space of ACEScg now have the correct colour response throughout the render pipeline.
- **DSOF-30168** - SDP files placed in SDPFile folder now create an IP video input automatically.
- **DSOF-30167** - Modifications to IP video capture streams now persist between reboots on Actors properly.
- **DSOF-30003** - Remote textures shared over RenderStream whose sources are arrowed layers where the content in that arrowed layer is controlled by an indirection now respond properly to indirection changes.

- **DSOF-30488** - Sending media management API calls in very quick succession will no longer sometimes fail.
- **DSOF-30471** - Layers mapped to inactive screens but also arrowed in to layers with active screens now prefetch their content properly.
- **DSOF-30698** - Using the “Find and Remove Programs” tool in Windows now properly lists Designer as “Designer” instead of “d3”.
- **DSOF-30701** - Attempting to provision media via the Media Provisioning API using only the “transfers” element will no longer return a spurious failure message after the correct success messages.
- **DSOF-30657** - A SkeletalPoint Tracking Source can no longer be selected for non-Skeleton objects.
- **DSOF-30584** - Concurrent Media Provisioning API calls referencing the same file will no longer perform multiple unnecessary copies and will instead perform 1 copy and create multiple hard-links.

r31.0.4 - Hotfixes

Download r31.0.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 223832
Starter build: 223833
Released: July 30th 2025

Improvements

- **DSOF-30789** - Plugin and web layer logs are now more comprehensive for easier debugging.
- **DSOF-29891** - The **plugin API** has a new endpoint which will allow users to import .d3export files called `importFromPackageName`.

Fixes

- **DSOF-30762** - Switching a DMX patch to output mode when some fields are toggled off will no longer produce a spurious error message.
- **DSOF-30667** - Skeleton objects can now be correctly controlled with Rigid Body Tracking Sources.

r31.0.3 - Hotfixes

Download r31.0.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 223323
Starter build: 223324
Released: July 23rd 2025

Improvements

- **DSOF-30746** - The warning message triggered upon Sockpuppet personality regeneration now specifies the location of the regenerated file, enabling easier validation after an upgrade.
- **DSOF-28856** - RenderStream layers that are syncing assets will now display the status of the sync on the layer itself in the track widget.

Fixes

- **DSOF-30738** - XR Tracker Delay no longer reports an error and fails to capture grid images in some circumstances.
- **DSOF-30131** - Designer will no longer very occasionally hang indefinitely when transitioning from fullscreen to windowed or leaving RenderStream layers.
- **DSOF-30775** - The **Delete All Patches** button in the **Patch Assignment Options** menu is functional again.
- **DSOF-30685** - The Track Widget is now more performant on directors, editors and understudies.
- **DSOF-30322** - The console will no longer be filled with lots of spurious messages in certain scenarios when viewing the Feed View.
- **DSOF-30783** - Opening a **Sockpuppet Patch Editor** for a **DMX Event Transport** will no longer result in the patch editor being disconnected from its parent editor.
- **DSOF-30744** - The Designer uninstaller will now correctly remove all registry keys.
- **DSOF-30654** - VX 4+ machines equipped with Matrox capture cards will no longer see that sometimes the 2E port is not synced with others when capturing 12G SDI signals.
- **DSOF-30321** - Blacks captured in HDR with ST 2110 Network Video Capture no longer display incorrectly.

r31.0.2 - Hotfixes

Download r31.0.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 222612
Starter build: 222613
Released: July 16th 2025

Fixes

- **DSOF-30707** - The XR Colour calibration widget can now correctly be opened again.
- **DSOF-22828** - Designer will no longer sometimes spuriously log errors about receiving frames while RenderStream is launching.
- **DSOF-30708** - The default DMX Event Transport channels in new projects are now 5, 6 and 7 as they were before r31.0.
- **DSOF-25822** - Designer will no longer fail to open the RenderStream asset list in rare cases where an asset is discovered but the node it was discovered from quickly disconnects from the network.
- **DSOF-30709** - After disabling the DMX Event Transport's Output Mode command, Output Mode is now correctly manually configurable again.
- **DSOF-30673** - Muting tracked points now correctly disables them on SkeletalPointTrackingSources.
- **DSOF-29740** - SDI 1080p Level B quad link video signals coming from Blackmagic video sources no longer flicker when captured on Disguise servers equipped with Deltacast capture cards.
  - If the **Colourimetry** or **Transfer Characteristic** of the incoming video signal cannot be read from the signal metadata, Designer will default to **Rec.709** and **SDR**.

r31.0.1 - Hotfixes

Download r31.0.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 222355
Starter build: 222356
Released: July 9th 2025

Improvements

- **DSOF-26593** - Designer now logs which adaptors has been set as the **Preferred Sync Adaptor** of a cluster pool to the console to better assist with debugging.

Fixes

- **DSOF-30655** - Linking a position receiver field to an open layer no longer causes Designer to CTD.
- **DSOF-30642** - The `DisplayViewTransform` field in OCIO configs is now properly applied when used as an input transform.
- **DSOF-30602** - Designer will no longer perform below specification when playing back many layers of video.
- **DSOF-30308** - Project folders that have a **plugins** sub-folder can now be deleted properly without a permissions error.
- **DSOF-28881** - Designer will not longer report an error when the project is saved if a RenderStream receive health widget is pinned.
- **DSOF-30582** - Rendering a layer with a Mesh Projection mapping no longer causes a frame drop on the first frame of the layer.
- **DSOF-30648** - Live update will not longer regularly become blocked when doing skeleton tracking across multiple machines.
- **DSOF-30644** - Understudies no longer spuriously report that they cannot send OSC messages when using projector calibrator devices.
- **DSOF-30610** - RenderStream workloads will no longer fail to launch for all assets if a single asset with an invalid engine type is discovered on the network.
- **DSOF-30581** - Compositor frames are no longer exported at proxy resolutions.
- **DSOF-30609** - d3Manager's feature **Clear ingestion history** works as expected again.

r31.0 - RenderStream Local, Legacy License Deprecation and Other Improvements

Download r31.0 Full (Pro)

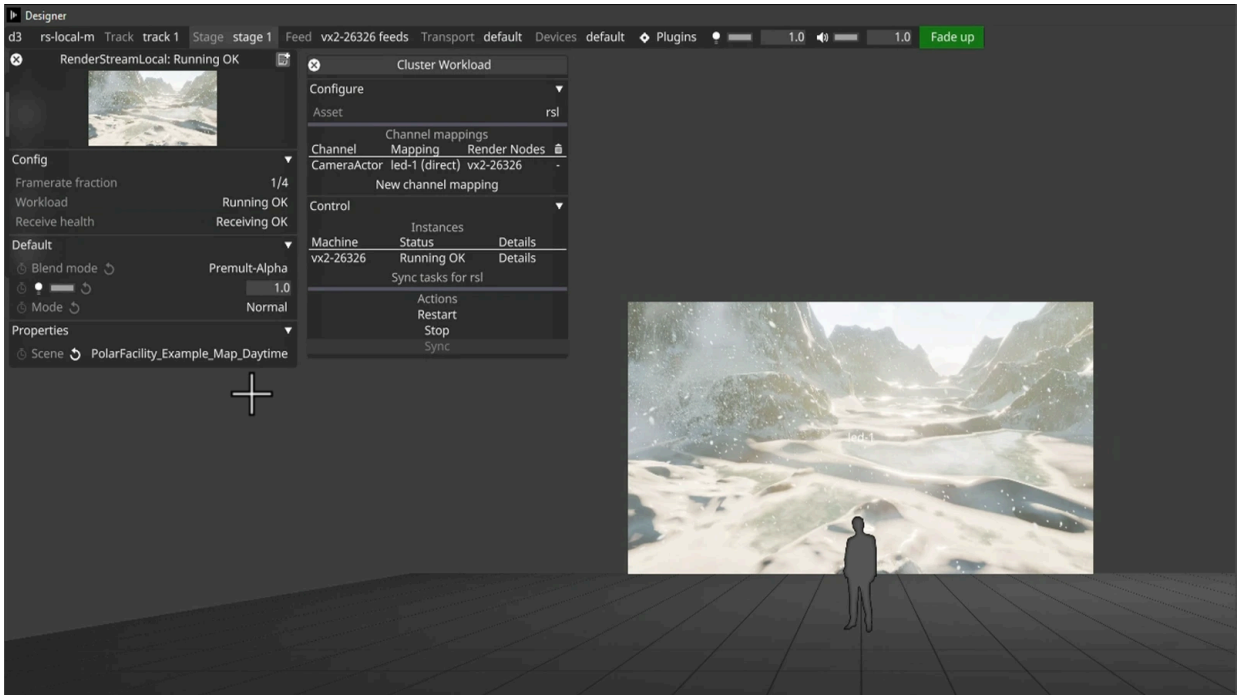
Download Release Notes as PDF

Full (Pro) build: 221477
Starter build: 221478
Released: July 7th 2025

New Features

RenderStream Local

We are releasing a new content layer called the **RenderStream Local** layer, which allows the user to run any RenderStream asset on the same server as Designer. This functions like the existing RenderStream layer, but rather than sending the rendered frames over the network, the frames are accessible to Designer in the shared GPU memory.



RenderStream Local layer using the Unreal Engine integration on a VX 2 media server

RenderStream Local layers are watermarked by default if no RenderStream License has been applied to the server. RenderStream Local is supported on the VX and GX ranges only.

VX 4 and VX 4+ servers do not support the RenderStream Local layer due to technical limitations with AMD GPUs. EX range servers can use RenderStream Local for TouchDesigner only with the purchase of an optional, perpetual Real-Time Connector License. Read more about optional EX range licenses **here**.

Read more about the RenderStream Local layer in our new documentation **here**.

TouchDesigner - EX Range

The EX range now supports the TouchDesigner RenderStream plugin via the RenderStreamLocal layer. This is enabled with the **optional EX Real-Time connector (RTC) license**, which also enables users to run a Notch block on the EX range. The Real-Time Connector license is purchased as a one-time cost. There is no need for a RenderStream license to enable this functionality. TouchDesigner using the RenderStream layer (where the RenderStream workload is deployed to an RX server) is not supported on the EX range.

Sockpuppet Patch Improvements

We've overhauled the Sockpuppet Patch UI, which will allow you to more easily view, modify and export your Sockpuppet Patches. You can read more about these changes **here**.

Camera Depth of Field Simulation

Cameras now have the capacity to simulate a *depth of field* effect that is physically accurate. You can find more information about this feature **here**.

This is especially useful when paired with **Stage Render Layers** and **2.5D Assets**.

Legacy Designer License Deprecation

From r31.0 onwards, the Disguise Designer software will no longer support Designer Legacy licenses. Only Designer Pro licenses are now supported.

Users will continue to be able to use both Designer Pro and Designer Legacy licenses to run versions prior to r31.0.

We have also removed support for shared Educational Licenses. If you are interested in teaching Disguise, we can distribute a range of appropriate licenses for you if you contact us **here**. For more information, see **Educational Licenses**.

Media Provisioning API

We have introduced a simple API for copying media to and removing media from your Designer media server cluster. You can read more about the media provisioning API **here**.

Improvements

In r31.0, we have made a range of improvements across several categories of the software.

General Improvements

- **DSOF-30315** - Transports can no longer be Engaged/Disengaged by pressing **Enter** after toggling Engage/Disengage.
- **DSOF-30313** - Plugins are now available in Starter versions of Designer.
- **DSOF-30227** - We now offer an optional Colour Management (ACES & OCIO) unlock license for the EX range. You can find more information about how to buy this license by contacting the **sales team**.
- **DSOF-30550** - Undo will now undo and redo the creation and deletion of whole objects, not just edits to objects.
- **DSOF-29784** - During **XR Colour Calibration**, you can now optionally choose to pre-generate your LED screen Mask and visualise it to help with debugging.
- **DSOF-29624** - During **XR Colour Calibration**, old LUTs are now automatically backed up in a backup folder and can be restored by undoing the previous calibration.
- **DSOF-30001** - Expressions now support negative array indexing to index from the last element, like Python.
- **DSOF-27140** - The **De-Isolate Sockpuppet** toggle on Sockpuppet fields now returns the layer to the state before the field was isolated instead of simply re-patching all fields.

- **DSOF-30382** - Graph legends font size is now large enough to be seen with the naked eye.
- **DSOF-30314** - A new **Zero Pose** Button in the Skeleton editor, which will set all the joint poses to 0.

API Improvements

You can visit our Developer documentation **here**.

- **DSOF-26991** - Designer now responds with more useful error messages when it receives an unsupported API request.
- **DSOF-30461**, **DSOF-30460**, **DSOF-30459** & **DSOF-30458** - A range of improvements have been made, including the ability to subscribe to live Graph data.
- **DSOF-29293** - There is now a new API endpoint for changing the **Cluster pool** of a RenderStream workload.
- **DSOF-30288** - The plugin API for accessing Indirections is now simpler to use.
- **DSOF-30265** - The Designer API now accepts UIDs in both Hexadecimal and Decimal formats.
- **DSOF-30180** - A new Service API endpoint is now available for deleting media on disk.

Error Message Improvements

- **DSOF-29559** - Error messages reported when Invalid Arrows are created are now more detailed.
- **DSOF-30348** - Designer now has better debug logging to detect issues with bulk modifications of QuickCal Reference Points.
- **DSOF-30224** - Designer now has more detailed and helpful error messages when Starter projects are opened in Ful versions of Designer.
- **DSOF-29397** - Designer now has more useful error notifications of certain errors, including when meshes are missing in OmniCal environments.
- **DSOF-29328** - Designer now has more descriptive error logs in the consoles if getting or saving information about the d3Net adaptor fails. This enables quicker debugging.

Fixes

- **DSOF-30492** - Using the colour checker in OCIO mode no longer erroneously reports small errors in some colour responses using the standard MacBeth ColorChecker chart.
- **DSOF-30427** - Designer will no longer sometimes CTD with an audio error after playing video with embedded audio for many hours.
- **DSOF-29659** - If the network adapter profile of a NIC is set to **Public** in Windows. Designer will now report a useful error when starting RenderStream, directing the user to change the setting, rather than allow the workload to sometimes get stuck on **Starting**.
- **DSOF-29726** - Dragging a section with a custom **Fade Duration** set no longer reverts the section's Fade setting to **Global**.

Designer r32 Release Notes

r32.4.12 - Hotfixes

Download r32.4.12 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *255893*
Starter build: *255894*
Released: *July 15th 2026*

Items marked with a • are also included in r33.2.4.

Improvements

- **DSOF-32989** - OmniCal now logs the projector name during RANSAC calibration, making calibration reports easier to understand.

Fixes

- **DSOF-32825** - SDI VFC outputs will no longer occasionally lose their configuration when feed settings are applied.
- **DSOF-31902** - Projects with a track jump module that references a tag will no longer take a long time to close.
- **DSOF-32537** - RenderStream texture parameters are now properly rendered when they are arrowed for another layer and the RenderStream Controller machine is an Actor.
- **DSOF-33071** - Designer will no longer raise a spurious error when a layer inside a Notch Block is invalid.
- **DSOF-32813** - Inserting time on a timeline set to 'Custom' FPS will add the expected amount of time.

r32.4.11 - Hotfixes

Download r32.4.11 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *253994*
Starter build: *253995*
Released: *July 1st 2026*

Items marked with a • are also included in r33.2.3.

Improvements

- **DSOF-33130** - Both Project Diagnostics and System Diagnostics now include console log files from the last 30 days, rather than only the last seven, so diagnostics collected some time after an issue occurred still capture the relevant logs.

Fixes

- **DSOF-32563** - Resolved an issue where Designer could not identify Rivermax network adapters by their PCI path, preventing the correct ConnectX-5 or ConnectX-6 licence from being selected for IP video.

r32.4.10 - Hotfixes

Download r32.4.10 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *253404*
Starter build: *253405*
Released: *June 24th 2026*

Items marked with a • are also included in r33.2.2.

Improvements

- **DSOF-32501** - Improved the reliability of timeline playback selecting the correct frames to display.
- **DSOF-32935** - Reduced the Designer installer size by removing redundant files from the bundled web component (libcef).
- **DSOF-32520** - d3 now warns you when more than 12 projectors are in use in a single dynamic blend, after taking the DynamicBlend exclude list into account.

Fixes

- **DSOF-33068** - d3 no longer crashes to desktop when an API client disconnects while unsubscribing from live updates.
- **DSOF-32776** - Project files are now kept compact during auto and manual saving, so they no longer bloat in size to the point of becoming un-openable in very long editing sessions.
- **DSOF-29827** - The `GET detectsystems` API endpoint now returns the accessing machine's real IP address instead of `127.0.0.1`.
- **DSOF-32760** - Projector View Blending now no longer renders mask objects that are behind surfaces, as it did before r32.4.2.

- **DSOF-27583** - The OmniCal report now explains why an OmniCal score was penalised and what can be done about it.
- **DSOF-32941** - d3 no longer reports a spurious error when using Mesh Projection on project shutdown.
- **DSOF-32965** - Moving vertices of a “Mesh Deform” feed warp no longer raises spurious notifications.
- **DSOF-32565** - OCIO input transforms for Logical VideoIns can now be edited while in Quick Edit mode.
- **DSOF-32961** - Project snapshots whose names contain spaces can now be recalled correctly.
- **DSOF-32942** - Designer will no longer intermittently open to a grey screen and require a restart on rare occasions.
- **DSOF-32574** - The OCIO transforms list now refreshes automatically when undoing or redoing transform deletions.
- **DSOF-31786** - In OCIO mode, ”- Curve” working space transforms no longer throw errors.

r32.4.9 - Hotfixes

Download r32.4.9 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *251951*
Starter build: *251952*
Released: *June 10th 2026*

Items marked with a • are also included in r33.2.1.

Fixes

- **DSOF-30798** & **DSOF-32367** & **DSOF-32851** - Matrox video capture inputs are now more stable. Designer no longer rebuilds an input’s capture topology — which produced a brief black frame — when only colour space, transfer characteristic, aspect ratio or audio metadata in the incoming SDI signal changes. Changes that genuinely affect the signal (resolution, frame rate, scan mode or 3G level) still rebuild the topology as before. In addition, when one input on a Matrox card restarts, the other inputs on that card are no longer disrupted.
- **DSOF-32697** & **DSOF-32753** - The Director no longer hangs when opening the Notch layer editor after hot-reloading a Notch block, and no longer hangs repeatedly after exposable parameters have been removed from a block and the block reloaded into a running project.
- **DSOF-32809** - Sequencing the same video clip at two keyframes on a single Video Layer now correctly restarts the clip from its first frame when the second keyframe is reached, instead of continuing to play uninterrupted — restoring the behaviour from before r30.8.

- **DSOF-32836** - A **Video Layer** with its Speed set to 0 and its At end point set to Pause now correctly holds on the first frame when played from the start of its section, instead of displaying the last frame.
- **DSOF-32861** & **DSOF-32870** - Copying and pasting **layers** on a Track now behaves correctly. Pasting an expanded group no longer creates duplicate child layers outside the group, and pasting multiple layers now preserves the time offsets between them — the earliest layer lands at the playhead and the rest keep their original spacing — instead of stacking every layer at the playhead.
- **DSOF-32954** - Moving a **Video Layer** with the **Ctrl+Alt+<** and **Ctrl+Alt+>** keyboard shortcuts now moves the layer's **keyframes** along with it, matching the behaviour when the layer is dragged with the mouse.

r32.4.8 - Hotfixes

Download r32.4.8 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *251212*
Starter build: *251213*
Released: *June 3rd 2026*

Items marked with a ● are also included in **r33.1.5**.

Improvements

- **DSOF-32691** - Drawing the timeline is now more performant on **Tracks** that contain a large number of **notes** and **tags**, reducing the per-frame cost on every machine that displays the timeline.

Fixes

- **DSOF-32433** - Editors no longer intermittently report media as missing on Actor and Understudy machines when that media is actually present.
- **DSOF-32437** - The **OpenVPCal Plugin** can now capture calibration patterns in a Director and Actor setup. Previously, pattern generation and patching worked but the capture step failed — the screen went black and the capture never completed — on anything other than a solo machine.
- **DSOF-32457** - Upgrading specific projects created in r18.1 to versions above r30.8 no longer opens to an unresponsive interface with a blank grey background.
- **DSOF-32652** - Designer machines no longer show a false "Display settings do not match project configuration. Did you remember to Apply Feed Settings?" warning when a GUI head is set to a custom resolution. The warning now appears only when the display configuration genuinely needs **feed settings** to be applied.

- **DSOF-32749** & **DSOF-32778** - Editing Track notes with the **Ctrl+N** note dialog now behaves correctly. Editing a note at a different zoom level to the one it was created at no longer creates a duplicate note at the nearest second, and clearing a note's contents and confirming with **Enter** now reliably deletes it.

r32.4.7 - Hotfixes

Download r32.4.7 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *250391*
Starter build: *250392*
Released: *May 27th 2026*

Items marked with a • are also included in r33.1.4.

Fixes

- **DSOF-32763** - Using **Insert Track** to insert one Track into another no longer links Cues, MIDI, Notes, and timecode between the source and destination tracks.
- **DSOF-32875** - Locked Layers that sit entirely after a region targeted by the **Remove Bars** timeline action now shift backwards along with the rest of the track, instead of staying at their original position and desyncing from surrounding layers.
- **DSOF-32816** - Pasting a group of layers into a new Track no longer extends the destination track's duration by the time offset that the group held in its source track.
- **DSOF-32629** - Changing the palette of a Radar Layer to a solid colour gradient now updates the Layer's output immediately. Previously, the radar continued to display as black until you switched tracks and back.

r32.4.6 - Hotfixes

Download r32.4.6 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *249734*
Starter build: *249735*
Released: *May 20th 2026*

Items marked with a • are also included in r33.1.3.

Improvements

- **DSOF-32061** - Changing the project refresh rate now better aligns layers, cues and keyframes to the new framerate.

- **DSOF-32858** - The `Null handle when setting texture parameter` console message is now rate-limited and includes the affected texture's path, description, status, and rendering context. Previously, this error was emitted unconditionally every frame with no information beyond the shader sampler slot, making the underlying issue difficult to diagnose from logs alone.

Fixes

- **DSOF-31070** - Active **IP Video Capture** sources are now preserved across Designer project restarts. Previously, the patched IP video-in resources could be missing on reopening the project, leaving the inputs inactive with `unable to create video capture stream` errors.
- **DSOF-30503** - The video delay calibration widget now reports realistic values for **ST 2110** video inputs. Previously, the widget produced delays of several thousand seconds due to a unit mismatch in the receive timestamp.
- **DSOF-32434** - **HDMI capture** inputs reporting RGB Limited — including **Nvidia GPU** outputs that incorrectly advertise their RGB Full streams as Limited — now produce an image instead of a black screen. The Limited-to-Full conversion is now performed by a Designer shader rather than by Deltacast hardware, where it was unreliable for these sources.
- **DSOF-32814** - **TransportControl Layers** now reliably issue timeline jumps on other tracks when their containing track is jumped to via timecode.
- **DSOF-32370** - Designer no longer logs `The given index isn't a section; please check your logic!` to the console when dragging **keyframes** on a track that also contains note or tag cues, and snapping a keyframe to a section boundary now correctly finds the next section break when there are intermediate non-section cues. This restores the behaviour from before r31.3.
- **DSOF-32448** - **RenderStream** streams no longer stop after a secondary render machine is marked as failed using the **Mark as Failed** failover method. The understudy now takes over and continues rendering the stream as expected.
- **DSOF-32688** - When the **d3Net** connection to a peer briefly drops and recovers, the Director now automatically re-admits the peer to the session. Previously, the peer remained offline in the **Network Status widget** and the Director's console accumulated `has already exited` warnings every few seconds until the show file was restarted.
- **DSOF-32271** - The **Network Status widget** on Editor machines no longer randomly reports remote machines as `---` or "not present". The widget now correctly subscribes to and displays the remote frame rate and machine status for every machine in the session.
- **DSOF-32686** - Machines will no longer occasionally fail to launch when launched remotely from the director.

- **DSOF-32857** - When Designer fails to start due to a subsystem exception (for example, when the display manager cannot enumerate the local display adapters), the startup-failure dialog now includes the originating exception's message and any context-aware remediation steps the subsystem has authored. Creating a diagnostic is no longer the default action — the operator must opt in — and when opted in, a faster system diagnostic is created instead of a full project diagnostic. This restores the behaviour from before r31.3.1.
- **DSOF-30200** - The console on an Editor running in **Solo** mode is no longer spammed with `updateDirectorBlockedState()` messages, making genuine errors easier to spot during troubleshooting.
- **DSOF-31218** - Designer no longer logs `New resource actions haven't been unsubscribed` and `Remove resource actions haven't been unsubscribed` warnings during shutdown. This may also resolve rare hang-on-shutdown behaviour observed in busy projects.
- **DSOF-30782** - Driver-update notifications in the console (for example, the Matrox driver/SDK mismatch warning) now link to the correct download pages on the Disguise website.

r32.4.5 - Hotfixes

Download r32.4.5 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *248487*
Starter build: *248488*
Released: *May 13th 2026*

Items marked with a ● are also included in r33.1.2.

Fixes

- **DSOF-32489** - RenderStream workloads no longer occasionally display an INVALID scene and fail to load all remote parameters when they are first detected.
- **DSOF-32670** - Launching RenderStream Local workloads no longer significantly degrades Designer performance while the project is launching in projects with arrows and mesh projections.
- **DSOF-32595** - Track rendering performance is improved, especially for large projects.
- **DSOF-32676** - Pressing **Enter** to stop the track now works correctly after the playhead has reached the end of the track. See Transport Player Controls.
- **DSOF-32693** - System diagnostics generated through d3manager now correctly include the Mellanox `Mlx5_Dump_Me_Now-*` dump folders, which are useful when troubleshooting network adaptor faults.

- **DSOF-32550** - The `profileGPUPoolFromLaunch` option switch now produces more detailed and accurate output, with properly balanced events and correctly labelled buffer entries.
- **DSOF-32651** - Projects that used the legacy virtual camera workflow prior to r25.0 no longer fail to upgrade when opened in a newer version of Designer.

r32.4.4 - Hotfixes

Download r32.4.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *247775*
Starter build: *247776*
Released: *May 6th 2026*

Items marked with a ● are also included in r33.1.1.

Fixes

- **DSOF-32605** & **DSOF-32592** - Editing keyframes on very large projects no longer causes the director machine to drop frames.
- **DSOF-32643** - When saving a section of a Track as a new Track, Cues, Notes, and Tags on the new Track are no longer linked to the old track as well.
- **DSOF-32620** & **DSOF-32621** - Loading Alembic files is now more robust: meshes containing unsupported elements (such as `FaceSet` material grouping metadata) now load with the unsupported elements ignored, rather than failing the whole file, and projects containing multiple large Alembic files no longer crash to desktop on startup.
- **DSOF-32348**, **DSOF-32355**, **DSOF-32356**, **DSOF-32372** & **DSOF-32331** - A range of IP-VFC reliability fixes:
  - IP-VFC cards appear more reliably after a cold reboot.
  - Adding or swapping IP-VFC cards between machine restarts is now more reliable.
  - Failure to lock to PTP is now reported as `PTP Not Locked`, instead of the misleading `PTP Domain Number is different` or `PTP Profile is different`.
  - NMOS connection requests that include a primary or secondary multicast address update now apply correctly to the IP-VFC port, as expected when running ST 2110 with out-of-band NMOS.
- **DSOF-32587** - When an OmniCal Plan contains cameras with no OmniCal camera assigned and is not set to simulate capture, the Plan camera background now correctly shows red instead of green.

r32.4.3 - Hotfixes

Download r32.4.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *247061*
Starter build: *247062*
Released: *April 29th 2026*

Items marked with a ● are also included in r33.0.3.

Improvements

- **DSOF-32580** - The `GuiSystem` is no longer marked as Internal, so its functions are now available to plugin developers via the **Designer Plugins API**.

Fixes

- **DSOF-32581** - Projects with the `enableSLC` Option Switch enabled and using SLC-sized precomps no longer fail to upgrade properly to the latest gold from r20.0.3 or earlier.
- **DSOF-32428** - Crossfading between sections that use a **Precomp Mapping** no longer fades through black. Precomp crossfades now match the behaviour of direct mappings.
- **DSOF-32099** - Video content no longer skips or jumps when a **speed keyframe** lands on a section break, restoring the behaviour from before r32.2.
- **DSOF-32610** - **RenderStream Local** layers no longer suffer latency spikes of up to 6 frames when the **Frame Fraction** field is set below 1. Latency now stays consistently at 1-2 frames as expected.
- **DSOF-32611** - Users can now set Min and Max metafields on exposed Unreal Engine parameters on **RenderStream Local** layers without the value of the field reverting back to the default once these have been edited.
- **DSOF-25822** - Designer no longer reports a spurious error and prevents the user from selecting assets in the **RenderStream** workload editor under rare circumstances.
- **DSOF-32540** - Designer and d3service now correctly report when their HTTP servers fail to bind their configured ports - for example when WSL2 with mirrored networking ghost-reserves them - rather than continuing to run with a silently unreachable **API**.

r32.4.2 - Hotfixes

Download r32.4.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *246100*
Starter build: *246101*

Released: *April 22nd 2026*

Items marked with a • are also included in r33.0.2.

Fixes

- **DSOF-31636** - Projection masks now update correctly without needing to enter the display settings first.
- **DSOF-32538** - Hold mode (Alt+P) now correctly freezes the last rendered frame on physical outputs, as it did before r32.4.1 and r33.0.1, rather than stretching the top row of pixels across the entire frame.
- **DSOF-32545** - Resolved an issue where Designer's interface elements were rendered approximately 11% larger than intended. Interface sizing now matches its behaviour before r32.3.
- **DSOF-32535** - Resolved an issue where d3service could intermittently crash when checking for internet connectivity after Designer had shut down, which previously required a server reboot to recover.
- **DSOF-32423** - Designer now pre-rolls and chases timecode correctly when using a 29.97 drop-frame source with the Custom Timeline FPS set to Global or Custom. Previously the pre-roll started late and the playhead remained permanently offset from the timecode source.
- **DSOF-32481** - Looping FBX animations now play for their full duration before restarting, rather than pausing shortly before the loop point.
- **DSOF-31802** - Colour Inspector RGB error values are now calculated correctly regardless of the active output colour space. Previously the 2014 Macbeth colour chart produced very high error values when a non-sRGB output transform was in use.
- **DSOF-32374** - Designer will no longer intermittently launch in to a Live Update Blocked state with certain video in formats present.
- **DSOF-32521** - Removing an OSC output expression while its 'Expression' field is selected now works correctly and no longer reports an error.
- **DSOF-32549** - Designer now has improved logging for identifying frame drops.
- **DSOF-32539** - The Transport Manager timecode dropdown now uses short property labels, restoring the expected dropdown width.
- **DSOF-32525** - d3service now correctly logs any licences that have been removed during an automatic licence update.
- **DSOF-32523** - Improved logging about the Designer shutdown process to make troubleshooting shutdown issues easier.

r32.4.1 - Hotfixes

This release has been superseded by r32.4.2. Please update to r32.4.2 to receive the fixes listed here.

Full (Pro) build: *244992*
Starter build: *244993*
Released: *April 8th 2026*

Items marked with a • are also included in r33.0.1.

Improvements

- **DSOF-32385** - Experimental HDR output options have been removed from d3Manager and the user guide, as these were unsupported and could cause unexpected display behaviour.
- **DSOF-32357** - The Python execution API now automatically rolls back project changes when a script raises an exception, preventing partial modifications from persisting.

Fixes

- **DSOF-32358** - RenderStream workload processes (including Unreal Engine, Notch, and TouchDesigner) are now correctly terminated when a workload is stopped, preventing ghost processes from remaining on render nodes.
- **DSOF-31668** - Resolved an issue where Designer could hang indefinitely when losing focus while running in fullscreen mode with video outputs on GX 3+.
- **DSOF-32405** - Designer no longer crashes on startup after downgrading from r32.4 to an older build.
- **DSOF-32395** - The Python execution API no longer throws an exception when a script creates a layer.
- **DSOF-32387** - Editing an Expression Variables layer, undoing changes, then switching tracks no longer reports an error.
- **DSOF-32364** - Inserting or deleting time on large projects no longer causes Designer to hang for an extended period.
- **DSOF-32352** - Notch instances are now correctly released for layers with excluded mappings, preventing long hangs when entering Notch Layers.
- **DSOF-32339** - Removing the last transform from an OCIO layer's transform list now correctly clears the colour effect.
- **DSOF-32320** - Keyframe carets and layer colours now update live when editing layers inside a group, as they did before r32.3.
- **DSOF-31688** & **DSOF-32377** - Modifying RenderStream parameters (including OCIO Input Transform and texture parameters) while a workload is running now works correctly.
- **DSOF-32376** - Cross-origin browser requests to the auth0 API endpoint now work correctly.
- **DSOF-32328** - OmniCal no longer generates repeated error notifications when an alignment filename exceeds the Windows path length limit.
- **DSOF-32220** - Bidirectional SockPuppet output patches now correctly send values over DMX, as they did before r32.2.

- **DSOF-32182** - The media provisioning API no longer incorrectly lowercases folder names for the first transfer entry.
- **DSOF-31189** - The **multitransport** preview widget no longer fails to display all timeline sections in some rare circumstances.
- **DSOF-28762** - Designer no longer unexpectedly enters a test mode if a file named `test.txt` exists in the projects folder.
- **DSOF-32388** - **Skeletal mesh animations** now correctly play back animated bone ends with no children in FBX files.
- **DSOF-32323** - Resolved an intermittent grey screen on startup on machines with IP-VFC cards installed and configured to lock to PTP.
- **DSOF-32256** - **RenderStream** remote texture parameters no longer appear over-exposed when using gamma colour space, particularly with Unreal Engine uncompressed transport.
- **DSOF-32046** - **RenderStream** exposed parameters are now correctly applied when the controller is set to an Actor rather than the Director, as they did before r32.2.

r32.4 - OmniCal Workflow Improvements

This release has been superseded by **r32.4.2** due to a regression causing issues after downgrading to an older release (**DSOF-32405**). Please update to r32.4.2 to receive the features, improvements and fixes listed here.

Download Release Notes as PDF

Full (Pro) build: *241799*
Starter build: *241800*
Released: *March 11th 2026*

New Features

With r32.4, we have introduced a range of improvements to OmniCal, including new API endpoints for the RigCheck workflow, QuickAlign improvements and image checks during capture.

Designer now also supports FBX animations loaded from meshes. These can be controlled using the new Scene Animation Layer, which also handles Alembic animations.

We have introduced the new **OCIO Layer**, enabling you to apply OCIO transforms to generic content.

OmniCal Enhancements

- **New RigCheck API**: New OmniCal API endpoints allow users to programmatically trigger RigChecks, monitor their progress, retrieve result data and more.
- **New OmniCal Score**: A streamlined metric makes it easy to assess and compare calibration quality across different Plans and RigChecks.

- **Advanced Image Diagnostics**: New **post-capture processes** automatically detect out-of-focus camera lenses and identify potential shifting of cameras, projectors, or surfaces by comparing RigCheck blobs against the original Plan.
- **QuickAlign Improvements**: Usability has been upgraded with a new **AlignmentPoint list editor**. This provides a clear overview of the current alignment state and allows for rapid point editing, such as easily toggling the “reshape” function.
- **Disk Space Management**: You can now easily clear old unused RigCheck results directly via the UI or API to free up storage.

Animation Enhancements

- **FBX Animation Support**: Designer now supports FBX animations loaded directly from meshes. Learn more about it **here**.
- **Scene Animation Layer**: This newly introduced **Scene Animation Layer** provides centralised, intuitive control over both FBX and Alembic animations.

Improvements

- **DSOF-29245**, **DSOF-30626** & **DSOF-32147** - OmniCal: Support new Vimba X SDK / driver version 2025-3.
- **DSOF-27178**, **DSOF-29108** & **DSOF-30373** - OmniCal: Better network camera error checking and logging.
- **DSOF-27259** & **DSOF-27307** - OmniCal: Automatic camera discovery management during GUI and API use.
- **DSOF-30773** - OmniCal: Camera Stats window now shows camera temperature and effective network packet size, e.g. to confirm Jumbo Packet configuration.
- **DSOF-27967**, **DSOF-27978**, **DSOF-28278** & **DSOF-31150** - OmniCal: Performance improvements for QuickAlign and Bundle Adjustment.
- **DSOF-26342** - OmniCal: Alignment Point editor now shows vertex and world position to help identify what part of the mesh a vertex is from.
- **DSOF-27669** - OmniCal: For better visibility during alignment QuickAlign now allows customising the wireframe colour.
- **DSOF-17906** & **DSOF-17907** - OmniCal: Add information regarding percentages in the Blob Detection Stats table.
- **DSOF-27615**, **DSOF-27874** & **DSOF-32012** - OmniCal: Cleaned up and reorganised several GUI elements. Most importantly, RigCheck has now its own collapsible section.
- **DSOF-13495** & **DSOF-32086** - OmniCal: OmniCal settings now use checkboxes instead of Yes/No or On/Off drop-down selections for quicker editing.
- **DSOF-26221** & **DSOF-26226** - OmniCal: Add tooltips to many options, buttons and windows.
- **DSOF-27968** - Minor performance improvements to Feed view and VideoIn scope views.
- **DSOF-31706** - The mesh centroid calculation is now more accurate for large scale meshes.

- **DSOF-32076** - Expressions now support casting String objects to Integer objects with the `int()` function. More information can be found **here**.
- **DSOF-31874** - The `getContentViewpoints` API endpoint now returns more useful data for Plugin developers.
- **DSOF-30266** - Device monitors for monitoring incoming data (OSC, DMX, Tracking etc.) now has a “Last Received” column which shows the machine timestamp the last command was received. This is to improve troubleshooting.
- **DSOF-32084** - Designer can now export Sockpuppet personalities in MA2 XML format again.
- **DSOF-31625** - Users can now access the SMC API endpoints with NGINX the same way they do with Designer endpoints by sending commands to `api/smc`.
- **DSOF-25454** - Downloads initiated via Web Plugins now display a useful progress bar.
- **DSOF-32025** & **DSOF-32024** & **DSOF-31999** - Sending RenderStream texture parameters is now more performant, lower latency, and we have exposed additional graphs to display their latency in real-time.

Fixes

- **DSOF-19711** - OmniCal: Prevent session conflicts during QuickAlign reshape in multi-machine sessions.
- **DSOF-31997** - OmniCal: When opening Capture Setup, all projectors are now correctly selected, so that switching from BlackLevel image to e.g. Alignment image works without issues.
- **DSOF-27452** - OmniCal: If a camera times out during capture, this will now cause the whole OmniCal process to abort, as expected.
- **DSOF-31161** - OmniCal: Disable Vimba X setting “Auto Adjust Packet Size” whenever OmniCal cameras are used in Designer. It can also be manually disabled in Vimba X Viewer. This setting is enabled by default by the Vimba X driver, but it was found to cause network problems for OmniCal captures.
- **DSOF-27258** - OmniCal: Loading a Plan or RigCheck result no longer shows a “Could not open capture.txt” error, if the capture folder is empty.
- **DSOF-27645** - Exporting Sockpuppet Personalities that have unicode characters now works properly.
- **DSOF-32062** - Playing the timeline from the start of a Video Layer with embedded audio will no longer skip the first few frames of audio if the Playhead was previously stopped at the start of the Video Layer.

r32.3.5 - Hotfixes

Download r32.3.5 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *241471*
Starter build: *241472*
Released: *March 11th 2026*

Fixes

- **DSOF-32236** - DMX Sockpuppet patched fields no longer change to the default value defined in the personality when a DMX device is lost, but instead retain the last-sent value.

r32.3.4 - Hotfixes

Download r32.3.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *241332*
Starter build: *241333*
Released: *March 5th 2026*

Fixes

- **DSOF-31665** - Resolved an issue where Designer could occasionally crash to desktop while using Precomps.
- **DSOF-32045** - Setting the Render Node of an RenderStream Local layer to a machine that is not in the session now works as expected.
- **DSOF-32015** - Actors that fail over but then are restored now receive tracking and DMX data correctly.
- **DSOF-31123** - The Receive Health widget in the RenderStream Local layer now works correctly.
- **DSOF-32219** - Tags and Notes will no longer sometimes move position after resizing the timeline.
- **DSOF-32056** - Stopping and starting video capture rapidly will no longer sometimes report spurious errors.
- **DSOF-32293** - RenderStream workloads with clusters of more than 1 machine will no longer sometimes get stuck on “Stopping” during workload shutdown.

r32.3.3 - Hotfixes

Download r32.3.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *240388*
Starter build: *240389*
Released: *February 26th 2026*

Fixes

- **DSOF-32130** - Notch blocks configured with an SRGBLinear output colour space with Designer in Gamma mode will now display the correct colour.
- **DSOF-31917** & **DSOF-31916** - Upgrading a project with Sockpuppet patches from any release prior to r31.0 will no longer result in inconsistencies between the old and upgraded Sockpuppet patches.
- **DSOF-32120** - Configuring an IPV6 address alongside an IPV4 address on your NIC will no longer occasionally cause that NIC to be un-selectable as the d3net adapter (The adapter still requires an IPV4 address to be set).
- **DSOF-32149** - Timeline tags can now be created with `;` separators again.
- **DSOF-32201** - Projects with long names will no longer sometimes fail to be discovered by mDNS Clients that are RFC-compliant (e.g. Python, zeroconf, Avahi etc.).

r32.3.2 - Hotfixes

Download r32.3.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: 239442
Starter build: 239443
Released: *February 18th 2026*

Fixes

- **DSOF-32128** - Sockpuppet personalities can now be renamed and duplicated, as they could before r31.0.
- **DSOF-32050** - Designer will no longer occasionally report an error when generating the user-readable name of a stream or workload while using RenderStream.
- **DSOF-32154** - Starter will now launch successfully on machines with Windows 11 update KB5074105.
- **DSOF-31530** - Stopping RenderStream workloads will no longer sometimes leave orphaned workload processes on the render node when the main executable spawns child processes.

r32.3.1 - Hotfixes

Download r32.3.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *238768*
Starter build: *238769*
Released: *February 11th 2026*

Fixes

- **DSOF-32055** & **DSOF-32033** & **DSOF-31930** - When saving a section of a Track as a new Track Designer will no longer behave unexpectedly.
- **DSOF-32008** - Arrowed content in to **Blur Layers** using the **Mask Blend Mode** will now animate correctly, as it did before r31.0.
- **DSOF-31944** - Fields in Layers that are expression controlled and linked to a field in a Layer controlled by Sockpuppet now update correctly as they did before r31.0.
- **DSOF-32058** - Rolling back an object in Designer now correctly allows the user to select versions of that object from History files, as it did before r30.6.
- **DSOF-31913** - Fields in Notch, RenderStream and RenderStream Local layers that have been removed from the asset after keyframes were added to them no longer display Keyframe indicators on the Track.
- **DSOF-31346** - Designer will now run more smoothly on Actors while ingesting new media.
- **DSOF-31918** - CTRL + UP ARROW and CTRL + DOWN ARROW now jump to the top or bottom of the Cue List.

r32.3 - OpenVPCal Plugin Support

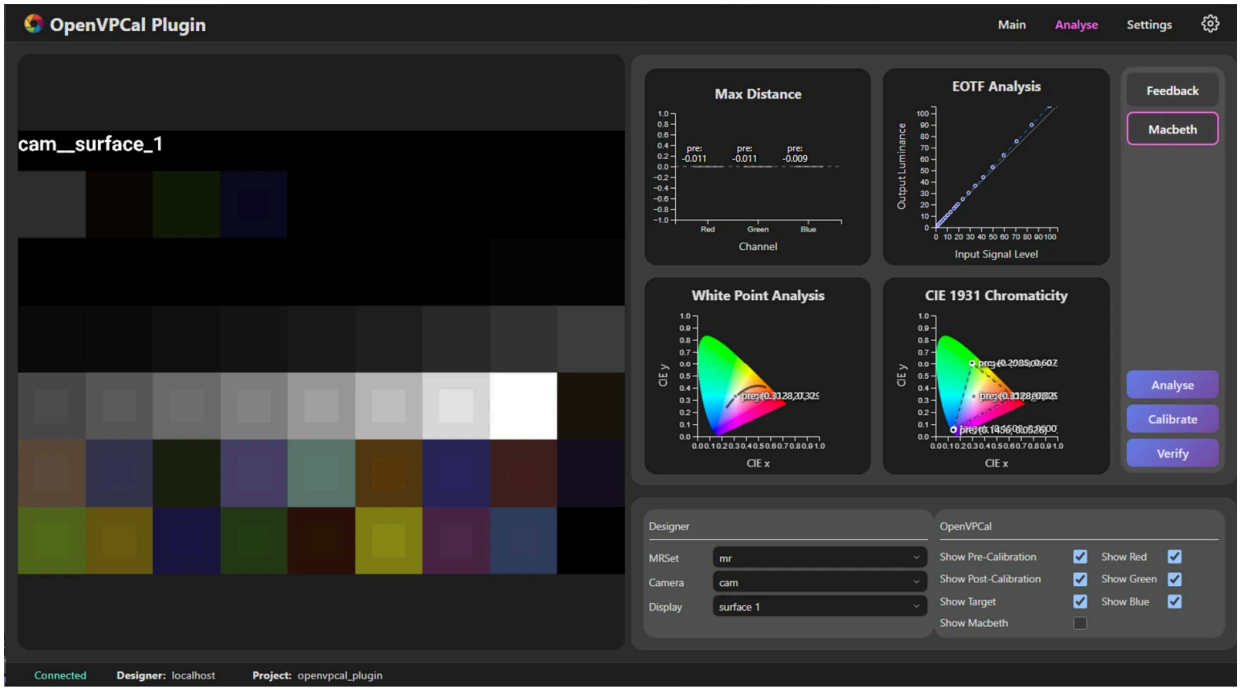
Download r32.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *238105*
Starter build: *238106*
Released: *February 4th 2026*

New Features

With the release of r32.3, Designer includes support for the OpenVPCal Plugin. This plugin integrates Netflix's OpenVPCal colour calibration tool directly into Designer, enabling accurate colour calibration of LED surfaces used in VP and XR workflows. The integration allows calibration data to be generated and applied within Designer, streamlining setup and ensuring colour consistency across calibrated LED volumes.



For information on how to use this plugin, see our OpenVPCal Plugin documentation here.

We've also created a useful open-source command-line tool for creating OCIO colour spaces from custom RGB Primaries. You can find it and instructions for how to use it on our GitHub here.

Improvements

- **DSOF-31232** - The Remove Media API endpoints now only act on media in the Disguise-controlled media paths:
  - projects
  - rs-assets
  - rs-engine

  You can now reference these special keys in your API calls to auto-resolve these paths: `{projects}`, `{rs-assets}` and `{rs-engine}`.
- **DSOF-31253** - Usage statistics are now anonymised on the client-side not the host-side.
- **DSOF-26403** - Prediction on incoming tracking data now works properly on actors.
- **DSOF-31872** - The execute python API now allows users to get basic information about internal Designer resources and their UIDs, as well as other non-trivial objects (like vectors) by returning them from your python script.
- **DSOF-31624** - Receiving OSC messages is now slightly more performant.
- **DSOF-31639** - We now provide a range of OCIO configs that are ACES 2.0 compliant so if you want to use ACES 2.0 you can now do so in OCIO mode.

- **DSOF-26257** - The `/transport/annotations` API endpoint response now returns the fade time in the response.
- **DSOF-25879** - We've added a new `api/transport/cues` API endpoint where you can send a mixed-list of tags, notes and cues in the same format as the `api/transport/annotations` API endpoint.
- **DSOF-31817** - Users can now disable or enable verbose UDP message printing for UDP devices.
- **DSOF-30791** - Users can now optionally manually configure which machines render which channels with RenderStream Local using the **Render Nodes** list.
- **DSOF-26052** - Users can now remotely create project and system diagnostics via the `system/createsystemdiagnostics` and `system/createprojectdiagnostics` API endpoints.

Fixes

- **DSOF-31815** - Diagnostics produced on machines where the username contains certain unicode characters now correctly include all debugging information.
- **DSOF-31542** - Navigating the track is now more performant in projects with many many layers.
- **DSOF-31372** - d3service now utilises a much lower amount of CPU resource.
- **DSOF-31469** - Enabling OCIO mode is now more performant.
- **DSOF-26999** - IP-VFC cards in understudies no longer inherit the Multi-cast IP addresses of the machines that they are taking over from during failover.
- **DSOF-31869** - Designer plugins now correctly react to monitor DPI scale.
- **DSOF-22046** - SDI VFCs in quad mode no longer default incorrectly in size to 3840x2160.
- **DSOF-31646** - The Live Update API is now more performant when given a target update frequency.
- **DSOF-31541** - Depth Map Mesh assets now always fit within the layer widget thumbnail area on lower DPI displays.
- **DSOF-30629** - The Live Update API can now set string type values.
- **DSOF-31552** - Closing and opening a project where virtual feed heads have been configured now correctly persists their resolution and does not wrongly default to 4096x2160.
- **DSOF-31046** - Colour Properties on layers in OCIO mode are now correctly enabled every time OCIO is enabled.
- **DSOF-31942** - OmniCal Point Cloud visualisation modes: **Inlier score** and **Filtered only** now correctly show inliers.
- **DSOF-31813** - Designer is now slightly more performant when processing Transport Commands, especially Timecode Transport Commands.
- **DSOF-32043** - The ITU-R BT.1886 Gamma curve is now correctly applied as an input transform for video clips when in Gamma colour management mode.

- **DSOF-31892** - The Live Update API now correctly updates deeply nested fields in multi-machine sessions.

r32.2.6 - Hotfixes

Download r32.2.6 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *238041*
Starter build: *238042*
Released: *February 4th 2026*

Improvements

- **DSOF-30843** - The non-functional “Get your assets” button has been removed from d3 Manager.

Fixes

- **DSOF-31894** - Designer will now more reliably report the license state of Mellanox NICs in Disguise Servers.
- **DSOF-32101** - Layer names now correctly show up on exported layers again.
- **DSOF-31980** - Updating the Nvidia Driver on your laptop above 581 will now no longer cause all RenderStream compressed receiving and sending to fail. We still do not recommend that users update drivers outside of the OS Images Disguise provides, but this should make working on laptops easier.

r32.2.5 - Hotfixes

Download r32.2.5 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *237380*
Starter build: *237381*
Released: *January 28th 2026*

Fixes

- **DSOF-31761** - Designer will no longer occasionally crash to desktop when scrubbing through many audio layers when few audio output channels are configured.
- **DSOF-31926** - VX 4 and VX 4N machines will no longer erroneously report that their Deltacast Drivers are out of date when they are not.
- **DSOF-31637** - OSC expressions no longer require array indexing for non-array OSC values.

- **DSOF-31902** - Projects with a Track Jump module that references a tag will no longer briefly hang before closing.

r32.2.4 - Hotfixes

Download r32.2.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *236919*
Starter build: *236920*
Released: *January 21st 2026*

Fixes

- **DSOF-31955** - Ask AId3n plugin now works properly again.
- **DSOF-31934** - Renderstream Remote Text Parameters can now be patched to Sockpuppet again.
- **DSOF-30181** - Renderstream will no longer intermittently fail to launch the first time an Render node is booted.
- **DSOF-31923** - Keyframe snapping at certain zoom levels is now more consistent.
- **DSOF-31862** - Machines with HDMI Capture cards (EX 3+ and EX 2C) no longer require the `enableHDMICapture` option switch to be set to enable HDMI capture.
- **DSOF-31082** - Deleting a RenderStream Local layer while it is running now works correctly and no longer reports an error.

r32.2.3 - Hotfixes

Download r32.2.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *236414*
Starter build: *236415*
Released: *January 14th 2026*

Improvements

- **DSOF-31885** - Designer now produces more detailed debugging information for a range of small Designer utility processes.
- **DSOF-31784** - Sockpuppet layers with missing media in their banks now display useful tooltips about where the content is missing even if the layers extend beyond the extent of the GUI.

Fixes

- **DSOF-31629** - Jumping in to a video layer that has a video keyframe before the start of the layer now correctly treats the keyframe as starting at the layer start.
- **DSOF-31888** - Opening a project via d3Manager will no longer fail to open projects in rare conditions where user permissions are limited on laptops.
- **DSOF-31867** - Designer now correctly composes multiple layers in **Mask** blend modes together like it did before r31.1.
- **DSOF-31852** - Removing and re-adding a device to the devices list no longer incorrectly reports spurious errors.
- **DSOF-31847** - Sending media remove requests via the remove media API will now always correctly remove the media even if Designer is operating under heavy load.
- **DSOF-31799** - Remote transports that are engaged when they are removed from the remote transport list are now correctly disabled and no longer respond to transport commands.
- **DSOF-25730** - You can no longer add new points by clicking on a vertex in “Line Up Points” mode when using QuickCal.
- **DSOF-31873** - Writing feed movies now always starts with the playhead at the start of the selected area.
- **DSOF-30193** - Removing the director from the d3NetManager of an actor will no longer cause the actor to hang indefinitely.
- **DSOF-31886** - The Provision Media API endpoint now responds with the correct values for mediaPath and localPath.
- **DSOF-31807** - Alembic meshes now load with everything calculated correctly before they are animated.
- **DSOF-31532** - The orthographic camera render mode works again.
- **DSOF-30677** - RenderStream local now correctly displays the graphs for texture parameters in the advanced debugging widget.

r32.2.2 - Hotfixes

Download r32.2.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *235800*
Starter build: *235801*
Released: *December 24th 2025*

Improvements

- **DSOF-31806** - Designer will now log more information to the console about certain rendering errors for faster debugging.

Fixes

- **DSOF-31866** - Advanced Machine Settings now appear correctly no matter which tab you type them under, as it did before r32.2.
- **DSOF-31856** - Media Remove API now supports removing files with upper cased names, as it did before r32.2.
- **DSOF-31875** - Task status API now always report 100% progress on task completion.
- **DSOF-31857** - Media Remove API now supports removing entire folders.
- **DSOF-31861** - Proxy files created by the Designer proxy maker are automatically detected, as it did before r30.7.
- **DSOF-29462** - QSDI VFC cards now always report the correct total resolution.
- **DSOF-31843** - Clicking on the space widget no longer fills up the undo system with undo operations that do nothing.

r32.2.1 - Hotfixes

Download r32.2.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *235248*
Starter build: *235249*
Released: *December 17th 2025*

Fixes

- **DSOF-31720** - Missing media Layer highlighting will now be more accurate.
- **DSOF-31551** - Moving machines in and out of session and changing machine roles while ingesting media can no longer very occasionally lead Designer to CTD.
- **DSOF-31759** - Designer now loads all FBX Skeletons with bones correctly regardless of the coordinate space of the bones in the FBX file.
- **DSOF-31841** - The `/service/media/remove` API endpoint will now correctly work after Designer has been closed.
- **DSOF-31823** - Using the `/service/media/provision` API endpoint with a **mediaPath** field for a file that does not exist on disk will now report “Failed” rather than “Succeeded” when subscribed to the Task Status Streaming API.
- **DSOF-31744** - d3service will now set Nvidia Power management mode to **Prefer Maximum Performance** on GX 3+ machines to improve FPS reporting and playback.
- **DSOF-31731** - Multi-editing in the Feed view now correctly shows output heads of EX range machines.

r32.2 - Depth Workflows, Sockpuppet GDTF Export and HDMI Capture

Download r32.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *234682*
Starter build: *234683*
Released: *December 10th 2025*

New Features

r32.2 brings with it a range of software features and fixes including additional capture capability as well as new VP and Sockpuppet workflows.

HDMI Video Capture

The **EX 3+** and **EX 2C** machines now support 4K DCI HDMI capture, and an additional 12G channel over SDI.

That means the EX 3+ can support simultaneously:

- 1x 4K DCI HDMI 2.0 capture (HDMI connector)
- 2x 12G SDI inputs via Ports A and C (HD-BNC connector), **or** 4x 3G SDI inputs (HD-BNC connector)

That means the EX 2C can support simultaneously:

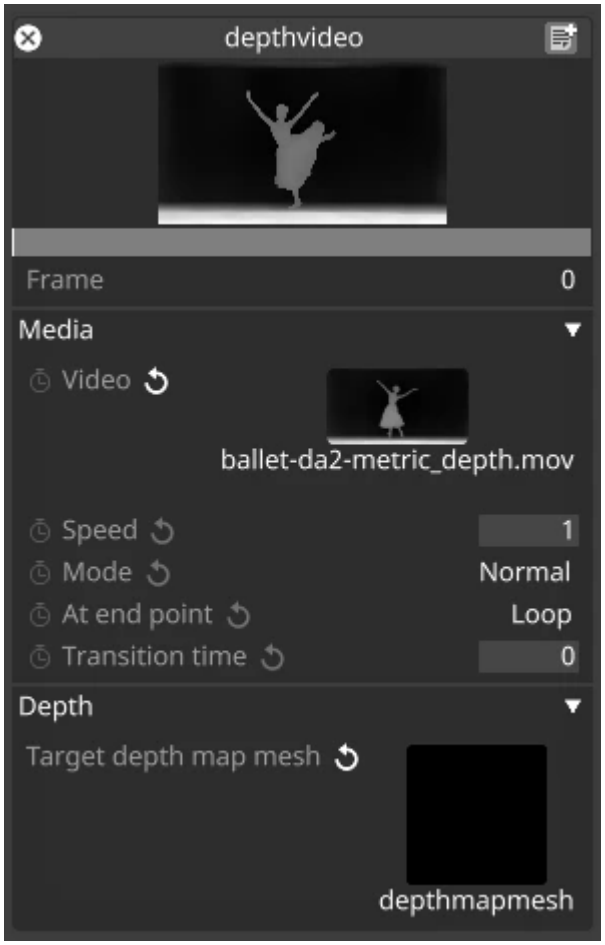
- 1x 4K DCI HDMI 2.0 capture (HDMI connector)
- 1x 12G SDI inputs via Port A (HD-BNC connector), **or** 4x 3G SDI inputs (HD-BNC connector) **or**
- 2x 12G SDI inputs via Ports A and C (HD-BNC connector)

Note that to unlock this feature you will need to:

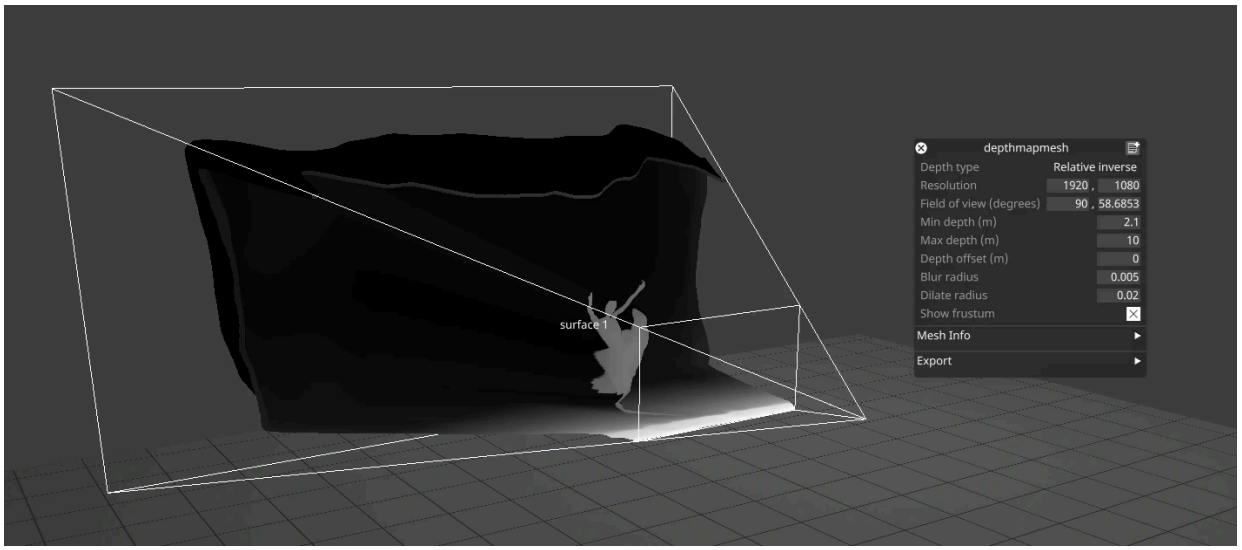
- Use r32.2 and above
- Enable the option switch `enableHDMICapture`
- Use the appropriate 25Q3 OS image for the relevant server as outlined **here**.

Depth Workflows

There are new **Layer**, **Mesh** and **Mapping** types which allow users to apply a Depth Video to meshes providing improved parallax effects in moving camera scenarios. This also integrates natively with **2.5D workflows**. You can find more information about these new workflows **here**.



Depth Video Layer



Depth Map Mesh

Sockpuppet GDTF Export

Sockpuppet Personalities can now be exported as GDTF that can be read by GrandMA3. We have removed the ability to export MA2 XML formats as this seemed to be used exclusively for converting to GDTF.

You can read more about how this feature works **here**.

Other Improvements

- **DSOF-31360** - Spatial and Colour Calibration processes are now more performant and less likely to drop frames potentially causing failed calibrations.
- **DSOF-31580** - Designer now supports additional verbose logging option switches for faster debugging of prefetch issues.
- **DSOF-31495** - The timeline is now highlighted where Cues, Notes and Tags will be dropped on the timeline to add clarity when they are dragged.
- **DSOF-31215** - When using a VR set to previsualise the scene you can now set a **User Parent** field which allows for the VR user to be the child of another stage object. You can read more about this new field **here**.
  - There is also a new option switch `enableNullVRDriver` which allows the user to use the Steam VR "null" driver for testing.
- **DSOF-26195** & **DSOF-31679** - Blackmagic Video Hub Matrixes can now be set to either 3G or 12G and will automatically update their delays appropriately, thereby removing the need to set `blackMagicMatrixSendDelay` manually. As a result this option switch has been deprecated.
- **DSOF-31465** - Designer now supports OCIO v2.5. You can read more about OCIO v2.5 compatibility **here**.
- **DSOF-30936** - The `api/service/media/remove` endpoint will now unlock and remove the media specified even while Designer is running.
- **DSOF-31274** - We now have a new **Fisheye Mapping** for simulating the effect of a hemispherical lens.
- **DSOF-30870** - The **Generate Content Table** button will now properly show the correct content version even if a frame replacement from a newer version is in use.
- **DSOF-31488** - Timeline zoom levels are now user-configurable so you can configure which zoom levels you would like to jump between in your project. You can read about how to configure this **here**.
- **DSOF-15273** - New tooltips have been added to the Observations Visualiser Control widget.
- **DSOF-15274** - The **Labels** option in the Observations Visualiser Control widget is now a tick-box instead of a number.
- **DSOF-31027** - Designer will now not allow the user to create invalid EX/VX/GX machine configurations in d3net Manager which would only report errors after their creation anyway.
- **DSOF-31120** - Understudies with no valid targets are now helpfully highlighted orange in the d3Net Manager UI.

- **DSOF-31609** - Cues, Notes and Tags used in the **Track Jump Layer** that are deleted will no longer silently stop working in the layer. Instead a useful notification is reported.
- **DSOF-31281** - The Global **Enter** keybind now will always toggle playback on the timeline and to select an option using the keyboard the user will instead use **CTRL + Enter**.

We've also made a range of improvements to our Plugins API:

- **DSOF-31482** - Transport Commands can now be created via the Designer **Plugins API**.
- **DSOF-31462** - It is now possible to get elapsed and remaining time left on layers from the Designer **Plugins API** new easily.
- **DSOF-31262** - The Designer **Plugins API** now has better controls for **Layer Stacks**.
- **DSOF-31460** - The Designer **Plugins API** now allows you to remove and add time from tracks.
- **DSOF-31026** - The Designer **Plugins API** now has better information about object Categories.

Fixes

- **DSOF-31694** - The **Screen fill factor** setting for XR Colour Calibration now works correctly again.
- **DSOF-31509** & **DSOF-31546** - Multi-Dragging Notes/Tags/Cues/Sections no longer "Slide off" features that they should not.
- **DSOF-31386** - When aborting a Colour Calibration in Write or Read mode Designer will no longer report a spurious error.
- **DSOF-31380** - Scene origin in 2.5D layers now correctly works when the 2.5D asset is rendered in a **Stage Render Layer**.
- **DSOF-31096** - Custom ranges, default values, and step sizes in Sockpuppet personalities configured i.e. from projects created in versions below r31.0 will now correctly retain these changes when updating to r32.2 and above.
- **DSOF-31056** - The Sockpuppet Personality GUI now allows multi-select editing again.
- **DSOF-30994** - Manually adding assets to a 2.5D Layer no longer reports spurious errors.
- **DSOF-30928** - Video with embedded audio in a quantised track with section breaks that cross the layer the video is sequenced in will no longer playback stuttery audio.
- **DSOF-31512** - You can now de-isolate isolated Sockpuppet fields properly after closing and re-opening a Sockpuppet widget editor.
- **DSOF-31404** - Sockpuppet Patched fields isolate/de-isolate button now automatically changes it's text based on whether the field is isolated or not.
- **DSOF-31416** - d3Manager now has improved logging for better diagnostics.
- **DSOF-31114** - The Floor mesh is no longer rendered on top of transparent screens even if the content on the screens is fully opaque.
- **DSOF-31023** - HD ProRes video performance for the GX 3+ has been greatly improved. The updated performance results are available **here**.

- **DSOF-31599** - Files without the OCIO extension placed in the OCIO folder are no longer wrongly loaded as (broken) OCIO configurations.
- **DSOF-31539** - Previews of 2.5D assets in “Metric” measurement mode no longer appear extremely small.
- **DSOF-31535** - The “Maximum Depth” field in 2.5D assets now scales content correctly.
- **DSOF-31510** - Understudy target filtering now correctly includes X1 machines.
- **DSOF-31282** - Audio prefetch requests are no longer included in Video delivery prefetch graphs.
- **DSOF-28967** - Selecting audio for the Tennis Layer now correctly displays the file extension in the Audio File selector.
- **DSOF-31101** - EX 2C machines can now correctly be set as as Non-Dedicated Director with VX4+ Actors.
- **DSOF-31362** - Duplicating time on timelines with many layers will no longer sometimes lead to a long hang.

r32.1.5 - Hotfixes

Download r32.1.5 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *234595*
Starter build: *234596*
Released: *December 10th 2025*

Fixes

- **DSOF-31758** - Designer will no longer fail to launch properly when loading specific Skeletal Mesh rigged FBX files.

r32.1.4 - Hotfixes

Download r32.1.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *234042*
Starter build: *234043*
Released: *December 3rd 2025*

Fixes

- **DSOF-31456** - Audio Layers with At Endpoint set to Loop now loops correctly even when the timeline Playhead holds on a section break.

- **DSOF-31703** - Projects upgraded from before r31.3.2 now correctly save Cue positions for all cues after project restarts.
- **DSOF-29654** - Using a Mesh or Perspective Mapping in an RS layer using a UE workload no longer has a negative impact on workload performance.
- **DSOF-31716** - ST 2110 capture of 1080p YCbCr signals no longer results in visual striping along the left side of the image.
- **DSOF-30961** - ST 2110 video capture latency has been significantly reduced and now has parity with SDI video capture solutions on Disguise servers.
- **DSOF-24743** - The IP Address of the Local Machine in the Machine editor no longer always displays 127.0.0.1 and instead shows the actual d3Net IP Address.

r32.1.3 - Hotfixes

Download r32.1.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *233619*
Starter build: *233620*
Released: *November 26th 2025*

Fixes

- **DSOF-31635** - Selecting a MIDI device in an MTC layer no longer reports an error on X1 machines.
- **DSOF-31439** - Video is now correctly prefetched before the start of a layer which should stop rogue black flashes when jumping the playhead or playing in to layers.
- **DSOF-31643** - A new option “No Clamp” has been added to the **Tonemapping** field of the **Colour Profile** object which allows for users to disable clamping in the colour pipeline when using Gamma Space colour management. Please note that if you set this option in r32.1.3 and roll back to r32.1.2 or below it will revert to “Filmic Grain” in the tone mapping field and you will need to manually set it again upon rolling back up to r32.1.3 or above.
- **DSOF-31550** - Telnet transport commands now respect the **transition** field again and will fade over that transition period instead of snapping.
- **DSOF-31516** - RenderStream, Video and Legacy Video layers with certain fields patched to Sockpuppet will no longer fail to populate their Sockpuppet personality editors properly when upgraded from older versions of Designer before r23.1.
- **DSOF-31664** - Using the `POST /media/provision` API now returns a correct matching UID so you can subscribe to the task progress.
- **DSOF-31606** - Designer now reads OSC messages even when the address omits the null-terminator (which is non-standard OSC).
- **DSOF-29913** - Sending an MSC command to jump to a cue that does not exist will no longer report an unhelpful error.

- **DSOF-31353** - Certain API endpoints will no longer fail if there is a mixture of d3 machines from before and after r26.0 on the network.
- **DSOF-31260** - HDR Textures sent as texture parameters to RS workloads where the working space is ACEScg are no longer clipped and now properly reflect the full HDR range.

r32.1.2 - Hotfixes

Download r32.1.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *232426*
Starter build: *232427*
Released: *November 12th 2025*

Fixes

- **DSOF-31466** - Track editing performance has generally been improved when working with many layers.
- **DSOF-31457** - Newly ingested **Videoclips** are now correctly returned by the `v1/resources` API endpoint.
- **DSOF-31485** - Keyframes now correctly snap to bar intervals at all zoom levels.
- **DSOF-31385** - The Task Status API endpoint now correctly reports about tasks when they are **Queued** and **Started**.

r32.1.1 - Hotfixes

Download r32.1.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *231784*
Starter build: *231785*
Released: *November 5th 2025*

Fixes

- **DSOF-31455** - Creating a virtual GX 3+ machine during pre-programming now properly lists the correct capture formats.
- **DSOF-31440** - Cue positions now always stay where the ought to be visually when duplicating Layers.
- **DSOF-31438** - Warped projectors on remote machines no longer are displayed on Editors and Directors as all black.
- **DSOF-31399** - Importing CUE tables now leaves user-defined cross-fades intact.

- **DSOF-30819** - RenderStream Local workloads using DX 12 and mesh mappings now look correct.
- **DSOF-31435** - Subscribing to the Live Update API no longer blocks users from undoing user actions.
- **DSOF-31303** - Creating a new track with the track widget closed will no longer report an error.

r32.1 - Partial IP-VFC Support for GX 3+

Download r32.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *231132*
Starter build: *231133*
Released: *October 22nd 2025*

Improvements

- **DSOF-30801** - The GX 3+ now has partial IP-VFC card support for specific output formats. You can find these formats listed **here**.

Fixes

- **DSOF-31321** - When a Video Clip has Frame Blending enabled and a non-zero Loop-In Frame, video playback now correctly loops back to the Loop-In Frame, not the first frame of the Video Clip.
- **DSOF-31313** - RenderStream receivers no longer send redundant network messages to other receivers, greatly reducing overall network traffic over d3net when running RenderStream with many actors.
- **DSOF-31376** - Changing the Video Clip of a Sockpuppet Video Layer when Brightness is 0 no longer starts playback automatically in the background. Instead, playback now starts only when Brightness is raised above 0.
- **DSOF-31352** - When a DMX signal is lost for more than 10 seconds, DMX event transport no longer reverts to 0, which could cause unexpected behaviour e.g. jumping back to CUE 0.
  - Triggering failover via DMX is also modified to now only work when the value is first set to 0 and then set to the configured value for failover triggering. e.g. if you need to send 20 for failover you will need to set the channel to 0, then 20. If you sent it from 0 to 10 and then to 20, Failover will not trigger.
- **DSOF-31305** - Creating new tracks no longer erroneously adds broken Cues to the track list.

- **DSOF-31265** - Sockpuppeted effects layers no longer duplicate the content source texture property in their personality on project restart. This restores behaviour before r31.0.
  - For customers with projects that have already experienced this problem, you can find instructions for how to reset your personalities to their defaults **here**.
- **DSOF-31234** - OSC drivers (used for e.g. tracking encoders) now support parsing messages without trailing slashes again.
- **DSOF-31283** - Setting the output mode to Hold no longer flickers between two frames, but outputs the last frame properly. This restores behaviour prior to r31.2.

r32.0.3 - Hotfixes

Download r32.0.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *229654*
Starter build: *229655*
Released: *October 8th 2025*

Fixes

- **DSOF-31299** - Opening projects with many tags and cues is no longer very slow.
- **DSOF-31263** - All user-configurations of Sockpuppet properties (like custom names etc.) now persist properly through project restarts.
- **DSOF-31257** - Notch blocks without default values set in Notch now set sensible default values in Designer instead of failing to launch properly.
  - Enum values will select the 1st enum.
  - Numerical fields will select the mid value between the min and max.
  - Colours default to black with alpha 1.
- **DSOF-30807** - The `api/session/sockpuppet/patches` API now correctly only returns fields patched on the layer.
- **DSOF-31275** - DSE blending now works properly in all scenarios again.
- **DSOF-31022** - When run on Windows 11 Disguise servers, the Designer installer will now disable secure-boot in Windows Task Scheduler to stop SecureBootEncodeUEFI.exe from taking focus.
- **DSOF-31318** - The Designer installer now warns if it detects UE5 and TouchDesigner running in addition to Unity and UE4.
- **DSOF-30298** - Switching Colour space from OCIO back to Gamma after setting OCIO parameters no longer results in console spam.

r32.0.2 - Hotfixes

Download r32.0.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *229072*
Starter build: *229073*
Released: *September 26th 2025*

Improvements

r32.0.2 includes all the same features as r32.0 but now also correctly includes the fixes in r31.3.4

r32.0.1 - Hotfixes

r32.0.1 has been removed. Use r32.0.2 instead.

Download Release Notes as PDF

Full (Pro) build: *228975*
Starter build: *228976*
Released: *September 25th 2025*

Improvements

No improvements here. This was a mistake release. Please update to r32.0.2.

r32.0 - GX 3+ Support

Download for r32.0 has been removed. Use r32.0.2 instead.

Download Release Notes as PDF

Full (Pro) build: *228570*
Starter build: *228571*
Released: *September 24th 2025*

New Features

GX 3+ Support

r32.0 supports the latest Disguise server type: the GX 3+. Full hardware specifications and further details are coming soon. You can find our initial (and eventually full) documentation here.

Improvements

- **DSOF-29129** - CodeMeter Runtime included in the Designer installer has been updated to v8.40. This change supports Notch blocks exported in Notch 1.0.0.041 and newer.
- **DSOF-30897** - Under light workloads, video inputs used in video layers are now delayed by one frame to ensure smooth video playback. This functionality can be disabled by setting the option switch `smoothVideoInputFramesDelay` to -1. This does not affect XR workflows.
- **DSOF-30716** - Designer now supports a new API session endpoint `api/session/transport/transports`, which lists all the MultiTransports and normal Transports in a single response. For more details, please refer to the **Developer Documentation**.
- **DSOF-30718** - Users can now monitor the ongoing statuses of their Media Provisioning Tasks by subscribing to the Task Status API. For more details, please refer to the **Developer Documentation**.
- **DSOF-30874** - In a 2.5D layer, the boolean field “Sync To Timeline” is now renamed to “Mode”. The two available options are “Normal” and “Locked”. This makes it consistent with other layers in Designer.
- **DSOF-29074** - The default point cloud visualisation mode for OmniCal is now “ProjectorReprojError” instead of “Tolerance”, as it is more useful for users.
- **DSOF-31086** - Designer now has a new Python object `SequencedValue`, which can be obtained through the new Python method `FieldSequence.getSequencedValue()`. This object contains information about the sequenced value at a given time, and its neighbouring left and right keyframes. For more details, please refer to the **Developer Documentation**.
- **DSOF-31180** - Designer now has new Python methods for the `VideoClip` class: `hasAudio()`, `enabledVersion`, `proxyInfo`. For more details, please refer to the **Developer Documentation**.
- **DSOF-26511** - The buttons in the Media Ingestion History widget now have more descriptive and useful tooltips.
- **DSOF-31055** - The `Layer.module` field accessible in the python API is now restricted so it cannot be accessed directly by plugin developers. This is because it doesn’t behave the way people expect and is not required for plugins.

Designer r33 Release Notes

r33.2.4 - Hotfixes

Download r33.2.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *255895*
Starter build: *255896*
Released: *July 15th 2026*

Items marked with a • are also included in r32.4.12.

Improvements

- **DSOF-32989** - OmniCal now logs the projector name during RANSAC calibration, making calibration reports easier to understand.

Fixes

- **DSOF-32825** - SDI VFC outputs will no longer occasionally lose their configuration when feed settings are applied.
- **DSOF-31902** - Projects with a track jump module that references a tag will no longer take a long time to close.
- **DSOF-32537** - RenderStream texture parameters are now properly rendered when they are arrowed for another layer and the RenderStream Controller machine is an Actor.
- **DSOF-33071** - Designer will no longer raise a spurious error when a layer inside a Notch Block is invalid.
- **DSOF-32813** - Inserting time on a timeline set to 'Custom' FPS will add the expected amount of time.

r33.2.3 - Hotfixes

Download r33.2.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *254006*
Starter build: *254007*
Released: *July 1st 2026*

Items marked with a • are also included in r32.4.11.

Improvements

- **DSOF-33130** - Both Project Diagnostics and System Diagnostics now include console log files from the last 30 days, rather than only the last seven, so diagnostics collected some time after an issue occurred still capture the relevant logs.

Fixes

- **DSOF-33027** - Resolved an issue where a RenderStream workload using a Mesh Mapping with **Enable Warp** disabled could report a CUDA error, preventing playback at reduced render resolution scales.
- **DSOF-32563** - Resolved an issue where Designer could not identify Rivermax network adapters by their PCI path, preventing the correct ConnectX-5 or ConnectX-6 licence from being selected for IP video.

r33.2.2 - Hotfixes

Download r33.2.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *253427*
Starter build: *253428*
Released: *June 24th 2026*

Items marked with a • are also included in r32.4.10.

Improvements

- **DSOF-32501** - Improved the reliability of timeline playback selecting the correct frames to display.
- **DSOF-32935** - Reduced the Designer installer size by removing redundant files from the bundled web component (libcef).
- **DSOF-32520** - d3 now warns you when more than 12 projectors are in use in a single dynamic blend, after taking the DynamicBlend exclude list into account.

Fixes

- **DSOF-33085** - Expressions now recover automatically once the cause of a runtime evaluation error is resolved (for example, OSC array indexing), without needing to be re-edited.
- **DSOF-32949** - The RenderStream JSON file is now created when saving from Unreal Engine on machines without a Designer Pro license.

- **DSOF-32716** - Fixed an intermittent crash that could occur shortly after reopening a project and starting an RSUC workload.
- **DSOF-33049** - RSUC output now stays correct when the mesh mapping render scale is changed.
- **DSOF-32743** - Designer will no longer take a long time to launch on projects with lots of RenderStream layers.
- **DSOF-33068** - d3 no longer crashes to desktop when an API client disconnects while unsubscribing from live updates.
- **DSOF-32776** - Project files are now kept compact during auto and manual saving, so they no longer bloat in size to the point of becoming un-openable in very long editing sessions.
- **DSOF-29827** - The `GET detectsystems` API endpoint now returns the accessing machine's real IP address instead of `127.0.0.1`.
- **DSOF-32760** - Projector View Blending now no longer renders mask objects that are behind surfaces, as it did before r32.4.2.
- **DSOF-27583** - The OmniCal report now explains why an OmniCal score was penalised and what can be done about it.
- **DSOF-32941** - d3 no longer reports a spurious error when using Mesh Projection on project shutdown.
- **DSOF-32965** - Moving vertices of a "Mesh Deform" feed warp no longer raises spurious notifications.
- **DSOF-32565** - OCIO input transforms for Logical VideoIns can now be edited while in Quick Edit mode.
- **DSOF-32961** - Project snapshots whose names contain spaces can now be recalled correctly.
- **DSOF-32942** - Designer will no longer intermittently open to a grey screen and require a restart on rare occasions.
- **DSOF-32574** - The OCIO transforms list now refreshes automatically when undoing or redoing transform deletions.
- **DSOF-31786** - In OCIO mode, "- Curve" working space transforms no longer throw errors.

r33.2.1 - Hotfixes

Download r33.2.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *251962*
Starter build: *251963*
Released: *June 10th 2026*

Items marked with a • are also included in r32.4.9.

Fixes

- **DSOF-30798** & **DSOF-32367** & **DSOF-32851** - Matrox video capture inputs are now more stable. Designer no longer rebuilds an input's capture topology — which produced a brief black frame — when only colour space, transfer characteristic, aspect ratio or audio metadata in the incoming SDI signal changes. Changes that genuinely affect the signal (resolution, frame rate, scan mode or 3G level) still rebuild the topology as before. In addition, when one input on a Matrox card restarts, the other inputs on that card are no longer disrupted.
- **DSOF-32697** & **DSOF-32753** - The Director no longer hangs when opening the **Notch** layer editor after hot-reloading a Notch block, and no longer hangs repeatedly after exposable parameters have been removed from a block and the block reloaded into a running project.
- **DSOF-32809** - Sequencing the same video clip at two **keyframes** on a single **Video Layer** now correctly restarts the clip from its first frame when the second keyframe is reached, instead of continuing to play uninterrupted — restoring the behaviour from before r30.8.
- **DSOF-32836** - A **Video Layer** with its Speed set to 0 and its At end point set to Pause now correctly holds on the first frame when played from the start of its section, instead of displaying the last frame.
- **DSOF-32861** & **DSOF-32870** - Copying and pasting **layers** on a Track now behaves correctly. Pasting an expanded group no longer creates duplicate child layers outside the group, and pasting multiple layers now preserves the time offsets between them — the earliest layer lands at the playhead and the rest keep their original spacing — instead of stacking every layer at the playhead.
- **DSOF-32954** - Moving a **Video Layer** with the **Ctrl+Alt+<** and **Ctrl+Alt+>** keyboard shortcuts now moves the layer's **keyframes** along with it, matching the behaviour when the layer is dragged with the mouse.

r33.2 - NMOS and ST.2110 Improvements

Download r33.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *250407*
Starter build: *250408*
Released: *May 27th 2026*

Improvements

- **DSOF-31347**, **DSOF-20828** & **DSOF-32890** - NMOS support has been extended across the IP video capture workflow:
  - Persistent **IP Video** inputs configured as **ST 2110** or **NMOS** are now registered as NMOS receivers, so they can be discovered and connected to from an NMOS registry.
  - Incoming **ST 2110** streams that aren't from RenderStream are now detected and listed in the video input source dropdown, with their SDP downloaded from the registry automatically.
  - The `enableOutOfBandNMOS` option switch has been removed — out-of-band NMOS now runs by default.
- **DSOF-32837** - Holding **D** and clicking a layer in the track view now toggles its **disabled state**, matching the existing **M + click** shortcut for mute.
- **DSOF-32740** - The **MIDI** and **OSC** monitor view now supports clearing, filtering, and sorting, making it easier to find the most recently received messages or focus on a particular channel during long sessions.
- **DSOF-32764** - **OSC devices** can now send to multiple IP addresses and ports from a single device, removing the need to duplicate programming across multiple devices to address several destinations.
- **DSOF-32329** - The **Colour Shift** layer property now includes a linear brightness control that works independently of the alpha channel, so brightness can be faded without affecting transparency. Layer types that bake Colour Shift into their main property panel — such as **Video** and **Bitmap** layers — expose the new control directly; other layers can access it via the Colour Shift property. Previously, fading brightness without affecting opacity required placing a solid black layer above the content or driving the Colour Shift contrast via an expression.
- **DSOF-30330** - The fade time used by the **Backspace** fade-down action is now configurable in seconds.
- **DSOF-32681** - **Layer Colour Rules** now include a **Not Equals** comparison operator, making it easier to colour layers based on whether a property has been modified from its default.
- **DSOF-32645** - The **Timecode** widget tooltip now clearly describes the direction of positive and negative offsets, so the value entered matches the observed behaviour.

- **DSOF-20072** - **Mesh Mapping** gains a new **Combine screens** option that can merge multiple active screens on a machine into a single viewpoint render. This is useful for setups with many screens where rendering each screen separately would be expensive. The available modes are:
  - **None** — each screen has its own separate frustum (the existing behaviour).
  - **All** — all screens share a single combined frustum.
  - **Non-Output** — screens are combined on non-output machines, but kept separate on output machines.
  - **All Active** — active screens are combined locally only.

  Combining only works when the total field of view across the combined screens is under 180 degrees.
- **DSOF-31631** - The **RenderStream** protocol now supports float-array parameters. The **Notch** integration uses this to receive OSC float arrays piped into a Notch block running as a RenderStream workload; support in the RenderStream UE plugin is coming in a future release, and other render workloads can implement the protocol's float-array support themselves.
- **DSOF-32482** - **SceneAnimation** layers can now be added to **Layer Stacks** and play back as part of the stack, allowing FBX and Alembic animations to be packaged into a single asset alongside their associated 2.5D plate content.
- **DSOF-32368** - **IP-VFC** cards running newer firmware now report detected PTP grandmasters to the Designer UI, making it easier to verify that an ST 2110 sender can see a PTP clock. Cards on older firmware are unaffected and continue to show no grandmaster information.
- **DSOF-32609** - A new **GUI capture** REST API endpoint (`GET /api/internal/gui/capture`) renders an offscreen screenshot of Designer's 3D viewport to a PNG under the project's `thumbnails/` folder. Output dimensions and whether to include widget panels are controllable via query parameters.
- **DSOF-29318** - **DMX screens** now support 8-bit and 16-bit **CMY** drivers in addition to RGB.
- **DSOF-32879** - Expressions can now be toggled on or off while preserving the formula by clicking on the `=` sign next to the expression. This applies to fields, list indirection index fields, etc.
- **DSOF-32897** - Disabled Expressions and Sockpuppeted fields on Layers suppressed by "Isolate Sockpuppet" now appear a dark green (or dark brown for expressions with errors) to more easily distinguish them from fields that are fully Sockpuppet Disabled or have no expression assigned.
- **DSOF-32694** - A new **global minimum proxy level** setting clamps how high-resolution displays appear in the visualiser, editors and visualiser cameras regardless of zoom level. This avoids the frame-drop risk on large-scale shows where accidentally zooming in close to a screen would otherwise force full-resolution rendering. Mapped feeds are unaffected, so output content is never proxied.

- **DSOF-32273** - 3D LUTs now use **tetrahedral interpolation** by default, bringing the non-OCIO LUT path into line with the OCIO path and producing smoother colour transitions, particularly for hue rotations. An **Interpolation** dropdown has been added to the LUT resource properties; select **Trilinear** to restore the previous behaviour for legacy pipeline matching.
- **DSOF-30256** - When **Apply Feeds** or genlock configuration is running on a remote server, the feed view now displays a clear overlay on that machine's feeds showing the progress, matching what the server reports on its splash screen.
- **DSOF-27947** - The **RigidBody tracking source** editor has been tidied up to match other object-tracking source editors. Greyed-out controls now include suggestion text explaining why they're unavailable, and the live position/rotation indicators in the **Values** section remain available for troubleshooting.

Fixes

- **DSOF-32838** - Disabled layers now correctly display their assigned media and mapping in the layer property panel and track view, instead of showing "none" or an incorrect mapping. Disabling a layer affects playback and rendering only, not the displayed configuration.
- **DSOF-32835** - The TransportControl layer's **Transport Jump Command** now retains its track reference if tracks are renamed by a remote editor.
- **DSOF-32687** - The NMOS SDP served by the NMOS node is now refreshed when a sender's colour format or other SDP-relevant properties change. Previously the served SDP described the prior parameters until Designer was restarted.
- **DSOF-32640** - Hot-reloading a Notch block — for example by copying it into a project that is already running — no longer sometimes causes Designer to hang when entering new notch layers.
- **DSOF-32591** - The HUD widget no longer splits and overlaps the playback controls and track scroll bar in projects with many machines.
- **DSOF-26810** - The remote diagnostic gathering process in d3 Manager no longer steals fullscreen on the target machine, preventing disruption to live show output during rehearsals.
- **DSOF-30153** - When duplicating a parallel mapping and then editing the original's settings, the white border in the layer's mapping selection now follows the active mapping instead of remaining attached to the duplicate.
- **DSOF-32608** - Opening the track widget on large projects is generally more performant, especially on very large projects.
- **DSOF-32833** - Calling field-evaluation APIs on non-numeric fields (such as text fields) no longer triggers an access violation. The evaluation path now validates the field type and returns a clear error for unsupported types instead of producing undefined behaviour.

r33.1.5 - Hotfixes

Download r33.1.5 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *251218*
Starter build: *251219*
Released: *June 3rd 2026*

Items marked with a • are also included in r32.4.8.

Improvements

- **DSOF-32691** - Drawing the timeline is now more performant on **Tracks** that contain a large number of **notes** and **tags**, reducing the per-frame cost on every machine that displays the timeline.

Fixes

- **DSOF-32433** - Editors no longer intermittently report media as missing on Actor and Understudy machines when that media is actually present.
- **DSOF-32437** - The **OpenVPCal Plugin** can now capture calibration patterns in a Director and Actor setup. Previously, pattern generation and patching worked but the capture step failed — the screen went black and the capture never completed — on anything other than a solo machine.
- **DSOF-32457** - Upgrading specific projects created in r18.1 to versions above r30.8 no longer opens to an unresponsive interface with a blank grey background.
- **DSOF-32652** - Designer machines no longer show a false “Display settings do not match project configuration. Did you remember to Apply Feed Settings?” warning when a GUI head is set to a custom resolution. The warning now appears only when the display configuration genuinely needs **feed settings** to be applied.
- **DSOF-32749** & **DSOF-32778** - Editing **Track notes** with the **Ctrl+N** note dialog now behaves correctly. Editing a note at a different zoom level to the one it was created at no longer creates a duplicate note at the nearest second, and clearing a note’s contents and confirming with **Enter** now reliably deletes it.

r33.1.4 - Hotfixes

Download r33.1.4 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *250397*
Starter build: *250398*

Released: *May 27th 2026*

Items marked with a • are also included in r32.4.7.

Fixes

- **DSOF-32763** - Using **Insert Track** to insert one **Track** into another no longer links Cues, MIDI, Notes, and timecode between the source and destination tracks.
- **DSOF-32875** - **Locked Layers** that sit entirely after a region targeted by the **Remove Bars** timeline action now shift backwards along with the rest of the track, instead of staying at their original position and desyncing from surrounding layers.
- **DSOF-32816** - Pasting a group of layers into a new **Track** no longer extends the destination track's duration by the time offset that the group held in its source track.
- **DSOF-32629** - Changing the **palette** of a **Radar Layer** to a solid colour gradient now updates the Layer's output immediately. Previously, the radar continued to display as black until you switched tracks and back.

r33.1.3 - Hotfixes

Download r33.1.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *249736*
Starter build: *249737*
Released: *May 20th 2026*

Items marked with a • are also included in r32.4.6.

Improvements

- **DSOF-32061** - Changing the **project refresh rate** now better aligns layers, cues and keyframes to the new framerate.
- **DSOF-32858** - The `Null handle when setting texture parameter` console message is now rate-limited and includes the affected texture's path, description, status, and rendering context. Previously, this error was emitted unconditionally every frame with no information beyond the shader sampler slot, making the underlying issue difficult to diagnose from logs alone.

Fixes

- **DSOF-32747** - Switching between **versions** of a video file no longer prevents the clip from rendering when the new version has a different duration to the previous one. Previously, the affected Video Layer had to be deselected and reselected to recover.

- **DSOF-32439** - Designer no longer fires audio device notifications on startup for installed ASIO and Dante drivers that have no hardware connected. Notifications now only fire when a previously-working audio device disconnects mid-session. This restores the behaviour from before r33.1.
- **DSOF-31070** - Active **IP Video Capture** sources are now preserved across Designer project restarts. Previously, the patched IP video-in resources could be missing on reopening the project, leaving the inputs inactive with `unable to create video capture stream` errors.
- **DSOF-30503** - The video delay calibration widget now reports realistic values for **ST 2110** video inputs. Previously, the widget produced delays of several thousand seconds due to a unit mismatch in the receive timestamp.
- **DSOF-32434** - **HDMI capture** inputs reporting RGB Limited — including **Nvidia GPU** outputs that incorrectly advertise their RGB Full streams as Limited — now produce an image instead of a black screen. The Limited-to-Full conversion is now performed by a Designer shader rather than by Deltacast hardware, where it was unreliable for these sources.
- **DSOF-32814** - **TransportControl Layers** now reliably issue timeline jumps on other tracks when their containing track is jumped to via timecode.
- **DSOF-32370** - Designer no longer logs `The given index isn't a section; please check your logic!` to the console when dragging **keyframes** on a track that also contains note or tag cues, and snapping a keyframe to a section boundary now correctly finds the next section break when there are intermediate non-section cues. This restores the behaviour from before r31.3.
- **DSOF-32448** - **RenderStream** streams no longer stop after a secondary render machine is marked as failed using the **Mark as Failed** failover method. The understudy now takes over and continues rendering the stream as expected.
- **DSOF-32688** - When the **d3Net** connection to a peer briefly drops and recovers, the Director now automatically re-admits the peer to the session. Previously, the peer remained offline in the **Network Status widget** and the Director's console accumulated `has already exited` warnings every few seconds until the show file was restarted.
- **DSOF-32271** - The **Network Status widget** on Editor machines no longer randomly reports remote machines as `---` or "not present". The widget now correctly subscribes to and displays the remote frame rate and machine status for every machine in the session.
- **DSOF-32686** - Machines will no longer occasionally fail to launch when launched remotely from the director.
- **DSOF-32857** - When Designer fails to start due to a subsystem exception (for example, when the display manager cannot enumerate the local display adapters), the startup-failure dialog now includes the originating exception's message and any context-aware remediation steps the subsystem has authored. Creating a diagnostic is no longer the default action — the operator must opt in — and when opted in, a faster system diagnostic is created instead of a full project diagnostic. This restores the behaviour from before r31.3.1.

- **DSOF-30200** - The console on an Editor running in **Solo** mode is no longer spammed with `updateDirectorBlockedState()` messages, making genuine errors easier to spot during troubleshooting.
- **DSOF-31218** - Designer no longer logs `New resource actions haven't been unsubscribed` and `Remove resource actions haven't been unsubscribed` warnings during shutdown. This may also resolve rare hang-on-shutdown behaviour observed in busy projects.
- **DSOF-30782** - Driver-update notifications in the console (for example, the Matrox driver/SDK mismatch warning) now link to the correct download pages on the Disguise website.

r33.1.2 - Hotfixes

Download r33.1.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *248549*
Starter build: *248550*
Released: *May 13th 2026*

Items marked with a • are also included in **r32.4.5**.

Fixes

- **DSOF-32723** - When upgrading projects from r33.0 or earlier to r33.1 or above, only layers that were muted while the editor was set to **Locked to Director** are now converted to **Disabled**. Layers muted on editors while in **Independent** transport mode are no longer disabled on upgrade.
- **DSOF-32489** - **RenderStream** workloads no longer occasionally display an INVALID scene and fail to load all remote parameters when they are first detected.
- **DSOF-32670** - Launching **RenderStream Local** workloads no longer significantly degrades Designer performance while the project is launching in projects with arrows and mesh projections.
- **DSOF-32595** - Track rendering performance is improved, especially for large projects.
- **DSOF-32676** - Pressing **Enter** to stop the track now works correctly after the playhead has reached the end of the track. See **Transport Player Controls**.
- **DSOF-32693** - **System diagnostics** generated through d3manager now correctly include the Mellanox `Mlx5_Dump_Me_Now-*` dump folders, which are useful when troubleshooting network adaptor faults.
- **DSOF-32550** - The `profileGPUPoolFromLaunch` **option switch** now produces more detailed and accurate output, with properly balanced events and correctly labelled buffer entries.

- **DSOF-32651** - Projects that used the legacy virtual camera workflow prior to r25.0 no longer fail to upgrade when opened in a newer version of Designer.

r33.1.1 - Hotfixes

Download r33.1.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *247780*
Starter build: *247781*
Released: *May 6th 2026*

Items marked with a ● are also included in r32.4.4.

Fixes

- **DSOF-32605** & **DSOF-32592** - Editing keyframes on very large projects no longer causes the director machine to drop frames.
- **DSOF-32643** - When saving a section of a Track as a new Track, Cues, Notes, and Tags on the new Track are no longer linked to the old track as well.
- **DSOF-32620** & **DSOF-32621** - Loading Alembic files is now more robust: meshes containing unsupported elements (such as `FaceSet` material grouping metadata) now load with the unsupported elements ignored, rather than failing the whole file, and projects containing multiple large Alembic files no longer crash to desktop on startup.
- **DSOF-32348**, **DSOF-32355**, **DSOF-32356**, **DSOF-32372** & **DSOF-32331** - A range of IP-VFC reliability fixes:
  - IP-VFC cards appear more reliably after a cold reboot.
  - Adding or swapping IP-VFC cards between machine restarts is now more reliable.
  - Failure to lock to PTP is now reported as `PTP Not Locked`, instead of the misleading `PTP Domain Number is different` or `PTP Profile is different`.
  - NMOS connection requests that include a primary or secondary multicast address update now apply correctly to the IP-VFC port, as expected when running ST 2110 with out-of-band NMOS.
- **DSOF-32587** - When an OmniCal Plan contains cameras with no OmniCal camera assigned and is not set to simulate capture, the Plan camera background now correctly shows red instead of green.

r33.1 - X2 Support and Quality of Life Improvements

Download r33.1 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *247072*
Starter build: *247073*
Released: *April 29th 2026*

Improvements

- **DSOF-28802**, **DSOF-28801**, **DSOF-28447**, **DSOF-32365** & **DSOF-32496** - Mesh Mappings have received a comprehensive update:
  - New methods to control resolution (Scaling, Fixed, or Pixels-per-Degree), independent of the projected screen.
  - An optional **No Warp** mode that sends the stream without warping content to UVs, so screen-space effects from RenderStream sources render cleanly without seams.
  - Per-axis **Overscan X** and **Overscan Y** fields for additional pixels of render area on the seams between meshes.
  - New cross-projection blend modes.
  - Performance improvements.
- **DSOF-29986** - Three new option switches (`renderstreamActiveLatencyPercentile`, `renderstreamActiveLatencyOffset` and `renderstreamBufferSize`) let users tune RenderStream active latency to address intermittent dropped frames caused by variable RenderStream sync timing. See Tuning RenderStream Active Latency for guidance.
- **DSOF-31998** - The Receive Health widget now lists incoming **RenderStream** texture parameter streams alongside frame streams, with sent and received rates available per stream.
- **DSOF-31948** - RenderStream workloads no longer intermittently crash when texture parameters are switched between sources (e.g. between a precomp and another texture) while the workload is running.
- **DSOF-31834** & **DSOF-31719** - The Bandwidth Estimation widget now reports outgoing RenderStream texture parameter bandwidth against the network adaptor that will actually be used (instead of an “Automatic” category), and reports incoming bandwidth for subscribed RenderStream streams.
- **DSOF-32190** - RenderStream asset sync tasks now display progress feedback, indicate when a task has stalled, and can be interrupted with a confirmation prompt.
- **DSOF-32188** - The RenderStream asset list now distinguishes between assets of the same name in different folders by surfacing the full project path.
- **DSOF-32263** - The OpenVPCal Plugin now disables the Designer GUI during capture to reduce the chance of dropped frames during the calibration process.

- **DSOF-32451** - The **OmniCal Plan Camera Stats** window has been reorganised — bandwidth is now reported in Mbit/s for easier comparison against configured network bandwidth, and the columns most useful for troubleshooting (such as missed packets and packet errors) are visible by default.
- **DSOF-32243** - The Live Update API has been extended to expose the same data points found in the **Proof of Play** .csv file in real time, enabling integration with content management systems. Note that **Proof of Play currently only supports Video Layers**.
- **DSOF-32570** - The **Designer Plugins API** now provides scoped authentication tokens for cloud-aware plugins instead of giving them access to the master Auth0 token, improving security in multi-plugin environments.
- **DSOF-31949** - Designer now displays a helpful notification when an audio input device (e.g. a USB device used for timecode) is unplugged.
- **DSOF-23055** - The **audio waveform view** now supports the audio of video clips on **Video Layers**, in addition to **Audio Layer** tracks.
- **DSOF-30285** - You can now force-break references when importing packages, allowing imports to skip dependencies you know aren't needed.
- **DSOF-25386** - Layers now have a project-level **Disable** option that persists across project restarts, replacing the legacy `allowPersistentMute` debug option. Disabled layers display dimmed with a `[DISABLED]` label and are excluded from rendering. Mute remains a per-machine session-level toggle that resets on machine reboot. Layers that were previously muted when the allowPersistentMute option switch was enabled will now appear as Disabled.
- **DSOF-30338** - Pressing **SHIFT + ESC** now also closes all the layer widgets on the track, not just the currently visible ones.

Fixes

- **DSOF-28848** - **Mesh Mapping** resolution and the resulting RenderStream stream resolution no longer change with local LOD when zooming in or out of the stage on the projected screen on Dedicated Director Machines.
- **DSOF-32351** - Render nodes no longer occasionally fail to render the scene (with receive health dropping to 0) when using compressed **RenderStream** texture parameters in setups with mixed controllers.
- **DSOF-31723** - **RenderStream** texture parameter bandwidth is no longer counted multiple times when several texture parameters on the same asset share a single arrowed-in stream.
- **DSOF-32274** - The **Python plugin API**'s `loadOrCreate` on Display subclasses (e.g. `LedScreen`, `Screen2`) now creates a default DirectProjection automatically, matching the result of creating displays through the UI.
- **DSOF-32459** - **ObjectView** widgets can no longer be resized smaller than their content on higher-DPI screens.
- **DSOF-32290** - The Surface masks menu now scrolls when there are more options than fit on screen, allowing access to all entries on HD monitors.

- **DSOF-27478**, **DSOF-31969**, **DSOF-31968** & **DSOF-17067** - List Editor improvements:
  - Custom columns now respect Separator Groups and only appear in the **Default** group, instead of being shown in every group.
  - The **Default** Category is now always the initially opened category, including in the Projector List Editor.
  - Importing CSVs exported from non-default categories now works correctly.
  - Importing a CSV no longer creates a duplicate title row.
- **DSOF-32037** - The **OSC Event Transport** field order has been restored to OSC Device → Input → Output → Behaviour, matching its order before r31.0.
- **DSOF-30252** - The **Join Session** prompt in d3 Manager now reappears after the second time of joining a session from the same Editor.
- **DSOF-32288** - The Designer installer no longer reports timeout errors when network shares take longer than 20 seconds to respond.

r33.0.3 - Hotfixes

Download r33.0.3 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *247066*
Starter build: *247067*
Released: *April 29th 2026*

Items marked with a ● are also included in **r32.4.3**.

Improvements

- **DSOF-32580** - The `GuiSystem` is no longer marked as Internal, so its functions are now available to plugin developers via the **Designer Plugins API**.

Fixes

- **DSOF-32581** - Projects with the `enableSLC` Option Switch enabled and using SLC-sized precomps no longer fail to upgrade properly to the latest gold from r20.0.3 or earlier.
- **DSOF-32428** - Crossfading between sections that use a **Precomp Mapping** no longer fades through black. Precomp crossfades now match the behaviour of direct mappings.
- **DSOF-32099** - Video content no longer skips or jumps when a **speed keyframe** lands on a section break, restoring the behaviour from before r32.2.
- **DSOF-32610** - **RenderStream Local** layers no longer suffer latency spikes of up to 6 frames when the **Frame Fraction** field is set below 1. Latency now stays consistently at 1-2 frames as expected.

- **DSOF-32611** - Users can now set Min and Max metafields on exposed Unreal Engine parameters on **RenderStream Local** layers without the value of the field reverting back to the default once these have been edited.
- **DSOF-25822** - Designer no longer reports a spurious error and prevents the user from selecting assets in the **RenderStream** workload editor under rare circumstances.
- **DSOF-32540** - Designer and d3service now correctly report when their HTTP servers fail to bind their configured ports - for example when WSL2 with mirrored networking ghost-reserves them - rather than continuing to run with a silently unreachable **API**.

r33.0.2 - Hotfixes

Download r33.0.2 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *246160*
Starter build: *246161*
Released: *April 22nd 2026*

Items marked with a • are also included in **r32.4.2**.

Fixes

- **DSOF-32538** - **Hold mode** (Alt+P) now correctly freezes the last rendered frame on physical outputs, as it did before r32.4.1 and r33.0.1, rather than stretching the top row of pixels across the entire frame.
- **DSOF-32545** - Resolved an issue where Designer's interface elements were rendered approximately 11% larger than intended. Interface sizing now matches its behaviour before r32.3.
- **DSOF-32535** - Resolved an issue where d3service could intermittently crash when checking for internet connectivity after Designer had shut down, which previously required a server reboot to recover.
- **DSOF-32423** - Designer now pre-rolls and chases timecode correctly when using a 29.97 drop-frame source with the Custom Timeline FPS set to Global or Custom. Previously the pre-roll started late and the playhead remained permanently offset from the timecode source.
- **DSOF-32481** - Looping **FBX animations** now play for their full duration before restarting, rather than pausing shortly before the loop point.
- **DSOF-31802** - **Colour Inspector** RGB error values are now calculated correctly regardless of the active output colour space. Previously the 2014 Macbeth colour chart produced very high error values when a non-sRGB output transform was in use.
- **DSOF-32374** - Designer will no longer intermittently launch in to a Live Update Blocked state with certain video in formats present.

- **DSOF-32521** - Removing an **OSC output expression** while its 'Expression' field is selected now works correctly and no longer reports an error.
- **DSOF-32549** - Designer now has improved logging for identifying frame drops.
- **DSOF-32539** - The **Transport Manager** timecode dropdown now uses short property labels, restoring the expected dropdown width.
- **DSOF-32525** - d3service now correctly logs any licences that have been removed during an automatic licence update.
- **DSOF-32523** - Improved logging about the Designer shutdown process to make troubleshooting shutdown issues easier.

r33.0.1 - Hotfixes

This release has been superseded by **r33.0.2**. Please update to r33.0.2 to receive the fixes listed here.

Full (Pro) build: *244994*
Starter build: *244995*
Released: *April 8th 2026*

Items marked with a • are also included in **r32.4.1**.

Improvements

- **DSOF-32385** - Experimental HDR output options have been removed from d3Manager and the user guide, as these were unsupported and could cause unexpected display behaviour.
- **DSOF-32357** - The **Python execution API** now automatically rolls back project changes when a script raises an exception, preventing partial modifications from persisting.

Fixes

- **DSOF-31636** - **Projection masks** now update correctly without needing to enter the display settings first.
- **DSOF-32358** - **RenderStream** workload processes (including Unreal Engine, Notch, and TouchDesigner) are now correctly terminated when a workload is stopped, preventing ghost processes from remaining on render nodes.
- **DSOF-31668** - Resolved an issue where Designer could hang indefinitely when losing focus while running in fullscreen mode with video outputs on **GX 3+**.
- **DSOF-32405** - Designer no longer crashes on startup after downgrading from r32.4 to an older build.
- **DSOF-32395** - The **Python execution API** no longer throws an exception when a script creates a layer.
- **DSOF-32387** - Editing an **Expression Variables** layer, undoing changes, then switching tracks no longer reports an error.

- **DSOF-32364** - Inserting or deleting time on large projects no longer causes Designer to hang for an extended period.
- **DSOF-32352** - **Notch** instances are now correctly released for layers with excluded mappings, preventing long hangs when entering Notch Layers.
- **DSOF-32339** - Removing the last transform from an **OCIO layer**'s transform list now correctly clears the colour effect.
- **DSOF-32320** - Keyframe carets and layer colours now update live when editing layers inside a group, as they did before r32.3.
- **DSOF-31688** & **DSOF-32377** - Modifying **RenderStream** parameters (including OCIO Input Transform and texture parameters) while a workload is running now works correctly.
- **DSOF-32376** - Cross-origin browser requests to the auth0 API endpoint now work correctly.
- **DSOF-32328** - **OmniCal** no longer generates repeated error notifications when an alignment filename exceeds the Windows path length limit.
- **DSOF-32220** - Bidirectional **SockPuppet** output patches now correctly send values over DMX, as they did before r32.2.
- **DSOF-32182** - The media provisioning API no longer incorrectly lowercases folder names for the first transfer entry.
- **DSOF-31189** - The **multitransport** preview widget no longer fails to display all timeline sections in some rare circumstances.
- **DSOF-28762** - Designer no longer unexpectedly enters a test mode if a file named `test.txt` exists in the projects folder.
- **DSOF-32388** - **Skeletal mesh animations** now correctly play back animated bone ends with no children in FBX files.
- **DSOF-32323** - Resolved an intermittent grey screen on startup on machines with IP-VFC cards installed and configured to lock to PTP.
- **DSOF-32256** - **RenderStream** remote texture parameters no longer appear over-exposed when using gamma colour space, particularly with Unreal Engine uncompressed transport.
- **DSOF-32046** - **RenderStream** exposed parameters are now correctly applied when the controller is set to an Actor rather than the Director, as they did before r32.2.

r33.0 - Machine Deprecation

Download r33.0 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *244214*
Starter build: *244213*
Released: *April 1st 2026*

Changes

In r33.0 we are moving a range of media servers from **End of Production** to **End of Support**.

The servers that are being deprecated are listed here:

- **2x4pro**
- **GX 1**
- **GX 2**
- **GX 2C**
- **VX1**
- **VX 2**
- **VX 4**
- **VX 4N**

These servers will behave like normal computers on versions of r33.0 and above, meaning that you will need a software license (like **Designer Pro** or **X1**) to use the Designer software, and the normal restrictions of those licenses will apply.

These servers will still function normally as Disguise Media Servers on all supported releases up to and including r32 and will still receive software updates for critical bugfixes in the r32 branch in line with our **Product Life Cycle Policy**. Release notes for r32 legacy support can be found **here**.

Designer r34 Release Notes

r34.0 - Colour, lighting and workflow improvements

Download r34.0 Full (Pro)

Download Release Notes as PDF

Full (Pro) build: *256372*
Starter build: *256373*
Released: *July 15th 2026*

Designer r34.0 is a major release because it changes the default blend mode behaviour. For details on the blend mode behaviour pre and post r34 see **Mask Blending**. To understand our release naming scheme and what can prompt a major version change, see **Designer Release Versioning Conventions**. This change will be highlighted in Designer when upgrading a project from a pre-r34 version of Designer.

Designer r34.0 brings a set of colour, lighting and workflow improvements including HDR / non-sRGB GUI support in OCIO colour-managed mode, custom DMX fixture types with new 16-bit monochrome channels, Anchor Layers, and faster remote diagnostics collection along with sequencing and RenderStream stability fixes.

Improvements

- **DSOF-27510** - Added support for viewing the GUI on non-sRGB / HDR monitors when working in OCIO colour-managed mode.
- **DSOF-7641** - DMX Screens now support custom fixture types built from any combination of supported channels, so you can match arbitrary fixture personalities.
- **DSOF-32343** - Added 16-bit monochrome (maximum and weighted-sum) channel types for DMX Screens, so all channel types now support both 8- and 16-bit output.
- **DSOF-32714** - Added Anchor Layers: lock a layer's position on the timeline so it can't be dragged, while still allowing its parameters to be edited.
- **DSOF-28790** - When you insert time before the playhead, the playhead now moves with it so the output stays on the same content.
- **DSOF-33087** - Expressions now support string comparison equality and inequality (`==`, `!=`) as well as lexicographic ordering (`<`, `>`, `<=`, `>=`).
- **DSOF-32846** - **Create System Diagnostics** on remote machines can now download each machine's diagnostic zip straight to a folder you choose, instead of collecting them by hand.

- **DSOF-32738** - Added MSAA anti-aliasing options to the 2.5D and Stage Render modules.
- **DSOF-30790** - Reduced RenderStream Layer (RSL) latency when texture parameters are in use.
- **DSOF-33168** - Genlock gain/loss on NVIDIA GPUs (GX 3 and GX 3+) is now detected automatically and reflected in Designer without a manual refresh.
- **DSOF-20229** - **Timeline Transport Speed Control (Prerelease)** change a track's playback speed via the Transport Manager, MIDI/OSC/DMX event transports, and the `/transport/speed` API. Enable it by turning on the `enableTransportSpeedControl` option in the d3Manager Preview tab (requires a restart).

Fixes

- **DSOF-33095** - Designer will no longer report a cascade of errors when rendering the Layer Stack GUI (for example, the 2.5D plate editor).
- **DSOF-31154** - Luma matte blend modes will no longer affect the entire layer stack above them.
- **DSOF-31741** - Designer will no longer report an error during resource transport.
- **DSOF-32969** - Designer will no longer report an error during sequence evaluation.
- **DSOF-32705** - RenderStream Layer (RSL) streams will no longer jitter when multiple streams are running.
- **DSOF-32532** - The HDMI RGB Full/Limited override is now available as a Video Input Patch Editor setting rather than a hidden option switch.
- **DSOF-32674** - Saving a layer to the library will no longer flood the console with "Failed to get bandwidth estimation" warnings.
- **DSOF-32868** - Bandwidth estimation for arrow texture parameters will now work when the playhead is outside the layer's range.

Designer Download Centre

All available Designer release notes can be found below.

Our release notes include Designer installer download links for each available release.

Release Notes

Designer r34 Release Notes

- Designer r34.0 Release Notes

Designer r33 Release Notes

- Designer r33.2.4 Release Notes
- Designer r33.2.3 Release Notes
- Designer r33.2.2 Release Notes
- Designer r33.2.1 Release Notes
- Designer r33.2 Release Notes
- Designer r33.1.5 Release Notes
- Designer r33.1.4 Release Notes
- Designer r33.1.3 Release Notes
- Designer r33.1.2 Release Notes
- Designer r33.1.1 Release Notes
- Designer r33.1 Release Notes
- Designer r33.0.3 Release Notes
- Designer r33.0.2 Release Notes
- Designer r33.0.1 Release Notes
- Designer r33 Release Notes

Designer r32 Release Notes

- Designer r32.4.12 Release Notes
- Designer r32.4.11 Release Notes
- Designer r32.4.10 Release Notes
- Designer r32.4.9 Release Notes
- Designer r32.4.8 Release Notes
- Designer r32.4.7 Release Notes
- Designer r32.4.6 Release Notes
- Designer r32.4.5 Release Notes

- Designer r32.4.4 Release Notes
- Designer r32.4.3 Release Notes
- Designer r32.4.2 Release Notes
- Designer r32.4.1 Release Notes
- Designer r32.4 Release Notes
- Designer r32.3.5 Release Notes
- Designer r32.3.4 Release Notes
- Designer r32.3.3 Release Notes
- Designer r32.3.2 Release Notes
- Designer r32.3.1 Release Notes
- Designer r32.3 Release Notes
- Designer r32.2.6 Release Notes
- Designer r32.2.5 Release Notes
- Designer r32.2.4 Release Notes
- Designer r32.2.3 Release Notes
- Designer r32.2.2 Release Notes
- Designer r32.2.1 Release Notes
- Designer r32.2 Release Notes
- Designer r32.1.5 Release Notes
- Designer r32.1.4 Release Notes
- Designer r32.1.3 Release Notes
- Designer r32.1.2 Release Notes
- Designer r32.1.1 Release Notes
- Designer r32.0.4 Release Notes
- Designer r32.0.3 Release Notes
- Designer r32 Release Notes

Designer r31 Release Notes

- Designer r31.3.4 Release Notes
- Designer r31.3.3 Release Notes
- Designer r31.3.2 Release Notes
- Designer r31.3.1 Release Notes
- Designer r31.3 Release Notes
- Designer r31.2.2 Release Notes
- Designer r31.2.1 Release Notes
- Designer r31.2 Release Notes
- Designer r31.1.1 Release Notes
- Designer r31.1 Release Notes

- Designer r31.0.4 Release Notes
- Designer r31.0.3 Release Notes
- Designer r31.0.2 Release Notes
- Designer r31.0.1 Release Notes
- Designer r31 Release Notes

Designer r30 Release Notes

- Designer r30.8.6 Release Notes
- Designer r30.8.5 Release Notes
- Designer r30.8.4 Release Notes
- Designer r30.8.3 Release Notes
- Designer r30.8.2 Release Notes
- Designer r30.8.1 Release Notes
- Designer r30.8 Release Notes
- Designer r30.7.5 Release Notes
- Designer r30.7.4 Release Notes
- Designer r30.7.3 Release Notes
- Designer r30.7.2 Release Notes
- Designer r30.7.1 Release Notes
- Designer r30.7 Release Notes
- Designer r30.6.1 Release Notes
- Designer r30.6 Release Notes
- Designer r30.5.3 Release Notes
- Designer r30.5.2 Release Notes
- Designer r30.5.1 Release Notes
- Designer r30.5 Release Notes
- Designer r30.4.1 Release Notes
- Designer r30.4 Release Notes
- Designer r30.3.5 Release Notes
- Designer r30.3.4 Release Notes
- Designer r30.3.4 Release Notes
- Designer r30.3.3 Release Notes
- Designer r30.3.2 Release Notes
- Designer r30.3.1 Release Notes
- Designer r30.3 Release Notes
- Designer r30.2.2 Release Notes
- Designer r30.2.1 Release Notes
- Designer r30.2 Release Notes

- Designer r30.1.2 Release Notes
- Designer r30.1.1 Release Notes
- Designer r30.1 Release Notes
- Designer r30.0.3 Release Notes
- Designer r30.0.2 Release Notes
- Designer r30.0.1 Release Notes
- Designer r30 Release Notes

Designer r29 Release Notes

- Designer r29.3 Release Notes
- Designer r29.2.2 Release Notes
- Designer r29.2.1 Release Notes
- Designer r29.2 Release Notes
- Designer r29.1.2 Release Notes
- Designer r29.1.1 Release Notes
- Designer r29.1 Release Notes
- Designer r29.0.1 Release Notes
- Designer r29 Release Notes

Designer r28 Release Notes

- Designer r28.1.1 Release Notes
- Designer r28.1 Release Notes
- Designer r28.0.1 Release Notes
- Designer r28 Release Notes

Designer r27 Release Note

- Designer r27.10.3 Release Notes
- Designer r27.10 Release Notes
- Designer r27.9 Release Notes
- Designer r27.8 Release Notes
- Designer r27.7.4 Release Notes
- Designer r27.7.2 Release Notes
- Designer r27.7.1 Release Notes
- Designer r27.7 Release Notes
- Designer r27.6.3 Release Notes
- Designer r27.6.2 Release Notes
- Designer r27.6.1 Release Notes
- Designer r27.6 Release Notes
- Designer r27.5.1 Release Notes

- Designer r27.4.3 Release Notes
- Designer r27.4.2 Release Notes
- Designer r27.4.1 Release Notes
- Designer r27.4 Release Notes
- Designer r27.3.3 Release Notes
- Designer r27.3.2 Release Notes
- Designer r27.3.1 Release Notes
- Designer r27.2 Release Notes
- Designer r27.1.4 Release Notes
- Designer r27.1.3 Release Notes
- Designer r27.1.2 Release Notes
- Designer r27.1.1 Release Notes
- Designer r27.1 Release Notes
- Designer r27 Release Notes

Designer r26 Release Notes

- Designer r26.5.3 Release Notes
- Designer r26.5.2 Release Notes
- Designer r26.5.1 Release Notes
- Designer r26.5 Release Notes
- Designer r26.4.2 Release Notes
- Designer r26.4.1 Release Notes
- Designer r26.4 Release Notes
- Designer r26.3.1 Release Notes
- Designer r26.3 Release Notes
- Designer r26.2.2 Release Notes
- Designer r26.2.1 Release Notes
- Designer r26.2 Release Notes
- Designer r26.1.1 Release Notes
- Designer r26.1 Release Notes
- Designer r26.0.5 Release Notes
- Designer r26.0.4 Release Notes
- Designer r26.0.3 Release Notes
- Designer r26.0.2 Release Notes
- Designer r26.0.1 Release Notes
- Designer r26.0 Release Notes

Designer r25 Release Notes

- Designer r25.3.1 Release Notes
- Designer r25.3 Release Notes
- Designer r25.2.3 Release Notes
- Designer r25.2.1 Release Notes
- Designer r25.2 Release Notes
- Designer r25.1.4 Release Notes
- Designer r25.1.3 Release Notes
- Designer r25.1.2 Release Notes
- Designer r25.1.1 Release Notes
- Designer r25.1 Release Notes
- Designer r25.0.3 Release Notes
- Designer r25.0.2 Release Notes
- Designer r25.0.1 Release Notes
- Designer r25 Release Notes

Designer r24 Release Notes

- Designer r24.4.1 Release Notes
- Designer r24.4 Release Notes
- Designer r24.3.1 Release Notes
- Designer r24.3 Release Notes
- Designer r24.2.2 Release Notes
- Designer r24.2.1 Release Notes
- Designer r24.2 Release Notes
- Designer r24.1.1 Release Notes
- Designer r24.1 Release Notes
- Designer r24.0.4 Release Notes
- Designer r24.0.3 Release Notes
- Designer r24.0.2 Release Notes
- Designer r24.0.1 Release Notes
- Designer r24 Release Notes

Designer r23 Release Notes

- Designer r23.4.2 Release Notes
- Designer r23.4.1 Release Notes
- Designer r23.4 Release Notes
- Designer r23.3 Release Notes
- Designer r23.2.1 Release Notes
- Designer r23.2 Release Notes

- Designer r23.1.3 Release Notes
- Designer r23.1.2 Release Notes
- Designer r23.1.1 Release Notes
- Designer r23.1 Release Notes
- Designer r23.0.2 Release Notes
- Designer r23.0.1 Release Notes
- Designer r23 Release Notes

Designer r22 Release Notes

- Designer r22.3.1 Release Notes
- Designer r22.3 Release Notes
- Designer r22.2.2 Release Notes
- Designer r22.2.1 Release Notes
- Designer r22.2 Release Notes
- Designer r22.1.6 Release Notes
- Designer r22.1.5 Release Notes
- Designer r22.1.4 Release Notes
- Designer r22.1.3 Release Notes
- Designer r22.1.2 Release Notes
- Designer r22.1.1 Release Notes
- Designer r22.1 Release Notes
- Designer r22 Release Notes

Designer r21 Release Notes

- Designer r21.4.10 Release Notes
- Designer r21.4.9 Release Notes
- Designer r21.4.8 Release Notes
- Designer r21.4.7 Release Notes
- Designer r21.4.6 Release Notes
- Designer r21.4.5 Release Notes
- Designer r21.4.4 Release Notes
- Designer r21.4.3 Release Notes
- Designer r21.4.2 Release Notes
- Designer r21.4.1 Release Notes
- Designer r21.4 Release Notes
- Designer r21.3.3 Release Notes
- Designer r21.3.2 Release Notes
- Designer r21.3.1 Release Notes

- Designer r21.3 Release Notes
- Designer r21.2 Release Notes
- Designer r21.1.2 Release Notes
- Designer r21.1 Release Notes
- Designer r21.0.5 Release Notes
- Designer r21.0.4 Release Notes
- Designer r21.0.3 Release Notes
- Designer r21.0.2 Release Notes
- Designer r21.0.1 Release Notes
- Designer r21 Release Notes

Designer r20 Release Notes

- Designer r20.1.3 Release Notes
- Designer r20.1.2 Release Notes
- Designer r20.1.1 Release Notes
- Designer r20.0.8 Release Notes
- Designer r20.0.7 Release Notes
- Designer r20.0.6 Release Notes
- Designer r20.0.5 Release Notes
- Designer r20.0.4 Release Notes
- Designer r20.0.3 Release Notes
- Designer r20.0.2 Release Notes
- Designer r20.0.1 Release Notes
- Designer r20 Release Notes

Designer r19 Release Notes

- Designer r19.1.8
- Designer r19.1.7
- Designer r19.1.6
- Designer r19.1.5
- Designer r19.1.4
- Designer r19.1.3
- Designer r19.1.2
- Designer r19.1.1
- Designer r19.1
- Designer r19.0.1
- Designer r19

Designer r18 Release Notes

- Designer r18.1.15
- Designer r18.1.10
- Designer r18.1.9
- Designer r18.1.8
- Designer r18.1.7
- Designer r18.1.4
- Designer r18.1.3
- Designer r18.1.2
- Designer r18.1
- Designer r18.0.6
- Designer r18.0.5
- Designer r18.0.4
- Designer r18.0.3
- Designer r18.0.2
- Designer r18.0.1

Designer r17 Release Notes

- Designer r17.4.12
- Designer r17.4.11
- Designer r17.4.10
- Designer r17.4.9
- Designer r17.4.8
- Designer r17.4.7
- Designer r17.4.6
- Designer r17.4.5
- Designer r17.4.4
- Designer r17.4.3
- Designer r17.4.2
- Designer r17.4.1
- Designer r17.4
- Designer r17.3.8
- Designer r17.3.7
- Designer r17.3.6
- Designer r17.3.5
- Designer r17.3.4
- Designer r17.3.3
- Designer r17.3.2
- Designer r17.3.1

- Designer r17.3
- Designer r17.2.2
- Designer r17.2.1
- Designer r17.2
- Designer r17.1.3
- Designer r17.1.2
- Designer r17.1.1
- Designer r17.1
- Designer r17.0.7
- Designer r17.0.6
- Designer r17.0.5
- Designer r17.0.4
- Designer r17.0.3
- Designer r17.0.2
- Designer r17.0.1
- Designer r17

Designer r16 Release Notes

- Designer r16.1.2
- Designer r16.1.1
- Designer r16.1
- Designer r16.0.6
- Designer r16.0.5
- Designer r16.0.4
- Designer r16.0.3
- Designer r16.0.2
- Designer r16.0.1
- Designer r16

Designer r15 Release Notes

- Designer r15.3.5
- Designer r15.2.5
- Designer r15.1.8
- Designer r15.0.6
- Designer r15

Designer r14 Release Notes

- Designer r14.5
- Designer r14.4.7

Hardware OS & Resource Downloads

⬇️ Hardware OS Image Downloads
⬇️ Resources

Plugin Gallery

Plugins are available for download from our Plugin Gallery

Designer Release Versioning Conventions

The Designer release versioning policy was first introduced in r28 to provide clarity on how we iterate Designer releases.

The version naming convention for Designer is `r'MAJOR'.'MINOR'.'HOTFIX'`.

Version numbers are incremented based on the nature of the changes in each release:

- `MAJOR`: Incremented when a release includes major changes that impact workflows, or where users must relearn how to perform existing tasks. A major release can also include support for, or deprecation of Disguise hardware products.
- `MINOR`: Incremented for feature additions and UI changes. Breaking changes to the API are permitted in Minor versions.
- `HOTFIX`: Incremented for patches and bug fixes that are backwards compatible, where you can revert a project file to an earlier Hotfix version. Breaking changes to the API are not permitted in Hotfix versions.`

Release version naming conventions by change type

The table below shows different types of changes and indicates which types of release they can be found in:

Change	Major	Minor	Hotfix
Requires a new OS for any Disguise Hardware product	✔	✘	✘
Supports new Hardware product type	✔	✘	✘
Modifies public API	✔	✘	✘
Replaces an established workflow	✔	✘	✘
Modifies the UI	✔	✔	✘
Adds new user-editable fields to objects	✔	✔	✘
Removes user-editable fields from objects	✔	✔	✘
Adds new features that benefit from (but do not require) a new OS on any Disguise Hardware product	✔	✔	✘
Adds new functionality to Designer	✔	✔	✘

Change	Major	Minor	Hotfix
Bug fixes	✔	✔	✔

For information about how to upgrade and downgrade your Designer project see our Upgrading and downgrading Designer projects page.

Camera Position Bookmarks

Recalling a camera position

Hit one of the function keys ranging from **F2-F11**.

Storing a camera position

Hold down the left Alt key, then hit one of the function keys ranging from F2-F11. This stores the current camera position on that function key.

Resetting the camera to its default position

Hit the function key F12 This will make the camera return to its central default position, i.e. south-north facing, 10 meters behind the origin position (0,0,0) in 3D space.

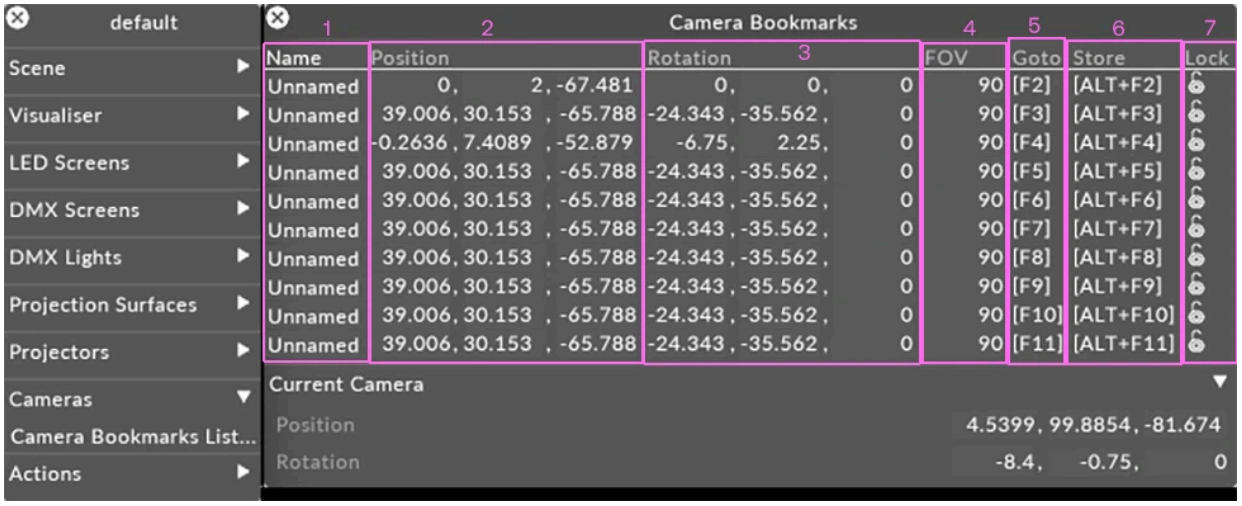
Camera Bookmarks List

To open the Camera Bookmarks List window:

1. Right-click the stage.
2. Select the Camera tab
3. Select the Camera Bookmarks List option

Or alternatively

Press **Ctrl + B**



1. Name

You can enter a custom name for each bookmark.

2. Position

You can view or edit the position for each projector bookmark position.

3. Rotation

You can view or edit the rotation for each projector bookmark position.

4. Field of View (FOV)

You can view or edit the Field of View for each projector bookmark position.

5. Goto

Left-click the button to recall a camera position using the Camera Bookmark list.

6. Store

Left-click the button to store the current visualiser camera position as that camera bookmark

7. Lock

Lock the Camera Bookmark from accidental edits.

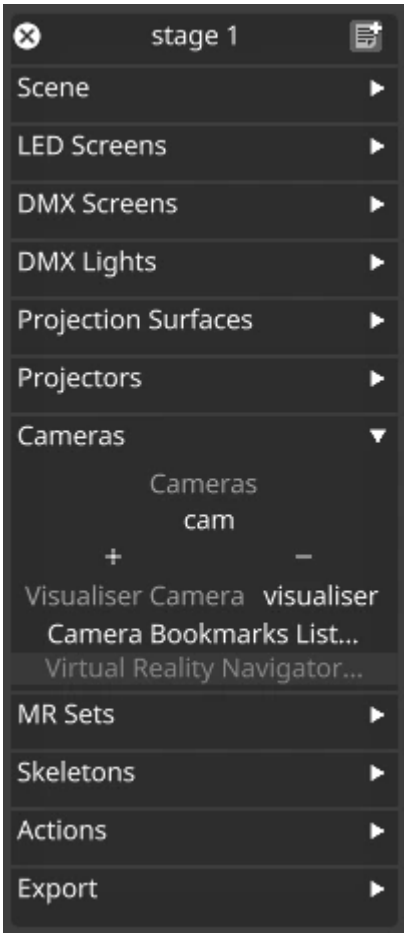
> **Note**
>
> **Please note**: When using some keyboards such as on a bootcamped Mac, you may need to use the keyboard shortcut **fn.+F2-F11** to recall camera positions and **fn + Alt+F2-F11 to store** a camera position.

Camera Properties

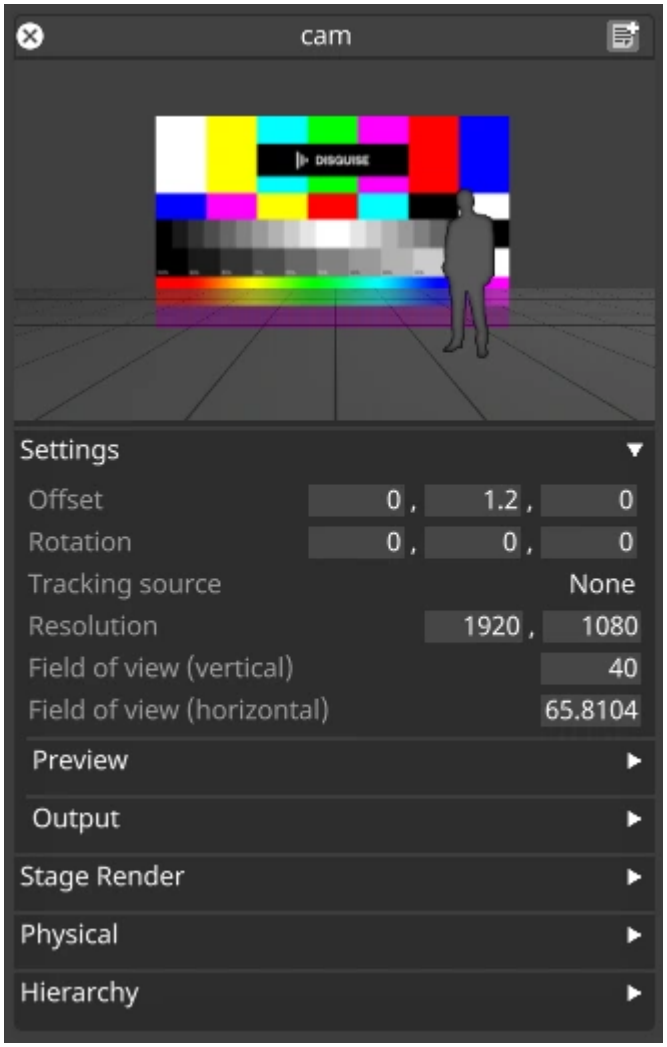
Cameras can be configured according to the properties of the real-world cameras they represent.

To create a camera and amend camera properties:

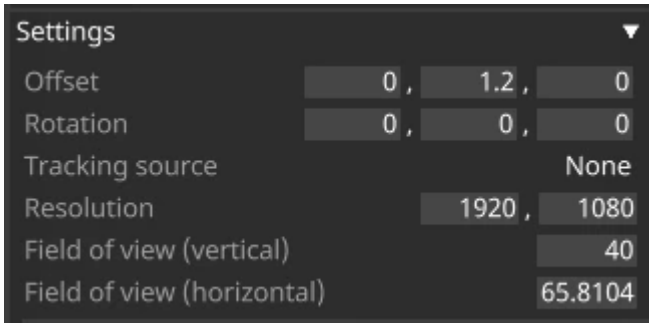
1. Open the stage editor by right-clicking stage from the dashboard or by right-clicking the floor in the visualiser.
2. Expand the **Cameras** tab.



3. Right-click a camera from the list or create a new one.
4. Adjust the desired properties of the camera using the editor.



Settings



Offset

The offset in meters of the camera's position from its parent. When parented to the stage which is the default this is the camera's world position.

Rotation

The rotation transformation in degrees from its parent. When parented to the stage, which is the default, this is the camera's world rotation.

Tracking source

See Object tracking source and Camera tracking for more information.

Resolution Source (visualiser camera only)

- **Take from GUI** - Default, Use the resolution of the GUI display.
- **Fixed** - You can specify a custom resolution. Will not change the resolution of the display, only the camera's view.

Resolution

The resolution that the camera will use to render its view.

Field of view (vertical)

The vertical field of view in degrees of the camera.

Field of view (horizontal)

The horizontal field of view in degrees of the camera.

Preview



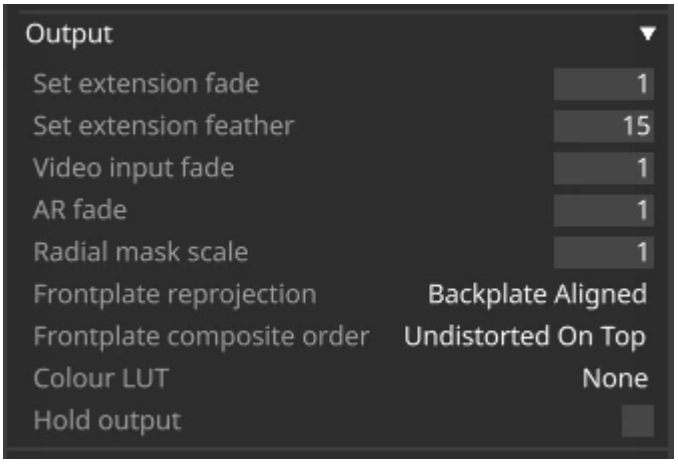
Camera plate

Sets the camera preview to Transmission, Backplate, or Frontplate.

Show Alpha

Toggles whether the camera preview will show Alpha or not.

Output



Set extension fade

Opacity of the set extension.

Set extension feather

Feather of the set extension. This is defined as the width of the feather in pixels.

Video input fade

Opacity of the video input in the full camera composite. Helpful if you want to see how well the set extension is lined up.

AR fade

Opacity of the AR (frontplate) content. Helpful to see how well the AR content is lined up.

Radial mask scale

Applies a radial mask to the film content. This can be helpful to remove excessive radial distortions, particularly for Virtual cameras.

Frontplate reprojection

- **Backplate aligned**: Front plate is delayed and reprojected with the backplate so frontplate and backplate content are displayed in sync. This is the default.
- **No reprojection**: Frontplate is delayed along with the backplate content but is not reprojected. This is used for frontplate content that aligns more with the filmed content.

- **Minimal latency**: Backplate image and frontplate images are taken from two different points in time. This results in the latest frontpate frame being displayed.

Frontplate composite order

Defines how content assigned to frontplate is ordered in the composite stack.

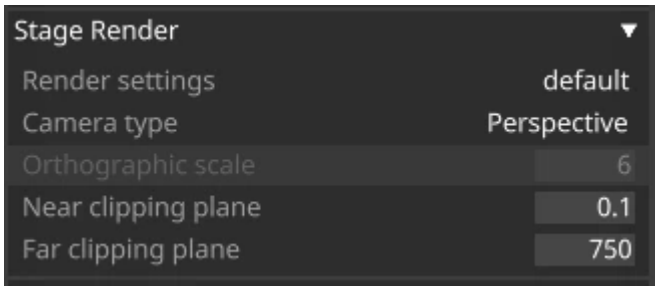
Colour LUT

Defines which LUT is applied to the camera. Designer has a number of LUT files built in.

Hold output

Hold output freezes the current frame of the camera output. This is a toggle setting.

Stage Render



Render settings

Stage render settings control how cameras render the virtual stage. Right-click on **default** to open the default configuration; left-click on **default** to open the StageRenderSettings list manager to create a new configuration or recall an existing one. See Stage Render Settings for more information.

Camera type

- **Perspective** - Perspective view.
- **Orthographic** - Orthographic view.

Orthographic scale

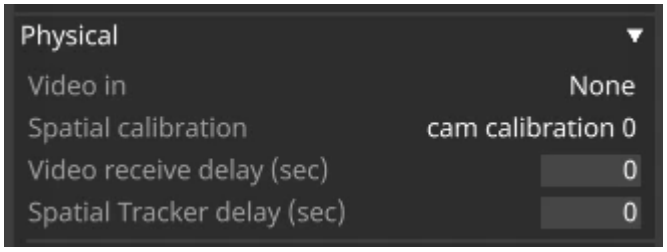
Orthographic cameras have no concept of depth and distance from the scene. A zoom-like effect can be achieved by adjusting the **Orthographic scale**, but this setting is independent from zoom in the equivalent perspective camera.

Near & Far clipping plane

Any geometry closer than the near-clipping plane or further than the far-clipping plane will clipped (not be rendered). The values are in meters.

Reducing the range of these values can improve shadow quality and reduce shadow acne.

Physical



Video in

Defines the live video input this camera is linked to.

Spatial calibration

Used to create spatial calibration configurations. See Spatial calibration for more information.

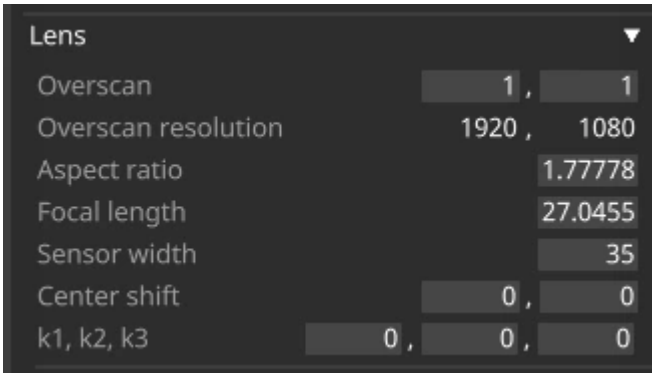
Video receive delay (sec)

Roundtrip latency time calculated from the Video Receive Delay calibration process.

Spatial Tracker delay (sec)

Amount of time in seconds between the camera frame arriving and the tracking data associated with it arriving. This is calibrated automatically during Tracking delay calibration.

Lens



Overscan

Defines the overscan ratio. The Default is 1. Setting to 1.1 would mean an overscan of 10%. The higher the overscan, the higher the performance impact.

Overscan resolution

Overscan resolution is the readout value in resolution of the overscan values.

Aspect ratio

Aspect ratio of lens image.

Focal length

Focal length of lens in mm.

Sensor width

Width of lens in mm, used to normalise focal length and center shift.

Centre shift

Center shift of lens in mm, based on sensor size.

K1, K2, K3

- **k1** - First order radial distortion coefficient, in normalised coordinates.
- **k2** - Second order radial distortion coefficient, in normalised coordinates. = **k3** - Third order radial distortion coefficient, in normalised coordinates.

Focus



The focus parameters are used for depth of field simulations in Designer and RenderStream engines.

Depth of field simulation is applied to stage renders in Designer when the **Focus mode** is not **Disabled**. This applies depth of field in camera previews (including the visualiser camera if set), the 2.5D layer and the Stage render layer.

Using lens focus parameters in Unreal Engine

1. Set up a Renderstream layer with an Unreal asset, with a channel created from a CineCamera.
2. Map the channel to a Camera or MR set's Backplate or Frontplate.
3. Start the RenderStream workload.
4. Set the **Focus mode** to **Manual** or **Object tracking**.
5. Adjusting the lens focus parameters in the camera should cause the depth of field effect to change in Unreal Engine.

Focus mode

- **Disabled:** No focus effects applied.
- **Manual** Use focus distance set manually or from tracking source.
- **Object Tracking** Set the focus distance based on a tracked object.

Focus tracked object

When in **Object Tracking** mode, the **Focus distance** is calculated based on the depth of this object's centroid relative to the camera.

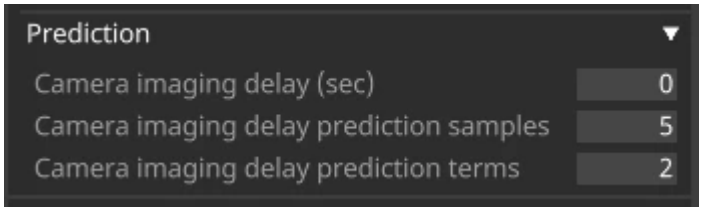
Focus distance

Distance to the focal plane in m. Editable in **Manual** mode, calculated automatically in **Object Tracking** mode.

Aperture

Aperture (f-stop) value, defined as the focal length / aperture diameter.

Prediction



Camera imaging delay (sec)

The amount of time between Designer outputting the frame and capturing the image. Prediction is turned off when this value is zero. If you want to turn prediction on, increase this value until the image looks good. Do not increase beyond the Video Receive Delay value.

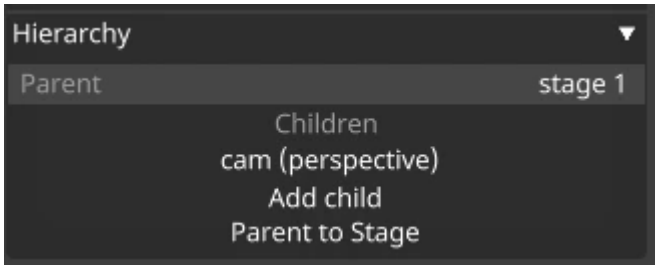
Camera imaging delay prediction samples

How much of the history of the tracking data to predict into the future. Expressed in frames.

Camera imaging delay prediction terms

How many terms we used to model the movement. Two terms is linear. Three terms is a cubic prediction.

Hierarchy



Parent

Shows the parent object (this is usually the stage, so the object will be offset from the origin point of the stage).

Children

Shows children of the object.

- Click **Add child** to create a parent/child relationship between this object and another.

- Click **Parent to stage** to re-parent the object back to the stages origin point.

Cameras

Cameras are another display type in Designer. Similarly to projectors they render the scene from a specific point of view.

It is possible to create multiple cameras in a project in order to simulate the location and viewing perspectives of physical cameras in the real world.

> **Warning**
>
> Be aware that having multiple cameras requires part of the scene to be rendered multiple times so can incur a major performance cost.

The Visualiser's view of the stage is also a camera referred to as the Visualiser Camera. This can be accessed by clicking the Visualiser Camera button below the Cameras list or right-clicking on the background.

Workflow

1. Open the stage editor by right-clicking stage from the dashboard or by right-clicking the floor in the visualiser.
2. Expand the Cameras tab.
3. Click + to add a camera.
4. Left-click the new camera field in the Camera manager.
5. Enter a name for the camera.
6. Left-click OK.
7. Choose Camera from the camera types list
8. You will now see a camera object in the visualiser, at the origin point (0,0,0).
9. Use the 3D widget to adjust the camera's X,Y,Z position within the stage.

[Animated GIF: Creating a camera]

Patching Cameras to Outputs

Cameras allow you to output that viewing perspective using feed rectangles in the Feed Output window.

Assigning the camera to a feed

1. Position the camera in the visualiser.
2. Left-click Feed from the dashboard.
3. Right-click on the camera feed at the top of the feed scene and left-click Add feed rectangle or alternatively hold ALT, left-click and drag an arrow from the camera feed to an available output head.

Configuring DMX Input and Output

DMX input and output in Designer is handled by a **DmxDevice** — a logical representation of a physical DMX converter connected to the machine via USB or Ethernet. You need at least one DmxDevice before you can create DMX Screens, DMX Lights, or Fixtures.

> ⚠ **Warning**
>
> A DmxDevice can be mapped to conflicting address ranges, which will result in unpredictable behaviour. Keep a clear record of the universes each device uses.

Workflow overview

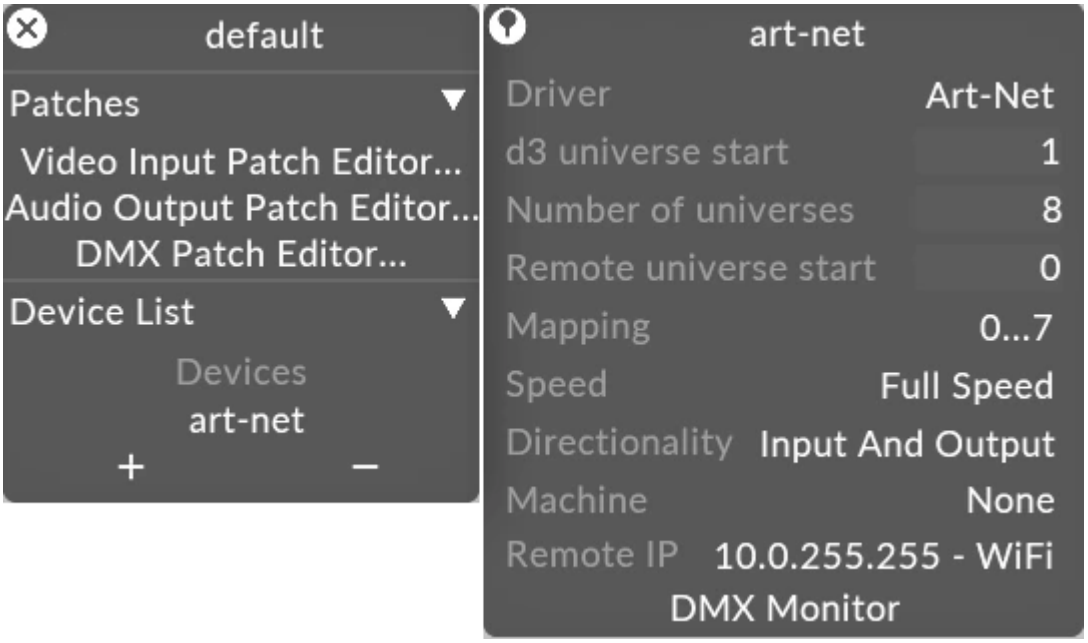
1. **Identify your hardware.** Determine which protocol your DMX converter uses — Art-Net, sACN, Enttec, SoundLight, EzDMX, or KiNET v1/v2.
2. **Create a DmxDevice.** Add one DmxDevice per physical converter.
3. **Set the driver and addressing.** Choose the converter type on the **driver** property, set the IP address (for Ethernet protocols), and define the universe range this device is responsible for via **start universe** and **universes**.
4. **Verify the connection.** Open the DMX Monitor from the DmxDevice editor to prove input and output on each universe.
5. **Configure global behaviour.** See Global DMX Options for settings that affect how Designer outputs DMX, including fade behaviour and lamp on/off commands.
6. **Build your stage.** Move on to Creating DMX Screens or Creating DMX Lights.

Create a DMX Device

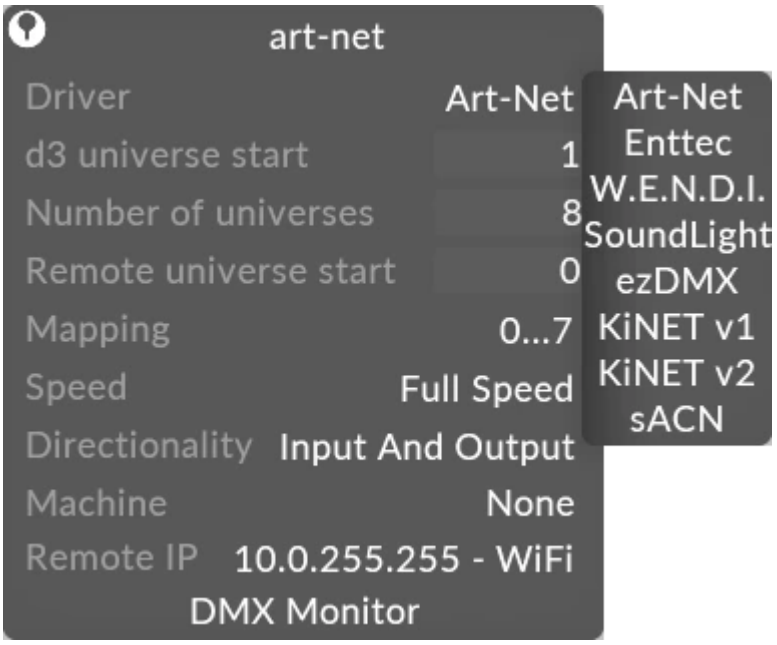
A DmxDevice is created in the same way as any other device type. Please see Creating devices for step-by-step instructions on how to create a device, and select DmxDevice from the menu of different device types.

Edit the DMX Device

1. Right-click the new DmxDevice, in this case Art-Net, to open the DmxDevice editor.



2. Left-click **driver**. This is an option switch that selects the converter device type.



Driver property points to different options of converter device types

Protocols Supported

The following options are supported:

Art-Net

An Art-Net device acts as a bridge between a standard Ethernet network and traditional DMX lighting systems, handling both input and output. This is the most commonly used DMX-over-ethernet protocol. Art-Net can transmit up to 32,768 Universes of data via a single ethernet cable.

Art-Net Broadcast

Art-Net broadcast is the initial transmission method for the Art-Net lighting protocol, where a signal is sent to all devices on a network to discover and configure lighting nodes. To do Art-Net Broadcast, set the remote IP of the device to be the broadcast address of the network. For example, if the node's IP is `2.0.0.1` and the subnet mask is `255.0.0.0` then the broadcast IP will be `2.255.255.255`.

Art-Net IP Address Filtering

We've modified the way we manage Art-Net/sACN connections to allow for more precise layering of DMX data. This means that Disguise is now more strict regarding which IP address it will receive data from, as opposed to the previous behaviour in which it would listen to the entire subnet. In light of this change, users will now need to be more specific when entering remote IP addresses, ensuring that either the correct unicast address or the subnet's broadcast address is used.

sACN

Streaming-ACN, also known as ANSI E.1 31-2016, is an alternate DMX-over-Ethernet protocol that is supported by Disguise. Unlike Art-Net, which is a broadcast (or unicast) protocol, sACN is a multicast protocol and can transmit up to 63,999 Universes of control data via an ethernet network.

When selecting an adapter for multicast traffic in Designer, it loads the list of the adapters present on the local machine. Note that the name of the adapter that is being used to transmit the sACN signal must be labelled the same way on each of the servers in the network in order to connect properly.

Incorrect example:

```
Server A (Director) NIC B labeled "B - sACN 1Gbit"
Server B (Actor) NIC B labeled "B - Artnet 1Gbit" (NIC B will not receive DMX)
```

Correct example:

```
Server A (Director) NIC B labeled "B - sACN 1Gbit"
```

```
Server B (Actor) NIC B labeled "B - sACN 1Gbit"
```

ENTTEC

This is the protocol supported by the popular ENTTEC Datagate conversion devices.

SoundLight

This is a USB-based protocol communicating with DMX devices made by SoundLight Inc.

EzDMX

This is a USB-based protocol communicating with Avolites EzDMX devices.

Kinet V1 and V2

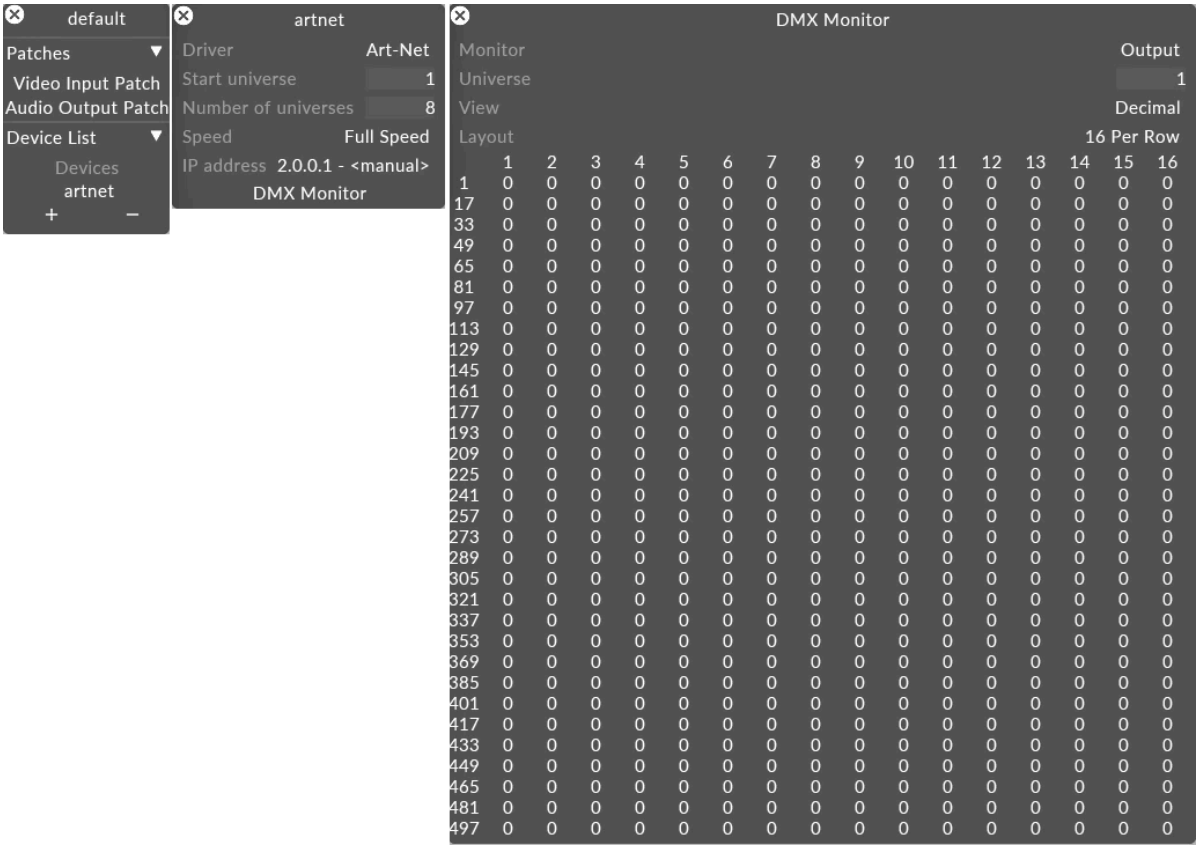
This is a lighting control protocol supported by Color Kinetics devices.

For this example:

- Select **Art-Net** from the list of driver converter types.
- Left-click **IP-address** to open the IP address editor. Ethernet-based protocols (Art-Net, ENTTEC, WENDI) identify each physical device with a different IP address. This property has no function for USB-based protocols (SoundLight, EzDMX).
- Left-click **Manual address** to open the **Select Remote Node** window and type in the IP address of the device. In this example, the IP address for a GrandMA lighting desk is being typed in.
- Left-click **OK** when you have finished typing in the IP address.
- Type in the **start universe** value; universe numbers always start from 1. The **start universe** property specifies the first universe number of the device. Designer makes an arbitrary number of DMX universes available to you and maps ranges of universes to individual DMX converter devices. This number specifies the universe number of the first universe mapped to this device.
- Type in the **universes** value. This specifies the number of universes to be mapped to the DMX device. In the example above, universes 1 through 8 are mapped to the Art-Net device located at 10.0.0.83.

Prove DMX input/output

1. Open the DMX monitor by left-clicking DMX monitor in the Device editor. The DMX monitor is used to prove DMX input and output, in this example for an Art-Net device.



DMX monitor is used to prove DMX input and output, opened by left-clicking DMX Monitor from the DmxDevice editor

2. Type in the universe value to prove DMX input on that specific universe.
3. Left-click on **Monitor** to change the value from Output to Input.
4. Check if the values are coming into Designer.

Related pages

- DMX Device — the DmxDevice reference page in the Devices section.
- Global DMX Options — global DMX output settings.
- DMX Screens and DMX Lights Overview — the broader workflow context.

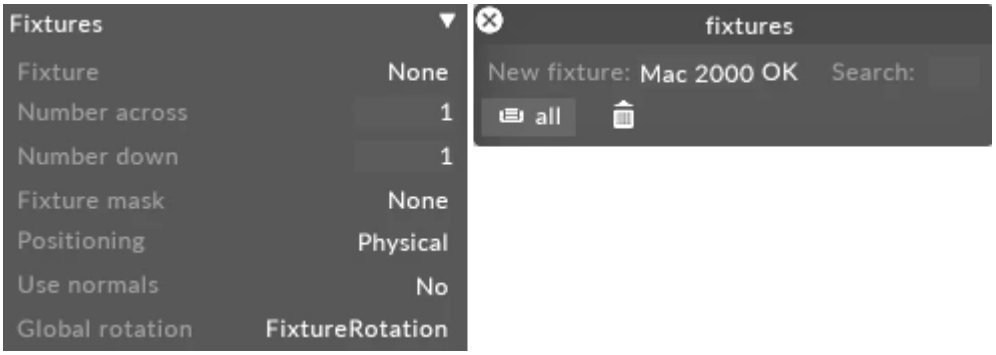
Creating a Fixture

When you first create a DmxLights screen, it is just an ordinary screen. You can drive content to it and see the content in the Stage Visualiser, but you cannot see the screen in the Feed level.

The first step is to set up the fixture the DmxLights screen will use to cover its surface. For information on how to create a DmxLights screen please read the previous sub-chapter DmxLights.

To create a fixture:

1. Left-click **fixture** from the DmxLights editor. This will open the Fixtures manager.
2. Type in the name of the fixture in the **new fixture** text field, in this example **mac 2000**.
3. Hit **Enter** to open a list of fixture types.
4. Left-click the type **Fixture**.



Process used to create a fixture, in this example Mac 2000

5. Hit **Enter** to create the new fixture. For information on how to create a grid of fixtures please see the following sub-chapter. Setting up a grid of fixtures.



Fixture editor, in this example for the newly created Mac 2000 fixture

6. Hitting **Enter** will also open the Fixture editor.

> **Note**
>
> **Please note**: The fixture object defines a fixture within the Stage Visualiser. It does not set up information about how to actually drive the fixture; that is handled by the **driver** property.

Fixture properties

Size

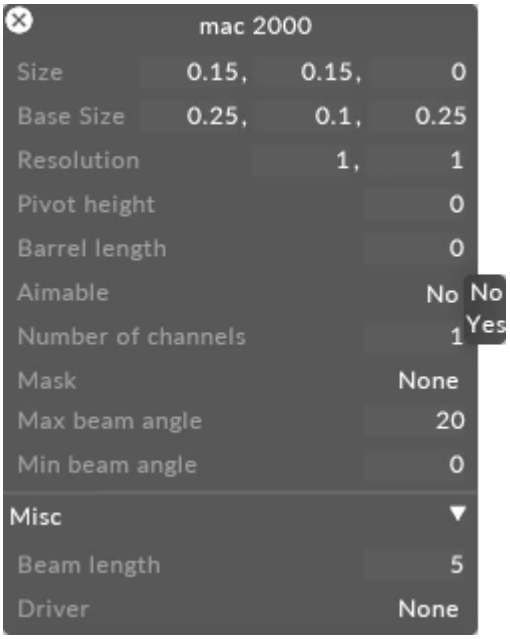
This specifies the physical size of the fixture, in meters. The first number is the x component (width), the second is the y component (height) and the third is the z component (depth). These numbers refer to the size of the actual fixture emitter, not to the total size of the fixture base.

Resolution

Each fixture is considered to be a mini screen containing one or more pixels. The default resolution is 1 by 1 pixel (i.e. a single pixel) but it is possible to have multiple pixels in the same fixture. For example, a Traxon tile has a grid of 8 by 8 pixels; a Robe Redwash has a grid of 4 by 1 pixels.

Aimable

Set this to **yes** if the fixture has a moving head, otherwise select **no** .



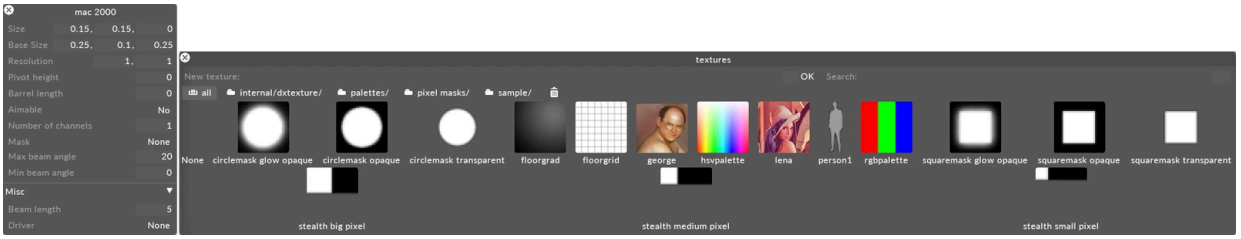
Aimable property should be set to yes if the fixture has a moving head

Number of Channels

Specifies the number of DMX channels in the fixtures personality.

Mask

This points to the still image file that defines the mask used when rendering the fixture. Selecting this property will open the Texture object library, which shows all of the Texture still image files saved on your local hard-drive in the **DxTexture** folder. By default d3 comes with a number of still image files. For example, fixtures with circular emitter profiles should use the **circlemask** bitmap.



Mask property is used to select a still image file that defines the mask used when rendering the fixture

The instructions on how to create a custom Pixel mask can be used to create a mask for rendering a fixture. For step-by-step instructions on how to create a Pixel mask, where to place a still image file, and how to access it in d3, scroll down to the section Pixel mask in the Editing screens topic.

Beam Angle

These control the max (zoomed out) and min (zoomed in) beam angles of the light, in degrees.

Beam Length

This sets the beam length, in meters. This property is for visualisation purposes only; it does not send a signal to the light.

Drivers

This specifies how colour and orientation information are sent to the actual physical fixture. For detailed information on how to use this property please see the Fixture drivers topic.

Creating DMX Lights

DmxLights are screens to which a rectangular array of fixtures has been attached. The fixtures are spaced out equally across the surface of the screen and sample content from the screen before sending it out via DMX.

You should use a DmxLights screen when you are trying to control an array of complex fixtures. Complex fixtures are those which have any or all of the following:

- Shutter open/close, lamp on/off, reset and other commands
- CMY colour mixers with a traditional lamp
- Extra control channels such as focus, zoom, iris, gobo
- A moving head base with pan and tilt

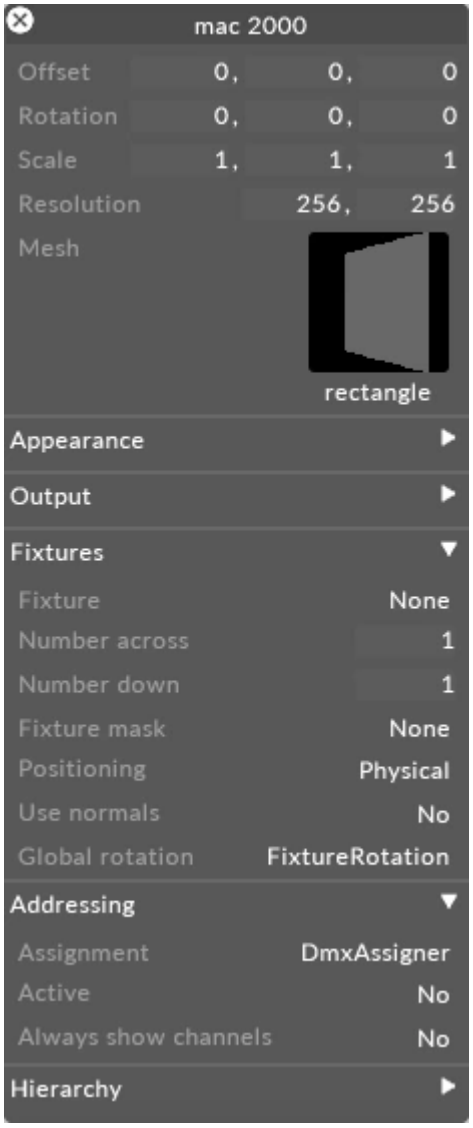
Creating a DmxLights screen

The DmxLights screen is added in the same way as any other screen type.

Please see the sub-chapter Creating/removing screens for step-by-step instructions on how to add a screen to a stage, and select **DmxLights** from the menu of different screen types.

DmxLights properties

The DmxLights properties are similar to the Screen properties, but with an extra tab called **addressing** (explained in the sub-chapter DMX addressing) and **fixtures** . Therefore all of the DmxLights properties not related to addressing or fixtures can be read in the sub-chapter Editing screens.



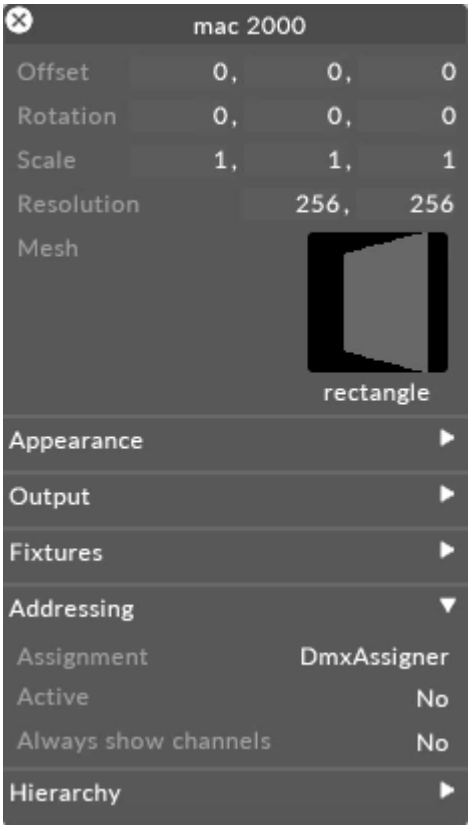
DmxLights has the same properties as a Screen but with two extra sections called Addressing and Fixtures

An explanation of each of the properties contained in the **fixtures** section are explained in the following sub-chapter Creating a fixture, and the sub-chapter Setting up a grid of fixtures.

DMX Addressing

Addressing is the process of assigning a unique DMX channel and universe number to each fixture in the DmxLights screen. There are two ways this can work: either you specify the addressing layout in Designer and print out a screenshot for the technicians to work to, or you receive an addressing layout chart and have to match it within Designer.

Addressing is handled under the **addressing** tab of the DmxLights editor.



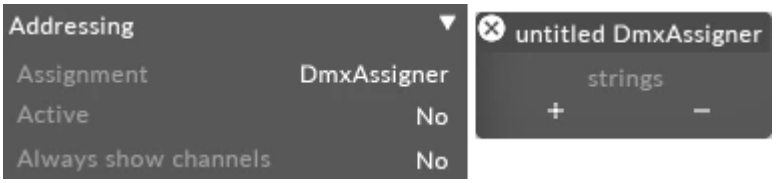
Addressing properties of the DmxLights editor control how DMX channels and universe numbers are assigned to each fixture.

Addressing properties

Assignment

The **DmxAssigner** specifies a set of addressing strings. These strings are used to assign addresses to the fixtures.

- To open the **DmxAssigner** right-click **assignment**.



DmxAssigner is used to control how addresses are assigned to fixtures, opened by right-clicking Assignment from the DmxLights editor.

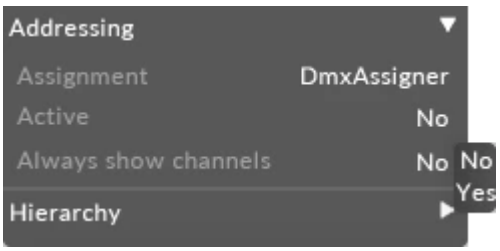
The **DmxAssigner** contains an array of **DmxStrings**. Each DmxString specifies a string of fixtures that have contiguous channel numbers.

Active

This indicates whether the DmxLights screen is actually outputting DMX. By default, this is set to **off** ; you should only switch it to **on** once the addressing is checked and complete.

Show channels

This controls whether the fixture bases and channel numbers are displayed in the visualiser.



Show Channels property controls whether channel numbers and fixture bases are displayed for each fixture in the Stage Visualiser

Switching **show channels** to **yes** will display each fixture in the visualiser.

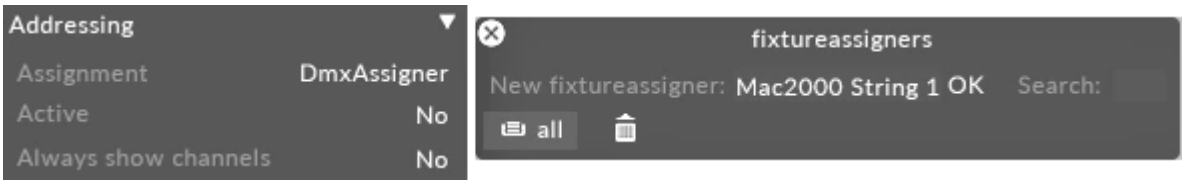
DmxAssigner

When wiring DMX fixtures, the usual practice is to arrange fixtures in strings, i.e. a series of fixtures wired in daisychain fashion, with channel numbers that step up in a certain way. A DmxLights screen may contain multiple strings. Each of these strings is specified using a DmxString.

To add a DmxString to the DmxAssigner:**

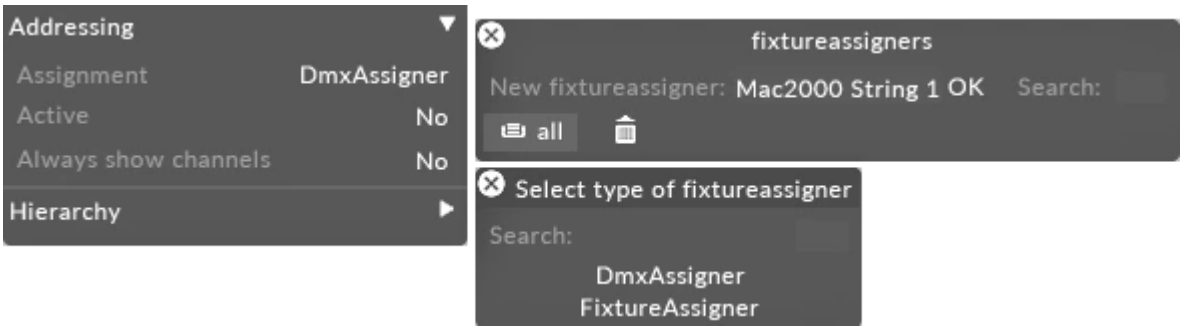
1. Right-click **+** to open the Dmxstrings manager.

2. Type the string name into the **new dmxstring** text field, in this example Mac2000 String 1 (be sure to include the name of the DmxLights screen in the name).



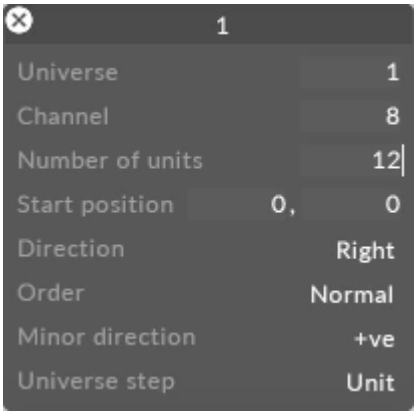
Process used to create a new DMX string, in this example Mygroup_str1

3. Hit **Enter**. This creates the new DmxString, adds it to the DmxAssigner, and opens the DmxString editor.



DmxString editor

4. Type in the properties you want and hit **assign!**. The DmxString will then assign the channel numbers, and the visualiser will display the channel numbers.



Assigning the channel numbers to the fixtures by left-clicking Assign!

DmxString properties

The DmxString starts at a particular fixture position in the grid and then steps across the grid, assigning channel numbers as it goes. The properties of the DmxString editor control which channels are assigned and the step direction.

Universe

This specifies the universe number that should be assigned to the first object in the string. The lowest valid number is 1.

Channel

This specifies the channel number within the universe that should be assigned to the first object in the string. Valid numbers are 1 to 512 inclusive.

Number of Units

This specifies the number of fixtures you want in your string. In the example above, our DmxLights screen has a 2 by 4 grid of fixtures, so the number of units is set to 2x4 = 8.

Start position

This specifies the index within the DmxLights screen of the first fixture in the string. The topleft fixture is designated (0,0), the fixture to its right is (1,0) and the fixture below it is (0,1). In general, you can find fixture (i, j) by starting at the top left fixture and counting (i) to the right and (j) down. In this example, we set start pos to (0,0) to indicate the top left fixture.

Direction

Starting at the first fixture, the DmxString will assign a channel, then step in a certain direction across the surface of the DmxLights screen before assigning the next channel number. There are four possibilities: left , right , up or down . In this example, the channel number are stepping to the right.

Order

This specifies the stepping order across the grid as a whole. You can select one of two options. Choosing normal means that when it reaches the edge of the grid, it moves up or down one row/column and starts again at the opposite edge. Selecting alternating means that when it reaches the edge of the grid, it moves up or down one row/column and then starts stepping in the other direction.

Minor Direction

This controls the direction of the step that takes place when the assigner gets to the edge of the grid. There are two options : ve (steps left or up) or +ve (steps right or down).

Universe step

Since fixtures cannot straddle a universe boundary, the assignment algorithm will step up a universe if it finds that there are not enough channels left in the current universe. However, it is sometimes more useful if each row or column within the grid is constrained to be contained within one universe. If this is the case, set universe step to row/column instead of unit.

Fixture Drivers

The final property of a fixture, **driver**, specifies how colour and orientation information are sent to the actual physical fixture. Please scroll down to the section 'Fixture properties in the Creating a fixture sub-chapter for information on the other fixture properties.



Driver property of a fixture specifies how colour and orientation information are sent to the actual physical fixture

This is sometimes referred to as the personality of the fixture. It is a list of functions that are supported by the fixture and the channels used to control those functions. This information is usually found in the product manual for the fixture, which is downloadable from the manufacturers website.

You can sequence a complete show in the visualiser without creating fixture drivers. However, a fixture must have a valid driver in order to be assigned a DMX address (channel/universe) using the addressing system and in order to send DMX to the outside world.

Types of fixture drivers

There are four types of fixture drivers available, each suitable for a different class of fixtures.

DmxDriver

This is the easiest type. Use this for DMXcontrolled pixelgrid fixtures that have no moving head or CMY colour mixing hardw

FixtureDriver

Please ignore this type of fixture driver.

GenericLampDriver

This driver is suitable for traditional moving head lights containing (optionally) a pan and tilt base and (also optionally) a CMY (cyan/magenta/yellow) colour mixing system. It supports programming commands such as lamp on/off, shutter on/off, etc.

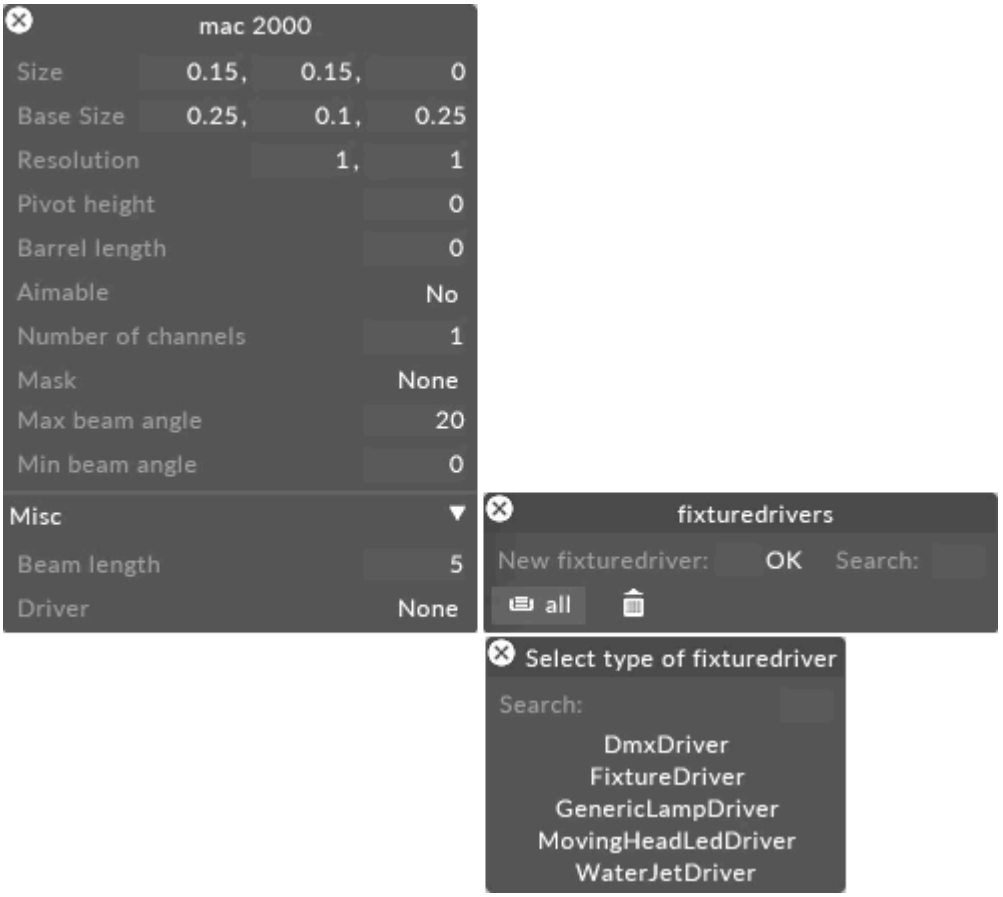
MovingHeadLEDDriver

This driver combines elements of DmxDriver and GenericLampDriver and is suitable for moving head fixtures that have multiple LED pixels mounted on the moving head.

Creating a fixture driver

To create a fixture driver:

1. Open the Fixture editor by right-clicking **fixture**, in this example **mac 2000** , from the DmxLights editor.
2. Open the Fixturedrivers manager by left-clicking **driver** from the Fixture editor.
3. Type in the name of the new fixture driver, in this example **bb4 driver**, in the **new fixturedriver** text field.
4. Hit **Enter** to create the new fixture driver.
5. Select a fixture driver type from the list of driver types.



DmxDriver

The DmxDriver is a fixture driver type that routes RGB pixel information to a regular rectangular grid of LED pixels.

DmxDriver Properties

Mode

This describes the pixel type of the LED fixture. There are two monochrome modes: *mono [weighted sum]* gives a more natural result for photographic/gradient images, whereas *mono [max signal]* ensures that peak brightness is maintained. Sending a redonly image with all levels at 255 will result in an output level of 255, whereas the weighted result will be less than 255.

The options are:

rgb : traditional threecomponent RGB LED , with eight bits per signal (red, green and blue).

rgb + amber : RGB + an extra amber component, all at eight bits per signal.

rgb + white : RGB + an extra white component, all at eight bits per signal.

rgb + amber + white : RGB + amber and white components, all at eight bits per signal.

cmy : cyan, magenta and yellow components.

mono [weighted sum] : monochrome (8 bits); the value sent is a weighted sum of red, green and blue.

mono [max signal] : monochrome (8 bits); the value sent is the maximum of red, green and blue.

Horizontal

This property allows the data sent to the tile to be mirrored in the horizontal axis.

Vertical

This property allows the data sent to the tile to be mirrored in the vertical axis.

Rotation

This property allows image data being sent to be rotated by 90 degrees clockwise or 90 degrees counterclockwise . This only has an effect if the grid is a square grid.

Amber Level, White Level

These properties allow you to directly control the amber and white signals sent to all pixels. They only have an effect if the mode property is set to RGB+amber or RGB+amber+white . In RGB+white mode, the signal sent to the white LED is computed from the RGB signals.

GenericLampDrivers

To set up a GenericLampDriver object, you need to start with the DMX channel specification of the fixture, usually downloadable as a PDF from the manufacturer. You then read down the channel list, filling in channel numbers into the GenericLampDriver as you go.

Most properties specify either a DMX channel number (which is always taken as an index from the first channel in the fixture, 1 being the first valid channel). If a property is set to 0, no data is sent for that property. For instance, if a light is a CMY fixture (cyan, magenta, yellow), but the cyan channel is set to 0, then information will only be sent to the magenta and yellow channels.

The properties are divided into three major sections: **lamp** , which controls how information is sent to the lamp; **pan/tilt**, which controls how rotation commands are sent to moving head fixtures; and **commands** , which allows for setting default parameters.

Mode

This specifies the colour mixing mode for the lamp. This is initialised to **cmy**.

Since GenericLampDrivers are only meant for singlelamp/pixel fixtures, the mirror/rotate properties from the DmxDrivers are unnecessary and are therefore removed. You can, however, change this to another value if you wish; this allows the GenericLampDriver to be used for singlepixel movinghead RGB LED fixture

Lamp controls

This set of properties controls how information is sent to the lamp.

Lamp properties for a GenericLampDriver

Dimmer channel : standard CMY lights allow you to vary the output brightness using a dimmer. This is a mechanical shutter that blocks more or less light as you change the dimmer setting. This property sets the channel number assigned to the dimmer; if set to 0 (as it should be for RGB LED fixtures), no information is sent.

Dimmer flipMode : some fixtures use the value ‘0 to signify dimmer closed (i.e. minimum light output); others use this value to signify dimmer open (i.e. maximum light output). This switch allows you to change the fixtures behaviour as appropriate.

Min brightness : dimmers, being mechanical, do not always produce a linear response. In particular, some dimmers appear to block all light until the value rises to a non0 value and then open up from there. If the fixtures dimmer exhibits this feature, set min brightness to the value at which output brightness reaches 0 as you dim the light. From then on, Designer will scale the output brightness appropriately to give you a clean, linear response.

Cyan, magenta, yellow channels : these properties apply to lights that use CMY colour generators. They are the channel numbers within the fixture of the cyan, magenta and yellow channels, respectively. These should be set to 0 for RGB fixtures.

CMYK flipMode : if it turns out that your lighting fixture views the world backwards, flip this switch and the CMYK values sent will be inverted, i.e. 0 will be most colour, 255 will be least colour.

Red, green, blue channels : these properties apply to lights for which the **mode** property (above) is set to **rgb** . They are the channel numbers of the red, green and blue components respectively. These should be set to 0 for CMY fixtures.

Zoom channel : if the light has the ability to zoom its beam (make it narrower and wider), enter the channel number of the zoom control here; otherwise, leave it at 0.

Focus channel : if the light has the ability to focus its spot so it appears hard edged at different distances, enter the channel number of the focus control here; otherwise, leave it at 0.

Gobo channel : if the light has the ability to change its gobo dynamically, enter the number of the gobo control channel here; otherwise, leave it at zero.

Lamp on, lamp off these are DMX commands (see section ' DMX commands below) to switch the fixtures lamp on or off. Fixtures often require you to send a DMX value continuously for a number of seconds to fire the command. The DMX commands gives you the ability to do this.

Open shutter, close shutter : many fixtures have a shutter that has two states: open (all light passes through) or closed (no light passes through). Shutter response is usually much faster than dimmer response, so Designer will use the shutter whenever a fast cuttoblack is required. The open/close shutter DMX commands (see next section) allow you to represent this.

DMX commands

Many lamp or fixture commands require you to send a particular value on a particular channel for some number of seconds. For example, the Martin Mac2000 will switch off its lamp if you send the value 250 on channel 1 for 5 seconds.

> **Note**
>
> **Please note**: It is possible to add DMX commands and animate their values using the DmxControl layer.

To create a DMX command:

1. Open the DmxCommands manager by left-clicking the **lamp on**, **lamp off**, **open shutter** or **close shutter** properties.
2. Type in the name of your DMX command, in this example **frost**, in the **new dmxcommand** text field.
3. Hit **Enter**. A DmxCommand editor will open.

Channel : the channel number to send the command on. As with all other channel numbers, this is local to the fixture, with the lowest valid channel being 1. If channel is 0, no data will be sent. You can read the channel number directly from the fixtures DMX chart.

Value : this is the value to be sent on the channel in order to actuate the command. Permissible values are 0 to 255 inclusive. Some commands work with a range of numbers, eg. 248255. It is usually best to pick a value near the middle of the range, i.e. 250 in this case.

Time : this is the duration that the value should be sent to actuate the command, in seconds. Once the command is actuated, Disguise will continue to send the value on the channel for this number of seconds; a command cant be cancelled once it has been actuated. It is possible for this number to be set to 0. If this is the case, Designer will send the value once only.

Min/max value : allows the value to be scaled to any range. **min** specifies the lower value in the range, ‘max specifies the upper number in the range.

Pan/tilt controls

This set of properties specifies the pan/tilt behaviour of the fixture. If the fixture does not have a moving head base, just leave these values at 0.

Pan/pan fine : most moving head fixtures allow the control of angles via a 16bit number, split into two parts and sent on two separate channels. These two properties specify those channels. As with all other channels, the lowest permissible value is 1. You can read the values directly off the fixture DMX chart.

Pan range : this specifies the range of travel in the pan axis (rotation around the vertical axis), in degrees. The range can be found in the fixtures manual. If, for example, the manual states a range of 270 to +270, the pan range should be set to `270*2 = 540` (you can always use Disguises built in calculator rather than working it out yourself). You can also set this property to a negative number; this will cause the fixture to flip its rotation direction.

Tilt/tilt fine : this specifies the channel numbers for the tilt control and the fine tilt control respectively. As with pan and pan fine , you can read these directly from the manual.

Tilt min/max : while pan range is usually symmetrical around the central axis, the tilt range may differ from front (positive values of tilt) to back (negative values). Therefore, Disguise allows you to specify the minimum and maximum tilt values in degrees. It is permissible for tilt min to be higher than tilt max ; if this is the case, the tilt direction response is reversed.

Commands

This set of properties allows for setting default parameters.

Commands properties for a GenericLampDriver

Reset : this is a DMX command that is issued to reset the fixture.

To reset all stage fixtures:

1. Open the Program Settings menu by right-clicking **d3** from the dashboard (bar at the top of the screen).
2. Select **reset all DMX fixtures**.

Default : tthis is an array of DMX commands that are sent every frame, regardless of what other data is being sent. This is because fixtures often have a number of extra controls that Designer does not drive directly, such as pan/tilt speed, gobo speed, strobing, secondary gobo or colour wheel controls, etc. If these are left unset, they can end up with values that interfere with normal operation. For this reason, it is advised that you create a DMX command for each extra fixture parameter, name it appropriately, set the default value to an appropriate value, and add it to the default array. This will ensure smooth operation of the fixture as a pixel.

Testing

Testing property used to test a fixture driver with a real example of a fixture

Tester : the final property of the driver is **LampTester**. This is a helper designed to help you test the fixture driver with a real example of a fixture, without going to the trouble of addressing the complete grid of fixtures.

- Right-click **tester** to open the LampTester editor.

To use the **LampTester** property, plug a single fixture into Designer and then modify the properties contained in the LampTester editor. While the LampTester editor is open, all other DMX signals (from the grid of fixtures, or from other DmxScreens) are suppressed.

Test channel : this is the base channel number of the fixture (1 is the lowest valid number). Ensure that this number is the same channel number as you have assigned to the fixture.

Test universe : this is the universe number you have assigned to the fixture (1 is the lowest valid universe).

> **Note**
>
> **Please note**: universe numbers refer to a physical DMX cable. They are not assigned on the fixture the way channel numbers are.

Lamp : this property allows you to test that you have the right lamp on/off commands. At the start, the state is set to **unknown** , as the tester has not sent any on/off commands and therefore does not know whether the lamp is on or off. When you set the property to **on** or **off**, the lamp on/off command is sent to the fixture. IIf you have the command filled in correctly, the lamp should turn on and off. If not, you need to check the command against the fixture manual.

Shutter : this property lets you test the shutter open/close command. Set the option switch to **open** or **closed** ; the lamp shutter should immediately respond.

Test intensity : this property lets you test the dimmer command. Change this number to a value between 0 (dark) and 255 (bright). The value you specify is sent directly to the dimmer, without mediation by the dimmer **min brightness** value (although the **dimmer flipMode** is taken into account).

Test colour : this property lets you send a test colour to the fixture. The colour you select is converted to RGB or CMY (depending on the fixture type), the **dimmer flipMode** mode is taken into account, and the data is sent to the fixture. If you have the channel numbers correct, the fixture should reproduce the colour you specify.

Colour Picker window is used to specify a test colour to the fixture, opened by left-clicking the Test Colour property

Pan : his property lets you directly send a pan angle to the fixture (in normal operation, pan and tilt are computer based on target points). 0 degrees should point the fixture towards the front of the fixture base, with negative values turning to the left and positive values to the right. The

front of the fixture is defined (by convention) to be the side to the right of the small LED control panel. The procedure is to send an angle (eg. 90 degrees) and check that the fixture does indeed turn to that angle. If it does not, you may have to adjust either the pan channel numbers (if there is no movement) or the pan range.

Tilt : this property lets you directly send a tilt angle to the fixture. When pan is set to 0, positive tilt values should tilt the fixture lamp towards the front of the fixture; negative values should tilt it towards the back. Setting tilt to 0 should point the fixture directly upwards. If the fixture fails to move when you change the tilt value, you have incorrect tilt channel number settings; if the fixture angle does not match the angle you enter, you will need to edit the tilt min and max values in the driver.

MovingHeadLedDrivers

The MovingHeadLedDriver controls fixtures consisting of a moving head base and a grid of LED pixels. It therefore combines the standard DmxDriver controls with the **pan/tilt** and **commands** properties from the GenericLampDriver. The only extra property of note is **first pixel channel**.

MovingHeadLedDriver properties

First pixel channel

This sets the channel (relative to the start of the fixtures channel; 1 is the lowest valid number) of the first pixel in the array.

First Pixel Channel property sets the channel of the first pixel in the array.

Fixtures Grid Setup

To set up a fixture please see the previous sub-chapter Creating a fixture.

Now that you have set up the fixture, you can begin playing with it in the Stage Visualiser. Initially, the DmxLights screen holds only one fixture; if you send content to the Dmx Lights (for example, by targeting a Colour layer), you will see a single beam of colour coming from the centre of the screen surface (assuming you have set a nonzero beam length).

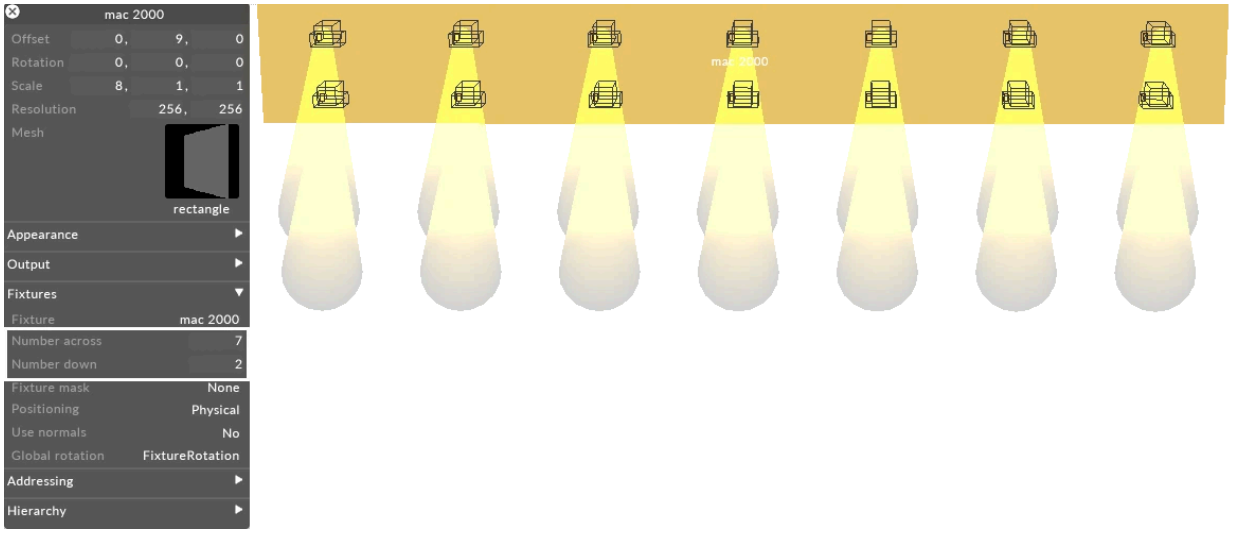
You can now increase the number of fixtures by editing the properties contained in the **fixture** section of the DmxLights screen editor.

DmxLights properties

> **Note**
>
> **Please note**: this sub-chapter explains the DmxLights properties relevant to setting up a grid of fixtures. For an explanation of the other DmxLight properties not mentioned in this sub-chapter please see the earlier topic DmxLights.

Number Across, Number Down

This controls the number of fixtures in the grid attached to the screen surface.

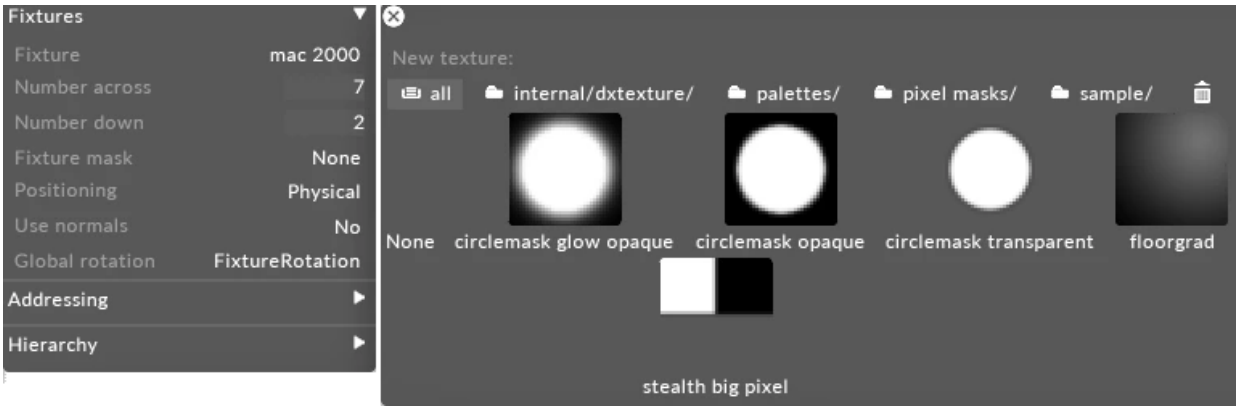


Number Across and Number Down properties control the number of fixtures in the grid attached to a screens surface

As you increase these values, you should see the number of fixture beams increase (assuming there is content going to the screen). **Number Across** increases the number of fixture beams horizontally, and **Number Down** increases the number of fixture beams vertically.

Fixture Mask

This controls the mask used when rendering the fixture.

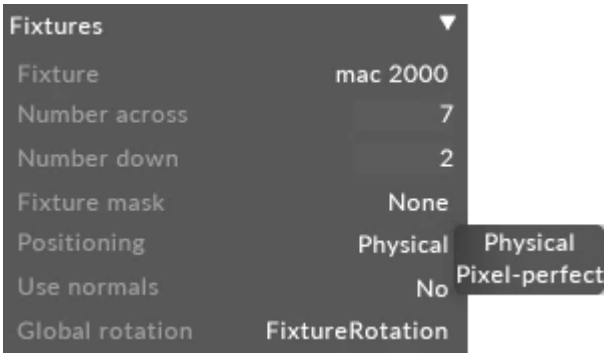


Fixture Mask property is used to select a still image file that defines the mask used when rendering the fixture

Please scroll down to the explanation of the **mask** property in the previous sub-chapter Creating a fixture for information on how to use the **fixtureMask** property.

Positioning

This controls how the positions of the individual fixtures are generated.

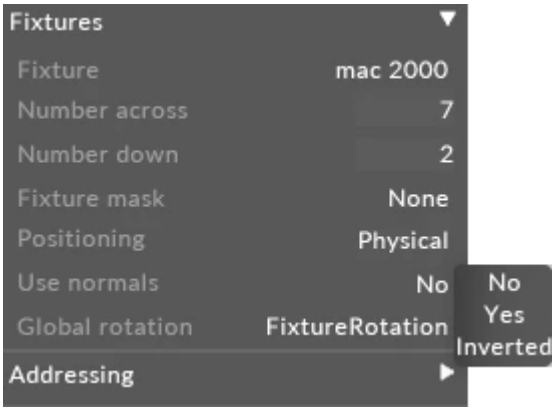


Positioning property controls how the positions of the individual fixtures are generated

There are two options: **physical** spaces the fixtures out at equal physical separations and samples the underlying content accordingly, **pixelperfect** spaces the fixtures out so that they sample the underlying content at regular intervals and positions them at the appropriate physical locations.

Use normals

This controls how the orientation of each fixture instance depends on the screens surface.

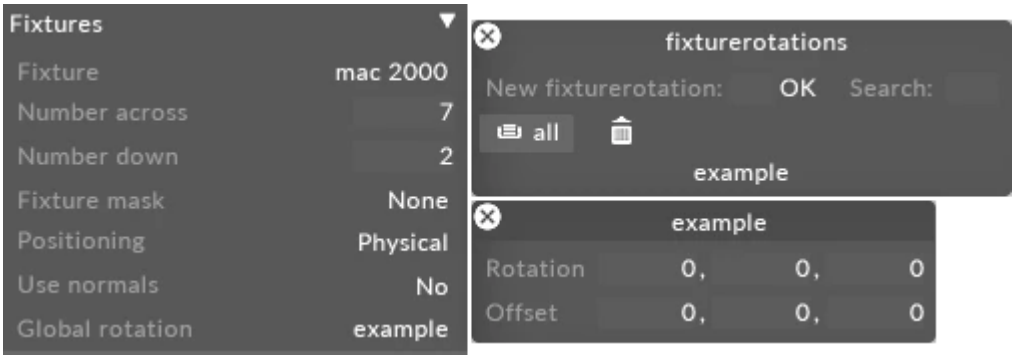


Use Normals property controls how the orientation of each fixture instance depends on the screens surface, in this example the fixtures are inverted.

There are three options. If set to **no**, then the orientation of each fixture does not depend on the screen surface. If set to **yes**, each fixture is oriented so that it is parallel to the screen surface. If set to **inverted**, a negative version of the surface normal is used, flipping the fixture upside down relative to the surface.

Global rotation

This allows you to rotate the fixtures relative to their standard orientation.



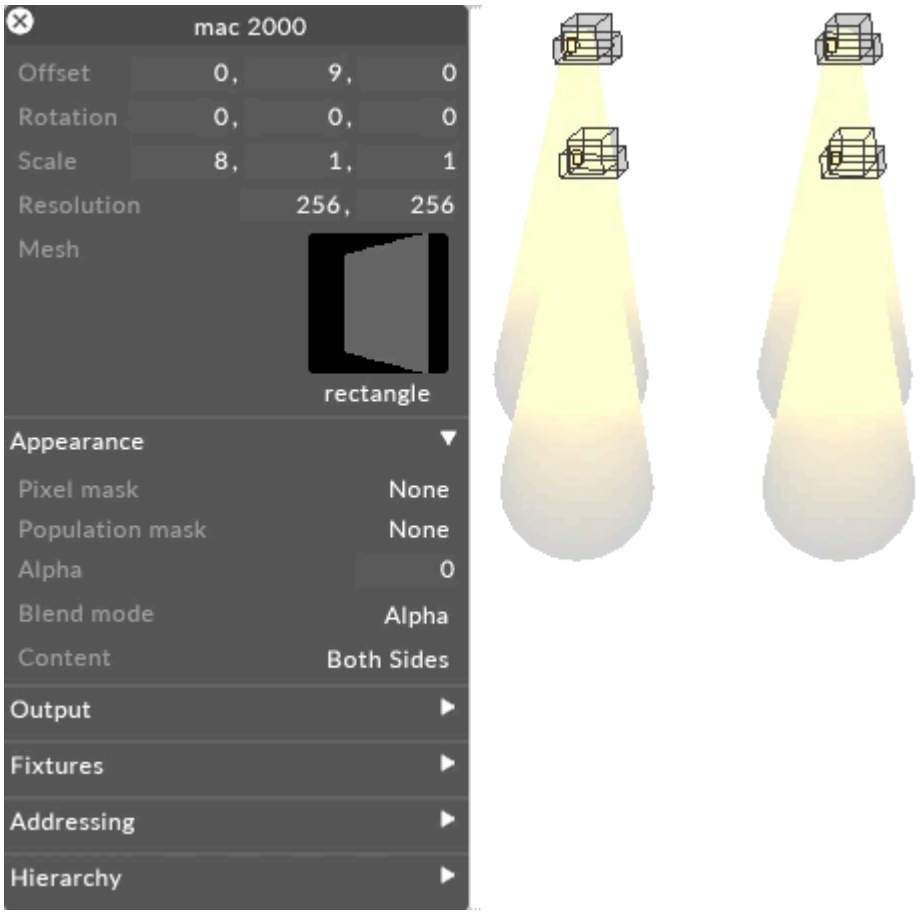
Global Rotation property being used to, in this example, rotate the ixtures by minus 20 degrees in the x direction

- Right-click **global rotation** to open a local (untitled) FixtureRotation editor. **rotation** controls the rotation of the fixtures, in degrees. The x component controls the rotation around the x axis; the y component around the y axis; and the z component around the z axis. **offset** controls the screen position in the 3D space, in metres. There are three numbers laid out horizontally: respectively the x (left/right), y (up/down) and z (into/out of the screen) coordinates.

> **Note**
>
> **Please note**: you will not see the effect of this rotation until you visualise the fixture bases. For more information please see the DMX addressing sub-chapter.

Once you see the fixture beams it is possible to just visualise the lights.

- Switch off the underlying screen content and just visualise the lights by setting the **alpha** property to 0. This property is contained in the **appearance** section of the DmxLights editor.



Alpha property set to 0 to switch off the underlying screen content

Modifying Fixture Positions

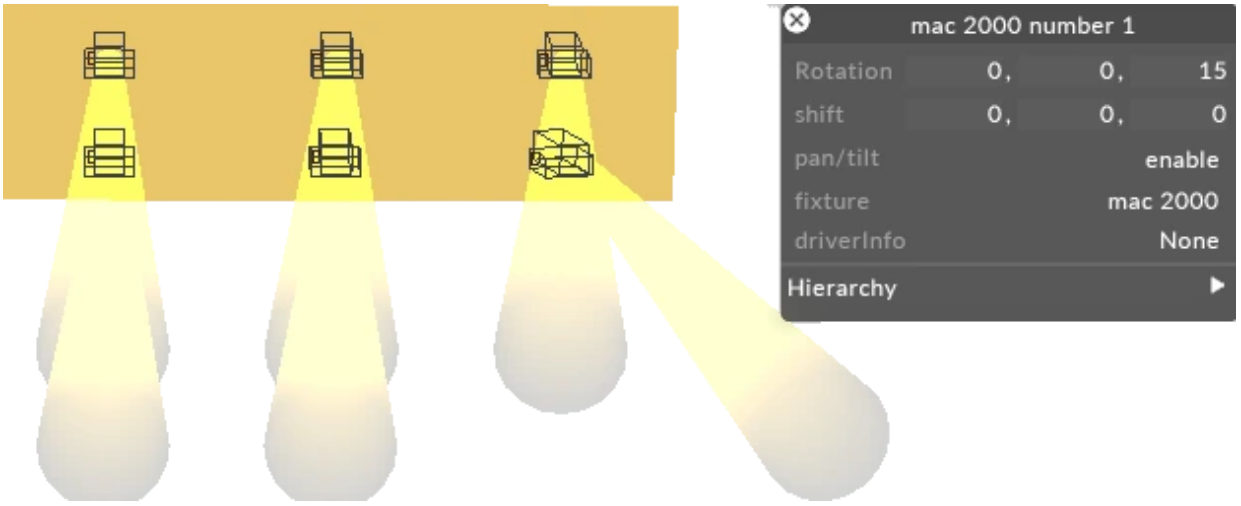
Once you have sequenced your show and rehearsals begin, you can connect the show to an actual stage. At this point, the precise orientation of the fixture bases (which was not an issue while sequencing) becomes important. If a physical fixture has a different base orientation to ‘s model of it, it will point in the wrong direction. For this reason, d3 gives you the ability to modify the position and orientation of every fixture in your virtual stage, until it matches the orientation in the real stage.

When you set **show channels** to **yes**, draws a 2D schematic showing the position and orientation of the base of each fixture in the DmxLights screen. The red rectangle on the face of the schematic indicates the side of the fixture with the LED channel programming readout. The front of the fixture is defined (by convention) as the side to the right of the LED readout and the schematic shows this using the label **front**.

You can control the rotation of all fixture bases in a DmxLights screen by editing the **global rotation** property of the DmxLights editor. If, however, a single fixture has been rigged in the wrong position or orientation, you can change the rotation of that individual fixture (explained below).

Modifying a fixture

1. Right-click the individual fixtures schematic. This will open the FixtureInstance editor. Or alternatively
2. Right-click the fixture instance from the Hierarchy tab of the DMX Lights Screen.
3. Type values into the **rotation** or **shift** text fields to modify the fixture base position relative to its original position.



FixtureInstance editor being used to rotate an individual fixture by minus 15 degrees, opened by

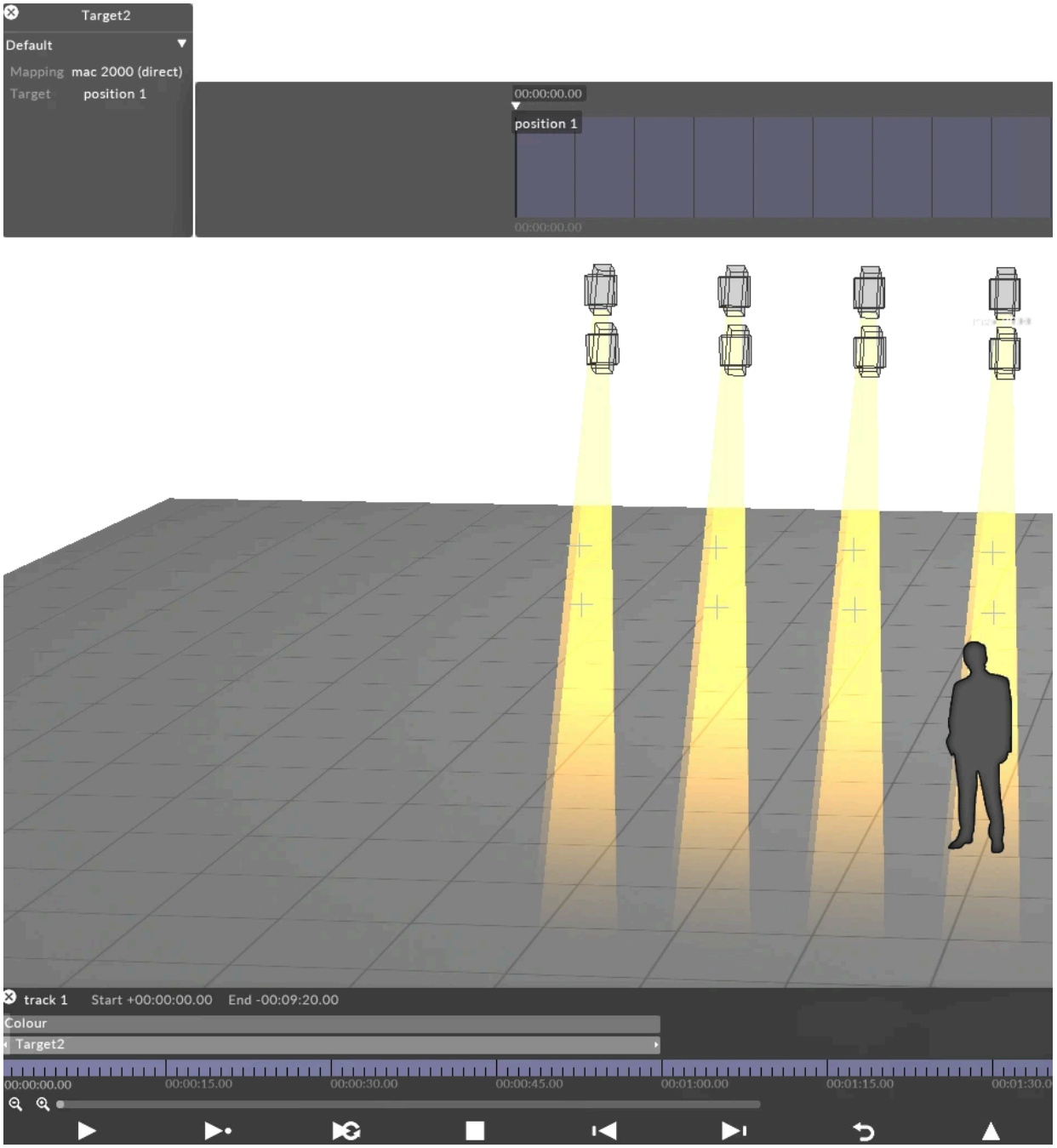
right-clicking the fixture instance.

Targeting Fixtures

The Target2 TargetPreset layer and Target TargetControl layer are used to change the orientation of moving head fixtures. The advantage of the Target2 layer is that it can edit multiple fixture targets, whereas the Target layer can only edit a single fixture target.

How to target the fixtures

1. Create a Target2 or Target layer depending on the number of fixture targets you wish to edit.
2. Left-click **mapping**.
3. Assign the layer to either a Direct mapping type with the lights you want to control; or a Feed mapping type that allows you to control the lights of more than one screen simultaneously, or control a subset of lights within a single DmxLights screen. In this example we have assigned a Direct mapping type to the **mac2000** fixtures. You will then see a set of target points (small white crosshairs), one per fixture.



Target points used to change the orientation of moving head fixtures, created by mapping the Target 2layer to the fixtures

> **Note**
>
> **Please notes**: to visualise the fixtures following the fixture targets, you must have the Aimable property set to Yes. For more information please see the sub-chapter Creating a fixture.

- To animate the fixtures by editing multiple fixture targets please see the section Targeting/animating fixtures in the TargetPreset layer topic. To edit a single fixture target use the TargetControl layer.

DMX Screens and DMX Lights Overview

Background

Designer DMX functionality was motivated by the need to control RGB LED pixel-based fixtures that were DMX-driven. In this view, a DMX-controlled pixel is no different from a DVI-controlled pixel; it is simply controlled using a different type of signal. This led to the implementation of the DMXScreen, which is identical to the normal screen type except that it outputs the RGB information via DMX instead of via the Feed system. For more information on the different screen types please see the Screen Types Overview sub-chapter.

Over time, this idea of lights being simply pixels extended to the control of traditional lighting fixtures, with the conversion from RGB to CMY colour spaces and the addition of moving head bases. This led to the creation of the Fixture System, which allows more complex fixtures to be modelled.

Using Designer for controlling DMX-fixtures is recommended for tasks involving highly sculptural lighting arrangements where the individual lights/pixels are being looked at, rather than lighting another surface. Designer is particularly suited for RGB LED pixel fixtures, since these have no personalities as such and therefore have zero setup time.

However, Disguise does not replace traditional lighting desks where typical tasks such as lighting a performer or surface is a requirement.

Current status

At the time of writing, has the following limitations when dealing with DMX fixtures:

- The visualiser shows light beams but does not model how light falls on surfaces or smoke/fog.
- Shadows are not visualised.
- CMYK fixtures can be driven, as can RGB , RGB+Amber and RGB+white fixtures. However, fixtures that are controlled via colourwheel are not supported.
- Designer does not have a fixture personality library. This means that when using Disguise to drive a new fixture, you need to create and validate a fixture personality (the Disguise term is Fixture Driver) that specifies which channel numbers have which functions. This is usually a simple process; however, it can take some time to get the driver working correctly and this time must be calculated into the project planning.

- Moving head fixtures are supported via the TargetControl layer and TargetPreset layer. These allow groups of lights to be aimed at points in stage space However, does not provide as much control over aiming as a standard lighting desk would do.
- While can control non-colour parameters such as iris, gobo, focus and zoom, a lighting desk is still recommended for controlling such parameters.

Creating DMX Screens

Working with DmxScreens is the easiest way to get DMX output with Designer. They behave like regular screens, but each pixel's colour and/or brightness information is sent out directly via DMX. Designer has no understanding of what kind of fixture is accepting this DMX stream; it sees them only as pixels.

DmxScreens are intended for LED fixtures that accept RGB, CMY or luminance only signals and have no extra control channels.

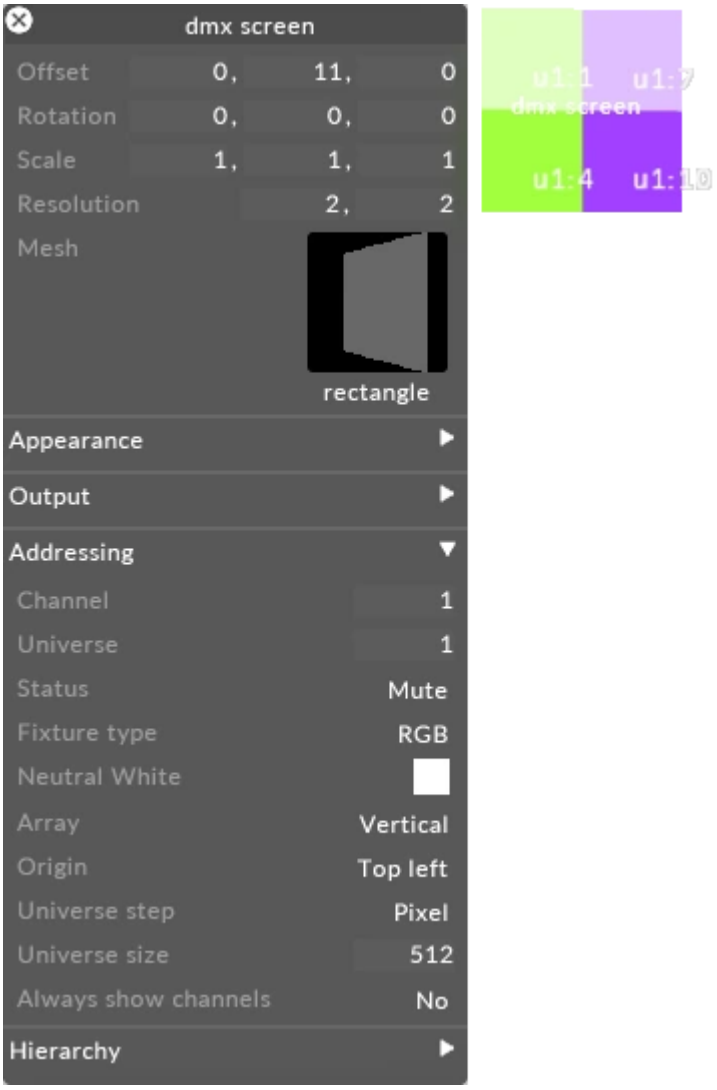
DmxScreens are not suitable for fixtures that have complex personalities including on/off commands, moving heads etc. For these kinds of fixtures you should create a DmxLight, which allows more complex fixtures to be modeled. For more information please see the following sub-chapter DmxLights.

Creating a DmxScreen

The DmxScreen is added in the same way as any other screen type. Please see the sub-chapter Creating/removing screens for step-by-step instructions on how to add a screen to a stage, and select **DmxScreen** from the menu of different screen types.

DmxScreen properties

The DmxScreen properties are similar to the Screen properties, but with an extra tab called **addressing** which controls the way each pixels channel number is assigned. Therefore all of the DmxScreen properties not related to addressing can be read in the sub-chapter Editing screens.



DmxScreen has the same properties as a Screen but with an extra tab called Addressing (explained below)

Channel

The start channel number of the first pixel to be assigned. You can fill in numbers ranging from 1 to 512.

Universe

The start universe number of the first pixel to be assigned. Valid universe numbers start from 1.

Status

This is either **mute** (not sending DMX) or **active** (sending DMX). Because it may be dangerous to send DMX for an incorrectly addressed screen, the default status is **mute**. When the screen is addressed correctly, set this to **active**.

DMX fixture type

This is the DmxFixtureType object which defines how the DmxScreen turns a pixel into DMX data and back again.

Neutral white

This enables the user to color correct the pixels using a paletter or precise RGB value.

Array

Starting from the origin (see below), the assignment algorithm steps horizontally or vertically, increasing the channel number as it goes. This property controls whether the step is **horizontal** or **vertical** .

Origin

This controls the starting point for channel assignment. If set to **top left** , the top left pixel is the first to have its channel assigned; if set to **top right** , the top right pixel is the first to be assigned; and so on.

Universe step

For large screens, the total number of channels in the screen may exceed 512, the maximum number of channels in a universe. When this happens, the channel assignment algorithm will jump up a universe and resume assignment. If this universe step happens within a row or column, this may prove inconvenient for physical wiring as two cables will have to be run to the row or column. For this reason, Disguise allows a **row/column** option which ensures that the universe number will not step halfway through a row or column.

Universe size

By default, a universe is assumed to be 512 pixels. If you want, you can set the size to something smaller. This allows a portion of the universe to be used for other fixtures or control channels, if required.

Always show channels

When set to **yes**, superimposes the universe and channel number for each pixel over the pixel in the Stage Visualiser. Left-clicking a channel number allows you to edit it using the mouse wheel. Note that changing the colour, array, origin or universe step properties will reassign the channel numbers.

> **Note**
>
> **Please note**: showing channels of very large arrays (eg. with 256x256 pixels) will kill the visualiser. For this reason, it helps to make sure you set the screen resolution correctly before you turn on **show channels**.

DMX Fixture Types

DmxFixtureType objects define how a DmxScreen turns a pixel into a set of DMX channels and back again. They allow the user to choose a set of DMX channels of standard types, along with some whole-pixel colour options.

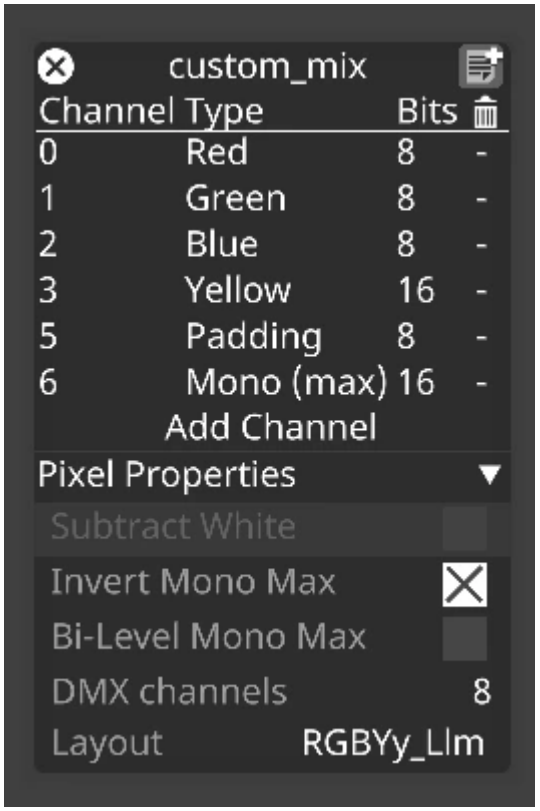
DmxFixtureTypes are intended for LED fixtures that accept RGB, CMY or luminance only signals and have no extra control channels. There is a 'Padding' channel type to enable these fixtures to be sent colour data without triggering control functions.

Creating a DmxFixtureType

DmxFixtureTypes can be created by clicking the 'DMX fixture type' field in a DmxScreen.

Multiple DmxScreens can reference the same DmxFixtureType.

DmxFixtureType Properties



Each DmxFixtureType consists of a list of DmxChannelAttributes, each of which defines an 8- or 16-bit logical DMX channel. These are shown in a table along with their corresponding DMX

channel, and can be added, removed and reordered.

As well as the DmxChannelAttributes, the DmxFixtureType also has some further options which apply to the whole pixel; these are listed under the 'Pixel Properties' dropdown.

Finally, the editor also displays the fixture type's overall DMX footprint and a text representation of the type.

DmxChannelAttributes

At present, Designer supports DmxChannelAttributes for the following common DMX channel types:

- Red
- Green
- Blue
- White
- Amber
- Cyan
- Magenta
- Yellow
- Mono Weighted Sum Luminance
- Mono Max Luminance
- Padding

Apart from 'Padding', there are 8- and 16-bit versions of each attribute.

Mono Weighted Sum Luminance

This is calculated as (0.3 * Red) + (0.59 * Green) + (0.11 * Blue) of the colour channels of the input pixel.

Mono Max Luminance

This is calculated as the highest value of the Red, Green or Blue channels of the input pixel.

Padding

Padding is used for DMX channels which you don't wish to send colour data to. It is always sent zero when outputting to DMX, and ignored when inputting from DMX.

Pixel Properties

These fields define options for the entire pixel, not single DMX channels. If the relevant DMX channels don't exist they're ignored.

Subtract White

If this is set, the White channel value is subtracted from any Red, Green or Blue channels.

The White channel is the minimum of the Red, Green or Blue channels, so with this set an RGBW fixture given the colour (255, 245, 205) as an input would output (50, 40, 0, 205) over DMX.

Invert Mono Max

If this is set, the output of any Mono Max Luminance channels is inverted.

Bi-Level Mono Max

If this is set, the output of any Mono Max Luminance channels is always either 0 if the 'raw' value would be less than 128 (8-bit) or 32768 (16-bit), or 255 (8-bit) or 65535 (16-bit) otherwise.

Upgrade from legacy predefined types

In previous versions of Designer, DmxScreens had to pick from a limited set of predefined fixture types, which were:

- RGB (8-bit)
- RGBW (8-bit)
- RGBA (8-bit)
- RGBAW (8-bit)
- RBG (8-bit)
- GRB (8-bit)
- GBR (8-bit)
- BRG (8-bit)
- BGR (8-bit)
- GRBW (8-bit)
- BRGW (8-bit)
- RrGgBb (16-bit)
- RrGgBbWw (16-bit)
- CMY (8-bit)
- CcMmYy (16-bit)
- WA (White+Amber, 8-bit)
- Monochrome (8-bit)
- Monochrome Max (8-bit)
- Monochrome Max Inverted (8-bit)
- Monochrome Bi-Level (8-bit)

- Monochrome Bi-Level Inverted (8-bit)

On upgrading a project from these previous versions, a new DmxFixtureType corresponding to each in-use legacy type is created. The new DmxFixtureType is guaranteed to give the same output as the legacy type for matching inputs.

Please note that the old RGBW/GRBW/BRGW/RrGgBbWw types used White subtraction, but RGBAW did not.

Performance

While the DmxFixtureType can be used to create any possibly combination of channels, this flexibility can incur a performance cost. Because of this, under the hood Designer delegates pixels-to-dmx conversion for common combinations of channels to predefined conversion functions for better performance.

The following combinations of channels (in any order) utilise these optimised conversion functions:

- RGB
- RGBW
- RGBA
- RGBAW
- RrGgBb
- RrGgBbWw
- CMY
- CcMmYy
- Mono Weighted Sum Luminance
- Mono Max Luminance

These cover all of the legacy predefined fixture types, plus all fixture types which use the same combination of channels (for example, there is a legacy fixture type for RGBW but not GBRW - both are supported by the optimised conversion functions).

All other combinations of channels use a custom conversion function which is around half as fast.

DMX Table Screens

A DMX table screen is a DMXscreen whose DMX patch is defined by a csv file. The behavior of the screen is much like the DMXscreen except that the patch is automated by the csv file allowing for more fluid patch mechanisms for non-linear patching.

Tables should be placed in a newly created **Table folder**, inside the**Objects folder** of the project file.

CSV format

The first line is the four column headers (pos x, pos y, universe, channel) and is ignored. These properties are explained as follows.

x position

x coordinate of the pixel, zero-based, relative to the resolution of the mesh as defined in . 0 is left.

y position

y coordinate of the pixel, zero-based, relative to the resolution of the mesh as defined in . 0 is top.

universe

DMX universe number offset, 1-based, relative to the start universe of the screen as defined in Designer.

channel

DMX start channel number offset of the pixel, 1-based, relative to the start address of the screen as defined in Designer.

Workflow

1. Create your DMX patch using a CSV or spreadsheet editor.
2. Create your DMXscreen in as normal remembering to set the resolution correctly.
3. Use the **Table** property of the screen to point to the CSV file that defines the channel assignments.

Example

Creating a table in excel

1. Define the column order in Excel.

x	y	universe	channel
1	1	1	1
1	2	1	4
1	3	1	7
1	4	1	10
1	5	1	13
1	6	1	16
1	7	1	19
1	8	1	22
1	9	1	25
1	10	1	28
1	11	1	31
1	12	1	34
1	13	1	37

   The X is the x axis in the UV Space and Y is the y axis in the UV Space when looking at UVs of a 3d Model.

2. So if the resolution of the Screen is 10x10 for example then the co-ordinates of the UV space would look like the image below.

	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

3. If the Fixture is a 3 channel fixture, then the address would be as follows compared to the table screen.

x	y	universe	channel
0	0	1	1
0	1	1	4
0	2	1	7
0	3	1	10
0	4	1	13
0	5	1	16
0	6	1	19
0	7	1	22
0	8	1	25
0	9	1	28
1	0	1	31
1	1	1	34
1	2	1	37
1	3	1	40
1	4	1	43
1	5	1	46

	0	1	2	3	4	5	6	7	8	9
0	1.1	1.31	1.61	1.81	1.111	1.141	1.171	1.201	1.231	1.261
1	1.4	1.34	1.64	1.94	1.114	1.144	1.174	1.204	1.234	1.264
2	1.7	1.37	1.67	1.97	1.117	1.147	1.177	1.207	1.237	1.267
3	1.10	1.40	1.70	1.100	1.120	1.150	1.180	1.210	1.240	1.270
4	1.13	1.43	1.73	1.103	1.123	1.153	1.183	1.213	1.243	1.273
5	1.16	1.46	1.76	1.106	1.126	1.156	1.186	1.216	1.246	1.276
6	1.19	1.49	1.79	1.109	1.129	1.159	1.189	1.219	1.249	1.279
7	1.22	1.52	1.82	1.102	1.132	1.162	1.192	1.222	1.252	1.282
8	1.25	1.55	1.85	1.105	1.135	1.165	1.195	1.225	1.255	1.285
9	1.28	1.58	1.88	1.108	1.138	1.168	1.198	1.228	1.258	1.288

4. Now export the x, ,y, universe, channel information as a .csv file.

Excel table creation tip

The following method expects the LEDs to be addressed column by column, left-to-right. If you require a different addressing order, the x and y equations can be swapped.

x column

Use the equation `=TRUNC((ROW()-1)/y)`, repeat this down the sheet to x*y number of rows, this will make each number from 0 to x repeat y-number of times.

y column

Use the equation `=TRUNC(ROW()-1)-(y*(TRUNC((ROW()-1)/y)))`, repeat this down the sheet to x*y number of rows. This will make the numbers from 0 to y repeat with each number from 0 to x, covering every permutation of these two ranges.

Universe column

Find the maximum number of LEDs you can fit in one universe (n). For RGB or any other three-channel LED's this number is 170. Use the equation `=TRUNC(((ROW()+(n-1)/n)`, repeat for

x*y rows.

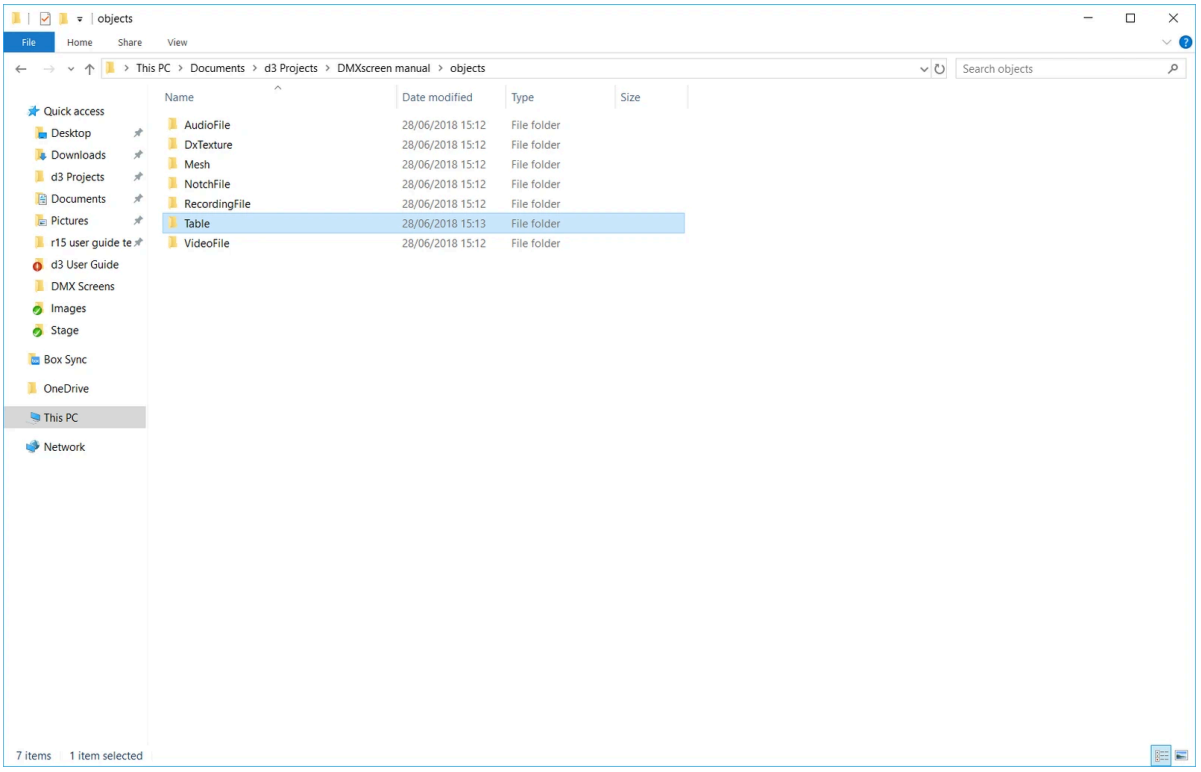
Channel column

Put a 1 in the first row, then `=MOD(D1+i, 510)` (where i is the number of channels required by a single LED) in the next row down, copy down letting the D co-ordinate increment. 510 is obtained by adding 1 to the highest addressable number (509 in the case of RGB LED's), repeat for x*y rows.

Once this is complete, export as csv, open in a text editor, create a new line at the top of the list and type `x,y,universe,channel`. Save the csv and use it in Designer.

Placing the CSV file

1. Copy the exported CSV file from excel.
2. Create a new folder inside the objects folder of your project file name this folder **Table**.



3. Paste the CSV file into this newly created table folder.

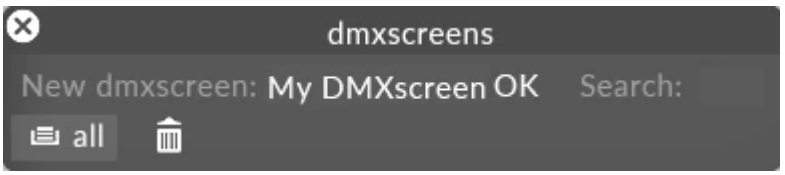
Creating the DMX TableScreen

1. Open the stage editor by right-clicking Stage from the dashboard or by right-clicking the floor in the visualiser.

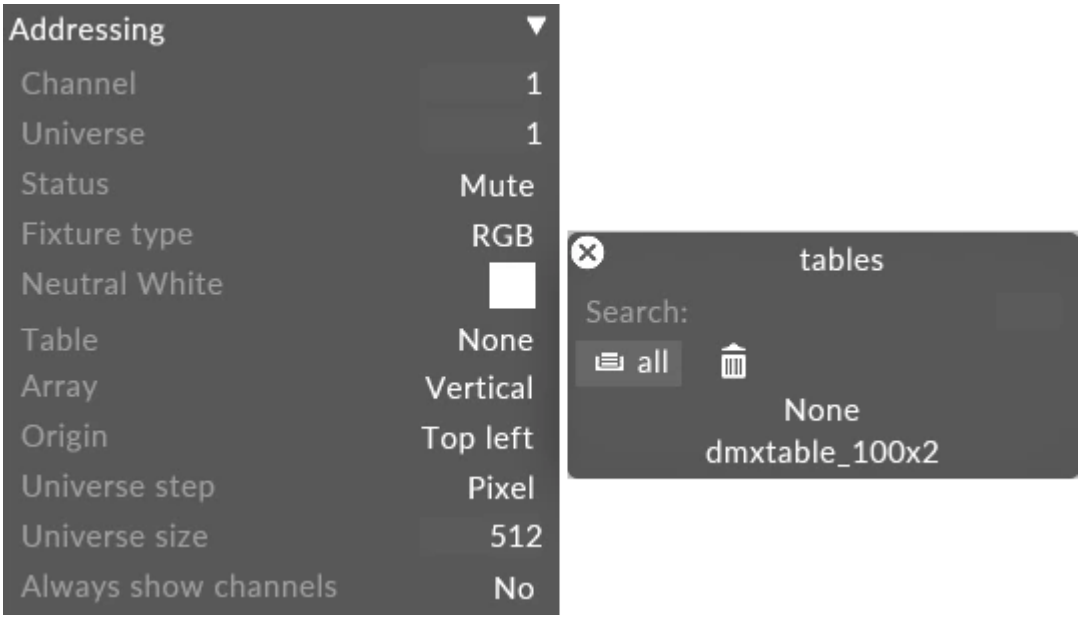
2. Expand the **DMXscreens** tab.



3. Click the **+** icon to open the DMXscreens manager.
4. Define a name for your screen and left-click **OK**.



5. Position your screen in the stage as normal.
6. Define the **Table property** as the CSV file you placed in the Table folder earlier.


Addressing
Channel 1
Universe 1
Status Mute
Fixture type RGB
Neutral White
Table None
Array Vertical
Origin Top left
Universe step Pixel
Universe size 512
Always show channels No
tables
Search:
all
None
dmxtable_100x2

Editing Local Channels

If you want to edit DMX channels locally do the following:

1. Hold down Alt and left-click a channel.
2. If you want to change the universe, change the **universe** property.
3. Change the start channel in the **channel** property.
4. In the **number of fixtures** property choose number of fixtures, i.e. pixels you want to change the channel of.
5. Depending on the orientation of the UV map change the direction to **right, left, up, down.**
6. Click **assign**.

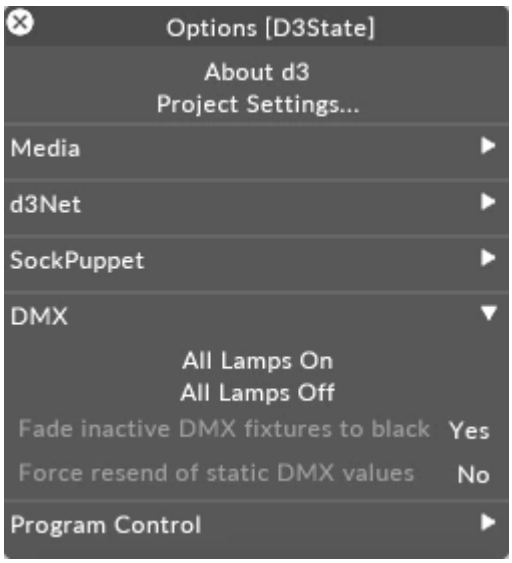


Interface showing how edit local DMX channels

Global DMX Options

There are four global switches that control how Designer outputs DMX information. They are found under thee **DMX** tab of the Program Settings menu.

- To access the global DMX properties, right-click **d3** from the dashboard. (bar at the top of the screen) and open DMX tab.



Global DMX properties

All lamps on

- Left-click **All lamps on** to send lamp on commands to all active fixtures in the stage.

All lamps off

- Left-click **All lamps off** to send lamp off commands to all active fixtures in the stage.

> **Note**
>
> **Please note**: some fixtures may have a mandatory cooling off period (say 5 minutes) before they can be turned off again.

Fade inactive DMX fixtures to black

This option controls what happens when no layers on the Timeline are writing to fixtures. Selecting **yes**(default value) will enable to send black; selecting **no**will enable d3 to send

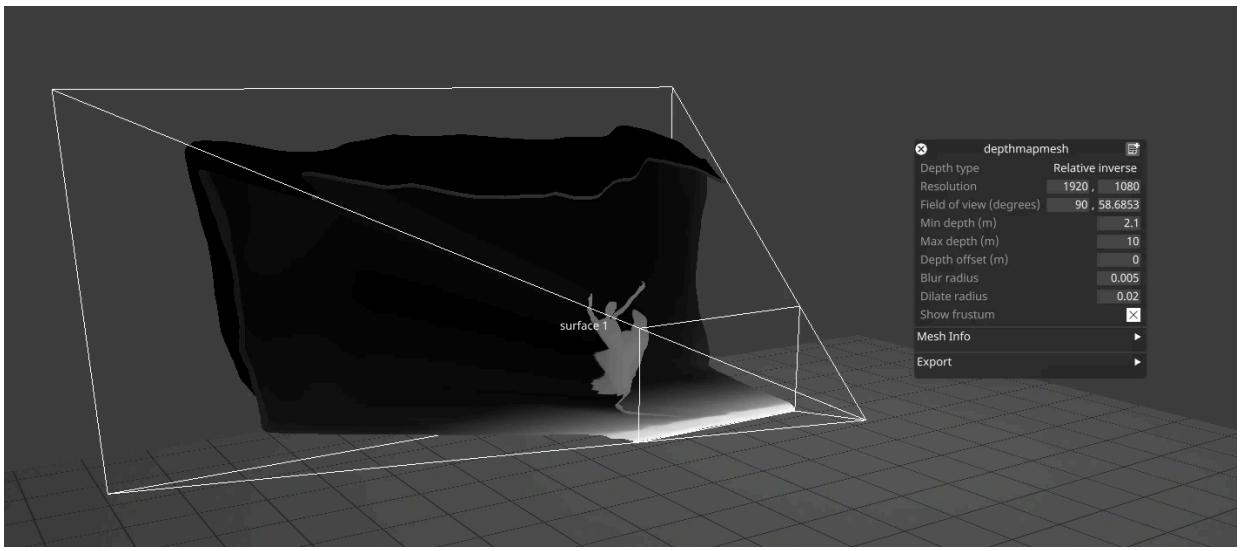
nothing.

Force resend of static DMX values

This option controls whether or not sends DMX values when they change. Selecting **no**(default value) will enable to only send DMX values when they change; selecting **yes**will enable DMX values to be sent constantly, regardless of whether the value is changing or not. This setting can be useful when merging ‘s DMX information with other DMX information, for example coming from a lighting desk.

Depth Map Mesh

A **Depth Map Mesh** is a mesh which takes its shape from a depth map image or video. Depth maps can be applied to the mesh using a Depth Map Mapping or Depth Video Layer. The mesh updates based on the depth map, occupying a space within the frustum defined by the **Min/Max depth** and the **Field of view** values.



Depth Map Mesh

The depth map should be a black and white texture encoding the depth values of the image. By default this is defined as an inverse normalised depth, where black (0) is the maximum depth and white (1) is the minimum depth.

Workflow

1. Click on the mesh property of the desired stage object (screen, prop etc.), and create a new Depth Map Mesh.
2. Map a depth map to the mesh using a Depth Video Layer, or another module with a Depth Map Mapping.
3. The mesh should now update based on the depth map mapped to it.
4. To resize the mesh frustum adjust the **Field of view** or **Min/Max depth** values.
5. Use the object as normal, e.g. mapping corresponding video content to the surface.

Properties

Depth type

The type defining how the depth map is interpreted:

- **Raw**: Normalised between 0 and 1, with 0 being near plane and 1 far plane.
- **Relative inverse**: Inverse normalised depth, with 0 being far plane and 1 near plane.

Resolution

The resolution of the mesh. This is the size of the grid of vertices which are updated by the depth map content. Typically, this should be set to the same resolution as the depth map content.

Field of view

The vertical and horizontal field of view encompassed by the frustum, in degrees. Adjust to scale the mesh relative to the rest of the stage.

Min/Max depth

The depths of the near and far planes of the frustum, in metres. The depth map is converted from normalised to absolute depth based on these values.

Depth offset

The offset of the eye point of the frustum relative to the origin of the mesh, in metres. This can be adjusted to set the mesh origin close to the average of the depth map content.

Blur/dilate radius

These values change the amount of blur and dilation applied to the depth map content, which can help reduce artifacts, particularly around the edges of objects. Between 0 and 1, where 1 sets the radius equal to the width of the texture.

Show frustum

Tick to render the outline of the frustum in the stage, in addition to the mesh itself.

Related information

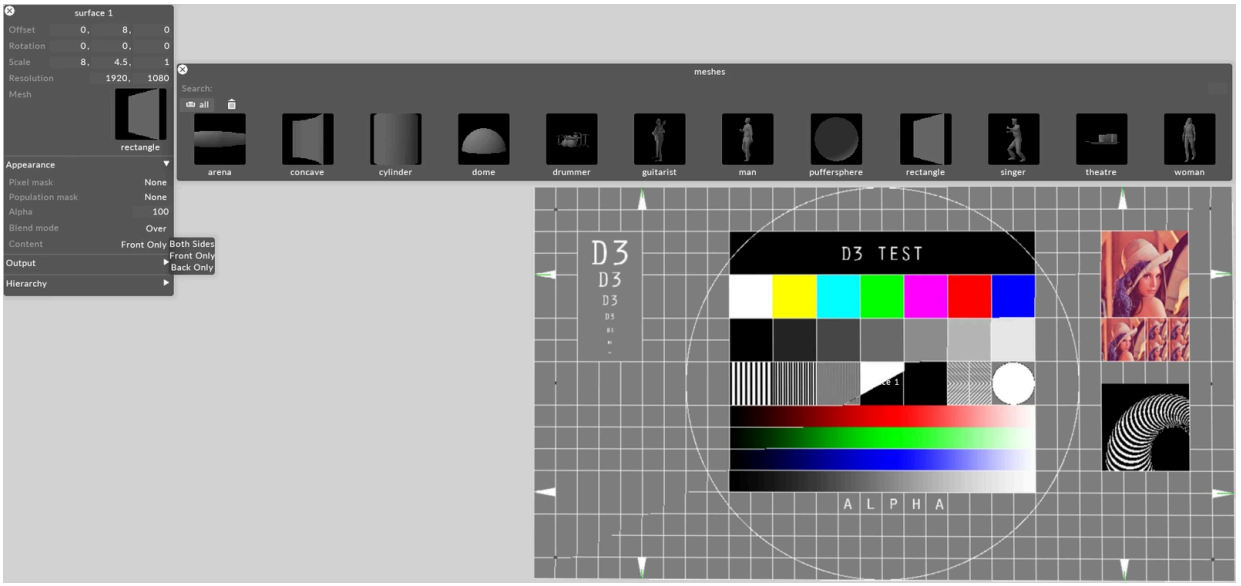
- Depth Video Layer
- Depth Map Mapping

- Depth Workflows

Editing Objects

Types of object properties

An objects properties can be categorised into four types. Examples of these four types are described below using the example of a Screen object and its editor.



Properties of an object can be categorised into four types: Numeric, Options, Object, Array.

Numeric

With a numeric property, you are asked to fill in a numeric value.

Options

An option property gives you a fixed option list to choose from.

Object

An object property refers to another object.

The example above highlights **mesh** as an object property. In this instance the **mesh** property is set to a Rectangle mesh.

Array

An array property is used when an object property points to a list of other objects when you wish to edit it.

In the example above I have left-clicked the **mesh** property to open the Mesh object library. Notice the object library contains further mesh objects such as Concave and Cylinder objects which can be swapped for the Rectangle mesh object. This is an example of an array property because the Rectangle object points to a list of other objects.

The information below provides a detailed overview on how to edit the four types of object properties.

Editing numerical properties

There are several ways to edit a numerical property:

Adjust using the scroll wheel

Left-click the property name or text field and use the mouse scroll wheel for adjusting the numerical property. Each step of the wheel will add or subtract a **step** value. Holding down the left **Shift** key will step ten times faster; holding down the left **Ctrl** key will step ten times slower.

Adjust using the Arrow keys

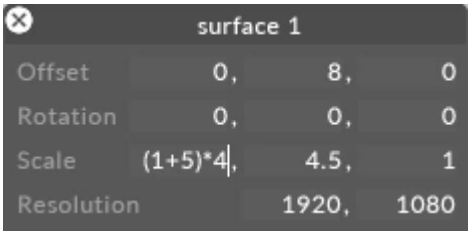
Left-click the property name or text field and use the **Arrow** keys to adjust the values. Each click of the **Arrow** key will adjust the value by the **step** value.

Type in the number directly

Left-click the property name or text field and type in a new value to replace the old one.

Type in a numerical formula

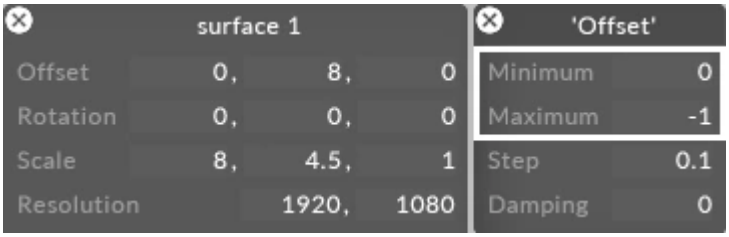
Left-click the property name or text field and type in a formula, for example, **(1 + 5)*4** . Press **Enter** to replace the formula with the result.



Change the minimum and maximum limits of a numerical property

Right-click the object property name; this will open up a small editor with four values: **min** , **max** , **step**, and **damping**. By default, when min > max, there are no limits. If min < max, then

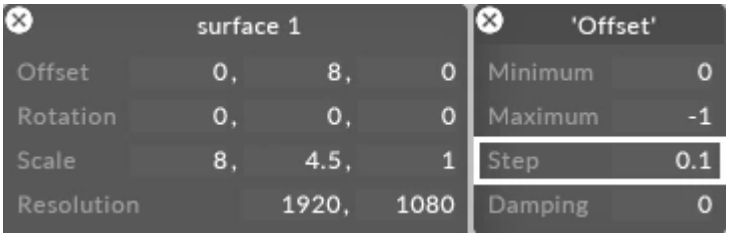
the numerical property is automatically restricted to the min/max range. This will apply to all the objects of that type across the whole project.



Minimum and maximum limits of a Screen objects Scale property

Change the Step of a numerical property

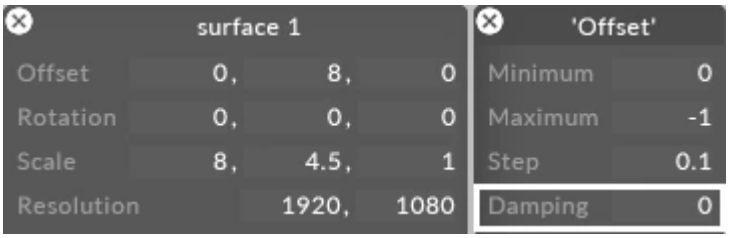
The **step** value controls the increment at which a numerical property changes. This will apply to all the objects of that type across the whole project.



Step value of a Screen objects Scale property

Damping

If a numerical parameter is linked to a MIDI surface control, the **damping** value smoothens the incoming MIDI value to a 0-255 range (MIDI only ranges between 0-127). The higher you set the damping value, the smoother the conversion will be. This will apply to all the objects of that type across the whole project.



Damping value of a Screen objects Scale property

To see how to link a MIDI control surface to a numerical parameter in Designer, see the Expressions section.

Editing an option property

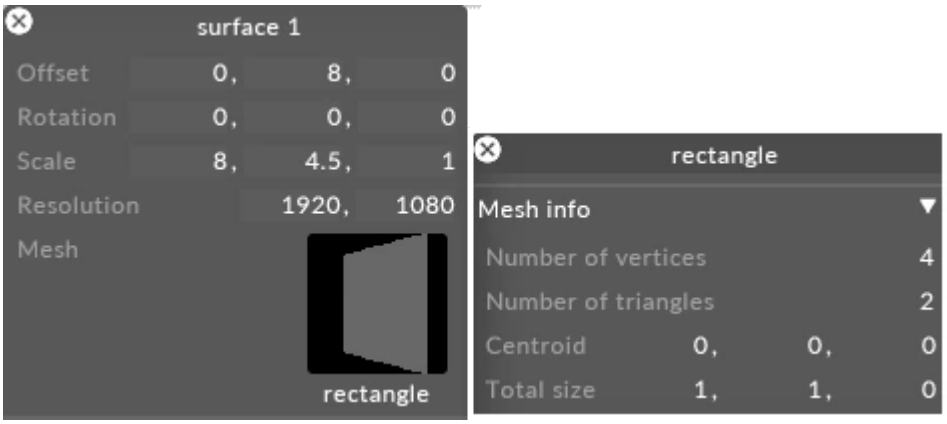
Left-click the option property name or value; this will open up a small menu with available options. Left-click the option you want.



Option properties to decide how content should appear on a Screen object

Editing an object property

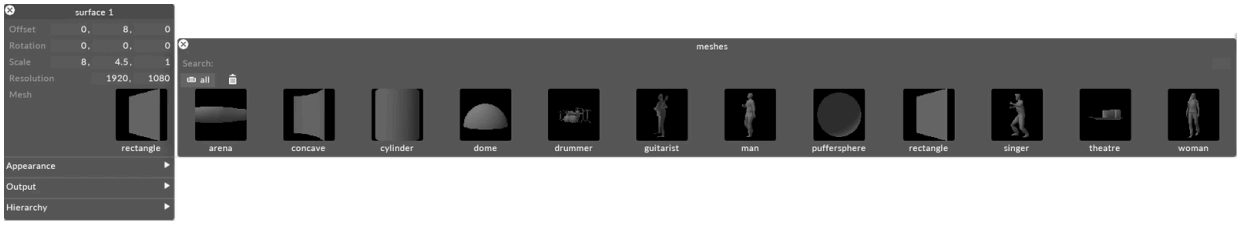
To examine or edit the object that the property refers to, right-click the object property name or thumbnail.



Right-clicking Mesh to access an objects properties, in this example a Rectangle

Editing an array property

To swap the object for a different object, left-click the object property name or thumbnail. This will open up an object library. Left-click an object thumbnail to select that object.

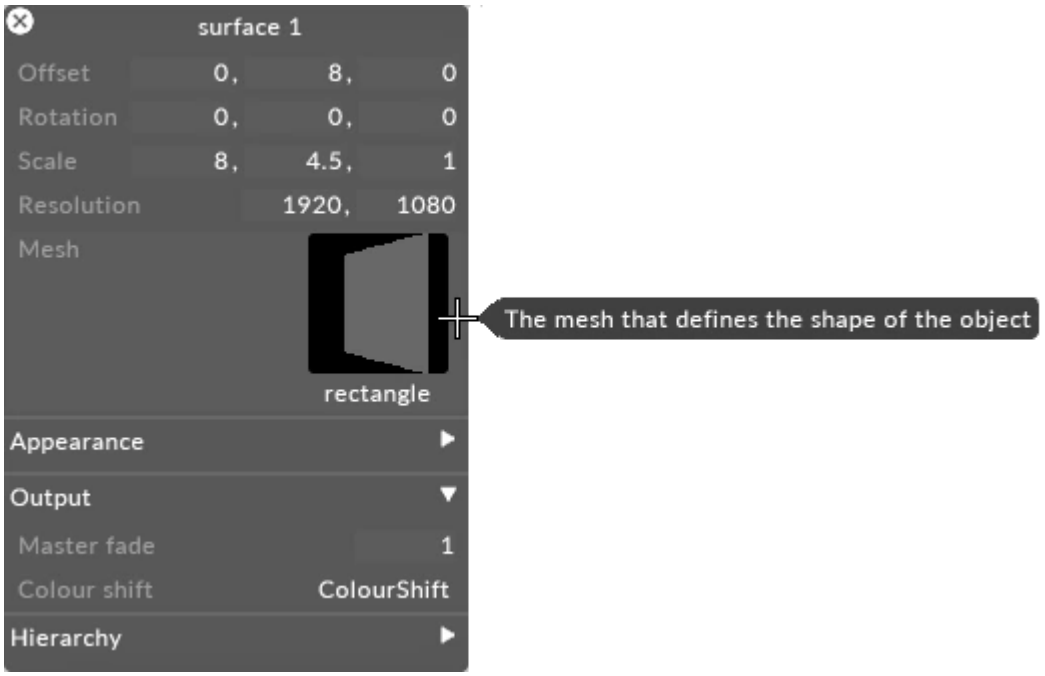


Left-clicking Mesh to access the Mesh object Library where you can swap an object for a different object

Object property explanations

The software is able to provide useful explanations on different object properties. To enable to display explanations of object properties:

- Hit **F1**.
- Hover your mouse cursor over an object. A text box should appear that provides an explanation of that particular object property.



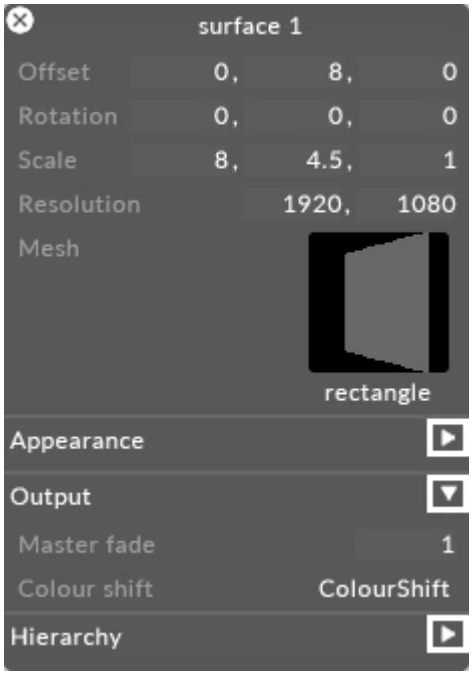
Object properties explained in a useful text box when you hit F1 and hover your mouse cursor over the particular property

- Hit **F1** to exit this mode.

Hitting **F1** will also open a **Shortcuts menu**.

Separator tabs

Object editors may contain elements called **separator tabs** , which appear as lighter grey bars with a sideways facing triangular arrow (when closed) or downward facing triangular arrow (when open). Separator tabs hide additional editor text fields or command actions, collecting them into sensible groups. Left-click separator tab to open or close it.



Separator tabs dividing the Screen Object editor into Appearance, Output and Hierarchy

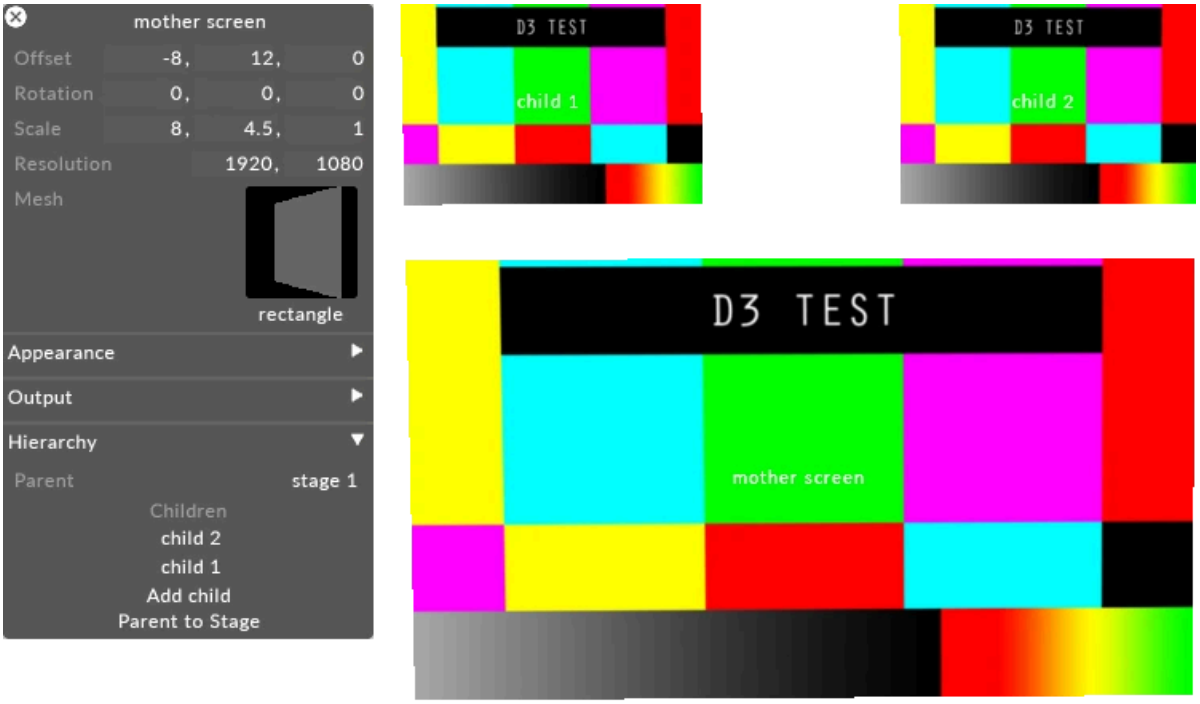
Hierarchy

Parenting objects such as screens, props, and projectors.

It is possible to make a object such as a screen, prop or projector the child of another object. This links the objects together, meaning that if you change the offset and rotation properties of the Parent object, the Child object will also be affected.

How to add a child to a screen

1. Right-click the screen you want to turn into a parent screen, in this example **mother screen**. This will open the Screen editor. Notice that **stage 1**is the parent of the Mother screen.
2. Under the hierarchy tab, left-click **Add Child**. This will open up a list of all screens and props in your Stage.

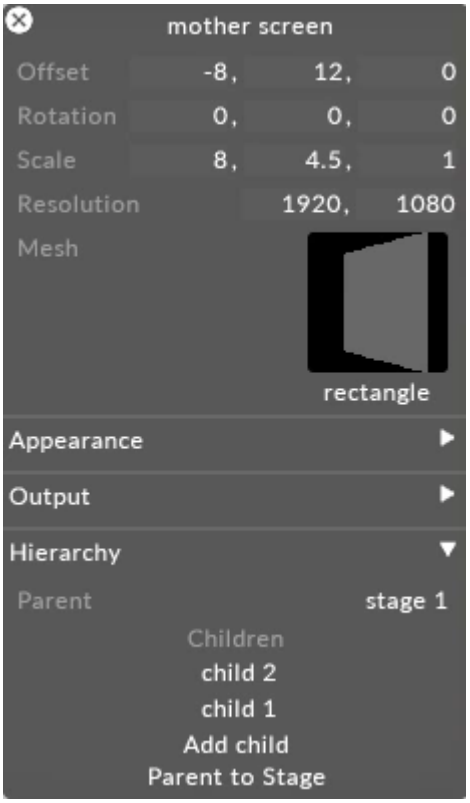


3. Left-click the screens you want to turn into children of the Parent screen. In this example we have added **child screen 1** and **child screen 2** as children of the Parent screen **mother screen 1**.

> **Note**
>
> Please note: After adding a child to the parent screen you will see that the child screen position and rotation have changed. This is because its offset position and rotation is now calculated from the pivot point of their parent screen rather than calculated from the centre of the Stage.

How to parent the child back to the Stage

- Under the hierarchy tab under the the child screens editor, left-click **Parent to Stage**. This will bring the child screen back to be parented to the Stage, in this example **stage 1**.



Parent to Stage property of the Child Screen editor being used to return the Child screens parent back to Stage 1

> **Note**
>
> A Parent screen can have multiple child screens and props.

Importing & Exporting Objects

Disguise allows you to export objects from one project, which can then be imported into different project. For example, you can export a track, stage object or device from one project into another. If an object is dependent other resources in the project (e.g. a track might contain layers which use a number of different mappings), the software automatically bundles all dependent objects into the same export package.

The examples here will show how to transfer a track, surface or screen position receiver from ProjectA into ProjectB. Many other types of objects in Designer can be exported and imported by adapting the steps described.

> **Note**
>
> From r14.4 onward, a device with an identical name as the exported object must be created in ProjectB prior to using the import feature. This will be remedied in a future release.

> **Note**
>
> Any assets such as video files, bitmaps or screen meshes need to be manually transferred to the new project's folder in windows.

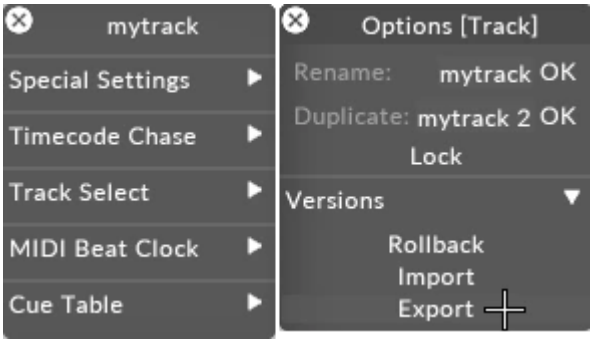
Workflow

1. Make objects (tracks, layers, devices etc) in Project A.
2. Right-click the header of the object editor you wish to export.
3. Click the **export** option. The file is written to a discrete D3EXPORT file in the **output** folder of the project.
4. In the project folder of Project B. Make a **Packages** folder.
5. Copy the D3EXPORT file from the output folder of Project A to the Packages folder of Project B.
6. Create an object with the **exact** same name in Project B.
7. Right-click the header of the object editor of your newly created object.
8. Click the import option an choose the file you wish to import from.
9. Left-click any items you do not wish to import that may be part of the object.
10. Click the Import select objects button at the top of the editor.

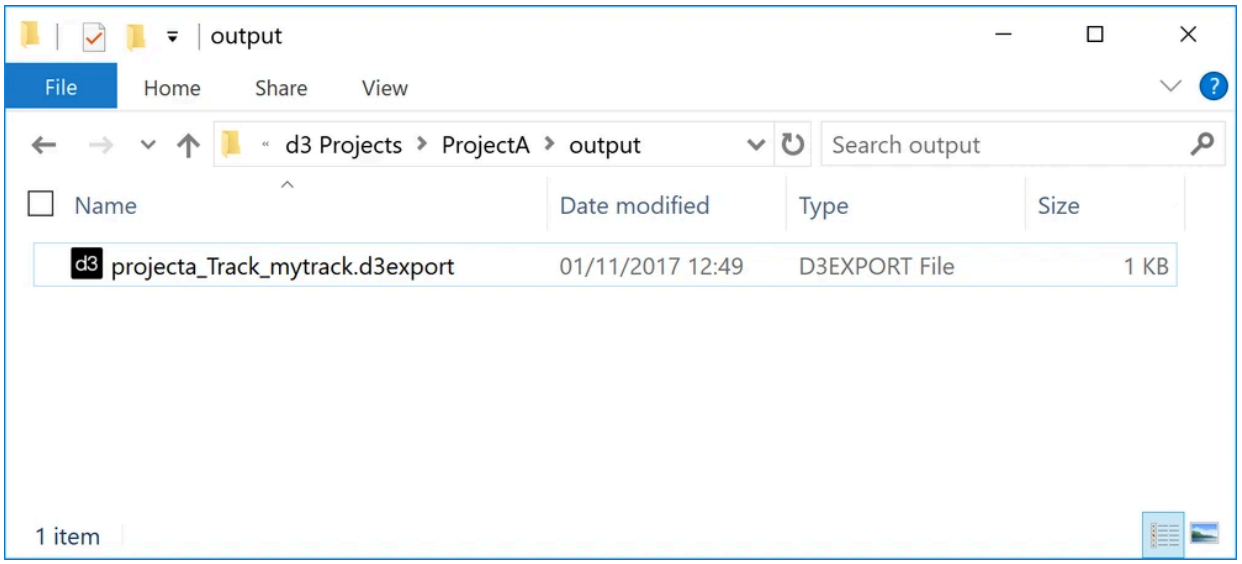
Transferring a track to a different project

To export a track from ProjectA

1. Run ProjectA, which contains the track you wish to export.
2. Right-click the track title bar to open the track editor.
3. Right-click the title of the track editor.
4. Left-click **Export**

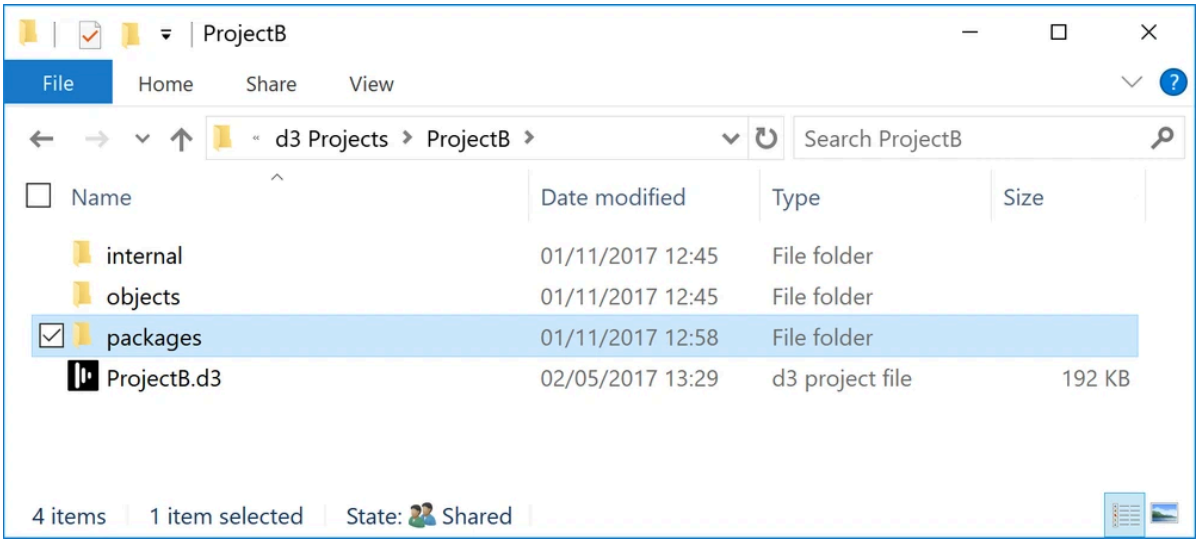


A file will be created in the **output** sub-directory of the project folder. This file contains the contents of the track, its layers as well as any resources the track references (e.g. video files, mappings and audio patches).

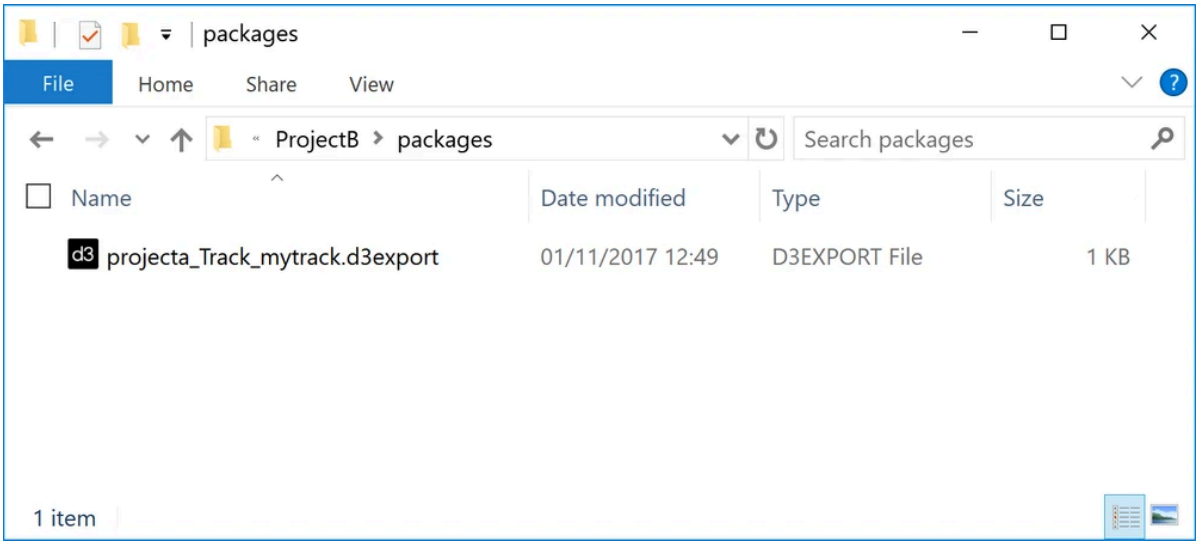


To import a track into ProjectB

1. In Windows, create a new sub-directory called **packages** inside the project folder.

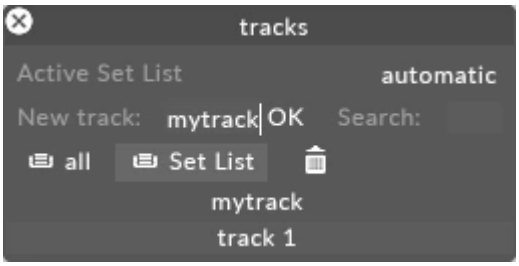


2. Copy the exported file into the new packages folder in ProjectB

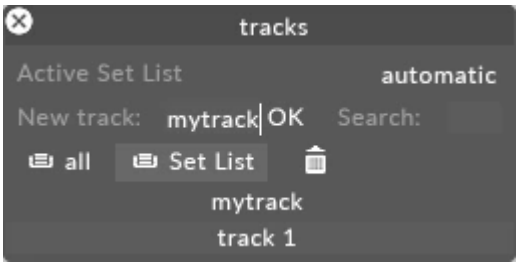


3. Run ProjectB.

4. Create a new track called mytrack (must be exactly the same name as the track from which you wish to import).



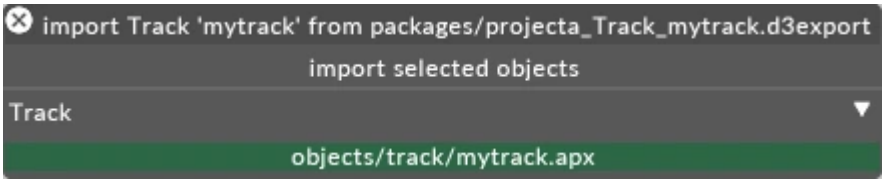
5. Right-click the track title bar to open the track editor.
6. Right-click the title of the track editor.
7. Left-click **Import**



8. Select the file from which you wish to import.



A list is shown, which includes mytrack and also any dependent resources which were exported alongside mytrack. If an object with the same name already exists in ProjectB then you can prevent overwriting it with the version from ProjectA by clicking on it.

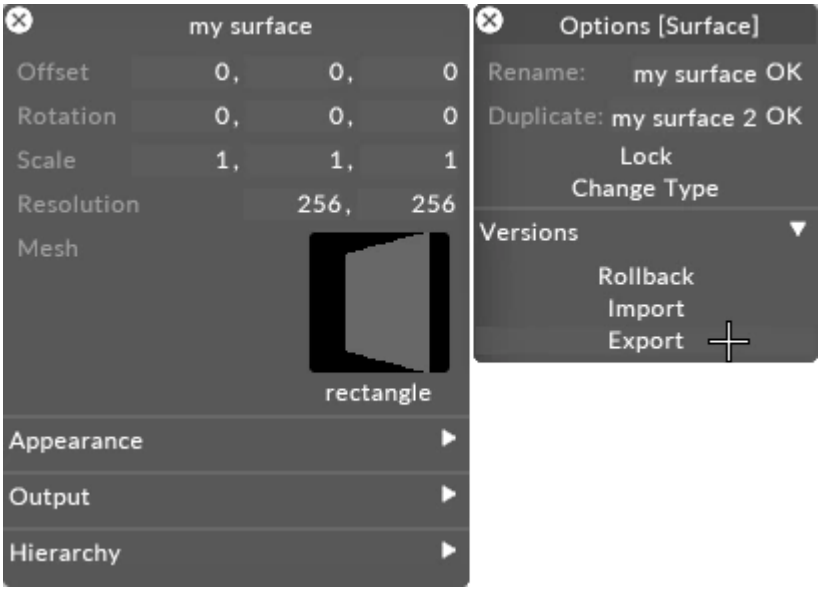


9. Click **import selected objects** to bring the selected objects into ProjectB.

Transferring a surface (or other stage object) to a different project

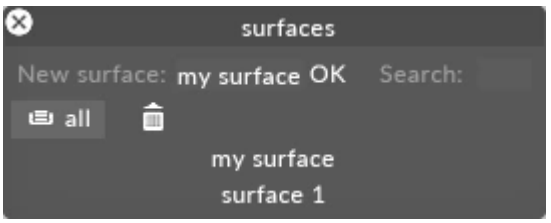
To export a surface from ProjectA

1. In ProjectA, right-click on the screen.
2. Right-click on the title of the screen editor
3. Left-click **Export**



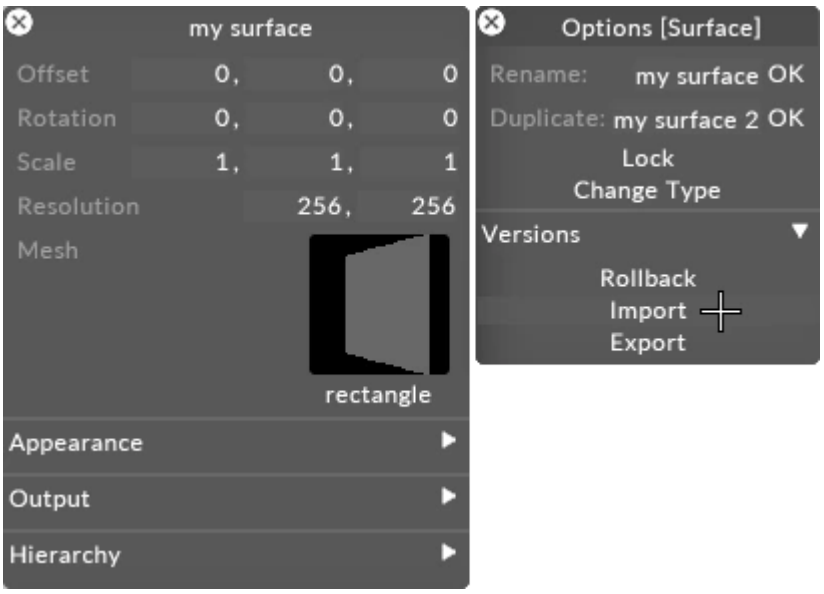
To import a surface into ProjectB

1. Copy the exported from from **ProjectA/output** to **ProjectB/packages**.
2. In ProjectB, create a new surface with the name my surface (must be exactly the same name as the surface from which you wish to import).

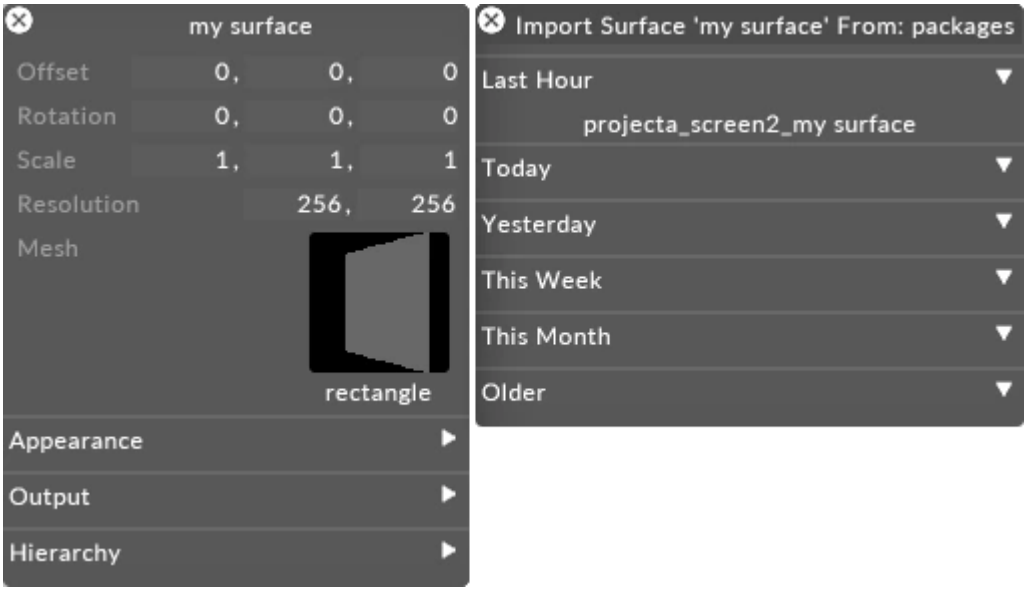


3. Right-click on the title of my surface.

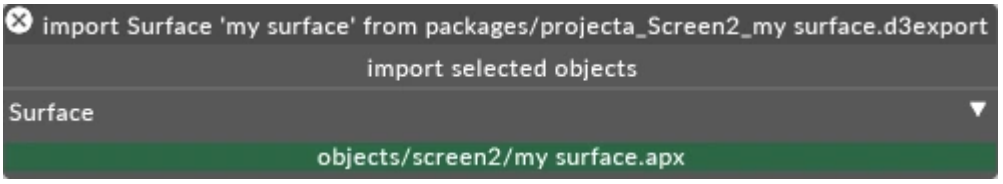
4. Left-click on **Import**.



5. Select the file from which you wish to import



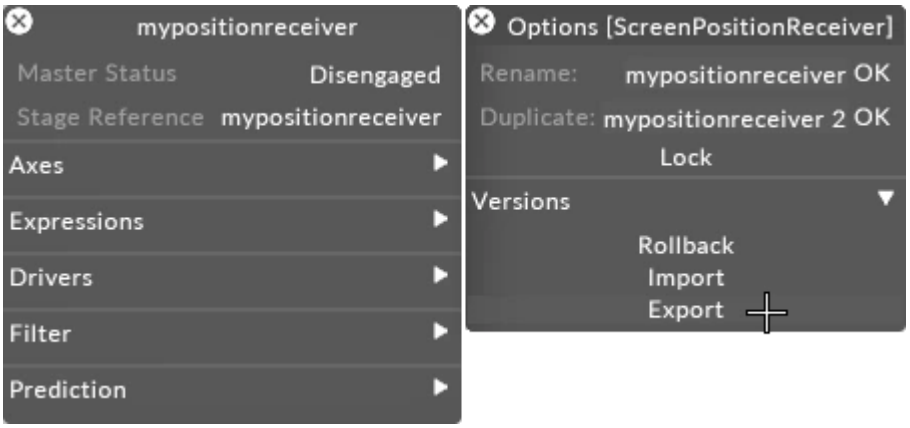
6. Click **import selected objects** to overwrite mysurface's properties which the exported data.



Transferring a ScreenPositionReceiver (or other device) to another project

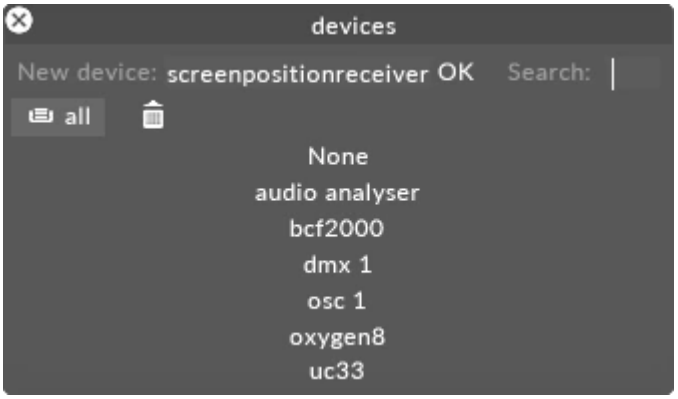
To export a ScreenPositionReceiver from ProjectA:

1. In ProjectA, open the device editor.
2. Right-click on the title of the screen editor.
3. Left-click **Export**



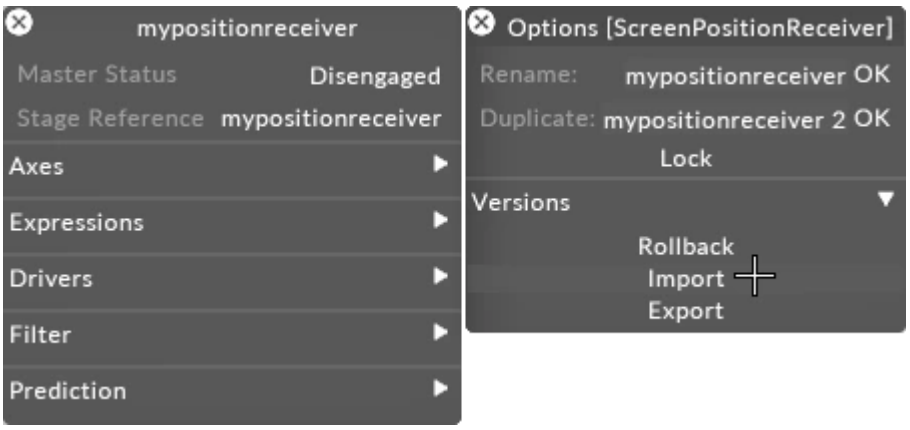
To import a ScreenPositionReceiver into ProjectB:

1. Copy the exported file from from **ProjectA/output** to **ProjectB/packages**.
2. In ProjectB, create a new ScreenPositionReceiver with the name mypositionreceiver (must be exactly the same name as the device from which you wish to import).

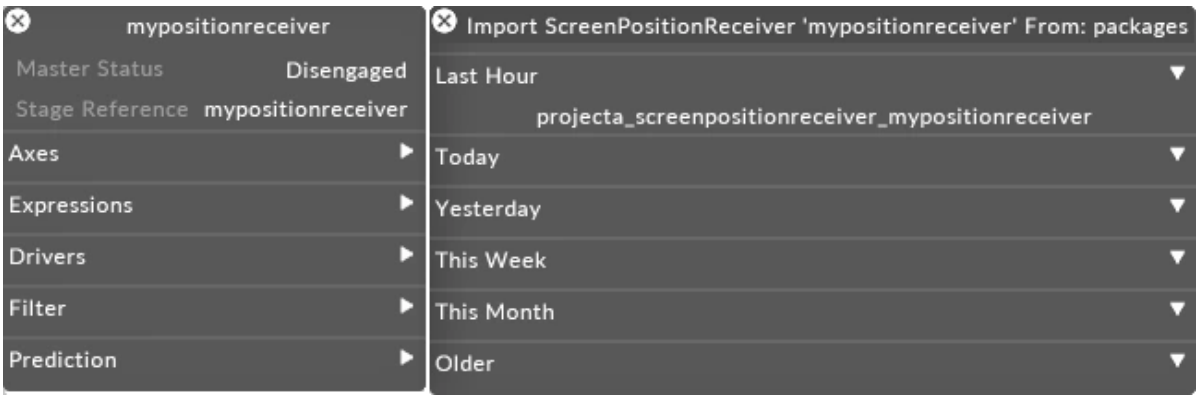


3. Right-click on the title of mypositionreceiver.

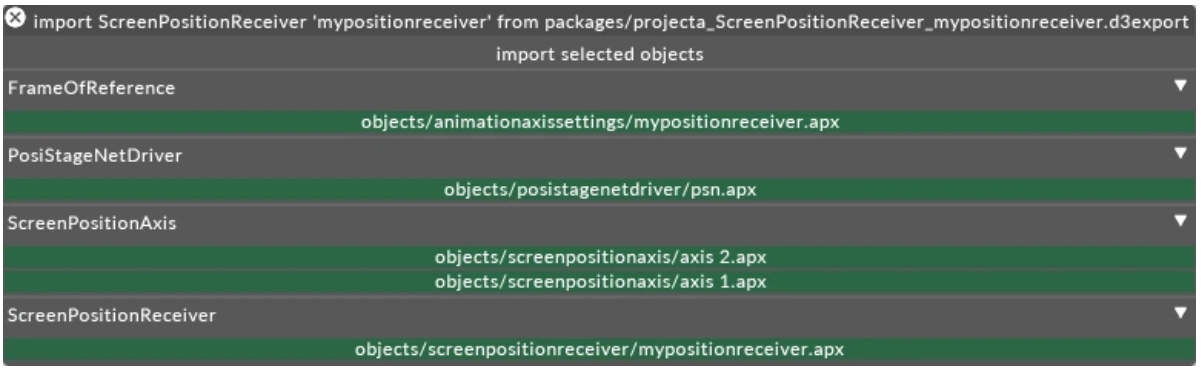
4. Left-click on **Import**.



5. Select the file from which you wish to import.

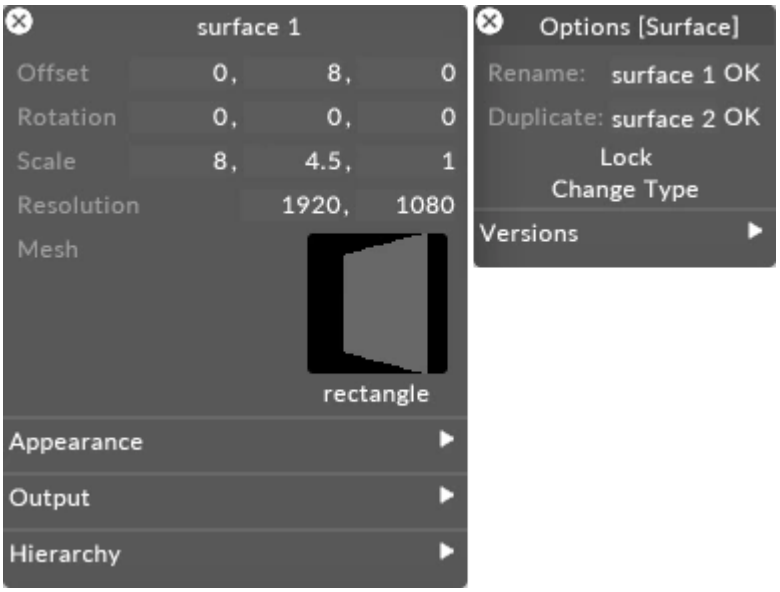


6. Deselect any objects you do not wish to overwrite in ProjectB. Click **import selected objects** to import the selected objects' data.



Managing Objects

Right-clicking the title bar of a standard object editor will open the Object options menu.



Object options menu for a Screen

Renaming an object

The first option is **rename**, followed by an editable text field.

To rename an object, type the name of the object in the rename text field and hit **Enter** (or click the **ok** button to the right of the text field). If the new name already exists, a small message will pop up explaining this.

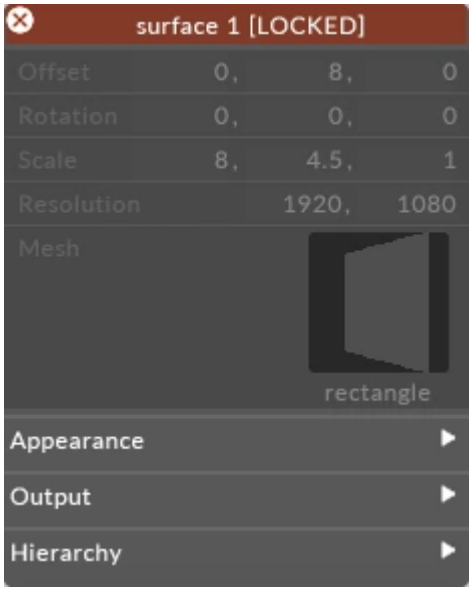
Duplicating an object

The second option is **duplicate** , followed by an editable text field.

To duplicate an object, type the name of the object in the duplicate text field and hit **Enter**.

Locking and unlocking an object

Objects can be locked to prevent other users from accidentally editing their contents. A locked object shows a red title bar with the word **[LOCKED]** appearing to the right of the object name.



Locking an object prevents other users from accidentally editing their contents

A locked object can still be edited to test what happens when you edit its properties. However, the modified properties will not be saved when exiting d3. Unlocking the object will cause the values to be saved as normal.

To lock an object, left-click **lock** from the Object options menu.

> ⚠ **Warning**
>
> People sometimes fail to notice the red title bar and make edits to locked objects, expecting them to be saved. Disguise does not warn you that the changes have not been saved when quitting without unlocking. Therefore be careful when you are using this option. A future release will issue a warning if locked objects have been edited and give you the option to save them.

Unpacking an object

For step-by-step instructions on how to import/export objects and from one project to another, please see the Importing/ExportingBetween projects.

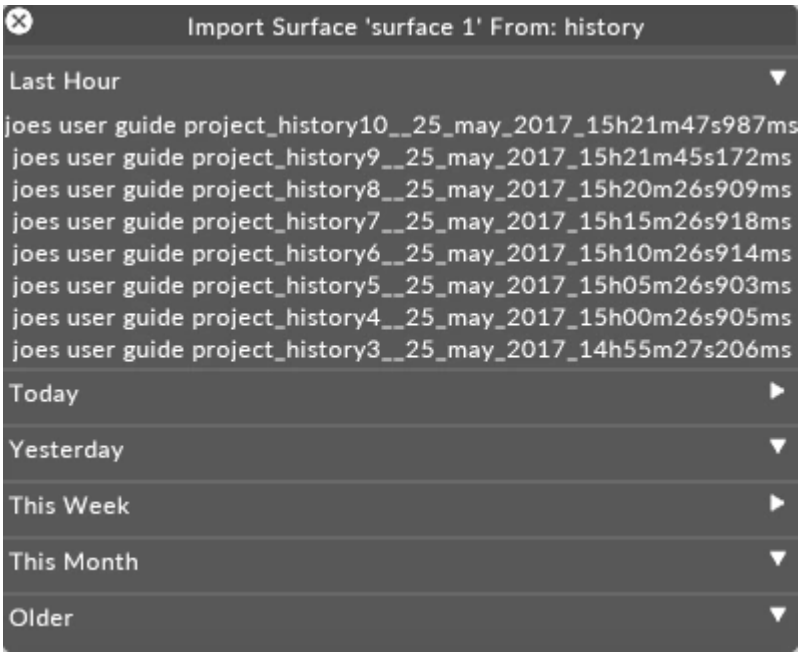
Rolling back an object to a previous version

The final option in the Object options menu, **roll back**, is used to roll back an object to a previous version.

Any time you exit the software, the state of every object is saved. Hitting **Alt-W** will also save the state of every object in the software (only objects that have changed will be saved). Every object stores the previous seven versions, including date-stamps, for when they were created.

To rollback an object to a previous version:

1. Open the objects editor and right-click the title bar. This will open the Object options menu.
2. Select **rollback** from the Object options menu, then you will see a list of version date-stamps.
3. Left-click the date-stamp you want to roll the object back to.



The software saves the last seven versions of an object with their date-stamps, opened by right-clicking an objects title bar and left-clicking Rollback

If the object cannot be roll-backed because it has been deleted, or the current **.d3** Project file becomes corrupted or otherwise fails to load, it is possible to revert to a previous version of the **.d3** Project file. For information on this feature please see the above sub-chapter Project structure.

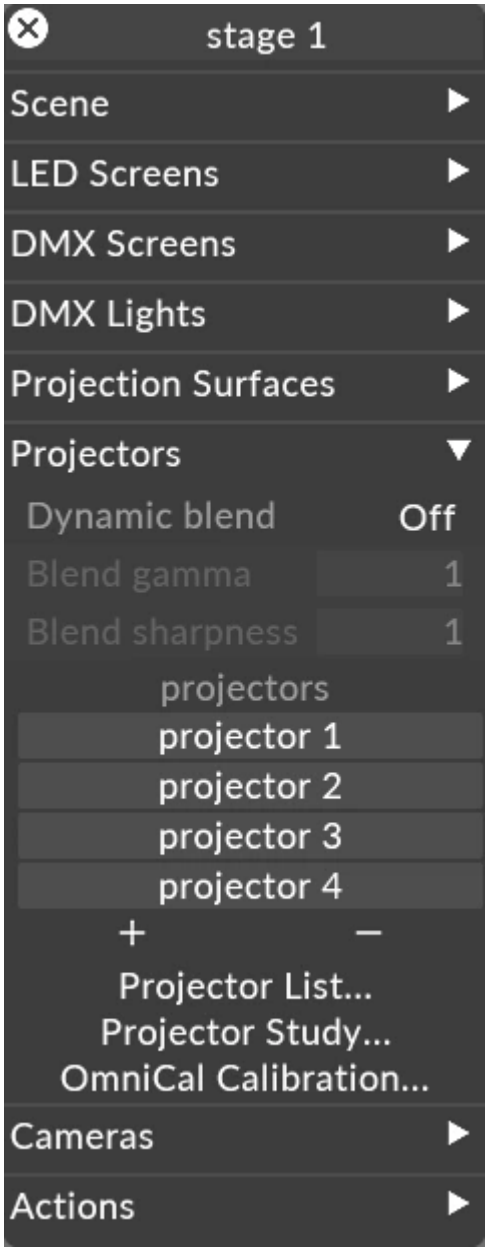
For information on how to use the other options from the Object options menu please see editing objects topic.

Multi-Edit Objects

As of r16, you can select and edit most user creatable objects in a single editor.

Selecting multiple objects

Objects can be selected from their manager by holding CTRL and left-clicking each individual item, or by holding shift and selecting the first and last object in a range.



Editing multiple objects

1. Right-click the selected objects from the manager or list.
2. The multi editor opens.
3. Select the items in the editor you wish to edit.
   - To select all, use hold **SHIFT**, left-click the first and then last.
   - To select a sub set, hold **CTRL** and left-click the desired objects.
4. Enter a new value for the field you are editing, press **enter** to apply that to all other selected items.

   [Animated GIF: Multi edit objects]

Not all objects in currently support multi-edit functionality, so occasionally you may find something that does not work with this functionality. If this occurs, please contact **Disguise support**.

Managing parameters displayed by multi editor

You can show/hide columns in the multi editor by right-clicking the header and toggling parameters on and off.

Projectors

Name	Resolution		Brightness (Lumens)	Feather	Anti-aliasing	Face Cull Mode
projector 1	1920,	900	20000	0	None	None
projector 2	1920,	500	20000	0	None	None
projector 3	1920,	900	20000	0	None	None
projector 4	1920,	500	20000	0	None	None

Show/Hide Columns [Projector]

Name (visible)
Resolution (visible)
Colour (hidden)
Render mode (hidden)
QuickCal reticle (hidden)
Brightness (Lumens) (visible)
Configuration (hidden)
Master fade (hidden)
Colour shift (hidden)
Feather (visible)
Anti-aliasing (visible)
Face Cull Mode (visible)
Offset (hidden)
Rotation (hidden)
Tracking source (hidden)
Scale (hidden)
Mesh (hidden)
Pixel mask (hidden)
Population mask (hidden)
Alpha (hidden)
Blend mode (hidden)
Content (hidden)
Colour Profile (hidden)
Colour LUT (hidden)
screens (hidden)
mask objects (hidden)
masking scale (hidden)
gridSize (hidden)
gridThickness (hidden)

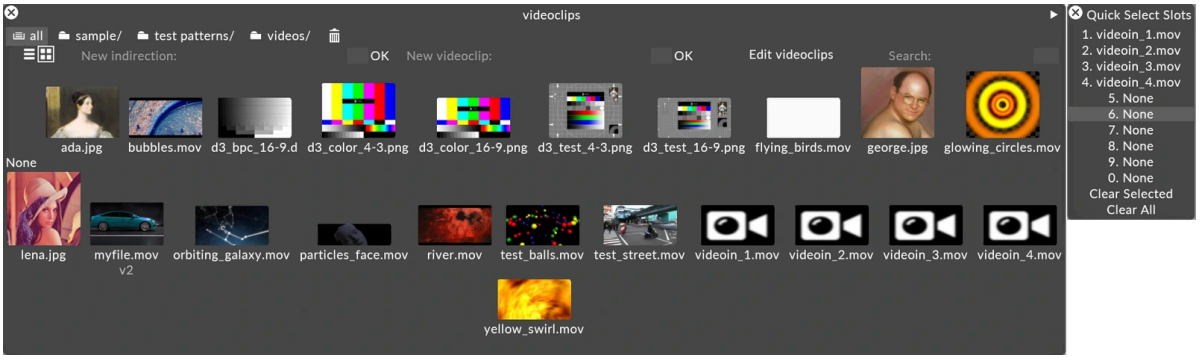
Object Assignment Hotkeys

As of r17.3, keyboard shortcuts can be set for user creatable objects, such as mappings, videoClips, Textures etc. These shortcuts are useful for recalling objects stored in **Quick Select Slots** located in an object's window.

Assigning hotkeys

Open an Object manager, such as VideoClip or Texture. This can be done from a layer by left-clicking the parameter to open the keyframe editor.

1. Left-click the small arrow in the titlebar or right-click anywhere in title bar.
2. The **Quick Select Slots** editor is displayed.



3. Select a slot by left-clicking, this highlights the target slot.
4. Select an object from the view by left-clicking it.
5. The target slot is populated with the resource (as opposed to adding a keyframe to the keywidget).
6. Close the **Quick Select Slots** editor to re-enable clicking a resource in the object view to target the timeline.

[Animated GIF: Quick Select Slots]

Using hotkeys

When a keyframe editor is open that has objects that have hotkeys assigned, press the corresponding number on your keyboard to quickly add that object as a keyframe at the current playhead position

Removing hotkeys

1. Left-click on a number slot
2. Left-click **Clear Selected** or **Clear All** to remove all assignments.

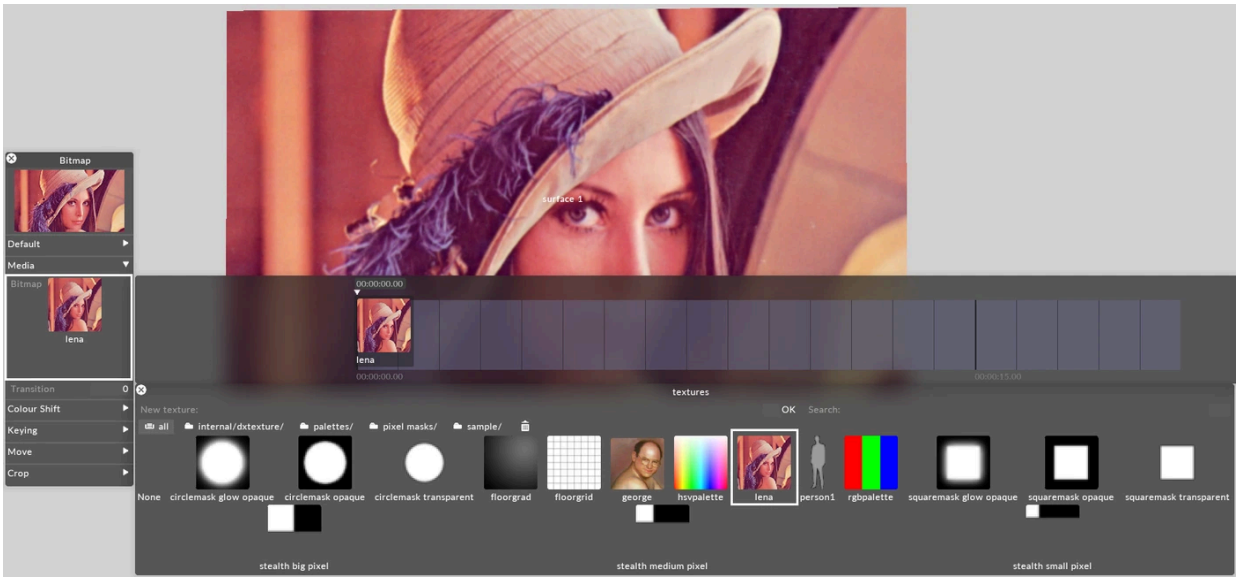
The role of None

By default the rest of the hotkeys (5, 6, 7, 8, 9, 0) are assigned to None. This does not represent empty for properties such as Palette & Media/Video. The assignment of “None” within these properties to a number slot is of utility as it can be used to cut a video to black. For properties such as Mapping “None” represents the state of being empty.

Object Libraries

The object library is a quick way to access stored objects within the system. Each object type has its own object library.

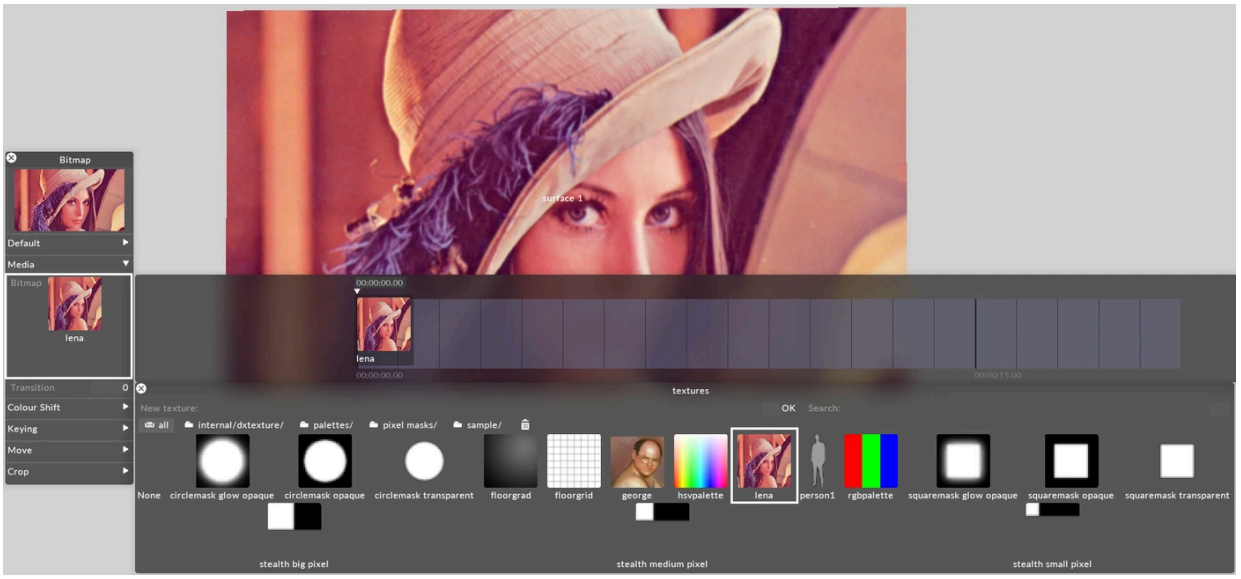
For example, the Screen uses a bitmap object as one of its properties in the Bitmap object editor. The bitmap property has its own object library where you can select which bitmap you want to project onto a Screen object.



Using the Bitmap object library to select a bitmap to be projected onto a Screen object.

Selecting an object

You can open an object library by left-clicking a property in the standard object editor. Left-clicking any object in the library will select that object.



Selecting a bitmap object from the Bitmap object library

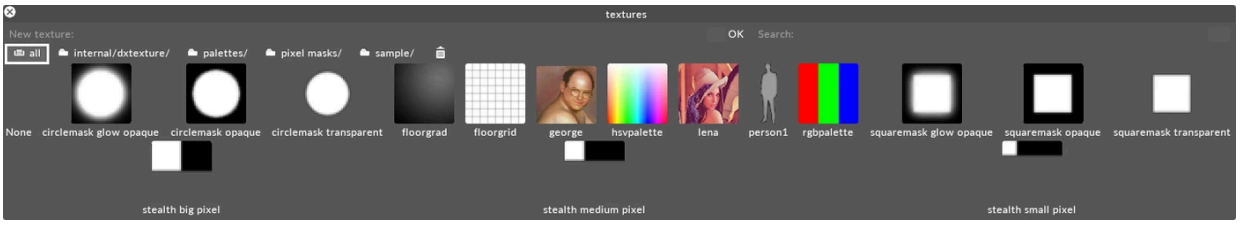
Organising objects in boxes

Objects are stored in named boxes and can be ordered from within those boxes (i.e. each box is like a playlist). One object may also appear in more than one box. Left-clicking a box will show you objects of that particular type only.

These boxes are represented by a list of tabs. Left-clicking a box tab opens up an array of objects below the box tab while highlighting the selected box. For these reasons an object library can also be known as an object box viewer.

Bitmap object boxes used to organise bitmaps by different types within the Bitmap object library

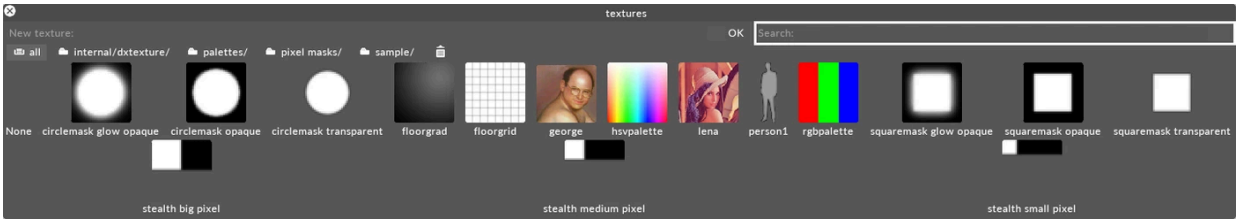
The **all** box contains all objects of that type, sorted either alphabetically or by date of creation (the most recently added objects will come first). The **trash** box (represented by a trash-can icon) contains objects that are no longer required.



Object all box

All and Trash boxes used to organise bitmaps within the Bitmap object library.

The Object Library's top row contains a New Object field and a **search** text box.



The Search box will help you locate objects more efficiently within the Bitmap object library

Reordering objects within an object box

Select the object box by left-clicking its tab. When the **sort** button is not highlighted, objects are displayed in the order you choose. In this mode, you can click on any object, drag it left or right and release the mouse button to drop it in its new place in the list.

Searching for an object

Left-click the **search** textfield at the top right corner of the object library and type in a search term. All object boxes will be filtered to contain only those objects whose names contain the search term (case insensitive). Clearing the search text field restores the view of all available objects.

Removing an object from the library

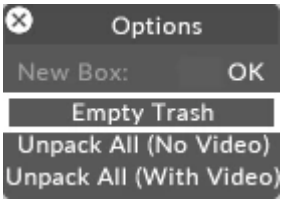
Click the **all** box tab and drag the object thumbnail to the **trash** box tab.

Restoring a deleted object

Click the **trash** box tab. Find the object you want to restore and drag it back to the **all** box tab.

Emptying the trash

To permanently delete the removed objects, right-click the **trash** box tab and select **empty trash**.



Empty Trash deletes objects permanently from an object library

> **Warning**
>
> This operation cannot be undone. The objects in the trash-can are permanently deleted. If you wish to restore an object that has been emptied from the trash, you will need to go to a previous `.d3` Project file in the `History` folder. Please see the sub-chapter Project Structure for more information.

Moving an object from one box to another

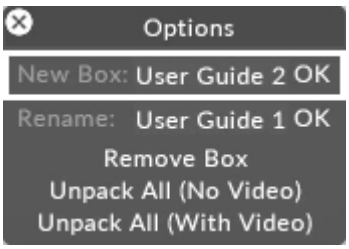
Simply drag the object thumbnail and drop it on top of the tab of the destination box. This will copy the object rather than moving it. By default, the object will be added to the top of the box.

Removing an object from a box

Drag the object from the box and drop it onto the desktop background.

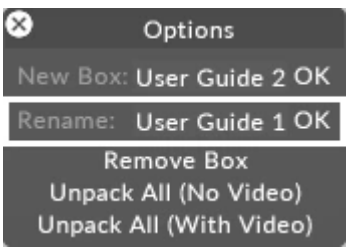
Creating a new object box

Right-click any box tab to see an option that says **new box** followed by an editable text field. Left-click the text field, type in the name of the new box and hit **Enter** (or click **ok**). This will create an empty box with that name.



Renaming an object box

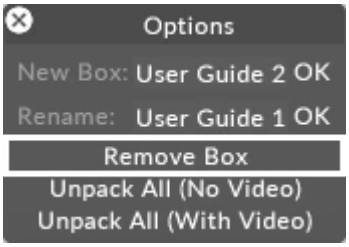
Right-click the object box tab to see an option that says **rename box** followed by a text field. Type in the new name and hit **Enter** or click **ok**.



Renaming the User Manual box to User Manual 1

Removing an object box

Right-click the object box tab and select **remove box**.



Organising boxes to reflect folder structure

By default, creating a folder within the **objects** folder on the drive will create a new box with that name.

If the folder contains other folders, then left-clicking this box will show you a second level of boxes, representing the lower level of folders. Boxes that represent folders cannot be removed, reordered or renamed; they are indicated with a small folder icon at the left of the box tab.

Object Tracking Source

Object tracking source, added in r16, allows the user to easily link an object in Designer stage to an automation object. This helps to make it clearer, which automation devices are controlling which elements in the stage and enables the user to assign whole sets of axis to an object at a time.

Workflow

1. Create objects in [the stage], such as screens, projectors, props etc.
2. Create an automation device ../../devices/tracking/creating-a-new-motion-controller.md.
3. Configure the automation device.
4. Assign the tracking source of the object to the automation device.

Generated workflow

When setting up your automation device, create the axis as normal, but do not set the property field or object field.

1. Right-click an object to open its properties.
2. Left-click the Tracking Source field.
3. Assign the object to a set of incoming automation axis.
4. Surface should use chosen axis orbit/ position information.

- Offset and Rotation fields should turn green to indicate that they are being controlled by automation.

5. To clear, click the Tracking Source field and select **None**.

Per axis workflow

When setting up your automation device, create the axis as normal, but do not set the property field or object field.

1. Right-click an object to open its properties.
2. Left-click the Tracking Source field.
3. Enter a new **objecttrackingsource** name and click OK.
4. Use the editor to assign each automation axis to a property of the object. I.E. Axis 1 controls X offset.
    - Offset and Rotation fields should turn green to indicate that they are being controlled by automation.

5. To clear, click the Tracking Source field and select **None**.
6. Also try to set and then adjust the frame of reference in order to transform the input positions. E.g. units or stage center.

Objects Editor Overview

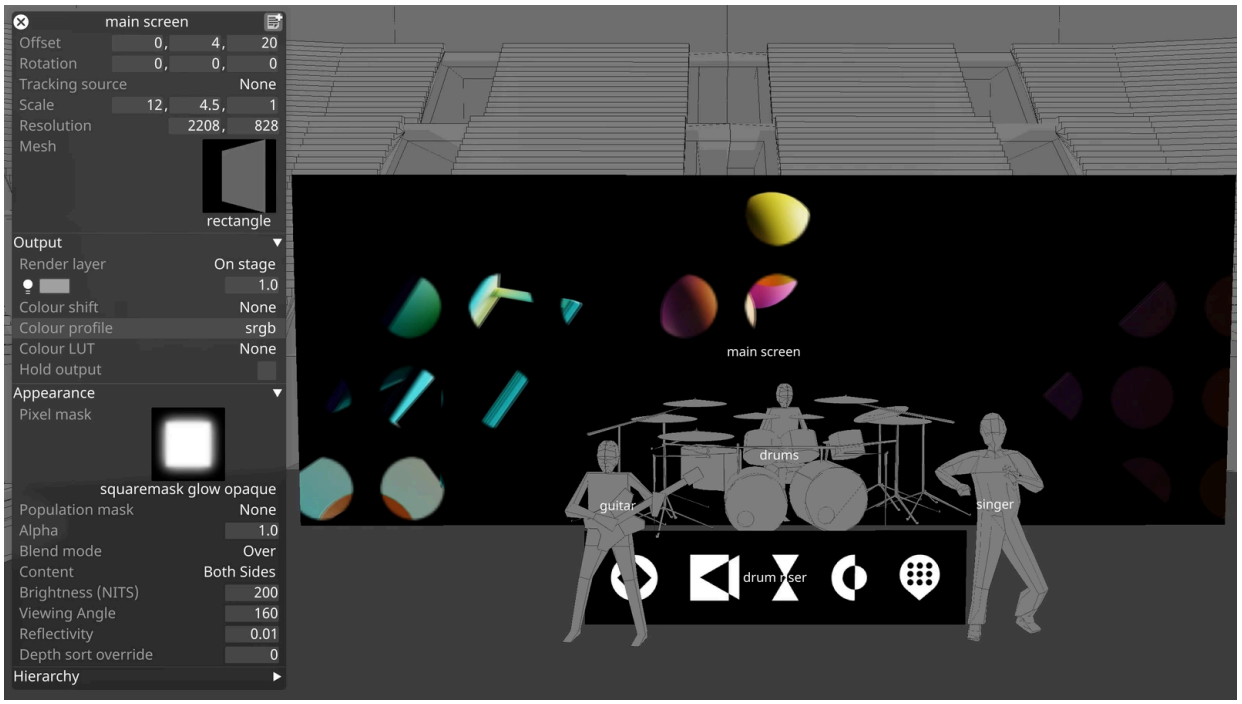
What is an object?

Everything in the software is an **object**. An object is an entity that has a list of named properties. For example, a Screen object has properties such as Offset, Rotation, Scale, Resolution, Mesh, Pixel Mask, Population Mask etc. These properties can be edited using an **object editor**.

Types of objects

Every object in the system has a type. For instance, objects in the Stage Visualiser may be of the type LED Screens, DMX Lights, Projection Surfaces, Projectors, Cameras, MR Sets and Skeletons. Props and Venues are also objects.

For more information on how to add screen and prop objects please read the next chapter Stage Setup. Read more about the different screen types in the Screen types overview sub-chapter.



Screen object and its editor, everything in the software is an object and all properties of an object can be edited using an object editor

The standard object editor

All properties of an object can be edited using an object editor. For instance, a Screen object's properties can be edited using the **Screen object editor**. In some cases, specialised editors have been created to provide more intuitive user interfaces. For example, the Track Player at the bottom of the screen is a specialised object editor for the Track type.

Opening an editor for an object

To open an object editor:

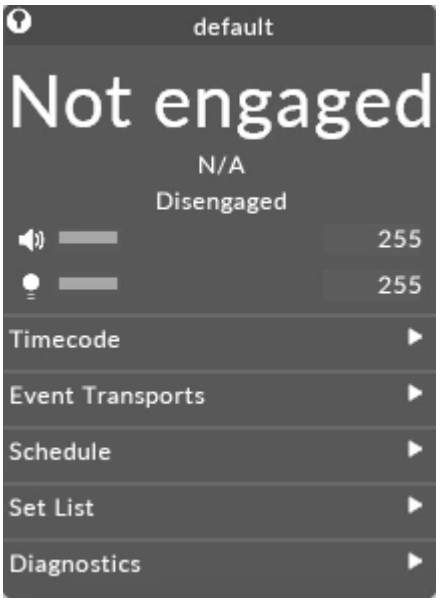
- Right-click an object, for example, any 3D object in the Stage Visualiser.

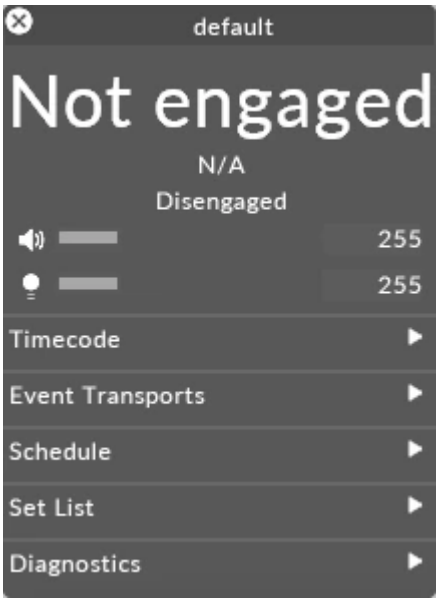
Making menu windows sticky

It is possible to make menu windows 'sticky' or pin the window in place. A menu window is simply a window in the software, such as an object editor. This means that when you close and restart the software, the menus will remain open. This is particularly useful if you are editing objects and you do not want to have to reopen all of the object editors after closing and restarting.

To make a window sticky:

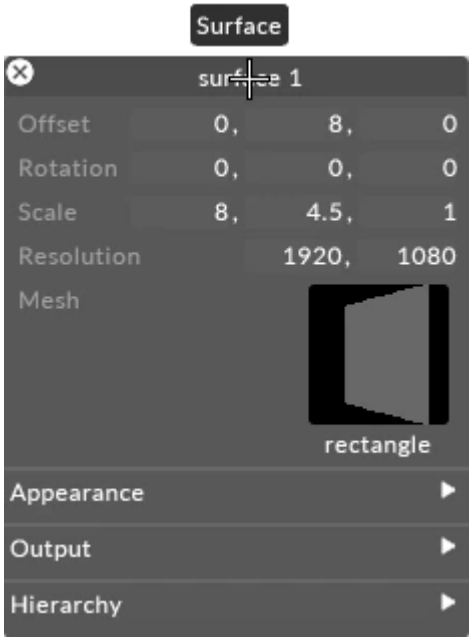
- **Ctrl +** left-click on the close button (**x**) of the window. You will notice that the close buttons icon changes.





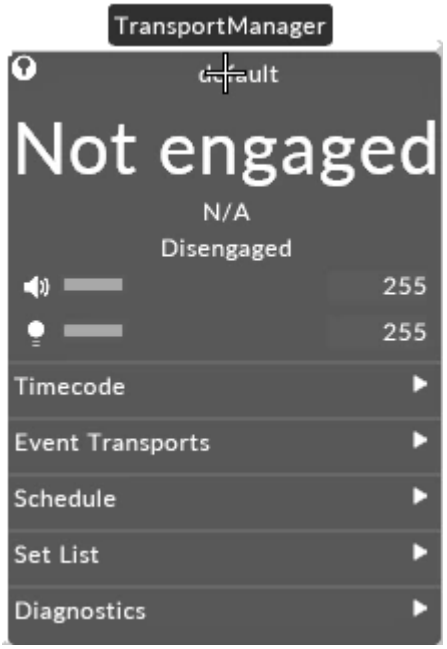
Finding out the name of an object

Every object has a unique name; this name is displayed in the title bar at the top of a standard object editor.



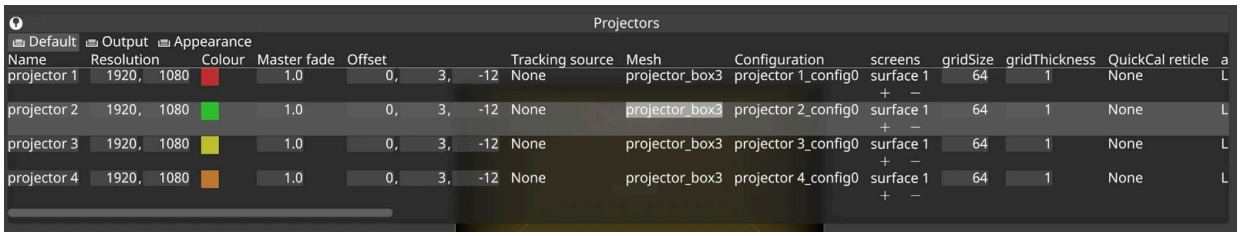
Finding out the type of an object

To find out the type of an object, hover the cursor over the title bar of an object editor; a popup text box will show you the type of the object.



Object type descriptions are displayed by hovering the cursor over the title bar of the object editor.

The Standard object List Editor



A List Editor for multiple Projectors, showing all of the same fields as the single-object Editor

If you need to edit multiple objects of the same type, then you can open a *List Editor* by multi-selecting the desired objects and right clicking on one.

All objects with an Editor have a corresponding List Editor; these display all of the same properties as the normal Editor in columns, with one object per row.

List Editor Categories

Because a single object can have more fields than will fit on screen, most list editors split the display up into categories (or tabs). These are selectable at the top of the List Editor, and correspond to the drop down sections in the regular Editor.

Showing and Hiding Columns


Projector List Editor Options
Show/Hide Columns
Name (visible)
Resolution (visible)
Colour (visible)
Master fade (visible)
Offset (visible)
Tracking source (visible)
Render layer (hidden)
Mesh (visible)
Pixel mask (hidden)
Population mask (hidden)
Alpha (hidden)
Blend mode (hidden)
Content (hidden)
Colour shift (hidden)
Colour profile (hidden)
Colour LUT (hidden)
Output transform (hidden)
Output transform (hidden)
OCIO transform properties (hidden)
Hold output (hidden)
Configuration (visible)
Render mode (hidden)
screens (visible)
mask_objects (hidden)
masking_scale (hidden)
blur_shadow (hidden)
Resolution (hidden)
gridSize (visible)
gridThickness (visible)
QuickCal reticle (visible)
autoSoftEdgeMembershipFunction (visible)
Feather (visible)
Anti-aliasing (visible)
Import/Export
Export As Table
Projector.csv
OK
Import

A List Editor for multiple Projectors, with the list of hidden and visible columns open

By default, all columns are visible in their Category and hidden in the others; in most List Editors, you can change this by right-clicking the title bar. This will bring up a list of all the columns in the editor along with their visibility, which you can toggle by clicking on them.

Import and Export

Right-clicking the title bar will also, for most List Editors, bring up the option to import and export the objects from/to CSV files. Some List Editors only support object export, and some don't support either.

When exporting, only the selected columns are exported to the CSV file, so you can ignore irrelevant fields. When importing, only the fields contained in the CSV file are overwritten - other fields are left as-is.

Editing multiple objects at once

It's possible to select multiple objects at once in a List Editor by holding down SHIFT or CTRL and clicking or using the arrow keys (this behaviour matches most other table-based software like E.G Microsoft Excel, so should be familiar).

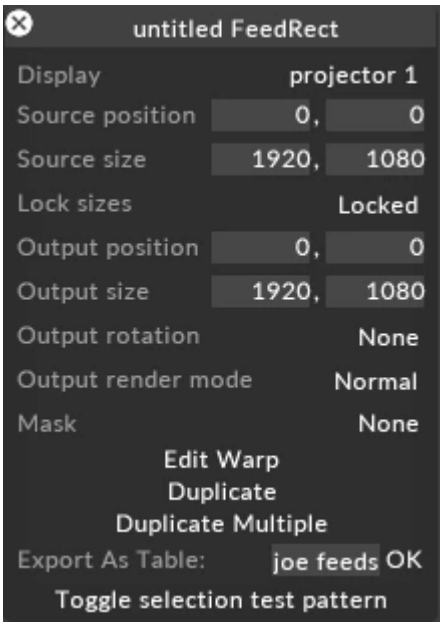
With multiple objects selected, changes can be made to all of them by editing a field in one object and then pressing ENTER to apply that change to all selected objects.

Blending and Masking Outputs

Designer allows the user to generate custom softedge textures and masks **inside** it. You can then apply the softedge texture directly on the output and update the shape, gradient and gamma settings in real-time.

Create a softedge mask on the output

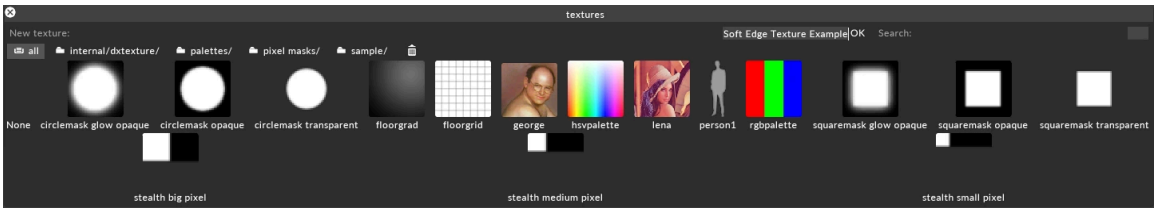
Select Mask option is used to create a custom SoftEdgeTexture mask



This will open the Texture object library which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder. For more information on the **DxTexture** and other folders please see the sub-chapter Placing media files for a project.

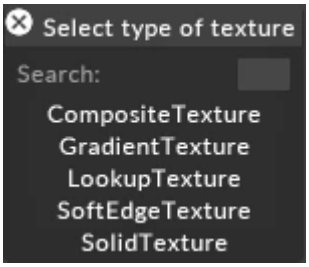
- In the top-left corner of the library, where it says **new texture** , type in the name of the softedge mask, for example **Output1_softedge**.

- Hit **Enter** and select the texture type **SoftEdgeTexture**.
  - Open the Feed level by left-clicking **Feed** from the dashboard (bar at the top of the screen), right-click the appropriate output and select **select mask** from the options list.

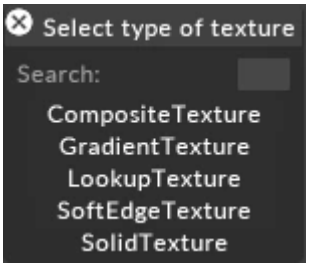


Texture object library being used to create a SoftEdgeTexture mask.

- Create a new Texture, and choose SoftEdge Texture when prompted.



Softedge editor



Resolution

The resolution values are shown in the top right corner of the softedge editor. The resolution is automatically set to the resolution of the output head.

Adjust global gradients through gamma

The **gamma** value adjusts the global gradient between the inner and outer points in the softedge mask.

Select and move points

- Select individual points, pairs of inner and outer points, or drag-select multiple points to adjust the blend level.

Add and remove points

- Add more points by holding down **Ctrl** and left-clicking between existing points.
- Remove points by right-clicking a point.

Adjust local gradients

Adjust the gradient between an inner and outer point by dragging them further apart, or closer together.

Press **Esc** to exit texture editing. Right-click the output feed and select 'Edit mask (Name) to edit the texture again.

Create a mask rather than a softedge

To create a mask rather than a softedge, set either **gamma** to 0 (this will set a sharp edge between the inner and outer points regardless of spacing between them) or move the inner and outer points closer together.

Composite multiple textures

Disguise allows the user to generate two different textures and composite them into one single texture. To do this:

- Create two different textures (they do not have to be of the type **SoftEdgeTexture** but can also be of the types **GradientTexture** and **SolidTexture**).
- Repeat the same process as above when creating a texture but this time choose the texture type **CompositeTexture** and name it, for example, **SoftEdge_output1** and **Gradient_output1**.
- After creating the the CompositeTexture texures, their corresponding outputs will turn grey. This is because the CompositeTexture textures need to be told what textures they contain.
- Right-click the output head and select edit mask (**SoftEdge_output1**) and edit mask (**Gradient_output1**) in the options window.
- Set the resolution of the CompositeTexture texture.
- Add the first texture by left-clicking **add new layer**, and then selecting the image from the Texture library.
- Click **add new layer** again and select the second image.
- To multiply the two images together, set the blend mode of image two to **multiply** .
- Press **Esc** to exit texture editing.

Creating and Removing Projectors

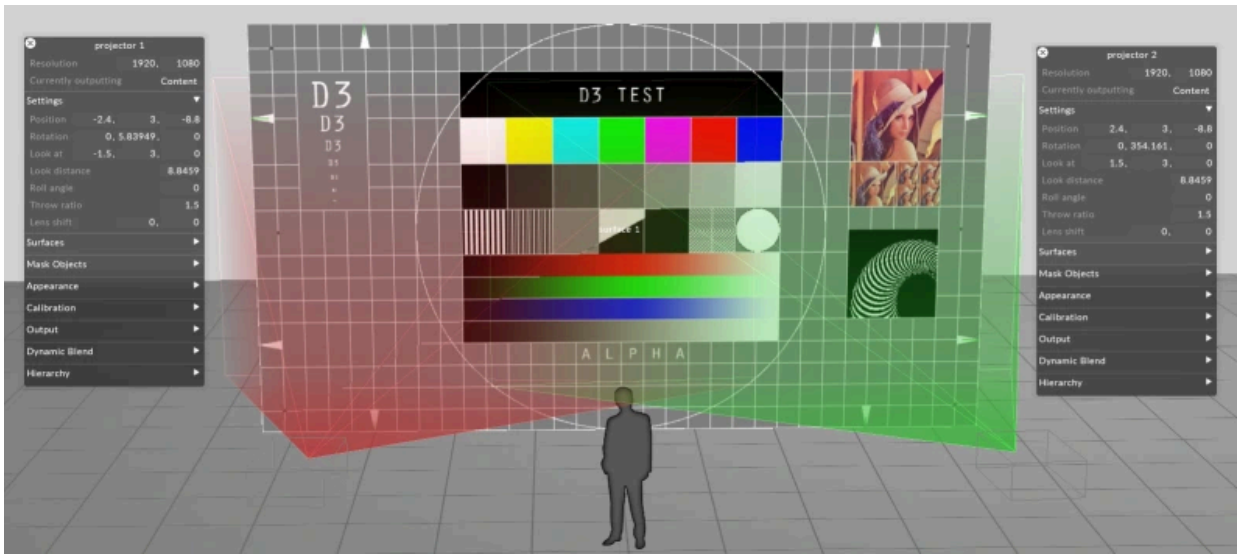
Projectors in d3 are used to sample content from projection surfaces and output them to feeds.

Creating a projector for a stage

1. Right-click **Stage** from the dashboard (bar at the top of the screen). This will open the Stage editor.
2. Select the **Projector** subfolder to view the list of projectors currently in the stage.
3. Left-click **+**. This will open a Projector manager that lists all of your projectors.
4. In the New Projector: field, enter the name of the new projector.
5. Left-click on OK and the new projector will be added to the stage.

You can then edit the projector to set its position, rotation, resolution, and output content via the feed system. Remember to assign a target Surface to the projector in order for it to output content.

The image below shows an example of two projectors added to the d3 Stage.



Stage Visualiser being used to visualise two projectors and a sculpture in a section of the d3 studio

Removing a projector from a stage

1. Right-click **stage** from the dashboard (bar at the top of the screen). This will open the Stage editor.
2. Select the **Projector** subfolder to view the list of projectors currently in the stage.

3. Left-click and drag the projector into the - icon. This will remove the projector from the stage.

Dynamic Blend

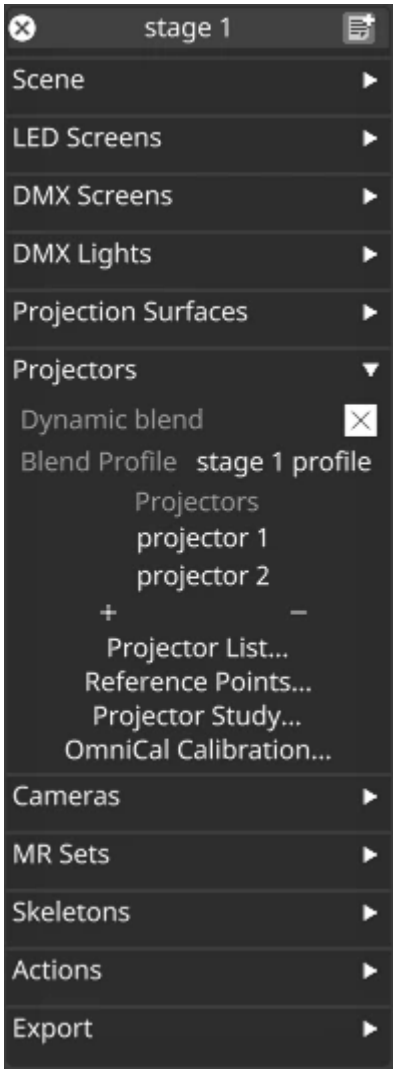
Dynamic Blend is a feature in Designer that enables the automatic calculation of soft edge blends across projectors. The quality of this feature depends on how accurate the projector positions and orientations are in 3D space. It is therefore best used when projectors are calibrated using OmniCal or QuickCal.

There are some global Dynamic Blend settings, but most settings are for individual projectors, to allow for a more fine-tuned blend result.

Enabling Dynamic Blend

To enable Dynamic Blend, follow these steps:

1. Right-click on the stage editor from the dashboard, or alternatively, right-click on the stage floor.
2. Expand the **Projectors** tab.
3. Check the box to enable **Dynamic Blend**.



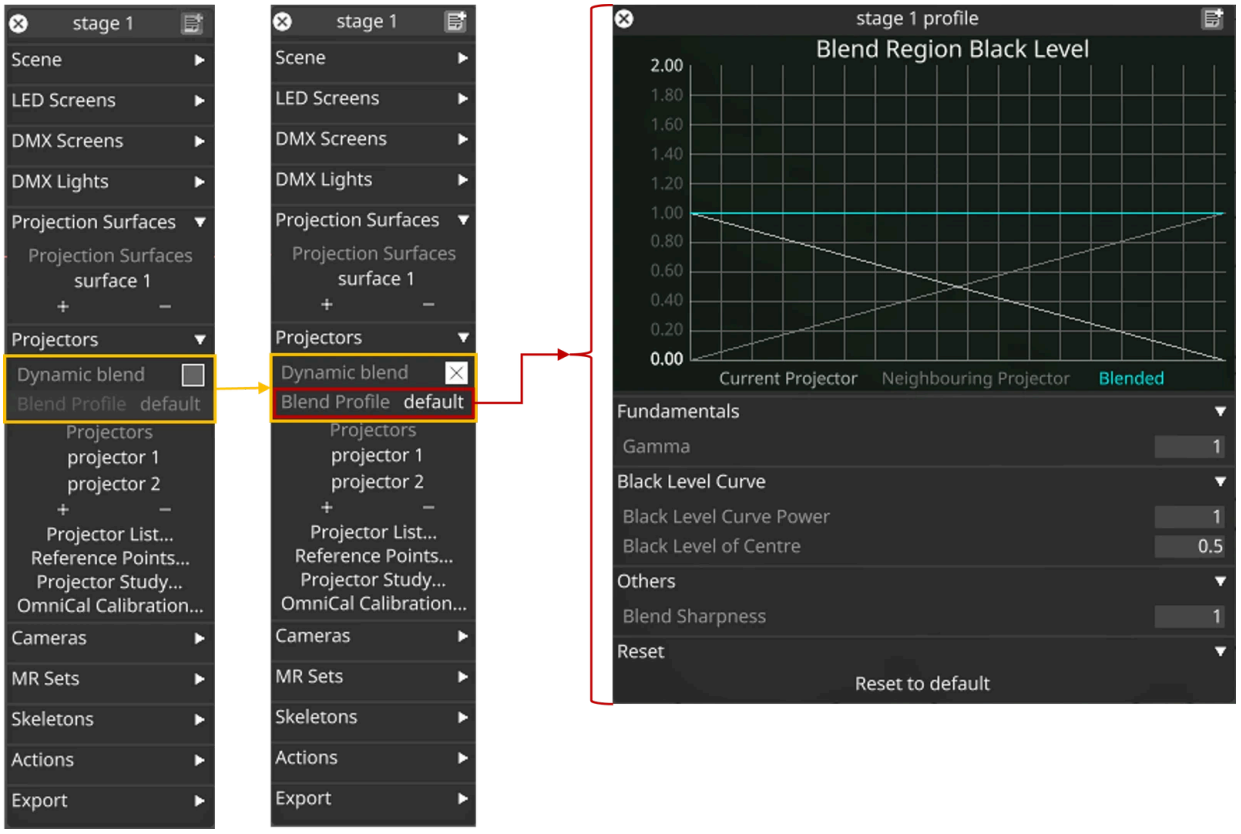
Dynamic Blend Widget

Dynamic Blend Settings (Global)

Blend Profile

Blend Profile provides control over the blended region when using Dynamic Blend.

You can access the profile by right-clicking **Blend Profile**.



Dynamic Blend Profile in Stage Widget

Gamma

Gamma controls the gamma curve and should be matched to the same as the physical projectors.

Black Level Curve Power

Black Level Curve Power controls the smoothness of the blended region.

This is set to `1.0` by default to optimise performance in situations where the Dynamic Blend mask is re-calculated every frame (e.g. when using object tracking). However, `2.0` is recommended for smoother blending.

> ⚠ **Warning**
>
> The correct **Gamma** value must be set for the black level curve to have the expected effect.

Black Level of Centre

Black Level of Centre controls the black level at the center of the blend region.

This is where the black levels of the current projector intersect with those of the neighbouring projectors in the graph.

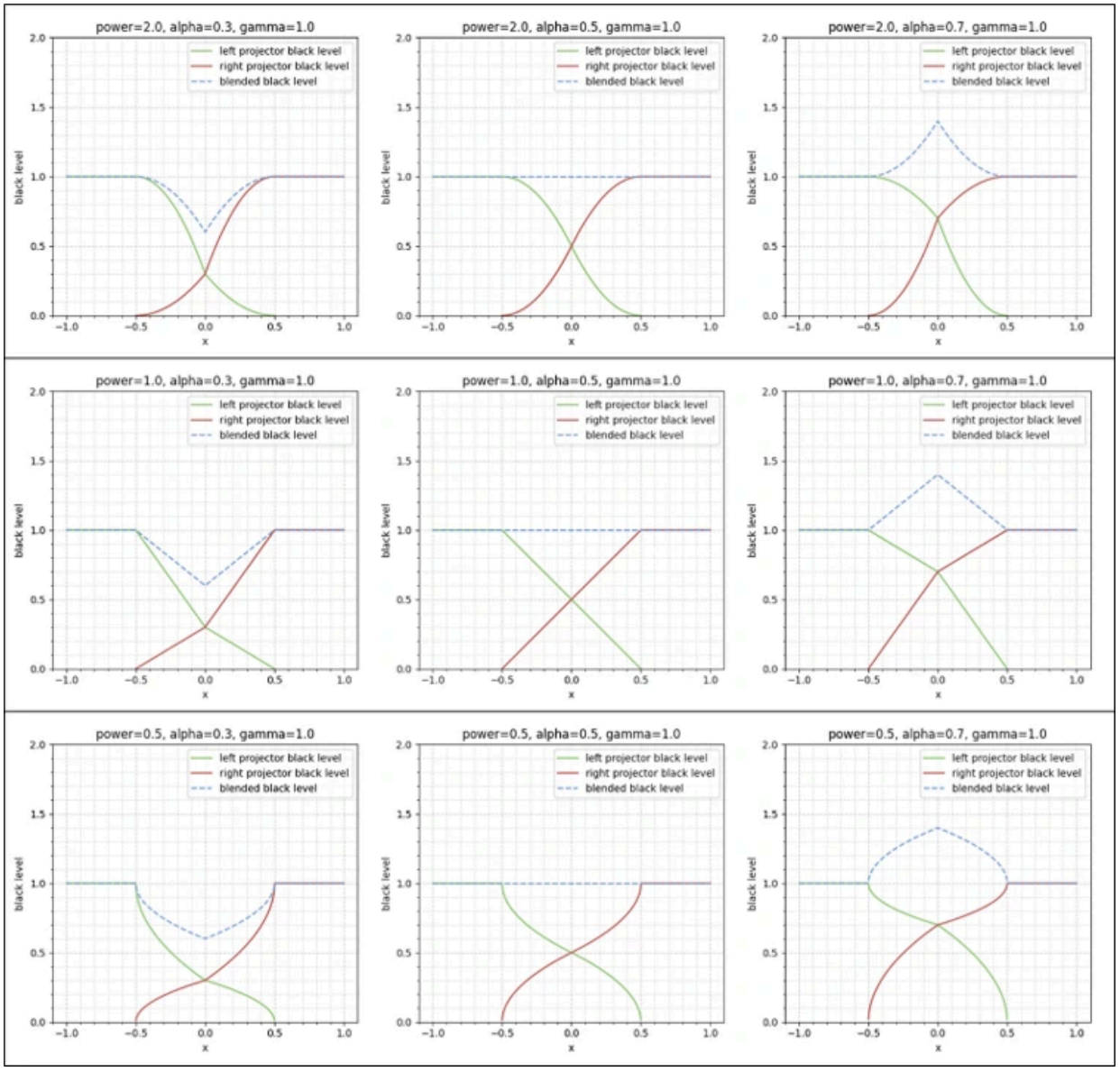
> **Warning**
>
> The correct **Gamma** value must be set for black level of centre to have the expected effect.

Blend Sharpness

Blend Sharpness controls the size of the blend zones. The higher the number, the smaller the blend zones.

Expected Characteristics of Blended Region

> **Note**
>
> power is Black Level Curve Power, and alpha is Black Level of Centre



Characteristics of Blended Region

Dynamic Blend Settings (Projector)

Dynamic Blend can also be controlled at the projector level. You can access these controls from the projector widget.

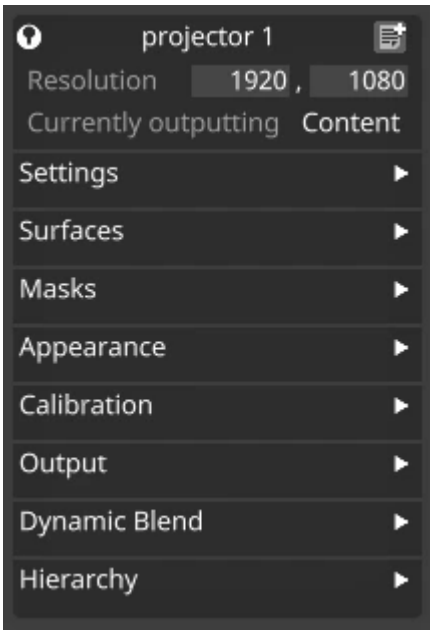
For more details, refer to the following link: [Editing Projector](#).

Editing Projectors

This sub-chapter explains the definition of the projector properties. These properties can be edited using the projector editor. To understand how to **use** the properties please see the sub-chapter Manual Calibration and QuickCal.

Editing a projector

To edit a projector, either right-click directly on a projector in the Stage, or right-click the projector from the screens list in the Stage editor



General projector properties

Resolution

The x and y **resolution** of the projector, set in pixels. This should ideally be the native resolution of the physical projector model you're using.

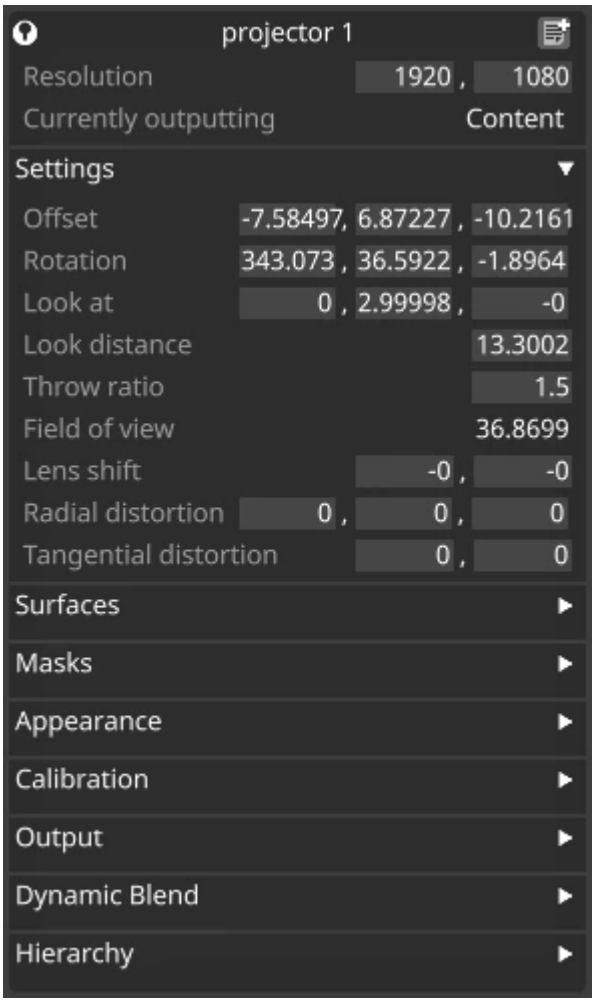
Currently outputting

Type of output mode that currently is active.

- **Content**: Outputs the content played on the timeline.
- **Wireframe**: Outputs the wireframe of the model.
- **Identify**: Full colour image with the projectors name on it.

- **Grid**: Outputs a coloured grid applied to the projection object.
- **None**: Outputs nothing (except reference points during QuickCal lineup).

Settings



Projector settings

Offset

The x, y and z position of the projector based from the origin point (0,0,0), set in meters.

Rotation

The rotation of the projector around the x, y and z axes respectively, in degrees.

Look At

The x, y and z position (in meters) of the **Look At** point. The projector always rotates to point at the **Look At** point.

Look Distance

The absolute distance between the projector position and its **Look At** position, in meters.

Throw ratio

The throw ratio is defined as the throw distance “D” divided by the width of the projected image, “W”. Since D and W are both in meters, the throw ratio quantity itself has no unit. Simply, the larger the throw ratio, the narrower the focus. Projector lenses are usually rated at particular throw ratios; you would simply type in the lens throw ratio here.

Field of View

Field of view in degrees for the specified throw ratio.

Lens shift

Represents horizontal and vertical lens shift. When horizontal shift is set to 0, there is no shift; when it’s set to 1, the left edge of the projected image lines up with the central projection axis. The same applies to negative numbers (-1 lines up the right edge) and to the vertical shift (bottom and top edges respectively).

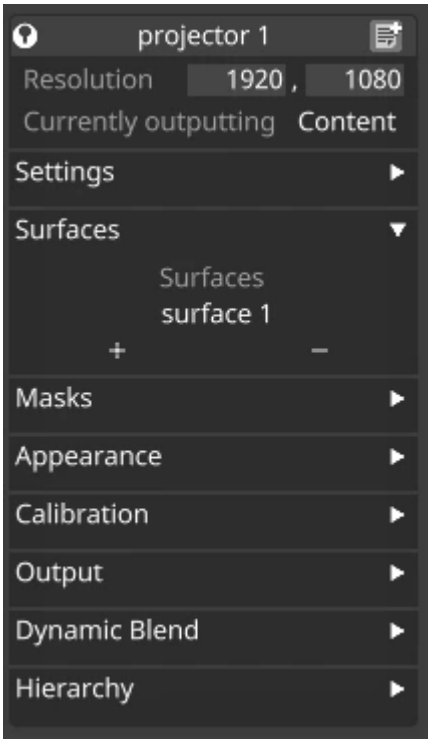
Radial distortion

Radial lens distortion coefficients k1, k2, k3

Tangential distortion

Tangential lens distortion coefficients p1, p2

Surfaces



Projector surfaces

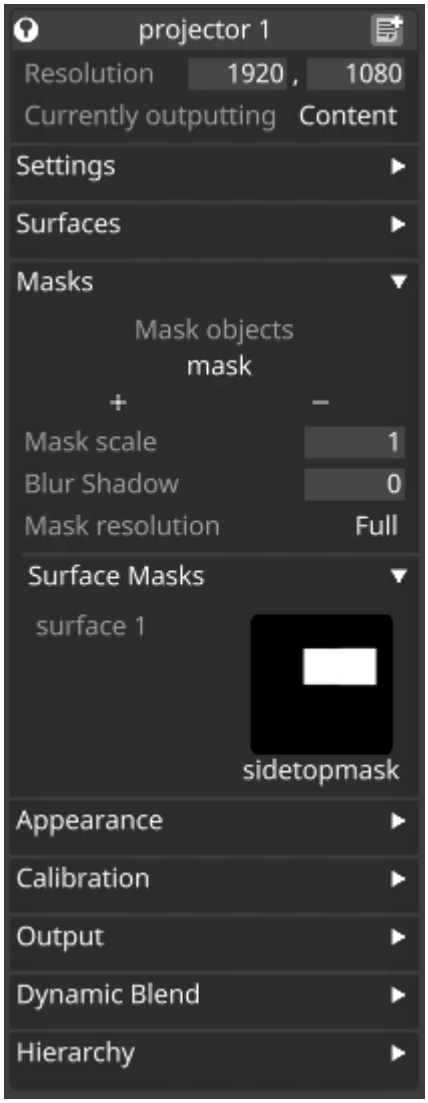
The list of screen surfaces the projector will project onto. The projectors view of the virtual stage will only contain these surfaces. Expanding the Projectors field in a Screen editor will similarly display the list of projectors assigned to that surface.

To add a projection surface to the list:

1. Left-click the + button to open the Surfaces manager.
2. Select the surfaces you wish the projector to see.

Masks

The masks section contains properties for masking the output of a particular projector, allowing certain areas to be excluded from the projection.



Mask settings

Mask objects

The list of objects this projector should render as black.

To add a mask object to the list:

1. Left-click the + button to open the Objects manager.
2. Select the objects you wish the projector to mask out (render black)

Mask scale

Mask scale allows you to scale the texture that is generated as the mask.

Blur shadow

Blur shadow allows you to add a blur effect to the edges of the generated mask.

Mask resolution

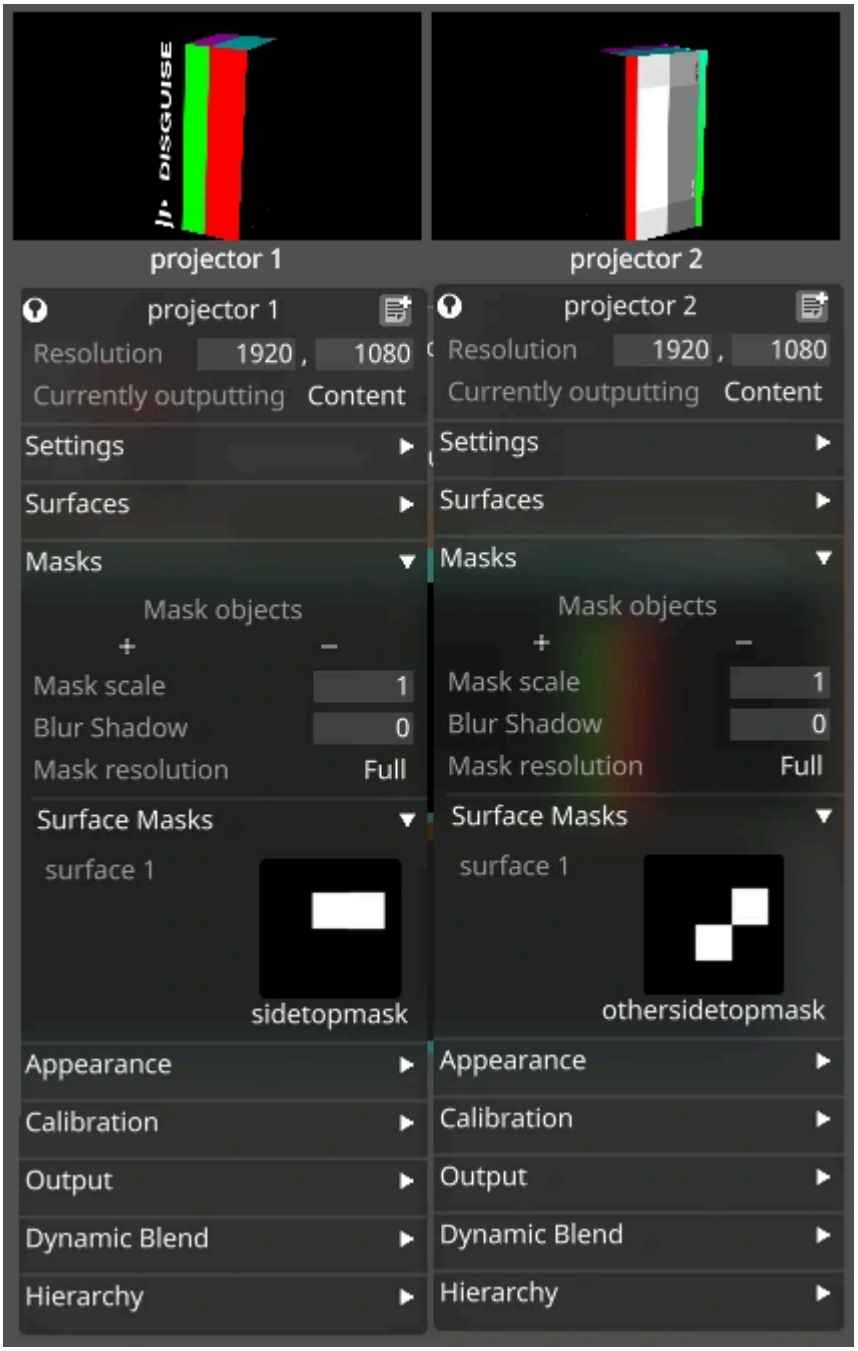
Mask resolution, set to Full by default, allows you to only generate the mask at half and quarter resolution for times when full resolution is not needed, or to save performance.

Surface Masks

Surface masks can be added for each surface assigned to a projector, to control which parts of that surface the projector targets. The masks are applied in the UV space of the surface. Areas which are white in the mask will be targetted by the projector, areas which are black will be masked out.

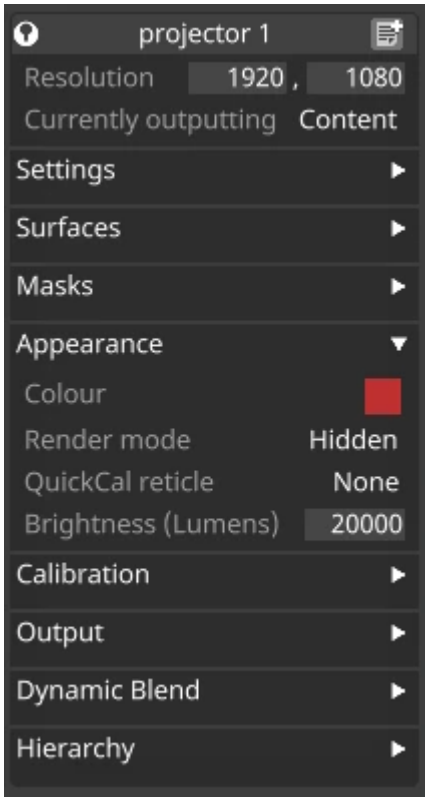
To assign different faces of a surface to different projectors

1. Set up the projection surface and assign it a UV-mapped mesh.
2. Set up two projectors targetting the projection surface.
3. Create a texture for the surface which is all black, except for the faces which projector 1 should hit which should be white.
4. Save this texture into **objects/DxTexture** in the project folder.
5. Repeat steps 3 and 4 for the faces which projector 2 should hit.
6. Select the corresponding surface masks in each projector.
7. The projectors should each now only output the intended faces of the surface.



Surface masks

Appearance



Appearance settings

Colour

The colour of the projector beam in the visualiser.

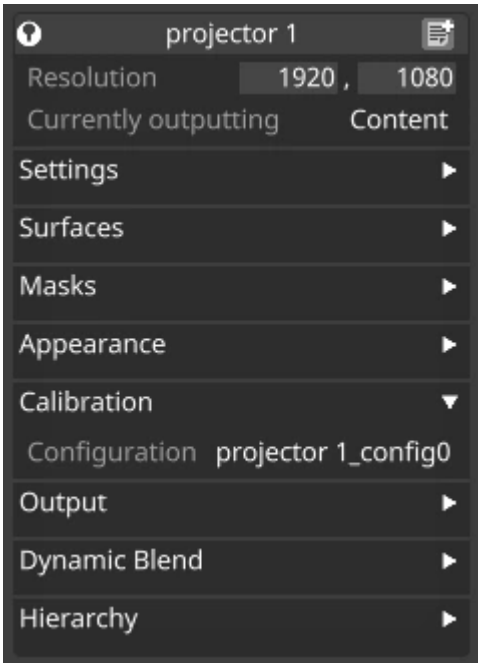
Render Mode

Switches the projector's output in the virtual stage for easier identification of testing.

Types of render mode:

- **Hidden**
- **Beam**
- **Wire**
- **Beam & Wire**

Calibration



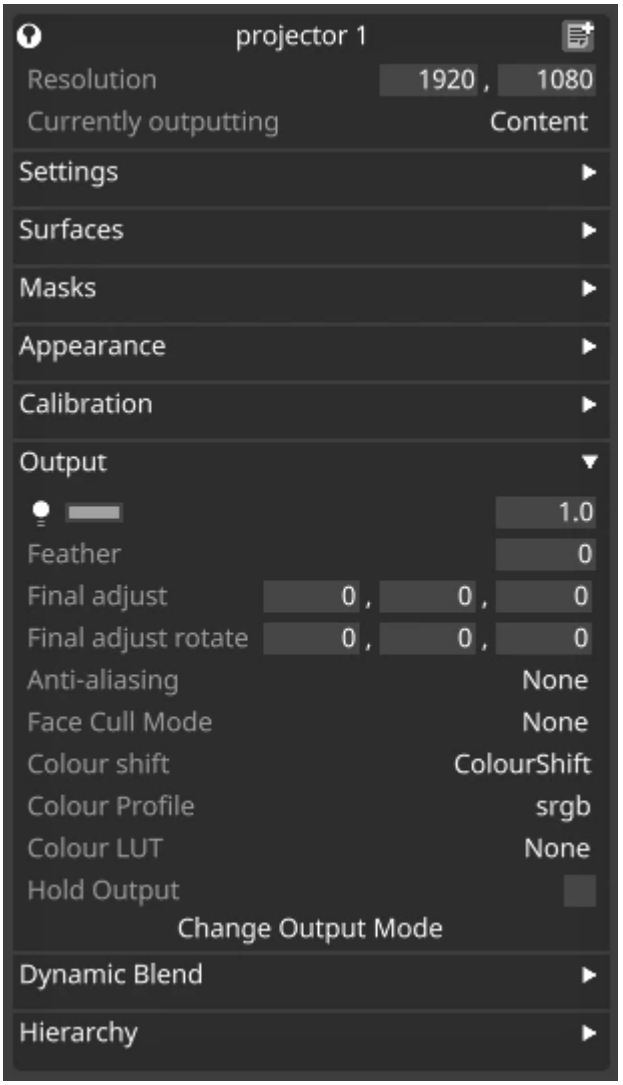
Calibration settings

Configuration

The configuration of a projector stores its **calibration** - a precise measurement of its actual position and lens settings. Calibrated quantities are not necessarily the same as the properties you enter in the preceding boxes, but will usually match fairly closely.

- Left-click on the configuration property to open the library of settings for all projectors. You can also create multiple configuration files for the same projector.
- Right-click **configuration** to start a QuickCal lineup.

Output



Output settings

Master Fade

Controls the output brightness.

> **Note**
>
> The Master fade only controls the brightness of the output feed. The brightness in the stage visualiser is not affected.

Feather

Shrinks or grows screens in the projector's view, to fix over-projection.

Final Adjust

Adjust the offset added to a projector's position, in meters.

Final Adjust Rotation

Offset added to a projector's rotation, in degrees.

Anti-Aliasing

The anti-aliasing options for the projector.

> ⚠ **Warning**
>
> Enabling anti-aliasing on projectors can cause performance degradation.

- None
- 2X FXAA
- 2X MSAA
- 4X MSAA
- 8X MSAA

Face Cull Mode

Use this to skip rendering faces with normals pointing toward (Front) or away (Back) from the projector.

Colour shift

The **Colour shift** property allows you to perform a number of colour-correction operations on the output of a projector.

To apply a **Colour shift** to a projector:

- Left-click **Colour shift** to open the Colour shift manager
- Either create a new Colour shift by typing a name into the new**colour shift** text box and hit **Enter** , or select a colour shift configuration from the list.

To edit a **Colour shift** :

Right-click a **Colour shift** in the **Colour shift** manager to bring up the **Colour shift** editor.

Colour Profile

Colour/gamma space of the output display.

Colour LUT

Cube LUT applied to correct display device output; does not appear in the visualizer.

Hold Output

Stops the output of this display until unchecked.

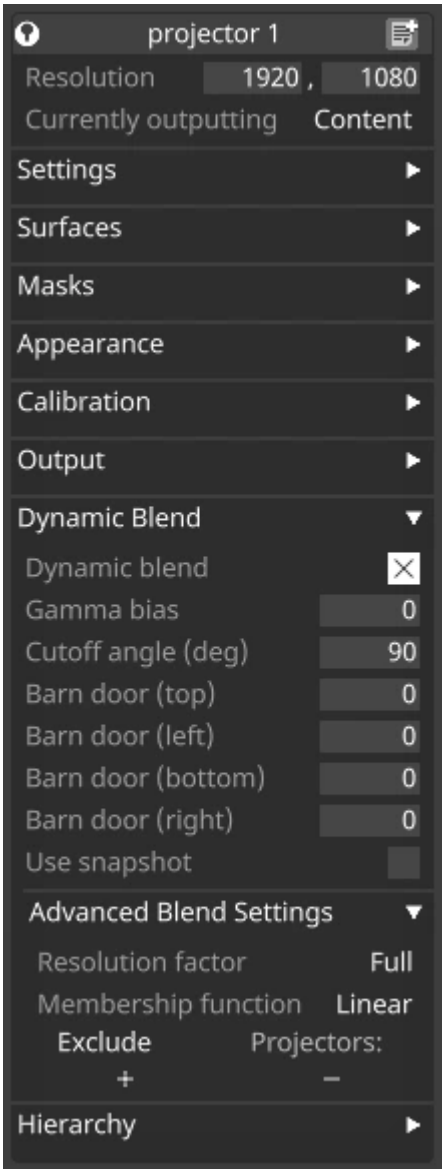
Change Output Mode

Left-click to change the type of output mode that currently is active.

- **Content:** Outputs the content played on the timeline.
- **Wireframe:** Outputs the wireframe of the model.
- **Identify:** Full colour image with the projectors name on it.
- **Grid:** Outputs a coloured grid applied to the projection object
- **None:** Outputs nothing (except reference points during QuickCal lineup)
- **BlackTrax:** For Blacktrax line up

Dynamic Blend

Dynamic Blend is a feature of Designer that enables automatic calculation of soft edge blends across projectors.



Dynamic Blend in Projector Widget

Dynamic Blend

Allows you to enable/disable **Dynamic blend** on individual projectors.

Gamma bias

Adjusts the estimate of this projector's gamma relative to the Stage's global blend gamma.

Cutoff Angle (deg)

The **Cutoff Angle** (in degrees) is a threshold for the angle between the projector's incidence ray and the normal vector at a pixel.

Any angle equal to or larger than this value will result in zero contribution from this projector for the given pixel.

By default, this value is set to 90 degrees, which means that pixels on a surface that is perpendicular to the projector will have zero contribution from this projector. Using 90 degrees is equivalent to the Dynamic Blend behaviour before the *Cutoff Angle* was introduced.

Barn door (top)

Top edge of the **Dynamic Blend**.

Barn door (left)

Left edge of the **Dynamic Blend**.

Barn door (bottom)

Bottom edge of the **Dynamic Blend**.

Barn door (right)

Right edge of the **Dynamic Blend**.

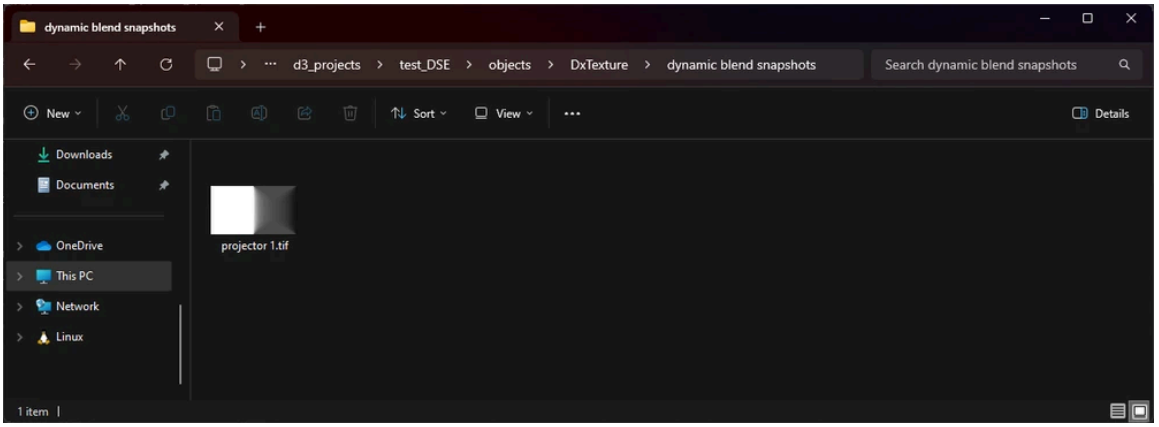
Use Snapshot

This allows you to capture a snapshot of the soft edge mask generated by Dynamic Blend, edit it in an external program, and then re-apply it to the projector.

To update the snapshot, you can directly modify the snapshot file: `objects/DxTexture/Dynamic Blend snapshots/<projectorName>.tif`.

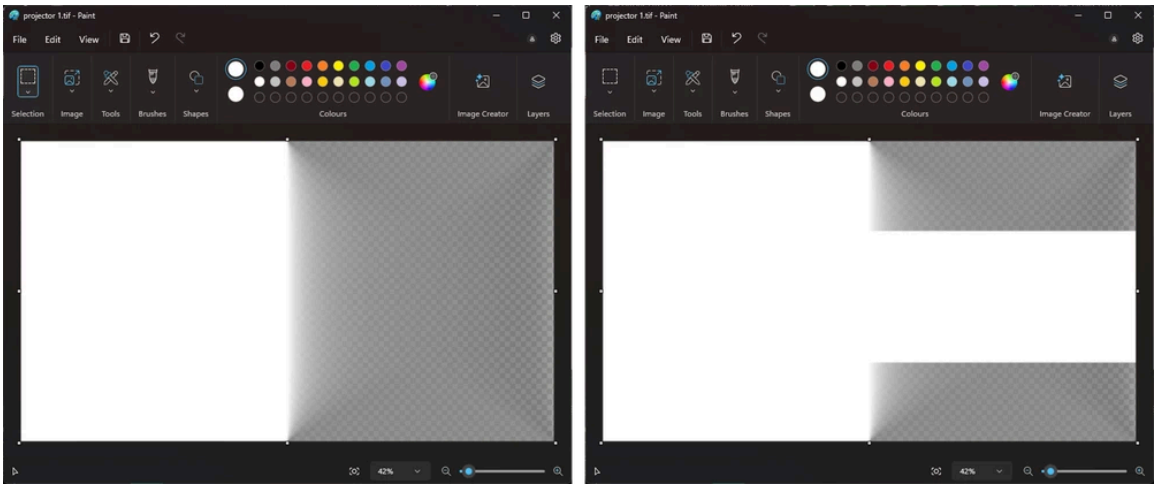
Steps to edit Dynamic Blend mask snapshot

1. Enable **Use Snapshot**.
   - This will create a DSE mask file (`<projectorName>.tif`) in the `objects/DxTexture/Dynamic Blend snapshots` folder.



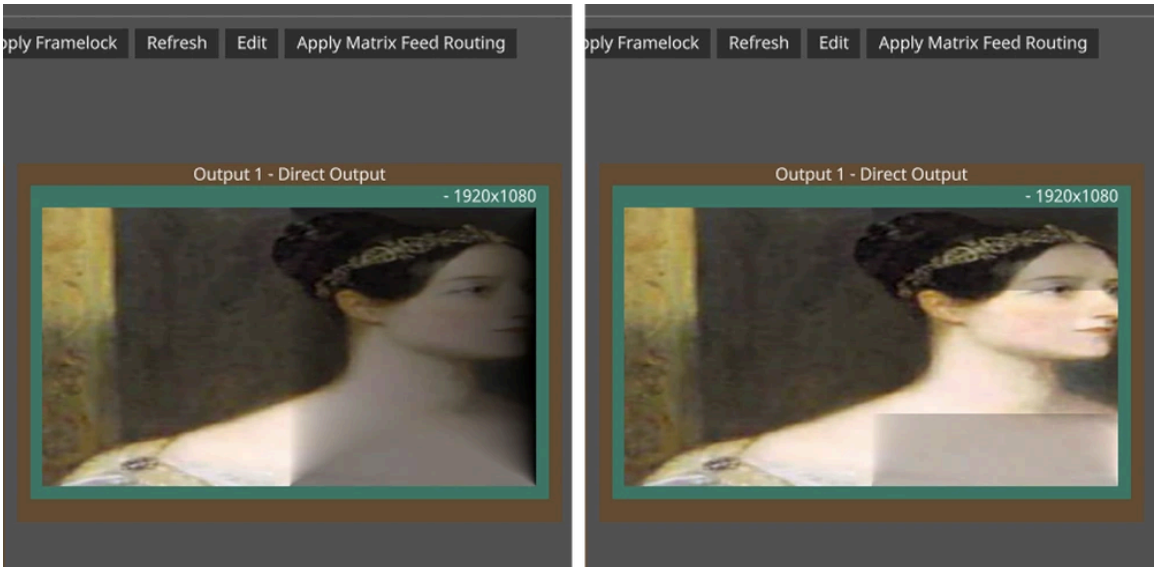
   - *Saved Dynamic Blend Snapshot*

2. Edit the `.tif` file (DSE mask) using an external program (**Microsoft Paint** is used as an example).



   - *Editing Dynamic Blend Snapshot using Paint (Before and After)*

3. See the edited mask being updated in D3.



- *Updated Dynamic Blend Snapshot in D3 (Before and After)*

> **Note**
>
> Any action that updates the mask, such as moving the projector or the projection surface, will overwrite the snapshot.

Resolution Factor

This determines the resolution used for calculating Dynamic Blend projector contributions. The default *Resolution Factor* value is 1/16th of the projector resolution (i.e. dividing width and height each by 4).

Higher resolutions improve the resulting blend mask, reducing visual artifacts such as overspill. However, this also increases the computational cost of calculating the blend. Projectors should use reduced resolutions if there are regular changes that cause Dynamic Blend to be recalculated.

Any change which affects the spatial relationship between the projector and the projection surfaces will cause Dynamic Blend to be recalculated. Common examples of these changes include:

- Moving or modifying projection surfaces involved in Dynamic Blend.
- Moving or modifying objects used for masks
- Moving or modifying projector properties

> **Note**
>
> When a screen or projector is controlled by a tracking source, even if it's standing still the values from the tracking source may jitter slightly, which also results in recalculation. Make sure that when using tracked objects you consider the performance cost of Dynamic Blend.

Membership Function

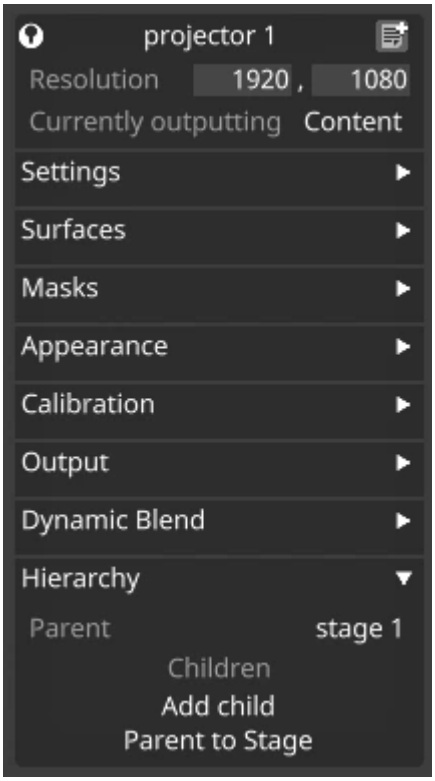
`Linear` / `Radial` / `Linear to Radial`. This controls how the blend is calculated for the individual projector.

> **Warning**
>
> Currently, only `Linear` is supported, and other membership functions may not work as intended.

Exclude Projectors

Projectors excluded from the **Dynamic Blend**.

Hierarchy



Hierarchy settings

For more information on Hierarchy, visit this link.

Importing Projectors

From r16, Designer started supporting import of projector information from external CSV files. Currently, both Mapping Matter and SimProj are supported.

The feature is intended to take a CSV file with a .txt file extension that contains the projector data. Currently, Mapping Matter and SimProj are known to work well. The CSV can be generated automatically from their programs, or manually, as long as the same format is used.

An example of CSV format without a projector UUID.

```
Projector_Name,Projector_Qte(Stack),Projector_Native-Rez-X,Projector_Native-Rez-Y,Projector_Lumens(lux),Projector_Bright
```

An example of CSV format with projector UUID.

```
Projector_Name,Projector_Qte(Stack),Projector_Native-Rez-X,Projector_Native-Rez-Y,Projector_Lumens(lux),Projector_Bright
```

Exporting the .csv file

1. A projector configuration is created by a user in Mapping Matter or SimProj.
2. Export the projector configuration to a correctly formatted CSV file.
3. Add the .csv files to the **Objects** > **Table** folder of your Designer project. If this folder does not exist, please create one.
4. Import the .csv file using the **Import Projector** functionality in Designer.

Importing the .csv file

1. In Designer, open the stage editor and navigate to **actions**.
2. Left-click **Import projectors from table**.
3. Select the CSV file from the list of table files. If an unsupported file is selected (e.g. containing something else than projectors), the import will fail, and an error message will inform the user.
4. If the import succeeds, all projectors in the CSV file will be imported and added to the Stage.
   - Existing projectors with the same name will be modified. If they are not in the Stage at the moment, they will be added.
   - If a projector with a certain name does not yet exist, it will be created and added to the Stage.
   - If the file contains multiple projector entries with the same name, Disguise will create duplicates with different names.
5. Designer will notify the user with a popup message showing information about many projectors were added, modified, or failed.

> **Note**
>
> **Please note**: The import of projectors is a one-off process, and needs to be repeated manually every time the file changes. The table filename is not saved and tracked in the project, like it is with other Table workflows in Designer.

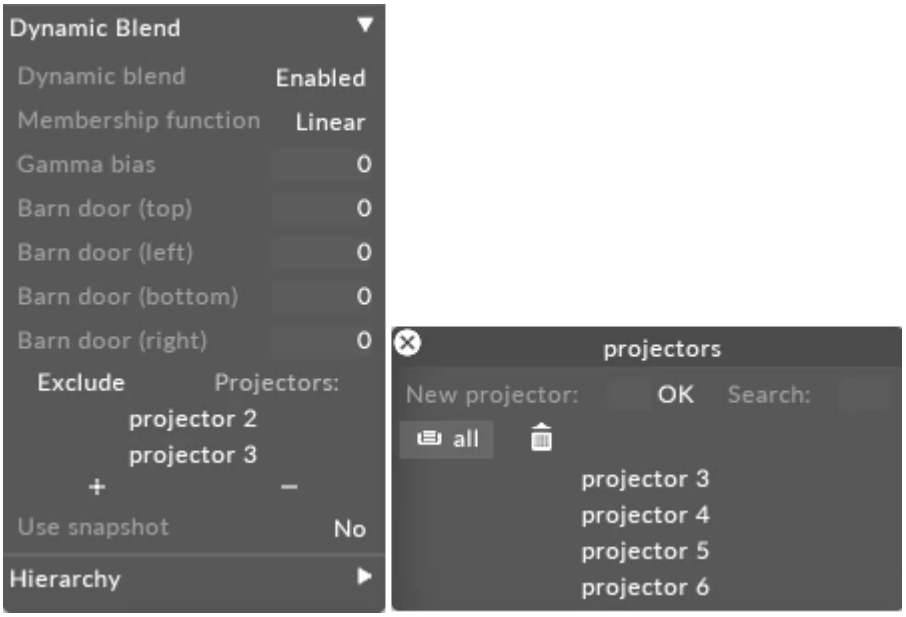
Include Exclude List

The include & exclude functionality found under the dynamic blend tab of a projectors properties, is specifically for use when dynamic blending large numbers of projectors. Dynamic blend has a limit of 12 projectors, so when going beyond 12 the include/exclude functionality allows you to specifically defined which projectors blend with which other projectors..

When using this functionality, you should stick to using either include or exclude per group of projectors.

Using the Include & Exclude list

1. Right-click on a projector to edit its properties.
2. Expand the Dynamic Blend tab.
3. Left-click Exclude to choose between either Exclude or Include.
4. Select the other projectors that this projector should include or exclude blending with.



Outputting to Projectors

Designer uses Feed scenes to output projector outputs. The output displays contained in these Feed scenes can be configured to a specific resolution and frame rate. For more information please see the sub-chapter Configuring Feed scenes.

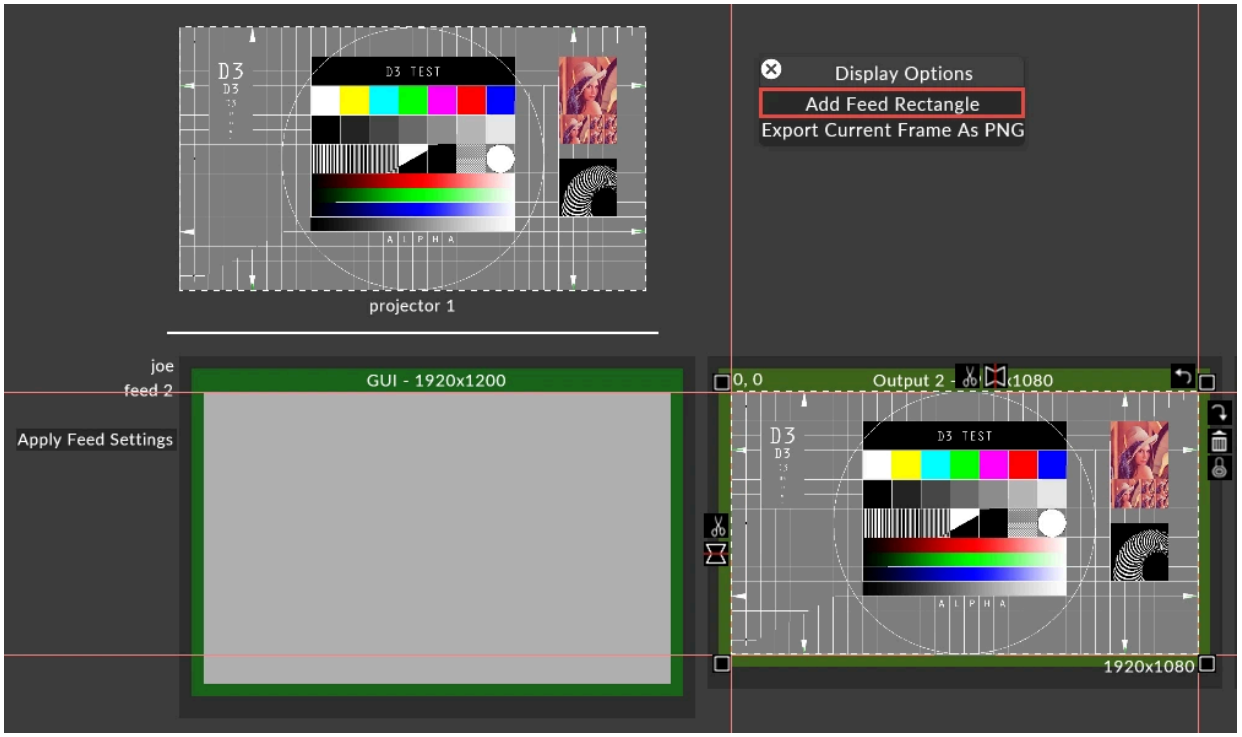
Creating an output from a projector

Go to the Feed level by left-clicking **Feed** from the dashboard.

The top half of the screen displays the video screens and the outputs from the projectors currently active stage in the Stage level.

Next, right-click the first projector output, then left-click **Add Feed Rectangle***.

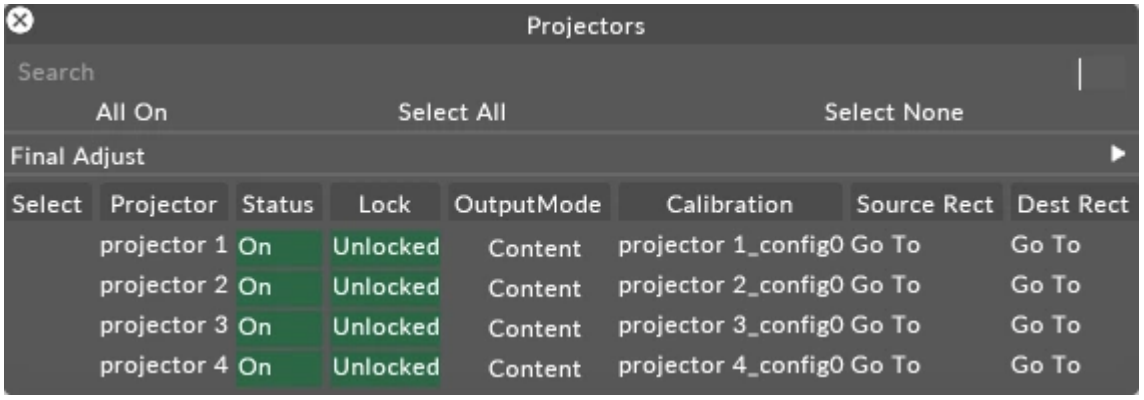
Please make sure that you clicked a projector output and not the video screen that the projector is sampling from. This will generate an output feed from the projector and place it on head 2 (by default, output head 1 is represented by the GUI). This should now send a feed to the first physical projector. Repeat this step for each projector that needs to be outputted. For a show that requires more than 3 projectors (1 GUI + 3 outputs) you will have to create a Director/Actor network explained in the Director/Actor setup using d3Net.



The **Add Feed Rectangle** option is used to add a Feed rectangle and generate an output feed from a projector.

Projector List Overview

The Projector List is a faster way of managing calibration when you have a large number of projectors to work through.



The Projector List

Open the Projector List by hitting **Ctrl + P** or via the Stage Editor.

Features of the Projector List

Select

Left-click to select which projectors are to be controlled together.

Projector

Left-click on a projector name to open its Projector Editor.

Status

Left-click to turn projectors on and off ('mute' means 'faded to black')

Lock

Left-click to lock the projector settings

Output Mode

Left-click to switch the output mode of the projectors.

Calibration

Left-click on a projector config to open the projection calibration editor (QuickCal).

Source Rectangle

Left-click to jump to the feed source rectangle for that projector in the feed view.

Destination Rectangle

Left-click to jump to the destination (output) rectangle in the feed view.

Final Adjust

Fine-adjust selected projector's positions in x, y & x axes for last minute adjustments (hold down the Ctrl key for fine control or the shift key for fast control)

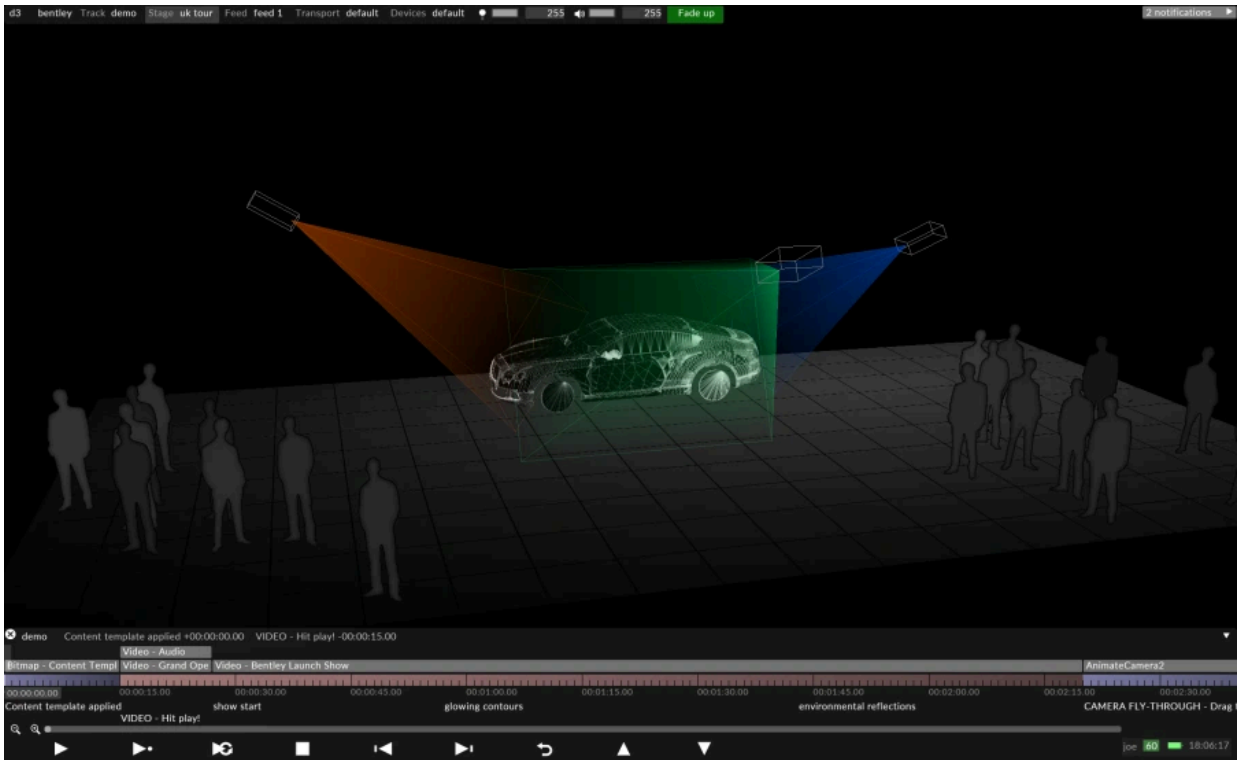
Multiple Projector Lists

Everytime you hit **Ctrl + P** another instance of the projection list is opened. Using the select buttons you can you can filter them differently to aid workflow when using large numbers of projectors.

Projector Simulation Overview

In Designer, content is created and as a texture applied to the projection surface - the car in the example here. Content can be made without any knowledge of the actual number of projectors that will be used - whether there is one projector or twenty, the content will stay the same.

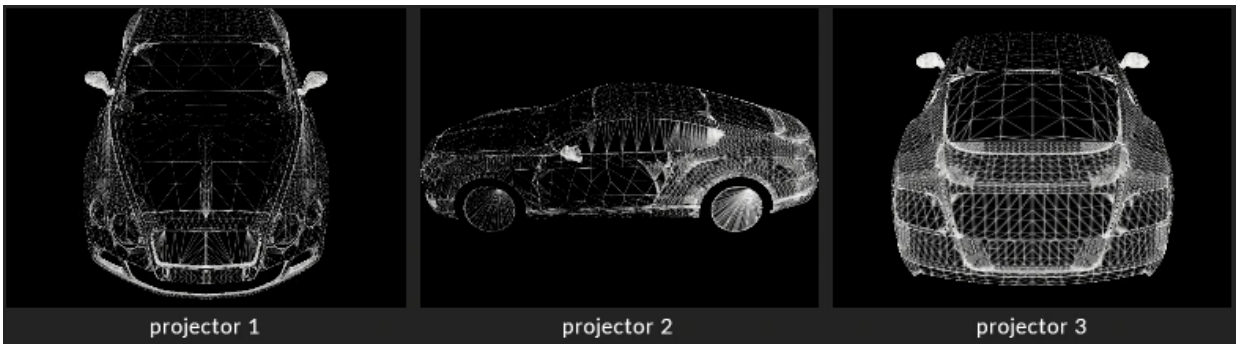
In Designer, you begin by creating Projector objects and add them to the scene; you set up their position, rotation and lens qualities to precisely match those of the real projectors. The software then renders the projection surface (and its content) from the point of view of each virtual projector, and outputs the resulting image to the real projector. If the projection surface and virtual projectors precisely match their counterparts in the real world, the result is a perfect image.



Designer used to visualise, simulate and calculate how physical projectors should be positioned for the Bentley Continental GT UK Tour.

If the physical projector has to move a couple of meters to the side, there is no need to re-render any content, just move the corresponding virtual projector to match. It will then render a new image from the new point of view. Similarly, if new projectors are added, there's no need to re-render content; just add a new projector to the scene and set it up.

There are two ways of matching a virtual projector to its physical counterpart: Manual calibration, or the calibration process referred to as QuickCal. For situations where your 3D model does not precisely match the real projection surface, provides a selection of warping tools.



Outputs that the three virtual projectors from the above image see in the Output Feeds level.

Projector Simulation as a decision-making tool

Projector simulation does not only have to be used for output purposes. During the early production stages, Projector Simulation can be used to explore projector positions, aiming points, appropriate lens sizes etc; it is a tool for specifying the correct hardware for a show

3D models preparation

As always when working in Designer, you need to model an exact virtual replica of the real-world screens. If only standard rectangular screens are being used, these can be created directly in Designer. However, for more complex three-dimensional objects, it is required that the screen is built and exported from a 3D software such as 3ds Max, Maya, Cinema4D or similar. It is crucial to not only model and export the 3D models, but to also properly texture-map (UV-map) them and to carefully optimize the polygon count of the model.

The more accurate the 3D model the better. The level of accuracy usually depends on the distance between the audience and the object. For building projections, it is recommended to laser scan the building. A laser scan can generate a highly accurate 3D mesh (+-5mm accuracy) that you can import into a 3D software application from which the optimization, UV-mapping and content template creation process can take place. The mesh is then exported as a texture mapped **.obj** file into Disguise.

For smaller objects, where the audience stands much closer to the object and the pixel density is higher (for example for car projections), it is even more important that the 3D mesh is as accurate as possible. However, as this usually is not the case, Disguise has a number of 2D-based warping tools allowing you to compensate for the inaccuracies between the virtual and the real-world model. Please see the sub-chapter Warping outputs for more information.

Content creation

Based on 3D models, animators can create content either in 2D or in 3D, or both. For simple setups, a 2D content template generated from the UV-coordinates of the 3D model can be used as a background image in for example After Effects.

Video files are rendered and imported. In the software, the content is then applied back onto the same 3D models, allowing the content to be pre-visualised in 3D and in real-time, from any point of view. As the output to the physical projectors is handled by the virtual projectors, the animators only need to think about how to create content that looks good on the screen in Designer.

How do I learn about preparing a projection-based 3D model?

The 3D modelling and UV-mapping processes are currently not covered in detail in this User Guide. To learn more about these processes, register for the Pre-Production Workflows course offered online in our free e-learning system at **https://learn.disguise.one**.

Projector Studies

Projector studies allows you create technical documents from Designer that contains photometric heatmaps of the scene and projector properties.

The PDF document contains the heatmap from the visualiser cameras view and each projector.

Each page of a projector study will show the following:

- Software version
- Project name
- The photometric quantity used.
- The user specified revision and comment.
- The time stamp the study was created.

In addition, each page that contains a projector view will show the following properties:

- Name
- Resolution
- Brightness (lumens)
- Throw Ratio
- Lens Shift Horizontal
- Lens Shift Vertical
- Position (metres)
- Rotation (degrees)

The final page will show a table of all projector properties.

Projector Properties Table

This table is a .csv file that contains the properties of the projectors in the stage.

The properties are as follows:

- Name
- Resolution X
- Resolution Y
- Brightness (lumens)
- Lens Shift Horizontal
- Lens Shift Vertical
- Position X (metres)
- Position Y (metres)

- Position Z (metres)
- Rotation about X axis (degrees)
- Rotation about Y axis (degrees)
- Rotation about Z axis (degrees)

Considerations

The photometric analysis does not take into account the following

- Atmospheric absorption of light as it passes through space.
- Brightness decay due to projector lamp life.
- Effects of lens focus and distortion.
- Projector brightness uniformity.
- Physical properties of the surface material.
- It assumes a lambertian reflectance of all surfaces, that they are perfectly diffuse and reflect light equally in all directions so that the brightness is the same no matter the viewing angle.

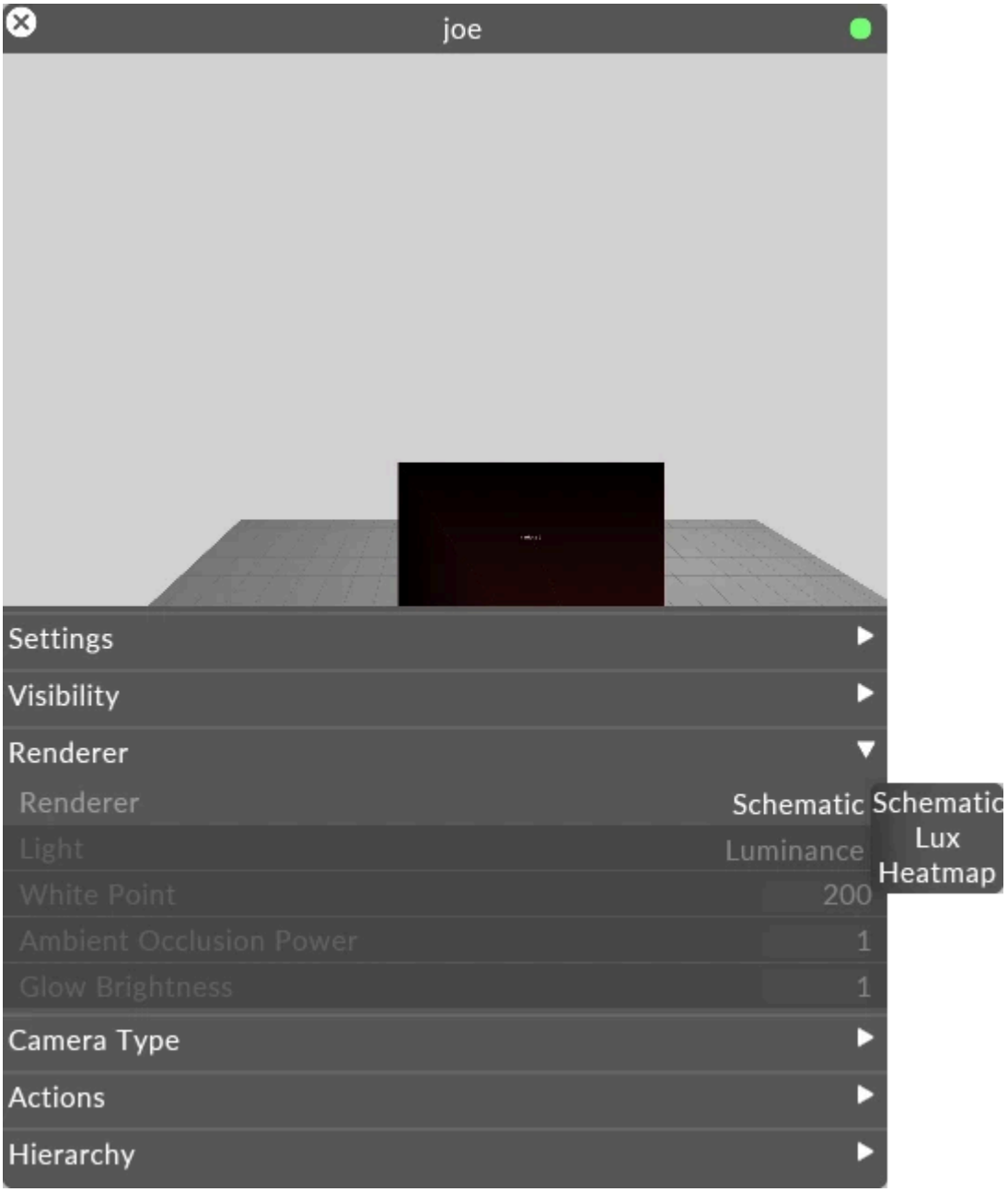
Workflow

1. Set your project up as normal, placing projectors, screens and other elements.
2. View the scene lighting in the heatmap rendering mode to see how close the setup matches expectations.
3. Open the Stage editor.
4. Define the desired settings in the projector studies editor.
5. Export the projector study.

Example

Enabling heatmap

1. Open the stage editor by right-clicking Stage from the dashboard or by right-clicking the floor in the visualiser.
2. Expand the Cameras tab, and right-click Visualiser camera to edit the visualiser camera settings. Alternatively, you can edit another camera and output that to the feeds.
3. In the camera editor, expand the Renderer tab and set the render mode to **Heatmap**.



You are now viewing the heatmap visualisation of the photometric quantity specified by the Light field under the render tab within the camera editor.

The key shown in the heatmap editor shows the colour scheme and scale of the heatmap.

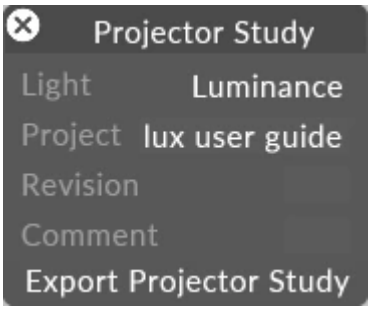
Editing heatmap properties

1. Open the heatmap editor.
2. Set the target value to be the preferred surface illuminance or luminance that you want to achieve.

Creating a new projector study

1. Open the stage editor by right-clicking Stage from the dashboard or by right-clicking the floor in the visualiser.
2. Expand the Projectors tab of the stage editor.
3. Left-click **Projector studies...** top open the Projector studies editor.
4. Left-click **Export projector study** and the projector study will be written to the **projectorstudies** folder within your project folder.

Projector study properties



The projector study editor

Light

- **Luminance** - Luminance - The intensity of light emitting from an object or surface per metre in a given direction, measured in nits (cd/m^2)
- **Illuminance** - The density of incident light in lumens hitting a surface per metre, measured in lux (lm/m^2).

Project

The name of the project. This can be changed without affecting the main project name.

Revision

User definable revision field.

Comment

User definable comment field.

Export Projector Study

Clicking **Export Projector Study** will write the projector study to the `reports` folder in Designer project folder.

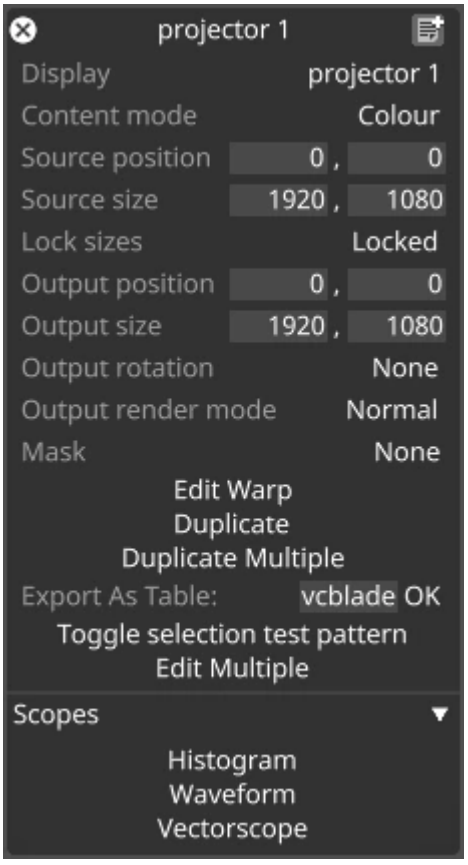
Warping Outputs

In cases where the projection surface does not match the virtual 3D model (i.e. where the lineup from the manual or automatic calibration needs a slight fine-tune), Designer provides a number of powerful warping layers that can be applied directly to the output. By using these tools there is no requirement for projector keystoning or any other warping inside the physical projector.

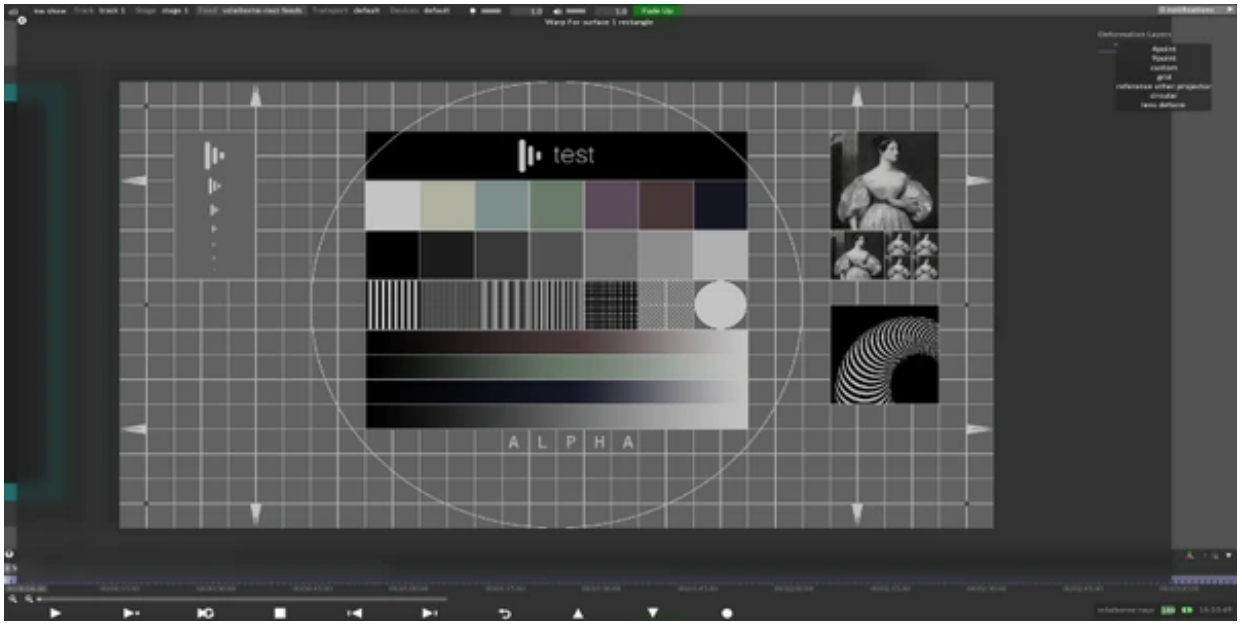
> ⚠ **Warning**
>
> Reset all digitial and optical warps inside the projector, including lens-shift, otherwise the lineup features within will be interrupted.

Adding/using warping layers

- To add a warping layer to an output left-click **feed** in the dashboard (bar at the top of the screen), right-click the appropriate output and select **Edit Warp** from the options list.

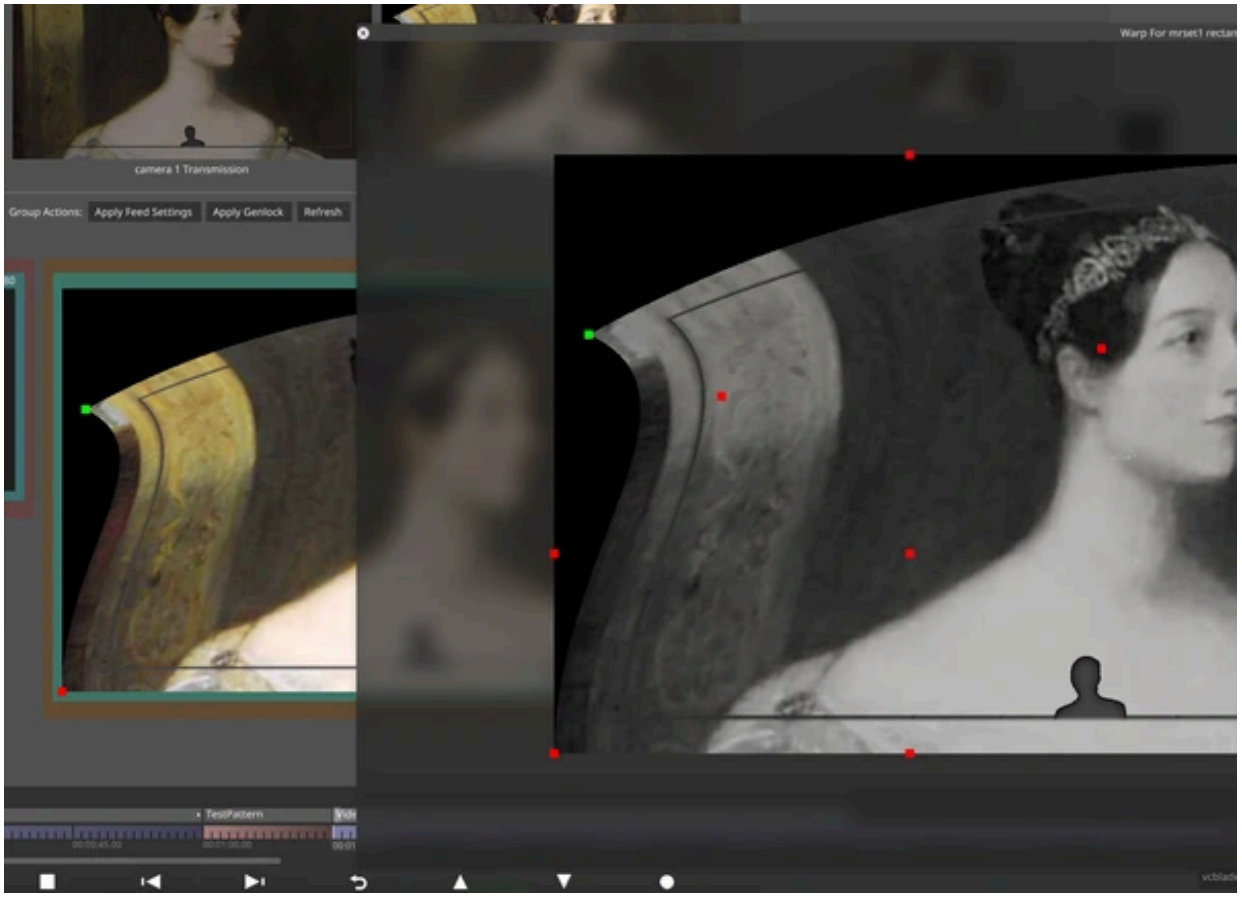


- In the editing window, left-click the **+** button under the **Deformation layers** title. This will display a list of deformation layers.



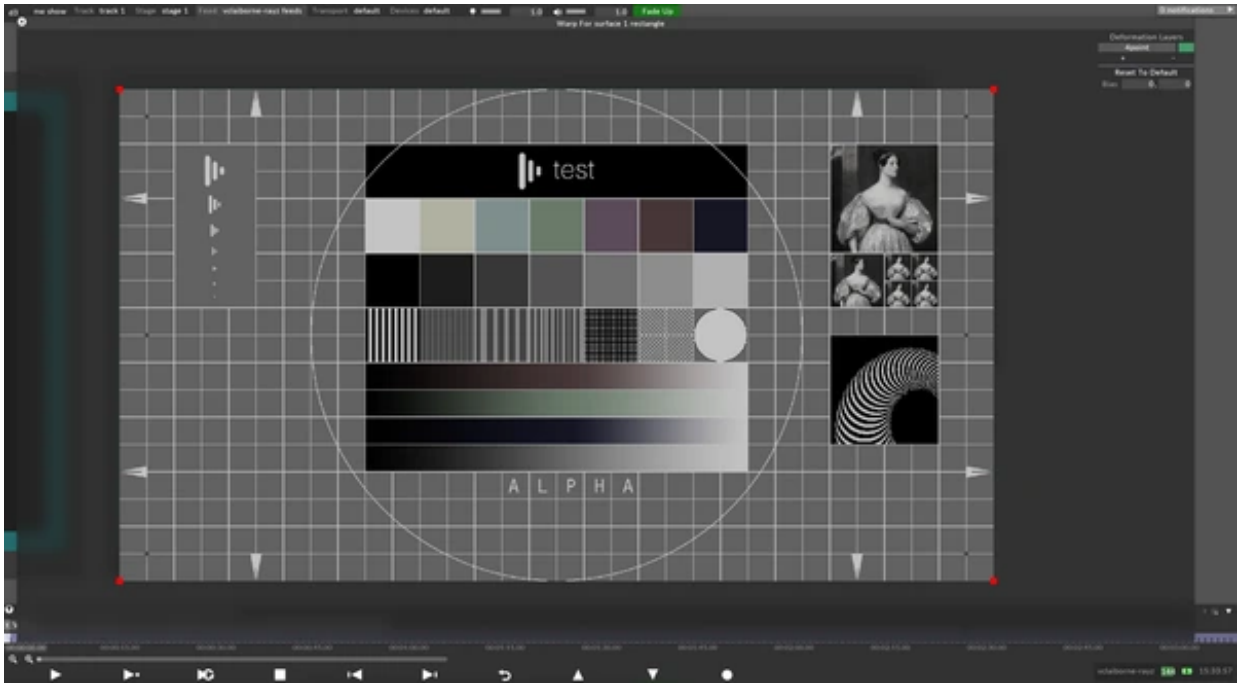
Deformation layers for warping an output feed, opened by left-clicking + under the Deformation Layers title

> **Note**
>
> Warp points can be added to the output so you can see exactly which part of the output is being manipulated.



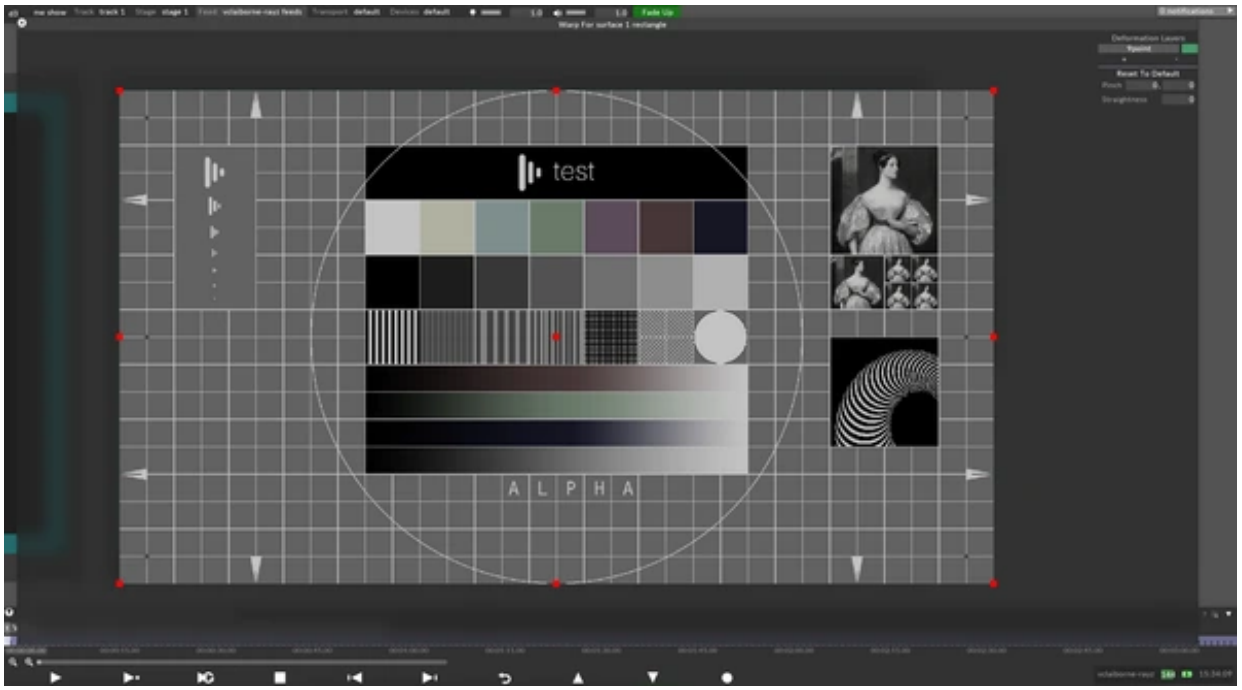
Warp points being added to an output

4point



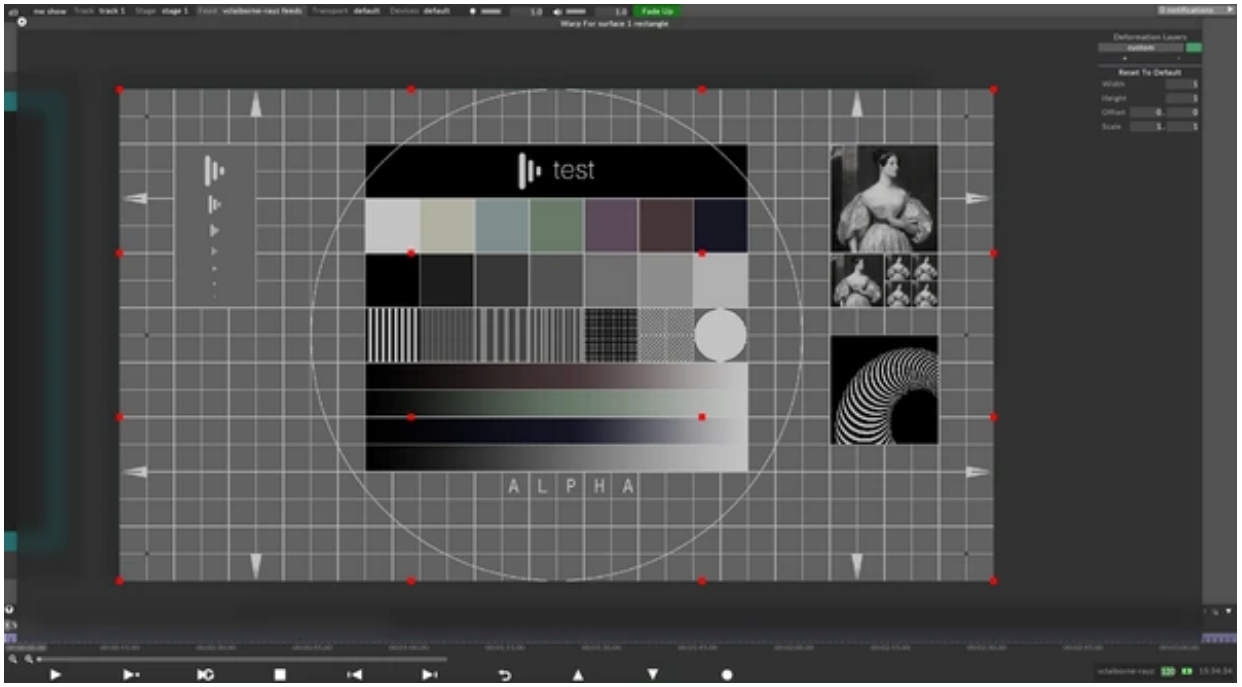
Drag any of the 4 points inwards to globally adjust the warping of the output. Adjust the horizontal and vertical **bias** to shift-scale the content.

9point



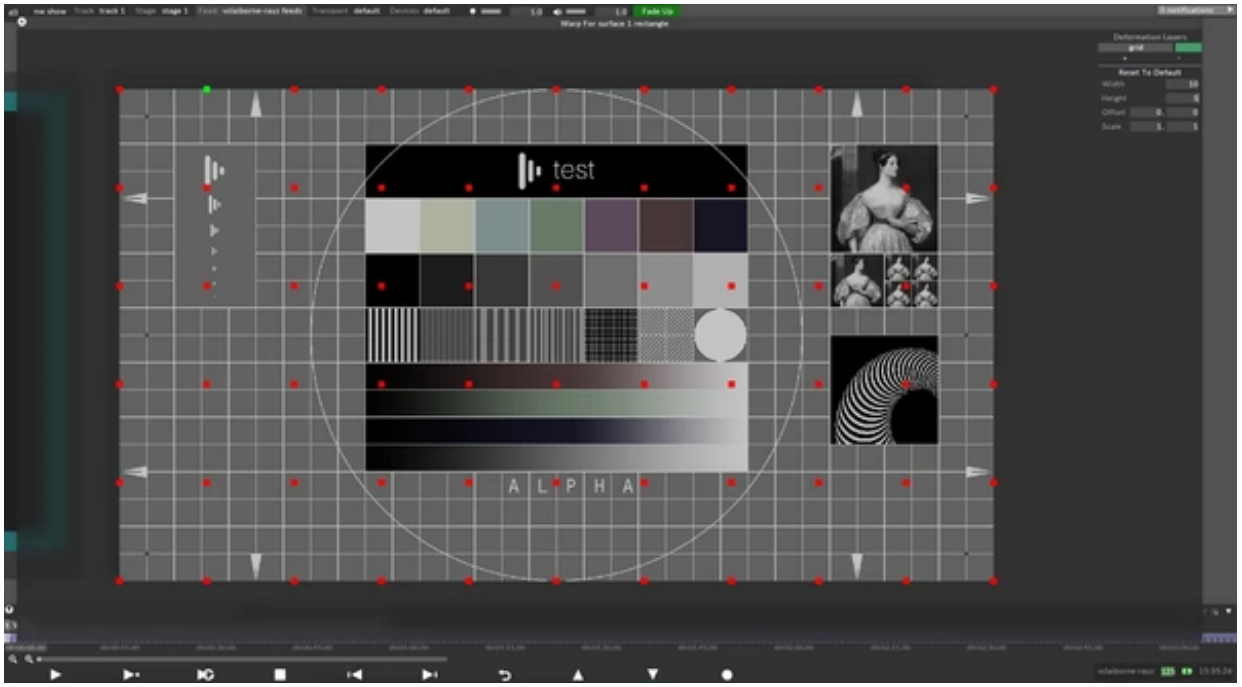
A 9point warp allows you to drag 9 points inwards and adjust the pinch and straightness between them. This feed warp is useful when projecting onto a cylindrical screen when not using Projector Simulation. It easily conforms a rectangular output to fit to a cylindrical screen.

Custom

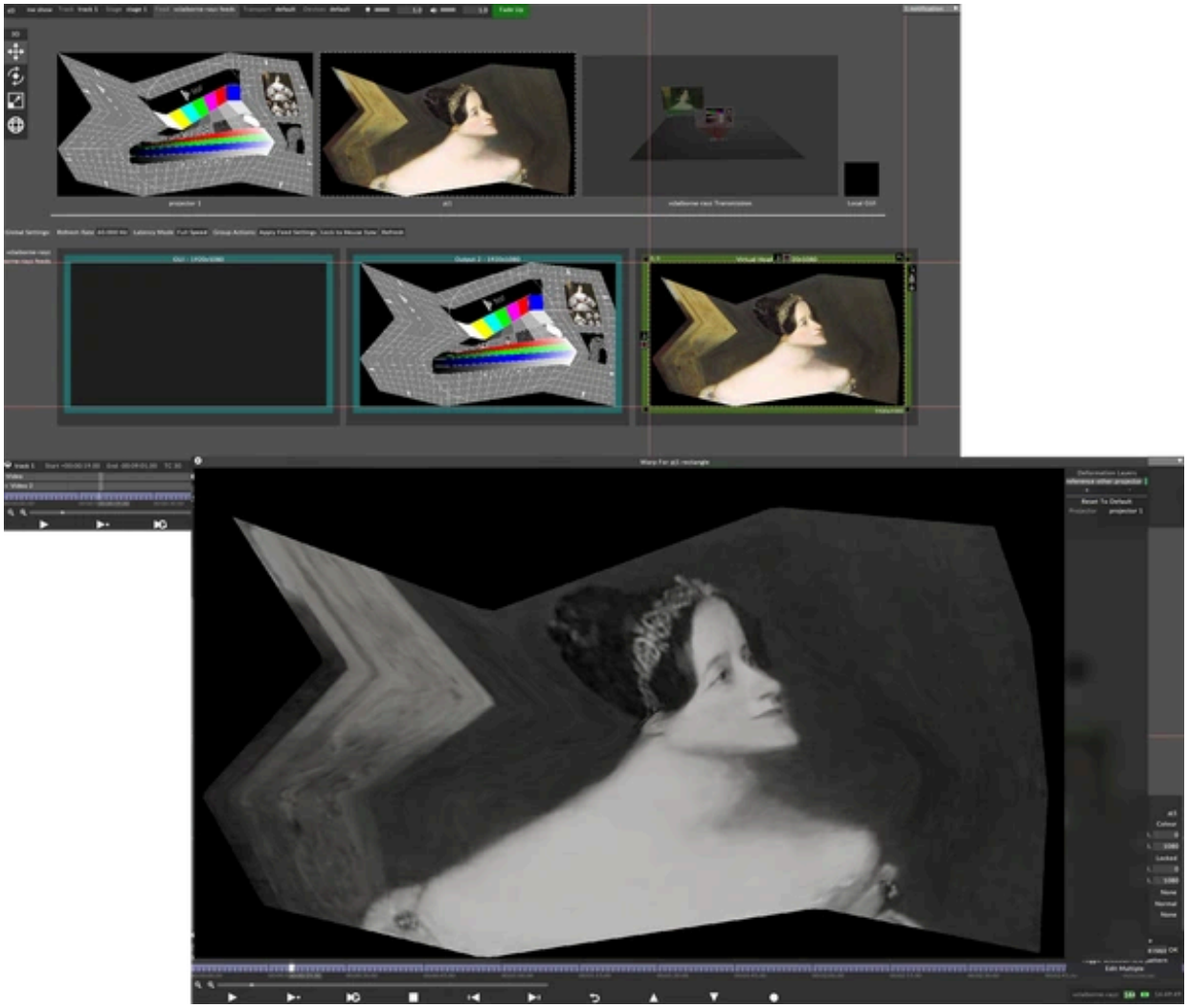


Creates an arbitrary number of grid points on the output which can be group-selected. You can use this when **local warping** on an object is required.

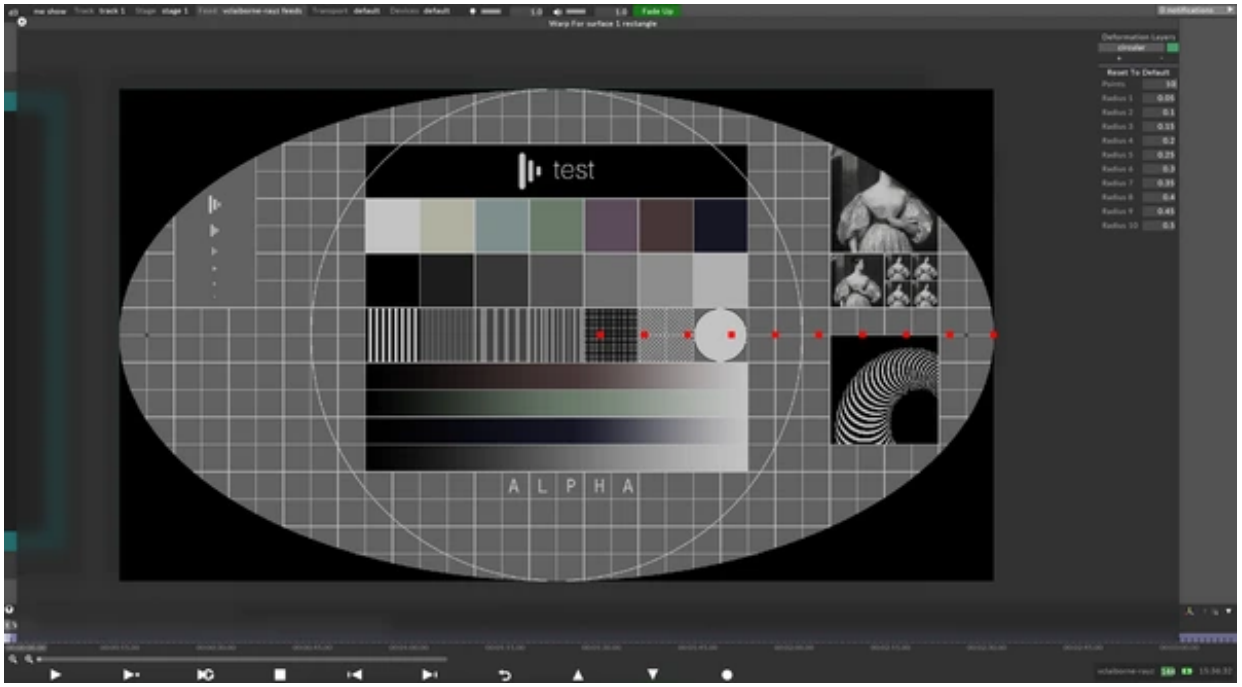
Grid



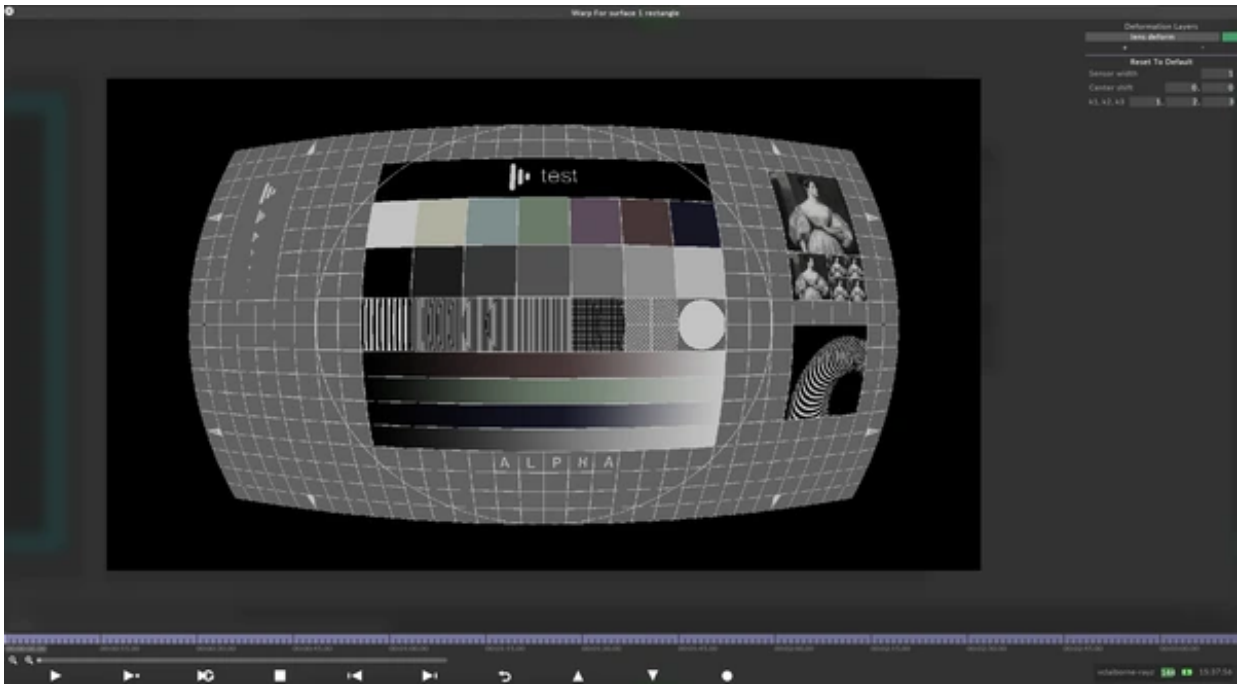
Reference other projector



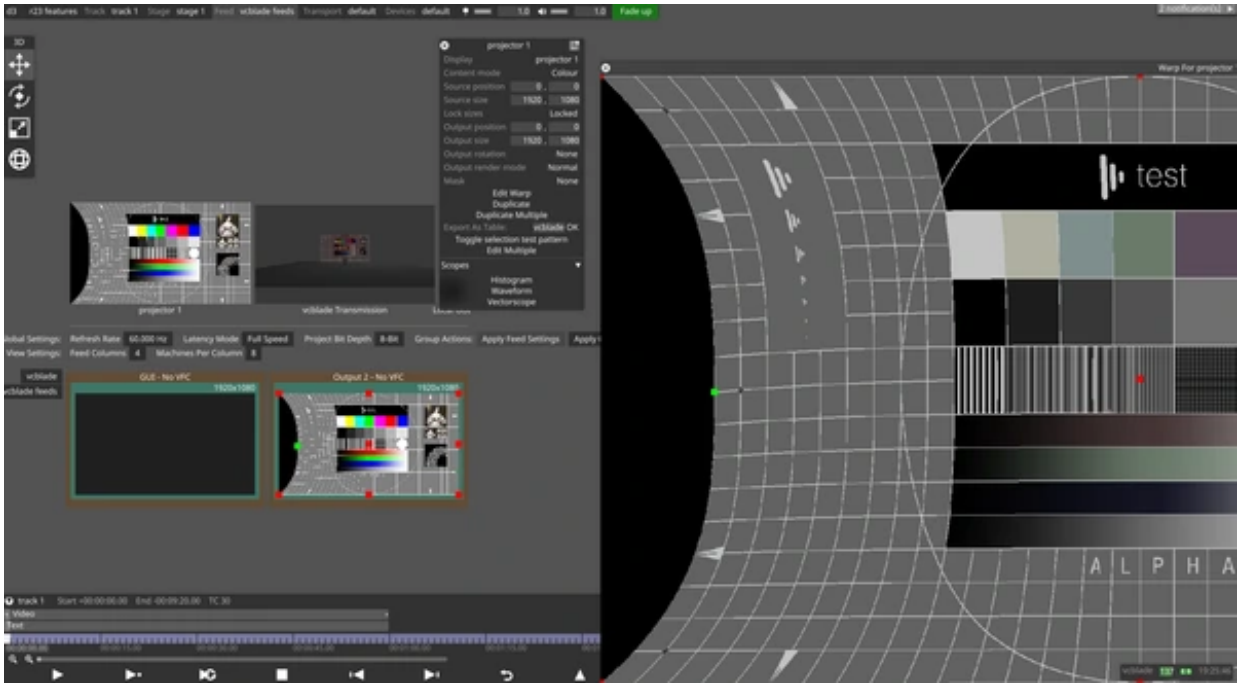
Circular



Lens deform



Draw control points on output



Warp points can be added to the output so you can see exactly which part of the output is being manipulated.

Appearance Properties

Appearance properties control how the screen appears in the visualiser.

Alpha

This controls the opacity of the screen. When Alpha is set to full (255), the screen is completely opaque; when Alpha is set to 0, the screen is completely transparent.

> **Note**
>
> Please note: The Alpha value only takes effect when the **blendMode**is set to **alpha**.

BlendMode

This controls how the screen contents are composited with the rest of the objects in the stage. Use **over** for nontransparent screens, **add** for screens that are totally invisible when there is no content on them, and **alpha** for screens that are partially transparent.

> **Note**
>
> Please note: setting the mode to **over** when either mask contains transparent pixels will still make those pixels see through.

Content

This controls how the screen displays its content in the Stage Visualiser. If you set it to **front**, only the front surfaces of the mesh will show content. If you use **back**, only the back surface will show content. If you select **both**, both surfaces will display content.

Brightness (NITS)

Sets the brightness in NITS. This value affects visualisation only.

Viewing angle

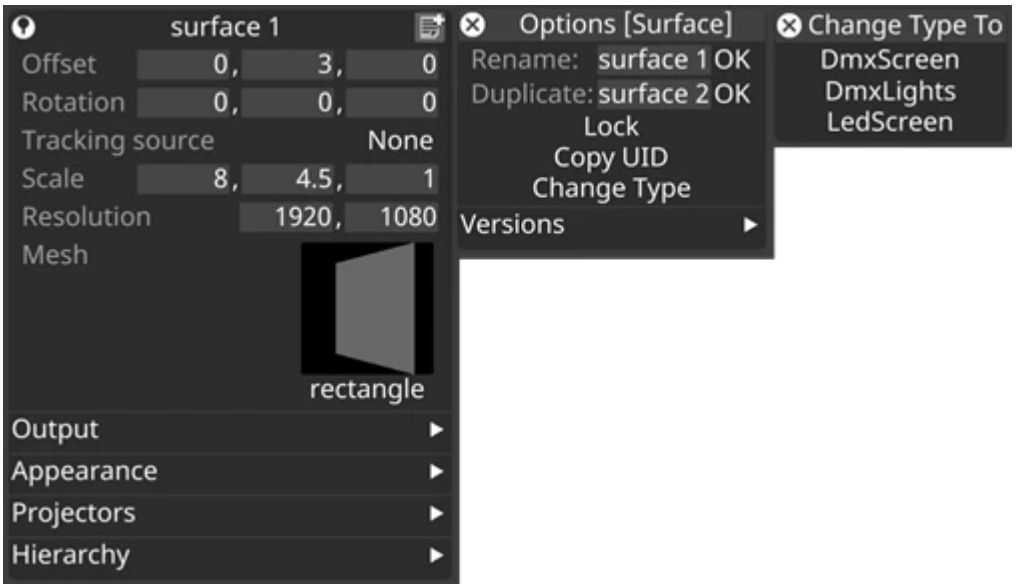
Angle in degrees where luminance is at 50%. Visualisation in Lux only. Setting a value of 0 will disable the visualisation.

Reflectivity

Proportion of incident light returned by the screen surface.

Changing the Screen Type

1. Right-click on the screen editor title bar.
2. Select the ‘change type’ option.
3. select the new type of screen

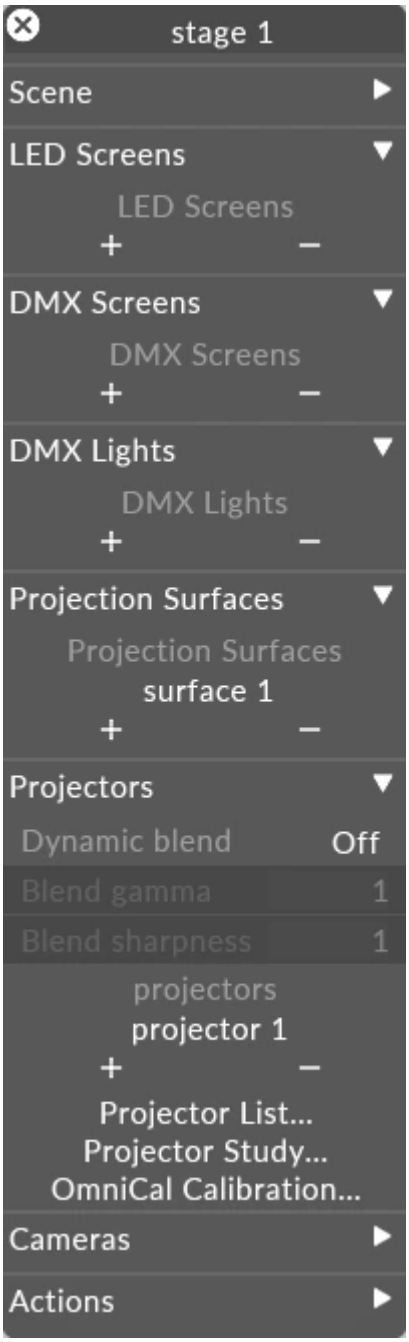


Creating Screens

When you create a new project, a projection surface screen and virtual projector are inserted by default. To remove this default screen see removing screens.

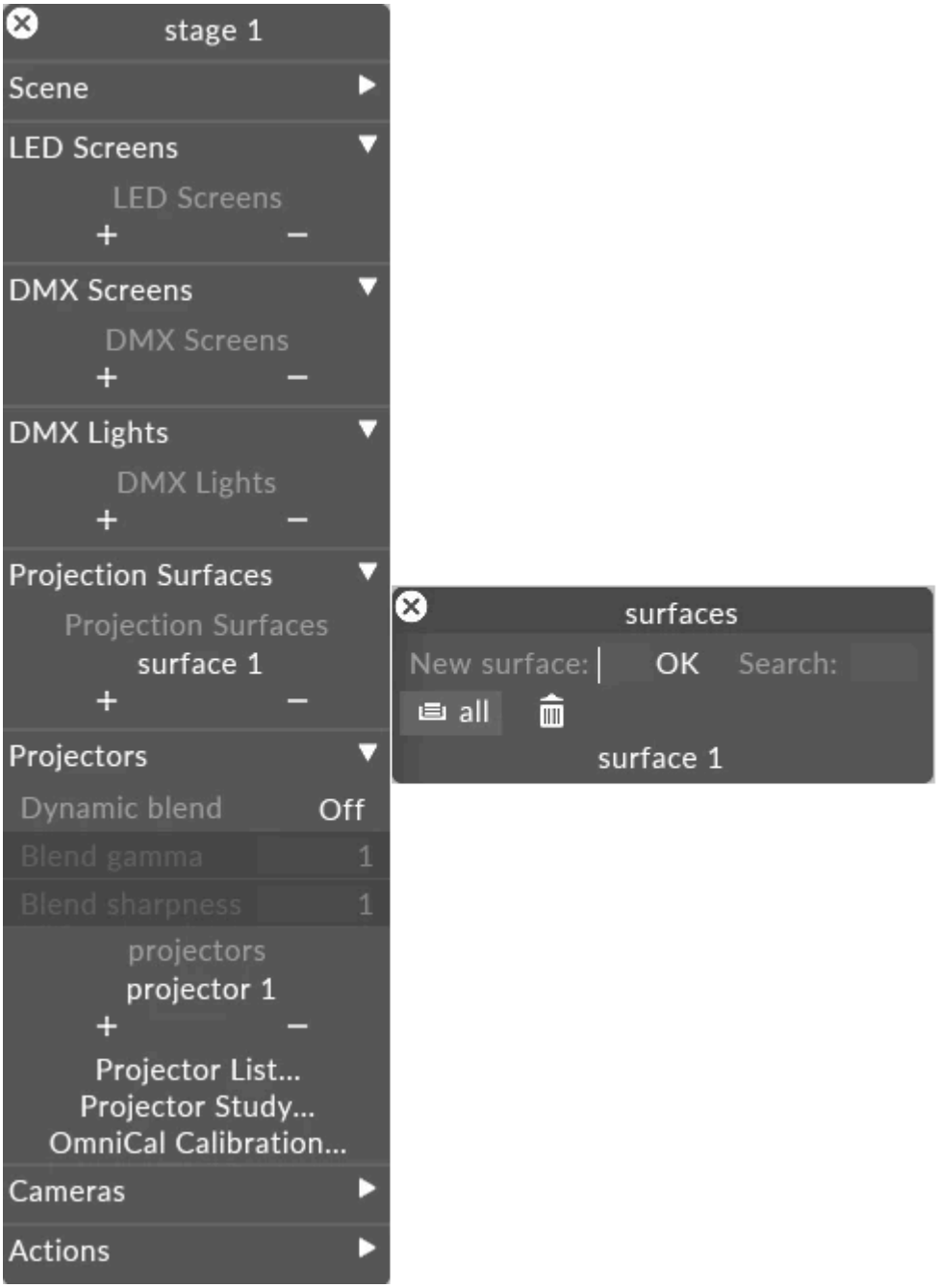
Creating a new screen

1. Right-click stage to open the Stage editor. Each type of screen has it's own tab in the stage editor. Listed below each screen type are screens associated to that type. A new project will, by default, contain a Screen called surface 1.



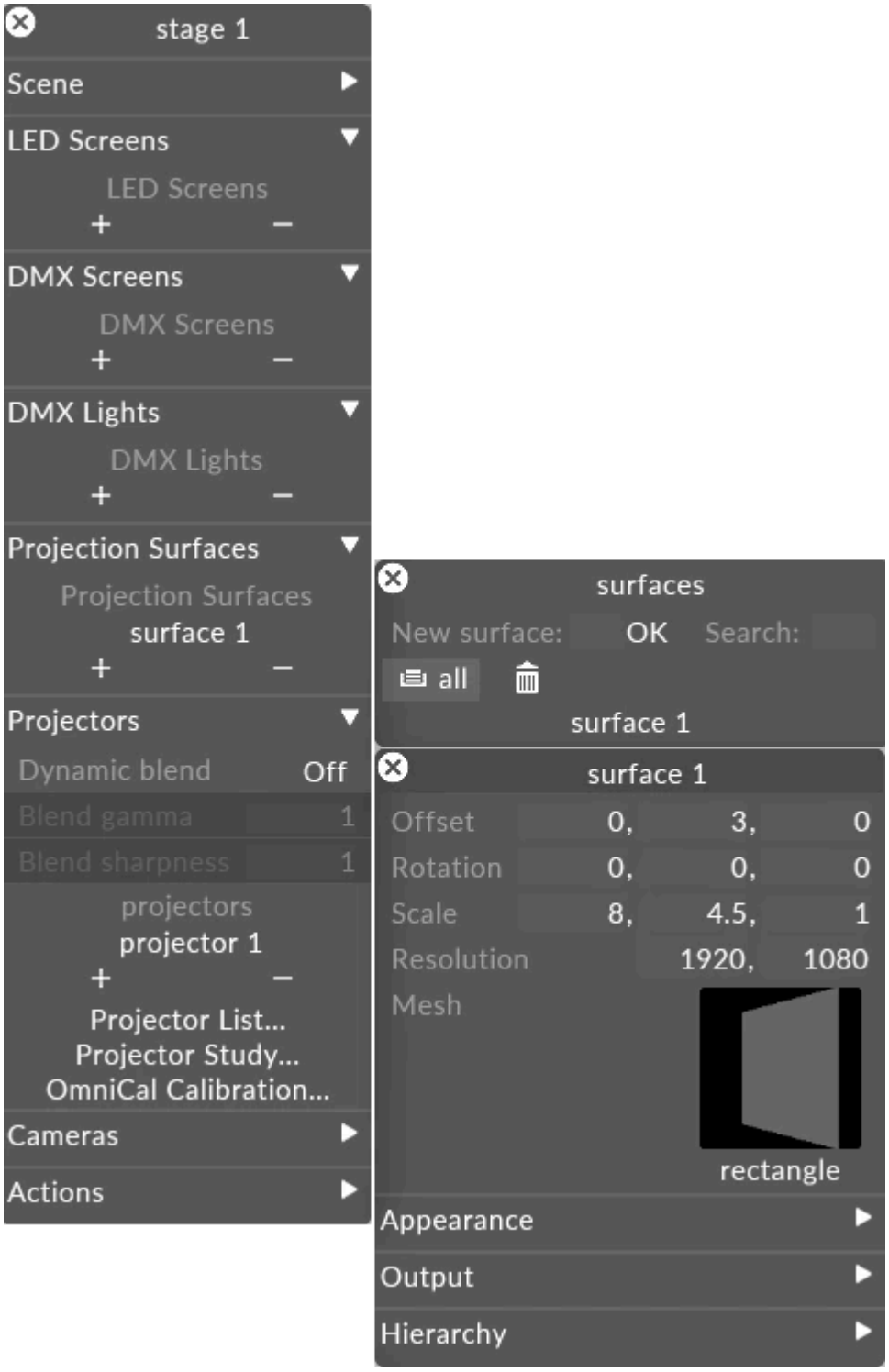
Stage editor showing the different screen types

2. Left-click the + button for the type of screen you wish to add. This opens the screen manager for that screen type. In this example we will add a new projection surface.
3. Type the name of the new screen in the new surface text box, in this example Projection Screen, and hit Enter.



To add a screen left-click the + for the correct type of screen and type a name for the new screen

The new screen will appear in the list of screens for that screen type. The new screen will be created and added to the currently active stage and the screen editor will open.



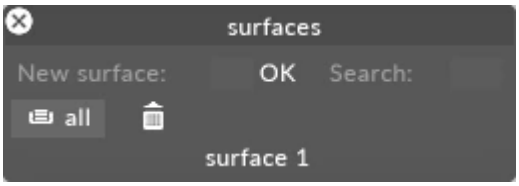
New screen listed in the screen list and the screen editor opened.

You can now edit the screen to change its size, position, orientation and shape.

Deleting Screens

To delete a screen

1. Left-click on the **+** button just below the **screens** list for that type of screen in the Stage editor to open the Screens manager.
2. Left-click and drag the screen you want to delete from the Screens manager to **trash** (represented by a trash-can icon).



This action places the item in the trash can.

To permanently delete the screen from the trash can

- Right-click **trash** and select **empty trash** to permanently delete the screen from your stage.



- Right-click **Trash** and select **Empty Trash** to permanently delete the screen.

> **Warning**
>
> You can never permanently delete a screen if it's active or referenced from anywhere in the project.

Output Properties

Output properties control additional properties that affect a screen's output.

Render layer

The render layer feature allows you to define where the screen is rendered.

On Stage - the screen is rendered in the camera & projector viewports.

Off Stage - the screen is on the stage, but not rendered at all.

Frontplate (AR) - the screen is in the stage, but only rendered to the camera frontplate.

Master fade

This controls the output level of the screen when sent to the Output Feeds level. It ranges from 0 to 1. Use this to reduce the brightness of a physical screen to compensate for cameras or other, less bright fixtures. Reducing Master Fade does not affect the brightness of the screen content in the Stage level.

Colour shift

Each screen has a **Colour shift** property which can be used to control the colour balance of the screen when sent to the Feed Outputs. This can be used to compensate for different colour and brightness characteristics of different LED technologies, allowing you to output consistent colour and brightness when using a mix of different technologies. This parameter does not take effect in the visualiser, as it is used exclusively to fix display hardware inconsistencies. For a full explanation of the **Colour shift** property, please see the Colour Shift section of the Common Layer Properties topic.

Colour profile

Allows you to specify a Colour profile for a screen.

Colour LUT

Allows for a LUT file to be applied to the screen. This is useful if you need to change the colour profile of the screen. We recommend you do this in your LED screen processor or onboard screen hardware. But an option to do it via a LUT exists for circumstances where this may not be possible or for other creative uses.

Projector view blending

The behaviour of projector view blending has been changed in `r32.0.3` to support transparent surfaces. To use the legacy projector view blending behaviour, enable the `useLegacyProjectViewBlending` option switch in Advanced Machine Settings.

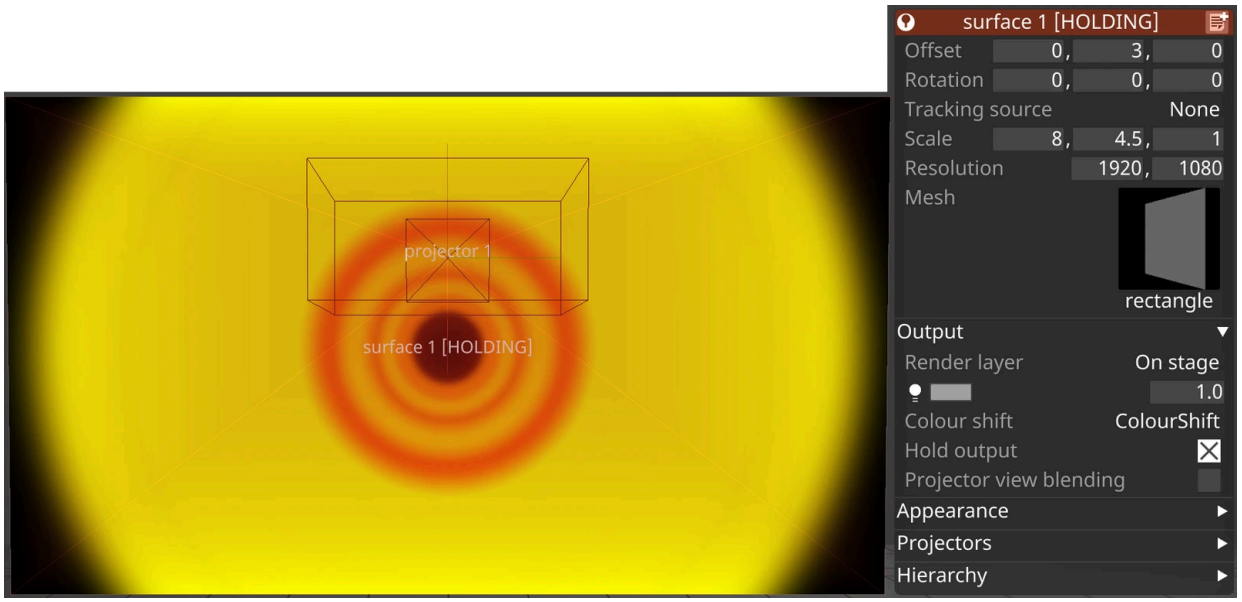
Only applicable to projection surfaces.

Allows for the surface to become semi-transparent in the projector view. Note that the projection surface blend must be set to **Alpha** for this to work.

See Projector View Blending for a full explanation of how it works, what it is used for, and how to switch back to the legacy behaviour.

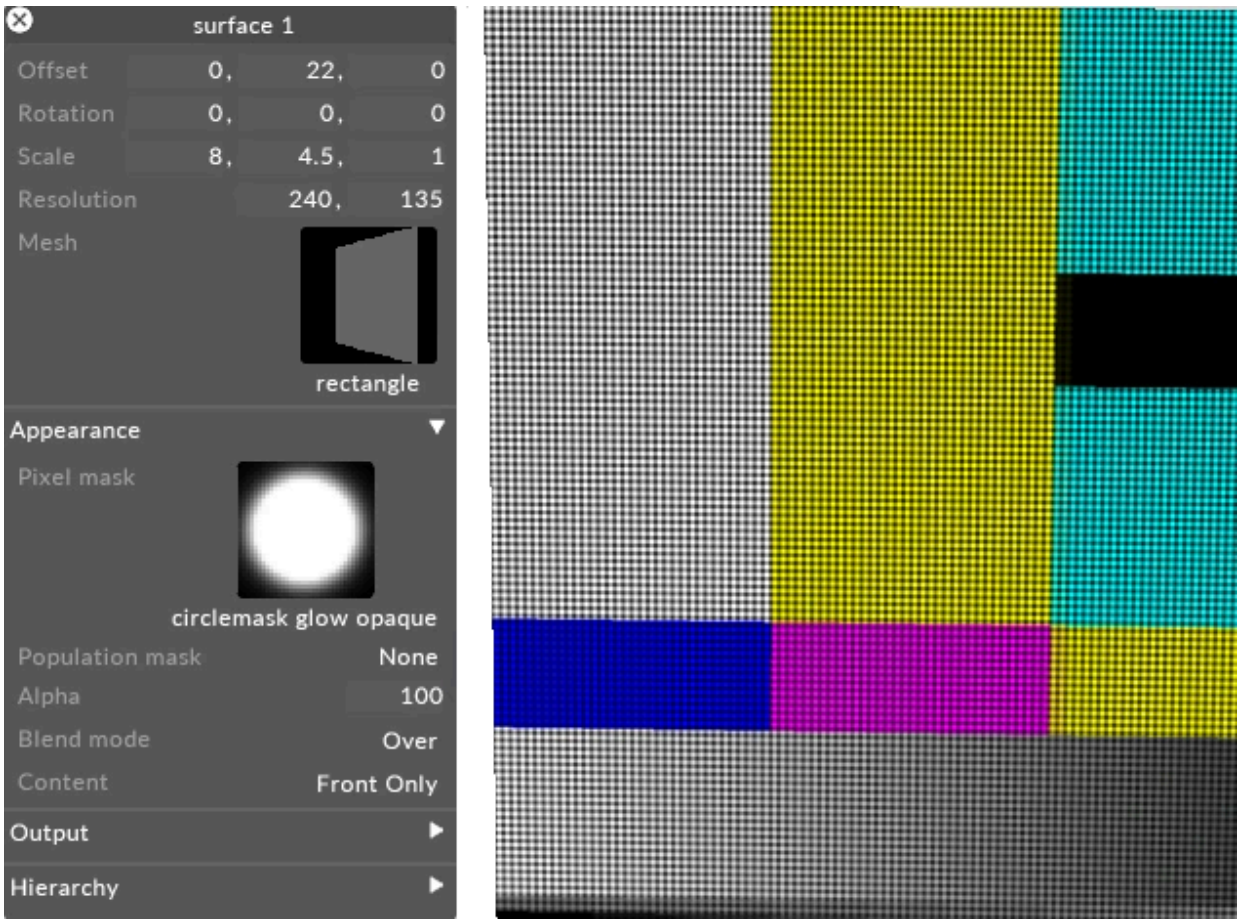
Hold output

The hold output function allows the user to freeze the output of a screen, similar to the project-level Hold function. This allows the user to continue sequencing, but hold the frame of output on one or a selection of screens.



Pixel Mask

This points to the still image file that defines the Pixel mask. This property lets you specify an image mask that is applied to the screen per physical pixel and thus allows you to create specific looks for individual pixels. For instance, if your pixels are circular, your mask should consist of a circle.



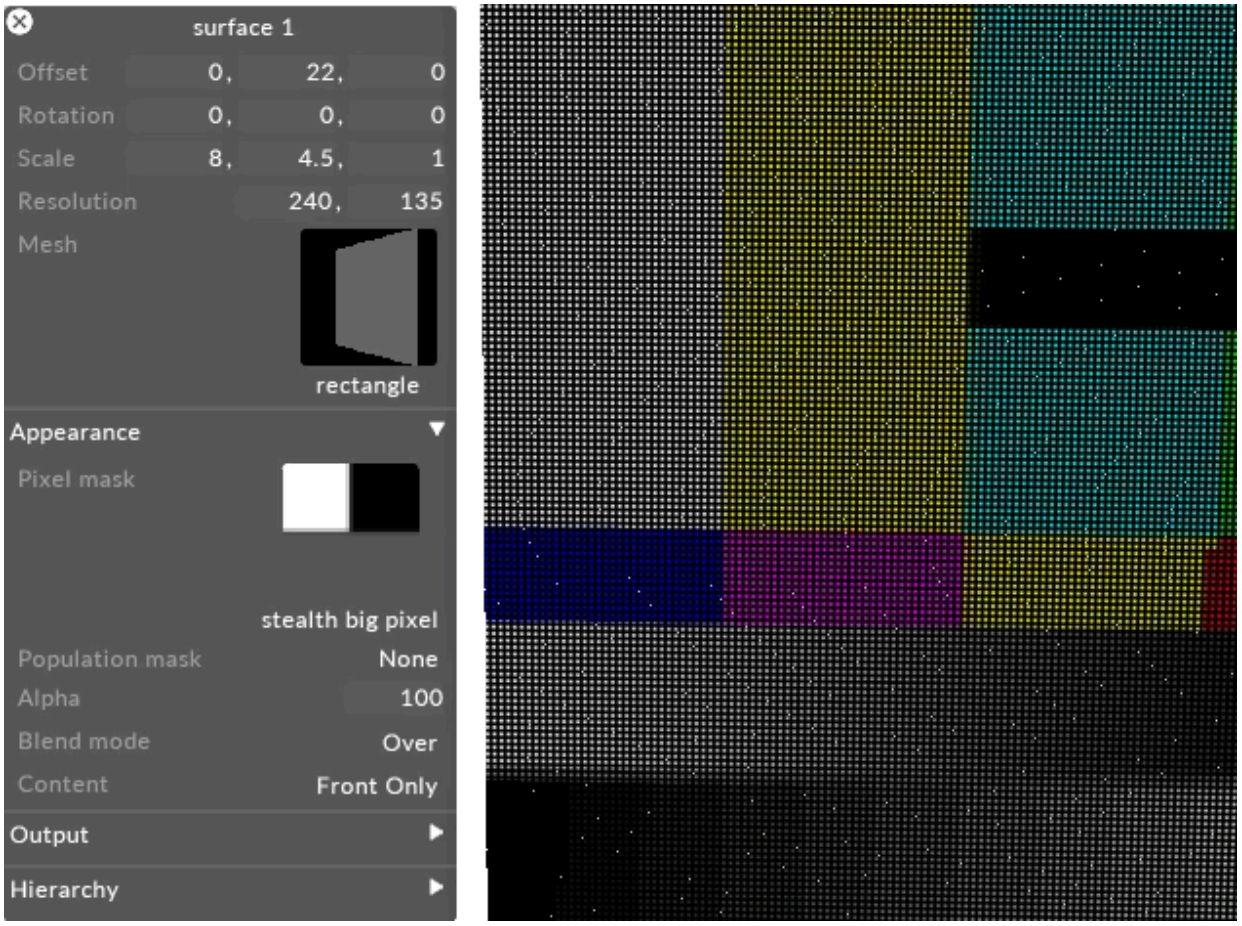
Circular Glow Opaque pixel mask applied to a screen

Designer comes with a number of pre-installed Pixel masks for simulating LED Stealth screens. Selecting this property will open the Texture object library, which shows all of the Texture still image files saved on your local hard-drive in the **DxTexture** folder. Pixel masks can also have alpha channels, allowing you to model other seethrough LED technologies.

Creating a Pixel mask

- Create a 36 x 36px **.png** image. We recommend using Adobe Photoshop for this.
- Make the transparent areas in the screen transparent in the Pixel mask.
- Make the illuminating areas in the screen as a white area in the Pixel mask.

- Make the black areas in the screen to black areas in the Pixel mask.



See the [Placing media files for a project] subchapter to understand where to place a still image file and how to access it in Designer. Also save the file to a [supported file format].

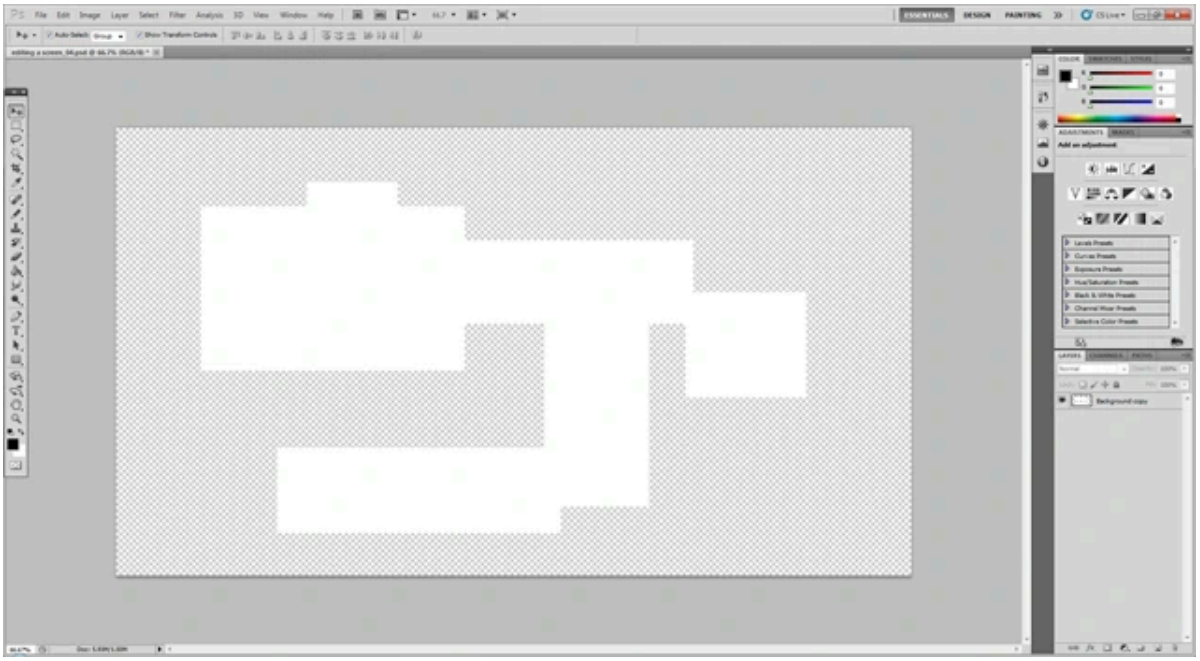
The Pixel mask will be applied onto every pixel of the screen (the number of pixels is defined by the resolution of the screen).

Population Mask

This points to the still image file that defines the Population mask. The**population mask** allows you to quickly specify which pixels in will open the Texture object library, which shows all of the Texture still image files saved on your local hard-drive in the **DxTexture** folder. However, before placing a Population mask you will need to create it.

How to create a Population mask

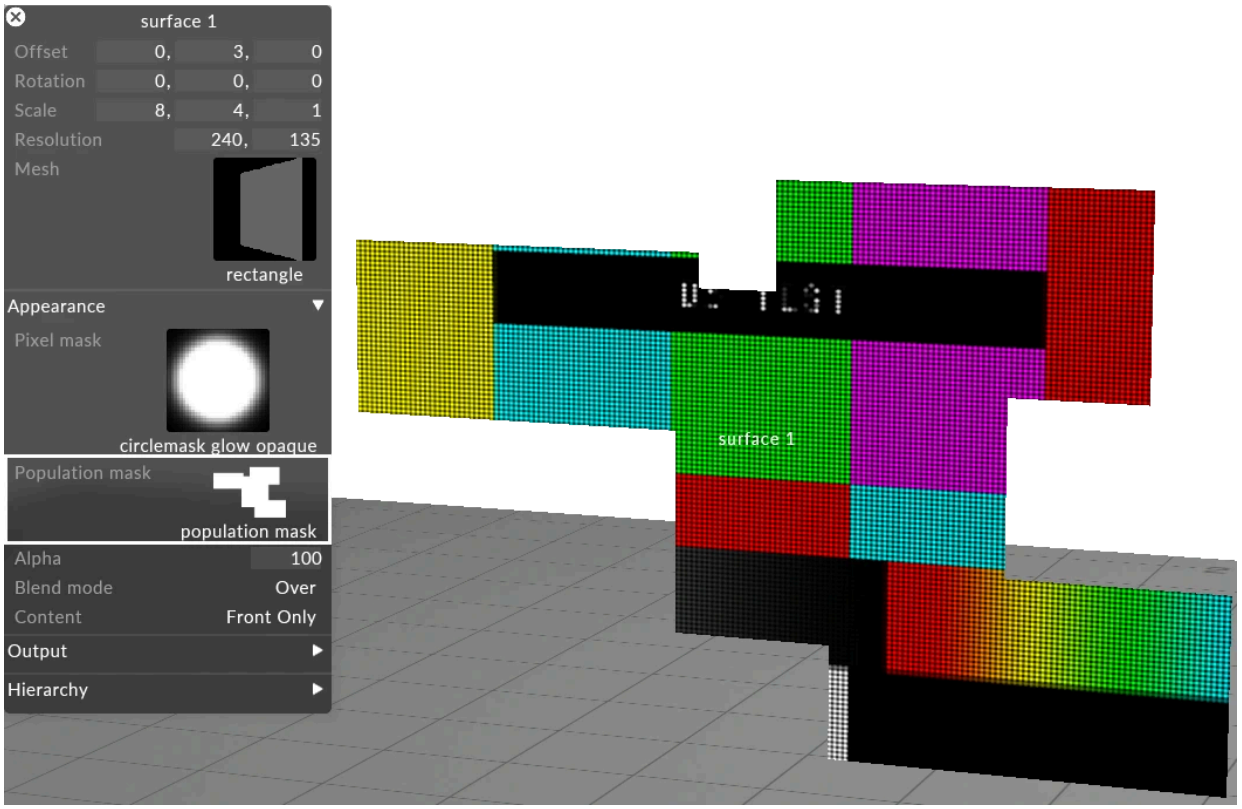
- Create a **.png** image. We recommend using Adobe Photoshop for this. The Population mask should have the same resolution as the screen.



Population mask being created in Adobe Photoshop

- Make the areas you want to be see-through in the screen the alpha channel in the Population mask.
- Make the areas you want to be illuminating in the screen white in the Population mask.
- Make the areas you want to be black in the screen black in the Population mask.

See the Placing media files for a project subchapter to understand where to place a still image file and how to access it in Designer. Also save the file to a supported file format.



Population mask created in Adobe Photoshop applied to a screen

Projection Example - Downstage Curtains

This technique is sometimes used on downstage curtains or gauze surfaces where physical position tracking is unavailable during movement. The goal is to provide a workaround preventing visible “snapping” of scenery when the curtain is raised, instead creating a smooth blend between curtain and scenery content.

Stage setup

- **Multiple projectors** (**proj1**, **proj2**, ...)
- **Projection-mapped scenery** (**scenery**)
- **Downstage curtain projection surface** (**curtain**) - can be raised and lowered manually. The position of the curtain is untracked.

Stage direction

To understand the physical show conditions, the following cues are given as stage direction:

1. **Curtain down** - **curtain** is lowered - it is visible to the audience and a set change / other event is happening behind **curtain**. **curtain** has a show logo mapped.
2. **Enter scene** - **curtain** is raised. Scenery must be projection mapped at all times. Curtain’s logo should fade out.
3. **Exit scene** - curtain is lowered. scenery must remain projection mapped until the curtain is fully dropped. Curtain’s logo should be visible.

The problem

Since **curtain** is untracked, and the stage direction is to have **scenery** projection mapped at all times, we can’t know when **scenery** becomes visible to the projector.

Further, it is impossible to apply a single blend to the projector because there are two very distinct “blend scenes” - the curtain down and the curtain up, which require different blends to ensure the projection surface looks good.

The solution

Therefore, we can map **scenery** while **curtain** is lowered. Then while the physical curtain is raised, fade the content on **curtain** out.

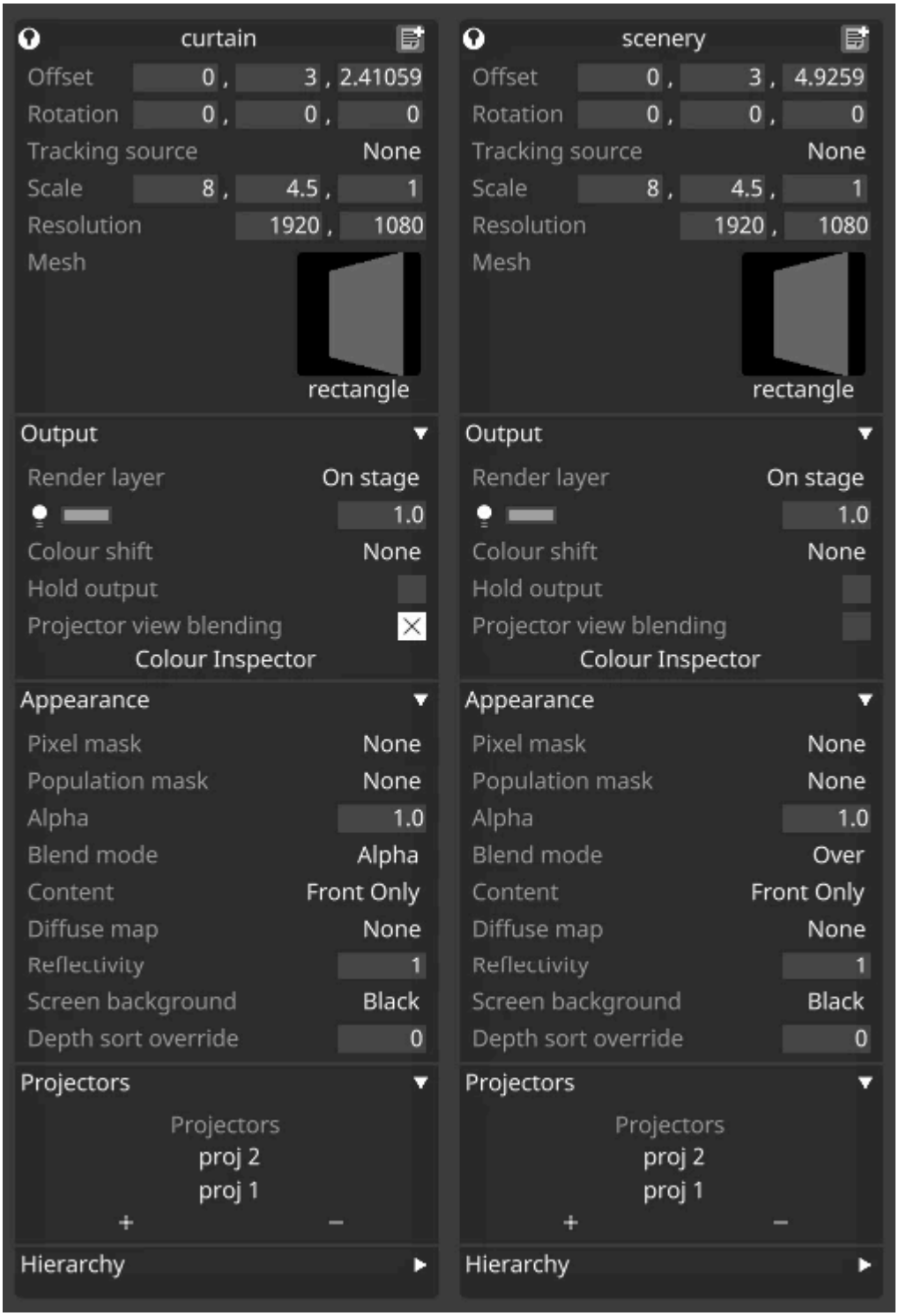
The idea in the real world would be to raise the physical curtain quickly and cross-fade the **curtain** and **scenery** content such that the audience does not notice the imprecise projection mapping during the transition while the physical curtain is raised and content is cross-fading.

Project setup

Stage setup

Ensuring the screens and projectors in the stage are correctly configured is required to ensure the effect is performed correctly.

1. Include both **curtain** and **scenery** in all projector surfaces.
2. Enable Projector View Blending on the **curtain**.
3. Enable Dynamic Blend on all projectors.
4. Calibrate projectors for good alignment on scenery, with acceptable alignment on the lowered curtain.
5. Minimize warps, as multi-depth projection is incompatible with 2D warping.
6. Prioritize focus on the most important scene element (typically on-stage scenery rather than the physical curtain).



Curtain down cue

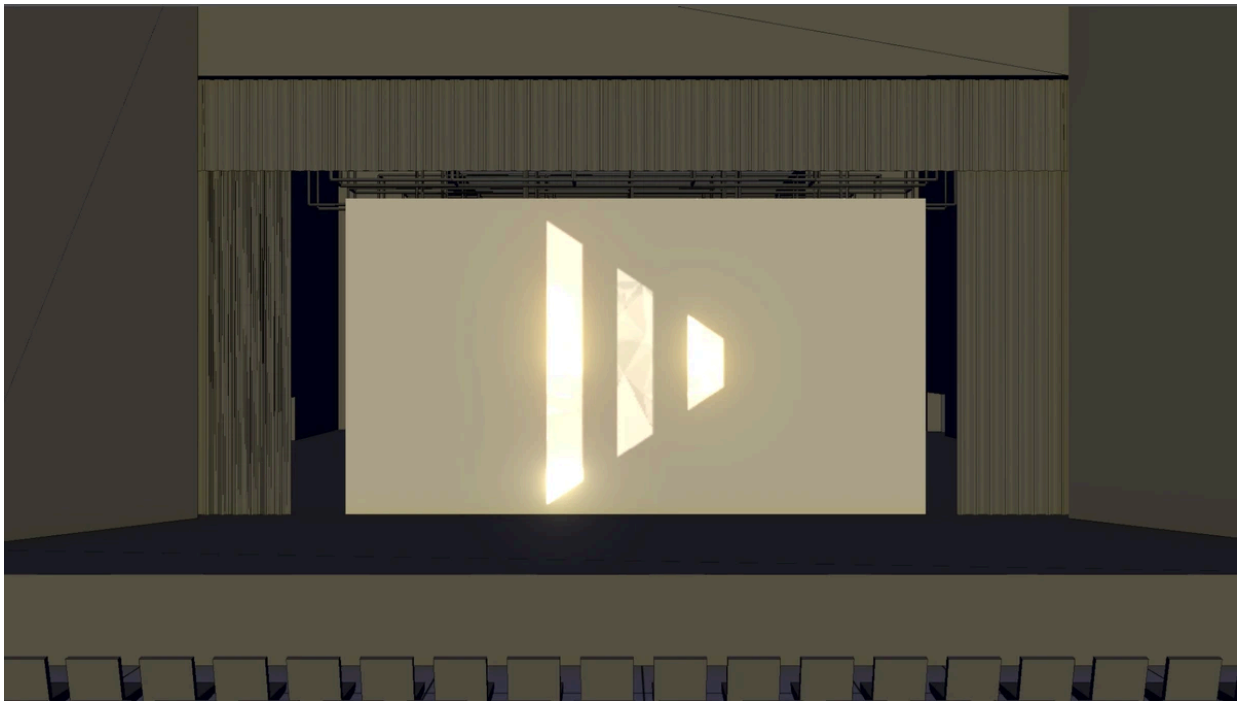
When curtain content is visible (scenery not yet revealed), optimise the content's appearance for the best possible rendition:

The following must be programmed to ensure the correct look in this cue:

1. Map one or more layers to the **curtain** with appropriate content (e.g., logo).
2. Set **curtain** Alpha to `1.0` (fully opaque.).
3. Minimise the visibility of any blend zones by spreading the content accordingly across the projection.

Note that the blend is targeting the **scenery**, not the **curtain**, so blend zones may be visible on the curtain. The screenshot below shows the worst case. To mitigate this, consider:

- Adding the **curtain** to only one projector — this removes blend areas but reduces brightness.
- Adjusting projector positions or content placement so that blend zones do not overlap the curtain content — this is more technical/creative but can produce the best result.

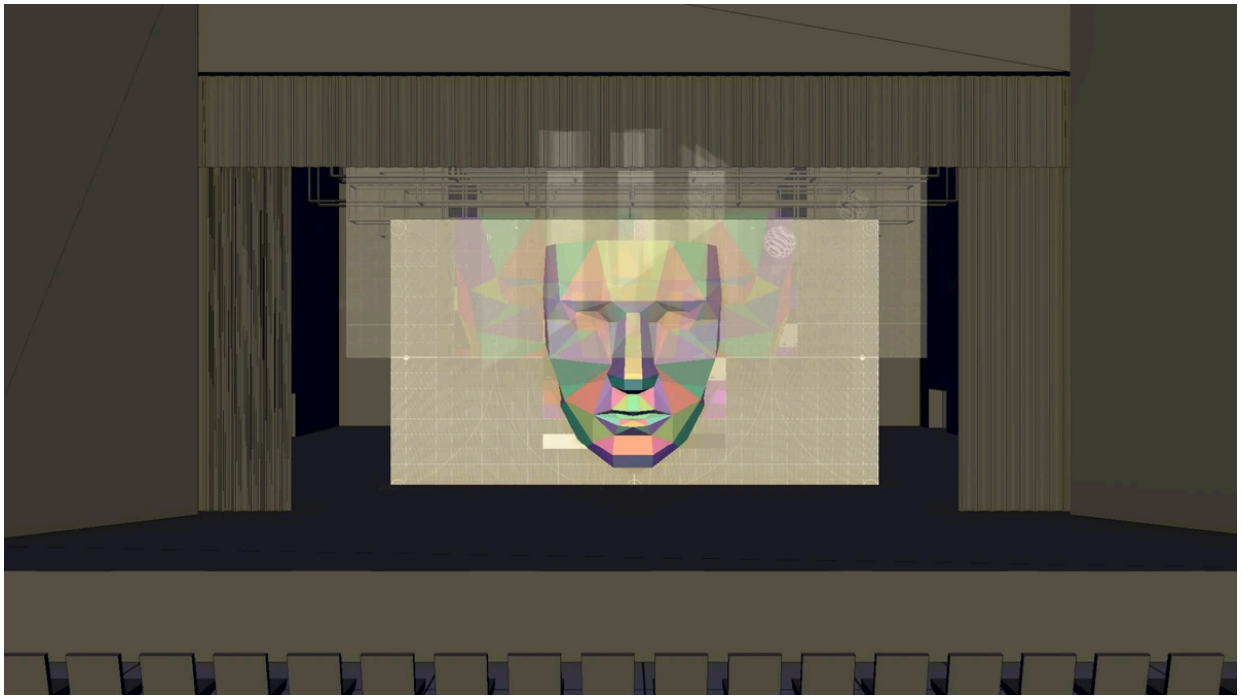


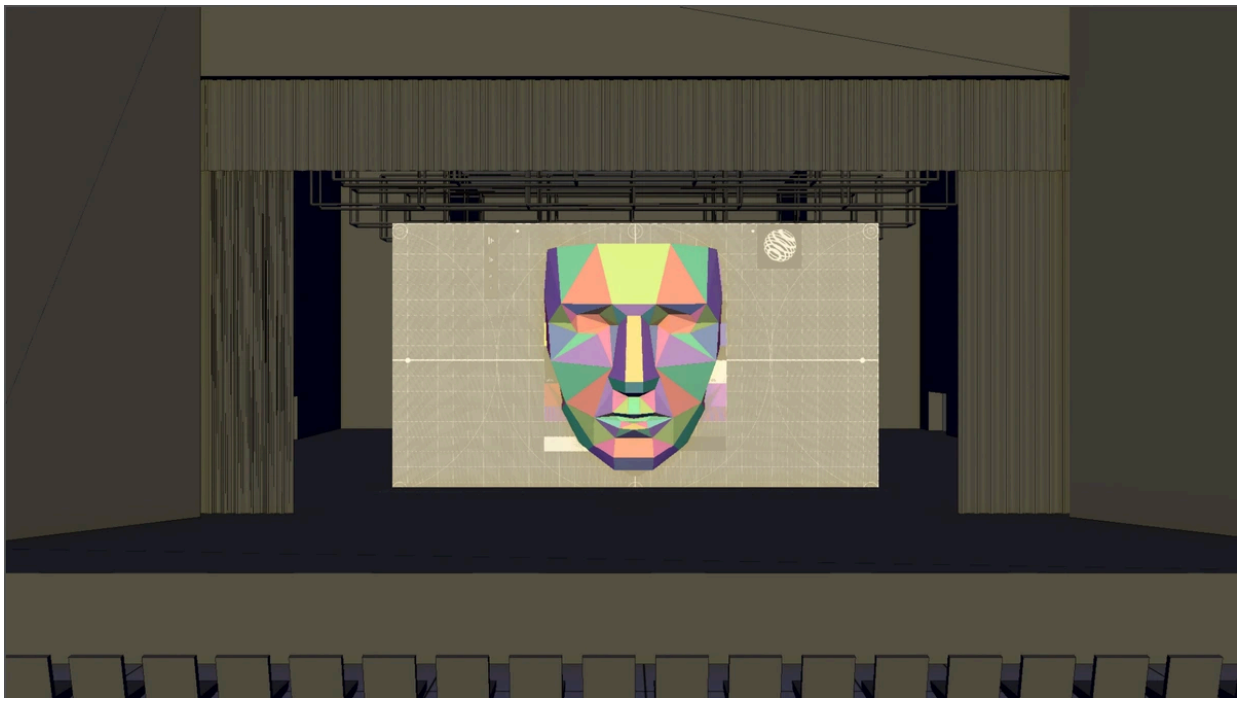
“Enter scene” cue

As the curtain is raised, both surfaces (**scenery** and **curtain**) should have content mapped. Consider using Universal Crossfade to cross-fade content appropriately during the transition. The goal is that as the audience focusses on the stage, the content projected onto the **scenery** should look as good as possible.

1. Map one or more layers to the **curtain** with the appropriate content (e.g. logo)
2. Map one or more layers to the **scenery** with the appropriate content.
3. Fade the **curtain** Alpha to `0.0` (fully transparent) at a defined point in the cue to progressively reveal the scenery during the transition. For instance, this can be achieved using an open layer mapped to the curtain’s alpha property.

4. Optionally, animate the **curtain** position to follow the physical curtain as it is raised — this is not required but can improve the visual result (the screenshots below show this approach).





“Exit scene” cue

This cue reverses the “Enter Scene” sequence: fade curtain alpha back to **1.0** to prioritize the curtain content as it descends.

Projection Example - Light Casting

This technique uses virtual screens to place content freely in the stage, regardless of destination surfaces, projecting light effects onto scenery. Some productions use it as a creative tool for placing specific content at points of interest, for example a spotlight tracking to focus on a specific actor or stage object. Unlike in the Downstage Curtains technique, the virtual **caster** surface uses a **transparent background** and never makes use of Dynamic Blend.

Stage setup

- **Multiple projectors** (**proj1**, **proj2**, ...)
- **Projection-mapped scenery** (**scenery**)
- **Virtual light caster surface** (**caster**) - a virtual screen positioned in 3D space, acting as a virtual gobo.

Stage direction

1. **Scene setup:** The **scenery** is projection mapped and visible at all times.
2. **Light effect:** Virtual light from the **caster** illuminates portions of the physical stage, potentially including **scenery**.
3. **Light animation:** Content in **caster** animates to create dynamic lighting effects.

The problem

Traditional theatrical lighting requires physical fixtures and rigging. Sometimes, it is more practical to reuse the projectors as a flexible gobo, instead.

The solution

Position a virtual screen with a transparent background in 3D space. We will call this the **caster** in this example. It places a lighting effect, cast from the projector positions, in the stage. The light is cast regardless of projection surfaces in Disguise, meaning it can target actors or create atmospheric effects. The transparent background ensures only opaque pixels affect the stage, creating natural blending. In the example below, we have mapped the spotlight-like effect to the caster.

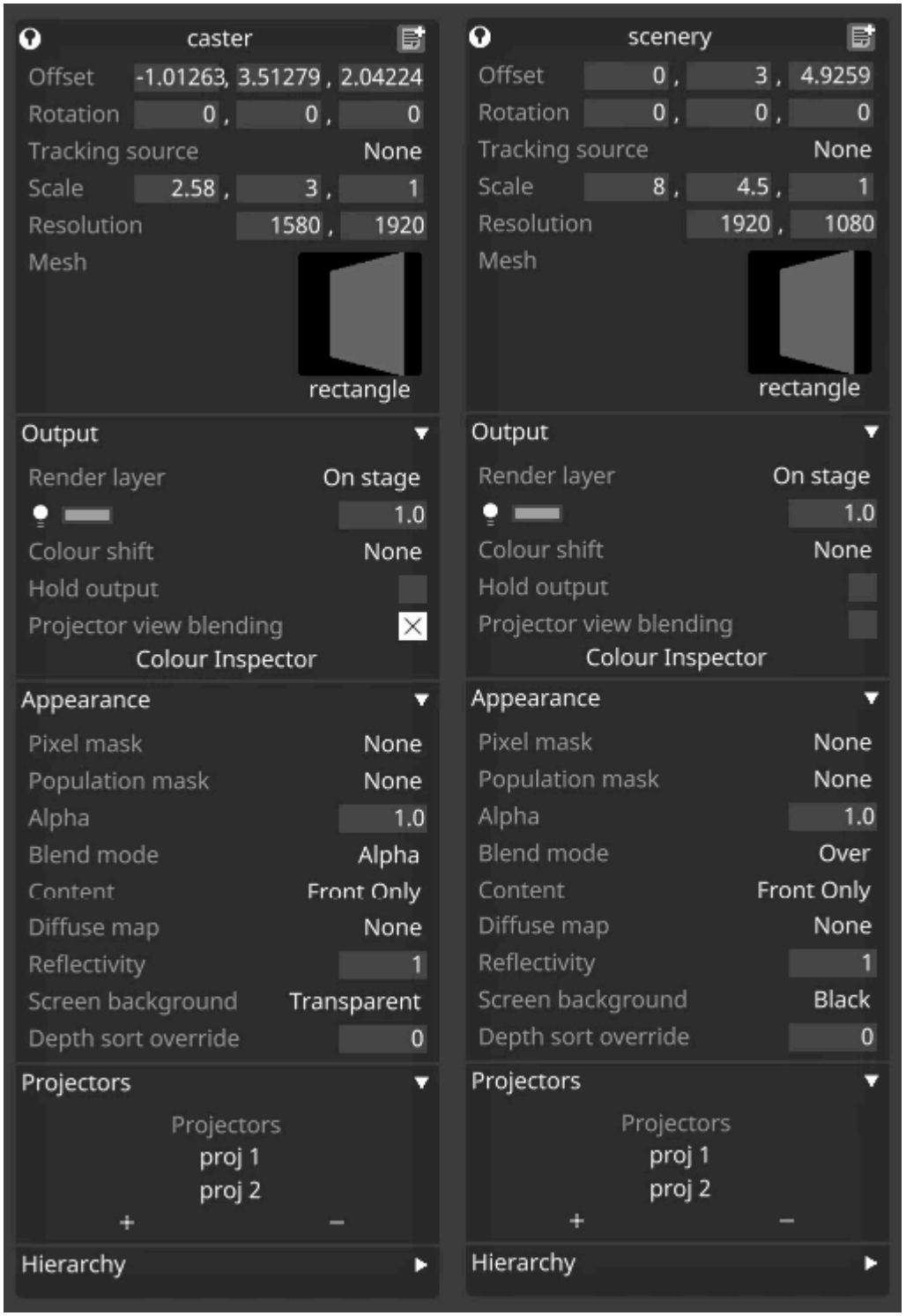
Setting the visualiser to **lux** mode shows the intended effect, where the caster content is projected against the **scenery**, actor prop and the portion of the stage covered by the projector's frustum:



Project setup

Stage setup

1. Include **scenery** and any other relevant stage objects (e.g. props) in all projectors' surfaces.
2. **Caster** can be in whichever projector's surfaces lists make sense for the light casting choice.
3. Enable Projector View Blending on the **caster** and ensure its background is set to **Transparent**.
4. Enable Dynamic Blend on all projectors.
5. Position the **caster** surface in 3D space at the desired location for the content we are casting.
6. Calibrate projectors for good scenery alignment.
7. **Note:** The **caster** is purely virtual and requires no physical surface correspondence on stage.



Caster content

- Create light patterns, gobos, or color washes.
- Use the alpha channel to define light shape and intensity.
- Fully transparent areas don't affect **scenery**.
- Opaque or semi-transparent areas blend with **scenery** as light effects.

Scenery content

- Program **scenery** content as normal. The **caster** light blends based on alpha values.

Animation and control

- Animate **caster** content for dynamic lighting effects.
- Adjust **caster** alpha to control light intensity.
- Animate **caster** position/rotation for moving light effects.
- Use multiple casters for complex scenarios.

Projector View Blending

Projector View Blending is a per-surface option on a projection surface that makes the surface semi-transparent in the projector view, so a projector can "see through" it to whatever is positioned behind. It is set in the screen's output properties, and the surface's blend must be set to **Alpha** for it to take effect.

It is the basis for techniques that deliberately project *past* a front surface, such as casting light onto scenery behind it, or fading a downstage curtain away to reveal the scenery upstage.

A recent update in `r32.0.3` changed how a surface with `Projector View Blending` enabled is treated, making these transparent-surface techniques possible. This page explains how the feature works, what it is used for, and how it differs from the legacy behaviour.

How it works

When a projector renders its view, it works out which surfaces and objects fall within its line of sight and in what depth order. Normally, surfaces in front occlude whatever sits behind them, just like a real projector.

With **Projector View Blending** enabled, the surface no longer occludes the objects behind it. The projector treats it as transparent and "sees through" it to the scenery, performers or other surfaces upstage. The surface's own content still blends into the output according to its alpha: opaque pixels appear as content or light, while transparent areas reveal whatever is behind.

When to use it

Use **Projector View Blending** wherever you want to project past a transparent front surface onto what is behind it:

- Light Casting: Position a transparent surface in 3D space and use it as a virtual gobo. Its opaque pixels cast light, patterns and colour washes onto the scenery behind it, reusing your projectors as flexible virtual lighting fixtures.
- Downstage Curtains: Keep upstage scenery projection-mapped continuously while a front curtain fades in and out. Because the projector sees through the curtain to the scenery behind, you can cross-fade the curtain away with no visible "snap" as it is raised.

Legacy and new behaviour

Before this change, a **Projector View Blending** surface acted as a solid occluder: it blocked the projector's view of anything positioned behind it. Scenery, performers and Mask Objects upstage of the surface were hidden from the projector, so you could not project through the

surface onto them, and they could not appear on the surface. The new behaviour treats the surface as transparent instead, which is what makes the techniques above possible.

	Legacy behaviour	New behaviour (default)
Projector View Blending surface in the projector's view	Acts as a solid occluder	Treated as transparent (see-through)
Scenery / performers behind the surface	Hidden from the projector	Visible; can be projected onto
Mask Object upstage of the surface	Occluded; does not appear on the front surface	Visible; can appear on the front surface
Casting light/content through the surface	Not possible	Supported (See: Light Casting)
Downstage curtain cross-fade	Not possible	Supported (See: Downstage Curtains)

> **Caution**
>
> Because the projector now sees past a **Projector View Blending** surface, a **Mask Object** placed upstage of the surface is no longer occluded by it and can be drawn onto the front surface. This can look like an unexpected shadow of an upstage object falling on a front surface. For example, the silhouette of an upstage set piece showing up on a front cloth. If your show relies on a front surface hiding the objects behind it, use the legacy behaviour below.

Switching to the legacy behaviour

The new behaviour is the default. If your show depends on the legacy behaviour, you can restore it:

1. In **d3 Manager**, open Advanced Machine Settings.
2. Enable the `useLegacyProjectViewBlending` option switch.
3. Restart d3 for the change to take effect.

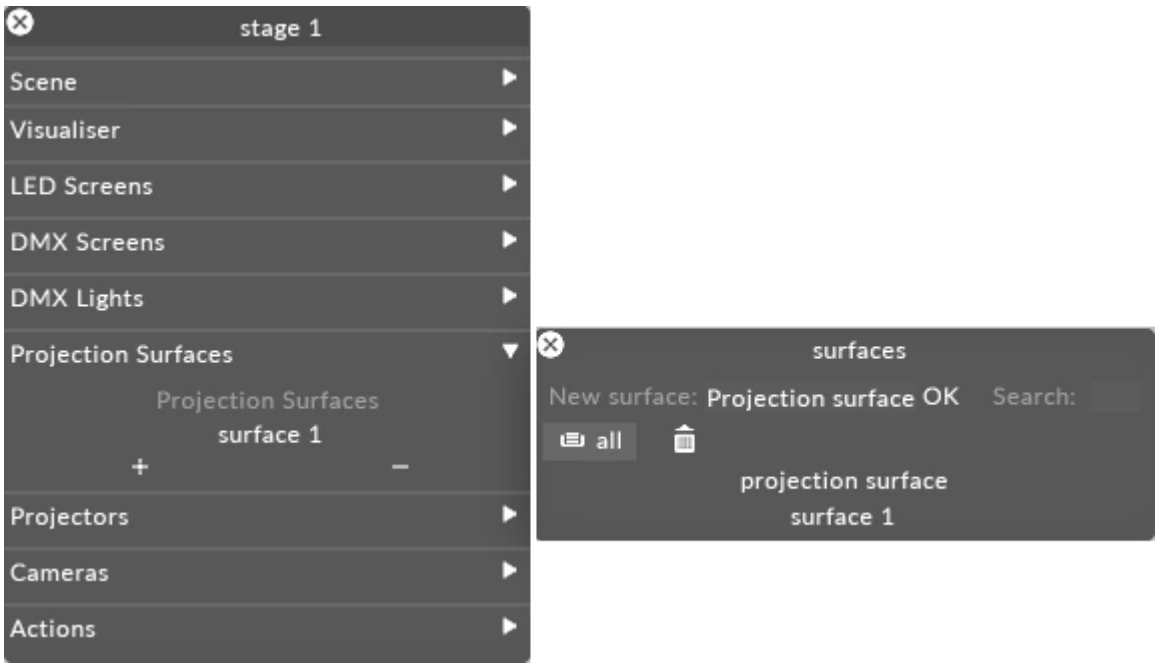
This restores the previous behaviour for every Projector View Blending surface in the project.

> **Note**
>
> The `useLegacyProjectViewBlending` option is available from `r32.4.10` and `r33.2.2` onward.

Removing Screens

To remove a scree, left-click and drag the screen name to the – button below in it's section of the Stage editor.

This will remove the screen from the currently active stage. The screen itself will not be deleted, it is still listed in the ScreensManager. To delete the screen permanently see the the deleting screens sub-chapter.



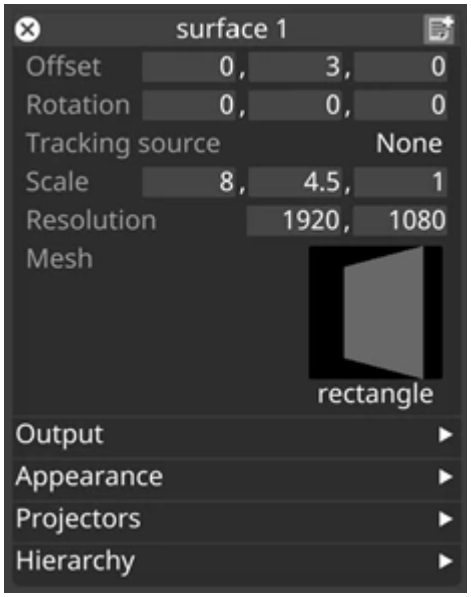
In this example surface 1, has been removed from the currently active stage, but remains in the surfaces manager.

Screen Editor

To edit a screen you need to open the **Screen editor**.

To open the Screen editor:

- Right-click a screen directly in the Stage level. or
- Right-click the screen name from the **screens** list in the Stage editor.



Screen editor is used to edit a screen.

Below are the descriptions for all the properties accessible from the Screen editor.

Offset

This controls the screen position in the 3D space. There are three numbers laid out horizontally: respectively the x (left/right), y (up/down) and z (into/out of the screen) coordinates.

Rotation

This controls the **rotation** of the screen mesh, in degrees. The x component controls the rotation around the x axis; the y component around the y axis; and the z component around

the z axis. Mesh vertices are rotated around their origin; for this reason, it is recommended that mesh vertices are centered around their origin.

Tracking source

This property defines which tracking source controls the offset & rotation properties of the object. For more information, see Object tracking source.

Scale

The **scale** property specifies a scaling factor to be applied to the mesh. If the original mesh is a unit mesh (i.e. its x, y and z extents are 1 meter) then the size refers to its actual size. The installed Rectangle, Cylindrical and Concave meshes are examples of unit meshes. The scales z component will have no meaning for flat screens. For screens with curvature (such as the installed Concave mesh) the z component will scale the z size of the screen.

Resolution

This controls the **resolution** of the screens physical canvas in pixels. If you are using Disguise's pre-installed Rectange mesh as the screen, set the resolution to match the physical dimension (aspect) of the screen.

Mesh

This points to the Mesh file that defines the shape of your screen. Selecting this property will open the Mesh object library, which shows all of the support mesh files saved on your local hard-drive in the **Mesh** folder. The mesh consists of an array of vertices, each of which specifies a 3D position in space and a 2D texture coordinate that indexes the physical canvas.

To swap a screen mesh with the currently active mesh:

1. Left-click **mesh** to open the Mesh object library.
2. Left-click the mesh you want to replace the currently active mesh. This will update the screen mesh.

If you are using any other shape than the standard Rectangle, Cylinder or Convex meshes, the screen requires a UV-mapped mesh file as the screen mesh.

See the Placing media files for a project page to understand where to place a mesh file and how to access it in . Also save the file to a supported file format.

To edit a mesh:

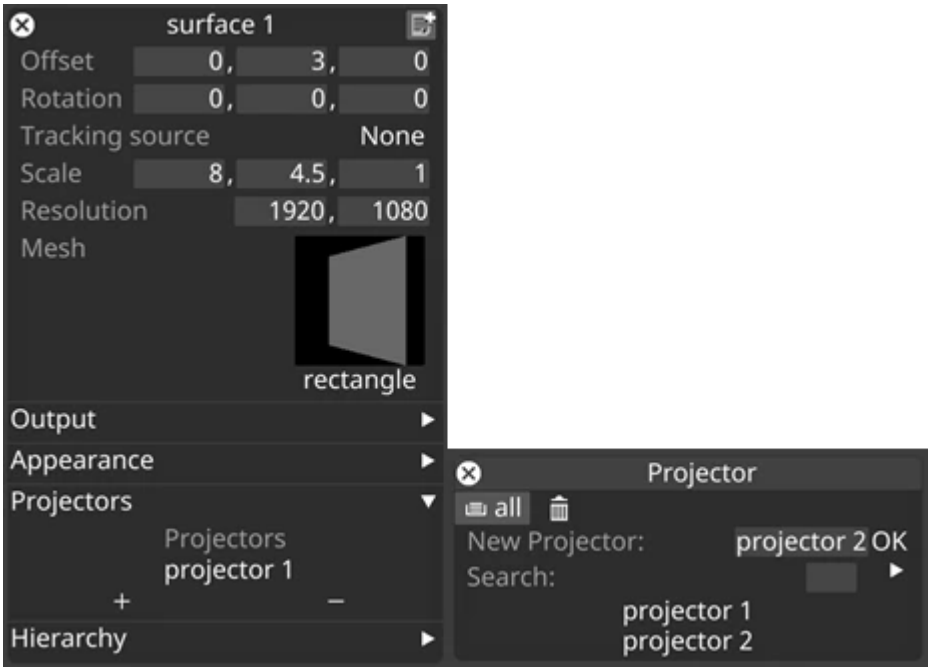
- Right-click the mesh inside the Mesh object library to open the Mesh editor. The Mesh editor is used to flip or swap the UV mapping coordinates of a mesh or find out how many vertices a 3D mesh contains.

The page LED Screen examples explains how to create a UV-mapped LED screens.

You can expand the Projectors field to access the list of projectors associated with the current screen.

To add or remove projectors from this list:

1. Left-click the **+/-** button to open the Projectors manager.
2. Select the projectors you wish to add/remove to/from the screen.



Screens Overview

A screen in Designer consists of exactly as many pixels as there are in the real world screen. Content can be rendered from the Timeline and mapped to the screens in the stage in real time (with the exception of the Projector screen type). The screens can then output their data via the Feed system or DMX depending on the screen type. Designer uses DmxScreens to output DMX data, and DmxLights to create DMX-based moving lights and other DMX-based screens.

Types of screens

Designer contains five different screen types that can be added to a stage.

Dmx Lights

This is the screen type to use when you want to create DMX-based moving lights and other DMX-based screens where custom DMX drivers are required (that cannot be created using the DmxScreens type, see below). DmxLights also visualises beam effects and movement. Learn more about DmxLights in the DmxScreens/Lights chapter.

Dmx Screens

This screen type is a normal video screen of any shape and form but outputs DMX data instead of video. Learn more about DmxScreens in the DmxScreens/Lights chapter.

Projection Surfaces

This screen type is an object that will be projected onto and should be used in conjunction with a virtual projector. Projection screens have no output feed and require projectors to view them. Learn more about this feature in the Projector Simulation chapter.

LED Screens

This screen type is used for LED screens.

Projectors

This screen type is actually a virtual projector used for projection mapping projects. Learn more about this feature in the Projector Simulation chapter.

In addition, Designer contains by default a set of primitive meshes:

- 1 x 1m Rectangle. The name ‘Rectangle’ may sound confusing as it’s actually a 1 x 1 m plane. This plane has been exported from the origin in 3ds Max (0,0,0).
- 1 x 1m Cylinder.
- 1 x 1m Convex.

These three primitive meshes can be used as the screen mesh for the six different screen types (with the exception of Projectors), defining the shape of your screens. They are already UV-mapped and can be re-sized, positioned and configured to match your design requirements. If you are using any other shape than the standard Rectangle, Cylinder or Convex meshes, the screen requires an imported UV-mapped .obj file as the screen mesh. Please see the Mesh section within the Editing screens sub-chapter for information on how to import a screen mesh into the software.

Single Large Canvas

A Single Large Canvas (SLC), launched in r22, is a practically unlimited canvas that users can operate on without having to manually split canvases (i.e. the displays and mappings) or concern for the mechanics and logic of distributing content over multiple machines or for performance. SLC allows users to focus on the creative side without concern for the practical limitations of large scale projects.

Previously, a show going from a small venue with HD screens to a large venue with massive screens had to work around GPU limits - such as the max internal resolution of 16,384x16,384 pixels of GPUs, - and manually split content across machines so the increased resolution wouldn't affect performance.

SLC removes these limitations and allows you to operate on massive content as if it was a single large piece of content, while only processing the content that is being output by each individual machine in the session.

SLC works in conjunction with the Media Distribution feature to make working with video at massive resolutions practical.

SLC can be combined with mesh projection to split large canvases across multiple machines.

How to configure Single Large Canvas

The new logic is always enabled, but the SLC configuration is hidden and limited to non-SLC resolutions until explicitly enabled.

1. Enable the enableSLC flag in the **Advanced Machine Settings** in d3Manager.
2. Open a project and the SLC configuration can be seen in the menu **d3 > Advanced > SLC configuration**

> **Note**
>
> SLC-aware display types (currently projection surfaces and LED screens) will now have their default min/max set to 100,000x100,000 instead of 16,384x16,384.

3. Create a display larger than 16,384x16,384 or reduce the "Resolution threshold" in the SLC configuration to enable SLC splitting for that display.

4. Create SLC video content:
    1. Split video content into regions smaller than 16,384x16,384 (most codecs only support 8K) and include a region name into each split in the format `_slc_region_<region name>`.
    2. Ingest the content and specify the regions inside d3 under `<video clip>->Video asset->Regions`.

> **Note**
>
> Versions of Designer prior to r27.7 used the string `_region<region name>` for region names. This is no longer supported, due to the phrase “region” being commonly used in other content delivery pipelines and causing potential conflicts. The new format is `_slc_region_<region name>`. To continue using the old `_region<region name>` syntax enable the **useLegacySLCRegionTag** option switch in advanced project settings.

SLC currently only supports projection surfaces and LED screens. Other displays are still limited to 16k.

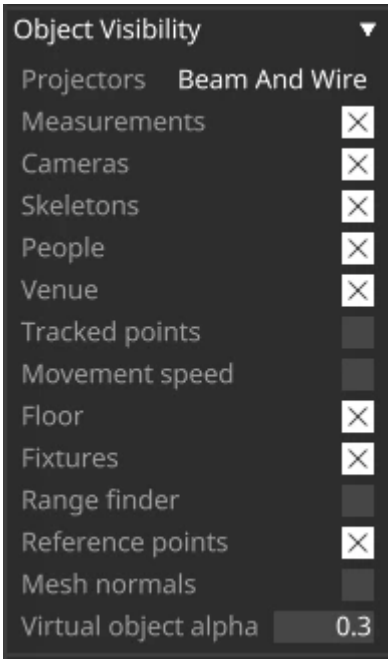
SLC does not currently integrate with any other content than video.

Stage Render Settings

Stage render settings are configurations which define how cameras render the virtual stage simulation within Designer. Render settings can be configured for these properties:

- **Object Visibility**
- **Label Visibility**
- **Renderer**

Object Visibility



The object visibility settings define which objects are shown in the stage render.

Visibility check boxes

The check boxes control whether the following stage components are rendered:

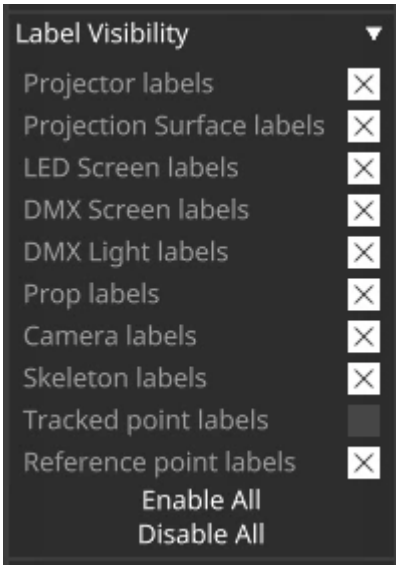
- Measurements
- Cameras
- Skeletons
- People
- Venue
- Tracked points
- Movement speed

- Floor
- Fixtures
- Range finder
- Reference points
- Mesh normals

Virtual Object Alpha

Opacity of virtual objects in render layers other than onstage or offstage.

Label Visibility

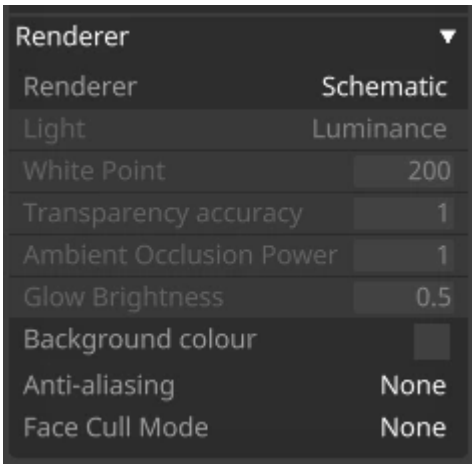


The label visibility settings consist of check boxes controlling whether labels are drawn for the following objects:

- Projectors
- Projection surfaces
- LED screens
- DMX screens
- DMX lights
- Props
- Cameras
- Skeletons
- Tracked points
- Reference points

It is possible to turn on or off rendering for all labels using the **Enable All** and **Disable All** buttons.

Renderer



The render settings define which renderer is used, and the properties of the renderer itself.

Renderer

- **Schematic** - Uses the Schematic renderer.
- **Lux** - Uses the Lux renderer.
- **Heatmap** - Uses the Heatmap renderer.
- **Depth** - Renders the depth map of the objects.

> **Tip**
>
> When using the Depth renderer, you may want to increase **zNear** and decrease **zFar** on the camera to more tightly bound the depth range of objects in your scene.

Light (only available for Heatmap)

- **Luminance** - Luminance - The intensity of light emitting from an object or surface per meter in a given direction, measured in nits (cd/m^2)
- **Illuminance** - The density of incident light in lumens hitting a surface per meter, measured in lux (lm/m^2).

White point

Camera exposure in lux.

Ambient occlusion power

Power of the ambient occlusion effect in the lux renderer. 0 disables it.

Glow brightness

Impact of glow effect in lux renderer.

Background colour

Changes the background colour of the scene. In Schematic, this will be the background colour.

In Lux, this will be the base colour of the environment and is affected by lighting. For example, if the ambient light is 0 the background will be black regardless of the colour.

In Heatmap, the background is always black.

Anti-aliasing

Anti-aliasing can smooth out jagged edges caused by aliasing. The higher the number the smoother aliasing, but at more of a performance cost.

Face Cull Mode

Used to temporarily disable rendering of faces with normals pointing to the front or to the back

Stage Setup

What is the Stage?

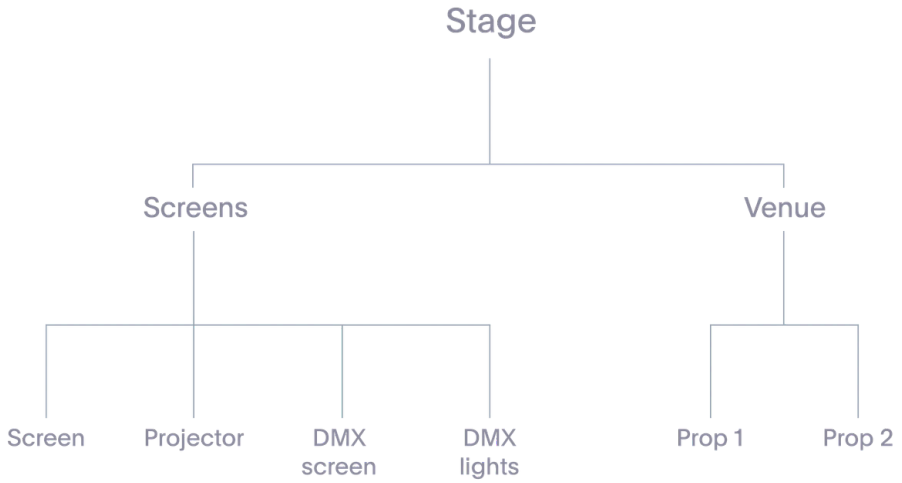
The Stage is a level in the Disguise software that uses the Stage Visualiser to view your current stage from any angle. The terms the Stage and the Stage level have the same meaning but to avoid confusion we will be using the Stage level term most commonly throughout the User Guide.

To view the stage

Left-click stage from the dashboard to open the Stage level. This level is open by default.

Objects within a stage

A stage is constructed from a series of objects. These objects are a range of different screen types, venues and props.



Hierarchy of objects contained within a stage: screens, venues and props

Screens

Designer has a number of different types of **screens** that you can add to a stage. The stage can then be used to play video from the **Timeline** onto the screens in real-time, avoiding the need for time consuming re-renders.

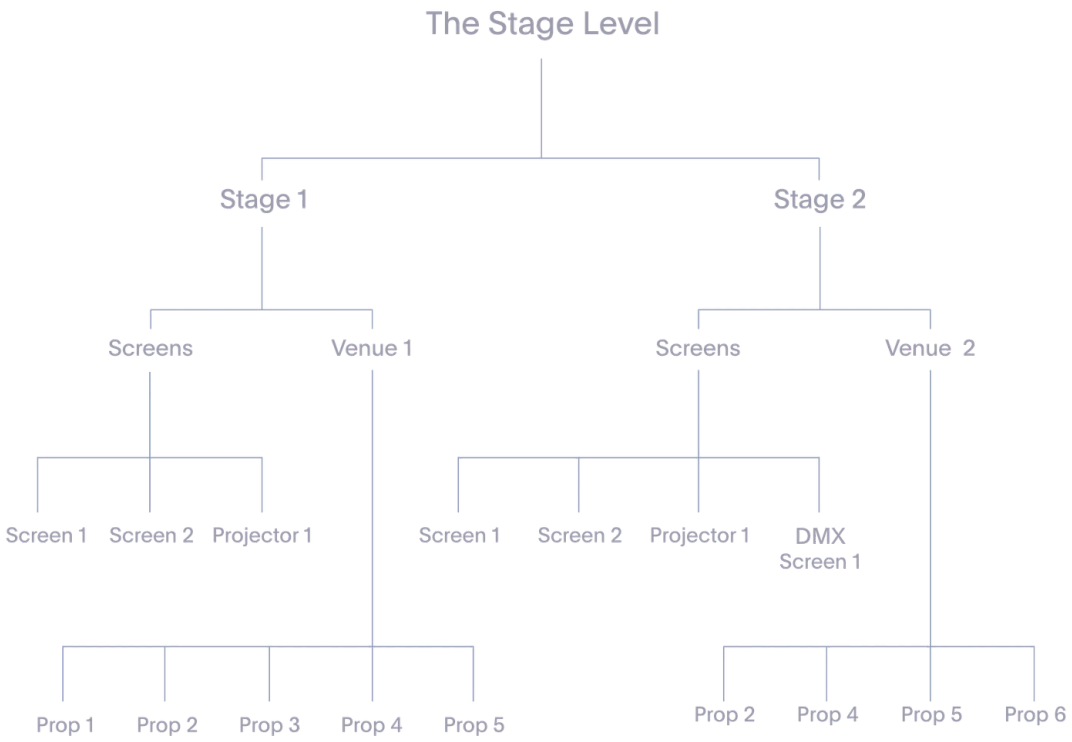
Venues

A stage can contain multiple **venues**. This is useful if you wish to create a range of stage designs, each venue representing a different stage design option, allowing you to quickly change from one design to another (during a client meeting for example).

Props : these venues are constructed from props. **Props** are objects which form the building blocks of your venue.

Multiple Stages

The Stage level can even contain multiple stages, which can be switched between quickly from the same d3 file.



Multiple Stage Levels

The Stage level can contain multiple stages which can be switched between quickly from the same project file, these stages can share the same screens, venues and props

Each stage you create can share the same screens, venues and props. In the example above there are two different stages in the same d3 file: **Stage1** and **Stage2**. Notice that both of these stages share certain screen types: **Screen1**, **Screen2** and **Projector1**; they also share specific props: **Prop2** , **Prop4** and **Prop5** . However, their overall prop configurations are different, hence the need to create two different venues; and their overall screen configurations are different, hence the need to create two different stages.

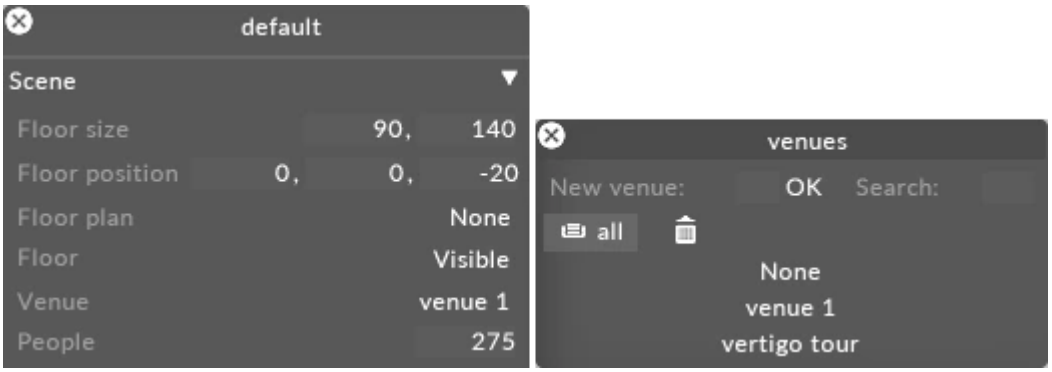
For information on adding, removing, and editing stages, screens, venues and props please read the following sub-chapters.

> **Note**
>
> For solid performance from Disguise hardware it is best to keep the total number of vertex points in your scene below about 150,000-200,000 vertices. This figure varies with the amount of video loading required.

Creating and Removing Props

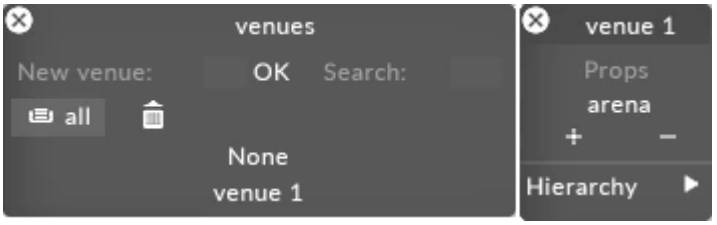
Creating a prop for a venue

- Right-click **stage** from the dashboard (bar at the top of the screen). This will open the Stage editor.
- Right-click **venue**. This will open up the Props menu which displays a list of all of the active props in the currently active venue.



A new project will by default contain one venue called **venue 1**, which itself will contain one prop called **Arena**.

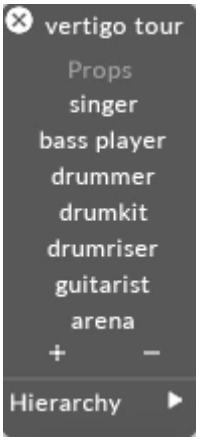
- Left-click +. This will open a Props manager that lists all of your props. It is important to note that the props in this list can be added to either, some, or all of your venues; you do not have to limit a prop to only one venue.



- Left-click a prop from the Prop manager to add it to the currently active venue, in this example venue 1. You can now edit the prop.
- If you wish to create a new prop, type the name of a new prop in the new prop text field and hit Enter. This will create the prop and add it to the currently active venue.
- Repeat these steps for each prop you wish to add to the currently active venue.

Removing a prop from a venue

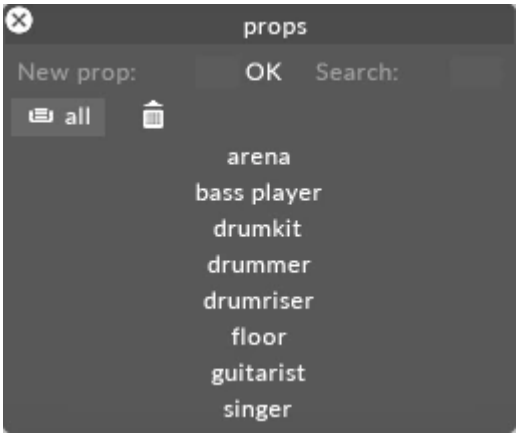
- Left-click and drag a prop , from the prop menu to the - button. This will remove the prop from the prop menu, although the prop itself will not be deleted: it is still listed in the Prop manager. Notice how this change has been updated in the Stage Visualiser.



Permanently deleting a prop

> **Warning**
>
> You can never permanently delete a prop if its active or referenced to from anywhere in the project.

- Left-click and drag the prop you want to delete from the Prop manager to **trash** (represented by a trash-can icon).



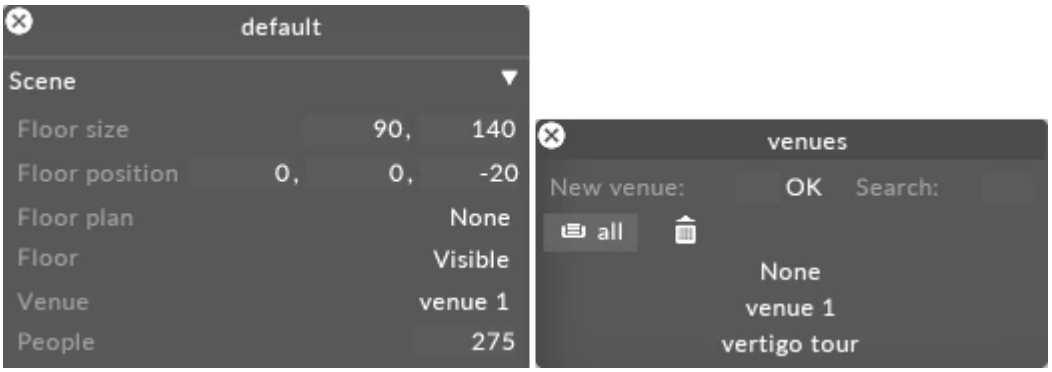
- Right-click **trash** and select **empty trash** to permanently delete the prop from your stage.


Options
New Box:
OK
Empty Trash
Unpack All (No Video)
Unpack All (With Video)

Creating and Switching Venues

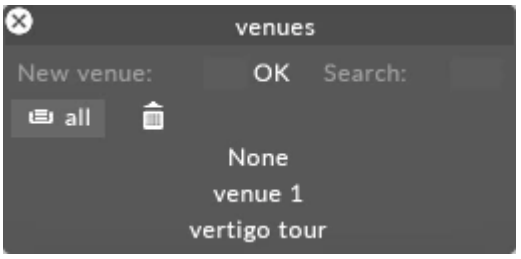
Creating a venue

- Right-click **stage** from the dashboard (bar at the top of the screen). This will open the Stage editor.
- Left-click **venue**. This will open up the Venues manager which displays a list of all of the venues you have created. The venues listed in the Venues manager are the same regardless of which stage is active, allowing you to share venues in multiple stages. A new project will by default contain one venue called **venue 1**.
- Type the name of the new venue in the **new venue** text box, in this example **venue 2** , and hit **Enter** . This will create the venue and add it to the list of venues in the Venue manager. You can now edit the venue by adding or removing props.



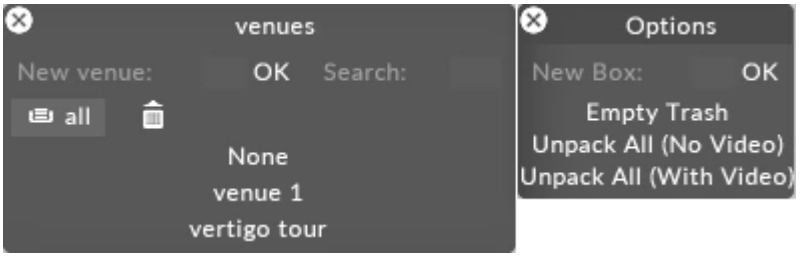
Switching from one venue to another

- Left-click the venue from the Venue manager you want to switch to. The venue will then be updated in the currently active stage.



Deleting a venue

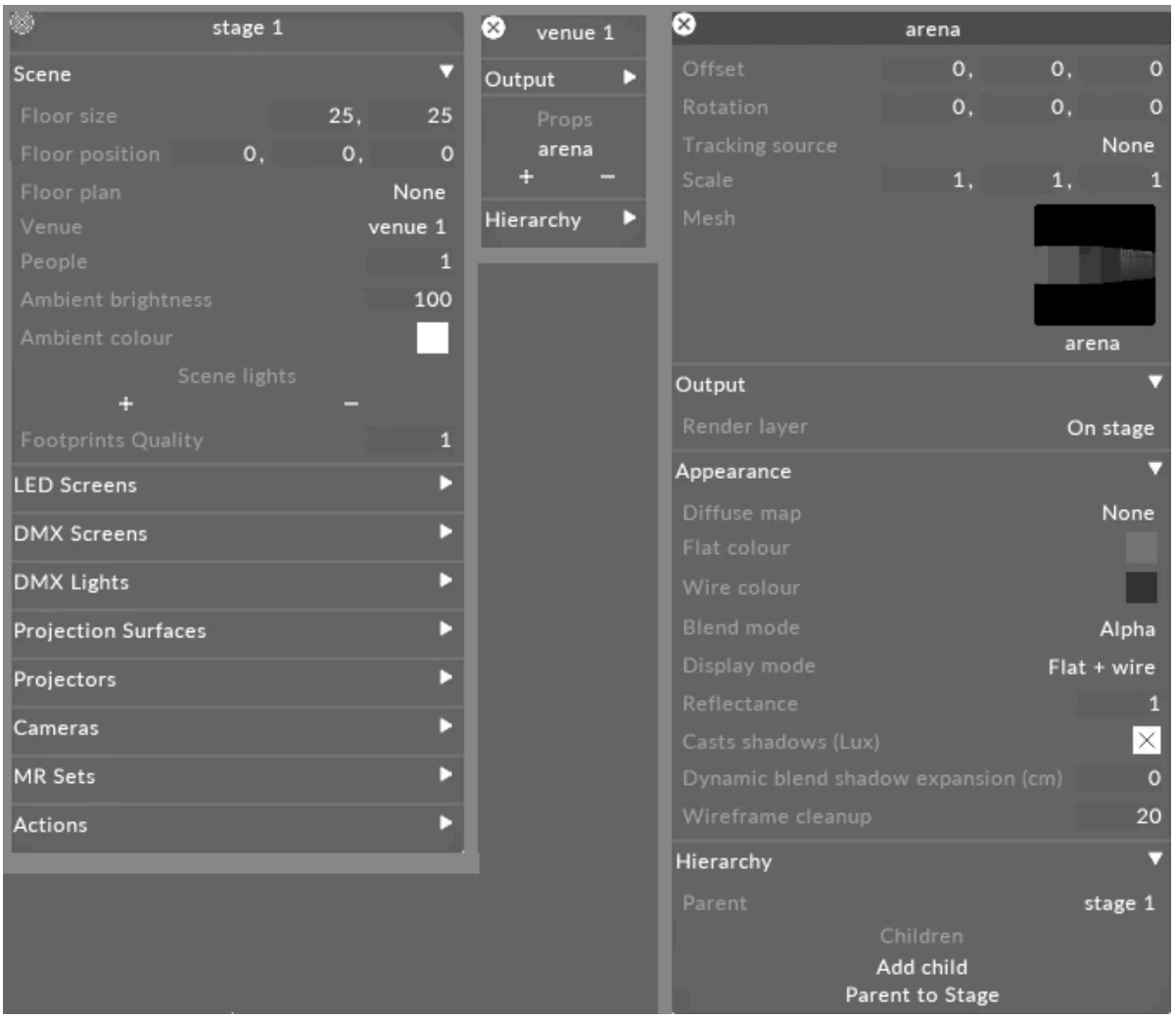
- Left-click and drag the venue you want to delete from the Venuemanager to **trash**(represented by a trash-can icon).
- Right-click Trash and select Empty Trash to permanently delete the venue.



> **Warning**
>
> You can never permanently delete a venue if its active or referenced to from anywhere in the project.

Editing Props

- Right-click a prop directly in the Stage level. or
- Right-click the prop's name from the list of props in the Props Manager menu. Read the Creating/Removing props sub-chapter above to learn how to open the Props Manager/Props menu.



Prop properties

Offset

Offset values are expressed in meters and are based on the original prop position along the x, y, z in the 3D application it was exported from.

Rotation

The rotation value is always based around the origin point in the 3D application it was exported from. For example, if you export a cube which is offset 10m to the right in Blender it will show up 10m to the right in the stage. When you change the rotation values it will rotate around the origin in Disguise, rather than the local origin of the object.

To avoid this, you should export the object at the origin 0,0,0 of your 3D application. Then offset it 10m in the stage. When you rotate the object in Disguise it will now rotate around its local axis.

Scale

The scale property is a multiplier. It multiplies the prop size with its original size as exported from the 3D application.

Mesh

This points to the Mesh file that defines the shape of your props. Selecting this property will open the Mesh object library, which shows all of the Mesh **.obj** files saved on your local hard-drive in the **Mesh** folder.



To change a prop mesh

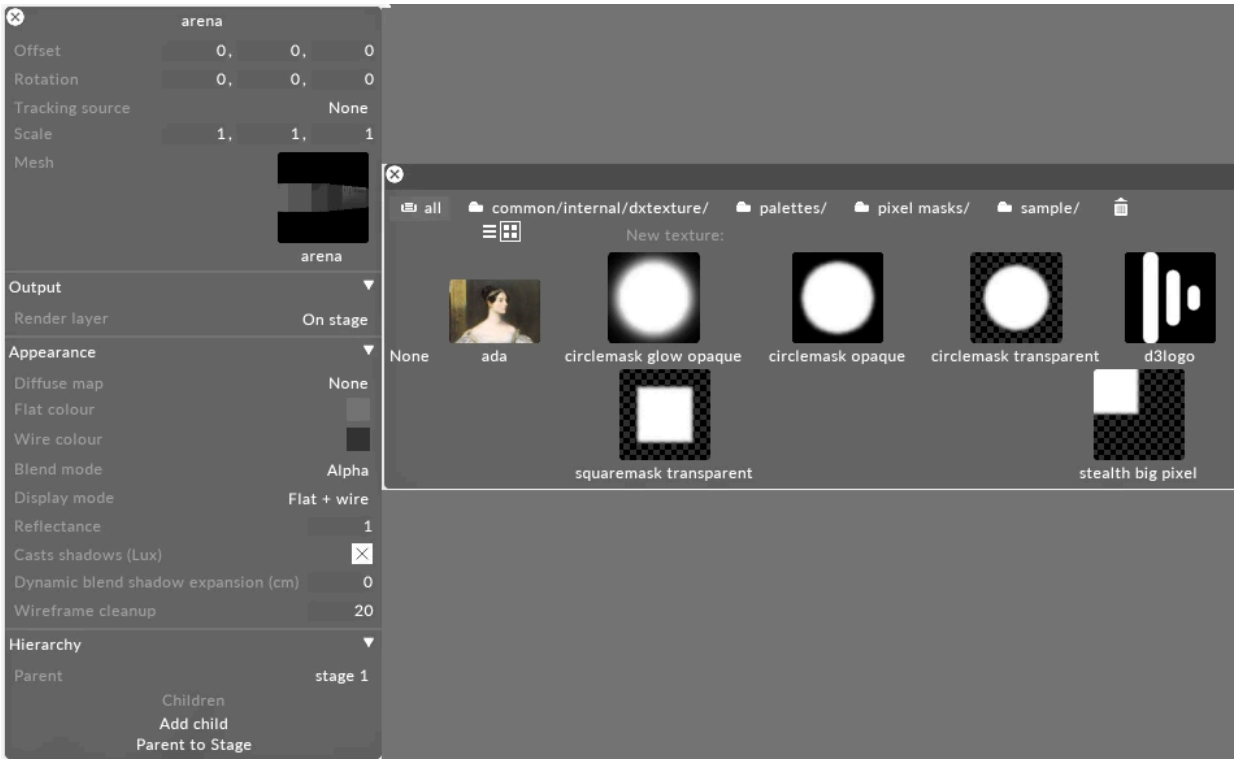
- Left-click **mesh** to open the Mesh object library.
- Left-click the mesh you want to replace the currently active mesh. This will update the prop mesh.

If you want to use any other shape than the standard prop meshes provided in Designer, you will need to use a UV-mapped **.obj** file of the prop.

Diffuse Map

This points to the Texture file that defines a prop's texture. You can use this property to create and apply a texture to a prop, allowing you to visualise your stage as realistically as possible.

Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the **DxTexture** folder.



Diffuse Map property being used to apply a still image to a prop from the Texture object library

To apply a texture to a prop

- Left-click **texture** to open the Texture object library.
- Left-click the texture you want to apply to the prop.

If you want to use a texture other than the standard still images provided in , you will need to use a custom still image file.

Flat colour

This property defines the color of a prop.

Wire colour

This defines the color of the wire-frame of the Prop. In order to see the wire-frame you need to set the props Display Mode to either **flat+wire** or **wireframe**.

Blend mode

This controls how the props contents are composited with the rest of the objects in the stage.

Over: should be used for non-transparent props.

Add: should be used for screens that are totally invisible when there is no content on them.

Alpha: should be used for screens that are partially transparent.

Display mode

This controls the different shading types of the prop.

Hidden: does not render the prop.

Flat: only renders a flat shaded prop.

Wireframe: only renders a wire-frame of the prop.

Flat+wire: renders a flat shaded prop with highlighted edges.

Wireframe cleanup

This defines the level of detail of the wire-frame rendering. The default value is 20. The lowest value is 0 which will render the most wire-frames, and the maximum value is 255 which will render the least wire-frames.

Further reading

See the Placing media files for a project sub-chapter to understand where to place a mesh **.obj** file and how to access it in the software. Also save the file to a supported file format.

Editing Venues

Unlike screens, venues do not have a series of properties which can be edited. Instead, venues contain **props**, which are objects that form the building blocks of your venue. Props have a series of editable properties including the option to add your own textures, all of which are explained in the Editing Props topic.

Venues and Props Overview

What is a venue?

A stage can contain multiple venues. This is useful if you wish to create a range of stage designs, each venue representing a different stage design option, allowing you to quickly change from one design to another (during a client meeting for example). When you create a new project there is already one venue prepared called venue 1. It only contains one prop called Arena.

What is a prop?

The venues are constructed from props. Props are objects which form the building blocks of your venue. A new project will by default contain a series of props contained in the Mesh object library. These props consist of a range of different buildings, a 3D man and a 3D woman.

Props are .obj meshes. If you want to use a prop other than the standard props available in Designer, you can import this prop. Please see the Mesh section within the Editing props sub-chapter for information on how to import a prop mesh into the software.

Heatmap

The heatmap render mode renders the view using colour coding for different lux levels. It is primarily used for visualising light levels within the scene.

All projectors and LEDs output white content in this mode. The graph on the right goes up to twice the camera's exposure max-lux level, so use that to scale it if necessary. This is the mode that will be used for Projector studies.

> **Note**
>
> **Please note**: Modern rendering modes such as Heatmap depend on appropriately powerful GPU choices. This feature requires significantly more GPU power than other rendering features in Designer. For project specific guidance, please contact **Support**.

Workflow

- Setup your project as normal by adding projectors, screens, venues & props.
- Change your visualiser camera to Heatmap mode, or make a new Camera to assign to a feed output.
- Define your target lux in the heatmap editor.

Enabling heatmap

1. Open the stage editor by right-clicking Stage from the dashboard or by right-clicking the floor in the visualiser.
2. Expand the Cameras tab, and right-click Visualiser camera to edit the visualiser camera settings. Alternatively, you can edit another camera and output that to the feeds.
3. In the camera editor, expand the Renderer tab and set the render mode to Heatmap.

You are now viewing the heatmap visualisation of the photometric quantity specified by the Light field under the render tab within the camera editor.

The key shown in the heatmap editor shows the colour scheme and scale of the heatmap.

Editing Heatmap properties

1. Open the heatmap editor.
2. Set the target value to be the preferred surface illuminance or luminance that you want to achieve.

Viewing heatmaps through cameras

1. Position the camera in the visualiser.



2. Left-click Feed from the dashboard.
3. Right-click on the camera feed at the top of the feed scene and left-click Add feed rectangle or alternatively hold ALT, left-click and drag an arrow from the camera feed to an available output head.

Heatmap properties

Target lux/nits

The value that determines the centre of the colour scheme, which is green.

Heatmap min

Manually sets the minimum value of the scheme.

Heatmap max

Manually sets the maximum value of the scheme.

> **Note**
>
> **Please note**: When you change target, this will change the minimum & maximum values to be zero for miniumum and double for maxiumum of the target value.

Lux

Lux is an enhanced rendering mode designed to simulate a more realistic impression of how a show would look.

> **Warning**
>
> Lux is an intensive performance mode and should not be used for playback!

Lux is most useful for showing clients a more realistic impression of how a project would look. This includes ambient lighting, shadowing of objects being hit by projectors based on physical lighting and scene settings. This allows you to make more technical & creative decisions in advance before going onsite.

> **Note**
>
> Modern rendering modes such as Lux depend on appropriately powerful GPU choices. This feature requires significantly more GPU power than other rendering features in Designer. For project specific guidance, please contact **support**.

Features of this rendering mode

- Physical lighting values
- Ambient light
- Ambient occlusion
- Projector shadows
- Bloom effect
- Diffuse maps

Limitations of the rendering mode

- Lux does not support transparent objects, that includes transparent pixel and population masks.
- Lux does not support blend modes other than ‘Over’, i.e. any non-opaque modes.

Scene Lighting

Lux aims to simulate light in an accurate way, as such the Scene is absent of light by default and only Projectors and Scene Lights can be used to introduce lights.

All objects will be affected by the Ambient Brightness in lux of the scene where ever they are. This must be accounted for when setting Exposure and is required to allow props to be seen.

The Ambient Colour effects the colour of this light. So a high Ambient Brightness and a red Ambient Colour will give everything a red tint.

Directional Lights can be used to add a sun-like light source to the scene, it has no source point but casts lights at a constant angle into the scene in parallel rays. This improves the appearance of a 3D object by providing shading to surfaces depending on their exposure to the Directional Light, much like an object in the real world. Directional Lights are visualised in the Scene at the specified Offset but this value has no effect on the lighting and visual results as the Directional Light has no source point.

The Reflectivity of an object can be set to adjust the amount of light reflected by the surface. This number is based on a perfect lambertian surface and represents the fraction of light that will be reflected. It does not indicate screen gain or simulate colour response.

> ⚠ **Warning**
>
> Scene lighting does not cast shadows.

Screens

All objects will be affected by any projectors that hit them. The brightness is determined by the projectors lumen value. Projectors will cast shadows.

LEDScreens, DMXScreens have physical luminance values based on NITS but do not cast light on other objects in the scene..

> ⚠ **Warning**
>
> DMXLights are not currently supported as lights.

Ambient Occlusion

Ambient Occlusion is an effect that emulates the occlusion seen in dark corners of objects in the real-world but is not related to any real lighting. It is only affected by the ambient light in the scene.

Ambient Occlusion Power can be changed via the Camera Editor and turned off to improve performance.

Enhanced Projector Footprints

Projector brightness is specified in Lux which is used for simulating the brightness of an image in Lux and also the resulting Lux readings in Heat Map mode.

In Lux mode, all objects will cast shadows when in the projector frustum for the use of previsualisation and checking of sight-lines. These shadows are not shown in the feed outputs.

Diffuse Maps

A Diffuse Map can be added to Projection Surfaces or Props to simulate how the projected light will interact with the surface. This is useful when projecting on surfaces that are not ideal for projection such as buildings with a stone surface or painted set pieces where the light that is reflected may be different than imagined due to the interference of the surface.

Workflow

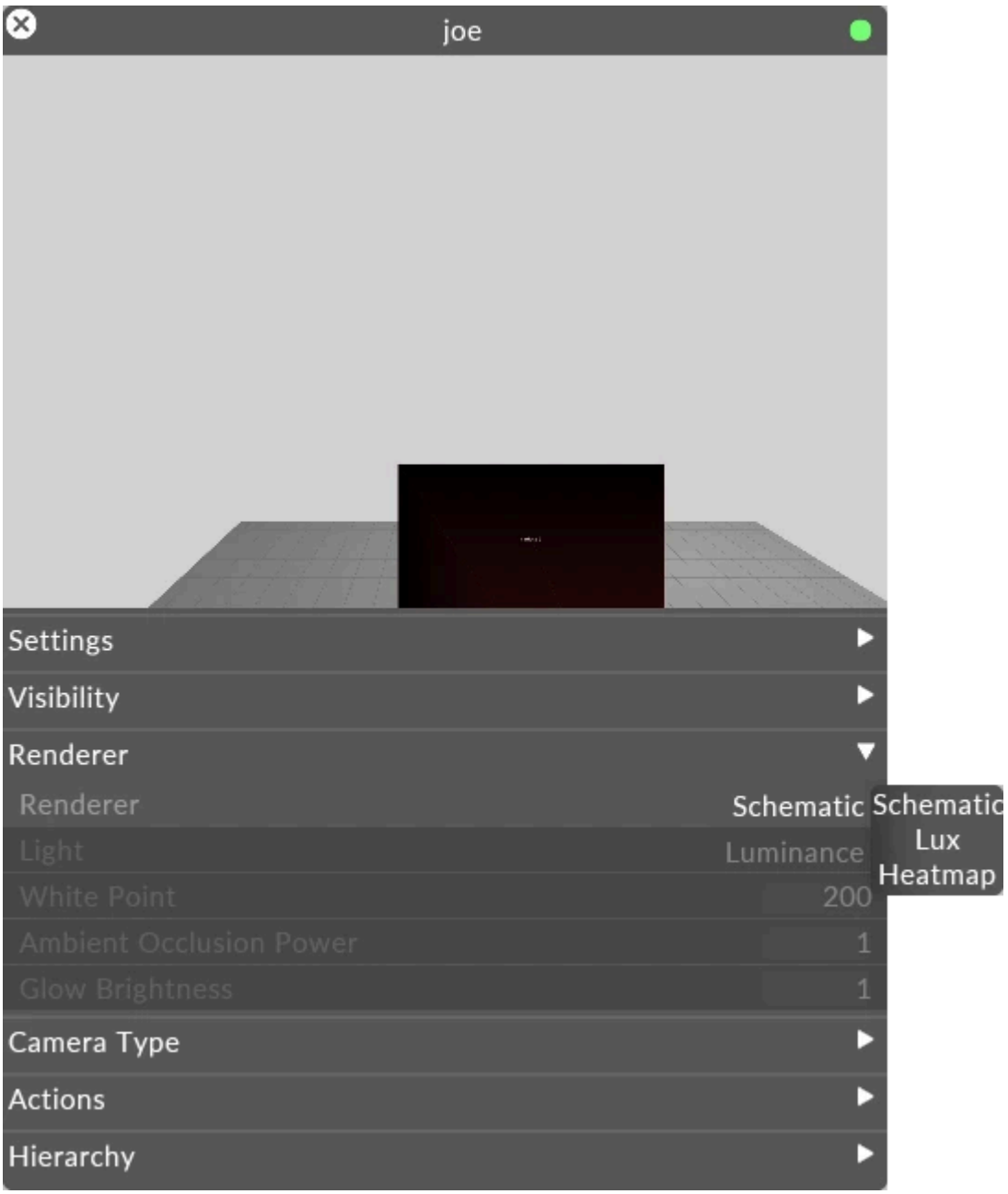
- Setup your project as normal by adding projectors, screens, venues & props.
- Define Ambient Brightness & Colour.
- Change your visualiser camera to Lux mode, or make a new Camera to assign to a feed output.

Example

Enabling lux

1. Open the stage editor by right-clicking **Stage** from the dashboard or by right-clicking the **floor** in the visualiser.
2. Expand the Cameras tab, and right-click **Visualiser camera** to edit the visualiser camera settings. Alternatively, you can edit another camera and output that to the feeds.

3. In the camera editor, expand the **Renderer** tab and set the render mode to **Lux**.



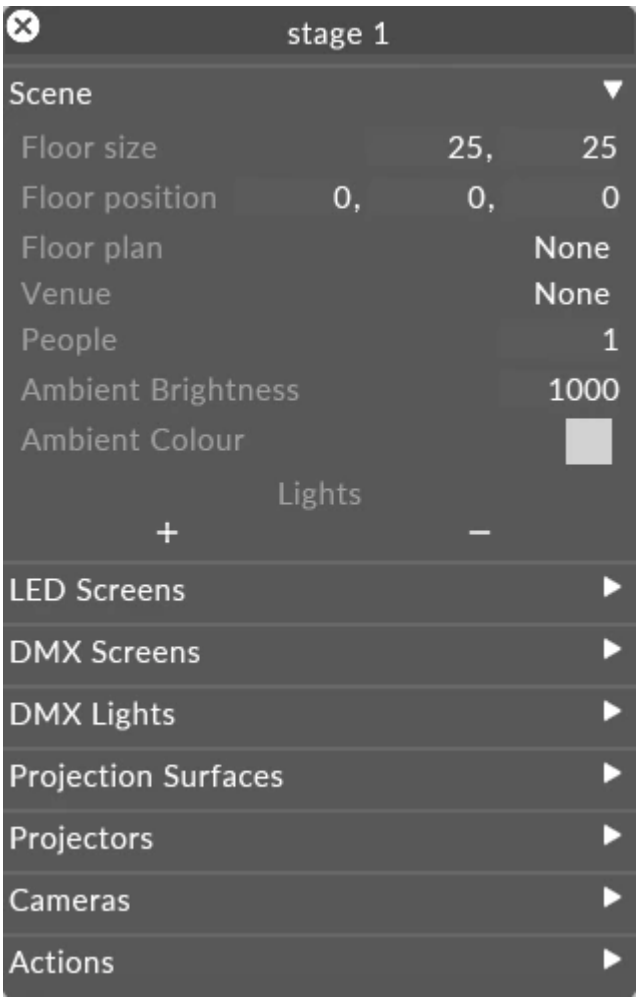
You are now viewing a Lux rendering of the scene based on the values defined in the visualiser camera.

For more information, see the Cameras topic.

Setting scene lighting

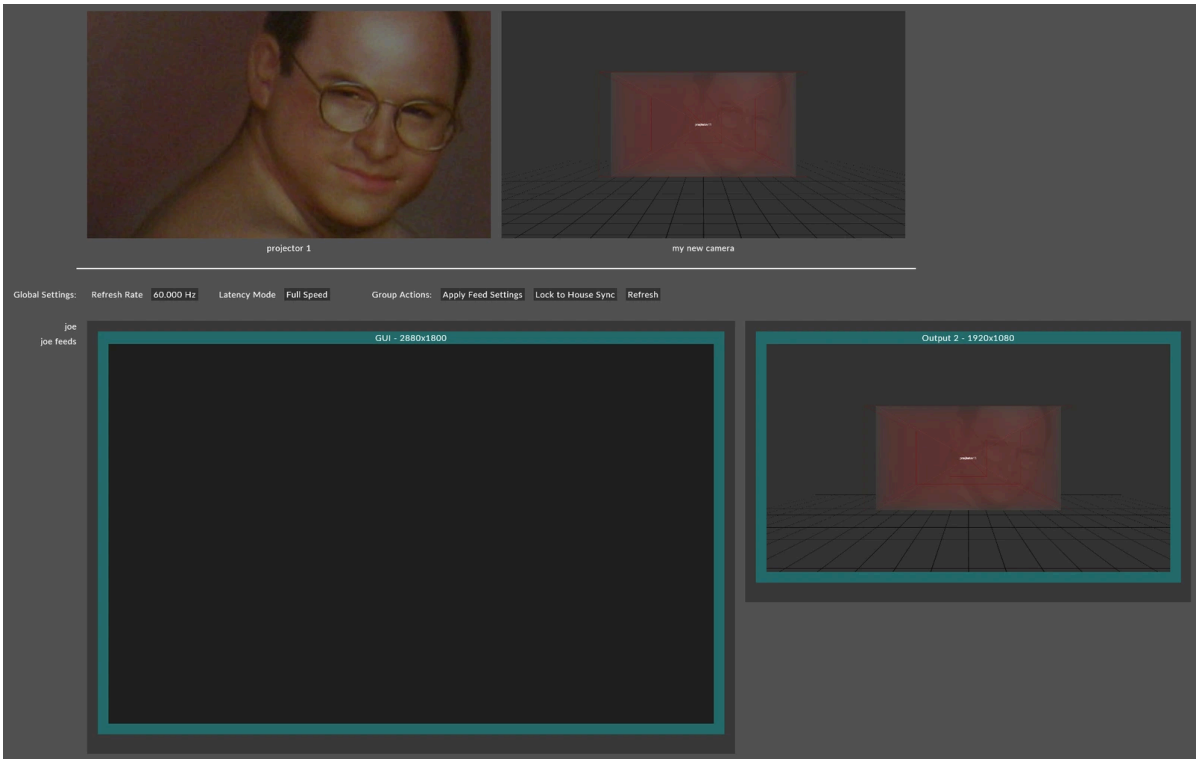
1. Open the stage editor by right-clicking **Stage** from the dashboard or by right-clicking the **floor** in the visualiser.
2. Expand the Scene tab.

3. Adjust the ambient light and colour values to suit.



Viewing Lux through cameras

1. Position the camera in the visualiser.



2. Left-click **Feed** from the dashboard.
3. Right-click on the camera feed at the top of the feed scene and left-click Add feed rectangle or alternatively hold ALT, left-click and drag an arrow from the camera feed to an available output head.

Schematic

Schematic render is an operational rendering mode that provides unlit, but accurate rendering of content in the stage visualiser.

Previous to r15, the schematic rendering mode was the only mode available in the stage visualiser settings. It is intended to be used during playback, sequencing and when maximum performance is needed.

Effectively communicate the technical aspects of your creative concept to the whole production team. View your stage, storyboards, and test content from any angle in the real-time 3D stage simulator.

Workflow

- Setup your project as normal by adding projectors, screens, venues & props.
- Change your visualiser camera to schematic mode, or make a new Camera to assign to a feed output.

Schematic is the default enabled mode of the three renderers.

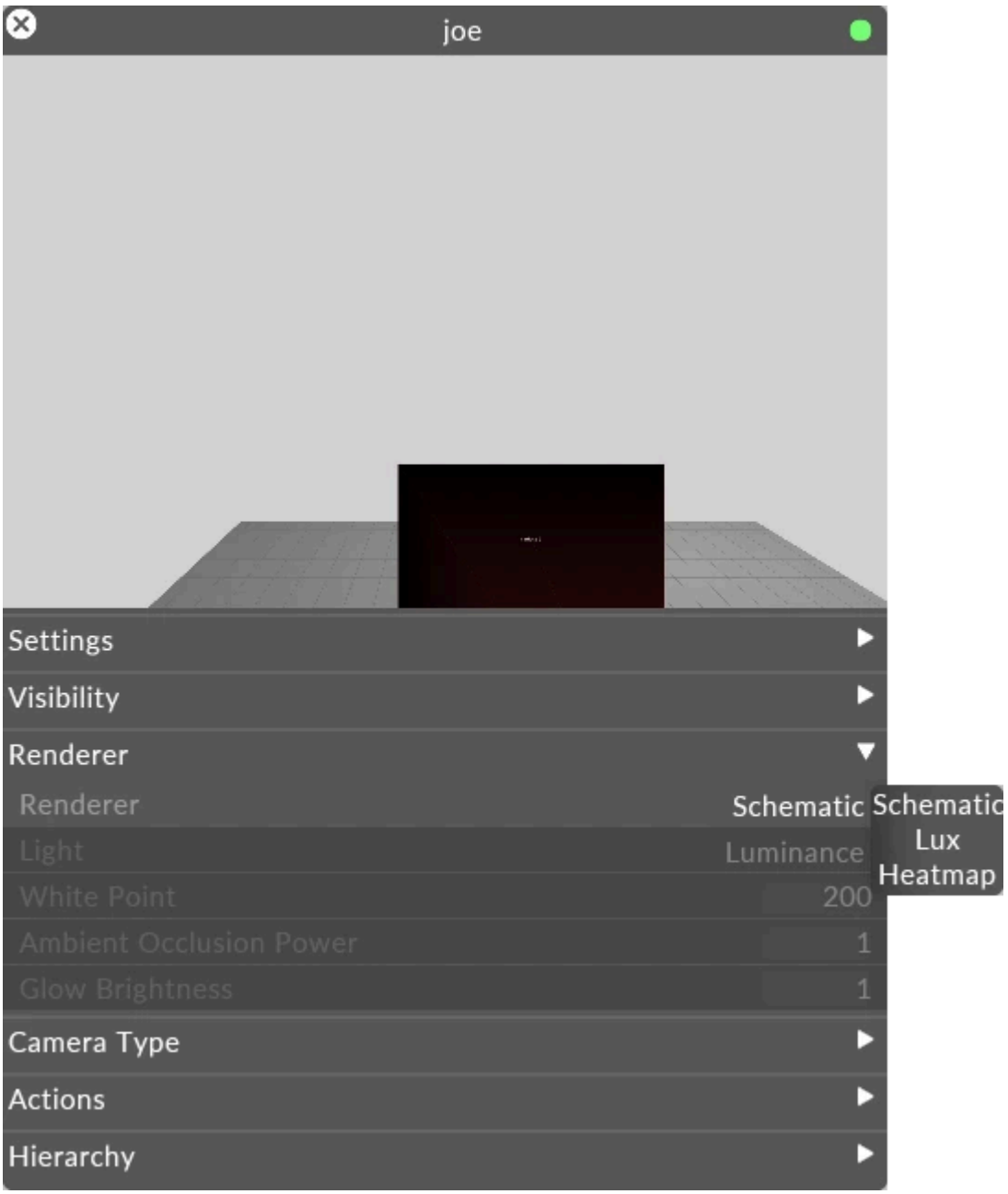
Example

> **Note**
>
> **Please note**: Schematic is the default enabled mode of the three renderers.

Enabling schematic mode

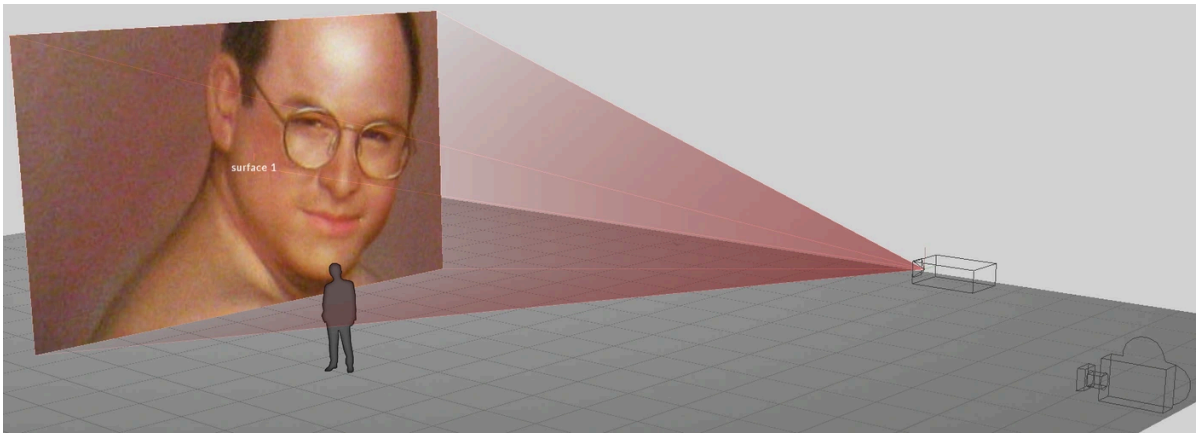
1. Open the stage editor by right-clicking Stage from the dashboard or by right-clicking the floor in the visualiser.
2. Expand the Cameras tab, and right-click **Visualiser camera** to edit the visualiser camera settings. Alternatively, you can edit another camera and output that to the feeds.

3. In the camera editor, expand the **Renderer** tab and set the render mode to **Schematic**.

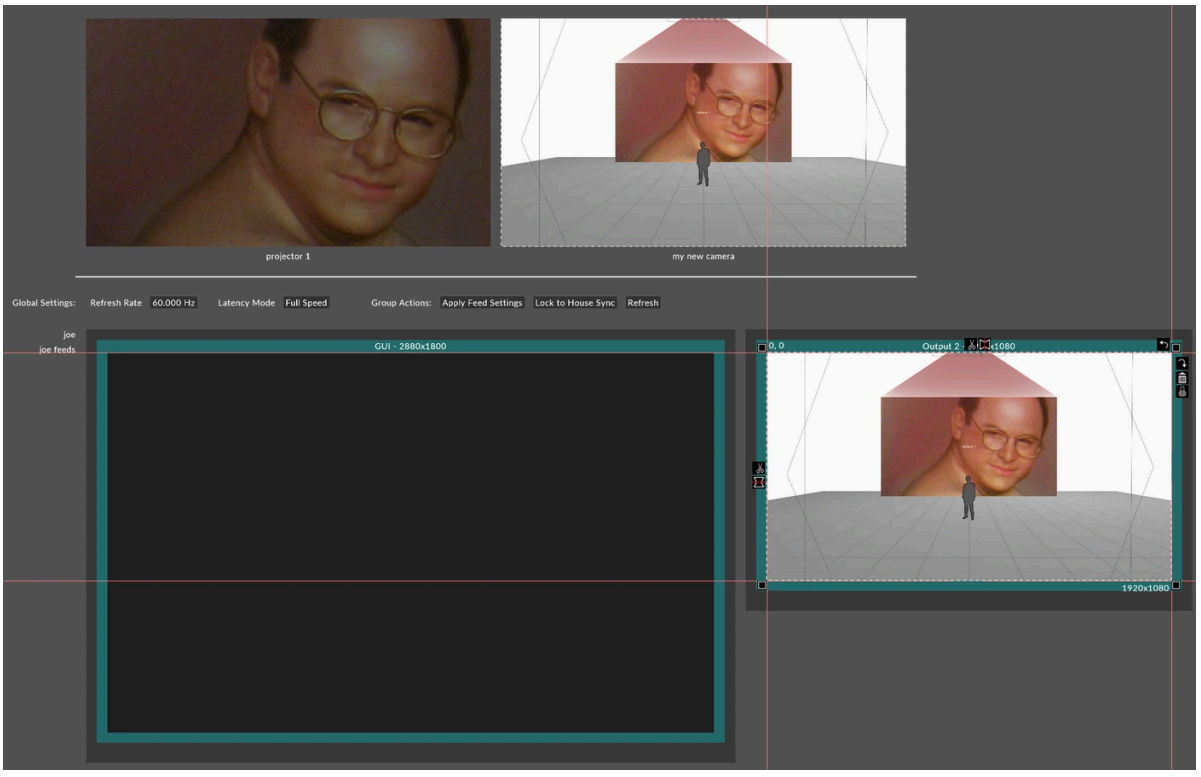


Viewing schematic rendering through cameras

1. Position the camera in the visualiser.



2. Left-click Feed from the dashboard.
3. Right-click on the camera feed at the top of the feed scene and left-click **Add feed rectangle** or alternatively hold ALT, left-click and drag an arrow from the camera feed to an available output head.



Visualiser Renderer Overview

Designer has three visualiser render modes. Schematic, lux and heatmap.

In r15, the visualiser rendering mode was changed to encompass two additional new modes. Heatmap and lux. Schematic was the default rendering mode for the visualiser before r15.

Schematic

Effectively communicate the technical aspects of your creative concept to the whole production team. View your stage, storyboards, and test content from any angle in the real-time 3D stage simulator.

For more information, see Schematic.

Lux

Use as a communication tool to bring together both the technical planning and creative vision of your project. Lux now includes ambient occlusion, directional light, camera exposure and enhanced projector simulation. Communicate ideas clearly and quickly to get everyone, from clients to operators, inspired and on board.

For more information, see Lux.

Heatmap

Heatmaps for projector studies using evidence based calculations - use the orthographic camera mode to ensure accuracy in positioning of objects. Export your projector study to provide paperwork evidencing the proposed setup against a target light level.

For more information see Heatmap.

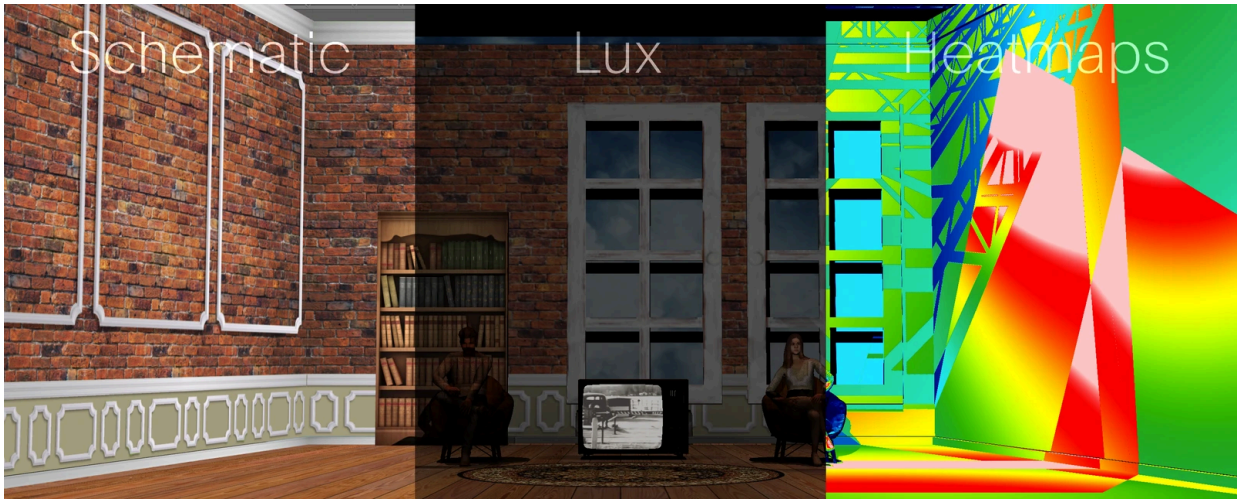


Image of the three different render modes, side by side

Adding and Removing Sections

Adding/Splitting a section

Right-click the bar at the point where you want to the start a new section and select **split section** from the popup menu.

Or, you can also hit **Alt + S**, which creates a section break at the current cursor position.

[Animated GIF: Splitting a section]

Removing/Merging a section

Right-click a bar within the section and select the **merge section** option from the popup menu. As a result, the current section will merge with the previous section.

Or, you can also hit *Alt + M** , which merges the section containing the current cursor position with the previous section.

[Animated GIF: Merging a section]

Creating & Managing Tracks

Creating a track

1. Left-click **track** in the d3 State editor (bar at the top of the screen). This will open up the Track manager.
2. Type in the name of the new track in the **new track** text field and hit **Enter**. The new track will be created, added to Track manager and activated on the Timeline.

[Animated GIF: Creating or managing tracks]

Switching from one to another

Select the track you want to switch to from the Track manager. The currently active track in the Timeline will immediately update.

Creating a set list

A show often uses many tracks. To make this easier to manage the tracks can be organised into Set List. A Set List can be created from either the Cue List or the transport manager.

It is important to use the Set List functionality to effectively manage what data the Cue List is showing.

1. Open the Cue List either through the Transport Manager, or by pressing **CTRL + G**.
2. Left-click the **Set List** tab.
3. Right-click the Set List, the Set List manager opens.
4. Create a new Set List in the manager or select an already created Set List.
5. Add the desired tracks to the Set List.

[Animated GIF: Creating a set list]

Cue Lists

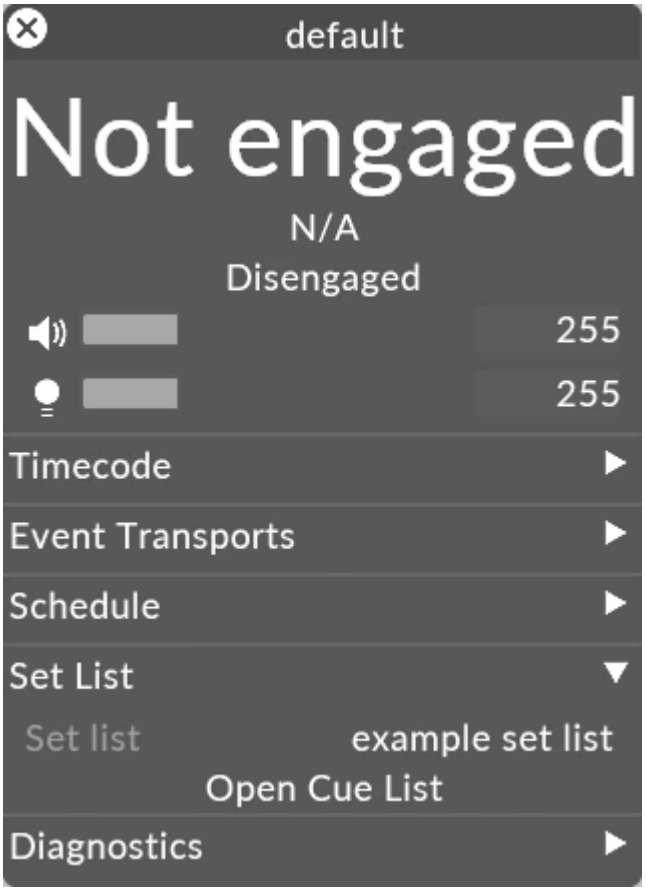
The Cue List shows a list of all sections & tags on the tracks within the currently active set list, allows users to trigger specific tags with a ‘go’ button, view where they are in the Set List, create new Set Lists and trigger the show from one single interface.

Opening the Cue List

The Cue List can be opened in two ways.

Option 1

1. Right-click **Transport** in the dashboard.
2. Expand the **Set List** tab.
3. Left-click the **Open Cue List** button.



Option 2

Use the keyboard shortcut - **CTRL G** to open the Cue List.

Using the Cue List

Auto scroll

The Cue List will scroll as the user plays through the timeline to allow the user to track where in the Cue List they are, without needing to manually scroll.

Track jump

Left-clicking on a track name in Cue List will take you to the beginning of that track in the timeline.

Active selection

The active Section will be highlighted in green, and the most recent cue will be highlighted in a lighter green.

Cue List Layout

- TC, CUE, and MIDI tags have their own **separate columns**.
- A Cue can contain up to one Tag for each Tag type.
- Tags of the same Cue are shown on **one line**.

Auto-Hiding and Showing Columns

Auto-Hiding

- **Empty tag and note columns** are hidden automatically.

Auto-Showing

- Adding an item from the **Track Widget** brings the column back without reopening the widget.

Row selection

- The row selection follows much the same behaviour as the list editor. Users can select a track for playback by hovering over the cue row and selecting it with a click. Users can then click the GO button to trigger that cue, or the note or tag columns to edit.

- Users cannot select more than one row.
- Once a track is selected, users can select other tracks by pressing up and down.
- User can press **CTRL + UP** to jump to top of list.
- User can press **CTRL + DOWN** to jump to bottom of list.

Adjustable size

Users can adjust the width as well as height of the widget by hovering over the edge, then left-clicking and dragging when the arrow icon is visible. The note column will truncate text (in the middle of the text) if there are large strings in the note column.

Removing tracks from the Cue List

If the Set List is set to Automatic, then all tracks in the project will display in the Cue List. However, this is inefficient and can cause performance issues with large projects; therefore, we recommend the use of Set Lists.

Removing a track from the Cue List can be done by specifying a Set List that does not contain that particular track.

Set List Configuration

A show often uses many tracks. To make this easier to manage, the tracks can be organised into a Set List. A Set List can be created from either the Cue List(cue-list) or the Transport Manager.

It is important to use the Set List functionality to effectively manage what data the Cue List is showing.

1. Open the Cue List either through the Transport Manager or by pressing **CTRL G**.
2. Left-click the **Set List** tab.
3. Right-click the Set List to open the Set List manager.
4. Create a new Set List in the manager or select an already created Set List.
5. Add the desired tracks to the Set List.

[Animated GIF: Creating a Set List]

Editing items within the Cue List

- Double-click the note field to edit or add a note to the track.
- Double-click the tag field to edit the tag after it has been added to the timeline.

Creating

- Tags and notes can be added directly in the Cue List if the column is visible.
- Use **Tab** to move through fields in the tag creation widget.

Deleting

- Clearing a tag or note field deletes it from both the cue and the list.

Searching the Cue List

As well as the standard text search (looking for matches in track name, notes and tags), you can filter your search by type, with the following syntax:

track: name will return only tracks that match the search text.

note: name will return only notes that match the search text.

tag: name will return only tags that match the search text.

cue: name will return notes and tags that match the search text.

DMX Transports Overview

DMX Transports allow Designer's transport controls to be controlled by external DMX sources, mainly lighting desks.

Contents

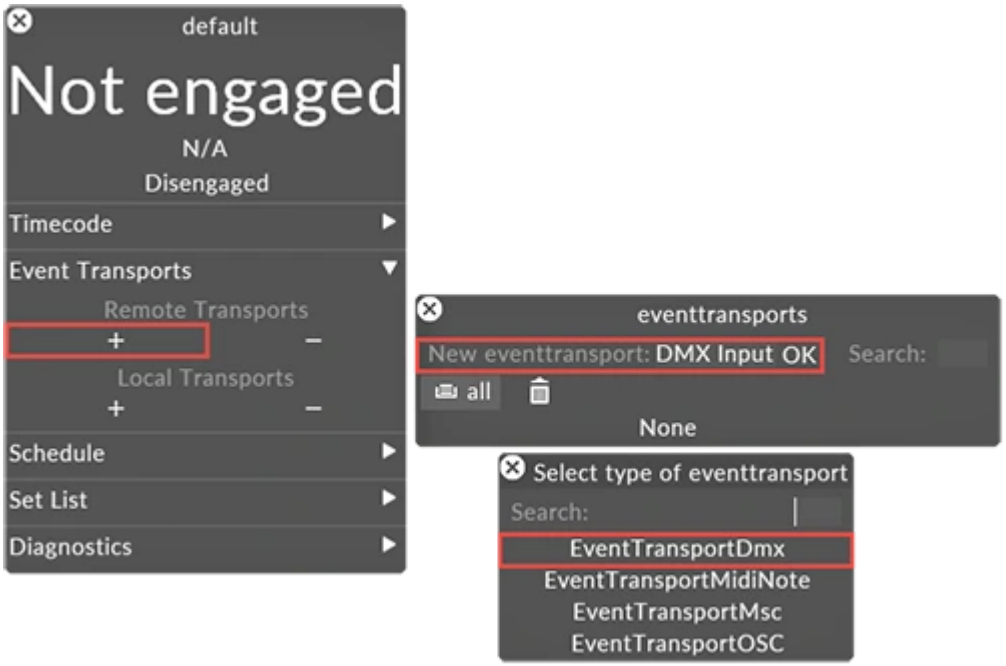
- Set up DMX Transports
- Switching tracks with DMX
- Triggering playback with DMX

DMX Event Transports Setup

This sub-chapter explains how to configure Designer to control the Timeline with DMX.

Creating an EventTransportDmx Object

1. Right-click on the Transport menu from the d3 State menu bar.
2. Under the **Event Transports** tab click the + icon and create a new **EventTransportDmx** object. This will open the **EventTransportDmx** editor.

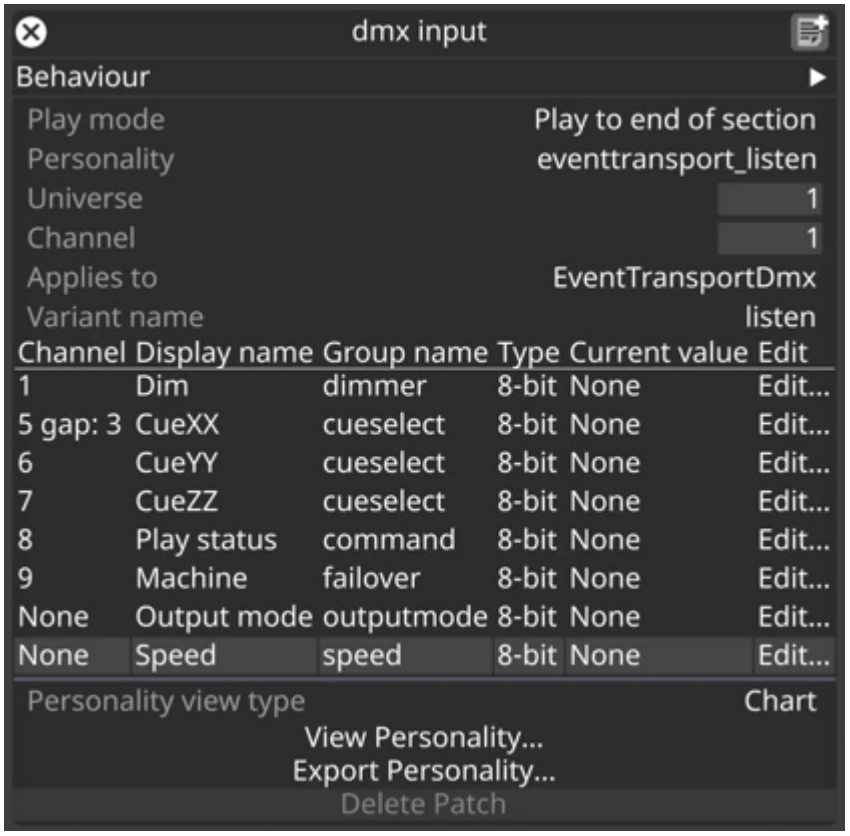


State Listen/Command operating modes

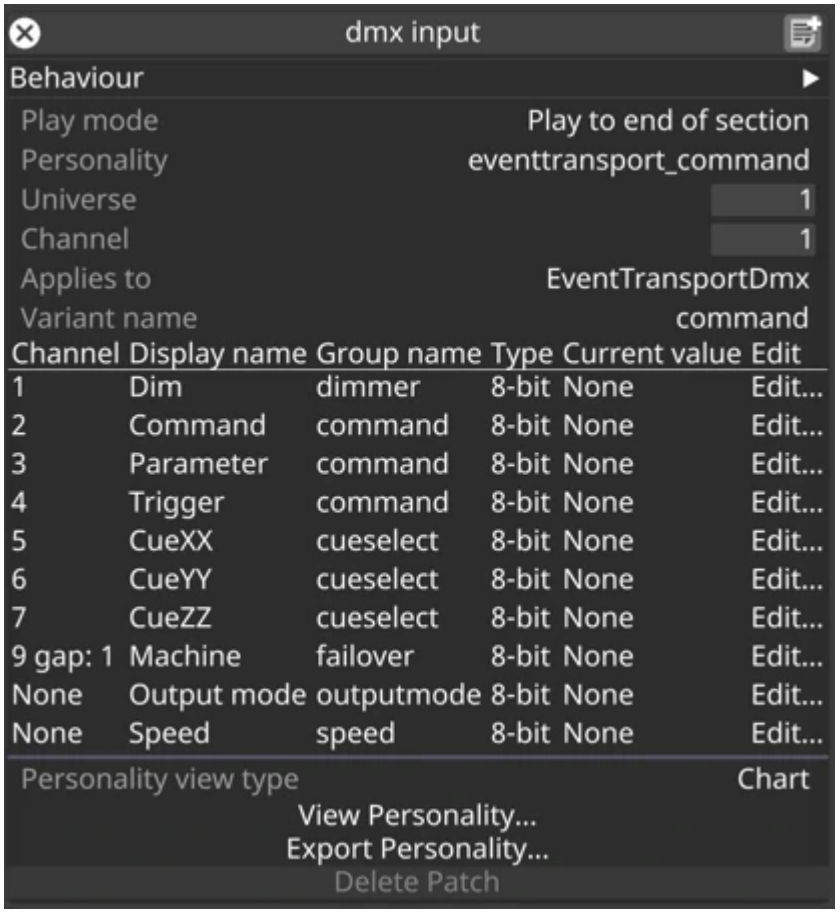
Before creating a EventTransportDmx object it is important to understand the difference between the state listen and command operating modes.

Designer offers two operating modes to utilise DMX as a show control protocol:

- State Listen mode
- Command mode



State Listen mode



Command mode

Behaviour Section

Cues Are

This option defines where cues are global or local to the current track.

When set to **global (all tracks)**, Disguise will change track if jumping to a cue that is not on the current track. This means that all cue tags need to be unique over multiple.

When set to local **(current track)**, Disguise will only jump to cues on the current track. This means cue tags do not need to be unique over multiple tracks.

Play Mode

This the play mode to be in when jumping to a cue.

Personality

This allows the user to select whether to use State Listen mode or Command mode.

State Listen mode

In State Listen mode, Disguise listens to the state of various channels to understand how it should be responding.

State Listen utilises five channels to control the Disguise show and reacts instantly to changes in these channel values. A list of the default channels used in State Listen mode can be seen in the section EventTransportDmx Personality properties above. It allows jumping to cues at any point on any track in your project and allows you to control the play mode in which it should be.

For most purposes the State Listen mode is the most appropriate methodology.

> **Note**
>
> **Please note**: If Designer is receiving a play status instruction via DMX, this overrides the GUI play status controls so after receiving the command from the GUI, the DMX instruction will override again. Cueing this parameter to 0 (Idle) will keep the play status and allow for the GUI controls to override.

Command mode

In Command mode, you build a command utilising two (or more) channels and then use a trigger channel (spiking to 255) to issue the command.

In this mode two actions are required for a command to be executed:

- You construct a command by setting values in various channels
- You issue the command using a trigger channel

> **Note**
>
> **Please note**: When a command has been triggered by spiking the trigger channel to 255, the trigger channel should be returned to 0 before triggering the next command.

The only exception to this is the brightness channel, which constantly matches the channel value.

Universe (1-base)

This is the universe Designer will listen on for DMX commands.

Channel (1-base)

This is the channel Designer will listen on for DMX commands.

Personality Section

Dim Channel (1-base)

This is the channel Disguise will listen to for any changes to the master brightness.

Cue XX Number (1-base)

The value sent to this channel will set the cue xx number for any go to cue commands when in command operating mode. In state listen mode, Disguise will automatically jump to the cue when the value sent changes.

Cue YY Number (1-base)

The value sent to this channel will set the cue yy number for any go to cue commands when in command operating mode. In state listen mode, Disguise will automatically jump to the cue when the value sent changes.

Cue ZZ Number (1-base)

The value sent to this channel will set the cue zz number for any go to cue commands when in command operating mode. In state listen mode, Disguise will automatically jump to the cue when the value sent changes..

Machine (1-base)

When set to non-zero, this channel triggers a machine failover event.

Output mode (1-base)

This channel sets the output mode to either:

- Fade Up
- Fade Down
- Hold

Play Status (1-base)

State Listen Mode only

This is the channel Disguise will listen to for play state changes.

Command Channel (1-base)

Command operating mode only.

This is the channel Designer will listen for commands. When the value sent to this channel is within range of a command, and the trigger channel is set to 255, Disguise will perform that command. For example, to trigger a next section command with the default settings, send a value in the range defined in the next section field (51-60 inclusive), and send the value 255 to the trigger channel.

Parameter Channel (1-base)

Command operating mode only.

The parameter is used when the track select command is issued. It defines which track to select.

Trigger Channel (1-base)

Command operating mode only.

This is the channel Disguise will listen for triggers. A trigger triggers the command the command channel is set to when the value is 255.

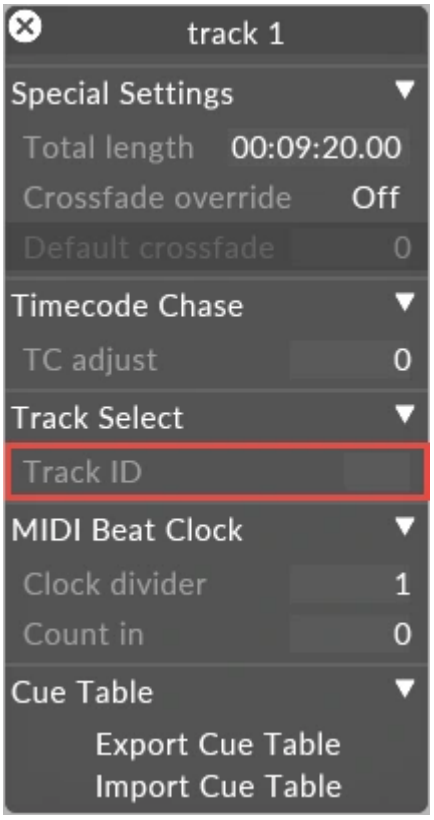
Speed (1-base)

This is the channel Disguise will listen to for any changes to the track player speed.

> ⚠ **Warning**
>
> Audio does not currently follow speed changes reliably, so this feature is off by default. Enable the `enableTransportSpeedControl` in Preview options to allow transport speed control.

Switching Tracks with DMX

1. Open the **Track editor** by right-clicking the titlebar of the Track Player.
2. Open the **track-select** section by left-clicking the tab.
3. Enter a value into the **track ID** text field (this value should be programmed into the lighting desk). In Designer the **track ID** should be written in decimal format. Track ID property of the Track editor is used to assign a note number to the current track, this number can then be programmed into the lighting desk.
4. Set the parameter channel value within the EventTransportDmx object editor to match the track ID value.
5. Set the command channel value within the EventTransportDmx object object editor to within `81...90` (default).
6. Execute the trigger (with a value move from `0 to 255`).



For more information on the Track editor, click here.

Triggering Playback with DMX

The format for Art-Net, OSC and MSC Cues is xx.yy.zz. (e.g. 3.1.1) and is communicated via three channels.

In State Listen mode, Disguise constantly monitors the three Cue channels. If a change in any of the three channels is detected, it will attempt to go to the specified Cue on the Timeline within Designer. These Cues can be set at any Timeline point in any track.

How to create a DMX Cue

For this example we are going to use the DMX cue 1.1.3.

1. Right-click on the bar you want to jump to and select the CUE field.
2. Type in the DMX Cue number using the CUE tag format (xx.yy.zz) into the tag text field.
3. Press Enter or the OK button to confirm.



To jump to this cue the DMX channels have be set to:

- Channel 5 = 1
- Channel 6 = 1
- Channel 7 = 3

> **Note**
>
> **Please note**: If Disguise cannot find the specified Cue, it will simply ignore the cue and not jump to any point. Cues can be in any position on the Timeline and on any track.

Jumping Track Bars

Jump units of time on the Timeline using keyboard arrows

You can control how to jump Track bars on the Timeline. This is useful if you want to, for example, find and create a cue point on the track from when the chorus is about to start later in a music video. To do this:

1. Right-click the d3 icon at the top left corner to open up the Program Settings menu.
2. Select **project settings** and open the **timeline control** tab.
3. Left-click **deferred jump**. This will point to two options.
4. Left-click yes to activate deferred jump. With this feature activated, you can now hit the left or right **Arrow** keys (while playing) to jump track bars without losing sight of the original bar you jumped from (this bar will also continue to flash).
5. Left-clicking **no** will deactivate this feature.

Jump to the next section using the angle bracket keys

- To jump to the next section rather than the bext bar, click the **greater than angle bracket** `(>)` key.
- To jump to the previous section click the **Less than angle bracket** `(<)` key.

Jumping to cues from a cue list

After creating sections and adding notes you can open a Cue List from which you can jump to a specific cue.

1. Hit Ctrl+G to open the Cue List.
2. Left-click the **GO** button, next to the name of the cue (the note name) to jump to the selected cue.



Jump Latency

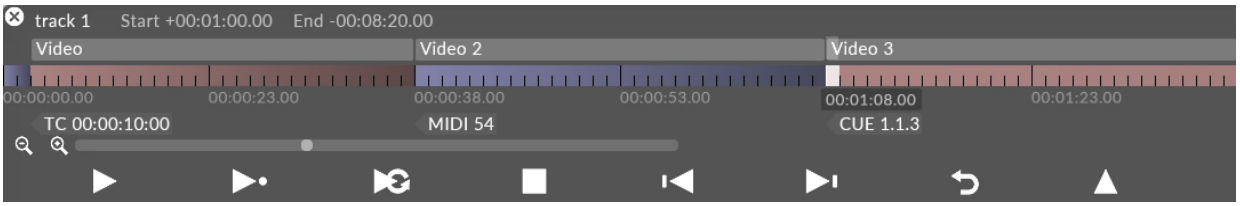
From r30.4 onwards, all track jumps are delayed by a number of frames before actioning. The extra latency is used in two ways:

1. To synchronise across all machines in the session,
2. For the prefetcher to begin prefetching content at the jump point, avoiding black frames.

This latency is set to 2 frames by default, but it can be modified using the `additionalCommandLatency` option switch. E.g. setting `additionalCommandLatency` to `3` which will provide an additional frame of latency to prefetch jumps. The exact amount of latency needed for your show depends on multiple factors, such as network complexity and video content load, but 2 is normally a safe number.

> **Note**
>
> If jump commands are being driven by external control e.g. DMX, there is an additional latency to consider - the protocol's tracking redistribution delay. We are working to isolate jump commands from the redistribution delay in future releases. In the mean time, this latency can be adjusted under Devices > Redistribution Delay.

Mixing MIDI Cue Types



Timecode cue, MIDI note cue and Show Control cue being used simultaneously on the Timeline

In many shows, it is necessary to use different types of synchronisation at different times. For example, one song may require MIDI timecode (MTC) chase, another may need MIDI Show Control (MSC) cues, and a third one may require midi-note cueing.

To enable this, Disguiseallows MIDI note and MSC commands to override its default timecode chasing behaviour. If d3 receives a MIDI note or MSC command while chasing timecode, it will immediately obey the command and stop responding to timecode. This mode is known as 'ignore MTC mode.

When Disguise goes into this mode, the Controls editor displays the message **ignoring MTC** below the timecode readout.

Once d3 is in ignore-MTC mode, it will not respond to timecode unless either the timecode value jumps to a different position or the timecode stops and restarts.

When in ignore-MTC mode, you can manually return to normal MTC chasing mode by disengaging and re-engaging (double-click on the **engaged** button of the Controls editor).

> **Note**
>
> **Please note**: if you select 'play-to-end-section or loop section play mode for MTC chasing, Disguise will go into ignore- MTC mode if it bumps into a section break while chasing.

Sending MIDI Timecode

You can configure Designer to send MIDI timecode (MTC) based on the position of the playhead on the timeline. This is useful if you want Disguise to control the cues of other devices in the show, such as lighting desks, fireworks etc. To see how to configure MTC output see the MTC layer page.

MIDI Note Setup

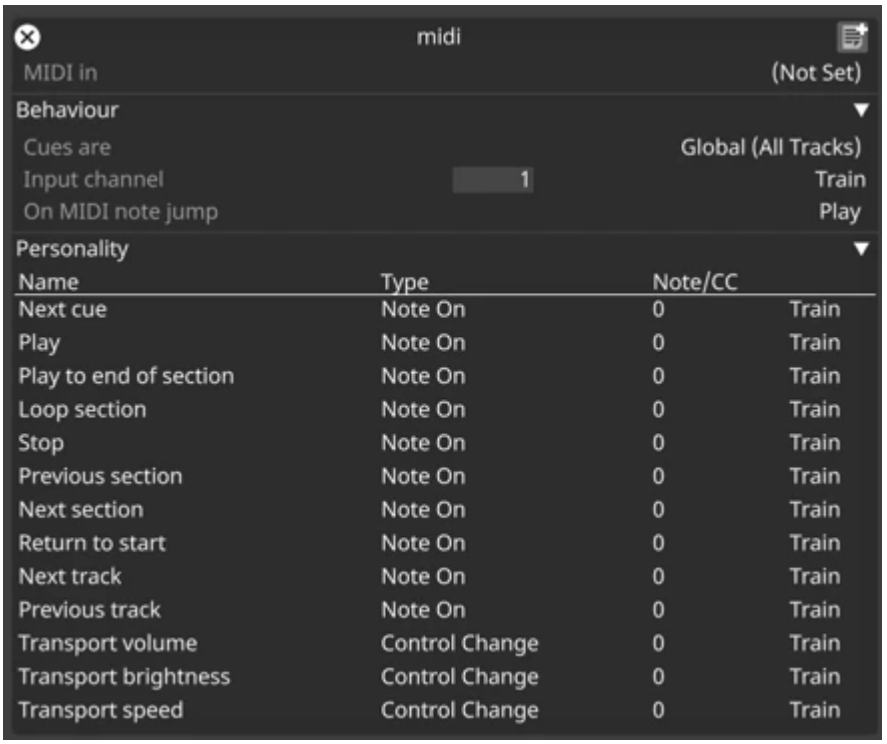
Designer can respond to MIDI notes in several ways. You can use MIDI notes to select different tracks, trigger transport commands (play, stop, next/previous section, etc) or to jump to particular sections.

Creating a EventTransportMIDI Object

1. Right-click the transport button from the dashboard.
2. Click the **+** icon under the Events Transport section and create a new Event TransportMIDI object. The EventTransportMIDI editor will open.
3. Make sure to press the **engage** button to enable the MIDI note input.



EventTransportMIDI Editor



MIDI Device

The MIDI device to use. You may need to download and install the driver for the MIDI device. Make sure that no other MIDI utilities such as MIDIOX are open while inputting to d3 as they may conflict with d3.

Input Channel (1 - 16)

Which MIDI channel to listen on.

Next-Cue

The MIDI note, in decimal, to use to jump to the next cue.

Play to End of Section

The MIDI note, in decimal, to use to set the play mode to play to end of section.

Stop

The MIDI note, in decimal, to use to set the play mode to stop.

Previous Section

The MIDI note, in decimal, to use to jump to the previous section.

Next Section

The MIDI note, in decimal, to use to jump to the next section.

Return to Start

The MIDI note, in decimal, to use to return to the first bar of the current track.

Next Track

The MIDI note, in decimal, to use to jump to the next track in the set list.

Previous Track

The MIDI note, in decimal, to use to jump to the previous track in the set list.

Transport Volume

The MIDI note, in decimal, to use to adjust the volume of the current transport.

Transport Brightness

The MIDI note, in decimal, to use to adjust the brightness of the current transport.

Transport Speed

The MIDI note, in decimal, to use to adjust the player speed of the current transport. The speed is scaled such that:

- Value 0 produces speed 0
- Value 50 produces speed 1
- Value 100 produces speed 2

Each value increment changes the speed by 0.02, up to speed 2.54 for value 127.

> ⚠ **Warning**
>
> Audio does not currently follow speed changes reliably, so this feature is off by default. Enable the `enableTransportSpeedControl` in Preview options to allow transport speed control.

On MIDI Note Jump

Defines what play mode to be in when jumping to a MIDI cue tag on the timeline.

Behaviour

This option defines where cues are global or local to the current track. When set to **global (all tracks),** Disguise will change track if jumping to a cue that is not on the current trac. This means that all cue tags need to be unique over multiple .When set to local **(current track),** Disguise will only jump to cues on the current track. This means cue tags do not need to be unique over multiple tracks.

Issuing transport commands based on MIDI notes

You can use MIDI notes to issue transport commands (effectively hitting the play, play-to-end-section buttons via MIDI notes).

- Open up the midi control editor of the EventTransportMIDI editor and type in the note number (in decimal format) into the box next to the command you want to control. If the value of these numbers is 0, no note is assigned.

When executing a command from the MIDI device the corresponding property will flash in cyan. The MIDI property will flash in cyan as soon as receives the command from the MIDI device.

> **Note**
>
> You can tag cues in the track as `channel.note` if they are channel specific, and just `note` to listen to all channels being sent. The `.` separator is entered directly in the MIDI tag field.

- **midi next-cue** is a composite command.
- If is stopped, **midi next-cue** will press the **play to end section** button.
- If is playing, it will press the **next section** button. This allows you to use a single command to start tracks and to hit cues.

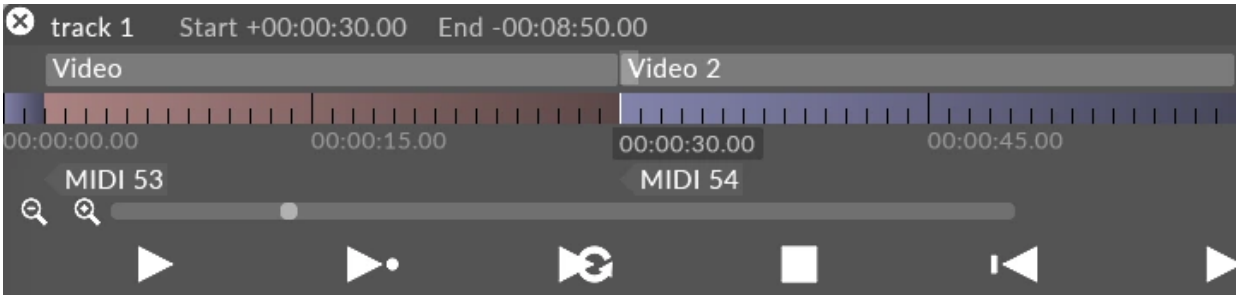
Tagging a specific section with a specific MIDI note

You can also tag any bar of any track with a specific MIDI note by editing the tag on that bar.

To do this:

Go to the bar, right-click the bar or press **Ctrl-T** , then type into the **Tag** text box the note number and any other label text you like in the note box. When receives that MIDI note, it will jump to that section.

For example, the following notes tag ‘section 1’ with MIDI note 53 and ‘section 2 ’ with MIDI note 54.



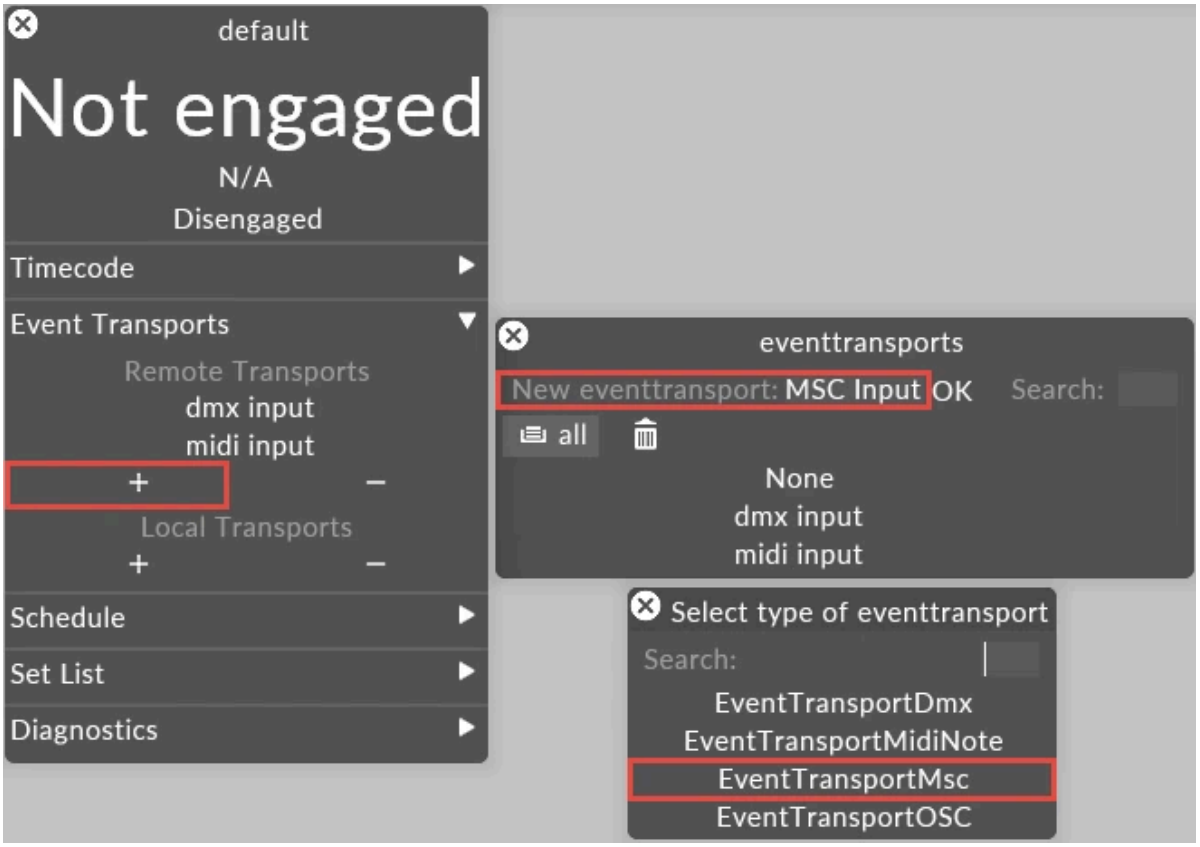
MIDI Show Control Setup

Designer can be set up to respond to MIDI Show Control (MSC) cues, usually issued by a lighting desk. Cue numbers are usually written as x.y.z, where x, y and z are integers. This allows for new cues to be easily inserted between existing cues. For example, if you have cues 1 and 2, you can insert a cue between them by numbering it 1.5, and so on.

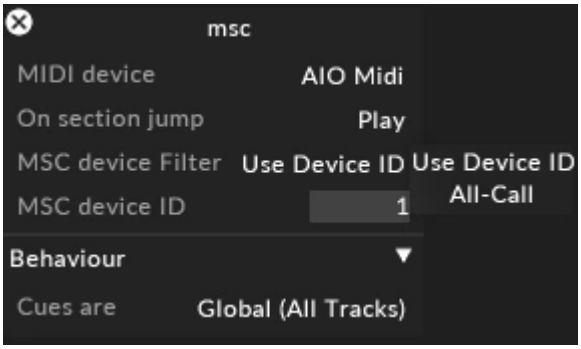
You do not need to take any special action in order to set up MSC cue triggers. You only need to set up the incoming MIDI device using the **EventTransportMSC** object.

Creating the EventTransportMSC

1. Open the **transport editor** from the dashboard by right-clicking the **transport** button.
2. Click the **+** icon under **event transports** and create a new **EventTransportMSC** object.



EventTransportMSC Editor



MIDI Device

The MIDI device used for MSC.

On Section-Jump

What play mode to be in when jumping.

MSC Device Filter

When set to Use Device ID, d3 will filter out incoming MSC commands that are only for this device.

When set to All-Call, d3 will listen to all incoming MSC commands regardless of the device ID.

MSC Device ID

Specifc the Device ID of the receiving MIDI Transport.

Cues Are

This option defines where cues are global or local to the current track.

When set to **global (all tracks),** d3 will change track if jumping to a cue that is not on the current track. This means that all cue tags need to be unique over multiple tracks.

When set to local **(current track)**, d3 will only jump to cues on the current track. This means cue tags do not need to be unique over multiple tracks

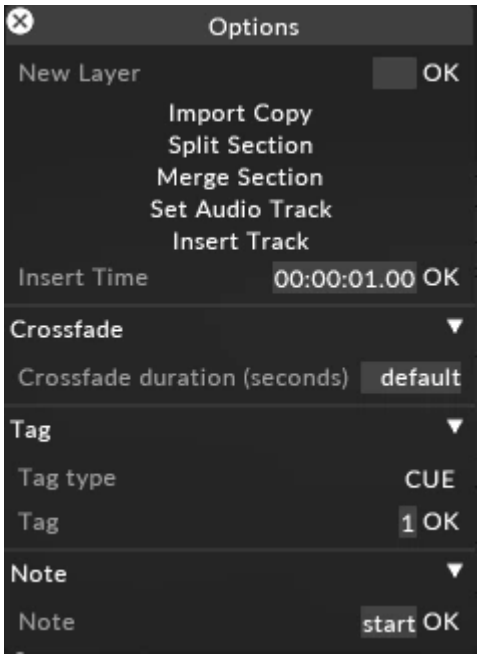
Jumping to cues using MSC

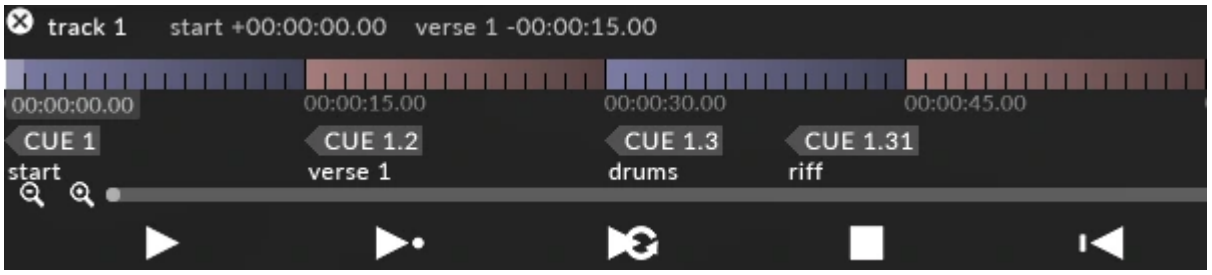
To jump to cues:

To mark a section of a track with a MIDI cue number, go to that section and right-click to bring up the options. Under Tag type, right-click and set the cue type to CUE. Then simply type in

the cue number you'd like into the Tag field and hit OK. You can add a note to this cue by filling in the Note field and hitting OK.

For example, the following note sets up cue 1 to be **start.**





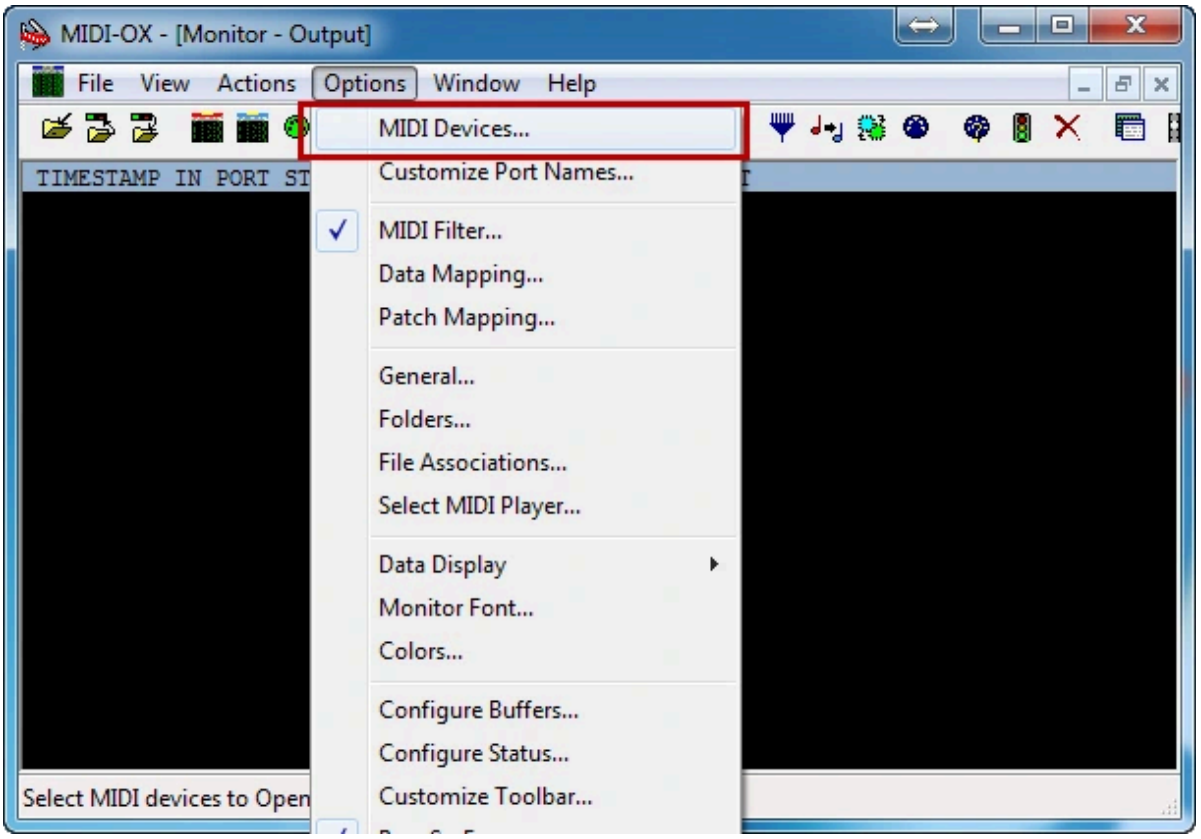
Marking MIDI Show Control cue points (CueNumber: MyCueLabel) on a track.

Troubleshooting MIDI

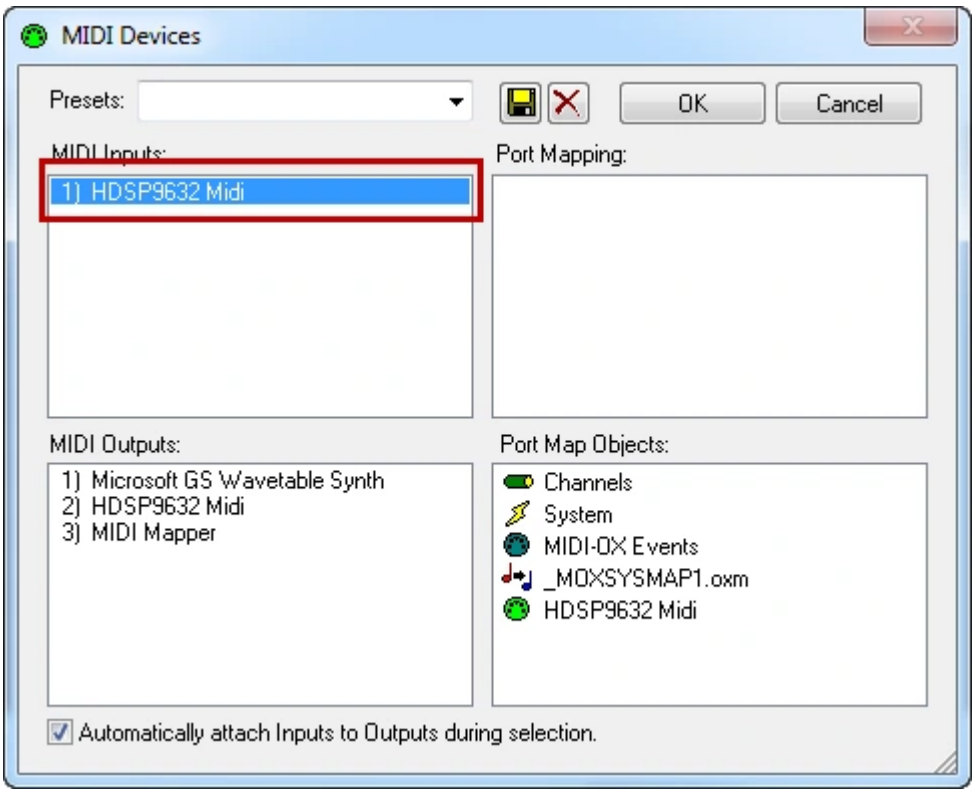
Proving MIDI Input

MIDIOX is a multipurpose MIDI toolkit and is very useful for troubleshooting any MIDI related problems. You can check the MIDI input coming from an external source by doing the following.

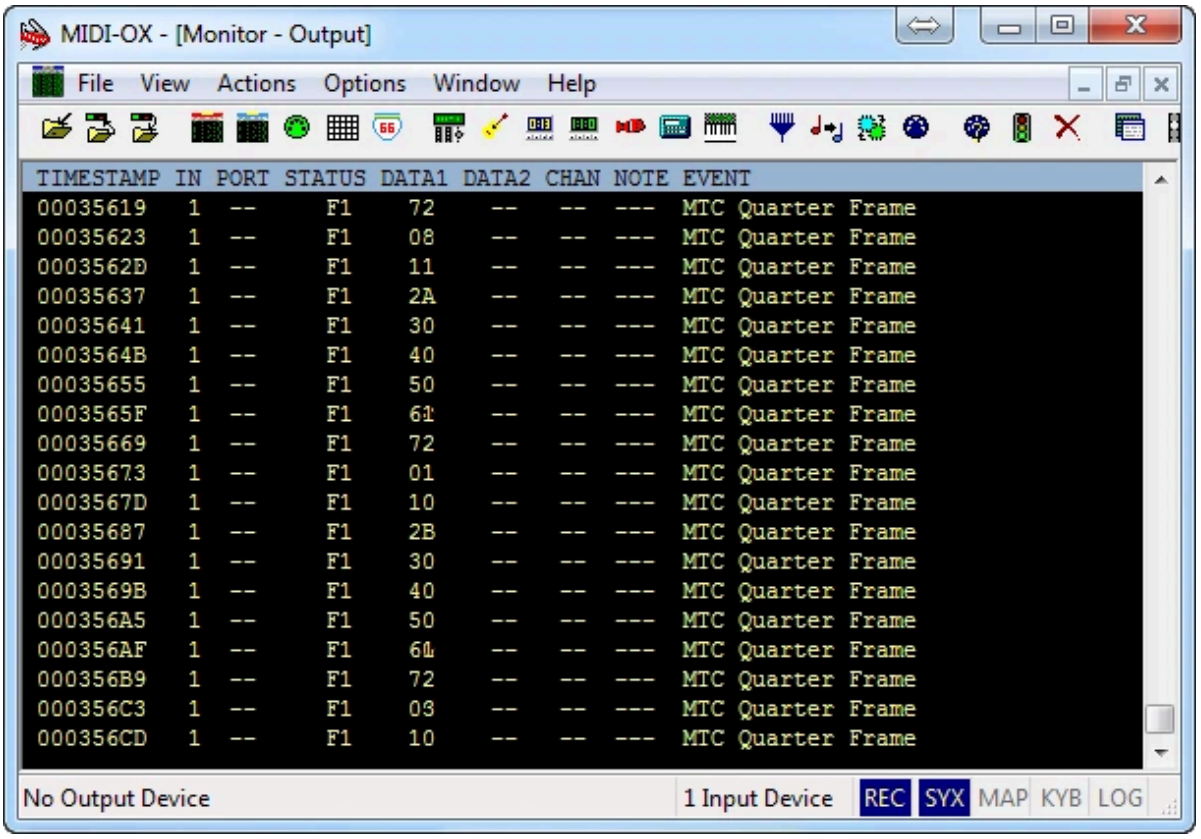
1. Open up MIDIOX, and select **Options > MIDI Devices**.



2. **Left-click** on you MIDI input. Click **OK.**



If there is a MIDI signal coming into the selected port you will see the data in the MIDI monitor window.


MIDI-OX - [Monitor - Output]
File View Actions Options Window Help
TIMESTAMP IN PORT STATUS DATA1 DATA2 CHAN NOTE EVENT
00035619 1 -- F1 72 -- -- --- MTC Quarter Frame
00035623 1 -- F1 08 -- -- --- MTC Quarter Frame
0003562D 1 -- F1 11 -- -- --- MTC Quarter Frame
00035637 1 -- F1 2A -- -- --- MTC Quarter Frame
00035641 1 -- F1 30 -- -- --- MTC Quarter Frame
0003564B 1 -- F1 40 -- -- --- MTC Quarter Frame
00035655 1 -- F1 50 -- -- --- MTC Quarter Frame
0003565F 1 -- F1 61 -- -- --- MTC Quarter Frame
00035669 1 -- F1 72 -- -- --- MTC Quarter Frame
00035673 1 -- F1 01 -- -- --- MTC Quarter Frame
0003567D 1 -- F1 10 -- -- --- MTC Quarter Frame
00035687 1 -- F1 2B -- -- --- MTC Quarter Frame
00035691 1 -- F1 30 -- -- --- MTC Quarter Frame
0003569B 1 -- F1 40 -- -- --- MTC Quarter Frame
000356A5 1 -- F1 50 -- -- --- MTC Quarter Frame
000356AF 1 -- F1 64 -- -- --- MTC Quarter Frame
000356B9 1 -- F1 72 -- -- --- MTC Quarter Frame
000356C3 1 -- F1 03 -- -- --- MTC Quarter Frame
000356CD 1 -- F1 10 -- -- --- MTC Quarter Frame
No Output Device
1 Input Device
REC SYX MAP KYB LOG

.

MultiTransport Controller

What is a MultiTransport?

Multitransports allow for the control of multiple tracks within a project simultaneously, instead of sequentially.

A Multitransport is comprised of multiple Transport Managers. More information on Transport controls can be found here.

Common uses of MultiTransports include dividing shows by main content tracks and live content elements, or in a multi-programmer scenario, where one programmer sequences control commands in one track, and the other sequences content in a new track. Then, at show time, both tracks can be controlled independently from each other, but still interact.

In the Workflow and Example tabs on this page, example uses of MultiTransports in broadcast, theater, and touring situations are outlined, but there are many creative uses of MultiTransports beyond those outlined here.

Example Workflows

Broadcast

Below we will compare the same broadcast scenario, with one project set up in a singular track setup, and the other with the use of a MultiTransport.

The project is of a TV Studio that requires the following elements: test patterns, studio graphic overlays, backgrounds, a live video feed, and Picture in Picture video elements for each different news segment (PiPs).

In this first example of a singular track setup, the project has multiple video layers, all stacked up on top of each other to determine hierarchy. The majority of these are backgrounds and studio graphics, all running beneath every other layer in the timeline (Video layers 8-13), with the live feed as its own section in the timeline. It is then up to the operator to navigate to the correct PiP for each news segment.

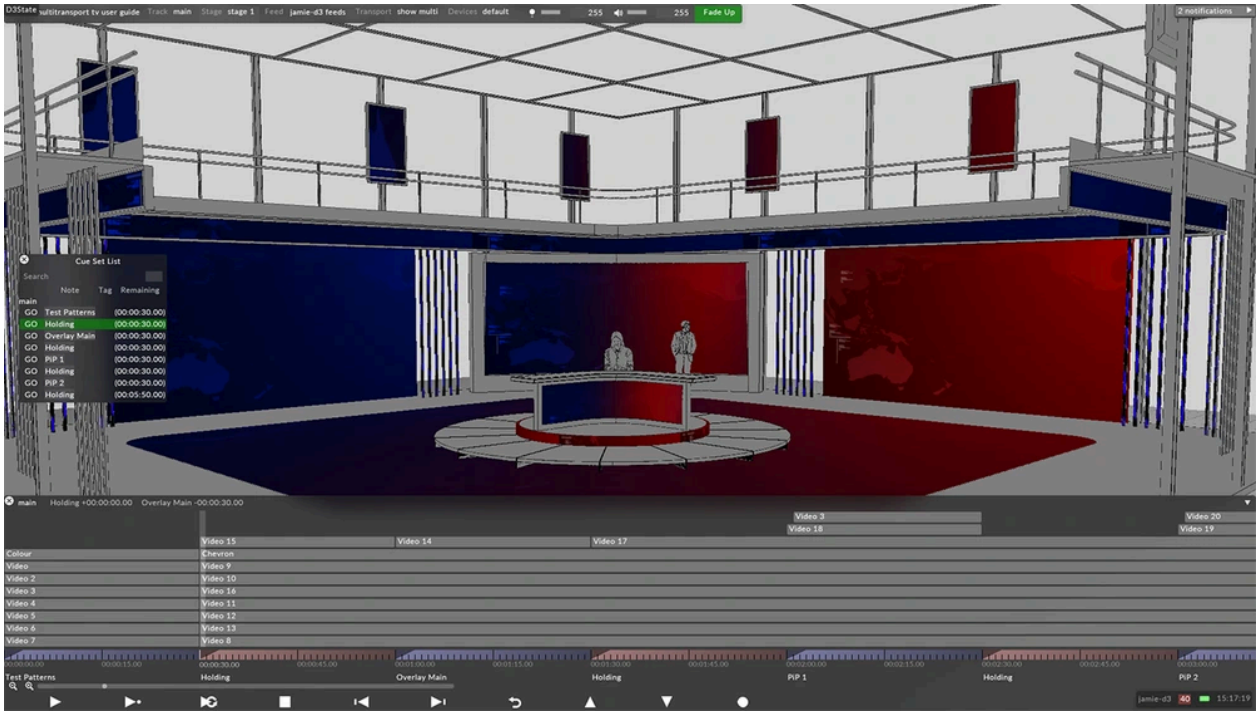


Image 1: Stacked layers

This creates a very rigid and manual timeline structure, in an environment that is needs to have a fluid and dynamic structure (for example, in the event of breaking news.) This is a reason a single Transport and Timeline structure will not be effective for this production.

In this second project, the production utilizes a MultiTransport to organize all their separate elements and allow for more flexible control.

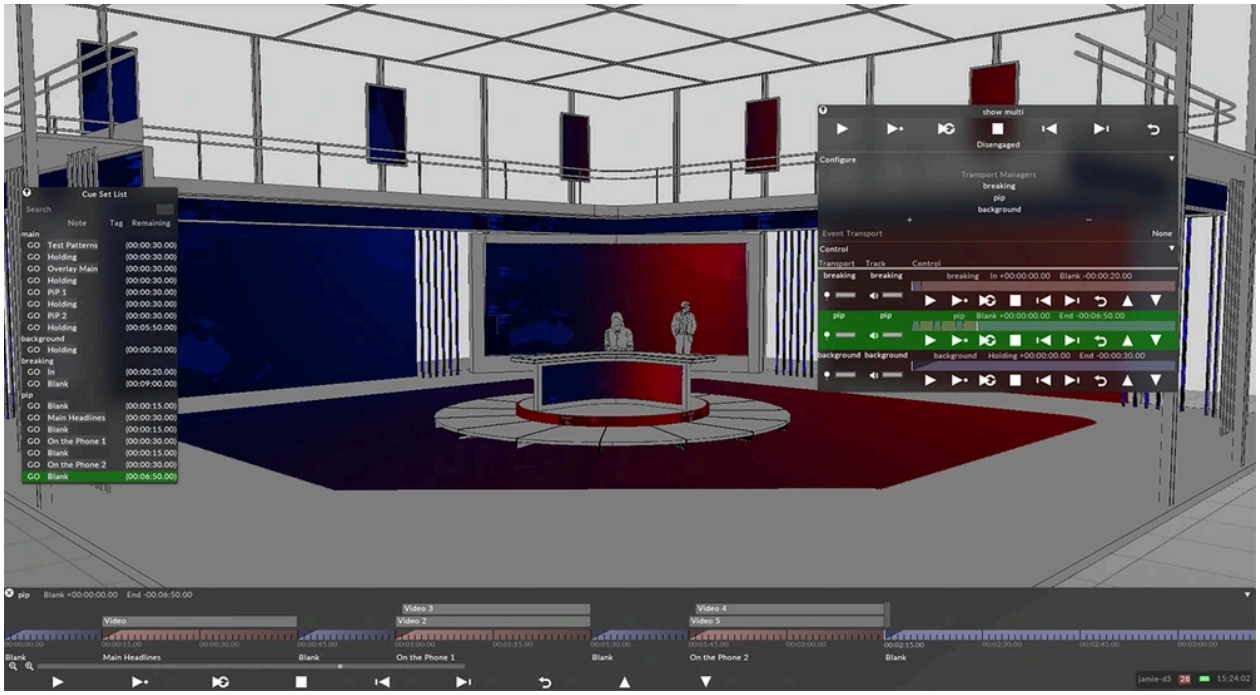


Image 2: MultiTransport

There are three separate tracks in the MultiTransport editor. The first is titled ‘breaking” and covers the breaking news issue from earlier. This track contains a graphic saying “Breaking News” and a live video feed of the reporter on the scene.

It can be made live at any point during the show by hitting the Play command for that track on the MultiTransport editor, and because it is above all other tracks in the editor, it will show on top of whatever other content is playing back on the assigned screens.

Because there is a universal crossfade option enabled on the track, the feed will always fade in and out at the assigned duration, so the operator does not need to worry about a hard cut when activating the live feed.

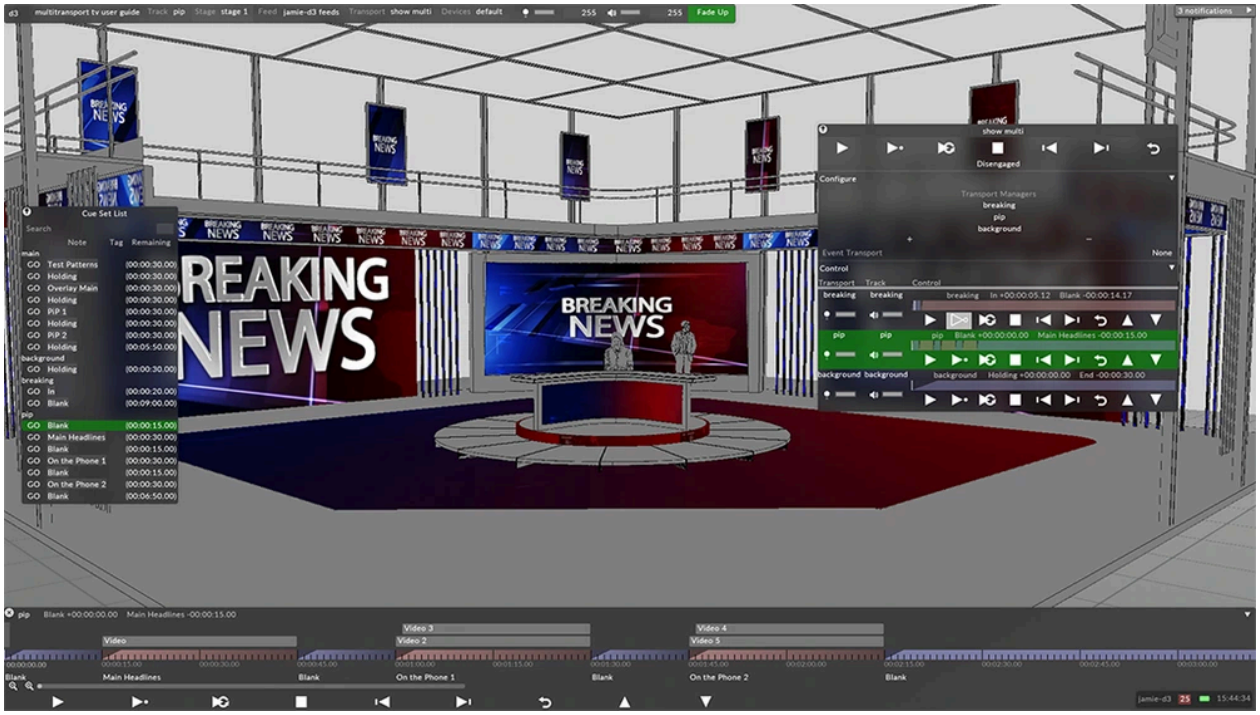


Image 3: Breaking News

The second track is titled PiP and contains sequentially cued news segments. Because each PiP is contained in its own section, they can be played back one by one by the operator until the anchor has completed discussion for each segment. Because the PiP track is beneath the breaking track, the breaking news live video feed will always take precedence over the PiP when it is activated.

The third and final track is titled background, because that is all it contains. It the lowest track, so all elements will appear on top of it. Because there is only one section, the operator can continually loop this background video for however long the broadcast is and does not have to worry about accidentally overriding it by cueing up a new piece of content in another track.

Finally, note that the cue list pinned to the left hand side of the GUI reflects all cues in all three of the tracks. This allows for great flexibility of the operator to control all separate graphic and video elements from one UI element. More information on the cue list can be found here.

Theatre

This example project is a theatrical show where the MultiTransport divides the Control Layers for the projector shutters from the content sequencing.

This can be useful in a tech rehearsal situation for any holds where the projectors need to be quickly shuttered and the commands have not been built into every cue, or a show where the timing of the projector control changes every night.

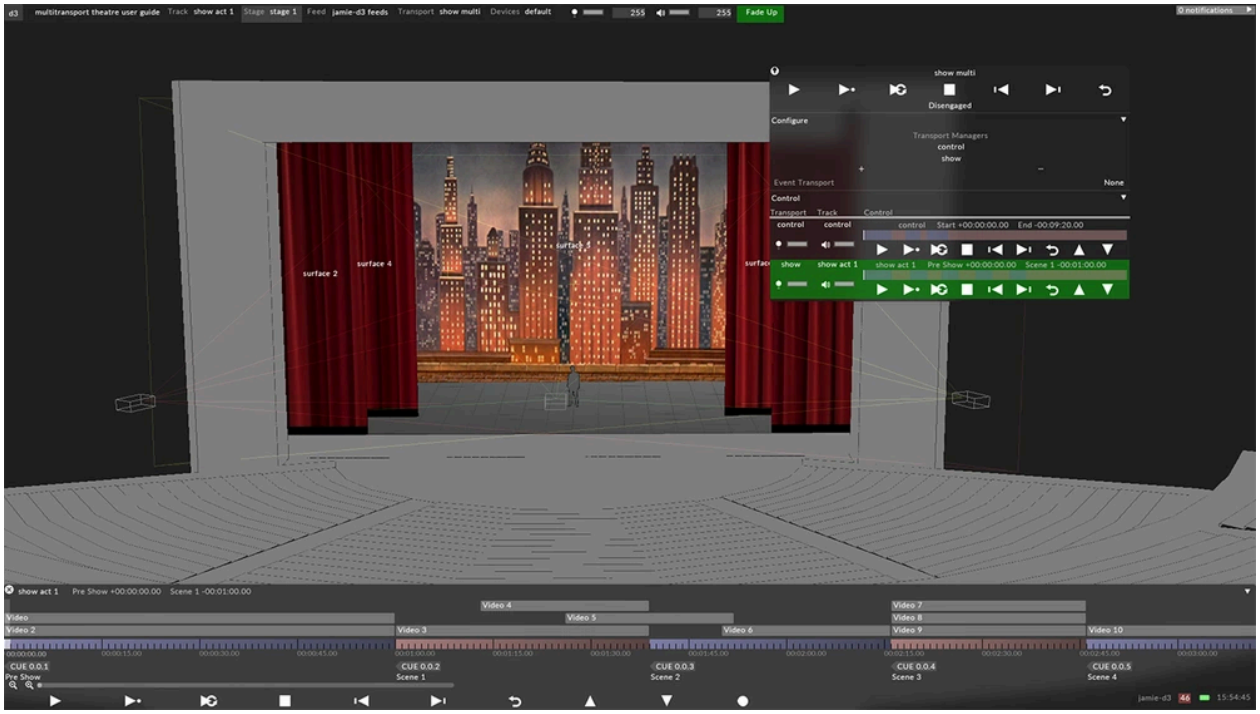


Image 4: Theatre

Concert Touring

In this example project file, the live video feed IMAG is one track, and all the song's video content is in the track called song 1 beneath it. This will allow the operator control of the IMAG live feed without having to cue it into every song's track, and is especially helpful when IMAG cues are being called by a camera director or stage manager. This is a similar concept to the broadcast studio, as it allows greater flexibility for a live show environment for unexpected cues.

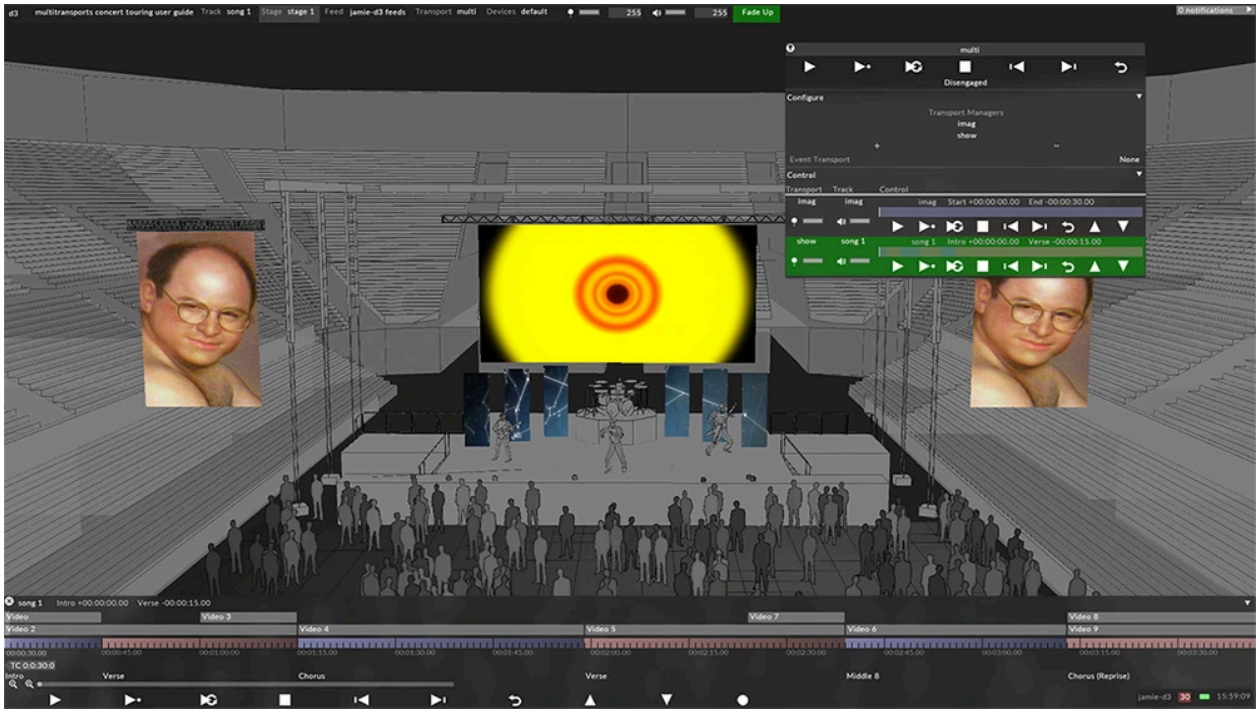


Image 5: Concert Touring

Breaking up every song into individual tracks also allows for the flexibility to create different multitransports based on individual set lists. For a concert touring example, a common practice is creating a set list for each new stop on the tour, where the song list and order is different in each stop. More information on creating set lists can be found here.

Workflow

Creating a Multitransport Manager

1. Create a TransportManager. For more information on TransportManager properties, see Transport Manager.
2. Create a Set List by left-clicking on the tracks editor in the top toolbar, and click on the Active Set List option. You can either create different set lists, or use the automatic one populated, containing all tracks created in the project. For this example, we will be making three set lists: one for all songs video content (which would contain all individual song tracks), one for the IMAG live video feed track, and one for projector control commands track.
3. Left-click to open the Transport Manager and assign the set list containing the tracks you wish to control.
4. Repeat Step 3 for all other set lists you with to have active in the MultiTransport. For this example, we will create three separate Transport Managers for each of our set lists: titled song content, IMAG, and control.
5. Create a new transport from the Transport editor like in Step 1, but choose MultiTransportManager as the type.
6. Under the Configure tab, click the + icon and the names of the Transport Managers you wish to control. This will then create a menu with the tracks editor for the active track in each set list. For our example, we will add all three Transports we created earlier.
7. To reorder these Transport Managers, left-click on one of the names in the Configure tab, and drag it above or below the others. This editor will still respect the top/bottom hierarchy of disguise, similar to layers in the Timeline, so the topmost tracks will always appear on top of those beneath it.
8. If you will be controlling this MultiTransport externally, for example through Midi or OSC, assign the proper transport under the Control tab.
9. Left-click Disengaged at the top of the MultiTransport editor to engage. Select a playback option in the top Global Transport Control.
10. Click on the individual playback controls for each individual track to control them separately. Use the Global playback controls at the top of the Multitransport editor to control all tracks at once.

Properties

- `Global Transport` - Controls of all Transports in the list
- `Global Engage/ Disengage`
- `Transport Managers List` - These are where individual Transport Managers are added to then be controlled by a MultiTransportManager
- `Event Transport` - Gives the ability to control the MultiTransportManager through Telnet (JSON Strings).
- `Control` - Contains the list of TransportManagers to then configure and control.

Telnet commands

Disguise provides a way to gather key information on the status of a Disguise session whilst also providing some basic timeline control.

All commands are formatted in JSON and sent over the telnet protocol.

Setup

1. Create a new Multitransport Manager.
2. Assign transport(s) to Multitransport Manager.
3. Assign tracks to transports or use the automatic setlist.
4. In the Multitransport Manager add an event transport and set its listening port.

Queries

Queries is the method used to extract information out of Disguise. They are formatted in JSON using the following structure.

```
{"request":<request_number>,"query":{"q":"<Query>"}}\n
```

> **Note**
> Please note: The '\n' denotes a newline character, programs such as PuTTY and NetCat automatically add the newline character when you send the string.

All Queries return data as JSON. It de-serialises into a dictionary that has three entries.

- **Request number**: Same number that has been given to Disguise in the initial request, can be used to synchronize requests / replies in a multithreaded environment. If no number has been supplied it defaults to 0. If an error has occurred the number is -1.
- **Status** - Defaults to "OK" but will provide context for an error if it occurs.
- **Results** - A list of dictionaries that contains the requested information. This is always a list, even if one element is returned back.

Available Queries

Machine list: `{"query":{"q":"machineList"}}`

Returns a list of dictionaries containing information about the machine: d3 name, hostname role and machine type.

Example return : `{"request":0,"status":"OK","results":`

`[{"machine":"4x4-demo","hostname":"4X4-DEMO","role":"Pure master","type":"4x4pro"}]}`

Machine status: `{"query":{"q":"machineStatus"}}`

Returns extra information about a machine: session status, failover status and current FPS.

Example return: `{"request":0,"status":"OK","results":[{"active":true,"Failed":false, "fps":32.345558166503909}]}`

Player list: `{"query":{"q":"playerList"}}`

Returns a list of all transports that have been assigned to the multi-event transport

Example return:
`{"request":0,"status":"OK","results"[{"player":"transport 1"},{"player":"transport2"},{"player":"transport 3"},{"player"`

Track list: `{"query":{"q":"trackList"}}`

Returns a list of all the tracks that have been assigned to players

Example return:
`{"request":0,"status":"OK","results":[{"track":"track 4", "Length":560.0}, {"track":"track 3","length":560.0}, {"track":`

Cue list: `{"query":{"q":"cueList <Track name>"}}`

Returns a list of all the Sections breaks in a given track

Example Return:
`{"request":0,"status":"OK","results":[{"location":"","startTime":0.0,"length":15.0},{"location":"a","startTime":15.0,"le`

Commands

You can control the timeline using the following command format

```
{"track_command":{"command":"<Playmode>","track":"<Track>", "location":"<location>", "player":"<player name>", "transiti
```

`<Playmode>`

- **play** - normal play mode, will ignore section breaks on the timeline
- **playSection** - play section mode - will hold at section breaks
- **Loop** - loop section mode - Will loop around section breaks
- **Stop** - stops the playhead

`<Track>`

Any track that is in the setlist for the player that you select

`<Location>`

Any valid timecode - `"00:00:15:00"`

Any valid Cues that are present on the timeline - "CUE 35"

`<player name>`

Any transport that is present inside the multi transport manager

`<transition time>`

Seconds - crossfades from current playhead position to the new requested position - e.g. "10"

`<transition track>` & **`<transition section>`**

Introduced in r17.1 you can assign actions to crossfades using track snippets. You can achieve something similar using the transitionTrack & transitionSection entries.

This is an example command

```
{ "track_command": { "player": "toptransport", "command": "playSection", "track": "toptrack", "location": "00:00:00:00",
```

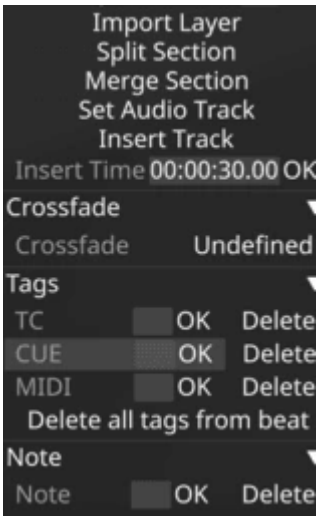
transitionTrack is the (string) name of a track, and must be paired with *transitionSection* which is the (string) note set at the section break.

Working with Notes

Notes are items of text added to the timeline to aid the user in identifying parts of the track.

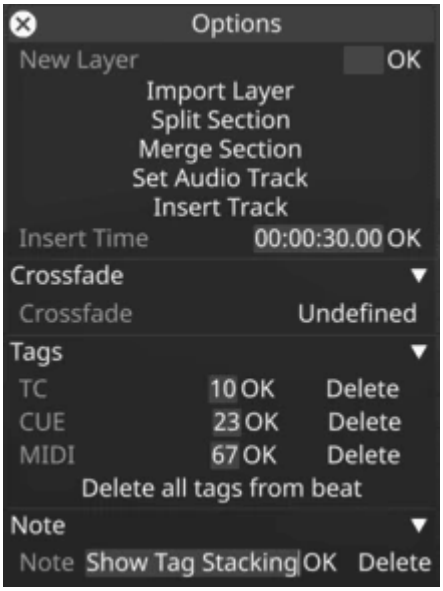
Adding a note to the track

- Right-click the bar where you want to add a note, left-click the **note** text field and type in the text you want to add.



Note field complete. Click OK to add the note to the track.

- Alternatively, you can hit **Ctrl+N**, which lets you type in or edit the note for the current cursor position.



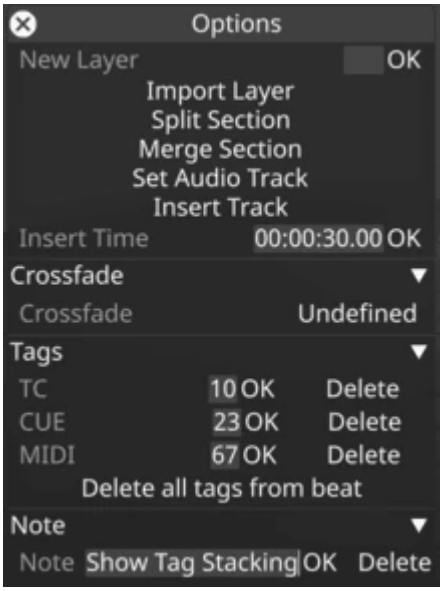
Note added to the track.

Removing a note from the track

- Select the already added text in the note data field and press the **Backspace** key followed by **Enter** or left-click the **OK** button.
- Alternatively, right-click on the note and left-click **Delete** in the track options editor.

Remove all Notes

It is also possible to remove all tags from a track or section of a track by selecting the section of timeline where the tags are to be deleted, then right-click in the shaded area to open the Track Options window; once open, select **Remove Notes**.



Selecting A Note Along A Track

Alt+Left Drag

Alt + Left-drag moves a single section, tag, or note. You can join an existing cue if it doesn't already have the same tag type or note—otherwise, it slips to the next beat. Just hold Alt and drag the item horizontally along the track.

Ctrl+Alt+Left Drag

Ctrl + Alt + Left-drag moves the entire cue, not just those with section breaks. Notes stay on the same line and cannot join existing cues—they always slip to the next available beat.

Controlling the Transport

Once a transport is set up with an OSC Event Transport, further customisations can be made to the way the OSC transport handles incoming OSC messages.

The OSC Event Transport is configured to work with a standard set of addresses by default, but these can all be changed by the user during show setup.

Trigger behaviour

The addresses which change the state of the transport are triggered in one of two ways, which can be convenient depending on the type of OSC controller being used.

Designer will automatically switch between these modes depending on how the OSC message is formatted. See below for **default** and **single float** argument behaviours. The single float argument behaviour is useful for controller applications which always send OSC messages.

Note that **brightness** and **volume** are not state changes and are not triggered in this way, for example. Each message documented below indicates which trigger behaviours apply.

Default behaviour

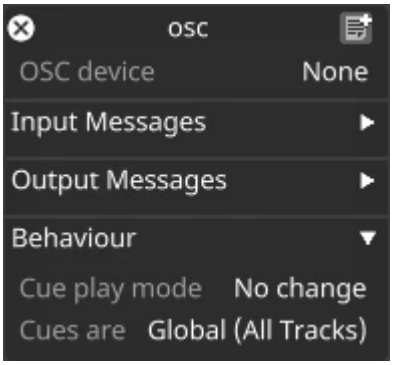
In most cases, as soon as a message is received on the configured address, the command is triggered.

This will happen if any number of arguments are supplied with the message (including no arguments.) The exception is below, when a single floating point argument is supplied.

Single-float argument behaviour

In the case where a single floating point argument is supplied as a parameter to the configured address, Designer will only trigger the command if that float value is set to exactly `1.0`. This allows for controllers which always send all configured commands to toggle the trigger behaviour on and off.

Behaviour



Cue play mode

Sets the playback mode when a specified cue is triggered.

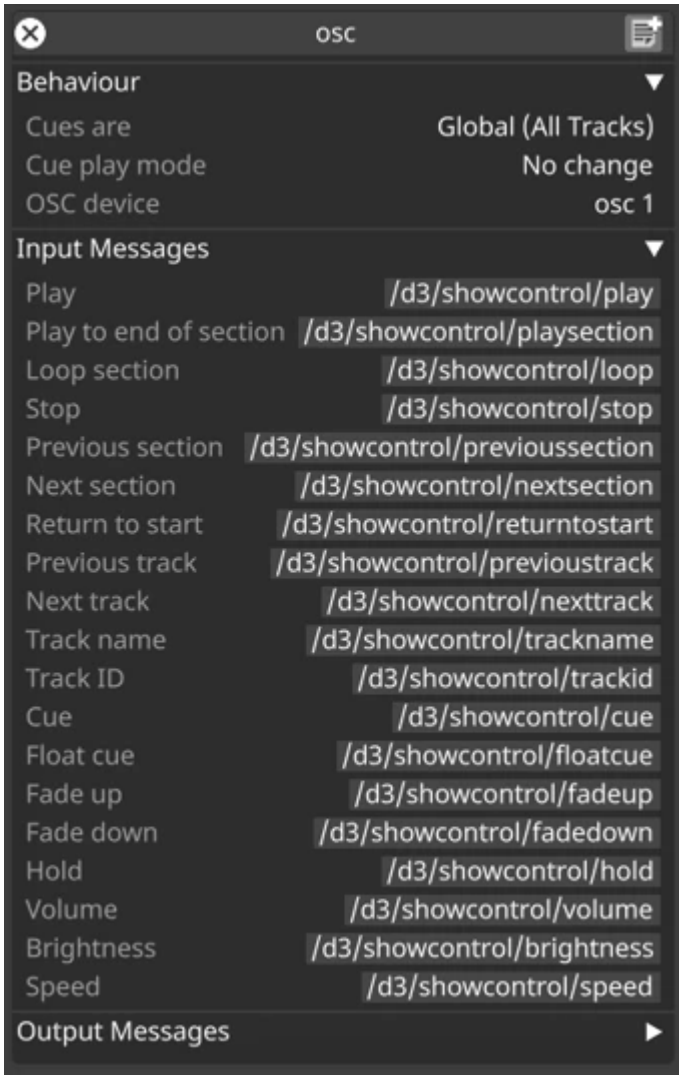
The following options are available:

- *No change* - Continue in the current play mode (this is the default)
- *Stop* - Jump to the cue and stop at that cue.
- *Play* - Switch to play mode after jumping to the cue
- *Play to end of section* - Switch to play to end of section mode after jumping to the cue
- *Loop section* - Switch to loop section mode after jumping to the cue.

Cue search behaviour (Cues are)

- *Local* - Only search the current track
- *Global* - Search all tracks in the current set list.

Input Messages



From a device broadcasting OSC, messages can be sent using the following addresses and arguments to control Designer

Play

Sets the transport to play mode.

Default address: `/d3/showcontrol/play`

This is a **triggered** command.

Play to end of section

Sets the transport to play to end of section mode.

Default address: `/d3/showcontrol/playsection`

This is a **triggered** command.

Loop section

Sets the transport to play and loop section mode.

Default address: `/d3/showcontrol/loop`

This is a **triggered** command.

Stop

Stops the transport.

Default address: `/d3/showcontrol/stop`

This is a **triggered** command.

Previous section

Causes the transport to jump to the previous section.

Default address: `/d3/showcontrol/previoussection`

This is a **triggered** command.

Next section

Causes the transport to jump to the next section.

Default address: `/d3/showcontrol/nextsection`

This is a **triggered** command.

Return to start

Causes the transport to return to the first bar of the current track.

Default address: `/d3/showcontrol/returntostart`

This is a **triggered** command.

Previous track

Causes the transport to jump to the start of the previous track.

Default address: `/d3/showcontrol/previoustrack`

This is a **triggered** command.

Next track

Causes the transport to jump to the start of the next track.

Default address: `/d3/showcontrol/nexttrack`

This is a **triggered** command.

Track name

Causes the transport to jump to the beginning of the named track. The track must appear in the currently selected set list.

Default address: `/d3/showcontrol/trackname`

Argument: responds to a message with a single string argument which matches the name of a track

Track ID

Causes the transport to jump to beginning of the track with the given ID. The track must appear in the currently selected set list.

Default address: `/d3/showcontrol/trackid`

Argument: responds to a message with a single argument which contains an integer, float or string, which will be converted to a string to match the track id.

Cue

Causes the transport to jump to a specified cue.

Default address: `/d3/showcontrol/cue`

See Cue messages for further information.

Float cue

The float cue is a special derivative of the cue. It is designed to receive floats from programs that cannot send multiple arguments.

Default address: `/d3/showcontrol/floatcue`

This feature can cause confusion, it is recommended to read the Float cues section for further information.

Fade up

Sets the master brightness to fade up.

Default address: `/d3/showcontrol/fadeup`

This is a **triggered** command.

Fade down

Sets the master brightness to fade down.

Default address: `/d3/showcontrol/fadedown`

This is a **triggered** command.

Hold

Causes Designer to hold (freeze) all outputs.

Default address: `/d3/showcontrol/hold`

This is a **triggered** command.

Volume

Sets the master volume.

Default address: `/d3/showcontrol/volume`

Argument: responds to a message with a float between 0.0 and 1.0. If no argument is supplied, sets volume to 1.0.

Brightness

Sets the master brightness.

Default address: `/d3/showcontrol/brightness`

Argument: responds to a message with a float between 0.0 and 1.0. If no argument is supplied, sets brightness to 1.0.

Speed

Sets the transport speed.

Default address: `/d3/showcontrol/speed`

Argument: responds to a message with a positive float. If no argument is supplied, sets speed to 1.0.

> ⚠ **Warning**
>
> Audio does not currently follow speed changes reliably, so this feature is off by default. Enable the `enableTransportSpeedControl` in Preview options to allow transport speed control.

Monitoring the Transport

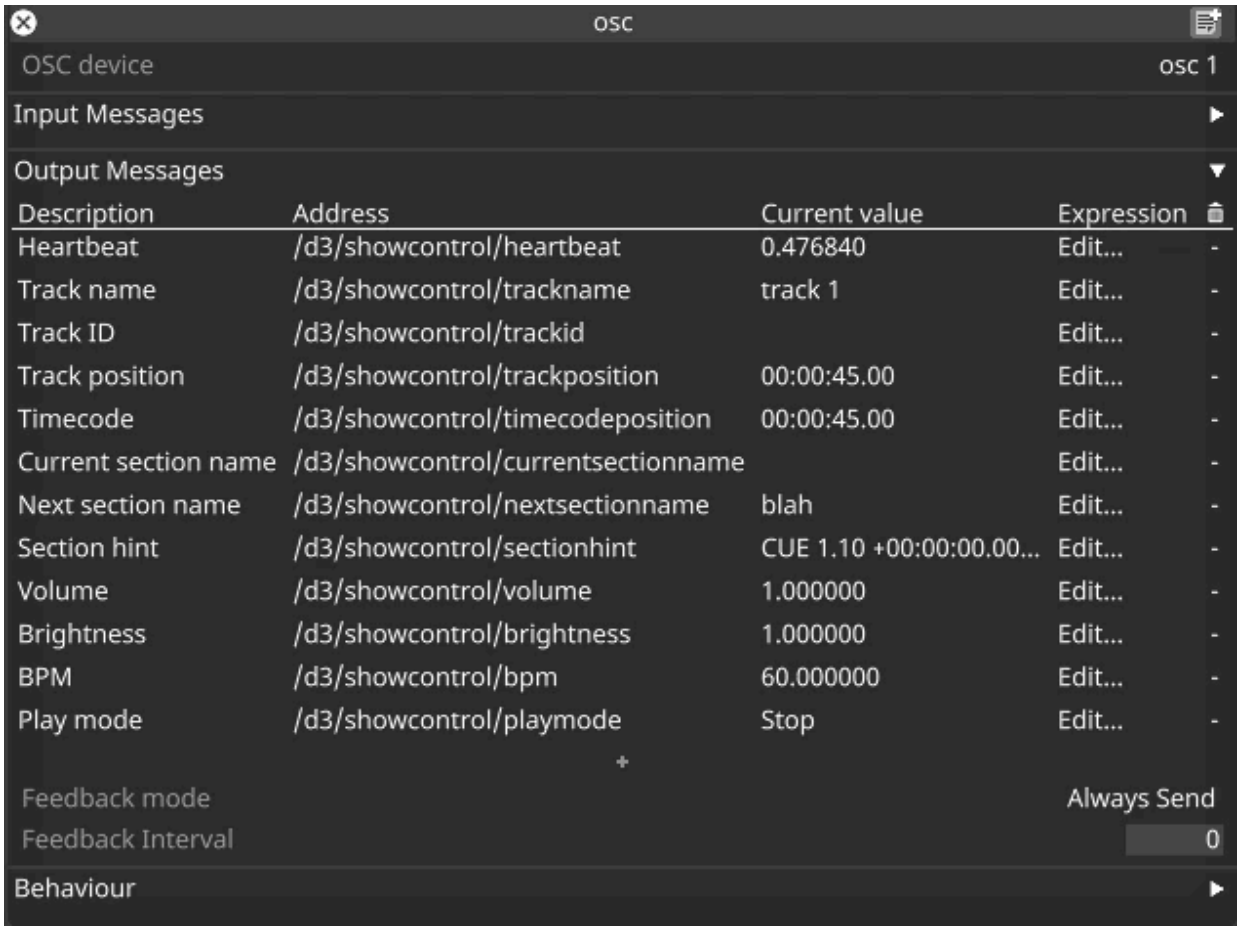
Once a transport is set up with an OSC Event Transport, further customisations can be made to the way the OSC transport handles outgoing OSC messages.

The OSC Event Transport is configured to work with a standard set of addresses and values by default, but these can all be changed by the user during show setup.

This page deals with the default messages and their meaning. See Customising OSC output messages for more information on configuring this section of the event transport.

The output messages list

The Output Message list contains information about what is sent, where it is sent, and what the value is. It also allows the user to customise the value sent.



The *Description* column is purely for the user to understand what is being sent. It does not have any functionality other than being an editable aide-mémoire.

Address specifies the OSC address to send the value to. This is editable and can be customised according to the needs of the production.

Current value provides a reference for the most recently sent value for the given message.

Expression provides access to the underlying expression used for customisation.

- (trash can) allows the user to delete messages from the list which are sent.

Default output messages

Heartbeat

A continually changing number to indicate to receiving applications that Designer is still running and sending messages.

Default address: `/d3/showcontrol/heartbeat`

Argument: sends a message with a continually varying float between 0.0 and 1.0.

Track name

Sends a string which contains the current track name. This can be used as-is when controlling the transport.

Default address: `/d3/showcontrol/trackname`

Track ID

Sends a string which contains the ID of the current track. This can be used as-is when controlling the transport

Default address: `/d3/showcontrol/trackname`

Track position

Sends a string which contains the time into the current track, formatted as timecode.

Default address: `/d3/showcontrol/trackposition`

Timecode

Sends a string which contains the current time, matched against global timecode.

Default address: `/d3/showcontrol/timecodeposition`

Current section name

Sends a string which contains the current section name, which is the note stored on the beat of the section start.

Default address: `/d3/showcontrol/currentsectionname`

Next section name

Sends a string which contains the next section name.

Default address: `/d3/showcontrol/nextsectionname`

Section hint

Address `/d3/showcontrol/sectionhint`

Outputs the current section cue tag, note, and time elapsed as well as the upcoming sections cue tag, note, and time remaining until that section.

Volume

Sends a string which represents the master volume.

Default address: `/d3/showcontrol/volume`

Argument: sends a message with a float between 0.0 and 1.0.

Brightness

Sends a string which represents the master brightness.

Default address: `/d3/showcontrol/brightness`

Argument: sends a message with a float between 0.0 and 1.0.

BPM

Sends a string which represents the current track BPM.

Default address: `/d3/showcontrol/bpm`

Argument: sends an float value.

Play mode

Sends a string which represents the current transport play mode.

Default address: `/d3/showcontrol/playmode`

Argument: sends a string value.

Output rate control

It is useful to limit the rate of updates from Designer, in some cases - perhaps there is a lot of fast-changing data on the network, or the application needs time to display what it has received. This is accomplished by using the *Feedback mode* field under the Output Messages section.

There is visual feedback of the most recent sent value in the user interface, in order to show the effect of rate control directly. The values in the user interface will update according to the rate control field selections.

Send changes only

In this mode, messages are sent every frame, but only if they have changed value since the last time they were sent.

This is very effective at reducing the amount of data sent across the network, and avoiding notifying subscribers on unneeded changes.

However, there is a large drawback which is that if the subscriber ever misses an event, it will not be able to 'catch up'. Therefore, it runs the risk of some subscribers displaying invalid or out of date information.

This can still be useful for non-critical monitoring applications.

Never Send

In this mode, messages are simply never sent. This can be useful to temporarily disable messages if the OSC Event Transport is connected to a system which needs to be reconfigured or otherwise needs a pause in traffic.

This can also be used to act as a 'blind' mode to hide changes from subscribers while working.

Always Send

This is the default method selected in new OSC Event Transports. This sends all messages every frame. This can be extremely network intensive. For this reason, there is a companion field which is available when *Always Send* is selected.

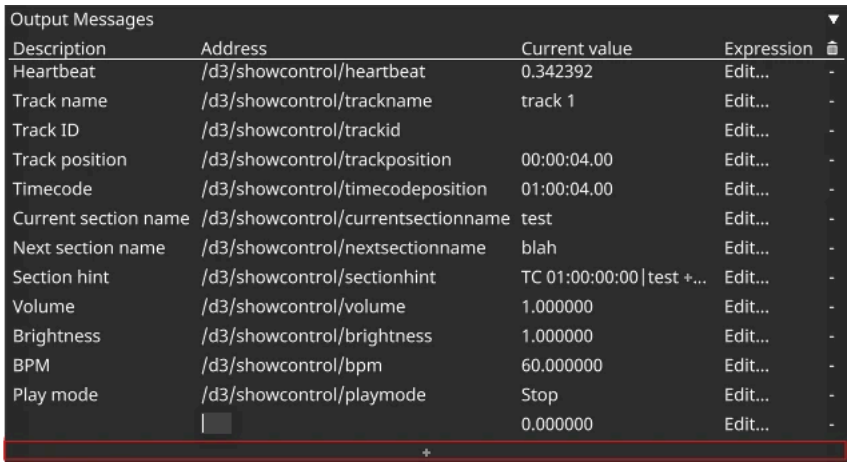
Feedback Interval

This is the time in seconds between all messages being sent.

Monitoring using Custom Messages

Using expressions, it is possible to customise the values sent by OSC Event Transport output messages. This page covers how to customise the output messages from the OSC Event Transport.

Adding a message



After the user clicks on the + button at the bottom of the Output Messages list, a new row is added. The row starts off with the entry for the OSC address selected and editable. All message rows must have a unique, non-blank OSC address to be valid.

Once the address is entered, a note in the Description column may be useful to keep track of what is being added. Alternatively, the user might want to dive straight in and press the *Edit...* button, to start entering the expression to create the desired value.

Invalid expressions cause the *Edit...* button to turn red. The error is described in mouse hover text on the button.

Variables

The OSC Event Transport has a number of local system variables which can be used to provide access to the transport which the OSC Event Transport is attached to.

Resource variables

Access to the current context of the transport is accomplished by accessing the Resources which make up the Transport. These variables can have fields referenced from them. Not all fields are documented, because this is directly accessing Designer internal objects, which are subject to change.

- `transport` - The Transport Manager which the Event Transport is monitoring.
- `track` - The current track within the transport.

Track time variables

Finding the current section or time within the track is simplified by providing these variables.

- `currentBeat` - The current beat on the track (for use with the Quantiser.)
- `currentTime` - The current time on the track.
- `currentSection` - The current section number on the track (first section is numbered `0`.)
- `currentSectionName` - The name (note) at the start of the current section.
- `nextSectionName` - The name (note) at the start of the next section.
- `currentSectionTag` - The tag (e.g. TC time) at the current section.
- `nextSectionTag` - The tag at the next section.

Feature variables

Features are either notes or tags. It is convenient to reference relative to a note or tag, whichever is closest. These variables deal with a complex set of lookups by storing that information in these variables.

- `currentFeatureTime` - The time of the most recent feature before the current track position. Evaluates to `0.0` if no feature exists.
- `currentFeatureName` - The name of the most recent feature before the current track position. Evaluates to `"Start"` if not feature exists.
- `nextFeatureTime` - The time of the next feature after the current track position. Evaluates to `track.lengthInSec` if no feature exists.
- `nextFeatureName` - The name of the next feature after the current track position. Evaluates to `"End"` if not feature exists.

See **constructing feature variables** for information on how these are constructed and for tips on how to get related information.

Function variable

`Timecode` is a special function-style variable which converts a time in seconds (e.g. currentTime) into a string in timecode format "HH:MM:SS.FF".

Timecode status

When working with timecode and timecode mode layers, the `transport.statusString` can sometimes not provide relevant information, as the status is overridden with which mode the layer has forced the system to accept.

If the user wants to provide timecode information, without regards to timecode mode overrides, use the `transport.tcStatusString` variable. This provides the raw timecode status, without any further processing. This includes pre-roll information, for example.

Fade status

> **Note**
>
> Available from r30.7 onwards.

Sometimes it is useful to be able to monitor the feed output status for the session. This is shown in the output field and is accessible via the `feedOutputMode` variable. This contains "Fade up", "Fade down", or "Output hold", depending on the current output mode.

Default output messages

It can be instructive to understand the meaning of the expressions which drive the default output messages.

Heartbeat

```
1 - (uptime % 1)
```

This counts down from 1 to 0 every second. `uptime` is a global variable

Track name

```
track.description
```

This is the description of the current track - all Resources have a `description` property which can be used to check which Resource an expression is accessing.

Track ID

```
track.trigger_note
```

This property is documented under Track ID. It is a discoverable via the alt-dragging technique.

Track position

```
Timecode(currentTime)
```

Converts the current time into the track into a Timecode string representation using the `Timecode` **function**. Note the result is not a `Timecode` object, but a string which looks like timecode. This may change in future versions of the software.

Timecode

```
transport.beatToTimecode(currentBeat).__str__()
```

The TransportManager's `beatToTimecode` function matches the current track time against TC tags and provides that time as the global timecode time.

The `.__str__()` is an unfortunate issue with the current expression system being unable to seamlessly convert Timecode objects to string.

Current section name

```
track.noteAtBeat(track.sectionToBeat(currentSection))
```

The Track's `noteAtBeat` function is used to look up notes if at an exact beat. For example, `track.noteAtBeat(currentBeat)` would only return a note if the play head was exactly on a note.

This expression attempts to provide more useful information by referencing back to the most recent section. Tracks' `sectionToBeat` converts the current section number into its corresponding beat, to enable the lookup of any note which may be at the beat at the beginning of that section.

Next section name

```
track.noteAtBeat(track.sectionToBeat(currentSection + 1))
```

This function is very similar to the above Current section name. However, instead of looking up the current section, it instead looks up `currentSection + 1`, i.e. the next section.

Section hint

```
format::{currentFeatureName:s} +{Timecode(currentTime - currentFeatureTime):s} {nextFeatureName:s} -{Timecode(nextFeatur
```

This expression attempts to provide a readable overview of the position in the current track, relative to known feature points (either notes or tags).

Volume

```
transport.volume
```

The current volume of the Transport is discoverable via the alt-dragging technique.

Brightness

```
transport.brightness
```

The current master brightness of the Transport is discoverable via the alt-dragging technique.

BPM

```
track.bpmAt(currentBeat)
```

When working with quantised tracks, the BPM can vary between sections. The Track's `bpmAt` function converts from a beat to a BPM to allow for inspection.

Play mode

```
transport.player.playMode.__str__()
```

The TransportManager has a `TrackPlayer` member called `player`. This stores a number of relevant values to the current state of the play head. The `playMode` member provides the current transport state as an enum value. The `__str__()` call converts that to a string for display to the user.

Example expressions

Description	Expression
Name of the track	`track.description`
Name of the transport	`transport.description`
Transport engaged status	`transport.engaged`
First beat of current section	`track.sectionToBeat(currentSection)`
Convert current track time in beats to seconds	`track.beatToTime(currentBeat)`
Convert current track time in seconds to beats	`track.timeToBeat(currentTime)`
Time remaining until next track feature	`Timecode(nextFeatureTime - currentTime)`
Time elapsed since last track feature	`Timecode(currentTime - currentFeatureTime)`

Description	Expression
Current section time elapsed	`Timecode(currentBeat - track.sectionToBeat(currentSection))`
Current section time remaining	`Timecode(track.sectionToBeat(currentSection + 1)-(currentBeat))`
Current incoming timecode	`transport.timecode.current.__str__()`
Current Transport Manager monitoring status (e.g. timecode)	`transport.monitorString`
Current Transport Manager status (e.g. “No matching timecode”)	`transport.statusString`
Current Transport Manager raw timecode status (e.g. “stopped”)	`transport.tcStatusString`

Constructing feature variables

The variables `currentFeature*` and `nextFeature*` are constructed by the OSC event transport for the users convenience. A feature is composed from the notes and tags on the current track.

This section adds information on how they are constructed to enable access to lower level information for custom reporting. Note the functions used here are not guaranteed to remain, though they are very stable internal APIs.

First, the beat of the note or tag is found:

Action	Function	Not found value
Next note	`track.findBeatOfNextNote(currentBeat)`	`1.7976931348623157E+308`
Previous note	`track.findBeatOfLastNote(currentBeat)`	`-1.0`
Next tag	`track.findBeatOfNextTag(currentBeat)`	`1.7976931348623157E+308`
Previous tag	`track.findBeatOfLastTag(currentBeat)`	`-1.0`

Note that the results are in beats, not in time. `track.beatToTime()` allows the beat to be converted to a track time, and `Timecode()` allows the time to be shown as timecode.

The name of a note or tag can be found with `track.noteAtBeat()` or `track.tagAtBeat()`. If an invalid beat or a beat with no note or tag is passed, the function returns an empty string.

With the above information, we can therefore emulate the construction of the various feature variables (beware these are very long, hence why the convenience variables exist.) The variables `currentFeatureBeat` and `nextFeatureBeat` do not exist normally, but are used to simplify the construction of the others for the purposes of documentation.

> **Note**
>
> If the user wants to use these variables to reference one another like below, variable assignment must be used to assign a the OSC output expression value to a variable.

Feature variable	Expression
`currentFeatureBeat`	`max(track.findBeatOfLastNote(currentBeat), track.findBeatOfLastTag(currentBeat))`
`nextFeatureBeat`	`min(track.findBeatOfNextNote(currentBeat), track.findBeatOfNextTag(currentBeat))`
`currentFeatureTime`	`track.beatToTime(currentFeatureBeat)`
`nextFeatureTime`	`track.beatToTime(nextFeatureBeat)`
`currentFeatureName`	`format::{track.noteAtBeat(currentFeatureBeat)}|{track.tagAtBeat(currentFeatureBeat)}`
`nextFeatureName`	`format::{track.noteAtBeat(nextFeatureBeat)}|{track.tagAtBeat(nextFeatureBeat)}`

OSC Application Templates

Disguise have made two OSC templates available for the iOS applications TouchOSC and Lemur.

Lemur

To use the template layout first download Lemur from the App Store.

Please see the **Lemur support page** for how the install the interface.

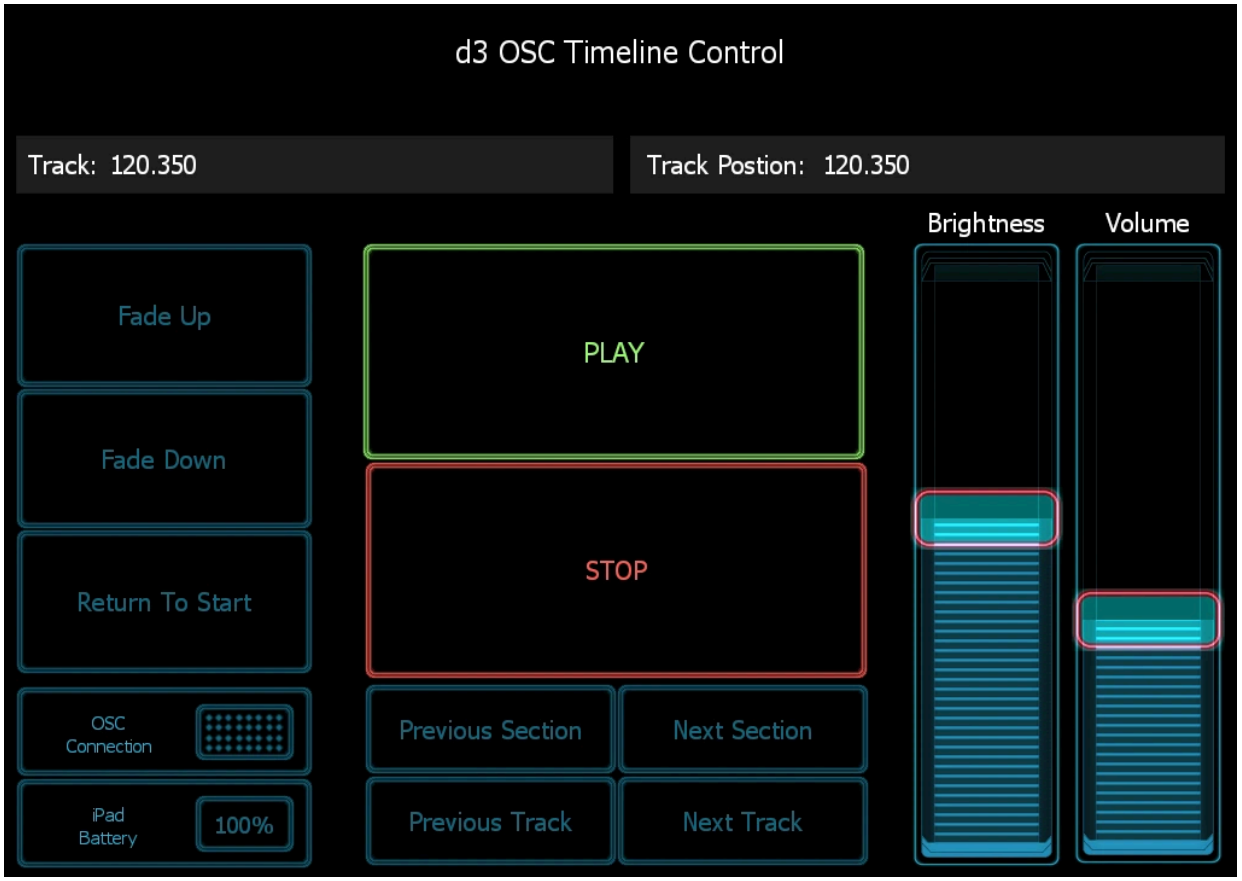
Download our pre-made **Lemur OSC template.**

Touch OSC

To use the template layout, first download **TouchOSC** from the App Store.

Please see **TouchOSC support page** for how to install the interface.

Download our pre-made **Touch OSC template**.


d3 OSC Timeline Control
Track: 120.350
Track Postion: 120.350
Brightness
Volume
Fade Up
Fade Down
Return To Start
PLAY
STOP
OSC Connection
iPad Battery
100%
Previous Section
Next Section
Previous Track
Next Track



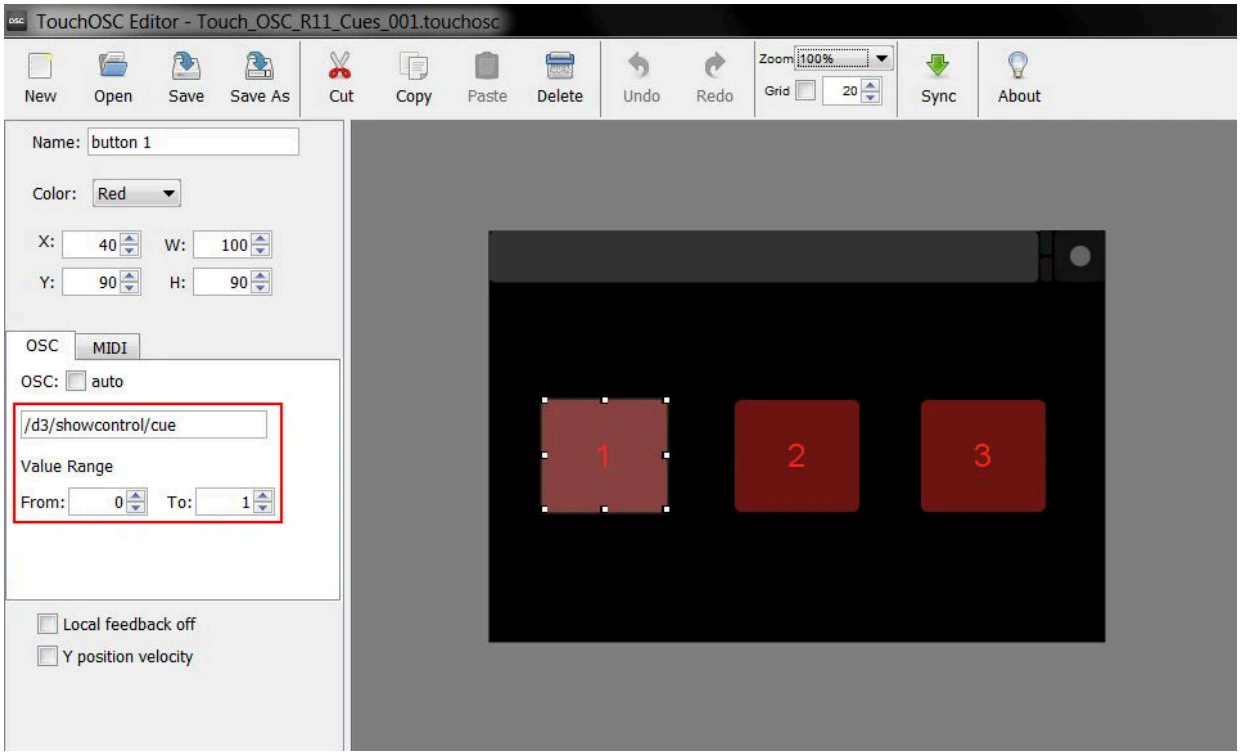
See the **Resources section** for a range of resources including TouchOSC layout and editor.

Example: Building a custom interface to call cues

It may be that the show requires a custom interface to call cues, this example calls 3 cues using buttons defined in a Touch OSC project.

Create an OSC interface following the example below, which can be downloaded **here**. This was created in **TouchOSC** but any application capable of sending OSC is adequate, for example **Lemur**.

> **Note**
>
> To open the TouchOSC interface, first run TouchOSC, then open the layout from inside the application.

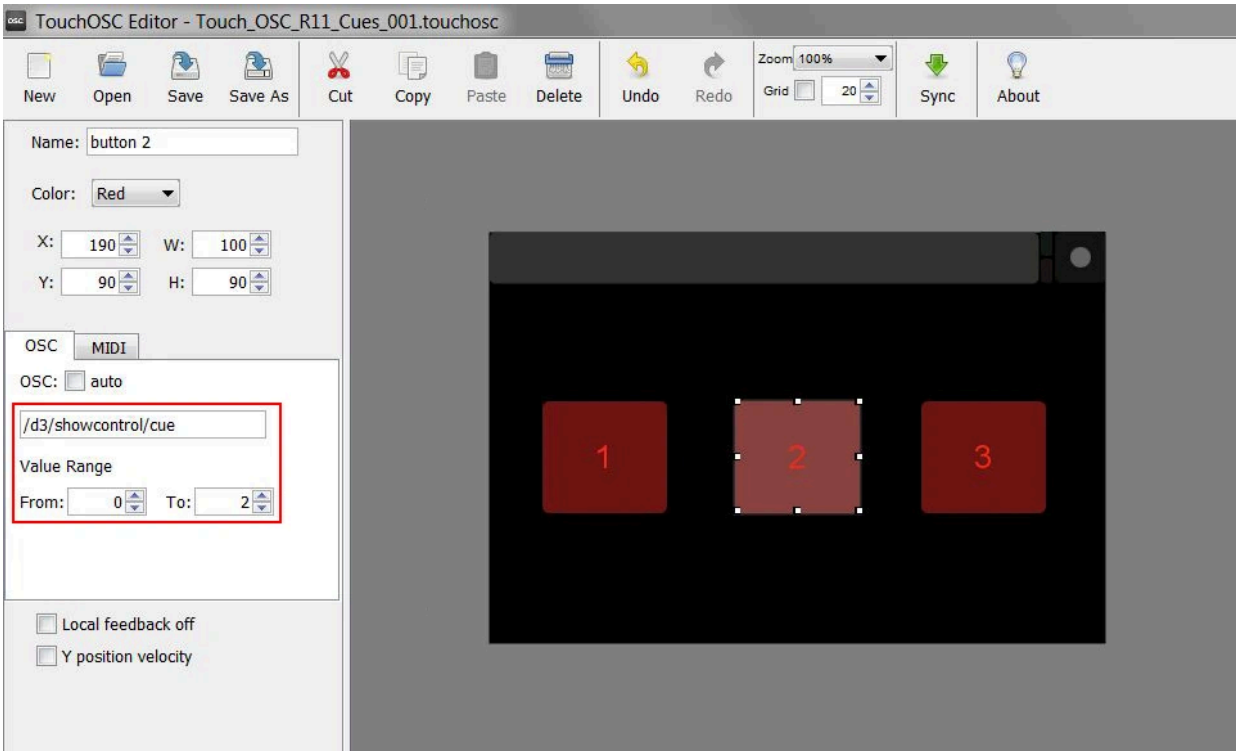


The OSC layout above shows three buttons each having an assigned string and argument.

String: `d3/showcontrol/cue`

Arguments:

- button 1 sends a message with float values between 0 and 1,
- button 2 sends a message with float values between 0 and 2 (shown below),
- button 3 sends a message with float values between 0 and 3.

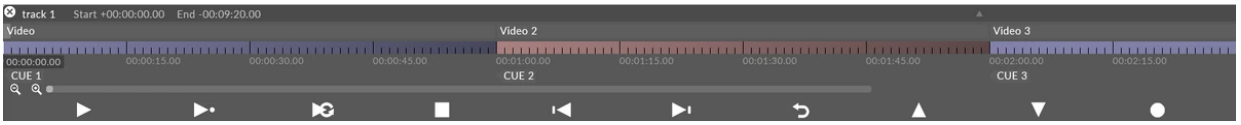


TouchOSC layout with button 2 assigned values 0 and 2 as an argument.

> **Warning**
>
> Because TouchOSC sends a cue value of 0 when you release the button, it will cause Disguise to jump to CUE 0 on the track. This is a limitation of TouchOSC, the workaround being to not have CUE 0 assigned to the track.

Setup the Timeline to receive incoming OSC messages. Assign cues to the track following a format that matches the argument(s) being received. In the example below, three cues were assigned to a track, each corresponding to a different argument.

- CUE 1 will be triggered by an OSC message sending a single argument value of 1.
- CUE 2 will be triggered by an OSC message sending a single argument value of 2.
- CUE 3 will be triggered by an OSC message sending a single argument value of 3.



Cues assigned to a track on the Timeline following three different formats for receiving three different incoming OSC messages.

> **Note**
>
> You can trigger cue x.y and x.y.z by sending a double or triple argument from a supported OSC system.

OSC Transport Overview

The OSC transport allows external control over the Designer timeline via OSC messages. This section is focussed on OSC control and reporting of a single transport within Designer.

There are other OSC workflows available in Designer.

Once an OSC transport is set up, users are able to trigger cues and monitor transport status.

There are a number of helpful external tools for which Disguise has some customisations which help ease integration.

OSC Transport Setup

To use OSC transport control please follow the steps described below. Please note that if jumping to a specific section in the timeline you need to tag the timeline with a specific cue syntax.

Step 1: Create an OSC device

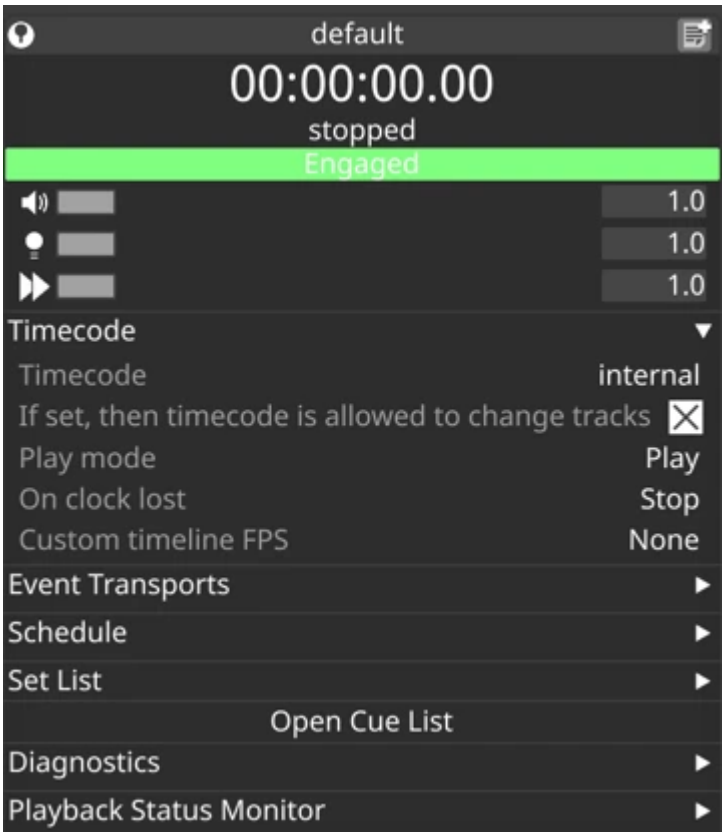
See OSC Device information for how to create and work with OSC devices.

Step 2: Create a new OSC Event Transport

1. Right-click **Transport**.

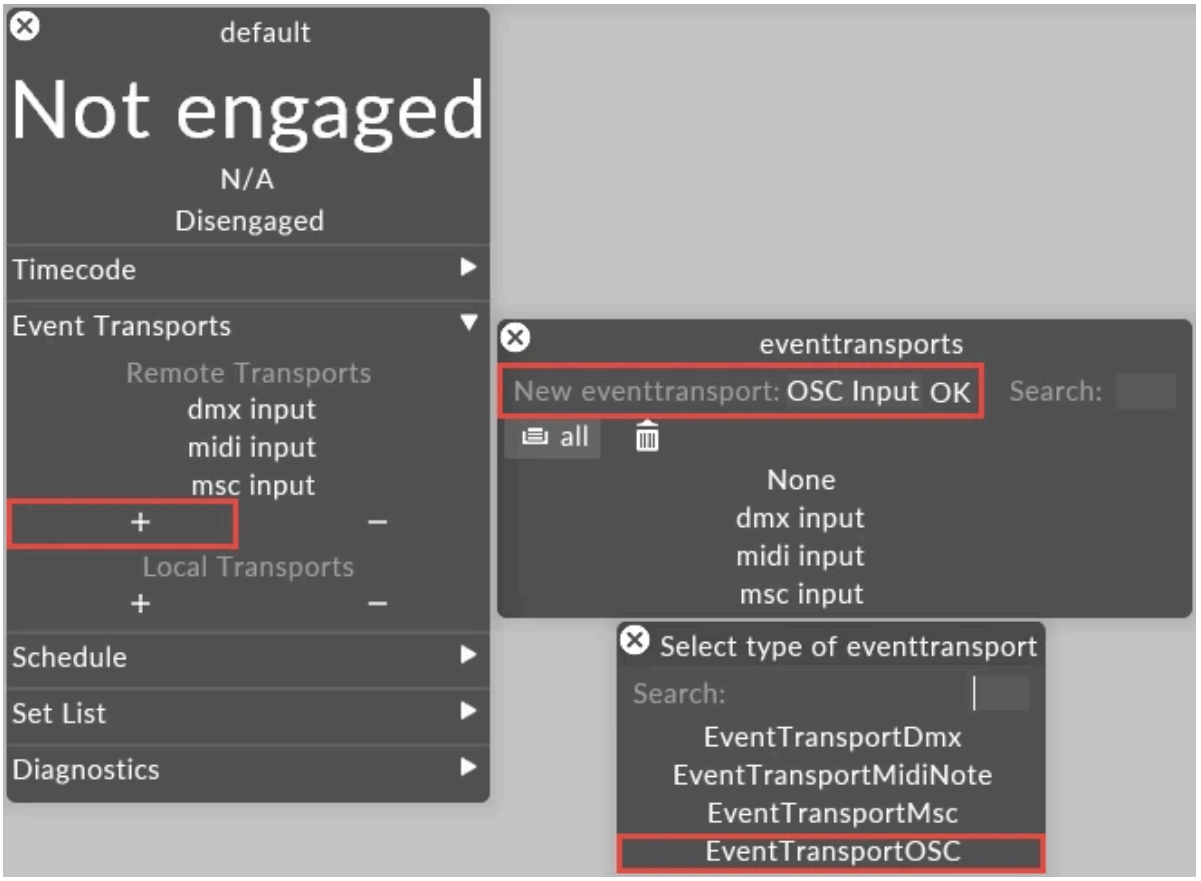


This will open the transport manager dialog.



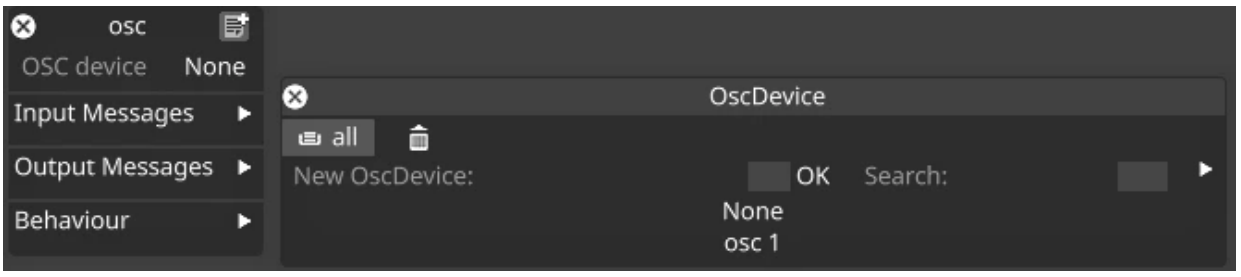
2. Expand the Event Transports section, **Left-click** on the **+** button.

3. In the “New eventtransport” section, Enter a name for the new Event Transport and press OK.
4. Select **EventTransportOSC** from the transport list.



Step 3: Select the OSC device

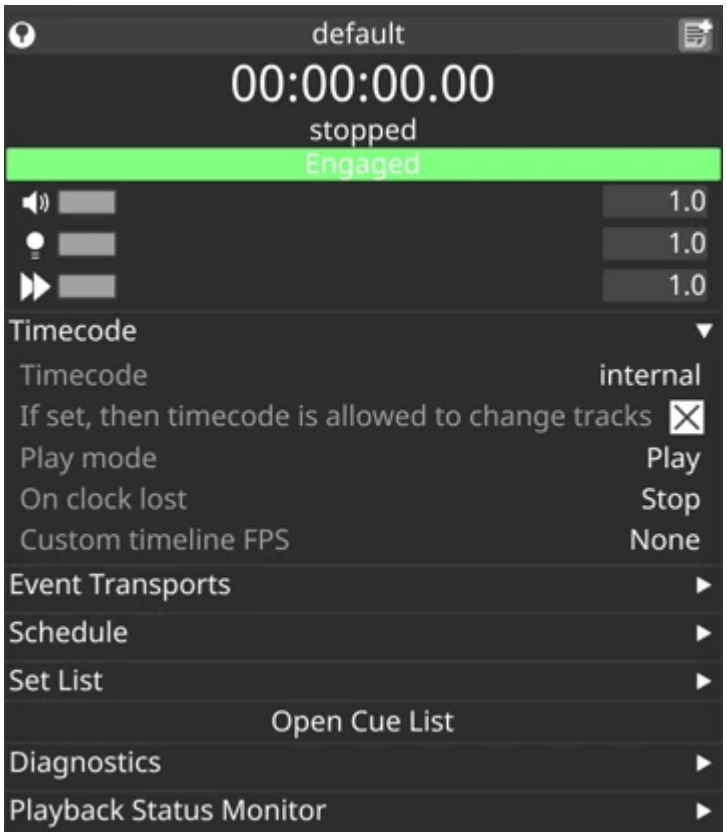
At the top of the OSC Event Transport editor, the OSC device created in step 1 needs to be selected to allow the transport to connect to the external device.



Step 4: Engage Transport Manager

To engage all transports within the transport manager, left-click on “Disengaged” in the transport window.

The button will change to “Engaged” and flash green which means that the all transports controls are engaged.



> **Note**
>
> Please note: If you want changes you make in to appear on the OSC application you are using, feedback mode needs to be set to always send or only send changes.

Next Steps

Once the OSC Event Transport is configured and able to send & receive OSC messages, it is possible to customise the behaviour of the Event Transport:

- Controlling the Transport
  - Including Triggering cues
- Monitoring the Transport

Triggering Cues with OSC

Organizing the track with cues is often required when building shows which interact with other systems or cast members. The OSC event transport provides a rich set of methods for calling these cues.

It is possible to use Disguise-supplied templates to call cues using a variety of external tools. OSC is an open protocol and many other systems use OSC for show control purposes.

Cue message formats

There are two main cue formats in use by Disguise for OSC control. The preferred method is to use the regular Cue trigger, but some applications are only able to send single floating-point values. Due to the nature of floating point values, this Float cue method is less flexible, but still allows show control from more limited systems.

Cue messages

The Cue command responds to a message with an array of between 1 and 3 float or integer value arguments. All values must be of the same type.

Each element in the array corresponds to a `.` separated sub-cue number. For example, an OSC message of the form `/d3/showcontrol/cue [1, 2, 5]` (where `/d3/showcontrol/cue` is the default address for cues, and `[1, 2, 5]` represents a list of arguments sent to that address.)

If the source sends floating point cue numbers, the values are rounded to the nearest integer and treated as above. If the rounding would change the number too much, an error is raised.

Such an OSC message would result in calling the cue `1.2.5`, either on the local track, or somewhere else in the set list, according to the cue behaviour.

Float cue messages

The Float cue command responds to a message with exactly 1 floating point value argument.

This argument is treated as a decimal number with two decimal places. For example, sending `1.1` is treated at `1.10`. Therefore, it is not possible to call cues with anything other than 2 numbers after the first major cue number. Only sub-cues with numbers in the range 0 to 99 are callable using this command.

This is because when sending floating point numbers using OSC, there is no difference between the number `1.1` and the number `1.10`, because mathematically they are equal.

Users can think of this as there always being a large number of repeating `0`s after every number. Designer will then sample the first two numbers after the decimal place. If there is a 0 in front of the number, it is discarded. So `01` is treated as `1`.

If the user must use this scheme, then the cues must be laid out in such a way that they are callable by this system.

Value	Cue	Reason
1.10	1.10	Actually transmitted as 1.1, trailing 0 is assumed
1.1	1.10	Decimal place numbers are evaluated as if there were 2 decimal values.
1.01	1.1	Leading 0 is dropped, and treated as a single-digit cue.
1.104	1.10	Trailing 4 is rounded down.

Common control systems

It is useful as a quick reference to touch on the syntax needed to correctly format the OSC message from a number of control systems.

ETC Eos OSC cue triggering

Use the string `/d3/showcontrol/cue=%3,%4`

This will send an OSC message with every cue of the integer and the float past the decimal point. So, cue 1.1 on the Eos will trigger cue 1.1 in Disguise.

> **Note**
>
> Designer understands cues as xx.yy, not xx.xx. This means that leading zeros are ignored (cue 1.1 and cue 1.01 both read as cue 1.1 inside Designer) Only in the last decimal point will this be an issue.

For more granular control, this can be changed to be `/d3/showcontrol/cue=%2,%3,%4.` That allows the first number to be cue list, second cue integer and third float. So cue list 3 cue 4.5 will trigger cue tag 3.4.5

> **Note**
>
> The arguments are separated by commas in the Eos output section, but are sent as period-separated. Avoid adding any extra spaces.

QLab OSC cue triggering

An OSC message from QLab can hold multiple arguments, separated by a space. So in QLab make a generic OSC cue and for it's string set it to `/d3/showcontrol/cue 7 8 9` and this will trigger cue 7.8.9 inside Designer.

> **Note**
>
> QLab messages can have a varied number of arguments, but Designer will only accept three or less.

Set List

Set lists are a way of managing the order the tracks are played back in Designer and are especially useful for managing which tracks the Cue List displays.

Creating a Set List

A show often uses many tracks. To make this easier to manage the tracks can be organised into Set List. A Set List can be created from either the Cue List(cue-list) or the Transport Manager.

It is important to use the Set List functionality to effectively manage what data the Cue List is showing.

1. Open the Cue List either through the Transport Manager, or by pressing **CTRL G**.
2. Left-click the **Set List** tab.
3. Right-click the Set List, the Set List manager opens.
4. Create a new Set List in the manager or select an already created Set List.
5. Add the desired tracks to the Set List.

[Animated GIF: Creating a Set List]

Switching from one Set List to another

Select the Set List you want to use from the Transport Manager or the Cue List. The currently active track in the Timeline will not change immediately. To change the active track, left-click on the track within the Cue List or select it from the track manager.

Tag Stacking and Multi-Tagging

Tag Stacking (also referred to as **multi-tagging**) allows you to assign **multiple tags of different types** to the **same beat** on the timeline.

This is primarily used to facilitate redundant control paths—such as using Timecode as a primary trigger with MIDI as a manual backup.

Each beat can contain a maximum of one tag of each unique type (TC, CUE, and MIDI) plus one Note.

Why Tag Stacking exists

Previously, each beat on the timeline could contain only one tag. This limited workflows where multiple signalling mechanisms were needed at the same moment — for example, combining timecode-driven cues with backup control signals.

Tag Stacking removes this limitation by allowing **one tag per unique tag type** on the same beat:

- One **Timecode** tag
- One **CUE** tag
- One **MIDI** tag

This enables:

- Redundant or fallback control strategies
- Clearer timeline intent
- Reduced duplication of timeline content

Cue table workflows

Tag Stacking is fully supported by cue table import and export.

- Each tag is represented as a separate row
- Stacked tags share the same beat value
- Older cue tables (without stacked tags) continue to work

Related Information

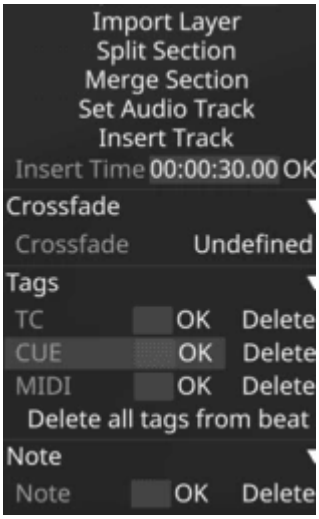
- Working with Tags
- Working with Notes

- Timeline

Working with Tags

Tags are often referred to simply as Cues. They represent parts of the track you may want to quickly jump to and are usually at the same point as section breaks, although they can work independently of section breaks.

There are three types of tags - **TC** (Timecode), **MIDI** and **CUE**. They are managed in exactly the same way, although the format for each tag differs slightly.



Tag formats

Each tag type accepts a specific set of characters and follows its own format. The tag editor restricts which characters are allowed, and when the value is confirmed (by pressing **Enter**, clicking **OK**, or leaving the field) Designer normalises the text into its stored format.

- **TC tags** accept digits (`0–9`) and the separators `:` `;` `,` `.` up to 11 characters. The value is normalised into four colon-separated fields (timecode format). Any separator between digit groups is converted to `:`, and missing fields are padded with `0`. For example, `1.30` becomes `1:30:0:0` and `1,2,3,4` becomes `1:2:3:4`. Entering exactly eight consecutive digits (e.g. `12345678`) is automatically split into `12:34:56:78`.
- **CUE tags** accept the same characters as TC tags — digits and the separators `:` `;` `,` `.` up to 11 characters. The value is normalised into up to three dot-separated numeric groups. Any separator between digit groups is converted to `.`, and trailing `.0` groups are removed. For example, `1:2:3` becomes `1.2.3` and `5,0` becomes `5`.
- **MIDI tags** accept digits and the `.` separator, up to 6 characters. Use the `channel.note` format to target a specific MIDI channel, or enter just the `note` number to listen on all channels. For example, `3.60` targets note 60 on channel 3, while `60` listens for note 60 on any channel. Leading and trailing `.` characters are ignored.

Improved use of tags throughout projects

> **Note:** As of r31.3, users can add multiple tag types to the same beat more efficiently, enabling a smoother and more effective workflow.

- Right-click the bar where you want to add a tag, left-click the **tag** text field, and type in the tag data you want to add.
- The three different types of tags now appear in separate rows:
  - **TC Tag**
  - **CUE Tag**
  - **MIDI Tag**
- You can now use the **Tab** key to move through all fields in the tag creation widget.

Other Ways of Adding a Tag to the Track

You can hit `CTRL+T`, which lets you type in or edit the tag data at the current cursor position.

You can also add the tags using the following shortcuts:

- TC Tag - `CTRL+1`
- CUE Tag - `CTRL+2`
- MIDI Tag - `CTRL+3`

Other Ways of Removing a tag from the track

- Select the already added tag data in the tag field and press the **Backspace** key followed by **Enter** or left-click the **OK** button.
- Alternatively, right-click on the tag and left-click **Delete** in the track options editor.

Remove all tags

It is also possible to remove all tags from a track or section of a track by selecting the section of timeline *(Shift-Drag)* where the tags are to be deleted, then right-click in the shaded area to open the Track Options window; once open, select **Remove Tags**.

Selecting Multiple Tags Along The Track

Alt+Left Drag

Alt + Left-drag moves a single section, tag, or note. You can join an existing cue if it doesn't already have the same tag type or note—otherwise, it slips to the next beat. Just hold Alt and drag the item horizontally along the track.

Ctrl+Alt+Left Drag

Ctrl + Alt + Left-drag moves the entire cue, not just those with section breaks. Tags stay on the same line and cannot join existing cues—they always slip to the next available beat.

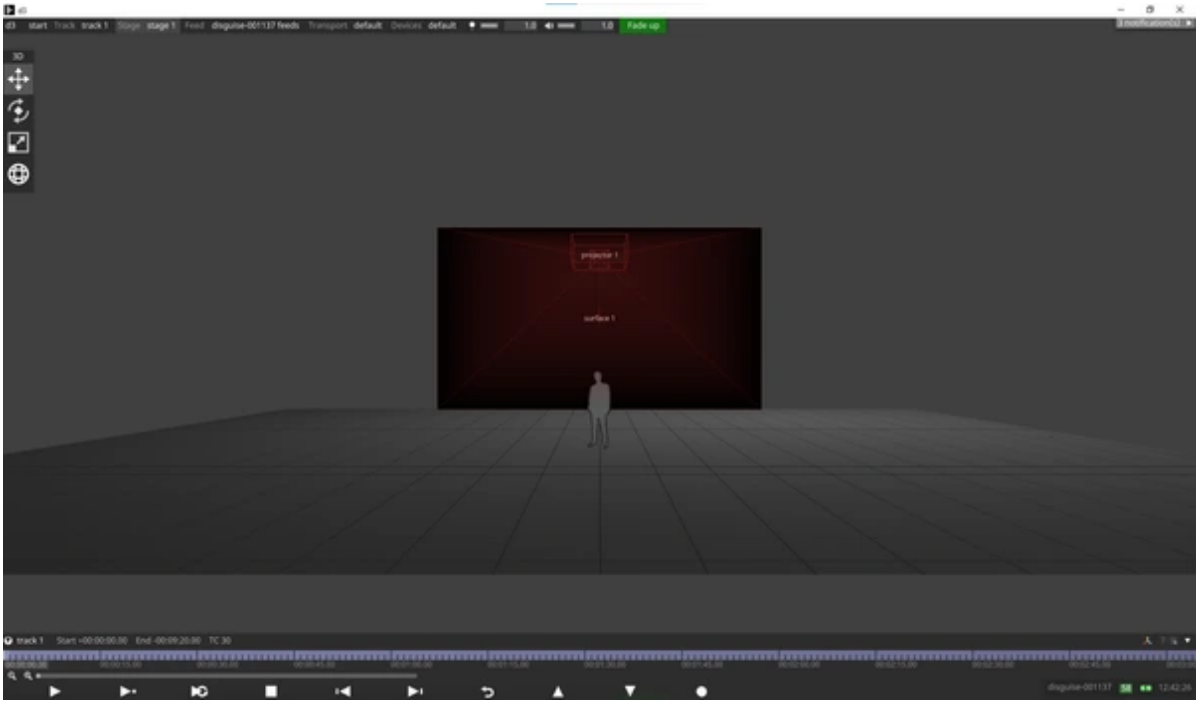
Recording Timecode with Expression Variables

The following workflow compares incoming timecode against the position of the playhead using Expression variables and a Shot Recorder device.

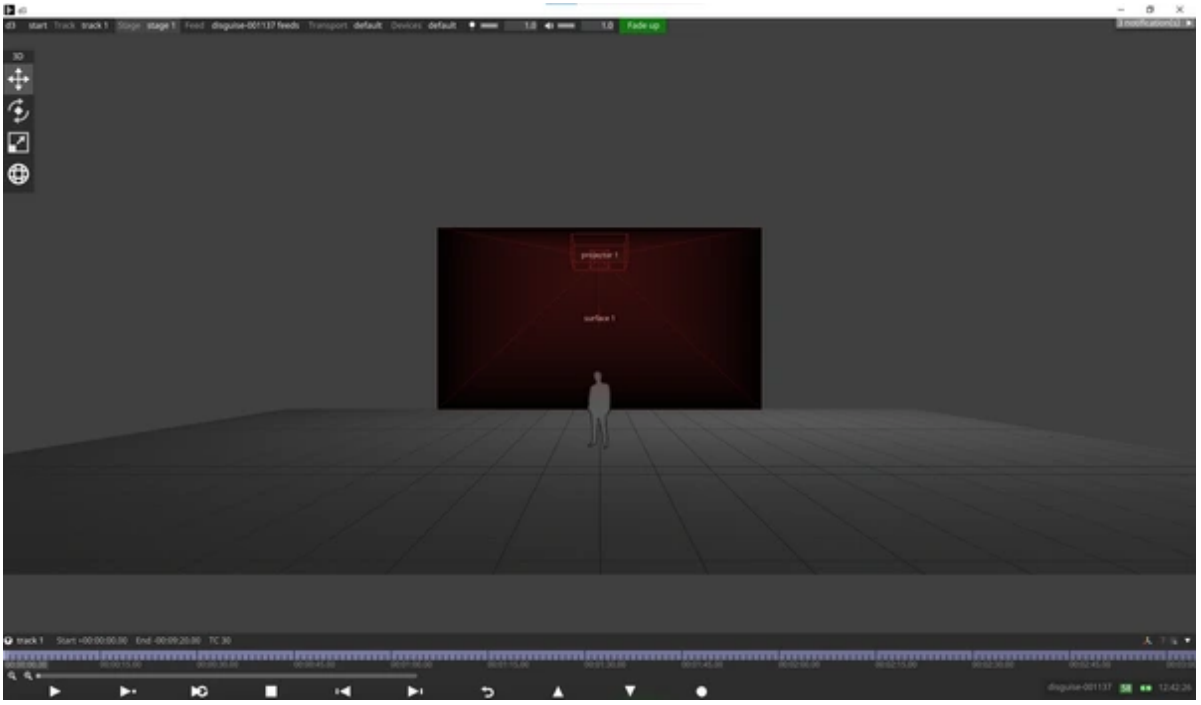
Workflow

The following workflow demonstrates recording timecode using a expression variables.

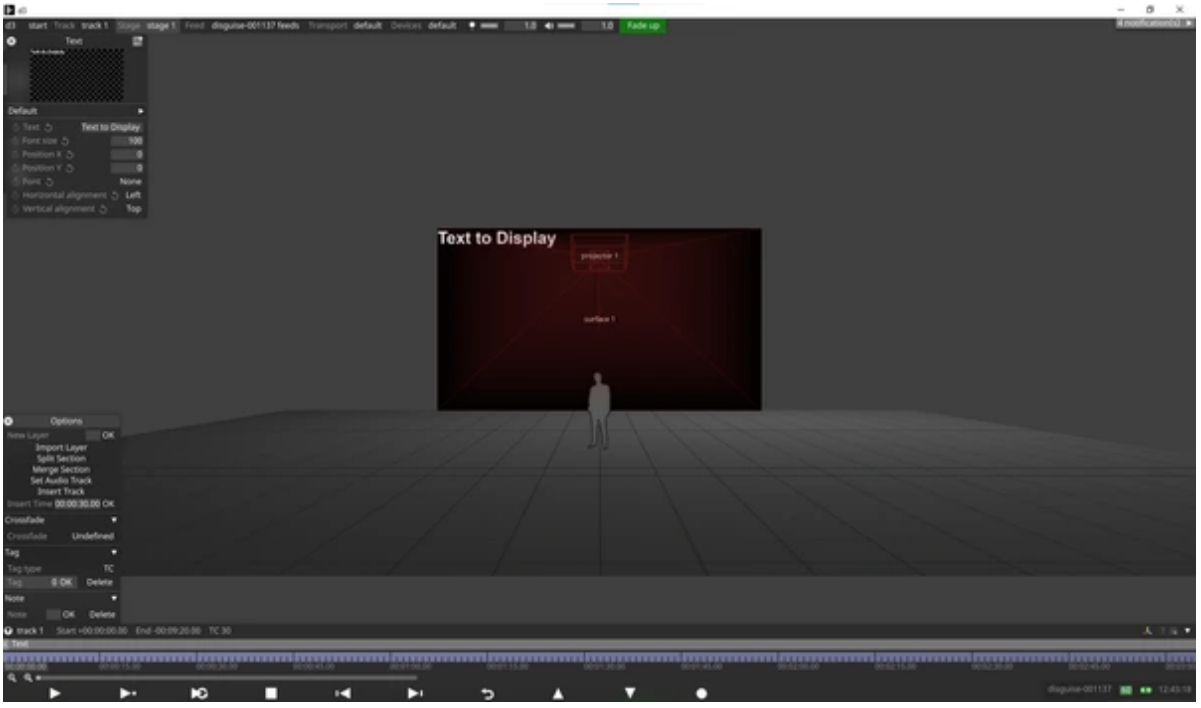
1. Create a blank project.



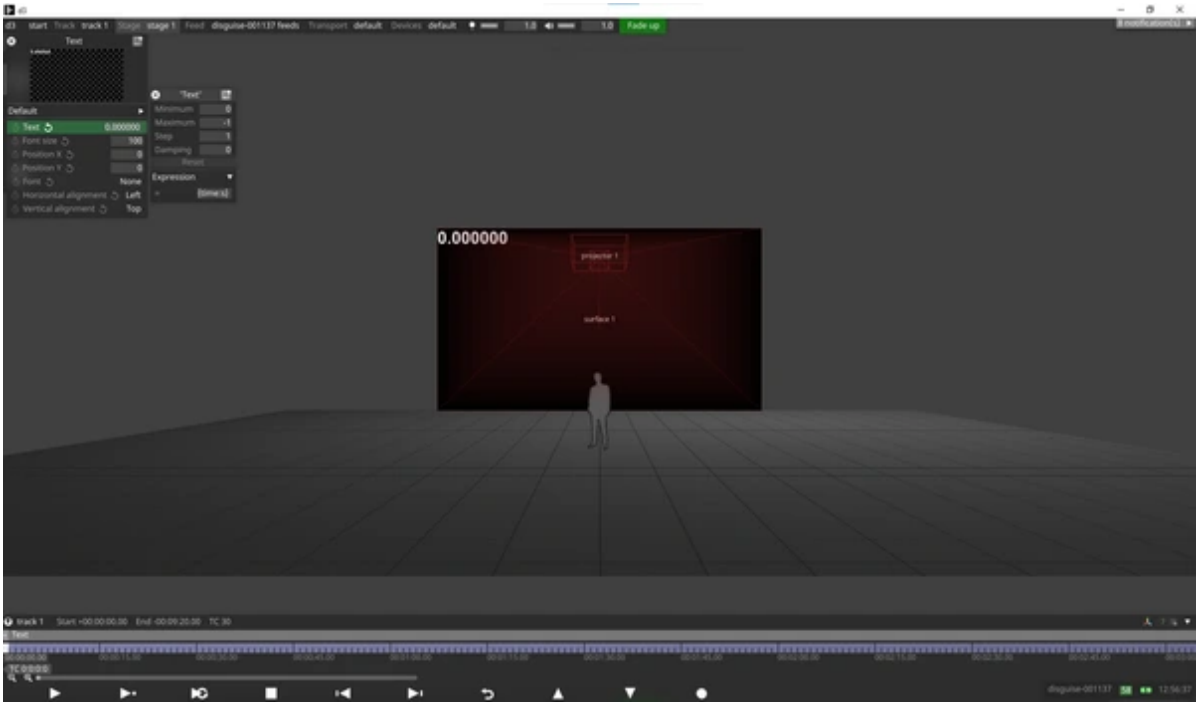
2. Create a layer, and ensure it is as long as the track. This example uses a **Text** layer.



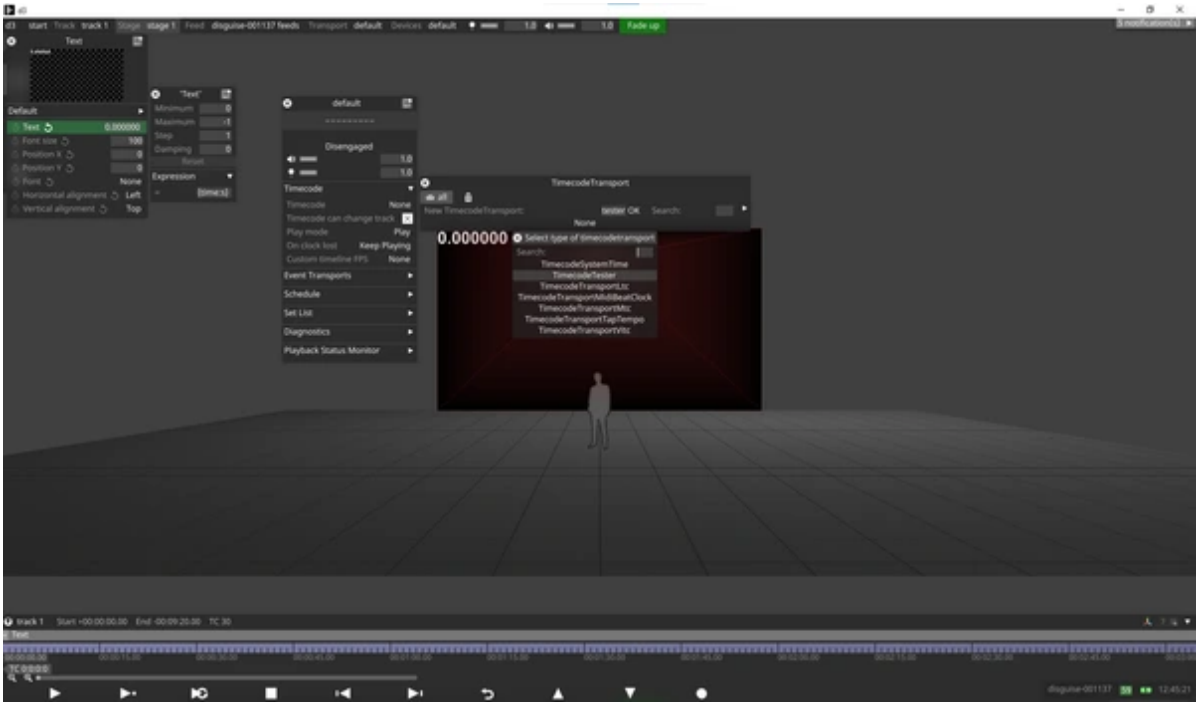
3. Add a 0 **Timecode Cue** (TC) at the beginning of the track.



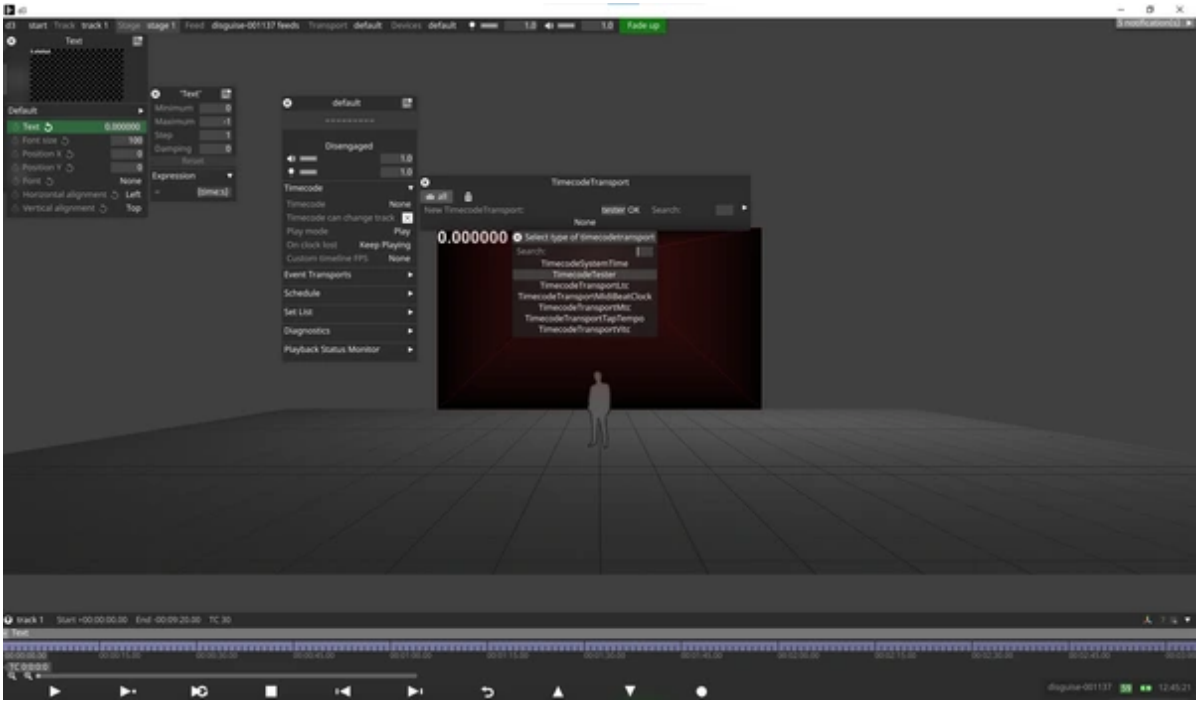
4. Right-click the **Text** field of the Text layer, and set the Expression to `time`.



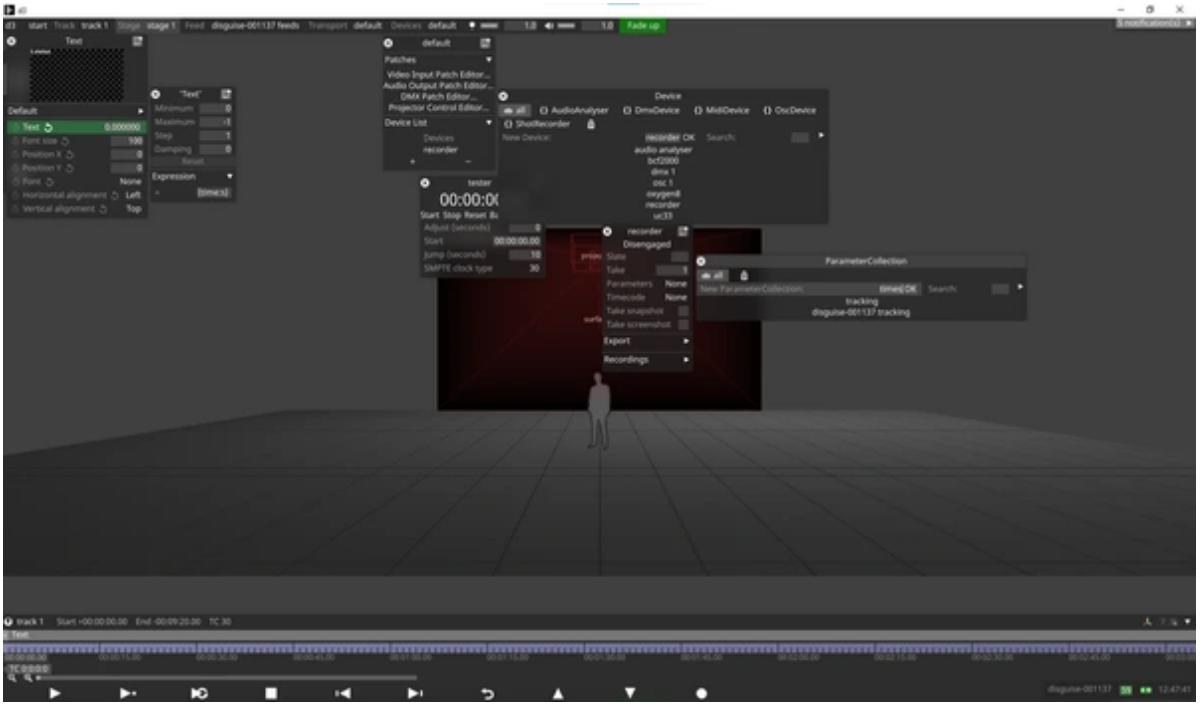
5. Create a new Timecode Transport source, for example, **TimecodeTester**.



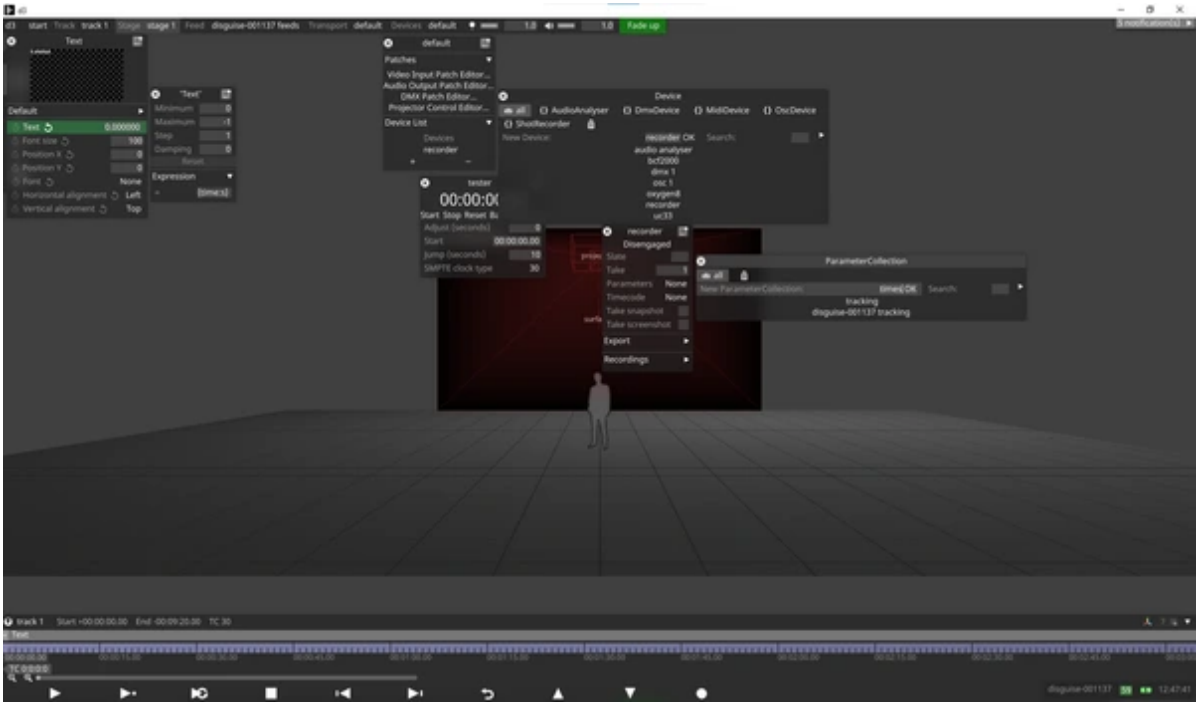
6. Go to **Device Manager**, and add a Shot Recorder device.



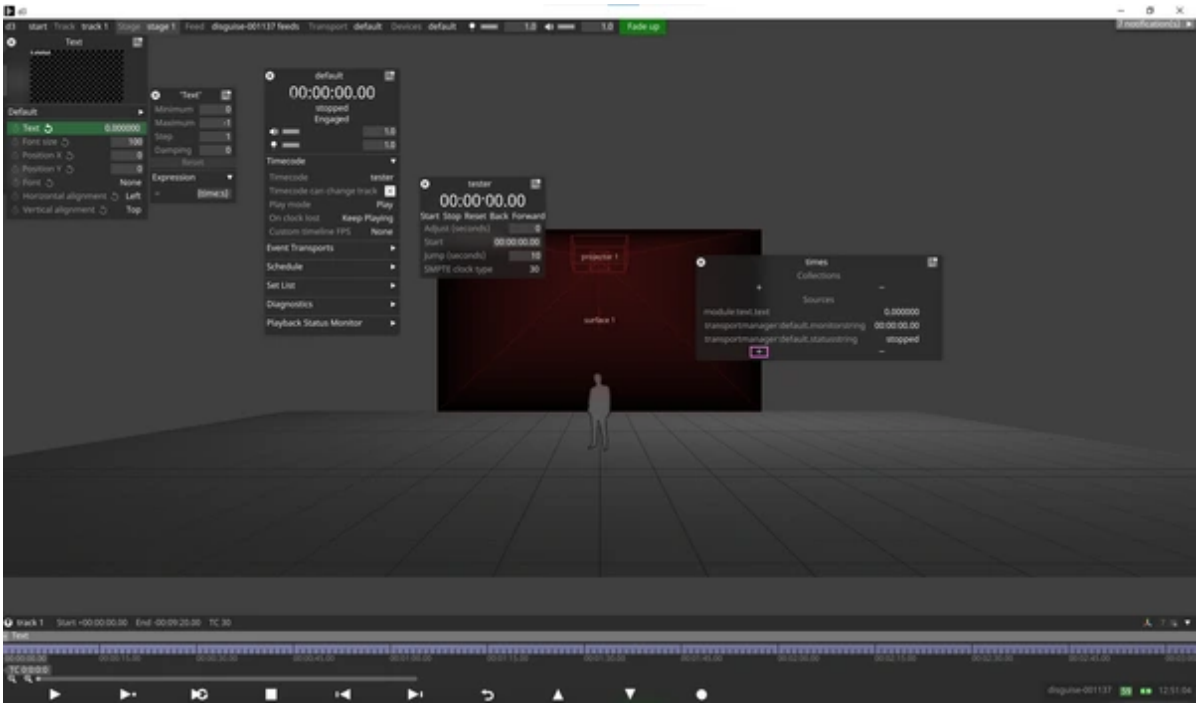
7. Create a ParameterCollection for the Shot Recorder.This is what will be recorded.



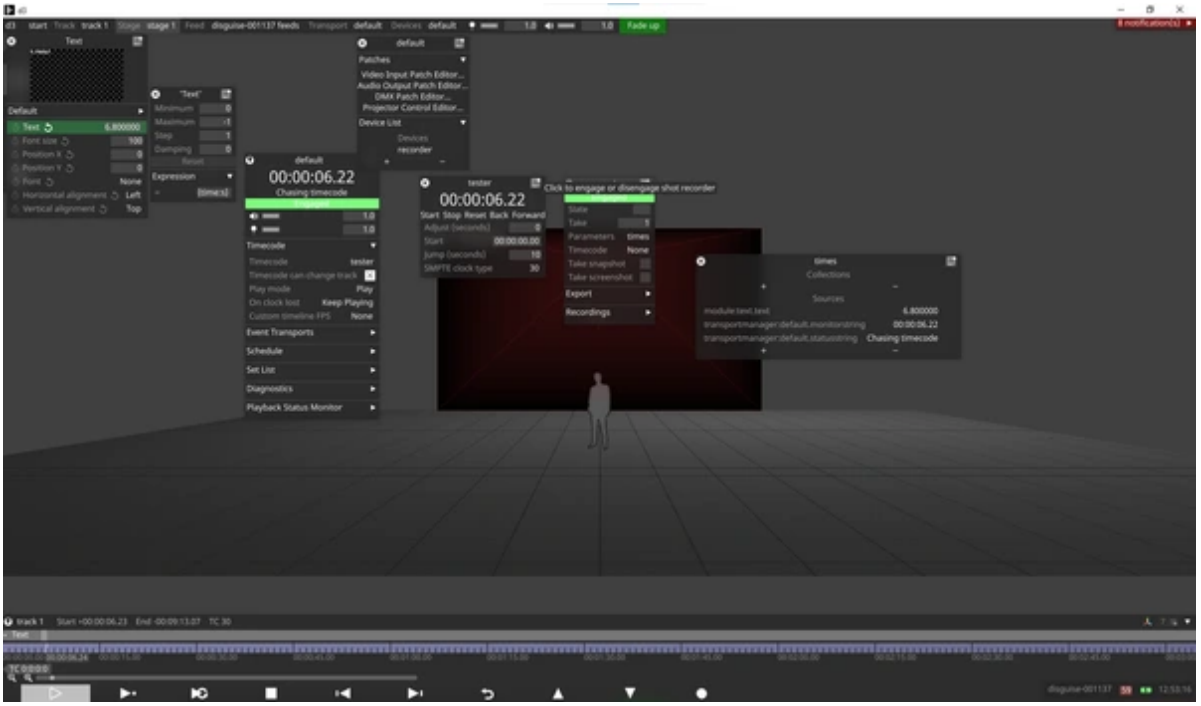
8. Link the Text value to the Parameter Collection by using Alt+drag from the + icon under **Sources** to the **Text field** of the Text layer.



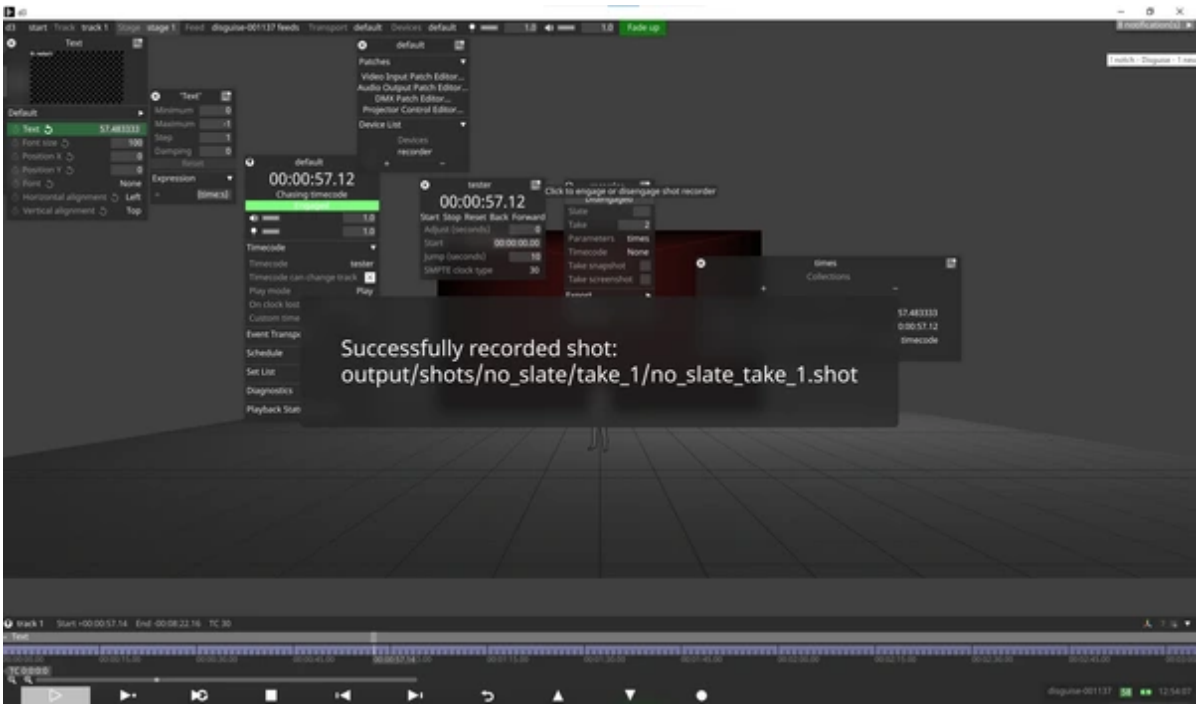
9. Engage the Transport and Alt+drag the Timecode value and status to connect the Timecode to the Transport.



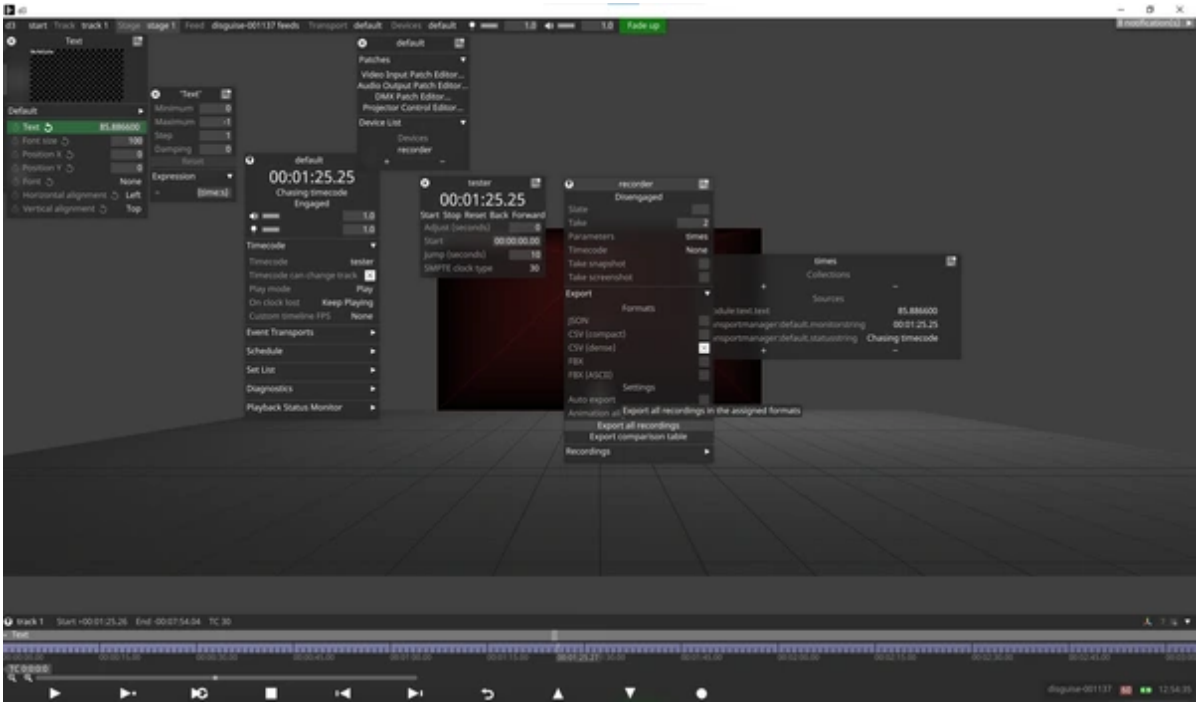
10. Start playing Timecode, and click on **Disengaged** on the Shot Recorder to engage it and begin recording.



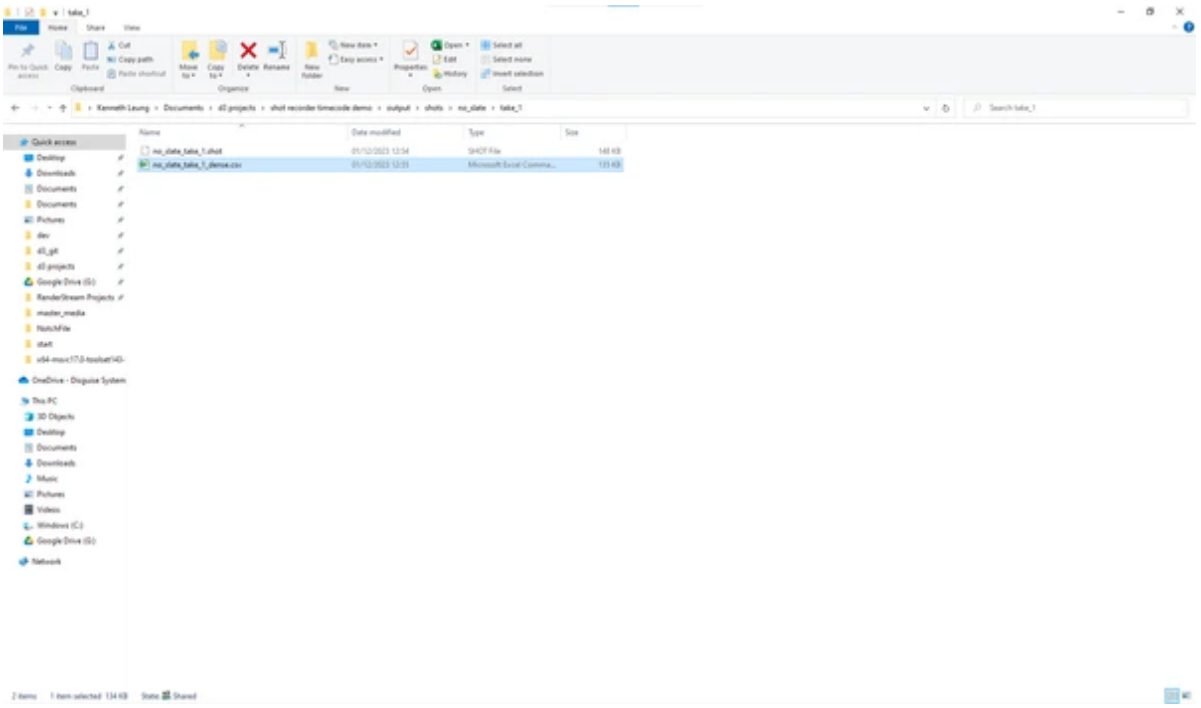
11. To finish the recording, click on the **Engaged** button of the shot recorder.



12. Expand the **Export** menu of shot recorder, select CSV (dense) and click **Export all recordings**.



13. There will be a .csv file under `output/shots/no_slate/take_xxx`.



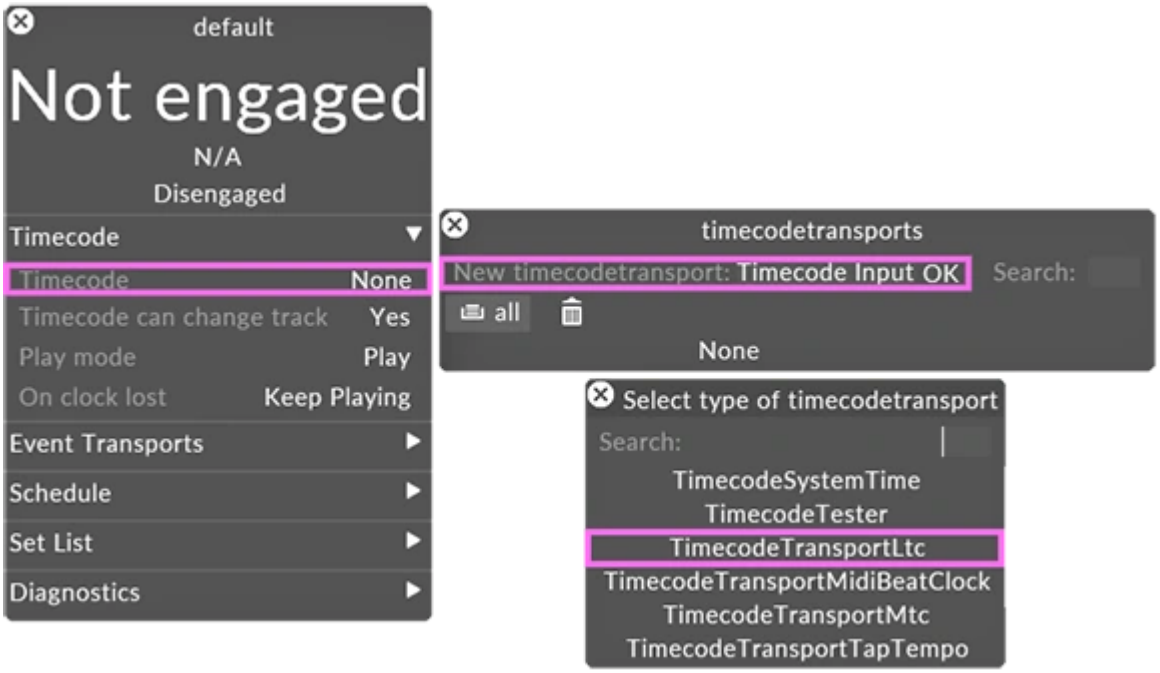
LTC Setup

Linear Timecode (LTC) allows Designer to synchronise its timeline to an external analogue audio-based timecode signal.

Setting up LTC input

First connect your LTC source to you hardware's soundcard and then open up the transport editor. Please see Using Timecode in to see how to setup the software to chase timecode.

1. From the main **transport** editor, create a new timecodetransport object and select the type **TimecodeTransportLtc**.
2. Make sure to press the **engage** button to enable the timeline to slave to the incoming LTC.



LTC Transport Properties

Timecode Readout

Displays the current incoming timecode. If there is no line-in selected, it will report 'No valid clock found'. If there is no incoming signal, it will report 'Clock not running'.

Line-in

This is the audio input to use for LTC.

Note, that on the Solo, LTC can be received through the microphone connector on the rear of the machine.

SMPTE clock type

The clock type (FPS) if the incoming LTC. The options are:

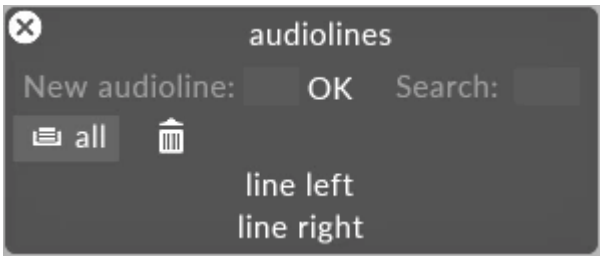
- 23.976fps
- 24fps
- 25fps
- 29.97fps drop frame
- 30fps

Adjust (sec)

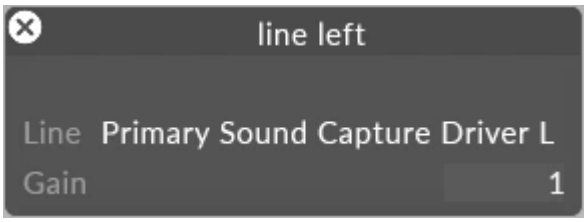
Allows you to add a delay (in seconds) to the incoming timecode.

Setting up the line-in

The next step is to setup the line in to use for LTC. To do so, left-click on the line-in property of the LTC transport editor and create a new audioline. This will open up the audioline editor for your new audioline.



Audioline editor



Signal Meter

Displays the levels of the incoming signal from the selected Line. By default, this shows an plot of incoming EQ levels (bass on the left, treble on the right); click on the signal meter to switch to a direct view of the signal, with clipping highlighted in red.

Line

This is the audio input to use.

Gain

If the incoming audio level is too low to extract a reliable clock signal from, you can boost the signal using the gain control. Incoming audio levels are simply multiplied by this number. Note however that if gain is too high, clipping will result, which can make clock detection unstable.

Once the audioline is setup and receiving signal, you will see the timecode readout update with the current time reference.

Notes on playback behaviour

- When a clip is set to Mode: Locked and includes a timecode trigger, the content will ‘jam sync’ to incoming timecode, jumping from one section to another with timecode.
- When a clip is set to Mode: Normal and includes a timecode trigger, the content will be fired at the moment of the timecode trigger but is then free-running relative to timecode.
- In case there is an overlap of the time code of the section you’re in and the next / a TC tag, it will not trigger.

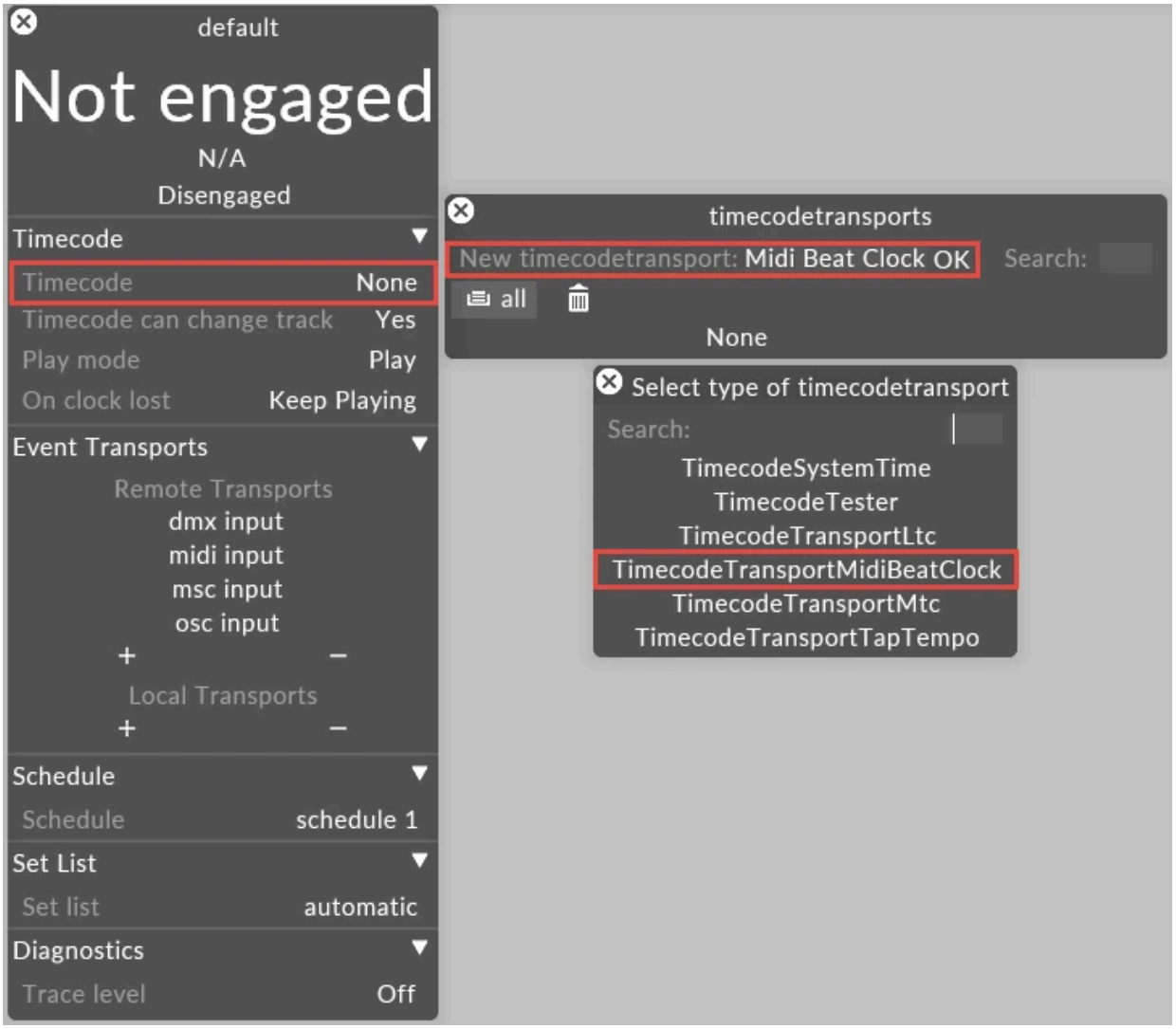
MIDI Beat Clock Setup

MIDI beat-clock chase is particularly useful for shows with electronic music of which the tempo may change compared to the guide audio in the track. It can also be used in rock shows where the drummer is playing to (or generating) a click-track.

MIDI beat-clock is effectively a regular metronome. When chasing beat-clock, Disguise will match the tempo and phase of the incoming signal, varying its playback speed accordingly. This is useful for shows that rely on rhythmic, to-the-beat editing and quantised video playback. MIDI beat-clock carries tempo and phase information but does not carry song position information. This makes it possible to combine it with manual or MIDI-based cue and track selection.

Setting MIDI Beat Clock chase

1. Create a new timecode object in the **transports** editor.
2. Choose **TimecodeTransportMidiBeatClock.**
3. Make sure to press the **engage** button to enable the MIDI beat-clock.



MIDI Beat Clock Properties

Clock device

As with MTC chasing, this can be set to the same device as the main MIDI input device or to a different device if necessary.

Input lock type

This should be set to **beat clock**.

Play mode

This selects the play mode that uses when chasing beat-clock it can be normal **play**, **play to end section**, or **loop section**.

On clock lost

When Disguise stops receiving clock beats (or receives a stop command), it can either stop or continue playing. For rehearsals, you will usually select **stop** mode, and then switch to **keep playing** mode during the live show.

On clock regained

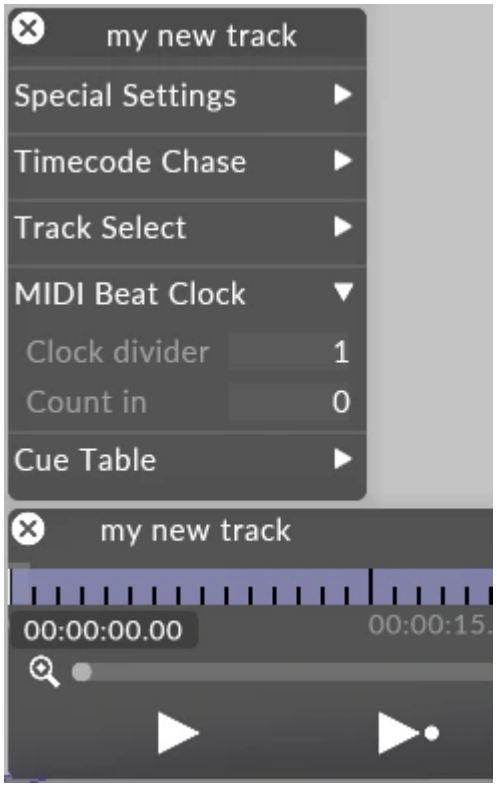
If d3 loses and then regains clock, it can either start from the beginning of the track or continue from where it currently is in the Timeline. Again, **reset to start** is the norm for rehearsals, and **play from current** is the best response during a live show.

Adjust

As with MTC , the adjust property allows you to delay the video signal relative to the audio. Positive values will make video events happen earlier, negative values will delay the video in relation to the audio.

MIDI beat-clock track settings

To change the per-track settings, open up the track you want to change, right-click the title bar to open the Track editor and open up the **midi beat-clock** tab.



MIDI Beat-Clock properties of the Track Editor are used to change the track tempo and add a beats count in

Clock divider

When working with quantised guide audio, it can happen that you quantise a track and end up with a different bpm than the musician has assigned to the track. For example, you might quantise a track to 120 bpm and then find that the clock signal for that track is coming in at 240 bpm. The **clock divider** property is useful in such a situation: the tempo of the incoming clock signal is simply divided by this number. In this example, you should simply set the clock divider to 2 in order to take the incoming 240-bpm signal and down-step it to 120 bpm, allowing d3 to play back at the correct speed. Similarly, in the opposite case (quantising at 240 bpm, but then receiving at 120 bpm), you should set the divider to 0.5 (1/2).

Count in

When starting a song, it is usual for the clock to issue a count-in: a number of beats that indicates the start of the track, but happens before the song starts. For example, if you set **count in** to 4 beats, Disguise will wait four beats after clock-start before starting to play the track. During count-in, the bpm indicator in the Controls editor shows the letter **c** after the beat-count.

For more information on the other properties contained in the Track editor please see the Editing tracks sub-chapter.

Jumping during beat-clock chase

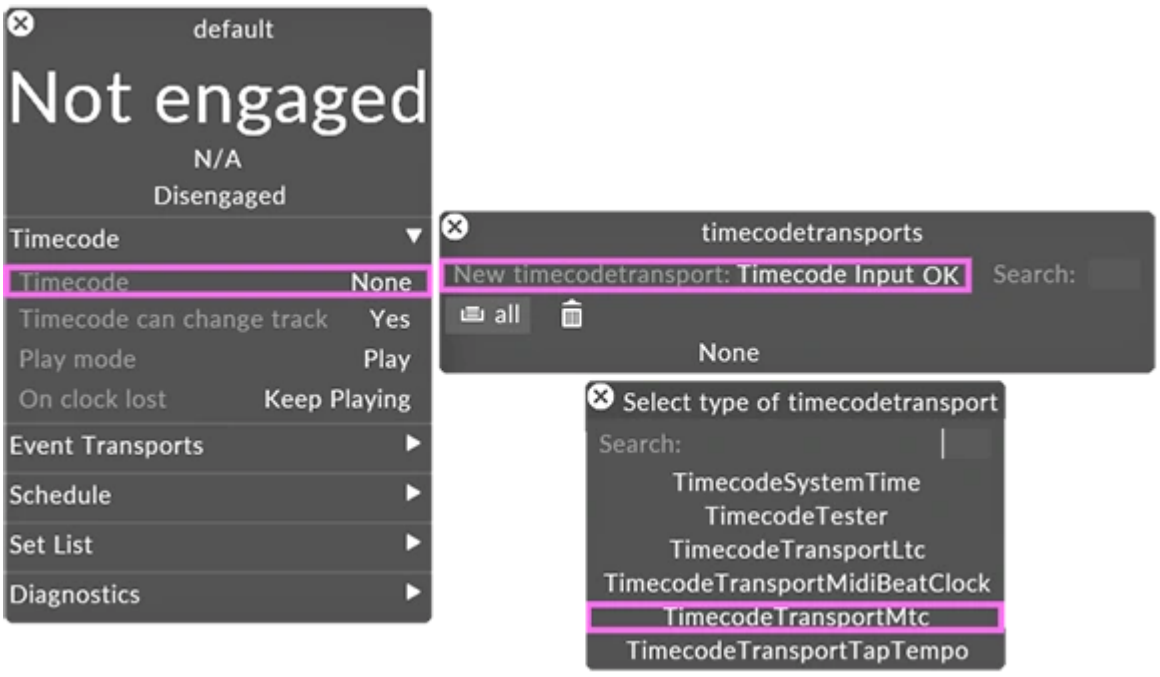
When Disguise is chasing beat-clock, it will always remain in the correct phase, so that it always stays locked to the beat. If you issue a transport command (for example jump-to-next-section), d3 will remain locked to the beat even if you issue the command midway through a beat. For example, if you issue a jump-to-next-section command when the beat counter is 0.5, d3 will jump to the next section and then jump 0.5 beats forward in the Timeline. This enables you to move around the track while knowing that Disguise will always remain on time.

MTC Setup

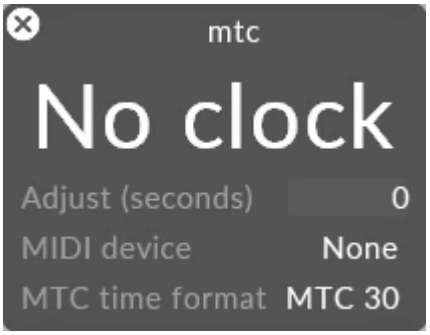
MIDI Timecode (MTC) allows Designer timelines to synchronise precisely with external timecode sources.

Setting up MTC input

1. Connect your external MTC source to the **MIDI input** on your Disguise hardware.
2. In the main **Transport** editor, create a new **TimecodeTransport** object and set its type to **TimecodeTransportMtc**.
3. Click **Engage** to enable the timeline to follow (slave to) the incoming MTC signal.



MTC Properties



Adjust

Adds an offset—positive or negative—to the incoming MTC clock. This is useful for compensating for front-of-house or system-wide latency.

- The value is measured in **seconds**.
- **Positive** values advance the timeline relative to the incoming timecode.
- **Negative** values delay the timeline relative to the incoming timecode.

MIDI Device

Specifies the MIDI input device from which MTC input will be received.

However, Designer does **not** support MTC output.

MTC Time Format

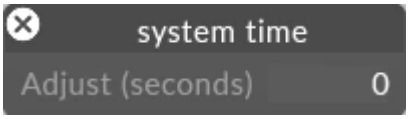
Defines the frame rate of the incoming MTC stream. Available options:

- **24 fps**
- **25 fps**
- **29.97 fps (drop-frame)**
- **30 fps**

For information on syncing timelines using timecode, see Using Timecode.

Timecode System Time

The **Timecode System Time** transport uses the machine's Windows system clock as its timecode source.



How System Time Timecode Works

System Time timecode provides a simple, continuous time reference by reading the current time from the underlying Windows operating system.

Designer converts this real-time clock into a frame-based timecode stream that can be used to drive timeline playback.

AS the clock runs independently of the Designer timeline, this method does **not** offer frame-accurate synchronisation like LTC or MTC, but it can be useful in scenarios where a lightweight or approximate time reference is sufficient.

Adjust Offset

The **Adjust (sec)** property allows you to apply a positive or negative offset to the system time before it is interpreted as timecode.

- **Positive values** advance the timecode.
- **Negative values** delay the timecode.

This is helpful if you need to align system-time playback with other cues or scheduling logic.

When to Use System Time

System Time is a simple alternative to dedicated timecode protocols and is suitable when:

- You need a basic time reference without external hardware.
- You are driving lightweight scheduled playback.
- Precise or frame-accurate synchronisation is not required.

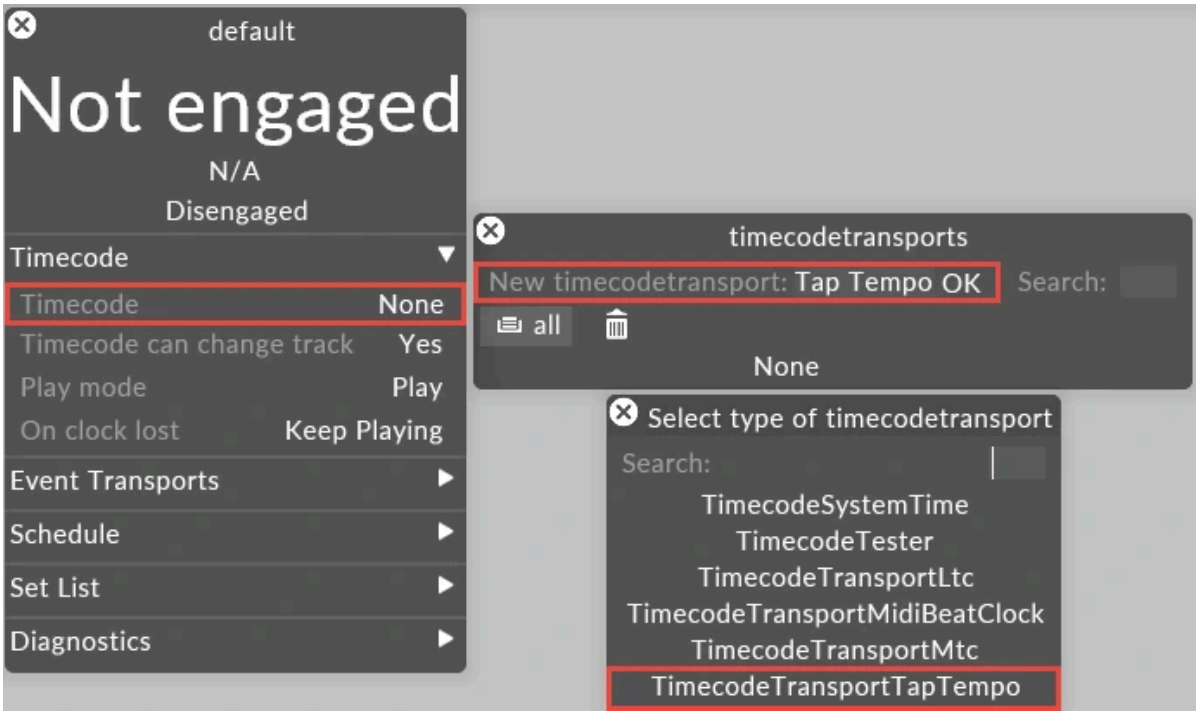
For more complex synchronisation (e.g., between machines or with show control systems), use LTC or MTC instead.

Tap Tempo Setup

The Tap Tempo feature lets the user define a bpm of the active track based on keyboard input. This feature is useful for live operation when you want visuals to match tightly to the beat but where no other timecode input is available.

How to setup Tap Tempo

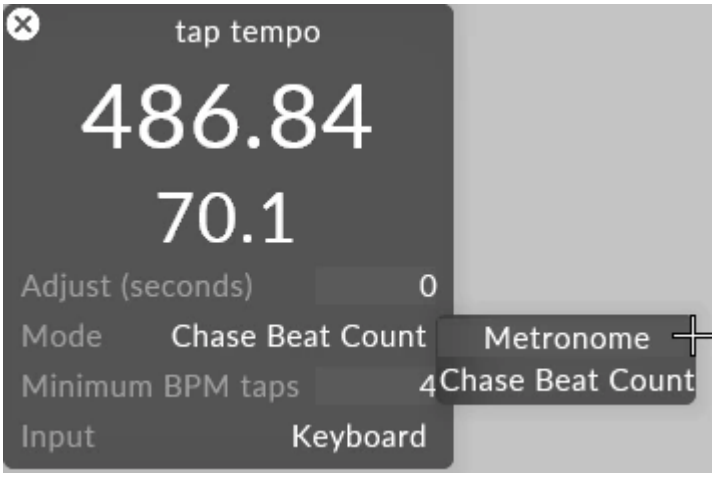
1. From the main **transport** editor, create a new timecodetransport object and select the type **TimecodeTapTempo**.
2. Make sure to press the **engage** button to enable Tap Tempo.



How to use TapTempo

1. To set a bpm, click the down the **INS** button as many times as set in the **min bpm taps** property described below. If using a MacBook Pro you may need to click **Fn+INS** to do this.
2. To jump to a specific bar while keeping the current bpm just click on that bar with the mouse.
3. If **Chase beat count** mode is active and you wish to place the playhead in the very beginning of the timeline, hold to the **DEL** key. If using a MacBook Pro you may need to click **Fn+Backspace** to do this. This feature is rarely needed.
4. Tapping **delete** will reset the beat counter to zero.

TapTempo editor



Beat read-out

Displays the total number of beats that has been played.

Bpm read-out

Displays the current bpm based on keyboard input.

Adjust

A value set in seconds that compensates for a potential delay. This values is usually ranging between 0-0.5 sec. This feature is rarely used and will be most likely removed in future releases.

Mode

Metronome

When Metronome mode is active the bpm will change as to the keyboard input without affecting the position of the timeline playhead. Metronome mode is set to default and is considered to be and used in most cases of live operation using TapTempo.

Chase beat count

Chase beat count mode automatically sets the playhead position on the Chase beat count mode automatically sets the playhead position on the timeline, based of to the total number of beats and the current bpm. For example, if being in Metronome mode, then switching to Chase beat count the playhead will automatically jump to a bar.

This feature is rarely used and will be most likely removed in future releases.

Min bpm taps

This value decides how many clicks the user need to input before calculting an average bpm.

Input

The interface for controlling the TapTempo parameters. Currently only keyboard input is supported.

Timecode Overview

Designer is able to receive incoming timecode signals, and trigger transport commands from those signals.

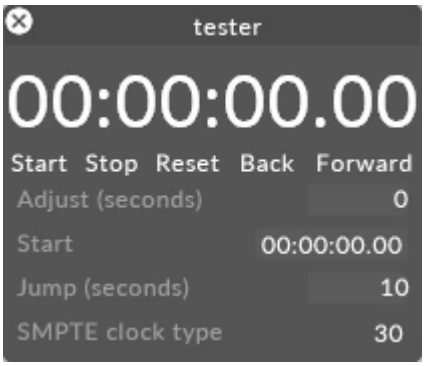
The following timecode formats are supported:

- Linear Timecode (LTC)
- MIDI Timecode (MTC)
- MIDI Beat Clock
- Tap Tempo
- System Time (Windows Clock)

For more information on timecode, check out the following pages:

- Track Timecode
- Setup LTC
- Setup MTC
- Setup System Time
- MIDI Beat Clock
- Setup Tap Tempo
- Triggering Playback with Timecode
- Troubleshooting LTC
- Timecode Tester
- Recording Timecode with Expression Variables

Timecode Tester



The Timecode Tester is now an available Timecode input option in the Transports Manager. Once the Timecode Tester is assigned as the input source, a widget will appear allowing you to Start, Stop, Pause and Jump the timecode tester. It is simply a way of streaming timecode internally.

Triggering Cues with Timecode

This page explains how to place timecode cue points on a track so Designer can trigger playback precisely when the incoming timecode reaches those positions.

Marking timecode cue points on a track

1. Open the track and navigate to the bar where you want to assign a timecode cue point.

   This is usually:

   - The first bar of the audio region for the song you want to chase, or
   - For multi-song tracks, the first bar of the audio section for that specific song.

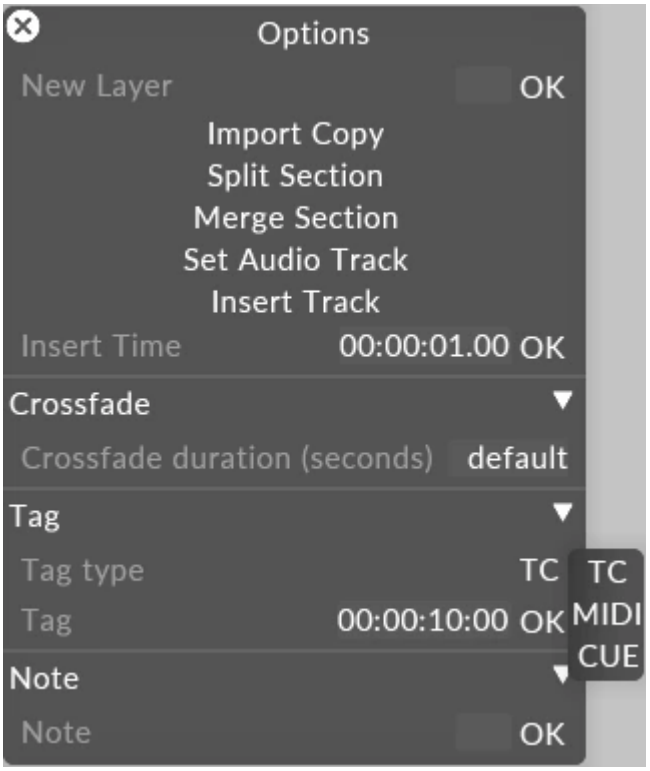
   A common workflow is to assign distinct timecode start positions to each song.

   For example:

   - Song 1 → `10:00:00:00`
   - Song 2 → `20:00:00:00`
   - Song 3 → `30:00:00:00`

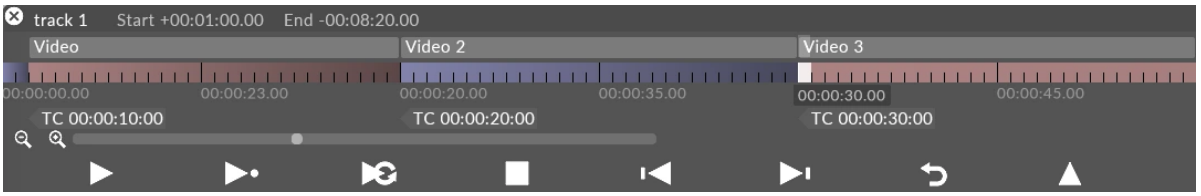
   Once you are on the correct bar, edit the tag attached to it:

   - Right-click the bar **or** press **Ctrl+T**
   - Select the **TC** tag type
   - Enter your desired timecode value in the tag dialog



2. In the **tag:** field, enter the timecode for when you want to play from this bar and sync to timecode.

- Enter the following syntax `hour:minute:second:frame`.
- Example `00:00:10:00`. A new tag will be created below the timeline at the selected bar.



3. Now when the incoming timecode reaches `01:00:10:00`, the track will start playing, locked to timecode, from that bar.

> **Note**
>
> Don't set a timecode note at the first bar of a track, always leave a few bars for pre-roll, otherwise there's a risk will not hit the note on time.

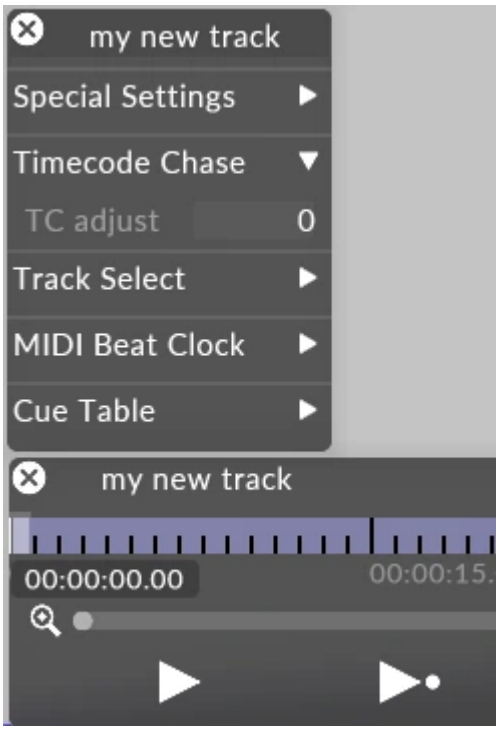
Per-track delay adjust

If you need individual tracks to respond to timecode at different offsets, you can apply a per-track delay:

1. Right-click the track's title bar to open the **Track Editor**.
2. Go to the **Timecode Chase** tab.
3. Adjust the **TC Adjust** property.

The **TC Adjust** value adds an offset (in seconds) to the incoming timecode *for this track only*. This is useful for compensating for front-of-house delay or other timing discrepancies.

- **Positive values** advance the track
- **Negative values** delay the track



The TC Adjust property modifies how incoming timecode is interpreted for the selected track.

For more about the Track Editor, see Editing tracks.

Setting active tracks

When your show contains multiple tracks, Designer can automatically switch to the correct track based on incoming timecode.

- When timecode is received, Designer searches all tracks within the **currently selected box** in the Track Manager.

- If multiple tracks match the same timecode range, Designer selects the **first** one in the list.

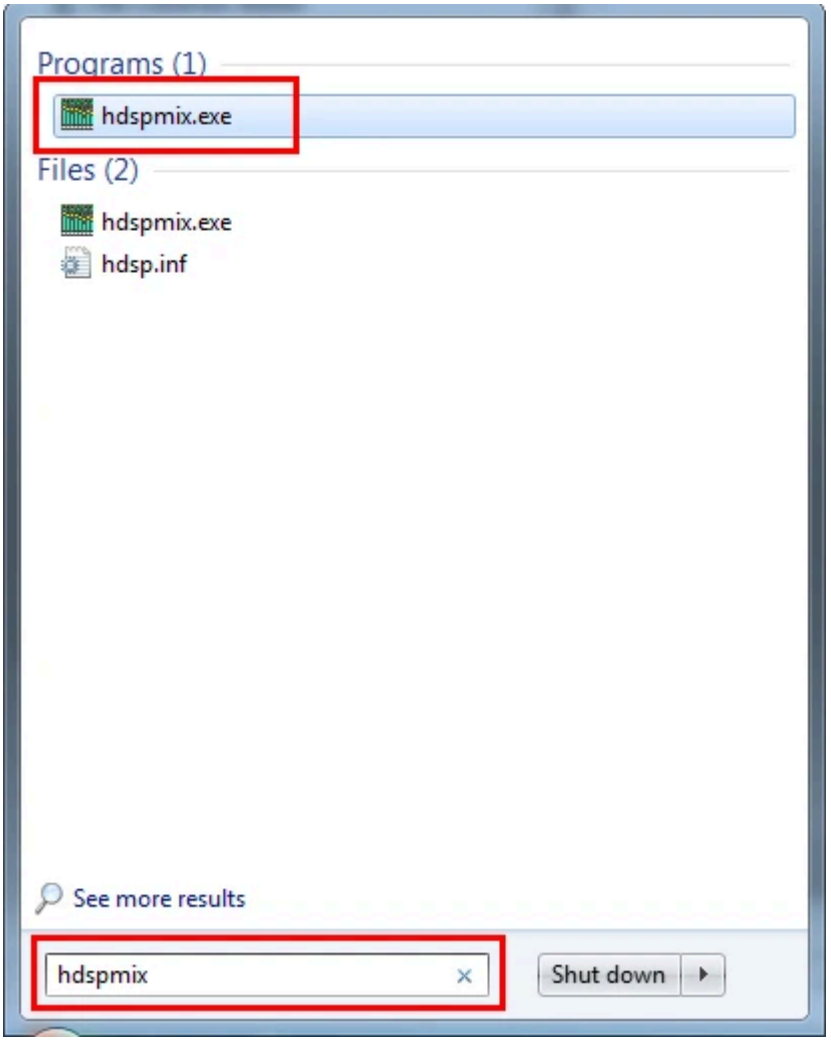
To ensure only the intended tracks are included in this search, create a **set-list**.

Step-by-step instructions can be found in the *Creating a set-list* section of the Creating/managing tracks page.

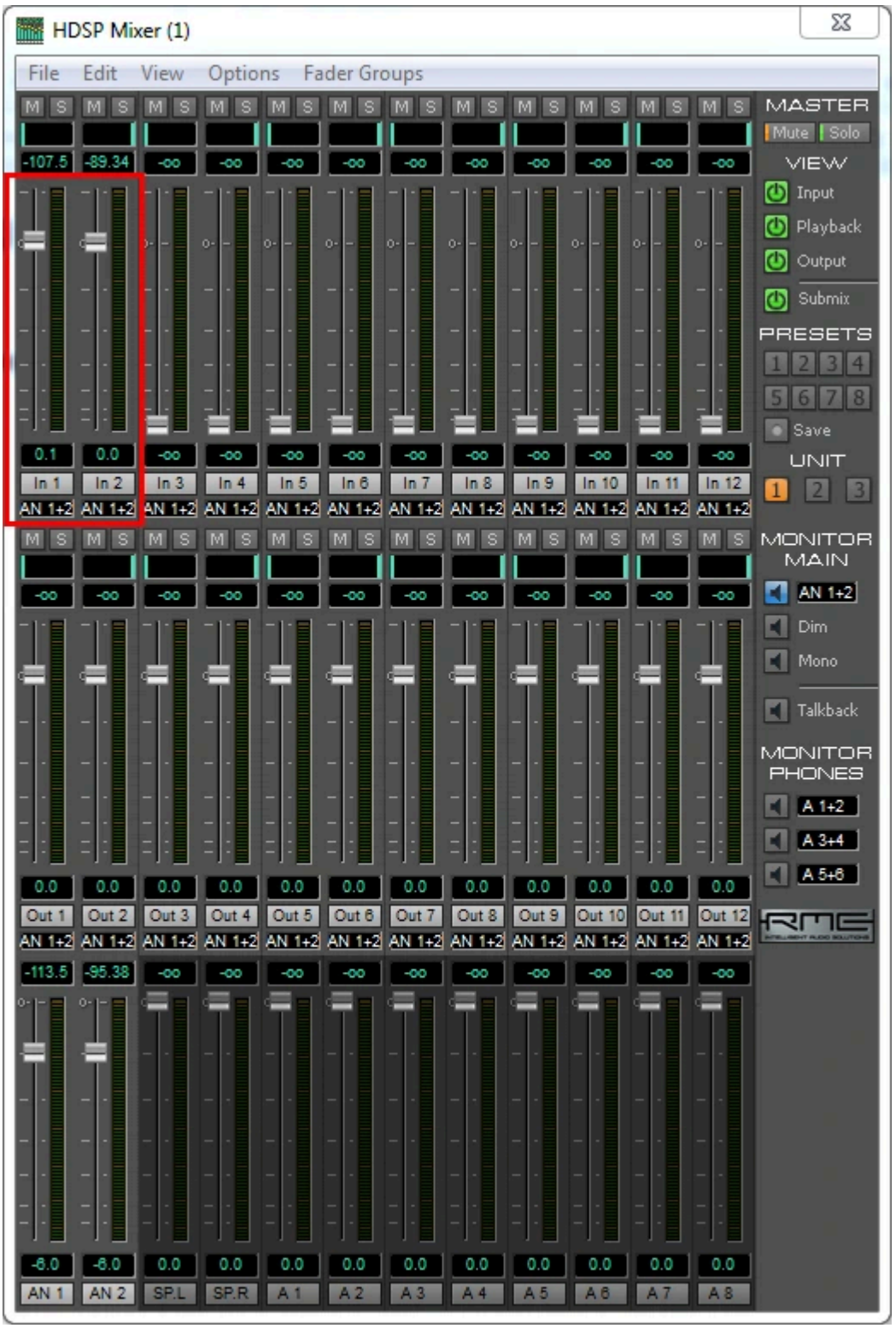
Troubleshooting LTC

No audio is coming in through the RME 9362 soundcard (only applicable on a 4u 2.5 server)

1. Check that the levels on the HDSP mixer are at 0db.
2. Open the start menu and type **hdspmix**. Open **hdspmix.exe.**



3. In the HDSP mixer, check that In 1 and In 2 levels are at 0db.



Timeline

What is the Timeline?

The terms Timeline and Track Player both refer to the section at the bottom of the interface. The reason for using two different names to describe the same section is that they suggest different meanings; whilst Timeline conveys a sense of time, Track Player refers to the function of playing a track. Therefore, both names are used synonymously within the User Guide depending on their context.

Objects within the Track Player

The Track Player is a specialised object editor used to play and edit tracks. All sequencing and Timeline information is organised into tracks. The Track Player is constructed from a series of properties explained below to make playing and editing tracks more intuitive.



Track Anatomy

- Time passed since the section started (2)
- Section name & time remaining within the section (3)
- Track collapser, makes a mini version of the Track where only Transport controls are visible (4)
- Notes & Cues on the Timeline (5)
- Timeline zoom controls allowing users to toggle between zoom levels on the timeline (6)
- Track scroll bar, which allows you to scroll the length of the Track as well as view the current location of the playhead (7)
- Machine status including name, current FPS, battery monitor and local time (8)

Customising Zoom Levels

To help you navigate the timeline more efficiently, Designer allows you to customise which zoom levels are enabled. This is useful for quickly jumping between your preferred levels of detail, skipping over intermediate zoom steps you don't use.



To customise the zoom levels:

1. Click on the zoom level readout, located in the bottom left of the timeline widget. This will open the **Zoom Levels** window.
2. In this window, you will see a list of all available zoom levels. Each zoom level has a toggle button next to it.
3. Click the toggle to enable or disable a specific zoom level. Enabled levels are marked with an 'x'.

Disabled zoom levels will be skipped when you zoom in or out using the `?` and `/` keys, or by clicking the zoom buttons in the UI. This allows you to tailor the zoom functionality to your specific workflow.

Please see Tracks Overview for information on tracks.

Closing/re-opening the Track Player

1. Left-click the x icon in the top left corner of the Track Player to close the Track Player.
2. Right-click **Track** in the dashboard (bar at the top of the screen) to re-open the Track Player.

This is a useful feature, particularly when you want to make screenshots and the Track Player is obscuring part of your view.

Controlling the Timeline from external sources

Designer can be configured to control the Timeline with SMTPE, MTC, Art-Net, MIDI notes, OSC and more. Read the Transports chapter for more information.

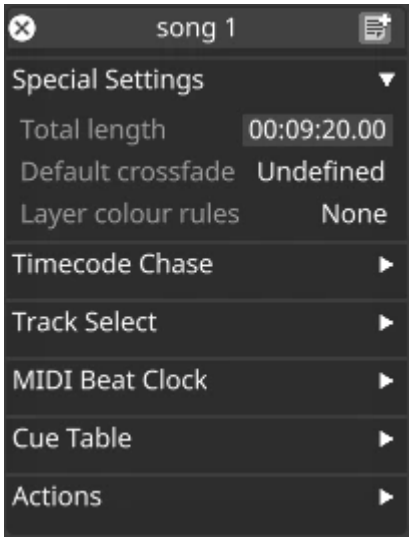
Bar Widget Shortcuts

- `CTRL+1` → TC tag
- `CTRL+2` → CUE tag
- `CTRL+3` → MIDI tag

Track Editor

Right-click the Transport controls title bar. This will open up a Track editor that lets you edit various track properties.

Special Settings



Special Settings

Total Length

This property defines the total length of the track in Hours Minutes Seconds & Frames (HMSF).

> **Note**
>
> **Please note**: Note that when the Timeline is Quantised, the legacy BPM options return to the dialogue.

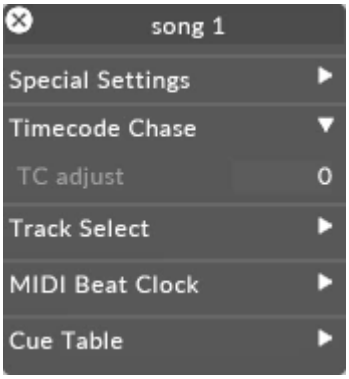
Default override

Defines the way tracks and sections fade in to each other by default. For further information see the Universal Crossfade page.

Layer colour rules

Defines the way the layers are coloured on this track. For further information see the Layer Colour Rules page.

Timecode Chase

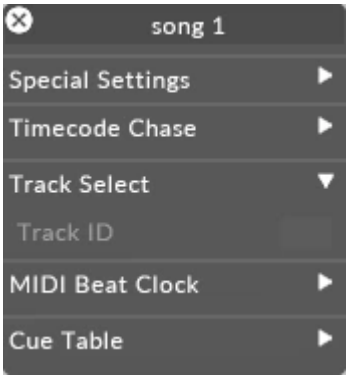


Timecode Chase

If for any reason you need to delay various tracks differently, you can do this by right-clicking the track titlebar to open up the **timecode chase** tab and editing the **TC adjust** property.

For more information on timecode chasing please see the sub-chapter Track timecode.

Track Select



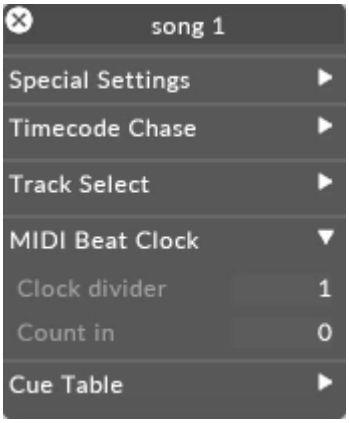
Track Select

Track ID

To select tracks based on an external MIDI note event, type in the **track ID** property in the text field with either a note number or note name (eg. C#1). When Designer receives a MIDI note, it will scan all tracks in the current active set-list. If it finds a match, it will trigger the track. For more information on MIDI notes please see the sub-chapter Midi notes.

For step-by-step instructions on how to use the track ID property to change tracks with ArtNet visit Changing tracks with ArtNet from the sub-chapter DMX Transports Overview.

MIDI Beat Clock



MIDI Beat Clock

Clock Divider

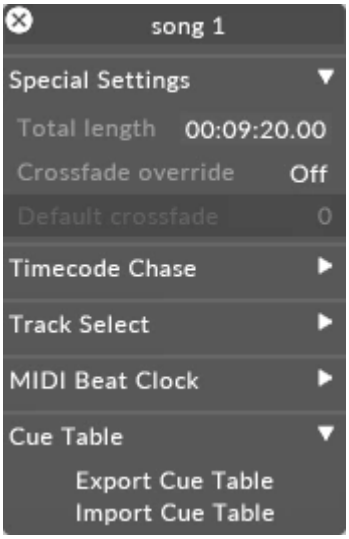
This property is used when synchronising to MIDI Beat Clock (as opposed to using timecode). It sometimes happens that the clock received is a multiple of the track bpm. For example, the track may originally be 60 bpm, but the input clock is received at 120 bpm. Setting the **clock divider** property allows you to scale the input clock; in this example, setting the divider to 2 will achieve the desired result.

Count In

The **count in** property is also used only when synchronising to MIDI Beat Clock. When the clock starts for the first time, d3 will wait for the specified number of beats before triggering track play.

Scroll down to the section MIDI Beat Clock Track settings in the MIDI Beat Clock topic for more information.

Cue Table



Cue Table

Designer allows you to export Track Cue notes to a table, allowing you to edit them en masse in a word processor or spreadsheet.

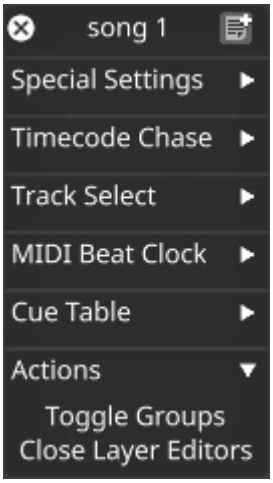
Export Cue Table

Left-clicking **export cue table** opens up a tab separated text file in a folder called objects/table.

Import Cue Table

Edit the cue names in the text file. Then go back to the Cue Table and left-click import **cue table** to load and apply the cue names.

Actions



Actions

Toggle Groups

Expand and collapse all groups on this track.

Close Layer Editors

Close all the open layer editors for layers on this track.

Track Timecode

The timecode FPS format that the timeline is represented in is, by default, defined by the project refresh rate.

The timeline has the following timecode FPS when the associated project refresh rate is selected:

- `60Hz - 30FPS`
- `50Hz - 25FPS`
- `59.94Hz - 29.97FPS`
- `48Hz - 48FPS (not a SMPTE standard)`
- `47.96Hz - 48FPS (not a SMPTE standard)`
- `30Hz - 30FPS`
- `29.97Hz - 29.97 Drop frame`
- `23.98Hz - 23.98FPS`
- `Anything else - 30FPS`

This can be overridden by creating a timecode transport, LTC or MTC, in the current transport manager and setting the FPS. The timeline will display in the FPS of the current transport managers timecode transport FPS if it exists.

All keyframes are created in absolute time in seconds and are not bound to any specific frame index. Changing the format that the timeline is displayed in does not change any keyframe times, and so keyframes that did appear on frame boundaries may not appear correctly on those same frame boundaries once the timecode FPS has changed. Therefore it is a good idea to set this correctly before you start sequencing.

Tracks Overview

What is a track?

All disguise sequencing and Timeline information is organised into tracks. Tracks provide a method for organising content and control commands for the show; the entire show may be placed into one track, or can be divided into multiple tracks. Better performance can be expected from dividing long tracks into individual ones.

The Track editor is used to play and edit each tracks within a project, as well as adjust each tracks individual settings like total length, and universal crossfade duration.

The Overview of the Timeline topic explains how to manage and edit the sequencing of individual tracks. Layers of content are placed on the Timeline in each track, which is explained in depth in the [Working with Layers] section.

Multiple tracks can be controlled at once through the use of Multitransports, to better organise content and control layers. More information on the use and creation of Multitransports can be found here.

Using tracks to sequence content to the beat

As described above in the Overview of the Timeline sub-chapter, the Track Player is used to play and edit tracks. This chapter explains how to create, manage and edit tracks. However, what is not discussed are layers and **audio files**. Layers are placed on the Timeline in the currently active track for Disguise sequencing. This is fully explained in the Working with Layers chapter. Audio files are inserted into a track, enabling content to be sequenced to the beat. For more information please see the Audio chapter.

Transport Player Controls

External synchronisation is managed by the Transport manager.



There are three play modes: **Play** , **Play-to-end-of-section** , and **Loop-section**. When you are using any of these modes, switching to a different mode happens seamlessly, without disturbing the progress of the Playhead.

Move the Playhead

The Playhead selects a position on the Timeline. When entering a play mode, the track will play from the current position of the Playhead.

To move the Playhead:

1. Left-click anywhere on a coloured Track bar to move the Play cursor to that point.
2. Hit the left and right **Arrow keys** to move the Play cursor one Track bar to the left or right.

Play



Normal play can be triggered by pressing the **Enter** key. Hitting **Enter** again will stop the cursor.

Normal play mode does not respect section boundaries; when the end of a section is reached, the playhead continues into the next section, stopping only at the end of the track. The Play button will flash to indicate which mode you are using.

Play-to-end-of-section



1. **Play-to-end-of-section** mode can be triggered by hitting the **Space bar**. Hitting the **Space bar** again will stop the playhead.

2. In this mode, the playhead will only progress until it reaches the end of a section (i.e. just before the next cue point). When this happens, Designer enters in a holding state. To indicate this, the button will flash at twice the normal speed and the playhead will remain static, although video and other content will continue to play.

When this happens, you can use the Next and Previous Section jump buttons to advance to the next section (i.e. trigger the next cue).

Loop-section



Loop-section play mode can be triggered by hitting the right hand **Shift** key. Hitting the right-hand **Shift** key again will stop the cursor.

In this mode, the playhead will progress until it reaches the end of a section, i.e. just before the next cue point. At this point, the playhead will loop back immediately to the beginning of the section and will continue playing from there.

Stop



Left-clicking the **Stop** button on screen will stop the playhead regardless of which play mode you are in. If you are using the keyboard, press the shortcut key for the play mode you are in to stop the cursor (i.e. the play keys act as toggles).

Previous section



Left-clicking the **Previous-section** button will make the cursor jump to the previous section if the cursor is on the first bar of the current section; otherwise the playhead will jump to the first bar of the current section.

You can also jump to the previous section using the **comma** `,` key on the keyboard.

Next section



Left-clicking the Next-section button will make the playhead advance to the start of the next section. If the playhead is in holding mode at the end of the section, Designer returns to Play-to-end-of-section mode. This button is therefore the equivalent of hitting the next cue.

You can also jump to the next section using the period/full stop `.` key on the keyboard.

Return-to-start-of-track



Left-clicking **Return-to-start-of-track** brings the playhead back to the very beginning of the track. Note that the software will stop playing when you click this button.

Next/Previous track from a setlist



Once you have created a set-list and selected it, left-clicking the **Next-track** and **Previous-track** buttons will make you step through the selected set-list.

Transport Manager

External synchronisation is managed by the Transport manager.

Transport Managers in Disguise allow for the control of playback to be sent via external commands to keep all cues across devices in sync. Transports can be controlled by timecode, Midi Show Control, Midi Note, DMX and OSC devices. Transports can contain multiple tracks, as defined by their assigned Set List.

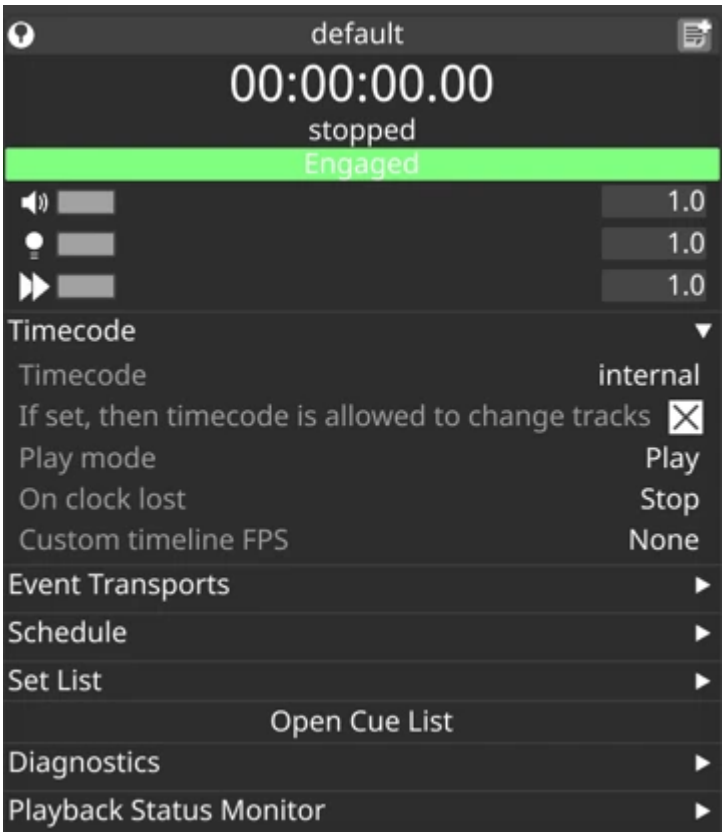
The control of multiple Transport Managers can be done through a MultiTransport controller.

[Animated GIF: Create transport]

Opening the Transport Manager

To open the Transport Manager, right-click **Transport** in the dashboard.





The transport manager manages external synchronisation

The transport manager gives you a large-format readout of the current clock time received when a transport device is connected to Disguise, and information about whether external synchronisation is **engaged** or **disengaged**.

> **Note**
>
> **Please note**: While working with external synchronisation, it can be useful to make the Transport Editor sticky by **Ctrl + left-clicking** the close button of the editor. From this point on, the Controls editor will remain open and pinned so you can always see its state. For more information, scroll down to the section 'Making menu windows sticky' in the Object Editor Overview sub-chapter.

Transport Editor Properties

Timecode readout

This shows the current value of the incoming clock signal, if any. This is a raw clock value, i.e. no adjustment has been applied to it. If you are chasing LTC or MIDI timecode, the display shows the standard `hours:minutes:seconds:frames`.

Chase status

Below the timecode readout is a status message. This is usually blank, but gives you useful status information about the current chase scenario.

Engaged/disengaged

The Engaged/Disengaged button allows you to turn synchronisation on or off. When set to disengaged, all external control signals are ignored. This is particularly useful when you are in a rehearsal situation and want to edit while the rehearsals are taking place.

- To engage, left-click the button; it will then begin flashing green and say engaged. The state of the Engaged/Disengaged button is persistent. This means that if you restart the software, it will be in the same state you left it in.

Volume

This shows and allows the user to set the master volume of this transport manager.

Brightness

This shows and allows the user to set the master brightness of this transport manager.

Player Speed

This shows and allows the user to set the track player's current play speed. 1 is normal, larger than 1 is faster, and slower than 1 is slower. A play speed of 0 will stop the playhead.

Track player speed can be modified via directly in the UI, or via event transports or certain timecode transports.

> **Note**
>
> **Please note**: By default, the maximum speed settable in the UI is 1.0. To change this limit, right-click anywhere on the speed field and enter the new limits. The percentage bar will automatically adjust itself to reflect the new limits. External controls, e.g. event transports, are not constrained by these limits.

> **Warning**
>
> Audio does not currently follow speed changes reliably, so this feature is off by default. Enable the `enableTransportSpeedControl` in Preview options to allow transport speed control.

Timecode

The **transport** property contains a **TimecodeTransport** object, used for syncing to LTC or MTC. See Setting up LTC in Disguise, Setting up MTC in Disguise.

> **Note**
>
> **Please note**: There can only be one timecode transport active at a time.

Timecode can change track

When timecode is received, Disguise searches through timecode tags on the timeline to determine where to jump to. If this option is set to 'yes', Disguise will search across all tracks in the currently selected track box, and jump to the first matching track it finds. If this option is set to 'no', Disguise will only search within the currently selected track.

Play mode

This specifies what play mode Disguise should select when chasing timecode - play normal (ignore section breaks), play-to-end-of-section, or loop. If the play head hits the end of the section in play-to-end-mode while chasing timecode, the transport will hold at the end of the section and go into 'ignore timecode' mode; it will stay in this mode until timecode either restarts or jumps elsewhere.

On clock lost

In a rehearsal situation, timecode stop usually means a pause in rehearsal; in this scenario, it's more convenient for Disguise to stop playback when timecode is interrupted or stops. In a show situation, on the other hand, timecode loss is usually an accident (someone tripped over a cable, or a device failed) and it's better to keep playing ("the show must go on"). This switch selects which behaviour to use.

Custom timeline FPS

Custom timeline FPS allows you to override the frame rate used by the transport's timeline. Clicking the field opens a popup with three options:

- **None**: No custom frame rate is applied. The timeline uses its default frame rate, which is the the SMPTE timecode rate corresponding to the project's display refresh rate (e.g. 60 Hz → SMPTE 30, 50 Hz → SMPTE 25, 59.94 Hz → SMPTE 29.97). The timecode readout on the timeline also displays SMPTE timecode.
- **Global refresh rate**: The timeline uses the system's global refresh rate as its frame rate. However as with None, the timecode readout still uses the corresponding SMPTE timecode rate.
- **Custom FPS**: Specify an exact frame rate value. Enter the desired FPS in the input field and press OK or Return to confirm. The value must be greater than zero.

This setting also controls the snap grid for timeline elements. Keyframes, cues, sections, and notes all snap to frame boundaries defined by the chosen frame rate. For example, setting a custom FPS of 24 causes elements to snap to 1/24th-second intervals rather than the project's native rate.

Local & Remote Transports

Event transports allow Disguise to be controlled externally by Art-net, OSC, MSC and MIDI notes. Please see Controlling the timeline with Art-Net Control, MIDI Show Control, MIDI Note Control,OSC Control.

- Remote Transports affect the d3Net network at all times that the Transport Manager is engaged. This is generally items like a controlling Lighting Desk or a master show control system (e.g. Alcorn Mcbride).
- Local Transport are for local control surfaces on Editors. They only affect the d3Net timeline when the Editor is **Locked to the Master**.

Schedule

A schedule allows Disguise to run automatically according to a schedule. Please see Scheduling Events.

Set List

User defined lists used to reorder tracks for playback. Please see Set List.

Trace Level

When set to on, Disguise will print out all transport events to the console (accessible with **ALT-C**).

Playback Status Monitor

Allows the user to send live data about the current state of playback every frame over already configured Devices (such as OSC Devices). Data includes the name of any video files being played; clip length and time to end.

Transports Overview

Designer can chase external SMPTE timecode, either as LTC (timecode over audio) or MTC (timecode over MIDI). The software can also respond to external cue commands, in the form of MIDI notes, MIDI Show Control cues, OSC, or Art-Net commands, and combine multiple cue types in the same show.

- The Transport Manager lets you configure what signals the track will receive.
- Tags let you mark points in your track that Disguise should jump to when it receives either timecode or a 'go to cue' command from an external device.
- [OSC] control allows for iPads, iPhones or other OSC-compatible devices to control the Disguise timeline but also to control layer properties.

Universal Crossfade

Universal crossfade smoothly transitions between any two points in a show when jumping within or between tracks.

Specifying when a crossfade occurs

By default, there is no crossfade - all jumps are hard cuts. In order to change the behaviour, the user has the option of changing the crossfade settings in a number of locations:

- Globally across the entire project: open the state manager by right-clicking the d3 icon on the top left of the gui, navigate to **Project Settings** and see option **Global Crossfade Duration**.
- Per-track: right-click on the track title bar, select **Special settings**, switch **Default Crossfade** to **Fade** or **TrackSection**, and select the transition time you want to use.
- Per section: right-click on the first bar of the section, under the Crossfade tab, select either Fade or TrackSection and configure the parameters accordingly.

The crossfade behaviour is taken from the most-local crossfade selection, in order: Section, then Track and finally Global. If a crossfade option is 'Undefined', the next option is checked. If all options are undefined, a hard cut is performed.

The fade is started under two circumstances:

- Jumping to another point on the timeline
- Holding at the end of a section and going forward into the next section

> **Note**
>
> Playing across a section boundary will not start the dissolve. Only an action that forces the playhead to another location on the timeline will trigger the crossfade.

Crossfade loop

The crossfade behaviour when looping a section has some customisation options: When in loop section playmode, the playhead can crossfade to the beginning of the current section x seconds before the end of the section. Where x is the duration of the fade or the length of the specified track section used to render the transition. This helps create a more seamless fade back to the start of a section rather than a hard cut.

1. Right-click on a section and set the transition as desired.
2. Check Loop XFade box.

3. The section will now fade back to the beginning using the duration set.

Types of crossfade

Crossfades can be accomplished using two methods:

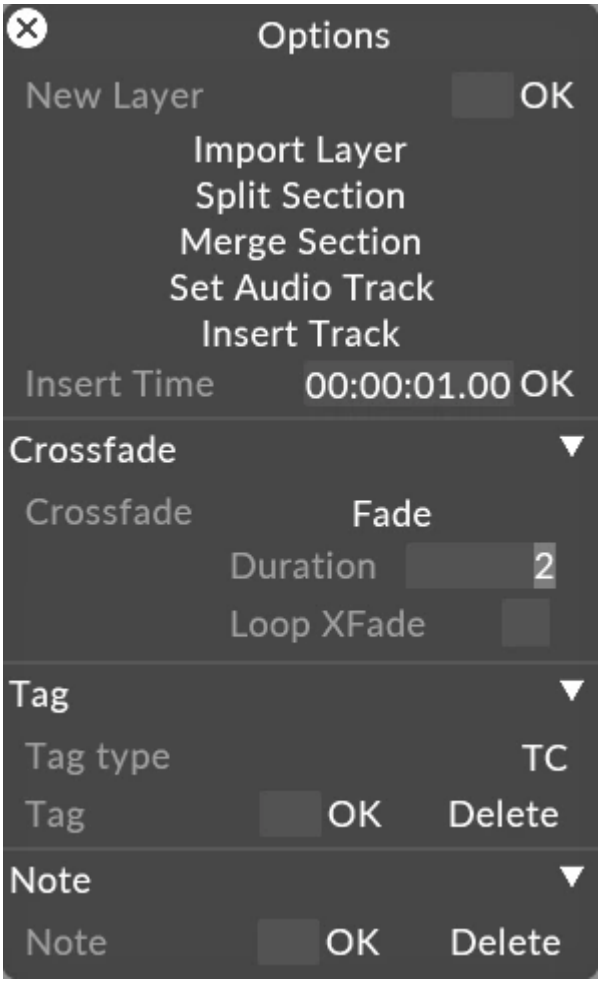
1. Fade - a dissolve from the original position to the new position, specified in seconds (including fractions of a second.)
2. TrackSection - a dissolve controlled by a separate track sequence which uses content which begins with a black screen and ends with a white screen. The duration is controlled by the length of the track section.

Fade transitions

This option provides a straight linear dissolve across all screens across the specified time period. All channels are dissolved at the same rate, including alpha.

Setting up a fade transition

1. Right-click a section.
2. Set the crossfade from Undefined to Fade.
3. Set the duration to be whatever time you wish the fade to occur over.
4. The beginning of each section shows a triangular indentation the length of the fade duration to indicate that jumping into the section will initiate a dissolve of that duration. The duration is always controlled by the destination section.



Sequenced transitions (TrackSection)

To achieve more control over the transition behaviour, the user can sequence a transition instead of a predefined fade, which only allows a straight dissolve. The transition uses normal track sequencing, allowing any layer type to be used.

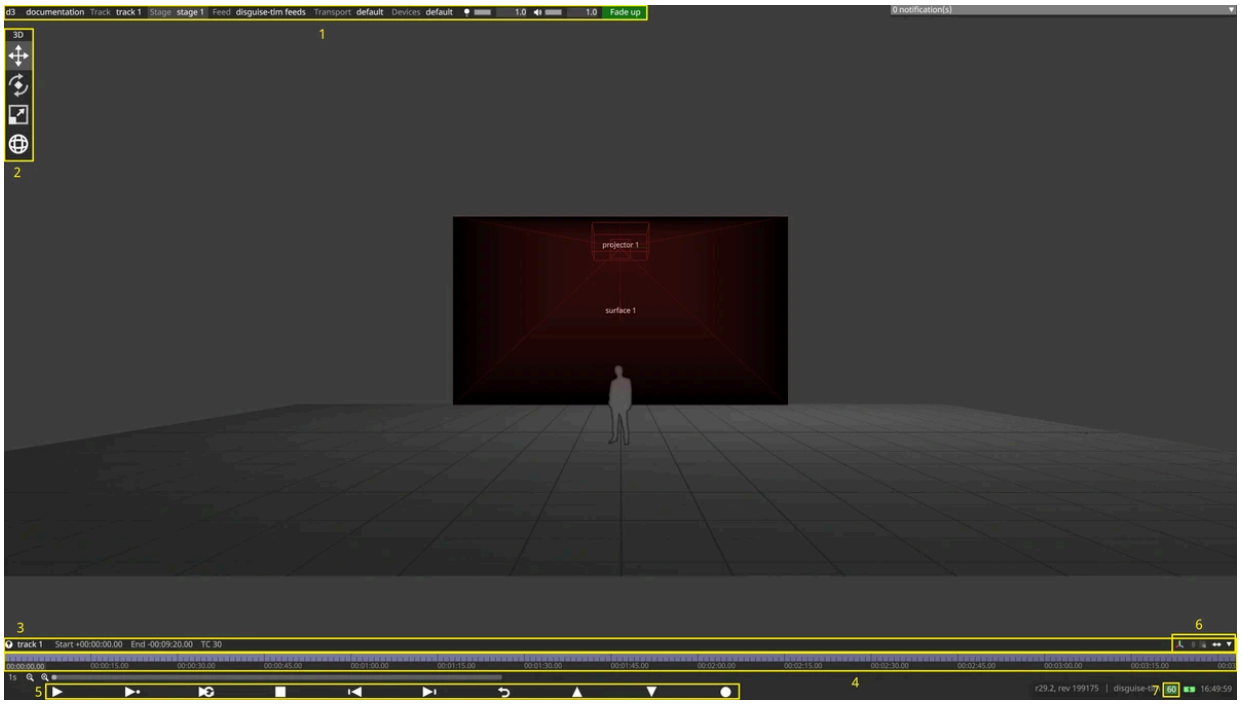
- Individual RGBA components are actually transitioned independently.
- All layer types are expected to work except those which deal with transport commands or status. Examples include:
  - TransportVolumeLocal
  - TransportBrightnessLocal
  - TransportControl
  - TrackJump
  - Readout
- Audio is played back during transitions. This is to allow an audio component to the transition.
- Prefetch is not performed - any ‘heavy’ video files will likely fail on the first frame. A workaround would be to offset the transition video forward by a frame or two.

Setting up a sequenced transition

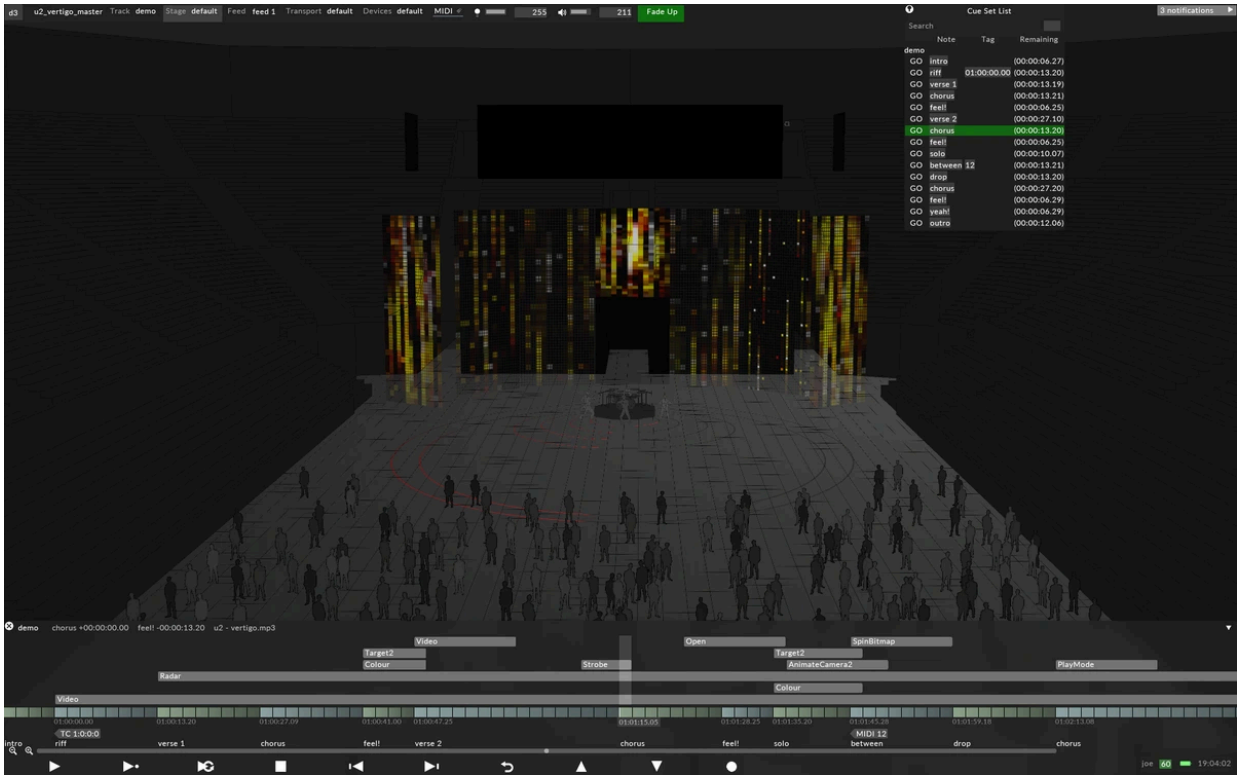
1. Create a track called “transitions”.
2. Create sections within the track that define your transition lengths.
3. Within your section, sequence content starting black, and ending white. Playmode should be set to “pause at end”. a. Note that each channel is dissolved independently. If working in multi-transport, alpha can be important to the transition sequencing.
4. Give the section a name by using a note.
5. On your main show track, right-click a section to define a section based crossfade. This can also be set via Telnet when using the Multi-transport API.
6. Choose “Track Section” in place of the crossfade override.
7. Choose the “transitions” track and the desired transition section to use.

Designer User Interface

Overview of the Designer Graphical User Interface (GUI).



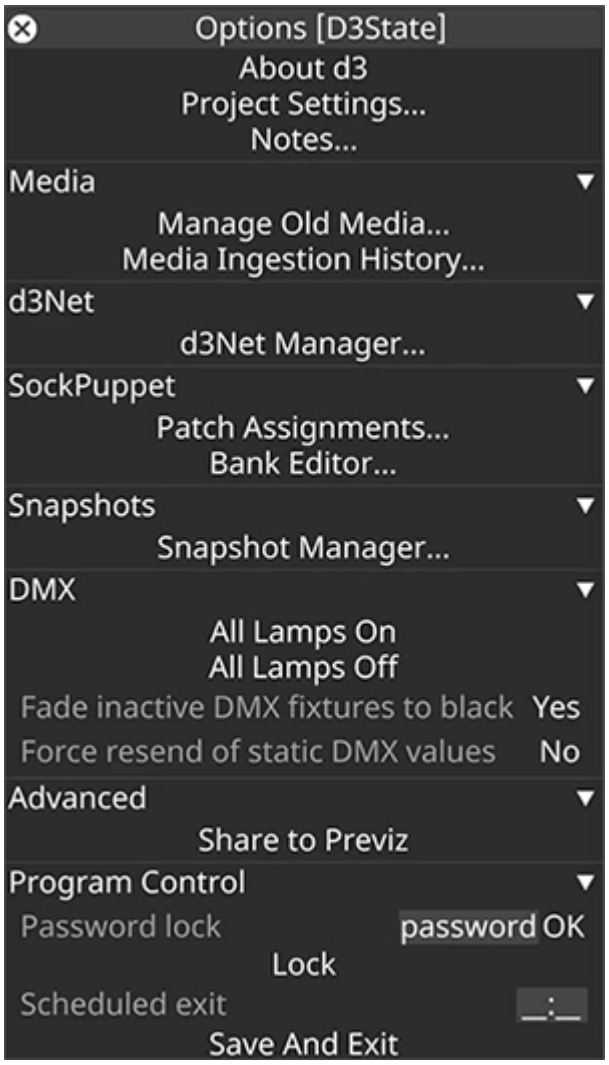
1. Dashboard
2. 3D Manipulators
3. Track
4. Timeline
5. Transport controls
6. 3D Manipulators toggle, Proxy Maker, Maximise and Minimise Timeline toggles. [L - R]
7. FPS - click FPS box for Monitoring Manager



Dashboard

This is the main menu of the system where you can access any system function. This is a standard object editor showing you the top level state of the system; hence the name. The menus, from left to right, are:

Options



Right-click d3 in the dashboard to open the Options menu.

Project name

The name of the project: this is the name of the .d3 file you are running, not the folder you are running it from.

Track

Left-click track to open the Track manager. This shows a list of tracks which you can choose from and edit/play. All sequencing and timeline information is organised into tracks. The entire show may be placed into one track or can be divided into multiple tracks.

Stage

Left-click stage to open the Stage level. The Stage level uses the Stage Visualiser to view your current stage from any angle and play video from the Timeline onto the stage in real-time, avoiding the need for time consuming re-renders.

Right-click stage to open the Stage editor. This allows you to choose the venue, add or remove screens, change the floor dimensions, change the number of people, set labeling of objects on/off, set the rendering style of virtual projectors and change the camera point of view. You can then create a completely new stage and use the Stage editor to switch freely between your different stages.

Feed

Left-click Feed to open the Feed level. The Feed level uses the Feed Visualiser to view how content is mapped from your virtual screens in the Stage level to the physical output display heads.

Right-click feed to open the Feed editor. The Feed editor controls how the screen content is configured on the output heads. You can then create a completely new feed and use the Feed editor to switch freely between your different feeds. This is very useful as you can switch to a completely different set of output devices at the click of a button.

Transport

Left-click transports to open the transport manager. This shows a list of control objects which manage all external show control.

Right-click transports to open the transport editor. This allows you to edit the properties of your show control objects, dictating how Designer responds to or generates external control signals. With this menu, you can set up MTC/ SMPTE clock chasing, DMX/Art-Net transport control, MIDI show control cueing, MIDI transport control, OSC, and a variety of other connection protocols.

Devices

Left-click Devices to open the DeviceManager. For more information on this see the Devices chapter.

Right-click Devices to open the Devices menu. The Devices menu shows a list of active devices, from which you can open a Devices manager that lists which internal or external devices are installed. Examples of devices are MIDI control surfaces, DMX managers, video input cards, etc.

Video Input and Audio Output patching can be done here.

Brightness

Left-click the white brightness bar or text field to modify the master output brightness. You can fill in any number between 0 (zero) and 255 (full) in the text field. These are the minimum and maximum values. When brightness is at 0, the bar flashes red.

Right-click the Brightness control to open the Brightness editor. This allows you to edit the minimum and maximum brightness limits, the unit step of a numerical property, and the damping factor.

> **Note**
>
> Note that this applies to the output brightness. The view within the visualizer will not change.

> **Note**
>
> When in a multi transport environment, the Brightness field will not be editable.

Volume/Mute Left-click the white volume bar or text field to modify the master audio volume. You can fill in any number between 0 (mute) and 255 (full) in the text field. These are the minimum and maximum values. When output volume is muted, the indicator flashes red.

Right-click the Volume control to open the Volume/Mute editor. This allows you to edit the minimum and maximum audio volume limits, the unit step of a numerical property, and the damping factor.

> **Note**
>
> When in a multi transport environment, the Volume field will not be editable.

Output mode

Left-click Fade Up to open the Output Mode editor.

Fade down (flashing red button)

Does a smooth fade to black from the current master level over the configured Fade up/down duration. When faded down, the indicator turns red to indicate that output is black.

Fade up (green)

Enables full output levels, fading up over the configured Fade up/down duration.

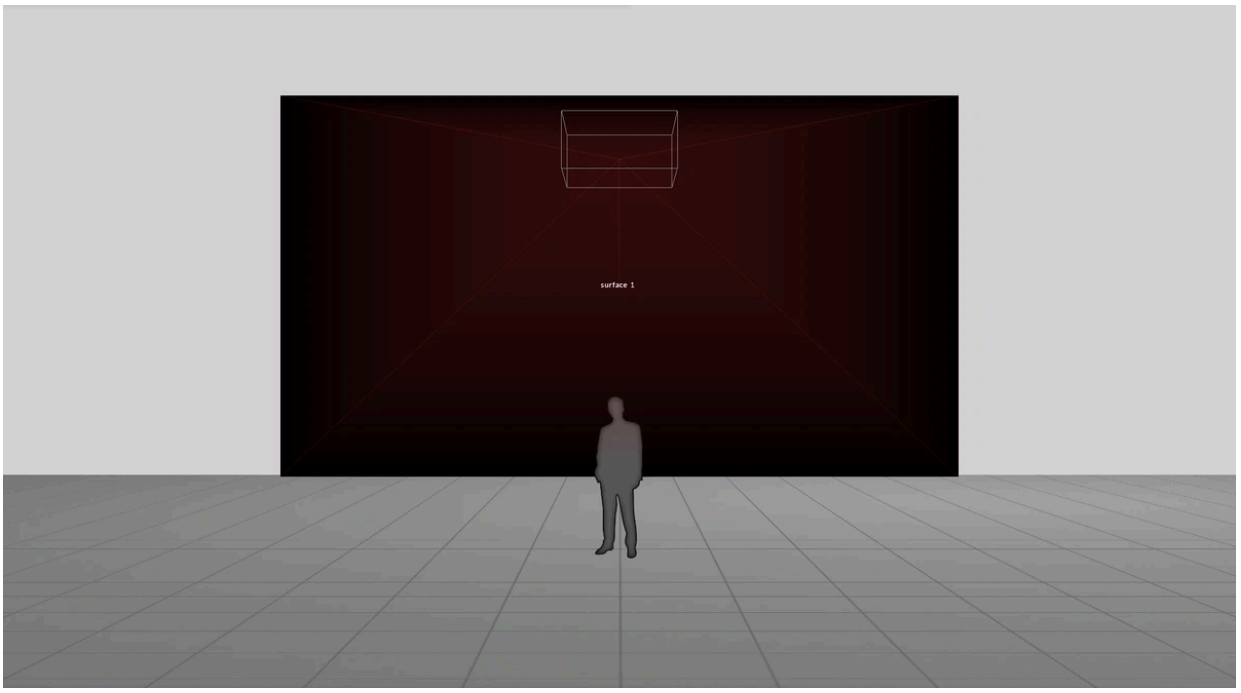
Hold (flashing red button)

Stores the last active frame and holds that frame in the output device until further notice, enabling you to continue working on the show in the Stage visualiser while for example outputting lineup content to LED processors or projectors.

Notifications tab

The Notifications tab gives you a list of notifications and error messages, such as missing files or device errors.

Stage Visualiser



The Stage Visualiser occupies the central portion of the screen. It shows a 3D visualisation of the stage and screens, and allows you to move the virtual camera around the stage. The Stage Visualiser is replaced by the Feed Visualiser when you switch from the Stage level to the Feed level.

Timeline

The editor at the bottom of the screen is called the Track Player. The Track Player is used to control the Timeline.

The top bar is called the Title bar, which shows you the track name and gives you a readout of the current time, section and audio guide within the track.

The Layer editor is located just below the Title bar. It shows you which layers are active and where they are on the Timeline.

Next are the Track bars which can be identified by the coloured section blocks. Each section has a different colour and one block equals one bar (by default, one bar is equal to four seconds).

Below the section blocks, you can see the textual Timeline notes, followed by the Transport controls.

The Track widget can be resized by clicking and dragging its left or right edges. To move it horizontally, click and drag the title bar. At any time, you can maximise it back to screen width by clicking the ↔ icon. A more focused, minimised view is also available by clicking on the ▼ icon.

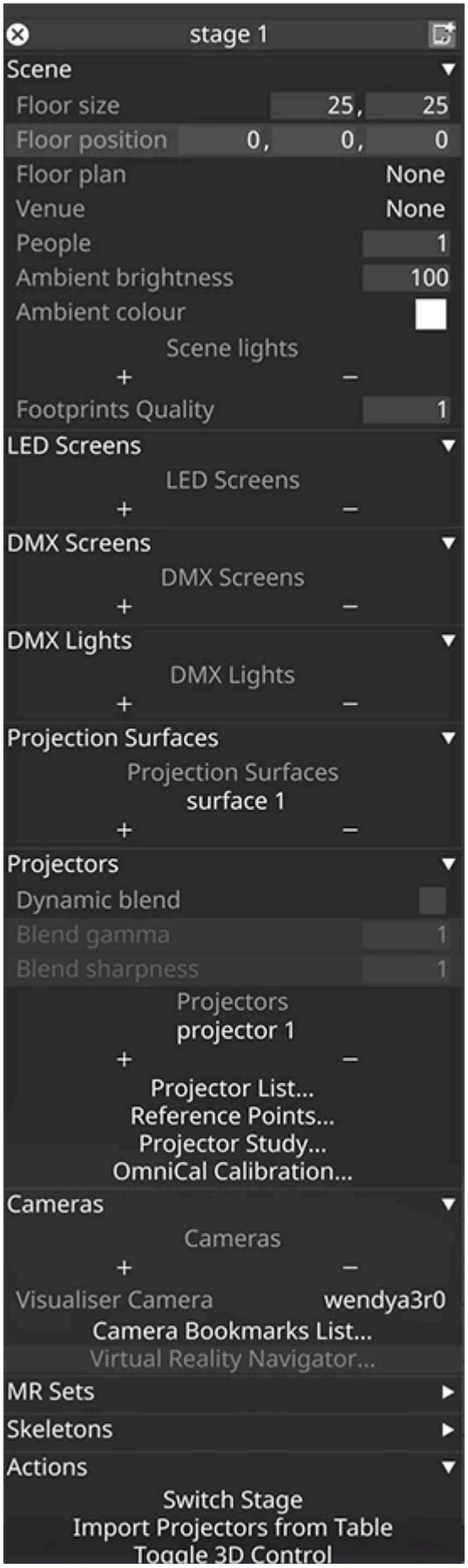
[Animated GIF: Resizing]

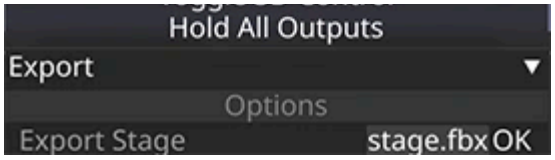
> **Note**
>
> The minimised track view has a fixed size.

Using stage editor

To edit the Stage you need to open the **Stage editor**.

To open the stage editor, right-click **stage** from the **dashboard** (bar at the top of the screen).


stage 1
Scene
Floor size 25, 25
Floor position 0, 0, 0
Floor plan None
Venue None
People 1
Ambient brightness 100
Ambient colour
Scene lights
+ −
Footprints Quality 1
LED Screens
LED Screens
+ −
DMX Screens
DMX Screens
+ −
DMX Lights
DMX Lights
+ −
Projection Surfaces
Projection Surfaces
surface 1
+ −
Projectors
Dynamic blend
Blend gamma 1
Blend sharpness 1
Projectors
projector 1
+ −
Projector List...
Reference Points...
Projector Study...
OmniCal Calibration...
Cameras
Cameras
+ −
Visualiser Camera wendya3r0
Camera Bookmarks List...
Virtual Reality Navigator...
MR Sets
Skeletons
Actions
Switch Stage
Import Projectors from Table
Toggle 3D Control



Scene

Select the scene tab to display the following properties:

Floor size

This property controls a stage's floor size. There are two numbers laid out horizontally: respectively the x (width) and z (depth) coordinates. The units used for floor size are meters.

Floor position

This property controls a stage's floor position in 3D space. There are three numbers laid out horizontally: respectively the x (left/right), y (up/down) and z (forward/backward) coordinates.

Floor plan

This points to the still image file that defines the floor plan of the currently active stage. Selecting this property will open the Texture object library, which shows all of the still image files saved on your local hard-drive in the DxTexture folder.

To add the floor plan to the stage floor:

1. Left-click floor plan to open the Texture object library.
2. Left-click the image you want to use for the stage floor.

If you want to use a floor plan other than the standard still images provided in the software, you will need to use a custom still image file.

See the Placing media files for a project sub-chapter to understand where to place a custom still image file and how to access it. Also, save the file to a supported file format.

Venue

This property enables you to swap a venue with the currently active venue. This switching of venues will be updated in the Stage Visualiser. This is very useful for quickly switching between different prop configurations.

1. Left-click venue to open the Venue manager. This will display a list of all of the venues you have created.
2. Left-click the venue you want to switch with the currently active venue.

For more detailed information on using this feature please see the Creating/switching venues, Editing venues, Creating/removing props and Editing props sub-chapters. For general information about venues and props please see the Venues/props overview.

People

This property controls the number of human figures displayed in the Stage Visualiser. The maximum number of human figures in a stage is 320.

Ambient Brightness

This property controls the ambient brightness level of the stage while in Lux renderer mode.

Ambient Colour

This property controls ambient colour of the stage while in Lux renderer mode.

Use the Colour Dropper tool to select an ambient colour for the stage.

Footprints level

This property is a resolution multipler for projector shadow buffers. 0 disables footprints.

LED Screens

Click the + icon to open the LED screens manager and create new LED screens to add to the stage.

Left-click and drag LED screens in the list into the - icon to remove them from the stage.

For more information see screen types overview and creating screens.

DMX Screens

Click the + icon to open the DMX screens manager and create new DMX screens to add to the stage.

Left-click and drag DMX screens in the list into the - icon to remove them from the stage.

For more information see screen types overview and creating screens.

DMX Lights

Click the + icon to open the DMX lights manager and create new DMX lights to add to the stage.

Left-click and drag DMX lights in the list into the - icon to remove them from the stage.

For more information see screen types overview and creating screens.

Projection Surfaces

Click the + icon to open the Projection Surfaces manager and create new Projection Surfaces to add to the stage.

Left-click and drag Projection Surfaces in the list into the - icon to remove them from the stage.

For more information see screen types overview and creating screens.

Projectors

Dynamic Blend

Toggles dynamic blend on and off for projectors, globally.

Blend gamma

Controls the blend gamma for Dynamic Blend.

Blend sharpness

Controls the blend sharpness for Dynamic Blend.

Click the + icon to open the Projector manager and create new Projector to add to the stage.

Left-click and drag Projectors in the list into the - icon to remove them from the stage.

For more information see screen types overview and creating screens.

Projector List

Clicking this button opens a list of all projectors in the project, with the ability to edit their properties in one editor. This can also be accessed with the shortcut, CTRL P.

Reference points

Clicking this button opens a list of all projector calibration points in the project, with the ability to view the name, parent object as well as toggle the mute, lock & delete functions.

Projector Studies

Clicking this button opens the Projector Studies editor.

OmniCal Calibration

Clicking this button opens the OmniCal Calibration editor.

Cameras

The cameras tab allows you to add fixed cameras to the stage that all have their own rendering settings. All cameras can be assigned to feed outputs.

Visualiser camera

The visualiser camera is the camera you are looking through on the local machine. It has its own set of settings, and can be changed by left-clicking the porperty and selecting a different camera. See visualiser renderer for more information.

Camera bookmarks list

Opens the camera bookmarks list.

See storing & recalling camera positions for more information.

Virtual reality navigator

Opens the VR viewfinder.

Actions

This property allows you to change the stage displayed in the Stage Visualiser. The currently active stage name will be displayed in the Stage tab of the dashboard as highlighted in the image below.

Switch Stage property is used to open the Stage manager and select a stage

To create a new stage:

1. Left-click **Switch stage** to open the Stage manager. This will display a list of all of the stages you have created.
2. Type the name of a stage into the **new stage** text field and hit **Enter**. This will create a new stage which will be added to the Stage manager.

You can then use the Stage editor to select the stage you want to switch with the currently active stage.

Export stage

As of r17.3, the stage can be exported as either FBX, OBJ or 3DS.

1. Enter a name for the export.
2. Append the file extension, such as .fbx .obj or .3ds
3. Click **OK**.

The exported file will be written to the output folder of the project folder.

Import Projectors from table

This button is used to import projectors via CSV. See Importing Projectors for more information.

Toggle 3D control

This button is used to toggle the Manipulators function on and off. It can also be toggled through the axis icon on the track header and with the CTRL M keyboard shortcut.

Hold/Unhold all outputs

Hold all outputs is a toggle between hold/unhold. Similar to the existing Hold functionality available in the dashboard, this function allows you to quickly set all screens in the stage to Hold mode which freeze the frame displayed on them, allowing you to continue sequencing without changing their output. This can also be done on a per screen basis as detailed in output properties.

Navigating the stage

Rotating around an object

1. Move the mouse pointer over the object you want to swing around.
2. Hold down the left mouse button.
3. Drag the mouse left/right or up/down to swing around the object.
4. Release the mouse button to end the swing movement.

Zoom

Drag

1. Hold down the right mouse button.
2. Drag the mouse back and forth to zoom in and out.

Mouse scroll wheel

Use the mouse scroll wheel to zoom in and out.

Q and A keys

- Hold down the Q key to zoom in.
- Hold down the left A key to zoom out.

Zoom to an object (Focus/Frame)

1. Left-click the object in the stage.
2. Press the F key to zoom to that object.

> **Note**
>
> These will only work if the Stage level has mousefocus; i.e. you should click the background before these will work.

Panning the camera

Tracking the camera moves it to the left, right, up or down without changing its orientation.

- Middle-click (click your mouses wheel if it has one) and drag, or
- Hold down the **Tab** key and move the mouse left / right / up / down.

Using the 3D Manipulators

Manipulators allow the user to freely offset, rotate and scale objects such as screens, projectors and props in the stage using a combination of keyboard shortcuts and mouse manipulation. This feature allows for workflows that are more familiar to users from packages such as Blender, 3DS, Cinema4D etc.

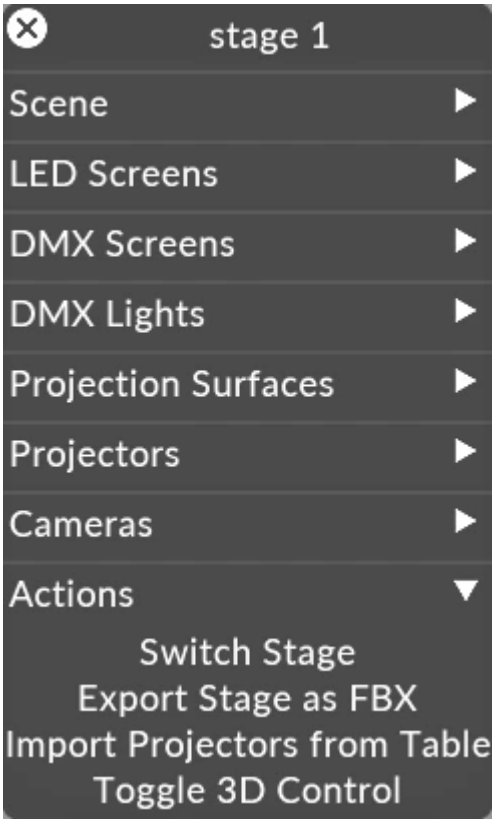
Workflow

1. Select items in the stage by left-clicking on them. When highlighted, items will show an orange outline.
2. Use the **E**, **R** or **T** buttons on the keyboard to toggle between offset, rotate and scale modes.
3. Use the on screen gizmo to manipulate the object(s) by left-clicking and dragging on one of the coloured axis handles.

[Animated GIF: Manipulators Workflow]

Manipulators editor





The Manipulators editor appears as an overlay to the stage when Manipulators are enabled via the icon on the track header, or by clicking Toggle 3D control in the actions tab of the stage editor.

The Maximum visualiser proxy project setting can be adjusted from the field at the top of the manipulators editor.

Keyboard shortcuts

Once Manipulators are activated, you can then use the following keyboard shortcuts while using the feature:

Offset (E)



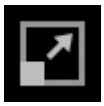
The offset mode allows you to freely offset x, y or z values using the gizmo in the stage.

Rotate (R)



The rotate mode allows you to freely rotate x, y or z values using the gizmo in the stage.

Scale (T)



The scale mode allows you to freely scale x, y or z values using the gizmo in the stage.

> **Note**
>
> Some items, for example Projectors, cannot be scaled.

Object/Global space toggle (G)



Global space is the coordinate system for the entire scene. Its origin is at the center of the stage.

Object space is the coordinate system from an object's point of view. The origin of object space is at the object's centroid, and its axes are rotated with the object.

If multiple objects are selected, object space refers to the centroid of all selected objects with the rotation of the most recently selected.

Disguise X Range FAQs

Here you'll find answers to the most common questions about X range license instances.

I. Functionality

Can I achieve 1-to-1 redundancy using 2x Disguise X range licenses?

Yes, this can be achieved. It is important to note that the X range license used in the Understudy role must be able to output the same number of video outputs assigned to the Non-Dedicated Director when in session. The table below outlines the expected d3Net session behaviour in more detail:

License instance assigned as Non-Dedicated Director	License instance assigned as Understudy
X1	X1, X2 or X3
X2	X2 or X3 only
X3	X3 only

Can I output 4x Full-HD (1920 x 1080) outputs instead of 1x 4K DCI output?

Yes, this can be achieved using an external video signal splitter.

Can I do non-16:9 resolutions on Disguise X range licenses?

Disguise X range licenses support a maximum resolution of X 4096px and a maximum resolution of Y 2400px across each available output head. Custom resolutions can be achieved across each output head, provided that they are within the 4096 x 2400 pixel rectangle, and that the choice of GPU used with Disguise X range can be configured according to the required resolution.

What versions of Designer support the Disguise X range licenses?

X1 is supported from r30.8. X2 and X3 is supported from r33.1.

Can I use NVIDIA Mosaic™ with Disguise X range licenses?

NVIDIA Mosaic™ is not currently supported by the X range licenses, however we are working to rectify this and will be releasing support soon.

II. Licensing

How is a Disguise X range license issued?

The Disguise X range licenses are issued via email to the user after purchase. The email address that the license is issued to should be agreed upon at the time of purchasing the license.

The email will include instructions that the user must follow to activate the Disguise X range license.

How is a Disguise X range license activated?

The Disguise X range license needs to be activated by the user via the Disguise CodeMeter License Central Web Depot (link here). Enter the 25-character Depot Ticket from the email sent from Disguise in the **Ticket** field and select **Retrieve**. On the next page, select **Activate License**.

The Disguise X range license will be activated at the point of being issued, with an expiration date of 1 year (366 days) from the date that it is issued via email. The Disguise X range license does not activate at the point of first usage.

When is a Disguise X range license issued?

The Disguise X range license is issued within 2 business days once the license has been purchased.

Can I change the Disguise X range license activation date once I've purchased a license?

No, this is not possible.

When will my Disguise X range license expire?

The Disguise X range licenses are 1 year (366 days) from date of issue.

Can I transfer a Disguise X range license across different nodes?

Disguise X range licenses require a physical Wibu CodeMeter USB License Key that the Disguise X range license is issued to at the time of launch. The CodeMeter USB License Key enables users to transfer X range licenses across different nodes for video playback.

Is a CodeMeter USB License Key included in the sale of a Disguise X range license?

No, the CodeMeter USB License Key can be optionally purchased.

Can I use my own CodeMeter USB License Key with a Disguise X range license?

Yes, users can use an existing CodeMeter USB License Key for Disguise X range licenses. The serial number of the CodeMeter dongle must start with a 3-.

Users will need to send the serial number of the USB License Key if an existing CodeMeter USB License Key is used.

Can I run a Disguise X range license without a CodeMeter USB License Key?

No, this is not currently available. A CodeMeter USB License Key is always required to run a Disguise X range license.

Can I purchase a weekly, monthly or perpetual Disguise X range license?

Disguise X range licenses are currently available on a recurring basis for 1 year (366 days) only. We will monitor demand for other license options over time.

What happens if the dongle used to host my X range license is lost or stolen?

We can restore an active X range license to another CodeMeter dongle in the event of loss or theft. An overview as to how this can be actioned can be seen here.

Can my X range license be rehosted from a centralised location?

This is currently not available.

Can I run a X range license on a Disguise media server that has reached End of Support or End of Life?

Yes, a user can install a CodeMeter dongle with a X range license onto a Disguise media server that has reached End of Support or End of Life (see product compatibility page here for reference) using the latest Designer software version.

III. System Specification and Validation

What graphic driver do you recommend for my GPU?

We are unable to verify known-good graphic driver versions for users of Disguise X range licenses.

How can I test and validate the performance of my node before I purchase a Disguise X range license?

We strongly recommend the installation of a Designer software version using either the Starter or Pro plan on your chosen node specification to test and validate performance before purchasing a Disguise X range license.

Can I install Windows Home OS versions on the node that I plan to use alongside a Disguise X range license?

We have not validated any other Windows OS versions except those that are listed under the Recommended Hardware Specification, which can be seen here. We will be unable to provide support on any nodes that fail to meet this specification. We will continue to monitor demand for specific Windows OS versions over time.

How does Designer determine display ordering on port order on the GPU, including the dedicated GUI output?

On Disguise hardware, we will query the GPU and try to make Windows match the display border to the order of the GPU ports, with the primary display at GPU port zero. We then draw to the first N displays where N is the number of licensed outputs.

On custom hardware, no reordering is performed. This must be done manually.

Is there any recommendations on synchronising the video outputs to genlock?

Genlock across multiple outputs is only possible if all outputs use the same timings. This includes fields like front and back porch, and not just resolution. If using different EDID files across video outputs, then you must ensure the video timings are the same across each video output or genlock will not be possible.

IV. Support

What support will be provided for Disguise X range licenses?

Support for Disguise X range licenses will be made available on a best-efforts basis only. Disguise will provide support to diagnose if an issue is related to Designer. Issues identified as Designer-related, for example, workflow issues that can be reproduced on a Disguise media server, will be logged and prioritised as normal.

Can Disguise Support assist me with troubleshooting issues specific to the node that I am using with my Disguise X range license?

The Disguise Support team is unable to troubleshoot issues relating to the node being used with the Disguise X range license, system performance, or system design.

On which platform will Disguise base its efforts to replicate issues?

The Disguise Support team will use a commercially available high-specification laptop as a baseline to reproduce the reported issues. This will help ascertain whether the issues are attributable to Disguise or external factors.

Disguise X Range Licensing Features

d3Net Overview

Machine role support for the Disguise X range licenses are shown in the table below:

Machine role	Disguise X range support
Non-Dedicated Director	Yes - with other X range license instances only
Actor	No
Understudy	Yes - with other X range license instances only
Editor	Yes

Disguise X range licenses can join a d3Net session as a Non-Dedicated Director to both control the session and output video, or as an Understudy for 1-to-1 redundancy with another X range instance.

Disguise X range licenses can be assigned the role of an Editor in any d3Net session. Disguise X range licenses can also have a PC or laptop join an active d3Net session as an Editor, providing that the PC or laptop is on a Designer Pro plan.

Disguise X range licenses cannot be assigned the role of an Actor in any d3Net session. This means that a user cannot add multiple X range instances to a session to synchronise multiple outputs at any one time. In addition, Disguise X range licenses cannot join a d3Net session with other Disguise media servers as a Director or Understudy.

Output Settings

Disguise X range licenses support a maximum resolution of X 4096px and a maximum resolution of Y 2400px across each available output head.

Disguise X range license	Max. video outputs supported
X1	Up to 1x 4K DCI output
X2	Up to 2x 4K DCI outputs

Disguise X range license	Max. video outputs supported
X3	Up to 3x 4K DCI outputs

Custom resolutions can be achieved across each output head, provided that they are within the 4096 x 2400 pixel rectangle, and that the choice of GPU used with Disguise X range can be configured according to the required resolution.

Applying Feed Settings is not supported on the Disguise X range licenses. Output configuration on a Disguise X range license will need to be completed using the GPU Control Panel. The output head will show as red in the feed view until its settings in Designer match the configuration within the GPU Control Panel, at which point it will show as green.

An overview on applying genlock using GPU control panels can be found on the Genlock Configuration page.

Graphic User Interface (GUI)

Users can output the Designer GUI from a dedicated output at up to 4K DCI resolution on their custom node.

Input Settings

Physical video input sources are supported up to the following bandwidth:

Disguise X range license	Max. video input bandwidth supported
X1	Up to 12 Gbps (i.e. 1x 12G SDI input)
X2	Up to 24 Gbps (i.e. 2x 12G SDI inputs)
X3	Up to 36 Gbps (i.e. 3x 12G SDI inputs)

These can be patched using the Video Input Editor in Designer, provided a capture card is installed on the custom node used with an X range instance. Please refer to the Recommended Hardware Specification for recommended capture cards.

Users can additionally input NDI® sources into Disguise X range licenses.

DMX

Users can configure DMX output from Disguise X range licenses.

MIDI

Users can configure MIDI output from Disguise X range licenses.

Audio

Full audio is enabled from Disguise X range licenses.

Feed Movies

Users can render feed movies with no watermark from Disguise X range licenses.

OmniCal

Users can leverage the use of OmniCal for camera-based projection calibration with Disguise X range licenses.

Notch

Notch layers can run on Disguise X range licenses. To remove the watermark, a Notch playback license must be installed on a CodeMeter USB License Key. Notch playback licenses are not included with Disguise X range licenses and must be purchased directly from Notch.

RenderStream

Disguise X range licenses can be used to run with RenderStream workloads with RX range nodes or validated third-party render nodes.

To run RenderStream Uncompressed on an X range license instance you will need:

1. A valid Disguise X range license on the X range node.
2. A valid RX range node(s) or validated third-party render node(s) with an active RenderStream license on the node(s).
3. A Mellanox NIC installed on the node used by the Disguise X range license instance, with a valid Rivermax license purchased from Disguise.

A form will need to be completed by the customer, including providing the model and serial number of any Mellanox NIC(s) that require a Rivermax license to be purchased from Disguise. The Rivermax license is tied to the serial number of the NIC and is non-transferable to other NICs. The requirement for both a Mellanox NIC and a Rivermax license is also applicable to enable support for SMPTE ST 2110 video inputs.

Please contact your account manager or Sales for more information.

To run RenderStream Compressed with a Disguise X range license instance you will need:

1. A valid Disguise X range license on the node.
2. A valid RX range node(s) or validated third-party render node(s) with an active RenderStream license on the node(s).

RenderStream Local, where the RenderStream workload is run locally on the same node as the Disguise X range license instance, is also supported. A RenderStream license is required to enable functionality without a watermarked output, and can be issued onto the CodeMeter USB License Key used by the Disguise X range license instance.

To run RenderStream Local with Disguise X range licenses you will need:

1. A valid Disguise X range license on the node.
2. An active RenderStream license on the node.

License re-hosting

Disguise X range licenses cannot be re-hosted. An X range license is issued onto a specific CodeMeter dongle and cannot be moved to another CodeMeter dongle.

In the event of loss or theft, we can restore an active X range license to another CodeMeter dongle. See Restoring CM license for an overview of how this can be actioned.

Related

- Designer Pro license transfer — how a license is re-hosted (deactivated, moved via the WebDepot, then reactivated) when transferring it between machines. X range licenses are not eligible for transfer.

Disguise X Range CodeMeter USB License Key

Disguise X range licenses have to be issued onto physical Wibu CodeMeter USB License Keys. This enables users to transfer the X range license across different nodes for video playback.

It is important to note that:

- the USB License Key must be attached to the node for video playback
- one CodeMeter USB License Key is required per Disguise X range license instance
- Users can either use an existing CodeMeter USB License Key for the Disguise X range license, or optionally purchase from Disguise. The serial number of the CodeMeter dongle must start with a 3-. Users will need to send the serial number of the USB License Key if an existing CodeMeter USB License Key is used.

We are unable to ship CodeMeter USB License Keys to the following countries:

Region	Country
Americas	Argentina Bolivia Brazil Chile Colombia Ecuador Guyana Paraguay Peru Suriname Uruguay
EMEA	**Africa** Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Comoros, Dijibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Republic of the Congo, Rwanda, Sahrawi Arab Democratic Republic, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somaliland, Tanzania, Togo, Tunisia, Uganda, Zambia **Middle East** Bahrain, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Turkey, United Arab Emirates*
APAC	Brunei Cambodia India Indonesia Laos Malaysia

Region	Country
	Philippines Singapore Thailand Timor-Leste Vietnam

* *Shipments to be made via Dubai providing the user has a TRN for importing the USB License Key.*

We are also unable to ship CodeMeter USB License Keys to any countries with trade sanctions imposed as found **here**.

Collection for CodeMeter USB License Keys can be arranged from Disguise offices in London, UK; Los Angeles, USA; Hong Kong; and Yokohama, Japan. Please contact your account manager to arrange.

Disguise X Range Overview

What is the Disguise X Range?

The Disguise X range licenses enable the following video output capabilities from a custom node:

- X1 - up to 1x 4K DCI (4096 × 2160 px) output
- X2 - up to 2x 4K DCI (4096 × 2160 px) outputs
- X3 - up to 3x 4K DCI (4096 × 2160 px) outputs

Each X range license is issued onto a physical Wibu CodeMeter USB License Key.

Licensing for Disguise X range licenses are available on a yearly recurring basis. Monthly licenses are not currently available.

The following information is available in this guide:

- Licensing Features
- Recommended System Specifications
- License Support
- CodeMeter USB License Keys
- FAQs
- X1 Overview
- X2 Overview
- X3 Overview

Disguise X Range Recommended System Specifications

Disguise Designer version

Support for Disguise X1 was introduced in Designer software version r30.8 (build number 215603).

Support for Disguise X2 and X3 was introduced in Designer software version r33.1 (build number 247072).

Recommended Hardware Specification

The table below outlines the recommended hardware specification for nodes used with the Disguise X range.

Item	Description
GPU	AMD or Nvidia GPU with sufficient rendering capabilities required for the number of outputs. Dual-GPU is not currently supported. Nvidia RTX and Quadro Professional GPUs must be used where genlock is a requirement within the wider video system
Sync Card	Nvidia Quadro Sync II must be used where genlock is a requirement within the wider video system
CPU	CPU with a recommended specification of at least: 8 Cores 16x Threads Base frequency 2.5 GHz
Motherboard	PCI Express 3.0 motherboard or higher
Memory	We recommend at least 24GB RAM or using the rule of 2:1 against video memory on the GPU.
Storage	Minimum 3GB/s read-write speed required for media drive/partition
Network Interface Card (NIC)	Media network: 1x 1GbE LAN is recommended. If working with RenderStream, we recommend dual-port 25GbE LAN or higher. RenderStream usage must support Rivermax therefore we recommend Mellanox ConnectX-5 or Mellanox ConnectX-6
Operating System	Windows 10 Pro 22H2 Windows 10 Enterprise SAC 1809

Item	Description
	Windows 11 Business 23H2 Windows 11 Enterprise GAC 23H2
Capture Cards	Deltacast: DELTA-12G1C-HMI10-ELP DELTA-12G-E-H2I1C DELTA-12G-E-H4I2C DELTA-12G-ELP-H-20 DELTA-12G-ELP-H-2C DELTA-3G-ELP-D80 DELTA-3G-ELP-D8C DELTA-12G-ELP-H1C Matrox: Matrox DLE5/X2/100 Matrox DLE5L/4/100 Please note that these capture card types may enable more than the maximum video input bandwidth that is supported on your X range license. Please see here for more information. Whilst we cannot guarantee that other capture card types will work, capture cards that show up as a DirectShow device in Windows will also be seen within the Designer project*. Some capture card types will require users to install specific SDK versions in order for them to show as DirectShow devices, for example the Blackmagic Design DeckLink Pro. We have seen successful instances with users running Magewell USB Capture SDI 4K Plus.
Data	1x USB 3.0 port to install the CodeMeter USB License Key with the Disguise X range license instance.

*This excludes all Bluefish capture cards, which are prevented from being shown as DirectShow devices in Designer.

Recommended Driver Specification

The table below outlines recommended Deltacast and Matrox SDK versions as a minimum:

Driver	Description
Deltacast	6.15 or later
Matrox	10.4 or later

The table below outlines recommended Nvidia Quadro Sync II firmware versions should genlock be required:

Driver	Description
Nvidia Quadro Sync II	2.02 - available here 2.22 - available here

The table below outlines Mellanox and Rivermax driver compatibility as validated by Disguise on Disguise hardware products. However, the exact driver version may differ depending on the Windows OS version and type of Mellanox NIC.

Driver	Driver version
Mellanox network driver	2.90.25506
Mellanox MFT	4.20.0.34
Rivermax	1.1.22655

Recommended Windows OS configuration

We strongly recommend removing any software and hiding any notifications that can steal focus from Designer, or could trigger a reboot of the node. Below is an advised suggestion, however, please note that we are unable to cover all scenarios:

Disable Firewall & Network Protection settings

1. Go to **Windows Security** → **Firewall and Network Protection** → **Firewall Notification Settings** → **Manage Notification**.
2. Disable **Virus & Threat protection** notifications.
3. Disable **Account protection** notification.
4. Disable **Firewall & network protection** notifications.

Disable Sleep Mode

1. Right-click the Windows logo in the bottom left corner of the home screen.
2. Go to **Power Options** → set all screen and sleep setting to **never**.

Disable Password-Protected Sharing

1. Open **Settings** → **Network and Internet** → **Advanced Sharing Settings** → **Password protected sharing**.
2. Set to off.

Disable Notification Setting

Open System → **Notification** → **Disable all notification options**.

Testing and Validating Node Specification

We strongly recommend the installation of a Designer software version using either the Starter or Pro plan on your chosen node specification to test and validate performance before purchasing a Disguise X range license.

Disguise X Range License Support

Disguise offers a variety of services to ensure customer excellence, including premium support packages, warranties, and a global customer service team with 24/7/365 support.

Disguise X range license instances are included within Disguise's support offering, however, it is important to note that support for Disguise X range licenses are available on a best-efforts basis only. Disguise Support will attempt to isolate an issue to determine whether it is specific to Designer or the node being used with the Disguise X range license for video playback.

It is the responsibility of the user to ensure that the node used with a Disguise X range license instance meets our recommended system specification outlined here. We are unable to provide support on any nodes that fail to meet these requirements, or requests to verify specific components within the recommended hardware specification, such as motherboard or GPU models for example.

We are also unable to support any issues specific to the node being used with Disguise X range licenses, the choice of drivers/SDKs, BSODs, or the use of any third-party software used on the node with Disguise X range licenses.

When raising a support ticket for a Disguise X range license instance via email **support@disguise.one** or the Disguise Support portal, we strongly recommend that users create a System Diagnostic, which includes a list of all hardware and software on the node. This can be achieved by following the steps outlined **here**.

Disguise X1 Overview

What is Disguise X1?

The Disguise X1 is a USB License Key-based software license that enables a single non-watermarked video output up to 4K DCI (4096 x 2160 px) from a custom node.



Licensing for Disguise X1 is available on a yearly recurring basis only. Monthly licenses are currently not available.

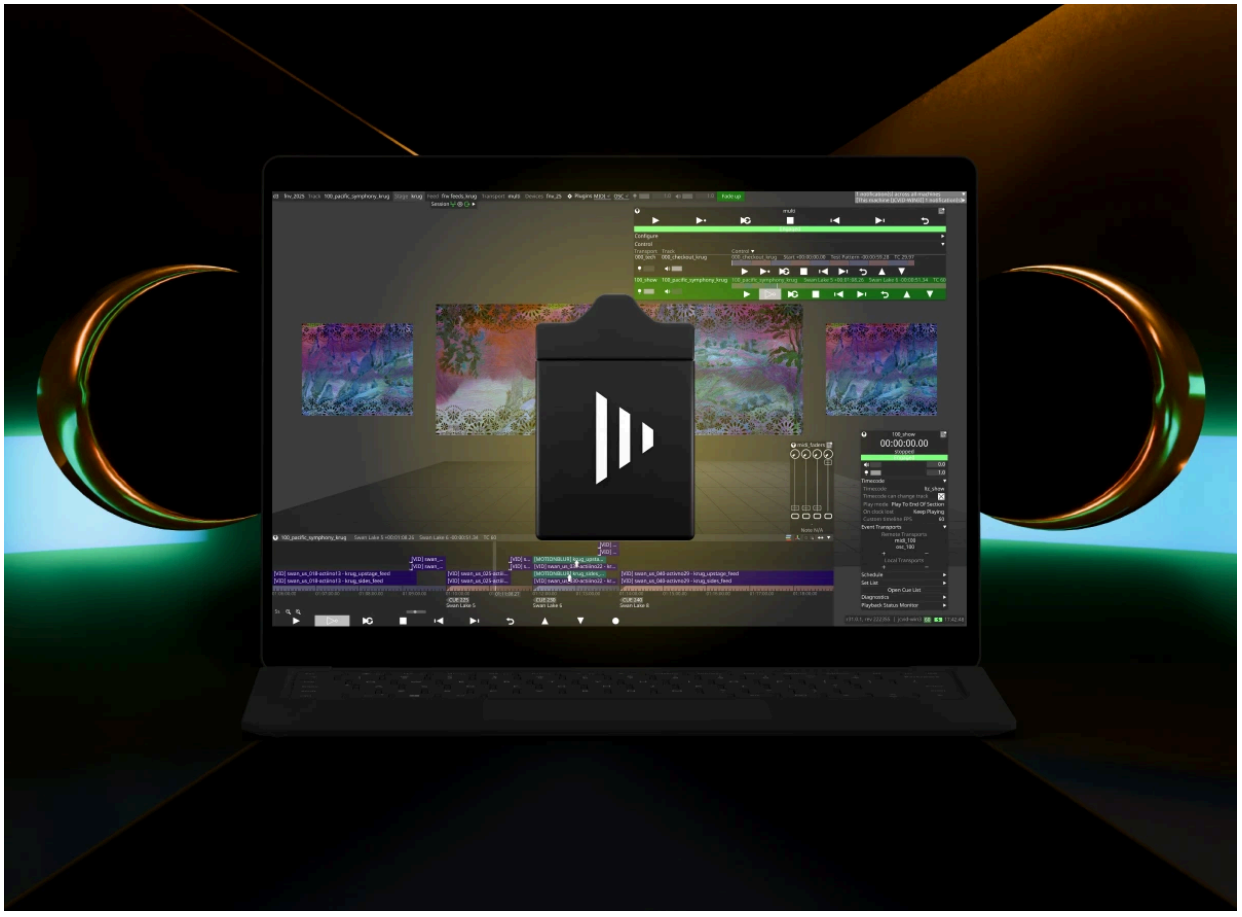
The following information is available in this guide:

- Licensing Features
- License Support
- Recommended System Specifications
- CodeMeter USB License Keys
- FAQs

Disguise X2 Overview

What is Disguise X2?

The Disguise X2 is a USB License Key-based software license that enables up to two non-watermarked video outputs from a custom node, each output supporting resolutions up to 4K DCI (4096 × 2160 px).



Licensing for Disguise X2 is available on a yearly recurring basis only. Monthly licenses are currently not available.

The following information is available in this guide:

- Licensing Features
- License Support
- Recommended System Specifications
- CodeMeter USB License Keys

- FAQs

Disguise X3 Overview

What is Disguise X3?

The Disguise X3 is a USB License Key-based software license that enables up to three non-watermarked video outputs from a custom node, each output supporting resolutions up to 4K DCI (4096 × 2160 px).

Licensing for Disguise X3 is available on a yearly recurring basis only. Monthly licenses are currently not available.

The following information is available in this guide:

- Licensing Features
- License Support
- Recommended System Specifications
- CodeMeter USB License Keys
- FAQs

Glossary of Colour Terms

This Colour Glossary is a reference page covering descriptions of key colour terms. To learn more about Designer's colour management tools and workflows, see the Colour Management section.

Common Colour Space Examples

A colour space is a complete model that defines how colours are represented across different devices or systems. It maps the entire range of colours (the gamut) that can be produced within a given environment.

Rec. 709

Rec. 709 is the standard camera encoding colour space for HDTV with a gamut identical to sRGB. However, Rec. 709 differs slightly in its encoding transfer function, and doesn't actually specify an inverse transfer function for display.

For broadcast encoding, it is defined in 8-bit colour depth (values between 0 and 255) where black is level 16, and white is level 235. These are often referred to as "video levels".

In the case of 10-bit colour depth which is common for post production, full range levels are between 0 and 1023, but the final output is mapped to broadcast standard 8-bit 16-235 when creating common deliverables.

Rec. 709 is by far the most common working and delivery colour space for most video projects. If you're creating video for broadcast delivery, or that will be consumed online, then Rec. 709 is most likely what you need to work and monitor in. The Rec. 709 gamut is supported by all common display technologies across many devices. Most computer video players know how to deal with Rec. 709 encoded video, and can display it correctly on an sRGB computer display.

sRGB

sRGB is a display referred colour space originally created for CRT computer monitors, but has become standardised for graphics and print. It is almost identical to the Rec. 709 video colour space. It's based on the same primaries and has the same gamut as Rec. 709 but specifies a different transfer function and gamma profile.

sRGB is still the standard for computer imaging, most consumer to mid level photo cameras and home printers. For professional printing and pre-press purposes Adobe RGB is often used which has an extended gamut that can be reproduced with professional CMYK printing. sRGB doesn't have anything to do with video in the context of broadcast standards, except to know

that for the most part Rec. 709 video will look fine on a sRGB computer display. There might be a slight difference in brightness due to the difference in transfer function.

DCI P3

DCI-P3 is a wide gamut video colour space introduced by SMPTE for digital cinema projection. It is designed to closely match the full gamut of colour motion picture film.

It is generally not a consumer standard and is mostly used for content destined for digital theatrical projection. However, Apple have adopted P3 colour across many device displays, and the ability to capture photo and video in the P3 colour space since iOS10.

Most professional reference monitors are able to display the full DCI P3 gamut.

You will often see a white point specified along with the colour space, such as P3 D55, P3 D61 or P3 D65. The D number indicates the target white colour temperature given in degrees Kelvin. D55 is 5500K, D61 is 6100K, D65 is 6500K, and the DCI standard white point is 6300K.

P3 is commonly expressed with both a D65 and D63 (DCI) white point. P3-D65 is increasingly common for ICVFX pipelines.

Rec. 2020

Rec. 2020 defines the colour specifications for UHD HDR. Its colour gamut covers a large percentage of the full CIE XYZ colour space. The standard defines 10-bit or 12-bit colour depth. A few display technologies are fully Rec. 2020 compliant but as yet, it is not a common video colour space to be working in for the average video creator.

HDR finishing is becoming more common for commercial high-end delivery, but not something the home freelance DP/colourist or video enthusiast will be equipped to undertake for some time to come. The average consumer HDR television does not meet the requirements as a reference display for post production.

A wide gamut colour space encompassing approximately 75% of all visible colours. Intended for implementation in future UHDTV standards and HDR Cinema. Seen as a future end-to-end colour space standard for digital cinema and consumer applications alike.

White Point, Gamma Offset, and Chroma Bit Depth

White Point, Gamma Offset, and Bit Depth are distinct from colour spaces, though they are closely related concepts in colour management.

White Point

White Point refers to the colour temperature of the “white” in an image or display. It defines the reference white in a colour space, influencing how all other colours are perceived.

On a piece of film, the measured density in the area of least opacity.

In a digital image, the numerical value that corresponds to the brightest area that will be represented when the image is eventually viewed in its final form.

In Virtual Production, white point registers as a calibration value used for determining the “colour temperature” of an image. Just as with cameras and film, this value is measured in degrees kelvin.

D65 (6500K) – Used in Rec 709 and most other colour spaces. It is often used in sRGB.

D65 (6500K) is a standard white point used in a wide variety of digital and print applications. It represents a colour temperature of approximately 6500 Kelvin and is intended to mimic natural daylight at midday, which is considered a neutral white. The “D” in D65 stands for “Daylight,” and 65 refers to 6500K.

Common uses of D65 (6500K) include sRGB and Rec. 709 colour spaces, consumer displays and monitors, photography annd video including video streaming such as YouTube. D65 is also used in colour management systems for graphic design and publishing to ensure that the colours on the screen are consistent with those in printed materials when viewed under natural daylight.

For broadcast television and some forms of digital video post-production, the D65 white point is used for consistency across the vast range of screens that viewers may use, including TV sets, laptops, and mobile devices. When mastering content for home video, D65 is often the white point of choice to ensure that the content looks correct on consumer displays.

DCI White (6300K) – Used specifically in DCI-P3 target colour gamut.

DCI White (6300K) is the white point standard used in Digital Cinema Initiatives (DCI), which is a specification designed for the digital cinema industry. The white point of 6300K is slightly warmer than the commonly used D65 (6500K).

DCI White (6300K) is used for digital cinema projection, colour graing in film, and the calibration of Cinema Projectors.

DCI White (6300K) may suit the darkened theater environment, where human perception of colour is different from brighter, ambient-lit environments (like a living room or office). In dark settings, a slightly warmer white (like 6300K) tends to appear more neutral to the human eye than a cooler white like D65 (6500K).

By using DCI White, the digital cinema standard ensures that films are projected with the colour balance and contrast that filmmakers intended, maintaining a cinematic look.

Gamma Offset

In order to most effectively compress and deliver digital video, it is useful to use a gamma offset to limit the number of colours addressed by the compression engine. This is a vital detail

to find out from:

- **2.2 gamma** – Most common gamma offset, used in Rec709 and sRGB colour profiles.
- **2.35 gamma** – The technical EBU standard for Rec709 profile, but not as widely used as 2.2 or 2.4 gamma.
- **2.4 gamma** – Used by many colourists when grading Rec709 projects to compensate for the higher contrast of modern displays.
- **2.6 gamma** – The standard gamma for P3, P7, and Rec2020 profiles.

Chroma Bit-Depth

Bit depth is the measure of resolution within a pixel. That is to say, how many discrete colours can a pixel address. In video we measure this a function of bits per channel (bpc). The greater the bit-depth, the more colours are available to record. Typically, video is encoded with at least 8 bits per channel. This gives us a total of 2^8 = 256 discrete values for each colour primary. When taken together, this gives us a total of 16,777,216 addressable RGB values. Expanding from this:

- **8-bit** (256 colours per channel) = millions of colours.
- **10-bit** (1024 colours per channel) = billions of colours.
- **12-bit** (4096 colours per channel) = trillions of colours.

When an image tries to encode colour data that has finer detail than the bit depth of the image, we perceive banding. This artifact is most evident in images featuring pronounced gradients like sunsets. Digital cinema supports full 12-bit colour, which effectively eliminates any perception of banding and allows for explicitly wider colour gamuts like P3

Legal/Full Range

Legal range, also known as Video or SMPTE range, video is a technique used in broadcast to limit the information addressed by an encoder on the luminance channel. If we think of our luminance channel having values from 0-100, legal range squeezes that video to an effective 7.5-92.5. The purpose of this is due to the way some digital signals are distributed.

When encoding video, codecs tend to eliminate detail in the extremities or at the very least introduce artifacting. By delivering content in legal range and expanding it during playback or exhibition, these effects. Two examples of this range include:

- **Legal 709** is 16 to 235 in 8-bit RGB values from black to white. Full range 709 is 0 to 255. And yes, it will affect how the footage looks.
- **Legal 709** is the most common colour space for broadcast and streaming.

Glossary

Absolute white

In theory, a material that perfectly reflects all light energy at every visible wavelength. In practice, a solid white with known spectral reflectance data that is used as the reference white for all measurements of absolute reflectance. When calibrating a spectrophotometer, often a white ceramic plaque is measured and used as the absolute white reference.

Absorb/absorption

Dissipation of the energy of electromagnetic waves into other forms (e.g., heat) as a result of its interaction with matter; a decrease in directional transmittance of incident radiation, resulting in a modification or conversion of the absorbed energy.

ACES

The Academy Color Encoding System (ACES) is a global standard for interchanging digital image files, managing color workflows and creating masters for delivery and archiving. See ACES Central for further information about ACES in general, and ACES for an overview of how ACES is implemented in Designer.

Appearance

A visual perception through which an object is seen to have attributes such as size, shape, colour, texture, glossiness, transparency, opacity, etc.

Artificial daylight

Term loosely applied to light sources, frequently equipped with filters, that try to reproduce the colour and spectral distribution of daylight. A more specific definition of the light source is preferred.

Attribute

Distinguishing characteristic of a sensation, perception or mode of appearance. Colours are often described by their attributes of hue, chroma (or saturation) and lightness.

Black

In theory, the complete absorption of incident light; the absence of any reflection. In practice, any colour that is close to this ideal in a relative viewing situation i.e., a colour of very low saturation and very low luminance.

Black level

The lowest level of brightness that can be displayed on a given screen.

Brightness

The dimension of colour that refers to an achromatic scale, ranging from black to white. Also called lightness, luminous reflectance or transmittance (q.v.). Because of confusion with saturation, the use of this term should be discouraged.

C*

Abbreviation for chromaticity.

Chroma/Chromaticity

The intensity or saturation level of a particular hue, defined as the distance of departure of a chromatic colour from the neutral (grey) colour with the same lightness value. In an additive colour-mixing environment, imagine mixing a neutral grey and a vivid red with the same value. Starting with the neutral grey, add small amounts of red until the vivid red colour is achieved. The resulting scale obtained would represent increasing chroma. The scale begins at zero for neutral colours, but has no arbitrary end. Munsell originally established 10 as the highest chroma for a vermilion pigment and related other pigments to it. Other pigments with higher chroma were noted, but the original scale remained. The chroma scale for normal reflecting materials may extend as high as 20, and for fluorescent materials it may be as high as 30.

Chromatic

Perceived as having a hue not white, grey or black.

Chromaticity coordinates (CIE)

The ratios of each of the three tristimulus values X, Y and Z in relation to the sum of the three designated as x, y and z respectively. They are sometimes referred to as the trichromatic coefficients. When written without subscripts, they are assumed to have been calculated for illuminant C and the 2Â° (1931) standard observer unless specified otherwise. If they have been obtained for other illuminants or observers, a subscript describing the observer or illuminant should be used. For example, x10 and y10 are chromaticity coordinates for the 10Â° observer and illuminant C.

Chromaticity diagram (CIE)

A two-dimensional graph of the chromaticity coordinates (x as the abscissa and y as the ordinate), which shows the spectrum locus (chromaticity coordinates of monochromatic light, 380 nm -770 nm). It has many useful properties for comparing colours of both luminous and non-luminous materials.

CIE (Commission Internationale de l’Eclairage)

The International Commission on Illumination, the first global organization for the standardization of colour and light measurement.

CIE 1976 Lab* Colour Space

A uniform colour space introduced in 1976 using the Adams-Nickerson cube root formula, designed for precise measurement of small colour differences.

CIE 1976 Luv* Colour Space

A uniform colour space also adopted in 1976, suited for additive colour mixing, particularly in applications like colour television.

CIE Chromaticity Coordinates

Numerical values that represent colour in a two-dimensional plane, independent of brightness, as defined by the CIE system.

CIE Chromaticity Diagram

A graphical tool that maps chromaticity coordinates, used to compare and analyze colours in the CIE system.

CIE Daylight Illuminants

Standard light sources defined by the CIE to simulate natural daylight for accurate colour assessment and comparison.

CIE Luminosity Function (y)

A curve describing the average human eye's sensitivity to different wavelengths of light, crucial for calculating perceived brightness.

CIE Standard Illuminants

Reference light sources established by the CIE for consistent colour measurement across various lighting conditions.

CIE Standard Observer

A model developed by the CIE to represent the average human visual response to light, used in colourimetry for accuracy in colour perception.

CIELAB (or CIE Lab*, CIE Lab)

The CIELAB (or CIE Lab*, sometimes just Lab) colour space is a perceptually uniform colour space defined by the International Commission on Illumination (CIE). It was designed to approximate human vision and is used in various industries for accurate colour representation, colour management, and colour difference measurement. The values L*, a*, and b* are plotted in a Cartesian coordinate system to represent colours in a three-dimensional space.

Components of CIELAB (L*, a*, b*):

The CIELAB colour space is plotted in a three-dimensional Cartesian coordinate system:

- L* (Lightness):

The L* value represents lightness, ranging from 0 (black) to 100 (white). It measures the brightness of the colour, independent of its hue or chroma. L* essentially corresponds to how light or dark a colour appears.

- a* (Green–Red Axis):

The a* value represents the colour's position between green and red. The a* axis runs horizontally, representing the green-red axis. Positive values along the a* axis indicate red, and negative values indicate green. This axis does not measure lightness, only the chromatic information related to these colours.

- b* (Blue–Yellow Axis):

The b* axis runs perpendicularly to the a* axis, representing the blue-yellow axis. Positive values on the b* axis indicate yellow, and negative values indicate blue. Like a*, this axis captures chromatic information but along the blue-yellow dimension. .

CMC (Colour Measurement Committee of the Society of Dyes and Colourists of Great Britain)

Organisation that developed and published in 1988 a more logical, ellipse-based equation based on LCh colour space for computing rE (see delta E*) values as an alternative to the rectangular coordinates of the CIELAB colour space.

Colour

One aspect of appearance; a stimulus based on visual response to light, consisting of the three dimensions of hue, saturation and lightness.

Colour attribute

A three- dimensional characteristic of the appearance of an object. One dimension usually defines the lightness, the other two together define the chromaticity.

Colour difference

The magnitude and character of the difference between two colours under specified conditions.

Colour-matching functions

Relative amounts of three additive primaries required to match each wavelength of light. The term is generally used to refer to the CIE standard observer colour- matching functions.

Colour measurement

Physical measurement by visual or instrumental means of light radiated, transmitted or reflected by a specimen under specified condition and transformed into numeric colourimetric terms describing its numeric colour attributes.

Colour model

A colour-measurement scale or system that numerically specifies the perceived attributes of colour. Used in computer graphics applications and by colour measurement instruments.

Colour order systems

Systems used to describe an orderly three- dimensional arrangement of colours. Three bases can be used for ordering colours: 1) an appearance basis (i.e., a psychological basis) in terms of hue, saturation and lightness; an example is the Munsell System; 2) an orderly additive colour mixture basis (i.e., a psychophysical basis); examples are the CIE System and the Ostwald System; 3) an orderly subtractive colour mixture basis; an example is the Plochere Colour System based on an orderly mixture of inks.

Colour specification

Tristimulus values, chromaticity coordinates and luminance value, or other colour- scale values, used to designate a colour numerically in a specified colour system.

Colour temperature

A measurement of the colour of light radiated by a black body while it is being heated. This measurement is expressed in terms of absolute scale, or degrees Kelvin. Lower Kelvin temperatures such as 2400K are red; higher temperatures such as 9300K are blue. Neutral temperature is white, at 6504K.

Colour wheel

The visible spectrum's continuum of colours arranged in a circle, where complementary colours such as red and green are located directly across from each other.

Colourants

Materials used to create colours dyes, pigments, toners, waxes, phosphors.

Colourimeter

An optical measurement instrument that responds to colour in a manner similar to the human eye by filtering reflected light into its dominant regions of red, green and blue.

Colourimetric

Of, or relating to, values giving the amounts of three coloured lights or receptors red, green and blue.

Colourist

A person skilled in the art of colour matching (colourant formulation) and knowledgeable concerning the behavior of colourants in a particular material; a tinter (q.v.) (in the American usage) or a shader. The word “colourist” is of European origin.

Complements

Two colours that create neutral grey when combined. On a colour wheel, complements are directly opposite from each other: blue/yellow, red/green and so on.

Contrast

The level of variation of a measured quantity such as lightness between two areas in an image. This is expressed as a number computed by a specified formula.

Daylight illuminants (CIE)

Series of illuminant spectral power distribution curves based on measurements of natural daylight and recommended by the CIE in 1965. Values are defined for the wavelength region 300 to 830 nm. They are described in terms of the correlated colour temperature. The most important is D65 because of the closeness of its correlated colour temperature to that of illuminant C, 6774K. D75 bluer than D65 and D55 yellower than D65 are also used.

Display-referred

A colour space which is referenced against the space in which images are displayed on screens or outputs after being processed.

Dynamic range

An instrument’s range of measurable values, from the lowest amount it can detect to the highest amount it can handle.

Electromagnetic spectrum

The massive band of electromagnetic waves that pass through the air in different sizes, as measured by wavelength. Different wavelengths have different properties, but most are invisible and some completely undetectable to human beings. Only wavelengths that are between 380 and 780 nm are visible, producing light. Waves outside the visible spectrum include gamma rays, x-rays, microwaves and radio waves.

Emissive object

An object that emits light. Emission is usually caused by a chemical reaction, such as the burning gasses of the sun or the heated filament of a light bulb.

Exposure

The overall brightness of an image. This can be controlled when capturing in a camera by adjusting shutter speed and aperture values, or while rendering or compositing by applying an adjustment to the overall luminance of the image.

Fluorescent lamp

A glass tube filled with mercury gas and coated on its inner surface with phosphors. When the gas is charged with an electrical current, radiation is produced. This, in turn, energises the phosphors, causing them to glow.

Gloss

Attribute due to surface reflected light, at specular angle to illumination, responsible for the degree to which reflected highlights or images of objects may be seen as superimposed on a surface. An additional parameter to consider when determining a colour standard, along with hue, value, chroma, the texture of a material and whether the material has metallic or pearlescent qualities. Gloss is an additional tolerance that may be specified in the Munsell Colour Tolerance Set.

The general rule for evaluating the gloss of a colour sample is the higher the gloss unit, the darker the colour sample will appear. Conversely, the lower the gloss unit, the lighter a sample will appear. Gloss can be measured in gloss units, which are expressed using the angle of measurement and the gloss value (e.g. 60Âº gloss = 29.8). A 60Âº geometry is recommended by the American Society for Testing and Materials (ASTM) D523 standard for the general evaluation of gloss

Greyscale

An achromatic scale ranging from black through a series of successively lighter greys to white. Such a series may be made up of steps that appear to be equally distant from one another (such as the Munsell Value Scale), or it may be arranged according to some other criteria such as a geometric progression based on lightness. Such scales may be used to describe the relative amount of difference between two similar colours.

Hue

Attribute of a visual sensation according to which an area appears to be similar to one, or to proportions of two of the perceived colours, red, yellow, green and blue. Munsell defined five principal hues (red, yellow, green, blue and purple) and five intermediate hues (yellow-red, green-yellow, blue-green, purple-blue and red- purple. These 10 hues (represented by their corresponding initials R, YR, Y, GY, G, BG, B, PB, P and RP) are equally spaced around a circle

divided into 100 equal visual steps, with the zero point located at the beginning of the red sector.

Adjacent colours in this circle may be mixed to obtain continuous variation from one hue to another. Colours defined around the hue circle are known as chromatic colours. 2) The attribute of colour by means of which a colour is perceived to be red, yellow, green, blue, purple, etc. White, black and grey possess no hue.

Illuminant

Mathematical description of the relative spectral power distribution of a real or imaginary source i.e., the relative energy emitted by a source at each wavelength in its emission spectrum that can in illuminating objects affect their perceived colours. Often used synonymously with light source or a lamp, although such usage is not recommended.

Illuminant A (CIE)

Incandescent illumination, yellow-orange in colour, with a correlated colour temperature of 2856K. It is defined in the wavelength range of 380 nm to 830 nm.

Illuminant C (CIE)

Tungsten illumination that simulates average daylight, bluish in colour, with a correlated colour temperature of 6774K.

Illuminants D (CIE)

Daylight lluminants, defined from 300 nm to 830 nm (the UV portion 300 nm to 380 nm being necessary to correctly describe colours that contain fluorescent dyes or pigments). They are designated as D, with a subscript to describe the correlated colour temperature; D65 is the most commonly used, having a correlated colour temperature of 6504K, close to that of illuminant C. They are based on actual measurements of the spectral distribution of daylight.

Integrating sphere

A sphere manufactured or coated with a highly reflective material that diffuses light within it.

Kelvin (K)

Unit of measurement for colour temperature. The Kelvin scale starts from absolute zero, which is -273° Celsius.

Light

- Electromagnetic radiation of which a human observer is aware through the visual sensations that arise from the stimulation of the retina of the eye. This portion of the spectrum includes wavelengths from about 380 nm to 780 nm. Thus, to speak of ultraviolet light is incorrect because the human observer cannot see radiant energy in the ultraviolet region.

- Adjective meaning high reflectance, transmittance or level of illumination as contrasted to dark, or low level of intensity.

Light source

An object that emits light or radiant energy to which the human eye is sensitive. The emission of a light source can be described by the relative amount of energy emitted at each wavelength in the visible spectrum, thus defining the source as an illuminant. The emission also may be described in terms of its correlated colour temperature.

Linear

A linear colour space is one where the numeric values of a pixel are directly proportional to the physical brightness represented by the pixel. Compositing and rendering operations which are representative of the behaviour of physical light should generally be carried out in a linear working space.

Luminous efficiency (V(l)) function (CIE)

A plot of the relative magnitude of the visual response as a function of wavelength from about 380 nm to 780 nm, adopted by CIE in 1924.

Metamerism

A phenomenon exhibited by a pair of colours that match under one or more sets of illuminants (be they real or calculated), but not under all illuminants.

Munsell Colour System

The colour identification of a specimen by its Munsell hue, value and chroma as visually estimated by comparison with the Munsell Book of Colour.

Nanometer (nm)

Unit of length equal to 10-9 metre (a.k.a. one billionth of a metre, or a milli-micron).

Observer

The human viewer who receives a stimulus and experiences a sensation from it. In vision, the stimulus is a visual one and the sensation is an appearance.

OCIO

OpenColorIO (OCIO) is an open colour management solution for authoring, sharing and applying colour spaces and transforms across different applications. See OCIO for an overview of how OCIO is implemented in Designer.

Primaries

Colour primaries define the range of possible colours which can be represented within a given colour space. They can be considered independently of brightness, to define the available chromaticity values of a space. Common colour primaries include Rec. 709, Rec. 202 and P3 D60.

Radiant energy

A form of energy consisting of the electromagnetic spectrum, which travels at 299,792 kilometers/second (186,206 miles/second) through a vacuum, and more slowly in denser media (air, water, glass, etc.). The nature of radiant energy is described by its wavelength or frequency, although it also behaves as distinct quanta (corpuscular theory). The various types of energy may be transformed into other forms of energy (electrical, chemical, mechanical, atomic, thermal, radiant), but the energy itself cannot be destroyed.

Reflectance

The ratio of the intensity of reflected radiant flux to that of incident flux. In popular usage, it is considered the ratio of the intensity of reflected radiant energy to that reflected from a defined reference standard.

Reflectance, specular

See specular reflectance.

Reflectance, total

See total reflectance.

Saturation

The attribute of colour perception that expresses the amount of departure from a grey of the same lightness. All greys have zero saturation (ASTM). See chroma/ chromaticity.

Scattering

Diffusion or redirection of radiant energy encountering particles of different refractive index. Scattering occurs at any such interface, at the surface, or inside a medium containing particles.

Scene-referred

A colour space which is referenced against the space in which images were originally captured or rendered.

Spectral power distribution curve

Intensity of radiant energy as a function of wavelength, generally given in relative power terms.

Spectrophotometer

Photometric device that measures spectral transmittance, spectral reflectance or relative spectral emittance.

Spectrophotometric curve

A curve measured on a spectrophotometer; a graph with relative reflectance or transmittance (or absorption) as the ordinate, plotted with wavelength or frequency as the abscissa.

Spectrum

Spatial arrangement of components of radiant energy in order of their wavelengths, wave number or frequency.

Specular gloss

Ratio of reflectance from a surface in the mirror or specular direction to the incident flux. It is sometimes measured at 60° relative to a perfect mirror.

Specular reflectance

Reflectance of a beam of radiant energy at an angle equal but opposite to the incident angle; the mirror-like reflectance. The magnitude of the specular reflectance on glossy materials depends on the angle and the difference in refractive indices between two media at a surface. The magnitude may be calculated from Fresnel's Law.

Specular reflectance excluded (SCE)

Measurement of reflectance made in such a way that the specular reflectance is excluded from the measurement; diffuse reflectance. The exclusion may be accomplished by black absorbers or light traps at the specular angle when the incident angle is not perpendicular, or in directional measurements by measuring at an angle different from the specular angle.

Specular reflectance included (SCI)

Measurement of the total reflectance from a surface, including the diffuse and specular reflectances.

Standard

A reference against which instrumental measurements are made.

Standard illuminants (CIE)

Known spectral data established by the CIE for different types of light sources. When using tristimulus data to describe a colour, the illuminant must also be defined. These standard illuminants are used in place of actual measurements of the light source.

Standard observer (CIE)

- A hypothetical ideal observer having either the tristimulus colour-mixture data recommended in 1931 by the CIE for a 2º viewing angle or for a larger angle of 10º as adopted in 1964.
- The spectral response characteristics of the average observer defined by the CIE. Two such sets of data are defined, the 1931 data for the 2º visual field and the 1964 data for the 10º visual field. By custom, the assumption is made that if the observer is not specified, the tristimulus data has been calculated for the 1931, or 2º field observer. The use of the 1964 data should be specified.

Subtractive primary colours

Cyan, magenta and yellow. Theoretically, all three subtractive primaries on white paper are 100% combined, black. When combined with different intensities, a scale is made up of different colours. When combining two primary colours at 100%, an additive primary colour, red, green, or blue, is equivalent to:

- 100% cyan + 100% magenta = blue
- 100% cyan + 100% yellow = green
- 100% magenta + 100% yellow = red

Tint

- verb: To mix white pigment with absorbing (generally chromatic) colourants.
- noun: The colour produced by mixing white pigment with absorbing (generally chromatic) colourants. The resulting mixture is lighter and less saturated than the colour without the white added.

Total reflectance

Ratio to the incident flux of the radiant flux reflected at all angles from the surface, thus including both diffuse and specular reflectances.

Transfer function

In colour science, a transfer function generally refers to the function which maps the numeric brightness value of a pixel to its physical brightness (e.g. in nits) when displayed. Transfer functions are generally applied to store a greater range of brightness values in ranges where the human eye is more perceptive to brightness changes. Common transfer functions include linear, gamma curves and the sRGB curve.

Transparent

Describes a material that transmits light without diffusion or scattering.

Tristimulus

Of, or consisting of, three stimuli; generally used to describe components of additive mixture required to evoke a particular colour sensation. Tristimulus colourimeter

An instrument that measures colour in terms of tristimulus values for a standard illuminant.

Tristimulus values (CIE)

Percentages of the components in a three-colour additive mixture necessary to match a colour; in the CIE system, they are designated as X, Y and Z. The illuminant and standard observer colour-matching functions used must be designated; if they are not, the assumption is made that the values are for the 1931 observer (2Âº field) and illuminant C. The values obtained depend on the method of integration used, the relationship of the nature of the sample and the instrument design used to measure the reflectance or transmittance. Tristimulus values are not, therefore, absolute values characteristic of a sample, but relative values dependent on the method used to obtain them. Approximations of CIE tristimulus values may be obtained from measurements made on a tristimulus colourimeter that gives measurements generally normalised to 100. These must then be normalised to equivalent CIE values. The filter measurements should be properly designated as R, G and B instead of X, Y and Z.

Value

Indicates the degree of lightness or darkness of a colour in relation to a neutral grey scale. The scale of value (or V, in the Munsell system of colour notation) ranges from 0 for pure black to 10 for pure white. The value scale is neutral or without hue.

Working space

The colour space in which rendering and compositing applications are carried out. Generally input sources will be transformed into the working space before processing, and outputs will be transformed from the working space to the output colour space.

X

- One of the three CIE tristimulus values; the red primary.
- Spectral colour-matching functions of the CIE standard observer used for calculating the X tristimulus value.
- One of the CIE chromaticity coordinates calculated as the fraction of the sum of the three tristimulus values attributable to the X value.

Y

- One of the three CIE tristimulus values, equal to the luminous reflectance or transmittance; the green primary.
- Spectral colour-matching function of the CIE standard observer used for calculating Y tristimulus value.

- One of the CIE chromaticity coordinates calculated as the fraction of the sum of the three tristimulus values, attributable to the Y value.

Z

- One of the three CIE tristimulus values; the blue primary.
- Spectral colour-matching function of the CIE standard observer used for calculating the Z tristimulus value.
- One of the CIE chromaticity coordinates calculated as the fraction of the sum of the three tristimulus values attributable to the Z primary.

Further Reading

- Netflix - ” What is Color Management?”
- Color Space (Wikipedia)

Glossary

This Glossary includes various technical acronyms, abbreviations, and common terms with their definitions. These terms are important to understand for those working with Disguise software and hardware, and engaging with the wider Disguise Ecosystem.

Term	Definition
1080p	Full HD, 1920 x 1080 pixel screen resolution, progressive, i.e. non-interlaced.
1080i	Full HD, 1920 x 1080 pixel screen resolution, interlaced.
2K	2048 x 1080 pixel screen resolution, DCI defined.
4K	Screen resoluton. See DCI 4k and 4K UHD.
DCI 4K	4096 x 2160 pixel screen resolution.
4K UHD	3840 x 2160 pixel screen resolution.
4:4:4, 4:2:2, 4:2:0	Different levels of Chroma Subsampling. A common video / image data compression strategy.
AI	Artificial Intelligence (AI) refers to computer systems designed to perform tasks that normally require human intelligence, such as perception, reasoning, learning, and decision-making. In XR, AI is often used for functions like object recognition, natural language interaction, scene understanding, and adaptive user experiences.
Aperture	Aperture is the lens opening that controls how much light enters the camera and affects both exposure and depth of field. A larger aperture (smaller f-stop number) lets in more light with a blurrier scene outside of the focal plane, while a smaller aperture (larger f-stop number) lets in less light with more of the scene in focus.
ArtNet	Data distribution protocol that allows DMX and RDM lighting data to be transported over an Ethernet network.
AR	Augmented Reality (AR) overlays digital elements, such as graphics or information, onto the real world in real time. It enhances, rather than replaces, the user's physical environment, typically through devices like smartphones, tablets, or AR glasses.
ARC	Audio Return Channel.
AV	Audio Visual.
BNC	Bayonet Neill–Concelman (a type of connector, used for SDI & Genlock).
BP / BP2	Backplane v2 - the infrastructure in disguise servers which houses VFC cards, e.g DisplayPort (DP).
BPC	Bits Per Channel - 8 or 10, usually - other standards have 12 or 16 BPC. This is what people are referring to when they say "10 bit".

Term	Definition
BPP	Bits Per Pixel. The number of data bits used to represent a 3 channel RGB (Red, Green, Blue) pixel. Normally 24 (8 x 3) but recently 30 (10 x 3).
Broadcast (multiple definitions)	Distribution of audio/video content to an audience, i.e. TV; OR A reserved IP address used to send information to all devices on a network.
BSOD	Blue Screen Of Death - OS-level crash due to faulty drivers or hardware.
CM	CodeMeter - Encryption and Licensing product used for disguise servers, designer and some 3rd party products (Notch).
CPU	Central Processing Unit, the main chip in a computer that does number crunching.
CTD	Crash to Desktop.
d3	Designer, Disguise software.
d3Manager	The software utility used to manage the Disguise media server hardware, including networking, display settings, and system diagnostics.
DCI	Digital Cinema Initiatives.
DHCP	Dynamic Host Configuration Protocol.
DMX	Digital Multiplex (DMX512 - used for lighting control, can be used to control d3, via a module called sockpuppet).
DoF	Depth of Field, the part of a camera lens which is in focus and consequently the parts of the image that are out of focus. Defined as shallow or wide - shallow means only a small part of the image is in focus, wide means that everything the camera sees is in focus.
DOF	Degrees of Freedom. Number of independent variables of a system, e.g. a 2D coordinate has 2, a 3D camera pose (position and orientation) has 6. Camera lens parameters have at least 1 (focal length), but typically many (2 for lens shift, plus varying number of distortion coefficients).
DP	DisplayPort, a common video connector present on our VFC cards.
DSE	Dynamic Softedge / Dynamic Blend.
DVI	Digital Visual Interface.
EDID	Extended Display Identification Data, the metadata between display and GPU.
FFS	Four-Finger Salute, CTRL+ALT+SHIFT+F12 a shortcut for resetting emulated edids / displays from d3service. This is a very common fix to a wide range of problems.
Focal Length	Focal length, measured in millimeters (mm), determines the angle of view of a camera or projector lens. Wide-angle lenses have a short focal length, capturing a broader scene, while telephoto lenses have a long focal length, magnifying distant subjects. The effective focal length of a lens is its physical focal length multiplied by a camera's crop factor, which is determined by the size of its sensor.

Term	Definition
FPGA	Field Programmable Gate Array (programmable chip).
FPS	Frames Per Second.
GPU	Graphics Processing Unit, hardware for displaying graphics in a computer.
GSOD	Grey/Green Screen Of Death.
HD	High definition (1280 x 720 pixel screen resolution, but most people use it to mean 1920 x 1080 screen resolution).
HD-BNC	High-Density Bayonet Neill–Concelman connector (small ones on the VX 4).
HDCP	High-bandwidth Digital Content Protection.
HDD	Hard Drive (spinning platter.)
HDMI	High Definition Multi-media Interface.
HDR	High Dynamic Range.
IMAG	Image Magnification, screens specifically for displaying close-ups of performers' on-stage acts so the audience in the back doesn't miss detail.
Interlacing	A means of increasing perceived framerate by displaying a single frame of video as two "half" frames.
Internet Protocol address	A unique (per network) numerical "address" attached to a device on a network.
IP-VFC	The next-generation of the Video Format Conversion (VFC) card using the IP workflow.
LED	Light Emitting Diode.
Localhost	A reserved hostname referring to this computer; resolves to the loopback address.
Loopback address	127.0.0.1 is a reserved IP address used for communicating with this computer.
LTC	Linear Time Code.
LUT	Look-up table.
mDP	Mini DisplayPort, connector type.
Media Server	A specialised computer system, that stores, processes, and outputs high-resolution video content for live shows and events.
MIDI	Musical Instrument Digital Interface, common AV / sound protocol.
MR	Mixed Reality (MR) merges the physical and digital worlds so that virtual objects can interact with and respond to the real environment. MR experiences are more immersive than AR, allowing users to engage with both real and virtual elements simultaneously.
MST	Media Streaming Terminal.

Term	Definition
MST	Multi-Stream Transport (DisplayPort).
Multicast	one-to-many or many-to-many network communication. More scalable and network-friendly than broadcast.
NAS	Network-attached storage.
NDI®	A relatively popular proprietary but royalty-free means of transporting video over an IP network.
NMOS	Networked Media Open Specifications.
NVMe	Non-Volatile Memory express, a connector for a solid state hard drive via the pci express bus, much faster than the more old fashioned SATA connector.
OSC	Open Sound Control, common AV / sound protocol. A network protocol that allows Disguise to communicate with and be controlled by other creative tools, lighting desks, and devices.
OTT	Over-the-top, initially named in reference to devices that go “over” a cable box to give the user access to TV content. In OTT channels, content is delivered via an internet connection - rather than through a traditional cable/broadcast provider.
PID (control)	Proportional Integral Derivative Controller.
QA	Quality Assurance. This relates to our testing process and quality control procedures for all software and hardware for making sure there are no bugs in our products.
QuickCal	Quick Calibration.
Prime Lens	A prime lens has a fixed focal length, meaning you can’t zoom in or out. Because of their simpler optical design, prime lenses often offer larger maximum apertures for faster shutter speeds, reduced distortion, and sharper images compared to zoom lenses.
Projector Calibration	The process of using software to align and blend the output of one or more projectors to create a seamless, cohesive image on a physical surface.
RAID	Redundant Array of Independent Disks (hard disk configuration)
Render Node	Render Node is a dedicated computer or server used to process and generate graphics or visual data, often as part of a distributed rendering system. In XR and visual effects workflows, render nodes accelerate complex scene calculations, allowing high-quality images, animations, or real-time simulations to be produced more efficiently.
RenderStream	A proprietary Disguise protocol that allows real-time 3D rendering engines (like Unreal Engine, Unity, TouchDesigner, and Notch) to be seamlessly integrated with and controlled by the Disguise media server.
RGB	A colour encoding system based on the three primary colours red, green and blue
RMA	Return Merchandise Authorisation. This is what we call the repair procedure.
RT	ResourceTransport, mechanism for synchronising data between multiple d3 instances.

Term	Definition
SAAS	Software as a service.
sACN	Streaming ACN, or ANSI E1.31. An open DMX over Ethernet standard.
Sensor Size	Crop sensors have a tighter field of view than full sensors. There are different types of crop, including APS-C, Super 35 and micro 4/3, each with their own crop factors and aspect ratios. Focal length measurements are based on a standard (35mm) sensor size. If you are using a crop frame camera the sensor is cropping out the edges of the frame, which is effectively increasing the focal length. The amount of difference in the field of view or focal length with a crop sensor is measured by its "Multiplier." For example, a Nikon APS-C crop sensor has a 1.5x multiplier. When a Nikon 50mm f/1.4 lens is attached to that Nikon DSLR, the focal length is multiplied by 1.5x and effectively acts like a 75mm lens on a full frame DSLR. Large sensor = shallower depth of field Smaller sensor = deeper depth of field.
Shutter Angle	Shutter angle is a way of describing the shutter speed relative to the frame rate. This is a term taken from rotary shutters, where the wider the angle is the slower the shutter speed. A shutter angle of 180° means the shutter will be open for half the time of a 360° shutter angle. The relationship between shutter angle, shutter speed and frame rate is defined as: S = A/(F*360)
Standard Definition	Abbreviated to SD, includes resolutions at or below 480p.
Secure Digital	Secure Digital, officially abbreviated as SD, is a proprietary, non-volatile, flash memory card format the SD Association developed for use in portable devices.
SDI	Serial Digital Interface.
SFP	Small form-factor pluggable transceiver.
SLC	Single Large Canvas.
SMPTE timecode	A standard timing signal used to synchronise Disguise systems with audio, lighting, cameras, and other show elements. Standardised by the Society of Motion Picture and Television Engineers (SMPTE).
SSD	Solid State Disk, a faster hard drive (compared to a HDD).
T-Stop	T-stop measures the amount of light that passes through a lens. Depending on the glass in the lens, different amounts of light will pass through to the sensor. T-stop takes the f-Stop number and divides it by the percentage of light transmitted through the lens. The larger the T-Stop, the darker the image. T-Stops are used more in the film world than the photography world.
Unicast	One-to-one network communication.
UXF/UXFade	Universal Crossfade.
UVM	UV Mapping (UV is not an acronym, they are like XYZ coordinates).
VFC	Video Format Conversion (VFC) cards are a proprietary Disguise hardware component that allows compatible Disguise servers to output synchronised content at different

Term	Definition
	resolutions. Video format conversion is achieved at very low latencies, compared to external format converters (lines rather than frames).
VGA	640 × 480 pixel screen resolution - Video Graphics Array, a display standard.
VR	Virtual Reality (VR) is a fully immersive digital experience that replaces the physical world with a computer-generated environment. Using headsets and motion tracking, VR allows users to interact with and explore 3D spaces as if they were physically present within them.
XFade	Crossfade.
XGA	1024 x 768 pixel screen resolution - eXtended Graphics Array, a display standard, follow up to VGA.
XLR	External Line Return. A type of connector commonly used for lighting and audio cabling.
xR	Extended Reality (XR) is an umbrella term for immersive technologies that blend the physical and digital worlds. XR relies on cameras, sensors, and real-time processing to create interactive environments that enhance or fully replace the user's perception of reality. See also VR, AR and MR.

Enabling Background Removal

The purpose of this document is to explain how to configure and achieve background removal in Notch when using Disguise media servers. It also provides a detailed reference table outlining which driver and SDK versions support background removal across different media server models and operating systems.

What is background removal?

Background removal in Notch uses NVIDIA's Virtual Background technology to automatically identify human forms in video or image inputs and separate them from the background. The node outputs a grayscale mask, effectively removing the background without the need for green screen keying.

NVIDIA originally developed Virtual Background for webcams, video calls, and streaming, so it performs best on video feeds that resemble those setups—typically front-facing, head-and-shoulders shots.

What is required to support background removal in Disguise?

To enable background removal, three specific NVIDIA drivers and SDKs must be present:

- Graphics Driver
- AR SDK
- Video Effects SDK

The table below outlines the NVIDIA packages included in each supported Disguise OS version:

Media Server	GPU Architecture	First OS to Support Virtual Background	NVIDIA Graphics Driver	NVIDIA AR SDK Version	NVIDIA Video Effects
EX 2	Ada Lovelace	24Q2	551.52	0.8.2	0.7.6
EX 2C	Ada Lovelace	24Q2	516.94	0.8.2	0.7.6
EX 3	Ampere	25Q1	551.52	0.8.2	0.7.2
EX 3+	Ada Lovelace	24Q2	513	0.8.2	0.6.5
VX 1	Turing	None	472.98	0.7.6	0.7.2
VX 2	Turing	None	472.98	0.7.6	0.7.2

Media Server	GPU Architecture	First OS to Support Virtual Background	NVIDIA Graphics Driver	NVIDIA AR SDK Version	NVIDIA Video Effects
VX 2+	Ampere	25Q1	516.94	0.8.2	0.7.2
VX 3	Ampere	25Q1	551.52	0.8.2	0.7.2
GX 2C	Turing	199B.947	472.98	0.7.6	0.6.5
GX 3	Ampere	24Q2	551.52	0.8.2	0.7.2
GX 3+	Blackwell	25Q3	573.42	0.8.7	0.7.6
RX II	Ampere	25Q1	536.25	0.8.2	0.7.2
RX III	Ada Lovelance	24Q2	551.52	0.8.2	0.7.2

Important Notes on updating Drivers/SDKs

NVIDIA continues to refine its Virtual Background technology in newer versions of its NVIDIA Graphics Drivers, AR SDKs and Video Effects SDKs. Please be aware that if you choose to update your graphics driver or SDK to a version outside of the validated OS packages then you will be running in an unvalidated state, and may experience the following side-effects:

- Dropped frames
- Tearing between outputs
- Failure to Genlock
- Failure to Apply Feed Settings

For this reason, if you choose to update drivers or SDKs outside the validated OS packages, please note that you do so at your own risk.

FAQs

Can I manually upgrade the driver or SDK versions?

Disguise develops and maintains custom operating systems (OS) for all current media servers. Each OS version includes carefully selected and tested driver combinations to ensure stability and performance.

Unless explicitly stated otherwise, manual driver updates are not supported, as they can adversely affect genlock, the applying of feed settings, or playback stability.

If background removal stops functioning after manual updates, we recommend updating your media server to the latest supported OS version instead.

Will Disguise update NVIDIA driver and SDK versions in future OS releases?

Yes. Disguise regularly updates its media server OS versions to introduce new functionality and performance improvements.

However, newer graphic driver or SDK versions will only be included in a Current OS once they have been fully validated by Disguise engineering teams and beta-tested by users.

NVIDIA resources

If you'd like to learn more about NVIDIA's Virtual Background technology or the SDKs used in Notch, you can find official information here:

- NVIDIA Graphics Drivers: https://www.nvidia.com/Download
- NVIDIA AR SDK: https://developer.nvidia.com/maxine/ar-sdk
- NVIDIA Video Effects SDK: https://developer.nvidia.com/maxine/video-effects-sdk

Please note that these links are provided for informational purposes only.

⚠️ **Installing or updating any of these drivers or SDKs manually will put your system in an unvalidated state and may cause performance or synchronisation issues.**

Notch manual

For more detailed information on how Notch implements background removal using NVIDIA Virtual Background technology, you can visit the Notch manual:

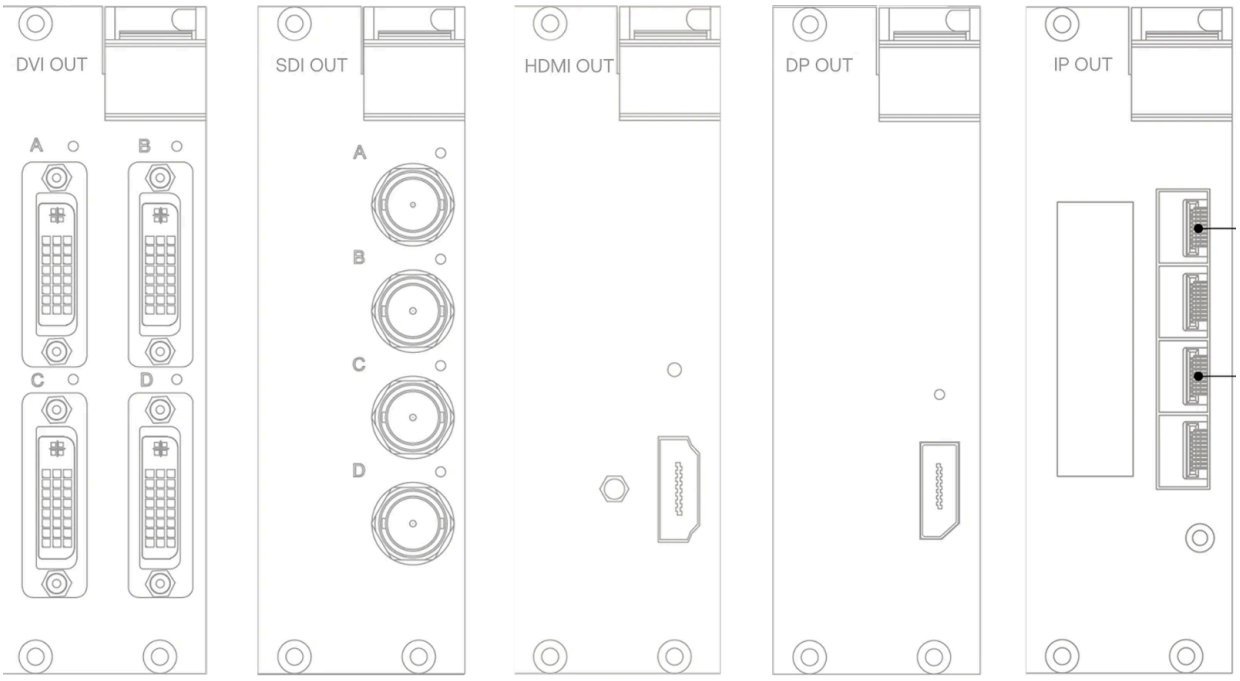
- Notch 2026.2 - NVIDIA Virtual Background
- Notch 0.9.23 - NVIDIA Virtual Background

⚠️ **All background removal functionality in Disguise media servers relies on validated OS Graphics Driver and SDK combinations. Refer to the table above for supported versions.**

Video Output

The VX and GX ranges of Disguise media servers come with a range of possible output configurations. They can be configured to output a combination of DVI, 3G-SDI, HDMI, and Display Port signals by installing the correct combinations of VFC cards.

It is also possible to use the IP-VFC card to output 12G-SDI and ST 2110 video signals However, today these cannot be mixed with other VFC card types in the same server. Please refer to TA-42 for more information.



VFC Card Diagrams

Specifications

The table below defines the key capabilities of our full range of VFC cards.

	Quad-DVI	Quad-SDI	HDMI	DP 1.4	IP
Ports	4x Dual-Link DVI outputs	4x 3G-SDI outputs	1x HDMI 2.0 output	1x DP 1.4 output	4x 25GbE SFP28 outputs [1]
Video outputs	Up to 1x 2K DCI output or 4x HD outputs using quad split mode	Up to 1x 4K DCI output using Quad 4K split mode or 4x Full-HD outputs using	Up to 1x 4K DCI output	Up to 1x 4K DCI output	Up to 1x 4K DCI output or 4x Full-HD outputs using quad split mode in both ST 2110 only [2]

	Quad-DVI	Quad-SDI	HDMI	DP 1.4	IP
		quad split mode			
Resolutions [3]	Up to 2K DCI	Up to 4K DCI	Up to 4K DCI	Up to 4K DCI	Up to 4K DCI [4]
Frame rate [5]	Up to 60Hz	Up to 60Hz	Up to 60Hz	Up to 60Hz	Up to 60Hz
Bit depth	Up to 8 bit	Up to 10 bit	Up to 10 bit	Up to 10 bit	Up to 10 bit
Chroma subsampling	RGB	YUV 4:2:2	RGB and YUV 4:4:4, 4:2:2 and 4:2:0	RGB and YUV 4:4:4, 4:2:2 and 4:2:0	ST 2110 - YUV 4:4:4, 4:2:2 and RGB in all video formats
HDR support	✗	✓ [6]	✓	✓	✗
Genlock	✓	✓	✓	✓	✓
PTP support	✗	✗	✗	✗	✓
Latency	4-5 scanlines	4-5 scanlines	0 scanlines	0 scanlines	Format-dependent
Legacy Range Support [7]	4x4pro 4x2pro 2x4pro	4x4pro 4x2pro 2x4pro	4x4pro 4x2pro 2x4pro	N/A	N/A
GX Range Support [7]	GX 1 GX 2 GX 2C GX 3 GX 3+	GX 1 GX 2 GX 2C GX 3 GX 3+	GX 1 GX 2 GX 2C GX 3 GX 3+	GX 3 GX 3+	GX 3 GX 3+ [8]
VX Range Support [7]	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 4+

Notes

[1] Port 1 and 2 are dedicated for ST 2110 mode, and Ports 3 and 4 are dedicated for SDI mode when using SFPs.

[2] When in ST 2110 mode, a redundant SMPTE 2110 video signal using Port 2 can be enabled in the event that the video signal from Port 1 goes down, using SMPTE 2022-7 for packet-level redundancy.

[3] Resolutions:

- 4K DCI - 4096 x 2160px

- UHD - 3840 x 2160px
- 2K DCI - 2048 x 1080px
- Full-HD - 1920 x 1080px
- HD - 1080 x 720px

[4] Please see the VFC spec sheet for a full overview on supported video formats.

[5] For higher frame rates please contact Tech Solutions.

[6] For more details on setting Colour Conversion and Transfer Characteristics for HDR, please go to this link.

[7] For a detailed overview on Disguise Media Servers and their compatibility with existing VFC cards, please view the **TA-23 : Disguise media servers with backplane version 2 do not support DP1.2 VFC cards** technical advisory.

[8] GX 3+ will have IP-VFC support, but it will not be available at launch.

VFC Spec sheet

You can read more about our VFC cards here. You can also view the full product information for all of our VFC cards in this **Technical Specifications** document.

Bandwidth Calculation

We recommend using a bandwidth calculator to ensure that the number of pixels, bit depth, chroma subsampling, and frame rate are within the specification of the video interface that is being used, and are also within the specifications of the VFC card. A useful bandwidth calculator (not produced by Disguise) can be found here: **https://tomverbeure.github.io/video_timings_calculator**.

Director Capabilities

Disguise media servers can be run as a network of media servers and assigned specific roles via d3Net.

EX range media servers are restricted to run in one of the following configurations running in session:

- As any media server role in a session with only other EX range media servers.
- As a Dedicated Director in a session with other VX or GX range media servers.

To read about what it means to be a Director see the following page on d3Net Setup. To read about limitations on EX range machines as Dedicated Directors see the following **section**.

It is important to note that running a media server as a non-dedicated director comes at the cost of performance.

If you are planning to use an EX range media server as a Director we recommend reviewing the capabilities and limitations against the the GX/VX ranges of media servers. This is summarised in the table below.

	GX/VX Ranges	EX Range
Video playback (i.e. HAP, Notch LC)	Can be used as Director	Can be used as Dedicated Director only
Notch	Can be used as Director*	Can be used as Dedicated Director only*
RenderStream	Can be used as Director	Cannot be used as Director
ACES/OCIO	Can be used as Director	Cannot be used as Director
MR Sets	Can be used as Director	Cannot be used as Director

* Notch

There are important differences in how Notch can be used.

VX range

- A Notch playback license is required to remove the watermark in GUI.
- Users must consider **Notchmarks** on a Director when running Notch block.
- The **Proxy Block** workflow can be used but must be built into the Notch block during pre-production. For Notch 2026.2, see the **media server Blocks documentation**.

GX range

- The GX range includes 2 year Notch playback license as standard.

- Users must consider **Notchmarks** on a Director when running Notch block.
- The **Proxy Block** workflow can be used but must be built into the Notch block during pre-production. For Notch 2026.2, see the **media server Blocks documentation**.

EX range

- A Realtime connector license must be added to the Dedicated Director. This is a one-time cost.
- User must then buy Notch playback license on Dedicated Director to run Notch block without watermark as seen in GUI.
- Users must consider **Notchmarks** on a Dedicated Director when running Notch block.
- The **Proxy Block** workflow can be used but must be built into the Notch block during pre-production. For Notch 2026.2, see the **media server Blocks documentation**.

General limitations of the EX range

An EX range media server cannot be used for:

1. RenderStream - No proxy streams will be received on Director when added to session.
2. ACES/OCIO - ACES OCIO modes are not available as options in the Project Settings.
3. MR Sets - Cannot output, edit, or display a camera preview in the Director and Actor roles.

EX range media servers running as Dedicated Directors

The EX range of media servers running as Dedicated Directors cannot:

- Receive RenderStream proxy or uncompressed streams.
- Receive full-resolution streams.
- Allow users to set ACES or OCIO transforms via the Director's GUI.
- Allow users to perform XR calibrations.

Optional EX Range Licenses

Along with the standard EX range license, which comes with the server, the following optional functional unlock add-on licenses are available:

- Real-Time Connector license
- Colour Management license

These perpetual feature unlock add-on licenses are valid for the EX range media servers only, i.e. the EX 2, EX 2C, EX 3 and EX 3+.

Real-Time Connector (RTC) license

This license unlocks the usage of Notch and TouchDesigner on the EX range. The usage of Notch and TouchDesigner is enabled as follows:

- Notch can be run as a Notch block in the Notch layer. A Notch playback license is additionally required for non-watermarked output.
- TouchDesigner can be run via the RenderStream Local layer. See here for setup requirements

The RTC license is a one-time purchase which is valid perpetually for the server. It cannot be moved between servers. The RTC license must be applied to all EX range servers running in the session should the project require Notch or TouchDesigner playback.

Any performance degradation resulting from running a resource-intensive content, such as a heavy TouchDesigner scene, is the responsibility of the customer. Optimisation of the project will be up to the customer.

If the Real-Time Connector license is not present on the EX range server, then the RenderStream Local layer is not enabled.

> **Important**
>
> TouchDesigner is the only RenderStream plugin type which is enabled on the EX range via RenderStream Local.
>
> Notch block playback is currently not supported using the RenderStream Local layer, and should use the Notch layer instead. This behaviour is specific to the EX range only.
>
> RenderStream remote mode is not supported at all on the EX range.

Colour Management License

The Colour Management license unlocks the usage of ACES and OCIO colour management on the EX range.

The Colour Management license is a one-time purchase which is valid perpetually for the server. It cannot be moved between servers.

In a session of all EX range servers, all servers must have Colour Management licenses applied in order to use ACES or OCIO mode.

Where an EX range server is used as a Director with machines that have Colour Managment enabled by default (VX and GX range machines), if the Colour Management license is not present on the EX director, then the EX cannot join the session if the project is in ACES or OCIO mode.

View licenses

You can review your available licenses by opening d3Manager and navigating to **Help > Disguise Licenses**.

License activation

Learn more about activating a license on the License Activation page.

EX Range Overview



The EX range was developed to become the gateway to the Disguise platform and has been designed as a video playback solution to deliver pixel-perfect experiences.

With performance and scalability, the EX range has been developed for location-based experiences (LBX), theatre shows, and keynote presentations.

What's Different?

The EX range has been designed specifically for video playback, and as a result, we offer EX range servers both with and without physical video inputs. For the EX range servers that do not have physical inputs, we do support NDI® video input, but we do not support USB video capture devices.

There are no audio inputs and outputs on the EX range. Audio Interfaces can also be used if needed.

The EX range does not support VFC cards with video output via DisplayPort only.

There is no support for RenderStream or mixed reality set extension within the EX range.

There is an optional Real-time Connector license if a user wishes to run generative content on their EX range media server, such as a Notch block or a TouchDesigner scene. The Real-time Connector license can be purchased as a one-time cost.

> **Note**
>
> It is important to note that the Notch layer is used to playback Notch blocks on an EX range media server, with a Notch playback license required to remove the watermark, whilst the RenderStreamLocal layer is used to playback a TouchDesigner scene as outlined here.

There is also an optional colour management license if a user wishes to use ACES or OCIO mode on their EX range media server. The colour management license can also be purchased as a one-time cost.

For the full range of licensing options available for EX range servers, see EX Range Licenses.

The EX range can be used as a network of machines with redundancy and failover options. This means that it can be used as a Director (Dedicated/Non-Dedicated), Actor, Understudy, and Editor within a d3Net session with other EX range servers only. It can also run as a Director and Editor with other VX/GX range media servers. See the Director Capabilities page for more information.

Compare the capabilities of the EX 2, EX 2C, and EX 3+ by referring to the table below:

	EX 2	EX 2C	EX 3+
4K Inputs	N/A	1x HDMI 2.0 and 2x 12G inputs for a maximum of 2x 4K inputs, or 4x 3G inputs (HD-BNC)*	1x HDMI 2.0 and 2x 12G inputs for a maximum of 3x 4K input, or 4x 3G inputs (HD-BNC)*
4K Outputs	2x 4K outputs (DisplayPort 1.4)	2x 4K outputs (DisplayPort 1.4)	3x 4K outputs (DisplayPort 1.4)
Network Ports	General Network: 2x 10GbE Media Network: Dual-port 100GbE	General Network: 2x 10GbE Media Network: Dual-port 100GbE	General Network: 2x 10GbE Media Network: Dual-port 100GbE
GPU	Nvidia RTX 4000 Ada	Nvidia RTX 4000 Ada	Nvidia RTX 4000 Ada
CPU	AMD EPYC 8C/16T 2.4GHz	AMD EPYC 8C/16T 2.4GHz	AMD EPYC 16C/32T 2.45GHz
Motherboard	PCIe Express 5.0	PCIe Express 5.0	PCIe Express 5.0
Storage	1x 1.92TB SSD	1x 1.92TB SSD	1x 3.84TB SSD
Physical Audio	No	No	No
Notchmarks	37,803	37,803	37,622
Video playback	Notch LC - 15 layers HAPQ - 21 layers	Notch LC - 15 layers HAPQ - 21 layers	Notch LC - 18 layers HAPQ - 23 layers

	EX 2	EX 2C	EX 3+
4K DCI at 30fps	ProRes 422 - 5 layers ProRes 4444 - 3 layers	ProRes 422 - 5 layers ProRes 4444 - 3 layers	ProRes 422 - 5 layers ProRes 4444 - 3 layer

*HDMI 2.0 input support, along with the option of an additional 12G-SDI input via Ports A and/or C on the EX 2C and EX-3+, was introduced in Designer software version r32.2.4 onwards. This functionality requires OS version **25Q3** or later.

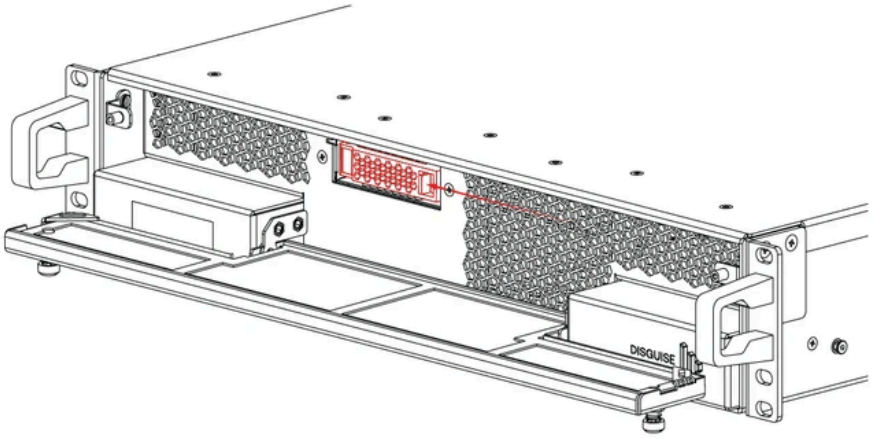
Replacing your NVMe SSD - EX

To remove and replace the NVMe SSD media drive on **EX 2**, **EX 2C**, and **EX 3+** Disguise media servers (excluding the EX 3), follow the steps outlined in the guide below.

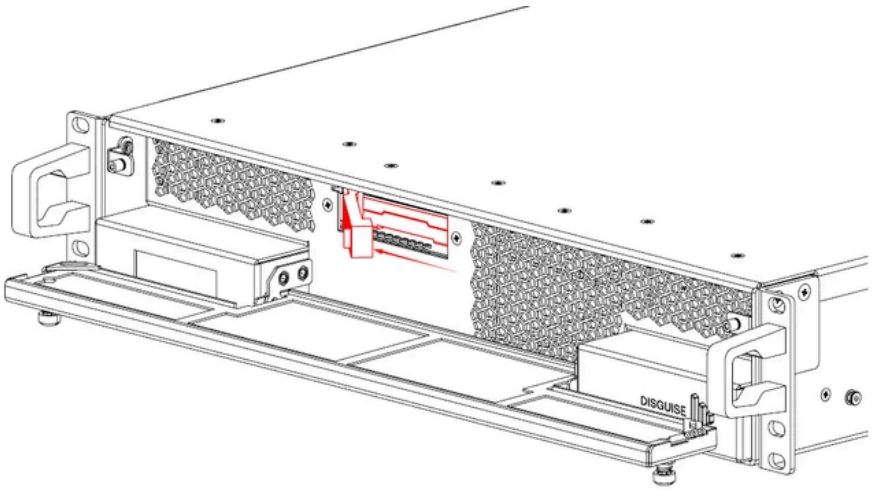
EX range media servers ship with either a 1.92TB or a 3.84TB Removable NVMe SSDs, allowing you to easily upgrade or replace your storage as your needs grow.

The following steps are a guide to help users change over the Solid State Drives. Please, read carefully to ensure best practice. If the system does not work after following these instructions, please call our Support team as per the contact details on the last page of this document.

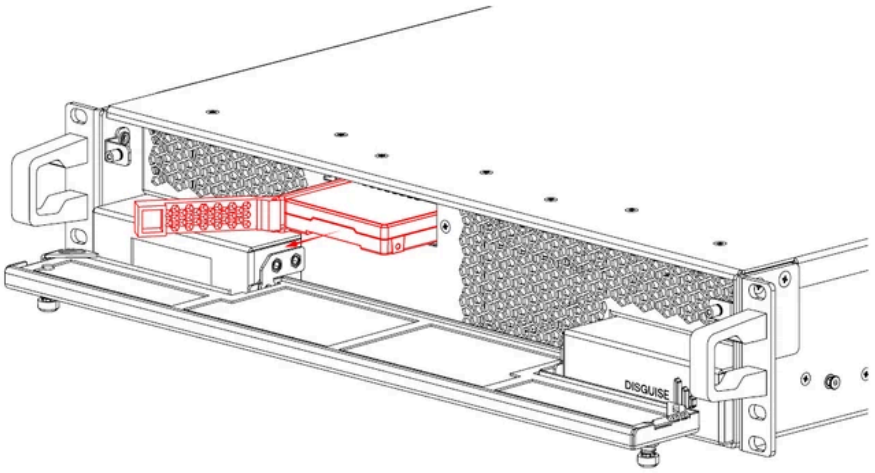
1. Undo the two thumb screws on the front door of the unit and bring the filter housing down to locate the drive bay door.
2. Push the clip to the left and you should feel a slight release. The door will gently swing open.



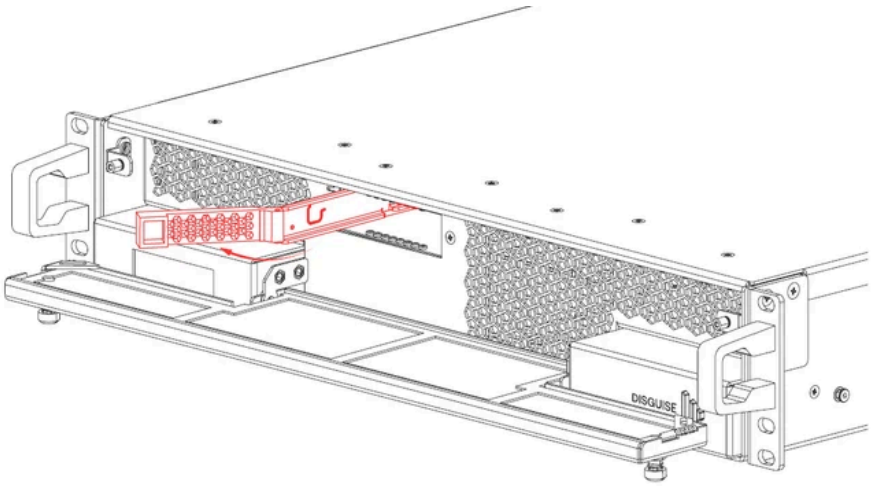
3. With the door open, slide it to the left. This motion will disconnect the current drive from the connector, making it ready for removal.

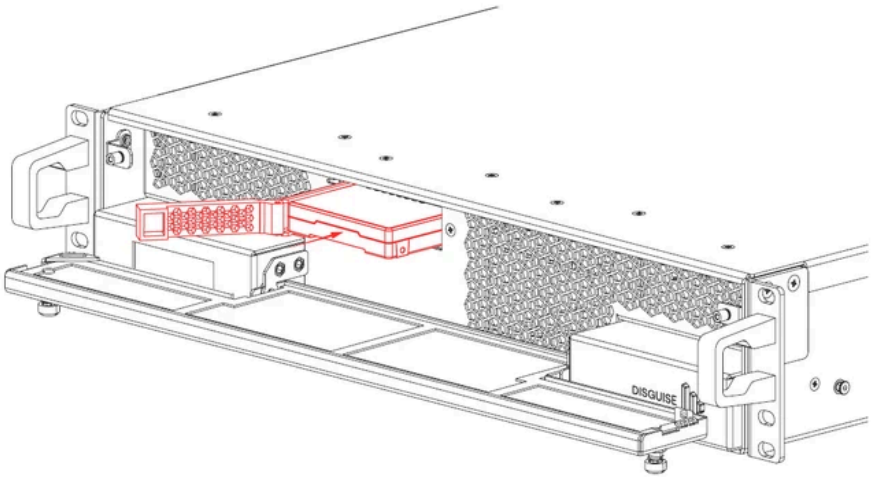


4. Pull out the drive caddy carefully. Remove the current drive from the caddy by gently lifting it out. To make removal easier, slightly tilt or bend the caddy while using your other hand to help guide the drive out.

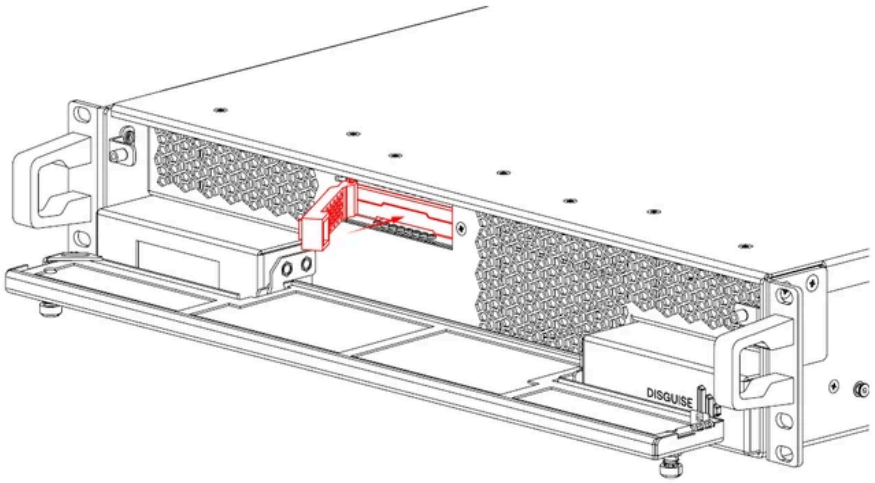


5. Take your new SSD and ensure the connector is facing upwards.
6. Place the new SSD into the caddy, aligning it properly with the slot. Insert the drive until it is fully seated in the caddy. Ensure the caddy is fully engaged and extends outward for proper alignment and installation.

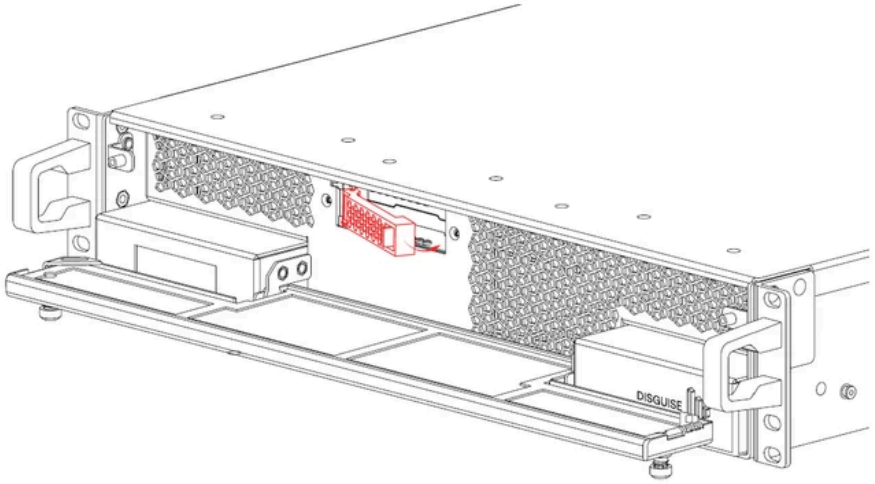




7. Gently hold the SSD by its bottom-left side and slide the caddy back into the bay*. Ensure the new SSD connects properly with the server's connector.

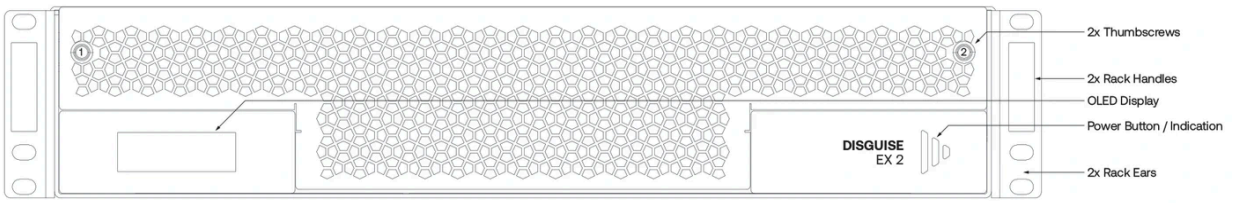


8. Swing the door back to its original position. Push it until you hear a click, indicating the door is securely closed.

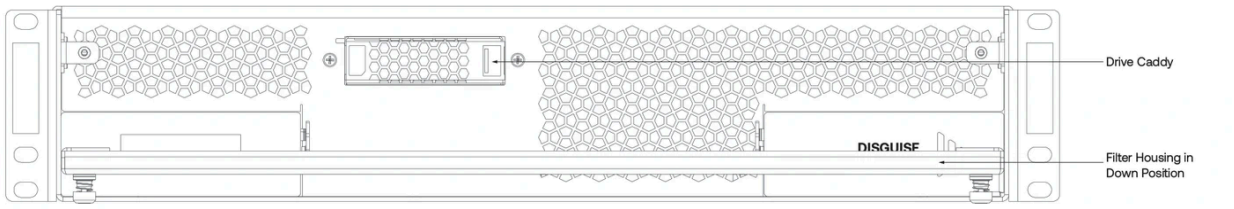


* If the drive can be seen to catch on the metalwork. If so, gently lift the left side if inserting to help alleviate.

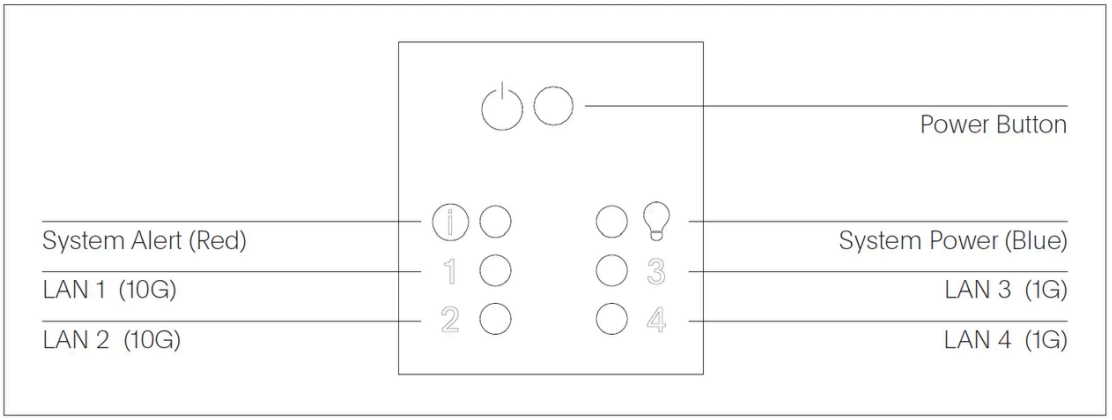
EX 2 Diagrams



EX 2 Front Panel

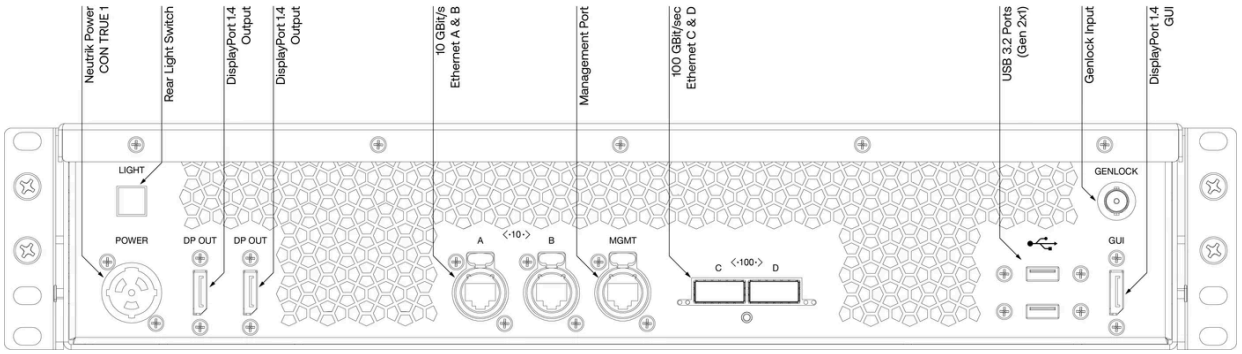


EX 2 Front Panel grill down



***Front Panel LED Indicators*

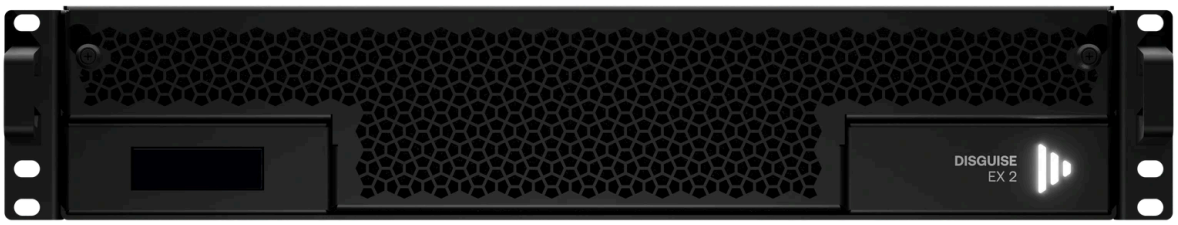
EX 2 Front Panel LED



EX 2 Rear Panel

EX 2 Overview

The EX 2 is a powerful video playback solution specifically designed for fixed installations and location-based experiences.



The new generation of EX media servers is the latest release in the Disguise modular scalable hardware architecture, providing the perfect entry point to the Disguise ecosystem for mid to small scale live events and experiences looking for a powerful pre-rendered video playback solution.

Featuring state-of-the-art components, including a PCIe Gen 5 motherboard, and increased networking capabilities, the EX 2 features two 4K video outputs with no video capture. It is also fully scalable and can run in a network with other EX machines for redundancy and failover, as well as a dedicated Director or Editor with other VX and GX machines.

Learn more about:

- Diagrams
- Redisguise
- Specifications
- Playback Performance
- SMC Overview

View the full Product information in the **Technical Specifications** PDF.

EX 2 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

If you encounter any issues with the Redisguise process, please review the Notes/ Help section at the bottom of this page.

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

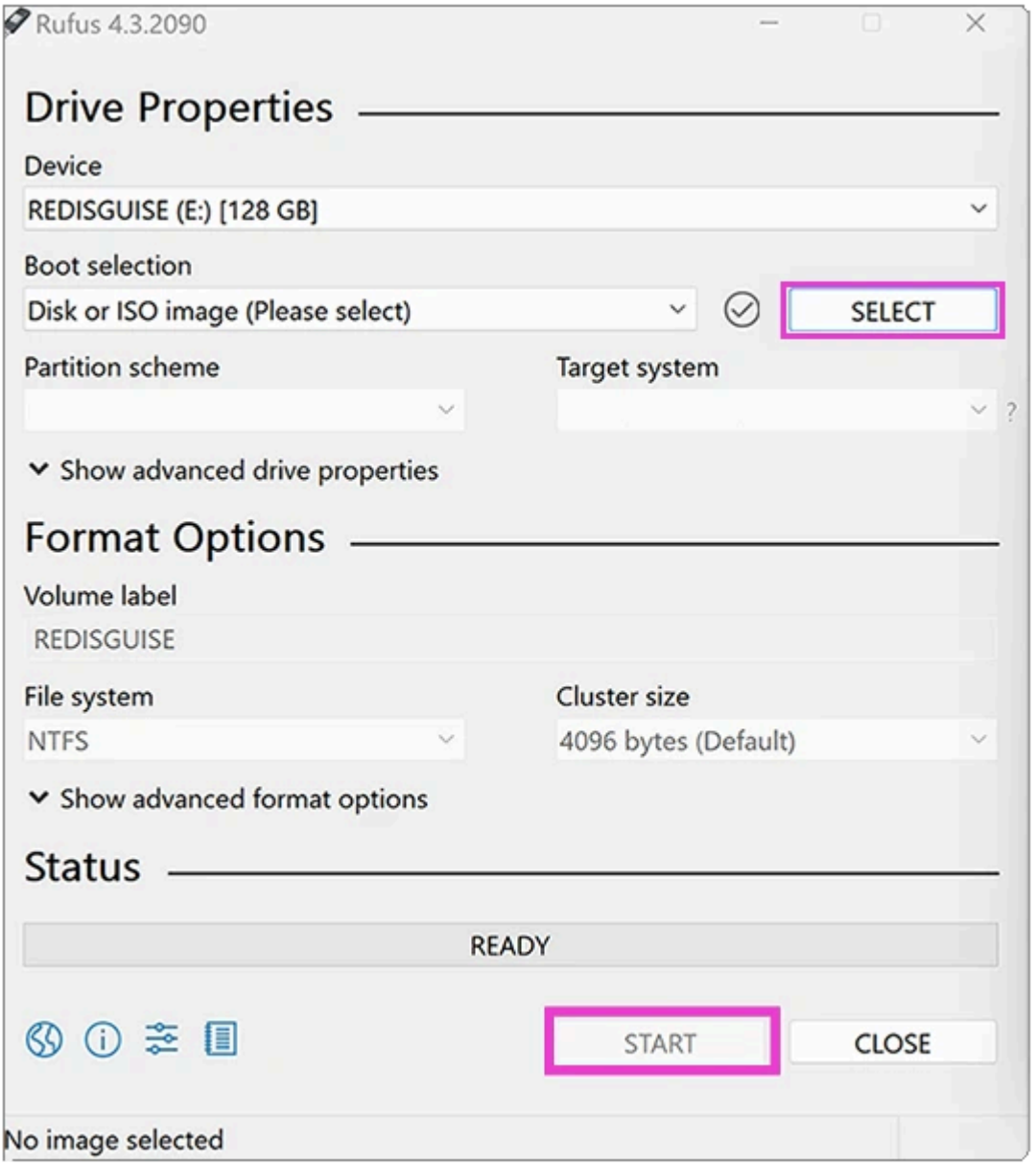
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **Exit** tab, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

EX 2 Specification

Hardware Specifications

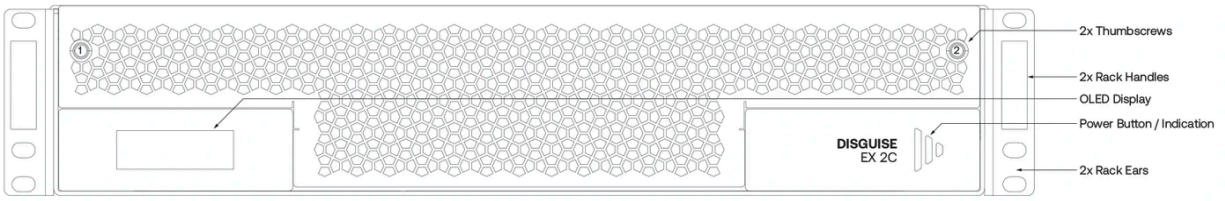
	EX 2
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	312W
Heat Dissipation Peak	1,065 BTU/hr
Max. Decibel Rating (if available)	52.4db
Operating System	Windows 11 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) / Humidity: 20%-80% (noncondensing) Altitude: 0-2700m (0-8850 ft)
Mounting System	2U 19" rack mount
OS	1x Internal Storage Drive
Storage	1.92TB Removable NVMe SSD (default)
Memory	64GB RAM (4x 16GB)

System Connectivity I/O

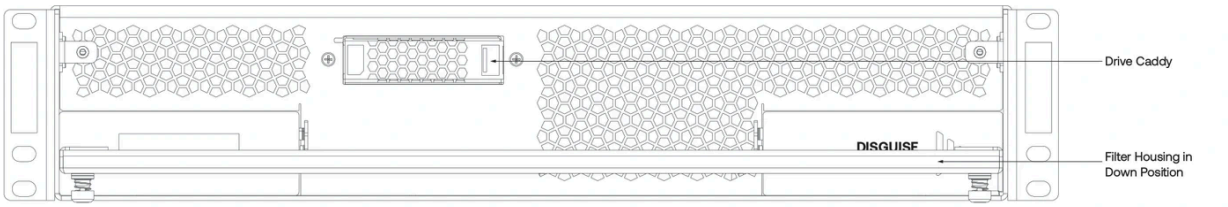
	EX 2
Video output	1x DisplayPort 1.4 (GUI) 2x DisplayPort 1.4 (Outputs)
Video input	Video input via NDI only
Audio/Optical Audio/MIDI	N/A
General Network	2x 10Gb/s (Ethernet)
High Speed Network	2x 100Gb/sec (QSFP28)
System Management Controller	1x Management Port (Ethernet)

	EX 2
Data/Peripherals	2x USB 3.2 (Gen 2x1)
Video Sync	1x BNC Genlock

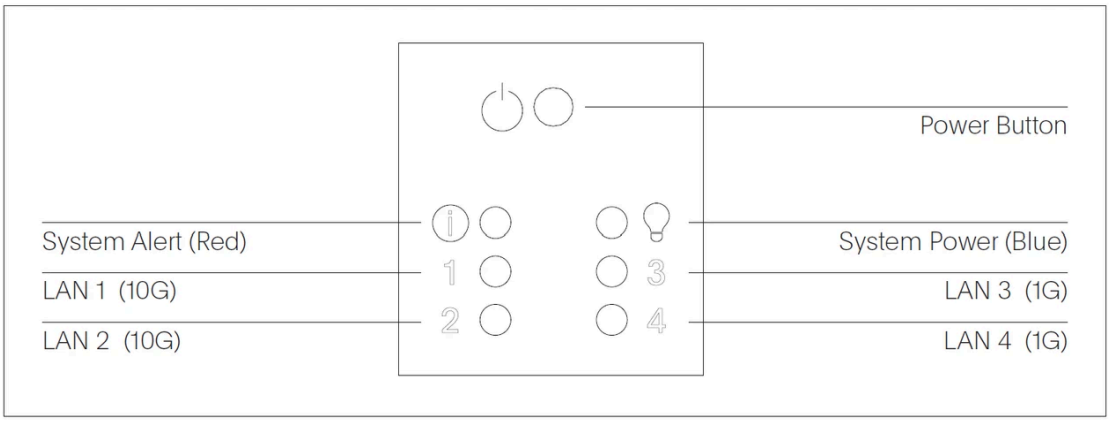
EX 2C Diagrams



EX 2C Front Panel

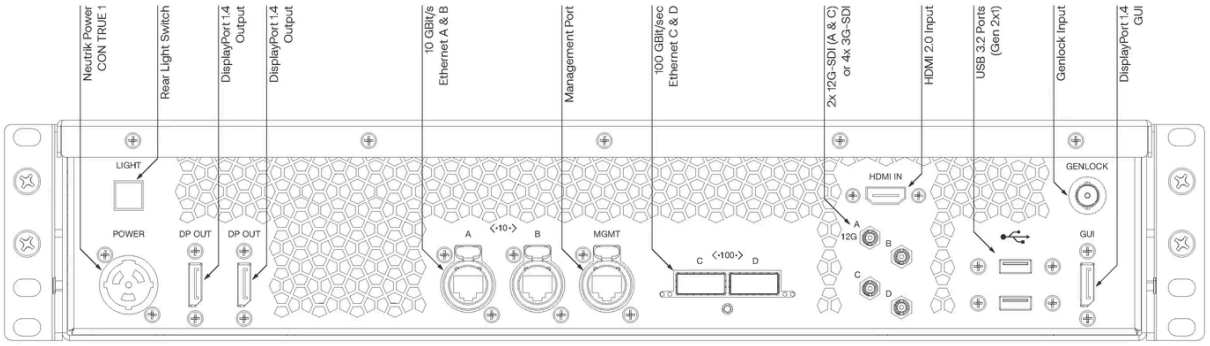


EX 2C Front Panel grill down



***Front Panel LED Indicators*

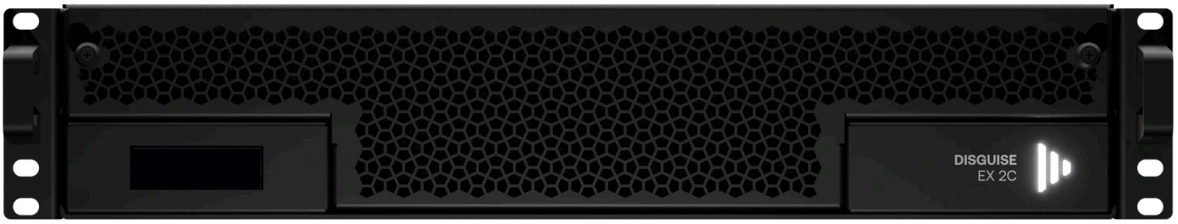
EX 2C Front Panel LED



EX 2 Rear Panel Annotated

EX 2C Overview

The EX 2C is a powerful video playback solution specifically designed for fixed installations and location-based experiences.



The new generation of EX media servers is the latest release in the Disguise modular scalable hardware architecture, providing the perfect entry point to the Disguise ecosystem for mid to small scale live events and experiences looking for a powerful pre-rendered video playback solution.

Featuring state-of-the-art components, including a PCIe Gen 5 motherboard, and increased networking capabilities, the EX 2C features two 4K video outputs and up to 1x 4K DCI or 4x Full-HD video capture inputs. It is also fully scalable and can run in a network with other EX machines for redundancy and failover, as well as a dedicated Director or Editor with other VX and GX machines.

Learn more about:

- Diagrams
- Redisguise
- Video Input
- Specifications
- Playback Performance
- SMC Overview

View the full Product information in the **Technical Specifications** PDF.

EX 2C Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

If you encounter any issues with the Redisguise process, please review the Notes/ Help section at the bottom of this page.

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

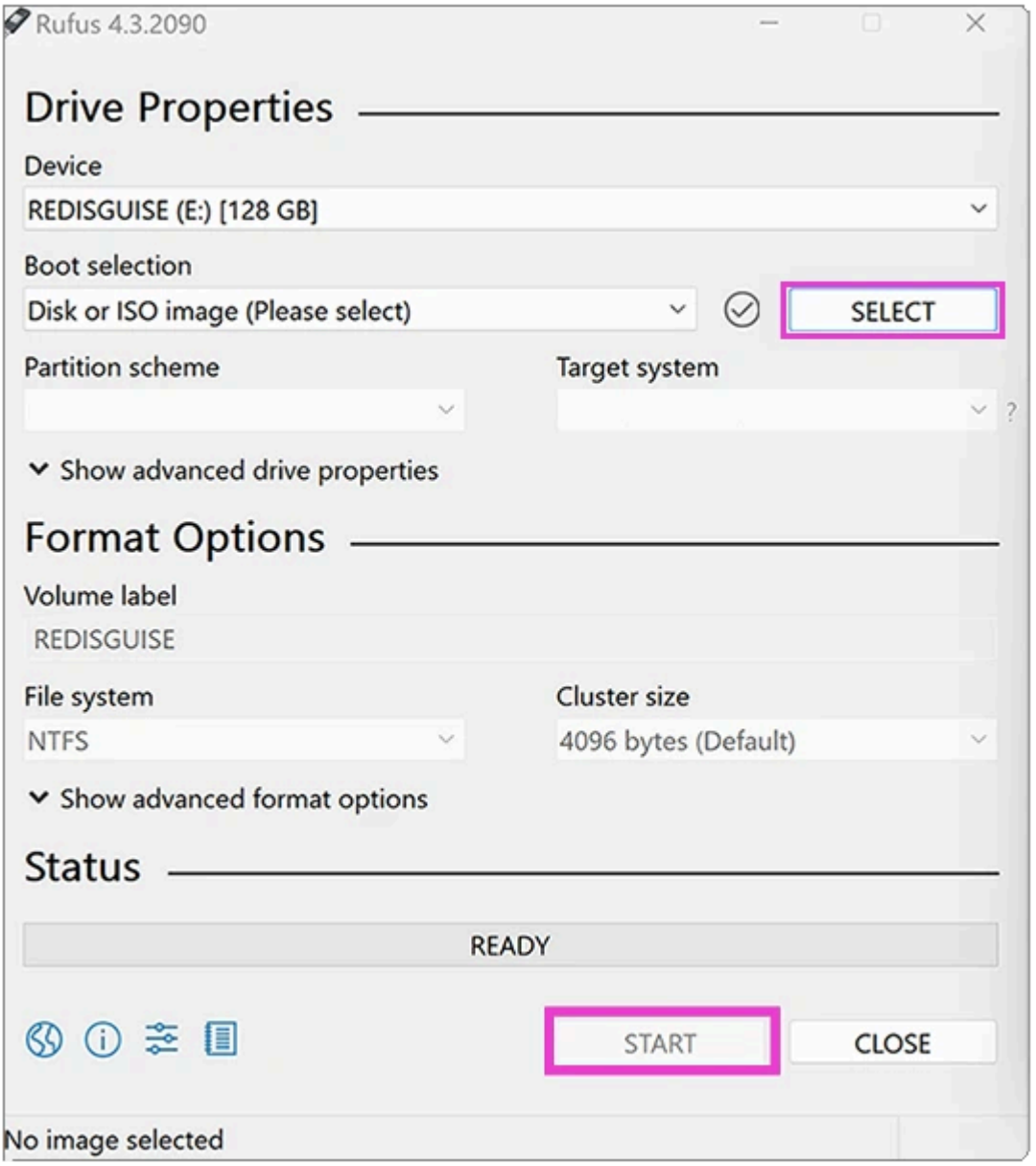
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **Exit** tab, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick

If you encounter any issues with the Redisguise process, please review the advice here.

✉️ *If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.*

EX 2C Specifications

Hardware Specifications

	EX 2C
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	332W
Heat Dissipation Peak	1,132 BTU/hr
Max. Decibel Rating (if available)	52.4db
Operating System	Windows 11 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 20%-80% (noncondensing) Altitude: 0-2700m (0-8850 ft)
Mounting System	2U 19” rack mount
OS	1x Internal Storage Drive
Storage	1.92TB Removable NVMe SSD (default)
Memory	64GB RAM (4x 16GB)

System Connectivity I/O

	EX 2C
Video output	1x DisplayPort 1.4 (GUI) 2x DisplayPort 1.4 (Outputs)
Video input	Up to 1x 4K DCI input or 4x Full-HD inputs via:- 1x 12G-SDI (A & C) or 4x 3G SDI (HD-BNC connectors) 1x HDMI 2.0 capture (HDMI connector)
Audio/Optical Audio/MIDI	N/A
General Network	2x 10Gb/s (Ethernet)
High Speed Network	2x 100Gb/sec (QSFP28)

	EX 2C
System Management Controller	1x Management Port (Ethernet)
Data/Peripherals	2x USB 3.2 (Gen 2x1)
Video Sync	1x BNC Genlock

EX 2C Video Input

Max Number of Unique Inputs

HDMI 2.0 video input is supported from Designer software version r32.2.4 onwards in conjunction with OS version 25Q3 onwards. With this configuration, the system supports up to 2x 4K DCI inputs or 1x 4K DCI + 4x Full-HD inputs at any one time via the following physical connections:

- 1x HDMI 2.0 capture (HDMI connector)
- 2x 12G inputs via Ports A and C (HD-BNC connector), or 4x 3G SDI inputs (HD-BNC connector)

The following table shows all possible maximum input configurations:

Supported Configurations	3G-SDI	12G-SDI	HDMI 2.0
12G + HDMI	0	1	1
Full-HD + HDMI	4	0	1
2x 12G-SDI (Ports A & C)	0	2	0

Supported Formats

SDI

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes).
- Chroma subsampling - YCbCr 4:2:2 (all modes).
- Each SDI input supports 3G Level A and Level B when applicable.
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p23.98, 720p24, 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

HDMI 2.0

All video standards outlined here have been tested up to the following:

- Bit depth - 8/10/12/16-bit, but anything above 10-bit will be treated as 10-bit
- Colour Formats - YCbCr 4:2:2, YCbCr 4:4:4, RGB Limited, RGB Full (all modes).
- Note that HDMI 2.0 has a bandwidth limit of around 18Gbps. This means at higher resolutions and refresh rates (eg. 4k@60) , the colour format might need to be dropped to YCbCr 4:2:2 for it to be accepted.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080p59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

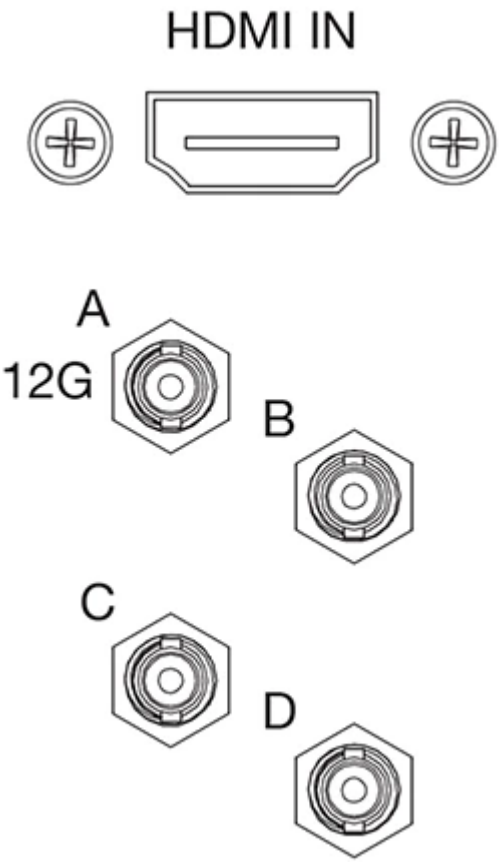
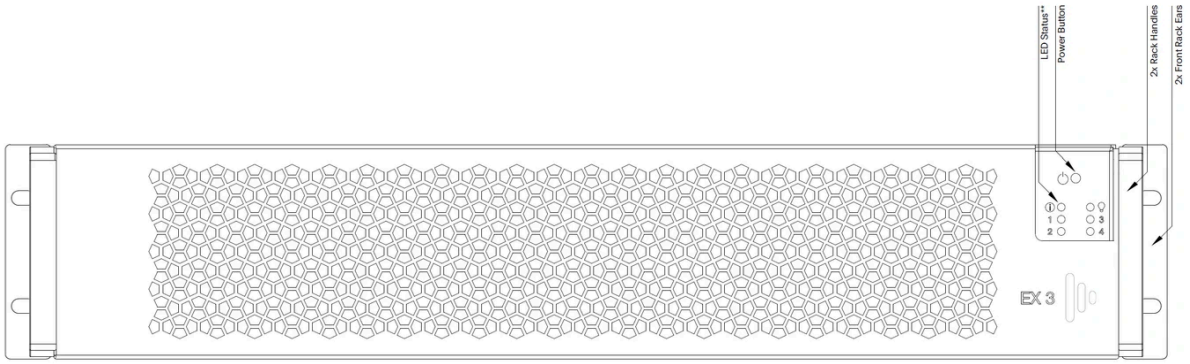


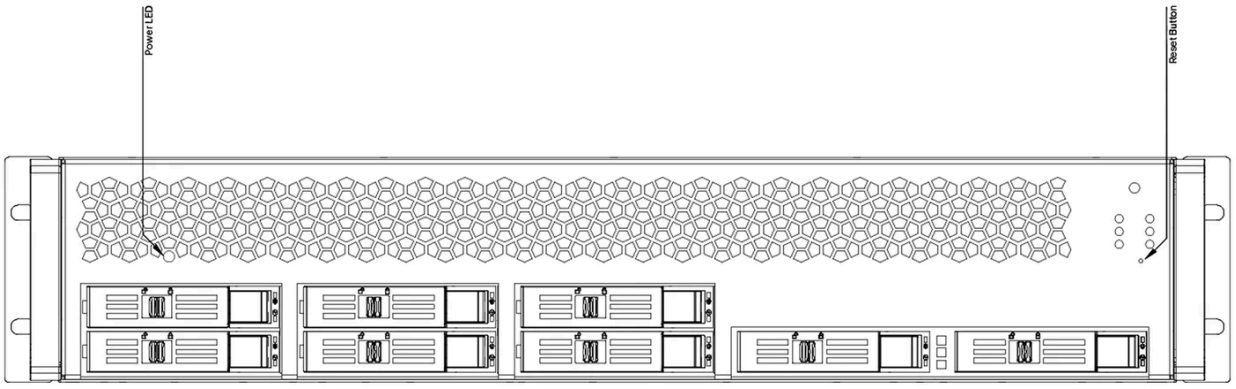
Diagram of Video Capture HDMI and BNC connections on rear of a EX 2C

> **Note**
>
> Live Video input inherently introduces frame latency during playback.

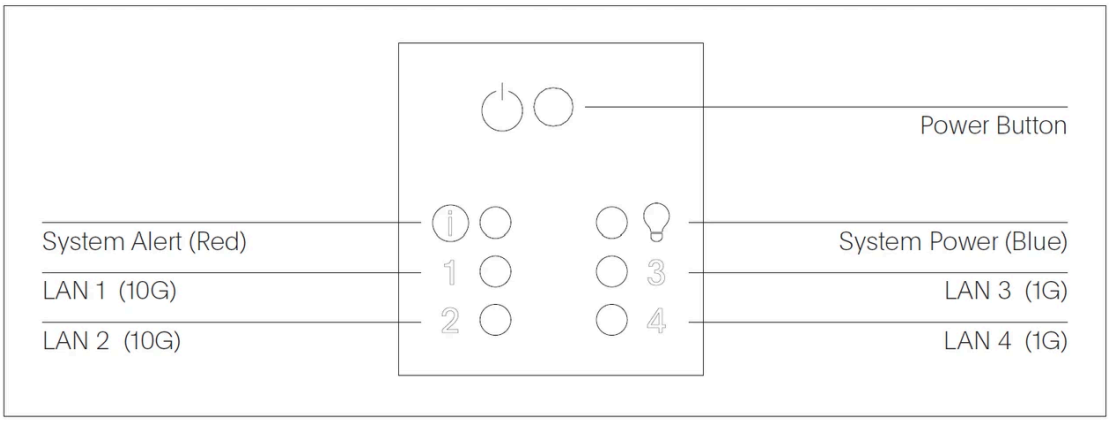
EX 3 Diagrams



EX 3 Front Panel

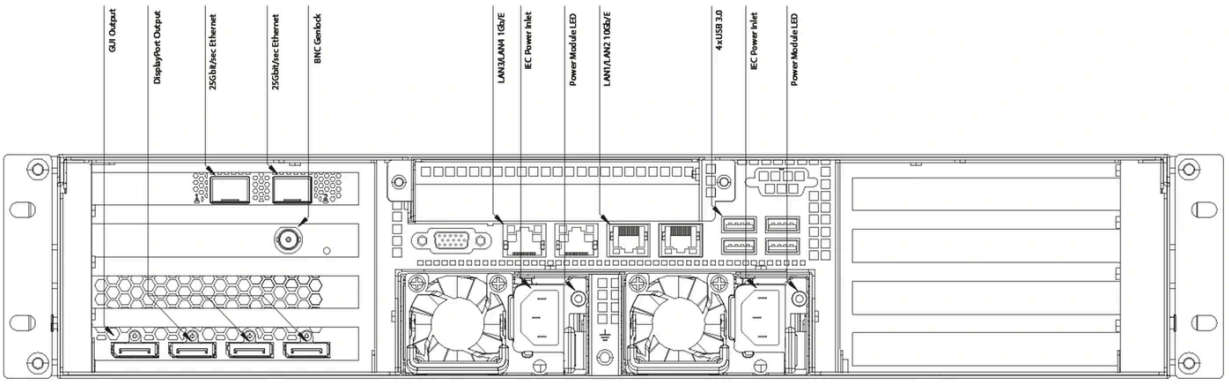


EX 3 Front Panel grill down



***Front Panel LED Indicators*

EX 3 Front Panel LED



EX 3 Rear Panel

EX 3 Overview

The EX 3 is a powerful video playback solution specifically designed for fixed installations and location-based experiences.



The EX 3 is a powerful video playback solution specifically designed for fixed installations and location-based experiences (LBX). These immersive spectacles can be located in theme parks, museum and visitor attractions, and architectural spaces with the intention of offering a shared experience for their audiences. Global audiences who want to attend unique experiences in the physical world, and then be able to share that experience in the digital world.

The EX 3 features 3x DisplayPort 1.4 outputs for 4K video within a 2U chassis.

It also includes sufficient networking capabilities for fixed installations with the inclusion of dual 1GbE, 10GbE and 25GbE ports.

Learn more about:

Diagrams Redisguise Playback Performance

View the full Product information in the **Technical Specifications** PDF.

EX 3 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

If you encounter any issues with the Redisguise process, please review the Notes/ Help section at the bottom of this page.

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

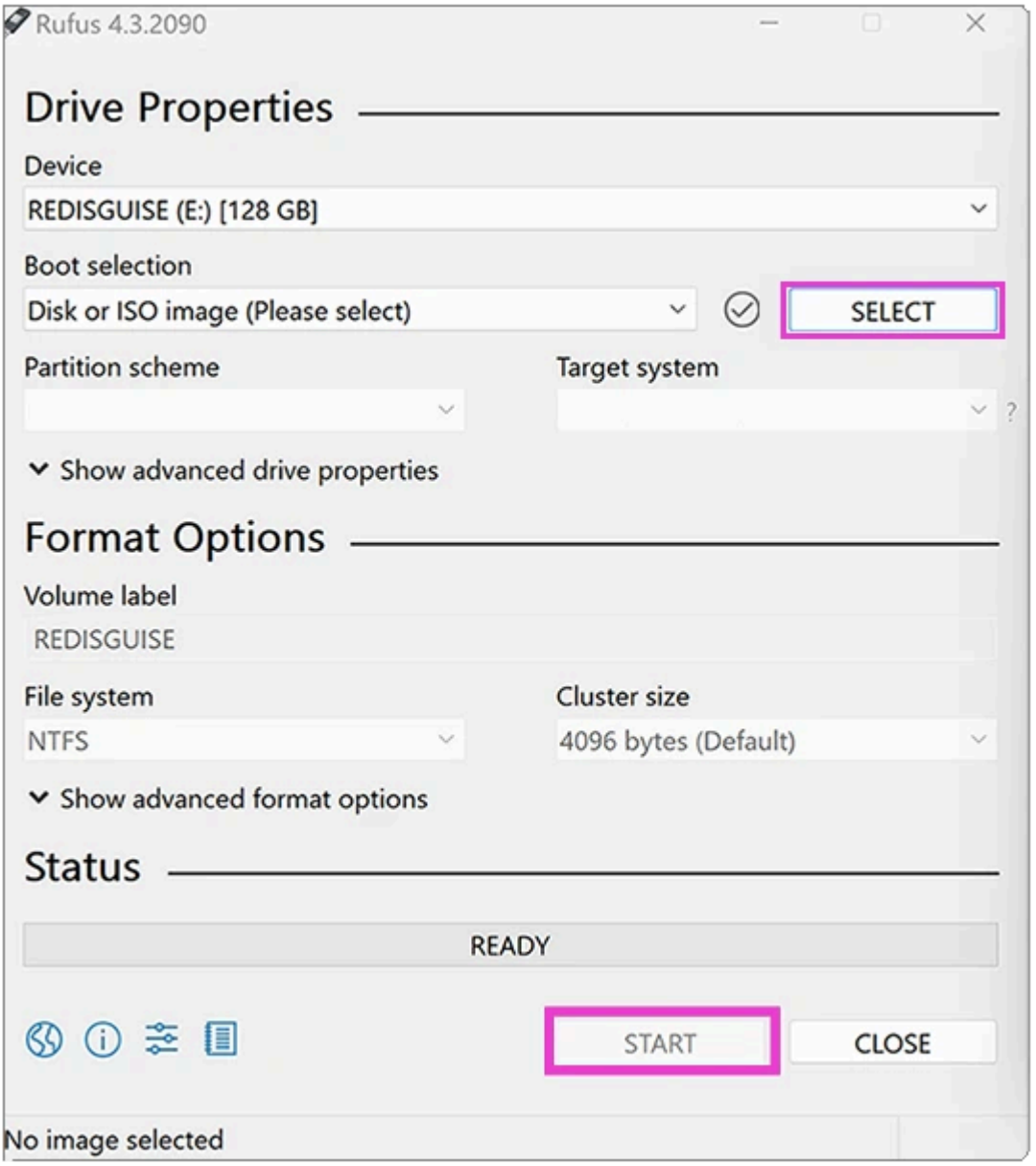
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.

2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Change the Boot option #1 to the USB stick.
4. Navigate to the **Advanced tab** and press **Enter** to view the CSM Configuration and ensure that Boot option filter is set to [UEFI and Legacy]. If not, then press **F4** and change it. Confirm and re-enter BIOS.
5. Once this setting is confirmed, navigate to the **Save & Exit** tab to the right of your current tab.
6. In the Boot Override section, select the following option:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

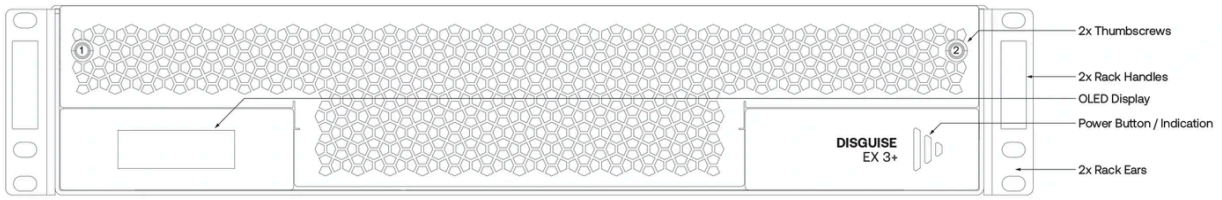
   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

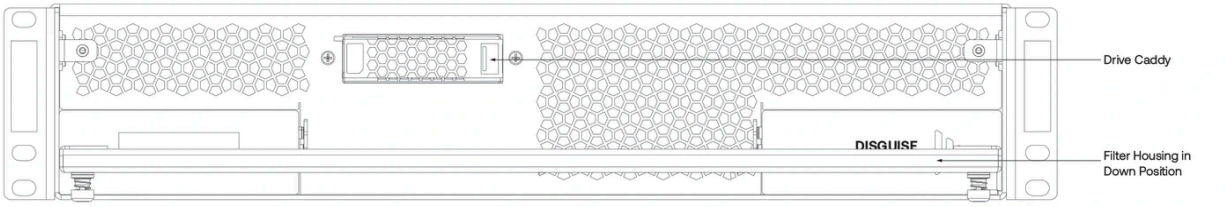
If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

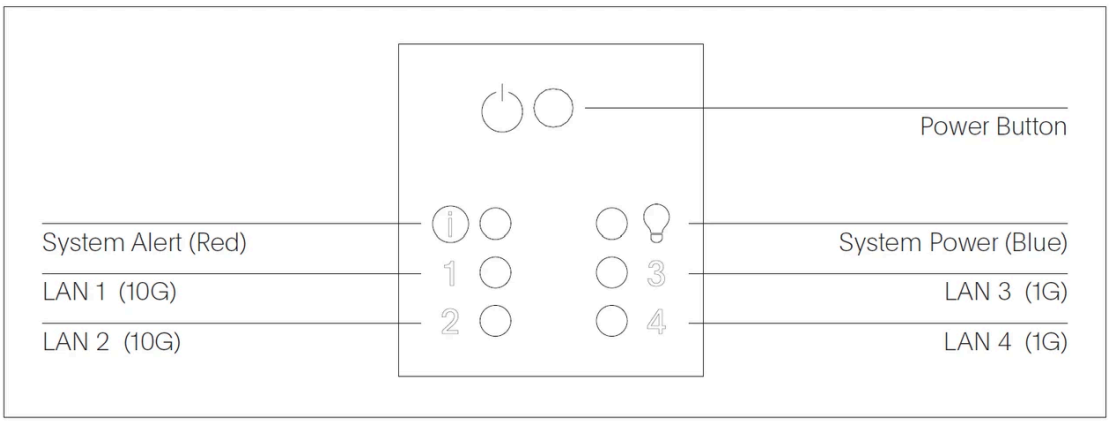
EX 3+ Diagrams



EX 3+ Front Panel

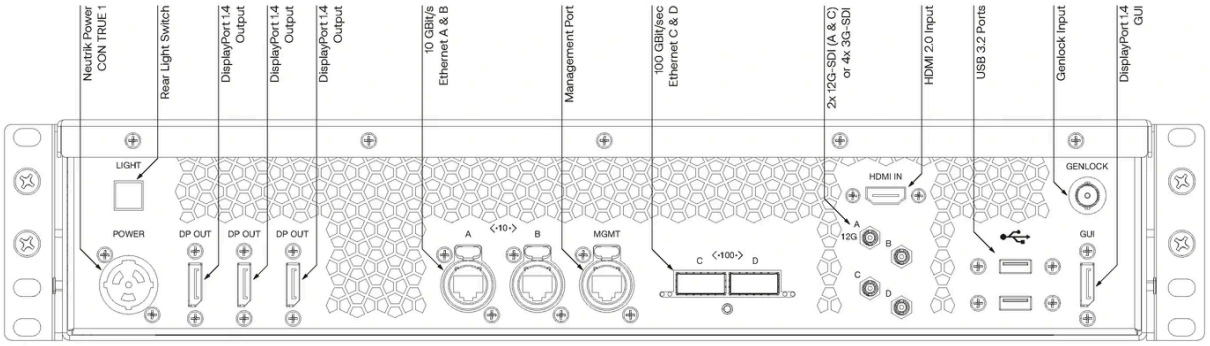


EX 3+ Front Panel grill down



***Front Panel LED Indicators*

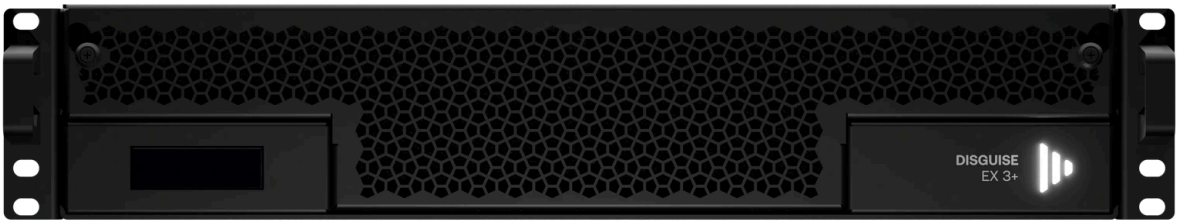
EX 3+ Front Panel LED



EX 3+ Rear Panel Annotated

EX 3+ Overview

The EX 3 is a powerful video playback solution specifically designed for fixed installations and location-based experiences.



The new generation of EX media servers is the latest release in the Disguise modular scalable hardware architecture, providing the perfect entry point to the Disguise ecosystem for mid to small scale live events and experiences looking for a powerful pre-rendered video playback solution.

Featuring state-of-the-art components, including a PCIe Gen 5 motherboard, and increased networking capabilities, the EX 3+ features three 4K video outputs and up to 2x 4K DCI or 8x Full-HD video capture inputs (with splitting). It is also fully scalable and can run in a network with other EX machines for redundancy and failover, as well as a dedicated director or editor with other VX and GX machines.

Learn more about:

- Diagrams
- Redisguise
- Video Input
- Specifications
- Playback Performance
- SMC Overview

View the full Product information in the **Technical Specifications** PDF.

EX 3+ Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

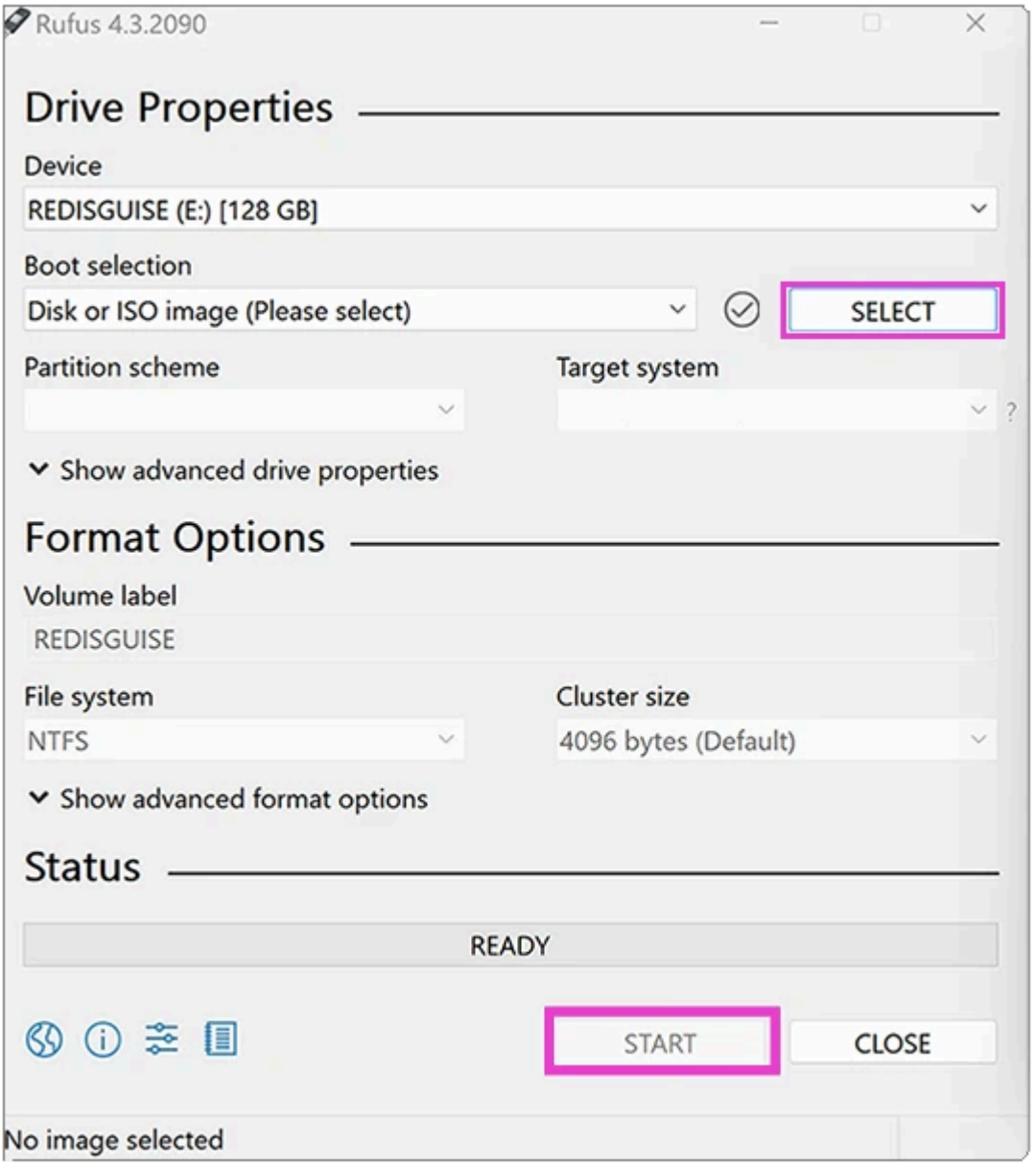
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **Exit** tab, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

EX 3+ Specifications

Hardware Specifications

	EX 3+
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	332W
Heat Dissipation Peak	1,132 BTU/hr
Max. Decibel Rating (if available)	52.4db
Operating System	Windows 11 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 20%-80% (noncondensing) Altitude: 0-2700m (0-8850 ft)
Mounting System	2U 19” rack mount
OS	1x Internal Storage Drive
Storage	3.84TB Removable NVMe SSD (default)
Memory	96GB RAM (6x 16GB)

System Connectivity I/O

	EX 3+
Video output	1x DisplayPort 1.4 (GUI) 3x DisplayPort 1.4 (Outputs)
Video input	Up to 3x 4K DCI inputs or 5x Full-HD inputs via any combination of the following: 1x HDMI 2.0 capture (HDMI connector) 2x 12G SDI inputs via Ports A and C (HD-BNC connector), or 4x 3G SDI inputs (HD-BNC connector)
Audio/Optical Audio/MIDI	N/A
General Network	2x 10Gb/s (Ethernet)

	EX 3+
High Speed Network	2x 100Gb/sec (QSFP28)
System Management Controller	1x Management Port (Ethernet)
Data/Peripherals	2x USB 3.2 (Gen 2x1)
Video Sync	1x BNC Genlock

EX 3+ Video Input

Max Number of Unique Inputs

HDMI 2.0 video input is supported starting from Designer software version r32.2.4, in conjunction with OS version 25Q3 or later. With this configuration, the system supports up to 3x 4K DCI inputs or 5x Full-HD inputs at any one time via the following physical connections:

- 1x HDMI 2.0 capture (HDMI connector)
- 2x 12G SDI inputs via Ports A and C (HD-BNC connector)
  - or 4x 3G SDI inputs (HD-BNC connector)

The following table shows all possible maximum input configurations:

Supported Configurations	3G-SDI	12G-SDI	HDMI 2.0
2x 12G-SDI via Ports A and C (HD-BNC connector) + HDMI	0	2	1
Full-HD + HDMI	4	0	1

Supported Formats

SDI

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes).
- Chroma subsampling - YCbCr 4:2:2 (all modes).
- Each SDI input supports 3G Level A and Level B when applicable.
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p23.98, 720p24, 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

HDMI 2.0

All video standards outlined here have been tested up to the following:

- Bit depth - 8/10/12/16-bit, but anything above 10-bit will be processed as 10-bit
- Colour Formats - YCbCr 4:2:2, YCbCr 4:4:4, RGB Limited, RGB Full (all modes).
- Note that HDMI 2.0 has a bandwidth limit of around 18Gbps. This means at higher resolutions and refresh rates (eg. 4k@60) , the colour format might need to be dropped to YCbCr 4:2:2 for it to be accepted.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p23.98, 720p24, 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

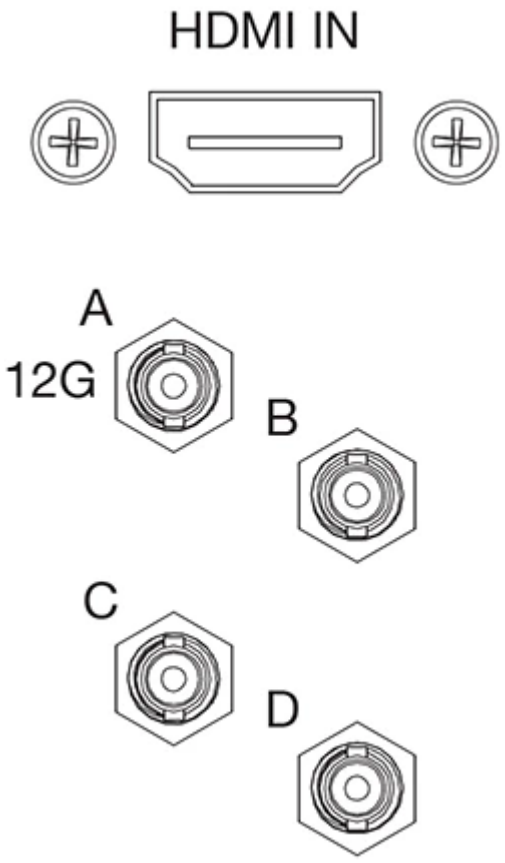


Diagram of Video Capture HDMI and BNC connections on rear of a EX 3+

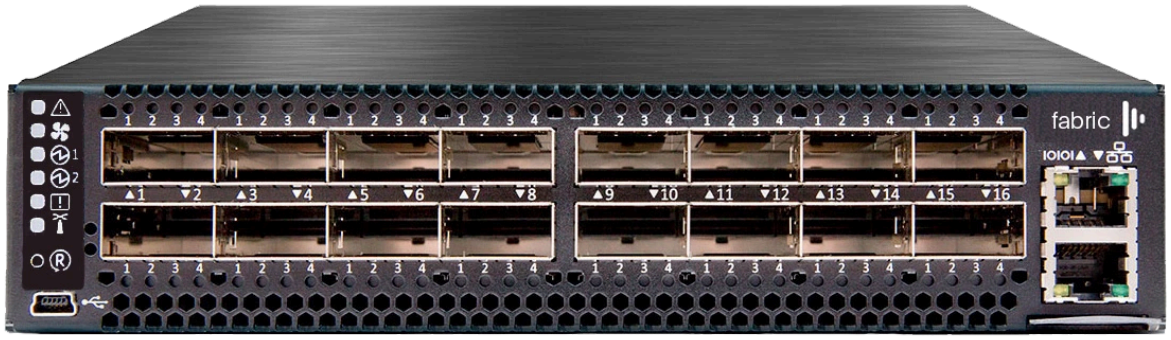
> **Note**
>
> Live Video input inherently introduces frame latency during playback.

Fabric

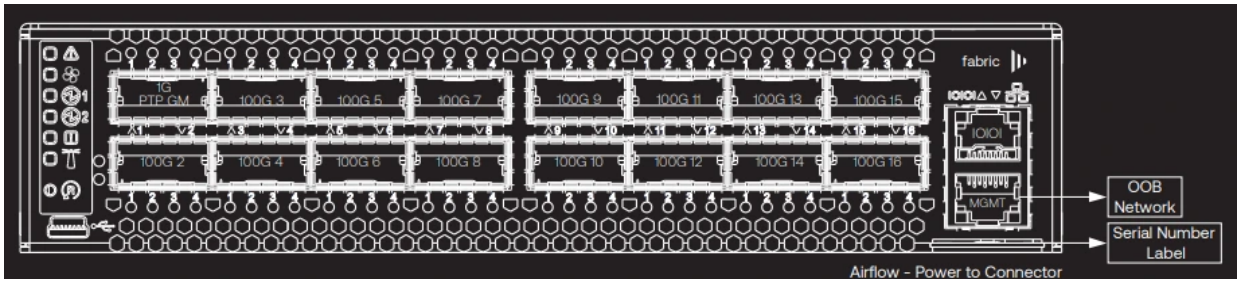
Fabric is a preconfigured network switch that works with RenderStream or ST 2110 video if using IP-VFC, and is sold by Disguise.

RenderStream remote mode requires a high-bandwidth network to connect the dedicated render node(s) to the VX and/or GX range media server(s) being used to composite and output the content.

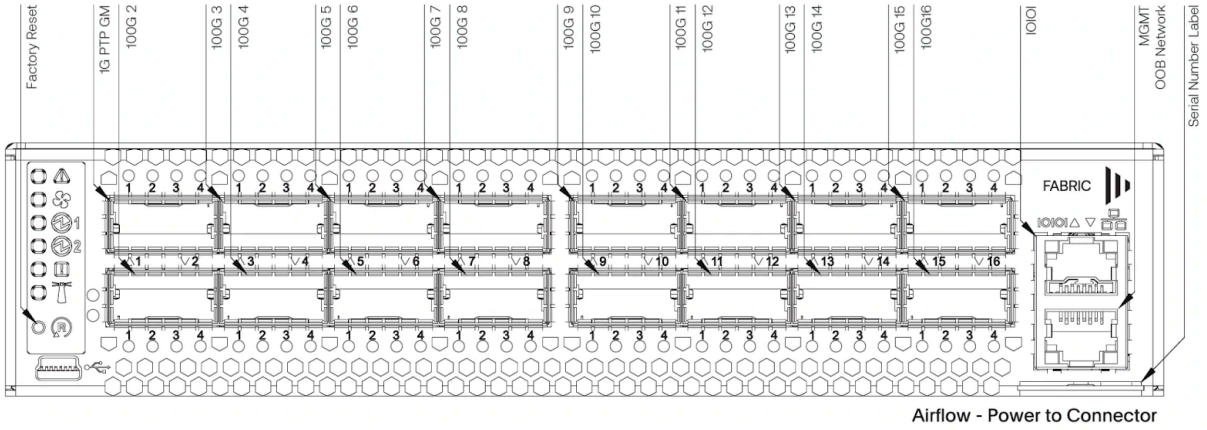
We have standardised on Mellanox ConnectX-5 (25GbE) or ConnectX-6 (100GbE) network interface cards (NICs) on our products. This is because they support Rivermax, which we use to enable RenderStream Uncompressed.



Fabric rear panel



Fabric rear annotated



Fabric rear detail

Please read the instructions on this quick start guide carefully to understand how to work with your new system.

View the full Product information in the **Technical Specifications** PDF.

Fabric Configuration

IGMP snooping is enabled on the required network ports used to connect to the RX nodes. This is used to manage and control the flow of Layer 3 multicast traffic.

RDMA over Converged Ethernet version 2 (RoCEv2) is supported on the Fabric network switch for lossless mode. Quality of Service (QoS) is also maintained to priorities media streams over control traffic.

Default Port Configuration

Port 1 is configured to 1GbE so that it can be connected to a PTP grandmaster. Ports 2 - 16 are configured to 100GbE.

Optional 25GbE port configuration

Port 1 is configured to 1GbE so that it can be connected to a PTP grandmaster. Ports 2 - 8 are configured to 100GbE. Ports 9 - 16 are configured to 25GbE using quad-split.

Please contact Disguise Support **support@disguise.one** to arrange switching Fabric to this configuration.

Fabric QuickStart Guide

Fabric is a preconfigured network switch that has been built to connect your output and render servers together.

Fabric is used alongside **RenderStream remote mode**, which requires a high-bandwidth network to connect the dedicated render node(s) to the VX/GX range media server(s) being used to composite and output the content.

> **Note**
>
> The default configuration has changed to 15x 100G ports from July 2024. The previous 25G quad-split configuration on ports 9/1-16/4 can be applied on request from Support.

Port Configuration

Port 1

Port 1 is configured as 1G and can be connected to a PTP Grand Master using a QSFP to SFP adapter.

Ports 2/1-16/4

Ports 2-16 are configured as 100G to connect to your 100G vx series server. Please use QSFP28 cables or optics for connection.

Password Protection

The Fabric switch has been designed specifically to be preconfigured in the correct way to seamlessly support RenderStream. The switch has several configuration settings that can be easily mis-configured to break Renderstream workflows. For this reason we do not provide the password to amend the configuration of the switch. If you believe access to the configuration is required please contact **support@disguise.one** and they can help with advising on how best to proceed.

DHCP

The Fabric switch comes preconfigured with a DHCP and DNS server to ease setup over the fabric network. Any device plugged into the network is accessible on the Fabric domain. Example: `\\rx-559999.fabric`.

The DHCP server is configured to allocate IP addresses in the range of `10.250.222.5-10.250.222.250/24`.

To access DHCP configuration and logs, please point your browser to `switch.fabric:8080/`.

Power

Follow these steps to properly power up your fabric.

1. Plug in both power cables.
2. Wait for the system to boot automatically.
3. Wait for the system status LED to turn GREEN. If the system LED turns RED, please contact Disguise support.

Power Rating: 100-127 VAC 50/60Hz 4.5A or 200-240VAC 50/60Hz 2.9A

NMOS

The switch comes preconfigured with AMWA NMOS registry that can be accessed on the following address: `switch.fabric:8010/`.

Filter Maintenance

> **Warning**
>
> It is recommended that you service the air filter when the unit is powered off. If the unit is on you will be exposed to the system fans and this may result in injury.

How to change air filters

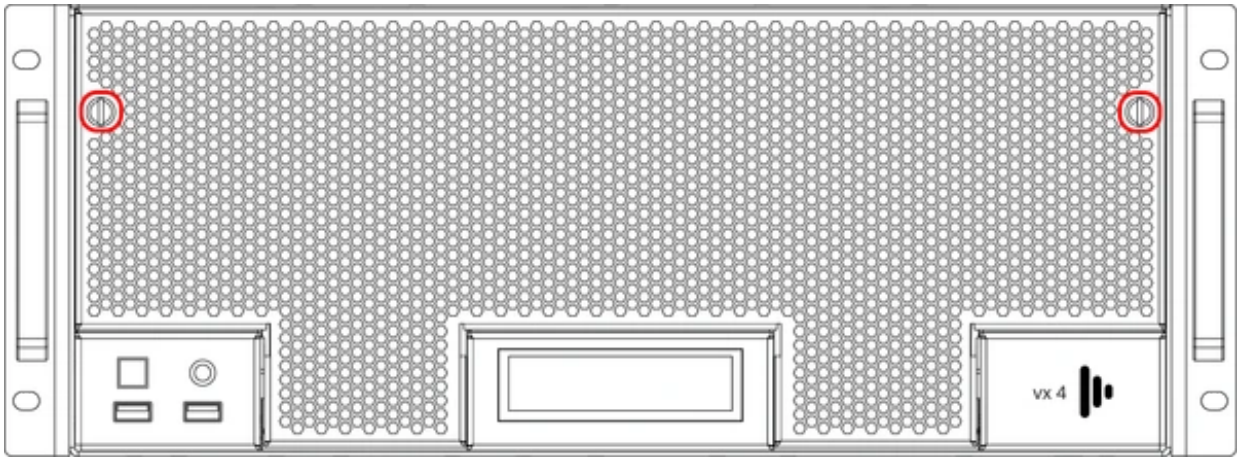


Changing Air Filters. Click the video image to view it in YouTube

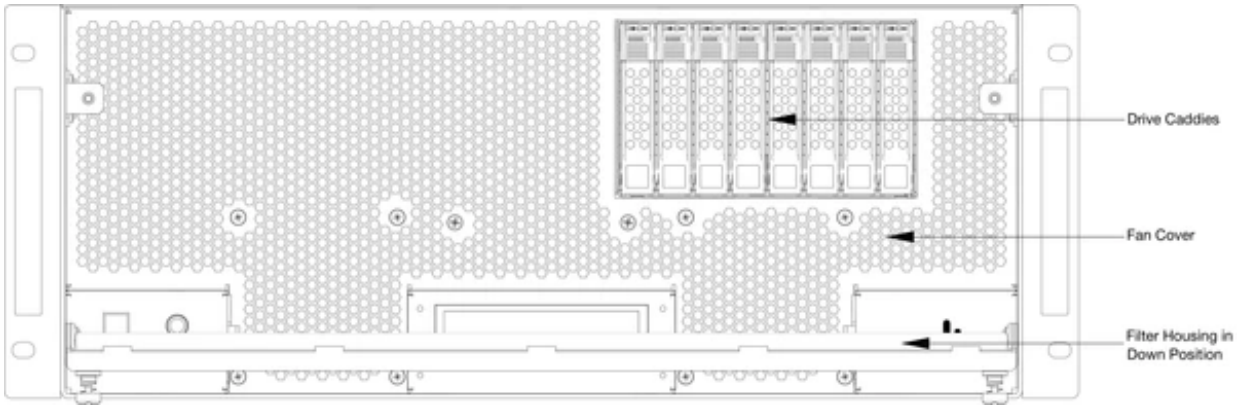
VX Range

VX 4

To remove the air filter material, first remove the screws marked in the diagrams below.



Air filter housing and thumb screws on front of VX 4 unit



Plan view of air filter housing on the VX 4 once opened

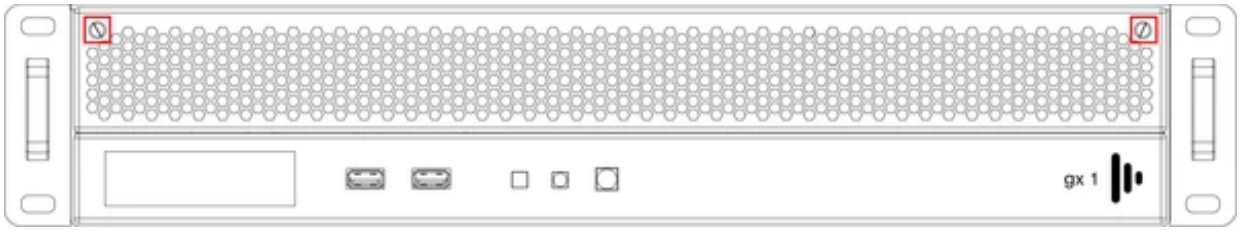
Next, clean the filter, then replace the filter in the metal frame and reattach the frame to the front of the unit.



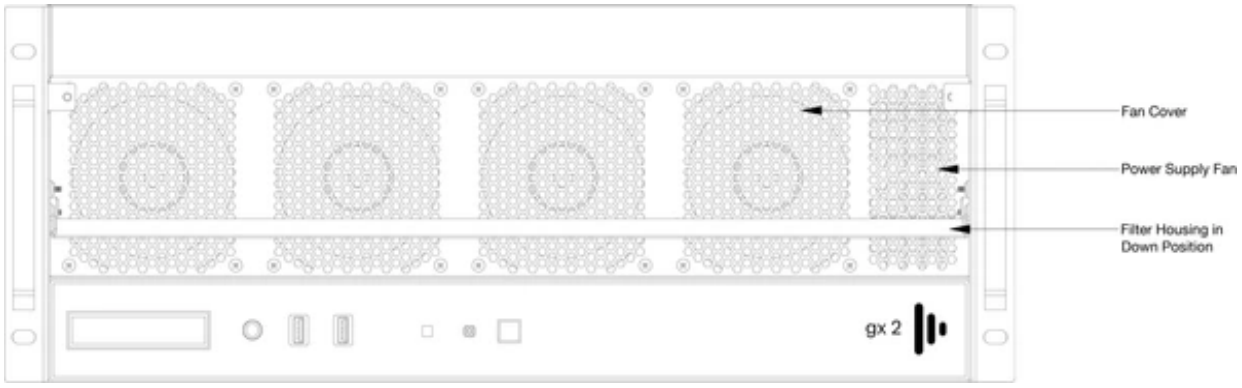
GX Range

GX 1

To remove the air filter material, first remove the screws marked in the diagrams below.



Air filter housing and thumb screws on front of GX 1 unit



Plan view of air filter housing on the GX 1 once opened

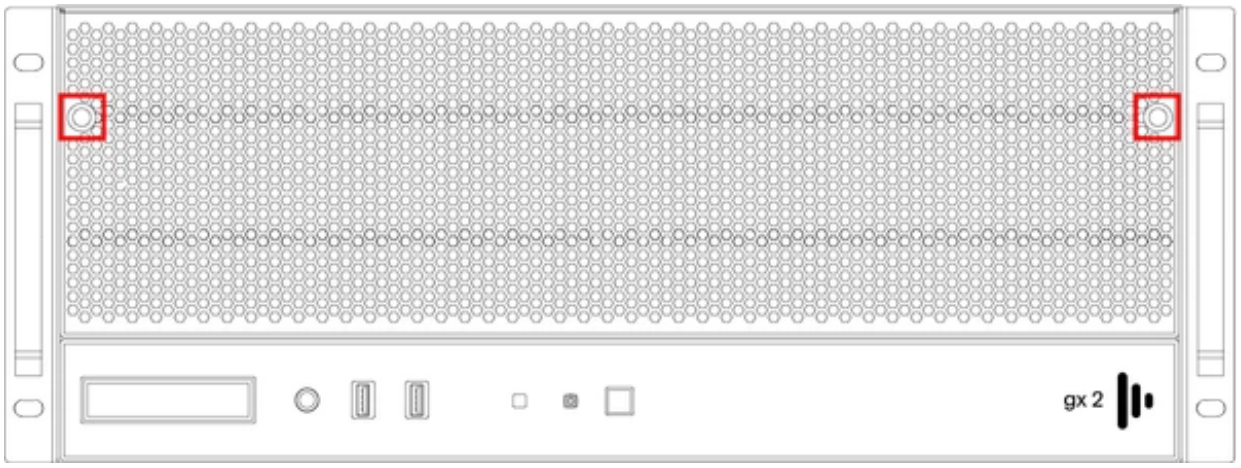
Next, clean the filter, then replace the filter in the metal frame and reattach the frame to the front of the unit.



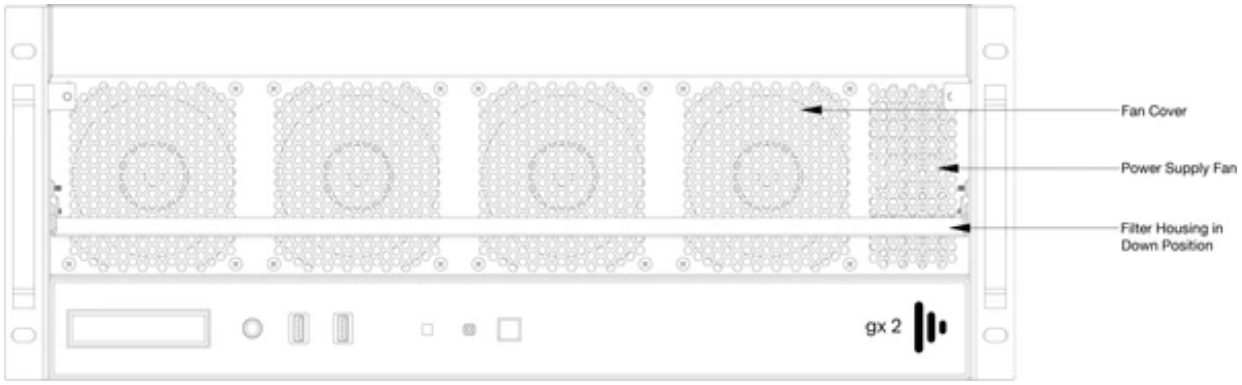
GX 1

GX 2 & GX 2C

To remove the air filter material, first remove the screws marked in the diagrams below.

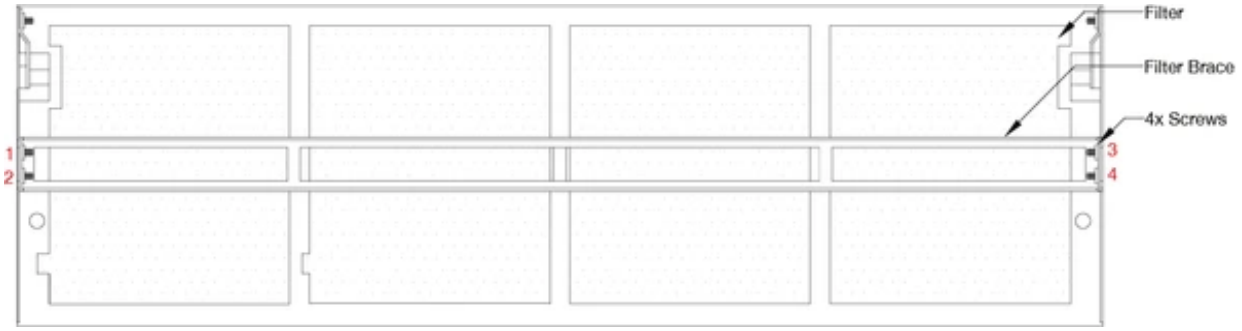


Air filter housing and thumb screws on front of GX 2 & GX 2C unit



Plan view of air filter housing on the GX 2 and GX 2C once opened

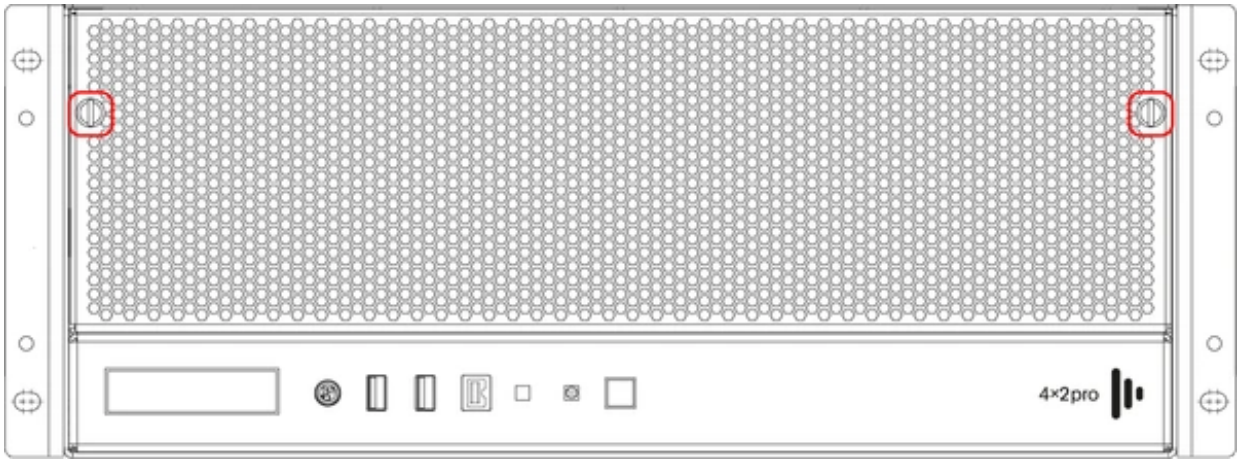
Next, clean the filter, then replace the filter in the metal frame and reattach the frame to the front of the unit.



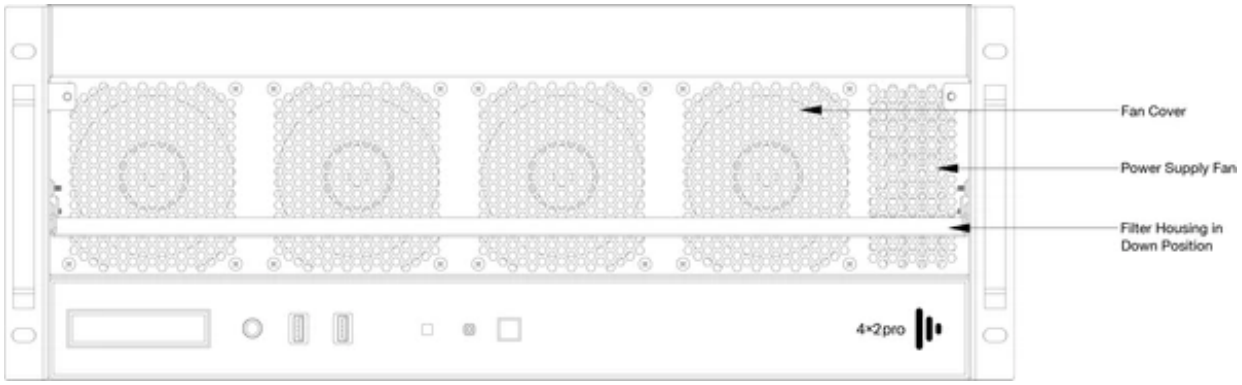
GX 2 & GX 2C

Legacy Servers

To remove the air filter material, first remove the screws marked in the diagrams below.



Air filter housing and thumb screws on front of 4x2pro unit



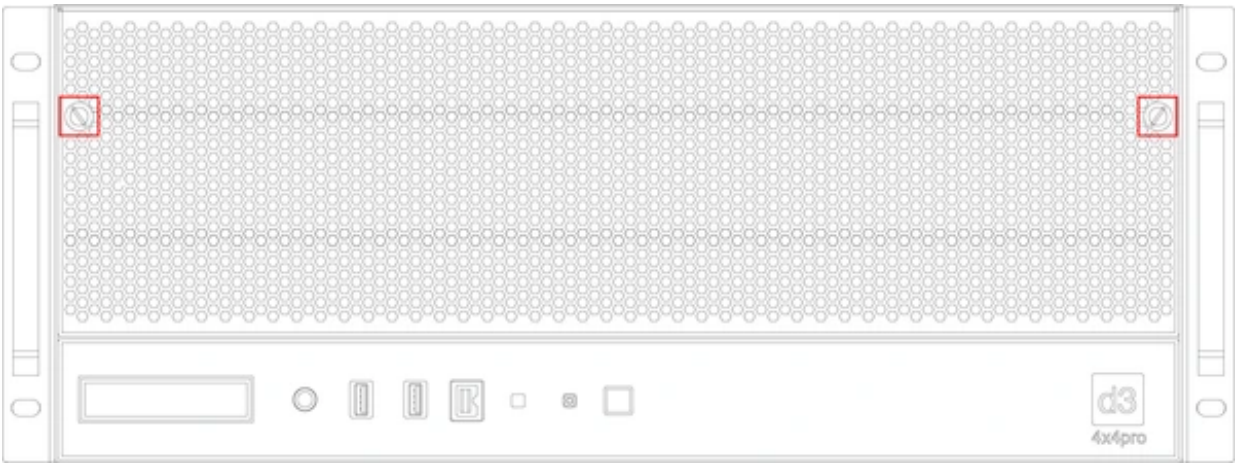
Plan view of air filter housing on the 4x2pro once opened

Next, clean the filter, then replace the filter in the metal frame and reattach the frame to the front of the unit.

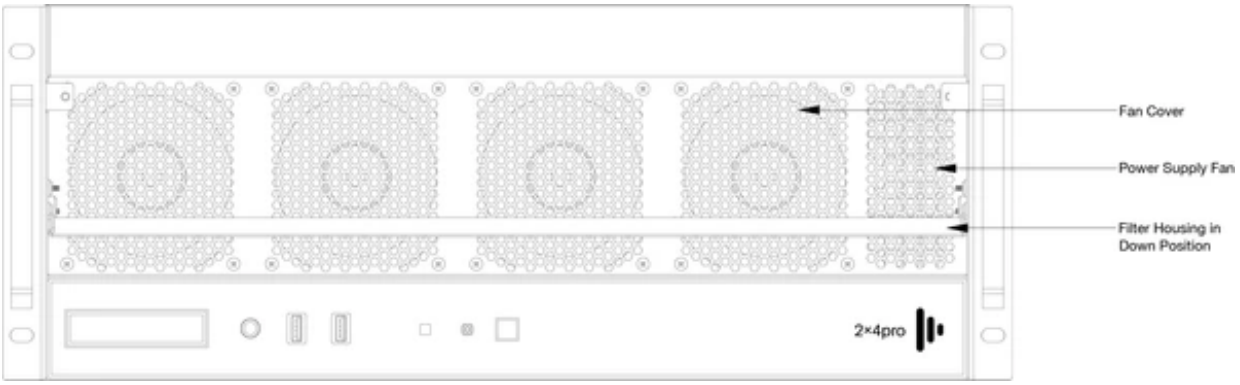


4x4pro

To remove the air filter material, first remove the screws marked in the diagrams below.



Air filter housing and thumb screws on front of 4x4pro unit



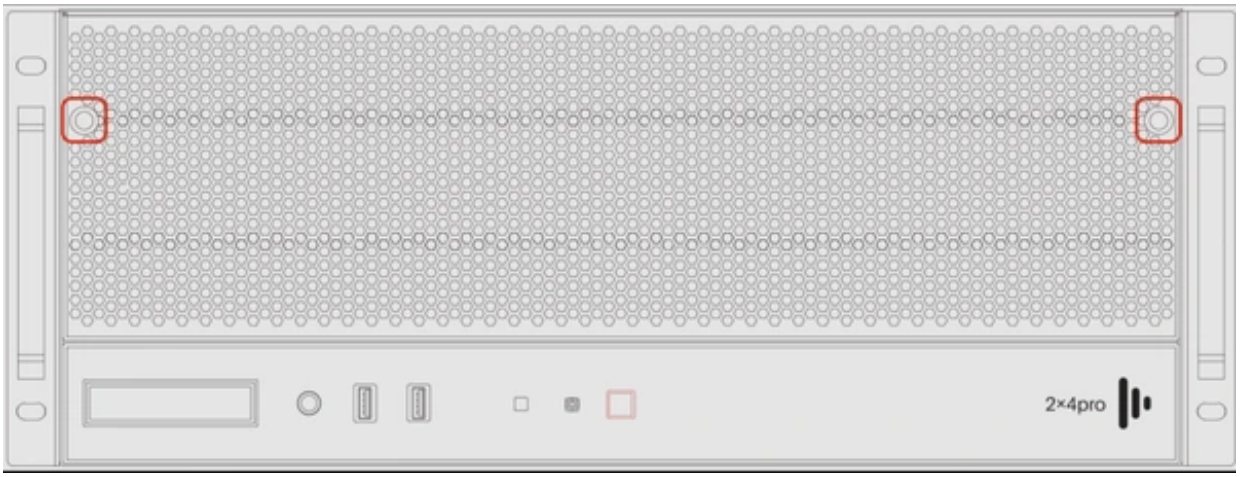
Plan view of air filter housing on the 4x4pro once opened

Next, clean the filter, then replace the filter in the metal frame and reattach the frame to the front of the unit.

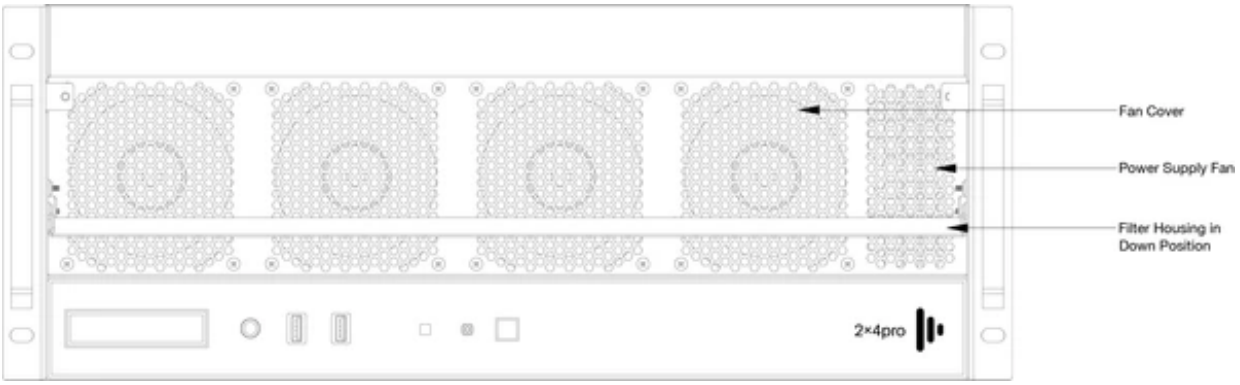


2x4pro

To remove the air filter material, first remove the screws marked in the diagrams below.



Air filter housing and thumb screws on front of 2x4pro unit



Plan view of air filter housing on the 2x4pro once opened

Next, clean the filter, then replace the filter in the metal frame and reattach the frame to the front of the unit.



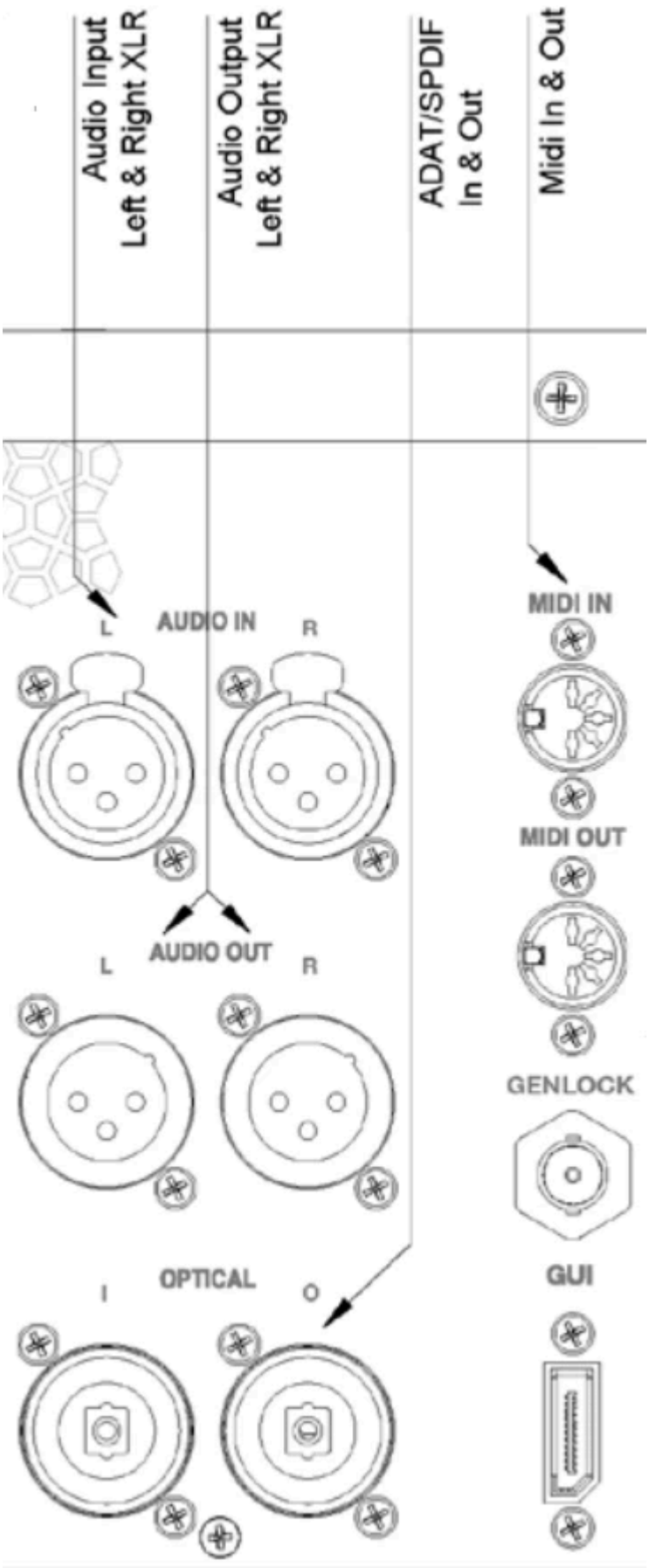
2x4pro

GX 3 & GX 3+ Audio Input and Output

The GX 3 and GX 3+ are equipped with broadcast quality pro audio cards which uses the latest 192kHz AD and DA converters.

Back panel connections

- XLR Left + Right Input
- XLR Left + Right Output
- ADAT/SPDIF Input
- ADAT/SPDIF Output
- MIDI Input
- MIDI Output



Audio connections on rear of GX 3 unit.

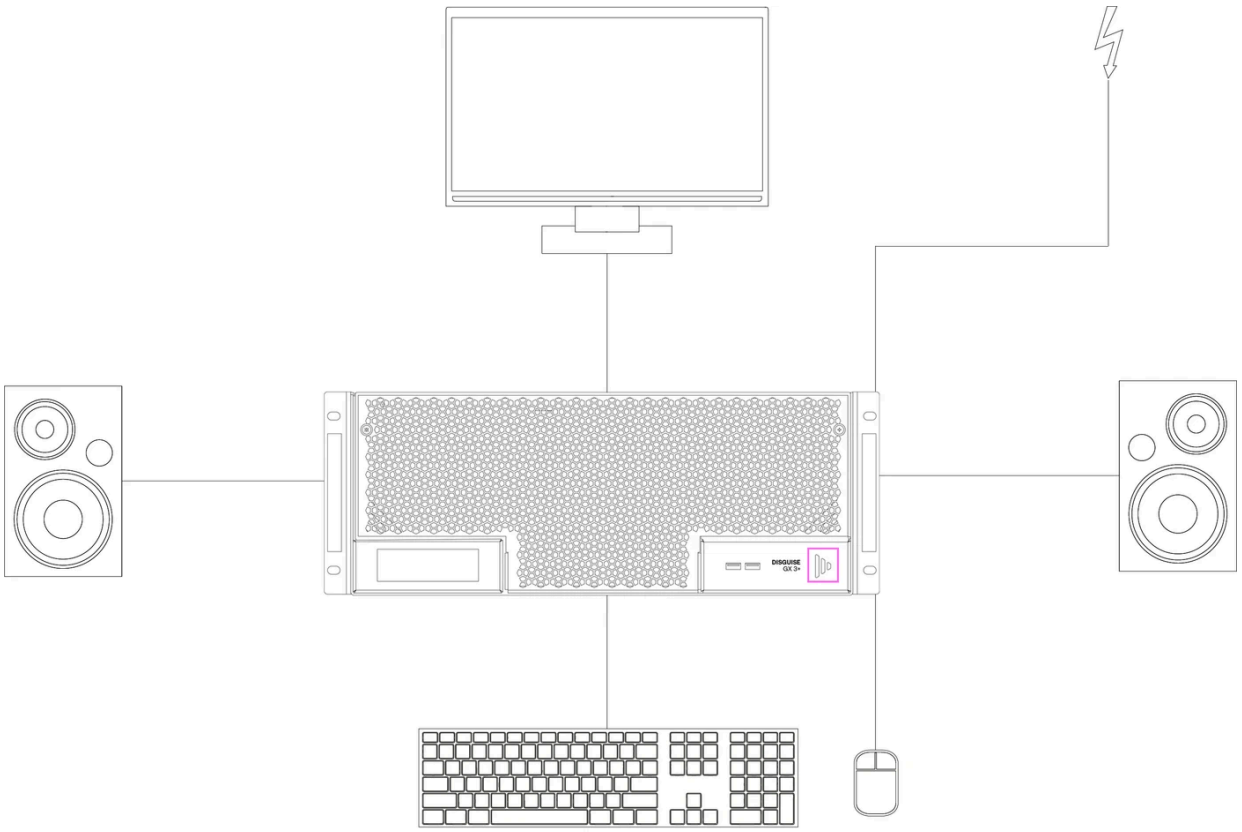
Front panel connections

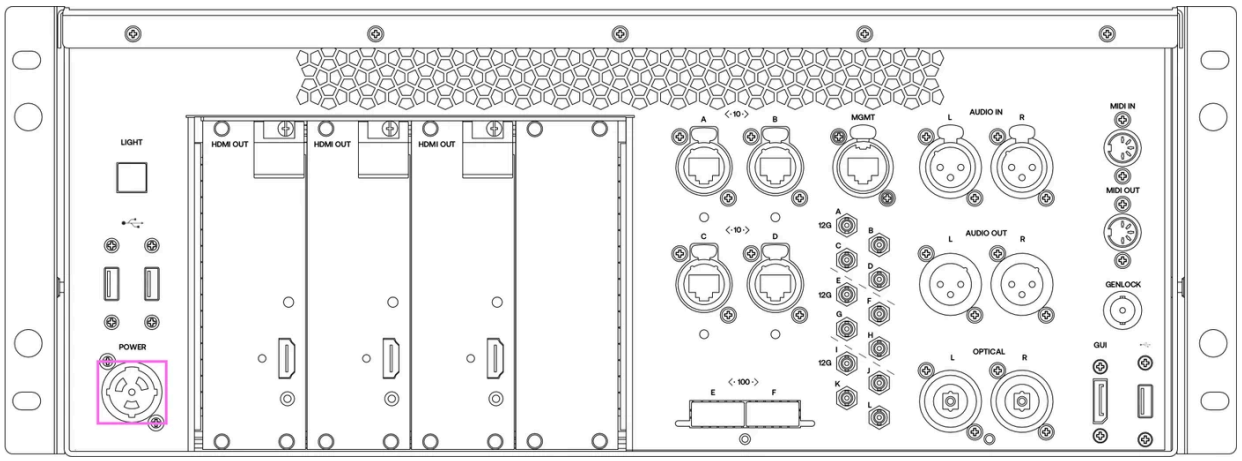
- 1/4inch Stereo Monitoring socket

It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

How to Start the Unit

1. Connect Power cord to the GX.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.



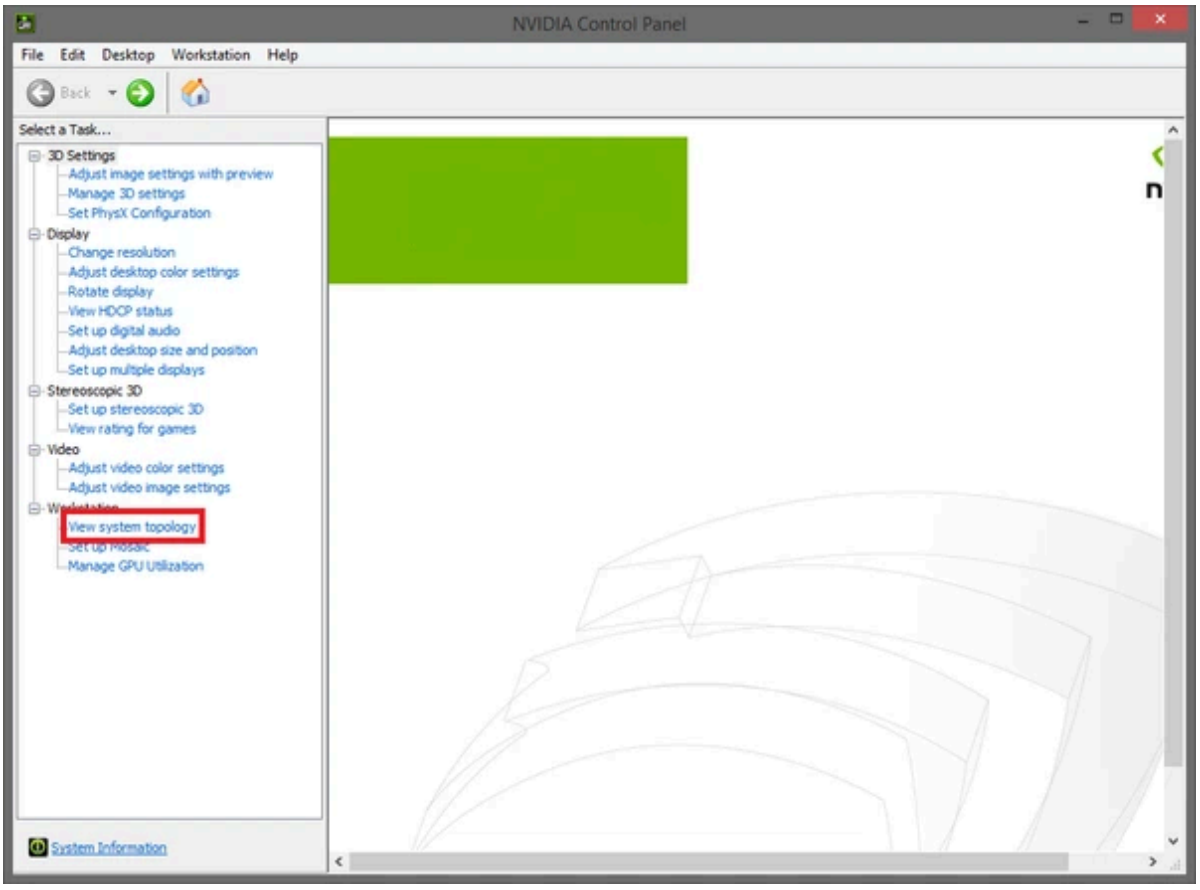


Location of power input on rear of GX 3+ unit

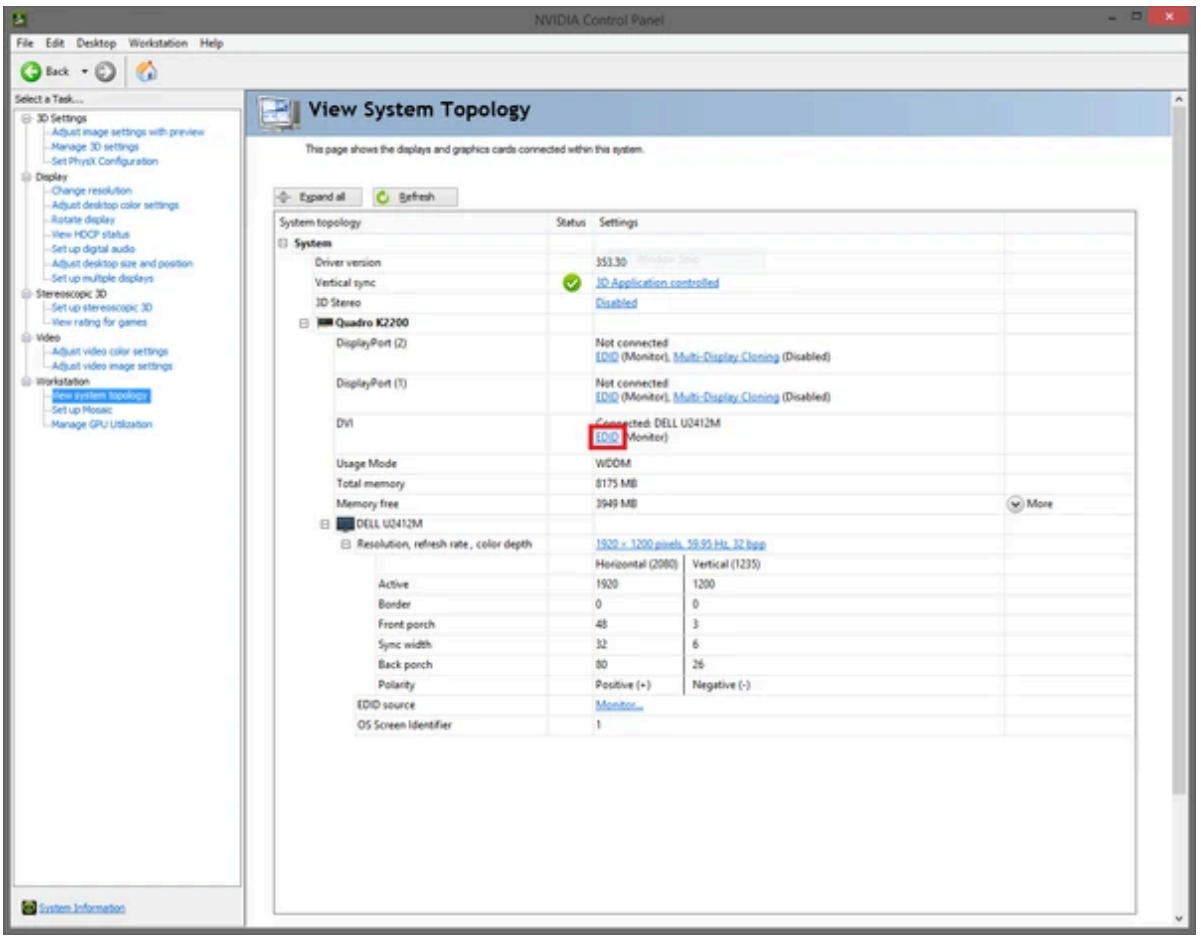
Managing EDIDs on NVIDIA Machines

Emulating EDIDs within Windows

1. Navigate to the “View system topology” tab.

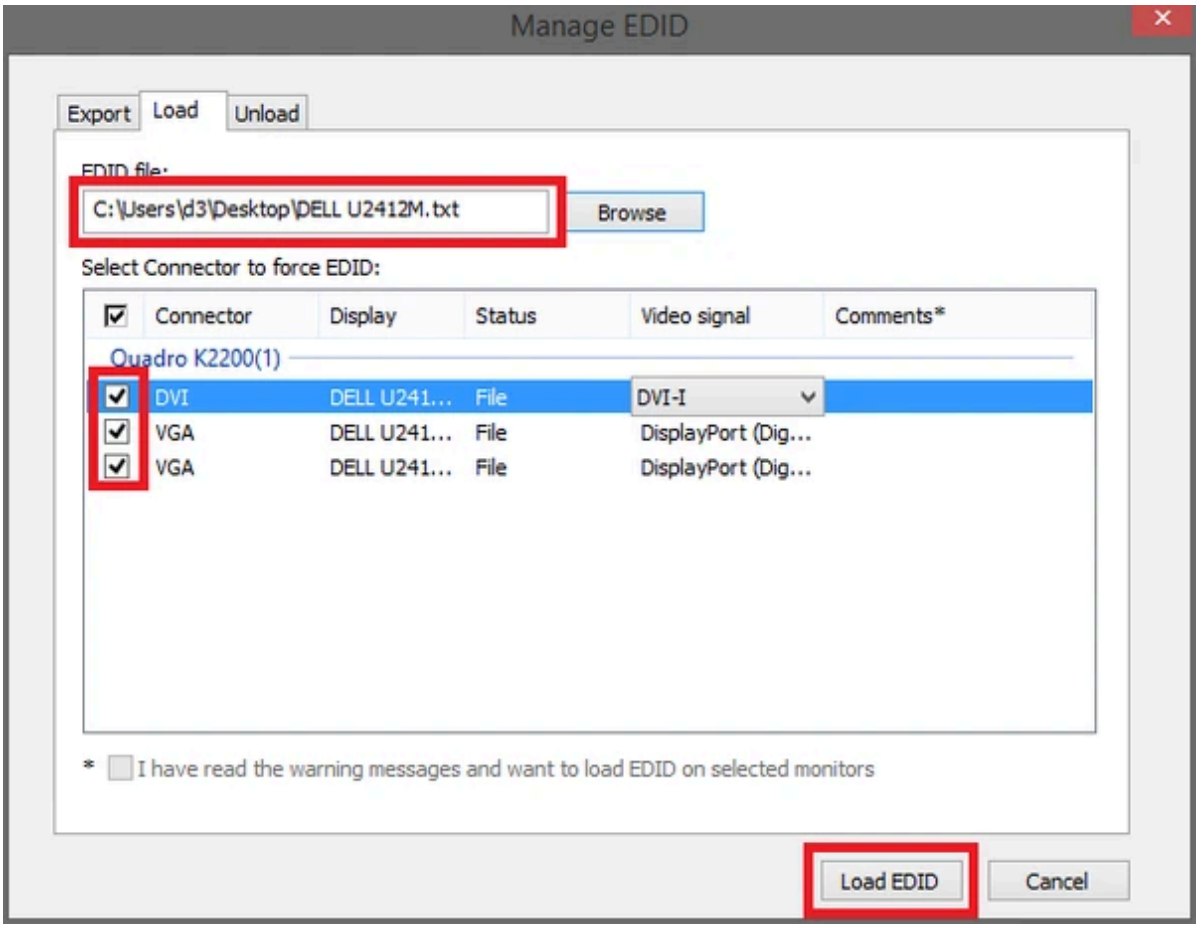


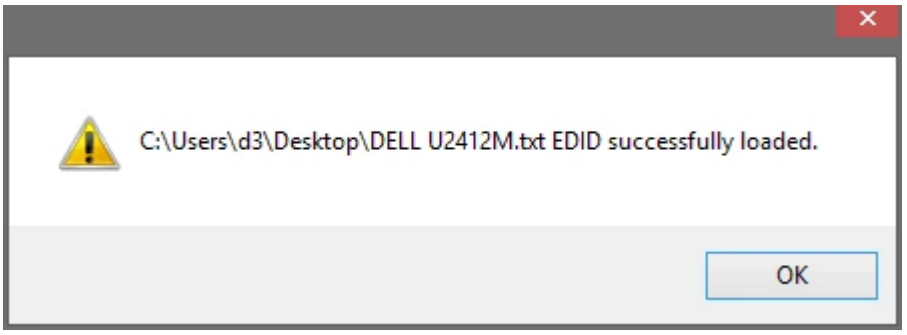
2. Click the EDID button next to a card connection (DVI or DisplayPort).



3. Navigate to the “Load” tab inside the Manage EDID window.

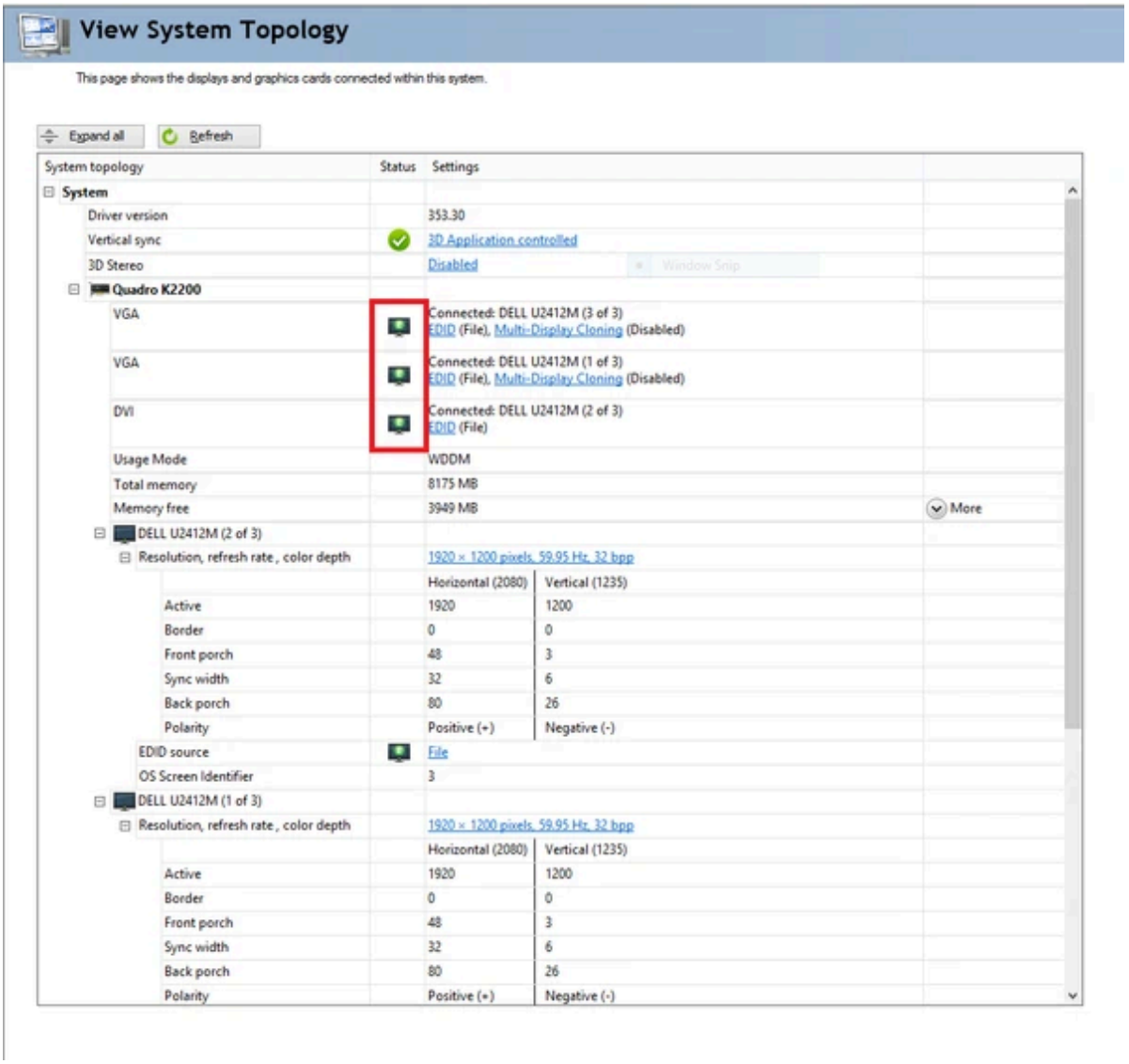
4. Browse to your preferred EDID and select which display connections you want to emulate the EDID on.





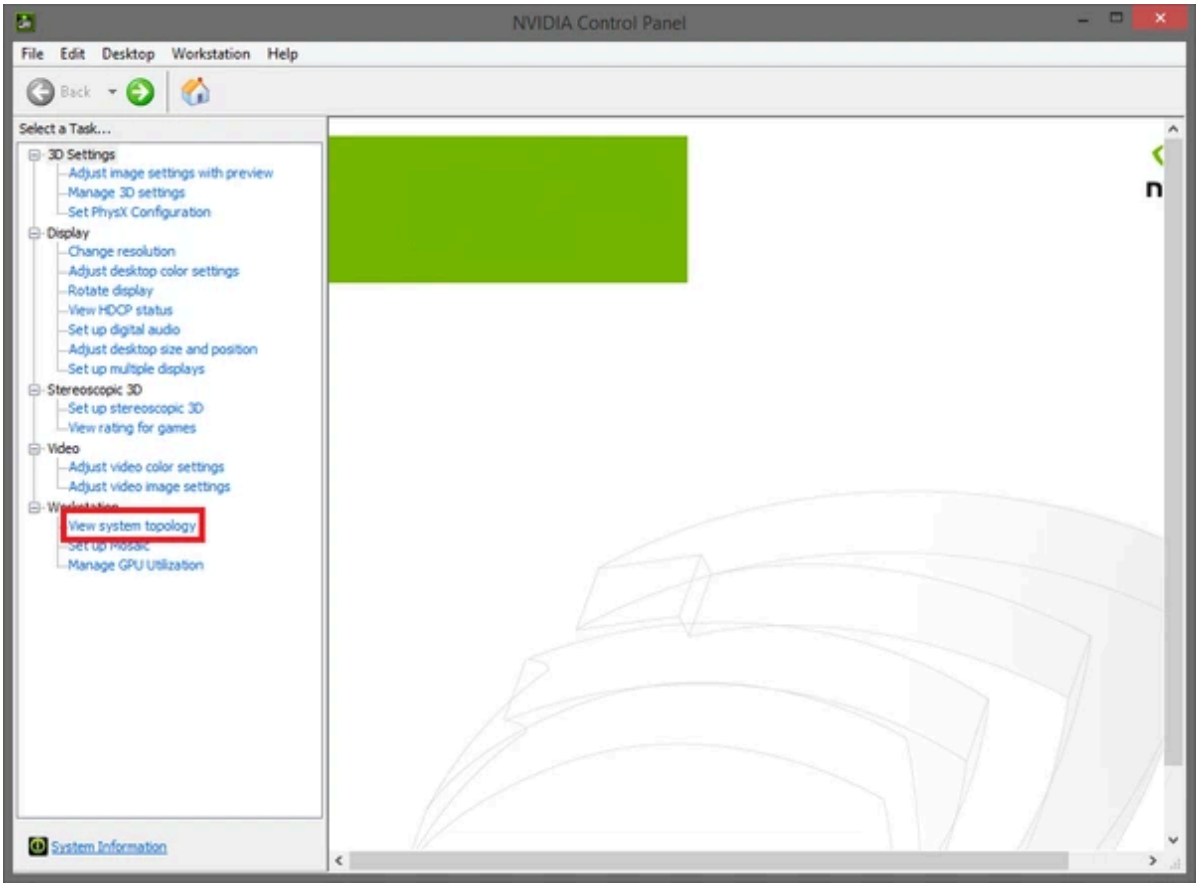
5. After the EDID is successfully applied, you will see this small icon, which indicates that the display connection has an emulated EDID associated with it:



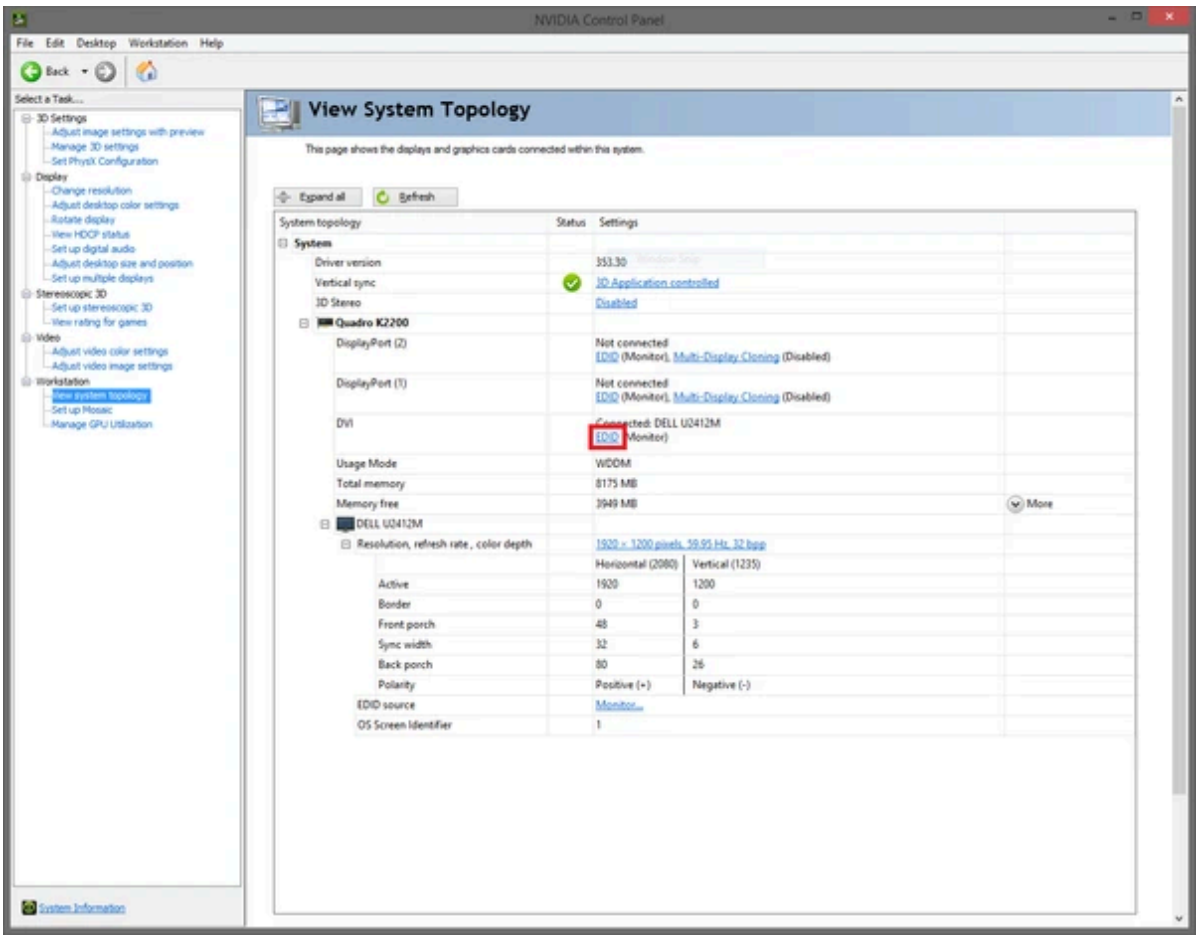


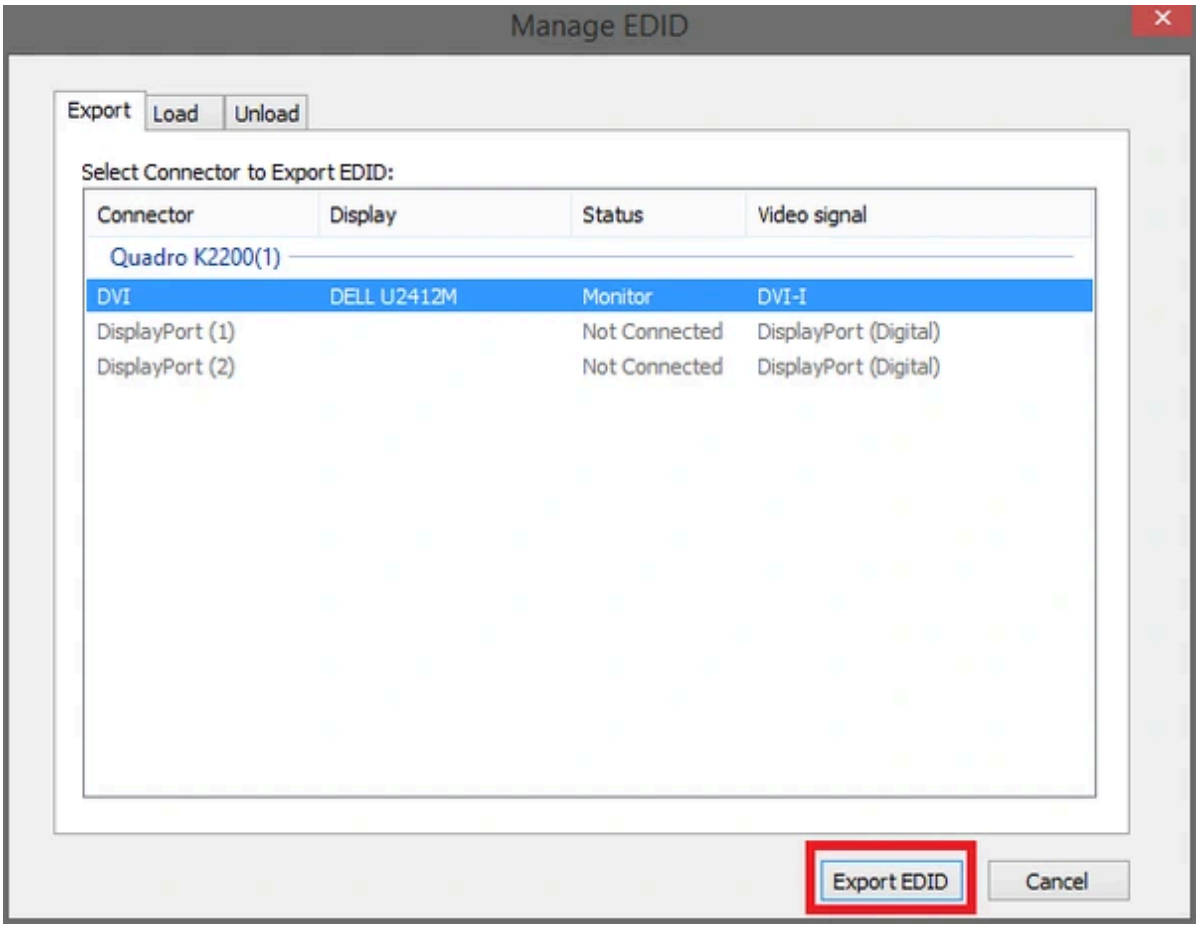
Exporting EDIDs

1. Navigate to the “View system topology” tab.

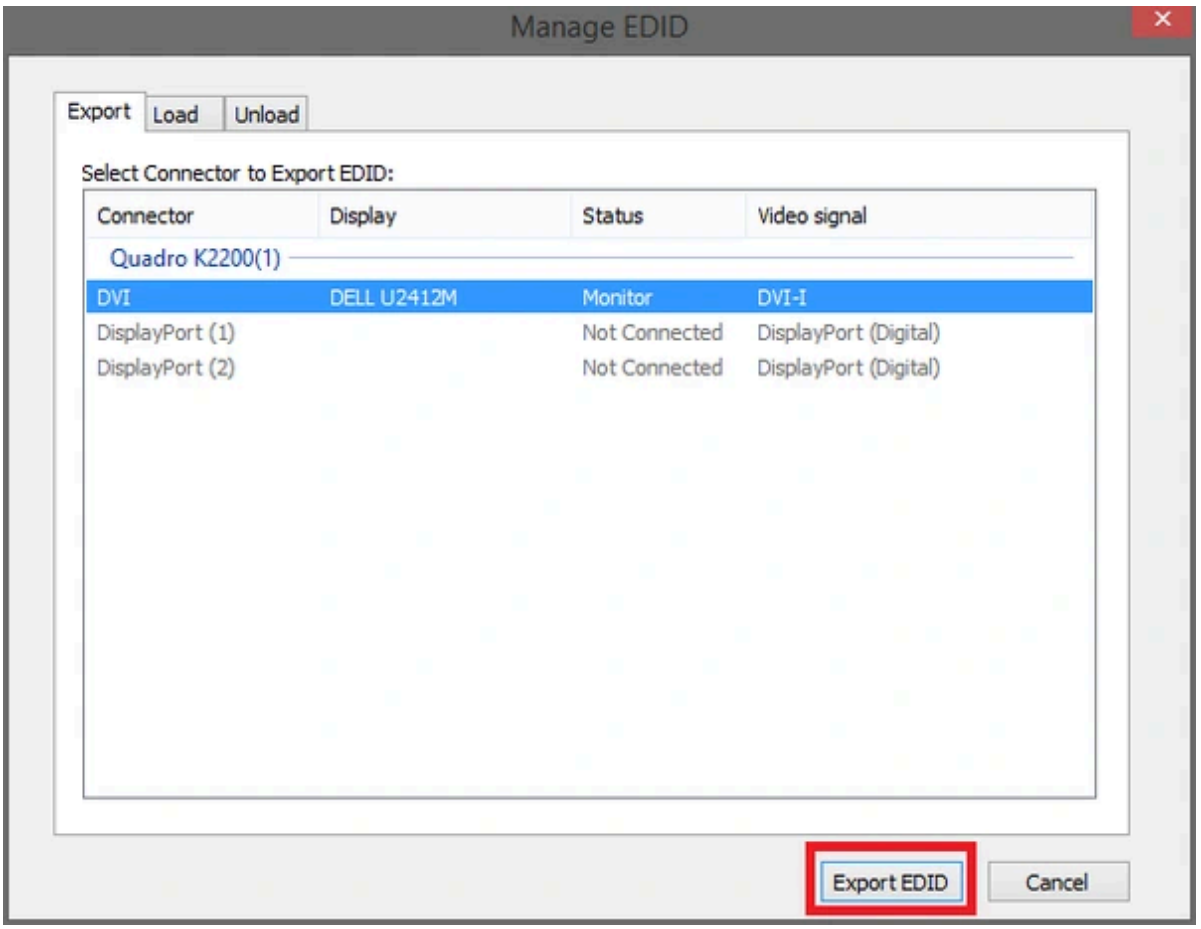


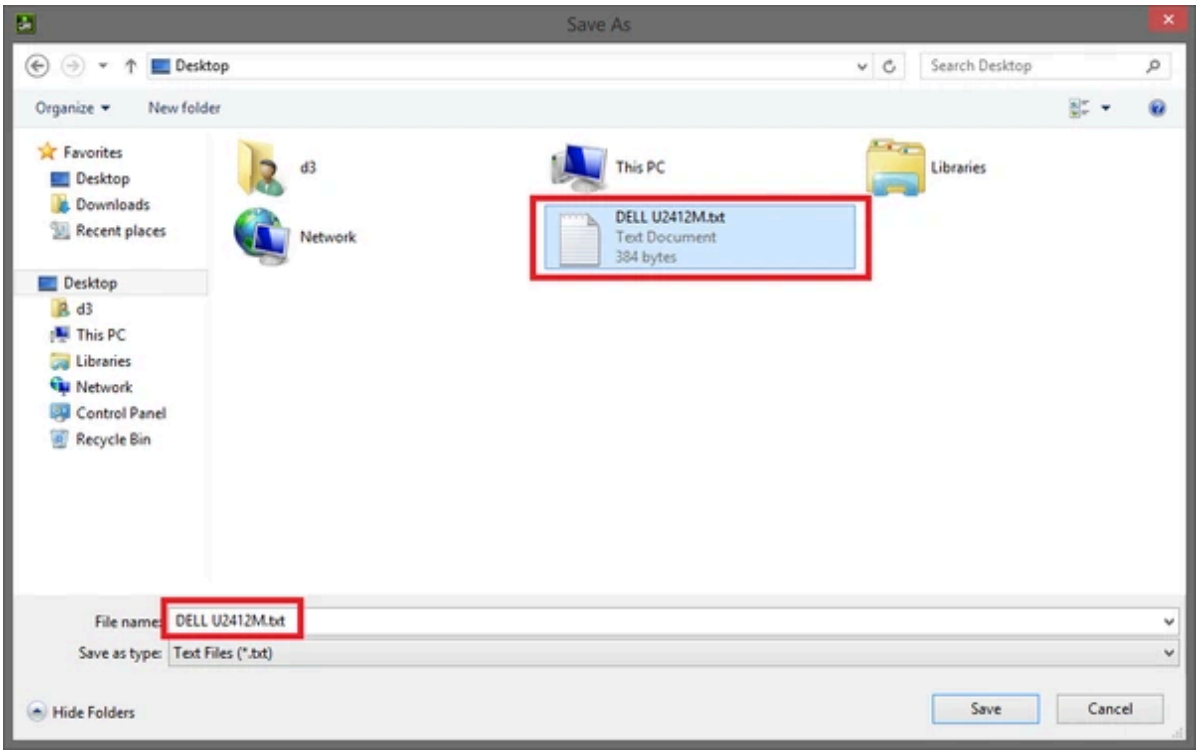
2. Click the EDID button next to a card connection (DVI or DisplayPort)




Manage EDID
Export
Load
Unload
Select Connector to Export EDID:
Connector
Display
Status
Video signal
Quadro K2200(1)
DVI
DELL U2412M
Monitor
DVI-I
DisplayPort (1)
Not Connected
DisplayPort (Digital)
DisplayPort (2)
Not Connected
DisplayPort (Digital)
Export EDID
Cancel

3. Export your preferred EDID to the desktop or documents folder





Resetting EDIDs

EDIDs on all outputs of all connected VFC cards can be reset to a neutral state easily using the keyboard shortcut FFS (Four Finger Salute) as follows:

- Hold CTRL + ALT + SHIFT + F12
- Disguise will display several status messages on the screen during the reset process; please wait until the reset process has completed before continuing.

> **Note**
>
> You can only genlock outputs that have identical EDID.

Powering the Unit

The VX and GX ranges of Disguise servers use Neutrik PowerCON TRUE1 as the power input.

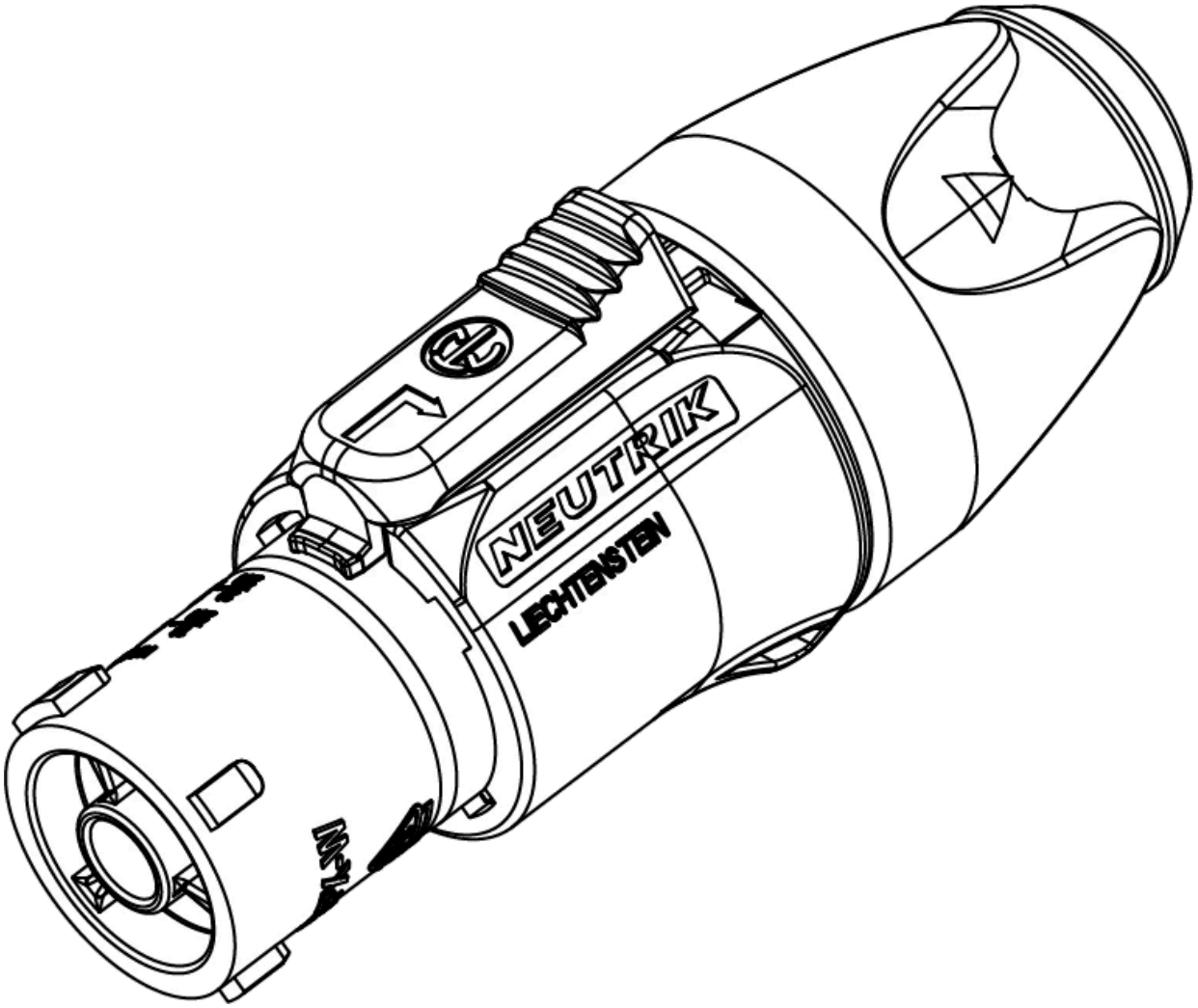
The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

Cabling

To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.



Neutrik powerCON TRUE1 connector

GX Range Overview



The Disguise GX range is designed to handle all the demands of playing back increasingly demanding generative video content at scale.

These are the current models in this range:

- GX 3+
- GX 3

These are the legacy models in the range:

- GX 1
- GX 2
- GX 2C

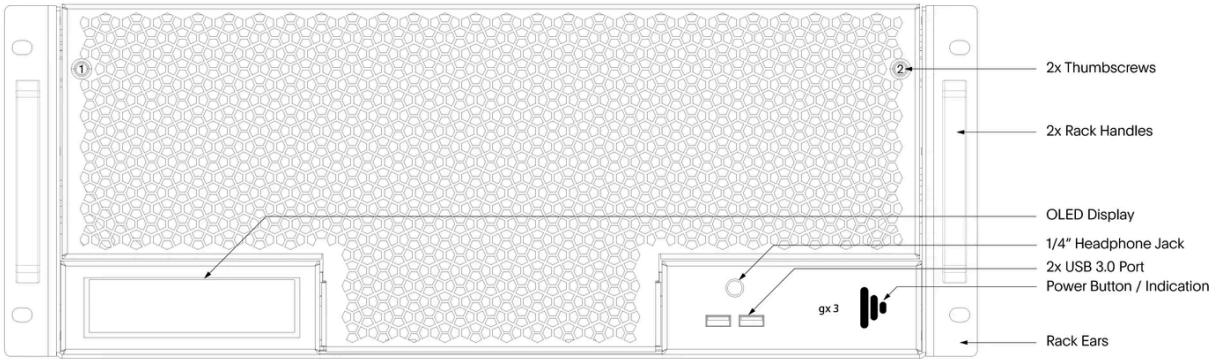
Technical specification comparison

Compare the technical specifications of the GX 3+ and GX 3 by referring to the table below:

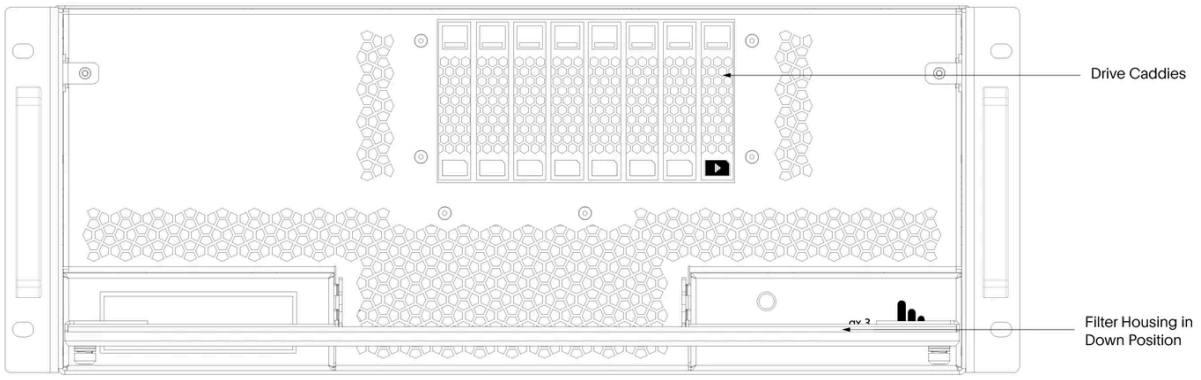
	GX 3+	GX 3
4K Inputs	3x 12G inputs or 12x 3G inputs (HD-BNC connectors)	3x 12G inputs or 12x 3G inputs (HD-BNC connectors)

	GX 3+	GX 3
4K Outputs	3x 4K outputs using VFC cards (with integrated EDID management)	3x 4K outputs using VFC cards (with integrated EDID management)
Network Ports	General Network: 4x 10GbE/sec (Ethernet) Media Network: Dual-port 100GbE (QSFP28)	General Network: 1x 1GbE/sec (Ethernet) 2x 10GbE Media Network: Dual-port 100GbE (QSFP28)
GPU	Nvidia RTX Pro 6000 Workstation Edition	NVIDIA RTX A6000
CPU	AMD EPYC 4.1Ghz	Intel Xeon 3.1Ghz
Motherboard	PCIe 5.0	PCIe 4.0
Storage	1x 3.84TB Removable NVMe SSD	1x 3.84TB Removable NVMe SSD
Notchmarks	143,699	53,045
Video playback 4K DCI at 30fps	Notch LC - 14 layers HAP - 41 layers ProRes 422 - 14 layers< br> roRes 4444 - 7 layers	Notch LC - 9 layers HAP - 24 layers ProRes 422 - 7 layers ProRes 4444 - 3 layers

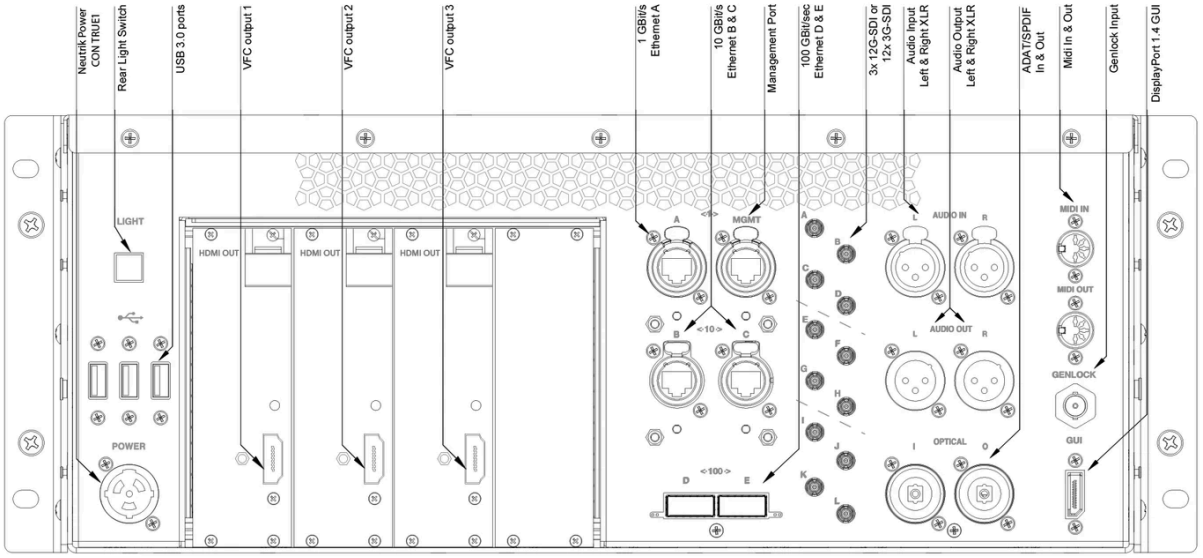
GX 3 Diagrams



Front view of GX 3



Front grill down view of GX 3



Rear view of GX 3

View the GX 3 Product page here and full GX 3 specification sheet here.

GX 3 Overview



The GX 3 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

Learn more about:

- Diagrams
- Performance
- Video Input
- Redisguise
- SMC Overview

View the full Product information in the **Technical Specifications** PDF.

GX 3 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

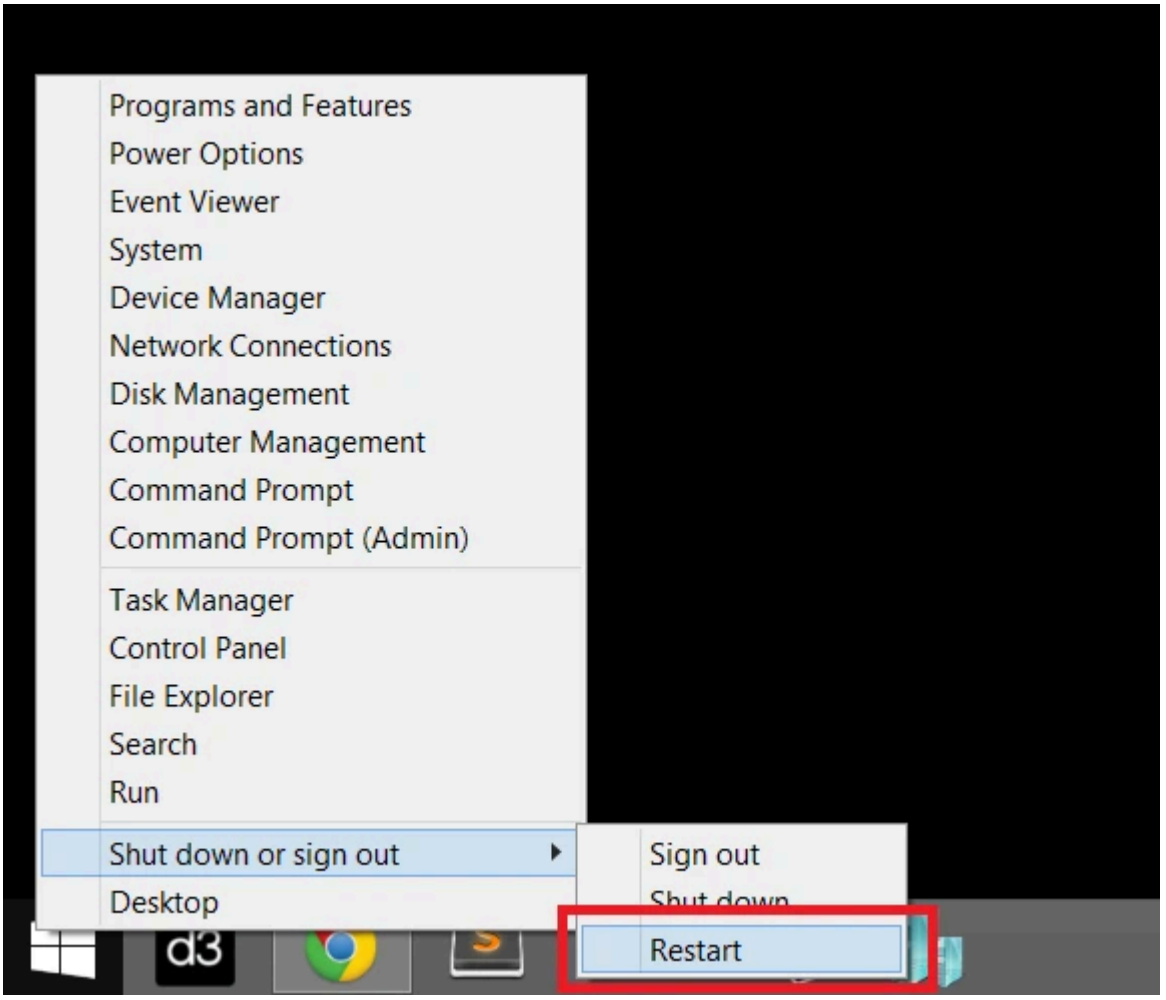
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

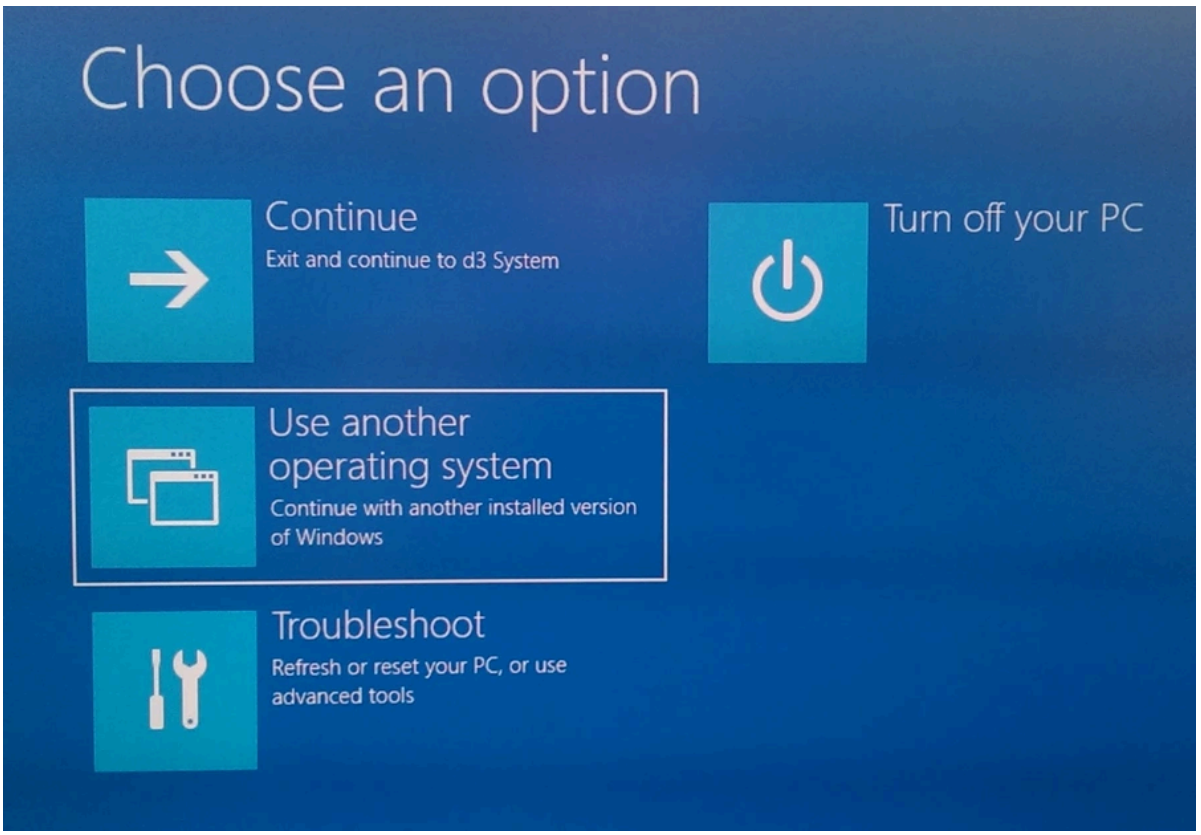
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

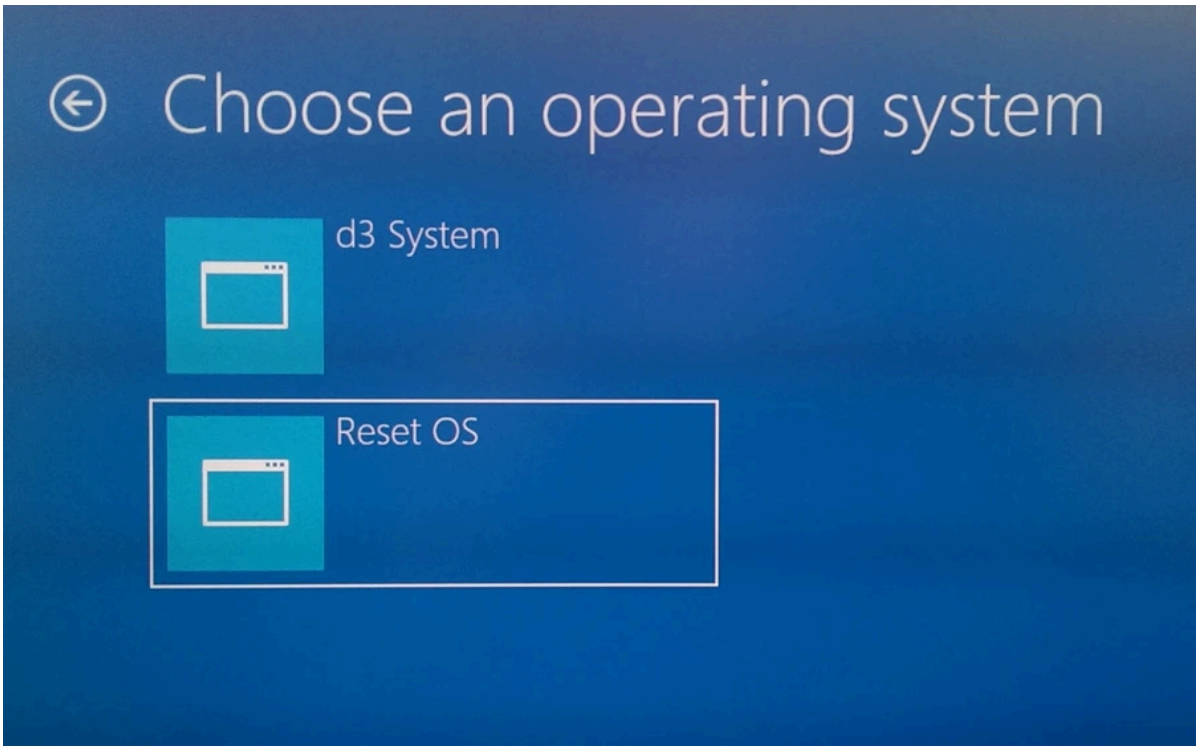




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

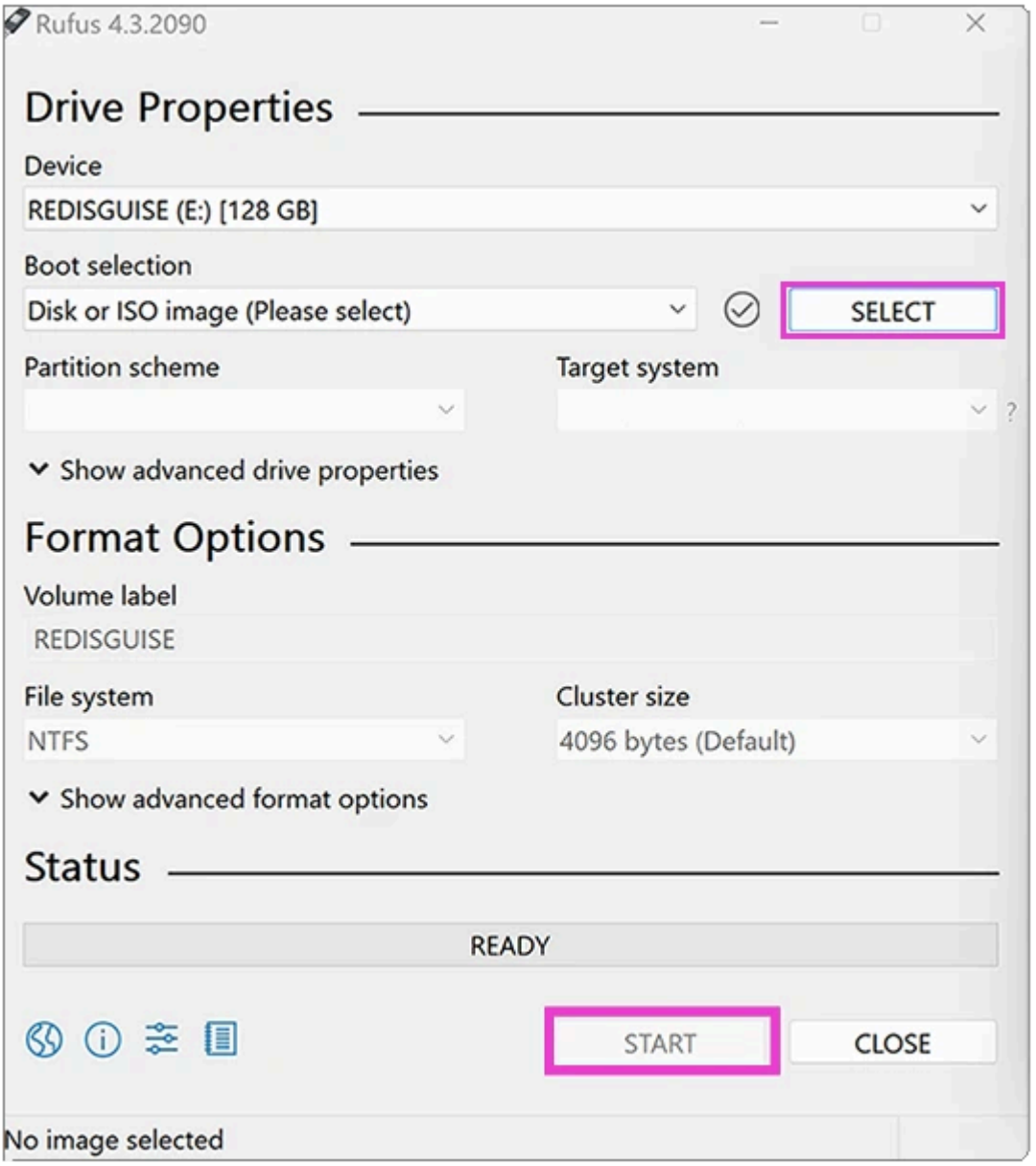
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

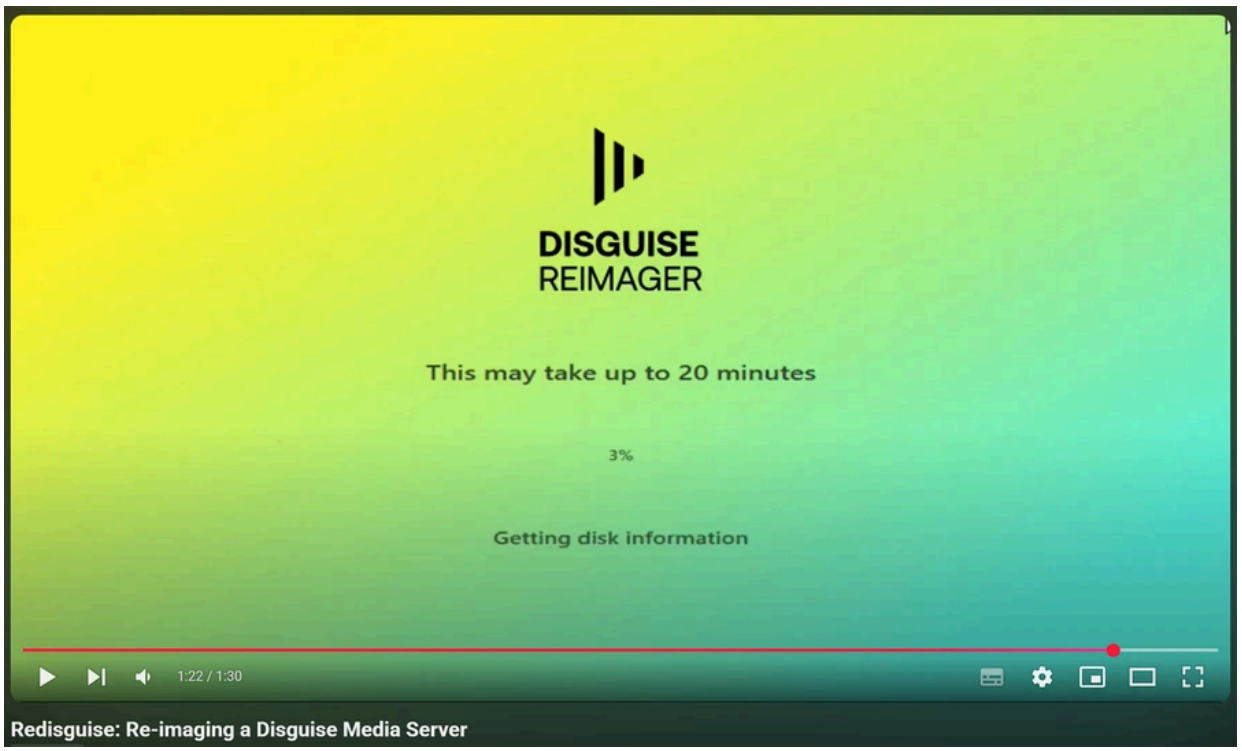
The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **Exit** tab, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

GX 3 Specification

Hardware Specifications

	GX 3
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	700W
Heat Dissipation Peak	2,388 BTU/hr
Max. Decibel Rating (if available)	56db
Operating System	Windows 11 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) / Humidity: 5%-95% (noncondensing) Altitude: 0-2700m (0-8850 ft)
Mounting System	4U 19" rack mount
OS	2x Internal Storage Drives
Storage	1x 3.84TB Removable NVMe SSD
Memory	96GB RAM (6x 16GB)

System Connectivity I/O

	GX 3
Video output	1x DisplayPort 1.4 3x 4K outputs using VFC cards (with integrated EDID management)
Video input	3x 12G inputs or 12x 3G inputs (HD-BNC connectors)
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio/Optical Audio/MIDI	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in
General Network	1x 1Gb/s 2x 10Gb/s (Ethernet)

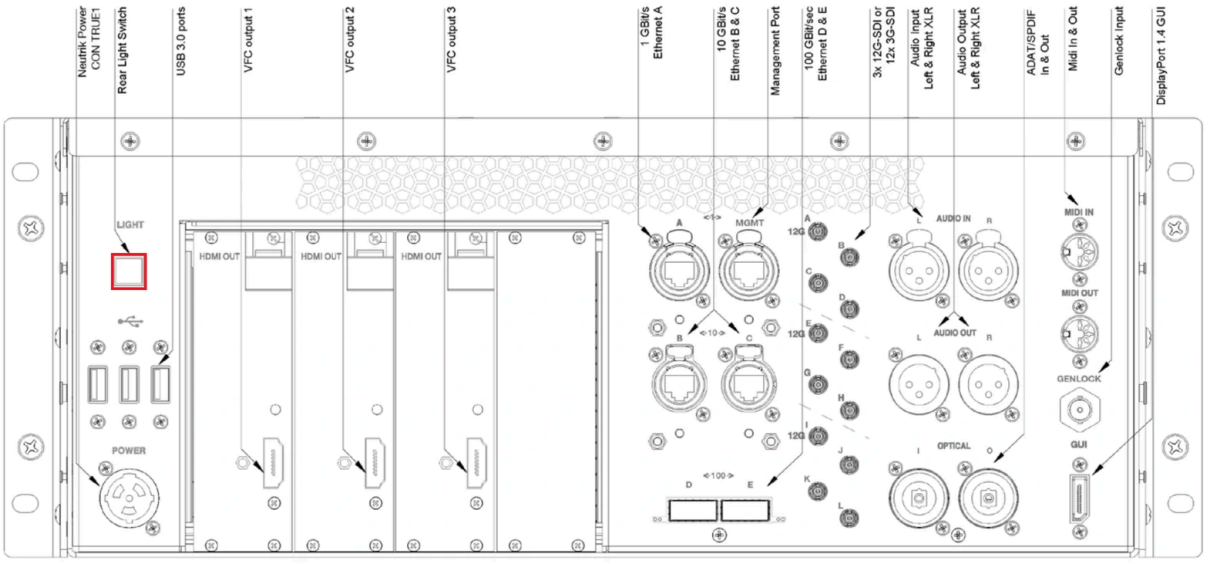
	GX 3
High Speed Network	2x 100Gb/sec (QSFP28)
System Management Controller	1x Management Port (Ethernet)
Data/Peripherals	5x USB 3.0
Video Sync	1x BNC Genlock

* For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

GX 3 Unit rear light

Disguise Servers in the pro and GX ranges come with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labeled “light” with power in.



Location of light switch on rear of a GX 3

GX 3 Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
GX 3	12	3

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 3x 2160p60 or 12x 1080p60.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes).
- Chroma subsampling - YCbCr 4:2:2 (all modes).
- Each SDI input supports 3G Level A and Level B when applicable.
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29. 7, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

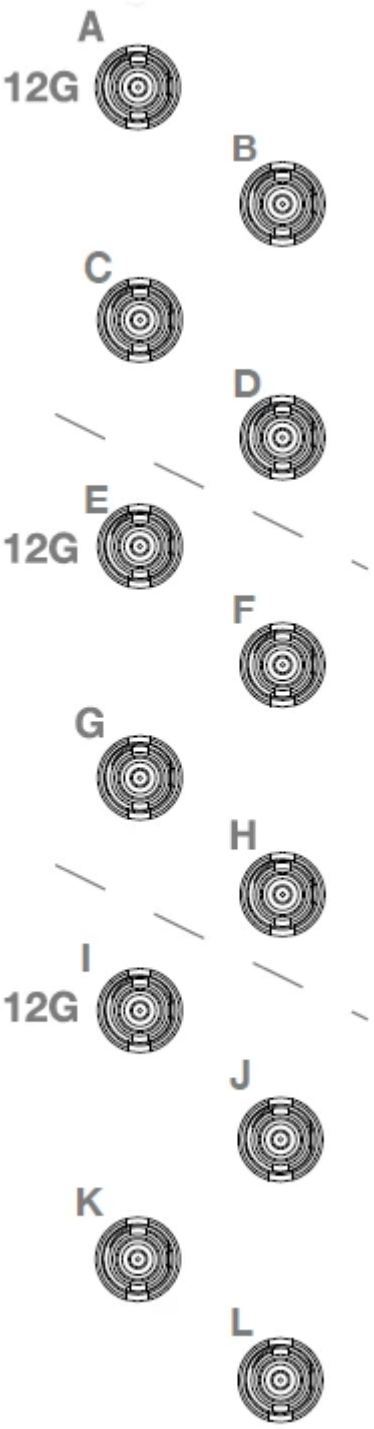
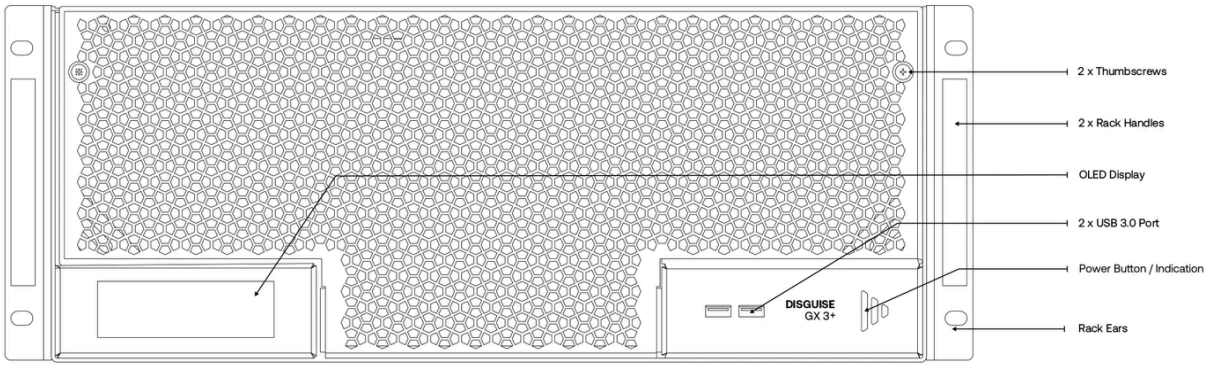


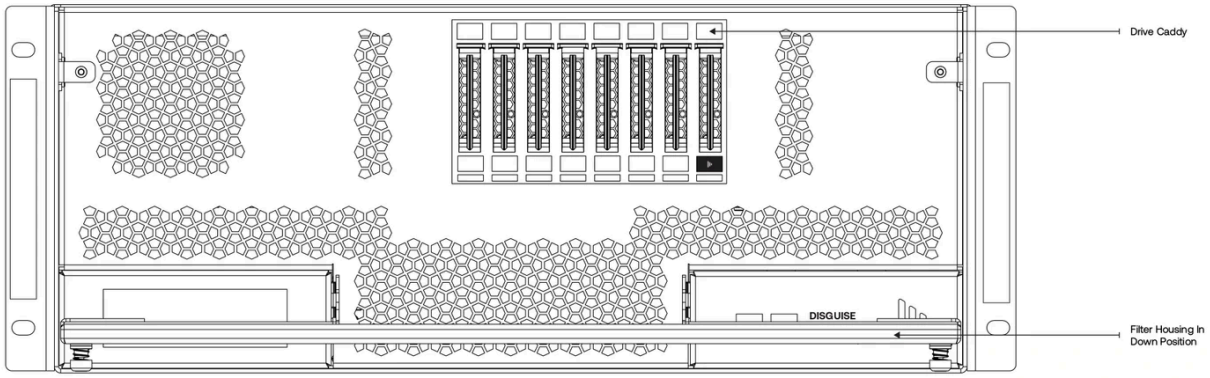
Diagram of Video Capture BNC connections on the rear of a the GX 3

> **Note**
>
> Live Video input inherently introduces frame latency during playback.

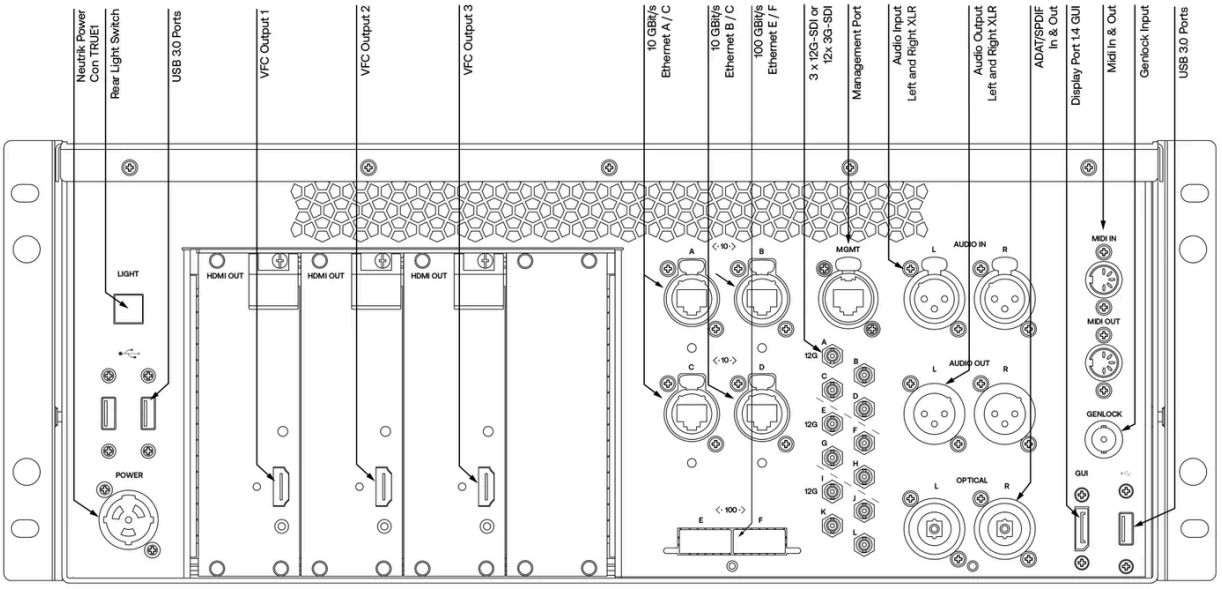
GX 3+ Diagrams



Front view of GX 3+



Front grill down view of GX 3+



Rear view of GX 3+

GX 3+ IP-VFC Support Guidelines

This page describes the IP-VFC support level when the card is installed in a GX 3+ media server. For general IP-VFC information, please see the IP-VFC overview.

Partial support for specific formats on the IP-VFC at launch

We are currently working on enabling the GX 3+ to have full support for the IP-VFC, however this will not be available for launch.

Initial format support for the IP-VFC when used with the GX 3+ can be seen in the table below:

Media Server	VFC Mode	Split Mode	Sync	Resolution	IP-VFC FW 24.4 (Current Gold)
GX 3+	ST 2110	Single + Quad	EXT	1080p to 2160p	Not supported
	ST 2110	Single + Quad	EXT	1080p to 2160p	Not supported
	SDI	Single	EXT	1080p to 2160p	Partially supported
	SDI	Quad	EXT	1080p	Not supported

Specific formats supported in SDI mode on the IP-VFC when used with the GX 3+ can be seen in the table below. These will be made available in Designer software version r32.1 onwards.

Frames per second (FPS)	4K DCI (4096 x 2160)	UHD (3840 x 2160)	2K DCI (2048 x 1080)	Full HD (1920 x 1080)
23.98p	✓	✓	✗	✗
24p	✓	✓	✗	✓
25p	✓	✓	✗	✓
29.97p	✗	✓	✗	✗
30p	✓	✓	✗	✓
50p	✓	✓	✗	✓
59.94p	✓	✓	✓	✗

Frames per second (FPS)	4K DCI (4096 x 2160)	UHD (3840 x 2160)	2K DCI (2048 x 1080)	Full HD (1920 x 1080)
60p	✔	✔	✘	✘

Support for all other formats in both SDI and ST 2110 modes will be made available in a future firmware update for the IP-VFC. We are working towards having a resolution within Q1 2026.

GX 3+ Overview



The GX 3+ is the next-generation GX range media server. Built on Nvidia's groundbreaking Blackwell GPU architecture and including a two-year Notch playback license, the GX 3+ unlocks the full capabilities of Notch 1.0 for generative content playback - enabling video designers to create richer, more sophisticated and responsive event visuals that bring their vision to life without compromise.

Learn more about:

- Diagrams
- Performance
- Video Input
- Redisguise
- Specifications

View the full Product information in the Technical Specifications PDF.

GX 3+ Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

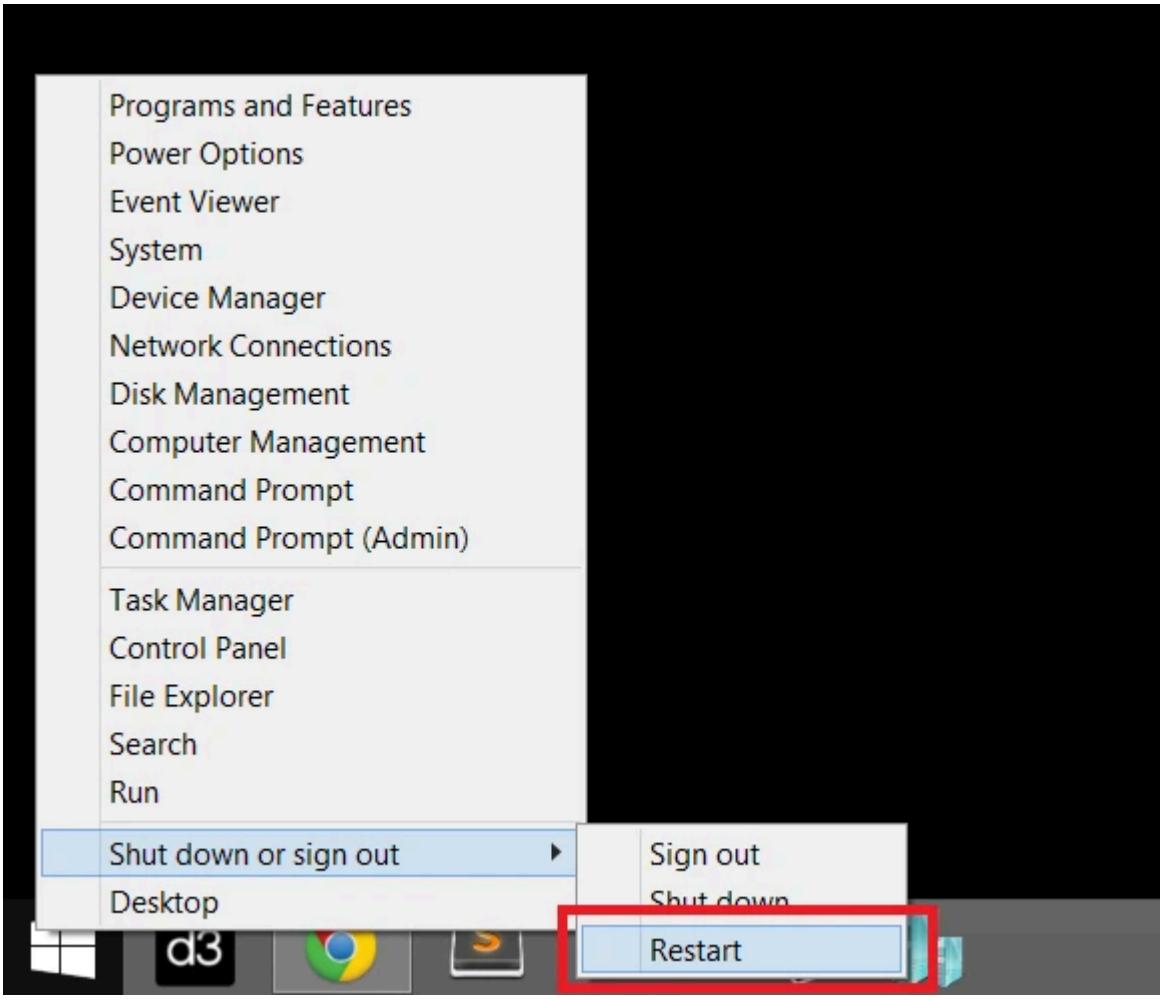
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

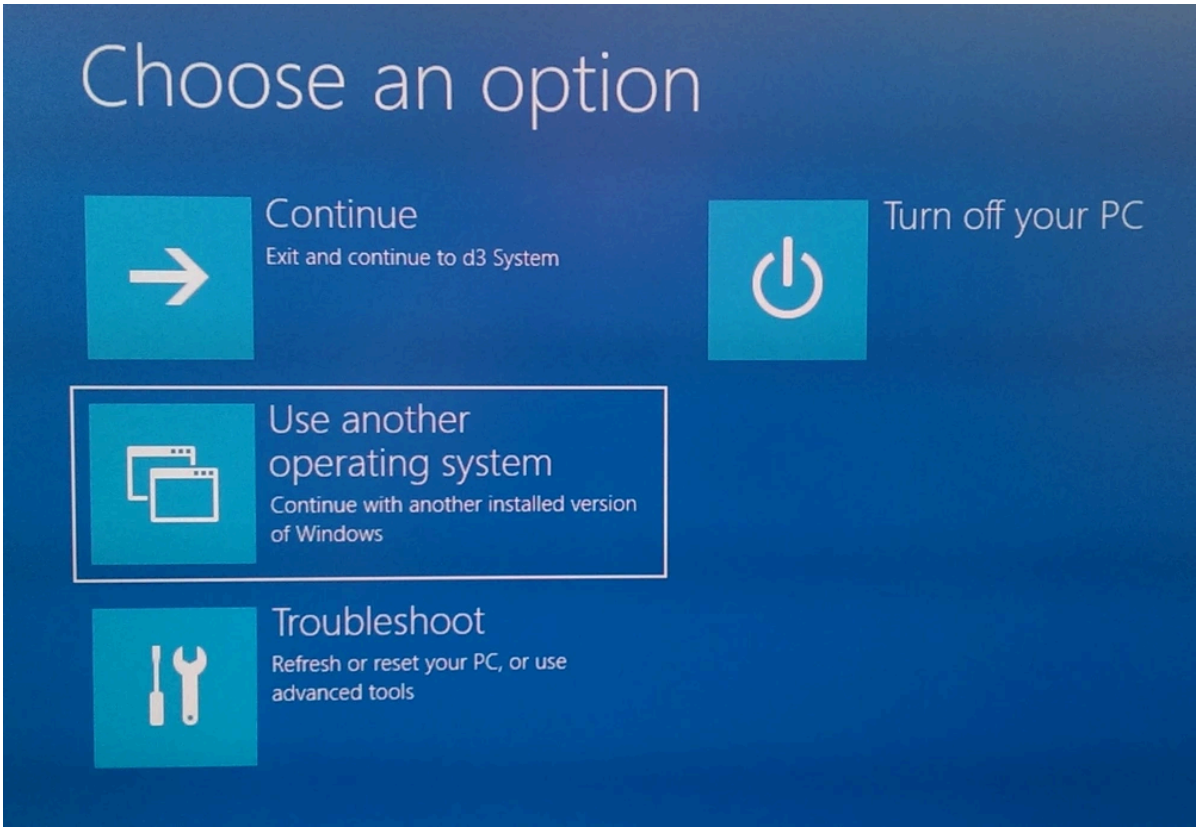
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

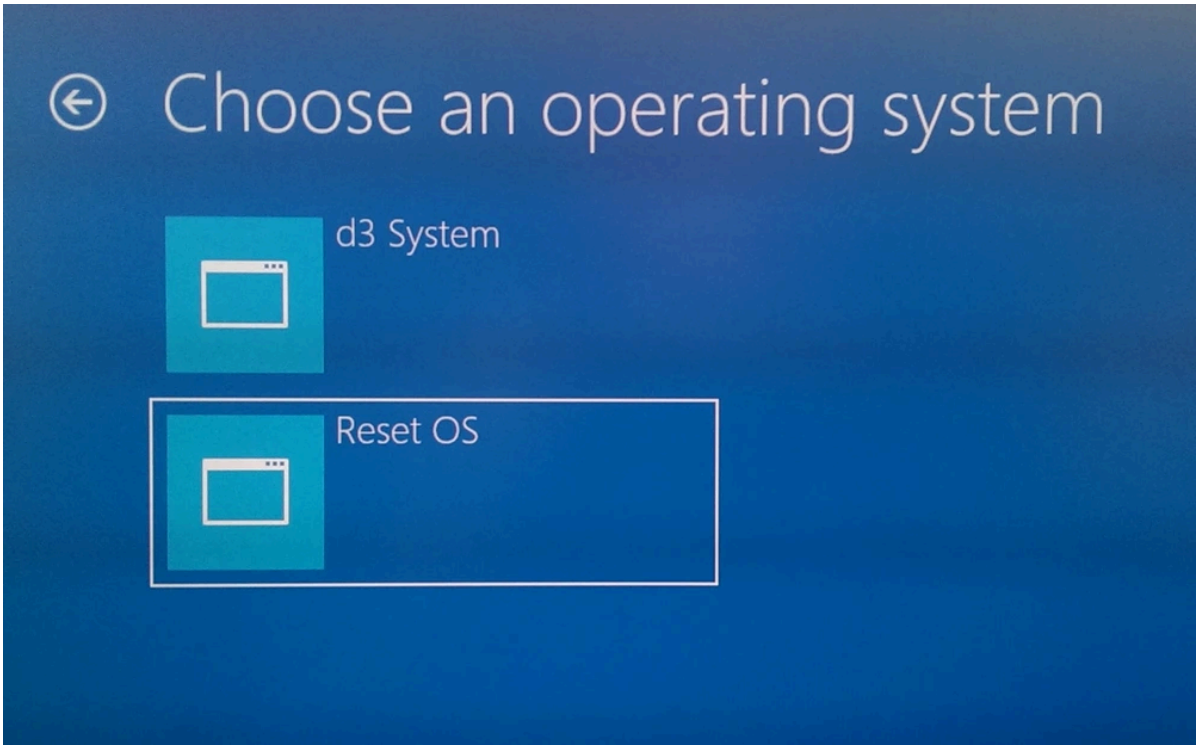




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

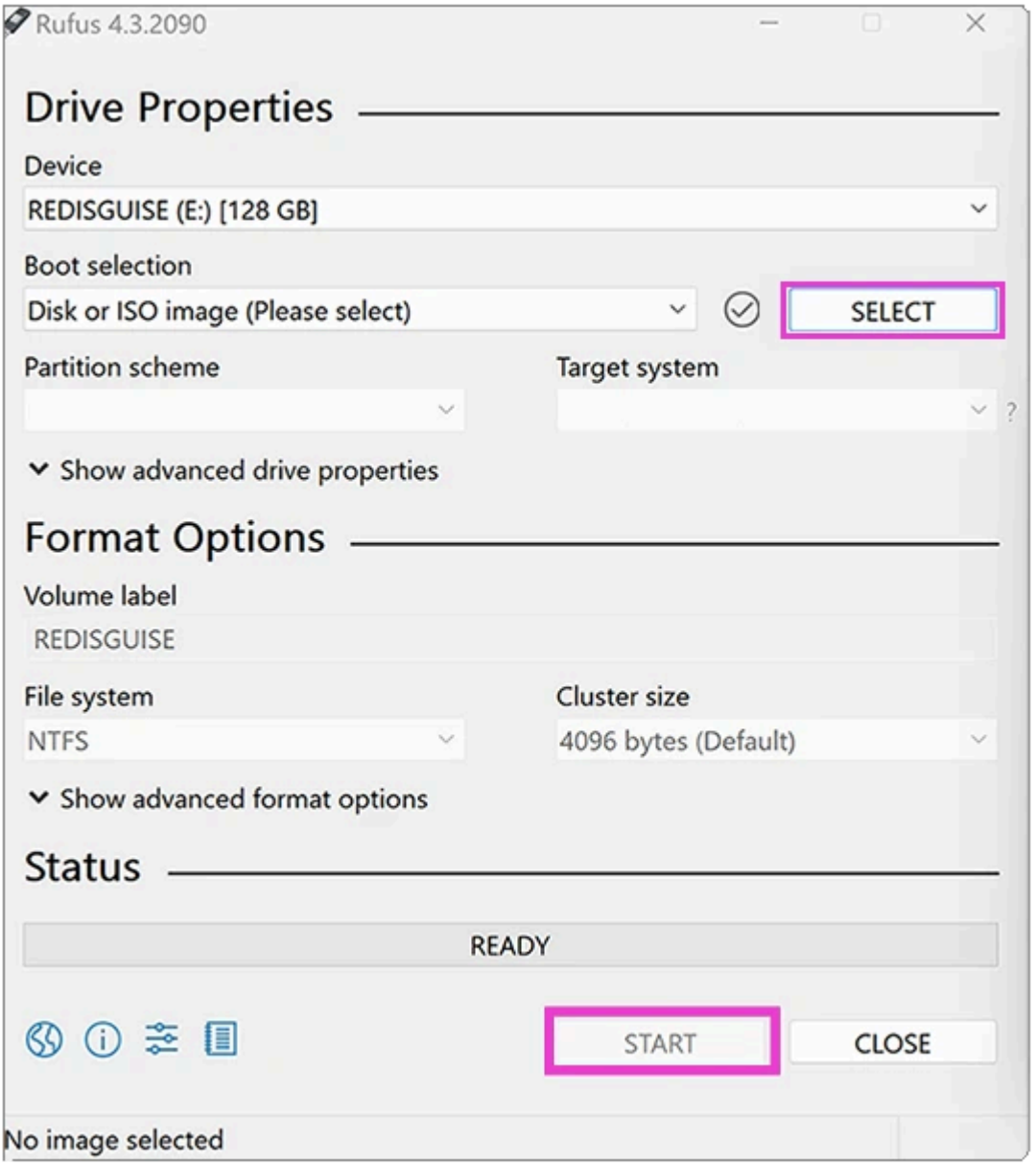
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk.
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

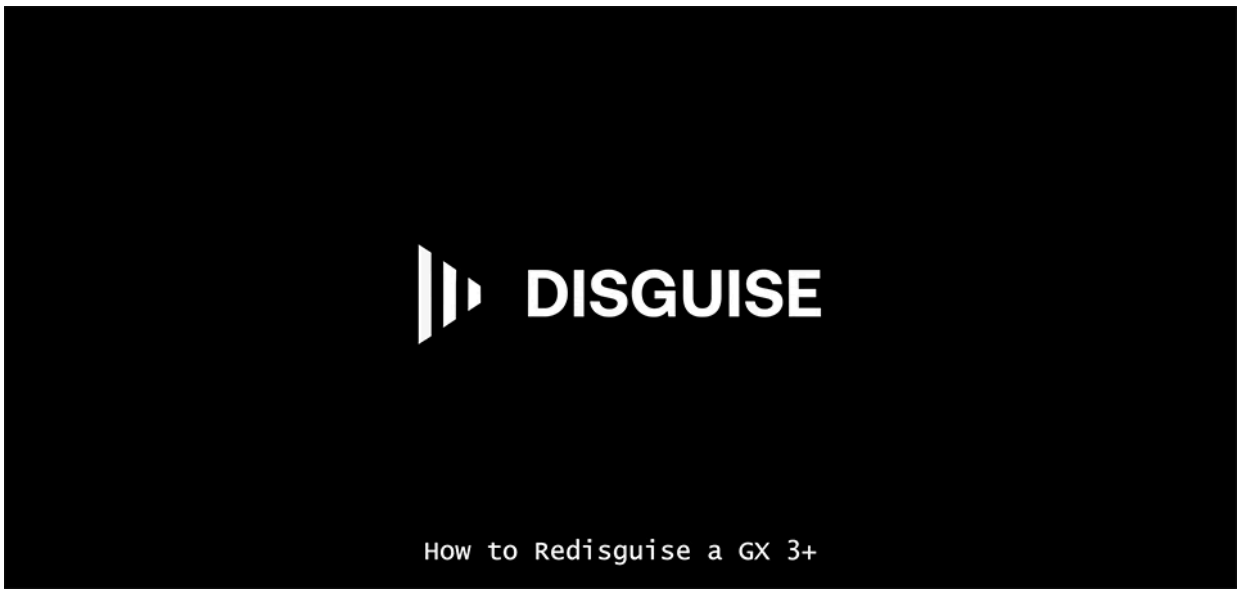
The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - "REDISGUISE" Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the Save and Exit tab, select the following option and press ENTER: UEFI: [diskname], Partition 2

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

GX 3+ Specification

Hardware Specifications

	GX 3+
Voltage	100-127V, 50-60Hz* 200-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	1089W
Heat Dissipation Peak	3,717 BTU/hr
Max. Decibel Rating	68dB
Operating System	Windows 11 Enterprise GAC
Environmental Tolerances	Temperature: 5-25°C (40°-77°F) / Humidity: 5%-95% (noncondensing) Altitude: 0-2700m (0-8850 ft)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	1x 3.84TB Removable NVMe SSD
Memory	192GB RAM (6x 32GB)

System Connectivity I/O

	GX 3+
Video output	3x 4K outputs using VFC cards (with integrated EDID management) 1x DisplayPort 1.4 (GUI port)
Video input	3x 12G inputs or 12x 3G inputs (HD-BNC connectors)
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio/Optical Audio/MIDI	Balanced XLR (circular 3-pin connector) - 2x in, 2x out
General Network	4x 10Gb/s (Ethernet)
High Speed Network	2x 100Gb/sec (QSFP28)

	GX 3+
System Management Controller	1x Management Port (Ethernet)
Data/Peripherals	5x USB 3.0 (3x rear, 2x front)
Video Sync	1x BNC Genlock

* For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

GX 3+ Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
GX 3+	12	3

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 3x 2160p60 or 12x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes)
- Chroma subsampling - YCbCr 4:2:2 (all modes)
- Each SDI input supports 3G Level A and Level B when applicable
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

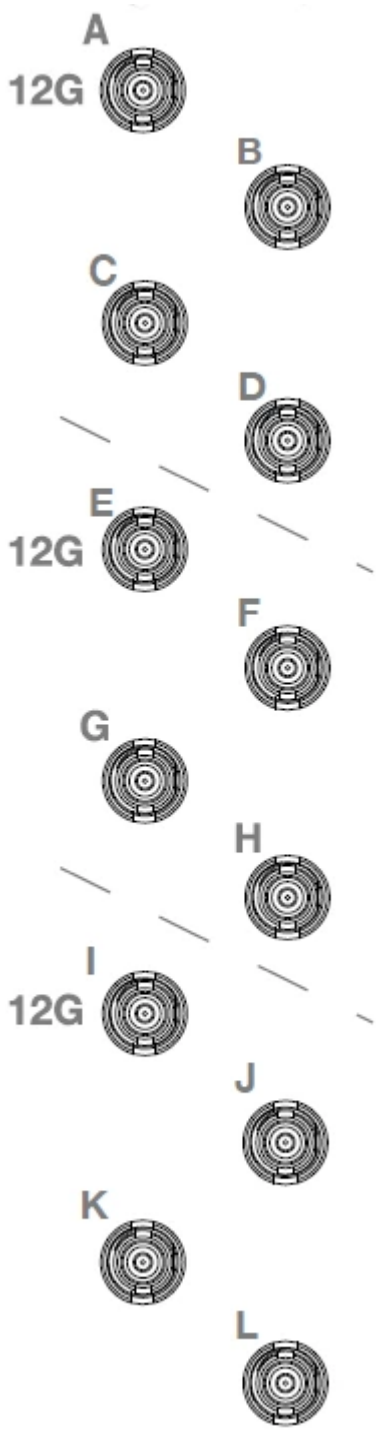


Diagram of Video Capture BNC connections on the rear of the unit

Hardware Guides

This section contains direct links to the latest Disguise Hardware Guides.

Each guide includes information on installation, connectivity, troubleshooting, and technical specifications.

EX Range Hardware Guides

EX 2 Hardware Guide | Disguise_EX2_Hardware_Guide_A2_1_2024_06_26.pdf

EX 2C Hardware Guide | Disguise_EX2C_Hardware_Guide_A2_1_2024_06_26.pdf

EX 3+ Hardware Guide | Disguise_EX3p_Hardware_Guide_A2_1_2024_05_30.pdf

GX Range Hardware Guides

GX 3+ Hardware Guide | Disguise_GX3p_Hardware_Guide_A2_2025_10_02.pdf

GX 3 Hardware Guide | Disguise_GX3_Hardware_Guide_B2_2024_11_10.pdf

PX Range Hardware Guides

PX & PX+ Hardware Guide | Disguise_PX_Range_Hardware_Guide_v1_2022_12_08.pdf

RX Range Hardware Guides

RX III Hardware Guide | Disguise_RXIII_Hardware_Guide_A2_1_2024_05_30.pdf

VX Range Hardware Guides

VX 2+ Hardware Guide | Disguise_VX2p_Hardware_Guide_B1_2024_03_05.pdf

VX 3 Hardware Guide | Disguise_VX3_Hardware_Guide_A2_2024_10_09.pdf

VX 4+ Hardware Guide | Disguise_VX4p_Hardware_Guide_B1_2024_03_05.pdf

Hardware OS Images

Getting OS Images

> **Tip**
>
> If your Disguise media server or node(s) does not have access to the internet, you can download these images to a laptop or USB in advance and burn them to your USB Drive.

> **Note**
>
> **USB Redisguise Instructions**
>
> For instructions on how to perform a USB Reimage on your Disguise media server, download the relevant file from the list below (this will be an **.ISO file**). Then, find the instructions for your model of server in the Navigation Menu as follows:
>
> - Select Hardware
> - Select your Product Range
> - Select your Server Model
> - Select 'Redisguise'

GX 3+ OS

Instructions for **How to Redisguise** a GX 3+

26Q1 | **Download your USB Redisguise file**

> **OS Image name in d3Manager:** `26Q1.c39055a1`
>
> **Compatible d3 Versions:** r32.0 and above
>
> **Applicable Models:** GX 3+
>
> **Windows Version:** Win 11 GAC 23H2

Revision History

- **Original Release:** `26Q1.c39055a1` on **10/Feb/2026**

Release Notes

Disguise OS image version GX3P_26Q1 is specific to the GX 3+ and is to be used with Designer version r32.0 and above.

- Deltacast has been updated to version 6.33.2 which resolves an issue that can intermittently cause the Deltacast card to disappear.
- The Intel Network Adapter Driver version has been updated to 30.6 to improve connection speed and stability on ports A, B, C and D.

Package	Version
GPU: NVIDIA	[573.42]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.33.2]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Blackwell)	[0.7.6]
NVIDIA AR SDK (Blackwell)	[0.8.7]

25Q3 | Download your USB Redisguise file

OS Image name in d3Manager: `25Q3.f0885a6e`

Compatible d3 Versions: r32.0 and above

Applicable Models: GX 3+

Windows Version: Win 11 GAC 23H2

Revision History

- **Original Release:** `25Q3.6ac03459` on **06/Oct/2025**

- **Re-Released as:** `25Q3.f0885a6e` on **27/Jan/2026** to resolve an issue with Rivermax not being detected in d3.

Release Notes

Disguise OS image version GX3P_25Q3 is the launch OS and specific to the GX 3+. Initial Designer support was introduced for the GX 3+ in r32.0 and above.

Package	Version
GPU: NVIDIA	[573.42.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.31.1]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Blackwell)	[0.7.6]
NVIDIA AR SDK (Blackwell)	[0.8.7]

EX 2 / EX 2C / EX 3+ OS

Instructions for **How to Redisguise** an EX 2 / EX 2C / EX 3+

25Q3 | **Download your USB Redisguise file**

OS Image name in d3Manager: `25Q3.c1edd10c`

Compatible d3 Versions: r32.2 and above

Applicable Models: EX 2 / EX 2C / EX 3+

Windows Version: Win 11 GAC 23H2

Revision History

- **Original Release:** `25Q3.30647cf3` on **15/Oct/2025**
- **Re-Released as:** `25Q3.c1edd10c` on **12/Nov/2025** to upgrade the sync card firmware from 2.02 to 2.22.

Release Notes

Disguise OS image version EX2C_EX2_EX3P_25Q3 is specific to the EX 2, EX 2C and EX 3+.

This OS upgrades the Deltacast Driver and Firmware versions to 6.31.1 to support video capture via the HDMI 2.0 input on EX 2C and EX 3+.

To support video capture functionality via the HDMI 2.0 input on the **EX 2C** and **EX 3+**, 25Q3 must be used with r32.2+. For more information about compatibility, please see **product compatibility** pages.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.31.1]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (ADA)	[0.7.2]
NVIDIA AR SDK (ADA)	[0.8.2]

24Q2 | **Download your USB Redisguise file**

Compatible Designer Versions: r28.0+

Release Date: 10/Jun/2024

Latest Re-Release: 16/Jun/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: EX 2 / EX 2C / EX 3+

Windows Version: Win 11 GAC 23H2

Release Notes

- Disguise OS image version EX2C_EX2_EX3P_24Q2 is the launch OS and specific to the EX 2, EX 2C and EX 3+.
- This is the Initial Release OS for the EX2, EX2C & EX3P Models.

- Hardware support for this machine has been enabled from Designer software version r27.5.1 and above.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (ADA)	[0.7.2]
NVIDIA AR SDK (ADA)	[0.8.2]

RX III OS

Instructions for **How to Redisguise** an RX III

26Q1 | **Download your USB Redisguise file**

OS Image name in d3Manager: `26Q1.79dc6ea0`

Compatible d3 Versions: r32.0 and above

Applicable Models: RX-III

Windows Version: Win 11 GAC 23H2

Revision History

- **Original Release:** `26Q1.79dc6ea0` on **24/Jun/2026**

Release Notes

Disguise OS image version RXIII_26Q1 is specific to the RX-III.

- The NVIDIA Driver has been upgraded to version 582.16 to add support for upcoming RenderStream plugins.

- The Intel Network Adapter Drivers have been upgraded to version 30.6 to improve connection speed on ports A and B.
- .NET 3.5 is now installed as standard to improve compatibility with Unreal Engine.

Package	Version
GPU: NVIDIA	[582.16]
Network: Mellanox	[2.90.25506]
NVIDIA Video Effects SDK (ADA)	[0.7.2]
NVIDIA AR SDK (ADA)	[0.8.2]

24Q2 | Download your USB Redisguise file

Compatible Designer Versions: r28.0+

Release Date: 10/Jun/2024

Latest Re-Release: 16/Jun/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: RX III

Windows Version: Win 11 GAC 23H2

Release Notes

- Disguise OS image version RXIII_24Q2 is the launch OS and is specific to the RX III.
- Hardware support for this machine has been enabled from Designer software version r27.5.1 and above.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
NVIDIA Video Effects SDK (ADA)	[0.7.2]
NVIDIA AR SDK (ADA)	[0.8.2]

GX 3 OS

Instructions for How to Redisguise a GX 3

25Q2 | Download your USB Redisguise file

OS Image name in d3Manager: `25Q2.19f7e35d`

Compatible d3 Versions: r28.0 and above

Applicable Models: GX 3

Windows Version: Win 11 GAC 23H2

Revision History

- **Original Release:** `25Q2.b2c88157` on **22/Jul/2025**
- **Re-Released as:** `25Q2.19f7e35d` on **11/Dec/2025** to add better error handling in the case of a failed reimage..

Release Notes

This OS Image is specifically designed for the GX 3 media server. The following changes have been implemented in this release:

- Mitigation for TA-34: Resolved an issue that could cause sporadic system hangs during boot-up.
- Improved Boot Speed: Optimised the boot process to reduce the time taken to load into Windows.

Note: In order to see the faster reboot times the server must undergo a full power cycle so will need to be shut down completely and disconnected from power. This step is crucial to see the improved boot speed to take effect.

Package	Version
GPU: NVIDIA	[551.52.0]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]

Package	Version
NVIDIA AR SDK (Ampere)	[0.8.2]

25Q1 | Download your USB Redisguise file

Compatible Designer Versions: r28.0+

Release Date: 18/Feb/2025

Latest Re-Release: 14/Jul/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: gx 3

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version GX3_25Q1 is a quality of life OS update which provides mitigations for TA-60. Additionally, this release incorporates user-requested quality-of-life improvements such as new software and additional Windows features, ensuring a more seamless and efficient user experience.

Package	Version
GPU: NVIDIA	[551.52.0]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

24Q2 | Download your USB Redisguise file

Compatible Designer Versions: r28.0+

Release Date: 05/Sep/2024

Latest Re-Release: 15/May/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: gx 3

Windows Version: Win 11 GAC 23H2

Release Notes

This OS includes an update to the Windows Version (Windows 11 23H2); with the following additions:

- Nvidia graphics driver (551.52)
- Nvidia AR SDK (0.8.2)
- Nvidia Video Effects SDK (0.7.2)
- Which collectively provide mitigations to these 2 technical Advisories (TA-49 and TA-57):

https://support.disguise.one/s/article/Use-of-Nvidia-Virtual-Background-in-a-Notch-block-can-cause-a-crash-to-desktop-CTD-on-specific-Disguise-media-servers

https://support.disguise.one/s/article/TA-57-Face-Tracker-node-in-a-Notch-block-can-cause-spontaneous-CTD

This OS is designed for d3 Designer Software Version r28.0 onwards

Package	Version
GPU: NVIDIA	[551.52.0]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

201F | Download your USB Redisguise file

Compatible Designer Versions: Up to r26.5.2

Release Date: 31/Jan/2024

Applicable Models: gx 3

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image version gx3_24Q1 is specific to the GX 3 media server. This OS includes an update to the Matrox SDK (10.4.101) and provides the following improvements to Disguise media servers with a Matrox SDI capture card installed.

- Mixed frame rate support - users can now work with any combination of video resolution formats and refresh rates across each video input.
- Ultra low latency mode - we have reduced the video latency when running in ultra low-latency mode from 4 frames per second to 3 frames per second at 30Hz, 50Hz and 60Hz.
- General performance improvements.

Package	Version
VIMBA SDK	[2.1.3]
GPU: NVIDIA	[513.12]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.15.10]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
Deltacast dCare	[1.12]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Turing)	[0.6.5]
NVIDIA AR SDK (Turing)	[0.7.6]
Raid: LSA Utils	[007.018.004.000]

VX 2+ OS

Instructions for How to Redisguise a VX 2+

25Q3 | Download your USB Redisguise file

Compatible d3 Versions: r32.0 and above

Release Date: 19/Nov/2025

Applicable Models: VX 2+

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version VX2+_25Q3 primary update is to upgrade the Deltacast SDK version to 6.31.0

- This update brings the VX 2+ in line with other media servers that it interoperates with, by standardizing the Deltacast SDK to a common driver and SDK version, this release enables smoother mixed sessions between VX, GX and EX servers, improving overall collaboration and compatibility across systems.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.31.0]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

25Q2 | Download your USB Redisguise file

Compatible d3 Versions: r28.0 and above

Release Date: 22/Jul/2025

Applicable Models: vx 2+

Windows Version: Win 11 GAC 23H2

Release Notes

This OS Image is specifically designed for the VX 2+ media server. The following changes have been implemented in this release:

- Mitigation for TA-34: Resolved an issue that could cause sporadic system hangs during boot-up.
- Improved Boot Speed: Optimised the boot process to reduce the time taken to load into Windows.

Note: In order to see the faster reboot times the server must undergo a full power cycle so will need to be shut down completely and disconnected from power. This step is crucial to see the improved boot speed to take effect.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

25Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2+

Release Date: 18/Feb/2025

Latest Re-Release: 16/Jun/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: vx 2+

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version VX2P_25Q1 is a quality of life OS release which provides mitigations for TA-60. In addition to this the inclusion of NVIDIA Video Effects SDK [0.7.2] and NVIDIA AR SDK [0.8.2], which will collectively provide mitigation for TA-57. Additionally, this release incorporates user-requested quality-of-life improvements such as new software, and additional Windows features, ensuring a more seamless and efficient user experience.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

24Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2+

Release Date: 13/Mar/2024

Applicable Models: vx 2+

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version vx2p_24Q1 is specific to the VX 2+ media server. This OS includes an update to the Deltacast SDK (6.22.01) to enable support for the Disguise VX 2+

media server, which makes use of a new capture card variant.

In order to make use of this new Deltacast SDK, please note that users will need to run this OS with Designer software version r27.2 and above.

The previous OS will work with Designer software versions r26.4 to r27.1.3

Package	Version
GPU: NVIDIA	[516.94]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA AR SDK (Ampere)	[0.7.6]

VX 3 OS

Instructions for **How to Redisguise** a VX 3

25Q3 | **Download your USB Redisguise file**

Compatible d3 Versions: r32.0 and above

Release Date: 19/Nov/2025

Applicable Models: VX 3

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version VX3_25Q3 primary update is to upgrade the Deltacast SDK version to 6.31.0

- This update brings the VX 3 in line with other media servers that it interoperates with, by standardizing the Deltacast SDK to a common driver and SDK version, this release enables smoother mixed sessions between VX, GX and EX servers, improving overall collaboration and compatibility across systems.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.31.0]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

25Q2 | Download your USB Redisguise file

Compatible d3 Versions: r27.2 and above

Release Date: 22/Jul/2025

Applicable Models: vx 3

Windows Version: Win 11 GAC 23H2

Release Notes

This OS Image is specifically designed for the VX 3 media server. The following changes have been implemented in this release:

- Mitigation for TA-34: Resolved an issue that could cause sporadic system hangs during boot-up.
- Improved Boot Speed: Optimised the boot process to reduce the time taken to load into Windows.

Note: In order to see the faster reboot times the server must undergo a full power cycle so will need to be shut down completely and disconnected from power. This step is crucial to

see the improved boot speed to take effect.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

25Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2

Release Date: 18/Feb/2025

Latest Re-Release: 14/Jul/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: vx 3

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version VX3_25Q1 is a quality of life OS update which will change our Nvidia Q-Sync Firmware to version 2.02 for the mitigation of TA-59. The inclusion of NVIDIA Video Effects SDK [0.7.2] and NVIDIA AR SDK [0.8.2], which will collectively provide mitigation for TA-57. Additionally, this release incorporates user-requested quality-of-life improvements such as new software, and additional Windows features, ensuring a more seamless and efficient user experience.

Package	Version
GPU: NVIDIA	[551.52.0]

Package	Version
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

24Q1 | **Download your USB Redisguise file**

Compatible Designer Versions: r27.2

Release Date: 13/Mar/2024

Applicable Models: vx 3

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version vx3_24Q1 is the launch OS and specific to the VX 3 media server.

Hardware support for the VX 3 has been enabled from Designer software version r27.2 and above.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]

Package	Version
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA AR SDK (Ampere)	[0.7.6]

VX 4+ OS

Instructions for How to Redisguise a VX 4+

25Q4 | Download your USB Redisguise file

OS Image name in d3Manager: `25Q4.481bc46b`

Compatible d3 Versions: r32.0 and above

Applicable Models: VX 4+

Windows Version: Win 11 GAC 23H2

Revision History

- **Original Release:** `25Q4.b5309692` on **05/Jun/2026**
- **Re-Released as:** `25Q4.481bc46b` on **19/Jun/2026** to resolve an occasional issue with Windows Activation.

Release Notes

Disguise OS image version 25Q4 primarily upgrades your VX 4+ to Windows 11.

- The operating system has been upgraded from Windows 10 to Windows 11.
- The AMD GPU driver has been upgraded from 22Q2 to 24Q4.
- An updated BIOS will be flashed onto your VX 4+ to improve boot time and stability.

PLEASE NOTE: We don't recommend changing the default settings in your BIOS, but if you run on non-standard settings, you'll need to re-apply these changes after the BIOS update completes.

Package	Version
GPU: AMD	[24Q4]
Capture: Matrox	[10.4.101.1269]

Package	Version
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.31.0]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
Raid: LSA Utils	[007.018.004.000]

25Q3 | **Download your USB Redisguise file**

OS Image name in d3Manager: `25Q3.f0885a6e`

Compatible d3 Versions: r32.0 and above

Applicable Models: VX 4+

Windows Version: Win 10 SAC 1809

Revision History

- **Original Release:** `25Q3.ce7efeb9` on **19/Nov/2025**
- **Re-Released as:** `25Q3.72b1e09f` on **11/Dec/2025** to fix a corrupted Matrox driver in the original release (for Matrox VX 4+ variants).
- **Re-Released as:** `25Q3.f0885a6e` on **27/Jan/2026** to resolve an issue with Rivermax not being detected in d3.

Release Notes

Disguise OS image version VX4+_25Q3 primary update is to upgrade the Deltacast version to 6.31

- This update brings the VX 4+ in line with other media servers that it interoperates with, by standardizing the Deltacast SDK to a common driver and SDK version, this release enables smoother mixed sessions between VX, GX and EX servers, improving overall collaboration and compatibility across systems.

Package	Version
GPU: AMD	[22Q2]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.31.0]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]
Deltacast dCare	[1.16]
Deltacast dScope	[1.9.0]
Raid: LSA Utils	[007.018.004.000]

25Q2 | Has been removed. For additional details, please refer to the Technical Advisory: **TA-65**

24Q2_1 | **Download your USB Redisguise file**

Compatible d3 Versions: r27.2 and above

Release Date: 28/Aug/2025

Latest Re-Release: 28/Aug/2025 - **Please delete any copies of this OS that were downloaded before this date**

Applicable Models: VX 4+

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image version vx4p_24Q2_1 is specific to the VX 4+ media server. This OS includes an update to the Deltacast SDK (6.22.01) to enable support for the Disguise VX 3 media server, which makes use of a new capture card variant.

PLEASE NOTE: This OS Was Re-Released on 28th August 2025 to resolve the following known issues - please re-make any old vx4p_24Q2_1 USB Flash Drives made before this date:

- This release of 24Q2_1 will recognise and remove a known problematic BIOS version that went live in OS 25Q2 (now removed). If it identifies this problem BIOS it will revert your BIOS back to the last known functional BIOS. NOTE: Any customers running 25Q2 should re-download this copy of 24Q2_1 and perform a Redisguise to avoid the risk of Blue Screens For more information about this see **TA-65**.
- The previous release had an issue where the RME TotalMix Application would not automatically start on boot

Package	Version
GPU: AMD	[22Q2]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
Raid: LSA Utils	[007.018.004.000]

24Q2 | **Download your USB Redisguise file**

Compatible Designer Versions: r27.0 to r27.1.3

Release Date: 21/Apr/2024

Applicable Models: vx 4+

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image version vx4+_24Q2 is specific to the VX 4+ media server. This OS includes an update to the Matrox SDK (10.4.101) and provides the following improvements to Disguise media servers with a Matrox SDI capture card installed:

- Mixed frame rate support - users can now work with any combination of video resolution formats and refresh rates across each video input

- Ultra-low latency mode - we have reduced the video latency when running in ultra-low-latency mode from 4 frames per second to 3 frames per second at 30Hz, 50Hz and 60Hz
- General performance improvements

To benefit from these improvements, please keep in mind that users will need to run this OS version with Designer software versions r27.0 through r27.1.3

NOTE: We have removed 24Q1 from the website as it contained an incorrect driver version. We have resolved this by updating the r27.2+ to 24Q2

Package	Version
GPU: AMD	[22Q2]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.15.10]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12]
Deltacast dScope	[1.9.0]
Raid: LSA Utils	[007.018.004.000]

VX 1 / VX 2 OS

Instructions for How to Redisguise a VX 1 / VX 2

25Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2

Release Date: 14/Mar/2025

Applicable Models: vx 1 / vx 2

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image vx12_25Q1 is a quality of life update that implements the addition of TotalFixRME being enabled upon start-up. Additionally, this release incorporates user-requested quality-of-life improvements such as new software, and additional Windows features, ensuring a more seamless and efficient user experience.

Package	Version
GPU: NVIDIA	[472.98]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Turing)	[0.6.5]
NVIDIA AR SDK (Turing)	[0.7.6]

24Q2 | Download your USB Redisguise file

Compatible Designer Versions: r27.2

Release Date: 22/Apr/2024

Applicable Models: vx 1 / vx 2

Windows Version: Win 10 SAC 1809

Release Notes

Package	Version
GPU: NVIDIA	[472.98]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]

Package	Version
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Turing)	[0.6.5]
NVIDIA AR SDK (Turing)	[0.7.6]

EX 3 OS

Instructions for **How to Redisguise** an EX 3

25Q1 | **Download your USB Redisguise file**

Compatible Designer Versions: r27.2

Release Date: 18/Feb/2025

Applicable Models: EX3

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version ex3_25Q1 includes an update to the Windows base operating system, migrating the EX 3 to Windows 11 23H2; in addition to this updating our Nvidia graphics driver to version 551.52. Additionally, this release incorporates user-requested quality-of-life improvements such as new software, and additional Windows features, ensuring a more seamless and efficient user experience.

Package	Version
GPU: NVIDIA	[551.52.0]
Network: Mellanox	[2.90.25506]
VIMBA SDK	[2.1.3]
Vimba X SDK	[2023.4.0.2776]

Package	Version
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

205 | Download your USB Redisguise file

Compatible Designer Versions: r24.2 to r26.5.2

Release Date: 13/Sep/2023

Applicable Models: EX3

Windows Version: Win 10 SAC 1809

Release Notes

Support for Nanite is still built into this version, thanks to the move on RX to 21H2 of Windows 10. Security updates are included up to August 2022.

We have updated the NVIDIA driver to 516.94 but users are able to update to newer version of the NVIDIA driver without waiting for a new OS release. This major release features an update to the Mellanox NIC driver and includes the latest Rivermax licensing and SDK. OS 205 is part of the Disguise OS 200+ range and requires versions of d3 r22 and newer to license and run Mellanox NIC with improved performance.

- Windows 10 updates to 21h2, this includes the latest security updates up to August 2022. It includes a UAC bug fix to allow d3 to remote install.
- NVIDIA driver 516.94 provides driver updates up to August 2022 and is a DCH branch driver.
- Direct X 12 is now the main graphics engine in the version of Windows and provides significant performance improvements.
- The latest version of Designer will be installed on new servers, and upgrading a media server will preserve the existing version of Designer installed. Disguise recommends upgrading to r21 in order to work in local languages and find solutions for the most complex projects with peers around the world. Take advantage of improved workflows and integrations with most of the leading technology.
- Intel Network Proset 26.8 is included and comes with a new advanced teaming utility for teaming compatible intel adapters. Please note that teaming may not be possible with vLANs and the Mellanox adapters.

- Mellanox transitions to 2.90.50010 with Rivermax 1.10.20 support. The driver and renderstream license is now fully integrated and will require no reinstallation of the driver after redisguise.

Package	Version
GPU: NVIDIA	[516.94]
Network: Mellanox	[2.90.25506]

PX / PXC / PX+ OS

23Q3 | Unable to offer PX / PXC / PX+ OS

Compatible Designer Versions: N/A

Release Date: 19/Oct/2023

Applicable Models: px / px + / px c

Windows Version: Win 10 SAC 22H2

Release Notes

Disguise OS Image Version 23Q3 is specific to the PX media server.

Package	Version
GPU: NVIDIA	[517.40]
Capture: Blackmagic	[12.6]
Capture: AJA	[16.2.5.3]

If you wish to perform a redisguise on a PX / PXC / PX+ machine please contact support **Here**

VX 4 OS

Instructions for **How to Redisguise** a VX 4

24Q1_1 | **Download your USB Redisguise file**

Compatible Designer Versions: r27.2+

Release Date: 04/Mar/2024

Applicable Models: vx 4

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image version vx4_24Q1_1 is specific to the VX 4 media server. This OS includes an update to the Deltacast SDK (6.22.01) to enable support for the Disguise VX 3 media server, which makes use of a new capture card variant.

In order to make use of this new Deltacast SDK, please note that users will need to run this OS with Designer software version r27.2 and above.

The previous OS will work with Designer software versions r27.0 to r27.1.3

Package	Version
GPU: AMD	[19Q3]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
Raid: LSA Utils	[007.018.004.000]

24Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2+

Release Date: 04/Mar/2024

Applicable Models: vx 4

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image version vx4_24Q1 is specific to the VX 4 media server. This OS includes an update to the Matrox SDK (10.4.101) and provides the following improvements to Disguise media servers with a Matrox SDI capture card installed:

- Mixed frame rate support - users can now work with any combination of video resolution formats and refresh rates across each video input
- Ultra-low latency mode - we have reduced the video latency when running in ultra-low-latency mode from 4 frames per second to 3 frames per second at 30Hz, 50Hz and 60Hz
- General performance improvements

Please keep in mind that users will need to run this OS version with Designer software versions r27.0 through r27.1.3

Package	Version
VIMBA SDK	[2.1.3]
Capture: Matrox	[10.4.101.1269]
Network: Mellanox	[2.90.25506]
Deltacast dCare	[1.12]
Capture: Deltacast	[6.15.10]
Deltacast dScope	[1.9.0]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
GPU: AMD	[19Q3]
Raid: LSA Utils	[007.018.004.000]

23Q2 | Download your USB Redisguise file

Compatible Designer Versions: r27.2

Release Date: 31/Jan/2024

Applicable Models: vx 4

Windows Version: Win 10 SAC 1809

Release Notes

Version: 23Q2 (215.1147)

Disguise OS Image Version vx4_23Q2 is specific to the VX 4 media server.

We have updated our naming convention for Disguise OS' and we will be phasing this in with updates to the Current OS range. It will be based off the year and quarter in which it was introduced.

We have created a combined ISO to support a number of vx 4 users with 100Gb NIC upgrades that require an alternative AMD driver. The ISO is built so that only the users that require the alternative AMD driver will receive the modified image.

Please note that in d3manager the image version will be shown as 215.1147. We will update this to show the new naming convention in future OS updates.

Package	Version
VIMBA SDK	[2.1.3]
GPU: AMD	[19Q3]
Capture: Matrox	[10.3.101.740]
Deltacast dCare	[1.12]
Network: Mellanox	[2.90.25506]
Deltacast dScope	[1.9.0]
Capture: Deltacast	[6.15.10]
Audio: RME	[4.38]
RAID: Broadcom	[7.20]
Raid: LSA Utils	[007.018.004.000]

GX 2C OS

Instructions for How to Redisguise a GX 2C

24Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2

Release Date: 04/Mar/2024

Applicable Models: gx 2c

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS image version gx2c_24Q1 is specific to the gx 2c media server. This OS includes an update to the Deltacast SDK (6.22.01) to enable support for the Disguise VX 3 media server, which makes use of a new capture card variant.

In order to make use of this new Deltacast SDK, please note that users will need to run this OS with Designer software version r27.2 and above.

The previous OS will work with Designer software versions up to r27.1.3.

Package	Version
GPU: NVIDIA	[472.98]
Capture: Deltacast	[6.22.06]
Audio: RME	[4.38]
VIMBA SDK	[2.1.3]
Deltacast dCare	[1.12.4]
Deltacast dScope	[1.9.0]
NVIDIA Video Effects SDK (Turing)	[0.6.5]
NVIDIA AR SDK (Turing)	[0.7.6]

199B | Download your USB Redisguise file

Compatible d3 Versions: From r15.3 to r27.2

Release Date: 04/May/2022

Applicable Models: gx 2c

Windows Version: Win 10 SAC 1809

Release Notes

Disguise OS Image Version 199B.947 is specific to the GX 2C media server and is a cumulative system update. This update includes the latest system drivers recommended and tested by the Disguise team built with the latest windows security updates.

- Windows 10 remains at 1809 but Microsoft's cumulative and security updates have been included up to April 2022.
- NVIDIA driver updated to 472.98 to improve performance with notch blocks. Full details of the driver can be found in the release notes here.
- .Net has been updated to 4.8+.
- Designer r21.0.2 will be installed at the factory or your existing version of Designer will be reinstalled on postboot.
- Deltacast 6.15.10 is the driver we recommend at this time, and we're currently working with Deltacast towards updating the driver in the next base version release.
- RME Audio Driver has been updated to 4.3.8 and tested to ensure audio performs as expected from previous versions of the driver.

Package	Version
VIMBA SDK	[2.1.3]
GPU: NVIDIA	[472.98]
Capture: Matrox	[10.2.101.26081]
Capture: Deltacast	[6.15.10]
Audio: RME	[4.38]
Deltacast dCare	[1.12]
Deltacast dScope	[1.9.0]

RX I / RX II OS

Instructions for **How to Redisguise** an RX I / RX II

26Q1 | **Download your USB Redisguise file**

OS Image name in d3Manager: `26Q1.cd6d5082`

Compatible d3 Versions: r27.2 and above

Applicable Models: MX MOVE / RX / RX-II

Windows Version: Win 11 GAC 23H2

Revision History

- **Original Release:** `26Q1.cd6d5082` on **05/Jun/2026**

Release Notes

Disguise OS image version rx_26Q1 is specific to the RX and RX-II Servers. This replacement Windows 11 OS updates our Nvidia graphics driver to version 582.16.

All Changes:

- The NVIDIA GPU Driver version has been updated to 582.16
- The Intel Network Adapter Drivers have been updated to the latest version (30.6) for the 4 Ethernet Ports

Package	Version
GPU: NVIDIA	[582.16]
Network: Mellanox	[2.90.25506]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

25Q1 | Download your USB Redisguise file

Compatible Designer Versions: r27.2

Release Date: 18/Feb/2025

Applicable Models: MX MOVE / rx / rx-II

Windows Version: Win 11 GAC 23H2

Release Notes

Disguise OS image version rx_25Q1 includes an update to the Windows base operating system, migrating the RX and RX II to Windows 11 23H2; in addition to this updating our Nvidia graphics driver to version 551.52. Additionally, this release incorporates user-requested quality-of-life improvements such as new software, and additional Windows features, ensuring a more seamless and efficient user experience.

Package	Version
GPU: NVIDIA	[551.52.0]

Package	Version
Network: Mellanox	[2.90.25506]
NVIDIA Video Effects SDK (Ampere)	[0.7.2]
NVIDIA AR SDK (Ampere)	[0.8.2]

23Q3 | Download your USB Redisguise file

Compatible Designer Versions: r27.2+

Release Date: 11/Oct/2023

Applicable Models: MX MOVE / rx / rx-II

Windows Version: Win 10 SAC 22H2

Release Notes

Disguise OS Image Version rx_23Q3 is specific to the RX and RX II render nodes.

The following updates have been made:

- NVIDIA - upgraded driver to v536.25
- Windows - upgraded to Windows 10 version 22H2

NOTE: We have updated our naming convention for Disguise OS and we will be phasing this in with updates to the Current OS range. It will be based off the year and quarter in which it was introduced.

Package	Version
GPU: NVIDIA	[536.25]
Network: Mellanox	[2.940.22655.23]
Mellanox Rivermax Full SDK Install	[1.1.22655]

GX 1 / GX 2 / 2x4pro OS

Instructions for How to Redisguise a GX 1 / GX 2 / 2x4pro

180 | Download your USB Redisguise file

Compatible Designer Versions: r14.3+

Release Date: 01/Oct/2021

Applicable Models: 2x4pro / gx 1 / gx 2

Windows Version: Win 10 LTSB 1607

Release Notes

Disguise OS Image Version 180.841 is specific to the 2x4pro, GX 1 and GX 2. This image includes no driver change, however, it patches a critical bug released in 175.819; as such, we recommend any users currently on version 175 or older to update with priority.

Essential to security and overall system stability. A fix to the Windows product ID process on deployment prevents Windows from failing to activate post-deployment, as in previous versions of the OS image.

- Nvidia driver updated to 461.92; fixing the issue where UCRS is blocked by no OpenCL support in driver. Lower versions of the Nvidia driver also showed instability in Genlock. This version has been rigorously tested by the Disguise team.
- Bluefish drivers remain 5.11.0.47

Package	Version
Audio: RME	[4.2.9]
GPU: NVIDIA	[461.92]
Capture: Bluefish	[5.11.0.47]
VIMBA SDK	[2.1.3]

Solo OS

Instructions for **How to Redisguise** a Solo

197 | **Download your USB Redisguise file**

Compatible Designer Versions: r14.4.7 to r29.2.2

Release Date: 06/May/2022

Applicable Models: solo

Windows Version: Win 10 LTSB 1607

Release Notes

Disguise OS Image Version 197.948 is specific to the Solo media server is a cumulative update to the Windows 1607 OS.

The Solo OS is built within the long term servicing channel (LTSC) of Windows 10 and runs Windows 10 2016 LTSB (1607) until 2026. It includes security and cumulative system update up to mid April 2022. Updates to the NVIDIA Graphics drivers, and .net 4.8 improved Designer performance and compatibility with the new gold version. Newer capture card drivers are included for both optional Bluefish and Vision cards.

- Windows 10 remains at 1607, with cumulative security updates up until mid April 2022.
- NVIDIA driver 472.98 released on 31st Jan 2022 is installed within this OS. It includes updates to CUDA and some improved notch block performance.
- dotNet has been updated to 4.8+ with all the latest security updates.
- Designer r21.0.2 will be installed at the factory or your existing version of Designer will be reinstalled on postboot.
- Intel Network Proset 26.8 is included; Intel Teaming is not fully supported on the Solo under Windows 1607
- Bluefish (optional SDI card) has been updated to driver 6.5.0.51 with new firmware v32 to improve performance in Designer. The update to the firmware will cause the media server to shut down and initiate a cold boot.
- The BlueInfo tool has been replaced by BlueToolbox, a new tool combining the features of the previous tools (e.g. BlueInfo, BlueProps, DMABenchmarking, etc.) whilst adding new features like video/audio capture preview, changing default card behaviour and user card licence query. A new firmware updater allows the Disguise re-imaging tool to update to the latest bluefish firmware.
- Vision LC (optional HDMI card) has been updated to the latest version 1.2.4
- RMEAudio has been updated to version 4.3, please note you will need to set the WDM device configuration in hammerfall to enable all of the audio devices. This cannot be set in Window 1607 the way that we usually set this in our other products.

Package	Version
GPU: NVIDIA	[472.98]
Audio: RME	[4.38]
Capture: Bluefish	[6.5.0.51]
Capture: Datapath	[1.2.4]
Chipset: ASMB-785	[10.1.1.38]

Package	Version
VIMBA SDK	[2.1.3]

2x2plus OS

Instructions for How to Redisguise a 2x2

Launch OS | Download your USB Redisguise file

4x4 / 4x2 OS

Instructions for How to Redisguise a 4x4 / 4x2

193 | Download your USB Redisguise file

Compatible Designer Versions: r18.1.10

Release Date: 07/April/2022

Applicable Models: 4x4 pro / 4x2 pro

Windows Version: Win 8.1

Release Notes

Disguise OS Image Version 193.934 is specific to the 4x4pro and 4x2pro. This is a cumulative OS update fixing key deployment bugs in OS 181 and providing cumulative security updates to Windows 8.1 Embedded installed up to 16/02/2022. A bug fix included in 193.934 fixes a known bug seen with versioning when utilising a Redisguise. It also includes a missing USB 3.0 driver found in later variants of the pro range.

- KB890830 has been excluded from update cycle
- Intel Network Proset 26.8 has been included to provide access to Intel ANS features via the command or adapter properties.

In addition to the above cumulative updates, the following Windows and Deployment bugs are directly patched by OS 193:

- The NIC adapters were incorrectly named and provisioned.
- The USB adapters would not function as expected.
- Non hardware specific devices present in configuration.

d3 will maintain the previous version on your media server. Please note the latest software version for the 4x4pro is r18.1.10 revision 84524 which can be accessed from the previous versions section of the website here. The fixes as detailed below resolve bugs found within the OS 181 and d3 r18.1.9 and below.

- d3 was reporting on the 4x2 media server that there was no VFC backplane.
- d3 was reporting on all media servers that there was a Bluefish driver versus sdk mismatch.
- If you have either of these errors in 193 please update to the above mentioned newer version of d3 before contacting support.

When upgrading from an OS Version lower than 181 please note the following key changes to the OS apply in addition to the above:

- Command prompt has been removed from the Win X menu and is replaced by PowerShell version 5.1 framework to aid Disguise remote support teams in troubleshooting complex issues both onsite and remotely.
- New Bluefish drivers and firmware are included in this build to resolve issues related to the failure of the Bluefish cards in d3. This OS Image automatically updates the bluefish firmware and will require the user to manually turn on the device after the first boot cycle. The new drivers & firmware together solve the known failure of the bluefish card in d3. d3 r18.1.9 revision - 81046.
- Bluefish provide BlueToolbox, a new tool combining the features of the previous tools (e.g. BlueInfo, BlueProps, DMABenchmarking, etc.) whilst adding new features like video/audio capture preview, changing default card behaviour and user card licence query, effectively replacing the blue info application previously deployed on Disguise 4x4pros and 4x2pros. A new firmware updater allows the Disguise re-imaging tool to update to the latest bluefish firmware upon deployment, after which the machine will shut down.
- LSA RAID Tools have been updated and will require the username to login.
- Hibernation mode has been disabled.

Package	Version
GPU: AMD FirePro w9100	[170111.310593]
Audio: RME	[4.29]
Capture: Bluefish	[6.5.0.51]
Network: Intel	[3.14.214.0]
Chipset: ASMB-785	[10.1.2.19]
VIMBA SDK	[2.1.3]
MegaRAID2	[v6.714.18.00]
FTDI	[2.12.28]

Package	Version
Open	[3.0.0]

Disguise Hardware Ranges

Disguise offers a wide variety of hardware products specialised for different applications.

These products include an array of media servers and other hardware.

Media server ranges

- EX Range
- GX Range
- VX Range
- RX Range
- PX Range
- Plus Range
- Legacy Servers

Below is a feature matrix to highlight the capabilities of each media server range:

	EX Range	VX Range	GX Range	RX Range	PX Range
Notch	✔ *	✔	✔ **	✔	N/A
RenderStream Support	✘	✔	✔	✔	N/A
Mixed Reality Support	✘	✔	✔	✔	N/A
d3Net (Clustering)	Director, Actor, Understudy, Editor with other EX range only Dedicated Director, Editor with VX/GX range	Director, Actor, Understudy, Editor with VX / GX Range only	Director, Actor, Understudy, Editor with VX / GX Range only	RenderStream cluster with VX / GX Range only	Porta only
API Support	✔	✔	✔	✘	N/A
OmniCal	✔	✔	✔	✘	N/A

* An EX server uses a real-time connector to run a Notch block.

** A GX server includes a 2 year Notch playback license as standard.

Hardware updates

We develop our own operating systems (OS) for all current Disguise media servers. Any driver or SDK used within an OS has been carefully selected and tested before being rolled out into a current OS. Unless otherwise stated, we do not support manually updated drivers, SDKs or third-party applications due to the unknown potential impact on performance, applying feed settings, and genlock.

To download the latest Hardware OS, please visit the Hardware OS Images page.

> **Caution**
>
> Any additional applications installed to Disguise Media Servers can severely impact the performance of the server. We strongly recommend not installing other applications to any servers.

Product compatibility

Learn about our product compatibility.

Other hardware

- Fabric
- VFC Cards

Additional information

- Filter Maintenance
- Video Playback Performance

IP-VFC 25Gb SFP support

To use the IP-VFC to output ST 2110 network video you need to connect one or more Network SFP modules.

Network SFP modules are validated by us to ensure proper functionality. We carefully select and validate specific SFPs that we officially support. You can find the list of supported models here:

- Mellanox MMA2P00-AS - 25GbE
- FS SFP28-25GSR-85 - 25GbE
- FS SFP-25GLR-31 - 25GbE

We presently do not support any 10GbE Network SFP modules.

IP-VFC Colour Conversion

The IP-VFC card is capable of 2 kinds of colour conversion:

- It can convert the RGB output by the GPU to a user-configurable **Colour Format**.
- It can apply a **Colour Conversion Profile** to the video.

Both of these can be configured by clicking on the VFC Slot of the IP-VFC in the Feed View.

> **Note**
>
> Changing these settings will not take effect until **Apply Feed Settings** or **Apply Genlock** is clicked and completes.

Colour Format

The IP-VFC supports 3 colour formats:

- RGB (Full) - commonly referred to as RGB 4:4:4
- YCbCr 4:4:4
- YCbCr 4:2:2
- Auto

The GPU will output RGB Full by default in Designer and the IP-VFC card will convert to the selected format at no extra processing cost.

In SDI mode the card will automatically be set to select 4:2:2 to be 12/3G SDI compliant.

Auto will attempt to select the highest bandwidth option that fits within your selected resolution.

Colour Conversion Profile

The **Colour Conversion Profile** field can be found under the **Colour** dropdown. This value determines how colour is converted from RGB to YCbCr colour space within the card.

You must make sure that the correct **Colour Conversion Profile** is selected for your output resolution. This will be automated in a future software release.

For now we recommend always selecting the **Auto** value.

The options available are:

- BT.601 - Suitable for 480i and 576i resolutions which the IP-VFC card does not currently support. **So never use it.**
- BT.709 - Suitable for 720p (HD Ready), 1080i and 1080p(FHD) resolutions.
- BT.2020 - Suitable for 2160p (UHD), 4096x2160 (4K DCI).
- Auto - Selects the correct profile based on the above rules for your selected resolution.

IP-VFC - FAQs

How reliable are the SFPs that have been tested with IP-VFC?

As part of our QA processes, the SFPs outlined in the list of supported SFPs have been used alongside the IP-VFC in the same testing environments, often over several days at a time with no issue. Long range SFPs draw more power and so are likely to run hotter during operation.

How can I update the firmware of the IP-VFC?

We have put together documentation on how to update the firmware of the IP-VFC. This is available here.

What's the behaviour of Port 2 on the IP-VFC when running redundancy in ST 2110 mode, and will it impact the GPU load on the server by running a redundant video stream?

There is no difference in GPU load. The redundant video stream is completed internally to the IP-VFC

When using ST 2110 mode in multicast, can you use the boundary clock on the Fabric for timing instead of a PTP grandmaster?

Fabric by default will act as a boundary clock so that will most often be the case.

Can you use a Fabric in the same configuration for RenderStream on one port/VLAN and ST 2110 on another?

We will look to test this.

Why can't the IP-VFC support 2160p60 at RGB 4:4:4 10-bit in SDI mode?

The IP-VFC is limited in SDI mode by 12G SDI, which means that it has a bandwidth of 12 Gbit/s. We offer YUV 4:2:2 support up to 4K DCI 60p in 10-bit which reaches around 11.2 Gbit/s. We are therefore restricted by bandwidth constraints and would have to consider lower framerates (i.e. 24p) on a case-by-case basis.

IP-VFC and Genlock

The IP-VFC card is ultra-low latency, and to achieve this, it relies on being genlocked. The IP-VFC interacts with genlock uniquely to other VFC cards and has additional capabilities and considerations.

The IP-VFC can be genlocked in 2 modes and 1 fallback mode:

- **PTP** (Precision Time Protocol) mode - with a PTP clock on the network.
- **EXT** (External) mode - with a traditional genlock source.
- **DP** (Display Port) mode - fallback with the output from the GPU.

The IP-VFC behaves differently from other VFC cards in that it will produce its own genlock signal to lock the GPU in both **PTP** and **EXT** modes. In these modes, the incoming PTP network timestamps, or the incoming external genlock signal, will be used to time a new genlock signal that the first-installed IP-VFC will generate and send to the Sync card on the GPU to lock it. This allows for a lower-latency workflow with the IP-VFC.

In **DP** mode, the IP-VFC receives timing sync from the DP signal output by the GPU and does not generate a genlock signal.

PTP mode

PTP (Precision Time Protocol) mode is exclusive to the IP-VFC and allows the IP-VFC to not only lock itself but also the media server to an incoming PTP clock. PTP mode is available **ONLY** when outputting ST 2110 network video.

PTP is a high-precision protocol for sharing time between machines over a network. This page will not explain how to configure PTP in general, but will explain how to use the IP-VFC in a network with PTP to apply genlock to your machine.

When PTP is available on the network, and it is configured with ST 2110 SFPs, the first installed IP-VFC card will automatically detect the PTP signal and can be configured to generate its own traditional genlock signal, which is sent to the sync card in the media server. On Nvidia machines, this is always a TTL genlock signal, and on AMD machines, this is always a Tri-level genlock signal at 1080p at 30Hz and below and 720p above 30Hz.

PTP does not run at a “Refresh Rate” like a traditional genlock signal. As a result, before applying feed settings, the GPU will see **NO genlock signal present**. Once you set the project refresh rate and apply feeds, the IP-VFC will then be configured to output a genlock signal at the project refresh rate. A card that has previously been configured to output at a particular rate will retain this configuration through reboots.

There are various flavours of PTP, these are the ones the IP-VFC supports:

- The IP-VFC card uses the SMPTE 2059-2 profile for PTP. Access the SMPTE specification here.
- The IP-VFC only supports PTPv2 (PTP version 2). Access a tutorial here.
- The IP-VFC supports both multicast and mixed PTP operating modes.

To apply PTP genlock, follow these steps:

1. Make sure you select **PTP** sync mode in the Feed View before you configure genlock for the IP-VFC. If you leave it at EXT mode when trying to lock to a traditional genlock signal, it will not apply properly.
2. Set your desired project refresh rate.
3. Configure your output heads to be all the same resolution.
4. Press **Apply Feed Settings** to configure the IP-VFC card to generate the correct genlock signal. (This will work even if Designer reports no genlock signal is present before pressing **Apply Feed Settings**).

After genlock is visible and feeds have been applied, this configuration will stick through reboots and project re-launches. To change Refresh rates simply change the project refresh rate and apply feeds again.

Under the **Sync Status** dropdown, you can find a range of additional read-only information about the existing clock source:

- **PTP Clock ID**: MAC address of the PTP Grandmaster.
- **PTP Port Number**: Probably always 0 and can be ignored.
- **PTP State**: Whether we are locked to PTP, locking, or not locked.
- **PTP Lock Distance**: Nanoseconds between the PTP clock for the Port and the Grandmaster (Anything < 100 nanoseconds indicates good PTP Lock).

The **PTP Grandmasters** section shows every PTP Grandmaster the IP-VFC has detected on the network. This is distinct from the **Sync Status** dropdown above: Sync Status shows the Grandmaster the card is *locked to*, **PTP Grandmasters** shows everything the card can *see*.

Each detected Grandmaster is shown in its own collapsible row, labelled by Clock ID. Expand a row to see:

- **Clock ID**: the Grandmaster's 8-byte clock identifier (colon-separated, MAC-style).
- **Domain**: the PTP domain number (0–127).
- **Log Interval**: the announce-message interval as $\log_2$ seconds. `0` = 1 second; `-2` = 0.25 seconds.
- **Level**: the transport type, `UDP` (Layer 3) or `ETH` (Layer 2).

If the card has received a PTP_MONITOR event but no Grandmasters are present, the section shows **None detected**. The list refreshes automatically as the set of detected Grandmasters changes.

Use this section to confirm the IP-VFC is seeing your intended PTP source before troubleshooting **Sync Status** problems. A persistent **None detected** indicates no PTP traffic on the configured interface — check upstream switches and Grandmaster configuration.

If the PTP connection sent from the PTP Grandmaster is unreliable, lost, or a bad connection is detected, the IP-VFC elects a new PTP source via the **Best Master Clock Algorithm (BMCA)**. This would usually be the boundary clock obtained from the network switches used across the video network. If the PTP connection is restored, it will again use that algorithm to return to the original clock.

EXT mode

EXT (External) mode most closely resembles a traditional genlock setup and indeed locks to a traditional genlock signal. EXT mode is available both when outputting SDI and when outputting ST 2110 network video signals from the IP-VFC.

When an external genlock source is connected to the genlock BNC, the IP-VFC will automatically detect it and can be configured to generate its own genlock signal, which is sent to the sync card in the media server. On Nvidia machines, this is always a TTL genlock signal and on AMD machines, this is always a Tri-level genlock signal at 1080p at 30Hz and below and 720p above 30Hz.

To configure EXT genlock, follow these steps:

1. Make sure you select **EXT** sync mode in the Feed View before you configure genlock for the IP-VFC. If you leave it at PTP mode when trying to lock to a traditional genlock signal, it will not apply properly.
2. Set your desired project refresh rate.
3. Configure your output heads to be all the same resolution.
4. Press **Apply Feed Settings** to configure the IP-VFC card to generate the correct genlock signal. (This will work even if Designer reports no genlock signal is present before pressing **Apply Feed Settings**).

DP fallback mode

DP (Display Port) sync is the mode that the IP-VFC enters if no PTP or external genlock sync is present. It can be forced on manually by internally locking the GPU. In this mode the timing of the card is driven directly by the output of the GPU. This is the highest latency mode. DP mode is available both when outputting SDI and when outputting ST 2110 network video signals from the IP-VFC.

If feed settings fail to be applied, sometimes we will fallback to DP sync mode automatically. This can then appear like the card is not locked or lockable, but often it is simply that the incoming genlock signal from the external genlock source does not match the project refresh rate.

IP-VFC Interoperability

The IP-VFC card has been specifically tested and validated working with a range of Disguise hardware, software and third-party devices.

Disguise Hardware and Software

Disguise Hardware

The IP-VFC card is compatible with a subset of Disguise hardware.

Backplane Version

The IP-VFC card has been designed to work in Disguise hardware using only backplane version 2 (BPv2).

Disguise Software

The IP-VFC card runs special firmware. We recommend all users of the IP-VFC card update to r29.0 **or above** and run the latest version of the firmware, which can be downloaded here.

The following compatibility table shows which Designer versions are compatible with specific IP-VFC firmware releases:

Designer version	IP-VFC FW Version
r23.3 to r28.1.1	1.0.1
r29.0+	23.0.7+

To update or rollback your IP-VFC card's firmware, follow the guide here.

Media Server Model

The tables below show which media server models support the IP-VFC card in each VFC mode.

> ⚠ **IP-VFC FW 25.1 support scope**
>
> IP-VFC FW 25.1 is only supported on the **GX 3**, in **ST 2110 mode**, with **PTP** synchronisation. It is **not** validated for GX 3+, VX 4+, VX 2+, or VX 3, and is **not** supported for SDI workflows. For any configuration outside of this, continue to use FW 24.4.

ST 2110 Support

Media Server	Split Mode	Sync	Resolution	IP-VFC FW 24.4	IP-VFC FW 25.1 (GX 3 only)
GX 3	Single + Quad	PTP	1080p to 2160p	Partial	Yes
GX 3+	Single + Quad	PTP	1080p to 2160p	No	No
VX 4+	Single + Quad	PTP	1080p to 2160p	Partial	No
VX 2+	Single + Quad	PTP	1080p to 2160p	No	No
VX 3	Single + Quad	PTP	1080p to 2160p	No	No

SDI Support

FW 25.1 is not validated for SDI workflows — for SDI, use FW 24.4.

Media Server	Split Mode	Sync	Resolution	IP-VFC FW 24.4	IP-VFC FW 25.1 (GX 3 only)
GX 3	Single + Quad	EXT	1080p to 2160p	Partial - Single Mode supported. Quad Mode behind option switch*	No
GX 3+	Single + Quad	EXT	1080p to 2160p	Partial - Single Mode supported. Quad Mode behind option switch*	No
VX 4+	Single + Quad	EXT	1080p to 2160p	Partial - Single Mode supported. Quad Mode behind option switch*	No
VX 2+	Single + Quad	EXT	1080p to 2160p	No	No
VX 3	Single + Quad	EXT	1080p to 2160p	No	No

It is important to note the following:

- Synchronisation - ST 2110 can only be synchronised using PTP, and SDI can only be synchronised using EXT
- Option switch for SDI Quad Modes - `enableIPSDIExperimentalMode`
- For current GX 3+ format support details, see the GX 3+ IP-VFC Support Guidelines.

Disguise Network Switch

We support outputting ST 2110 Video from an IP-VFC over our Disguise Fabric network switch.

We recognise that users may already have access to a high-speed network switch, or have requirements to accessing a network switch with their own configuration. The following

minimum requirements must be met for any network switch being used alongside IP-VFC

- IGMP snooping must be enabled on the required network ports used to connect to each IP-VFC in order to manage and control the flow of Layer 3 multicast traffic.
- If you intend to quad-split a 100Gb port to 4x 25GbE links then forward error correction (FEC) must be disabled on each port that has been quad-split.
- Jumbo packets should be disabled on the required network ports used to connect to each IP-VFC being used.
- RDMA over Converged Ethernet (RoCE) version 2 must be supported, specifically lossless mode.
- Quality of Service (QoS) must be maintained to prioritise media streams over control traffic.
- If a PTP grandmaster is being used for synchronisation within the video system then we strongly recommend having a network port on the network switch assigned for this connection.

Third-party products

Network switches

There is an increasing number of SMPTE ST 2110-compatible network switches that have worked in ST 2110 video systems alongside Disguise.

As of May 2026, we have validated the following switches:

- **Arista DCS-7060CX-32S** - up to 32x 100GbE QSFP28 ports and 2x SFP+ ports
- **Mellanox MSN2100-CB2F** - up to 16x QSFP28 ports
- **Mellanox MSN4600-CS2FC** - up to 64x QSFP28 ports
- **Netgear M4350-16C** - up to 16x 100GbE QSFP28 ports

LED processors

There are now a number of LED processors on the market that support ST 2110 video inputs, which have worked in ST 2110 video systems alongside Disguise. As of July 2024, these include:

- **Colorlight Z8** - optional ST 2110 input card support 25GbE input via the SFP28 module for video input at up to 4K DCI 60fps 4:4:4 12-bit. The input card also includes a second 25GbE input for seamless protection switching using the SMPTE 2022-7 spec. Learn more about the Z8 processor **here**
- **Megapixel Helios** - optional 100GbE input card supports up to 4 streams at both 4:4:4 and 4:2:2 up to 12-bit. The Megapixel Helios must also be updated to v22.11 or later. Learn more about the Megapixel Helios and 100GbE input **here**.

- **7th Sense Juggler** - I/O cards support either 25GbE or 100GbE input via the SFP28 and QSFP28 modules for video inputs at up to 4K DCI 60fps 4:4:4 12-bit. Learn more about the Juggler here.

SDI Matrices

Most standard SDI Matrices that support 12G SDI inputs work with the IP-VFC in 12G SDI mode.

If you are using a Ross Ultrix Matrix, we recommend using FW 24.4 as there are known issues with FW 23.0.7 and the Ross Ultrix Matrix.

SFP modules

Disguise specifically whitelists certain models of SFP for outputting SDI or ST 2110 Network video from the IP-VFC. You can find the supported SFPs here:

- Supported SDI SFP modules.
- Supported ST 2110 Network SFP modules.

We strongly recommend the usage of OM4 fibre, which is a high-bandwidth multimode optical fibre.

LC to LC OM4 fibre cables should be used for 25GbE networking.

MTP to Quad LC OM4 breakout fibre cables should be used for connections between 100GbE and 4x 25GbE.

IP-VFC Overview

The IP-VFC is a Video Format Conversion (VFC) card designed to support IP video streams with Disguise Media Servers. It allows users to output high-quality, low-latency video in either SDI or ST 2110 formats, making it suitable for a range of professional broadcast workflows and live production environments.

Network ports and SFPs

Each IP-VFC card features four network ports, which can be configured for either IP video (ST 2110) or SDI video output, depending on the type of Small Form-factor Pluggable (SFP) modules installed.

The cards currently support the following SFP types:

- Network SFPs enables the output of ST 2110 video over a network.
- SDI SFPs enables the output of SDI video.

Outputting video

IP-VFC cards support a fixed range of video formats and frame rates or frequencies, from 720p at 23.98 fps to 4K DCI at 60 fps. Before using an IP-VFC card, ensure that your required format is supported.

IP-VFC cards can have 4 SFPs installed but can only ever output either ST 2110 network video or SDI video, never both at the same time.

To configure your IP-VFC card to output video in ST 2110 or SDI output modes follow the steps outlined here:

- ST 2110 Network Video Configuration.
- SDI Network Video Configuration.

Hardware and software interoperability

The IP-VFC card is currently only supported on a subset of Disguise media servers and Designer software versions. For a full list of compatible hardware and software, see the IP-VFC interoperability page.

The IP-VFC card is only officially supported when it is the only type of VFC card installed in a server. Mixing different types of VFC cards in the same system is not supported.

Additionally, the IP-VFC requires a media server with Backplane Version 2 (BP V2). If your server does not have BP V2, a paid upgrade is available to make it compatible with the IP-VFC.

Firmware

For all IP-VFC firmware resources, including the firmware updater tool and earlier versions, see the **Resources page**. Past releases are listed in the IP-VFC release notes.

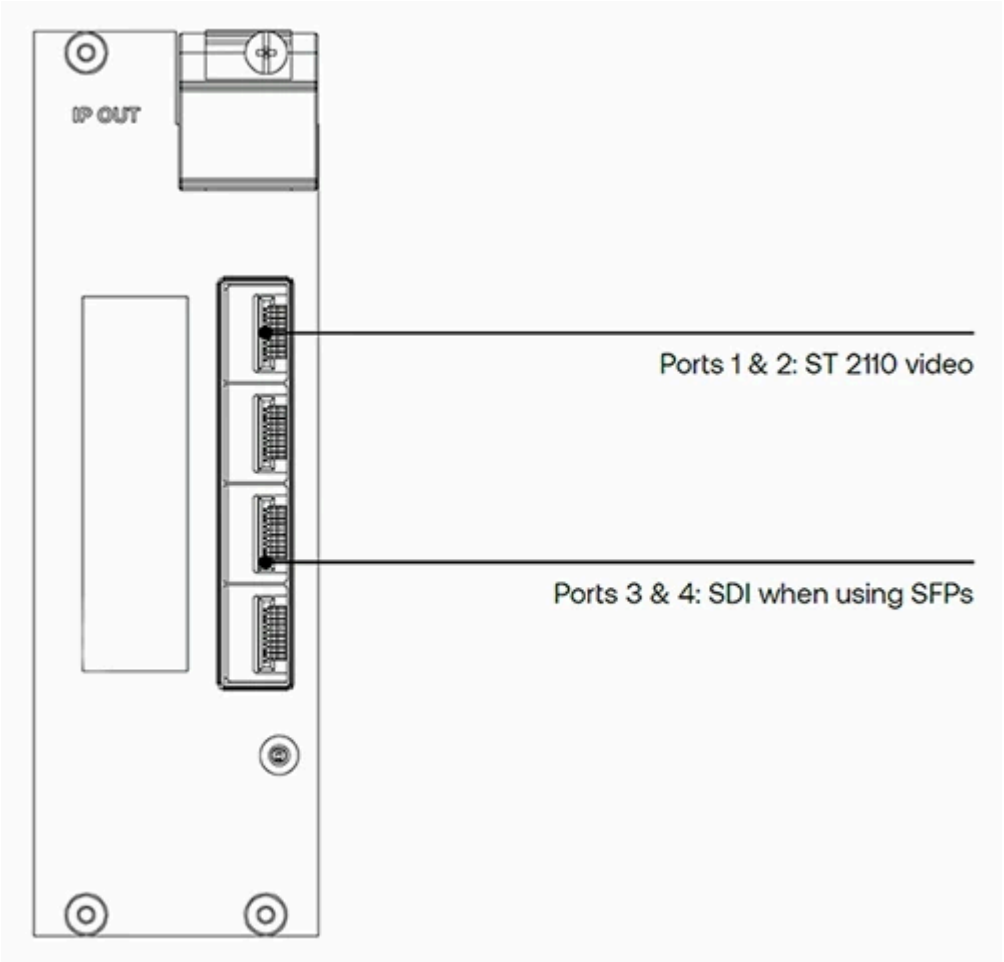
Product specifications

View the official product information in the **Technical Specifications** PDF.

IP-VFC - Ports

IP-VFC cards feature four rear ports:

- 2x configured for ST 2110 network video
- 2x for 12G-SDI video



IP-VFC Ports labelled

Ports Eth0 & Eth1 - ST 2110 Network Video

Plugging a 25Gb network SFP module into **Eth0** (Port 1) allows the IP-VFC to output ST 2110 Network video.

Plugging a second 25Gb network SFP module into **Eth1** (Port 2) allows the IP-VFC to output a redundant ST 2110 Network video stream. Using SMPTE 2022-7 receivers can rely on packet-level redundancy to ensure no packets are missed even in noisy networks.

You can learn more about configuring ST 2110 network video output from the IP-VFC card here.

Ports 3 & 4 - SDI Video

Inserting a 12G or 3G SDI SFP module into **Port 3** or **Port 4** enables the IP-VFC to output an SDI video signal.

In the future, **Port 3** and **Port 4** will support dual 3G-SDI SFP modules for Quad mode output, like a Quad Split SDI SFP module, but this functionality is not currently supported.

You can learn more about configuring SDI video output from the IP-VFC card here.

IP-VFC Release Notes

This page lists firmware releases for the IP-VFC card.

For all firmware resources, including earlier versions and the firmware updater tool, see the Resources page.

To update or roll back your card's firmware, follow the IP-VFC firmware update guide.

> **Choosing a firmware version**
>
> Choosing the right firmware depends on your media server model, video transport (ST 2110 or SDI), and sync method. We recommend reviewing this information in the media server interoperability tables before updating to confirm your setup is supported.

Firmware 25.1

⬇️ Download (19.9MB) · Designer r29.0+

> **Supported configurations**
>
> FW 25.1 is only supported on the **GX 3**, in **ST 2110 mode**, with **PTP** synchronisation. It is not validated for GX 3+, VX 4+, VX 2+, or VX 3, and is not supported for SDI workflows. For any other configuration, use FW 24.4. See the IP-VFC interoperability tables for full details.

- Significant improvements to the robustness of failover on ethernet interfaces when using ST2110 with PTP
- Fixes a bug where after the link on the redundant ethernet port went down it could fail to come back up
- Fixes a bug where applying feeds with certain ST2110 formats would result in an unstable genlock signal
- Improved startup reliability
- Improved reliability of applying feeds when using PTP sync

Firmware 24.4

⬇️ Download (18.9MB) · Designer r29.0+

- Improved jitter, with the NCO source amended to EXT sync.

- Resolved a PTP lock selection bug.
- Improved card startup behaviour.

IP-VFC SDI Video Configuration

The IP-VFC card can natively output an SDI video signal in one of the fixed formats described here. In this mode the card will not do anything special with networking and will simply act like a 12G or 3G output card.

Configuring SDI Video output

Follow these steps to configure the card for SDI video output:

1. Insert the card in to the back of the machine like a normal VFC card.
2. Insert one of our supported SDI SFPs in to Port 3.

> **Note**
>
> You should always configure your IP-VFCs with SFPs connected. Setting them up without SFPs will not work.

3. Open Designer, and in the Feed View validate that the IP-VFC is detected by the machine.
4. In the project settings set the correct refresh rate for the project, remember that the project refresh rate must match one of the IP-VFCs supported framerates.
5. Ensure that EDID emulation is set to **If Connected** or **Always** to make sure the changes are applied when you press **Apply Feed Settings**.
6. To configure the resolution of the output, right-click on the **Port** (the smaller box within the **Slot** in the Feed View) to open the Port editor.
7. Select **Auto** for the Colour Conversion Profile field under the **Colour** dropdown.
8. In the **Display Mode** field, select one of the pre-configured resolutions. Note the table of supported resolution/framerate formats to make sure you're using a supported configuration.
9. The IP-VFC works best when genlocked in EXT sync modes. If you require Genlock for your project read the Genlocking with the IP-VFC page.
10. Press **Apply Feed Settings** - This will apply the configuration to the GPU as well as to the VFC card. This may take some time to complete.

There is a known issue with the IP-VFC card where the first time **Apply Feed Settings** finishes it may not succeed. This can present differently on different servers:

- On an **AMD Machine** you may find that the card will output "No Signal" or report an "Underrun". In this case pressing **Apply Feed Settings** again will correct it.
- On an **Nvidia Machine** you will find that the card will apply feeds correctly, but the line-offsets of the SDI signals may differ between cards. pressing **Apply Genlock** in that state will correct it.

Once Apply feeds has completed successfully, you should see that the **Port** box in the Feed View is now highlighted in green to indicate that the settings in Designer now match the settings applied to the GPU and VFC card. If the settings do not match, it will be highlighted in orange and clicking on the **Port** field will report what value differs.

If the Slot or Port does not turn green you can follow our IP-VFC troubleshooting guide to resolve the problem.

Receiving video from the IP-VFC card

Once configured the card will output either a 3G or a 12G signal like a normal SDI source.

Using a 3G dual SDI SFP you will find that the lower BNC output is the one that will output the 3G signal.

Colour Formats in SDI mode

SDI output is always YCbCr 4:2:2 and the Colour Format field will be forced to YCbCr 4:2:2 when in SDI mode. Designer will always output RGB 4:4:4 and the card will do the conversion to RGB 4:2:2.

IP-VFC - SDI SFP module support

To use the IP-VFC to output 12G or 3G SDI video signals you need to connect one or more SDI SFP modules.

We explicitly support a number of transmitter SFP modules for SDI output as listed in the table below.

SFP Model	1x 12G	1x 3G
Embrionix EB12BN1T-MNR	✔	✔
Embrionix EB12HD2T-MNR-2	✔	✔
Embrionix EB30HD2T-LNR	✘	✔
Riedel MN-Z-SFP-2T-SDI-12G	✔	✔

SFP modules that are not explicitly on this list will not work!

We do not support any transceiver SFP modules or ST 2110 to SDI converter SFP modules.

IP-VFC ST 2110 Network Video Configuration

The IP-VFC card can natively output an ST 2110 network video signal in one of the fixed formats described here. In this mode, the IP-VFC is assigned an IP address and sends a video stream to a network multicast address which receivers can listen to.

The following needs to be configured via the **Feed View** UI in Designer to output an ST 2110 video signal:

- The GPU output.
- A network address for the IP-VFC port.
- A multicast address for the video stream.

Configuring ST 2110 video output

Follow these steps to configure the card for ST 2110 video output:

Step 1: Hardware setup

1. Insert the card and SFP

1. Insert the IP-VFC card into the back of the machine (like a standard VFC card).
2. Insert a supported 25Gb Network SFPs into Port 1 (labelled **Eth0**).

> **Note**
>
> IP-VFCs must be configured with SFPs connected — setup will not work without them.

Step 2: Initial recognition and basic configuration

1. Validate recognition in Designer

1. Open Designer and go to **Feed View**.
2. Check that the IP-VFC is detected by the machine.

2. Project settings configuration

1. Set the correct refresh rate in your **Project Settings**.
   - It must match one of the IP-VFC card's supported framerates.

Step 3: Configuring the VFC card

1. Configure the GPU settings

1. In **Feed View**, right-click on the VFC slot to configure IP-VFC settings.
2. Set **EDID Emulation** to either:
   - **If Connected**, or
   - **Always**
3. Set the **Split Mode** to either:
   - **Quad** to create 4 video streams with a resolution totalling 4K DCI, or
   - **Mirror** to create a single video stream up to 4K DCI resolution This ensures changes apply correctly when you click **Apply Feed Settings**.

2. Configure IP address (Eth0 and optional Eth1)

1. Open the **Eth0 details** dropdown.
2. Select the IP Mode:

- **DHCP**: Uses a DHCP server to auto-assign an IP.
- **STATIC**: Manually set the following using IPv4 addresses:
  - IP address
  - Subnet mask
  - Gateway
  - (Optional) Hostname or DNS if your network requires it.

For **Eth1 redundancy**, repeat these steps using the **redundancy configuration guide**.

3. Checking Ethernet link status

The **Eth0 details** and **Eth1 details** dropdowns each include a **Link Status** field showing the current operating state of that port's Ethernet interface, as reported by the IP-VFC card. Use it to confirm a port has a live network link before troubleshooting a stream.

- **UP**: the interface is up and has a link.
- **DOWN**: the interface is down (for example, no cable or SFP link).
- **UNKNOWN**: the card reported link status but did not include a state for this interface.

The **Link Status** field only appears once the card has reported Ethernet link status, which requires IP-VFC firmware 25.1 or later. It refreshes automatically as the link status changes.

Step 4: Validating the SFP and adding colour settings

1. Check SFP type

Use the SFP Types dropdown to confirm the correct SFP is installed.

- You should see: **25G SFP** under **SFP 0** (**Eth0**).

2. Colour settings

Under **Colour** > Colour Conversion Profile, choose: **Auto**.

Step 5: Output and streaming settings

1. Configure output resolution

1. In **Feed View**, right-click the **Port** to open the **Port Editor**. In **Mirror** mode there is 1 port per slot, in **Quad** mode there are 4.
2. In **Display Mode**, select one of the pre-configured resolutions. Check the table of supported resolution/framerate formats to make sure you're using a supported configuration.

2. Configure multicast streaming (Eth0)

In the **Eth0 Multicast** dropdown for each **Port**, set:

> - IP: - IPv4 multicast address to send the video stream to.
> - Port: - Port to send the video stream to.
> - RTP Payload Type ID: - Indicates that we are sending a video stream (**Don't change this**).

- All IP-VFCs can use the same multicast address if your receiver supports source-specific multicast. Otherwise, use unique addresses per card. In **Quad** mode you will need to set different multicast targets as all 4 streams all come from the same source IP.
- These settings generate an **SDP** file on the card, which can be used to receive video on receivers.

3. Disable Forward Error Correction (FEC) on the relevant network ports

The IP-VFC does not support Forward Error Correction (FEC). Ports that the IP-VFC is connected to on the network switch or router must be configured have FEC **DISABLED** in order to work with the IP-VFC or the IP-VFC will fail to establish a link with them.

Step 6: Enabling genlock synchronisation and applying feed settings

1. Enable genlock

For genlocking (via **PTP** or **EXT** sync), see the Genlocking with the IP-VFC guide.

While it is technically not required to use genlock with the IP-VFC card, it is recommended for the lowest possible latency on the card and the most reliable functionality.

2. Apply settings

Click **Apply Feed Settings.**

- This applies settings to both the GPU and the IP-VFC card.

- This may take some time.

There is a known issue with the IP-VFC card, specifically on the **VX 4 and VX 4+**, where the first time **Apply Feed Settings** finishes, it may not succeed. You may find that the card will output “No Signal” or report an “Underrun”. In this case, pressing **Apply Feed Settings** again will correct it.

Once successful:

- The Port box in **Feed View** turns green to indicate that the settings in Designer now match the settings applied to the GPU and IP-VFC card.
- If orange, click the Port to see what differs between the configuration in Designer and the GPU or IP-VFC card configuration.

If the Slot or Port does not turn green you can follow our IP-VFC troubleshooting guide to resolve the problem.

Receiving video from the IP-VFC card

Different network video receivers are configured differently, but all receivers need to know what multicast and port to subscribe to to find the video stream.

Generally they discover streams in 3 ways:

- Manually by taking specific IP addresses and ports.
- Semi-manually by reading an SDP file available on the network.
- Automatically by implementing NMOS.

Receiving video with manual configuration

Some network video receivers will have the capacity to directly type in a multi-cast address and receive a stream. For these devices you can copy the multicast address directly out of the Designer interface.

Receiving video by reading an SDP file

Once the IP-VFC is configured correctly for output above, it makes an **SDP** file available over the network for all receivers to see. The path to this file can be manually copied using the **Copy SDP path to clipboard** button in the **Port** editor under the **Eth0 Multicast info** dropdown.

Some network video receivers will require that you manually give them this path so they can read the SDP file and setup the stream.

Receiving video using NMOS

The **SDP** file is also used by an **NMOS server** which runs on the IP-VFC itself which makes the stream discoverable to any receivers that have NMOS configured.

Receivers that support NMOS should automatically discover the stream once it's been configured and provide you with an interface to select it.

Specifically the IP-VFC supports:

- NMOS AMWA IS-04 Discovery & Registration
- NMOS AMWA IS-05 Connection Management

Failover in an ST 2110 Network video environment

Failover and redundancy in network video environments is different to non-networked systems. There are no "Matrixes" and Designer does not control any downstream switching.

There are 2 kinds of failure that we account for:

1. **Machine failure **- Handled by normal Designer failover.
2. **Network failure** - Handled by **redundant video streams**

Machine failure

If a whole machine fails then an understudy will take over the feeds of that machine in the same way failover works with other VFC cards. With IP-VFC cards configured IP settings of each card will *not* change on failover. This means that they have to be configured accordingly beforehand.

Network topology considerations

The way your network is configured determines how we set up the understudy:

Simple network setup (Layer 2):

Both the primary machine and its understudy can use the same multicast IP. When the understudy takes over, receiving devices automatically get the video from the understudy without any address changes. This requires the option switch `copyIPVFCMulticastOnFailover` be enabled.

Routed network setup (Layer 3):

The primary machine and its understudy each need their own unique multicast IP's. When the understudy takes over, receiving devices need to switch to its address to receive the video. This is default behaviour in Designer. Designer will not automatically signal this failover change on the network, so you will need to configure your own method for telling your video sinks to change their sources.

Configuring redundancy on the Eth1 port

The 2nd port on the IP-VFC is called **Eth1** and is designed to provide a fully redundant video stream using the 2022-7 Seamless Protection Switching standard. This allows the receivers to sit at the end of a noisy network and have packet-level redundancy, so if either the main or backup stream delivers at least 1 of every packet the stream will appear seamless.

To configure it you must insert an SFP in to the **Eth1** port and follow the same steps outlined **here**, addressing **Eth1** instead of **Eth0**.

All remaining redundancy configuration is performed on the receiver to ensure proper packet-level failover.

IP-VFC - Supported Output Formats

The IP-VFC supports a range of specific, fixed output formats and frequencies.

All modes support RGB (Full), YCbCr 4:4:4 and YCbCr 4:2:2 at 10-bit.

All modes at 4K DCI and UHD support BT.2020 colour spaces, whilst all modes at Full-HD support BT.709. Please refer to the Colour Conversion Profile section **here**.

Supported formats are listed in the table below:

FPS	4K DCI (4096 x 2160)	UHD (3840 x 2160)	2K DCI (2048 x 1080)	Full HD (1920 x 1080)
23.98p	✔	✔	✔	✔
24p	✔	✔	✔	✔
25p	✔	✔	✔	✔
29.97p	✔	✔	✔	✔
30p	✔	✔	✔	✔
50p	✔	✔	✔	✔
50i	✘	✘	✘	✔
59.94p	✔	✔	✔	✔
59.94i	✘	✘	✘	✔
60p (Mirror)	✔	✔	✔	✔

IP-VFC Troubleshooting

This guide outlines helpful tips and tricks for resolving common issues encountered with the IP-VFC.

Slot Statuses

In the **Feed View**, right-clicking on a slot displays various statuses that a card can be in. Below is a list of possible statuses, what they mean, and how to resolve them:

Failed Initialisation

Description: The card is running outdated or incompatible firmware.

Resolution: Update the firmware.

The card will not output any signal until the correct firmware is installed and it can communicate with Designer.

VFC Card Not Responding

Description: The card was previously connected but is no longer responding. This usually indicates a software crash on the card.

Resolution: Power cycle the server and reseat the card to reboot it.

A fully configured card will never enter this state during normal operation, it is only possible to enter this state when the card is being configured, i.e. when applying Genlock or Feed Settings.

Refresh Rate is Different

Description: The card is outputting a refresh rate that does not match the GPU's configuration.

Resolution: Click **Apply Feed Settings** to sync the refresh rates.

Port Statuses

In the **Feed View**, right-clicking on a Port (beneath the Slot) shows various port statuses. Here's what they mean and how to resolve them:

Stream Disabled

Description: The card was able to output a signal briefly, but an unstable sync or genlock signal caused it to stop.

Resolution: Verify and correct the upstream genlock signal.

A fully configured card will never enter this state during normal operation, it is only possible to enter this state when the card is being configured, i.e. when applying Genlock or Feed Settings.

Underrun

Description: The card is not receiving video at the expected rate, preventing it from outputting at the correct frame rate. This may cause signal stuttering. An unstable genlock signal is a common cause.

Resolution: Click **Apply Feed Settings** again to ensure both the GPU and IP-VFC card are correctly configured.

Failure to Establish a Link

If the IP-VFC fails to establish a valid network connection, the likely cause is **Forward Error Correction (FEC)** being enabled on the network ports. FEC is commonly enabled by default in many environments, but the IP-VFC is not compatible with it.

Before proceeding, ensure FEC is disabled on all ports connected to the IP-VFC.

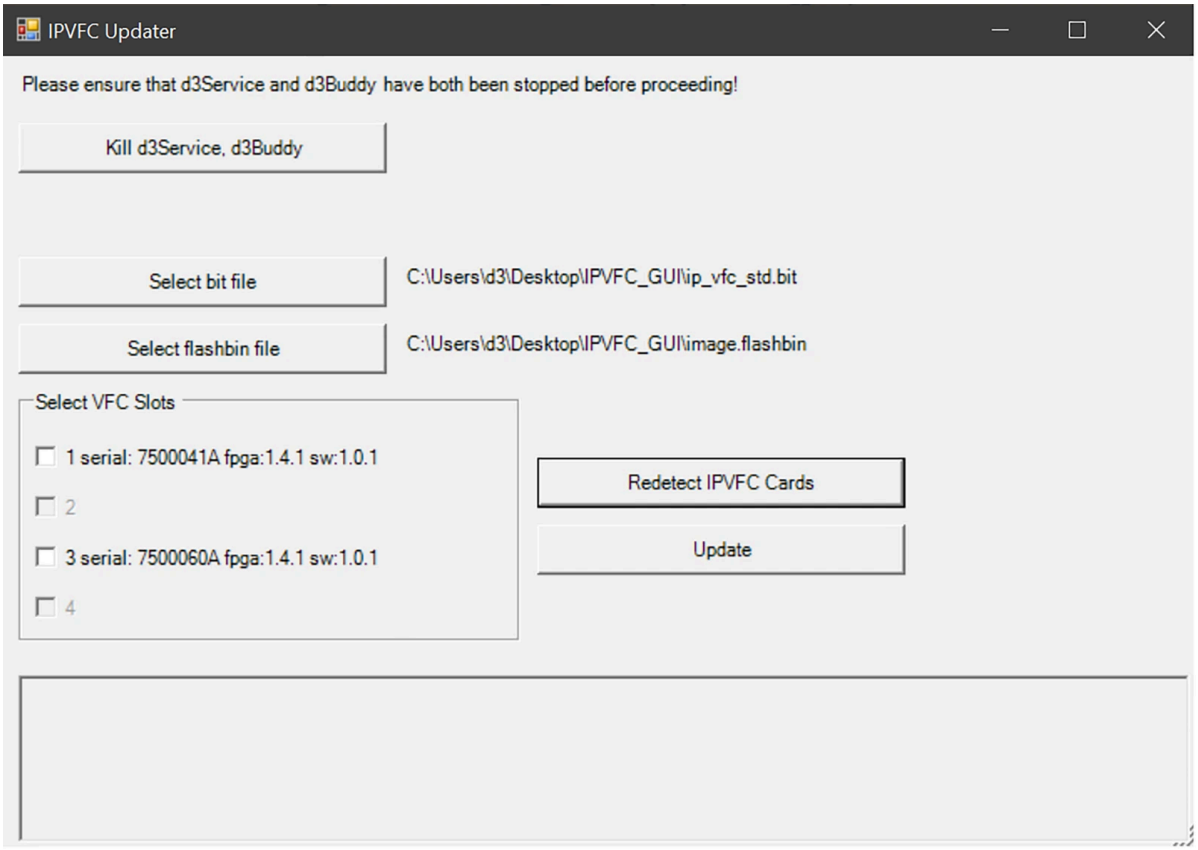
IP-VFC Firmware Update

We regularly release newly updated firmware for the IP-VFC card. These can be found on our resources page.

Here we provide instructions on how to check and update your IP-VFC card's firmware.

Check IP-VFC firmware

1. Download the IP-VFC firmware updater download tool and latest firmware.
2. Right-click the `IPVFCUpdaterGUI` PowerShell script and click **Run with PowerShell**.
3. Click the **Kill d3Service, d3Buddy** button.



4. Click **Redetect IP-VFC Cards**. Detected IP-VFC cards then appear in the VFC Slots list detailing the serial number as well as the versions of software that the card is running.
5. If no cards appear in the list but there are cards plugged into the system, wait for at least two minutes and click **Redetect IP-VFC Cards** to populate the list.

Update IP-VFC firmware

1. Perform all of the steps in the **Check IP-VFC Firmware** in the above section.
2. Click **Select bit file** and select the **.bit** file from the version you want to install.
3. Click **Select flashbin file** and select the `.flashbin` file from the version you want to install.
4. Check all the boxes next to the cards that you would like to update.
5. Click the **Update** button.
6. Separate PowerShell windows will then appear with the progress of each cards update.
7. After approximately 7 minutes the cards will have finished updating and will automatically reboot.
8. Click **Redetect IP-VFC Cards** and check that all the cards that were updated now display in the list with the correct version (Note: the reboot process takes approximately 2 minutes).

If there were any problems with an update, the logs from each card are stored in the same folder as the updater.

2x2plus Overview

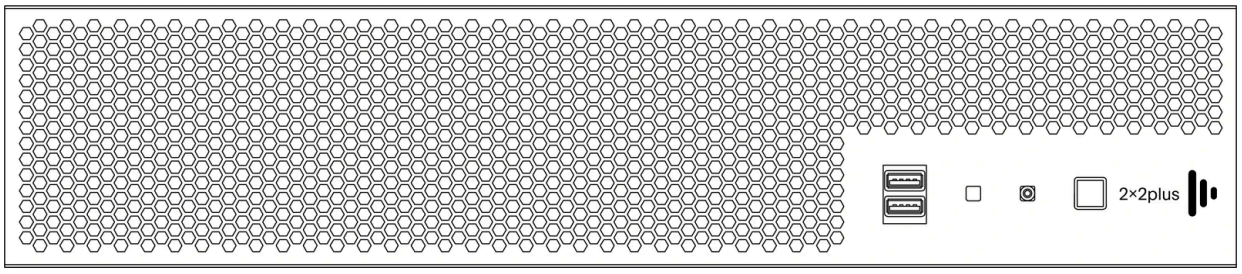
> **Warning**
>
> Do not open or remove the case unless you are instructed to do so by a certified Engineer.

The machines come pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

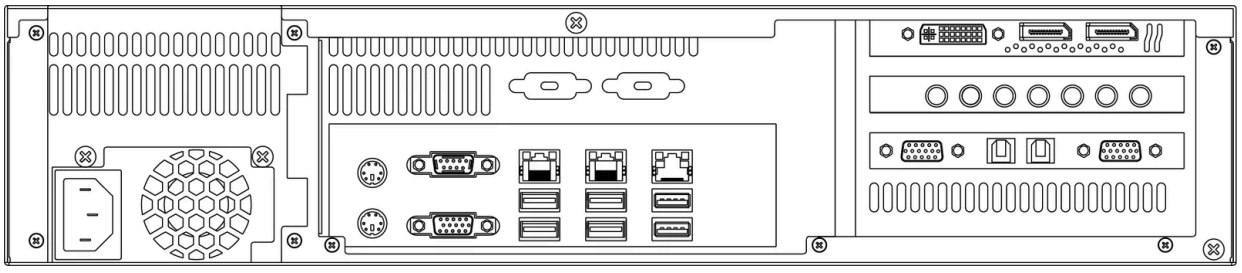
For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

2x2 machine

Front view of 2x2



Rear view of 2x2



If you experience any problems with hardware please contact the **support team**.

2x2plus Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

If you encounter any issues with the Redisguise process, please review the Notes/ Help section at the bottom of this page.

Redisguise is the process of updating and restoring the system using a bootable USB drive.

This process can be used to update to a newer OS image or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

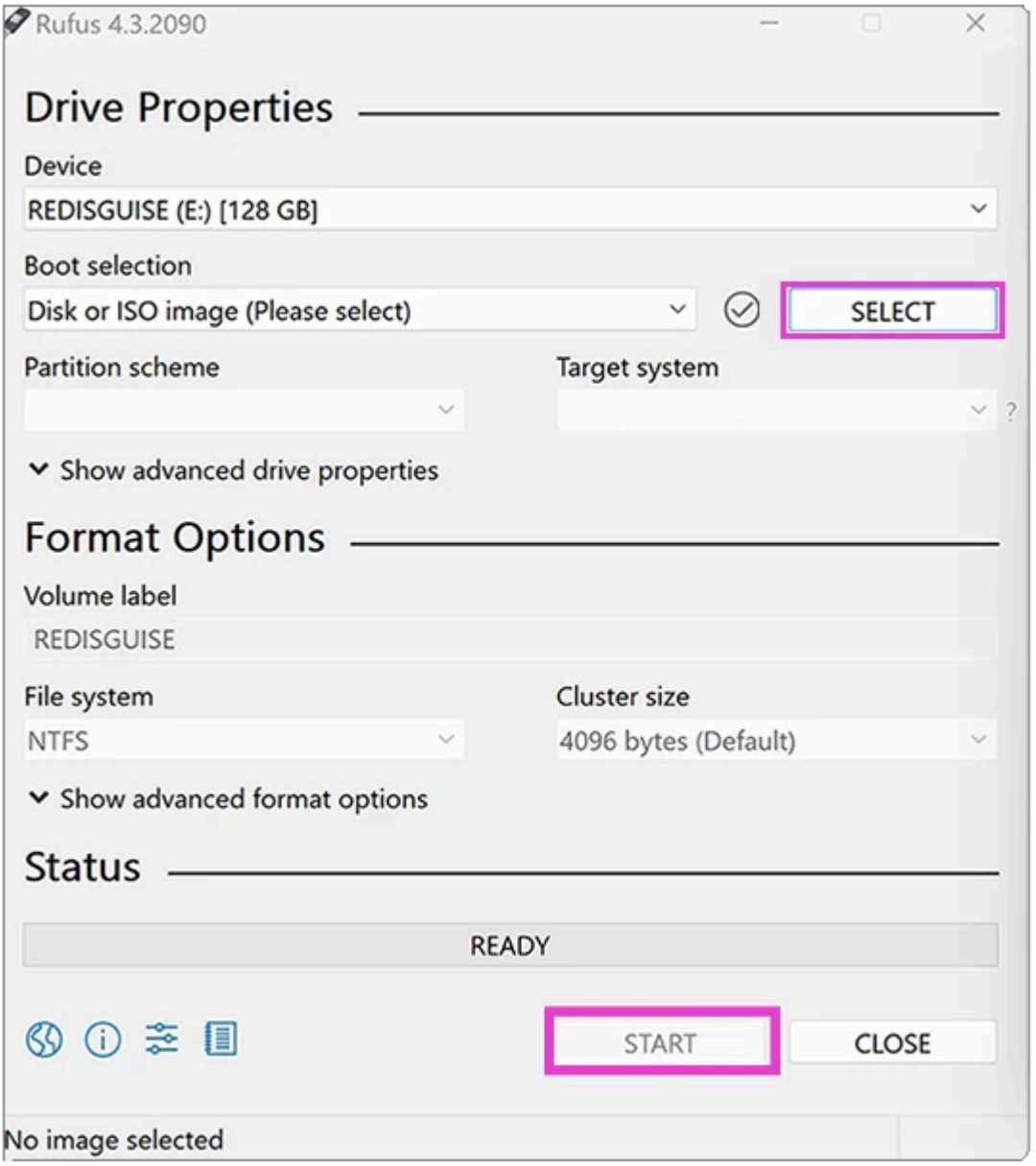
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: “REDISGUISE” as per image
- An internet connection to the machine you are re-imaging.
- OS images can be found **Hardware OS Imaging**.
- Download and install a version of **7Zip**

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick, open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.

- **7-Zip** archive tool/file manager.



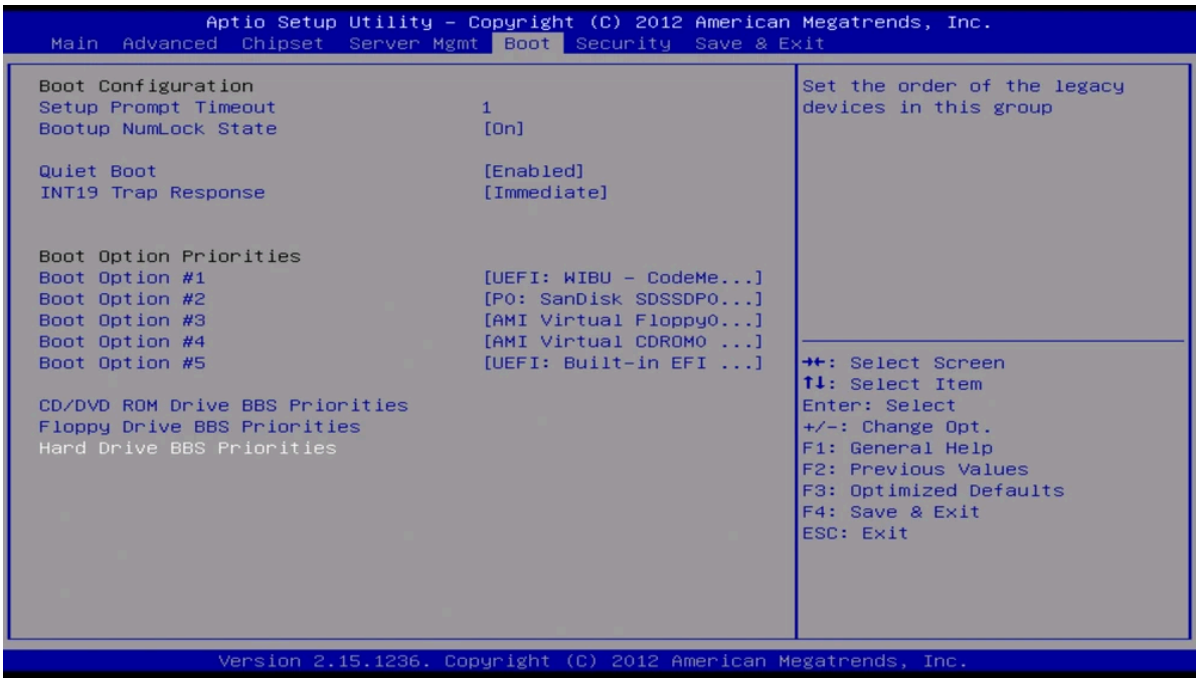
The settings should be:

- `Partition scheme - MBR`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

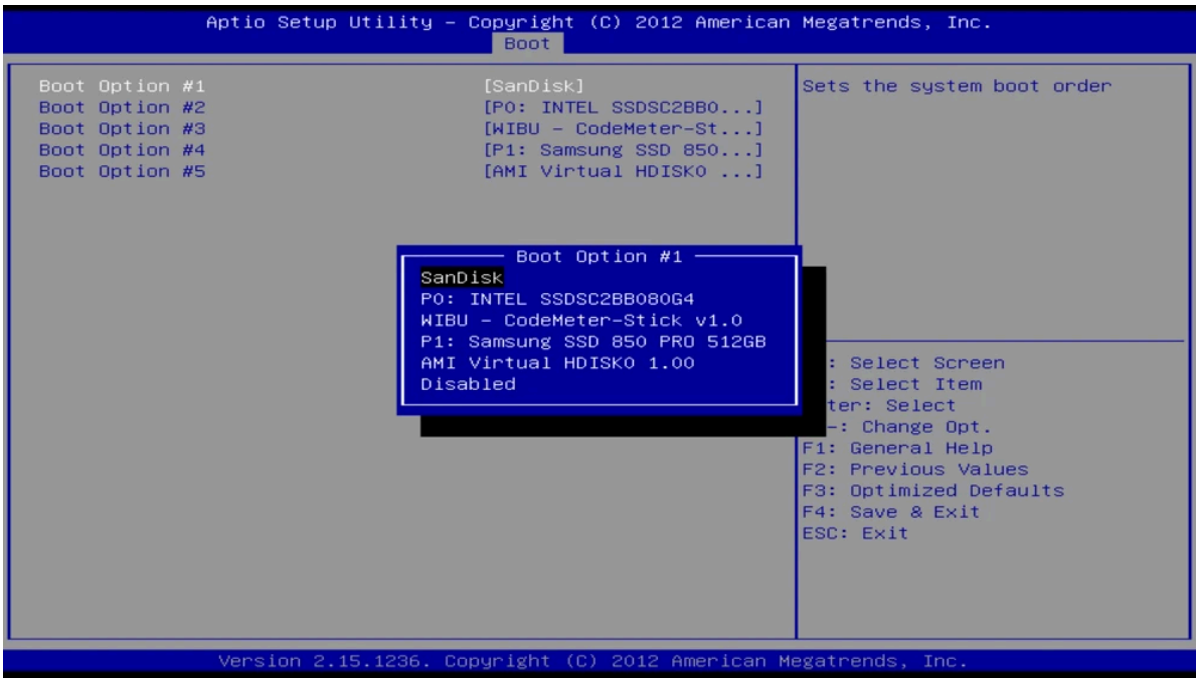
Booting into the USB

1. Insert the USB key and a keyboard into the system.
2. Invoke the BIOS whilst the system is posting by continuously pressing the **Delete** key.
3. Navigate to the BOOT tab and select **Hard Drive BBS Priorities**.

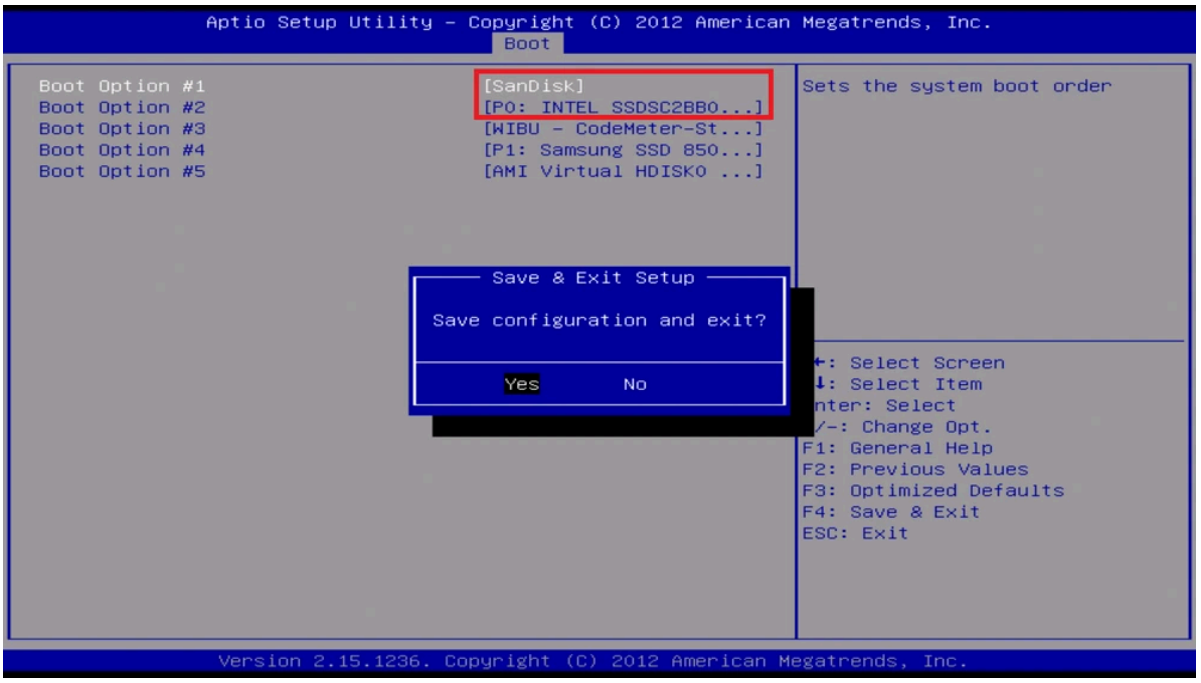


4. Select Boot Option #1. Select your USB key from the menu. Normally, it is listed as the name of the Vendor of the USB key **(SanDisk)**.

5. Select Boot Option #2. Please ensure this is listed as the OS drive **(INTEL SSDSC2BB080G4)**.



6. Please press **F4** to **Save configuration and exit**. This should reset the computer and prompt you with a **Press any key to boot from USB window**.



7. Press **Enter** when the **"Press any key to boot from USB"** window appears, and you should be booting into the USB.



8. After this, you will need to press **Enter** once to boot into the USB, and the re-imaging process will commence - it should take around 20 minutes or so to complete, and two system restarts will be part of the automated process.
9. The system will boot up in a Windows inactivated state. Wait 20-30 seconds or so, so Microsoft's servers can successfully authorise the system. With a mouse connected to any of the USB ports, right-click on the start icon on the taskbar and select System. This will prompt the system to update its activation state.

The Redisguise process will run automatically until the re-imaging has completed. The system will reboot and run scripts on startup. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

2x2plus Specifications

Hardware Specifications

	2x2
Voltage	100-240V, 50-60Hz*
Power Connection	IEC
Power Consumption Peak	350W
Heat Dissipation Peak	1,194 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 8.1 Embedded Pro
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	2U 19" rack mount
OS	2x Internal Storage Drives
Storage	2x 512GB Removable NVMe SSD
Memory	8GB RAM (2x 4GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

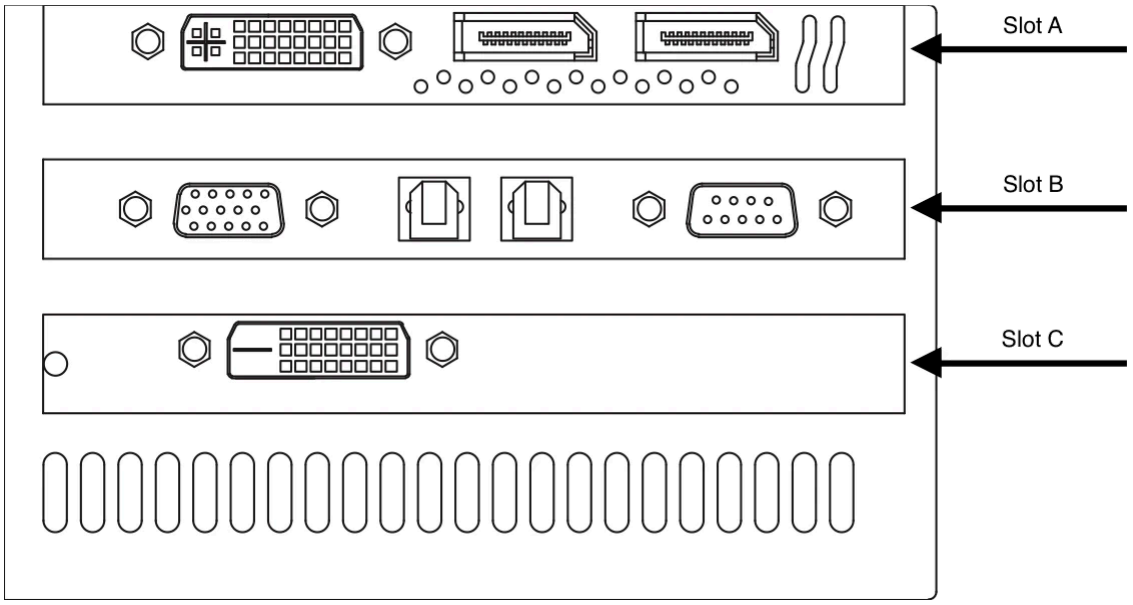
	2x2
Video output	2x DisplayPort 1.2 outputs (max. 2560 x 1600p resolution)
Video input	Optional input cards: 3x 1.5G inputs (HD-BNC connectors) 2x 3G inputs (HD-BNC connectors) 1x DVI input (DVI-D connector)
Optical Audio	Optional: ADAT/SPDIF (Toslink connector) - 1x in, 1x out

	2x2
MIDI	Optional: MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio	Default - Stereo (1x in, 1x out) Optional audio card: Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in
General Network	2x 1GbE/sec
High Speed Network	N/A
System Management Controller	N/A
Data/Peripherals	4x USB 2.0 2x USB 3.0
Video Sync	N/A

2x2plus Card Configuration

The Disguise 2x2 comes in a variety of optional factory fitted configurations. Your machine configuration can only be changed by sending it back to Disguise to be upgraded. The following configurations are available:

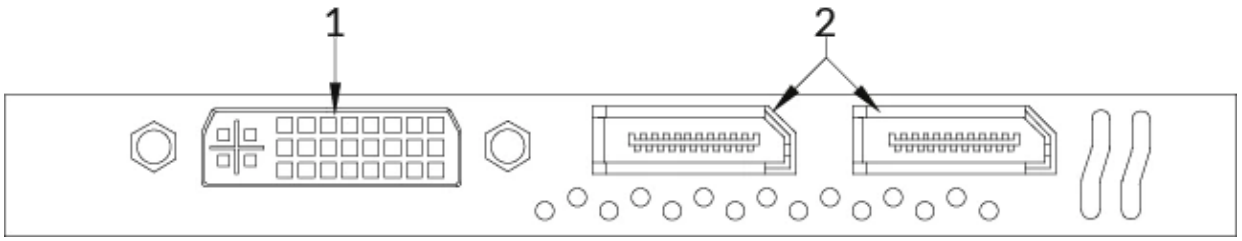
- No capture, a choice of on-board audio or Pro Audio
- 1 x DVI capture, a choice of on-board audio or Pro audio,
- 2 x 3G-SDI, a choice of on-board or Pro audio



Rear view card configuration

Slot A

Slot A is video output and is non-configurable. The 2x2 has 1 control / GUI output and 2 dedicated DisplayPort stage outputs



Video output card

Video output card

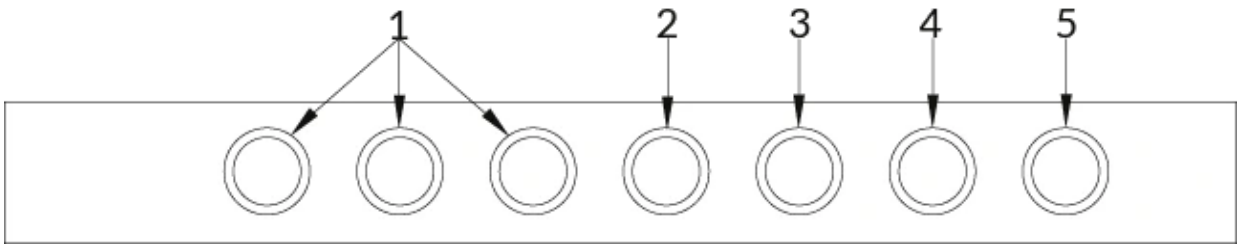
1. DVI
2. DisplayPort

The control / GUI output is situated on the DVI connector ONLY, enabling you to configure the system, operate Windows and program the softeware environment. This output CANNOT be used for output to the stage.

Supported resolutions on the DisplayPort outputs and DVI output are up to 2560x1600 @ 60hz. (When using the correct DisplayPort to DVI adapter).

Slot B

Slot B is by default On-Board Audio but can be configured to be Pro Audio I/O.

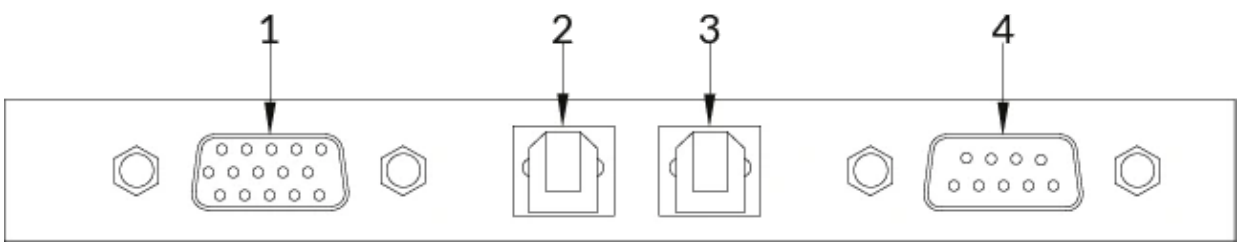


Pro audio card

On-board audio card

1. Not in use
2. Output line level
3. Output mic level
4. Input mic level
5. Input line level

Pro audio



Pro audio card

1. Analog audio
2. ADAT in
3. ADAT out
4. Digital audio

Slot C

Slot C has three options: no capture, DVI capture, or 3G-SDI capture. Capture options are factory fitted.

DVI capture

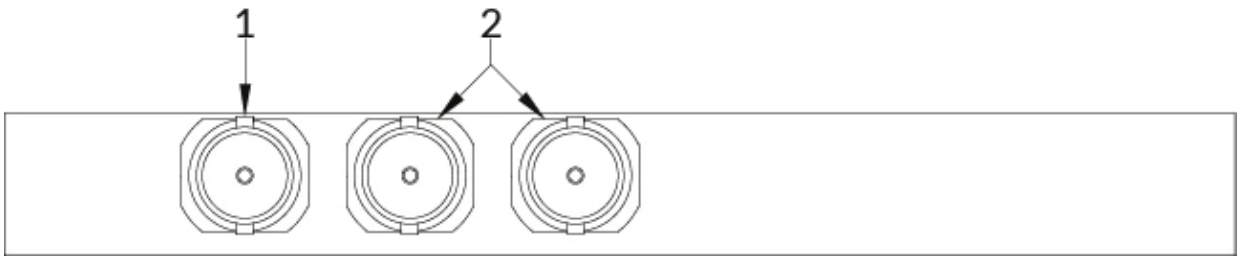


DVI capture card

1. DVI

Supported resolutions are up to 1920x1200 @ 60hz.

3G-SDI capture



3G-SDI capture card

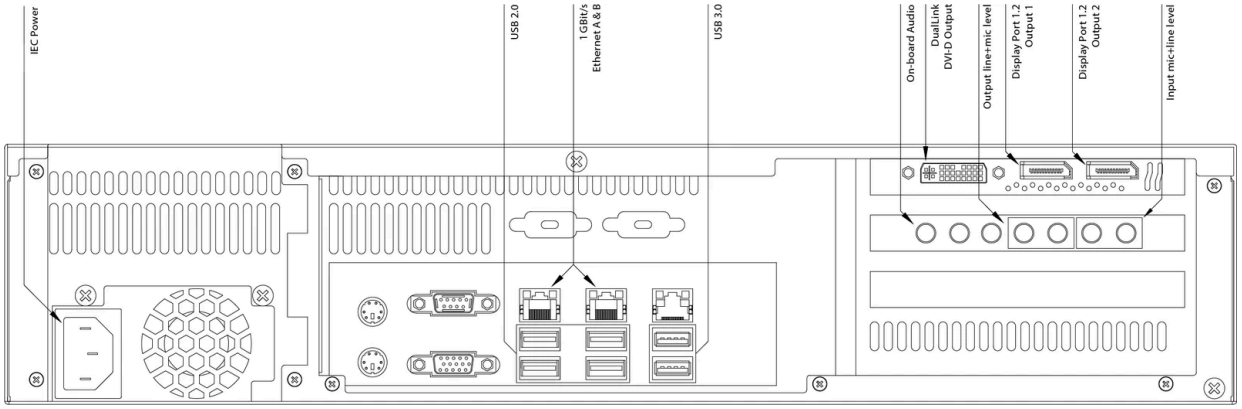
1. Not in use
2. 3G-SDI

Supported resolutions are up to 1920x1080 @ 60hz.

2x2plus Diagrams

2x2 Base unit

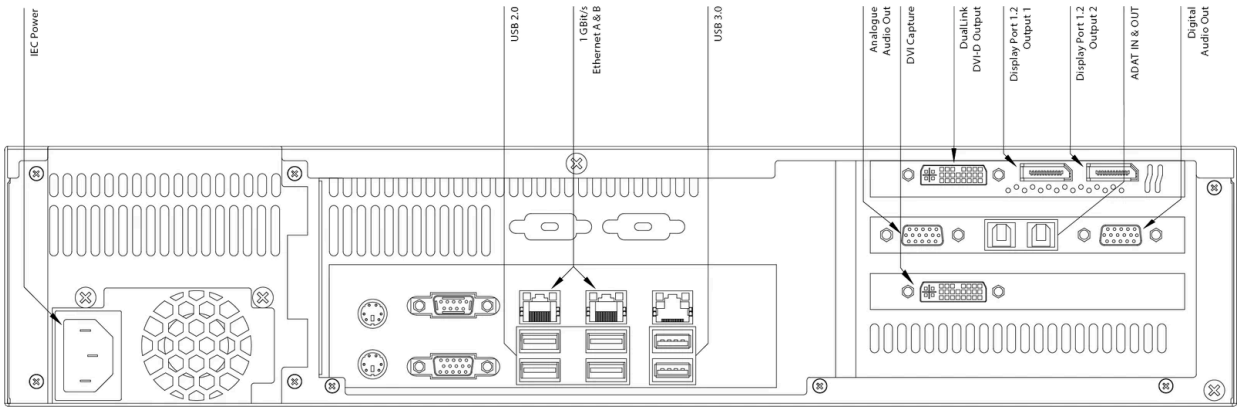
The base unit has no video capture card and comes with the on-board audio card (Pro-audio is also available). Base unit 2x2 rear panel diagram



Base unit 2x2 rear panel diagram

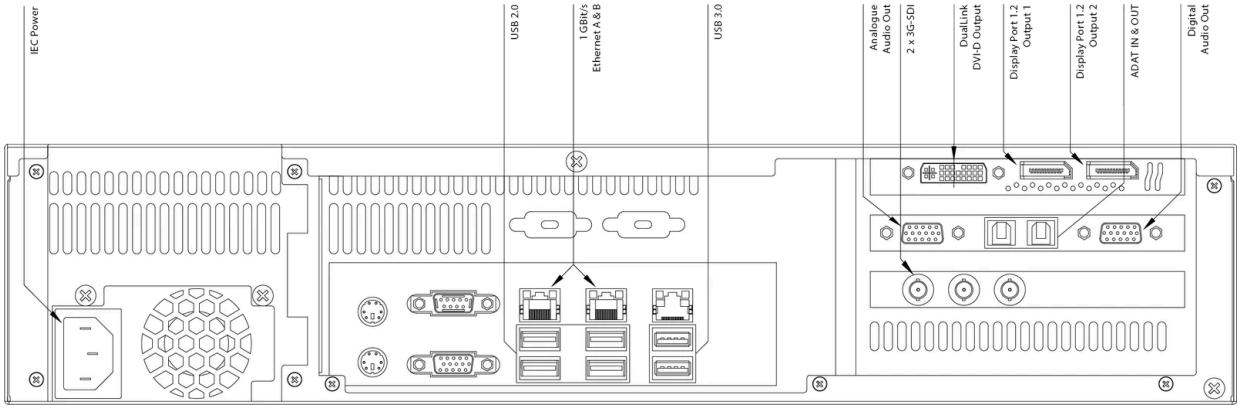
2x2 Configuration A

1 x DVI video capture card and shown with Pro-audio card (on-board audio is also available).



2x2 Configuration B

2 x 3G-SDI video capture card and shown with Pro-audio card (on-board audio is also available).


IEC Power
USB 2.0
1 GBit/s
Ethernet A & B
USB 3.0
Analogue
Audio Out
2 x 3G-SDI
DualLink
DVI-D Output
Display Port 1.2
Output 1
Display Port 1.2
Output 2
ADAT IN & OUT
Digital
Audio Out

2x2plus DVI Capture



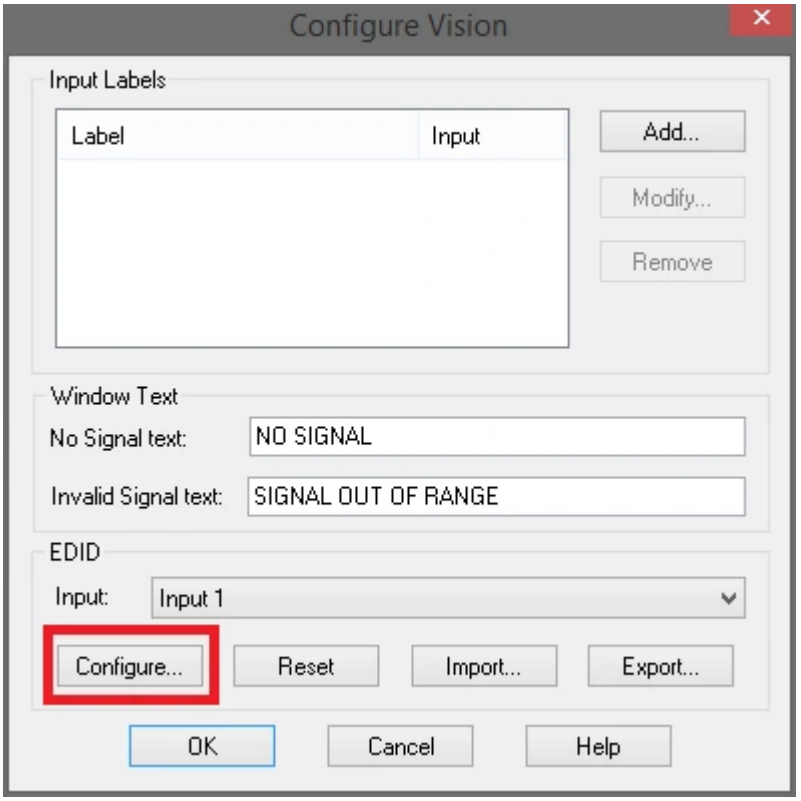
Technical limitations

> **Warning**
>
> Maximum Supported resolution: Resolutions up to 1920x1200@60hz

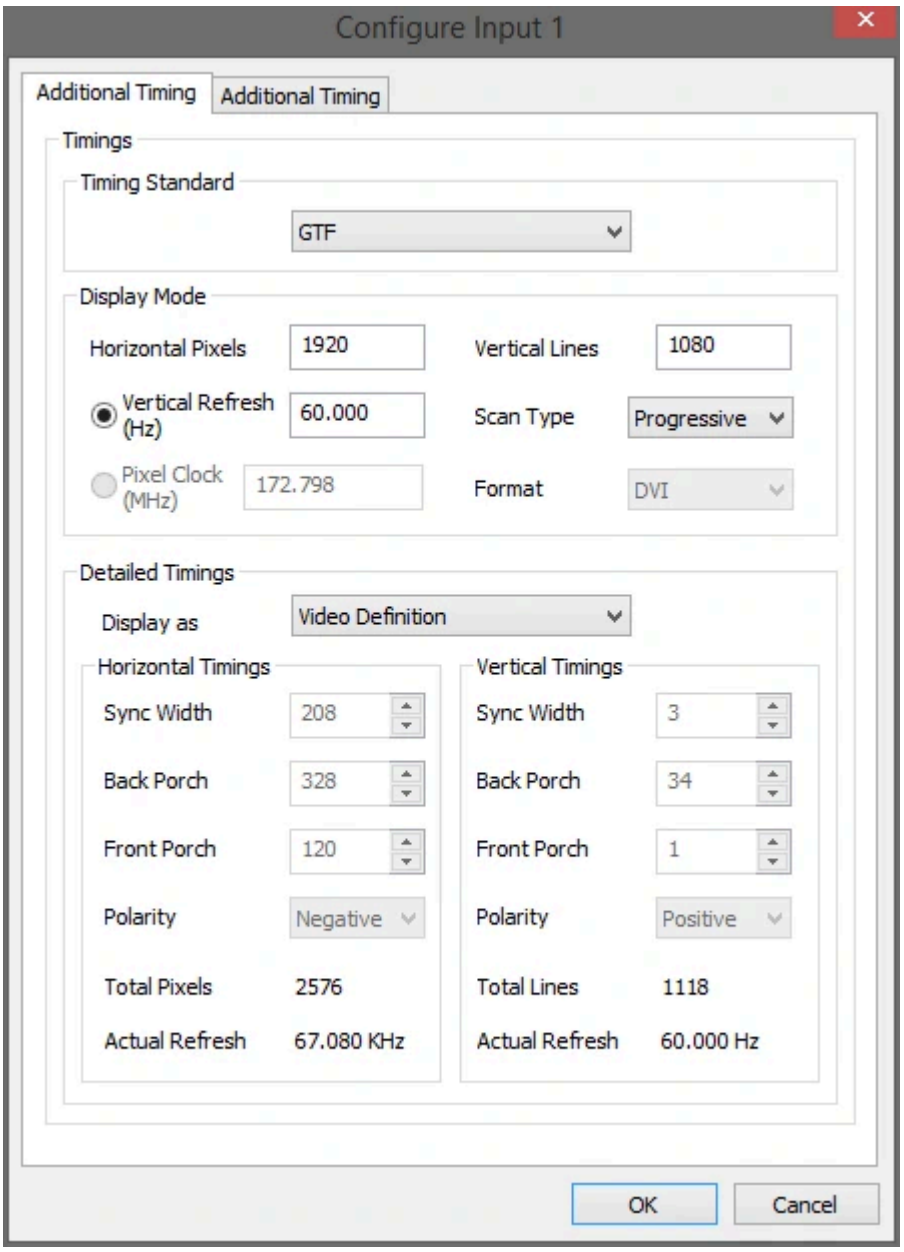
> **Warning**
>
> Colour Sampling Supported: RGB 8-8-8, YUV 4-2-2

Configuring presented EDID to source device

1. Open the **Configure Vision** application and click the **Configure** button!

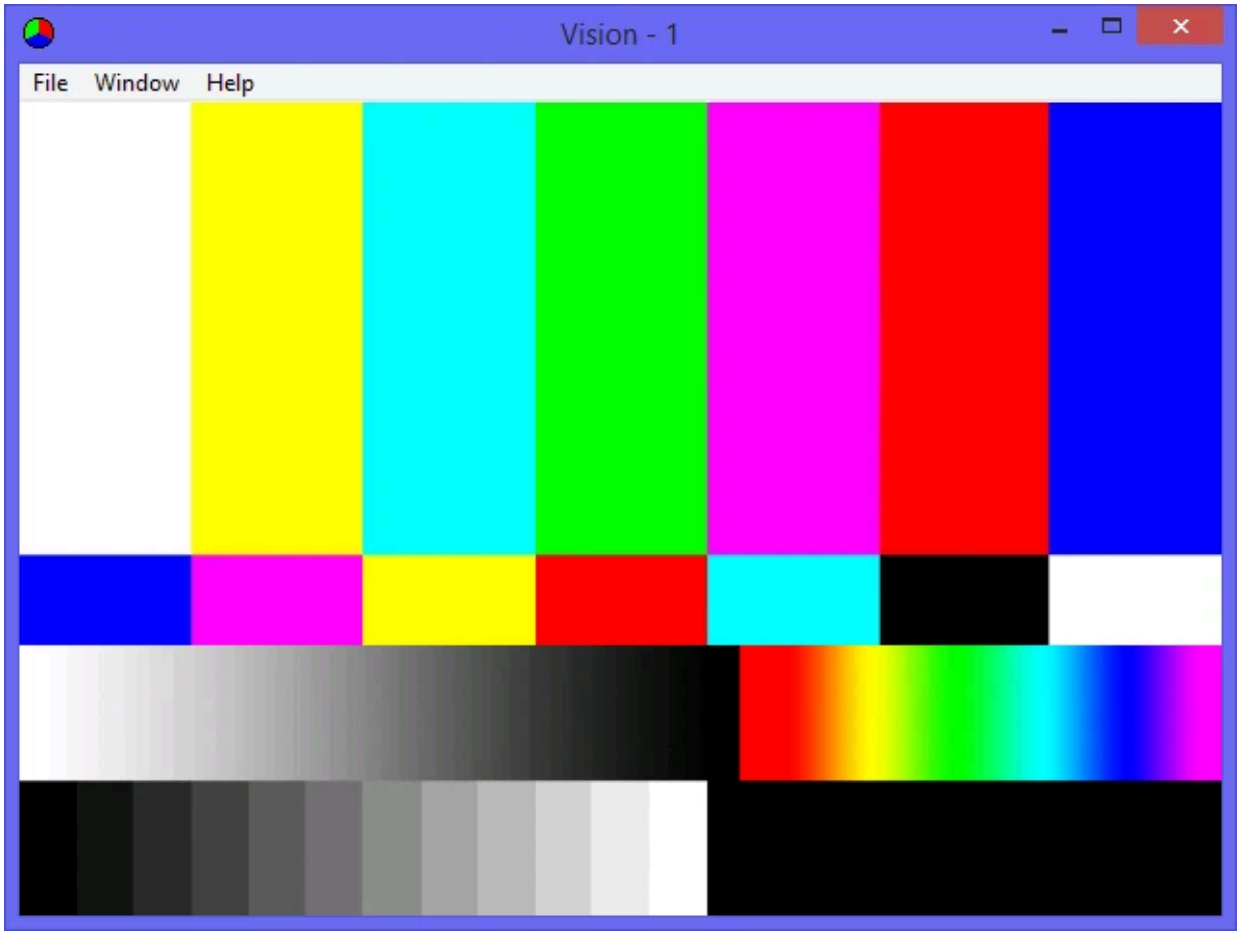


2. Create an EDID to present to the source device, for example a laptop.



Preview DVI Input outside

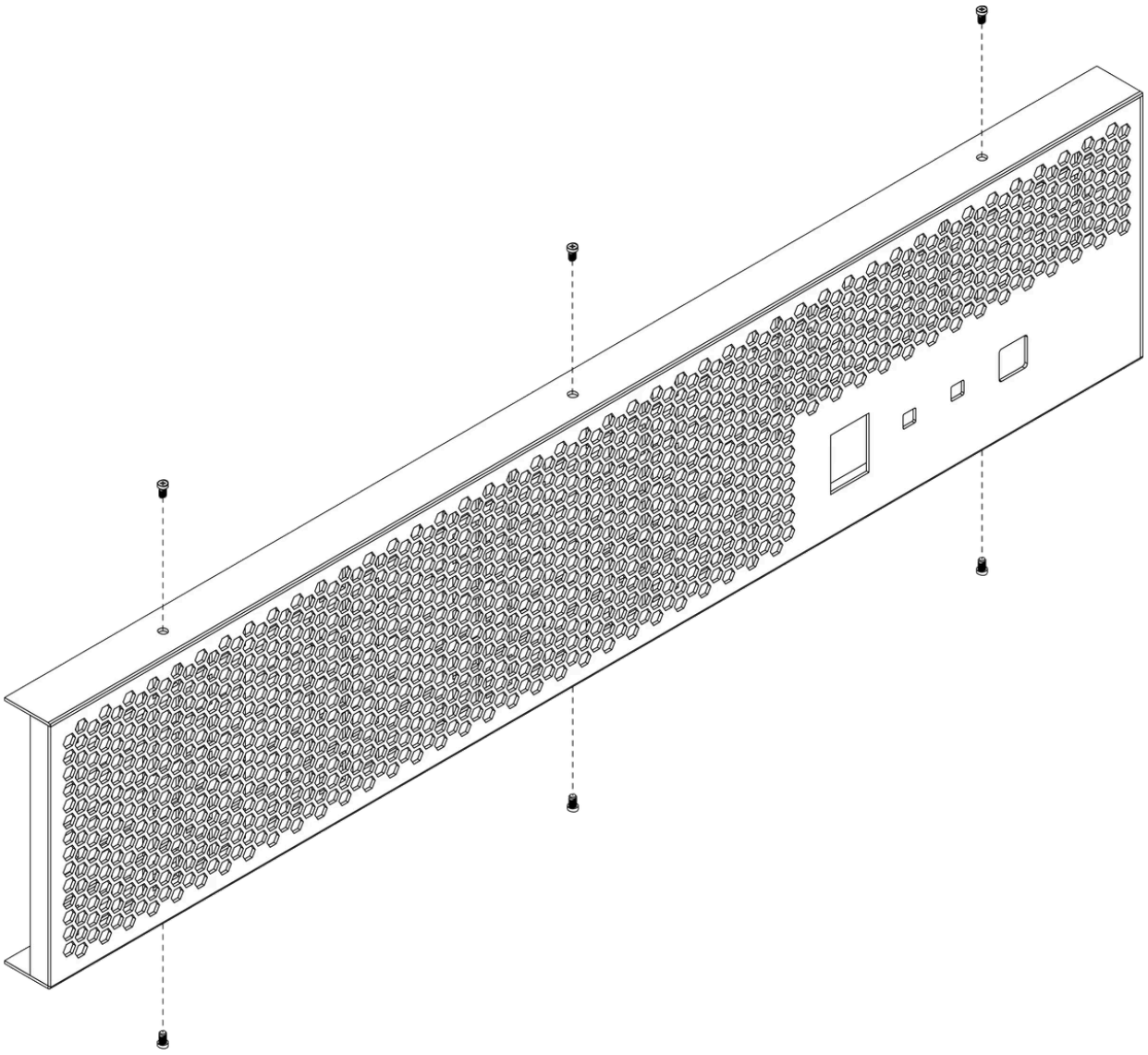
1. Please open the Vision Window application to show DVI capture outside the software.


Vision - 1
File
Window
Help

2x2plus Filter Replacement

You should regularly inspect the air filter on the front of the unit to prevent loss of cooling efficiency.

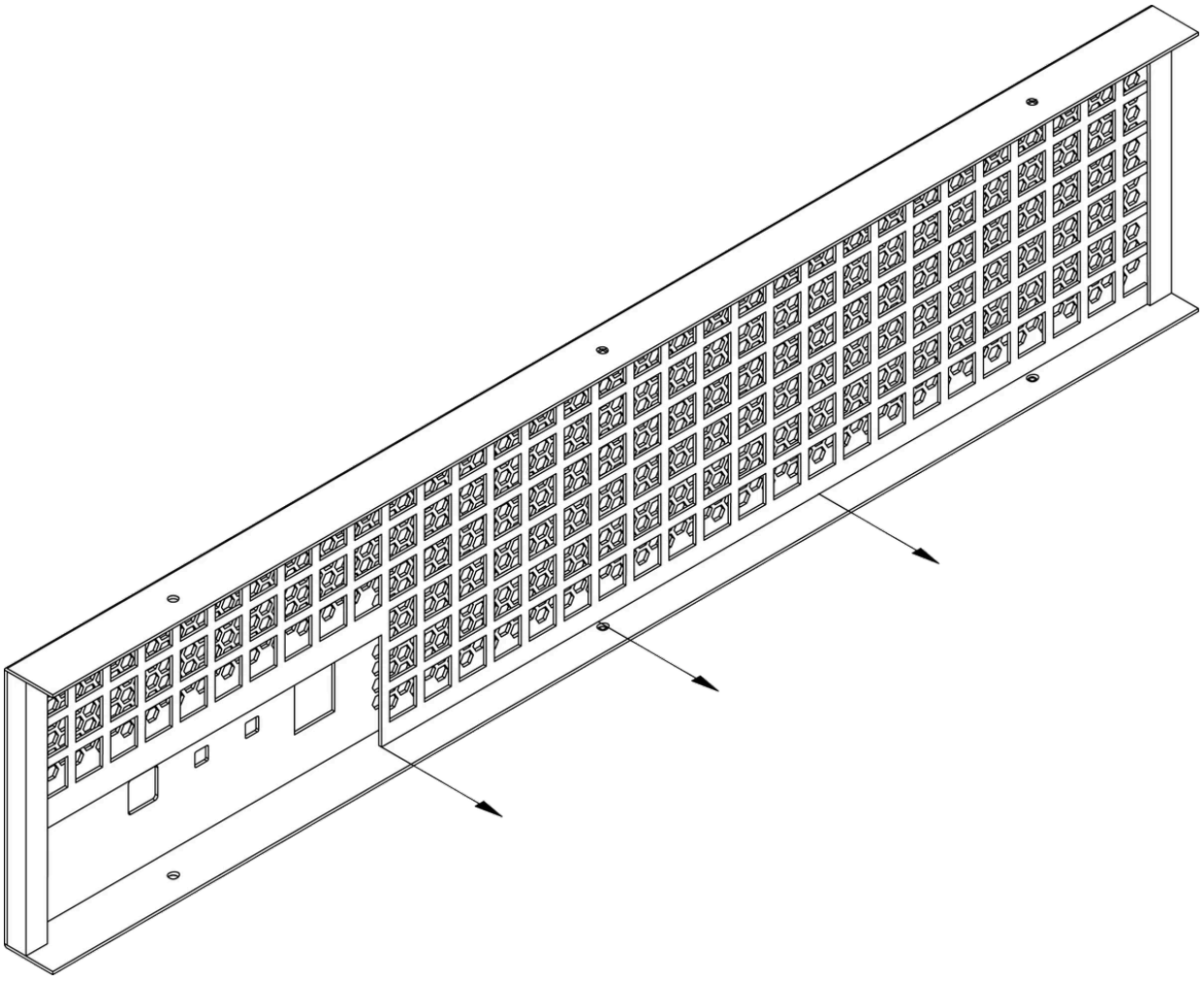
To access the filter, remove the 3 top facia screws and the bottom 3 facia screws. Then simply pull the entire facia off to get access to the filter.



Air filter housing front

> **Note**
>
> Please note: It is recommended that you service the air filter when the unit is powered off. If the unit is on you will be exposed to the system fans.

To remove the perforated metal grid keeping the filter in place, please pull from the middle out.



Air filter housing rear

Give the filter a clean, replace the filter in the metal frame and reattach the facia to the front of the unit.

Onboard Audio

The onboard audio card has two channels of audio input and two channels of audio output.

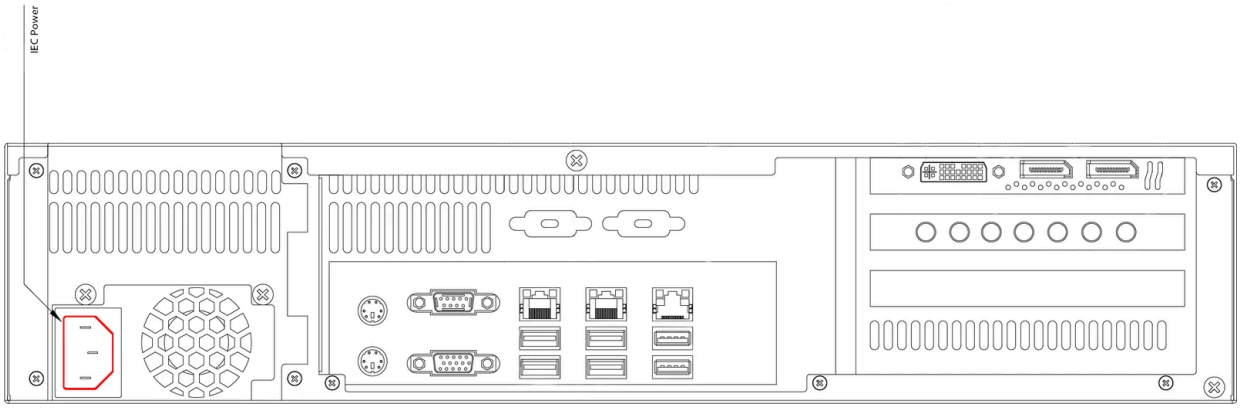
These connections are made over mini-jack (3.5 mm) connections. There are 2 points of connection both for input and output.

One set is for line level audio and one set is for mic level audio.

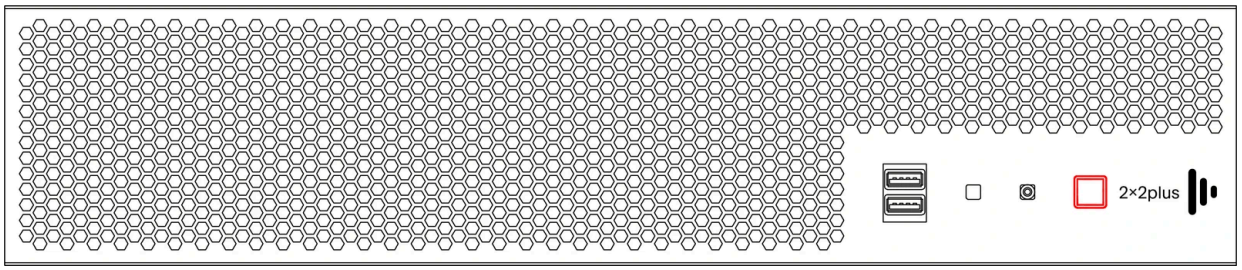
> **Warning**
>
> Audio does not appear as a configurable device unless a mini-jack is connected on the back of the system

Powering the 2x2plus

1. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
2. Press the power button on the front of the unit and wait for the system to load into Windows.



Location of power input on rear of the plus range unit

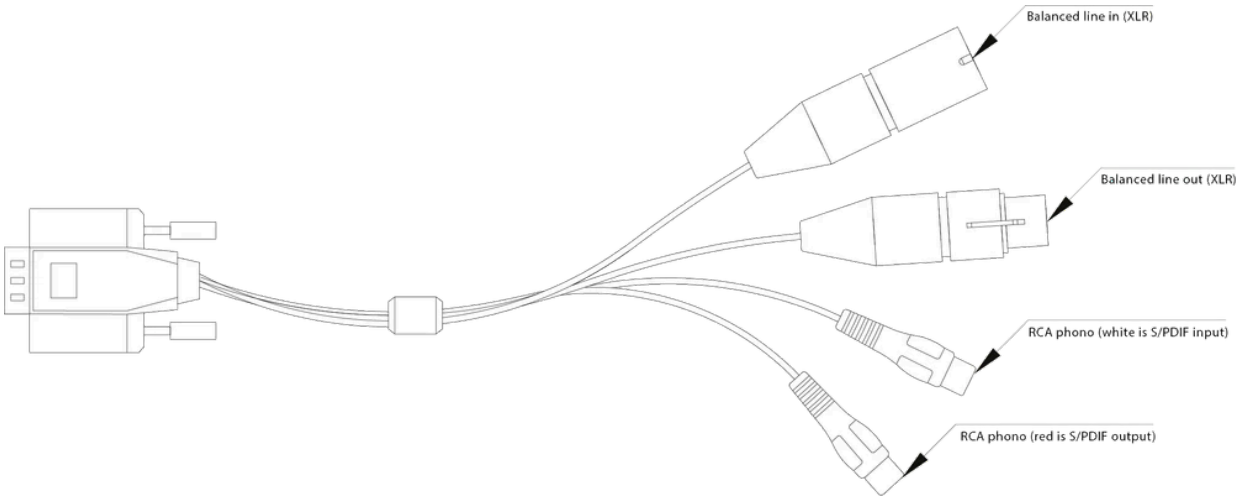


Location of power switch on front of unit

Pro Audio

Digital breakout cable

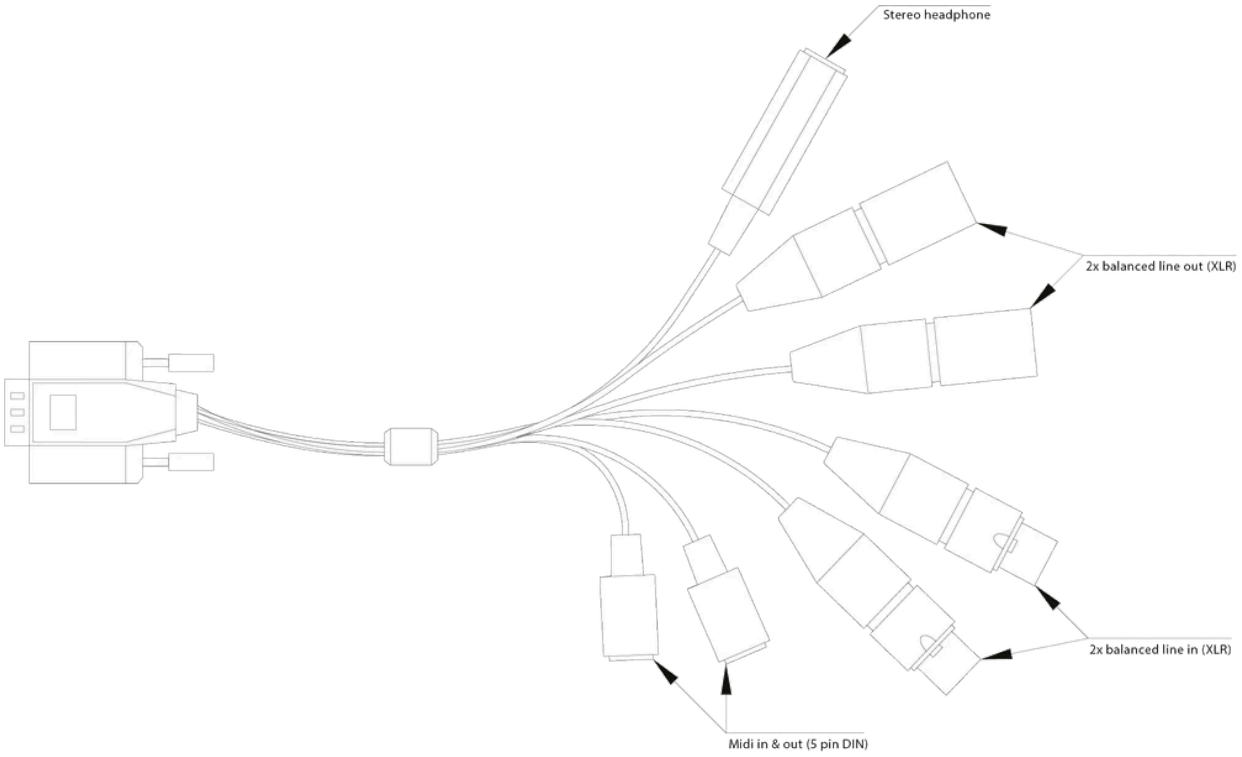
This digital breakout cable provides the following inputs and outputs:



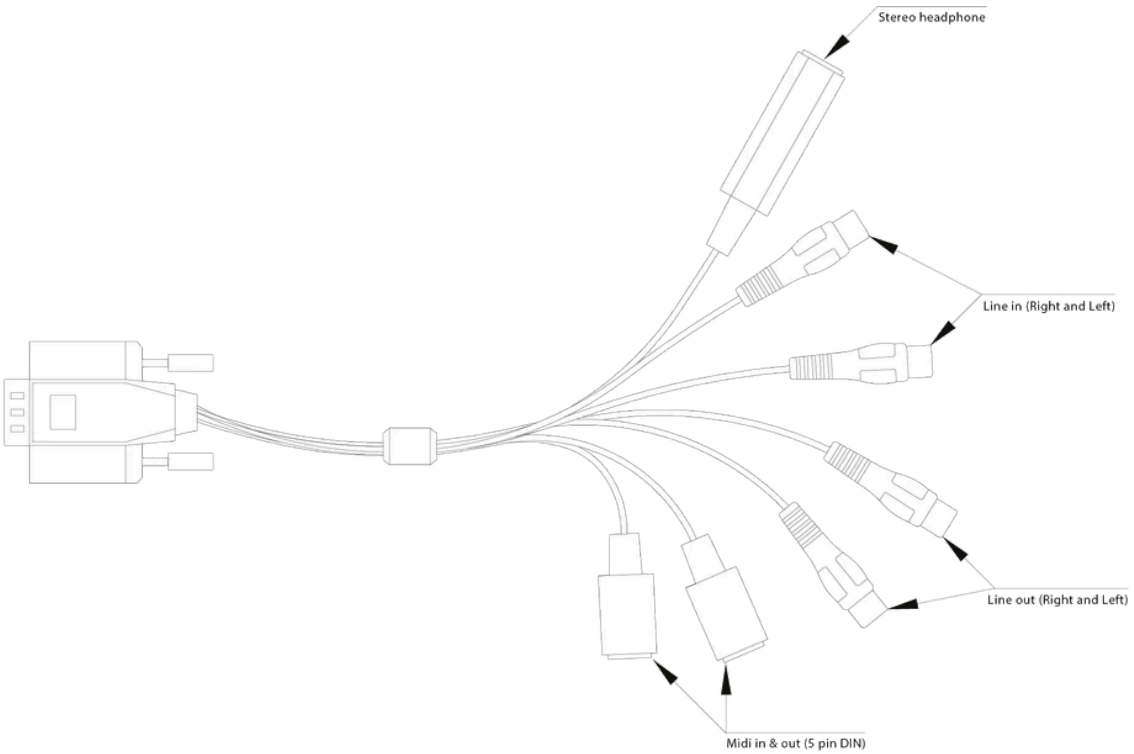
Analog breakout cables

The Pro audio option comes with analog breakout cables which lets you choose which input/output to use.

HDSPe AIO: Analog breakout cable, balanced



HDSPe AIO: Analog breakout cable, un-balanced

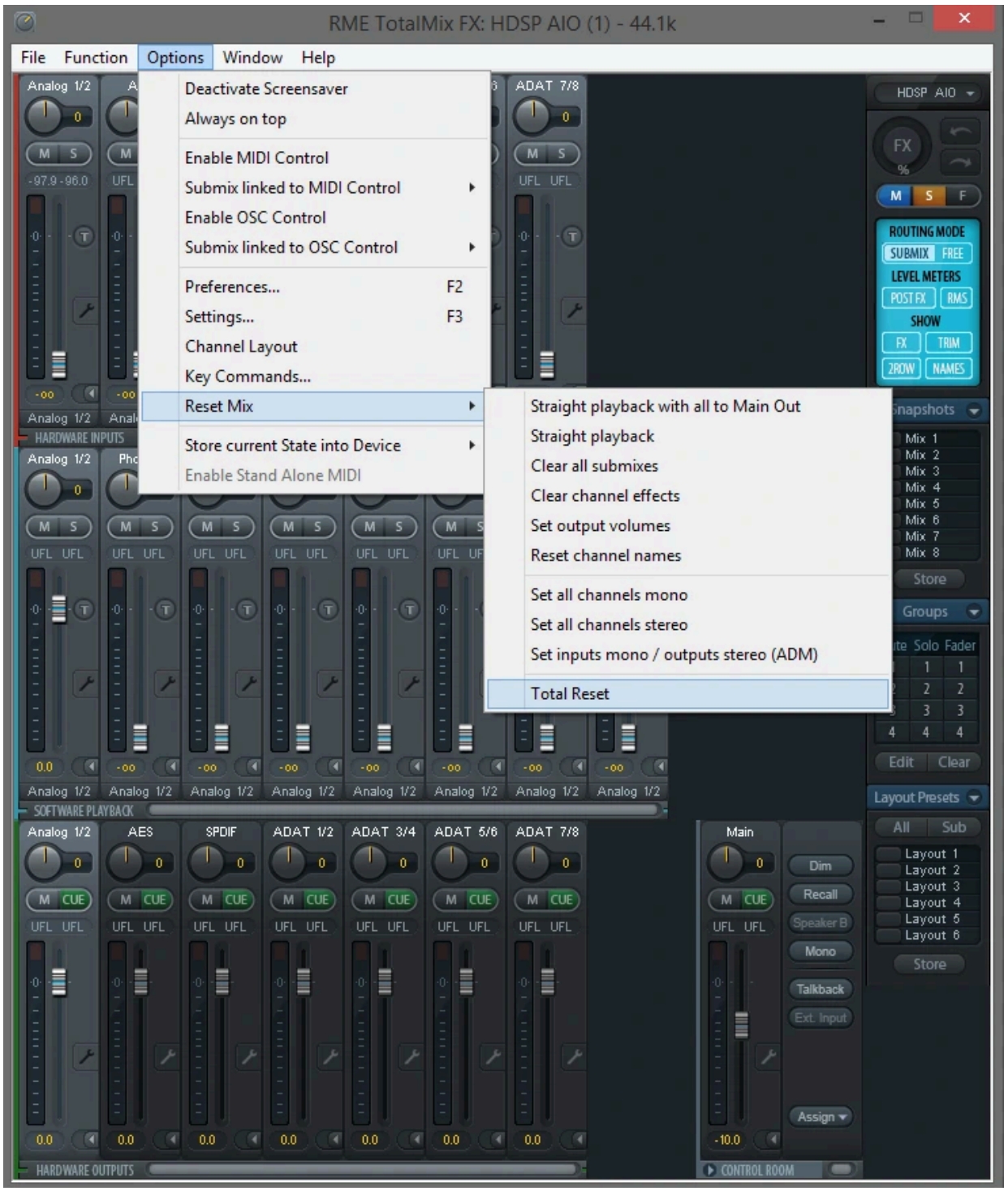


Are different breakout cables available?

There are several variations of the audio breakout cables available.

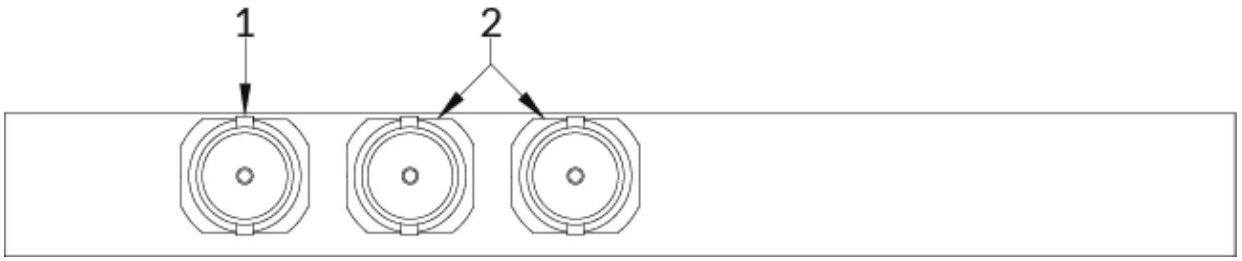
Please refer to the RME website for more information.

Resetting Pro-audio mixer to default settings



Please see the audio output patch topic for more information on how to configure your output channels.

Optional SDI Video Capture



3G-SDI capture card

1. Not in use
2. 3G-SDI

Supported resolutions are up to 1920x1080 @ 60hz.

LED Indicators

LED	Explanation
Magenta, pulse, fast:	3G Level ‘B’ SDI input.
Magenta, pulse, slow:	3G Level ‘A’ SDI input.
Blue, pulse, slow:	1.5G SDI input.
Yellow, pulse, slow:	270Mb/s SDI input.
Amber, pulse, slow:	270Mb/s ASI input.
Off:	No valid input signal detected.

Maximum number of unique inputs

SD-SDI	1.5G SDI	3G-SDI
2	2	2

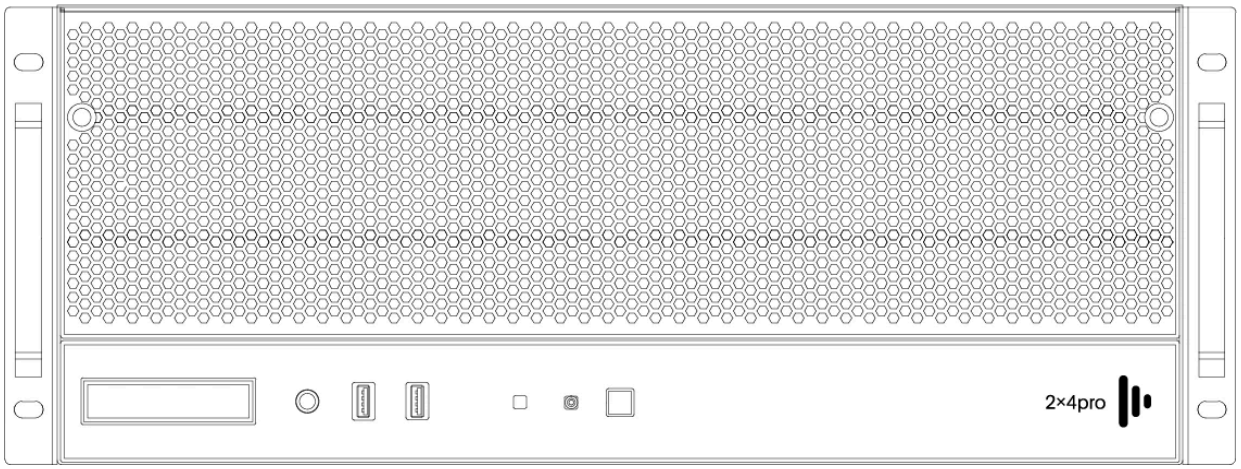
> **Warning**
>
> 4K video capture over 2 x 3G-SDI is not currently supported

Supported formats

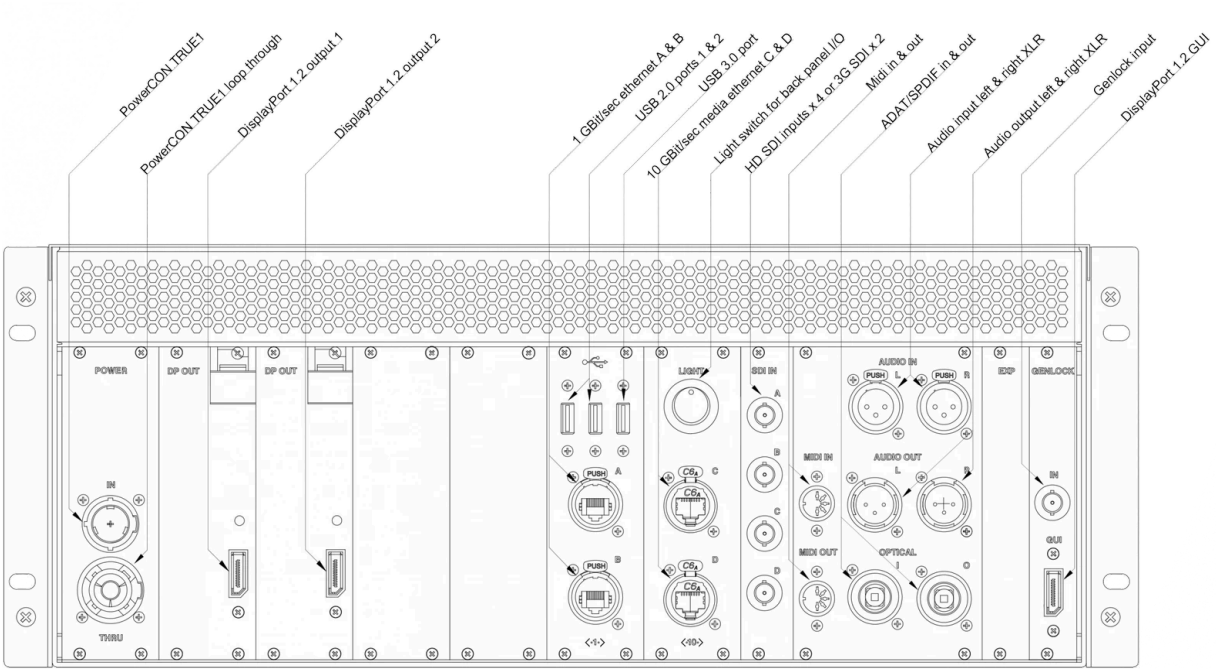
Resolution	Format	Hz
720x486	interlaced	59.94
720x576	interlaced	50.00
1280x720	progressive	23.976, 24, 25, 29.97, 30, 50, 59.94, 60
1920x1080	interlaced	47.96, 48, 50, 59.94, 60
1920x1080	PsF	23.976, 24, 25, 29.97, 30
1920x1080	progressive	23.976, 24, 25, 29.97, 30, 47.96, 48, 50, 59.94, 60
2048X1080	progressive	23.976, 24, 25, 29.97, 30, 47.96, 48, 50, 59.94, 60
2048X1080	interlaced	47.96, 48, 50, 59.94, 60
2048x1556	PsF	14.98, 15, 18.98, 19

The max single input datarate 3G/1080p60hz.

2x4pro Diagrams



2x4pro front panel



2x4pro rear panel annotated

2x4pro Overview

> **Warning**
>
> Opening hardware may void your warranty. Consult support before opening the hardware.

> **Warning**
>
> Do not open or remove the case unless you are instructed to do so by a certified Engineer.

If you experience any problems with hardware please contact the **support team**.

The machines come pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

For detailed information on the specifications for each plus and pro machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our website.

2x4pro Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

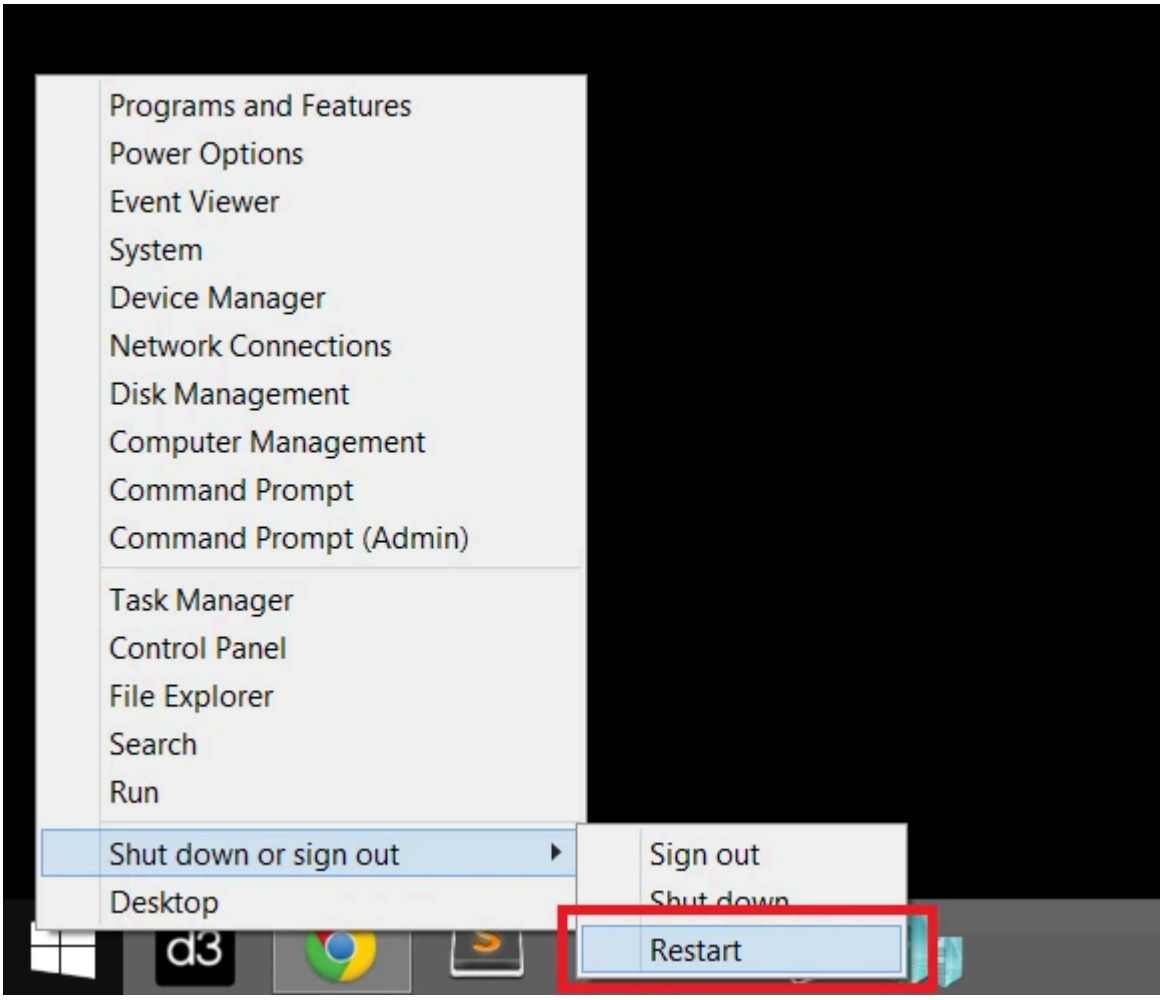
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

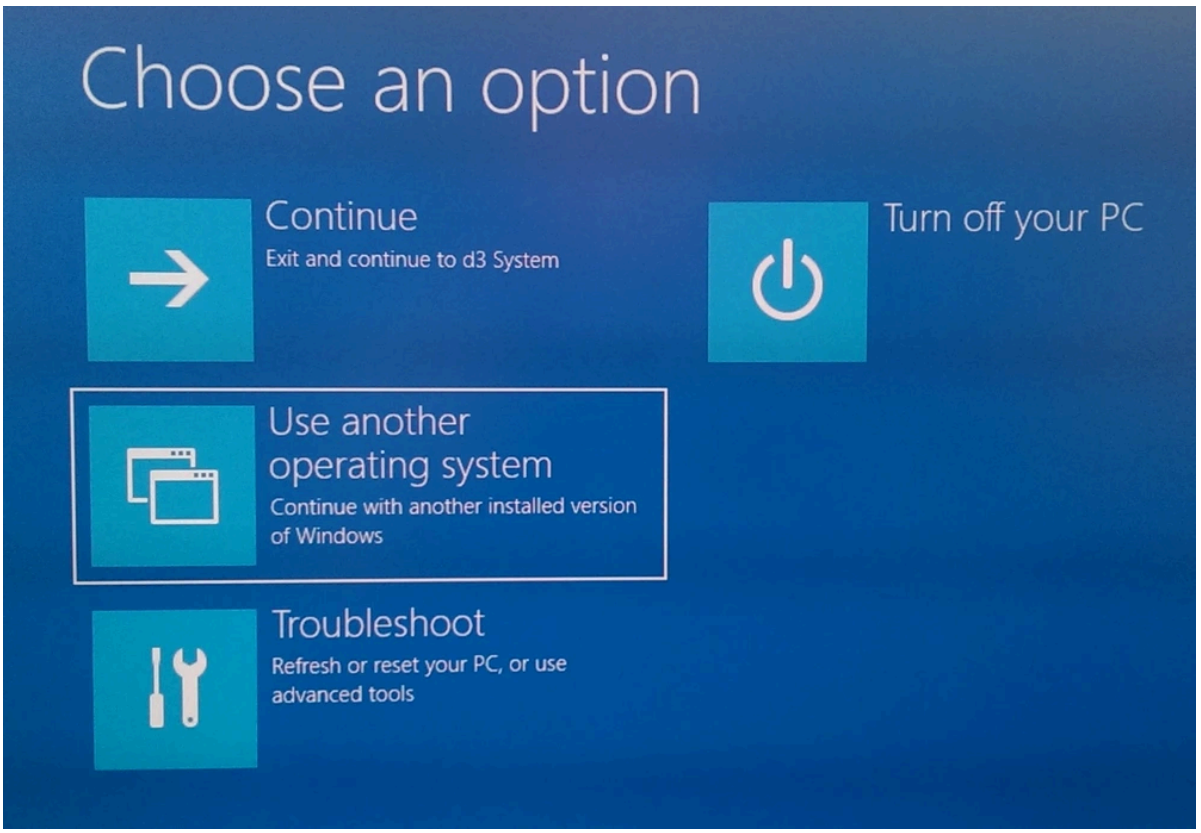
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

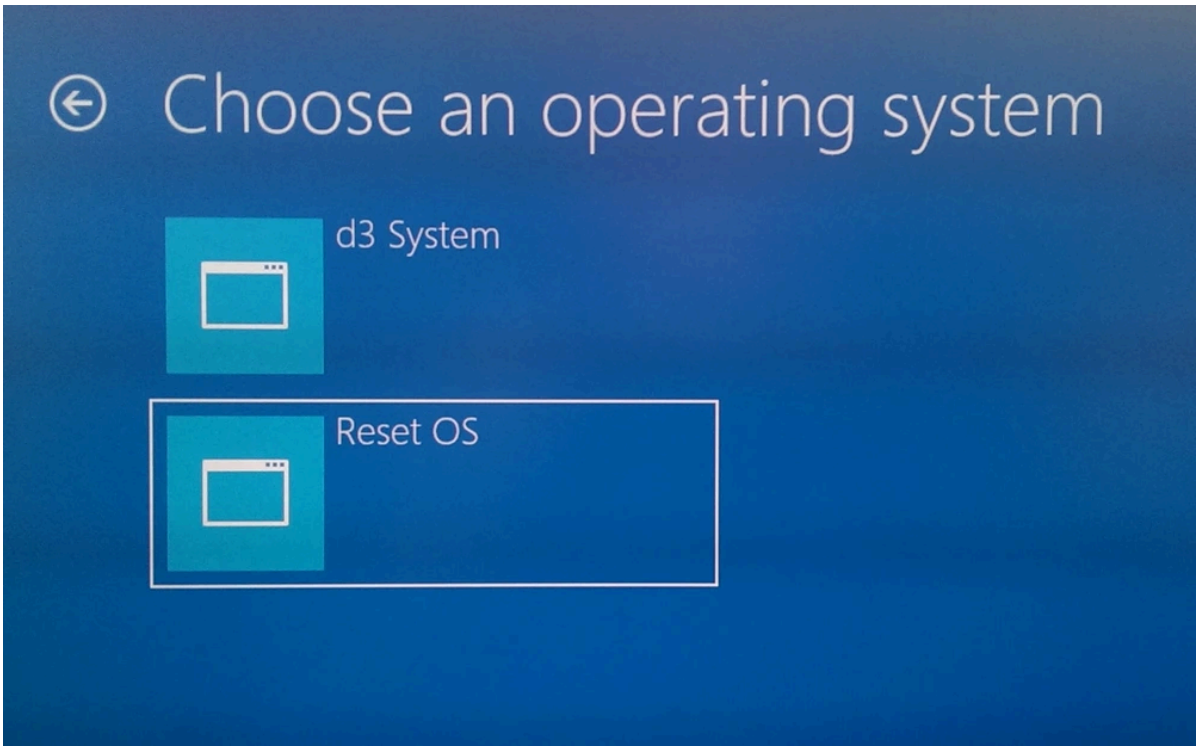




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

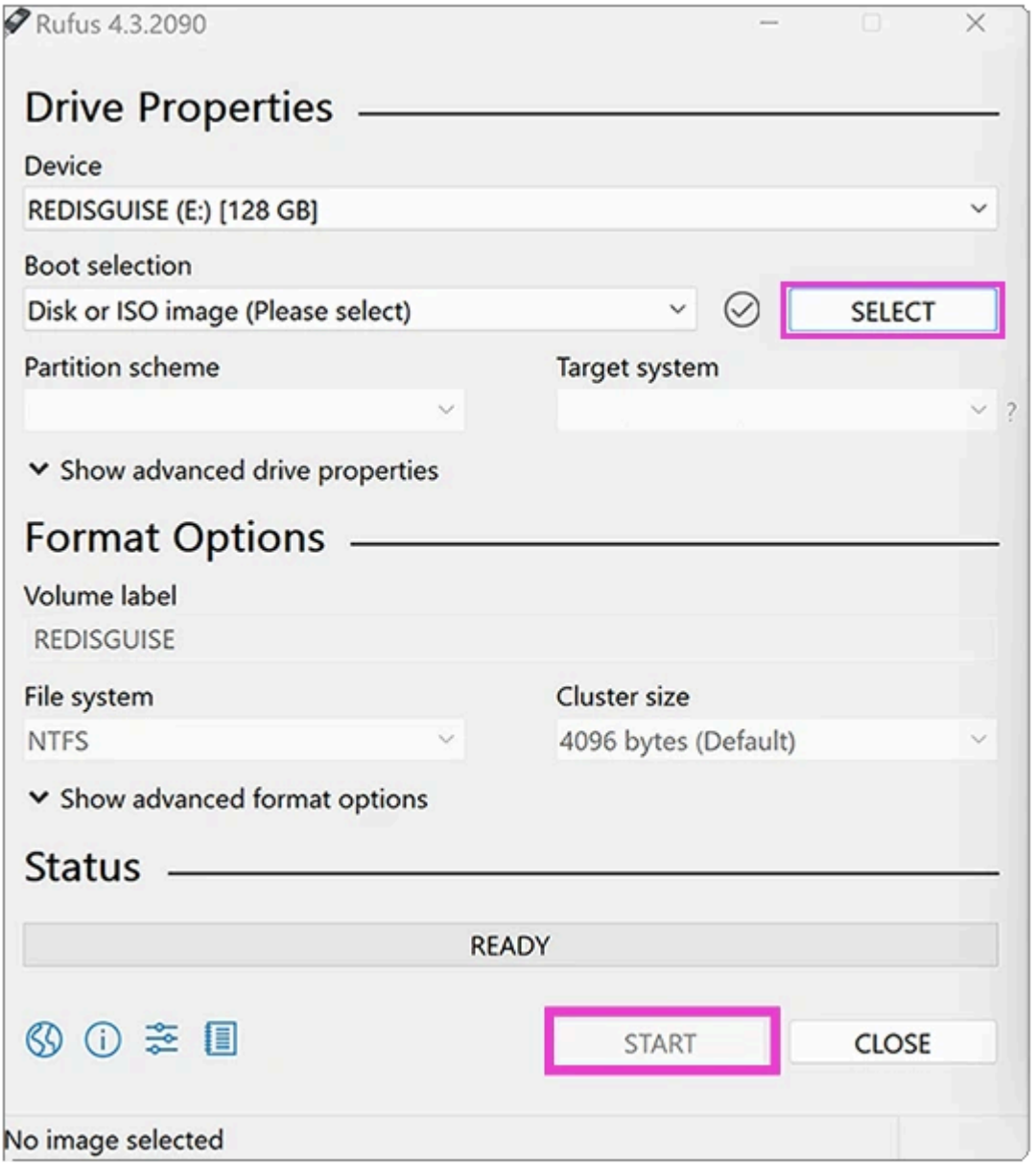
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
- **7-Zip** archive tool/file manager.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.

- **7-Zip** archive tool/file manager.



The settings should be:

- `Partition scheme - MBR`
- `Target system - BIOS (or UEFI-CSM)`
- `Volume label - automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

Booting into the USB

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete key** until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Navigate to the **Boot** tab.
4. Select **Hard Drive BBS Priorities**.
5. Change Boot Option #1 to your USB thumb drive (the name will look different depending on the manufacturer of the drive).
6. Press **ESC** to return to the main section.
7. Navigate to the **Save & Exit** tab (**Do not** Save & Exit the BIOS itself).
8. In the **Boot Override** section, select the USB that matches the name of your USB manufacturer. **DO NOT** select the one that starts with UEFI.

The Redisguise process will run automatically until the re-imaging has completed. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

2x4pro Specifications

Hardware Specifications

	2x4pro
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	500W
Heat Dissipation Peak	1,706 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 IoT Enterprise LTSB
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	1x 1.92TB Removable NVMe SSD
Memory	16GB RAM (4x 4GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

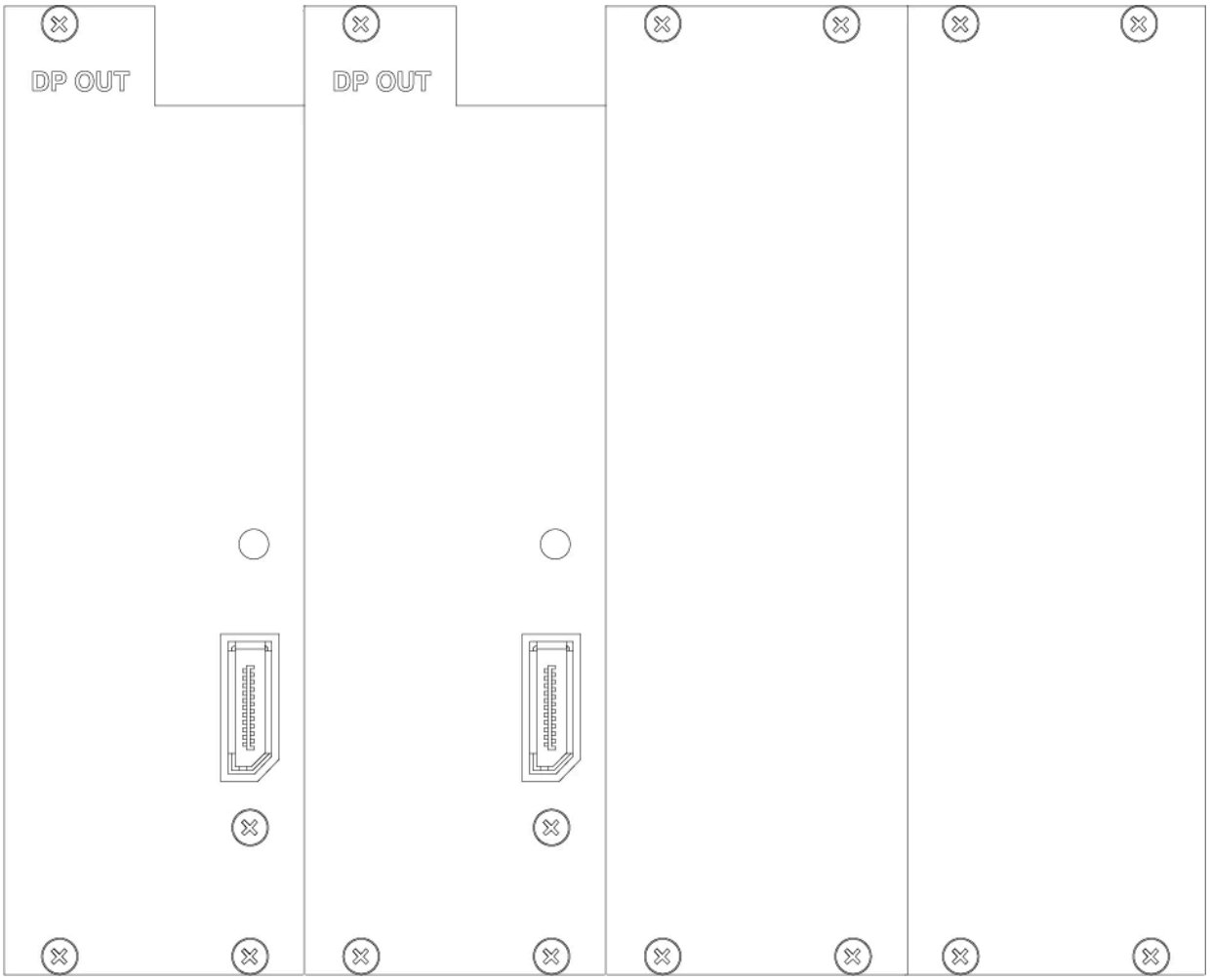
	2x4pro
Video output	2x 4K outputs using VFC cards (with integrated EDID management
Video input	4x 1.5G inputs or 2x 3G inputs (HD-BNC connectors)
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in

	2x4pro
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	N/A
System Management Controller	N/A
Data/Peripherals	5x USB 3.0
Video Sync	BNC Genlock

4K Output - 2x4pro

The 2x4pro ships with the standard configuration of Display Port cards.

> **Warning**
>
> We highly advise using DisplayPort cables specifically validated for: DP 1.2, DP 1.2a or 21.6 Gbps bandwidth.



2 x DisplayPort 1.2 outputs on rear of 2x4pro

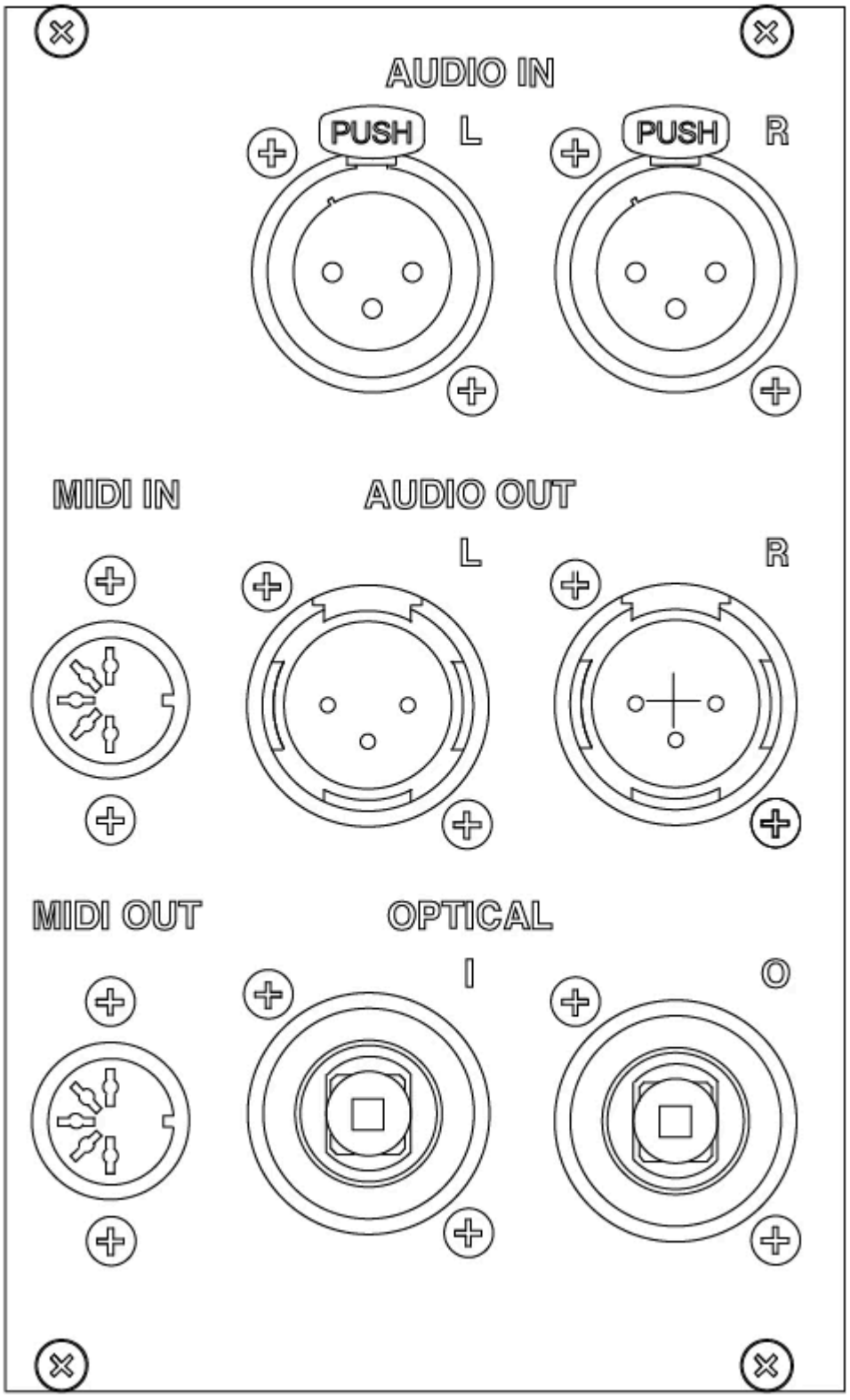
Display Port 1.2 enables Disguise servers to support resolutions up to 4096x2160 60hz over Single Stream Transport.

2x4pro Audio Input and Output

The 2x4pro is equipped with a broadcast quality pro audio card which uses the latest 192kHz AD and DA converters.

Back panel connections

- XLR Left + Right Input
- XLR Left + Right Output
- ADAT/SPDIF Input
- ADAT/SPDIF Output
- MIDI Input
- MIDI Output



Audio connections on rear of 2x4pro unit.

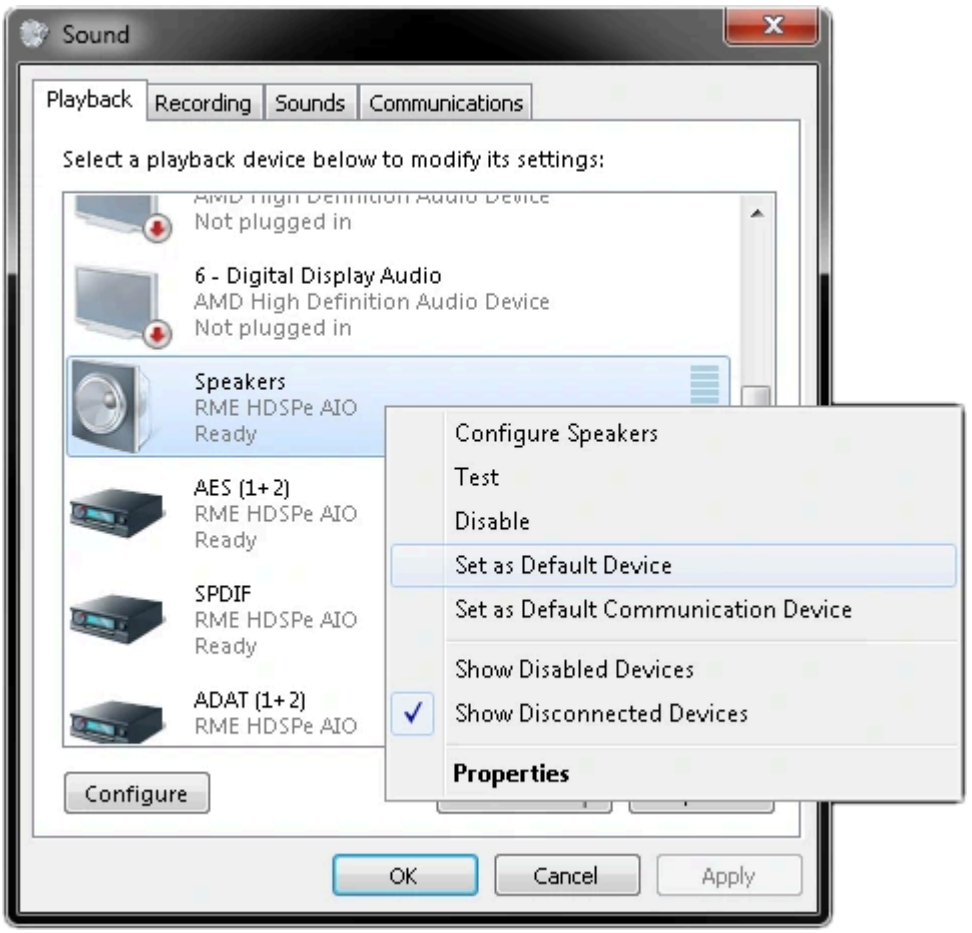
Front panel connections

- 1/4inch Stereo Monitoring socket

It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

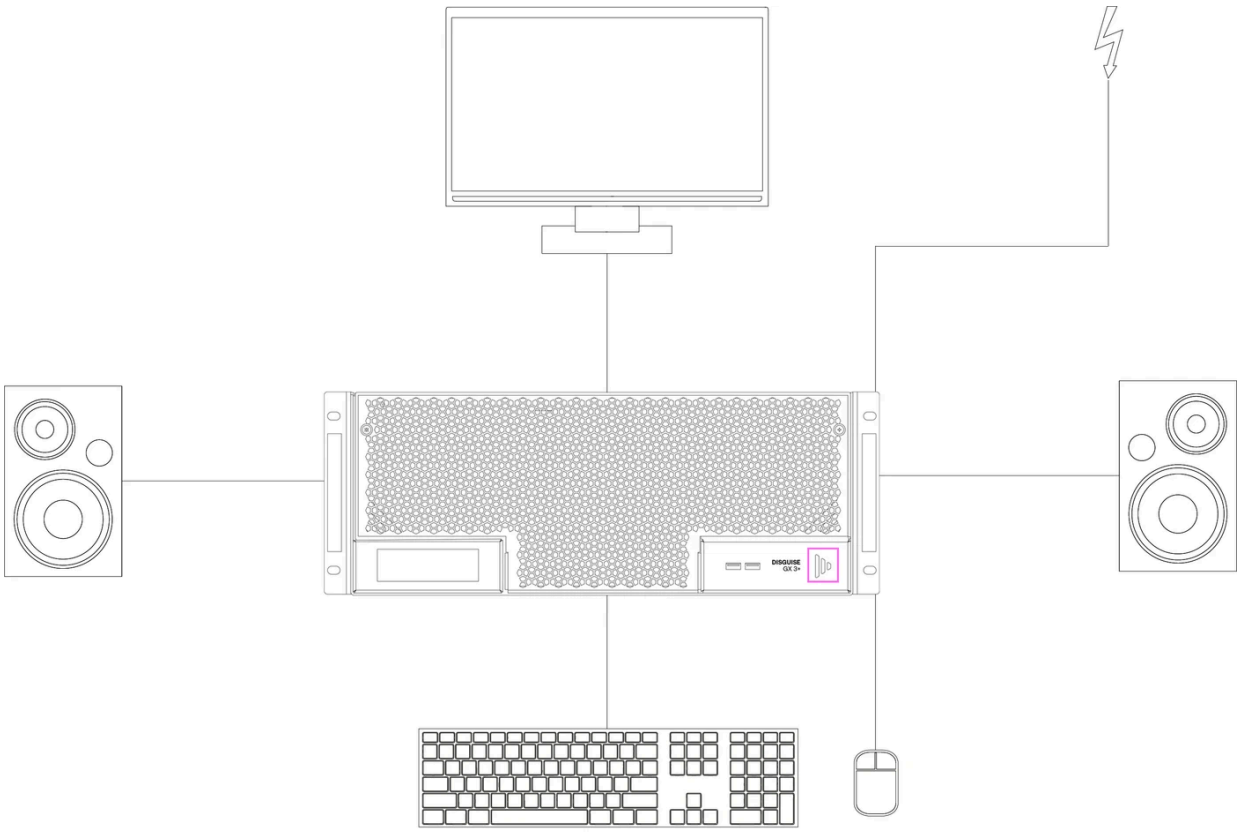
RME card settings

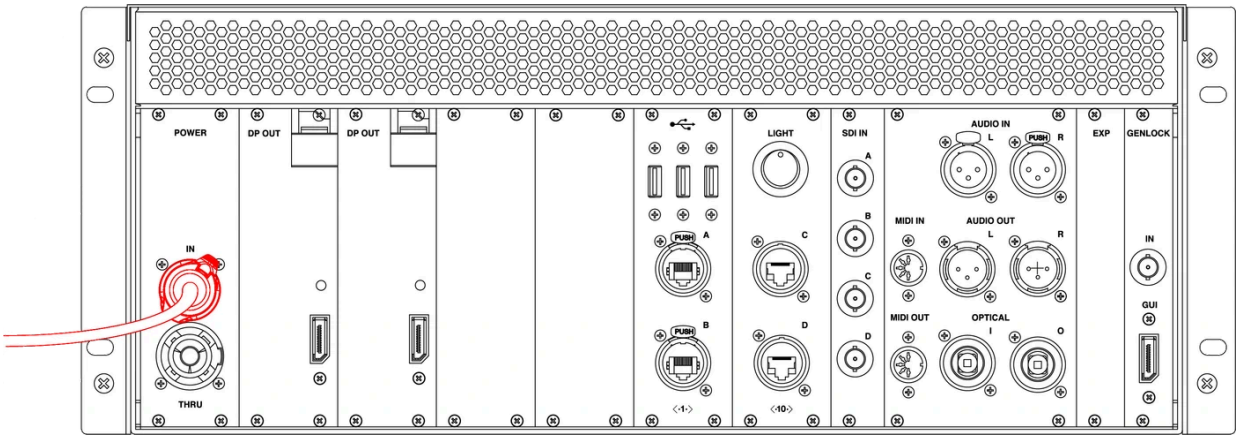
1. Go to the Windows Start Menu.
2. Right-click on the speaker in the task tray next to the clock on the desktop and click on **Playback Devices**.
3. Scroll Down and right-click the device named Speakers and select Set as Default device if it is not already selected.



How to Start the 2x4pro

1. Connect Power cord to the 2x4pro.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.





Location of power input on rear of 2x4pro unit

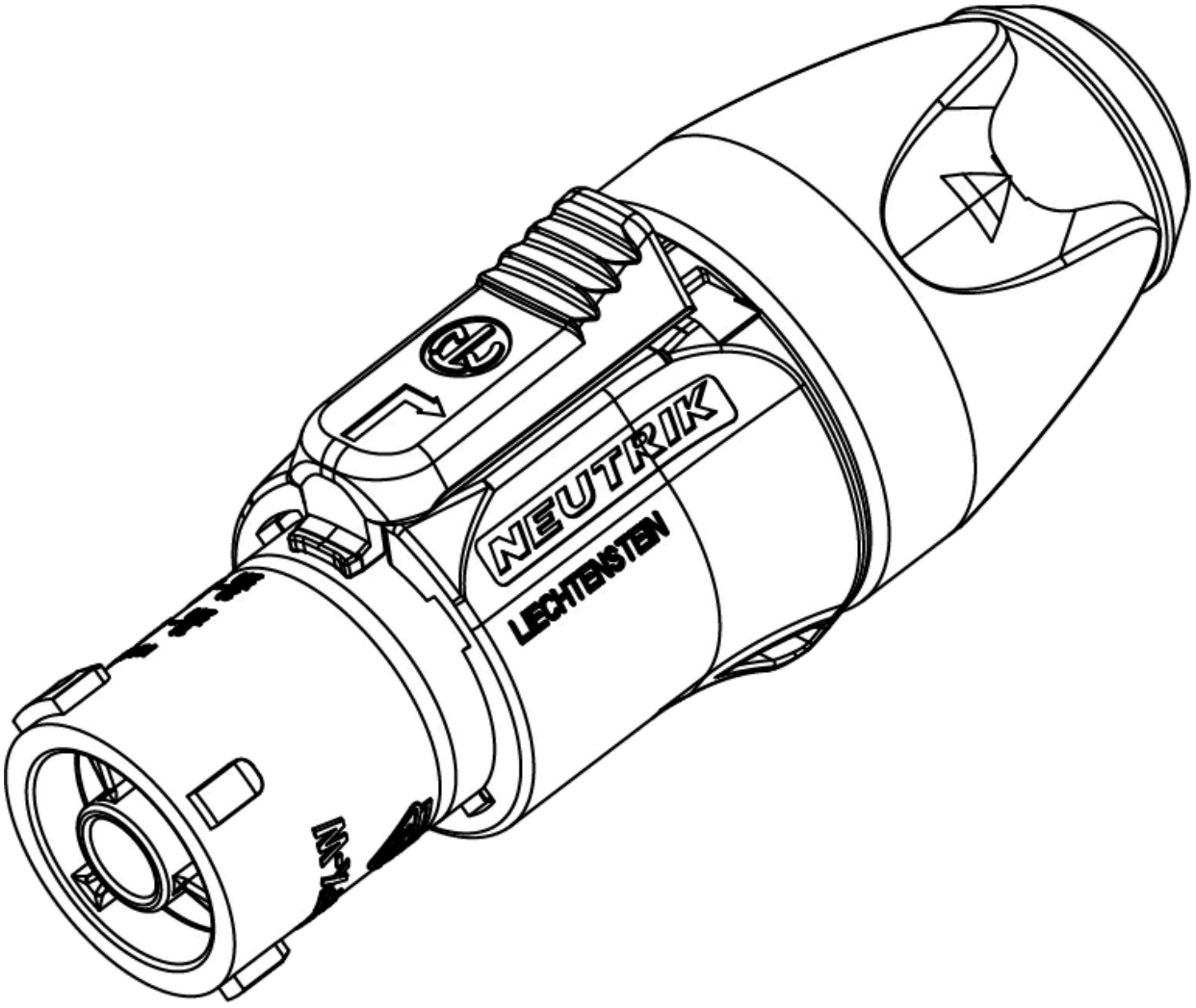
Powering the 2x4pro

The 2x4pro Disguise server uses Neutrik powerCON TRUE1 as the power input. The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type NAC3FX.

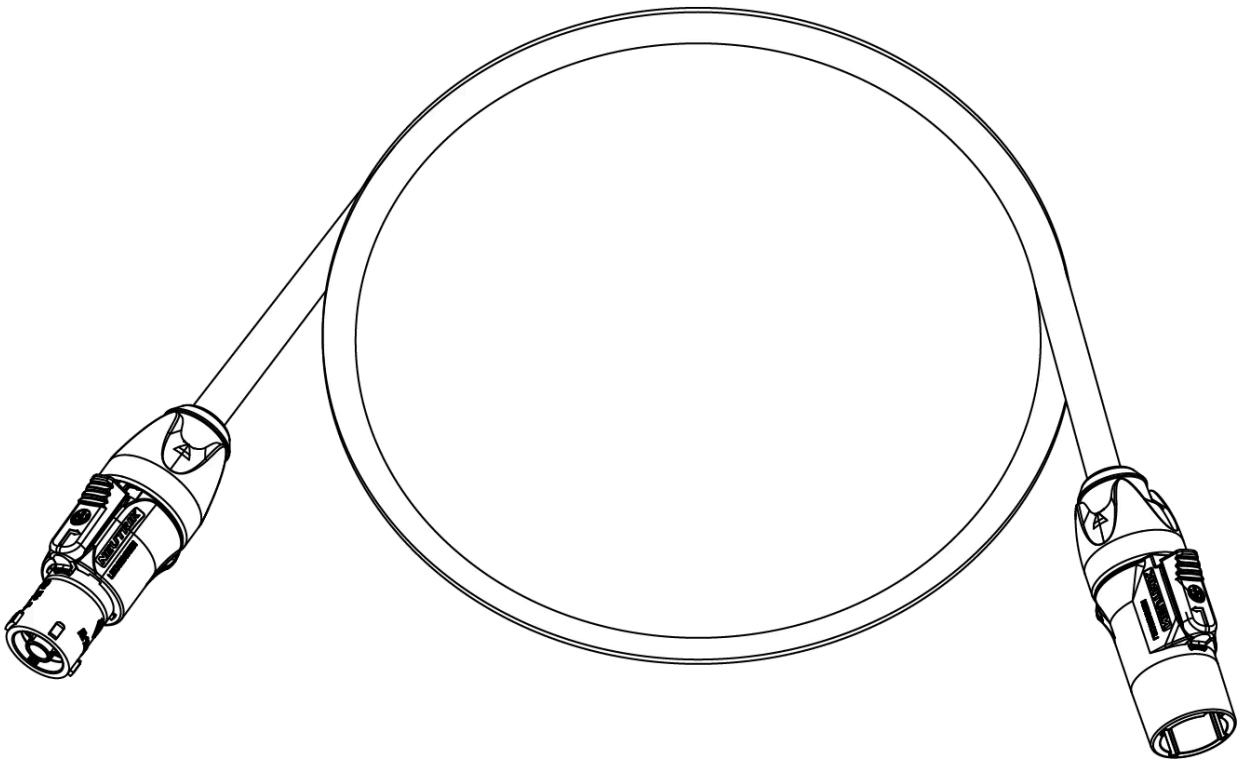


Neutrik powerCON TRUE1 connector

Powering a multi server system

The 2x4pro uses True1 Powercon as its power input and features a loop through to make powering a multi server system more efficient.

The power input to the machine is rated at 12Amps RMS per connection in Europe and USA.



Loop through cables should have the following attributes:

SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long

One end terminated with appliance coupler type Neutrik AG, type NAC3MX-W

Other end terminated with appliance coupler type Neutrik AG, type NAC3FX

Power calculations for a safely powered system

It is important that you calculate how many 2x4pro units you can daisy chain together using the in/loop connections provided. Failure to do so could result in a loss of power to the Disguise system.

Use the formula “Power = Voltage x Current” to calculate how many units you can chain together. For Example:

UK Power: 230V 13Amp rated supply.

For example, max power draw of a 2x4pro = 500W (check technical specifications for your unit).

Available Power = 230V x 12A

Available Power = 2990W

Available Power / Max Power Draw = Number of Units

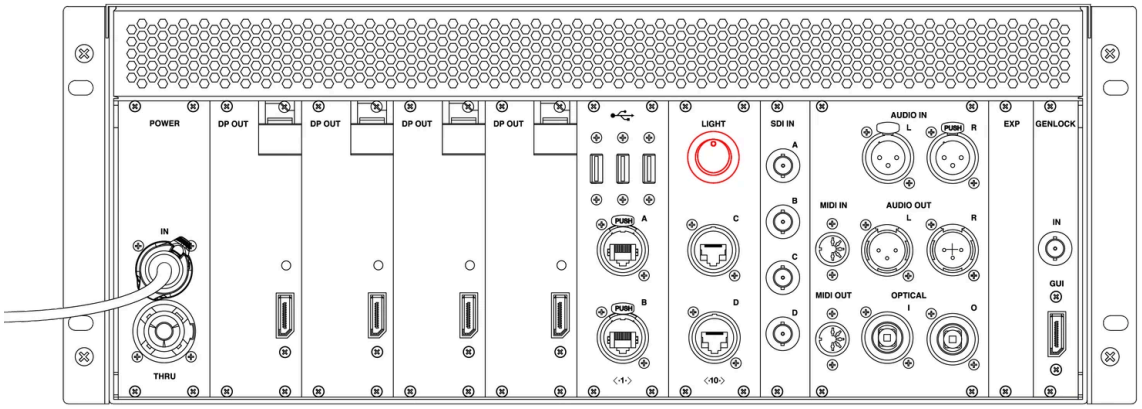
2990W / 1400W = 2.1 Units

> **Warning**
>
> Warning: Be safe! On a UK 13Amp supply @230V you can connect 2 Units safely with 100W of headroom.

Unit Rear Light - 2x4pro

The 2x4pro Disguise server comes with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labelled “light” with power in.



2x4pro Video Input

Your system is equipped with capture cards. These cards have the ability to capture live video from either SD-SDI or HD-SDI video sources with up to four unique feeds, or two unique 3G-SDI feeds per machine.

Max Number of Unique Inputs

SD-SDI	HD-SDI	3G-SDI
4	4	2

Supported formats

720x486i @ 59.94 Hz NTSC 720x576i @ 50.00 Hz PAL 1280x720p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz 1920x1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 1920x1080PsF @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz 1920x1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048X1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048X1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz 4K UHD 3840x2160, 4K P/PsF @ 23, 24, 25, 29, 30fps 4K DCI 4096x2160, 4K P/PsF, @23, 24, 25, 29, 30fps

It is possible to have a different format on each input, However the limitations are a maximum of 1x 4k or 2x 1080p60.

If you are using 1x 4k or 2x 1080p it is not possible to use any other video inputs on the unit due to hardware limitations.

Back-Plate Layout

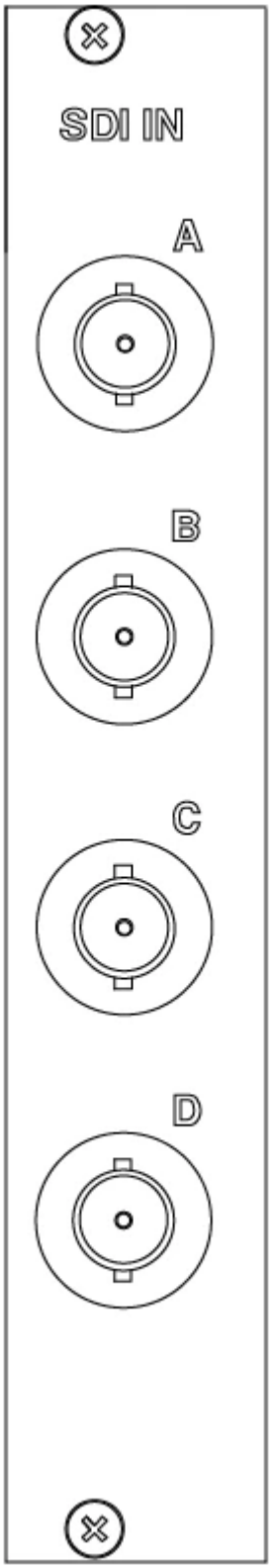
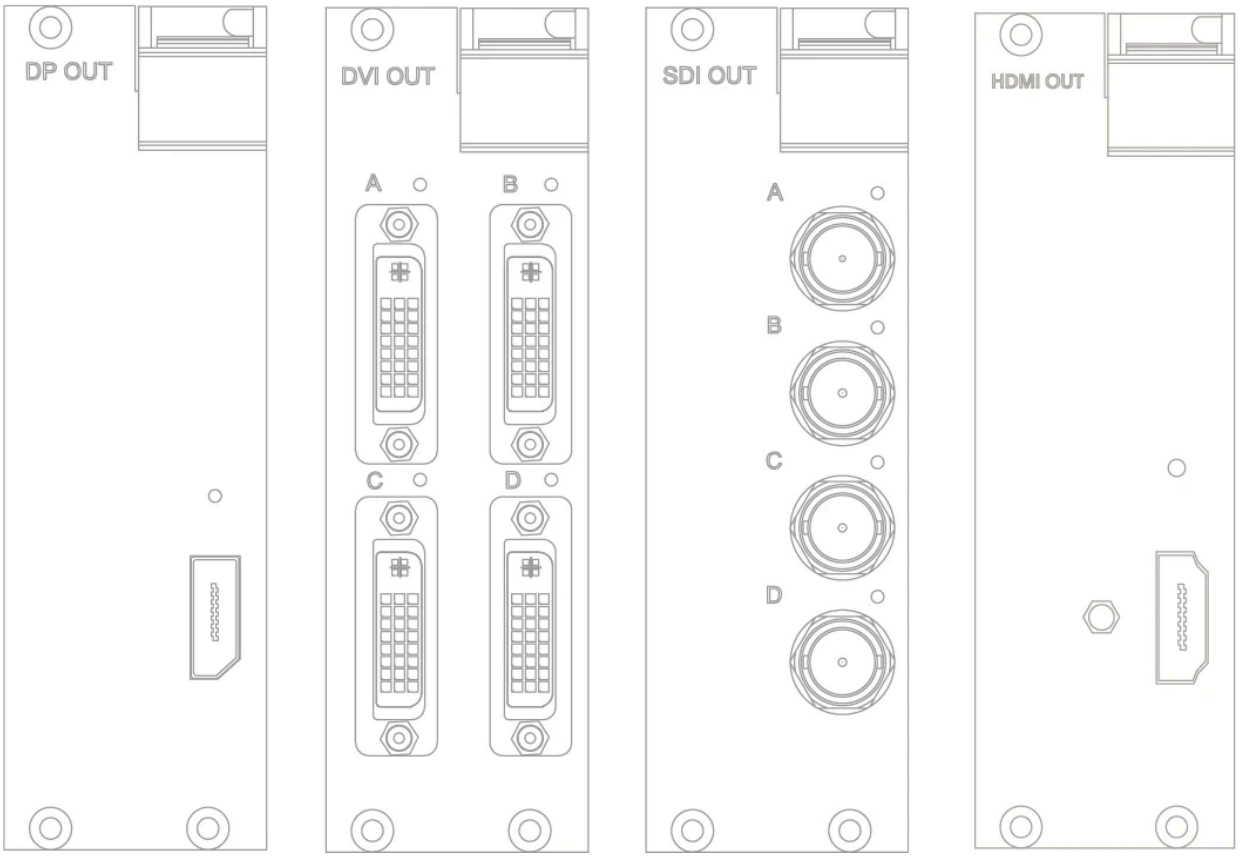


Diagram of Video Capture BNC connections on rear of a unit.

> **Note**
>
> **Please note**: Live Video input inherently introduces frame latency during playback. Please contact **Support** for guidance on performance standards.

2x4pro Video Output

Disguise servers come with a range of possible output configurations. It is possible to use a combination of any of the types of four VFC cards below.



Display Port 1.2	Quad DVI	Quad SDI	HDMI
1 Output per card	4 Outputs per card	4 Outputs per card	1 Output per card
Max res: 4096x2160	Single Link DVI: (up to) 1920 x 1200	Max res: 1920 x 1080	Max res: 4096x2160 @60 YCbCr444 8bit 3840x2160 @60 YCbCr422 10bit* 3840x2160 @30 YCbCr444 10bit
LED indicator	LED indicator	LED indicator	LED indicator

Display Port 1.2	Quad DVI	Quad SDI	HDMI
Genlocked	All outputs genlocked	All outputs genlocked	Genlocked

4U v2.5 - Overview of SDI Input

Your 4U v2.5 system is equipped with 2x **Active Silicon Phoenix PHX-D20HDSDI** capture cards. These cards have the ability to capture live video from either SD-SDI or HD-SDI video sources with up to four unique SD or two unique HD feeds per machine.

What formats do my capture cards accept?

The 4U v2.5 system can have the following SDI inputs:

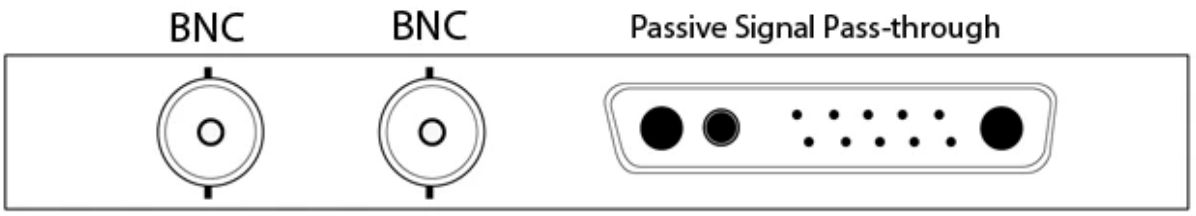
Inputs	525i/NTSC	625/PAL	720p/50	720p/60	1080i/60	1080p/24	1080p/30
2	✔	✔	✔	✔	✔	✔	✔
4	✔	✔	✔	✘	✘	✘	✘

Capture card performance

Capture card performance

The Active Silicon capture card operates with a 2/3 frame delay at 24/30 fps.

What connections do the capture cards have?



Capture cards connections

Audio Breakout

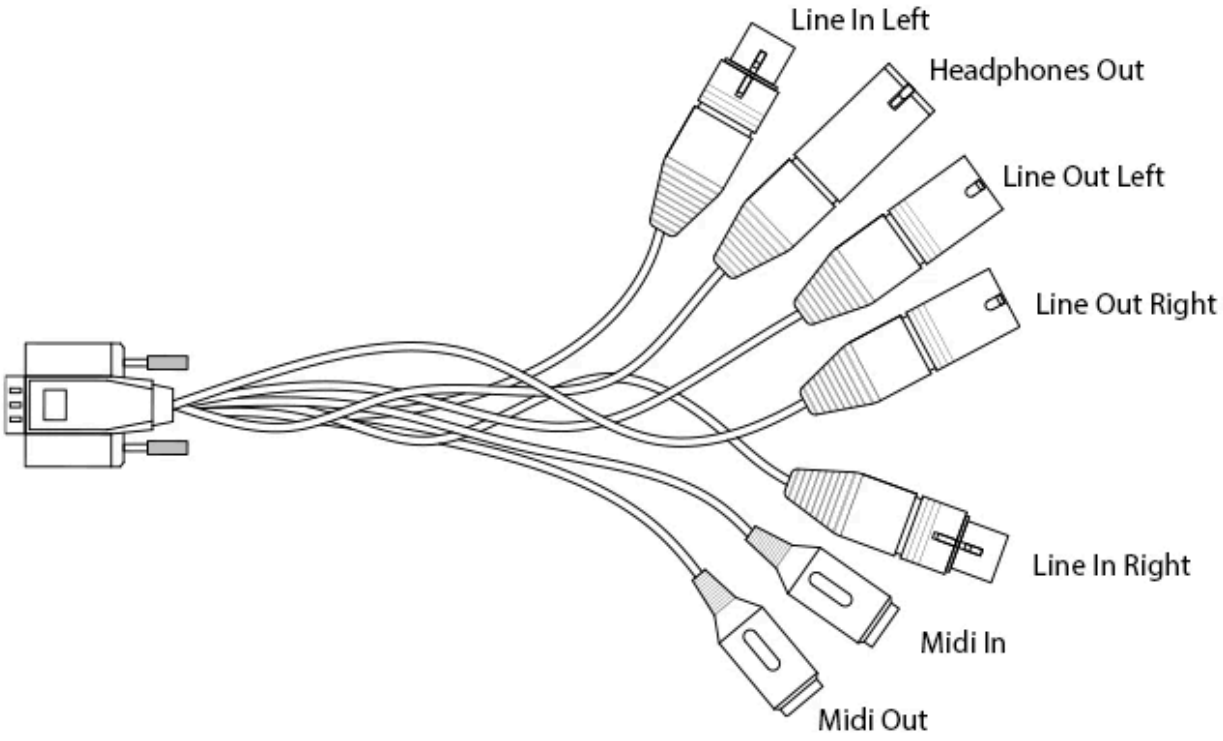
Why do I need a breakout cable?

For flexibility each d3 system comes with an **analog breakout cable** which lets you choose which input/output to use.

What connections does the breakout cable have?

The breakout cable provided with each d3 system is the:

HDSP 9632/HDSPe AIO: Analog breakout cable, balanced (P/N BO9632XLRMKH)



Each Disguise system is supplied with a breakout cable for the RME HDSP 9632 audio card.

This breakout cable is supplied for the RME HDSP 9632 audio card and provides the following inputs and outputs:

- 1 x Midi in (5 pin DIN)
- 1 x Midi out (5 pin DIN)
- 1 x Balanced stereo line out (TRS)

- 2 x Balanced line out (XLR)
- 2 x Balanced line in (XLR)

Are different breakout cables available?

There are several variations of the audio breakout cables available.

Please refer to the RME website for more information.

Audio Cards

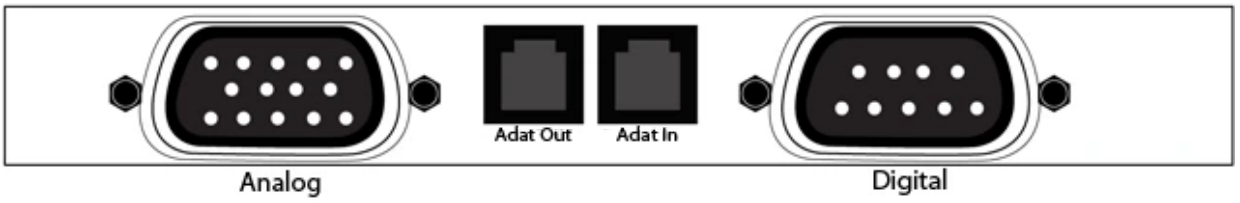
What audio card does my machine have?

All of the 4U machines use a RME HDSP 9632 Hammerfall DSP pro audio card, which uses the latest 182 kHz AD- and DA- converters.

Which connections does the RME card have?

The RME card has four connections:

- Analog In/Out [Via Analogue Breakout Cable supplied]
- Digital In/Out [Via Digital Breakout Cable not included]
- **ADAT** Out [8 Channels via optical cable not included]
- **ADAT** In [8 Channels via optical cable not included]



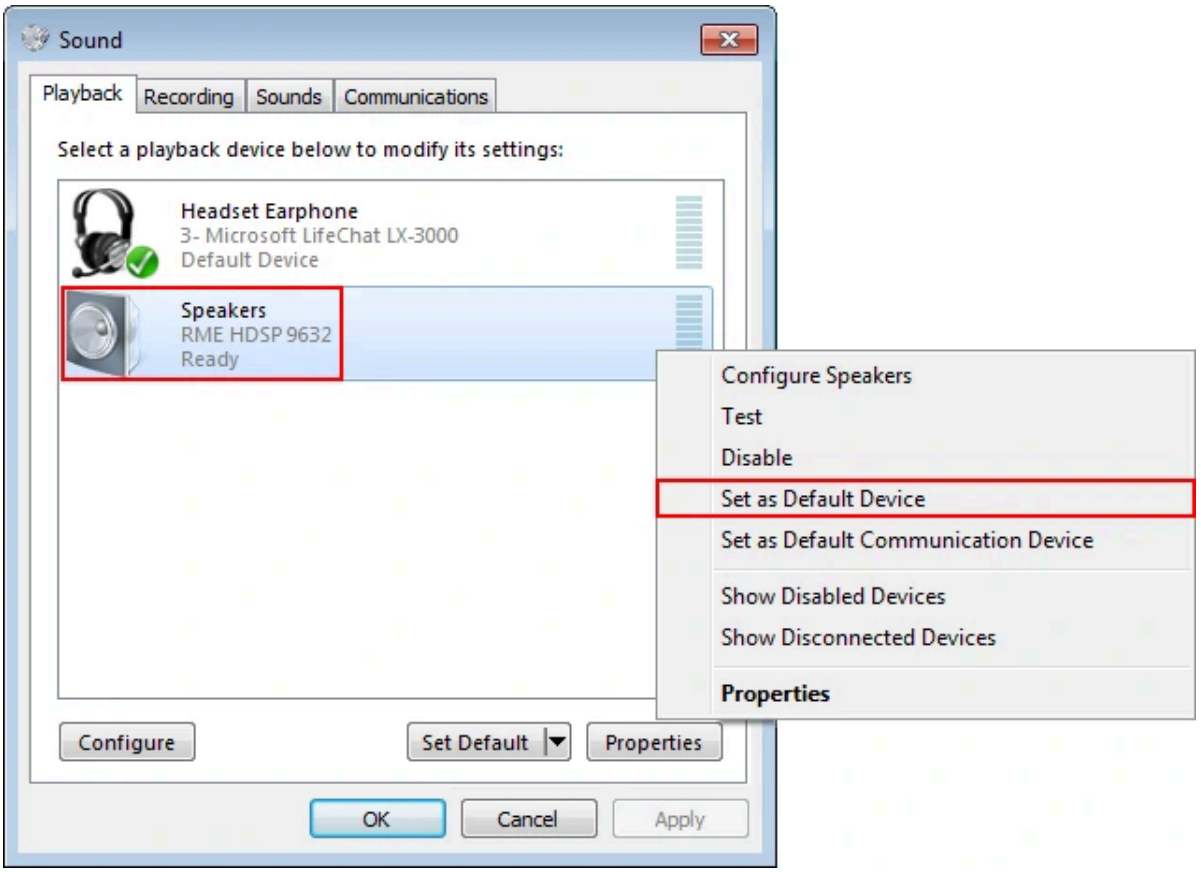
RME card connections

To connect the RME card to external devices, we recommend using the supplied analogue breakout cable.

RME card settings

1. Go to the Windows Start menu.
2. Type **Sound** in the search bar and then select **Sound** under the Control Panel category.

3. Right-click the device named Speakers RME HDSP 9632 and select **Set as Default Device** if it is not already selected.



Sound settings for a 4U d3 system, set the **RME HDSP** 9632 device as the default device

All audio should now be going through the balanced line out from the audio card.

For information on how to use advanced audio card features, including the **HDSP** mixer application, please consult the manual found **here**.

Available ports directly on the card are:

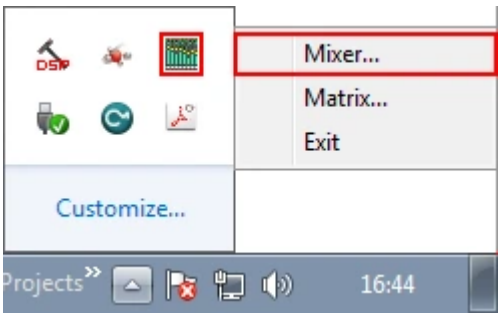
- 1 x Optical **ADAT** / **SPDIF** in (**TOSLink**)
- 1 x Optical **ADAT** / **SPDIF** out (**TOSLink**)

Default HDSP Settings

You can find all the default settings for the HDSP Mixer application **Disguise download center**.

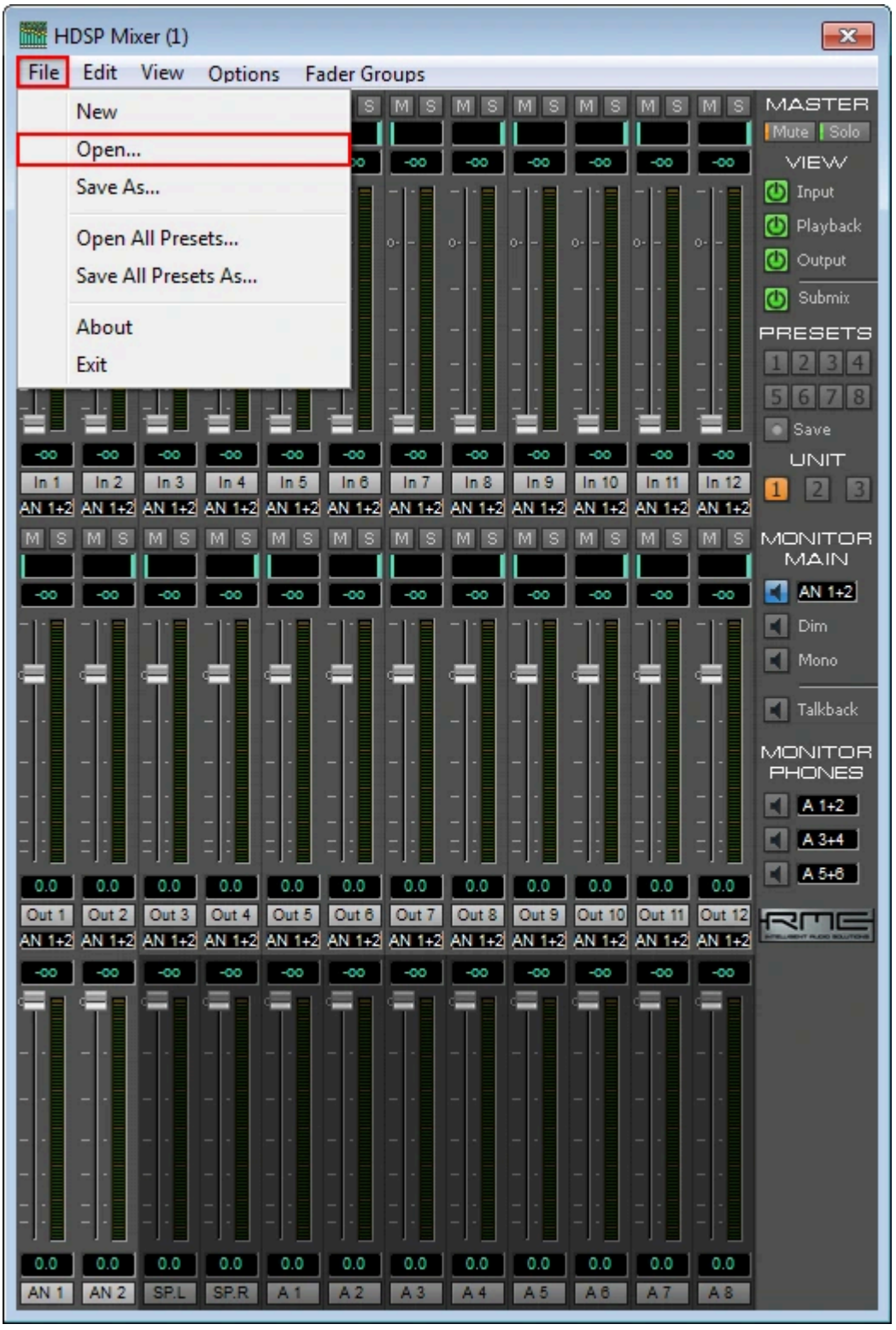
To apply this settings file:

1. Right-click the Hammerfall DSP Mixer icon in the taskbar and select **Mixer...**



2. Open the HDSP Mixer application by right-clicking the Hammerfall DSP Mixer icon in the task-bar (bottom right-hand corner of your screen) and selecting Matrix.

3. Select File > Open and choose the settings file. All settings should now be restored to their original values.



4. Select File > Open from the HDSP Mixer window and then select the Settings file to restore the HDSP Mixer default settings.

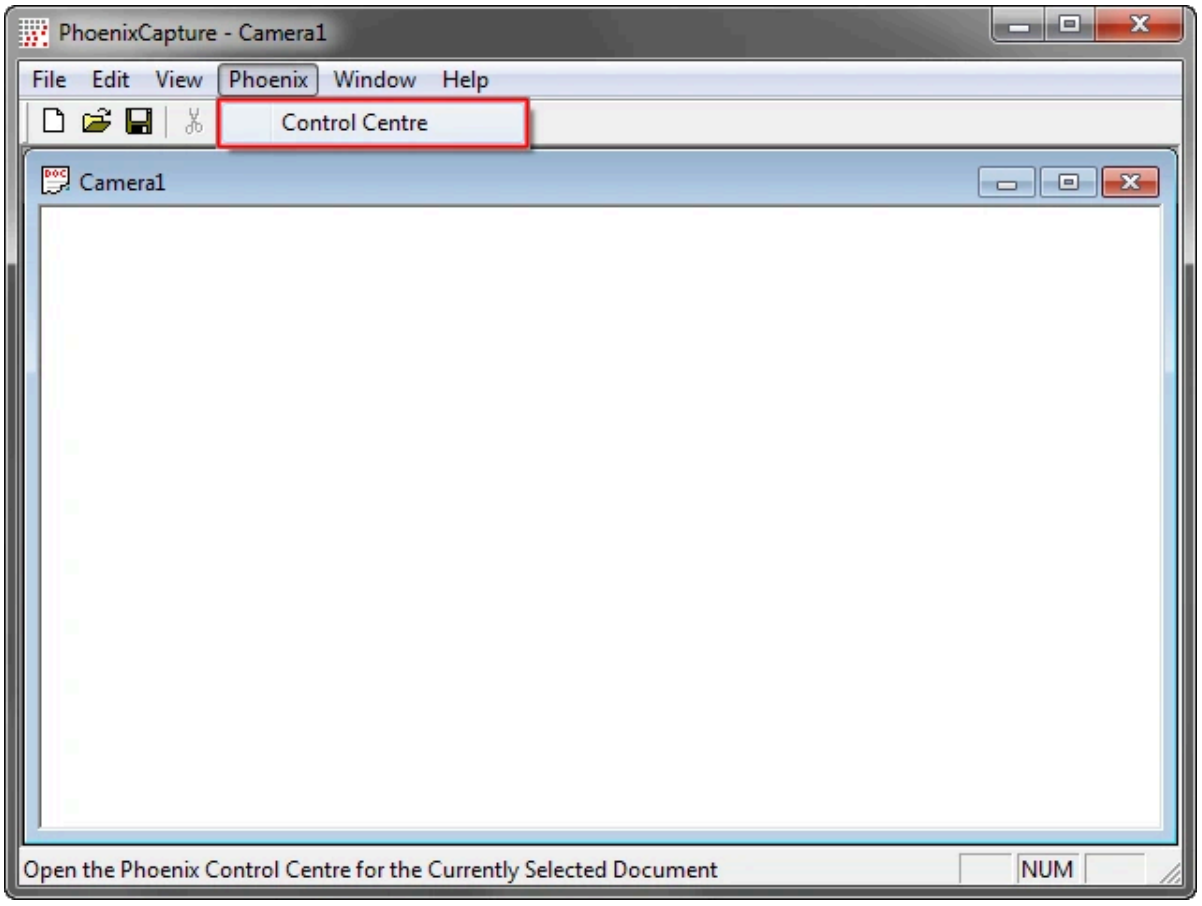
You will lose all of the previous settings.

Configuring SDI Capture

Live Video input inherently introduces frame latency during playback. Please contact Disguise support for guidance on performance standards.

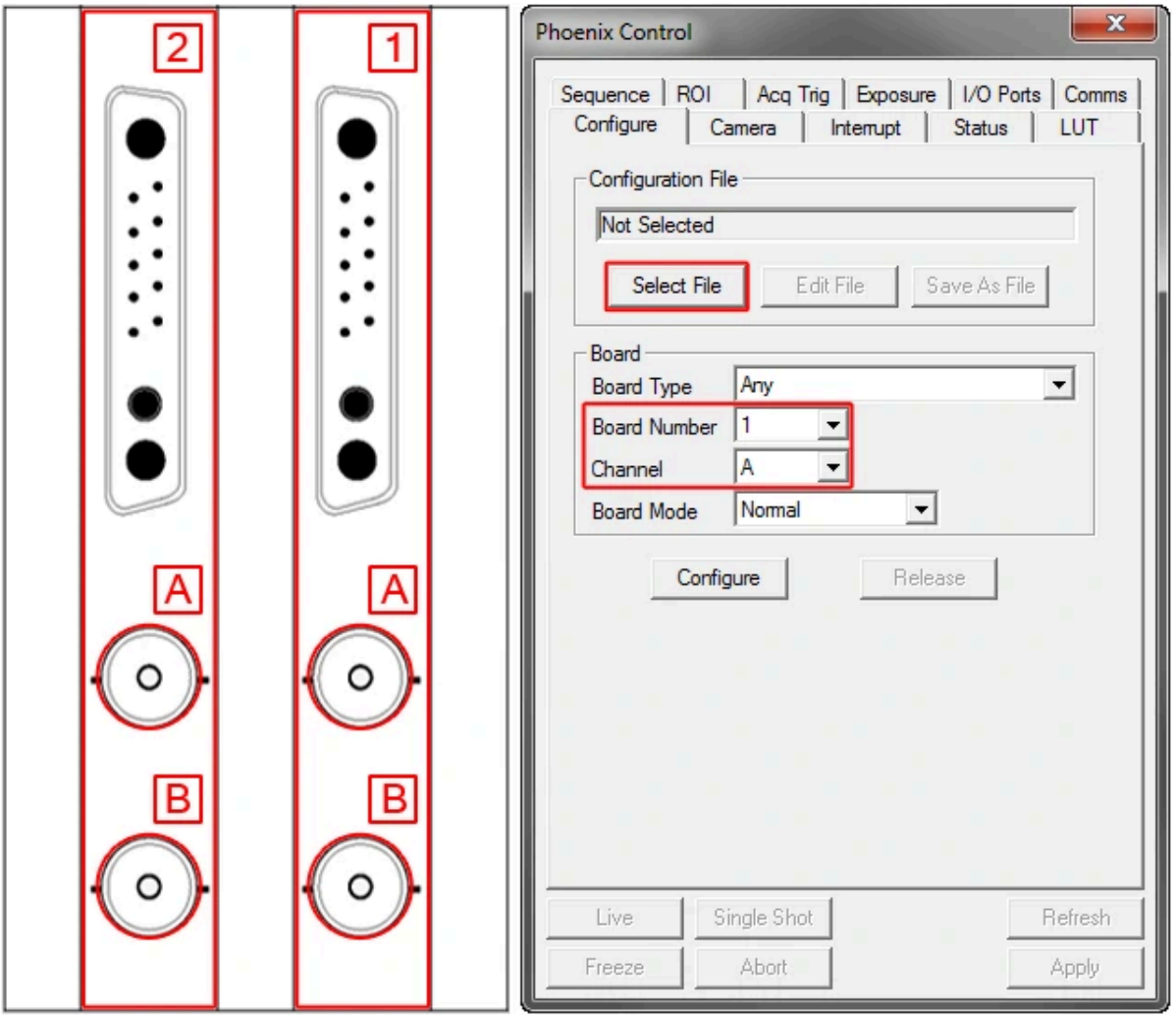
The first step to getting SDI inputs into d3 is to configure the Active Silicon SDI capture card outside d3. To do this:

1. Run the Active Silicon Phoenix Capture 32-bit application (Start > All Programs > Active Silicon PhoenixCapture (32-Bit)). You will now be presented with a screen as in the image below.
2. Select Phoenix > Control Centre.



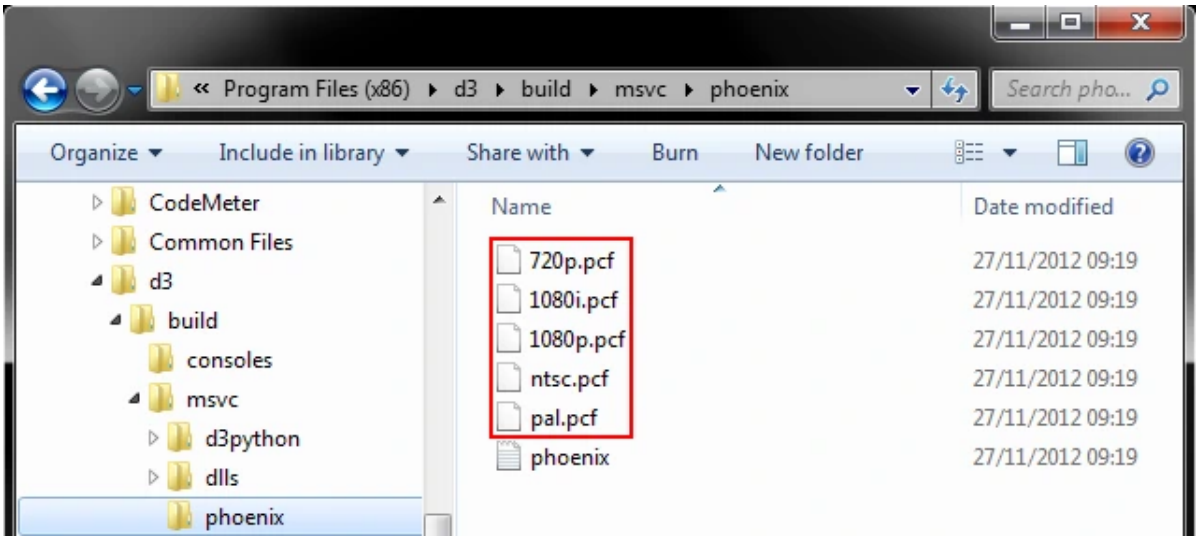
Use the cards capture application, in this example the Phoenix Capture application for a Phoenix card, to set up SDI capture

3. Select the board number and channel that you plugged your SDI source into then hit select file.



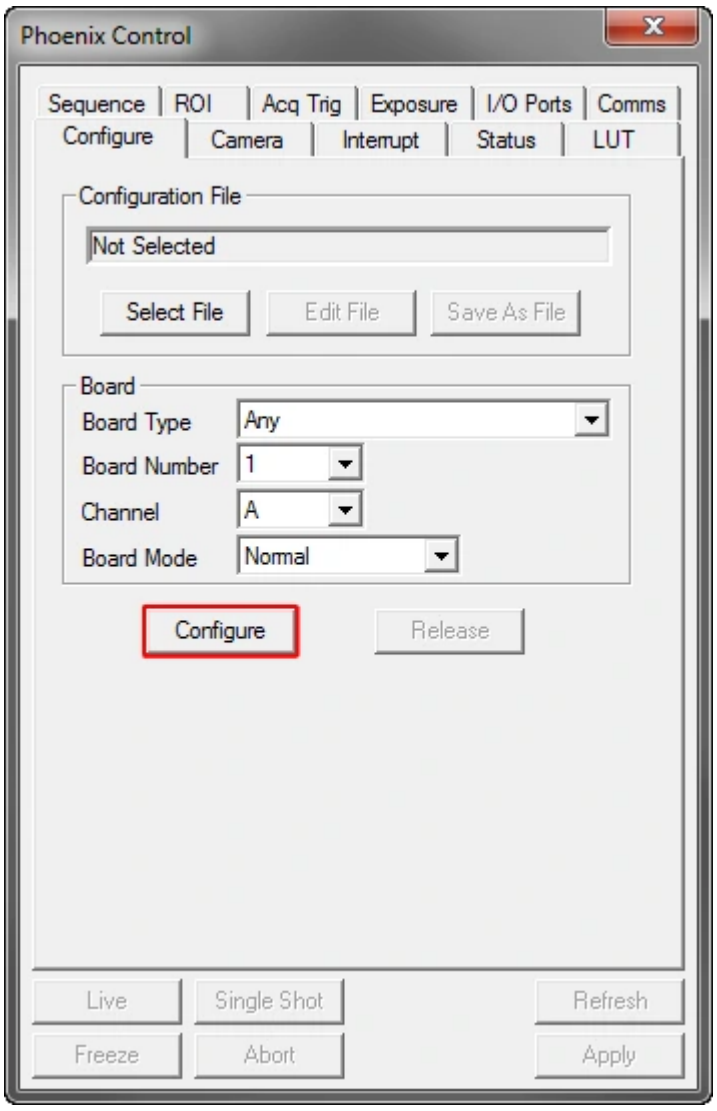
4. Select the board (1) or (2) and port (A) or (B) within the Phoenix Control window.

5. Select the correct configuration file for the **SDI** signal you are capturing (PAL , NTSC , 1080i or 1080p)



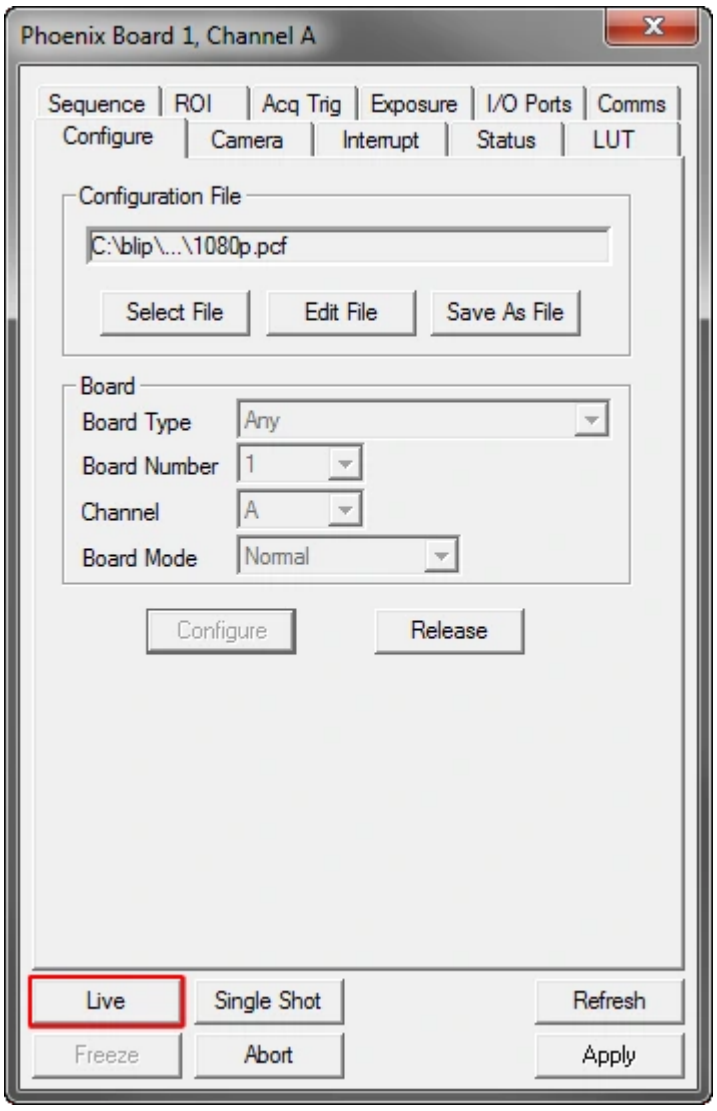
6. Choose the appropriate configuration file for the SDI signal

7. Click configure to save your settings.

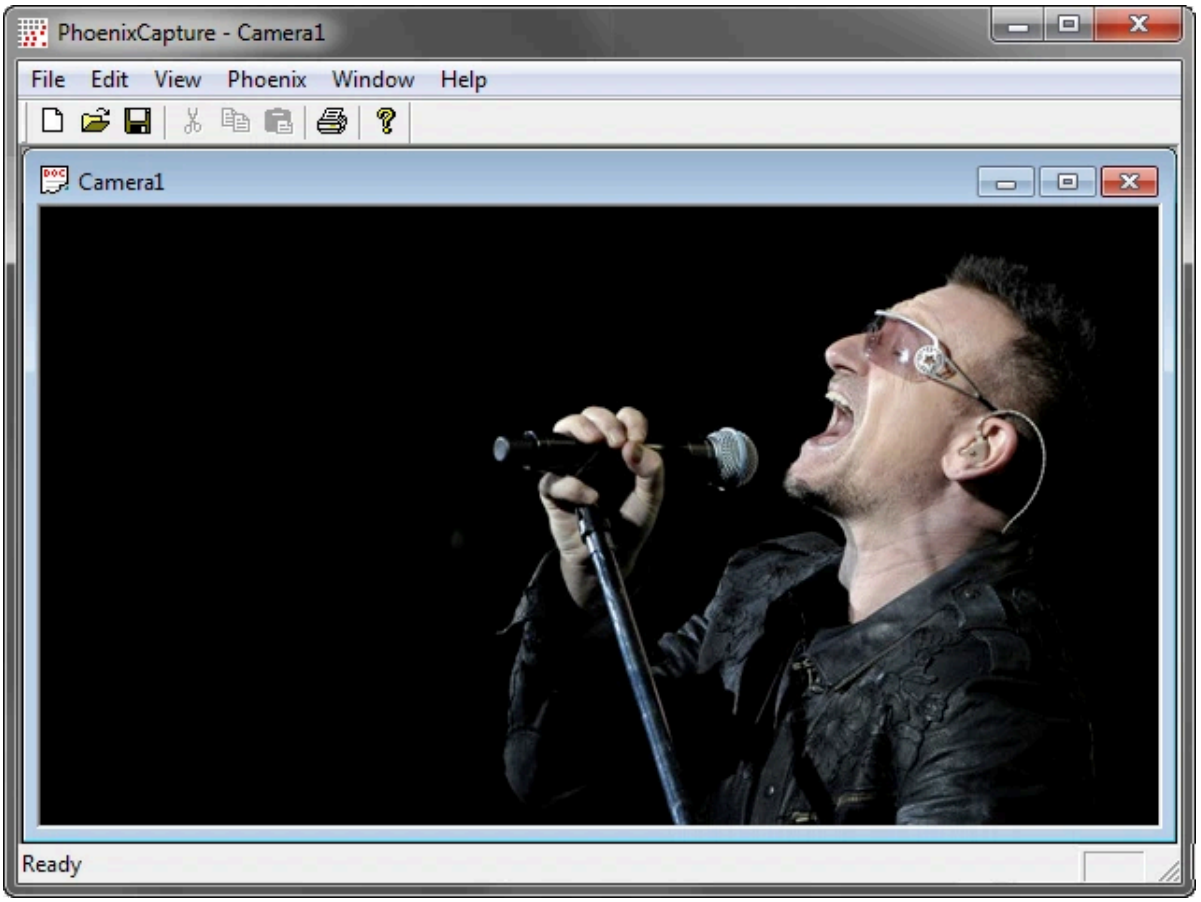


Click Configure to save your changes

8. Click Live to test your signals.



Click Live to test your signals. You should now see the SDI input in the camera window screen in the Active Silicon PhoneixCapture window.



Signals that are sent successfully will display an image in the camera window of the cards capture application

9. Click **Configure** to check the status of the card. Please note: if an error message pops up it may be necessary to re-flash or update the driver. software. For any other problems please contact the **Disguise Suppport**. The capture card has now been configured and you can continue with creating a Video sampler device in Designer.

12HD Playback Configuration

For r11, we've done a great deal of optimisation on every aspect of video playback performance, all the way from disk through GPU drivers and synchronisation. The prefetch estimation system already improves timing solidity; with a few tweaks of the BIOS to ensure the best possible SSD performance, d3 can now play twice as much video as it could before.

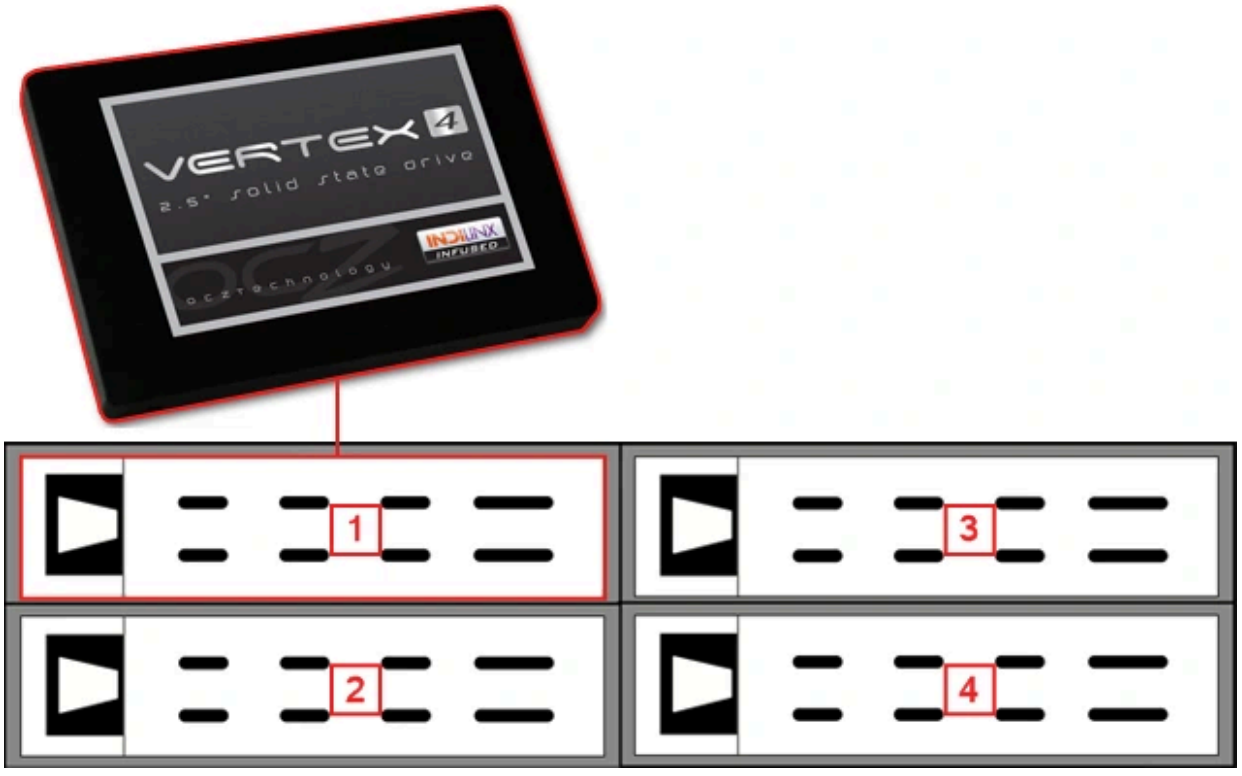
In order to get optimum performance and to be able to run up to 12 layers of HD content, the media drives in your machine need to be in the 2 drive bays that support the fast SATA3 data protocol.

What systems are eligable for 12HD playback?

12HD is only available on 4u v2.5 systems that are running r11 software.

Is 12HD playback already setup on my machine?

12HD is setup by default on all recently shipped v2.5 machines (post September 2012), however some older machines may have slightly different configurations set up.



Every Disguise machine contains four bays, and are shipped with a single 512Gb OCZ Vertex 4 Solid State Drive (SSD) located in drive bay 1.

On recent machines, out of the four drive bays there are two fast SATA3 drive bays (bays **1** and **2**) and two SATA2 drive bays (bays **3** and **4**).

To ensure optimal performance always populate bay 1 and 2 first. Your d3 machine ships with a single 512Gb **OCZ** Vertex 4 Solid State Drive (**SSD**). The **SSD** will be located in drive bay 1 and is capable of 461.9 MB/s sequential read and 462.9 MB/s sequential write.

Older 4U v2.5 machines may have a different configuration of fast SATA3 drive bays and SATA2 drive bays.

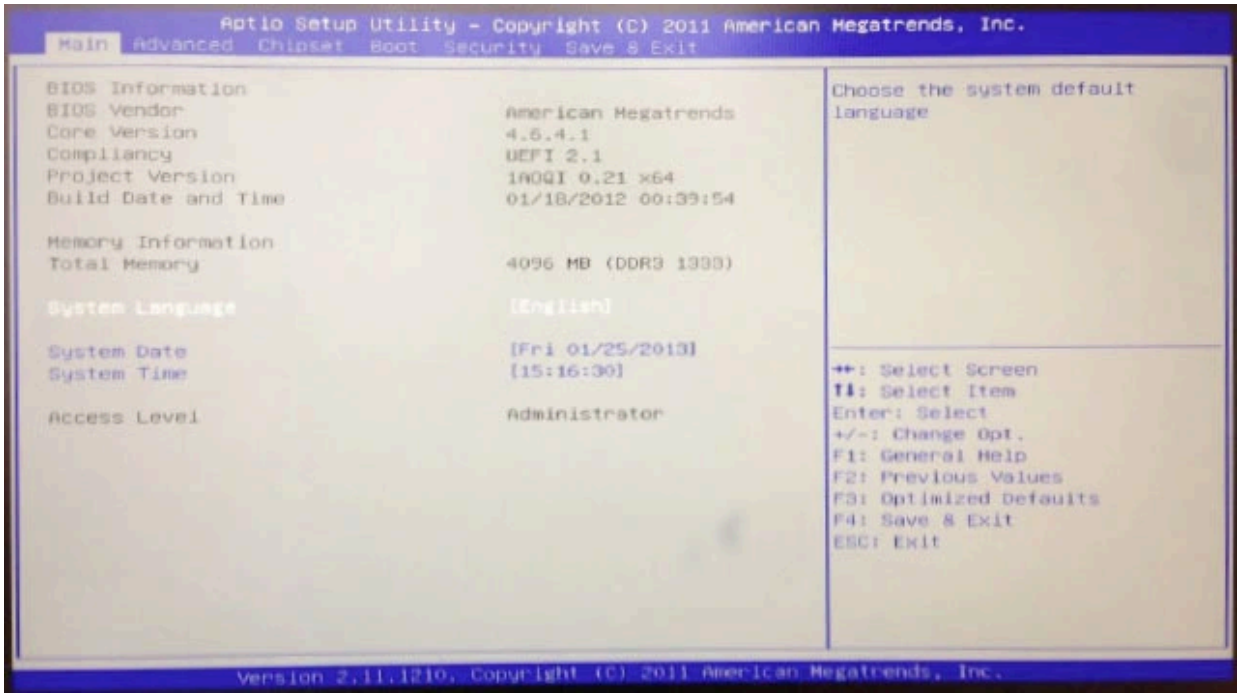
Setting up 12HD playback

Before starting the process to setup 12HD please downland install **this Windows patch** from Microsoft. This patch will change the drive identity within the registry and prevent a BlueScreen error associated with a change of SATA mode change.

Once the patch is installed, ensure there is only one media drive in the machine and it is in drive bay 1 (top left). In our example below we have used an OCZ Vertex 4 drive.

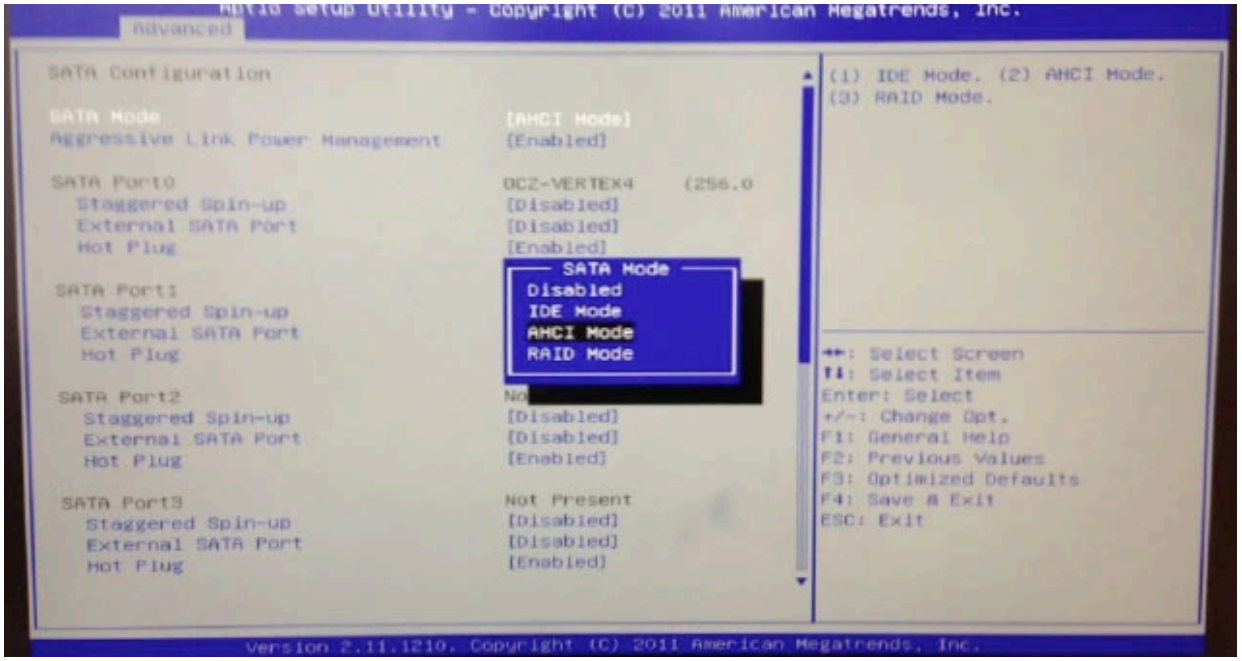
Restart the machine and hold down the 'del' key to enter the BIOS.

You will be presented with the following screen.



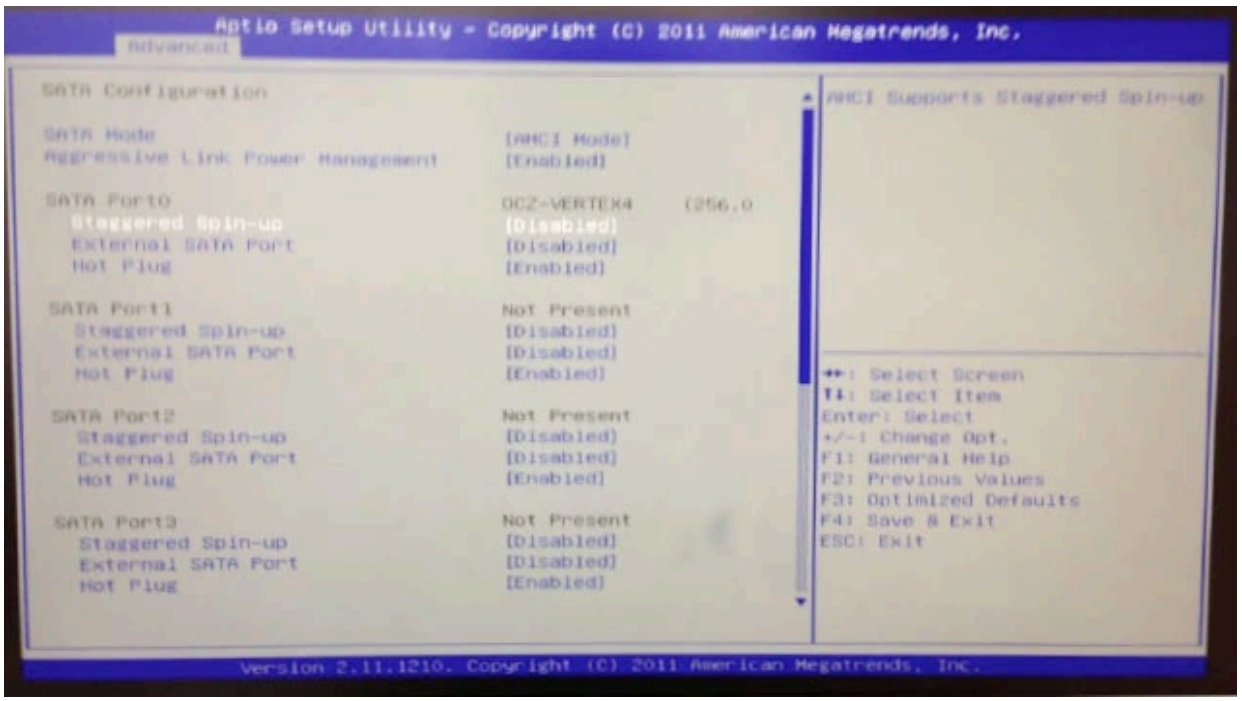
In the BIOS menu scroll right one tab to the 'Advanced' tab and scroll down to the SATA configuration menu item. Press Enter.

In SATA configuration open up the SATA menu item and select AHCI mode (unless this has already been selected.)



SATA mode menu

The screenshot below shows the OCZ Vertex 4 drive in SATA port 0. The fast SATA3 slots are set as SATA PORT0 and SATA PORT1 in the BIOS. In this example our OCZ Vertex 4 drive would be running at full SATA3 speed and would run at 12HD performance.



SATA Configuration screen showing a drive in Port 0.

The next step is to establish the location of the other fast SATA3 port. In order to do this, shut the computer down and move the SSD into another drive bay. Then restart the machine

holding the ‘del’ key to enter the BIOS and repeat the steps above to establish the drive bay that is connected to SATA PORT1.

It is important to shut down the machine before moving the drive between drive bays as this change will not be reflected in the BIOS and you may damage the drive.

Do not change any other BIOS settings or enable or disable any features as you may stop the d3 machine from working correctly or at all.

Once booted into Windows you can check the read/write speed of the drive by using a drive test utility such as **ATTO Bench.**

A SATA3 drive should be running at between 450 - 500 MB/s.

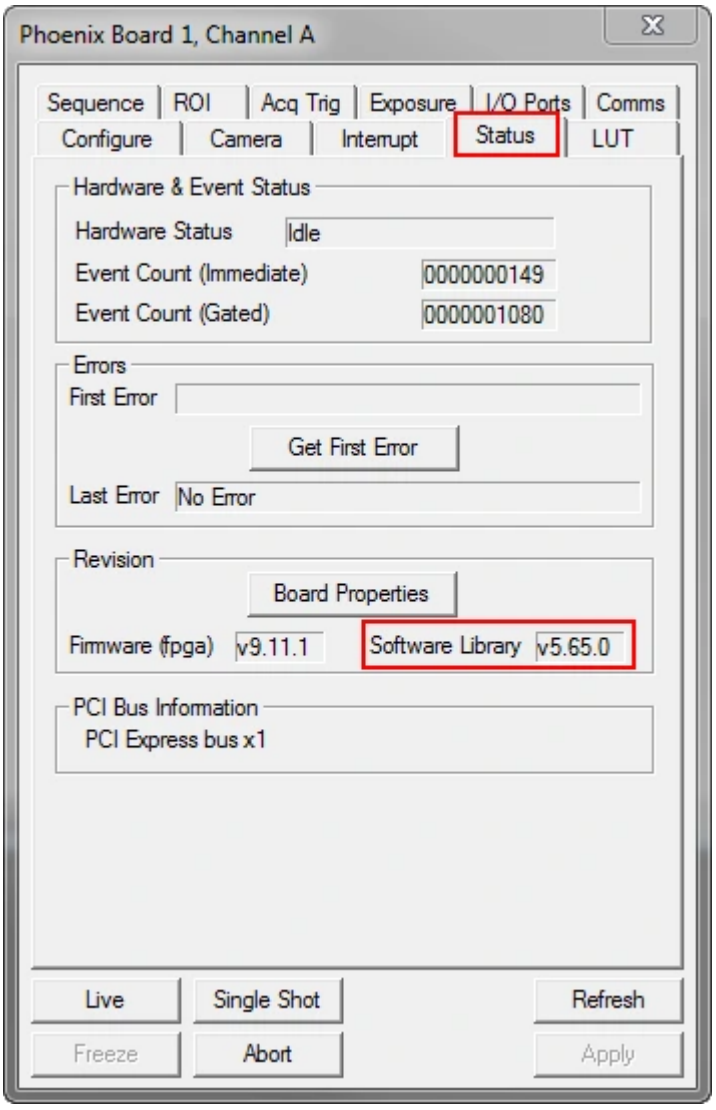
If you require any support or advice regarding 12HD please contact **support**

Flashing an Active Silicon Card

It is sometimes necessary to program the Flash memory on all Phoenix boards with updated information to match that in the current driver set.

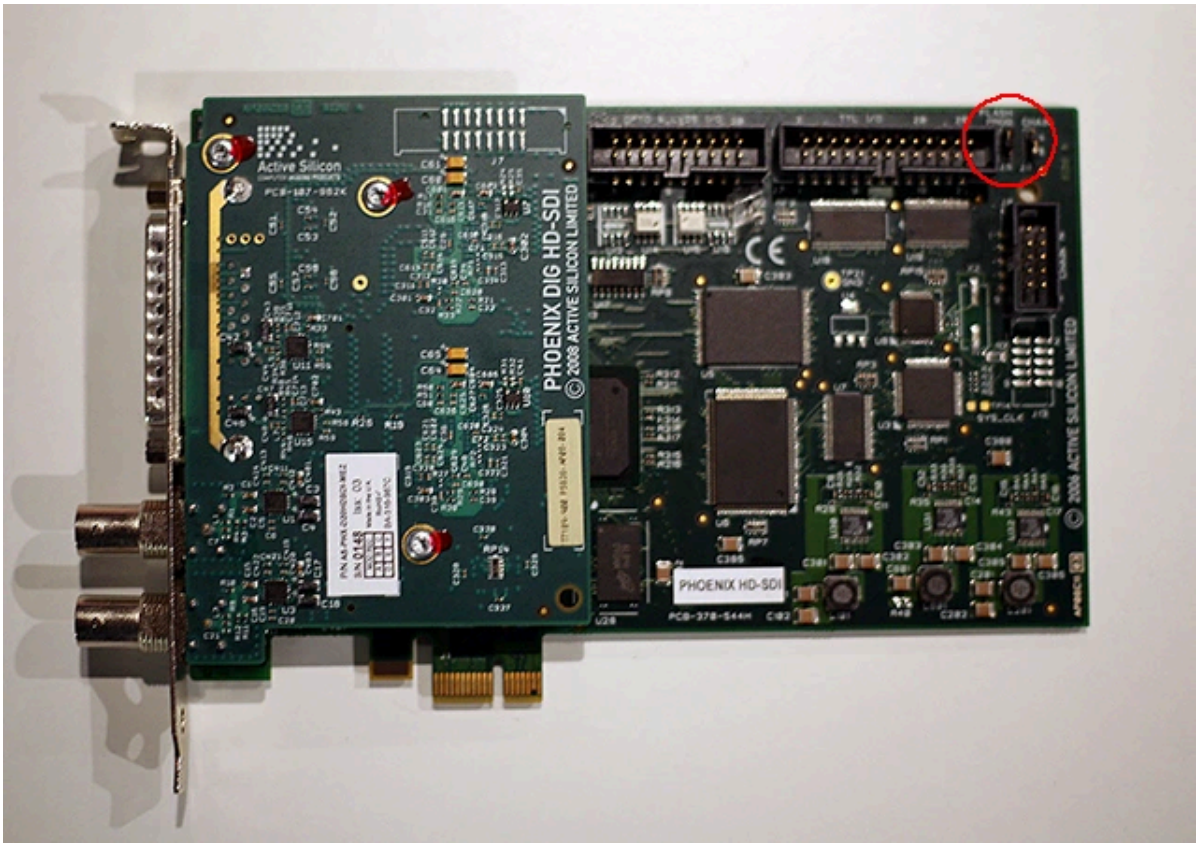
To flash an active silicon card

1. First, check the current firmware version. Open the Phoenix Capture application and click Phoenix > Control Center and navigate to the status tab. You can see the firmware version next to the Software Library box.

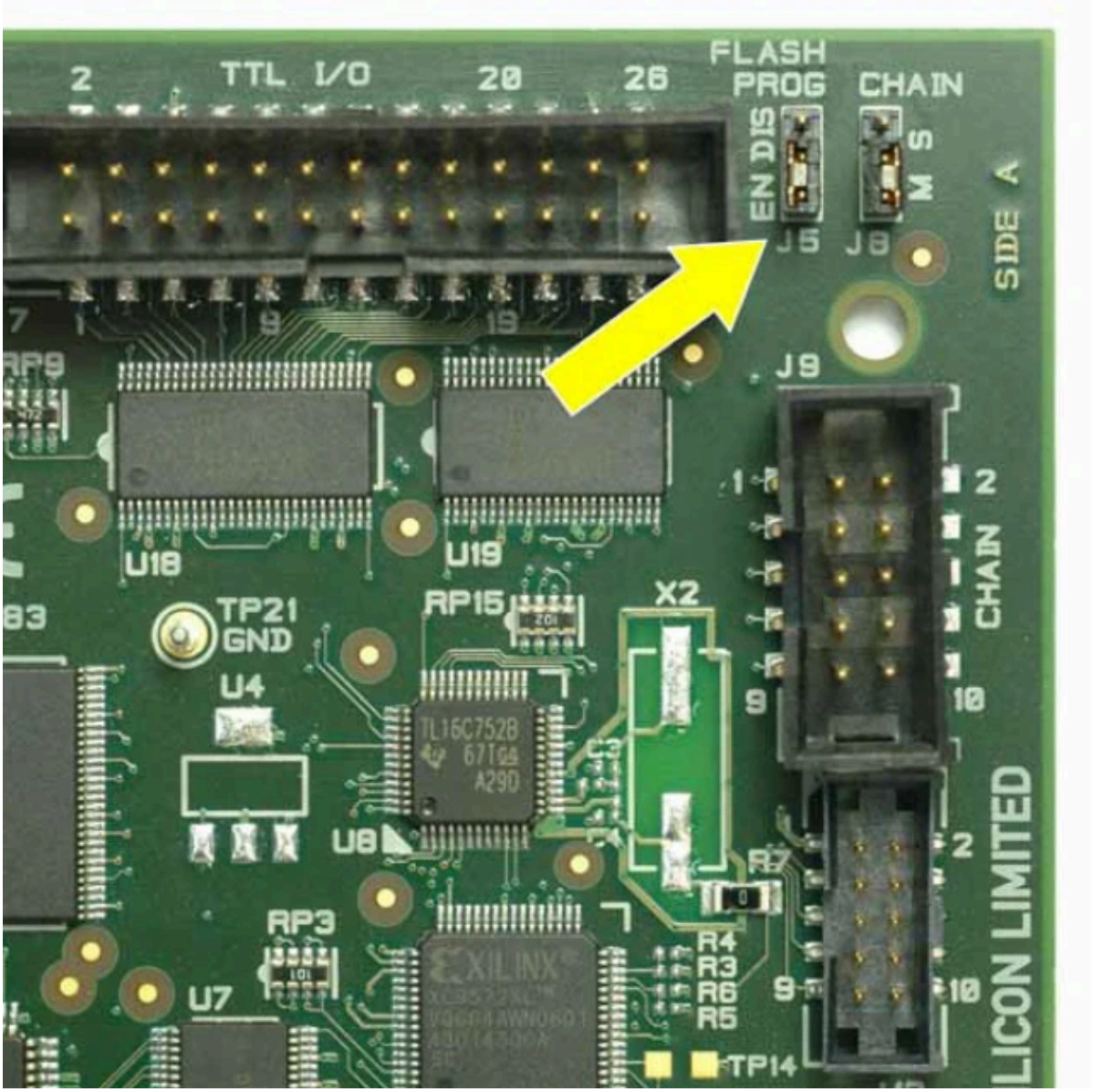


2. Check the current firmware version of your boards, in this example a Phoenix board, using the cards control window before flashing an Active Silicon card.
3. Shut down the host computer and remove all Phoenix boards from the machine.

4. Ensure that the jumper marked FLASH PROG is in the enabled (EN) position on each board. Look at the pictures below to find the position of this jumper on the Active Silicon card. They all show the jumper in the enabled position.



Position the jumper on the board (top-right), in this example a Phoenix board, to enabled (EN) in order to flash the card.



Jumper marked FLASH PROG on your Active Silicon card should be set to enabled (EN)

5. Replace the Phoenix boards in to the host computer and reboot.
6. When the operating system has loaded, run the PfwProg (Phoenix Firmware Updater) application, and press the Program button.
7. When the application has completed, shut down the computer.
8. The FLASH PROG jumper may now be set back to the DIS position.
9. Reboot the computer and continue to use the Phoenix boards.

4U v2.5 Graphics Cards Configuration

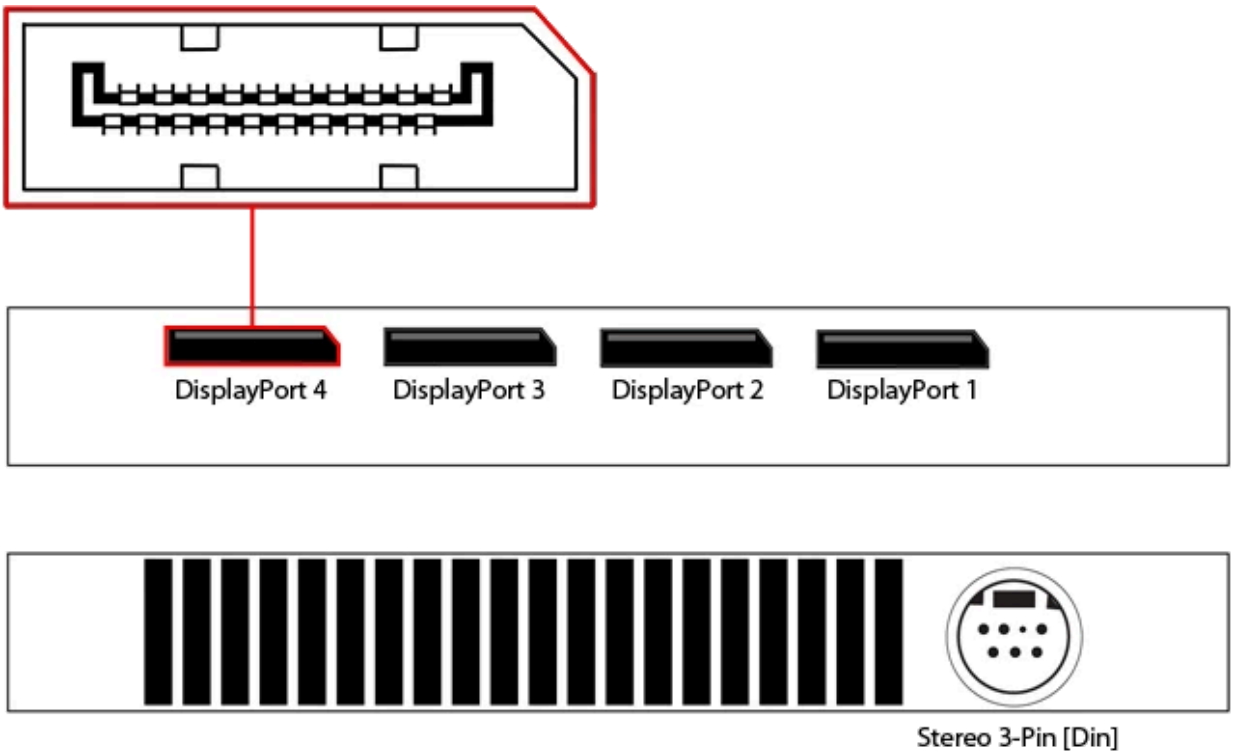
What graphics card does my d3 machine have?

Your Disguise 4U v2.5 uses AMDs Firepro V8800 graphics card. It is capable of driving 4 individual outputs at up to 2560 x 1600 pixels using the DisplayPort interface.



What connections does the V8800 graphics card have?

The V8800 graphics card has 4 DisplayPort connectors, please see example below:

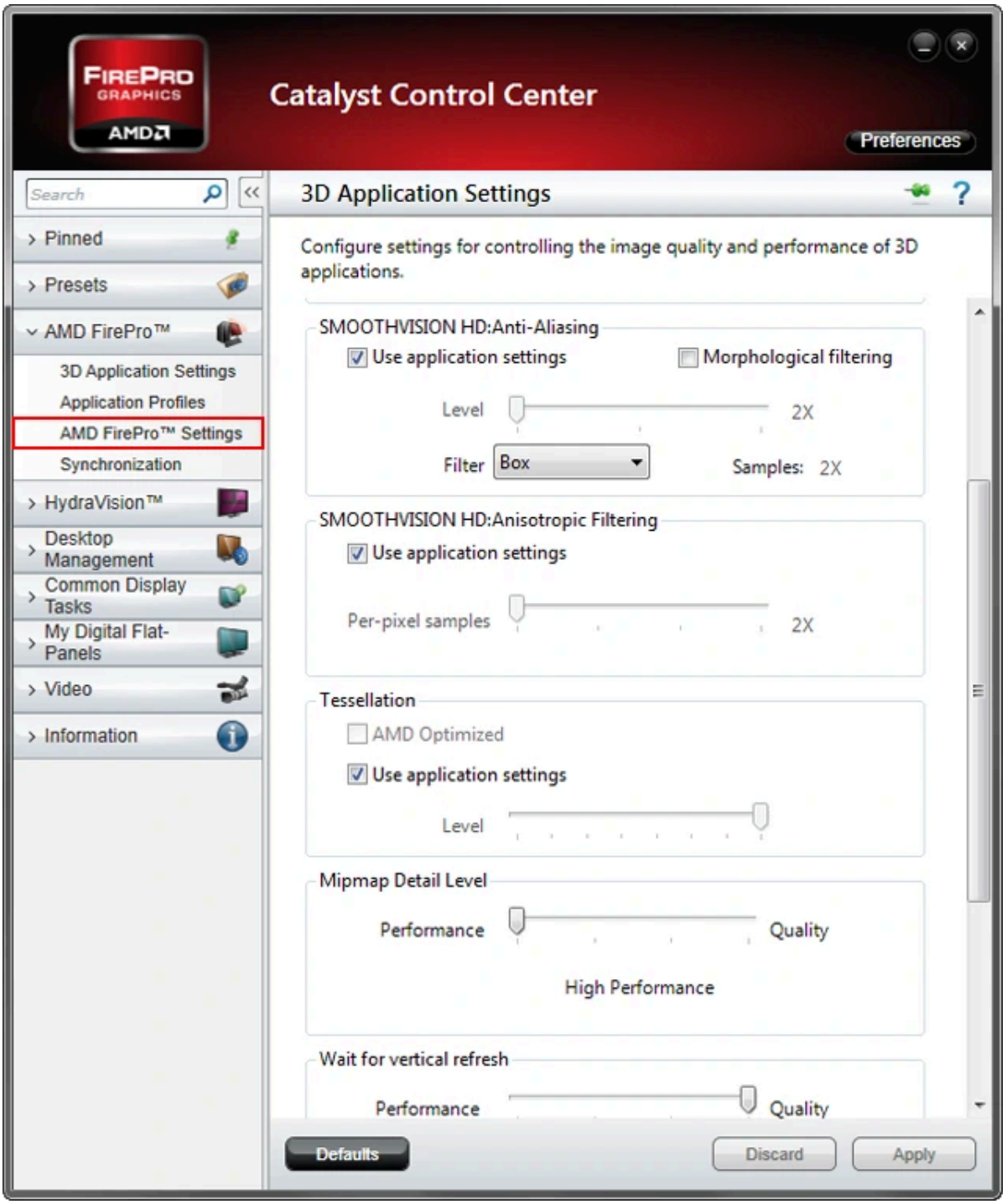


AMD FirePro V8800 graphics card is used by the 4U v2.5 machine and has four DisplayPort connectors

In order to use the DVI interface please use the active DisplayPort adapters supplied with your 4U v2.5 system.

Settings for your V8800 graphics card

- Once you have opened Catalyst Control Center, expand the AMD FirePro option on the left side pane and select AMD FirePro Settings.



Select AMD FirePro Settings under AMD FirePro from the Catalyst Control Center and change the settings to those shown below to maximise performance for a AMD FirePro graphics card

Change the configurations to the following:

SMOOTHVISION HD: Anti-Aliasing

- Use application settings: On
- Morphological filtering: Off

SMOOTHVISION HD: Anisotropic Filtering

- Use Application Settings: On

Tessellation

- AMD Optimized: Off
- Use application settings: On

Mipmap Detail Level

- High Performance

Wait for vertical refresh

- Always On
- Left-click **Apply**.

Managing Displays

To enabling and configuring your displays open up the Windows Display settings by right-clicking the desktop and select screen resolutions.

For more precise advanced display configuration options open up the Catalyst Control Center:

1. Right-click on the desktop and select Catalyst Control Center.

2. Under Desktop Management, select Creating and Arranging Desktops, then select the ? icon.



This will open the Desktop and Display Management website where you can learn how to enable, arrange, duplicate and rotate desktops.

Also see Getting the best display on your monitor.

4U v2.5 Hardware Overview

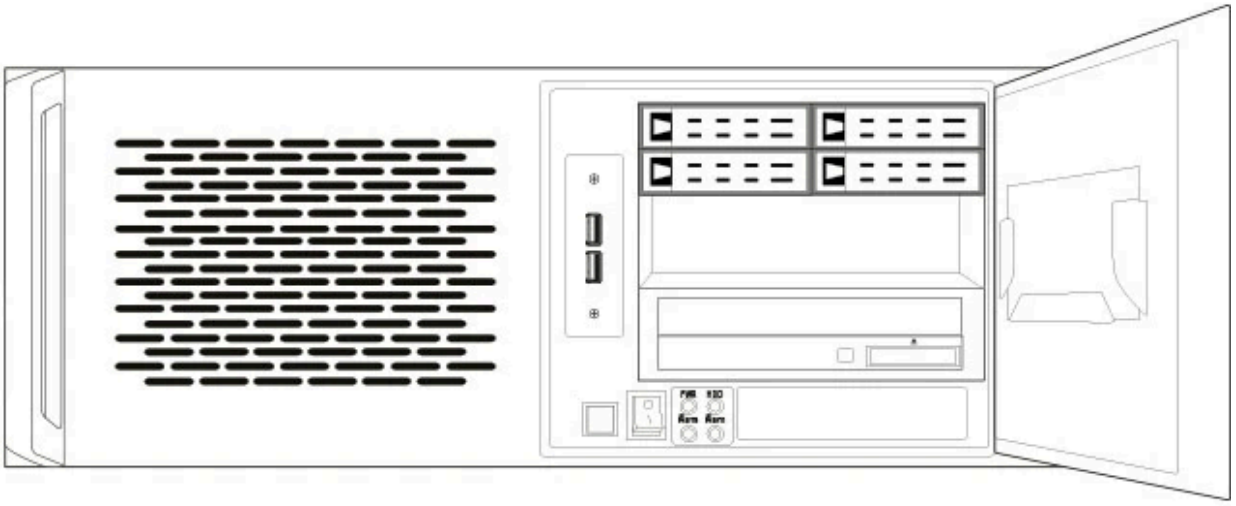
Hardware comes in two machine types, the 2U and the 4U.



The machines come pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback. We also offers a software only version, Designer.

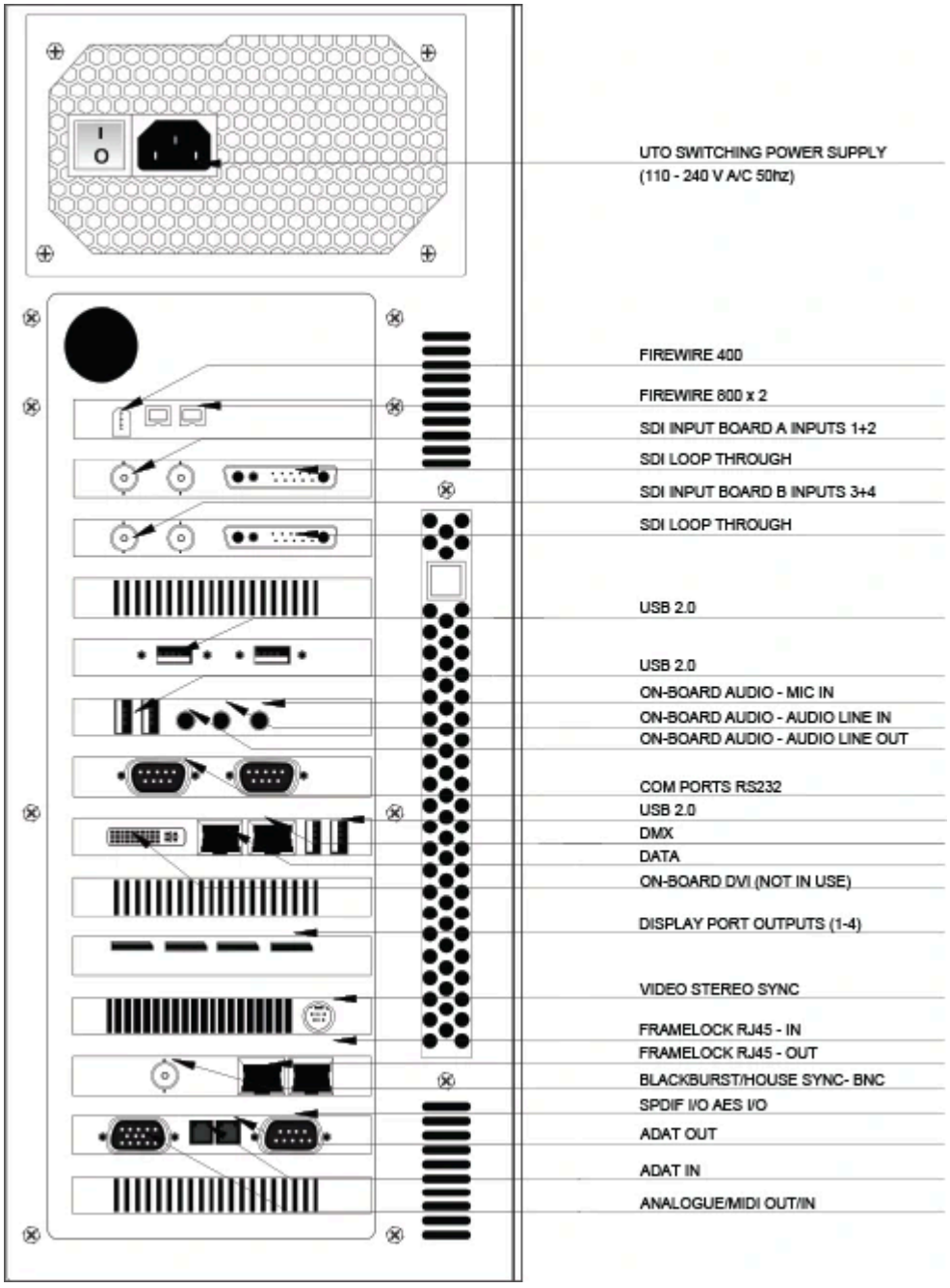
4U machine

The v2.5 is the latest model of the 4U machine. Other earlier versions of the 4U machine are the v1.0, v1.5 and v2.0.



Front view of 4u v2.5 with front door open

The diagram below illustrates the configuration of the 4U v2.5 machines back panel. Parts of this diagram will be used throughout this chapter to explain specific hardware components.



Architectural configuration of the 4U v2.5 machines back panel

Support

If you experience any problems with hardware please contact the Disguise support team.

> **Warning**
>
> Do not open the case unless you are instructed to do so by a certified Engineer.

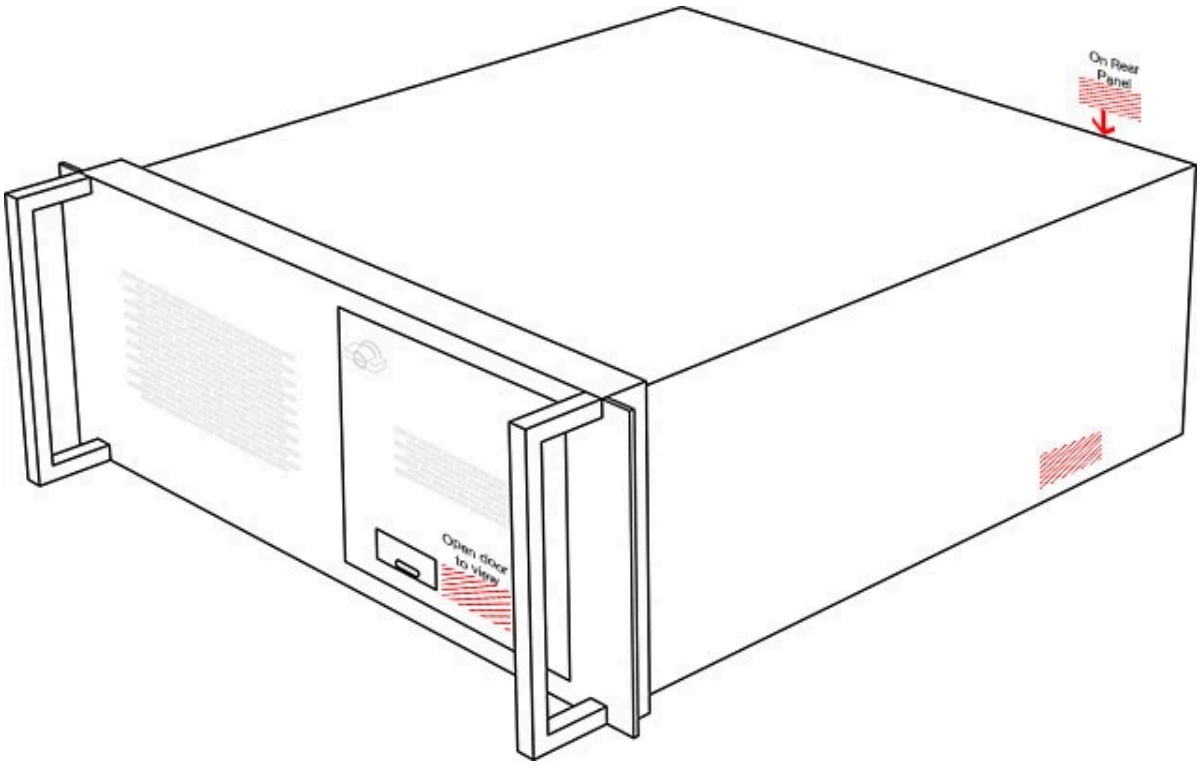
4U v2.5 Identifying the Hardware Version

For information on how to identify the current software version please see the software sub-chapter Identifying the version

Locating the serial number

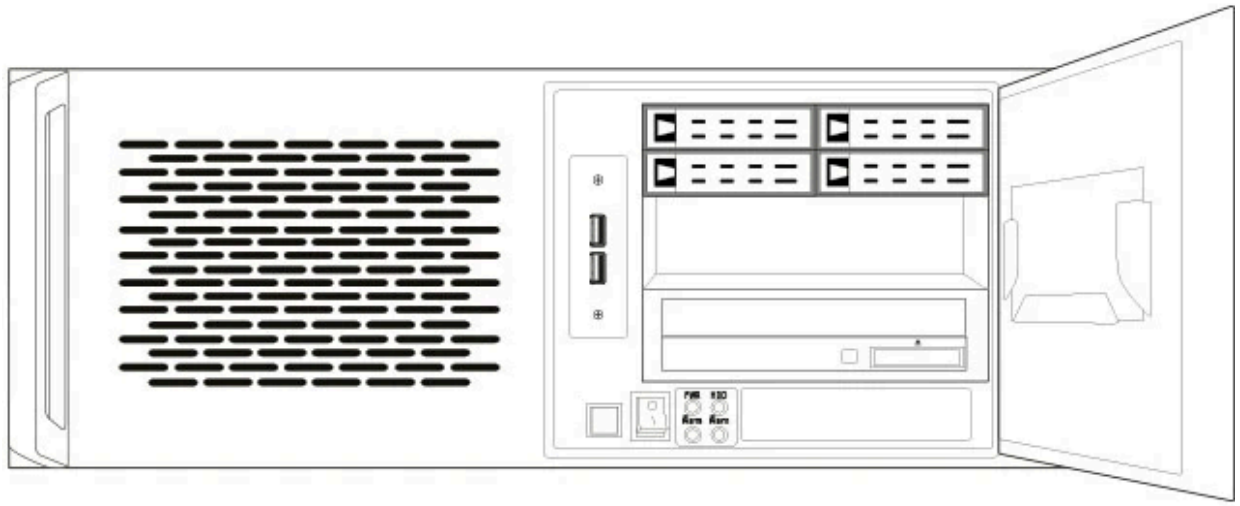
Every Disguise machine has a 5 digit serial number, each 4u machine has the serial number in 3 locations.

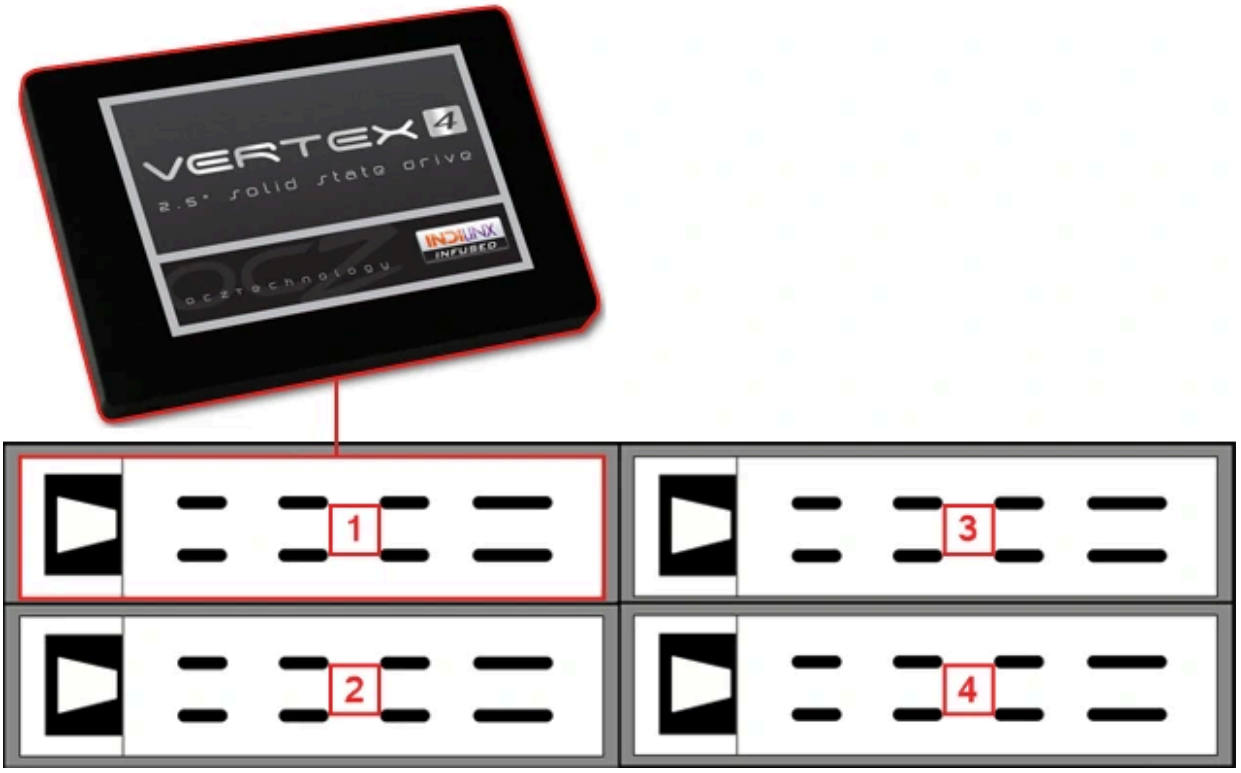
- The front panel - open the door and it is located next to the power switch.
- The right hand side panel.
- On the rear panel



Removable Media Drives

Your Disguise machine contains four drive bays, which are found on the front panel behind the door.





Every Disguise machine contains four bays, and are shipped with a single 512Gb OCZ Vertex 4 Solid State Drive (SSD) located in drive bay 1.

Out of the four drive bays there are two fast SATA3 drive bays (bays 1 and 2) and two SATA2 drive bays (bays 3 and 4).

To ensure optimal performance always populate bay 1 and 2 first. Your Disguise machine ships with a single 512Gb OCZ Vertex 4 Solid State Drive (SSD). The SSD will be located in drive bay 1 and is capable of 461.9 MB/s sequential read and 462.9 MB/s sequential write.

> **Note**
>
> If you ever need to replace or exchange your media drive it is recommend that you use a drive with similar read/write speeds. For further information please contact the **Disguise Support team**.

> **Warning**
>
> Do not remove drives when the machine is on.

4U v2.5 Updating the Software

For information on how to update the current software version to the latest release please see the software user guide sub-chapter Installing Designer.

> **Note**
>
> To update to the latest release on your 2U or 4U machine please see the software user guide sub-chapter System Requirements.

4U v2.5 Redisguise

> **Note**
>
> Please note only machines after January 2012 will have a populated restore partition. This includes all 4U v2.5s. If in doubt over whether your system is included, or if your machine is older then January 2012, please contact the **Disguise Support team**.

Internal Restore

Internal restore, on a v2.5, is the process of re-imaging the system to the its factory defaults.

To do this you need to restore the system from its restore partition on the C: drive . This process will return all settings back to the original configuration of your system.

If you need to re-image a machine completely please contact the **Support team** who will provide a download link to download a copy of the machine image.

Preparing your system for restoration

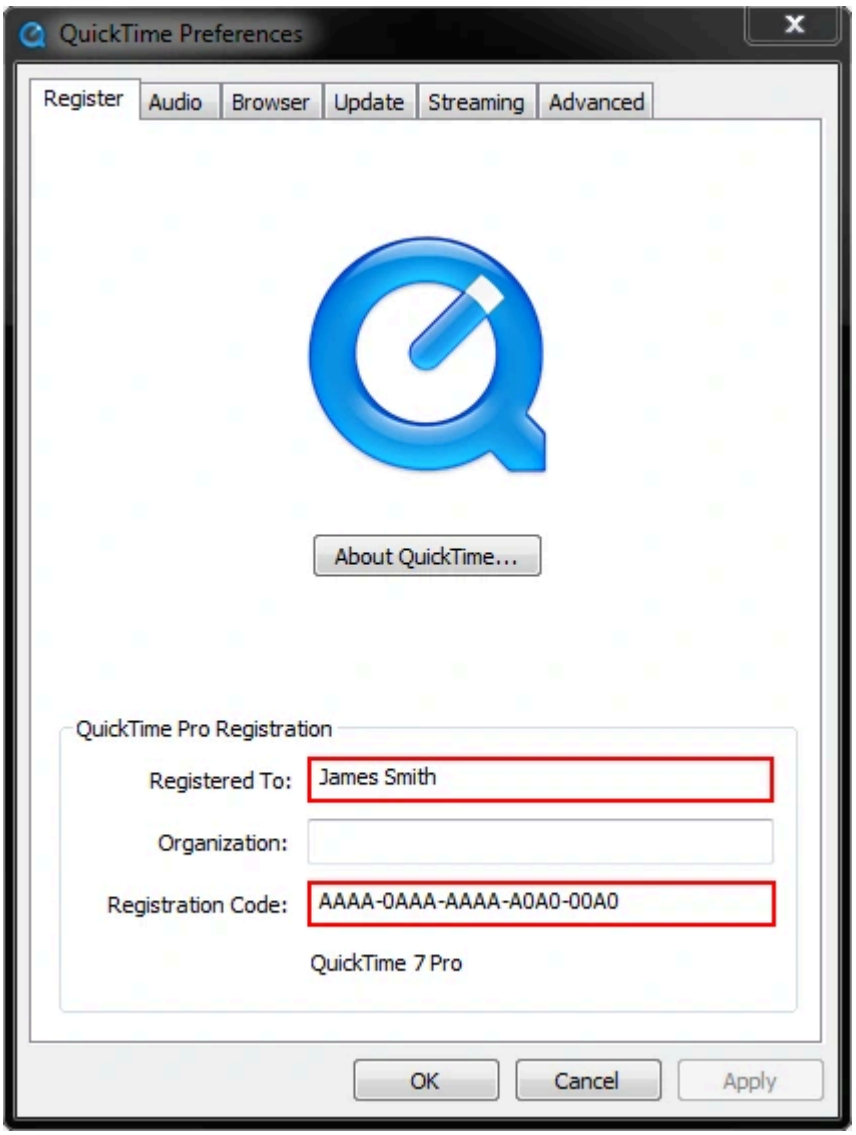
To prepare your system for restoration:

1. Back up any important files or program installers stored on the **C: drive** onto an external disk as these will be replaced and lost by the system image.

> **Note**
>
> Please note: this process will have no impact upon any data stored on your systems Media drive. However, to avoid confusion between disks it may be worthwhile removing the media drive from slot 1 on the systems hot swap drive caddy.

2. Make a note of your systems **QuickTime Pro Registered To** and **Registration Code** details. This information is in the paperwork you received with each of your systems. If this is not to hand you will be able get this information by following these steps:
3. Open QuickTime Player (**Start menu > All Programs > QuickTime > QuickTime Player**).
4. Select **Edit > Preferences > Register**. Here you can see who QuickTime Pro is registered to and the Registration Code.

5. Make a note of both of these details.



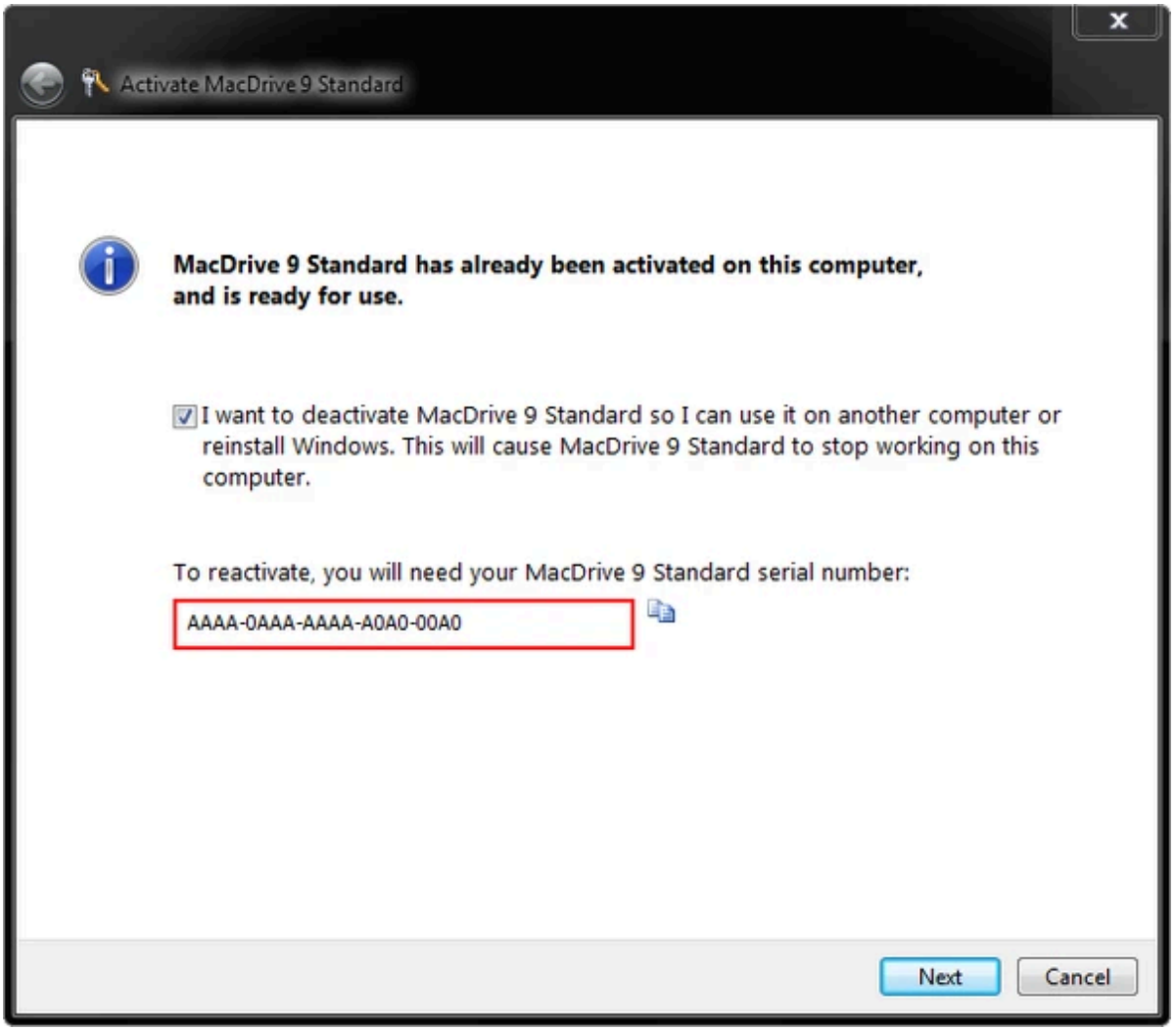
Make a note of your systems QuickTime Pro Registered To and Registration Code details

In addition, you will need to deactivate MacDrive 9 before the system is restored.

To deactivate MacDrive 9:

1. Open MacDrive 9 Standard (**Start > All Programs > MacDrive 9**).
2. Select **Deactivate MacDrive Standard**.

3. Make a note of the displayed serial number.



4. Tick the box **I want to deactivate MacDrive 9 Standard so I can use** and select **Next**.

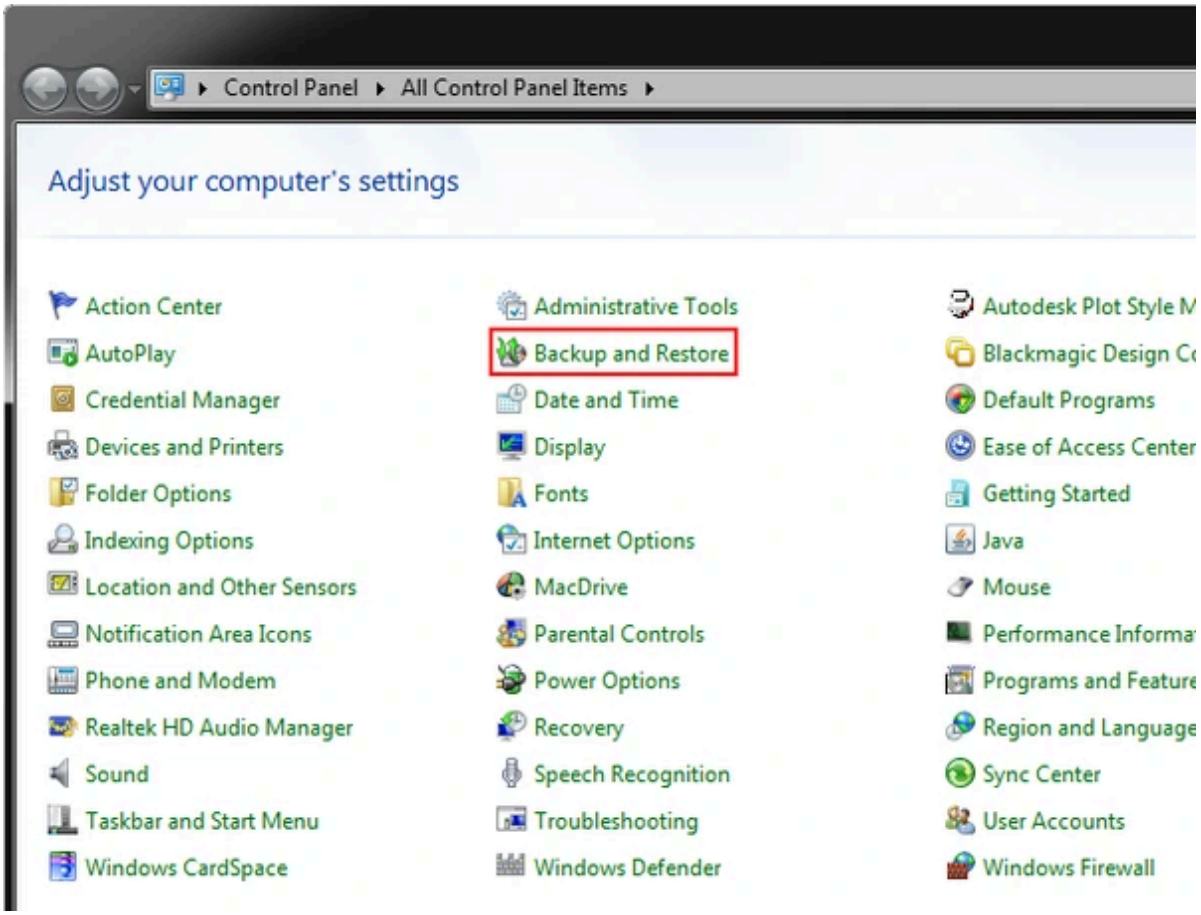
Restoring your system

Once the above steps have been completed you are ready to start the system restore.

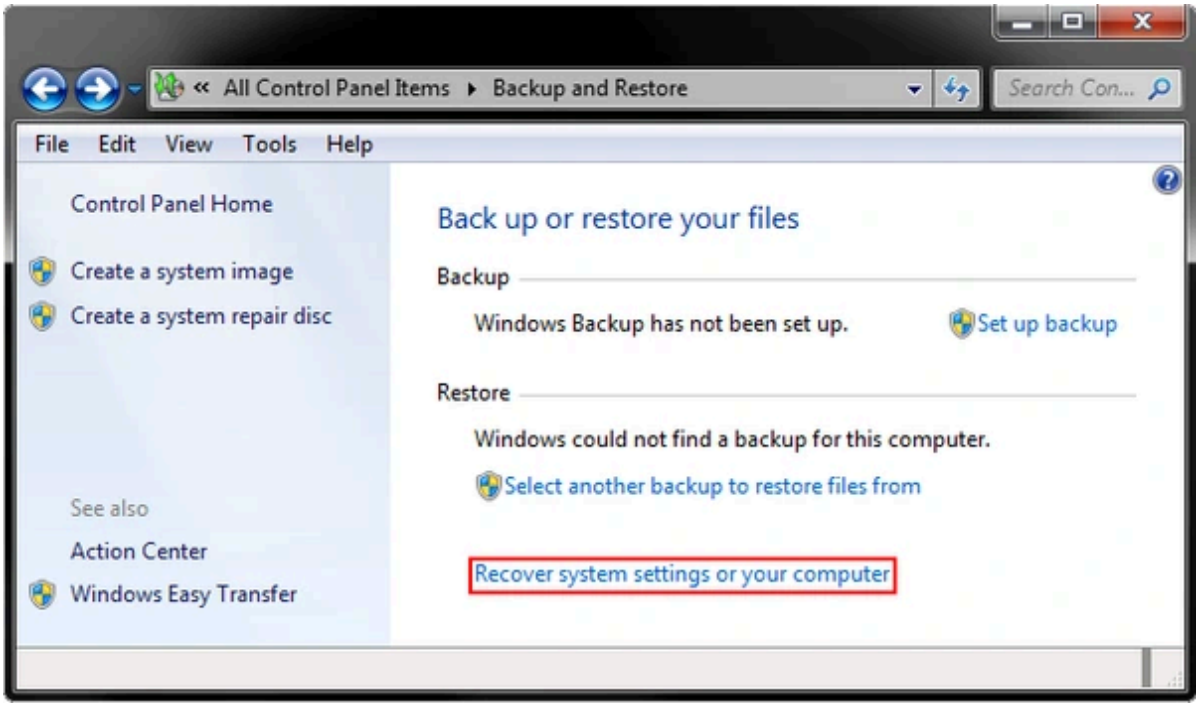
To start the system restore:

1. Open the **Control Panel** (**Start menu > Control Panel**).

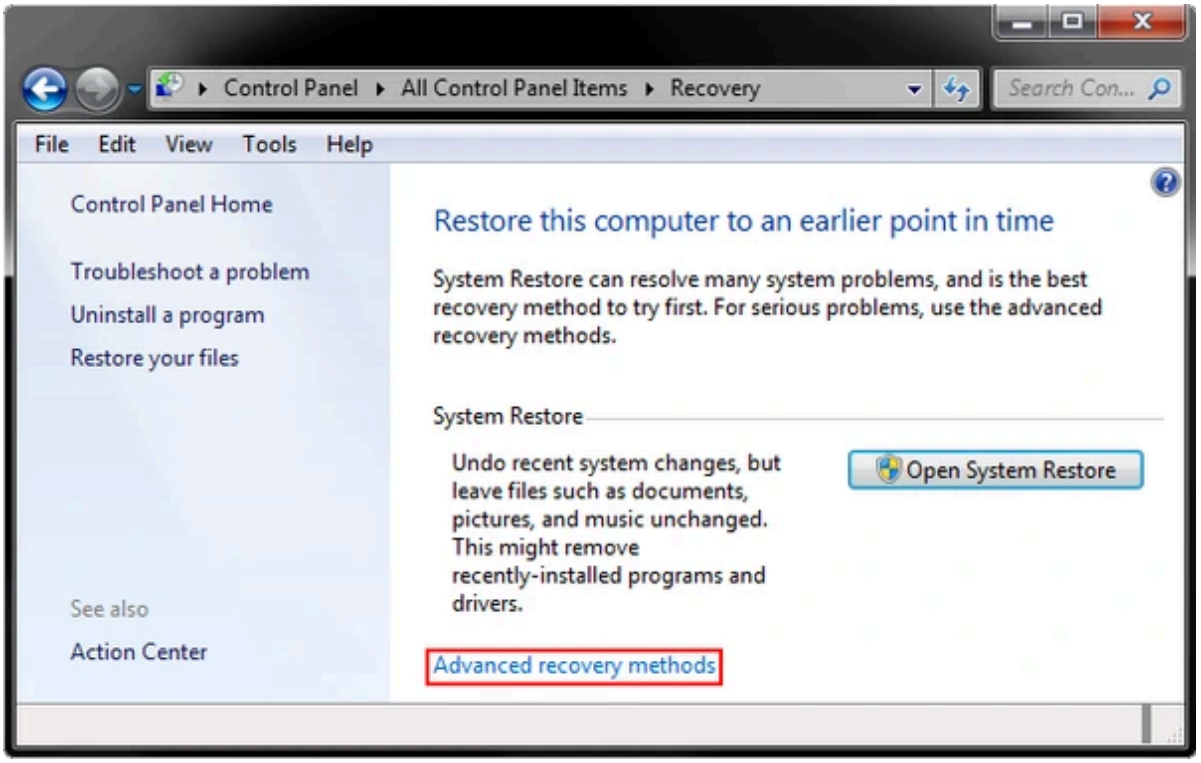
2. Select **Backup and Restore** from the Control Panel.



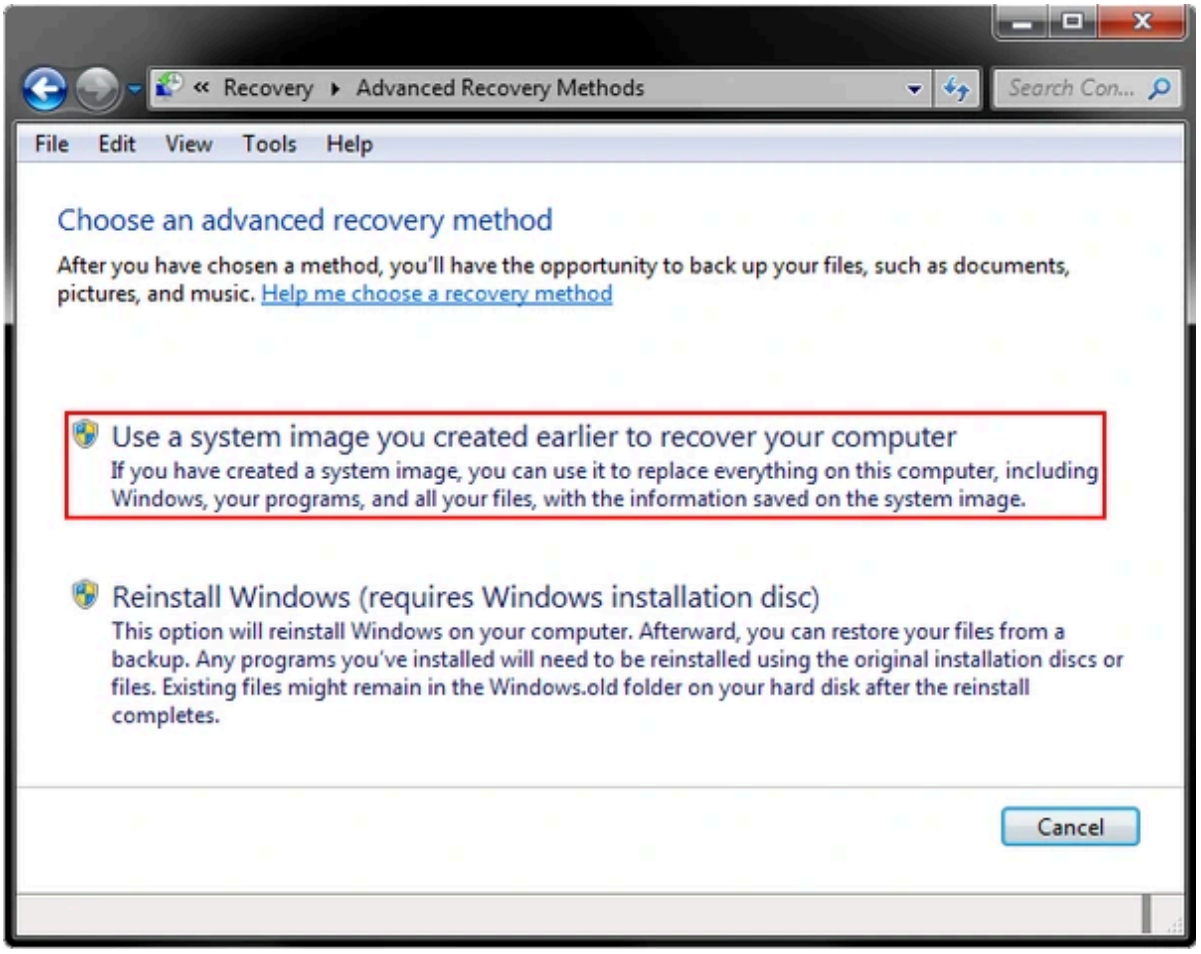
3. Select **Recover system settings or your computer**.



4. Select **Advanced recovery methods**.

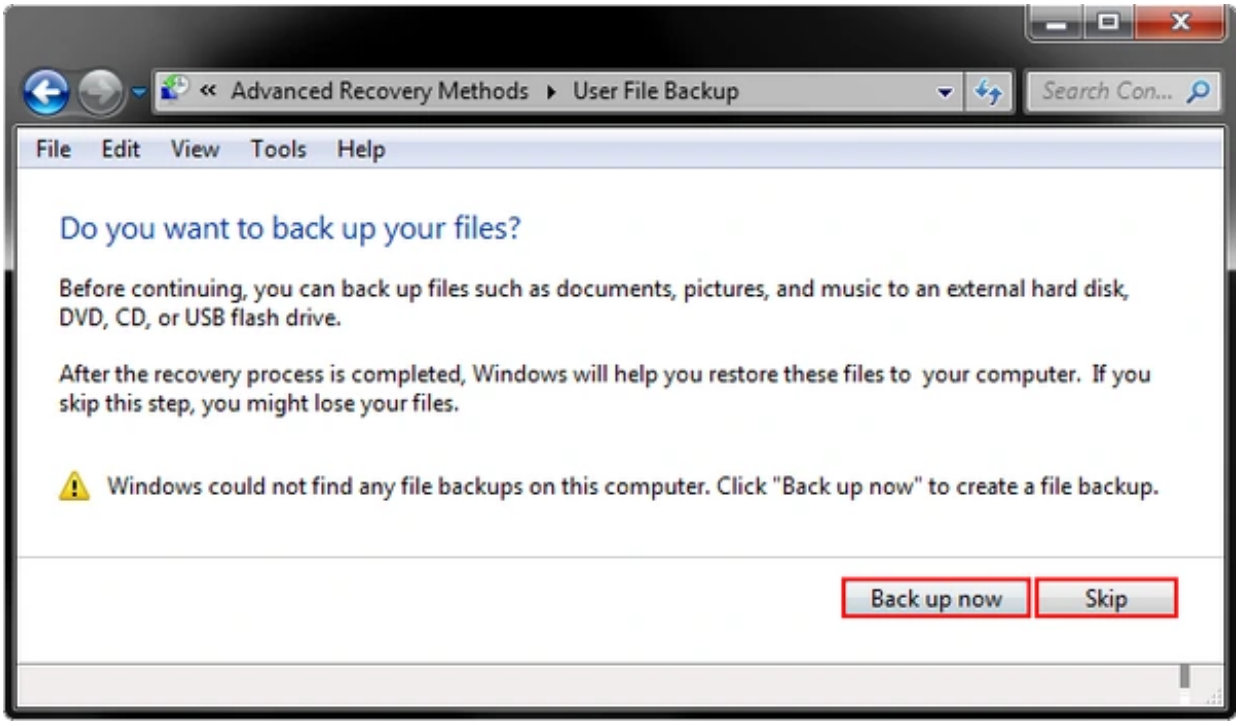


5. Select **Use a system image you created earlier to recover your computer**.



6. You will then be asked **Do you want to back up your files?** Select **Skip** if you followed the instructions above and backed up any important files or program installers stored on the C: drive onto an external disk. If not please backup any important files.

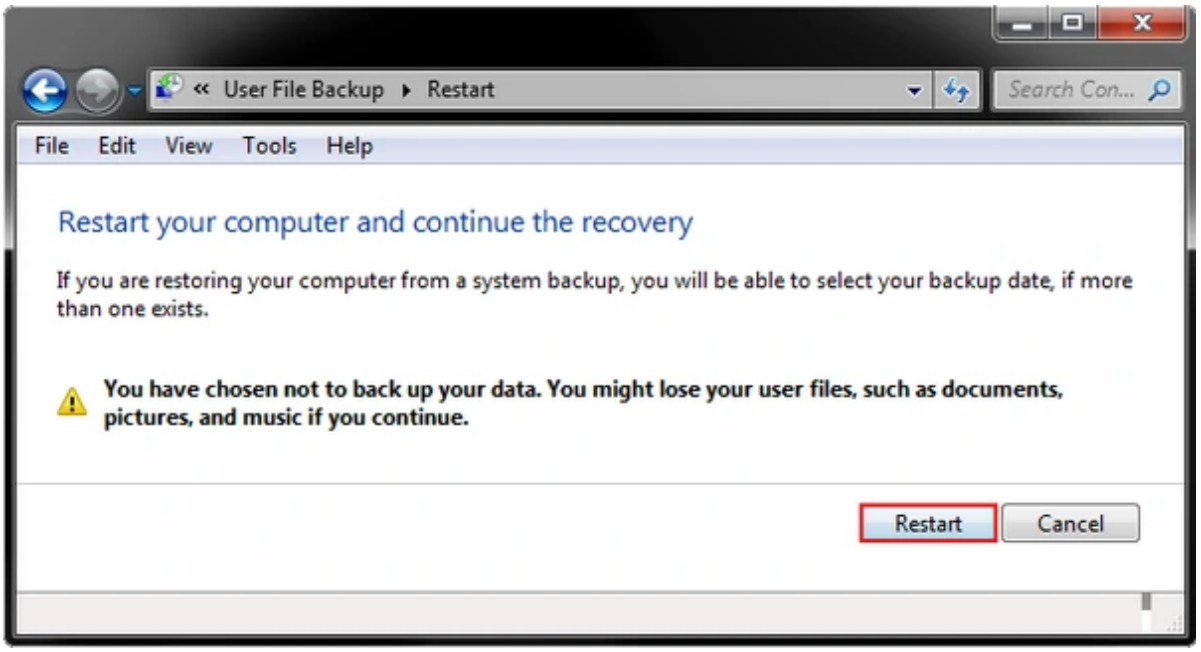
> **Note**
>
> Please note this process will have no impact upon any data stored on your systems Media drive. However, to avoid confusion between disks it may be worthwhile removing the media drive from slot 1 on the systems hot swap drive caddy.



Warning

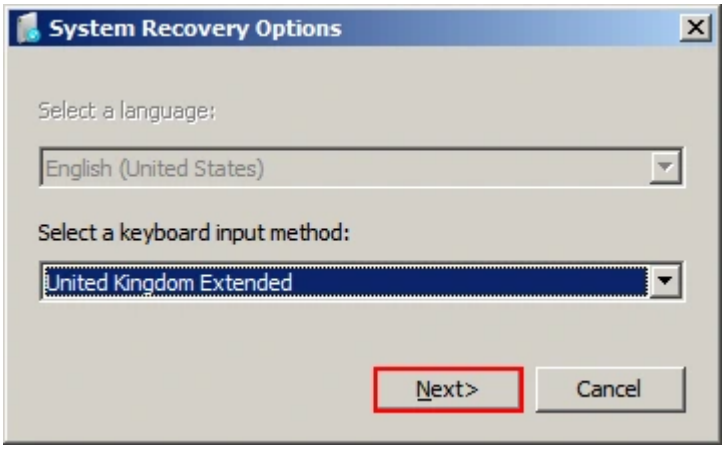
Everything saved on the (C:) drive since you received your system will be lost unless backed up.

7. From here you will be prompted to **Restart your computer and continue the recovery**. Select **Restart**.

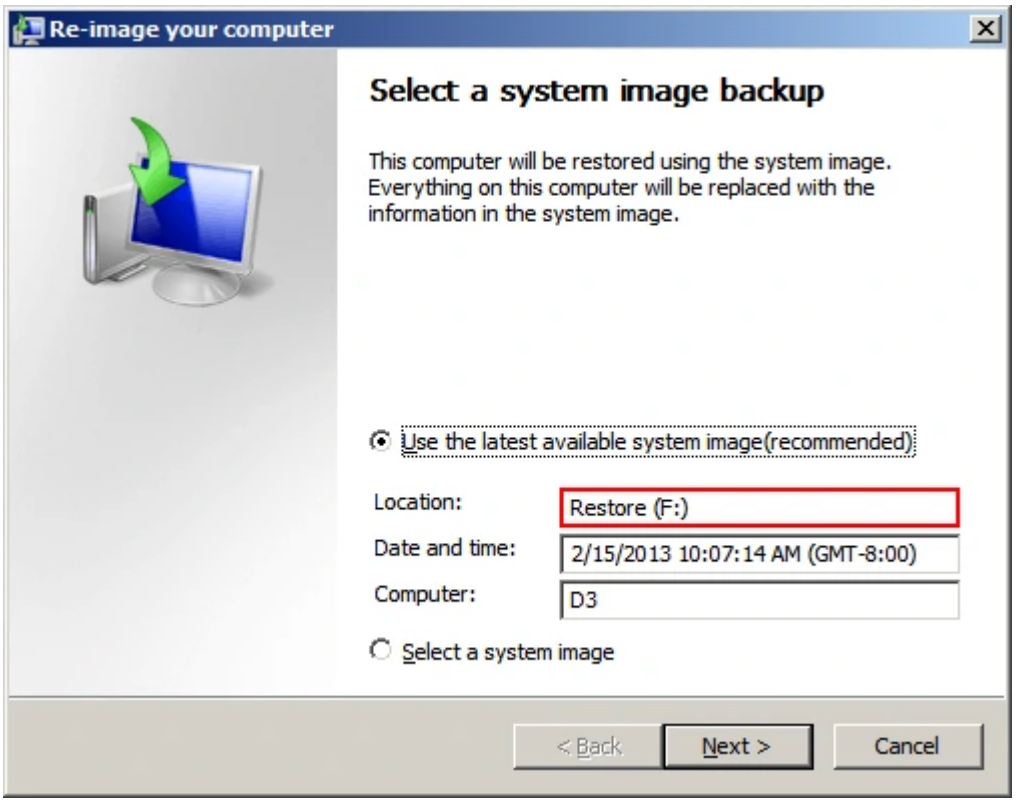


Your system will now reboot into the Windows Recovery Environment.

8. You will be presented with a window asking you to Select your keyboard input method. After doing this select **Next**.

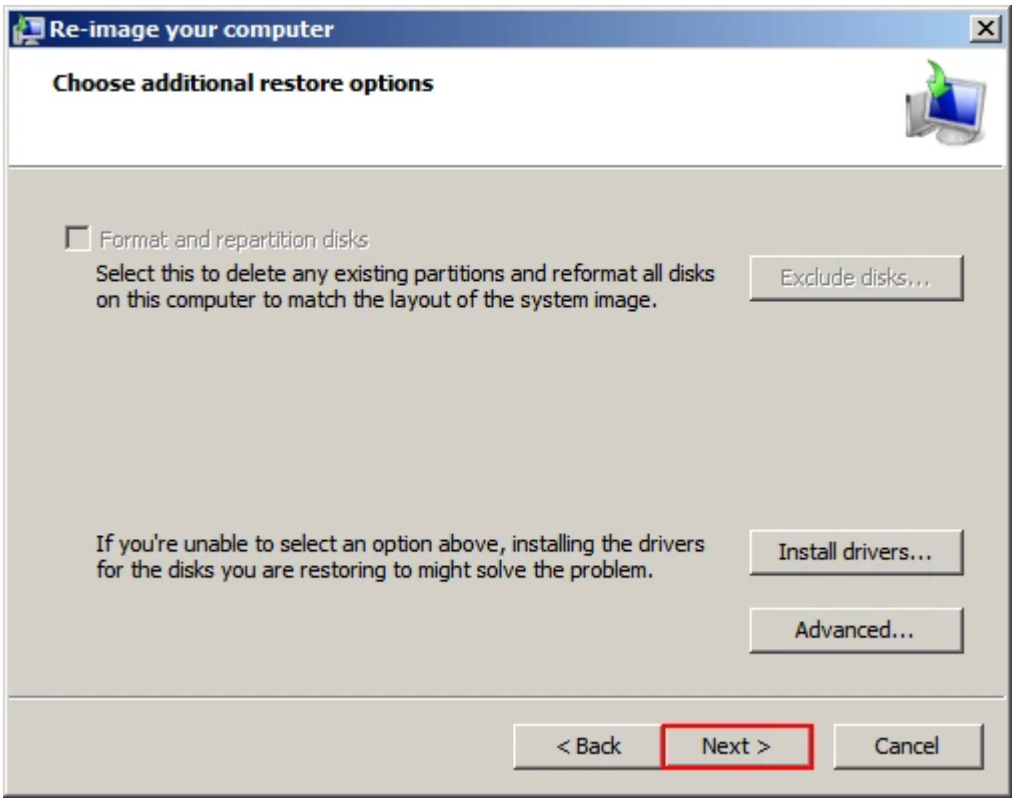


9. You will then be prompted to **Select a System Image Backup**. The location should be set to **Restore (F:)**.

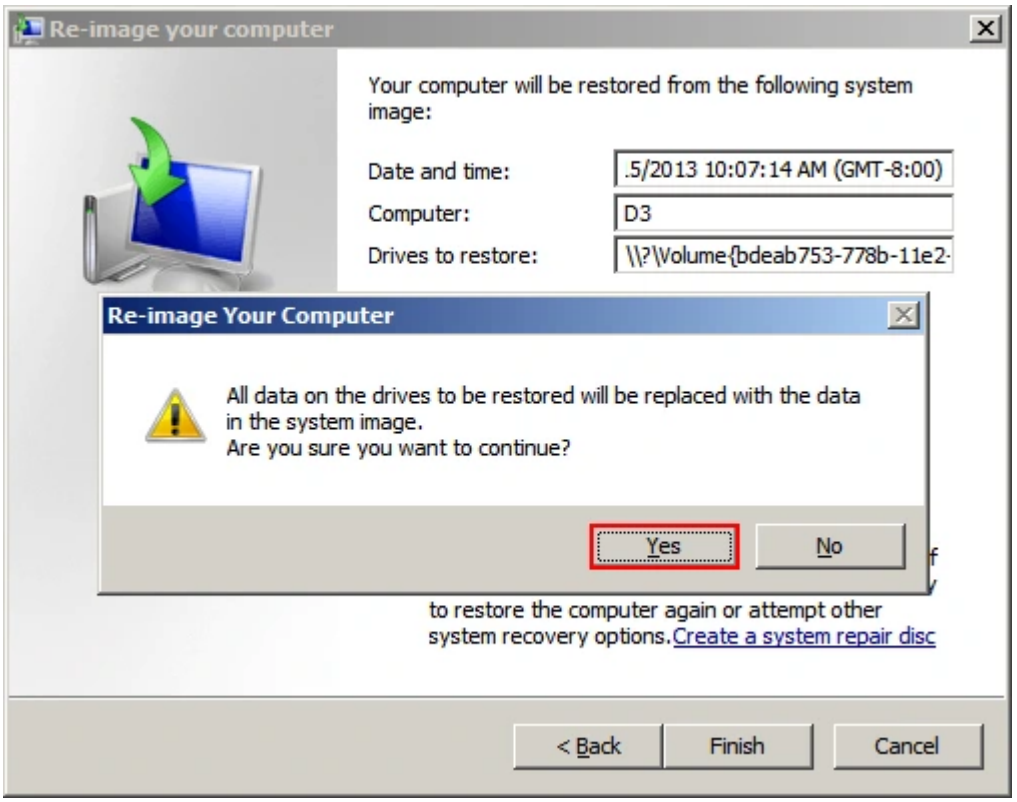


10. Select **Next**.

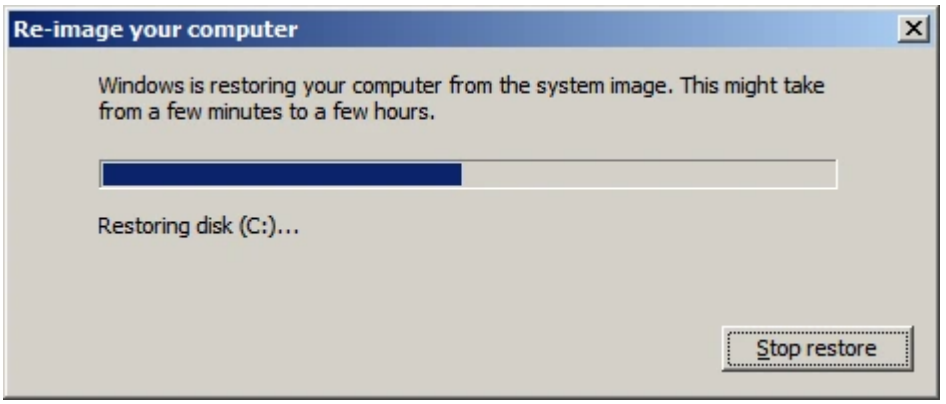
11. This will be followed by **Choose Additional Restore Options**, this can be ignored so just select **Next**.



12. Select **Finish** on the following window and confirm that All data on the drives to be restored (C:) will be replaced with the data in the system image. Select **Yes**.



The restore process will then start automatically and should take no longer than 10 minutes.



Once this has completed the system will automatically reboot and will be restored to the factory defaults.

After a system has been restored

1. Once the reboot is complete, you will need to select **Cancel** on the pop up window stating that Recovery has completed. Do you want to restore your user files?
2. You will then need to restart the machine as prompted.

3. Once the machine has finished its reboot cycle you will need to ensure that the QuickTime and MacDrive Registration keys and Serial numbers have been carried across. This should be the case, however if not you can reactivate the software by following the steps below.

Additionally, you may need to apply a specific Windows Update (though only apply if actually needed).

QuickTime Pro

1. Open **QuickTime Pro** (**Start menu > All Programs > QuickTime > QuickTime Player**).
2. Open the **Edit** tab **> Preferences > Register**. This will open the registration window.
3. Re-enter the Registered To & Registration Code fields recorded earlier.

MacDrive 9

1. Open **MacDrive 9 Standard** (**Start menu > All Programs > MacDrive 9 Standard)**.
2. Select **Activate MacDrive Standard**. This will open the Activation window.
3. Enter the Serial number recorded earlier.

Viruses and Malware

Viruses and other malware are potential problems that should be considered when using any software.

However, most anti-virus software is very intrusive and reduces performance as it actively scans the system in the background. When using Disguise hardware for a show, you want as few background applications running as possible to maximize the performance. Therefore, we do not install anti-virus software by default on any 4U or 2U system.

Recommended virus scanner

For information on the virus scanner we recommend which does not reduce performance please see the software sub-chapter Viruses and malware.

4U v2.5 Windows Updates

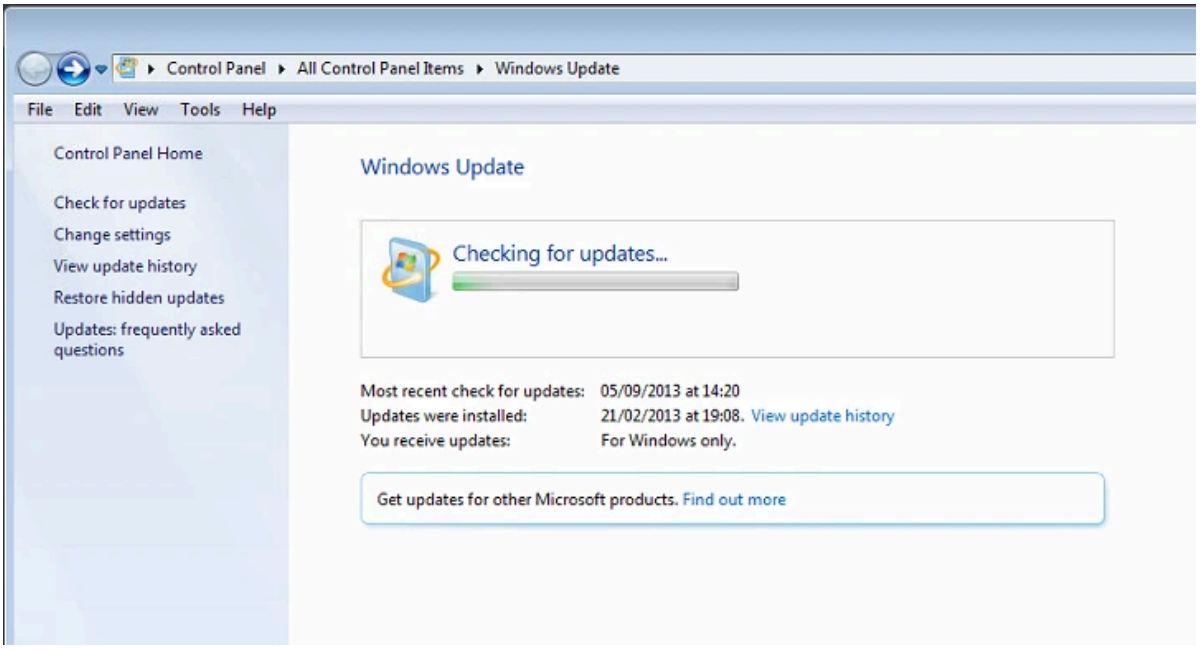
> **Note**
>
> Please note that under most circumstances we do not recommend users to install Windows Updates on their own. There are, however, cases in which machines may require a specific Intel update in order to function properly within a network (Intel - LAN, LAN (Server) - Intel(R) 82579LM Gigabit Network Connection).

Diagnosing this issue is fairly simple, as the main symptom is a noticeable decrease in performance and unstable frame rates occurring whenever the machine is networked.

How to Install the Intel update

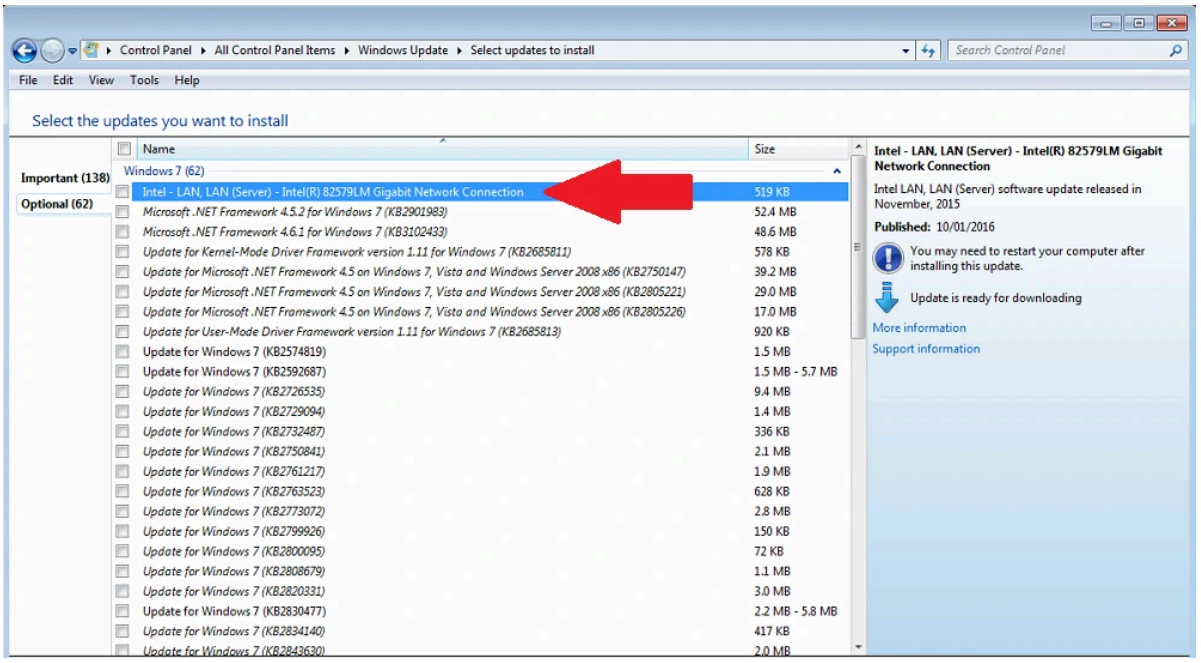
If you are experiencing the symptoms described above and require the Intel update, please follow the steps below:

1. Click on Start.
2. Search for Control Panel.
3. Click on Windows Update
4. Click on Check for updates

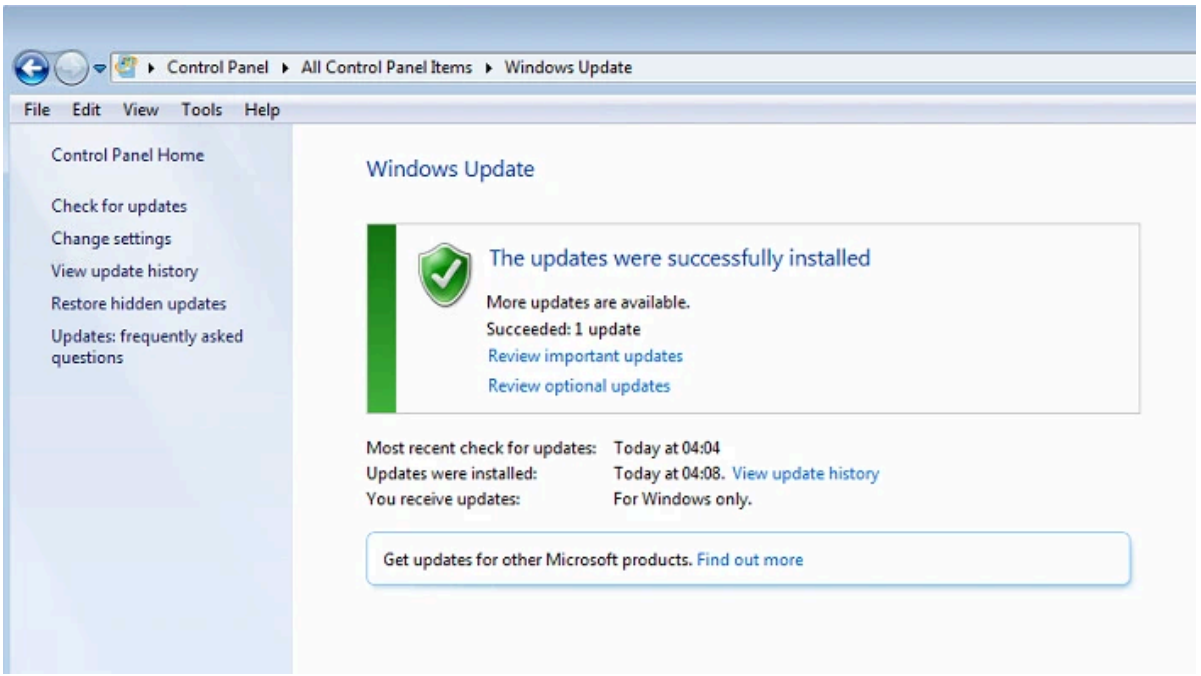


At this point, Windows may attempt to install updates automatically. DO NOT interrupt those automatic updates as they are required for the Intel update to successfully install.

5. Once the first automatic updates are installed and Windows has finished searching for updates, you will be able to view and select specific Important and Optional updates to install.
6. Select to View Important updates and untick the box at the very top of the list to untick and de-select all Important updates
7. Navigate to the Optional updates tab and tick the box on the Intel update from there: Intel - LAN, LAN (Server) - Intel(R) 82579LM Gigabit Network Connection.



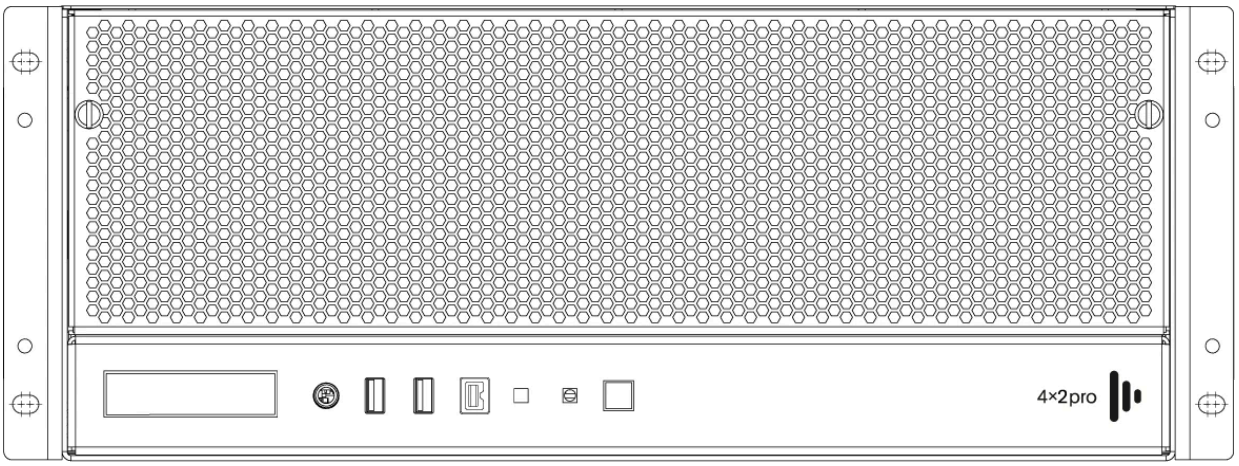
8. Ensure there are no selected updates from the Important tab, then install the Intel update on its own.



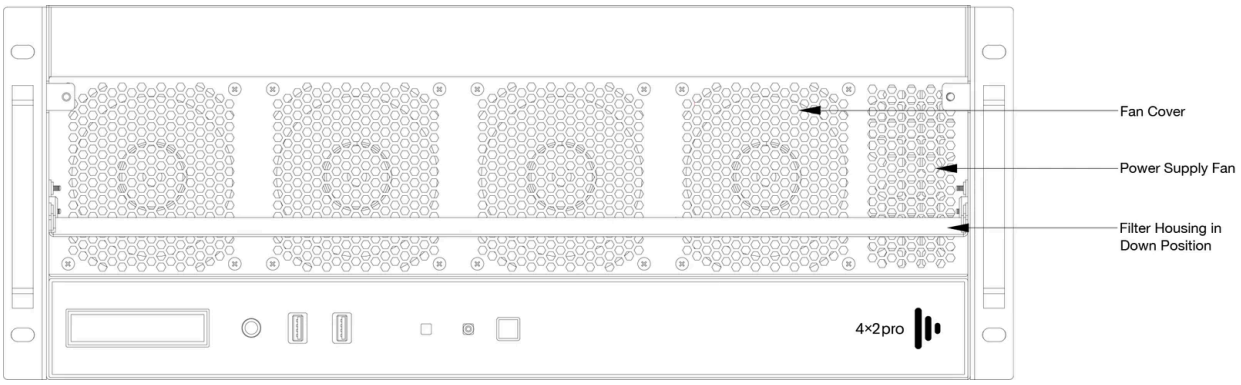
9. If the update is successful you should see the above screen.

At this point you should notice an increase in network performance right away. There is normally no need to restart the machine, although restarting is always recommended.

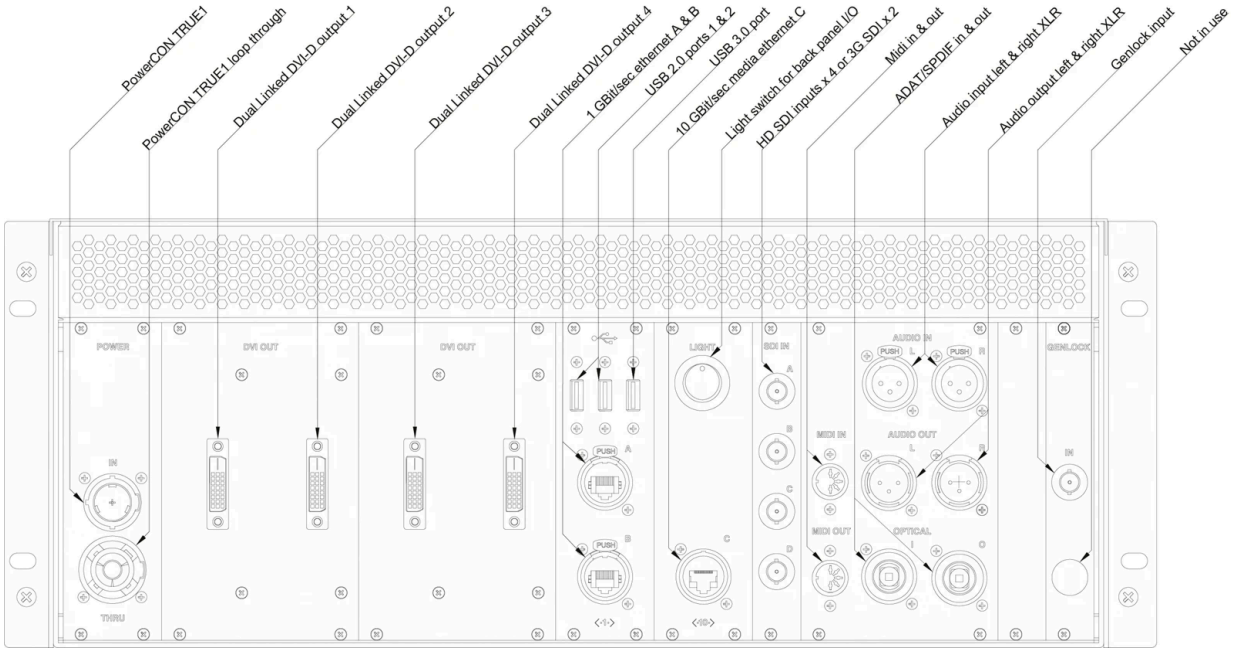
4x2pro Diagrams



Front view of 4x2



Front grill down view of 4x2



Rear view of 4x2

4x2pro Overview

Opening hardware may void your warranty. Consult support before opening the hardware.

> **Warning**
>
> Do not open or remove the case unless you are instructed to do so by a certified Engineer.

> **Note**
>
> If you experience any problems with hardware please contact **Disguise support**.

The machines come pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

For detailed information on the specifications for each plus and pro machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our web site.

4x2pro Redisguise

Internal system restore is the process of doing a factory restore on the system.

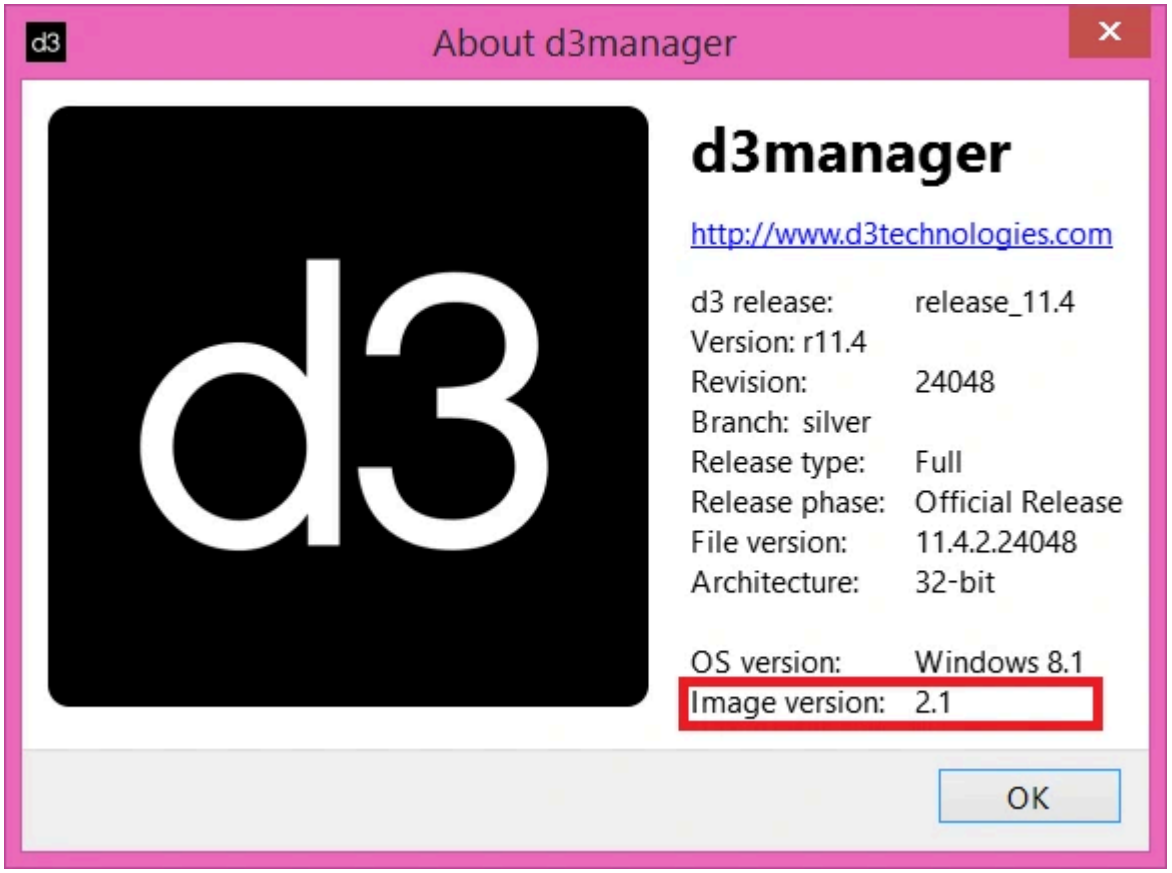
Redisguise is the process of doing an update or restore on the system using a bootable USB drive.

Neither of these restore processes affects the media drive of the server.

Internal Restore

This procedure will only work with OS version 10 and greater.

To locate your OS version please go to **d3Manager**- **Help** - **About d3Manager**.

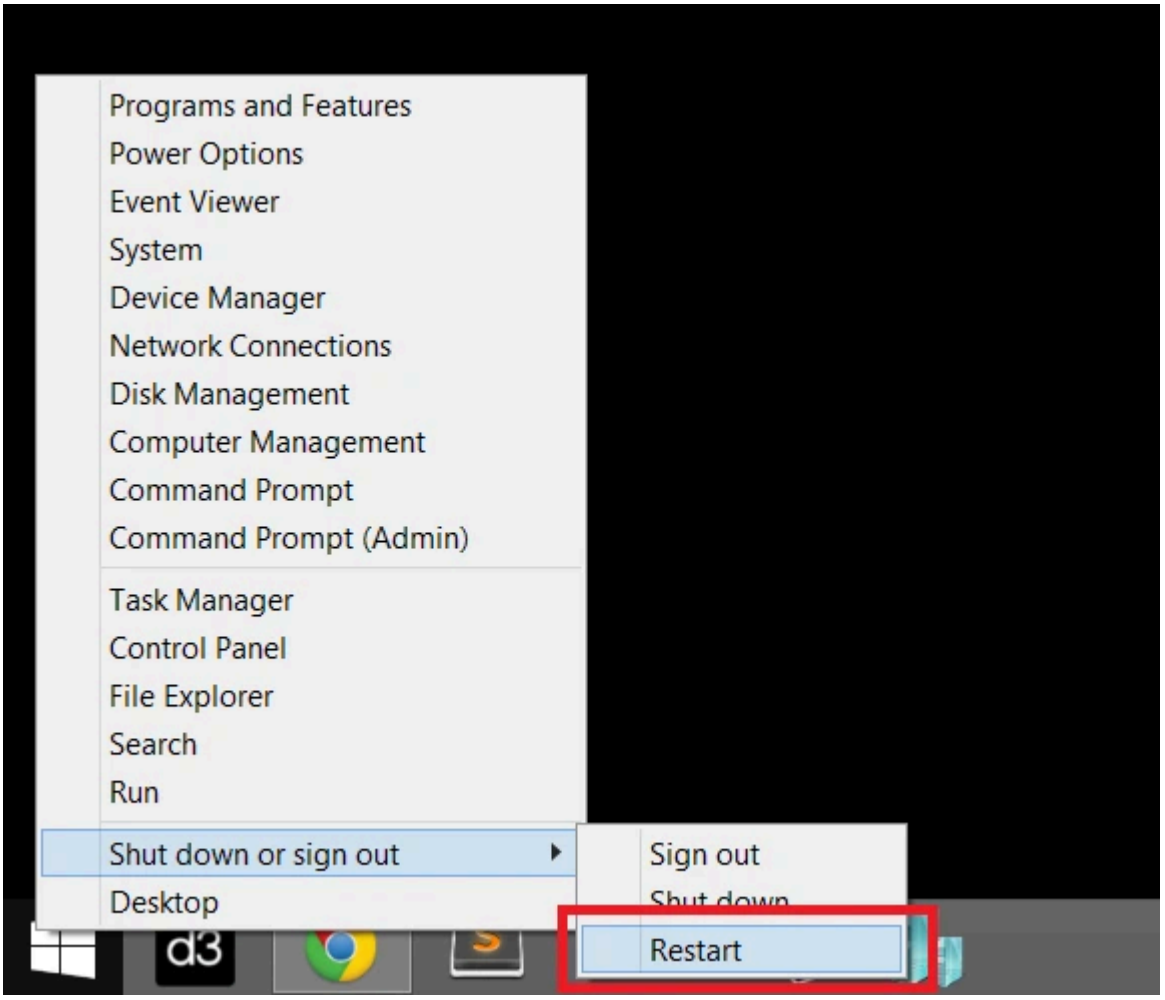


⚠️ **The system needs to be connected to the internet during this procedure. If it is not, or it loses internet connection during the process - windows activation will fail.**

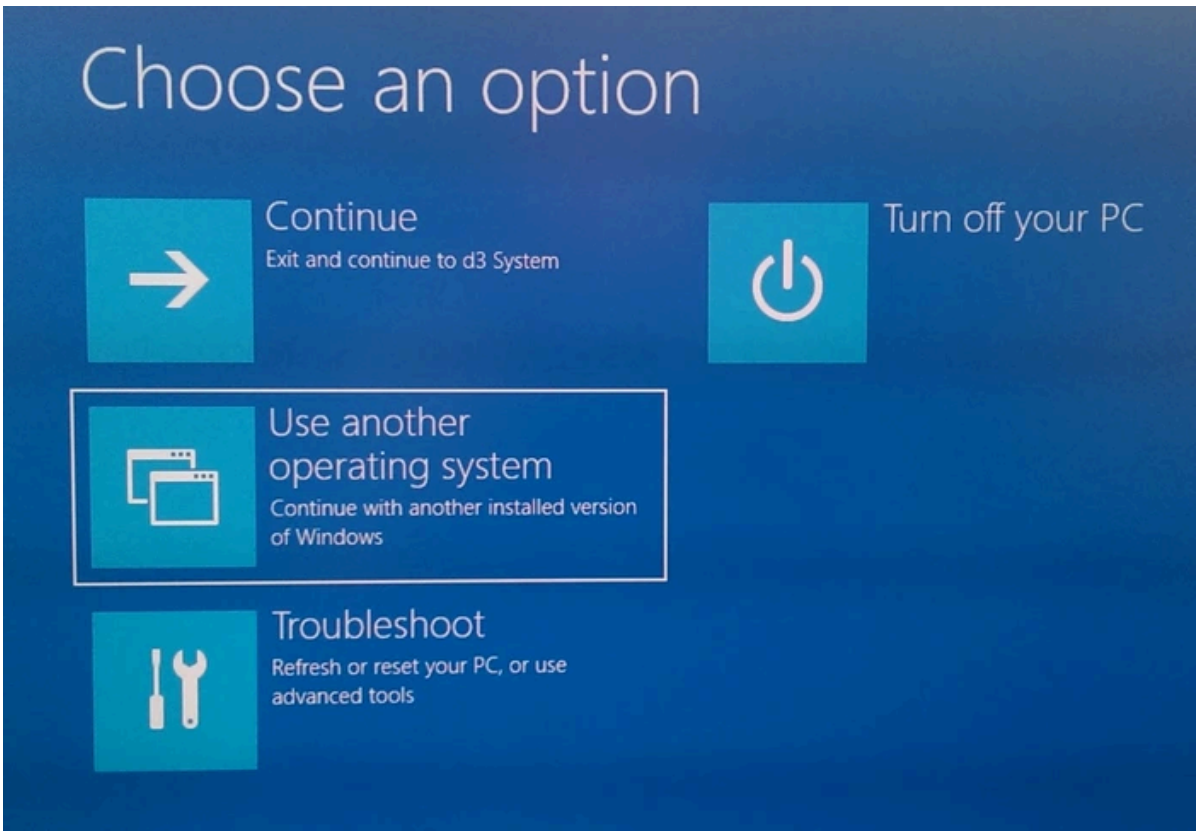
Re-imaging the system

1. Hold down **shift** whilst restarting the system.

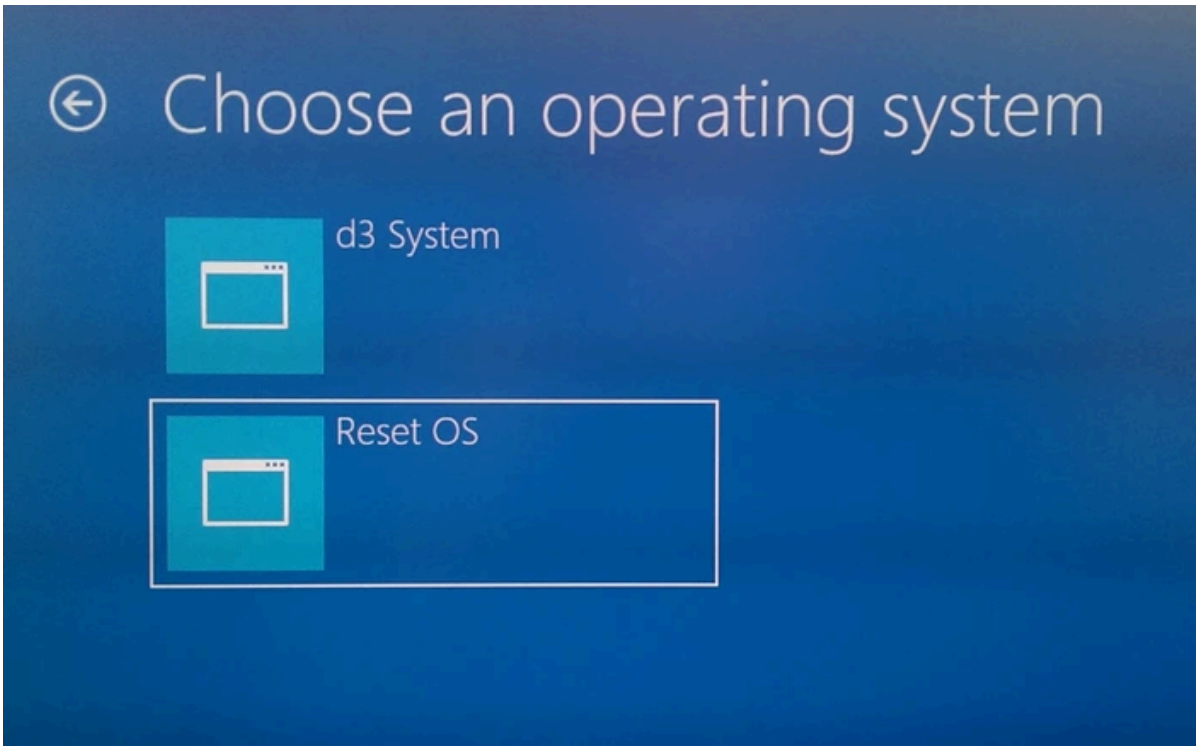




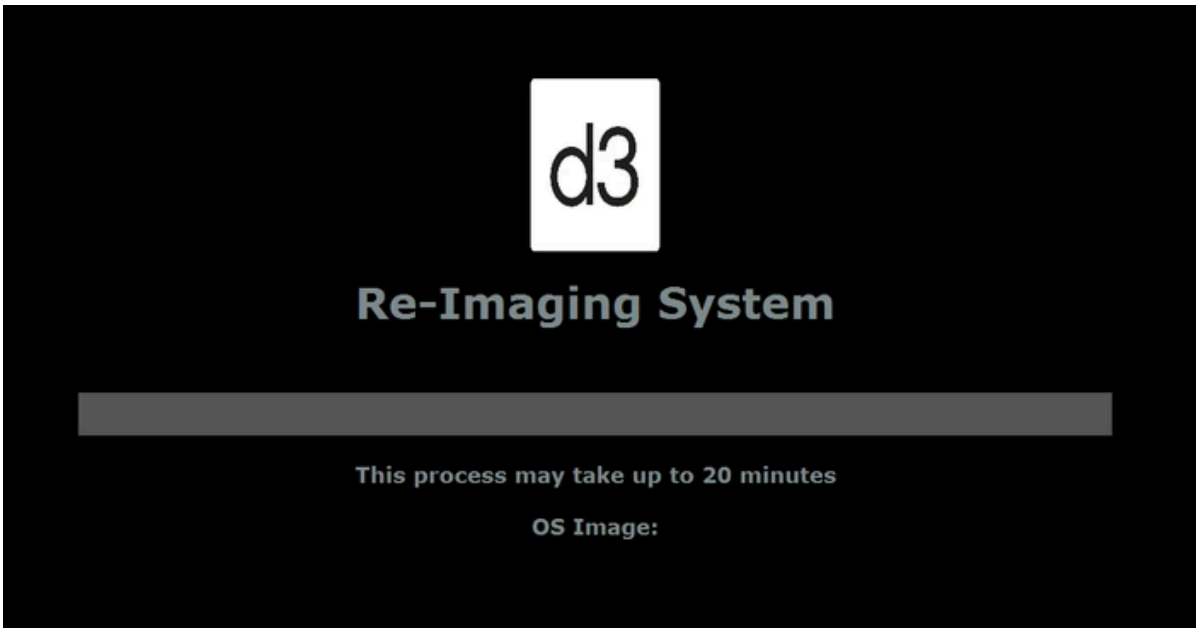
2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.



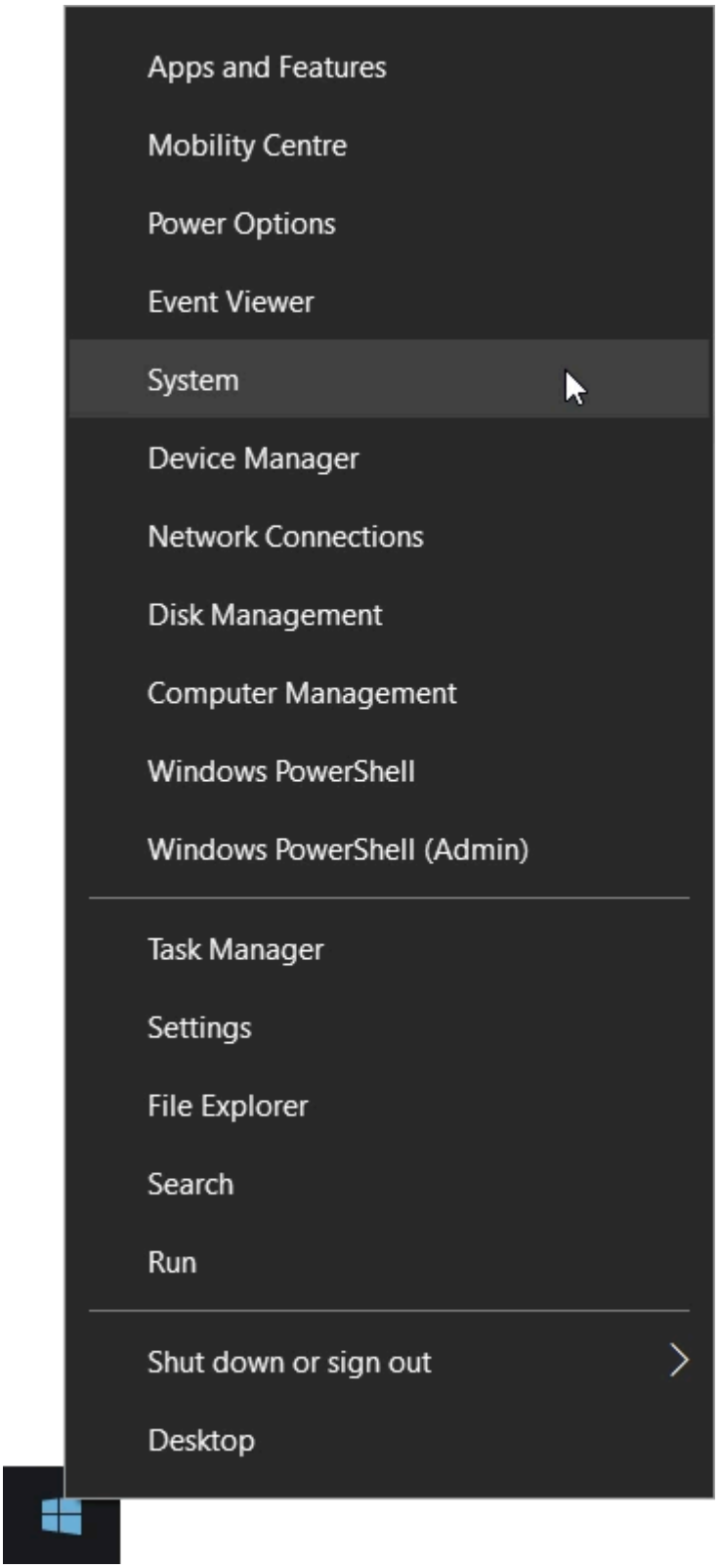
Activating windows

Windows should activate automatically, as long as the machine was connected to the internet for the duration of the re-imaging process.

If windows does not activate during the re-imaging process, follow these steps.

1. Wait for a few minutes after the re-imaging process has completed to allow the server time to activate Windows.

2. Navigate to the System tab by right-clicking on the Windows start menu and selecting **System**.



3. In the System window, check to see if you have valid Windows license information visible. If you do not, contact the **Disguise support team**.

Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

The system needs to be connected to the internet during this procedure.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To locate your OS version please go to **d3Manager**- **Help** - **About d3Manager**.

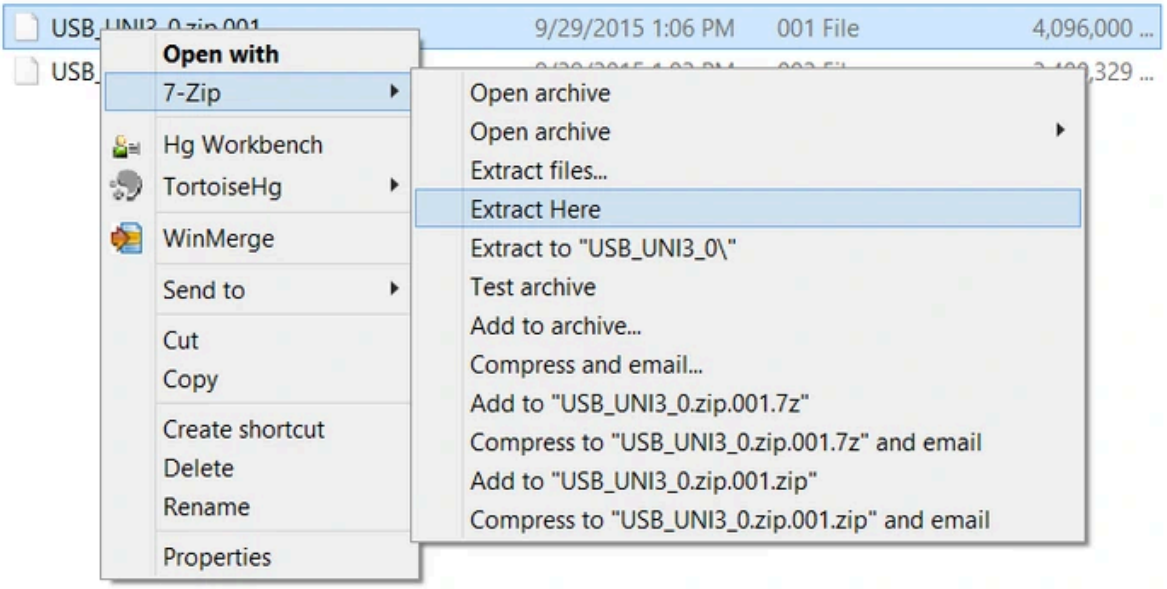


You will need

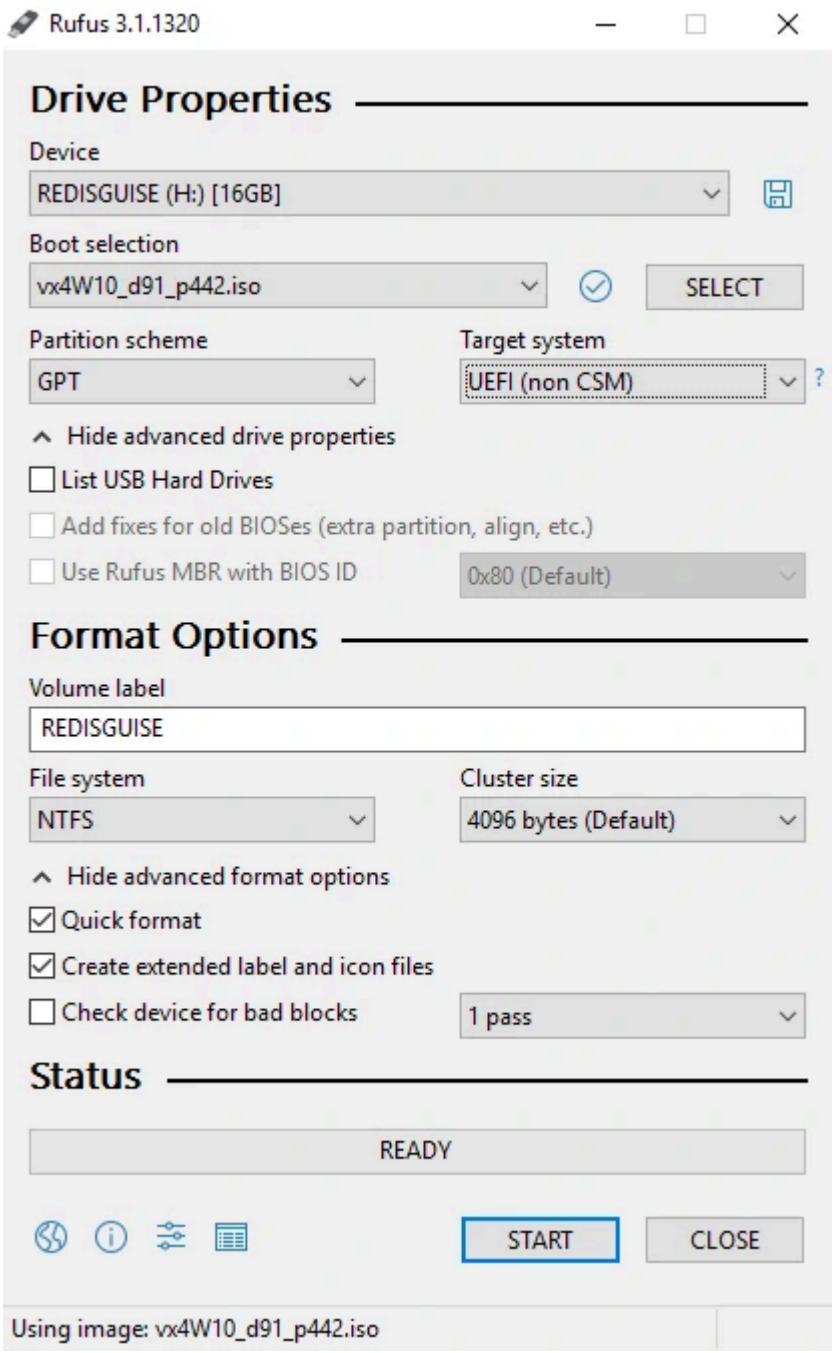
- A 16GB USB memory stick.
- A version of Rufus to turn it into a bootable disk. Make sure the volume name of the USB is: “REDISGUISE” as per image
- An internet connection to the machine you are re-imaging
- Download and install a version of 7Zip
- Download and unzip the multifile archive using 7Zip
- OS images can be found Hardware OS Imaging.

Create a Bootable USB

1. Download and unzip the multi-file archive using 7Zip. You will only need to unzip file 001.



2. Create Bootable USB stick with the unzipped ISO. The settings should be:




```
    - Partition scheme - MBR
    - Target system - BIOS (or UEFI-CSM)
    - Volume label - automatically pulled from ISO file
    - File system - NTFS
```

Booting into the USB

⚠️ **You must use the white USB 2.0 ports on the rear of the system for the reimage process to work. The USB 3.0 ports do not support re-imaging.**

1. Insert the USB Device into the USB 2.0 (white) port on the back of the system.
2. Plug a keyboard into the other USB 2.0 (white) port.
3. Invoke boot options whilst your server is booting by pressing the F11 key on the BIOS splash screen.
4. Select your USB key from the menu. Normally it is listed as the name of the Vendor of the USB key. Please be aware of the **Press any key to boot from USB** message as this will disappear quickly if you are running a version of Rufus prior to v3.
5. After this you will need to press **Enter** once to boot into the usb and the re-imaging process will commence. This should take around 20 minutes to complete and will include three system restarts which will be part of the automated process.
6. The system will boot up in a Windows in-activated state. Wait 20-30 seconds for Microsoft's servers to successfully authorise the system. With a mouse connected to any of the USB ports right-click on the start icon on the task bar and select system. This will prompt the system to update its activation state.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

4x2pro Specifications

Hardware Specifications

	4x2
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	1000W
Heat Dissipation Peak	3,412 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 8.1 Embedded Pro
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	2x 512GB Removable NVMe SSD
Memory	16GB RAM (4x 4GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

	4x2
Video output	4x DVI Dual Link outputs (max. 2560 x 1600p resolution)
Video input	4x 1.5G inputs or 2x 3G inputs (HD-BNC connectors)
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in

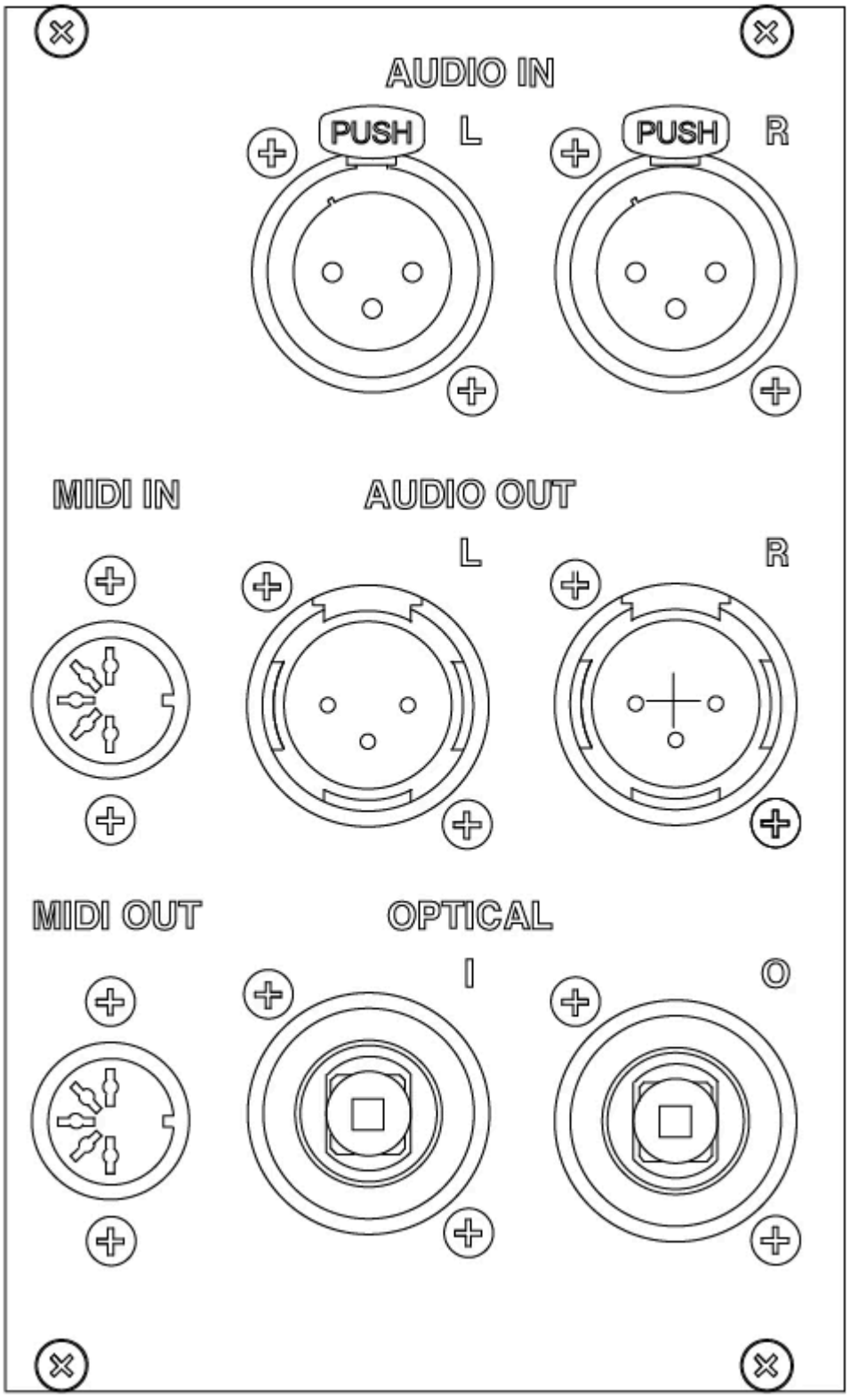
	4x2
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	N/A
System Management Controller	N/A
Data/Peripherals	2x USB 2.0 3x USB 3.0
Video Sync	BNC Genlock

4x2pro Audio Input and Output

The 4x2 is equipped with a broadcast quality pro audio card which uses the latest 192kHz AD and DA converters.

Back panel connections

- XLR Left + Right Input
- XLR Left + Right Output
- ADAT/SPDIF Input
- ADAT/SPDIF Output
- MIDI Input
- MIDI Output



Audio connections on rear of 4x2pro unit.

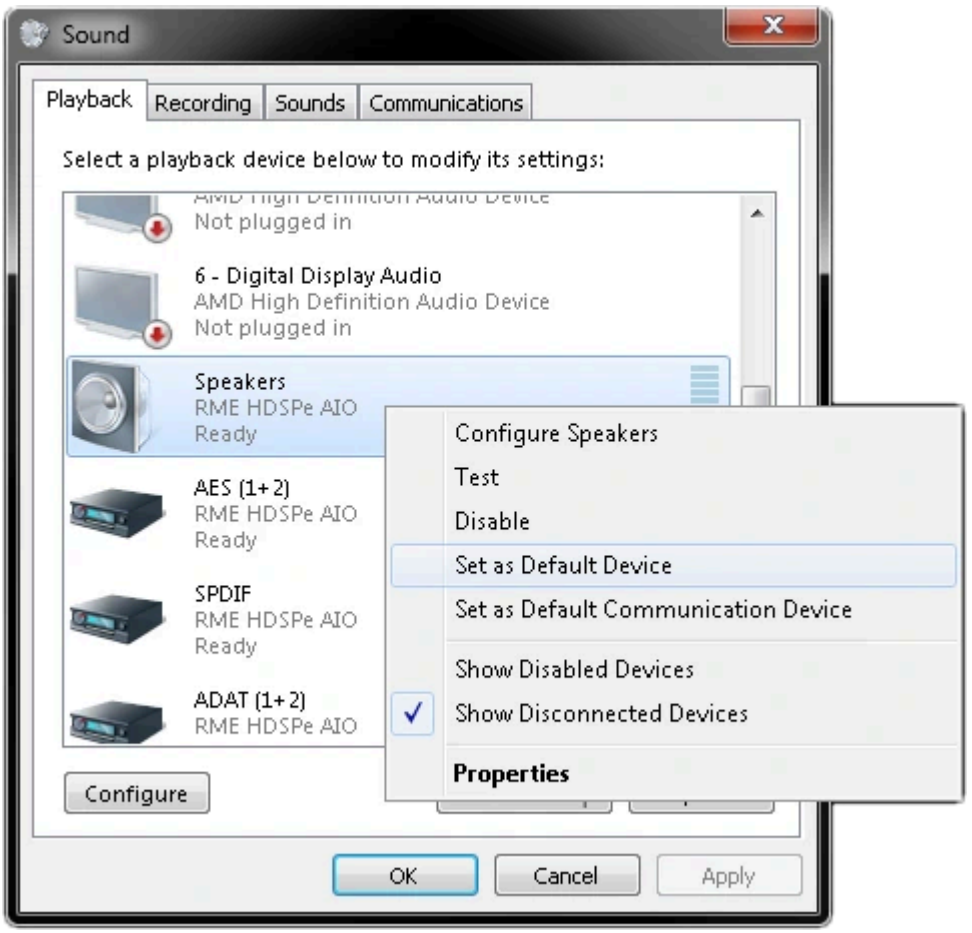
Front panel connections

- 1/4inch Stereo Monitoring socket

It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

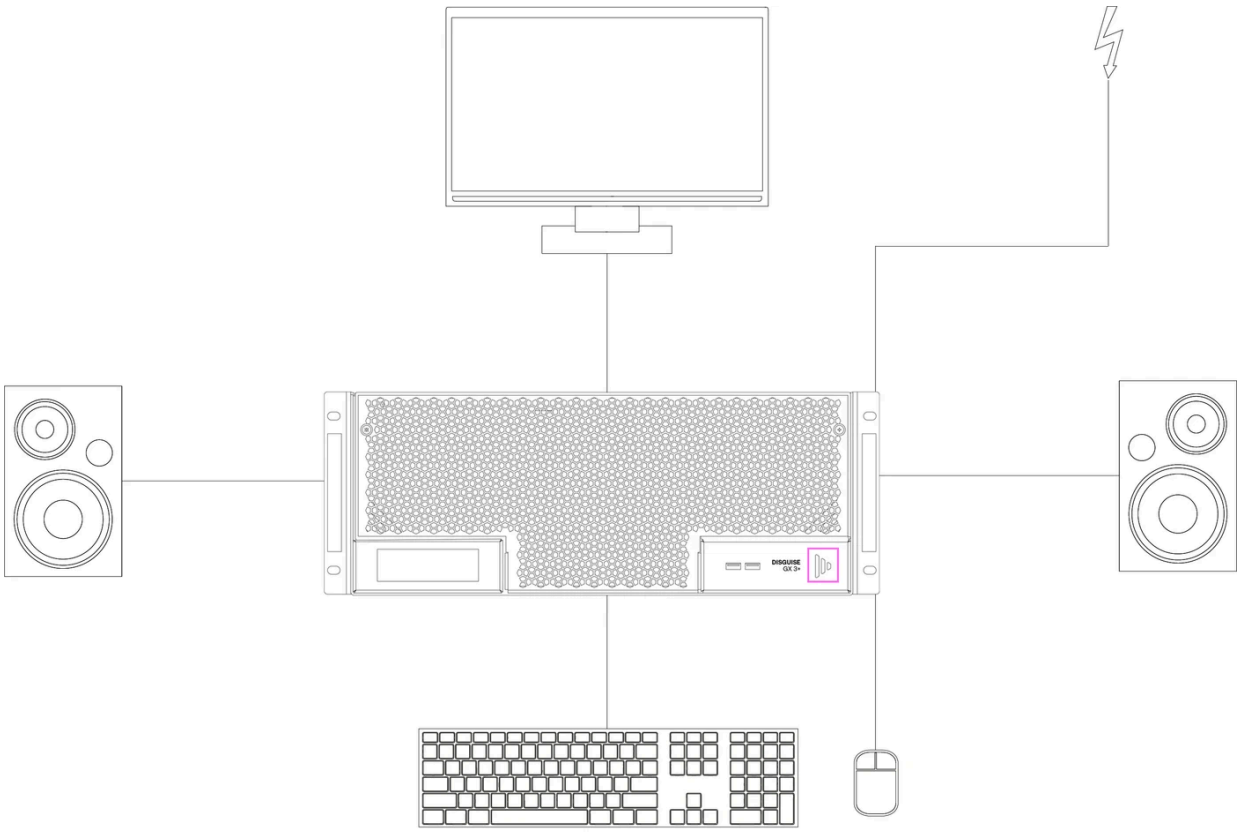
RME card settings

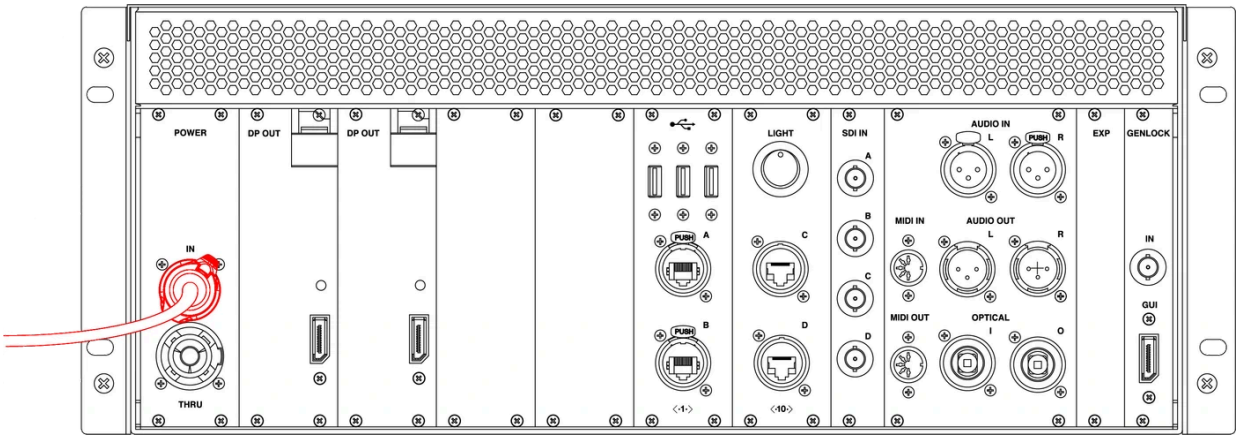
1. Go to the Windows Start Menu.
2. Right-click on the speaker in the task tray next to the clock on the desktop and click on Playback Devices.
3. Scroll Down and Right-click the device named Speakers and select Set as Default device if it is not already selected.



How to Start the 4x2pro

1. Connect Power cord to the 4x2.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.





Location of power input on rear of 4x2pro unit

Powering the 4x2pro

The 4x2 Disguise server uses Neutrik PowerCON TRUE1 as the power input.

The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

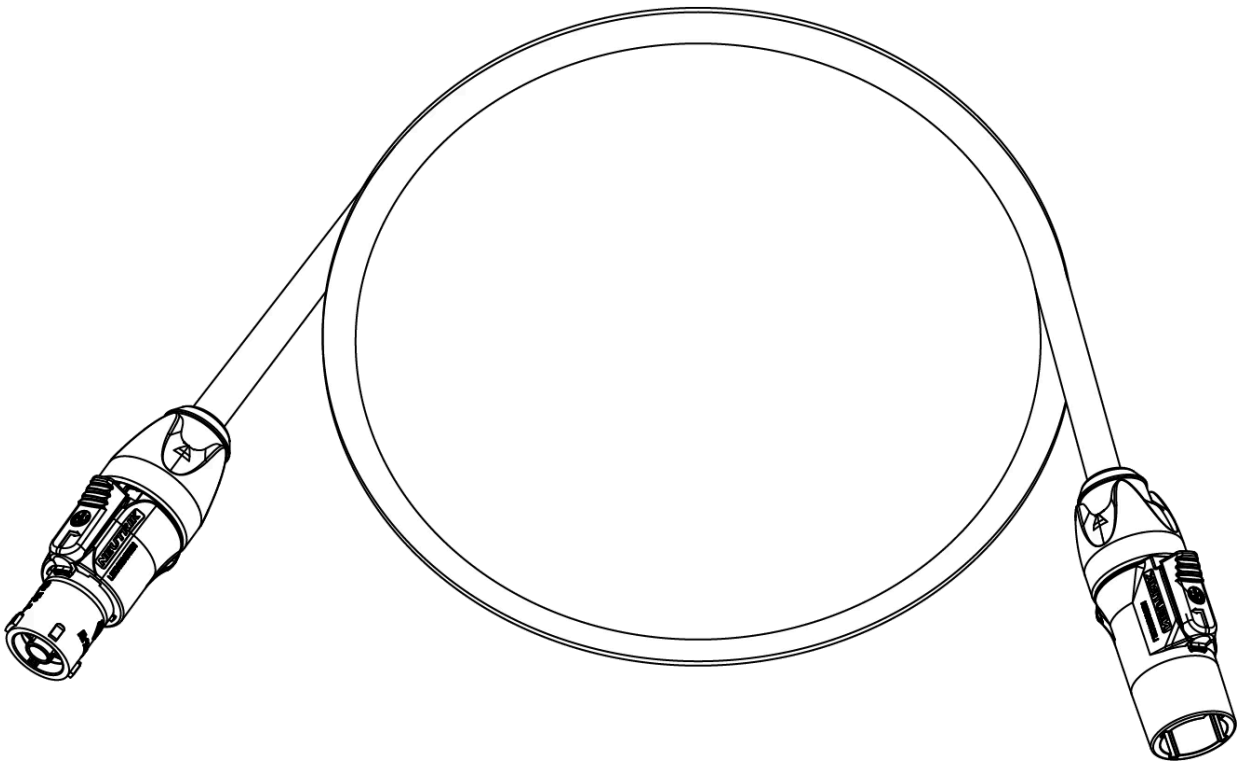
To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.

Powering a multi server system

The 4x2 uses True1 Powercon as its power input and features a loop through to make powering a multi server system more efficient.

The power input to the machine is rated at 12Amps RMS per connection in Europe and USA.



Loop through cables should have the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with appliance coupler type Neutrik AG, type **NAC3MX-W**.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.

Power calculations for a safely powered system

It is important that you calculate how many 4x2pro units you can daisy chain together using the in/loop connections provided. Failure to do so could result in a loss of power to the Disguise system.

Use the formula “Power = Voltage x Current” to calculate how many units you can chain together. For Example:

UK Power: 230V 13Amp rated supply.

For example, max power draw of a 4x2pro = 1000W (check technical specifications for your unit).

Available Power = 230V x 12A

Available Power = 2990W

Available Power / Max Power Draw = Number of Units

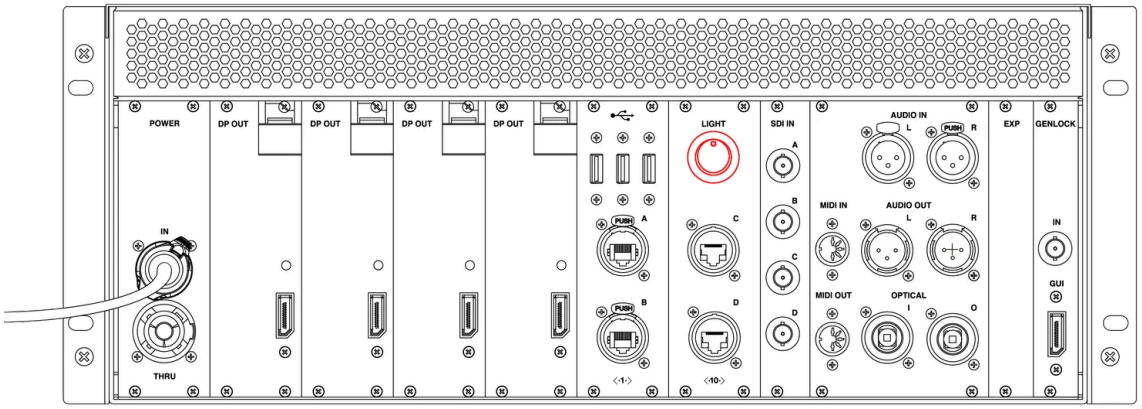
2990W / 1400W = 2.1 Units

> **Warning**
>
> Warning: Be safe! On a UK 13Amp supply @230V you can connect 2 Units safely with 100W of headroom.

Unit Rear Light - 4x2pro

The 4x2 Disguise server has the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labelled “light” with power in.



4x2pro Video Input

Your system is equipped with capture cards. These cards have the ability to capture live video from either SD-SDI or HD-SDI video sources with up to four unique feeds, or two unique 3G-SDI feeds per machine.

Max Number of Unique Inputs

SD-SDI	HD-SDI	3G-SDI
4	4	2

Supported formats

- 720x486i @ 59.94 Hz NTSC
- 720x576i @ 50.00 Hz PAL
- 1280x720p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz
- 1920x1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
- 1920x1080PsF @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz
- 1920x1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
- 2048X1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
- 2048X1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
- 2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz
- 4K UHD 3840x2160, 4K P/PsF @ 23, 24, 25, 29, 30fps
- 4K DCI 4096x2160, 4K P/PsF, @23, 24, 25, 29, 30fps

It is possible to have a different format on each input, However the limitations are a maximum of 1x 4k or 2x 1080p60.

If you are using 1x 4k or 2x 1080p it is not possible to use any other video inputs on the unit due to hardware limitations.

Back-Plate Layout

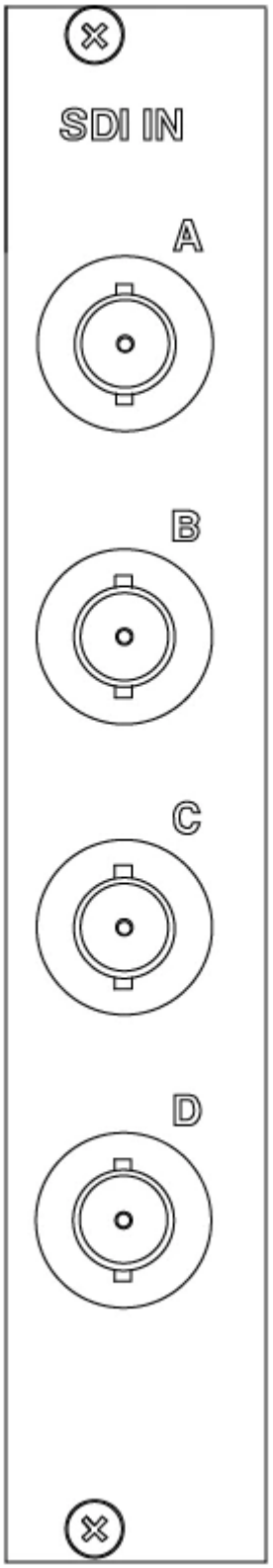


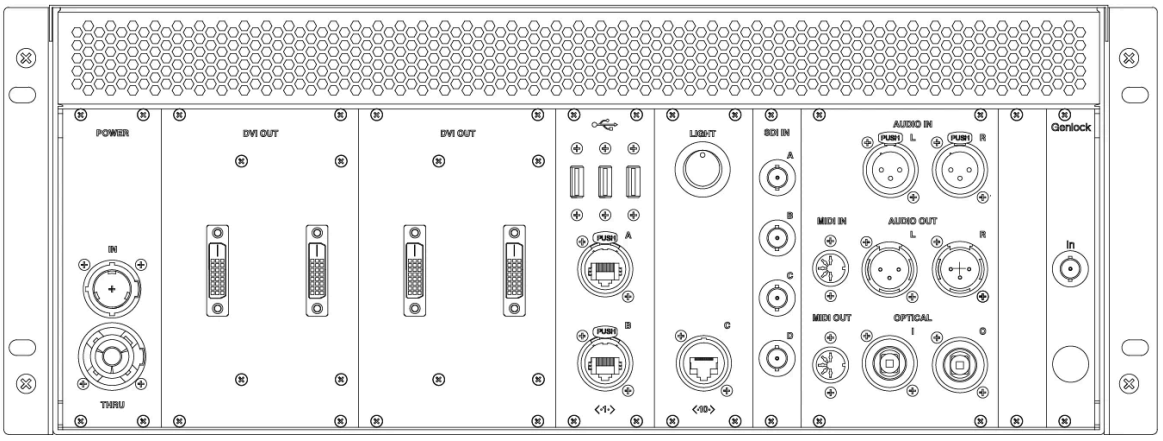
Diagram of Video Capture BNC connections on rear of a unit.

> **Note**
>
> **Please note**: Live Video input inherently introduces frame latency during playback. Please contact **Support** for guidance on performance standards.

4x2pro Video Output

Disguise servers come with a range of possible output configurations. It is possible to use a combination of any of the types of four VFC cards below.

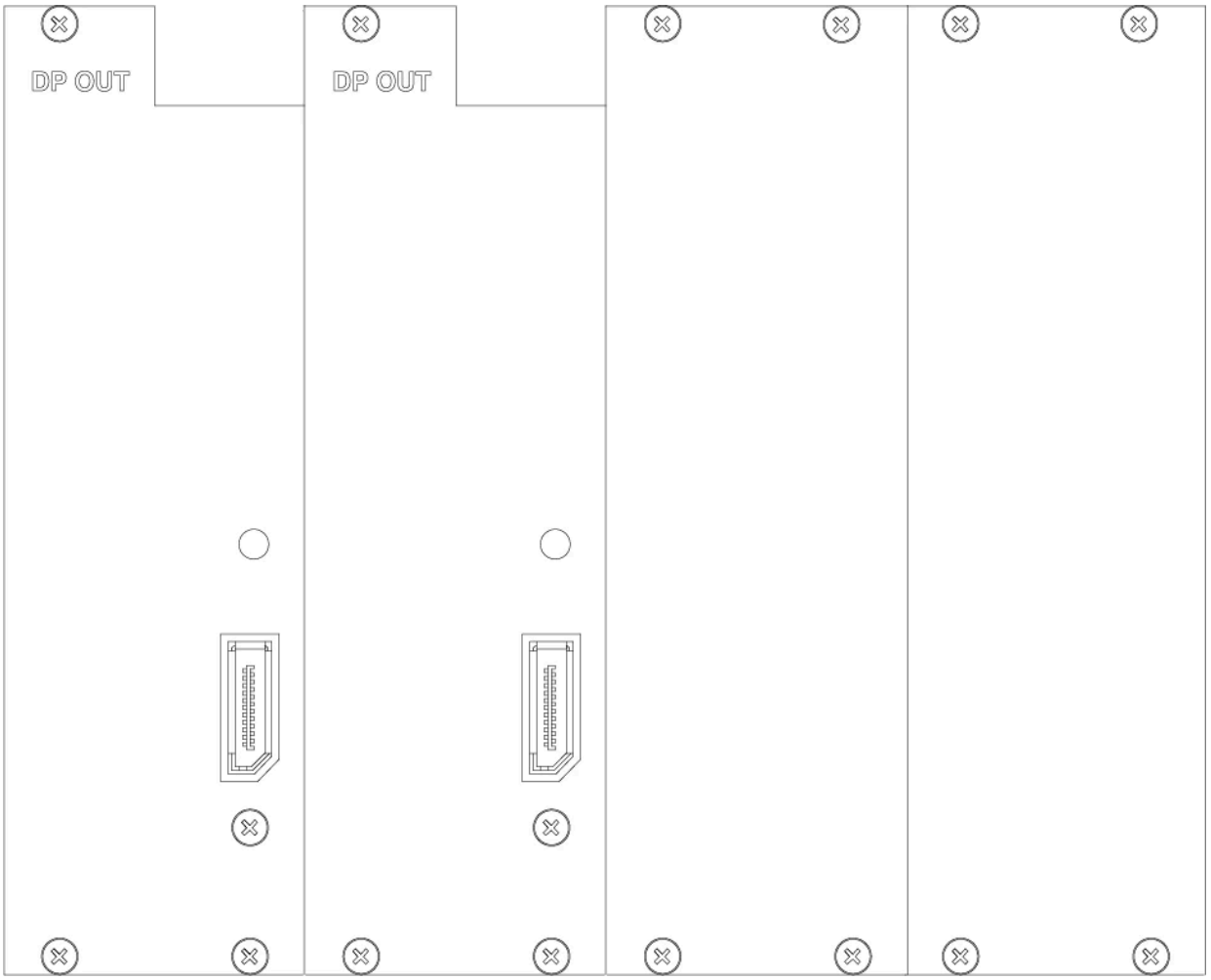
The 4x2 comes with 4 individual outputs of Dual Link DVI capable of up to 2560x1800 on each output.



4x4pro 4K Output

The 4x4 4K Output ships with the standard configuration of Display Port cards.

> **Warning**
>
> We highly advise using DisplayPort cables specifically validated for: DP 1.2, DP 1.2a or 21.6 Gbps bandwidth.



2 x DisplayPort 1.2 outputs on rear of 4x4

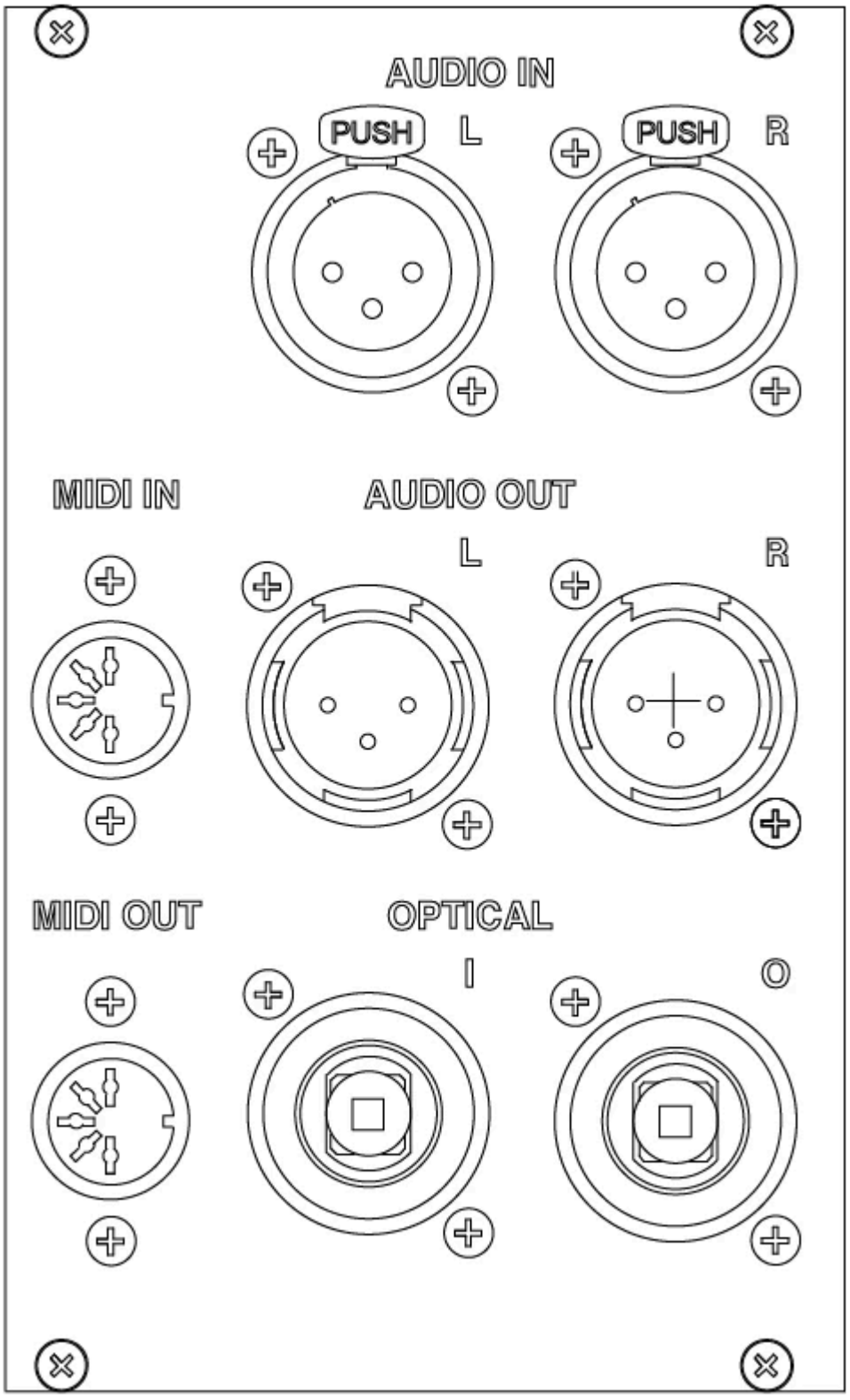
This enables the pro & GX ranges of Disguise servers to support resolutions up to 4096x2160 60hz over Single Stream Transport.

4x4pro Audio Input and Output

The 4x4 is equipped with a broadcast quality pro audio card which uses the latest 192kHz AD and DA converters.

Back panel connections

- XLR Left + Right Input
- XLR Left + Right Output
- ADAT/SPDIF Input
- ADAT/SPDIF Output
- MIDI Input
- MIDI Output



Audio connections on rear of 4x4 unit.

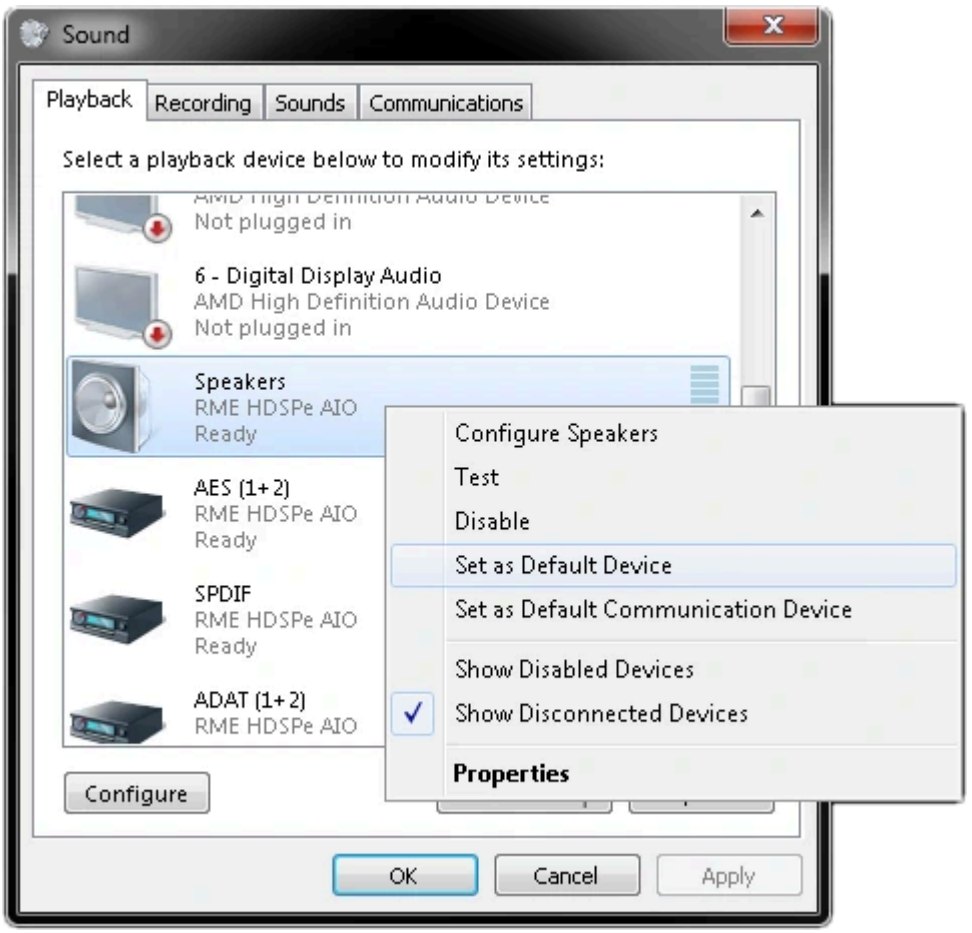
Front panel connections

- 1/4inch Stereo Monitoring socket

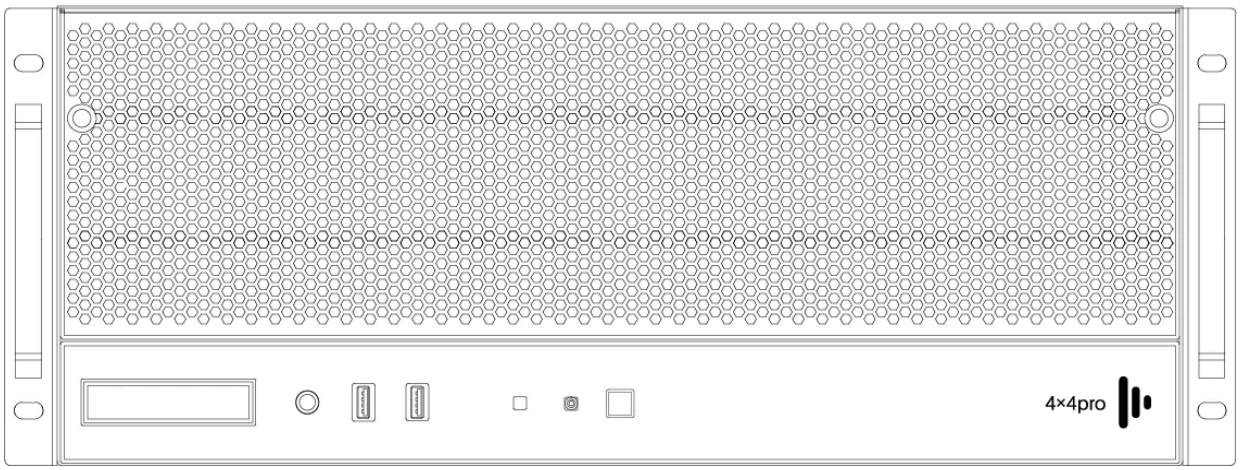
It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

RME card settings

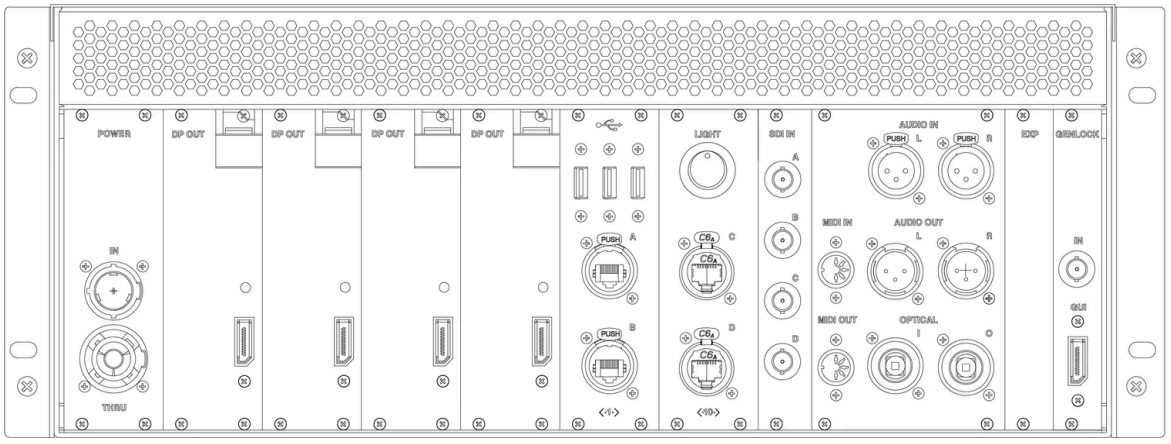
1. Go to the Windows Start Menu.
2. Right-click on the speaker in the task tray next to the clock on the desktop and click on Playback Devices.
3. Scroll Down and Right-click the device named Speakers and select Set as Default device if it is not already selected.



4x4pro Diagrams



4x4 Front view



4x4 Rear view

4x4pro Overview

Opening hardware may void your warranty. Consult support before opening the hardware.

Do not open or remove the case unless you are instructed to do so by a certified Engineer.

If you experience any problems with hardware please contact the **support team**

The machines come pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

For detailed information on the specifications for each plus and pro machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our web site.

4x4pro Performance

Playback

The following table shows how many layers can simultaneously be played back per codec:

Benchmarks - Video Layers (Full HD)

Video Codec	Content Data Rate (MB/s)	Max Layers on 4x4
HD HAP	27.8	43
HD HAPQ	31.3	40
HD Animation	107	16
HD TIFF Sequence	237	8
HD NotchLC	65.31	23
UHD HAP	95.4	18
UHD HAPQ	143	12
UHD Animation	697	2
UHD TIFF Sequence	949	2
UHD NotchLC	233.91	8

NOTES

- All content is 30 fps
- Readings are taken from an
- VFC-compatible machines run with pass-through style cards (HDMI or DP)
- 60Hz project
- Genlock on all machines which support it
- One unique video file per layer, all mapped onto one screen
- Absolute maximum level of performance
- One more layer means the system starts to drop frames
- Measured against 15.3.2, build 57746

Capture Latency

The following table provides data on how many frames of latency the 4x4pro requires from capture to output:

4x4 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	4-5	4	3
50Hz	4-5	4	3
30Hz	4-5	4	3

4x4 NDI®

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5-6	5	4
50Hz	5-6	5	4
30Hz	5-6	5-6	4

4x4pro Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

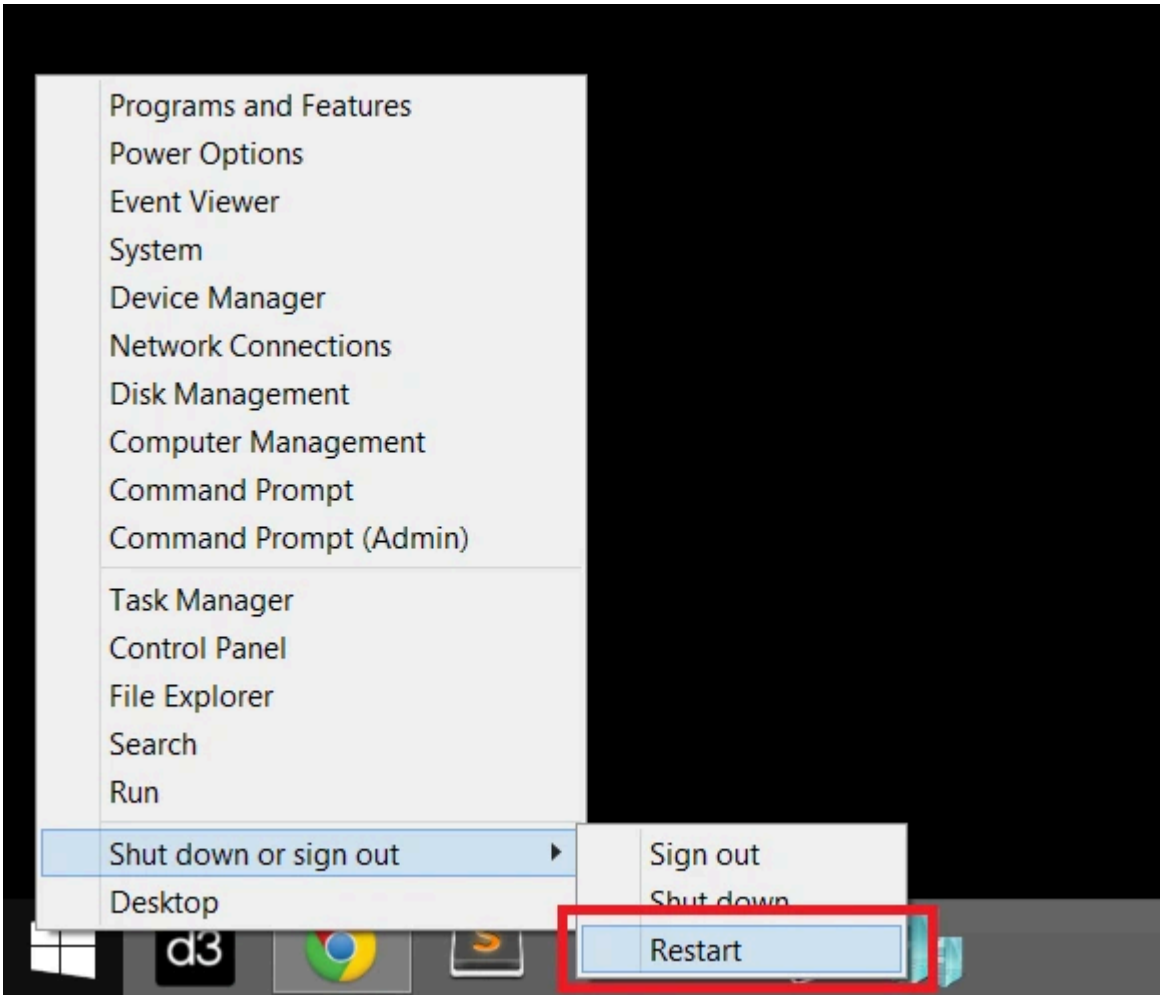
Internal restore is the process of re-imaging the system to the last Redisguise version.

This procedure will only work with OS version 10 and later.

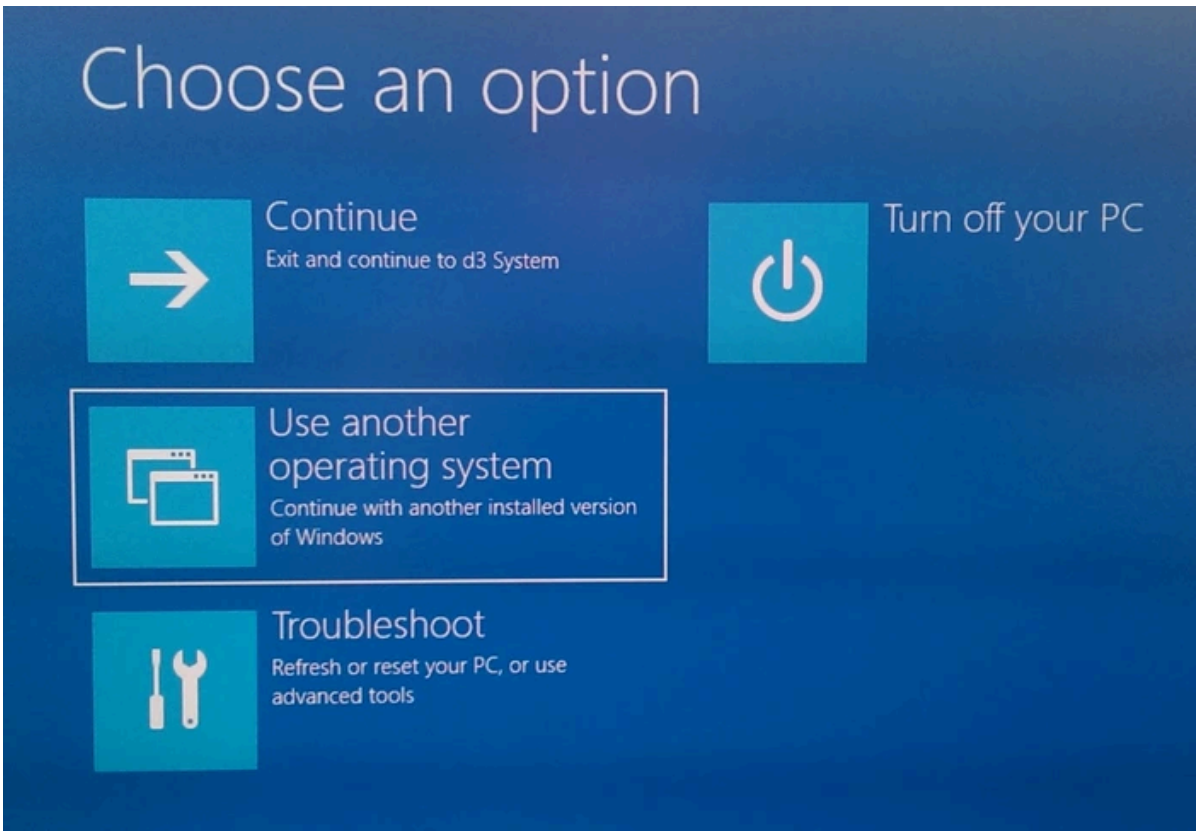
To identify which OS image your system currently runs, please go to **d3Manager > Help and select About Manager**.

1. Hold down **shift** whilst restarting the system.

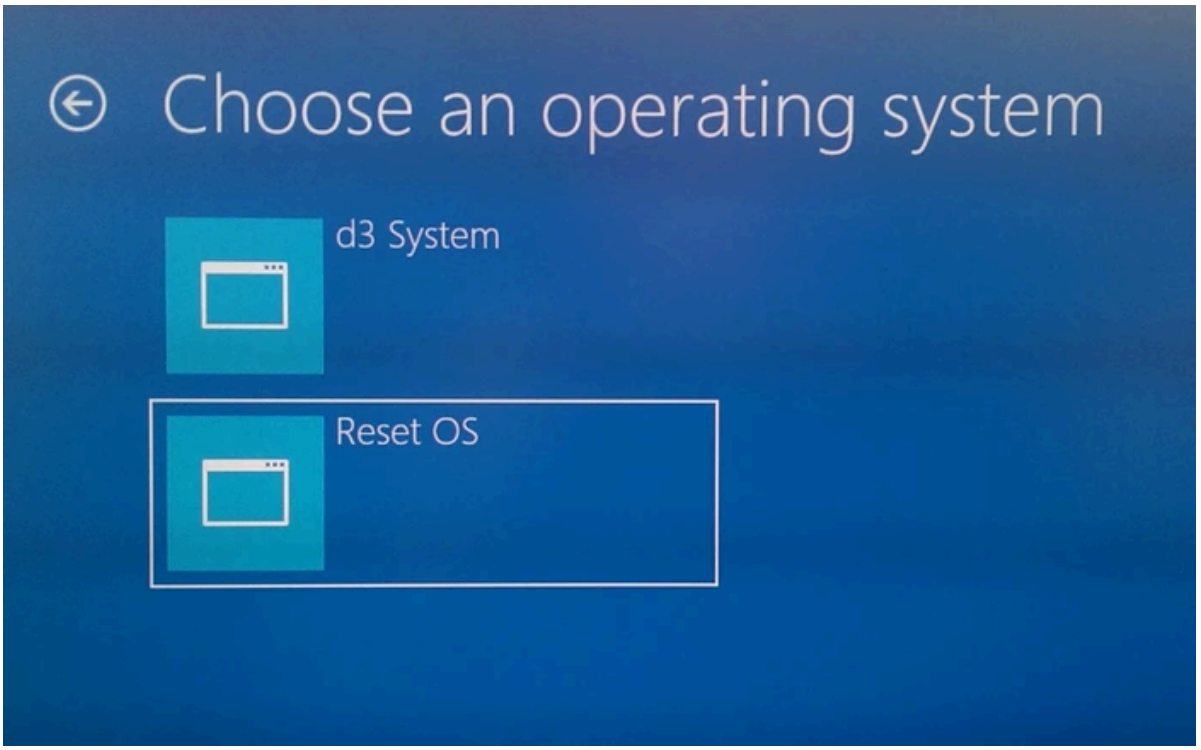




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

If you encounter any issues with the Redisguise process, please review the Notes/ Help section at the bottom of this page.

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

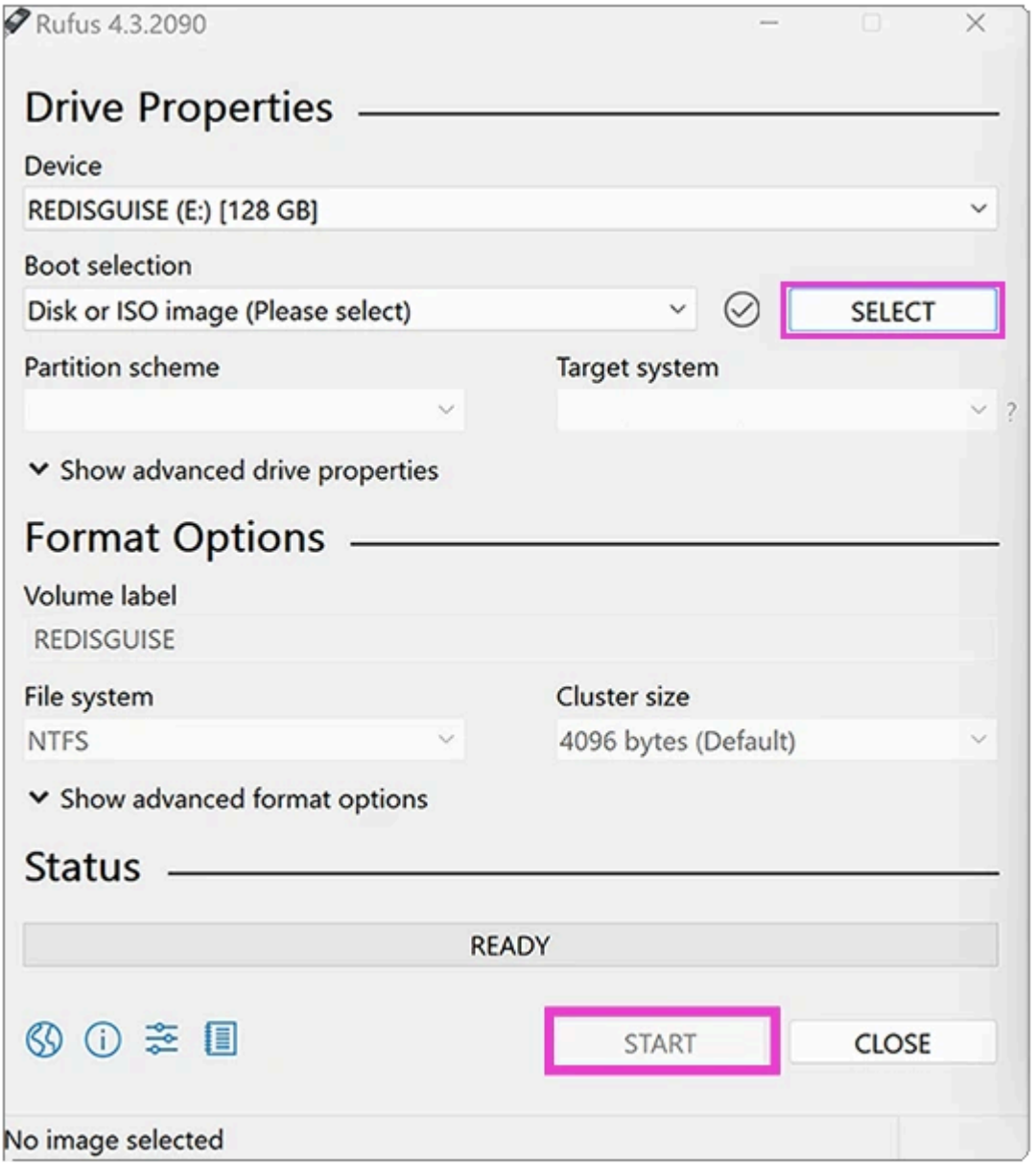
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: “REDISGUISE” as per image
- An internet connection to the machine you are re-imaging.
- OS images can be found **Hardware OS Imaging**.
- Download and install a version of**7Zip**

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.

- **7-Zip** archive tool/file manager.



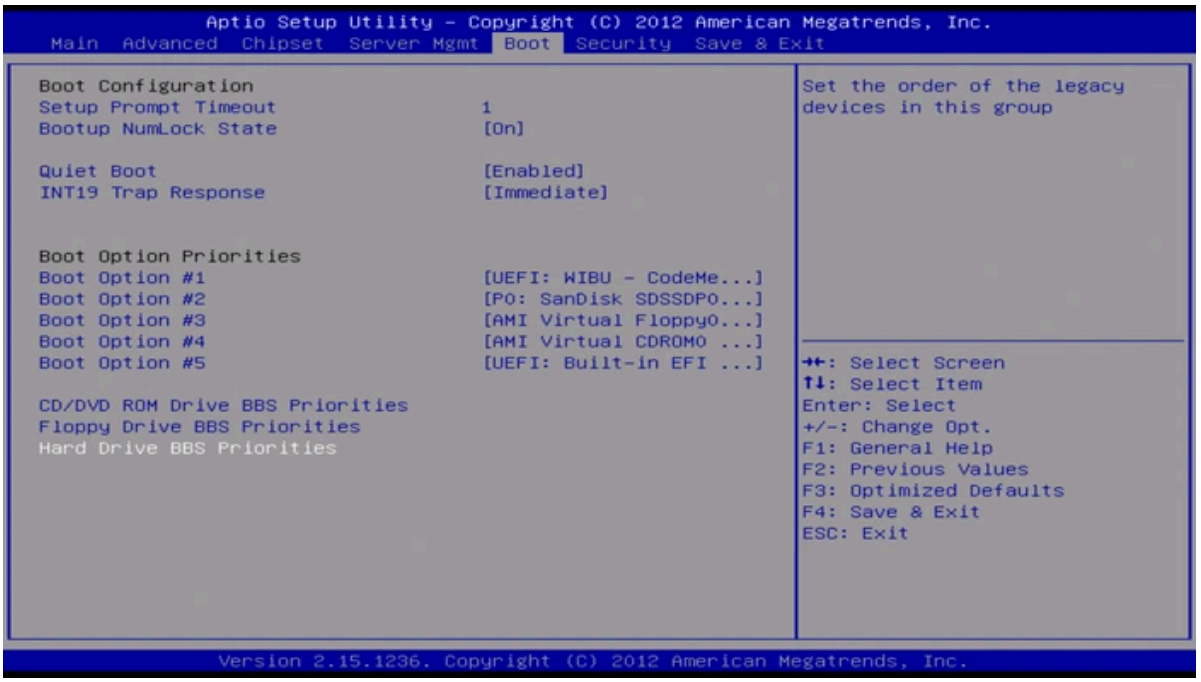
The settings should be:

- `Partition scheme - MBR`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

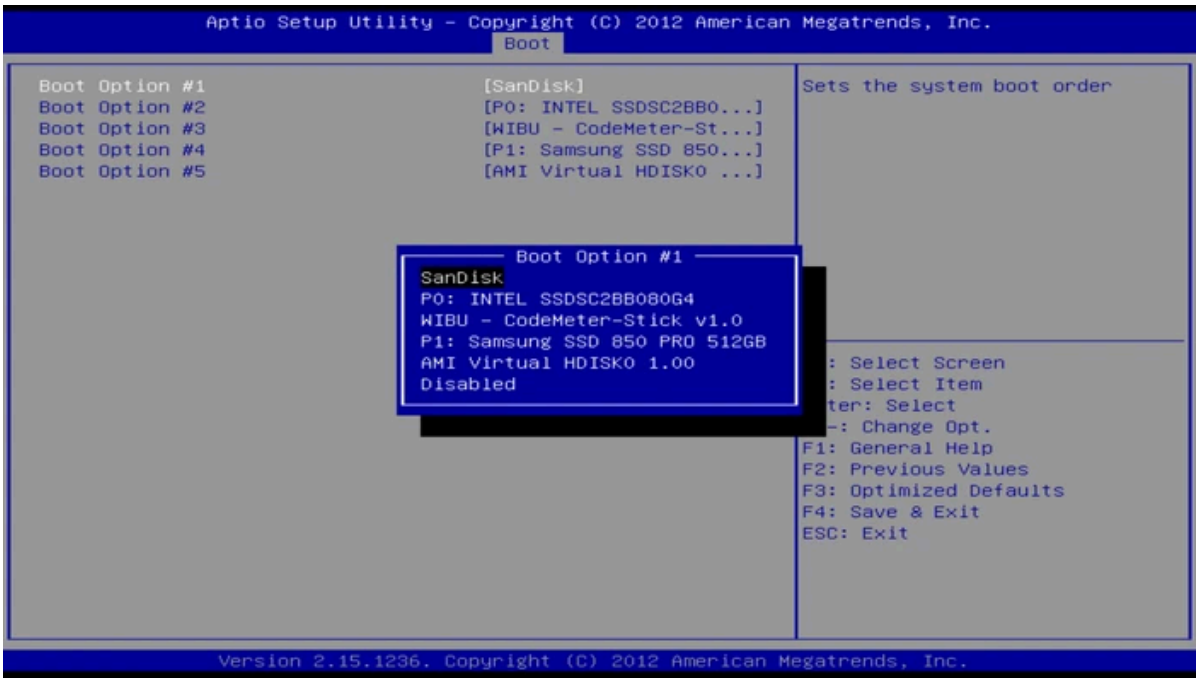
Booting into the USB

1. Insert the USB key and a keyboard into the system.
2. Invoke the BIOS whilst the system is posting by continuously pressing the **Delete** key.
3. Navigate to the BOOT tab and select **Hard Drive BBS Priorities**.

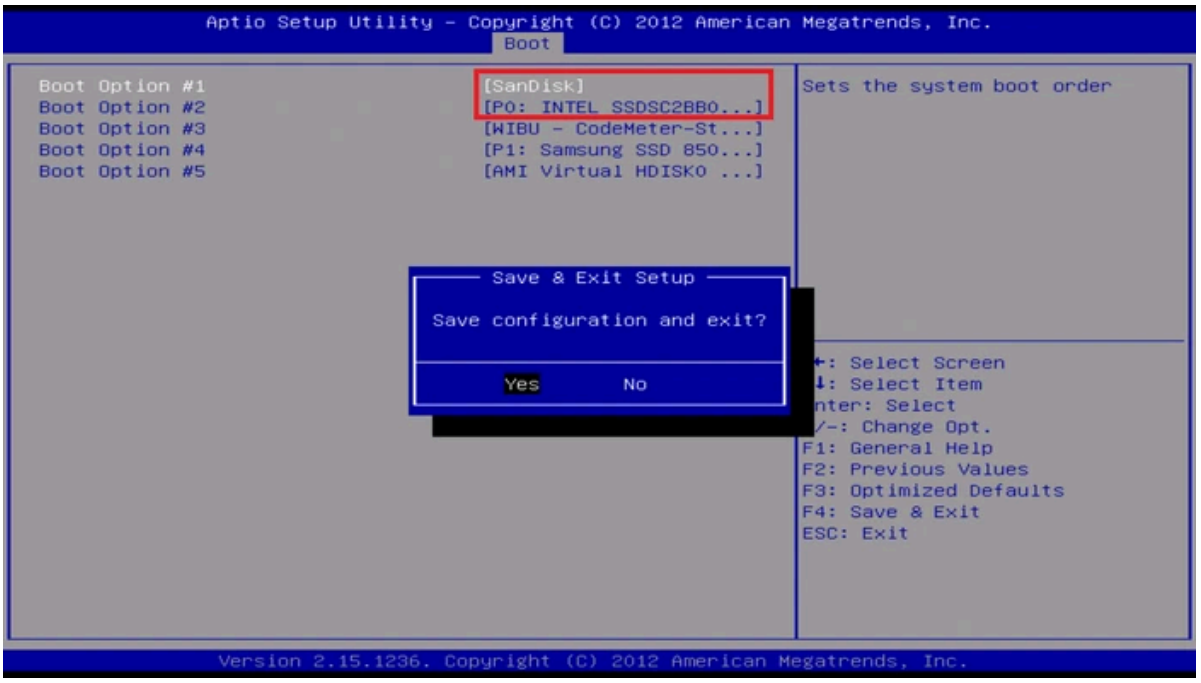


4. Select Boot Option #1. Select your USB key from the menu. Normally it is listed as the name of the Vendor of the USB key **(SanDisk)**.

5. Select Boot Option #2. Please ensure this is listed as the OS drive **(INTEL SSDSC2BB080G4)**.



6. Please press **F4** to **Save configuration and exit**. This should reset the computer and prompt you with a **Press any key to boot from USB window**.



7. Press **Enter** when the **“Press any key to boot from USB”** window appears and you should be booting into the USB.



8. After this you will need to press **Enter** once to boot into the usb and the re-imaging process will commence - it should take around 20 minutes or so to complete and two system restarts will be part of the automated process.
9. The system will boot up in a Windows inactivated state. Wait 20-30 seconds or so, so Microsoft’s servers can successfully authorize the system. With a mouse connected to any of the USB ports right-click on the start icon on the task bar and select system. This will prompt the system to update its activation state.

The Redisguise process will run automatically until the re-imaging has completed [5]. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

4x4pro Specifications

Hardware Specifications

	4x4
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	1000W
Heat Dissipation Peak	3,412 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 8.1 Embedded Pro
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	4x 1.92TB Removable NVMe SSD (default RAID 10)
Memory	32GB RAM (4x 8GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

	4x4
Video output	4x 4K outputs using VFC cards (with integrated EDID management)
Video input	4x 1.5G inputs or 2x 3G inputs (HD-BNC connectors)
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in

	4x4
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	N/A
System Management Controller	N/A
Data/Peripherals	2x USB 2.0 3x USB 3.0
Video Sync	BNC Genlock

Advanced RAID Controller Information

MegaRaid LSI Controller

> **Note**
>
> Please Note: uses Raid0 to provide faster streaming access to content. There is no content backup provided by Raid0.

The MegaRAID Storage Manager software enables you to configure, monitor, and maintain storage configurations on LSI SAS controllers such as those installed in your system.

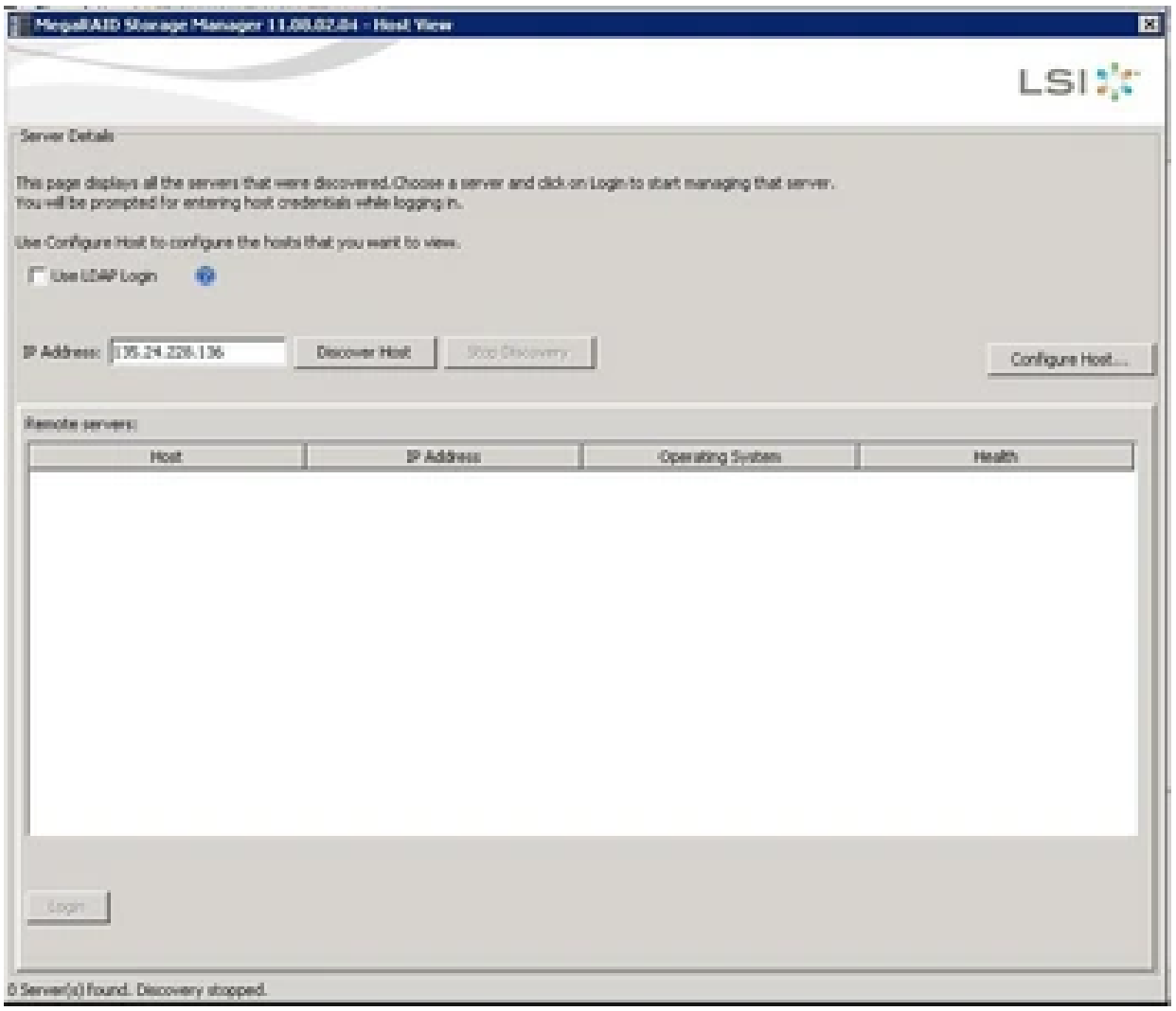
The MegaRAID Storage Manager software enables you to easily configure the controllers, drives, and virtual drives on your server.

The Configuration wizard greatly simplifies the process of creating drive groups and virtual drives. The wizard allows you to easily create new storage configurations and modify configurations.

You must have administrative privileges to use the MegaRAID Storage Manager software in either full-access or in view-only mode.

To start the MegaRAID Storage Manager software double-click on the desktop icon.

This will open the following window:



The Host View dialog shows an icon for each server on which the MegaRAID Storage Manager software is installed.

The servers are colour-coded with the following definitions:

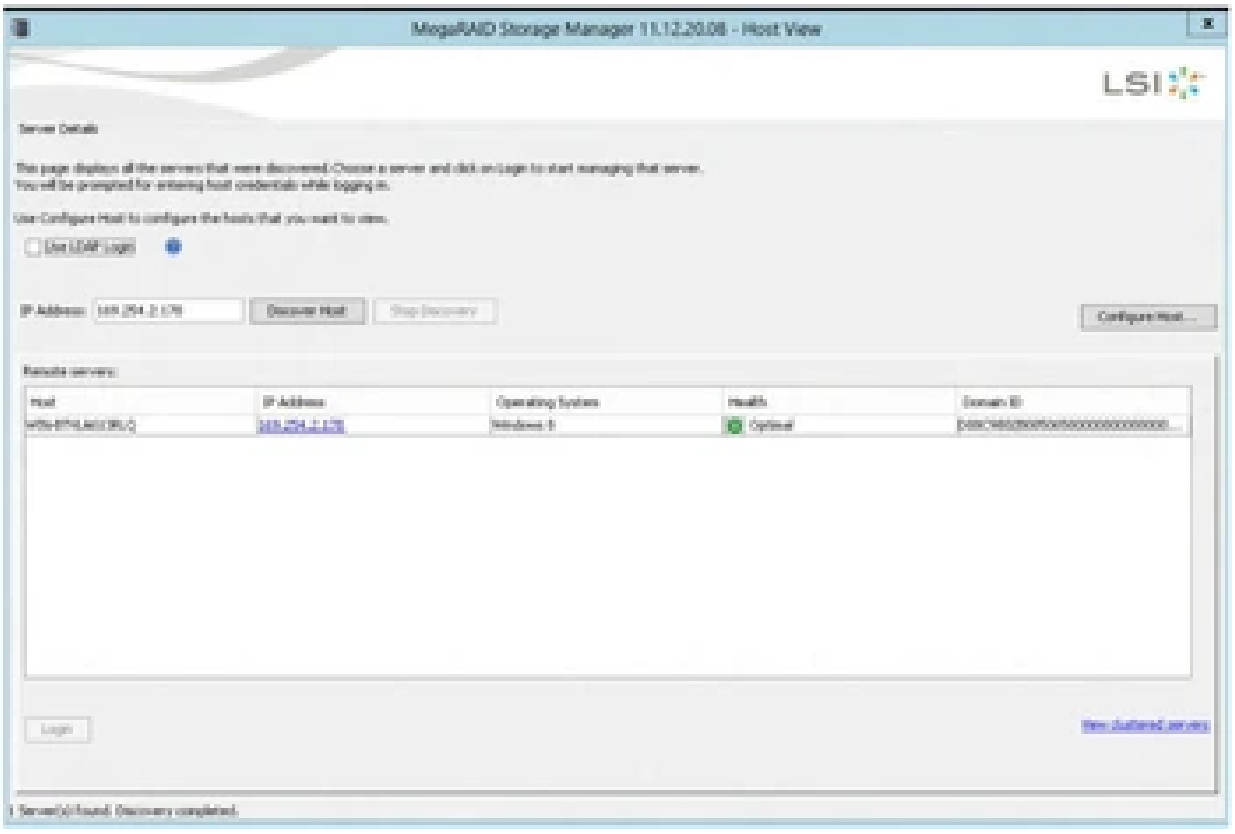
Green : The server is operating properly
Yellow : The server is running in a partially degraded state (possibly because a drive in a virtual drive has failed)
Orange : The server is running in a degraded state
Red : The server storage configuration has failed

Next you will see a login screen:

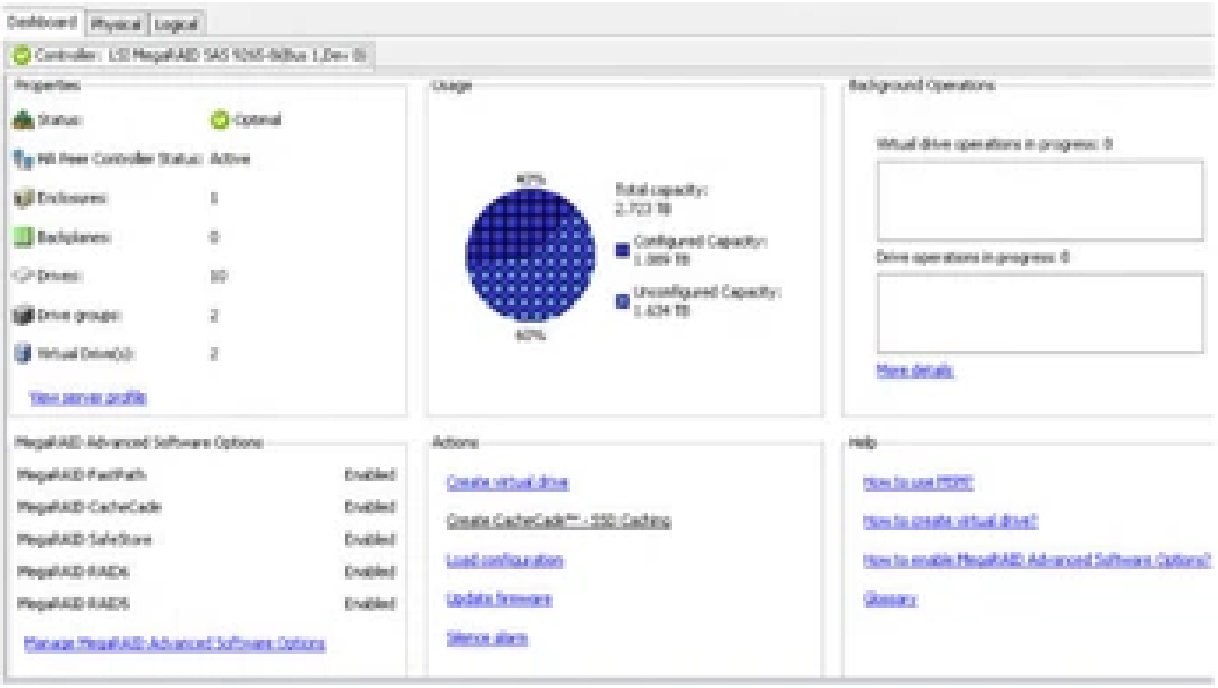


Enter **d3** as the **User Name** and click **Login**.

This will open MegaRAID storage Manager - Host View window, as follows:

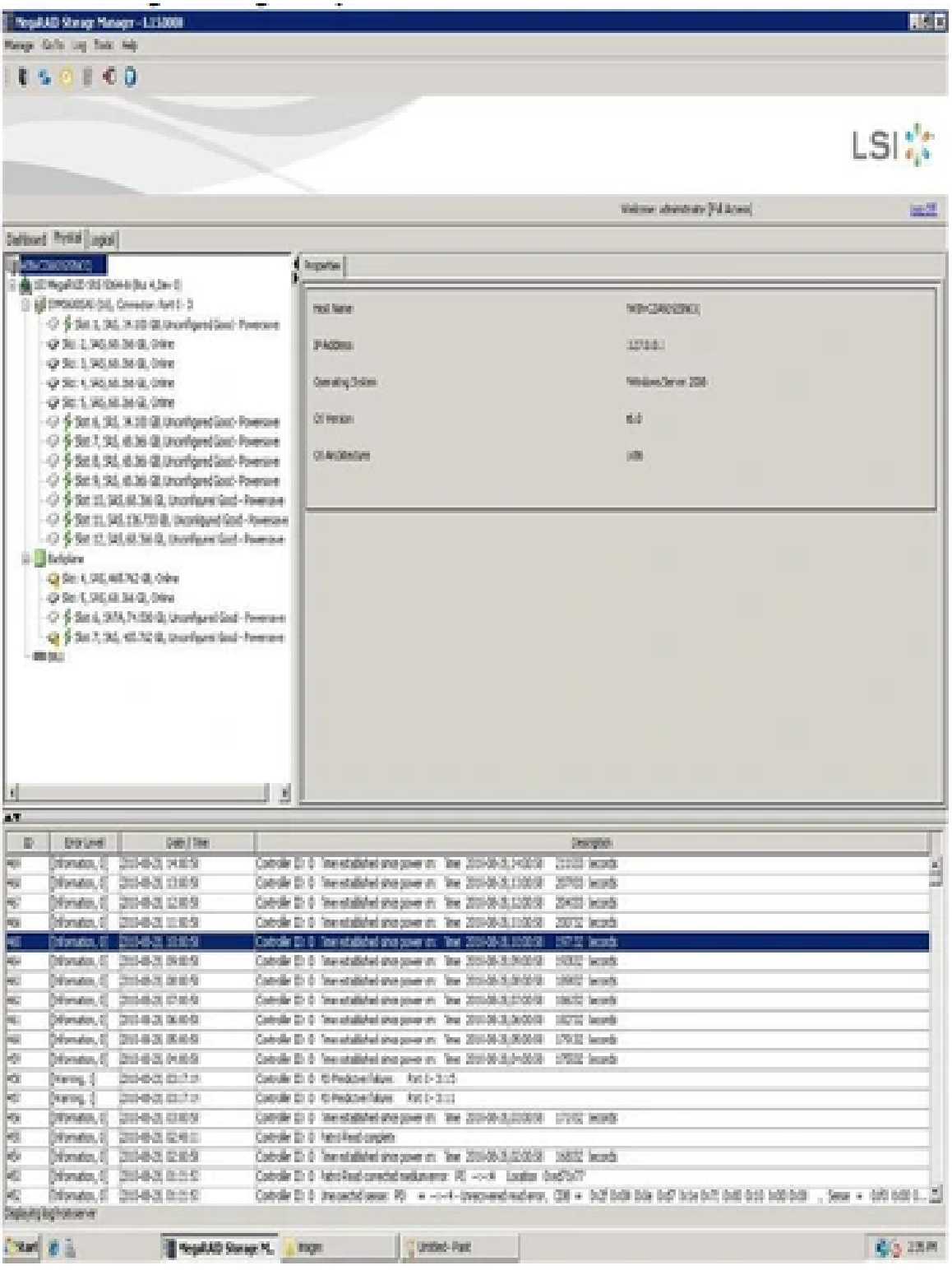


Clicking on **Configure Host** will open the main Dashboard View:



Physical View

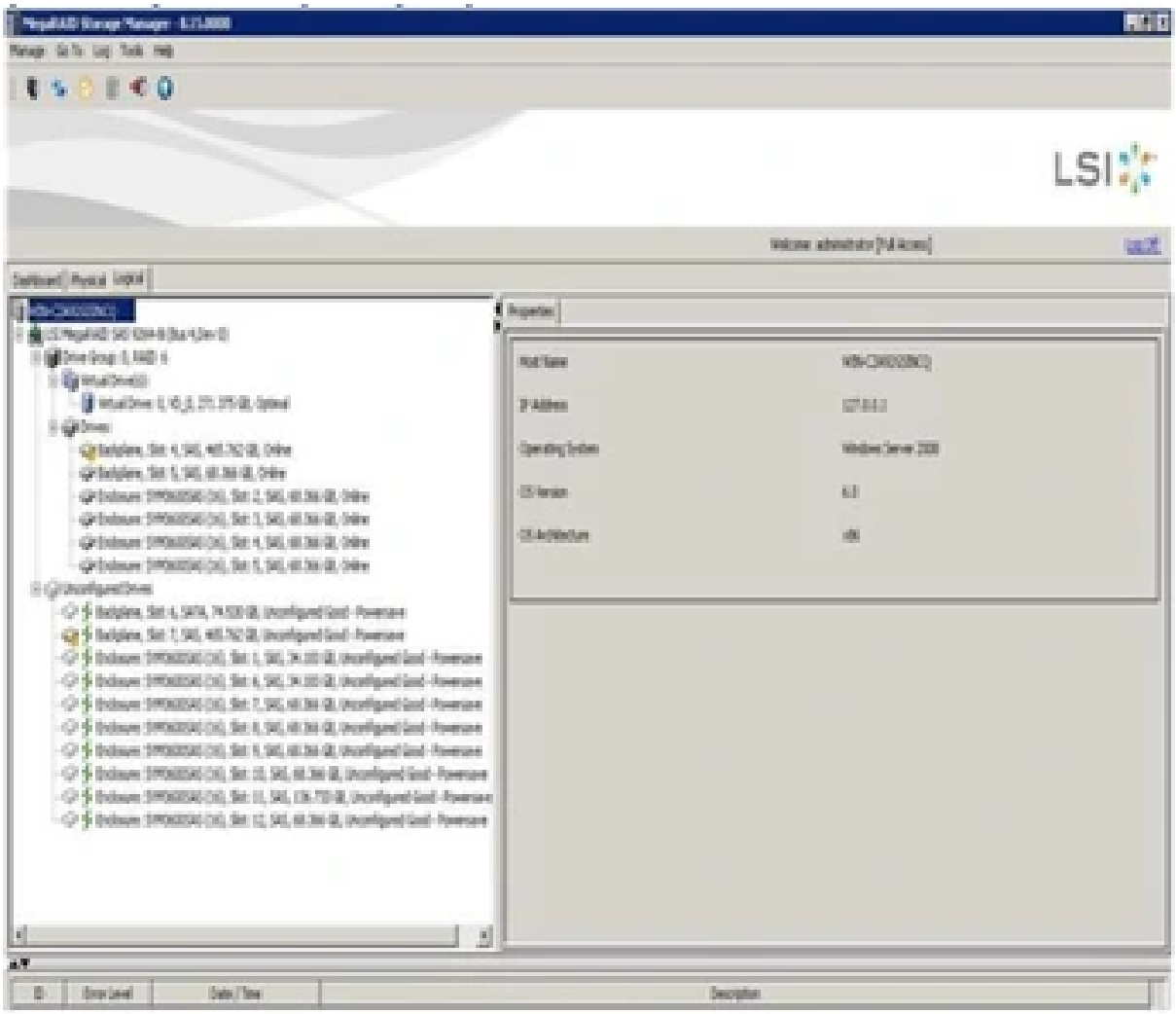
The Physical view shows the hierarchy of physical devices in the system. At the top of the hierarchy is the system itself, followed by the controller and the backplane. The controller label identifies the MegaRAID controller, such as the MegaRAID SAS 9260-8i controller, so that you can easily differentiate between multiple controllers. Each controller has one or more ports. Drives and other devices are attached to the ports. The properties for each item appear in the right panel of the screen.



Logical View

The Logical view shows the hierarchy of controllers, virtual drives, and the drives and drive groups that make up the virtual drives. The properties for these components appear in the right panel

The following figure shows the Logical view:



You can view the properties for individual drives from the drop down menus, as follows:



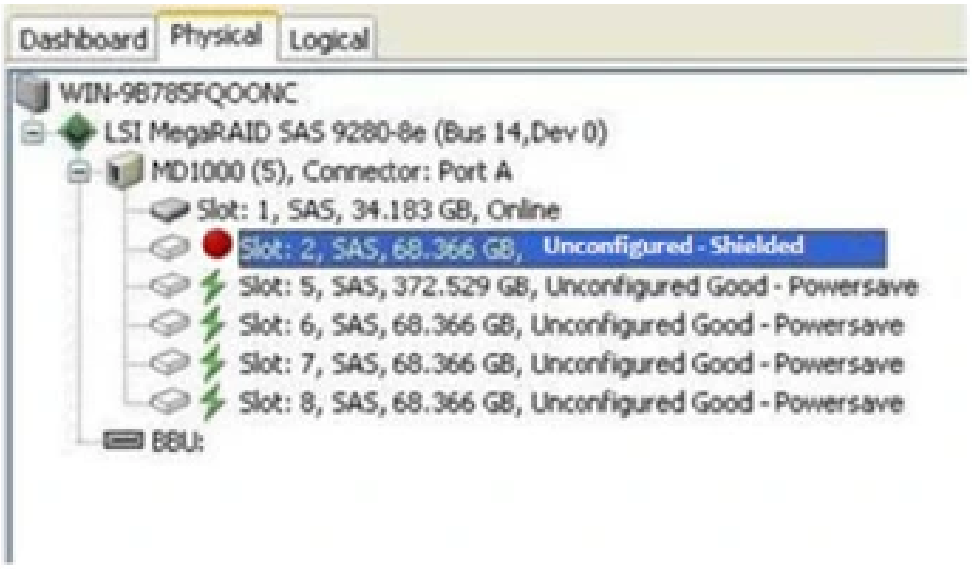
Shield State

Physical devices in MegaRAID firmware transit between different states. If firmware detects a problem or a communication loss for a physical drive, it transitions the physical drive to a bad (FAILED/UNCONF BAD) state. To avoid transient failures, an interim state called the Shield state appears before marking the physical drive as bad state. The results of the diagnostic tests determine if the physical drive is good or bad. If any of the diagnostics tests fail, the physical drive will transition to BAD state (FAILED or UNCONF BAD). The three possible Shield states are Unconfigured - Shielded, Configured - Shielded, and Hotspare - Shielded (which is not used in the d3 application).

Shield State Physical View

Follow these steps to view the Shield state under the Physical view tab:

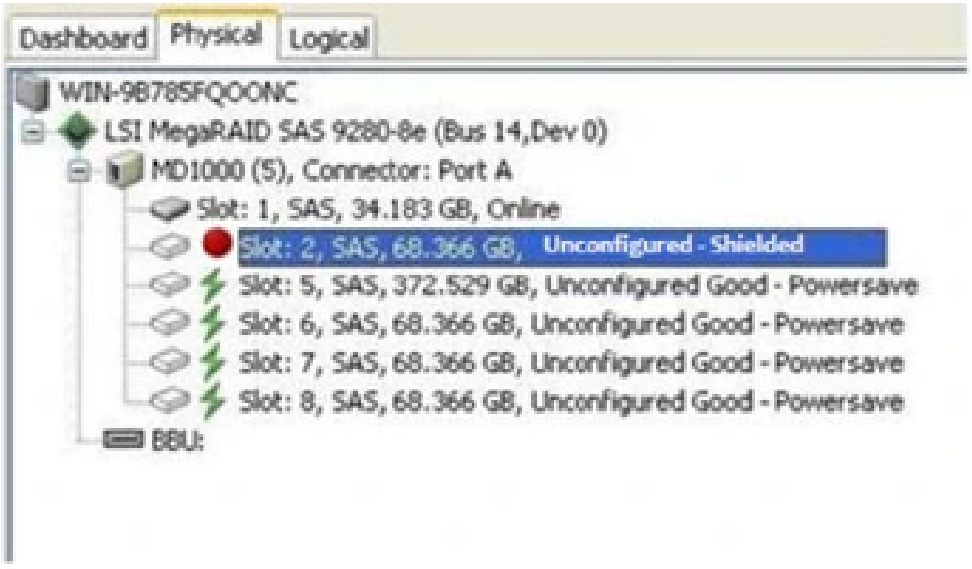
- Click the Physical tab in the device tree
- The red dot icon (▯) indicates a Shield state
- The Physical View shield state is shown in the following fig



Logical View Shield State

Follow these steps to view the Shield state under the Logical tab:

- Click the Logical tab in the device tree
- The red dot icon (▯) indicates a Shield state
- The Logical view Shield state is shown in the following fig

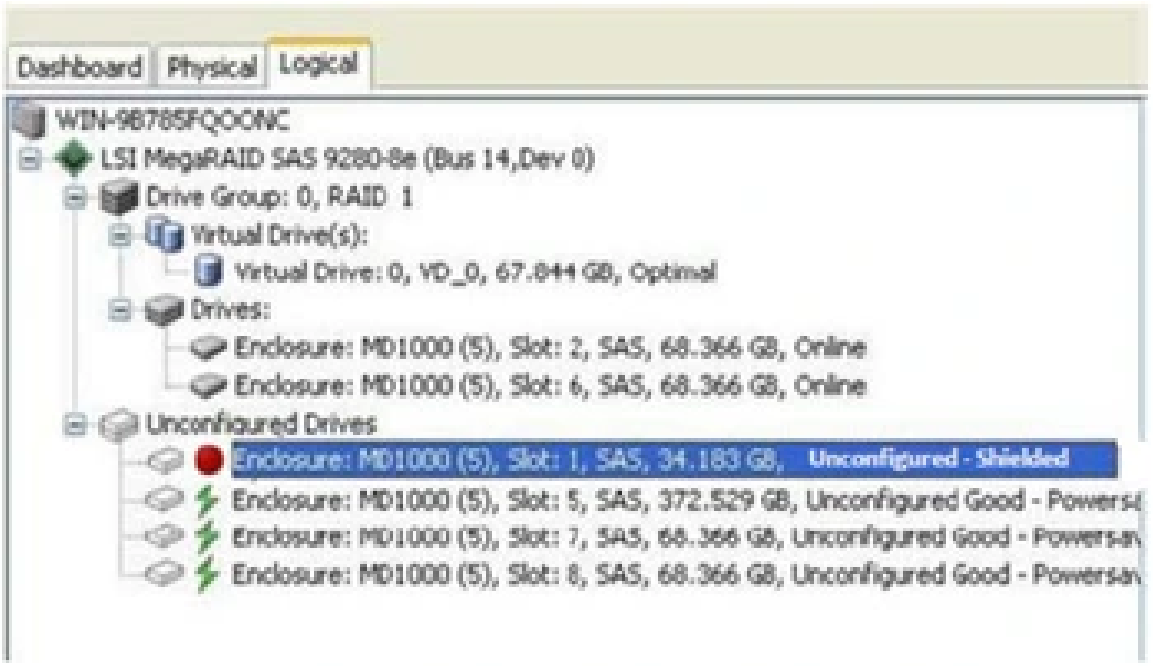


Viewing the Physical Drive Properties

Follow these steps to view the physical properties of the drive in the Shield state:

- Click the Physical tab or Logical tab in the device tree

- The red dot icon (▯) indicates a Shield state
- Click the physical drive in Shield state on Physical view or Logical view of the device tree to view the properties
- The device properties are displayed as shown in the following fig



Device Icons

The following icons in the left panel represent the controllers, drives, and other devices.

	Status
	System
	Controller
	Backplane
	Enclosure
	Port
	Drive group
	Virtual drive
	Online drive
	Power save mode

A red circle to the right of an icon indicates that the device has failed. For example, this icon indicates that a drive has failed:

A yellow circle to the right of an icon indicates that a device is running in a partially degraded state. For example, this icon indicates that a virtual drive is running in a degraded state because a controller has failed. An orange circle to the right of an icon indicates that a device is running in a degraded state.

Configuration

This section explains how to use MegaRAID Storage Manager software to create and modify storage configurations on LSI SAS controllers.

The LSI SAS controllers should only be configured fo RAID 0 for the d3 application to work correctly.

The Configuration wizard allows you to easily create new storage configurations and modify the configurations.

> **Note**
>
> **Please note**: You cannot create or modify a storage configuration unless you are logged on to the server with administrator privileges

Creating a New Configuration

You can use the MegaRAID Storage Manager software to create new storage configurations on systems with LSI SAS controllers. You can create the following types of configurations:

- Simple configuration specifies a limited number of settings and has the system select drives for you. This option is the easiest way to create a virtual drive.
- Advanced configuration lets you choose additional settings and customize virtual drive creation. This option provides greater flexibility when creating virtual drives for your specific requirements.

Selecting Virtual Drive Settings

This section describes the virtual drive settings that you can select when you use the advanced configuration procedure to create virtual drives. You should change these parameters only if you have a specific reason for doing so.

It is usually best to leave them at their default settings.

- Initialization state: Initialization prepares the storage medium for use. Specify the initialization status
- No Initialization: (the default) The new configuration is not initialized, and the existing data on the drives is not overwritten
- Fast Initialization: The firmware quickly writes 0s to the first and last 8-MB regions of the new virtual drive and then completes the initialization in the background. This allows you to start writing data to the virtual drive immediately

Full Initialization: A complete initialization is done on the new configuration. You cannot write data to the new virtual drive until the initialization is complete. This process can take a long time if the drives are large.

Read policy: Specify the read policy for this virtual drive

- Always read ahead: Read ahead capability allows the controller to read sequentially ahead of requested data and to store the additional data in cache memory, anticipating that the data will be needed soon. This process speeds up reads for sequential data, but little improvement occurs when accessing random data.
- No read ahead: (the default) Disables the read ahead capability.

Write policy: Specify the write policy for this virtual drive

- Write Through: In this mode, the controller sends a data transfer completion signal to the host when the drive subsystem has received all of the data in a transaction. This option eliminates the risk of losing cached data in case of a power failure.
- Always Write Back: In this mode, the controller sends a data transfer completion signal to the host when the controller cache has received all of the data in a transaction.

I/O policy: The I/O policy applies to reads on a specific virtual drive. It does not affect the read ahead cache.

- Cached IO: In this mode, all reads are buffered in cache memory.
- Direct IO: (the default) In this mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. Cached IO provides faster processing, and Direct IO ensures that the cache and the host contain the same data.

Access policy: Select the type of data access that is allowed for this virtual drive

- Read/Write: (the default) Allow read/write access. This setting is the default value.
- Read Only: Allow read-only access.
- Blocked: Do not allow access.
- Disk cache policy: Select a cache setting for this drive:
- Enabled: Enable the disk cache.
- Disabled: (the default) Disable the disk cache.
- Unchanged: Leave the current disk cache policy unchanged.

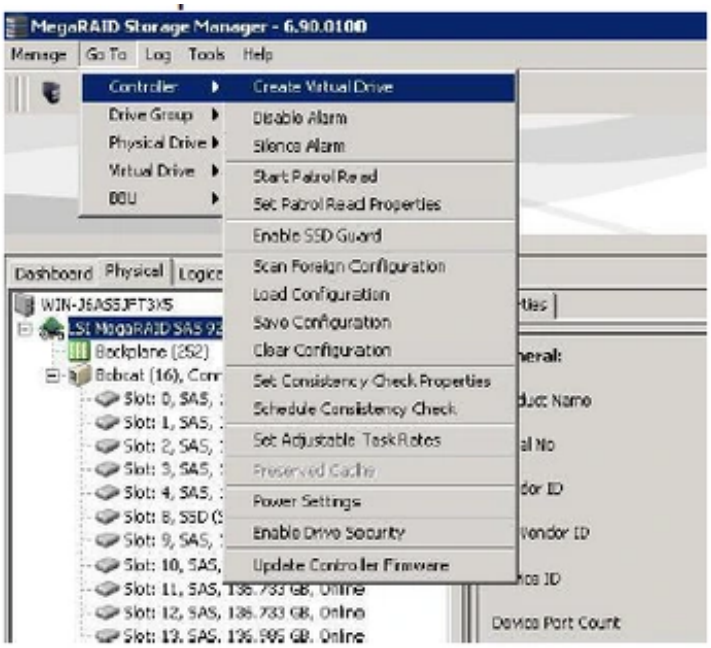
Creating a Virtual Drive Using Simple Configuration

Simple configuration is the quickest and easiest way to create a new storage configuration. When you select simple configuration mode, the system creates the best configuration possible using the available drives.

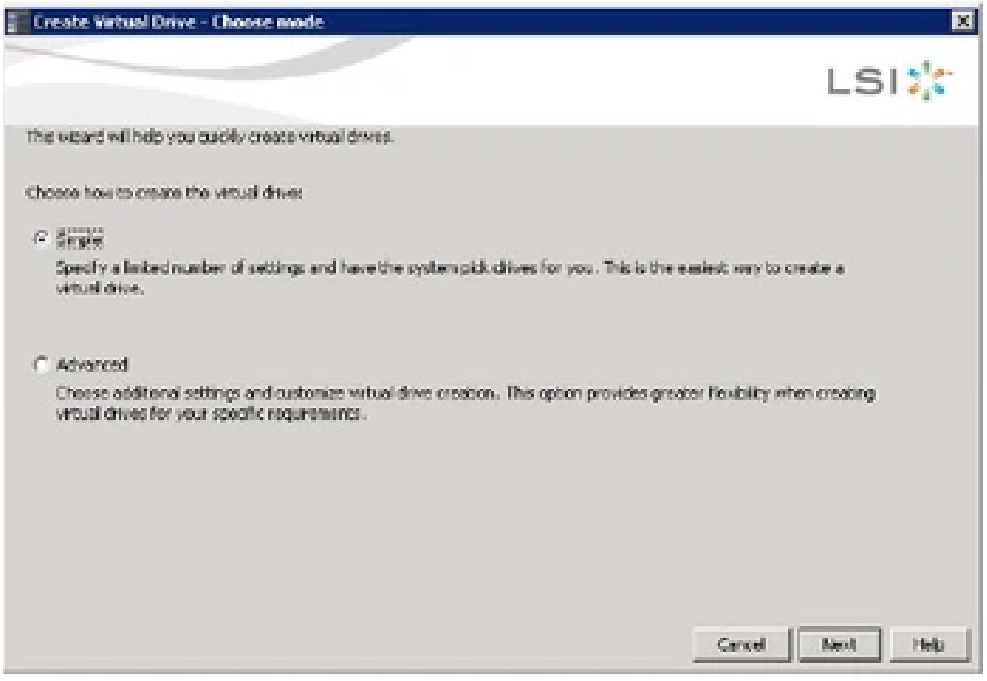
> **Note**
>
> **Please note**: You cannot create spanned drives using the simple configuration procedure. To create spanned drives, use the advanced configuration.

Follow these steps to create a new storage configuration in simple configuration mode

- Perform either of the following steps:
- Right-click the controller node in the device tree in the left frame of the MegaRAID Storage Manager window, and select Create Virtual Drive.
  Or
  Select the controller node, and select Go To > Controller > Create Virtual Drive in the menu bar, as shown in this image.

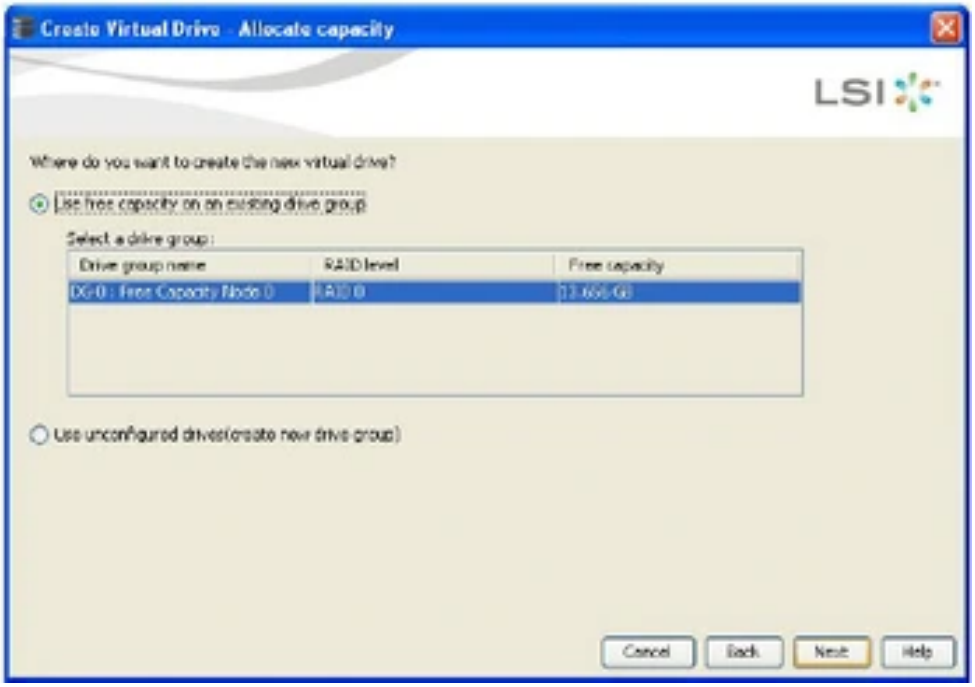


The dialog for the configuration mode (simple or advanced) appears, as shown in the following figure:-

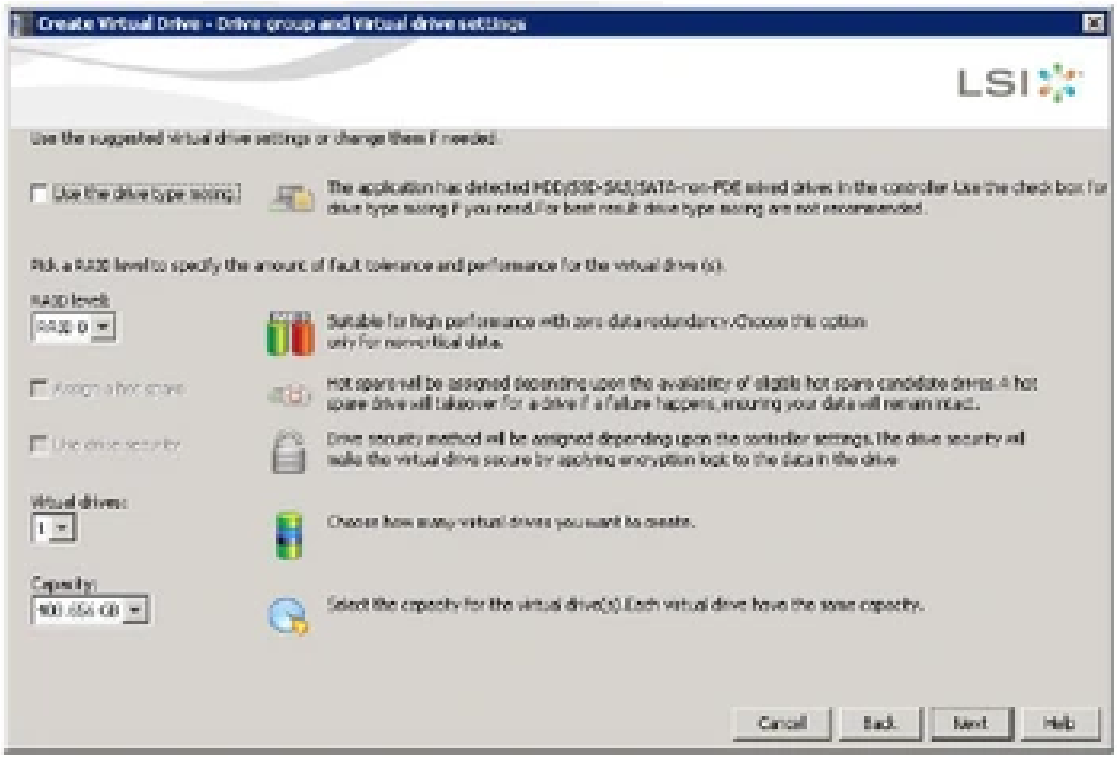


Select the Simple radio button, and click Next.

The Create Virtual Drive - Allocate capacity dialog appears, as shown in the following figure. If unconfigured drives are available, you have the option to use those unconfigured drives. If unconfigured drives are available, the Create Drive Group Settings window appears, and you can go to the next step.



- Perform either of the two options: If a drive group exists, select the Use free capacity on an existing drive group radio button and click Next. Continue with the next step. The Create Virtual Drive window appears, as shown in the following figure. If unconfigured drives are available, select the radio button to use the unconfigured drives, and click Next. Continue with next step. The Summary window appears as shown:-



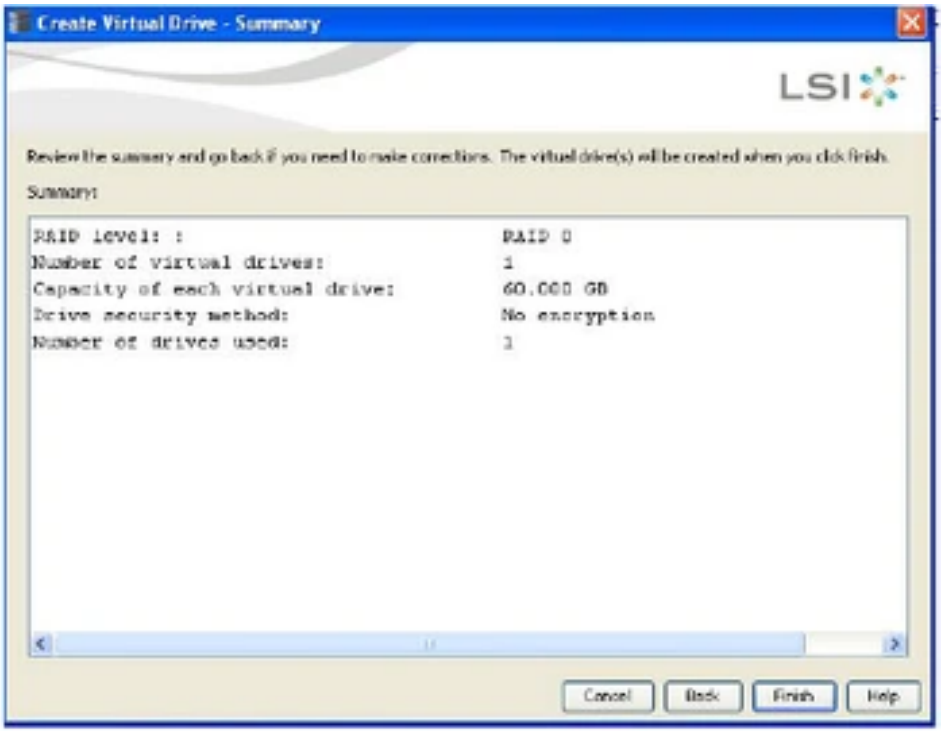
Please note: For best results, do not use drive type mixing.

- Select RAID 0 for the virtual drive.
  When you use simple configuration, the RAID controller supports RAID levels 1, 5, and 6. In addition, it supports independent drive (configured as RAID 0).

> **Warning**
>
> DO NOT select any other raid type than Raid 0.
> DO NOT select the Assign a hot spare check box.
> DO NOT select the Use drive security check box.

- Use the drop-down list in the Virtual drives field to choose how many virtual drives you want to create. Select the capacity of the virtual drives. Each virtual drive has the same capacity. Click Next.

The Create Virtual Drive - Summary window appears, as shown in the following figure. This window shows the selections you made for simple configuration:-

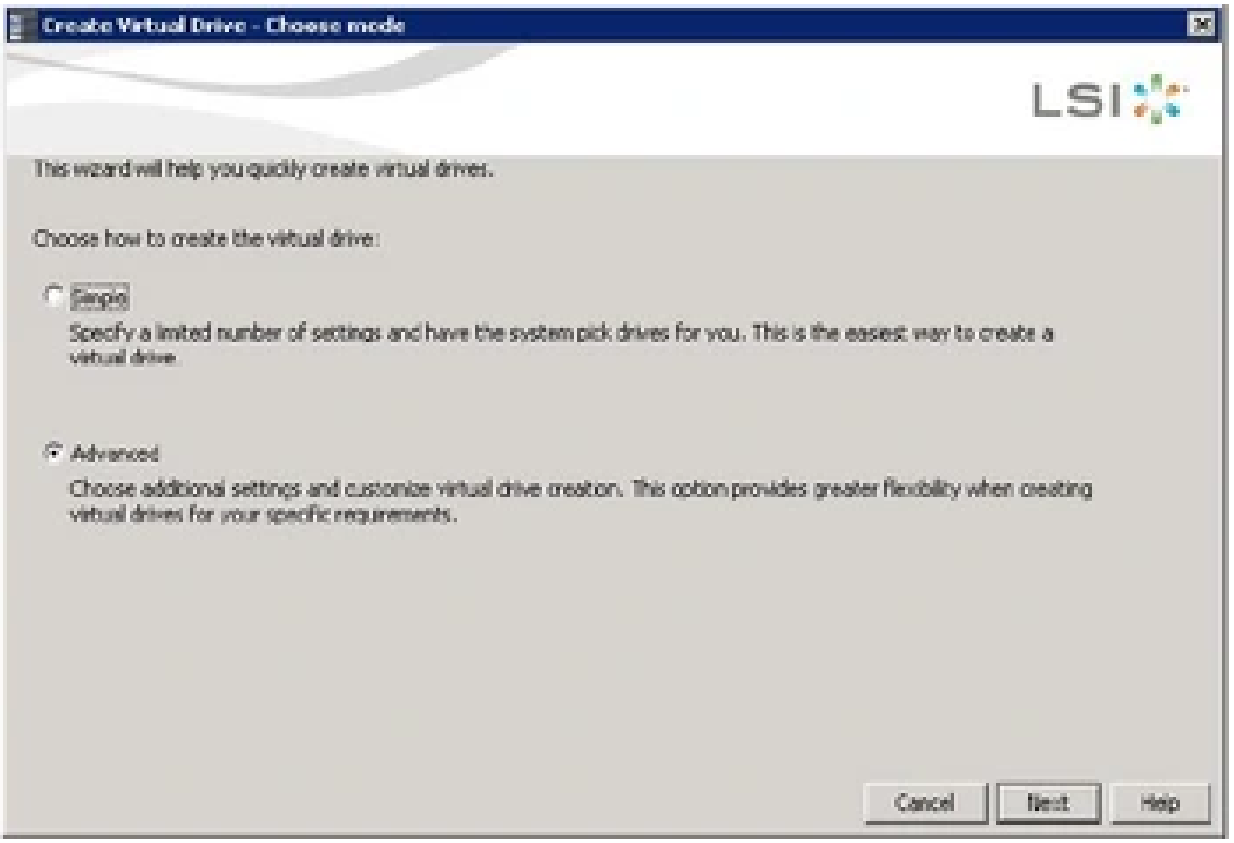


Either click Back to return to the previous window to change any selections, or click Finish to accept and complete the configuration. The new virtual drive is created after you click Finish. After the configuration is completed, a dialog box notifies you that the virtual drives were created successfully.

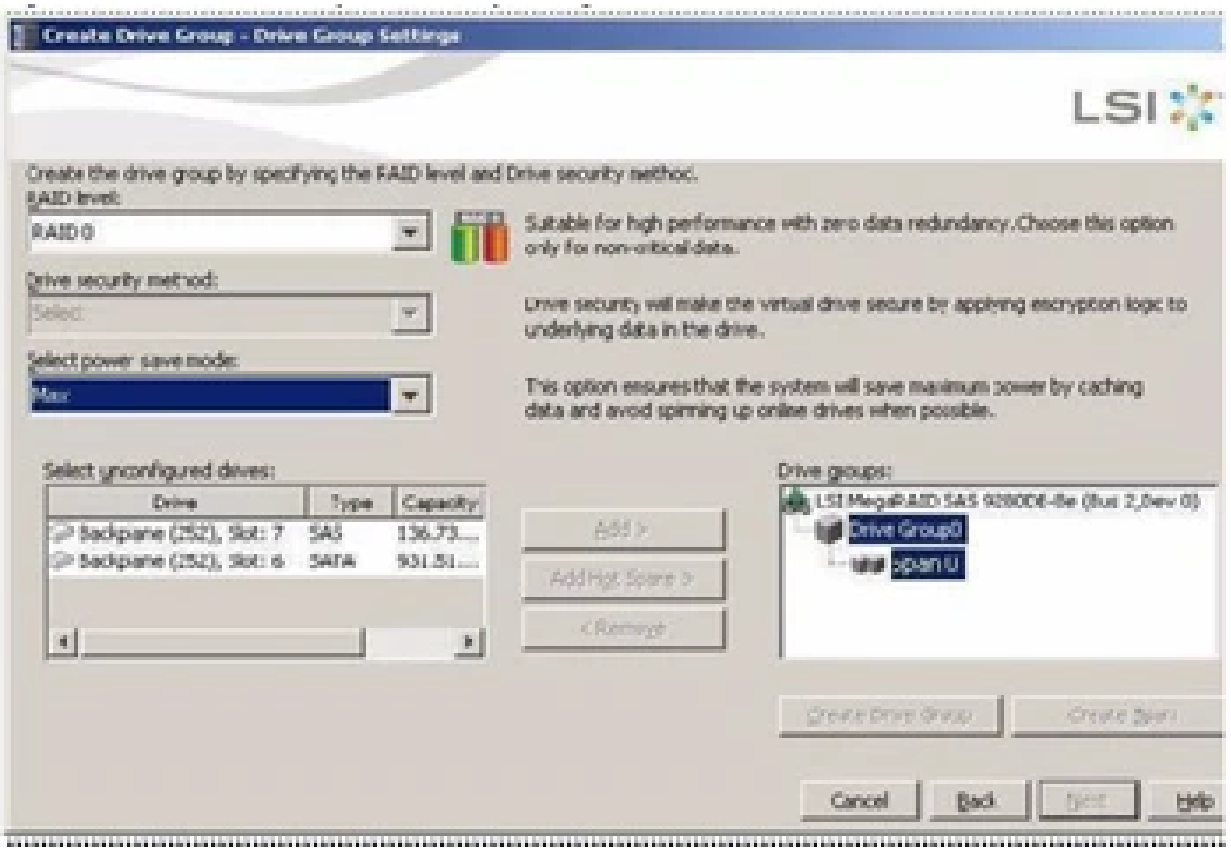
Creating a Virtual Drive Using Advanced Configuration

The advanced configuration procedure provides an easy way to create a new storage configuration. Advanced configuration gives you greater flexibility than simple configuration because you can select the drives and the virtual drive parameters when you create a virtual drive. In addition, you can use the advanced configuration procedure to create spanned drive groups.

- Follow these steps to create a new storage configuration in the advanced configuration mode. This example shows the configuration of a spanned drive group. Perform either of the following steps to bring up the Configuration wizard: Right-click the controller node in the device tree in the left frame of the MegaRAID Storage Manager window, and select Create Virtual Drive. Select the controller node, and select Go To > Controller > Create Virtual Drive in the menu bar. The dialog for the choosing the configuration mode (simple or advanced) appears, as shown in the following figure:-



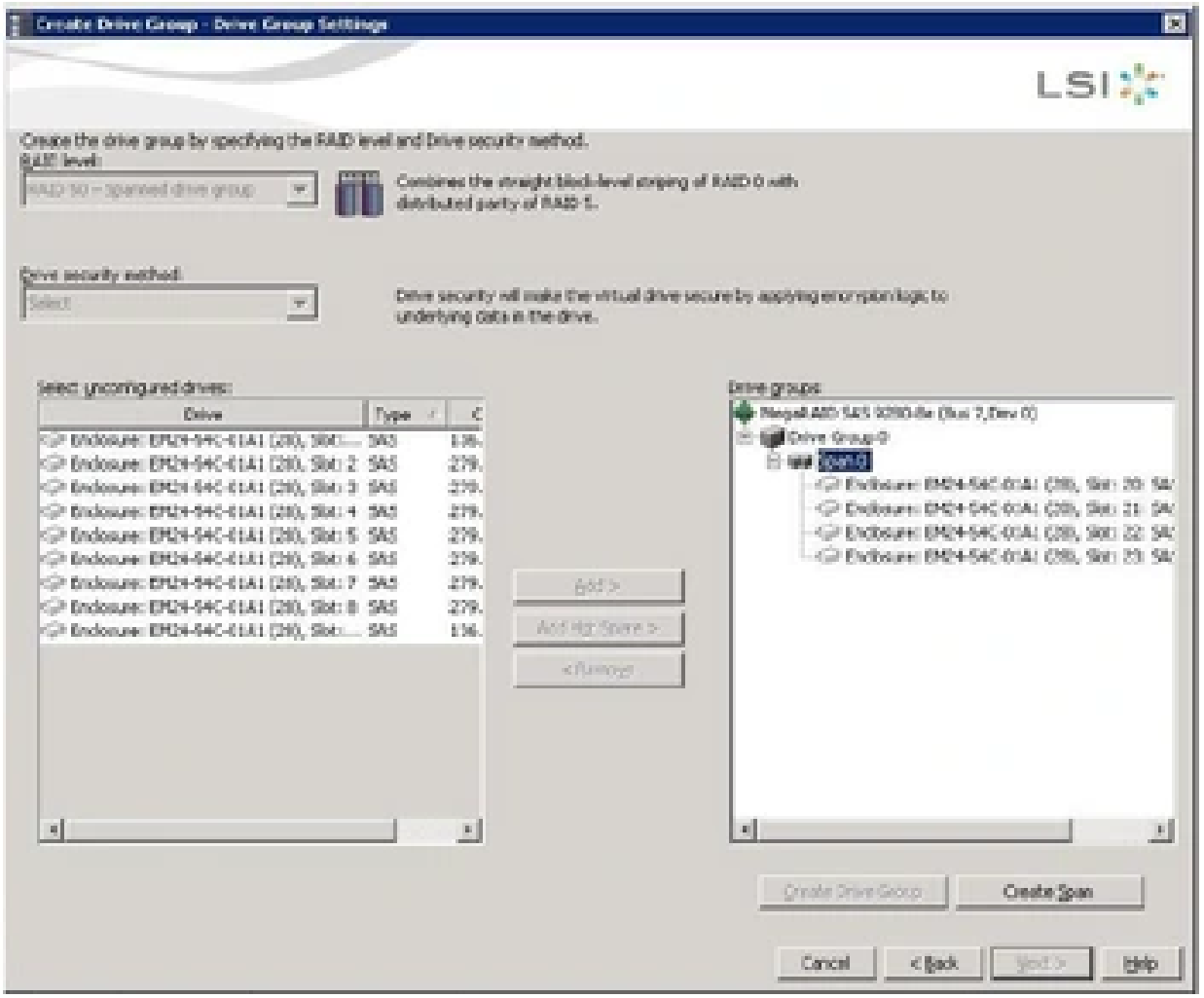
Select the Advanced radio button, and click Next.
The Create Drive Group Settings window appears, as shown in the following figure:-



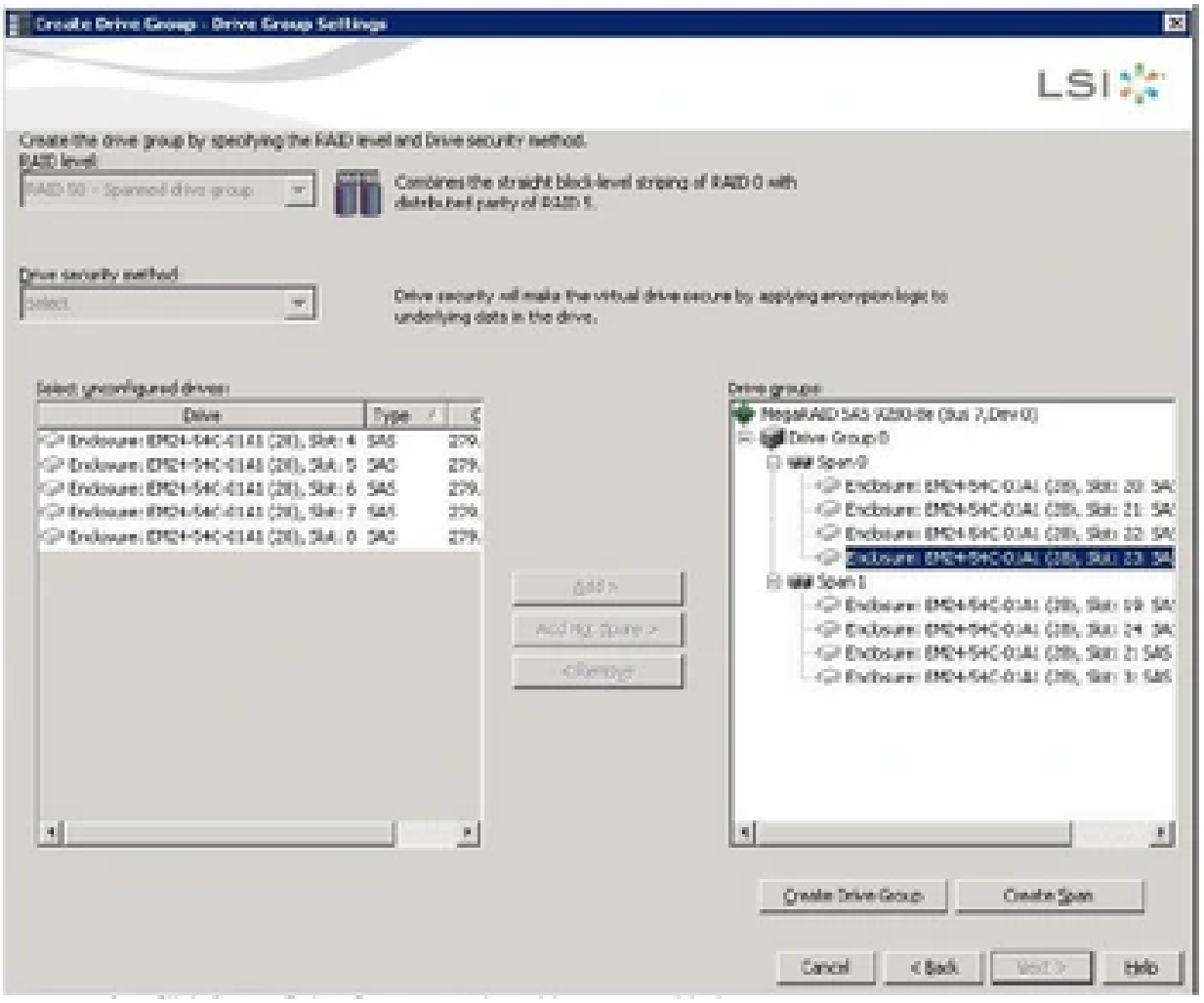
Select the following items on the Create Drive Group - Drive Group Settings window:
Select the RAID level 0.
Independent drives configured as RAID 0 are supported.

DO NOT set a drive security method.

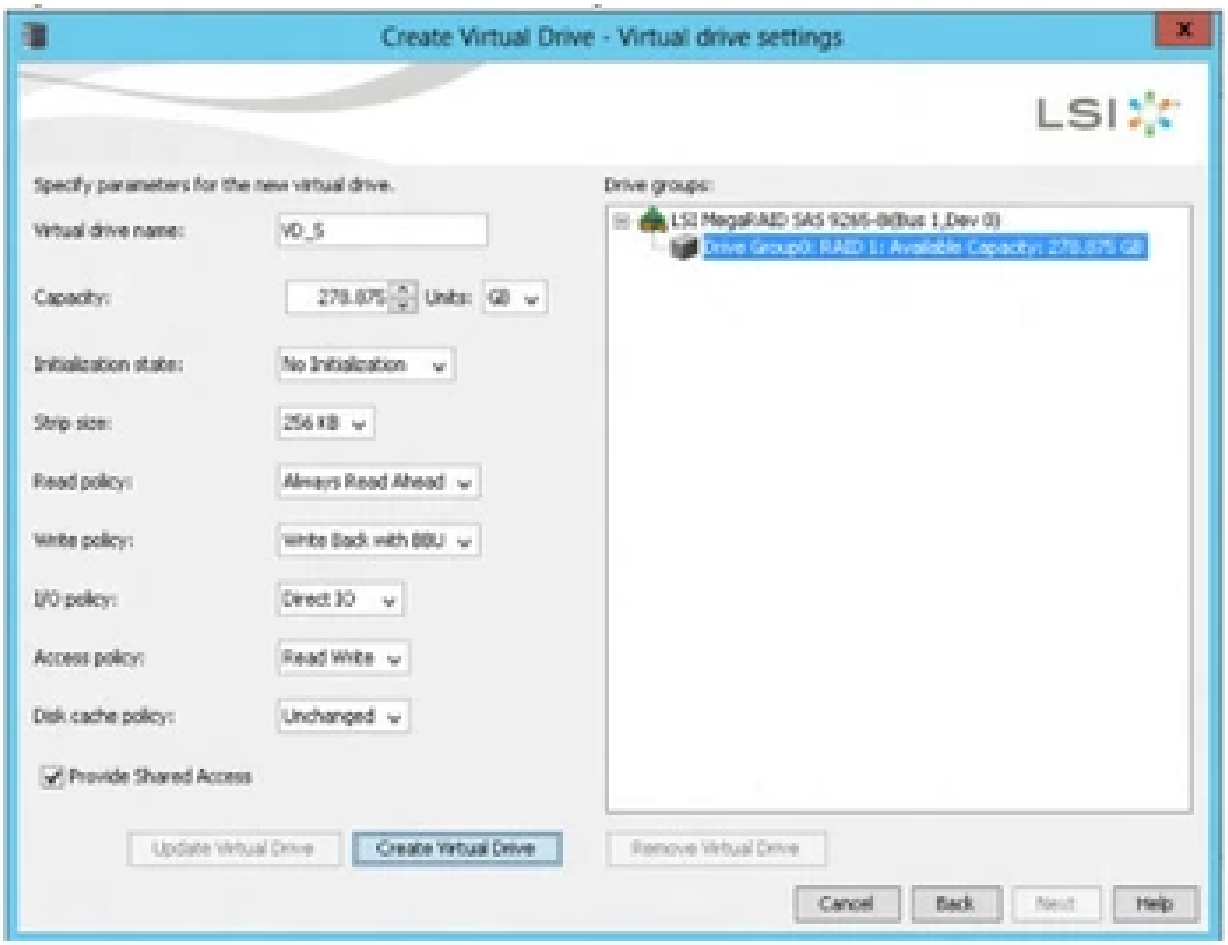
Select unconfigured drives from the list of drives, and click **Add>** to add them to the drive group.
The selected drives appear under Span 0 below Drive Group 0, as shown in the following figure:-



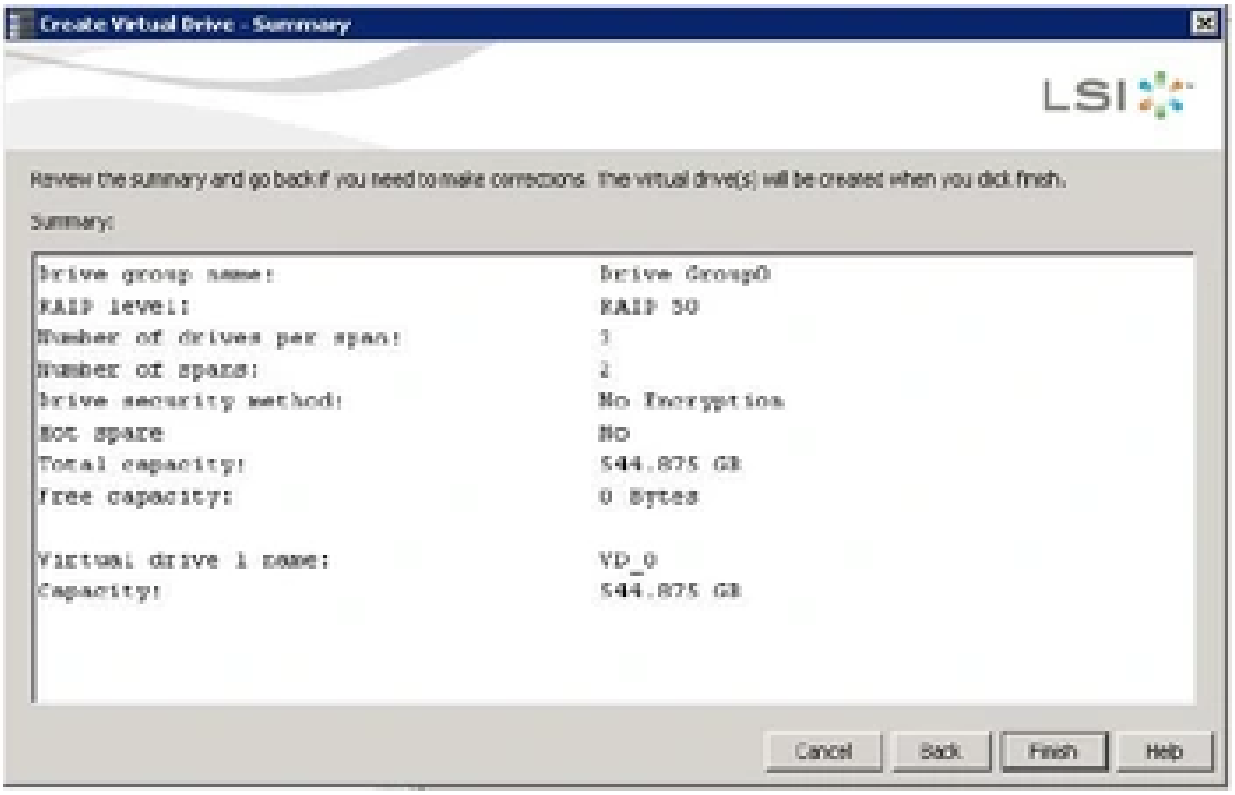
Click Create Span to create a second span in the drive group.
Select unconfigured drives from the list of drives, and click Add> toadd them to the second drive group.
The selected drives appear under Span 1 below Drive Group 0, as shown in the following figure:-



Click Create Drive Group to make a drive group with the spans.
Click Next to complete this step.
The Create Virtual Drive - Virtual drive settings window appears, as shown in the following figure. The drive group and the default virtual drive settings appear. The options to update the virtual drive or remove the virtual drive are grayed out until you create the virtual drive:



Change any virtual drive settings, if desired.
Click Create Virtual Drive.
The new virtual drive appears under the drive group. The options Update Virtual Drive and Remove Virtual Drive are available. Update Virtual Drive allows you to change the virtual drive settings, and Remove Virtual Drive allows you to delete the virtual drive. Click Next.
The Create Virtual Drive - Summary window appears, as shown in the following figure. This window shows the selections you made for advanced configuration:-



Click Back to return to the previous window to change any selections, or click Finish to accept and complete the configuration. After you click Finish, the new storage configuration is created and initialized according to the selected options. After the configuration is completed, a dialog notifies you that the virtual drives were created successfully.

Click OK.

The Enable SSD Caching on New Virtual Drives dialog appears.

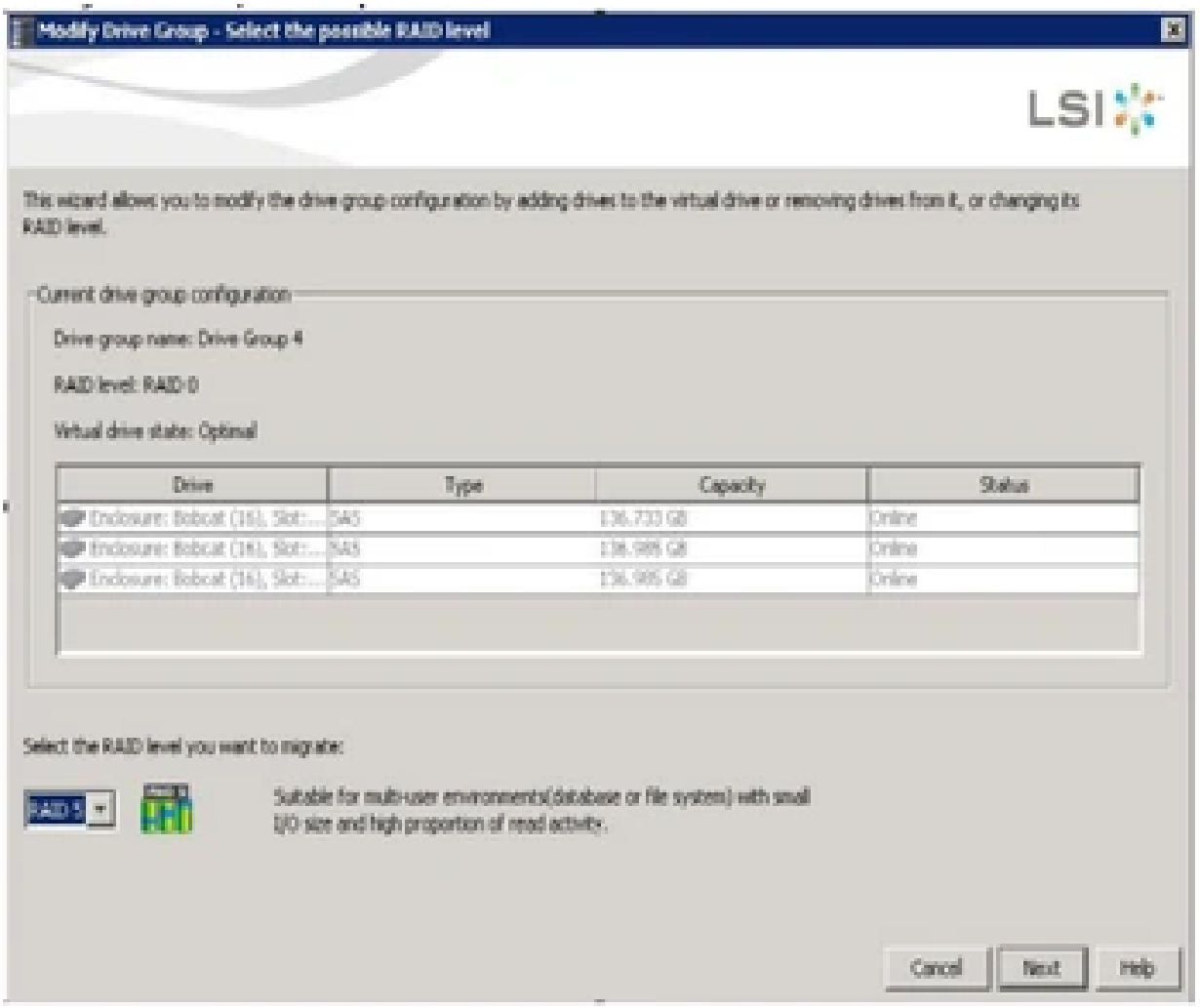
The newly created virtual drive is enabled for SSD caching by default. Click OK to confirm SSD caching on the virtual drive. Click No if you want to disable SSD caching on the virtual drive. The All check box is selected by default. To disable SSD caching on the virtual drives, deselect the All check box. If more drive capacity exists, the dialog asks whether you want to create more virtual drives. If no more drive capacity exists, you are prompted to close the configuration session.

Select either Yes or No to indicate whether you want to create additional virtual drives. If you select Yes, the system takes you to the Create Virtual Drive - Drive group and Virtual drive settings Dialog. If you select No, the utility asks whether you want to close the wizard. If you selected No in the previous step, select either Yes or No to indicate whether you want to close the wizard. If you select Yes, the Configuration wizard closes. If you select No, the dialog closes, and you remain on the same page.

Adding a Drive or Drives to a Configuration

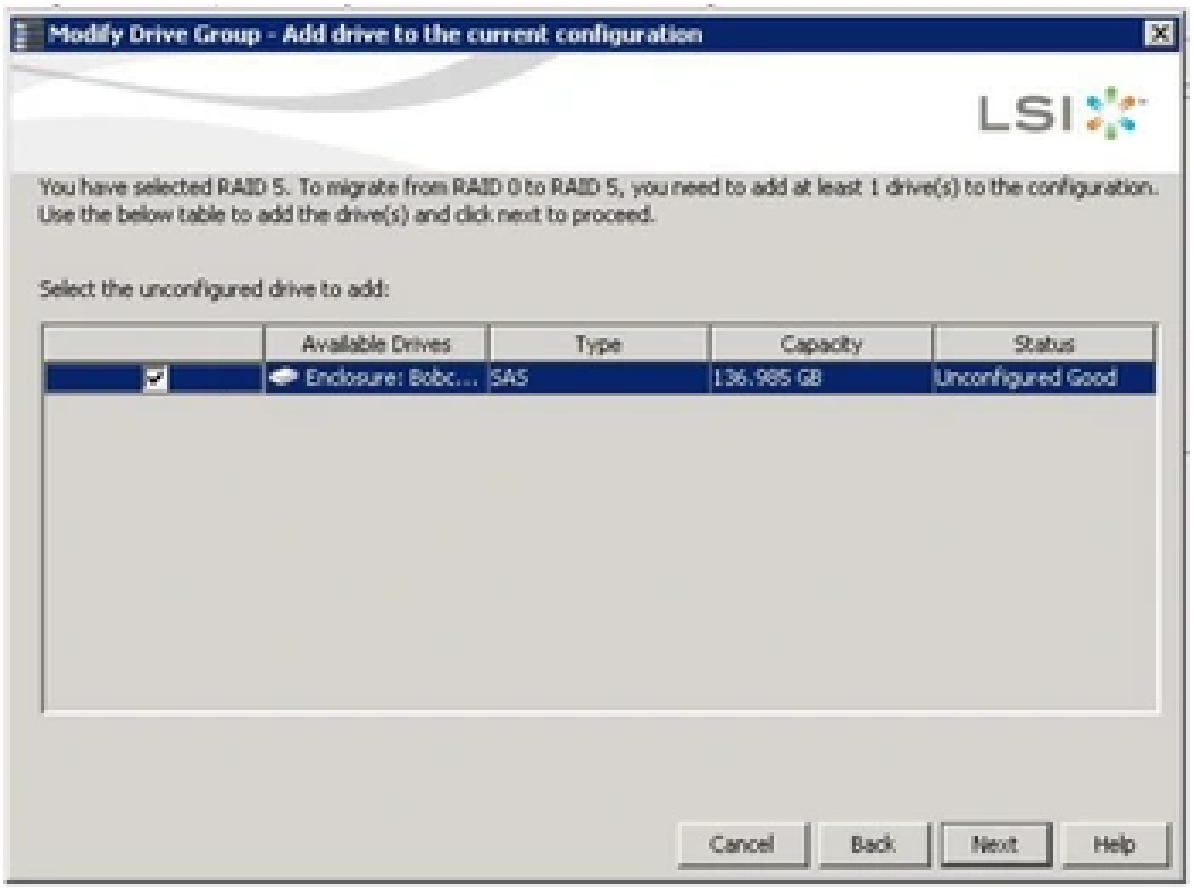
> **ATTENTION**
>
> ATTENTION: Be sure to back up the data on the virtual drive before you add a drive to it.

Follow these steps to add a drive or drives to a configuration with the Modify Drive Group wizard. Click the Logical tab in the left panel of the MegaRAID Storage Manager window. Select a drive group in the left panel of the window. Either select Go To > Drive Group > Modify Drive Group on the menu bar, or right-click the virtual drive icon to access the Modify Drive Group wizard. The Modify Drive Group wizard window appears:-



1. Select RAID 0 as the level to which you want to change (“migrate”) the drive group, and click Next.

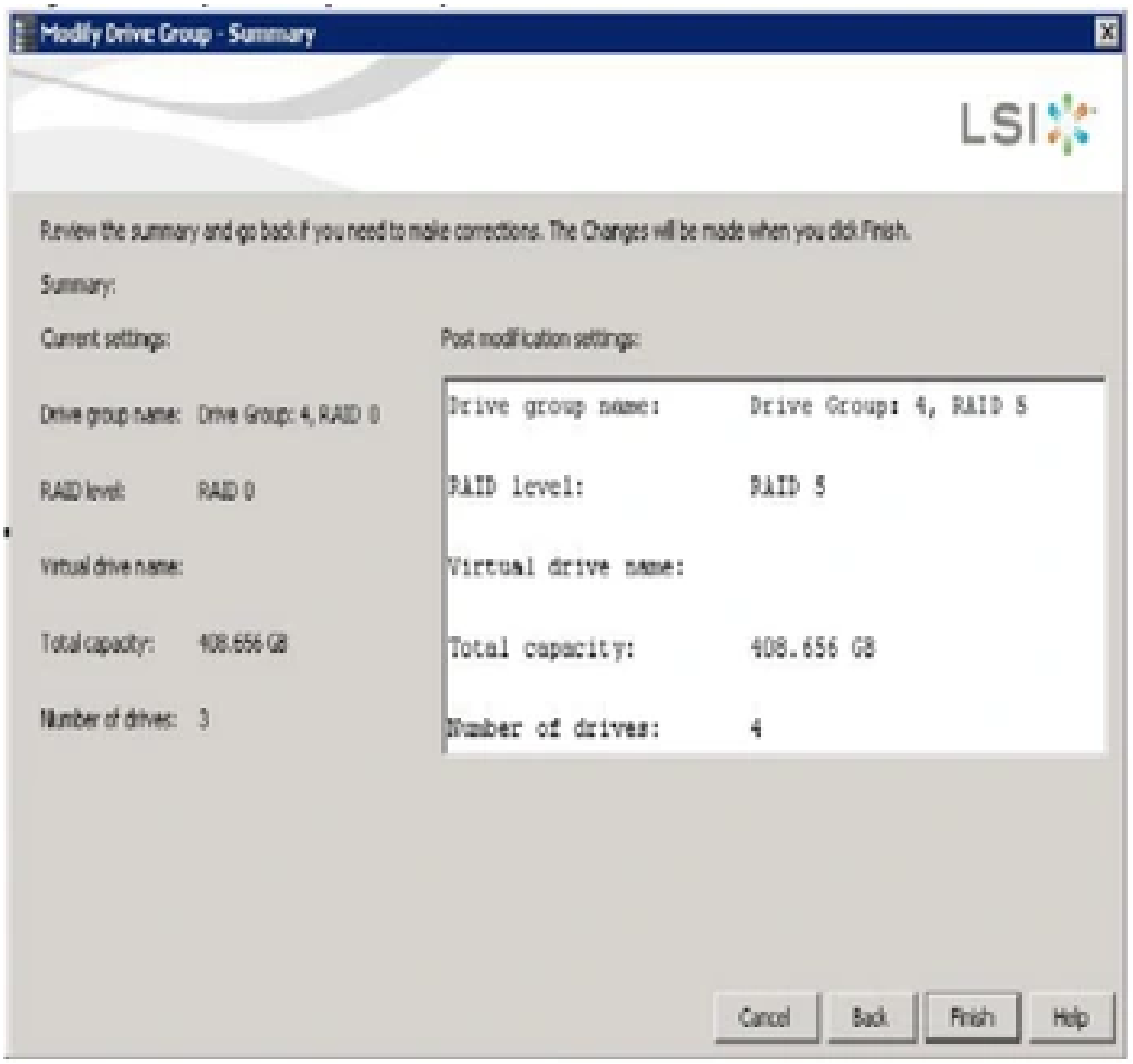
2. The following window appears. It lists the drives you can add, and it states whether you have to add a minimum number of drives:-



Click the check box next to any unconfigured drives that you want to add, and then click Next.

> **Note**
>
> NOTE The drives you add must have the same capacity as or greater capacity than the drives already in the drive group.

The Modify Drive Group - Summary window appears. This window shows the current settings and what the settings will be after the drives are added:-



1. Review the configuration information. You can click Back if you need to change any selections.
2. Click **Finish** to accept the changes. A confirmation message appears. The message states that this operation cannot be aborted and asks whether you want to continue.
3. Click **Yes** to accept and complete the addition of the drives to the drive group.

Removing a Drive from a Configuration

> **ATTENTION**
>
> ATTENTION Be sure to back up the data on the virtual drive before you remove a drive from it. Follow these steps to remove a drive from the configuration.

1. Click the Logical tab in the left panel of the MegaRAID Storage Manager window.

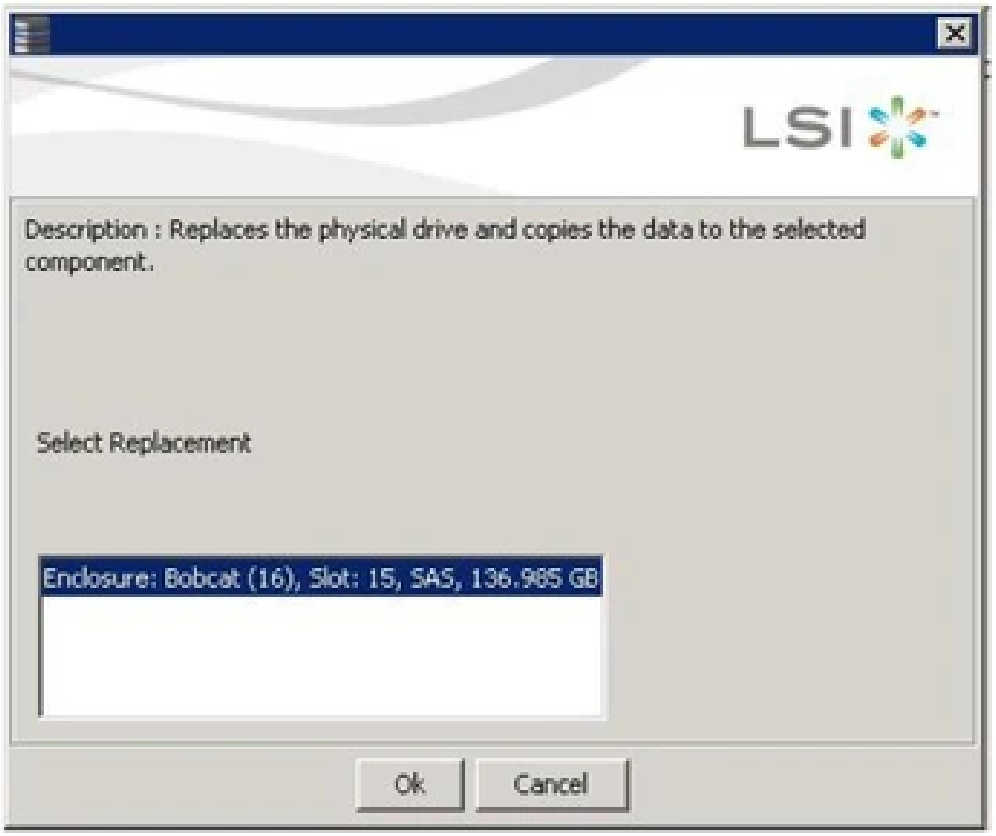
2. Click a drive icon in the left panel of the window.
3. Either select Go To > Physical Drive > Make Drive Offline on the menu bar, or right-click the drive, and select Make Drive Offline from the menu.
4. A confirmation message appears. The message states that this operation cannot be aborted and asks whether you want to continue.
5. Click Yes to accept and complete the removal of the drive from the drive group.

Replacing a Drive

> **ATTENTION**
>
> ATTENTION Be sure to back up the data on the virtual drive before you replace a drive.

Follow these steps to add a replacement drive and copy the data from the drive that was removed to the replacement drive.

1. Click the Logical tab in the left panel of the MegaRAID Storage Manager window.
2. Select a drive in the left panel of the window.
3. Either select Go To > Physical Drive > Replace Physical Drive on the menu bar, or right-click the virtual drive icon to access the Modify Drive Group wizard. The dialog with the replacement drive appears, as shown in the following figure:-



4. Select a replacement drive.
5. A confirmation message appears. Click **Yes**. This step replaces a drive and copies the data to the selected component.

Maintaining and Managing Storage Configurations

This section explains how to use the MegaRAID Storage Manager software to maintain and manage storage configurations. Log on to the server in Full Access mode to perform the maintenance and management tasks.

Initializing a Virtual Drive

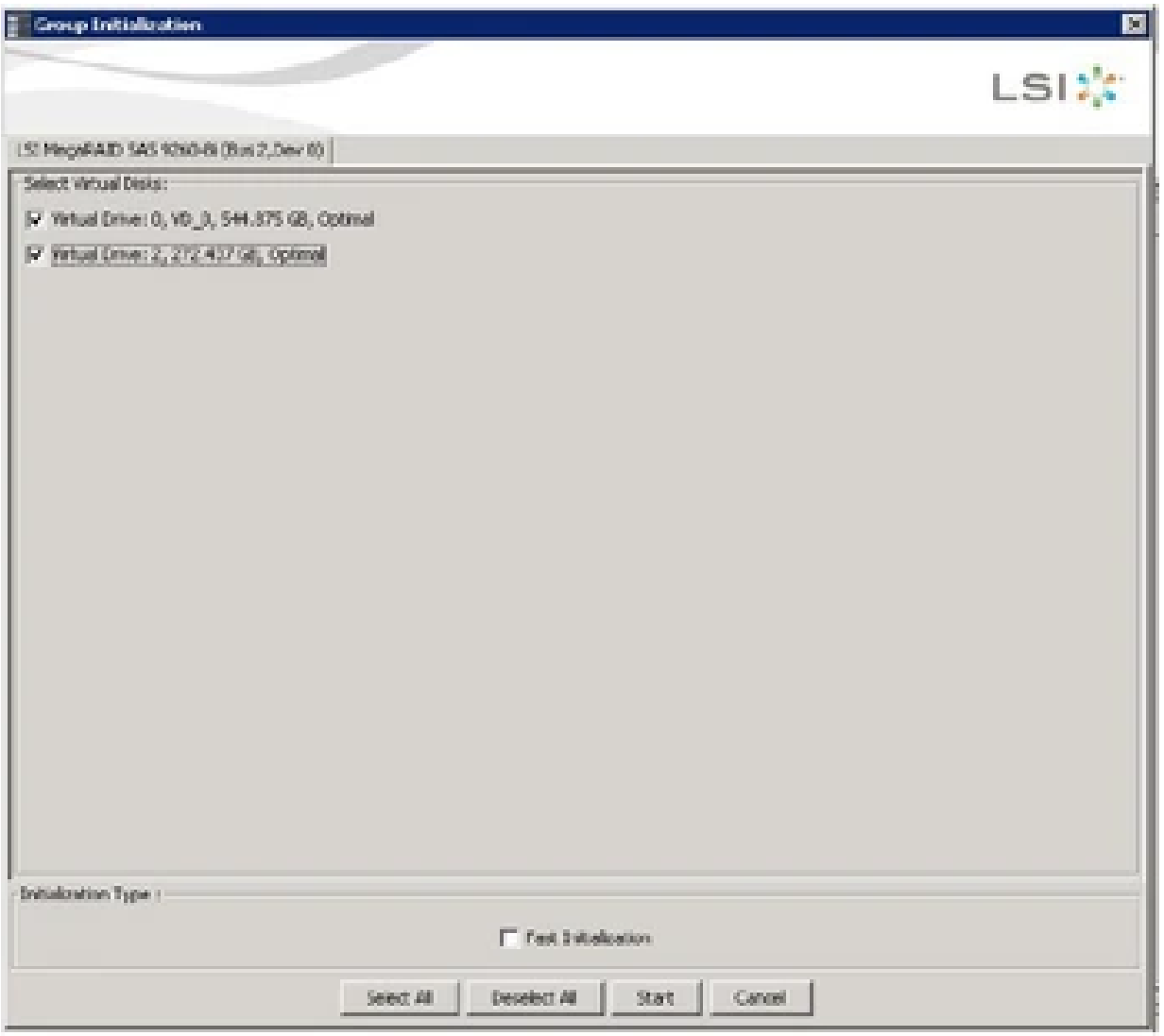
When you create a new virtual drive with the Configuration Wizard, you can select the Fast Initialization or Full Initialization option to initialize the disk immediately. However, you can select No Initialization if you want to initialize the virtual drive later. To initialize a virtual drive after completing the configuration process, perform these steps: Select the Logical tab in the left panel of the MegaRAID Storage Manager window, and click the icon of the virtual drive that you want to initialize. Select Go To > Virtual Drive > Start Initialization. The Initialize dialog appears. Select the virtual drives to initialize.

> **ATTENTION**
>
> Initialization erases all data on the virtual drive. Make sure to back up any data you want to keep before you initialize a virtual drive.

Select the Fast Initialization check box if you want to use this option. If you leave the box unselected, the MegaRAID Storage Manager software runs a Full Initialization on the virtual drive. Click Start to begin the initialization. You can monitor the progress of the initialization.

Running a Group Initialization

Initialization prepares the storage medium for use. You can run initialization on multiple drives at one time. Follow these steps to run a group consistency check. Select Manage > Initialize. The Group Initialization dialog appears:-



Either check the virtual drives on which to run the initialization, or click Select All to select all of the virtual drives. Click Start. You can monitor the progress of the group initialization.

Scanning for New Drives

You can use the Scan for Foreign Configuration option to find drives with foreign configurations. A foreign configuration is a RAID configuration that already exists on a replacement set of physical disks that you install in a server. In addition, if one or more drives are removed from a configuration, by a cable pull or drive removal, for example, the configuration on those drives is considered a foreign configuration by the RAID controller. Drives that are foreign are listed on the physical drives list with a special symbol in the MegaRAID Storage Manager software. The utility allows you to import the existing configuration to the RAID controller or clear the configuration so you can create a new configuration using these drives. You can preview the foreign configuration before you decide whether to import it.

The MegaRAID Storage Manager software usually detects newly installed drives and displays icons for them in the MegaRAID Storage Manager window. If for some reason the MegaRAID Storage Manager software does not detect a new drive (or drives), you can use the Scan for Foreign Configuration command to find it.

Follow these steps to scan for a foreign configuration

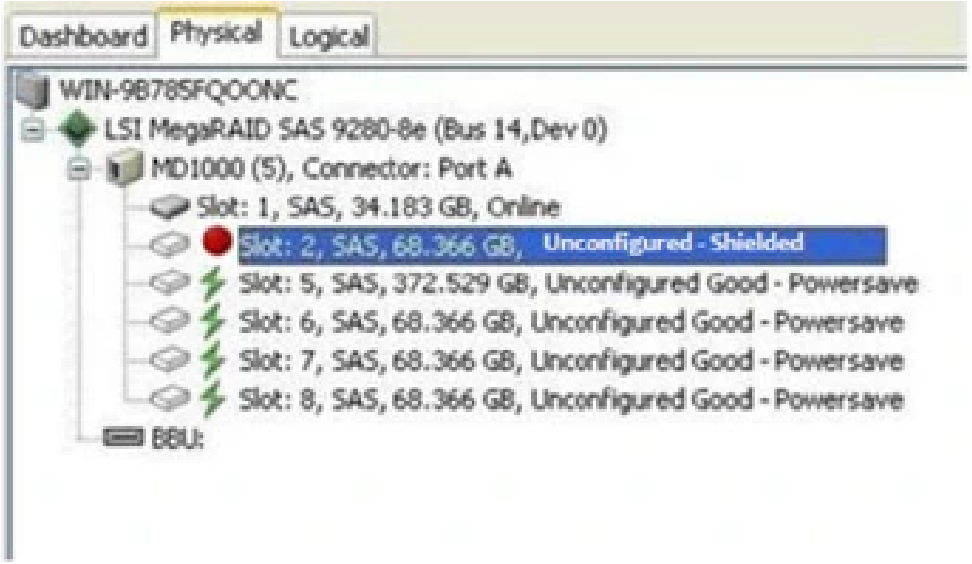
1. Select a controller icon in the left panel of the MegaRAID Storage Manager window.
2. Select Go To > Controller > Scan Foreign Configuration.
3. If the MegaRAID Storage Manager software detects any new drives, it displays a list of them on the window. If not, it notifies you that no foreign configuration is found. Follow the instructions on the window to complete the drive detection.

Upgrading Firmware

The MegaRAID Storage Manager software enables you to easily upgrade the controller firmware. To avoid data loss because of dirty cache on the controller, the utility forces the virtual disks into Write Through mode after a firmware upgrade. It is in this mode until the server reboots. In Write Through mode, the controller sends a data transfer completion signal to the host when the disk subsystem has received all of the data in a transaction. This way, in case of a power outage, the controller does not discard the dirty cache.

Follow these steps to upgrade the firmware

In the left panel of the MegaRAID Storage Manager window, click the icon of the controller you want to upgrade. In the MegaRAID Storage Manager window, select Go To > Controller > Update Controller Firmware. Click **Browse** to locate the .rom update file, as shown in the following figure:-



After you locate the file, click **Open**.

The MegaRAID Storage Manager software displays the version of the existing firmware. When you are prompted to indicate whether you want to upgrade the firmware, click **Yes**. A progress bar appears along with messages that indicate when an image opens and when an image downloads.

After an image has been downloaded and if Online Firmware Update is supported on the controller, a confirmation message box appears that asks for your confirmation.

If Online Firmware Update is not supported on the controller, the confirmation message box does not appear.

Instead, after an image is downloaded, a message appears that indicates an image is being flashed. The controller is updated with the new firmware code contained in the.rom file. Reboot the system after the new firmware is flashed. The new firmware does not take effect until reboot. If you click Yes in the confirmation message box, the progress bar continues with a message that indicates that an image is being flashed. After the progress bar disappears, either of the following two messages appear in a message box.

New Firmware Version is flashed successfully. Online Firmware Update is not possible in this case. System reboot is required for the new firmware > version number > to take effect.

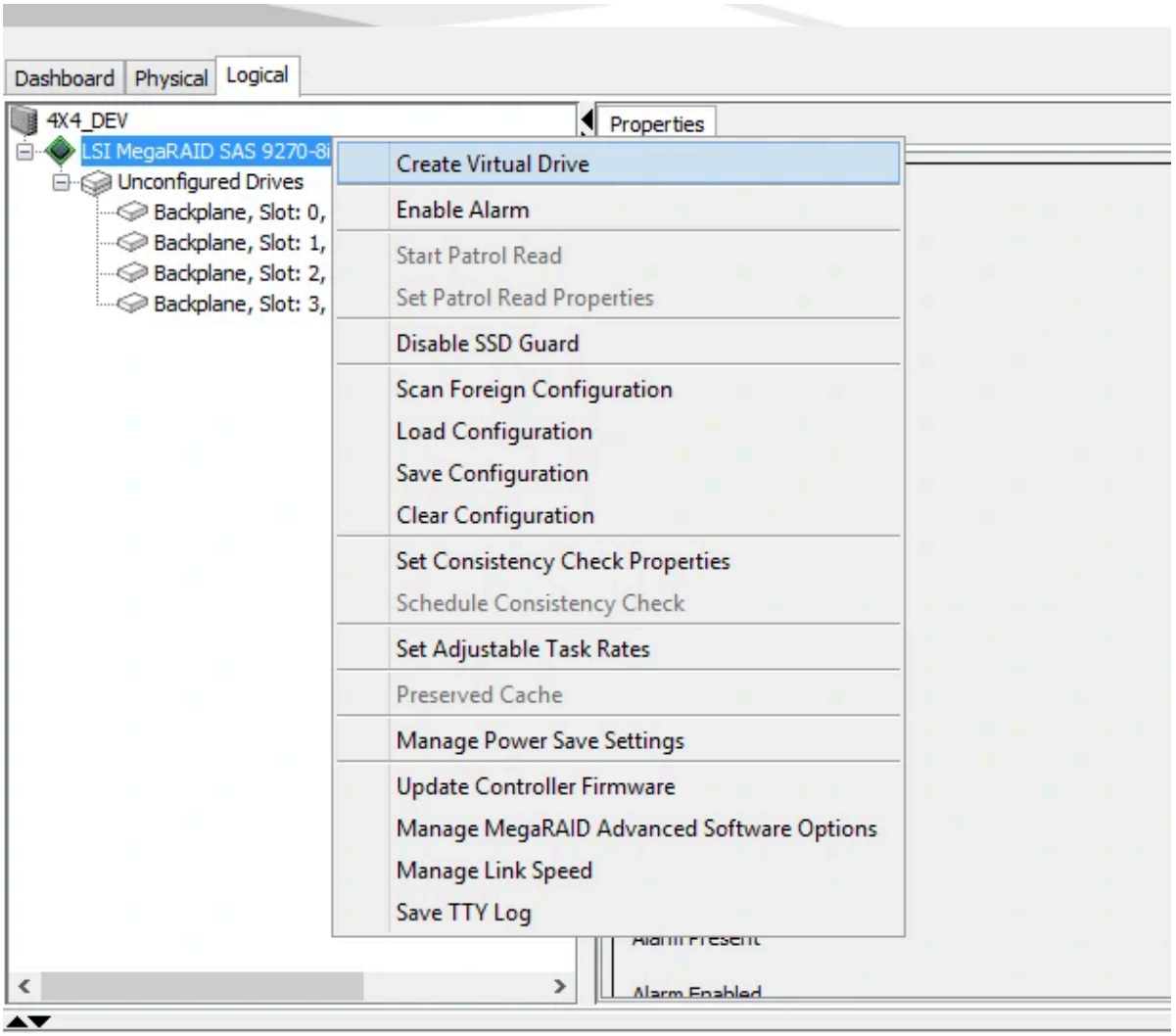
New Firmware Version is flashed successfully. Controller Reset will start now.

If the first message appears, reboot your system. If the second message appears, the MegaRAID Storage Manager main menu window reappears. A Restart Started event appears in the log (at the bottom of the MegaRAID Storage Manager main menu window) and a progress bar appears that states Controller reset is in progress. After the controller reset process is completed, the controller is updated with the new firmware code contained in the .rom file.

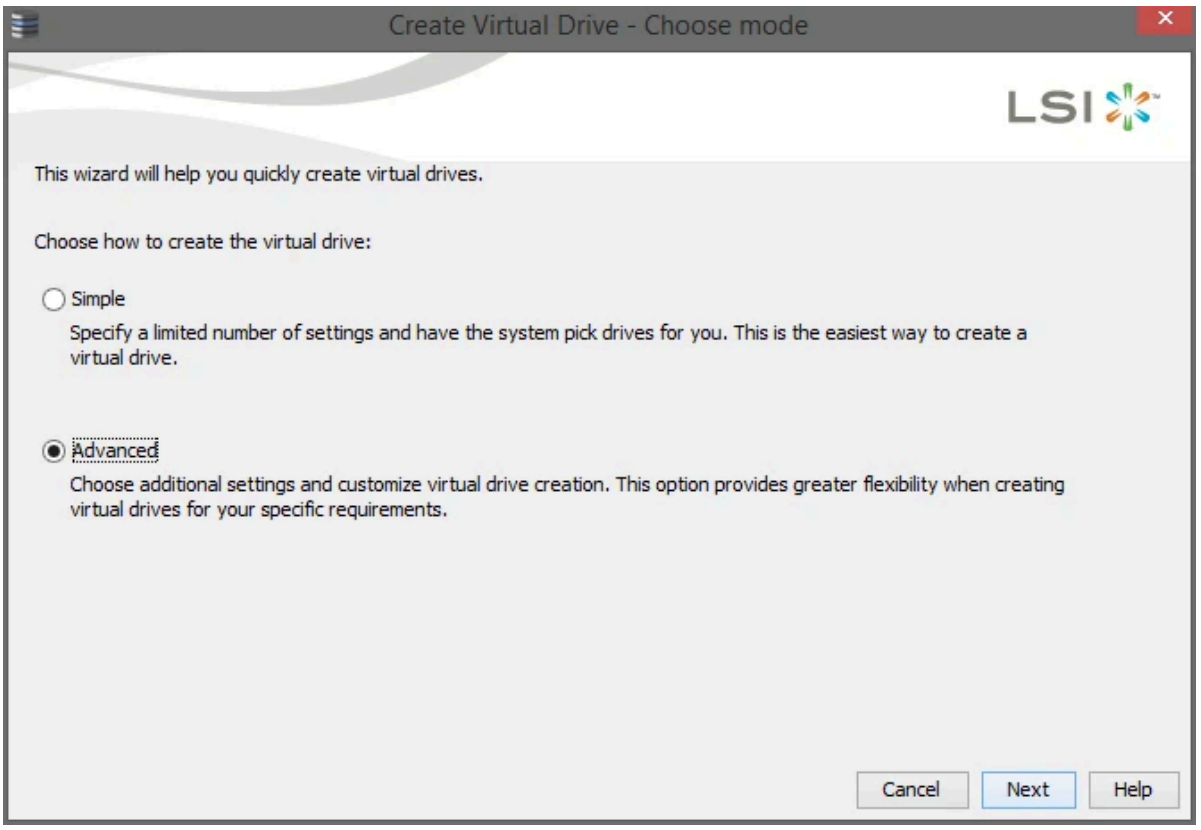
> **Note**
>
> Please note: While performing the Online Firmware Update method, there is a small window of time where the IOs are held and the controller is automatically reset. This results in a timeout to your virtualized environments and causes I/O errors. Choose the traditional Firmware update method to avoid the controller reset.

Creating a RAID Array

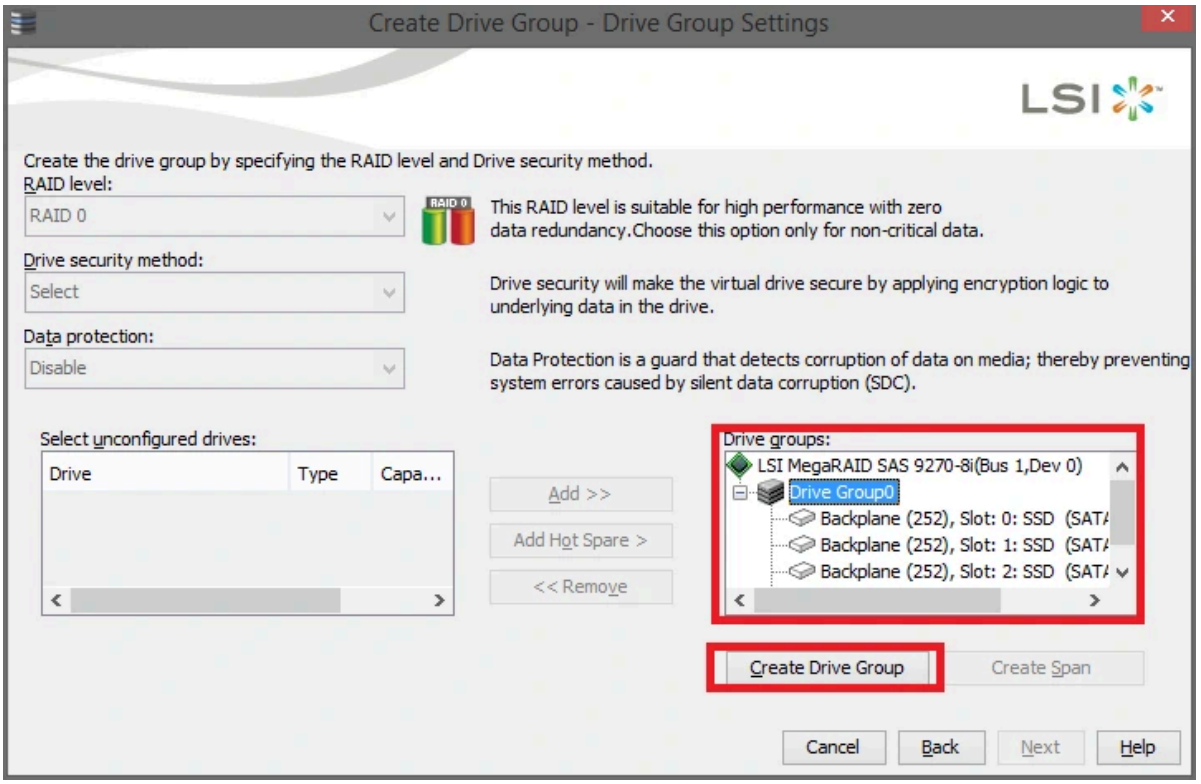
1. On the Logical tab, right-click on the highlighted area and select **Create Virtual Drive**.



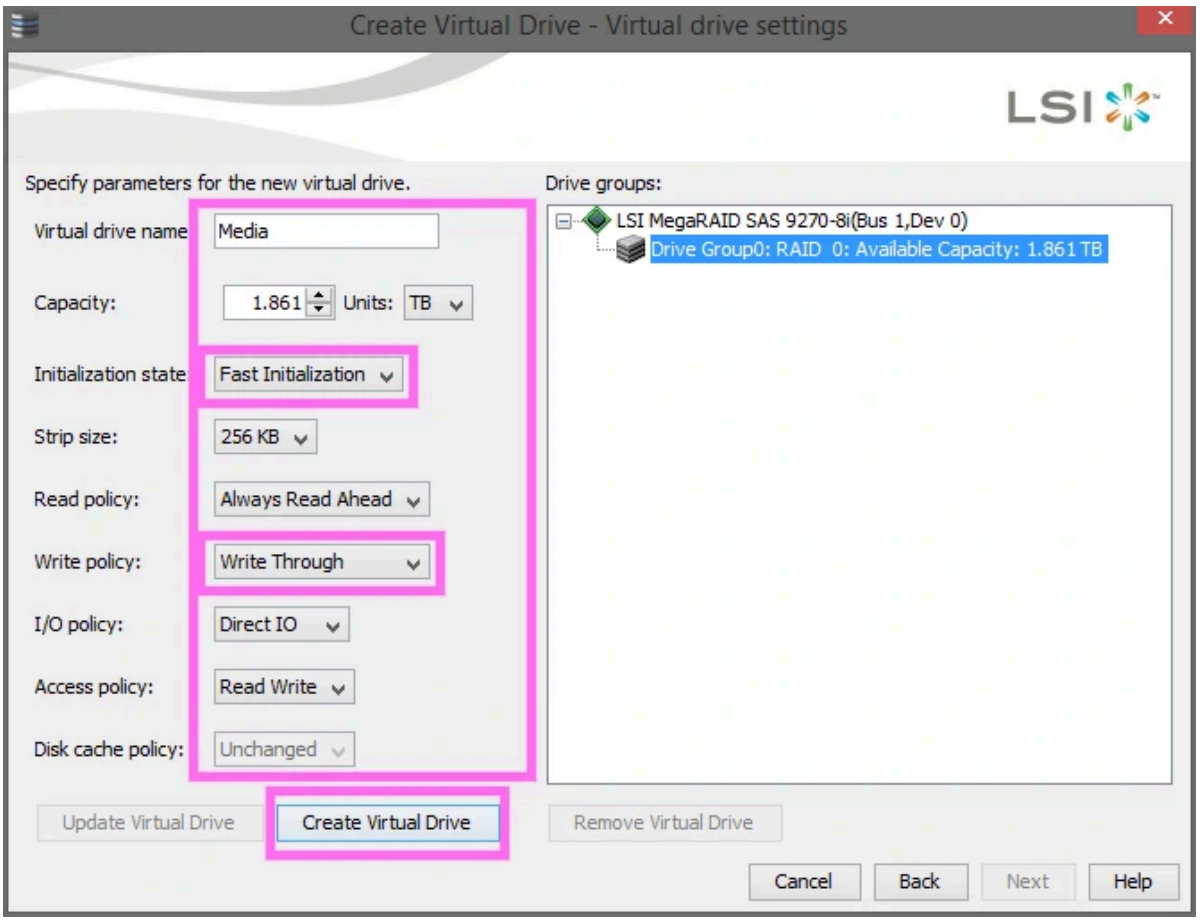
2. Select **Advanced** before moving through the wizard.



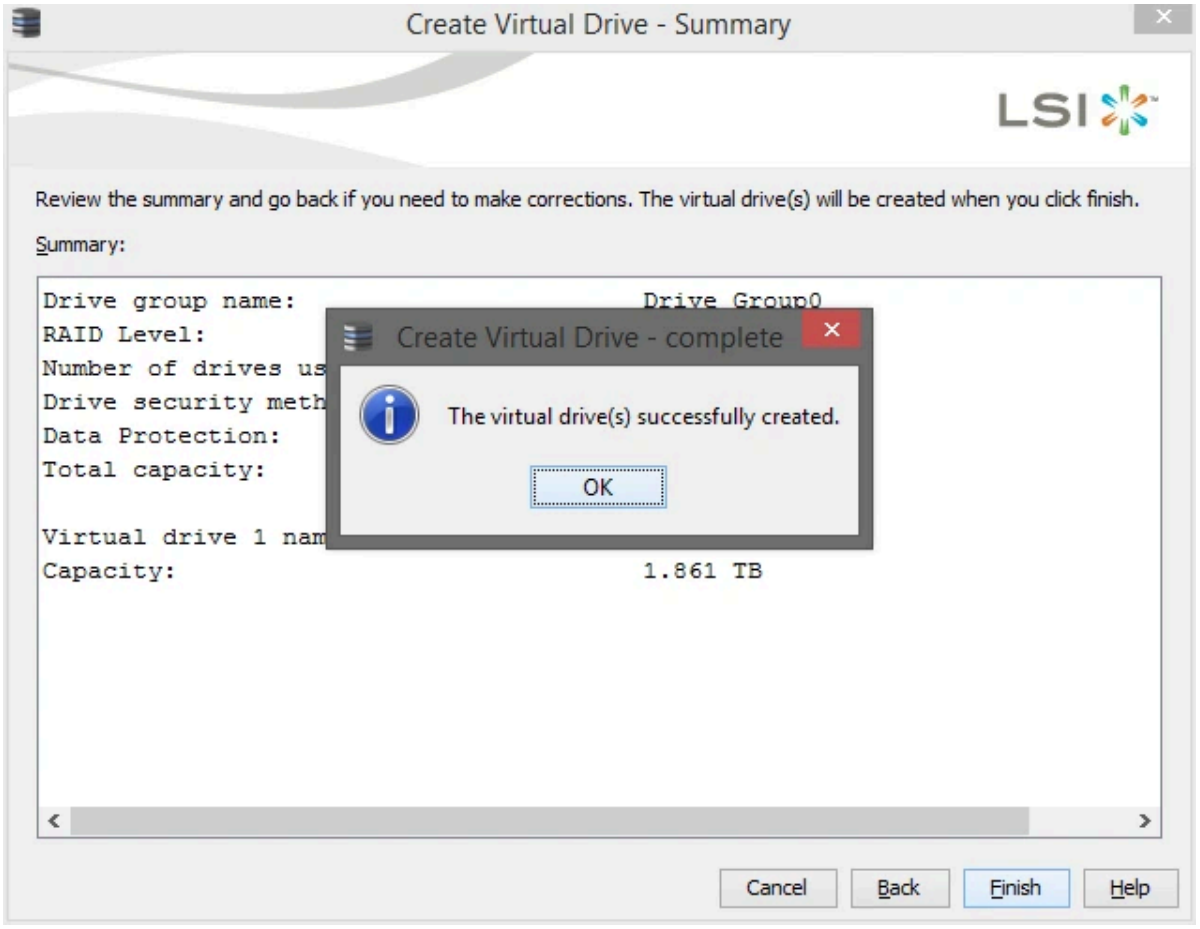
3. Select **Create Drive Group** and add the drives from the left table to the right table to be within the drive group.



4. Ensure all settings match what is within the image and then Create Virtual Drive.



5. Your Virtual Drive should now be completed with the following popup.



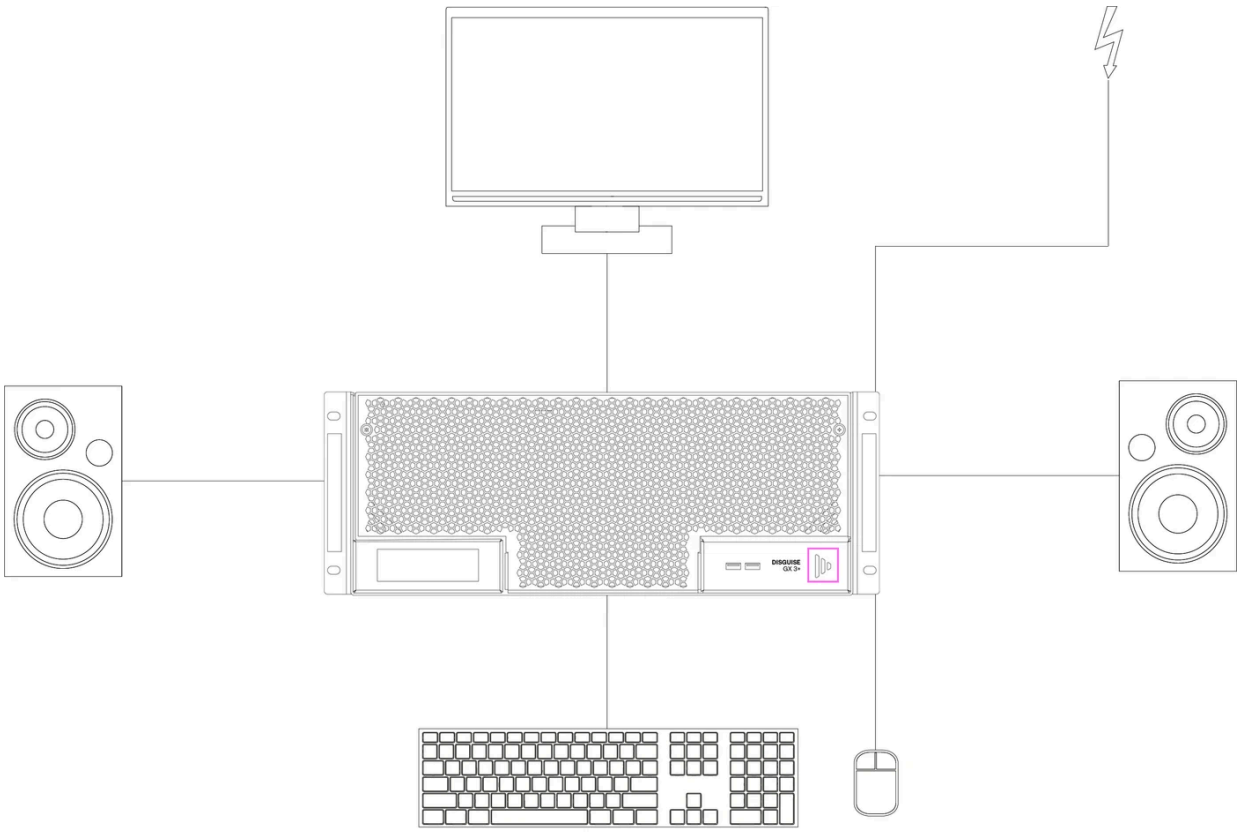
Hard Drive Configuration

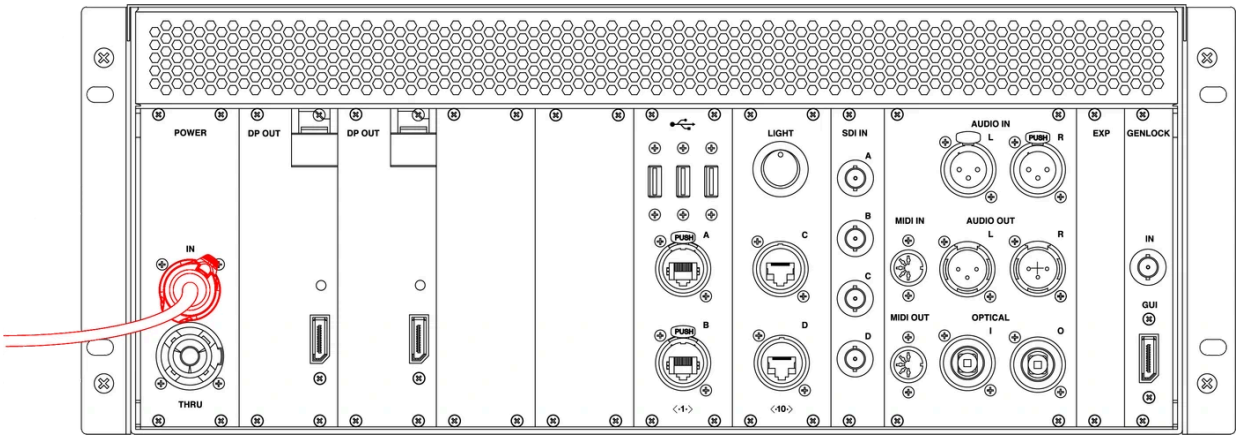
Do not remove drives when the machine is on as data may be corrupted if this occurs.

If you ever need to replace or exchange your media drive it is recommended that you use a drive with similar read/write speeds. For further information please contact the **support team**.

How to Start the 4x4pro

1. Connect Power cord to the 4x4.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.

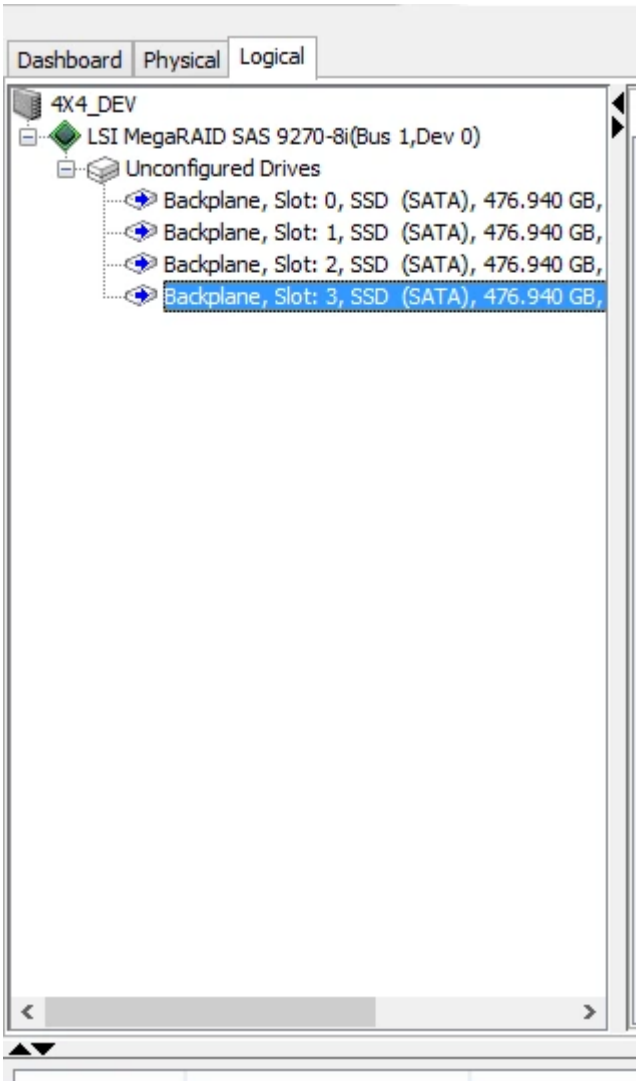




Location of power input on rear of 4x4 unit

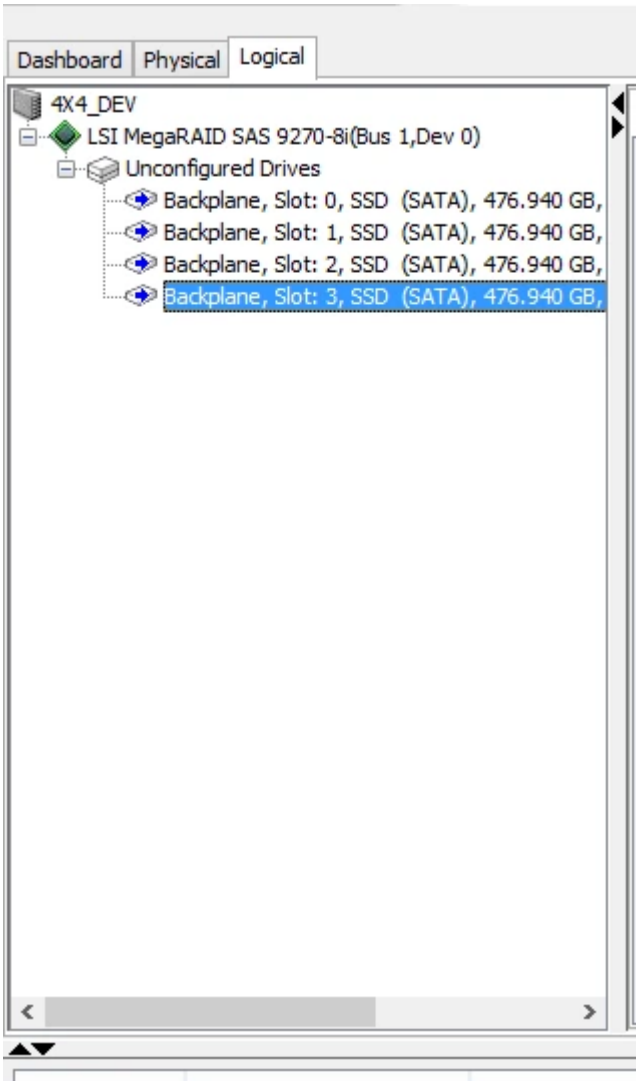
Importing RAID from Different System

If you transfer configured disks from one system to another you may encounter a configuration similar to what you can see here.

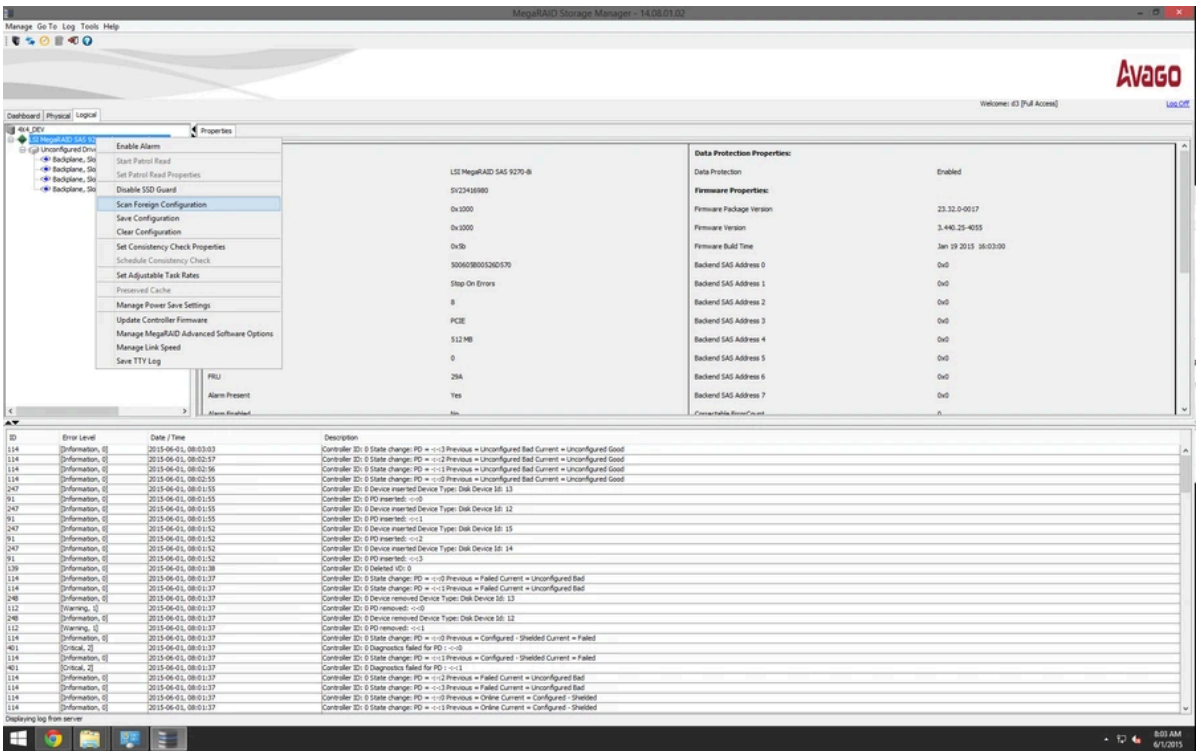


Importing a RAID

1. Navigate to the **Logical** tab, where you should see your unconfirmed drives.



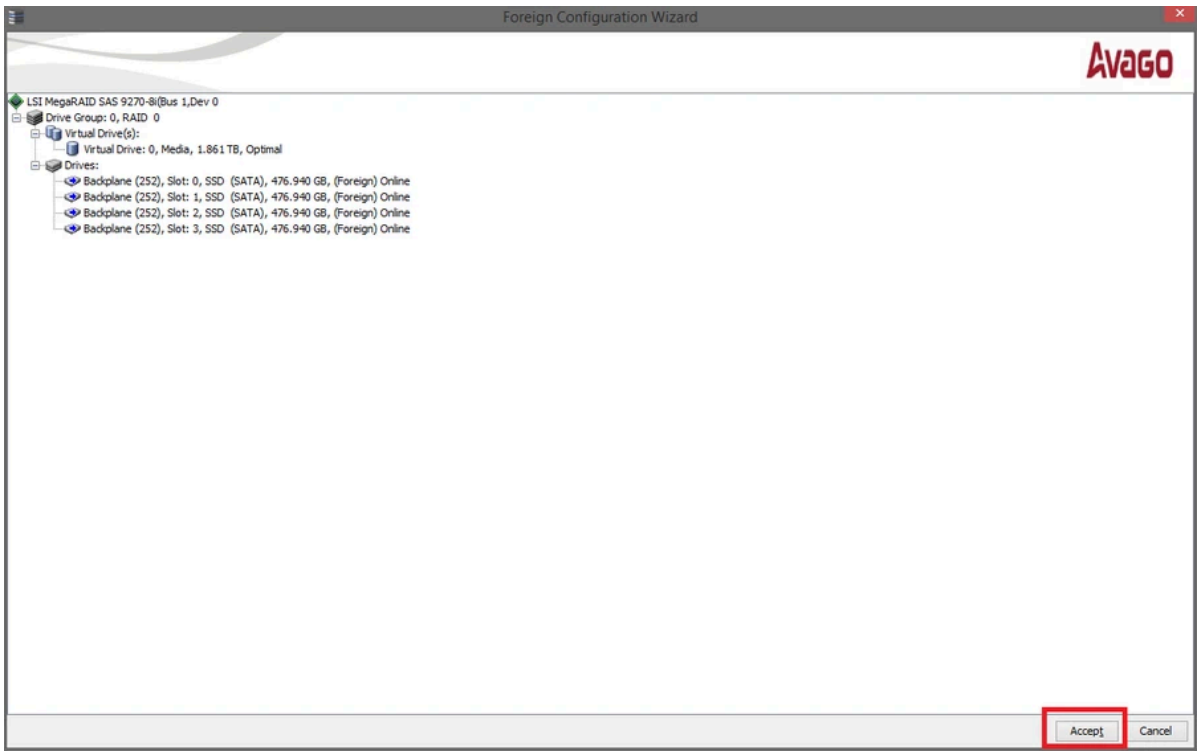
2. Right-click on the highlighted Megaraid root and select **Scan Foreign Configuration**.



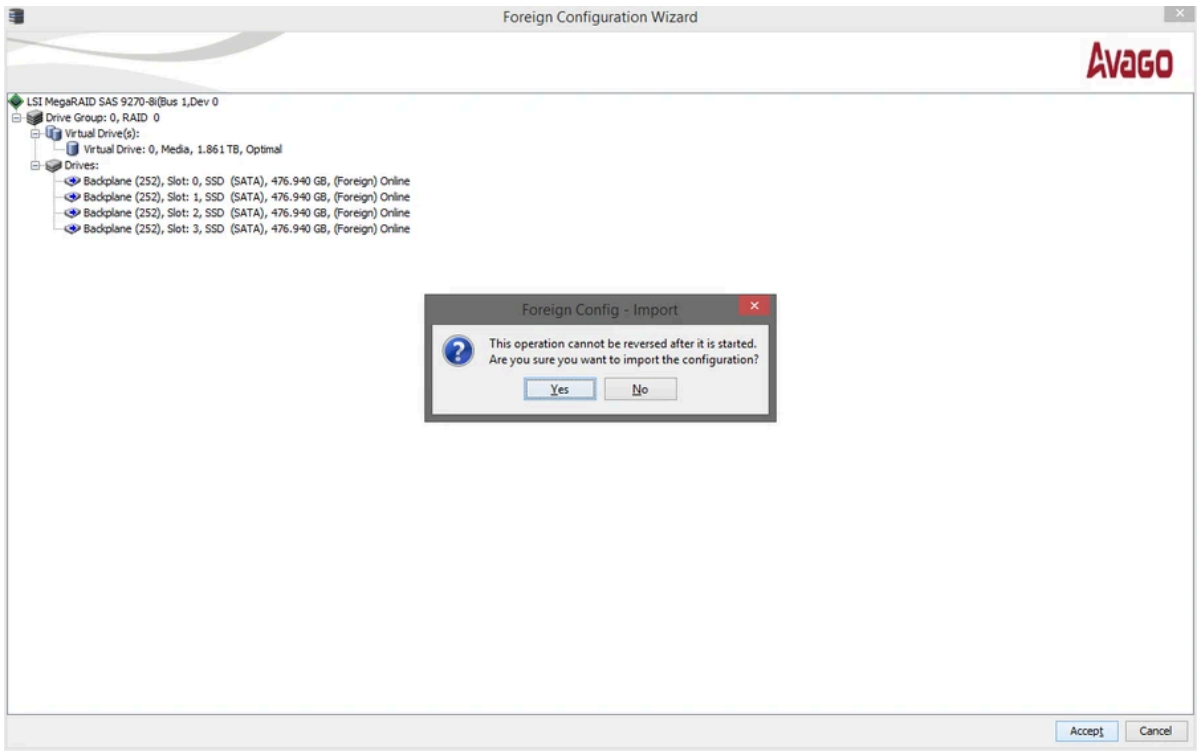
3. Select **Import** from the options presented.



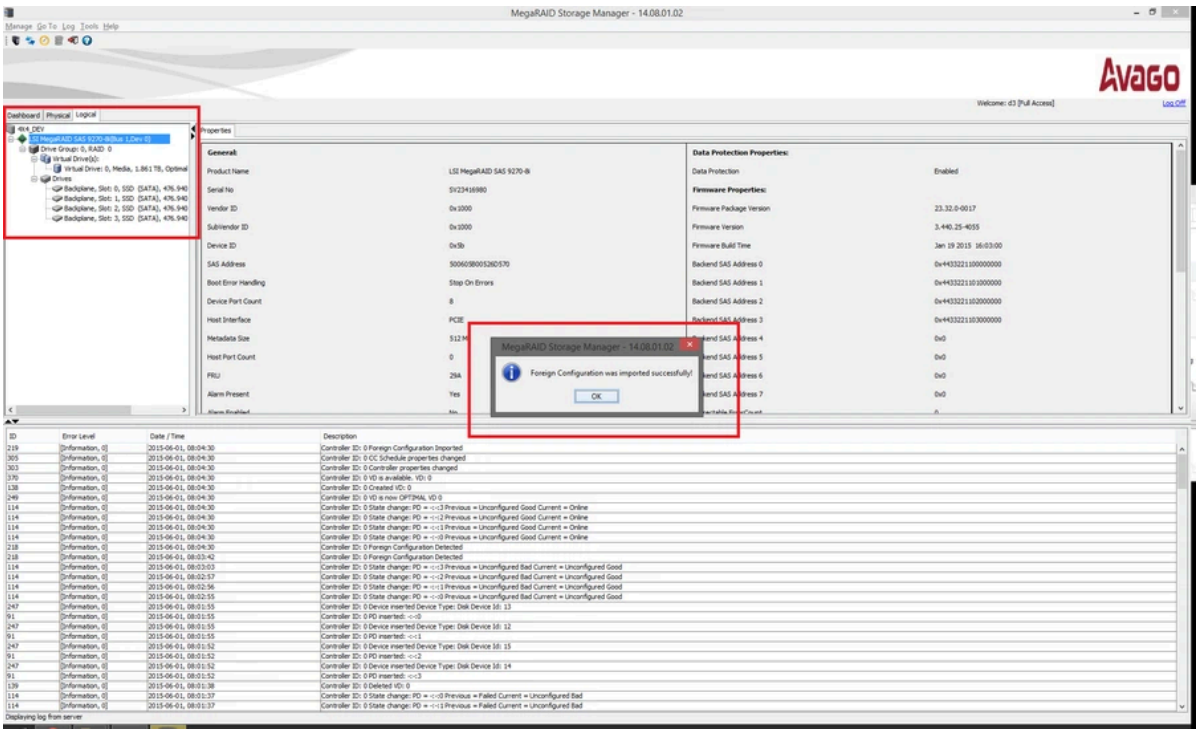
4. Left-click on the **Accept** button in the bottom right corner of the dialog.



5. Click **Yes** when prompted by the import dialog.



6. Click **OK** to complete the import process.



Powering the 4x4pro

The 4x4 Disguise server use Neutrik PowerCON TRUE1 as the power input.

The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

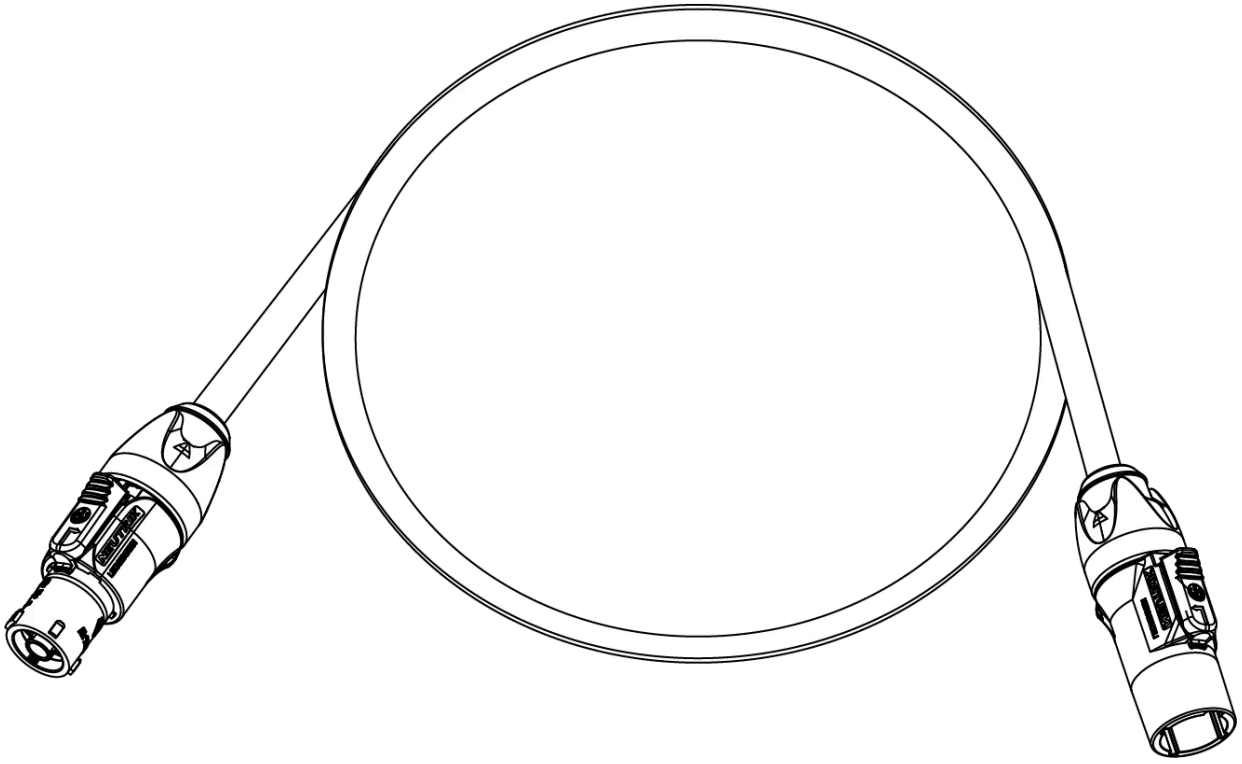
To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.

Powering a multi server system

The 4x4pro uses True1 Powercon as its power input and features a loop through to make powering a multi server system more efficient.

The power input to the machine is rated at 12Amps RMS per connection in Europe and USA.



Loop through cables should have the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with appliance coupler type Neutrik AG, type NAC3MX-W.
- Other end terminated with appliance coupler type Neutrik AG, type NAC3FX.

Power calculations for a safely powered system

It is important that you calculate how many 4x4pro units you can daisy chain together using the in/loop connections provided. Failure to do so could result in a loss of power to the Disguise system.

Use the formula “Power = Voltage x Current” to calculate how many units you can chain together. For Example:

UK Power: 230V 13Amp rated supply.

For example, max power draw of a 4x4 = 1000W (check technical specifications for your unit).

Available Power = 230V x 12A

Available Power = 2990W

Available Power / Max Power Draw = Number of Units

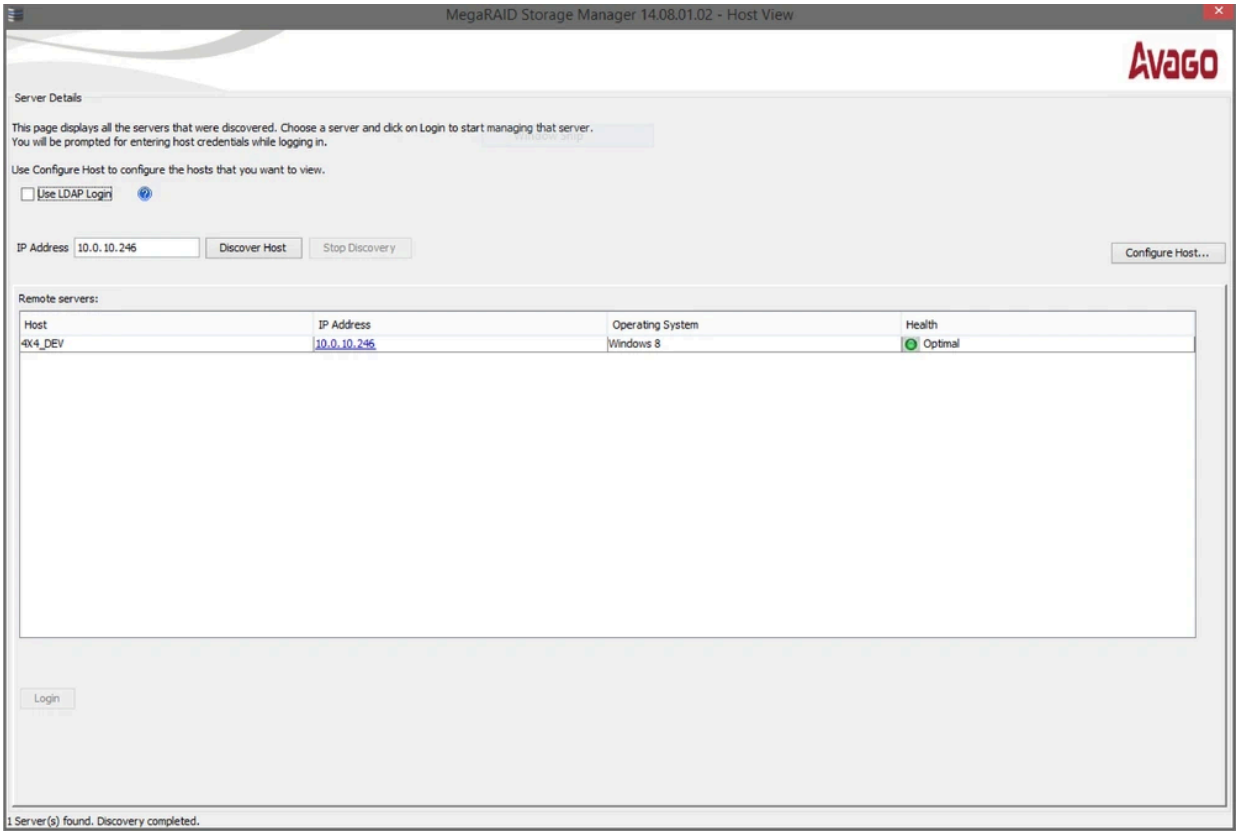
2990W / 1400W = 2.1 Units

> **Warning**
>
> Warning: Be safe! On a UK 13Amp supply @230V you can connect 2 Units safely with 100W of headroom.

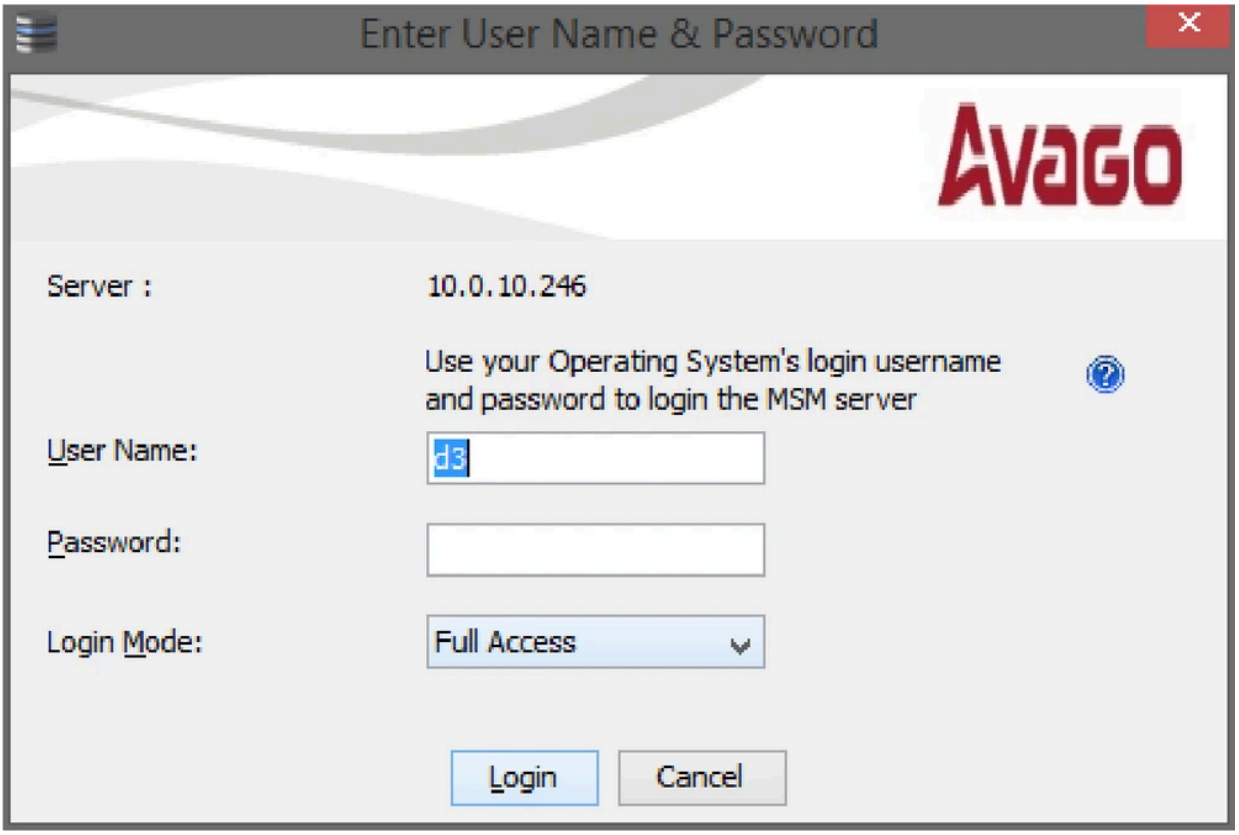
RAID Controller

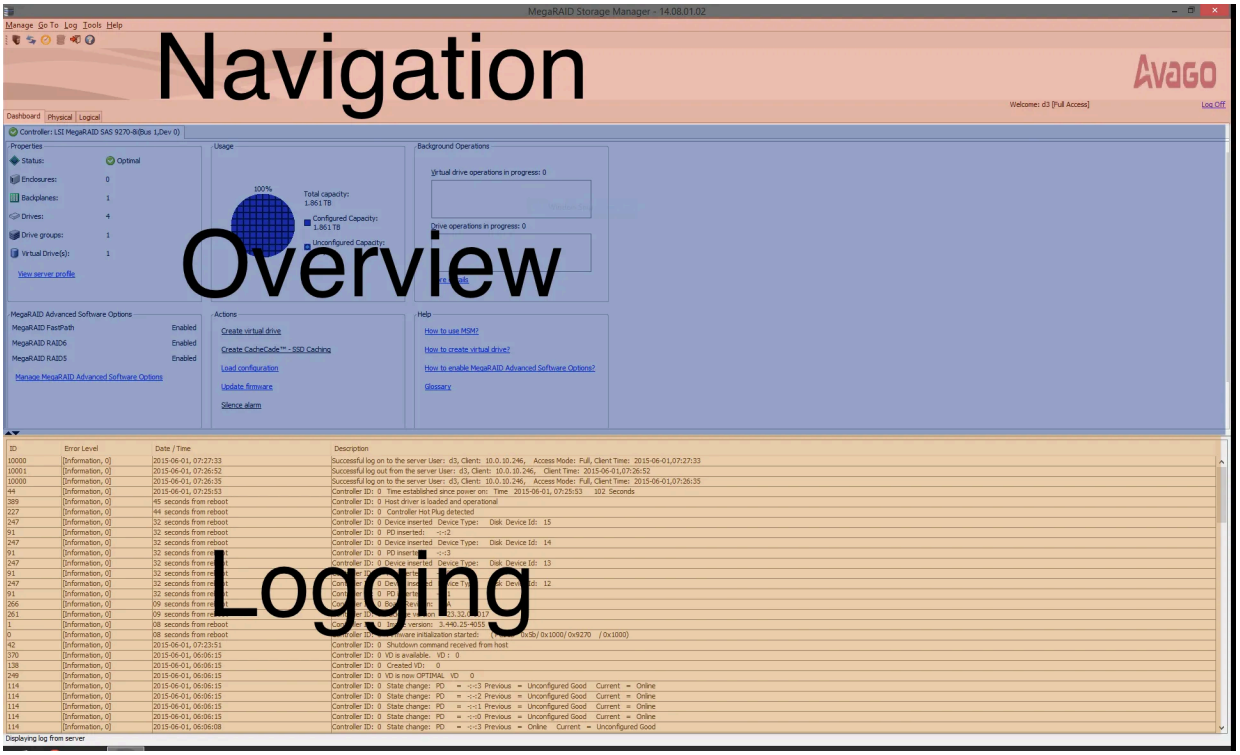
Login:

Double-click the computer in the LSI MSM discovery menu



Login with “d3” as username and no password





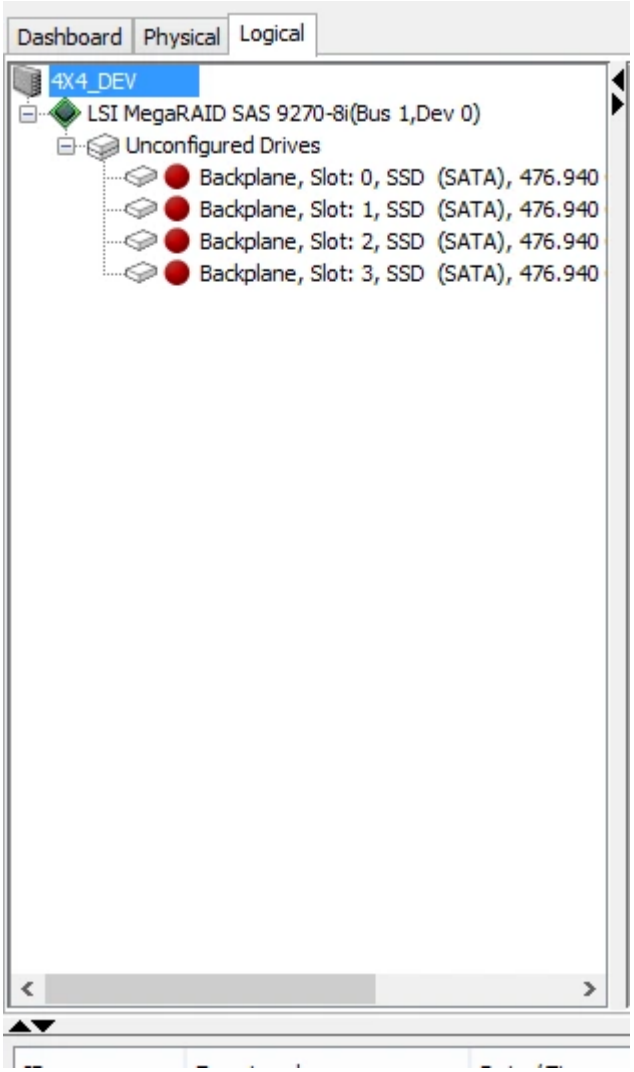
For Advanced RAID controller information, please see here.

Unconfigured Bad Drives

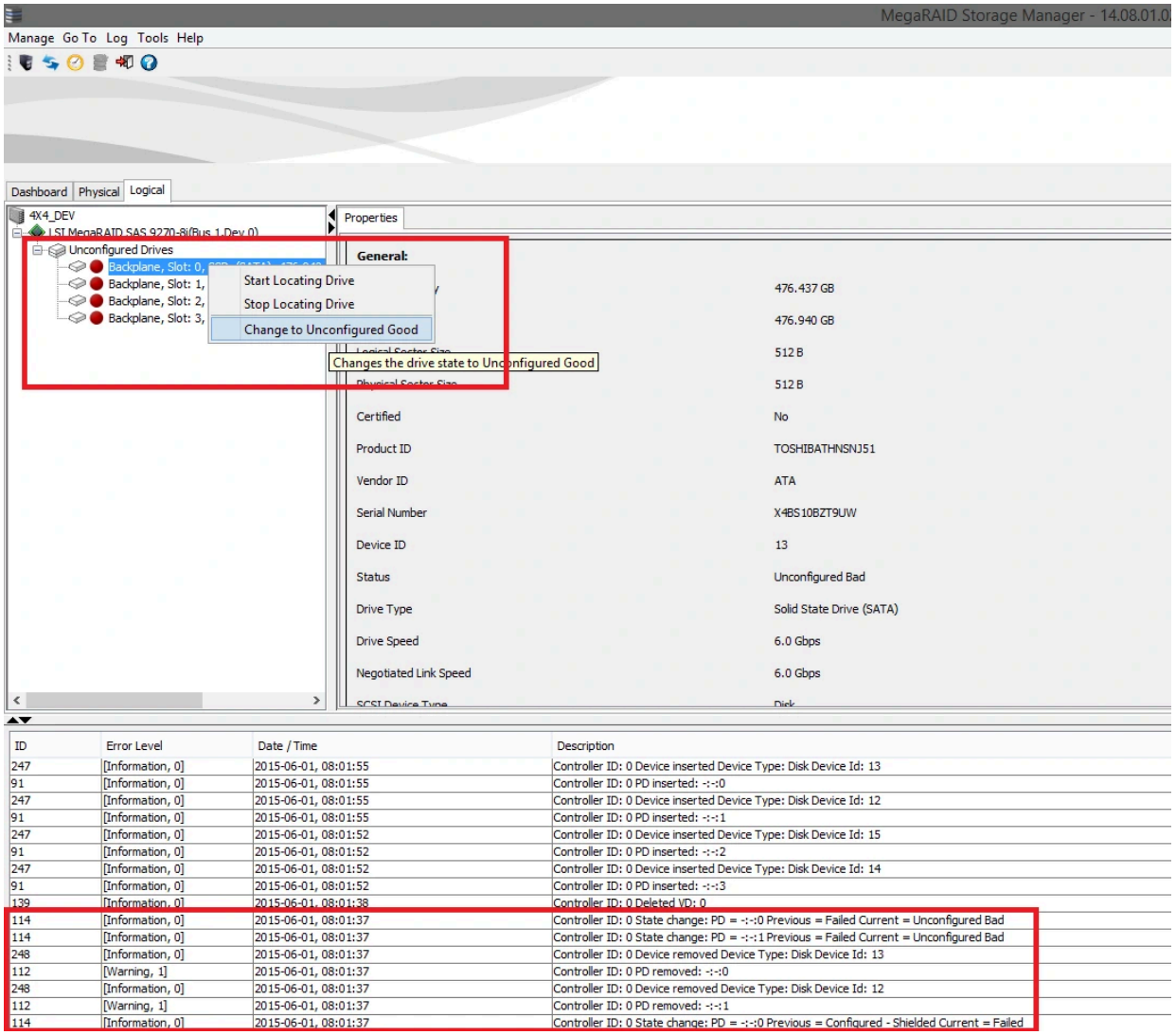
Below is an illustration of the symbols used to indicate Unconfigured BAD drives.

> **Note**
>
> This can be caused by a variety of events, such examples include but are not limited to, SSD malfunction, RAID corruption or hotplugging.

> **Note**
>
> If this is observed please inspect the log carefully or **contact support** if you are in doubt.



Restore Unconfigured GOOD state

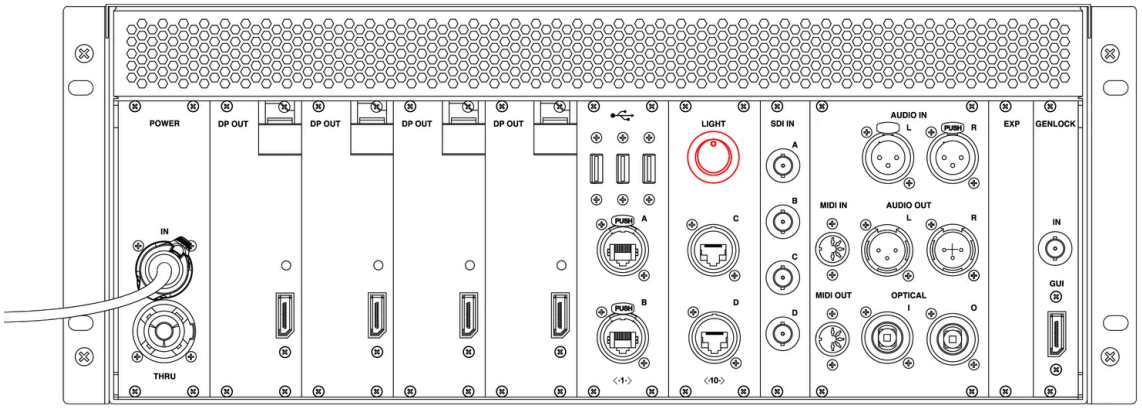


ID	Error Level	Date / Time	Description
247	[Information, 0]	2015-06-01, 08:01:55	Controller ID: 0 Device inserted Device Type: Disk Device Id: 13
91	[Information, 0]	2015-06-01, 08:01:55	Controller ID: 0 PD inserted: -:-:0
247	[Information, 0]	2015-06-01, 08:01:55	Controller ID: 0 Device inserted Device Type: Disk Device Id: 12
91	[Information, 0]	2015-06-01, 08:01:55	Controller ID: 0 PD inserted: -:-:1
247	[Information, 0]	2015-06-01, 08:01:52	Controller ID: 0 Device inserted Device Type: Disk Device Id: 15
91	[Information, 0]	2015-06-01, 08:01:52	Controller ID: 0 PD inserted: -:-:2
247	[Information, 0]	2015-06-01, 08:01:52	Controller ID: 0 Device inserted Device Type: Disk Device Id: 14
91	[Information, 0]	2015-06-01, 08:01:52	Controller ID: 0 PD inserted: -:-:3
139	[Information, 0]	2015-06-01, 08:01:38	Controller ID: 0 Deleted VD: 0
114	[Information, 0]	2015-06-01, 08:01:37	Controller ID: 0 State change: PD = -:-:0 Previous = Failed Current = Unconfigured Bad
114	[Information, 0]	2015-06-01, 08:01:37	Controller ID: 0 State change: PD = -:-:1 Previous = Failed Current = Unconfigured Bad
248	[Information, 0]	2015-06-01, 08:01:37	Controller ID: 0 Device removed Device Type: Disk Device Id: 13
112	[Warning, 1]	2015-06-01, 08:01:37	Controller ID: 0 PD removed: -:-:0
248	[Information, 0]	2015-06-01, 08:01:37	Controller ID: 0 Device removed Device Type: Disk Device Id: 12
112	[Warning, 1]	2015-06-01, 08:01:37	Controller ID: 0 PD removed: -:-:1
114	[Information, 0]	2015-06-01, 08:01:37	Controller ID: 0 State change: PD = -:-:0 Previous = Configured - Shielded Current = Failed

Unit Rear Light - 4x4pro

The 4x4 Disguise server has the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labelled “light” with power in.



4x4pro Video Input

The 4x4 server is equipped with capture cards. These cards have the ability to capture live video from either SD-SDI or HD-SDI video sources with up to four unique feeds, or two unique 3G-SDI feeds per machine.

Max Number of Unique Inputs

SD-SDI	HD-SDI	3G-SDI
4	4	2

Supported formats

720x486i @ 59.94 Hz NTSC 720x576i @ 50.00 Hz PAL 1280x720p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz 1920x1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 1920x1080PsF @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz 1920x1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048X1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048X1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz 4K UHD 3840x2160, 4K P/PsF @ 23, 24, 25, 29, 30fps 4K DCI 4096x2160, 4K P/PsF, @23, 24, 25, 29, 30fps

It is possible to have a different format on each input, However the limitations are a maximum of 1x 4k or 2x 1080p60.

If you are using 1x 4k or 2x 1080p it is not possible to use any other video inputs on the unit due to hardware limitations.

Back-Plate Layout

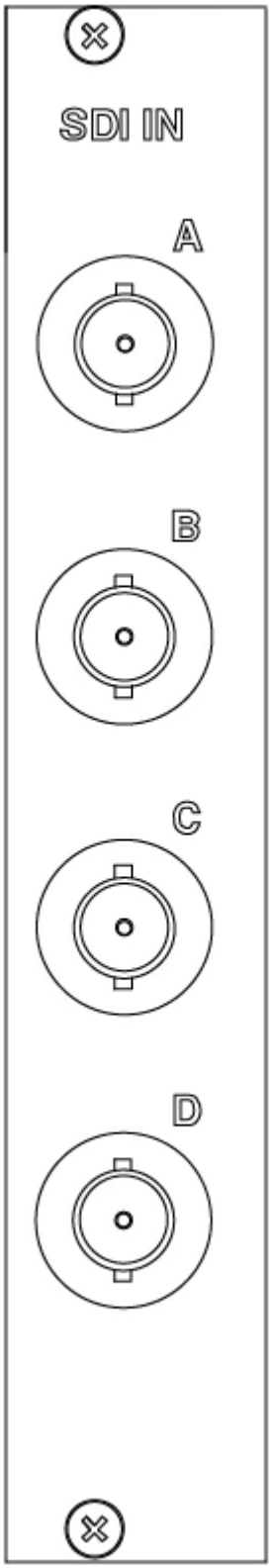


Diagram of Video Capture BNC connections on rear of a unit.

> **Note**
>
> **Please note**: Live Video input inherently introduces frame latency during playback. Please contact **Support** for guidance on performance standards.

4K resolutions is currently only supported over quad split HD-SDI

Supported formats

720x486i @ 59.94 Hz NTSC
720x576i @ 50.00 Hz PAL
1280x720p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz
1920x1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
1920x1080PsF @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz
1920x1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
2048X1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
2048X1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz
4K UHD 3840x2160, 4K P/PsF @ 23, 24, 25, 29, 30fps
4K DCI 4096x2160, 4K P/PsF, @23, 24, 25, 29, 30fps

It is possible to have a different format on each input, However the limitations are a maximum of 1x 4k or 2x 1080p60.

If you are using 1x 4k or 2x 1080p it is not possible to use any other video inputs on the unit due to hardware limitations.

Back-Plate Layout

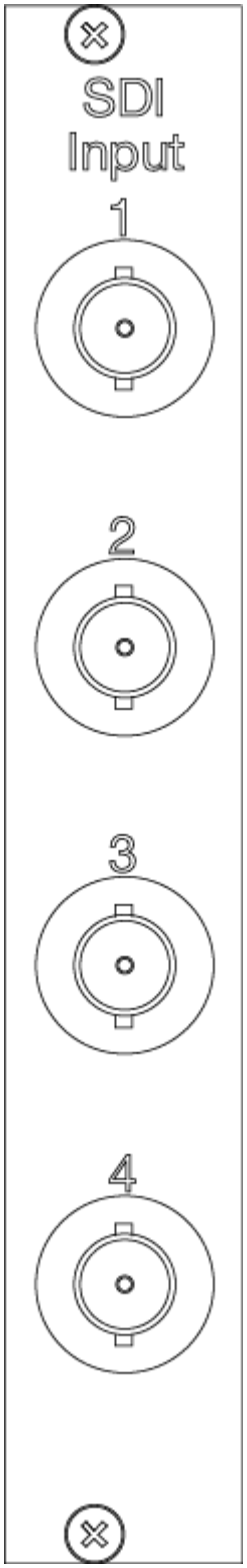
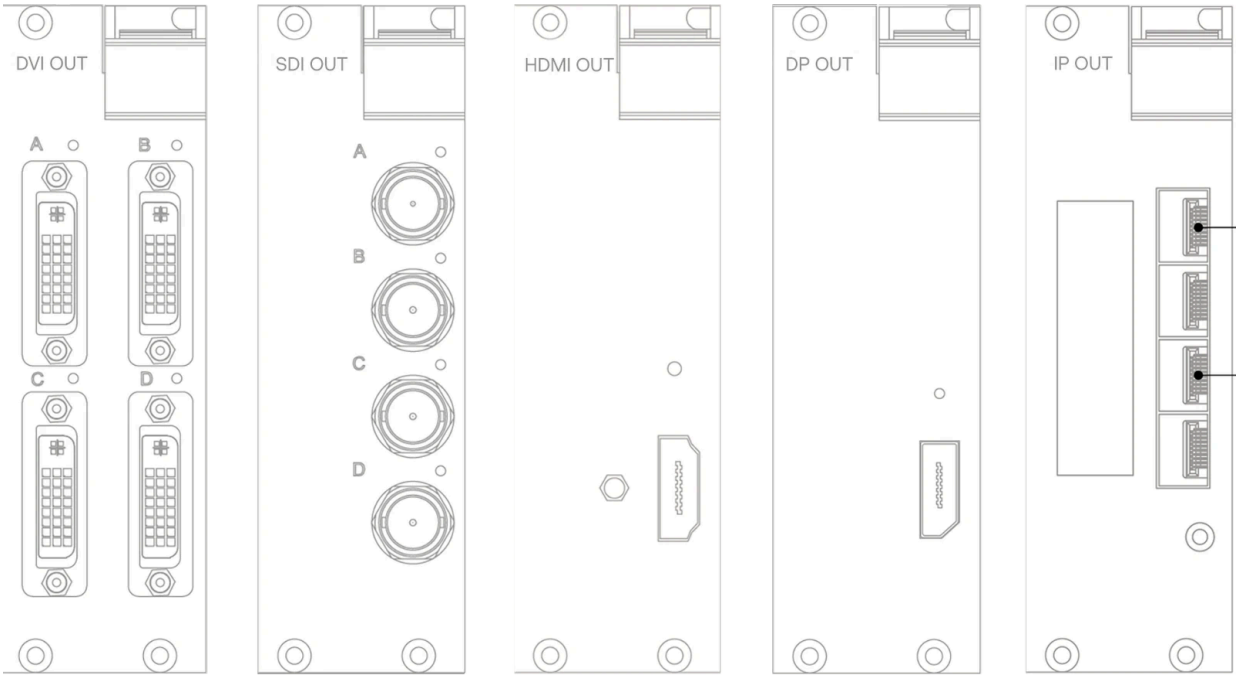


Diagram of Video Capture BNC connections on rear of unit

> **Note**
>
> Live Video input inherently introduces frame latency during playback. Please contact Support for guidance on performance standards.

4x4pro Video Output

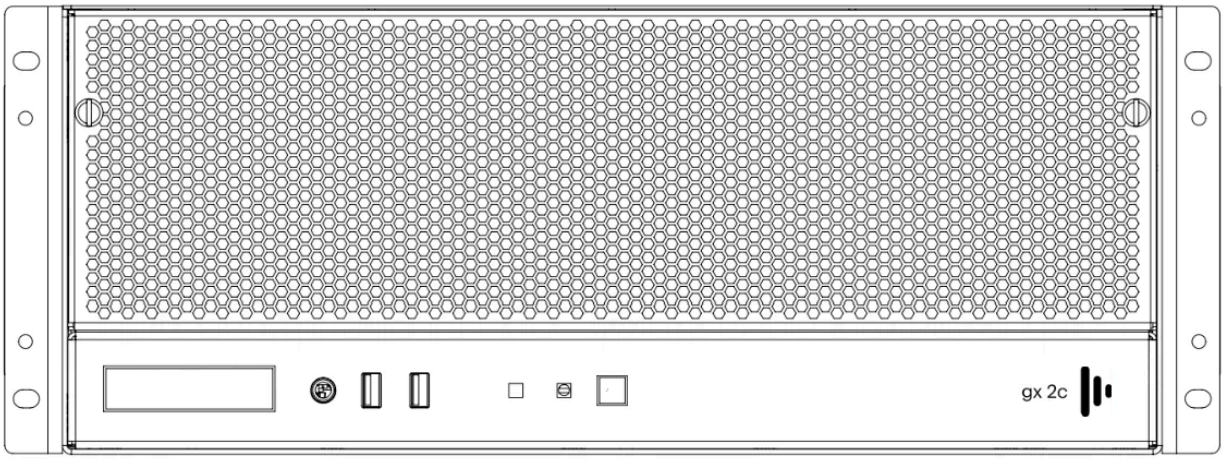
Disguise servers come with a range of possible output configurations. It is possible to use a combination of any of the types of four VFC cards below.



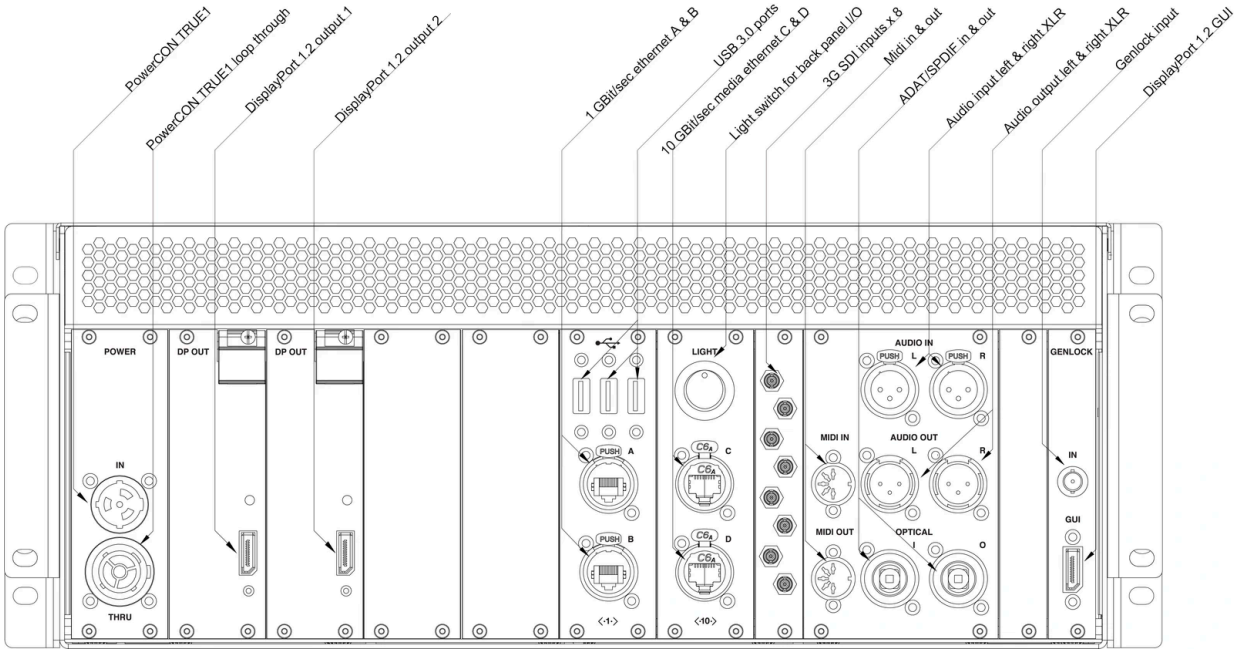
Display Port 1.2	Quad DVI	Quad SDI	HDMI
1 Output per card	4 Outputs per card	4 Outputs per card	1 Output per card
Max res: 4096x2160	Single Link DVI: (up to) 1920 x 1200	Max res: 1920 x 1080	Max res: 4096x2160 @60 YCbCr444 8bit 3840x2160 @60 YCbCr422 10bit* 3840x2160 @30 YCbCr444 10bit
LED indicator	LED indicator	LED indicator	LED indicator
Genlocked	All outputs genlocked	All outputs genlocked	Genlocked

GX 2C Diagrams

GX 2C Diagrams



GX 2C Front Panel



GX 2C Rear Panel Annotated

GX 2C Overview



The GX 2C comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

Learn more about:

- Diagrams
- Specifications
- Video Input
- Redisguise
- Performance

> **Caution**
>
> Opening hardware may void your warranty. Consult Disguise support before opening the hardware.

> **Warning**
>
> Do not open or remove the case unless you are instructed to do so by a certified Disguise Engineer.

> **Note**
>
> If you experience any problems with hardware please contact the **Support Team**.

View the full Product information in the **Technical Specifications** PDF.

GX 2C Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

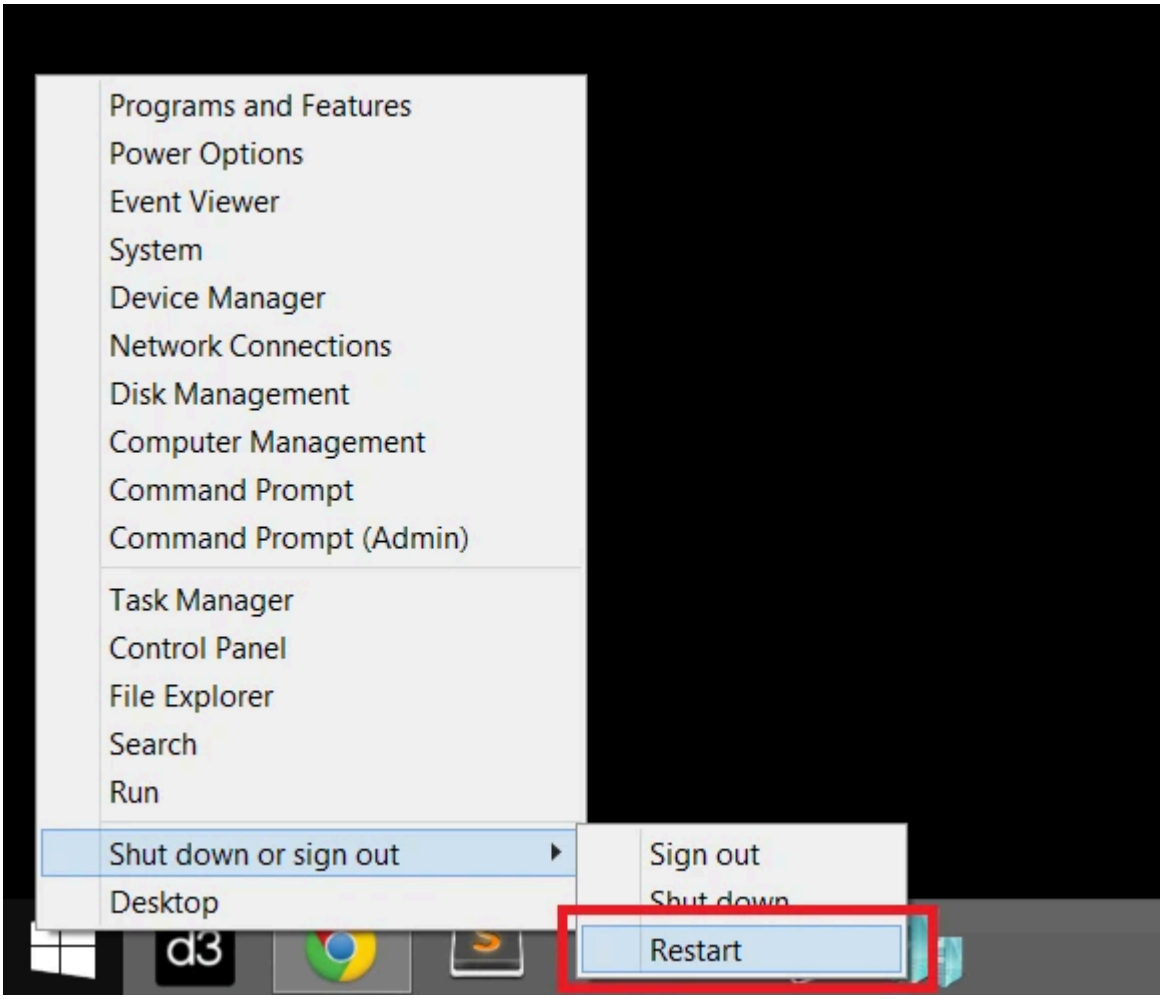
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

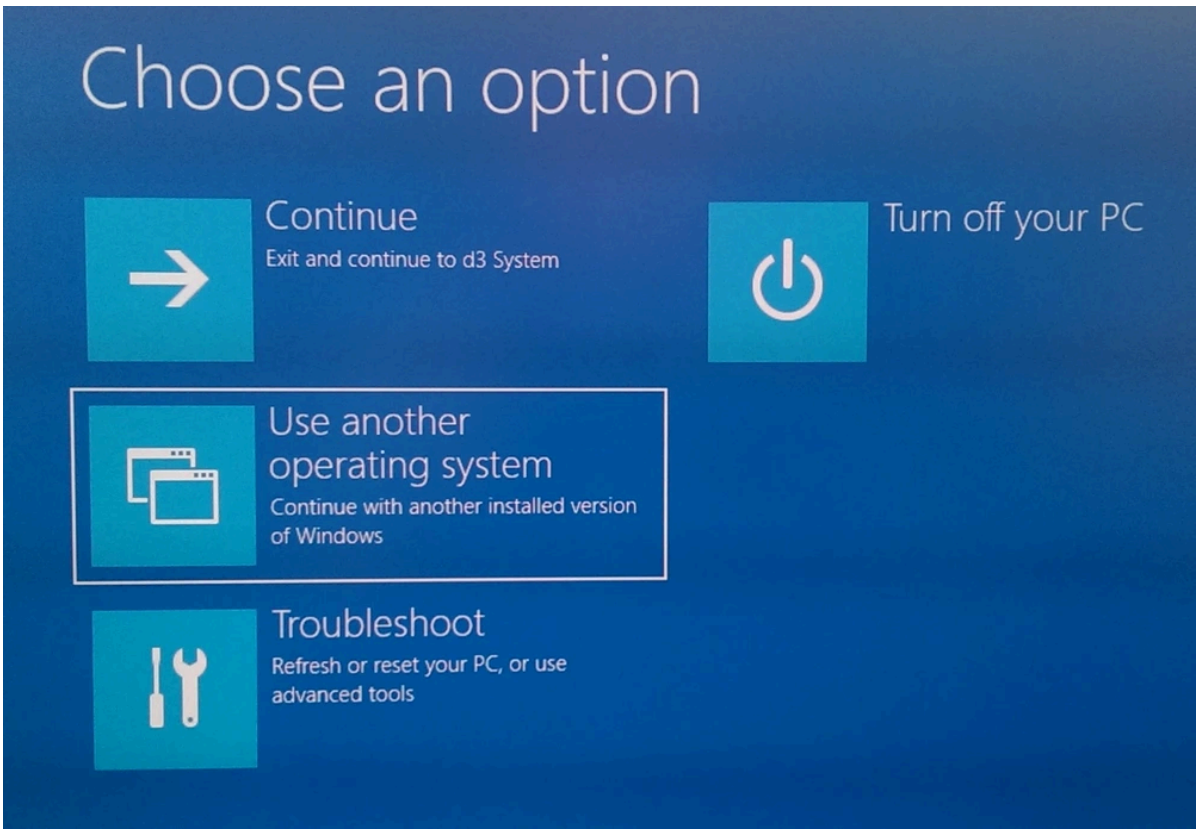
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

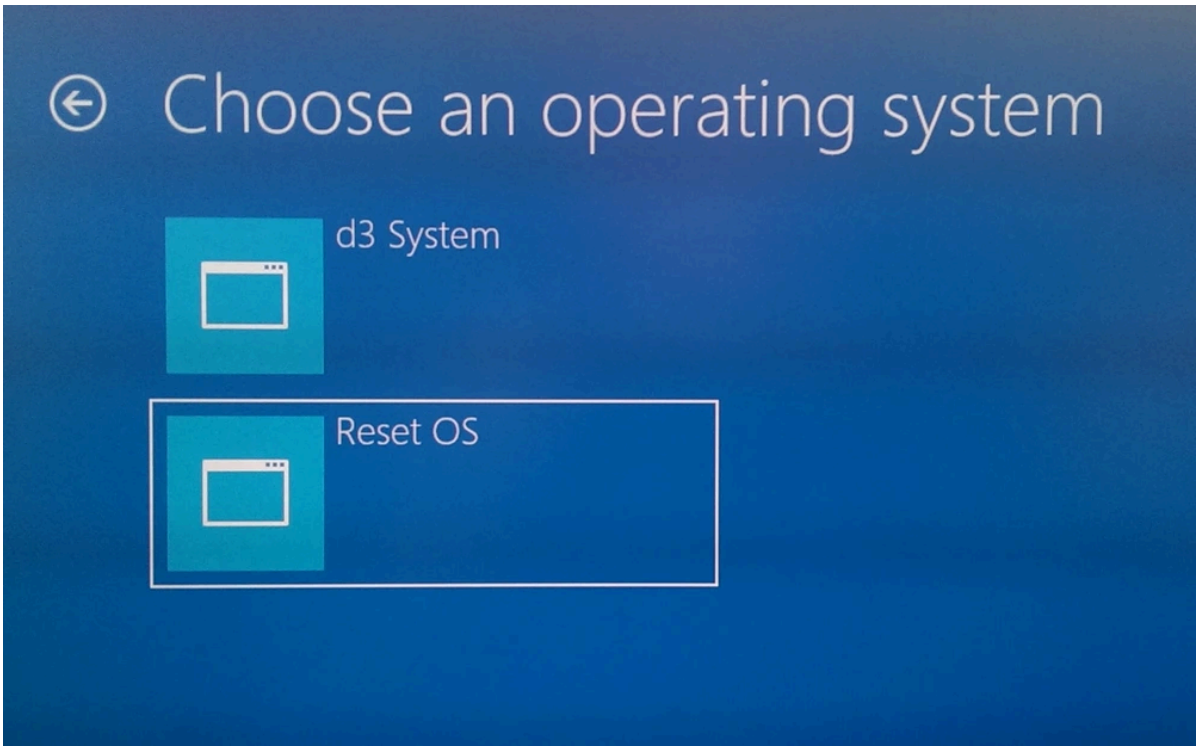




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

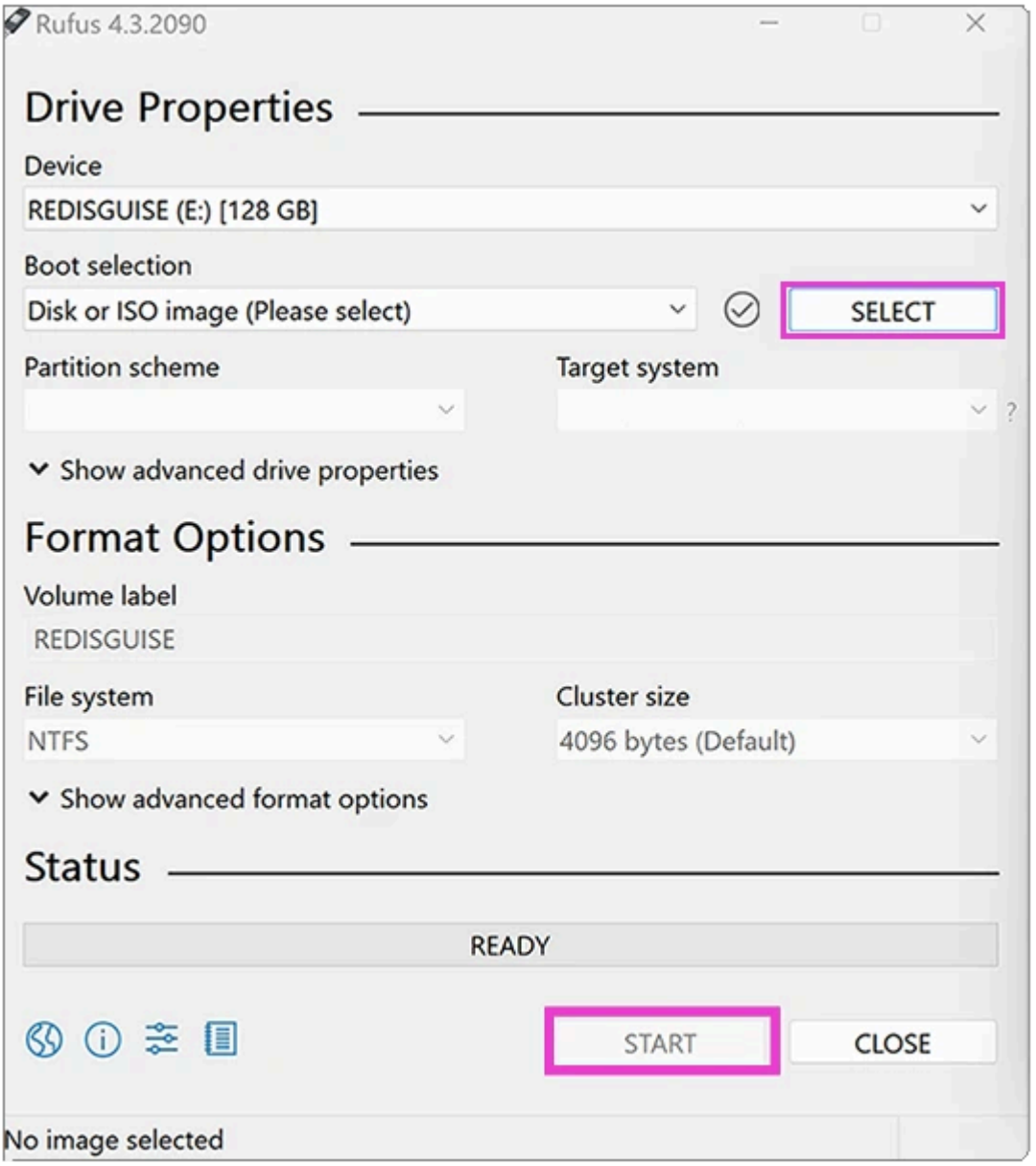
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - MBR`
- `Target system - BIOS (or UEFI-CSM)`
- `Volume label - automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

Booting into the USB

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete key** until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Navigate to the **Boot** tab.
4. Select **Hard Drive BBS Priorities**.
5. Change Boot Option #1 to your USB thumb drive (the name will look different depending on the manufacturer of the drive).
6. Press **ESC** to return to the main section.
7. Navigate to the **Save & Exit** tab (**Do not** Save & Exit the BIOS itself).
8. In the **Boot Override** section, select the USB that matches the name of your USB manufacturer. **DO NOT** select the one that starts with UEFI.

The Redisguise process will run automatically until the re-imaging has completed. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

GX 2C Specifications

Hardware Specifications

	GX 2C
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	517W
Heat Dissipation Peak	1,764 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	1x 3.84TB Removable NVMe SSD
Memory	64GB RAM (8x 8GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

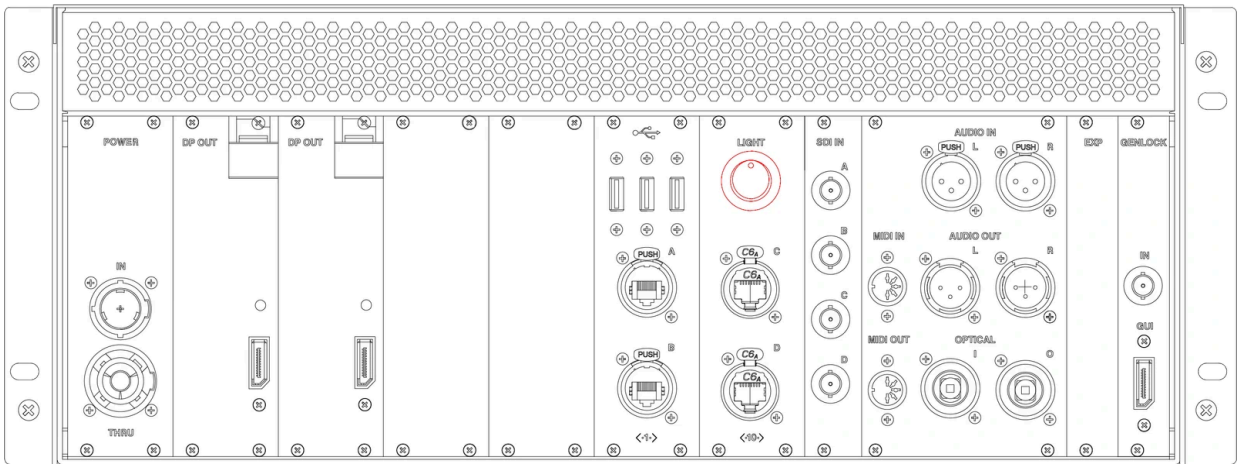
	GX 2C
Video output	1x DisplayPort 1.2 (GUI) 2x 4K outputs using VFC cards
Video input	8x 3G inputs with support for quad-3G for 2x 4K inputs (HD-BNC connectors)
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out

	GX 2C
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	No
System Management Controller	No
Data/Peripherals	5x USB 3.0
Video Sync	BNC Genlock

GX 2C Unit Rear Light

Disguise Servers in the Pro and GX ranges come with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labeled “light” with power in.



Location of light switch on rear of a GX 2C

GX 2C Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
GX 2C	8	12G is only possible with Quad Link 3G-SDI for 2x 4K inputs

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 2x 2160p60 or 8x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes).
- Chroma subsampling - YCbCr 4:2:2 (all modes).
- Each SDI input supports 3G Level A and Level B when applicable.
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

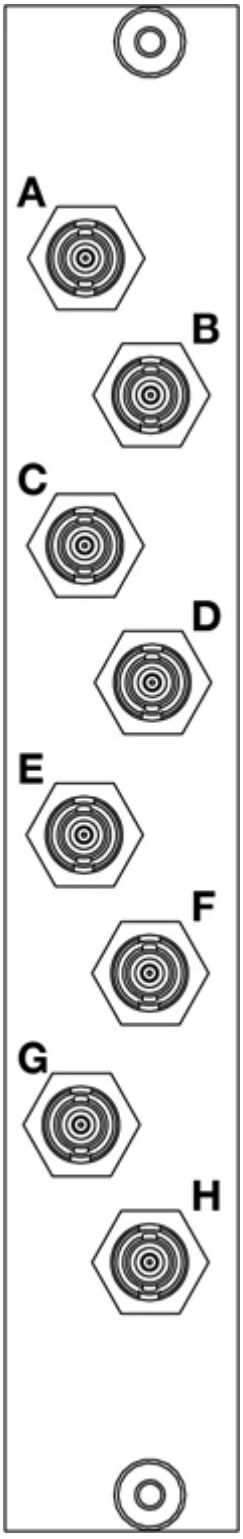
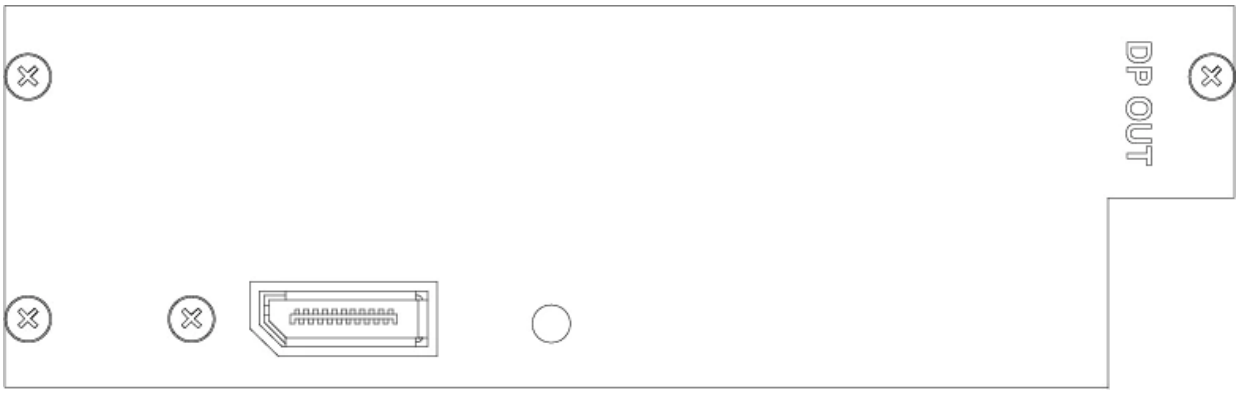


Diagram of Video Capture BNC connections on rear of a GX 2C

GX 1 4K Output

The GX 1 4K Output ships with the standard configuration of 1 Display Port VFC card.



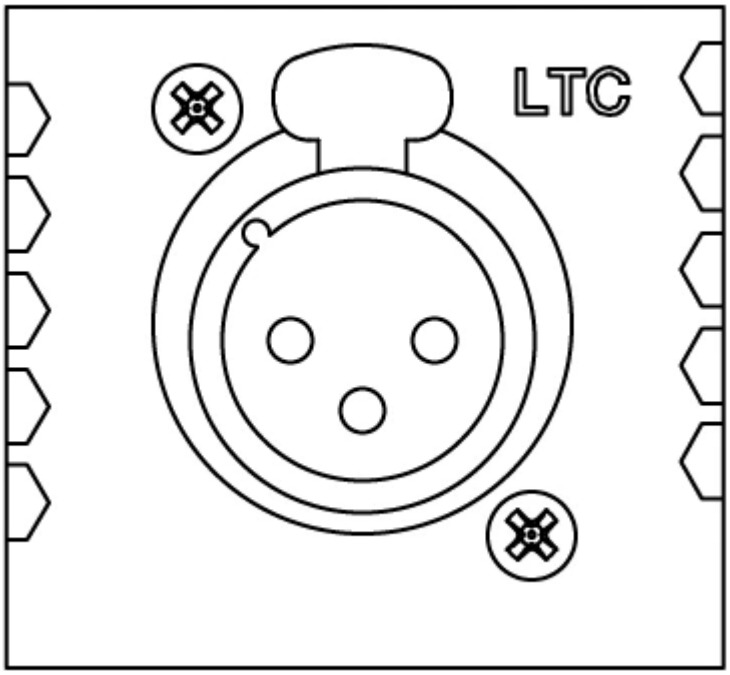
2 x DisplayPort 1.2 outputs on rear of GX 1

This enables the pro & GX ranges of Disguise servers to support resolutions up to 4096x2160 60hz over Single Stream Transport.

> **Warning**
>
> We highly advise using DisplayPort cables specifically validated for: DP 1.2, DP 1.2a or 21.6 Gbps bandwidth.

GX 1 Audio Input and Output

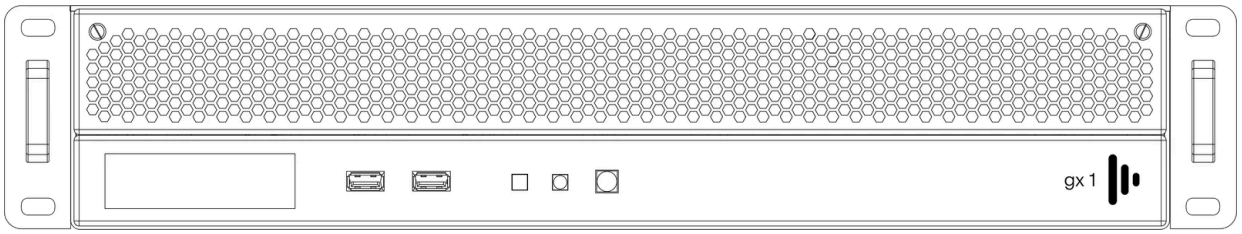
> **Warning**
>
> The GX 1 only supports LTC input.



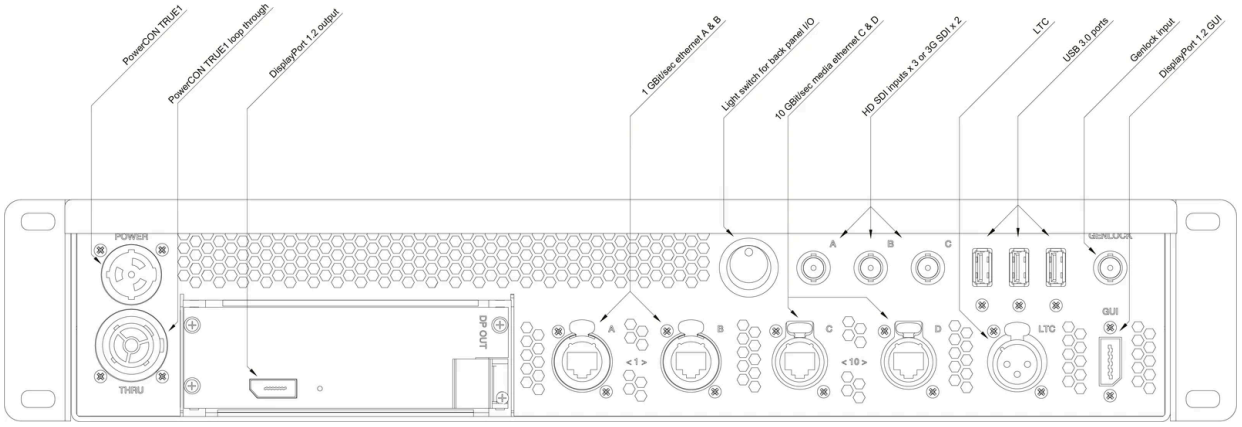
The GX 1 only supports LTC input.

It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

GX 1 Diagrams

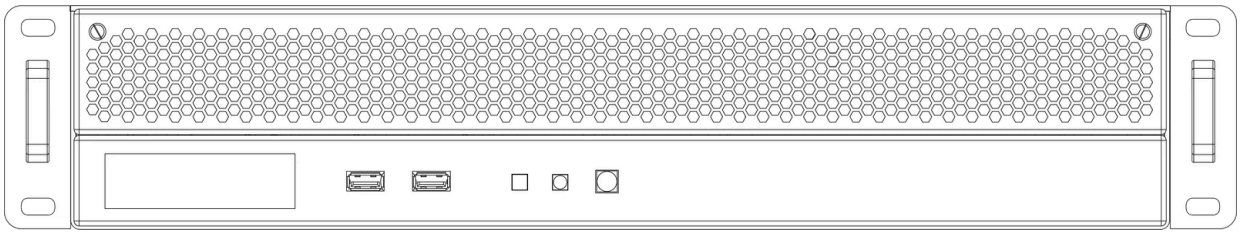


GX 1 Front panel annotated



GX 1 Rear panel annotated

GX 1 Overview



The GX 1 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

The GX 1 is one of our legacy servers.

Learn more about the GX 1:

- Diagrams
- Specifications
- Video Input

For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

GX 1 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

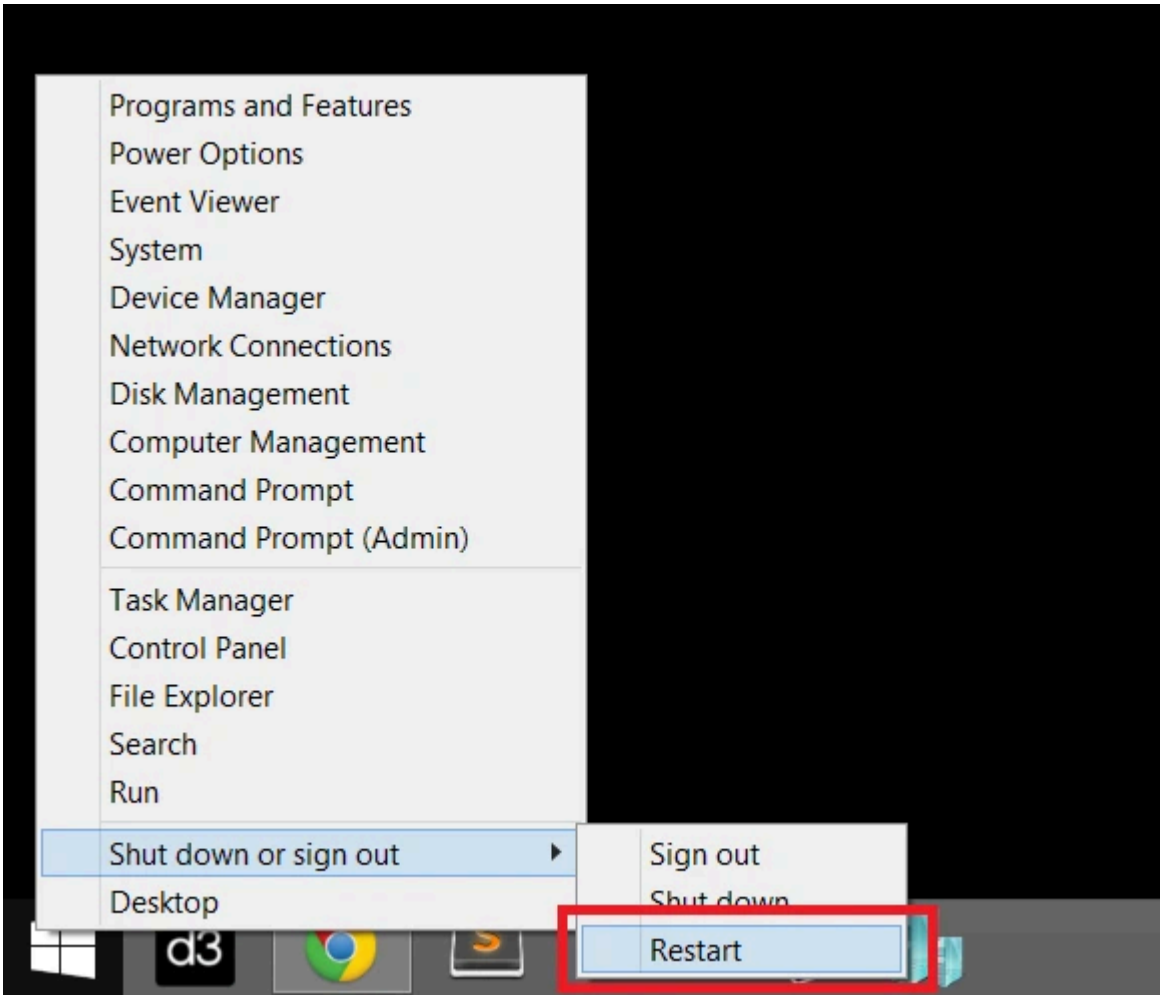
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

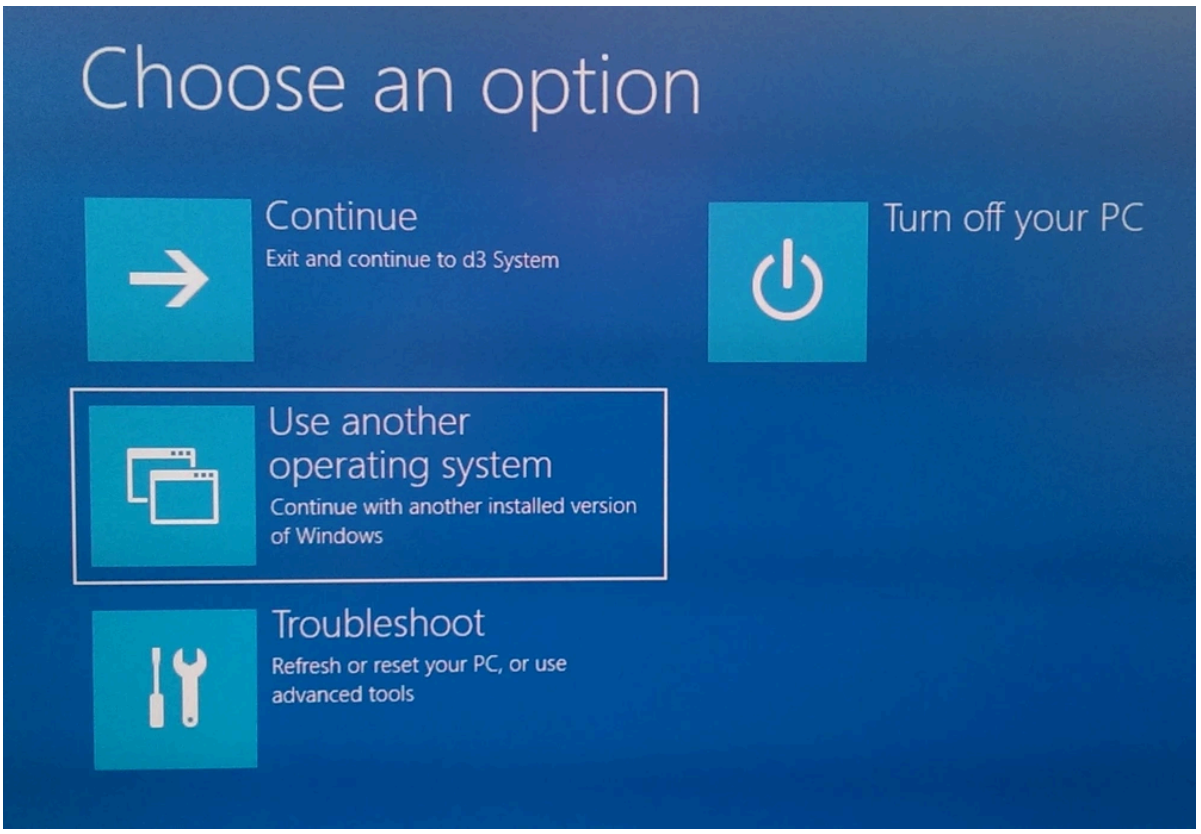
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

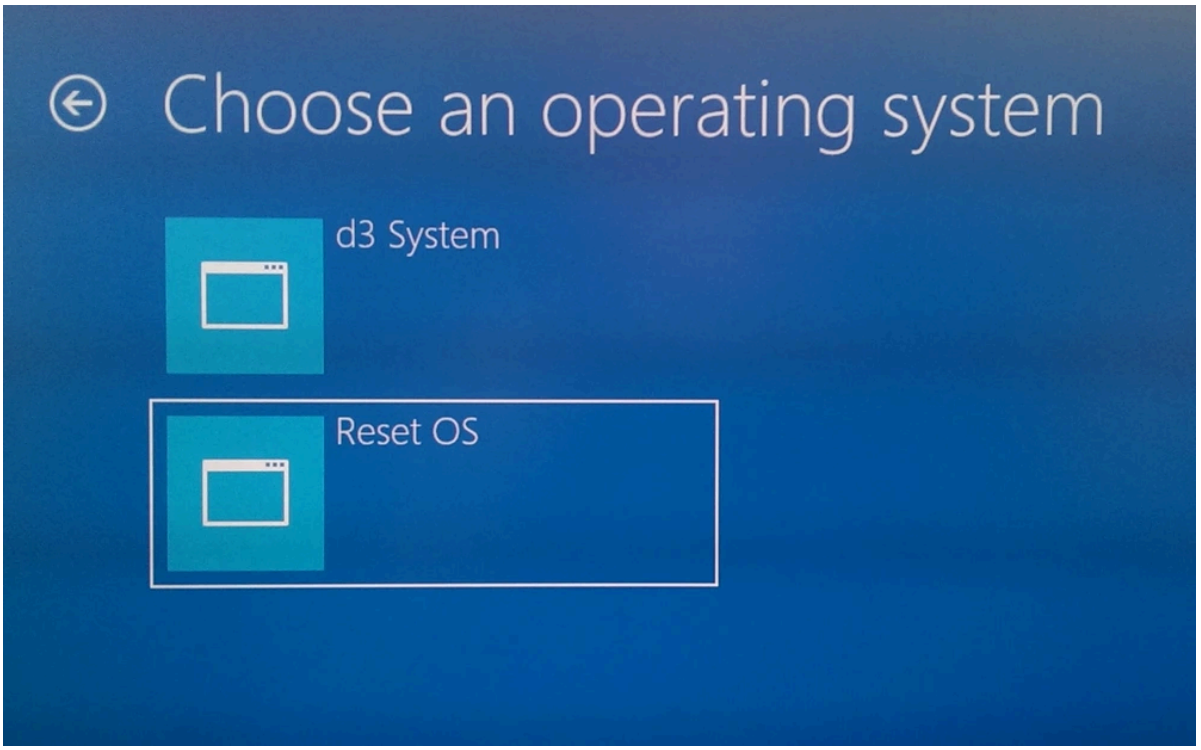




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

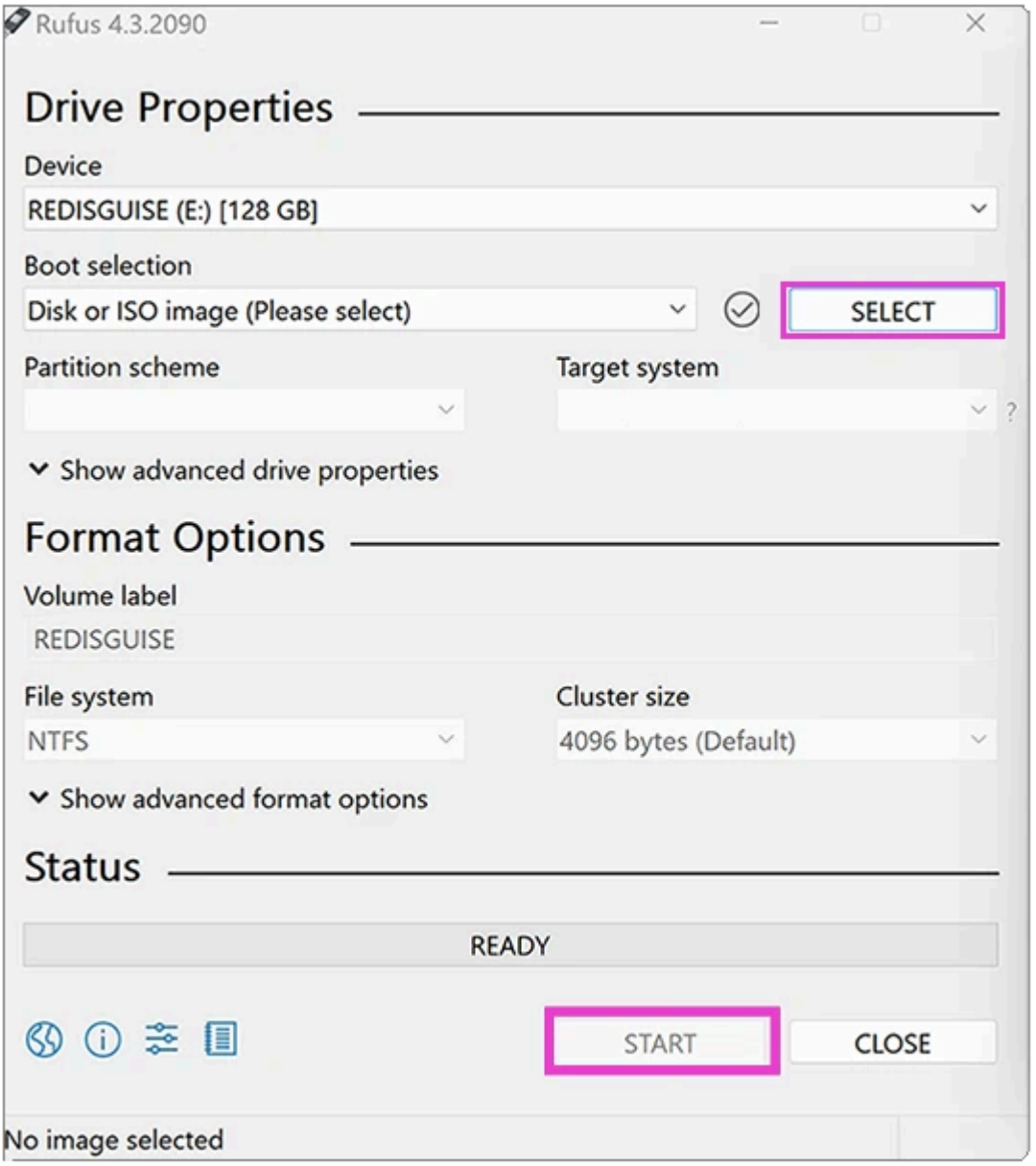
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
- 7-Zip archive tool/file manager.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.

- 7-Zip archive tool/file manager.



The settings should be:

- `Partition scheme - MBR`
- `Target system - BIOS (or UEFI-CSM)`
- `Volume label - automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

Booting into the USB

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete key** until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Navigate to the **Boot** tab.
4. Select **Hard Drive BBS Priorities**.
5. Change Boot Option #1 to your USB thumb drive (the name will look different depending on the manufacturer of the drive).
6. Press **ESC** to return to the main section.
7. Navigate to the **Save & Exit** tab (**Do not** Save & Exit the BIOS itself).
8. In the **Boot Override** section, select the USB that matches the name of your USB manufacturer. **DO NOT** select the one that starts with UEFI.

The Redisguise process will run automatically until the re-imaging has completed [5]. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

GX 1 Specifications

Hardware Specifications

	GX 1
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	400W
Heat Dissipation Peak	1,365 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 IoT Enterprise LTSB
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	2U 19” rack mount
OS	2x Internal Storage Drives
Storage	1x 1.92TB Removable NVMe SSD (default RAID 10)
Memory	16GB RAM (4x 4GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

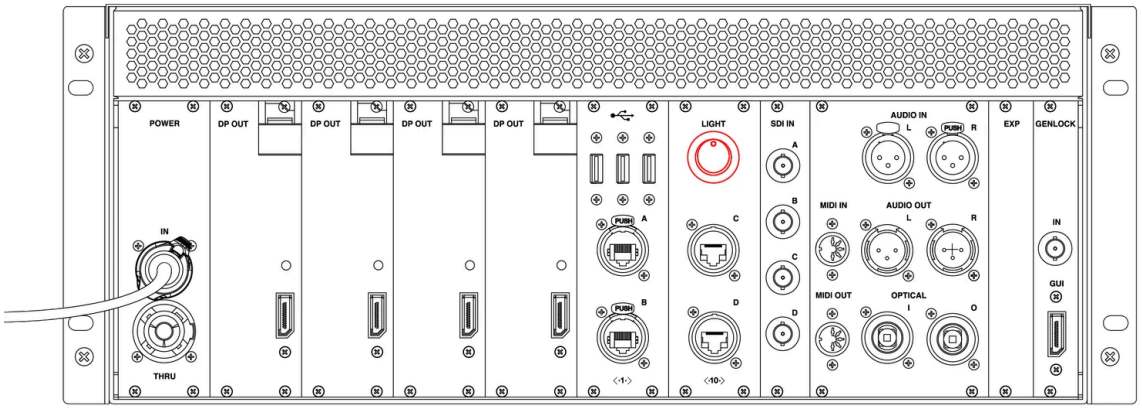
	GX 1
Video output	1x 4K output using VFC cards (with integrated EDID management)
Video input	3x 1.5G inputs or 2x 3G inputs (HD-BNC connectors)
Optical Audio	N/A
MIDI	N/A
Audio	Balanced XLR (circular 3-pin connector) - 1x in

	GX 1
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	N/A
System Management Controller	N/A
Data/Peripherals	5x USB 3.0
Video Sync	BNC Genlock

Unit Rear Light - GX 1

Disguise servers in the pro and GX ranges come with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labeled “light” with power in.



GX 1 Video Input

Your system is equipped with capture cards. These cards have the ability to capture live video from either SD-SDI or HD-SDI video sources with up to three unique feeds, or two unique 3G-SDI feeds per machine.

SD-SDI	HD-SDI	3G-SDI
3	3	2

Supported formats

720x486i @ 59.94 Hz NTSC 720x576i @ 50.00 Hz PAL 1280x720p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz 1920x1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 1920x1080PsF @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz 1920x1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048X1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048X1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz 2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz 4K UHD 3840x2160, 4K P/PsF @ 23, 24, 25, 29, 30fps 4K DCI 4096x2160, 4K P/PsF, @23, 24, 25, 29, 30fps

It is possible to have a different format on each input, However the limitations are a maximum of 1x 4k or 2x 1080p60.

If you are using 1x 4k or 2x 1080p it is not possible to use any other video inputs on the unit due to hardware limitations.

Back-Plate Layout

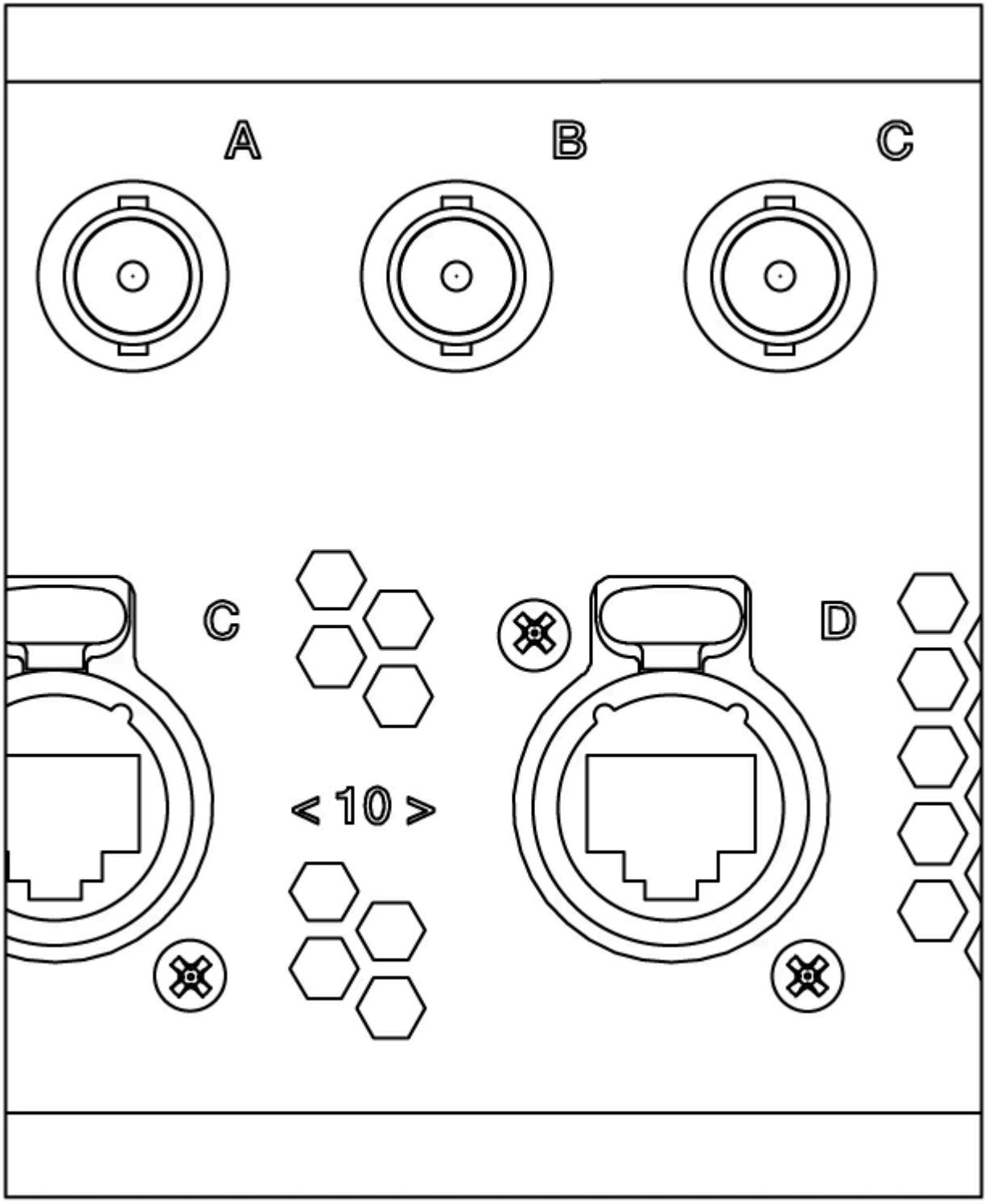
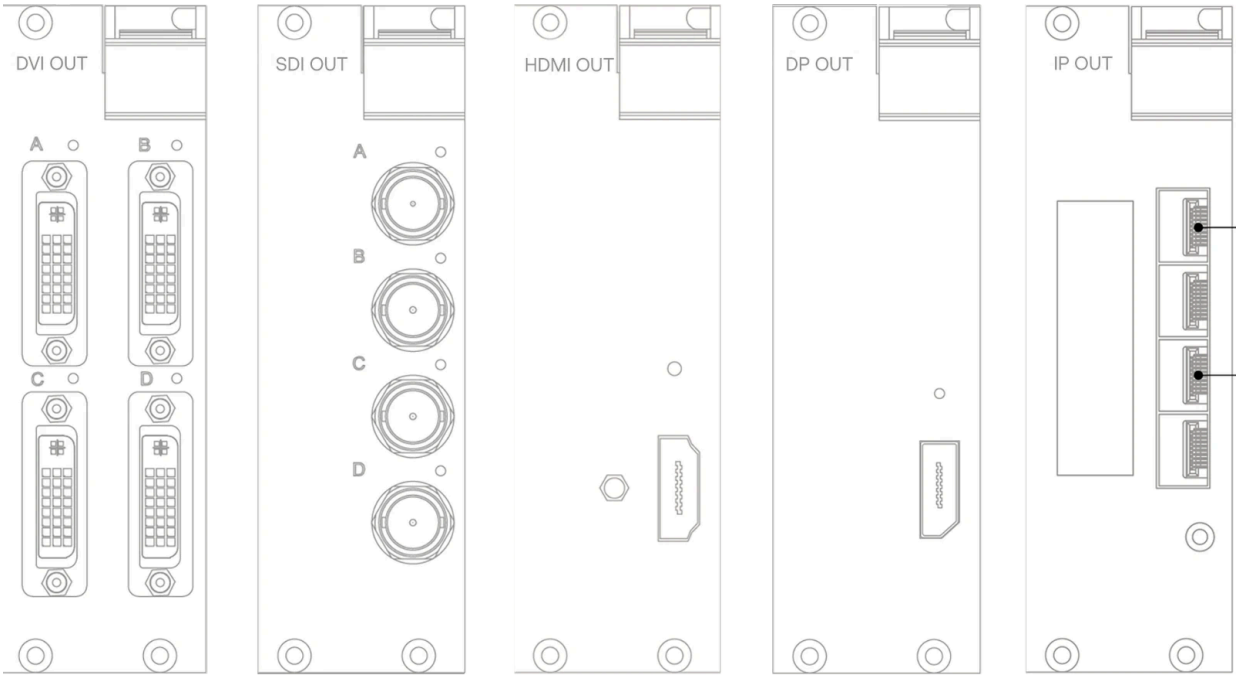


Diagram of Video Capture BNC connections on rear of GX 1

GX 1 Video Output

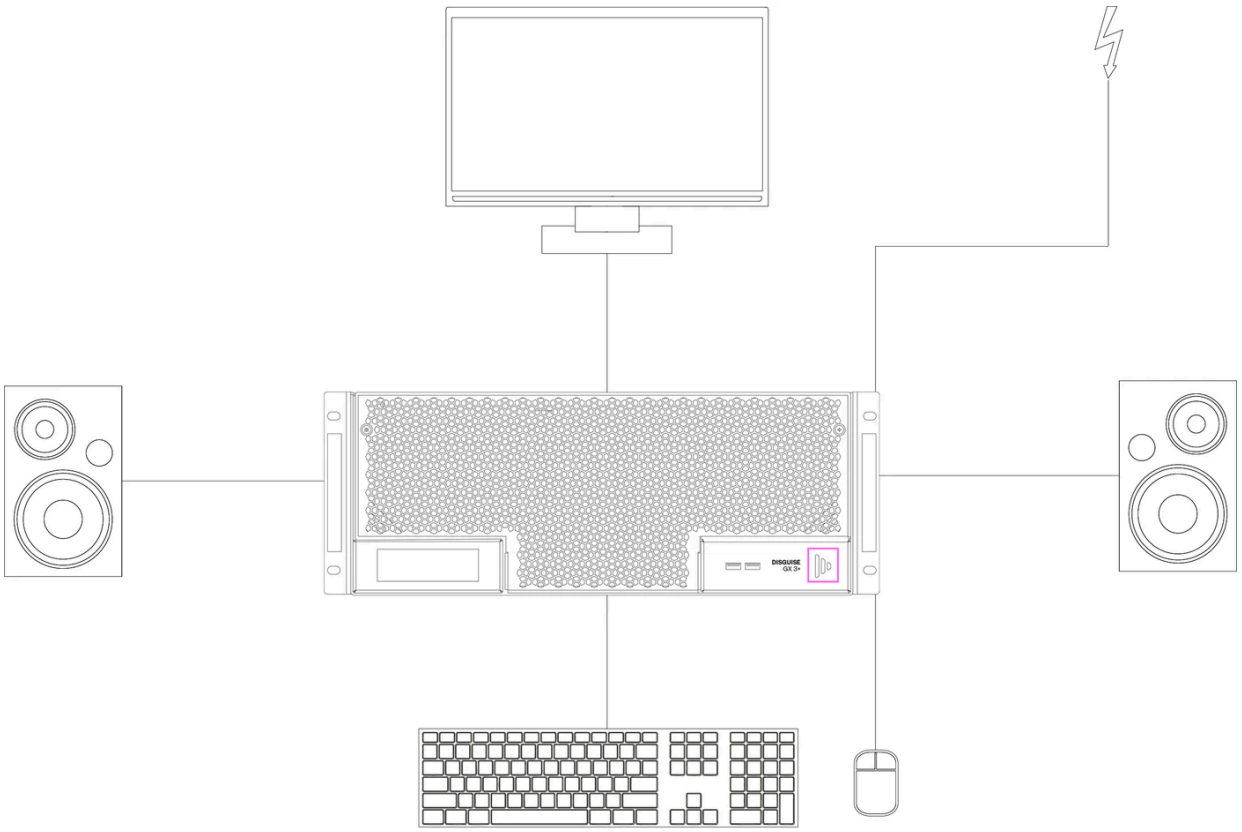
Disguise servers come with a range of possible output configurations. It is possible to use a combination of any of the types of four VFC cards below.

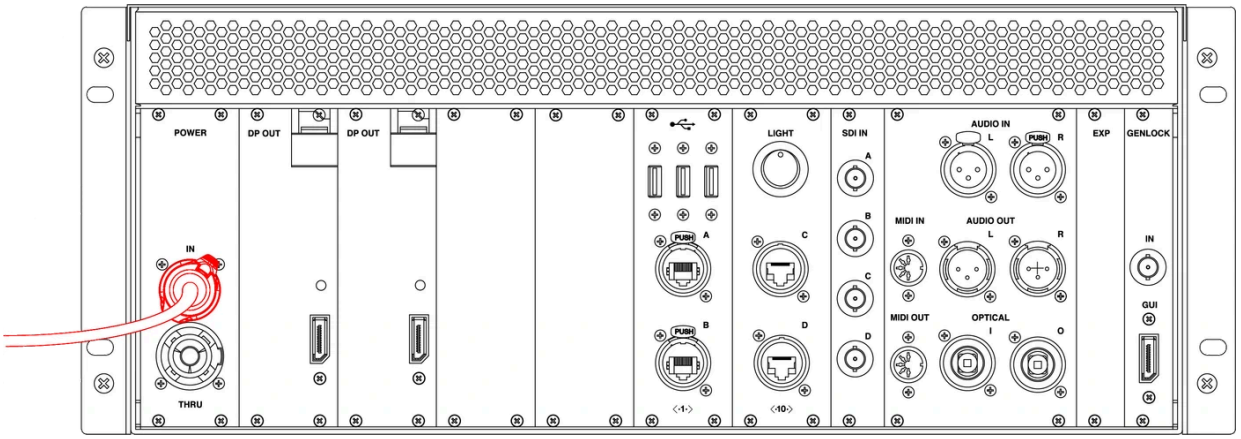


Display Port 1.2	Quad DVI	Quad SDI	HDMI
1 Output per card	4 Outputs per card	4 Outputs per card	1 Output per card
Max res: 4096x2160	Single Link DVI: (up to) 1920 x 1200	Max res: 1920 x 1080	Max res: 4096x2160 @60 YCbCr444 8bit
LED indicator	LED indicator	LED indicator	LED indicator
Genlocked	All outputs genlocked	All outputs genlocked	Genlocked

How to Start the GX 1

1. Connect Power cord to the GX 1.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.





Location of power input on rear of GX 1 unit

Powering the GX 1

The pro and GX ranges of Disguise servers use Neutrik PowerCON TRUE1 as the power input.

The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

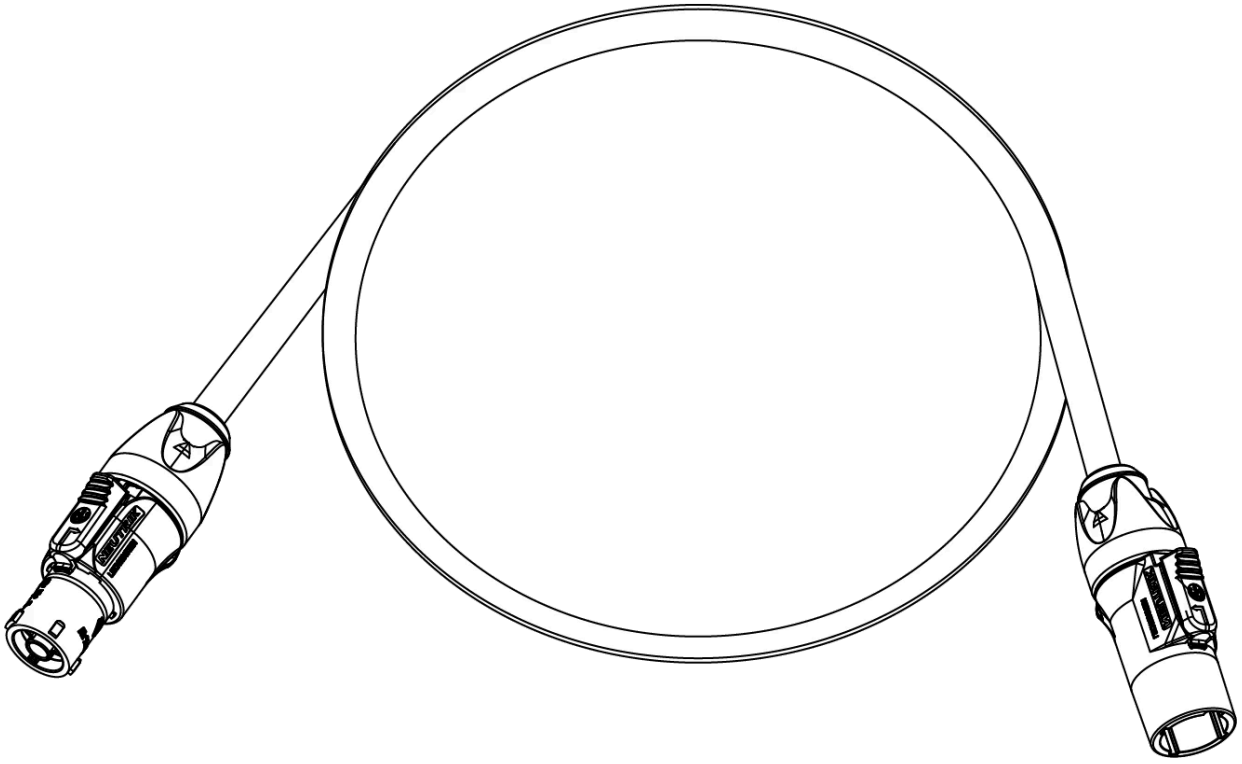
To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.

Powering a multi server system

The GX 1 uses True1 Powercon as its power input and features a loop through to make powering a multi server system more efficient.

The power input to the machine is rated at 12Amps RMS per connection in Europe and USA.



Loop through cables should have the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with appliance coupler type Neutrik AG, type NAC3MX-W.
- Other end terminated with appliance coupler type Neutrik AG, type NAC3FX.

Power calculations for a safely powered system

It is important that you calculate how many GX 1 units you can daisy chain together using the in/loop connections provided. Failure to do so could result in a loss of power to the Disguise system.

Use the formula “Power = Voltage x Current” to calculate how many units you can chain together. For Example:

UK Power: 230V 13Amp rated supply.

For example, max power draw of a GX 1 = 400W (check technical specifications for your unit).

Available Power = 230V x 12A

Available Power = 2990W

Available Power / Max Power Draw = Number of Units

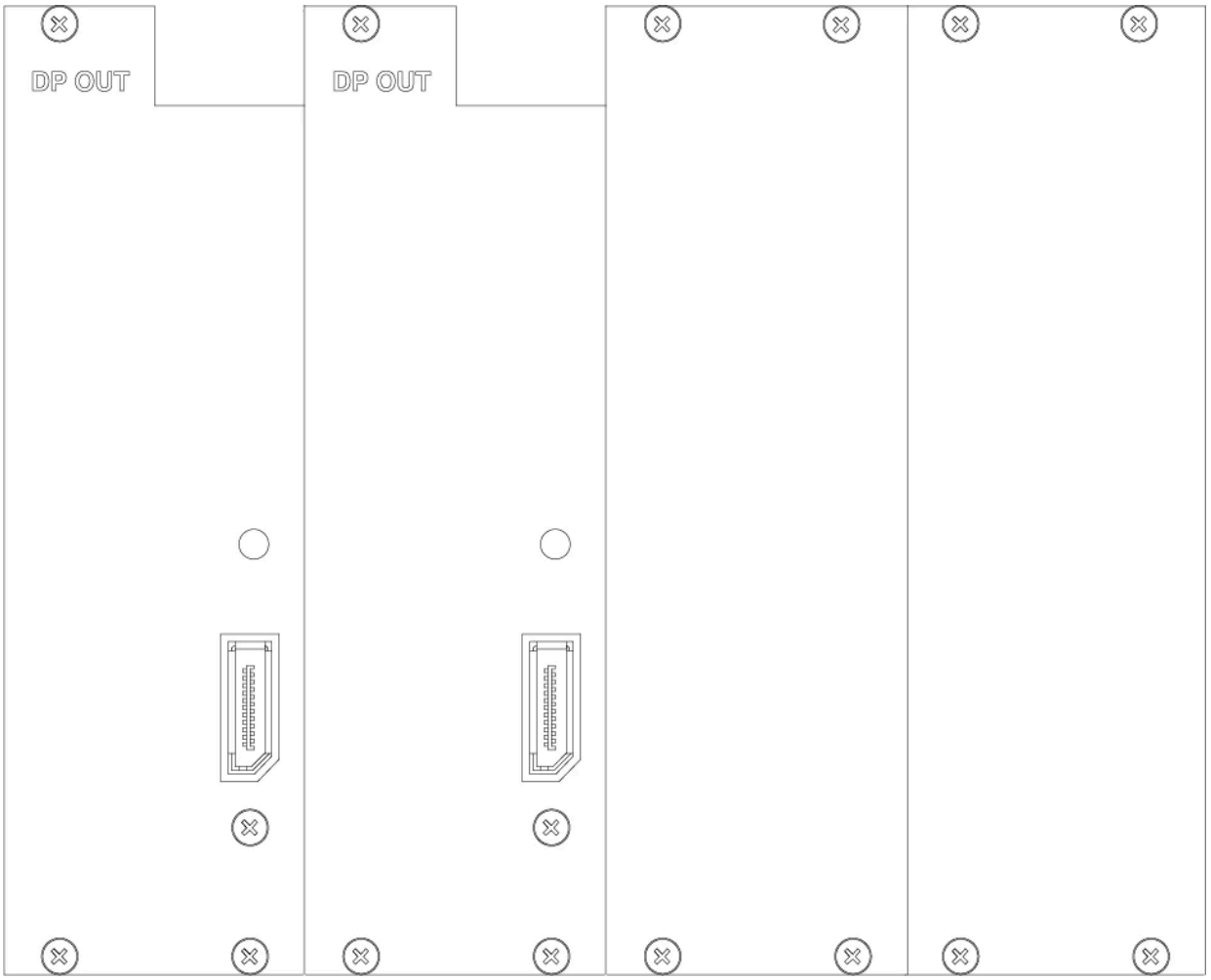
2990W / 1400W = 2.1 Units

> **Warning**
>
> Warning: Be safe! On a UK 13Amp supply @230V you can connect 2 Units safely with 100W of headroom.

GX 2 4K Output

The GX 2 4K Output ships with the standard configuration of Display Port cards.

> **Warning**
>
> We highly advise using DisplayPort cables specifically validated for: DP 1.2, DP 1.2a or 21.6 Gbps bandwidth.



2 x DisplayPort 1.2 outputs on rear of GX 2

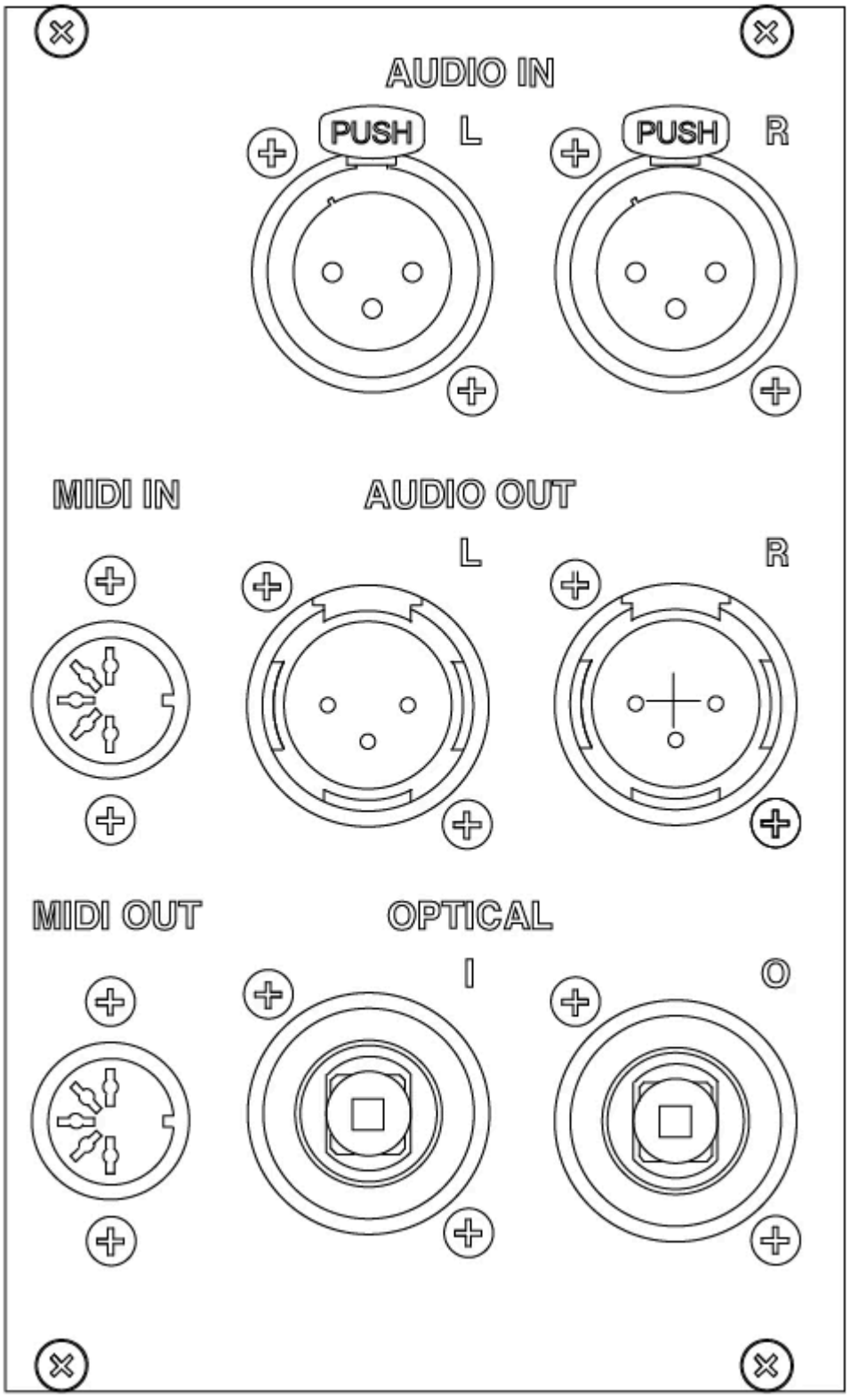
This enables the pro & GX ranges of Disguise servers to support resolutions up to 4096x2160 60hz over Single Stream Transport.

GX 2 Audio Input and Output

The GX 2 & GX 2C are equipped with a broadcast quality pro audio card which uses the latest 192kHz AD and DA converters.

Back panel connections

- XLR Left + Right Input
- XLR Left + Right Output
- ADAT/SPDIF Input
- ADAT/SPDIF Output
- MIDI Input
- MIDI Output



Audio connections on rear of GX 2 unit.

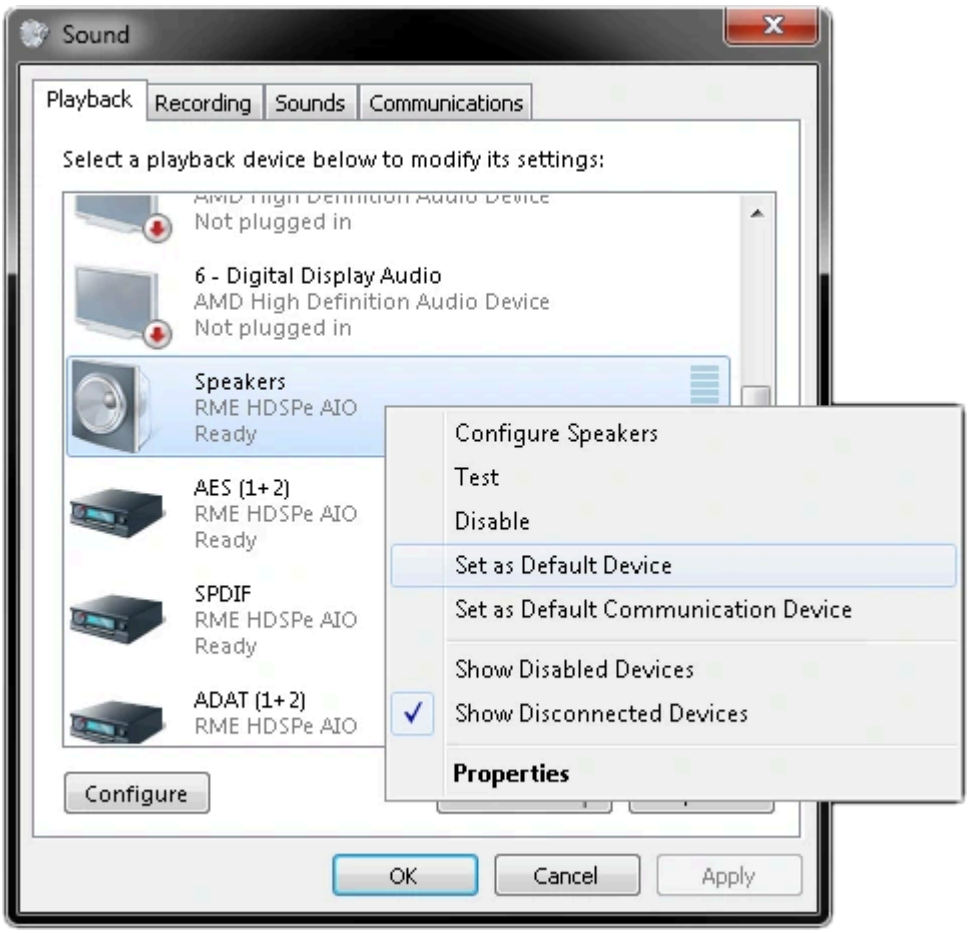
Front panel connections

- 1/4inch Stereo Monitoring socket

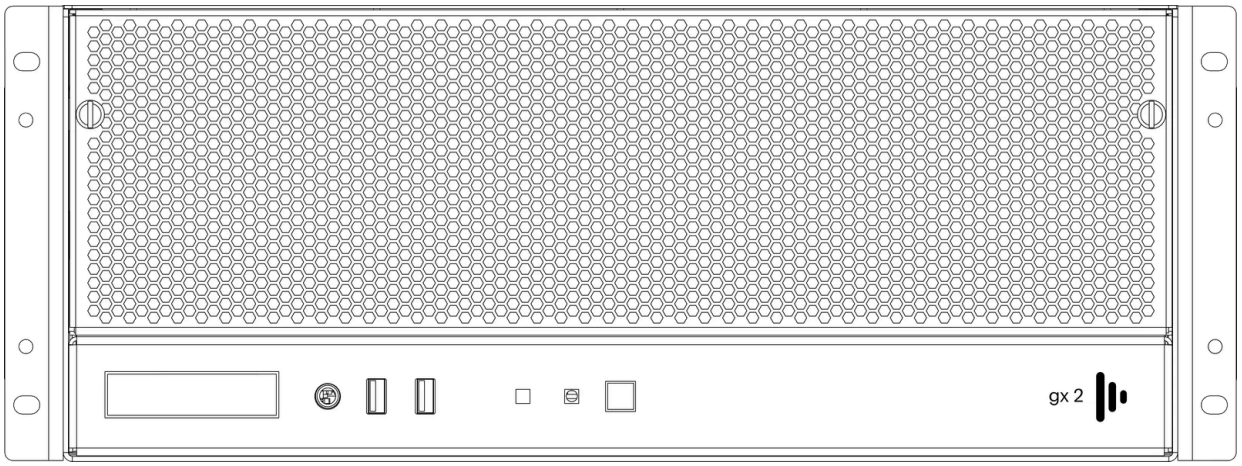
It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

RME card settings

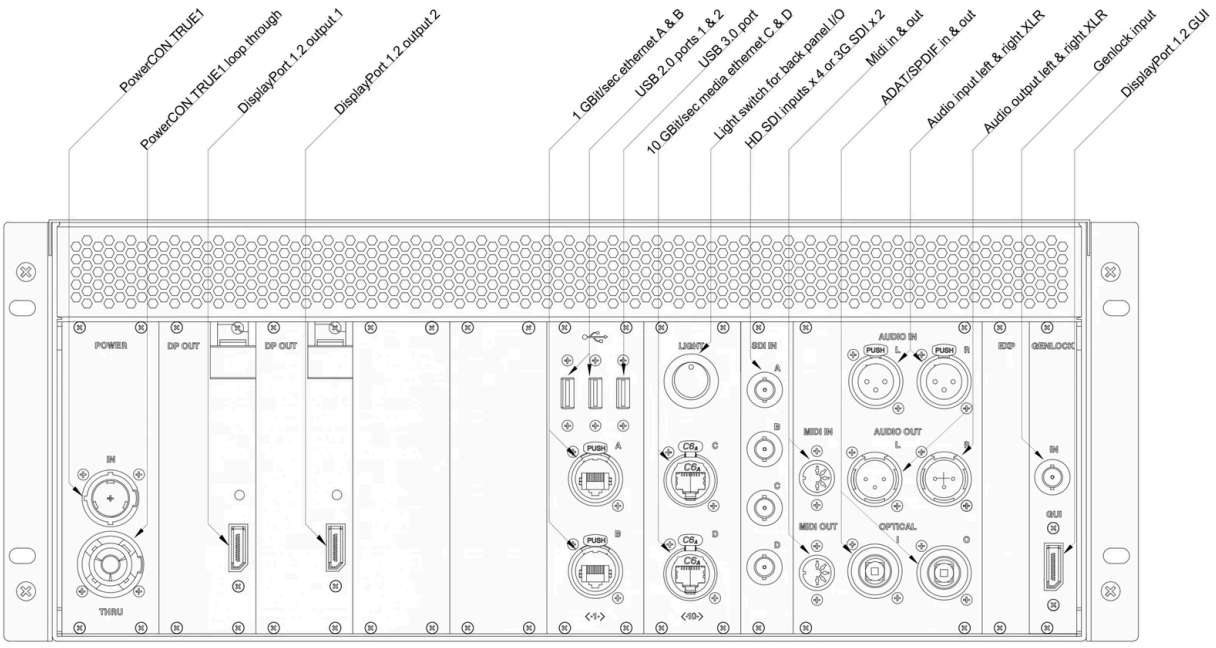
1. Go to the Windows Start Menu.
2. Right-click on the speaker in the task tray next to the clock on the desktop and click on Playback Devices.
3. Scroll Down and Right-click the device named Speakers and select Set as Default device if it is not already selected.



GX 2 Diagrams

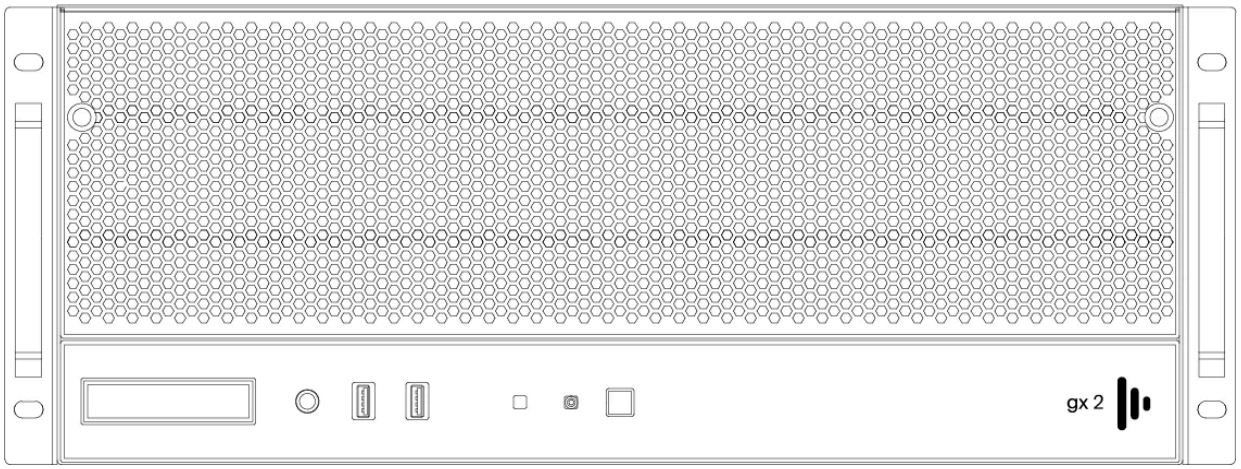


GX 2 Front panel



GX 2 Rear panel annotated

GX 2 Overview



The GX 2 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

The GX 2 is one of our legacy servers.

Learn more about the GX 2:

- Diagrams
- Specifications
- Performance
- Video Input

For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

GX 2 Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps	27.8	36
HAPQ	30fps	31.3	31
Animation	30fps	107	18
TIFF	30fps	237	10
NotchLC	30fps	65.31	20

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps	95.4	13
HAPQ	30fps	143	12
Animation	30fps	697	3
TIFF	30fps	949	2

*testing completed on r30.0 200921

NOTES

- Content is played back at 30 fps as outlined in the video codec above.
- All the Full HD codecs listed above produce an output resolution of 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.

Capture Latency

The following table provides data on how many frames of latency the GX 2 requires from capture to output:

GX 2 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
50Hz	5	4	3
30Hz	5	4	3

GX 2 NDI®

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	6	5	4
50Hz	6	5	4
30Hz	6	5-6	4

GX 2 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

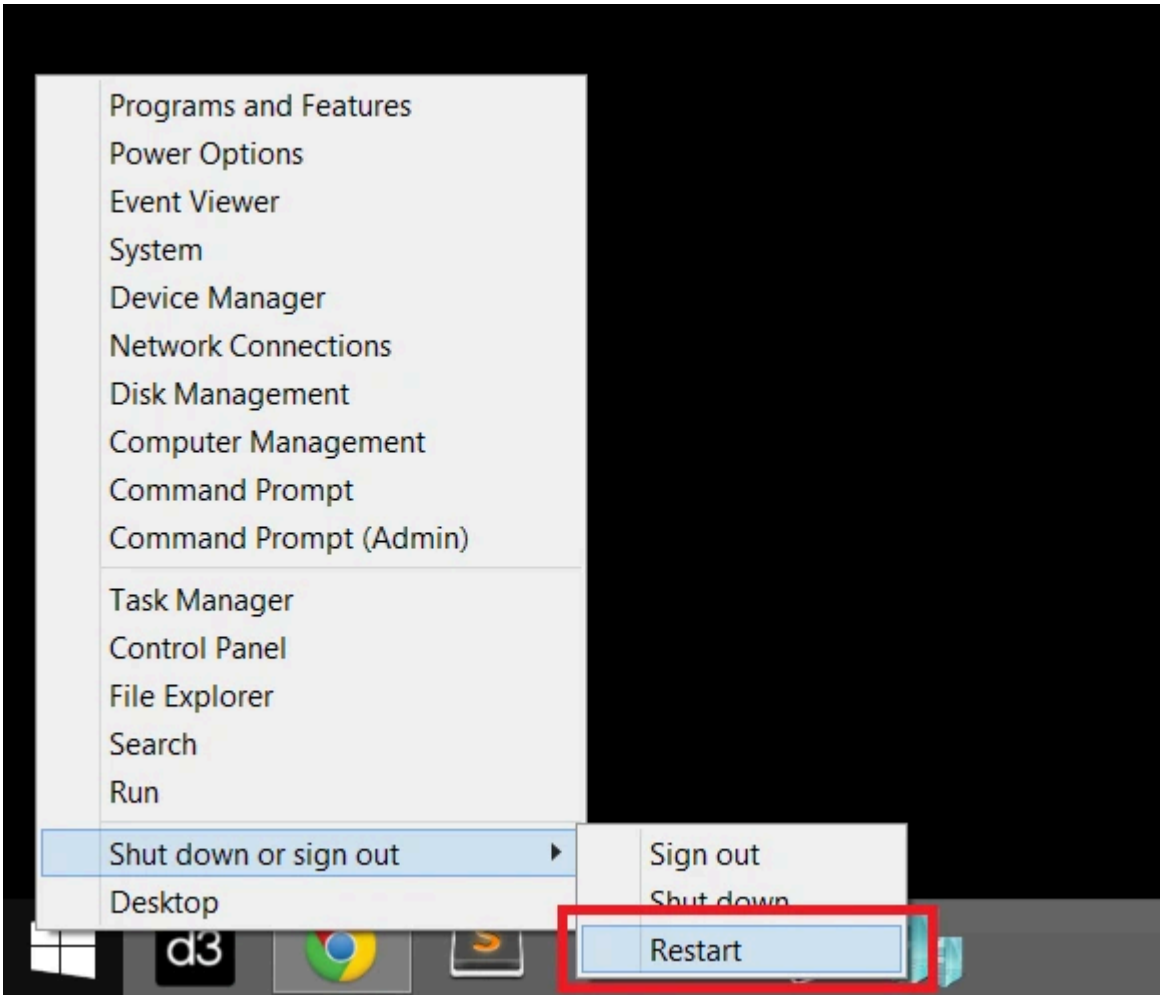
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

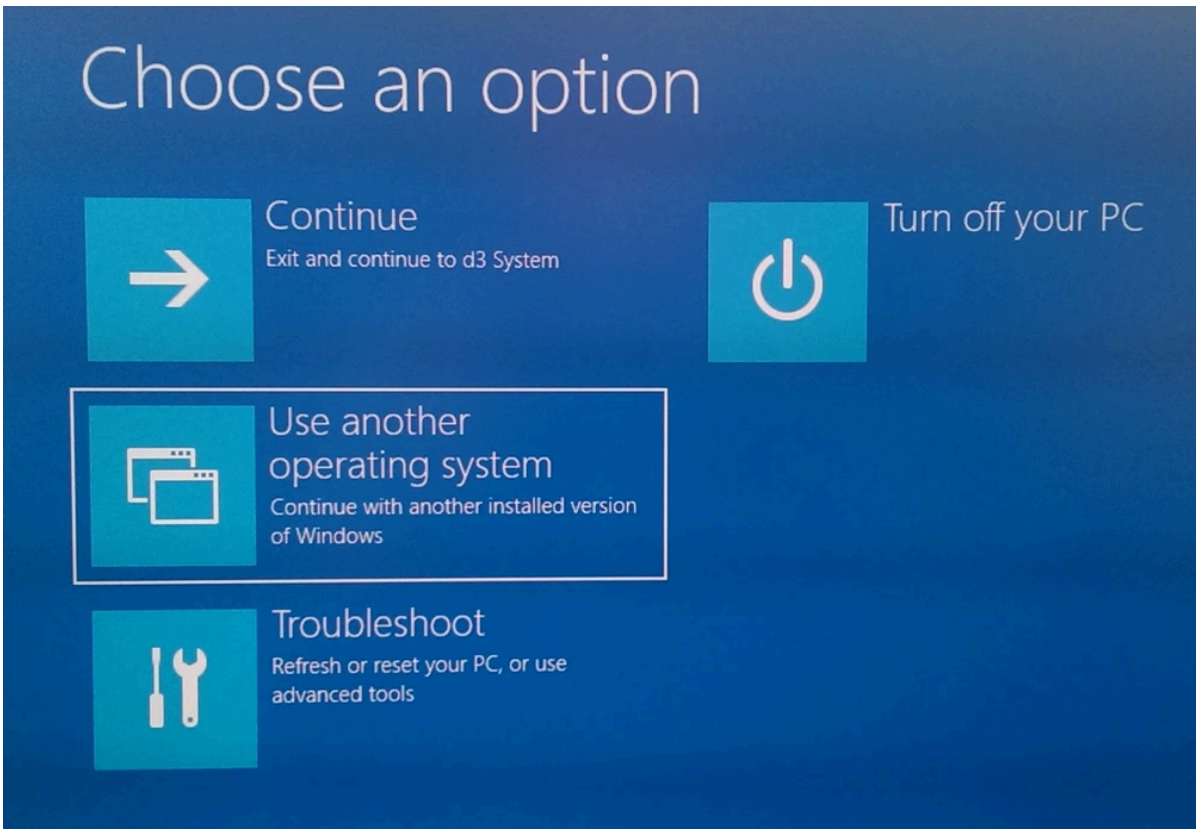
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

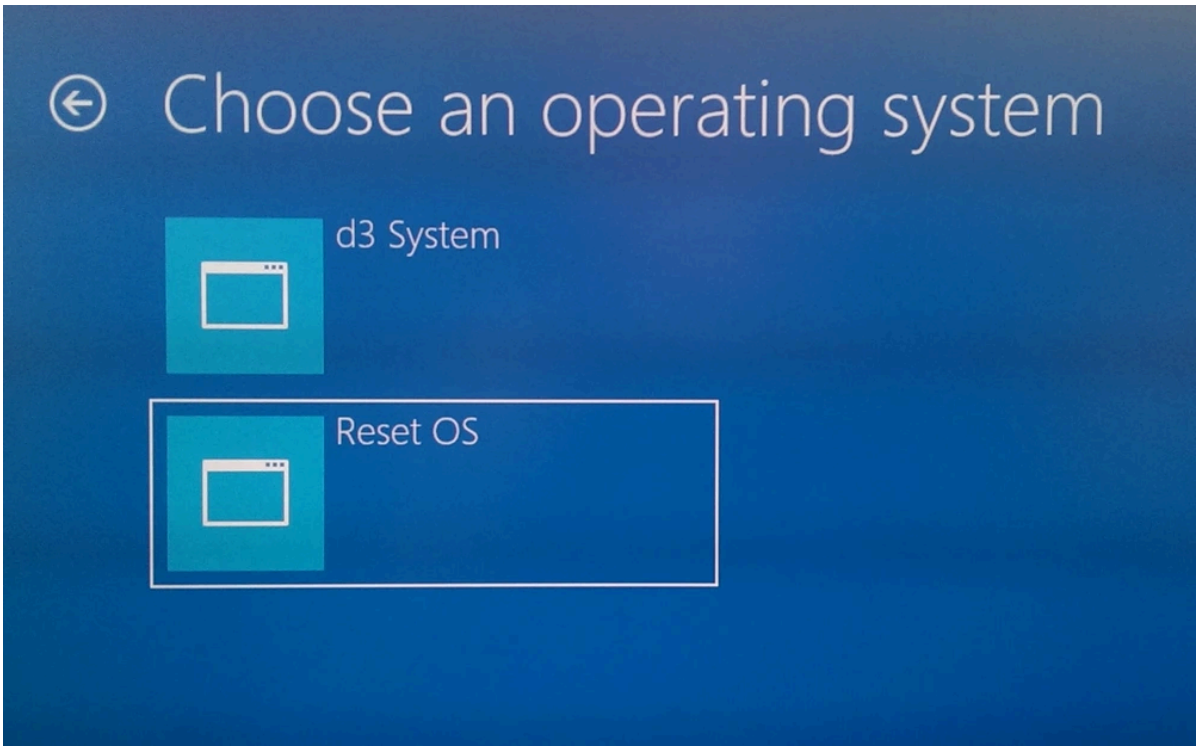




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

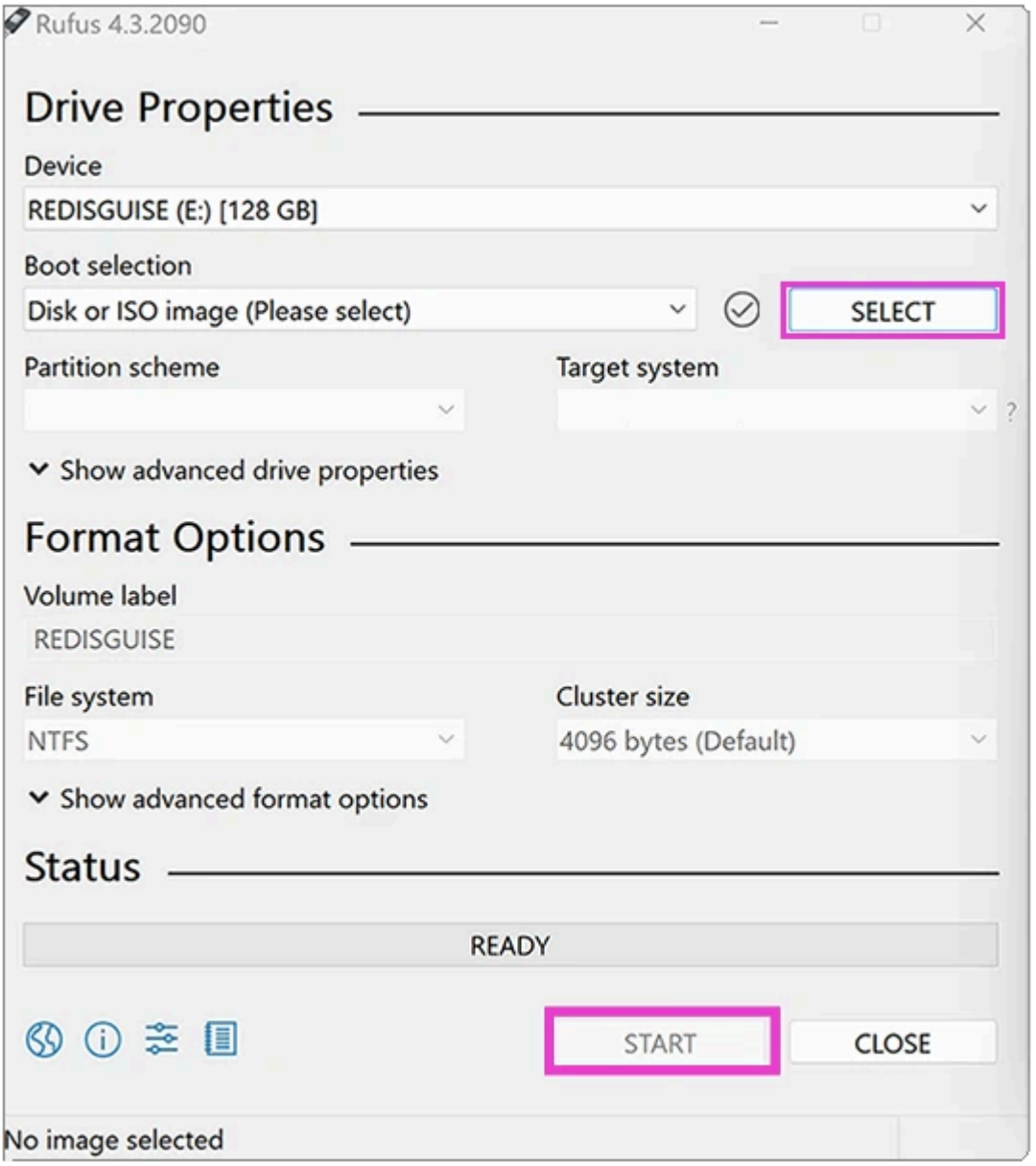
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
- 7-Zip archive tool/file manager.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.

- 7-Zip archive tool/file manager.



The settings should be:

- `Partition scheme - MBR`
- `Target system - BIOS (or UEFI-CSM)`
- `Volume label - automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

Booting into the USB

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete key** until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Navigate to the **Boot** tab.
4. Select **Hard Drive BBS Priorities**.
5. Change Boot Option #1 to your USB thumb drive (the name will look different depending on the manufacturer of the drive).
6. Press **ESC** to return to the main section.
7. Navigate to the **Save & Exit** tab (**Do not** Save & Exit the BIOS itself).
8. In the **Boot Override** section, select the USB that matches the name of your USB manufacturer. **DO NOT** select the one that starts with UEFI.

The Redisguise process will run automatically until the re-imaging has completed [5]. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

GX 2 Specifications

Hardware Specifications

	GX 2
Voltage	100-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	560W
Heat Dissipation Peak	1,911 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 IoT Enterprise LTSB
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	1x 1.92TB Removable NVMe SSD (default RAID 10)
Memory	16GB RAM (4x 4GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

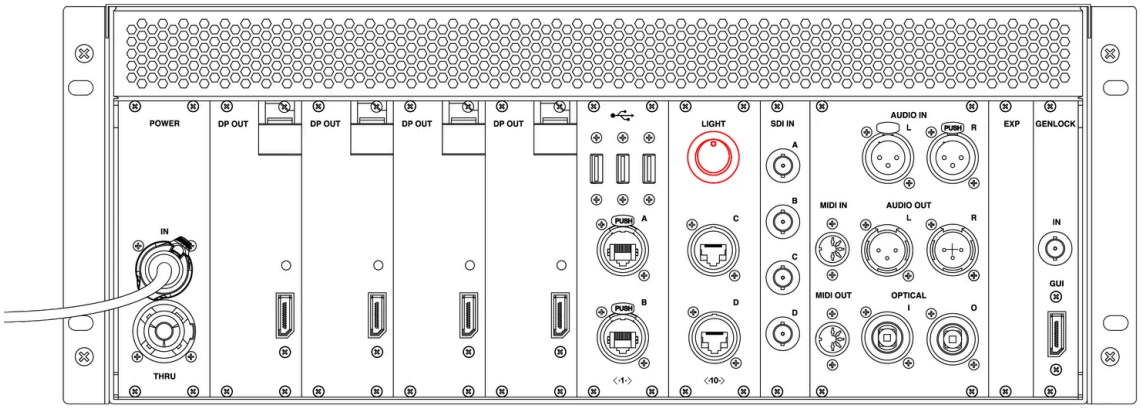
	GX 2
Video output	2x 4K outputs (with integrated EDID management)
Video input	4x 1.5G inputs or 2x 3G inputs (HD-BNC connectors)
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in

	GX 2
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	N/A
System Management Controller	N/A
Data/Peripherals	5x USB 3.0
Video Sync	BNC Genlock

Unit Rear Light - GX 2

Disguise servers in the pro and GX ranges come with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labeled “light” with power in.



GX 2 Video Input

Your system is equipped with capture cards. These cards have the ability to capture live video from either SD-SDI or HD-SDI video sources with up to four unique feeds, or two unique 3G-SDI feeds per machine.

Max Number of Unique Inputs

Media Server	HD-SDI	3G-SDI
GX 2	4	2

> **Note**
>
> It is possible to have a different format on each input, However the limitations are a maximum of 4x 720p60 or 2x 1080p60.

Supported formats

2K DCI (2048 x 1080)

2K DCI 23.976p, 2K DCI 24p, 2K DCI 25p, 2K DCI 29.97p, 2K DCI 30p, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.976, 1080psf23.976, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p47.952, 1080i47.952, 1080i48, 1080p48, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p23.976, 720p24, 720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Misc

2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz 720x486i @ 59.94 Hz NTSC 720x576i @ 50.00 Hz PAL

Back-Plate Layout

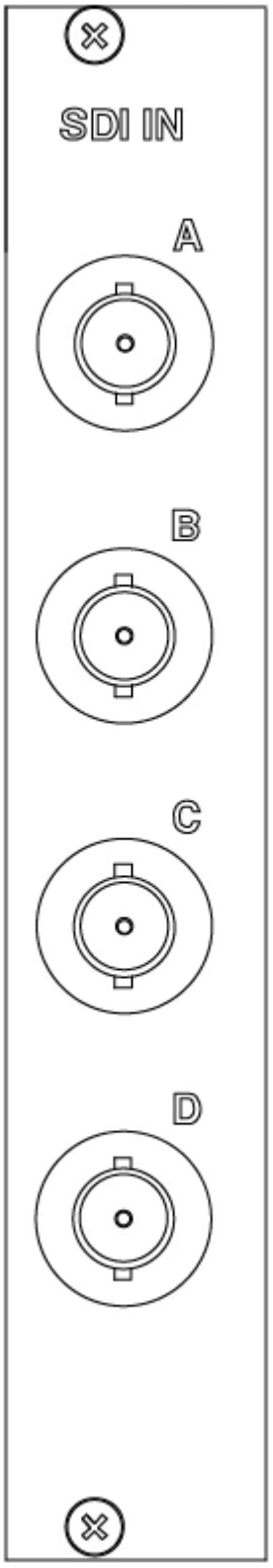
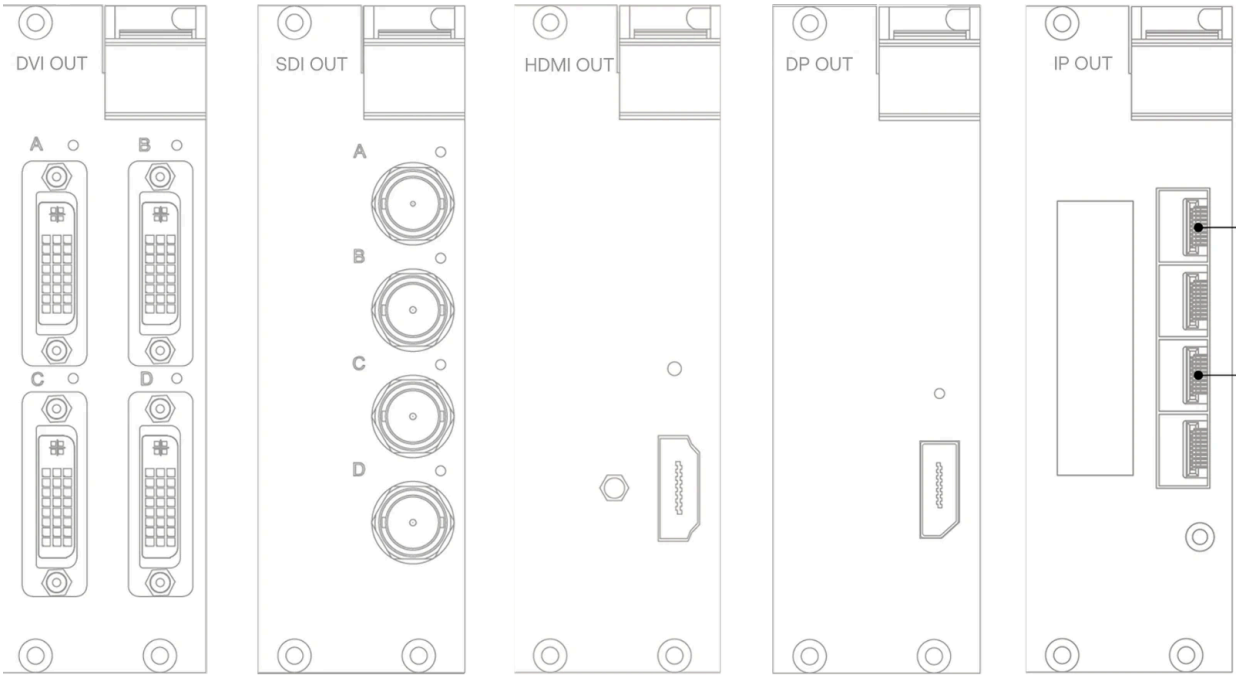


Diagram of Video Capture BNC

connections on rear of a GX 2

GX 2 Video Output

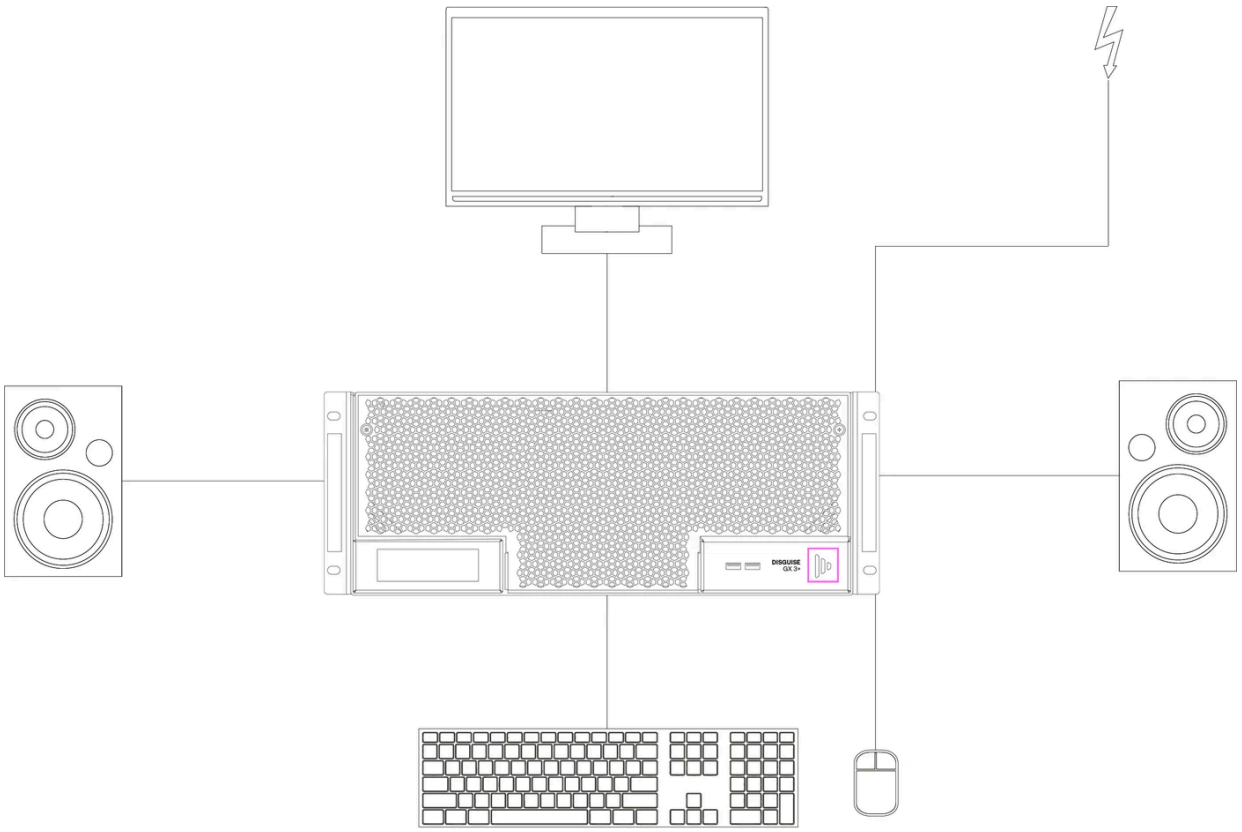
The pro and GX ranges of Disguise servers come with a range of possible output configurations. It is possible to use a combination of any of the types of four VFC cards below.

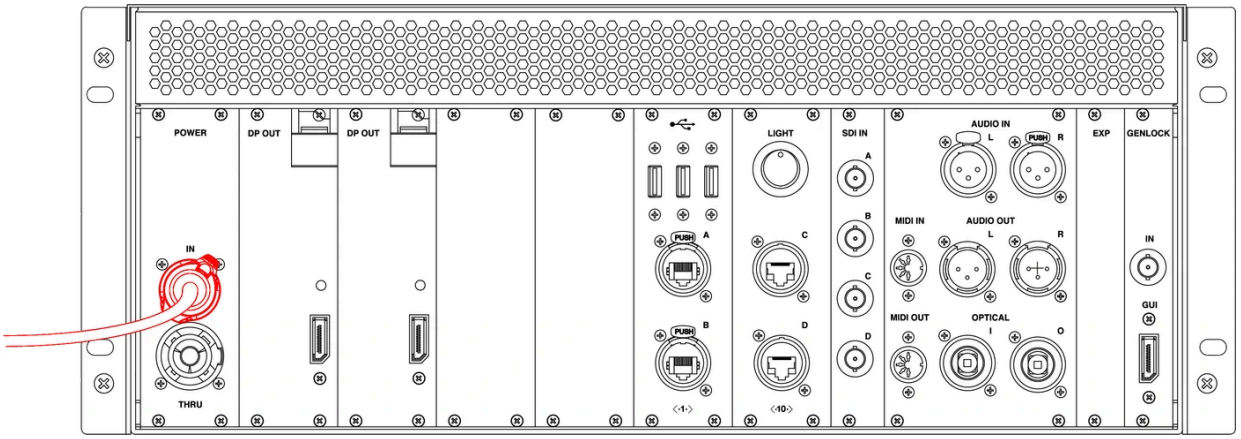


Display Port 1.2	Quad DVI	Quad SDI	HDMI
1 Output per card	4 Outputs per card	4 Outputs per card	1 Output per card
Max res: 4096x2160	Single Link DVI: (up to) 1920 x 1200	Max res: 1920 x 1080	Max res: 4096x2160 @60 YCbCr444 8bit 3840x2160 @60 YCbCr422 10bit* 3840x2160 @30 YCbCr444 10bit
LED indicator	LED indicator	LED indicator	LED indicator
Genlocked	All outputs genlocked	All outputs genlocked	Genlocked

How to Start the GX 2

1. Connect Power cord to the GX 2.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.





Location of power input on rear of GX 2 unit

Powering the GX 2

The pro and GX ranges of Disguise servers use Neutrik PowerCON TRUE1 as the power input.

The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

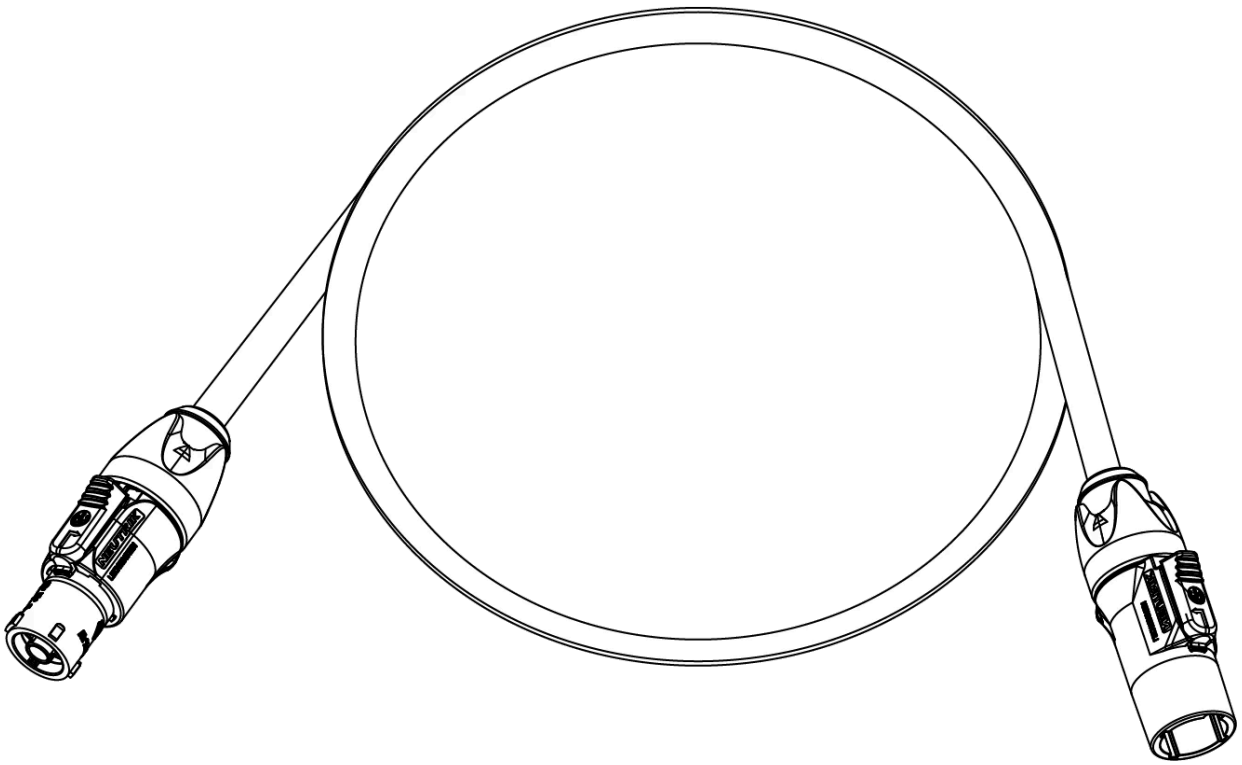
To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.

Powering a multi server system

The GX 2 uses True1 Powercon as its power input and features a loop through to make powering a multi server system more efficient.

The power input to the machine is rated at 12Amps RMS per connection in Europe and USA.



Loop through cables should have the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with appliance coupler type Neutrik AG, type NAC3MX-W.
- Other end terminated with appliance coupler type Neutrik AG, type NAC3FX.

Power calculations for a safely powered system

It is important that you calculate how many GX 2 units you can daisy chain together using the in/loop connections provided. Failure to do so could result in a loss of power to the Disguise system.

Use the formula “Power = Voltage x Current” to calculate how many units you can chain together. For Example:

UK Power: 230V 13Amp rated supply.

For example, max power draw of a GX 2 = 560W (check technical specifications for your unit).

Available Power = 230V x 12A

Available Power = 2990W

Available Power / Max Power Draw = Number of Units

2990W / 1400W = 2.1 Units

> **Warning**
>
> Warning: Be safe! On a UK 13Amp supply @230V you can connect 2 Units safely with 100W of headroom.

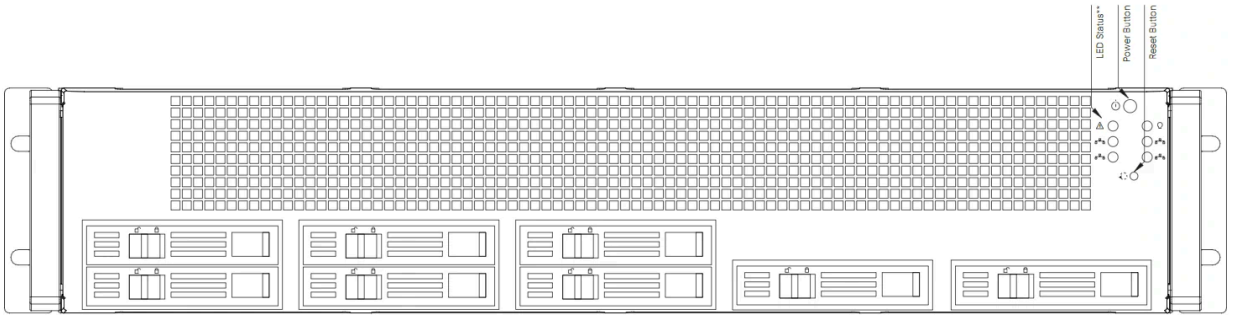
Legacy Servers Overview

We move media servers and/or render nodes to the Legacy Server section when they have moved to the **End of Production** phase of their Product Lifecycle or later. Please visit the **Product Lifecycle** page for more information.

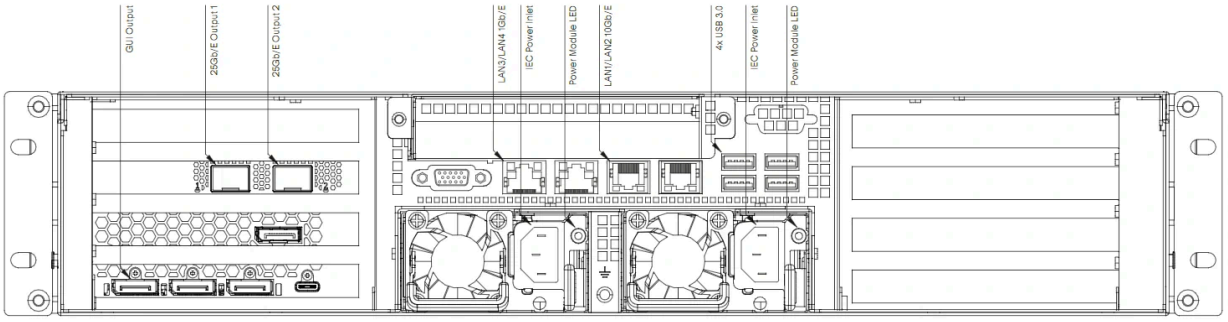
Legacy Media Servers/Render Nodes

- 4U v2.5
- 2x2
- 2x4pro
- 4x2
- 4x4
- Solo
- GX 1
- GX 2
- GX 2C
- RX and RX II
- VX 1
- VX 2
- VX 4

RX and RX II Diagrams



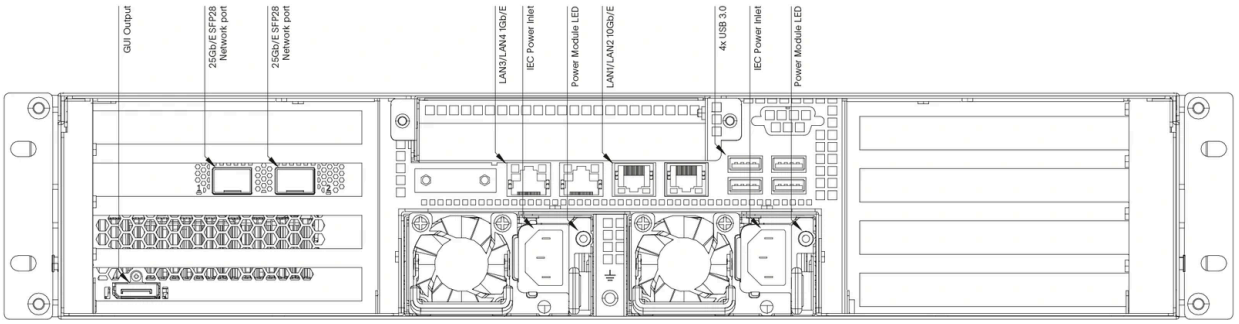
RX Front Panel



RX Rear Panel Annotated

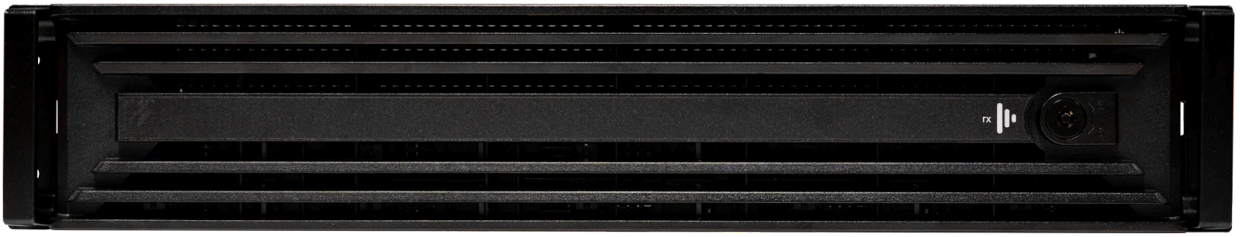


RX II Front Panel

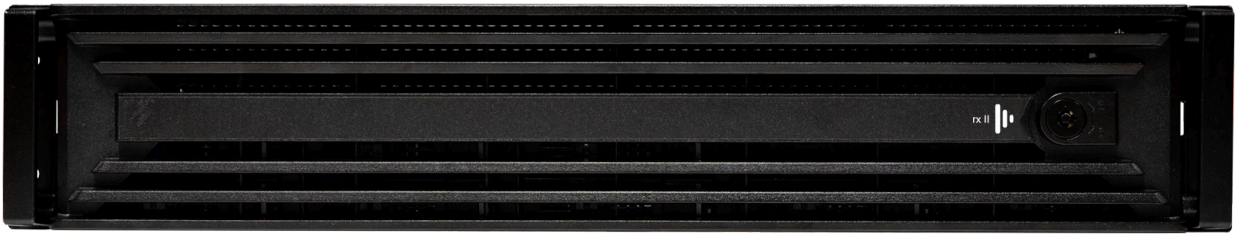


RX II Rear Panel Annotated

RX and RX II Overview



RX



RX II

Learn more about:

RX and RX II

- Diagrams
- Redisguise

View the full RX Product information in the Technical Specifications PDF.

Or view the full RX II Product information in the Technical Specifications PDF.

RX & RX II Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

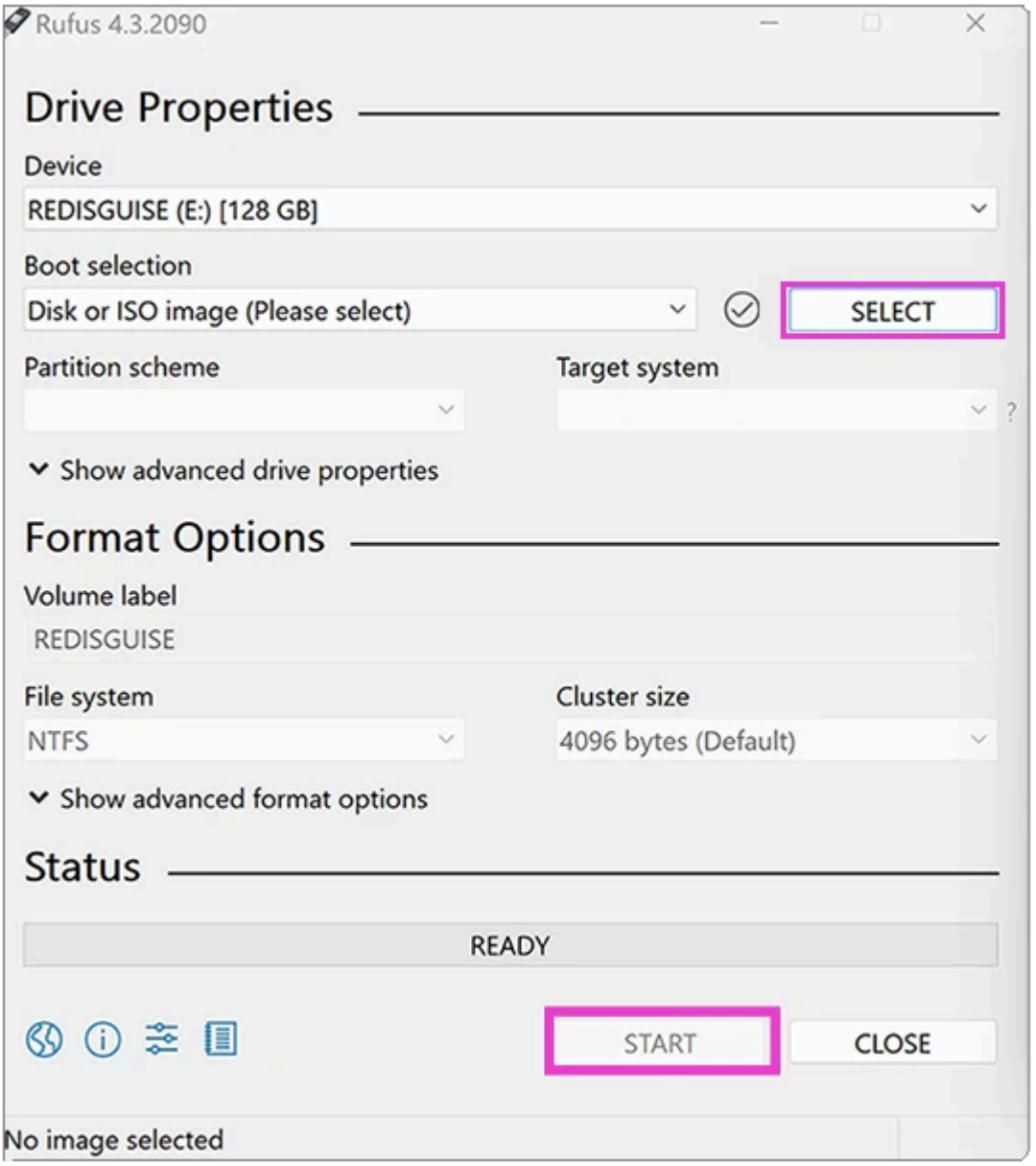
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
- **7-Zip** archive tool/file manager.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.

2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Change the Boot option #1 to the USB stick.
4. Navigate to the **Advanced tab** and press **Enter** to view the CSM Configuration and ensure that Boot option filter is set to [UEFI and Legacy]. If not, then press **F4** and change it. Confirm and re-enter BIOS.
5. Once this setting is confirmed, navigate to the **Save & Exit** tab to the right of your current tab.
6. In the Boot Override section, select the following option:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

RX II Specifications

Hardware Specifications

	RX II
Voltage	115-240V, 50-60Hz*
Power Connection	IEC
Power Consumption Peak	539W
Heat Dissipation Peak	1,839 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 Enterprise GAC
Environmental Tolerances	Temperature: 5-30°C (40°-86°F) Humidity: 20-80% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	2U 19” rack mount
OS	1x Internal Storage Drive
Storage	1x 1.8TB Partitioned NVMe SSD
Memory	96GB RAM (12x 8GB)

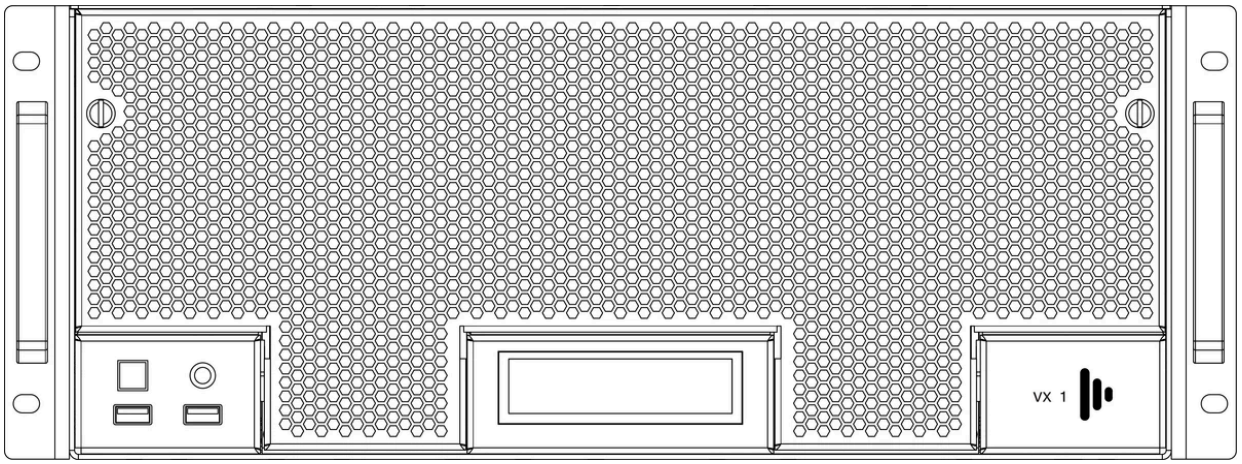
- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

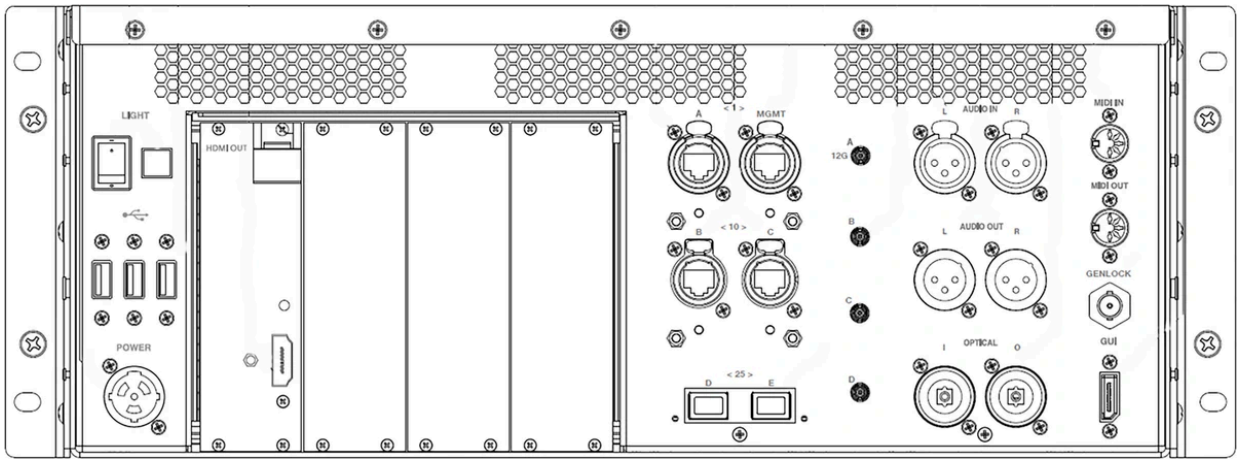
	RX II
Video output	0 - RenderStream output only
Video input	0 - RenderStream input only
Optical Audio	No
MIDI	No
Audio	No

	RX II
General Network	2x 1GbE/sec 2x 10GbE/sec
High Speed Network	2x 25GbE/sec port (SFP28)
System Management Controller	No
Data/Peripherals	4x USB 3.0
Video Sync	No

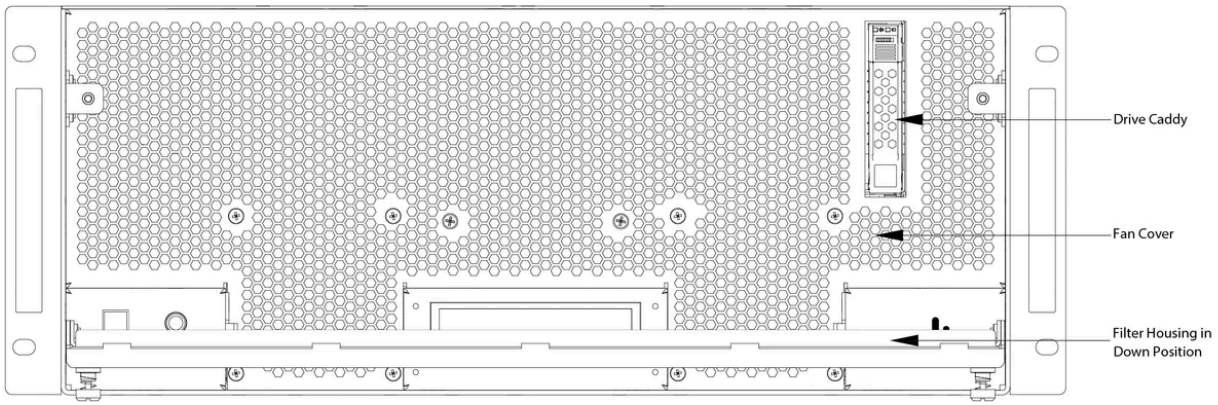
VX 1 Diagrams



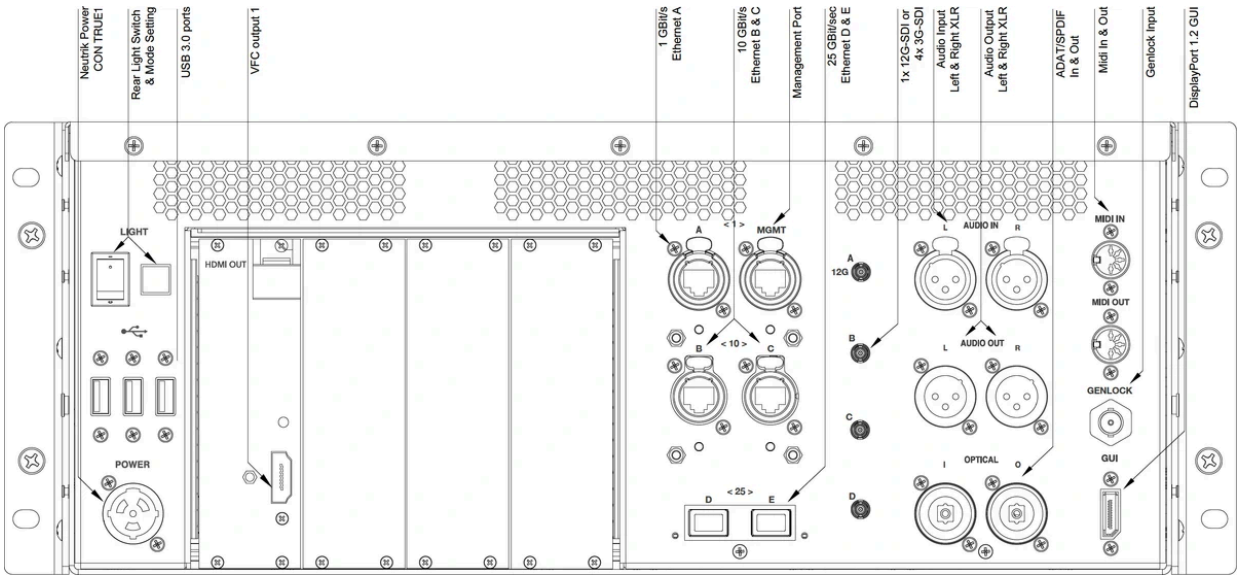
VX 1 Front Panel



VX 1 Rear Panel



VX 1 Front Ppanel Grill Down



VX 1 Rear Panel Annotated

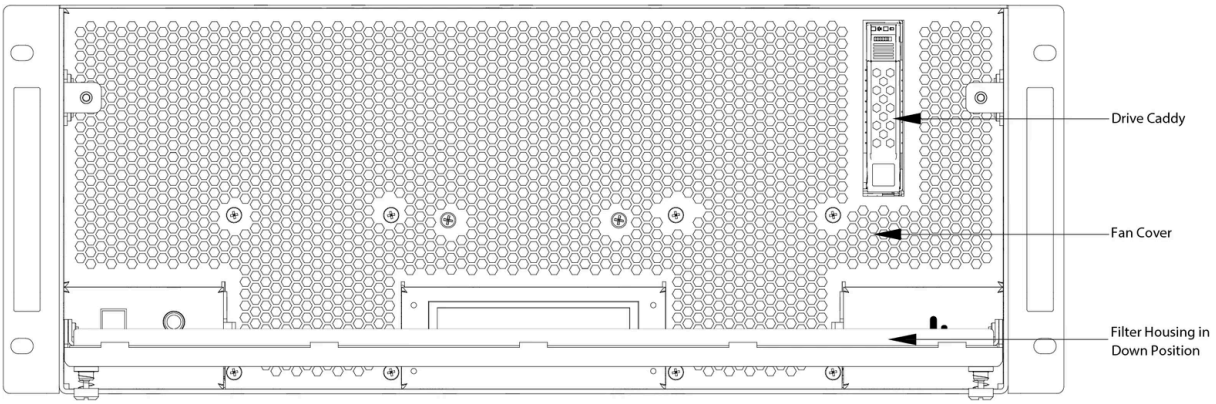
VX 1 Hard Drive Configuration

> **Warning**
>
> Do not remove drives when the machine is on as data may be corrupted if this occurs.

> **Note**
>
> If you ever need to replace or exchange your media drive it is recommended that you use a drive with similar read/write speeds. For further information please contact the **support team**.

Media Drives

The VX 1 comes with 1x NVMe drive.



Location of drive bay on the unit.

VX 1 Overview



The VX 1 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

For detailed information on the specifications for the VX 1 as well as the other software and hardware bundles offered by Disguise, please visit this link.

> **Caution**
>
> Opening hardware will void your warranty. Consult Disguise support before opening the hardware.

> **Warning**
>
> Do not open or remove the case unless you are instructed to do so by a certified Disguise Engineer.

> **Note**
>
> If you experience any problems with hardware please contact the Support Team.

Learn more about:

- Diagrams

- Performance
- Video Input
- Redisguise
- SMC Overview

View the full Product information in the **Technical Specifications** PDF.

VX 1 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

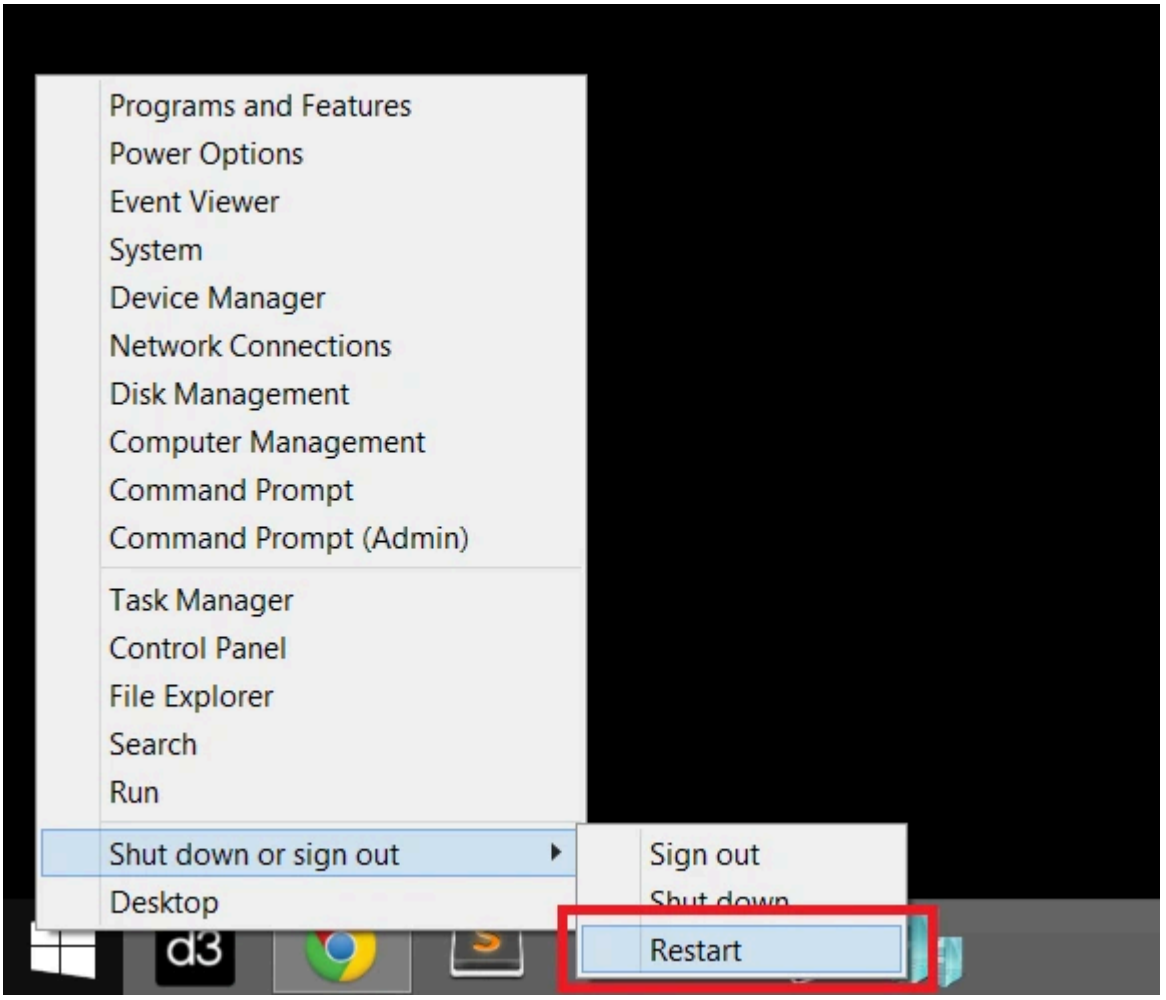
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

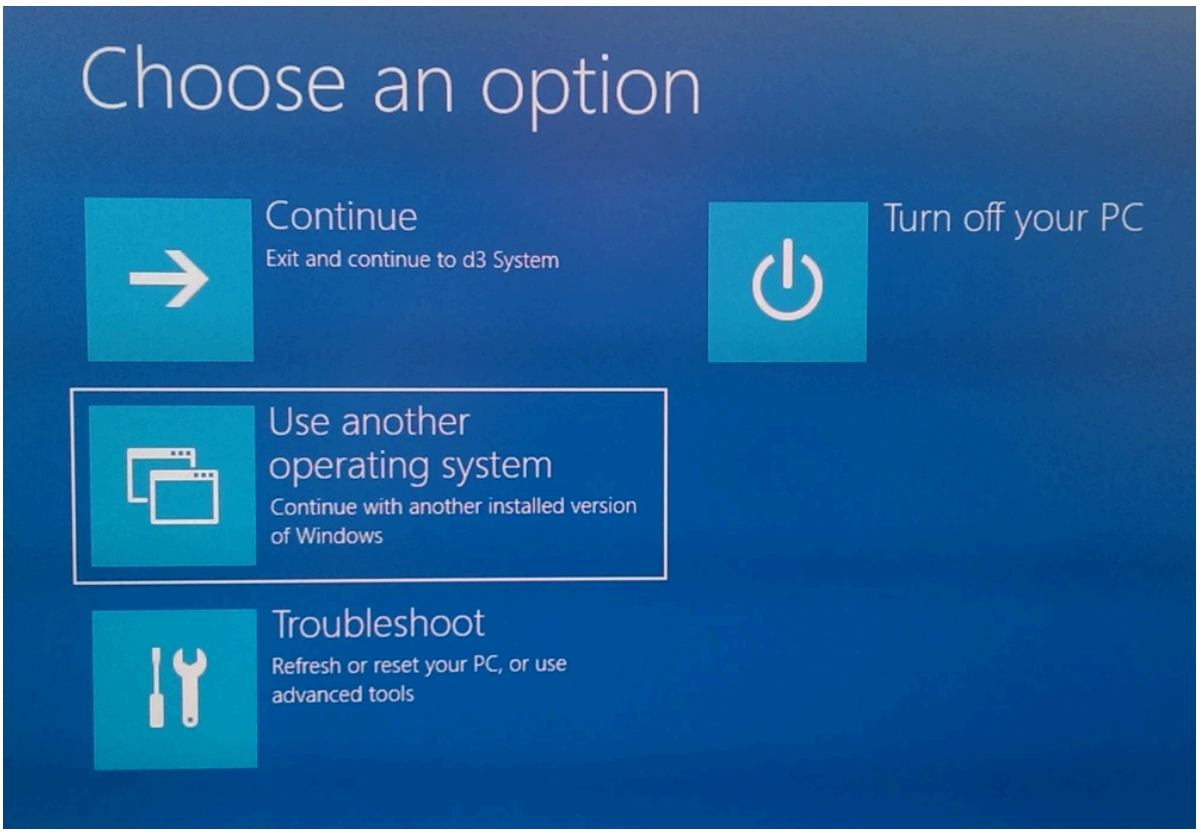
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

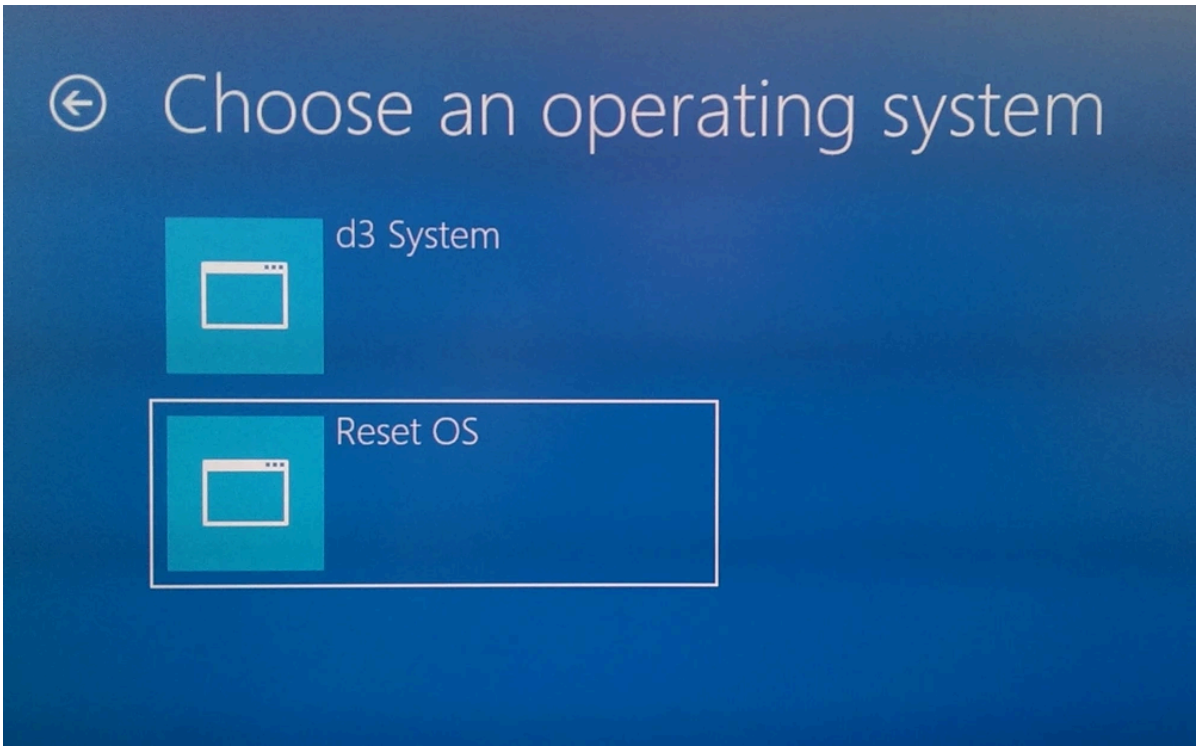




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
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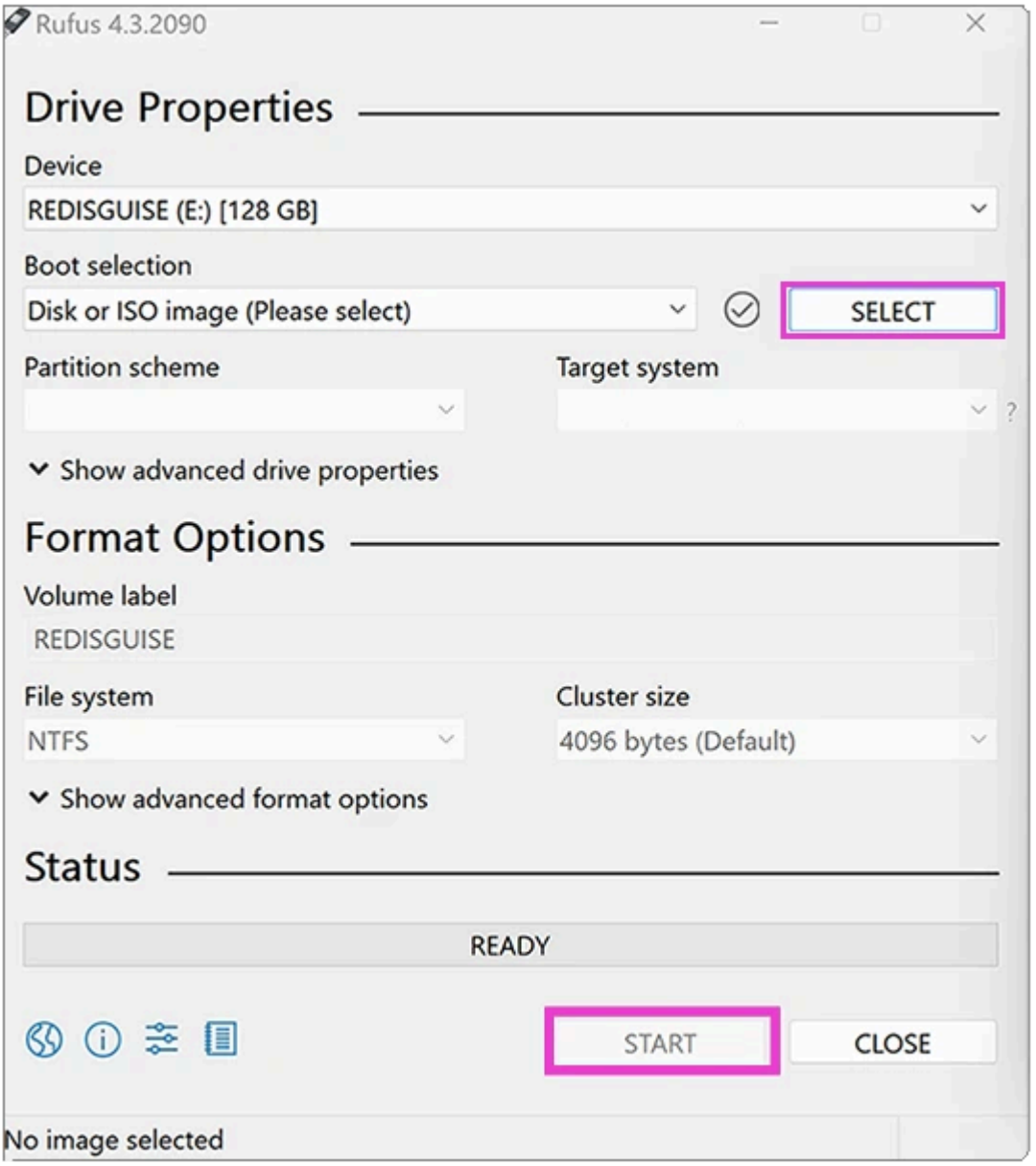
Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.<

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.

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4. Navigate to the **Advanced tab** and press **Enter** to view the CSM Configuration and ensure that Boot option filter is set to [UEFI and Legacy]. If not, then press **F4** and change it. Confirm and re-enter BIOS.
5. Once this setting is confirmed, **navigate to the Save & Exit** tab to the right of your current tab.
6. In the **Boot Override** section, select the following option:
   `UEFI: [diskname], Partition #`

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   The Redisguise process will run automatically until the re-imaging has completed.

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If you encounter any issues with the Redisguise process, please review the advice here.

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VX 1 Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
VX 1	4	1

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 1x 2160p60 or 4x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes)
- Chroma subsampling - YCbCr 4:2:2 (all modes)
- Each SDI input supports 3G Level A and Level B when applicable
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

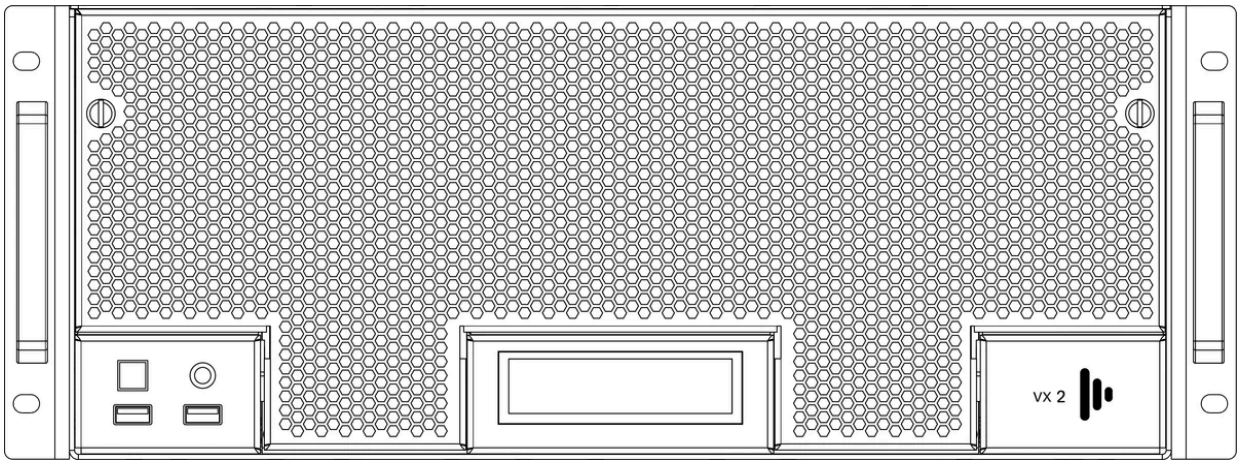
720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

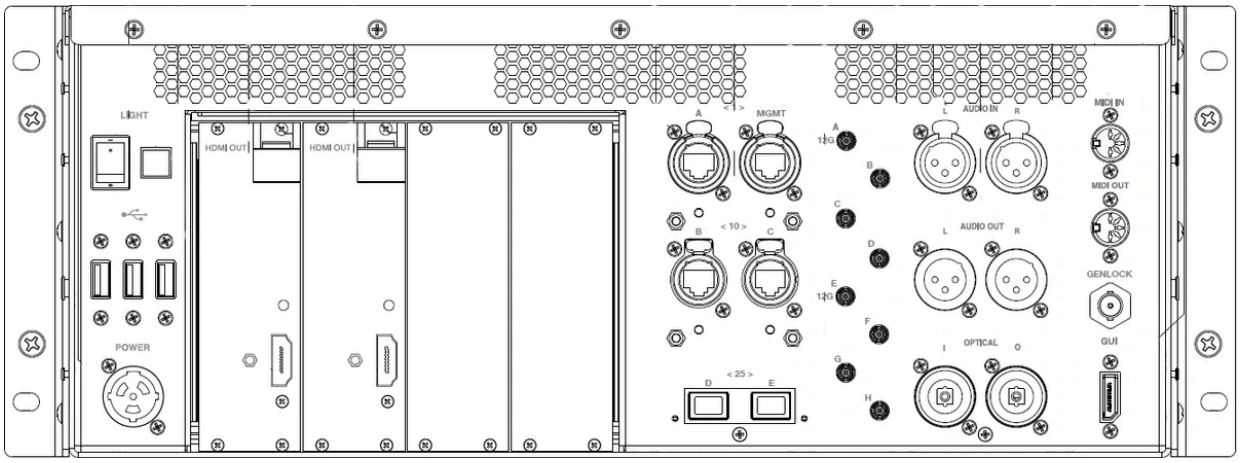


Diagram of Video Capture BNC connections on rear of a VX 1

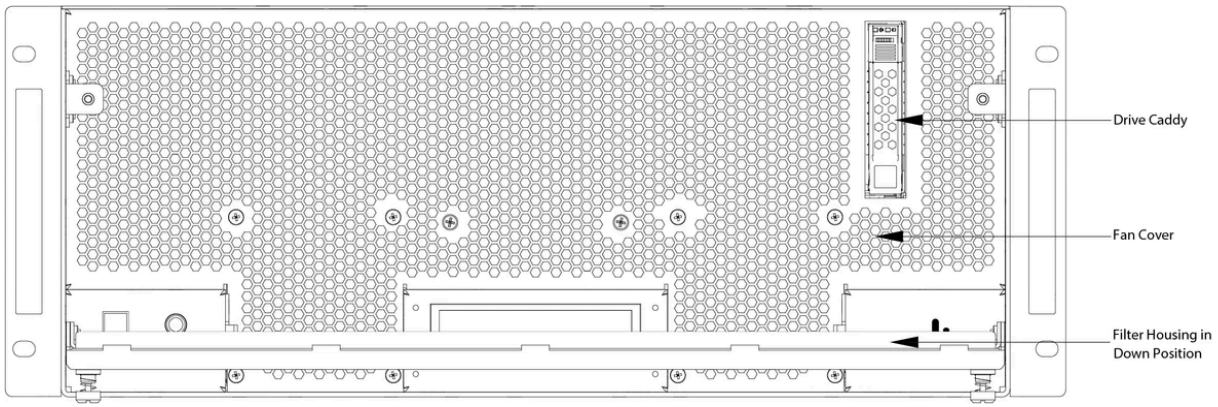
VX 2 Diagrams



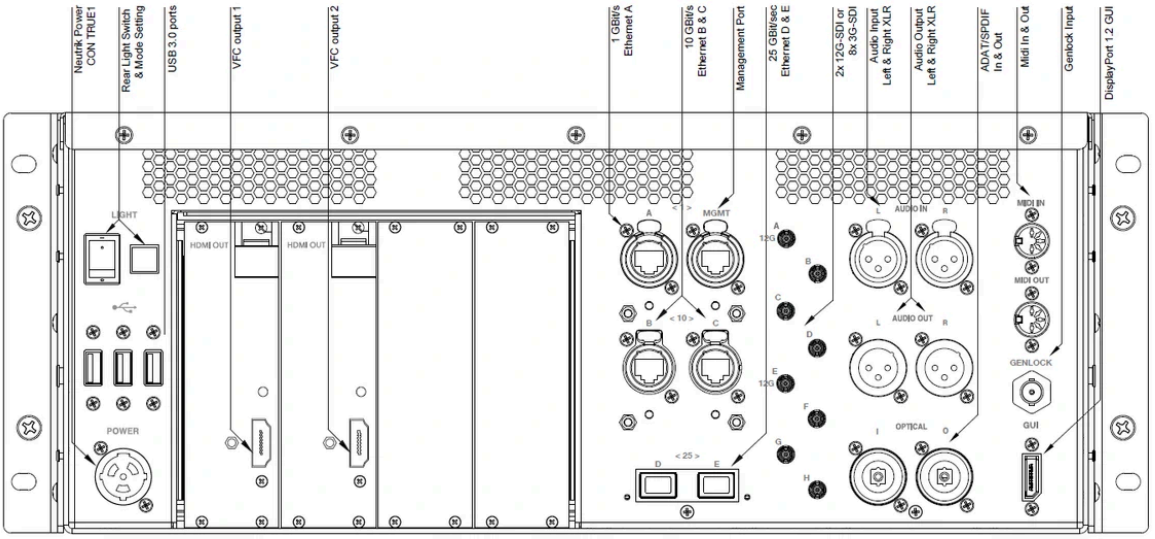
VX 2 Front Panel



VX 2 Rear Panel



VX 2 Front Panel Grill Down



VX 2 Rear Panel Annotated

VX 2 Hard Drive Configuration

> **Warning**
>
> Do not remove drives when the machine is on as data may be corrupted if this occurs.

> **Note**
>
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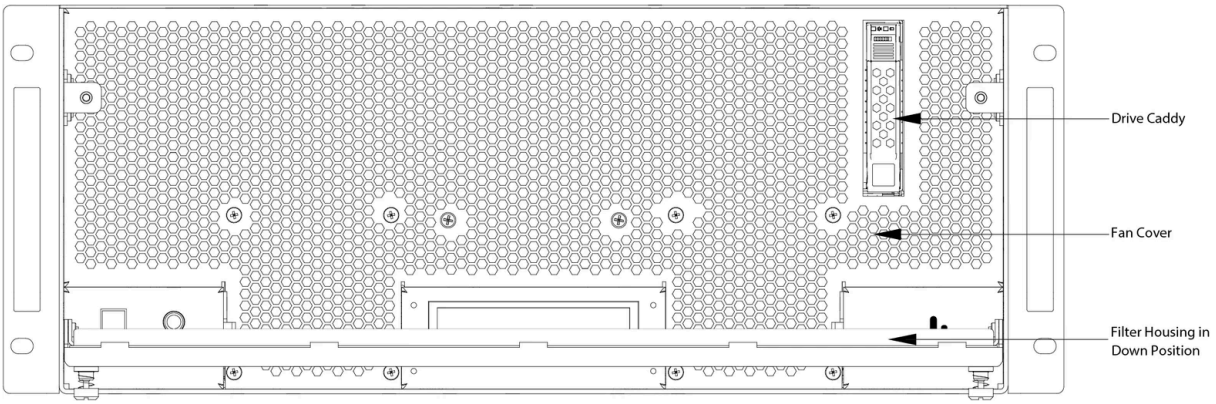
Media Drives

The VX 2 comes with 1x NVMe drive.



Location of drive bay on the unit.

VX 2 Overview



The VX 2 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback. Learn more about:

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- Video Input
- Redisguise
- Specifications
- SMC Overview

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Internal Restore Process

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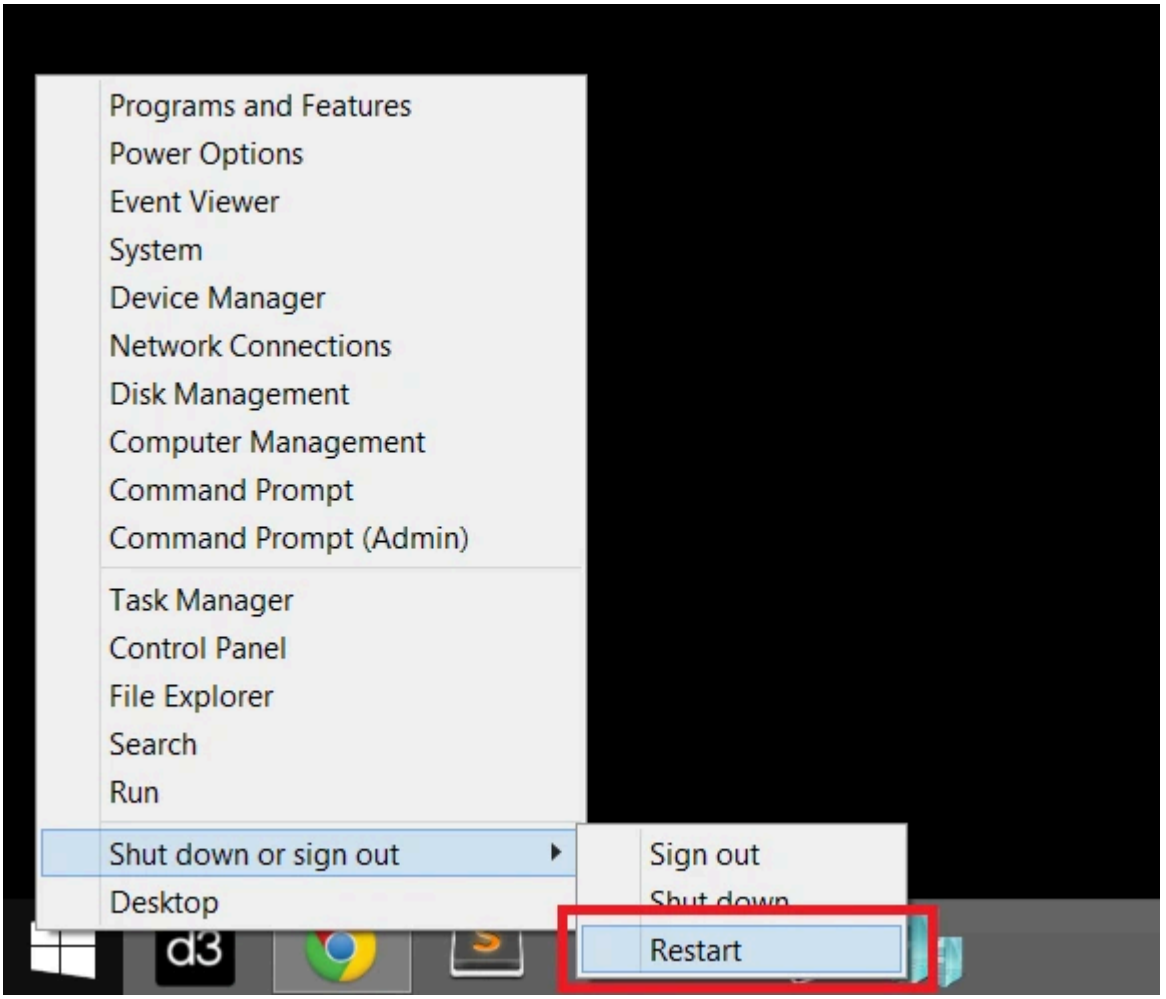
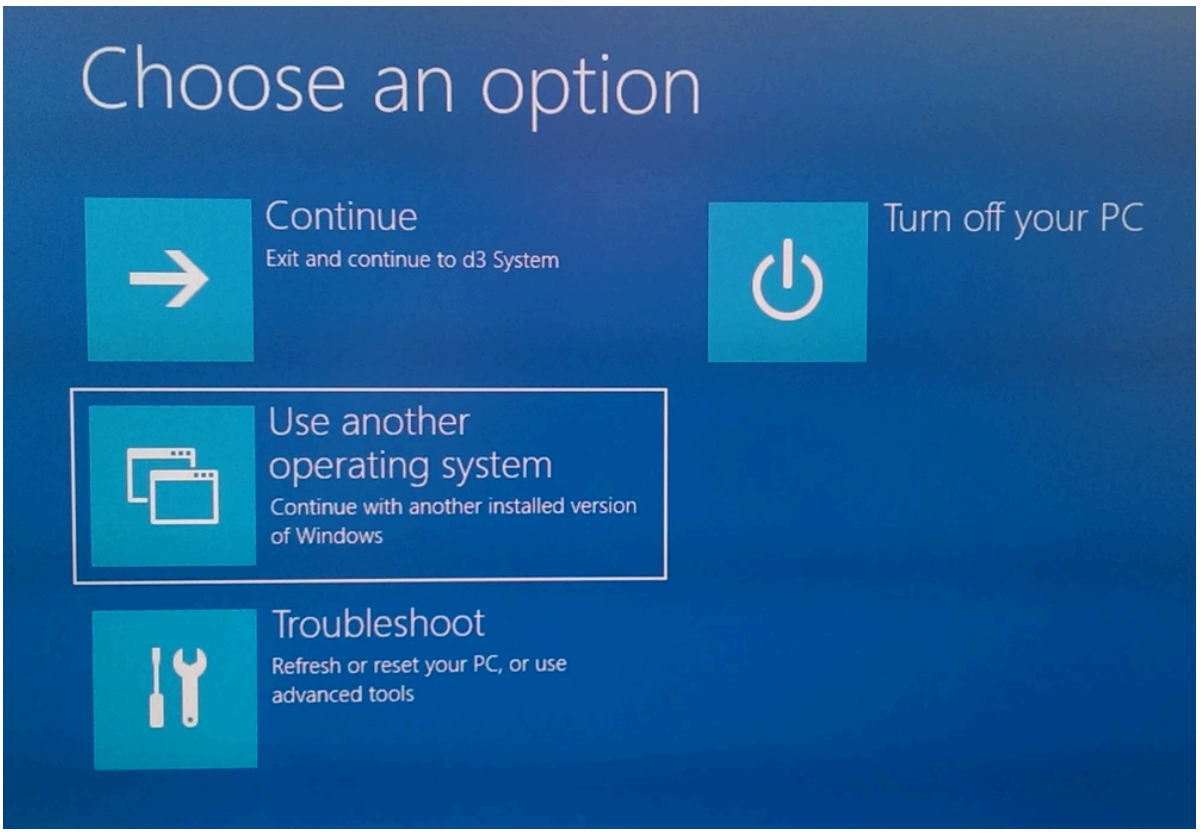
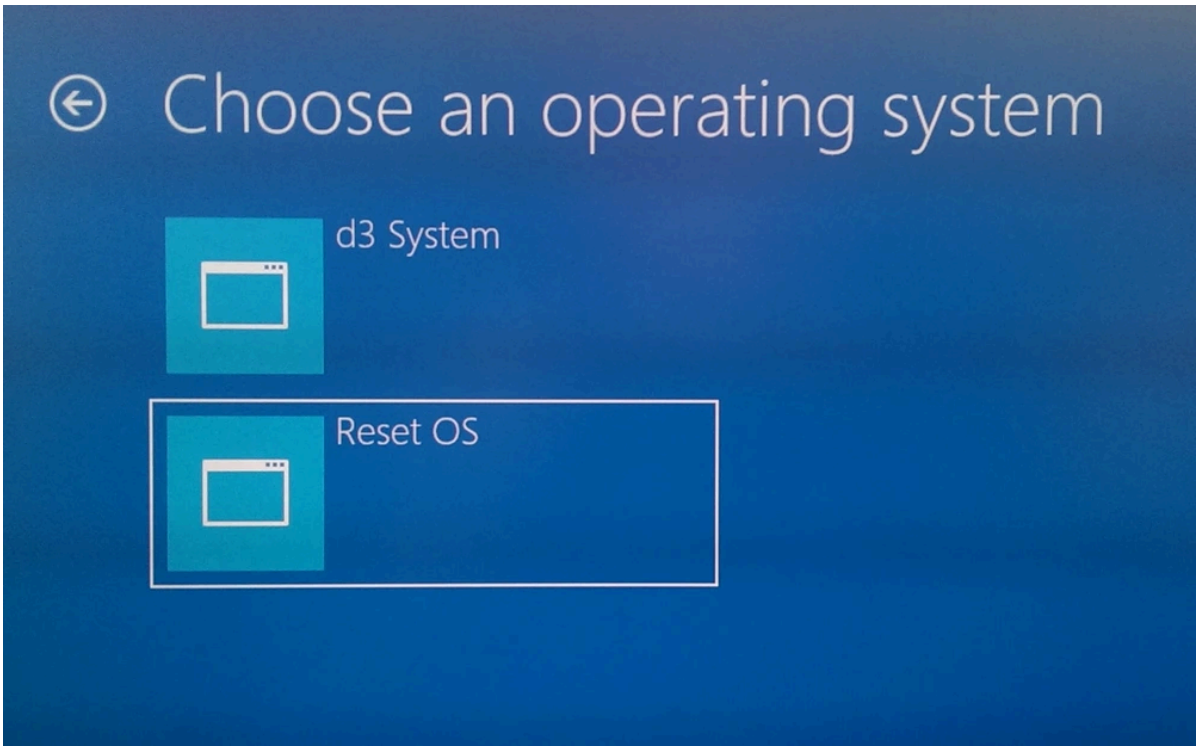


2. Select **Use another operating system**



3. Select **Reset OS**.



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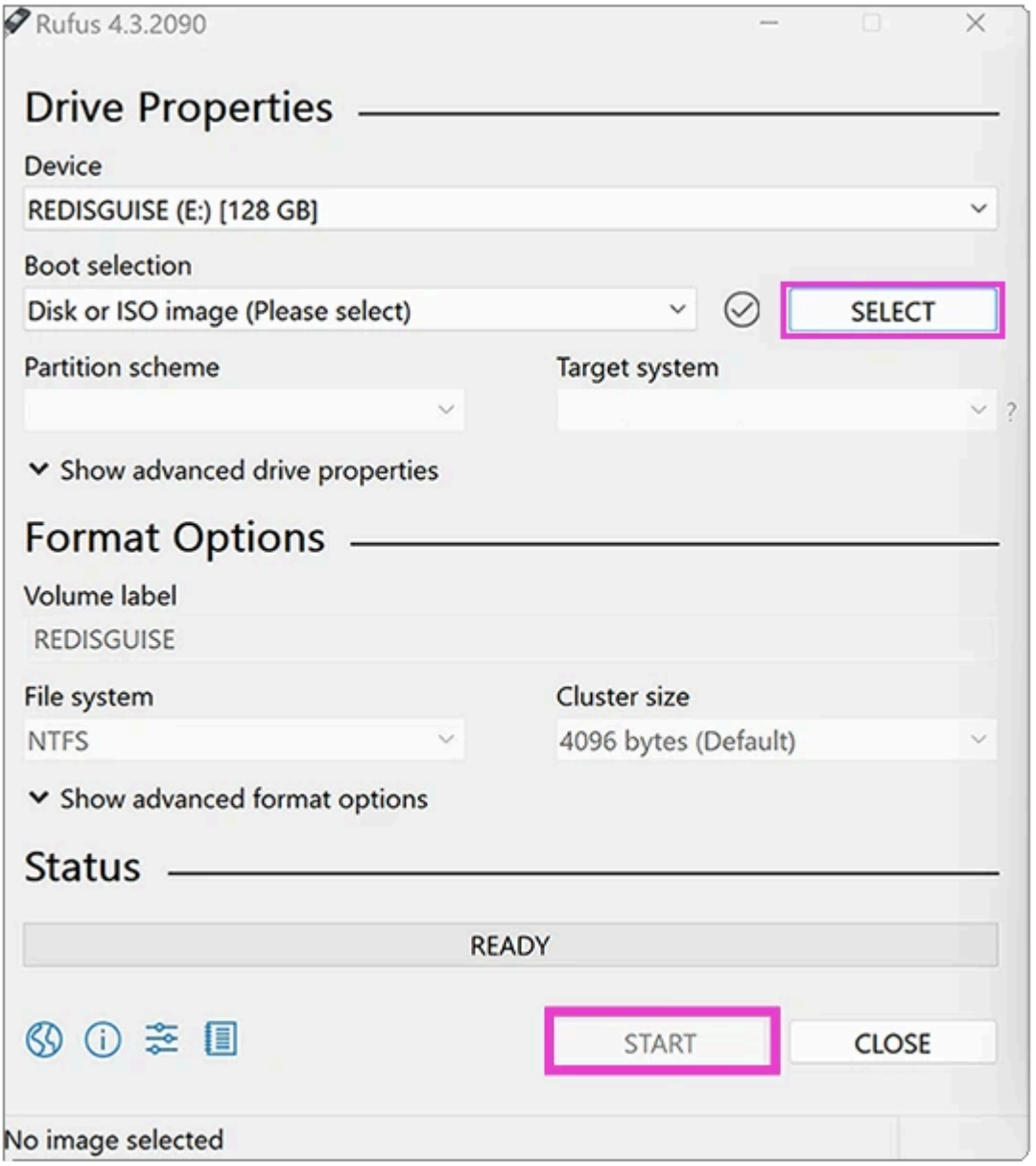
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
- **7-Zip** archive tool/file manager.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.

2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Change the Boot option #1 to the USB stick.
4. Navigate to the **Advanced tab** and press **Enter** to view the CSM Configuration and ensure that Boot option filter is set to [UEFI and Legacy]. If not, then press **F4** and change it. Confirm and re-enter BIOS.
5. Once this setting is confirmed, **navigate to the Save & Exit** tab to the right of your current tab.
6. In the **Boot Override** section, select the following option:
   `UEFI: [diskname], Partition #`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

VX 2 Specifications

Hardware Specifications

	VX 2
Voltage	115-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	374W
Heat Dissipation Peak	1,276 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	1x 3.84TB Removable NVMe SSD
Memory	48GB RAM (6x 8GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

	VX 2
Video output	1x DisplayPort 1.4 GUI (for VX 2 with backplane version 2) or 1x DisplayPort 1.2 GUI (for VX 2 with backplane version 1) 2x 4K outputs using VFC cards
Video input	2x 12G inputs or 8x 3G inputs (HD-BNC connectors)
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out

	VX 2
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in
General Network	1x 1GbE/sec 2x 10GbE/sec
High Speed Network	2x 25GbE/sec port (SFP28)
System Management Controller	1x Management Port (Ethernet)
Data/Peripherals	5x USB 3.0
Video Sync	BNC Genlock

VX 2 Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
VX 2	8	2

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 2x 2160p60 or 8x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes)
- Chroma subsampling - YCbCr 4:2:2 (all modes)
- Each SDI input supports 3G Level A and Level B when applicable
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

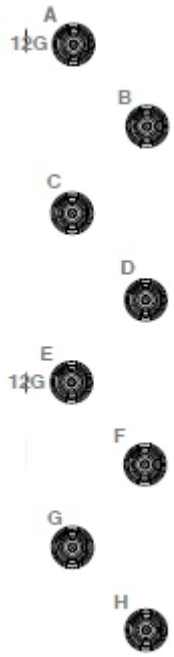
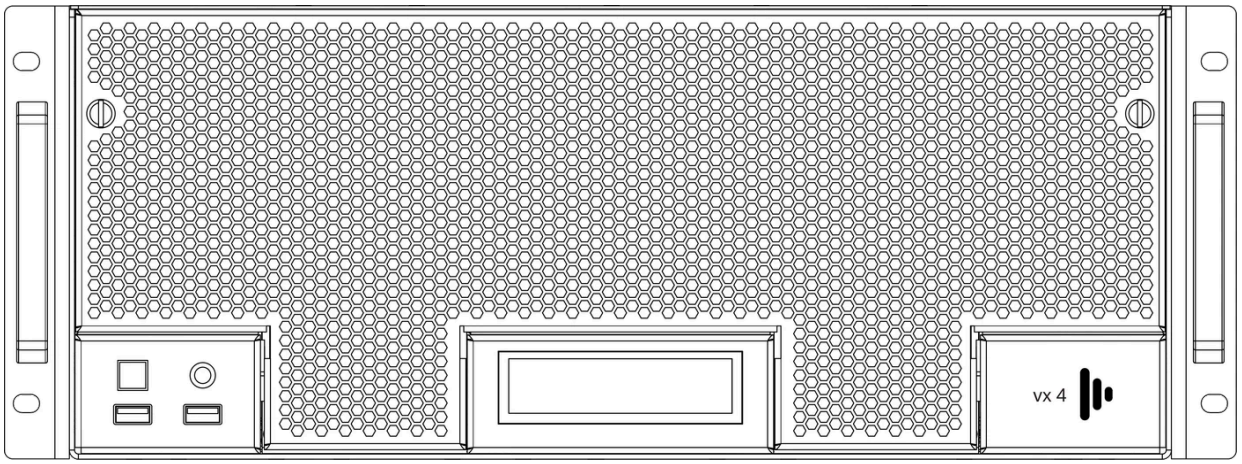
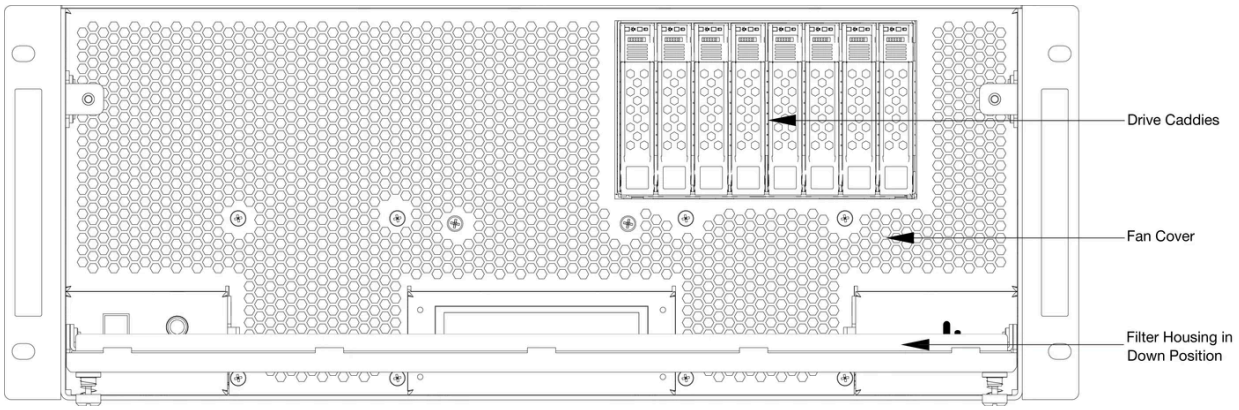


Diagram of Video Capture BNC connections on rear of a VX 2

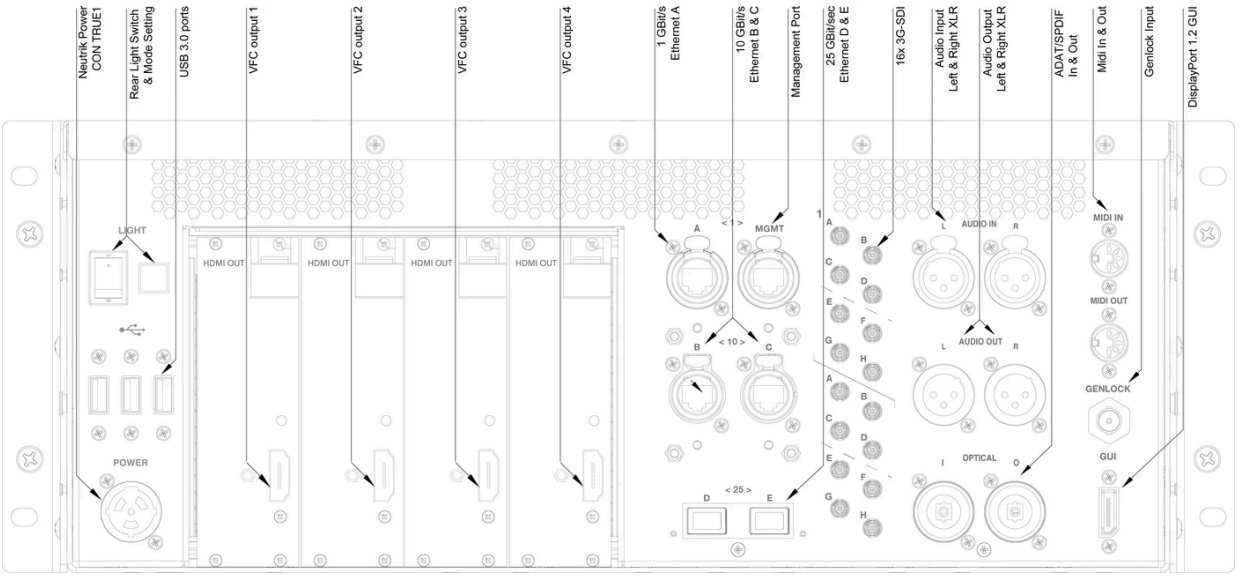
VX 4 Diagrams



Front view of VX 4



Front grill down view of VX 4



Rear view of VX 4

VX 4 Hard Drive Configuration

> **Warning**
>
> Do not remove drives when the machine is on as data may be corrupted if this occurs.

> **Note**
>
> If you ever need to replace or exchange your media drive it is recommended that you use a drive with similar read/write speeds. For further information please contact the **support team**.

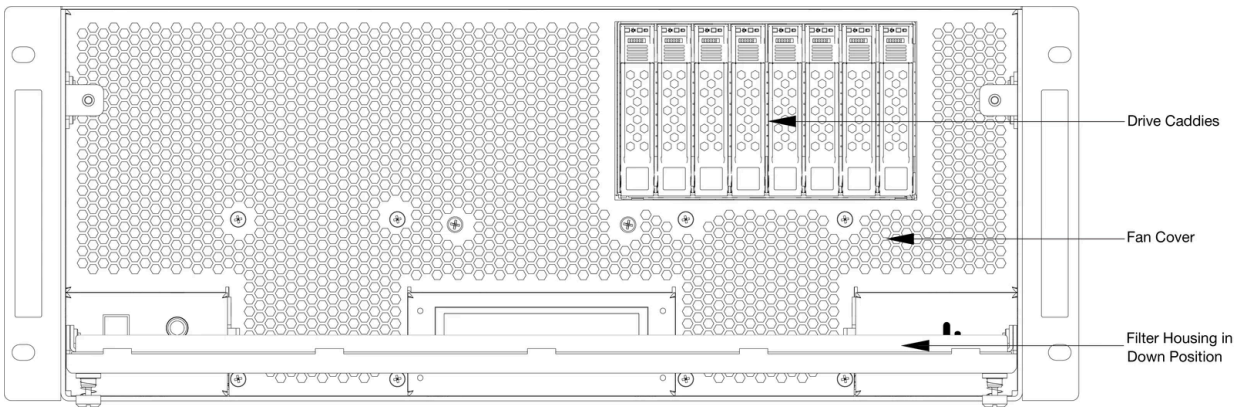
Media Drives

The VX 4 comes with 4x NVMe SSD drives.

These drives are removable from the drive bay. It is possible to user-reconfigure the RAID configuration using software in Windows to control the dedicated RAID controller hardware.

The cage contains eight caddies, four populated with 4x NVMe drives. Drives are configured as RAID10.

To reveal the drive bay undo the two thumb screws on the front of the unit. See diagram below.



Location of drive bay on the unit

VX 4 Overview

The VX 4 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.



Learn more about:

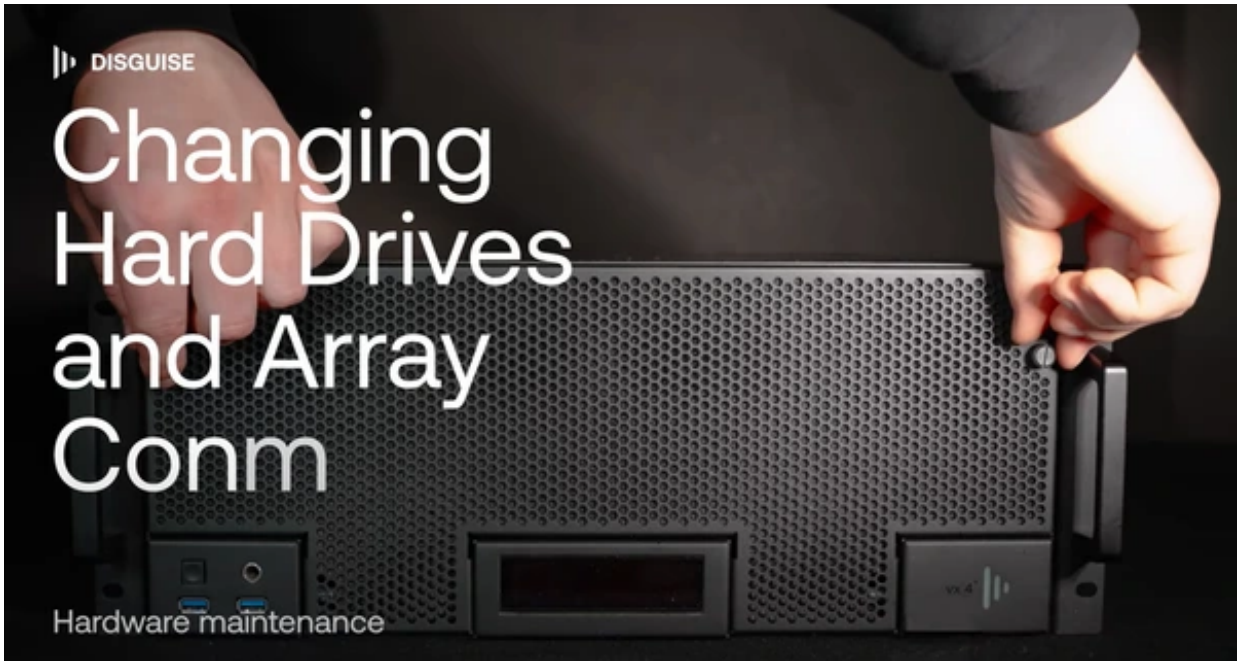
- Diagrams
- Performance
- Video Input
- Redisguise
- Specifications
- SMC Overview

For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

View the full Product information in the **Technical Specifications** PDF.

RAID Configuration

A redundant array of independent disks (RAID) is a reliable way to improve the performance and reliability of servers. The drives used in this guide were for examples and you will likely have a different setup in your RAID. If you want to know information about what drives are required/recommended then please contact the **Disguise Support team**.



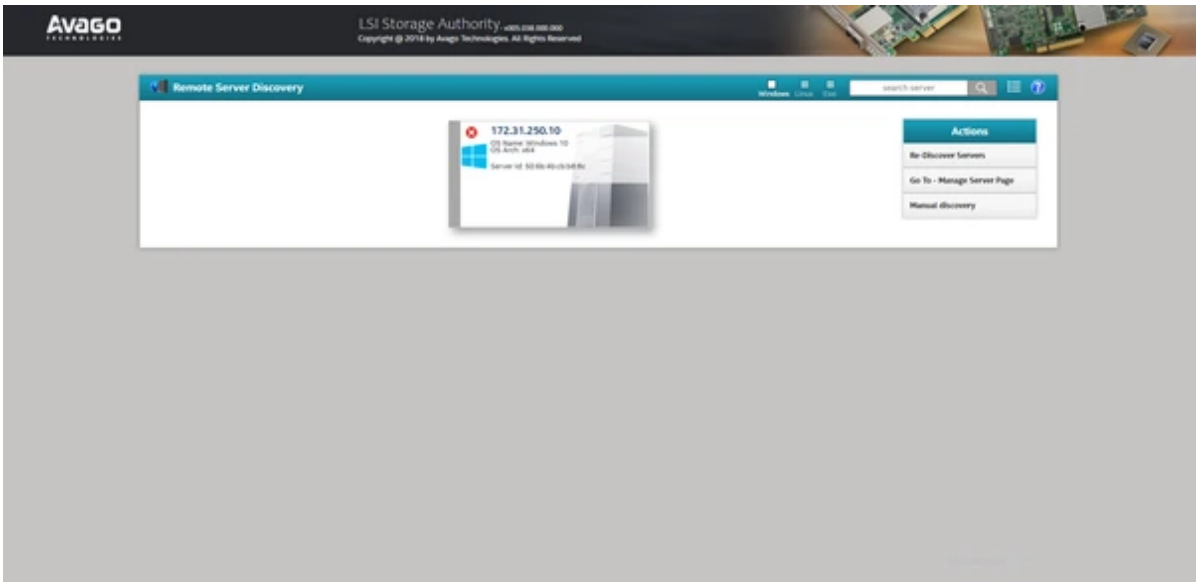
Hardware Maintenance - RAID Configuration. Click on the video image to view the view in YouTube

Logging in to the RAID controller

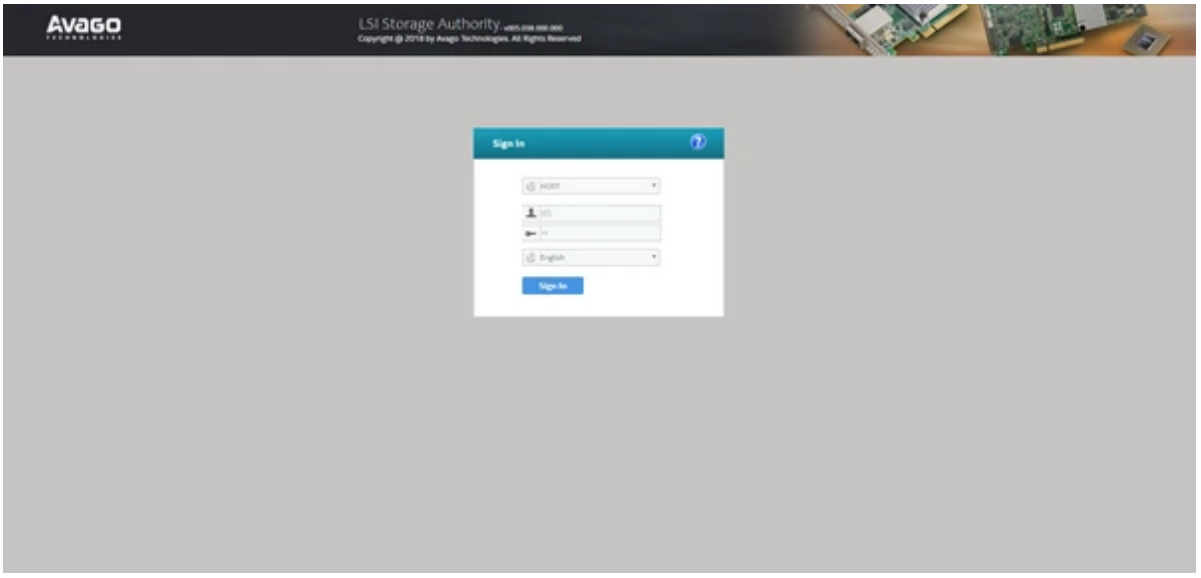
In order to login and configure your RAID, you must ensure that yourserver has a password setup for the user account.

1. Open the Windows start menu and select LSA.

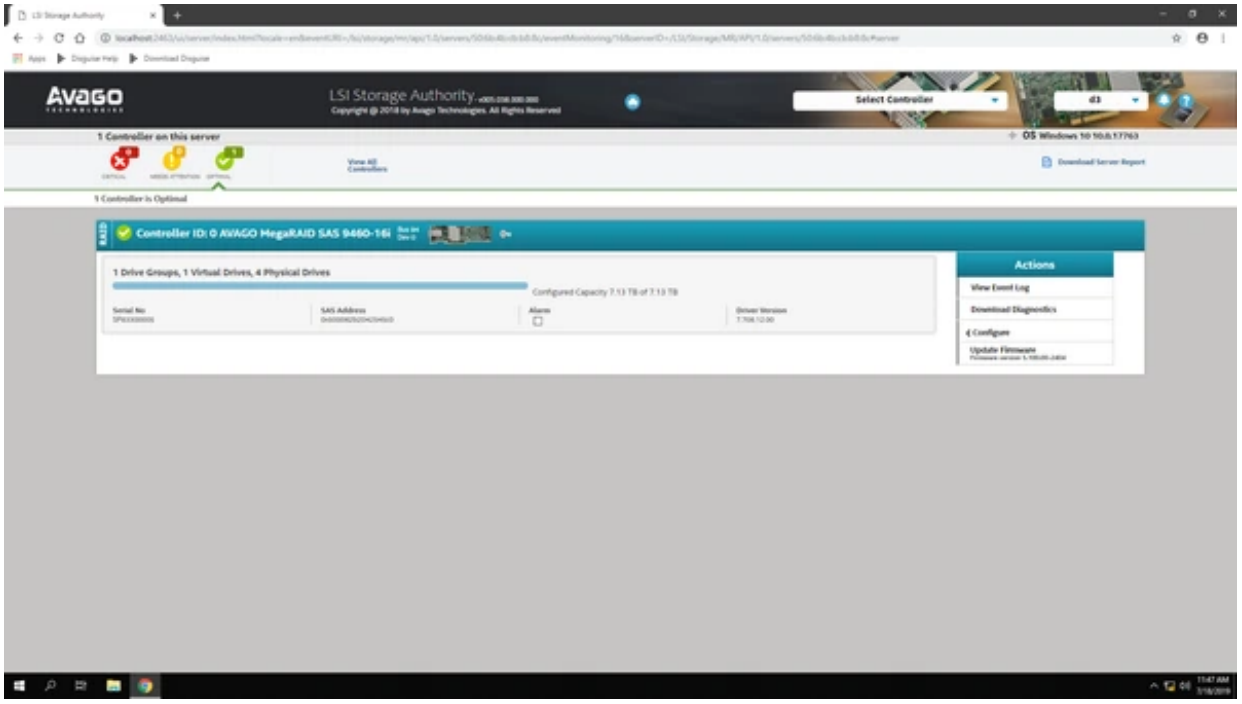
2. On the LSA landing page, select the server with your local IP address (multiple will show if on a network with more than one VX 4).



3. Enter your login details of the local user account (default is Username: d3, Password: NOT SET)

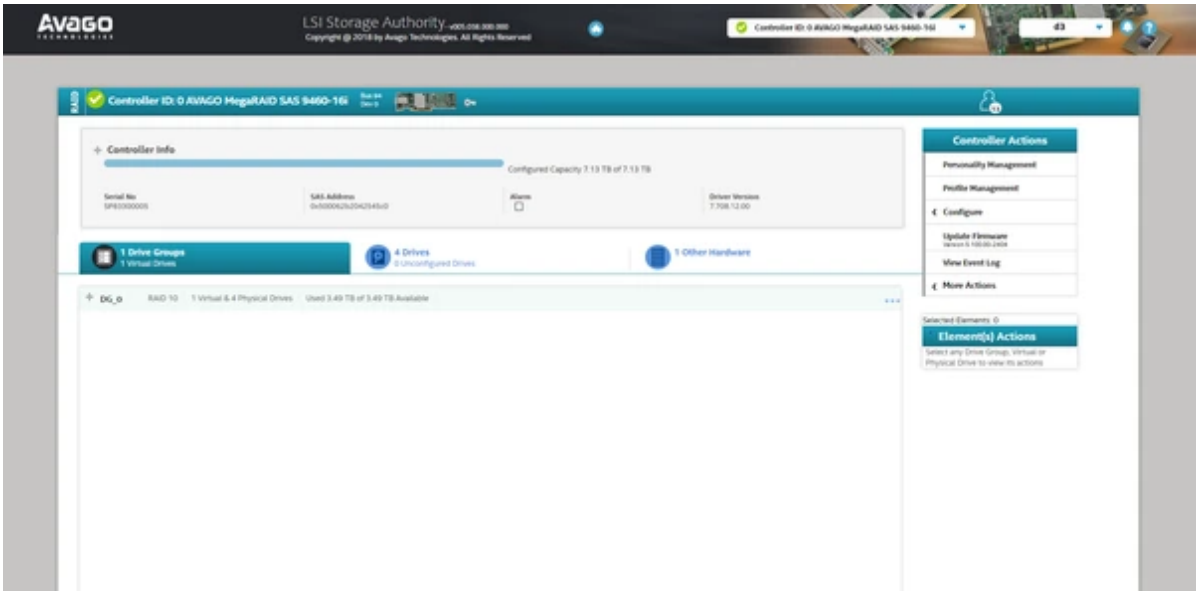


Overview of the RAID



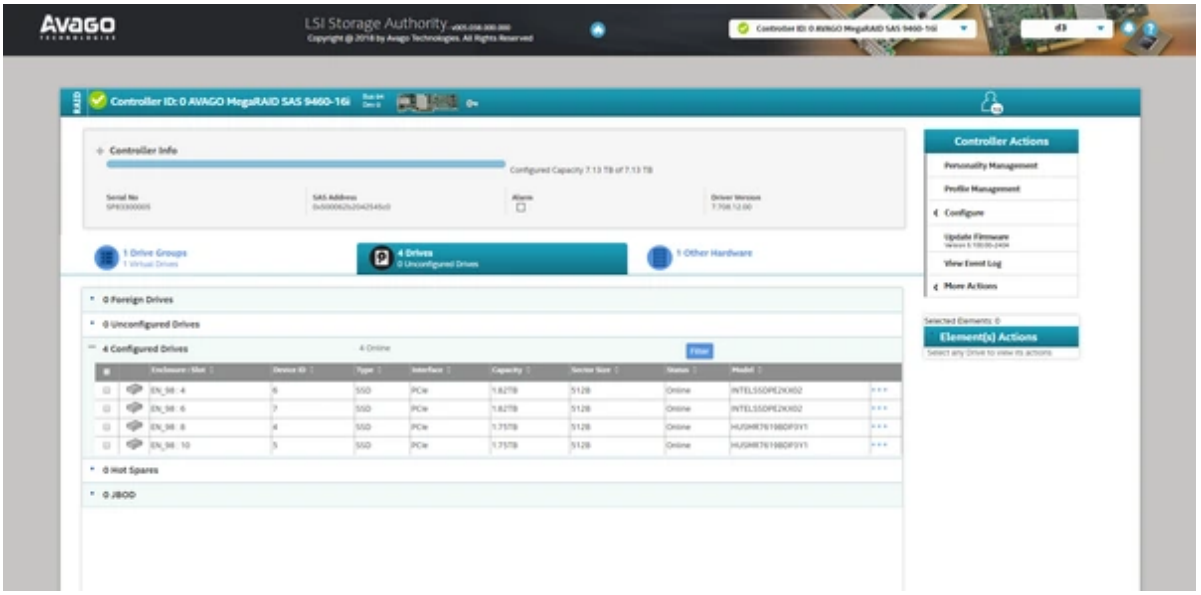
On the landing page you will see information about the controller within the system. This will alert you to any issues, the current capacity and how many drives are present.

1. Select the controller from the **Select Controller** dropdown menu at the top of the page.



2. On the controller landing page you are able to find out more detailed information about the controller itself and the drives within the system.

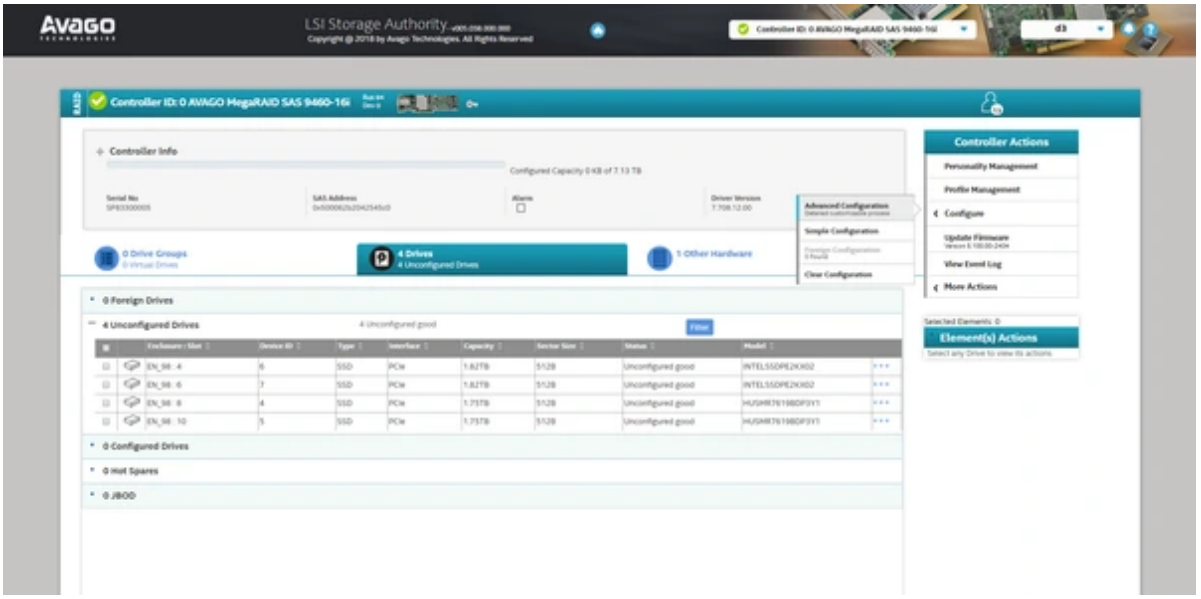
3. The first tab shown contains extra information into the Virtual Drive. RAID Level etc.



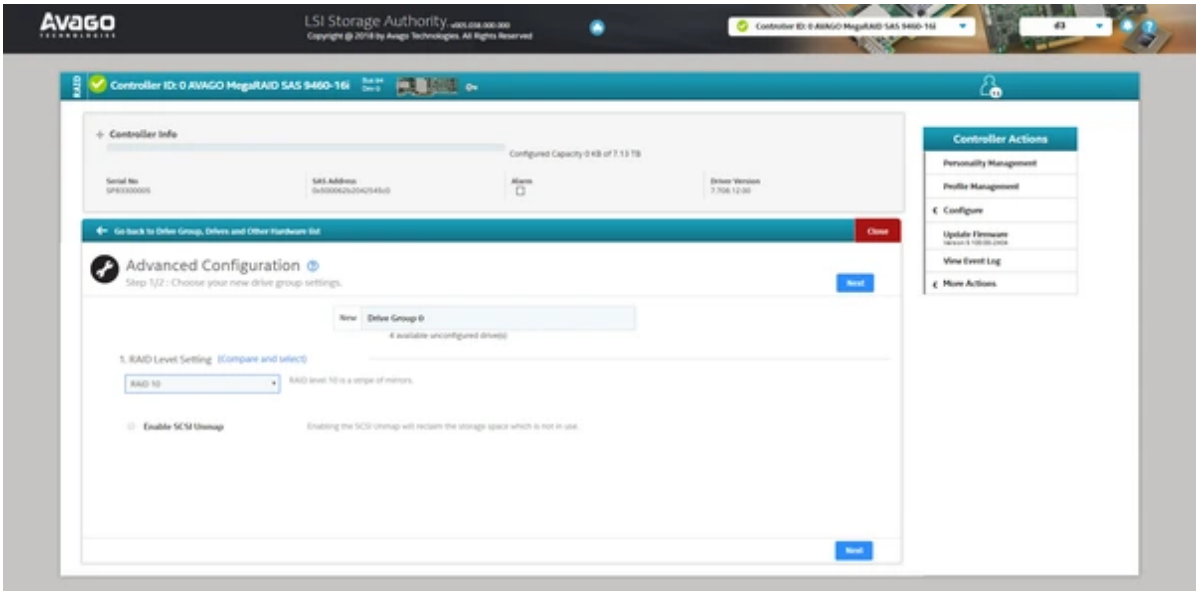
4. From the drive information page you should look to do any configuration.

Creating a RAID

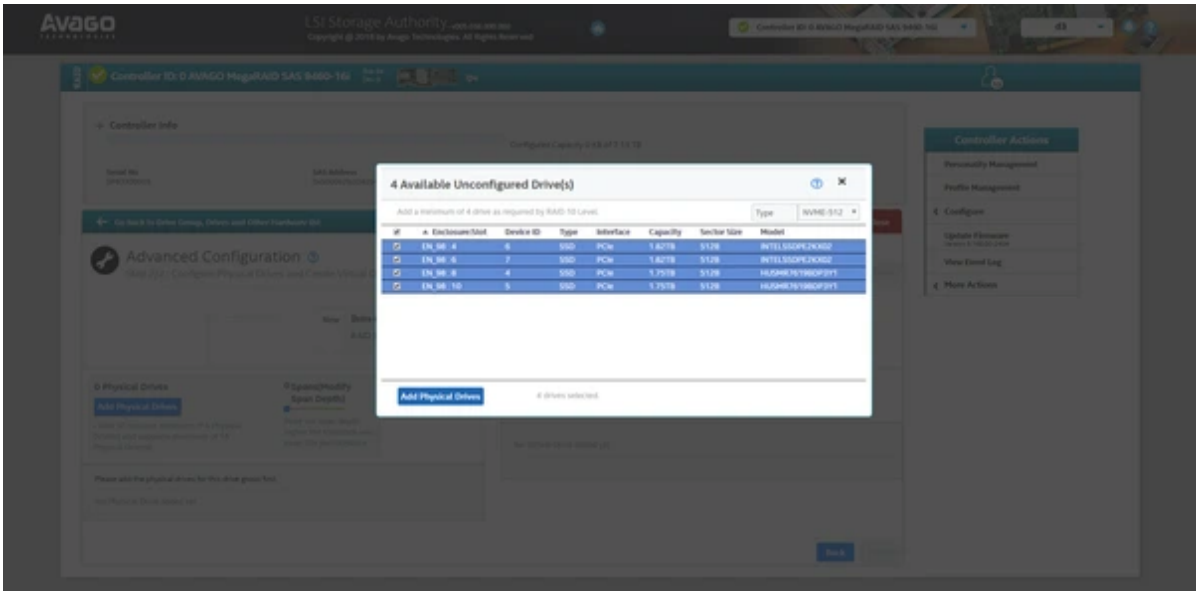
1. If you want to create a new RAID, click on the **Configure** tab on the far right of the page.
2. Select **Advanced Configuration** to ensure you get all available options.



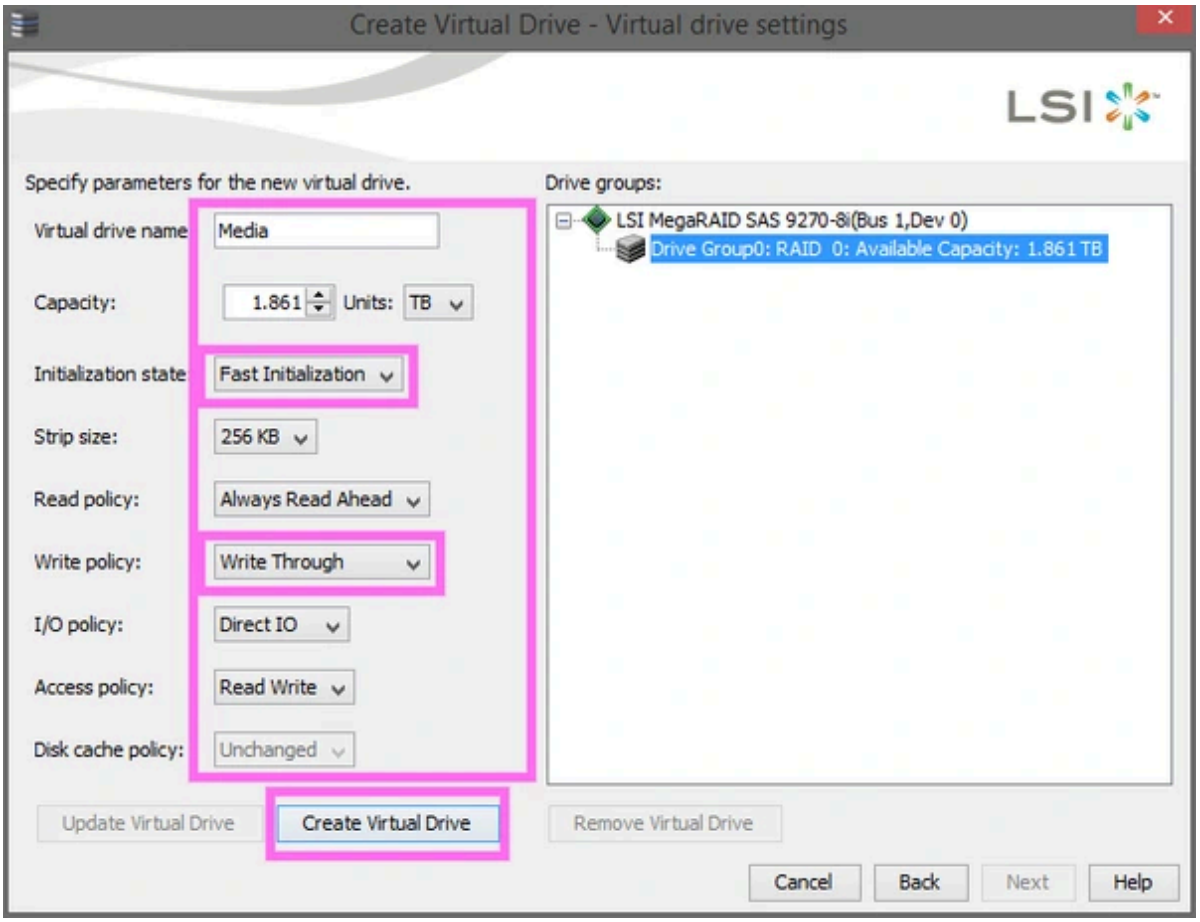
3. The default and recommended setup is RAID 10. This should be selected to meet any performance stats released by Disguise. If the RAID is set up at a different level you could be at risk of losing your data without redundancy.



4. Continue to the next page and select **Add Physical Drives** to choose which drives you are going to put into an array. RAID 10 requires a minimum of 4 drives to be set up.

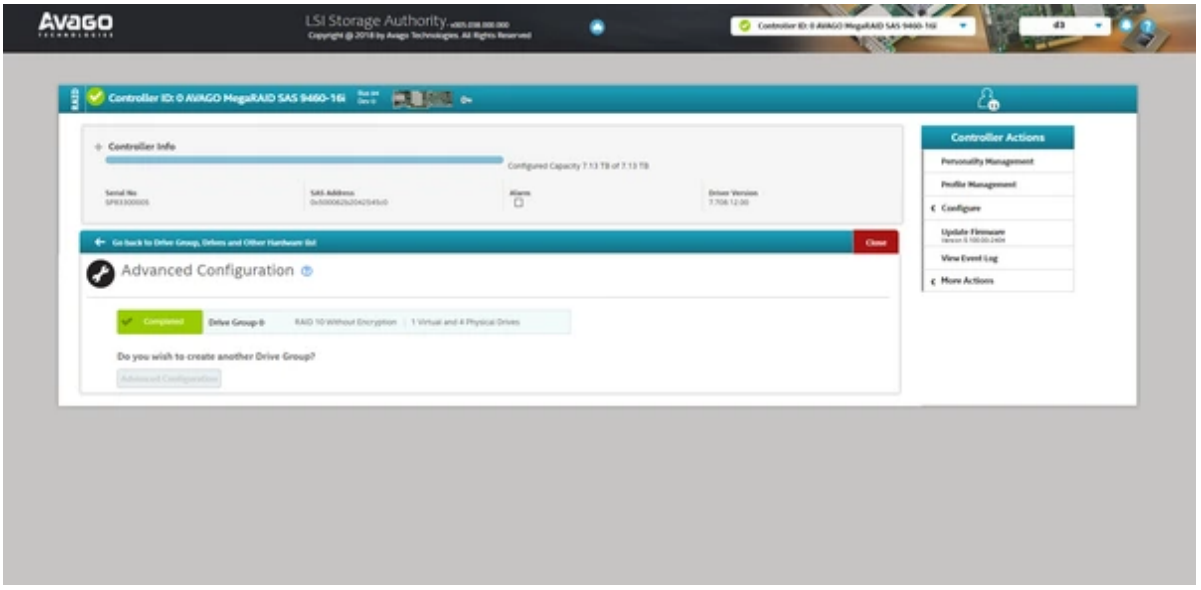


5. Once the drives have been selected, click on **Add Virtual Drives**. The default configuration is as below and should be followed to ensure no issues.
    - **Virtual Drive Name** - Media
    - **Strip size** - 256 KB
    - **Initialization State** - No Initialization
    - **Read Policy** - Always Read Ahead
    - **Write Policy** - Write Through
    - **I/O Policy** - Direct IO
    - **Disk Cache Policy** - Unchanged
6. When all settings are set. Click **Add Virtual Drives**.



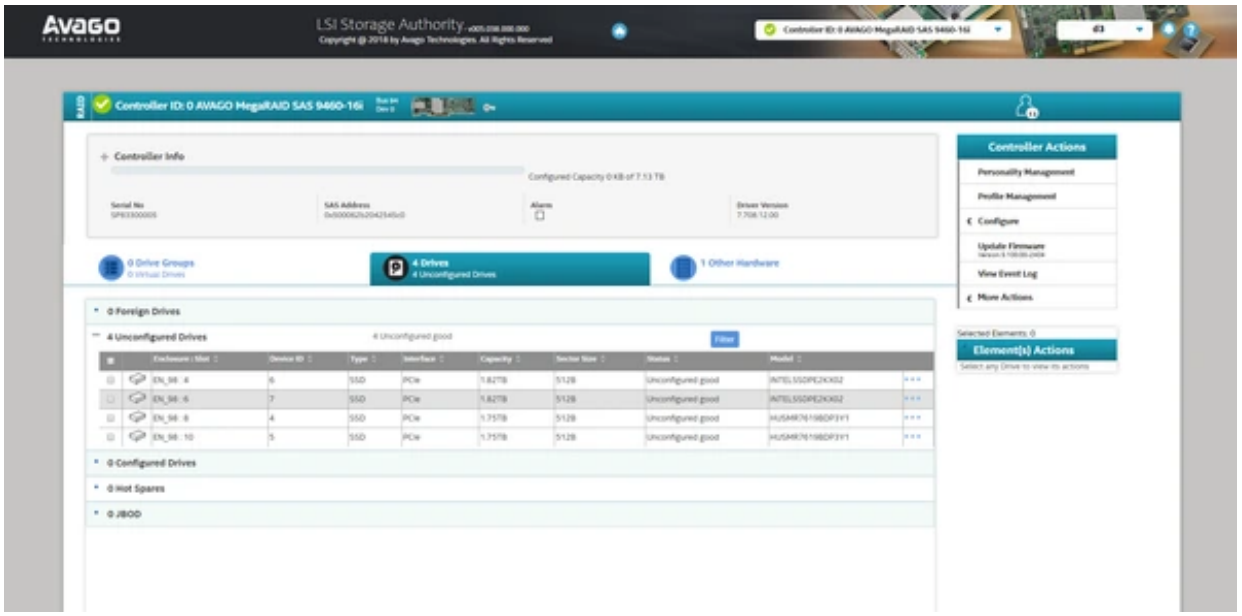
7. Continue through the wizard by selecting **Finish**.

8. You will then be presented a completion page showing the details of the configured RAID.



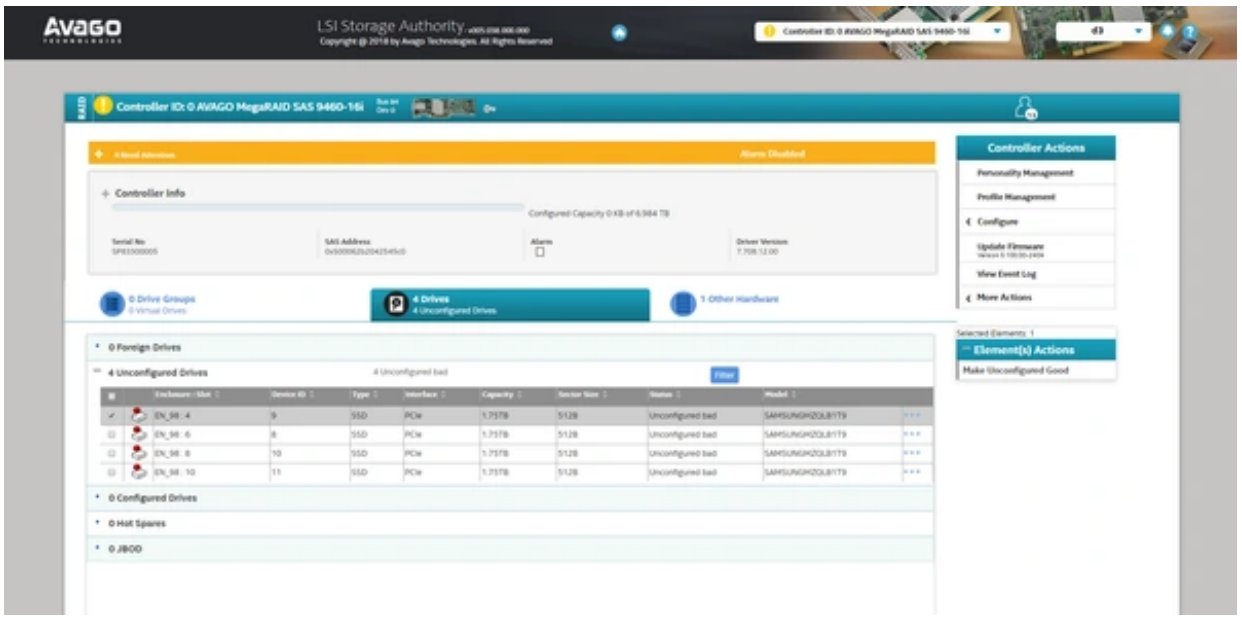
Unconfigured Good/Bad

Unconfigured Good drives are ready to be configured into a RAID.



Unconfigured Bad drives must first be made into unconfigured good drives before any configuration can be done. If a drive (or drives) is showing up as unconfigured bad then select

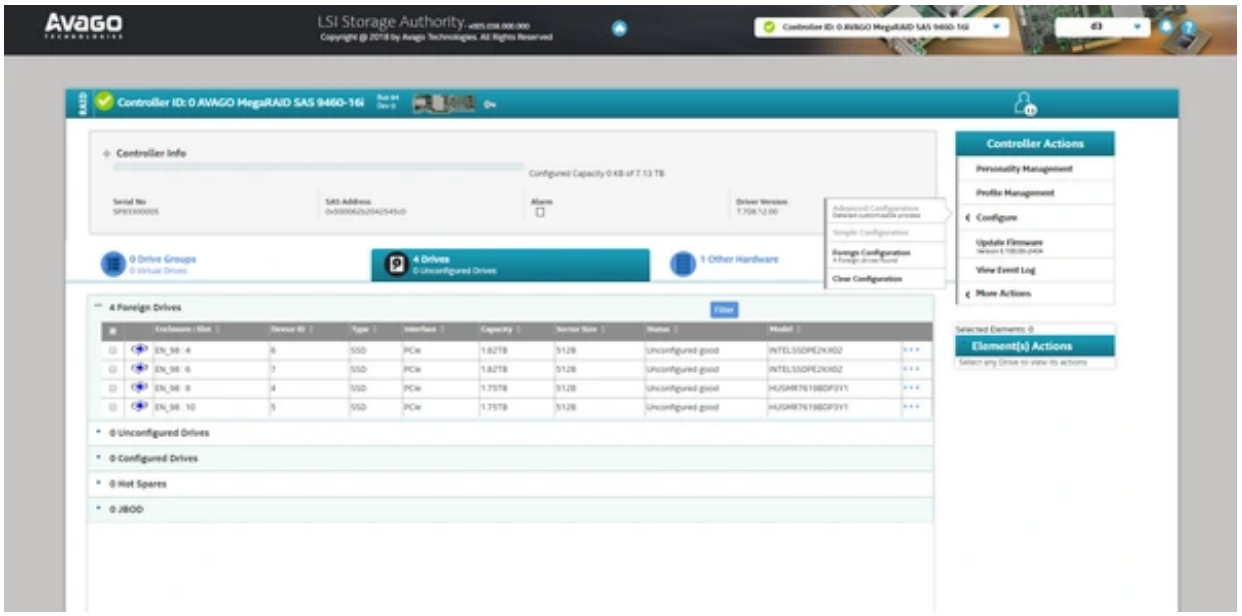
it (one by one) and click on **Make Unconfigured Good** on the right hand side.



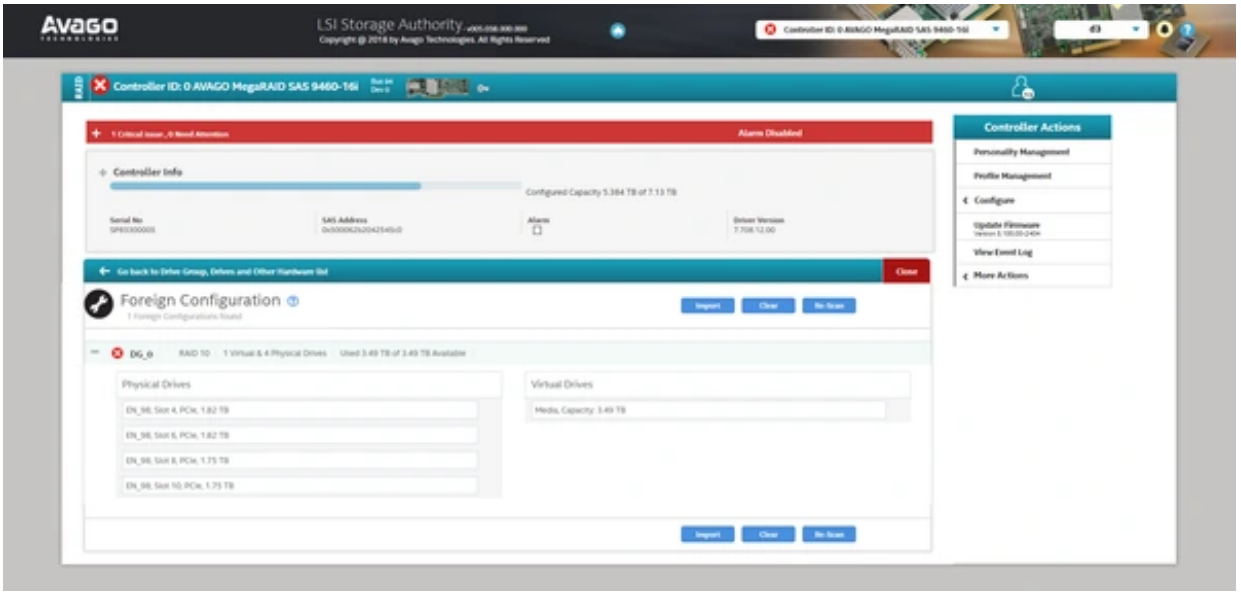
Importing Foreign Config

Drives that have been imported from another system or that have been changed from unconfigured bad may show up as foreign drives or a foreign configuration.

To import the drives, select the drives that are labelled under **Foreign Drives** and select **Configure** and **Foreign Configuration** from the right side menu.



You will then be taken to a page where you can select 'Import' to adopt the foreign configuration. Details of the Virtual Drive will be shown on this page.


LSI Storage Authority
Controller ID: 0 AVAGO MegaRAID SAS 9460-16i
Alarm Disabled
Controller Info
Controller Actions
Personality Management
Profile Management
Configure
Update Firmware
View Event Log
More Actions
Foreign Configuration
Import
Clear
Re-Scan
Physical Drives
Virtual Drives
Close

VX 4 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

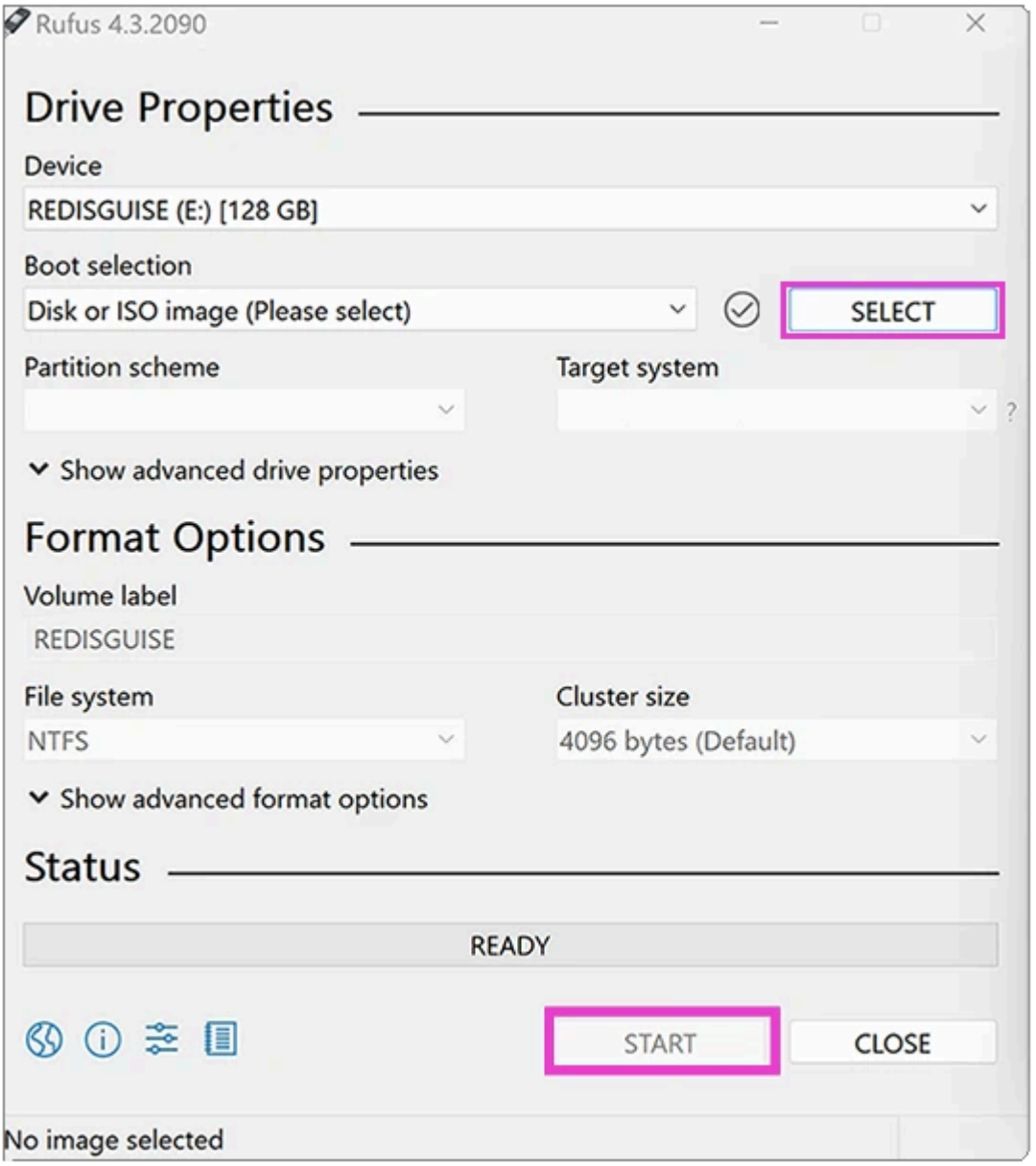
- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.
- **7-Zip** archive tool/file manager.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**..
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.

- **7-Zip** archive tool/file manager.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete key** until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Change the Boot option #1 to the USB stick.

4. Once this setting is confirmed, **navigate to the Save & Exit tab** to the right of your current tab.
5. Change Boot Option #1 to your USB thumb drive (the name will look different depending on the manufacturer of the drive).
6. Press **ESC** to return to the main section.
7. Navigate to the **Save & Exit** tab (**Do not** Save & Exit the BIOS itself).
8. In the **Boot Override** section, select the USB that matches the name of your USB manufacturer. **DO NOT** select the one that starts with UEFI.

The Redisguise process will run automatically until the re-imaging has completed [5]. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

VX 4 Specifications

Hardware Specifications

	VX 4
Voltage	115-240V, 50-60Hz*
Power Connection	Neutrik powerCON True1
Power Consumption Peak	858W
Heat Dissipation Peak	2,928 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 Enterprise GAC
Environmental Tolerances	Temperature: 5-35°C (40°-95°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	4U 19” rack mount
OS	2x Internal Storage Drives
Storage	4x 1.92TB Removable NVMe SSD (default RAID 10)
Memory	96GB RAM (6x 16GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

	VX 4
Video output	1x DisplayPort 1.4 GUI (for VX 4 with backplane version 2) or 1x DisplayPort 1.2 GUI (for VX 4 with backplane version 1) 4K outputs using VFC cards
Video input	16x 3G inputs with support for quad-3G for 4x 4K inputs (HD-BNC connectors
Optical Audio	ADAT/SPDIF (Toslink connector) - 1x in, 1x out

	VX 4
MIDI	MIDI (circular 5-pin DIN connector) - 1x in, 1x out
Audio	Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in
General Network	1x 1GbE/sec 2x 10GbE/sec
High Speed Network	2x 25GbE/sec port (SFP28) Optional upgrade: 2x 100GbE/sec port (QSFP28)
System Management Controller	1x Management Port (Ethernet)
Data/Peripherals	5x USB 3.0
Video Sync	BNC Genlock

VX 4 Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
VX 4	16	12G is only possible with Quad Link 3G-SDI for 4x 4K inputs

> **Note**
>
> It is possible to have a different format for each input. However, the limitations are a maximum of 4x 2160p60 or 16x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes).
- Chroma subsampling - YCbCr 4:2:2 (all modes).
- Each SDI input supports 3G Level A and Level B when applicable.
- All Quad Link formats support either square division or two-sample interleave (2SI) methods.

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

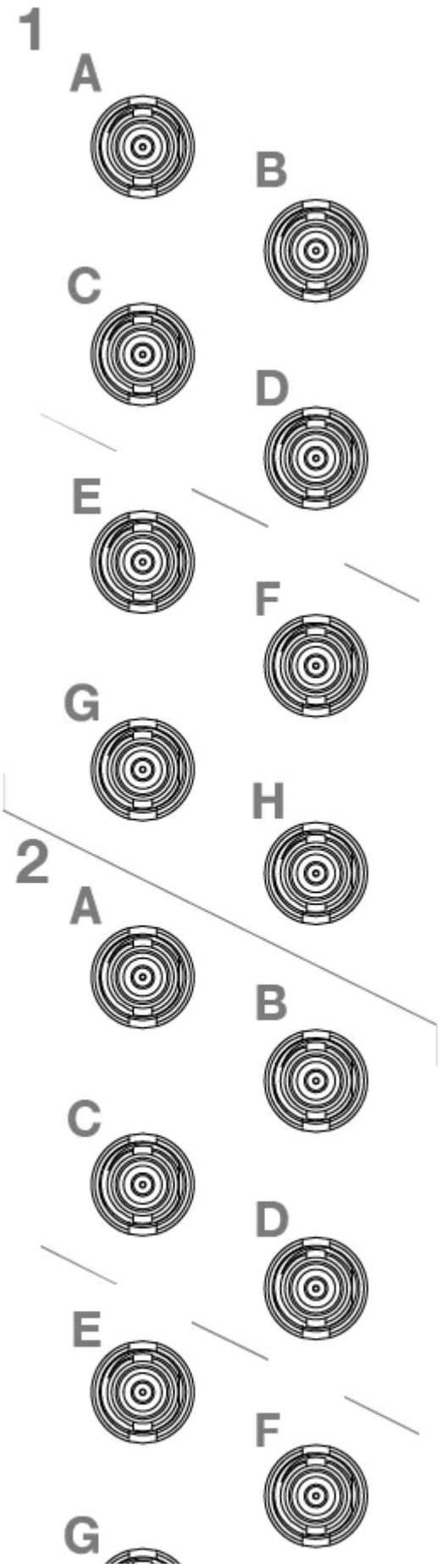
1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60,

1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout


1
A
B
C
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G
H
2
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B
C
D
E
F
G

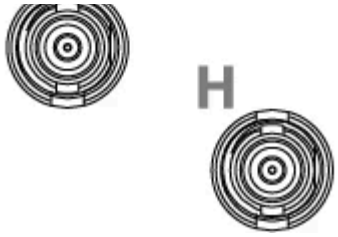


Diagram of Video Capture BNC connections on rear of unit

OmniCal Wired Kit

OmniCal is the industry-leading camera-based projector calibration system that radically improves projection quality and setup times.



Disguise OmniCal camera

A compact and robust machine vision camera based on industry-standard GigEVision protocols with PoE Ethernet connectivity and flexible lens options.

- 5.1 MegaPixel Sony IMX264 sensor
- Native resolution: 2464 x 2056
- Chroma: Monochrome
- Maximum frame rate: 23 FPS
- Sensor Type: CMOS
- Shutter mode: Global shutter
- Sensor size: Type 2/3
- Pixel size: 3.45 µm × 3.45 µm
- Interface: Gigabit Ethernet, RJ45 connector (IEEE 802.3 1000BASE-T, IEEE 802.3af PoE)
- Single camera link speed: 1 GigE

- Recommended cable category: CAT6 (CAT6A for 10G links)
- Power consumption: 2.4 W – PoE (802.3af) / PoE+ (802.3at)
- Operating temperature: +5 °C to +45 °C housing temperature
- Lens mount: C-Mount
- Thread size for camera mounting: M3
- Dimensions: 60.5 x 29.2 x 29.2 mm (including connectors, excluding mounting plate)
- Weight: 80 g

The Disguise G-507 OmniCal camera is based on the Allied Vision camera model **Mako G-507B**, using a custom firmware. Only Disguise-branded cameras **can be used with OmniCal**.

Lens Options

OmniCal cameras support the lenses listed below. Each lens is graded for 5 Megapixel cameras and has been pre-calibrated by our Engineering team:

- Fujinon 6 mm lens
- Fujinon 8 mm lens
- Fujinon 12 mm lens
- Fujinon 25 mm lens

These 4 lenses cover a wide range of indoor and outdoor, as well as short and long distance scenarios.

> **Note**
>
> If a (simulated or real) OmniCal plan cannot get a reliable calibration with any of these focal lengths, despite troubleshooting with calibration settings (e.g. due to location restrictions for camera placements), then please contact Disguise Support as early as possible, so we can assist with your setup.

Field of View for Camera Lenses

The Disguise OmniCal kits offer camera and lens options to provide various needs in terms of camera coverage and Field of View (FOV) angles.

The widest Field of View is with an OmniCal camera on a 6mm lens. The most narrow / telephoto lens option is with a 25mm lens.

Please note that the Field of View / opening angle depends on the focal length of the lens, and also the physical size of the image sensor. For example, the camera inside a mobile phone typically has a smaller image sensor compared to the OmniCal cameras; whereas professional

film or photography cameras typically have a larger sensor. Given a certain focal length, a smaller sensor will result in a smaller FOV, compared to a larger sensor.

The focal length mentioned in a lens data sheet is usually the actual value, not the 35mm-film-equivalent. Therefore focal length values can only be directly compared for cameras with the same sensor size.

OmniCal cameras have a 3.908 crop factor (compared to 35mm film) when used with the approved lenses outlined above.

All information in Designer regarding focal length, 35mm-equivalents and FOV is either editable or automatically calculated when editing a Camera in an OmniCal plan.

Focal length	Focal length 35mm equivalent	Horizontal Field of View angle
6 mm	23.4mm	~70.6 degrees
8 mm	31.3 mm	~56 degrees
12 mm	l46.9 mm	~39 degrees
25 mm	97.7 mm	~19.3 degrees

Kits

OmniCal is sold in Small and Large kits, with 4 and 8 OmniCal cameras respectively.

High-resolution lenses with 6, 8, 12 and 25 mm focal lengths are included in the kit, depending on your project needs. A total of 24 lenses are available in the Large Kit, allowing for on-the-fly customisation to ensure the perfect setup.

Small Kit

	L	W	H
Unit Dimensions	270 mm	246 mm	174 mm
Unit Weight:		3.2 kg	7.1 lbs

Contents

- **Upper Foam**: Up to 4 Disguise OmniCal Cameras
- **Lower Foam**: Up to 12 high-resolution lenses (see Lens Options).

Large Kit

	L	W	H
Unit Dimensions	380 mm	266 mm	174 mm
Unit Weight:	-	6.4 kg	14.1 lbs

Contents

- **Upper Foam**: Up to 8 Disguise OmniCal Cameras
- **Lower Foam**: Up to 24 high-resolution lenses (see **Lens Options**).

Not included

The kits do not contain network equipment like cables, network switches, or PoE injectors.

For details on the required cables and switches please see Network Setup on the next page.

Supported Cameras

Only official **Disguise cameras** are supported by OmniCal. Users do not need a special license to enable OmniCal cameras.

Off-the-shelf Allied Vision cameras are not supported.

Legacy Wireless kit with iOS app

The wireless OmniCal kit based on an iOS app is no longer supported since r19.1, see Product Compatibility table (at the bottom). Note that Apple will also remove the OmniCal iOS app from the AppStore at the end of 2025.

Further Information

- **Technical Specification Sheet**
- OmniCal Workflow Overview
- OmniCal Camera Setup

OSManagerCLI (prerelease)

> **Prerelease**
>
> Disguise OSManagerCLI is currently in prerelease, and is still in active development. The purpose of this is to evaluate the performance in real-world conditions, uncovering potential issues and gathering valuable feedback to improve the final version. See **Giving feedback** below.

What is OSManagerCLI?

Disguise OSManagerCLI is a command-line interface (CLI) that enables users to reimage any Disguise media server or node from a Windows computer, and achieves this over a local network.

OSManagerCLI works by ingesting the OS of a Disguise media server or node onto a Windows machine, which connects to the servers running in session via d3net. Users can then choose the media server(s) or node(s) that they want to reimage, and the process will complete.

OSManagerCLI reduces the number of required steps taken to complete a reimage when compared to the current USB Redisguise method. It also reduces the time spent on reimaging multiple servers or nodes at any one time as it can reimage one-to-many.

OSManagerCLI is self-contained, so it can also run from a large USB drive or external SSD. Your ingested OS Library travels with it, and it should “just work” when plugged into any Windows laptop. Just make sure the drive is large enough for all your OS images.

> **Windows only**
>
> OSManagerCLI runs on Windows laptops only.

Getting started

You will need:

- A Disguise media server or node running **Designer software version r30.2 or above** and be using a supported OS version. These can be seen in the table below:

Server	OS version
EX 2	25Q3 or later

Server	OS version
EX 2C	25Q3 or later
EX 3+	25Q3 or later
GX 3	25Q2 or later
VX 1	25Q1 or later
VX 2	25Q1 or later
VX 4	25Q1 or later
VX 4+	25Q1 or later

- A **Windows laptop/machine** (also running **Designer version r30.2 or above**), on the same network (d3Net) as the servers you want to reimage. Administration access must be authorised, and there must be sufficient disk space for the OS images that need to be ingested (each is typically 10 GB or more).

OSManagerCLI hosts a Windows network share from your laptop (eg `\\<your-laptop>\d3OsDeploymentShare`) that your servers pull the OS from during their reimage. The first time it runs, it checks (and, if needed, adjusts) a couple of Windows file-sharing settings for you so this works smoothly.

First time installation

1. **Download and extract:** Download the **latest OSManagerCLI_v1.12.zip** and extract `OSManagerCLI.exe` from it. That single file is all you need.
2. **Install and run:** Save `OSManagerCLI.exe` into any folder on your Windows laptop (or even an external SSD), then double-click it. On first launch it sets everything up for you, creating `config`, `logs`, `resources` and `d3OsDeploymentShare` folders alongside the exe, and adds a shortcut to your Start Menu.
3. **Ingest an OS:** Download the **Hardware OS Images** that you need. Then press the letter `O` to select **Choose OS**, then ingest an OS image
4. **Choose your server:** Press `A` to select **Choose Actor**. OSManagerCLI scans d3Net and lists the servers it finds (you can also add one directly by hostname or IP).
5. **Start a Redisguise:** With an OS and a server selected, press `R` to select **Start a Redisguise**. The server reboots, pulls the OS from your laptop over the network, and reimages itself. **Keep your laptop powered on and connected** to the network until the Redisguise finishes. The server pulls the OS from it during its reimaging cycle.

Upgrading to newer OSManagerCLI versions

We will be updating OSManagerCLI from time to time. Please follow these steps to update:

1. Delete the old `OSManagerCLI.exe` file and drop the new version in its place.
2. Leave everything else (your `config`, `logs`, ingested OS Library, etc) untouched.

See the Release notes for what's changed in each version.

Giving feedback

OSManagerCLI is under active development and your feedback directly shapes it. We're especially keen to hear about usability, anything that confuses you, and of course any bugs.

Please share any feedback with **product-team@disguise.one**. When you get in touch, please:

- Describe what you were doing, what you expected, and what actually happened.
- **Zip up your `logs` folder** (it sits next to the exe) and attach it. It helps us get to the bottom of issues quickly.

See also

- Command line & exit codes — advanced/automated use and what each exit code means.
- Release notes — what's new in each version.

OSManagerCLI Release Notes

> **Tip**
>
> To upgrade, just replace your old `OSManagerCLI.exe` with the new one. See Upgrading.

v1.12 — 01/Jul/2026

- **Safe reimaging.** OSManagerCLI now re-checks for any networking changes immediately before a Redisguise to ensure the correct machine gets reimaged.
- **Diagnosing networking issues.** OSManagerCLI now diagnoses any API connection issues thoroughly, giving much clearer feedback about how to resolve them.
- A stray click can no longer pause the program. The console's Quick-Edit / "Select" mode is disabled, so accidentally clicking in the window won't silently freeze the app mid-run.
- Smarter network-address selection when a machine has more than one IP address.
- New `-Help` parameter prints usage instructions directly on the command line.
- Added a reminder not to disconnect the network for 10 minutes after starting a Redisguise.

v1.11 — 12/Jun/2026

- **More robust hands-free (command-line) reimaging.** When driven from the command line, OSManagerCLI now checks your inputs up front (for example, confirming the `-IngestOSFilePath` file exists before it starts) and exits cleanly with the relevant code at every step. See Command line & exit codes.
- **Meaningful exit codes.** OSManagerCLI now returns a specific exit code for every outcome, so scripts and automation can tell exactly how a run ended. Look any code up with the new `-DescribeExitCode <n>` flag, or list them all with `-ListExitCodes`.
- New `-Version` parameter prints just the version number, handy for scripting and support.
- Reliability improvements for Windows 10 servers.
- Running hands-free (with `-MachineToReimageHandle`) no longer adds or updates a Start Menu shortcut.

v1.10 — 13/Apr/2026

- The Start Menu shortcut is now only added or updated for a **local install**. Running from a removable/USB drive no longer touches your Start Menu.

- You can now run **multiple instances** on one laptop, for example a local install on your C: drive and a portable copy on an External SSD. Your laptop hosts a separate share for each (`\\<your-laptop>\d3OsDeploymentShare`, `\\<your-laptop>\d3OsDeploymentShare2`, and so on), and the correct share is always used when requesting a reimage, so there are no conflicts.
- On start-up, OSManagerCLI now checks Windows Group Policy to make sure **Guest is not blocked** under *Local Policies → User Rights Assignment → Deny access to this computer from the network*, so that the actors being reimaged can reach the deployment share.

v1.9 — 09/Apr/2026

- Automatically warns about (and corrects) your Windows settings if **Password Protected Sharing** isn't already disabled.
- Performs a **disk-space check** before ingesting a new `.iso` or `.os` file.
- Cleans up properly after a failed ingestion.
- Returns to the **Main Menu** (instead of the OS menu) after a successful ingestion.

v1.8 — 02/Apr/2026

- Added a title bar and clearer visibility of which version you're running.
- Fixed a bug (introduced in v1.7) that prevented the exe from running when placed in the root directory of a drive.

v1.7 — 30/Mar/2026

- Initial release.

OSManagerCLI Command Line & Exit Codes

> **Note**
>
> This reference is for advanced users who want to automate it or interpret an exit code.

Command-line (headless) use

As well as double-clicking the .exe and walking through its interactive menus, OSManagerCLI can run a 'hands-free' reimage as part of one of your automation scripts, straight from the command line:

```
.\OSManagerCLI.exe -PreIngestedOSFileHandle 'gx3p_25Q3_f0885a6e' -MachineToReima
geHandle 'gx3p-42123'
```

You can tell if a reimage was successful or not by checking the exit code (`0` means success).

```
.\OSManagerCLI.exe -PreIngestedOSFileHandle 'gx3p_25Q3_f0885a6e' -MachineToReima
geHandle 'gx3p-42123'
$reimageSuccessExitCode = $LASTEXITCODE

if( $reimageSuccessExitCode -eq 0 ) {
  Write-Host "Reimage Was Successful"
}
else {
  $exitCodesMeaning = & .\OSManagerCLI.exe -DescribeExitCode $reimageSuccessExit
Code
  Write-Host "Reimage Failed with Exit Code $reimageSuccessExitCode, which mean
s: $exitCodesMeaning"
}
```

OSManagerCLI requires Administrator rights, so it relaunches itself in a new elevated window if you are not already running in a Terminal '(As Administrator)'. If you are in a non-elevated session, to capture its exit code from a script, start it elevated and wait for it to finish:

```
$run = Start-Process .\OSManagerCLI.exe `
  -ArgumentList '-PreIngestedOSFileHandle','gx3p_25Q3_f0885a6e','-MachineToReima
geHandle','MYSERVER' `
  -Verb RunAs -Wait -PassThru

$reimageSuccessExitCode = $run.ExitCode   # 0 = success; see the tables below
Write-Host "Exit Code Was: $reimageSuccessExitCode"
```

Parameters

Parameter	Description
`-IngestOSFilePath <path>`	Ingest the OS image at `<path>` (an `.iso` or `.os` file) into your OS Library.
`-PreIngestedOSFileHandle <handle>`	Use an OS you've already ingested, identified by its handle (the name shown in the OS list). Requires `-MachineToReimageHandle`.
`-MachineToReimageHandle <hostname>`	The server (Actor) to reimage. Requires an OS source: one of the two parameters above must be set.
`-Help`	Print usage for every parameter, then exit.
`-Version`	Print just the version number of the current .exe (e.g. `1.12`), for easy scripting, then exit.
`-DescribeExitCode <n>`	Print the name and meaning of a single exit code, then exit.
`-ListExitCodes`	Print the full exit-code table, then exit.

A few rules the tool enforces:

- `-IngestOSFilePath` and `-PreIngestedOSFileHandle` can't be used together. They're two ways of choosing the same thing.
- `-MachineToReimageHandle` needs an OS source as well.
- `-PreIngestedOSFileHandle` needs `-MachineToReimageHandle`.

Examples

```
# Ingest an OS only
OSManagerCLI.exe -IngestOSFilePath "D:\OSImages\gx3p_25Q3_f0885a6e.iso"

# Reimage a server using an OS you've already ingested
OSManagerCLI.exe -PreIngestedOSFileHandle gx3p_25Q3_f0885a6e -MachineToReimageHa
ndle MYSERVER

# Ingest an OS and reimage a server in one go
OSManagerCLI.exe -IngestOSFilePath "D:\OSImages\gx3p_25Q3_f0885a6e.iso" -Machine
ToReimageHandle MYSERVER
```

Exit codes

OSManagerCLI returns a meaningful exit code so that scripts (and you) can tell exactly how a run ended. `0` means success; anything else indicates why it stopped.

> **Tip**
>
> Run `OSManagerCLI.exe -ListExitCodes` (or `-DescribeExitCode <n>`) at any time to print this information directly from the tool.

Success

Code	Name	Meaning
0	`Success`	Completed successfully, or you quit normally.

Command-line parameters (100–199)

Code	Name	Meaning
100	`ParamMutuallyExclusiveSources`	`-IngestOSFilePath` and `-PreIngestedOSFileHandle` were both supplied (use only one).
101	`ParamMachineHandleNeedsOsSource`	`-MachineToReimageHandle` was supplied without an OS source.

Code	Name	Meaning
102	`ParamPreIngestedHandleNeedsMachine`	`-PreIngestedOSFileHandle` was supplied without `-MachineToReimageHandle`.

Start-up & environment (200–299)

Code	Name	Meaning
200	`ConfigInvalidJson`	The config file contains invalid JSON.
201	`NoDeploymentShareFolderSelected`	No OS Library (deployment share) folder was selected.
202	`DeploymentShareSetupFailedAsAdmin`	Deployment share setup failed while running as Administrator.
203	`DeploymentShareSetupNeedsAdmin`	Deployment share setup is incomplete and needs Administrator rights.
204	`SevenZipMissingUserDeclined`	7-Zip wasn't found and you chose not to continue without it.
205	`D3ServiceMissingUserDeclined`	d3Service wasn't detected and you chose not to continue without it.
206	`PasswordProtectedSharingGuestMissing`	Password Protected Sharing couldn't be disabled (the built-in Guest account wasn't found).
207	`PasswordProtectedSharingUserDeclined`	You declined to disable Password Protected Sharing (which requires enabling the Guest account).
208	`GuestNetworkAccessPolicyUndetermined`	Couldn't determine the Windows Guest network-access policy.
209	`GuestNetworkAccessUserDeclined`	You declined the Windows policy change that lets servers reach the deployment share on your laptop.
210	`LocalD3ServiceVersionTooLow`	The d3/Designer version installed on this machine is below the minimum required.
211	`D3InstalledButServiceNotRunning`	d3/Designer is installed on this machine but the d3Service process isn't running, so the local API is unreachable.

OS selection, headless (300–399)

Code	Name	Meaning
300	`HeadlessOsHandleNotFound`	The pre-ingested OS handle wasn't found in your OS Library.

Code	Name	Meaning
301	`HeadlessOsLibraryEmpty`	Your OS Library is empty (nothing has been ingested yet).

Ingesting an OS, headless (400–499)

Code	Name	Meaning
400	`HeadlessIngestSevenZipPathNotSet`	The 7-Zip path isn't set in the config.
401	`HeadlessIngestSevenZipPathInvalid`	The configured 7-Zip path doesn't exist.
402	`HeadlessIngestArchiveUnreadable`	7-Zip couldn't read the archive (invalid or corrupt file).
403	`HeadlessIngestNotEnoughDiskSpace`	Not enough disk space to extract the archive.
404	`HeadlessIngestCreateDirFailed`	Couldn't create the OS Library destination folder.
405	`HeadlessIngestExtractionFailed`	7-Zip returned an error while extracting the archive.
406	`HeadlessIngestNotExactlyTwoWims`	The archive didn't contain exactly two `.wim` files.
407	`HeadlessIngestNotExactlyOneBootWim`	The archive didn't contain exactly one boot `.wim` file.
408	`HeadlessIngestOsDirNotExactlyOneWim`	The `/OS` folder didn't contain exactly one `.wim` file.
409	`HeadlessIngestSourcesDirNotExactlyOneBootWim`	The `/sources` folder didn't contain exactly one boot `.wim` file.
410	`HeadlessIngestOsWimMoveFailed`	Couldn't move the OS `.wim` into the OS Library.
411	`HeadlessIngestBootWimMoveFailed`	Couldn't move the boot `.wim` into the OS Library.
412	`HeadlessIngestFileNotFound`	The file given to `-IngestOSFilePath` doesn't exist.

Redisguise / reimage, headless (500–599)

Code	Name	Meaning
500	`HeadlessRedisguiseNoServerSelected`	No server was selected.
501	`HeadlessRedisguiseNoOsSelected`	No OS was selected.

Code	Name	Meaning
502	`HeadlessRedisguiseEndpointNotVerified`	Couldn't resolve and identity-verify the server's d3Service API endpoint. DNS-SD discovery and the last-known address were both tried; the intended machine couldn't be confirmed on a reachable IP and port.
505	`HeadlessRedisguiseNoOsWim`	No OS `.wim` file was found in the selected OS.
506	`HeadlessRedisguiseNoBootWim`	No boot `.wim` file was found in the selected OS.
507	`HeadlessRedisguiseReimageRequestFailed`	The reimage request failed.
509	`HeadlessRedisguiseDesignerVersionTooLow`	The server's installed Designer version is below the minimum required, and headless mode can't prompt to override.
510	`HeadlessRedisguiseActorHasRunningProject`	The server has a project open in Designer, and headless mode can't prompt to override.
511	`HeadlessRedisguiseMultipleBootWims`	The OS profile contains more than one boot `.wim`, and headless mode can't prompt to pick which one to use.

Redisguise USB, headless (600–699)

Code	Name	Meaning
600	`HeadlessUsbNoOsSelected`	No OS was selected for Redisguise USB creation.

Capture Latency Methodology

This document outlines the test setup and methodology that Disguise uses to measure the video capture latency of its products.

Scope

The measurements are conducted on the currently available and supported products in the Disguise catalog.

The trend of data recorded since r15.1.2 will be used to determine the expected results and ensure that no regression of functionality has occurred.

Latency is measured as a quantity of frames at the current refresh rate. Conversion to milliseconds can be performed with this equation:

```
(Number of frames of latency x (1 / refresh rate)) x 1000
```

Variables and considerations

When testing there are a number of variables that are accounted for to achieve accurate and insightful results:

- The global latency mode, which affects the number of buffered frames the software keeps on the graphics card. A larger buffer typically ensures smoother playback.
- The input latency mode - Disguise buffers incoming video to ensure smooth playback of video input. The number of frames of delay affects latency.
- The project refresh rate. Frames at lower refresh rates represent a larger fraction of a second than at higher refresh rates, so the software has more time to complete frame-bound operations.
- For the test, frame blending, skipping, or doubling must be avoided at all costs by matching the content frame rate to the global refresh rate.

Global latency modes

Global latency modes affect the number of buffered frames that Disguise stores on graphical memory before outputting them. These buffered frames help absorb sudden spikes in rendering time to avoid visible frame drop. The trade-off is that the latency increases with the number of buffered frames.

- In **normal mode** Disguise buffers 2 frames before outputting.
- In **low latency mode** Disguise buffers 1 frame before outputting.

- In **ultra low latency mode** Disguise does not buffer any frames.

Input latency modes

As with output, Disguise buffers incoming video both to absorb spikes in render time and to deal with variation or mismatches in input timing, refresh rate.

By default, Disguise delays incoming video by one frame in order to ensure smooth playback across inputs.

This figure can be adjusted using the `smoothVideoInputFramesDelay` options switch.

Content

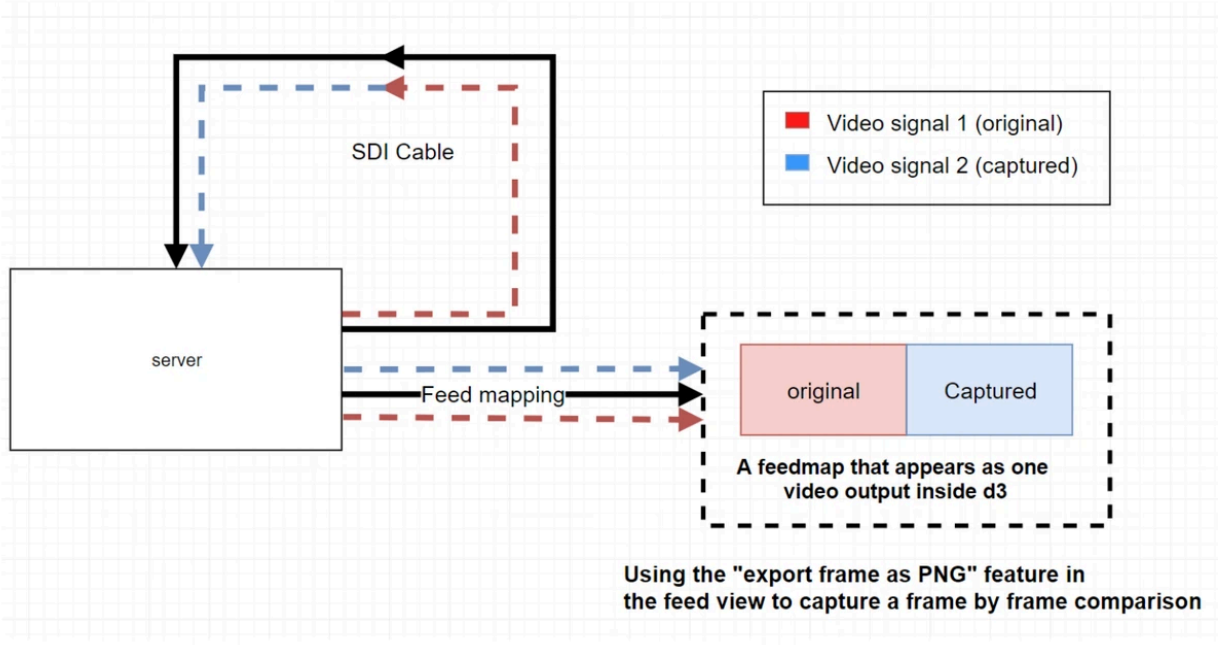
Test content is rendered as TIFF sequences. This is done for the sake of quality control – every frame can be individually checked in the event of manual investigation.

There is one image sequence per refresh rate. Each sequence is 90 frames long to keep the test project as portable as possible. The test script is able to account for scenarios where the frame numbers “wrap around” within a comparison.

Methodology / Environment

The test has been constructed to be completely self-contained, only relying on Disguise hardware and software, removing potential uncertainties introduced by third party equipment.

The system being tested outputs from an SDI VFC card into its own SDI capture card. The captured signal gets composited inside a feed map alongside the source video and a frame is exported for analysis.



This process is automated using a script in the Disguise internal test script library. It is intended to interface with a specially designed Disguise project, and covers 60, 59.94, 50, 30 and 29.97 Hz configurations. Each latency mode: Normal, Low, and Ultra Low, is sampled at least 5 times for each refresh rate.

Note that the DisplayPort to SDI conversion inside the SDI VFC card itself incurs 7 lines of delay, but this is considered negligible within the scope of this test.

The comparison between source and captured image is achieved using specially designed content:



In this latency test sample, the original video is on the left and the captured video on the right. The frame counter at the moment this snapshot was taken is at 53 frames and the counter for the captured video is at 49 frames. The difference between the two demonstrates that the system has 4 frames of latency between being output by the GPU, traveling through the capture system, and once again appearing on the screen inside Disguise.

The automated test script is able to compare the two halves of this sample using image analysis of a binary “barcode”, visible on the extreme left of each half of the image – the barcode is only up to 16 pixels across, which is why it appears as a white line in this illustration. This is done for each sample of each latency mode of each refresh rate.

Capturing and compiling data

The average of each sample set is discovered and the resulting 12 data points are tabulated.

This is an example of some results for the VX 4+.

VX 4+ SDI			
Refresh rate	**Normal mode (frames)**	**Low latency mode (frames)**	**Ultra low latency (frames)**
60Hz	4-5	4	3
59.94Hz	4-5	4	3
50Hz	4-5	4	3
30Hz	4-5	4	3
29.97Hz	4-5	4	3

Exceptions/limitations

The solo has options for SDI capture but does not support VFC cards. The test can still be carried out using in-house tooling, but is not replicable externally. Only the SDI capture option has been measured in this way, and findings show similar performance to the gx1 (with which it shares its underlying SDI capture hardware).

Additional notes

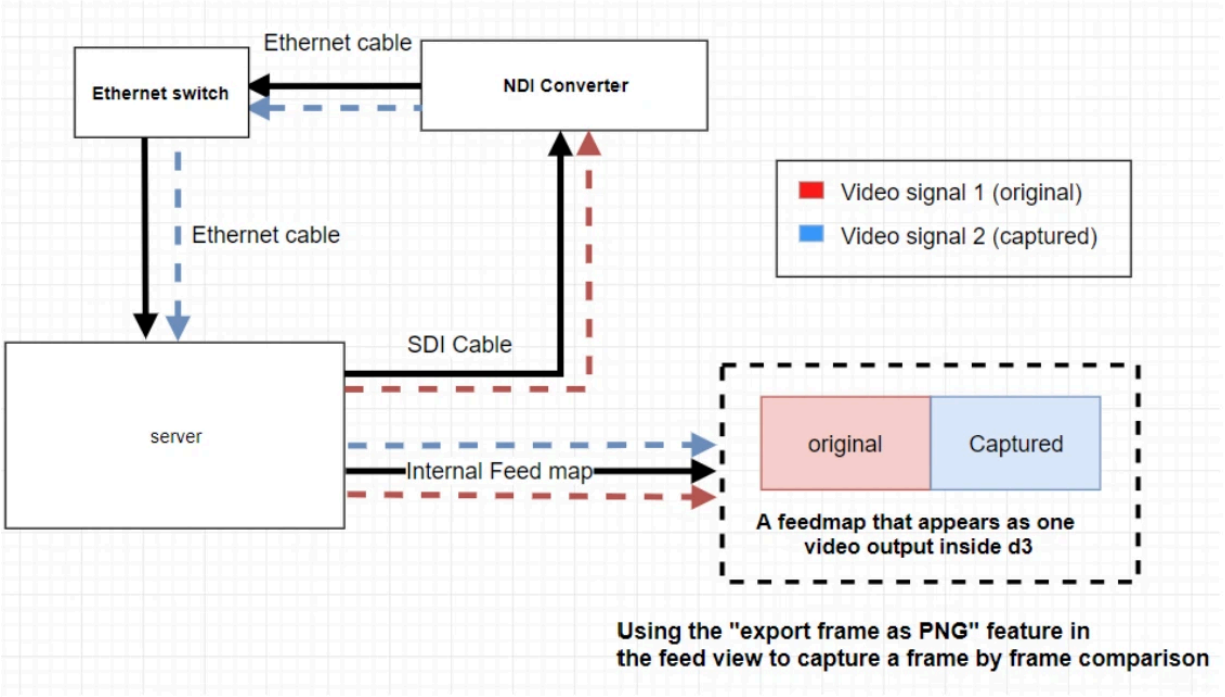
The original version of this test (circa r15.1.2) was only able to compare a single capture input against the video source. The test has since been updated to compare up to 4 capture inputs with the source and with each other.

The test now also checks for tearing on the capture inputs.

All input signals the capture card receives in this test are progressive, and Level-A when using 3G-SDI.

Modifying the current methodology for measuring latency with NDI®

This test can be modified to measure NDI® capture latency as well, with the inclusion of a third-party converter.



The converter used is the Birddog Studio 2, which has a claimed latency of 1 frame when converting from SDI to NDI®.

EX 2 Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single EX 2. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	55 45
HAPQ	30fps 60fps	61.25 122.5	50 38
Animation	30fps 60fps	187.25 374.5	40 25
TIFF	30fps 60fps	237 474	39 19
NotchLC	30fps 60fps	78.375 156.75	38 23

*testing completed on r28 194541

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	17 8
ProRes HQ	30fps 60fps	232 464	14 7
ProRes 4444	30fps 60fps	348 696	9 5

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	21 16

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	20 16
Animation	30fps 60fps	798.25 1596.5	12 5
NotchLC	30fps 60fps	331.5 663	15 7
DPX (8-bit RGB)	30fps 60fps	759 1518	8 5
DPX (10-bit RGB)	30fps 60fps	1011 2022	6 3
TGA (8-bit RGB)	30fps 60fps	759 1518	12 6
TGA (8-bit RGBA)	30fps 60fps	1011 2022	9 5
TIFF (8-bit RGB)	30fps 60fps	759 1518	12 6
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	9 5

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	5 2
ProRes HQ	30fps 60fps	991 1982	4 2
ProRes 4444	30fps 60fps	1490 2980	2 1

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

EX 2C Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single EX 2C. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	55 45
HAPQ	30fps 60fps	61.25 122.5	50 38
Animation	30fps 60fps	187.25 374.5	40 25
TIFF	30fps 60fps	237 474	39 19
NotchLC	30fps 60fps	78.375 156.75	38 23

*testing completed on r28 194541

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	17 8
ProRes HQ	30fps 60fps	232 464	14 7
ProRes 4444	30fps 60fps	348 696	9 5

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	21 16

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	20 16
Animation	30fps 60fps	798.25 1596.5	12 5
NotchLC	30fps 60fps	331.5 663	15 7
DPX (8-bit RGB)	30fps 60fps	759 1518	8 5
DPX (10-bit RGB)	30fps 60fps	1011 2022	6 3
TGA (8-bit RGB)	30fps 60fps	759 1518	12 6
TGA (8-bit RGBA)	30fps 60fps	1011 2022	9 5
TIFF (8-bit RGB)	30fps 60fps	759 1518	12 6
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	9 5

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	5 2
ProRes HQ	30fps 60fps	991 1982	4 2
ProRes 4444	30fps 60fps	1490 2980	2 1

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the EX 2C requires from capture to output:

EX 2C SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

EX 3 Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single EX 3. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	34 30
HAPQ	30fps 60fps	61.25 122.5	29 17
Animation	30fps 60fps	187.25 374.5	12 6
TIFF	30fps 60fps	237 474	9 4
NotchLC	30fps 60fps	78.375 156.75	24 13

*testing completed on r27.2 181738

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	9 4
ProRes HQ	30fps 60fps	232 464	2 1
ProRes 4444	30fps 60fps	348 696	2 1

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	15 8

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	8 4
Animation	30fps 60fps	798.25 1596.5	3 1
TIFF	30fps 60fps	949 1898	3 2
NotchLC	30fps 60fps	331.5 663	6 3
DPX (8-bit RGB)	30fps 60fps	759 1518	2 1
DPX (10-bit RGB)	30fps 60fps	1011 2022	2 0
TGA (8-bit RGB)	30fps 60fps	759 1518	2 1
TGA (8-bit RGBA)	30fps 60fps	1011 2022	2 0
TIFF (8-bit RGB)	30fps 60fps	759 1518	3 2
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	2 0

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	7 3
ProRes HQ	30fps 60fps	991 1982	2 1
ProRes 4444	30fps 60fps	1490 2980	1 0

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

EX 3+ Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single EX 3+. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	56 48
HAPQ	30fps 60fps	61.25 122.5	50 38
Animation	30fps 60fps	187.25 374.5	29 20
TIFF Sequence	30fps 60fps	237 474	32 19
NotchLC	30fps 60fps	78.375 156.75	38 23

*testing completed on r28 194541

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	26 13
ProRes HQ	30fps 60fps	232 464	21 11
ProRes 4444	30fps 60fps	348 696	14 10

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	23 19

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	22 16
Animation	30fps 60fps	798.25 1596.5	9 5
NotchLC	30fps 60fps	331.5 663	18 9
DPX (8-bit RGB)	30fps 60fps	759 1518	8 5
DPX (10-bit RGB)	30fps 60fps	1011 2022	4 2
TGA (8-bit RGB)	30fps 60fps	759 1518	10 6
TGA (8-bit RGBA)	30fps 60fps	1011 2022	8 4
TIFF (8-bit RGB)	30fps 60fps	759 1518	10 5
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	8 5

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	5 3
ProRes HQ	30fps 60fps	991 1982	5 3
ProRes 4444	30fps 60fps	1490 2980	3 2

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the EX 3+ requires from capture to output:

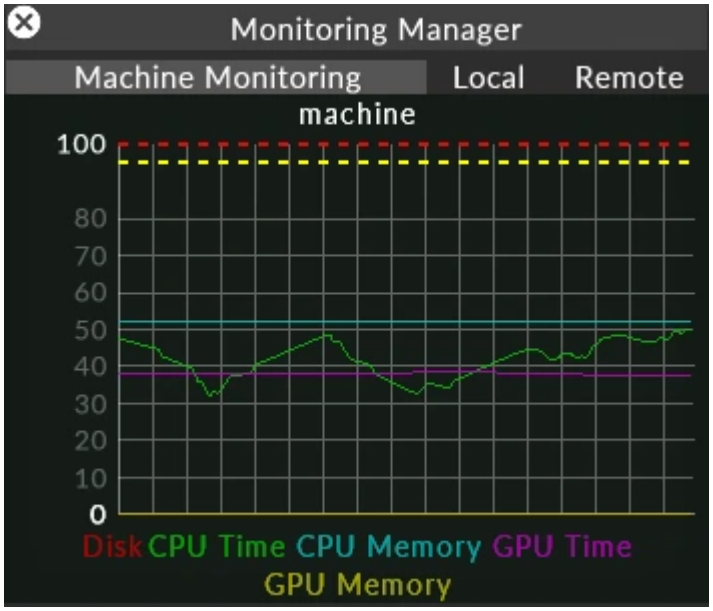
EX 3+ Deltacast

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

Machine Monitoring Graphs

There are several machine monitoring graphs within Designer.

To open the Monitoring Manager, left-click on the FPS in the lower right corner of the track



Once the Monitoring Manager window is open, left-click on **Local** to see the list of monitoring graphs:



Output Latency Graph

What is it?

This graph shows the queue length for each output. The queue length is dictated by whether the project is running at normal latency, low latency or ultra low latency.

This graph can be used to see dropped frames. If the queue length drops down by one, then a frame has been shipped before the next frame has joined the queue. Because frames are queued, this will not be seen on the output as a dropped frame. Running in ultra low latency where frames are shipped as soon as they have rendered, means that if the next frame is ready when a frame ships, you will see a frame drop.

If running at normal latency, but the graph line drops to zero, then frames are not ready fast enough which could manifest as framedrop.



GPU Profiler

What is it?

This is a cumulative graph that shows the amount of time spent in different tasks, e.g how much time spent in the GUI, how much time downloading DMX.

The sequence of events when playing back a video is:

Frames are loaded from video files -> decoded into RAM -> uploaded to the GPU -> rendered on the GPU.

Frame

The amount of time taken to render the frame on the GPU. This includes other rendering work, not just that related to video playback. When Frame finishes, the frame is ready to be presented.

Deliver Frames

The amount of time a frame takes to upload to the GPU in the sequence of events described above.

Compositor

The composite time spent on all the track elements together.

GUI

The amount of time spent rendering the GUI.

Render Everything

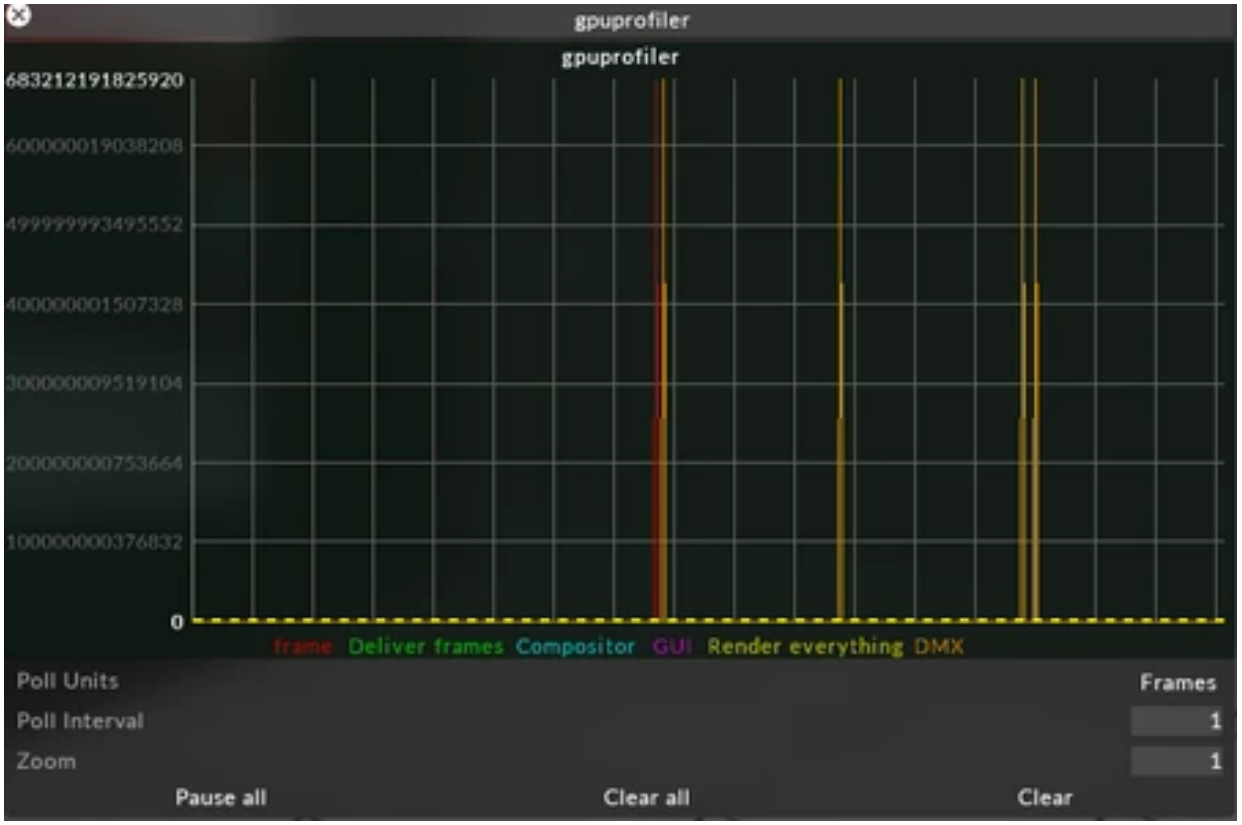
The cumulation of all the components that make up Compositor and GUI time.

DMX

The time spent downloading DMX

How do I use it?

When looking at the graph you can see how much time is spent in each part of the process. If any lines are going above the dotted lines then the server is dropping frames. The dotted lines indicate the maximum amount of time that can be spent at either 50fps or 60fps.



Frame Latency

What is it?

Graphs in milliseconds (ms) the journey of a frame from the time it is rendered through to being presented for output, relative to the present time which is 0.

Ready

The time that the frame was ready (rendered) at. Whenever a frame is rendered, it is ‘ready’. ‘Ready’ shows how many milliseconds in advance the frame was ready before it was actually presented. This value will vary based on the load on Disguise.

Queued

Time the frame was added to the present queue. The present queue is Disguise notifying windows that this is an upcoming frame. This will most likely be identical to ‘ready’ as the frame is added to the queue as soon as it is rendered. The time may be higher if the queue is full, so the frame can’t be immediately added to the queue.

Estimated Present

From when it was added to the queue, the time at which it is estimated that the frame will be presented given the length of the queue.

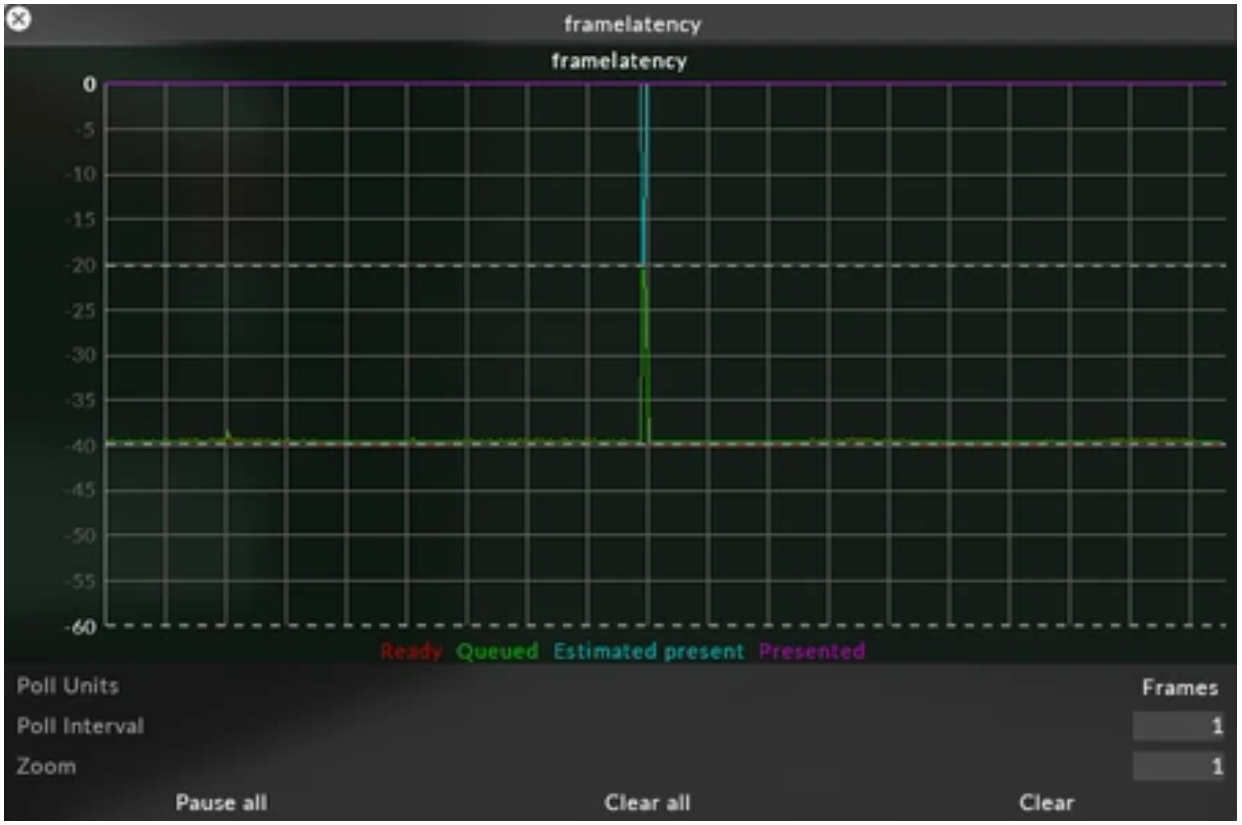
Present

The time at which the frame was actually presented, which is always 0.

All other graphed values are relative to this.

How do I use it?

If Disguise is running slow, frames will not be ready in time and will be too close to 0, or after 0. This means it is dropping frames. You will also see that if running in low or ultra low latency mode, there is less time from ‘ready’ to ‘present’, and in half speed mode the frame is ready twice as early as in full speed mode.



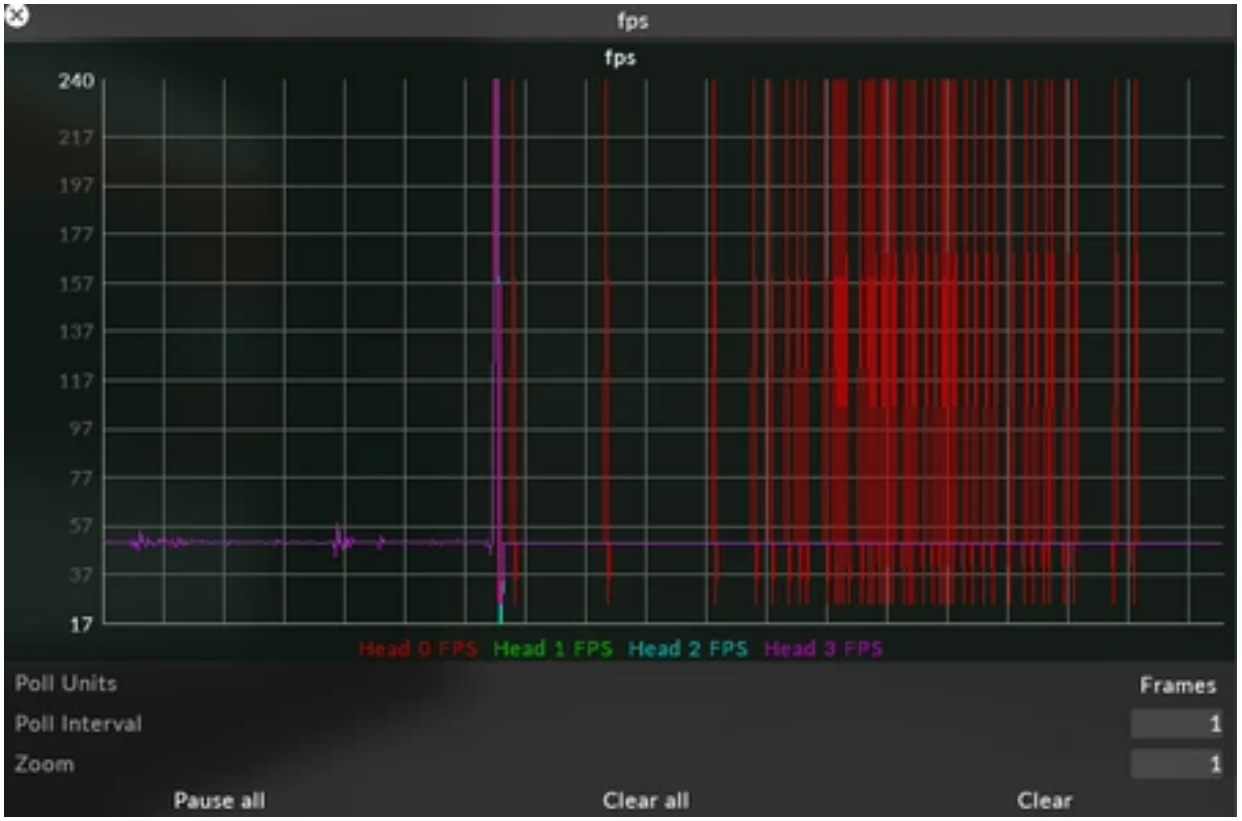
FPS

What is it?

Graphs the frames per second (FPS) per head

How do I use it?

Use this graph to see if you are dropping frames on any output head.



Process Memory

What is it?

Memory Used (MB)

How much memory Disguise is using.

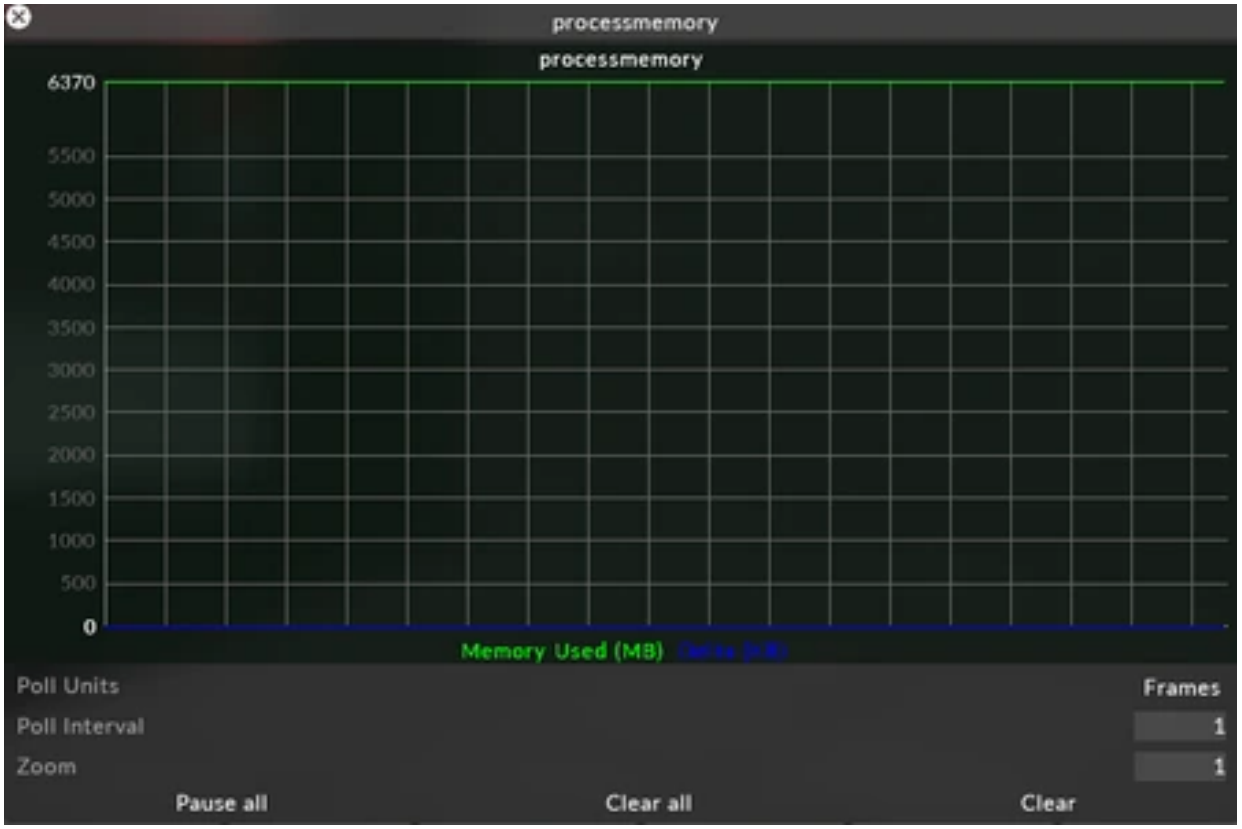
Delta (KB)

The difference between how much memory in use from one frame to the next.

How do I use it?

You can see values changing as you add and remove resources, e.g. many of the normal actions of setting up and programming a showfile.

This graph usually should not have to be used, but it can be used if experiencing crashes to make sure they are not memory related. If there is a memory leak, the delta will continuously spike in an upwards trend.



PCI/CPU IO

What is it?

Read

Graphs the data the CPU is reading from PCI devices.

Write

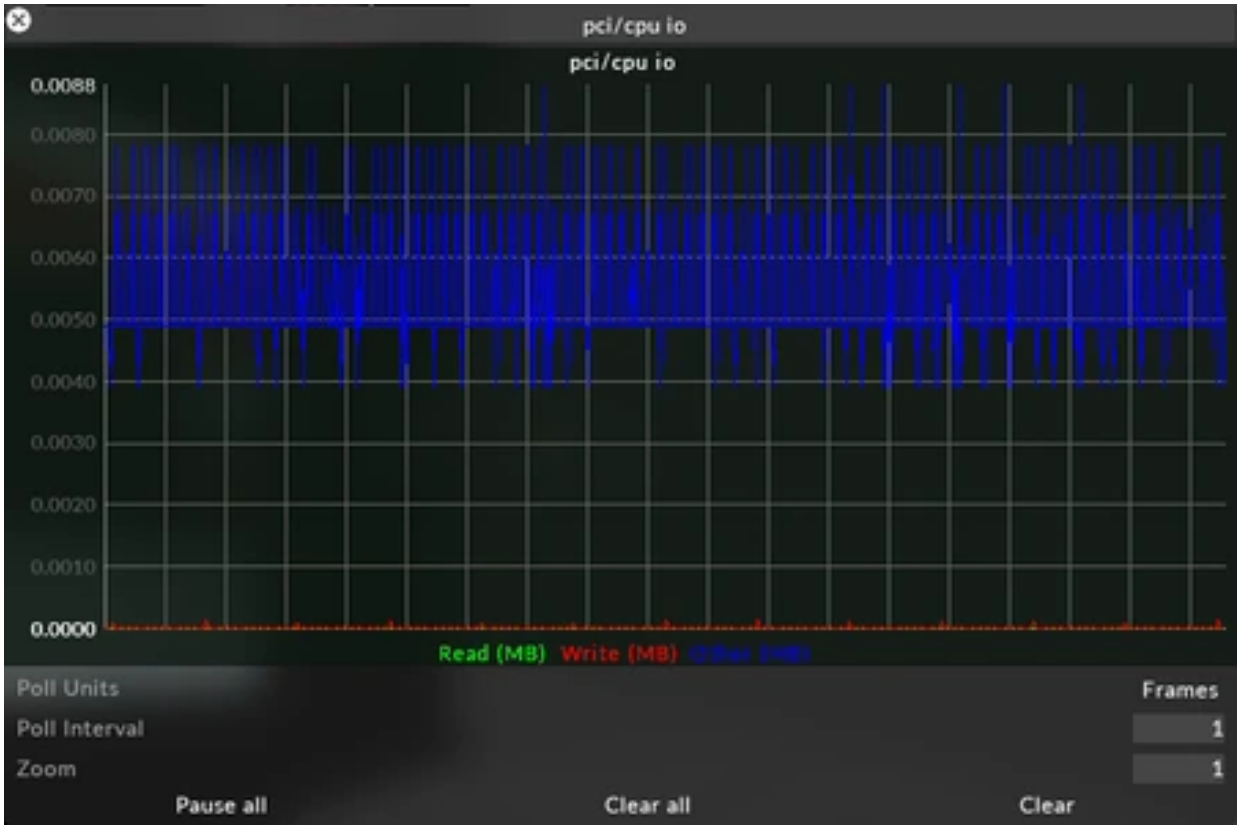
Graphs the data the CPU is writing to PCI devices.

Other

The number of bytes transferred during operations other than read and write.

How do I use it?

It is very unlikely that this graph will be needed in normal operation. Could be used if a fault with a PCI device or the motherboard is suspected.



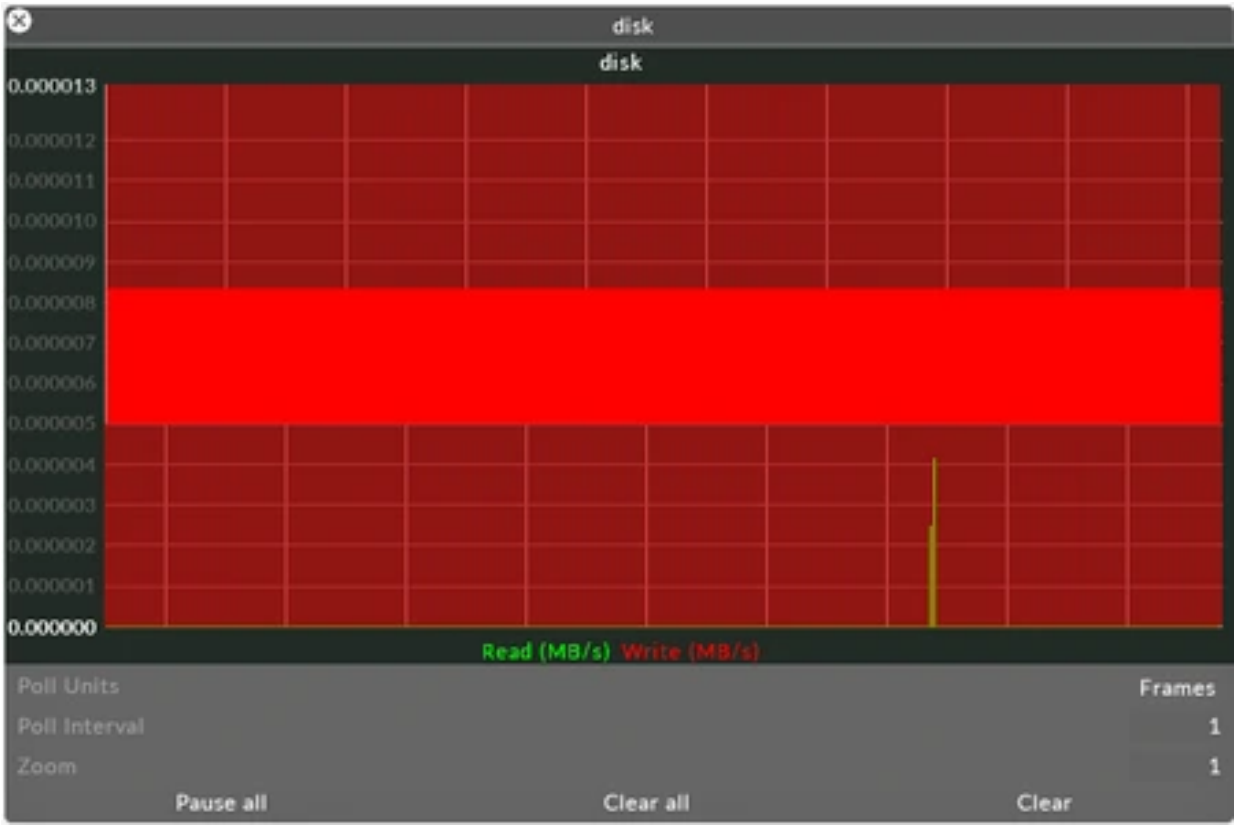
Disk

What is it?

Shows the read and write disk speed in MB/s.

How do I use it?

Could be used to see if you were bottlenecked somewhere e.g. read speed would go up and then plateau.



CPU

What is it?

The CPU graph is cumulative.

Working Time (ms)

The amount of time spent on the CPU

Present Wait Time (ms)

The amount of time waiting to present. When running a project in normal latency this should be flat, but when running in ultra low latency this series will be ‘spikey’ as there’s no queue.

Total Time (ms)

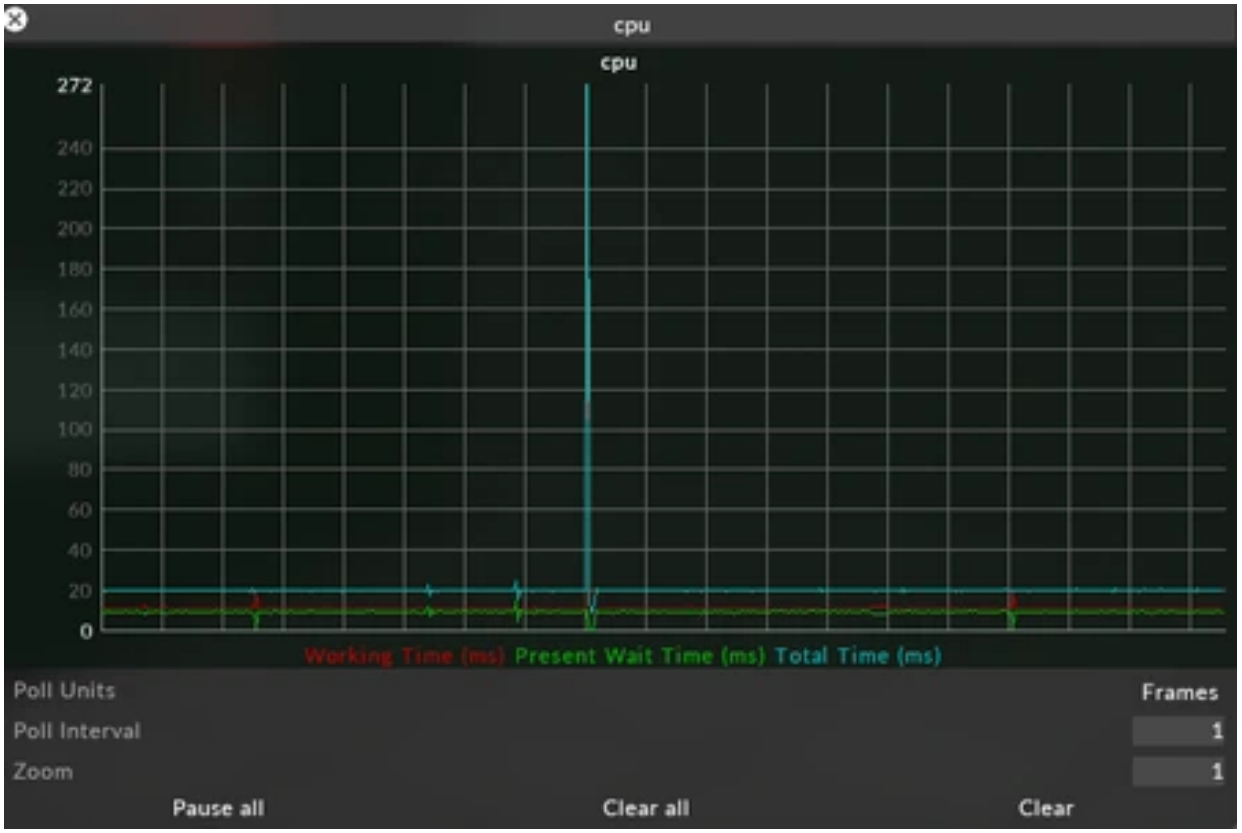
Total time is the cumulation of working time and present wait time, and should always sit beneath the ms required at your FPS.

How do I use it?

In a normal setup, total time should be flat because Disguise takes the full CPU cycle to present a frame. At the end of every update loop, something is given to the GPU to present. If

that loop is finished early, then there has to be a wait before there is a slot available in the queue.

If the CPU working time is high and the present time is low, then this is because the queue is empty. If frames are dropped in this scenario, then it is because of CPU load.



GPU Memory

What is it?

This graph shows the amount of memory that the GPU is currently using.

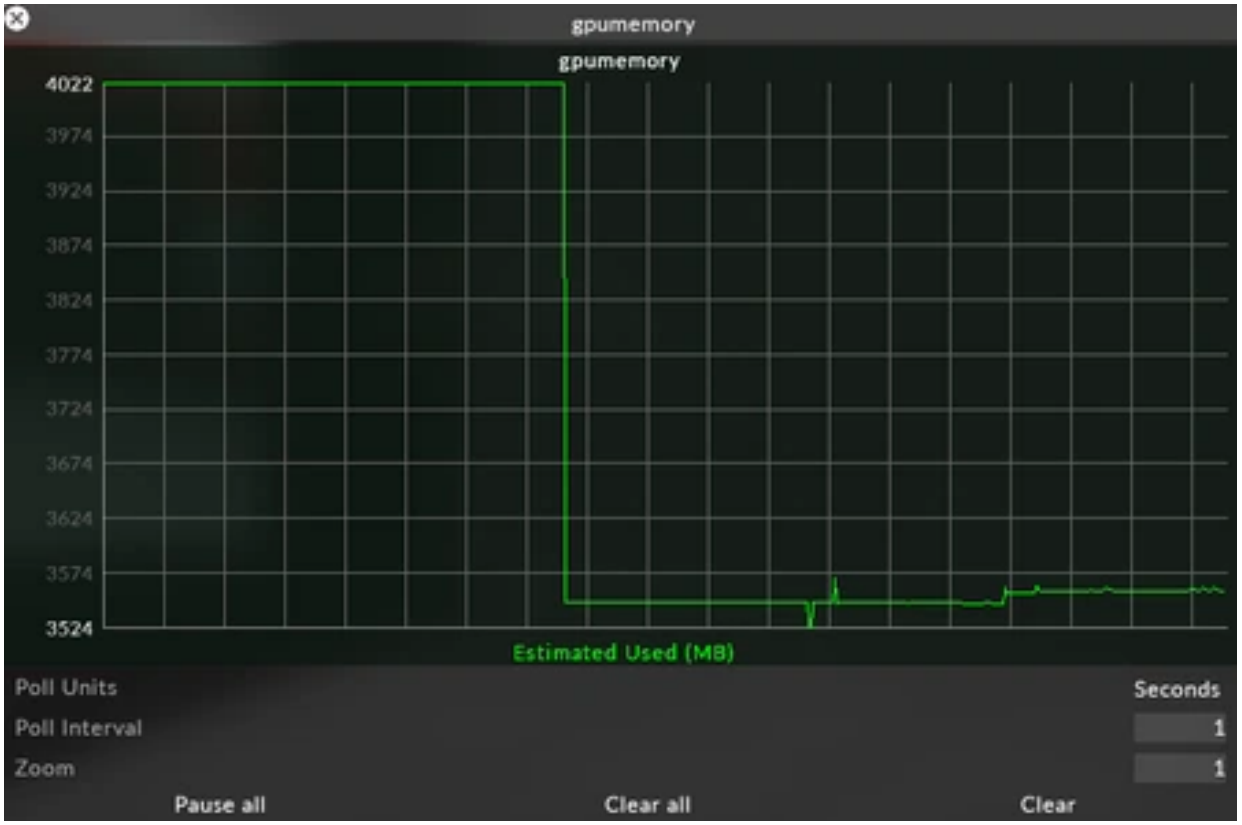
The GPU is responsible for dealing with its own memory allocation, but Disguise tries to be as efficient as possible with the GPU memory it requires.

All textures that are rendering onscreen in the GUI are bitmaps that are uploaded to the GPU. This includes all GUI elements, as well as any media that is playing back.

Disguise tries to reduce the amount of GPU memory in use by evicting textures when they are no longer needed. If textures are not used for a while, they are evicted. Conversely, some textures e.g LUTS are expensive to upload to the GPU, but once they are uploaded they are fast to use. For this reason, Disguise tells the GPU to keep these textures alive.

How do I use it?

Not commonly needed, but if a bug e.g. a memory leak, is suspected, a constantly increasing GPU Memory value is useful information for reporting the suspected bug. GPU Memory will increase as textures are uploaded, and decrease as they are evicted.



Timer

What is it?

`actualFrameTime` is the clock of the next upcoming present, and the delta is the amount of time passed between each frame time.

How do I use it?

This value should remain constant, at a value dictated by the fps of the system.

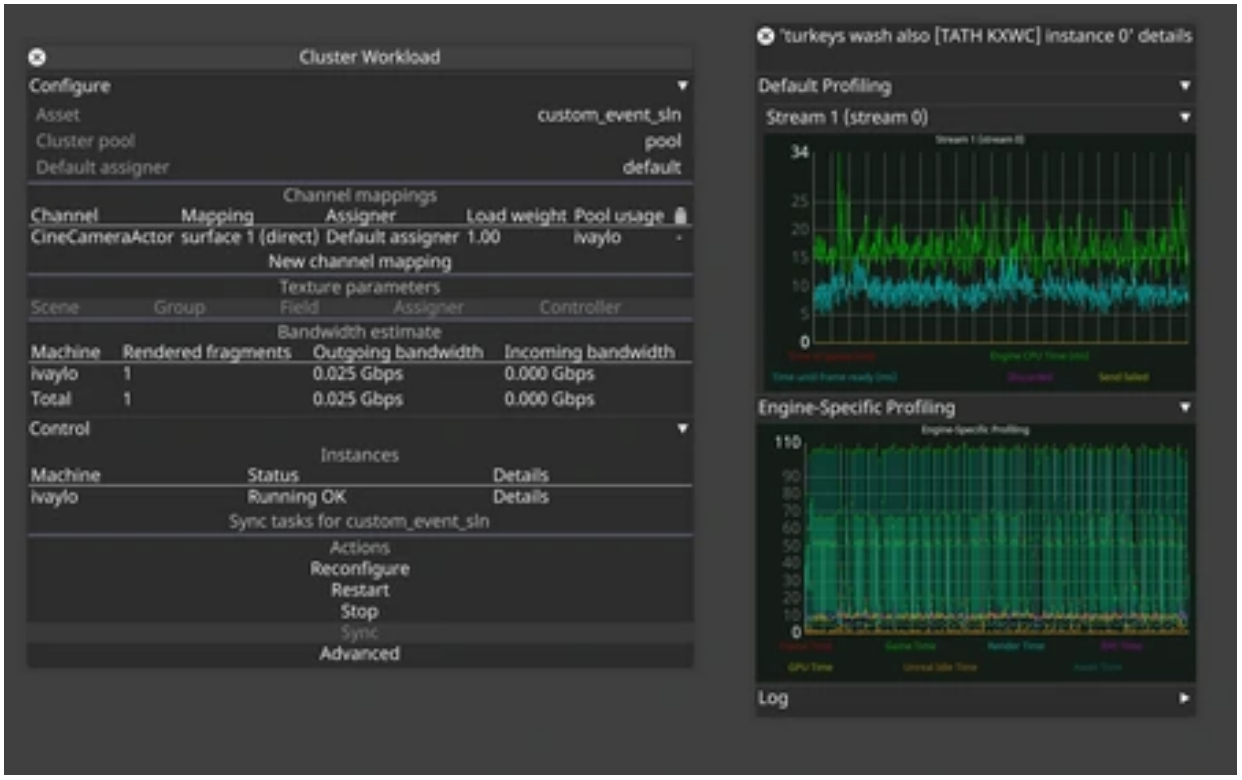


Monitoring RenderStream Graphs Reference

Where can I find RenderStream graphs?

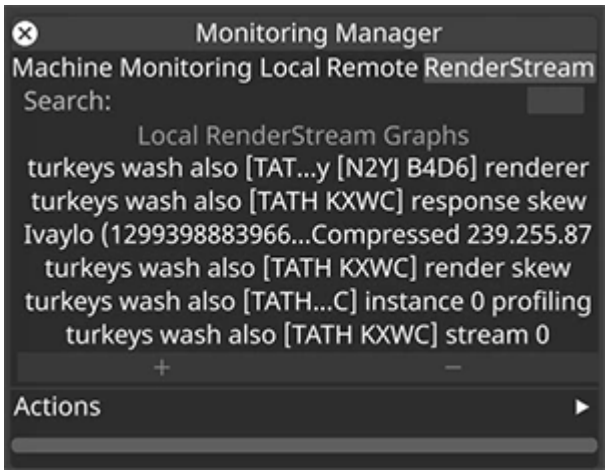
There are two places where we can find RenderStream graphs:

1. The **Details** view of one of the machines in a workload
    - shows engine and stream profiling for a specific render node machine
    - can be accessed via the ‘Details’ button next to a specific machine in workload widget



Workload widget and the stream profiling graphs that are accessible from it

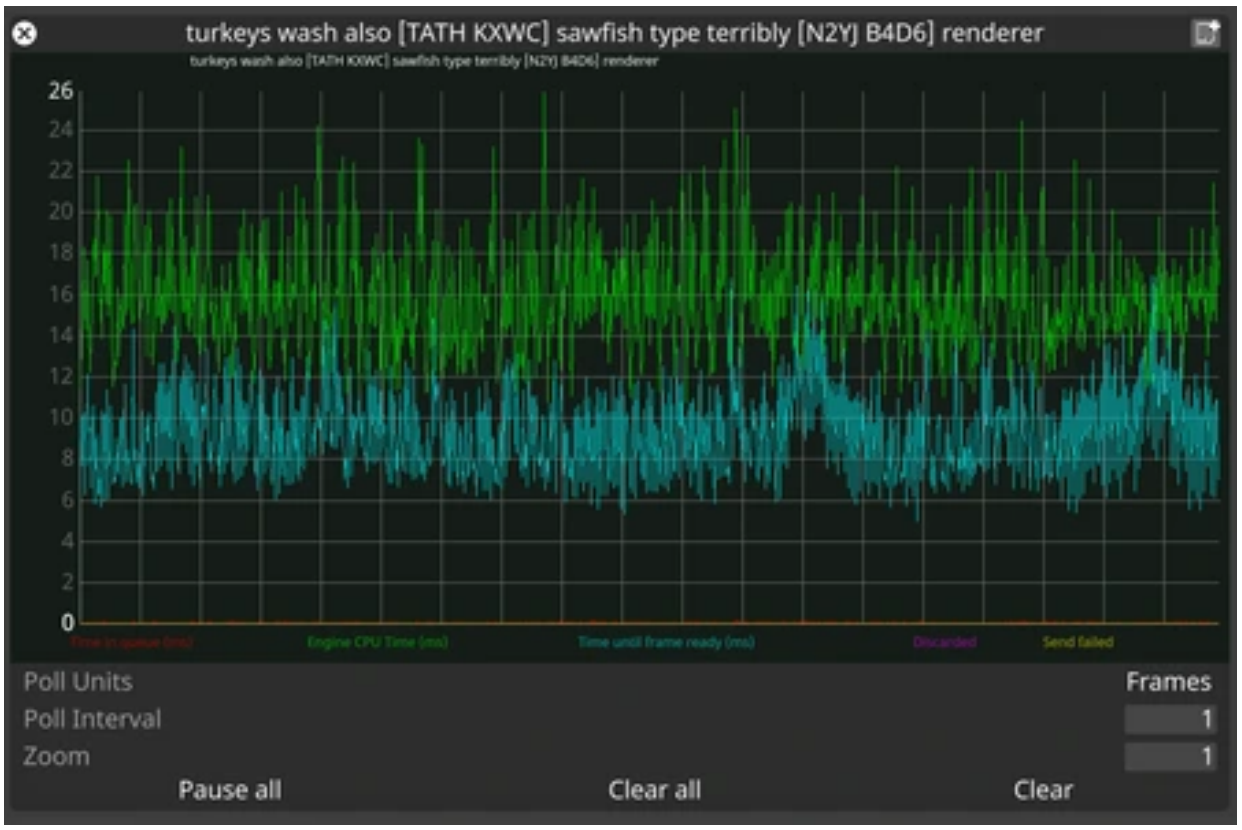
2. The 'RenderStream' tab of the Monitoring Manager
    - lists all graphs for all streams and workloads
    - graphs are grouped by actors receiving the streams
    - can be accessed via the Monitoring Manager (left-click on FPS bug in Disguise)



Graphs available for RenderStream in the Monitoring Manager

RenderStream graphs

Renderer graph



What is it?

Engine-agnostic profiling data captured by the RenderStream plugin from the render node.

Time in queue (ms)

The time a frame request spends waiting to be picked up for processing by the workload instance.

Engine CPU time (ms)

How much time the frame request spends being processed. It is the time between the frame request being picked up for processing and the call to send the resulting frame back to disguise.

Time until frame ready (ms)

How long it takes to send the frame.

Discarded

Shows the frames dropped by the render node.

Send failed

Shows problems in sending the frames back to disguise.

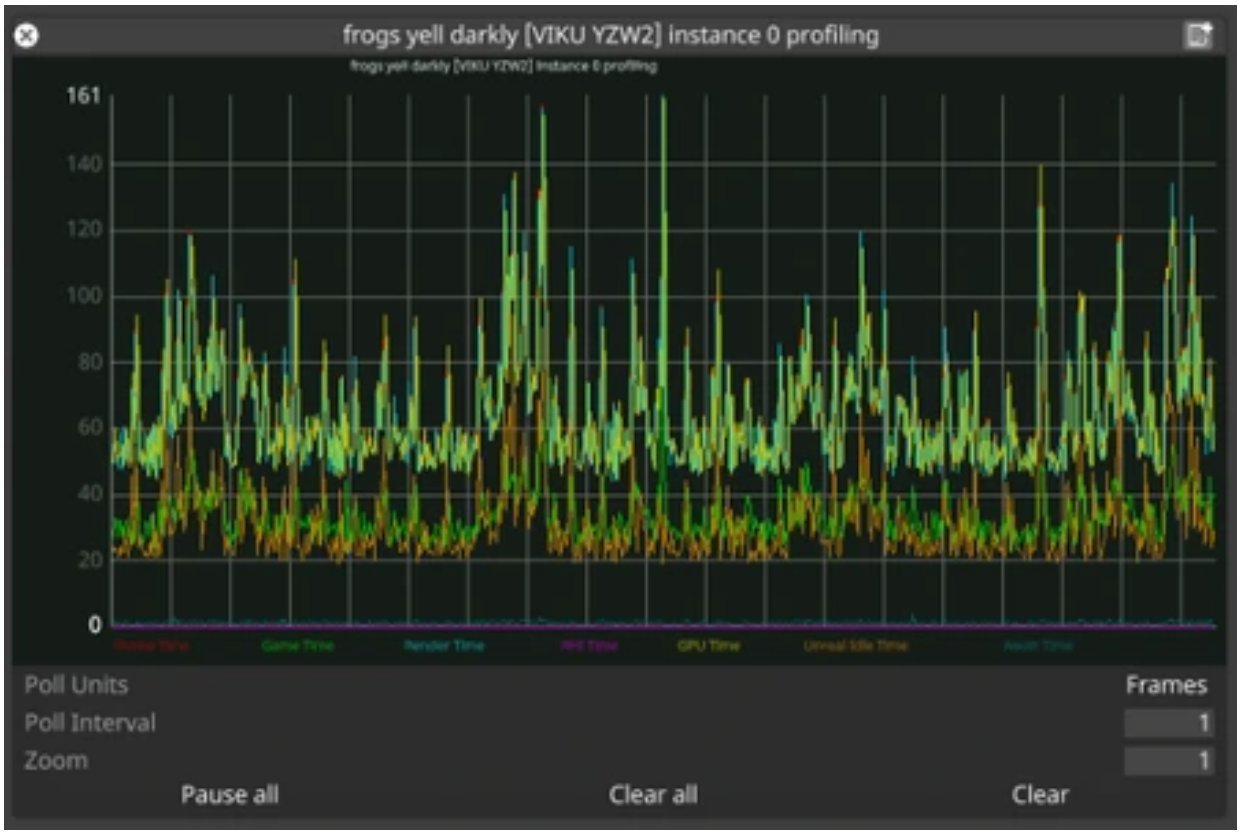
How do I use it?

Normally, time in queue should be minimal with most of the time spent generating the frame indicated by **Engine CPU time (ms)**. No requests should be discarded or marked as send failed.

High **Time in queue**: engine can't keep up with the rate of incoming requests from disguise. Eventually, if too many requests are waiting in the queue, the render node will discard request, which will be reflected in the **Discarded** line in the graph.

High **Time until frame ready**: indication of sending/networking issues

Profiling graph



What is it?

Engine-specific profiling information for a workload instance. This data is specific to each RenderStream plugin implementation, or could be missing depending on the implementation as well.

How do I use it?

The data we get completely depends on what engine data a particular plugin implementation is tapping into. In the case imaged above, we have Unreal Engine with granular data about how much time each step of the UE pipeline is taking. Abnormally high values in any of these sections could indicate high CPU usage (blueprints, geometry, physics, etc.), high GPU usage (resolution, post-processing, etc.), or other issues. For example, high Unreal Idle Time could indicate network slowdowns in nDislpay synchronisation.

Stream graph



What is it?

Data generated by the receiver of a stream (actor/director) describing the latency of the stream.

render frame delta (ms)

Shows the difference in timestamps between arriving frame and the frame that arrived before it.

latency (ms)

Actual latency of a stream: the time elapsed between Disguise requesting a frame and then receiving back the frame for that request. This is equal to the sum of network latency and engine latency.

network latency (ms)

The time attributed to network communication and compression for compressed streams.

engine latency (ms)

The time attributed to render engine CPU and GPU operations.

active latency (ms)

The current active latency which is based on the slowest stream in the session.

How do I use it?

Render frame delta should be constant (at 60fps, delta should be 16.6ms). Fluctuations identify either dropped frame requests or unstable framerate on the RenderStream controller machine.

Latency should not be too far off from the active latency. If there is a stream that is significantly faster than other streams, its latency will show as a lot lower than the active latency. If the difference between the two is greater than 4 frames worth of time, effort should be made to better balance the workload. Also, if using a manual active latency override, this could be an indication that the override value is not accurate.

Active latency and latency should not fluctuate wildly. That could indicate optimisation is required on the asset side.

Render skew graph



What is it?

The graph shows how well temporally matched are the frames received across the streams of a workload.

Active latency error

Shows how close to the active latency prediction are the displayed frames of a RenderStream workload. This is the difference between the expected timestamp based on active latency and the actual timestamp of the closest matching group of frames.

Streams error

Within the best matching group of frames, these lines indicate the individual stream errors.

How do I use it?

Ideally, active latency error should be zero with the individual stream errors being less than a frame worth of time.

- If individual streams have error greater than a frame worth of time, this could be perceived as a tear between fragments that belong to the same actor.

- If the active latency error differs across multiple subscribing actors (across multiple instances of this graph), this could be perceived as a tear on the edge between the outputs of two actors.

Response skew graph



What is it?

Shows how close to the active latency prediction is the currently processed RenderStream response. This is the difference between the expected timestamp based on active latency and the actual timestamp of the closest matching group of frame responses (frame sent notifications from render nodes).

How do I use it?

This can be used as another indication how well the active latency estimation fits a stream. Ideally, the error in this graph should be less than a frame worth of time. More than a frame of error could indicate network issues on the d3net network adapter, as it is the one used for sending RenderStream frame requests and receiving the sent notifications replies from render nodes.

GX 1 Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	43 25
HAPQ	30fps 60fps	61.25 122.5	29 14
Animation	30fps 60fps	187.25 374.5	9 4
TIFF	30fps 60fps	237 474	7 3
NotchLC	30fps 60fps	78.375 156.75	23 11

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	9 4
ProRes HQ	30fps 60fps	232 464	6 3
ProRes 4444	30fps 60fps	348 696	4 2

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	14 6
HAPQ	30fps 60fps	261.25 522.5	7 3
Animation	30fps 60fps	798.25 1596.5	2 1

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
NotchLC	30fps 60fps	331.5 663	6 2

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	2 1
ProRes HQ	30fps 60fps	991 1982	2 1
ProRes 4444	30fps 60fps	1490 2980	1 0

*testing completed on r30.0 200921

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the GX 1 requires from capture to output:

GX 1 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	7	6	5
50Hz	7	6	5
30Hz	7	6	5

GX 2C Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	45 21
HAPQ	30fps 60fps	61.25 122.5	30 15
Animation	30fps 60fps	187.25 374.5	12 6
TIFF	30fps 60fps	237 474	9 4
NotchLC	30fps 60fps	78.375 156.75	25 12

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	7 3
ProRes HQ	30fps 60fps	232 464	5 2
ProRes 4444	30fps 60fps	348 696	3 1

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	17 8
HAPQ	30fps 60fps	261.25 522.5	9 4
Animation	30fps 60fps	798.25 1596.5	3 1
TIFF	30fps 60fps	949 1898	2 1

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
NotchLC	30fps 60fps	331.5 663	7 2

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	2 1
ProRes HQ	30fps 60fps	991 1982	1 0
ProRes 4444	30fps 60fps	1490 2980	1 0

*testing completed on r30.0 200921

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the GX 2C requires from capture to output:

GX 2C SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

GX 3 Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single GX 3. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	48 47
HAPQ	30fps 60fps	61.25 122.5	44 24
Animation	30fps 60fps	187.25 374.5	16 8
TIFF	30fps 60fps	237 474	12 6
NotchLC	30fps 60fps	78.375 156.75	39 20

*testing completed on r26.0 164886

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	29 15
ProRes HQ	30fps 60fps	232 464	26 13
ProRes 4444	30fps 60fps	348 696	15 8

*testing completed on r27.8 191655

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	24 12

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	12 6
Animation	30fps 60fps	798.25 1596.5	4 2
TIFF	30fps 60fps	949 1898	3 2
NotchLC	30fps 60fps	331.5 663	9 5
DPX (8-bit RGB)	30fps 60fps	759 1518	4 2
DPX (10-bit RGB)	30fps 60fps	1011 2022	3 1
TGA (8-bit RGB)	30fps 60fps	759 1518	4 2
TGA (8-bit RGBA)	30fps 60fps	1011 2022	3 1
TIFF (8-bit RGB)	30fps 60fps	759 1518	4 2
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	3 1

*testing completed on r26.0 164886

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	7 3
ProRes HQ	30fps 60fps	991 1982	6 3
ProRes 4444	30fps 60fps	1490 2980	3 2

*testing completed on r27.8 191655

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.

- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the GX 3 requires from capture to output:

GX 3 Matrox

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

GX 3+ Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single GX 3+. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	84 54
HAPQ	30fps 60fps	61.25 122.5	66 45
Animation	30fps 60fps	187.25 374.5	26 13
TIFF	30fps 60fps	237 474	18 10
NotchLC	30fps 60fps	78.375 156.75	69 35

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	38 27
ProRes HQ	30fps 60fps	232 464	38 21
ProRes 4444	30fps 60fps	348 696	32 16

*testing completed on r32.0 228571

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	41 20

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	13 9
Animation	30fps 60fps	798.25 1596.5	5 2
TIFF	30fps 60fps	949 1898	3 2
NotchLC	30fps 60fps	331.5 663	14 9
DPX (8-bit RGB)	30fps 60fps	759 1518	4 2
DPX (10-bit RGB)	30fps 60fps	1011 2022	4 1
TGA (8-bit RGB)	30fps 60fps	759 1518	6 3
TGA (8-bit RGBA)	30fps 60fps	1011 2022	4 2
TIFF (8-bit RGB)	30fps 60fps	759 1518	6 3
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	3 1

*testing completed on r32.0 228571

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	14 7
ProRes HQ	30fps 60fps	991 1982	11 5
ProRes 4444	30fps 60fps	1490 2980	7 3

*testing completed on r32.0 228571

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.

- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the GX 3+ requires from capture to output:

GX 3+ Deltacast

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

Machine Performance

In order to keep at frame rate it's a balancing act between GPU time and CPU.

Every frame follows a simple pattern

CPU updates everything and sets up the rendering for that frame, then at the end it calls 'present'. 'Present' then blocks any further CPU action until the GPU outputs the frame to the screens.

The following graphs are useful to address performance concerns:

FPS

It's good for a simple overview

GPU

Shows the time spent in the frame: the dotted red line is what you want to be underneath, This is your ms budget per frame to hit every genlock pulse.

CPU

Shows some info on where the CPU is spending most of its time.

Graph data

- working time is the actual time the CPU spent doing things.
- present wait time shows how much time the CPU sat there waiting for the GPU to finish it's job.
- present wait time does not include the working time, so after the working time the CPU still waits that amount of time for the GPU to finish.
- you will always block on present because the GPU won't output until a genlock pulse is received (or a vsync pulse if you are locked to the server's own timing).
- If in free run the GPU can just output whenever present is called; present will still block until all outputs have finished so the balancing act .is making sure the CPU finishes in under the ms budget, and making sure the GPU finishes in time for the genlock pulse.

Troubleshooting Framedrops

- If your working time is under-budget but your present time pushes you over budget, your GPU is causing the framedrops.
- If your working time is over-budget then your CPU is causing framedrops.
- With **Notch** there is both CPU work and GPU work so you have to consider both.

Profiler

- For a breakdown of CPU timings you can press CTRL + ALT + P to see the Profiler which shows functions and how much time (in ms) is spent there
- `D3::frame` is the root.
- You can find NotchModule calls to see how much cpu time is spent on notch calls; this helps you figure out if you are going over your frame budget because of what you've got in Disguise or what you've got in Notch.

If you are actually waiting for the GPU to finish then it's more difficult to get a breakdown; it's best to mute the layer and see if it is purely the cause of GPU time being so high in that section.

Once you know the cause you can now address things appropriately.

- If **Notch** is spending too much of your CPU time then this is down to parameters.
- If it's GPU then it's down to rendering techniques.

The **Child threshold** parameter in the profiler controls the granularity of functions included in the profile. Child functions called by a function hit while profiling will only be included in the output if their cumulative runtime over a single frame exceeds the threshold. The default value is 5 ms, decrease this to see more child functions in the profile. Note that there is a small overhead for each function call while profiling, so setting the threshold too low may inflate the measured time taken in small functions which are called many times per frame.

Hardware Playback Performance Capture

Introduction and Disclaimer

This document specifies the method taken to determine the maximum video throughput of any given Disguise media server. It will no doubt become apparent that the environment created to find these figures better resembles laboratory conditions than a real production, and should therefore be thought of as theoretical maximums rather than practical ones.

The impact from the application of other software and hardware features is not explored in this suite of tests, nor do they take into consideration the discrete purposes of certain machines in the catalogue - ie: the generative capabilities of the GX range.

Goals

The goal of this test is to discover how many separate videos of a single codec can be played while maintaining a desired framerate. The test is identical for each Disguise media server to allow for direct comparison. Since different codecs stress the video playback pipeline in different ways, these tests will make it possible to determine potential strengths and weaknesses of each media server.

Project Requirements and Scope

The video playback pipeline in itself is host to a large amount of potential variables. A set of rules has been recorded to ensure that the tests are truly illustrative of what the product is capable of, as well as keeping the process as repeatable as possible. Some of these rules will eliminate variables that are hard to control, and others will ensure that the machine is being stressed adequately.

The project attached abides to these rules, which can be divided into categories of stage, timeline, feed, and hardware:

Stage

- The media server being tested must be run as an Actor with its GUI disabled.
- If the media server cannot be run as an Actor, minimum GUI elements should be present, and measurements are to be taken in the stage view
- The stage is to be kept as minimal as possible. No props or any other complex geometry.
- One LED screen per resolution tested and all layers directly mapped to that screen.

Timeline

- One codec tested per track.
- One unique video file per layer.
- Add one additional layer every two sections.
- Video layers must be set to Locked mode.
- The prefetcher must be moderated by making two sections per additional video.

Feed

- All screens must be assigned to an output on the Actor machine. The Director machine should be a Dedicated Director with no outputs assigned.

Hardware

- Actor machine should be genlocked across all outputs.
- If the media server being tested is VFC compatible, it must contain only DisplayPort or HDMI VFC cards.
- The Actor machine should have a physical display connected to at least one of the DisplayPort or HDMI outputs to aid in spotting frame drops. All other non-GUI outputs should be emulated to ensure all can be genlocked.
- If the media server features a RAID array, it must be in the same configuration as it would out of box. For example, the VX 4+ ships with a RAID 10 configuration, and so that is used for the test.
- All media servers must be using the latest version of their respective OS images with the correct, trusted GPU driver.

Parallel to the above restrictions runs the matter of codecs and video content, which have their own guidelines.

Other supported codecs were not included for the following reasons:

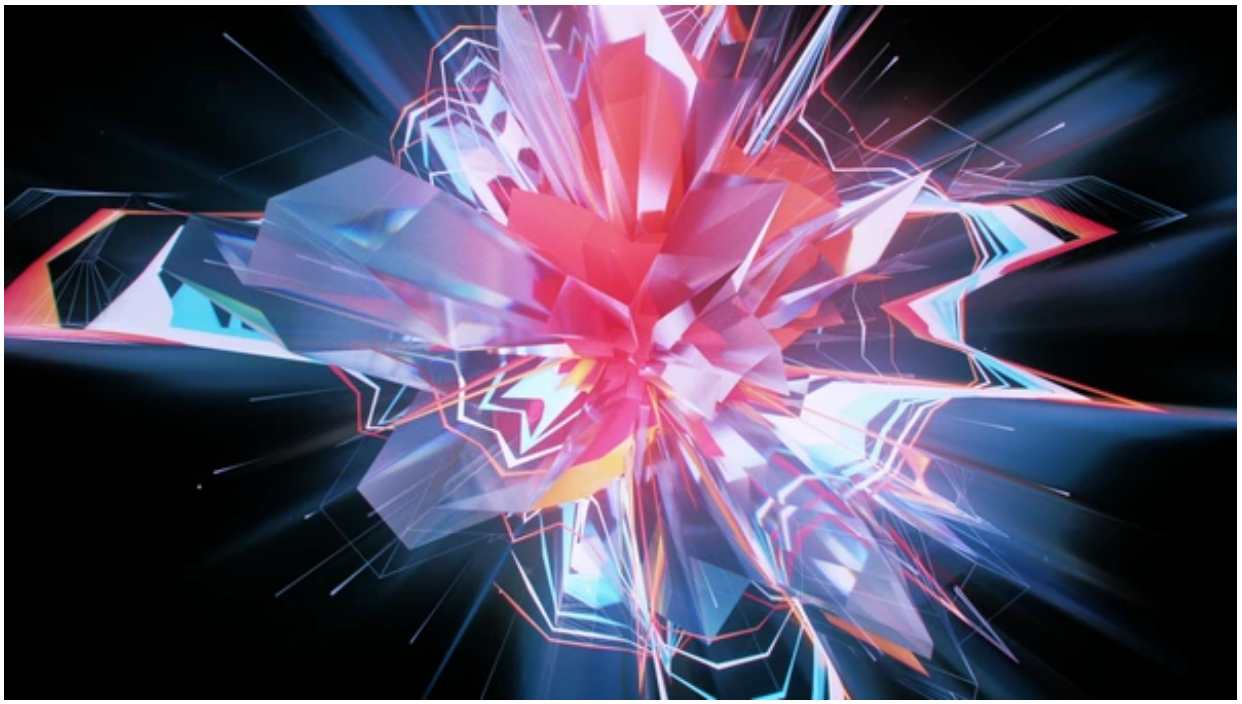
DXV: Similar, if sometimes slightly lighter, performance impact to HAP. Less popular than HAP due to lack of support for version 3.

HAP-Alpha: Identical performance impact and data rate to HAPQ, since both make use of a fourth channel.

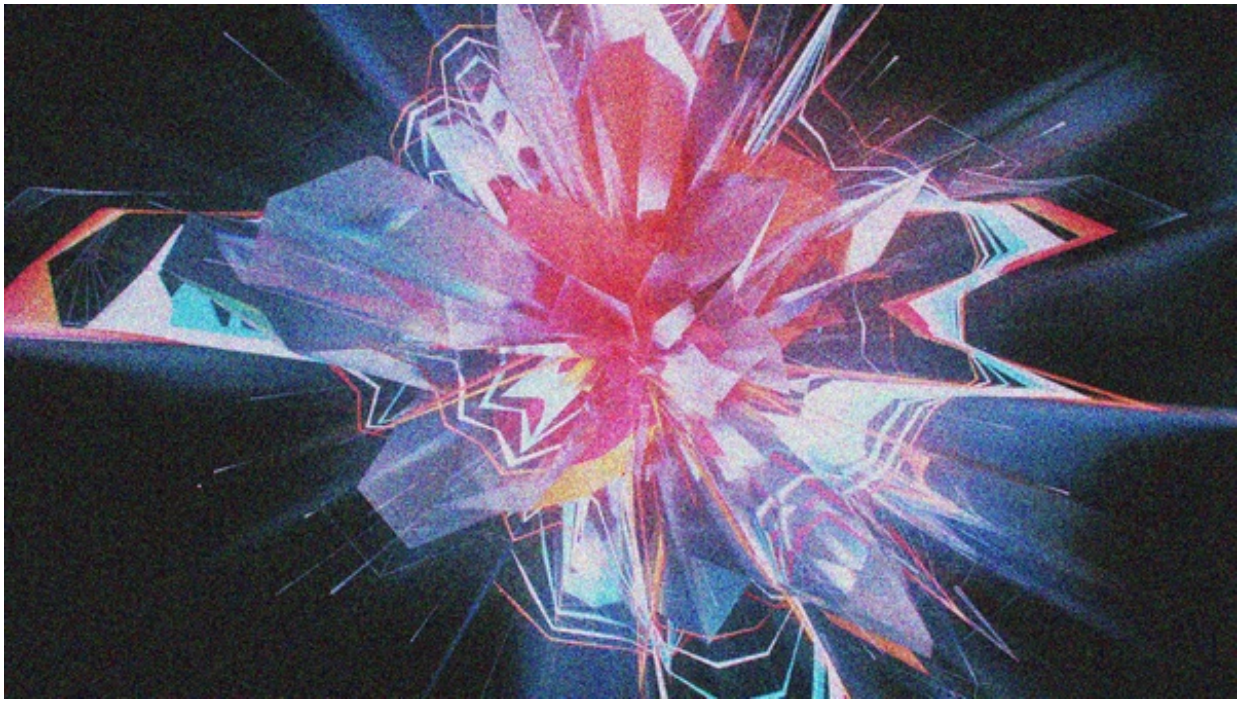
Photo-JPEG: CPU-bound codecs are always at a disadvantage compared to their GPU processed counterparts. In the case of Photo-JPEG, the sacrifice made in order to play these files is disproportionate to the gain in quality when considered alongside Quicktime Animation.

The video content used for each codec was also given careful consideration - solid black frames would not do, but neither would full frames of animated colour noise. Content has been selected to produce a processing load and data rate that is on the heavy side of realistic, and to ensure this the following guidelines have been respected:

- Avoid using motion graphics with large blocks of unbroken hues. This is especially important for Quicktime Animation. Noisy gradients are suitable, real-life filmed content is preferred.
- The video should include lots of movement, like sweeping moves across the frame or quick cuts. Large steady moves are preferred as they can help the individual testing more easily assess playback smoothness. Sports footage is good for this - boardsports in particular.
- Although audio is not tested, all videos should include embedded audio when possible.
- All clips should each be a couple of minutes long.
- Content must be rendered at maximum quality for that codec - ie: spatial quality at 100 in Adobe Media Encoder.
- Content must be rendered in 30fps and 60fps at either Full HD (1920 x 1080) or 4K DCI (4096 x 2160) with 8-bit colour with the exception of DPX Sequence which is tested with content files with both 8-bit and 10-bit colour
- 4% colour noise should be added to the content to smooth out variable bit rates.



Bad: Motion graphics with large areas of one colour. This is especially problematic with Quicktime Animation and can lead to large fluctuations in data rate frame-to-frame.



Good: Additional colour noise. This breaks up the large patches and evens out, but is also likely to increase the data rate of the video.



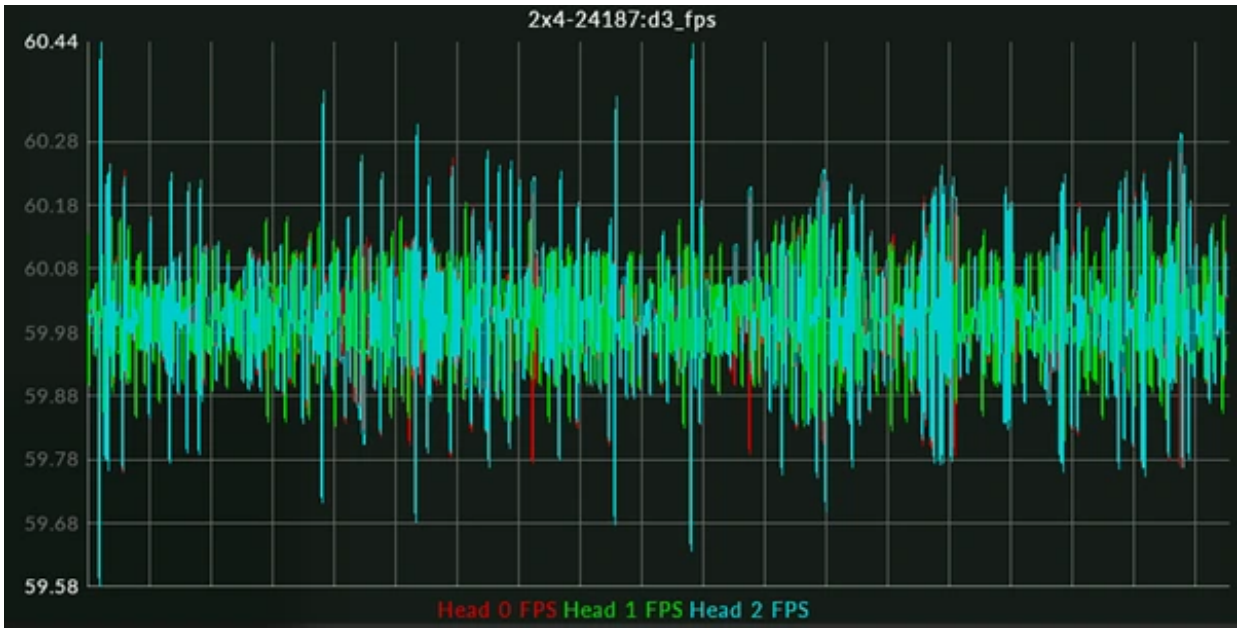
Best: Real-life filmed content. In this example the motion of the ocean as a whole creates a good amount of natural noise, while the movement of the wave and the surfer is a good subject with which to track frame smoothness.

How Data Is Gathered

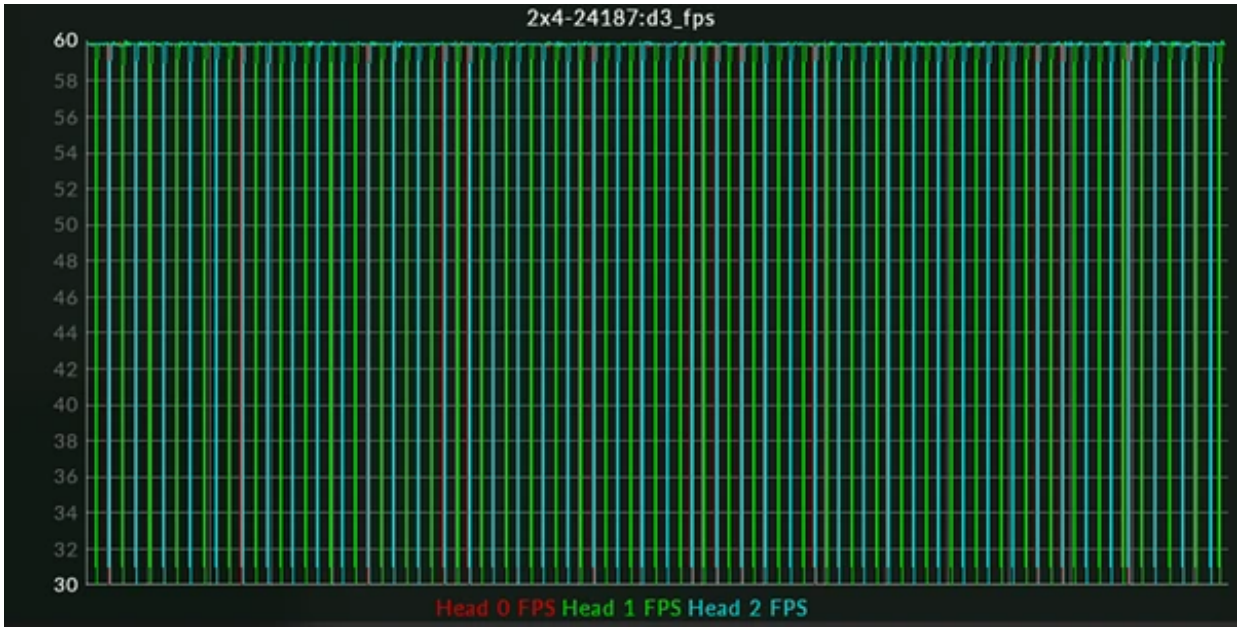
The data gathered is the number of video layers playing back content before the machine starts dropping or missing frames in a 60Hz project. 60Hz is used because, as the highest conventional refresh rate available, each frame represents the smallest amount of time possible - 16.67ms per frame in this case - making it the hardest rate for the software to work at. Lower refresh rates can result in greater maximum performance from there being more time in a frame to do that frame's work, but the return made on using a lower refresh rate is not a 1-to-1 conversion, nor is it guaranteed to be consistent across all use cases.

The maximum number of 60 frames per second videos cannot be taken, necessarily, to be half that of 30 frames per second videos. Other, more subtle, overheads exist outside of the data rate of the video that would have to be accounted for, and may well be influenced further by hardware configuration.

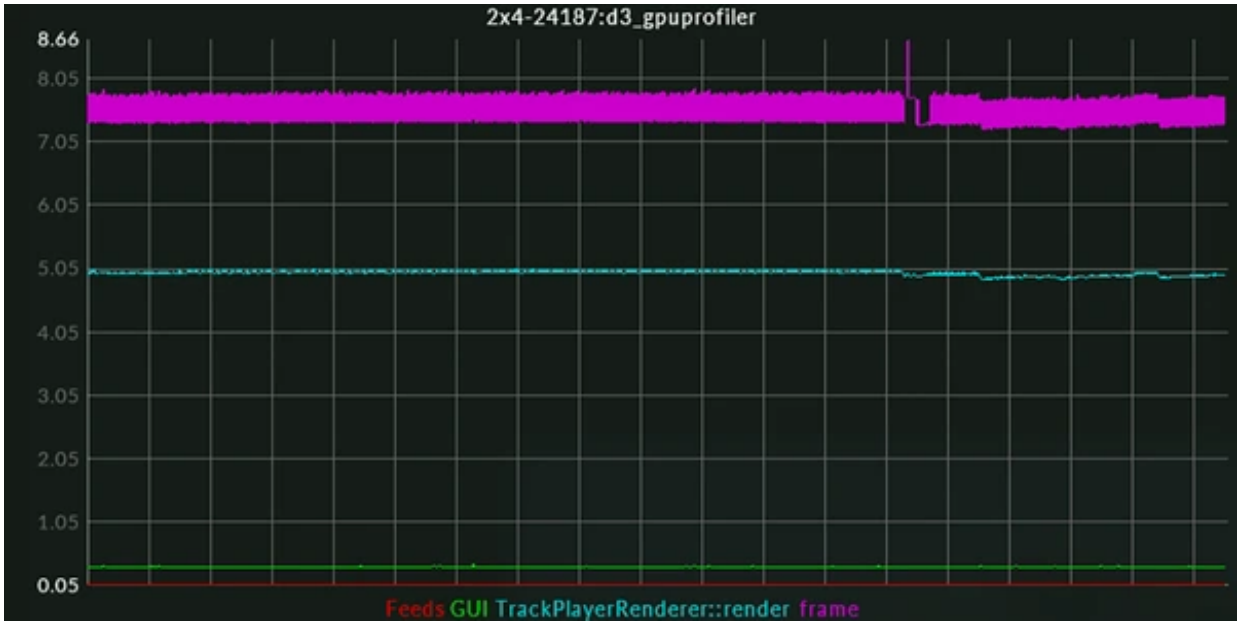
The correct number of layers for each case is discovered by using the built-in machine monitors over d3net. These display metrics to do with all aspects of hardware performance and are automatically collected and streamed while d3net sessions are hosted. The specific monitors used to qualify these layer counts are: FPS, GPU Profiler, Prefetcher Misses, and sometimes Prefetcher Requests. Between these monitors and a visible output, it is possible to verify the performance of each step in the rendering process, spot bottlenecks, and check those against the real video output.



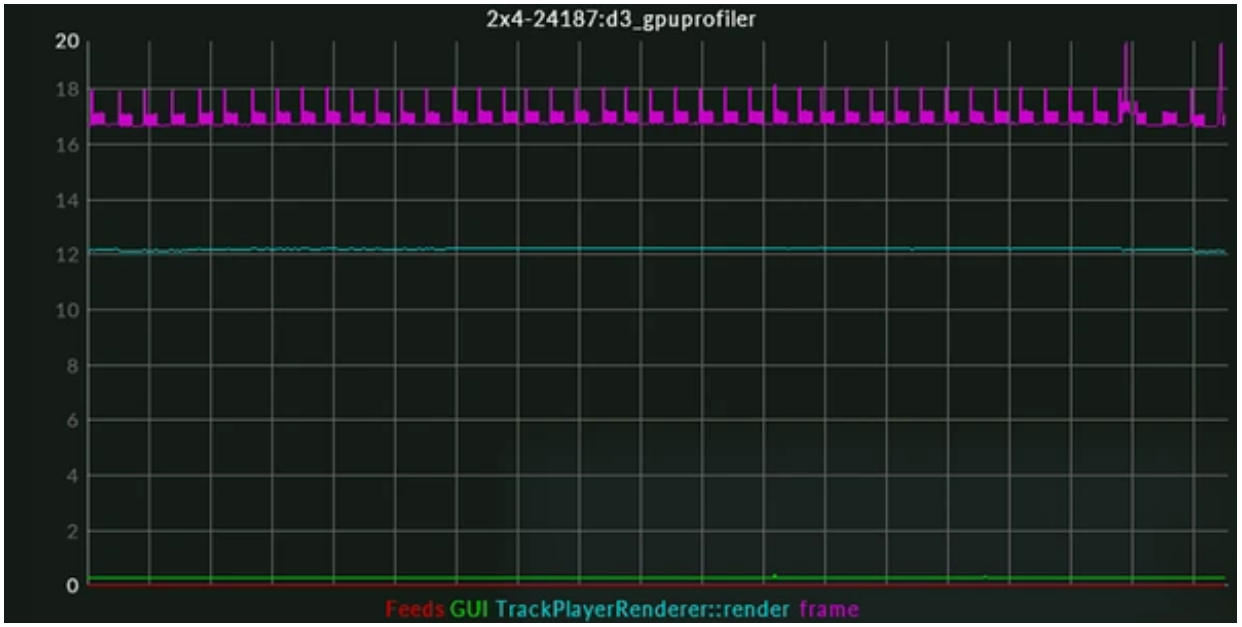
Good FPS: Y-axis shows all three heads are at values within a frame of 60fps. Some variation within this range is expected and attributed to minute differences in timing between the renderer and the metric gathering system.



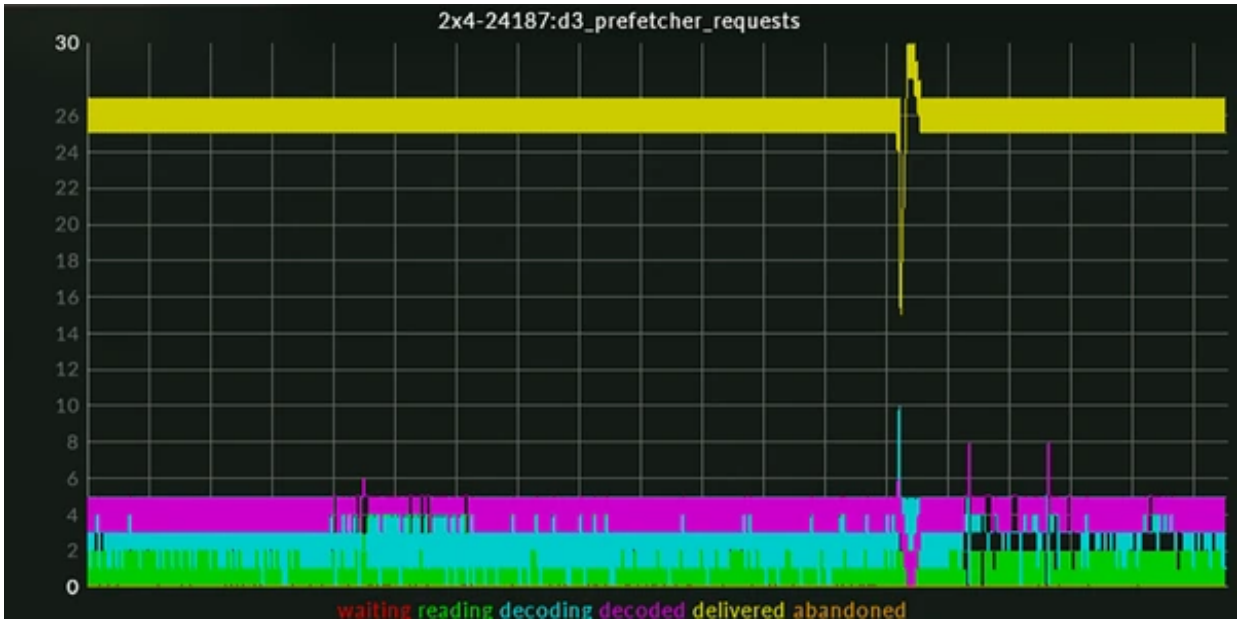
Bad FPS: Consistent spikes down to 30fps on head 1 and 2 (green and cyan lines). Head 0 is the GUI and can be safely ignored if nothing else is dropping frames.



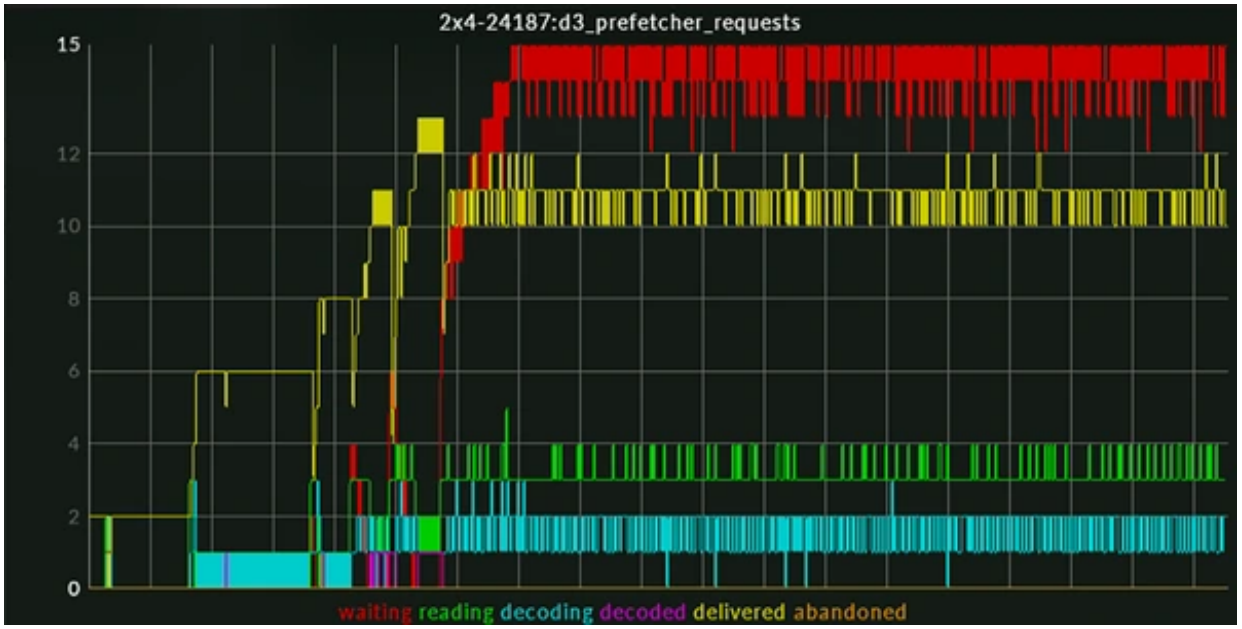
Good GPU Profiler: The GPU profiler shows how long the GPU is taking to perform a specific frame's tasks. Provided that the magenta line stays below the duration of the frame in milliseconds, the GPU can be assumed to be handing each frame on time. In this case it is taking between 7.05ms and 8.05ms out of a total 16.67ms to perform that frame's tasks.



Bad GPU profiler: The magenta line is at or above 16.67ms. This implies that the GPU is taking longer than a frame's duration to complete working on that frame and must drop a frame every so often to account for the lost time.



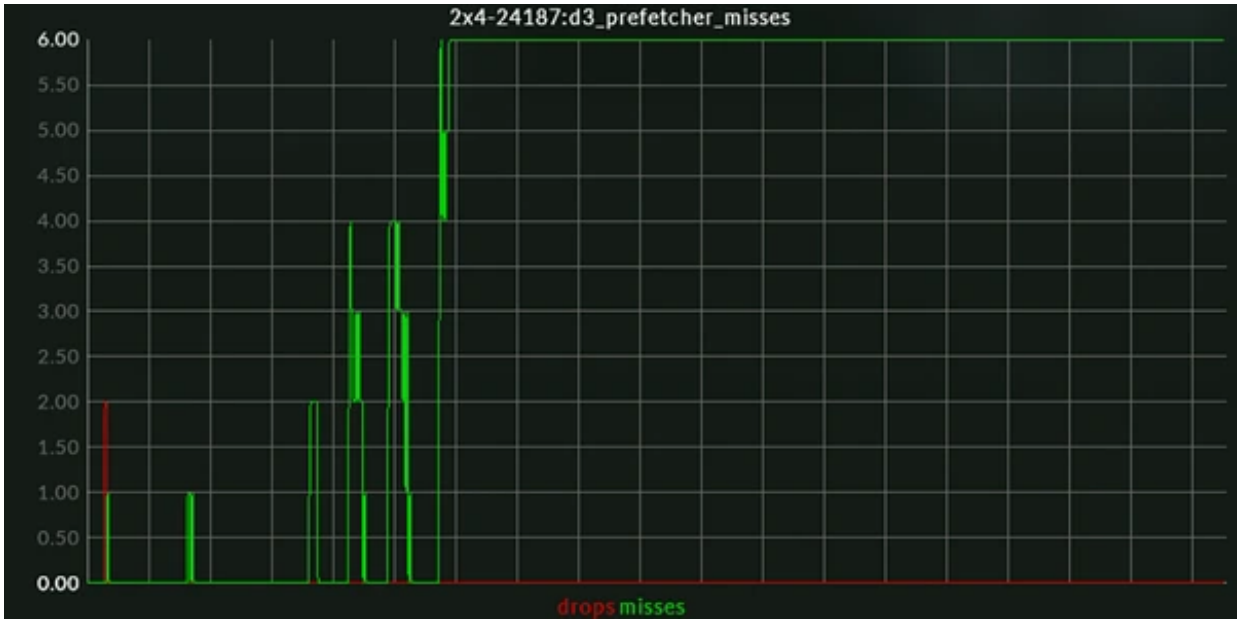
Good prefetcher requests: The prefetcher is the system that reads video data from the media drive in order to get it decoded and delivered to the renderer in time. Ideally, reading (green), decoding (cyan), decoded (purple) and delivered (yellow) should be flat lines of constant quantities steadily increasing with each new video. Waiting (red) and abandoned (orange) should be at 0 but small amount of waiting frames is acceptable.



Bad prefetcher requests: Waiting (red) frames count has exceeded all other counters, implying a growing queue of things to be read from the media drive. The other counters have grown slightly erratic as a result and playback will be choppy. In these cases, the FPS is often still at 60 on the renderer, pointing to a bottleneck on the media drive.



Good prefetcher misses: A flat line at 0. The graph is a more simplified breakdown of prefetcher requests and will only report in situations like those shown in the bad prefetcher requests example.



Bad prefetcher misses: A flat line at a value greater than 0. This means 6 video frames are missing their deadline per frame, the result is choppy output and again is likely to occur without affecting renderer framerate.

Armed with these remote monitors running on the Director machine, layers are then piled onto the Actor machine until one of them regularly falters during sustained playback. Each layer, with its unique copy of the same clip, is put into Locked mode and keyframed so that each layer delivers the same video frame at the same time. This ensures that any frames in the clip that are 'difficult' to decode all have an impact on the system at the same time. To put it another way: if the video layers were in normal mode, the exact moment-to-moment performance of the machine could vary depending on the time difference between each extra video being added to the stack. It is for this reason that the whole clip must be played through and the monitors observed for the duration.

The most layers the Actor can manage without any suspect behaviour from the monitors for the duration of the clip is recorded as the benchmark for that machine and software version. Machines that cannot operate as Actors are instead configured as mixed Directors, controlled and monitored by a remote editor in Lock to Master mode. While being tested they also have the timeline in a minimised state and no other GUI elements open. This ensures that the GPU can spend as much time as possible on the video playback task, and as little as possible on rendering the GUI.

Solo Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	13 6
HAPQ	30fps 60fps	61.25 122.5	6 3
Animation	30fps 60fps	187.25 374.5	2 1
TIFF	30fps 60fps	237 474	2 1
NotchLC	30fps 60fps	78.375 156.75	4 2

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	5 3
ProRes HQ	30fps 60fps	232 464	5 3
ProRes 4444	30fps 60fps	348 696	3 1

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	3 2
HAPQ	30fps 60fps	261.25 522.5	1 0
Animation	30fps 60fps	798.25 1596.5	0 0

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
NotchLC	30fps 60fps	331.5 663	1 0

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	1 1
ProRes HQ	30fps 60fps	991 1982	1 0
ProRes 4444	30fps 60fps	1490 2980	0 0

*testing completed on r29 196648

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the Solo requires from capture to output:

Solo SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	7	6	5
50Hz	7	6	5
30Hz	7	6	3

VX 1 Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	51 45
HAPQ	30fps 60fps	61.25 122.5	15 8
Animation	30fps 60fps	187.25 374.5	12 6
NotchLC	30fps 60fps	78.375 156.75	17 11

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	11 6
HAPQ	30fps 60fps	261.25 522.5	3 2
Animation	30fps 60fps	798.25 1596.5	3 1

Testing completed on r21

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 1 requires from capture to output:

VX 1 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

VX 2 Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	52 36
HAPQ	30fps 60fps	61.25 122.5	45 30
Animation	30fps 60fps	187.25 374.5	15 12
TIFF	30fps 60fps	237 474	11 8
NotchLC	30fps 60fps	78.375 156.75	26 23

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	12 6
ProRes HQ	30fps 60fps	232 464	9 4
ProRes 4444	30fps 60fps	348 696	6 3

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	13 6
HAPQ	30fps 60fps	261.25 522.5	7 3
Animation	30fps 60fps	798.25 1596.5	3 1
TIFF	30fps 60fps	949 1898	2 1

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
NotchLC	30fps 60fps	331.5 663	6 3

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	3 1
ProRes HQ	30fps 60fps	991 1982	2 1
ProRes 4444	30fps 60fps	1490 2980	1 0

*testing completed on r30.0 200921

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 2 requires from capture to output:

VX 2 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

VX 2+ Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single VX 2+. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	49 49
HAPQ	30fps 60fps	61.25 122.5	45 28
Animation	30fps 60fps	187.25 374.5	19 9
TIFF	30fps 60fps	237 474	14 7
NotchLC	30fps 60fps	78.375 156.75	39 23

*testing completed on r26.4 174820

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	29 15
ProRes HQ	30fps 60fps	232 464	25 13
ProRes 4444	30fps 60fps	348 696	14 8

*testing completed on r27.8 191665

Video Playback Performance - Video Layers (4k DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	27 13

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	14 7
Animation	30fps 60fps	798.25 1596.5	5 2
TIFF	30fps 60fps	949 1898	3 2
NotchLC	30fps 60fps	331.5 663	11 5
DPX (8-bit RGB)	30fps 60fps	759 1518	4 1
DPX (10-bit RGB)	30fps 60fps	1011 2022	3 1
TGA (8-bit RGB)	30fps 60fps	759 1518	4 2
TGA (8-bit RGBA)	30fps 60fps	1011 2022	3 1
TIFF (8-bit RGB)	30fps 60fps	759 1518	4 2
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	3 1

*testing completed on r26.4 174820

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	7 3
ProRes HQ	30fps 60fps	991 1982	7 3
ProRes 4444	30fps 60fps	1490 2980	3 2

*testing completed r27.8 191665

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.

- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 2+ requires from capture to output:

VX 2+ SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)
60Hz	5	4
50Hz	5	4
30Hz	5	4

VX 3 Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single VX 3. These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	45 44
HAPQ	30fps 60fps	61.25 122.5	39 28
Animation	30fps 60fps	187.25 374.5	18 9
TIFF	30fps 60fps	237 474	13 6
NotchLC	30fps 60fps	78.375 156.75	35 23

*testing completed on r27.2 181738

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	28 14
ProRes HQ	30fps 60fps	232 464	25 12
ProRes 4444	30fps 60fps	348 696	15 8

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	25 13

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	13 6
Animation	30fps 60fps	798.25 1596.5	4 1
TIFF	30fps 60fps	949 1898	3 2
NotchLC	30fps 60fps	331.5 663	11 5
DPX (8-bit RGB)	30fps 60fps	759 1518	4 1
DPX (10-bit RGB)	30fps 60fps	1011 2022	3 1
TGA (8-bit RGB)	30fps 60fps	759 1518	4 1
TGA (8-bit RGBA)	30fps 60fps	1011 2022	2
TIFF (8-bit RGB)	30fps 60fps	759 1518	4 2
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	3 1

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	6 3
ProRes HQ	30fps 60fps	991 1982	6 3
ProRes 4444	30fps 60fps	1490 2980	3 2

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 3 requires from capture to output:

VX 3 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

VX 4 Performance

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	60 43
HAPQ	30fps 60fps	61.25 122.5	52 38
Animation	30fps 60fps	187.25 374.5	22 11
TIFF	30fps 60fps	237 474	20 10
NotchLC	30fps 60fps	78.375 156.75	37 24

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	10 6
ProRes HQ	30fps 60fps	232 464	7 6
ProRes 4444	30fps 60fps	348 696	6 3

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	17 12
HAPQ	30fps 60fps	261.25 522.5	12 8
Animation	30fps 60fps	798.25 1596.5	4 1
TIFF	30fps 60fps	949 1898	4 1

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
NotchLC	30fps 60fps	331.5 663	8 5

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	3 1
ProRes HQ	30fps 60fps	991 1982	3 1
ProRes 4444	30fps 60fps	1490 2980	2 1

*testing completed on r30.0 200921

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 4 requires from capture to output.

VX 4 SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
30Hz	5	4	3

VX 4 NDI®

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5-6	5	4
50Hz	5-6	5	4
30Hz	5-6	5-6	4

VX 4N Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single VX 4N . These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	56 49
HAPQ	30fps 60fps	61.25 122.5	52 39
Animation	30fps 60fps	187.25 374.5	22 13
TIFF	30fps 60fps	237 474	21 10
NotchLC	30fps 60fps	78.375 156.75	37 33

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	12 6
ProRes HQ	30fps 60fps	232 464	12 6
ProRes 4444	30fps 60fps	348 696	6 3

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	22 16
HAPQ	30fps 60fps	261.25 522.5	15 9

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
Animation	30fps 60fps	798.25 1596.5	5 3
TIFF	30fps 60fps	949 1898	5 2
NotchLC	30fps 60fps	331.5 663	12 7

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	3 2
ProRes HQ	30fps 60fps	991 1982	3 2
ProRes 4444	30fps 60fps	1490 2980	1 0

*testing completed on r30.0 200921

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned
- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 4N requires from capture to output:

VX 4N SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

VX 4+ Performance

Playback Performance

Performance specifications listed here outline the maximum amount of video layers that are achievable on a single VX 4+ . These can fluctuate in future releases.

Video Playback Performance - Video Layers (Full HD)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	31 62	58 48
HAPQ	30fps 60fps	61.25 122.5	51 42
Animation	30fps 60fps	187.25 374.5	40 24
TIFF	30fps 60fps	237 474	36 19
NotchLC	30fps 60fps	78.375 156.75	30 24

*testing completed on r26.0 168310

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	151 302	23 12
ProRes HQ	30fps 60fps	232 464	23 11
ProRes 4444	30fps 60fps	348 696	13 7

*testing completed on r27.8 191655

Video Playback Performance - Video Layers (4K DCI)

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAP	30fps 60fps	132 264	31 24

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
HAPQ	30fps 60fps	261.25 522.5	22 15
Animation	30fps 60fps	798.25 1596.5	9 3
TIFF	30fps 60fps	949 1898	9 5
NotchLC	30fps 60fps	331.5 663	13 9
DPX (8-bit RGB)	30fps 60fps	759 1518	10 4
DPX (10-bit RGB)	30fps 60fps	1011 2022	9 3
TGA (8-bit RGB)	30fps 60fps	759 1518	11 6
TGA (8-bit RGBA)	30fps 60fps	1011 2022	9 5
TIFF (8-bit RGB)	30fps 60fps	759 1518	11 6
TIFF (8-bit RGBA)	30fps 60fps	1011 2022	9 4

Codec	Content Frame Rate	Data Rate (MB/s)	Max. Layers
ProRes 422	30fps 60fps	654 1308	5 3
ProRes HQ	30fps 60fps	991 1982	5 3
ProRes 4444	30fps 60fps	1490 2980	3 2

*testing completed on r27.8 191665

NOTES

- Content is played back at 30 fps and 60 fps as outlined in the video codec above.
- All Full HD codecs listed above have an output resolution relevant to 1920 x 1080 pixels.
- All 4K DCI codecs listed above have an output resolution relevant to 4096 x 2160 pixels.
- The test media server is run as an actor with its GUI disabled. The Director media server running in the session should be a Dedicated Director with no outputs assigned

- Full overview on the video playback performance methodology used to capture the above data can be seen here.

Capture Latency

The following table provides data on how many frames of latency the VX 4+ requires from capture to output:

VX 4+ SDI

Refresh Rate	Normal mode (frames)	Low Latency mode (frames)	Ultra-Low Latency mode (frames)
60Hz	5	4	3
50Hz	5	4	3
30Hz	5	4	3

10G Ethernet

Your Disguise system is can be equipped with an optional 10G Ethernet card.

The 10G Ethernet card is a newly available option for the Solo, that allows for media transfer at 10gb/s speeds which aligns with the GX and VX ranges of products.

Back-Plate Layout

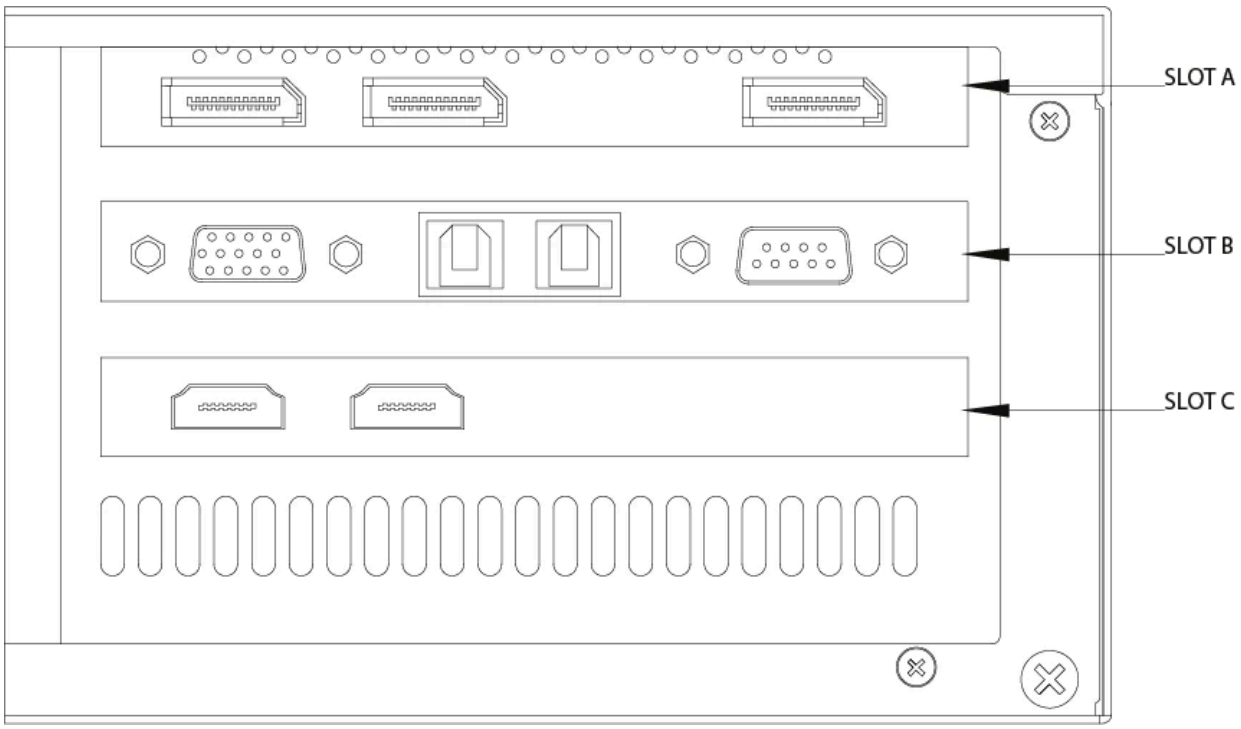


Diagram of Ethernet connections on rear of Solo.

Card Configuration

The Disguise Solo comes in a variety of optional factory fitted configurations. Your machine configuration can only be changed by sending it back to Disguise to be upgraded. The following configurations are available:

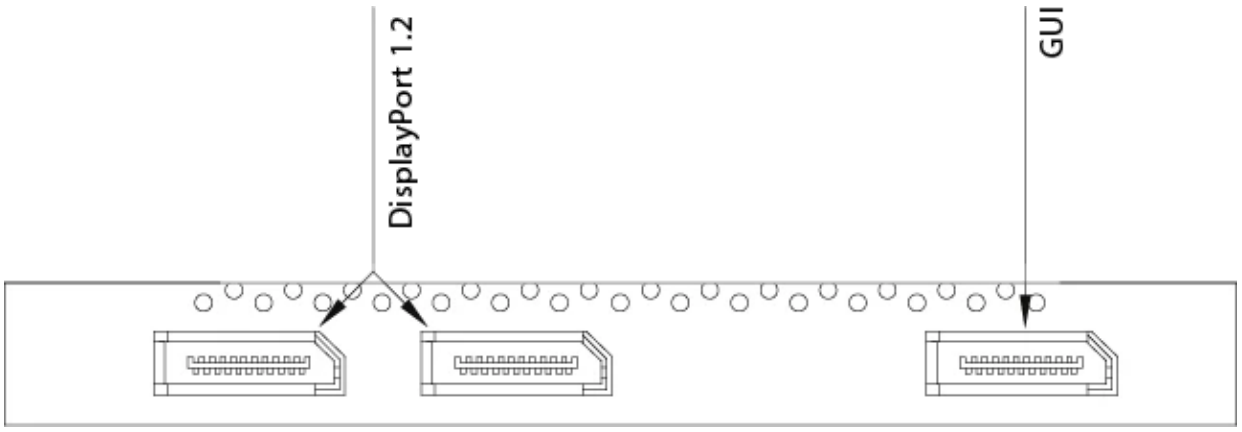
- No capture, a choice of on-board audio or Pro Audio
- 10Gb Ethernet, a choice of on-board audio or Pro Audio
- HDMI capture, a choice of on-board audio or Pro Audio
- SDI capture, a choice of on-board or Pro Audio



Rear view card configuration

Slot A

Slot A is video output and is non-configurable. The Solo has 1 control / GUI output and 2 dedicated DisplayPort stage outputs.



Video output card

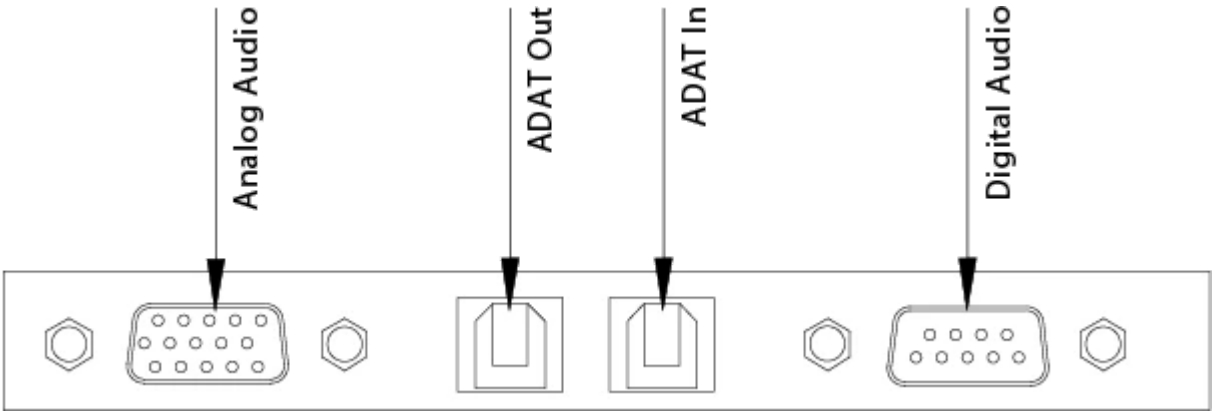
The solo has three DP 1.2 outputs (1x dedicated GUI, 2x Outputs)

The GUI output is located on the previously highlighted port. This port CANNOT be used to output to the stage.

Supported resolutions on the DisplayPort outputs are up to 4096x2160 @60hz.

Slot B

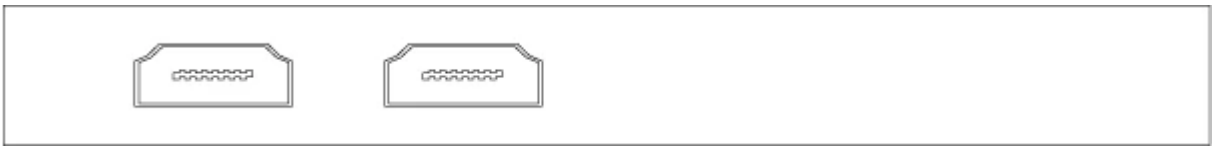
Slot B is by default blank, so the on-board audio is used but can be configured to be Pro Audio I/O when the order is placed.



Slot C

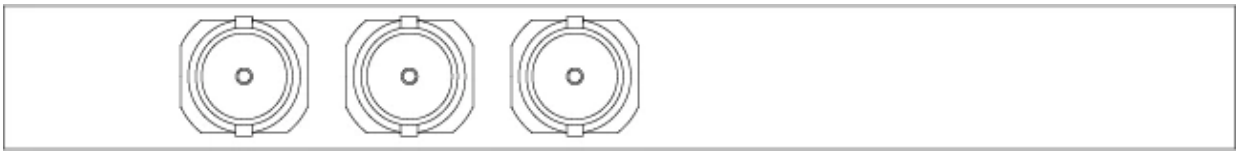
Slot C has four options - blank, HDMI capture, SDI capture or 10G Ethernet. Capture/Ethernet options are factory fitted.

HDMI Capture card



Max resolution: 1x 4096x2160 @30 Hz or 2x 1920x1080p @60Hz

SDI Capture card



Max resolution 3x HD - SDI or 2x 3G - SDI

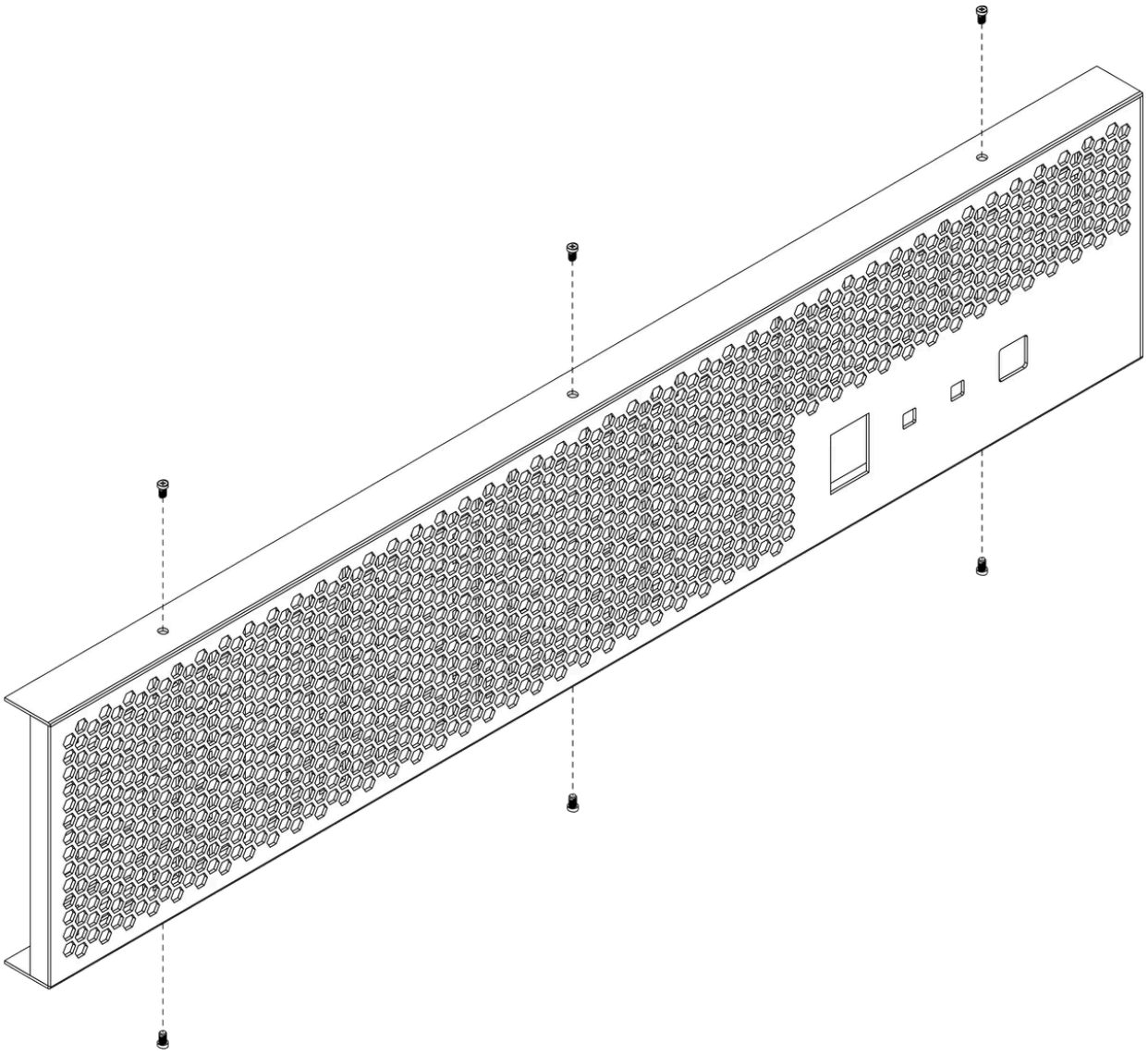
10G Ethernet card



Solo Filter Replacement

You should regularly inspect the air filter on the front of the unit to prevent loss of cooling efficiency.

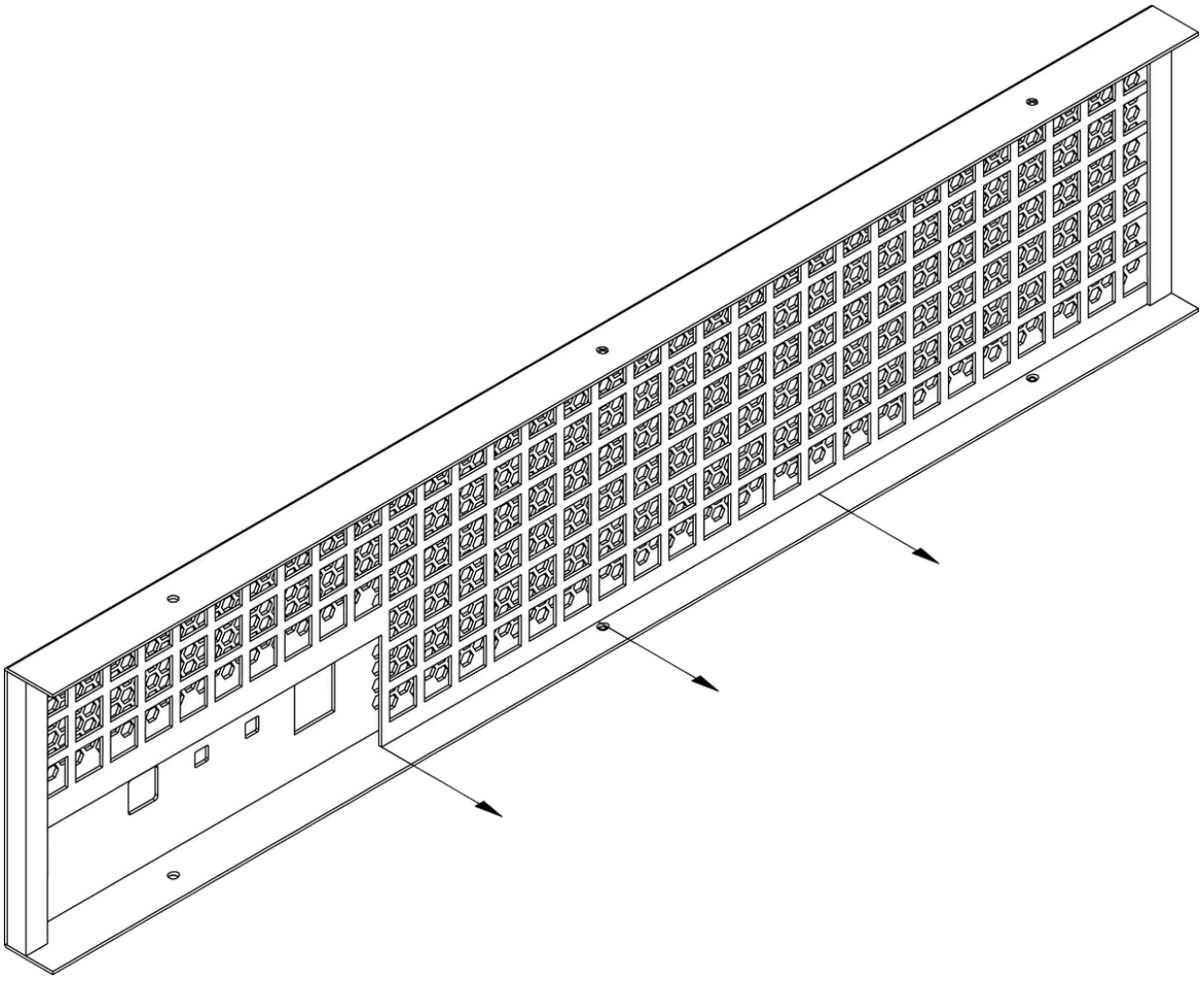
To access the filter, remove the 3 top facia screws and the bottom 3 facia screws. Then simply pull the entire facia off to get access to the filter.



Air filter housing front

> **Note**
>
> Please note: It is recommended that you service the air filter when the unit is powered off. If the unit is on you will be exposed to the system fans.

To remove the perforated metal grid keeping the filter in place, please pull from the middle out.



Air filter housing rear

Give the filter a clean, replace the filter in the metal frame and reattach the facia to the front of the unit.

Onboard Audio

The Onboard Audio card has one channel of audio input and one channel of audio output.

These connections are made over mini-jack (3.5 mm) connections. There is 1 point of connection both for input and output.

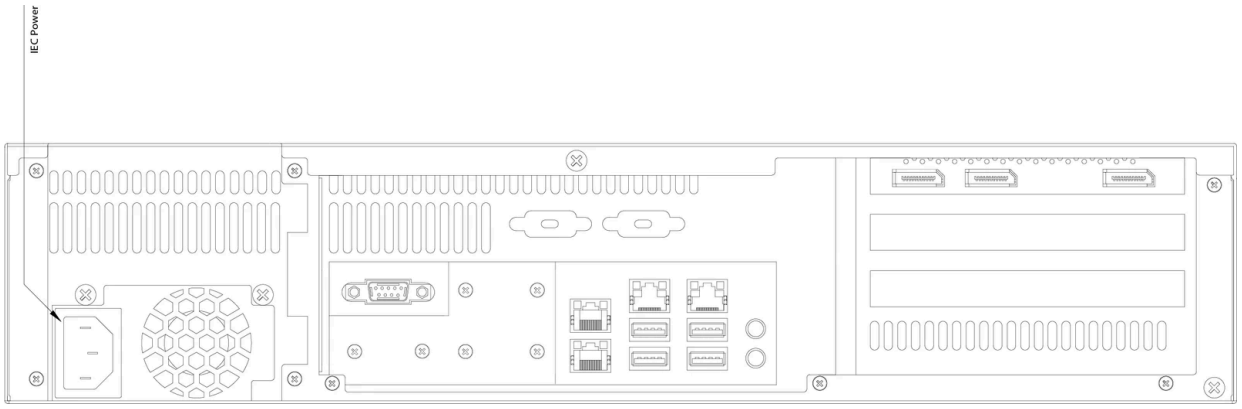
One is for line level audio and one is for mic level audio.

Solo can receive LTC input through the microphone input but care must be taken to set the correct volume values. If the volume is set too loud, it will not work properly. The recommended settings in windows is +0db (off).

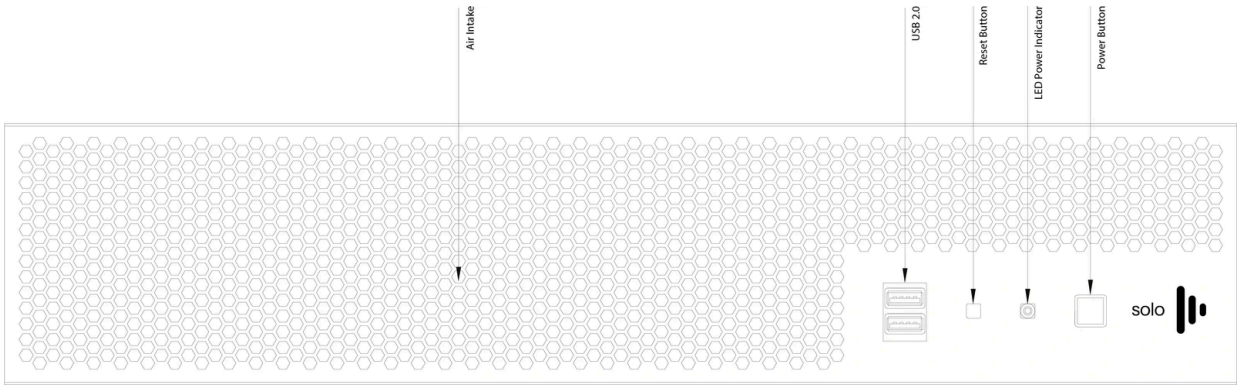
> **Note**
>
> Please note: Audio does not appear as a configurable device unless a mini-jack is connected on the back of the system.

Solo Powering the system

1. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
2. Press the power button on the front of the unit and wait for the system to load into Windows.



Location of power input on rear of the plus range unit

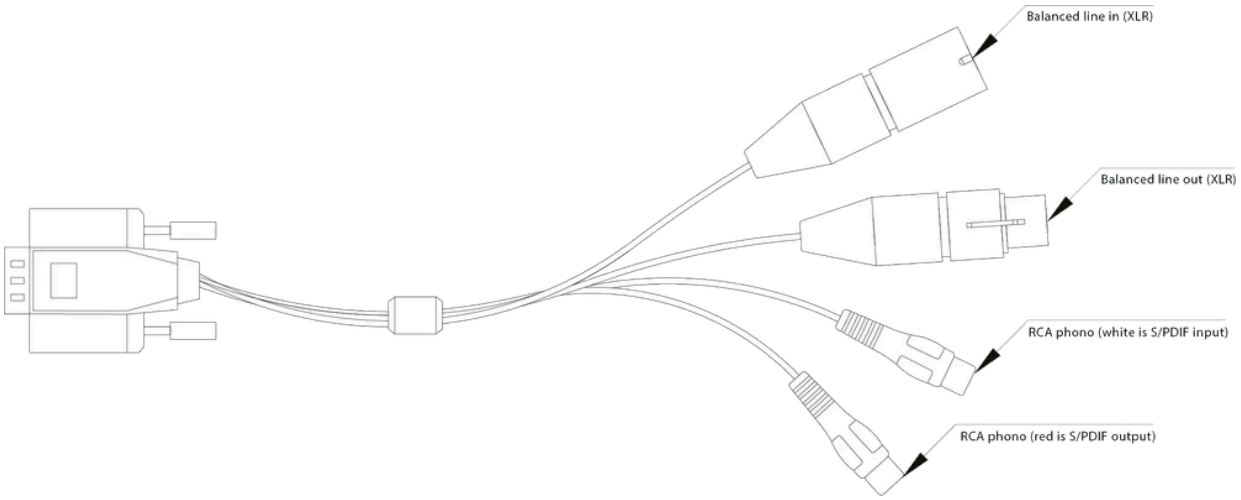


Location of power switch on front of unit

Pro Audio

Digital breakout cable

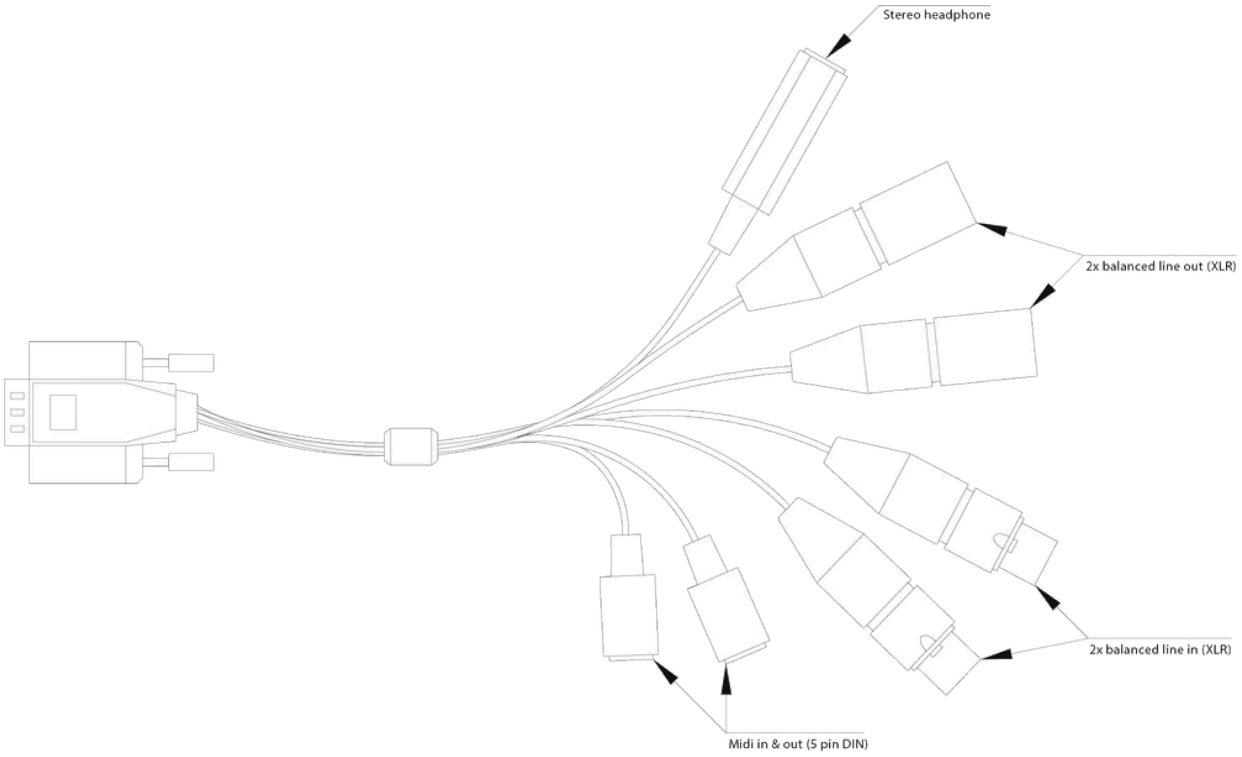
This digital breakout cable provides the following inputs and outputs:



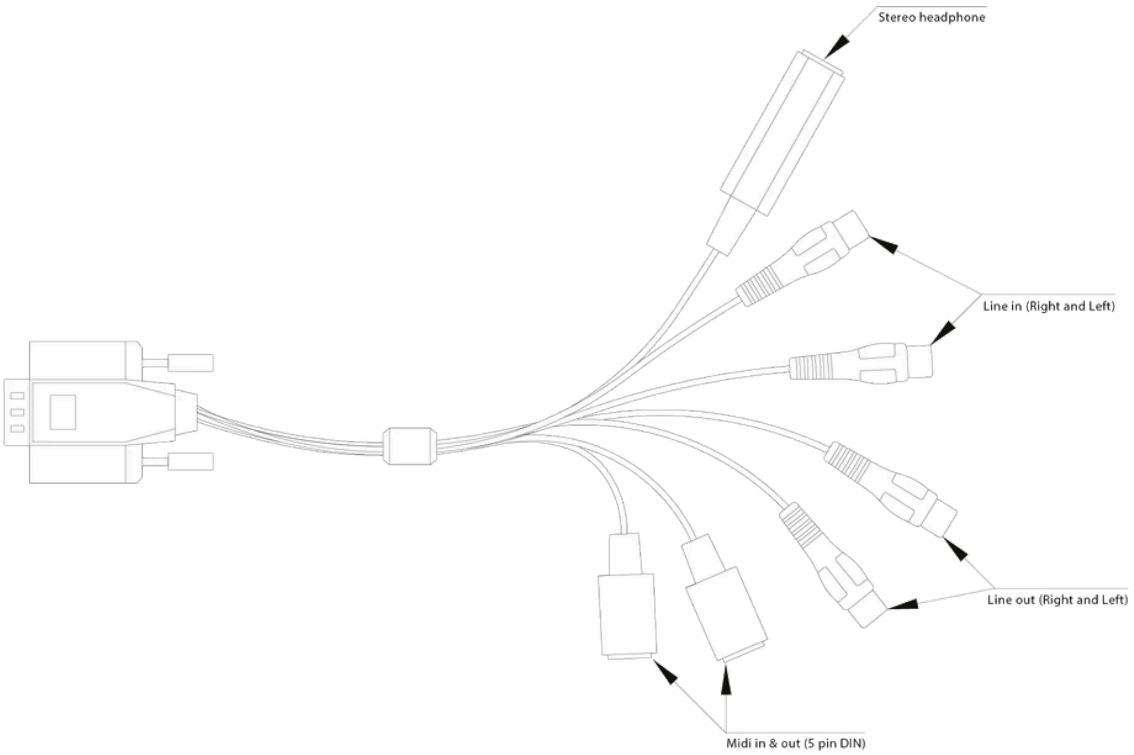
Analog breakout cables

The Pro audio option comes with analog breakout cables which lets you choose which input/output to use.

HDSPe AIO: Analog breakout cable, balanced



HDSPe AIO: Analog breakout cable, un-balanced

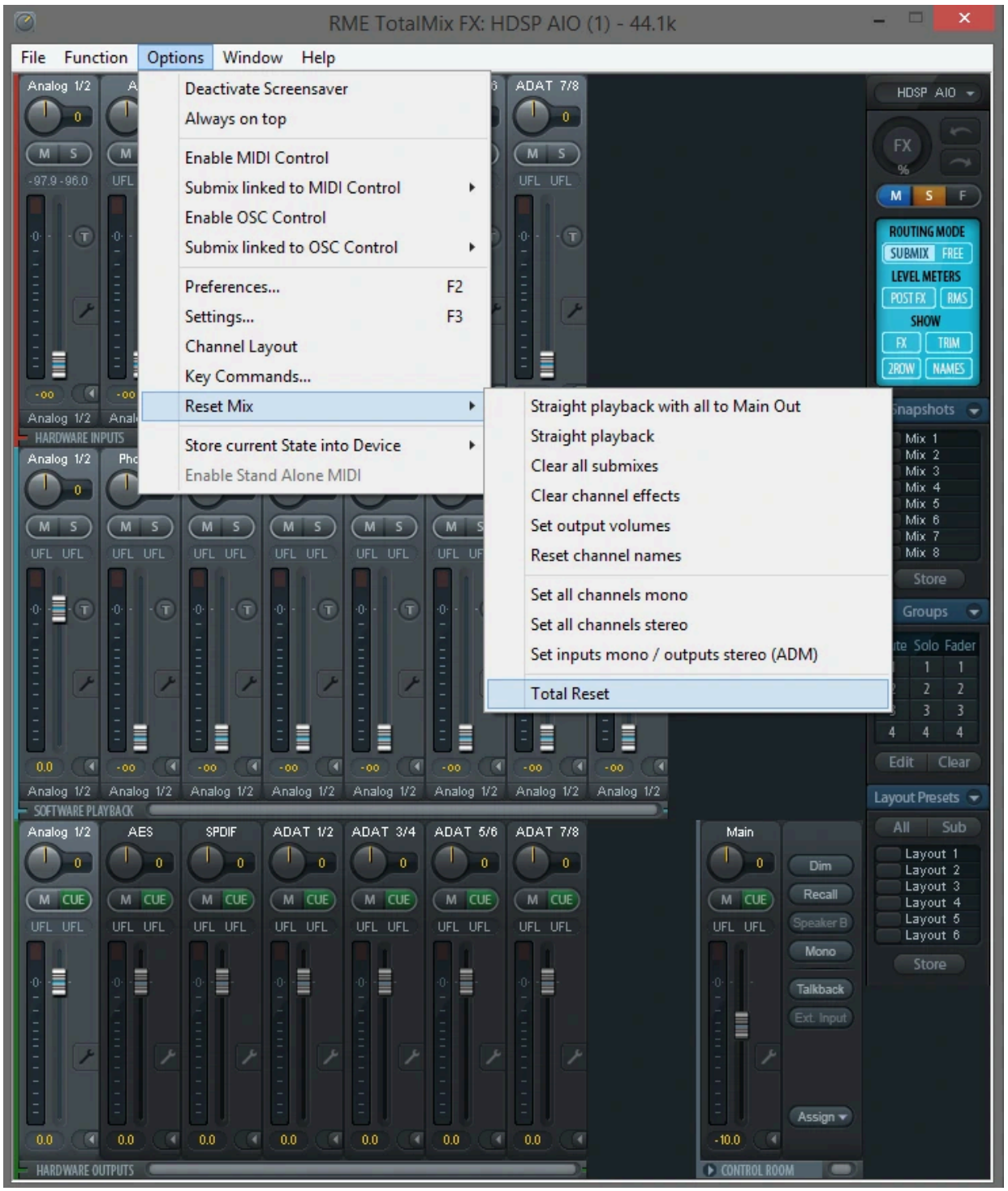


Are different breakout cables avaialble?

There are several variations of the audio breakout cables available.

Please refer to the RME website for more information.

Resetting Pro-audio mixer to default settings



Please see the audio output patch topic for more information on how to configure your output channels.

SDI Capture

Your Disguise system can be equipped with optional capture cards. These cards can capture live video from either SD-SDI or HD-SDI video sources with up to three unique feeds, or two unique 3G-SDI feeds per machine.

Max Number of Unique Inputs

The Solo machine can take three HD-SDI inputs or two 3G SDI inputs.

Supported formats

720x486i @ 59.94 Hz NTSC
720x576i @ 50.00 Hz PAL
1280x720p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz, 60Hz
1920x1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
1920x1080PsF @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz
1920x1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
2048X1080p @ 23.976Hz, 24Hz, 25Hz, 29.97Hz, 30Hz, 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
2048X1080i @ 47.96Hz, 48Hz, 50Hz, 59.94Hz, 60Hz
2048x1556PsF @ 14.98Hz, 15Hz, 18.98Hz, 19Hz

It is possible to have a different format on each input, However, the limitations are a maximum of 1x 4k or 2x 1080p60.

If you are using 1x 4k or 2x 1080p it is not possible to use any other video inputs on the unit due to hardware limitations.

Back-Plate Layout

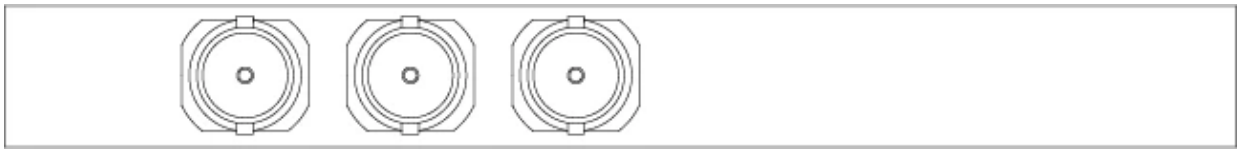
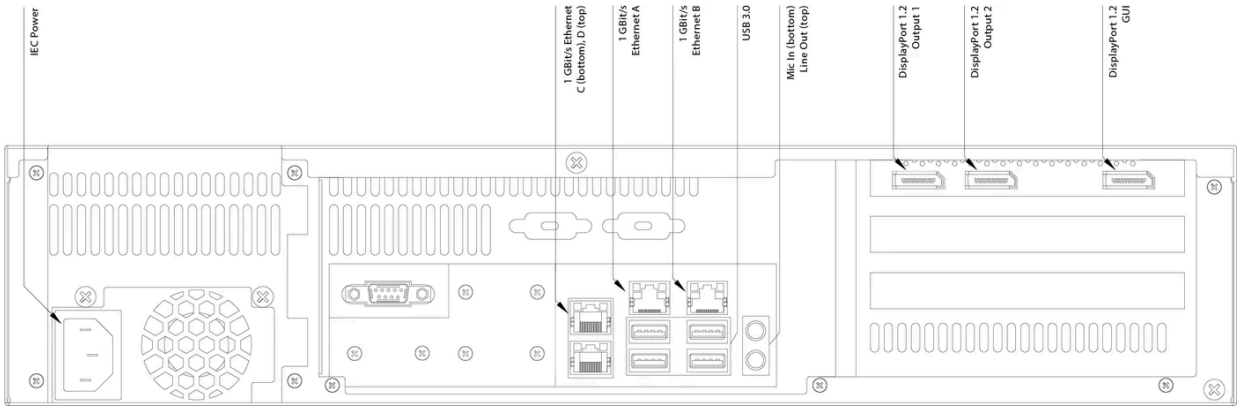


Diagram of Video Capture BNC connections on the rear of the Solo.

Live Video input inherently introduces frame latency during playback.

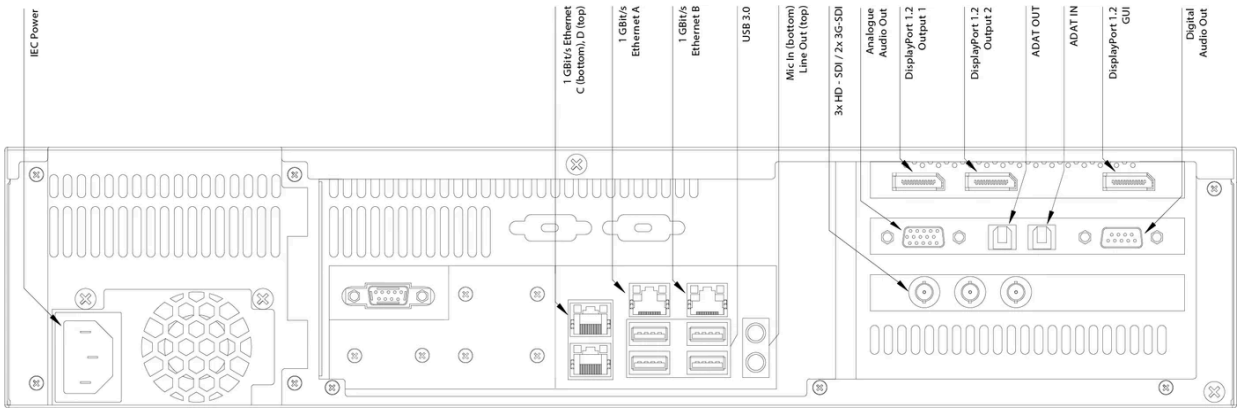
> **Note**
>
> Please contact **Support** for guidance on performance standards.

Solo Diagrams



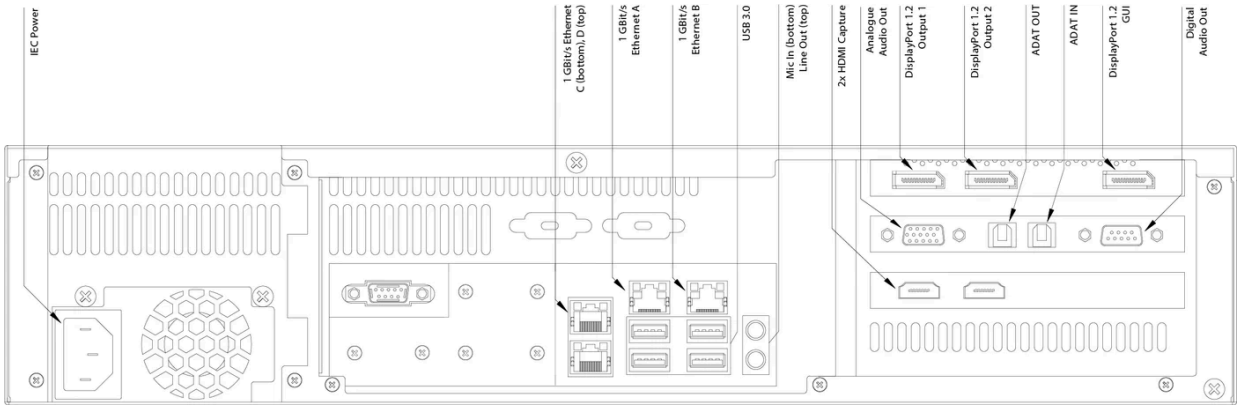
Solo base unit

The base unit has no video capture and comes with onboard audio.



Solo Configuration A

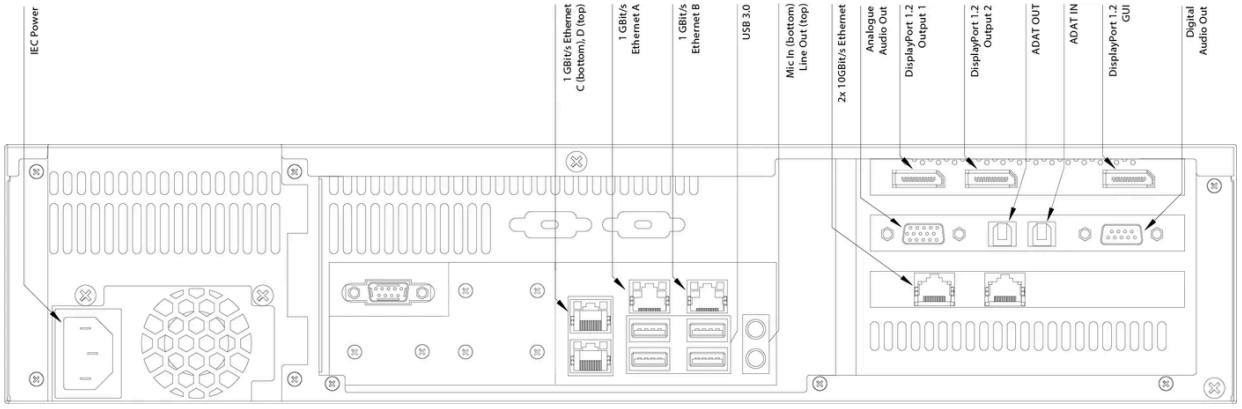
Pro Audio & SDI capture options installed.



Solo Configuration B

Pro Audio & HDMI Capture options installed.

Solo Configuration C



Pro Audio & 10G network options installed.

Solo HDMI capture

Your Disguise system is can be equipped with optional capture cards. These cards have the ability to capture live video.

Maximum number of unique inputs

The Solo machine can take two HDMI inputs.

Max resolution: 1x 4096x2160 @30 Hz or 2x 1920x1080p @60Hz

Back-Plate layout

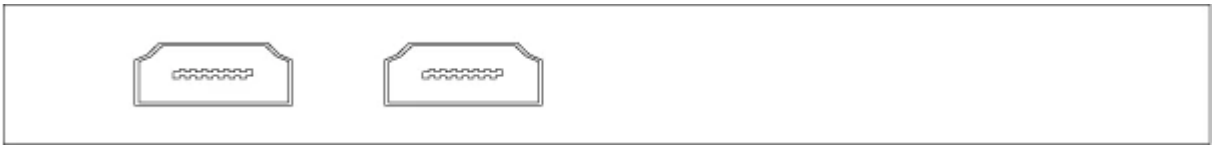


Diagram of HDMI Video capture connections on rear of Solo.

Live Video input inherently introduces frame latency during playback.

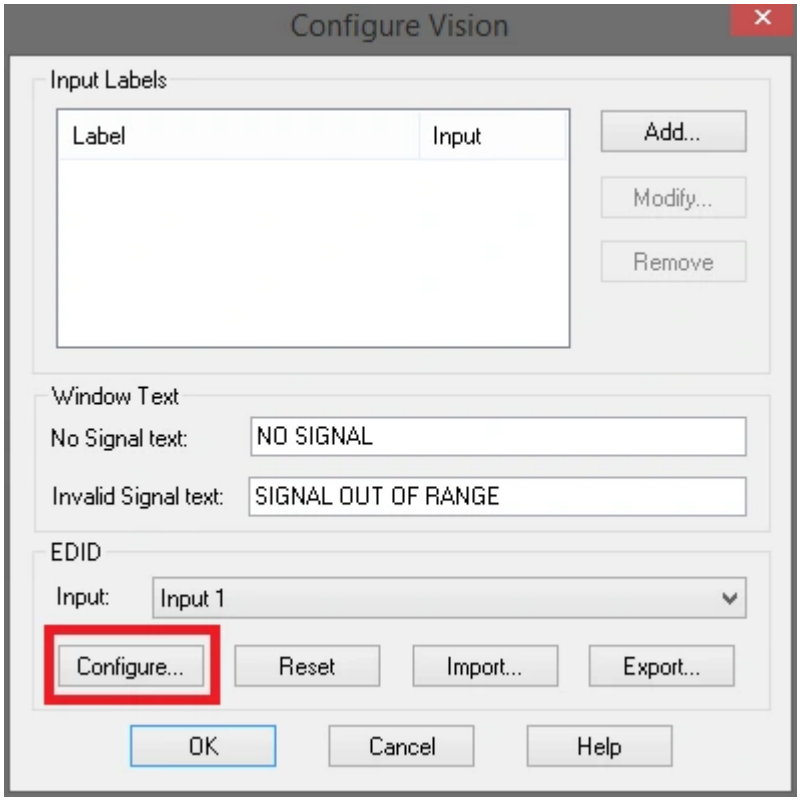
Please contact **Support** for guidance on performance standards.

Technical limitations

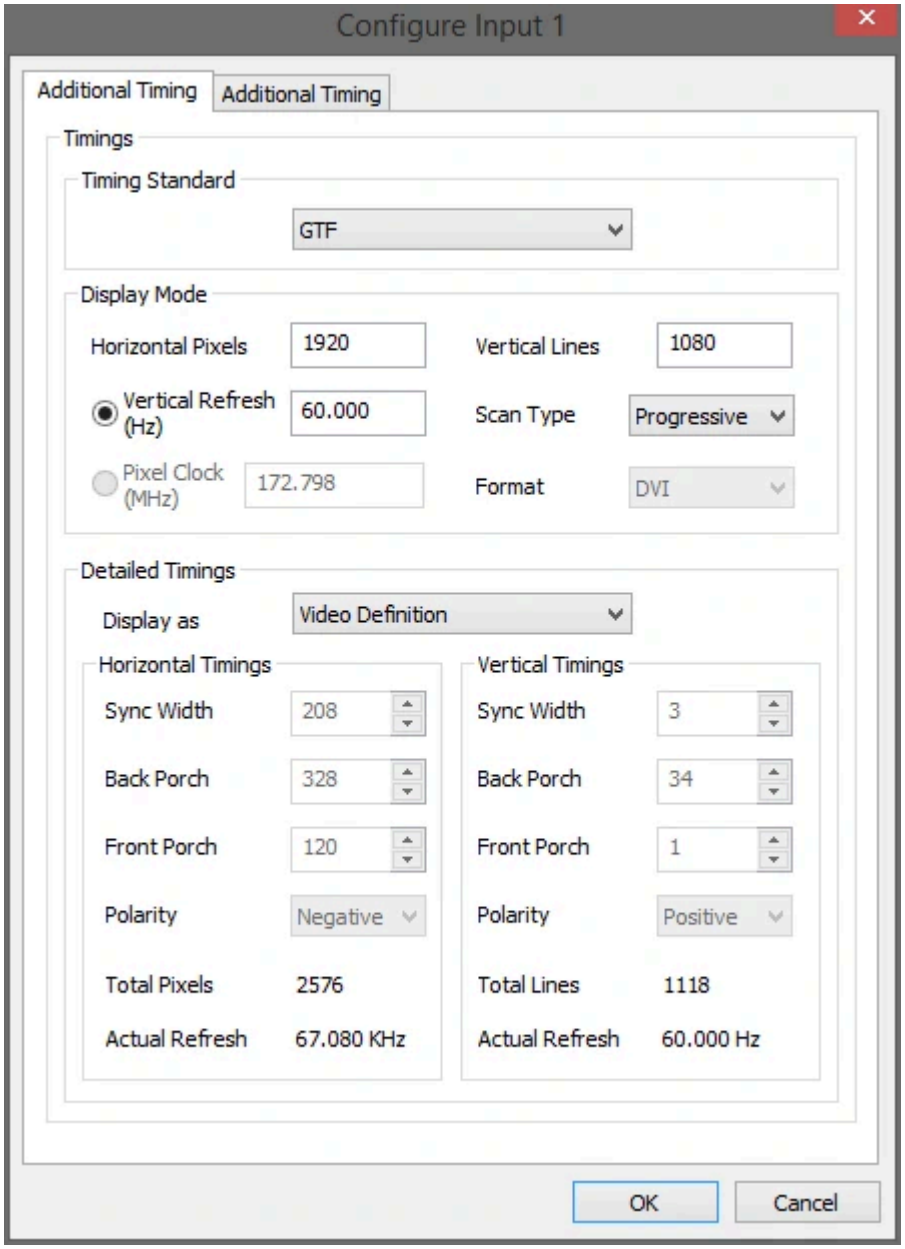
> **Warning**
>
> Colour Sampling Supported: RGB 8-8-8, YUV 4-4-4

Configuring presented EDID to source device

Please open the **Configure Vision** application and click the **Configure** button

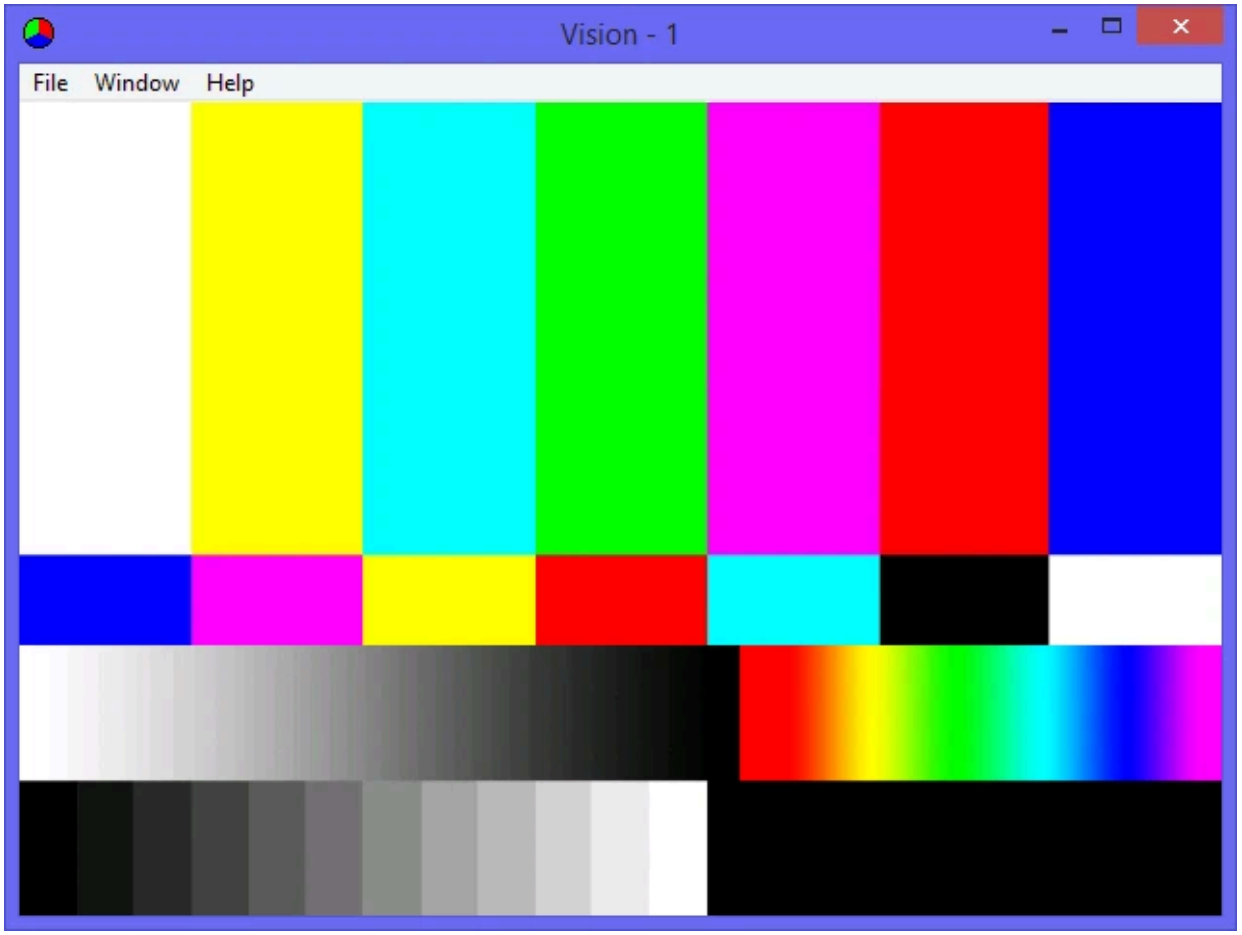

Configure Vision
Input Labels
Label
Input
Add...
Modify...
Remove
Window Text
No Signal text:
NO SIGNAL
Invalid Signal text:
SIGNAL OUT OF RANGE
EDID
Input:
Input 1
Configure...
Reset
Import...
Export...
OK
Cancel
Help

Create an EDID to present to the source device, for example a laptop



Preview HDMI Input outside Designer

Please open the **Vision Window application** to show HDMI capture outside the software


Vision - 1
File
Window
Help

Solo Overview

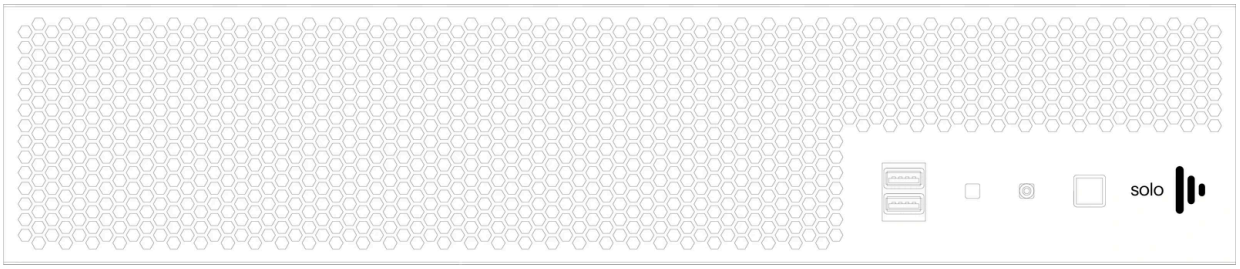
> **Warning**
>
> Do not open or remove the case unless you are instructed to do so by a certified engineer.

The Solo server is a legacy media server that was re-engineered for the next generation of content creation. The Solo is a 2U standalone server, built for the everyday show or project.

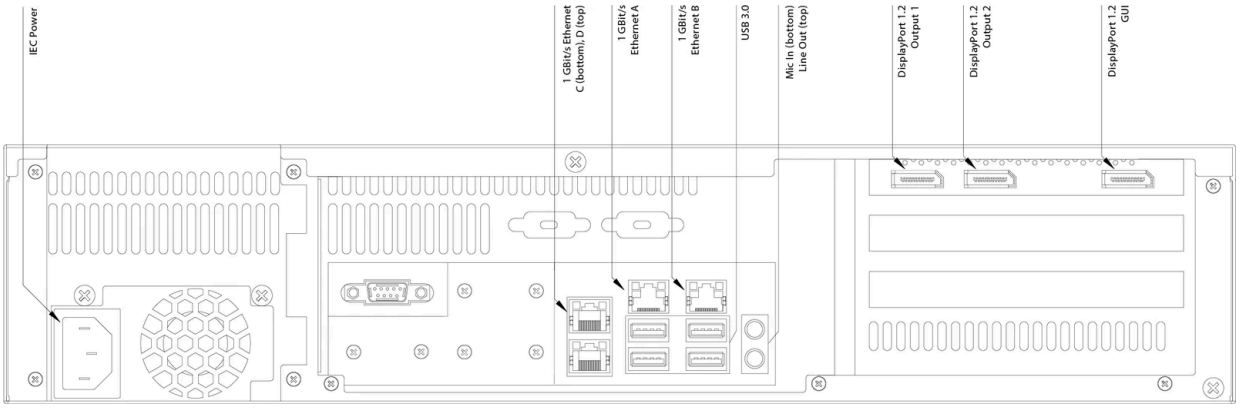
The machines come pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

For detailed information on the specifications for Solo, please see the specifications page.

Solo machine



Front view of Solo



Rear view of Solo

What's Different?

The Solo is a powerful 2U media server that can be used as a standalone solution, to design, sequence, and playback your shows, or as a Director in a larger network with pro, VX, and GX range media servers.

Optional video input cards support either 2x HDMI inputs for 1080p60 (HDMI connectors), 3x 1.5G inputs (HD-BNC connectors), or 2x 3G inputs (HD-BNC connectors). The Solo also supports NDI video capture.

The default audio option on a Solo is stereo (1x in, 1x out). An optional audio card can be purchased. This additionally supports balanced XLR (2x in, 2x out) and analogue (1x in). USB audio interfaces can also be used if needed.

The Solo does not support VFC cards, with video output via DisplayPort only.

The Solo is primarily designed as a stand-alone media server and has certain restrictions when used in concert with other servers. A Solo **can**: - Act as a Non-Dedicated Director on its own (this is the primary use case). - Act as an Understudy to a Solo Director. - Act as an Editor in a session with any other Disguise media server. - Act as a Director (Dedicated or Non-Dedicated) in a session with other EX, VX, GX or Pro media servers. :::note The Solo does not have a Genlock port and does not support Genlock, so its utility as a Director in a session of other media servers is limited. ::: A Solo **cannot**: - Act as an Actor in any session. - Act as an Understudy to an actor in any session.

The Solo does not support RenderStream.

If you experience any problems with hardware please contact the **support team**.

View the full Product information in the **Technical Specifications** PDF.

Solo Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

Redisguise is the process of updating and restoring the system using a bootable USB drive.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

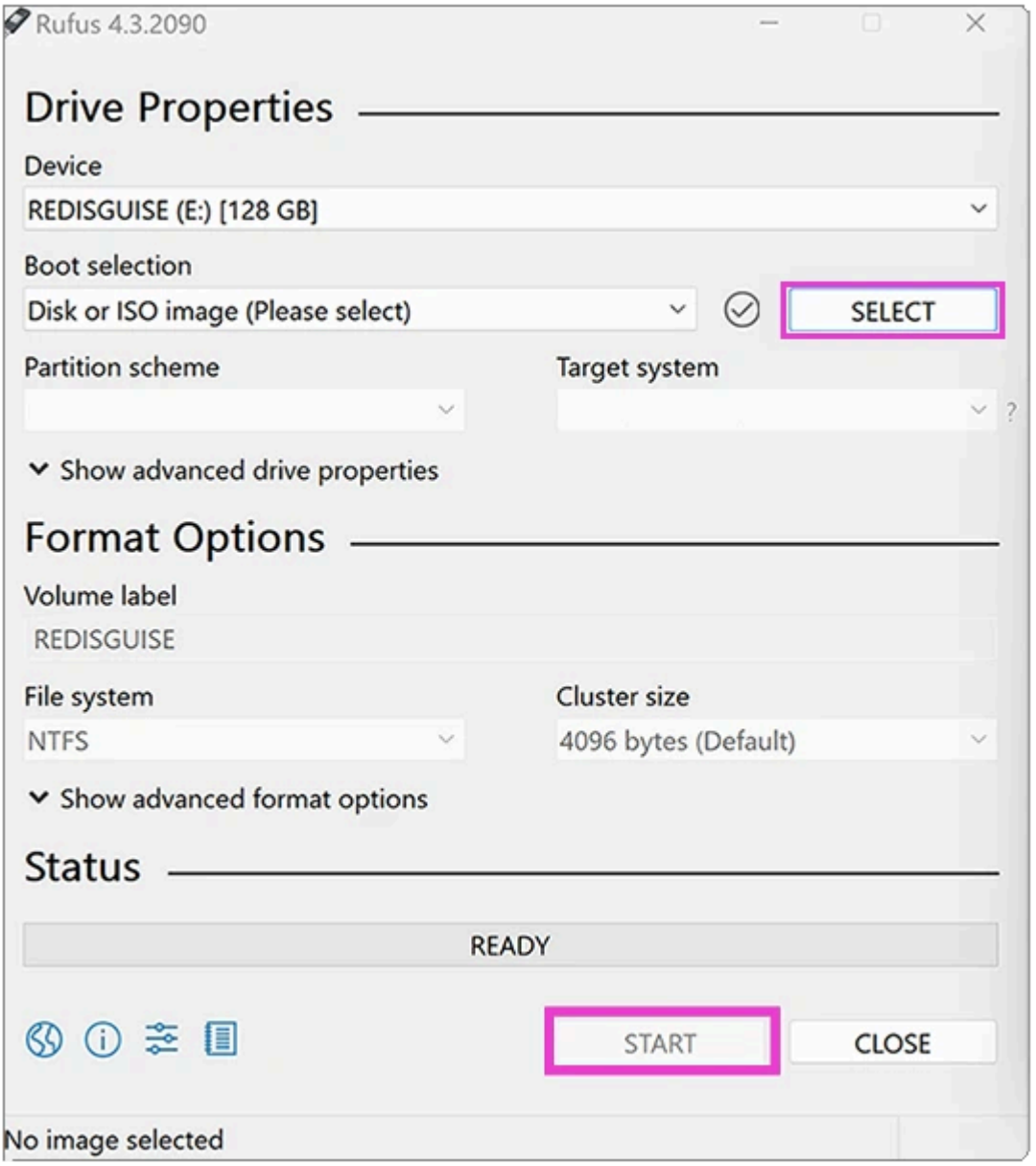
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - MBR`
- `Target system - BIOS (or UEFI-CSM)`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`
- `Advanced Drive Properties`
  - `Add fixes for old BIOSes (extra partition, align, etc)`
  - `Use Rufus MBR with BIOS ID | 0x80(Default)`

- `Advanced Format Options`
  - `Quick format`
  - `Create extended label and icon files.`

Booting into the USB

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the Delete key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Navigate to the **Boot** tab.
4. Select **Hard Drive BBS Priorities**.
5. Change Boot Option #1 to your USB thumb drive (the name will look different depending on the manufacturer of the drive).
6. Press **ESC** to return to the main section.
7. Navigate to the **Save & Exit** tab (Do not Save & Exit the BIOS itself).
8. In the **Boot Override** section, select the USB that matches the name of your USB manufacturer. **DO NOT** select the one that starts with UEFI.

The Redisguise process will run automatically until the re-imaging has completed [5]. The system will reboot and run scripts on start-up. Please ensure you allow these to finish before beginning any other processes.

A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

Solo Specifications

Hardware Specifications

	Solo
Voltage	100-240V, 50-60Hz*
Power Connection	IEC
Power Consumption Peak	350W
Heat Dissipation Peak	1,194 BTU/hr
Max. Decibel Rating (if available)	N/A
Operating System	Windows 10 LTSC
Environmental Tolerances	Temperature: 5-40°C (40°-104°F) Humidity: 5-95% (non-condensing) Altitude: 0-2700mm (0-8850 ft.)
Mounting System	2U 19” rack mount
OS	1x Internal Storage Drive
Storage	1x 1.92TB Removable NVMe SSD
Memory	8GB RAM (2x 4GB)

- For countries with variable power supply, we recommend a UPS to provide a consistent voltage.

System Connectivity I/O

	Solo
Video output	1x DisplayPort 1.2 (GUI) 2x 4K outputs using DisplayPort 1.2
Video input	Optional input cards: 2x HDMI inputs for 1080p60 (HDMI connectors) 3x 1.5G inputs (HD-BNC connectors) 2x 3G inputs (HD-BNC connectors)
Optical Audio	No

	Solo
MIDI	No
Audio	Default - Stereo (1x in, 1x out) Optional audio card: Balanced XLR (circular 3-pin connector) - 2x in, 2x out Analogue (1/4 headphone jack) - 1x in
General Network	Default - 4x 1GbE/sec Optional upgrade: Additional 2x 10GbE/sec
High Speed Network	No
System Management Controller	No
Data/Peripherals	2x USB 2.0 4x USB 3.0
Video Sync	No

Product Compatibility

The table below provides full compatibility information on Disguise hardware and software products.

Product	Life Cycle Phase	Initial Designer support introduced	Latest Designer support available	Can I load the latest Designer version?	OS
4x4pro	End of Life	r11.3	r18.1.15	No	Current OS
4x2pro	End of Life	r11.3	r18.1.15	No	Current OS
2x4pro	End of Support	r14.2	r32.4.x	No	Current OS
2x2plus	End of Life	r12	r18.1.15	No	Current OS
Solo	End of Life	r14.4.7	r29.3	No	Current OS
EX 2	Current Production	r28	Latest version	Yes	Current OS
EX 2C	Current Production	r28 or r32.2 if HDMI 2.0 input and/or additional 12G SDI input is required	Latest version	Yes	24Q2 - r28.0 to r31.1.3 25Q3+ - r32.2+
EX 3	End of Production	r24.2	Latest version	Yes	201F.1063 - r24.2 to r26.5.2 25Q1+ - r27+
EX 3+	Current Production	r28 or r32.2 if HDMI 2.0 input and/or additional 12G SDI input is required	Latest version	Yes	24Q2 - r28.0 to r31.1.3 25Q3+ - r32.2+
GX 1	End of Support	r14.3	r32.4.x	No	Current OS
GX 2	End of Support	r14.3	r32.4.x	No	Current OS
GX 2C	End of Support	r15.3.1	r32.4.x	No	199B.947 - up to r27.1.3

Product	Life Cycle Phase	Initial Designer support introduced	Latest Designer support available	Can I load the latest Designer version?	OS
					24Q1+ - r27.2+
GX 3	Current Production	r22	Latest version	Yes	201F.1063 - r22 to r26.5.2 24Q1 - r27 to r27.10.3 25Q1+ - r28+
GX 3+	Introduction	r32	Latest version	Yes	25Q3
VX 1	End of Support	r17.4 or r20.1 if Matrox capture card installed	r32.4.x	No	187C.1048 - up to r21.4.9 03C.1048 - r22 to r26.5.2 m24Q1 - r27 to r27.1.3 24Q2+ - r27.2+
VX 2	End of Support	r17.4 or r20.1 if Matrox capture card installed	r32.4.x	No	187C.1048 - up to r21.4.9 203C.1048 - r22 to r26.5.2 24Q1 - r27 to r27.1.3 24Q2+ - r27.2+
VX 2+	Current Production	r26.4	Latest version	Yes	23Q4 - r26.4 to r27.1.3 24Q1+ - r27.2+
VX 3	Current Production	r27.2	Latest version	Yes	24Q1+ - r27.2+

Product	Life Cycle Phase	Initial Designer support introduced	Latest Designer support available	Can I load the latest Designer version?	OS
VX 4	End of Support	r15.2 or r20.1 if Matrox capture card installed	r32.4.x	No	194H.1048 - up to r21.4.9 202B.1048 - r22 to r26.5.2 24Q1 - r27 to r27.1.3 24Q1_1+ - r27.2+
VX 4N	End of Support	r24.1.1	r32.4.x	No	Current OS
VX 4+	Current Production	r21.4	Latest version	Yes	197D.1048 - r21.4 to r21.4.9 204A.1048 - r22 to r26.5.2 24Q2 - r27 to r27.1.3 24Q2_1+ - r27.2+
RX	End of Production	r18	Latest version	Yes - only if used with a Disguise media server that can load the latest Designer software version	Current OS
RX II	End of Production	r19	Latest version	Yes - only if used with a Disguise media server that can load the latest Designer software version	Current OS
RX III	Current Production	r27.5	Latest version	Yes - only if used with a Disguise media server that can load the latest Designer software version	Current OS

Product	Life Cycle Phase	Initial Designer support introduced	Latest Designer support available	Can I load the latest Designer version?	OS
OmniCal Wired Kit	Current Production	r15	Latest version	Yes	N/A
OmniCal Wireless Kit (iOS)	End of Life	r15	r19	No	N/A

The latest Designer software version can be found here.

The current OS for each Disguise media server or node can be found here.

An overview of our product lifecycle can be found here.

Product Lifecycle

What and why

Disguise prides itself on being at the cutting edge of technology advancements. As a result, we are constantly striving to develop new features, improvements and workflows in Designer to ensure that productions and experiences across the global media and entertainment industries choose to be powered by Disguise.

A key part of our value proposition is the development of our hardware platform, which relies upon a wide array of components that we carefully select and test before adding to our products. We work closely with the manufacturers and suppliers of these components to make sure that we have enough supply to last during the entire product life cycle.

The life cycle of our hardware products can vary for a number of reasons, such as key components receiving a major update to their functionality, or reaching end of life.

We have therefore implemented a product life cycle for our hardware products which we have introduced in a number of phases, from initial development to the end of life.

To show what this Product Lifecycle looks like from Development to End of Life, we have included the Product Lifecycle Timeline illustration below.



Product Lifecycle Timeline

Product Lifecycle - Phase Overview

Each phase of the product life cycle has a number of different support types:

- Hardware - hardware product, including the Operating System (OS) where applicable.
- Software - Designer software version(s).
- Workflow - workflow(s) within Designer.

Each product life cycle phase also has numerous support types with several different levels:

- Beta - support is offered to beta users only.
- Full - an overview on support and warranties is outlined in our general terms and conditions can be viewed **here**.
- Best efforts - we will continue to offer support where possible, but is dependent on a number of factors which we will outline within each of the phases.
- None - no more support can be provided.

From time to time we may need to move a hardware product to a later phase within the life cycle. We intend to provide a sufficient level of communication to our users in the event that this takes place.

Development

The development phase of a hardware product life cycle is when we run a closed beta, consisting of real world testing on productions and experiences. The purpose of this phase is to ensure that the hardware product meets both our users' and our own requirements, and is an extremely important aspect of the product development cycle.

During the development of a hardware product, we only support beta users.

Support Type	Support Level
Hardware	Beta
Software	Beta
Workflow	Best Efforts

Introduction

The introduction phase of a hardware product life cycle is the first year following a public launch. During this phase, the product is launched under normal support, including a launch OS where applicable.

An initial Designer software version is released, which introduces software support for the hardware product.

We release initial video playback performance metrics and include this information within the specification sheets.

All Disguise hardware products are sold with a 2-year standard warranty. This can be optionally extended by up to 5 years. No warranty period on a hardware product can be extended for longer than 5 years from the point of manufacture.

Support Type	Support Level
Hardware	Full
Software	Full
Workflow	Full

Current Production

During this phase, the Designer software version is regularly tested against the hardware product and updated, including the OS where applicable.

Support Type	Support Level
Hardware	Full
Software	Full
Workflow	Full

End of Production notice

We release an End of Production (EOP) notice to our users to inform them that the referenced hardware product will soon no longer be produced, typically around 6 months before we expect to conclude production.

We will no longer provide additional warranty options to be purchased on a product that is reaching the end of production.

Support Type	Support Level
Hardware	Full
Software	Full
Workflow	Full

End of Production

We will send an email to all users to communicate that the hardware product(s) has now reached the end of production, and that we no longer produce any more units.

The notice will inform our users that we will continue to provide repairs for the hardware product for up to 5 years from the date of notice. During this phase, for any hardware product that is out of warranty, any repairs (and/or relevant parts) will be subject to availability based on a first-come, first-served basis. Hardware support level is therefore best efforts.

We will no longer update the Current OS of the hardware product, where applicable, unless a critical bug has been identified within any of the drivers and/or SDKs included within the OS.

The notice will also inform our users that software support will be ending 1 year from the date of the notice. Updated software versions of Designer will be regularly tested and will continue to run on the hardware product.

Support Type	Support Level
Hardware	Best efforts
Software	Full
Workflow	Full

End of Support

We will send an email to all users to communicate the final supported Designer software version that can be used with that hardware product.

We will move to a long-term release model for the Designer software version, where we only fix show-critical issues that do not require large changes for 1 year. Software support therefore, moves to best efforts.

We will provide final video playback performance metrics specific to the specific Designer software version and will add this to the specification sheet documentation.

During this period, for any hardware product that is out of warranty, any repairs (and/or relevant parts) will still be subject to availability on a first-come, first-served basis. Hardware support level is therefore still best efforts.

Support Type	Support Level
Hardware	Best efforts
Software	Best efforts
Workflow	Full

End of Life

We will send an email to all users to communicate that we will no longer fix bugs in the long-term Designer software version release for that product.

We continue to offer workflow support on a best-efforts basis, but may need to refuse support in some cases if the workflows have changed significantly compared to the latest Designer software version(s).

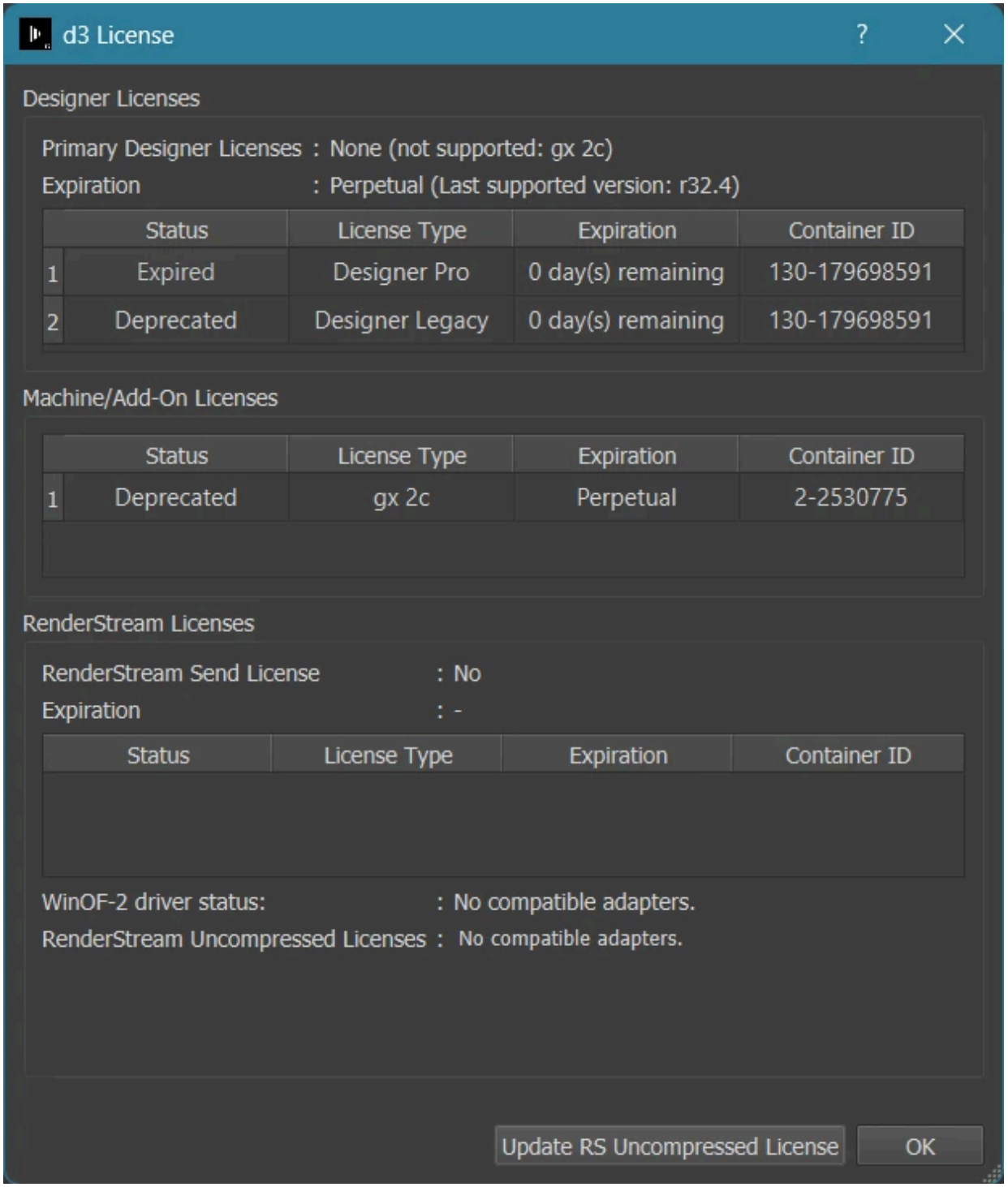
Support Type	Support Level
Hardware	None
Software	None
Workflow	Best efforts

Using servers beyond End of Support

It's important to note that the Designer software license included in our hardware products is permanent and does not expire.

When a server model is designated **End of Support** or **End of Life**, it can still be used on projects for the lifetime of that product, but only up to its last supported Designer software version. See the **product compatibility page** for details.

Newer Designer versions will consider that product *deprecated*, and will not be able to run Designer. If a certain server is considered deprecated in a given Designer release will be clearly indicated during installation, and on the Disguise Licenses page in d3Manager. It will also show the "last supported version".



Disguise Licenses page shows GX2C as deprecated on Designer r33.0

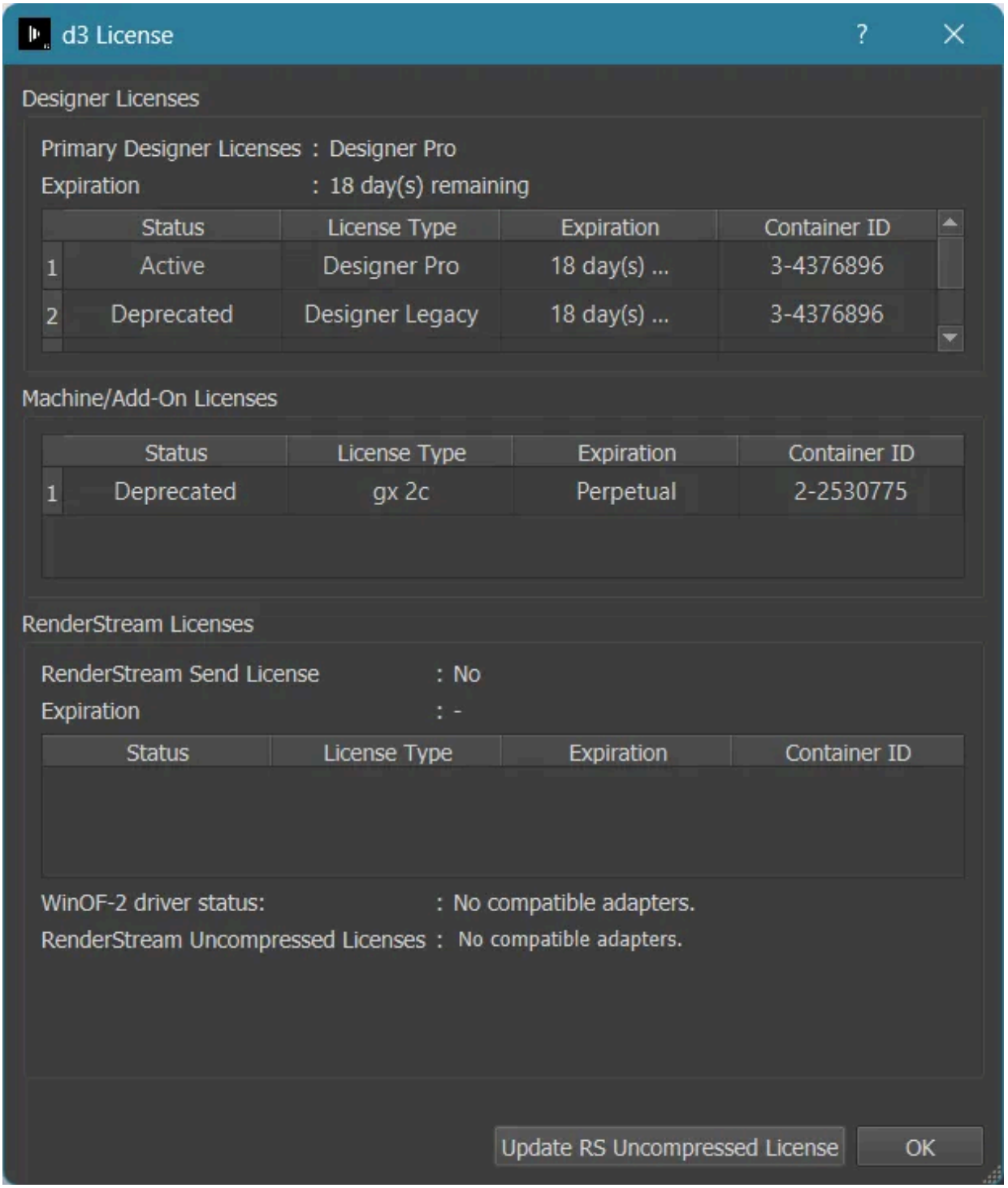
Using Designer Pro on End of Support servers

Deprecated servers can be used as Editor machines on newer software releases, if a Designer Pro license is added to the server. In this case the Designer Pro license takes precedence over the server license that is deprecated in the newer Designer release.

The general rules is that any not-expired, not-deprecated license takes precedence over a deprecated license.

A deprecated machine with a Designer Pro or X1 license no longer behaves as a Disguise server, and instead follows the normal restrictions of the software license. This affects behaviour of outputs (e.g. watermarks), what d3net roles are allowed, etc.

> **Note**
>
> This also means that server-specific features such as Display Management and VFC configuration will not be available while running as Designer Pro or X1.



Disguise Licenses page shows GX2C with Designer Pro on Designer r33.0

PX & PX+ Overview

Engineered to power Unreal Engine vanilla graphics, the px and px+ are our high-performance render marchines that work seamlessly with Porta to provide you with the assurance of best-in-class support and maintenance from Disguise.



Additional Information

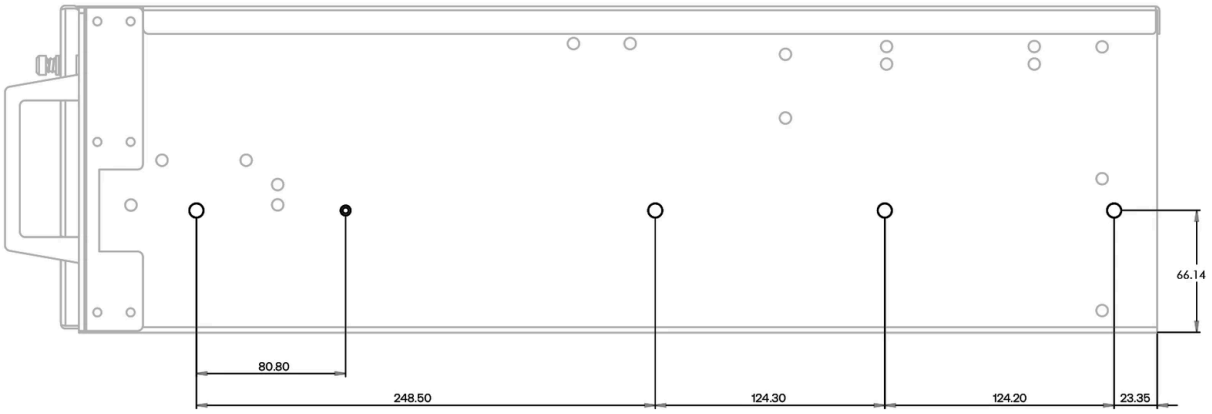
- The Product page for the PX Range here
- The PX Product information in the PX Technical Specifications document.
- The PX+ Product information in the PX+ Technical Specifications PDF

Rack Slide Replacement

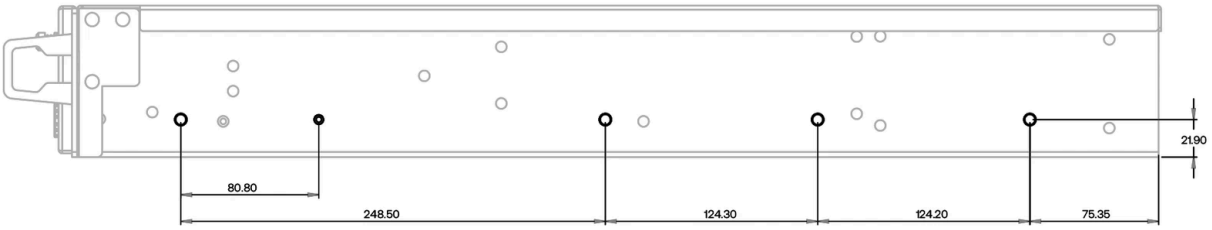
Disguise servers mount into a rack using slide rails secured by keyhole standoffs on the chassis. Standoffs (or standoff spacers/fixings) are fastener components designed to create space, secure components, or align parts at a fixed distance from a surface. If a slide needs swapping, it can simply be unscrewed and replaced in situ. The procedure is the same across the range.

The standoff positions differ between 4U and 2U chassis, as shown below.

4U Chassis



2U Chassis



⚠ Before you start

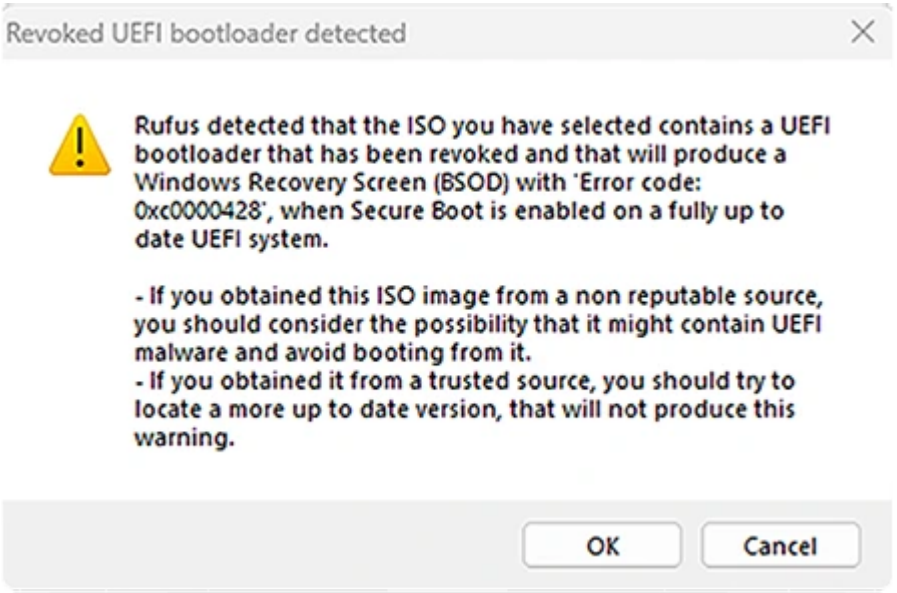
Power the server down, disconnect it from the rack, and place it on a flat surface before replacing any rack slide hardware.

Redisguise Advice

Redisguise is the process of updating and restoring the operating system on a server using a bootable USB drive.

The following advice will help resolve common issues with the process:

1. Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.
2. It's critically important to use the correct USB Redisguise settings. The re-image process will fail if they are not set correctly.
3. Some very old OS versions consisted of 3 parts due to the way the data was compressed. Where this is the case, place all 3 parts in the same directory and then use 7-Zip to extract the first part. 7-Zip will automatically continue to extract the other 2 parts to create the full ISO image.
4. Please do not select 'Save Changes' in the BIOS. You only need to access the 'BootOverride' Section.
5. During the Redisguise process, servers may appear to get stuck indefinitely at 0% completion. This is typically due to a misconfiguration of the USB drive in Rufus. If this happens, review and repeat the steps shown in the 'Create a Bootable USB' paragraph for your specific server model (see Redisguise Overview).
6. On the latest versions of Rufus you may see the warning below. This is expected and does not apply to current Disguise hardware. Please click OK to continue as normal.



7. We have provided a table below to illustrate which servers require specific USB ports for the Redisguise process.

Server	Re-imaging USB Port	Port colour
GX 1, GX 2, GX 2C	Use the rear ports only	
4x2pro, 4x4pro	Use the rear (USB 2.0) ports only	USB 2.0 rear ports are White USB 3.0 front & rear ports are Blue

⚠️ If you experience any problems during updating or restoring the system, or any of these instructions are unclear, please contact the support team.

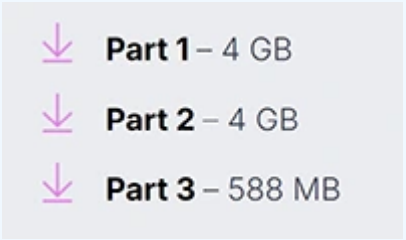
Redisguise Overview

Redisguise is the process of updating and restoring the operating system on a server using a bootable USB drive.

This process can update to a newer OS image, re-image the same version, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **Disguise Manager > Help** and select **About Manager**.

The OS Images can be downloaded from the Hardware OS Images section.

> **Note**
>
> Some very old OS versions consisted of 3 parts due to the way the data was compressed. Where this is the case, place all 3 parts in the same directory and then use 7-Zip to extract the first part. 7-Zip will automatically continue to extract the other 2 parts to create the full ISO image.
>
> 
>

Server	Partition System
4x4pro	Legacy MBR
4x2pro	Legacy MBR
2x4pro	Legacy MBR
2x2plus	Legacy MBR
Solo	Legacy MBR
EX 2	[UEFI GPT]
EX 2C	[UEFI GPT]
EX 3	[UEFI GPT]

Server	Partition System
EX 3+	[UEFI GPT]
GX 1	Legacy MBR
GX 2	Legacy MBR
GX 2C	Legacy MBR
GX 3	[UEFI GPT]
GX 3+	[UEFI GPT]
VX 1	[UEFI GPT]
VX 2	[UEFI GPT]
VX 2+	[UEFI GPT]
VX 3	[UEFI GPT]
VX 4	[UEFI GPT]
VX 4+	[UEFI GPT]
RX	[UEFI GPT]
RX II	[UEFI GPT]
RX III	[UEFI GPT]

Redisguise Instructions

Please see the following links for Redisguise information. Please note, older servers have Update & Restore information.

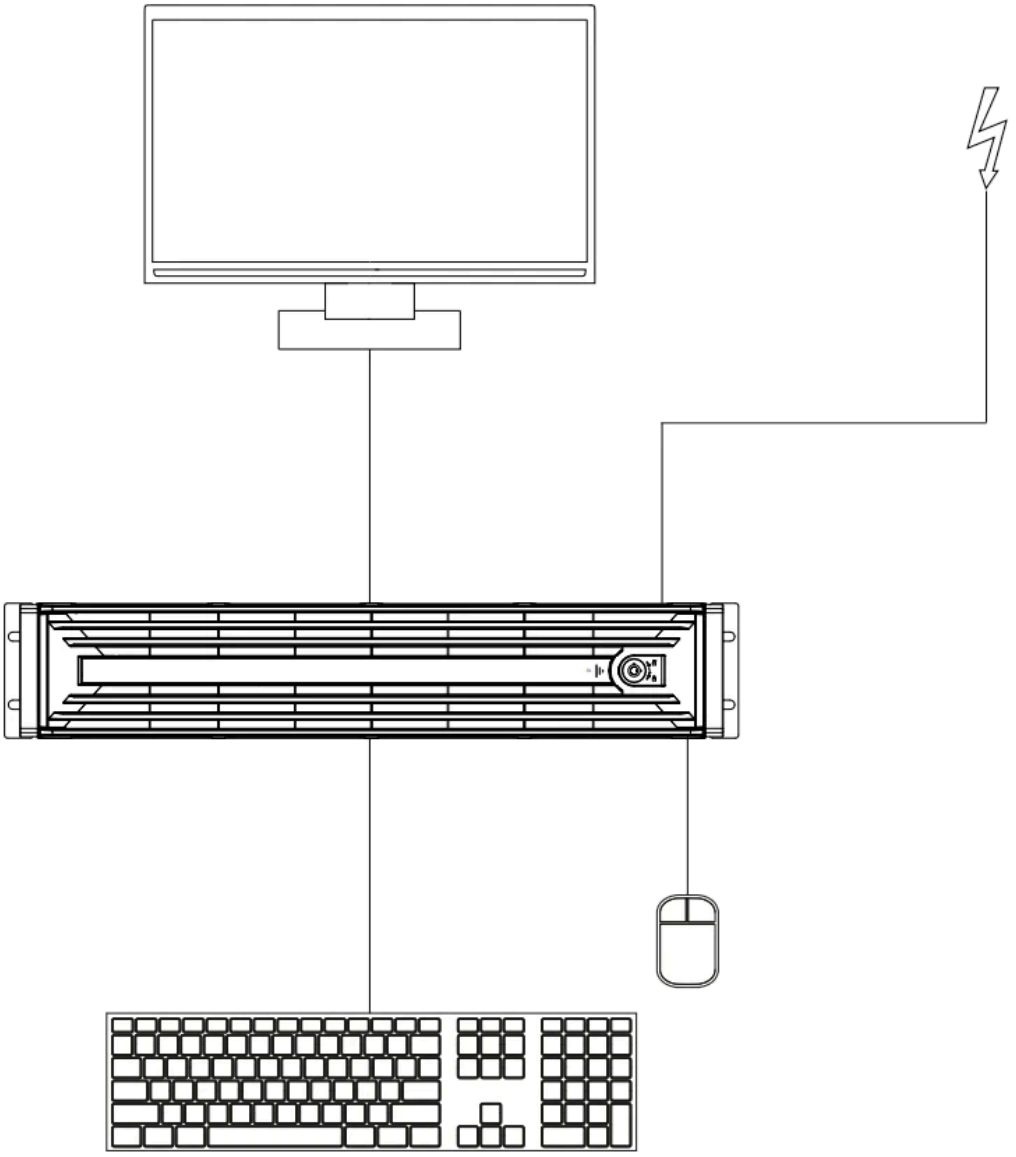
- 4U v2.5
- 4x4pro
- 4x2pro
- 2x4pro
- 2x2plus
- Solo
- EX 2
- EX 2C
- EX 3
- EX 3+
- GX 1
- GX 2

- GX 2C
- GX 3
- GX 3+
- VX 1
- VX 2
- VX 2+
- VX 3
- VX 4
- VX 4+
- RX
- RX II
- RX III

If you encounter any issues with the Redisguise process, please review the advice here, and if the issue persists, please contact the **support team**.

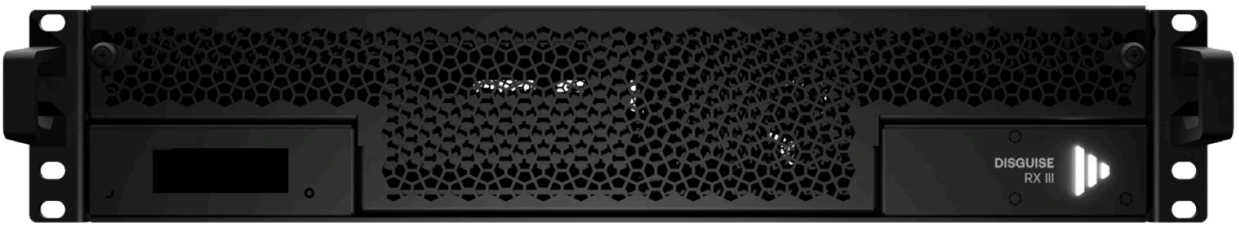
How to Start the Unit

1. Connect Power cord to the vx.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.



RX Range Overview

The RX range is used to host third party render engines and act as a remote render node to a d3net session.



RX III

These are the current machines in the range:

- RX III
- Diagrams
- How to start the Unit
- How to replace a media drive
- Redisguise
- SMC Overview

RX and RX II

The RX and RX II are legacy machines in the RX range:

- RX and RX II Overview
- Diagrams
- Redisguise
- How to start the unit
- RX II Specifications

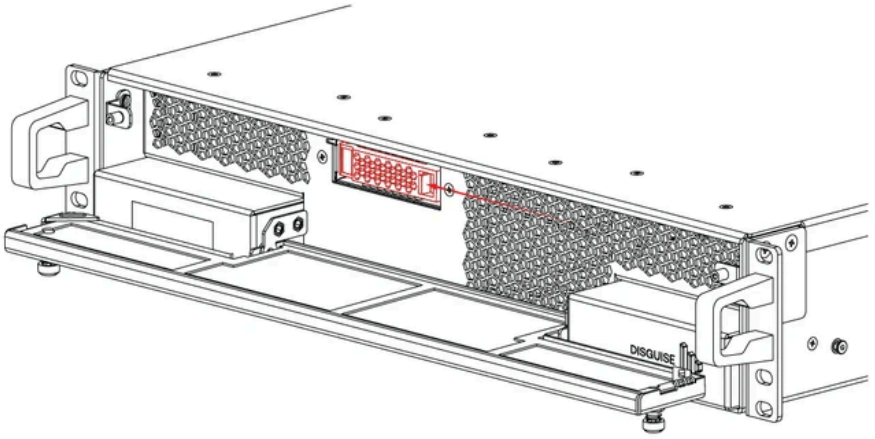
Replacing your NVMe SSD - RX

To remove and replace the NVMe SSD media drive on **RX III** Disguise media servers, follow the steps outlined in the guide below.

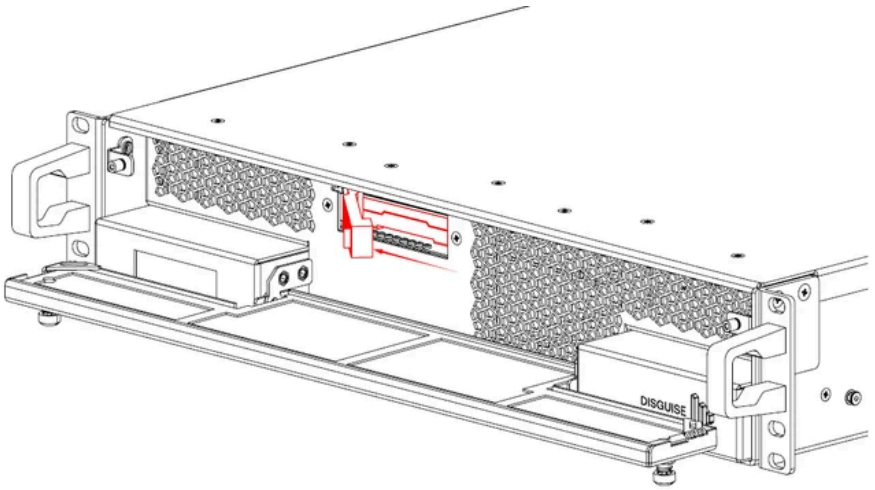
RX III media servers ship with a 1.92TB Removable NVMe SSDs, allowing you to easily upgrade or replace your storage as your needs grow.

The following steps are a guide to help users change over the Solid State Drives. Please, read carefully to ensure best practice. If the system does not work after following these instructions, please call our Support team as per the contact details on the last page of this document.

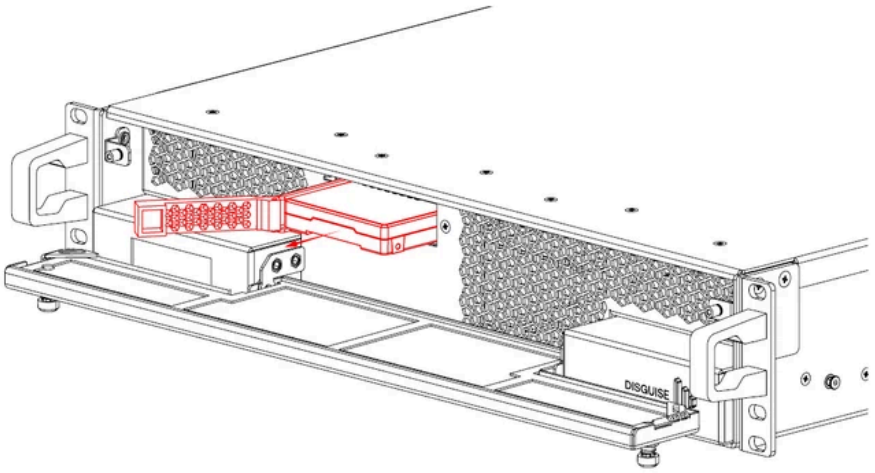
1. Undo the two thumb screws on the front door of the unit and bring the filter housing down to locate the drive bay door.
2. Push the clip to the left and you should feel a slight release. The door will gently swing open.



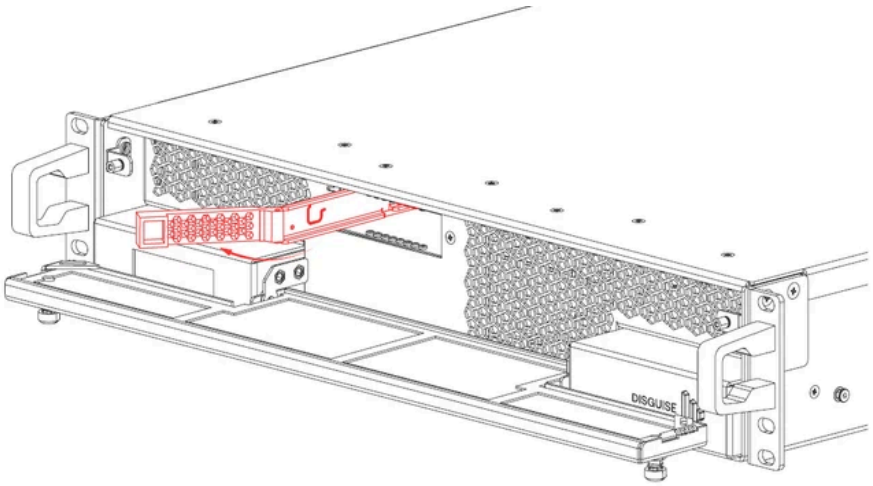
3. With the door open, slide it to the left. This motion will disconnect the current drive from the connector, making it ready for removal.

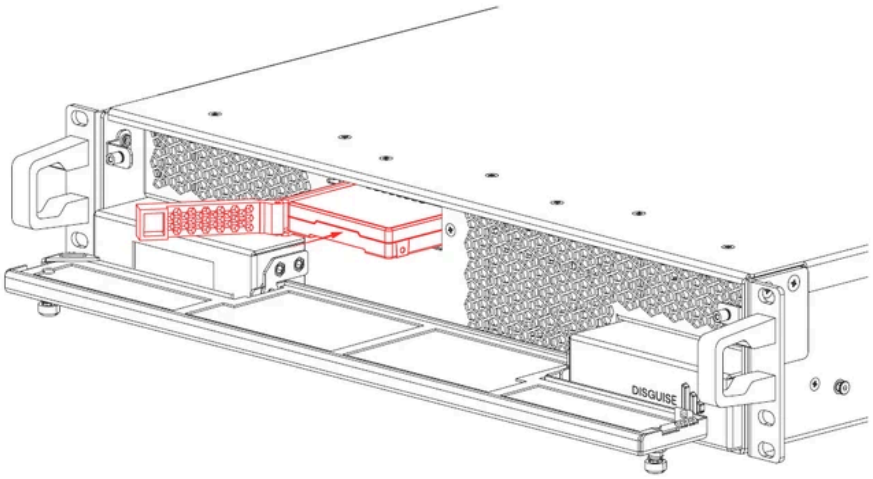


4. Pull out the drive caddy carefully. Remove the current drive from the caddy by gently lifting it out. To make removal easier, slightly tilt or bend the caddy while using your other hand to help guide the drive out.

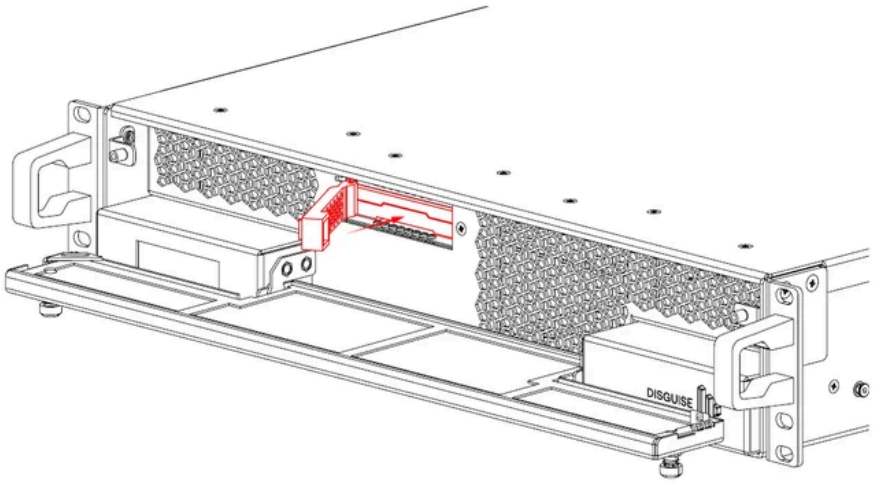


5. Take your new SSD and ensure the connector is facing upwards.
6. Place the new SSD into the caddy, aligning it properly with the slot. Insert the drive until it is fully seated in the caddy. Ensure the caddy is fully engaged and extends outward for proper alignment and installation.

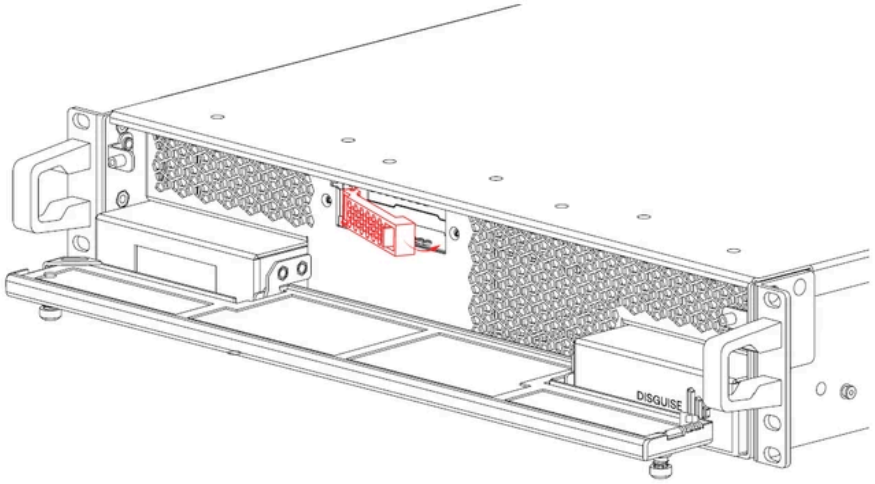




7. Gently hold the SSD by its bottom-left side and slide the caddy back into the bay*. Ensure the new SSD connects properly with the server's connector.

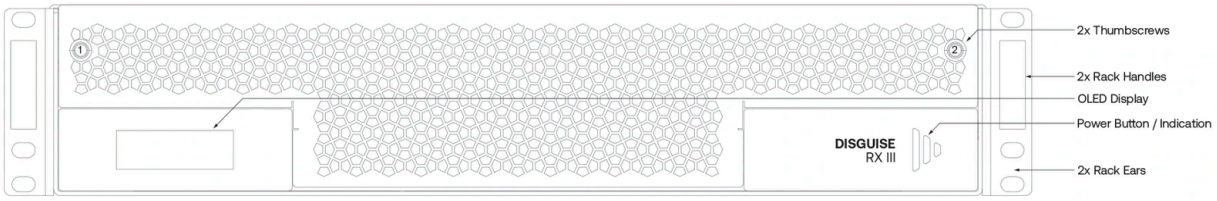


8. Swing the door back to its original position. Push it until you hear a click, indicating the door is securely closed.

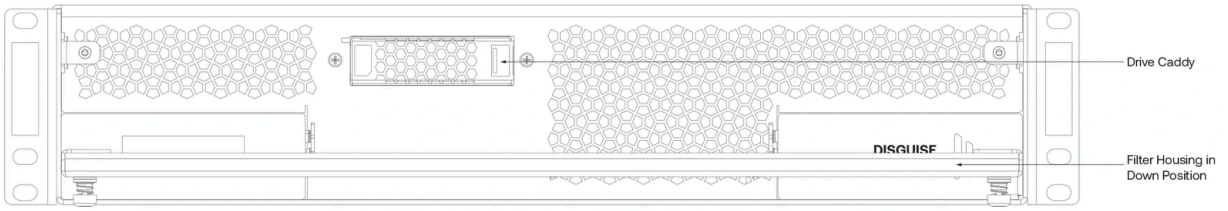


* If the drive can be seen to catch on the metalwork. If so, gently lift the left side if inserting to help alleviate.

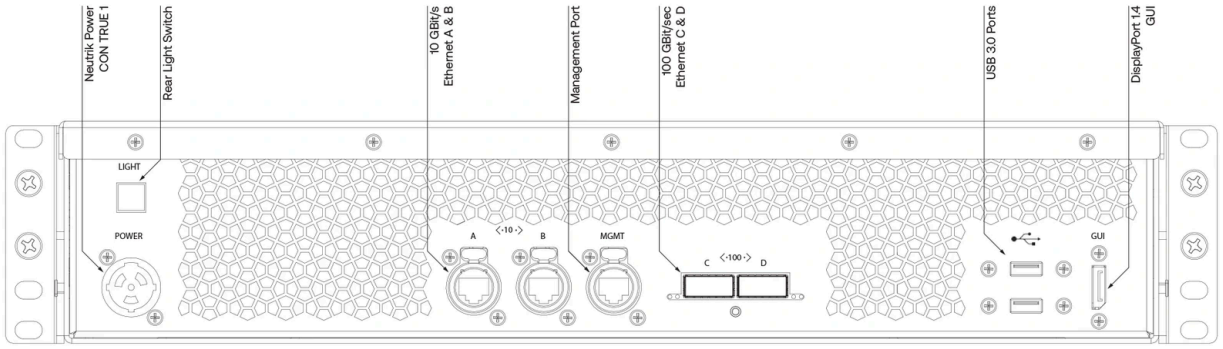
RX III Diagrams



Front view of RX III



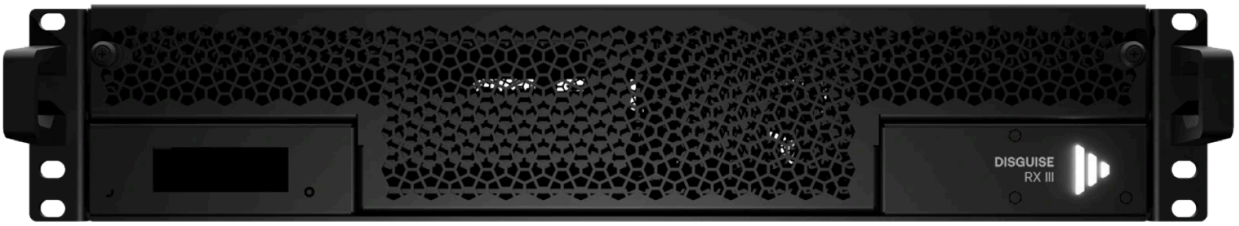
Front grill down view of RX III



Rear view of RX III

View the RXIII Product page And full gx3 specification sheet here.

RX III Overview



Learn more about:

- Diagrams
- How to start the Unit
- How to replace a media drive
- Redisguise
- SMC Overview

Visit the Product page **here** and view the full Product information in this **Technical Specifications** document.

RX III Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

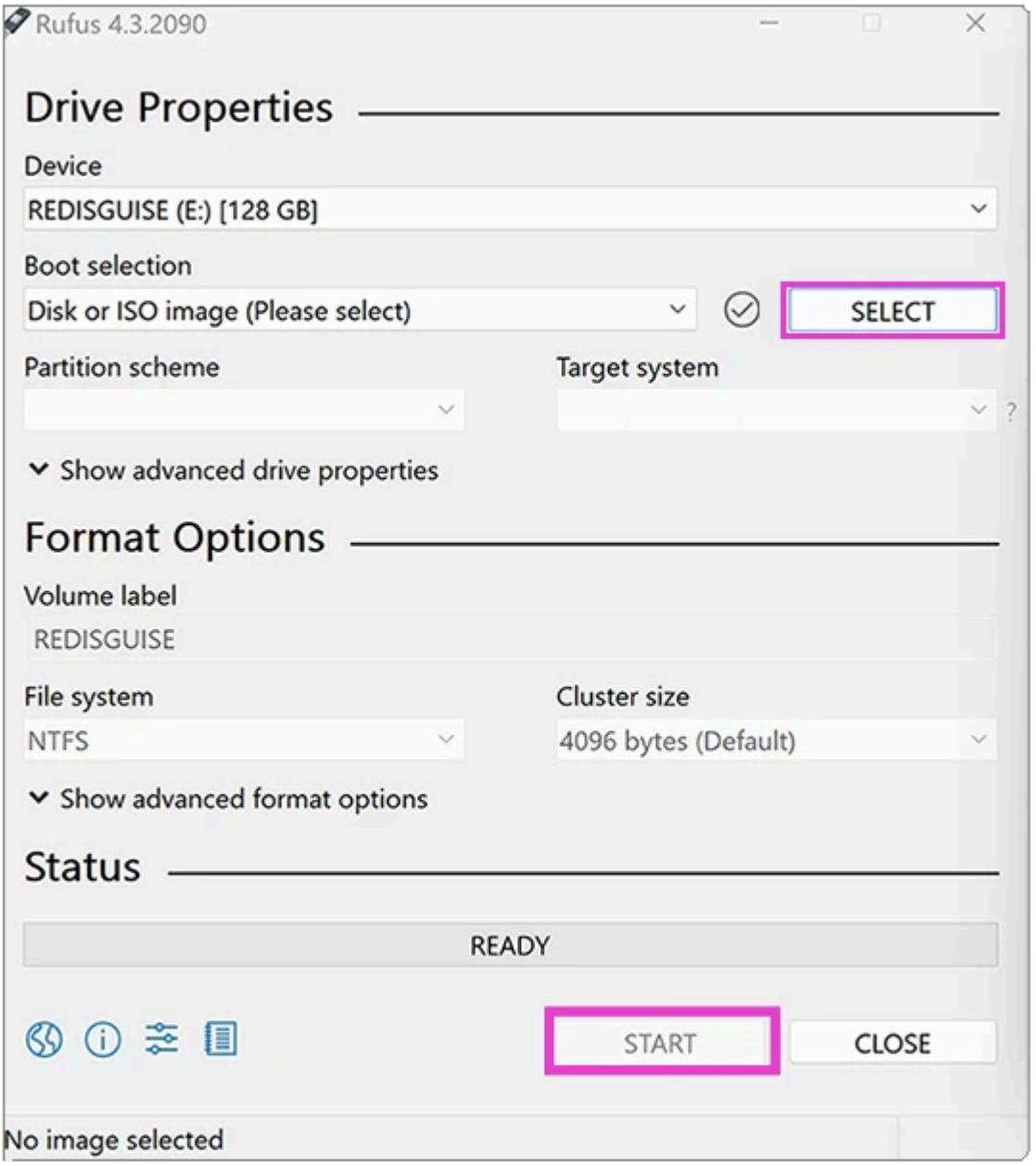
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.

2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. Change the Boot option #1 to the USB stick.
4. Navigate to the **Advanced tab** and press **Enter** to view the CSM Configuration and ensure that Boot option filter is set to [UEFI and Legacy]. If not, then press **F4** and change it. Confirm and re-enter BIOS.
5. Once this setting is confirmed, navigate to the **Save & Exit** tab to the right of your current tab.
6. In the Boot Override section, select the following option:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

SMC Mk I

The system is currently present in the following Disguise machines:

- VX 1
- VX 2
- VX 2+
- VX 3
- VX 4
- VX 4+
- GX 3

Troubleshooting

Fixing Backdated Version Issue

This issue occurs when a new version of Remora is replaced with v0.12 during a server re-image or similar process. This will cause the screen to freeze or be blank and the system will possibly be uncontactable through the normal channels. See *Fixing Backdated Version Issue* on the SMC Mk I page for details.

1. Connect the MGMT port to any of the other ports on the server.
2. Open Chrome and try the following IP addresses to open the update page, if they do not work proceed with further steps `172.31.250.9:9998` `10.0.0.102:9998`
3. Set the connected port to DHCP (Obtain address automatically).
4. Install **Wireshark**.
5. Point **Wireshark** at the port connected to the **MGMT** port.
6. In Windows, disable the connected port.
7. Accept the Wireshark notifications telling you that it's not connected.
8. Re-enable the port.
9. Look for ARP packets from a device named **RASPBERR** (The internal raspberry pi) in Wireshark.
10. These packets should contain the IP that the remora system is self-assigning.
11. Open chrome and type in the IP found PLUS port 9998. (For example, `169.254.123.145:9998`).
12. This will open the **Remora** update page.
13. Drag the latest Remora update into the browser (can be found at top of page).
14. Allow update to happen.
15. Remove the cable between MGMT and other port.

16. Restart d3service.

SMC Mk II

SMC Mk II is based on a new hardware platform that is more robust, and will be supported long term. The system is currently present in the following Disguise machines:

- EX 2
- EX 2C
- EX 3+
- RX III
- GX 3+

System Management Controller

System Management Controller (SMC) is an out-of-band management system.

This section includes information on SMC and SMC Mk II. SMC Mk II is a platform change, and maintains all the features of SMC Mk I. Any Mk I or Mk II specific information and troubleshooting is on their respective subpages. Please see the Troubleshooting page for general advice.

SMC Mk I

The system is currently present in the following Disguise machines:

- VX 1
- VX 2
- VX 2+
- VX 4
- VX 4+
- GX 3

SMC Mk II

The system is currently present in the following Disguise machines:

- EX 2
- EX 2C
- EX 3+
- RX III
- GX 3+

SMC Features

The system management controller allows:

1. Constant and up-to-date access to information about the status of the main Disguise server it is contained within such as:

- Power state
- VFC cards currently inserted
- Network adapter details and configuration
- Server session details

2. Communication with the BMC on the motherboard allows for:

- Turning on and off machines remotely
- Monitoring physical metrics such as power draw and temperature

To make life easier, all this information is generally available in three different ways:

- OLED screen on the front of the servers
- Webpage, accessible on the host server, and via connection to the server MGMT port
- Accessible via the same IP as the webpage, with the /api/ extension

Accessing SMC

From an SMC host machine

If operating on the Disguise server - the 'host' machine for an SMC - simply access the static `172.31.250.9` IP address into your browser. This applies to all SMC versions and host machine models.

Across a management link/network

The base method for accessing the SMC webpage is:

1. Connect the MGMT port via ethernet to your network or host
2. Open your browser, and navigate to the IP address displayed on the front OLED screen. This will open a webpage. If it does not load please refer to the Troubleshooting page.

Alternatively, can connect to an SMC on your network using the `smc.local` address in place of the IP address. This requires mDNS to be configured on your network. This will load the webpage of the first available SMC, from which (on the SMC page) you can access all the SMCs on your management network by selecting their IPs.

User Account Control

To use the website and some of the API endpoints in v3 and above, a user account must be created. This is to protect against unauthorised access to critical machine functions (like turning off a server mid-show)

1. Once navigated to the IP address and the login page is visible, click 'Sign Up'
2. A four-digit number will appear on the front screen which will need to be put in the 'Screen Number' field whilst filling out the form. This number will only appear for 30s, click 'Resend Verification' to generate a new number.

Designing into a network infrastructure

Each of the aforementioned Disguise servers have a MGMT ethernet port on the back which is solely for access to the system. This can be built into an existing network infrastructure but care should be taken to isolate this network from all others by using VLANs or maintaining a separate physical network. The reasons for this are two-fold:

- Security - Since the system has access to lower-level functionality that bypasses the Windows OS on the servers, this **shouldn't be connected to the internet on a permanent basis**
- Reliability - One of the main features of the system is to provide out-of-band management and help configure or change the Disguise server - this cannot happen if the network is down or not configured correctly!

Discovering MGMT network IPs when OLED display is not visible

When the IP address is not visible on the front OLED screen (due to display issues or physical access limitations), you can use the following workflow:

1. On the host machine (the server containing the SMC), open a web browser and navigate to the static IP address `172.31.250.9`.
2. Log in to the SMC web interface (or create an account if this is your first time).
3. On the Network Servers section of the dashboard, you'll see:
   - The MGMT network IP of your current SMC host machine.
   - A list of all other SMCs detected on the same MGMT network with their IPs.
4. You can click on any of the listed SMCs to navigate directly to their management interface.
5. Record the discovered MGMT network IP addresses for future reference or automation purposes.

This method allows you to:

- Discover your SMC's MGMT network IP when the OLED display is not readable.
- Navigate between all SMCs on your management network without knowing their specific IPs in advance.
- Create a complete map of all SMCs on your MGMT network for documentation purposes.

Functionality

Front OLED Screen

The front OLED screen displays data that is organised into pages that are in a table-based format. In v2 and v3, the only available pages are default information and VFC card information. From v4 onwards there will be a selection of different pages that can be displayed which the user can configure at any time from the webpage and REST API.

Default Page

Field Name-Description (Example)

- **Machine**-The model of the Disguise server (vx 4).
- **Name** - The name of the Disguise server (vx-44150).
- **Role** - The role of the machine set by d3 net manager (understudy).
- **MGMT IP** - The status of the MGMT IP (assigned)

VFC Page

This page displays information about the currently installed VFCs. If the Disguise server is powered off then this information may be out of date. (This can only be a 'left' page).

- **Slot** - Which slot the VFC card is installed in left-most looking at the rear is slot 1 (1).
- **Card** - The type of VFC card installed in the slot (HDMI).

Network Config Page

This page displays information about the network adapters in the Disguise server.

- **Name** - The name of the interface set in Windows (A - d3net 1Gbit).
- **IP** - The IPv4 address of the interface (10.0.0.34).

System Temps

This page displays the readings of temperature sensors in the system

- **Name** - The IPMI component name (CPU0_TMP)
- **Temp** - Temperature sensor reading in degrees Celsius (42 C)

System Status

This page displays the readings of temperature sensors in the system

- **Name** - The name of the status (System Power)
- **Status** - The value of the status (On)

Web Interface

The web interface is the most user-friendly way of using SMC functionality (to manage your server, view the IPs of other servers on your management network, and see system stats). It is the only place to create an SMC account (see User Account Control), and can be accessed on an SMC host machine or across the management network.

All stats update every 10-15 seconds to ensure that the page is up to date. Information accessible on the webpage also has corresponding API endpoints from which it can be queried.

Status Page

Main (index) page - account creation required to access.

Network Servers

This section displays all the other servers that can be found on the same subnet. Clicking on a row will navigate to that machine's management page.

Stats Page

Gathers all sensor and important status messages from the IPMI system. This page self-updates every 10-15 seconds. System statistics such as temperature, voltage, and fan speeds are recorded.

Remora Page

Contains details about the Remora system present in the Disguise server such as firmware and hardware version as well the current MGMT IP. This page will tell whether you have an SMC Mk I or Mk II hardware platform. It also provides an ease of access link to the update page, and to fetch the system startup logs.

API

Features and new status information tend to appear here first - Navigate to `ip.address/api` to access the example page and view what features are available - Can use any http client to send requests to the API (curl, python etc)

Generally any request that involves getting information will not require authentication, anything that modifies the state will require basic authentication tokens (log in on the example API page).

For detailed API documentation, visit the **SMC API documentation** on the Disguise developer portal.

Updating

All SMC systems are updated during the reimaging process, and when updating the OS if the new OS version contains a later SMC OS version. Updating SMC systems manually is **NOT** recommended unless recommended by a member of support or development staff.

1. Navigate to `ip.address:9998` in a browser and a SWUpdate landing page should appear.
2. Contact your support representative for a copy of the latest firmware.

> 1. It is **NOT** recommended to install an older version than currently installed.
> 2. Currently installed version can be found by entering `ip.address/api/remora` into the browser, the current version will be listed as 'Firmware Version'

3. Drag and drop the .swu file to the window and the update will start - a progress bar will also appear on the front screen
4. Once updated the system will restart - this will not affect the operation of the main Disguise server in any way.

SMC Troubleshooting

The following troubleshooting advice applies to both SMC Mk I and SMC Mk II. Any platform specific troubleshooting steps are contained in their respective pages!

How to restart

Without removing power from Disguise server:

- Navigate to Install an update page - `ip.address:9998`
- Click 'Restart System' on top navigation bar of the page.
- If the reboot method above does not work then perform a cold boot.

OLED

Front screen is blank/jumbled data/frozen

- Follow 'How to restart ' to restart the system and see if the screen starts working again.
- If the screen is not fixed try to install an update (either the same or newer version if available).
- If the screen is still frozen or not working after trying BOTH of the restart methods then contact **support**.

> **⚠ Caution**
>
> There is a known issue presently found on VX1, VX2, and VX4 hosts, where upon a re-image/OS update, the OLED becomes jumbled. This is related to a manufacturing fault and is automatically accounted for in later OS versions. It can also be fixed by downgrading SMC Mk I firmware to 5.0.5 or earlier manually.

MGMT

MGMT IP stuck on Link Down

This means that there is a problem with the physical network connection

- Check all cables are plugged in correctly and functional
- Check that any network infrastructure such as switches are powered on and connected
- Check that connected network cards are enabled

MGMT IP stuck on Assigning IP

Generally means that the physical layer is operating correctly but there are problems in the network stack configuration

- Check that the network is on the correct subnet: If the IP is of type 169.254 then link-local so subnet is 255.255.0.0.
- If connected to DHCP server then check this can ‘see’ the system.
- If connected directly to a windows computer, install Bonjour and/or give the NIC an IP in the correct subnet. (Link-local addressing on the side should sort out any address conflicts).

MGMT IP assigned but still can’t connect

- If connected straight to a windows computer, install Bonjour and/or give the NIC an IP in the correct subnet. (Link-local addressing on the side should sort out any address conflicts).
- If connected to DHCP server then check this can ‘see’ the system.
- Try accessing the webpage via the Disguise server itself (see Connecting Internally).
- If all else fails try restarting both ways.

DisplayPort FAQs

Adapters

DisplayPort (DP) adapters are used to convert DP to DVI for use with equipment supporting the DVI interface.

> ⚠ **Warning**
>
> As they provide the least flexibility we avoid the use of Passive DisplayPort adapters in any situation.

Types of adapters

There are three main types of DP adapters:

- Passive single-link
- Active single-link
- Active dual-link

We recommend using Active adapters for most applications. Active adapters are shown in the image here and support a maximum 1920x1200 output resolution.



Using Active DisplayPort adapters will allow you to output resolutions up to 1920 x 1200 pixels per DisplayPort output.

Identifying DisplayPort adapters

DisplayPort adapters can be identified by the following:



Active adapters will always have the word Active on them (left), passive adapters will not have the word Active on them (middle), DisplayPort to dual link **DVI** adapters will always have a **USB** connector (right)

For more information please see **here**

Outputting more than 1920x1200

Yes, in order to output a dual link **DVI** signal (max 2560 x 1600), extra power is required. If you want to output up to 2560 x 1600 pixels you will need to use Active Dual Link adapters (not included). Active Dual Link adapters will always have an external **USB** cable as they require extra power.

Therefore the following rules apply:

- For 2 or less outputs of **DVI**single link, passive adapters can be used.
- For 3 or more outputs of **DVI**single link, active adapters must be used.
- For any amount of outputs of **DVI** dual link, active DisplayPort to dual link adapters must be used.

Recommended adapters

The following adapters have been used and tested with d3 systems.

Active DisplayPort to single-link

- StarTech DisplayPort to DVI Active Adapter
- Weison Active DP to single-link DVI Adapter

Active DisplayPort to dual-link

- StarTech DisplayPort to DVI Dual-link Active Adapter
- Accell DisplayPort to DVI-D Dual-link Adapter

DisplayPort Cables

- The maximum supported DisplayPort cable length is 2m (6ft).
- The DP cable needs to be triple shielded.
- Symptoms of an unsupported cable:
  - Flickering or black screen: Cable is too long or the differential pairs have too great resistance to transport the bandwith required
  - Noise on the signal: Shielding is not adequate for the environment
- Good quality cable can be purchased from **Molex, Accell, BizLink**

EDID Overview

Extended Display Identification Data, or “EDID”, is the metadata between display and GPU.

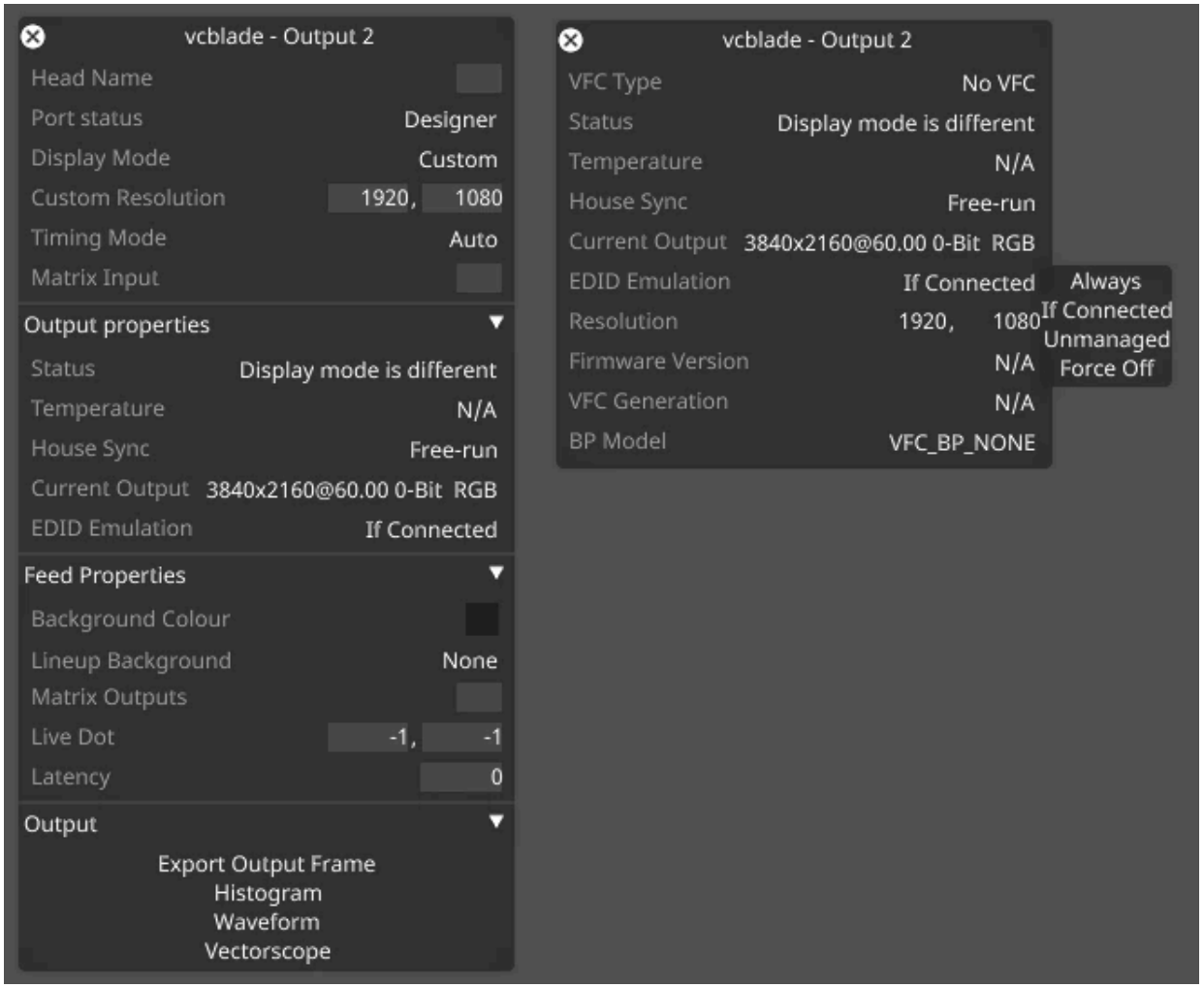
What is an EDID?

An EDID communicates metadata about manufacturer specifications and data for a display to a video source such as a graphics card. EDID allows for the display to relay its capabilities, such as its native resolution, to the attached source, and then allow the source to generate the necessary video characteristics to match the needs of the display.

For more information on the standard for the EDID format, please visit Video Electronics Standards Association (VESA).

EDID Emulation within Designer

EDID emulation within is configured via the VFC card properties editor in the Feed Output window.



EDID Emulation modes

- **Always** - Forces EDID emulation even without connected device
- **If Connected** - Emulate EDID only when a display is conncted to the output
- **Unmanaged** - DO not modify current EDID emulation
- **Force Off** -Do not emulate EDID, remove existing if set

For information on configuring EDIDs at the Windows level, please visit the Managing EDIDs page.

Resetting EDIDs

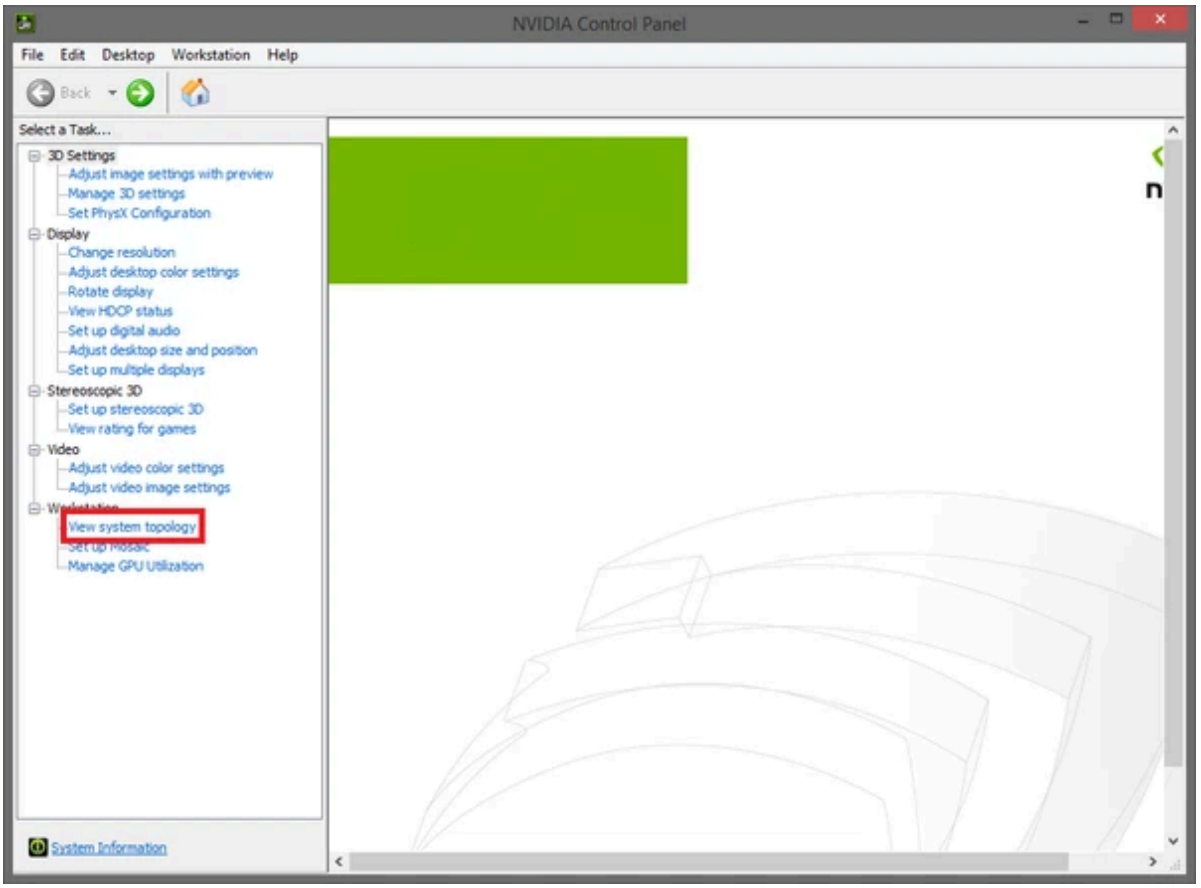
EDIDs on all outputs of all connected VFC cards. EDIDs can be reset to a neutral state easily using the keyboard shortcut FFS (Four Finger Salute) as follows:

- Hold CTRL + ALT + SHIFT + F12
- will display several status messages on the screen during the reset process; please wait until reset process has completed before continuing.

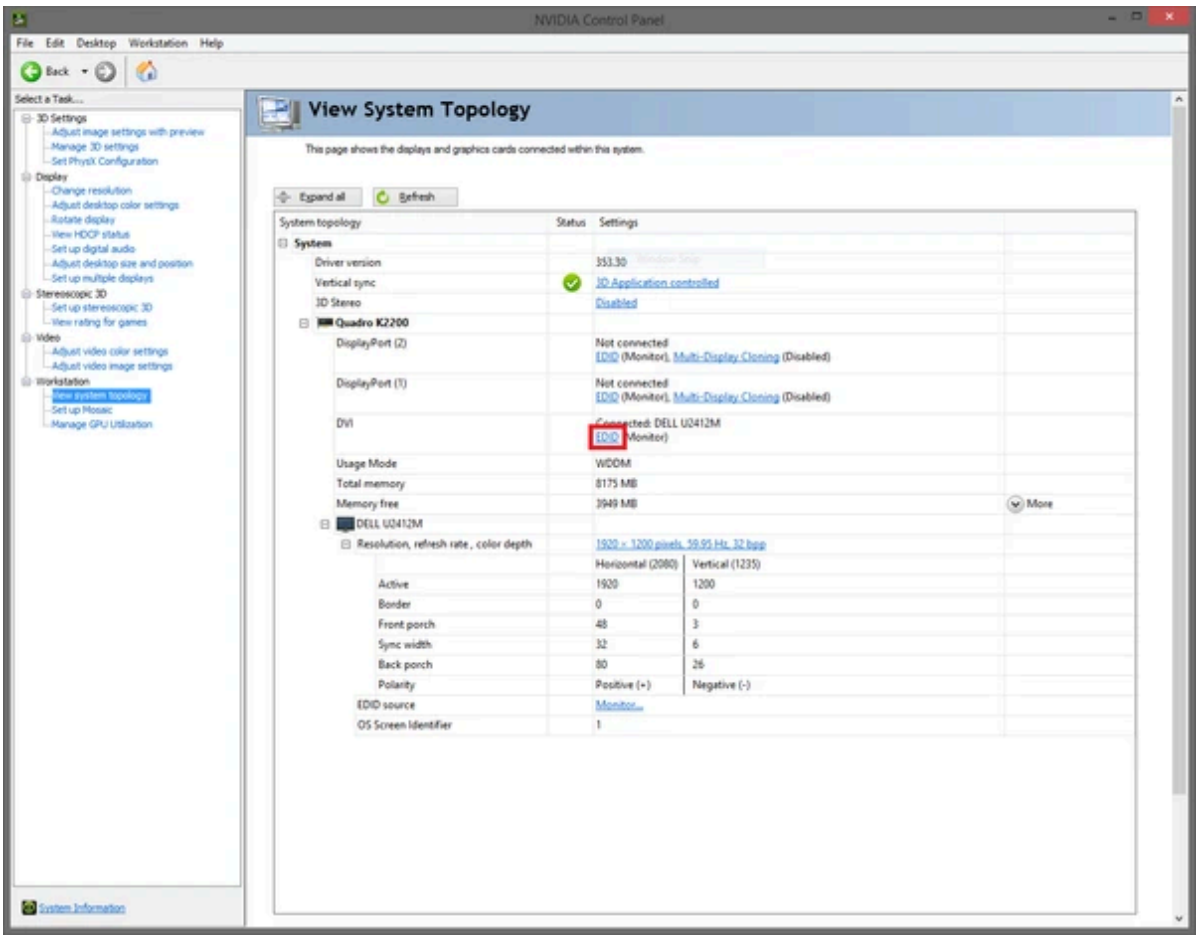
Managing EDIDs

Emulating EDIDs within Windows

1. Navigate to the “View system topology” tab.

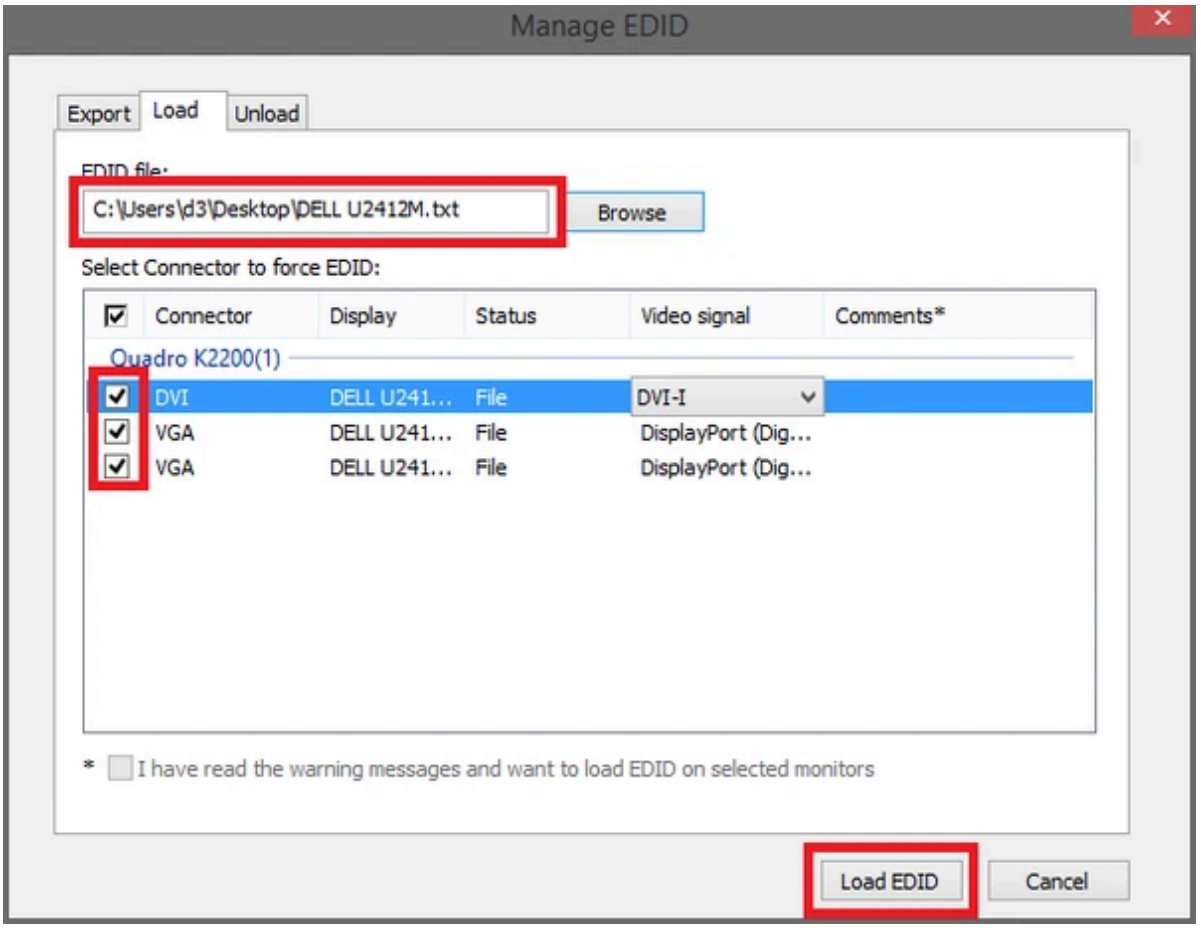


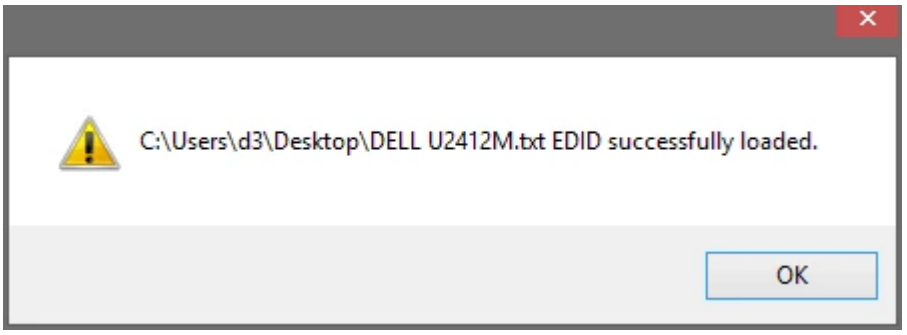
2. Click the EDID button next to a card connection (DVI or DisplayPort).



3. Navigate to the “Load” tab inside the Manage EDID window.

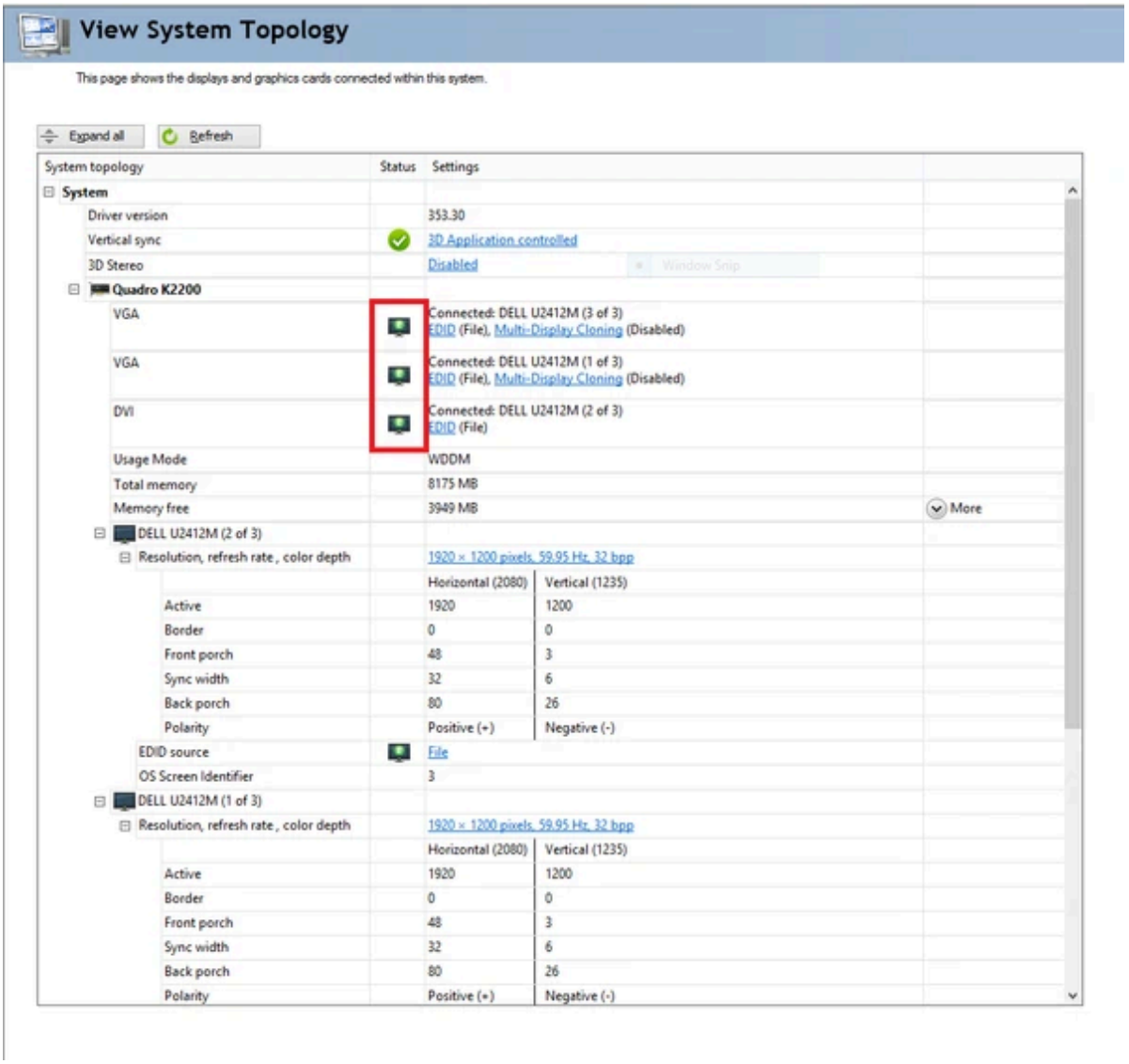
4. Browse to your preferred EDID and select which display connections you want to emulate the EDID on.





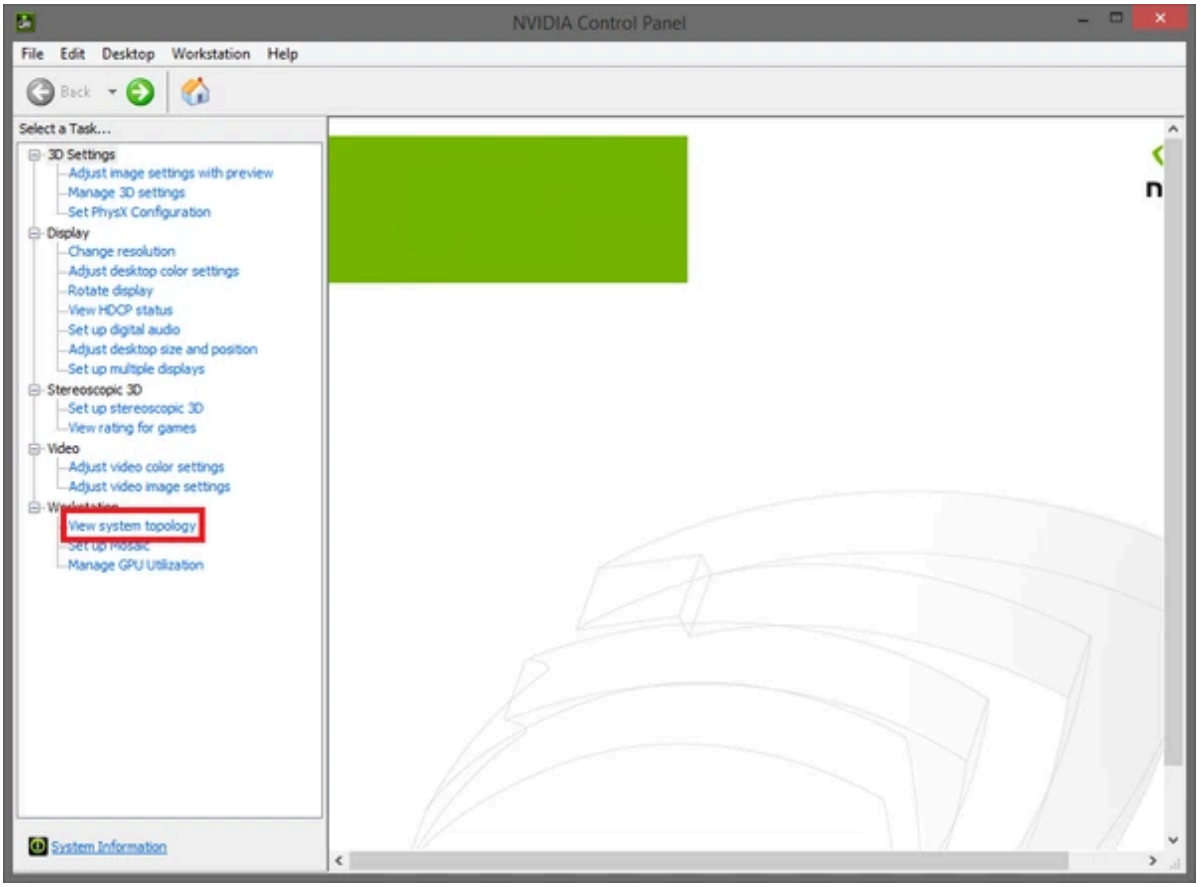
5. After the EDID is successfully applied you will see this small icon which indicates that the display connection has an emulated EDID asociated with it:



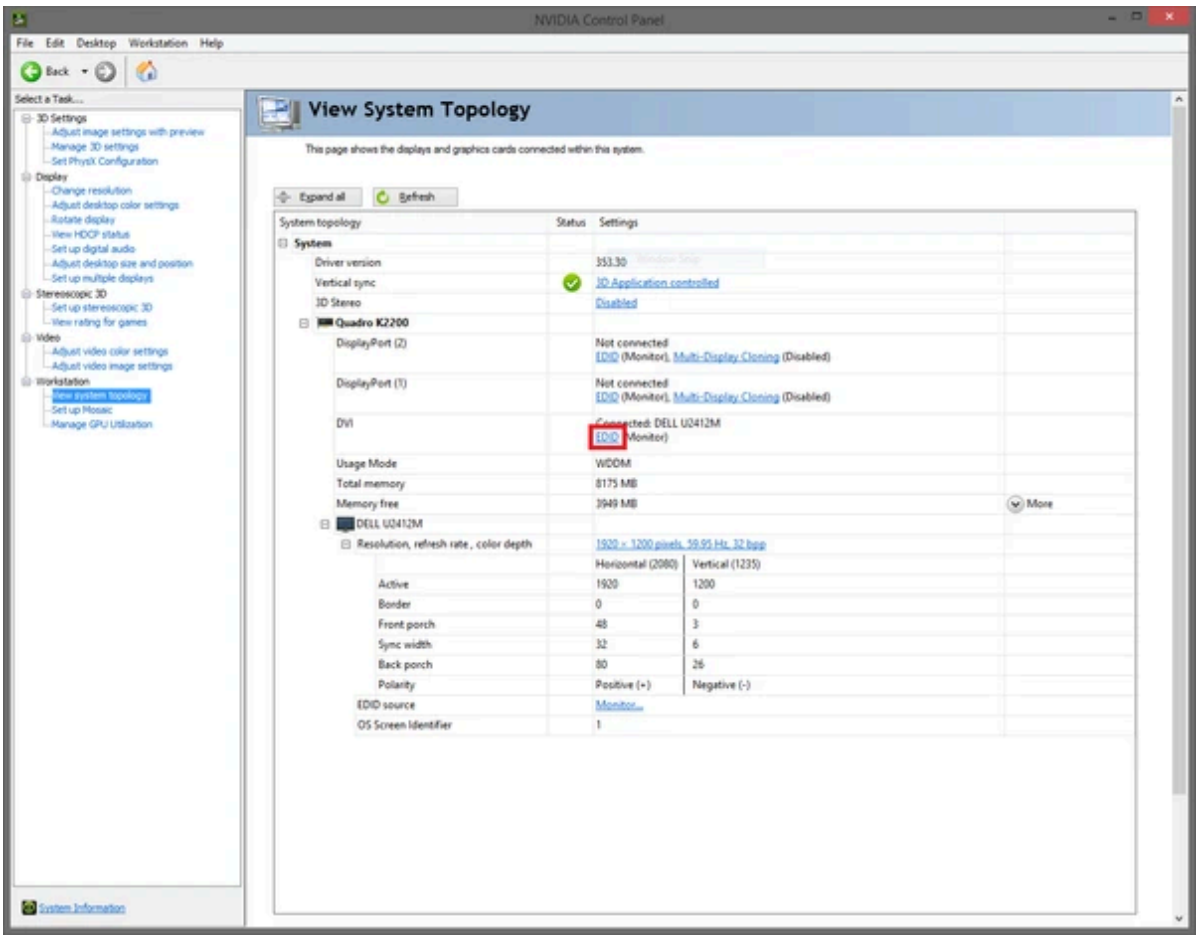


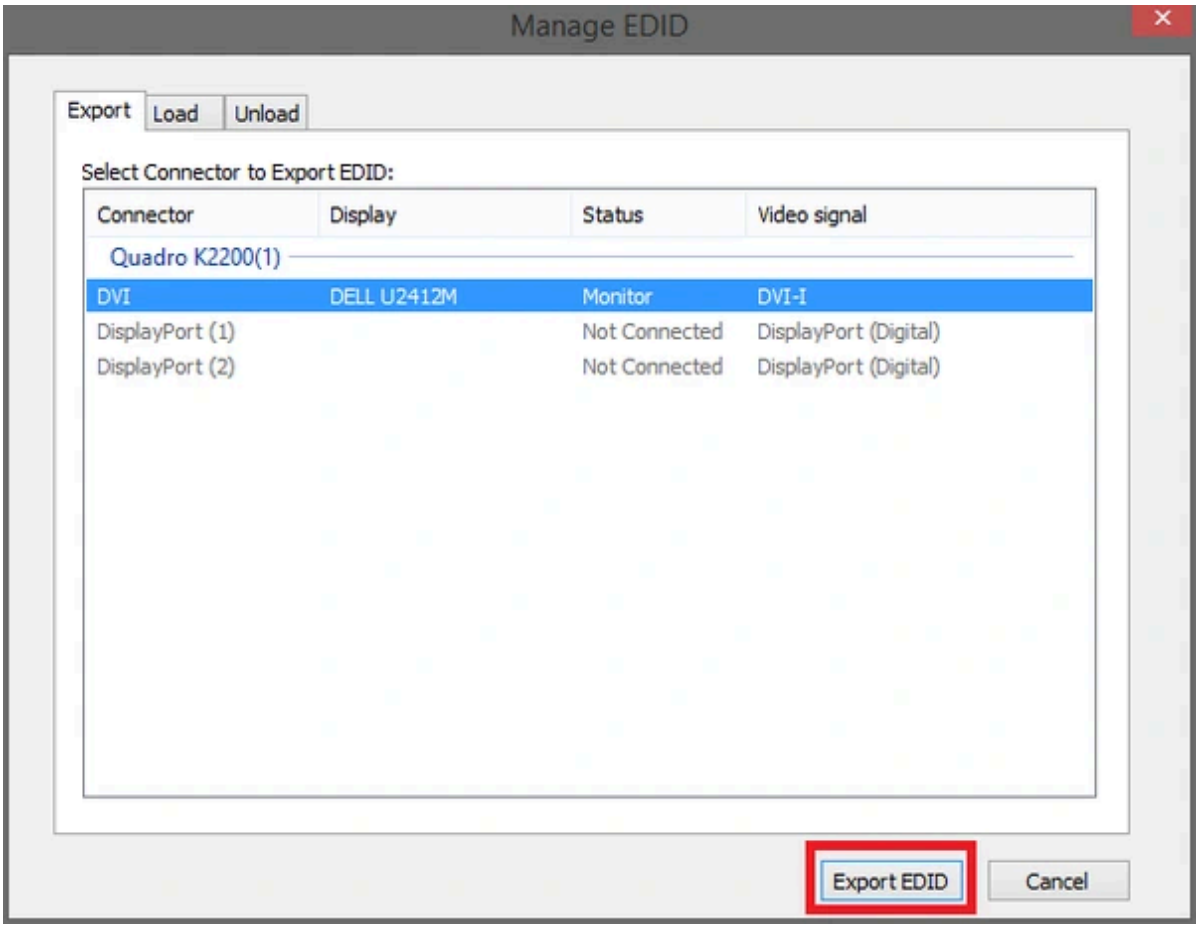
Exporting EDIDs

1. Navigate to the “View system topology” tab.

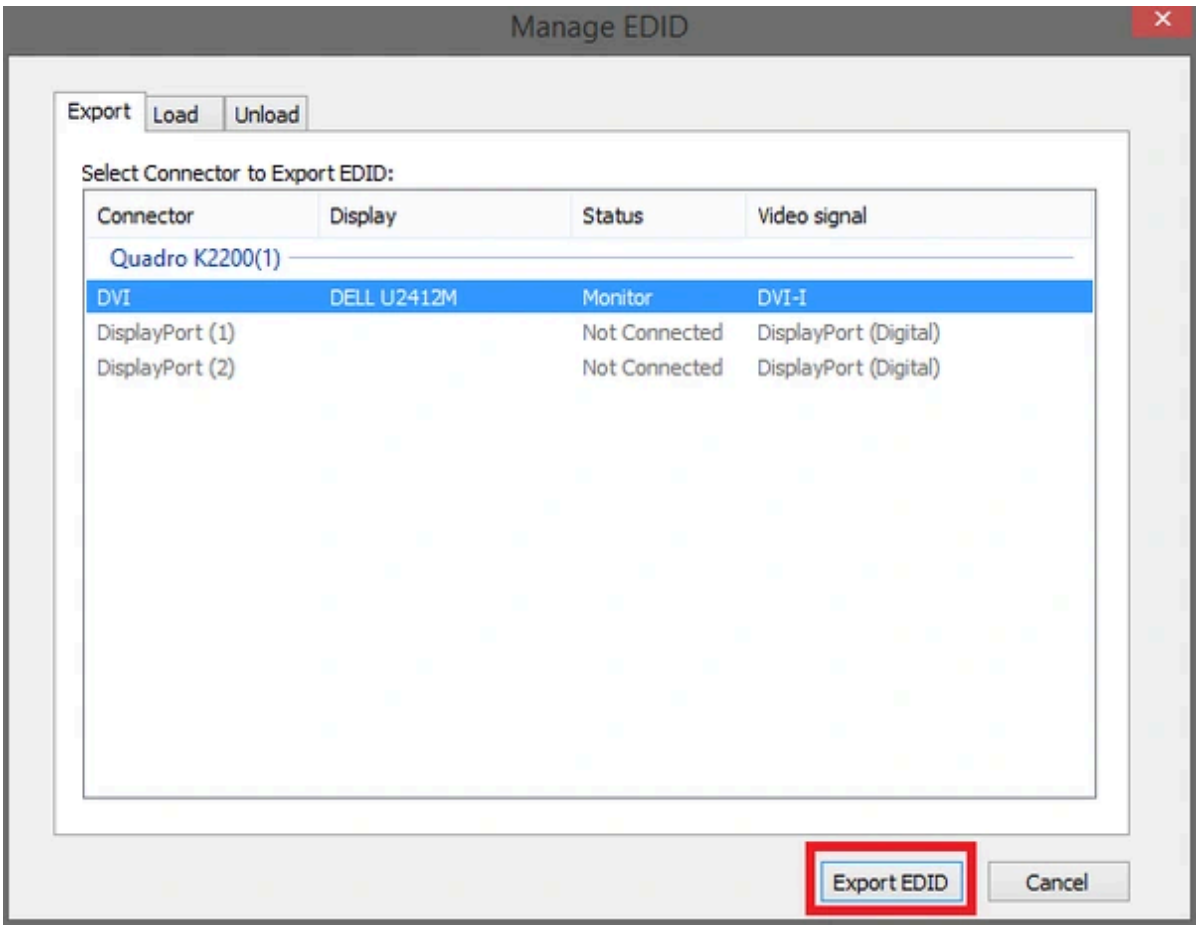


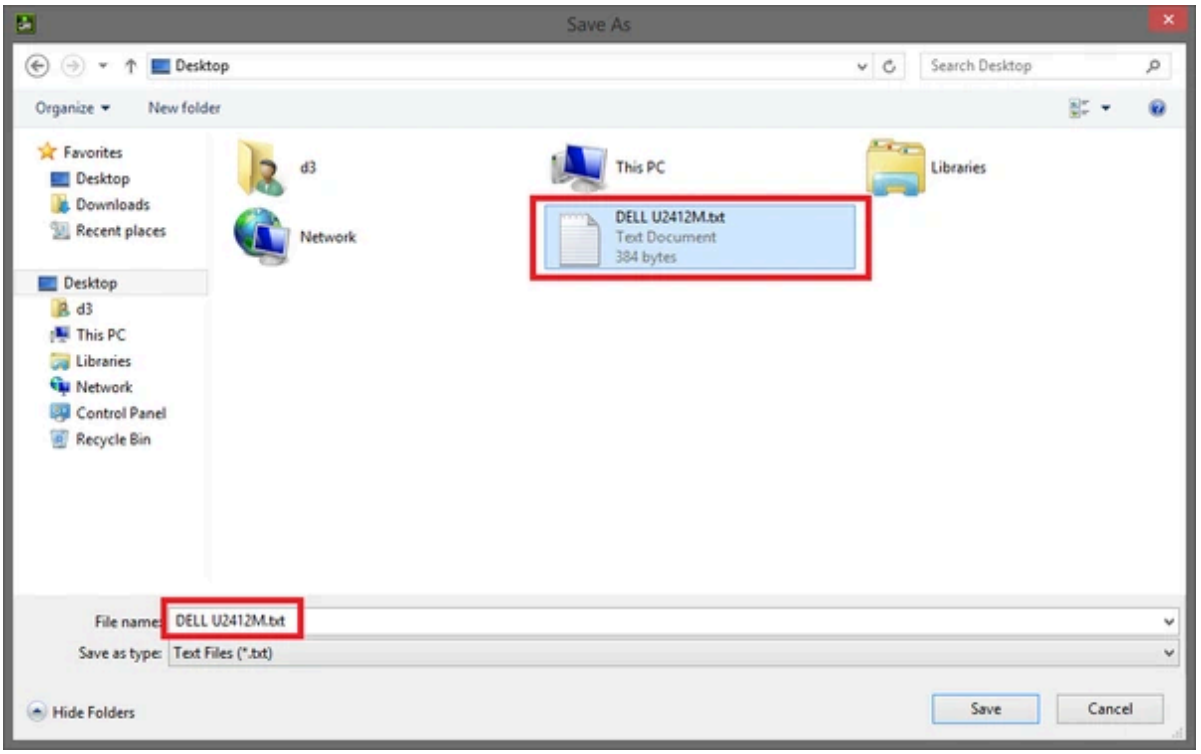
2. Click the EDID button next to a card connection (DVI or DisplayPort)




Manage EDID
Export
Load
Unload
Select Connector to Export EDID:
Connector
Display
Status
Video signal
Quadro K2200(1)
DVI
DELL U2412M
Monitor
DVI-I
DisplayPort (1)
Not Connected
DisplayPort (Digital)
DisplayPort (2)
Not Connected
DisplayPort (Digital)
Export EDID
Cancel

3. Export your preferred EDID to the desktop or documents folder





Resetting EDIDs

EDIDs on all outputs of all connected VFC cards can be reset to a neutral state easily using the keyboard shortcut FFS (Four Finger Salute) as follows:

- Hold CTRL + ALT + SHIFT + F12
- Disguise will display several status messages on the screen during the reset process; please wait until reset process has completed before continuing.

> **Note**
>
> You can only genlock outputs that have identical EDID

Update VFC Card Firmware

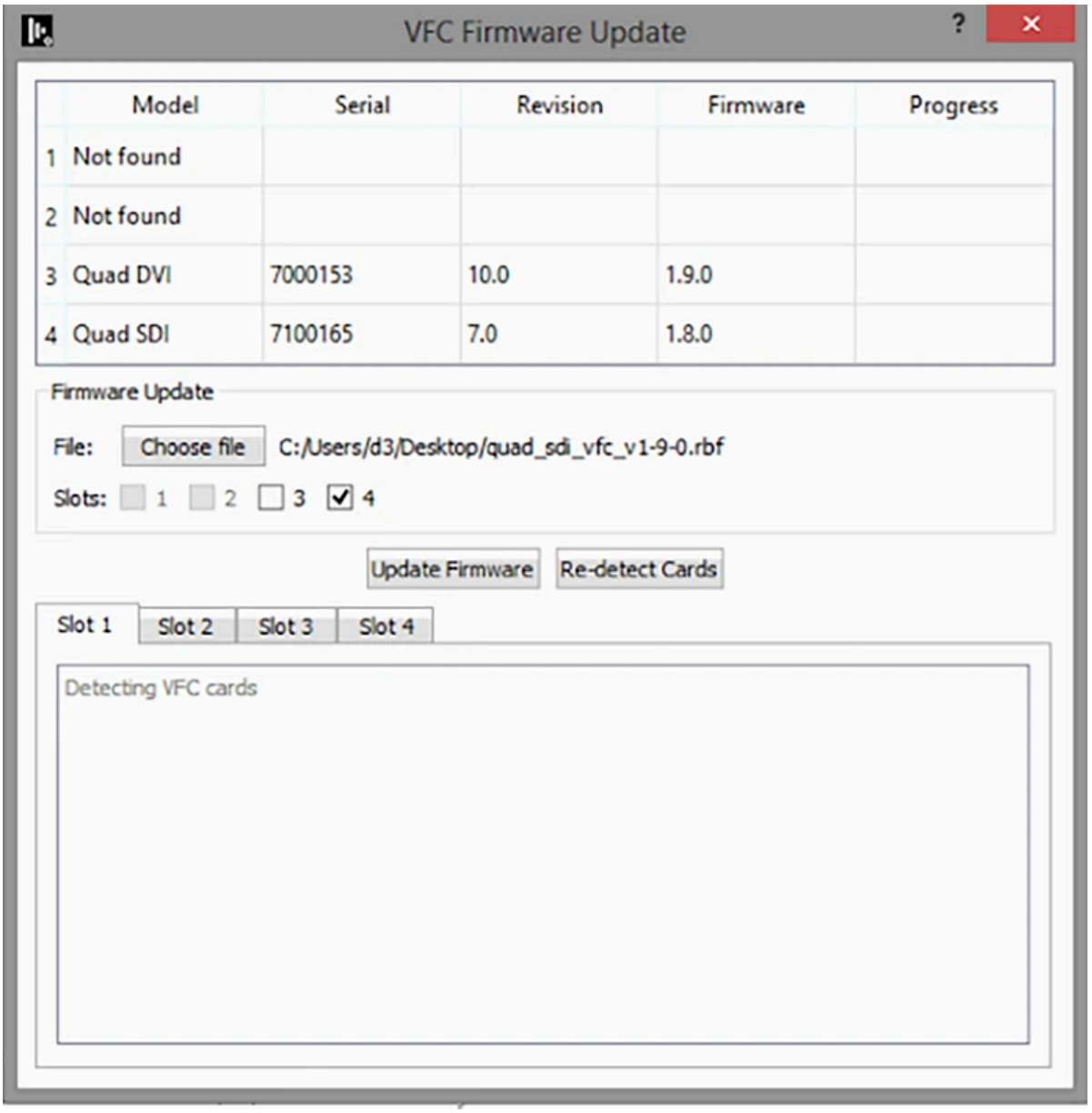
How to determine the current firmware version

1. Populate a VFC compatible Disguise machine with the Quad-SDI or Quad-DVI VFC cards you want to check.
2. Run **vfcfirmwareupdater.exe** located at **C:\Program Files\d3Production Suite\build\msvc**.
3. Check **Firmware Version**.

How to update the firmware

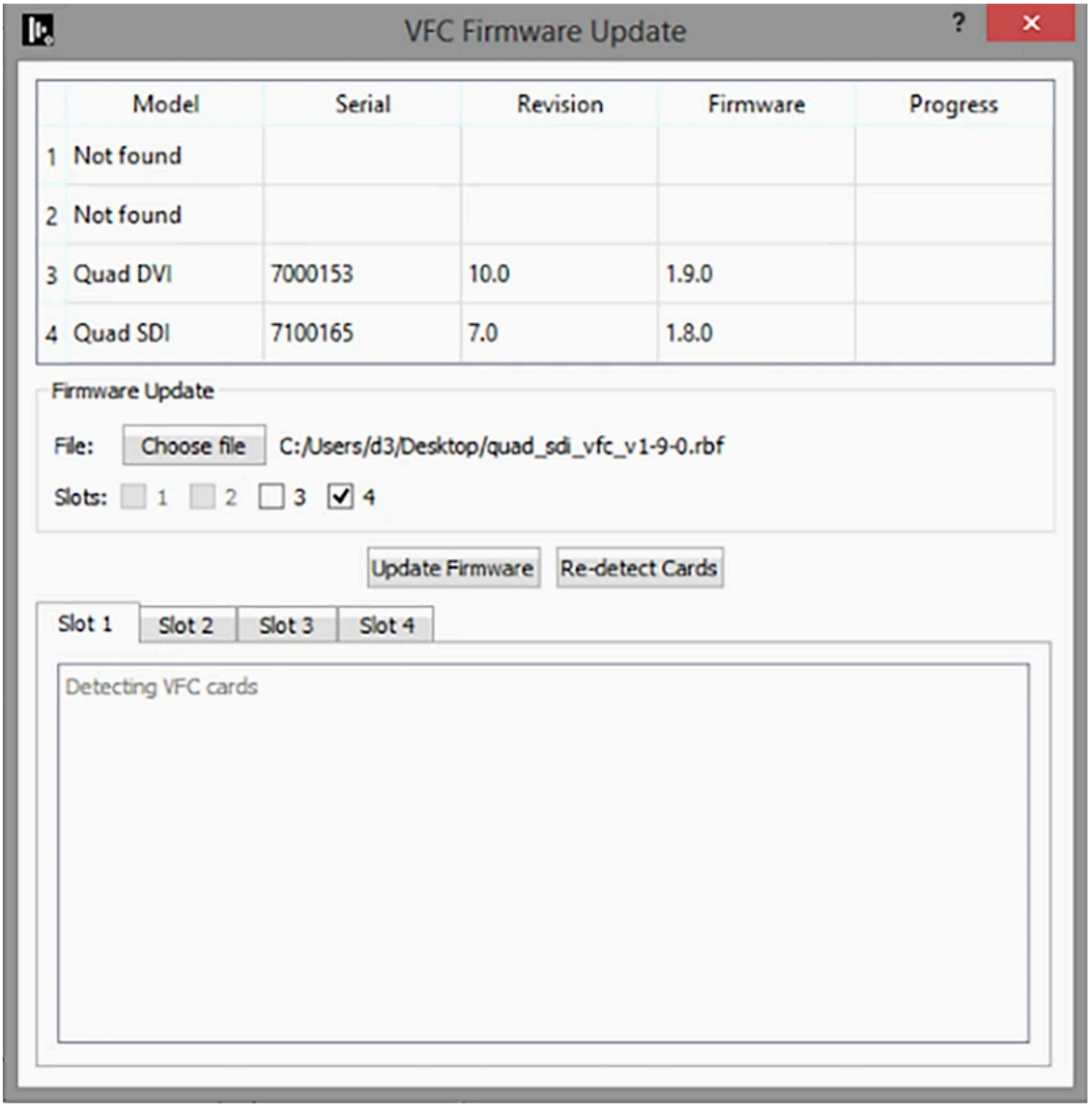
1. Populate any VFC compatible Disguise machine with either the Quad-SDI or Quad-DVI VFC cards required to be updated.
2. Download the VFC firmware update Quad-SDI and/or Quad-DVI VFC cards from the the **Resource section**.

3. Run `vfcfirmwareupdater.exe` located at C:\Program Files\d3 Production Suite\build\msvc or in the **Resource section**.

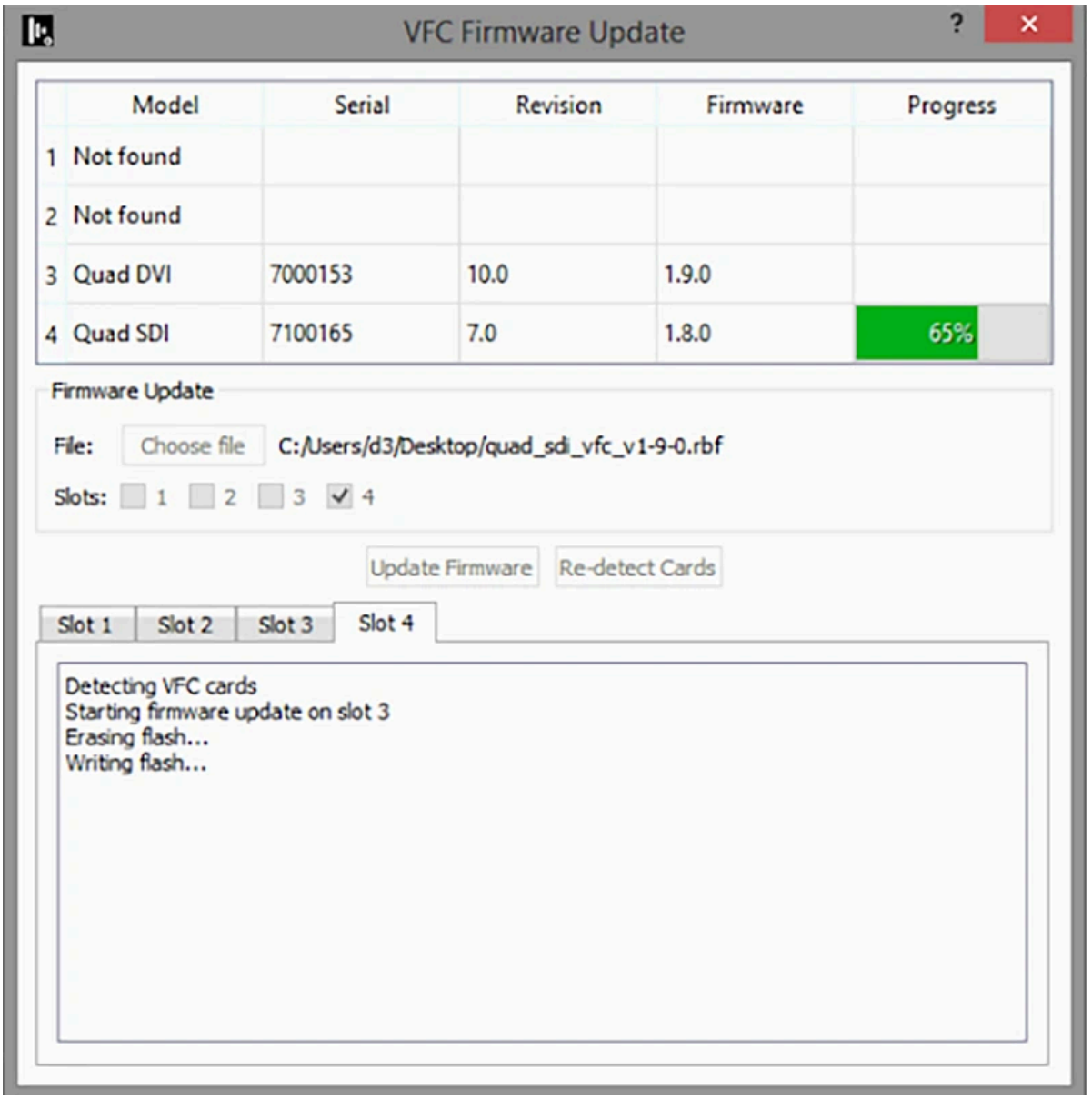


4. Click Choose file and load the downloaded VFC firmware update. If updating the Quad-SDI VFC card for example, the filename should be quad_sdi_vfc_v1-9-0.rbf .

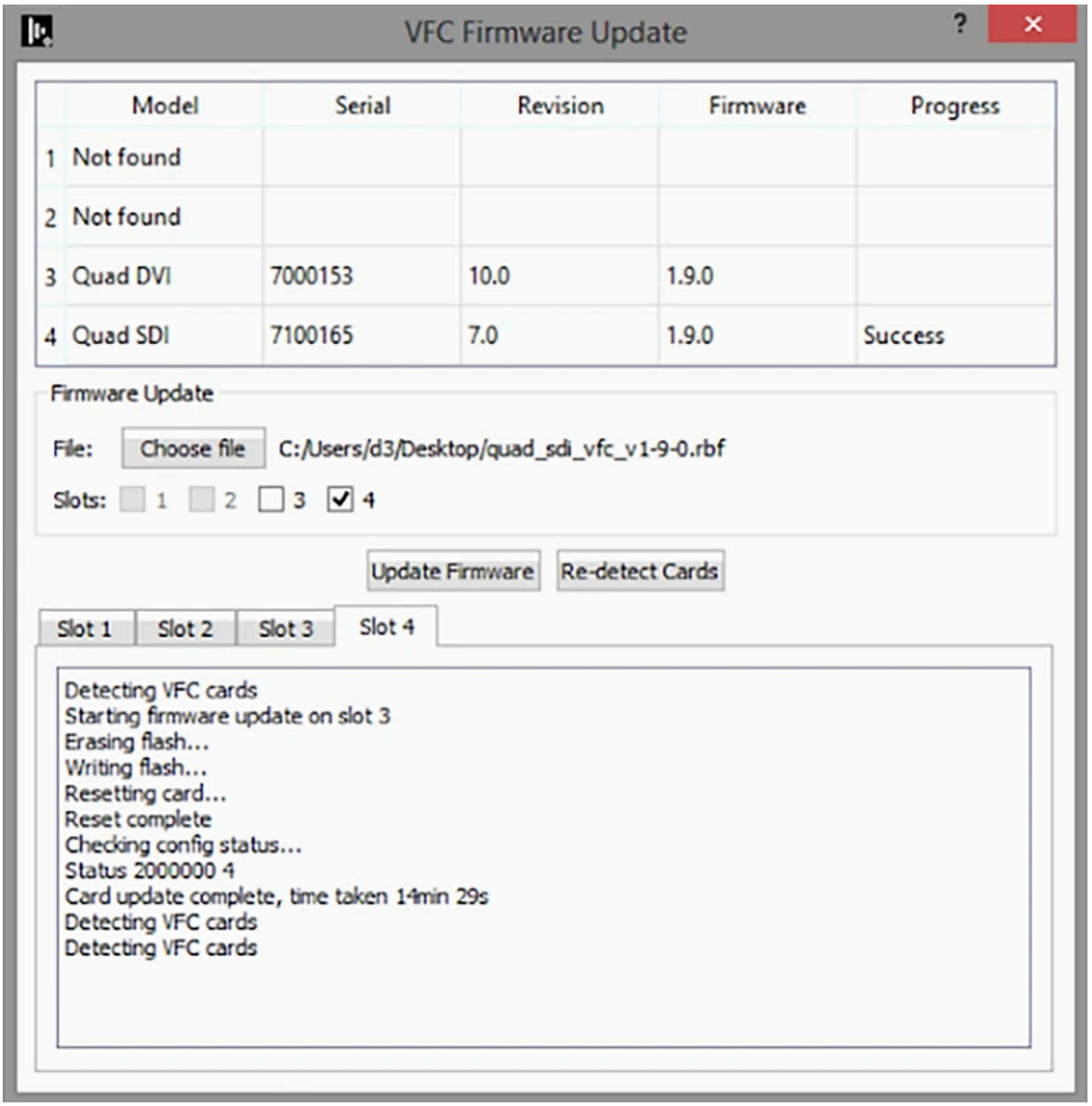
5. Slots will be automatically seleced.
   Ensure only Quad-SDI or Quad-DVI type cards have the correct firmware update applied to them.



6. Click Update Firmware, the update will start and will take between 10-25 minutes.



7. On completion, the Firmware version field will not update until all cards have finished updating and have been re-initialised and detected.



8. Finally, reboot the system.

VFC Cards Overview

The powerful proprietary Disguise VFC card allows a server to be easily configured for DVI, SDI, HDMI, Display Port and/or ST2110 outputs.

Slot Info

Information on a VFC slot can be accessed from within the Feed window. For more information on configuring VFC slots from the Feed Window, visit this link.

Port Info

Each VFC card contains one or more ports. Each port has its own physical connector and can output a separate video signal. Port configuration can also be access from within the Feed window. For more information on configuring VFC ports from the Feed Window, visit this link.

Configuring multiple VFC Cards

As well as the individual editors, it's possible to configure multiple VFC cards via the All VFC Devices editor.

Specifications

The table below defines the key capabilities of our full range of VFC cards.

	Quad-DVI	Quad-SDI	HDMI	DP 1.4	IP
Ports	4x Dual-Link DVI outputs	4x 3G-SDI outputs	1x HDMI 2.0 output	1x DP 1.4 output	4x 25GbE SFP28 outputs [1]
Video outputs	Up to 1x 2K DCI output or 4x HD outputs using quad split mode	Up to 1x 4K DCI output using Quad 4K split mode or 4x Full-HD outputs using quad split mode	Up to 1x 4K DCI output	Up to 1x 4K DCI output	Up to 1x 4K DCI output or 4x Full-HD outputs using quad split mode in both ST 2110 only [2]
Resolutions [3]	Up to 2K DCI	Up to 4K DCI	Up to 4K DCI	Up to 4K DCI	Up to 4K DCI [4]
Frame rate [5]	Up to 60Hz	Up to 60Hz	Up to 60Hz	Up to 60Hz	Up to 60Hz
Bit depth	Up to 8 bit	Up to 10 bit	Up to 10 bit	Up to 10 bit	Up to 10 bit

	Quad-DVI	Quad-SDI	HDMI	DP 1.4	IP
Chroma subsampling	RGB	YUV 4:2:2	RGB and YUV 4:4:4, 4:2:2 and 4:2:0	RGB and YUV 4:4:4, 4:2:2 and 4:2:0	ST 2110 - YUV 4:4:4, 4:2:2 and RGB in all video formats
HDR support	✗	✓ [6]	✓	✓	✗
Genlock	✓	✓	✓	✓	✓
PTP support	✗	✗	✗	✗	✓
Latency	4-5 scanlines	4-5 scanlines	0 scanlines	0 scanlines	Format-dependent
Legacy Range Support [7]	4x4pro 4x2pro 2x4pro	4x4pro 4x2pro 2x4pro	4x4pro 4x2pro 2x4pro	N/A	N/A
GX Range Support [7]	GX 1 GX 2 GX 2C GX 3 GX 3+	GX 1 GX 2 GX 2C GX 3 GX 3+	GX 1 GX 2 GX 2C GX 3 GX 3+	GX 3 GX 3+	GX 3 GX 3+ [8]
VX Range Support [7]	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 1 VX 2 VX 2+ VX 3 VX 4 VX 4+	VX 4+

Notes

[1] Port 1 and 2 are dedicated for ST 2110 mode, and Ports 3 and 4 are dedicated for SDI mode when using SFPs.

[2] When in ST 2110 mode, a redundant SMPTE 2110 video signal using Port 2 can be enabled in the event that the video signal from Port 1 goes down, using SMPTE 2022-7 for packet-level redundancy.

[3] Resolutions:

- 4K DCI - 4096 x 2160px
- UHD - 3840 x 2160px
- 2K DCI - 2048 x 1080px
- Full-HD - 1920 x 1080px
- HD - 1080 x 720px

[4] Please see the VFC spec sheet for a full overview on supported video formats.

[5] For higher frame rates please contact Tech Solutions.

[6] For more details on setting Colour Conversion and Transfer Characteristics for HDR, please go to this link.

[7] For a detailed overview on Disguise Media Servers and their compatibility with existing VFC cards, please view the **TA-23 : Disguise media servers with backplane version 2 do not support DP1.2 VFC cards** technical advisory.

[8] GX 3+ will have IP-VFC support, but it will not be available at launch.

LED Codes

The colour of the LED on the VFC card indicates the status of the card as follows:

White The VFC card is receiving power but no connection has been made to it. FPGA is booting. LED should power off after going white. If it is stuck on white, the VFC is has not booted correctly and is not in a good state. Requires attention.

Blue The VFC card is receiving power and the server is establishing a connection. Flashing blue indicates a persistent error and the VFC is constantly trying to re-configure itself. Requires attention.

Green The VFC card is operating normally.

Orange If this does not resolve, this indicates an error, possibly with the FPGA. Requires attention.

Pink In early days of the DP VFC card, a Pink LED indicated an programming issue with the card. This status code has been corrected in a later software release and should no longer need attention.

VFC Specifications Sheet

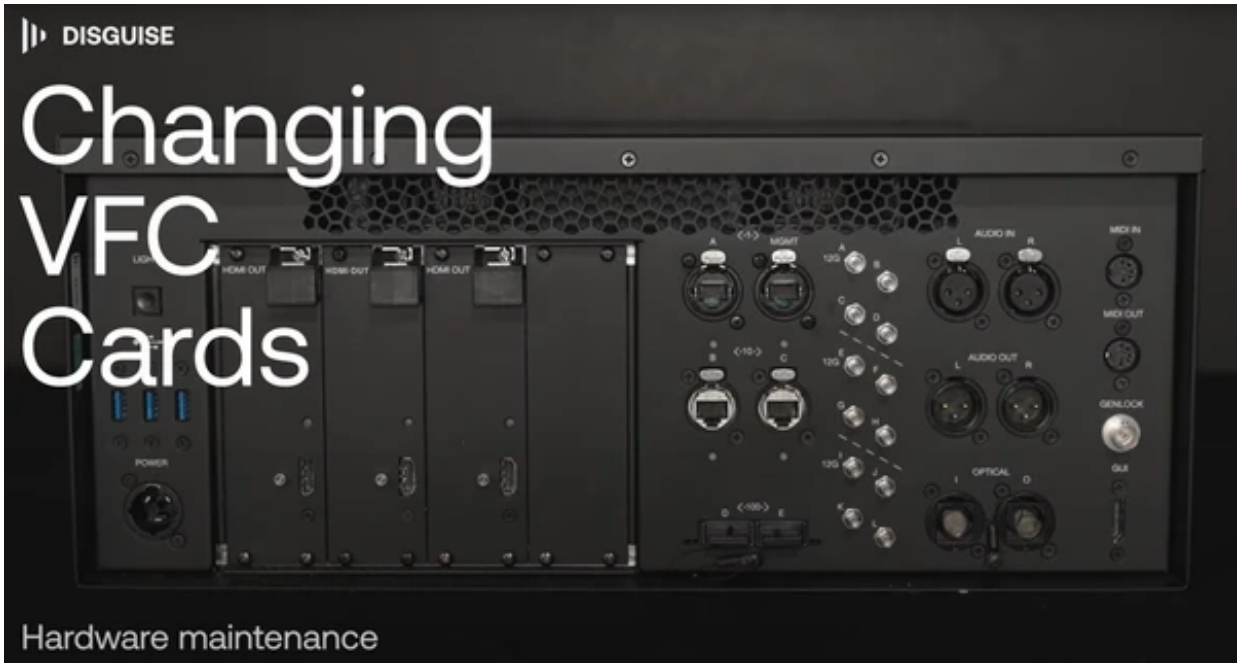
View the full Product information in this **Technical Specifications** document.

VFC Card Replacement

Before replacing a VFC card it is worthwhile going over the recommended practices for how to handle them in and out of the server.

Please take necessary precautions when handling VFC cards in order to protect them against electrostatic discharge (ESD). We strongly recommend the following mitigations:

- Keep VFC cards in ESD bags and packaging when not in use. The packaging for VFC cards includes an ESD bag as standard and this is sufficient. Do not leave VFC cards out in the open.
- Keep VFC cards in ESD bags and packaging during transportation, including carrying VFC cards by hand.
- Use an ESD wrist strap when handling the IP-VFC card outside of its ESD packaging.



VFC Card Replacement. Click on the video image to view the video in YouTube

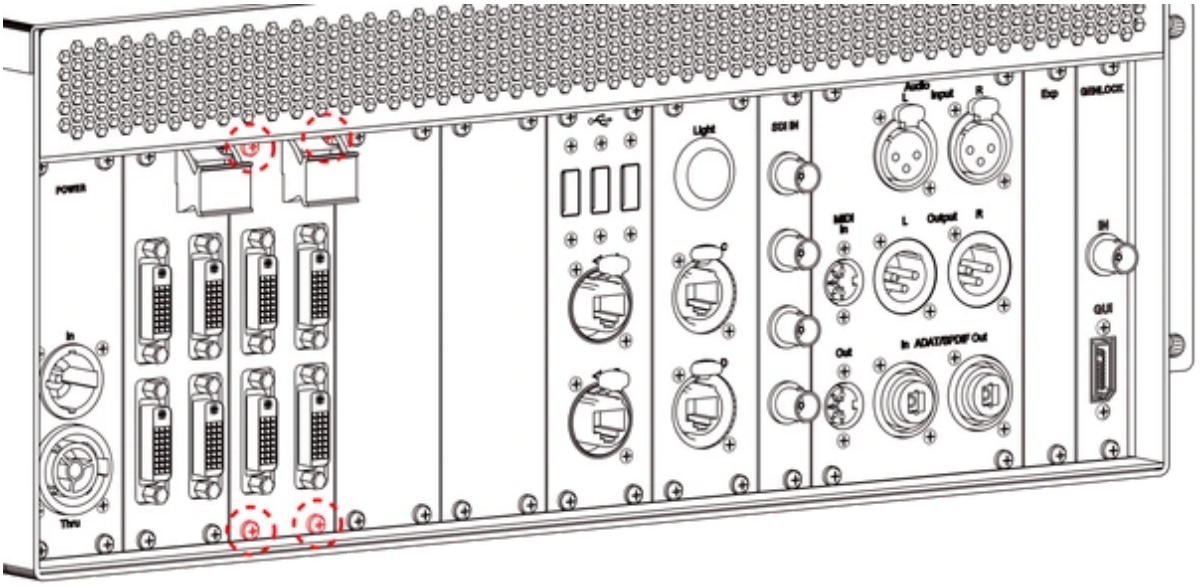
VFC Card Replacement

> **Note**
>
> Take steps to ensure you are free of static electricity before starting the procedure and ground yourself appropriately. We recommend the use of an anti-static wrist strap as well as an anti-static mat if one is available. It is easiest to change the cards starting on the right hand side, and it is advised to do so regardless of the amount of cards you need to change.

Users can change VFC cards as they require. You can replace one or multiple cards. The following steps are a guide to help users change VFC cards. Please read carefully to ensure best practice. If the system does not work after following these instructions, do not force the VFC cards but contact **Support**

Replacing a VFC card

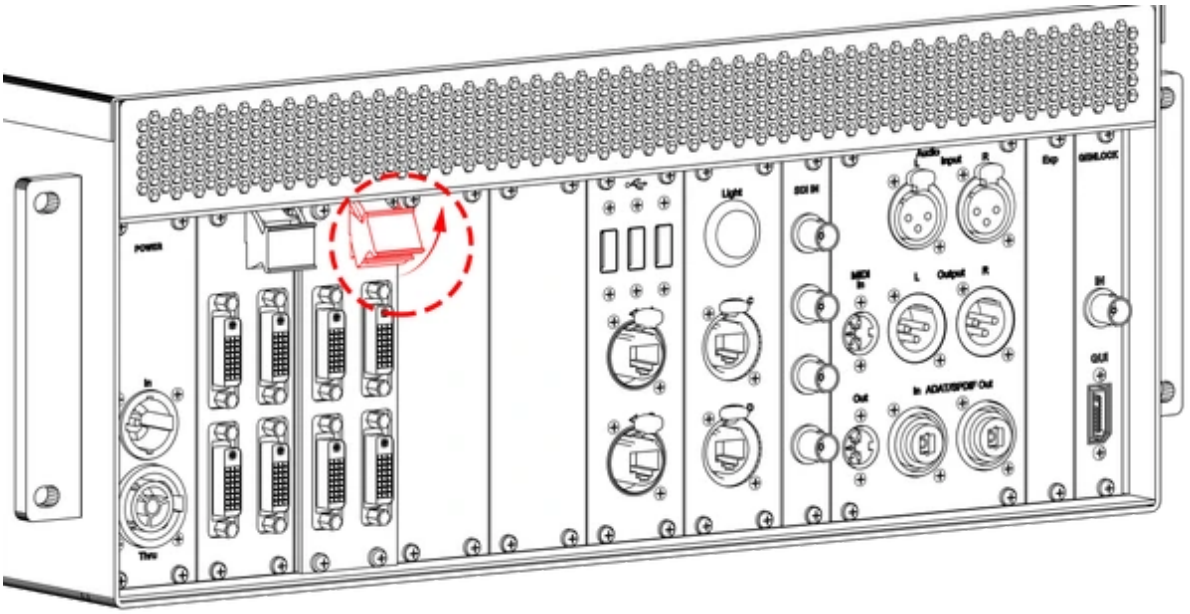
1. Disconnect the system from all sources of power: remove the power cord from input and output, before changing the VFC cards.
2. Using a manual Phillips #1 screwdriver loosen the 4x retaining screws on the VFC card you want to replace. The screws are indicated with a red line in the image below. The VFC card should be screwed in slowly by applying each screw in increments of around 25-50% each time. The first screw should be in the bottom right followed by top-left, top-right, and ending with bottom left.

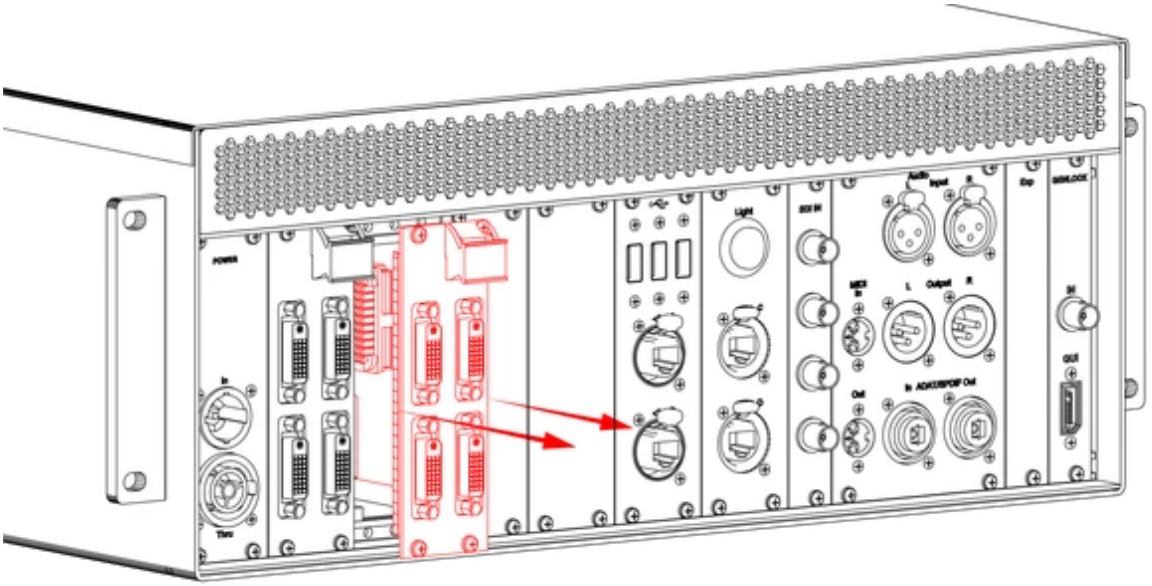


Red lines indicate screw location. Example shows Quad DVI VFC cards.

3. Lift the latch on the top right corner of the card and gently remove the card from the rear of the unit by pulling gently as shown in the images below.

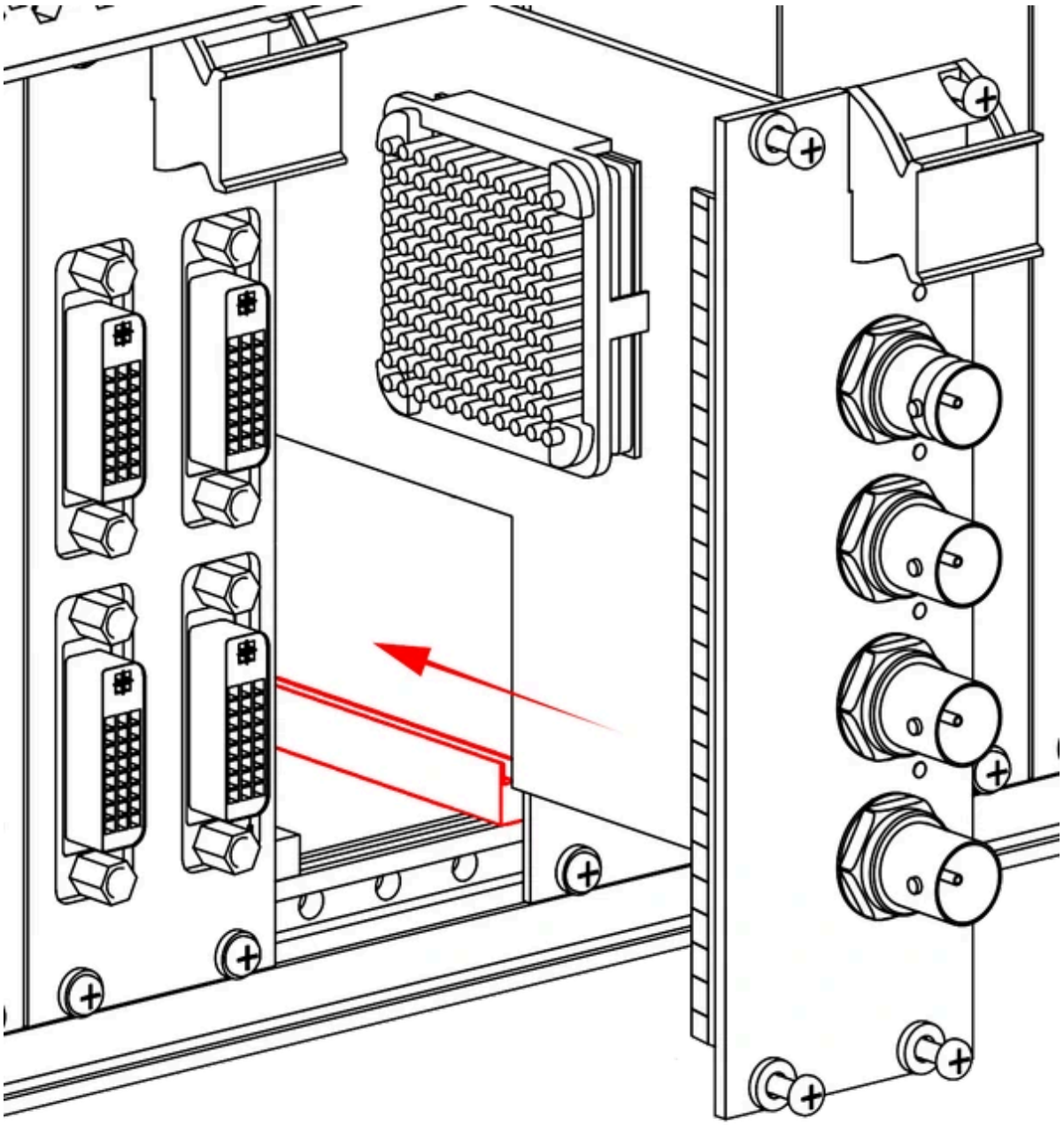
4. The VFC cards are fragile, be sure to pull straight not flexing the card and if under any resistance do not use excessive force. Avoid touching the exposed electronics.

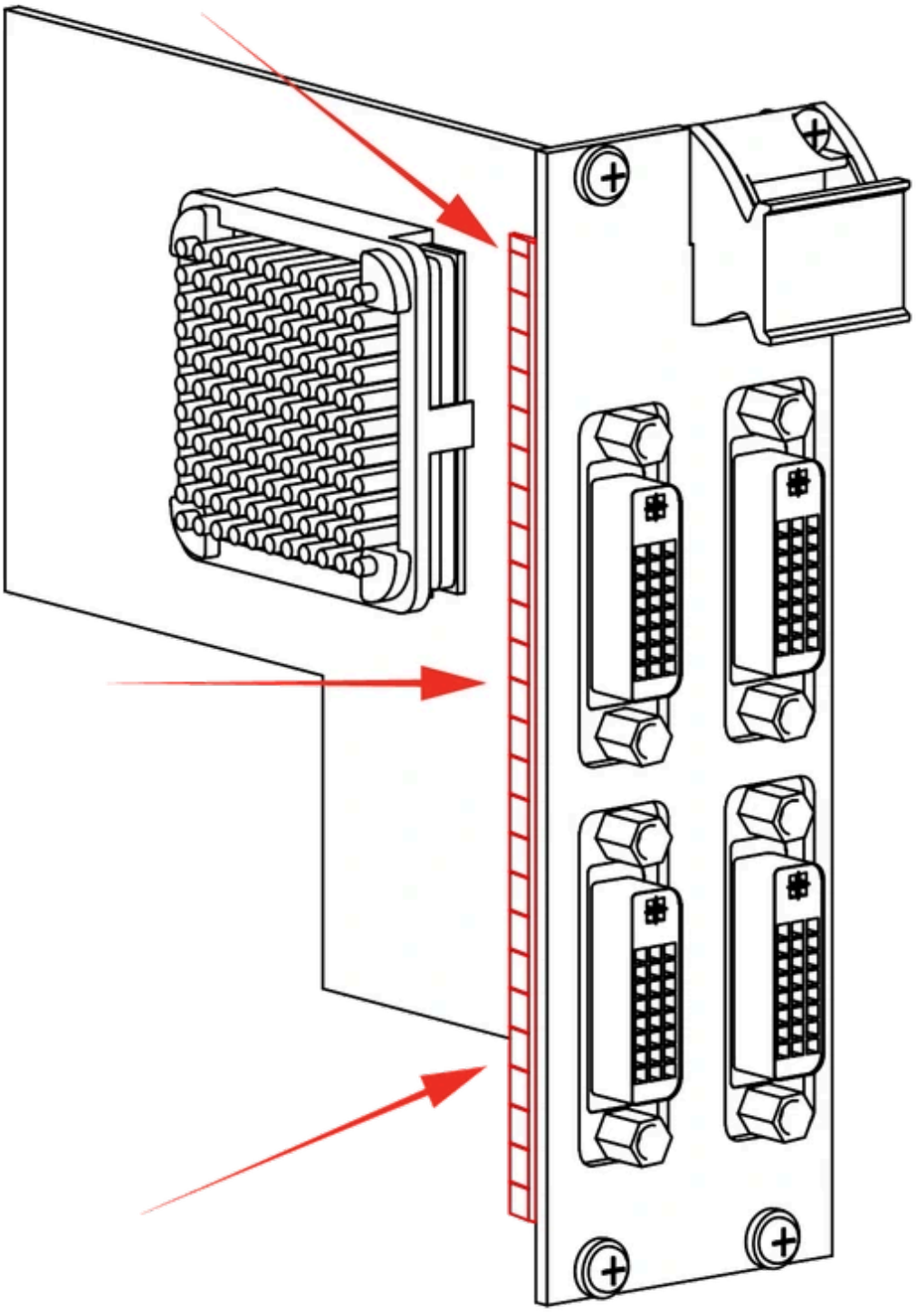




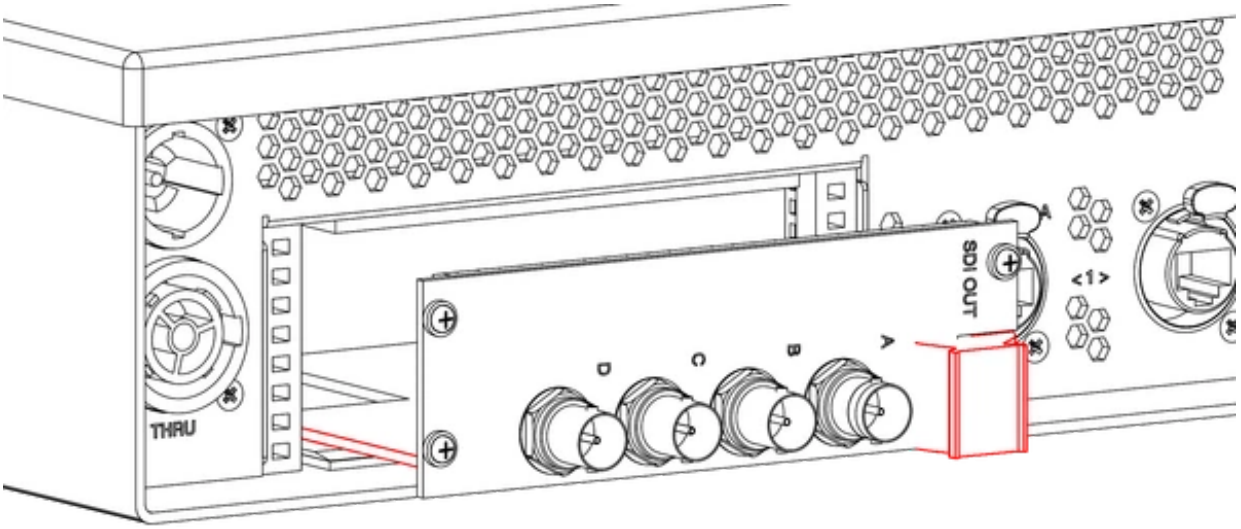
5. Gently place the removed card into the anti static box provided with your purchase.

6. Gently insert the new VFC card into the vacant slot, being careful to line the card up with the guides both at the top and the bottom of the system, as indicated for the bottom with red lines in the image below.

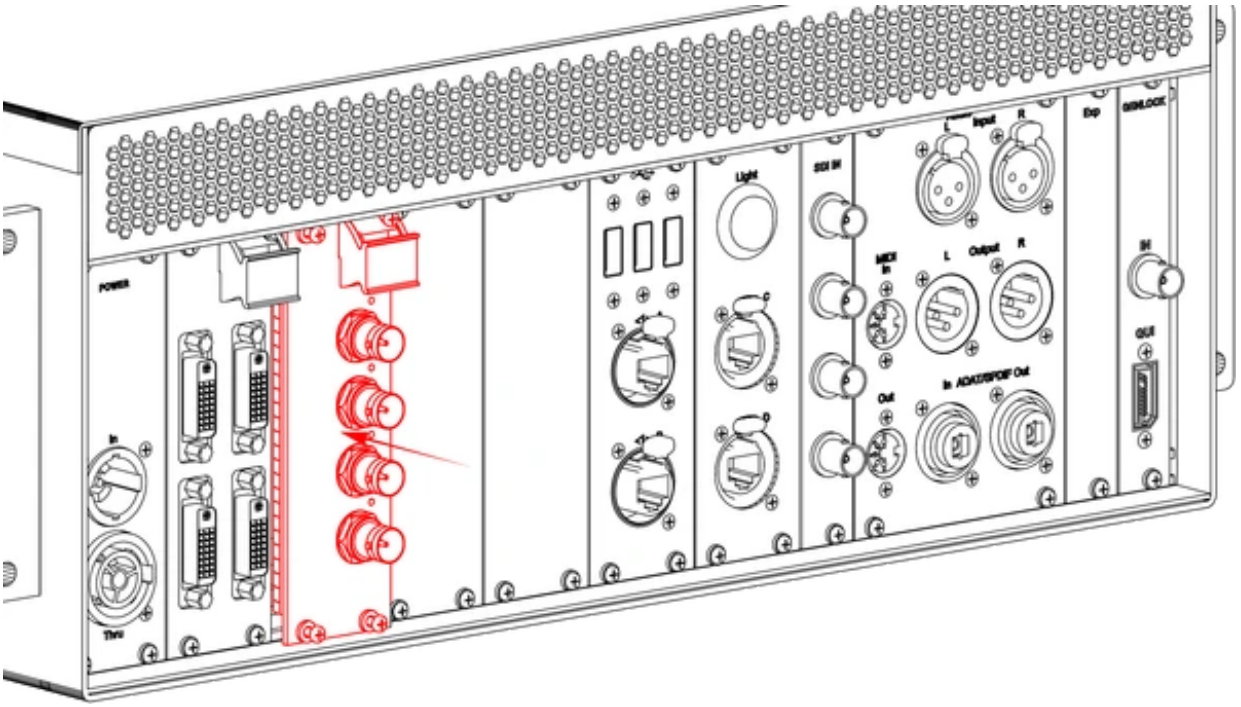




> **Note**
>
> Please note: Note that when replacing a VFC card in a gx 1, ensure that the latch is on the right when inserting a card as shown in the image below. The plastic guides are located near the base of the server and help align the card with the connector

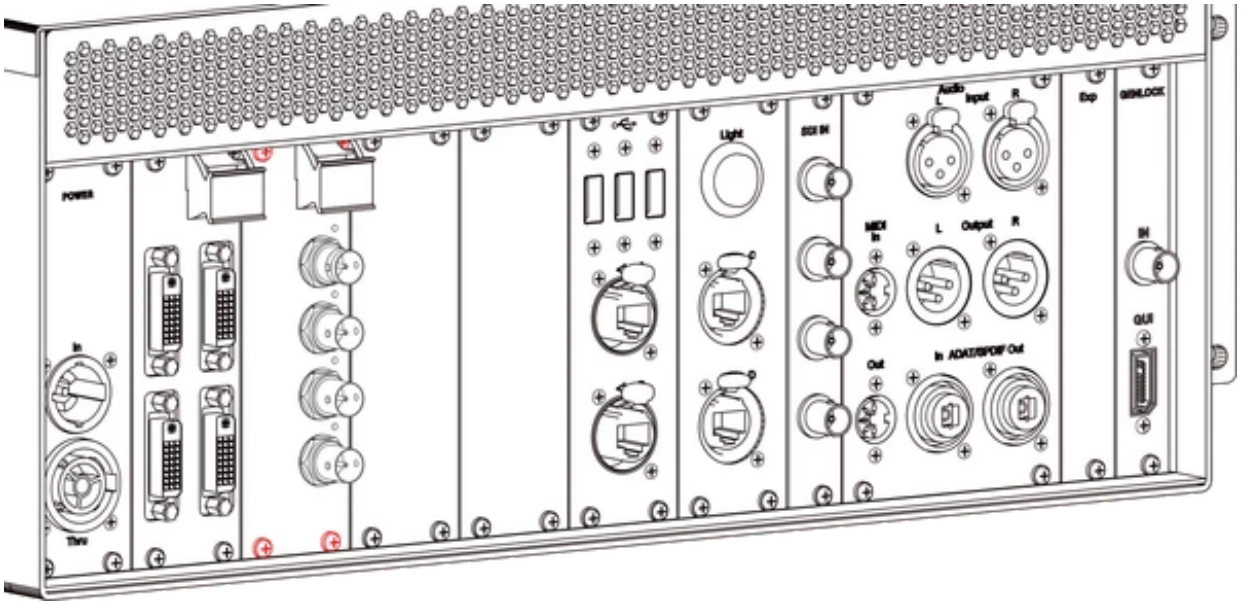


7. The top and bottom of the card needs to slide into the guides. Be sure that the grounding spring maintains its position to avoid jamming when re-inserting. 8. Once inserted into the guides, make sure the card is fully flush with the rear of the server by gently and firmly pressing in the centre of the VFC card, as indicated in the image below.



9. Fasten the four retaining screws before repeating all of the steps for the next card. To

reduce the risk of damaging the threads, do not apply excessive torque to the screws.

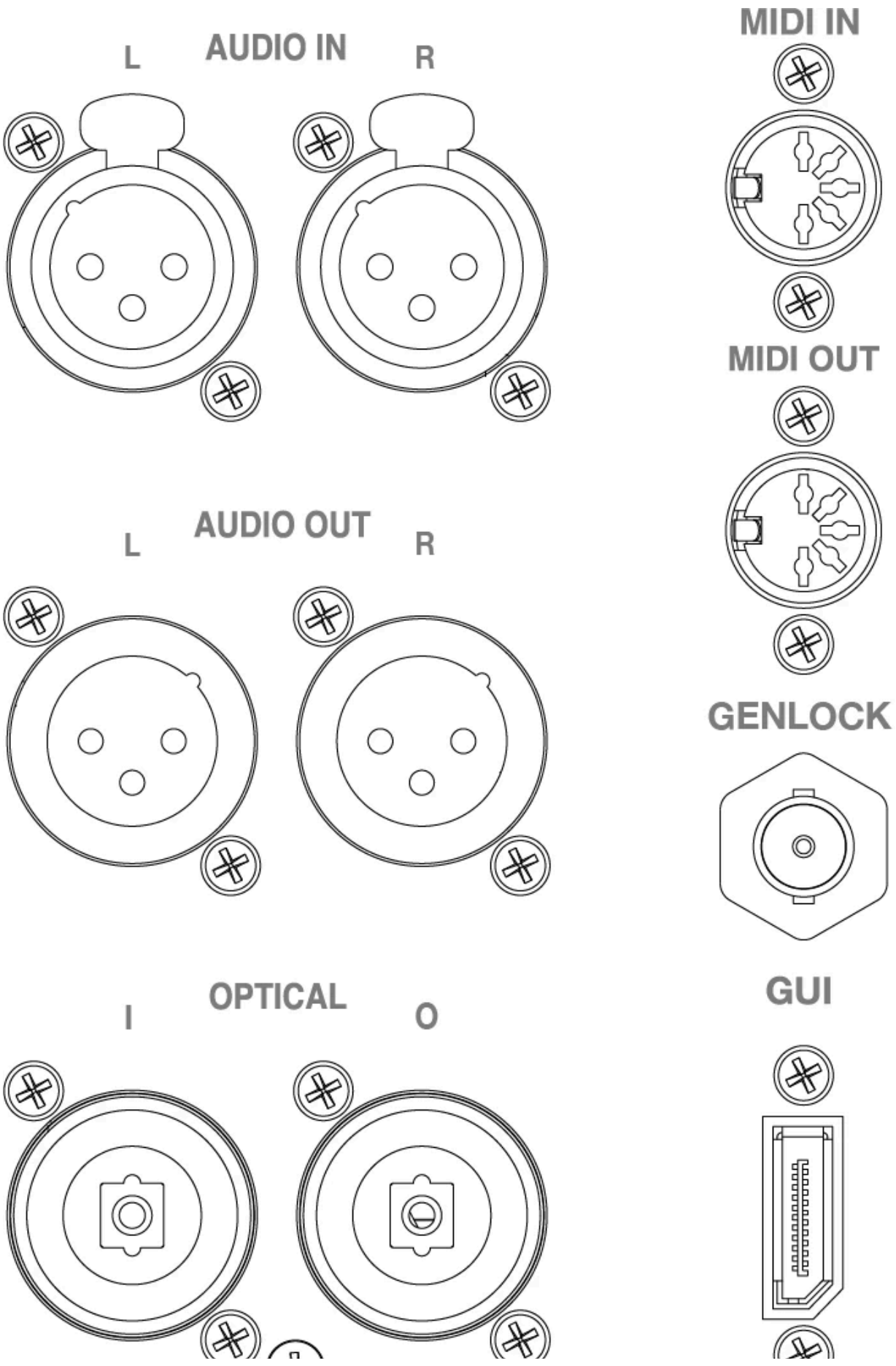


VX Audio Input and Output

The VX range is equipped with a broadcast quality pro audio card which uses the latest 192kHz AD and DA converters.

Back panel connections

- XLR Left + Right Input
- XLR Left + Right Output
- ADAT/SPDIF Input
- ADAT/SPDIF Output
- MIDI Input
- MIDI Output


L
AUDIO IN
R
MIDI IN
MIDI OUT
L
AUDIO OUT
R
GENLOCK
I
OPTICAL
O
GUI



Audio connections on rear of VX unit

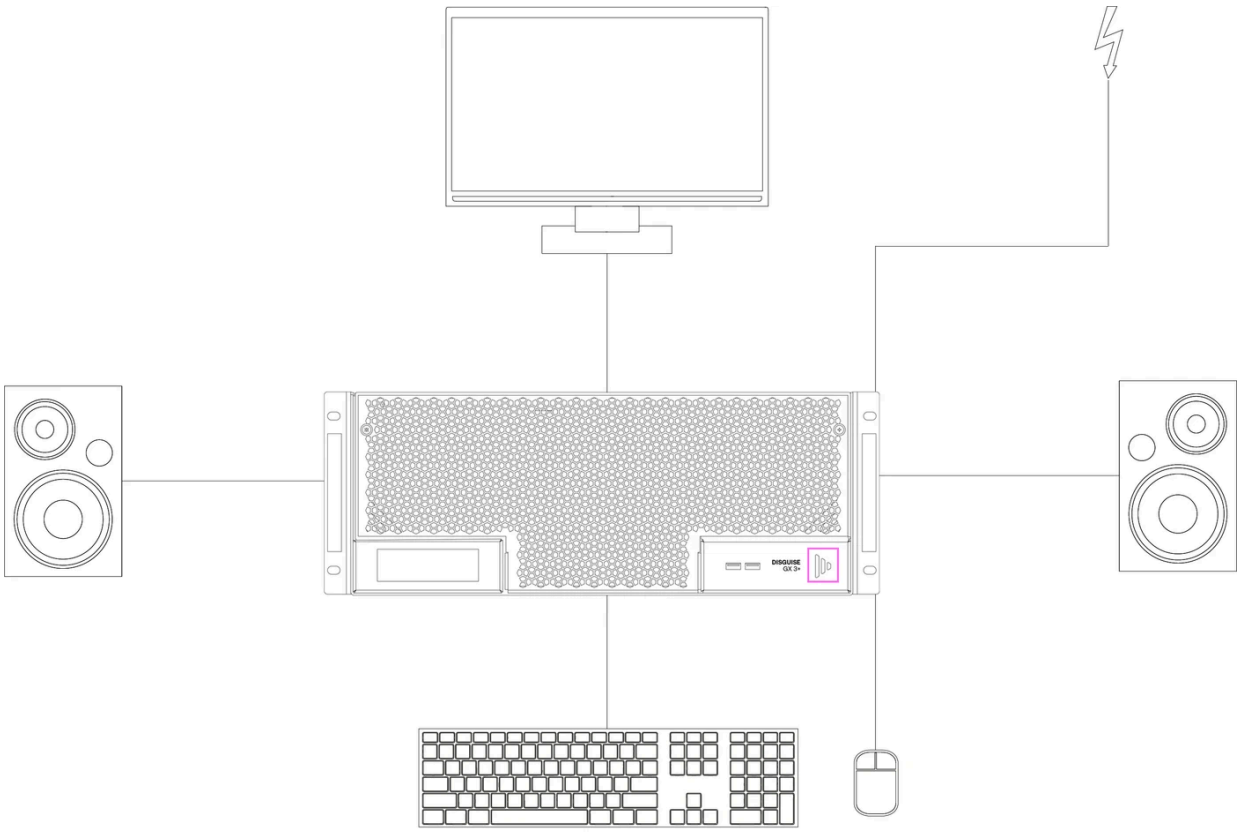
Front panel connections

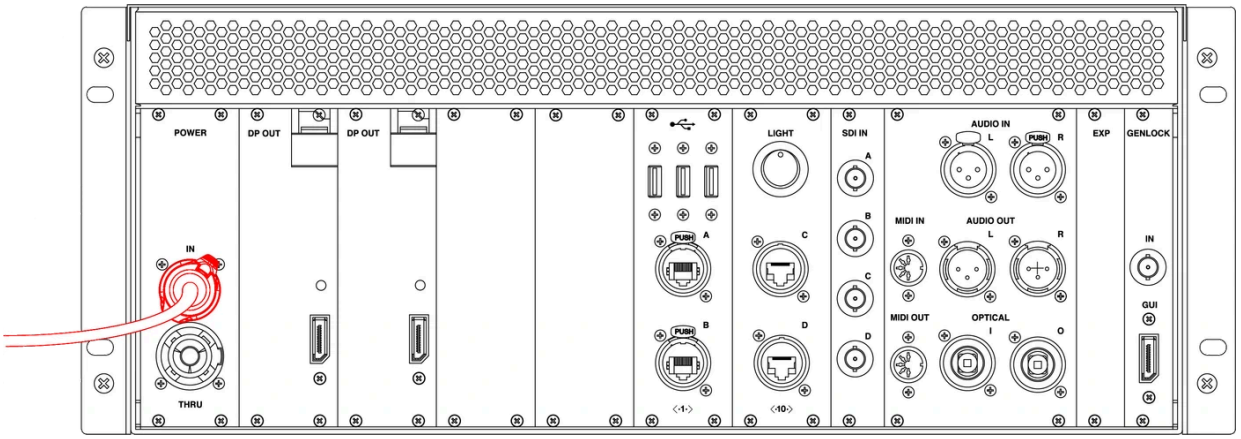
- 1/4inch Stereo Monitoring socket

It is possible to monitor audio output from the unit from the 1/4inch stereo socket with a pair of headphones.

How to start the gx

1. Connect Power cord to the gx.
2. Make sure you have connected a keyboard, mouse and monitor to the primary graphics output.
3. Press the power button on the front of the unit and wait for the system to load into Windows.



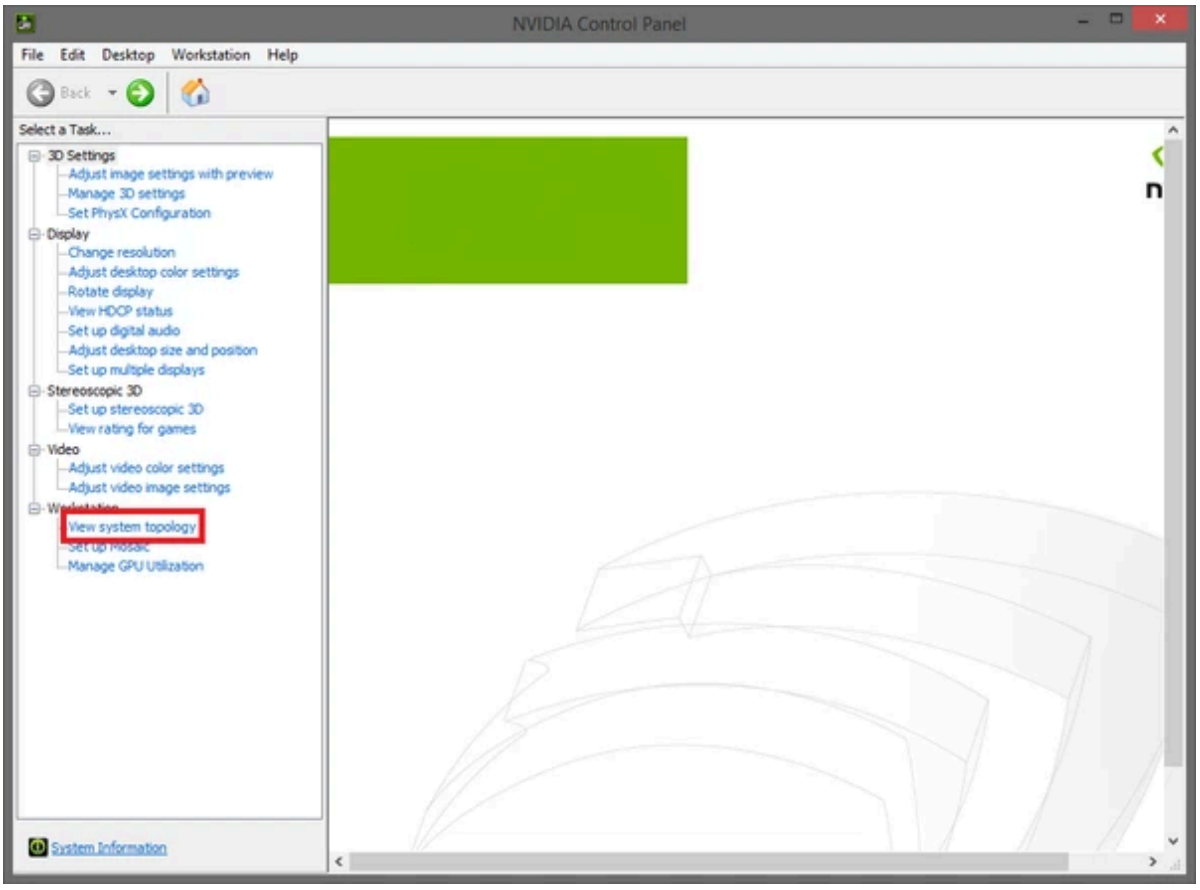


Location of power input on rear of GX 2 unit

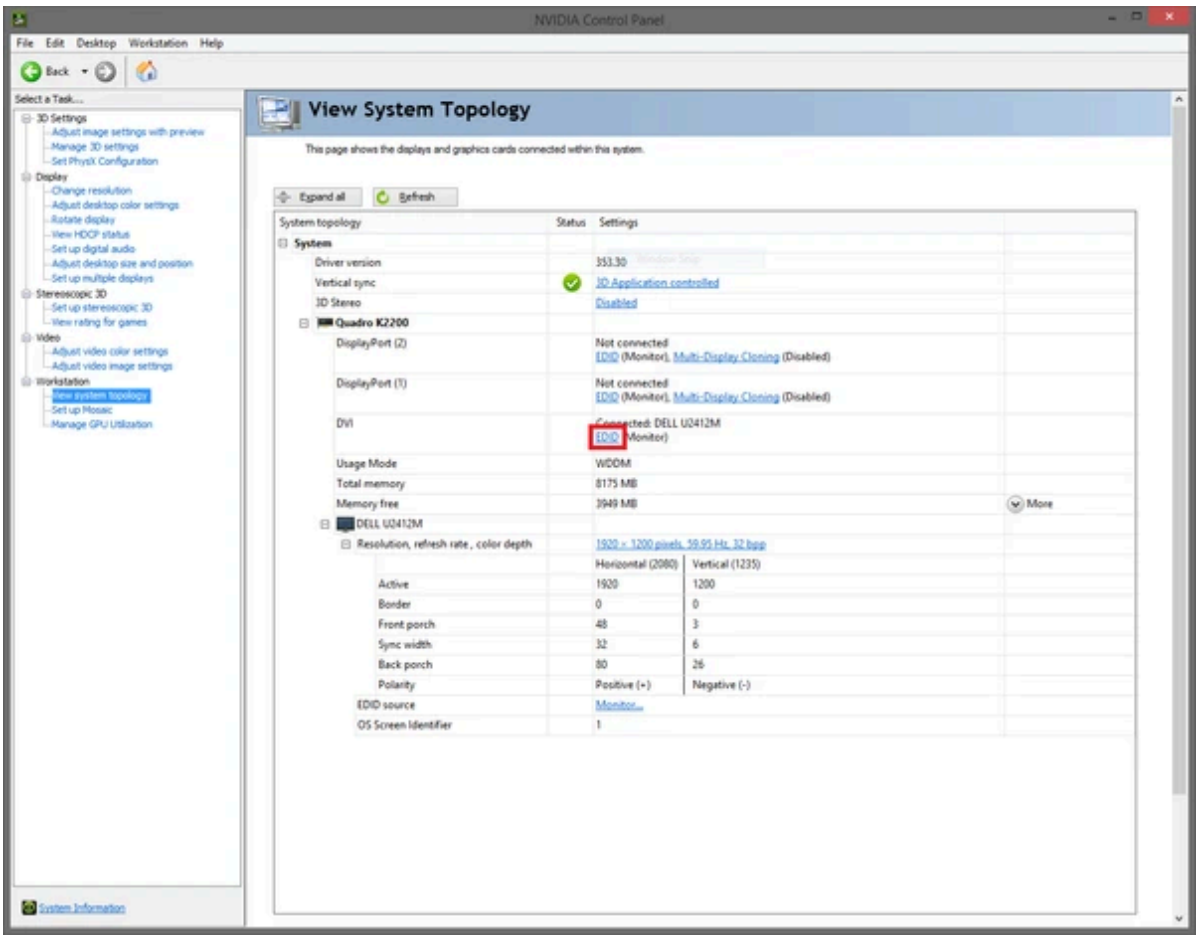
Managing EDIDs on NVIDIA Machines

Emulating EDIDs within Windows

1. Navigate to the “View system topology” tab.

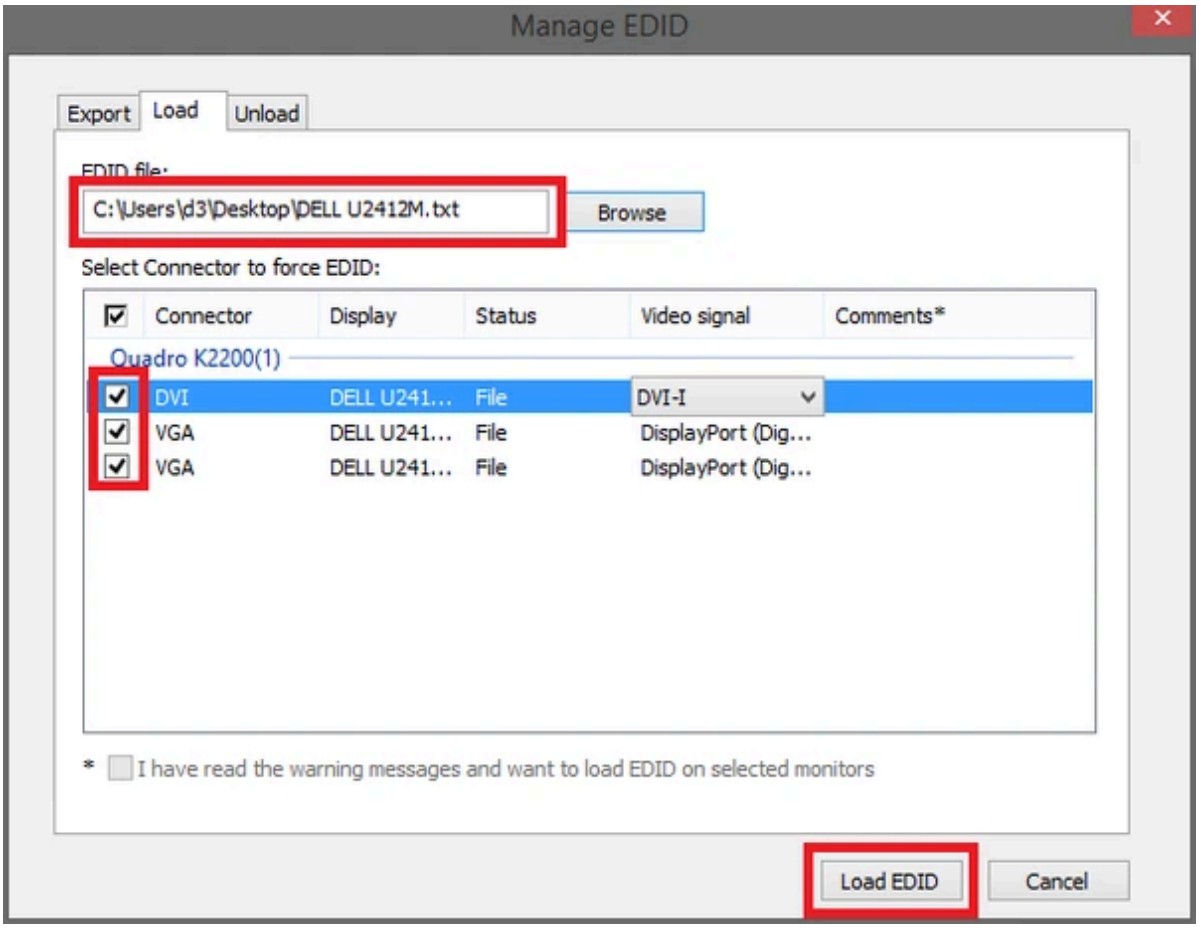


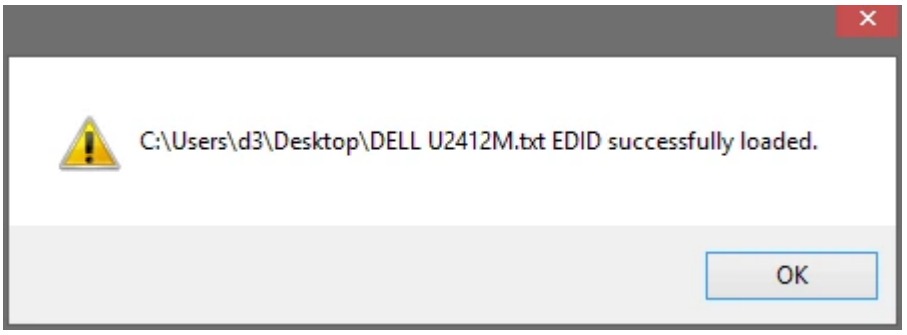
2. Click the EDID button next to a card connection (DVI or DisplayPort).



3. Navigate to the “Load” tab inside the Manage EDID window.

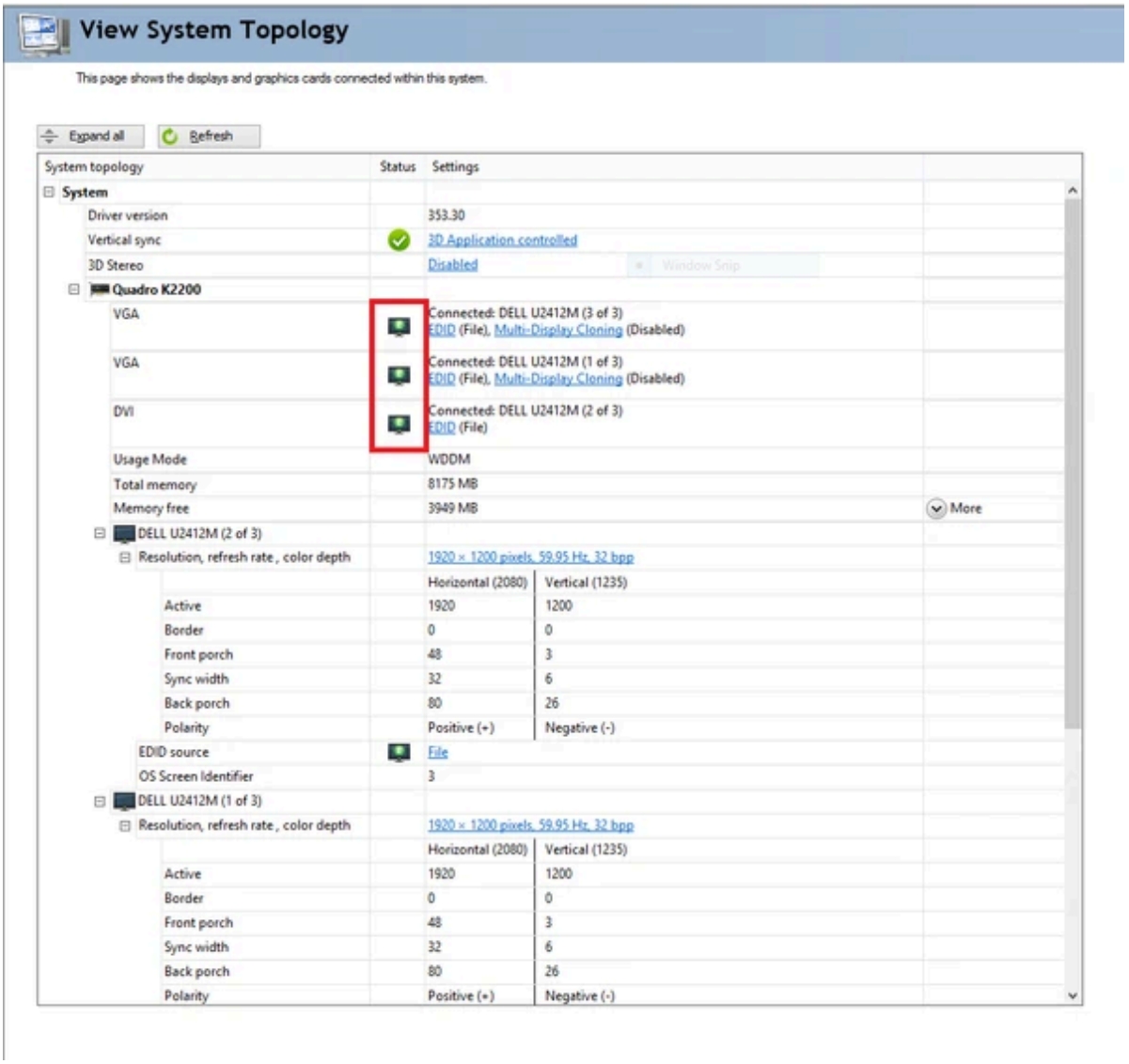
4. Browse to your preferred EDID and select which display connections you want to emulate the EDID on.





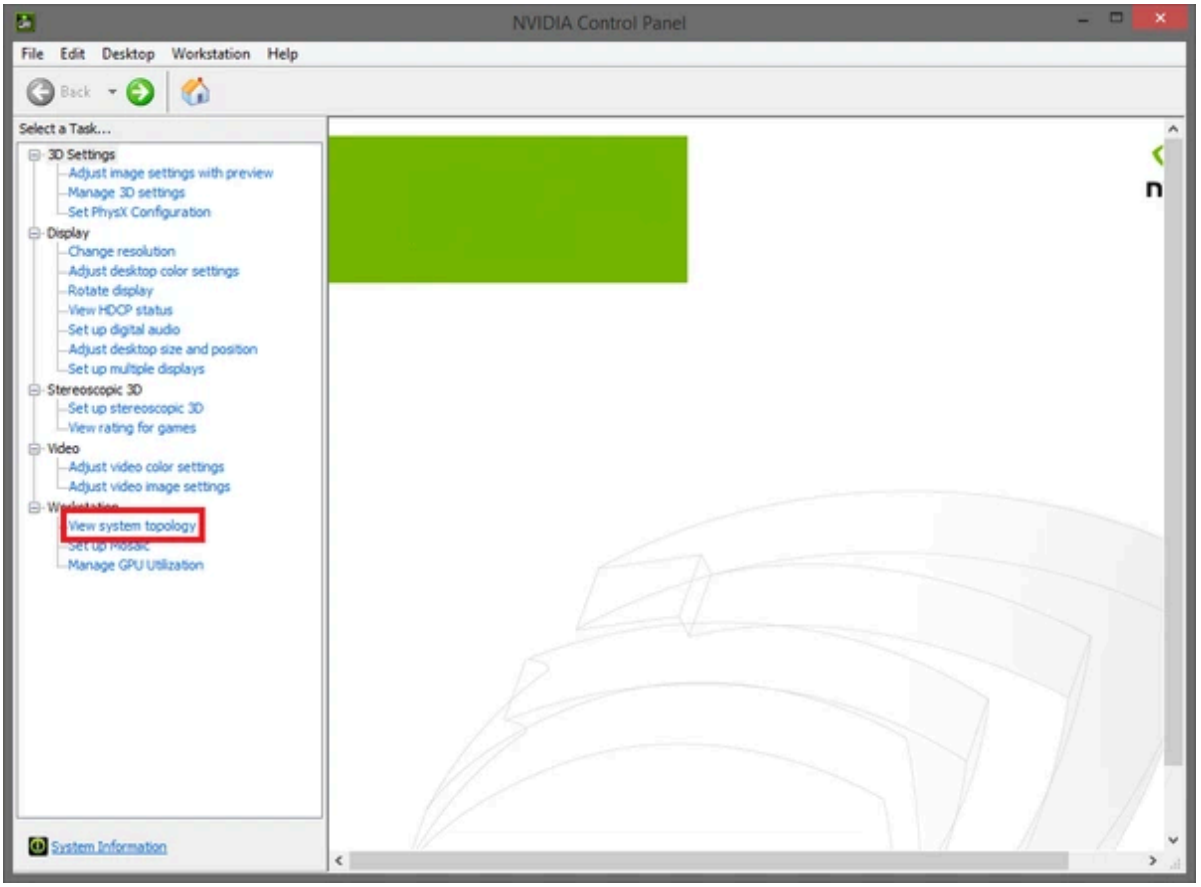
5. After the EDID is successfully applied you will see this small icon which indicates that the display connection has an emulated EDID asociated with it:



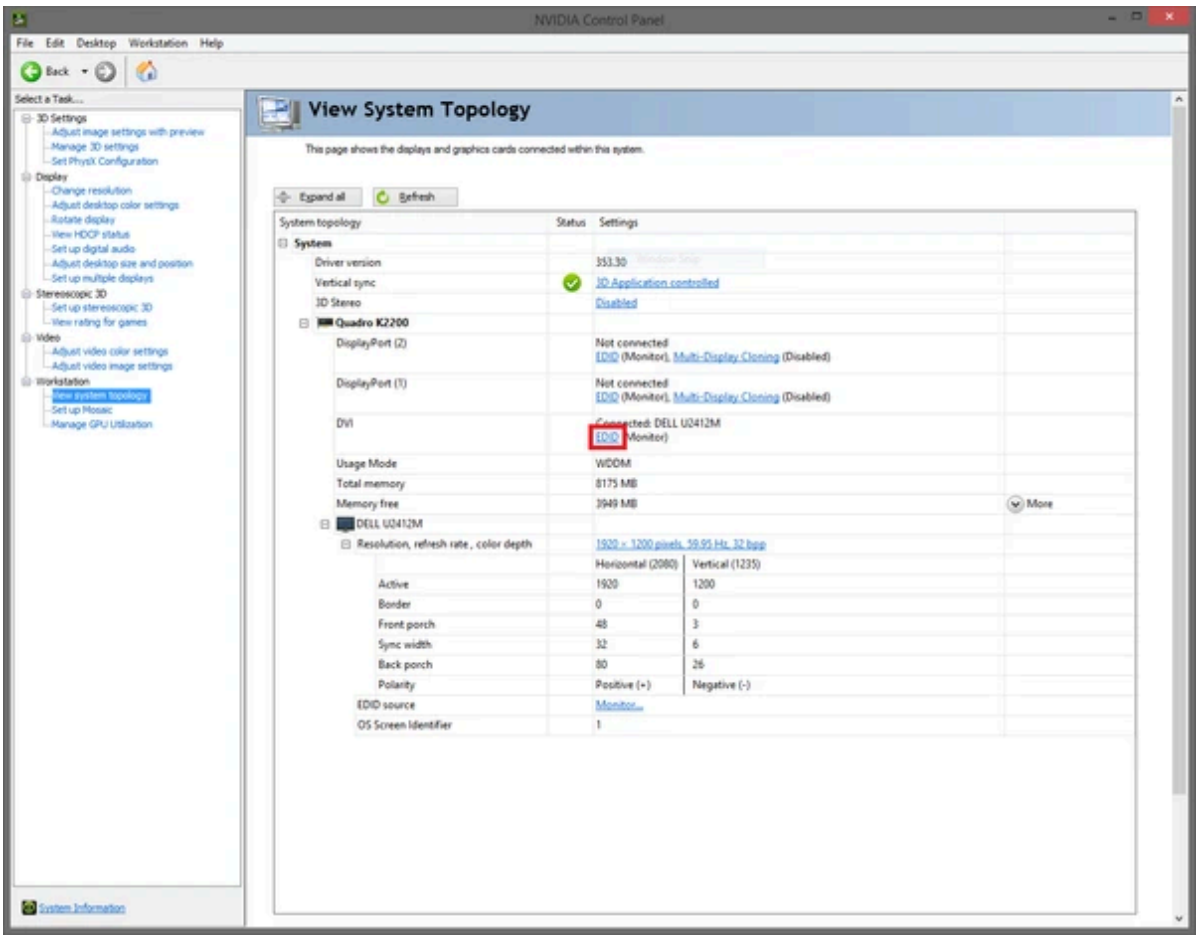


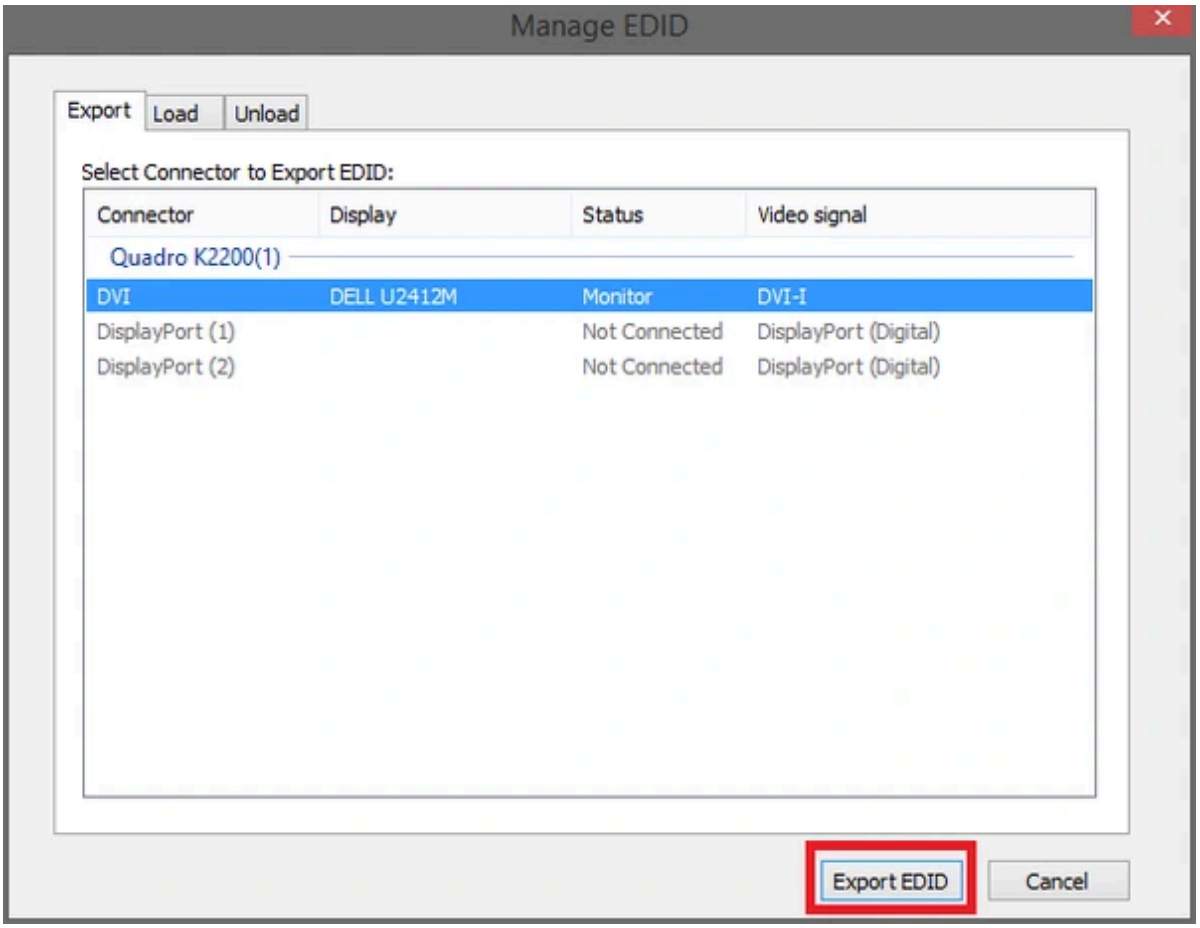
Exporting EDIDs

1. Navigate to the “View system topology” tab.

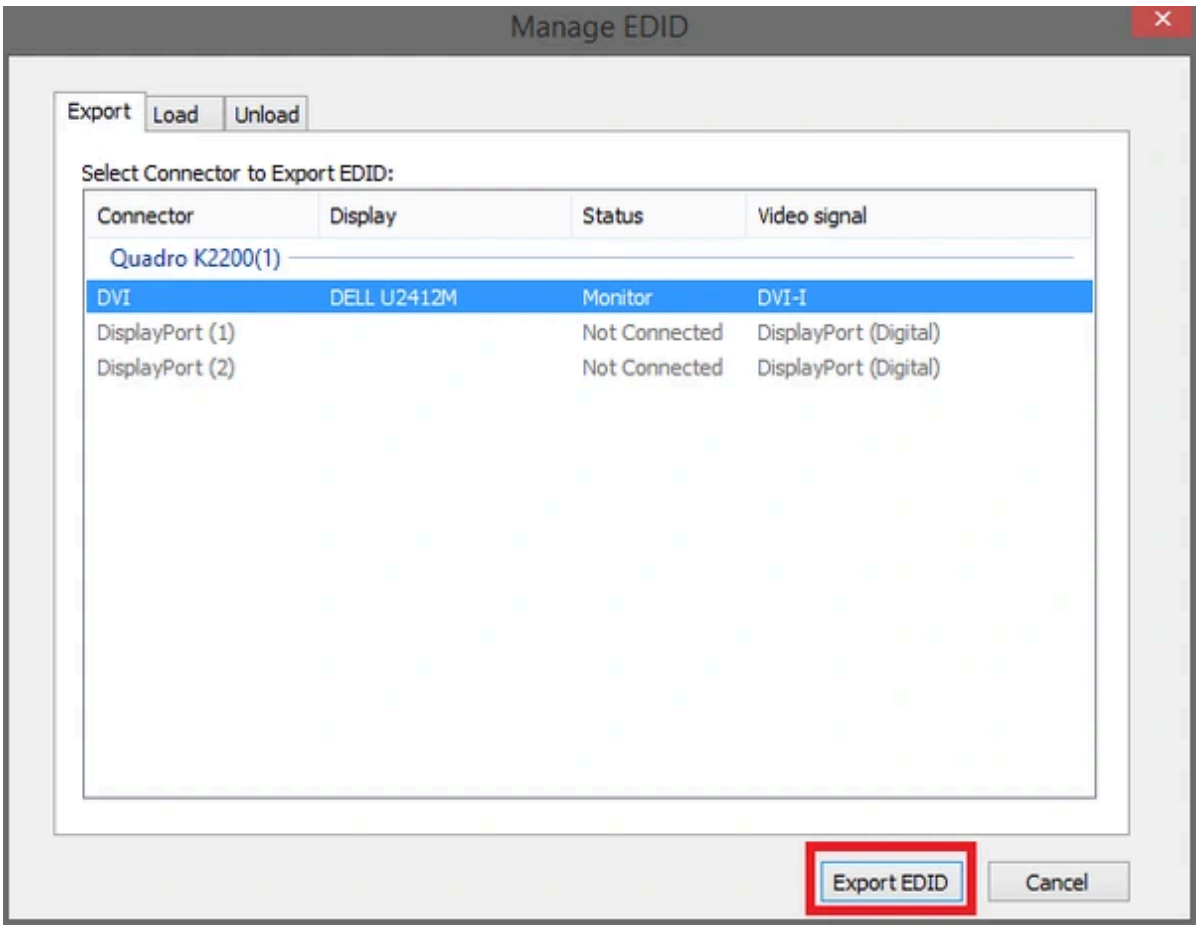


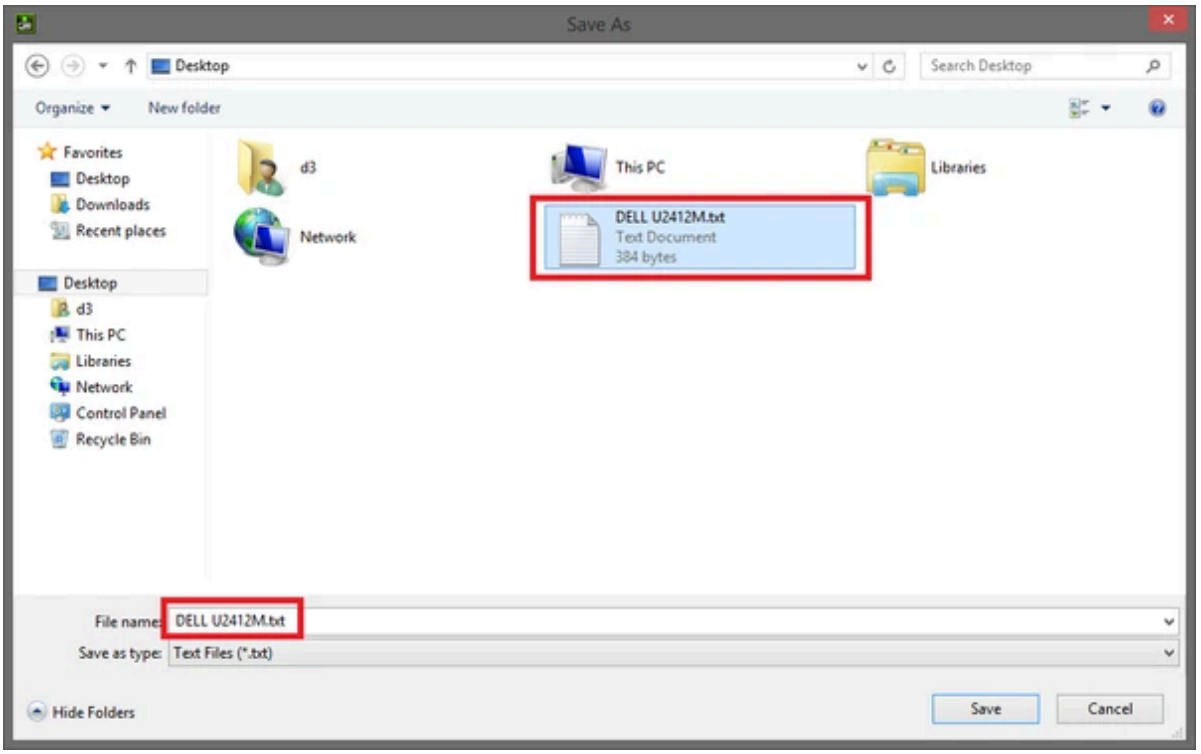
2. Click the EDID button next to a card connection (DVI or DisplayPort)




Manage EDID
Export
Load
Unload
Select Connector to Export EDID:
Connector
Display
Status
Video signal
Quadro K2200(1)
DVI
DELL U2412M
Monitor
DVI-I
DisplayPort (1)
Not Connected
DisplayPort (Digital)
DisplayPort (2)
Not Connected
DisplayPort (Digital)
Export EDID
Cancel

3. Export your preferred EDID to the desktop or documents folder





Resetting EDIDs

EDIDs on all outputs of all connected VFC cards can be reset to a neutral state easily using the keyboard shortcut FFS (Four Finger Salute) as follows:

- Hold CTRL + ALT + SHIFT + F12
- Disguise will display several status messages on the screen during the reset process; please wait until reset process has completed before continuing.

> **Note**
>
> You can only genlock outputs that have identical EDID

Powering the VX

The Pro and GX ranges of Disguise servers use Neutrik PowerCON TRUE1 as the power input.

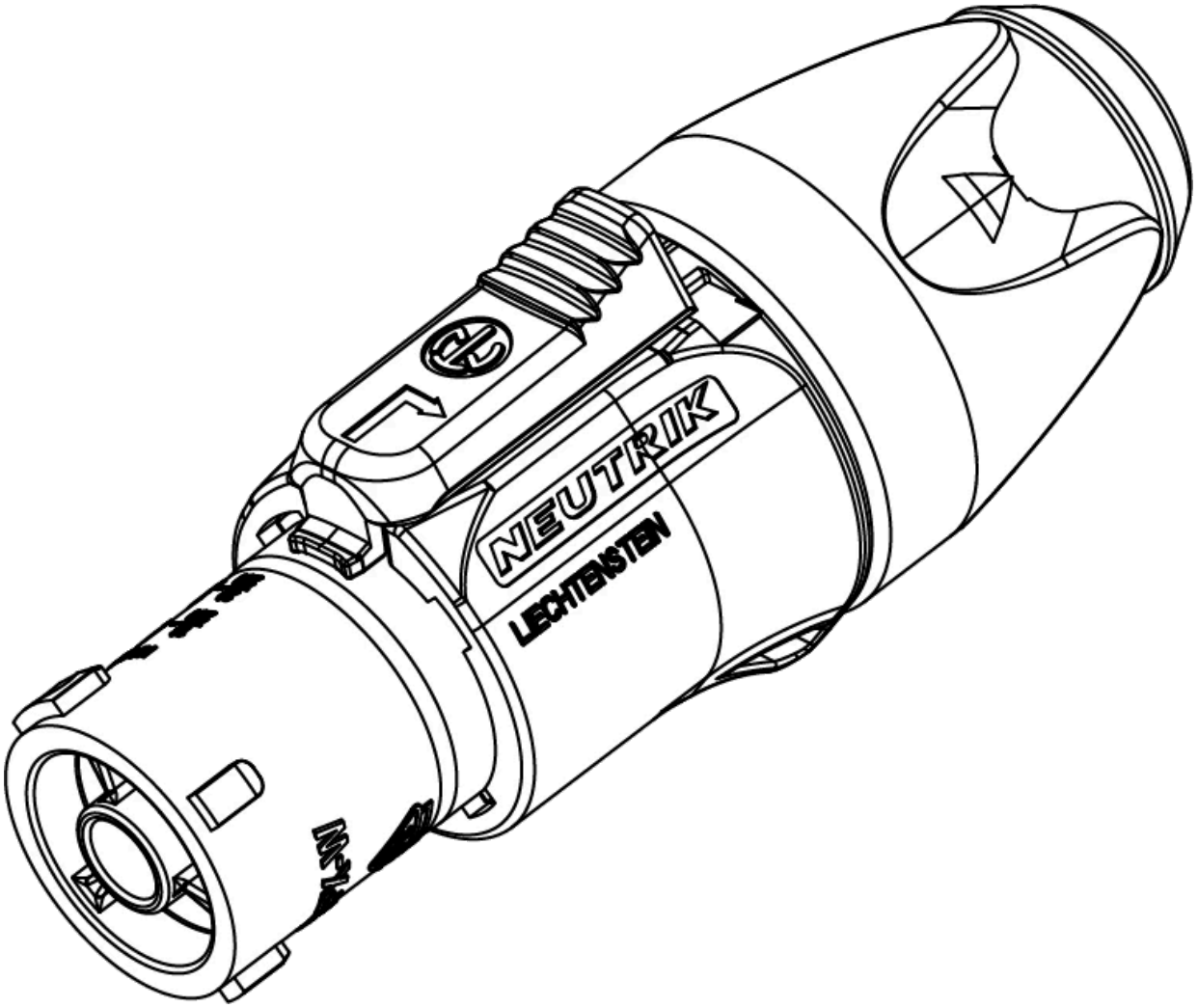
The TRUE1 is:

- Lockable
- Live-Mating (safely)
- Extendable
- Dust and water resistant according to IP65 in mated condition

Cabling

To power a server, you should use a cable with the following attributes:

- SJT flexible cord, min. 12AWG, min. 300V, min. 60vdm;C, max 4.5 m long.
- One end terminated with NEMA 5-15P/BS 1363/CEE 7 plug.
- Other end terminated with appliance coupler type Neutrik AG, type **NAC3FX**.

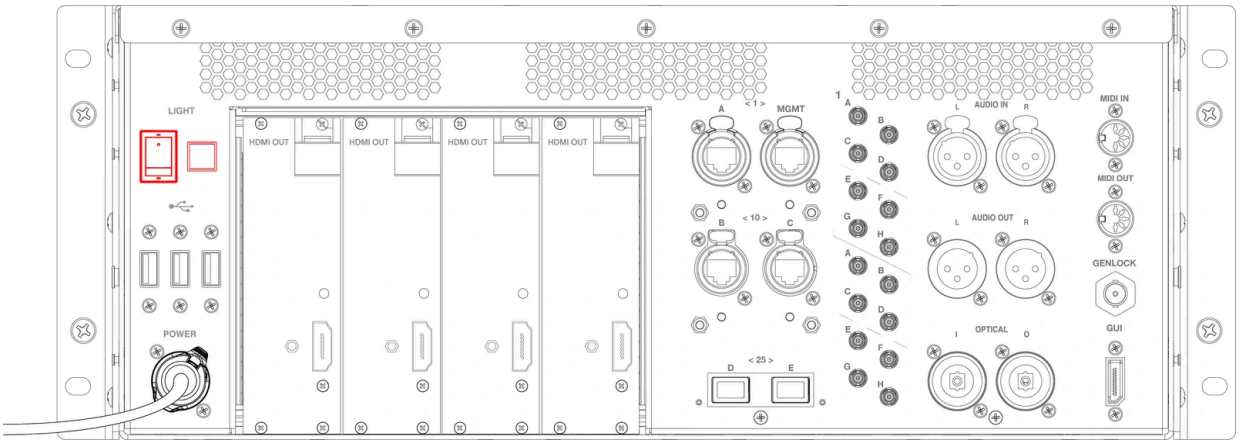


Neutrik powerCON TRUE1 connector

VX Unit Rear Light

Disguise Servers in the pro and gx ranges come with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labelled “light” with power in.



Location of light switch on rear of a GX 3

VX Range Overview



The VX range of servers has been engineered to playback video at the higher quality, smoothness, and resolution required by live events and virtual productions with the power to scale.

These are the current models in this range:

- VX 2+
- VX 3
- VX 4+

These are the legacy models in this range:

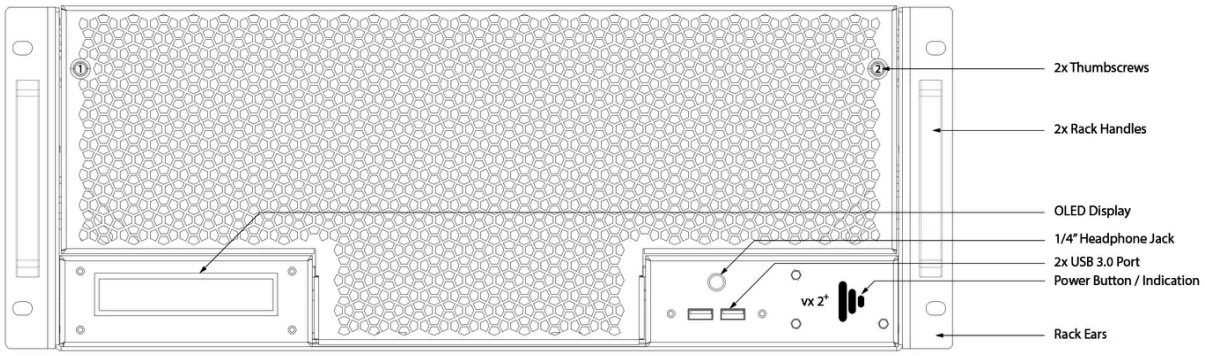
- VX 1
- VX 2
- VX 4

Common operations include:

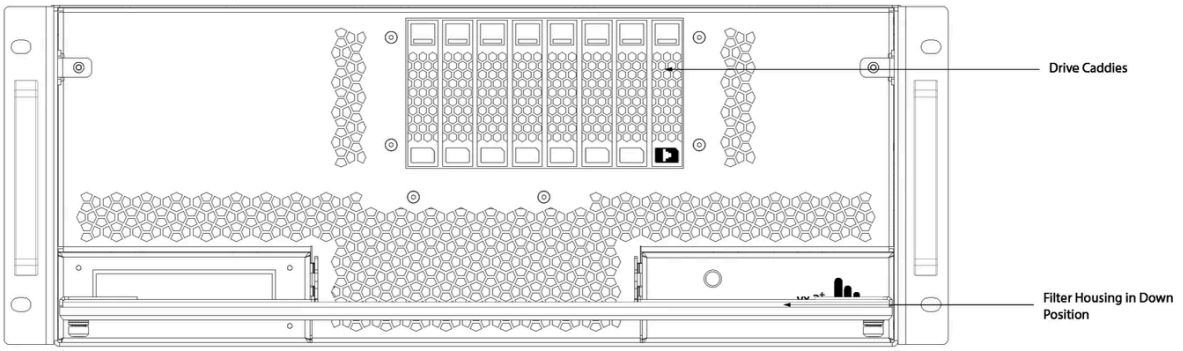
- How to start the unit
- Unit rear light
- Managing EDIDs
- Audio input and output
- Video output
- SMC Overview

For detailed information on the specifications for each media server, as well as the other software and hardware bundles offered by Disguise, please see the **Products** section of our website.

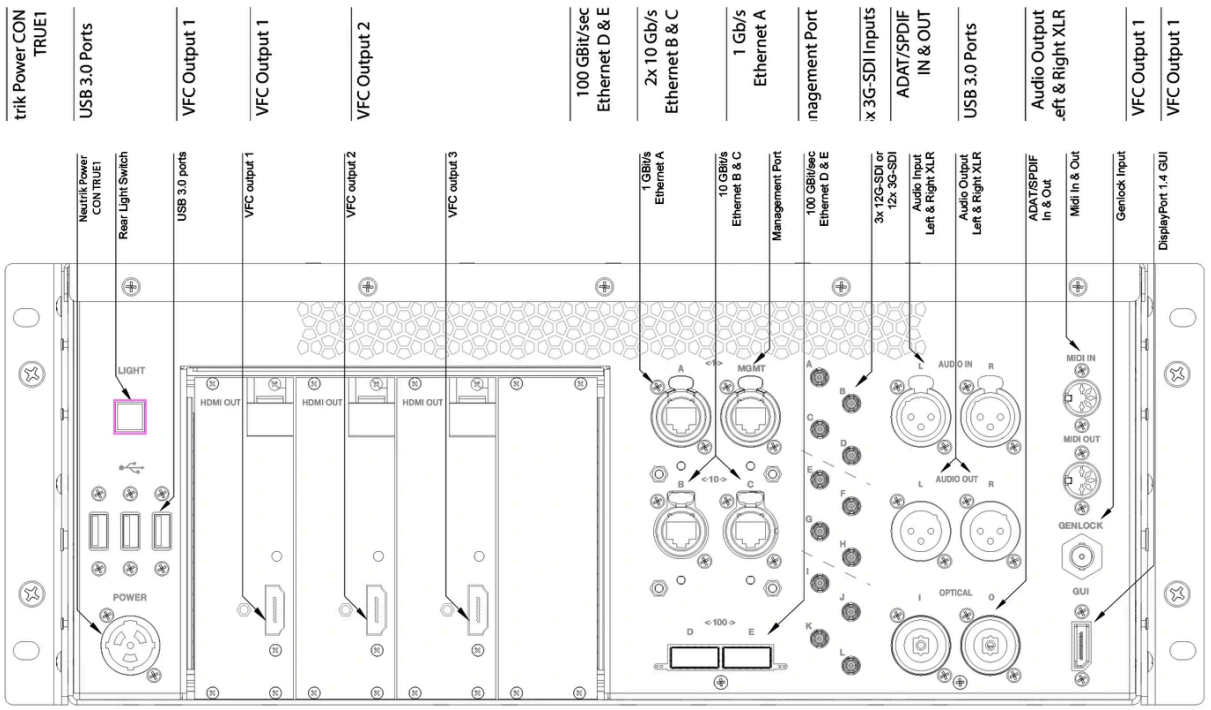
VX 2+ Diagrams



Front view of VX 2+



Front grill down view of VX 2+



Rear view of VX 2+

View the full VX 2+ specification sheet **here**.

VX 2+ Overview

The VX 2+ comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

The VX 2+ is the evolution of the VX 2 media server, with later-gen CPU, GPU, and motherboard and increased networking capabilities.



Learn more about:

- Diagrams
- Performance
- Video Input
- Redisguise
- SMC Overview

For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

View the full Product information in the **Technical Specifications** PDF.

VX 2+ Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

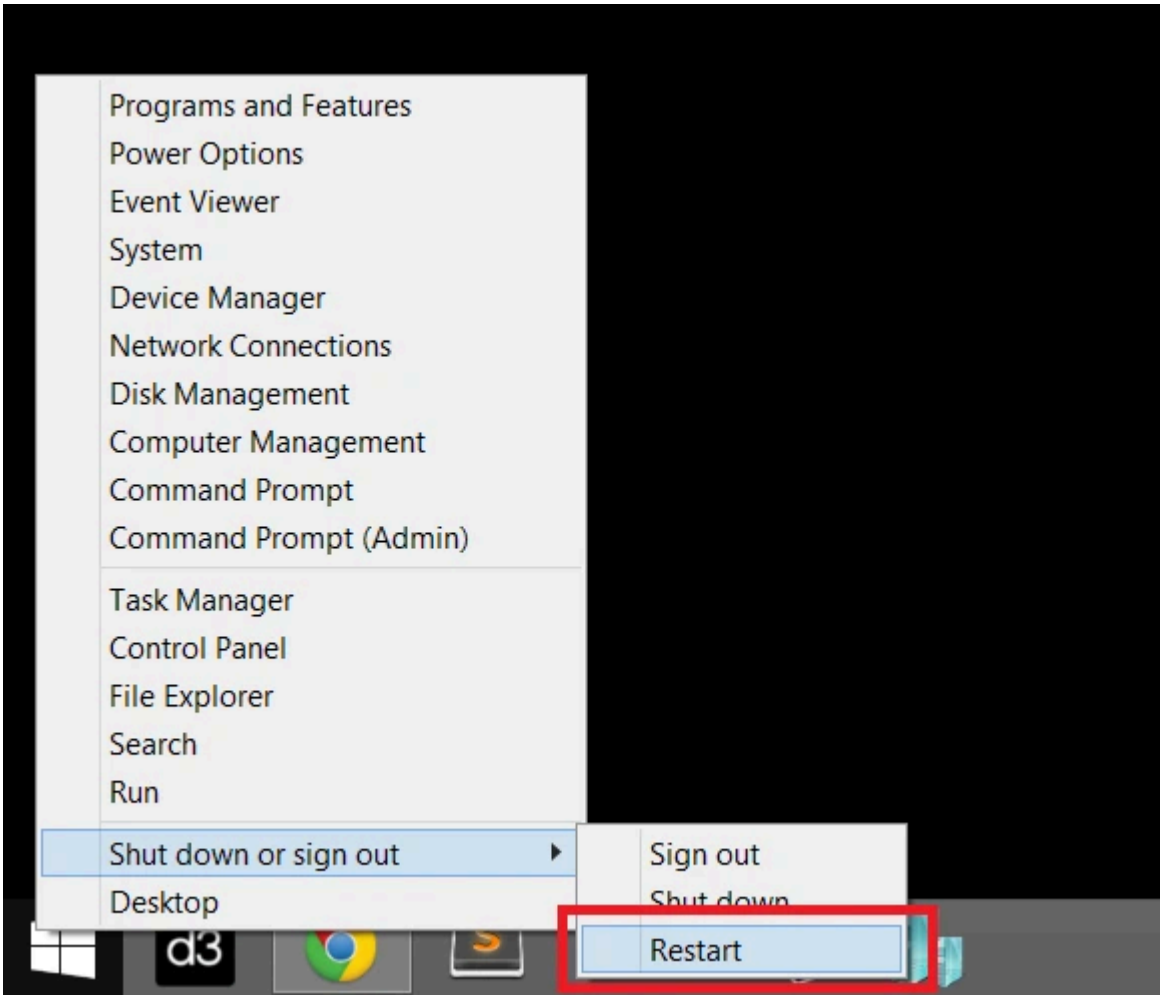
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

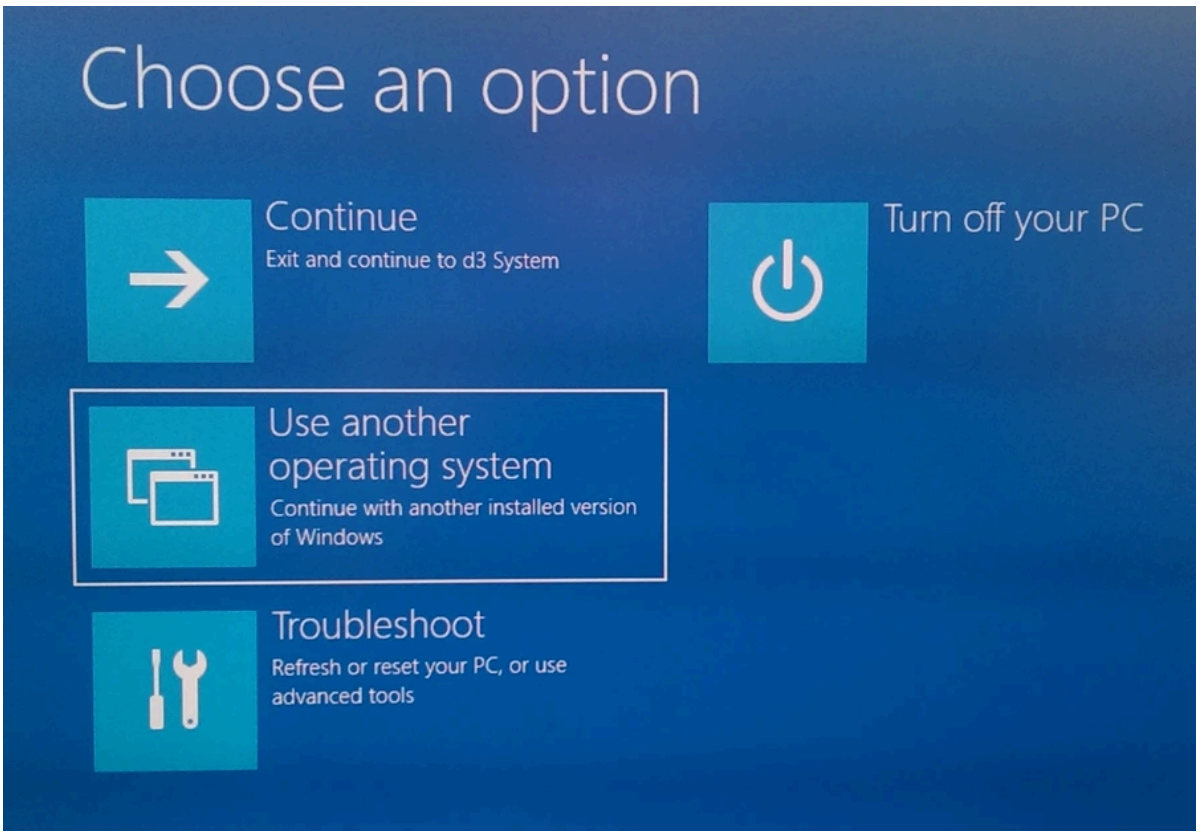
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

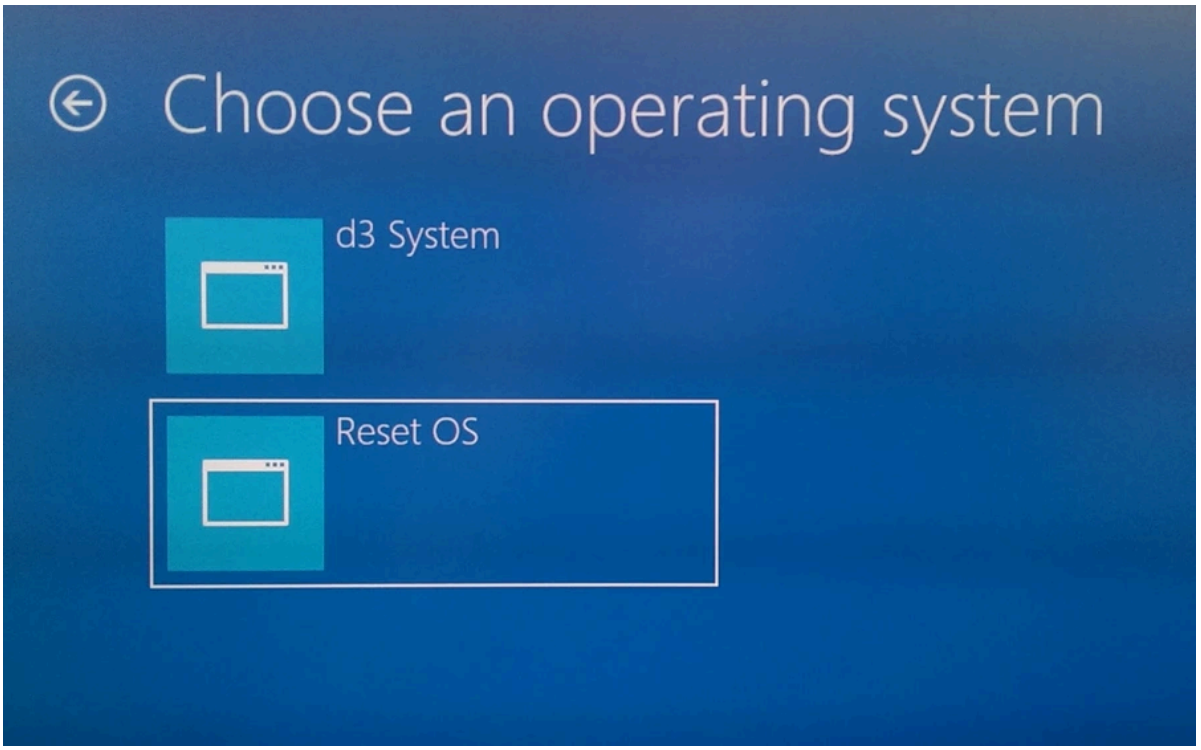




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

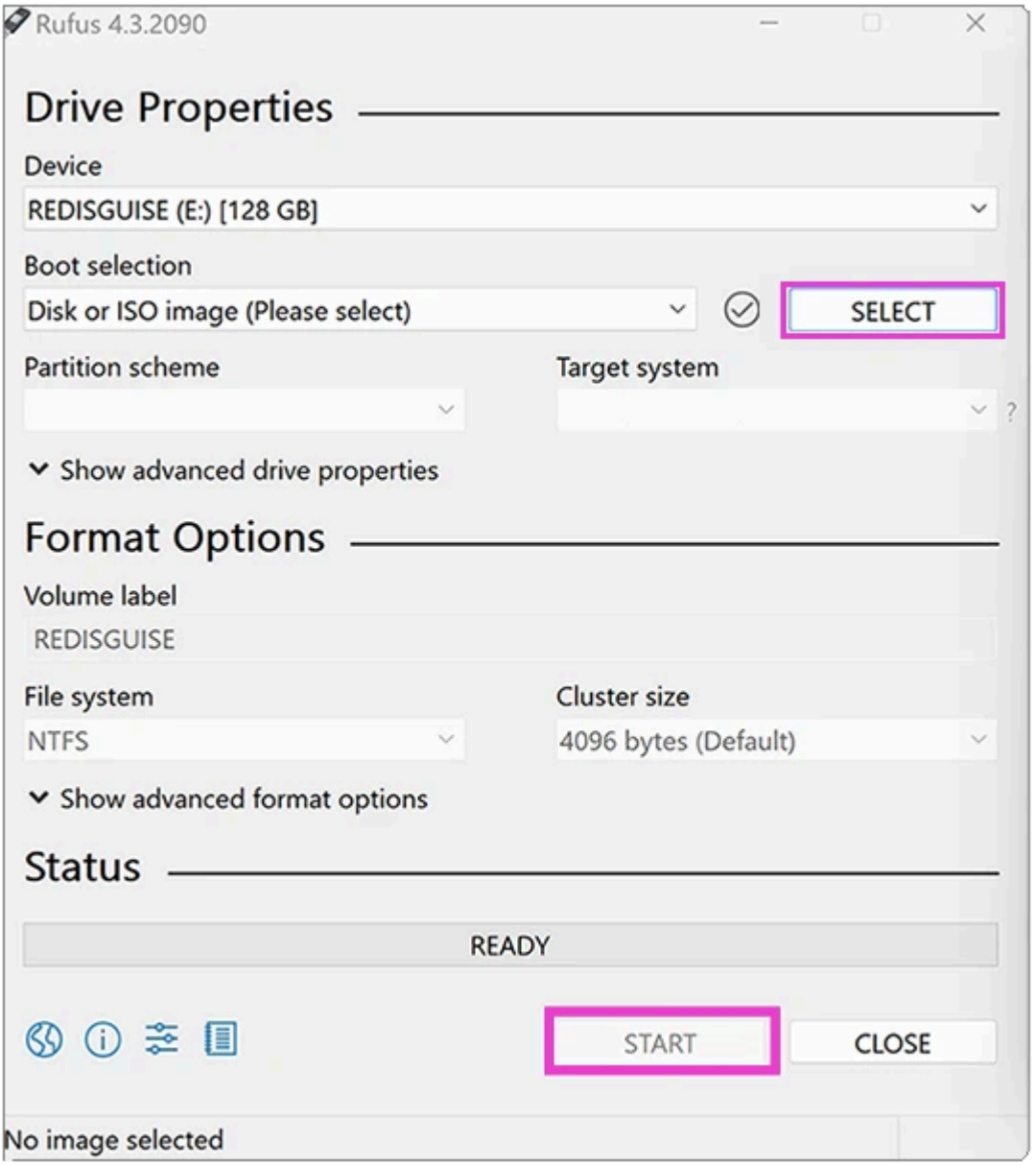
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.[1]

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.[2]

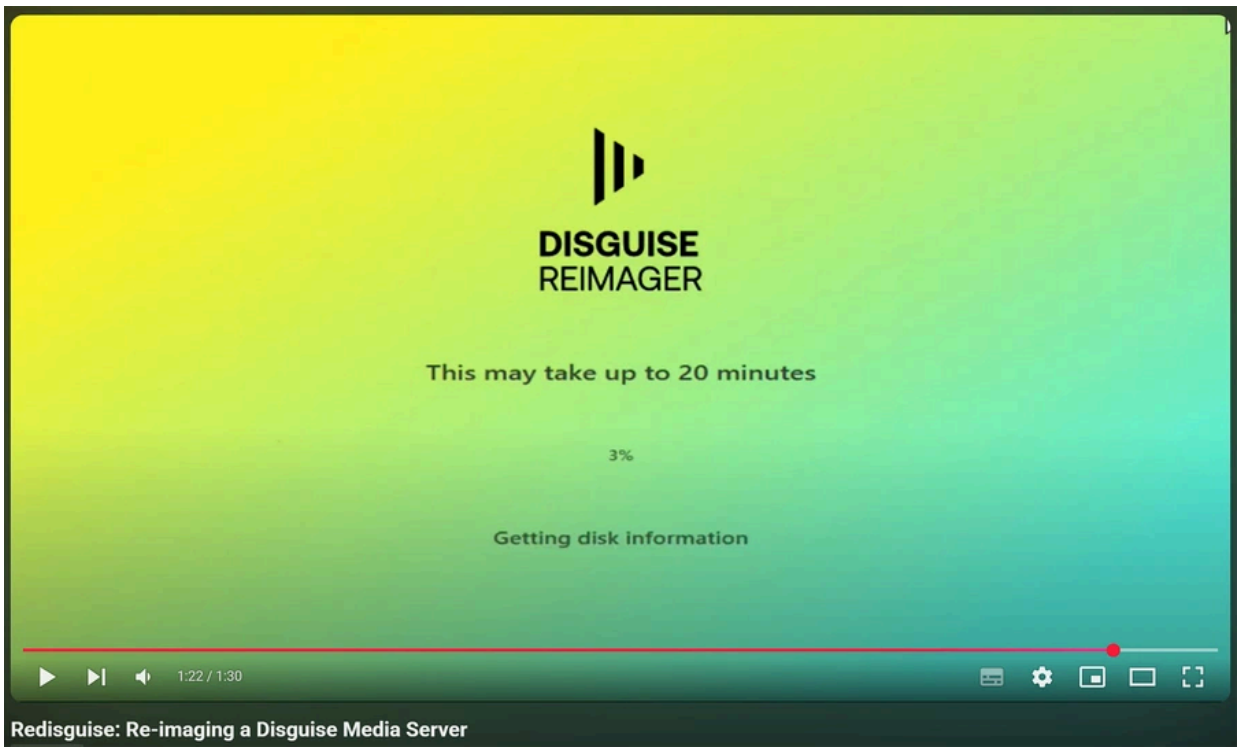
The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **Exit** tab, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

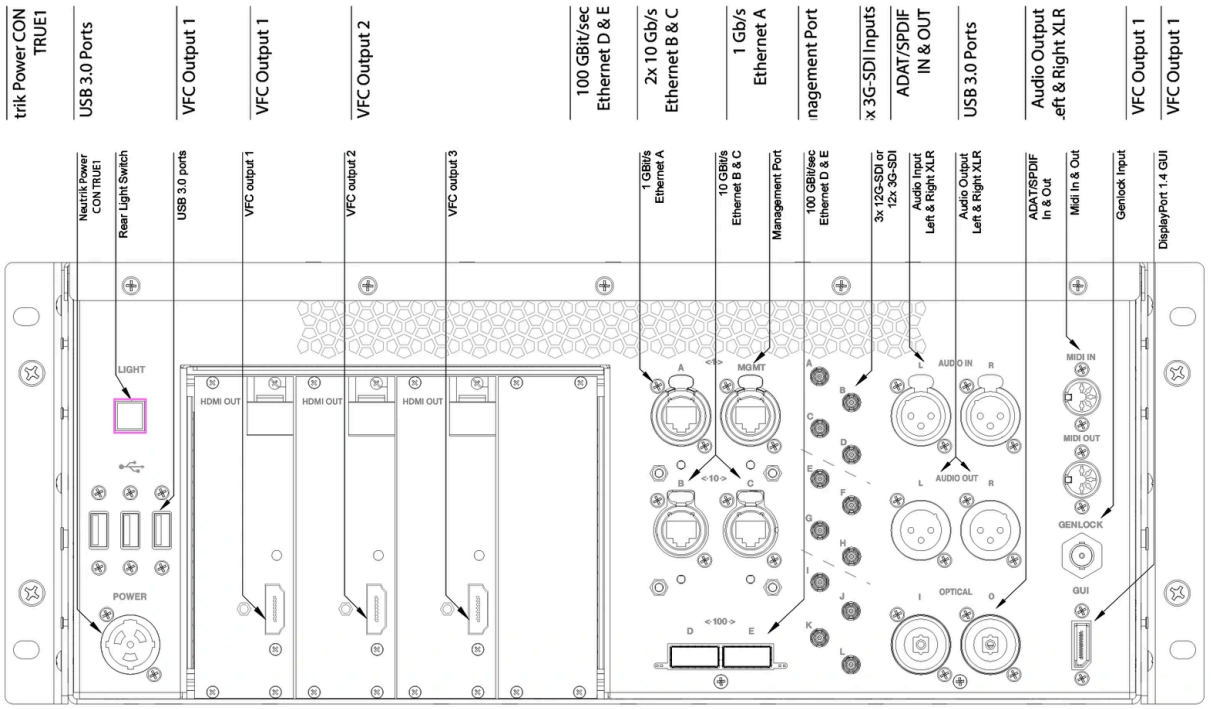
If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

VX 2+ Unit Rear Light

Disguise Servers in the pro and gx ranges come with the addition of an LED light on the back of the unit that illuminates the connections on the rear panel.

The light can be turned on or off using the switch labeled “light” with power in.



Location of light switch on rear of a VX 2+

VX 2+ Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
VX 2+	8	2

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 2x 2160p60 or 8x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes)
- Chroma subsampling - YCbCr 4:2:2 (all modes)
- Each SDI input supports 3G Level A and Level B when applicable
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

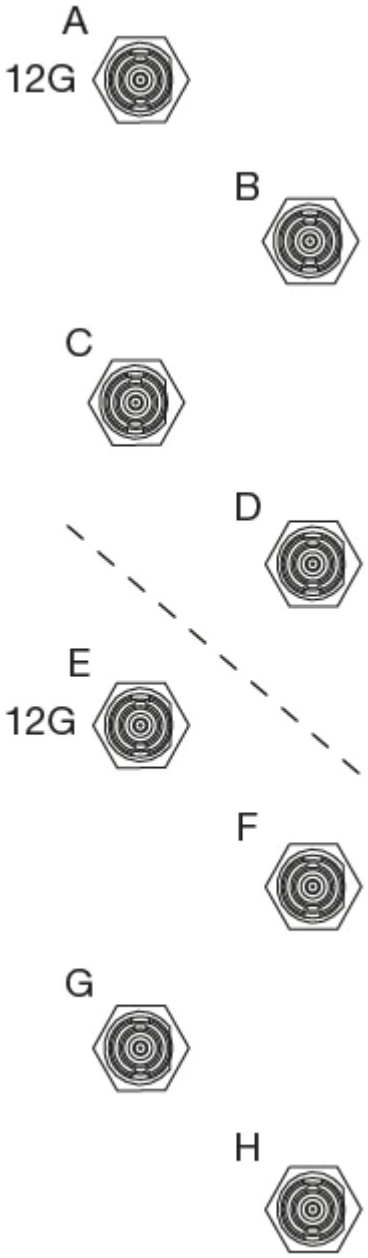
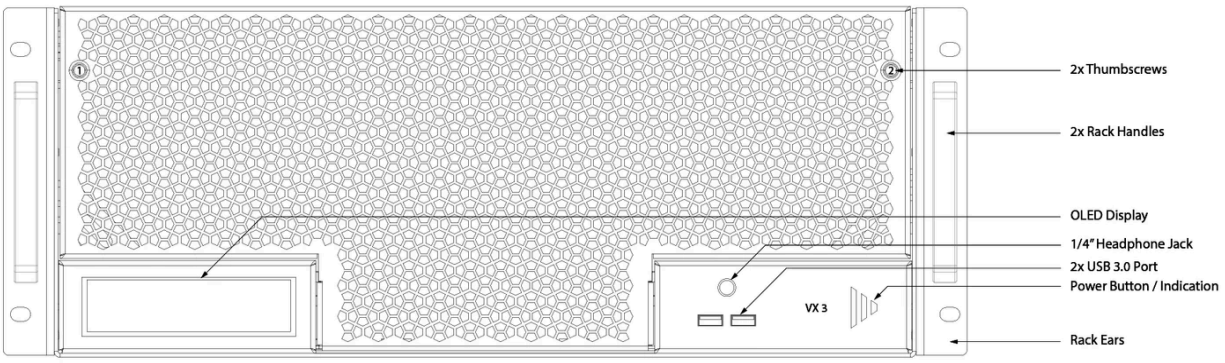
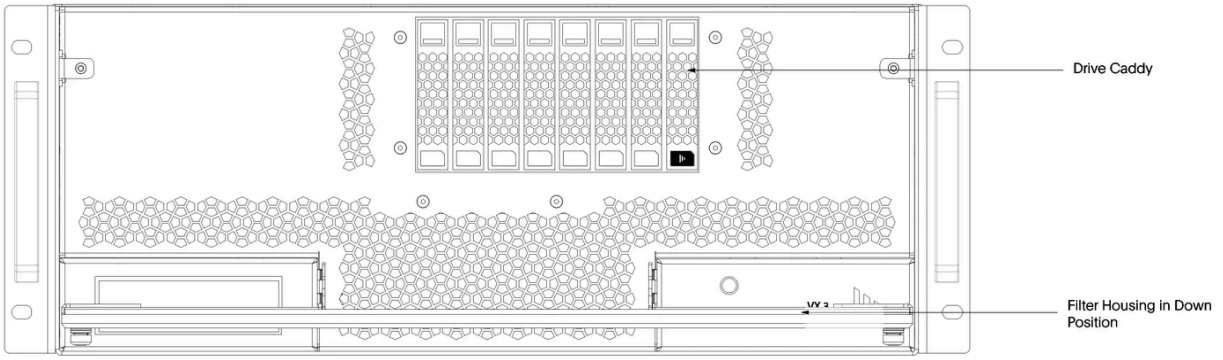


Diagram of Video Capture BNC connections on the rear of a VX 2+

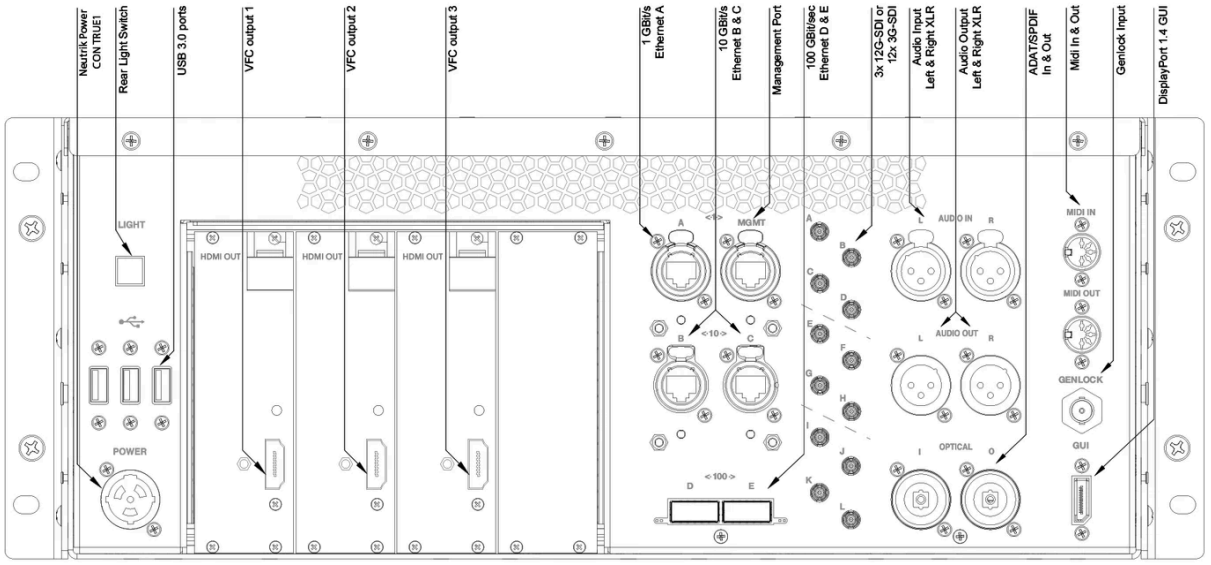
VX 3 Diagrams



Front view of VX 3



Front grill down view of VX 3



Rear view of VX 3

VX 3 Overview

The VX 3 comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.



Learn more about:

- Diagrams
- Performance
- Video Input
- Redisguise
- SMC Overview

For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

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VX 3 Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

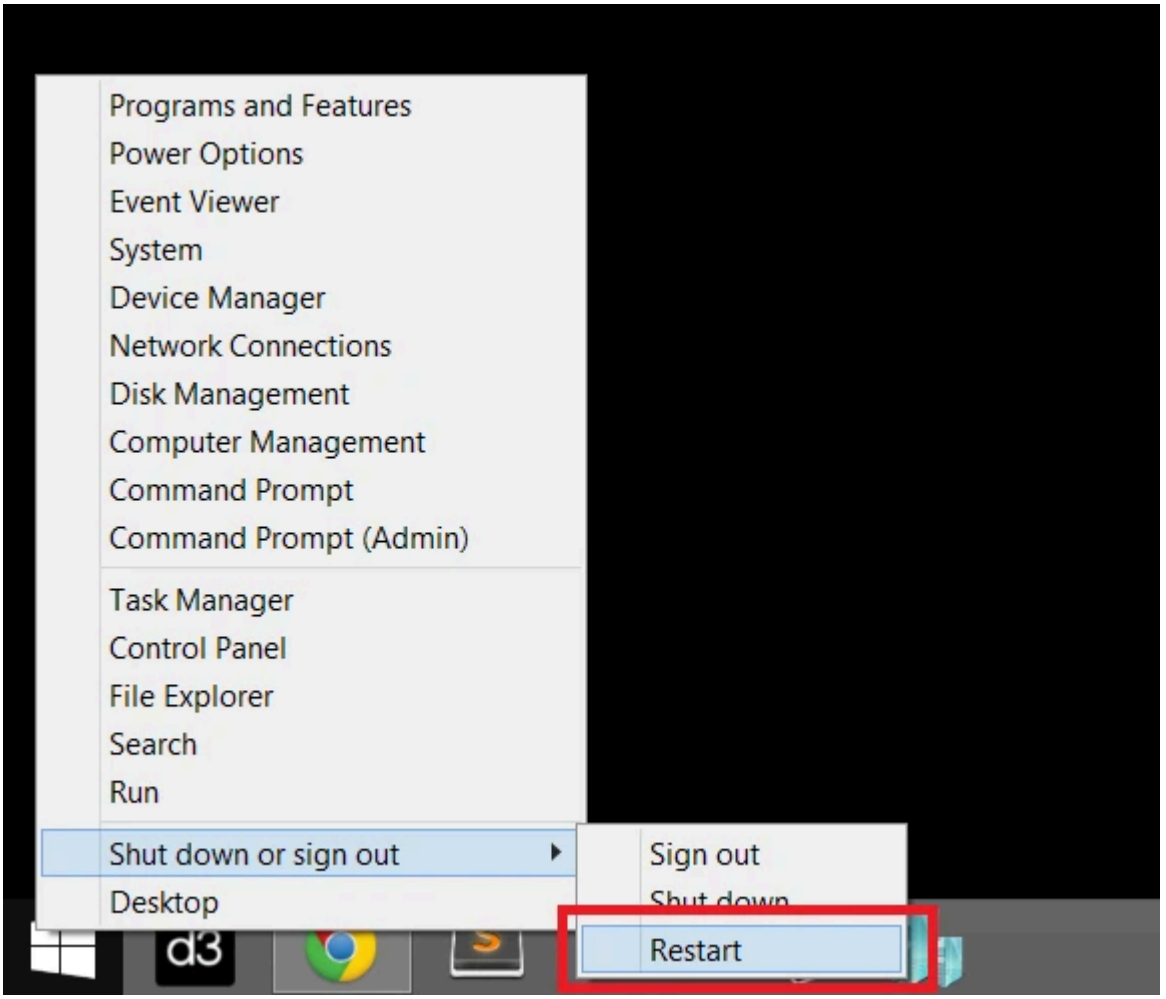
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

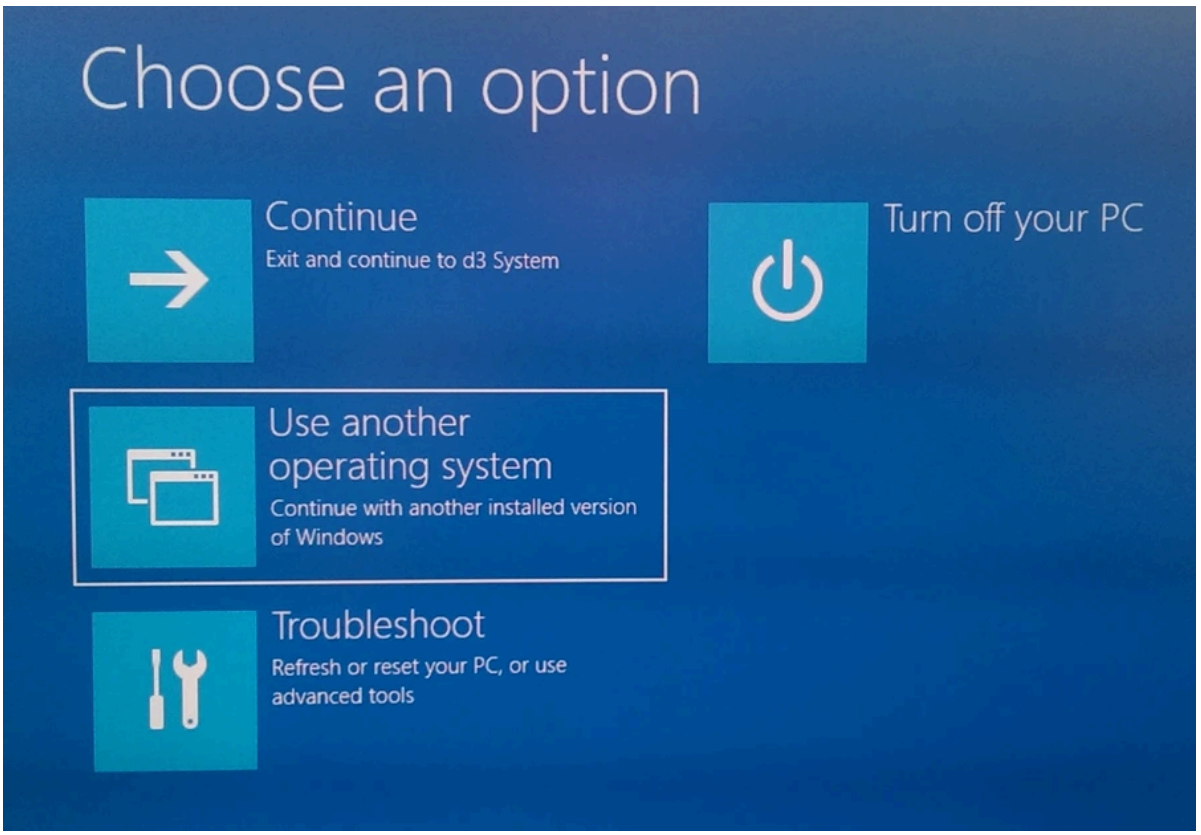
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

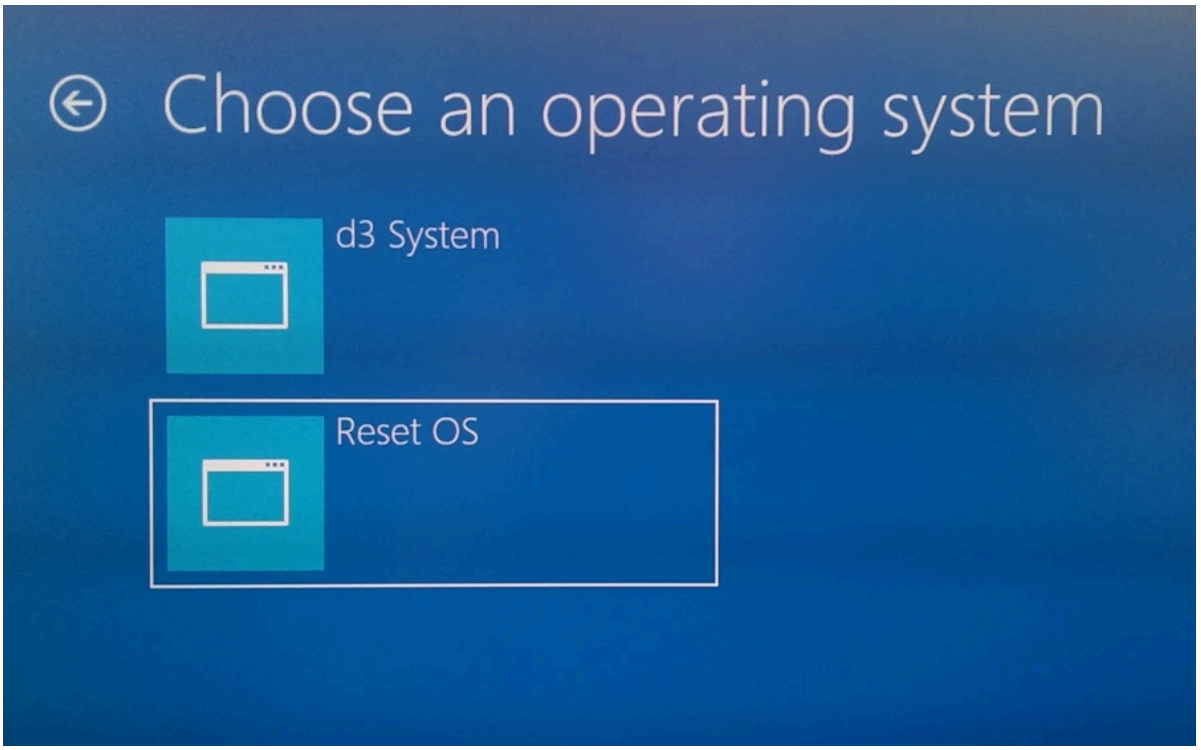




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
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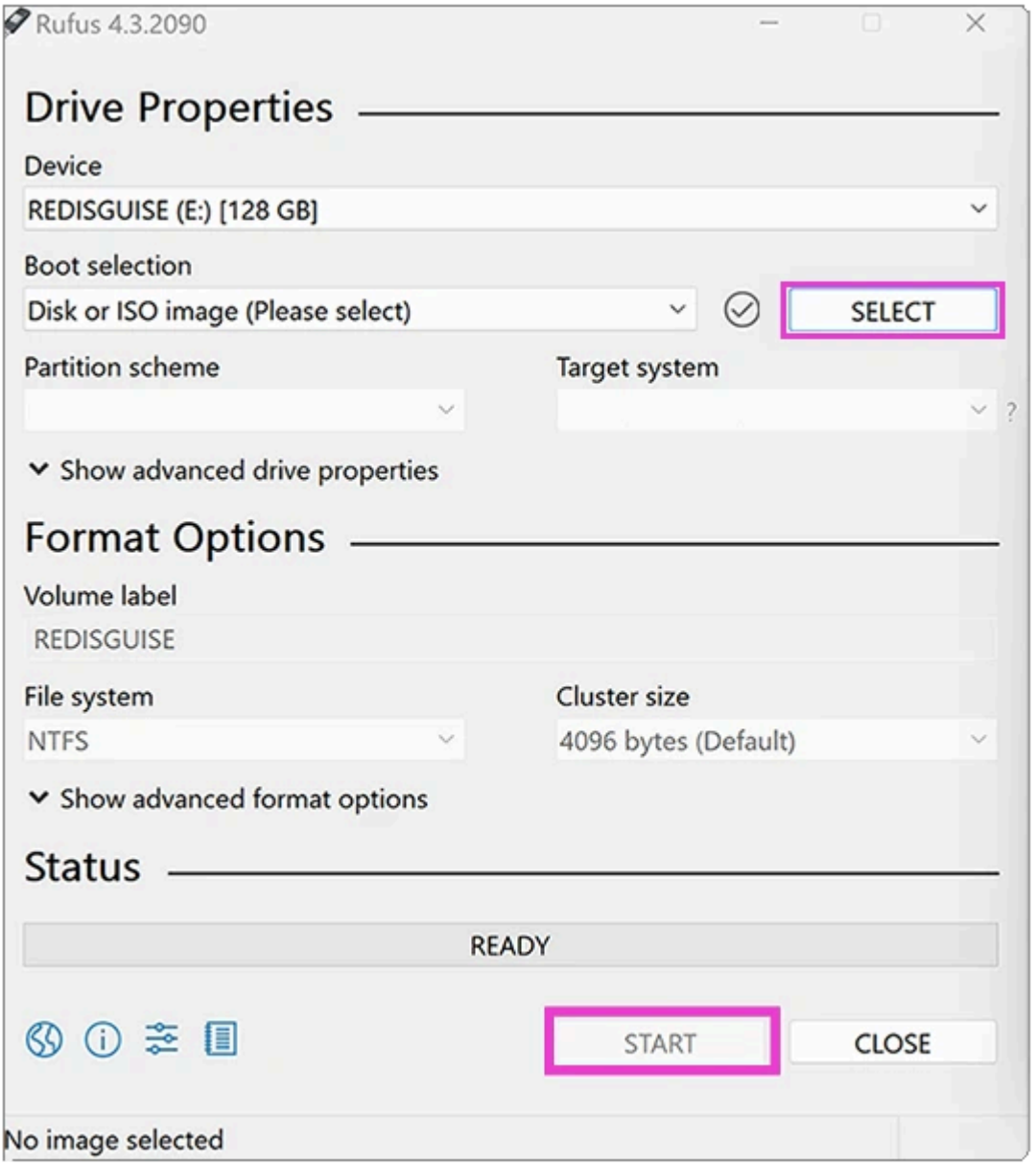
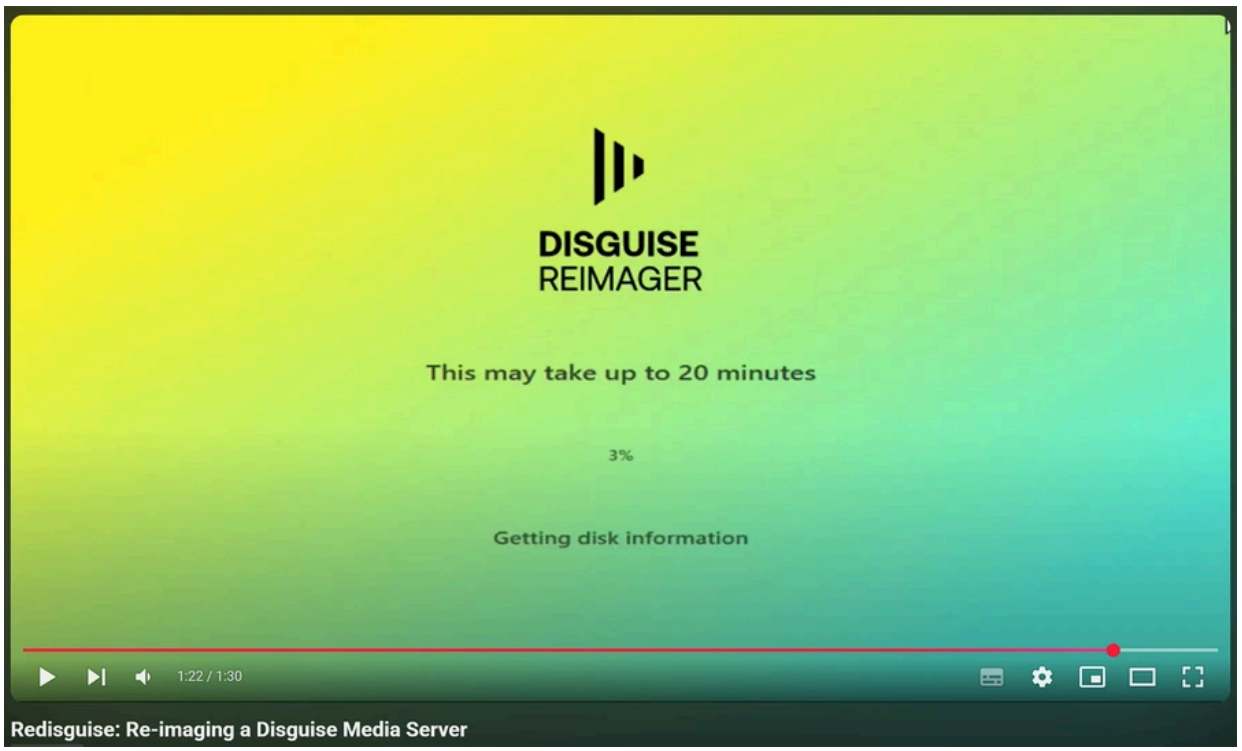
The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **EXIT** tab, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

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VX 3 Unit rear light

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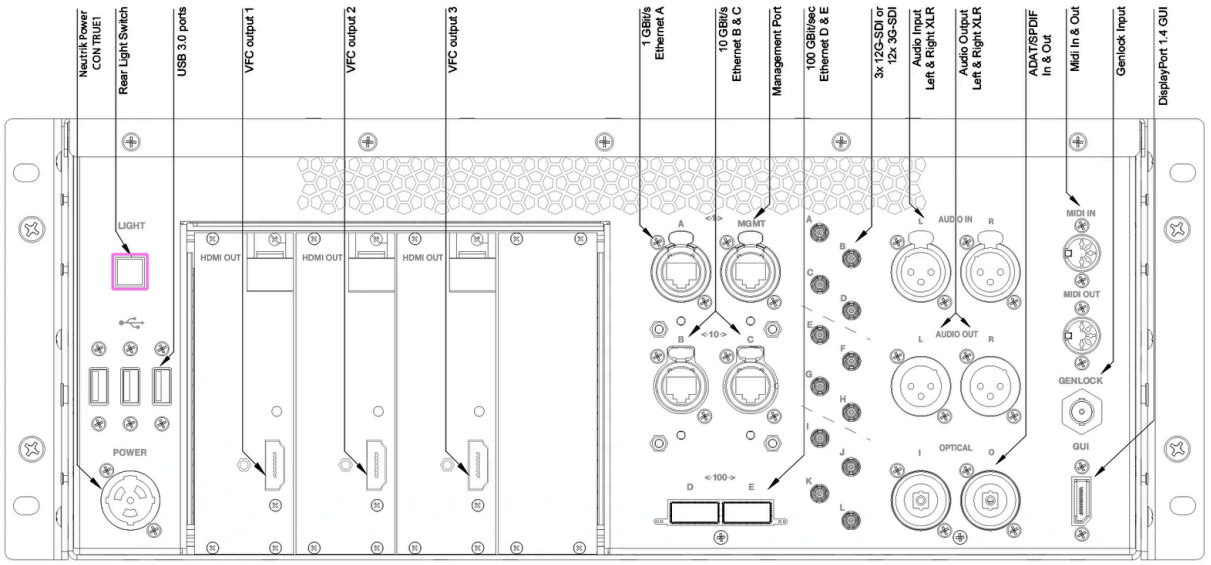


Location of light switch on rear of a VX 3

VX 3 Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
VX 3	12	3

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 3x 2160p60 or 12x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes)
- Chroma subsampling - YCbCr 4:2:2 (all modes)
- Each SDI input supports 3G Level A and Level B when applicable
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

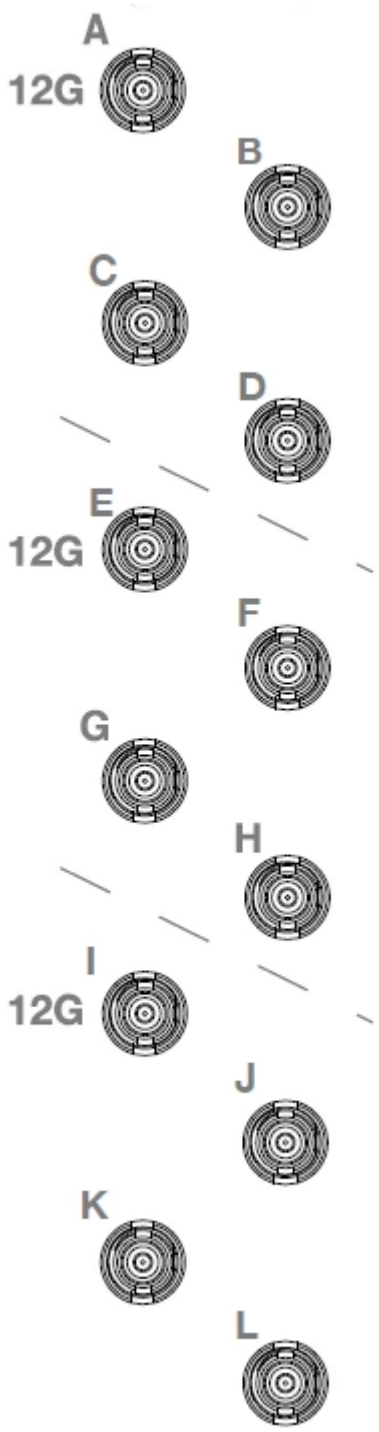
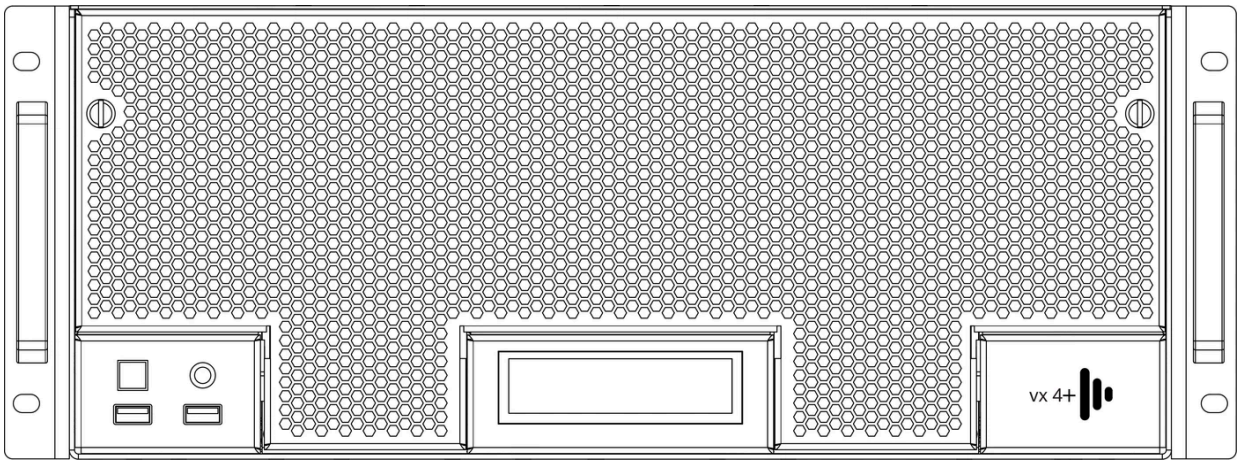
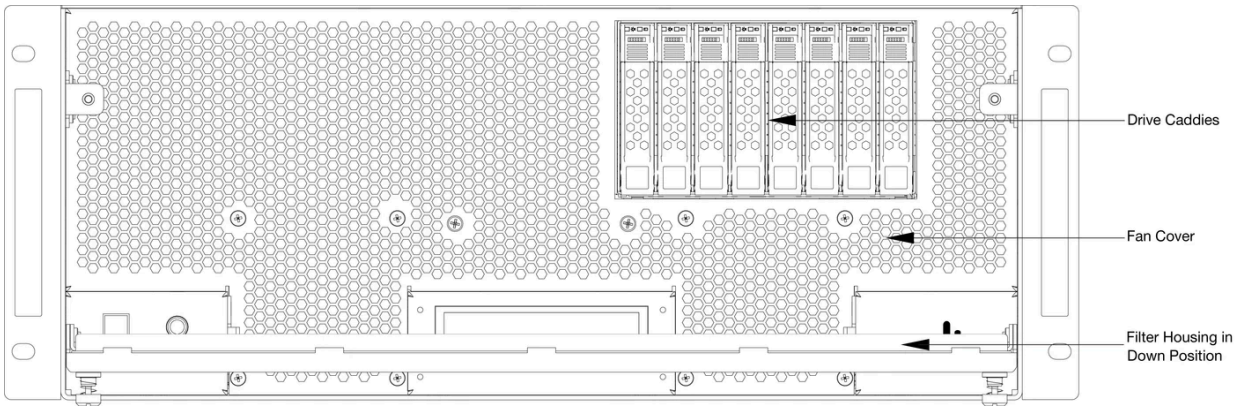


Diagram of Video Capture BNC connections on the rear of a VX 3

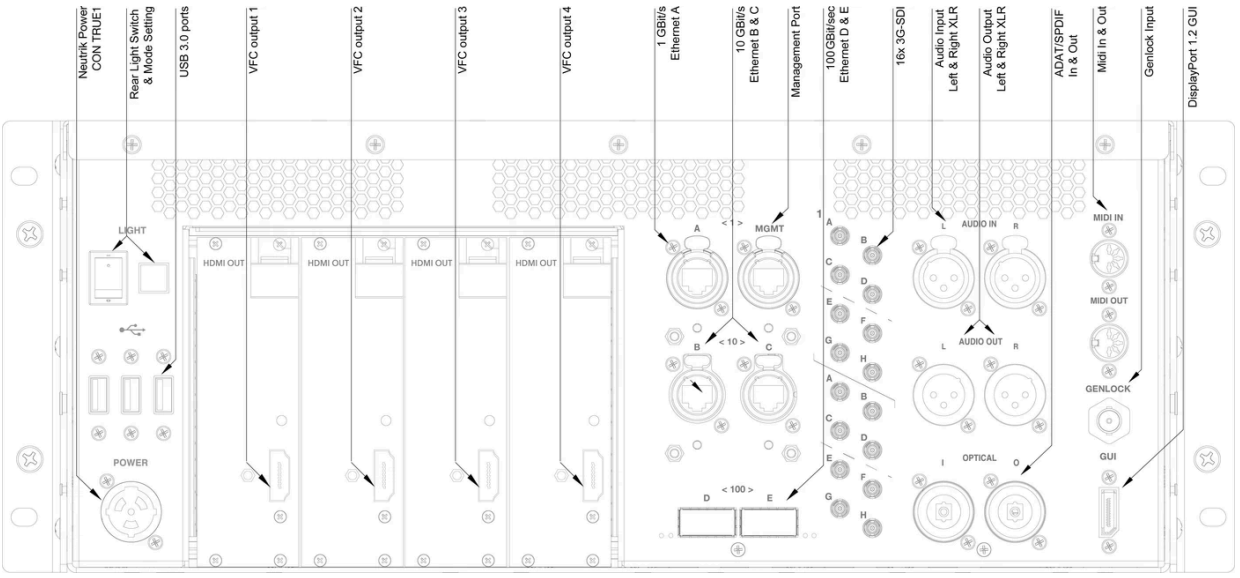
VX 4+ Diagrams



Front view of VX 4+



Front grill down view of VX 4+



Rear view of VX 4+

VX 4+ Hard Drive Configuration

> **Warning**
>
> Do not remove drives when the machine is on as data may be corrupted if this occurs.

> **Note**
>
> If you ever need to replace or exchange your media drive it is recommended that you use a drive with similar read/write speeds. For further information please contact the **support team**.

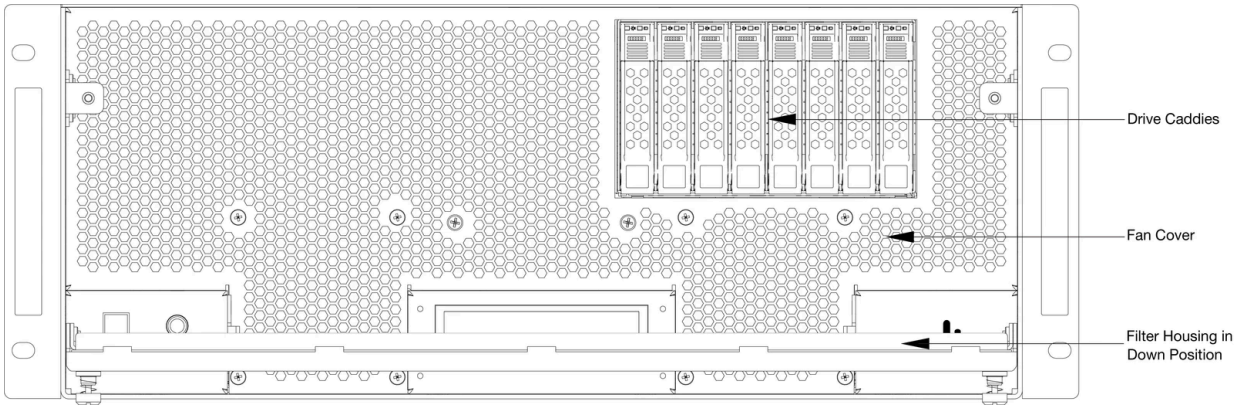
Media Drives

The VX 4+ comes with 4x NVMe SSD drives.

These drives are removable from the drive bay. It is possible to user-reconfigure the RAID configuration using software in Windows to control the dedicated RAID controller hardware.

The cage contains eight caddies, four populated with 4x NVMe drives. Drives are configured as RAID10.

To reveal the drive bay undo the two thumb screws on the front of the unit. See diagram below.



Location of drive bay on the unit

The drive layout differs between the server manufacturer. The table below illustrates which slots the drives should be added to.

Manufacturer	Serial Numbers	Slots
OSS	(SN 44/45xxx)	2, 4, 6, 8
Axiom	(SN 46xxx)	1, 2, 7, 8

VX 4+ Overview

The VX 4+ comes pre-installed with the latest software version, enabling you to design, configure and sequence the show on the same machines as you later use for show playback.

The VX 4+ is the evolution of the VX 4 media server, with later-gen CPU, GPU, and motherboard and increased networking capabilities.



Learn more about:

- Diagrams
- Performance
- Video Input
- Redisguise
- SMC Overview

For detailed information on the specifications for each machine, as well as the other software and hardware bundles offered by Disguise, please see the products section of our **website**.

Or view the full Product information in the **Technical Specifications** PDF.

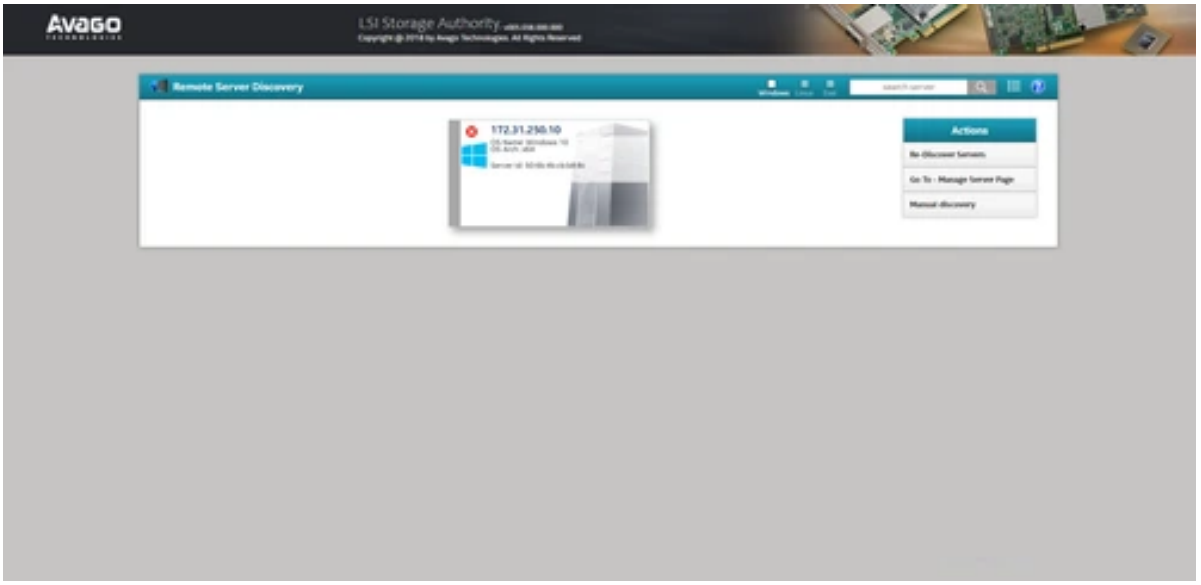
RAID Configuration

The drives used in this guide are examples only. Your system may differ. For guidance on required or recommended drives, contact the Disguise Support team.

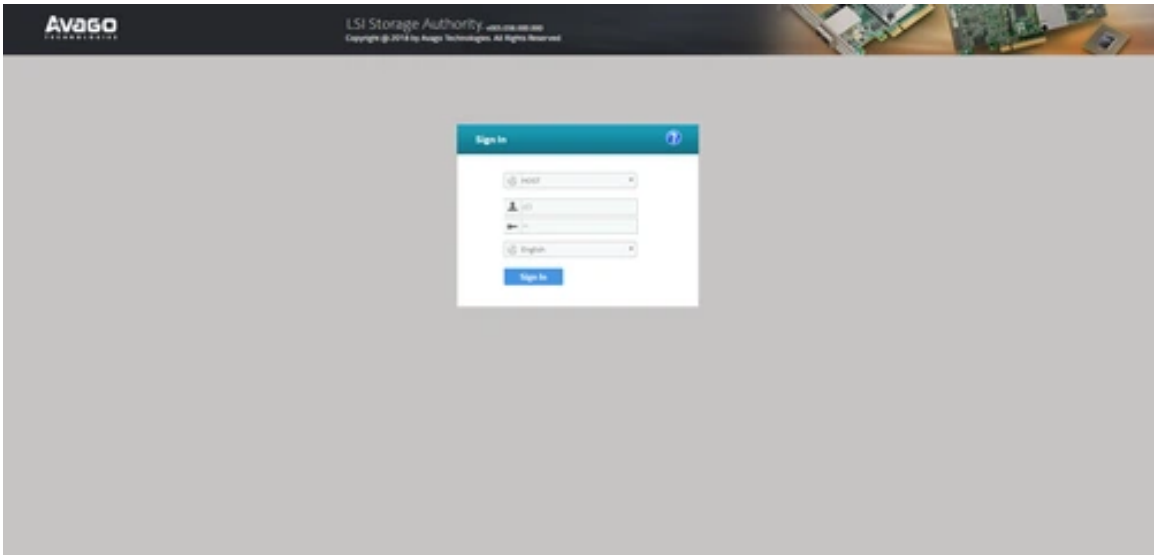
Logging in to the RAID Controller

Before configuring RAID, ensure your Windows user account has a password set.

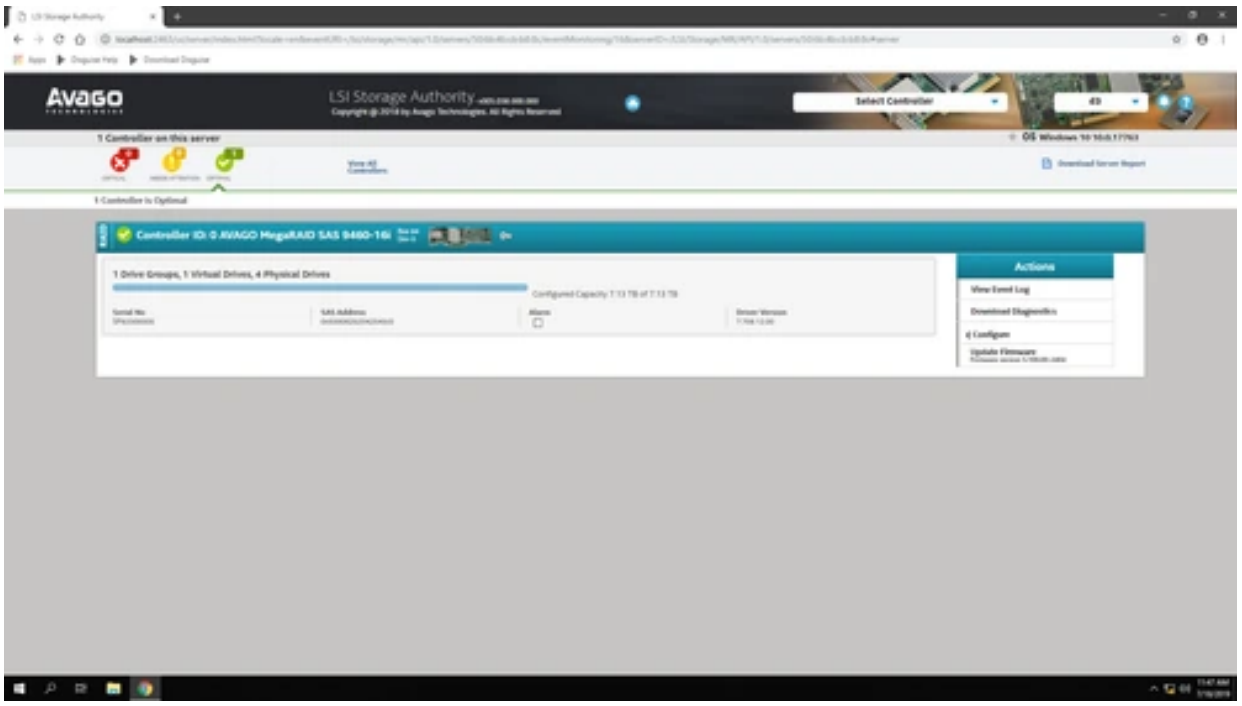
1. Open the Windows **Start Menu** and select **LSA**.
2. On the LSA landing page, select the server with your local IP address.



3. Enter your login details of the local user account.
   - Username: `d3`
   - Password: not set

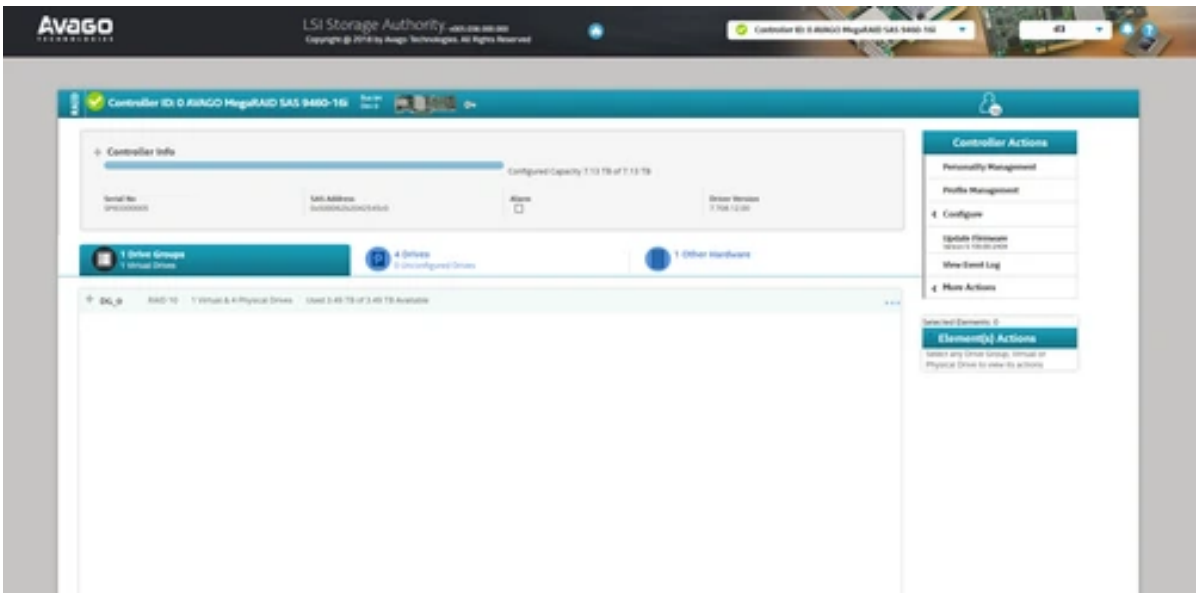


Viewing the RAID Configuration in LSA

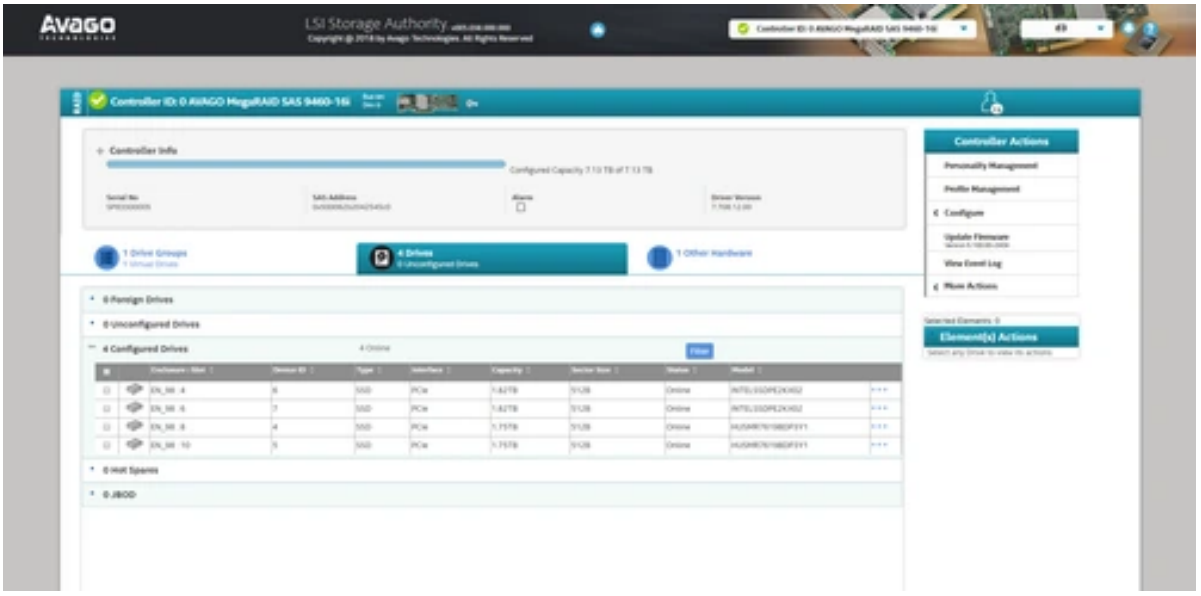


The landing page displays controller information, including system health, total capacity and detected drives.

1. Open the **Select Controller** dropdown and choose your controller.



2. Review the controller page for drive count, capacity, and status.
3. Open the first tab to view detailed Virtual Drive information, such as RAID levels.



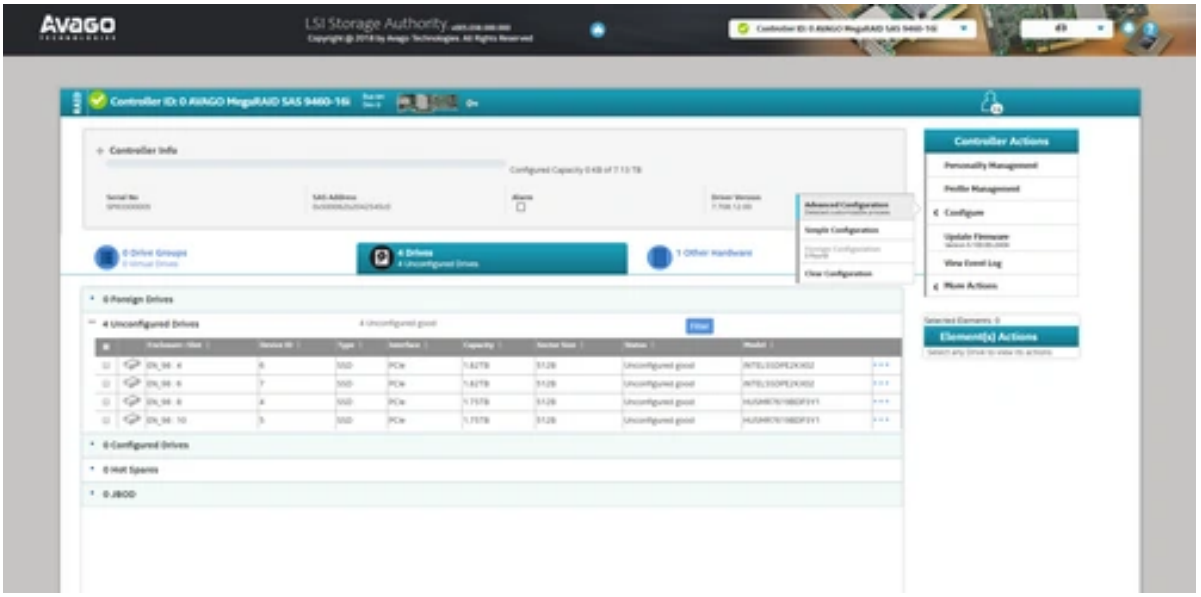
4. Use this information to begin your configuration tasks.

Creating a RAID

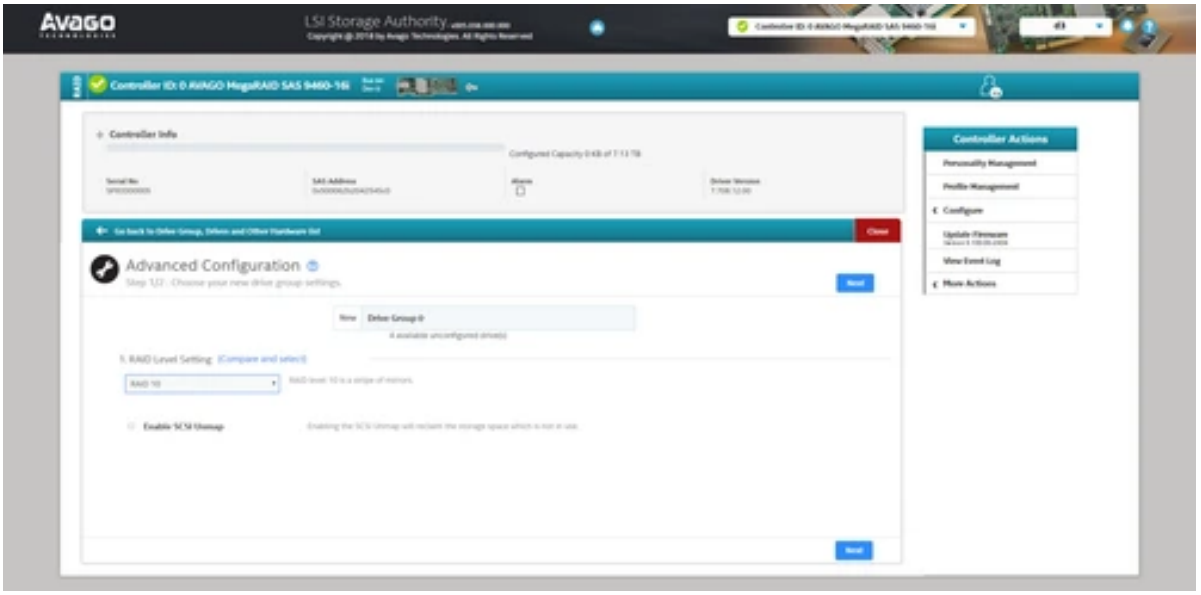
The following steps will take you through creating a RAID if no Virtual Drive already exists.

1. Open the **Configure** tab.

2. Select **Advanced Configuration**.

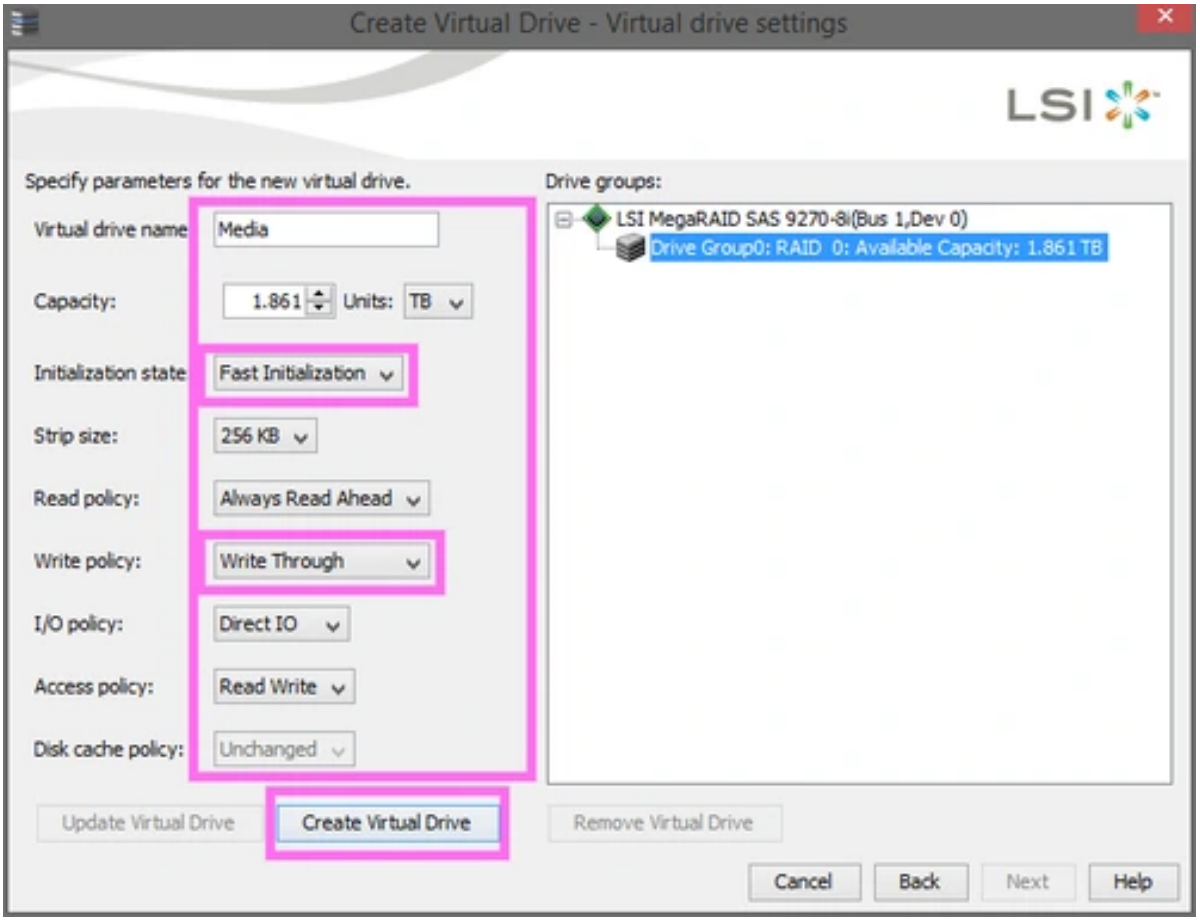


3. Choose **RAID 10**, which is the recommended configuration. This is selected to meet any performance stats released by Disguise. If the RAID is set up at a different level, you could be at risk of losing your data without redundancy.



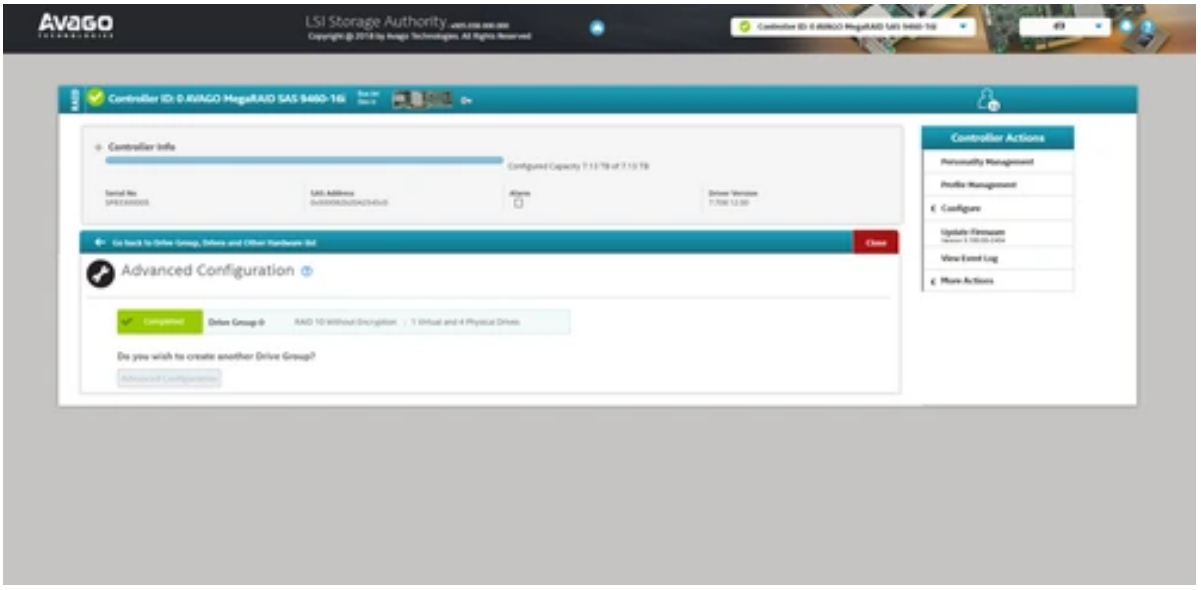
4. Continue to the next page and select **Add Physical Drives** to choose which drives you are going to put into an array. RAID 10 requires a minimum of 4 drives to be set up

5. Select **Create Virtual Drive**, then apply the following settings:
   - **Virtual Drive Name**: Media
   - **Strip Size**: 256 KB
   - **Initialization State**: No Initialization
   - **Read Policy**: Always Read Ahead
   - **Write Policy**: Write Through
   - **I/O Policy**: Direct IO
   - **Disk Cache Policy**: Unchanged
6. Select **Create Virtual Drives**.



7. Select **Finish** to complete the process.

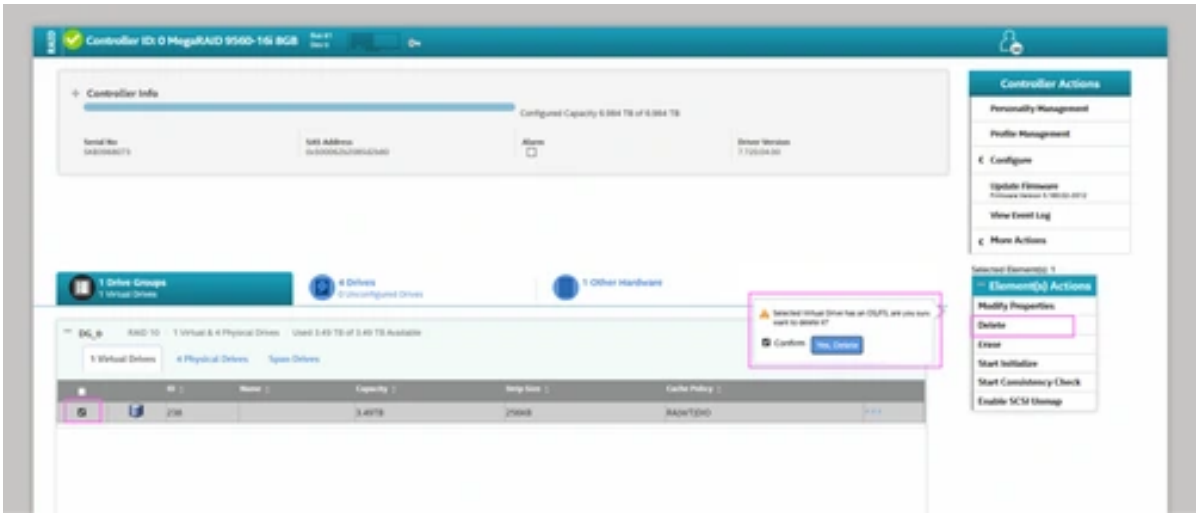
8. Review the completion page for RAID details.



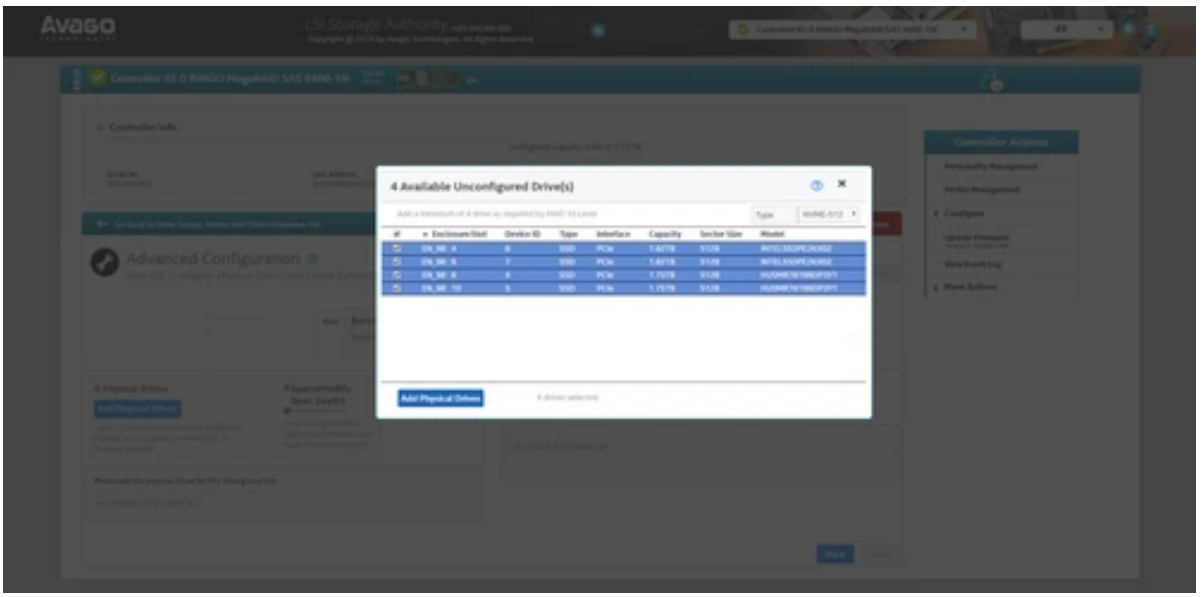
Replacing an existing Virtual Drive

To replace an existing Virtual Drive with a new Drive, delete the existing drive and then create a new Virtual Drive:

1. Launch LSA.
   - User: `d3`
   - Password: n/a
2. Under **Drive Groups**, tick the checkbox to select the drive, and then select **Delete** from the **Element(s) Actions**.

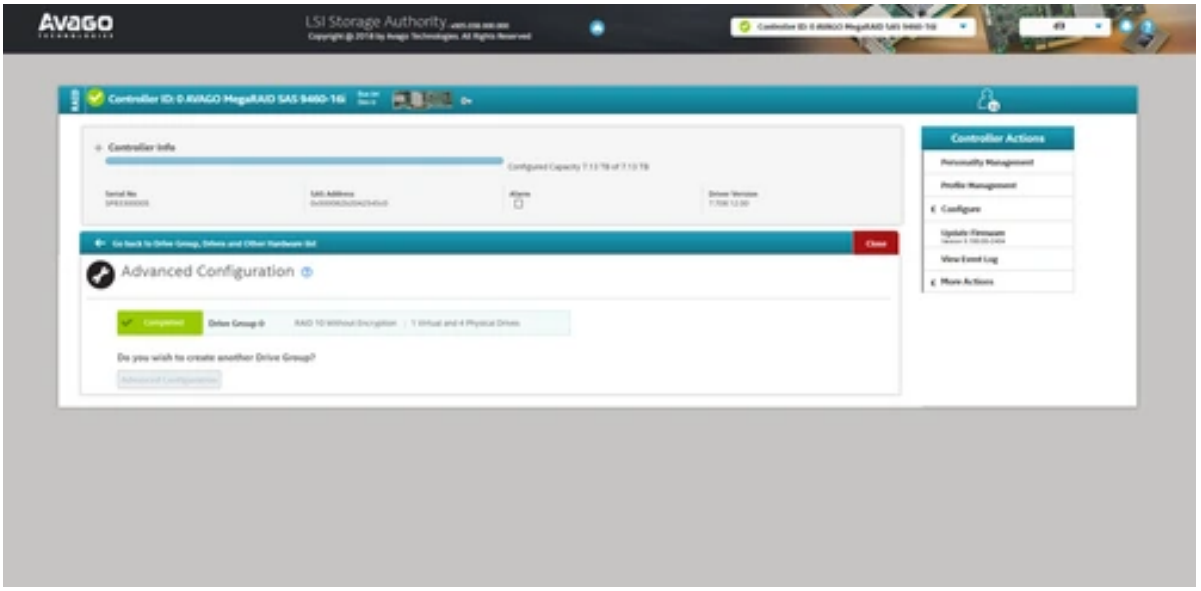


3. Select the physical drives to include in the new array.



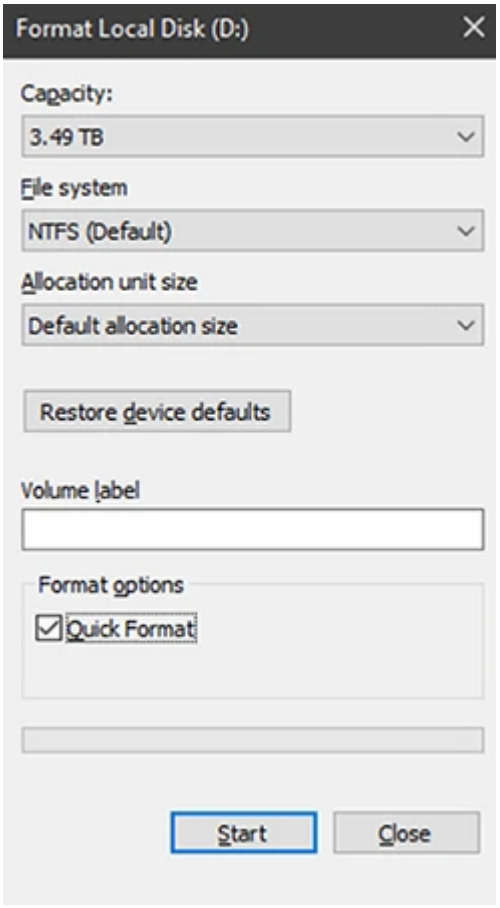
4. Select **Add Virtual Drives**, then apply the following settings:
    - **Virtual Drive Name** - Media
    - **Strip size** - 256 KB
    - **Initialization State** - No Initialization
    - **Read Policy** - Always Read Ahead
    - **Write Policy** - Write Through
    - **I/O Policy** - Direct IO
    - **Disk Cache Policy** - Unchanged
5. Click **Add Virtual Drives**.
6. Select **Finish** to complete the process.

7. Windows will prompt you to format and partition the new virtual drive. You may also do this manually if required. See the **Manually format and partition on Windows** section below for details.

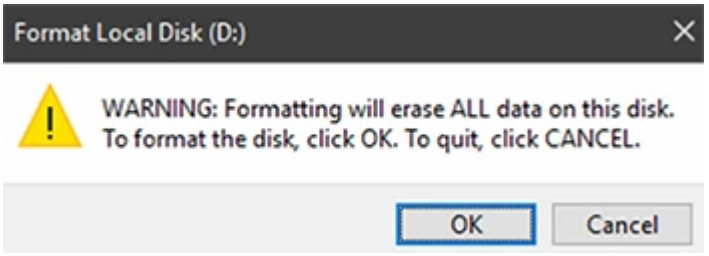


8. User the following format settings:

```
Capacity - Default
File System - NTFS
Allocation unit size - Default allocation size
Volume Label - You can leave this blank ('D:' is the default)
Format options - Quick format since the RAID controller already handled drive in
itialization and health checks.
```



9. Click **OK** to confirm and close the Windows warning and finish formatting.



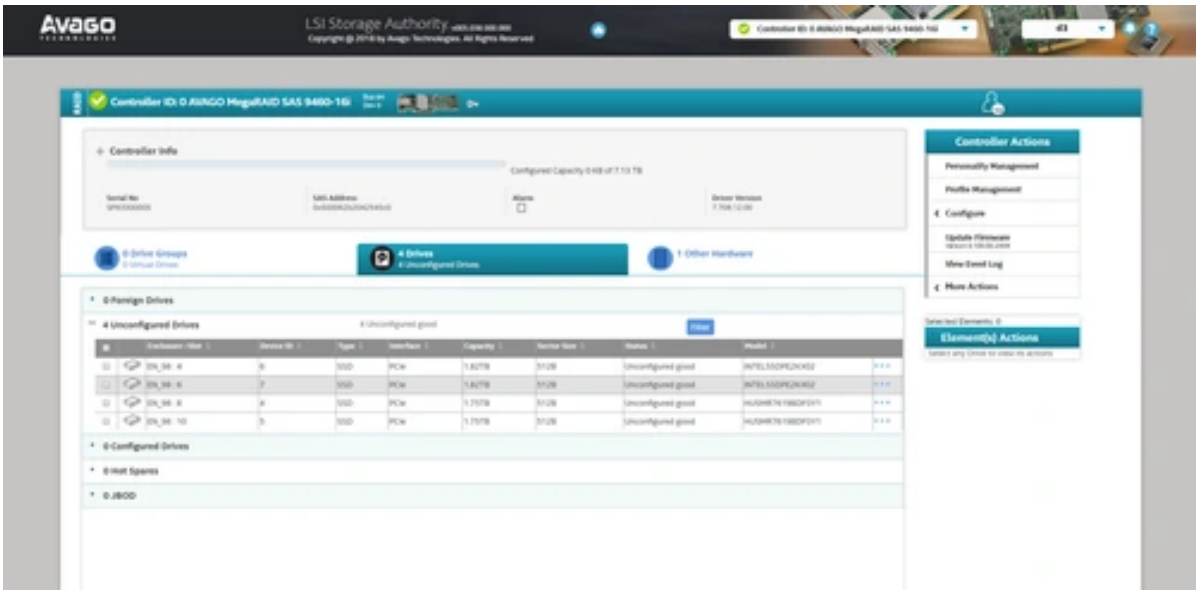
20S. Congratulations, you now have a new RAID10 array. Open **d3Manager** and update the **d3Project** folder location if prompted. The common path is: **C:\Users\User\Documents\d3 Projects**.

Unconfigured Good/Bad

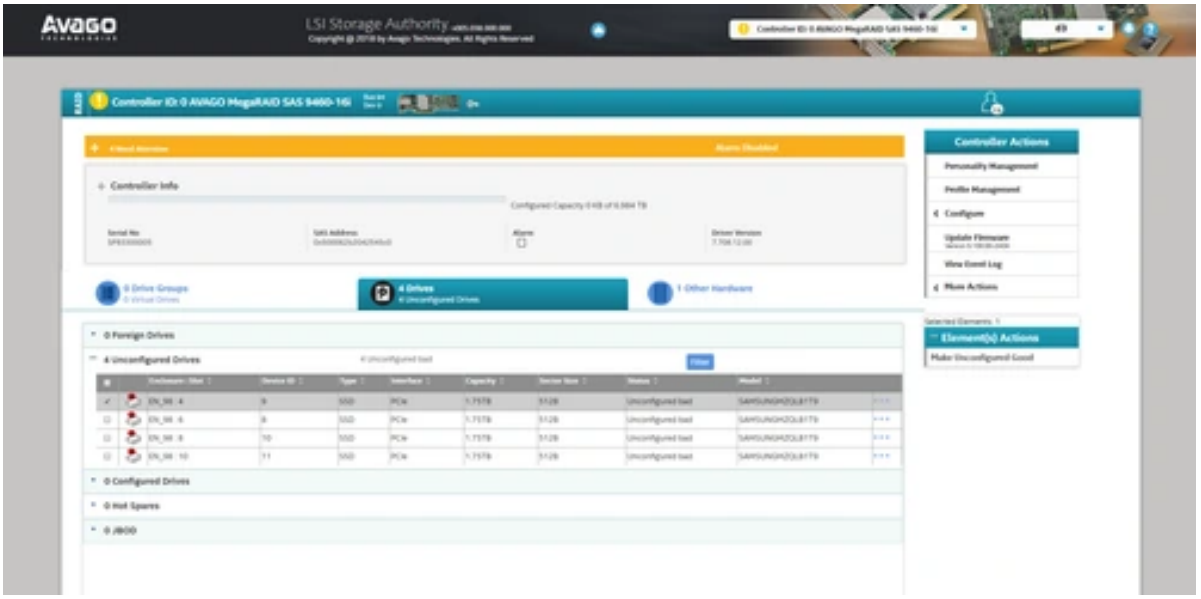
When replacing a physical drive, the LSI controller automatically detects the new disk. Before adding a drive to a RAID array, ensure it is marked **Unconfigured Good**.

If a drive is marked **Unconfigured Bad**, it must be converted first.

1. Identify any drives marked **Unconfigured Good** - these are immediately ready for RAID configuration.



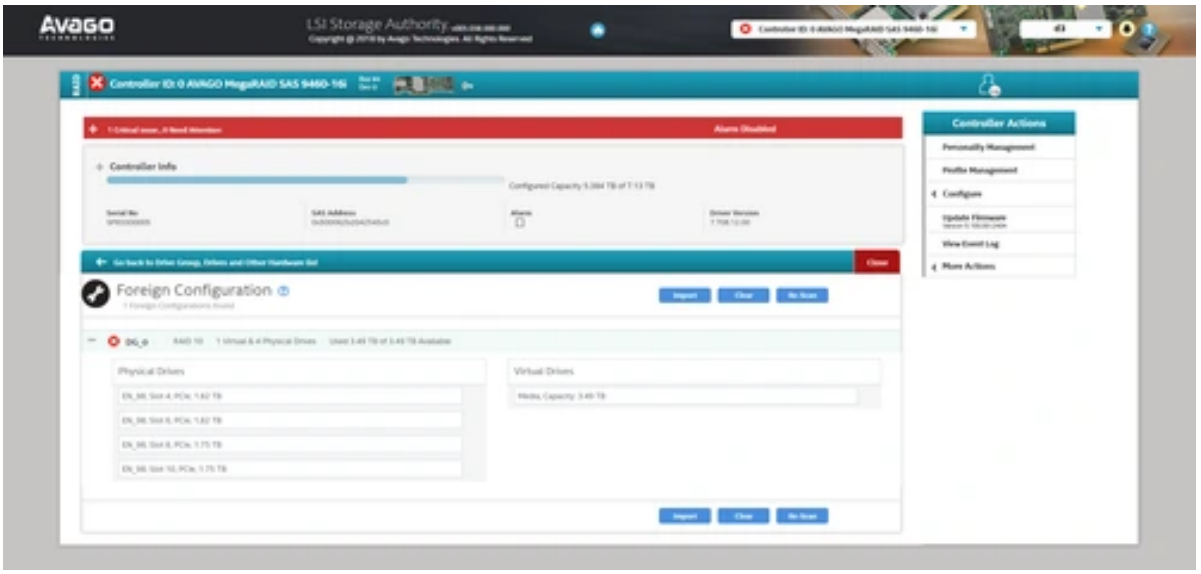
2. For any drives marked **Unconfigured Bad**, select each drive individually.
3. Under **Element(s) Actions**, choose **Make Unconfigured Good**.



Importing Foreign Configurations

Drives previously used in another system, or recently changed from **Unconfigured Bad**, may show a **Foreign Configuration**. Foreign configurations must be reviewed and imported before the RAID can operate correctly.

1. In the drive list, select any drives marked **Foreign Drives**.
2. Navigate to **Configure > Foreign Configuration**
3. Select **Import** to adopt the foreign configuration.



4. Review the details of the Virtual Drive to confirm the import was successful.

Manually format and partition on Windows

1. Press the **Start** button.
2. Type **Disk Management** and open **Create and format hard disk partitions**.
3. In the lower panel, find the disk that represents your RAID virtual drive.
4. If prompted to initialise the disk, choose **GPT** → **OK**.
5. If no prompt appears, right-click the disk label (e.g., **Disk 1**) → **Initialize Disk** → select **GPT** → **OK**.
6. In the unallocated area, right-click and choose **New Simple Volume**.
7. Select the default full size.
8. Choose a drive letter (e.g., **D:**).
9. Use the following format settings:

```
File system: NTFS

Allocation unit size: Default
Volume label: (any name you want)
Check “Perform a quick format”
```

10. Click **Next**, then click **Finish**.

VX 4+ Redisguise

⚠️ **Performing a system restore from the new disk image will erase any valuable data on your system drive. Please ensure you make a backup of any essential files from your system (C:) drive before initialising this process. The process does NOT destroy any media or projects on your media drive.**

Internal Restore

Internal restore is the process of re-imaging the system to the last Redisguise version.

Skip to the **Redisguise section** below if your are intending to upgrade to a new OS.

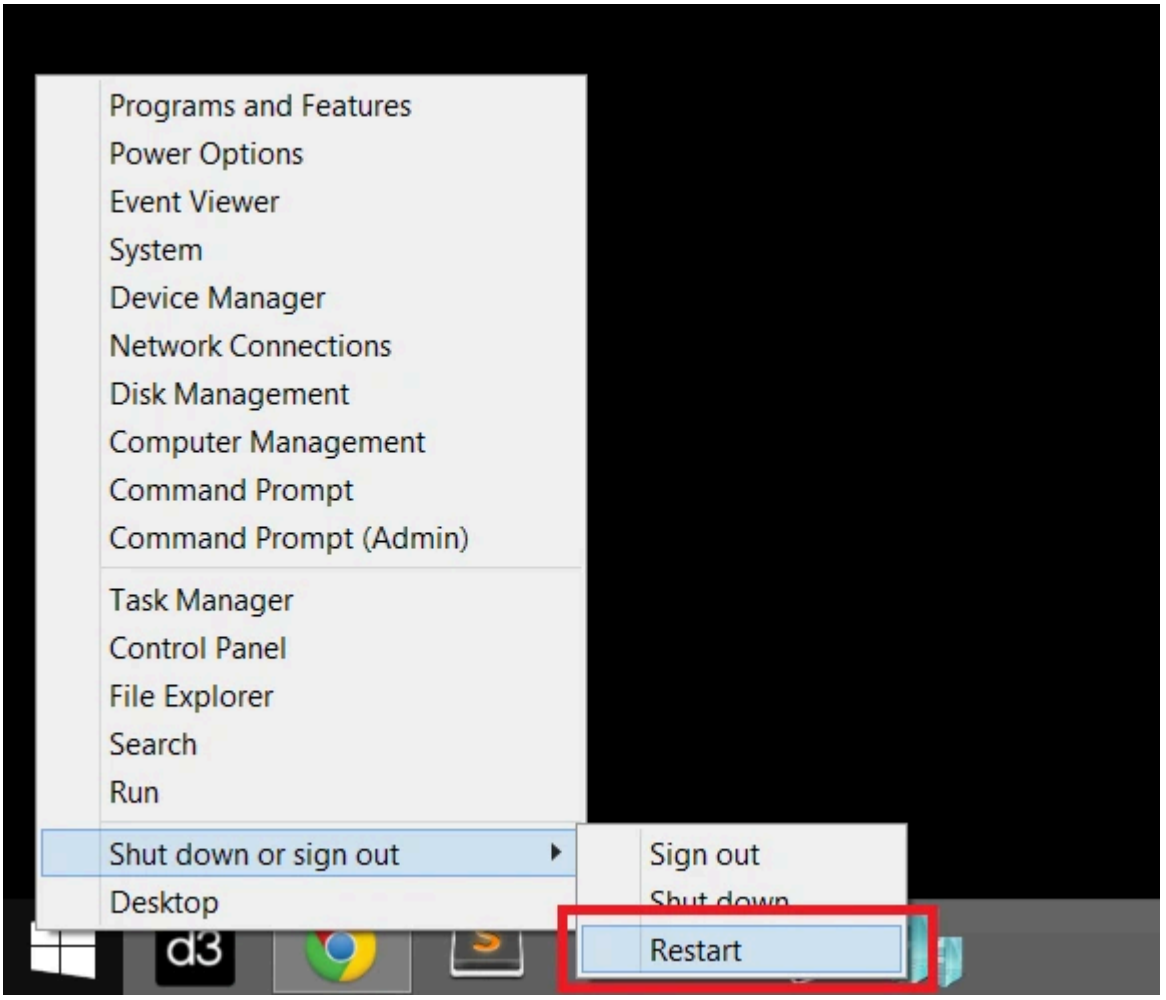
This procedure will only work with OS version 10 and later.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

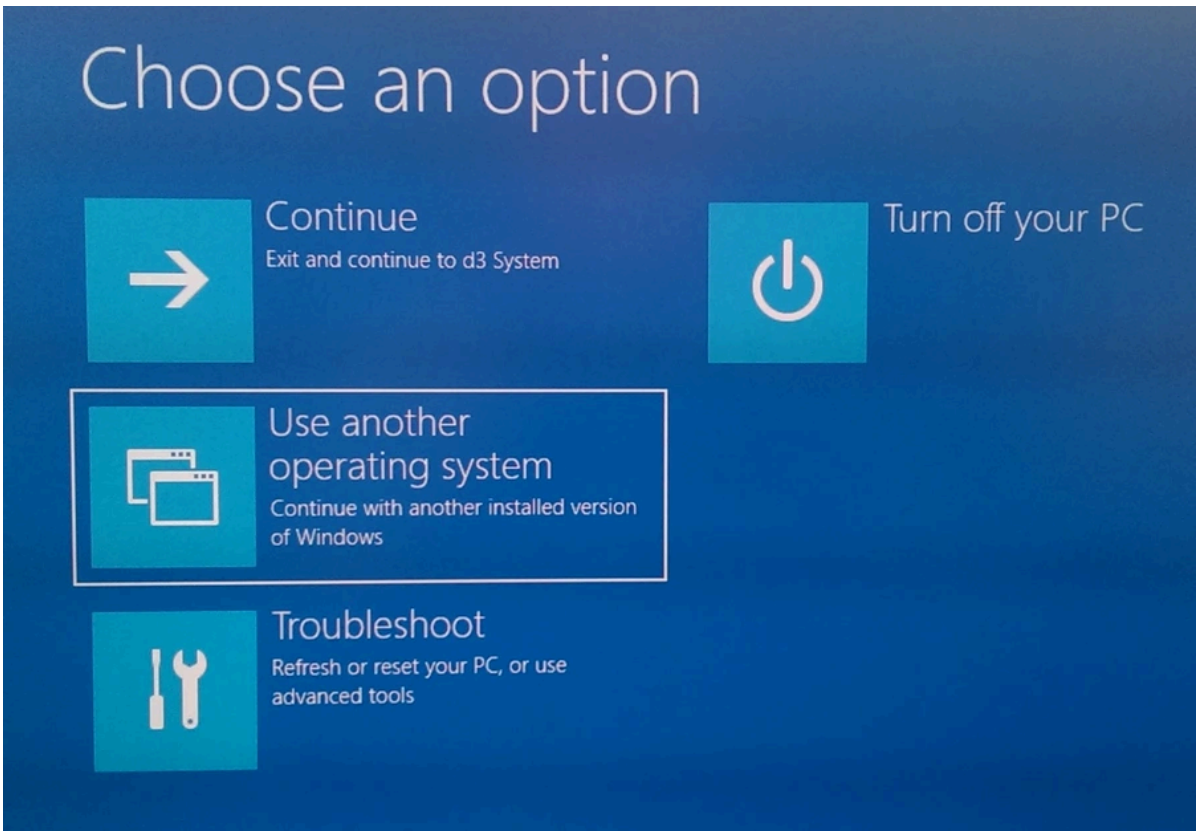
Internal Restore Process

1. Hold down **shift** whilst restarting the system.

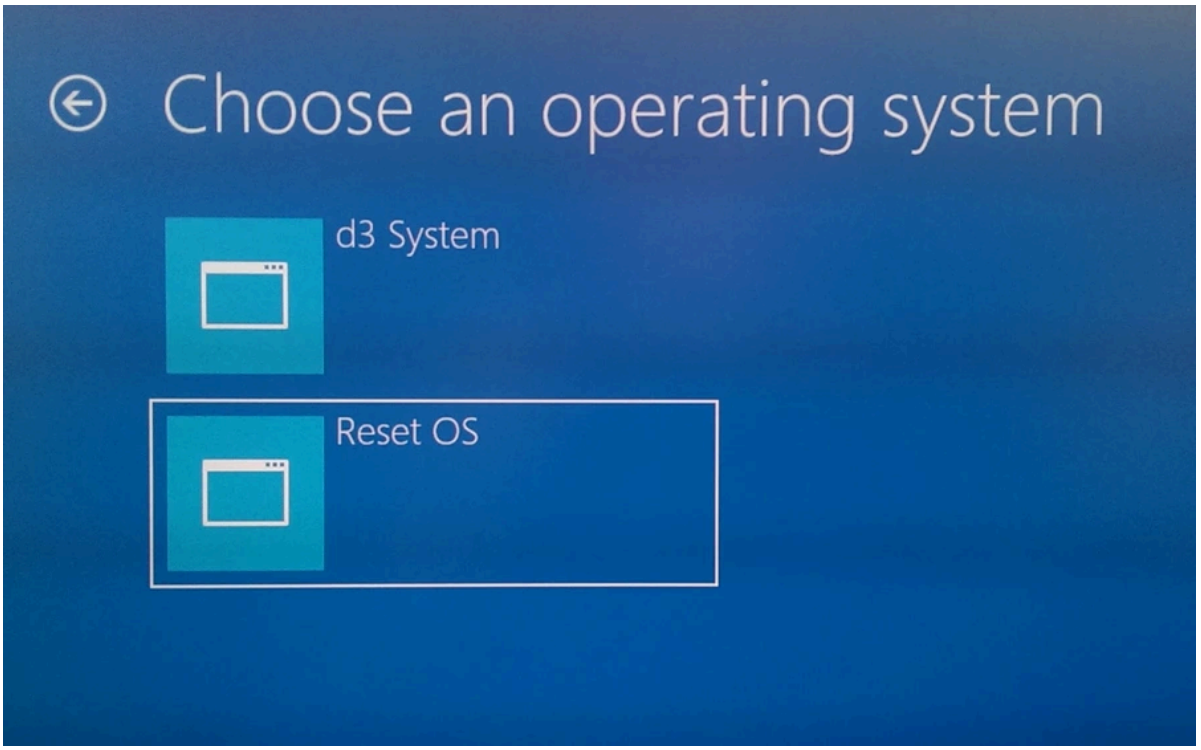




2. Select **Use another operating system**



3. Select **Reset OS**.



4. The system will reboot into the internal re-imaging system which will reinstall the Operating System and revert to factory settings.

USB Redisguise

Redisguise is the process of updating and restoring on the system using a bootable USB drive.

This process can be used to update to a newer OS image, or revert to a previous OS image.

To identify which OS image your system currently runs, please go to **d3Manager > Help** and select **About Manager**.

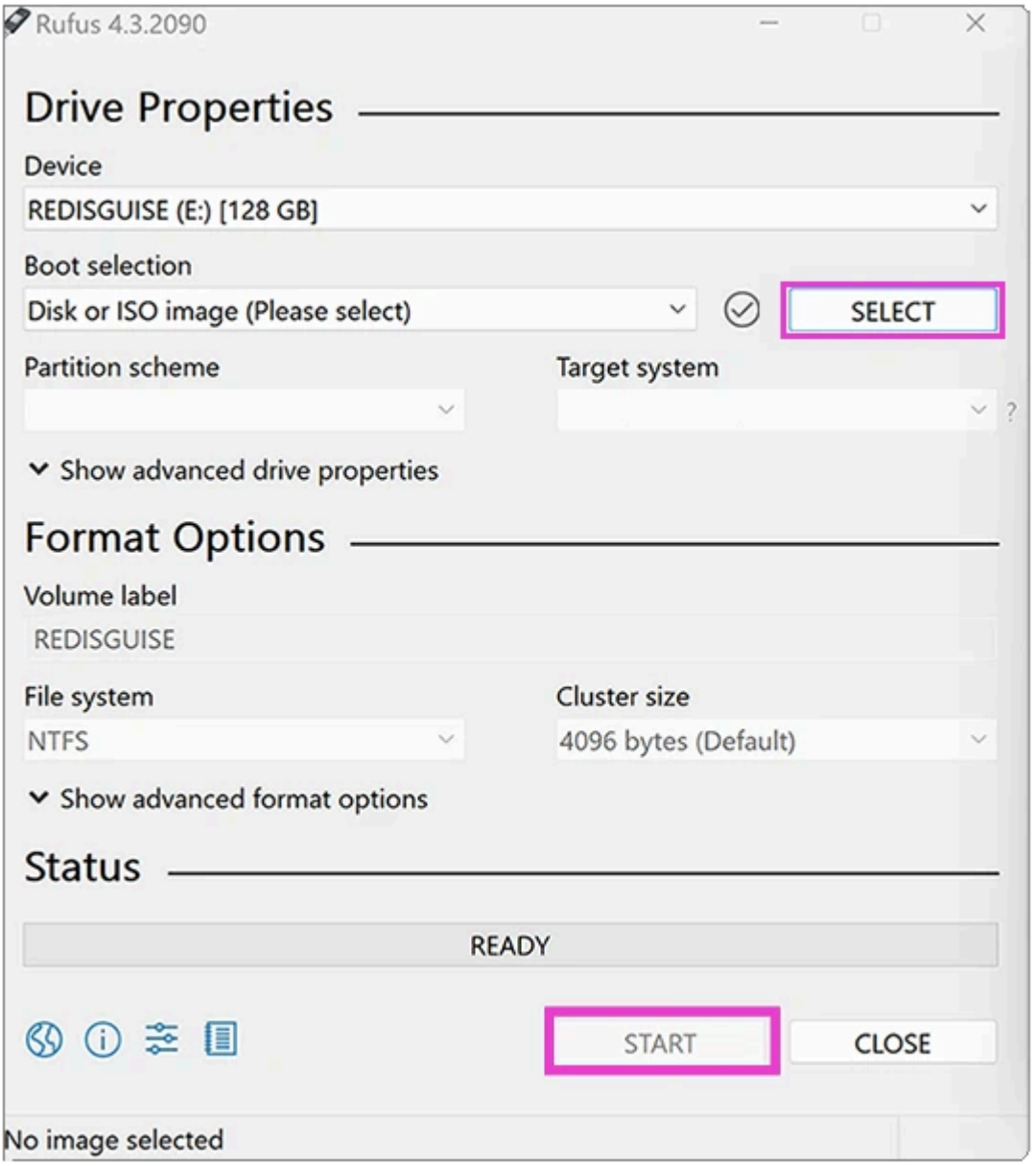
You will need

- A 16GB USB memory stick
- A version of **Rufus** to turn it into a bootable disk. Ensure the volume name of the USB is: **REDISGUISE**
- An internet connection to the machine you are re-imaging
- An OS image from the **Hardware OS Imaging**.

Create a Bootable USB

1. Download the ISO from the **Hardware OS Imaging**.
2. To create a Bootable USB stick open Rufus, click **Select** and browse to the downloaded ISO. Then click **Start**.

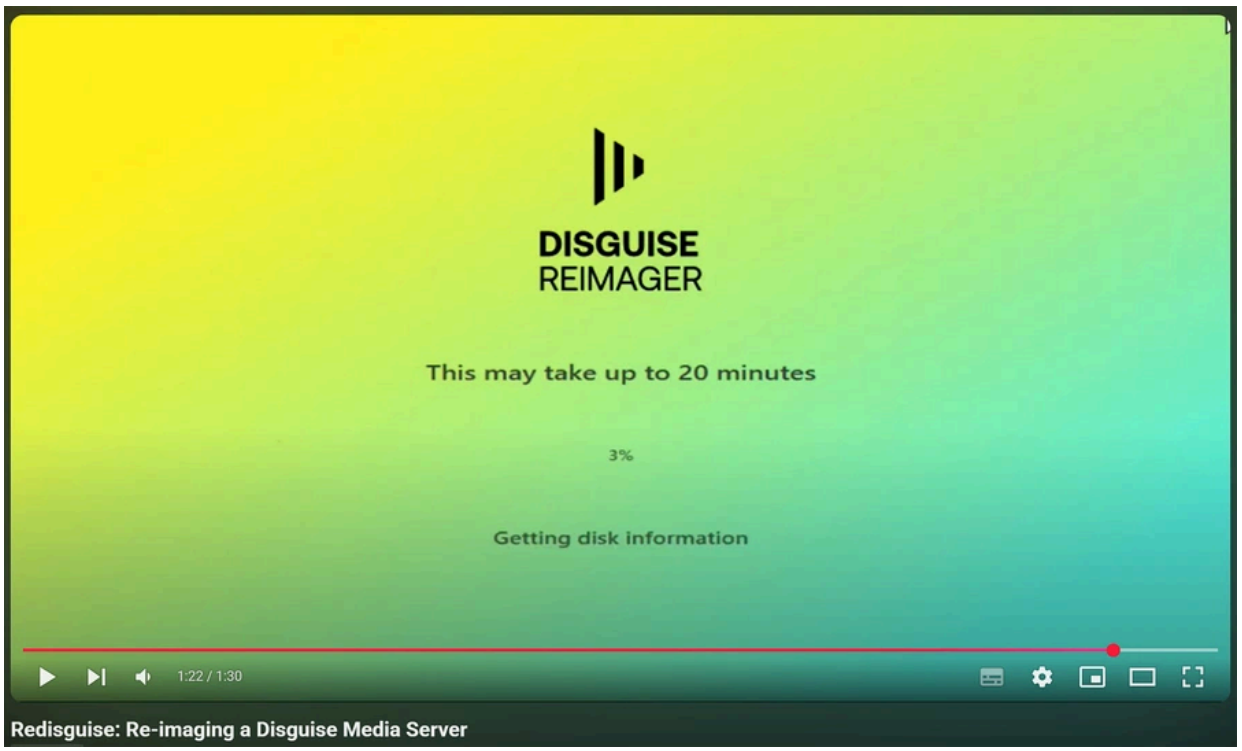
The Partition scheme, Target system, and File System fields should appear automatically.



The settings should be:

- `Partition scheme - GPT`
- `Target system - UEFI - non CSM`
- `Volume label - Automatically pulled from ISO file`
- `File system - NTFS`

Booting into the USB



▶️ Click here to view the Booting into the USB Redisguise video.

The system needs to be connected to the internet during this procedure.

1. Plug the USB Drive into your Disguise server and switch it on.
2. To enter the BIOS, wait for the Disguise logo to appear and then continue pressing the **Delete** key until the BIOS screen appears. You can navigate the BIOS using the arrow keys.
3. On the **EXIT** section, select the following option and press ENTER:
   `UEFI: [diskname], Partition 2`

   The disk name may vary depending on the manufacturer of the USB stick in use.

   The Redisguise process will run automatically until the re-imaging has completed.

   A **log file** will be automatically generated and stored on the USB memory stick.

If you encounter any issues with the Redisguise process, please review the advice here.

If the issue persists while updating or restoring the system, or any of these instructions are unclear, please contact the Disguise support team and provide the log file located on the USB drive.

VX 4+ Video Input

Max Number of Unique Inputs

Media Server	3G-SDI	12G-SDI
VX 4+	16	4

> **Note**
>
> It is possible to have a different format on each input. However, the limitations are a maximum of 4x 2160p60 or 16x 1080p60 at any one time.

Supported Formats

All video standards outlined here have been tested up to the following:

- Bit depth - 10-bit (all modes).
- Chroma subsampling - YCbCr 4:2:2 (all modes).
- Each SDI input supports 3G Level A and Level B when applicable.
- All quadlink formats support either square division or two-sample interleave (2SI) methods.

4K DCI (4096 x 2160)

4K DCI 23.98p, 4K DCI 24p, 4K DCI 25p, 4K DCI 29.97p, 4K DCI 30p, 4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

Quadlink 4K DCI (4096 x 2160 using 4x 2048 x 1080 inputs)

4K DCI 47.952p, 4K DCI 48p, 4K DCI 50p, 4K DCI 59.94p, 4K DCI 60p

UHD (3840 x 2160)

2160p23.98, 2160p24, 2160p25, 2160p29.97, 2160p30, 2160p50, 2160p59.94, 2160p60

Quadlink UHD (3840 x 2160 using 4x 1920 x 1080 inputs)

2160p50, 2160p59.94, 2160p60

2K DCI (2048 x 1080)

2K DCI 23.98p, 2K DCI 23.98psf, 2K DCI 24p, 2K DCI 24psf, 2K DCI 25p, 2K DCI 25psf, 2K DCI 29.97p, 2K DCI 29.97psf, 2K DCI 30p, 2K DCI 30psf, 2K DCI 47.952p, 2K DCI 48p, 2K DCI 50p, 2K DCI 59.94p, 2K DCI 60p

Full HD (1920 x 1080)

1080p23.98, 1080psf23.98, 1080p24, 1080psf24, 1080p25, 1080psf25, 1080p29.97, 1080psf29.97, 1080p30, 1080psf30, 1080p50, 1080i50, 1080p59.94, 1080i59.94, 1080p60, 1080i60

HD (1280 x 720)

720p25, 720p29.97, 720p30, 720p50, 720p59.94, 720p60

Back-Plate Layout

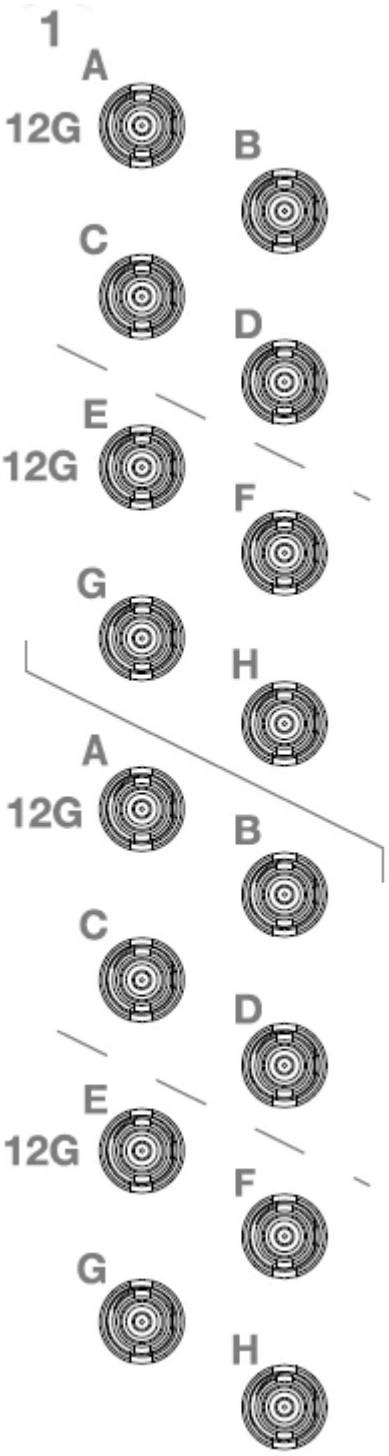


Diagram of Video Capture BNC connections on the rear of the unit

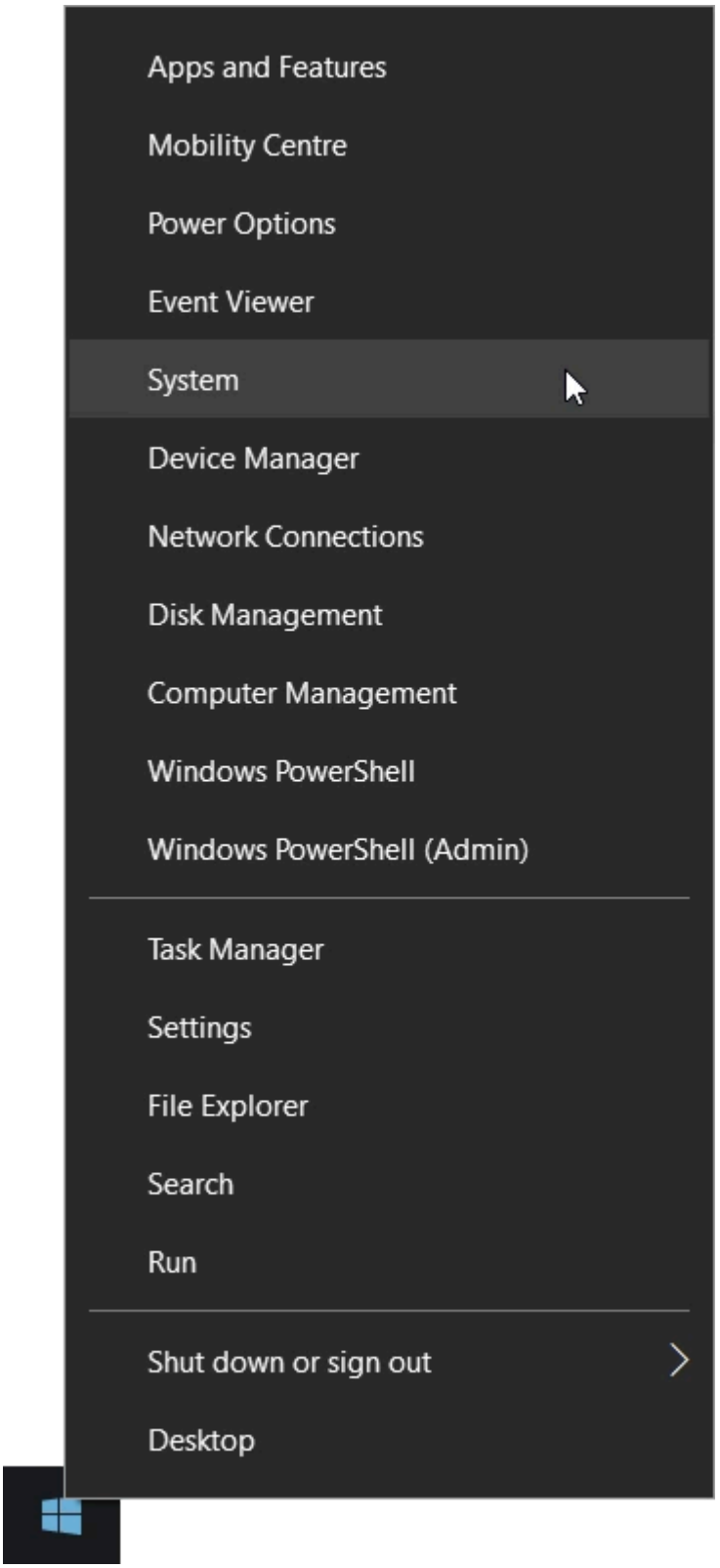
Windows Activation

Windows should activate automatically, as long as the machine was connected to the internet for the duration of the re-imaging process.

If Windows does not activate during the re-imaging process, follow these steps.

1. Wait for a few minutes after the re-imaging process has completed to allow the server time to activate Windows.

2. Navigate to the System tab by right-clicking on the Windows start menu and selecting System.



3. In the System window, check to see if you have valid Windows license information visible. If you do not, contact the Disguise support team.

Disguise Learn Courses

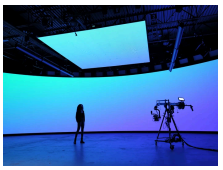
Disguise Essentials



Take the Disguise Essentials Learning Plan.

Disguise Essentials

Disguise Workflow Specialist



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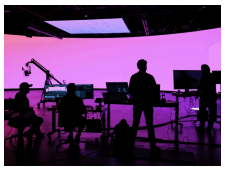

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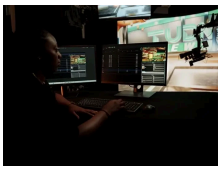

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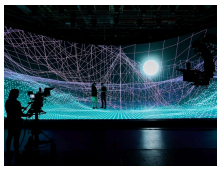

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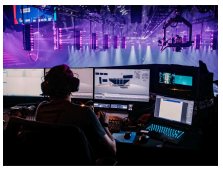

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English

2026

Guide	Description	Size	Date
Disguise Full User Guide r33	Complete User Guide for r33.	878 MB	02 Apr 2026
Disguise Designer guide	Designer software documentation.	435 MB	01 Apr 2026
Disguise Workflows guide	Workflow guides including xR, Virtual Production, OmniCal and integrations.	127 MB	01 Apr 2026
Disguise RenderStream guide	RenderStream setup and configuration.	32 MB	01 Apr 2026
Disguise EX Range guide	EX Range hardware documentation.	14 MB	01 Apr 2026

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xR Workflows guide (2 MB)

Porta 2.0 (7 MB)

Hardware Guides

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Admin Account Management

The **users** page in Porta is for account administrators only and can be used to add users and manage user permissions.

Key features

- Add new users
- Remove users
- Manage users permissions
- Group users

Opening the user settings

1. From the Window menu in Porta, click on **Settings**.
2. In the Settings panel, select **Users**.

Creating a user

1. Hit the new user button on the top menu.



2. Add the new user's name and email address.
3. Select a user role. **Admin** if the user will be modifying accounts and **User** if not.
4. Give the user a password, the user can change the password when they log in.

Establish a Designer Connection with Porta Bridge

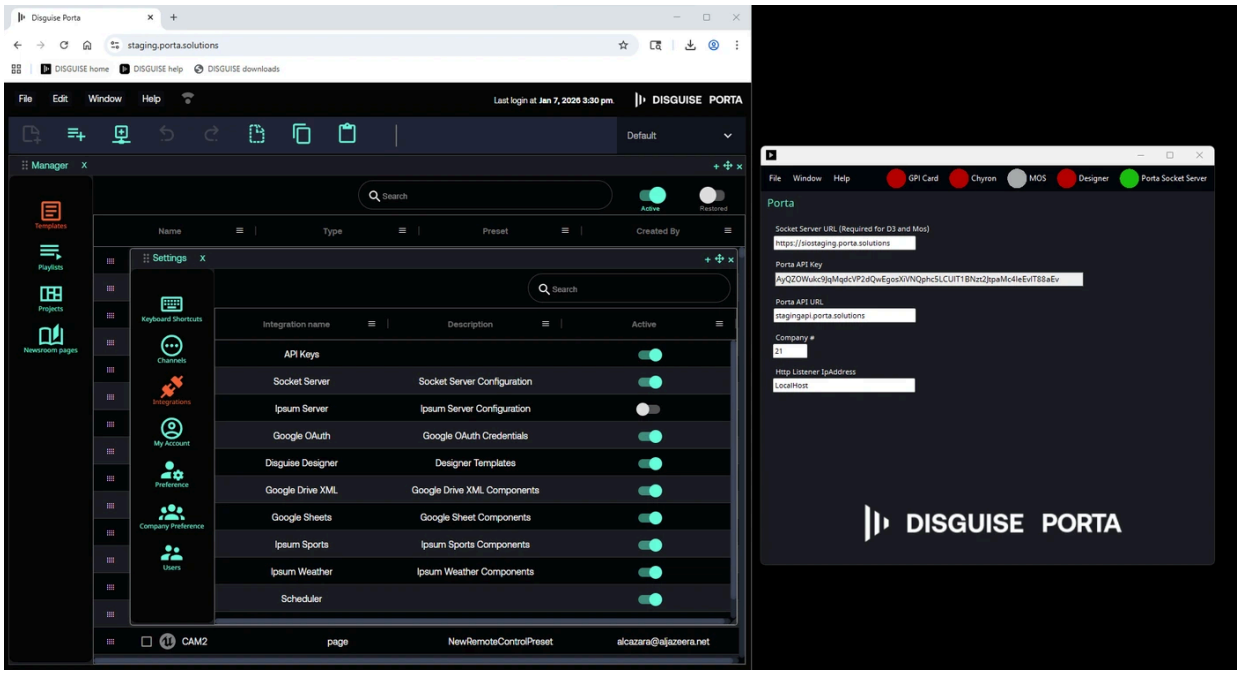
Porta Bridge acts as the communication gateway between Porta and external systems, such as Designer (d3 software), MOS, RossTalk/GPI. For this page, we will focus on establishing the communication between Porta and Designer (d3 software).

Porta Bridge: Set up connections

Step 1: Connect to Porta

- **Specify Porta configuration**: Navigate to **Window -> Porta**
- **Socket Server URL** : Location of the Socket Server. In Porta, go to **File -> My Account -> Integrations** and double click **Socket Server** to reveal the URL.
- **Porta API Key**: In Porta, go to **File -> My Account -> Integrations** and double click **API Key** to reveal the key.

Upon successful connection to Porta, top right indicator for **Porta Socket Server** will turn green.

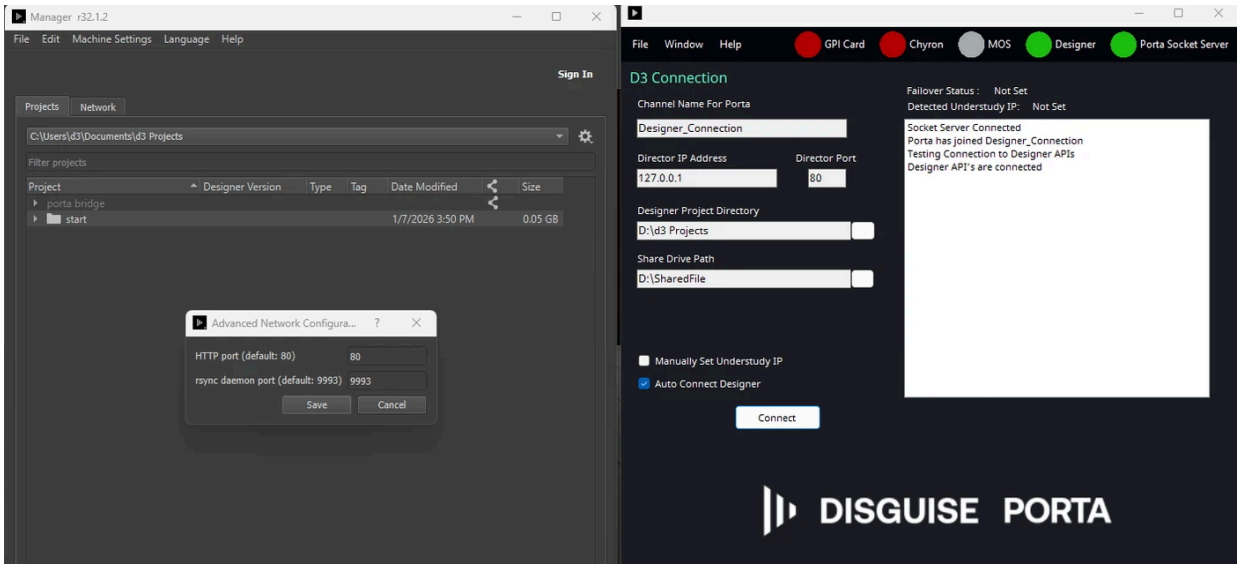


Step 2: Connect to Designer

Review the following settings:

- **Specify the Designer configuration**: In Porta Bridge, navigate to **Window -> Designer**.
- **Channel Name for Porta**: This is the d3 channel name is shown in Porta.
- **d3 IP Address**: This is the location of the d3 instance that is running.
- **Port(Not Required)**: Port location if needed 80 if not used.
- **Backup d3 IP Address**: This is the location of the d3 Understudy instance if needed by the project.
- **d3 Project Path**: The location of the d3 Project Path not the projects itself.
  - It ends with `\d3 Projects`.
  - The Default location is `Documents\d3 Projects`
- **Share Drive Location**: The location of a share drive that stores images that can be added to d3 via Porta Pages.

Upon successful connection to Designer, the top right **Designer** indicator will turn green.

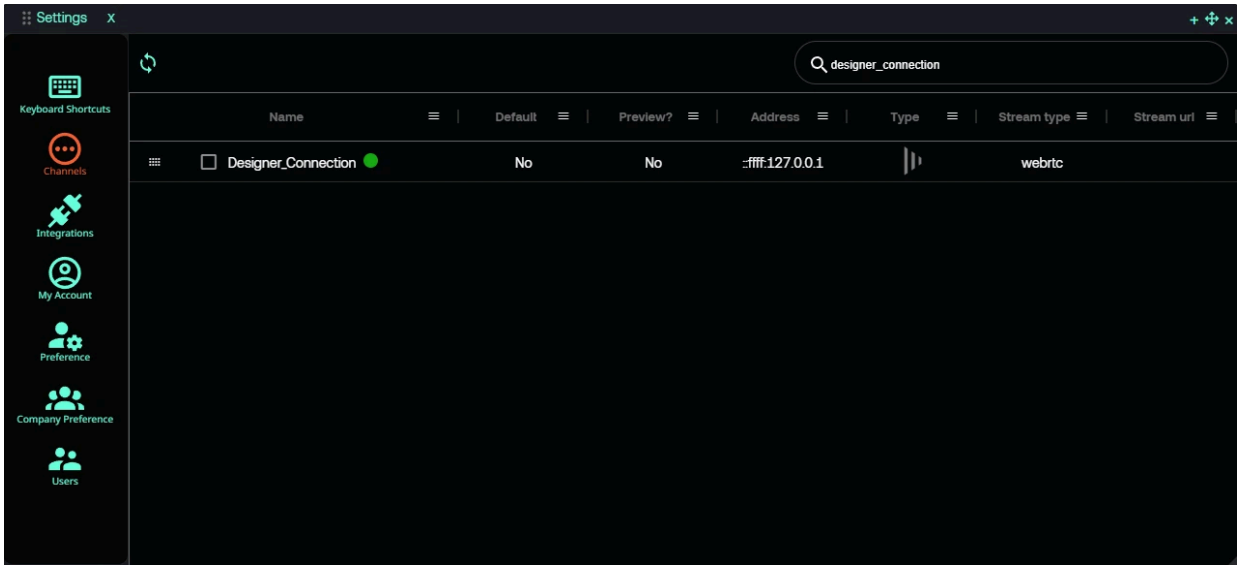


Successful Connection

Once Porta Bridge is configured and connected successfully to Porta and Designer, the next step is to test the connection in Porta.

Testing the connection in Porta

Go to **Windows > Settings -> Channels** and click the refresh button. Here you will see the new Channels that you have created in the d3 Connection Configuration.



Verify that Porta shows the d3 Connection

Troubleshooting

- Indicators should be GREEN, if they are RED, it indicates an issue with the connection.
- Ensure the Disguise project is running **BEFORE** starting the d3 connector.
- The Designer active project is the expected project for Porta's selected page/template/channel.
- Check that the Designer API homescreen can be reached by IP address in Chrome.
- In the Porta menu, under **Window -> Settings -> Channels**, ensure the correct channels are listed. If not, use the sync button in the channel panel, or refresh the Porta interface.
- In the Porta menu, under **Window -> Settings -> Preference**, ensure **Enable Play Groups** and **Enable play group sequence** are enabled.

Summary

Porta Bridge is the application that connects Porta to other systems, such as Designer.

Upon establishing the connection, user will be able to control Designer features such as Transport/Timeline Controls, HTTP Sockpuppet. It also enables alignment with general Designer features such as Failover and Content Ingestion/Deletion.

Porta Bridge RossTalk Integration

Porta Bridge is used as the communication gateway for Porta to connect to other processes, such as Designer(d3 software), MOS, RossTalk/Chyron/GPI.

The External Commands Panel is for receiving commands from external trigger sources including

1. **RossTalk**
   - **Connection**: TCP socket
   - **Format**: Plain-text commands following the RossTalk protocol specification
   - Used to receive trigger commands from Ross Video switchers and compatible control systems
2. **Chyron** (CII – Chyron Intelligent Interface)
   - **Connection**: TCP socket
   - **Format**: Plain-text commands following the Chyron CII protocol specification
   - Used to receive trigger commands from Chyron-compatible character generators and control systems
3. **GPI** (General Purpose Interface)
   - **Connection**: Serial (hardware)
   - **Format**: Electrical signal via a physical switcher board connected to a SeaLevel GPIO card installed in the host computer
   - **Requirement**: A SeaLevel GPIO card must be installed — this protocol will not function without one

> **Note**
>
> ```
> Only one network protocol can be active at a time – either RossTalk or Chyr
> on, not both.
> GPI operates independently of the network protocols and can run alongside w
> hichever network protocol is selected, provided compatible SeaLevel hardwar
> e is installed.
> ```

How to connect to Porta

Step 1:

- **Ensure Porta Configuration**: Navigate to Window->Porta and make sure that the API URL and Porta API Key are filled in correctly.
- **Socket Server URL** : Location of the Socket Server. This can be found by going to Porta Interface->File->My Account->Integrations and double click “Socket Server” to reveal the url.
- **Porta API Key**: This can be found by going to Porta Interface->File->My Account->Integrations and double click “API Key” to reveal the key.

Step 2:

- **Specify Rosstalk/Chyron configuration**: Navigate to Window-> RossTalk/GPI **RossTalk/Chyron TCP Listener Port**: Specify the port to listen for any RossTalk Command; the default is 7788.
- **Log**: It shows the running log of receiving GPI ID for troubleshooting/monitoring purpose.

Testing the connection in Porta

Upon successful connection to RossTalk/Chyron or GPI Command, the log should record

“Timestamp:Received command: GPI ##”

If the command was attached to a trigger it will show,

“Timestamp:Received Playing Page ID: #####”

The command will be sent to Porta and the corresponding playlist/page will be loaded.

Custom Triggers

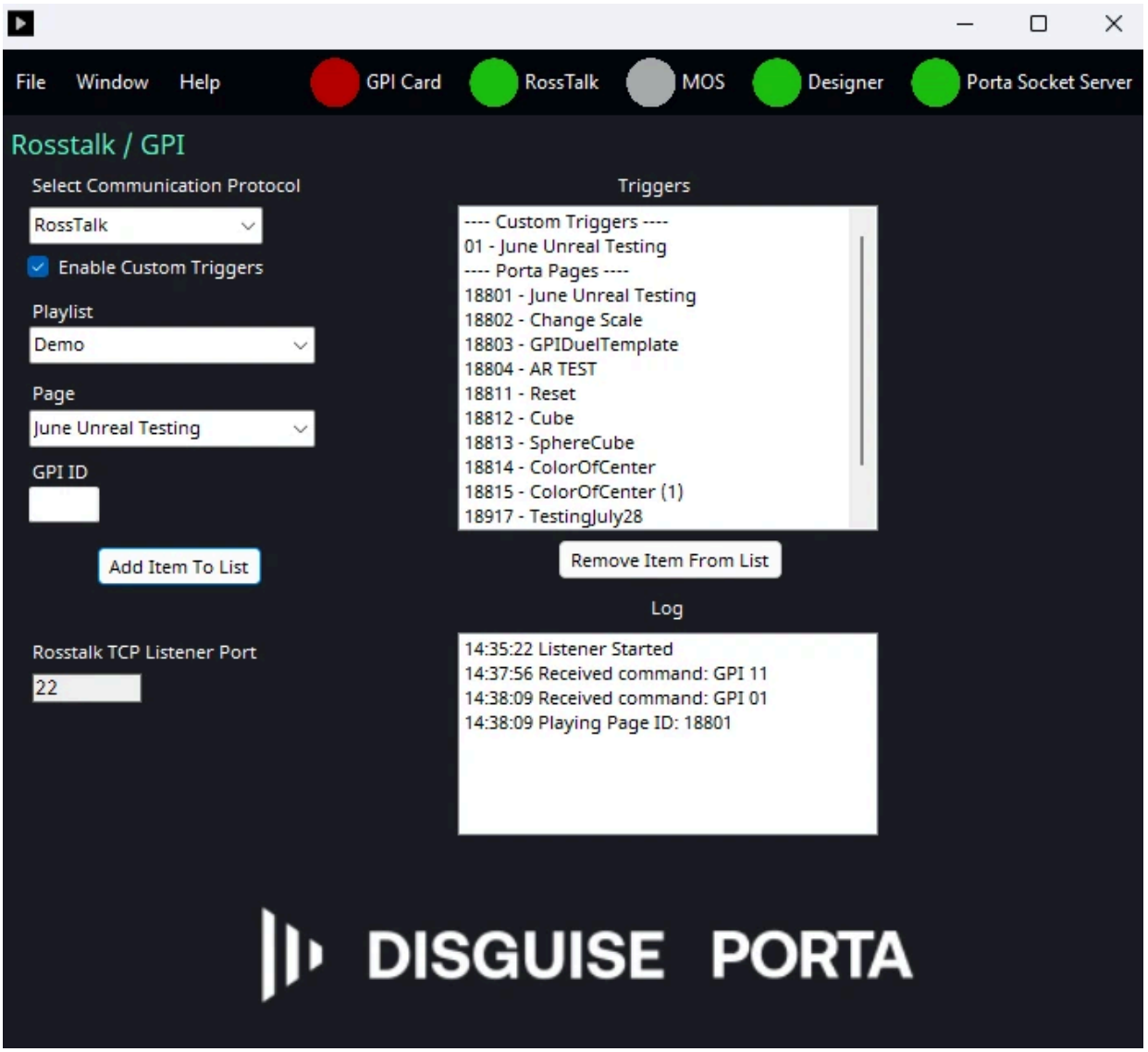
By default, the page ID is used to trigger a page. However, you can also use custom triggers.

To set up a custom trigger, make sure you have selected the option to **Enable** custom triggers. Once you have done that you will have the option to add custom triggers to your list. You will see the new options below.

- **Playlist/Page**: Drop down menus that contain playlists and their respective pages, which should be loaded from Porta Database automatically
- **GPI ID**: User can type in specific GPI ID to link with specific playlist and page
- **Add Item To List**: User can add the pair of GPI ID <> Playlist & Page. The pair then should appear in the “GPI/Ross Talk Trigger List” for reference.
- **Remove Item From List**: User can select the pair of GPI ID <> Playlist & Page to delete.

Selecting a Playlist, Page, and GPI ID, then clicking **Add Item To List** will add the trigger to the list. This allows you to trigger a specific playlist and page based on the GPI ID you set up.

Note: The GPI ID must be unique and must be a numeric value.



GPI

Configuring a GPI trigger requires a SeaLevel GPI (GPIO) card installed in the host machine.

To verify the card is functioning:

1. Click the “GPI Card” icon.
2. Select “Test”.

If the test fails:

- Confirm the card is properly seated and connected.
- Ensure the correct drivers are installed and up to date.
- Verify the hardware is recognised by the operating system.

Trigger Configuration

GPI operation requires Custom Triggers to be enabled.

When a GPI input is activated, the SeaLevel card sends a GPI ID to Porta Bridge. The received GPI ID is then matched against the configured Custom Trigger list, and the associated playlist and page are loaded.

Each GPI trigger also includes a state selection dropdown:

- Up (High)
- Down (Low)

This defines which signal state transition will activate the mapped trigger.

RossTalk

RossTalk is a plain-text-based protocol that allows control of the switcher from an external device. RossTalk commands are sent to the Porta Bridge. Commands using the `GPI xx` syntax will trigger the playlist and page linked to the GPI ID within the Custom Trigger list.

Chyron Intelligent Interface (CII)

Chyron is a protocol that allows control of the switcher from an external device. Similar to RossTalk, Chyron commands are sent to Porta Bridge. Commands using the Play/{Page} syntax will trigger the playlist and page linked to the GPI ID.

Channels

Channels reference a connection to a machine that runs the Unreal Engine or Designer project.

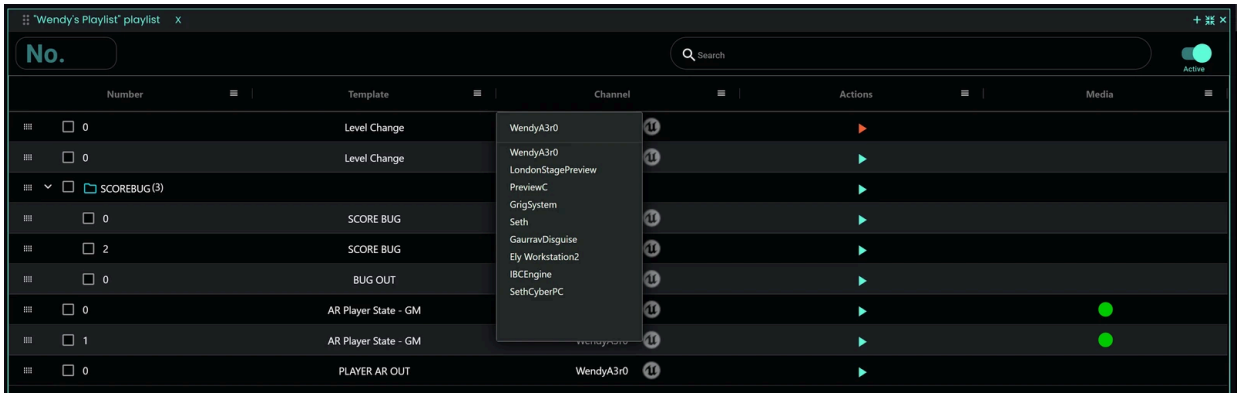
By assigning channels, users determine where content is played. Different channels can be selected for certain things based on a company's requirements.

The following functions and properties are available for channels:

- Create new
- Save
- Update
- Duplicate
- Remove
- Sync
- Display list
- View Channel
- Default
- Group
- Ungroup
- Delete

Assign a channel to a project

Select the output channel in the Channels column of the template. A dropdown lists all the available channels.



Set a default channel for all projects

1. From the Window menu in Porta, click on **Settings**.
2. In the Settings panel, select **Channels**.
3. Here you can set your most frequently used channel as default by editing the Default column. The default channel will automatically be assigned to new playlists.

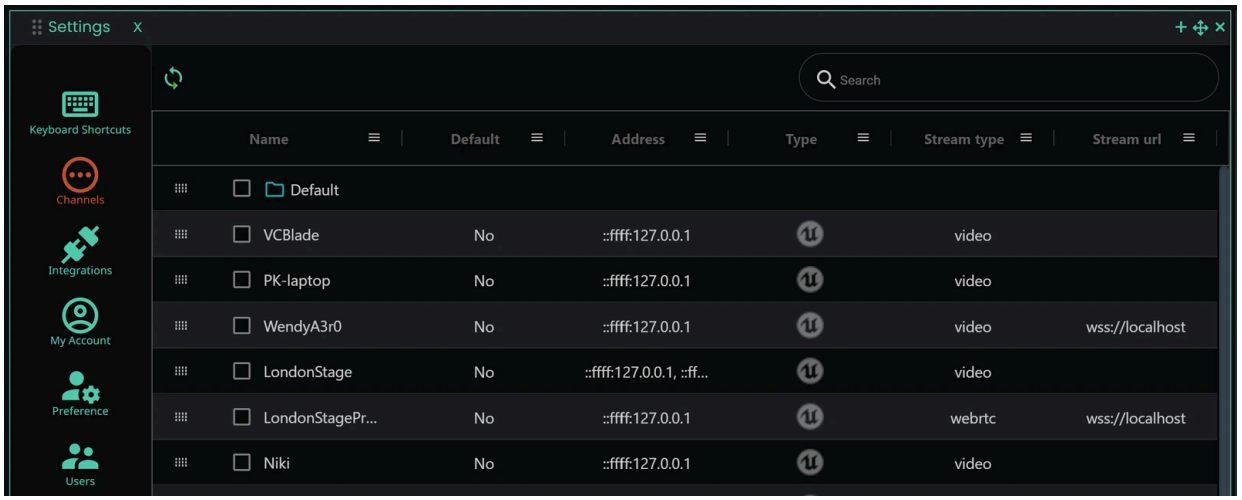
Group a channel

1. From the Window menu in Porta, click on **Settings**.
2. In the Settings panel, select **Channels**.
3. Select the channels you want to add to the Group.
4. Hit **Add Group Folder** in the menu.
5. Name the Group and hit **Save**.

You can also drag and drop a channel into a group by expanding the group and clicking on the Move icon on the left of each row.

If a new channel has been added but does not appear in the list, click **Refresh**.

You can delete a channel by selecting the channel and hitting the trash can button in the menu



Designer HTTP Sockpuppet

Once connection is established using **Porta Bridge,,** Porta can access any parameter exposed via HTTP Sockpuppet.

Controlling HTTP Sockpuppet Parameters in Porta

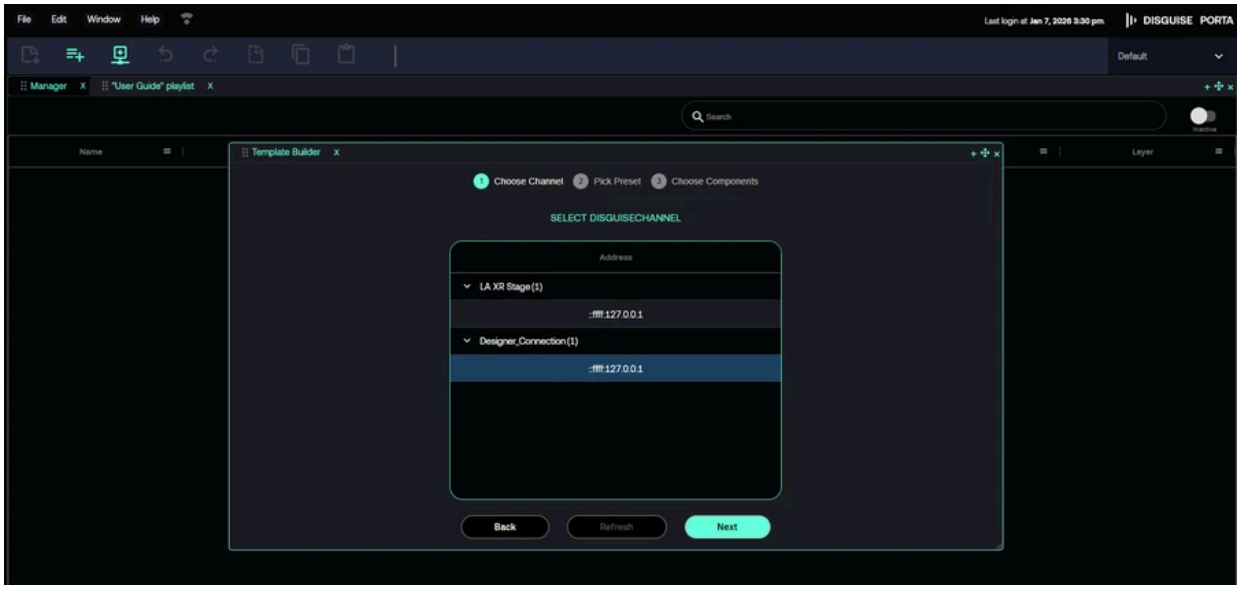
Step 1: Create a new template

1. In Porta, navigate to **File -> New -> Template**.
2. In **Template Builder > SELECT HOW TO START YOUR TIMELINE**, click **DISGUISE TEMPLATE**.



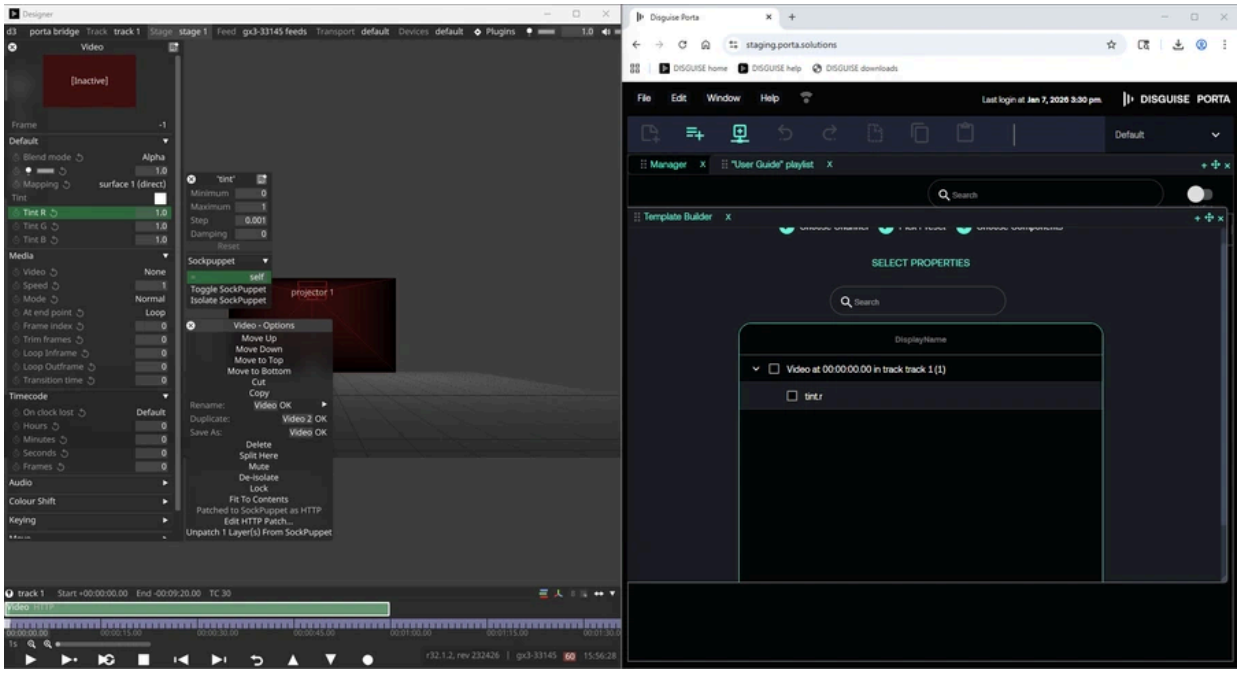
Step 2: Select the Channel

1. Find and select the established Channel.



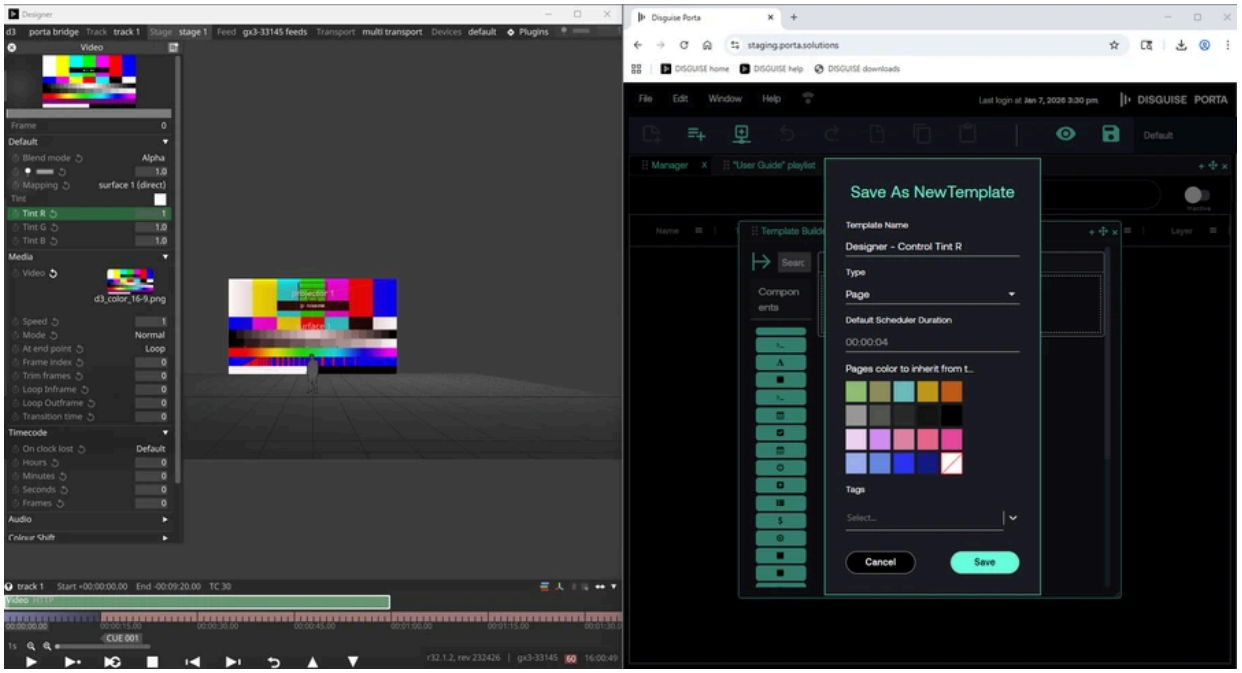
Step 3: Select an Exposed HTTP Sockpuppet Parameter

1. Find the parameter exposed in Designer. [How to expose parameter via HTTP Sockpuppet]



Step 4: Save the Template

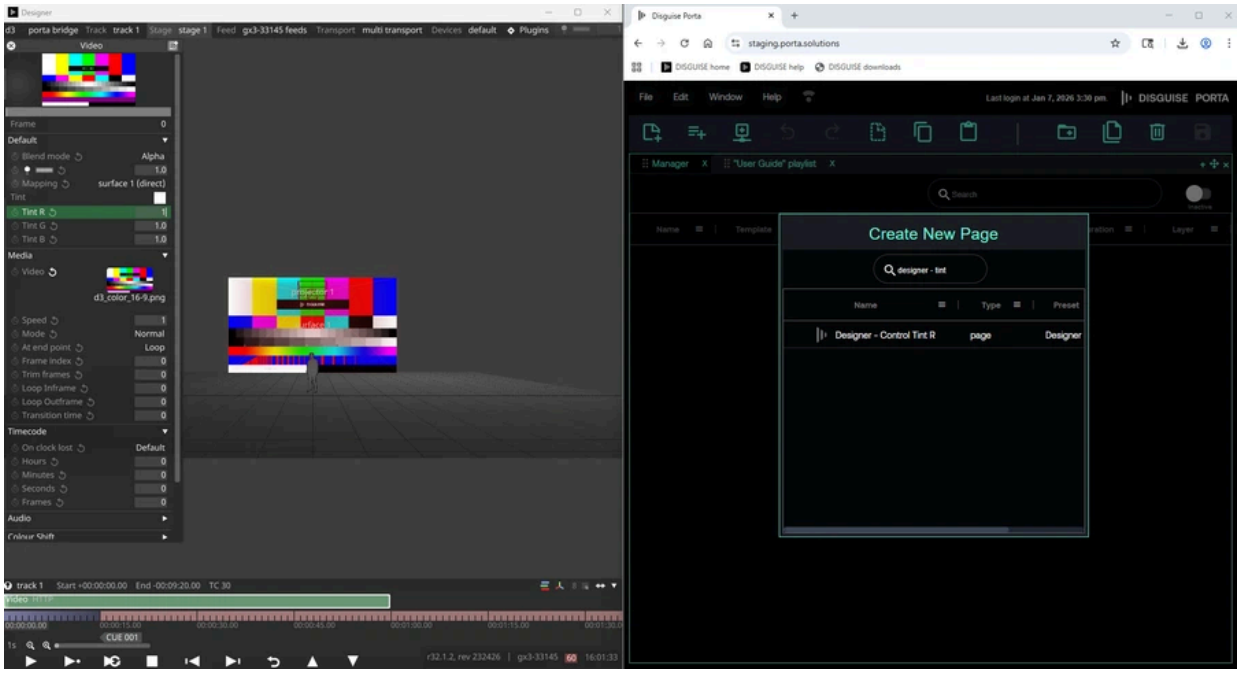
Find the parameter exposed in Designer, and save the template.



Step 5: Create a Page for Programming

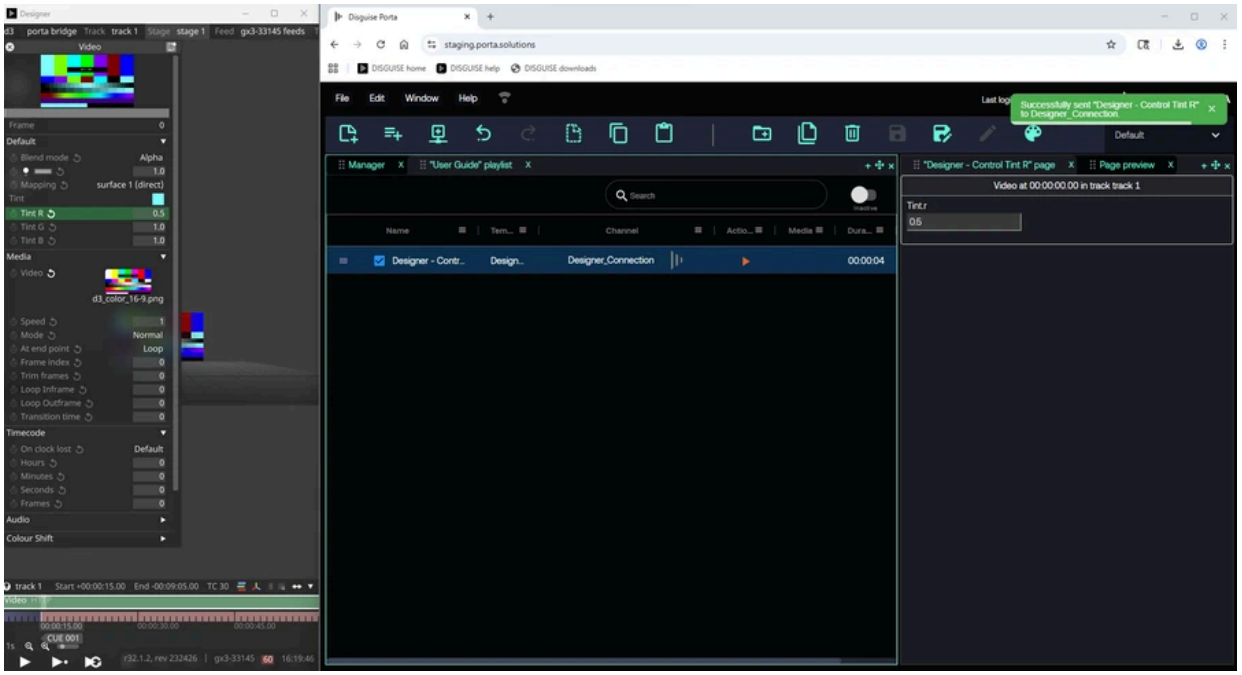
1. Create a new page for specific programming.

- Add multiple pages to a Playlist.
- Pages can also be grouped.



Step 6: Trigger the Parameter in Designer

Now cue will trigger the desired change in Designer.



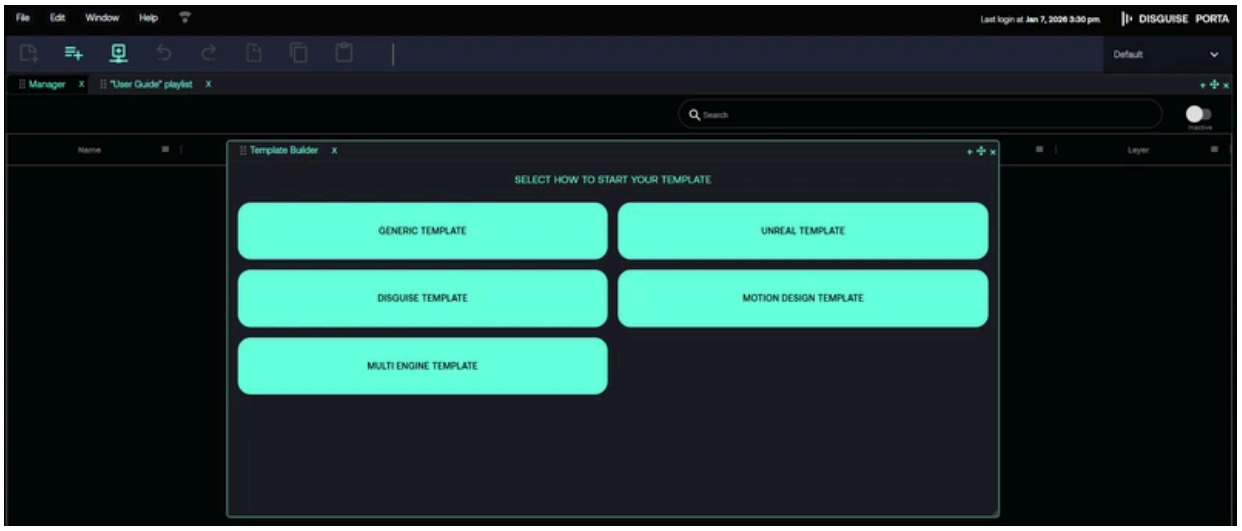
Designer Timeline Control

Once the connection is established using **Porta Bridge**, Porta can access the **timeline** and **transport controls** programmed in **Designer**. This allows user to pre-programme cues in Designer and trigger them without interacting with Designer during operation.

Designer Timeline & Transport control setup

Step 1: Create a Template

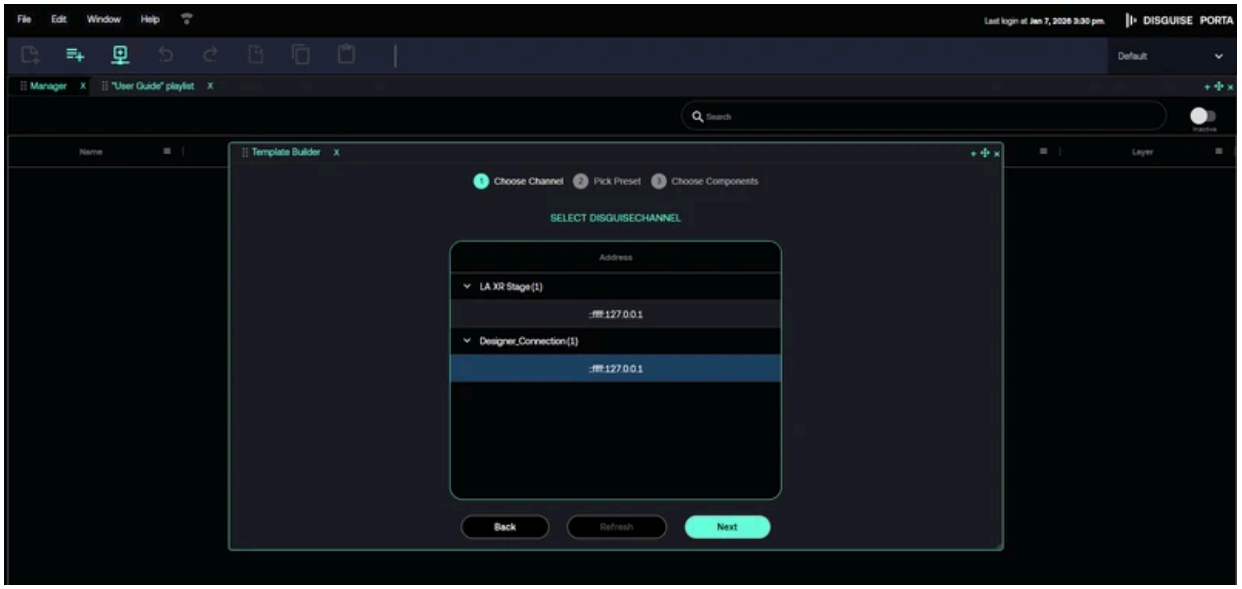
1. In Porta, navigate to **File -> New -> Template** to open **Template Builder**.
2. In **Template Builder -> SELECT HOW TO START YOUR TIMELINE**, click **DISGUISE TEMPLATE**.



Click DISGUISE TEMPLATE in the SELECT HOW TO START YOUR TIMELINE window

Step 2: Select the Channel

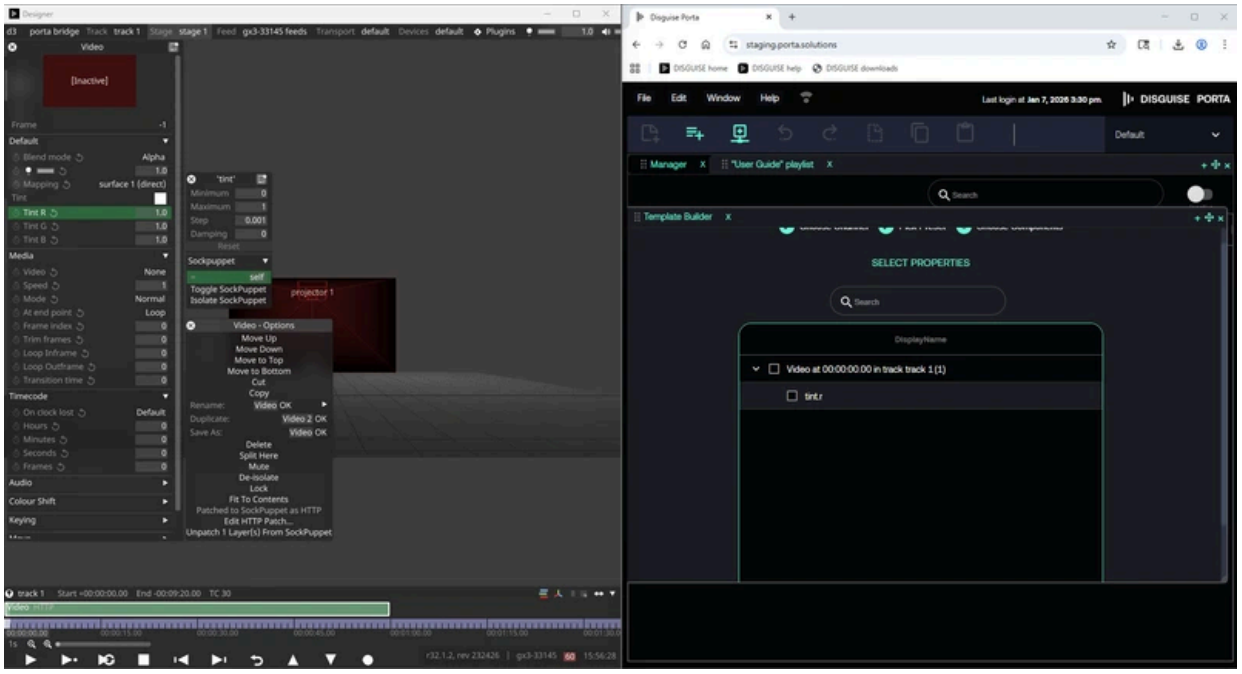
1. Find and select the established Channel.
2. When prompted to select exposed parameters, click **Next** without making a selection. This is not necessary for Timeline and Transport control.



Select the Channel by IP address

Step 3: Fetch the available Timeline and Transport controls

Fetch the available Timeline and Transport controls from Designer.

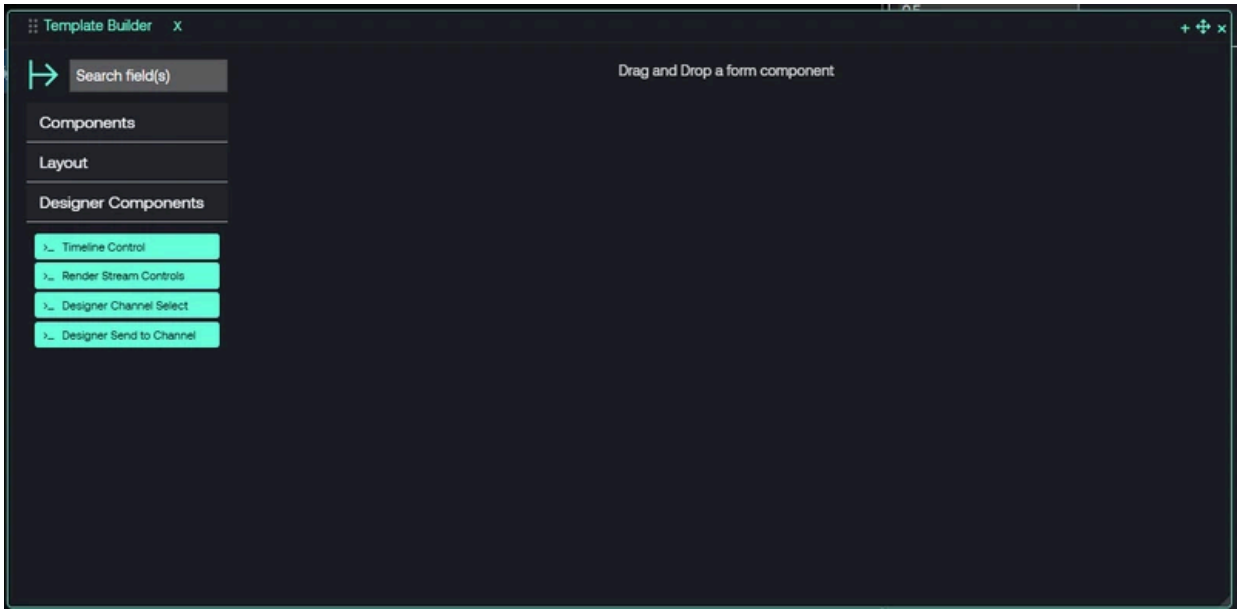


In this example, the video track properties are available to select.

Step 4: Add the Timeline control component

Drag the **Timeline Control** component from below **Designer Components** component and drop into the right-hand form panel of **Template Builder**.

This will expose the available Timeline and Transport controls.



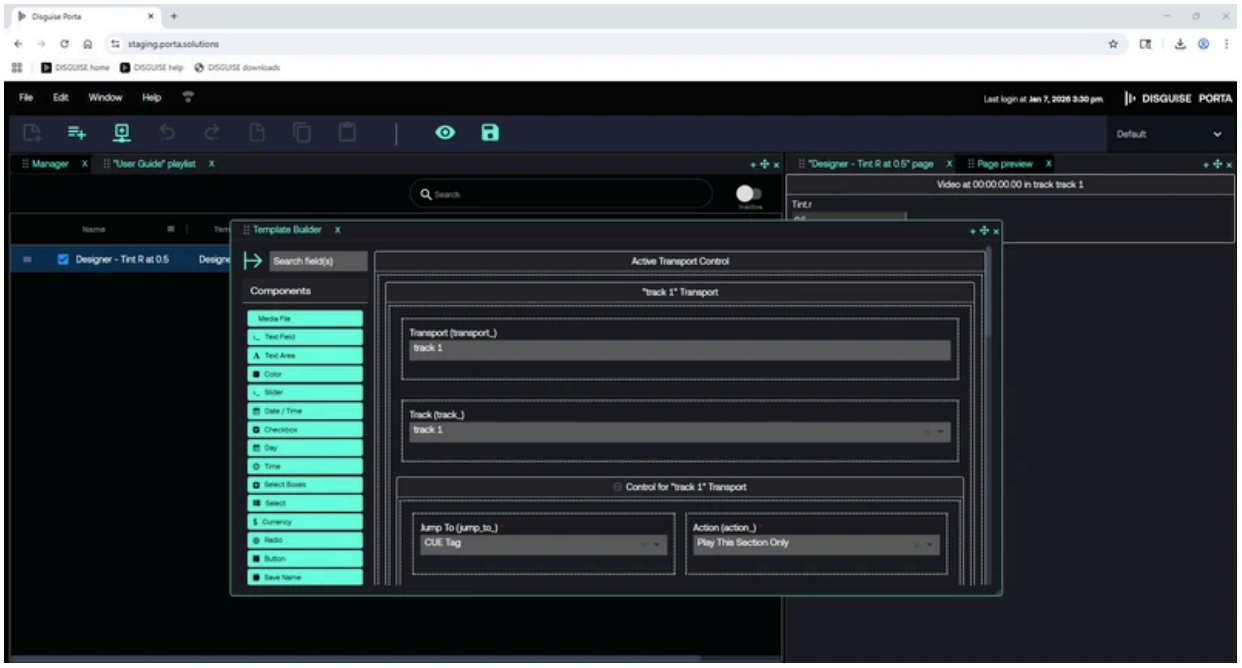
Drag and drop the Timeline Control component to the form panel

Step 5: Save the Template and create a Page

Save the template, then create the page **Active Transport Control** using this template to store the specific programming.

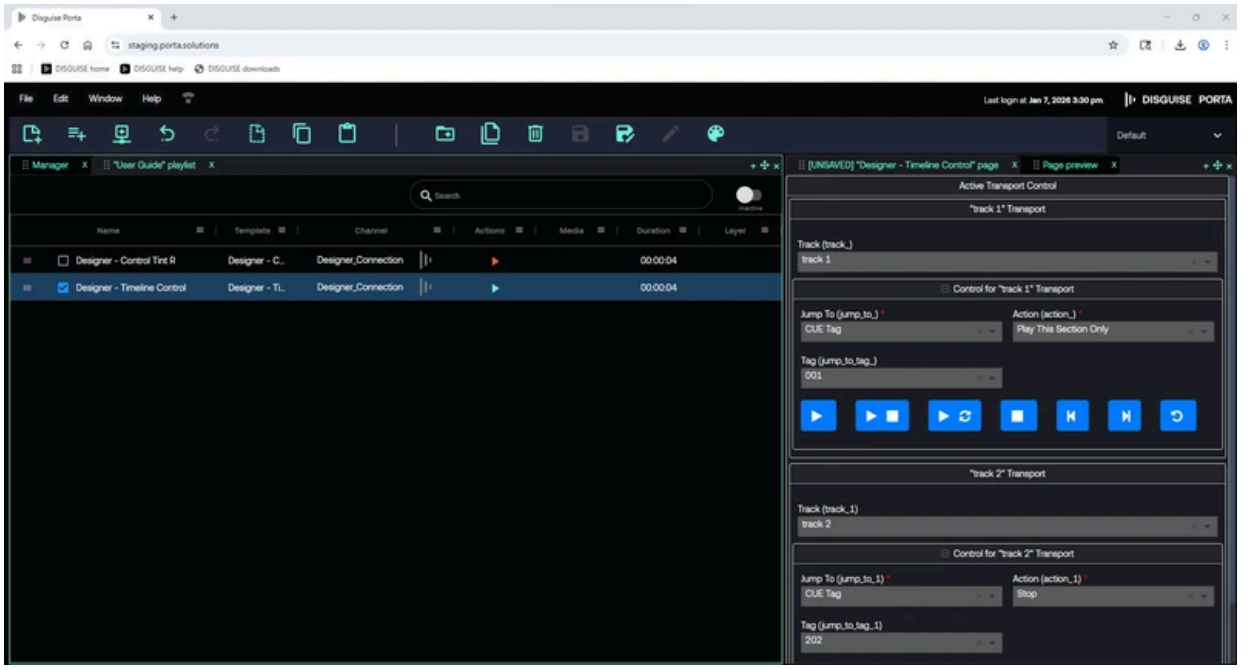
In the example below, the page triggers:

- **CUE 001** on **Track 1**
- **CUE 202** on **Track 2**



Creating Active Transport Control in Template Builder

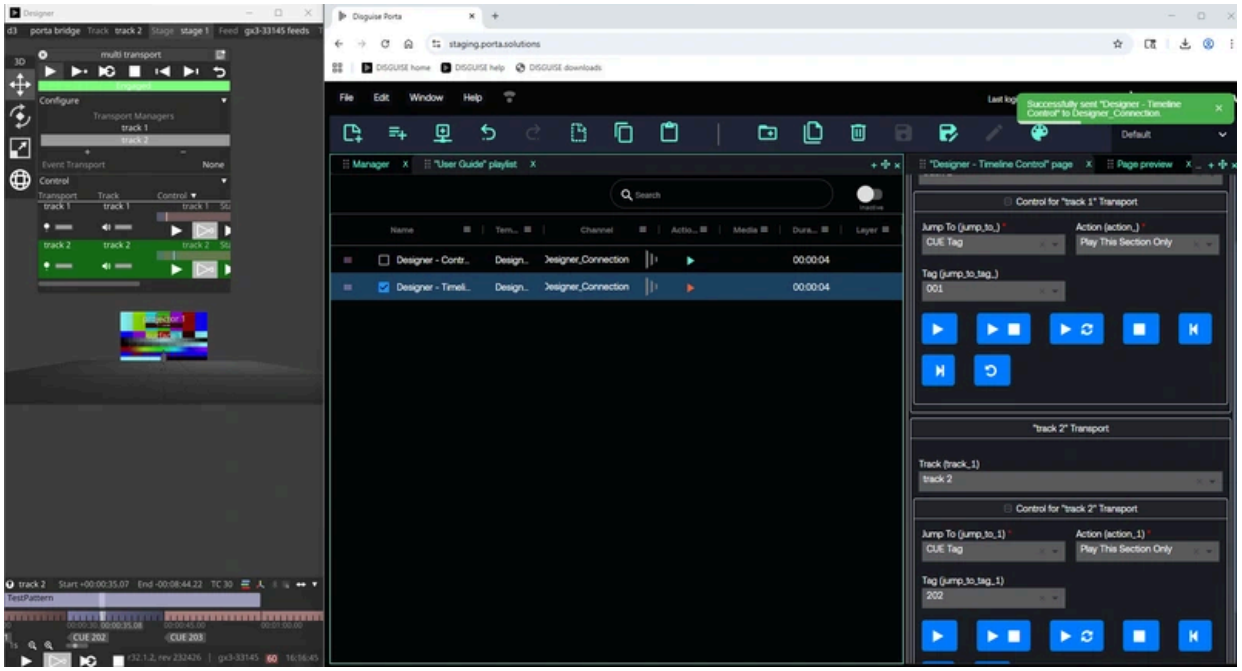
By adding a page to a playlist, the **Active Transport Control** panel is available.



Porta playlist composed of two pages, with one page active

Step 6: Trigger Timeline Cues

Trigger the CUE changes directly in Designer using the playback controls in Porta.



Trigger Transport controls in Designer from Porta

Google API Integration

Features

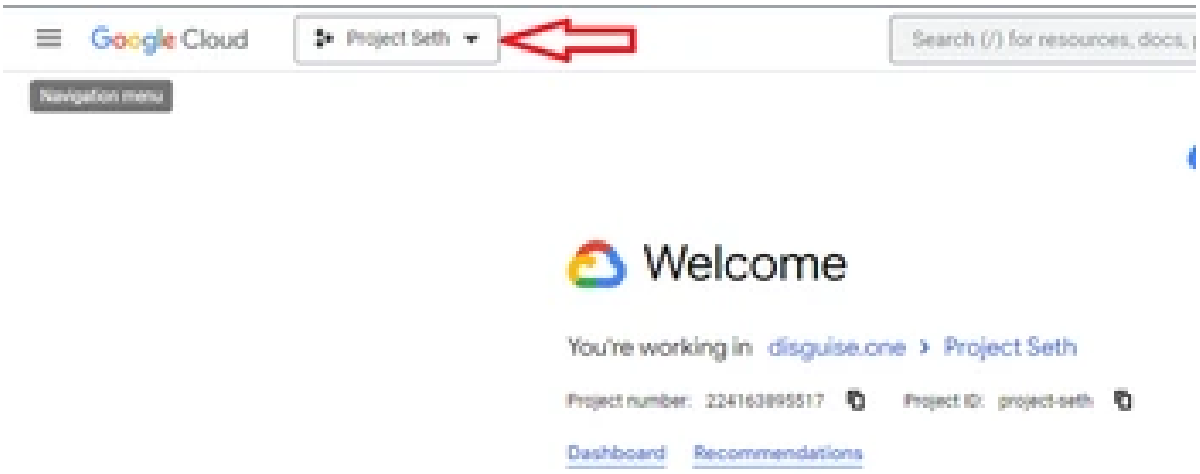
- Google Sheets
- Google Drive
- OAuth

OAuth Configuration for Porta and Google Integration

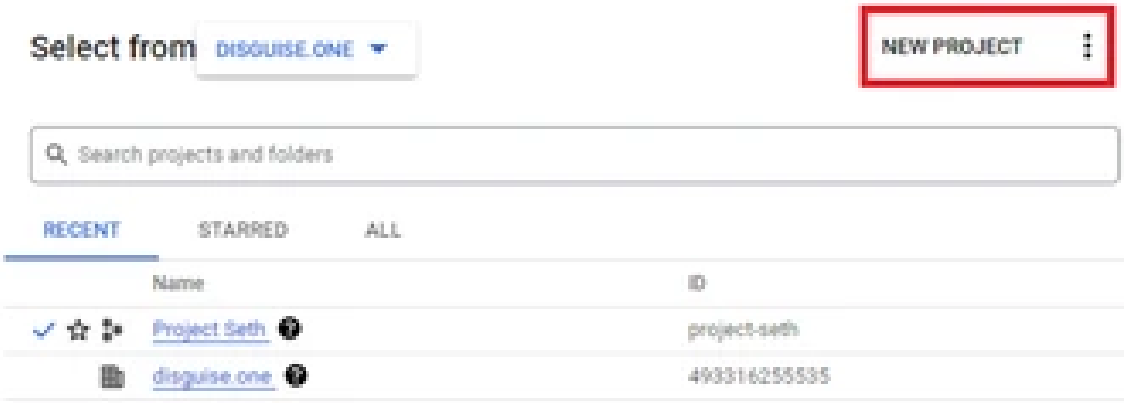
OAuth is an open standard for access delegation, commonly used as a way for internet users to grant websites or applications access to their information on other websites but without giving them the passwords.

Create a new project in Google Cloud and enable Google Sheets and Google Drive APIs

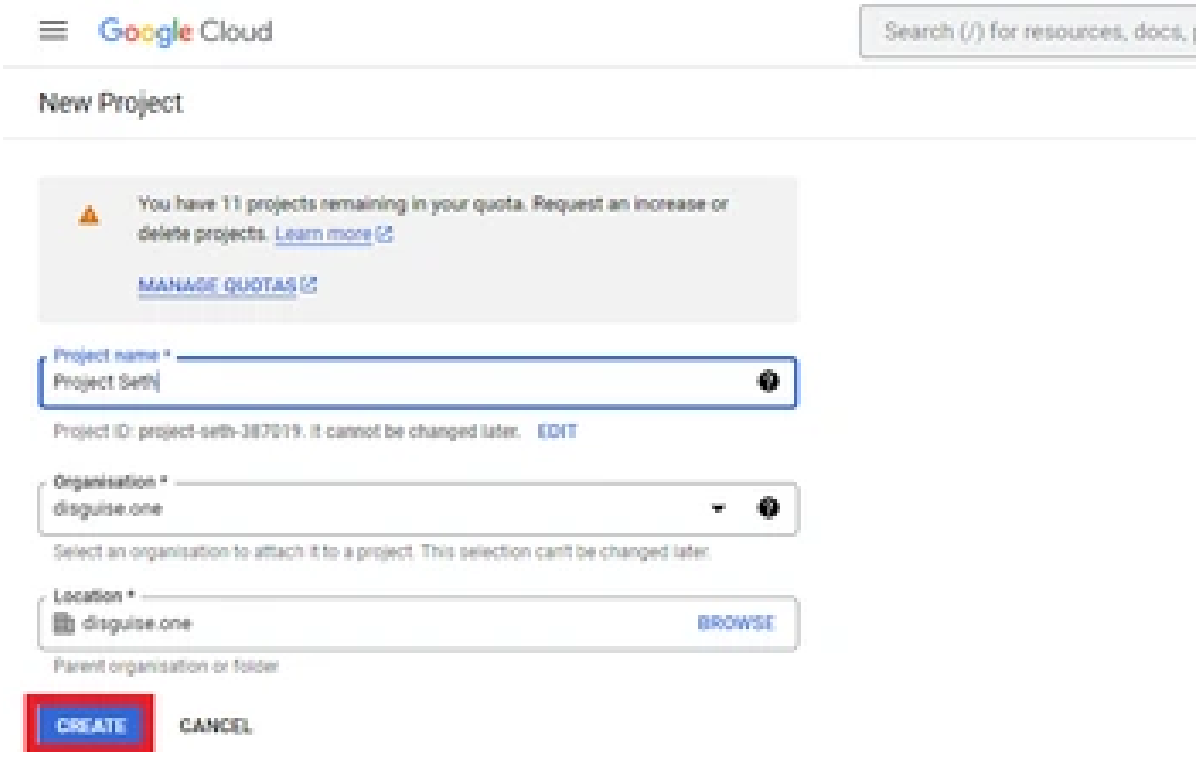
1. Navigate to https://console.cloud.google.com/welcome and create a new project in Google Cloud.



2. Click **NEW PROJECT**.

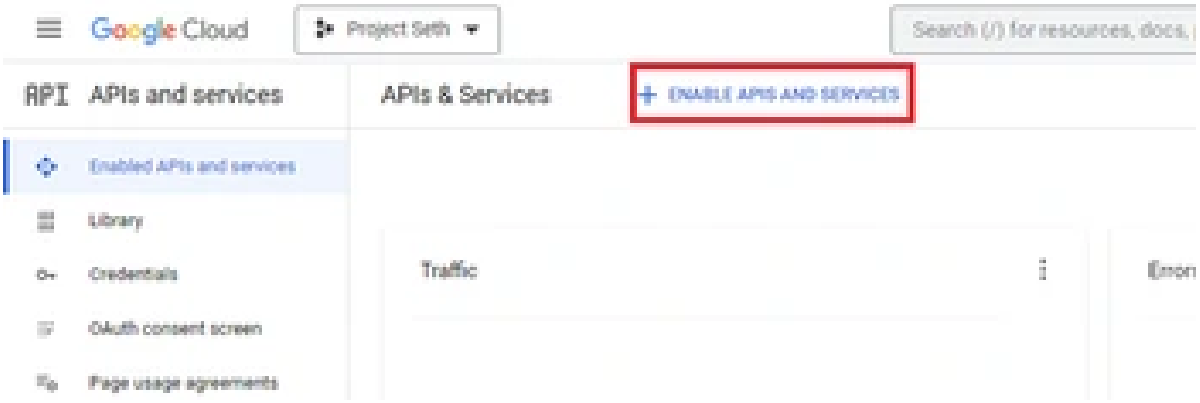


3. Enter the project details.

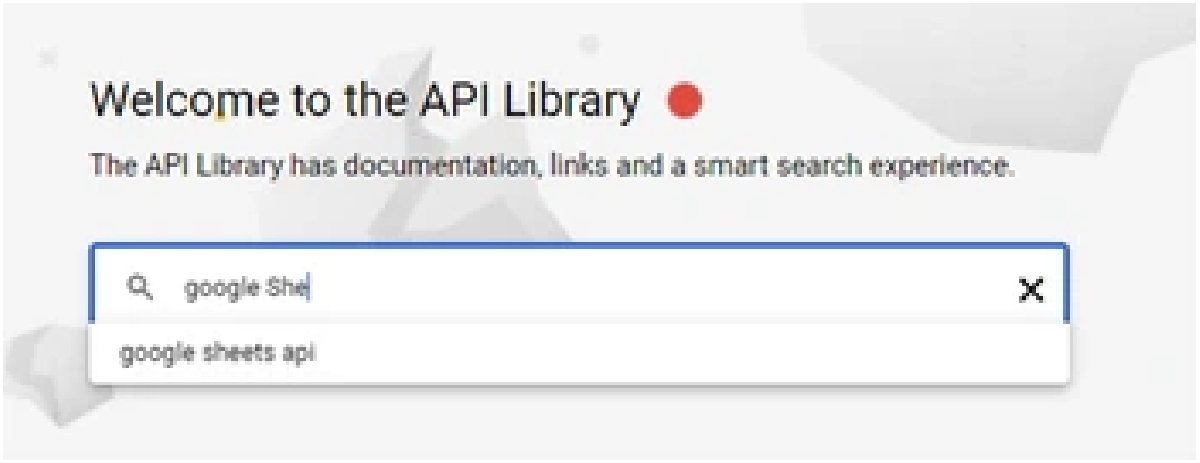


4. Navigate to APIs and services and select **Enabled APIs and services** from the sidebar.

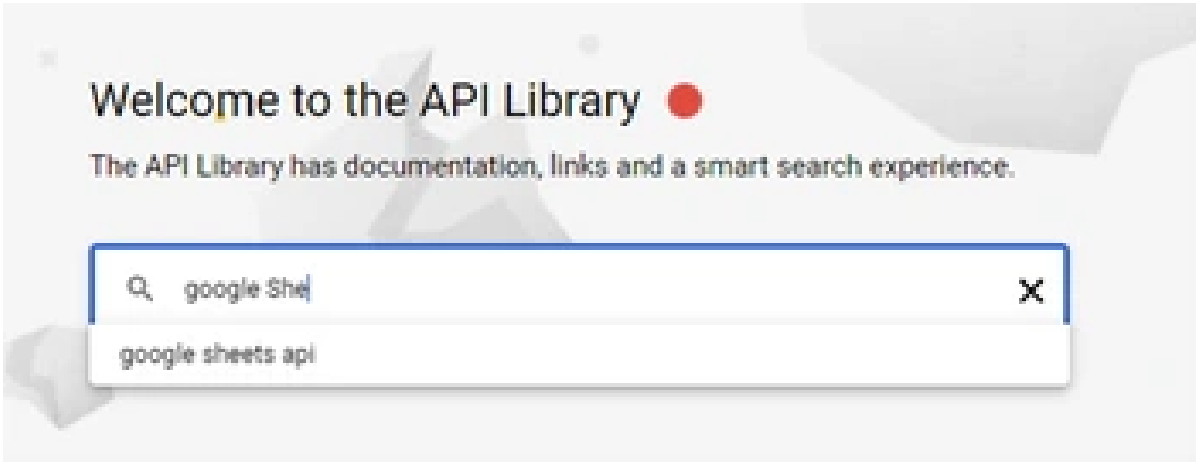
5. Select **+ Enable APIs and services**.



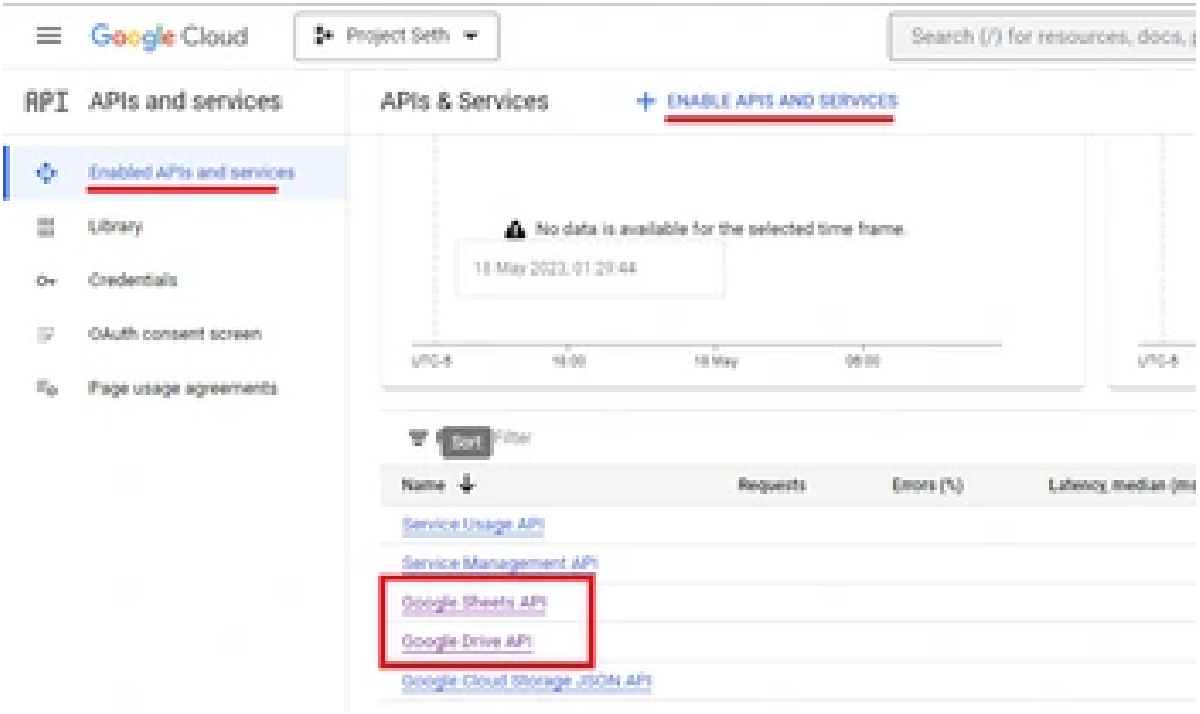
6. Search for and enable Google Sheets API. Then repeat the search to enable Google Drive API.



7. Click **Enable for both Google Sheets API and Google Drive API**.



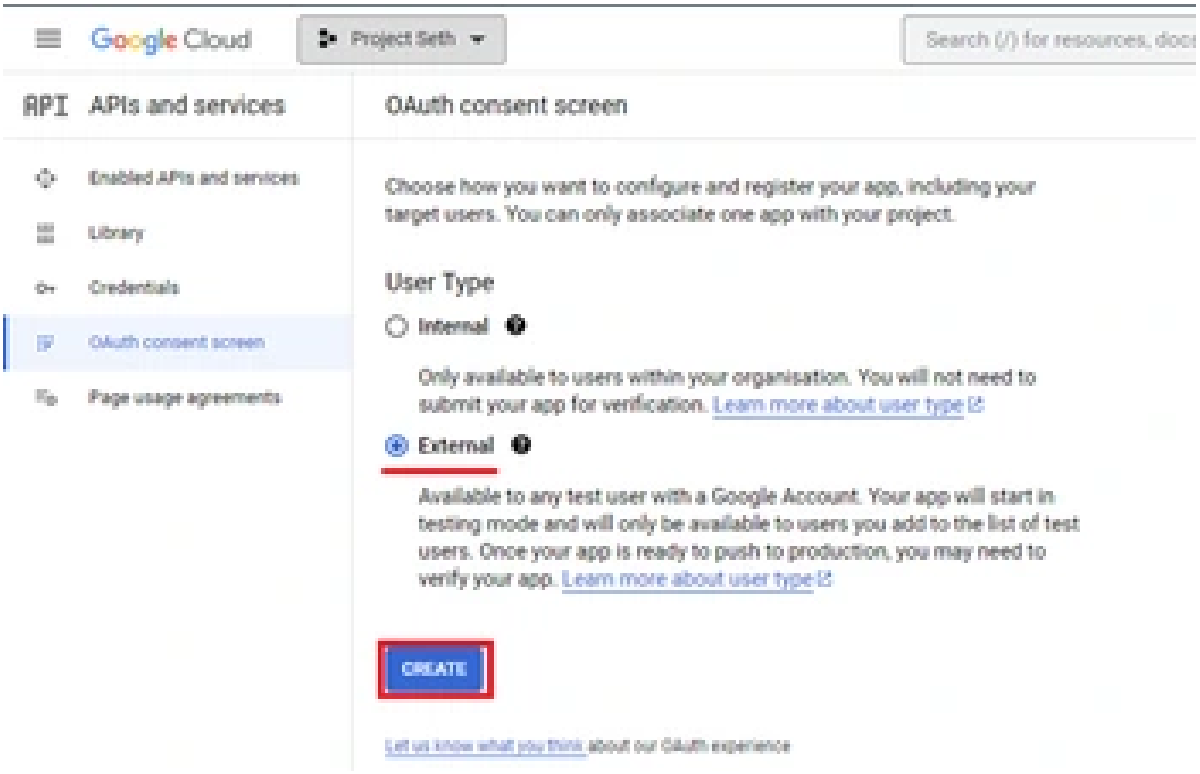
8. Check that Google Sheets API and Google Drive API are enabled.



Edit the OAuth Consent Screen

1. Select the OAuth consent screen from the side menu.
2. Select the User Type, **External**.

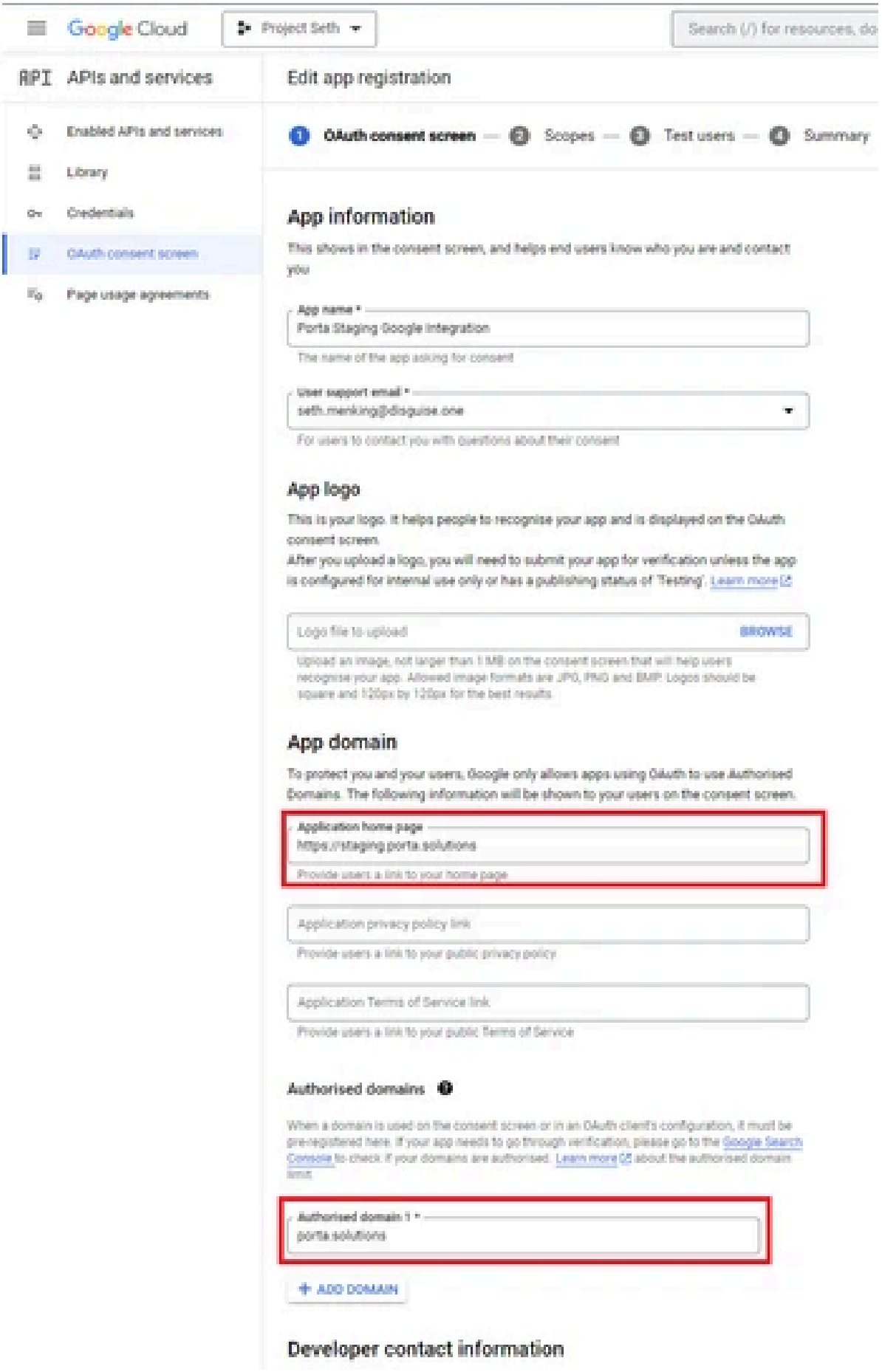
3. Click **Create**.



4. Enter the following information:

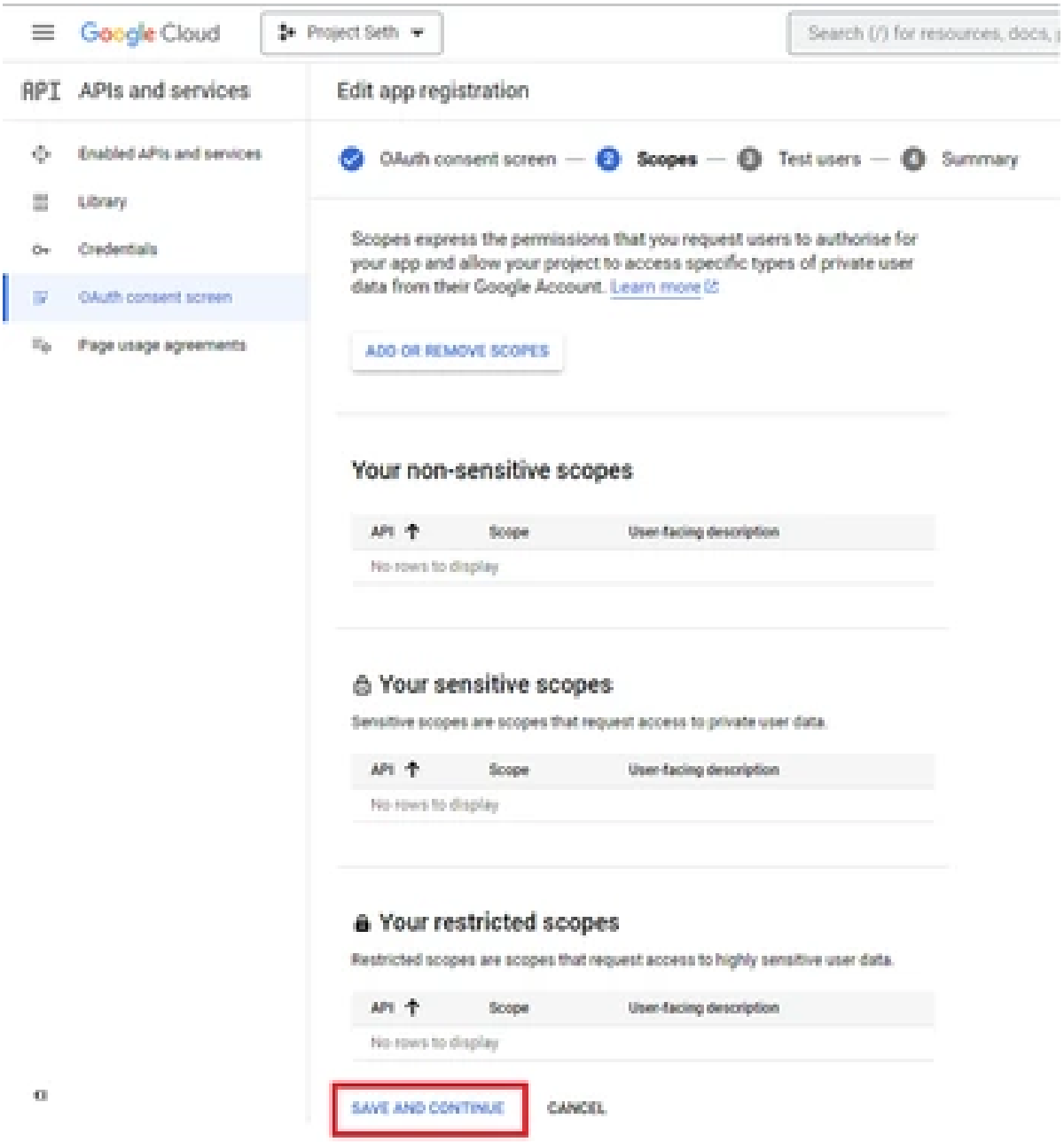
- App name - `eg., Porta Production or Porta Staging`
- User support email - `[your email address]`
- Application home page - `eg., https://staging.porta.solutions`

- Authorised Domain name - `porta.solutions`

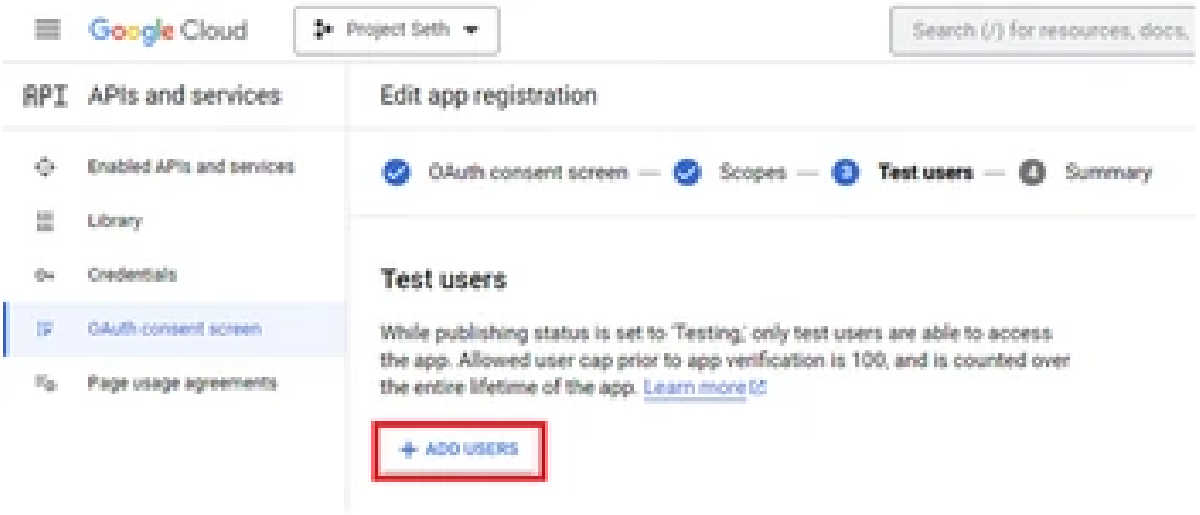

Google Cloud
Project Seth
Search (/) for resources, do
APIs and services
Edit app registration
Enabled APIs and services
Library
Credentials
OAuth consent screen
Page usage agreements
1 OAuth consent screen
2 Scopes
3 Test users
4 Summary
App information
This shows in the consent screen, and helps end users know who you are and contact you
App name *
Porta Staging Google Integration
The name of the app asking for consent
User support email *
seth.menking@disguise.one
For users to contact you with questions about their consent
App logo
This is your logo. It helps people to recognise your app and is displayed on the OAuth consent screen.
After you upload a logo, you will need to submit your app for verification unless the app is configured for internal use only or has a publishing status of 'Testing'. Learn more
Logo file to upload
BROWSE
Upload an image, not larger than 1 MB on the consent screen that will help users recognise your app. Allowed image formats are JPG, PNG and BMP. Logos should be square and 120px by 120px for the best results.
App domain
To protect you and your users, Google only allows apps using OAuth to use Authorised Domains. The following information will be shown to your users on the consent screen.
Application home page
https://staging.porta.solutions
Provide users a link to your home page
Application privacy policy link
Provide users a link to your public privacy policy
Application Terms of Service link
Provide users a link to your public Terms of Service
Authorised domains
When a domain is used on the consent screen or in an OAuth client's configuration, it must be pre-registered here. If your app needs to go through verification, please go to the Google Search Console to check if your domains are authorised. Learn more about the authorised domain limit.
Authorised domain 1 *
porta.solutions
ADD DOMAIN
Developer contact information



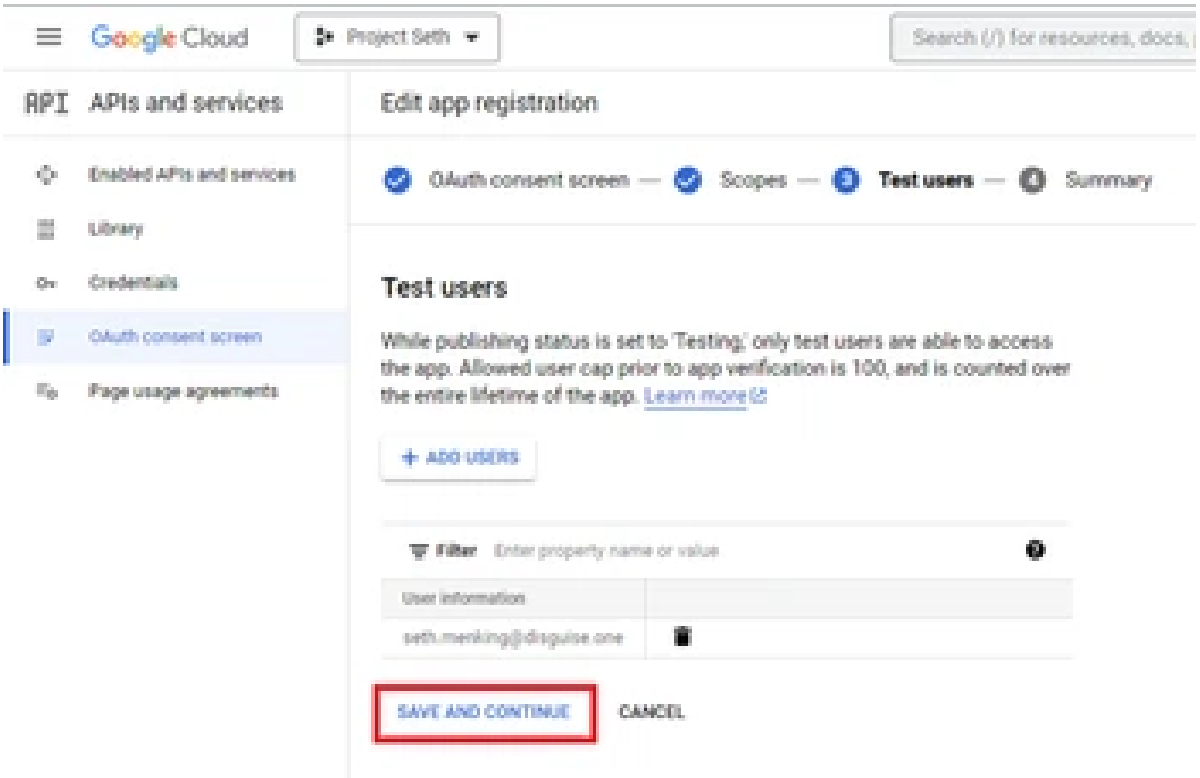
5. Click **SAVE AND CONTINUE**.
6. Confirm the default settings for scopes and click **SAVE AND CONTINUE**.



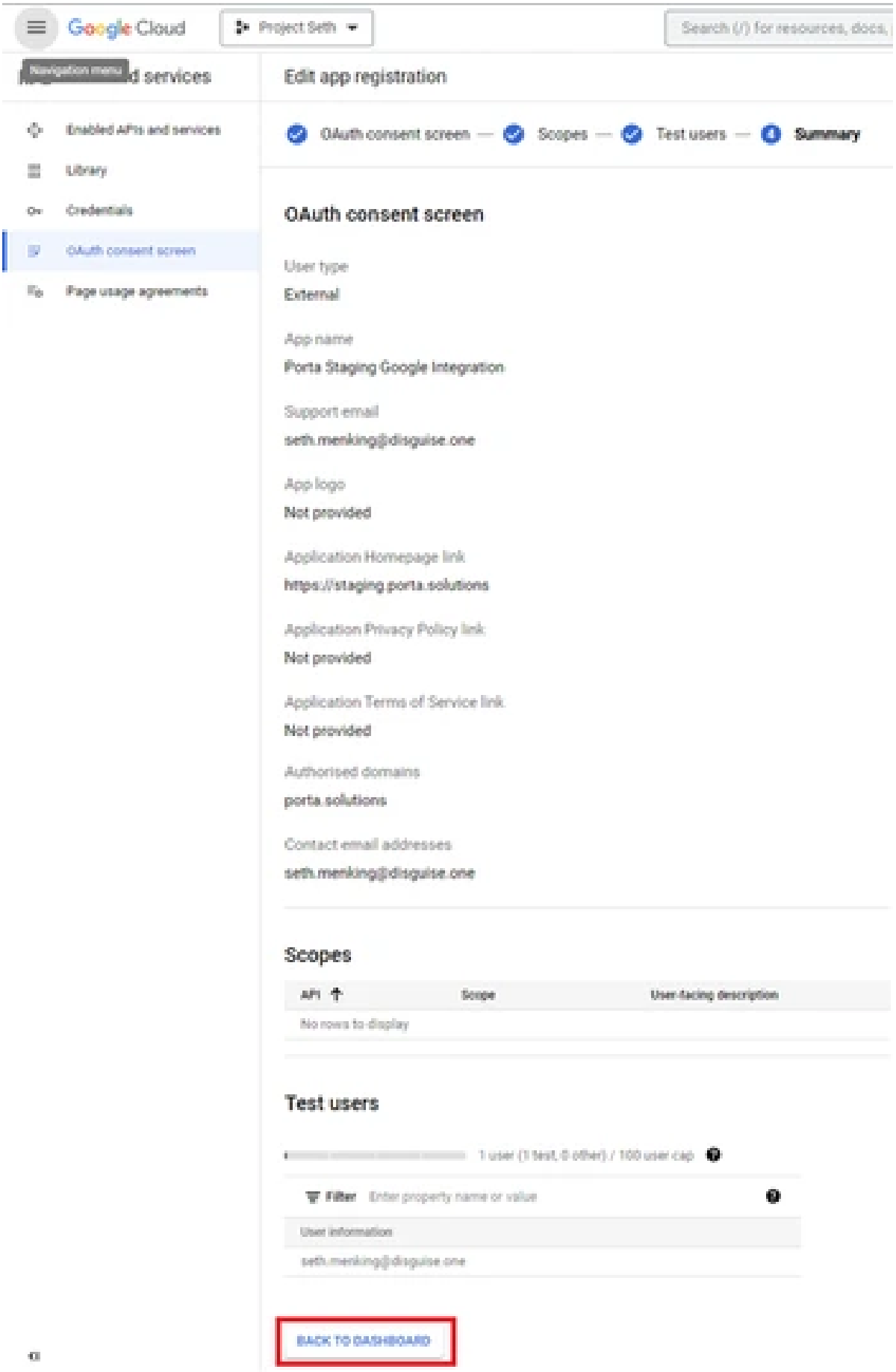
7. Click **+ADD USERS** to add Test users.



8. Enter the Test User email address(es) and click **ADD**.
9. Confirm the Test User email address(es) have been added and click **SAVE AND CONTINUE**.

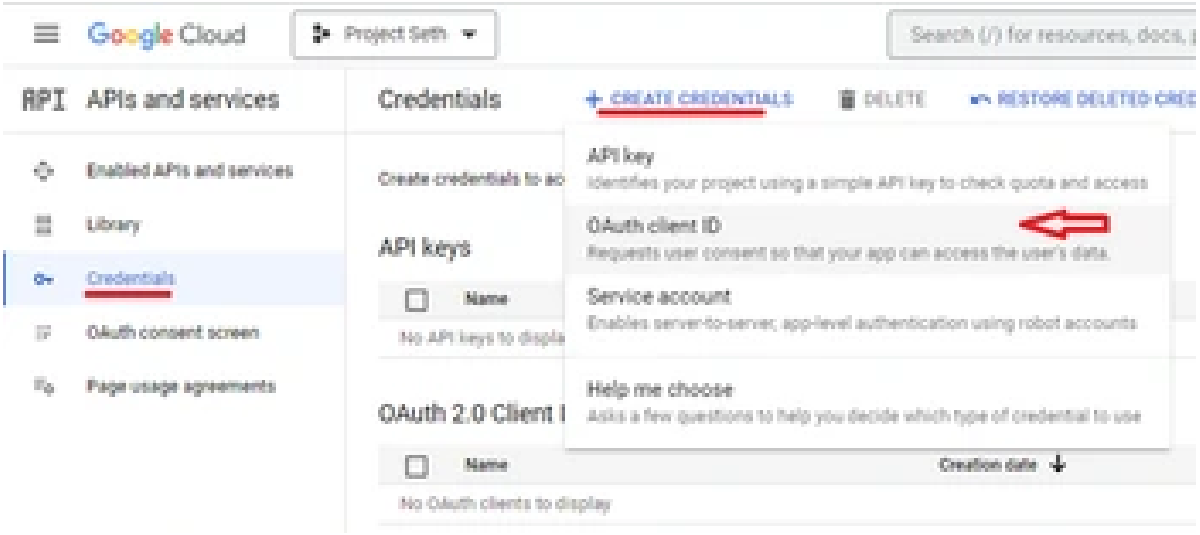


10. Confirm the details are correct on the summary page and click **BACK TO DASHBOARD**.


Google Cloud
Project Seth
Search (/) for resources, docs,
Navigation menu
d services
Enabled APIs and services
Library
Credentials
OAuth consent screen
Page usage agreements
Edit app registration
OAuth consent screen
Scopes
Test users
4
Summary
OAuth consent screen
User type
External
App name
Porta Staging Google Integration
Support email
seth.menking@disguise.one
App logo
Not provided
Application Homepage link
https://staging.porta.solutions
Application Privacy Policy link
Not provided
Application Terms of Service link
Not provided
Authorised domains
porta.solutions
Contact email addresses
seth.menking@disguise.one
Scopes
API
Scope
User-facing description
No rows to display
Test users
1 user (1 test, 0 other) / 100 user cap
Filter
Enter property name or value
User information
seth.menking@disguise.one
BACK TO DASHBOARD

Create Credentials

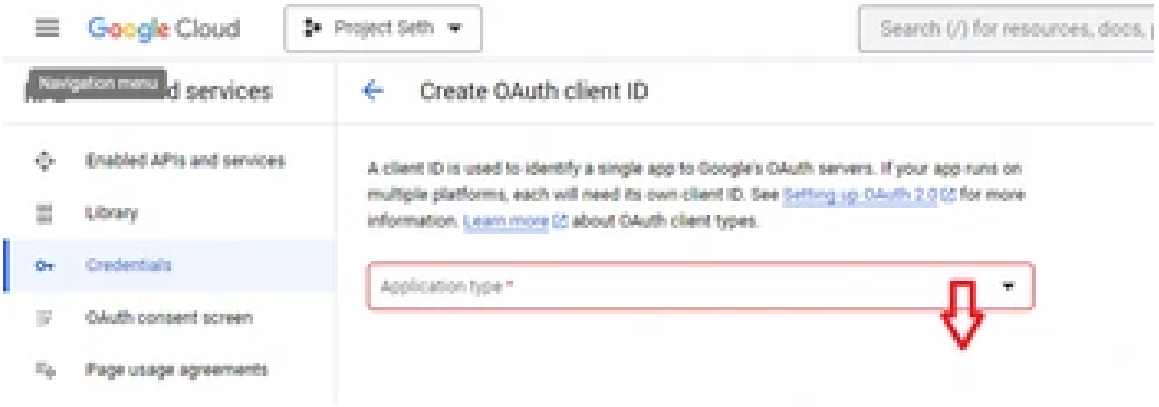
1. Select **Credentials** from the side menu.
2. Click **+ Create Credentials**.



3. Select OAuth client ID from the list.Google Cloud create credentials

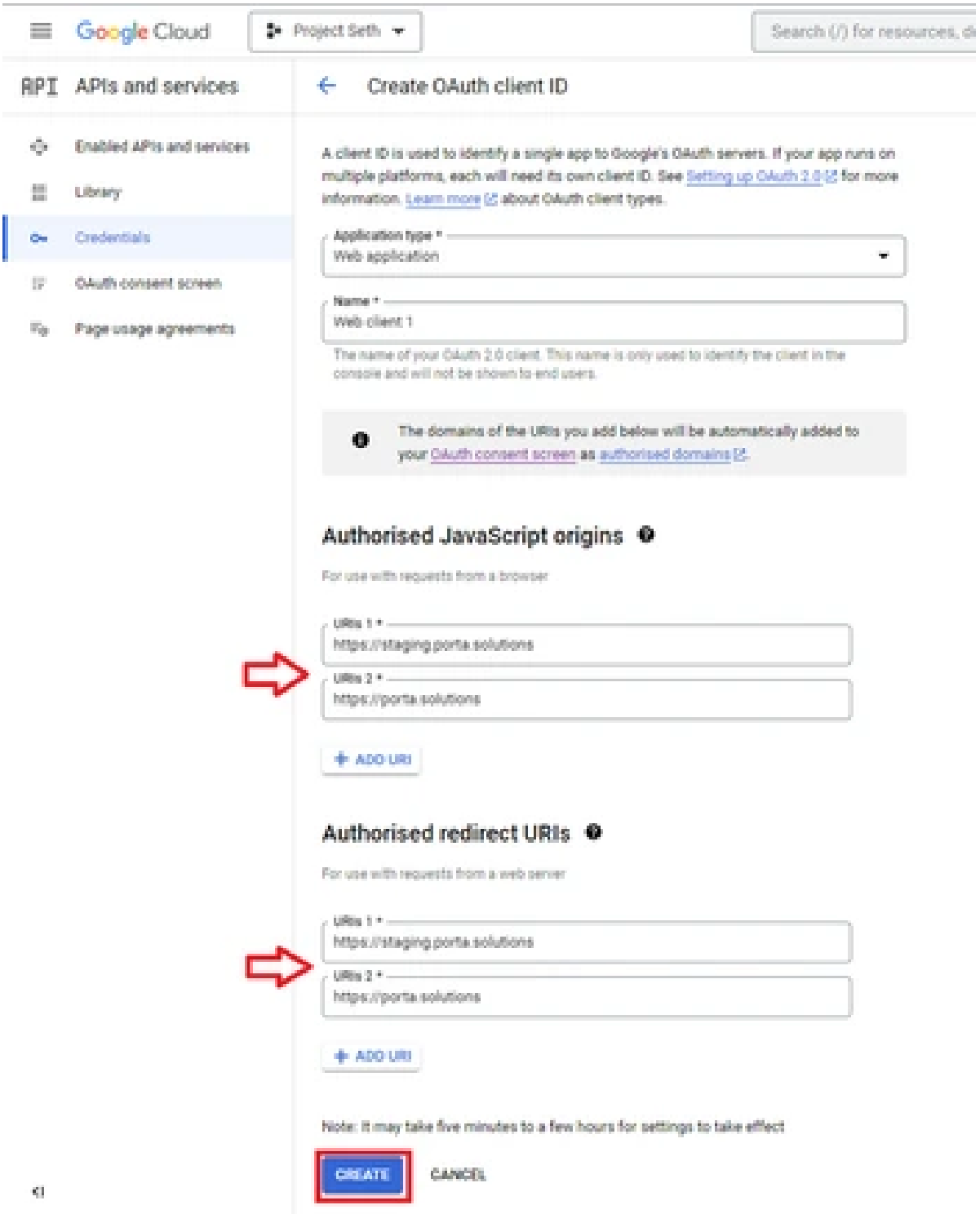
4. Complete the form:

- **Application type**: Web Application Google Cloud credentials type - web application

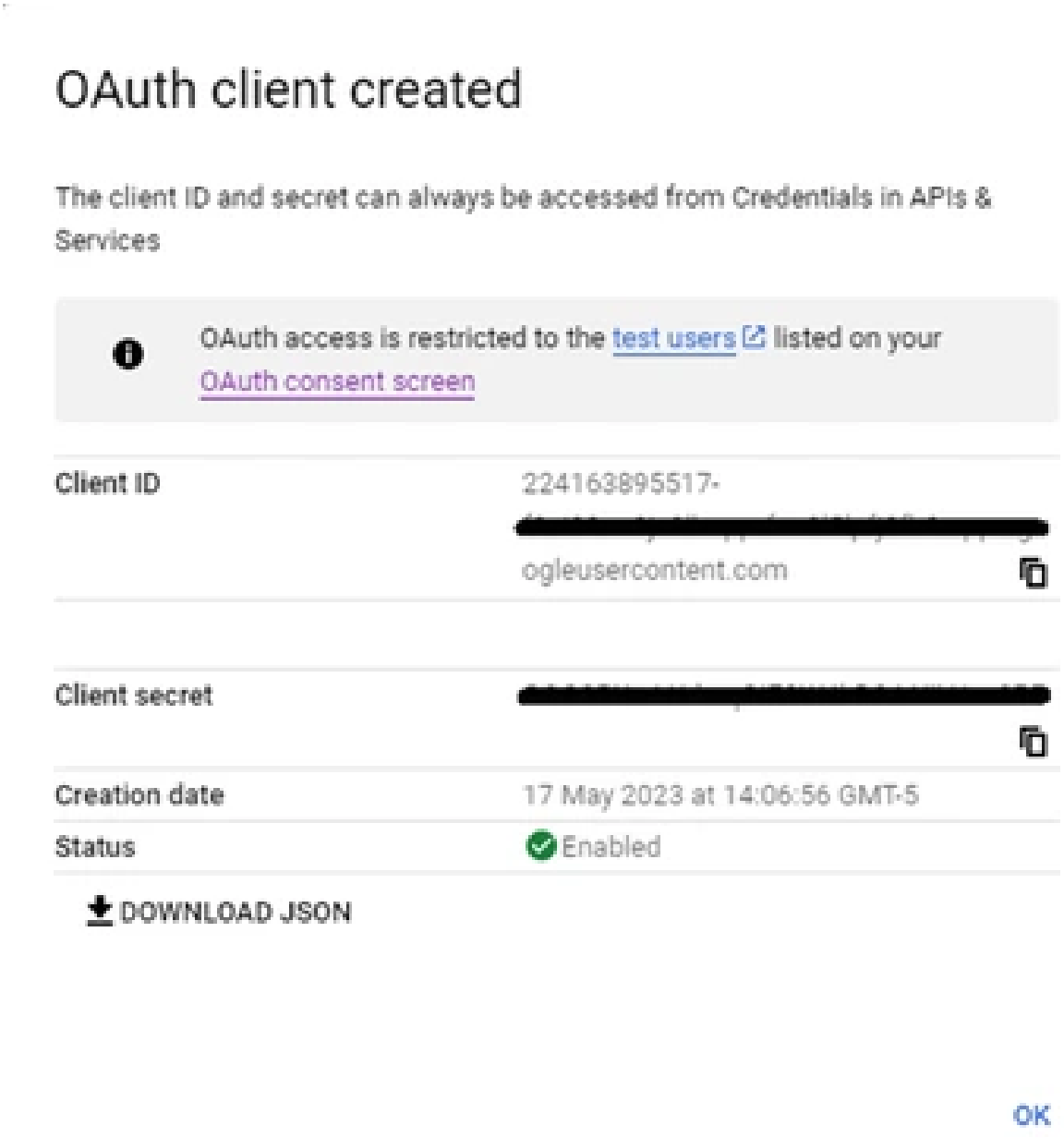


- **Name:** Web client 1
- **Authorised Javascript origins** - enter the domains you will use this OAuth on.
- For example:
- **URIs 1:** https://staging.porta.solutions
- **URIs 2:** https://porta.solutions
- Authorised redirect URIs - also enter the domains you will use this OAuth on.
- **URIs 1:** https://staging.porta.solutions
- **URIs 2:** https://porta.solutions

5. Click **Create**.



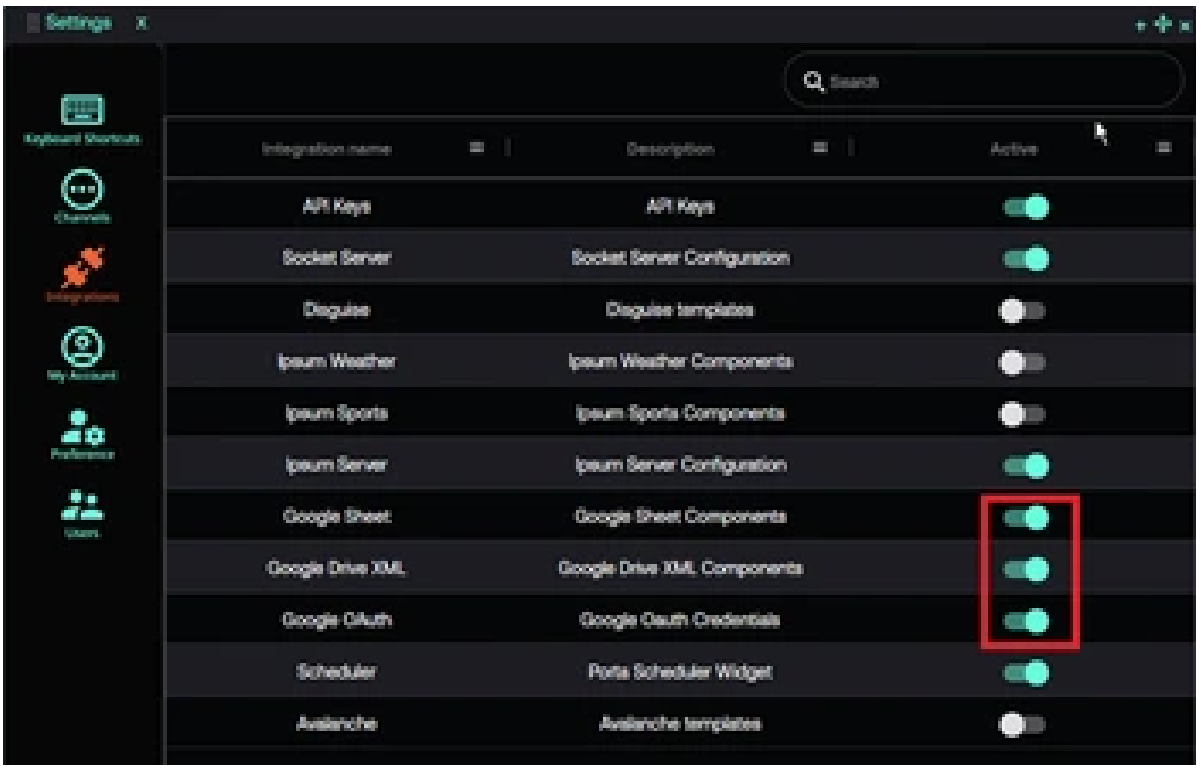
6. Copy and save the **Client ID** and **Client secret** to configure the Porta settings. You can also download the .JSON file and manually copy from it.



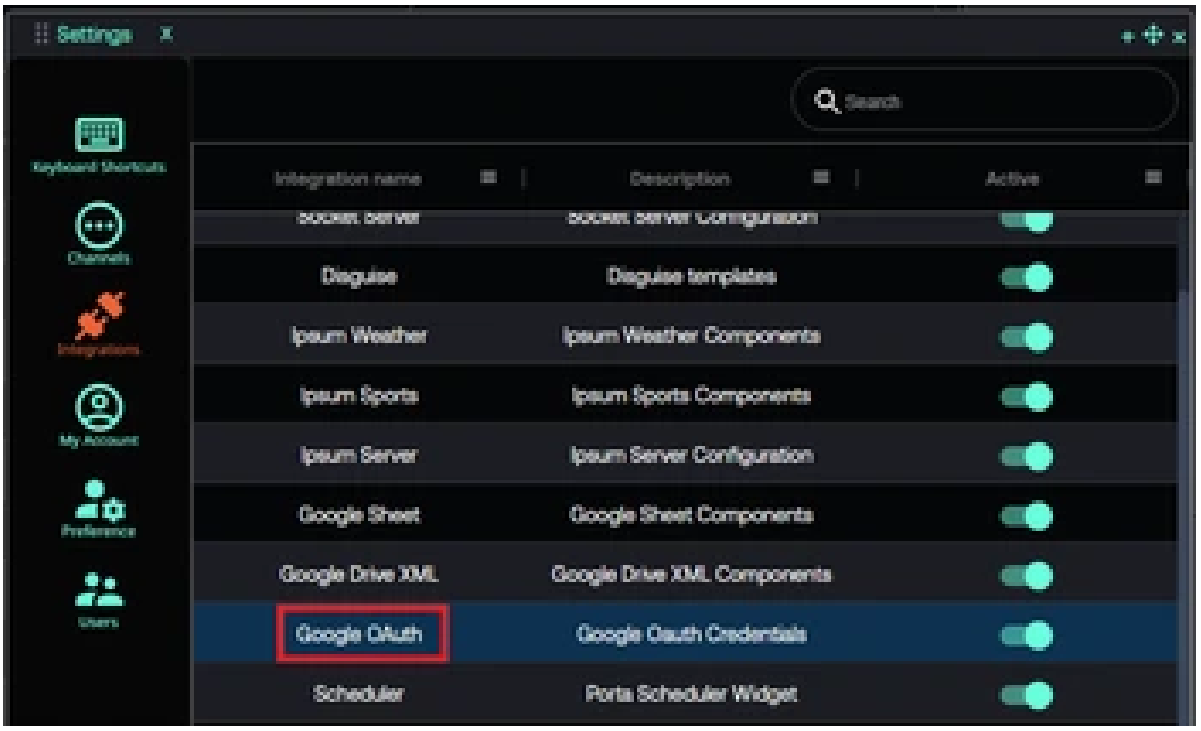
Porta Configuration

1. Navigate to **Settings > Integrations**.

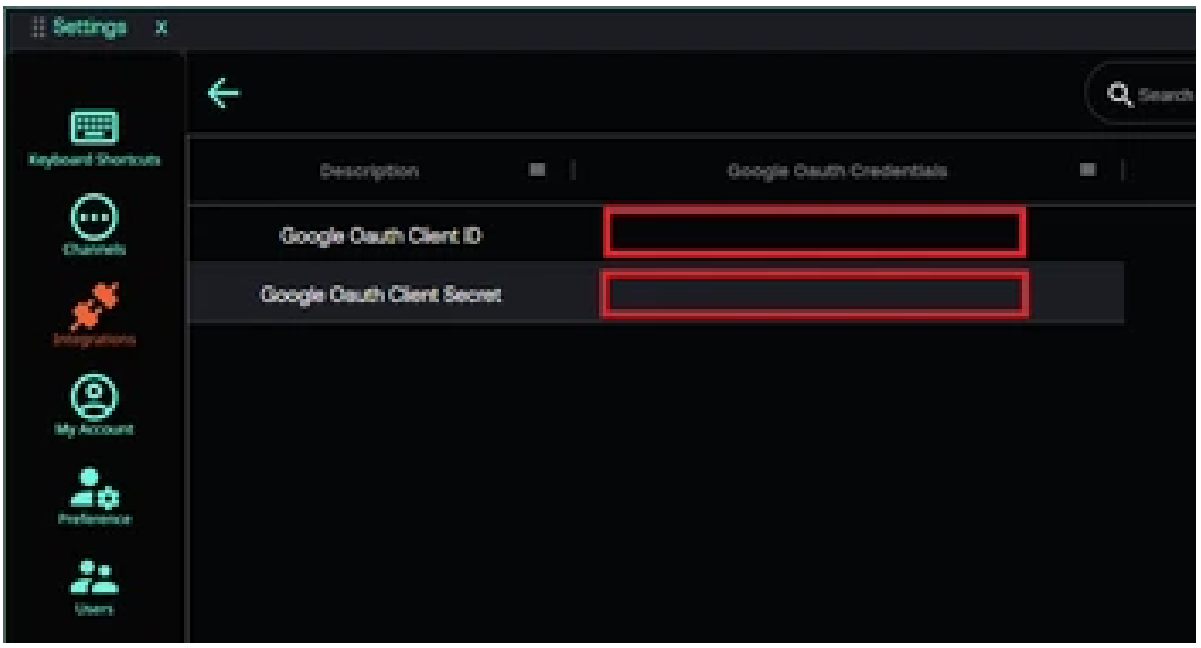
2. Activate the **Google Sheet**, **Google Drive XML**, and **Google OAuth** integrations.



3. Double-click on **Google OAuth** from the list of integrations.

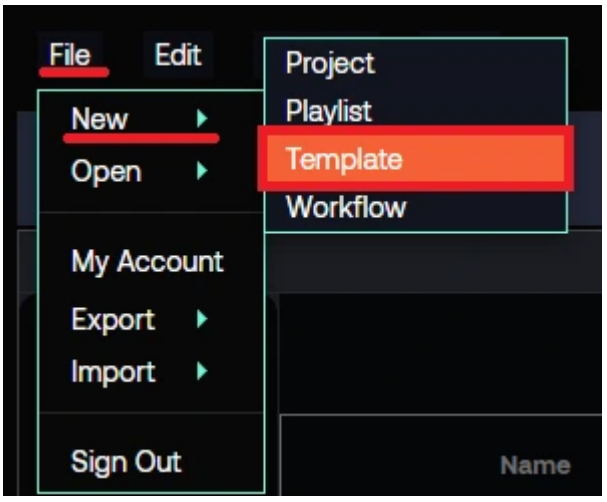


4. Add the **Client ID** and **Client secret** saved from the Google OAuth page.

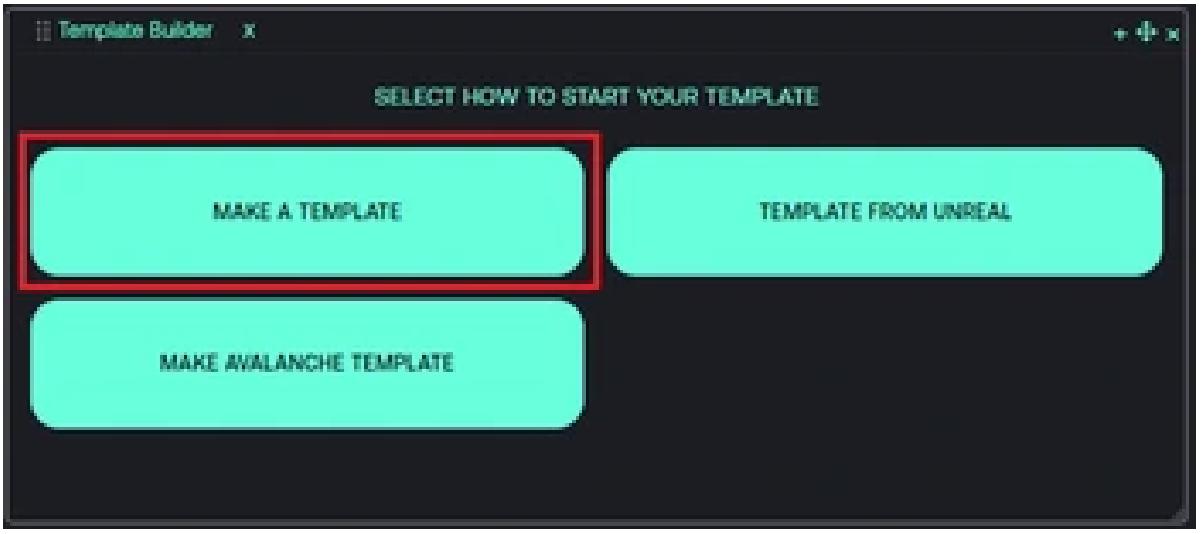


Using Google Sheets in Porta

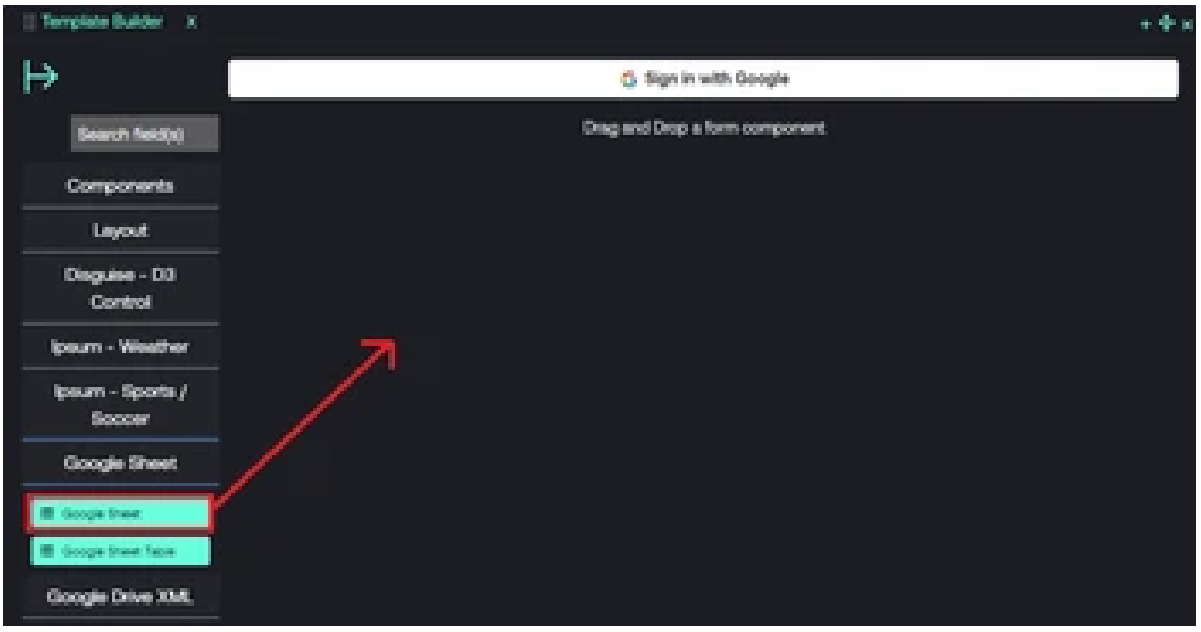
1. Click **File** > **New** > **Template** to create a new template.



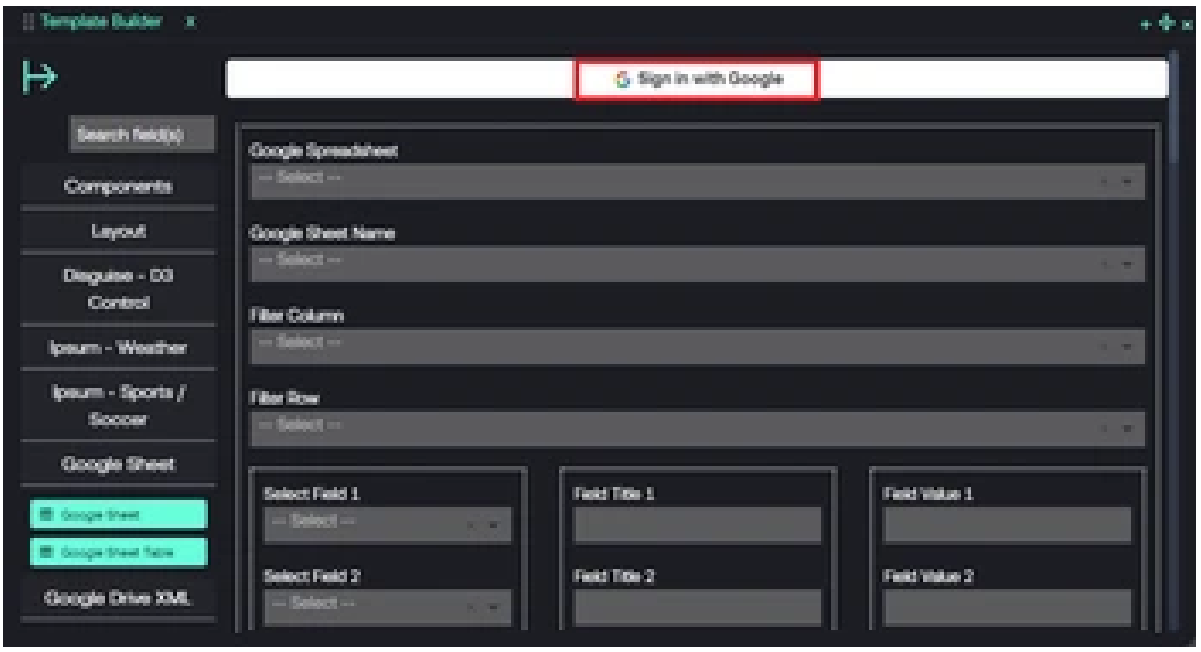
2. Click **MAKE A TEMPLATE**.



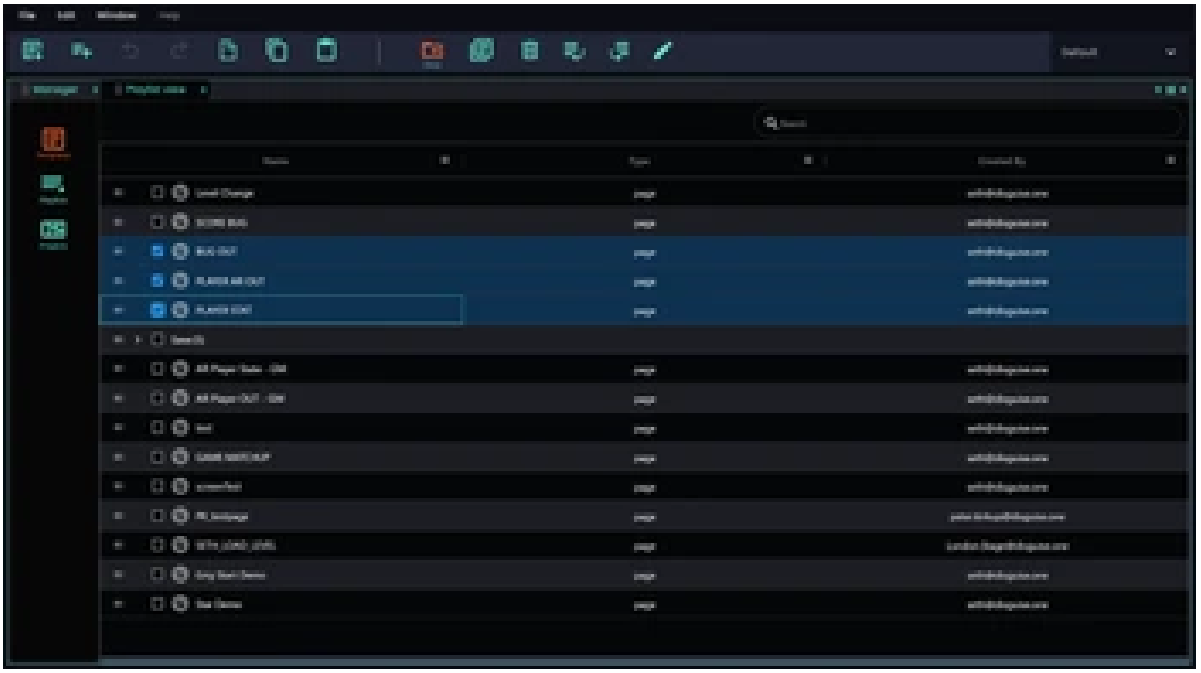
3. Select **Google Sheet** from the Template Builder options.
4. Click on **Google Sheet**.



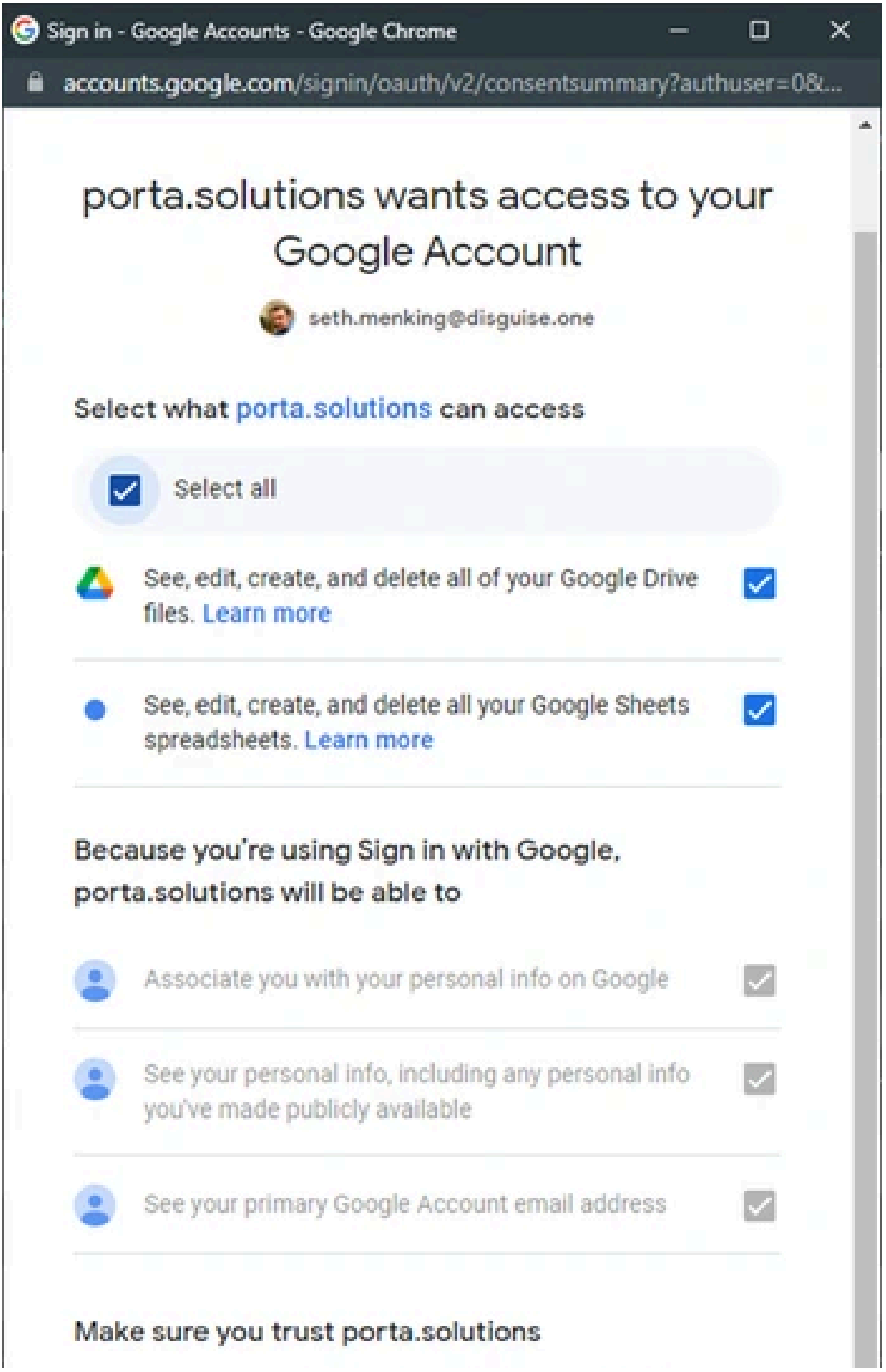
5. Click **Sign in with Google**.

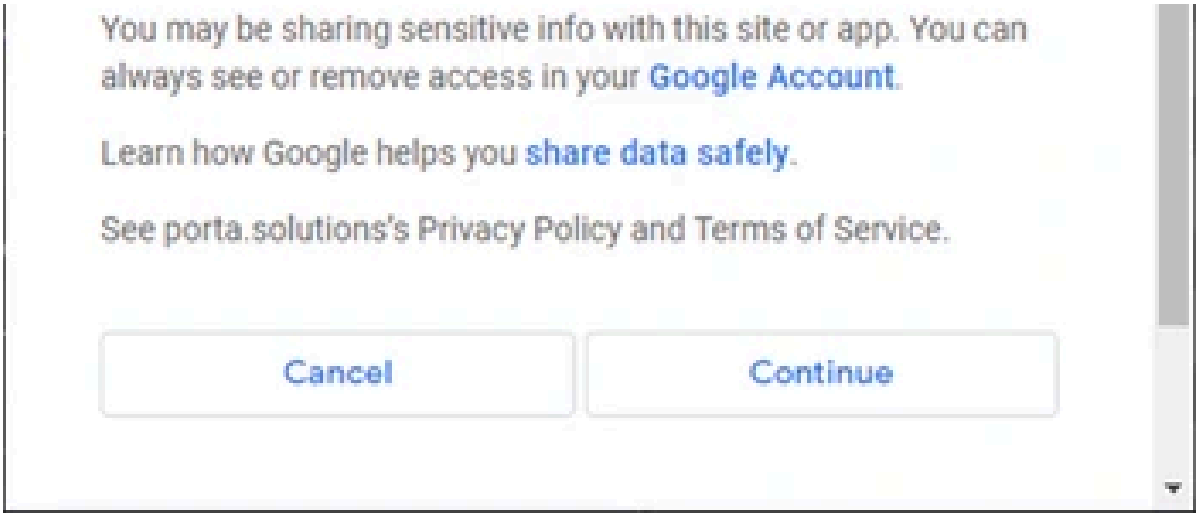


6. Click on your Google user credentials to choose your Google account.

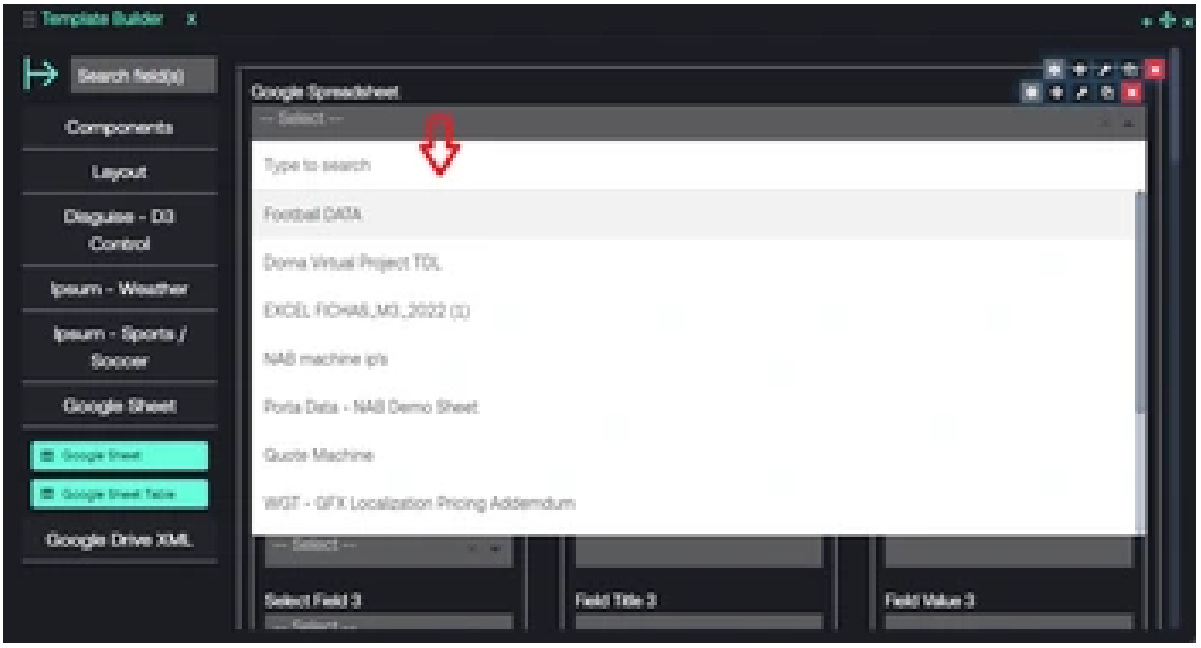


7. Allow access to see, edit, create and delete Google Drive files and Google Sheet spreadsheets.


Sign in - Google Accounts - Google Chrome
accounts.google.com/signin/oauth/v2/consentsummary?authuser=0&...
porta.solutions wants access to your Google Account
seth.menking@disguise.one
Select what porta.solutions can access
Select all
See, edit, create, and delete all of your Google Drive files. Learn more
See, edit, create, and delete all your Google Sheets spreadsheets. Learn more
Because you're using Sign in with Google, porta.solutions will be able to
Associate you with your personal info on Google
See your personal info, including any personal info you've made publicly available
See your primary Google Account email address
Make sure you trust porta.solutions



8. Select a Google Sheet from the dropdown list.

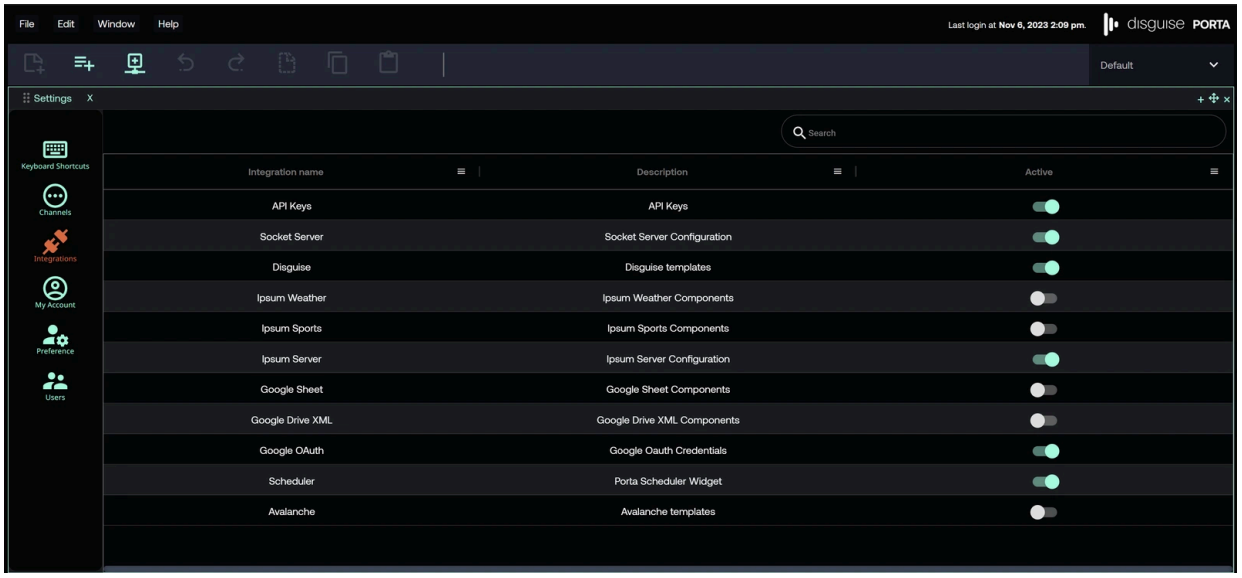


Integrations

The Integrations settings menu allows you to turn on and off optional integrations

Porta integrates with the following:

- **API Keys** - Porta API Keys
- **Socket Server** - Socket Server Configuration
- **Disguise** - Disguise templates
- **Ipsum Weather** - Ipsum Weather Components
- **Ipsum Sports** - Ipsum Sports Components
- **Ipsum Server** - Ipsum Server Configuration
- **Google Sheet** - Google Sheet Components
- **Google Drive XML** - Google Drive XML Components
- **Google OAuth** - Google Oauth Credentials
- **Scheduler** - Porta Scheduler Widget
- **Motion Design/Avalanche** - Avalanche templates



Motion Design Integration

Porta integrates with Unreal Engine's Motion Design. Launched in 2024, Motion Design is an Internal Editor plugin for broadcasting. You can use it for graphics creation, playout, and real-time data visualization for live television, news, weather, sports production, interstitial graphics, and a variety of other use cases that call for rapid design and animation workflows.

Further Reading

- Unreal Engine's Developer Community Course
- Motion Design Quickstart Guide

Porta Newsroom Integration via MOS Gateway

The Newsroom Computer Systems (NRCS) integration through MOS enables more dynamic and simplified broadcast show control, while unlocking more agile collaboration across departments.

NRCS allows:

- Rundown management
- Customisable running order for content
- Playout control
- Computer-assisted machine control
- Indexing of incoming news stories and wires

MOS Gateway retains all loaded playlists, playlist and event status information. It can also distribute commands, update status, event changes and messages.

Real-time changes can be made to the rundown, and those will be synced live with Porta.

MOS Gateway and Newsroom Plugin

The MOS Gateway is part of the Porta Bridge and supports the following features:

- Porta Playlist Management from the NRCS.
- Live Updates from NRCS to Porta.
- Modify and Sync Porta Playlists with NRCS.
- Live snapshot from Unreal when modifying a porta Page.
- Make pages from templates to add to Newsroom rundowns.

The Newsroom Plugin

The Newsroom plugin is a browser extension that allows you to:

- Create a Porta Page from a Newsroom template.
- Add a Porta Page to a Newsroom rundown.
- See updates to a Porta Page in real-time when using the Unreal Engine.

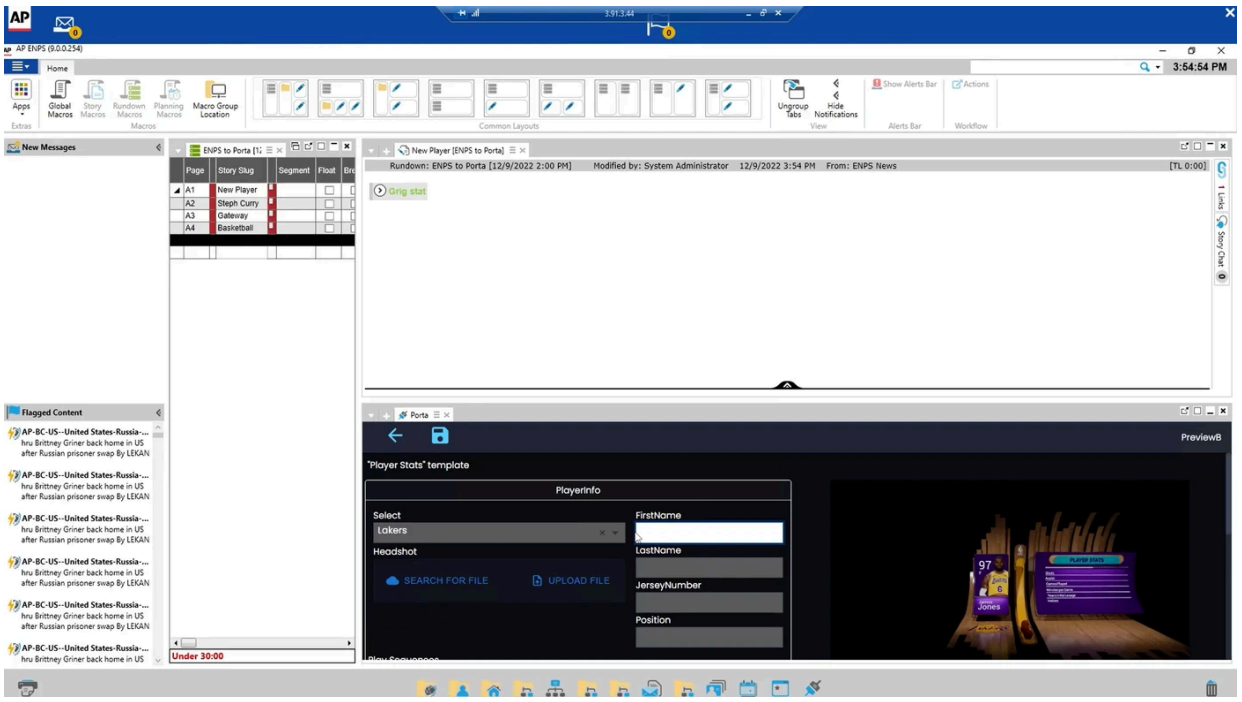
The URL can be accessed in the company information by the Porta system admin. The admin can set:

- **NR Url**: the url that is needed to connect the newsroom plugin to the NCRS

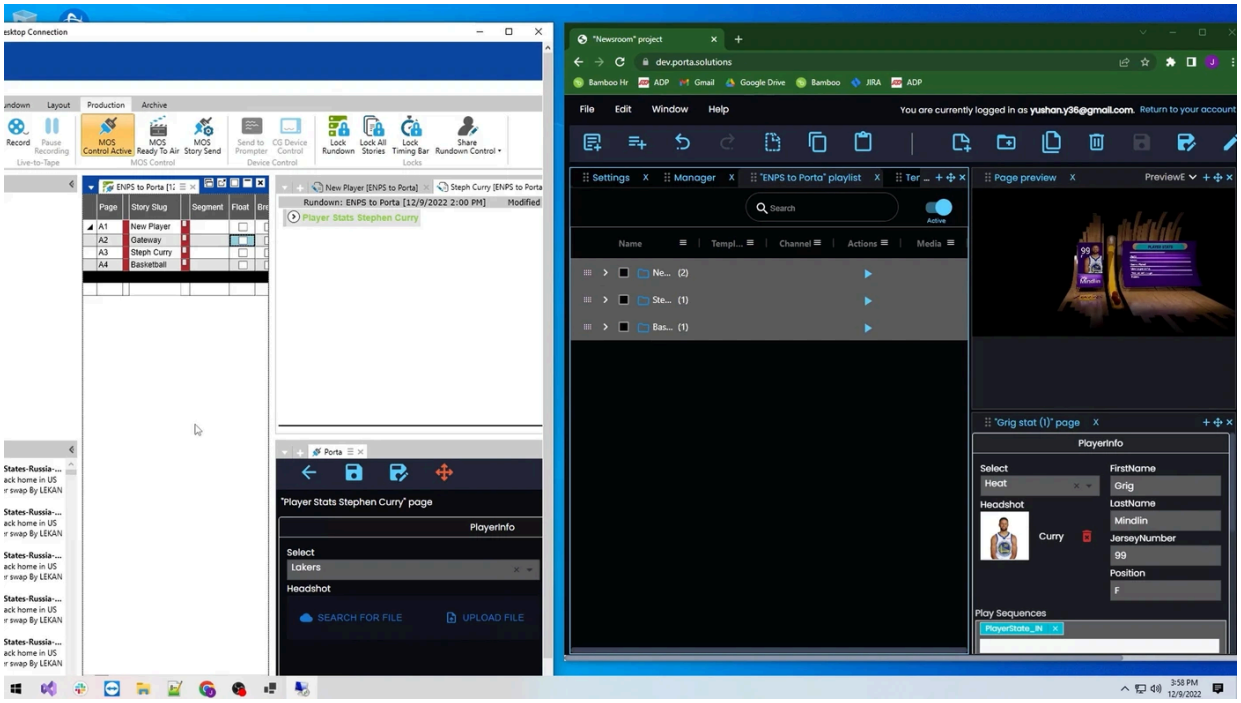
- **NR sending delay(ms)**: the delay in milliseconds between sending messages to unreal when a change is made in a page.
- **NR Preview channel**: the name of the channel that is used for the live preview of the page in the newsroom.

Additional MOS Features

- Still Preview



See how it works



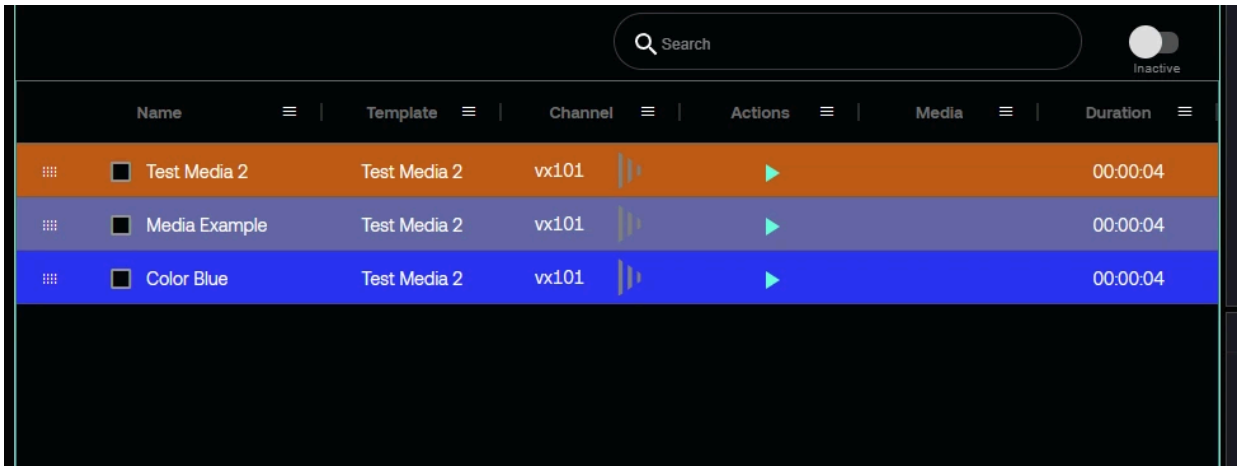
Newsroom Computer System (NRCS) with MOS Gateway Demo Video

Page Colour

In order to help organise your playlist you can change the colour of Stories, Groups and Pages within a playlist.

Change the colour of a page

1. Open a playlist.
2. Select the story or group you want to change the colour of.
3. Select the colour icon on the far right of the top menu.
4. From this menu select a colour and hit **Save**.



> **Note**
>
> You can create a custom colour by selecting the **Select Custom Colour** at the bottom of the colour select menu.

Page Editor

The Page Editor allows you to update the page that is ready to play. When you create a page you can fill in the info based off of the **Porta Template**.

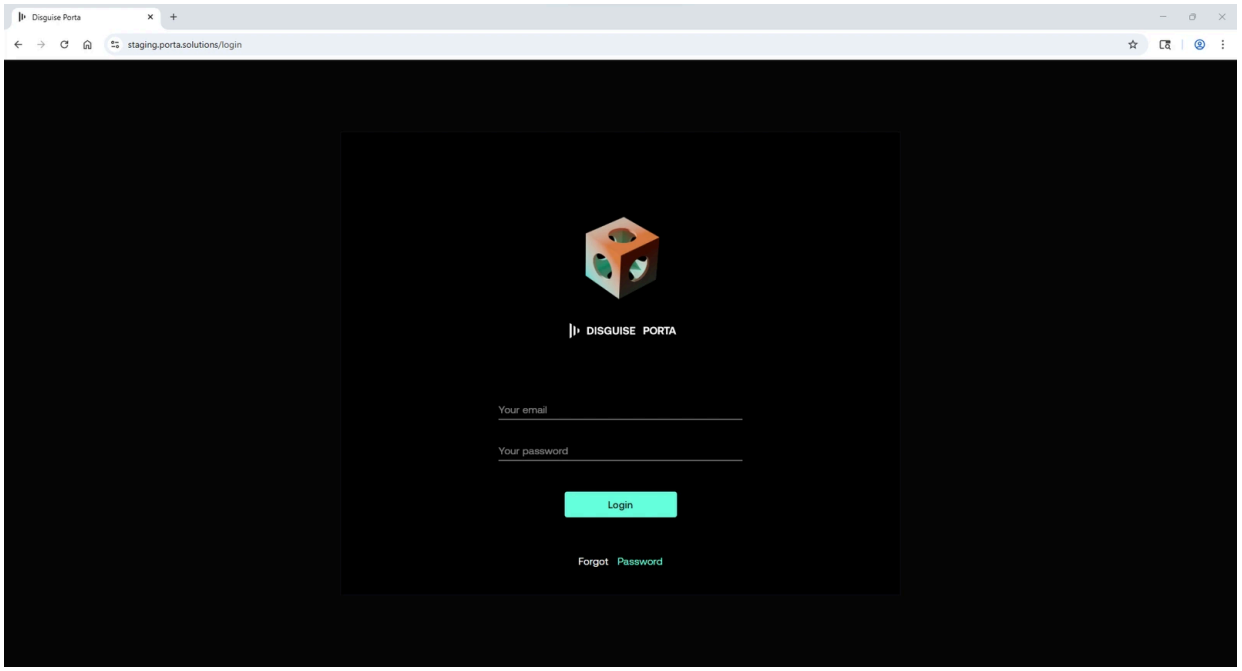
See more of the Porta Template Builder.

Once you create a template you can view the Page Editor by selecting a page from a playlist.

If you close the page editor you can reopen it by going to **Window > Page Editor** to reopen the Page Editor. It will be blank but selecting a page will fill in the data.

Porta Cloud

Porta Cloud runs on a globally distributed, multi-tenant infrastructure in the cloud.

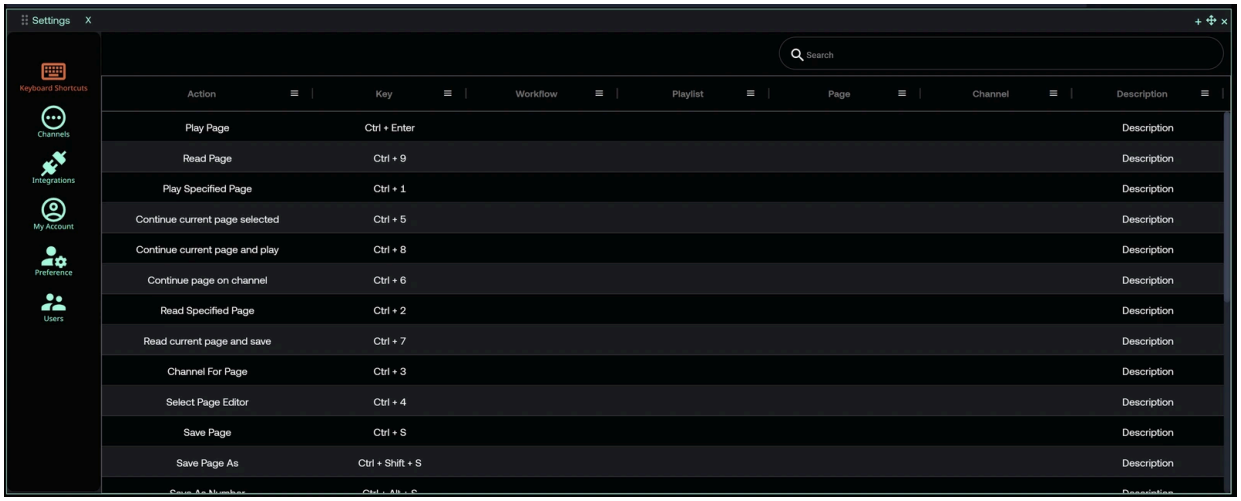


To run Porta Cloud, visit https://staging.porta.solutions Please contact Disguise for signup.

Porta Keyboard Shortcuts

Keyboard Shortcuts

To view the list of Keyboard Shortcuts navigate to **File > My Account** and on the Settings window click **Keyboard Shortcuts**.



Keyboard shortcuts

The following table includes the default configuration for Porta 2.3.

Action	Key
Play Page	Ctrl + Enter
Read Page	Ctrl + 9
Play Specified page	Ctrl + 1
Continue current page selected	Ctrl + 5
Continue current page and play	Ctrl + 8
Continue page on channel	Ctrl + 6
Read Specified Page	Ctrl + 2
Read current page and save	Ctrl + 7
Channel For Page	Ctrl + 3
Select Page Editor	Ctrl + 4

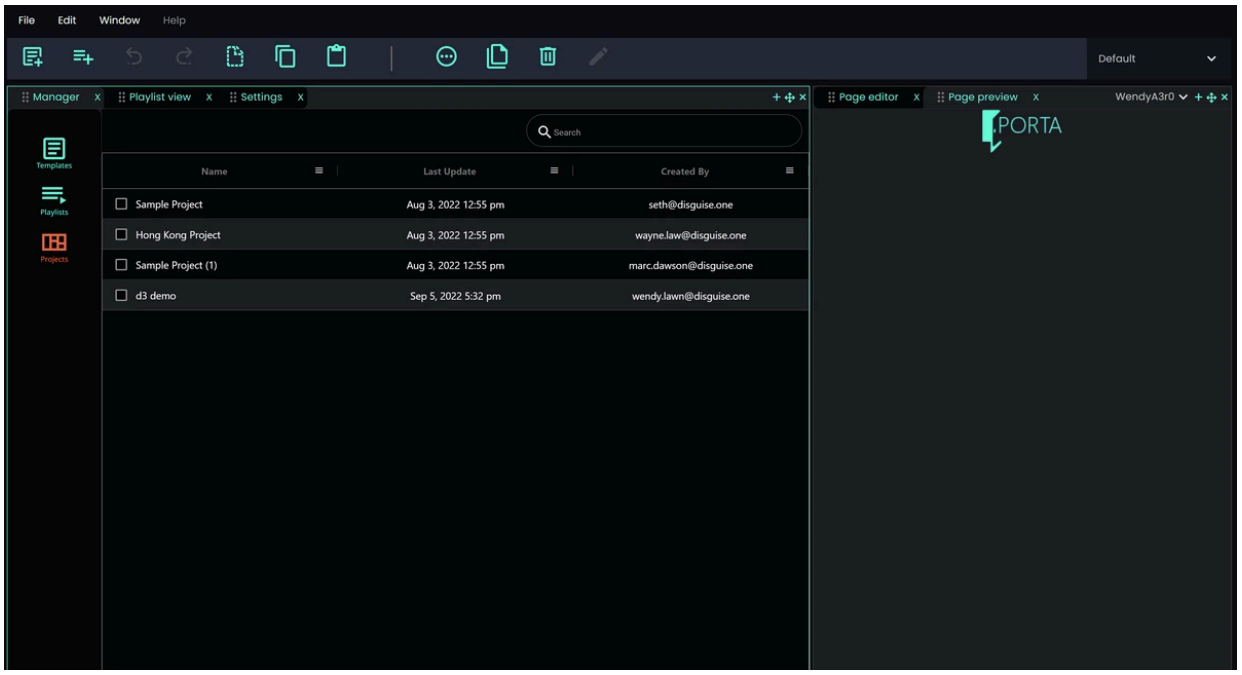
Action	Key
Save Page	Ctrl + S
Save Page As	Ctrl + Shift + S
Save As Number	Ctrl + Alt + S
Move To Number	Ctrl + V
Read First Page	Ctrl + F
Read Last Page	Ctrl + L
Read Next Page	Ctrl + R
Play current and read next	Ctrl + P
Read Previous Page	Alt + R
New Template	Ctrl + Shift + K
New Page	Ctrl + Shift + H
Duplicate Page	Ctrl + D
Rename Page	Ctrl + Shift + R
Create Group	Ctrl + Shift + L
Delete Page	Ctrl + Shift + D
Undo	Ctrl + Z
Redo	Ctrl + Shift + Z

Customize keyboard shortcuts

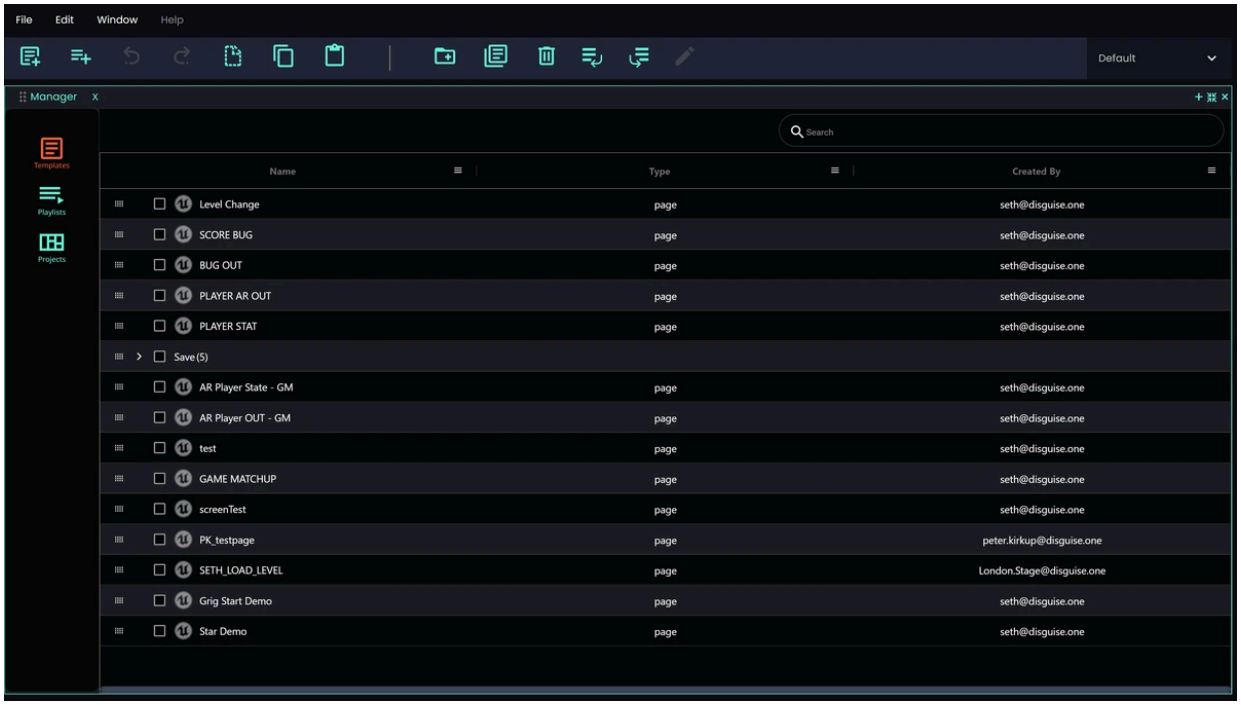
1. To customise a keyboard shortcut, select the existing shortcut in the Key column.
2. Press the new key or key combination you want to add.
3. Click **Enter** to confirm the key/key combination.

Manager Widget

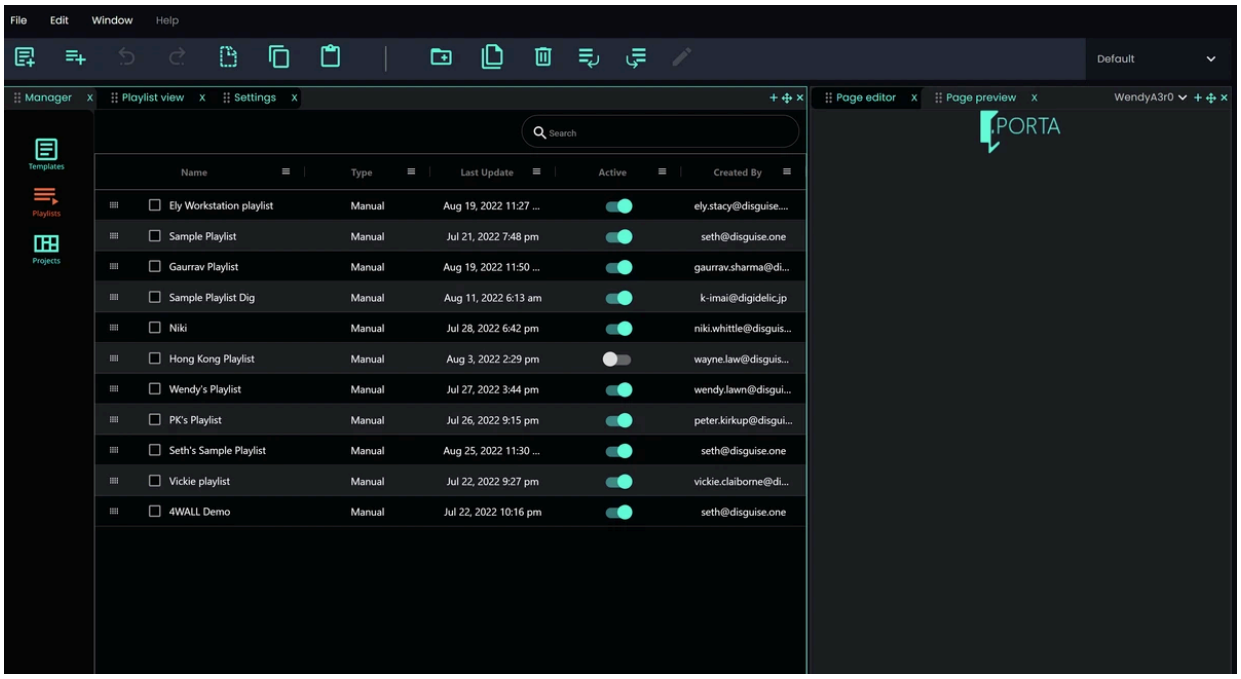
Manager: Project view



Manager: Templates view



Manager: Playlists view



From the manager widget panel, you can access:

- Templates

- Playlists
- Projects
- Newsroom pages

Porta Media Supported File Types

Supported File Types

Video

- .mp4
- .mpeg
- .mpg
- .avi
- .mov
- .m4v

Audio

- .mp3

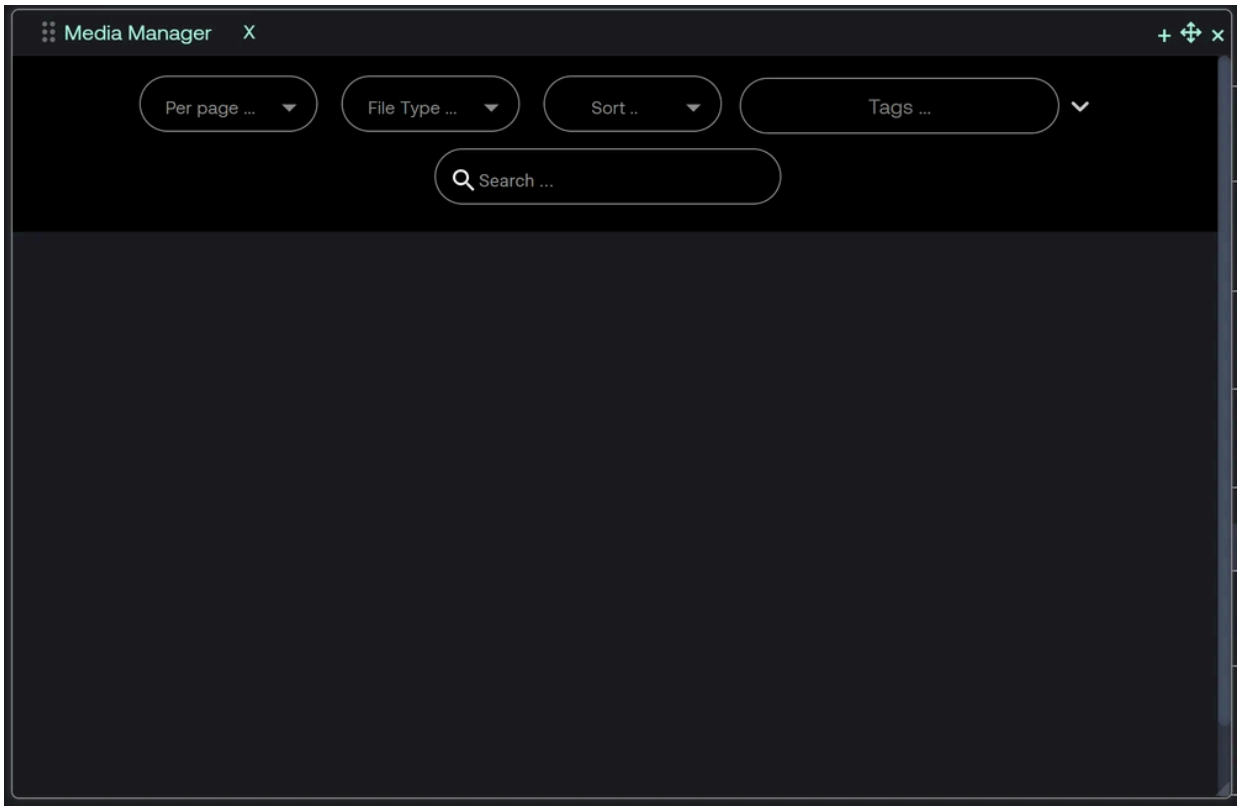
Image

- .jpg
- .jpeg
- .png
- .bmp
- .tiff
- .tif

For more information about uploading and syncing see the Media Manager page.

Porta Media Browser/Manager

To browse the Media Manager go to **Window > Media Browser**.

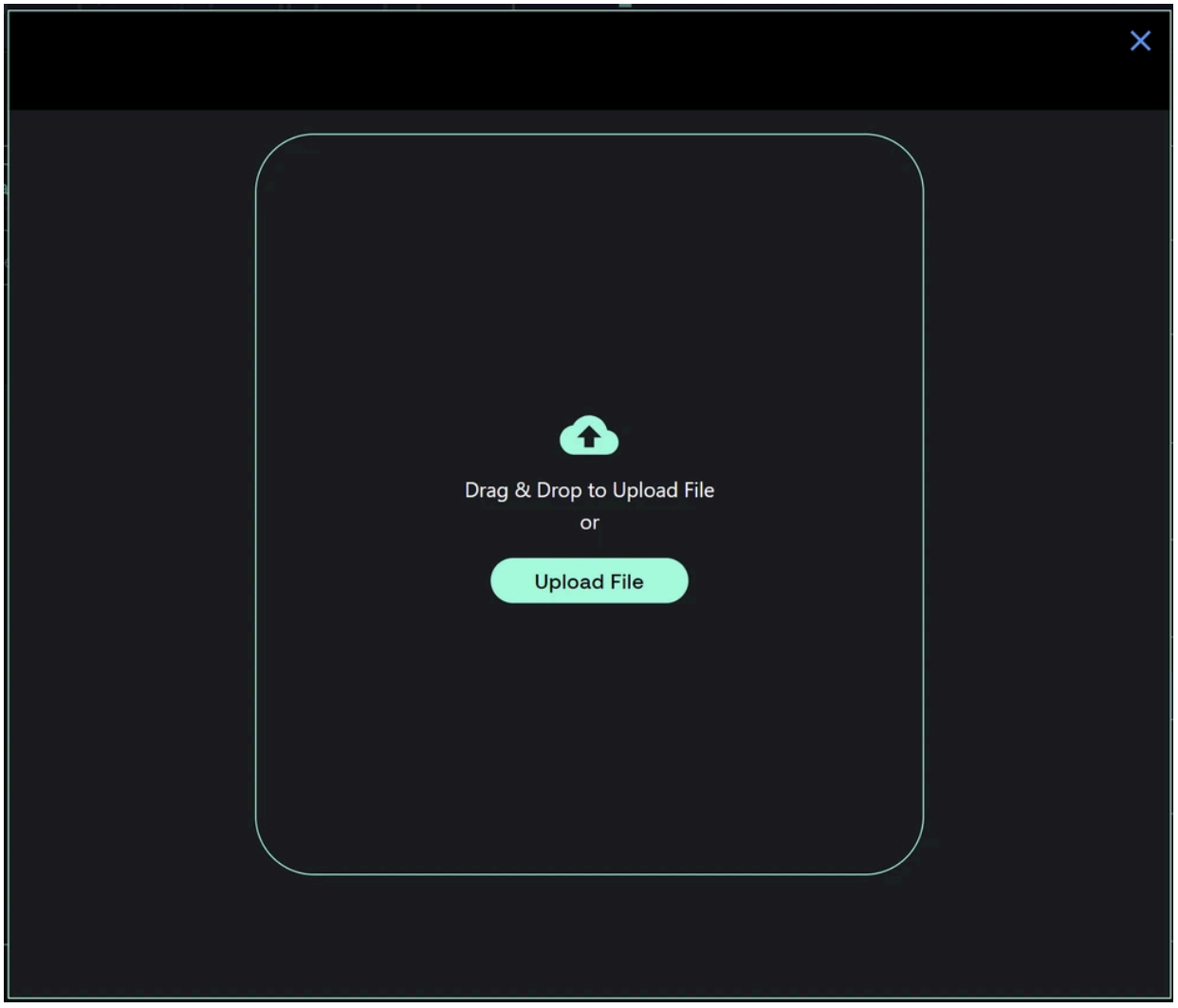


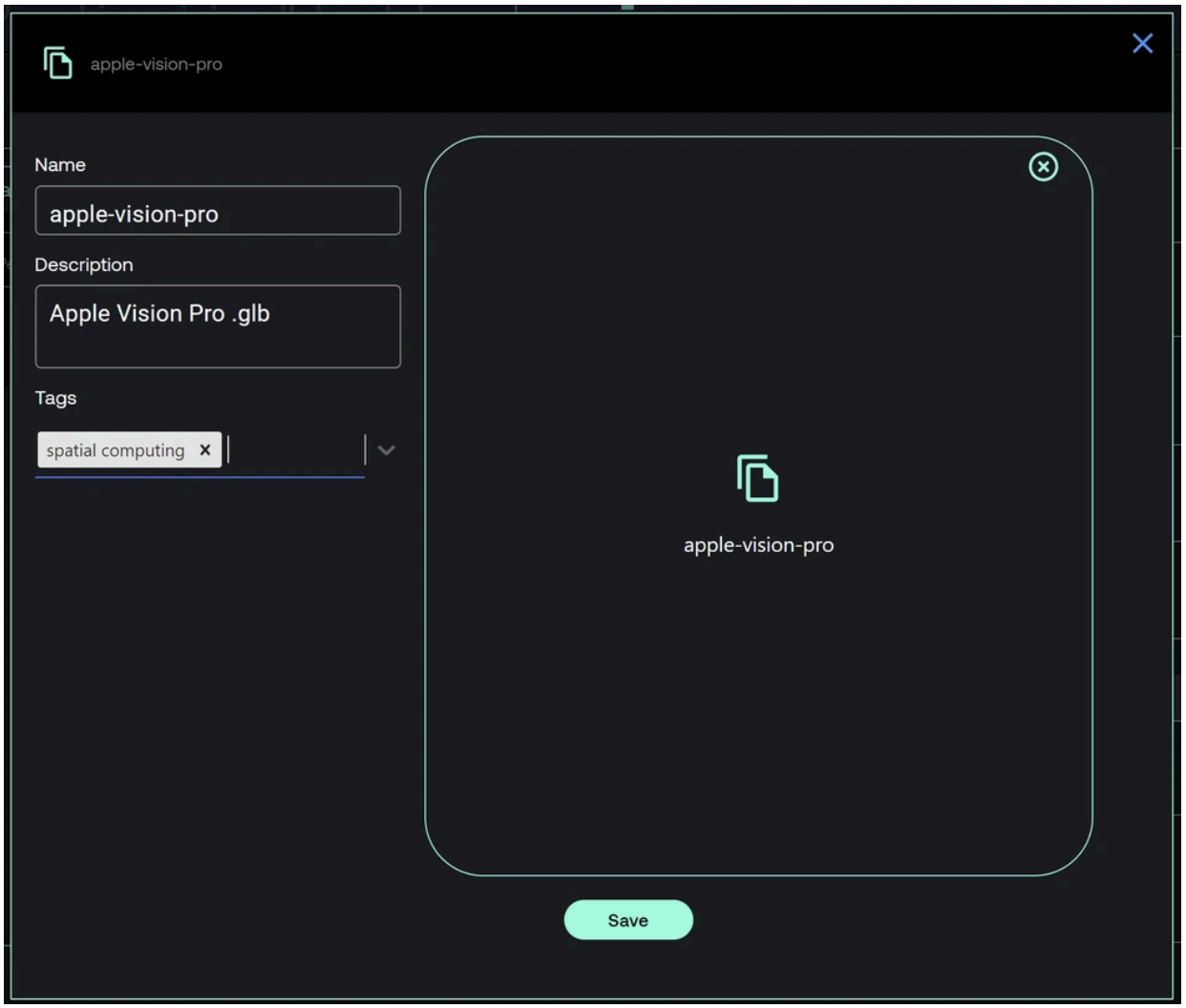
Media Manager

Uploading Media

1. Click **Upload new** in the main toolbar.
2. Click **Upload file** or Drag and Drop a file.
3. The default name can be edited, a description can be included, and any tags added.




Drag & Drop to Upload File
or
Upload File


apple-vision-pro
Name
apple-vision-pro
Description
Apple Vision Pro .glb
Tags
spatial computing
apple-vision-pro
Save

Porta Manager Overview

Porta Manager is a web-based interface for managing your Porta On Prem installation. It provides an installer wizard for installing and updating Porta On Prem, as well as user-friendly tools to manage Porta and its machines.

Requirements

There are no additional requirements for running Porta Manager beyond the base requirements for Porta VM, which are as follows:

- A copy of the latest Porta On Prem Virtual Machine release as a zip file.
  - This zip contains the `setup_vm.ps1` script and the `.ova` VM image file.
  - The image is an `.ova` file, which is a virtual machine image that can be imported into VirtualBox.
  - The image is a pre-configured Ubuntu image with Docker and Porta Manager already installed.
- VirtualBox 7.1.8 installed.
- Latest copy of the Porta On Prem application as a zip file.
- Minimum of 3 physical machines if running database replication.

Component	Specification
Operating System	Windows 11 64-bit
Hypervisor	VirtualBox 7.1.8
CPU	Intel i7 4th Generation (required: CPU with AVX2 support)
Memory	8GB RAM
Storage	100+GB free disk space

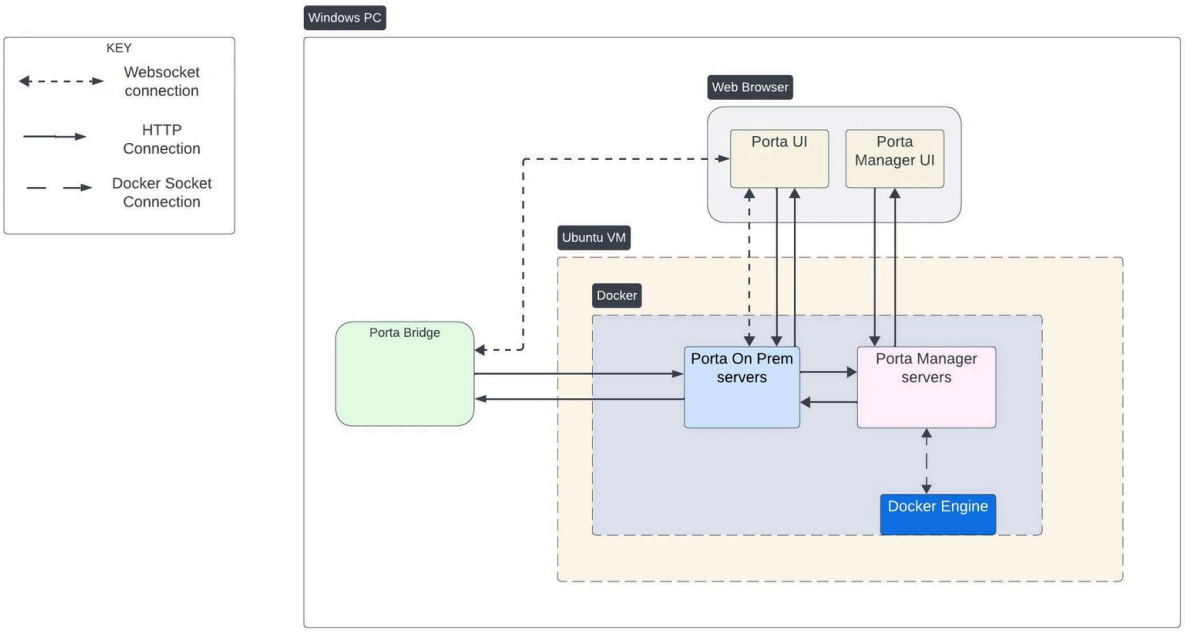
Features

- **Porta Configuration Management**: Tools to help you store and manage your Porta On Prem technical settings, such as machine IP addresses.
- **Porta Installation Wizard**: A step-by-step guide to help you install Porta On Prem.
- **Dashboard**: A central hub to administrate and monitor the status of your Porta On Prem installation.
- **Helpers**: User-friendly tools to assist with common administrative tasks.

- **Logging**: Various logs of installations, updates, and other administrative actions performed through Porta Manager.

Architecture

Porta Manager is deployed with the Porta Virtual Machine (Ubuntu 24.04 server) and run using Docker.



Docker Containers

Porta Manager uses Docker containers to run its services. These container names are often appended by a `-1`, i.e., `porta-manager-app-1`, but the base names are as follows:

`porta-manager-app` Container

Role	Porta Manager Web Application
Description	Runs the Porta Manager web application, which provides the user interface for managing Porta On Prem. This is what you interact with when you access Porta Manager in the browser.
Published Ports	88

`porta-manager-horizon` Container

Role	Porta Manager Horizon (Queue) Service

Description	Long running process that handles queued jobs, such as installer wizard processing.
Published Ports	None

`porta-manager-task` Container

Role	Porta Manager Scheduled Tasks Service
Description	Long running process that handles scheduled background tasks.
Published Ports	None

`porta-manager-db` Container

Role	Porta Manager Database Server
Description	Porta Manager's MySQL database server.
Published Ports	3310

`porta-manager-redis` Container

Role	Porta Manager Redis Server
Description	A Redis server that is primarily used as a cache driver and jobs queue.
Published Ports	6378

Updating Porta Manager

> **Caution**
>
> Updating Porta Manager requires an active internet connection.

> **Note**
>
> Updating Porta Manager will not update or modify your Porta On Prem installation. To update Porta On Prem, please use the Porta Manager's Installer Wizard.

The latest Porta Manager comes pre-installed on the Porta VM, but if you need to update it, you can do so by following these steps:

1. Open **Windows Powershell** or **Terminal**.

2. Connect to the Porta VM using SSH (replace the command below with your own values)
   - `portavm` is the username you will be connecting as
   - `VM-IP` is the VM's IPv4 address on the network

   ```
   ssh portavm@<VM-IP>
   ```

   - For example:

     ```
     ssh portavm@192.168.50.9
     ```

3. Run the following command to update Porta Manager:

   ```
   update_manager
   ```

4. The terminal will begin to display information about shutting down the existing manager and fetching a list of versions available to install. You will then be prompted with the list of available versions.
5. Select the version you wish to install by entering the corresponding number and pressing `Enter`.
6. The script will proceed to download and unzip the selected version of Porta Manager.
7. After unzipping and loading the new version, the script will prompt you to confirm that this is the version you wish to install. Confirm the version by entering the corresponding number and pressing `Enter`.
8. The update will then finalize, boot the Porta Manager, and wait for it to come online.
9. Once the update is complete, you can access Porta Manager by opening a web browser and navigating to `http://<VM-IP>:88`, replacing `<VM-IP>` with the actual IP address of your Porta VM.

Changing the IP of Porta On Prem

After the initial set up of Porta VM and Porta On Prem, you may eventually want, or need, to make changes to your network, or otherwise change the static IP address of Porta VM.

This guide will walk you through the steps needed to ensure your VM and its applications are accessible at a new IP address.

> **Tip**
>
> During this process, you will be prompted for the `sudo` password; this is the Porta VM password provided to you.

> **Warning**
>
> If these commands are run using an SSH connection (a Windows Powershell or Terminal) to access the VM, your connection will be disrupted while the script is running and the setup will fail.

1. Disable the current static IP

1. Ensure your Porta VM is already running.
2. Using the native VirtualBox terminal window of the running virtual machine, log in to the VM:
   - Type the username `portavm` and hit `Enter`,
   - Type the password provided to you and hit `Enter` again to log in.
3. Run the following command to disable the current static IP address and enter the `sudo` password when prompted:

   ```
   sudo ./scripts/disable_static_ip.sh
   ```

4. Restart the VM with the command `sudo reboot` and wait for it to display the log in screen once more.

2. Set up the new static IP

1. Log in to the native VM terminal again.

2. Follow the steps to set up a static IP address as outlined below:
    1. Ensure your Porta VM is already running.
    2. Using the native VirtualBox terminal window of the running virtual machine, log in to the VM:
        - Type the username `portavm` and hit `Enter`,
        - Type the password provided to you and hit `Enter` again to log in.
    3. Run the following command to begin setting up a static IP address and enter the enter the `sudo` password when prompted:

        ```
        sudo ./scripts/setup_static_ip.sh
        ```

    4. The script will perform a network scan to find available IP addresses on your network.

        > **Caution**
        >
        > If the network scan fails to complete or doesn't find any available IPs, you'll be asked "Would you like to manually enter an IP address?"
        >
        > 1. Type `y` and press `Enter`.
        > 2. Type a full, valid IP address (e.g., `192.168.1.100`), and hit `Enter`.
        >   - If the IP appears to be in use, you'll be asked to confirm by typing `y` and pressing `Enter`.

    5. Select an IP address for the virtual machine by typing the number corresponding to one of the listed available IPs and pressing `Enter`.
        - If you choose to enter a custom IP address:
        - Enter the full IP address (e.g., `192.168.1.100`)
        - If the entered IP appears to be in use, you'll be asked to confirm. If you are sure the IP is safe to use, type `y` and pressing `Enter`.

        > **Tip**
        >
        > If you're unsure of available IP addresses, contact your network administrator or IT specialist.

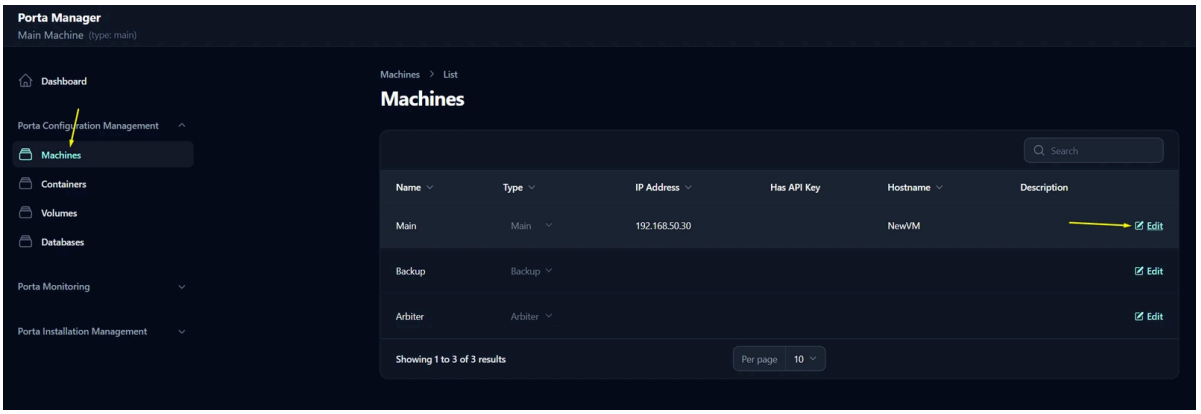
6. Next, select the machine role (also known as its type) by entering the number corresponding to one of the following options and pressing `Enter`:
    1. main
    2. backup
    3. arbiter

    > **Note**
    >
    > If you're only using one machine for Porta, select `1` for `main`.

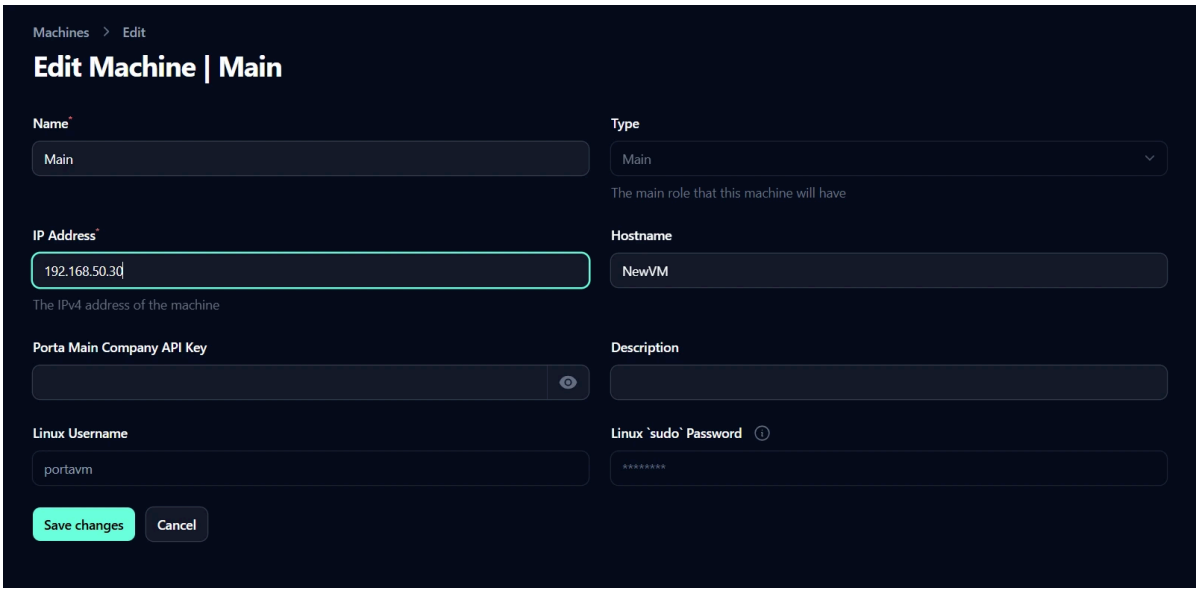
7. The script will then proceed to configure the VM with the selected static IP address and machine role.
    - *You will see a lot of output in the terminal, including password prompts, but you can ignore it.*
8. When IP configuration is complete, the script will print "Static IP setup completed successfully! VM is now accessible at IP:" and list the new static IP address.

3. Use Porta Manager to fix Porta's IP

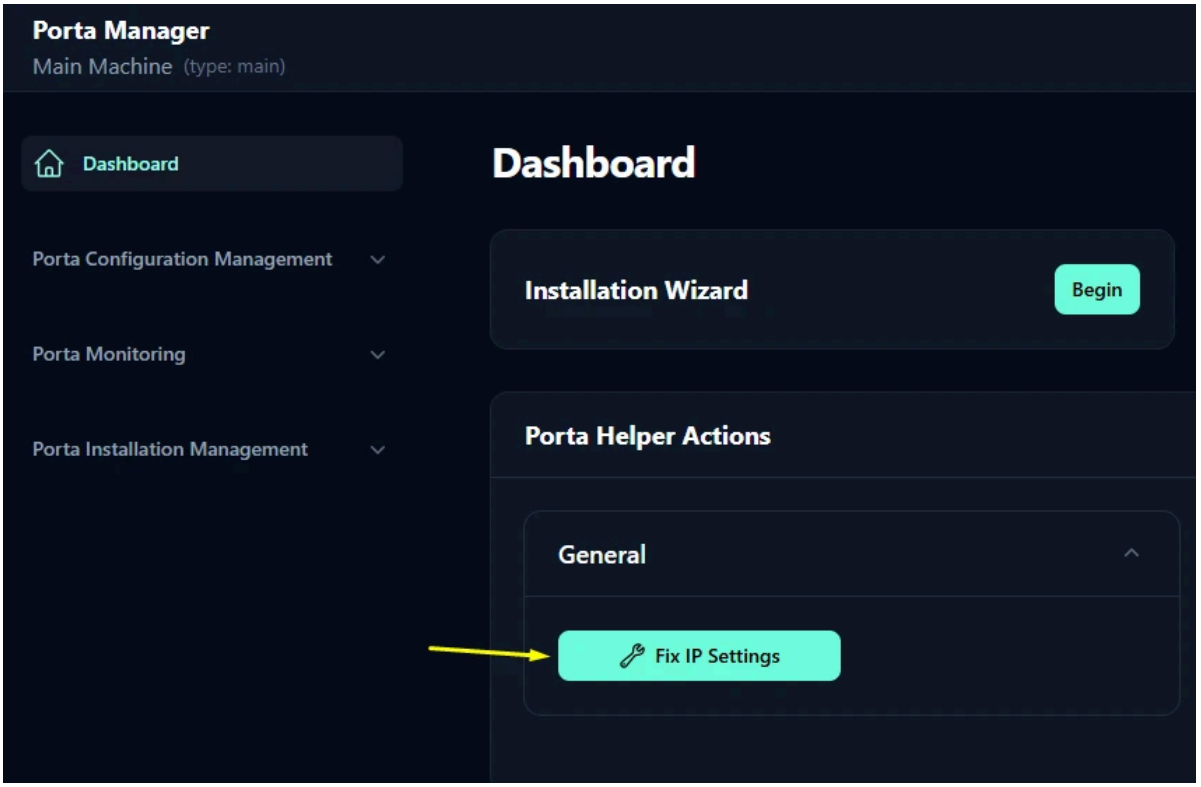
1. When static IP setup finishes, access and log in to the Porta Manager.
2. In the Porta Manager sidebar, navigate to the `Porta Configuration Management` section and click on the `Machines` menu item.
3. In the `Machines` table, locate the row for your Porta VM and click `Edit` on the right side of the row.



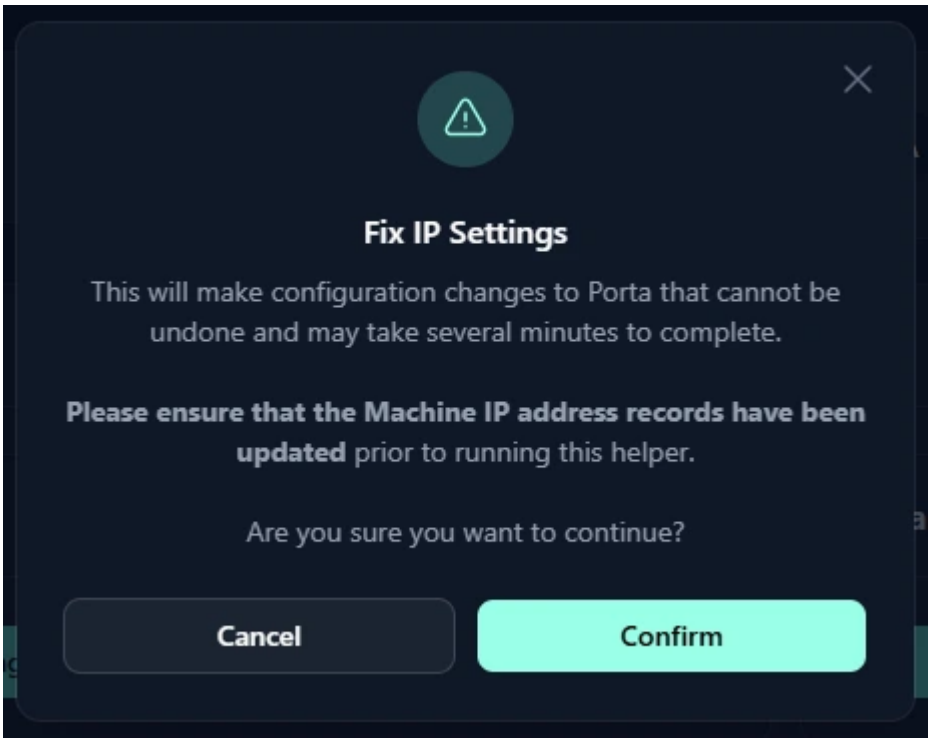
4. On the `Edit Machine` page, update the `IP Address` field to match the new static IP address you just set for the VM, then click `Save Changes`.



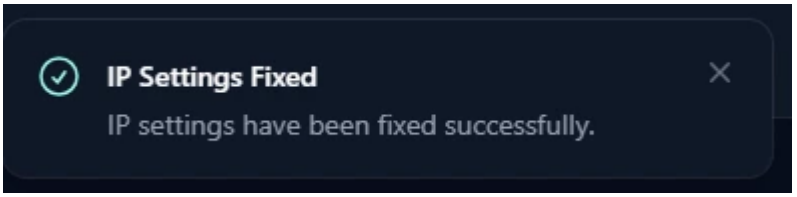
5. Return to the Porta Manager dashboard by clicking on the `Dashboard` menu item in the sidebar.
6. On the Porta Manager dashboard, use the `Fix IP Settings` button to fix Porta's IP.



7. In the pop-up that appears, confirm that you want to update Porta's IP address by clicking `Confirm`.



8. Wait for the process to complete. You will see a success message indicating that Porta's IP address has been updated successfully when it has finished.



9. You should now be able to access and use Porta as usual.

Porta VM Diagnostics Cheatsheet

This page lists where everything is and how to look at it on a Porta VM deployment. Treat it as a reference, not a procedure — pick the entry that matches the symptom being diagnosed.

- For a structured walk-through of common symptoms, see the Porta VM Troubleshooting guide.
- For a five-minute first-pass check, see the Porta VM Support Checklist.

Quick-fire data collection

Inside the VM, either over SSH or directly at the VirtualBox console:

```
# Bundles diagnostics under ~/logs/collected_data/YYYYMMDD/HH-SS/.
# Requires VM image 0.9.14.2 or newer.
collect_data

# Runs the full Porta diagnostics: versions, group members, health checks.
porta_diag

# Quick environment snapshot: hostname, IPv4, MAC, and /etc/hosts.
~/scripts/vm_info.sh
```

To copy the resulting bundle to the Windows host, set up the VirtualBox shared folder once — see Porta On Prem VM Windows Shared Folder — then:

```
~/scripts/export_to_windows.sh ~/logs/collected_data/...
```

In-VM helpers

Diagnostics

Helper	What it does	Ava sinc
`collect_data`	Runs various diagnostics to gather system and app data. Results are stored under `~/logs/collected_data/YYYYMMDD/HH-SS/`.	`0.9`

Helper	What it does	Ava sinc
`porta_diag`	Runs the full Porta servers diagnostics.	`0.9`
`view_hosts_file`	Prints the contents of `/etc/hosts`.	`0.9`
`check_diskspace`	Simple disk space check.	`0.9`
`check_diskspace_sorted`	Disk space check sorted by size.	`0.9`
`docker_disk_usage`	Docker disk usage by images, containers, and volumes.	`0.9`
`docker_volume_size` `<volume_name>`	Inspects the size of a named Docker volume.	`0.9`
`~/scripts/vm_info.sh`	Prints the VM's hostname, IPv4 address, MAC address, and `/etc/hosts` contents.	All
`~/scripts/porta-manager/check-conn-cache.sh`	Shows the cached connections, the loaded in-memory connections, and the database connection cache for every Porta Manager container.	All

Versioning

Helper	What it does	Available since
`porta_check_version`	Prints Porta version information, including Laravel, PHP, MySQL, Redis, and OS.	`0.9.14.2+`
`mngr_check_version`	Prints Porta Manager version information.	`0.9.14.2+`
`~/scripts/porta-manager/check-manager-version.sh`	Underlying script for `mngr_check_version`.	All

Logs

Each Porta log helper has a paired `_follow` variant that tails the file (equivalent to `tail -f`) instead of dumping its current contents.

Helper	What it shows
`porta_laravel_logs` / `porta_laravel_logs_follow`	`/var/www/storage/logs/laravel-YY` from the `porta` container.
`porta_php_errors` / `porta_php_errors_follow`	`/var/log/php/errors.log` from the container.

Helper	What it shows
`porta_horizon_logs` / `porta_horizon_logs_follow`	`/var/www/logs/horizon.log` — queu sequence playout.
`porta_task_logs` / `porta_task_logs_follow`	`/var/www/logs/default_tasks.log` tasks, database backups, socket check
`porta_main_db_logs` / `porta_main_db_logs_follow`	MySQL error log on this machine, when machine.
`porta_backup_db_logs` / `porta_backup_db_logs_follow`	MySQL error log on this machine, when backup machine.
`porta_arbiter_db_logs` / `porta_arbiter_db_logs_follow`	MySQL error log on this machine, when machine.
`mngr_app_logs`	Porta Manager app container logs.
`mngr_horizon_logs`	Porta Manager installer wizard processi
`mngr_task_logs`	Porta Manager background task runner
`~/scripts/porta-manager/view-logs.sh [container] [lines]`	Underlying script for the `mngr_*_logs` `[container]` is `app`, `horizon`, or `t` `[lines]` is a line count, or `f` to follow

> **Note**
>
> On older VM images that don't have the bash shortcuts, use `view-logs.sh` directly. For example, `~/scripts/porta-manager/view-logs.sh app 300` tails the last 300 lines of the manager app container's log, and `~/scripts/porta-manager/view-logs.sh horizon f` follows the horizon container's log.

Replication

Helper	What it does	Available since
`porta_group_status`	Shows the group replication status as reported by this machine.	`0.9.14.2+`

Helper	What it does	Available since
`porta_all_group_status`	Runs the same status query against every machine in the group using the entries in `/etc/hosts`. Each VM's `/etc/hosts` must be correct for this to work.	`0.9.14.2+`
`porta_start_repl`	Runs `START GROUP_REPLICATION` on this machine.	`0.9.14.2+`
`porta_stop_repl`	Runs `STOP GROUP_REPLICATION` on this machine.	`0.9.14.2+`
`porta_bootstrap`	Bootstraps the replication group from this machine. Check first with `porta_all_group_status` — only run this if no other member is already primary.	`0.9.14.2+`
`porta_set_bootstrap_ON`	Persists the bootstrap flag as ON. This machine will always set itself as primary on startup. Useful only for single-VM setups — **never use it on a multi-VM replication group**, as it can cause split-brain.	`0.9.14.2+`
`porta_set_bootstrap_OFF`	Persists the bootstrap flag as OFF. This is the default state for a Porta VM.	`0.9.14.2+`
`~/scripts/porta/view-ALL-group-repl-status.sh`	Underlying script for `porta_all_group_status`.	All

Database backups

Helper	What it does	Available since
`porta_backup_db`	Creates a backup of the Porta database. The resulting ZIP archive is saved inside the `porta` container at `/var/www/storage/app/Porta-Backups`.	`0.9.14.2+`
`porta_restore_db`	Restores the Porta database from a backup. Prompts with a list of locally available dumps.	`0.9.14.2+`
`porta_db_dump [db_container_name] [db_name]`	Runs a raw `mysqldump`. Defaults to `porta-db` and the `porta` database.	`0.9.14.2+`

Helper	What it does	Available since
`porta_db_restore [db_container_name] [db_name]`	Restores a database from a `mysqldump`. Defaults to `porta-db` and the `porta` database. Prompts with a list of locally available dumps.	`0.9.14.2+`
`porta_reset_db`	**Destructive — wipes all data on this machine** and recreates the database from migrations. Used as the last-resort step in disaster recovery.	`0.9.14.2+`

> **Note**
>
> Automatic backups run every three hours on a non-primary machine — usually the arbiter — and are saved inside the `porta` container at `/var/www/storage/app/Porta-Backups`. Filenames look like `arbiter-machine-mysql-3-backup-YYYY-MM-DD-HH-mm-ss.zip`.
>
> For full backup and recovery procedures, see Porta VM Disaster Backup and Restore.

Scheduler playout

These helpers query the same Scheduler tables but on different machines in the replication group. Use the variant that matches the machine you are currently on — for example, run `porta_playouts` from the main machine, `porta_backup_playouts` from the backup machine.

Helper	What it shows	Available since
`porta_playouts`	Last 50 Scheduler playouts, including the currently active and next entries. Main machine only.	`0.9.14.2+`
`porta_playout_history`	Last 50 Scheduler playout history items. Main machine only.	`0.9.14.2+`
`porta_backup_playouts`	Last 50 Scheduler playouts. Backup machine only.	`0.9.14.2+`
`porta_backup_playout_history`	Last 50 Scheduler playout history items. Backup machine only.	`0.9.14.2+`
`porta_arbiter_playouts`	Last 50 Scheduler playouts. Arbiter machine only.	`0.9.14.2+`

Helper	What it shows	Available since
`porta_arbiter_playout_history`	Last 50 Scheduler playout history items. Arbiter machine only.	`0.9.14.2+`

VM lifecycle

Helper	What it does	Available since
`~/scripts/reset_identity.sh`	Picks a new hostname and unique machine ID, updates `/etc/hosts`, and reboots. Run this after importing the VM image to a second or third host so the copies don't share an identity. See **Manually Resetting the Identity of a Porta On Prem VM**.	All
`~/scripts/setup_static_ip.sh`	Sets a static IP via netplan. The Porta VM PowerShell setup script does this automatically — only run manually if setup failed mid-flight. See **Manually Setting Up a Static IP**.	All
`~/scripts/disable_static_ip.sh`	Disables the static IP configuration by renaming `/etc/netplan/99-portacfg.yaml`. The VM will fall back to DHCP on next boot.	All
`~/scripts/reset_dhcp.sh`	Forces a new DHCP lease and clears cached leases. Only meaningful when the VM is not using a static IP.	All
`~/scripts/static_ip_info.sh`	Prints the current netplan static IP configuration.	All
`~/scripts/setup_shared_folders.sh`	Prepares the VM side of a VirtualBox shared folder for file export to Windows. See **Porta On Prem VM Windows Shared Folder**.	All

> **Warning**
>
> `~/scripts/setup_static_ip.sh` and `~/scripts/disable_static_ip.sh` restart networking on the VM. **Run them from the VirtualBox console, not over SSH.** If executed over SSH, the connection drops when networking restarts and the script fails mid-flight.

Porta Manager lifecycle

Helper	What it does	Available since
`update_manager` (alias `install_manager`)	Downloads the latest available Porta Manager build and runs the installer. Automatically runs	All

Helper	What it does	Available since
	`backup-env.sh` first so `APP_KEY` is preserved across the update.	
`mngr_init_user`	Initialises the first Porta Manager admin user. Only needed after a full Porta Manager database wipe.	`0.9.14.2+`
`mngr_backup_env`	Copies the `.env` file from the `porta-manager-app` container to `${MNGR_CONFIG_DIR}/.env` to preserve `APP_KEY` between updates. Runs automatically when calling `update_manager`.	`0.9.14.2+`
`mngr_restore_env`	Restores the preserved `.env` file from `${MNGR_CONFIG_DIR}/.env` back into the `porta-manager-app` container.	`0.9.14.2+`
`mngr_recreate`	Recreates the Porta Manager containers from their existing images, preserving data volumes. Useful if the VM's IP changed without running **Fix IP Settings** in the Porta Manager dashboard.	`0.9.14.2+`
`mngr_wipe_recreate`	**Destructive — wipes Porta Manager data and storage volumes**, then recreates the containers from existing images. Porta application data is not affected.	`0.9.14.2+`
`~/scripts/porta-manager/install-manager.sh`	Underlying script for `update_manager`.	All
`~/scripts/porta-manager/init-manager-user.sh`	Underlying script for `mngr_init_user`.	All
`~/scripts/porta-manager/backup-env.sh`	Underlying script for `mngr_backup_env`. Runs automatically as part of `install-manager.sh`.	All

Where files live inside each container

`porta` container — UI and API

Path	Notes
`/var/www`	Laravel application root.
`/var/www/.env`	Application environment file containing host, database credentials, app key, and integrations.
`/var/www/bootstrap/cache/config.php`	Cached Laravel configuration. Must be regenerated after any `.env` change with `php artisan config:cache`.
`/var/www/storage/logs/laravel-YYYY-MM-DD.log`	Laravel error log.
`/var/www/storage/app/Porta-Backups/*.zip`	Automatic and manual database backups.
`/var/www/logs/horizon.log`	Horizon worker log — sequence playout.
`/var/www/logs/default_tasks.log`	Scheduled task log — database checks, socket checks, backups.
`/var/www/logs/default_queue.log`	Default queue worker log. Entries should end `DONE`, not `FAIL`.
`/var/log/php/errors.log`	PHP error log inside the container.
`/etc/nginx/sites-available/default`	Nginx vhost. The default `client_max_body_size` is `1024M`.
`/etc/supervisord.conf`	Supervisor configuration. Manages `nginx`, `php-fpm`, `porta-horizon-worker_*`, and `porta-task-worker_*`.
`/usr/local/etc/php/conf.d/app.ini`	PHP configuration. Default `post_max_size` is `1024M` and default `upload_max_filesize` is `1000M`.

> **Warning**
>
> Do not edit `/var/www/.env` without guidance from a Disguise engineer. Incorrect values can prevent Porta from starting or leave the database in an inconsistent state.

`porta-db*` container — MySQL

Path	Notes
`/etc/my.cnf`	MySQL configuration.

Path	Notes
`/var/lib/mysql`	Data directory. Mounted as a Docker volume; for advanced sysadmin use only.

`porta-socket` container

Path	Notes
`/usr/src/app`	Node.js source.
`/usr/src/app/.env`	Socket server environment — Redis URL and port.

A healthy startup log includes the lines:

```
info: Starting namespace: /unreal
info: Starting namespace: /disguise
info: Starting namespace: /playout_status
```

The Socket.IO admin UI is available at `http://<VM-IP>:8000/socketio-adminui`. Contact `support@disguise.one` for the credentials.

`porta-redis` container

To watch messages from the Porta API (including Porta Scheduler) to the socket server, open a Redis CLI session:

```
docker exec -it porta-redis redis-cli
> MONITOR
# or, only API → socket messages:
> PSUBSCRIBE *-API-msg
```

Health-check commands

Run these against the `porta` container:

```
docker exec -it porta bash -c "php artisan check:version"
```

For database replication health

```
docker exec -it porta bash -c "php artisan health:single-check 'PrimaryDatabaseC
onnectionCheck' --do-not-store-results --no-notification --fail-command-on-faili
ng-check"

docker exec -it porta bash -c "php artisan health:single-check 'MysqlClusterChec
k' --do-not-store-results --no-notification --fail-command-on-failing-check"

docker exec -it porta bash -c "php artisan health:single-check 'MysqlNodeStatusC
heck' --do-not-store-results --no-notification --fail-command-on-failing-check"
```

To inspect Porta's active database connection, run:

```
docker exec -it porta bash -c "cat .env | grep DB_HOST"
docker exec -it porta bash -c "cat bootstrap/cache/config.php | grep -B 2 \"'def
ault' => 'mysq\""
```

`DB_HOST` should reference the same `DB_HOST_#` slot as the current primary's IP. If they differ, the Porta backend is talking to a read-only replica — re-running the primary connection health check will trigger a reconnect.

Browser-side monitoring URLs

URL	Purpose
`http://<VM-IP>:8000/health`	Database group, replication, and primary connection health. Green is healthy.
`http://<VM-IP>:8000/horizon`	Queue worker dashboard. Watch for failed jobs piling up.
`http://<VM-IP>:8000/socketio-adminui`	Socket.IO admin UI. Requires credentials from Disguise support.

The Porta UI browser console (**F12** → **Console**) is the only place UI-side errors land. There is no front-end log file.

Configuration cache invalidation

To refresh the configuration cache in the `porta` container, run:

```
docker exec -it porta bash -c "php artisan config:cache"
```

Then `docker restart porta` if anything that PHP-FPM reads at boot has changed.

For Porta Manager, the equivalent action is `mngr_recreate`, which drops and recreates the Manager containers from existing images and preserves data volumes.

Porta VM Disaster Backup and Restore

This page covers:

- how Porta VM creates and stores database backups,
- how to take one manually,
- how to restore from one,
- and how to recover from data loss affecting one or several machines in a replication group.

For diagnosing why a failure happened in the first place, see the Porta VM Troubleshooting guide.

> **Caution**
>
> Recovery procedures on this page include destructive steps that wipe a machine's database. Always take a manual backup before starting unless an automatic backup younger than three hours is known to be safe and intact.

How automatic backups work

Every three hours, Porta creates a backup of the database on a non-primary machine (usually the arbiter) and stores it inside the `porta` container at:

```
/var/www/storage/app/Porta-Backups
```

Each backup is a ZIP archive containing an SQL dump of the database. The archive name has the format:

```
machine_type-machine-connection_name-backup-Y-m-d-H-i-s.zip
```

For example, a backup created on the arbiter at 14:30 on 2026-05-20 would be named `arbiter-machine-mysql-3-backup-2026-05-20-14-30-00.zip`.

> **Note**
>
> These archives are intended for disaster recovery from catastrophic data loss. They are not a substitute for application-level export of show data — Porta show data, media references, and template definitions all live in the same database and are restored together.

Alternate setups

The location and frequency change depending on the topology:

- **Single-machine setup**: backups are created on the single machine.
- **Single machine with an isolated backup machine**: backups are created on both machines independently.
- **Three-machine replication group**: backups run on the arbiter by default. Verify by looking for the most recent backup ZIP inside each machine's `porta` container.

Container and port reference

Machine role	Database container	MySQL port	Replication port
Main	`porta-db`	`3306`	`33061`
Backup	`porta-db-2`	`3307`	`33062`
Arbiter	`porta-db-3`	`3308`	`33063`

Checking replication health before recovery

Before any destructive recovery step, capture the current state of the replication group so you can confirm afterwards that the recovery worked:

- `porta_all_group_status` shows the replication group as reported by every machine. Requires correct `/etc/hosts` entries on the machine running it.
- `porta_group_status` shows the replication group as reported by this machine only.
- `porta_main_db_logs`, `porta_backup_db_logs`, and `porta_arbiter_db_logs` show the MySQL error log on each role. Use the `_follow` variants to tail live output.

Manually creating a backup

Take a manual backup any time, especially before a destructive operation like a database reset.

Inside the VM, run:

```
porta_backup_db
```

The resulting backup is saved inside the `porta` container at `/var/www/storage/app/Porta-Backups`, with the same naming format as automatic backups.

> **Tip**
>
> The manual backup helper uses the same artisan command (`php artisan backup:run --only-db --disable-notifications`) as the automatic schedule, so the output is interchangeable with the scheduled backups.

Restoring from a backup

Inside the VM, run:

```
porta_restore_db
```

The helper prompts with a list of available backup files in the local backups directory. Enter the number corresponding to the backup you want to restore and press **Enter**.

> **Caution**
>
> Restoring overwrites the current database contents on the target machine. If the target machine is part of a healthy replication group, removing this machine's data without coordinating with the rest of the group can cause a replication state mismatch. Use the **multi-node disaster recovery** procedure when more than one machine is affected.

Single-node disaster recovery

Use this procedure when one machine in a replication group has lost data, but the other machines in the group are healthy and have an authoritative copy of the data.

There is no need to use a backup file in this case — the broken database can simply be reset, after which it will join the existing group as a new member and replication will fill it in from the

surviving machines.

1. Confirm the rest of the group is healthy:

   ```
   porta_all_group_status
   ```

   At least one machine must show `MEMBER_STATE` of `ONLINE` and `MEMBER_ROLE` of `PRIMARY`. The other surviving machine should be `ONLINE`.

2. On the broken machine only, take a manual backup if the database is at least running (even if replication is failing). This is a precaution in case the machine has data the rest of the group does not:

   ```
   porta_backup_db
   ```

3. On the broken machine, reset its database:

   > **Warning**
   >
   > `porta_reset_db` wipes all data in the database container on this machine. Only run it on the machine you are recovering.

   ```
   porta_reset_db
   ```

4. Wait for the container to come back up. It will join the existing group and begin replicating data from the surviving machines. The amount of time depends on how much data has to be transferred.

5. Re-check the group:

   ```
   porta_all_group_status
   ```

   When the recovered machine reaches `ONLINE`, the restoration is complete.

Multi-node disaster recovery

Use this procedure when two or more machines have lost data, or when the entire site has gone down and no machine still holds the authoritative current data.

1. Identify the machine that holds the backup you want to restore from. Ideally this is the machine that has the most recent backup, regardless of role.
2. If any database container on any machine is currently down, start it so its data is accessible. Replication will fail to start, which is expected — only the database service itself needs to be running:

   ```
   docker start porta-db    # or porta-db-2, porta-db-3 depending on role
   ```

3. Take a manual backup on each machine that can be brought up, even if its data is suspect. This is a precaution against losing recoverable transactions:

   ```
   porta_backup_db
   ```

   Backups live in the `porta` container, not in the database container, so taking a backup here does not interfere with the reset in the next step.
4. Stop each machine's database container so the next step starts from a clean slate. From each machine:

   ```
   docker stop porta-db    # or porta-db-2, porta-db-3
   ```

5. On the machine holding the desired backup, reset that machine's database:

> **Warning**
>
> `porta_reset_db` wipes the database container on this machine. The backup ZIPs in `/var/www/storage/app/Porta-Backups` survive because they live in the `porta` container, not the database container.

```
porta_reset_db
```

6. Restore from the chosen backup on the same machine:

```
porta_restore_db
```

   When prompted, select the backup you identified in step 1.

7. Wait for the restore to complete. This machine is now the authoritative primary.
8. On each of the other machines, reset the database so they will rejoin the new group as fresh members and replicate from the restored primary:

```
porta_reset_db
```

9. Each machine should join the group and begin replicating data from the restored primary. Confirm with:

```
porta_all_group_status
```

   When every machine reaches `ONLINE`, the restoration is complete.

Failover recovery with Unreal Engine

When a PX running Porta fails, the Unreal project rendering on the connected RX needs to be pointed at the backup PX so the show can continue. This is controlled by batch files on the RX

desktop.

Total machine failure — power or network loss

If the main PX has completely lost power or network connectivity:

1. On the RX, run the desktop batch file `make px2 primary.bat` to switch the running Unreal project to the backup PX.
2. Continue the show on the backup PX while the main PX is repaired.
3. Once the main PX is recovered, run `make px1 primary.bat` on the RX to switch back.

Partial machine failure — service or performance loss

If the main PX is still running but its socket server is degraded or its performance has dropped:

1. On the failed PX, stop the Porta socket server:

   ```
   docker stop porta-socket
   ```

2. On the RX, run `make px2 primary.bat` to switch the running Unreal project to the backup PX.
3. Continue the show on the backup PX while the main PX is investigated.
4. When the main PX is healthy again, restart its socket server:

   ```
   docker start porta-socket
   ```

   Then run `make px1 primary.bat` on the RX to switch back.

Manually Setting Up a Static IP for a Porta On Prem VM

To reliably access Porta from the same address, we need to set up a static IP for the VM.

> **Tip**
>
> During this process, you will be prompted for the `sudo` password; this is the Porta VM password provided to you.

> **Warning**
>
> If these commands are run using an SSH connection (a Windows Powershell or Terminal) to access the VM, your connection will be disrupted while the script is running and the setup will fail.

1. Ensure your Porta VM is already running.
2. Using the native VirtualBox terminal window of the running virtual machine, log in to the VM:
   - Type the username `portavm` and hit `Enter`,
   - Type the password provided to you and hit `Enter` again to log in.
3. Run the following command to begin setting up a static IP address and enter the enter the `sudo` password when prompted:

```
sudo ./scripts/setup_static_ip.sh
```

4. The script will perform a network scan to find available IP addresses on your network.

> **Caution**
>
> If the network scan fails to complete or doesn't find any available IPs, you'll be asked "Would you like to manually enter an IP address?"
>
> 1. Type `y` and press `Enter`.
> 2. Type a full, valid IP address (e.g., `192.168.1.100`), and hit `Enter`.
>   - If the IP appears to be in use, you'll be asked to confirm by typing `y` and pressing `Enter`.

5. Select an IP address for the virtual machine by typing the number corresponding to one of the listed available IPs and pressing `Enter`.
   - If you choose to enter a custom IP address:
   - Enter the full IP address (e.g., `192.168.1.100`)
   - If the entered IP appears to be in use, you'll be asked to confirm. If you are sure the IP is safe to use, type `y` and pressing `Enter`.

> **Tip**
>
> If you're unsure of available IP addresses, contact your network administrator or IT specialist.

6. Next, select the machine role (also known as its type) by entering the number corresponding to one of the following options and pressing `Enter`:
   1. main
   2. backup
   3. arbiter

> **Note**
>
> If you're only using one machine for Porta, select `1` for `main`.

7. The script will then proceed to configure the VM with the selected static IP address and machine role.
   - *You will see a lot of output in the terminal, including password prompts, but you can ignore it.*
8. When IP configuration is complete, the script will print "Static IP setup completed successfully! VM is now accessible at IP:" and list the new static IP address.

> ⚠ **Caution**
>
> **IMPORTANT NOTE**: If you are setting up multiple Porta VMs and their IP addresses are not sequential (e.g., 10.100.100.10, 10.100.100.11, 10.100.100.12), you **must** manually configure the hosts file on each VM after setup has completed. Please see the **Manually configuring the hosts file** section below for instructions.

Manually configuring the hosts file

During set up, the script `setup_vm.ps1` attempts to automatically configure the hosts file on each Porta VM to ensure proper communication between multiple machines in a replication group. However, this automatic setup will not work as intended if the assigned IP addresses are not sequential.

For example, if you have three Porta VMs with the following IP addresses:

- Main machine: `192.168.50.123`
- Backup machine: `192.168.50.244`
- Arbiter machine: `192.168.50.25`

or:

- Main machine: `192.168.50.24`
- Backup machine: `192.168.50.25`
- Arbiter machine: `192.168.50.23`

Then the automated configuration will be incorrect, and you'll need to manually edit the hosts file on each VM.

1. On each Porta VM, open the hosts file for editing using a text editor with superuser privileges. For example, you can use `nano`:

   ```
   sudo nano /etc/hosts
   ```

2. Add entries for each Porta database in the replication group, mapping their static IP addresses to their respective hostnames. For example:

```
127.0.0.1 localhost
127.0.1.1 MACHINENAME

# Replace <these> with the actual IPs
10.221.113.40 porta-db
10.221.113.15 porta-db-2
10.221.113.66 porta-db-3

# The following lines are desirable for IPv6 capable hosts
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
```

3. Save your changes and exit the text editor.
   - In `nano`, you can do this by pressing `CTRL + X`, then `Y` to confirm saving, and `ENTER` to exit.
4. Repeat these steps on each Porta VM in the replication group to ensure all machines can communicate with each other.

Manually Resetting the Identity of a Porta On Prem VM

Each Porta VM is a copy made from the same image, so any virtual machines created from this image will all have the same identity. This will cause problems when it requests an IP address from the network.

We want to be able to uniquely identify this virtual machine, so we need to reset its identity and then reboot the machine.

> **Note**
>
> You will be prompted for the `sudo` password during this process; this is the Porta VM password provided to you.

1. Open Windows Powershell or Terminal.
2. Connect to the VM using SSH (replace the command below with your own values):
   - `portavm` is the username you will be connecting as
   - `VM-IP` is the VM's IPv4 address on the network

```
ssh portavm@<VM-IP>

# Example: ssh portavm@192.168.50.9
```

3. Run the following command to reset the VM's identity:

```
./scripts/reset_identity.sh
```

4. You will be prompted to enter a new hostname for the VM.
   - To use the default suggested hostname, simply hit `Enter`.
     - The suggestion is usually the current hostname appended with a random number, e.g., `Porta-VM-1234`.
   - To use a custom hostname, type it in and hit `Enter`.
     - You can simply use with its Windows hostname appended with `-VM` (e.g. `PXLAB-VM`), as long as this is a unique name.
   - The hosts file of the virtual machine will be automatically updated with this new hostname.
5. The terminal will then output various information as it resets the identity.
6. When prompted to reboot, type `y` and hit `Enter` to reboot the VM.
7. While the machine is rebooting, your current connection will be disconnected, which is normal.
8. Once the reboot is finished, your VM will be using its new hostname and machine identity!
   - You can verify its new hostname by reconnecting using SSH again, replacing the command below with your own values. - `portavm` is the username you will be connecting as
     - `VM-IP` is the VM's IPv4 address on the network

     ```
     ssh portavm@<VM-IP>
     ```

   - The terminal prompt on successful connection should now show the new hostname, for example:

     ```
     portavm@Porta-VM-1234:~$
     ```

Migrating to a Virtual Machine - FAQ

This page answers the questions we hear most often about moving Porta On Prem from Windows Subsystem for Linux (WSL) to a virtual machine (VM).

About the change

What is changing?

Today, Porta On Prem runs on your PX using WSL and Docker Desktop. We are moving it to a dedicated Linux VM that runs Docker Engine. Porta itself does not change. The application, its features, and your daily workflows stay the same. Only the foundation underneath changes.

Why are you making this change?

WSL and Docker Desktop are built for developing software, not for running it in production. On your PX, this causes real problems:

- Updates depend on several software layers that each change on their own schedule, so an update can break.
- WSL storage grows over time but does not release space, so it slowly fills your Windows system drive.
- Routine tasks rely on scripts in a terminal, which are difficult for anyone who is not a developer.

The VM removes these problems. Porta runs inside one self-contained Linux environment that behaves the same way, whatever the Windows host around it does.

Will Porta look or work differently for our operators?

No. Porta is the same application, with the same interface and the same workflows. Your operators do not need to learn anything new to run shows.

Your data and media

Will our media be affected?

No. Your media stays on your networked drive or Designer machines, where it is today. Media uploaded directly to Porta will be migrated along with its data.

Will we lose any of our Porta content, such as templates, playlists, or schedules?

No. The migration copies your current Porta data into the VM and checks it before the system goes live. We rehearse this with a copy of your own data first.

The migration

How much downtime will there be?

The migration happens in a planned maintenance window that we agree with you in advance.

What happens if something goes wrong during the migration?

We rehearse the full migration on a separate test system that copies your setup, before we touch your live system. The complete process must pass several times before we schedule your migration.

During the migration, we keep a tested way to return to your current setup. If anything is wrong, we go back to it.

Who carries out the migration?

Disguise prepares and performs the migration. The one setup step that still uses a script is normally done by Disguise before we hand the machine back to you.

Running Porta day to day

How do we manage Porta after the move?

You install, update, and manage Porta through Porta Manager, a web interface. Both technical and non-technical staff can use it. Common tasks are buttons on a dashboard, not scripts you run in a terminal.

Do we need Linux or developer skills?

No. Porta Manager is designed so that routine tasks do not need a terminal or any developer knowledge.

What if a task fails?

Porta Manager keeps a record of every install, update, and maintenance action, with step-by-step logs. If something fails, you can see which step failed and send us that detail. This helps

us support you faster.

Updates

How do updates work now?

You add the new Porta release in Porta Manager and follow clear on-screen steps. The update runs in place, in a stable Linux environment. You can even close the browser and continue later from the same point.

Do we get a new VM image for every Porta update?

No. The VM image is only for the first setup. After that, you update Porta in place. We do not send a new image for each update.

Can we get the latest fixes without moving to the VM?

New Porta releases are built for the VM deployment, so moving to the VM is how you receive the latest fixes and new features. The application itself stays the same; only the way we build and deliver it has changed.

Disk space

Will the disk keep filling up the way it does now?

No. Porta's storage no longer grows without limit the way WSL does today. Porta VM uses a separate virtual disk with a size you control, kept apart from your Windows system drive.

Backups and rollback

How are our backups handled?

Porta backs up its own data automatically on a regular schedule as before. You can also make a backup at any time with one click, for example before a large change to a show. Within Porta Manager, each backup shows its date, size, and location.

Can we undo a change if we need to?

Yes. You can restore Porta to an earlier backup in one click. Before it restores, Porta Manager first backs up the current state, so you do not lose your most recent data.

Looking ahead

Does this lock us into one machine?

No. We build the Porta VM to a standard, portable format. Porta is no longer tied to one specific machine. You do not need this to run Porta today, but it gives you room to grow in the future.

Do we need to do anything to prepare?

We agree to a maintenance window with you and confirm the details of your setup beforehand. We will let you know if we need anything from your team before the migration.

Porta VM Helper Commands and Scripts

This page is the reference for the bash commands and shell scripts that ship with the Porta VM image. They are available from any shell on the VM — over SSH, or at the VirtualBox console — and are grouped by the task they help you accomplish.

- For a symptom-driven walk-through that uses these helpers in context, see the Porta VM Troubleshooting guide.
- For a quick-reference cheatsheet covering helpers, log paths, container internals, and monitoring URLs together, see the Porta VM Diagnostics Cheatsheet.

How to read this page

- **Commands** appear as bare names, like `porta_check_version`. These are bash shortcuts available on VM image `0.9.14.2` and newer. Type them at the prompt and press **Enter**.
- **Scripts** appear with their full path, like `~/scripts/setup_static_ip.sh`. These are the underlying shell scripts and are available on all VM images. Run them by executing the full path.
- **Available since** indicates the earliest Porta VM image version that ships the helper. `All` means it has been there since the first release. Run `porta_check_version` (or read the VM image filename) to find your version.

> **Note**
>
> The `~` character is shorthand for the home directory of the user `portavm`, which is `/home/portavm`. Using `~` in place of `/home/portavm` works in most contexts; use the full path if you run into a problem.

Diagnostics

Helper	What it does	Ava sinc
`collect_data`	Runs various diagnostics to gather system and app data. Results are stored under `~/logs/collected_data/YYYYMMDD/HH-SS/`.	`0.9`
`porta_diag`	Runs the full Porta servers diagnostics.	`0.9`

Helper	What it does	Ava sinc
`view_hosts_file`	Prints the contents of `/etc/hosts`.	`0.9`
`check_diskspace`	Simple disk space check.	`0.9`
`check_diskspace_sorted`	Disk space check sorted by size.	`0.9`
`docker_disk_usage`	Docker disk usage by images, containers, and volumes.	`0.9`
`docker_volume_size` `<volume_name>`	Inspects the size of a named Docker volume.	`0.9`
`~/scripts/vm_info.sh`	Prints the VM's hostname, IPv4 address, MAC address, and `/etc/hosts` contents.	All
`~/scripts/porta-manager/check-conn-cache.sh`	Shows the cached connections, the loaded in-memory connections, and the database connection cache for every Porta Manager container.	All

Versioning

Helper	What it does	Available since
`porta_check_version`	Prints Porta version information, including Laravel, PHP, MySQL, Redis, and OS.	`0.9.14.2+`
`mngr_check_version`	Prints Porta Manager version information.	`0.9.14.2+`
`~/scripts/porta-manager/check-manager-version.sh`	Underlying script for `mngr_check_version`.	All

Logs

Each Porta log helper has a paired `_follow` variant that tails the file (equivalent to `tail -f`) instead of dumping its current contents.

Helper	What it shows
`porta_laravel_logs` / `porta_laravel_logs_follow`	`/var/www/storage/logs/laravel-YY` from the `porta` container.
`porta_php_errors` / `porta_php_errors_follow`	`/var/log/php/errors.log` from the container.

Helper	What it shows
`porta_horizon_logs` / `porta_horizon_logs_follow`	`/var/www/logs/horizon.log` — queu sequence playout.
`porta_task_logs` / `porta_task_logs_follow`	`/var/www/logs/default_tasks.log` tasks, database backups, socket check
`porta_main_db_logs` / `porta_main_db_logs_follow`	MySQL error log on this machine, when machine.
`porta_backup_db_logs` / `porta_backup_db_logs_follow`	MySQL error log on this machine, when backup machine.
`porta_arbiter_db_logs` / `porta_arbiter_db_logs_follow`	MySQL error log on this machine, when machine.
`mngr_app_logs`	Porta Manager app container logs.
`mngr_horizon_logs`	Porta Manager installer wizard processi
`mngr_task_logs`	Porta Manager background task runner
`~/scripts/porta-manager/view-logs.sh [container] [lines]`	Underlying script for the `mngr_*_logs` `[container]` is `app`, `horizon`, or `t` `[lines]` is a line count, or `f` to follow

> **Note**
>
> On older VM images that don't have the bash shortcuts, use `view-logs.sh` directly. For example, `~/scripts/porta-manager/view-logs.sh app 300` tails the last 300 lines of the manager app container's log, and `~/scripts/porta-manager/view-logs.sh horizon f` follows the horizon container's log.

Replication

Helper	What it does	Available since
`porta_group_status`	Shows the group replication status as reported by this machine.	`0.9.14.2+`
`porta_all_group_status`	Runs the same status query against every machine in the group using the entries in `/etc/hosts`. Each VM's	`0.9.14.2+`

Helper	What it does	Available since
	`/etc/hosts` must be correct for this to work.	
`porta_start_repl`	Runs `START GROUP_REPLICATION` on this machine.	`0.9.14.2+`
`porta_stop_repl`	Runs `STOP GROUP_REPLICATION` on this machine.	`0.9.14.2+`
`porta_bootstrap`	Bootstraps the replication group from this machine. Check first with `porta_all_group_status` — only run this if no other member is already primary.	`0.9.14.2+`
`porta_set_bootstrap_ON`	Persists the bootstrap flag as ON. This machine will always set itself as primary on startup. Useful only for single-VM setups — **never use it on a multi-VM replication group**, as it can cause split-brain.	`0.9.14.2+`
`porta_set_bootstrap_OFF`	Persists the bootstrap flag as OFF. This is the default state for a Porta VM.	`0.9.14.2+`
`~/scripts/porta/view-ALL-group-repl-status.sh`	Underlying script for `porta_all_group_status`.	All

Database backups

Helper	What it does	Available since
`porta_backup_db`	Creates a backup of the Porta database. The resulting ZIP archive is saved inside the `porta` container at `/var/www/storage/app/Porta-Backups`.	`0.9.14.2+`
`porta_restore_db`	Restores the Porta database from a backup. Prompts with a list of locally available dumps.	`0.9.14.2+`
`porta_db_dump [db_container_name] [db_name]`	Runs a raw `mysqldump`. Defaults to `porta-db` and the `porta` database.	`0.9.14.2+`
`porta_db_restore [db_container_name] [db_name]`	Restores a database from a `mysqldump`. Defaults to `porta-db` and the `porta` database. Prompts with a list of locally available dumps.	`0.9.14.2+`

Helper	What it does	Available since
`porta_reset_db`	**Destructive — wipes all data on this machine** and recreates the database from migrations. Used as the last-resort step in disaster recovery.	`0.9.14.2+`

> **Note**
>
> Automatic backups run every three hours on a non-primary machine — usually the arbiter — and are saved inside the `porta` container at `/var/www/storage/app/Porta-Backups`. Filenames look like `arbiter-machine-mysql-3-backup-YYYY-MM-DD-HH-mm-ss.zip`.
>
> For full backup and recovery procedures, see Porta VM Disaster Backup and Restore.

Scheduler playout

These helpers query the same Scheduler tables but on different machines in the replication group. Use the variant that matches the machine you are currently on — for example, run `porta_playouts` from the main machine, `porta_backup_playouts` from the backup machine.

Helper	What it shows	Available since
`porta_playouts`	Last 50 Scheduler playouts, including the currently active and next entries. Main machine only.	`0.9.14.2+`
`porta_playout_history`	Last 50 Scheduler playout history items. Main machine only.	`0.9.14.2+`
`porta_backup_playouts`	Last 50 Scheduler playouts. Backup machine only.	`0.9.14.2+`
`porta_backup_playout_history`	Last 50 Scheduler playout history items. Backup machine only.	`0.9.14.2+`
`porta_arbiter_playouts`	Last 50 Scheduler playouts. Arbiter machine only.	`0.9.14.2+`

Helper	What it shows	Available since
`porta_arbiter_playout_history`	Last 50 Scheduler playout history items. Arbiter machine only.	`0.9.14.2+`

VM lifecycle

Helper	What it does	Available since
`~/scripts/reset_identity.sh`	Picks a new hostname and unique machine ID, updates `/etc/hosts`, and reboots. Run this after importing the VM image to a second or third host so the copies don't share an identity. See **Manually Resetting the Identity of a Porta On Prem VM**.	All
`~/scripts/setup_static_ip.sh`	Sets a static IP via netplan. The Porta VM PowerShell setup script does this automatically — only run manually if setup failed mid-flight. See **Manually Setting Up a Static IP**.	All
`~/scripts/disable_static_ip.sh`	Disables the static IP configuration by renaming `/etc/netplan/99-portacfg.yaml`. The VM will fall back to DHCP on next boot.	All
`~/scripts/reset_dhcp.sh`	Forces a new DHCP lease and clears cached leases. Only meaningful when the VM is not using a static IP.	All
`~/scripts/static_ip_info.sh`	Prints the current netplan static IP configuration.	All
`~/scripts/setup_shared_folders.sh`	Prepares the VM side of a VirtualBox shared folder for file export to Windows. See **Porta On Prem VM Windows Shared Folder**.	All

> **Warning**
>
> `~/scripts/setup_static_ip.sh` and `~/scripts/disable_static_ip.sh` restart networking on the VM. **Run them from the VirtualBox console, not over SSH.** If executed over SSH, the connection drops when networking restarts and the script fails mid-flight.

Porta Manager lifecycle

Helper	What it does	Available since
`update_manager` (alias `install_manager`)	Downloads the latest available Porta Manager build and runs the installer. Automatically runs `backup-env.sh` first so `APP_KEY` is preserved across the update.	All
`mngr_init_user`	Initialises the first Porta Manager admin user. Only needed after a full Porta Manager database wipe.	`0.9.14.2+`
`mngr_backup_env`	Copies the `.env` file from the `porta-manager-app` container to `${MNGR_CONFIG_DIR}/.env` to preserve `APP_KEY` between updates. Runs automatically when calling `update_manager`.	`0.9.14.2+`
`mngr_restore_env`	Restores the preserved `.env` file from `${MNGR_CONFIG_DIR}/.env` back into the `porta-manager-app` container.	`0.9.14.2+`
`mngr_recreate`	Recreates the Porta Manager containers from their existing images, preserving data volumes. Useful if the VM's IP changed without running **Fix IP Settings** in the Porta Manager dashboard.	`0.9.14.2+`
`mngr_wipe_recreate`	**Destructive — wipes Porta Manager data and storage volumes**, then recreates the containers from existing images. Porta application data is not affected.	`0.9.14.2+`
`~/scripts/porta-manager/install-manager.sh`	Underlying script for `update_manager`.	All
`~/scripts/porta-manager/init-manager-user.sh`	Underlying script for `mngr_init_user`.	All
`~/scripts/porta-manager/backup-env.sh`	Underlying script for `mngr_backup_env`. Runs automatically as part of `install-manager.sh`.	All

Porta On Prem VM Overview

Architecture

Requirements

Porta On Prem Virtual Machine requires the following minimum system configuration:

- A copy of the latest Porta On Prem Virtual Machine release as a zip file.
  - This zip contains the `setup_vm.ps1` script and the `.ova` VM image file.
  - The image is an `.ova` file, which is a virtual machine image that can be imported into VirtualBox.
  - The image is a pre-configured Ubuntu image with Docker and Porta Manager already installed.
- VirtualBox 7.1.8 installed.
- Latest copy of the Porta On Prem application as a zip file.
- Minimum of 3 physical machines if running database replication.

Component	Specification
Operating System	Windows 11 64-bit
Hypervisor	VirtualBox 7.1.8
CPU	Intel i7 4th Generation (required: CPU with AVX2 support)
Memory	8GB RAM
Storage	100+GB free disk space

Docker

`porta` Container

> **Note**
>
> Also communicates on Porta Bridge's port 1500

- Role: Porta UI & API

- Published Ports:
  - 8080 for UI
  - 8000 for API

`porta-db` Container

- **Role**: Porta MySQL Database
- **Published Ports**:
  - MySQL Client Ports:
    - 3306 for `porta-db`
    - 3307 for `porta-db-2`
    - 3308 for `porta-db-3`
  - MySQL Replication Ports:
    - 33061 for `porta-db`
    - 33062 for `porta-db-2`
    - 33063 for `porta-db-3`

`porta-socket` Container

- Role: Porta WebSocket Relay Server
- Published Ports: 6001

`porta-redis` Container

- Role: Porta Redis Server
- Published Ports: 6379

Database

Porta On Prem runs three MySQL databases utilizing the MySQL standard Group Replication features.

Database Replication

MySQL Group Replication provides distributed replication with automated coordination between servers in the group. Group replication ensures that the database service is continuously available.

The replication group operates in single-primary mode with automatic primary election, in which only one server accepts writes at a time. In the case of primary failure, the Porta backend will automatically attempt to reconnect to the newly elected primary.

Replication States

Possible values of member_state from performance_schema.replication_group_members:

Member State	Description
`ONLINE`	The server is an active member of a group and in a fully functioning state.
`RECOVERING`	The server has joined a group and is in the process of becoming an active member.
`OFFLINE`	The Group Replication plugin is loaded but the member does not belong to any group. *This status may briefly occur while a member is joining or rejoining group.*
`UNREACHABLE`	The local failure detector suspects that the member cannot be contacted, because the group's messages are timing out. *This can happen if a member is disconnected involuntarily.*
`ERROR`	The member is in an error state and is not functioning correctly as a group member. *While a member is joining or rejoining a replication group, its status can be displayed as `ERROR` before the group completes the compatibility checks and accepts it as a member.*

WebSocket Server Failure & Failover

Porta On Prem monitors its connection to the WebSocket server and will automatically attempt to failover to the backup server if the connection is lost.

If the failed server comes back online, it will **not** replace the active server, but will act as the new "backup" server until the active server fails or otherwise shuts down.

Helpers

Helpers can be accessed from the Porta Manager Dashboard.

Name	Description
Bootstrap Database	Bootstrap this machine's Porta database to create a replication group with this machine as primary.
Start Replication	Start this machine's Porta database replication.
Stop Replication	Stop this machine's Porta database replication.
Fix IP Settings	Fixes Porta if this machine's IP address changes after Porta is already installed.

Installing Porta On Prem

- Initial Machine Setup

Logs

Porta UI Logs

The front-end logs can be viewed in the Web Browser console. To access the logs, open the browser's developer tools (F12) and select the `Console` tab.

Monitoring

Viewing Database Health

A database health dashboard is available at `http://<MACHINE-IP>:8000/health`. This dashboard displays the results of ongoing database replication health checks.

Viewing Queued Tasks

Some heavy-duty tasks, such as media conversion, are queued and run in the background. A minimal UI is available at `http://<MACHINE-IP>:8000/horizon` to monitor these tasks.

Socket.IO Admin UI

View the Socket.IO Admin UI at `http://<PORTA-MACHINE-IP>:8000/socketio-adminui` to monitor the status of the Porta Socket Server. Please contact **support@disguise.one** for the login credentials.

Porta On Prem VM Windows Shared Folder

Setting up a Shared Folder between Porta VM and Windows

Set up a mount point between VM and Windows to easily transfer files between Windows and the Porta VM.

1. Connect to the VM using SSH (replace the command below with your own values):
   - `portavm` is the username you will be connecting as
   - `VM-IP` is the VM's IPv4 address on the network

   ```
   ssh portavm@<VM-IP>

   # Example: ssh portavm@192.168.50.9
   ```

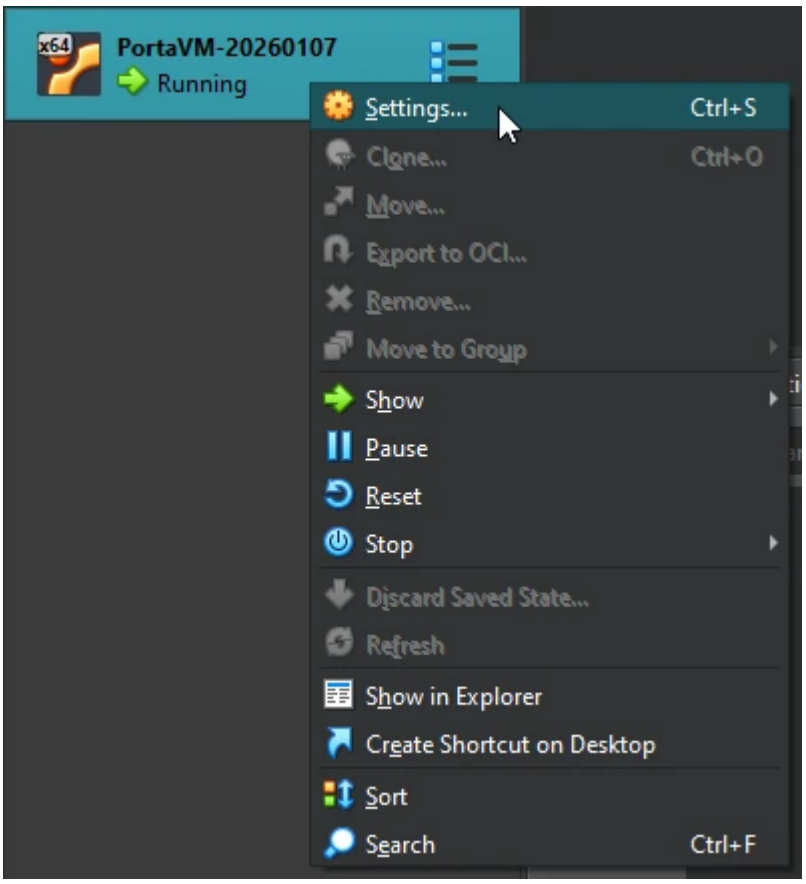
2. In the VM, run:

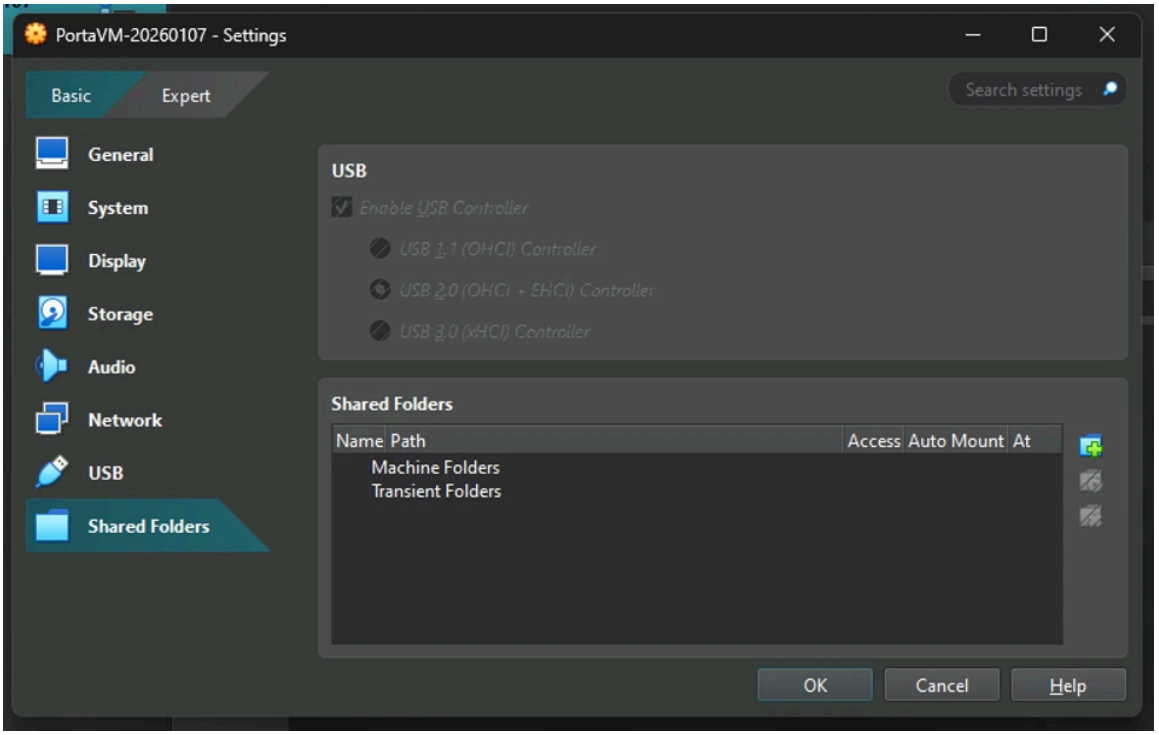
   ```
   ~/scripts/setup_shared_folders.sh
   ```

3. Enter the Porta VM `sudo` password when prompted.

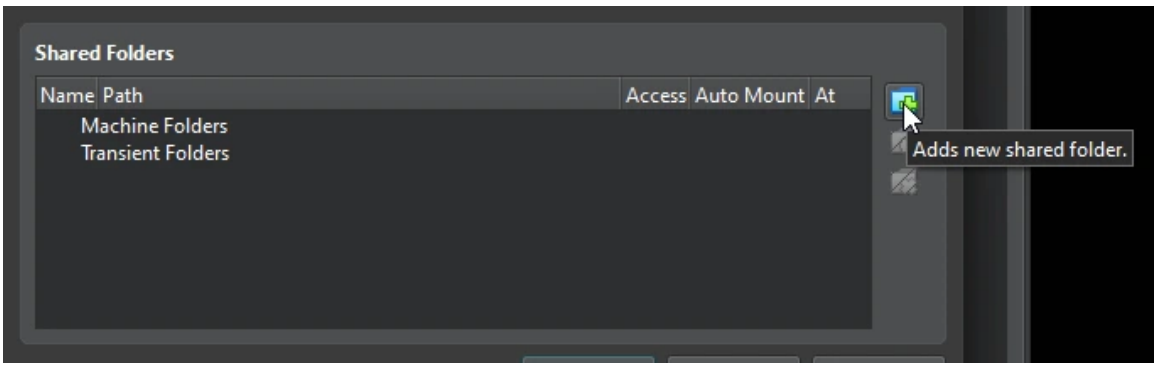
4. After the script completes, return to the VirtualBox application in Windows and set up the Windows shared folder:

1. Right-click on the VM and go to `Settings → Shared Folders`:

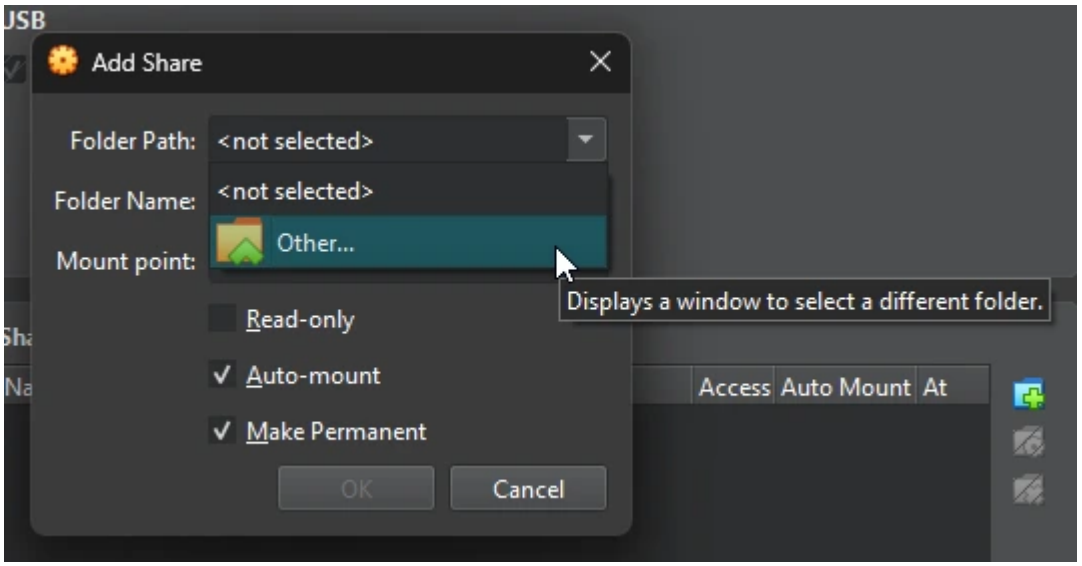




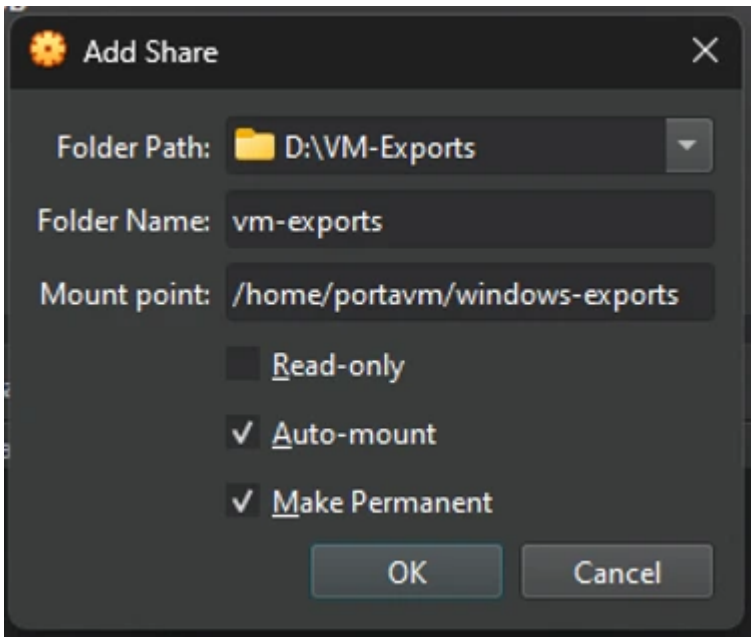
2. Click the “Add new shared folder” icon:



3. In the pop-up that appears, enter the following details:
    - **Folder Path:** Use the dropdown's "Other" option to choose, or create, a folder where VM files can be exported.



    - **Folder Name:** Enter `vm-exports`
        - *This name is case-sensitive and must be entered as seen here.*
    - **Mount point:** Enter `/home/portavm/windows-exports`
        - *This name is case-sensitive and must be entered as seen here.*
    - Check **"Auto-mount"** and **"Make Permanent"** and click OK.



4. Click OK to close the settings window.

5. You can now **export files** from the Porta VM to Windows using the shared folder.

Exporting from Porta VM to Windows

To export a file from the Porta VM to Windows, first, ensure you have already **set up a shared folder**, then:

1. Connect to the VM using SSH (replace the command below with your own values):
   - `portavm` is the username you will be connecting as
   - `VM-IP` is the VM's IPv4 address on the network

   ```
   ssh portavm@<VM-IP>

   # Example: ssh portavm@192.168.50.9
   ```

2. Run the following command, replacing `/path/to/file/to/export` with the path to the Porta VM file you want to export:

   ```
   ~/scripts/export_to_windows.sh /path/to/file/to/export
   ```

3. The file will appear at the Windows **Folder Path** that you specified during setup.

Porta VM Support Checklist

Run this checklist on a live Porta VM deployment as the first step when something isn't working. It takes about five minutes top-to-bottom and is designed to surface the most common sources of configuration drift — IP changes, stopped containers, stale `/etc/hosts` entries, and integration misconfiguration — before deeper troubleshooting.

Throughout this page:

- `<VM-IP>` means the Porta VM's IPv4 address on the local network — the static IP, if one is configured.
- `<HOST-IP>` means the Windows host's IPv4 address (often on a `d3net` adapter).
- The VM SSH user is always `portavm`.

Identify the deployment

- ☐ **The VM is running.** In VirtualBox on the Windows host, the Porta VM is in state `Running`. Headless mode is fine.
- ☐ **The VM hostname is unique.**

  Connect to the VM using SSH (replace the command below with your own values):

  - `portavm` is the username you will be connecting as
  - `VM-IP` is the VM's IPv4 address on the network

  ```
  ssh portavm@<VM-IP>

  # Example: ssh portavm@192.168.50.9
  ```

> **⚠ Caution**
>
> The terminal prompt after connecting should not show `portavm@Porta-VM` if you run more than one Porta VM. If it does, the identity reset was never run after import, and ARP, DHCP, and database replication will conflict.

- ☐ **Capture the VM's IP and hostname.** Inside the VM run:

  ```
  ~/scripts/vm_info.sh
  ```

  This prints:

  - The hostname.
  - The IPv4 address.
  - The MAC address.
  - The contents of `/etc/hosts`.
- ☐ **Capture the Porta version.** Inside the VM run `porta_check_version` (available on VM image `0.9.14.2` and newer).
- ☐ **Capture the Porta Manager version.** Inside the VM run `mngr_check_version` (available on VM image `0.9.14.2` and newer).

Docker containers

Run `docker ps -a` inside the VM. The expected baseline is:

Porta application stack

The application stack runs one set of these, named according to the machine's role in the replication group:

- ☐ `porta` is running, with ports `8080` (UI) and `8000` (API) published.
- ☐ One of the following is running:
  - `porta-db` (ports `3306` / repl `33061`) — main machine.
  - `porta-db-2` (ports `3307` / repl `33062`) — backup machine.
  - `porta-db-3` (ports `3308` / repl `33063`) — arbiter machine.
- ☐ `porta-socket` is running, with port `6001` published.
- ☐ `porta-redis` is running, with port `6379` published.

Porta Manager stack

Every Porta VM runs the Porta Manager stack regardless of role:

> **Note**
>
> Container names are likely suffixed with `-1` (e.g. `porta-manager-app-1`) due to the way Docker handles naming. This is normal and expected.

- [ ] `porta-manager-app` is running, with port `88` published.
- [ ] `porta-manager-horizon` is running. No published port.
- [ ] `porta-manager-task` is running. No published port.
- [ ] `porta-manager-db` is running, with port `3310` published.
- [ ] `porta-manager-redis` is running, with port `6378` published.

> **Caution**
>
> Any container using a `portadisguise/...` image with a name that doesn't appear in the lists above must be stopped and removed. Then restart `porta` and `porta-socket`.

Porta application access

- [ ] Porta is being accessed in the browser at `http://<VM-IP>:8080`, not `http://localhost:8080`.
  - The VM is a separate host on the network, and `localhost` reaches the Windows machine, which is not running Porta.
- [ ] The same rule applies to the API: `http://<VM-IP>:8000`.
- [ ] The database status icon in the Porta UI is green.
- [ ] The database health dashboard is all green at `http://<VM-IP>:8000/health`.
- [ ] The Horizon queue dashboard at `http://<VM-IP>:8000/horizon` shows no piled-up failed jobs.
- [ ] In Porta, under **Window** → **Settings** → **Integrations** → **Socket Server**, the URL is `http://<VM-IP>:6001`.
- [ ] In Porta, under **Window** → **Settings** → **Channels**, the expected channels are listed.
  - If they aren't, click the sync button in the channel panel.
- [ ] In Porta, under **Window** → **Settings** → **Preference**, the following are enabled if you use group sequences:
  - "Enable Play Groups"
  - "Enable play group sequence"
- [ ] In Porta, under **Window** → **Settings** → **Preference**, "Local Live Preview" is set to your preferred value.

Porta Manager access

- [ ] Porta Manager is reachable at `http://<VM-IP>:88`.

> **Note**
>
> Port `88`, not `8080`. The default Porta Manager admin sign-in is `superadmin@disguise.one` with the Porta VM password provided by Disguise.

- [ ] In Porta Manager, under **Porta Configuration Management** → **Machines**, the IP address shown for each machine row matches the actual static IP of that VM.

> **Tip**
>
> If a machine row's IP doesn't match reality, that is almost certainly the underlying cause of any "Porta lost the database" or "Bridge can't connect" symptom. See Changing the IP of Porta On Prem.

Designer, Unreal, and Porta Bridge

- [ ] **Designer** is running, with the expected project open.
- [ ] The active Designer project matches the page, template, and channel that Porta is configured to use.
- [ ] **Unreal** (if used) is running, plugins are up to date, and the expected project is open.
- [ ] Unreal's Porta plugin settings reference the correct Porta instance:
  - **Connection URL**: `http://<VM-IP>:6001` or `http://porta-socket.server:6001`
  - **API URL**: `http://<VM-IP>:8000` or `http://porta.server:8000`
- [ ] If using the `porta-socket.server` or `porta.server` hostnames, the Unreal machine's Windows `hosts` file maps them to the VM's current static IP.
- [ ] **Porta Bridge** is running.
- [ ] Only a single instance of Porta Bridge is running.

> **Caution**
>
> Check the Windows system tray and Task Manager on the Bridge machine. Multiple instances of Porta Bridge cause races. If duplicates are found, stop all instances and restart Bridge.

- ☐ Porta Bridge is up to date.
- ☐ Porta Bridge is connected to the correct Porta and Designer.
- ☐ Porta Bridge's configuration matches the deployment:
  - **API URL**: `http://<VM-IP>:8000`
  - **Socket Server URL**: `http://<VM-IP>:6001` or `http://porta-socket.server:6001` (with matching Windows `hosts` entry if using the hostname)
  - **HTTP Listener IP Address**: the Windows host IPv4 (where Bridge runs)
- ☐ The Windows host firewall on the Bridge machine has port `1500` open for inbound traffic. The Scheduler uses this port to drive transport and media requests.

Network and firewall

- ☐ **The VM has a static IP.** Inside the VM:

  ```
  ~/scripts/static_ip_info.sh
  ```

  This prints the contents of `/etc/netplan/99-portacfg.yaml`. If it's empty, the VM is on DHCP and the IP can change. Depending on your network, this may already have caused the current incident. See Manually Setting Up a Static IP.

- ☐ **The VM's `/etc/hosts` file maps the replication group correctly.** Inside the VM run `view_hosts_file`. For a single-machine setup the only critical entry is `127.0.0.1 localhost`. For replication, each VM must have:

  ```
  <MAIN IP>     porta-db
  <BACKUP IP>   porta-db-2
  <ARBITER IP>  porta-db-3
  ```

  > ⚠ **Caution**
  >
  > Stale entries here are the most common cause of "node won't join the group" complaints. Each line must match the current static IP of the corresponding machine.

- ☐ **The Windows host firewall allows inbound traffic on the following ports:**
  - MySQL ports: `3306`, `3307`, `3308`
  - Group replication ports: `33061`, `33062`, `33063`
  - Socket server: `6001`
  - Porta UI: `8080`
  - Porta API: `8000`
  - Porta Manager: `88`
  - Porta Bridge HTTP Listener: `1500` (on the Bridge machine, if separate)

  The VM bridges its network adaptor into the LAN, so these ports must also be reachable from the host's perspective.

Disk and resources

- ☐ **The VM has free disk space.** Inside the VM:

  ```
  check_diskspace
  ```

  Anything under approximately ten percent free on `/` is a problem. The `porta` container will fail to write logs and the database will refuse new transactions.

- ☐ **Docker has no large reclaimable cache.** Inside the VM:

  ```
  docker_disk_usage
  ```

  If "Images Reclaimable" is more than a few gigabytes, free it with:

  ```
  docker image prune -af
  ```

  This removes unused images only — volumes (your data) are preserved.

- ☐ **VirtualBox has allocated enough host resources to the VM.** Confirm in VirtualBox **Settings** → **System** that the VM has at least:
  - 8 GB RAM
  - 4 vCPU
  - A CPU that supports AVX2

  Under-allocation is a frequent cause of:

  - `rcu: detected stalls on CPUs/tasks` messages.
  - Slow boot.
  - Intermittent container restarts.

When a check fails

For each failed check, see the matching section in the Porta VM Troubleshooting guide. Most paths from a failed check to a recovery procedure are documented there.

Porta VM Troubleshooting Playbook

This page is a symptom-driven troubleshooting playbook for a Porta On Prem deployment running on Porta VM. Each section is keyed by a common symptom, then describes the likely cause and the recovery steps.

- For a top-to-bottom check to run first, see the Porta VM Support Checklist.
- For a reference of where logs and configuration live, see the Porta VM Diagnostics Cheatsheet.

VM lifecycle issues

The VM's IP address is shown as 127.0.0.1

This means VirtualBox isn't connected to the correct network adaptor, or DHCP isn't working on the chosen adaptor.

1. Shut down the VM if it is running.
2. On the Windows host, open PowerShell and run `ipconfig /all` to list all adapters and their names. Note any adapter that shows a real IPv4 lease.
3. In VirtualBox, open the VM's **Settings** → **Network**. Confirm:
   - "Attached to" is set to **Bridged Adapter**.
   - "Name" matches an adapter from step 2 (often labelled `d3net`).
4. Start the VM, log in at the VirtualBox console as `portavm`, and check the IP with:

```
~/scripts/vm_info.sh
```

"Failed to establish SSH connection" during setup_vm.ps1

The cause depends on which step the failure occurred at. The setup script reports the step in the error message.

- **During Network Configuration**, with the IP shown as `127.0.0.1`, see The VM's IP address is shown as 127.0.0.1 above.
- **During Resetting Identity**, the SSH host key for the IP may be cached, or the SSH session dropped during the reboot. After the VM is back up, manually reset identity from the VirtualBox console: see Manually Resetting the Identity of a Porta On Prem VM.

- **During Setting Static IP Address**, set the static IP manually from the VirtualBox console: see Manually Setting Up a Static IP.

> **Warning**
>
> The `setup_static_ip.sh` script must be run from the VirtualBox console, not over SSH. The SSH session will drop when networking restarts and the setup will fail mid-flight.

ACPI shutdown takes longer than three minutes

This usually means the VM's OS is stuck or under-resourced.

1. In the VM's terminal window, choose **File** → **Close** → **Power Off Machine**.
2. Once the terminal closes, start the VM again from VirtualBox.
3. If this recurs, check the VM's RAM and CPU allocation. The minimum is 8 GB and 4 vCPU.

Timed out waiting for the VM to come online

This message is common during the identity-reset and static-IP setup reboots. The setup script's wait window is shorter than some VMs need.

1. Gracefully shut down the VM.
   - In the VM's terminal window, choose **File** → **Close** → **ACPI Shutdown**.
   - If ACPI hangs, use **Power Off Machine** instead.
2. In the Powershell window, press `Ctrl+C` to stop the setup script.
3. Re-run `setup_vm.ps1`.
4. When prompted to import a new Porta VM or use an existing one, type `2` and press **Enter**.
5. Select the VM you previously imported.
6. Continue from the network configuration step.

”rcu: detected stalls on CPUs/tasks” appears in the VM terminal

This message indicates the VM is resource-starved.

1. Gracefully shut down the VM with **File** → **Close** → **ACPI Shutdown**, or **Power Off Machine** if ACPI hangs.
2. In VirtualBox **Settings** → **System**, confirm the VM has at least:
   - 8 GB RAM
   - 4 vCPU
   - A CPU that supports AVX2
3. Start the VM and monitor for recurrence.

If the message returns regularly, the host machine is under-provisioned for Porta VM. Consider allocating more resources or moving the VM to a more capable host.

The VM is stuck on “Begin: Loading essential drivers” at boot

The storage controller has lost the solid-state-drive hint, or VirtualBox’s storage configuration has drifted after a package update.

1. Shut down the VM.
2. In VirtualBox **Settings** → **Storage**, click the SATA virtual disk.
3. Check both of the following:
   - **Solid-state Drive**
   - **Use host I/O cache**
4. Start the VM.

VirtualBox shows “E_INVALIDARG 0X80070057” when importing the .ova

The drive holding VirtualBox’s default machine folder doesn’t have enough free space.

1. In VirtualBox, go to **File** → **Preferences** → **General**.
2. Change “Default Machine Folder” to a drive with enough space.
3. Run the VM setup again.

Static IP setup reported a failure but SSH actually works

This is a known false-positive warning in some Porta VM setup script versions.

Verify directly:

```
~/scripts/static_ip_info.sh
```

- If a static IP is configured and the VM is reachable at it, the warning was incorrect — carry on.
- If the static IP was not actually set, run `~/scripts/setup_static_ip.sh` from the VirtualBox console.

The static IP wizard picked an unexpected subnet

The wizard infers the subnet from the existing DHCP configuration, which can be wrong on complex networks.

Use the manual-entry option in the wizard, or follow Manually Setting Up a Static IP from the VirtualBox console. Confirm the correct subnet with your IT team if there is any uncertainty.

VM IP changed and Porta is broken

A VM IP change is the most common root cause for live incidents on Porta VM. Multiple symptoms can all trace back to this:

- Porta can't reach the database.
- The Porta UI shows the database status as red.
- Porta Bridge can't connect.
- Engine clients (Unreal, Designer) can't reach Porta.

The canonical recovery procedure is in Changing the IP of Porta On Prem. The summary below highlights the parts most often missed.

Recovery summary after an IP change

1. From the **VirtualBox console** (not SSH), reconfigure the VM's static IP:

   Using the native VirtualBox terminal window of the running virtual machine, log in to the VM:

   - Type the username `portavm` and hit `Enter`,
   - Type the password provided to you and hit `Enter` again to log in.

   Then run:

   ```
   sudo ./scripts/disable_static_ip.sh
   sudo reboot
   ```

   When the VM is back up, log in again and run:

   ```
   sudo ./scripts/setup_static_ip.sh
   ```

2. In **Porta Manager** → **Porta Configuration Management** → **Machines**, edit each machine's IP to the new value and click **Save Changes**.
3. On the Porta Manager dashboard, click **Fix IP Settings** and confirm.
4. Wait for the success message.
5. Refresh Porta in the browser.

Porta application surface

The browser shows an old Porta version after an update

The browser has cached the old version.

1. Hard-reload the page with `Ctrl+Shift+R`.
2. If that doesn't help, clear all cookies and site data for the Porta origin, then reload.
3. Verify the backend version inside the VM:

   ```
   porta_check_version
   ```

   If the backend reports the new version, the update succeeded and the browser is the only thing stuck.

Login fails with "500 Internal Server Error" or "Could not create token: Key provided is shorter than 256 bits"

The JWT secret is empty or too short. This commonly happens after a `.env` edit or a partial install.

1. Inside the VM, run the following against the `porta` container:

   ```
   docker exec -it porta bash -c "php artisan cache:clear && php artisan jwt:sec
   ret && php artisan config:cache"
   ```

2. Clear the browser cookies for the Porta origin.
3. Try logging in again.

The socket server can't reach Redis ("ECONNREFUSED 127.0.0.1:6379")

The socket container started before Redis was ready, or Redis was restarted while the socket server held an open connection.

1. Stop the socket server container:

```
docker stop porta-socket
```

2. Restart Redis and wait a few seconds:

```
docker restart porta-redis
```

3. Start the socket server again:

```
docker start porta-socket
```

Disk and resources

”No space left on device” or the VM is running slowly

1. Check disk usage:

```
check_diskspace
```

2. Check what Docker can reclaim:

```
docker_disk_usage
```

3. If “Images Reclaimable” is significant, remove unused images. Volumes are preserved:

```
docker image prune -af
```

4. If `/` is still tight after step 3, the virtual disk needs to be enlarged. This is a VirtualBox-side operation (Virtual Media Manager, resize the `.vdi`) **plus** an in-VM resize chain using `parted`, `pvresize`, `lvextend`, and `resize2fs`. Contact Disguise support — partition resizing is hard to reverse and best done with engineering guidance.

High memory usage on the VM

1. Confirm the host's allocation in VirtualBox **Settings** → **System** → **Motherboard** → **Base Memory** is at least 8 GB. 16 GB is recommended for larger deployments.
2. Inspect per-container memory inside the VM:

```
docker stats
```

`porta-db` is normally the heaviest container.

Designer, Unreal, and Porta Bridge connections

The configuration values for these integrations change with every IP change. Confirm the following in order:

Porta Bridge can't connect to Porta

1. Confirm only one Porta Bridge instance is running on the Windows host. Check both the Windows system tray and Task Manager. Kill duplicates and restart Bridge.
2. In **Bridge** → **Window** → **Porta**, confirm:
   - **Socket Server URL**: `http://<VM-IP>:6001`.
   - **API URL**: `http://<VM-IP>:8000`.
3. Confirm **Bridge HTTP Listener IP Address** is the Windows host's IPv4, not the VM's IPv4.
4. Confirm the Windows firewall on the Bridge machine has port `1500` open for inbound traffic.
5. If using `porta-socket.server` or `porta.server`, confirm the Bridge machine's Windows `hosts` file maps them to the VM's current static IP.

Designer integration is not working

1. Confirm Designer is running.
2. Confirm the active Designer project matches the page, template, or channel that Porta is configured to use.
3. Verify Bridge is healthy. If Bridge is down, Designer's integration will fail.

Porta Manager and the Installer Wizard

Porta Manager is unreachable at port 88

1. Check the container status:

```
docker ps -a
```

2. If `porta-manager-app` has exited, view its logs:

```
docker logs porta-manager-app
```

3. Recover non-destructively by recreating from existing images:

```
mngr_recreate
```

4. If that fails, contact Disguise support.

”MAC Invalid” or “Invalid MAC” errors after a Porta Manager update

The `APP_KEY` in the running container differs from the key the data was encrypted with. Manager updates back up the relevant config automatically, so this should be rare.

1. Restore the preserved env file:

```
mngr_restore_env
```

2. Recreate the Manager containers:

```
mngr_recreate
```

Disaster recovery

For the full backup and restore procedures — including how automatic backups work, how to take a manual backup, single-node recovery, multi-node recovery, Unreal Engine failover, and VirtualBox snapshot rollback — see Porta VM Disaster Backup and Restore.

Porta On Prem VM Setup Guide

The `setup_vm.ps1` powershell script will guide you through the set-up of a new VM automatically. Periodic interaction will be required, but overall this script will:

- Detect and disable Hyper-V if it is enabled.
- Import a new Porta VM image or use an existing VM.
- Configure the VM's network settings.
- Enable the OpenSSH Windows feature.
- Generate an SSH key and set up SSH access to the VM.
- Optionally add rules to Windows firewall.
- Optionally reset the VM's identity.
- Configure a static IP address for the VM.

Prerequisites

Before beginning the setup process, ensure your physical machine meets the prerequisite criteria:

- A copy of the latest Porta On Prem Virtual Machine release as a zip file.
  - This zip contains the `setup_vm.ps1` script and the `.ova` VM image file.
  - The image is an `.ova` file, which is a virtual machine image that can be imported into VirtualBox.
  - The image is a pre-configured Ubuntu image with Docker and Porta Manager already installed.
- VirtualBox 7.1.8 installed.
- Latest copy of the Porta On Prem application as a zip file.
- Minimum of 3 physical machines if running database replication.

Component	Specification
Operating System	Windows 11 64-bit
Hypervisor	VirtualBox 7.1.8
CPU	Intel i7 4th Generation (required: CPU with AVX2 support)
Memory	8GB RAM

Component	Specification
Storage	100+GB free disk space

Setup

> **Note**
>
> - Any prompts for username should be entered as `portavm`.
> - Any prompts for password should be entered as the Porta VM password provided to you by Disguise.

1. Beginning the Setup

1. Extract the latest Porta On Prem VM zip file on the Windows machine for which it will be installed.
2. Right-click on Windows Powershell or Windows Terminal and choose “Run as administrator”.
3. In the window that opens, run the following command:

   > **Note**
   >
   > Replace `Path\to\setup_vm.ps1` with the path to the location of your extracted `setup_vm.ps1` script.

   ```
   Powershell -ExecutionPolicy ByPass -NoExit -File "\Path\to\setup_vm.ps1"
   ```

   Example:

   ```
   Powershell -ExecutionPolicy ByPass -NoExit -File "C:\Users\user.name\Desktop\setup_vm.ps1"
   ```

2. Running the Script

- The script will begin running and prompt for the Porta VM password.
- Enter the Porta VM password provided to you by Disguise and press `Enter`.

3. Hyper-V Check

In order to set up and run Porta VM, Hyper-V must not be enabled. The status of Hyper-V will be automatically checked.

- If Hyper-V is already disabled, the script will proceed automatically.
- If Hyper-V is enabled, you'll need to disable it by typing `y` and hitting `Enter`.
  1. If you choose to disable it now, you'll need to reboot your computer.
     - To reboot now, enter `y` and press `Enter`
  2. After rebooting, run the `setup_vm.ps1` script again and begin from Step 1.

4. VirtualBox Check

The script will check if VirtualBox is installed:

- If VirtualBox is already installed, the script will proceed automatically and you may proceed to the next step.
- If VirtualBox is not installed, you will be prompted to install it.
  1. If you choose to install it, enter `y` and press `Enter`.
  2. The script will download and install VirtualBox automatically.
  3. After installation, you may need to reboot your computer
     - To reboot now, enter `y` and press `Enter`
  4. After rebooting, run the `setup_vm.ps1` script again

> ⚠ **Caution**
>
> If you decline the VirtualBox installation, you will need to install it manually yourself and then run the `setup_vm.ps1` script again.

5. VM Selection

You'll be presented with options to import a new VM, or use an existing one.

1. Type `1` and hit `Enter` to choose to import a new VM.
2. In the file explorer window that opens, navigate to the folder where you extracted the VM zip and select the `.ova` file.
3. Click `Open` to import this file.
4. The image will begin importing. Wait for it to finish, this may take several minutes.
   - There will be a lot of output in the terminal, but you can ignore it.
5. Once the import is complete, the script will print "Successfully imported the appliance." and proceed automatically to the next step.

> **Tip**
>
> After completing the VM import step, if at any time during set up you need to stop and restart the setup process, such as if you mis-entered a selection, you can do so by stopping and re-running the `setup_vm.ps1` script.
>
> When you reach the VM Selection step again, type `2` and press `Enter`, then select the existing VM you just imported instead of re-importing it.
>
> You may then continue with the setup from here.

6. VM Network Configuration

1. Select the network adapter you want the VM to use by entering the number corresponding to the listed adapter and pressing `Enter`.
   - If you're unsure which adapter to choose, select the one that reads as `(Status: Up ...)`
   - If your machine contains a more complex networking setup, you may need to try different adapters until you find one that works, or ask your network administrator for help.
2. The virtual machine will now power on and begin booting.
   - This will open another terminal window that may briefly display a lot of output.
   - While waiting for hte VM to boot, your Powershell window will display "Waiting for VM to start..." periodically until the VM is fully booted.
3. In the Powershell window, you will see the detected IP address of the VM, which will be used to access Porta later.
   - For example: `VM is running with IP: 10.221.113.136`

> **Tip**
>
> If the IP is 127.0.0.1, please see the **Troubleshooting section** for more information.

4. You will be warned that the `authenticity of the host can't be established` and asked if you want to continue connecting.
5. Type `yes` and press `Enter` (the "yes" will not appear in the terminal, but it is still being entered)
6. The terminal will display "SSH connection established successfully".

> **Caution**
>
> If you encounter a "Failed to establish SSH connection" error, AND your IP address is displayed as 127.0.0.1, please see the **VM IP Address is 127.0.0.1** troubleshooting section for more information.
>
> If you encounter a "Failed to establish SSH connection" error with a different IP, you will need to manually reset the identity and/or set up the static IP after VM setup has completed. Please see the Resetting Identity and Manual Static IP Setup guides for instructions.

7. Setting up firewall rules is optional, and you can decline to set them up by typing `n` and pressing `Enter`.

7. Resetting Identity

> **Note**
>
> If you are only running one virtual machine, you may decline to reset the identity by entering `n` and pressing `Enter`, then proceeding to the next step, **"Setting Static IP Address"**.

1. If you are running multiple virtual machines, enter `y` and press `Enter`.
2. Enter a new hostname or simply press `Enter` to use the default suggested hostname.
3. You will be prompted for the password again a couple of times, then the VM will reboot.
   - After about 30 seconds, the VM will be back online.
   - It's not uncommon to encounter a timeout error when the VM is rebooting, see the **Timed out waiting for VM to come online** section if this happens. 4.The script will then get a new IP address for the VM and print it to the terminal.
   - You may be prompted for password several more times.

8. Setting Static IP Address

The script will automatically proceed to set up a static IP for the VM.

1. The script will perform a network scan to find available IP addresses on your network.

> **Caution**
>
> If the network scan fails to complete or doesn't find any available IPs, you'll be asked "Would you like to manually enter an IP address?"
>
> - To be prompted to enter a custom IP address of your choosing, type `y` and press `Enter`.
> - To decline and set up the static IP manually later, type `n` and press `Enter`.
>   - The script will skip the static IP setup and proceed to the completion step.
>   - After the setup completes, **you'll need to manually configure the static IP on the VM**. Please see the VM Static IP Setup guide for instructions.

2. Select an IP address for the virtual machine by typing the number corresponding to one of the listed available IPs and pressing `Enter`.
   - If you choose to enter a custom IP address:
     - Enter the full IP address (e.g., `192.168.1.100`)
     - If the IP appears to be in use, you'll be asked to confirm by typing `y` and pressing `Enter`
3. Next, select the machine role (also known as its type) by entering the number corresponding to one of the following options and pressing `Enter`:
   1. main
   2. backup
   3. arbiter

> **Note**
>
> If you're only using one machine for Porta, select `1` for `main`

4. The script will then proceed to configure the VM with the selected static IP address and machine role.
   - You will see a lot of output in the terminal, including password prompts, but you can ignore it.
5. When IP configuration is complete, the script will print "Static IP setup completed successfully! VM is now accessible at IP:" and list the new static IP address.

> **Caution**
>
> **IMPORTANT NOTE**: If you are setting up multiple Porta VMs, their IP addresses should be sequential (e.g., 10.100.100.10, 10.100.100.11, 10.100.100.12).
>
> Otherwise you **must** manually configure the hosts file of each VM correctly after setup has completed. Please see the *Manual Static IP Setup* guide's Manually configuring the hosts file section for instructions.

9. Completed

Once the setup has finished, your VM is ready to use!

- Access the Porta Manager (installer wizard) in the browser at the VM's IP address and port `88`: `http://VM-IP:88`.
- Porta Manager's login credentials are:
  - Email address: `superadmin@disguise.one`
  - Password: The Porta VM password
- After signing in, you can click the "Begin" button on the dashboard to use the installer wizard to install Porta.
  - Make sure you have downloaded the latest Porta On Prem bundle and have it ready to upload when prompted by the installer wizard.

> **Warning**
>
> If static IP address setup, or SSH connection, failed or was skipped during the VM setup, don't forget to manually set up the static IP.

Troubleshooting common issues during VM setup

ACPI Shutdown is taking longer than 3 minutes

Force the machine to stop:

- In the VM's terminal window, File > Close > Power Off Machine.

Once the VM terminal window has closed, in VirtualBox, start it again by double-clicking the VM in the sidebar, or selecting it and clicking the Start button in the header.

Timed out waiting for VM to come online / VM takes too long at any given step

The error “Timed out waiting for VM to come online” is not uncommon during IP setup or resetting identity. Try the following steps:

1. First, we will try to gracefully shut down the machine.
   - In the VM’s terminal window, **File > Close > ACPI Shutdown**
2. If this does not begin printing new output to the window, or is taking more than a minute or two to complete, you can force the machine to stop:
   - In the VM’s terminal window, File > Close > Power Off Machine.
3. Return to your initial Powershell window and enter `Ctrl+C` to stop the VM setup script.
4. Re-run the `setup_vm.ps1` script by hitting the `Up` arrow on your keyboard so that the `setup_vm.ps1` command from the beginning of this guide appears, and then hitting `Enter`.
5. Continue as before until the `VM Selection` step.
6. When prompted to import a new Porta VM or use and existing one, type `2` and press `Enter`.
7. You’ll see a list of available VMs with their current status (running or stopped).
8. Select the VM you previously imported by typing its listed number and hitting `Enter`.
9. If the VM is not already running, the script will start it.
10. Continue with the steps from **Network Configuration** above.

Failed to establish SSH connection

If you encounter this error during the **Network Configuration** step, AND your IP was listed as `127.0.0.1`, see **VM IP Address is 127.0.0.1** below.

If you encounter this error during the **Resetting Identity** step, then after VM setup has completed you will need to manually reset the VM’s identity and manually set up a static IP for the machine. Please see the Manually Resetting Identity and VM Static IP Setup guides for instructions.

If you encounter this error during the **Setting Static IP Address** step, you will need to manually set up the static IP after VM setup has completed. Please see the VM Static IP Setup guide for instructions.

VM IP address is 127.0.0.1

VirtualBox is probably not connected to the correct network adapter, or DHCP is not working. Take these steps to try to resolve the issue:

1. Shutdown the VM if it is running.

2. Open Powershell in Windows and run `ipconfig /all` to list all adapters and their names.
3. Open VirtualBox and navigate to the VM's **Settings -> Network Settings**.
4. Ensure the Vm's "Attached to" is set to "Bridged Adapter" and the selected "Name" matches the name of the adapter you want to use, as listed in the `ipconfig` results.
5. Start the VM and try again.

"No available IPs found"

Sometimes the network scan fails to complete or doesn't find any available IPs. There are a few scenarios in which this can occur, and the solution depends on which.

- If this issue occurs during the *Resetting Identity* step, you will need to manually reset the identity and/or set up the static IP after VM setup has completed. Please see the Manually Resetting Identity and Manual Static IP Setup guides for instructions.
- If this issue occurs during the *Setting Static IP Address* step, you'll need to configure an IP manually after VM setup has completed. Please see the VM Static IP Setup guide for instructions.

VirtualBox error when importing appliance: `E_INVALIDARG 0x80070057`

Likely a disk space issue. Make sure the default location for the VM is on a drive with enough space.

- In VirtualBox, go to File > Preferences > General and change the Default Machine Folder if needed.

VM booting is stuck on "Begin: Loading essential drivers"

Shut down the VM and go into the VM's VirtualBox Settings -> Storage. Make sure these are set as expected. Checking the Solid State box for the SATA hard disk resolved the issue when last seen.

`rcu: detected stalls on CPUs/tasks` or other similar errors in the VM terminal

This indicates the VM is struggling with resources. Normally restarting the VM will resolve the issues. Gracefully shut down the VM by navigating to the VM's terminal window and clicking **File > Close > ACPI Shutdown**.

If this does not begin printing new output to the window, or is taking more than a minute or two to complete, you can force the machine to stop by navigating to the VM's terminal window, and clicking **File > Close > Power Off Machine**.

If this error becomes a common occurrence, please make confirm that your physical machine meets the VM requirements, and, if so, contact Disguise support.

`systemd-networkd.service: Watchdog timeout` message / `array-index-out-of-bounds` message in the VM terminal

This message can appear during setup, and is usually not a problem. If the setup completes successfully, you can ignore this message.

VM Disk Space Issues

If you encounter disk space issues on the VM (not Windows itself), check Docker's filesystem by running this command in the VM's terminal:

```
docker system df
```

Here is an example of what you may see:

```
TYPE            TOTAL     ACTIVE    SIZE      RECLAIMABLE
Images          12        4         13.77GB   10.3GB (74%)
Containers      4         4         360MB     0B (0%)
Local Volumes   7         3         6.55GB    6.334GB (96%)
Build Cache     0         0         0B        0B
```

If the Images "Reclaimable" space is significant, you can free it up by connecting to the VM and running:

```
docker image prune -af
```

If you still need more space, please contact Disguise support for assistance.

Disaster Backup and Restore

Backups

Every 3 hours, a backup of the Porta database is created on a non-primary machine (likely the Arbiter) and stored in the `storage/app/Porta-Backups` directory of the `porta` container. The backup is a ZIP archive containing an SQL dump of the database.

> **Note**
>
> The purpose of these files is to be used for disaster recovery in the event of catastrophic data loss.

The backup archive name is in the format `machine_type-machine-connection_name-backup-Y-m-d-H-i-s.zip` where `Y-m-d-H-i-s` is the date and time the backup was created.

Alternate Setups

- If your Porta On Prem installation is only running a single machine, the backups will be created on this machine.
- If your Porta On Prem installation is running on a single machine with an isolated backup machine, the backups will be created on both machines independently.

QuickRef

- Main machine database has container name `porta-db`
  - MySQL port `3306`
  - Replication port `33061`
- Backup machine database has container name `porta-db-2`
  - MySQL port `3307`
  - Replication port `33062`
- Arbiter machine database has container name `porta-db-3`
  - MySQL port `3308`
  - Replication port `33063`

View database logs

These logs will contain information about replication, and other MySQL logs.

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\view-database-log.bat`

View database replication group members as reported by this machine

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\view-group-repl-status.bat`

View database replication group members as reported by each machine

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\view-ALL-group-repl-status.bat`

Start Group Replication

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\actions\START-repl.bat`

Stop Group Replication

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\actions\STOP-repl.bat`

Manually Creating a Backup

Porta will create backups automatically on its own, but in the event you want to create a backup manually, such as before performing a destructive replication recovery operation like a reset, you may do so by navigating to `porta-onprem-bundle\porta-helpers\porta-database\action` and running `create-backup.bat`.

The resulting backup will be located in the `porta` container in the `/var/www/storage/app/Porta-Backups` directory, with a name like `machine_type-machine-connection_name-backup-Y-m-d-H-i-s.zip`.

Recover from Data Loss

Single Node Disaster Recovery (Data Loss)

If only a single member needs to be restored, the broken database should be wiped, rebuilt, rejoin as a new member, and let replication restore it. No need for using backups to recover. See the [”! Reset Database !” section] in the recovery guide.

Once the database container reset has completed, the database should join the existing group and begin replicating data from the existing databases. Once the replicating has finished, the restoration is complete.

Multiple Node Disaster Recovery (Data Loss)

In most cases, in the event that disaster recovery is needed, most or all databases will be down or offline.

If any database containers on any machines are down, start them so that we can inspect their data and run the recovery steps. Group replication will fail on start but that's ok; we just need the database to be running in order to access it.

1. If possible, manually run the backup tool on each machine.
   - See the **"Manually Creating a Backup" section** above
2. Stop each machine's database container.
3. On the machine that contains the backup you would like to use to restore, reset the database container.
   - See the "! Reset Database !" section in the recovery guide.
4. Once the database container reset has completed, the container should be running and you may now run the restore tool and choose the backup file to restore from. Ideally, this would be the most recent backup among all the machines.
   - See the **"Restoring from a backup made with the backup tool" section** below.
5. Once the restore has completed, reset the database containers on the other machines
   - See the "! Reset Database !" section in the recovery guide.
6. Once the database container reset has completed, each machine's database should join the existing group and begin replicating data from the restored database.
7. Once the database containers have joined the group and finished replicating data, the restoration is complete.

Restoring from a Backup Made with the Backup Tool

Navigate to `porta-onprem-bundle\porta-helpers\porta-database\actions` and run `restore-from-backup.bat`

You will eventually be prompted to choose a backup file to restore with. Enter the number corresponding to the backup you would like to restore and press Enter.

Failover Recovery with Unreal Engine

> Note: After the main PX has recovered, to set the PX in use back to the main PX, run the `make px1 primary.bat` batch file located on the desktop of the RX.

Total Machine Failure - Power or Network Loss

Run the RX batch file `make px2 primary.bat` located on the desktop of the RX to switch the running Unreal project to the backup PX.

Partial Machine Failure - Service/Performance Loss

Stop Porta's socket server (`porta-socket`) by running `stop-porta-socket.bat` in `porta-onprem-bundle/porta-helpers/porta-run` on the failed PX.

Run the RX batch file `make px2 primary.bat` located on the desktop to switch the running Unreal project to the backup PX.

Group Replication and Troubleshooting

This page provides installation information for Porta On Prem with MySQL's group replication.

> **Note**
>
> The MySQL database logs will often refer to the database as a "node" in the replication group. This is synonymous with the database being a "member" of the replication group.

QuickRef

- Main machine database has container name `porta-db`
  - MySQL port `3306`
  - Replication port `33061`
- Backup machine database has container name `porta-db-2`
  - MySQL port `3307`
  - Replication port `33062`
- Arbiter machine database has container name `porta-db-3`
  - MySQL port `3308`
  - Replication port `33063`

View database logs

These logs will contain information about replication, and other MySQL logs.

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View database replication group members as reported by this machine

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\view-group-repl-status.bat`

View database replication group members as reported by each machine

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\view-ALL-group-repl-status.bat`

Start Group Replication

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\actions\START-repl.bat`

Stop Group Replication

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\actions\STOP-repl.bat`

Create a backup of the database

See: Disaster Backup and Restoration

Restore from a backup of the database

See: Disaster Backup and Restoration

Resetting a Database Container

See the "! Reset Database !" section in Replication Group Member Recovery

Successful Log Messages

Non-Primary Member

Example of successful log messages for a non-primary member:

```
# The database has found the group to join and it has a primary member
2024-01-24T14:44:29.647313Z 16 [System] [MY-011511] [Repl] Plugin group_replication reported: 'This server is working as seco
ndary member with primary member address 10.100.100.176:3306.'

# If there are changes to be applied, the database will begin applying them
2024-01-29T14:42:36.696980Z 0 [System] [MY-013471] [Repl] Plugin group_replication reported: 'Distributed recovery will trans
fer data using: Incremental recovery from a group donor'

# The database has joined the group and began replicating
2024-01-24T14:44:29.647977Z 0 [System] [MY-011503] [Repl] Plugin group_replication reported: 'Group membership changed to 10.
100.100.176:3306, 10.100.100.177:3307 on view 17061069903020065:2.'

# The database has officially successfully joined the group and its data is in sync with the other databases
2024-01-24T14:44:39.153344Z 0 [System] [MY-011490] [Repl] Plugin group_replication reported: 'This server was declared online
within the replication group.'
```

Primary Member

Example of successful log messages for a primary member:

```
# The replication group lost its primary member and has elected a new one
2024-01-29T15:13:13.328189Z 0 [System] [MY-011507] [Repl] Plugin group_replication reported: 'A new primary with address 192.
168.50.42:3308 was elected. The new primary will execute all previous group transactions before allowing writes.'

# This database has been elected as the new primary
2024-01-29T15:13:13.634688Z 22 [System] [MY-011510] [Repl] Plugin group_replication reported: 'This server is working as prim
ary member.'
```

Troubleshooting Errors

`ERROR 3092 (HY000) at line 1: The server is not configured properly to be an activ`

The cause of this error truly is dependent on error log details of this machine (and often others). Check the error logs of this machine and look for those errors in this document. It may also help to check the logs fo the other machines in the group for errors around the same timestamp.

Each Machine Only Sees Itself

If each machine only sees itself in the replication group, this likely means that there was no existing group to join. This can happen if the machines are not able to communicate with each other, or if the group replication process was not bootstrapped on any of the machines.

Example after viewing replication group status on each machine (each will have one `OFFLINE` entry like this):

```
+---------------------------+--------------------------------------+----------------+-------------+--------------+-----------
--+----------------+----------------------------+
| CHANNEL_NAME              | MEMBER_ID                            | MEMBER_HOST    | MEMBER_PORT | MEMBER_STATE | MEMBER_ROL
E | MEMBER_VERSION | MEMBER_COMMUNICATION_STACK |
+---------------------------+--------------------------------------+----------------+-------------+--------------+-----------
--+----------------+----------------------------+
| group_replication_applier | 3059e925-bc43-11ee-a26c-0242ac120002 | 10.100.100.177 |        3307 | OFFLINE      |
|                | XCom                       |
+---------------------------+--------------------------------------+----------------+-------------+--------------+-----------
--+----------------+----------------------------+
```

To fix this, group replication needs to be restarted **on each machine**: See Bootstrap the Replication Group in the recovery guide.

A Joining Member Creates Its Own Group Instead of Joining Existing Group

If a joining member creates its own group, this likely means that the `group_replication_bootstrap_group` setting is set to `ON` for the joining member.

1. Run the `set-bootstrap-OFF.bat` helper in `porta-helpers/porta-database/actions/caution` to turn this off.
2. Run the `restart-repl.bat` helper in `porta-helpers/porta-database/actions` to restart replication on the machine.

Error joining existing group

`Timeout while waiting for the group communication engine to be ready` / **`Error connecting to all peers`**

Another member's logs might also display `Old incarnation found while trying to add node`

Error log example (for the member that is failing to join):

```
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] Timeout while waiting for the group communication engine
to be ready!'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] The group communication engine is not ready for the memb
er to join. Local port: 33062'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] The member was unable to join the group. Local port: 330
62'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] Error on opening a connection to peer node porta-db-3:33
063 when joining a group. My local port is: 33062.'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] Error on opening a connection to peer node porta-db-3:33
063 when joining a group. My local port is: 33062.'
[ERROR] [MY-011640] [Repl] Plugin group_replication reported: 'Timeout on wait for view after joining group'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] The member is already leaving or joining a group.'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] Error connecting to all peers. Member join failed. Local
port: 33062'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] The member was unable to join the group. Local port: 330
62'
```

If Error is Happening On First Join

Try:

- pinging
  - `ping <MACHINE_IP>`)
- telnet (from Powershell)
  - `telnet <MACHINE_IP> <DATABASE_PORT>`
- remote mysql access
  - `porta-helpers\porta-run\sysadmin\CLI\access-mysql.bat`

If these all work, **check the hosts file** and ensure the IP to container name mapping is correct on both machines. (This was the issue the last time this error was seen during setup).

If Error is Happening On Re-join

This error often occurs if there is no bootstrapped member. Run this check to get a sense of the state of the cluster: View Database Replication Group Members as reported by each machine

- If each machine is `OFFLINE` and only sees itself, then you need to bootstrap the group replication process on one of the machines. See Bootstrap the Replication Group in the recovery guide.
- If a machine is listed as `UNREACHABLE`, check the details in its logs and see the section **Old incarnation found while trying to add node**.

`Old incarnation found while trying to add node`

If another member, i.e., `porta-db-3` has already tried and failed to join the group and is listed as `OFFLINE`, this error may display on the existing member when trying to `START GROUP_REPLICATION` again.

Example of what this log entry would look like on the primary member in an existing group:

```
[Warning] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] Old incarnation found while trying to add node porta-d
b-3:33063 17339258949477546. Please stop the old node or wait for it to leave the group.'
```

Example of what this log entry would look like on the member that is not able to join the existing group:

```
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] The member was unable to join the group. Local port: 330
63'
[ERROR] [MY-011640] [Repl] Plugin group_replication reported: 'Timeout on wait for view after joining group'
[ERROR] [MY-011735] [Repl] Plugin group_replication reported: '[GCS] The member is leaving a group without being on one.'
```

Run this check on each machine to get a sense of the state of the cluster: View Database Replication Group Members as reported by each machine

There is an `UNREACHABLE` Primary Member

One of the machines will likely display one of the member's `MEMBER_STATE` as `UNREACHABLE`:

```
+---------------------------+--------------------------------------+----------------+-------------+--------------+-----------
--+----------------+----------------------------+
| CHANNEL_NAME              | MEMBER_ID                            | MEMBER_HOST    | MEMBER_PORT | MEMBER_STATE | MEMBER_ROL
E | MEMBER_VERSION | MEMBER_COMMUNICATION_STACK |
+---------------------------+--------------------------------------+----------------+-------------+--------------+-----------
--+----------------+----------------------------+
| group_replication_applier | e0ff1ffa-bac5-11ee-9fc8-0242ac120002 | 10.100.100.176 |        3306 | UNREACHABLE  | PRIMARY
| 8.0.32         | XCom                       |
| group_replication_applier | faa25e2f-bac6-11ee-a05b-0242ac120005 | 10.100.100.177 |        3307 | ONLINE       | SECONDARY
| 8.0.32         | XCom                       |
| group_replication_applier | faa25e2f-bac6-11ee-a05b-0242ac120003 | 10.100.100.178 |        3308 | ONLINE       | SECONDARY
| 8.0.32         | XCom                       |
+---------------------------+--------------------------------------+----------------+-------------+--------------+-----------
--+----------------+----------------------------+
```

NOTE: When the `UNREACHABLE` member also has a `MEMBER_ROLE` of `PRIMARY`, no new primary will be elected until the unreachable member has been kicked out. If there is a majority remaining, the member should be kicked out automatically after a timeout period.

If there is no majority remaining to vote the member out, or you would like to remove to member quickly, group replication needs to be restarted **on each machine**: See Bootstrap the Replication Group in the recovery guide.

There is no `UNREACHABLE` Primary Member

If there is no `UNREACHABLE` primary member, then there may be a problem with transactions. Check the machine's database logs (see section View database logs) for details. If the logs contain *"This member has more executed transactions than those present in the group"*, see the section This member has more executed transactions than those present in the group.

`This member has more executed transactions than those present in the group`

Sometimes this can occur when attempting to join a group that the member is already a part of. Check the group members from the failed joiner to confirm that it is not already a member of the group: View Database Replication Group Members as reported by each machine. If all members are present in the result, then the member is already a part of the group.

If the member is not a part of the group, this error can also occur if a member has a higher `gtid_executed` value than the existing members. This can happen if the member was previously part of a group, or was the primary of its own group, and is now being added to a different group.

In most cases, recovery can be done similar to the steps for "Single Database Failing to Rejoin Group", but ideally would not be done until off hours and a Disguise engineer or support team member can assist.

Installation Instructions

Instructions

Installation and Update instructions **must be run for each machine running Porta On-Prem**.

- First Time Installation
- Update Existing Installation
- Porta Integrations Setup
- Installation/Update (Troubleshooting)

See Also

- Initial Machine Setup
- Disaster Backup & Restore
- Support Checklist
- Group Replication Troubleshooting
- Group Replication Member Recovery

Requirements Before Installation

Please work with IT to ensure the machines are set up on the same network before beginning the installation process.

Please ensure that the machine has been prepared beforehand: Initial Machine Setup

Installing Porta On Prem

This process covers **installing on a new machine**, or running a fresh install for an existing installation so that it is wiped. For steps on updating an existing installation, see **Update Existing Installation** below.

1. Make sure Docker is running.
2. Transfer the **porta-onprem-bundle.zip** archive to the Desktop of machine being installed.
   - If you have internet access, this can be found at **https://staging.porta.solutions** under the **Help menu > Plugins**.
3. Right-click and extract the files to the Desktop.
4. Open the unzipped porta-onprem-bundle folder and navigate to the `porta-helpers` folder.

> This folder contains the `install` and `update` scripts that will be used to install and update Porta On Prem, as well as the `database` folder which contains the helper scripts for running database operations.

> **Note**
>
> If you are updating an existing installation, return to step 3 in the **Update Existing Installation** section below.

5. Right-click on `install.bat` and choose “Run as Administrator” to begin the installation process.
6. When prompted, enter the `sudo` password for Ubuntu (WSL) and press Enter.
7. When you are prompted about database replication, type `y` and press enter (even if you are only running one machine)
8. When prompted, enter the Porta machine **type**. This would be `main`, `backup`, or `arbiter`, depending on which machine you are currently working with.
9. When prompted, enter or confirm the Porta machine IP

> **Caution**
>
> The IP address required here **cannot be** 127.0.0.1. It is the IPv4 address for the machine’s current network connection. The IPv4 address can be observed by running `ipconfig` in Powershell or cmd.exe and looking under the correct network adapter’s (often d3net) value for IPv4.

10. If prompted, enter the IP for the other Porta machines

11. If you are installing for the **FIRST TIME ONLY**, or are re-installing after a failed attempt, and have not used Porta yet, then confirm that you would like to wipe the database with “y`
12. Wait for the installation to continue. It can take up to 10 minutes for the installer to prompt you again. If an unexpected error occurs, the process will be aborted.
    - You may be prompted with `gzip: porta-images.tar already exists; do you wish to overwrite (y or n)?` — type `y` and press enter to continue

> It is normal to see the error message `Error occurred in command: 'xargs docker rmi'` after `Error response from daemon: conflict: unable to delete 143f1a610ec2 (must be forced) - image is being used by stopp`, installation will not be aborted.

> **Note**
>
> During installation of the Porta Front End, you may see what appear to be prompts for user input in the console terminal. **These are not actually prompts**, they should be ignored and the installation will continue after a few seconds.
> For example:

```
===
================================================================================================
=====> Building Porta Front End, this may take several minutes...
================================================================================================
===

> porta@0.1.0 build
> GENERATE_SOURCEMAP=false react-scripts build

Creating an optimized production build...
Browserslist: caniuse-lite is outdated. Please run:
  npx update-browserslist-db@latest
  Why you should do it regularly: https://github.com/browserslist/update-db#readme
```

13. When the install is nearing completion, you will be prompted with `Should this database be bootstrapped?`. If this is the first and only machine with Porta installed, type `y` and press Enter. If another machine is already running Porta, type `n` and press Enter.

> **Warning**
>
> Bootstrapping a database in an existing, healthy group can lead to data loss and corruption. If you are unsure how to proceed, please contact support.

14. When the installation is complete, you will see a message that the installation was successful, and shortcuts to Porta On Prem and the Porta On Prem backup will be created on the desktop.
15. You can double-check the version of Porta that was just installed by navigating to `porta-onprem-bundle/porta-helpers/porta-checks` and double-clicking on `check-version.bat`.
16. **If this was the main machine, repeat steps 1-16 on the back-up machine**
    - Be sure to wait for the main machine to finish installing before starting the backup machine; the main machine database must be running before the backup machine’s database can be set up.
17. **If this was the backup machine, repeat steps 1-16 on the arbiter machine**
    - Be sure to wait for the main and backup machines to finish installing before starting the arbiter machine; the other databases must be running before the arbiter machine’s database can be set up.
18. See Porta Integrations Setup to set up the Porta Bridge and Unreal plugins (if applicable)

Update Existing Installation

1. On the desktop, if there is an existing `porta-onprem-bundle.zip`, rename it to `porta-onprem-bundle-old.zip`.
2. Follow steps 1 through 4 in the **#Installing-Porta-On-Prem** section above (they are the same for updates and new installs).

3. After doing installation steps 1-4 from the **#Installing-Porta-On-Prem** section, in the `porta-helpers` folder,navigate to the `porta-database` folder, then `actions`, and double-click on `create-backup.bat` to create a backup of the database before updating.

> **Note**
>
> Updating Porta On Prem will not overwrite the database, but it's always a good idea to have a backup before making changes.

4. In the `porta-helpers` folder, right-click on `update.bat` and choose "Run as Administrator" to begin the update process.
5. When prompted, enter the `sudo` password for Ubuntu (WSL) and press Enter.
6. When you are prompted about database replication, type `y` and press Enter (even if you are only running one machine)
7. When prompted, enter the Porta machine **type**. This would be `main`, `backup`, or `arbiter`, depending on which machine you are currently working with.
8. When prompted, enter or confirm the Porta machine IP.

> **Caution**
>
> The IP address required here **cannot be** 127.0.0.1. It is the IPv4 address for the machine's current network connection. The IPv4 address can be observed by running `ipconfig` in Powershell or cmd.exe and looking under the correct network adapter's (often d3net) value for IPv4.

9. If prompted, enter the IP for the other Porta machines.
10. Wait for the update to continue. It can take up to 10 minutes for the update to prompt you again. If an error occurs, the process will be aborted.
    - You may be prompted with `gzip: porta-images.tar already exists; do you wish to overwrite (y or n)?` — type `y` and press Enter to continue.

> Note: `Error occurred in command: 'xargs docker rmi'` after `Error response from daemon: conflict: unable to delete 143f1a610ec2 (must be forced) - image is being used by stopp` will not abort, this is normal.

> **Note**
>
> During installation of the Porta Front End, you may see what appear to be prompts for user input in the console terminal. These are not actually prompts, they should be ignored and the installation will continue on its own. For example:

```
===
================================================================================================
=====> Building Porta Front End, this may take several minutes...
================================================================================================
===


> porta@0.1.0 build
> GENERATE_SOURCEMAP=false react-scripts build

Creating an optimized production build...
Browserslist: caniuse-lite is outdated. Please run:
  npx update-browserslist-db@latest
  Why you should do it regularly: https://github.com/browserslist/update-db#readme
```

11. When the update is nearing completion, you will be prompted with `Should this database be bootstrapped?`. The answer will depend on the current state of the database replication group. We can check this by navigating to `porta-onprem-bundle/porta-helpers/porta-database` and double-clicking on `view-ALL-group-repl-status.bat`. This should print status entries from each machine in the group.
    - If the resulting output shows any entries with `MEMBER_STATE` of `ONLINE` and `MEMBER_ROLE` of `PRIMARY`, then the group is already bootstrapped and the answer should be “n.`
    - If the resulting output shows all entries with `MEMBER_STATE` of `OFFLINE`, then it is safe to bootstrap this machine and the answer should be “y.`
    - In all other cases, the answer should be “n.`
        - If you are still unsure how to proceed please choose `n` and contact support.
    - This output should look something like:

```
"Viewing group replication status as reported by PORTA-DB..."
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
| CHANNEL_NAME              | MEMBER_ID                            | MEMBER_HOST    | MEMBER_PORT | MEMBER_STATE | MEMBER_
ROLE | MEMBER_VERSION | MEMBER_COMMUNICATION_STACK |
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
| group_replication_applier | 1a351ce3-ba19-11ee-9e59-0242ac120002 | 192.168.50.163 |        3306 | ONLINE       | PRIMARY
| 8.0.32         | XCom                       |
| group_replication_applier | d7c0535c-ba19-11ee-9f28-0242ac140002 | 192.168.50.20  |        3307 | ONLINE       | SECONDA
RY    | 8.0.32         | XCom                       |
| group_replication_applier | e4a0ac63-ba19-11ee-9f54-0242ac150002 | 192.168.50.42  |        3308 | ONLINE       | SECONDA
RY     | 8.0.32         | XCom                       |
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+

"Viewing group replication status as reported by PORTA-DB-2..."
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
| CHANNEL_NAME              | MEMBER_ID                            | MEMBER_HOST    | MEMBER_PORT | MEMBER_STATE | MEMBER_
ROLE | MEMBER_VERSION | MEMBER_COMMUNICATION_STACK |
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
| group_replication_applier | 1a351ce3-ba19-11ee-9e59-0242ac120002 | 192.168.50.163 |        3306 | ONLINE       | PRIMARY
| 8.0.32         | XCom                       |
| group_replication_applier | d7c0535c-ba19-11ee-9f28-0242ac140002 | 192.168.50.20  |        3307 | ONLINE       | SECONDA
RY    | 8.0.32         | XCom                       |
| group_replication_applier | e4a0ac63-ba19-11ee-9f54-0242ac150002 | 192.168.50.42  |        3308 | ONLINE       | SECONDA
RY     | 8.0.32         | XCom                       |
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+

"Viewing group replication status as reported by PORTA-DB-3..."
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
| CHANNEL_NAME              | MEMBER_ID                            | MEMBER_HOST    | MEMBER_PORT | MEMBER_STATE | MEMBER_
ROLE | MEMBER_VERSION | MEMBER_COMMUNICATION_STACK |
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
| group_replication_applier | 1a351ce3-ba19-11ee-9e59-0242ac120002 | 192.168.50.163 |        3306 | ONLINE       | PRIMARY
| 8.0.32         | XCom                       |
| group_replication_applier | d7c0535c-ba19-11ee-9f28-0242ac140002 | 192.168.50.20  |        3307 | ONLINE       | SECONDA
RY    | 8.0.32         | XCom                       |
| group_replication_applier | e4a0ac63-ba19-11ee-9f54-0242ac150002 | 192.168.50.42  |        3308 | ONLINE       | SECONDA
RY     | 8.0.32         | XCom                       |
+---------------------------+--------------------------------------+----------------+-------------+--------------+--------
-----+----------------+----------------------------+
```

> **Warning**
> Bootstrapping a database in an existing, healthy group can lead to data loss and corruption. If you are unsure how to proceed, please contact support._**

12. If the database has not been bootstrapped, you will be prompted with `Should the database be migrated?`. If this is the final machine being updated, and no machines have been bootstrapped during their update process, type `y` and press enter. Otherwise, press Enter to confirm `n`.

13. If the database has not been bootstrapped, you will be prompted with `Should the database be seeded?`. ***If you have not been instructed to seed for this update, type or confirm*** `n`. Otherwise, if this is the final machine being updated, and no machines have been bootstrapped during their update process, type `y` and press Enter. Otherwise, type `n` and press Enter.
14. When the update is complete, you will see a message that the installation was successful.
15. You can double-check the version of Porta that was just installed by navigating to `porta-onprem-bundle/porta-helpers/porta-checks` and double-clicking on `check-version.bat`.
16. If Porta is open in a browser, refresh the page to load the update.
17. **If this was the main machine, repeat steps 1-14 on the backup machine**.
    - Be sure to wait for the main machine to finish installing before starting the backup machine; the main machine database must be running before the backup machine's database can be set up.
18. **If this was the backup machine, repeat steps 1-14 on the arbiter machine**
    - Be sure to wait for the main and backup machines to finish installing before starting the arbiter machine; the other databases must be running before the arbiter machine's database can be set up.
19. If applicable, update your Porta Bridge and Unreal plugins configurations. See Porta Integrations Setup below for details.

Porta Integrations Setup

Porta Bridge

1. Run the Bridge as Administrator.
2. Fill out the D3 Connection Configuration.
3. Before hitting the Start button, go to the menu Window > Porta.
4. Make sure the Socket Server URL is `http://porta-socket.server:6001`
5. Make sure the API URL is `http://<PORTA-MACHINE-IP>:6001`
    - Replace `<PORTA-MACHINE-IP>` with the IP address of the current machine running Porta
6. Make sure the Http Listener IP Address is `<BRIDGE-MACHINE-IP>`
    - Replace `<BRIDGE-MACHINE-IP>` with the IP address of the machine running the Bridge.
    - *This is likely the same as the Porta machine IP if the Bridge is running on the same machine as Porta*
7. Go to Window > D3 and hit the Start button to connect Porta to D3.

Unreal Plugin

Locally

If Unreal is running locally on the same machine as Porta On Prem, the Unreal plugin should be set up with the following:

- Connection URL: `http://porta-socket.server:6001`
- API URL: `http://<PORTA-MACHINE-IP>:8000`
    - Replace `<PORTA-MACHINE-IP>` with the IP address of the current machine running Porta.

Externally

If Unreal is running on different machine than Porta On Prem, the Unreal setup is slightly different.

1. On the Unreal machine, open the `hosts` file **as administrator** in Windows (Located in `C:\Windows\System32\drivers\etc`)
    - This is often most easily done by opening the start menu and typing `notepad` to search for the Notepad application
    - Right-click the Notepad application and select "Run as administrator"
2. Copy & paste the following entries at the bottom of the `hosts` file and replace each `<XXXXXXX MACHINE IP>` with the appropriate machine IPs. Save the `hosts` file as type `All files (*.*)` (it should have NO file extension).

```
<PORTA MACHINE IP> porta.server
```

> ⚠ **Caution**
>
> The IP address required here **cannot be** 127.0.0.1. It is the IPv4 address for the machine's current network connection. The IPv4 address can be observed by running `ipconfig` in Powershell or cmd.exe and looking under the correct network adapter's (often d3net) value for IPv4.

The Unreal plugin should then be set up with the following:

- Connection URL: `http://porta.server:6001`
- API URL: `http://porta.server:8000`

Access Porta in Chrome

Use the “Main Company” and check the `Socket Server URL` to **ensure the socket server is set to `http://<PORTA-MACHINE-IP>:6001`, NOT `http://porta-socket.server`**

Default Login Credentials:

- email: `superadmin@disguise.one`

Be sure to access Porta in the browser using its machine IP, NOT `localhost`

Porta: `http://<PORTA-MACHINE-IP>:8080/`
Porta API: `http://<PORTA-MACHINE-IP>:8000/`

Porta On Prem Installation Troubleshooting

Installation/Update Troubleshooting

Database Replication

For database troubleshooting, see group-replication-troubleshooting.

During Installation: `SQLSTATE[HY000] [1130] Host '172.18.0.1' is not allowed to connect to this MySQL s` at the migration step

```
Thu Dec 12 13:14:20 PST 2024: ERROR: Error occurred in command: 'docker exec -it porta bash -c "php artisan config:cache && y
es | php artisan migrate && yes | php artisan db:seed --class=PermissionSeeder"' (Exit Code: 1) at line 47
```

This error may occur after a failed or aborted installation. It usually indicates that MySQL did not finish properly setting up.

- Verify this by trying to run the `porta-run/access-mysql.bat` helper. If this fails, then there is no `porta` user and MySQL is misconfigured.

For existing installations, try running `update.bat` again. If this is a new installation that has not yet been used, try fully re-installing Porta from `install.bat` again.

Installation Aborts because `Container 'porta-socket' did not become ready within the timeout.`

This error can occur when the socket server container is not able to start up in time, without being caused by any particular errors. Re-run the install/update script and it should complete successfully.

Porta Version listed in the `About` section does not appear to have changed

It could be that the browser is caching the old version. If refreshing the browser does not resolve the issue, try clearing the browser cache and then refreshing the page.

In Chrome:

- Click on the browser address bar (Porta disables some default keyboard shortcuts in the browser)
- Hit Ctrl+Shift+Delete
- Under the basic tab,
  - select “All time” for the time range
  - check the box for “Cookies and other site data”
- Click “Clear data”
- Refresh the page

To check against the version registered in the Porta backend, run the following helper:
`"porta-onprem-bundle\porta-helpers\porta-checks\check-version.bat"`

If this version is correct, then the update was successful and the browser is just caching the old version information.

`SQLSTATE[23000]: Integrity constraint violation: 1062 Duplicate entry 'superadmin@`

This error usually occurs when the install script is run more than once on the same machine. Operation should not be affected and you may continue the installation steps as normal.

Illuminate\Database\QueryException - SQLSTATE[HY000] [2002] Connection refused

Sometimes the database is not finished running/configuring before the install script tries to make changes to it. In this case, just run the following commands in the WSL terminal:

For first time installs: set the config and initialize the database & Run data insert:

1. Run the config cache helpers: `porta-onprem-bundle\porta-helpers\porta-run\cache-api-config.bat`

2. Run the seed helper: `porta-onprem-bundle\porta-helpers\porta-database\actions\caution\migrate-or-seed.bat`
    1. Enter or confirm the Windows user when prompted.
    2. Enter or confirm the WSL user when prompted.
    3. Answer “y” for `Should the database be migrated?`.
    4. Answer “y” for `Should the database be seeded?`.

For updates: set the config and initialize the database:

1. Run the config cache helpers: `porta-onprem-bundle\porta-helpers\porta-run\cache-api-config.bat`
2. Run the seed helper: `porta-onprem-bundle\porta-helpers\porta-database\actions\caution\migrate-or-seed.bat`
3. Enter or confirm the Windows user when prompted.
4. Enter or confirm the WSL user when prompted.
5. Answer “y” for `Should the database be migrated?`.
6. Answer “n” for `Should the database be seeded?`.

The command ‘docker’ could not be found in this WSL 2 distro

If you see this error along with
`'ERROR: Error occurred in command: 'docker load -i "$PORTA_IMAGES_TAR"' (Exit Code: 1) at line 39'`

- Make sure Docker Desktop is running; you should be able to see the Docker icon in the taskbar or system tray.
    - If it appears to be running, it could be in resource-saver mode. In the system tray, right-click the Docker icon and select “restart”, then try again.

If the above does not work, make sure Ubuntu 22.04 is set as your default Linux distro: **Porta Local Development Setup | Set default distro**

Warning: Redis connection could not be made to ‘redis://localhost:6379’ : Error: connect ECONNREFUSED 127.0.0.1:6379

1. Stop the Socket Server container with `porta-helpers/porta-run/sysadmin/stop-container.ps1` and select the `porta-socket` container.
2. Ensure the Redis container is started with `porta-helpers/porta-run/sysadmin/restart-container.ps1` and select the `porta-redis` container.
3. Once the Redis container is running, start, or restart, the Socket Server container with `porta-helpers/porta-run/sysadmin/restart-container.ps1` and select the `porta-socket` container.

`line 2: $'\r': command not found` or `/bin/bash^M: bad interpreter: No such file or directory`

This is caused by windows line endings in the bash scripts. Run the helper `porta-helpers/porta-run/sysadmin/fix-crlf.bat` and try again.

ERROR 3093 (HY000) at line 1: The group_replication_group_name cannot be changed when Group Replication is running

This error can occur when running the install script on a machine that has already been set up as a Porta machine.

Simply restart the database container using the helper `porta-helpers/porta-run/sysadmin/restart-container.ps1` and selecting the database container. Then view the container’s logs to ensure replication starts correctly by using the helper `/porta-helpers/porta-database/follow-database-log.bat`. You should eventually see a message like:

```
[System] [MY-011490] [Repl] Plugin group_replication reported: 'This server was declared online within the replication grou
p.'
```

If this occurs on the main machine, you may also need to seed the database. Check to see if any users are registered by using the helper `porta-helpers/porta-database/view-database-users.bat`. If the results are empty, seed the database by running the seed helper and enter “y” for migration and seed: `porta-onprem-bundle\porta-helpers\porta-database\actions\caution\migrate-or-seed.bat`

If this is the main machine and the results are empty, seed the database by running the seed helper:
`porta-onprem-bundle\porta-helpers\porta-database\actions\caution\migrate-or-seed.bat`

1. Enter or confirm the Windows user when prompted.
2. Enter or confirm the WSL user when prompted.
3. Answer “n” for `Should the database be migrated?`.

4. Answer “y” for `Should the database be seeded?`.

SQLSTATE[HY000]: General error: 1290 The MySQL server is running with the —read-only option

If this error is displayed in the Porta web app, then this instance of Porta is not connected to the primary database. It’s possible for this issue to occur if a database has recently gone down and Porta has not yet recovered, or if no primary was bootstrapped.

Porta should automatically recover within a few seconds, however, if it does not, you can take the following steps:

1. Using helper `porta-helpers/porta-database/view-ALL-group-repl-status.bat`, view group members and make sure that:
   - at least two members have a `MEMBER_STATE` of `ONLINE`
   - only one member has `MEMBER_ROLE` of `PRIMARY`
   - the member with `MEMBER_ROLE` of `PRIMARY` has `MEMBER_STATE` of `ONLINE`

   Running the helper will result in something like:

```
+---------------------------+--------------------------------------+----------------+-------------+--------------+---------
-----+----------------+----------------------------+
| CHANNEL_NAME              | MEMBER_ID                            | MEMBER_HOST    | MEMBER_PORT | MEMBER_STATE | MEMBER_
ROLE | MEMBER_VERSION | MEMBER_COMMUNICATION_STACK |
+---------------------------+--------------------------------------+----------------+-------------+--------------+---------
-----+----------------+----------------------------+
| group_replication_applier | 1a351ce3-ba19-11ee-9e59-0242ac120002 | 192.168.50.163 |        3306 | ONLINE       | PRIMARY
| 8.0.32         | XCom                       |
| group_replication_applier | d7c0535c-ba19-11ee-9f28-0242ac140002 | 192.168.50.20  |        3307 | ONLINE       | SECONDA
RY    | 8.0.32         | XCom                       |
| group_replication_applier | e4a0ac63-ba19-11ee-9f54-0242ac150002 | 192.168.50.42  |        3308 | ONLINE       | SECONDA
RY     | 8.0.32         | XCom                       |
+---------------------------+--------------------------------------+----------------+-------------+--------------+---------
-----+----------------+----------------------------+
```

2. If there is no member with `MEMBER_ROLE` of `PRIMARY`, then you will need to Bootstrap the Replication Group as explained in the Replication Group Member Recovery documentation.
3. If the error is still occurring even after the `view-ALL-group-repl-status.bat` helper is reporting a member with `MEMBER_ROLE` of `PRIMARY` and `MEMBER_STATE` of `ONLINE`, then check the database logs for errors by running the helper `porta-helpers/porta-database/view-database-log.bat`.
4. If there are no recent errors, see if Porta is detecting the primary connection correctly on the problem machine by running the helper `porta-helpers/porta-checks/check-primary-connection.bat`

   This will result in something like:

```
Running health check...

Running check: Primary Database Connection...
Ok: Found online primary: {"member_host":"192.168.50.163", member_port":3306}

All done!
```

5. If the above command returns `Ok: Found online primary...` and the `member_host` displayed by the command matches the `MEMBER_HOST` from the `view-ALL-group-repl-status` helper above, then the issue is likely that Porta’s active connection is not being set to the primary connection.

6. To check Porta's active connection, run the helper `porta-helpers/porta-checks/check-env-connections.bat`

   This will result in something like:

   ```
   DB_HOST_1=192.168.50.163
   DB_HOST_2=192.168.50.20
   DB_HOST_3=192.168.50.42
   DB_HOST="${DB_HOST_3}"
   ```

   The `DB_HOST` variable should be set to the primary database's `DB_HOST_#` variable.

   In this example, the primary database has a `MEMBER_HOST` of 192.168.50.163, which is the value of `DB_HOST_1`. So `DB_HOST` should actually be set to `DB_HOST_1` and not `DB_HOST_3`.

7. Cross-reference this with the default connection cached in the configuration with the helper `porta-helpers/porta-checks/check-default-connection.bat`.

   This will result in something like:

   ```
     'database' =>
   array (
     'default' => 'mysql-3',
   ```

   The numeric suffix of the value of `'default' =>` should match the suffix of the `DB_HOST_#` variable that `DB_HOST` is set to.

   In this example, they're both 3, so the configuration is cached correctly, but is not set to the primary connection

Your initial run of `check-primary-connection.bat` should have triggered a connection change to the primary database.

When running backup tool command:

`Backup failed because Parameter 'host' cannot be empty...`

This error can occur when running the backup tool command on a machine that does not have its configuration cached.

To fix this, run the helper `porta-helpers/porta-run/cache-api-config.bat`

Running the backup tool command again should now work.

Error on Login: "500 Internal Server Error" / "Could not create token: Key provided is shorter than 256 bits"

If you get this generic error, you may need to generate a new token secret using the helper `porta-helpers/porta-run/sysadmin/generate-secret.bat`

Then try logging in to Porta again.

Machine Setup

These instructions are for the initial setup of each machine that is intending to run Porta On Prem.

> **Note**
>
> We'll be using Windows Subsystem for Linux and Windows cmd, Powershell, or Terminal to interact with Docker.

WSL Setup and Ubuntu Installation

1. On a device that has internet access, download:
   - WSL Kernel Update 5.10.102.2 for x64 arch
   - WSL 2 version 2.0.14 x64 arch
   - Porta Ubuntu 22.04 WSL2 image
   - Stock Ubuntu 22.04 WSL2 image (just in case)
   - Docker Desktop 4.28.0
2. Copy the downloaded files to the machine being installed
3. Ensure that the machine has installed any pending Windows updates
4. Open the Windows start menu, search for `Windows Features`, and select `Turn Windows features on or off`
5. Enable the following features if they are not checked already:
   - Virtual Machine Platform
   - Windows Subsystem for Linux
6. Reboot the machine after enabling these features
7. In the files you downloaded and transferred to the machine, double-click `wsl_update_x64_XXXXXX.cab` to extract the WSL2 kernel .msi file
8. Run `wsl_update_x64.msi` to install the WSL2 kernel update
   - If your machine is already more-up-to-date than 5.10, this step may not work. Continue to the next step.
9. Open powershell as administrator
10. In powershell, run `dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart`
11. In powershell, run `dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart`
12. Double-click `wsl.2.0.14.0.x64.msi` to update WSL to version 2.0.14
    - If your machine is already more-up-to-date than 2.0.15, this step may not work. Continue to the next step.
13. Reboot the machine
14. Open powershell as administrator
15. Run `wsl --set-default-version 2`

16. Check your WSL version with `wsl --version` (or `wsl --status`)
    - the WSL version should be 2.0.14 or higher
    - the Kernel version should be 5.10.102.2 or higher

> **Note**
>
> If running `wsl` commands gives error:
>
> ```
> This application requires the Windows Subsystem for Linux Optional Component.
> Install it by running: wsl.exe --install --no-distribution
> The system may need to be restarted so the changes can take effect.
> Error code: Wsl/WSL_E_WSL_OPTIONAL_COMPONENT_REQUIRED
> ```
>
> There may be pending Windows updates that need to be installed before proceeding

17. Install the Porta Ubuntu image
    1. Run `wsl --shutdown`
    2. Run `wsl --import Ubuntu-20.04 Ubuntu %USERPROFILE%\Downloads\Ubuntu2204-WSLimage.tar`
       - Replace `%USERPROFILE%\Downloads\Ubuntu2204-WSLimage.tar` with the path to the downloaded Ubuntu WSL image, if needed
    3. The import may take a few minutes to finish
    4. The initial WSL ubuntu login will be with the `root` user. We need to set default user by creating a config file and updating it
    5. Open the WSL command line interface by running `wsl` in powershell
    6. Run:

       ```
       touch /etc/wsl.conf
       ```

       ```
       echo -e "[user] \n default=px" > /etc/wsl.conf
       ```

       > **Note**
       >
       > Any extra characters in the file `/etc/wsl.conf` will prevent this user from being used. Check the file by running `cat /etc/wsl.conf`. You should see:
       >
       > ```
       > [user]
       > default=px
       > ```

    7. Run `exit` and in powershell, run `wsl --terminate Ubuntu-20.04`.
    8. When you open wsl again it should be as the `px` user

> If you have issues using the Porta image, see the **Stock WSL Ubuntu Image Installation** section below, then return here to run the following steps after the stock image is installed.

18. After distro install completes, in powershell, you should see `Ubuntu-22.04` listed if you run `wsl -l -v --all`
    - If you aren't seeing `Ubuntu-22.04` listed, try checking the distro in use by starting WSL and checking the OS version by running `wsl` in Powershell, and then running `cat /etc/os-release`. The output should look something like:

```
PRETTY_NAME="Ubuntu 22.04.4 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.4 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=jammy
```

19. Reboot the machine
20. Reopen powershell as administrator
21. Double-check your install: `wsl --status`, you should see:
    - `Default Distribution: Ubuntu-22.04`
    - `Default Version: 2`
    - ***If you receive "WSL2 is not supported with your current machine configuration" then you need to enable virtualization in the BIOS***. This process will vary depending on your machine.
22. Make sure Ubuntu is using WSL2 by running `wsl -l -v --all` this should look something like:

```
NAME                   STATE           VERSION
* Ubuntu-22.04           Running         2
```

23. Ensure Ubuntu is used as the default distro by running this command in Powershell:
    - `wslconfig /s Ubuntu-22.04`
24. You can confirm by running `wsl --status` again, or `wslconfig /l`
25. Now you can move on to the **Docker installation**.

For more details, see the **Official Microsoft WSL manual install instructions**.

Stock WSL Ubuntu Image Installation

1. Rename the Ubuntu AppxBundle extension from `.AppxBundle` to `.zip`
2. Extract this zip archive
3. Inside the extracted folder, use the file with the name ending in `_x64.appx` in the next step (likely `Ubuntu_2204.1.7.0_x64.appx`)
4. Open Powershell as administrator, navigate to the folder containing the .appx and run the following command in that directory, where `app-name` is the name of the Linux distribution `.appx` file:
   `Add-AppxPackage .\Ubuntu_2204.1.7.0_x64.appx`

5. Once the Appx package has finished, you can start running the new distribution by **running the following steps** (The command `wsl -l` will not show that the distribution is installed until this step is complete):
   1. Add your Linux distribution path to the Windows environment PATH (C:\Users\Administrator\Ubuntu in this example), using PowerShell:

      ```
      $userenv = [System.Environment]::GetEnvironmentVariable("Path", "User")
      [System.Environment]::SetEnvironmentVariable("PATH", $userenv + ";C:\Users\Administrator\Ubuntu", "User")
      ```

   2. In powershell, run `ubuntu2204.exe`. This will begin installing the Ubuntu 22.04 distro and prompt for user setup.
   3. When prompted for a username and password, enter a new username and password (this user will have `sudo` aka admin permissions)
      - The username must contain only lowercase letters, underscores, and dashes
      - **Do not proceed with the `root` user**, this is a security risk and will cause issues with the installation

      > **Note**
      >
      > You may not need to add to PATH, the exe should be located at `%LOCALAPPDATA%\Microsoft\WindowsApps` in the folder that looks like `CanonicalGroupLimited.Ubuntu22.04LTS...` and you could try just clicking `ubuntu2204.exe` or calling the full path from powershell in order to start the Ubuntu install

6. Resume the instructions at **Step 18** above in the WSL Setup & Ubuntu Installation section.

Restricting WSL resource usage with `.wslconfig`

> **Tip**
>
> The WSL configuration file is located in Windows at `%USERPROFILE%\.wslconfig`.
>
> If the file does not already exist, it can be created using a text editor such as Notepad.

1. Open or create the `.wslconfig` file in Notepad

To restrict WSL's resource usage, open or create the `.wslconfig` file. Ensure the file begins with `[wsl2]`, then on subsequent lines you may define several properties, such as memory and processors.

This example file is a good default configuration for a PX:

```
[wsl2]
# Limits VM memory in WSL to no more than xGB
memory=32GB

# Makes the WSL VM use x virtual processors
processors=6

# Turn off gui support. Can offer better performance
guiApplications=false

# NOT RECOMMENDED -- Limits the maximum size in bytes that a distro filesystem is allowed to take up
# 161061273600 -> 150GB
# defaultVhdSize=161061273600
```

2. Save the changes

After entering your configuration, save and close the file.

> ⚠ **Caution**
>
> When saving, be sure that:
>
> - The filename `.wslconfig` is not missing the leading `.`.
>   - ❌ `wslconfig`
>   - ✅ `.wslconfig`
> - No extension is added to the file
>   - When saving, in the “Save as type” selection, choose “All files (*.*)”.
>   - ❌ `.wslconfig.txt`
>   - ✅ `.wslconfig`

3. Shut down Docker Desktop & WSL

1. Use the system tray to quit Docker Desktop.
2. Open Powershell.
3. Run `wsl --shutdown` to stop WSL.
4. Run `wsl -l -v` to ensure the distributions are all listed as “Stopped”.

4. Start Docker Desktop again

Launch Docker Desktop again. WSL should load with the new configuration.

Docker

Download and install Docker Desktop for Windows, version 4.28.0:

- https://desktop.docker.com/win/main/amd64/139021/Docker%20Desktop%20Installer.exe

Follow the installer instructions for WSL2 backend and, when prompted in docker, ensure the **Use WSL 2 instead of Hyper-V** option on the Configuration page is selected.

After installation is complete, open Docker Desktop and ensure it is running, then proceed with the following:

1. Set Docker Desktop to start on login
   - In the top right menu bar, click the gear icon to open settings
   - Select the left sidebar's "General" tab to pull up the General settings
   - Check the box "Start Docker Desktop when you log in"
   - Also Uncheck:
     - Send usage statistics
     - Show CLI Hints
     - SBOM Indexing
   - In the bottom right, click "Apply & Restart"
   - Using the inner "X" icon in the top right, close the Settings menu
2. **Disable Resource Saver** in Docker Desktop Settings
   - In the top right menu bar, click the gear icon to open settings
   - Select the left sidebar's "Resources" tab
   - **Uncheck** the box "Enable Resource Saver"
   - In the bottom right, click "Apply & Restart"
3. **Disable Updates** in Docker Desktop Settings
   - In the top right menu bar, click the gear icon to open settings
   - Select the left sidebar's "Software updates" tab to pull up the updates settings
   - **Uncheck** the box "Automatically check for updates"
   - **Uncheck** the box "Automatically download updates"
   - In the bottom right, click "Apply & Restart"
4. **Disable Extensions** in Docker Desktop Settings
   - In the top right menu bar, click the gear icon to open settings
   - Select the left sidebar's "Extensions" tab
   - **Uncheck** the box "Enable Docker Extensions"
   - In the bottom right, click "Apply & Restart"
5. **Disable Beta Features** in Docker Desktop Settings
   - In the top right menu bar, click the gear icon to open settings
   - Select the left sidebar's "Features in Development" tab
   - **Uncheck** the box "Enable WASM"
   - **Uncheck** the box "Enable SOCKS proxy support"
   - In the bottom right, click "Apply & Restart"
6. **Disable Notifications** in Docker Desktop Settings
   - In the top right menu bar, click the gear icon to open settings
   - Select the left sidebar's "Notifications" tab
   - **Uncheck** ALL items in the list
   - In the bottom right, click "Apply & Restart"
7. Using the inner grey "X" icon in the top right, close the Settings menu
8. Set up the Windows user to auto-login
   - A sales engineer, support engineer or IT specialist may need to help with this step
9. Open the `hosts` file **as administrator** in Windows (Located in `C:\Windows\System32\drivers\etc`)
   - This is often most easily done by opening the start menu and typing `notepad` to search for the Notepad application
   - Right-click the Notepad application and select "Run as administrator"

10. Copy & paste the following entries at the bottom of the `hosts` file and replace each `<XXXXXXX MACHINE IP>` with the appropriate machine IPs. Save the `hosts` file as type `All files (*.*)` (it should have NO file extension).

```
<CURRENT MACHINE IP> porta-socket.server
<MAIN MACHINE IP> porta-db
<BACKUP MACHINE IP> porta-db-2
<ARBITER MACHINE IP> porta-db-3
```

    - *NOTE: The IP address required here **cannot be** 127.0.0.1. It is the IPv4 address for the machine's current network connection. The IPv4 address can be observed by running `ipconfig` in Powershell or cmd.exe and looking under the correct network adapter's (often d3net) value for IPv4.*

11. Add inbound rules to open mysql ports **on EACH machine**:
    1. In Windows Security —> Firewall & network protection —> Advanced Settings —> Inbound Rules —> Add Rule
    2. Choose "Ports" then hit Next
    3. Choose TCP and add or paste these as specific local ports: `3306,3307,3308,33061,33062,33063`
    4. Allow the connection
    5. Apply the rule in all scenarios
    6. Name the rule "Porta MySQL Ports"

Porta On Prem Installation

Now the machine is set up to run Porta On Prem. Follow the Porta On Prem Installation Guide to complete the installation.

Troubleshooting

Installation

For Porta installation troubleshooting, see Installation Troubleshooting

Database Replication

For database troubleshooting, see Group Replication Troubleshooting

`wsl --install -d Ubuntu-22.04` gives `Error Code 0x80072ee7`

WSL/Ubuntu set up will need to be done using the offline steps in the WSL Setup & Ubuntu Installation section above.

WslRegisterDistribution failed with error: 0x80370102

This error may occur when rebooting after `wsl --install`.
Follow the WSL instructions to enable virtualization in the BIOS, then continue with the installation steps from earlier.

`ERROR: CreateProcessParseCommon:711: Failed to translate` when running `wsl` commands

Make sure that Ubuntu was set as a default distro, this error often indicates that Docker's distro is being used instead of Ubuntu. Though soem commands like `wsl -l -v --all` still worked.

This error displayed as:

```
PS C:\Users\administrateur> wsl
<3>WSL (27) ERROR: CreateProcessParseCommon:711: Failed to translate C:\Users\administrateur
<3>WSL (27) ERROR: CreateProcessParseCommon:757 : getpwuid(0) failed 2
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\Program Files\WSL
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\WINDOWS\system32
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\WINDOWS
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\WINDOWS\System32\Wbem
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\WINDOWS\System32\WindowsPowerSh
ell\v1.0\
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\WINDOWS\System32\OpenSSH\
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\Program Files\dotnet\
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\Program Files\Docker\Docker\res
ources\bin
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\Users\administrateur\AppData\Lo
cal\Microsoft\WindowsApps
<3>WSL (27) ERROR: UtilTranslatePathList:2866: Failed to translate C:\Users\administrateur\Ubuntu
Processing fstab with mount -a failed.
Failed to mount C:\, see dmesg for more details.
Failed to mount D:\, see dmesg for more details.
Failed to mount C:\, see dmesg for more details.
Failed to mount D:\, see dmesg for more details.

<3>WSL (27) ERROR: CreateProcessEntryCommon:334: getpwuid(0) failed 2
<3>WSL (27) ERROR: CreateProcessEntryCommon:505: execvpe /bin/sh failed 2
<3>WSL (27) ERROR: CreateProcessEntryCommon:508: Create process not expected to return
```

Docker Desktop - Unexpected WSL error

An unexpected error was encountered while executing a WSL command...

In Powershell (not cmd or WSL), check `wsl --status`, if you receive “WSL2 is not supported with your current machine configuration” then you need to enable virtualization in the BIOS. This process will vary depending on your machine.

Docker Installation Errors - “wsl update failed” or similar

If you encounter an error regarding WSL updates when installing Docker Desktop, make sure WSL is up to date by following the instructions in the troubleshooting section “Error: 0x8024500c after wsl —update”, then uninstall Docker Desktop and re-install it.

If you continue to encounter errors regarding WSL updates, uninstall Docker Desktop and re-install it, but this time under Configuration, DON’T check Use WSL2 instead of Hyper-V.

Once install has completed, Docker will prompt you to reboot. After reboot, start Docker Desktop again.

Navigate to Settings

Check “Use the WSL2 based engine”, then select “Apply & restart”.

Error: 0x8024500c after `wsl --update`

Some installs with Windows 10, or without using the Microsoft store, will display this error. Check the current WSL Kernel version by running `wsl --version` (or `wsl --status`) in Powershell and checking the entry for `Kernel version`, which should begin with `5` (we do NOT want WSL Version“, that is different).

If the Kernel version is not greater than or equal to `5.10.102.2`, then we will need to manually update the kernel:

- Visit **Microsoft’s update catalog** and sort by last updated. *As of writing, the latest version is* `5.10.102.2`.

- Download the `.cab` file for the latest version
- Double-click the `.cab` file to extract the `.msi` file within in
- Run `wsl_update_x64.msi` to install the WSL2 kernel update
- Open powershell as administrator
- In powershell, run `dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart` to enable the new version
- Run `wsl --set-default-version 2`
- Check your WSL version with `wsl --version` (or `wsl --status`)
  - the WSL version should be 2.X.X (start with 2)
  - the Kernel version should be 5.10.102.2

Check the WSL version by running `wsl --version` (or `wsl --status`) in Powershell. If the `wsl --version` and `wsl --status` commands do not work, try running:

```
(Get-AppxPackage | ? Name -eq "MicrosoftCorporationII.WindowsSubsystemforLinux").Version
```

If the version listed is not greater than or equal to `2.0.14`, then you will need to manually update WSL by taking the following steps (as listed in Updating WSL 2 without Microsoft Store) :

Download the `2.0.14` WSL app package and msi release from the **WSL Releases page in the Github repo**. This will be the assets with file extension `.msixbundle` and `.msi`.

Run `wsl --shutdown` and reboot to make sure that WSL is not in use at all.

Start an Administrator PowerShell and run the following (adjust the package name for the latest version you downloaded):

```
Add-AppxPackage <path.to>/Microsoft.WSL_1.0.0.0_x64_ARM64.msixbundle
```

If you run into problems regarding windows store, try installing using the `.msi` file instead.

After installing, check the new WSL version with `wsl --version` or `(Get-AppxPackage | ? Name -eq "MicrosoftCorporationII.WindowsSubsystemforLinux").Version`

Reboot the machine

Backup the Porta On Prem WSL virtual disk

This guide will walk you through backing up the WSL virtual disk for Porta On Prem data.

> **Note**
>
> Default location for `docker-desktop-data` is usually `%LOCALAPPDATA%\Docker\wsl\data`

> **Tip**
>
> These steps concern the internal docker distribution (“distro”) in which data for containers, volumes, etc. is stored. It does not affect the Ubuntu distro, which is on a separate virtual drive.

1. Use the system tray to shut down Docker Desktop.
2. After Docker has finished shutting down, open Powershell.
3. Run `wsl --shutdown` to stop all distributions.
4. Run `wsl -l -v` and ensure the docker distros are stopped. A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

5. Export the `docker-desktop-data` distribution to a `.tar` file.
    1. Open powershell **as an administrator**.
    2. Confirm that `docker-desktop-data` exists and is stopped by running:

        ```
        wsl -l -v
        ```

        A successful output will look like this:

        ```
        NAME                   STATE           VERSION
        * Ubuntu-22.04         Stopped         2
        docker-desktop-data    Stopped         2
        docker-desktop         Stopped         2
        ```

    3. In Powershell, run the following command to export the `docker-desktop-data` distribution to a `.tar` file.
        - In the command, **replace `D:\path\to\backup` with your desired backup directory**.
            - **This directory must already exist** prior to exporting. Create a new directory if necessary.
        - Make sure the export destination has enough free disk space.
        - The export may take a while if the virtual disk is large (anywhere from 5 to 15 minutes).
        - ```
          wsl --export docker-desktop-data D:\path\to\backup\docker-desktop-data.tar
          ```

    4. You'll know the export has finished when the `PS C:\Users\username>` prompt appears again on the next line.
6. Verify the backup file was created successfully.
    1. Navigate to the backup directory you specified in step 2.
    2. Confirm that the `docker-desktop-data.tar` file exists.
    3. Check the file size to ensure it's greater than 0 bytes.
          ```

Migrating Porta On Prem WSL data to a new location

This guide will walk you through migrating the WSL virtual disk for Porta On Prem to a new location on your system.

> **Note**
>
> Default location for `docker-desktop-data` is usually `%LOCALAPPDATA%\Docker\wsl\data`

> **Tip**
>
> These steps concern the internal docker distribution (“distro”) in which data for containers, volumes, etc. is stored. It does not affect the Ubuntu distro, which is on a separate virtual drive.

1. Backup the virtual disk

First, we want to create a database backup to ensure we have a restore point in case anything goes wrong.

1. Use the system tray to shut down Docker Desktop.
2. After Docker has finished shutting down, open Powershell.
3. Run `wsl --shutdown` to stop all distributions.
4. Run `wsl -l -v` and ensure the docker distros are stopped. A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

5. Export the `docker-desktop-data` distribution to a `.tar` file.
    1. Open powershell **as an administrator**.
    2. Confirm that `docker-desktop-data` exists and is stopped by running:

        ```
        wsl -l -v
        ```

        A successful output will look like this:

        ```
        NAME                   STATE           VERSION
        * Ubuntu-22.04         Stopped         2
        docker-desktop-data    Stopped         2
        docker-desktop         Stopped         2
        ```

    3. In Powershell, run the following command to export the `docker-desktop-data` distribution to a `.tar` file.
        - In the command, **replace `D:\path\to\backup` with your desired backup directory**.
            - **This directory must already exist** prior to exporting. Create a new directory if necessary.
        - Make sure the export destination has enough free disk space.
        - The export may take a while if the virtual disk is large (anywhere from 5 to 15 minutes).
        - ```
          wsl --export docker-desktop-data D:\path\to\backup\docker-desktop-data.tar
          ```

    4. You'll know the export has finished when the `PS C:\Users\username>` prompt appears again on the next line.
6. Verify the backup file was created successfully.
    1. Navigate to the backup directory you specified in step 2.
    2. Confirm that the `docker-desktop-data.tar` file exists.
    3. Check the file size to ensure it's greater than 0 bytes.
          ```

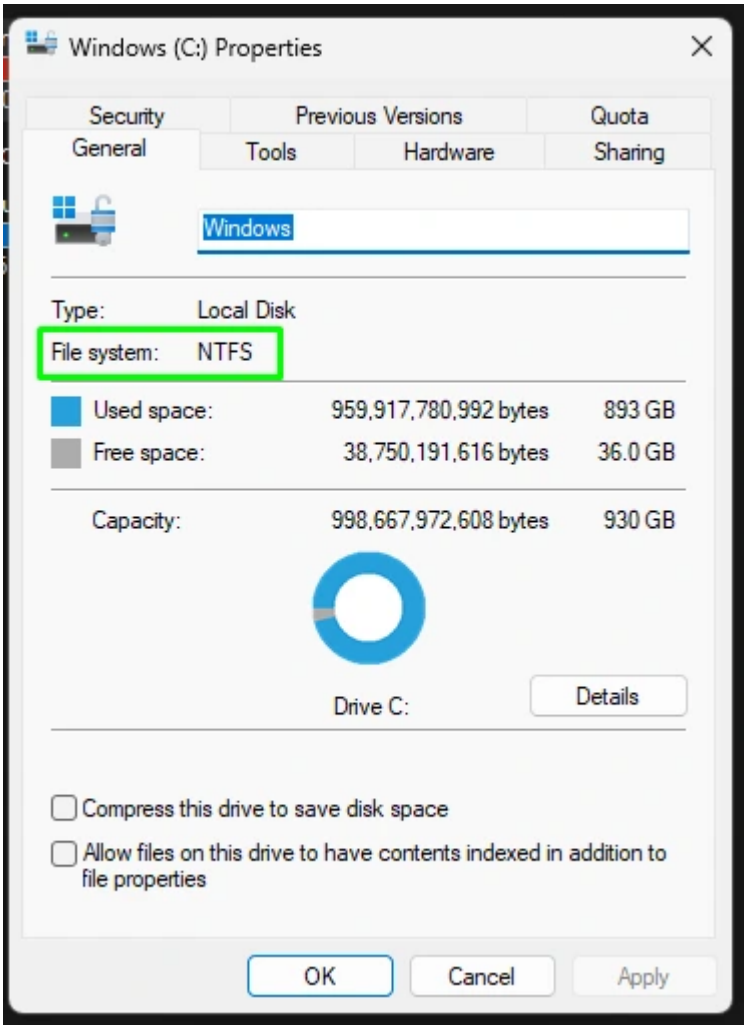
> **Tip**
>
> Note the name of the backup file that was created, because we'll need it in the next steps.

2. Confirm that your target drive is formatted as NTFS

> **Caution**
>
> The virtual disk used by WSL requires the host drive to be formatted as **NTFS**.
>
> If your target drive is formatted as exFAT, FAT32, ReFS, or a network share, the restoration will fail.

1. In Explorer, navigate to `This PC`.
2. Right-click the drive you want to restore to and select `properties` from the context menu.

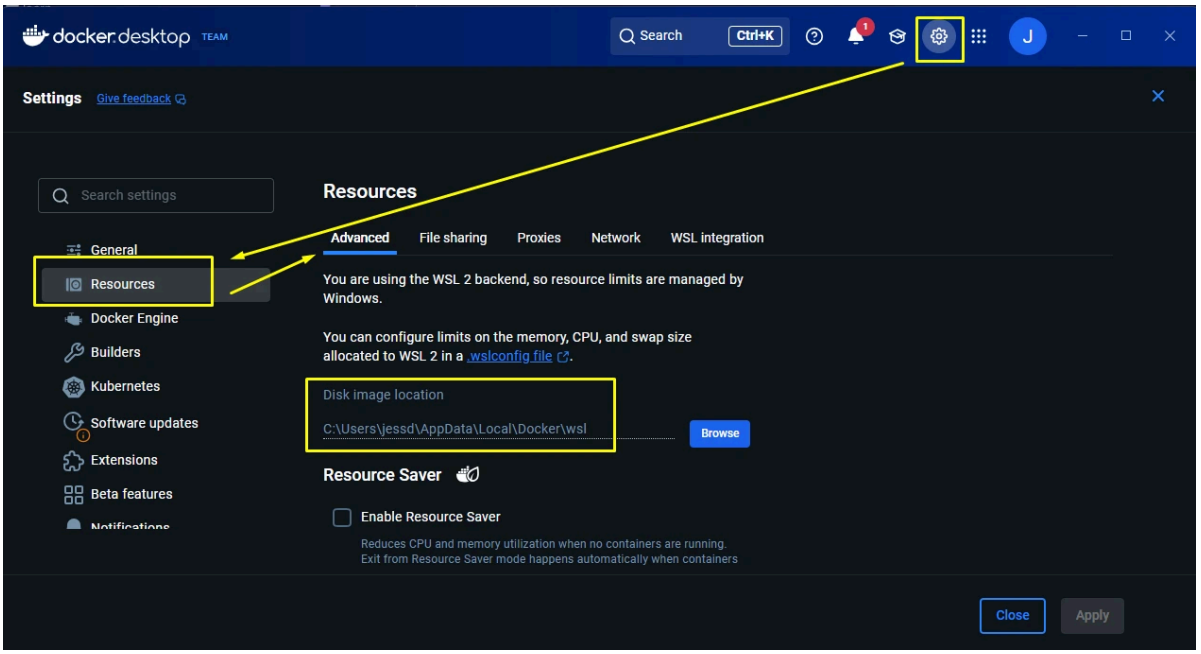
3. In the window that opens, check the `File system` property.



3. Locate your existing virtual disk

1. In Explorer, navigate to `%LOCALAPPDATA%\Docker\wsl\data` to find your existing virtual disk file, named `ext4.vhdx`.

2. You can also check Docker Desktop's **Settings > Resources > Advanced** and check its `Disk image location`.



3. Note this path so that we can copy it for use later.

4. Shut down Docker Desktop

1. Use the system tray to quit Docker Desktop.
2. Open Powershell.
3. Run `wsl --shutdown` to stop all distributions.
4. Run `wsl -l -v` and ensure the docker distros are stopped. A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

5. Unregister (delete) the existing docker-desktop-data distribution

> **Warning**
>
> If you execute the following steps without a backup to restore from, **all Porta data and files will be permanently lost on this machine.**

1. Open Powershell **as an administrator**.
2. Confirm that `docker-desktop-data` exists and is stopped by running:

```
wsl -l -v
```

   A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

3. In Powershell, run the following command to unregister (delete) the `docker-desktop-data` distribution:

```
wsl --unregister docker-desktop-data
```

4. You will not receive any confirmation message, but you can verify it was removed by running `wsl -l -v` again.
   - The output should no longer list `docker-desktop-data`:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop         Stopped         2
```

5. You can also check the disk location in Windows explorer (likely `%LOCALAPPDATA%\Docker\wsl\data`) to ensure that the `ext4.vhdx` file was removed.

6. Restore the virtual disk to the new location

Now that we have a backup, we can proceed to restore the virtual disk to the new location.

1. Ensure that the folder that you will be restoring your data to already exists, e.g., `%LOCALAPPDATA%\Docker\wsl\data`, or `D:\wsl\docker-desktop-data`.
2. Import the data to restore the `docker-desktop-data` distribution from your backup `.tar` file.
    1. Open Powershell.
    2. Run the following command to import the backup.
        - **Replace `D:\path\to\backup` with the path to your backup file.**
        - **Replace `D:\path\to\restore\folder` with the path to your restore destination directory.**

    ```
    wsl --import docker-desktop-data "D:\path\to\restore\folder" "D:\path\to\backup\docker-desktop-data.tar" --version 2
    ```

    3. You'll know the import has finished when the `PS C:\Users\username>` prompt appears again on the next line.

> **Note**
>
> Import may take up to 15 minutes, depending on the size of the virtual disk.

3. After the import has finished, confirm that the distro is recognized in WSL by opening Powershell and running:

```
wsl -l -v
```

A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

4. Start Docker Desktop again. It should find and use the newly imported `docker-desktop-data` distribution.
5. After starting Docker, in Powershell, run a quick `docker images` or `docker volume ls` command to confirm your images/volumes are still present.
6. Everything should be back to normal now.

Freeing Windows Disk Space

There are a few steps we can take to try to reduce the disk space usage of Porta On Prem.

1. Decrease Porta's disk usage

- Purge MySQL binary logs

2. Free up Windows disk space by compacting the virtual disk

After taking steps to clear out Porta disk space, it may not be immediately reclaimed by the Windows drive. To compact the virtual disk used by WSL and free up Windows disk space immediately, follow the steps below.

2a. Backup the virtual disk

1. Use the system tray to shut down Docker Desktop.
2. After Docker has finished shutting down, open Powershell.
3. Run `wsl --shutdown` to stop all distributions.
4. Run `wsl -l -v` and ensure the docker distros are stopped. A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

5. Export the `docker-desktop-data` distribution to a `.tar` file.
    1. Open powershell **as an administrator**.
    2. Confirm that `docker-desktop-data` exists and is stopped by running:

        ```
        wsl -l -v
        ```

        A successful output will look like this:

        ```
        NAME                   STATE           VERSION
        * Ubuntu-22.04         Stopped         2
        docker-desktop-data    Stopped         2
        docker-desktop         Stopped         2
        ```

    3. In Powershell, run the following command to export the `docker-desktop-data` distribution to a `.tar` file.
        - In the command, **replace `D:\path\to\backup` with your desired backup directory**.
            - **This directory must already exist** prior to exporting. Create a new directory if necessary.
        - Make sure the export destination has enough free disk space.
        - The export may take a while if the virtual disk is large (anywhere from 5 to 15 minutes).
        - ```
          wsl --export docker-desktop-data D:\path\to\backup\docker-desktop-data.tar
          ```

    4. You'll know the export has finished when the `PS C:\Users\username>` prompt appears again on the next line.
6. Verify the backup file was created successfully.
    1. Navigate to the backup directory you specified in step 2.
    2. Confirm that the `docker-desktop-data.tar` file exists.
    3. Check the file size to ensure it's greater than 0 bytes.

2b. Compact the virtual disk

1. Open Powershell.
          ```

2. Run the following command to stop the WSL distributions:

```
wsl --shutdown
```

3. Run this command to open the program `diskpart` so we can interact with WSL's virtual disk:

```
diskpart
```

4. In the `diskpart` prompt, run the following command to select the WSL virtual disk:

```
select vdisk file="%LOCALAPPDATA%\Docker\wsl\data\ext4.vhdx"
```

> **Note**
>
> This command assumes that Docker Desktop's WSL data is stored in the default location. If your Docker installation is using a different location for WSL data, adjust the file path accordingly.

5. Next, run the following command to attach the virtual disk:

```
attach vdisk readonly
```

6. Now, run this command to compact the virtual disk:

```
compact vdisk
```

   - This will shrink the disk to free up space on the host's drive.

7. Finally, run this command to detach the virtual disk:

```
detach vdisk
```

8. Type `exit` to leave the `diskpart` program.

2c. Start Docker Desktop

Once finished, you can run Docker Desktop again. Everything should boot normally and the disk space should be freed.

2d. Restoration (if needed)

If something goes wrong, use the restoration guide to restore the virtual disk from the backup you created in step 1.

Purging Database Replication Logs

The MySQL database's binary logs can accumulate over time and consume significant disk space. By default, these logs are set to **automatically purge every 3 days**. However, if you need to manually purge them to free up space, you can follow these steps:

1. Manually create a database backup

First, we want to create a database backup to ensure we have a restore point in case anything goes wrong.

1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-database\action` directory.
   - *In Porta version 2.3.115+, this will instead be* `porta-onprem-bundle\porta-helpers\porta-database\actions\create-backup.bat`.
2. Double-click on the `create-backup.bat` script to run it.

> **Tip**
>
> Note the name of the backup file that was created, because we'll need it in the next step.

2. Export the backup to the host machine in case of failure

Copy the file from the porta container to the host machine. This will ensure you have a local copy of the backup outside the WSL environment.

1. Open Powershell
2. Run the following command, and replace:
   - `filename.zip` : with the name of the backup you created in step 1
   - `D:\destination\path` : with the location you want to save the backup

```
docker cp porta:/var/www/storage/app/Porta-Backups/filename.zip D:\destination\path
```

> **Tip**
>
> If you don't remember the filename, or it was not output after the backup, you can view the list of existing backups by running the following in Powershell:

```
docker exec -it porta ls -al storage/app/Porta-Backups/
```

3. Purge the MySQL binary logs

> **Tip**
>
> **Checks Before Purging**
>
> It would be helpful to note the typical number of binlog files being generated per day to confirm they are still the culprit for taking up space. You can check these files using the Docker Desktop UI:
>
> 1. In the left sidebar, navigate to Volumes
> 2. Search for and select porta-db-volume
> 3. Scroll through these files to view the binlog files
>
> *[Animated GIF: Checking binlog files]*
>
> As of December 5th 2025:
>
> - The maximum size of binlog files should be about **500MB**.
> - It's ok if this size is occasionally exceeded, but every file well over 500MB indicates something wrong.
> - There should be no binlog files older than **3 days**.
> - It would be normal to see **3-6 binlogs created per day**.

3a. Stop replication on the machine

1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-database\action` directory.
   - *In Porta version 2.3.115+, this will instead be `porta-onprem-bundle\porta-helpers\porta-database\actions`.*
2. Double-click on the `STOP-repl.bat` script to run it.

3b. Manually purge MySQL binary logs created more than 3 days ago

> **Caution**
>
> If replication is running, the `PURGE` command will be run for all databases in the group, but the var changes will **not**.
>
> We will use `SET sql_log_bin = {OFF|ON}` to run the `PURGE` on the current database only.

1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-run` directory.
   - *In Porta version 2.3.115+, this will instead be `porta-onprem-bundle\porta-helpers\porta-run\sysadmin\CLI`.*
2. Double-click on the `access-mysql.bat` script to run it and access the MySQL shell.
3. In the MySQL shell, run the following commands to remove logs older than 3 days.
   - Remember to **edit the date in the command to 3 days ago** so that it includes any logs **more than 3 days old**:
   -
```
SET sql_log_bin=OFF;
```
```
PURGE BINARY LOGS BEFORE '2025-12-05 00:00:00';
```
```
SET sql_log_bin=ON;
```

> ⚠ Caution
>
> ### Encountering
> `ERROR 1227 (42000): Access denied; you need (at least one of) the SUPER or BINLOG`
>
> In this case, we'll need to access the MySQL server manually:
>
> 1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-run` directory.
>   - *In Porta version 2.3.115+, this will instead be* `porta-onprem-bundle\porta-helpers\porta-run\sysadmin\CLI`.
> 2. Double-click on the `access-db-shell.bat` script to run it and access the server shell.
> 3. Log in to MySQL as the root user by running `mysql -u root -p`.
> 4. When prompted for a password, type your database password and hit `Enter` to submit
>   - You will be greeted by a `mysql>` prompt, which means we have successfully logged in.
> 5. Run the above `SET sql_log_bin` and `PURGE` commands again (see step 3 above).
> 6. Continue following the steps of this guide.

4. Decrease the binlog expire time

> Tip
>
> If our expiration time is already set correctly, then we can skip this step. To confirm that settings are correct, we can check the current value by doing the following:
>
> 1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-run` directory.
>   - *In Porta version 2.3.115+, this will instead be* `porta-onprem-bundle\porta-helpers\porta-run\sysadmin\CLI`.
> 2. Double-click on the `access-mysql.bat` script to run it and access the MySQL shell.
> 3. In the MySQL shell, run the command `SELECT @@binlog_expire_logs_seconds;` to view the current expiration time in seconds.
> 4. If the value is greater than `259200` (note the number of digits), then proceed with the steps below to change it.
>
> You will see a result like the following:
>
> ```
> +------------------------------+
> | @@binlog_expire_logs_seconds |
> +------------------------------+
> |                    259200000 |
> +------------------------------+
> 1 row in set (0.00 sec)
> ```

1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-run` directory.
   - *In Porta version 2.3.115+, this will instead be* `porta-onprem-bundle\porta-helpers\porta-run\sysadmin\CLI`.
2. Double-click on the `access-mysql.bat` script to run it and access the MySQL shell.
3. In the MySQL shell, run the command `SET PERSIST binlog_expire_logs_seconds=259200;`

5. Start replication on the machine

1. Navigate to the `porta-onprem-bundle\porta-helpers\porta-database\action` directory.
   - *In Porta version 2.3.115+, this will instead be* `porta-onprem-bundle\porta-helpers\porta-database\actions`.
2. Double-click on the `START-repl.bat` script to run it.

Restore the Porta On Prem WSL virtual disk

This guide will walk you through restoring the WSL virtual disk for Porta On Prem from a previously created backup.

> **Note**
>
> Default location for `docker-desktop-data` is usually `%LOCALAPPDATA%\Docker\wsl\data`

> **Tip**
>
> These steps concern the internal docker distribution ("distro") in which data for containers, volumes, etc. is stored. It does not affect the Ubuntu distro, which is on a separate virtual drive.

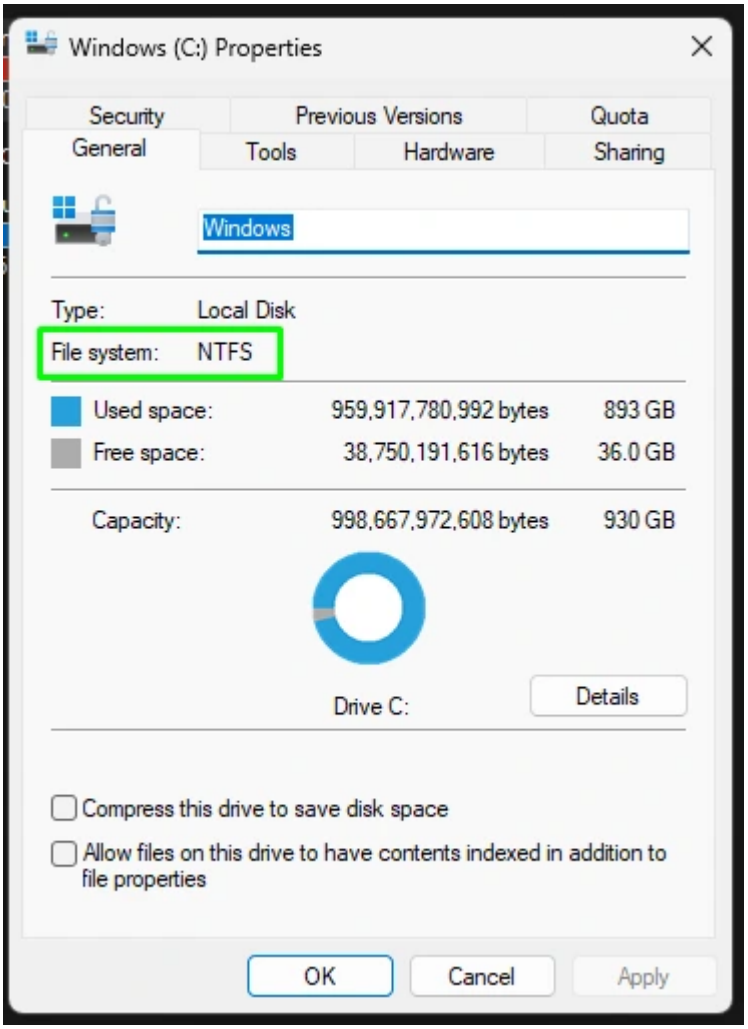
1. Ensure your backup exists

1. Check your backup location for an existing and up to date `.tar`.
   - By default, if you followed the backup instructions, this is likely `D:\wsl\backups\docker-desktop-data.tar`.
2. If you do not have an up-to-date backup, return to this step after you have performed the backup instructions to create one.
3. If you have an up-to-date backup, proceed to the next section.

2. Confirm that your target drive is formatted as NTFS

> **Caution**
>
> The virtual disk used by WSL requires the host drive to be formatted as **NTFS**.
>
> If your target drive is formatted as exFAT, FAT32, ReFS, or a network share, the restoration will fail.

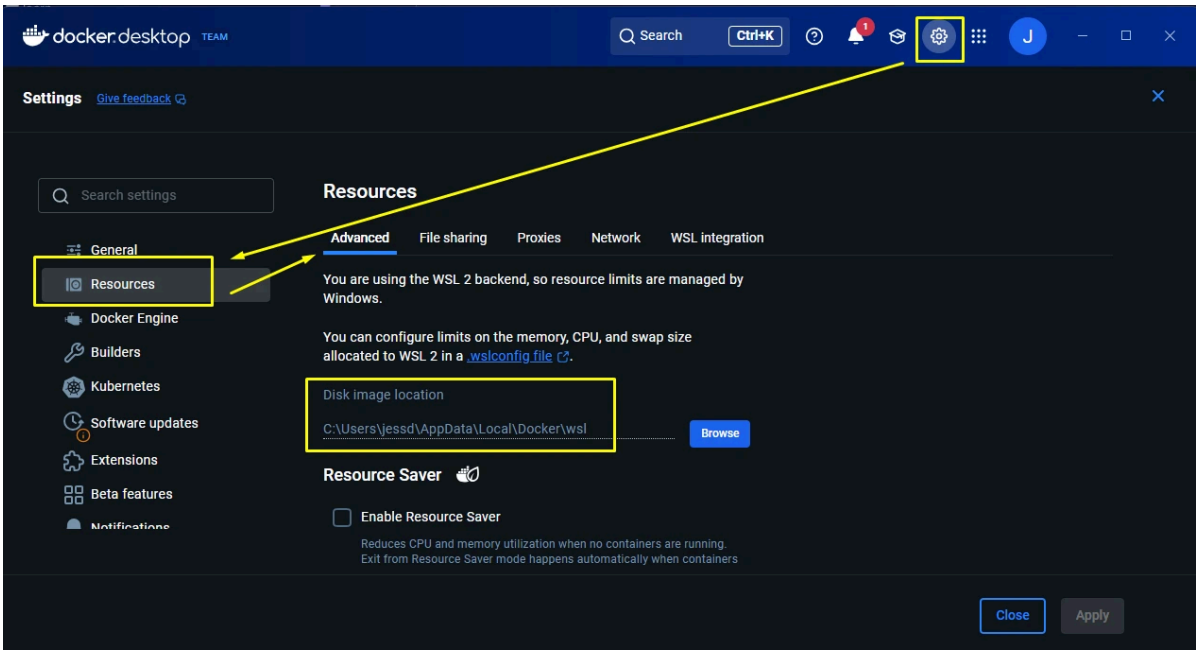
1. In Explorer, navigate to `This PC`.
2. Right-click the drive you want to restore to and select `properties` from the context menu.
3. In the window that opens, check the `File system` property.



3. Locate your existing virtual disk

1. In Explorer, navigate to `%LOCALAPPDATA%\Docker\wsl\data` to find your existing virtual disk file, named `ext4.vhdx`.

2. You can also check Docker Desktop's **Settings > Resources > Advanced** and check its `Disk image location`.



3. Note this path so that we can copy it for use later.

4. Shut down Docker Desktop

1. Use the system tray to quit Docker Desktop.
2. Open Powershell.
3. Run `wsl --shutdown` to stop all distributions.
4. Run `wsl -l -v` and ensure the docker distros are stopped. A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

5. Unregister (delete) the existing docker-desktop-data distribution

> **Warning**
>
> If you execute the following steps without a backup to restore from, **all Porta data and files will be permanently lost on this machine.**

1. Open Powershell **as an administrator**.
2. Confirm that `docker-desktop-data` exists and is stopped by running:

```
wsl -l -v
```

A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

3. In Powershell, run the following command to unregister (delete) the `docker-desktop-data` distribution:

```
wsl --unregister docker-desktop-data
```

4. You will not receive any confirmation message, but you can verify it was removed by running `wsl -l -v` again.
   - The output should no longer list `docker-desktop-data`:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop         Stopped         2
```

5. You can also check the disk location in Windows explorer (likely `%LOCALAPPDATA%\Docker\wsl\data`) to ensure that the `ext4.vhdx` file was removed.

6. Restore the virtual disk

1. Ensure that the folder that you will be restoring your data to already exists, e.g., `%LOCALAPPDATA%\Docker\wsl\data`, or `D:\wsl\docker-desktop-data`.
2. Import the data to restore the `docker-desktop-data` distribution from your backup `.tar` file.
    1. Open Powershell.
    2. Run the following command to import the backup.
        - Replace **`D:\path\to\backup`** with the path to your backup file.
        - Replace **`D:\path\to\restore\folder`** with the path to your restore destination directory.

    ```
    wsl --import docker-desktop-data "D:\path\to\restore\folder" "D:\path\to\b
    ackup\docker-desktop-data.tar" --version 2
    ```

    3. You'll know the import has finished when the `PS C:\Users\username>` prompt appears again on the next line.

> **Note**
>
> Import may take up to 15 minutes, depending on the size of the virtual disk.

3. After the import has finished, confirm that the distro is recognized in WSL by opening Powershell and running:

```
wsl -l -v
```

A successful output will look like this:

```
NAME                   STATE           VERSION
* Ubuntu-22.04         Stopped         2
docker-desktop-data    Stopped         2
docker-desktop         Stopped         2
```

4. Start Docker Desktop again. It should find and use the newly imported `docker-desktop-data` distribution.
5. After starting Docker, in Powershell, run a quick `docker images` or `docker volume ls` command to confirm your images/volumes are still present.
6. Everything should be back to normal now.

Porta On Prem README

Architecture

Porta On Prem requires the following minimum system configuration:

- minimum of 3 machines if running database replication.

Component	Specification
Operating System	Windows 10 or 11, 64-bit, Win10 must have minimum update 21H2
Virtualized Operating System	WSL 2 with Ubuntu 22.04 as default distro
CPU	Intel i7 4th Generation (required: CPU with AVX2 support)
Memory	8GB RAM
Storage	30+GB

Docker

`porta` Container

- Role: Porta UI & API
- Published Ports:
  - 8080 for UI
  - 8000 for API

> **Note**
>
> Also communicates on Porta Bridge's port 1500

`porta-db` Container

- **Role**: Porta MySQL Database

- **Published Ports**:
  - MySQL Client Ports:
    - 3306 for `porta-db`
    - 3307 for `porta-db-2`
    - 3308 for `porta-db-3`
  - MySQL Replication Ports:
    - 33061 for `porta-db`
    - 33062 for `porta-db-2`
    - 33063 for `porta-db-3`

`porta-socket` Container

- Role: Porta WebSocket Relay Server
- Published Ports: 6001

`porta-redis` Container

- Role: Porta Redis Server
- Published Ports: 6379

Database

Porta On Prem runs three MySQL databases utilizing the MySQL standard Group Replication features.

Database Replication

MySQL Group Replication provides distributed replication with automated coordination between servers in the group. Group replication ensures that the database service is continuously available.

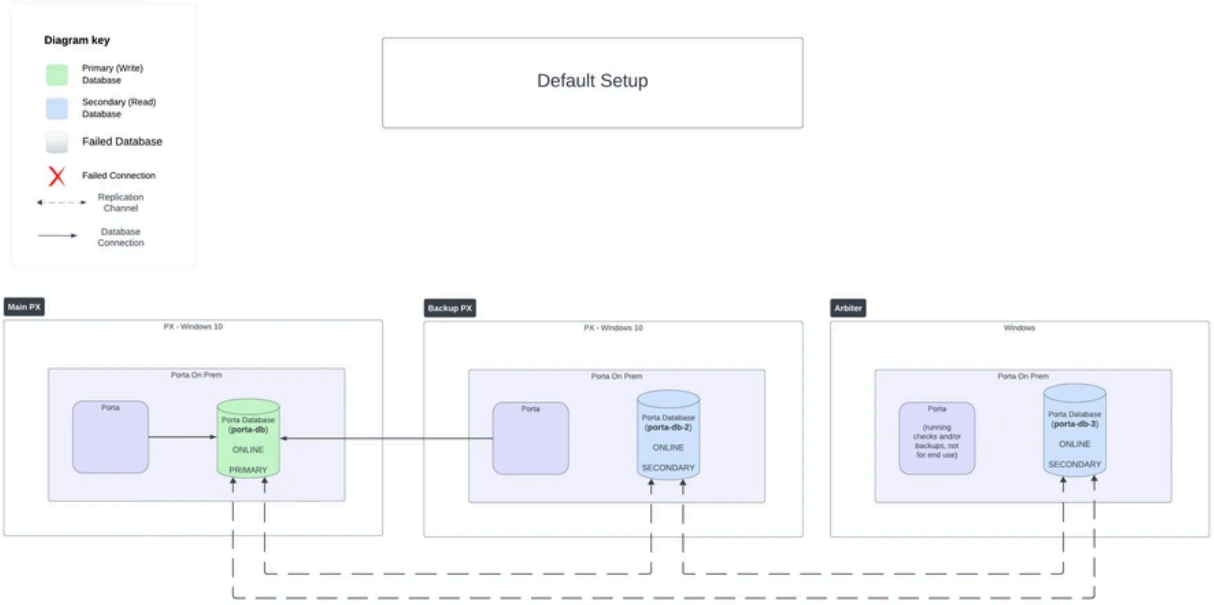
The replication group operates in single-primary mode with automatic primary election, in which only one server accepts writes at a time. In the case of primary failure, the Porta backend will automatically attempt to reconnect to the newly elected primary.

Replication States

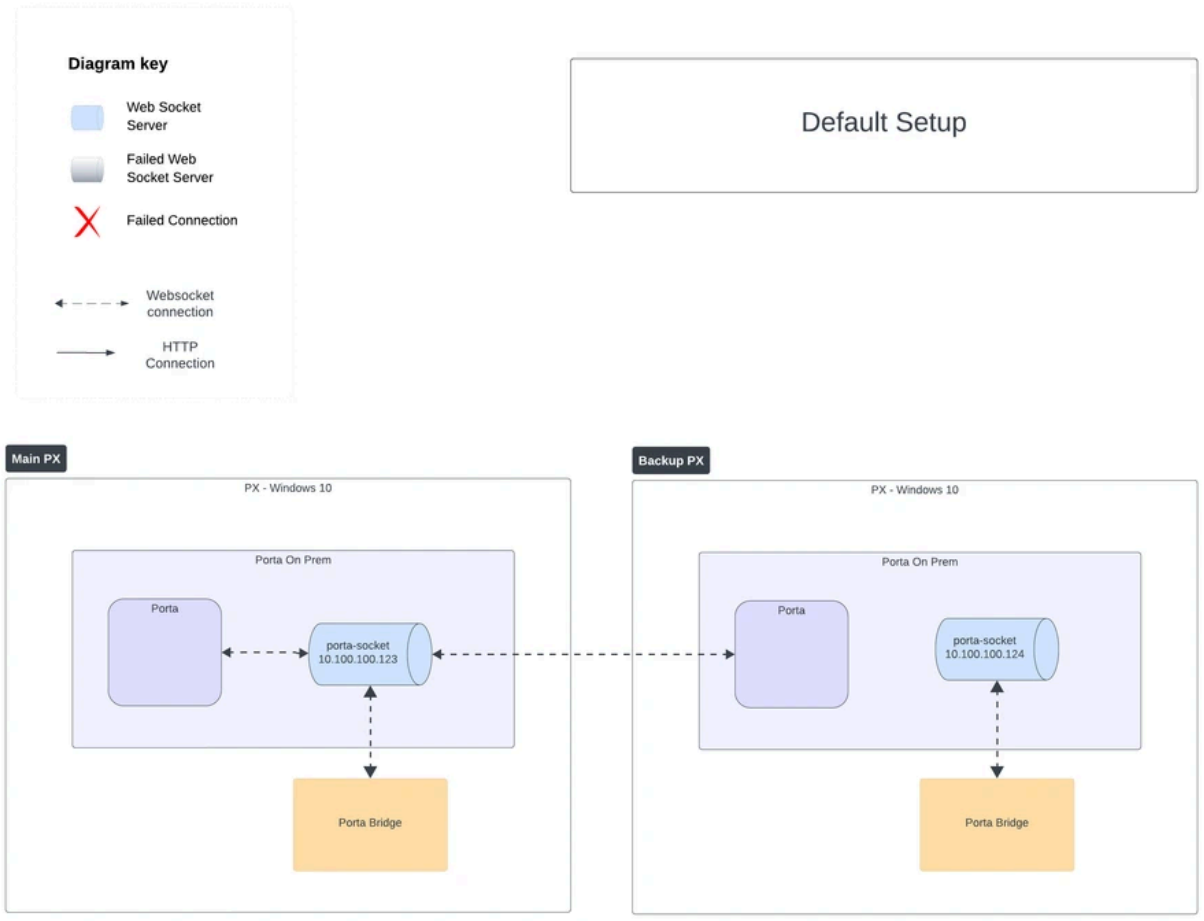
Possible values of member_state from performance_schema.replication_group_members

Member State	Description
`ONLINE`	The server is an active member of a group and in a fully functioning state.
`RECOVERING`	The server has joined a group and is in the process of becoming an active member.

Member State	Description
`OFFLINE`	The Group Replication plugin is loaded but the member does not belong to any group. *This status may briefly occur while a member is joining or rejoining group.*
`UNREACHABLE`	The local failure detector suspects that the member cannot be contacted, because the group's messages are timing out. *This can happen if a member is disconnected involuntarily.*
`ERROR`	The member is in an error state and is not functioning correctly as a group member. *While a member is joining or rejoining a replication group, its status can be displayed as `ERROR` before the group completes the compatibility checks and accepts it as a member.*

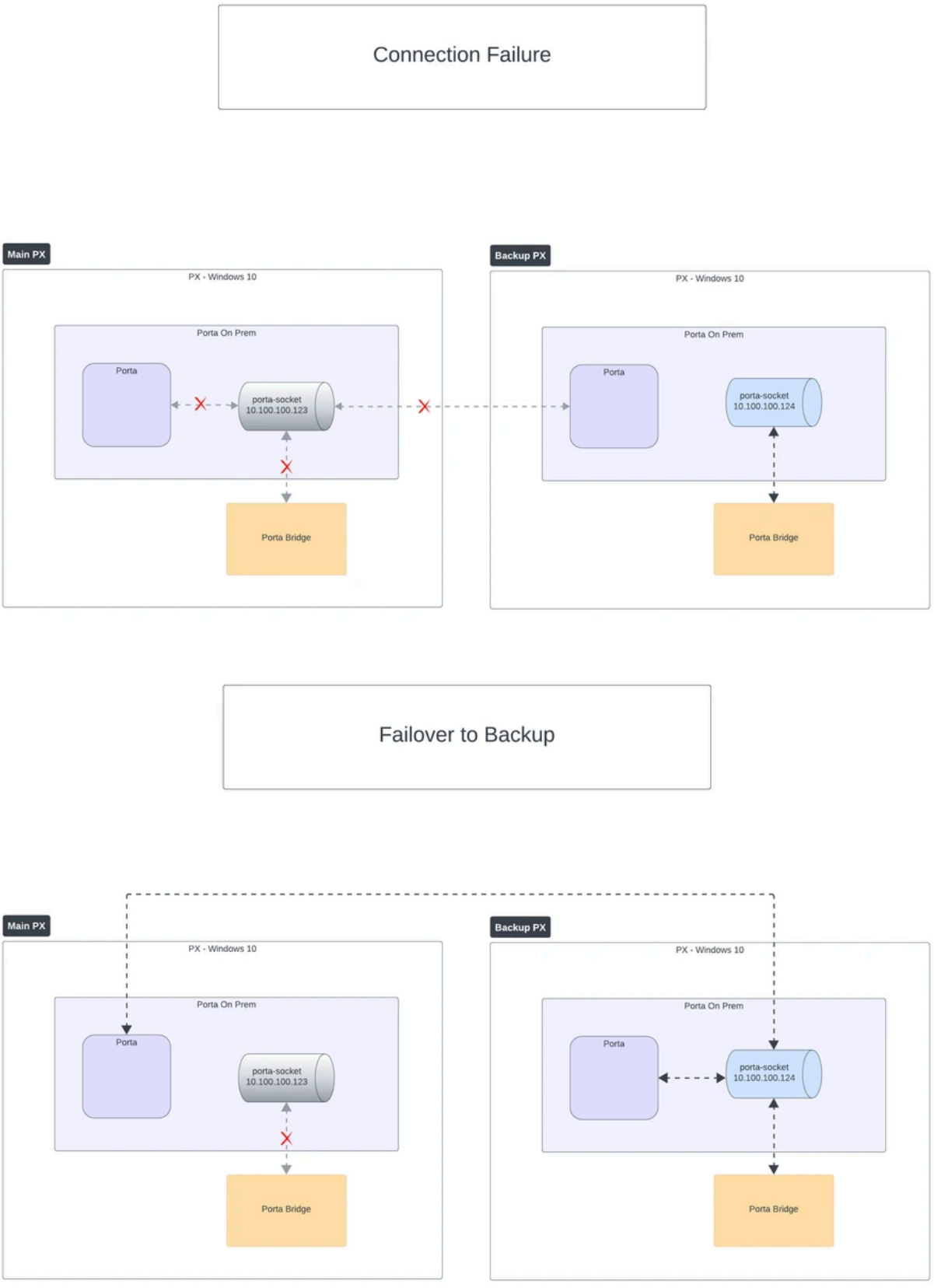


> **Note**
>
> The following documentation provides further details about Porta On Prem database replication:
>
> - Replication Group Member Recovery
> - Replication Group Troubleshooting

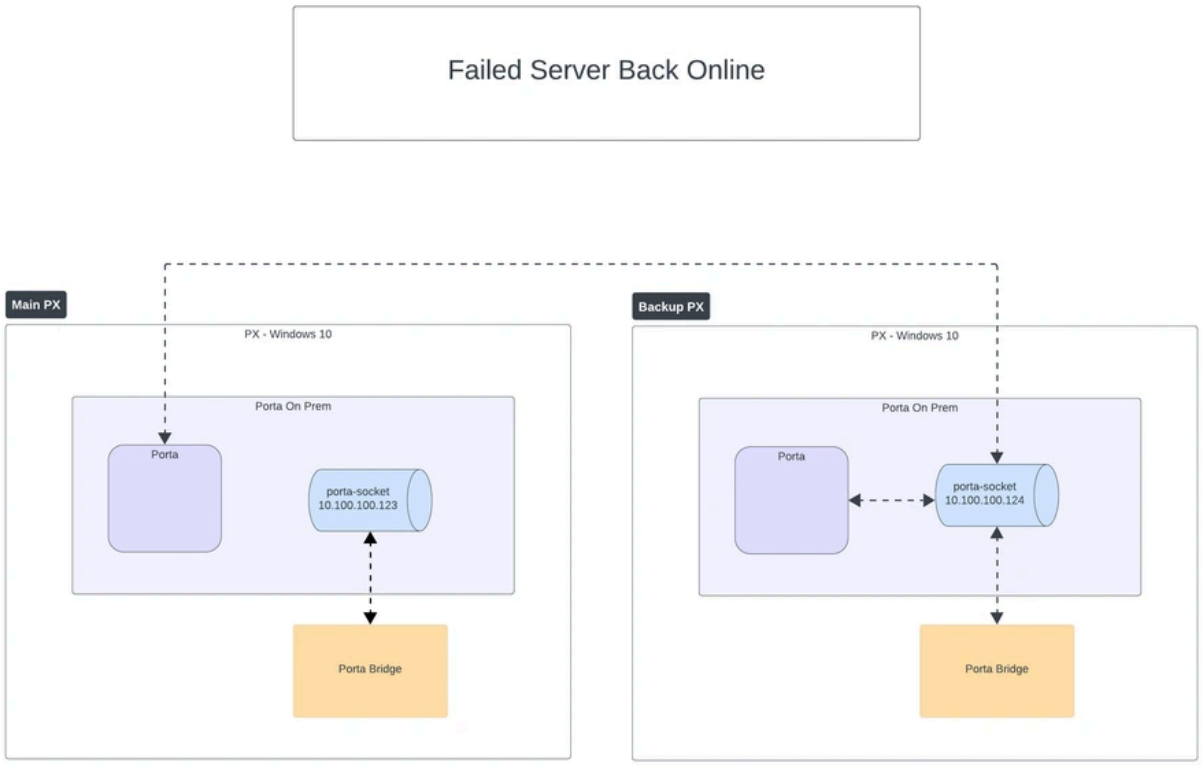


WebSocket Server Failure & Failover

Porta On Prem monitors its connection to the WebSocket server and will automatically attempt to failover to the backup server if the connection is lost.



If the failed server comes back online, it will **not** replace the active server, but will act as the new “backup” server until the active server fails or otherwise shuts down.



Helpers

Many recovery or monitoring tasks have user-friendly shortcut scripts available, and they will be referenced throughout these documents.

> **Tip**
>
> Helper scripts are contained within helper folders located in `porta-onprem-bundle/porta-helpers`

Database Helpers

Checks

Location: `porta-database`

Script Name	Description
view-group-repl-status.bat	View the database replication group's member statuses (as reported by this machine)
view-ALL-group-repl-status.bat	View the database replication group's member statuses (as reported by EACH machine)

Script Name	Description
view-database-log.bat	View this machine's database logs
follow-database-log.bat	View this machine's database logs in real time
view-repl-vars.bat	View this machine's database replication variables' values
view-binlog-events.bat	View this machine's database binary log events
view-transactions.bat	View this machine's database transactions
view-database-users.bat	View the registered Porta users in the database

Replication Actions

Location: `porta-database/actions`

Script Name	Description
bootstrap.bat	Bootstrap this database's replication
restart-repl.bat	Restart this database's replication
START-repl.bat	Start this database's replication
STOP-repl.bat	Stop this database's replication

Backup & Recovery Actions

Location: `porta-database/actions`

Script Name	Description
create-backup.bat	Create a backup of the database
restore-from-backup.bat	Restore a database from a backup
`caution/copy-DB-backup-from-container-to-host.ps1`	Copy a database backup from the database container to the host machine
`caution/copy-DB-backup-into-container-and-restore.ps1`	Copy a database backup from the host machine into a database container and optionally use it to restore the database

Other Database Actions

Location: `porta-database/actions/caution`

> **Caution**
>
> These scripts will perform destructive actions on the database. Use with caution only as directed.

Script Name	Description
`reset.bat` ⚠️	Reset this database ⚠️ **THIS WILL WIPE DATA ON THE MACHINE**
`migrate-or-seed.bat`	Migrate and/or seed the database
`set-bootstrap-OFF.bat`	Disable bootstrapping when the database is started (this is the default setting)

Destructive Database Actions

Location: `porta-database/actions/caution`

> **Warning**
>
> These scripts will lead to irreparable data loss if misused. Do not use unless directly instructed by a Disguise engineer.

Script Name	Description
⛔ `set-bootstrap-ON.bat` ⛔	Enable bootstrapping when the database is started **THIS WILL LEAD TO DATA LOSS if used in a 3 machine setup**
⛔ `transfer/MAIN-TO-BACKUP-transfer-database.bat` ⛔	Transfer the database from the main machine to the backup machine. This will **overwrite ALL data in the backup machine**'s database. Intended only for use with a 2 machine setup.
⛔ `transfer/BACKUP-TO-MAIN-transfer-database.bat` ⛔	Transfer the database from the backup machine to the main machine. This will **overwrite ALL data in the main machine**'s database. Intended only for use with a 2 machine setup.

General Check Helpers

Location: `porta-checks`

Script Name	Description
view-workers.bat	View Porta's server workers
view-failed-jobs.bat	View Porta's failed jobs
check-default-connection.bat	Check the default database connection cached by Porta
check-env-connections.bat	Check the database connections configured in Porta's environment configuration
check-primary-connection.bat	Check the primary database connection being used by Porta
check-version.bat	Check the Porta version

Log Viewer Helpers

Location: `porta-log-viewers`

Script Name	Description
view-laravel-log.bat	View Porta API's logs
view-horizon-log.bat	View Porta's queue logs
view-tasks-log.bat	View Porta's background tasks logs
view-php-errors-log.bat	View Porta API's low level error logs
view-server-log.bat	View Porta's general server logs
view-socket-log.bat	View Porta's socket server logs
view-redis-log.bat	View Porta's Redis server logs

Config Viewer Helpers

Location: `porta-config-viewers`

Script Name	Description
view-api-env.bat	View the Porta's API environment configuration file contents
view-app-env.bat	View the Porta's UI environment configuration file contents
view-cached-connection.bat	View the cached default database connection being used by Porta
view-cache-config.bat	View all cached configurations being used by Porta
view-supervisor-conf.bat	View the Porta's supervisord configuration

Script Name	Description
view-php-conf.bat	View the Porta's PHP configuration
view-nginx-conf.bat	View the Porta's nginx configuration

System Helpers

Location: `porta-run`

Script Name	Description
cache-api-config.bat	Cache Porta API's configuration files
clear-api-cache.bat	Clear Porta API's cache
rotate-porta-logs.bat	Manually rotate Porta's system logs
copy-file-from-container.bat	Copy a file from a running container to the host machine
copy-file-from-stopped container.bat	Copy a file from a stopped container to the host machine

System Administration Helpers

Location: `porta-run/sysadmin`

> ⚠ **Caution**
>
> These scripts will perform disruptive actions in Porta. Use with caution only as directed.

Script Name	Description
fix-crlf.bat	Convert Windows line endings (CRLF) to Linux line endings (LF) in the given directory
generate-secret.bat	Generate a new secret key for Porta's environment configuration file. *This will also cache the API configuration.*
❌ migrate-volumes.bat	***Obsolete*** — Migrate the mounted drives to docker volumes in an old version of Porta On Prem
restart-workers.bat	Restart Porta server workers
restart-container.bat	Restart a Docker container
stop-container.bat	Stop a Docker container

Script Name	Description
stop-porta-socket-server.bat	Stop the `porta-socket` container

Installing Porta On Prem

- Initial Machine Setup
- New Installation or Existing Update
- Installation/Update Troubleshooting

Logs

Installer Logs

Porta installer logs are located in the WSL directory: `/home/$USER/porta/logs/installer`

> **Note**
>
> `$USER` within WSL will be interpreted to the current WSL user's username. For example, from the WSL CLI, you can navigate to the logs directory by running the command `cd /home/$USER/porta/logs/installer` or `cd ~/porta/logs/installer`

You can access these logs in Windows explorer by navigating to one of the following paths (depending on your installation):

- `\\wsl$\Ubuntu\home\<USERNAME>\porta\logs\installer`
- `\\wsl$\Ubuntu-22.04\home\<USERNAME>\porta\logs\installer`
- `\\wsl$\Ubuntu-20.04\home\<USERNAME>\porta\logs\installer`

> **Note**
>
> `<USERNAME>` should be replaced with your WSL username

Porta UI Logs

The front-end logs can be viewed in the Web Browser console. To access the logs, open the browser's developer tools (F12) and select the `Console` tab.

Porta Server and Service Logs

Porta related logs are located within their respective containers. You can view some of these logs by running one of the helpers within the `porta-onprem-bundle\porta-helpers\porta-log-viewers` folder.

Porta API log

Application Logs

These logs will be the most useful for general debugging and troubleshooting of the Porta API.

- Helper: `view-laravel-log.bat`
  - > Note: The log filenames will begin with `laravel-` and be scoped by date, i.e. `laravel-YYYY-MM-DD.log`

Scheduled/Background Tasks Logs

These consist of scheduled or long-running background tasks like socket server checks, database backups & checks, etc.

- Helper: `view-tasks-log.bat`

Queued Tasks Log

These logs are for queued background tasks such as media ingestion and conversion.

- Helper: `view-horizon-log.bat`

PHP Error Logs

These logs are for lower level PHP errors and exceptions. These will occur if something goes wrong on the server level, such as a memory error.

- Helper: `view-php-errors-log.bat`

General API Server Logs

Logs regarding server processes and services.

- Helper: `view-server-log.bat`

Porta Database logs

These logs are for the Porta database server. They will contain information about replication, and other MySQL logs.

- Helper: `porta-onprem-bundle\porta-helpers\porta-database\view-database-log.bat`

Porta Socket Server Logs

These logs will contain lots of information about websocket connections and requests passing through the server. Nearly all events and status changes are logged here.

- Helper: `view-socket-log.bat`

Redis Server Logs

These logs will almost never be needed unless there is a redis error seen in the socket server or API logs.

- Helper: `view-redis-log.bat`

Diagnostics and Monitoring

Full Diagnostic

Run a Porta diagnostic to compile various logs and configuration information into a single archive.

1. In porta-onprem-bundle's `porta-helpers` folder, run the full diagnostic helper by double-clicking on `porta-full-diag.bat`
2. The diagnostic will run and create a directory and `.tar.gz` file in the same folder as the helper script.

Viewing Database Health

A database health dashboard is available at `http://<MACHINE-IP>:8000/health`. This dashboard displays the results of ongoing database replication health checks.

Viewing Server Workers

Such as those that process the play group sequence (`porta-horizon-worker`) or run database checks in the background (`porta-task-worker`)

- Helper: `porta-onprem-bundle\porta-helpers\porta-checks\view-workers.bat`

- Example result:

```
nginx                                    RUNNING   pid 7, uptime 0:16:57
php-fpm                                  RUNNING   pid 8, uptime 0:16:57
porta-task-worker:porta-task-worker_00   RUNNING   pid 746, uptime 0:02:57
porta-task-worker:porta-task-worker_01   RUNNING   pid 747, uptime 0:02:57
porta-horizon-worker:porta-horizon-worker_00             RUNNING   pid 732, u
ptime 0:02:59
porta-horizon-worker:porta-horizon-worker_01             RUNNING   pid 733, u
ptime 0:02:59
```

Viewing Queued Tasks

Some heavy-duty tasks, such as media conversion, are queued and run in the background. A minimal UI is available at `http://<MACHINE-IP>:8000/horizon` to monitor these tasks.

View failed tasks

Viewed failed tasks directly with the helper `porta-onprem-bundle\porta-helpers\porta-checks\view-failed-jobs.bat`

Socket.IO Admin UI

View the Socket.IO Admin UI at `http://<PORTA-MACHINE-IP>:8000/socketio-adminui` to monitor the status of the Porta Socket Server. Please contact **support@disguise.one** for the login credentials.

Backups and Restorations

Please refer to the Porta On Prem Backup and Restore Guide for details on how to backup and restore your Porta OnPrem databases.

Replication Group Member Recovery

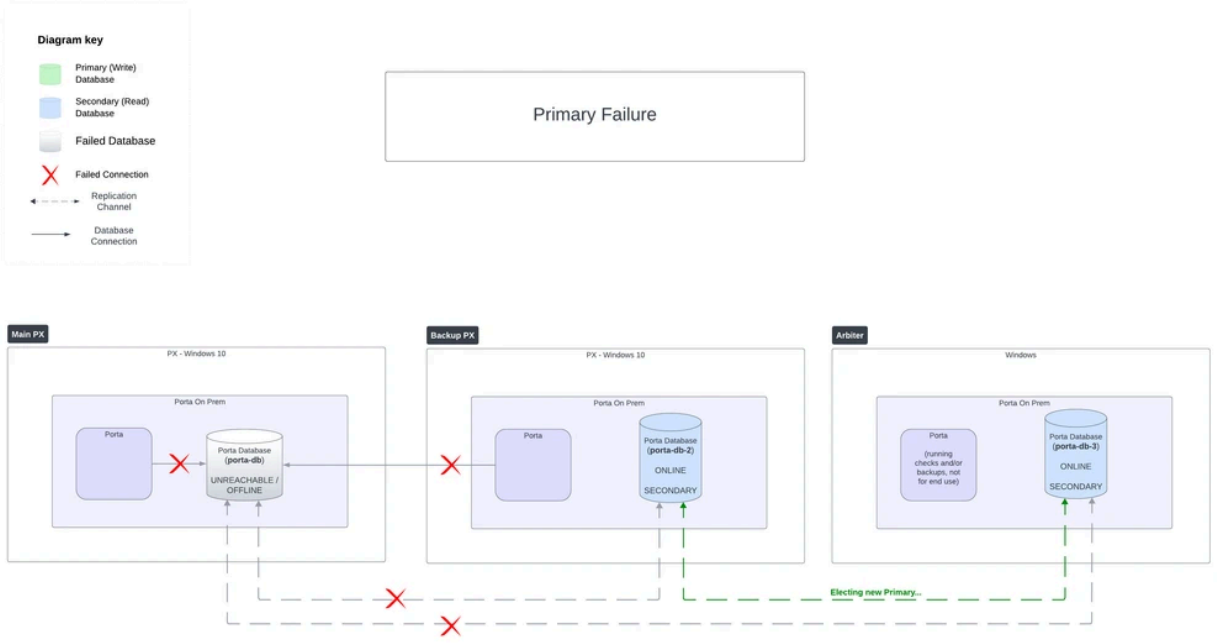
This page provides recovery instructions based on the specific issue that you are experiencing.

Failover Recovery Overview

If the primary (write) database fails unexpectedly, such as in the case of power failure, network failure, etc., Porta will automatically failover to the backup database and continue operations. Here is a high-level overview of the failover process:

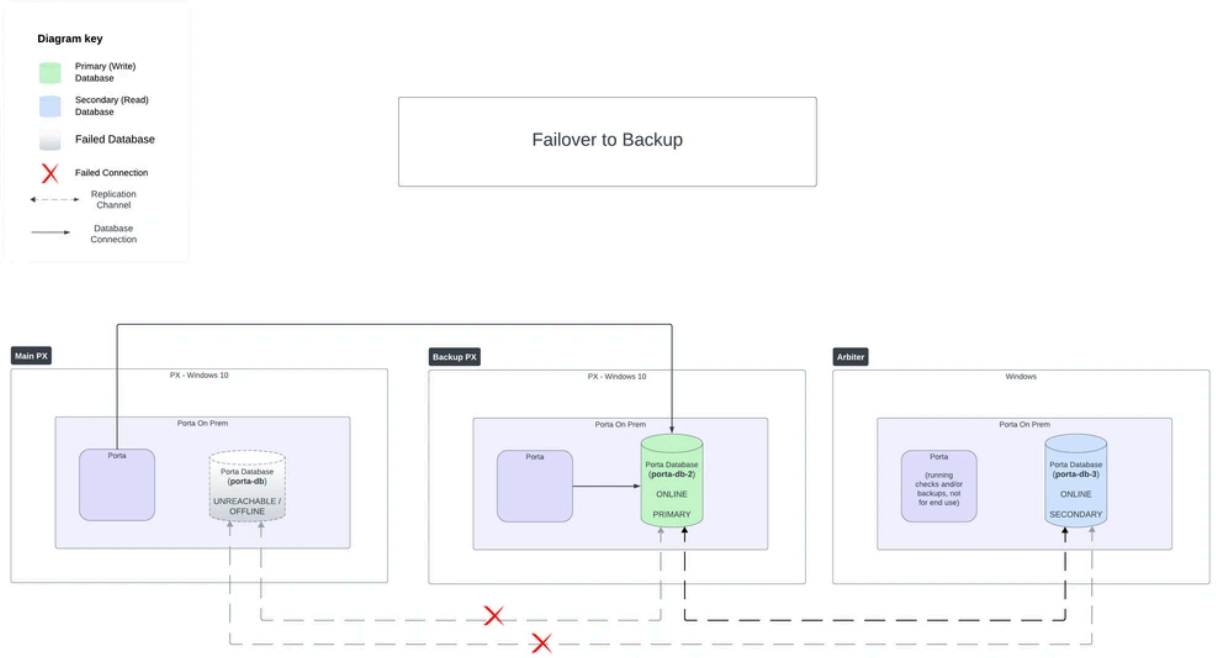
Primary failure

Upon detection of a failure, the remaining databases will elect a new primary database.



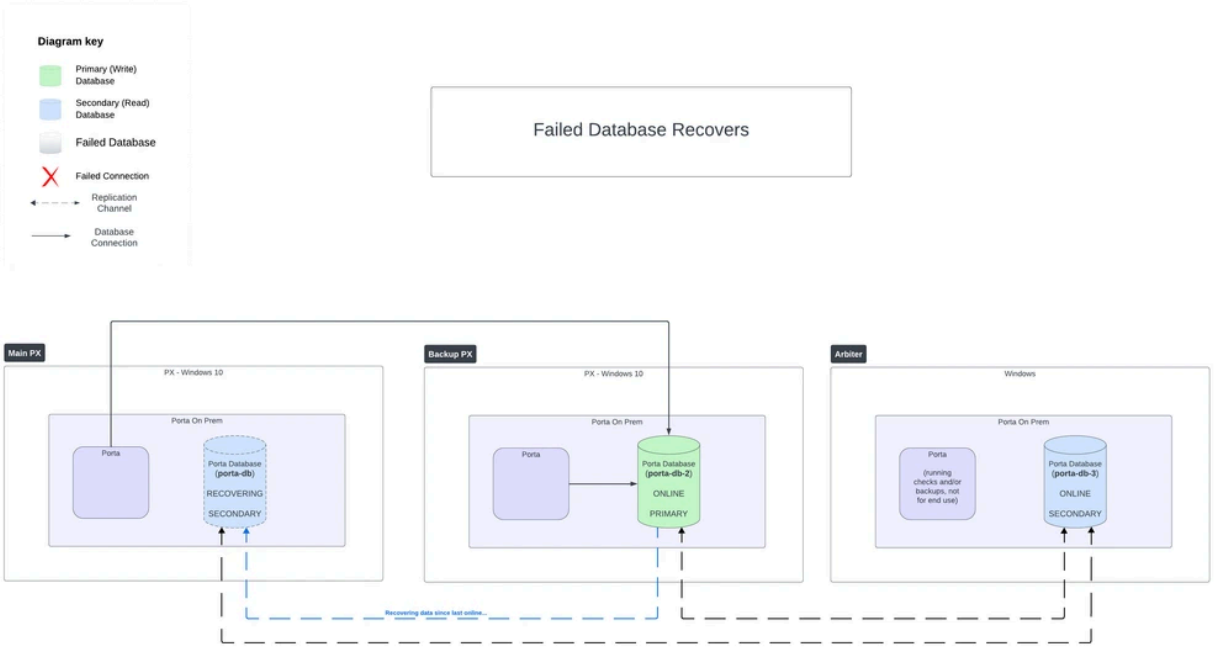
Failover to backup

The backup database is now given the `MEMBER_ROLE` of `PRIMARY` and the ability to write data. Porta detects and establishes this new connection, and operations proceed as usual.



Failed machine begins recovery

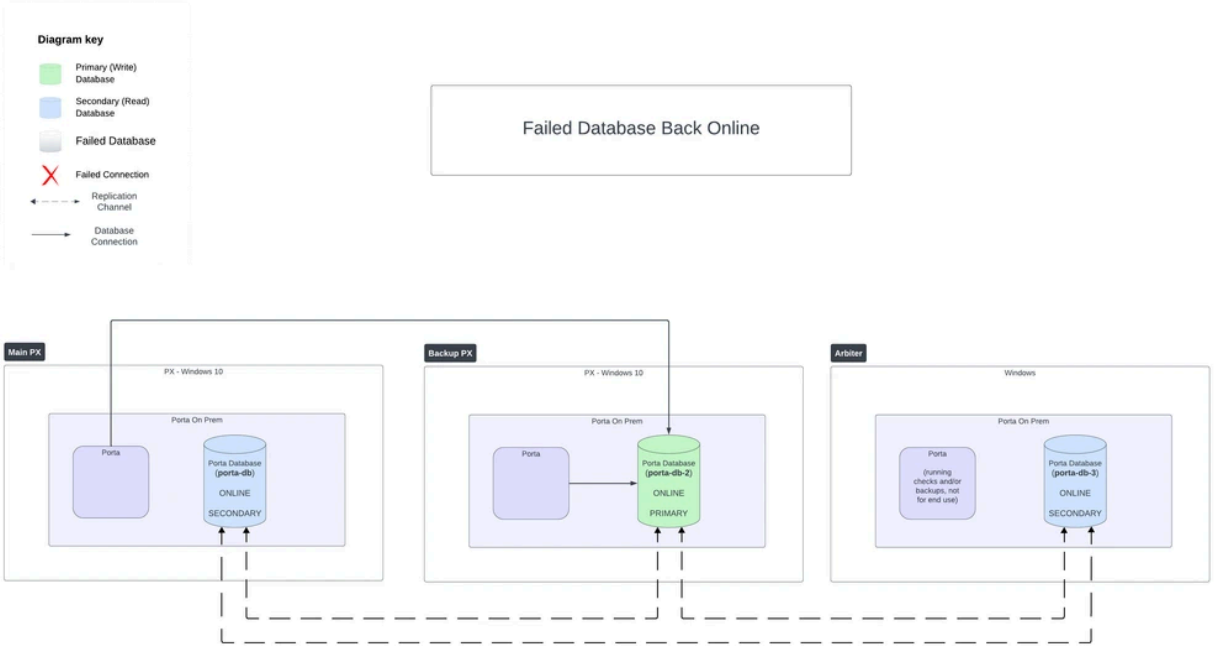
If the failed machine regains connectivity, it will attempt to rejoin the group and begin recovering data that was missed during the failure. During this period, it will have a `MEMBER_STATE` of `RECOVERING`.



> **Note**
>
> Depending on the amount of data that was missed, this process may take some time. In most cases, recovery will only take a minute or two.

Failed Machine is fully operational again

When the failed machine has fully recovered, it will have a `MEMBER_STATE` of `ONLINE` and will be fully operational again. **However, the `MEMBER_ROLE` of `PRIMARY` will remain with the backup machine until it leaves group, such as via failure, shutdown, or other means.**



Manual Recovery Steps

There are some cases in which manual intervention will be required after a failure or shutdown. Below are some common issues and their recovery steps.

All/Most Databases Are Down and Won't Come Online Correctly

When all databases are down and won't come online correctly, as in the case of a site power failure, we need to manually bootstrap the group. See: Bootstrap the Replication Group

Single Database Failing to Rejoin Group

1. Check the status of all members in the group
   - Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`.
   - In the `porta-database` folder, double click `view-ALL-group-repl-status.bat`
2. If the other machines have `MEMBER_STATE` of `ONLINE` **and there is a member with** `MEMBER_ROLE` **of** `PRIMARY`, then we can try simply **restarting replication** on the machine that is failing to rejoin the group: **Restart Replication**
3. If the other machines have `MEMBER_STATE` of `ONLINE` and there is NOT a member with `MEMBER_ROLE` of `PRIMARY`, then bootstrap a machine that is not `ONLINE`: **Bootstrap Replication**
   - After bootstrapping the machine:
     - On another machine, **Restart Replication** to ensure it joins the group
     - On the last machine, **Restart Replication** to ensure it joins the group
4. If one of the above steps does not work, then we can try resetting the database container that is failing to rejoin the group:
   - **Reset the Database**
   - **! WARNING: Resetting will wipe the database data on the machine !**

Every Machine Only Registers Itself in the Group

If each machine only sees itself in the replication group with a `MEMBER_STATE` of `OFFLINE`, this likely means that there was no existing group to join. This can happen if the machines are not able to communicate with each other, or if the group replication process was not bootstrapped on any of the machines.

To fix this, we need to bootstrap the replication group: **Bootstrap the Replication Group**

A Machine is Listed as UNREACHABLE

If the other machines are listed as `ONLINE`, then restart replication on the machine that is listed as `UNREACHABLE`: **Restart Replication**

If the restart fails to fix the issue, then we need to **Bootstrap the Replication Group**

A Joining Member Creates Its Own Group

If a joining member creates its own group, this likely means that the `group_replication_bootstrap_group` configuration was not set to `OFF` on the joining member. We will need to turn this off in the configuration file and restart replication on the machine: **Turn Off Default Bootstrap**.

> Note: It is possible that creating its own group may prevent it form joining the existing group, even after turning bootstrap off. If this happens, we may need to **Bootstrap the Replication Group**. If the machine is unable to join the group after bootstrapping, then we may need to **Reset the Database**.

Misc

For more troubleshooting details and error messages, see the Group Replication Troubleshooting document.

Common Replication Recovery Actions

Stop Replication

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`
2. In the `actions` folder, double click `STOP-repl.bat`
3. Enter or confirm the current Windows user.
4. Enter or confirm the default WSL user.
5. Enter or confirm the current machine type.
6. Enter or confirm the current machine IP address.
7. Let the process run until finished.

Start Replication

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`
2. In the `actions` folder, double click `START-repl.bat`
3. Enter or confirm the current Windows user.
4. Enter or confirm the default WSL user.
5. Enter or confirm the current machine type.
6. Enter or confirm the current machine IP address.
7. Let the process run until finished.

Restart Replication

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`
2. In the `actions` folder, double click `restart-repl.bat`
3. Enter or confirm the current Windows user.
4. Enter or confirm the default WSL user.
5. Enter or confirm the current machine type.

6. Enter or confirm the current machine IP address.
7. Let the process run until finished.

Bootstrap Replication

> For bootstrapping a single member.

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`
2. In the `actions` folder, double click `bootstrap.bat`
3. Enter or confirm the current Windows user.
4. Enter or confirm the default WSL user.
5. Enter or confirm the current machine type.
6. Enter or confirm the current machine IP address.
7. Let the process run until finished.
8. If prompted for migration, enter `n`.
9. If prompted for seeding, enter `n`.

Bootstrap the Replication Group

> For bootstrapping the replication group on all machines, such as when a primary member does not exist.

1. On the **main** machine, Stop Replication
2. On the **backup** machine, Stop Replication
3. On the **arbiter** machine, Stop Replication
4. On the **main** machine, Bootstrap Replication
5. On the **backup** machine, Start Replication
6. On the **arbiter** machine, Start Replication

All members should be running correctly and `ONLINE`.

Reset Database

> **Danger**
>
> RESTTING THE PORTA DATABASE WILL WIPE ALL DATA ON THE MACHINE!

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`
2. In the `actions` folder, double click `create-backup.bat` to create a backup of the database.

3. In the `actions` folder, navigate to the `caution` folder.
4. In the `caution` folder, double click `reset.bat`
5. Enter or confirm the current Windows user.
6. Enter or confirm the default WSL user.
7. Enter or confirm the current machine type.
8. Enter or confirm the current machine IP address.
9. Enter or confirm additional machine information.
10. Let the process run until finished.

Turn Off Default Bootstrap

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`, then `caution`
2. In the `caution` folder, double click `set-bootstrap-OFF.bat`
3. Enter or confirm the current Windows user.
4. Enter or confirm the default WSL user.
5. Enter or confirm the current machine type.
6. Enter or confirm the current machine IP address.
7. Let the process run until finished.
8. Navigate up to the `actions` folder and **Restart Replication** to rejoin the existing group.

Turn On Default Bootstrap

1. Navigate to the desktop's `porta-onprem-bundle` folder, then to `porta-helpers`, then `porta-database`, then `actions`, then `caution`
2. In the `caution` folder, double click `set-bootstrap-ON.bat`.
3. Enter or confirm the current Windows user.
4. Enter or confirm the default WSL user.
5. Enter or confirm the current machine type.
6. Enter or confirm the current machine IP address.
7. Let the process run until finished.
8. Navigate up to the `actions` folder and **Restart Replication**.

Porta On Prem Support Checklist

> **Note**
>
> References to `XXX.XXX.XX.XXX` means the current machine's IPv4 address (usually under `d3net` in Powershell's `ipconfig` output).

1. ☐ Docker
   - ☐ `porta` container is running
   - ☐ `porta-db` / `porta-db-2` / `porta-db-3` container is running
     - The container name will be machine dependent
   - ☐ `porta-socket-server` container is running
   - ☐ `porta-redis` container is running
   - ☐ There are no extra containers running
     - Containers, or container groups, prefixed with `porta` are expected.

     > **Caution**
     >
     > Any strangely named containers using a `portadisguise` image will interfere with Porta and must be stopped and deleted. Then the `porta` container should be restarted.

2. ☐ Porta
   - ☐ Porta is being accessed by its IP address in the browser: `http://XXX.XXX.XX.XXX:8080` (not `localhost`)
   - ☐ Under Settings > Integrations > Socket Server, the URL is `http://XXX.XXX.XX.XXX:6001`
   - ☐ When sending/saving a page —> the page in the playlist has a channel selected
   - ☐ In Porta's menu under `Window` > `Settings` > `Channels`, the correct channels are listed
     - if not, use the sync button in the channel panel
   - ☐ In Porta's menu under `Window` > `Settings` > `Preference`, "Enable Play Groups" and "Enable play group sequence" are enabled
   - ☐ In Porta's menu under `Window` > `Settings` > `Preference`, "Local Live Preview" is set as desired
   - ☐ In Porta's menu under `Window` > `Settings` > `Integrations`, the desired integrations are active and configured
     - Google OAuth and Ipsum server require additional configuration, double click to configure
3. ☐ Designer
   - ☐ Designer is currently running
   - ☐ The active project in Designer is the expected project for Porta's selected page/template/channel
   - ☐ Is the Designer API docs "Try it out" working for `/session/sockpuppet/patches`?
4. ☐ Unreal
   - ☐ Unreal is currently running
   - ☐ Unreal plugins are up to date
   - ☐ The Unreal project is the expected project for Porta's selected page/template/channel
   - ☐ The Unreal game is running
   - ☐ Project settings for Porta Plugin are referencing the correct Porta instance
     - ConnectionURL: `http://XXX.XXX.XX.XXX:6001` or `http://porta.server:6001`
     - API URL: `http://XXX.XXX.XX.XXX:8000` or `http://porta.server:8000`
   - ☐ If using `porta.server` in the project settings, the host file has been updated to include the IP address of the machine running Porta

5. ☐ Porta Bridge
    - ☐ The Bridge is currently running
    - ☐ Only a single instance of the Bridge is running
        - Check the system tray and task manager for multiple instances

        > ⚠ **Caution**
        >
        > If multiple instances are running, stop all instances and restart the Bridge.

    - ☐ The Bridge version is up to date
    - ☐ Bridge is connected to the correct instance of Porta and Designer
        - If the Bridge is installed on a PX, it should be connected to that PX's instance of Porta
    - ☐ Bridge is connected to the correct instance of Designer
    - ☐ Bridge API URL is `http://XXX.XXX.XX.XXX:8000`
    - ☐ Bridge Socket Server URL is `http://porta-socket.server:6001` or `http://XXX.XXX.XX.XXX:6001`
6. ☐ Database
    - ☐ Database status icon colour is green
    - ☐ Database health dashboard (`http://XXX.XXX.XX.XXX:8000/health`) is showing all green

Two Machine System Guide

This document covers actions related to a Porta On Prem setup involving only 2 machines that are not run in a replication group and does not apply to a 3 system setup. For a 3 system setup, see the Replication Group Member Recovery guide.

PX Database Sync

The backup PX machine is running as a cold backup system for use in case of main PX failure. Syncs should only occur from the main system to the backup system, and the backup PX is **not** intended for simultaneous use with the main PX.

On the main PX machine, within Porta, create and configure for your show as desired.

Once finished, run the `MAIN-TO-BACKUP-transfer-database.bat` helper within `porta-onprem-bundle/porta-helpers/porta-database/actions/caution/transfer` to transfer the database from the main machine to the backup machine.

> NOTE: an error Out of sort memory may appear in Porta for a short period after transfer (about 30 seconds) while the data is loading. This is normal and should resolve itself.

> Note: There is no need to also edit the company socket URL; this helper will automatically configure the socket URL value in the database based on its saved configuration values.

Porta Overview

What is Porta?

Porta is a production control platform that enables the triggering of templated content in Designer and Unreal Engine. It provides a centralised, operator-friendly interface for controlling live and scheduled visual content without requiring direct interaction with creative toolsets.

Porta is typically deployed in an on-premise (Porta On Prem) environment. It can also be deployed in cloud-based or hybrid cloud/on-premise configurations, depending on operational requirements.

What does Porta do?

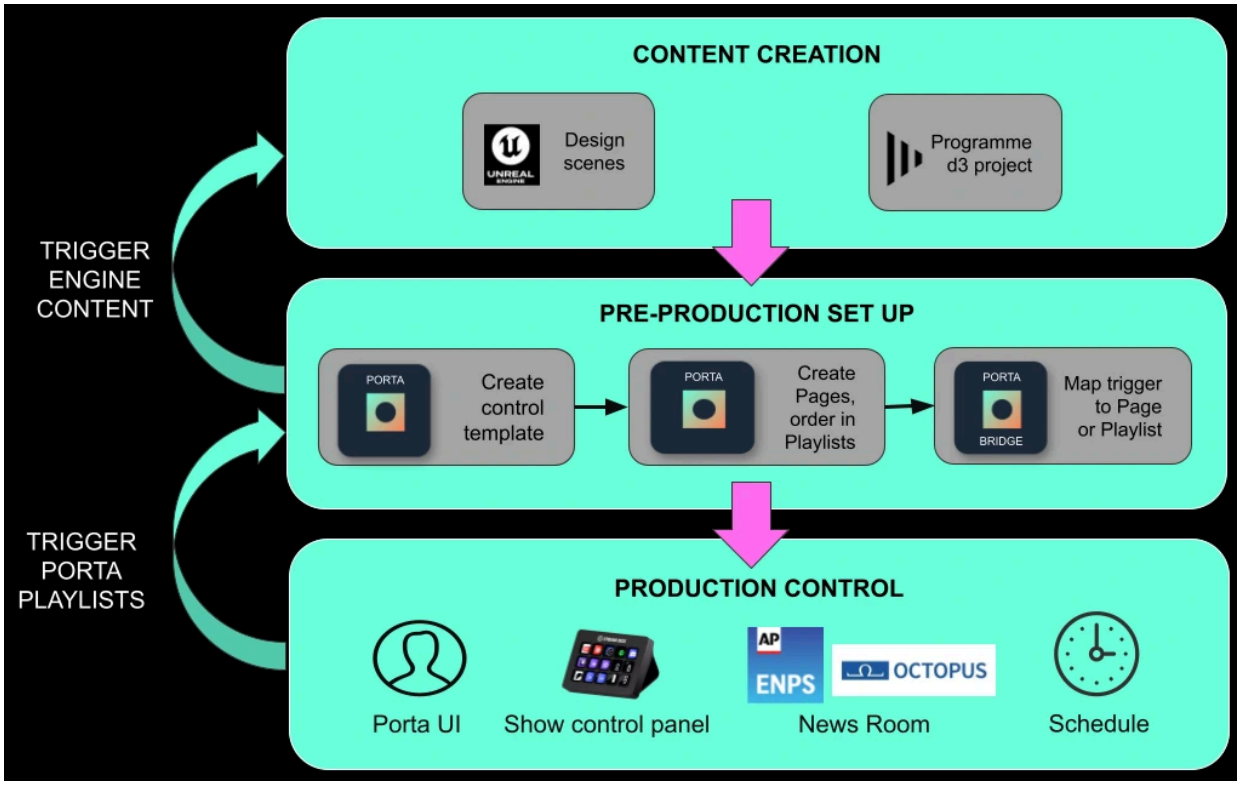
Porta simplifies the control of visual experiences across a wide range of broadcast and live production use cases, including:

- On-air graphics
- Broadcast and virtual studios
- Stadiums
- Live venues

Porta has the following capabilities:

- Structured workflows that allow Disguise and Unreal Engine specialists to expose templated content to operations teams.
- Real-time updates to text, graphics, media, and configuration data without accessing Designer or Unreal Engine directly.
- Playlist-based control via a browser interface or through integration with external control systems.
- Native support for RossTalk, Chyron CII, and GPI protocols.
- Rule-based scheduling for automated playback by date and time.

Porta Workflow



Porta simplifies production control by enabling different roles and stages of the production lifecycle to concentrate on their own specialities:

1. **Content Creation**: This is typically done by an Unreal Engine artist or d3 Programmer, designing the scenes in Unreal Engine or programming the d3 project, and in both cases, then exposing the parameters and content to be adjusted at show time by external systems.
2. **Pre-production Set Up**: The technical production operator uses Porta to create templates, playlists and pages in line with the show requirements.
3. **Production Control**: During live operation, templated content is triggered by the appropriate control system. In a news broadcast, this is typically a News Room Computer System (NRCS); for a live event or stadium environment, this is typically a production switcher or show control panel. Alternatively, triggers can be configured according to date and time rules, or triggered manually using the Porta web interface.

Porta documentation

New to Porta, or arrived here from an older link? The documentation is organised into the areas below. Each area also appears in the sidebar.

Control Designer

Connect Porta to Designer and drive content on the d3 timeline.

- Porta Bridge — establish the connection between Porta and Designer.
- Timeline Control and HTTP Sockpuppet — trigger and control Designer playback.

Control Unreal Engine

Connect Porta to Unreal Engine and trigger templated scenes.

- Plugins — install and connect the Porta plugins.
- Unreal Integration and Unreal Motion Design.

Working with Porta

Day-to-day operation: building templates, pages and playlists, then driving them.

- **Getting started:** Find Channel, Make Template, Make Page, Use Playlist.
- **Interface reference:** Workspace, Settings, Media and Media Manager, Projects, Page Editor and Page Preview. The rest of the interface pages are listed under this section in the sidebar.

Data integration

- Google API Integration — drive page content from an external data source.

Control integration

Trigger Porta from broadcast and show-control systems.

- RossTalk/GPI
- Newsroom Integration/MOS

Deployment

- Porta Cloud — cloud-hosted deployment.
- **Porta On Prem (Porta VM):** overview, setup and the troubleshooting guides in the sidebar.

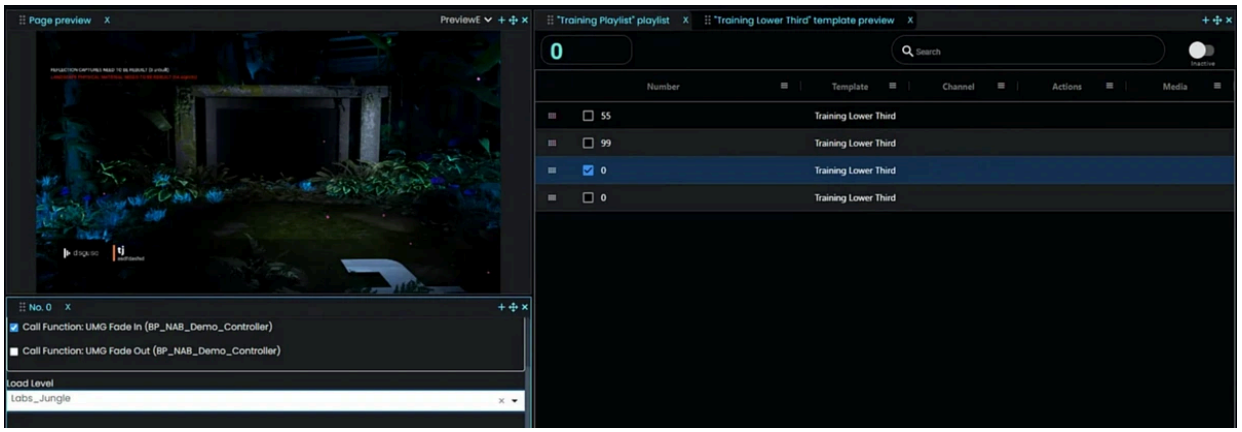
Releases

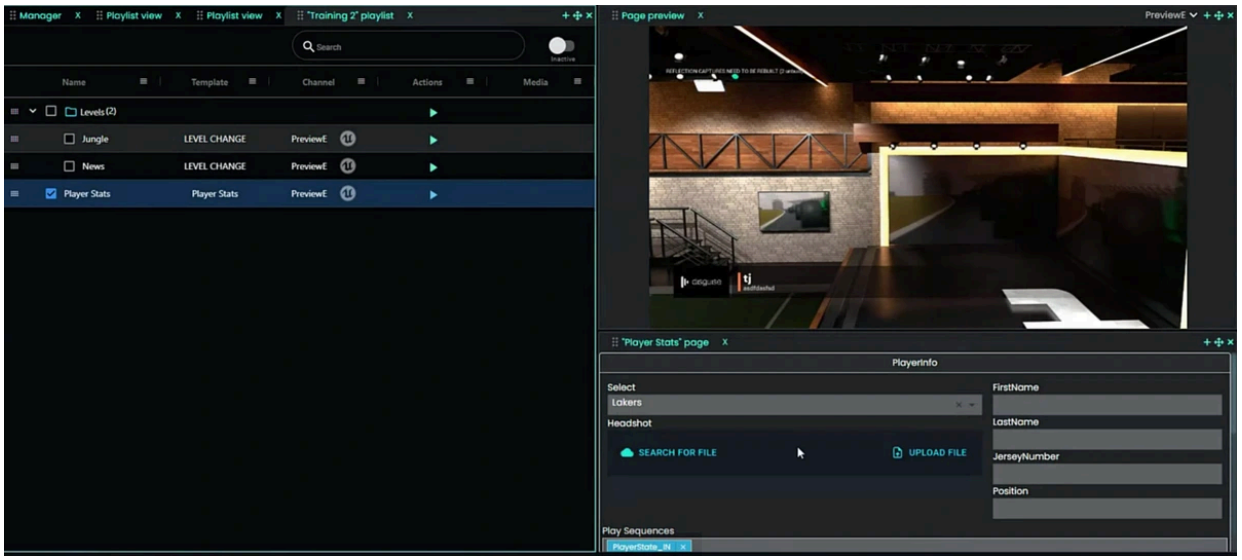
- Release notes index — what changed in each Porta version.

Page Preview

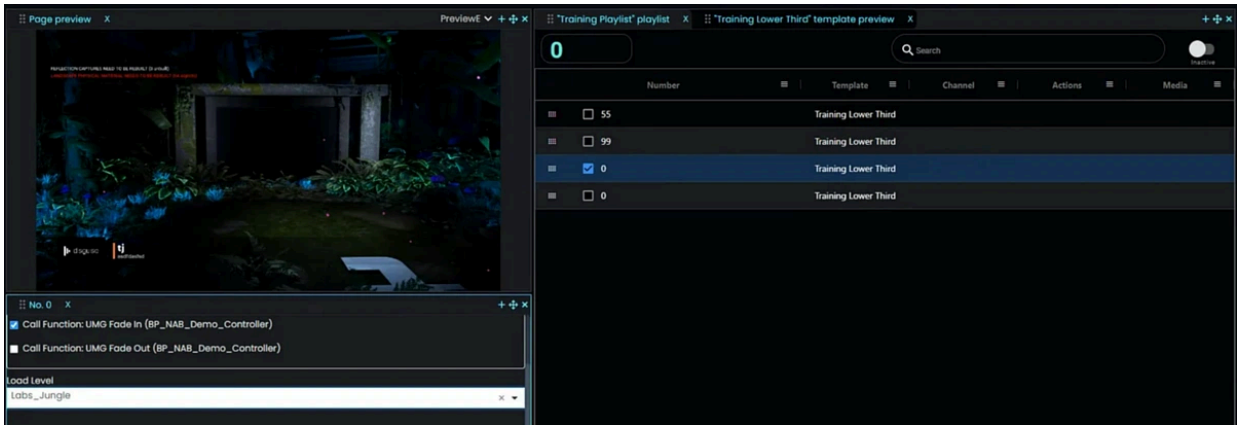
The Unreal level can load into Page Preview. If you have multiple levels in your Unreal project, the Load Level field will automatically list all levels in a dropdown field.

In this instance, the lower third will appear as an overlay on top of the level preview.





Loading levels



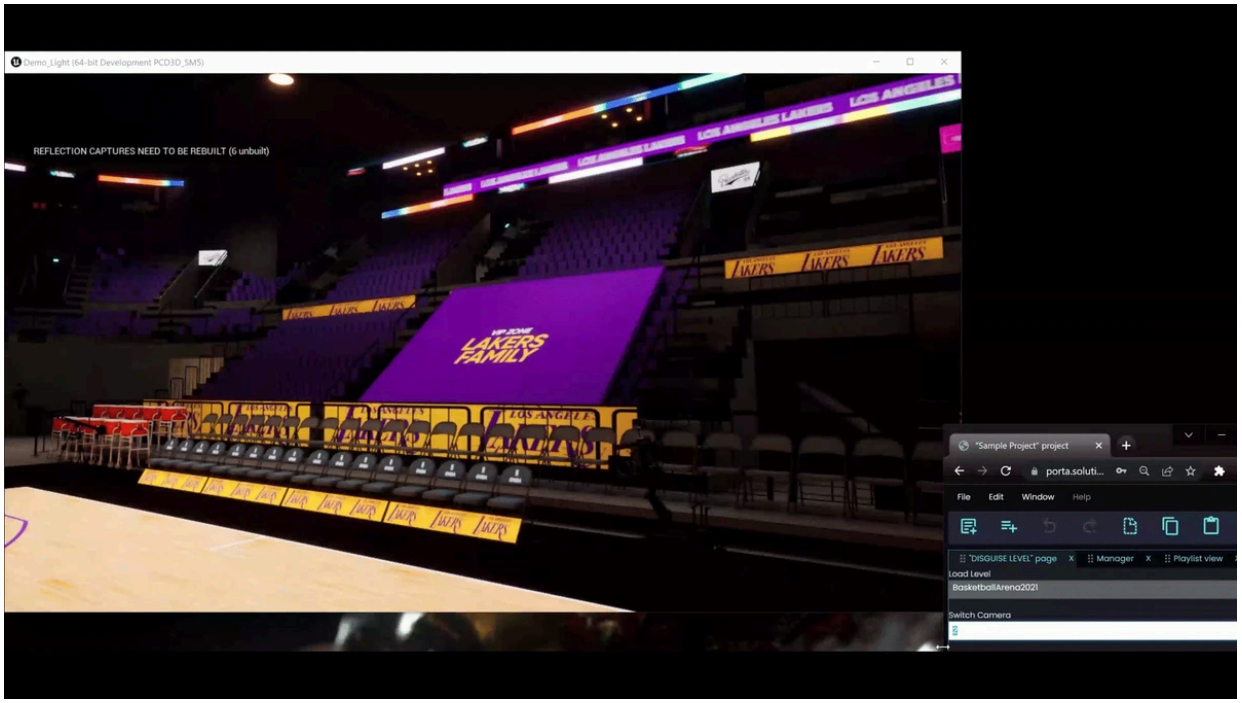
Camera Switching

Camera switching relies on exposing parameters on cameras in the Unreal Project.

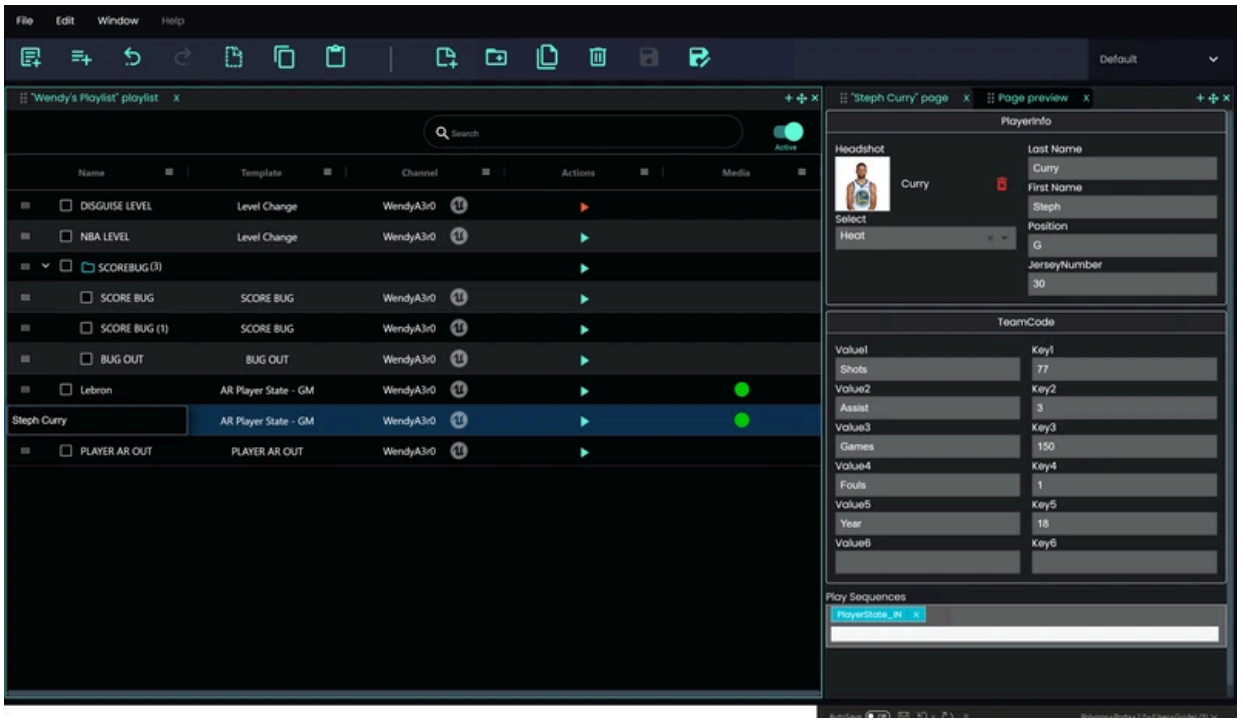
A designer would then connect the project presets and add the cameras to a template in Template Builder as a selection dropdown. It can be previewed here.

The template is used to make a playlist.

The camera options must be added to a page and any switching can be done from the page.

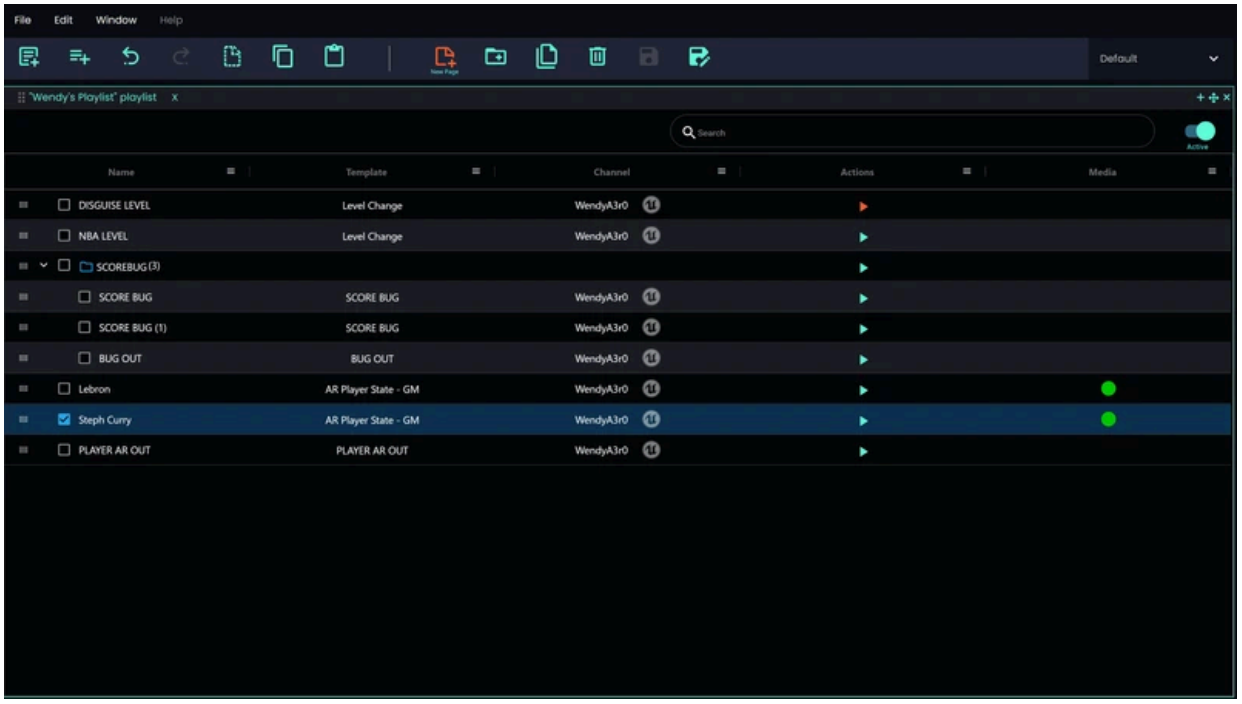


Pages



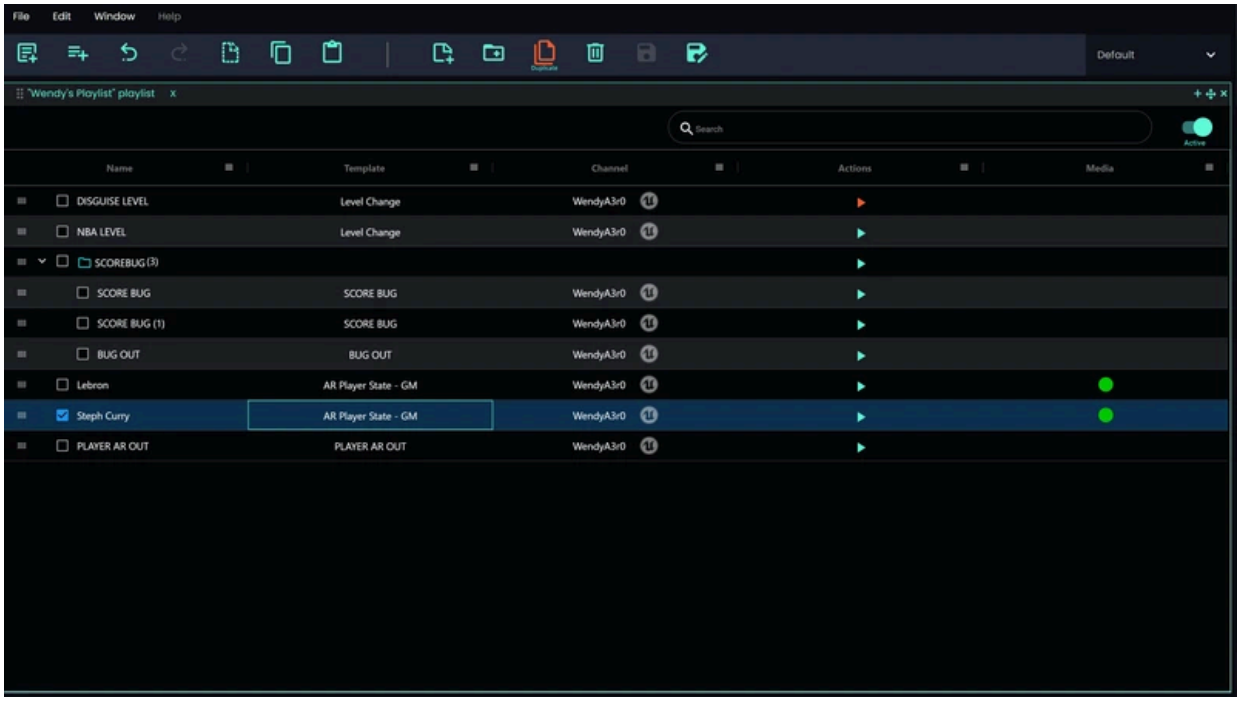
Create a new page from a playlist

Select a playlist and click the **New Page** button.



Duplicate a page

To duplicate a page, select the page you want to duplicate and click the **Duplicate** button.

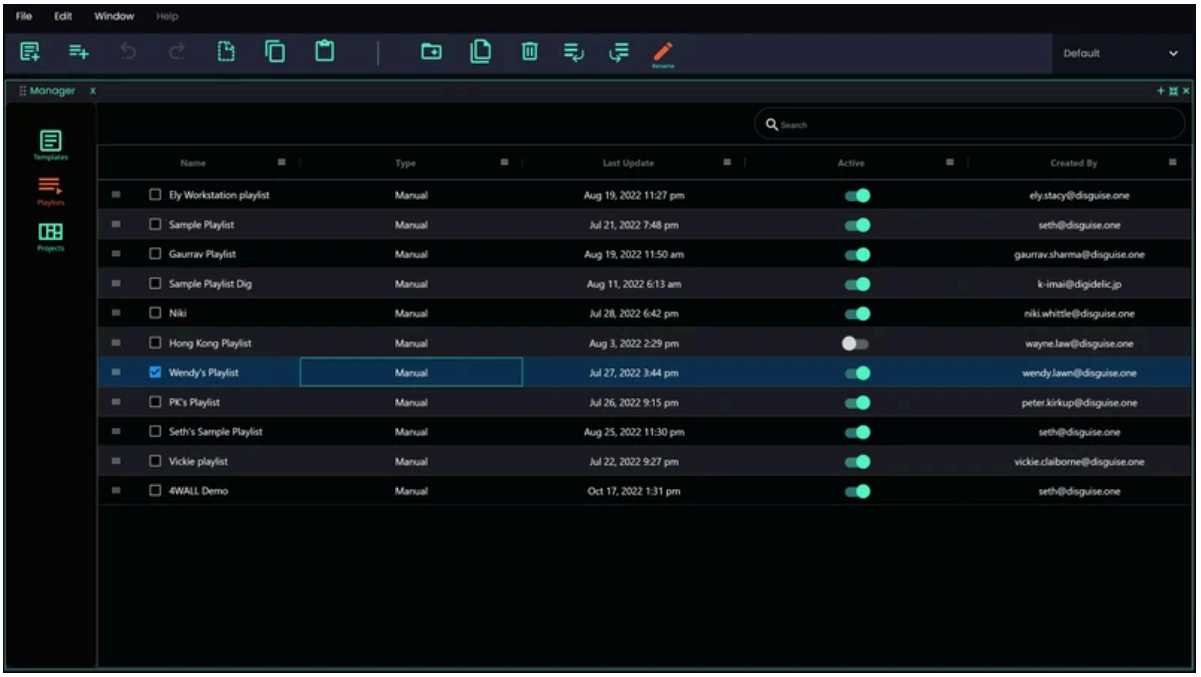


Numeric pages

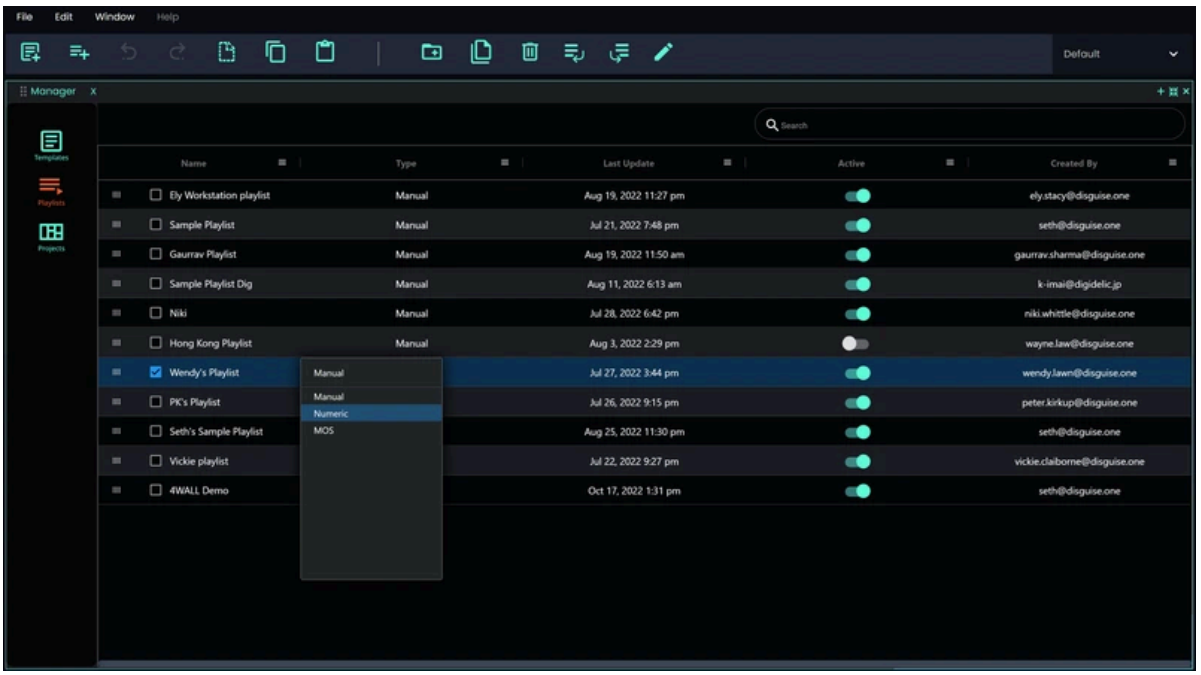
By default, pages use page names. As an operator, it can be much quicker to work with numbered pages as it is much quicker to type a number on a keyboard num pad to call up a page.

Enable page numbers

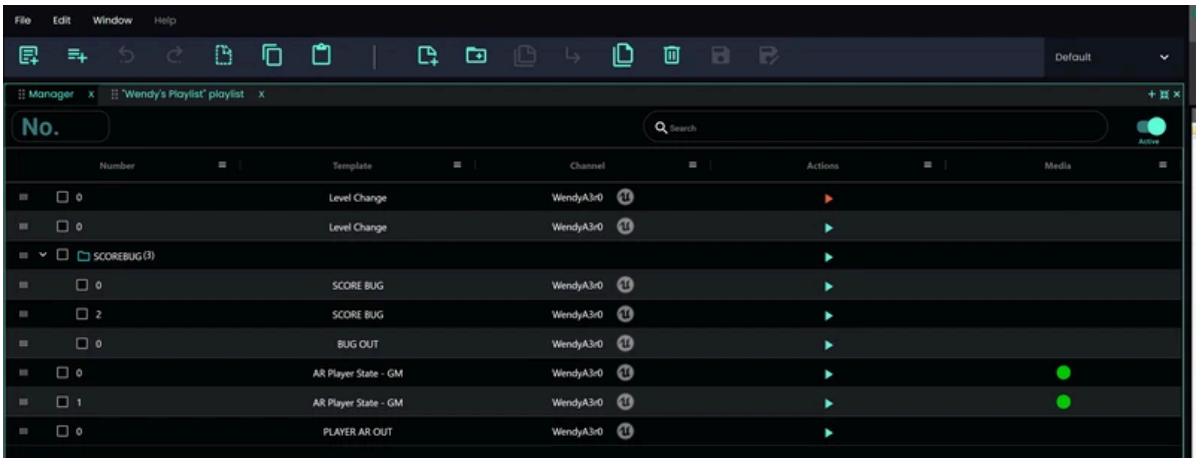
1. To enable numbered pages to to **Window > Manager**.
2. Click **Playlists**.
3. Click **Edit** in the main toolbar.



4. Under Type, click **Manual** and select **Numeric** from the dropdown list.



5. Return to the playlist. The page names have now been replaced with numbers.

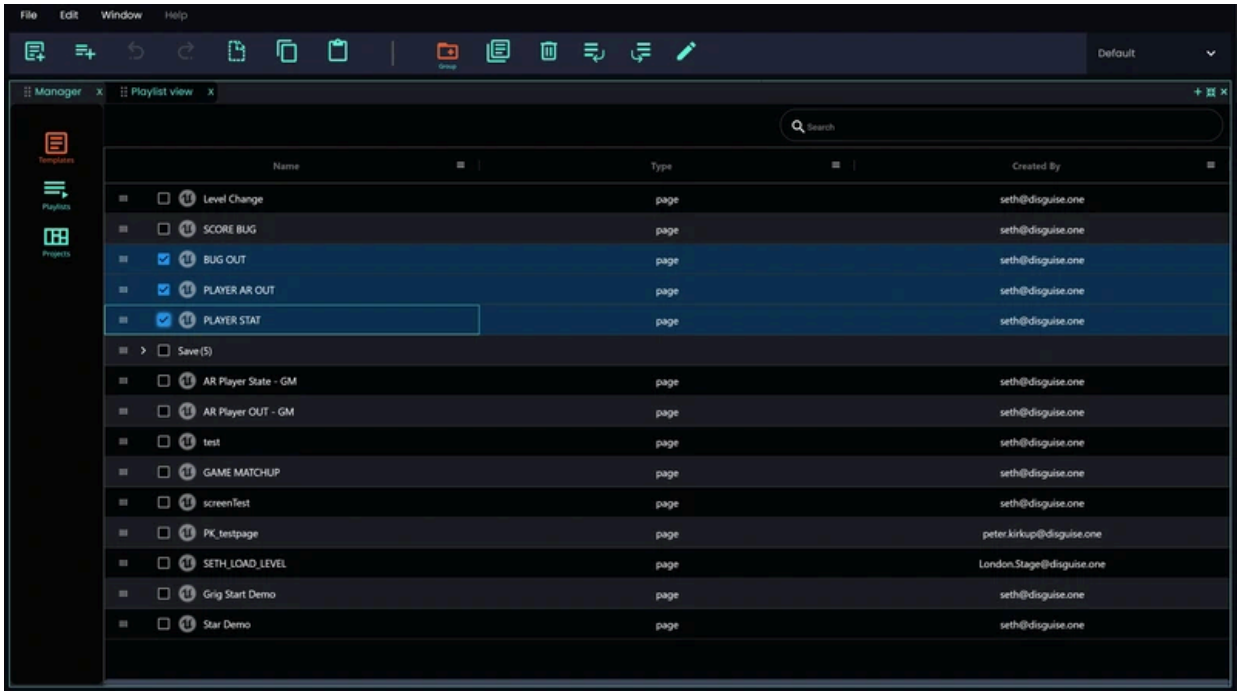


Play a graphic

Play the Unreal project in Standalone mode and click on the play icon in the **Actions** column.

Group pages

1. Select and highlight the items that you want to group.
2. Click the **folder+** icon.
3. Enter a name for the new group and click Save.


File
Edit
Window
Help
Default
Manager
Playlist view
Search
Templates
Playlists
Projects
Name
Type
Created By
Level Change
page
seth@disguise.one
SCORE BUG
page
seth@disguise.one
BUG OUT
page
seth@disguise.one
PLAYER AR OUT
page
seth@disguise.one
PLAYER STAT
page
seth@disguise.one
Save (5)
AR Player State - GM
page
seth@disguise.one
AR Player OUT - GM
page
seth@disguise.one
test
page
seth@disguise.one
GAME MATCHUP
page
seth@disguise.one
screenTest
page
seth@disguise.one
PK_testpage
page
peter.kirkup@disguise.one
SETH_LOAD_LEVEL
page
London.Stage@disguise.one
Grig Start Demo
page
seth@disguise.one
Star Demo
page
seth@disguise.one

Porta Playlist

A **playlist** is part of a **project** and holds **pages**. The playlist can be split up into **pages groups** for easier organisation.

Playlist functions

- Create new
- Save
- Update
- Duplicate
- Remove
- Batch restore
- Play page group in sequence
- Play page group simultaneously
- Group
- Ungroup
- Save group
- Display page group list
- Delete

Create a new playlist

When a project is created, a playlist will be automatically generated.

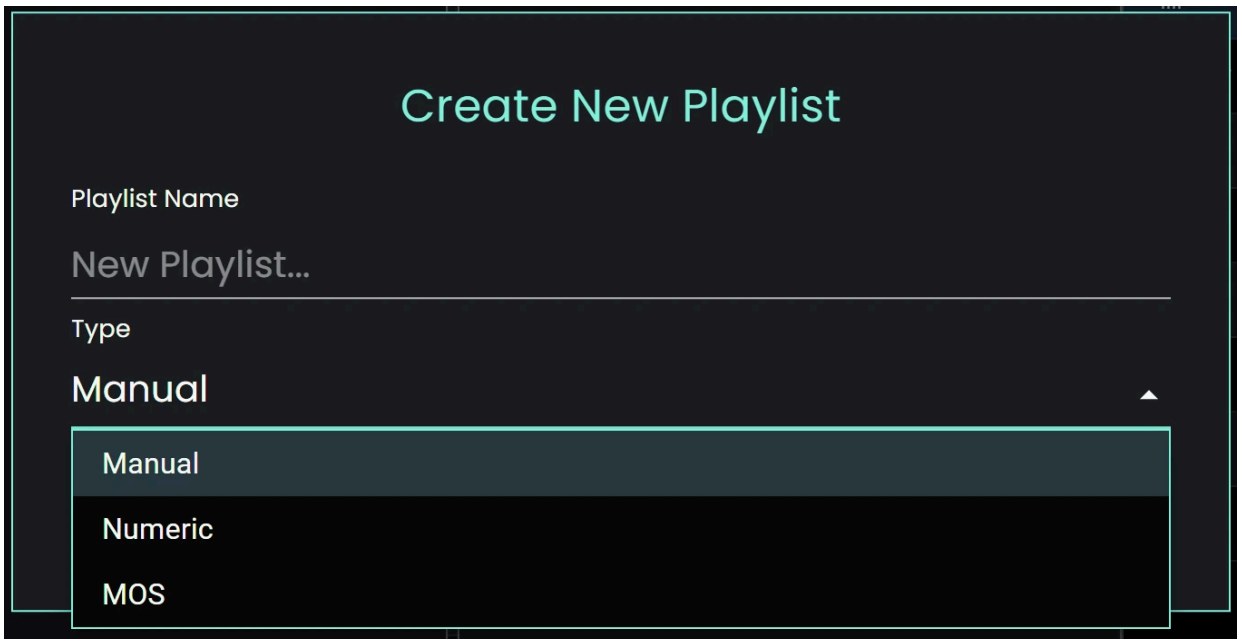
If you want to make additional playlists, you can use one of these three ways:

1. Click on the New Playlist button on the menu ribbon.
2. Click **File > New >** Playlist.
3. Click + to add and select **Playlist**.

Next, enter the name of the new playlist, select a type from the dropdown menu and click **Save**.

Playlist type options are:

- **Manual** - this is the default setting.
- **Number** - this allows operators to type a number to activate a preset.
- **MOS** - this integrates with newsroom control systems.



View Playlist

You can view the playlist by going to **Window > Playlist** this will show a list of playlist for the Project that is active.

Import playlists

Click **File > Import Playlist**.

Export playlists

Click **File > Export Playlist**.

Porta Plugins

In Porta, go to **Help** > **Plugins** to see the full list of plugins available.

We have also included some download links below.

Unreal Plugins

- Plugins_5_4.zip
- Plugins_5_4.zip
- Plugins_5_5.zip

Avalanche

- Porta_5_4_Avalanche.zip
- Porta_5_5_Avalanche.zip

Porta Bridge Installer

- PortaBridgeInstaller

Porta Projects

Porta Projects is to help organise playlist within an Orginization and can be created in the file menu.

Functionality

- Name/Rename
- Create
- Edit
- Delete
- Duplicate
- Undo
- Redo
- Open

Project page

Project page

Create a project in Porta

All activity in Porta is project-based, the first project is set up as Default every playlist is attached to a project.

There are two ways to create a new project:

- Click on the New Project menu button.
- Or, click **File > New > New Project**.

Name the new project and click **Save**.

You will not see a playlist if its not in the Project that is selected, to change what project that is selected go to **Windows > Manager** and click on Playlist

> **Note**
>
> Mos intergration uses a project name that can be set in the Porta Bridge.

Settings

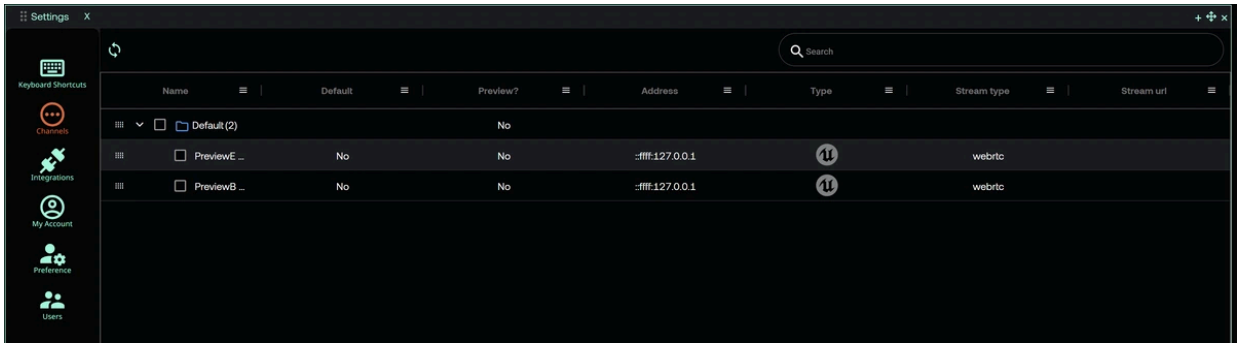
The Settings window in Porta includes the following:

- Keyboard Shortcuts
- Channels
- Integrations
- My Account
- Preferences
- Users

Keyboard Shortcuts

Keyboard Shortcuts are shown in Settings > Keyboard Shortcuts. For more information see Keyboard Shortcuts.

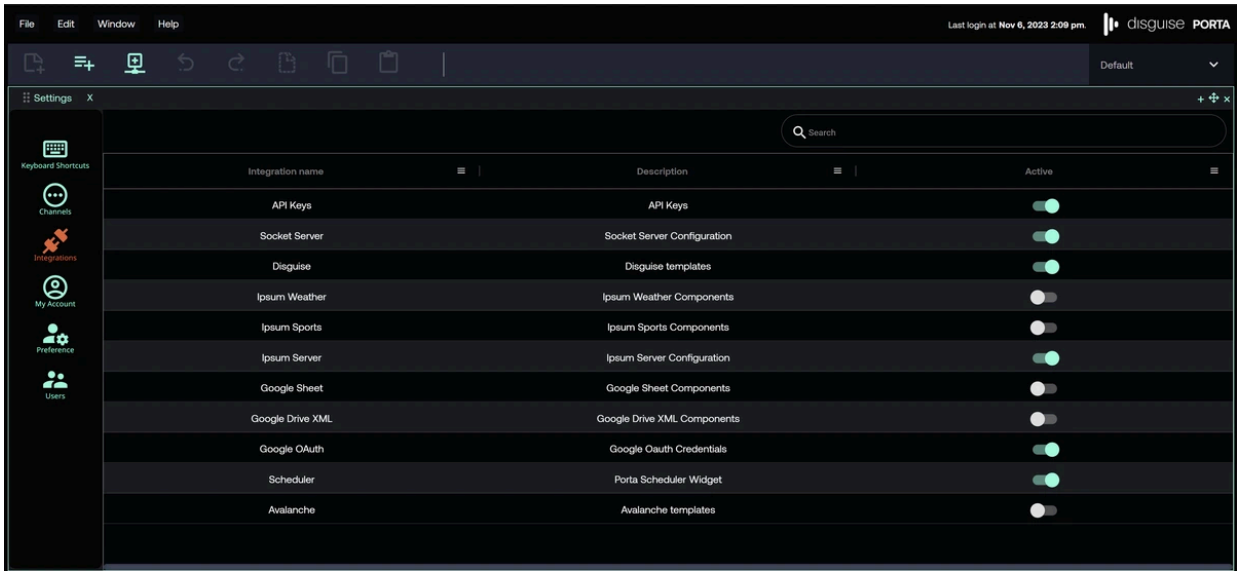
Channel



Channel functions

- Sync
- Default
- Preview
- Groups
- Delete
- Create new

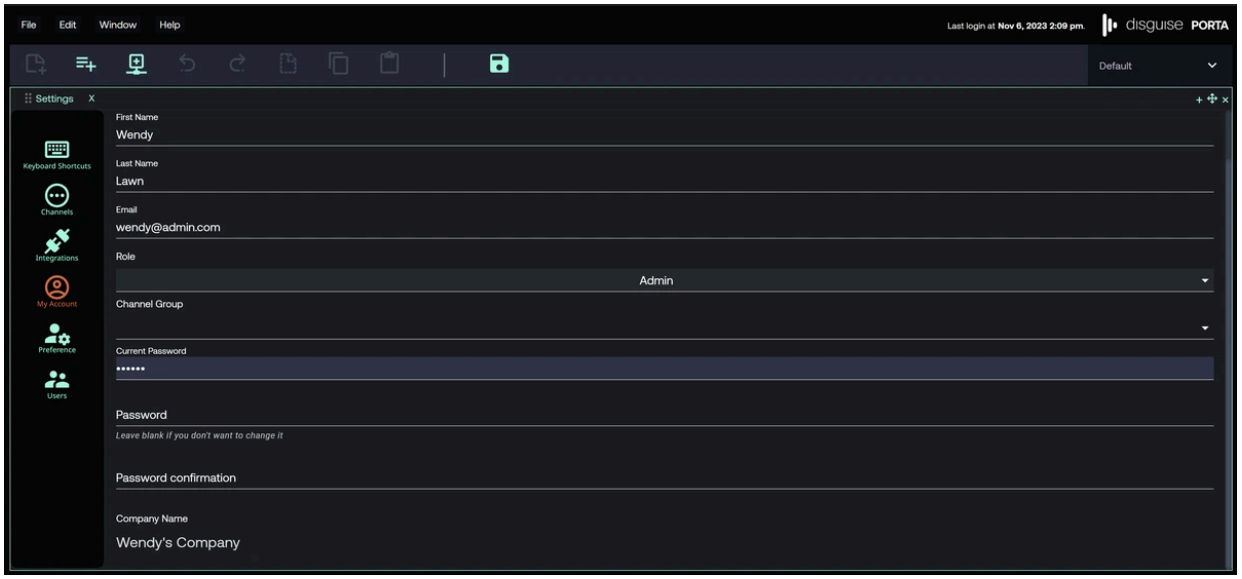
Integrations



Porta integrates with the following:

- **API Keys** - Porta API Keys
- **Socket Server** - Socket Server Configuration
- **Disguise** - Disguise templates
- **Ipsum Weather** - Ipsum Weather Components
- **Ipsum Sports** - Ipsum Sports Components
- **Ipsum Server** - Ipsum Server Configuration
- **Google Sheet** - Google Sheet Components
- **Google Drive XML** - Google Drive XML Components
- **Google OAuth** - Google Oauth Credentials
- **Scheduler** - Porta Scheduler Widget
- **Motion Design/Avalanche** - Avalanche templates

My Account



Admin user account management

Admin users are able to change the account permissions for individual users and reset passwords from the **My Account** menu.

Super Admin users are able to manage account permissions and reset passwords for specific users. Super admins are also able to configure Company account information including socket server addresses.

- First Name
- Last Name
- Email
- Role - Admin/User
- User Group*
- Channel Group*
- Current Password
- Password Confirmation
- Company Name*

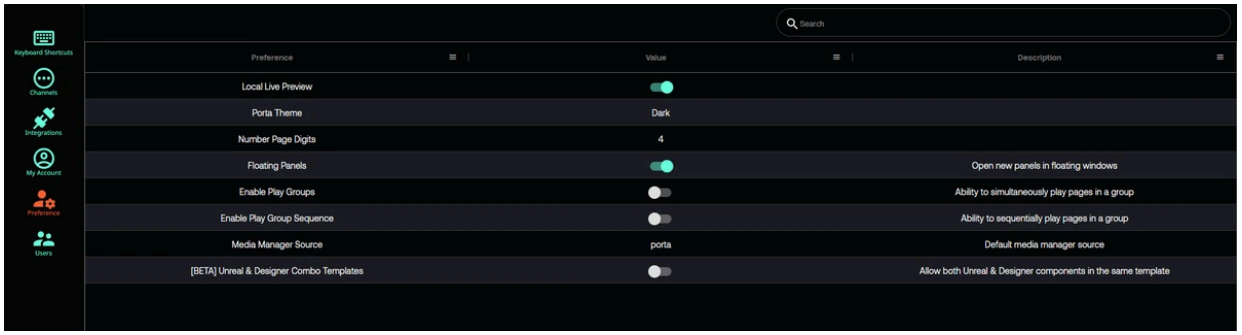
** Configurable*

Permissions can also be set to allow/not allow users to do the following:

- Create playlist
- Create page
- Play page

- Continue page
- Edit page

Preferences

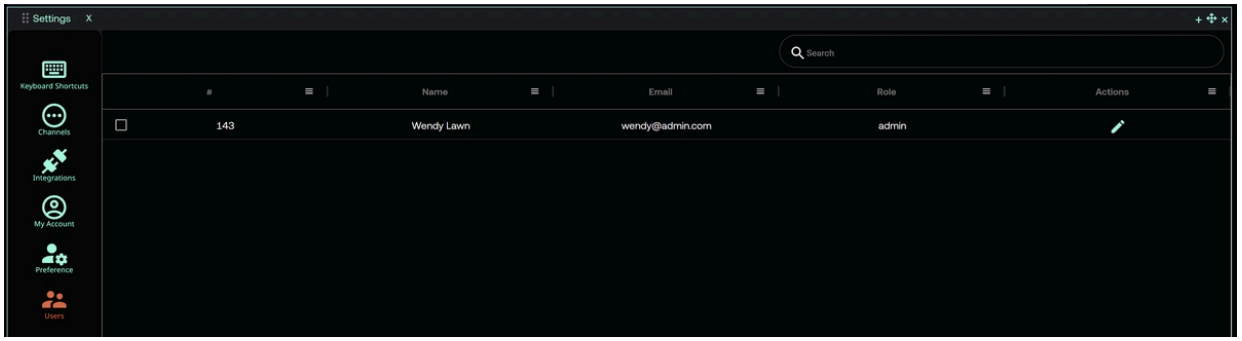


Edit your preferences

These include:

- **Local Live Preview** (Toggle on/off)
- **Porta Theme** (Dark mode)
- **Number Page Digits** (numeric value)
- **Floating Panels** (Toggle on/off)
- **Enable Play Groups** (Toggle on/off)
- **Enable play group sequence** (Toggle on/off)
- **Media Manager Source** (porta, local, shared)
- **Unreal & Designer Combo Templates** (Toggle on/off)

Users



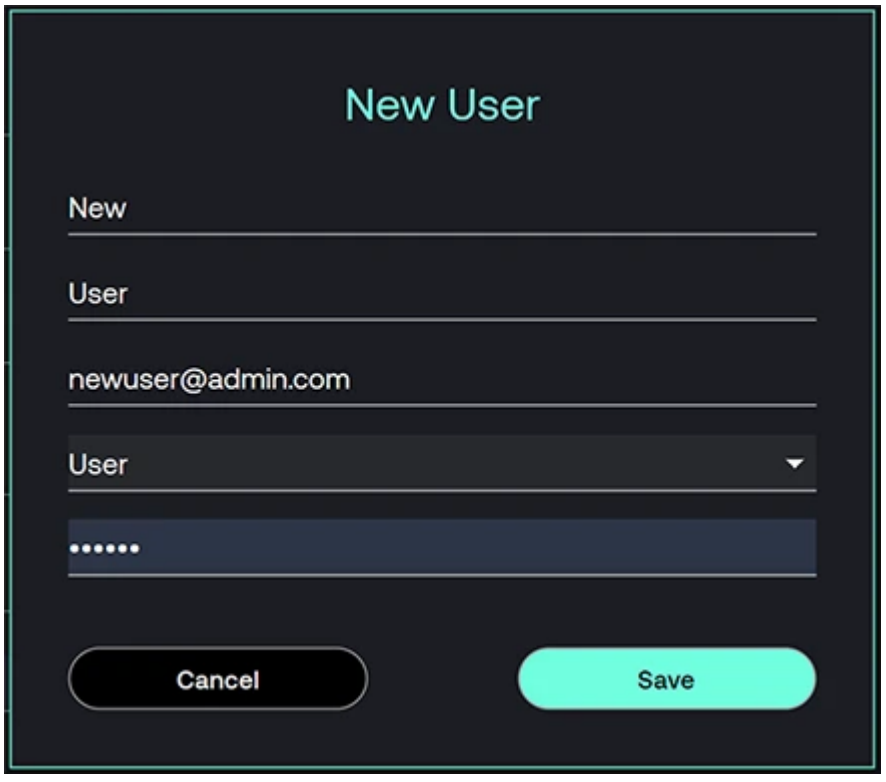
User account management

1. Click the pencil in the Actions column to edit user details.
2. In the Edit User window you can amend the following user information:
    - First Name
    - Last Name
    - Email address
    - Passwords
3. Press **Enter** to confirm changes.

Add a new user

This feature is only available to Admins.

1. Click the Edit icon pencil in the Actions column to edit user details.
2. In the Edit User window, select the new user icon.
3. Add the user's first and last names, email address, role and password.
4. Click **Save**.



User groups

User group functions

- Edit
- Save
- Update
- Group
- Ungroup
- Remove
- Display list

Template Builder

Template Builder is a powerful tool for quickly creating templates. It enables designers to bring together key assets, sequences and settings in the Unreal Project that they can be triggered from Porta. Templates create playlists, playlists organise pages, and pages include sequences and graphics that can be played simply and remotely.

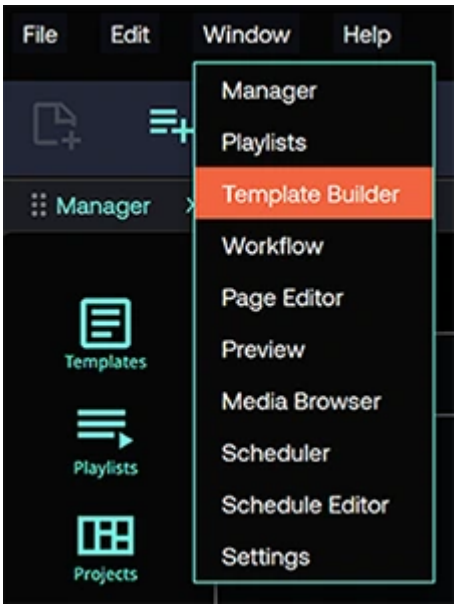
Key features

- Engine-specific templates
- Presets
- Customisable form layouts
- Form component presets
- Conditional logic for custom use cases - capitalization, CSS themes, brand colours etc
- Play Sequence - animation selection

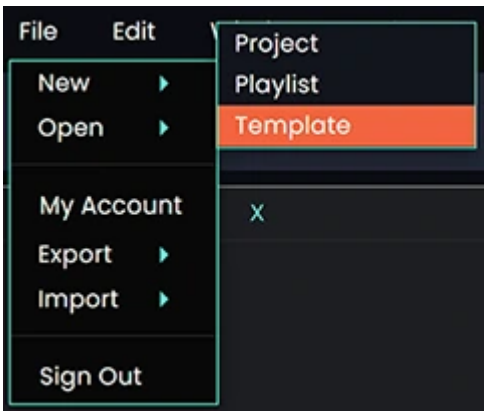
Using Template Builder

There are several different ways to open Template Builder:

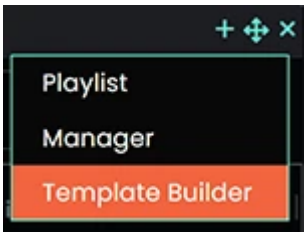
1. From the menu, click **Window > Template Builder**.



2. Click **File** > **New** > **Template** to create a new template.



3. Open Template Builder from any panel. In the top right corner of any panel, select the **+** icon.

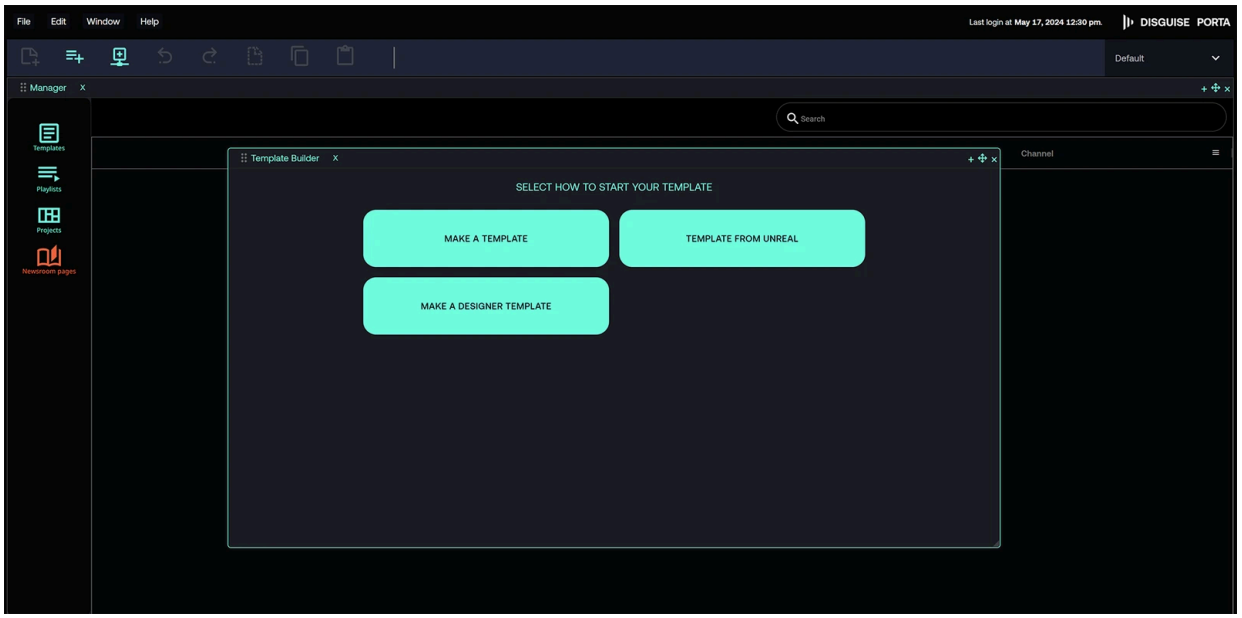


Create an Unreal Engine template using Template Builder

1. Ensure that the Unreal Engine project has been made and is open.
2. Select **Template from Unreal** from Template Builder.
3. Select a row from the list to choose your engine to bind it to Porta and click **Next**.
4. Select a preset from the list and click **Next**.
5. With the current version of Porta, you can only connect to one **Preset Template** at a time to make an asset.
6. Select the components that you need using the checkboxes.
7. A component is a property that has been exposed in Unreal Engine.
8. A form will load with all the exposed properties and functions in the UE project. This form is automatically generated to help users get started.
9. Maximise the Template Builder form by clicking the **Maximize** button positioned between the Add and Close buttons.
10. Click the **|<-** button to toggle the left sidebar panel. This panel lists all the available exposed presets in the Unreal project.

Create a Disguise template using Template Builder

1. Ensure that the Unreal Engine project has been made and is open.
2. Select **Template from Disguise** from Template Builder.
3. Select a row from the list to choose what channel to bind it to Porta and click **Next**.
4. Select the exposed sockpuppet properties you wish to control from the form and click **Next**.
5. A form will load with all the selected properties from the Designer project. This form is automatically generated to help users get started.
6. Maximise the Template Builder form by clicking the **Maximize** button positioned between the Add and Close buttons.
7. Click the **|<-** button to toggle the left sidebar panel to utilize other Template Builder components.



Other template types you can make with Template Builder include:

- Customisable form-based component template.
- Combined Unreal Engine and Designer template.

For a list of form-based components that can be used, see the Template Builder Components page.

Porta Unreal Plugin

Introduction

The Porta Unreal Engine integration allows you to control pre-built visual effects, scenes, and animations authored in Unreal Engine from Porta.

Designers expose parameters and functions on Unreal assets so that Porta can remotely switch items on and off, change levels or environments, adjust lighting, reposition assets, switch camera views, or trigger animations. Augmented Reality (AR) assets — such as sports players, F1 cars, or weather elements — can also be added to levels and driven from Porta.

Prerequisites

Supported Unreal Engine versions

Download the Porta Unreal Engine plugin build that matches your Unreal Engine version.

Unreal Engine version	Latest plugin release
5.7	Plugins_UE5.7.4_24.0.5.zip
5.6	Plugins_UE5.6.1_24.0.5.zip
5.5	Plugins_UE5.5.4_24.0.5.zip
5.4	Plugins_UE5.5.4_24.0.5.zip
5.3	Plugins_UE5.3.2_24.0.5.zip

Review the recommended hardware and software specifications for Unreal Engine on the Epic Games documentation site. For general Unreal Engine documentation and learning resources, see the Unreal Engine website.

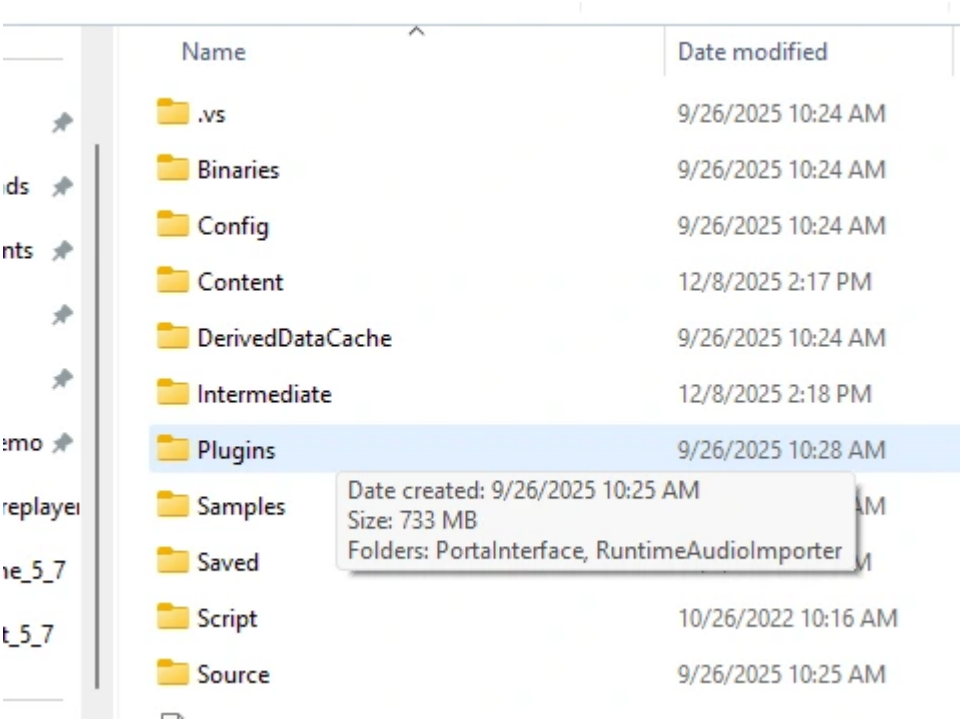
Required plugins

You need the following plugins enabled in your Unreal project:

- **Remote Control API** — ships with Unreal Engine.
- **Pixel Streaming** — ships with Unreal Engine. Required for Porta Preview.
- **Porta Unreal Engine plugin** — downloaded from Porta.

Install the Porta Unreal Engine plugin

1. In the Porta web interface, go to **Help** → **Plugins** and download the Porta Unreal Engine plugin that matches your Unreal Engine version.
2. Unzip the archive and copy all folders (except `DefaultPorta.ini`) into the `Plugins` folder of your Unreal project. If the `Plugins` folder does not exist, create it at the project root.



3. In the Unreal Editor, go to **Edit** → **Plugins**, search for **Remote Control API** and **Pixel Streaming**, and enable both.
4. Relaunch the project when Unreal prompts you, so the loaded plugins are activated.

Configure the plugin

The recommended way to configure the plugin is through the Unreal Editor UI. For headless or automated setups, see **Advanced: DefaultPorta.ini**.

In the Unreal Editor, go to **Edit** → **Project Settings** → **Porta** and fill in each section:

Connection

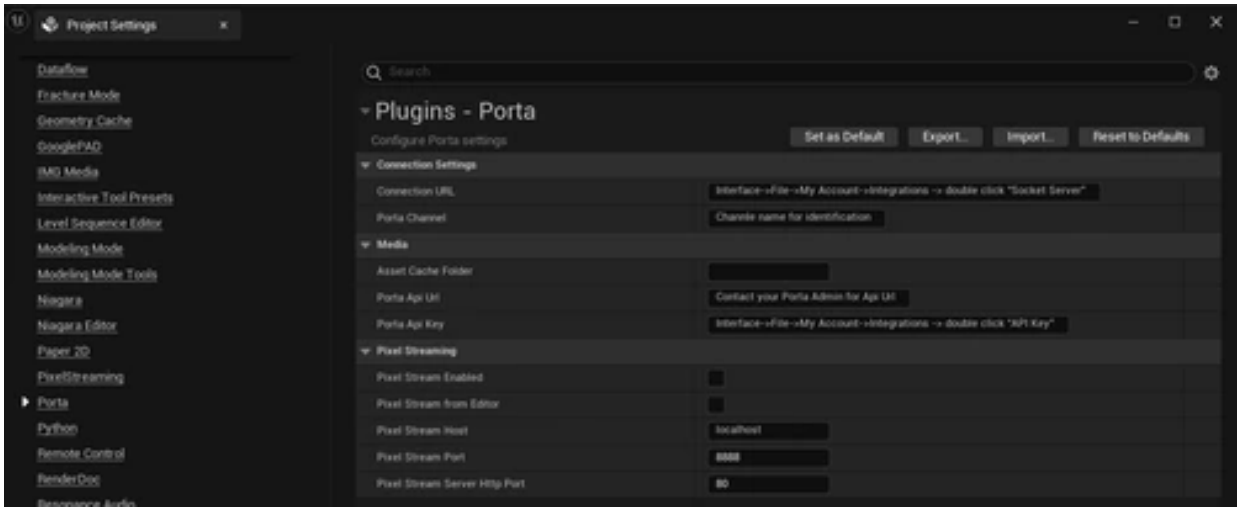
- **Connection URL** — In Porta, go to **File** → **My Account** → **Integrations** and double-click **Socket Server** to reveal the URL.
- **Porta Channel** — A unique name used to identify this Unreal Engine connection in Porta.
- **Namespace** — Leave at the default value.

Media

- **Asset Cache Folder** — `C:\PortaCache` (or any writable path where Porta can stage media assets).
- **Porta Api Url** — Contact your Porta administrator for the API URL.
- **Porta Api Key** — In Porta, go to **File** → **My Account** → **Integrations** and double-click **API Key** to reveal the key.

Pixel Streaming

Enable this section if you want to use Porta Preview. The host and port values you set here are used by Porta to establish the preview connection. See **Porta Preview** for details.



Advanced: DefaultPorta.ini

If you need to configure the plugin without opening the editor — for example in CI, headless builds, or as part of a project template — edit `DefaultPorta.ini` directly.

Copy the `DefaultPorta.ini` file that shipped in the plugin archive into your project's config folder at `<Project_Folder>/Config/DefaultPorta.ini`. Open it in a text editor and set the following keys. String values containing URLs must be wrapped in double quotes.

Key	Value
`ConnectionURL`	Socket server URL. For Porta On-prem: `"http://<host-ip>:6001"`.
`PortaChannel`	Unique name for this Unreal connection.
`Namespace`	Leave as the default `unreal`.
`AssetCacheFolder`	`C:\PortaCache` or another writable path.
`PortaApiUrl`	Porta API URL. For Porta On-prem: `"http://<host-ip>:3000"`.

Key	Value
`PortaApiKey`	API key from **File** → **My Account** → **Integrations** in Porta.

Example:

```
[/Script/PortaInterface.PortaSettings]
ConnectionURL="http://192.168.1.10:6001"
PortaChannel=NYCUnrealEngine
Namespace=unreal
AssetCacheFolder=C:\PortaCache
PortaApiUrl="http://192.168.1.10:3000"
PortaApiKey=YOUR_API_KEY_HERE
```

The Project Settings UI and `DefaultPorta.ini` write the same values — use whichever is more convenient.

Test the connection

1. Open your Unreal project and click **Play**.
2. In the Output Log, look for:

   ```
   LogPorta: Connected
   ```

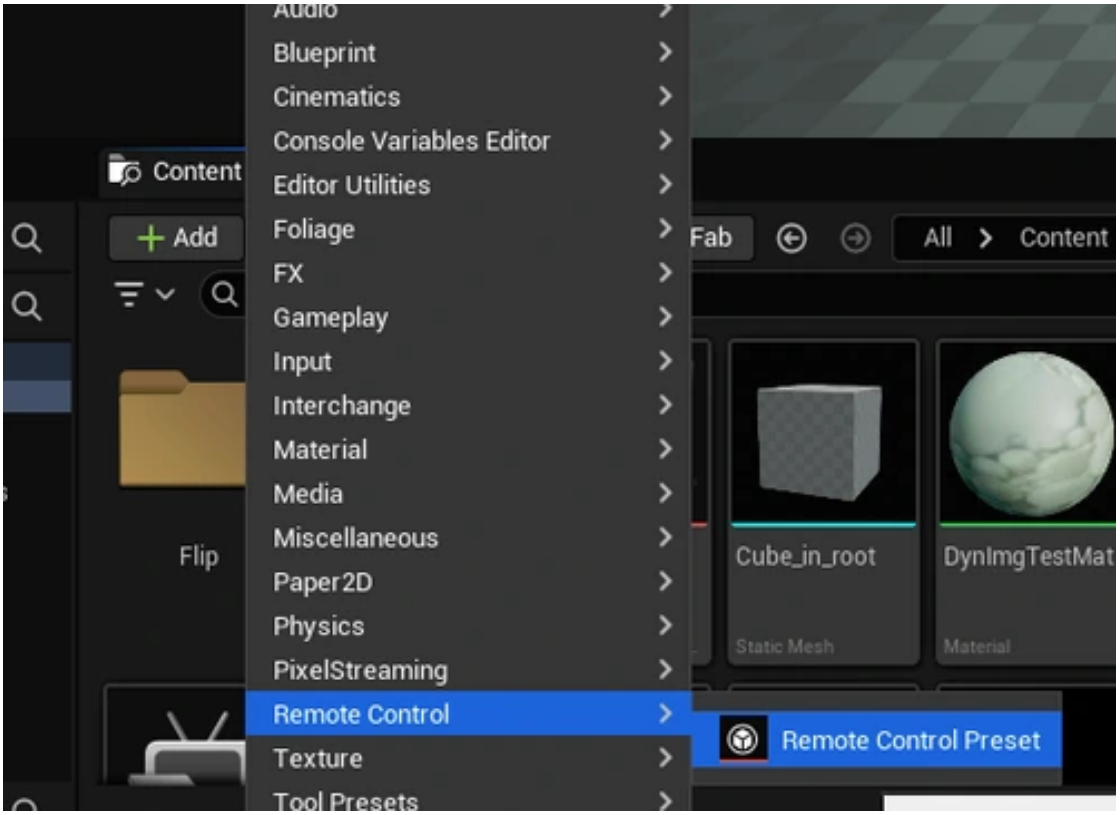
3. In Porta, go to **Window** → **Settings** → **Channels** and click the refresh button at the top. Your new channel should appear in the list.

If the connection fails, see Troubleshooting.

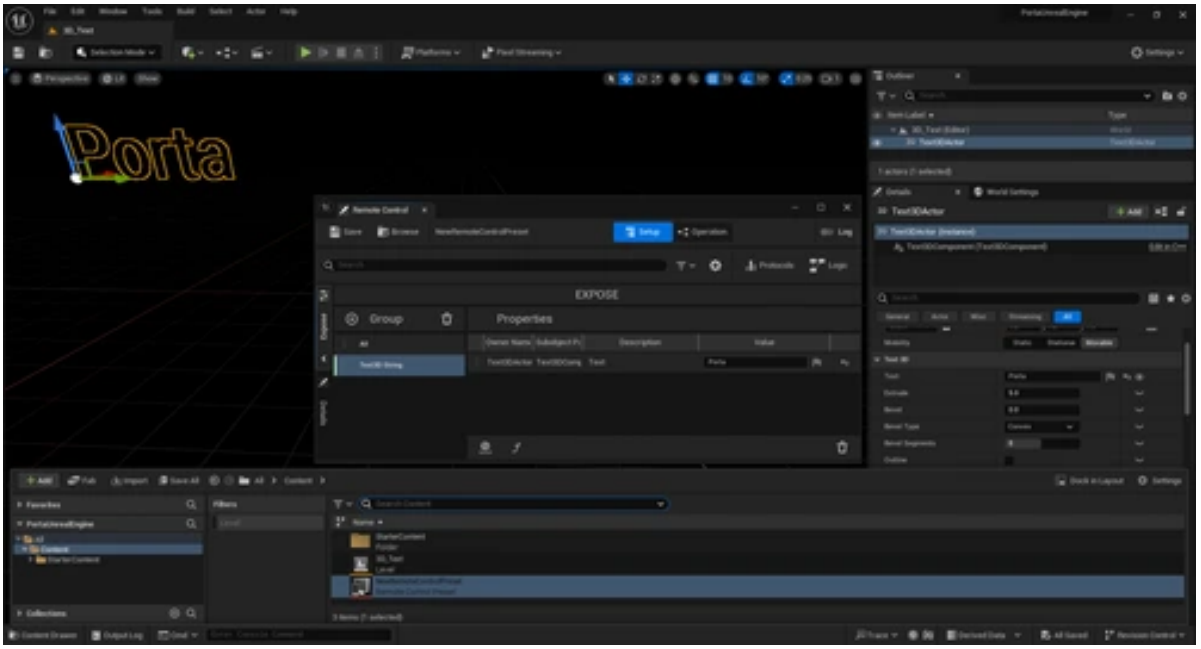
Create a Remote Control Preset

Porta controls Unreal through an Unreal asset called a **Remote Control Preset**, which exposes variables and functions inside your project to external tools.

1. In the Content Browser, click **Add** → **Remote Control** → **Remote Control Preset**.



2. Open the preset. With it open, you can expose properties and functions on actors in your scene. Anything you expose becomes available for control from Porta.



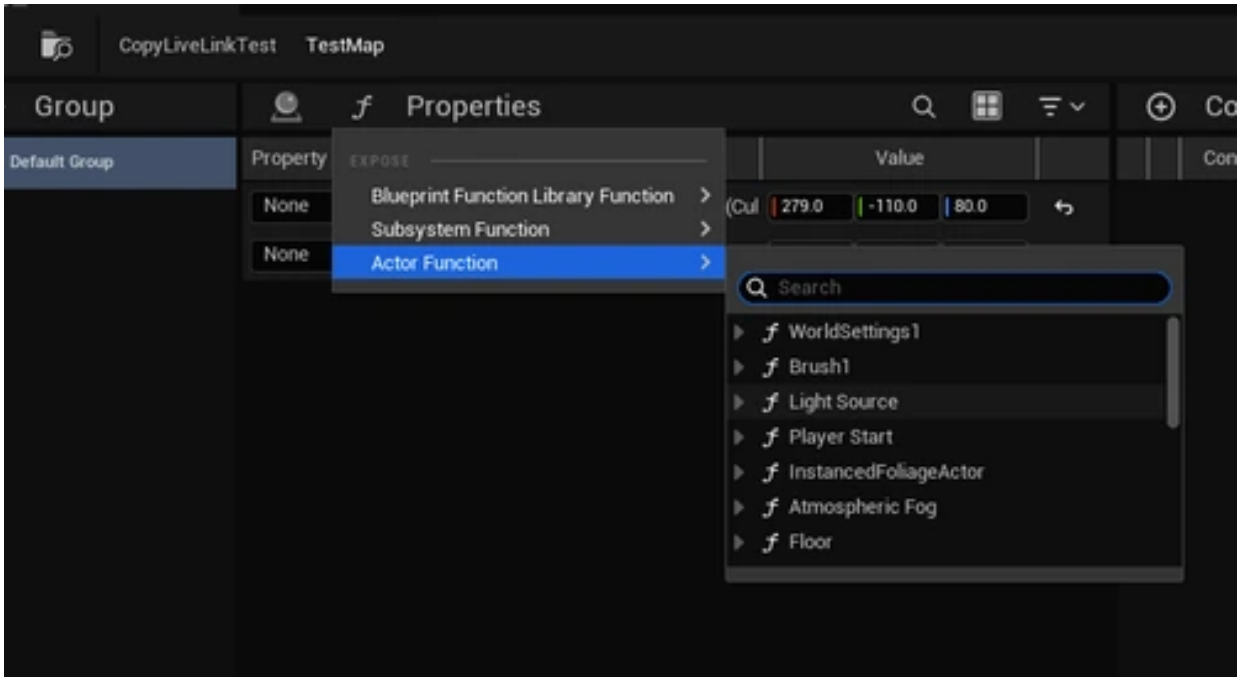
Expose properties

Select an actor in the scene, find the property you want in the Details panel, and click the **Expose this property** button next to it. Exposed properties appear in the Properties area of the Remote Control Preset.



Expose functions

In the Remote Control Preset window, click the **F** button near the Properties header to expose a function.

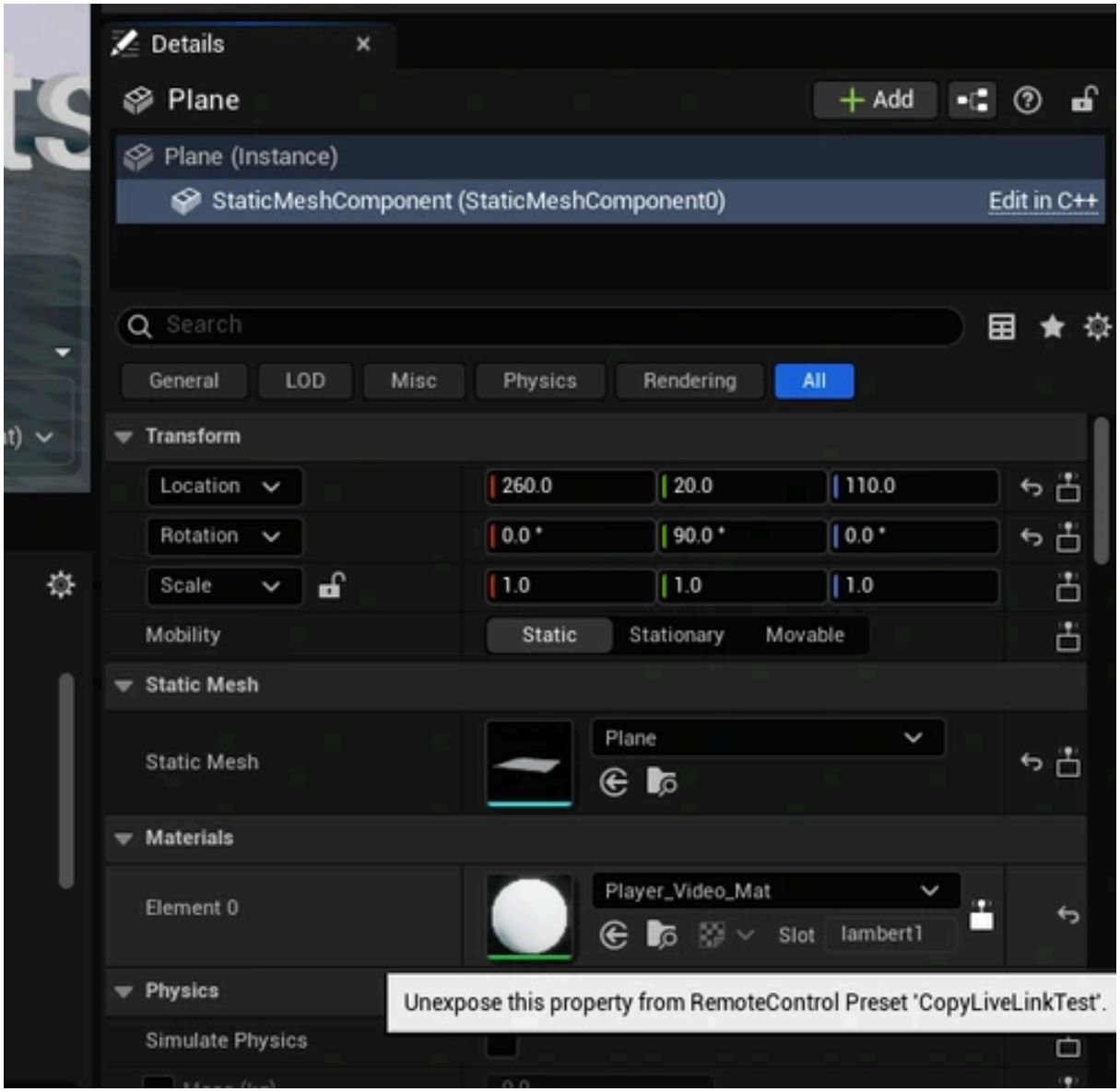


Expose images

There are three ways to expose an image to Porta, depending on how you want to use it.

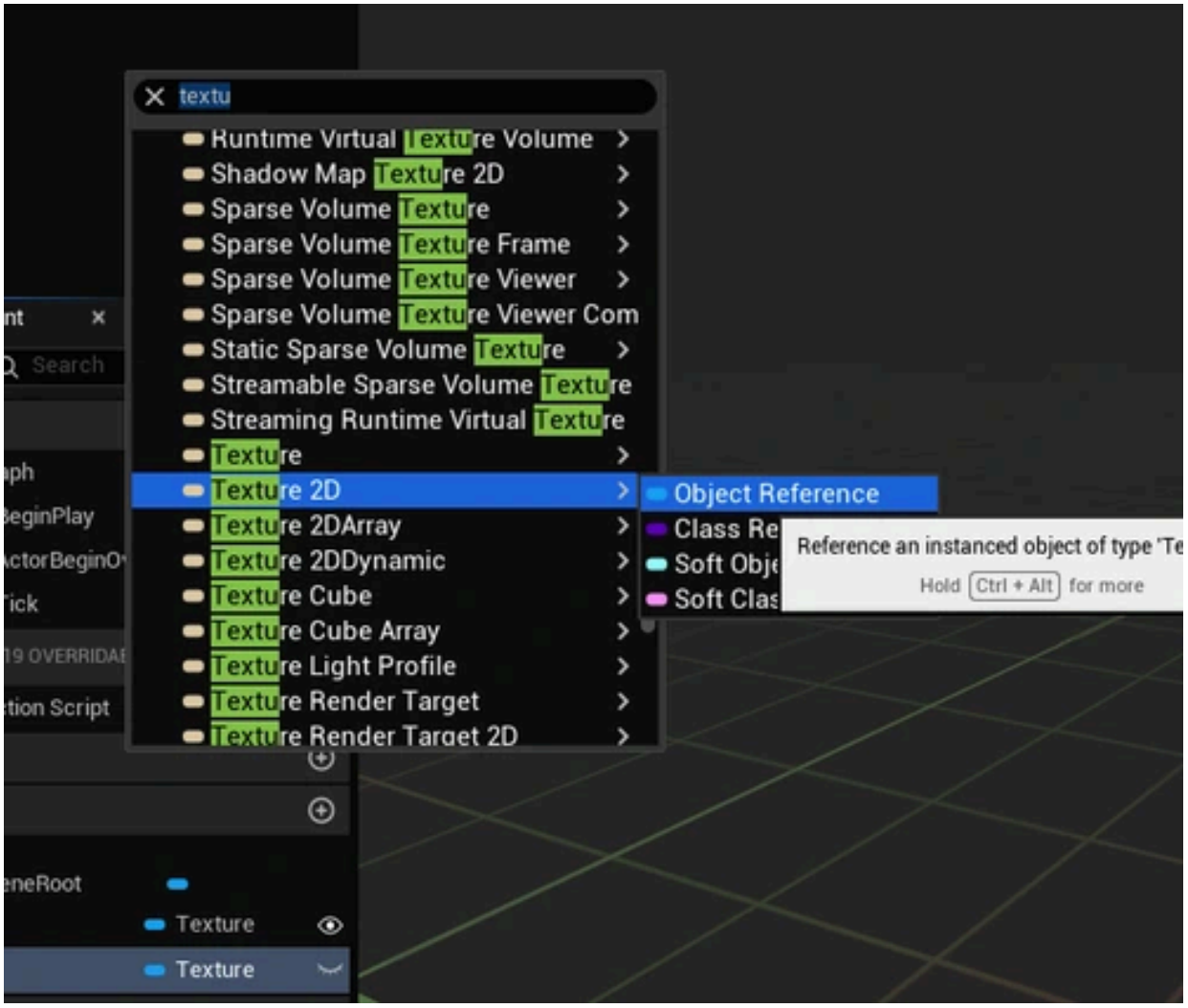
Override a material directly on an actor

Select the actor, click its **Mesh Component** in the Details panel, find the **Materials** property, and expose **Element 0**.



As a Blueprint variable

Create a Blueprint variable of type `Texture` or `Texture 2D` and flag it public by clicking the eye icon next to the variable.



As a function parameter

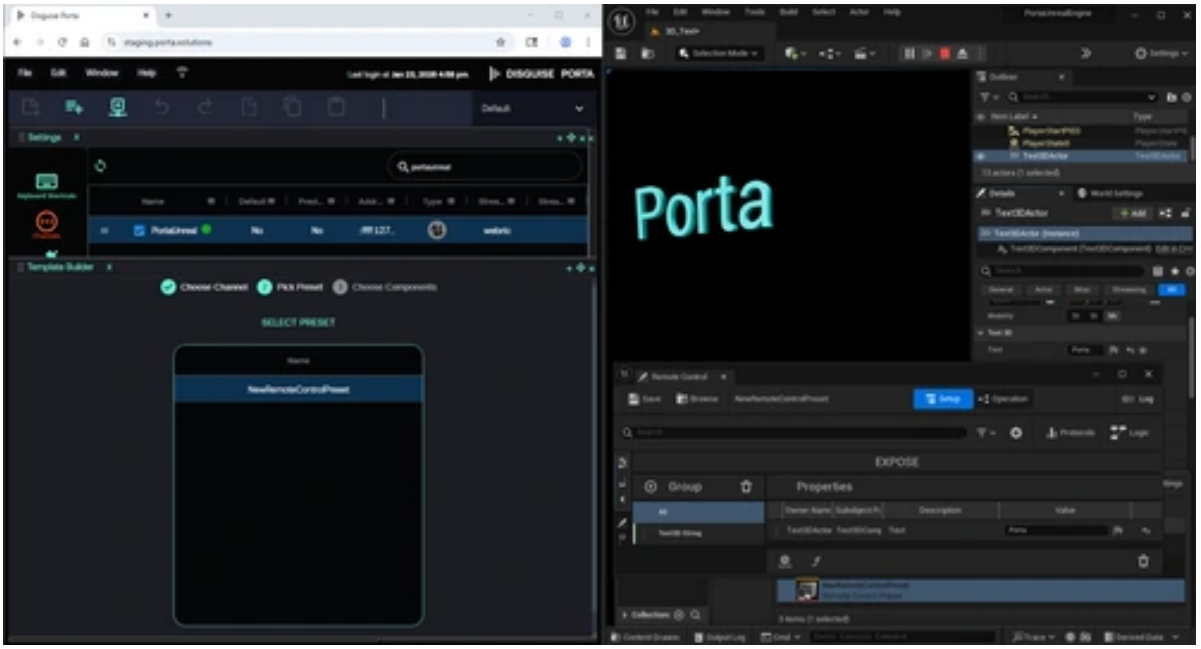
Create a function that takes a `Texture` or `Texture 2D` parameter and expose the function the same way as any other.

Build a Porta template from the preset

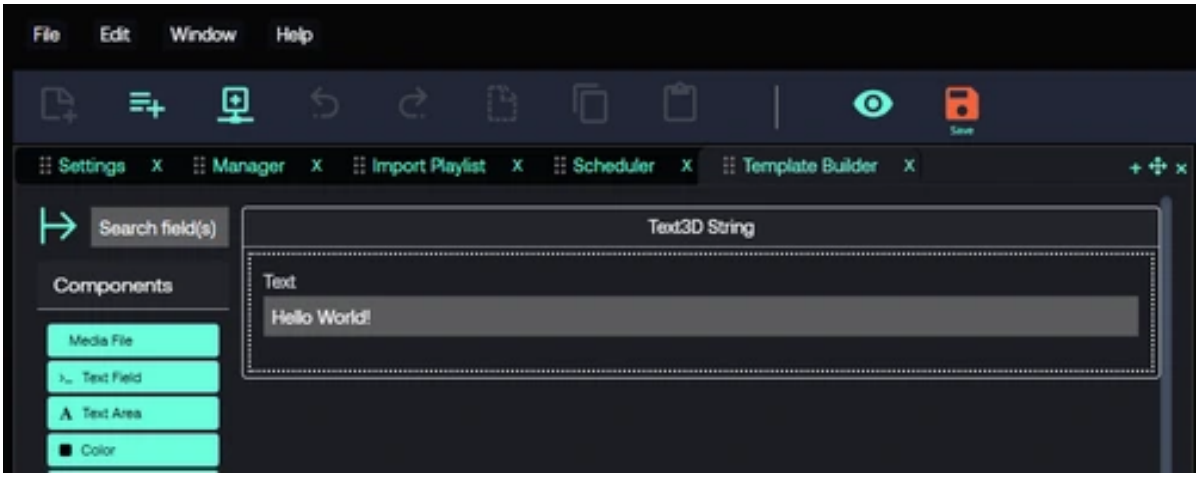
With Unreal running and in the **Play** state, you can turn a Remote Control Preset into a Porta template.

1. In Porta, open the **Settings** panel from the **Window** menu.
2. Select the **Channels** tab and click the **sync** button to add the new channel.
3. From the **File** menu, select **New** → **Template** to open the template builder.
4. Select **Unreal Template**.
5. Choose your channel's address and click **Next**.
6. In the **Select Preset** box, choose the exposed preset from Unreal Engine and click **Next**.

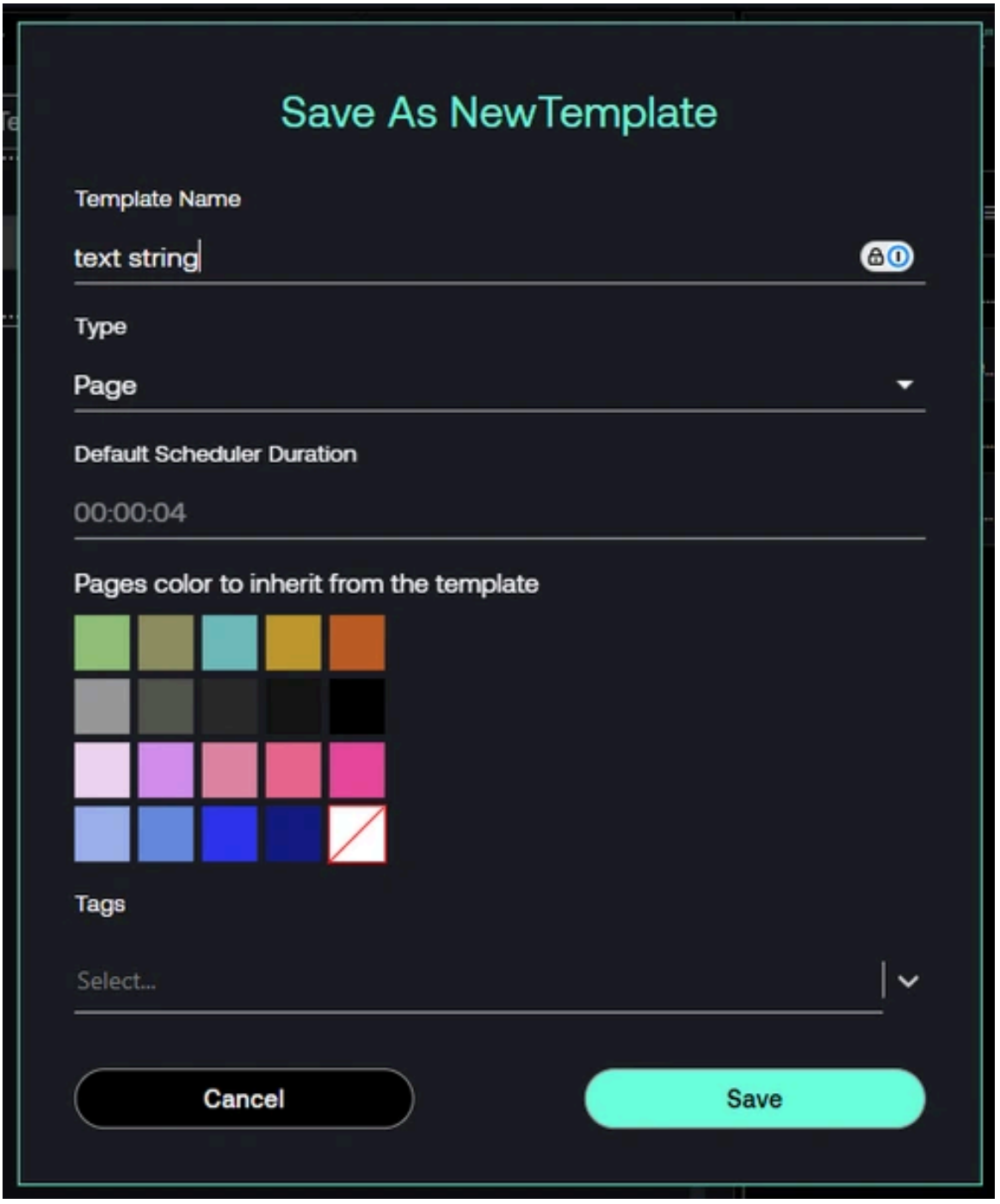
7. Select the preset properties you want to control and click **Next**.



8. The selected properties are added as components to the template.
9. Set a default value for each component.
10. Click **Save** in the action menu ribbon.

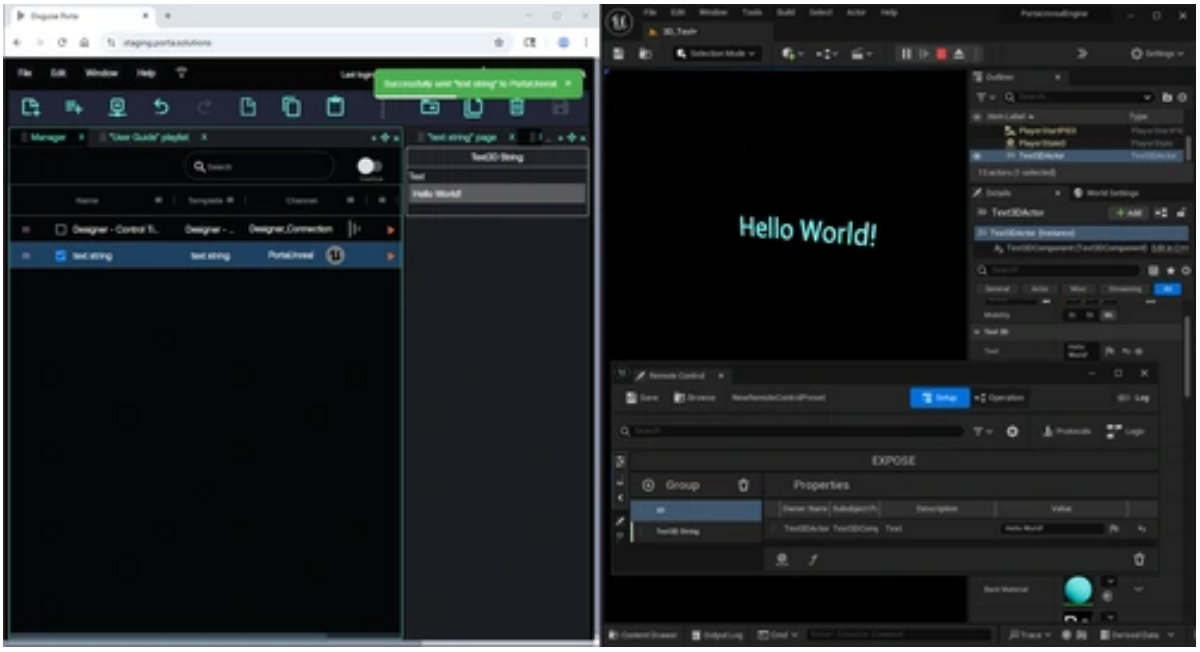


11. In the pop-up, enter a unique name for the template and click **Save**.



12. Return to your playlist and create a page from the template using **New Page** in the action menu ribbon. Double-click the template in the pop-up to add it as a page.

13. Click **Send now** (play icon) on the page row to push the value to Unreal Engine.

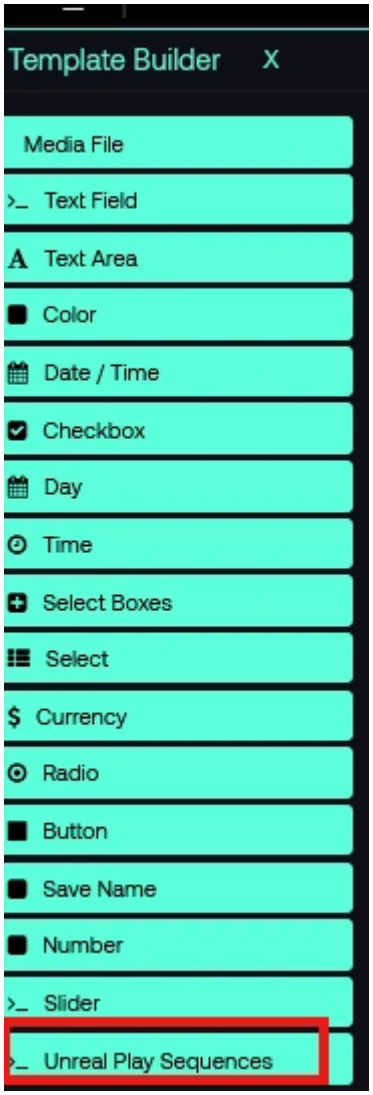


Level Sequences

Level Sequences animate actors in an Unreal scene. To play a Level Sequence from Porta:

1. In the Template Builder, drag the **Unreal play sequences** item into your template.
2. When you preview the template or create a page from it, a list of available level sequences will be shown. The selected sequence plays when you press **Play page**.

Use **Unreal Out Sequences** for sequences that should play on **Take Out** or **Stop** instead.



Porta Preview

Porta Preview uses the Unreal Pixel Streaming plugin to stream the Unreal viewport into Porta so you can preview your changes. If you don't need this feature, leave the Pixel Streaming section disabled in Project Settings.

Local setup

For a simple local setup, enable Pixel Streaming in **Edit** → **Project Settings** → **Porta** → **Pixel Streaming** (or in `DefaultPorta.ini`) with the following values:

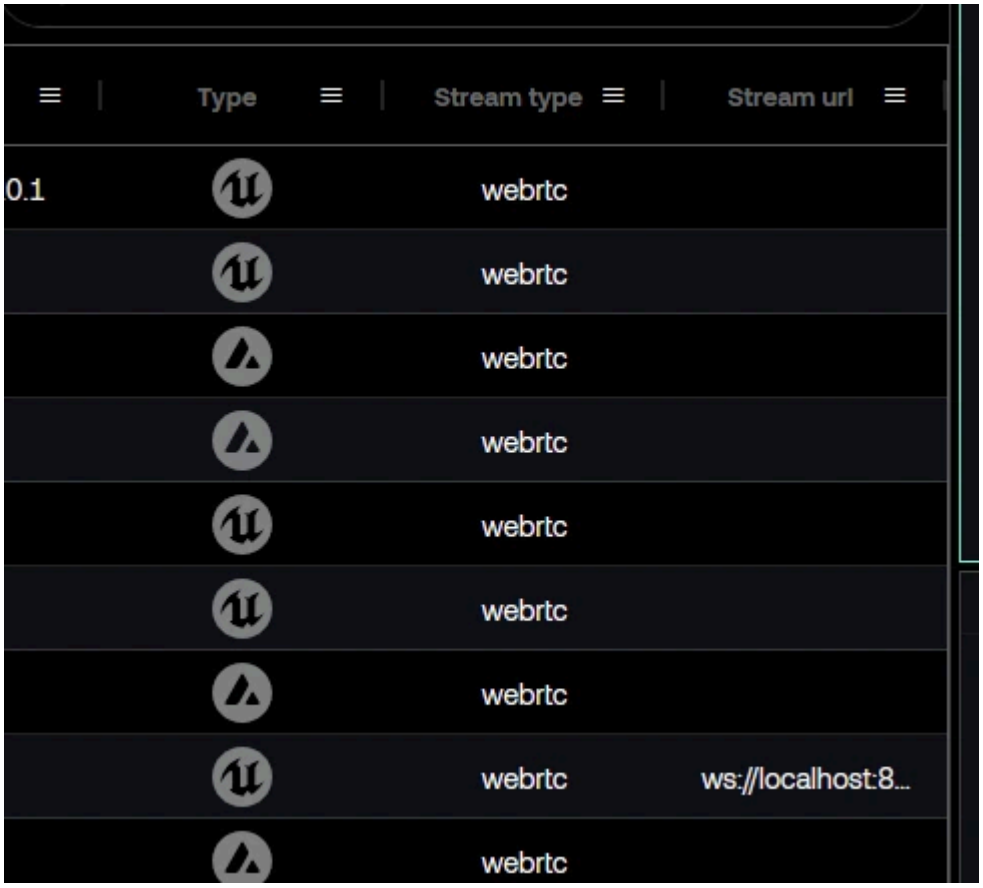
```
PixelStreamEnabled=True
PixelStreamFromEditor=True
PixelStreamHost=localhost
PixelStreamPort=8888
PixelStreamServerHttpPort=80
```

- `PixelStreamEnabled` turns the feature on.
- `PixelStreamFromEditor` lets you stream directly from the editor (usually what you want).
- The remaining values generally only need to change if port 80 or 8888 conflicts with something else on the host.

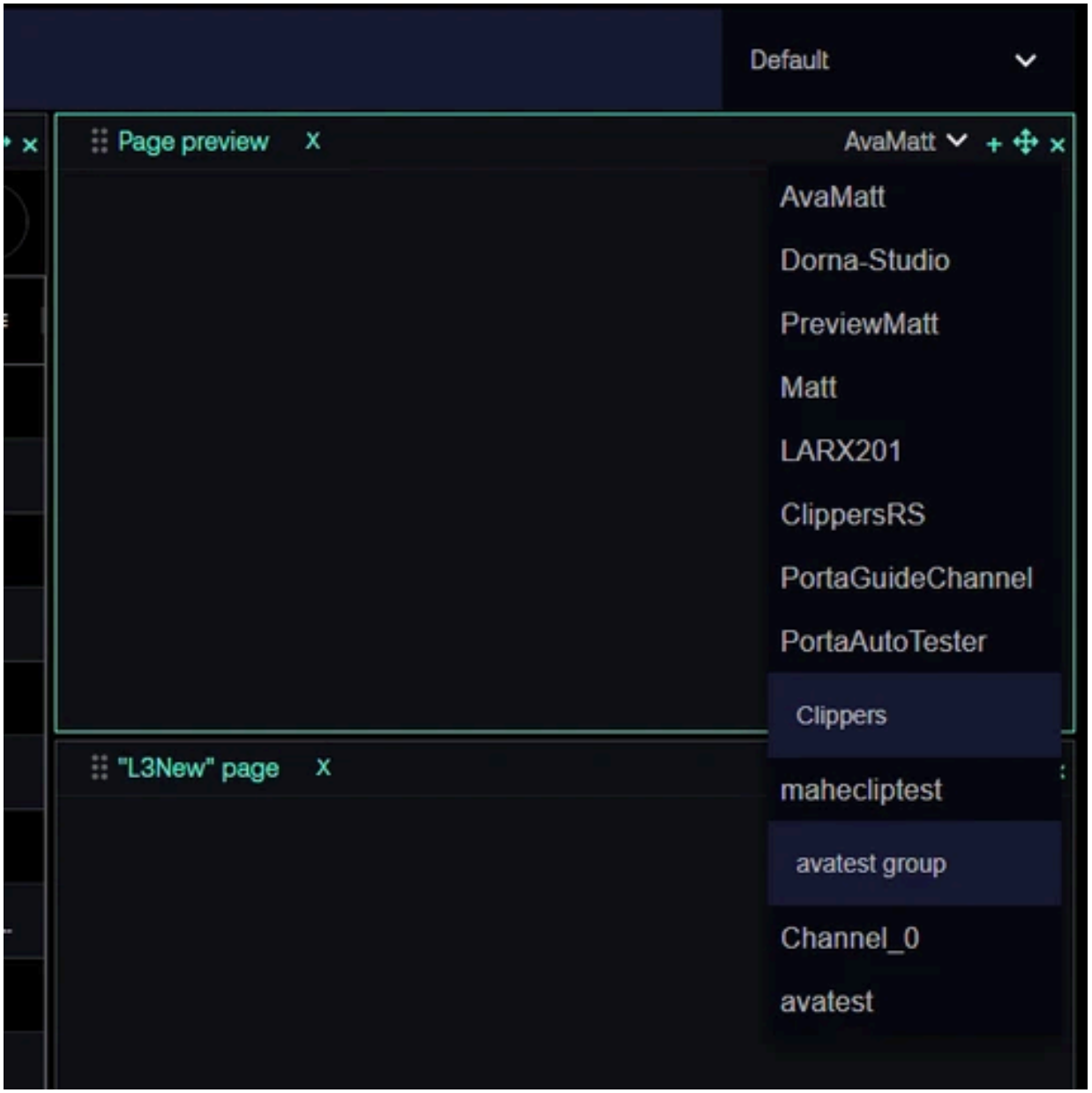
On the Porta side, mark your channel as a **Preview** channel:



Then set the IP address of your Unreal machine:



The channel will then appear in the Preview window dropdown:



Setting up Pixel Streaming across multiple on-prem machines or to cloud hosts is more involved and is beyond the scope of this guide.

Troubleshooting

`LogPorta: Warning: Socket IO connection failed`

The socket server is unreachable. Check that:

- The `Connection URL` in Project Settings (or `ConnectionURL` in `DefaultPorta.ini`) matches the URL shown in Porta under **File → My Account → Integrations → Socket Server**.
- The Porta socket server is running.

- No firewall is blocking the configured port (default 6001 for Porta On-prem).

`LogPorta: Error: Invalid Porta config options`

One or more required configuration values are missing or malformed. Re-check each field under **Edit** → **Project Settings** → **Porta**, paying attention to quoting in `DefaultPorta.ini` if you use it.

Channel not showing up in Porta

In Porta, go to **Window** → **Settings** → **Channels** and click the refresh button at the top while Unreal is running in Play mode.

Pixel Streaming preview not appearing

- Confirm **Pixel Streaming** is enabled in Project Settings and that the channel is marked as a Preview channel in Porta.
- Verify the IP address set in Porta matches the Unreal host machine.
- Check that the configured ports (default 8888 and 80) are not blocked by a firewall or used by another service.

Guides for Unreal Engine

Basics

- Understanding the Basics of Unreal Engine
- Your First Hour in Unreal Engine 5.2

Blueprints

- Blueprints Visual Scripting – Quick Start Guide
- Introduction to Blueprint Essential Concepts Course

Remote Control

- Getting Started with Remote Control Presets
- Unreal Engine Remote Control Presets (YouTube)

Materials

- Unreal Engine Materials Overview
- Materials and Textures for UI
- Introduction to Materials Tutorial

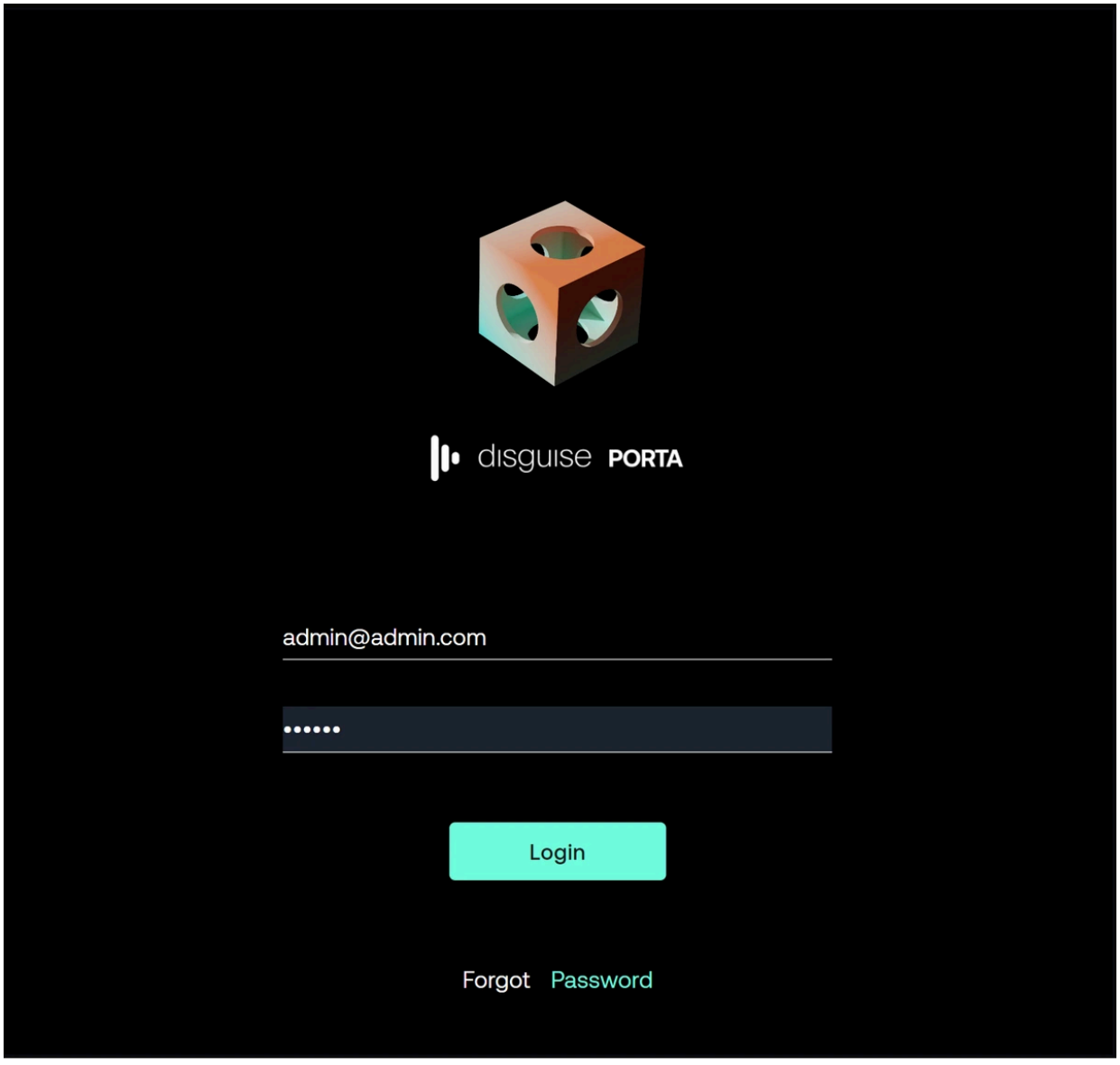
Motion Design (Avalanche)

- Motion Design in Unreal Engine – Getting Started Course
- Getting Started with Motion Design (Avalanche) Tutorial

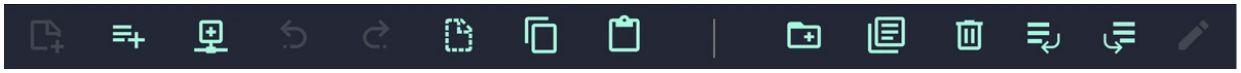
Workspace

The user interface is customisable with dockable elements. This enables users to arrange their workspace to suit the way they work. This section is an overview of the key interface elements.

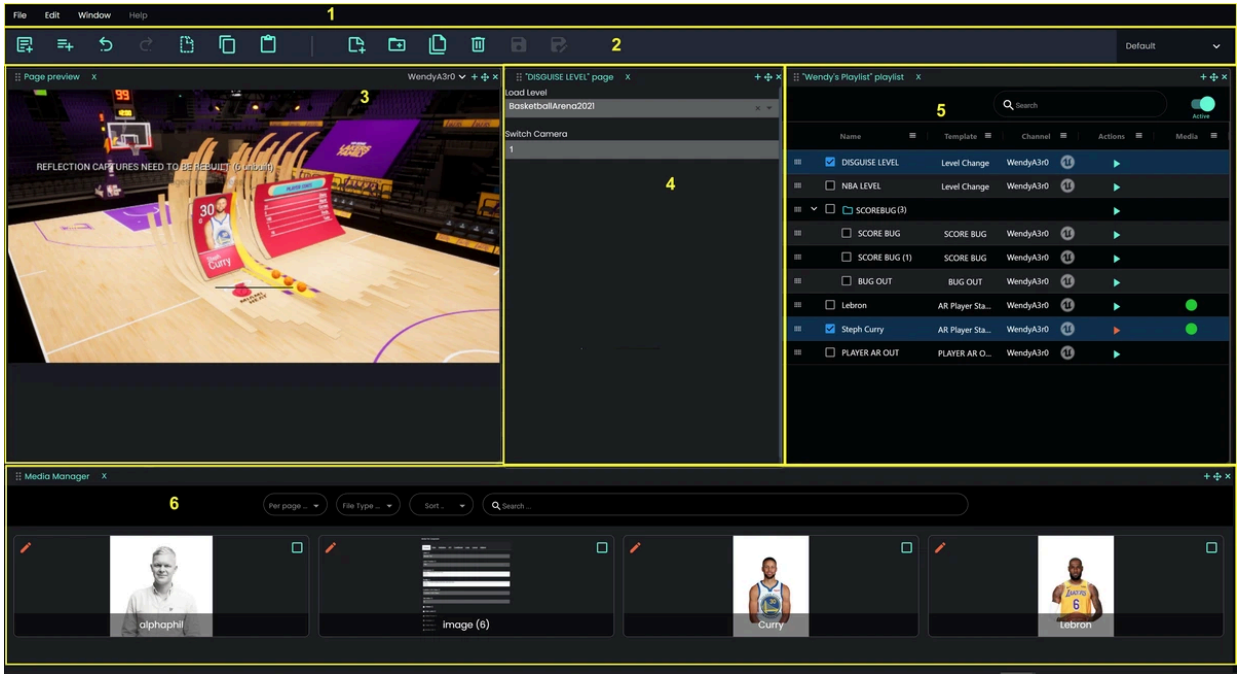
Porta login page



Main toolbar



Workspace Layout



Default Workspace Layout

1. Top menu
2. Main toolbar
3. Page preview
4. Page
5. Playlist
6. Media manager

Menu

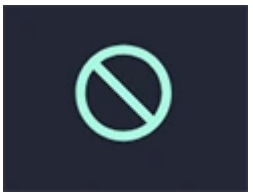
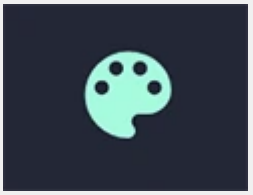
- File
  - New
    - Project
    - Playlist
    - Template
    - Workflow
  - Open
    - Project
    - Workflow
    - Playlist
    - Template
  - My Account
  - Export
    - Project
    - Playlist
    - Template
  - Import
    - Project
    - Playlist
    - Template
  - Sign Out
- Edit >
  - Undo
  - Redo
  - Cut
  - Copy
  - Paste
  - Select All
  - Deselect All
  - Delete

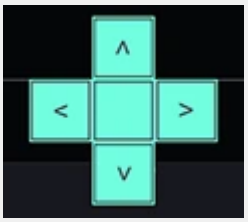
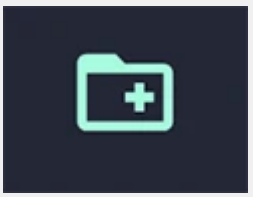
- Window
  - Manager
  - Playlists
  - Template Builder
  - Workflow
  - Page Editor
  - Preview
  - Media Browser
  - Scheduler
  - Schedule Editor
  - Settings
- Help
  - Documentation
  - Plugins
  - Database Health*

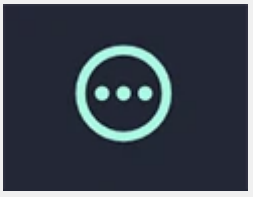
*with some Setup

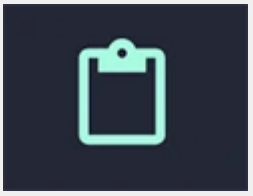
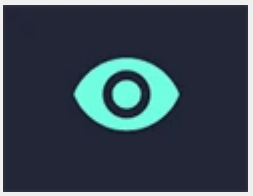
Menu commands

Menus are contextual based on what you're doing in Porta. The table below shows which commands may be available.

Icon	Description
Clear	
Copy	

Icon	Description
Create	
Cut	
Delete	
Drag and Drop	
Duplicate	
Group	

Icon	Description
Import	
Maximise	
Minimise	
New Page	
New Playlist	
New Project	
New Shortcut	

Icon	Description
	New User
	New Workflow
	Paste
	Permissions
	Preview
	Rename

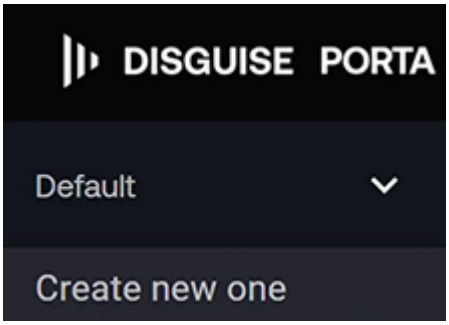
Icon	Description
Revert	
Save	
Save As	
Upload	

Customising the workspace layout

The Porta interface can be easily customised by opening, rearranging, and docking widget panels in the browser so you can organise your screen how you need it. Panels can also be tabbed so that you can jump between tabs and keep the layout organised. These layouts can be saved as workspaces.

To view a list of workspaces, click Default in the top right belong the logo.

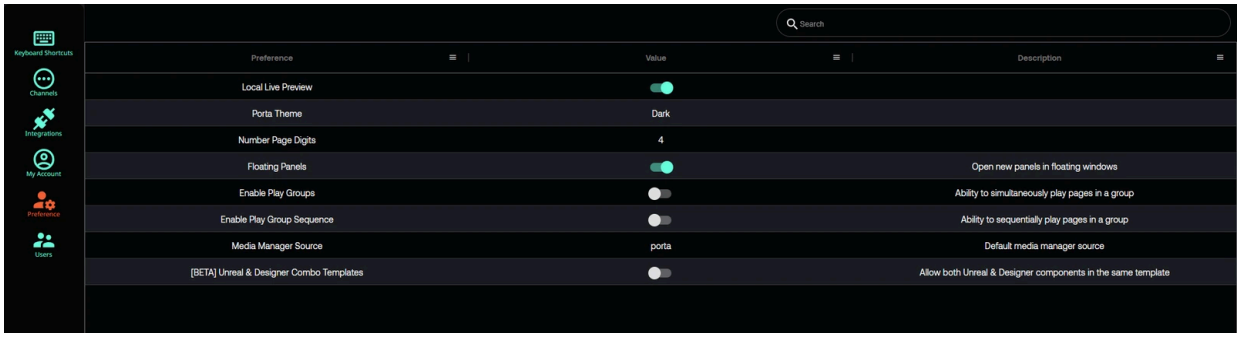
To create a workspace, click **Default > Create new one** in the top right belong the logo.


DISGUISE PORTA
Default
Create new one

Preferences

The preferences page allows you to modify preferences for the company.

Preferences	Description	Options
Local Live Preview	Allows you to see the preview of an Unreal Engine you have running on your local PC.	Toggle on/off
Porta theme	Allows you to change the theme of Porta between light and dark modes.	Dark mode
Number Page Digits	Allows you to change how many digits a story ID can be.	numeric value
Floating Panels	Allows for panels to be moved around the screen.	Toggle on/off
Enable Play Groups	Allows you to play groups from a playlist all at once.	Toggle on/off
Enable Play Group Sequence	Allows you to play a group, this will play a group and have a delay between each page.	Toggle on/off
Media Manager Source	Allows you to set the defualt media location for Porta.	Porta, local, shared
Unreal & Designer Combo Templates	Allows you to create a combo template with both Designer and Unreal Engine.	Toggle on/off



Porta Bridge 1.2

Release 1.2.2

New Features

- Enhanced UI feedback for a clearer and improved operator experience.

Improvements

- Improved stability and responsiveness.
- Improved memory management to reduce overhead and increase runtime reliability.
- Added GPI trigger support for both In and Out sequence execution.
- Introduced new status indicators for Ross Talk connectivity and GPI card state monitoring.

Porta Bridge 1.3

Release 1.3.1

New Features

- Chyron support has been added.
- Octopus NRCS support added.

Improvements

- Live Updates in Porta will now show when changing Rundowns in NRCS.
- Designer integration for Understudy IP has been updated and can be viewed with failover status

Porta Manager 0.1 Release Notes

Porta Manager 0.1 was a pre-release intended for local development.

0.1.1

Build: *0.1.1-main+f8d94fe0.0098*
Released: *July 11th 2025*

- Internal build pipeline and workflow updates only.

0.1.0

Build: *0.1.0-main+53d3d25f.0081*
Released: *July 9th 2025*

- **PN-1954**: Initial release of **Porta Manager** with build pipeline and versioning.
- **PN-2027**: Porta Manager version is now shown in the top-right profile dropdown.
- **PN-2086**: Resolved an issue where the machine IP would revert to the subnet on page load.
- **PN-2095**: Resolved a `mysql --read-only` error encountered during the migration step.
- **PN-1858** & **PN-2026**: Increased the build step timeout to prevent errors during Porta installation.
- **PN-2012**: The installer no longer forces unrelated configuration entries to be fixed when only some are required.
- **PN-1853**: Database replication bootstrapping is now auto-detected on Porta installation.
- The home route now redirects to the dashboard.

Porta Manager 0.2 Release Notes

Porta Manager 0.2 was a pre-release.

0.2.1

Build: *0.2.1-main+bf347263.0123*
Released: *August 1st 2025*

- **PN-2165**: Resolved an issue with replication group seed and local addresses.

0.2.0

Build: *0.2.0-main+2b96b9e4.0120*
Released: *July 28th 2025*

- **PN-2144**: Resolved a MySQL root user denied error when installing across three machines with replication.
- **PN-2153**: New Porta installations now correctly run the schema dump before migrations.
- **PN-2150**: Resolved a “Wrong COM_STMT_PREPARE response size” error when running certain MySQL statements.
- **PN-2097**: Improved seeding behaviour for single and three-machine deployments, regardless of replication setting.
- The seeding toggle is now automatically disabled and hidden during updates.
- Migrations are now automatically enabled and the toggle hidden during updates.
- The database settings summary now displays even when replication is disabled.
- On step 3 of the installer wizard, the “Prev” button is disabled and the “Start” button is replaced with “Complete” once installation has finished.

Porta Manager 0.3 Release Notes

Porta Manager 0.3 was a pre-release.

0.3.8

Build: *0.3.8-main+21d22ed7.0297*
Released: *February 10th 2026*
VM Requirement: `0.10.1+`
Porta Requirement: `2.6.7+`

- **PN-2381**: Resolved an issue where the wrong or empty **Porta Bridge** host was set in Porta during installation.

0.3.7

Build: *0.3.7-main+c1e8d88f.0293*
Released: *January 22nd 2026*
VM Requirement: `0.9.17.1+`
Porta Requirement: `2.6.4+`

- **PN-2060**: You can now clear the current installation wizard to start fresh.

0.3.6

Build: *0.3.6-main+f7e26208.0276*
Released: *December 11th 2025*
VM Requirement: `0.9.17+`
Porta Requirement: `2.6.4+`

- **PN-2311**: Added a database backup and restore helper. You can now view Porta database backup files on any machine, and restore Porta from a backup in the list.

0.3.5

Build: *0.3.5-main+83142657.0257*
Released: *November 20th 2025*
VM Requirement: `0.9.16+` (`0.9.14.2+` supported with manual update steps)
Porta Requirement: `2.6.4`

- **PN-2258**: Added database backup and sync helpers, including a listing to track helper execution.

- Added an API key field to the Machine.
- The machine name and type are now displayed in the app header.
- Refreshed the design of the helper action dashboard.

0.3.4

Build: *0.3.4-dev+0b4df7c1.0232*
Released: *October 7th 2025*
VM Requirement: `0.9.13+`

- The machine's default IP value is now set to the host IP for the host machine, otherwise the subnet is used.
- On first wizard load, the current VM machine type is used as the default.
- Added Start and Stop replication helpers, with notifications when replication is unavailable.
- Helpers that aren't relevant to the current configuration are now hidden.
- Added a simple database replication status page to Porta Manager.
- Added in-page instructions throughout the wizard.

0.3.3

Build: *0.3.3-dev+9d54ea07.0225*
Released: *September 29th 2025*
Porta Requirement: `2.6.0+`

- **PN-2229**: The database container's `auto.cnf` is now removed on start so the server UUID is regenerated uniquely.
- **PN-2237**: Resolved replication status info on wizard step 2.
- **PN-2226** & **PN-2144**: MySQL root can now connect remotely to prevent access errors.
- **PN-2228**: Resolved the replication IP allowlist.
- **PN-2240**: Resolved a read-only error encountered on Update.
- **PN-2242**: Resolved an issue where the IP helper failed for non-Main machines.
- **PN-2244**: Resolved a "No route to host" database migration error when installing Porta on a non-Main machine.
- **PN-2246**: Resolved various database errors encountered during install, including container restart loops and missing image references.
- **PN-2248**: Resolved missing `APP_KEY` after updating Porta.

0.3.2

Build: *0.3.2-dev+99ba42f2.0207*
Released: *September 23rd 2025*
Porta Requirement: `2.6.0+`

- **PN-2145**: Added a helper to resolve issues with the Porta backend when the IP changes (for single-machine deployments).
- Added a feature to view the history of attempted installations and their details.

0.3.1

Build: *0.3.1-main+a1aba18a.0136*
Released: *August 22nd 2025*
Porta Requirement: `2.6.0+`

- **PN-2203**: Resolved a MySQL client SSL issue that prevented Porta from completing a fresh installation.

0.3.0

Build: *0.3.0-main+39e1e9f6.0129*
Released: *August 20th 2025*
Porta Requirement: `2.6.0+`

- **PN-2120**: The UI is no longer built during Porta installation, reducing install time.

Porta Manager 0.4 Release Notes

0.4.0

Build: *0.4.0-main+20a9e8f0.0309*
Released: *April 30th 2026*
VM Requirement: `0.12.0+`
Porta Requirement: `2.7.0+`

- **PN-2506**: Porta On Prem now installs successfully on machines without network or internet access.
- **PN-2453**: Resolved an issue where fresh on-prem installs would intermittently fail during the Replication task with a MySQL “server has gone away” error.

Known Issues

- **PN-2550**: Fix IP Settings button does not propagate the fix to the `report_host` replication var.
- **PN-2218**: Porta reports 422 incorrect password error when API’s stored IP is incorrect.
- **PN-1972**: UI is not updated when a queued job fails.

Porta 2.0

Released: August 1st 2022

New Features

- User driven, customisable UI
- Template Creation
- Forms
- Rundown creation
- Based on vanilla Unreal Engine
- Porta and Ipsum are fully supporting Unreal 5.0 and its sub-releases

Key Features

- Device, location and user agnostic.
- Unreal Engine vanilla graphics control.
- Playlist driven, non-linear playout.
- Pixel Streaming cloud preview.
- No blueprints required.
- Data-driven graphics with Polygon Ipsum.

Porta 2.1

Released: January 18th 2023

New Features

Porta now supports MOS Gateway

- Porta MOS Gateway
- Support for MOS 2.8 protocol
- Newsroom Integration
  - Porta HTML5 Newsroom plugin
  - Unreal Engine based preview server for users to have graphic preview in the Porta HTML5 Newsroom plugin
  - Support for Newsroom Systems integrations:
    - ENPS, iNews, Open Media, Octopus, Dalet, Dina

Content Scheduler

- Migration of the scheduling capabilities of IPSUM to Porta
- Easy to use schedule and loop modes for playlist and content
- Allowing Porta to schedule and trigger playlists of templates automatically, for Unreal and Disguise designer content.

Other Features

- Visual macros and custom keyboard shortcuts.
- Integration with Google Docs.
- Custom colours for pages in playlist.
- Page save names based on data.

Porta 2.2

New Features

- Native compatibility with Unreal 5.3: Customers will be able to use Unreal Motion Graphics BETA and start creating any kind of graphics (AR, CG,) in one platform. The enables users to take advantage or the new production tools available in Unreal Engine.
- Improved integration with Designer. This gives users deeper D3 control. This means that you can create templates to control renderstream, calibration, timeline controls and other d3 APIs.
- Remote scheduler is a workflow for transferring, scheduling and playing out media content from Porta to Designer. This is the first iteration of an ongoing improvement.

Improvements

New macros UI “Workflow Widget”,iits out macro language were you can create tasks and assign them to keyboard shortcuts to automate functions tied to keyboard shortcuts and streamdecks.

- XML/Google drive integration.
- Additions to Template Builder:
- Template colour.
- Duration settings.
- Improved channel monitoring.
- Channel grouping.
- Live Link for Unreal Data.

Porta 2.3

Released: April 25th 2024

Porta Site

Porta offline capabilities added

- Porta can now be hosted on PX servers with no need to access the internet.
- Integrate On Prem Media to be Searchable and Taggable: On-premises media assets can now be easily searched and tagged.
- Automatic API and Database Failover: Ensures continuous operation with no downtime.
- MySQL Database Replication: High data availability and redundancy with MySQL database replication.

Key features

UE 5.4 / Motion Design

- Support for Epic Games new Motion Graphics State Machine and Transition Logic: Enhanced support for robust transition logic for improved performance and reliability
- Remote Control Refactor to Work with 5.4: Updated remote control systems for compatibility and optimized performance with UE 5.4.

Media Component UI Improvements

- Integrate On-Prem Media to be Searchable and Taggable: On-premises media assets can now be easily searched and tagged.
- UI Improvements for Previewing Media: Enhanced user interface for a more intuitive media preview experience.

GPI Support (Sealevel Cards)

- Interface for GPI Triggers: Added interface to map GPI triggers to Porta functions using Sealevel Cards

Advanced User Permissions

- User Group Management: Ability to add user groups for effective user organisation and management.
- Granular Permissions on Channel Groups and Playlists: Detailed access control with granular permissions for channel groups and playlists.

On-Prem Redundancy

- Automatic API and Database Failover: Ensure continuous operation with automatic failover mechanisms.
- MySQL Database Replication: High data availability and redundancy with MySQL database replication.

D3 Integrations updated

- Porta now uses Sock-puppet to control Transitions and media.
- Porta Bridge uses new media API for media detection and deletion.
- Porta Now detects running projects using D3 API.

Porta Bridge

- Porta Bridge Media Deletion has been updated to use Date of ingestion and file sizes in deleting media.
- Porta Bridge no longer need to close D3 to delete Media.
- Porta Bridge now detects Director and actors.

Interface for GPI Triggers

- Added interface to map GPI triggers to Porta functions for enhanced control.
- Advanced user permissions configuration.

Unreal Engine Integration

- Unreal Engine 5.3 supported
- Unreal Engine 5.4 supported

Porta 2.4

Release date: July 10, 2025

New Features

- Socket Server improvements
- OnPrem improvements
- On-Prem installer
- Porta Bridge improvements
- Merge Epic Games Avalanche/Motion Design** and Porta code into one plugin

Support for Motion Design State Machine and Transition Logic: Enhanced support for robust transition logic for improved performance and reliability.

Porta 2.5 Release Notes

> **Caution**
>
> This is a pre-release version and expected to be unstable. Not suitable for Production!

2.5.2

Build: *2.5.2_dev+feb9e8cf.00453*
Released: *July 30th 2025*

- **PN-2161**: Fix empty integrations panel.
- **PN-2087**: Workflow fixes for deploying.

2.5.1

Build: *2.5.1_dev+9126962f.00442*

- **PN-2028**: Fixing issue when building Designer templates and clickng play button on Designer pages.
- **PN-1894**: Add endpoints that can be accessed by Porta Manager to replace batch and bash script helpers.

2.5.0

Build: *2.5.0_dev%2Bd298eb52.00415*

- **PN-2117**, **PN-397**, **PN-399**, **PN-400**: Upgrade servers to Ubuntu 24.04, PHP 8.3, Laravel 12.
- **PN-2142**: Include version in filename of the `porta-onprem-bundle.zip` download file.
- **PN-1998**: Replace text references to “Avalanche” with “Motion Design”.
- **PN-1873**: Fix S3 file links.
- **PN-1886**: Fix for Unreal Engine dropdowns not filling out in multi engine templates.
- **PN-1964**: Fix error cannot read properties of undefined (reading “type”) when channel is undefined.
- **PN-1439**: Add file tree view in media manager.
- **PN-2041**: Fix blank media field when media is selected.
- **PN-2045**: Fix a browser crash when media is undefined.
- **PN-2062**: Add new build workflow automation.

- **PN-2076**: Fix S3 uploads.
- Catch some errors related to fetching patches when Designer is not running.

Porta 2.6 Release Notes

2.6.8

Build: *2.6.8_staging+c3a555b9.00811*
Released: *April 1st 2026*

- **PN-2267**: Fix Scheduler playing out rapidly if prior playlist item is stalled/errored.
- **PN-2453**: Fix occasional `MySQL server has gone away` error during installation.
- **PN-2388**: Fix Scheduler creating duplicate page groups when they are nested.
- **PN-2440**: Fix occasional issue in which successful logins redirect to the login page again.
- **PN-2394**: Remove erroneous “This action is unauthorised” message on the super admin dashboard.
- **PN-2427**: Improve Scheduler messaging when no sets exist.
- **PN-1096**: Allow copying API key via right-click when using Porta On Prem
- **PN-170**: Indicate hidden active Scheduler rows in the UI when parent rows are collapsed.
- **PN-2351**: Improve web socket relay server logging.

Known Issues

- **PN-2272**: Scheduler pause button occasionally returns transaction lock error instead of pausing.

2.6.7

Build: *2.6.7_staging+e0b6260b.00711*
Released: *February 10th 2026*

- **PN-2268**: Prevent removal of playlists in Scheduler when they are playing or up next.
- **PN-2383**: Fix Scheduler not sending media with requests.
- **PN-2381**: Fix Scheduler being unaware of Porta Bridge host address.

Known Issues

- **PN-2267**: Scheduler may playout rapidly if prior playlist item is stalled/errored.
- **PN-2272**: Scheduler pause button occasionally returns transaction lock error instead of pausing.

2.6.6

Build: *2.6.6_staging+5d1c18f2.00690*
Released: *January 22nd 2026*

- **PN-1640**: Fix uncommon crash when playlist groups are moved.
- **PN-2260**: Disable unintended ability to play multiple schedule sets at once.
- **PN-712**: Implement scheduler playout history tracking.

2.6.5

Build: *2.6.5_staging+d906be46.00650*
Released: *December 11th 2025*

- **PN-2227**: Allow CSV Export and Import for playlists.
- **PN-2302**: Show scheduler status on page load.

2.6.4

Build: *2.6.4_staging+a3702a2e.00625*
Released: *November 20th 2025*

- **PN-2258**: Add API endpoints & functionality for machine backup, restore, and sync.
- **PN-1528**: Expand logrotate to clean up and compress more logs to better mitigate disk space issues.
- Allow Horizon dashboard access if on prem.

2.6.3

Build: *2.6.3_dev+914f9d80.00608*
Released: *November 12th 2025*

- PN-2310: Fix issue preventing production builds from adding schedule rules.

2.6.2

Build: *2.6.2_dev+0a16b755.00585*
Released: *October 24th 2025*

- **PN-2271**: Fix page sorting within a playlist in the Scheduler panel.
- **PN-2272**: Improve issues with Scheduler pausing.
- **PN-2261**: Remove unfinished Scheduler view options.
- **PN-1941**: Set Porta database logs to clean out more frequently to avoid disk space issues.
- Add dedicated Scheduler exclusion rule button for UI clarity.

- Improve responsiveness when Scheduler play/pause/stop is clicked.
- Prevent unnecessary Scheduler status update renders to improve UI performance.
- Improve “active project” Bridge-related error message.

2.6.1

Build: *2.6.1_dev+d0228409.00543*
Released: *August 25th 2025*

- Re-enables Scheduler and implements minimal looping functionality On Prem.
- Schedule rules are available but may behave unexpectedly.
- Implements workaround for **DSOF-31059** (strings have no `type` property).
- Implements workaround for **DSOF-30807** (all fields returning as patched).

2.6.0

> **Warning**
>
> Porta On Prem 2.6.0 and newer are **only compatible with Porta Manager 0.3.1 and newer**

Build: *2.6.0_dev+c920da43.00530*
Released: *August 20th 2025*

- **PN-2182**: Fix API documentation generation.
- **PN-1673**: Fix media manager select button.
- **PN-2037**: Fix media tag removal.
- **PN-2120**, PN-2183: Build Porta On Prem front end prior to installation.

Porta 2.7 Release Notes

2.7.1

Build: *2.7.1_staging+7ab803bc.00881*
Released: *June 11th 2026*

- **PN-2645**: Resolved an issue where **Scheduler** items would play out earlier than their scheduled time when the item's duration was long. For example, a 12-hour item could play 12 hours before its scheduled start.
- **PN-2636**: Resolved an issue where the **Scheduler** tick job would crash repeatedly when a playout's schedule listing had been deleted.
- **PN-2639**: Resolved an issue where the **Scheduler** transport control "Loop this section" action did not jump to the selected cue before looping.
- **PN-2432**: Resolved an issue where the **RenderStream Designer** template component could not find **RenderStream** layers in **Designer** 30.2 and later.
- **PN-2064**: Resolved an issue where a newly created **Colour page** would fail to send (returning "No requests to send") until its colour was changed and saved. New Colour pages now have a default colour set automatically.
- **PN-2607**: Updated the bundled `lodash` dependency to address CVE-2026-4800.

2.7.0

Build: *2.7.0_staging+786fcb88.00859*
Released: *April 30th 2026*

- **PN-2423**: Improve Schedule rules UI, including custom repeat options (weekly, monthly, date range) and clearer rule descriptions.
- **PN-2452**: Improve Porta On Prem health checks to reduce excessive database connections and prevent "too many connections" errors.
- **PN-2429**: Prevent editing duration or channel of Scheduler pages that are currently playing or next, with a toast message when an edit is attempted.
- **PN-1672**: Fix page save errors when "local" Designer files referenced as resources by a page are missing.
- **PN-1239**: Fix Slider control not sending data set values to channels.
- **PN-2487**: Fix groups containing only controllers in an Unreal Remote Control Preset breaking the Unreal Property dropdown.

Known Issues

- **PN-2206**: Designer template builder requires at least one HTTP patched field in order to proceed.
- **PN-2272**: Scheduler pause button occasionally returns transaction lock error instead of pausing.

Porta Release Notes

All available Porta release notes can be found below. For download links, please contact Disguise Support.

Porta Release Notes

> Porta 2.7 Release Notes
>
> - Porta 2.7.1 Release Notes
> - Porta 2.7.0 Release Notes

> Porta 2.6 Release Notes
>
> - Porta 2.6.8 Release Notes
> - Porta 2.6.7 Release Notes
> - Porta 2.6.6 Release Notes
> - Porta 2.6.5 Release Notes
> - Porta 2.6.4 Release Notes
> - Porta 2.6.3 Release Notes
> - Porta 2.6.2 Release Notes
> - Porta 2.6.1 Release Notes
> - Porta 2.6.0 Release Notes

> Porta 2.5 Release Notes
>
> - Porta 2.5.2 Release Notes
> - Porta 2.5.1 Release Notes
> - Porta 2.5.0 Release Notes

Porta 2.4 Release Notes

Porta 2.3 Release Notes

Porta 2.2 Release Notes

Porta 2.1 Release Notes

Porta 2.0 Release Notes

Unreal Plugins

Porta Unreal Plugins are available for download from our Porta Plugins page

Porta Bridge

Porta Bridge 1.2

Porta Bridge 1.3

Porta Manager Release Notes

> Porta Manager 0.4 Release Notes

- Porta Manager 0.4.0 Release Notes

> Porta Manager 0.3 Release Notes

- Porta Manager 0.3.8 Release Notes
- Porta Manager 0.3.7 Release Notes
- Porta Manager 0.3.6 Release Notes
- Porta Manager 0.3.5 Release Notes
- Porta Manager 0.3.4 Release Notes
- Porta Manager 0.3.3 Release Notes
- Porta Manager 0.3.2 Release Notes
- Porta Manager 0.3.1 Release Notes
- Porta Manager 0.3.0 Release Notes

> Porta Manager 0.2 Release Notes

- Porta Manager 0.2.1 Release Notes
- Porta Manager 0.2.0 Release Notes

> Porta Manager 0.1 Release Notes

- Porta Manager 0.1.1 Release Notes
- Porta Manager 0.1.0 Release Notes

Porta VM Release Notes

> Porta VM 0.13 Release Notes

- Porta VM 0.13.0 Release Notes

Porta VM 0.10 Release Notes

- Porta VM 0.10.1 Release Notes
- Porta VM 0.10.0 Release Notes

Porta VM 0.9 Release Notes

- Porta VM 0.9.17.1 Release Notes
- Porta VM 0.9.17 Release Notes
- Porta VM 0.9.16 Release Notes
- Porta VM 0.9.14.2 Release Notes

Porta VM 0.9 Release Notes

Porta VM 0.9 was a pre-release intended for testing and evaluation.

0.9.17.1

Version: `PortaVM-0.9.17.1`
Released: *December 24th 2025*
Bundled Porta Manager: `0.3.6`

- Hot fix for initial VM IP configuration.

0.9.17

Version: `PortaVM-0.9.17`
Released: *December 11th 2025*
Bundled Porta Manager: `0.3.6`

- Bundled with **Porta Manager** 0.3.6 and supporting changes.

0.9.16

Version: `PortaVM-Ubuntu2404-0.9.16`
Released: *November 20th 2025*
Bundled Porta Manager: `0.3.5`

- Added convenient terminal shortcuts for container shell access and viewing backup directory contents.
- Stability fixes.

0.9.14.2

Version: `PortaVM-Ubuntu2404-0.9.14.2`
Released: *October 24th 2025*
Bundled Porta Manager: `0.3.4`

- Added a **Porta Manager** health check at the end of setup so the Manager isn't accessed before it's ready.
- Static IP setup now auto-updates `hosts` file entries based on the role and IP selected during setup.
- Added command-line tools for database backup, restore, and diagnostics.

- Added a script to set up a shared folder between the VM and the Windows host for easy file transfer.
- Added log viewing and monitoring aliases for easier troubleshooting.
- Added system diagnostics and data collection helpers.
- Stability fixes.

Porta VM 0.10 Release Notes

0.10.1

Version: `PortaVM-0.10.1`
Released: *February 10th 2026* Bundled Porta Manager: `0.3.7`

- **PN-2381**: Resolved an issue where the wrong or empty **Porta Bridge** host was set in Porta during installation.
- **PN-2336**: VM setup now reports SSH and container health failures clearly instead of finishing with success messages.

0.10.0

Version: `PortaVM-0.10.0`
Released: *January 22nd 2026*
Bundled Porta Manager: `0.3.7`

- **PN-1928**: The Porta VM now starts automatically when the Windows host boots.
- **PN-2110**: You can now update **Porta Manager** on an air-gapped machine using a shared folder between the VM and Windows host.

Porta VM 0.13 Release Notes

0.13.0

Version: `PortaVM-0.13.0`
Released: *April 29th 2026* Bundled Porta Manager: `0.4.0` Bundled Porta On Prem: `2.7.0`

- **PN-2426**: Resolved an issue where offline VM installation produced an invalid static IP configuration. The setup script now handles missing-network conditions and prompts for manual IP entry when the network scan fails.
- **PN-2437**: Resolved an issue where the static IP setup script would hang indefinitely when scanning a `/16` subnet. The scan now times out and falls back to manual IP entry.
- **PN-2517**: Shorten network service boot timeout.
- SSH connection setup is now consolidated and runs at the end of VM setup for improved reliability.
- Firewall setup now correctly skips when no network adaptors are present.
- The Porta Manager IP is no longer subject to a separate SSH check during setup.

Known Issues

- The “Fix IP Settings” button in **Porta Manager** must be used after changing a machine’s IP.
- Migrating an existing database to a Porta On Prem instance is not yet supported.
- SSH connection setup occasionally fails during VM setup. If this happens, run the static IP setup manually from the VM terminal — see the VM machine setup guide for instructions.
- The VM occasionally stalls during setup, boot, or ACPI shutdown, and must be powered off abruptly to recover.
- After updating Virtual Box, the host computer may need to be restarted before the VM can be launched.

Still Preview

The Still Preview is a feature introduced to support MOS page editing. In programs like ENPS you can modify pages while using the Porta NewsRoom plugin. The edits will show up as a still preview when you are editing the page.

To use this feature you need to have the Newsroom plugin.

Learn more about plugins here.

Template Builder Components

Below are the components that can be found in the template builder and a brief description.

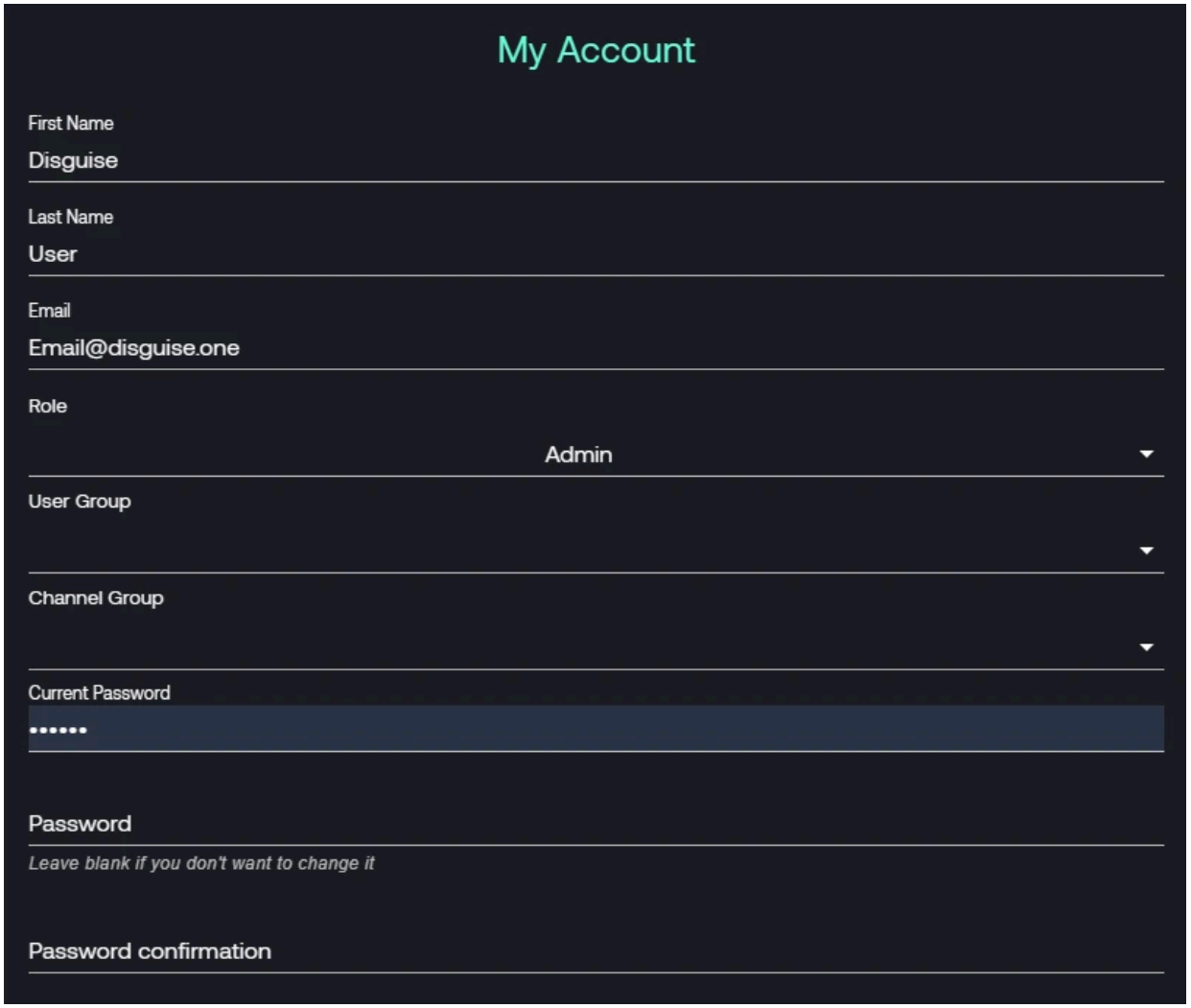
Components	Description
Media File	A Media File component allows users to select media from a media manager or upload it from a local drive.
Text Field	A Text Field can be used for short and general text input. There are options to define input masks and validations, allowing users to hold information into desired formats.
Text Area	A Text Area has the same options as the Text Field form component. The difference is that it will be a multi-line input field that allows for longer text.
Color	The colour component produces a primary colour fill.
Number	Number fields can be used whenever a field should be limited to a type of number value. There are options to set Thousands Separator, set Decimal Places and Require Decimals.
Date/Time	Date/Time form components can be used to input dates, times or both dates and times.
Checkbox	A check box can be used for boolean value input field. It can either be on or off. There are options to set Shortcut and Input Type.
Day	The Day component can be used to enter values for the Day, Month, and Year using a number or select type of field.
Time	The Time component can be used to input time using different time widgets you would like to use.
Select Boxes	The Select Boxes allows the user to check multiple values from list of options.
Select	The Select displays a list of values in a dropdown list to users. Users can select one of the values.
Currency	The Currency component should be used when a field should display currency amounts on a form. This component holds a numeric input mask that allows two decimal values and automatically adds commas as a user inputs a currency amount.
Radio	The Radio allows the user to check only one value from list of options.
File	A File component allows users to select media from a media manager or upload it from a local drive.
Button	Buttons can be added to perform various actions within the form.
Play Sequences	A Play Sequences component links to a media sequence and configures a trigger that will play it.
Send to Channel	A Send to Channel component...

Components	Description
Load Level	A Load Level component allows users to configure Unreal Engine levels so that they can be loaded on request.

Porta User Account Management

The My Account Page is used to edit your user account, you can update your name, email and password.

1. From the Window menu in Porta, click on **Settings**.
2. In the Settings panel, select **My Account**.

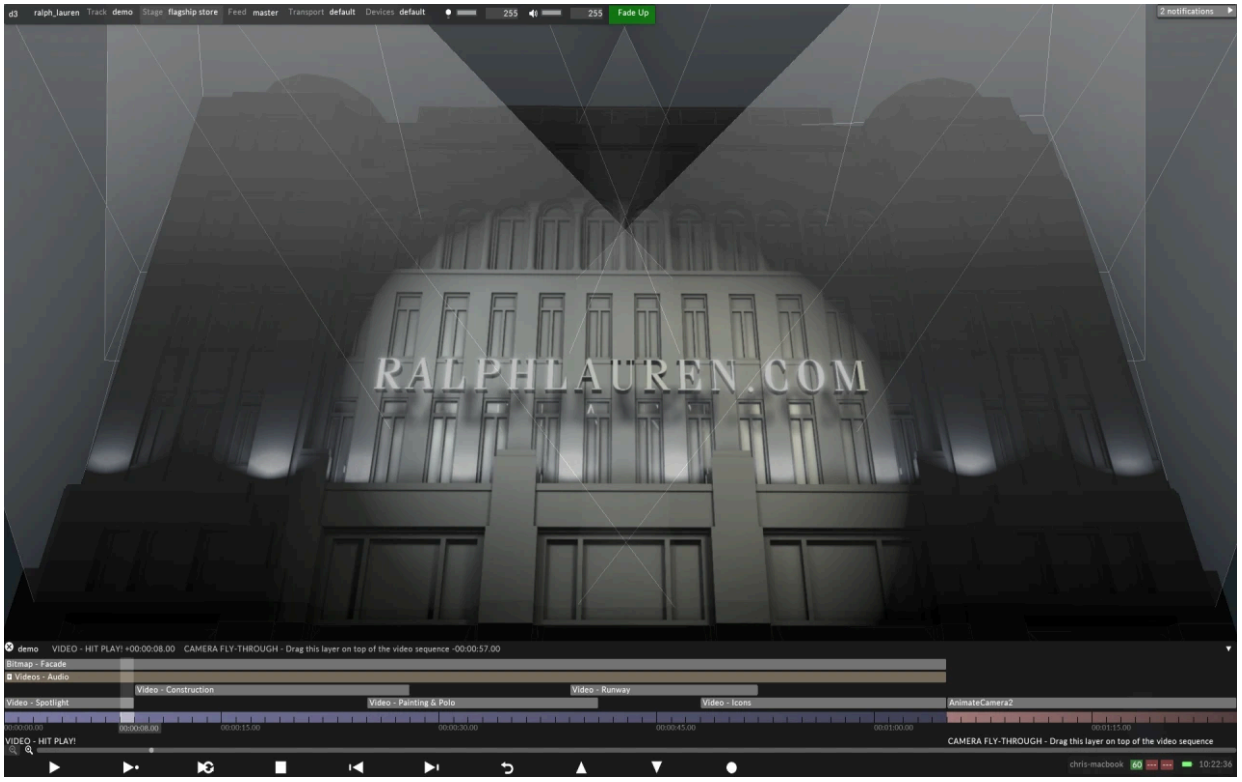


1. Input your password.
2. Confirm your password.
3. Hit the **Save** button in the top menu.

If you are an admin you can find more information on the - Admin User Management page

3D Fundamentals Overview

This sub-chapter will teach you the **fundamental** knowledge necessary to **prepare** 3D models for Designer.



The London Ralph Lauren Flagship Store in Designer.

This section includes:

- Understanding the .obj files
- Exporting 3D models
- Optimising 3D models

Exporting 3D models

Designer supports the .obj format for 3D meshes. This topic covers the .obj export settings unique to Blender, 3ds Max, Maya, and Cinema 4D, which should be followed to ensure the object is exported to Designer correctly.

Custom 3D models can be loaded into your project and utilized for previsualisation. These models be used as either display surfaces or as props. The supported format for a 3D model is .obj.

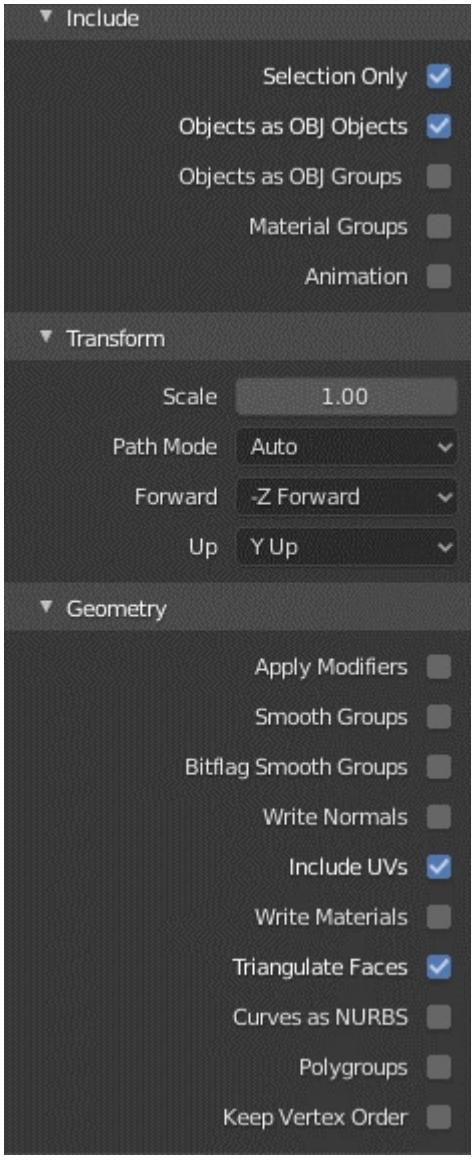
Custom 3D objects can either have a baked in UV unwrap, or not. Objects with a UV unwrap can be used as screen objects to display content, while non-unwrapped ones can only be used as Prop objects used for the visualiser.

Outlined in these tabs are the needed export settings for a custom OBJ to be used in Disguise.

> **Note**
>
> Other types of 3D objects known as Alembic files can also be imported into Designer; these types of objects included animation that can be triggered from within Designer. For more information on these types of files, please visit this link: Alembic files.

Blender Export Settings

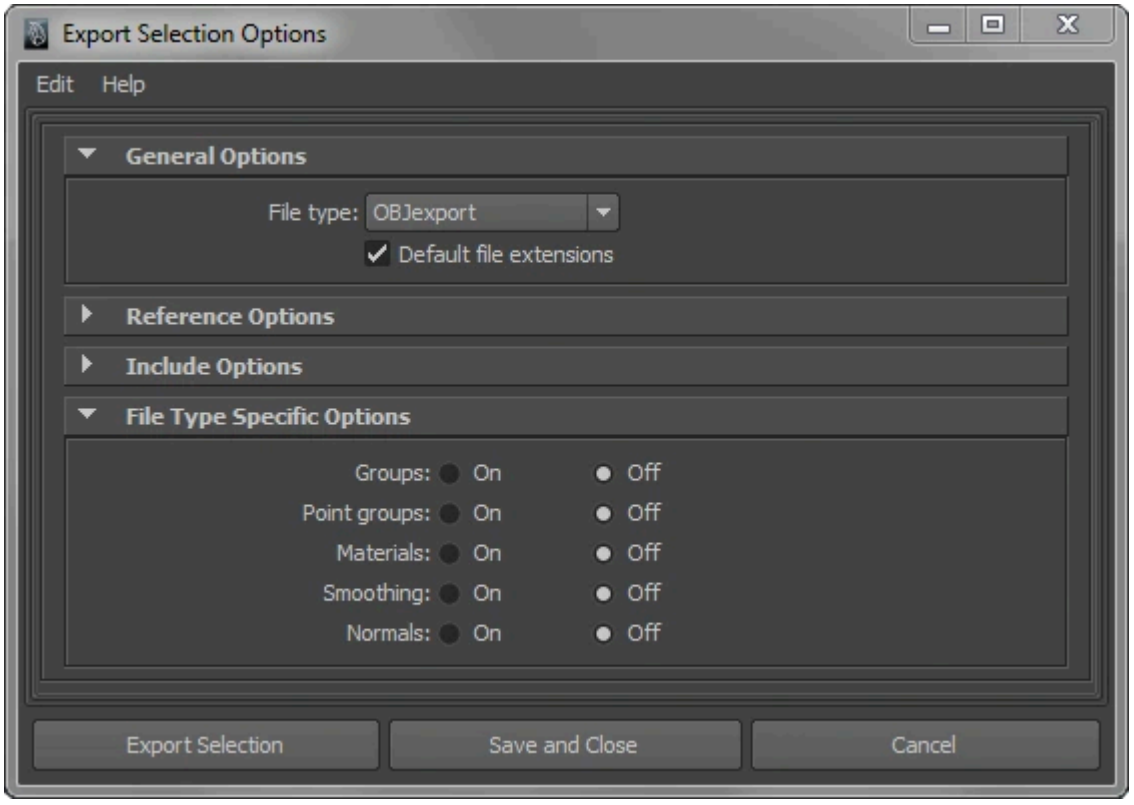
1. Select the object to be exported from the 3D application. Note that the selection can not contain any scene elements such as lights or cameras.
2. Select the 3D application's export utility.
3. Select the .obj format from the list of available formats.



Export settings for Blender

Maya Export Settings

1. Select the object to be exported from the 3D application. Note that the selection can not contain any scene elements such as lights or cameras.
2. Select the 3D application's export utility.
3. Select the .obj format from the list of available formats.

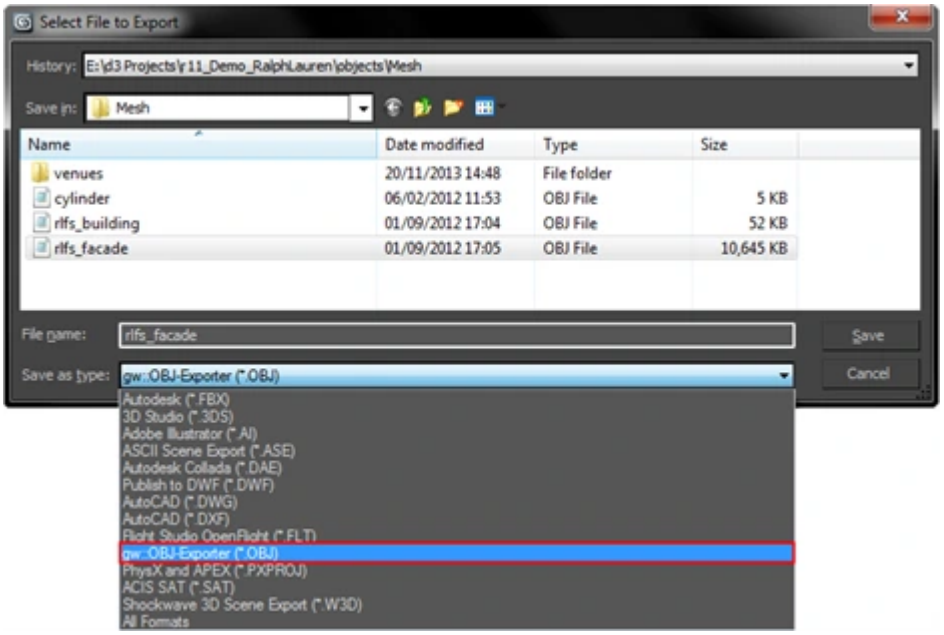


Export settings for Maya

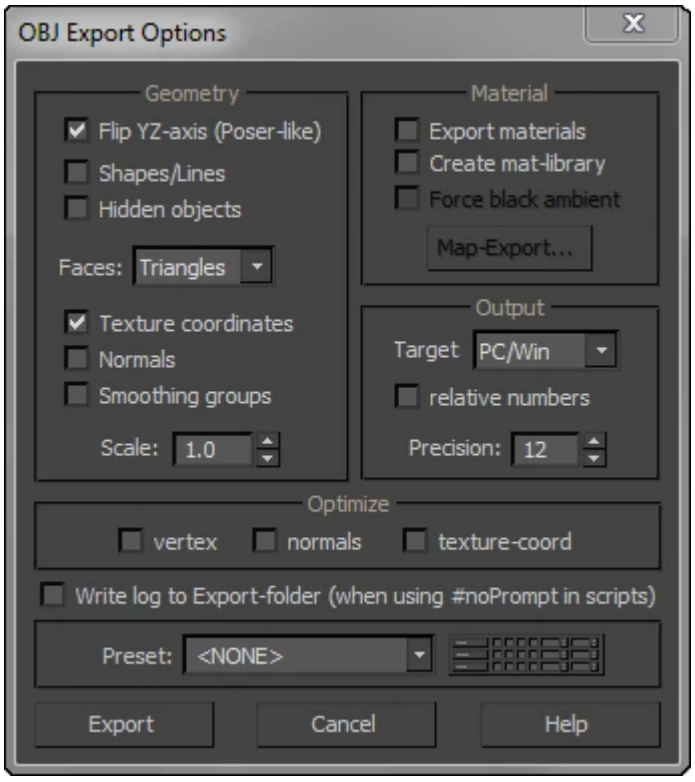
3ds Export Settings

1. Select the object to be exported from the 3D application. Note that the selection can not contain any scene elements such as lights or cameras.
2. Select the 3D application's export utility.

3. Select the .obj format from the list of available formats.



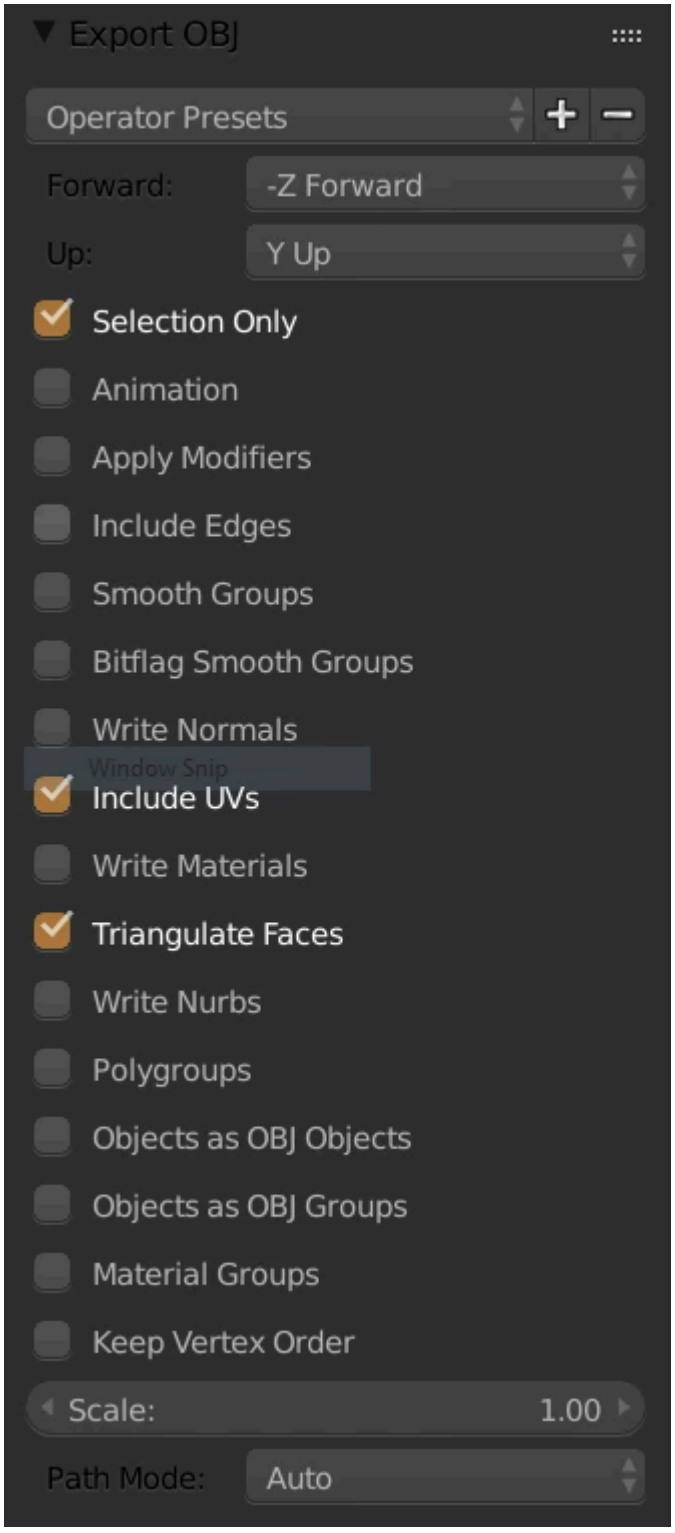
- Deselect shapes, lines, hidden objects, normals, smoothing groups, material, and material libraries. Disguise does not support these.
- If the object is to become a screen or a textured prop, select texture coordinates, which will export the object's UV map.
- Select flip yz-axis to ensure the object is orientated correctly in Designer.



Export settings for 3ds Max

Save the .obj file in the Disguise Project folder in the following directory: Projects > Project Name > objects > Mesh.

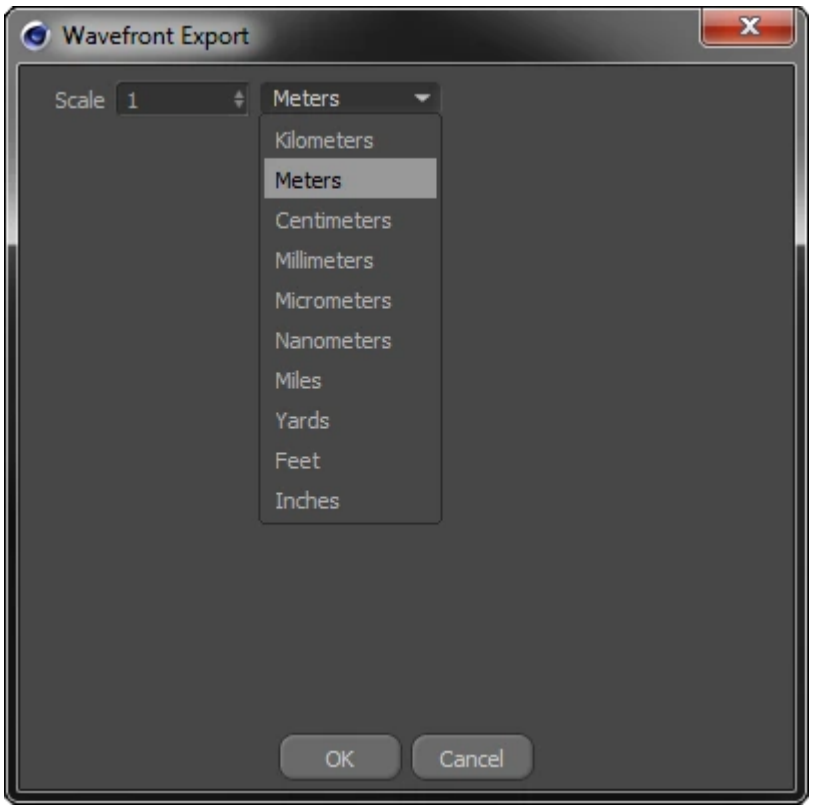
To read more about where to place media, see the Placing media files for a project page.



A list of .obj files exported from 3ds Max to a Disguise Project folder. **Please note:** We recommend triangulating faces before exporting models for use in Designer.

C4D Export Settings

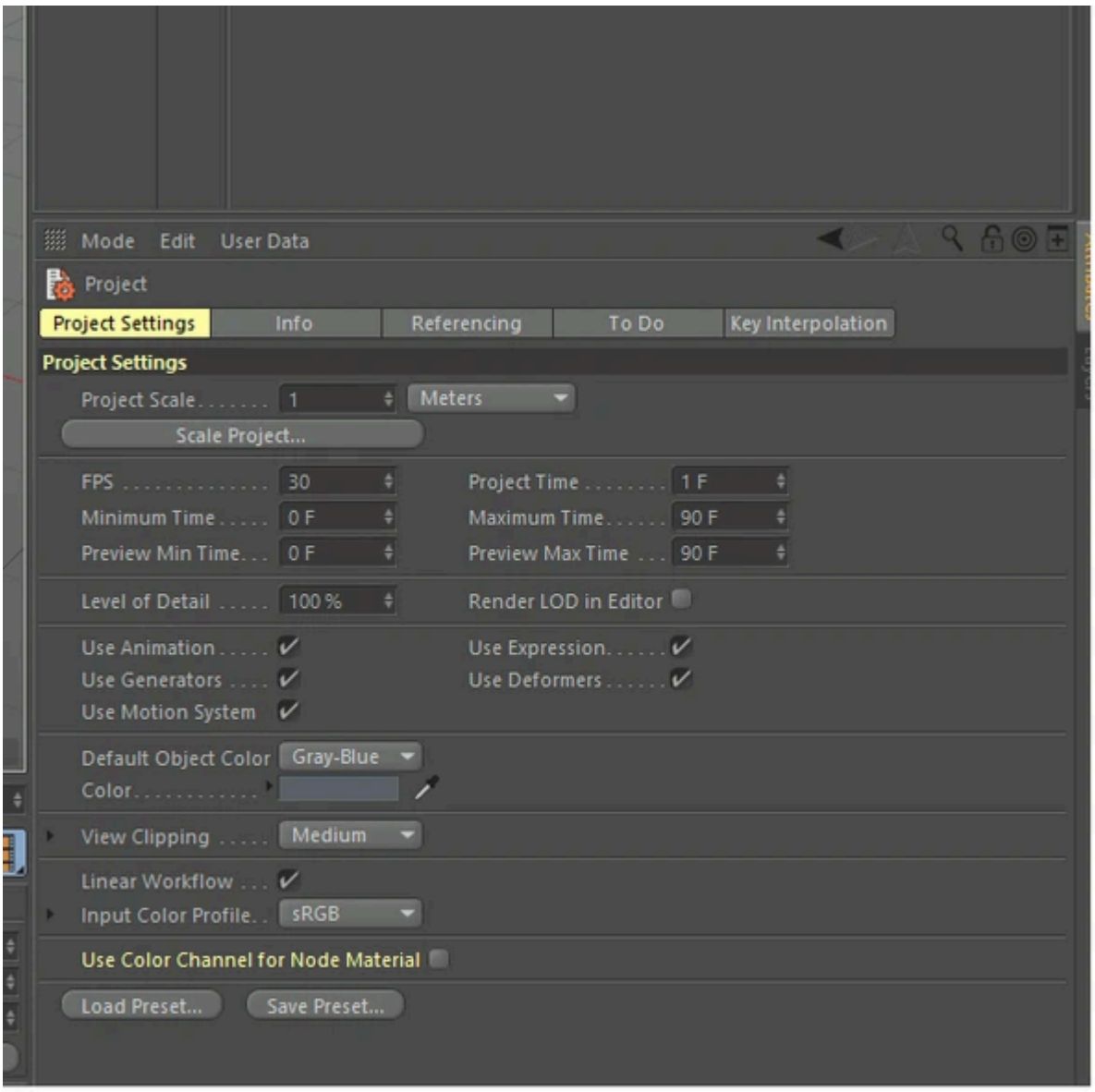
1. Check the project settings are set to scale in **meters** (C4D defaults to cm).
2. Select the object to be exported from the 3D application. Note that the selection can not contain any scene elements such as lights or cameras.
3. Select the 3D application's export utility.
4. Select the .obj format from the list of available formats.



Export settings for C4D

1. Check the project settings are set to scale in **meters** (C4D defaults to cm).
2. Select the object to be exported from the 3D application. Note that the selection can not contain any scene elements such as lights or cameras.
3. Select the 3D application's export utility.

4. Select the .obj format from the list of available formats.



Example 1 - MiSTRIP Star

This case study shows how to prepare a star shaped LED screen constructed from **Barco MiSTRIPS** for Designer. The first step is to UV map the 3D model by **unwrapping** the mesh into a **grid**. As explained on **The UV Map as the Hardware Output page**, **the UV map should comprise a grid because this is the output to the LED processor from the software, and LED processor's can only capture outputs composed from rectangles**.

How the UV map is generated

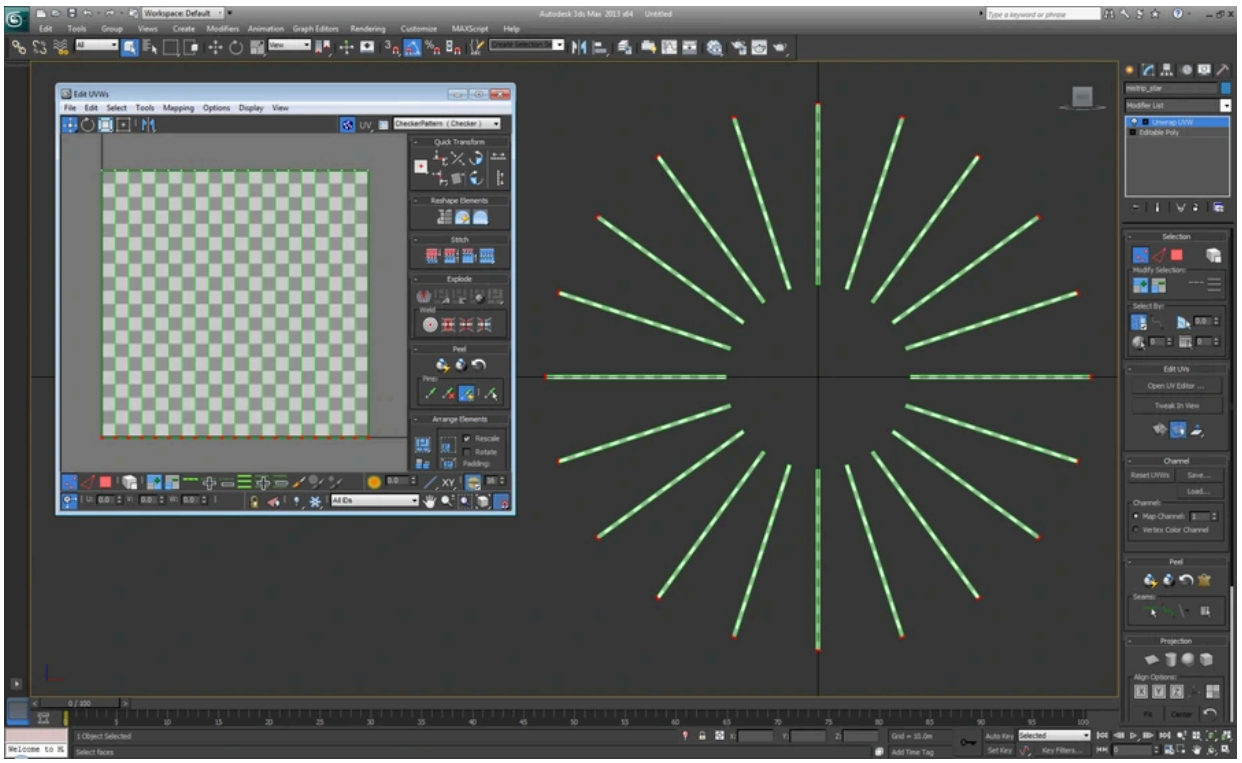
A plane can be **arrayed around a local pivot point** to recreate the surface with the UV map **automatically generated**. However, the UV map will have **overlapping** UV shells and therefore will require editing, either **manually** using UV editing tools or **automatically** using a script, depending on the level of complexity.

Step 1 - Generating the UV map (3ds Max)

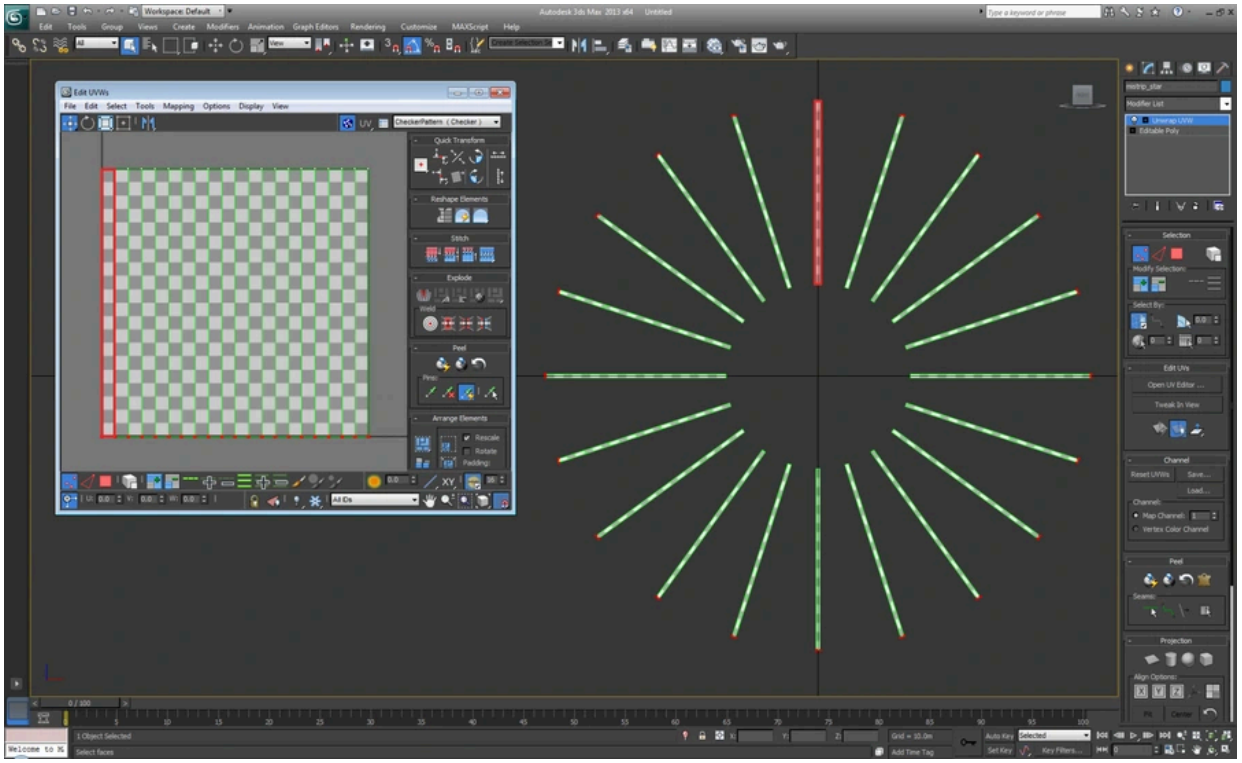
1. Draw a plane that matches a MiSTRIP's dimensions, 0.063x1.484 metres.
2. Ensure you have the box called **generate mapping coordinates** checked. Doing so will enable the plane to automatically generate a normalised UV map.
3. Position the plane's local pivot point to the scene's origin. The origin is 0,0,0 in 3D space corresponding to the X,Y,Z axes.
4. With the plane selected, select the **Array** tool.
5. **Array** the plane by a count of **20** around **360** degrees. This will array twenty planes around the local pivot point.
6. **Attach** all the plane's together into one **Editable Mesh / Editable Poly**.
7. Select the**Unwrap UVW**modifier.
8. Open the **Edit UVWs** window to view the UV map.
9. At this stage, the UV map will have overlapping UV shells. To **unwrap** the UV map, reposition the UV shells next to each other, either **manually** using **UV editing tools** or **automatically** using a script.
10. It is important to **snap** the UV shells next to each other into a **grid**. Doing so will remove gaps in the UV map, which in turn will remove virtual pixels from Disguise's output to the LED processor.
11. **Normalise** the UV map by rescaling it to fill UV space entirely from a range of 0-1 in both the U and V axes.

The image below shows the MiSTRIPs arrayed in a 360 degree **arc**, but in UV space they are arrayed in a horizontal **row** as a **grid**. Importantly, the surface's outer ring of vertices correspond to the UV map's bottom row of UV coordinates, highlighted in red.

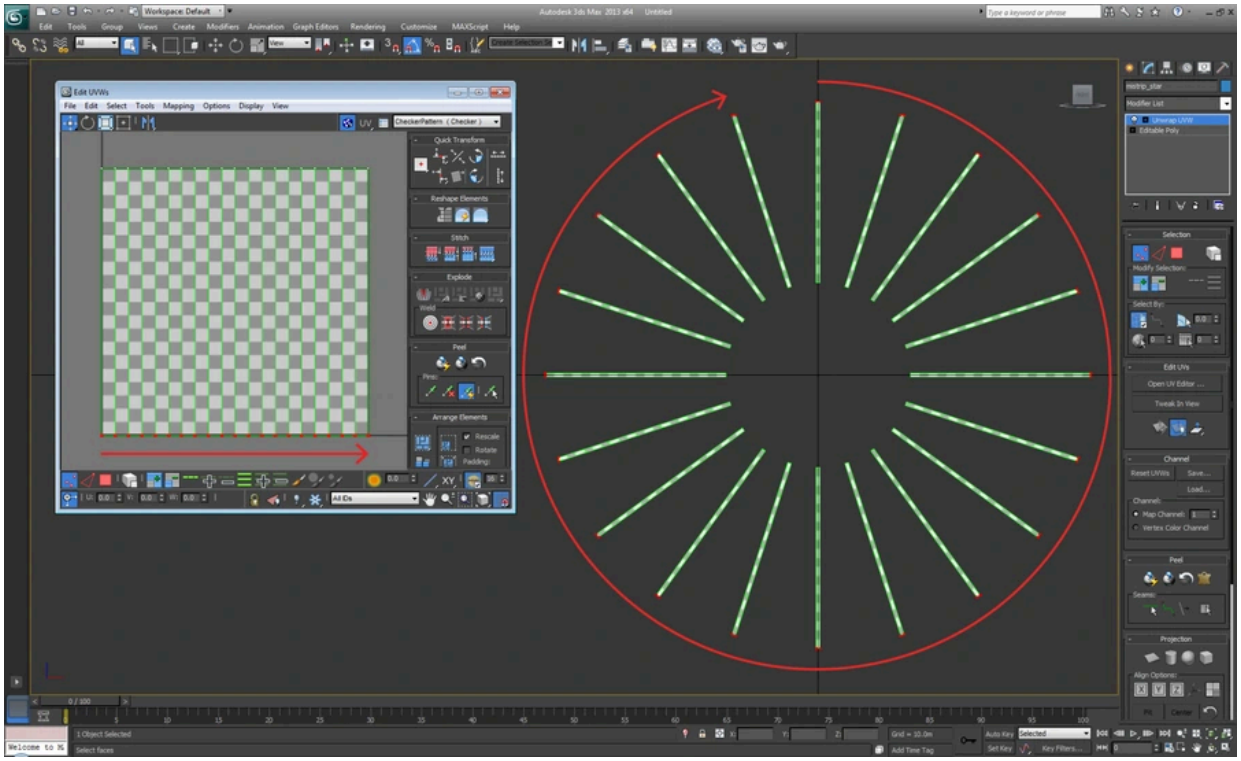
This indicates the surface's UV coordinates are **uniformly** positioned.



The image below shows how each MiSTRIP corresponds to a UV shell, highlighted in red. Importantly, each UV shell is *equal* in scale to each MiSTRIP, which indicates the UV map has an *even* distribution of UV coordinates.



The image below shows how the MiSTRIPs are arrayed in UV space. Importantly, the MiSTRIPs are arrayed in a *clockwise* direction, and this order follows the UV map, where the UV shells are arrayed in a *left to right* direction.



In order to set a resolution of this screen made of 20 Mistrips it is crucial to turn each strip into a rectangle in UV space.

Step 2 - Mapping content to screens

The left-image below shows a **Radar** layer **Parallel** mapped to the screen in Designer, which was exported as an **.obj** file from **Autodesk 3ds Max**. The right-image shows the **Output Feed** from Disguise to the LED processor, which is being generated in **realtime** by the Parallel map applied in Disguise's **Stage simulator**. The feed output is **independent** of the video content, which means the output can be a **different** resolution. In this case, the content has a resolution of 1024x1024 pixels, but the output has a resolution of 20x112 pixels. This is possible because **the Parallel map does not apply content directly to the screen's UV coordinates**; enabling the content creator to design content using templates that are **independent** of the LED outputs. Therefore, the creative workflow for the content creator is **separated** from the technical workflow for the hardware technicians, as explained on The UV Map as the Hardware Output page.

The resolution of the screen in Designer should **exactly** match the physical screen's number of pixels. The resolution of 20x112 pixels was calculated by:

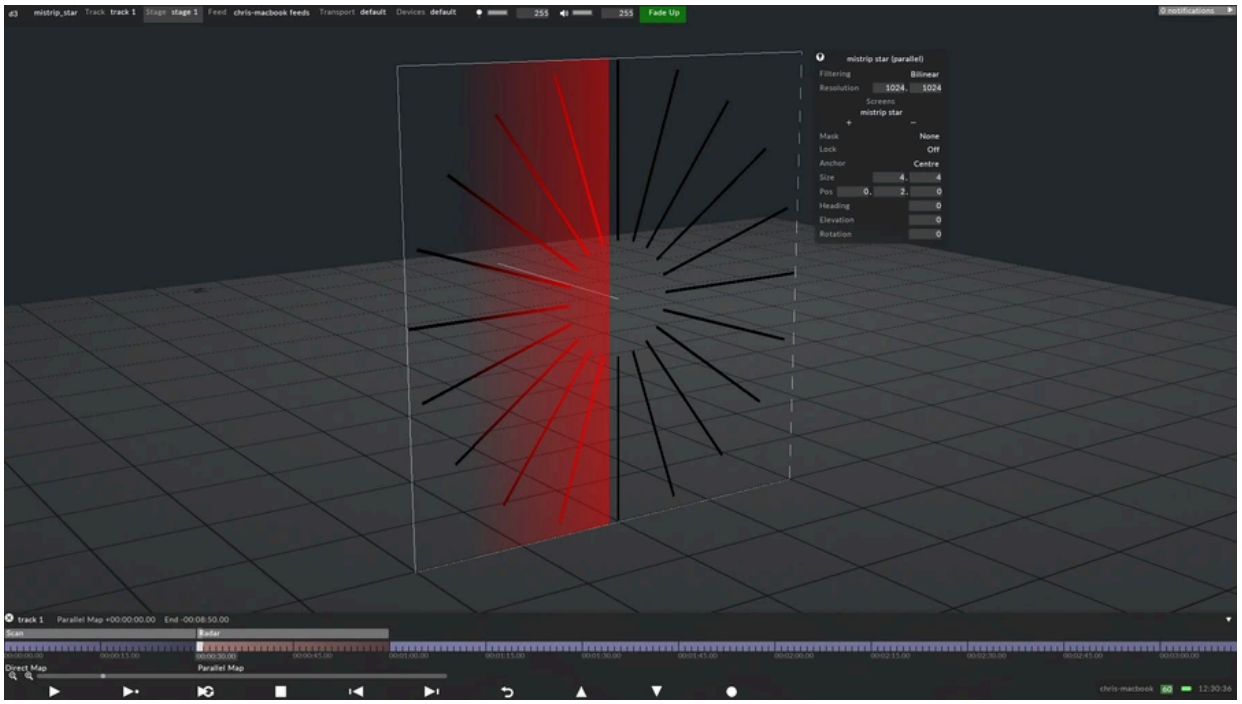
- Knowing precisely how many pixels each MiSTRIP contains **horizontally**.

- Multiplying this value by the **total** number of horizontal MiSTRIPs, to calculate a horizontal resolution.
- Knowing precisely how many pixels each MiSTRIP contains **vertically**.

In this case:

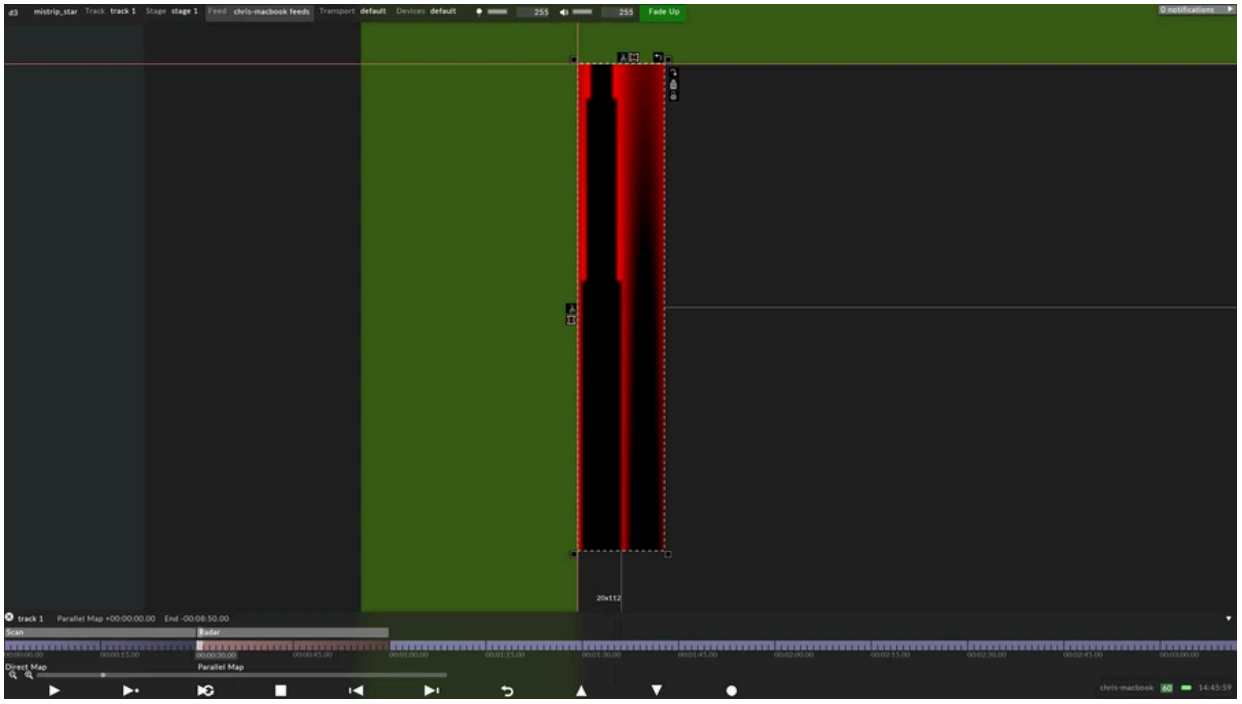
- 1 MiSTRIP = 1 pixel **horizontally**.
- The total number of horizontal MiSTRIPs is 20. Therefore, 1 pixel x 20 MiSTRIPs = 20 pixels horizontally in **total**.
- 1 MiSTRIP = 112 pixels **vertically**.

> **Note**
>
> **Please note**: When setting the resolution of a screen in the software, the UV map is **divided** into a **grid** of the same resolution, and in turn each of the grid's quads are **sampled** by the screen and **outputted** to the LED processor. Therefore, it is important to **match** the resolution of Disguise's screen to the physical screen.



The UV map also represent the output sent to the physcial LED strips.

The image below shows a Population mask applied to the screen in Designer, which was exported as a **.png** from **Adobe Photoshop**. The Population mask has removed MiSTRIP sections from the screen and, in turn, from the output to the LED processor, which maybe necessary if the screen's geometry requires updating. To read more about generating Population masks, see the Population masks page.



Example 2 - OLite column

This case study shows how to prepare a column shaped LED screen constructed from **Barco OLites** for for Designer. As explained on the **MiSTRIP Star** page, the first step is to UV map the 3D model by **unwrapping** the mesh into a **grid**.

How the UV map is generated

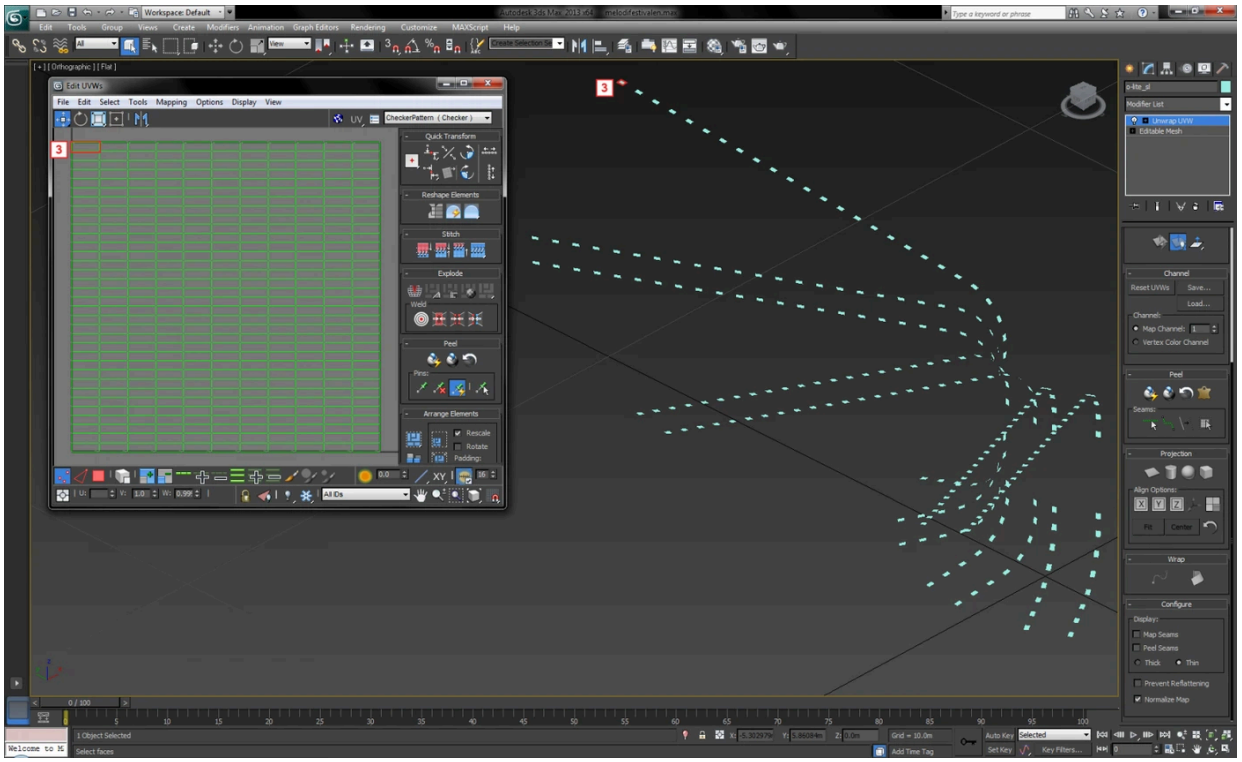
A plane can be **arrayed across a spline** to recreate the surface with the UV map **automatically generated**. However, the UV map will have **overlapping** UV shells and therefore will require editing, either **manually** using **UV editing tools** or **automatically** using a script, depending on the level of complexity.

Step 1 - Generating the UV map (3ds Max)

1. Draw a plane that matches an OLite's dimensions, 0.084x0.112 metres.
2. Ensure you have the box called **generate mapping coordinates** checked. Doing so will enable the plane to automatically generate a normalised UV map.
3. Draw a **spline** that snaps to the outer edge of one OLite column.
4. With the plane selected, select the **Spacing** tool.
5. From the spacing tool's parameters select **pick path**, and select the spline.
6. From the spacing tool's parameters select **count**, and enter a value of **34**. This will array thirty four planes across the spline.
7. **Attach** all the plane's together into one **Editable Mesh / Editable Poly**.
8. **Clone** the column by a count of **11**.
9. Align each column into position using the **move** and **rotate** tools.
10. **Attach** all the column's together into one **Editable Mesh / Editable Poly**.
11. Select the **Unwrap UVW**modifier.
12. Open the **Edit UVWs** window to view the UV map.
13. At this stage, the UV map will have overlapping UV shells.To **unwrap**the UV map, reposition the UV shells next to each other, either **manually** using **UV editing tools** or **automatically** using a script.
14. It is important to **snap** the UV shells next to each other into a **grid**. Doing so will remove gaps in the UV map, which in turn will remove virtual pixels from Disguise's output to the LED processor.
15. **Normalise** the UV map by rescaling it to fill UV space entirely from a range of 0-1 in both the U and V axes.

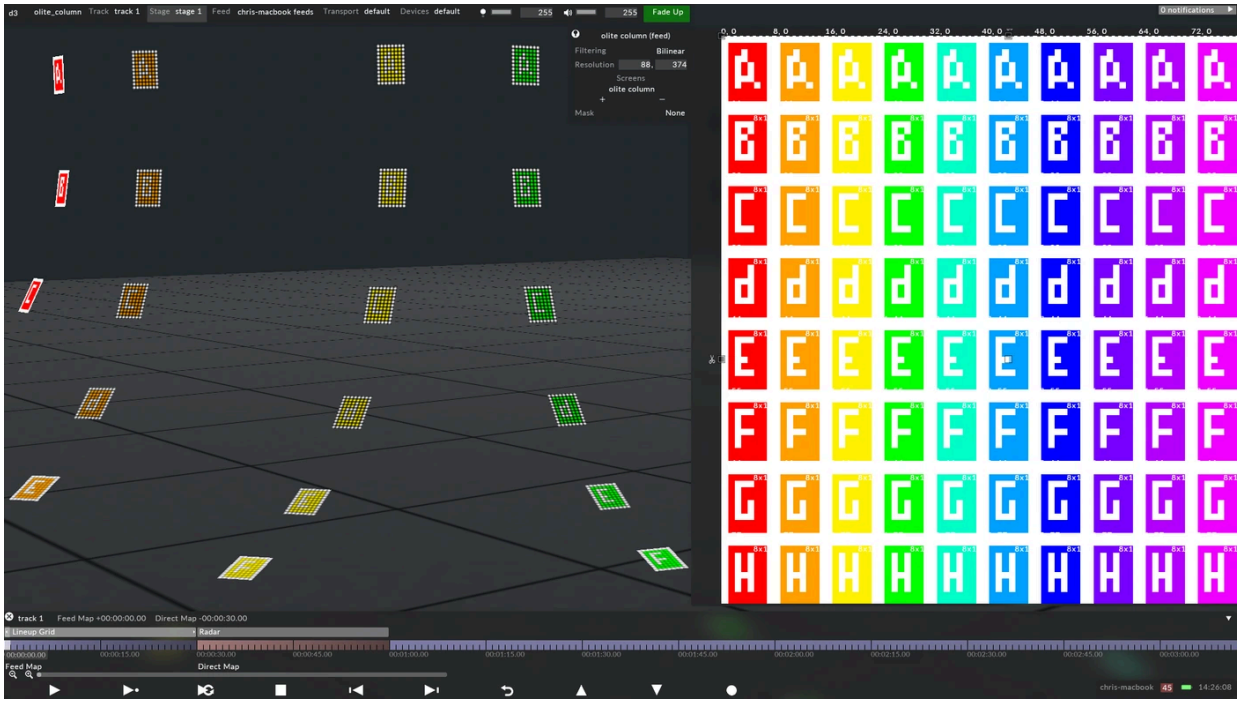
The image below shows the OLites arrayed in a **curved** direction, but in UV space they are arrayed in a **linear** direction as a **grid** Importantly, the surface's outer ring of

polys correspond to the UV map's top row of UV shells, highlighted in red.
This indicates the surface's UV shells are **uniformly** positioned.



Step 2 - Mapping content to screens

The image below shows a content template **Feed** mapped to the screen in Disguise, which was exported as an **.obj** file from **Autodesk 3ds Max**. The template was rendered from the UV map, and therefore contains no information about the **physical gaps** between the OLites. If video content is to be mapped to the screen with the physical gaps included, then a **Feed** map could be generated in d3. The Feed map **samples** different areas of the template, and in turn the sampled areas are **mapped** to the OLites. The advantage here is the sampled areas can be **reconfigured**, allowing for content to be moved, cropped, scaled and rotated, in the same way the Output Feeds can be reconfigured.



A **Parallel** or **Perspective** map can be generated from Designer. As explained on the MiSTRIP Star page, these mappings**do not apply content directly to the screen's UV coordinates**; enabling the content creator to design content using templates that are **independent** of the LED outputs. Therefore, the creative workflow for the content creator is **separated** from the technical workflow for the hardware technicians, as explained on The UV Map as the Hardware Output page.

The resolution of the screen in Designer should **exactly** match the physical screen's number of pixels. The resolution of 80x374 pixels was calculated by:

- Knowing precisely how many pixels each OLite contains **horizontally**.
- Multiplying this value by the **total** number of horizontal OLites, to calculate a horizontal resolution.
- Knowing precisely how many pixels each OLite contains **vertically**.
- Multiplying this value by the **total** number of vertical OLites, to calculate a vertical resolution.

In this case:

- 1 OLite = 8 pixels **horizontally**.
- The total number of horizontal OLites is 11. Therefore, 8 pixels x 11 OLites = 88 pixels horizontally in **total**.
- 1 OLite = 11 pixels **vertically**.
- The total number of vertical OLites is 34. Therefore, 11 pixels x 34 OLites = 374 pixels horizontally in **total**.

> **Note**
>
> **Please note**:When setting the resolution of a screen in Designer, the UV map is **divided** into a **grid** of the same resolution, and in turn each of the grid's quads are **sampled** by the screen and **outputted** to the LED processor. Therefore, it is important to **match** the resolution of Disguise's screen to the physical screen. For further information see the How Does Sample UV Maps page.

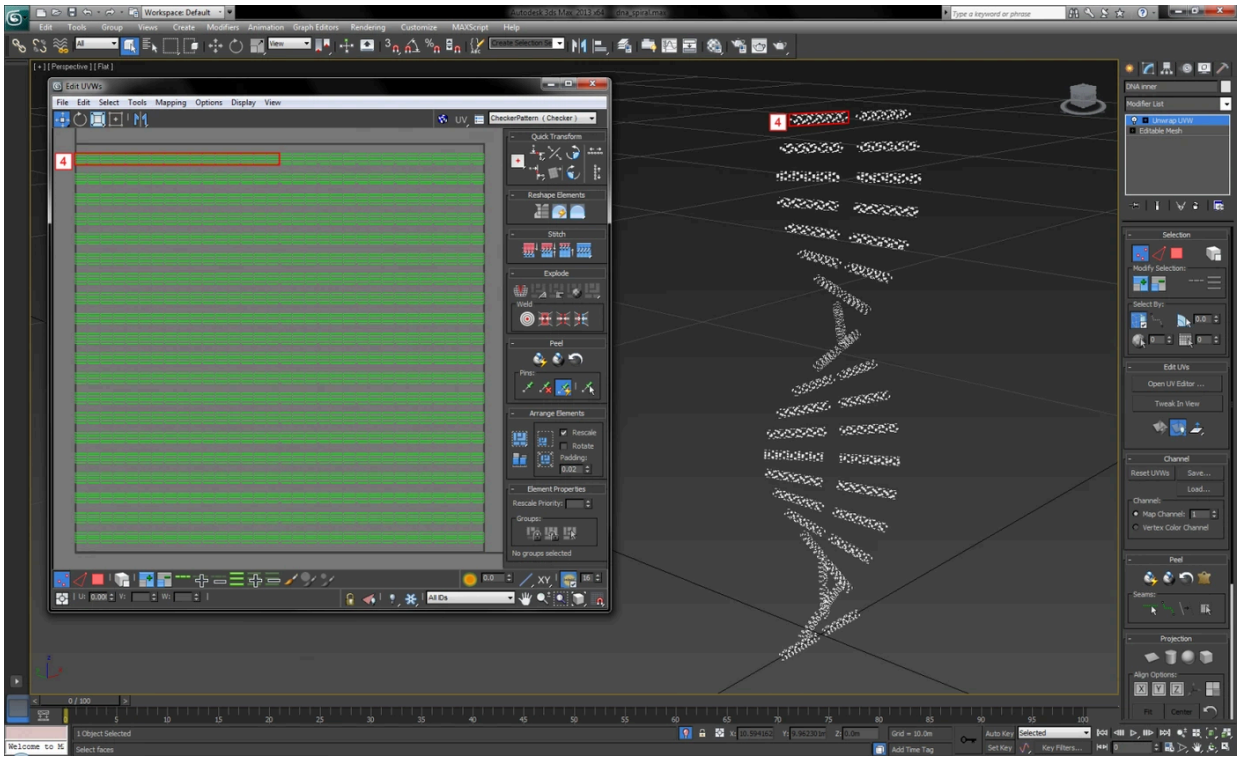
Example 3 - DNA Spiral

This case study shows how to prepare a spiral shaped LED screen constructed from pucks for Designer. As explained in the previous case studies, the first step is to UV map the 3D model by **unwrapping** the mesh into a **grid**.

How the UV map is generated

The DNA spiral's UV map was generated using a combination of techniques applied to the MiSTRIP Star and the OLite Column.

However, the key difference here is the UV map contains **gaps**. This is because the content creator required a 2D template that **accurately** represented the 3D model. In this case, **virtual gaps** were included to represent the **physical gaps** between the pucks.

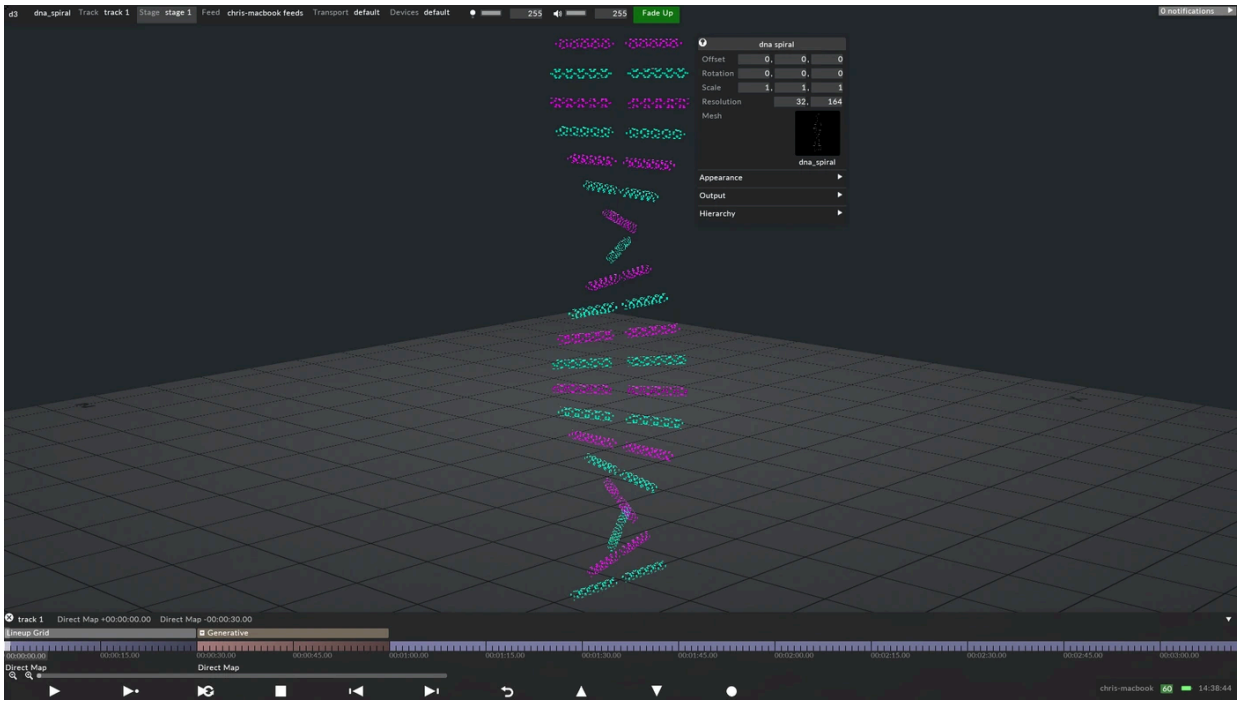


The UV map of the DNA spiral

The left-image below shows a content template **Direct** mapped to the screen in Designer, which was exported as an **.obj** file from **Autodesk 3ds Max**. The template was rendered from the UV map, and therefore includes **virtual gaps** to,represent the **physical gaps** between the pucks.

The Direct map samples the **entire** UV map including the **virtual gaps**, but only the UV coordinates **assigned** to the 3D model will display video content; enabling the content creator to design content using a template which **accurately** represents the 3D model. However, here the disadvantage is Disguise's screen will require a **higher** resolution than the physical screen, **which may affect video performance**.

The right-image below shows the **Output Feed** from Designer to the LED processor. The output is **independent** of the content, which means the output can be a **different** resolution. In this case, the content has a resolution of32x164 pixels, but the output has a resolution of 32x82. This is possible because the Output Feeds can be **reconfigured**, allowing for virtual pixels to be **removed** from the output, and for the output to be **edited** to match the LED processor's pixel map. Therefore, the creative workflow for the content creator is **separated** from the technical workflow for the hardware technicians, as explained on The UV Map as the Hardware Output page.



Normally, the resolution of the screen in Disguise should **exactly** match the physical screen's number of pixels. However, in this case the resolutions can **differ**. The resolution of 32x164 pixels was calculated by:

- Knowing precisely how many pixels each puck contains **horizontally**.
- Multiplying this value by the **total** number of horizontal pucks, to calculate a horizontal resolution.
- Knowing precisely how many pixels each puck contains **vertically**.
- Multiplying this value by the **total** number of vertical pucks, and **doubling** the sum, to calculate a vertical resolution.

In this case:

- 1 puck = 1 pixel **horizontally**.
- The total number of horizontal pucks is 32. Therefore, 1 pixel x 32 pucks = 32 pixels horizontally in **total**.
- 1 puck = 1 pixel **vertically**.
- The total number of vertical pucks is 84. Therefore, 1 pixel x 82 pucks = 82, and 82 x 2 = 164 pixels horizontally in **total**.

The vertical resolution was **doubled** because the UV map contains **gaps**. **Importantly, the gaps were spaced evenly to match the heights of the UV shells**. Doing so ensures Disguise's screen will **precisely** sample the UV map. If the resolution is incorrect the screen will sample virtual pixels, which in turn will display **black** across the output. Therefore, it is important to generate a **pixel-perfect** content template to render video content from.

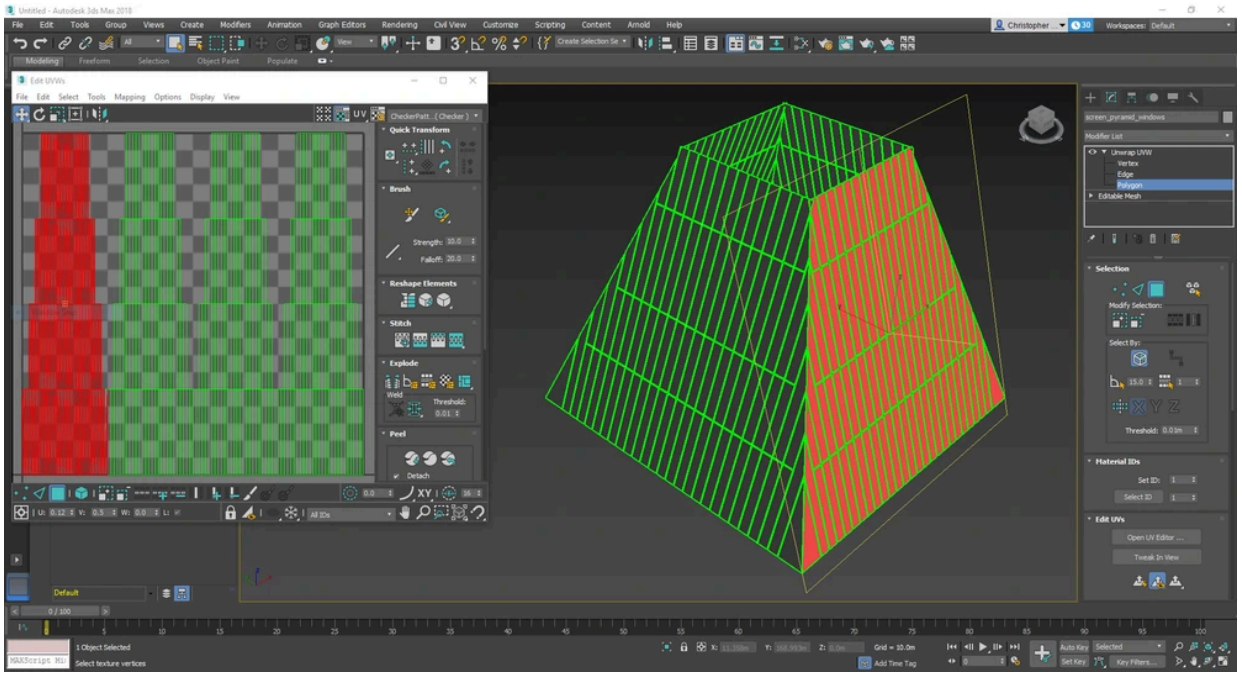
> **Note**
>
> **please** note**: When setting the resolution of a screen in Designer , the UV map is **divided** into a **grid** of the same resolution, and in turn each of the grid's quads are **sampled** by the screen and **outputted** to the LED processor. Normally, it is important to **match** the resolution of the screen to the physical screen but, in this case, Disguise's screen should have a **higher** resolution to allow for virtual pixels. Therefore, it is **highly recommended** to test playback performance before running a live show. For further information see the How Does Sample UV Maps page.

Example 4 - Millenia Tower

Example 4: Millenia Tower

This case study shows how Singapore's Millenia Tower was prepared for Designer software. The key difference here is the screens used Pulsar Chroma lights, which are **DMX** controlled fixtures. The previous case studies explained how to prepare **DVI** controlled fixtures for Designer, although Designer maps DMX pixels in the *same* way it does DVI pixels. Therefore, the 3D modelling and UV mapping techniques covered earlier apply here. However, it is important to understand Designer's DMX screen sends RGB data over Art-Net and other supported protocols, instead of the Output Feeds. To read more about DMX screens, see the Creating DMX screens sub-chapter.

How the UV map is generated

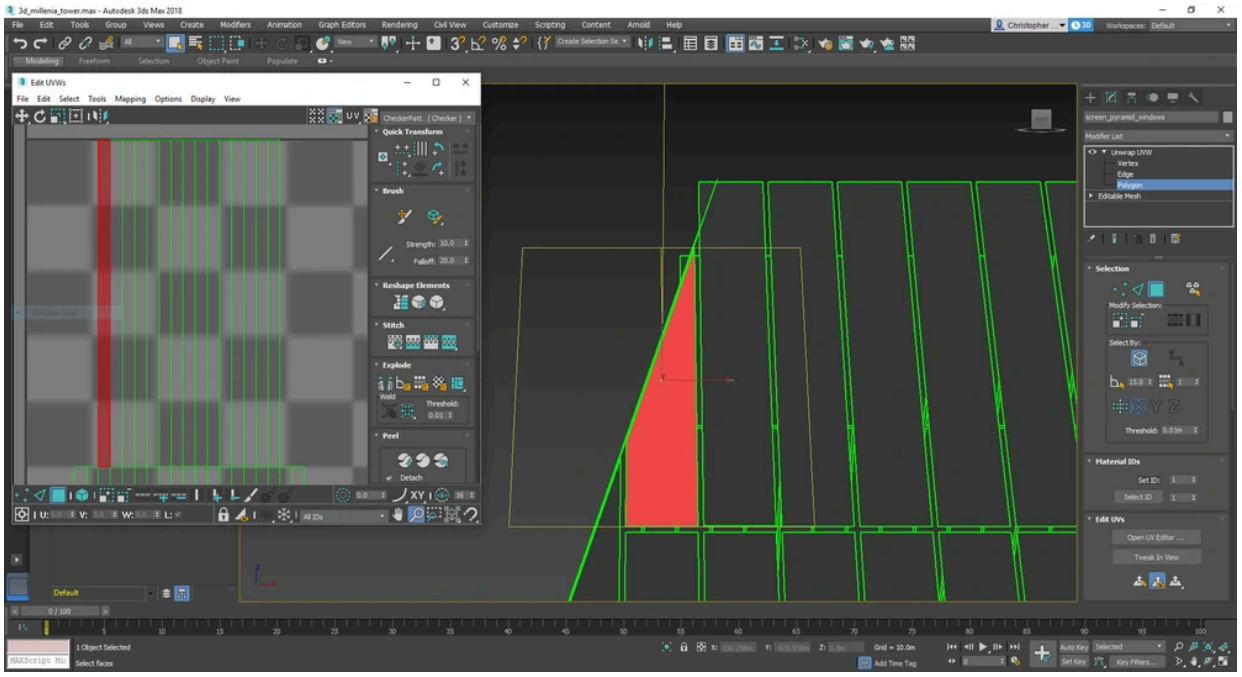


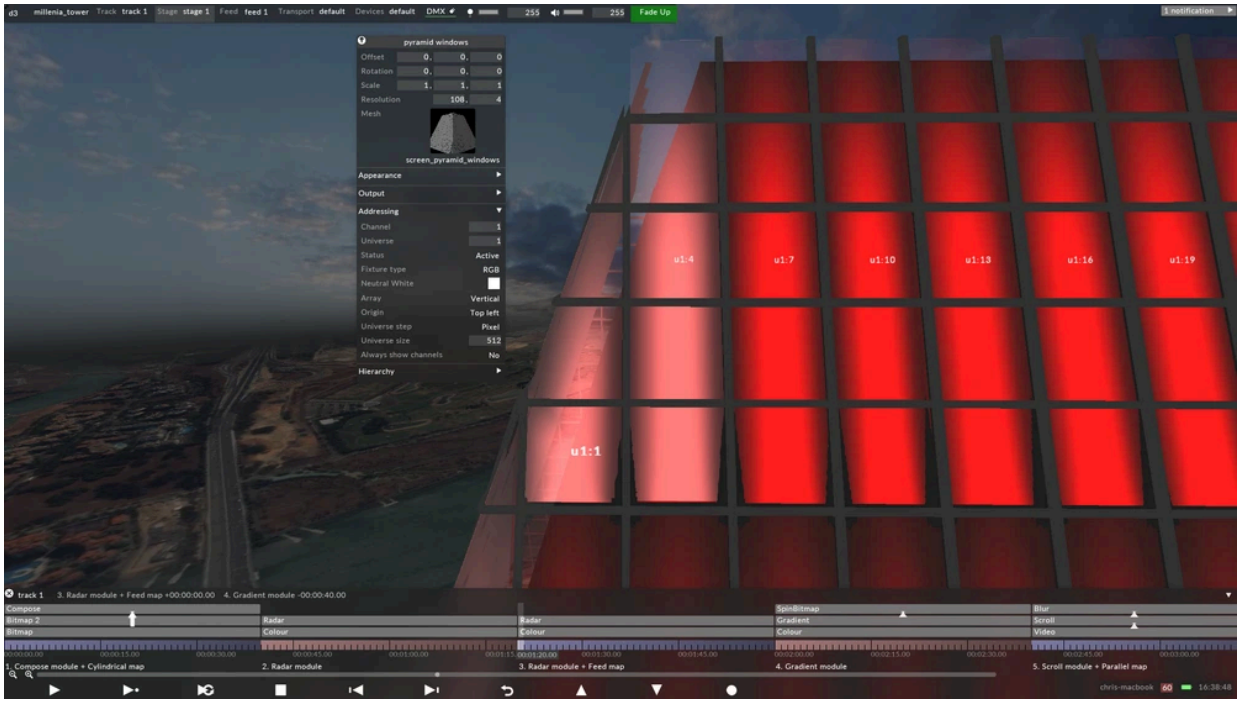
The Millenia Tower's UV map was generated using a combination of techniques applied previously, which explained how to **unwrap** a 3D model into a **grid**.

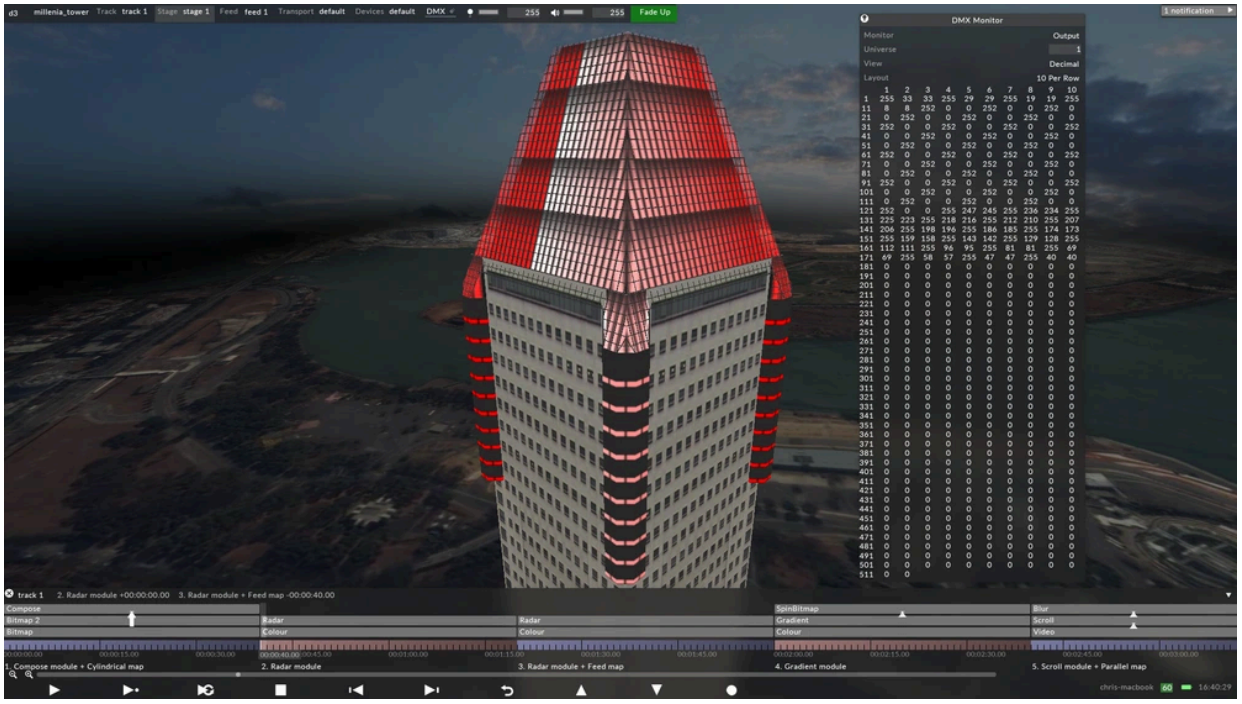
Similar to the DNA Spiral, this UV map contains gaps **separating** the tower's four sides, although in this case the 3D model does **not** contain the same gaps.

The UV map was designed on the basis that each Chroma light would be mapped in Designer to a resolution of 1x1 pixels. Consequently, in **Autodesk 3ds Max** each Chroma light was

assigned one UV shell, all of which **matched** in scale, because this ensured Designer's **Direct** map **precisely** sampled the UV map. Because the tower's upper levels contain less Chroma lights than the lower levels, the UV map's upper levels contained less UV shells than the lower levels, resulting in **virtual gaps**.






DMX Monitor
1. Compose module + Cylindrical map
2. Radar module
3. Radar module + Feed map
4. Gradient module
5. Scroll module + Parallel map

LED Screen Examples Overview

This sub-chapter will teach you **how** to UV map **LED** screens for Designer, which are controlled either by **DVI** or **DMX** signals. The following examples revisit the UV mapping principles covered in the previous sub-chapter. Therefore, it is **recommended** to read this first.
Topics include:

Example 1: MiSTRIP Star

Example 2: OLite column

Example 3: DNA spiral

Example 4: Millenia Tower



Optimising 3D Models

When preparing objects for Designer there are a number of processes to consider.

- Objects should be divided into Screens and Props.
- Screens should only include the surfaces necessary to display video content and may require re-modelling by detaching or deleting unnecessary polygons.
- Detached objects can be used in Designer as props, which are helpful for simulating a show in the Stage visualiser to present to the client.
- Objects should not exceed 150,000-200,000 vertices and may require remodelling by welding unnecessary vertices.

Dividing 3D models into screens and props

In a 3D application, an object can be detached into multiple sub-objects. This is necessary when dividing a 3D model into screens and props for Designer. Screens are video displays such as LED panels, projection surfaces and DMX fixtures, and props are scenographic elements such as audience seating, stage floors and truss pieces.

Screens

A new Designer project contains the following .obj files to be used as screens:

- rectangle.obj
- cylinder.obj
- concave.obj
- dome.obj

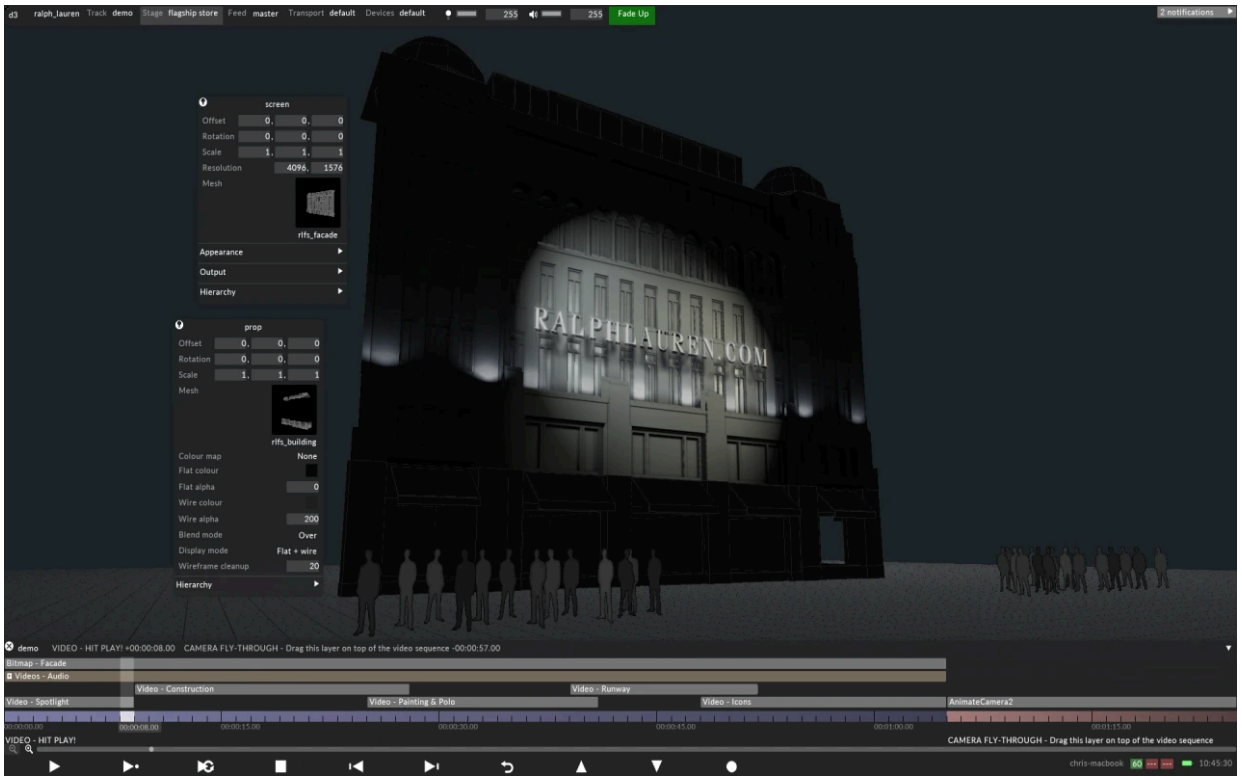
> **Note**
>
> The rectangle.obj, concave.obj and puffersphere.obj file is generated in the software and is not visible in the mesh library.

Complex screens, for example a building or a car, require 3D modelling and UV mapping tools available in 3D applications. For further information see the LED screen examples and the Projection screen examples.

Props

Parts of an object which are not required to display video content can be used in Designer as props. The image below shows the Ralph Lauren London Flagship Store divided into two sub-

objects: a screen to display video content and a prop to simulate the building's top and bottom. In Designer a prop can be customised to simulate the object more realistically including the ability to map paint textures to it. For further information see the Editing Props page.



The Ralph Lauren Flagship Store divided into a screen and a prop in Disguise.

Deleting overlapping faces

Delete all overlapping faces from the object. It is important to understand when video content is mapped to the screen in Designer, any surfaces with overlapping faces will display overlapping content. To test this, map a Radar layer to the screen.

Reducing the number of vertices

In the Designer, the Stage should not exceed 150,000-200,000 vertices. It is recommended to reduce the total number of vertices by welding them together, which should be done in a 3D application. Be careful not to delete too many vertices because this may lower playback quality, but on the other hand too many vertices may lower playback performance. A balance between quality and performance is necessary.

Please note: during a live show it is recommended to remove props from the Stage in order to optimise playback performance. For further information see the Creating and removing props page.

Helpful resources

3ds Max

- Support and learning

Maya

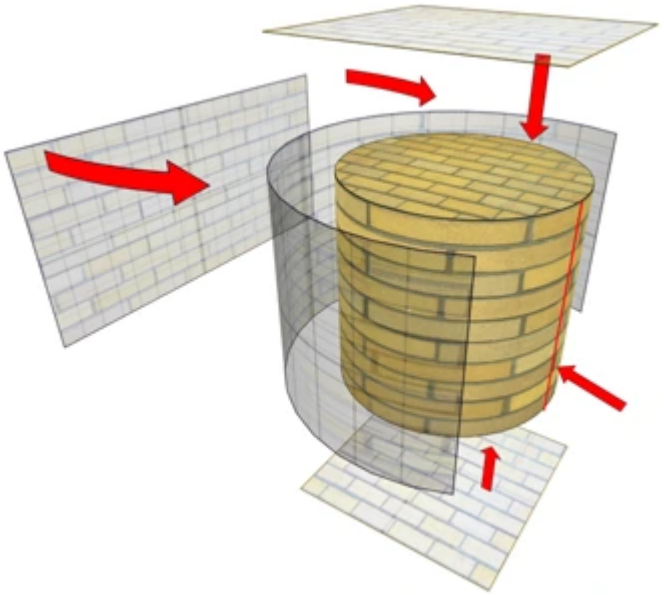
- Support and learning

Projection Examples- Cylindrical mapping

Cylindrical mapping is suitable for projection surfaces **wrapping** around **360** degrees, for example a cylinder or a bottle.

How the UV map is generated

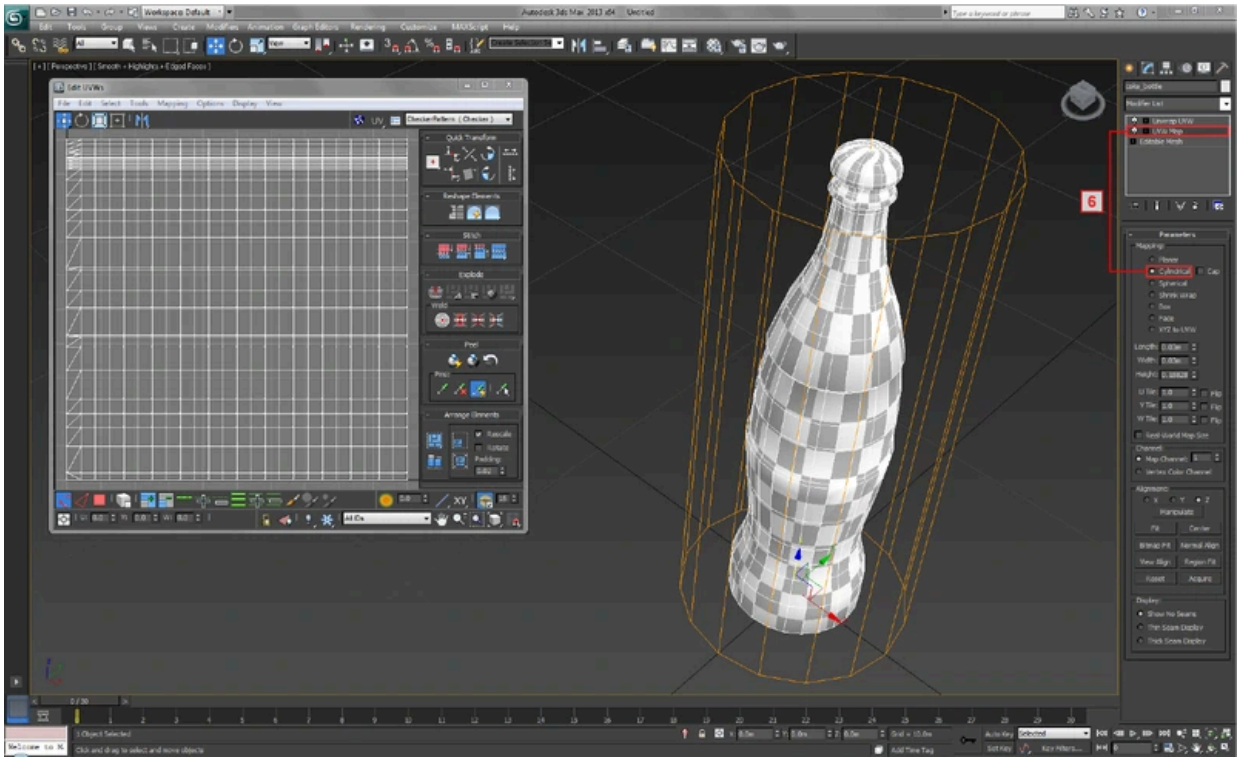
The Cylindrical map will **cylindrically** project UV coordinates to the surface, by **arraying** the map around 360 degrees. This will enable **symmetrical** content to flow across the surface **smoothly**. However, because the UV map is joined at a seam, **asymmetrical** content will **not** flow around the surface smoothly.



Step 1 - Generating the UV map (3ds Max)

1. Select the UVW Map modifier.
2. From the list of projection types select **cylindrical**.
3. The cylindrical map will project UV coordinates from its normals to the surface. Therefore, it is necessary to fit the cylindrical map's position, orientation and scale to the surface.
4. Select the Unwrap UVW modifier.
5. Open the Edit UVWs window to view the UV map.

The image below shows a **non-uniform** checker pattern rendered to the surface, which indicates the UV map has an **uneven** distribution of UV coordinates. To fully unwrap the surface the UV map should be ***relaxed***.

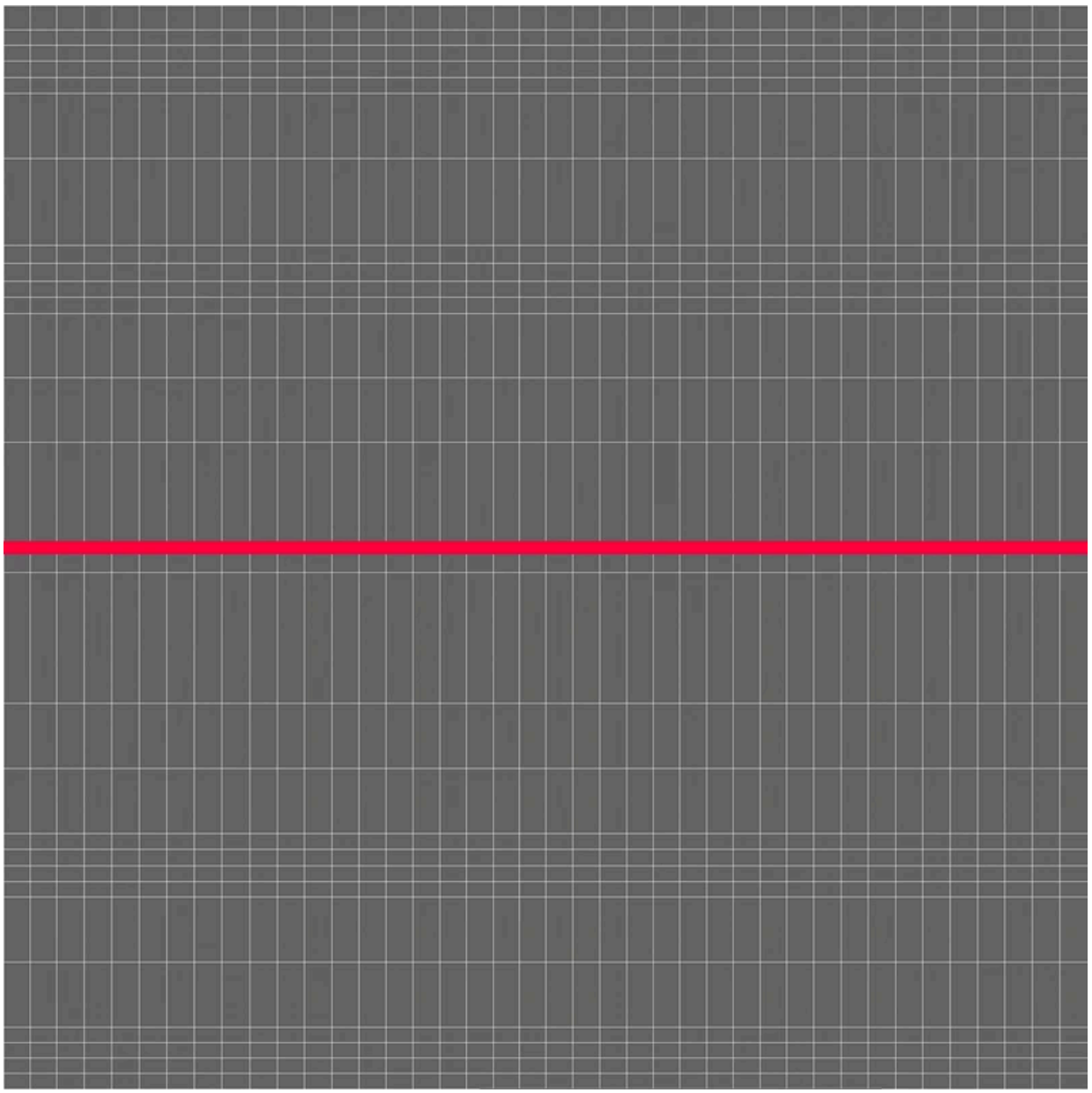


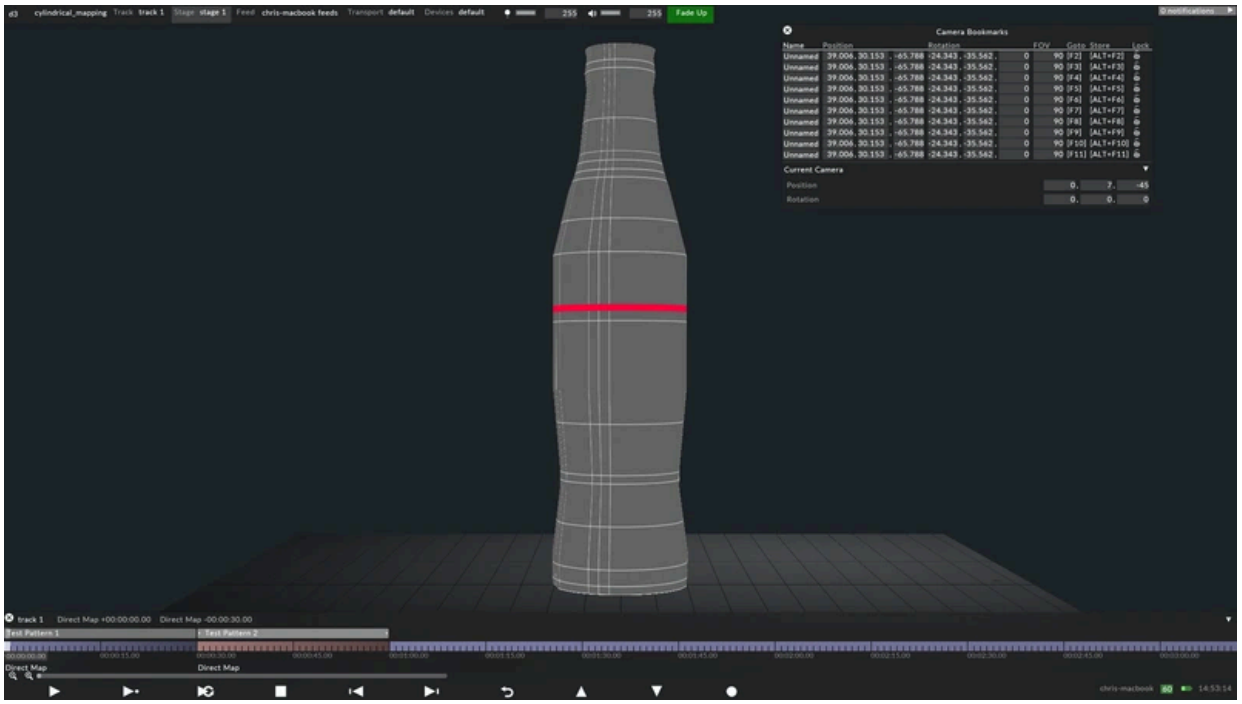
A 3D model of a coke bottle cylindrically mapped in 3ds Max.

Step 2 - Rendering UV maps to content templates

The images below show two content templates mapped to the screen in Designer. The template's resolution was calculated by following the same technique used for Shrink wrapped projection surfaces, because when a surface is Cylindrically mapped it is problematic to calculate the resolution **mathematically.**

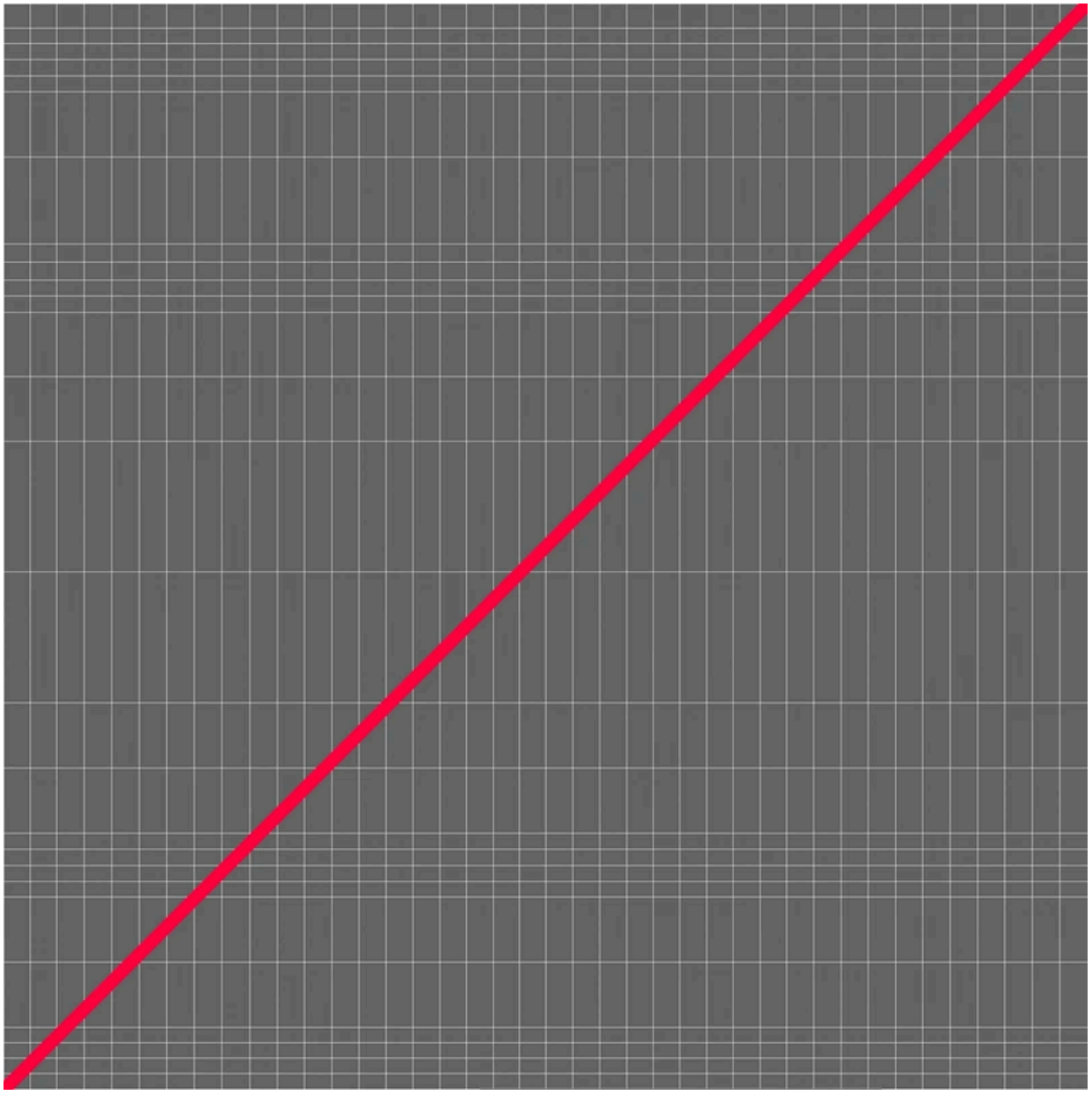
If a **horizontal** line is drawn across the template, in it will seamlessly map to the screen.

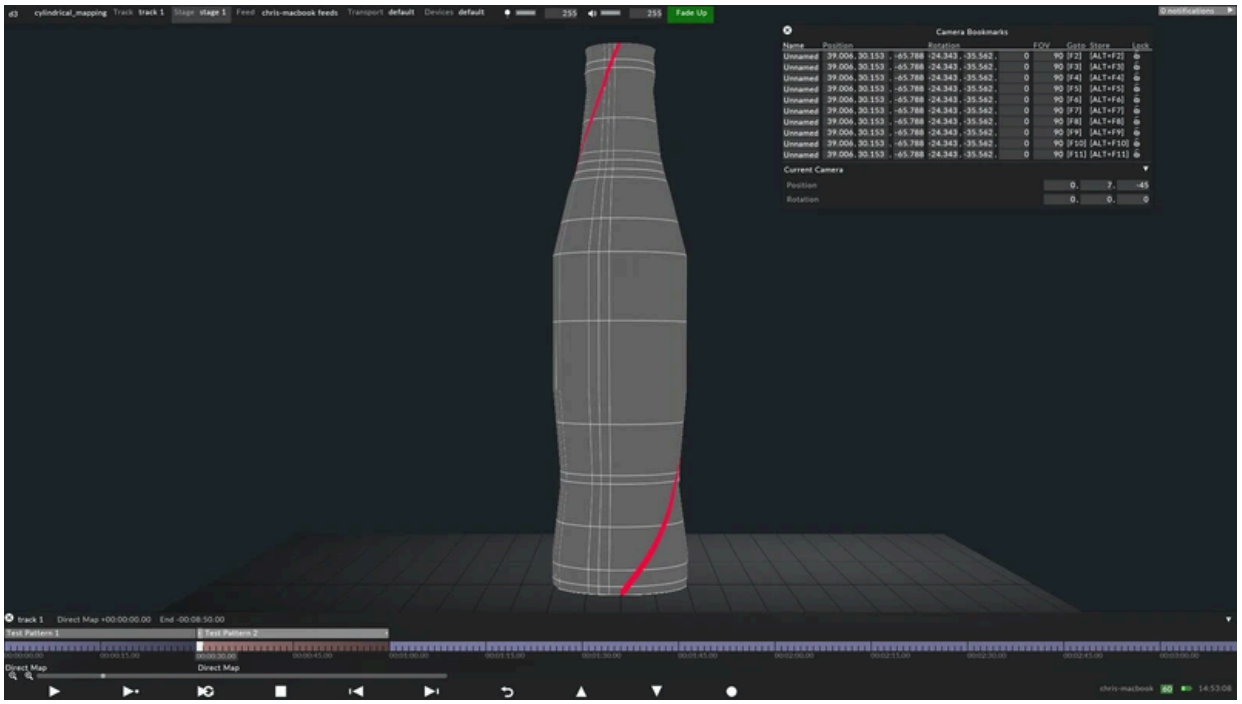




A 2D content template rendered from 3ds Max and applied to the coke bottle in . Notice how the horizontal line maps onto the 3D model seamlessly.

If a **diagonal** line is drawn across the template, in it will reveal a seam when mapped to the screen.





A 2D content template rendered from 3ds Max and applied to the coke bottle in . Notice how the diagonal line reveals a seam at its start and end points.

Helpful resources

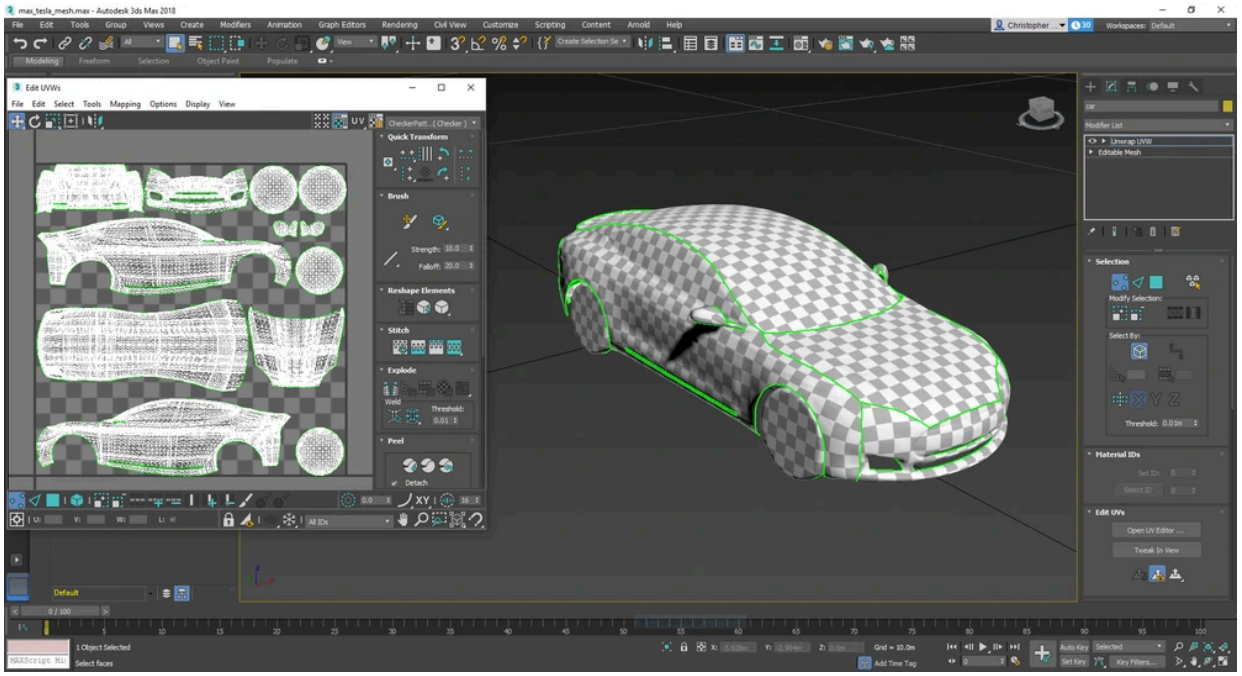
- Unwrapping UVs in 3ds Max
- Editing UVs in 3ds Max
- Flattening UVs in 3ds Max
- Unfolding UVs in 3ds Max
- Rendering content templates in 3ds Max

Projection Examples - Pelt mapping

Pelt mapping is suitable for projection surfaces **curving** across **multiple** axes, which areproblematic to unwrap using other mapping types, for example a body or a head.

How the UV map is generated

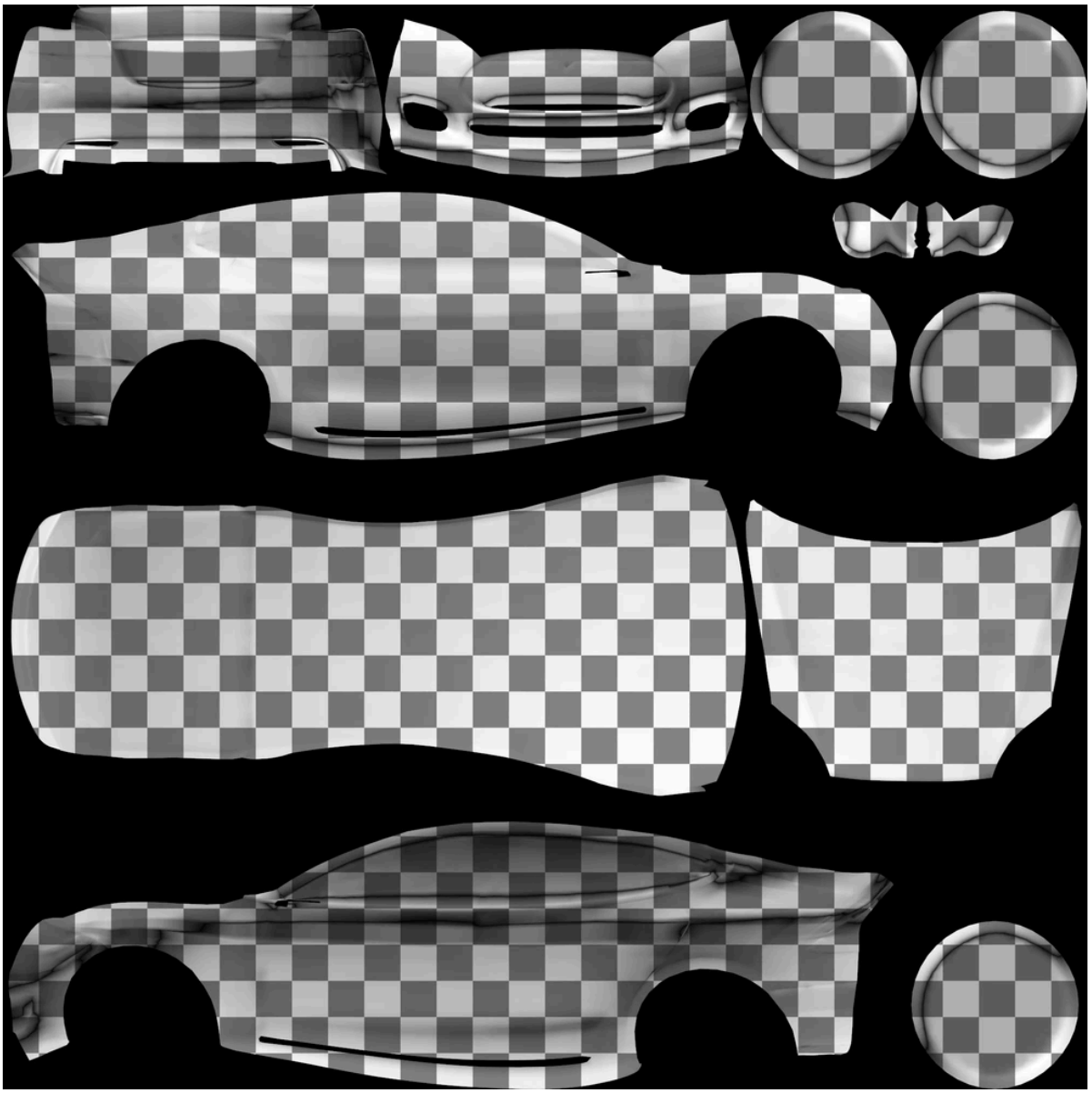
The Pelt map features a **stretcher** that can be manipulated by **springs** to **pull** the UV map outwards. This enables **precision** control over the UV coordinates to ensure they are **evenly** distributed across the **most** complex surfaces, which other mapping types are incapable of **completely** unwrapping.



Step 1 - Generating the UV map (3ds Max)

1. Select the **Unwrap UVW** modifier.
2. From the list of projection types select **pelt mapping**.
3. Open the **Edit UVWs** window to view the UV map. The image below shows a **non-uniform** checker pattern rendered to the surface, which indicates the UV map has an **uneven** distribution of UV coordinates.

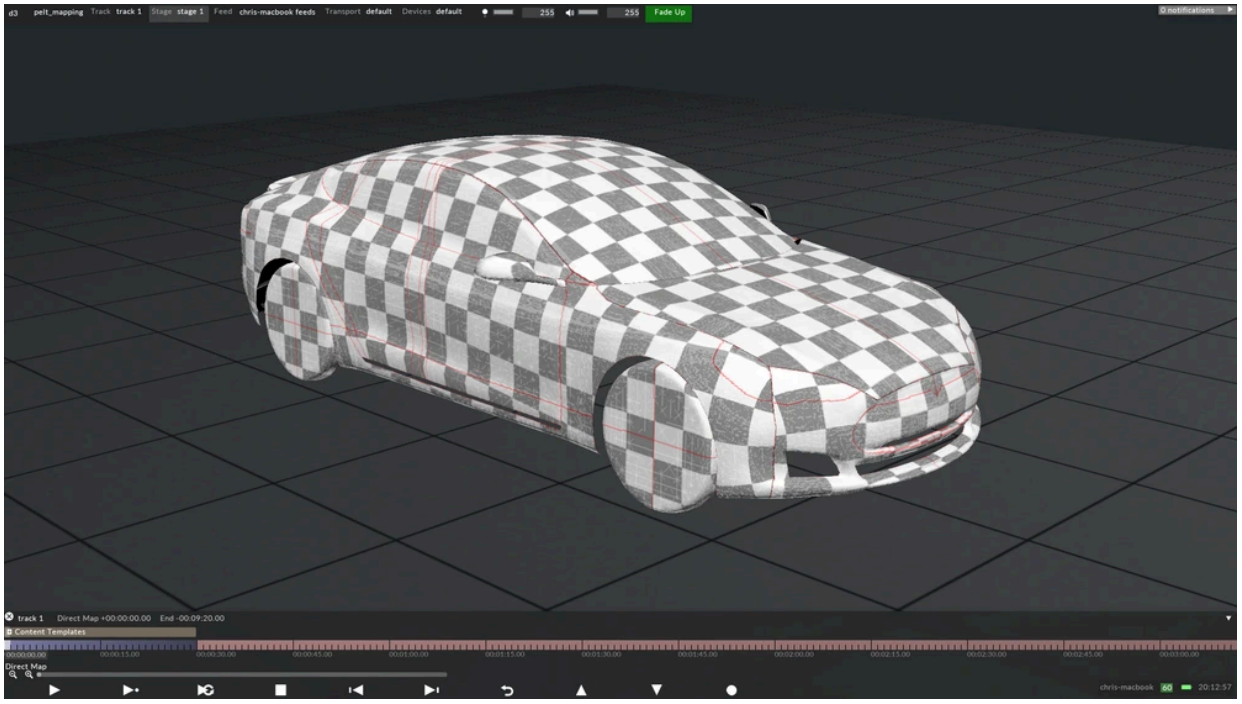
4. To fully unwrap the surface the pelt map's stretchers should be **pulled** outwards until the UV map **accurately** represents the **true** shape of the projection surface.



A 3D model of a car pelt mapped in 3ds Max.

Step 2 - Rendering UV maps to content templates

The image below shows the content template mapped to the screen in Disguise. The template's resolution was calculated by following the same technique used for Shrink wrapped / Cylindrical mapped projection surfaces, because when a surface is Pelt mapped it is problematic to calculate the resolutio **mathematically**.



For more information

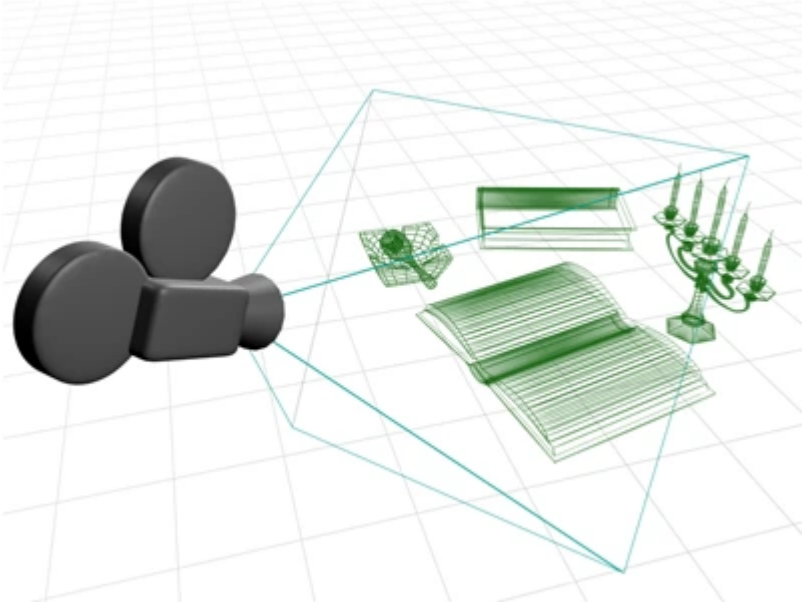
Autodesk 3ds Max Learning center

Projection Examples - Perspective mapping

Perspective mapping is suitable for projection surfaces to display content rendered to a single point of view, for example building blocks animating into a building. However, perspective mapping is also suitable for 2D content, as explained below.

How the UV map is generated

A camera can perspective project UV coordinates from its point of view to the surface. The UV map can then be rendered to a content template to be placed as a background in Adobe After Effects. Here the content creator can render 2D content and in Designer the content will map perfectly to the screen. The 2D content will appear correct from any point of view.



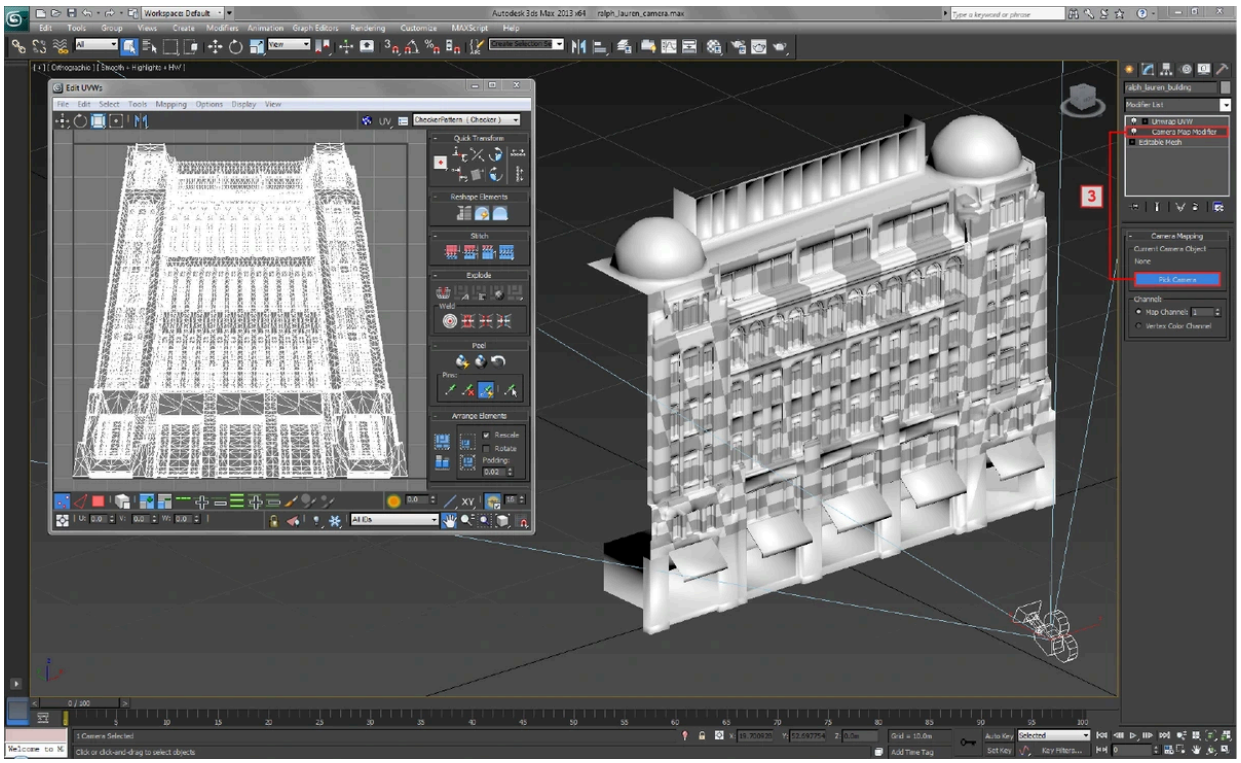
In a 3D application the content creator can also render 3D content by rendering 3D effects from a camera's point of view. The render camera should match the position of the previous camera, and the 3D content should be rendered to a resolution that matches the 2D content. The mapped 3D content will only appear correct from the render camera's point of view. Therefore, both cameras should be positioned to the point of view from which the audience will view the projection surface.

Step 1 - Generating the UV map (3ds Max)

1. Create a camera in your 3D scene.

2. Adjust its position, field of view and zoom, to capture the surface's outer edge. In the camera's viewport safe frames can be enabled to show the captured area more clearly.
3. Select the surface and apply a Camera Map modifier.
4. From the Camera Map modifier pick camera. The camera will perspective project UV coordinates onto the surface.
5. Select the Unwrap UVW modifier.
6. Open the Edit UVWs window to view the UV map.

The image here shows a non-uniform checker pattern rendered to the surface. However, from the camera's point of view the UV map will appear to have an even distribution of UV coordinates.



Step 2 - Rendering UV maps to content templates

- The images below show the content template and how its resolution was calculated. The template's resolution was calculated from the render settings set to generate 3D content, because when a projection surface is perspective mapped the UV map can be used to generate both 2D and 3D content. Therefore, the 2D and 3D content should match in resolution.

- The images below show the content template and how its resolution was calculated. The template's resolution was calculated from the render settings set to generate 3D content, because when a projection surface is perspective mapped the UV map can be used to generate both 2D and 3D content. Therefore, the 2D and 3D content should match in resolution.
- The UV map can be rendered to a template to be placed as a background in Adobe After Effects, to generate 2D content.
- The UV map can have animated geometry baked into it in a 3D application, for example 3ds Max, to generate 3D content.

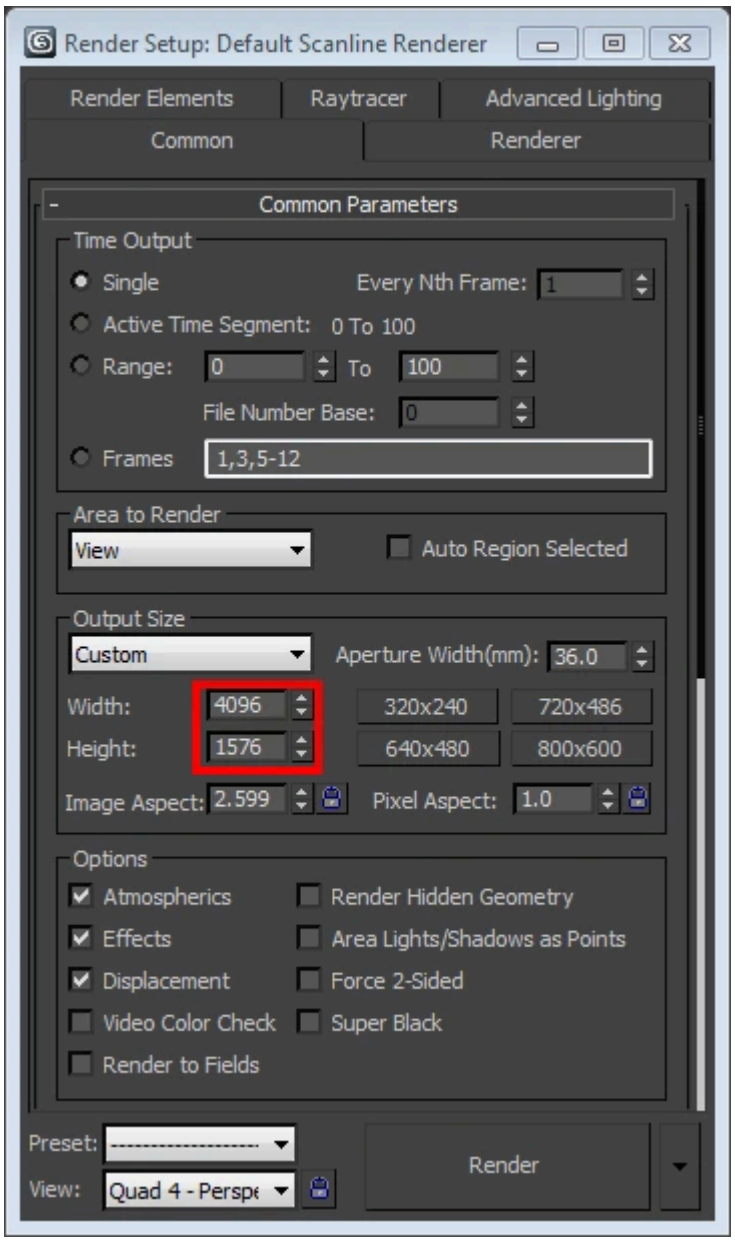
The template's resolution is 4096x1576 pixels. This was calculated by:

- Knowing the aspect ratio of the camera's output (this is automatically generated by the camera output's width and height, shown in the render settings).
- Knowing precisely how many pixels produced by the projector will hit the projection surface, across either the horizontal or vertical axis..
- Multiplying or dividing this value by the aspect ratio, to calculate a resolution for the remaining axis.

Therefore, the following calculations apply:

- The camera's output has an aspect ratio of 2.599.
- Approximately 4096 pixels will hit the projection surface horizontally.
- 4096 pixels / 2.599 = 1576 pixels (the vertical resolution).

Render settings from 3ds Max



The images below show the content template and examples of 2D and 3D content rendered from the UV map.



A 2D content template of the Ralph Lauren London Flagship Store renderedvfrom 3ds Max.



Helpful resources

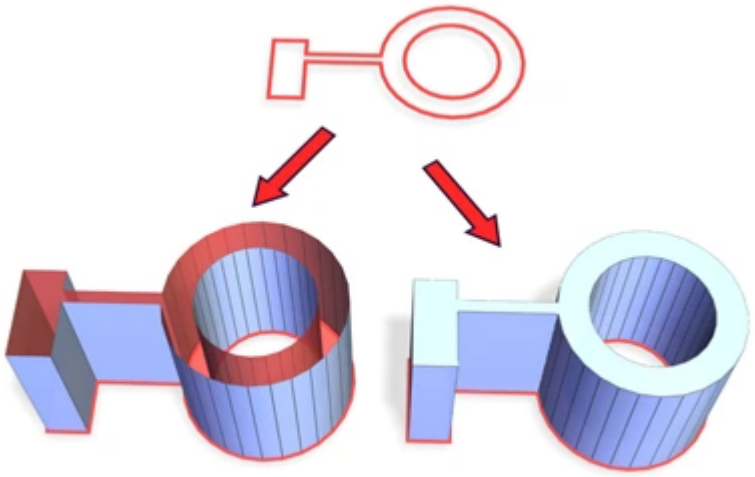
- Creating cameras in 3ds Max
- Projecting camera maps in 3ds Max
- Rendering content templates in 3ds Max

Projection Examples - Pixel-perfect mapping

Pixel-perfect mapping is suitable for projection surfaces **bending** across **one** axis, for example a wall constructed from multiple angled surfaces.

How the UV map is generated

A spline can be **extruded** to recreate the surface with the UV map **automatically generated**. Because the UV coordinates are generated by the extrusion, the UV map will have a **perfectly** even distribution of UV coordinates.

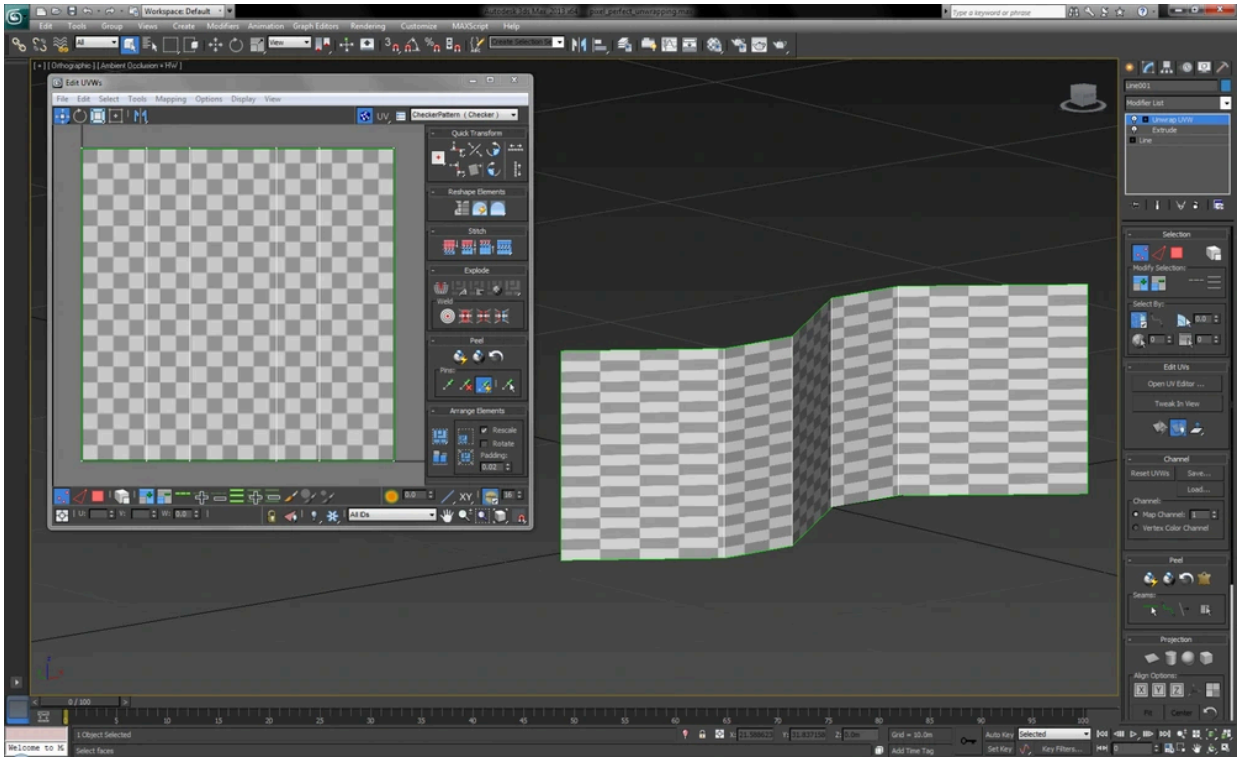


Step 1 - Generating the UV map (3ds Max)

1. Draw a spline that traces the surface's bottom edge.
2. Apply an Extrude modifier to extrude the spline to match the surface's height.
3. Ensure you have the box called **generate mapping coordinates** checked when extruding the spline. Doing so will enable the extrusion to automatically generate a normalised UV map.
4. Select the Unwrap UVW modifier.
5. Open the **Edit UVWs** window to view the UV map.

6. Check the UV coordinates are correctly **flipped** by comparing the positions of the surface's vertices to the UV map's texture coordinates. Before performing the check, ensure the surface is orientated and viewed in a south-north (front-back) direction. The image below shows the surface's top-left vertice corresponds to the UV map's top-left texture coordinate. This is correct. If the UV coordinates were incorrectly flipped, in , the video content would be **mirrored** across the screen when Direct mapped, for example a **Radar** layer would scan the screen in the **opposite** direction.

The image below shows a **uniform** checker pattern rendered to the surface, which indicates the UV map has an **even** distribution of UV coordinates.If the checker pattern appeared non-uniform, i.e. the checkers were differently sized, this would indicate the UV map had an **uneven** distribution of UV coordinates.



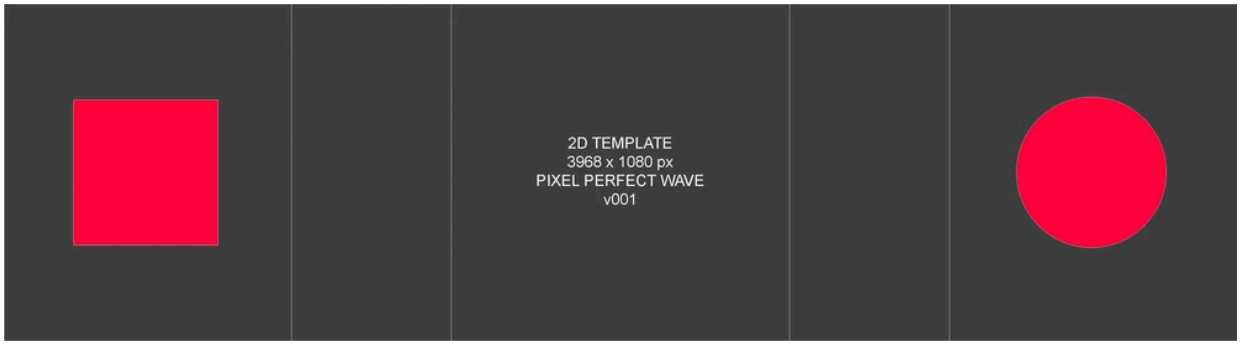
A pixel-perfect UV mapped surface in 3ds Max.

Step 2 - Rendering UV maps to content templates

The image below shows the content template, which was rendered from the UV map. The template's resolution was calculated by:

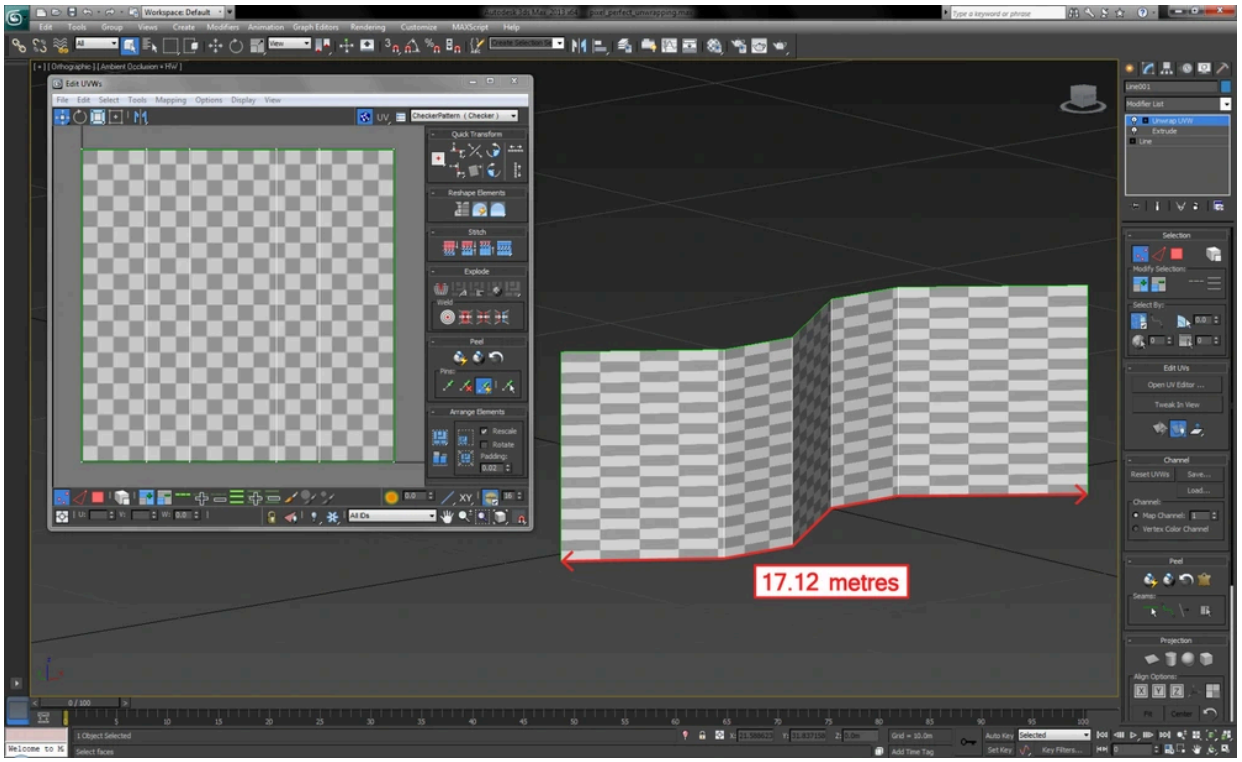
- Knowing precisely how many pixels produced by the projector will hit the projection surface, across **either** the horizontal or vertical axis.
- Dividing this value by the projection surface's dimension across the chosen axis, to calculate a **pixel density**.

- Multiplying the pixel density by the remaining axis' dimension, to calculate its resolution.



UV map rendered to a content template

It is important to measure the projection surface's dimensions based on the UV map. In this case, the total length of the extruded spline should be measured, because the extrusion automatically generated the normalised UV map



By calculating both the template's horizontal and vertical resolutions from a single pixel density value, the content should enable square pixels. This is important because if the resolution is calculated incorrectly the content may appear stretched across the projection surface. The template's resolution is 3698x1080 pixels. This was calculated by:

- Knowing approximately 1080 pixels will hit the projection surface vertically.

- 1080 pixels / 5 meters (the projection surface's height) = 216 pixels per meter (hitting the projection surface vertically).
- 216 pixels x 17.12 meters (the projection surface's length) = 3698 pixels (the horizontal resolution).

As a result, the aspect of the template's resolution should match that of the surface's dimensions. This can be checked by:

- Dividing the template's horizontal resolution by the vertical resolution.
- Dividing the surface's length by the physical height (remember to base the measurements on the UV map, explained earlier).

In this case:

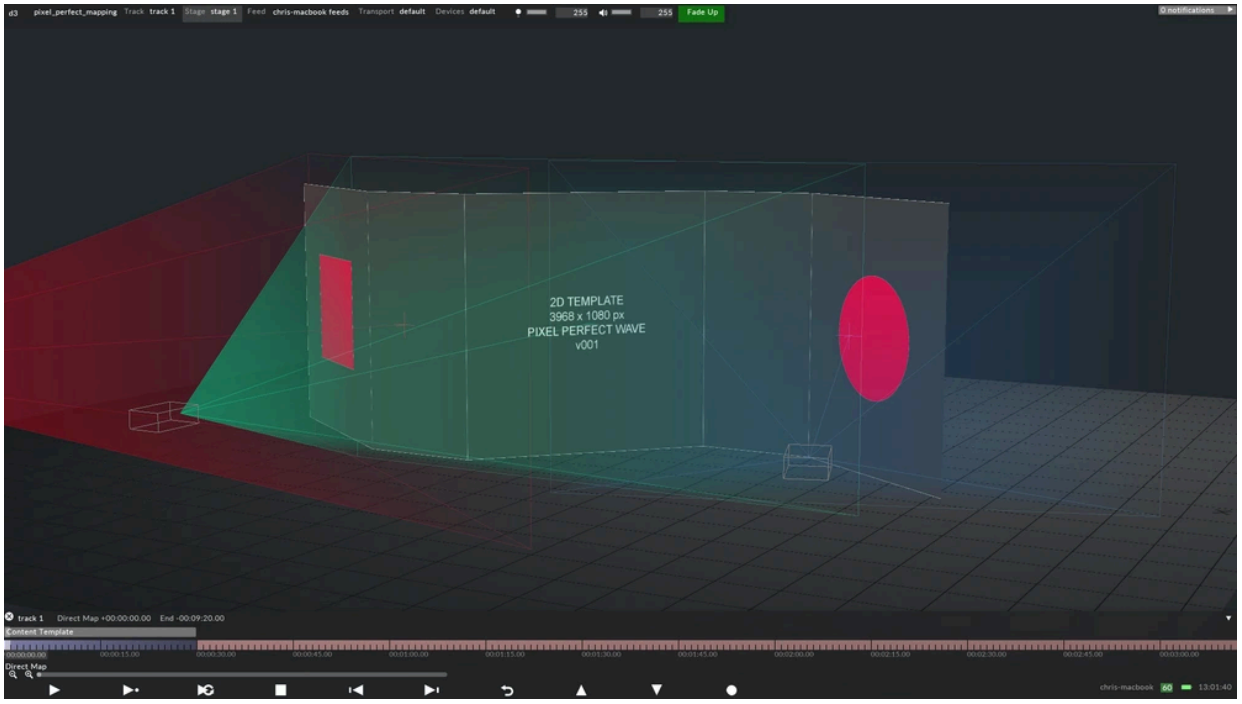
- 3698 / 1080 = 3.424
- 17.2 / 5 = 3.424

Both values are matching, which indicates the template's resolution is correct. To double-check this, a uniform square and circle should be drawn on the template in an image editing application, for example *Adobe Illustrator*, before the template is exported to . If the square and circle appear uniform across the screen in the template's resolution is correct.

Step 3 - Mapping content to screens

The image below shows the content template directly mapped to the screen in Disguise, which was exported as an `.obj` file from 3ds Max. n Designer three HD virtual projectors have been configured to sample content from the screen. Each virtual projector samples a different part of the screen, and in realtime the sampled content is outputted to the physical projectors by three unique feeds.

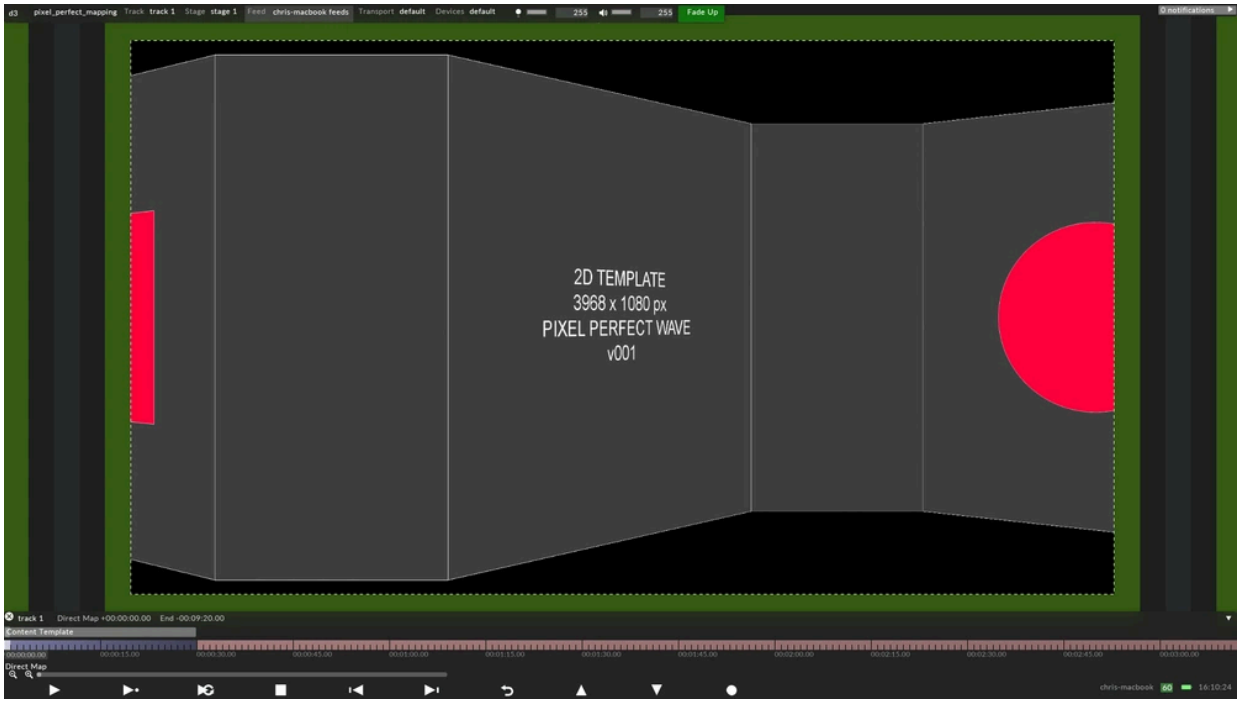
Remember to set the resolution of the screen in to match the content template by opening the Screen editor.



Template re-applied on the screen in Disguise.

Step 4 - Outputting content to projectors

The image below shows the three unique feeds to be outputted to the physical projectors. If a virtual projector changes position its corresponding output will automatically update in realtime to show the virtual projector's updated point of view. Therefore, if a virtual projector's position changes onsite, content does not require re-rendering, because the outputs are independent of the content. To read more about Disguise's projector simulation toolkit see the Projector simulation chapter, which explains how to perform quick calibration, warp, and blend projectors using Disguise.



The automatically generated outputs from the three virtual projectors.

Helpful resources

- Drawing splines in 3ds Max
- Extruding splines in 3ds Max
- Unwrapping UVs in 3ds Max
- Editing UVs in 3ds Max
- Rendering content templates in 3ds Max

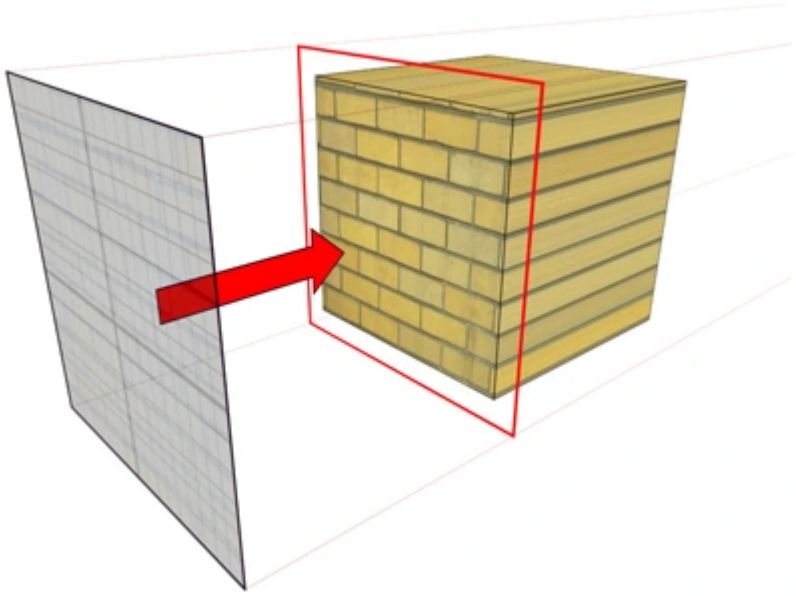
Projection Examples - Planar mapping

Planar mapping is suitable for projection surfaces that have:

- flat surfaces requiring one side to be UV mapped
- shallow surfaces requiring multiple oblique sides to be UV mapped
- for example a plane or a facade

How the UV map is generated

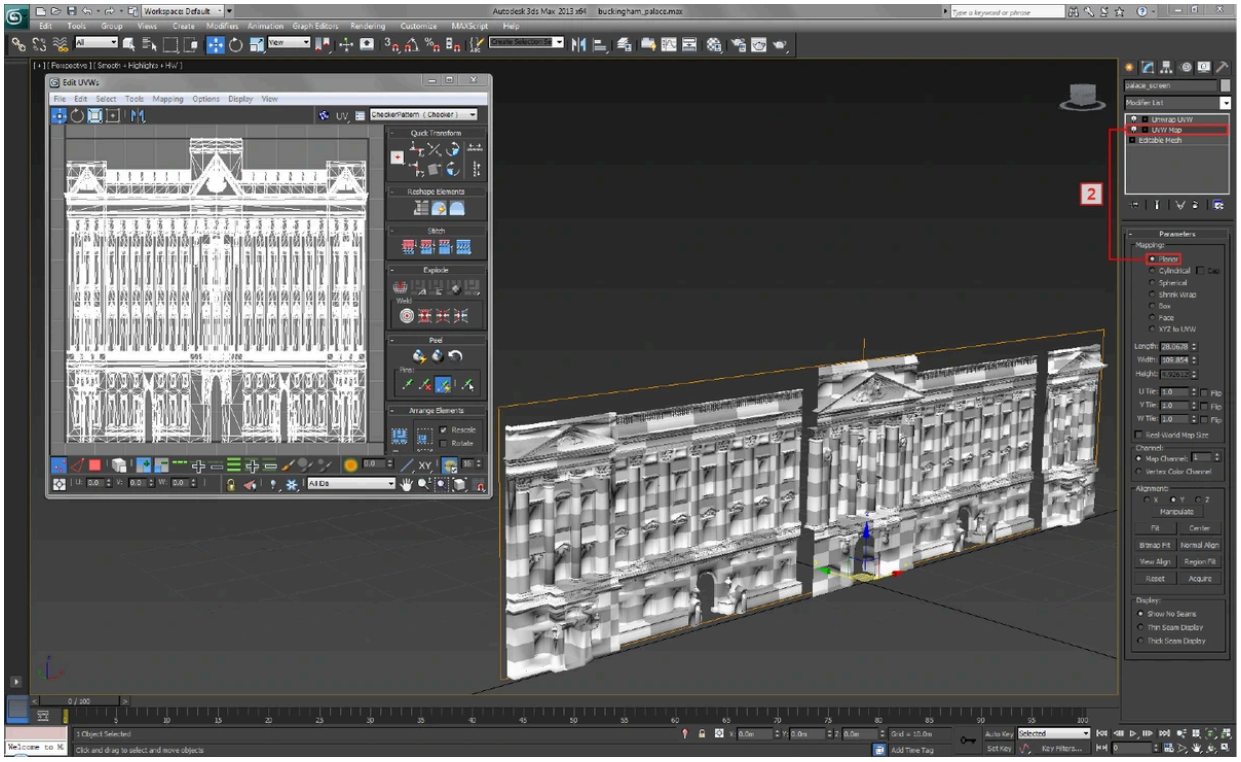
The Planar map will parallel project UV coordinates to the surface. Therefore, it is important to align the Planar map's position, orientation and scale to the surface.



Step 1 - Generating the UV map (3ds Max)

1. Select the UVW Map modifier.
2. From the list of projection types select planar.
3. The Planar map will project UV coordinates from its normals to the surface. Therefore, it is necessary to fit the planar map's position, orientation and scale to the surface.
4. Select the Unwrap UVW modifier.
5. Open the Edit UVWs window to view the UV map.

The image here shows a uniform checker pattern rendered to the surface, which indicates the UV map has an even distribution of UV coordinates, for all areas facing towards the Planar map. As a result, those areas have a higher UV density than the areas facingaway from the Planar map. For example, the windows' side faces have a lower UV density, which will result in content appearing stretched. To avoid this the UV map should be **relaxed**.



A 3D model of the Buckingham Palace planar mapped in 3ds Max.

Step 2 - Rendering UV maps to content templates

The image below shows the content template, which was rendered from the UV map. The template's resolution was calculated by following the same technique used for pixel-perfect projection surfaces. However, the key difference is this template was calculated by measuring the dimensions of the Planar map object, because in this case the Planar map automatically generated the normalised UV map.





A 2D content template of the Buckingham Palace rendered from 3ds Max.

Helpful Resources

- Projecting planar maps in 3ds Max
- Unwrapping UVs in 3ds Max
- Editing UVs in 3ds Max
- Relaxing UVs in 3ds Max
- Rendering content templates in 3ds Max

Projection Examples Overview

This sub-chapter will teach you how to UV map Projection screens for Designer. The following examples revisit the UV mapping principles covered in the previous sub-chapter. Therefore, it is recommended to read this first.

Topics include:

Several mapping types in Designer:

- Cylindrical Mapping
- Pelt Mapping
- Perspective Mapping
- Pixel-perfect Mapping
- Planar Mapping
- Shrink Wrapping
- Spline Mapping

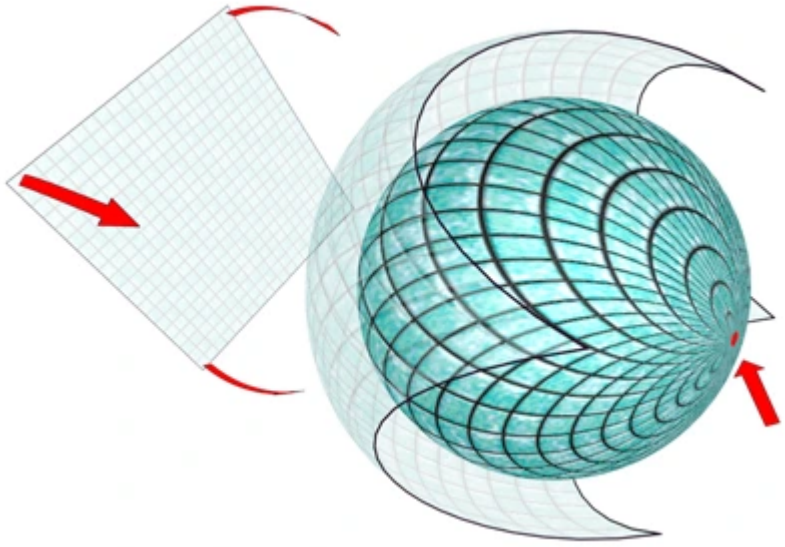


Projection Examples - Shrink wrapping

Shrink wrapping is suitable for projection surfaces curving across multiple axes, for example a sphere or a car. However, depending on the creative requirements, a Pelt map may be more suitable.

How the UV map is generated

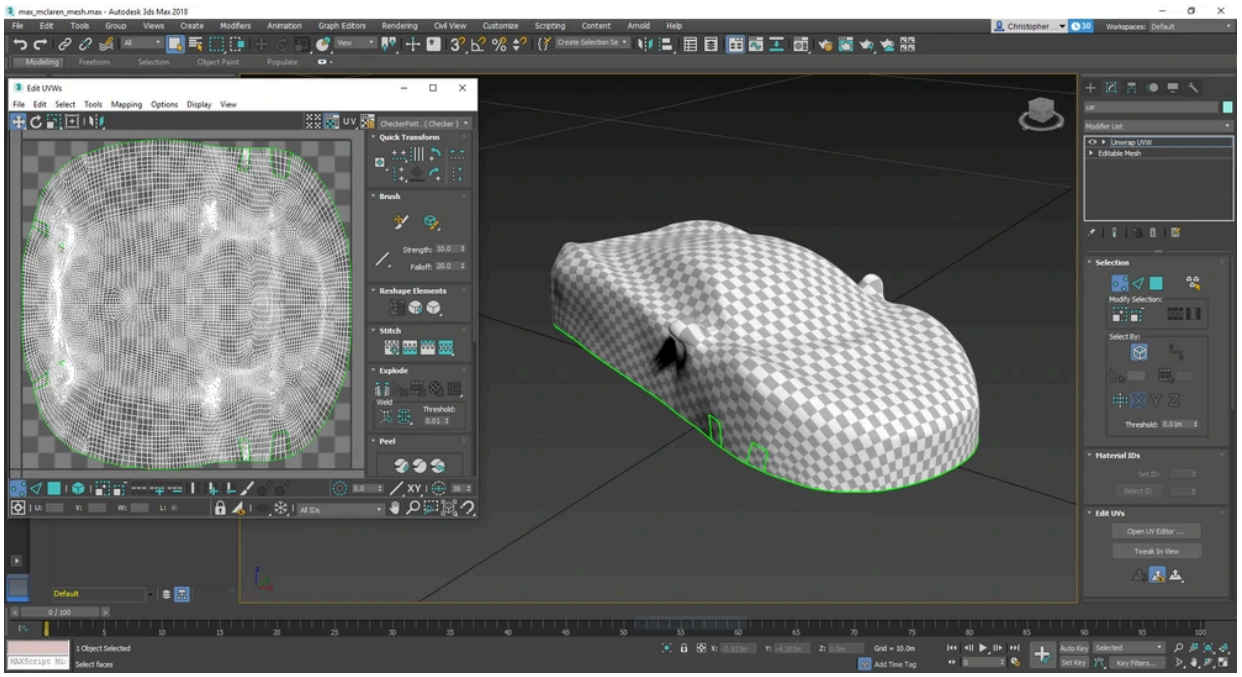
The Shrink wrap will spherically project UV coordinates to the surface, by truncating the corners of the map and joining them at a single pole. This will enable content to flow across the surface smoothly, because the UV map will only contain one singularity.



Step 1 - Generating the UV map (3ds Max)

1. Select the UVW Map modifier.
2. From the list of projection types select shrink wrap.
3. The shrink wrap will project UV coordinates from its normals to the surface. Therefore, it is necessary to fit the shrink wrap's position, orientation and scale to the surface.
4. Select the **Unwrap UVW modifier**.
5. Open the Edit UVWs window to view the UV map.

The image below shows a non-uniform checker pattern rendered to the surface, which indicates the UV map has an uneven distribution of UV coordinates. To fully unwrap the surface the UV map should be relaxed.



A 3D model of the Audi A7 mesh shrink wrapped in 3ds Max.

Step 2 - Rendering UV maps to content templates

The images below show the content template and how its resolution was calculated. When a projection surface is shrink wrapped, it is problematic to calculate the resolution mathematically. However, it is possible to calculate the resolution visually. The template's resolution is 3448x1424 pixels.This was calculated following the steps below:

1. Export the projection surface as an .obj from the 3D application to Designer. Remember to export the .obj's texture coordinates, as explained in the Exporting UV maps page.
2. In Disguise, add the .obj to the Stage as a Screen.
3. Create a Bitmap layer on the Timeline.
4. From the layer's DxTexture library, select a texture with a square aspect.
5. Direct map the texture to the screen.
6. Set the layer's scale mode to pixel-perfect.
7. From the screen's editor, set a resolution for the horizontal or vertical axis that matches or preferably exceeds, the projector's pixel density. This requires knowing precisely how many pixels produced by the projector will hit the projection surface.
8. Increase / decrease the screen's resolution across the remaining axis until the texture appears square. This will ensure square pixels are enabled.
9. Offset the texture using the pos x and y parameters, to check square pixels are visible across the entire surface.



A square Bitmap Direct mapped to the car screen in Disguise.



A content template rendered from the Audi A7 UV map with a paint texture baked into the shrink wrap.

Helpful Resources

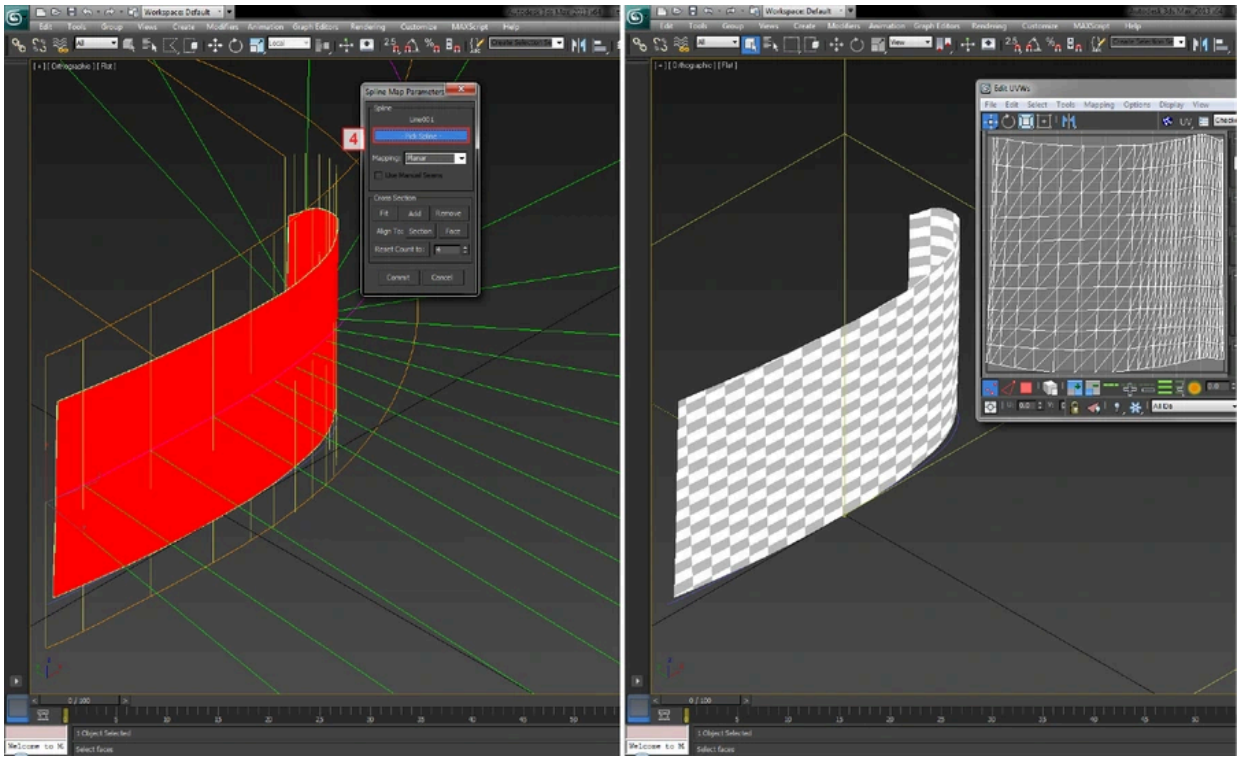
- Projecting shrink wraps in 3ds Max
- Unwrapping UVs in 3ds Max
- Editing UVs in 3ds Max
- Flattening UVs in 3ds Max
- Unfolding UVs in 3ds Max
- Rendering content templates in 3ds Max

Projection Examples - Spline mapping

Spline mapping is suitable for projection surfaces curving across multiple axes, for example a coiled snake or a winding road.

How the UV map is generated

The Spline map will extrude UV coordinates from a selected spline to be projected to the surface. This will enable content to flow across the surface smoothly, because the UV coordinates will match the surface's curvature.



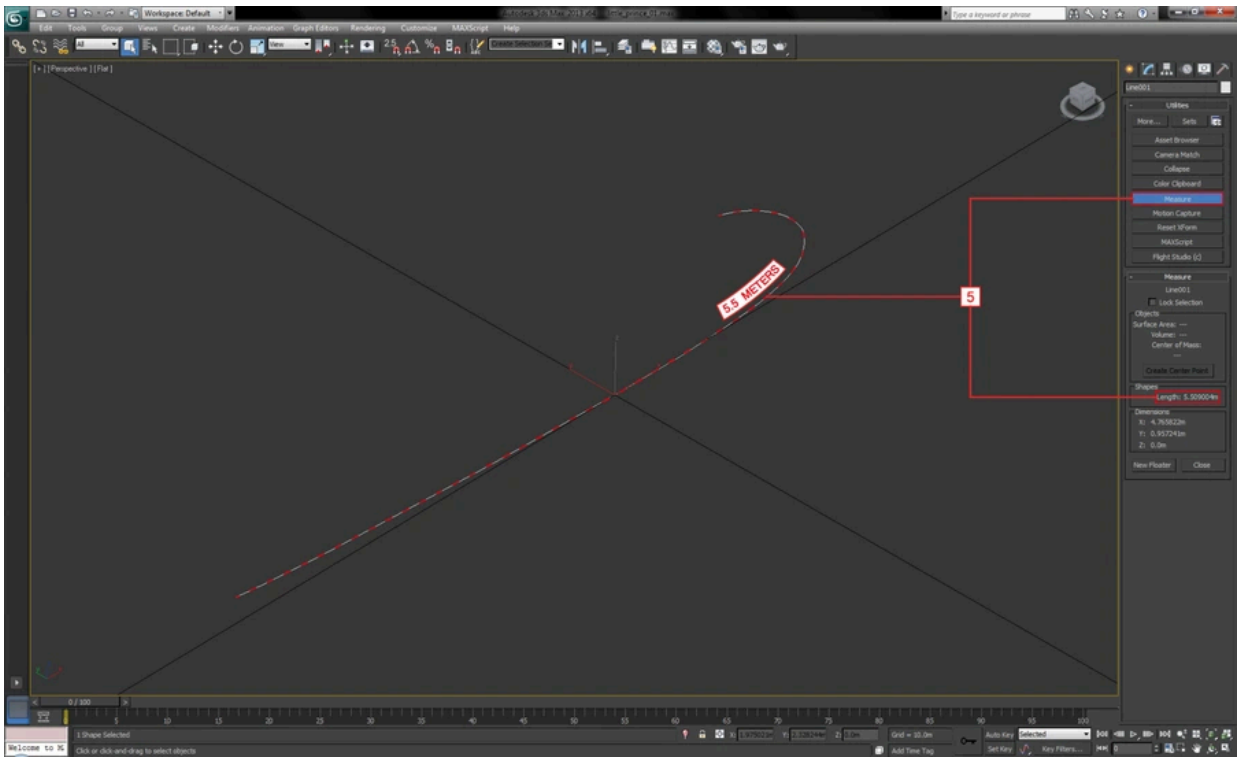
Step 1 - Generating the UV map

The following steps are instructions for generating UVs in 3ds Max.

1. Draw a spline that snaps to the surface's bottom edge.
2. Plot all the vertices in the same vertical position to ensure the UV projection is orientated correctly.
3. Plot the spline across the surface's widest points to ensure the UV projection is assigned to the entire surface.

4. Select Unwrap UVW modifier.
5. Select all of the surface's faces.
6. From the list of projection types select spline mapping.
7. From the spline map's parameters select pick spline.
8. Open the Edit UVWs window to view the UV map.
9. Rotate and normalise the UV map, if necessary.

The image here shows a uniform checker pattern rendered to the surface, which indicates the UV map has an even distribution of UV coordinates.

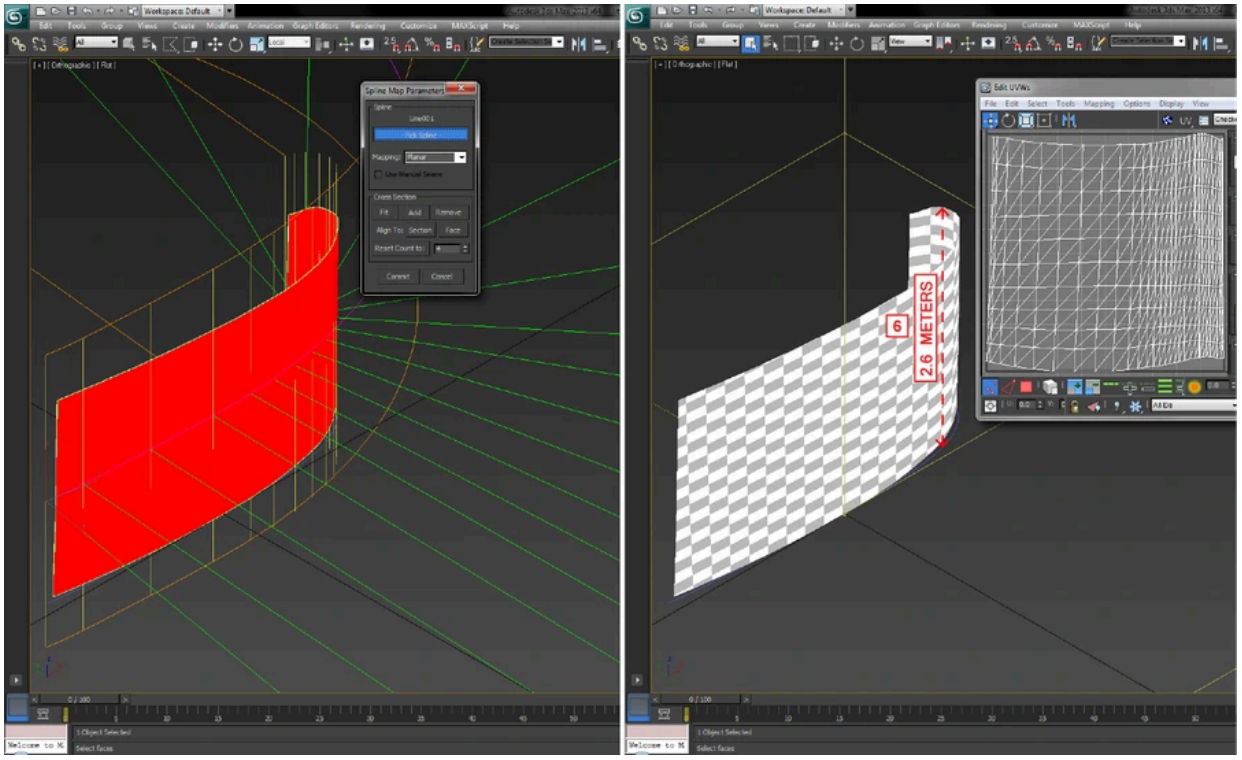


A 3D model of a screen from the Little Prince musical spline mapped in 3ds Max.

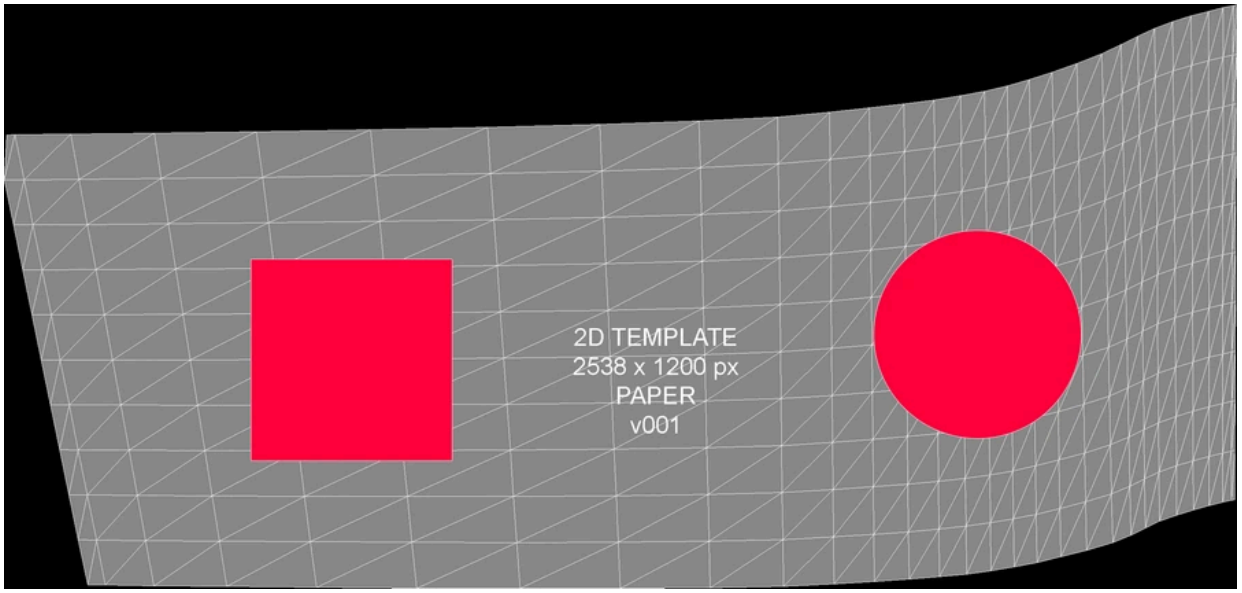
Step 2 - Rendering UV maps to content templates

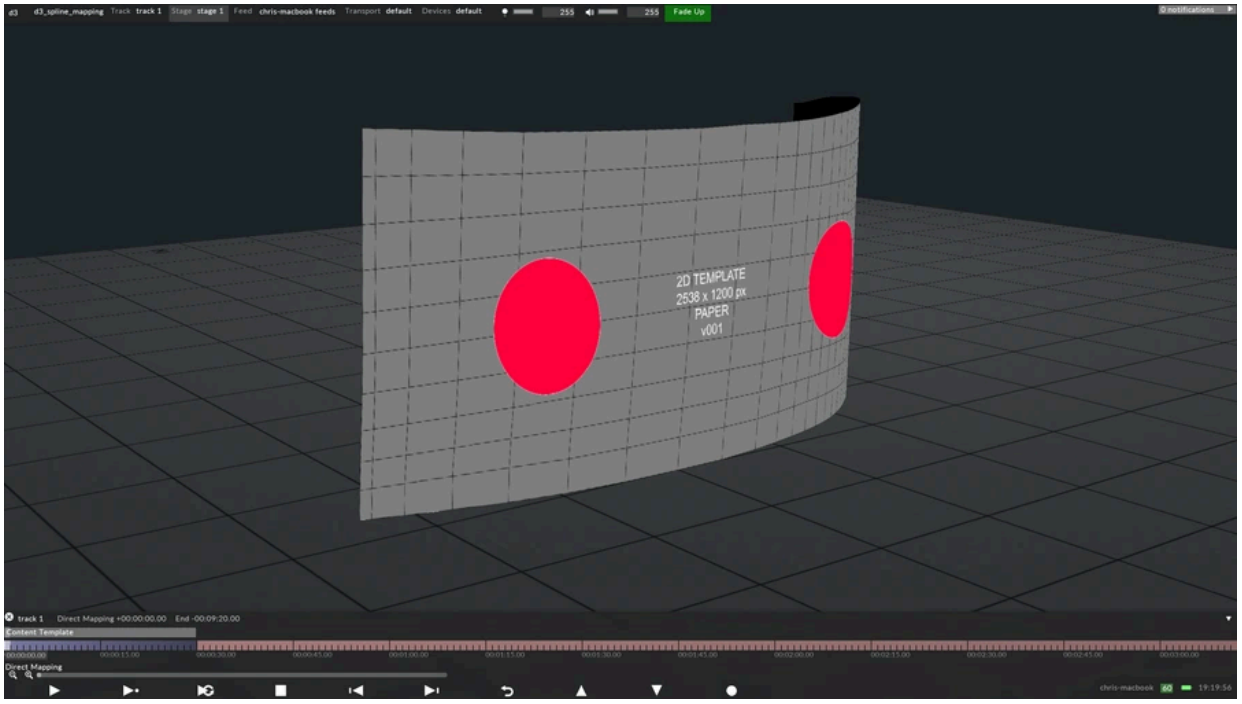
The images below show the content template and how its resolution was calculated. The template's resolution was calculated by following the same technique used for pixel-perfect projection surfaces. However, the key difference is this template was calculated by measuring the total length of the extruded spline, because in this case the extrusion automatically generated the UV map.

The 3D application should calculate the total length of the spline automatically. In 3ds Max select the spline, **Command Panel > Utilities > Measure**.



The length of the spline can be measured by selecting it and then selecting Utilities > Measure.





A 2D content template of a screen from the Little Prince musical rendered from 3ds Max.

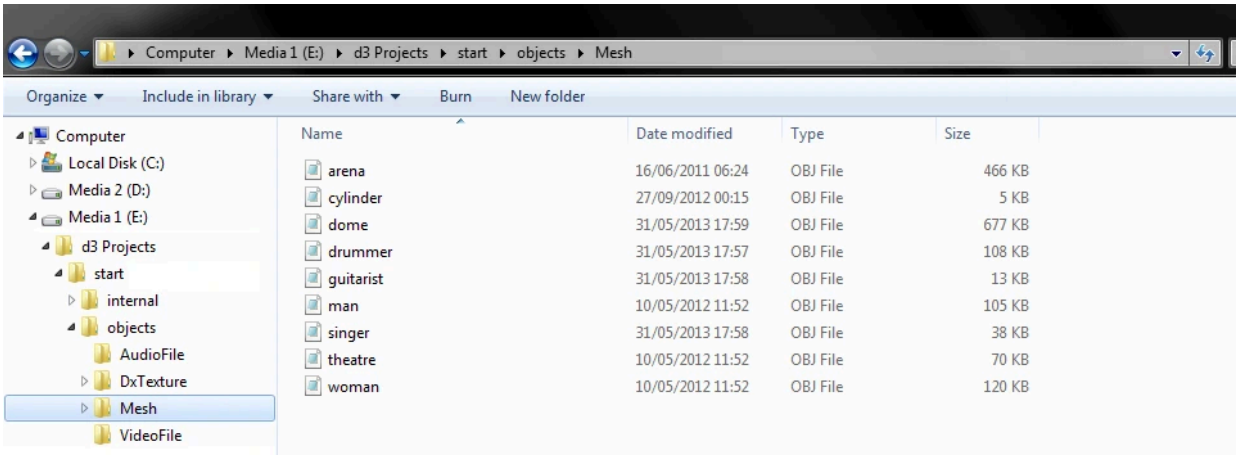
Helpful Resources

- Projecting spline maps in 3ds Max
- Unwrapping UVs in 3ds Max
- Editing UVs in 3ds Max
- Flattening UVs in 3ds Max
- Unfolding UVs in 3ds Max
- Rendering content templates in 3ds Max

Understanding .obj files

An **.obj** file is a format containing data for an object's vertices, polygons and texture coordinates.

The image below shows a Disguise project containing common **.obj** files which can be separated into two categories: **Screens** and **Props**. A Screen is an object representing a **video display**, for example a projection dome, and requires a **UV map** to display video content. A Prop is an object representing a **scenographic element**, for example a theatre venue, and does not always require a UV map. To read more about where to place media, see the Placing media files for a project page. To read more about UV mapping, see the What is UV mapping page.



Common .obj files contained in the Disguise Start project.

Helpful Resources

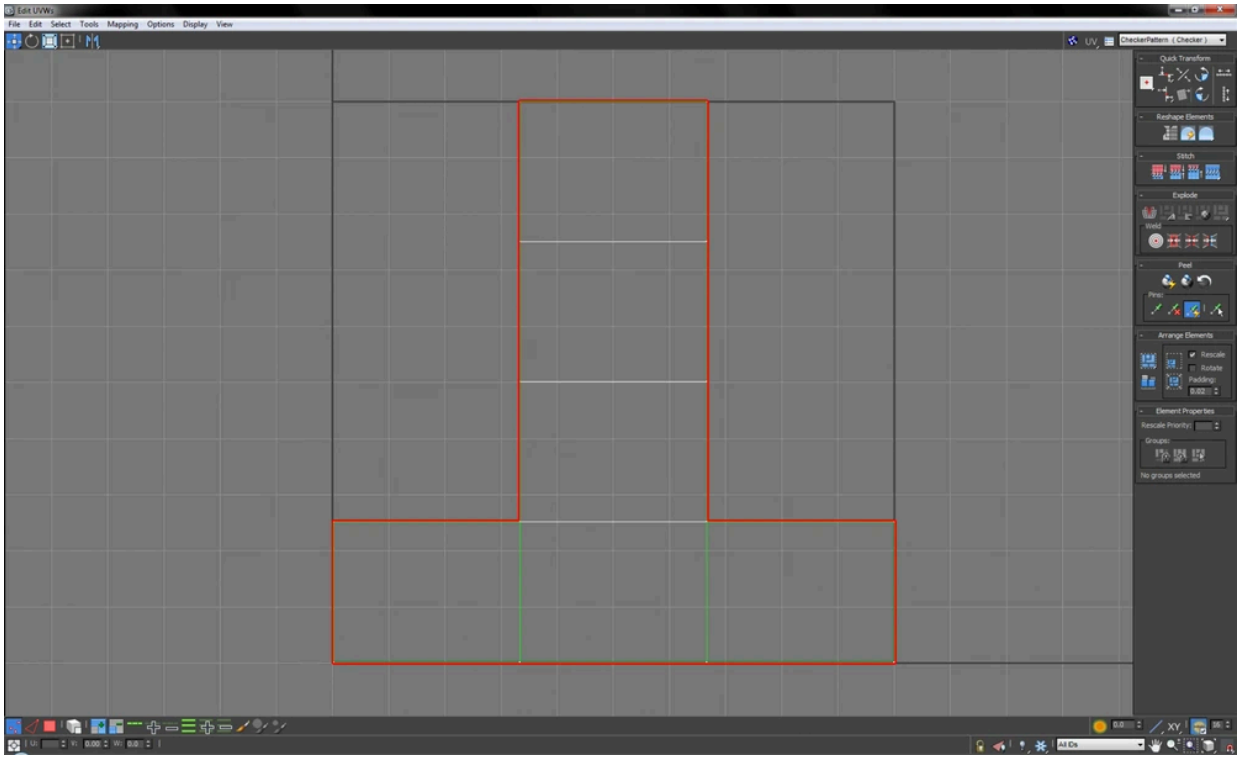
Wavefront OBJ File Format Summary

Editing UV maps

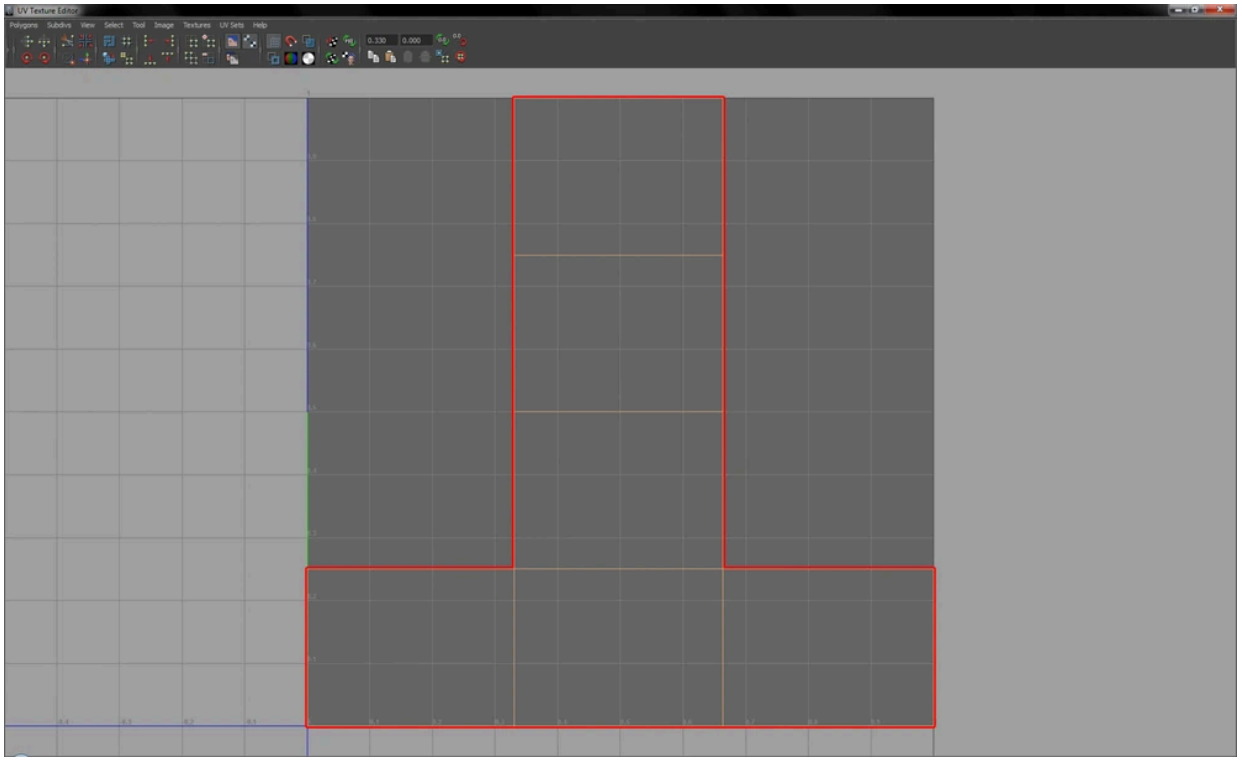
Usually after you've generated an appropriate UV map you may still need to edit the UV coordinates manually. Regardless if you have to do that or not you should always inspect the UV layout before exporting the object. 3d Max, Maya and Cinema4D offers powerful tools and plugins to do so.

The most commonly used operations for editing UV coordinates are:

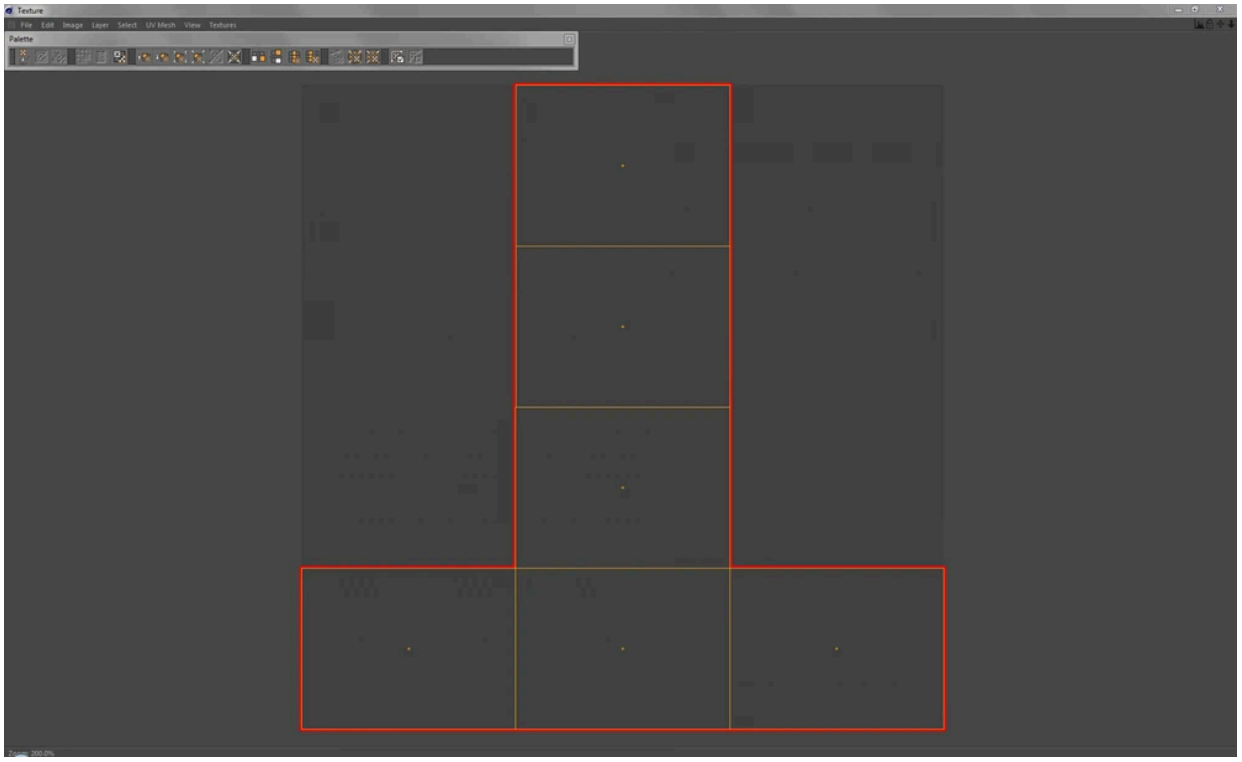
- Re-scale UV coordinates horizontally or vertically, or both.
- Move UV vertices and/or faces.
- Rotate UV coordinates.
- Mirror UV coordinates.
- Snap UV coordinates to each other.
- Relax UV coordinates.
- Normalize UV coordinates.



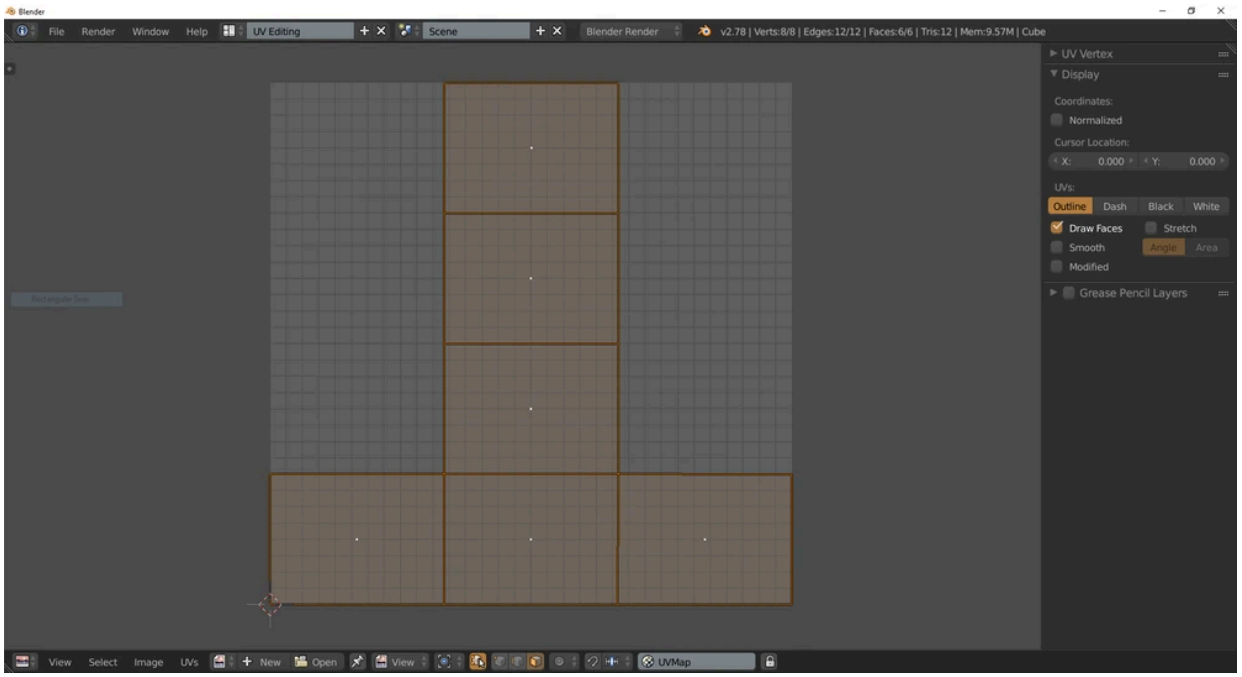
UV editor of 3ds Max



UV editor of Maya



UV editor of Cinema4D



UV editor of Blender

Helpful resources

3ds Max

- Unwrap UVW Modifier
- UVW Editor

Maya

- UV editor
- Viewing and evaluating UVs

The UV map as the Hardware Output

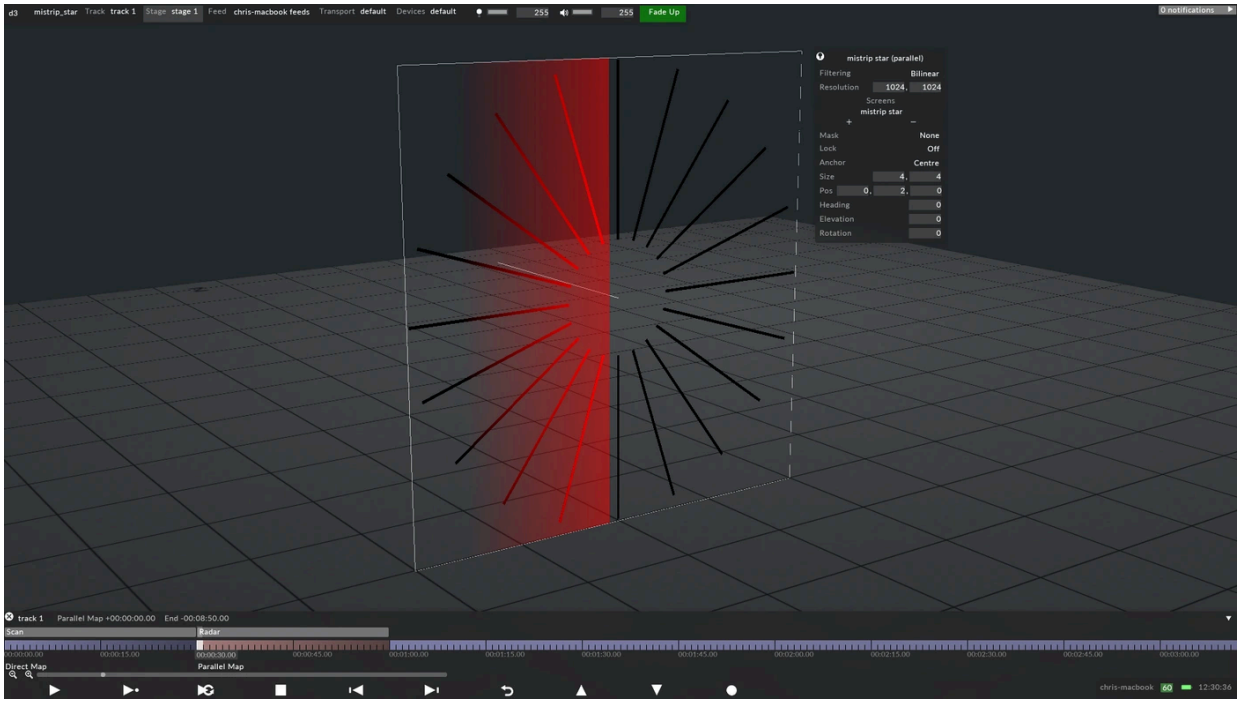
Direct mapping means that content is being applied directly onto the UV map of the screen's mesh, inside Disguise's visualiser. But the UV map itself, set to the assigned resolution by the screen editor also turns into the output that can be added to the displayhead and further sent to the LED processor. The output is captured by the processor pixel per pixel and sent to the physcial LED technology. As LED processors only can capture strict rectangular outputs it is therefore necessary to generate a precise grid-like UV map for LED screens.

Creative and Technical workflow separation

With Designer's advanced capabilities of mapping surfaces in various ways (using the different Mapping types), you are not bound not to make content only according to the layout of the UV map or resolution of the screens. Content can for example be virtually projected using a Parallel map, Perspective map, Cylindrical map, Radial map, or re-distributed using a Feed map. Only when using a Direct Map the content is applied directly onto the UV coordinates. When virtually projecting the content onto the pixels using a Parallel map the content instead gets "baked" it into the respective UV maps of all screens included in the map while the output always stays in the format of the UV maps.

With this unique system, you can use multiple content templates (i.e. mapping types) throughout your project while the outputs always stay in the same format defined by the UV map of the screens. As a result of this the content workflow and the technical output get separated; the content people can work from content templates that don't reflect the layout of the outputs.

In the example below a screen made of 20 MiStrips receives content from a Parallel map. The Parallel map virtually projects the content into the UV coordinates of the object, i.e the content gets baked into the UV coordinates as explained above. However, the output is still in the format of the UV map and is to be captured by a LED processor.

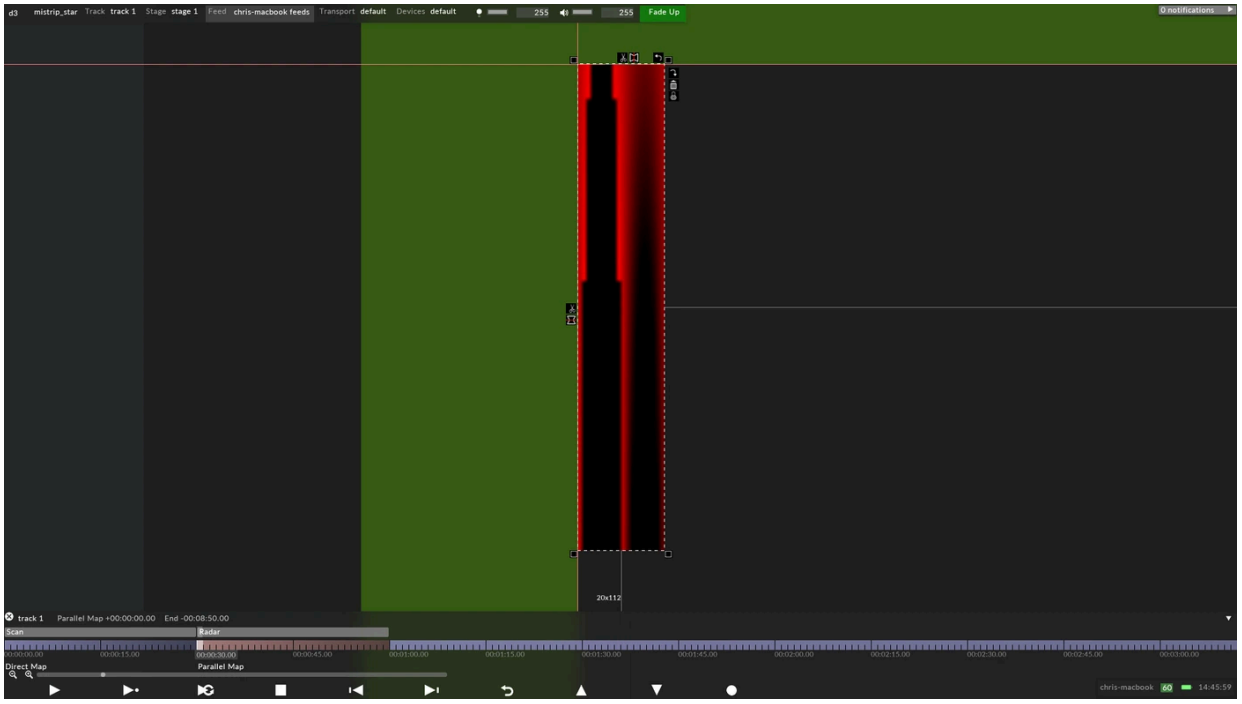


Content rendered out onto a display head for an LED processor to receive from Disguise.

Re-configure the outputs

If the output does not match the LED processor's specifications, it can be reconfigured using Disguise's quick editing controls including the ability to re-position, chop, mirror, and rotate the output.

This allows for even more freedom and separation between the creative and technical workflow.



Same example as above but the output has been reconfigured using Disguise's quick editing controls.

UV mapping documentation

This sub-chapter will teach you the specific principles necessary to UV map 3D models for Disguise.

Topics include:

- What is UV mapping?
- How does Designer sample UV maps?
- The UV map as the hardware output
- The UV map exported as the content template
- Editing UV maps



The UV map as the content template

As explained on the previous page, the UV map determines the output to the LED processor. However, preparing UV maps for projection surfaces requires a different workflow.

Normally the projection surface is unwrapped into a texture that the content creator can generate video content from, in a similar way to how artists texture 3D models in the video games industry. The UV map is rendered into a content template to be placed as a background in Adobe Photoshop, Illustrator, After Effects or any other image / video editing application. The template's resolution is calculated from two variables: aspect and density.

- The template's aspect ratio should match the UV map's to enable square pixels. This requires knowing precisely how the UV coordinates have been mapped to the 3D model. If the aspect is calculated incorrectly the rendered content may appear stretched across the projection surface.
- The template's pixel density should match, or preferably exceed, the projector's to enable a 1:1 pixel density. This requires knowing precisely how many pixels produced by the projector will hit the projection surface. If the density is calculated incorrectly the content may appear pixelated across the projection surface.

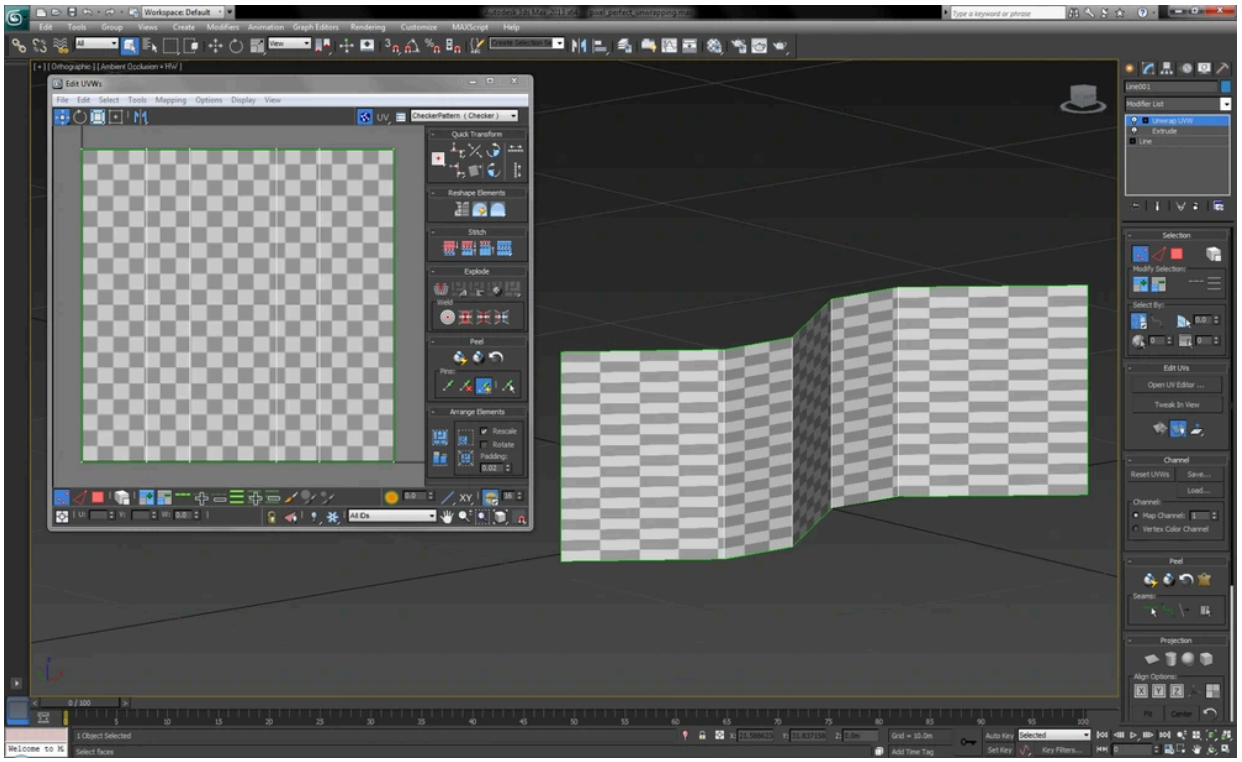
When video content has been rendered from the content template, it can then be Direct mapped to the screen in Designer. The content will map perfectly to the 3D model if the UV map for the template matches the UV map for the screen. In Designer, virtual projectors can be configured to sample content from the screen, and in realtime the sampled content is outputted to the physical projectors. Therefore, the projector outputs are independent of the content, which means the creative workflow for the content creator is separated from the technical workflow for the hardware technicians, as explained in The UV Map as the Hardware Output page.

Example

The example below demonstrates how the unwrapped UV map is rendered into a 2D image which can be used as a background template for 2D animations. When re-applied onto the screen in , the same template perfectly maps onto the 3D geometry. Virtual projectors are then sampling different parts of the screen and sends the output to the physical projectors. In this example, three HD projectors are covering the screen. This example below is identical to the example on the Pixel Perfect mapping page except the details how to create the UV map.

Step 1 - initial UV unwrap

The UV map has been unwrapped and normalised. See the Pixel Perfect Mapping page for more details how to create the UV map.

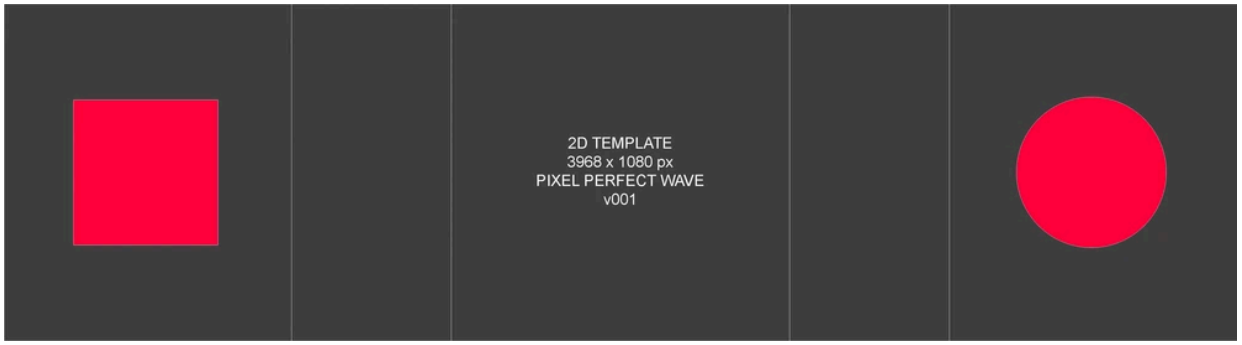


The UV map of the linear screen has been unwrapped and normalized.

Step 2 - Rendering UV maps to content templates

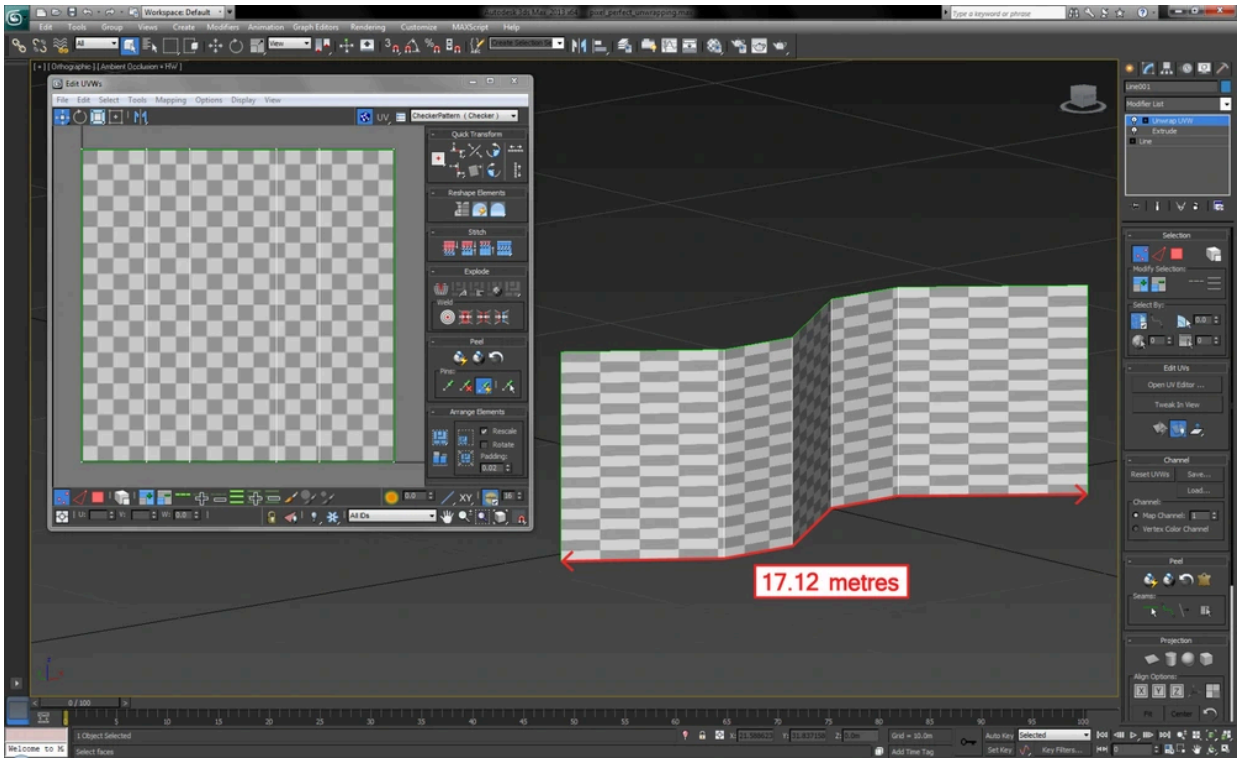
The image below shows the content template, which was rendered from the UV map. The template's resolution was calculated by:

- Knowing precisely how many pixels produced by the projector will hit the projection surface, across either the horizontal or vertical axis.
- Dividing this value by the projection surface's dimension across the chosen axis, to calculate a pixel density.
- Multiplying the pixel density by the remaining axis' dimension, to calculate its resolution.



UV map rendered to a content template.

It is important to measure the projection surface's dimensions based on the UV map. In this case, the total length of the extruded spline should be measured, because the extrusion automatically generated the normalised UV map.



By calculating both the template's horizontal and vertical resolutions from a single pixel density value, the content should enable square pixels. This is important because if the resolution is calculated incorrectly the content may appear stretched across the projection surface The template's resolution is 3698x1080 pixels. This was calculated by:

- Knowing approximately 1080 pixels will hit the projection surface vertically.
- 1080 pixels / 5 metres (the projection surface's height) = 216 pixels per metre (hitting the projection surface vertically).

- 216 pixels x 17.12 metres (the projection surface's length) = 3698 pixels (the horizontal resolution).

As a result, the aspect of the template's resolution should match that of the surface's dimensions. This can be checked by:

- Dividing the template's horizontal resolution by the vertical resolution.
- Dividing the surface's length by the physical height (remember to base the measurements on the UV map, explained earlier).

In this case:

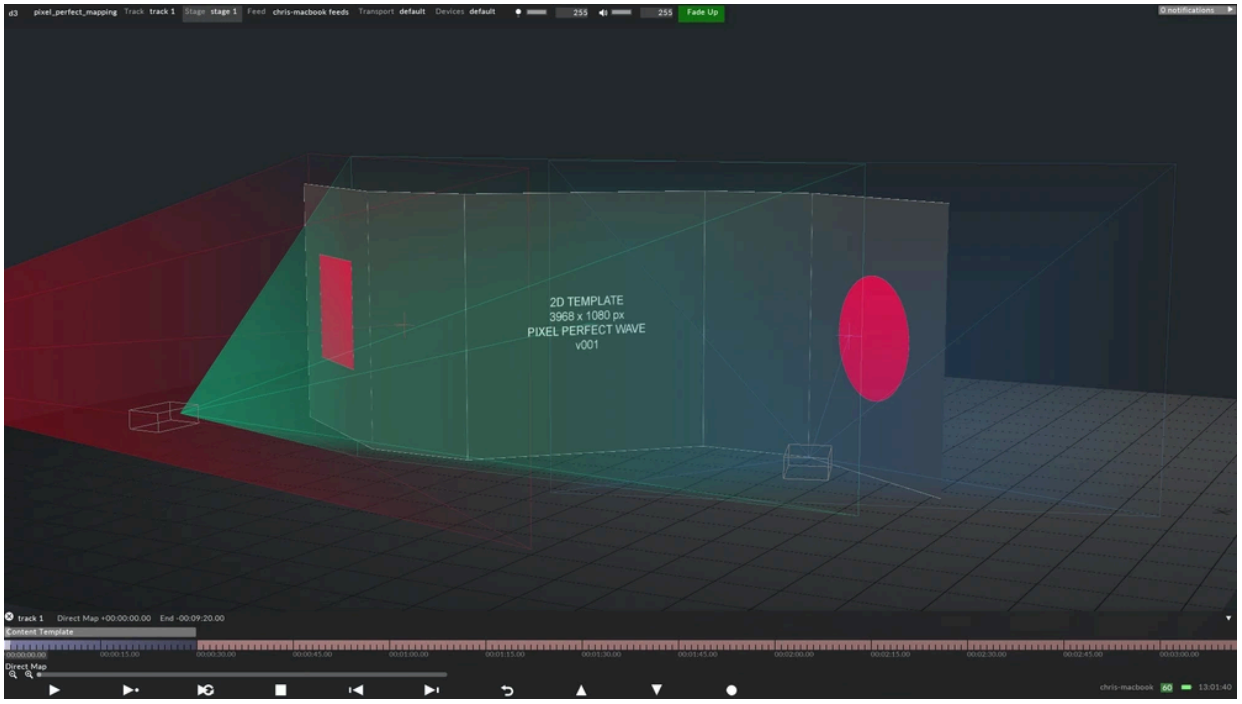
- 3698 / 1080 = 3.424
- 17.2 / 5 = 3.424

Both values are matching, which indicates the template's resolution is correct. To double-check this, a uniform square and circle should be drawn on the template in an image editing application, for example **Adobe Illustrator**, before the template is exported to . If the square and circle appear uniform across the screen in the template's resolution is correct.

Step 3 - Mapping content to screens

The image below shows the content template directly mapped to the screen in , which was exported as an .obj file from 3ds Max. In Disguise, three HD virtual projectors have been configured to sample content from the screen. Each virtual projector samples a different part of the screen, and in realtime the sampled content is outputted to the physical projectors by three unique feeds.

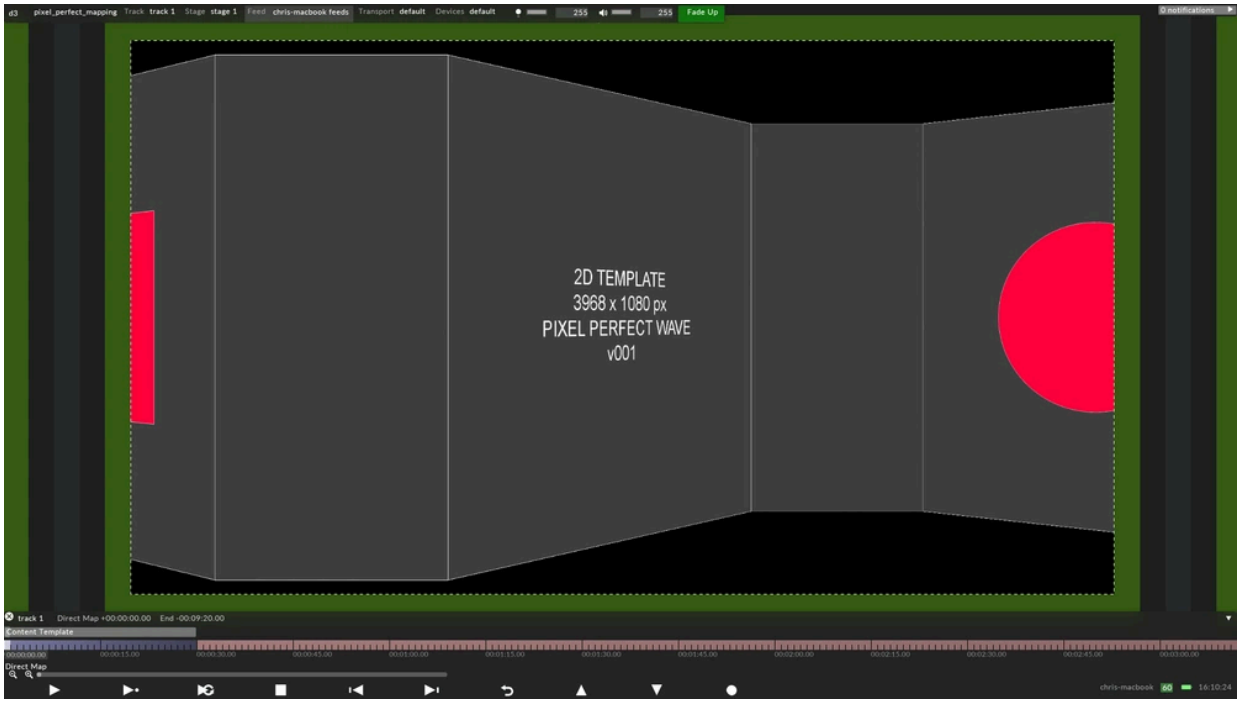
Remember to set the resolution of the screen in to match the content template by opening the Screen editor.



Template re-applied on the screen in Designer.

Step 4 - Outputting content to projectors

The image below shows the three unique feeds to be outputted to the physical projectors. If a virtual projector changes position its corresponding output will automatically update in realtime to show the virtual projector's updated point of view. Therefore, if a virtual projector's position changes onsite, content does not require rerendering, because the outputs are independent of the content. To read more about Disguise's projector simulation toolkit see the Projector simulation chapter, which explains how to quick calibrate, warp, and blend projectors.



The automatically generated outputs from the three virtual projectors.

Helpful Resources

- Unwrapping UVs in 3ds Max
- Editing UVs in 3ds Max
- Flattening UVs in 3ds Max
- Unfolding UVs in 3ds Max
- Rendering content templates in 3ds Max

How does Disguise Designer sample UV maps?

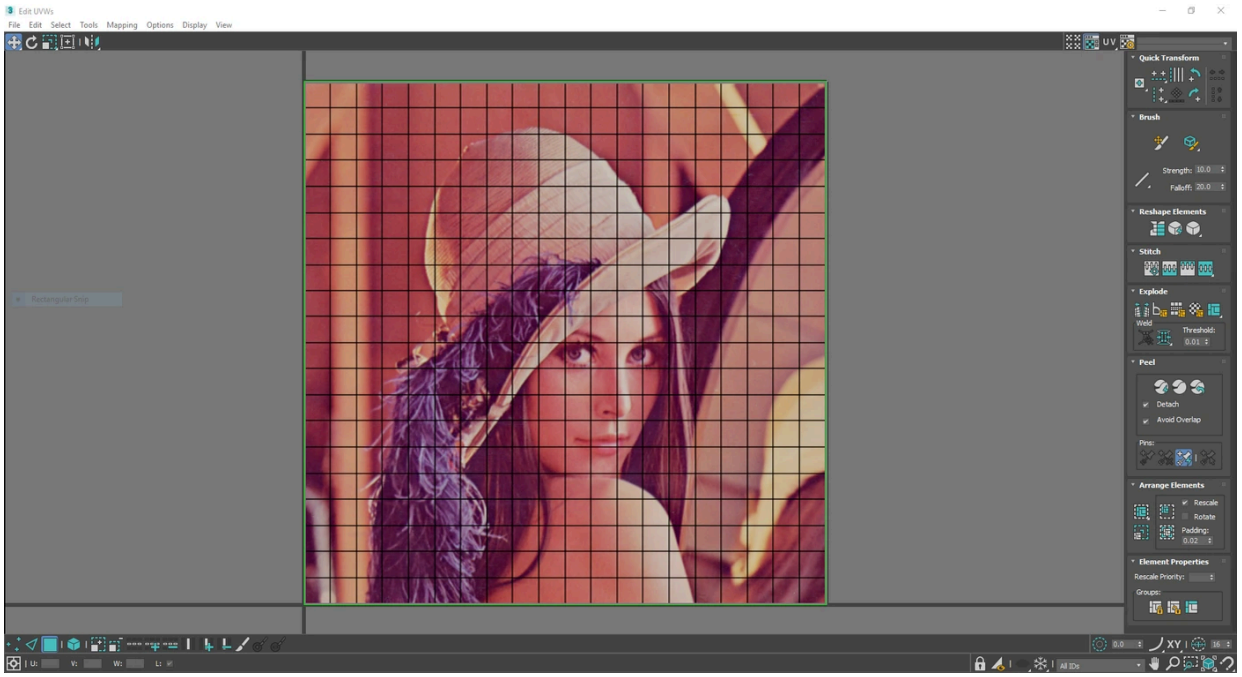
In Designer, all meshes used for displays such as LED screens or Projection surfaces require a UV map to function. This is important because if a display does not contain a UV map it will display black and cannot be used for any mapping or output.

A UV map tells Disguise how to translate back and forth between the 2D source content and the mesh's 3D polygons for visualisation and to enable Disguise's 3D content mapping & projection mapping capabilities.

A UV map does not specify the aspect ratio or resolution of the mesh. UVs are defined in what is called 'normalised coordinates', which means they must have values between 0 and 1 on both the U and V axes, and there should not be any gaps left at the edges of the UV 'box'.

This normalised property of UV maps enables you to select the appropriate resolution and aspect ratio based on artistic and technical requirements from within the d3 visualiser. The aspect ratio of the display is usually defined by the position and size of the 3D geometry of the mesh, while the resolution is determined based on the LED product or projector type and positioning within d3, depending on the display technology used. Aspect ratio is determined by the ratio between the horizontal and vertical dimensions of the display resolution.

For example, if Designer is started with a standard 'rectangle' mesh on a display, the mesh has 4 vertices in each corner with normalised UV coordinates at (0,0), (0,1), (1,0), and (1,1). The display is set to 1920x1080 resolution. The software will sample source content 1920 times across each of the 1080 lines stretching across the mesh polygons. If d3 wishes to know the 3D location of the second pixel on the second line, the UV coordinate (0.0005, 0.0009), or (1/1920, 1/1080) is found, and d3 calculates the corresponding 3D location.

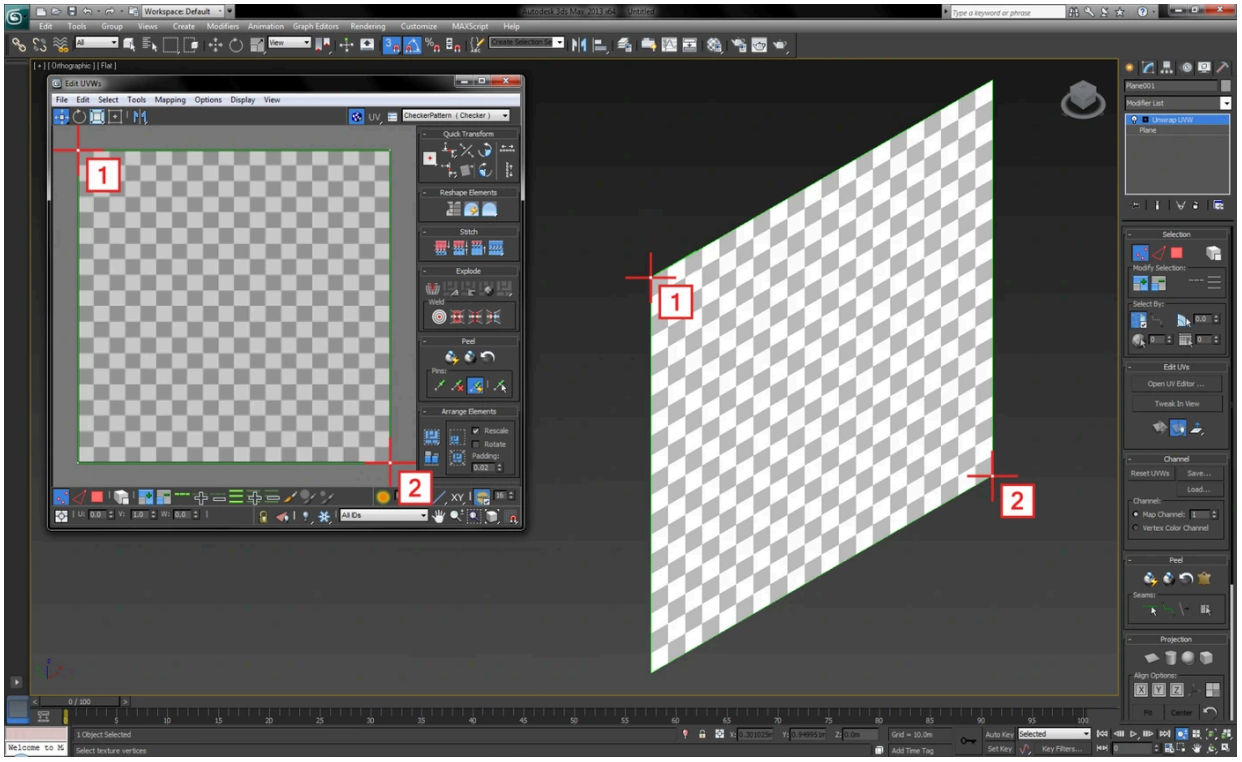


Screen in sampling the UV map shown in 3ds Max. The screen's top left pixel is sampling the UV map's top left quad.

Normalising UV maps

Normalising is the process of scaling the UV map to fill UV space entirely from a range of 0-1 in both the U and V axes. When Disguise samples the UV map it will capture the entire UV space. Therefore, it is important to normalise the UV map correctly while setting the resolution of the screen in Disguise correctly, because together these will determine how video content is mapped to the screen.

The normalised UV map is capable of generating uniform pixels across the 3D model if the resolution of the screen is set correctly in Designer. To do so, the resolution must be set to a non-square aspect, and this is possible because Disguise can read textures with different horizontal and vertical resolutions. However, a non-normalised UV map is capable of generating uniform pixels too, although in this case the resolution should be set to a square aspect in Disguise, for example 1024x1024 pixels. However, here the disadvantage is the UV map is sampling less UV space, resulting in more virtual pixels that will not be visible in Disguise. To read more about setting screen resolutions see the Screen editor page.



The UV map has been normalised allowing for all pixels set in Disguise's screen editor to be assigned on the screen.

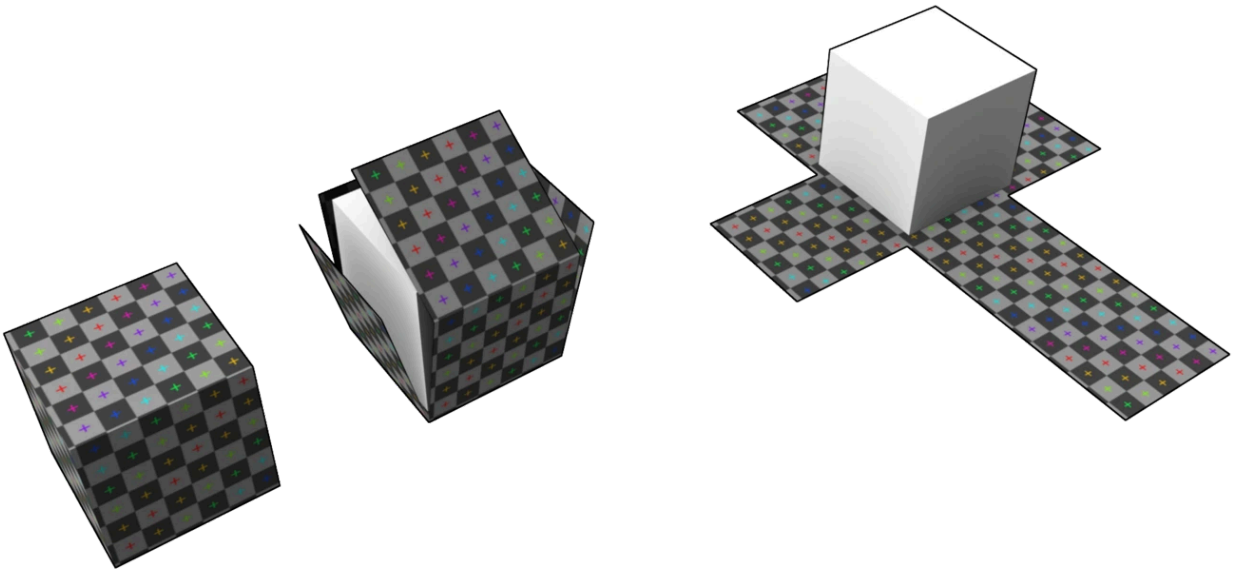
Helpful Resources

- Normalize UV's (Maya)
- PolyUnwrapper (3ds Max plugin)

What is UV mapping?

UV mapping is the process of generating a 2D representation of a 3D object.

This 2D representation is constructed from UV coordinates, which are commonly known as texture coordinates. U represents the horizontal axis and V represents the vertical axis. Each UV coordinate has a corresponding point in 3D space called a vertice. Together vertices form edges, edges form faces, faces form polygons, and polygons form surfaces. The image below shows how a cube in 3D space can be unwrapped into a texture in 2D space to generate a UV map.

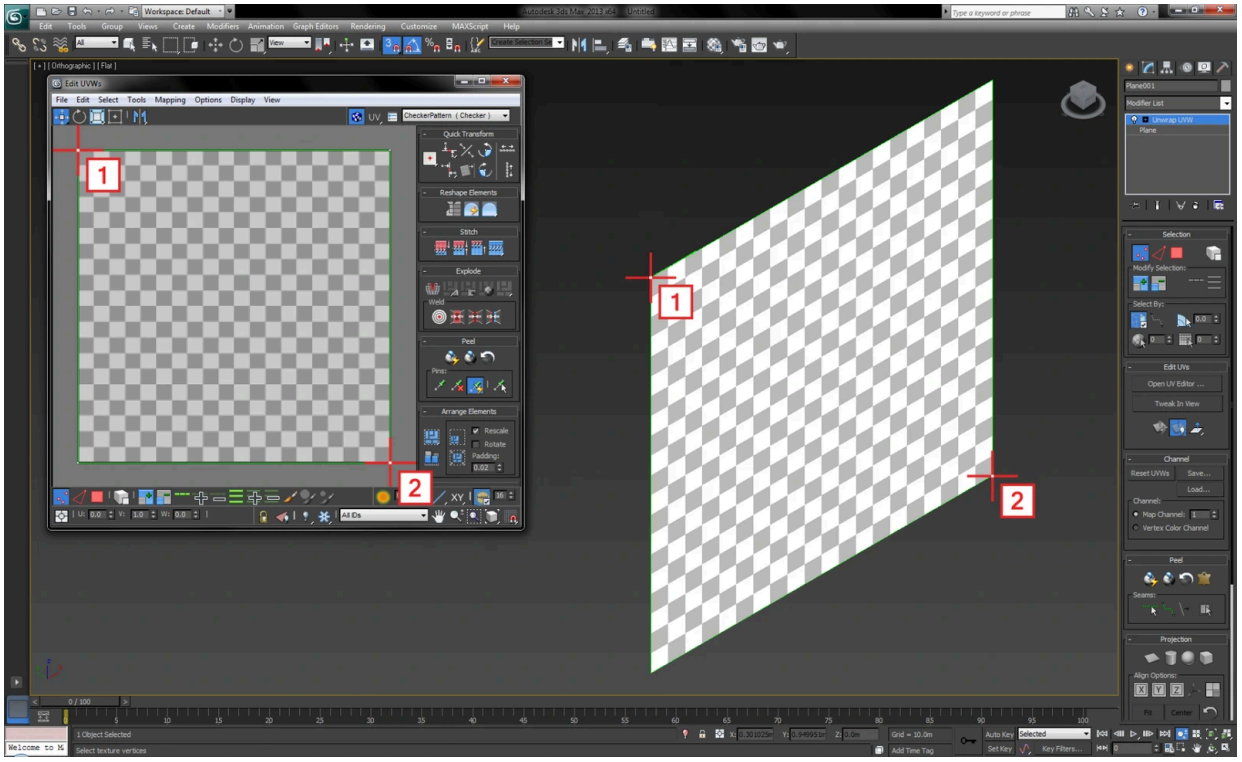


A 3D cube being unwrapped into a 2D representation to generate a UV map.

A UV map can be generated automatically by a 3D application, for example **3ds Max**, **Maya**, **Cinema 4D** and **Blender**, but normally the UV map requires editing manually. To read more about editing UV maps see the Editing UV maps

Example UV map

The image below shows a plane constructed from four vertices with four corresponding texture coordinates. The top-left vertice corresponds to the top-left texture coordinate and the bottom-right vertice corresponds to the bottom-right texture coordinate. For further information see the LED screen examples and the Projection screen examples.



A plane modelled and UV mapped in 3ds Max. The plane's top-left vertice corresponds to the top-left texture coordinate (1), and the bottom-right vertice corresponds to the bottom-right texture coordinate (2).

Helpful Resources

3ds Max

- Support and learning

Maya

- Support and learning

Cinema 4D

- Support and learning

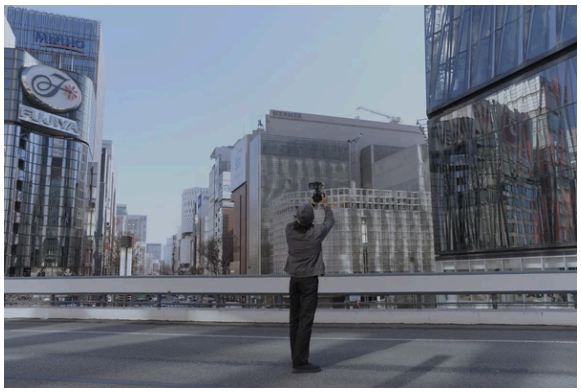
Blender

- Support and learning

Sony – XYN Spatial capture solution

By combining the Disguise virtual production platform with **Sony – XYN Spatial capture solution**, you can bring high-quality 3DCG assets from real-world spaces into your virtual production workflow. These assets can then be displayed reliably on an LED wall with consistent, high-quality results.

This solution uses Sony's proprietary 3DCG generation technology. Its 3D Gaussian Splatting-based rendering algorithm reproduces the texture and depth of real environments. Even with transparent objects or complex scenes rich in information about distance and lighting conditions, it can generate and render highly realistic 3DCG assets. This makes it well-suited for the high-quality background rendering required in virtual production.



Capture the real world and generate 3DCG assets



High-quality projection onto the LED wall

Using with Disguise

Supported Disguise Solutions

- Director: GX 3, GX 3+, VX 3, or VX 4+
  Note: While any VX or GX server is compatible, complex scenes may encounter bandwidth limitations due to the 25 Gb network interface card.
- Renderer: RX III
- Disguise Designer: r32.3.3 or later

Supported Unreal Engine Versions: 5.4, 5.5, 5.6

For instructions on how to use the XYN Spatial Renderer Plugin, please refer to the **XYN support page**.

For instructions on how to configure and use RenderStream, please refer to our RenderStream - Unreal Engine documentation.

Benefits of Integration

Efficient 3DCG Content Production

XYN Spatial capture solution streamlines the process of converting real-world spaces into 3DCG assets, reducing the workload required to create background content for XR and virtual production. Capturing an existing location makes it possible to create assets much faster than traditional workflows that require extensive 3D modeling and texture work. This improves production efficiency and shortens content creation time. When used together with Disguise, the created assets can be deployed more smoothly into actual virtual production environments, helping establish a workflow designed for practical use on set.

Expanded Use of Real-Location Content

Because real urban spaces, buildings, and indoor environments can be incorporated as background assets, the use of real-location content in XR stages and large-scale LED productions can be significantly expanded. This makes it easier to bring a wider variety of spatial expressions into productions, including environments that were previously difficult to prepare because of cost constraints.

More Realistic XR Production

The real-world 3DCG assets generated with XYN reproduce fine shapes and details with high fidelity and a natural appearance, enhancing the realism of visual expression in XR stages and virtual production. This enables more immersive experiences for audiences and viewers and improves the overall expressive quality of live events and video production.

What is XYN Spatial capture solution?

XYN Spatial capture solution is designed to create high-quality 3DCG assets from real-world objects and spaces. It improves the efficiency of 3DCG production workflows for applications such as movie and game props, metaverse content, and background assets for virtual production. It currently provides functions mainly for virtual production, including In-Camera VFX and green screen workflows, enabling efficient use of production-quality 3DCG assets.

The XYN Spatial capture solution consists of the following applications:

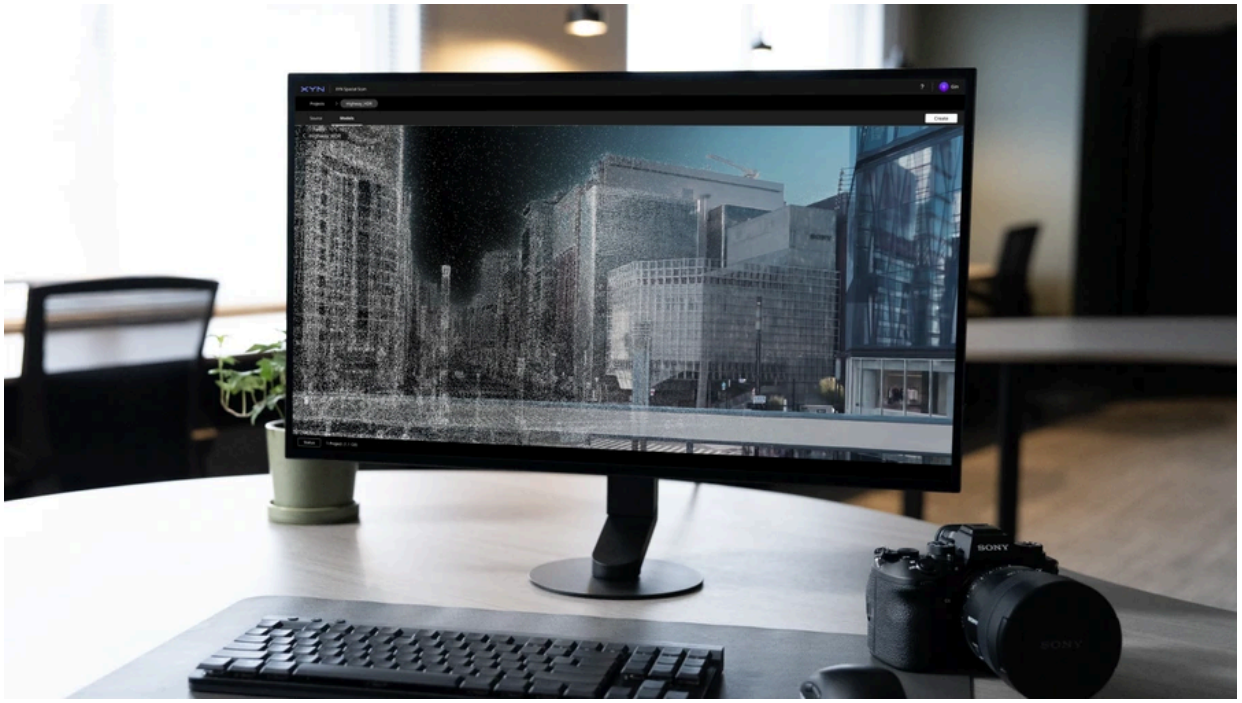
1. XYN Spatial Scan Navi

XYN Spatial Scan Navi is a smartphone application that supports the capture of spatial content using a mirrorless camera.



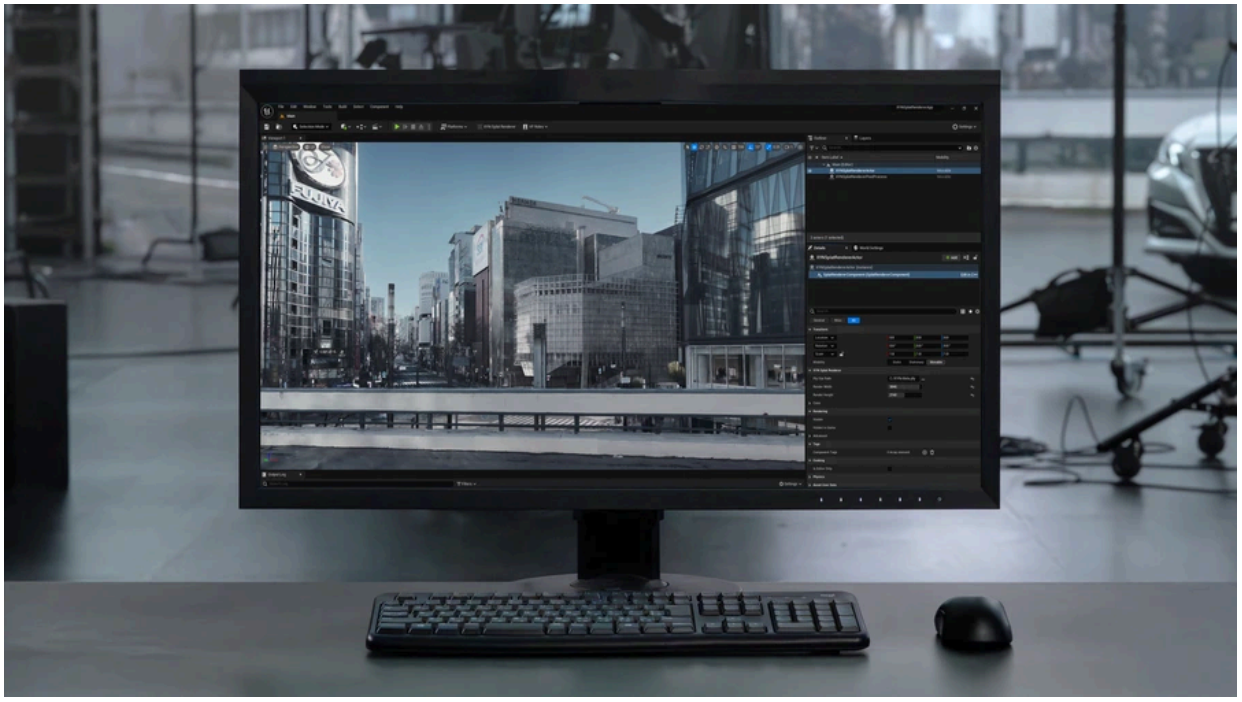
2. XYN Spatial Scan

XYN Spatial Scan is a cloud application that converts real-world spaces into high-quality 3DCG assets. After captured data is uploaded, Sony's proprietary algorithms generate 3DCG assets with high resolution, accurate colour reproduction, and HDR expression.



3. XYN Spatial Renderer Plugin

XYN Spatial Renderer Plugin is a renderer plugin that enables stable, high-quality display. When used together with the Disguise solution, it allows production-grade 3DCG assets created with XYN to be displayed and captured on an LED wall as intended, with stable, high-quality results.



By combining these applications, you can manage the entire workflow consistently, from generating high-quality 3DCG assets for production use to reviewing and using them in the production environment.

For more information, see **here**.

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Volinga 3DGS



Volinga provides an end-to-end pipeline for generating, optimising, and exporting volumetric assets for VFX, virtual production, broadcast and film.

Volinga transforms 2D image or video datasets into photorealistic 3D environments and provides a pipeline for utilising **3D Gaussian Splatting (3DGS)** scenes in Unreal Engine based workflows.

For more information on Volinga, refer to the **Volinga website**.

For full workflow documentation, refer to the **Volinga documentation**.

3D Gaussian Splatting (3DGS)

3D Gaussian Splatting (3DGS) is a real-time radiance field representation developed by INRIA and the Max Planck Institute.

In 3DGS, a scene is reconstructed as a collection of optimised 3D Gaussians, each containing colour, opacity, and spatial data.

For current Disguise workflows, 3DGS is the supported representation for volumetric capture, while earlier NeRF-based workflows have been deprecated.

Volinga Suite

Volinga provides the following products:

- **Volinga Suite** – for creating and editing 3D Gaussian Splatting (3DGS) content.
- **Volinga Plugin** – for integrating 3D Gaussian Splatting (3DGS) content into Unreal Engine workflows and into Disguise via RenderStream.

Volinga supports ACES and OCIO for accurate colour management.

Integration

Volinga brings 3DGS volumetric content into the Disguise ecosystem.

For all new projects, the Volinga Unreal Engine Plugin together with the Disguise Unreal Engine RenderStream Plugin is the recommended workflow. The native Volinga RenderStream plugin remains available for legacy projects but is no longer the focus of feature development or active updates.

Unreal Engine 5 Plugin

Unreal Engine via RenderStream (Recommended)

This workflow uses the Volinga Unreal Engine plugin to render 3DGS content inside Unreal Engine, with frames streamed into Designer using **RenderStream** via the Disguise Unreal Engine RenderStream plugin.

Scene Composition
Import `.nvol` or `.ply` assets into the Unreal Content Browser and place multiple volumetric actors within a single level.

Camera Integration
3DGS actors respect Unreal Cine Camera parameters, including focal length, sensor size, and camera transforms.

Production Tooling
Supports advanced relighting, optimisation controls, and access to Volinga Plugin Pro features.

This workflow aligns with standard Unreal Engine integrations within the Disguise ecosystem.

Legacy

Designer (r24.4+) supports direct playback of `.nvol` assets without a game engine.

This workflow maps volumetric content directly to LED surfaces without the need for Unreal Engine. However, it is important to note that you will not have access to advanced relighting,

the latest optimisation features, or any ongoing feature expansion. For legacy workflow information, refer to the **Volinga documentation**.

Supported asset formats

Volinga supports the following 3DGS asset formats:

- **NVOL** – Generated by Volinga Suite. Includes extended metadata, including colour information.
- **PLY** – 3D Gaussian Splatting assets generated by supported third-party pipelines.

NVOL remains the primary output format of Volinga Suite.

NeRF support

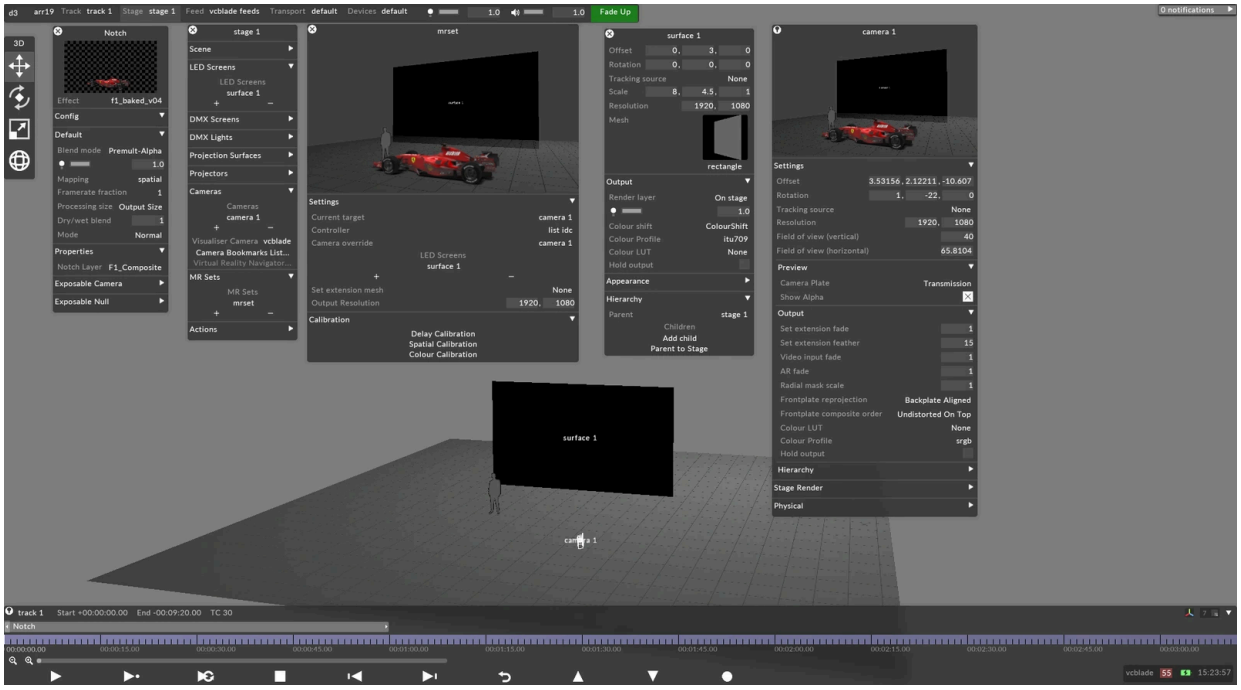
While 3DGS is the recommended standard, Volinga continues to support Neural Radiance Fields (NeRF) for specific use cases like complex refractive surfaces.

AR

AR content from a generative content engine, such as Notch, can be placed in the 3D scene overlaying existing video content or a live video input using this workflow.

1. Create an MR set.
2. Create a virtual camera(s).
3. Create an LED screen on the stage, check that the Render Layer (located in the Output tab of the layer) is set to ‘On Stage’.
4. In the MR Set properties editor, add the LED surface to the MR set, create an indirection controller, and select the virtual camera(s) as the resource.
5. Create a Notch Layer and select the desired Notch block that you want to use as an AR object.
6. Create a Spatial mapping for the Notch layer and add the virtual camera(s) as a screen.
7. Set the Camera plate of the Spatial mapping to Backplate.

At this point, you will see the AR object in the Camera transmission preview and the MR Set preview windows.



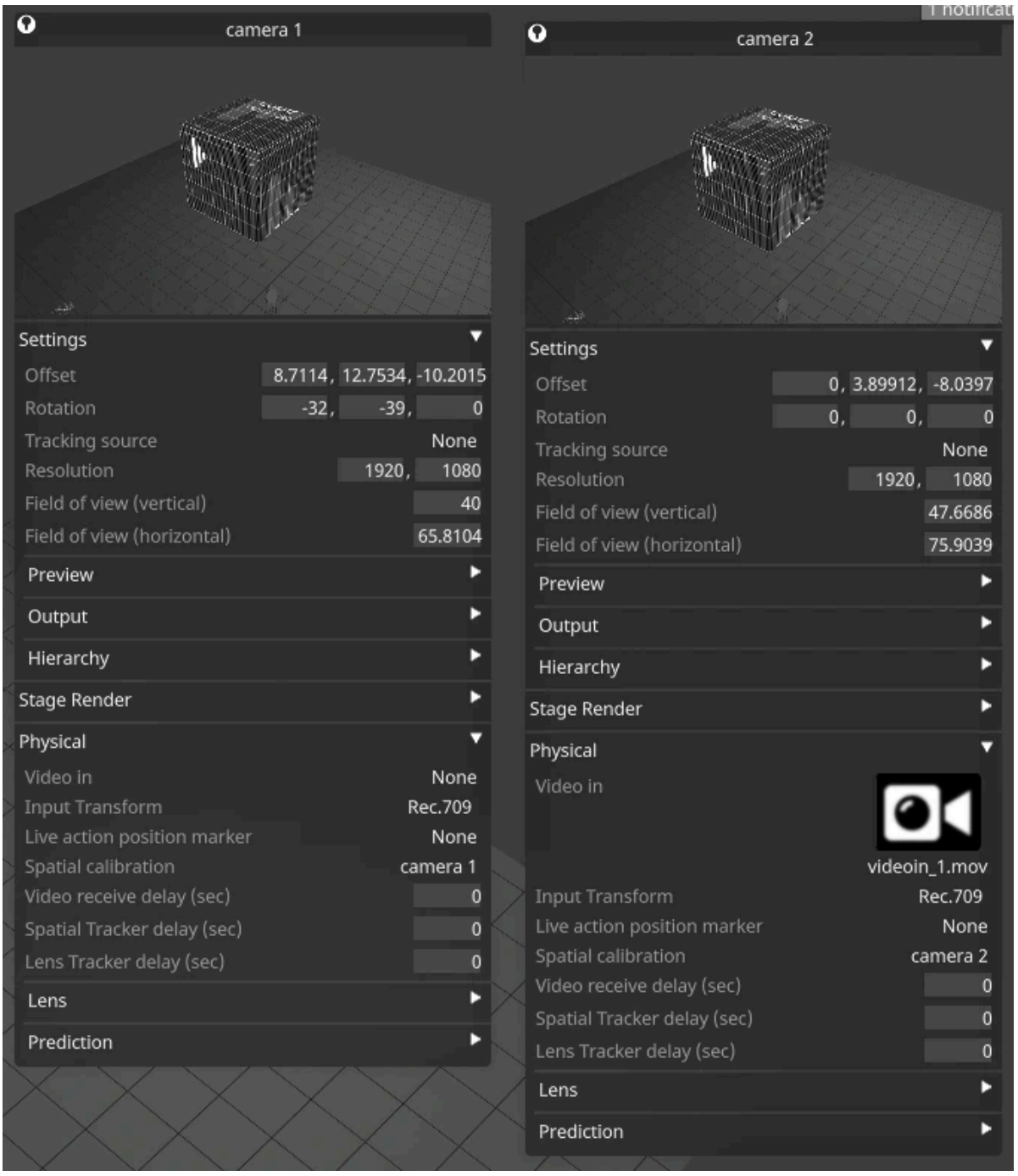
AR Spatial Calibration

r20 introduces a new way to manually align AR objects without the need to perform an xR calibration from an MR Set.

This workflow involves an AR object which requires a virtual camera. The following steps are intended as a practice scenario:

1. Add 2 cameras to the stage; Camera 1 represents the video input (real world) camera while camera 2 represents the virtual (composite) camera.
2. Patch video input 1 to Camera 1.

3. On Camera 2, expand the Physical tab, and then set the Video in to Video Input 1.

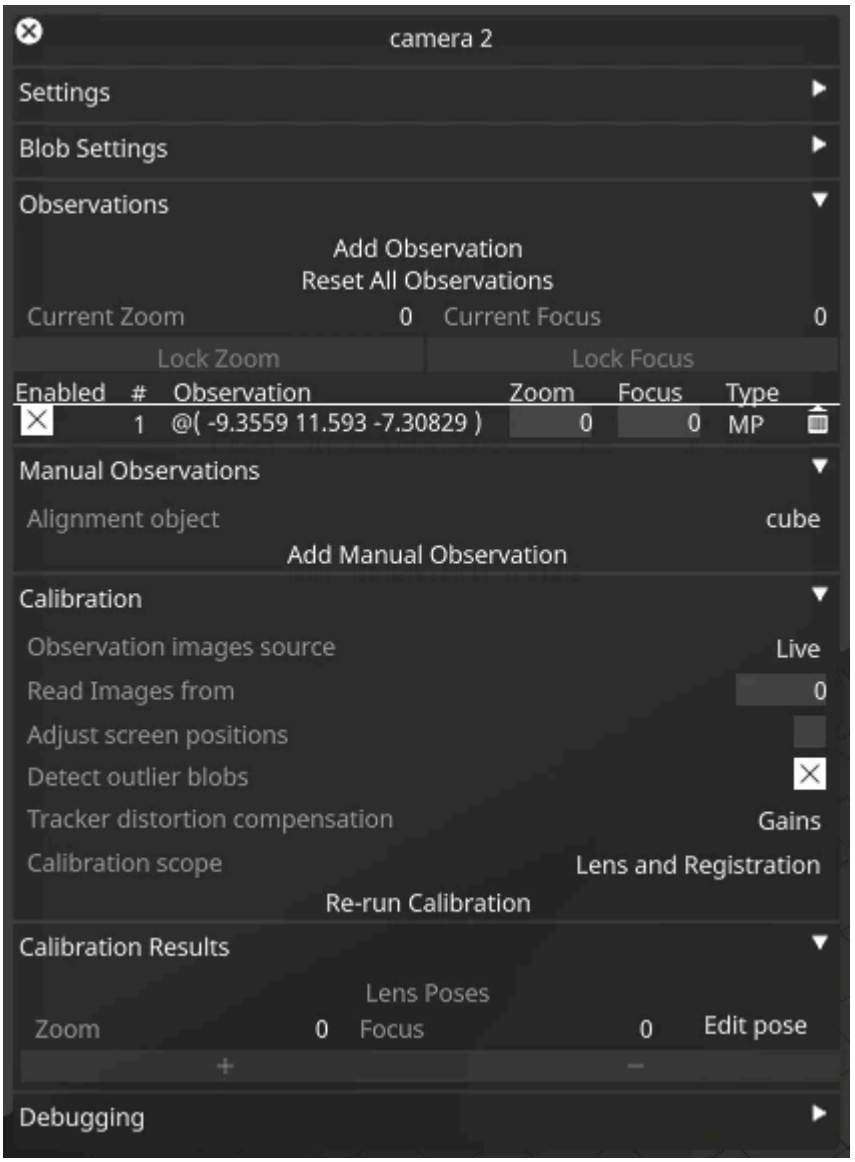


4. Add the AR object to the stage.
5. Add a virtual lineup layer to the timeline.

Next, open the properties editor for camera 2 (virtual camera), then follow these steps:

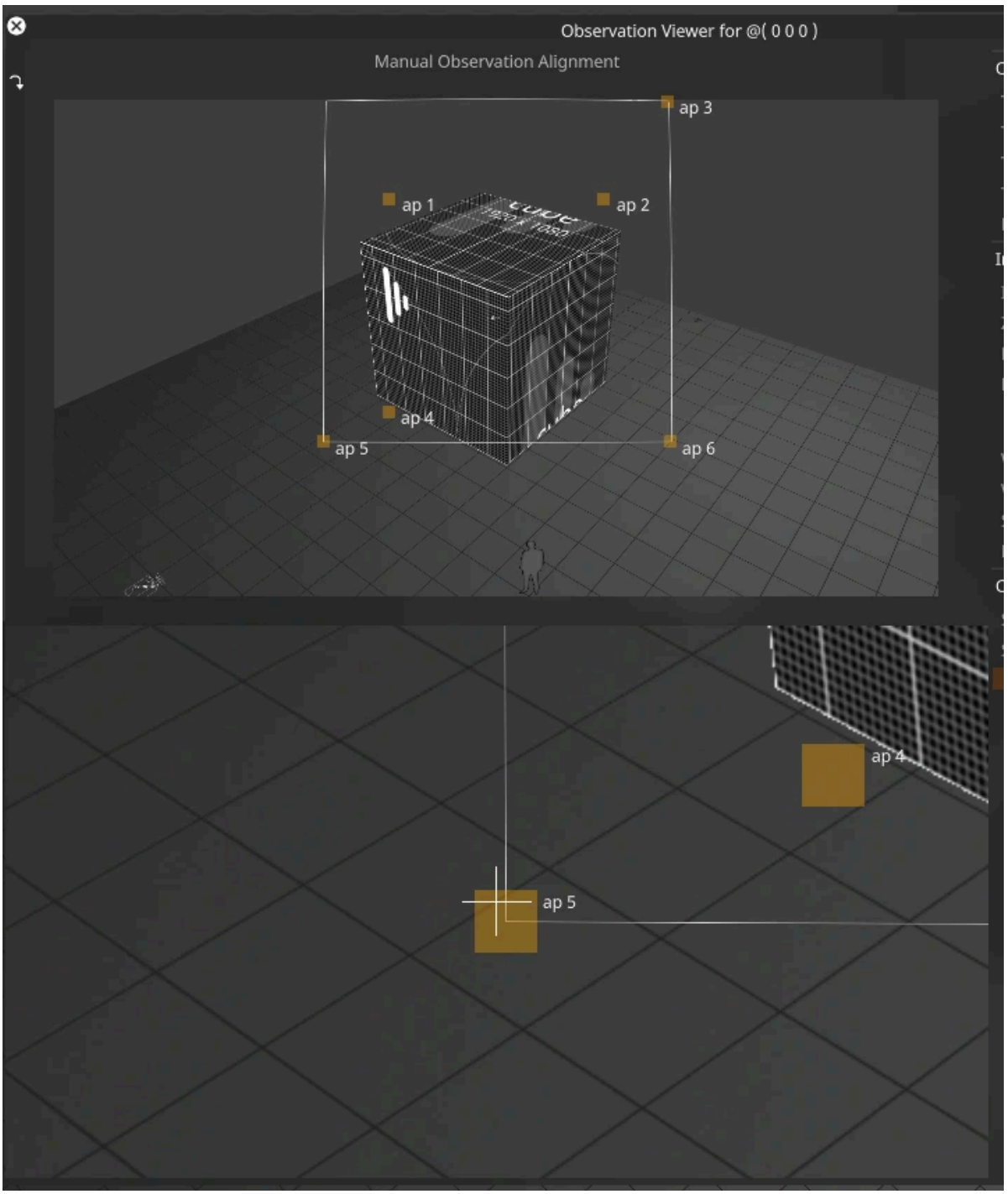
1. Go to the **Spatial Calibration** field in Physical tab.

2. Create a new spatial calibration, then right-click on the calibration to open its properties editor.



3. In the Manual Observation tab, add an alignment object- this is the object you're aligning to
4. Click **Manual Observation**.

5. Right-click on the manual observation that you created to open the Observation Viewer.



6. Click on each of the vertices of the wireframe object in the Observation Viewer (check the number of points needed message) and drag to the corresponding vertices of the alignment object.
7. Click on Update Calibration once all points have been aligned
8. Add additional observations as needed using the same process.

> **Note**
>
> Each time you move your camera, you will need to take another manual observation. A minimum of 3 observations are required to get it aligned where it will stay aligned when you move the camera.

Calibration Errors

The process of calibrating a camera or projector requires a set of input data and a model that expresses the geometry and physics. This model is a set of known equations that are determined by unknown parameters. For projectors or cameras the model usually involves a *3D position and orientation*, as well as lens parameters such as *focal length*, *lens shift* or *distortion coefficients*.

During the calibration process suitable model parameters are estimated, based on the input data observations.

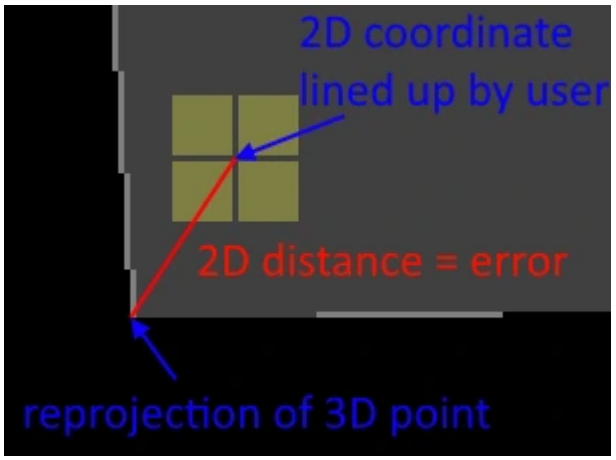
Calibration errors are a measure of how well the estimated model parameters conform to the input data.

Calibration in Disguise typically involves several pairs of 2D and 3D points. The source of these point pairs can be for example:

- manual input (2D lineup position in QuickCal)
- automatic detection (2D blob positions in OmniCal or xR)
- existing file data (3D mesh vertices used in QuickCal)
- reconstructed 3D points (based on automatically detected 2D blobs in OmniCal or xR)

Error measurements are often calculated as **Reprojection Errors**: the input 3D points are projected back onto the projector (or camera) image using the equations and parameters of the calibrated model.

The resulting 2D points are compared against the original input 2D points. The difference between them (usually the absolute 2D distance) is used for the error calculation. The total error is aggregated over all point pairs in different ways (see below).



The unit for these reprojection errors is usually in pixels.

Lower error values are better.

Typically, a reprojection error below 1 pixel is desirable, although in some circumstances higher values can be acceptable. This is a judgement call that depends on the shape of the surface, what content is used, or the effective resolution that the content will be visible at on the projection surface. If the audience is far away, or the resolution is very high, then higher errors may not be noticeable.

In QuickCal it is more difficult to achieve true subpixel accuracy, since the user can only line up the 2D cursor at full pixel boundaries. This introduces systematic errors of up to a half pixel in either direction.

In OmniCal and xR, the 2D blobs are detected with sub-pixel accuracy due to the relative size of the blobs in the camera images.

There are several ways of calculating errors from the above-mentioned point differences:

Average or Mean absolute error (Avg)

The average (or mean) error is simply the sum of absolute errors divided by the number of errors. The use of absolute values means that it cannot be negative. A value of 0 would be a perfect result. Individual differences have a proportional influence on the total average error. This makes it easy to understand and a good measure of success.

Root Mean Square error (RMSE)

The RMSE is the square root of the average of squared individual errors. It also cannot be negative, and a value of 0 would be a perfect result. Because the individual differences are squared, larger errors have a disproportionately large effect on the total RMSE. Consequently, RMSE is sensitive to outliers.

This is why OmniCal will remove any outliers from the data set before and between calibration steps. The RMS error is often used during the calibration itself to drive the process faster in the best “direction”. But it is also used at the end of a calibration as a measure of success.

In QuickCal, the RMS reprojection error is always calculated again after the calibration completes. For some algorithms, QuickCal also reports back the internal RMS error from the algorithm itself. In the UI this is shown as “rest”.

Notes

- It is possible for two different calibration input data sets to have the same average error, but different RMS errors.

- A calibration error is not always a guarantee for a successful calibration that is visually convincing. If there are only few input point pairs, then it is possible that redundant information or mistakes lead to unrealistic model parameters, despite low error values.

Calibration Error Visualisation

In Designer different colours are used to give operators a clearer idea of what calibration errors mean.

Below is a list of colours used in QuickCal and OmniCal and the meaning they represent. The meaning depends if the error value is a total error like RMSE, or whether it is only for a single 2D/3D point pair from the input data set. Any error value is alway represented by a gradient between any of these colours, so a green yellow is better than pure yellow, which again is better than orange.

Colour	Error	Meaning for RMSE	Meaning for Individual Point Pair
 Green	Low error (good quality)	Calibration was successful.	Good contribution to calibration.
Yellow	Medium-high error	Calibration quality is borderline acceptable. Need to make a visual judgement whether it looks good enough or not.	Potentially problematic contribution to calibration. If there too many point pairs like this, then overall calibration may not be good enough
 Red	High error	Unacceptable quality	Bad contribution to calibration (a single bad point pair can make a calibration fail). **QuickCal**: operator should re-align or remove it. **OmniCal**: operator should aim to filter it out using outlier handling
 Magenta	Not calibrated	Calibration failed.There were not enough 2D/3D input point pairs fo the selected algorithm. Input data was bad / inconsistent.	No contribution to calibration. **OmniCal**: rejected due to outlier handling.

Further Reading

- Mean absolute error [Wikipedia]
- Root-mean-square deviation [Wikipedia]

OmniCal Multi-Pose Alignment

Multi-pose alignment is an QuickAlign tool to allow projection on moving objects that are controlled by simple automation.

OmniCal QuickAlign positions secondary (non-master) objects relative to the master object. The normal workflow already allows users to align multiple objects separately from the master object. This is useful when the relative distance and angle between objects in the real world are unknown.

A multi-object scene supports projection on moving scenery if accurate 3D tracking data is available for all moving objects. However, often objects are moved on stages using 1D automation systems that provide accurate 1D motor information instead of 3D tracking data. Multi-pose alignment exists for this use case: it allows users to create accurate 3D poses for a moving object, where each pose is linked to a certain automation axis value.

Multi-pose alignment expands the alignment of secondary objects (but not the master screen) to cover motion. It adds the ability to align an object in multiple poses (position and orientation), where each aligned pose is associated with the automation value recorded at that time. Designer can then interpolate between the aligned poses based on the current incoming automation value. The interpolation produces new 3D poses between the recorded and aligned poses. This enables correct projections onto moving objects, even though the automation system itself only provides a single-axis value.

Currently, only movement along a linear path is supported, which requires 2 poses per object. These poses are typically chosen as the two extreme poses where the object is visible.

This workflow is for Multi-Pose Alignment in OmniCal, and not to be confused with QuickCal's Multi-Pose calibration of e.g. rotating objects.

Prerequisites

- A stationary **master screen** is required, in addition to any projection objects that are moving.
- **Accurate Meshes**: Multi-pose is designed to interpolate between object poses. These poses are determined by alignment points, therefore an accurate 3D model is required.
- For optimal calibration, the master screen should match real-world scale, as it sets the reference for the entire setup. If the master screen scale is incorrect, adjustments may be needed for all secondary screens.

Limitations

- Only supports linear paths, with a single input value from the automation system.

- Does not support calculating rotation pivot points.
  - If an object rotates between poses, the system will simply linearly interpolate between these rotations, which may not be what is desired.
- Multi-pose alignment only uses a single calibration (it is not multi-pose calibration like QuickCal). Therefore, there are some important requirements for projector calibration:
  - Projectors need to be calibrated with depth (e.g. using the DLT algorithm). Blobs cannot be on a single plane (coplanar).
  - Projection will only be accurate within the calibrated “space”, i.e. around the volume enclosing the blobs. Surface movement should be limited to this area. As always, Blobs that land on the floor or areas behind the object will be helpful in extending the calibrated volume.
- No mesh interpolation is done.
- Multi-pose alignment is not supported by the Rig Check workflow.
  - It shouldn’t normally be necessary to use Multi-pose on a regular basis.
  - It should only be necessary to redo it when there are changes to the automation system, causing screens to move along a different path.

Workflow Overview

1. Extract high-quality meshes.
2. Set up automation axes for all moving screens.
3. Perform a capture and calibration.
4. Align master screen and all static screens in the base pose.
5. Create two poses for each moving screen.

Detailed Steps

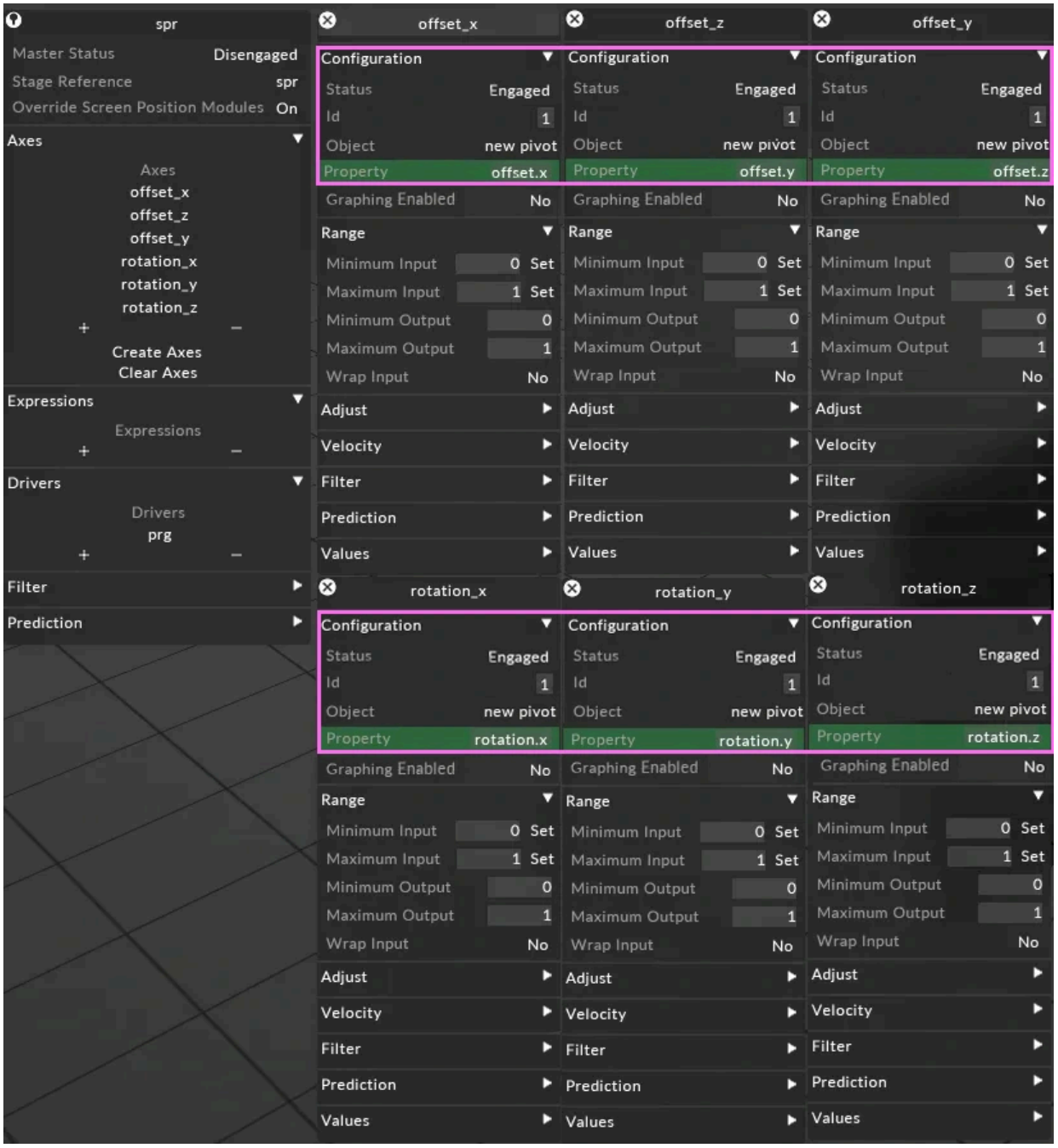
1. Extract high-quality meshes

The multi-pose workflow requires that you have accurate meshes. You can skip this step if you already have these or if you are in a simulation.

Please see Extracting a mesh using OmniCal for further information.

2. Set up automation axes for all moving screens

1. Create an automation device and driver using the regular workflow.
2. Create 6 axes, all with the same input ID from automation, for XYZ position and XYZ rotation of the object as follows.



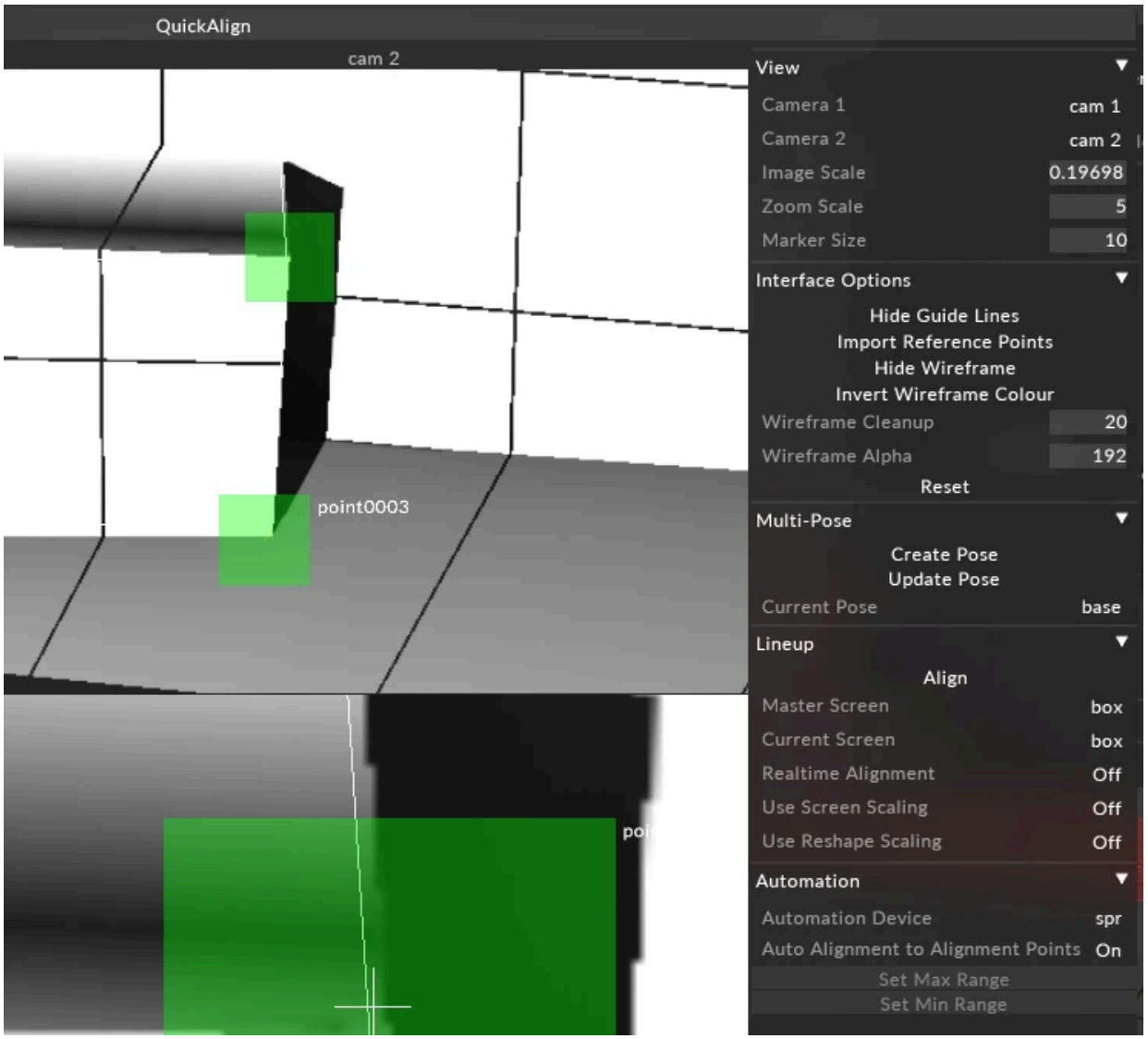
Set up automation axes for all moving screens

> **Note**
>
> All 6 axes are required even if the object is moving in a single dimension and no rotation is expected. This is because QuickAlign will calculate a composite rotation and translation of the surface. Ignoring rotation will mean the translation will not be correct. This will become especially apparent when the local origin of the mesh is far away from its centroid.

3. Perform a capture and calibration

1. Follow the regular OmniCal workflow to capture and calibrate.
2. Open the **Quick Align** editor.

4. Align the master screen and all static screens in base pose



Align the Master screen

1. Make sure that the **Current Pose** in QuickAlign is set to **base** and that the **Master Screen** and **Current Screen** are set to the actual master screen object in the visualiser.
2. Perform an alignment, as usual.
3. Repeat for all static screens.

4. You can only use reshape tools in the base pose. In other poses, the current mesh is being moved, but no further reshaping is supported.
   - Note that for other poses, the UI does not yet prevent you from turning alignment points into reshape points.
   - If you need to reshape a mesh for which you need to use the Multi-Pose workflow, then you can either do this by aligning and reshaping in the base pose, or doing it in a separate step, and export+re-import the mesh (probably preferred).

5. Create two poses for each moving screen

In most cases, it will be enough to create two poses: a minimum and maximum pose, each for the most extreme position in which the object will be visible / projected on. For example, if a projection surface is moved from left to right, then these are the most left and most right positions in which enough alignment points are still visible to produce a reliable alignment.

When a new pose is created, a new short capture is taken by OmniCal. This capture only contains alignment images that are used within QuickAlign to help with object alignment. These captures do not contribute to the calibration result, only to multi-pose alignment.

You can right-click on a pose to view the screens and automation data contained within it.

Create min Pose

1. Enable OmniCal camera discovery.
2. With the Quick Align editor open, ask your automation operator to move the moving object to its minimum visible position.
3. Click **Create Pose**.
   This will take a capture and present the camera images for the user to align to. It will also take a snapshot of the current automation input values.
4. Select the object which has just been moved by automation as the **Current Screen** to be aligned.
5. Perform an alignment of the screen at this minimum position.
   Each pose can contain multiple screens, so you can repeat this for each screen that is visible. Alternatively, you could create a separate pose per screen.
6. Click **Set Min Range** in the automation section of the Quick Align editor.
7. The minimum pose has now been set.

Create max Pose

1. Keep the Quick Align editor open, and ask your automation operator to move the object to its maximum visible position.
2. Repeat the same pose creation steps, but in step 6. select **Set Max Range** in the automation section of the Quick Align editor.

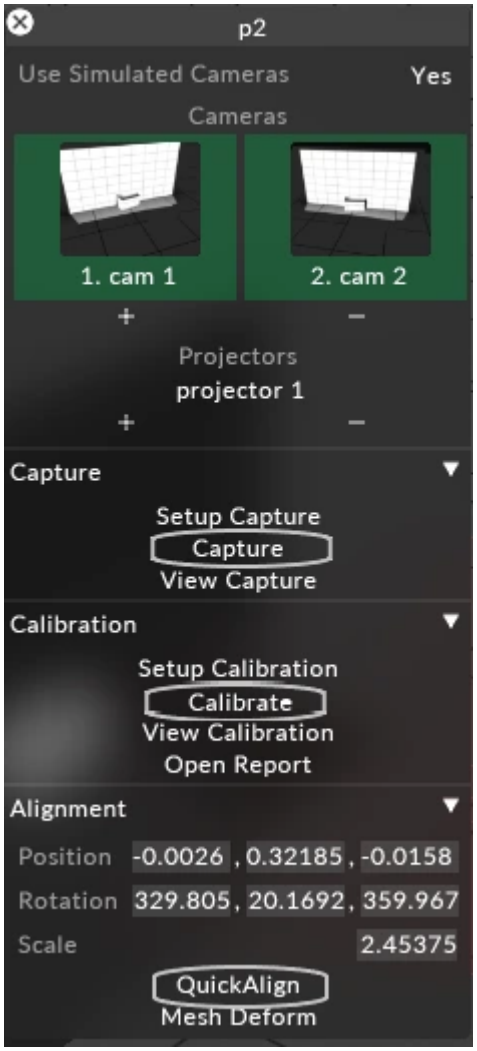
3. Click **Normalise Rotation** (always required unless a rotation of >= 180 degrees is required between the poses).
   For example, after a multi-pose alignment, if you get -0.2deg as the min output and 359.7deg as the max output, then the min output should be set to 359.7 or the max output should be set to -0.3deg. This is because the direction of rotation is ambiguous.
4. Close the Quick Align editor and ensure automation is engaged.

Extracting a mesh using OmniCal

Although not specific to the multi-pose workflow, generating accurate meshes simplifies calibration workflows.

Follow the regular OmniCal workflow:

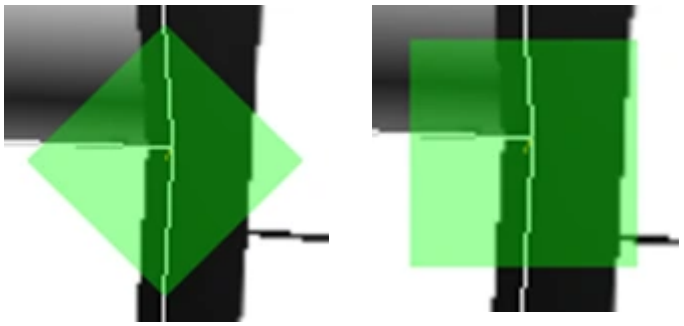
1. Create a plan
2. Capture
3. Calibrate
4. Align.



Capture, calibrate, QuickAlign in the OmniCal plan

Reshape the alignment points

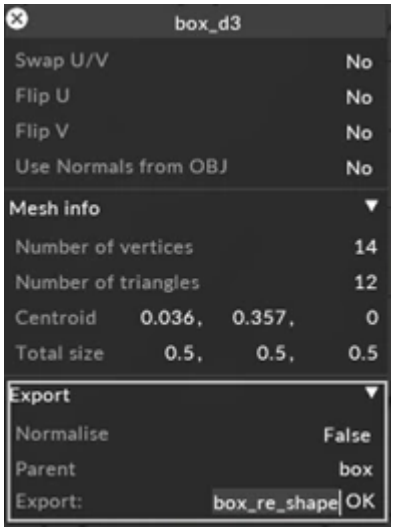
Use the reshape tool (shift + drag alignment points to display a diamond) to match the shape of the actual object in real-world space. Once happy, export the reshaped mesh. These will be written to the output/ folder of the project, so you'll need to copy these in to the Mesh folder of your project.



Reshape Alignment Point	*Alignment Point*

Export the mesh

To export a mesh, right-click the mesh in the screen editor to display the mesh editor. Select False for normalise (this will ensure the offset and rotation of your screen is correct when using the new meshes), type a name for the new mesh and click OK. The mesh will be exported to the following folder: `output/mesh/filename.obj`.



Export mesh editor

Reset the alignment points

1. Once the newly reshaped mesh is copied into the Mesh folder, Designer will ingest it into the system, and it should appear in the list of meshes for a screen. Assign these meshes to the projection surfaces.
   Once this is done, the alignment points will no longer be valid (because the mesh has changed).
2. Open the **Quick Align** editor.
3. Select **Reset Alignment** in Quick Align to remove the alignment points. If necessary, realign the screen using alignment points, but without using the reshape tools.



Reset alignment

MultiPose Projector Calibration

The QuickCal configuration includes a Multi-Pose workflow to improve the calibration of spaces where projection surfaces move or rotate. This is helpful when a surface used for calibration is not fully covering the space in its current pose, or if there are no good visible reference points that cover the whole space. A typical example is a long narrow(ish) object like a car, that is being projected on while being rotated on a turntable.

This workflow is for manual QuickCal calibration, and not to be confused with Multi-Pose Alignment in OmniCal's QuickAlign, which is for 3D alignment based on automation input.

Multi-Pose Projection Workflow

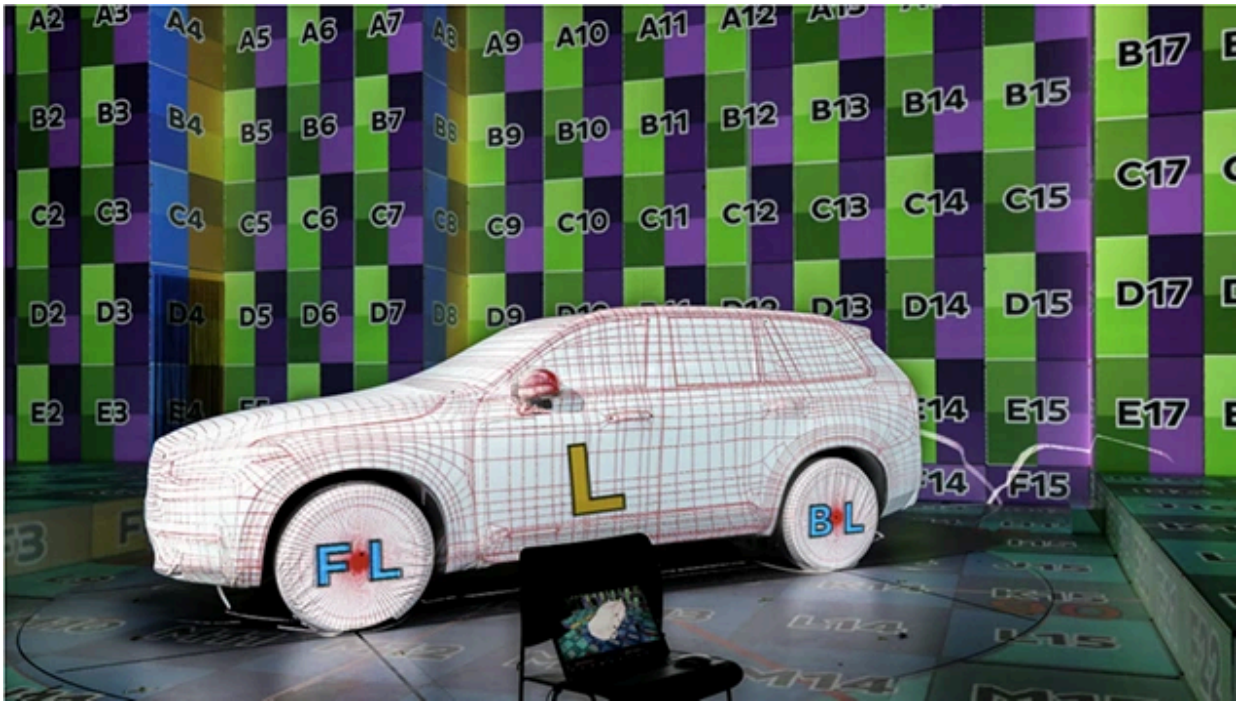
1. Ensure that the object's position and rotation are correctly controlled via an automation system.
2. Place the moveable object in a particular position (the "pose") and then perform a QuickCal calibration, as usual.
3. Then use automation to rotate or move the object to a second position. This will change the current 3D position of any existing reference points.
4. Line up the existing reference points to the respective correct 2D coordinates for this pose.
5. Add and line up new reference points, if necessary, until the projected image is correct and sharp in this pose.
6. This process is then repeated for as many poses as are required.

Unlike in the single-pose workflow, we see the reference points rotate along with the model. Once a reference point has been aligned, its 3D position at that time is stored along with the 2D lineup coordinate. When automation input changes the current 3D position of a reference point, it will not affect the previously saved lineups.

Modify an existing pose

An existing pose can be modified by moving the object back near a previous position using the automation system. QuickCal has the option to hide markers for poses other than the current one. This may help find an earlier pose. The match does not have to be exact. When a reference point is lined with a 3D position close to an earlier pose, then the earlier pose gets overwritten.

Example



Example application : a car on a rotating turntable, with encoder

In this image is an example of a car on a motorised turntable. During configuration, as the car rotates, the calibrated points gradually drift from their locations on the real model, showing that the calibration isn't perfect across the whole space. Once the car is in a new pose, we simply drag the existing markers to the correct positions, and add new ones if necessary, until the projected image is correct and sharp across all possible car positions in the space.

Typically it would be enough to use two poses (e.g. front and side view), so that the extremes of the space are covered by lined up QuickCal points.

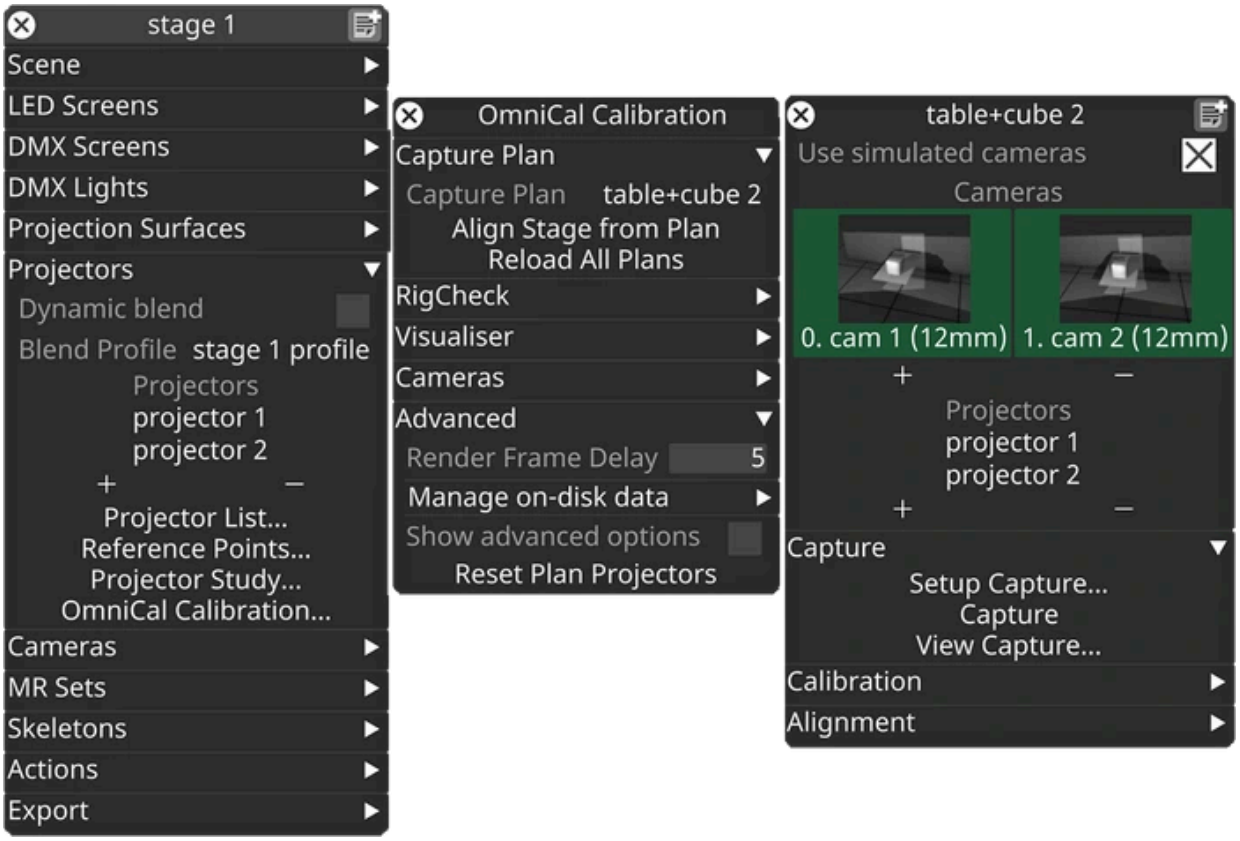
OmniCal Alignment

Alignment is a user-guided process that is required to align the calibrated data with the coordinate system in Designer. OmniCal also includes the ReShape feature to adjust 3D model vertices based on the user alignment.

OmniCal Stage Plan

In the **Stage** editor, under **Projectors**, click **OmniCal Calibration** to open the **Calibration** editor. This widget controls the main OmniCal behaviour. Right-click on any **Capture Plan** to open its **OmniCalStagePlan** editor.

In the **OmniCalStagePlan** we recommend working through the sections from top to bottom: **Capture**, **Calibration**, **Alignment**, and **Mesh Deform** (if required).



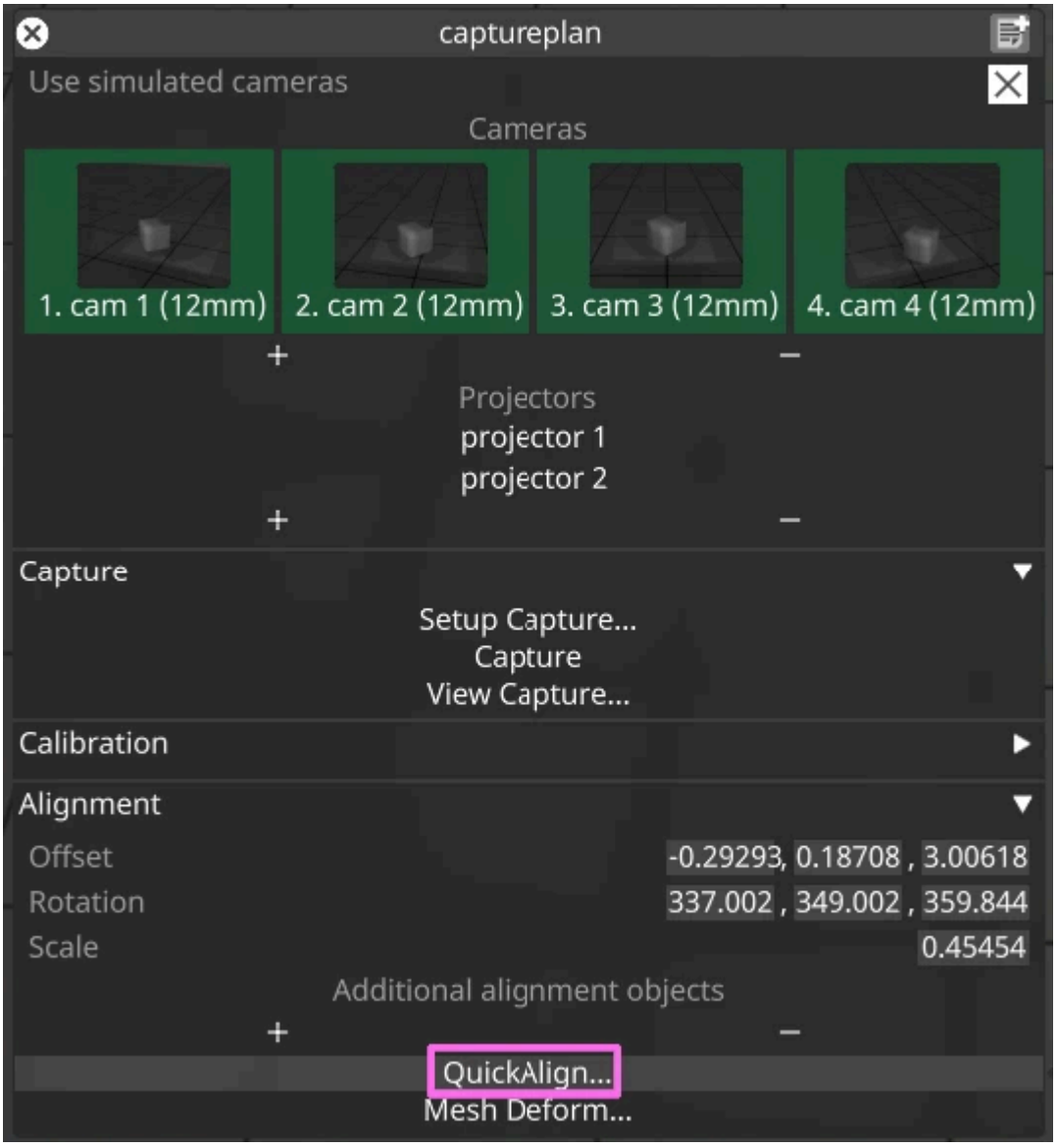
Alignment

Alignment is the process of registering or aligning the coordinate system of the captured point cloud with that of Designer. It is a required step to make the projector output match the

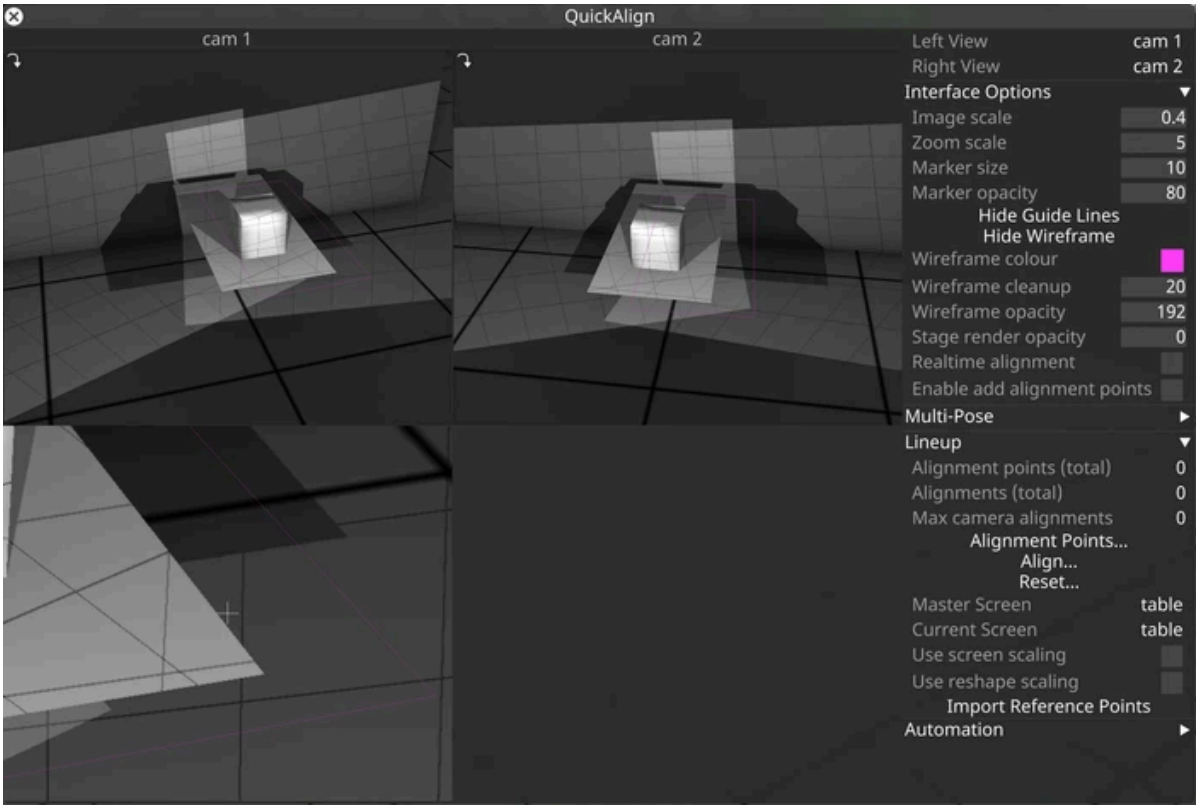
physical scene after OmniCal calibration has finished. A good alignment is a requisite for further steps like Mesh Deform.

Perform Alignment

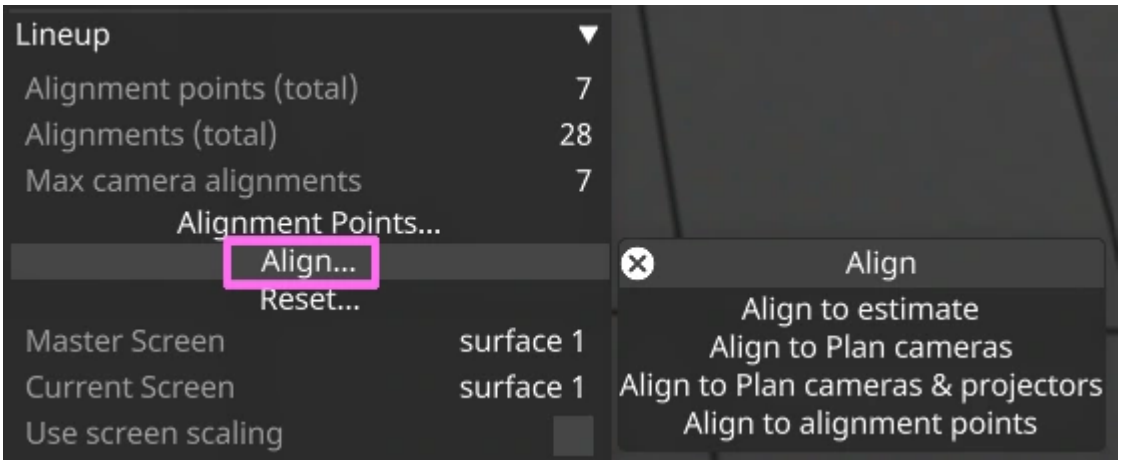
1. In the plan editor, roughly edit the point cloud **Alignment** via **Position**, **Rotation** and **Scale**. This does not need to be exact at all, just close enough in terms of scale and rotation that further steps are made easier.



2. Once the point cloud is roughly aligned (i.e. somewhat close to the projection surfaces in the visualiser), click **QuickAlign...** to open the tool for detailed alignment. In QuickAlign you should see a reprojected wireframe of the first projection surface, drawn on top of the alignment image taken for each camera.
    - The top two views relate to the cameras currently selected as **Left View** and **Right View** in the top right corner.
    - If the cursor is located in one of the camera views, then a zoomed-in view will be shown below it. This is essentially a magnifying glass for precise alignment of vertices to pixels in the camera image.
    - The **Interface Options** allow adjustments of QuickAlign UI elements to improve visibility during the alignment process. Most importantly, the alignment point marker size, opacity and the wireframe opacity and colour can be adjusted.



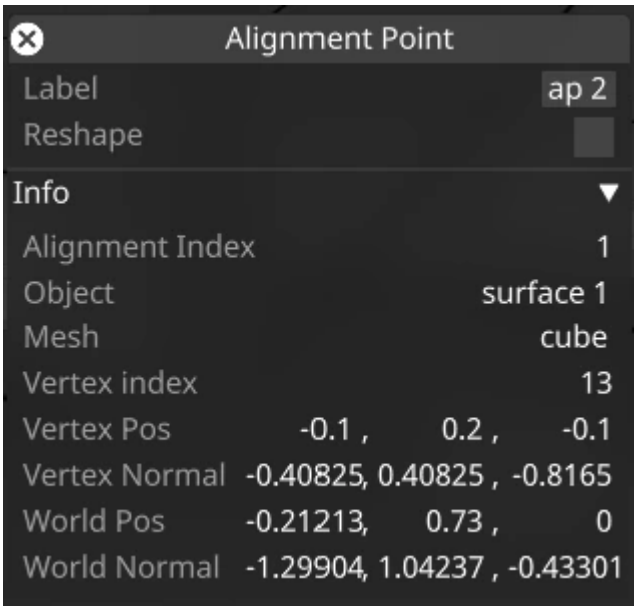
3. There are tools to automatically align the point cloud to the stage. In **QuickAlign** click **Align...** to open a menu with alignment methods:
   - **Align to estimate** creates an initial alignment estimate based on point cloud coordinates and vertices of all projection surfaces. This is not accurate, and requires that there is a good overlap between point cloud and all meshes, with little to no missing or extra areas.
   - **Align to Plan cameras** uses the positions of plan cameras. Requires that the planned positions of plan cameras are somewhat realistic.
   - **Align to Plan cameras & projectors** uses the positions of plan cameras and projectors. Requires that the planned positions of plan cameras and projectors are somewhat realistic.
   - **Align to alignment points** uses the manually created alignment points in each camera. Use this option when you want to (re-)apply the current alignment point data (see below) to the stage.



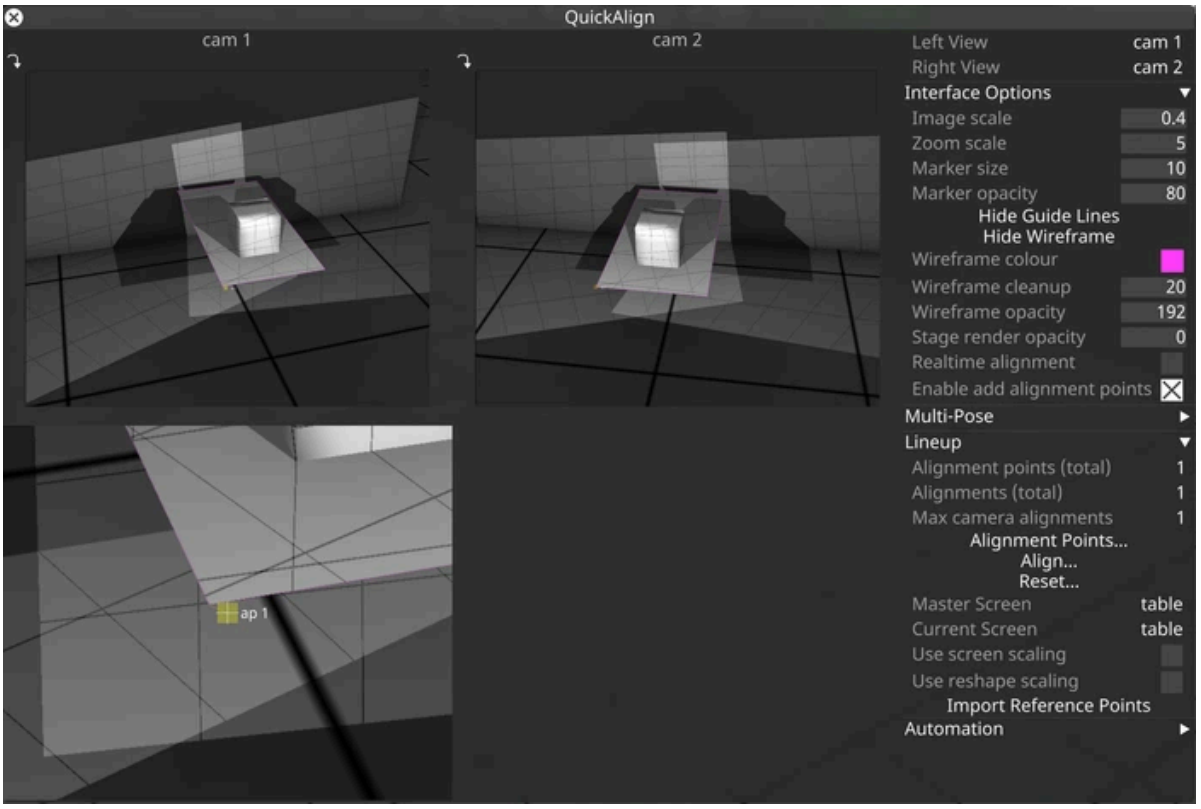
4. In most real-world environments the automatic Alignment tools don't provide a good enough alignment. To manually improve the alignment, create **AlignmentPoints** and line them up in multiple cameras. At least 3 alignment points need to be lined up in at least 2 cameras each. It's best to edit the alignment points one by one in each camera view. Alignment points are best placed on mesh vertices that correspond to distinct features in the physical model (e.g. a corner of a building). Not every camera will see every alignment point, so additional points may be needed.

5. Create **AlignmentPoints**:

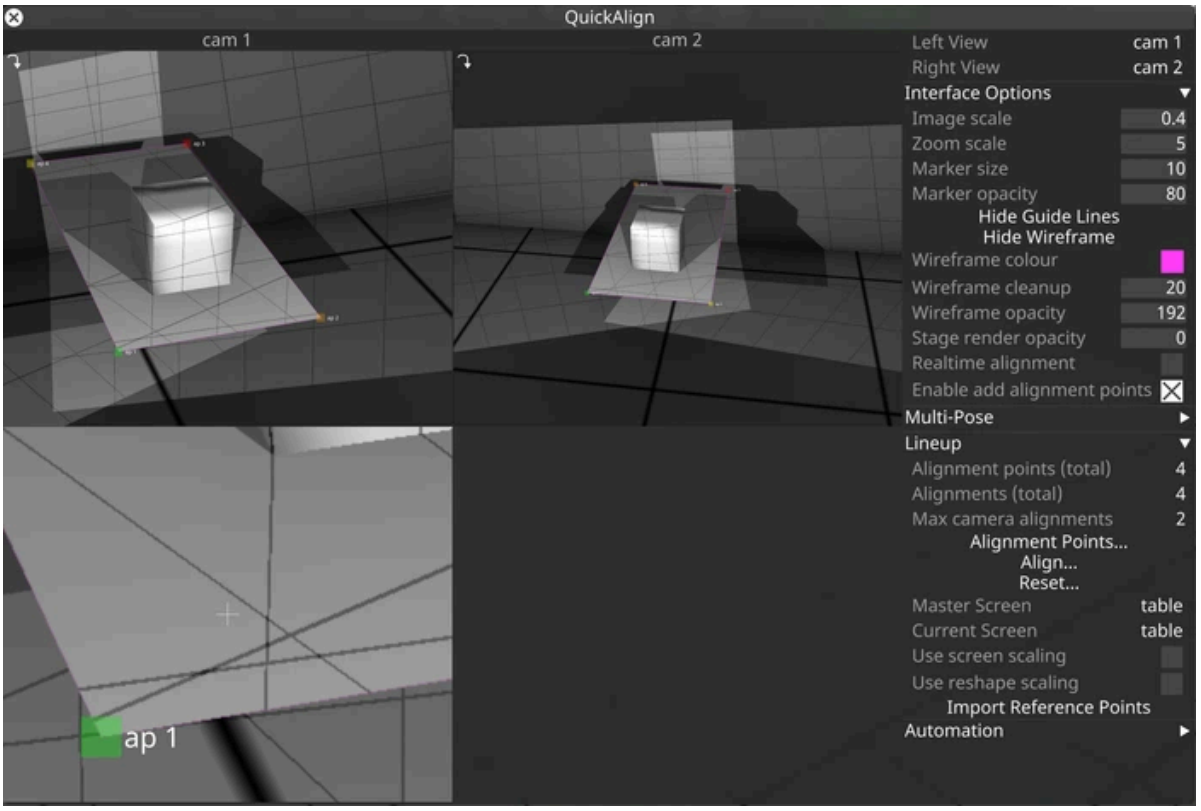
- Enable the checkbox **Enable add alignment points**.
- Click near a vertex on the wireframe to create an AlignmentPoint for this mesh vertex.
- Alternatively, AlignmentPoints can be imported from existing QuickCal projector ReferencePoints.
- Right-click on a point to access and edit its properties.



6. Drag the AlignmentPoint to the corresponding area in the camera image. Do the same for the corresponding point in the second camera view.



7. Repeat this process for a minimum of three points.
    - The currently selected AlignmentPoint will flash its marker. While it is selected, it can be moved using the arrow keys on the keyboard.
    - Hold **SHIFT** + arrow keys to move the AlignmentPoint marker faster.
    - Hold **CTRL** + mouse movement for slower fine control movement.



AlignmentPoint markers are drawn in different colours, based on their alignment state:

1. Red: This point is not being used as part of the alignment, but has been added to the view.
2. Yellow: It has been aligned only in the current camera. It is not used in the alignment calculation until it gets aligned in another camera.
3. Orange: It has been aligned only in a different camera.
4. Green: It has been aligned in at least two cameras, and therefore is used in the alignment calculation.

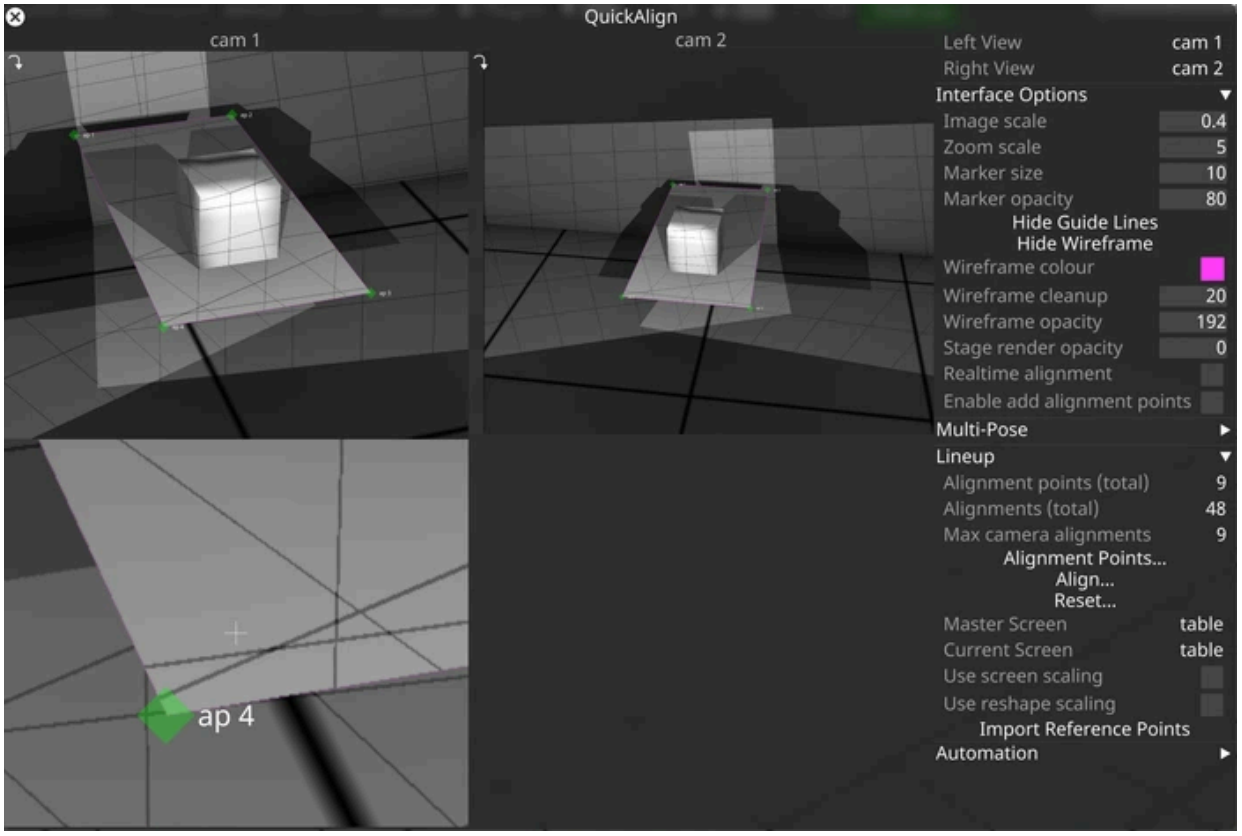
Multi-screen Alignment

If there is more than one screen in the plan, it may be helpful to use **Multi-screen alignment**. This allows aligning surfaces in the stage based on the captured images and a common master screen. If the relative offset and rotation between all surfaces in the stage matches the relationships of the actual physical surfaces, then this may not be needed.

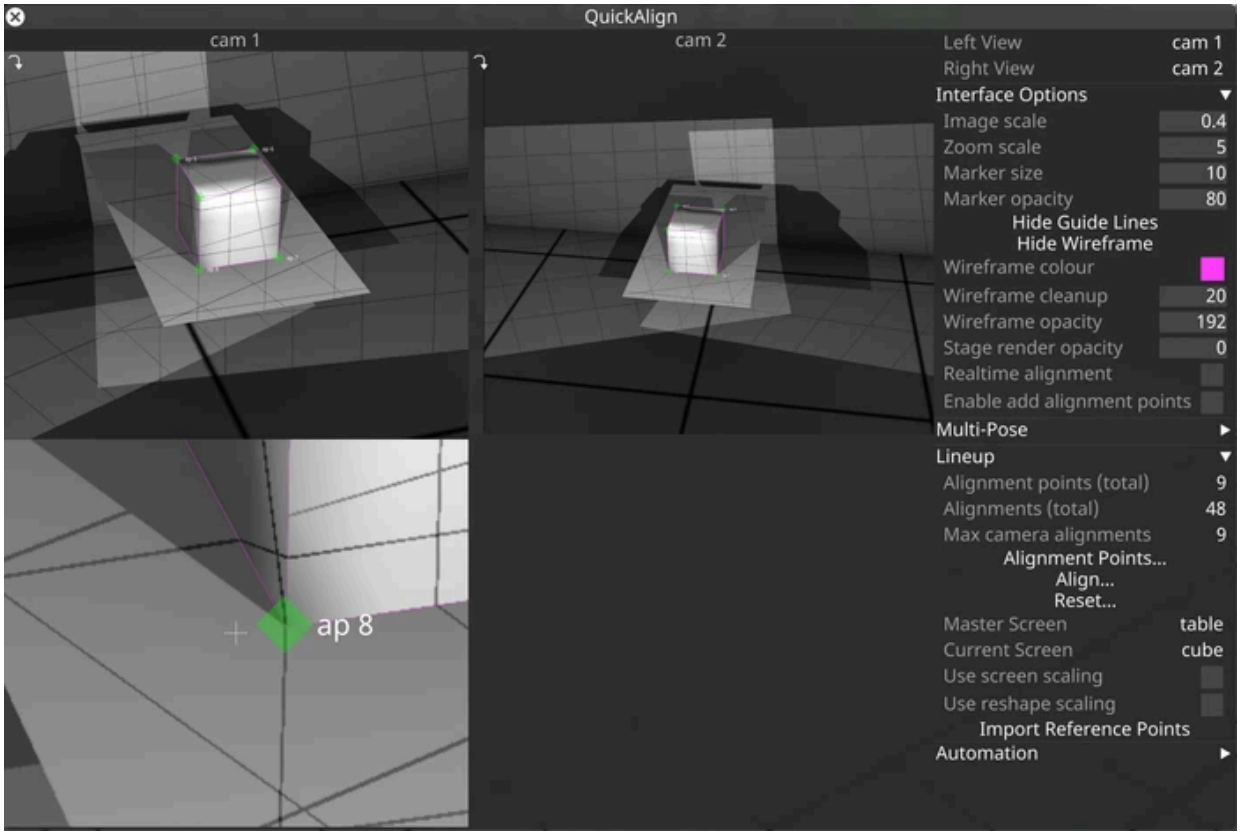
- The master screen should be aligned first.

- The master screen acts as a registration base for all other screens. Reshaping or scaling of the master screen will therefore affect all other screens.
- When aligning secondary screens, they will be moved to the correct position relative the Master screen.
- When stage automation is used to control physical screen positions, it is best to choose a non-moving surface as the master screen.

An example for how to align multiple surfaces can be seen in the demo video from the Overview page, at around 2:40 minutes.



Aligned Master screen



Aligned secondary screen

Alignment Reshape

If the proportions of the model match the physical surface exactly, then the alignment should fit perfectly. But if the proportions are not correct, you may need to perform **Alignment reshape**. Reshape allows adjustments to mesh vertices based on lined-up alignment points. This can be useful for adjustments such as stretching or squeezing the projection surface, or even moving some internal mesh elements (such as a window) by a certain amount. Typical applications are in theatre where scene elements are built according to a CAD drawing, but the physical construct ends up with minor deviations due to the construction process or limitations imposed by the stage.

The reshape process does not use the captured point cloud, but simply adjusts existing mesh vertices and mesh proportions. This is done according to the calibrated cameras, captured alignment images and alignment point data provided by the user. UV coordinates for a vertex are not modified during Reshape.

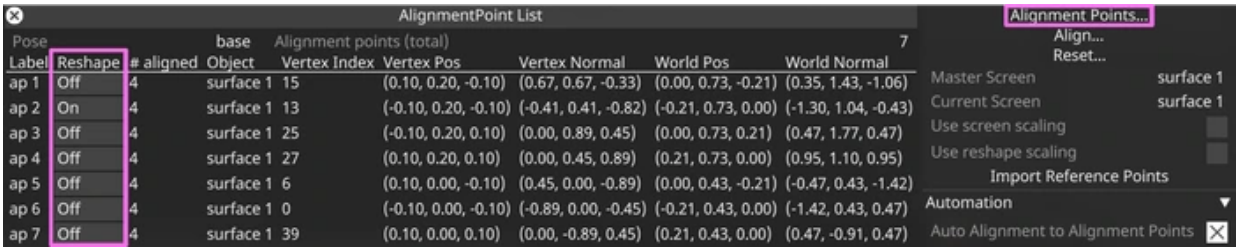
> **Note**
>
> When reshape causes stretching between vertices, this will in effect reduce the spatial resolution of the content, since any texture is now covering a slightly larger physical area. If a mesh requires significant changes (such as moving a building's window by a meter) then it may be a good idea to export the reshaped mesh, clean it up and adjust the affected UVs in a 3D modelling software, then export it again as an OBJ file into Designer. Note that such UV changes will also affect content for this screen, so this may then also need re-rendering.

Enable Reshape

1. To enable **Reshape** for an alignment point hold **SHIFT** and left-click it. This will turn it into a reshape point which is indicated by a diamond marker (45 degree rotated).
2. Left-click the point again (without holding **SHIFT**) to turn it back to a non-reshaped alignment point.

Alternatively, right-click an AlignmentPoint to open its editor, and toggle the **Reshape** checkbox.

The **AlignmentPoint List** widget offers a quick way to toggle **Reshape** for all alignment points.



Pose Label	Reshape	# aligned	base Object	Alignment points (total) 7 Vertex Index	Vertex Pos	Vertex Normal	World Pos	World Normal
ap 1	Off	4	surface 1	15	(0.10, 0.20, -0.10)	(0.67, 0.67, -0.33)	(0.00, 0.73, -0.21)	(0.35, 1.43, -1.06)
ap 2	On	4	surface 1	13	(-0.10, 0.20, -0.10)	(-0.41, 0.41, -0.82)	(-0.21, 0.73, 0.00)	(-1.30, 1.04, -0.43)
ap 3	Off	4	surface 1	25	(-0.10, 0.20, 0.10)	(0.00, 0.89, 0.45)	(0.00, 0.73, 0.21)	(0.47, 1.77, 0.47)
ap 4	Off	4	surface 1	27	(0.10, 0.20, 0.10)	(0.00, 0.45, 0.89)	(0.21, 0.73, 0.00)	(0.95, 1.10, 0.95)
ap 5	Off	4	surface 1	6	(0.10, 0.00, -0.10)	(0.45, 0.00, -0.89)	(0.00, 0.43, -0.21)	(-0.47, 0.43, -1.42)
ap 6	Off	4	surface 1	0	(-0.10, 0.00, -0.10)	(-0.89, 0.00, -0.45)	(-0.21, 0.43, 0.00)	(-1.42, 0.43, 0.47)
ap 7	Off	4	surface 1	39	(0.10, 0.00, 0.10)	(0.00, -0.89, 0.45)	(0.21, 0.43, 0.00)	(0.47, -0.91, 0.47)

AlignmentPoint List Widget

An example for how to use reshape points can be seen in the demo video from the Overview page, at around 4:24 minutes.

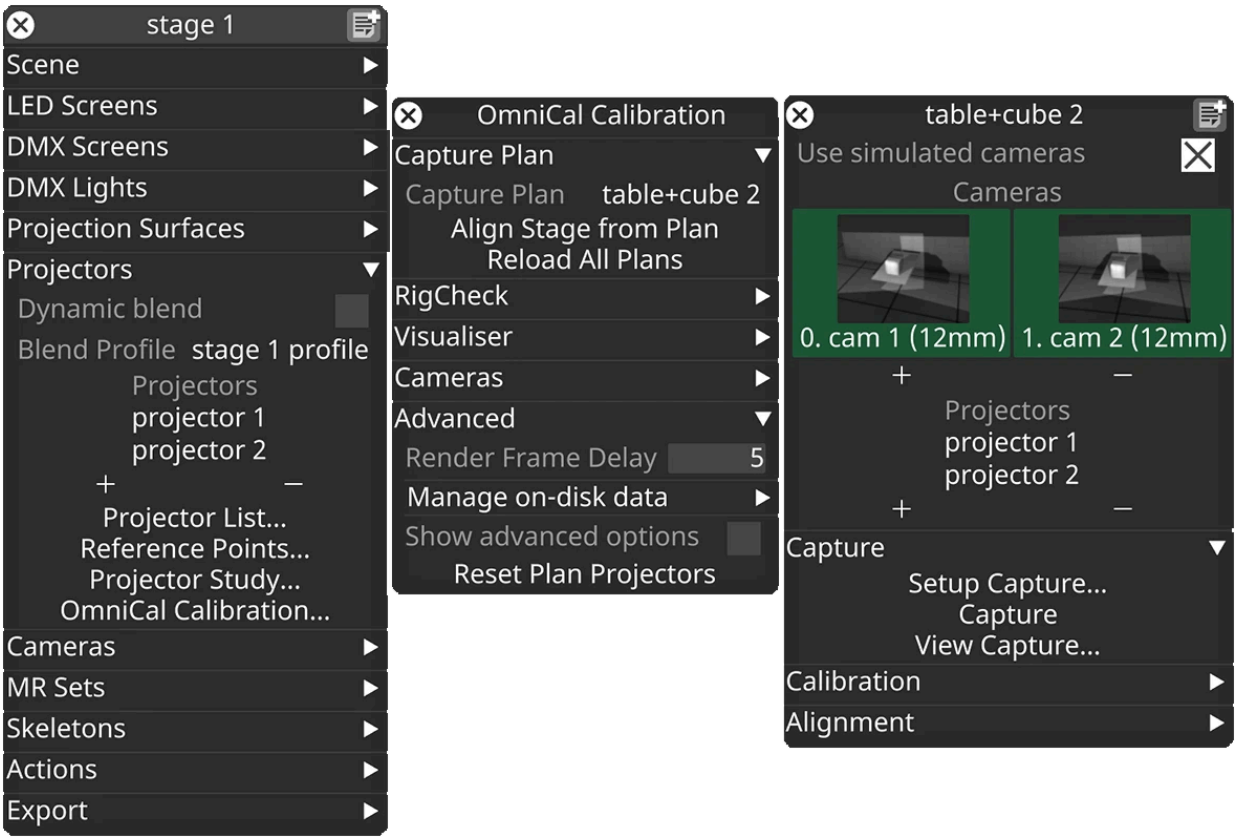
OmniCal Calibration

Calibration is the automatic process of calculating camera and projector poses and settings using the blobs detected during OmniCal Capture. Calibration also produces a consistent 3D point cloud formed from all blobs.

OmniCal Stage Plan

In the **Stage** editor, under **Projectors**, click **OmniCal Calibration** to open the **Calibration** editor. This widget controls the main OmniCal behaviour. Right-click on any **Capture Plan** to open its **OmniCalStagePlan** editor.

In the **OmniCalStagePlan** we recommend working through the sections from top to bottom: **Capture**, **Calibration**, **Alignment**, and **Mesh Deform** (if required).



Calibration

The calibration process triangulates the position of the blobs detected in a capture as well as the relative positions of cameras and projectors and their lens intrinsics. From this point, you

no longer need access to the physical stage to continue the calibration process.

Calibration Stages

OmniCal calibration has several stages:

1. Camera Calibration
   - Camera poses are calibrated based on the detected blob information and pre-calibrated lens data.
2. Camera Graph Calculation
   - Cameras are connected to each other on a graph, depending on their mutual overlap.
   - This graph is saved in the project, and re-used in later RigChecks, to ensure that alignments remain compatible.
3. Point Cloud Reconstruction
   - A combined point cloud is generated from all blobs seen by all camera pairs.
4. Projector Calibration
   - Projector poses and intrinsics are calibrated using the point cloud and projected blob coordinates.
5. Bundle Adjustment
   - An iterative process that optimises the pose and intrinsics for all cameras and projectors by minimising the total reprojection error.
6. Final Point Cloud Reconstruction

Calibration Settings

Click **Setup Calibration...** to open the **OmniCal Calibration Setup** widget.

In most cases, the default settings suffice. If calibration results are unsatisfactory despite good capture quality, adjust one setting at a time to clearly assess its impact.

By default more advanced calibration settings are hidden. Enable the checkbox **Show Advanced Options** to see all available settings.

> **Note**
>
> Most calibration settings include tooltips within Designer to provide contextual information on when and how to adjust them.

Redo Blob Detection

If **Redo Blob Detection** is enabled, then pressing **Calibrate** will first re-run the blob detection steps, before proceeding with the normal calibration.

Blob detection is always run as part of the OmniCal capture, which then saves the blob data to disk. Calibration usually loads this blob data at the beginning of a new calibration process.

Re-running blob detection allows users to adjust certain limits in the **Blob Detection Settings** in **Capture Setup**, so that they take an effect during the next calibration. Only blob filter settings like **Blob Area Limits** etc have an effect in this workflow. Settings related to blob projection (like **Blob Size**) are fixed, since this would require re-running a full *capture*.

Adjusting the *Blob limits* and then re-running the Blob detection can be a useful troubleshooting step, especially if:

- not enough blobs are actually in use, due to too strict *Blob limits* filters.
  - Loosening **Blob Circularity Limits** and **Blob Inertia Limits** prevents discarding blobs that appear elongated on the projection surface.
  - Adjusting the **Blob Area Limits** minimum value can help include small blobs that are otherwise discarded.
- there are very large blobs that badly affect the results, or that are wrongly split into many smaller blobs. Using a smaller **Blob Area Limits** maximum value may help in this case.
- there are many very small blobs that badly affect the results. Using a larger **Blob Area Limits** minimum value may help in this case.

> **Note**
>
> If there are many blobs that are very large or very small, then it is recommended to adjust the blob size accordingly, and start a new capture.

Camera Calibration settings

The **Camera Calibration** separator contains settings that only affect the calibration of OmniCal cameras.

But note that the quality of the camera calibration affects the generated point cloud, and thus directly the quality of projector calibrations.

Camera Outlier Handling

The **Outlier Handling** option controls how the initial camera calibration deals with potentially erroneous input points (outliers). Camera outliers can be caused by external influences such as reflections, stray light, partial occlusions, etc. Outlier detection algorithms use many subsets of all input point pairs to find data that causes calibrations to deviate too much from a

common consensus result. These outlier point pairs are then discarded and ignored for further processing.

The following **Outlier Handling** modes are available for OmniCal cameras:

- **RanSaC** (Random Sample And Consensus): Commonly used outlier handling algorithm.
- **LMedS** (Least Median of Squares): More robust algorithm compared to RanSaC, but slower. It tolerates at most 50% outliers. **LMedS** is the default for cameras.

The **Desired Confidence** option determines how LMedS or RanSaC work. The default value is 0.999, and should not be modified unless instructed by Disguise Support.

This setting is separate from the one configured for projectors, see **Projector Outlier Handling**.

Use Camera Lens Distortion

The **Use Lens Distortion** option determines the complexity of the non-linear lens distortion model that will be used for all OmniCal cameras. Each setting determines how many and which distortion parameters are calculated or ignored during the calibration process (and later Bundle Adjustment).

Using a lens model with two radial distortion parameters works for most use cases, as it allows modelling a combination of *barrel* and *pincushion* distortion, sometimes called *mustache* distortion.

This setting is separate from the one configured for projectors, see **Use Projector Lens Distortion**.

Lens distortion mode	# distortion terms	Distortion Model
Off	0	None
radial k1	1	Simple radial distortion (barrel or pincushion)
radial k1-2 (default)	2	Typical radial distortion (mix)
radial k1-3	3	Higher order radial distortion
radial k1-6	6	Complex radial distortion
radial k1 + tangential	3	Simple radial and tangential distortion
radial k1-2 + tangential	4	Typical radial and tangential distortion
radial k1-3 + tangential	5	Higher order radial and tangential distortion

Lens distortion mode	# distortion terms	Distortion Model
radial k1-6 + tangential	8	Complex radial and tangential distortion

> **Note**
>
> Reliably calculating lens distortion parameters requires sufficient and suitable input data, which relates to camera blob coverage. Insufficient blob coverage in one or more cameras may lead to unrealistic distortion values, which in turn will lead to bad calibration quality, even though the RMS error may be relatively low. In this case it is advised to reduce the lens distortion setting from the default to a lower value like **radial k1**, or even **Off**.

Calibration Model

The **Calibration Model** can be set to one of three modes:

- **Auto** (default): Attempt to detect appropriate model. Only manually select another mode if 'Auto' fails.
- **Epipolar**: Used with scenes "with depth", i.e. where blobs are not just projected on a flat surface, but are spread across 3 dimensions.
- **Homography**: Used with scenes where blobs are mostly projected on a flat surface, or the depth provided is very shallow (e.g. < 1cm).

Point Cloud Reconstruction settings

The **Point Cloud Reconstruction** separator contains settings that affect the calibration of OmniCal cameras, and how they contribute to a combined point cloud.

Camera graph optimisation

Camera graph optimisation should be enabled for camera setups where all cameras overlap with each other, so that they form a closed loop, i.e. the first and last camera overlap with each other. Enabling the camera graph optimisation prevents gaps or discontinuities where the point cloud boundaries meet. This will give more consistent reconstruction and calibration results for typical setups for 360-degree projections inside of or on domes, cylinders, spheres or the walls of a room.

Camera graph BA iterations

Camera graph BA iterations controls a separate Bundle Adjustment pass for the camera graph optimisation. The default is 500, but it is rare to need more than 50 iterations. This step is much faster than later Bundle Adjustment steps that involve cameras and projectors.

Projector Calibration settings

The **Projector Calibration** separator contains settings that only affect the calibration of projectors.

Use Projector Lens Distortion

The **Use Lens Distortion** option for projectors allows the same choices as for cameras (see Use Camera Lens Distortion), but instead applies to projector calibration.

> **Note**
>
> Reliably calculating lens distortion parameters requires sufficient and suitable input data, which relates to projector blob coverage. Insufficient blob coverage in one or more projectors may lead to unrealistic distortion values, which in turn will lead to bad calibration quality, even though the RMS error may be relatively low. In this case it is advised to reduce the lens distortion setting from the default to a lower value like **radial k1**, or even **Off**.

When using some ultra-short throw projector lenses (ultra-wide angle) it may be beneficial to use a higher lens distortion setting like **radial k1-3** or **radial k1-2 + tangential**.

Projector Outlier Handling

The **Outlier Handling** option controls how the projector calibration deals with potentially erroneous input points (outliers). Projector outliers are typically caused by incorrect point cloud data that managed to evade the camera outlier detection. See **Camera Outlier Handling** for more information.

The following **Outlier Handling** modes are available for projectors:

- **None**: Any outliers are accepted into the projector calibration. This may speed up the calibration if the input data is clean. But any unexpected outliers can lead to loss of calibration quality or even failure.
- **RanSaC** (Random Sample And Consensus): Commonly used outlier handling algorithm. **RanSaC** is the default for projectors.

Inlier percentage

Estimated number of inliers as a percentage of all input point pairs.

Used in outlier handling algorithms such as RanSaC. The default value should not be modified unless instructed by Disguise Support.

- Unit: percentage
- Range: 0 - 1. Default: 0.8 (80%).

Sample size

Number of point pairs grouped together during outlier handling to form a subset of the input points.

Used in outlier handling algorithms such as RanSaC. The default value should not be modified unless instructed by Disguise Support.

- Unit: count
- Range: 6 - 1000. Default: 7.

Projector Calibration Algorithm

The **Projector Calibration Algorithm** can be set to one of three modes:

- **DLT** (Direct Linear Transformation): requires input data "with depth"
- **Zhang**: also works with input data from completely flat (planar) surfaces
- **Auto** (default): will try all available algorithms and select the best result.

Bundle Adjustment settings

The **Bundle Adjustment** separator contains settings that affect the final optimisation of calibration parameters for OmniCal cameras and projectors.

Bundle Adjustment target

The **Bundle Adjustment target** can be set to one of six modes:

- **None**
  Disable Bundle Adjustment optimisation. Useful for troubleshooting, to quickly iterate over earlier capture or calibration stages.
- **Cameras**
  Only optimise cameras, and leave projectors at their initial calibration results. Fastest, but cannot guarantee the highest quality projection results. Useful for troubleshooting.
- **Cameras and Projectors**
  Optimise cameras and projectors in a combined pass, without a separate camera optimisation. Gives accurate results for two OmniCal cameras.
- **Cameras then Projectors**
  Optimise cameras first, then cameras and projectors in a combined pass. Slowest, but gives most accurate results.
- **Cameras then each Projector**
  Optimise cameras first, then each projector in an individual pass. Faster than the other combination modes. Recommended for large number of projectors, to reduce calibration time.

- **Auto** (default)
  Automatically selects the most appropriate Camera / Projector combination, based on the number of cameras and projectors:
  - If two cameras are used, then **Cameras and Projectors** is selected.
  - Otherwise **Cameras then Projectors** is selected.

Iterations

The number of **iterations** controls how much time is spent on iteratively improving the overall calibration result. There are two separate iterations settings, that are relevant, depending on the selected BA target:

- **Iterations (combined)**
  - Used for **Cameras** and combined **Cameras and/then Projectors** modes.
  - High values will lead to longer calibration duration, especially for large numbers of cameras and projectors.
  - Default: 7 iterations.
- **Iterations (individual projectors)**
  - Used for **Cameras then each Projector** mode.
  - This mode is faster, so the iterations can be set much higher than for the combined modes.
  - Default: 14 iterations.

Perform Calibration

Once you have finished adjusting the Calibration Settings, click **Calibrate** in the Plan editor and confirm with clicking “Yes” to start the calibration process. Depending on the number of cameras and projectors, this can take from a few seconds to tens of minutes.

After starting a calibration, a new window will open that shows its progress. This window also contains detailed messages about the current **calibration stage**. Once the calibration has finished, you can close this progress window. The messages from the progress window are saved to the OmniCal report, for later viewing.

OmniCal Report

The OmniCal report is useful for assessing the success and quality of a calibration, and for potential trouble-shooting.

Click **Open Report** to see a summary of the current Plan or RigCheck Result calibration. A new window will open which details the calibration success using the **OmniCal Score** and RMS reprojection errors and other metrics. The report also shows the detailed messages from the earlier calibration progress window. This includes more detailed information, in case the OmniCal score and/or RMS errors are high.

Error values below 1 pixel are considered good, and above 1px usually point to something going wrong in the process (physical setup, scene, configuration, ...). In many situations an error around 1.5 pixels is still acceptable, but it is worth going through troubleshooting steps to try and minimise any potential issues.

The report values are displayed using a colour between Green and Red to better highlight problematic camera or projector errors. If everything is green, then the calibration was a success.

> **Note**
>
> Projector calibration depends on the quality of the earlier camera calibration step. Therefore any larger camera errors will likely result in either high projector errors or unreliable calibration results. This can be useful to determine at what stage in the OmniCal process an issue arises.

OmniCal Score

The OmniCal Score is a simple way to assess and compare calibration quality between Plans or RigChecks. It was introduced in r32.4 as a "single value" measure that shows whether a calibration was successful, and how good it is.

The basis of the OmniCal Score is the rounded up **aggregate projector RMS error**, enhanced with penalty terms for any issues that were identified during the calibration. These added penalties make the OmniCal score more useful for identifying success than standard RMS errors, which sometimes can be low despite unrealistic calibrated parameters. While the OmniCal Score is not an RMS value itself, it uses the same open-ended range, where 0 is the theoretical best value, and a value of 1 or less is considered ideal.

The OmniCal Score contains penalty terms for issues identified during the calibration, including, but not limited to:

- Projector with high RMS error.
- Projector with invalid z-clipping values.
- Projector result is mirrored or pointing backwards.
- Projector result with non-square pixels or skewed image axes.
- Projector result with unrealistic focal length, lens shift or lens distortion coefficients.

If penalties were added to the OmniCal Score, then an alert message will highlight this to the user at the end of the calibration. The OmniCal report will then contain relevant details and reasons towards the end. Some of these problems can be avoided by changing relevant calibration settings and **re-calibrating** (e.g. if some projectors have unrealistic **lens distortion** values).

The OmniCal Score is also contained in RigCheck API responses, to make it easy for API callers to compare a result against an earlier one.

Camera Table

This table lists each OmniCal camera of the current calibration against its calculated RMS error. It also shows whether the calibration resulted in square pixels, i.e. the aspect ratio for a single pixel in the camera is 1:1. Non-square camera pixels are usually the result of incorrect input data, e.g. wrong camera focal length, incorrectly scaled Feed Rects or incorrect settings in the physical projector.

Below the table is the aggregate camera RMS error, which combines all camera errors into a single value for easier comparison between different calibrations.

Projector Table

This table lists each projector of the current calibration against its calculated RMS error. It also shows whether the calibration resulted in square pixels, i.e. the aspect ratio for a single pixel in the camera is 1:1. Non-square projector pixels are usually the result of incorrect input data, e.g. incorrectly scaled Feed Rects or incorrect settings in the physical projector.

Below the table is the aggregate projector RMS error, which combines all projector errors into a single value for easier comparison between different calibrations. The **OmniCal Score** is based on this value.

Calibration and Point Cloud visualisation

Once calibration is complete, you can view the point cloud and pixel errors for each projector. To do so, go to the **OmniCal Calibration** widget and open the **Visualiser** section. Set the **Visualisation Source** to **Plan** and set the **Visualisation Mode** to **All** or **Only Point Clouds**.

The generated point cloud will now be shown in the stage visualiser.

> **Note**
>
> The point cloud is drawn using the Plan's current alignment settings, so it may not be aligned well to the stage until QuickAlign has been performed. The cloud visualisation is helpful in achieving an initial manual alignment, which will make QuickAlign easier to understand.

Point Cloud Visualisation

The **Point Cloud visualisation** option provides several visualisation modes that help with analysing issues such as interference from other light sources, or movement during a capture. The default and most useful mode is **ProjectorReprojError**, which visualises the individual reprojection errors for each projected blob after projector calibration.

Point Cloud Visualisation	Description
Off	Disable point cloud visualisation.
Observations	Draw number of camera pairs that see a cloud point. The observation count affects the 3D reconstruction: Red=0 (failed), Blue=1 (OK), Green=2+ (better quality).
InlierScore	Draw cloud point inlier category using colours. Red: invalid or outlier, Orange: outlier, Yellow: projector calibration outlier, Blue: camera calibration outlier, Green: inlier.
InliersOnly	Only draw cloud points that are inliers (Blue) after applying camera calibration classifiers such as RanSaC or LMedS.
OutliersOnly	Only draw cloud points that are outliers (Red) after applying camera calibration classifiers such as RanSaC or LMedS. Reveals unstable points, possible scene movement, mismatched blob codes etc.
Deform	Draw distance of cloud points to aligned mesh (along point normal), using Mesh Deform threshold settings.
ProjectorInliersOnly	Only draw cloud points that are inliers (Blue) after projector calibration.
ProjectorOutliersOnly	Only draw cloud points that are outliers (Red) after projector calibration.
ProjectorReprojError	Draw cloud point reprojection errors after projector calibration. The point colour indicates the error quality between Green=good, Yellow=acceptable and Red=bad/outlier. Helps identify problematic points or projection areas.

Point labels

With the **Point labels** option a text label can be rendered for each cloud point. The text content depends on the option value. The default value is **Off**.

Note that rendering cloud point labels has a significant impact on performance.

Point labels	Description
Off	Disable point labels.
GridCode	Draw x, y index that corresponds to the blob in the projector grid. This can be helpful for identifying points as part of OmniCal troubleshooting.
ProjectorReprojError	Draw cloud point reprojection errors after projector calibration. This is a single RMS error value per point and given in pixels. Lower values are better. Values larger than 1px may indicate problems with the capture, such as light interference, movement etc., especially if they appear in clusters.

Re-running calibrations

Re-run a calibration by modifying a setting and clicking **Calibrate** again. Note that issues introduced during image capture (lighting changes, obstructions, etc.) will require re-running **Capture**.

Re-running the calibration with different settings is useful:

- If the calibration quality was decent, but not yet good enough. Tweaking camera or projector calibration settings can help in some cases to get better results.
- If there were incorrect calibration settings (e.g. camera calibration was set to “Homography”, but the blobs land on non-planar surfaces).
- Simply to experiment with settings, e.g. when trouble-shooting issues.

Limitations of OmniCal

OmniCal can accurately calibrate projectors, including their particular lens distortion coefficients. Any rectilinear lens is supported, including ultra-wide-angle / ultra-short-throw lenses with throw ratios around 0.35, even if they use built-in mirrors.

However, OmniCal currently does not support fish-eye lenses.

Another minor limitation is that OmniCal cannot correct chromatic aberration in projector lenses. This is a less common phenomenon in projection (compared to photography), but it is noticeable at the corners of some ultra-short-throw lenses.

OmniCal Capture

Capture is the process of projecting structured light patterns, taking images of these and detecting blobs within these images.

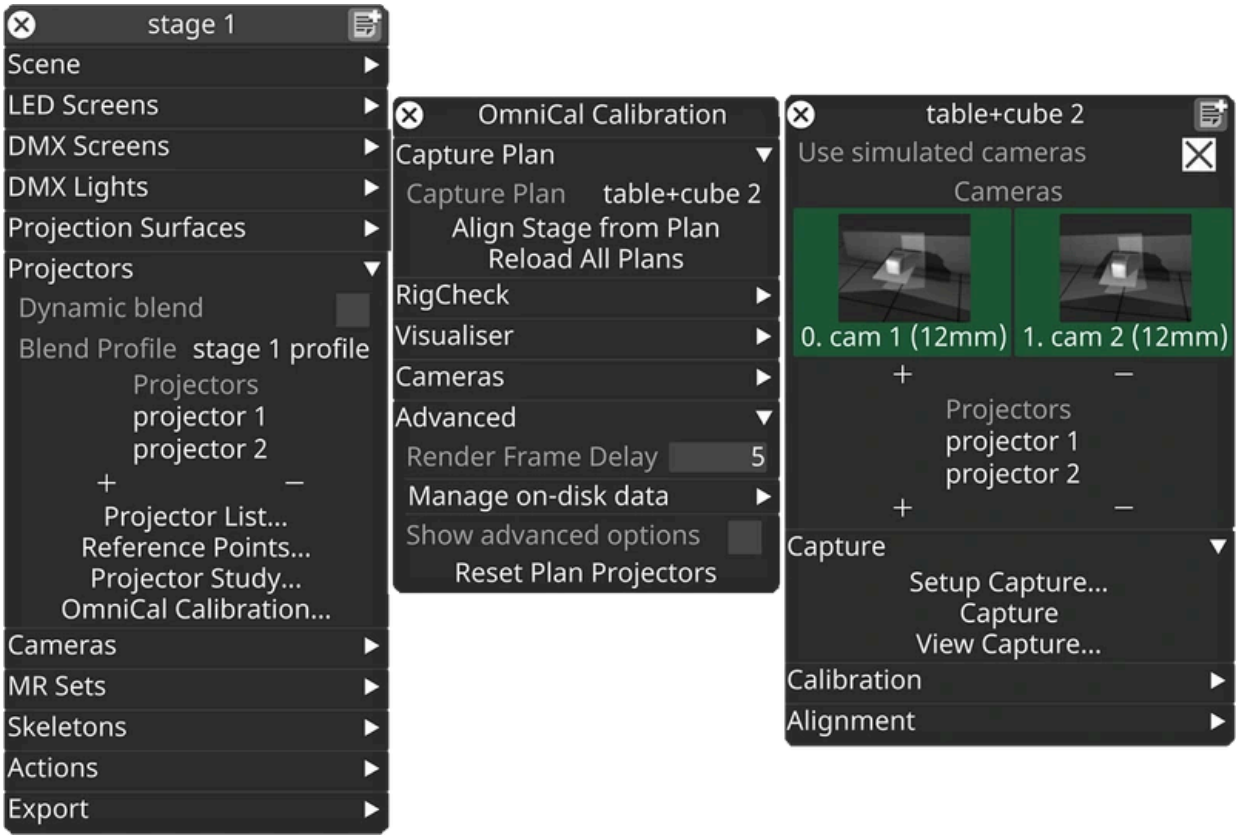
After completing camera and network setup, OmniCal is ready to capture using the Plan workflow:

1. Configure the positions and properties of **cameras and projectors**.
2. **Setup** the Capture.
   This may require adjusting exposure, projection and alert settings.
3. **Perform** the Capture and wait for completion.
   The capture may take a while to complete. OmniCal will show the progress in the UI and may alert users of issues that require their attention.

OmniCal Stage Plan

In the **Stage** editor, under **Projectors**, click **OmniCal Calibration** to open the **Calibration** editor. This widget controls the main OmniCal behaviour. Right-click on any **Capture Plan** to open its **OmniCalStagePlan** editor.

In the **OmniCalStagePlan** we recommend working through the sections from top to bottom: **Capture**, **Calibration**, **Alignment**, and **Mesh Deform** (if required).



Plan Workflow

This page details the OmniCal Plan workflow intended for trained users. For re-calibration of existing Plans, please see the RigCheck workflow.

Configure cameras and projectors

1. Left-click the calibration editor from the stage editor to open it.
2. To create a new Capture Plan, left-click on **CapturePlan**.
   This opens the **capture plan manager**.
3. Enter a name in the **New OmniCalStagePlan** field and click **OK**.
4. Right-click the newly created capture plan.
5. To work with simulated capture (without physical cameras), enable **Use simulated cameras**.
6. Click the **+** icon to add a new plan camera to the plan.

7. Right-click on each of the plan cameras to open its camera plan editor, to make further changes:
   - Adjust camera settings like offset, rotation or focal length as needed.
     The pose will be used for visualisation, and also for simulated captures.
   - If physical cameras are connected, then click **Physical OmniCal Camera** and select the appropriate camera from the list of discovered cameras.
   - Ensure that the configured focal length matches the physical lens.
8. Click the **+** icon to add projectors to the plan.
   - Ensure that projector outputs are correctly assigned in the **Feed View**.
   - Ensure that projection surfaces are correctly assigned to the projectors.

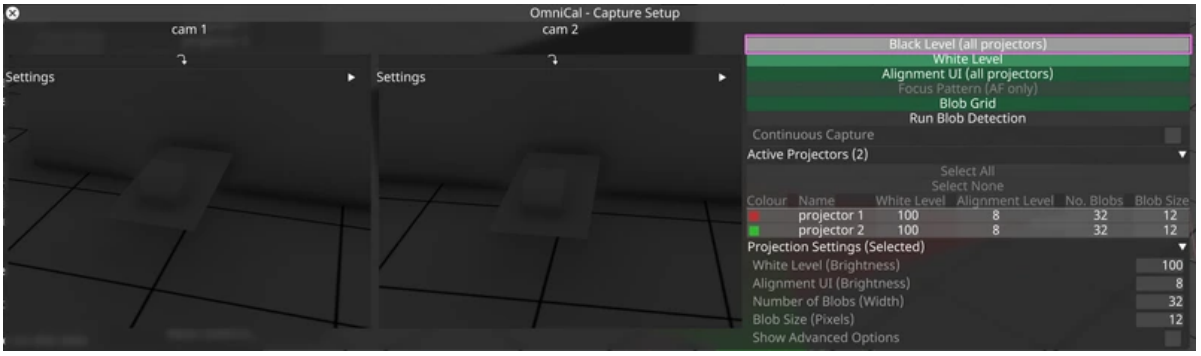
Capture Setup

When using physical cameras (no simulation), **Capture Setup** requires the camera network to be set up correctly (see previous chapter OmniCal Setup.

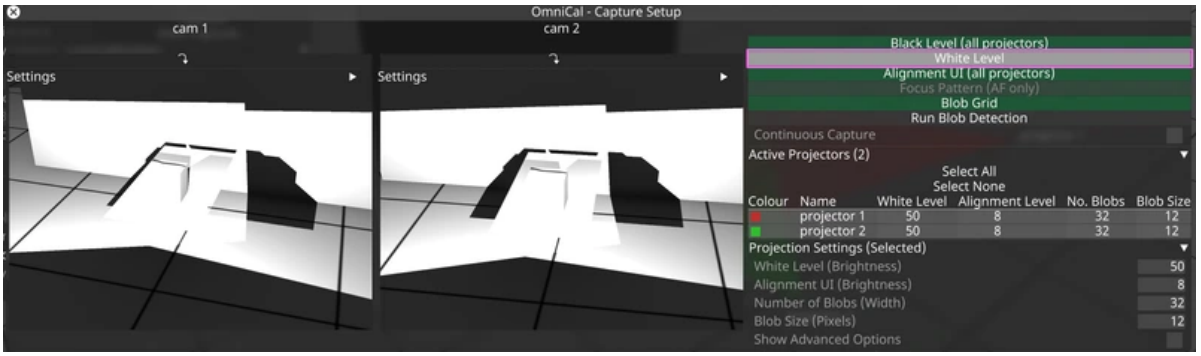
1. Left-click **Setup Capture** to open the **Capture Setup** window.



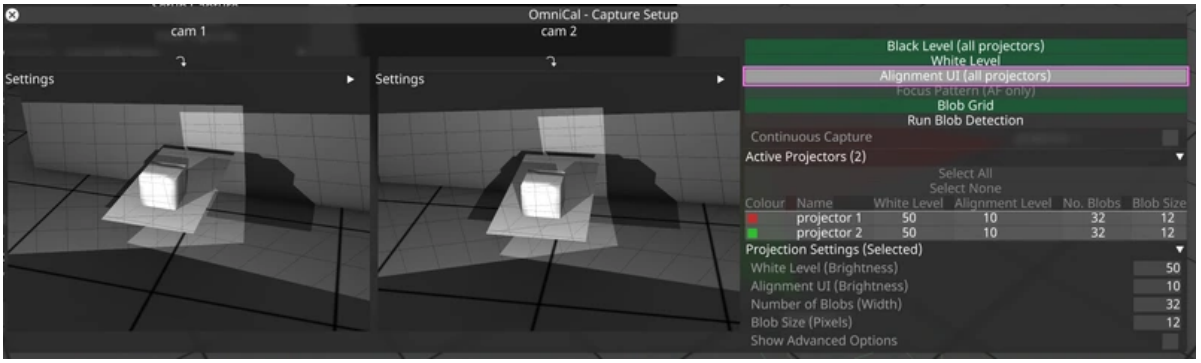
2. Click **Black Level (all projectors)** to capture the OmniCal camera view when projectors are outputting black. Black Level images should be fairly dark, but still allow recognition of important scene elements. Adjust using **lens aperture (iris)** on the physical lens and **exposure time** in Designer. Only use **gain** if the desired look cannot be achieved with other means.



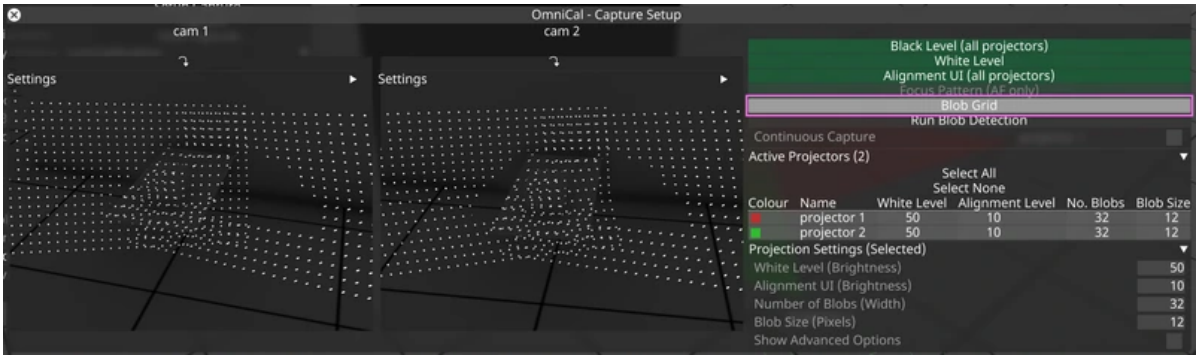
3. Click **White Level** and adjust the White Level (Brightness) value to make sure the camera images are not overexposed. Click on any projector to view and adjust it individually. The goal is to achieve a similar brightness for all projectors in the camera images.



4. Click **Alignment UI (all projectors)** and adjust the Alignment (Brightness) value to make sure you can clearly see the grid on the projection surface. The goal is to have alignment images where you are able to visually identify parts of the real-world projection surface, so they can later be matched up in QuickAlign (after Capture and Calibration).



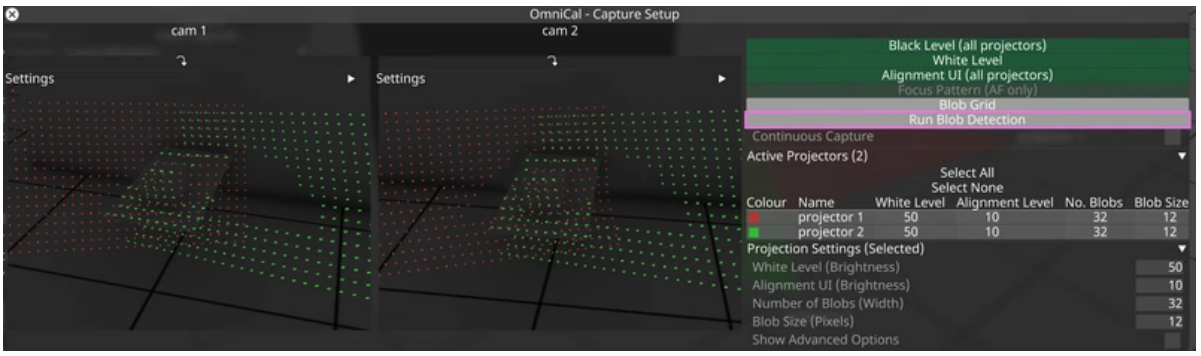
5. Click **Blob Grid** to see how many blobs are projected, and how well they cover the surfaces you are calibrating.
   Then adjust the blob size and the grid size (Number of Blobs) according to your projector and camera setup.



- The **blob size** is the size of projected blobs in pixels (in each projector's output image). This should be chosen as small as possible, but so that blobs are still clearly visible in all camera images. Note that the same blob may appear smaller in cameras that are further away or use wider-angled lenses (smaller focal length).
- The **grid size** is the number of blobs projected horizontally. Note that high values for grid size and larger blob sizes may lead to blobs touching each other. This must be avoided. Blob detection will fail if there is no clear gap between individual blobs.
- Blobs should appear with enough contrast against the background (i.e. Black Level) to make them easy to recognise.

> **Note**
>
> Generally speaking, blobs should be as small as possible whilst still remaining detected by all cameras. More blobs do not necessarily mean better calibration, but will increase calibration time. 32 blobs across the image width should be sufficient for most use cases. Projecting more blobs is useful when **Mesh Deform** is used after calibration and alignment, as it increases the number of inserted vertices.

6. Click **Run Blob Detection** to test the blob detection on all OmniCal cameras.



- A test blob detection will take a few moments until all cameras have taken images for all projectors. Results will be highlighted in each camera view.
- Detected blobs will be shown in the respective projector colour.
- At this stage the camera aperture or exposure may need adjusting, to improve blob detection and make it consistent for all cameras.
  - To adjust exposure, click on the camera name and adjust the exposure time in the Camera Plan Editor.
  - Adjusting the camera lens aperture requires physical access to the focus ring on the physical camera lens.

> **Note**
>
> A good way of finding a suitable exposure time is to turn **Continuous Capture** on, select **Blob Grid** mode and then adjust the camera exposure time until the blob levels are clearly visible. Then turn **Continuous Capture** off again.

Configure OmniCal Alerts

Alert settings allow users to adjust how OmniCal behaves when it encounters potential issues, such as blurry camera images. If a configured threshold is crossed, OmniCal will alert the user via a notification.

At the moment, alert settings only affect OmniCal post-capture processes that run towards the end of a capture. Some settings apply to both the Plan and RigCheck workflow, and some only to RigCheck.

These alert settings are user-configurable, to allow adjusting to specific project or environmental demands.

OmniCal alert settings typically consist of absolute or relative thresholds (percentages) that the current capture is compared against:

- **Absolute thresholds** are compared directly against actual values calculated during the capture. Depending on the process, a notification is either triggered if the current value is greater or smaller than the threshold.
- **Relative thresholds** are used to compare an absolute value from the current (RigCheck) capture against the equivalent value from the earlier Plan capture. A deviation greater than the configured percentage will trigger a notification.

> **Note**
>
> OmniCal Alerts cannot currently be queried via the OmniCal API. This will be added in a future release.

Settings for camera focus detection

Camera focus detection checks captured images whether they are out-of-focus (i.e. blurry) by calculating a **blur score** for each camera.

Threshold Plan workflow

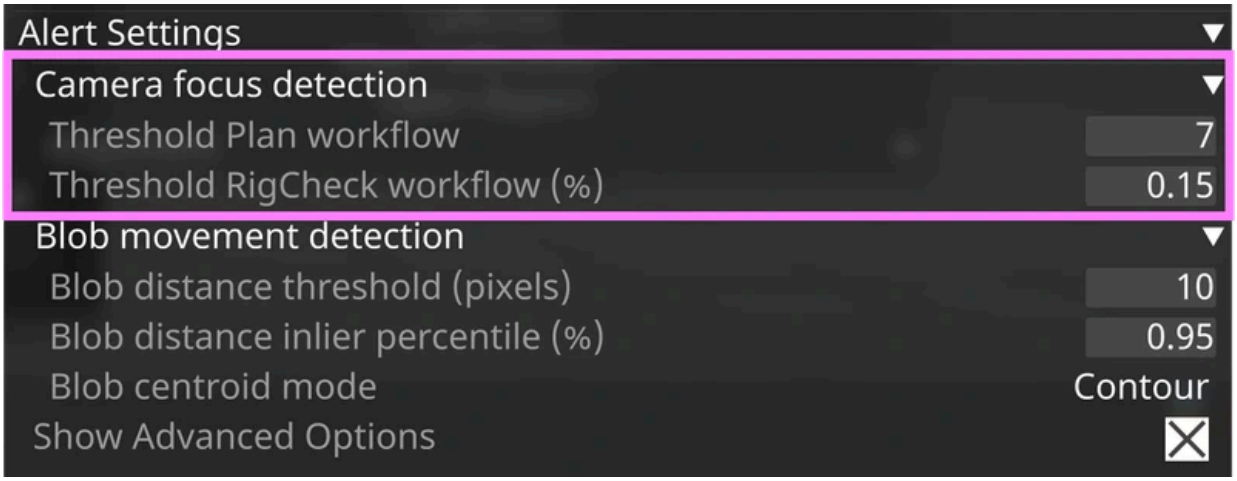
Absolute threshold for blur scores. Detects if the camera lens is potentially out of focus. Smaller values mean “less in focus” or more blurry.

- Unit: unitless
- Range: 0 - 1000. Default: 7
- Threshold type: absolute
- Workflow: Plan and RigCheck

Threshold RigCheck workflow (%)

Relative threshold for comparing blur scores between RigCheck and the original Plan. Detects if the camera lens focus has deteriorated since the initial installation.

- Unit: percentage
- Range: 0 - 1. Default: 0.15
- Threshold type: relative
- Workflow: RigCheck



Settings for blob movement detection

Blob movement detection checks whether captured blob coordinates have moved between the original Plan and a subsequent RigCheck. If the measured movement exceeds the defined limits, then OmniCal generates a notification.

Blob movement detection only applies to the RigCheck workflow.

Blob distance threshold (pixels)

Absolute threshold for average blob movement when comparing blob coordinates of the current RigCheck to the original Plan. OmniCal will show a notification if the calculated value is above this threshold.

- Unit: pixels
- Range: 0 - 200. Default: 10
- Threshold type: absolute

Blob distance inlier percentile (%)

Which percentile of blob centroid distances to use for calculations (assuming a normal distribution of the distances). Values outside the specified percentile are ignored for the blob movement calculation. Setting this below 100% helps to prevent the effect of outliers distorting the average distance result.

Default: 0.95, i.e. 95%.

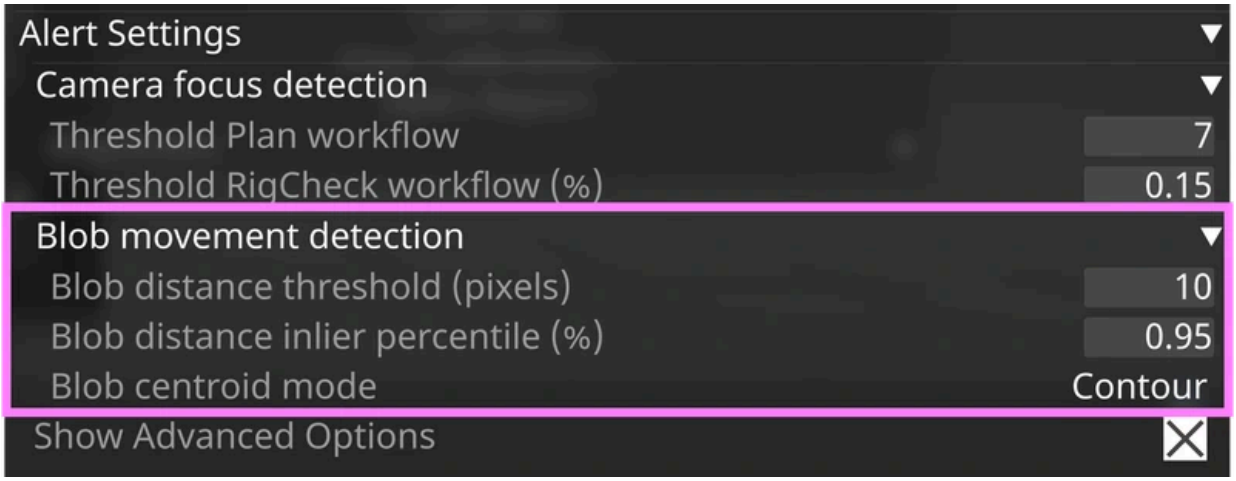
Blob centroid mode

Determines which blob centre coordinate to use for calculations: *Contour*, *Ellipse*, *BoundingBox*, or *BrightestPoint*. This is an advanced setting that normally does not need to be adjusted.

For each blob, OmniCal stores 4 different centre coordinates. These centre values may vary depending on the shape of the blob (as it appears in the camera). For example, a projected

circle may only be partially visible in a camera, leading to a deviation between the centres of, e.g. the detected contour and an ellipse modelled around it.

Default: *Contour*.



Perform a capture

Capture preparation to avoid interference

During an ongoing capture, we recommend the following:

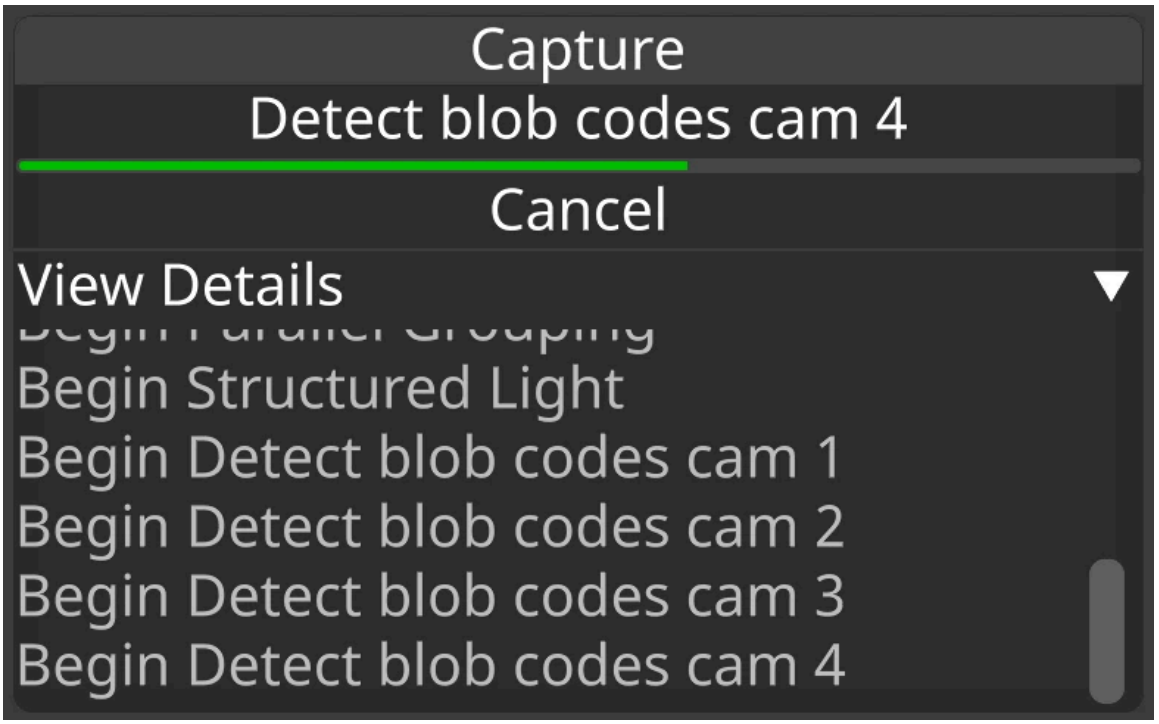
- The stage should be clear of interfering objects that might obscure the projection surface (e.g. ladders or other construction equipment).
- No changing light levels.
- No reflective surfaces in the projection path.
- No moving projection surfaces.
- No people walking across the projections or camera views.

Any such interference may lead to incorrect capture data that causes bad calibration results. If you notice any such interference or other capture problems, then cancel the current capture, remove the source of the problem and start a new **Capture**.

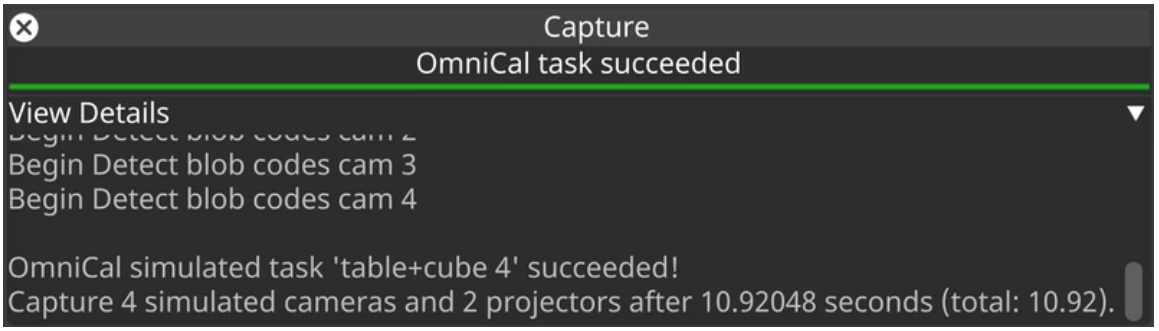
To perform a capture

1. Click **Capture** from the plan editor.

2. The system will perform a capture.
    - The time taken depends on the number of projectors and cameras, whether projectors are converging or not and any overlap between projectors. For example, 4 cameras and 4 non-converging projectors takes roughly a minute.

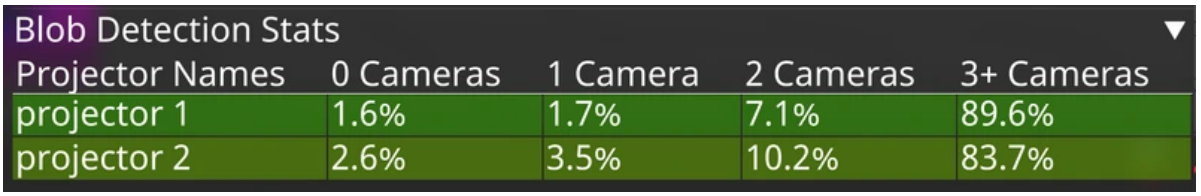


    - OmniCal will run some **post-capture processes** towards the end of the capture. These processes compare images against **configurable thresholds**, and may produce notifications if any thresholds are triggered.



3. Verify the results of the capture by clicking **View Capture**.
4. Click **Blob Detection Results** to see which blobs were detected in the cameras.
5. Verify that the blob detection results are as expected. These results should be consistent with what you saw earlier in the capture setup.

6. Blob statistics show how many cameras observe / detect a projector's blobs. An observer ratio of 50% or higher would be ideal.



Post-capture processes

During the OmniCal capture, certain post-capture processes will automatically run on some of the captured images. The purpose of these processes is to detect whether any conditions outside of Designer may affect the quality and validity of the capture.

Images are compared against **configurable thresholds**, and if any thresholds are triggered, OmniCal will notify the operator with relevant information and suggestions for next steps.

Camera focus detection

Camera focus detection helps to ensure that all OmniCal camera lenses are in focus. If a camera is found to potentially be out of focus, a notification will be issued. Operators may then need to manually adjust the lens focus on the physical camera.

Camera focus detection uses Fourier Transform algorithms to calculate a *blur score* for each camera. This score is compared to thresholds to detect whether the image is likely blurry.

Users can configure the behaviour of this process using **threshold settings**. The thresholds may also get automatically adjusted by OmniCal, based on the nature of the scene (see below). If the blur score for a camera is below the adjusted threshold, then this camera's lens is likely out of focus.

Meaning of calculated blur score

The blur score is a unitless measure that determines how relatively in or out of focus a camera lens is. A higher blur score means a more focused, and a lower score describes a more blurry image.

Note that the blur score also depends on the mage content, and can vary for a given camera, even if the lens focus is not modified. This is because the blur score calculation is sensitive to scene composition and environmental influences, including:

- Light distribution in the scene
  - Very dark (underexposed) or very bright (overexposed) areas are equivalent to low frequencies, so will lead to worse blur scores.

- Natural structure of the scene
  - Uniform colour / structure areas are equivalent to low frequencies, so will lead to worse blur scores.

> **Note**
>
> The blur score can only be meaningfully compared between roughly equivalent images, e.g. same camera pose, similar lighting conditions, same projector output, etc.

If a captured image was found to have any of the above influences, then the **configured threshold** will be automatically adjusted accordingly, to prevent false positive warnings.

Blob movement detection

Blob movement detection helps to confirm that the scene and rig setup, camera alignment, and overall positioning remain consistent during the RigCheck workflow.

This process checks whether any of the projected blobs have shifted or moved in any camera images between the original Plan and a subsequent RigCheck. It identifies blob centres in both datasets, measures the distance between matching centres, and calculates the overall average movement in pixels.

Blob movement detection also detects if a camera can no longer “see” blobs from a certain projector. This may indicate that a projector is turned off, or its footprint has changed considerably.

Users can configure the behaviour of this process using **threshold settings**. If the measured movement exceeds any of the defined limits, then OmniCal generates a notification.

Meaning of detected Blob movement

If blob movement detection triggers a notification, then this can mean one (or more) of the following:

- One or more cameras have moved.
  - The RigCheck will need alignment adjustment for each affected camera.
- One or more projection surfaces have moved.
  - The RigCheck will need alignment adjustment for each affected surface.
- One or more projectors have moved.
  - OmniCal will automatically update all projector calibrations.
  - As long as the projection surface is still covered sufficiently, no further action is required.
  - In case 2D warps or manual blend masks are used, these will likely need adjusting.

OmniCal cannot currently determine which of these situations has occurred. Operators are advised to visually check the scene for alignment issues and adjust them using the Result Aligner, if needed.

Managing OmniCal data on disk

OmniCal Plan data on disk

OmniCal's Plan workflow stores a mix of data on the hard disk, rather than in the .d3 project itself.

This includes:

- OmniCal settings
- Captured images
- Calculated blob detection results
- Calibration results
- Alignment data
- Report data

This data is stored in subfolders of the Designer project's `internal/opticalstageplan/` folder. Every Plan has its own set of data, and its subfolder has the same name as the associated Plan object in Designer.

The data in the **internal** subfolders is managed together with the corresponding Plan object in Designer: When the Plan object is deleted, and the trash in Designer is cleared, any associated folder (including images, config and result files) is also deleted from the hard disk.

Storing many Plans in a project folder can fill up the hard disk over time. It is usually a good idea to delete any Plans that are no longer in use. This not only frees up disk space; it also reduces confusion if there are many different Plans with similar names.

> **Note**
>
> Whenever a new Capture is started in the Plan workflow, all previous capture and calibration data for this Plan is first deleted from the hard disk. OmniCal settings (including alignment and Mesh Deform) are not deleted, though.

OmniCal RigCheck data on disk

RigCheck result data is treated the same as Plan data, except that it is stored in the Designer project subfolder `internal/opticalresult/`. At the beginning of a RigCheck, all settings (including alignment data) are copied from the Plan to the new RigCheck result. See also Managing RigCheck data on disk.

Comparing Plan variations

Often it is necessary to compare the impact of different Plan setups or settings, e.g. the number of cameras or their placement or lens options. Sometimes it's only the impact of calibration settings that needs to be compared.

This is best achieved by copying the relevant Plan and editing the copy:

- Right-click on the Plan title bar, choose a new name and click **Duplicate**.
- Make any required changes to the copied Plan's settings.
- Start a new Capture and/or Calibration for the new Plan.

That way it's possible to switch between the two plans without losing any previous settings or results. This is more flexible and will improve understanding of the impact of any changes to a Plan setup or its settings.

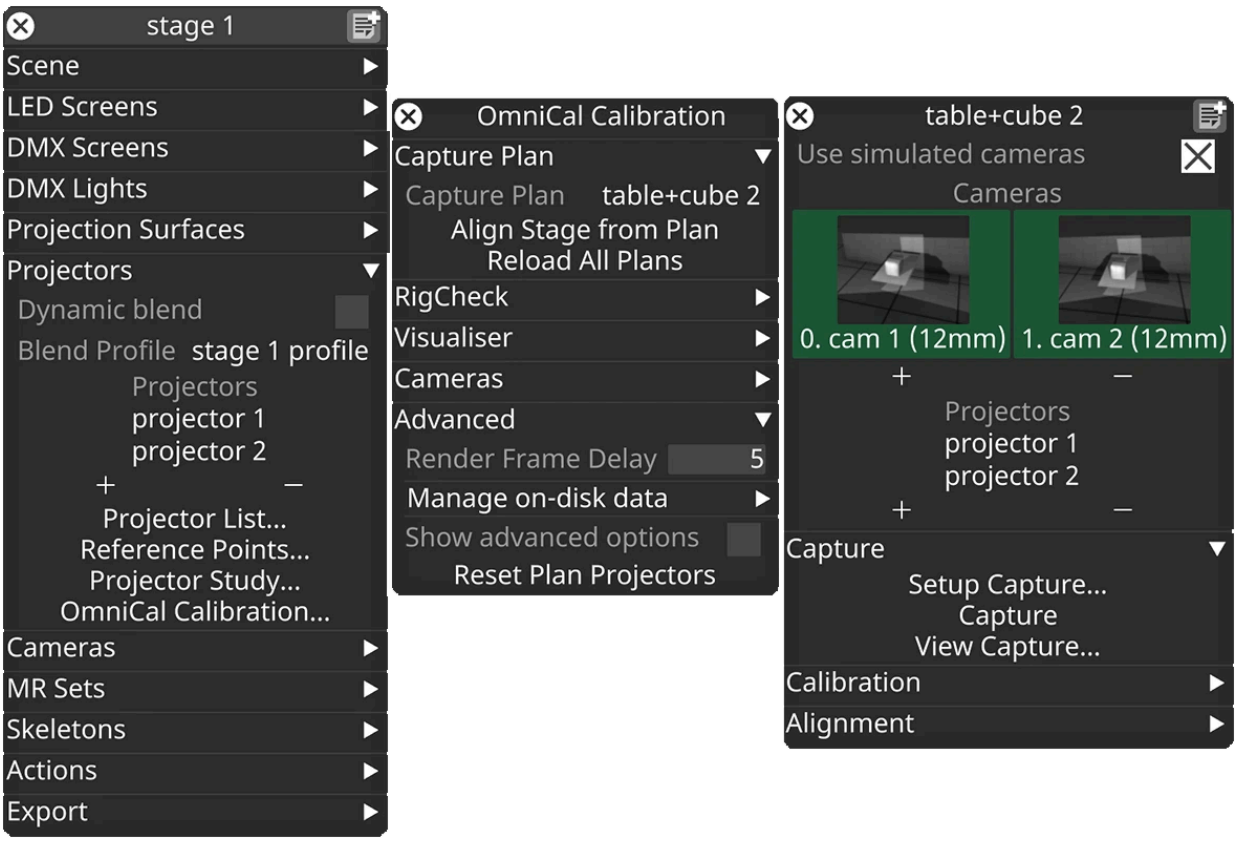
OmniCal Mesh Deform

Mesh Deform is an automatic process that enhances the existing 3D model by inserting new vertices based on the aligned point cloud, and adjusting existing vertices accordingly.

OmniCal Stage Plan

In the **Stage** editor, under **Projectors**, click **OmniCal Calibration** to open the **Calibration** editor. This widget controls the main OmniCal behaviour. Right-click on any **Capture Plan** to open its **OmniCalStagePlan** editor.

In the **OmniCalStagePlan** we recommend working through the sections from top to bottom: **Capture**, **Calibration**, **Alignment**, and **Mesh Deform** (if required).



Mesh Deform

If aligning and reshaping is not enough to make the projection match the physical object, then this is likely caused by shape differences that are not captured in the current 3D mesh. The mesh will need deforming to match the real world object. A typical situation is that *Reshape*

has handled certain vertex deviations, but there are remaining differences like uneven surface areas that are modelled as flat in the 3D mesh, or differences in curvature between the real world object and the 3D mesh.

Mesh Deform is an OmniCal feature that enhances the 3D mesh so it conforms to the captured point cloud. This is achieved by inserting new vertices into the mesh, and splitting triangles accordingly. The new vertices are based on points in the captured and aligned point cloud. Finally, a sophisticated smoothing algorithm adjusts all existing vertex coordinates according to their neighbours (including any newly inserted vertices).

Mesh Deform is able to deal with deformations in physical projection objects that are not or not adequately represented in the original mesh. For example it can accurately represent the actual surface of a curved screen, including any imperfections that arise from the construction process.

UV coordinates of original mesh vertices are not affected during Mesh Deform. Any inserted vertices get assigned UVs that are interpolated from their neighbours.

> **Note**
>
> Typically Mesh Deform is run once at the beginning of tech setup. As long as the physical projection surface does not change over time, the deformed mesh will be valid for any future capture and calibrations. See also **Point cloud size and detail** below.

Mesh Deform requirements

To use Mesh Deform correctly, a few requirements must be satisfied by the original mesh and the current state of the project:

- The original mesh must be “watertight” in areas that belong together.
  - If e.g. the North and East wall of a building are not connected in the mesh at their common edge (i.e. vertices are welded together), then they will likely get torn away from each other during Mesh Deform. Vertices with the same 3D position must be welded in the mesh, so that e.g. the top right vertex of the East wall is the same vertex as the top left vertex of the North wall, etc.
  - Holes (e.g. for windows of a building) are allowed, but it may be necessary to prevent unwanted deformations that could introduce twists to the window. This can be done by adding AlignmentPoints to the four corner vertices of each window and anchoring them (see **Anchor points** below).
- The OmniCal and Designer coordinate system must have been aligned, so the captured point cloud and original mesh overlap properly.
- For best Mesh Deform results it is recommended to first use Reshape to get the best possible match between mesh and point cloud.

Mesh Deform settings

Point cloud size and detail

Ideally, Mesh Deform is performed using an OmniCal capture that uses a high number of projected blobs (see grid size). The denser a point clouds is, the more detail it will provide for Mesh Deform. Therefore a larger grid size will provide a more accurate and higher quality deformed mesh. If the physical projection surface does not have many local deformations, then the default grid size is often sufficient.

Dense captures take a longer time to complete and calibrate, so only use a high grid size when a higher quality Mesh Deform is actually needed. When using high grid sizes, it is recommended to use a separate OmniCal plan with lower grid size for faster (e.g. daily) re-calibration. This is especially helpful if the calibration concerns multiple surfaces, but not all require deforming.

> **Note**
>
> It's easiest to start off with an OmniCal plan using a normal number of blobs (e.g. grid size of 48 or less), to first figure out correct camera placement and settings. If it's necessary to perform a higher quality Mesh Deform, then make a copy of this OmniCal plan and simply increase the grid size to a higher value before going through all steps from capture to Mesh Deform.

Distance threshold

This threshold denotes the maximum absolute distance between a point in the point cloud and the nearest mesh surface, along the point normal's direction. It is used to decide whether or not to add a new vertex for a certain cloud point (and deform its neighbours accordingly), or not. If the cloud point is further away from the current aligned (and potentially reshaped) mesh than this threshold, then Mesh Deform will not add a new vertex at the cloud point's 3D position.

This threshold is useful to exclude noisy or irrelevant data from the point cloud, e.g. trees in the foreground.

Default value: 0.1 m

Depending on the size and scale of a physical projection surface, this value may need to be increased or decreased to get better looking results.

Angle threshold

This threshold denotes the maximum angle between the normal vector of a cloud point and the normal vector of the nearest mesh surface. It is used to decide whether or not to add a new vertex for a certain cloud point (and deform its neighbours accordingly), or not. If the

angle is larger than this threshold, then Mesh Deform will not add a new vertex at the cloud point's 3D position.

This threshold is useful to prevent smoothing over edges and corners (e.g. right angles between floor and wall).

Default value: 30 degrees.

Anchor points

Anchor points in Mesh Deform are vertices that do not get modified during the smoothing operation. They are used as fixed guides. Any other vertices get interpolated based on the original vertex position, its non-anchor neighbours and the anchor points near it.

Mesh Deform treats all newly inserted vertices as anchor points, since they are directly derived from the captured point cloud. Other vertices (like mesh borders or alignment points) can also be treated as anchor points. This will influence the output mesh, since those vertices will keep their original aligned (or reshaped) position. This can make sense if there is for example a high confidence on the calculated location of reshaped points. But in most cases where Mesh Deform is required this is not desirable, so these options are not enabled by default.

Anchor points can be modified using these settings:

- **Lock mesh boundaries**: Unlocked / Locked
  - Whether mesh boundary vertices are treated as anchor points or not.
  - Has no effect on closed meshes without boundary edges, e.g. spheres.
  - Default: Unlocked.
- **Use alignment points**: No, Yes, If aligned in 2+ cameras
  - Whether Alignment points from QuickAlign will be treated as anchor points or not.
  - The third option only anchors alignment points that are aligned in more than 2 cameras. Having several camera intersections can provide a higher reliability on the calculated 3D vertex position.
  - Default: No.

Visualising Mesh Deform

You can preview the Mesh Deform results by changing the Point Cloud visualisation mode to **Deform** in the calibration editor. The results are updated in real-time so you can try out different deform settings using this. The lines indicate where each existing mesh vertex would be moved to. Newly inserted vertices will not be shown, though.

Using Mesh Deform

It is a good idea to try the default Mesh Deform settings first, and carefully inspect the result. If the deformed mesh has included or excluded cloud points incorrectly, then decrease or

increase the distance and angle parameters as required and try again.

1. Click **Mesh Deform...** from the Alignment tab of the Plan editor.
2. Select the screen you wish to deform by left-clicking the **screen property** in the deform editor.
3. Adjust parameters for this screen, as required.
4. Click **Deform**.

Mesh Deform Performance

Running a Mesh Deform operation may take a while, depending on the number of vertices and triangles in the original mesh, as well as the size of the captured point cloud.

After clicking **Deform**, the process will run in the background until it is complete. This may take several seconds (for simple meshes) up to tens of minutes (for complex meshes and dense point clouds). Mesh Deform is very CPU intensive, so although it's possible to continue using Designer while this is running, the impact on performance is very noticeable.

OmniCal Overview

OmniCal is an advanced camera-based system for projection mapping projects. It includes tools to plan projection setups, calibrate and align projectors to the Designer coordinate system, align projection surfaces, adjust mesh inconsistencies and deform meshes based on captured point clouds.

One of the big frustrations of our powerful 3D workflow has always been achieving accurate 3D models and calibrating those - solutions so far have been based around laser scanning or having a skilled CAD person on site who can modify the CAD model when inconsistencies are found between the 3D mesh and reality.

OmniCal removes the requirement to have accurate 3D models using its powerful calibration and Mesh Deform tools.

View the full Product information in this **Technical Specifications** document.



Features

- Robust and reliable cameras using Ethernet-based connections.
- OmniCal captures images of structured light patterns to construct a 3D representation of projection surfaces as a point cloud.
- It uses the point cloud to calibrate the relationship between projection surfaces, projectors and cameras.

- The QuickAlign tool helps users to manually align projection surfaces in the Designer project to match their real world positions and proportions. This is an “offline” process which doesn’t require access to the physical stage. Multiple scene objects can be aligned separately, if their relative pose is not known in advance.
- The single click Mesh Deform tool deforms a 3D model to match the real world (using the point cloud data).
- RigCheck provides easy re-calibration tools. If only projectors have moved since the previous calibration this is a single click. If cameras or projection surfaces have moved then an operator will need to adjust the previous alignment using newly captured camera images.
- The OmniCal simulation workflow allows planning with simulated cameras and lenses, view their coverage and perform test calibrations to ensure that the system and camera setup will perform as required on site.
- Supports 360° projection environments.
- Designed for calibration of surfaces and scenes with 3D depth.

> ⚠ **Note**
>
> The simulator should be used as part of the production workflow to assess project suitability.

Hardware

The OmniCal machine vision (MV) system consists of multiple Disguise OmniCal cameras and suitable lenses, with a choice of four field-of-view options.

The use of standard Ethernet technology and **Power over Ethernet (PoE)** contribute to a reliable, low-maintenance system that is ideal for fixed installations.

The OmniCal MV system is sold in kits of up to 4 or 8 cameras, or in custom arrangements, depending on project requirements. For more information, please see OmniCal Wired Kits.

Current limitations

- The quality of the calibration will depend on having suitable lighting conditions.
- Requires constant light levels during capture process.
- Works best with low ambient light levels.
- As mentioned above a Simulation must be run first to check project suitability. For large projects we recommend doing separate calibrations with groups of projectors and manually blending overlaps between the groups.
- Requires non-reflective, opaque projection surfaces (no gauzes or mirrors).

- Needs a few clearly defined feature points on the 3D mesh and real object, which can be visually identified on the camera images. Projection surfaces with sharp corners work well for example, but NOT smooth surfaces with no features.
- OmniCal requires depth from the projectors point of view. Scene depth is particularly important when using moving elements such as Automation.

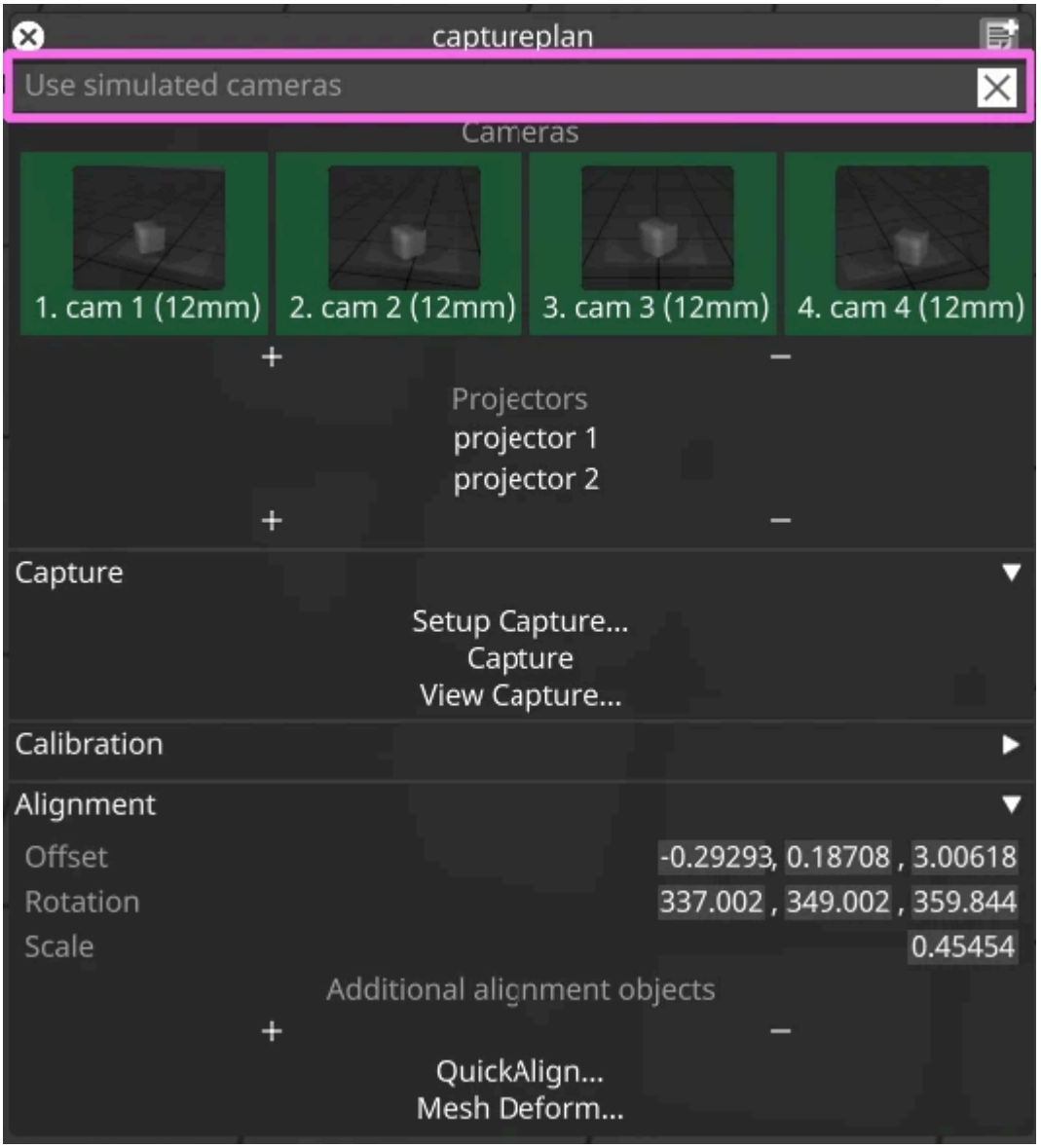
Workflow

For a trained OmniCal operator

Create a simulated Camera Plan

1. Use the Disguise simulator to check project suitability.
2. You can place virtual cameras and simulate a capture and calibration. You will need to have a project file with projectors and projection surfaces in the same configurations and positions as they will be on-site.
3. The basic rule for camera placement is that at least 2 cameras need to see every point on your projection surface(s). Also cameras should also have a large angular separation. i.e the directions they face should not be parallel.

4. The simulation will help you determine how many cameras are needed, their positions and lenses and the calibration parameters. It will also show you the ideal calibration results you should expect on-site. Note that these ideal results are without real-world influences like unsuitable lighting conditions, reflections, occlusions, movement in the scene during capture etc.

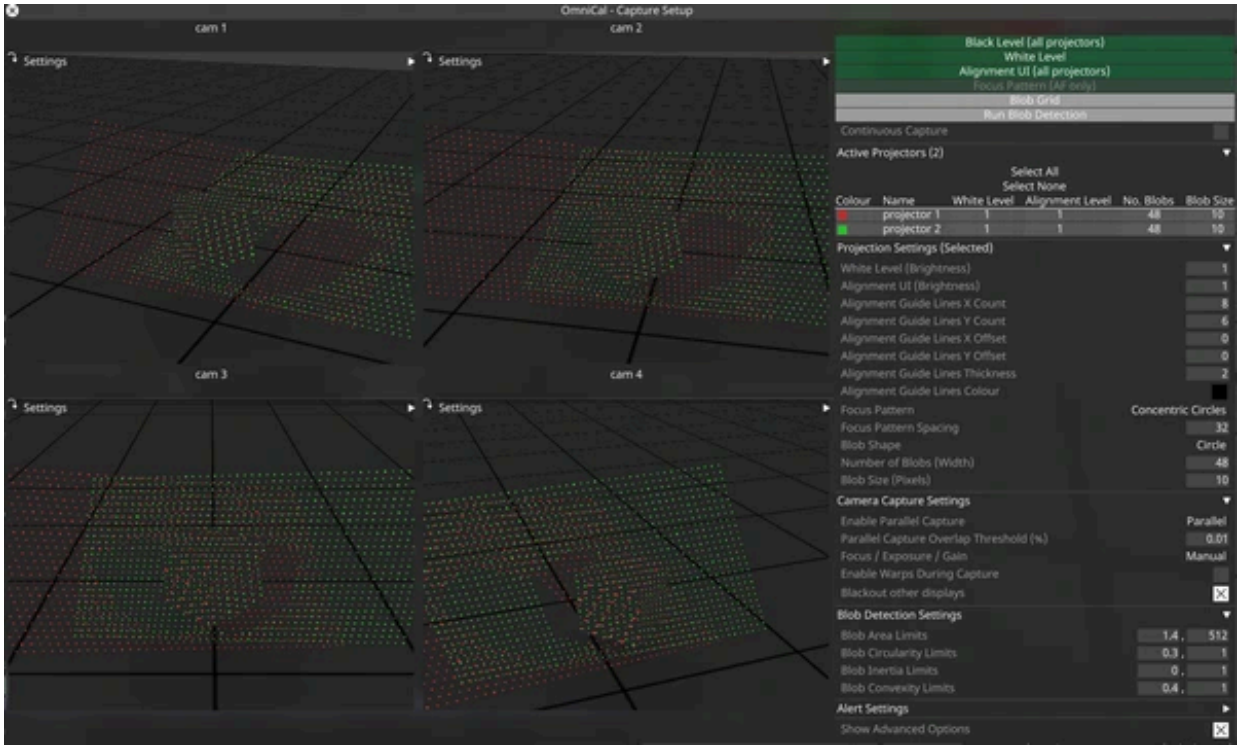


Checkbox to use simulated cameras

Setup Cameras On-site

1. You will need to make sure the position, orientation and field-of-view of your real cameras matches your simulated Camera Plan. To help you with this, there is a camera setup editor that shows what the cameras are looking at.
2. When mounting the OmniCal MV system, you need to manually adjust the physical focus and aperture (iris) on the lens, so that the images of the scene are sharp and well exposed. Exposure time can be controlled from within Disguise.

3. From the **Capture Setup** tool, check how well Blob Detection is working. Blobs are the dots that are projected in the structured light patterns.
4. You may need to adjust camera parameters (like exposure time) according to the light level to get the best results.

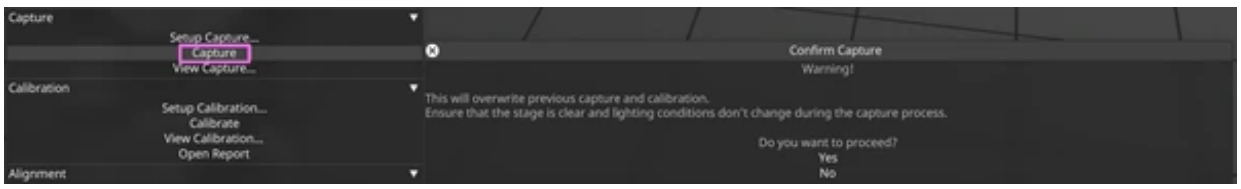


Example of Capture Setup with Blob Detection

Capture

> **Warning**
>
> A clear stage without movement or major lighting changes is required for this.

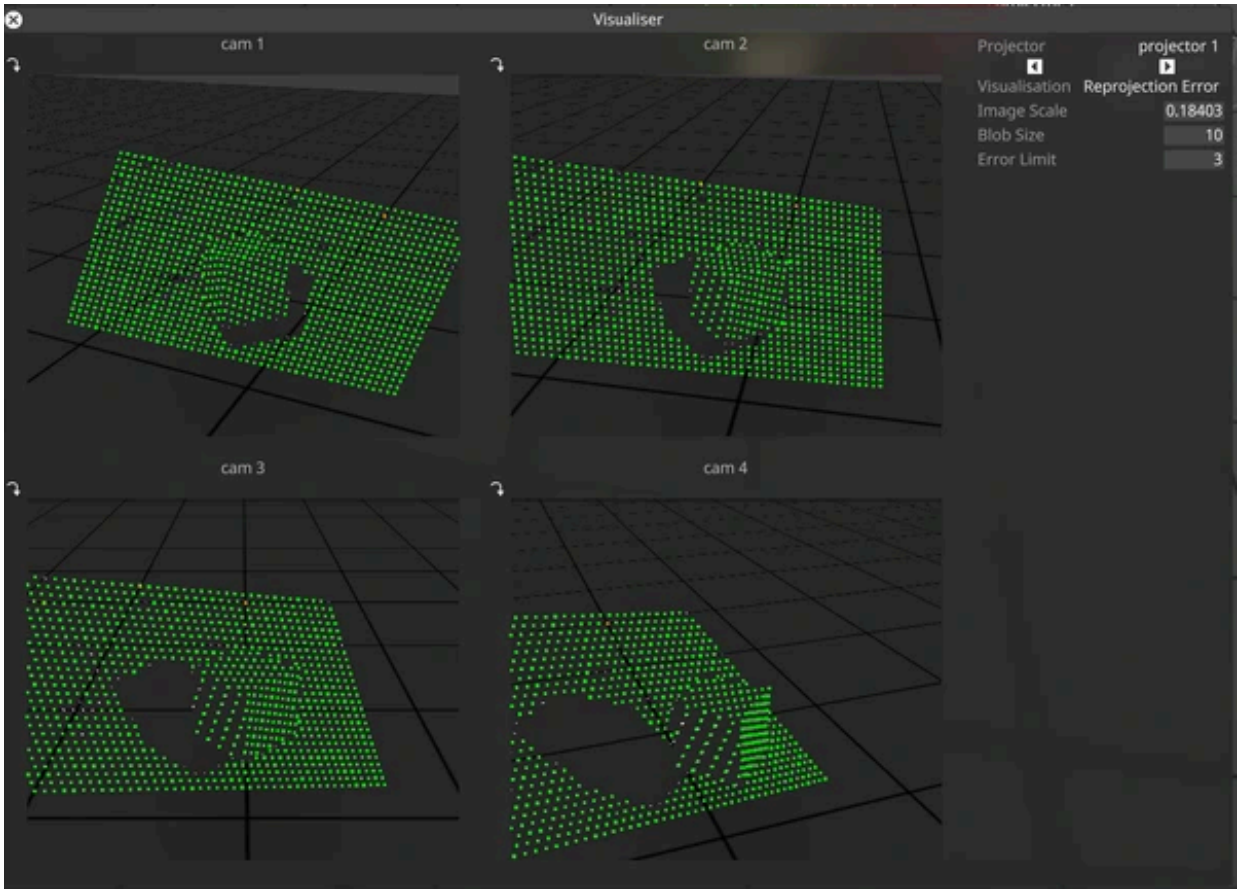
1. Capture is an automatic ‘one-button’ process that typically takes less than a minute. Exact duration depends on number of projectors, cameras and the resolution of the structured light pattern (number of blobs).
2. Once this is complete, the physical stage is free. The next steps can be done “offline”.



Confirm Capture Window

Calibration

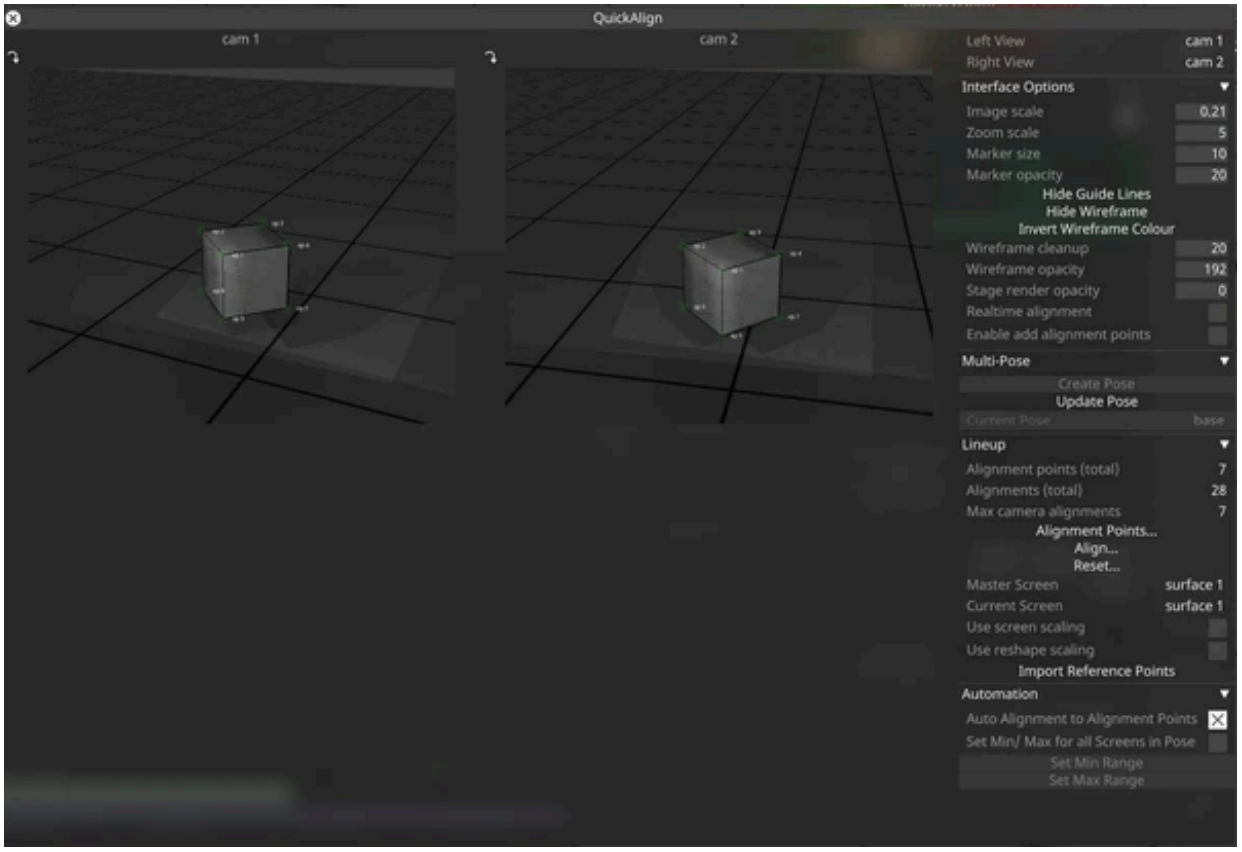
1. You can view the point cloud after this stage and see check the calibration errors in pixels for each projector.
2. You may need to adjust calibration parameters to get the best results, but usually these will be chosen automatically.



Example of successful calibration in Visualiser

Alignment

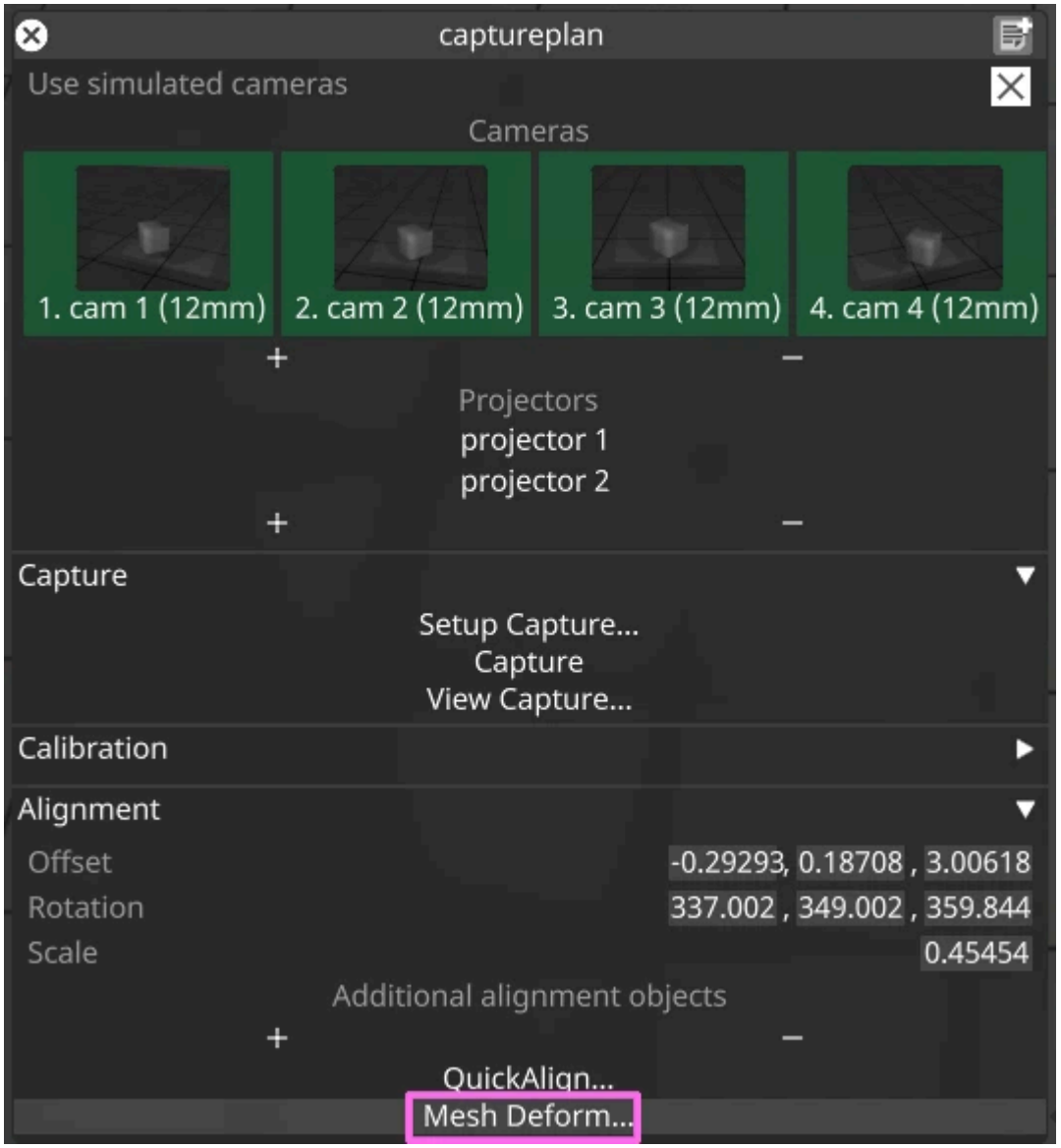
1. This is a manual step which aligns the point cloud with the projection surfaces in Disguise.
2. Users add alignment points to camera images to line up wireframe views of the projection surfaces with reality.
3. This only needs to be done once as long as cameras or projection surfaces do not move.
4. Re-shape points can also be added to correct the shape of the mesh. This can be thought of as a 3D warp from the camera's point of view.



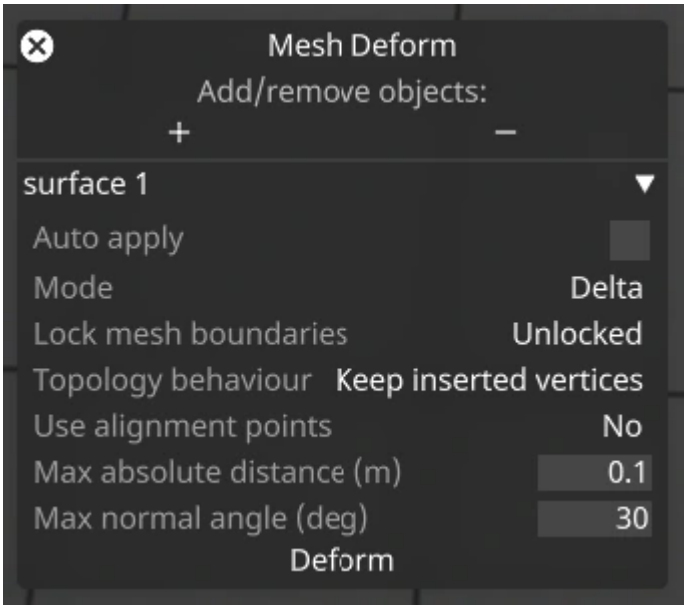
Example of successful alignment in QuickAlign Widget

Mesh Deform

This is a final key step which deforms a mesh in Designer to match the real world by using the depth information from the point cloud.



Mesh Deform Button



Mesh Deform Widget

For an untrained operator (recalibration)

Select Camera Plan

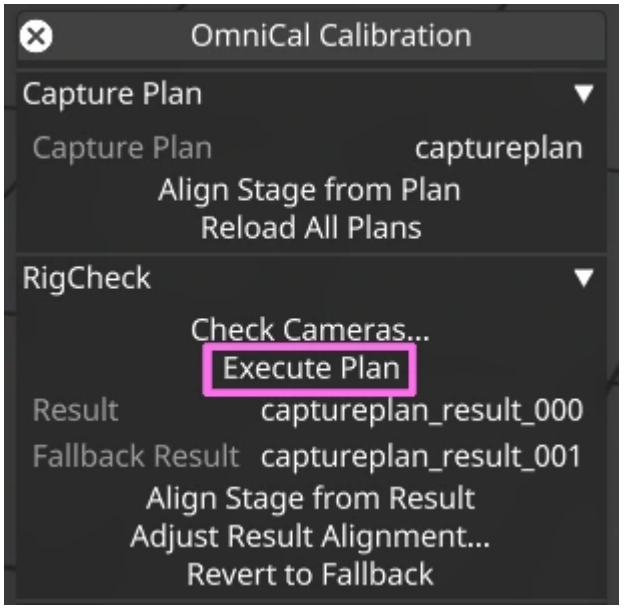
A user would select a Camera Plan previously created by a trained operator which contains known good settings for Capture, Calibration and Alignment.

Rig Check

This tool allows a user to compare live camera images to those from a previous Capture to check whether cameras or projection surfaces have moved. If so, the user can adjust the alignment reference points by dragging them into the correct positions.

Execute Plan

1. A button which triggers a new Capture and Calibration using the settings from the Camera Plan.
2. No user interaction is required after this point. Projectors will automatically be calibrated at the end of this process.



Execute Plan Button

Tips and Tricks

General Tips & Tricks

- The fast way to tell if you have a good calibration is to look at the OmniCal Score (and projector and camera calibration errors) in the OmniCal report. Any score below 1 pixel is considered good, similar to the error margin that would be accepted when using QuickCal.
- Anything above 1 pixel usually indicates that something went wrong. In simulations you will normally see errors of around 0.5 pixels or below.
- Avoid reflective surfaces as they can cause issues with calibration.
- Use surfaces with a lot of depth features as they make the calibration more accurate. It is especially important to have depth from each projector's "point of view". For example, if all the visible blobs from a projector land on a flat surface it will not be calibrated correctly. One way to fix this is to place an object in your environment temporarily during a capture to provide depth information.
- When calibrating a perfectly flat surface, the calibration results can sometimes be unrealistic, because of the lack of depth in the scene. To get better results, switch the camera **Calibration Model** from **Auto** or **Epipolar** to **Homography** in the Plan's **Calibration Setup** window.

Blob Detection Tips & Tricks

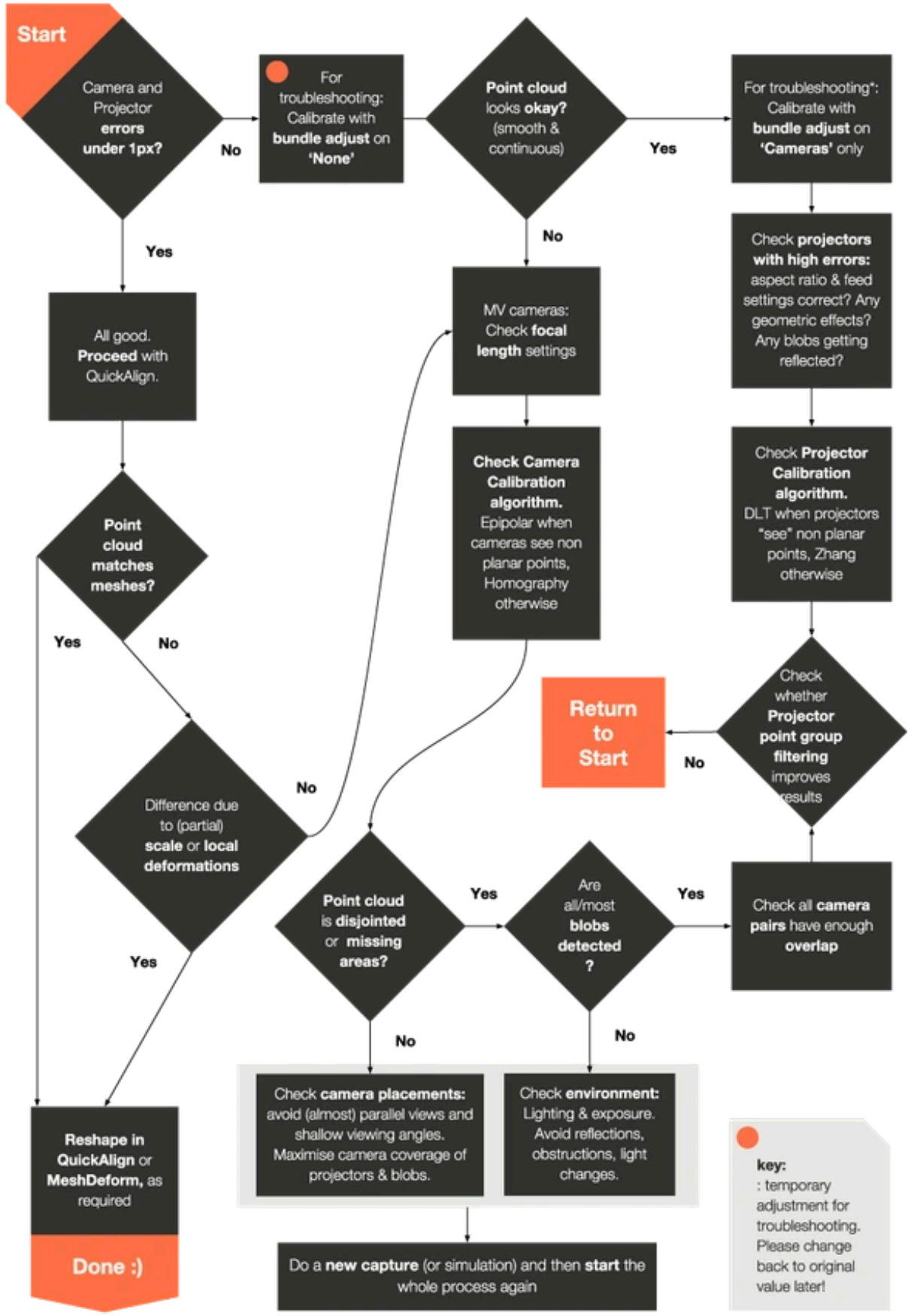
- Each blob needs to be seen by at least 2 cameras to be used in a calibration.

- Ensure blobs from across a projectors output can be seen. For example, if only blobs from the top left or only the center of a projector's output are detected it won't be calibrated correctly. In such a situation the calibration can be made more reliable by reducing the number of lens distortion coefficients, see Projector Calibration settings.
- Use a large enough angle difference between cameras (> 10 degrees), so their views are not too similar, while still being able to cover similar features of the projection object.
- Use the available settings in Capture Setup to improve blob detection. Different values of blob size, grid density, camera exposure, etc will suit different environments. For example, use smaller blob sizes if cameras are closer to the projection surface.
- Blobs should be as small as possible while still being detected by all cameras. This improves the calibration accuracy.
- If Blobs are too large they won't be detected at all, or may get wrongly split into multiple sub-blobs. Use advanced Blob filter settings to prevent this.
- Elongated blobs can cause higher calibration errors, because of the perspective effect (the actual blob center is not in the geometric center). Reduce the blob size to limit the impact of this. Avoid large angles between the projector and projection surface normal e.g 45 degrees.
- Using more blobs doesn't mean a better calibration. Usually the default of grid size of 32 is sufficient. Use more blobs if you require a detailed point cloud for Mesh Deform.
- Avoid light gradients on projection surfaces. If the light level changes across a camera image, then blob detection may not work as well.
- If most blobs are landing on a flat surface this can skew the calibration results in favour of those areas. Enabling planar point removal in the Plan's Calibration Setup window may improve your results.

Alignment Tips & Tricks

- It can be difficult to align (almost) symmetrical shapes like spheres, domes, cylinders, cubes or pyramids. Embed features or identification letters and numbers into the OBJ to make identification of vertices and alignment easier. It may also help to explicitly create named reference points using QuickCal, and then import them into QuickAlign.
- Point cloud visualisation is helpful to manually set an initial scale and alignment, before using QuickAlign. The various point cloud visualisation modes also help to understand calibration and alignment better, or to preview MeshDeform results.
  - Note: Point cloud visualization affects general Designer performance. Once you have verified the validity of your calibration, turn it off to ensure good performance.

Troubleshooting


Start
Camera and Projector errors under 1px?
No
For troubleshooting: Calibrate with bundle adjust on 'None'
Point cloud looks okay? (smooth & continuous)
Yes
For troubleshooting*: Calibrate with bundle adjust on 'Cameras' only
Check projectors with high errors: aspect ratio & feed settings correct? Any geometric effects? Any blobs getting reflected?
No
Yes
All good. Proceed with QuickAlign.
MV cameras: Check focal length settings
Check Camera Calibration algorithm. Epipolar when cameras see non planar points, Homography otherwise
Check Projector Calibration algorithm. DLT when projectors "see" non planar points, Zhang otherwise
Point cloud matches meshes?
Yes
No
Difference due to (partial) scale or local deformations
No
Yes
Return to Start
Check whether Projector point group filtering improves results
No
Point cloud is disjointed or missing areas?
Yes
Are all/most blobs detected ?
Yes
Check all camera pairs have enough overlap
No
No
Reshape in QuickAlign or MeshDeform, as required
Done :)
Check camera placements: avoid (almost) parallel views and shallow viewing angles. Maximise camera coverage of projectors & blobs.
Check environment: Lighting & exposure. Avoid reflections, obstructions, light changes.
Do a new capture (or simulation) and then start the whole process again
key:
: temporary adjustment for troubleshooting. Please change back to original value later!

OmniCal Troubleshooting guide

OmniCal RigCheck

RigCheck is the tool for quickly re-calibrating without advanced knowledge of the rest of the OmniCal system. It is primarily used by operators at fixed installations to re-calibrate shows after minor external changes, by comparing live camera images to those from a previous Capture to check whether cameras or projection surfaces have moved. If so, the user can adjust the alignment reference points by dragging them into the correct positions.

Accessing RigCheck

1. Open the stage editor by right-clicking Stage in the dashboard, or by right-clicking the floor in the visualiser.
2. Left-click **OmniCal Calibration** to open the OmniCal Calibration editor.
3. Ensure that you have a plan already calibrated by a trained operator.
4. Left-click **Check cameras**.

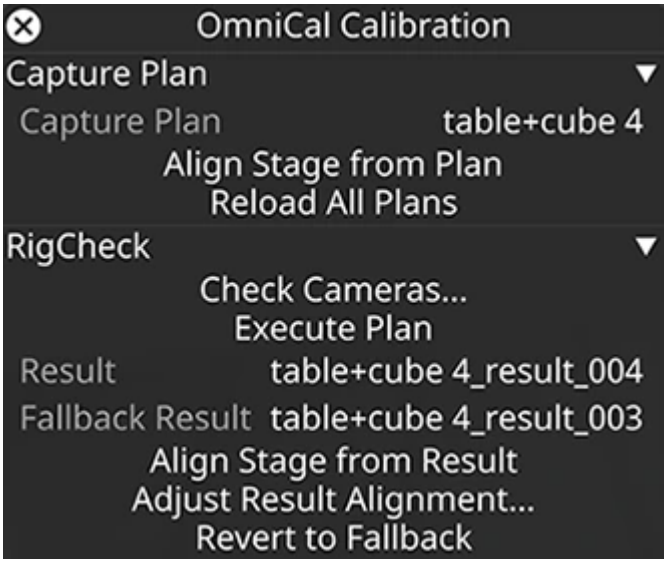
> ⚠ **Warning**
>
> - The stage should be clear.
> - No changing light levels.
> - No people walking across stage.

Workflow

The RigCheck workflow is used after a full OmniCal capture, calibration and alignment has been completed using the Plan workflow.

In RigCheck, the current plan is used as a template to repeat all required OmniCal steps with the same settings, but at a later time. The original plan itself is not modified in this workflow. Each RigCheck result stores its own set of settings and data. RigCheck allows minor alignment adjustments that differ from the original Plan to account for minor changes in projector or camera movement. It is therefore suited for recalibration of proven setups, e.g. when being run by day-to-day operators on fixed installations.

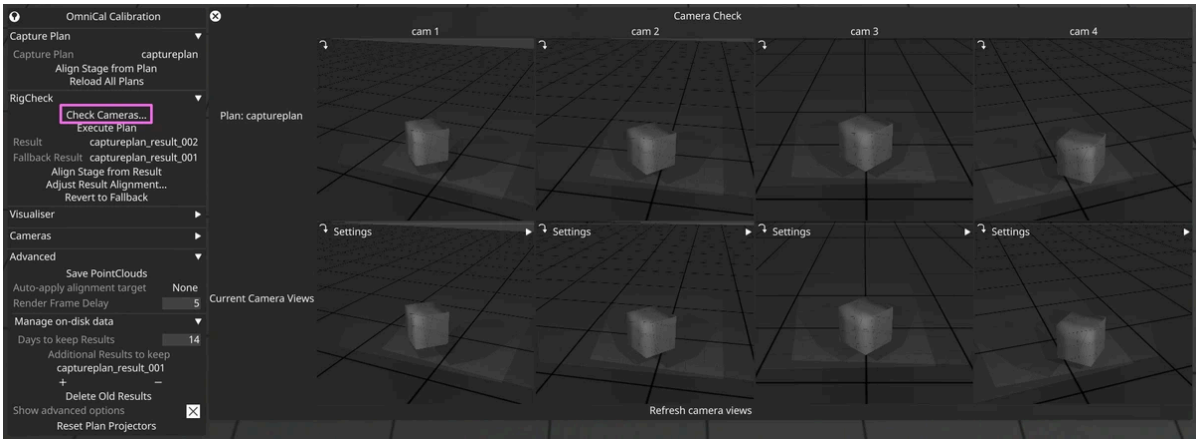
The **RigCheck** separator in the main **OmniCal Calibration** window groups all relevant functionality to prepare, run or align a RigCheck.



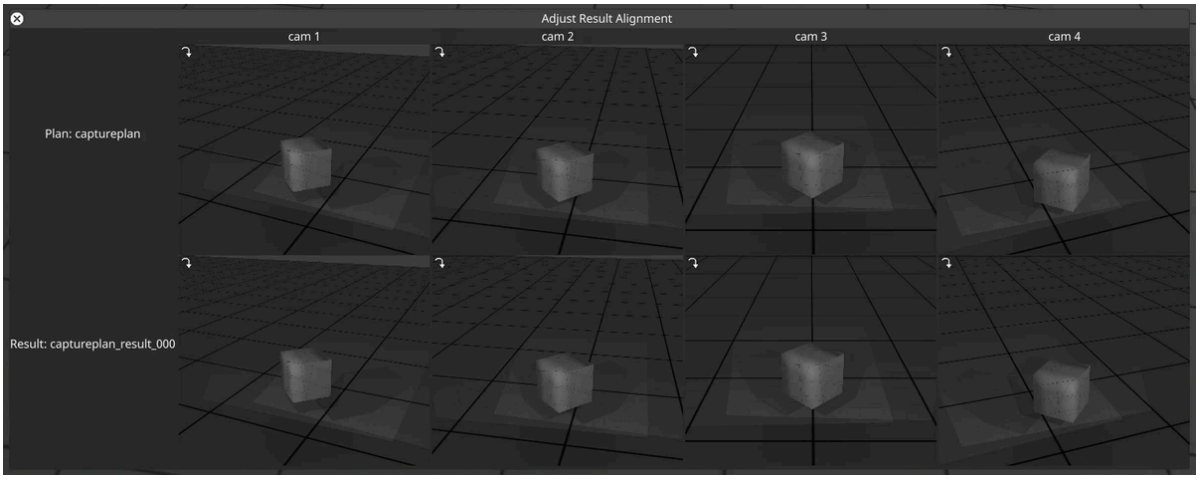
OmniCal Plan with several RigCheck Results.

Using RigCheck

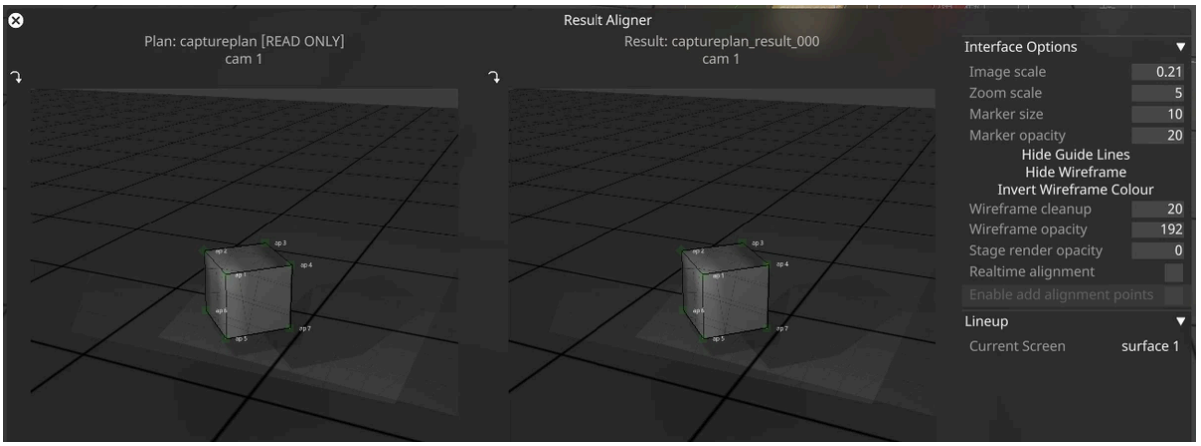
1. Ensure that you have a plan already calibrated by a trained OmniCal operator. It should be selected in the *OmniCal Calibration* editor.
2. Left-click **Check Cameras** in the OmniCal Calibration editor.
3. Verify there are no errors when the **Check Cameras** window opens. Errors can include the following:
    - **a.** Cameras are unavailable.
    - **b.** Camera names have been modified in the plan. The plan capture is used as a reference for RigCheck. Any changes to cameras names after a completed plan capture will invalidate it.
4. The **Check Cameras** window will open which shows camera pairs consisting of the original plan capture and a snapshot capture of the current stage. You can take a new snapshot using the Refresh Camera Views button.



5. Ensure that the camera views match:
    - **a.** They don't need to be identical, but the coverage of projection surfaces should match and they should be in approximately the same positions.
    - **b.** The brightness of the images should also match. The exact camera settings specified in the plan (like exposure time) will be used here, so any differences would be either due to the physical aperture or focus of the camera lens, or the lighting environment. It is therefore recommended that the focus and aperture of machine vision cameras be locked in place for repeatability.
6. Once you are happy with the camera views, close the **Check Cameras** window.
7. Left-click **Execute Plan**. This will perform a capture, calibration, alignment and optionally a mesh deform (if it was configured to run automatically in the plan's deform settings). A new Result object is created which contains the capture, calibration etc data.
8. Ensure that the correct Plan and Result are selected in the OmniCal Calibration editor.
9. Left-click **Align Stage from Result** in the OmniCal Calibration editor. Note that this will apply the result's alignment to the stage (if it hasn't been applied already). This will update both projectors and projection surfaces if they have alignment points. If Align Stage from Result is greyed out a tool tip should tell you the reason, which can include the following:
    - **a.** The Plan has no capture or calibration.
    - **b.** The Result has no capture or calibration.
10. Verify there are no errors when the **Adjust Result Alignment** window opens. Errors can include the following:
    - **a.** The camera names in the Plan and Result don't match. The Plan may have been modified since the Result was created.
11. The **Adjust Result Alignment** window will open which shows camera pairs consisting of the original Plan capture and the Result capture that was taken.



12. Left-click on a camera image to open the **Result Aligner** window. If any **Mesh Deforms** have been applied these will be undone in order for alignment points to be editable.



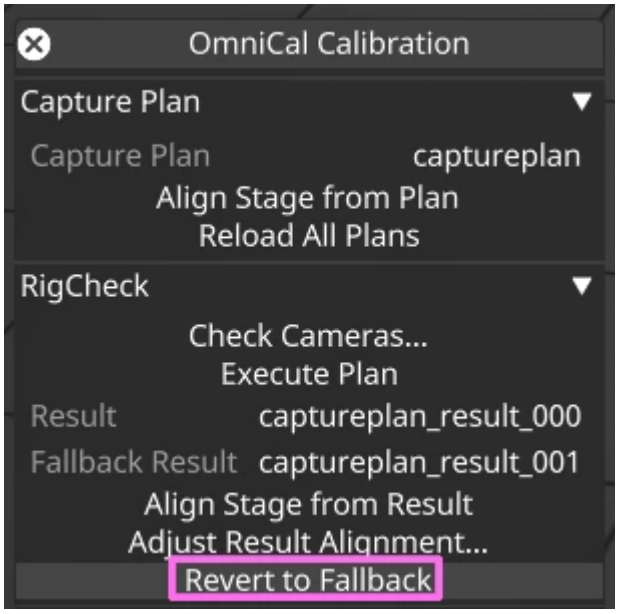
13. On the left hand side is the camera view from the original Plan (read only) and on the right the Result. You can then update the alignment points on the right to match the left. This will update the alignment on the stage as you do it. The controls are identical to **QuickAlign**, except that it's not possible to add/remove any alignment points.
14. Select the next screen by pressing the button at the bottom of the camera views or selecting it from the surfaces drop down and repeat the process of checking and adjusting alignment points.
15. Repeat this for all cameras. You could in theory only check cameras or projection surfaces which you know to have moved.
16. Close the **Adjust Result Alignment** window. You will be asked if you'd like to re-apply the **Mesh Deform**.

Reverting to a Fallback Result

Designer r32.4 added a convenient way to revert the OmniCal calibration state to a previous RigCheck Result, called the **Fallback Result**. This is useful when a RigCheck failed or produced suboptimal quality.

The fallback should typically be set to the most recent RigCheck Result with the best visual quality, as determined by an OmniCal operator after a visual inspection of the scene. The **Fallback Result** must be fully calibrated and aligned for all projectors, with no errors.

Click the **Revert to Fallback** button to switch from the current **Result** to the **Fallback Result**. This will revert the OmniCal state and update the calibration and alignment of all affected projectors to the newly selected current **Result**.



Revert to Fallback button

RigCheck API

Essential parts of the RigCheck workflow are now also available via API endpoints for the Designer session.

> **Note**
>
> Alignment adjustments are currently not supported via the API. If such adjustments are needed, then these can usually be done by logging into a Designer session remotely.

Managing RigCheck data on disk

OmniCal RigCheck Result data on disk

Just like in the Plan workflow, RigCheck also stores a mix of data on the hard disk, rather than in the .d3 project itself.

The RigCheck data includes:

- OmniCal settings
- Captured images
- Calculated blob detection results
- Calibration results
- Alignment data
- Report data

This RigCheck data is stored in subfolders of the Designer project's `internal/opticalresult/` folder. Every RigCheck has its own set of data, and its subfolder has the same name as the associated "Result" object in Designer.

The data in the **internal** subfolders is managed together with the corresponding Result object in Designer: When the RigCheck Result object is deleted, and the trash in Designer is cleared, any associated folder (including images, config and result files) is also deleted from the hard disk.

Delete old and unused RigCheck Results

If a project has many RigCheck Results in Designer, then this may cause the hard disk to fill up over time. To free up disk space, users can move RigCheck results that are no longer needed to the trash, and then empty the trash.

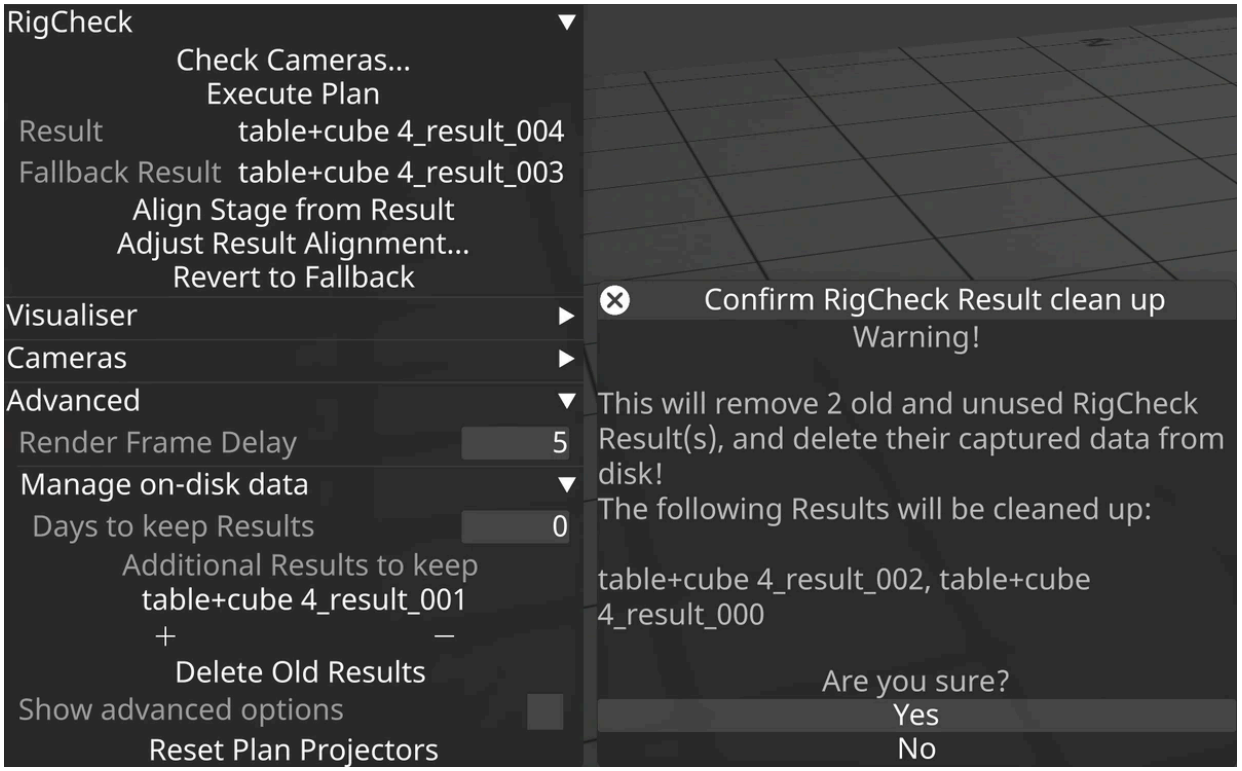
For projects that recalibrate on a regular basis (e.g. via API calls) this manual way of deleting RigCheck data can be too slow and error prone. Designer version r32.4 introduces an easier way to delete any RigCheck Results that are old and unused, via the **Delete Old Results** button or API endpoint `omnical/rigcheck/deleteoldresults`.

The API endpoint or button will delete any RigCheck Results that are both:

- Older than the **Days to keep Results** value configured in Designer.
- Not in use.

The following Results are considered "in use":

- Currently selected **Result**.
- Currently selected **Fallback Result**.
- Any result in the backup list, see **Additional Results to keep**.



*Example usage of **Delete Old Results**.*

Manage on-disk data for API usage

Users can configure **Days to keep Results** and **Additional Results to keep** in Designer to suit their needs, but they cannot currently be modified by the API.

The API endpoint `omnical/rigcheck/acceptresult` automatically adds the current Result to the **Additional Results to keep** backup list. This allows for cleanup automation by API callers, without the need to interact with Designer directly.

OmniCal Camera Setup

> **Warning**
>
> OmniCal camera networks must use a separate network adaptor than any other network traffic (d3net, media, ...)! This is because the GigEVision protocol streams video at very high bandwidths and does not tolerate network interference.

Summary

1. GigEVision network setup.
2. Install Vimba or Vimba X for Windows.
3. Set up camera positions and configure exposure and lens settings.
4. Configure cameras in Designer.
5. Troubleshoot any network or camera issues.

OmniCal Machine Vision (MV) system

The camera setup described here must be done before you run Designer.

Network setup

> **Warning**
>
> OmniCal MV cameras will use all the available network bandwidth. Therefore, they must always remain on a dedicated physical network, separated from any other traffic. Sharing the camera switch with other devices or using network adaptor virtualisation (e.g. VLANs) cannot be supported, as any other traffic leads to dropped packets and potentially to disconnected cameras.

> **Note**
>
> - When Camera Discovery is enabled, machine vision cameras continuously capture images and stream them to the Director. This only affects the camera network and not Disguise directly; however, it consumes CPU time processing these packets. During show playback camera discovery should therefore be disabled.
> - Camera Discovery can be disabled explicitly in the **OmniCal Calibration** window and is also turned off automatically when the Calibration and Plan windows are closed.

For information about used network ports, please see Network ports and activity.

Network infrastructure

The OmniCal MV system is based on the **GigE Vision (R) industry standard**, which requires a bandwidth of 1 Gbit/s or higher. Camera capture speed scales with the available usable bandwidth. For example, on 10 Gbit/s setups the discovery of MV cameras and the transmission of captured images will be much faster.

The MV cameras are powered via **Power over Ethernet** (PoE), which simplifies installation by combining power and data through a single Ethernet cable. PoE must be provided either by the network switch or a PoE injector. The power requirement over PoE is quite low at 2.8W.

Ensure that all network infrastructure parts (switches, cables...) match the desired bandwidth and power specifications.

In the case of wired cables (as opposed to fibre), appropriate cables are required for reliable performance over long distances and in the presence of electromagnetic interference (EMI).

Minimum cable type for runs up to 100 meters, depending on network bandwidth:

- 1 Gb/s: Cat 6
- 10 Gb/s: Cat 6A

Multicast considerations

OmniCal does not actively make use of multicast technology. Therefore, we recommend disabling it in network switches, if possible.

A GigE switch that has multicast enabled will be able to replicate traffic to multiple subscribed GigE Vision receivers. Only the first receiver will be able to control camera parameters; all others can only view image data.

In practice, multicast is irrelevant for OmniCal because only one Director server can run the image capture process and receive the images. The Disguise recommendation is to disable multicast, unless operators require it for purposes other than OmniCal.

Disguise OmniCal cameras support multicast network configurations when configured correctly. Refer to the **Switch Setup** section for configuration guidance.

Network adaptor settings

The following settings need to be set on the network adaptor on the Director server that connects to the switch with the cameras. You may need to update to the latest drivers to see some of these advanced options.

- Jumbo Frames: Enabled
  - Packet / frame size (MTU) should be set to 8228 bytes or the largest supported value.
    - e.g. 9000 or 9014, depending on whether the adaptor's driver includes the packet header in the count or not.
- DMA Coalescing: Disabled
  - DMA Coalescing can increase latency, so it should be disabled for GigEVision use.
- Flow Control:
  - Can usually be left in the default setting.
  - In most network situations, enabling Flow Control for Rx/Tx is beneficial; however, it does not improve GigEVision performance for OmniCal cameras.
    - If the network adaptor is not exclusively used for OmniCal (e.g. when testing or demoing from a laptop), then Flow Control is best enabled.
    - If the network adaptor is exclusively used for OmniCal (i.e. on Disguise servers), then it's preferred to disable Flow Control.
    - In some edge cases, it may be necessary to enable Flow Control to allow stable camera discovery, see **Troubleshooting section**.
- Interrupt Moderation Rate: Extreme
  - This reduces the number of system interrupts, which reduces CPU usage and thus improves performance for high-throughput use cases.
  - In some situations (e.g. smaller packet sizes) it may be beneficial to use a less aggressive setting such as *High* or *Adaptive*, see **Troubleshooting section**. This is because a lower interrupt moderation rate makes the system more responsive to incoming packets, which helps when large amounts of individual packets are received (as is the case with packet sizes smaller than 9 kbyte Jumbo frames).
- Transmit buffers: 256 bytes
  - The adaptor won't be sending a lot of data, so set it to 256 bytes or the closest low value that is supported by the driver.
- Receive buffers: max setting available, e.g. 4096 bytes
  - This is because the adaptor will mainly need to receive many large packets.

- Receive-Side Scaling (RSS): Enabled
  - RSS helps to better balance CPU usage for network events, so it should usually be enabled.

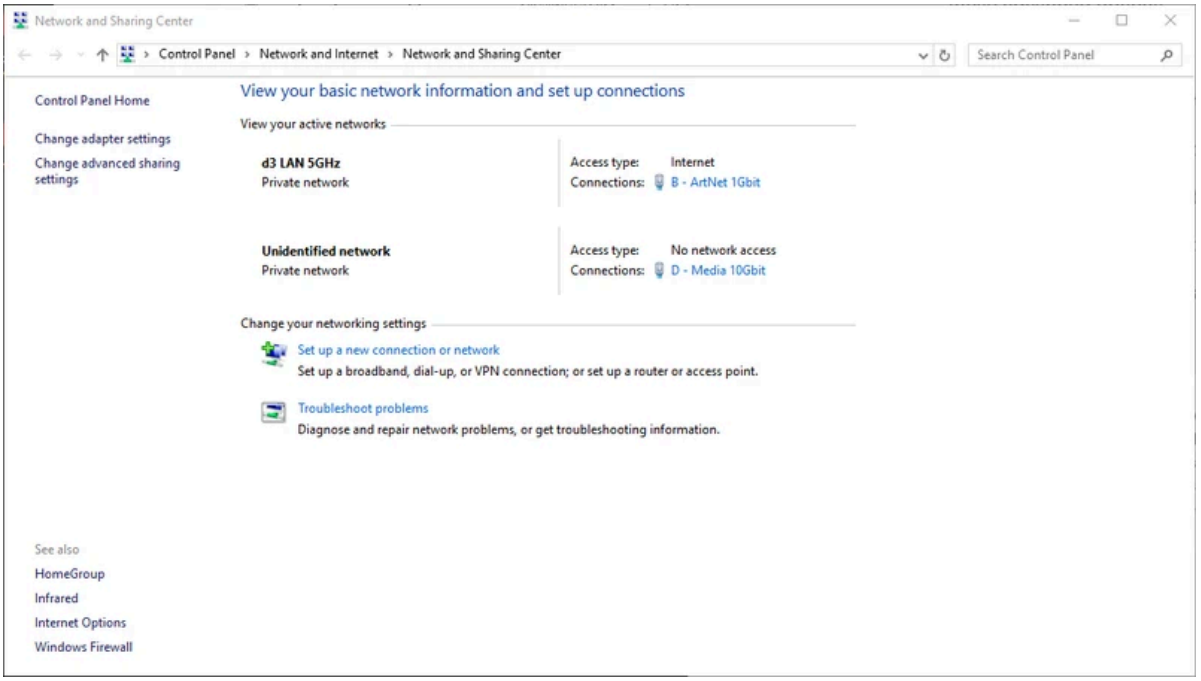
See GigE installation manual for further explanation.

Setting up the network adaptor

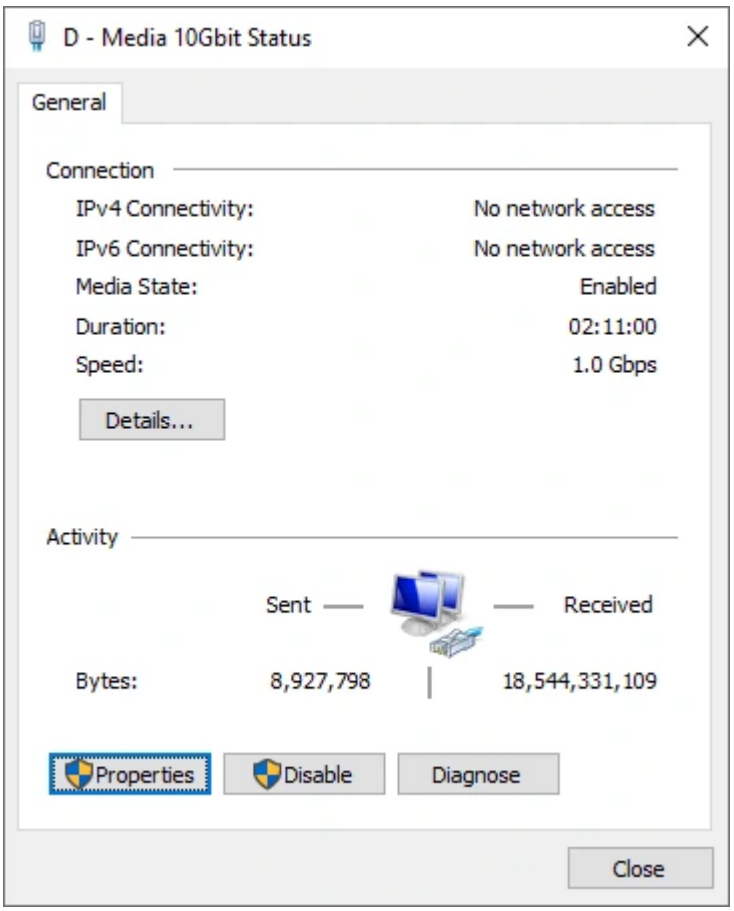
Using a 1 Gb port on the Director server for the camera communication is sufficient for small numbers of cameras. But a higher bandwidth port (e.g. 10 Gb) is preferred (even on a 1 Gb network), because their max receive buffer size is larger.

> **Note**
>
> Some network adaptors may show some of the settings under an *Advanced* button. Other adaptors may not provide some settings at all: external network adaptors such as Promise SANLink3 may only offer the Jumbo Frames setting.

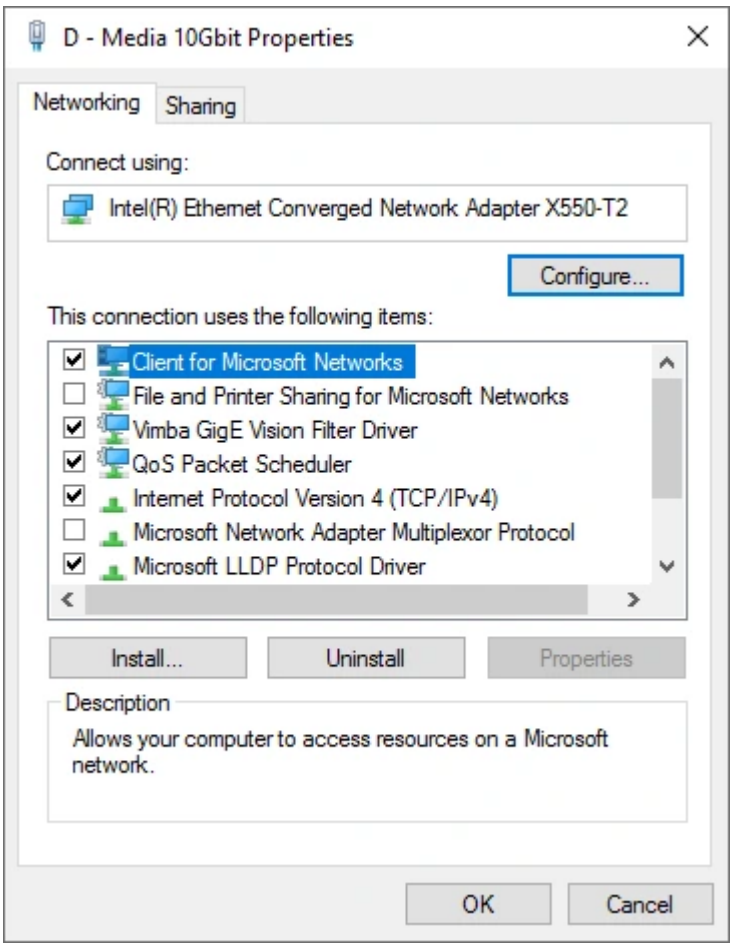
1. Navigate to the **Network and Sharing Center** and click to open the **D - Media 10Gbit adaptor**.



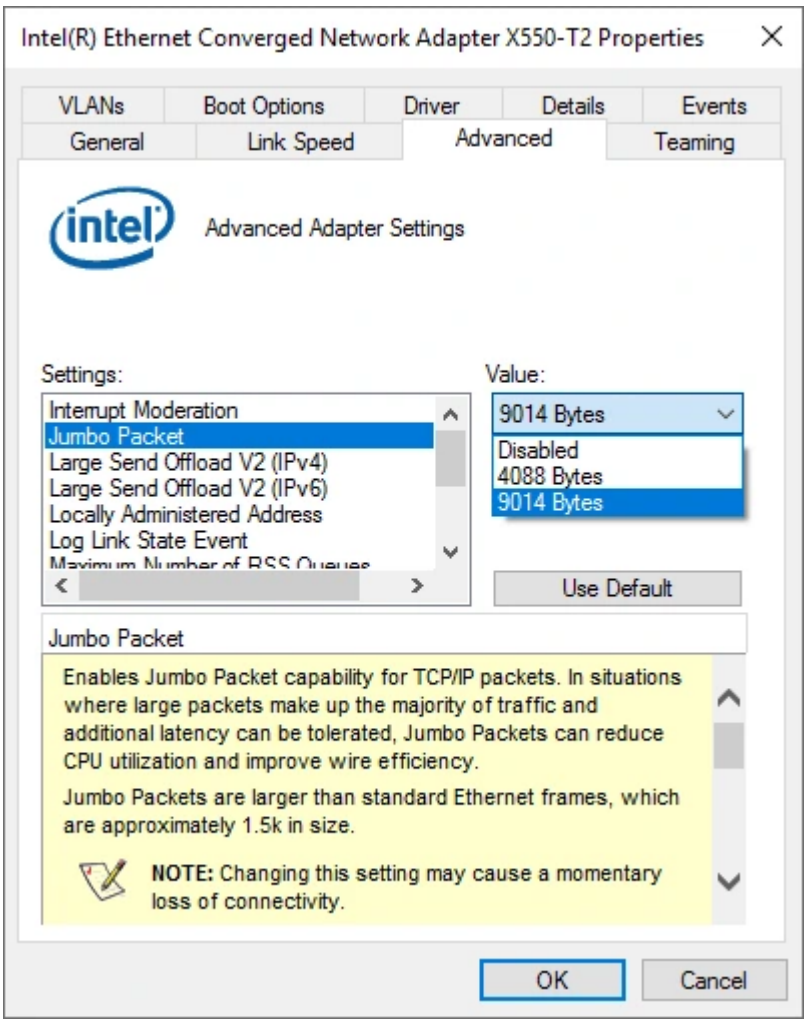
2. On the General tab, click to open **Properties**.



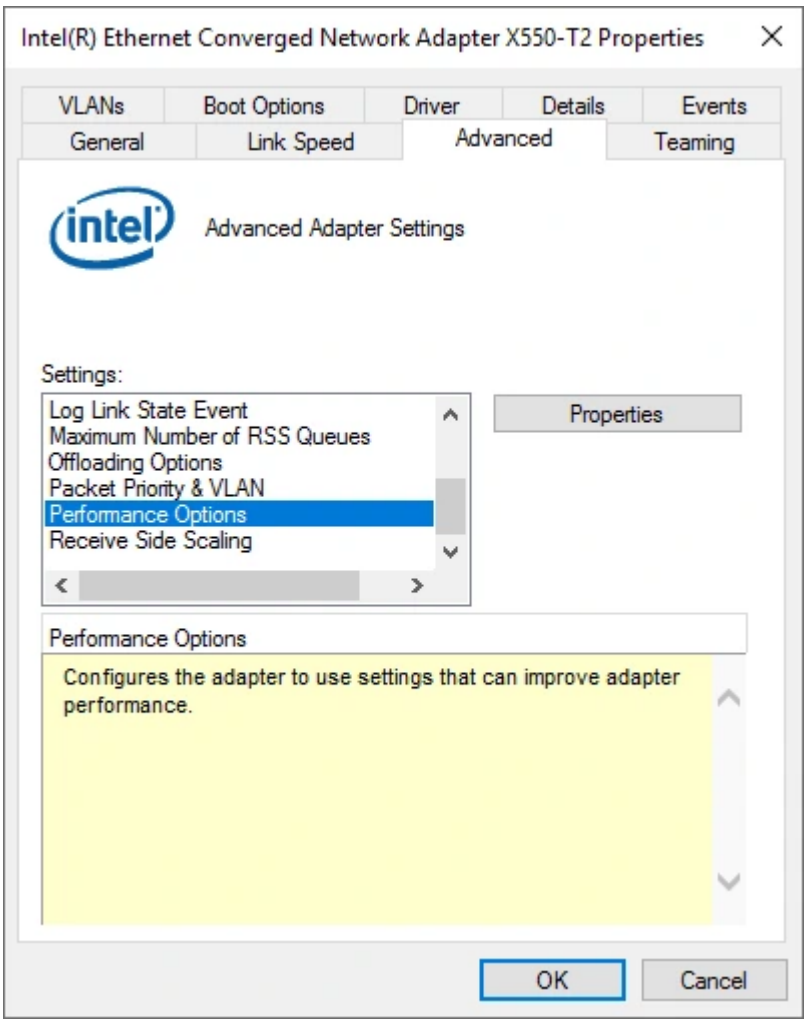
3. Enable the following settings and click **Configure.**



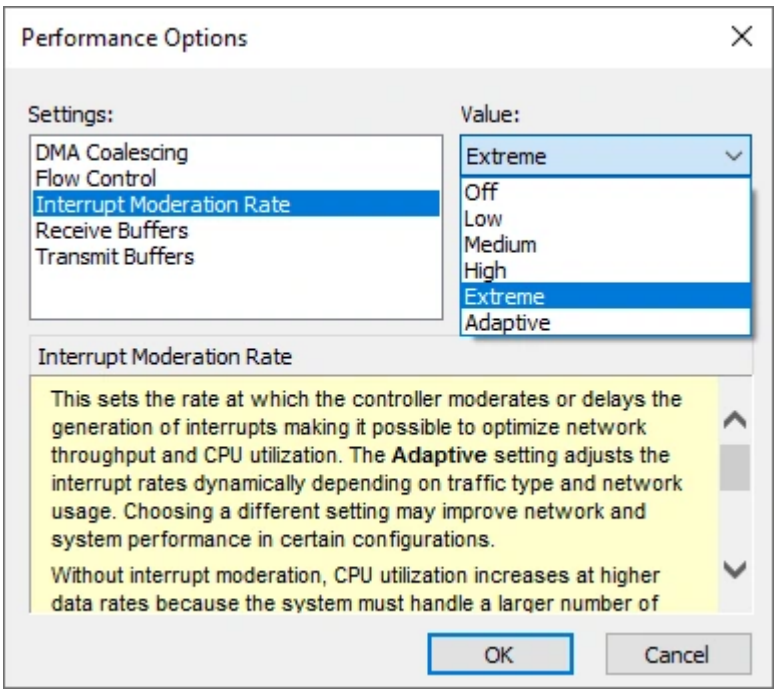
4. Select **Jumbo Packet** and assign it a value of **9014 bytes.**



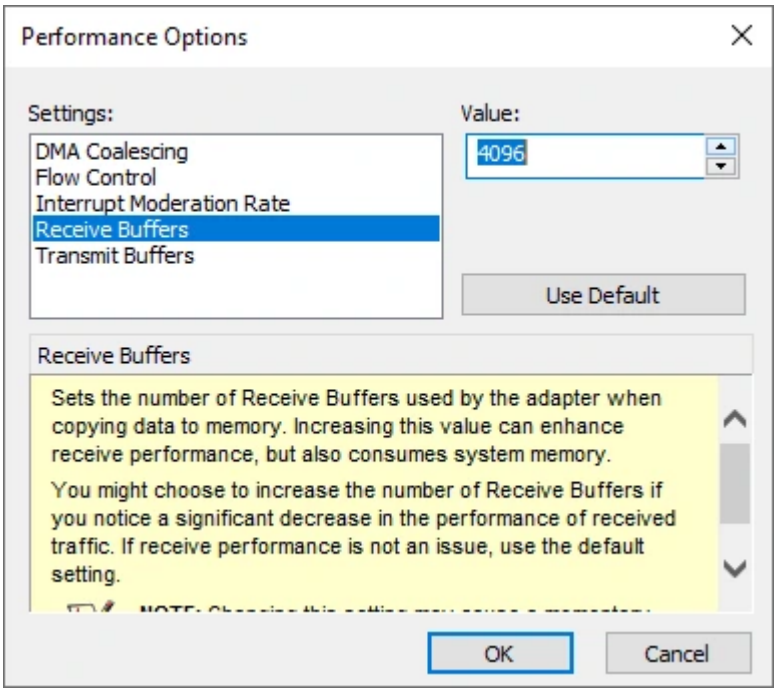
5. On the Advanced tab, select **Performance Options**.



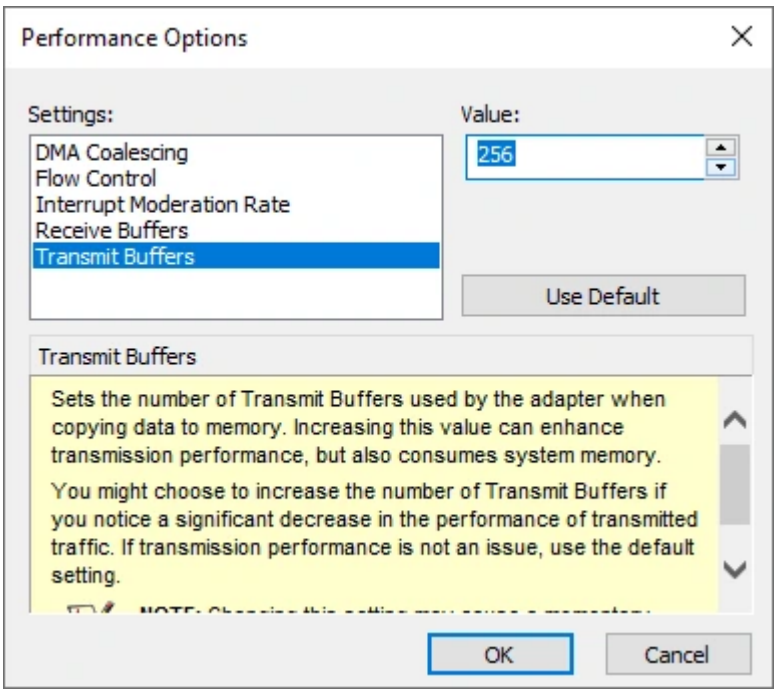
6. Set the **Interrupt Moderation Rate** to **Extreme**.



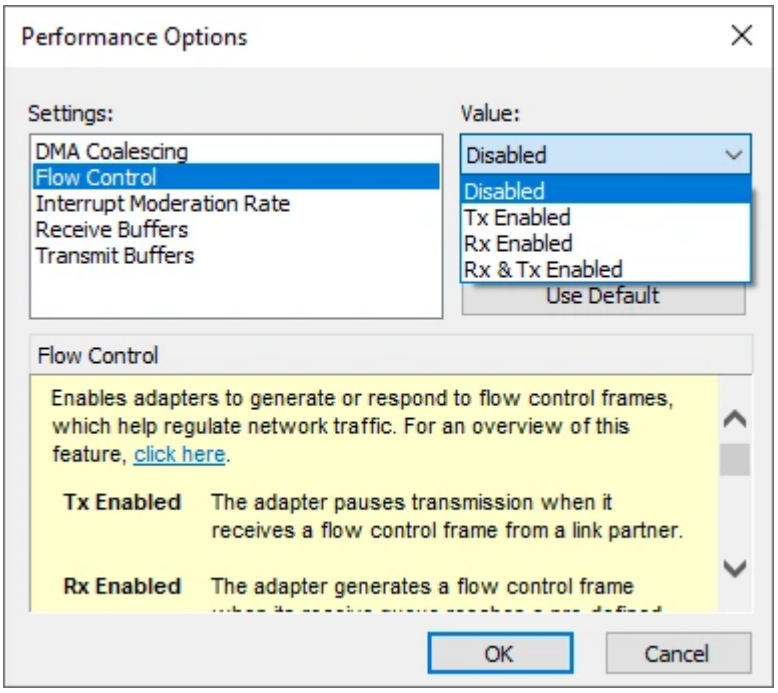
7. Select **Receive Buffers** and set it to **4096**.



8. Select **Transmit Buffers**, set it to **256** and click **OK**.



9. Select **Flow Control** and click **Disabled** or **Enabled**, as required (see **Network adaptor settings**).



Jumbo Packets

Jumbo Packets allow sending more data in a single packet, for example, 9 kbyte instead of the default of 1500 bytes. This reduces the number of packet headers being sent and increases the amount of actual data sent per second. Therefore, Jumbo Packets increase the overall *usable* bandwidth, and also reduce the CPU usage on the sender and receiver's side. Jumbo Packets can be configured for different packet / MTU sizes, typically around 8-9 kbyte. The value quoted by network adaptor drivers or switches can also vary, depending on whether they include any packet headers in the value or not.

Using Jumbo Packets can arguably make a network more fragile to interference, since dropped packets are larger, so resending them requires more work and data. So when using Jumbo Packets, the system should always be set up to minimise dropped packets. In Designer, you can use **Plan Camera Stats** to check how your system performs regarding dropped packets and frames.

GigEVision protocol requirements

GigEVision was chosen as the basis for OmniCal machine vision cameras. It is an interface standard for high-performance industrial cameras on standard low-cost IP networking infrastructure. GigEVision comprises of several UDP-based protocols that optimise for fast image transfer, but do not guarantee packet delivery to the receiver. For video data, it uses a custom packet-resend algorithm, in which packets get dropped altogether if it's not possible to get a full frame within a reasonable time. If the network is too saturated (e.g. camera bandwidth configured too high) or it experiences interference (other network devices on the camera switch), then some packets or even whole image frames may get dropped, cameras may time out, and in some cases, cameras may even lock up and need to be rebooted.

The **Network adaptor settings** explained above are required for best performance of GigEVision cameras. In some circumstances, it may be possible to use OmniCal successfully with different settings, but this will likely affect performance and reliability, and is therefore not recommended.

Switch Setup

1. Connect a PoE network switch with a **bandwidth of 1 Gb/s or higher** to the Director.
2. **Enable jumbo frames/packets** by setting the max packet size to the highest it will go (usually around 9k, see also **above section**).
3. If possible, **disable multicast** on the switch with the MV cameras. If multicast is required for other reasons, then ensure correct configuration of related settings (see below).

> **Note**
>
> When using OmniCal with more than 6 cameras, a network switch with at least 10 Gb/s is strongly recommended. The 10 Gb switch should be connected to a 10 Gb network port on the Director.

Multicast settings for switches

If multicast is required to be enabled on the switch that connects the MV cameras to the Director, then the settings below need to be configured correctly. See **Multicast considerations** for additional information.

> **Warning**
>
> Some GigE switches only support a maximum PacketSize (MTU) of 1500 bytes in multicast mode. This breaks the Jumbo Packet requirement (see **above**). **Switches with this limitation must have multicast disabled**. See the Allied Vision **GigE installation manual** for further explanation.

IGMP Snooping

Enable *IGMP Snooping* to ensure multicast camera connections are stable and protected from excess traffic.

IGMP Snooping is a mechanism to reduce unnecessary Internet Group Management Protocol (IGMP) network traffic. It prevents hosts on a local network from receiving traffic for a multicast group they have not explicitly joined. Network switches implement *IGMP Snooping* by keeping a map of links to multicast transmissions, so they can prune unnecessary multicast traffic from ports that are not an intended receiver.

IGMP Querier

Enable *IGMP Querier*, because isolated networks without (internet) router need a querier configured.

IGMP Version

IGMP Version **v2** is recommended for best compatibility in AV networks.

Immediate Leave

Immediate Leave should be set to **Recommended**, as it improves multicast efficiency.

Multicast Flooding

Multicast Flooding should be **Disabled**, because multicast should follow IGMP membership only.

OmniCal MV system setup (in Windows)

Install Vimba SDK and drivers for MV cameras

The *Vimba* / *Vimba X* software installs camera drivers, SDK, and the *Vimba Viewer* application used for testing and **troubleshooting**.

Download the correct Vimba SDK

There are two separate SDK variants from the camera manufacturer: *Vimba* (which is no longer receiving updates) and the new *Vimba X*. Designer releases since r27.7 only work with *Vimba X*. Designer notifies users if an unknown or incompatible SDK version is installed.

More recent Designer versions are optimised for newer versions of the *Vimba X* SDK, so please **download** and install the appropriate version:

Designer Version	Required SDK
>= r32.4	Vimba X SDK 2025-3
>= r27.7 and < r32.4	Vimba X SDK 2023-4
< r27.7	Vimba SDK

Vimba and *Vimba X* can be safely installed side-by-side on a system. This may be helpful if users need to switch between older and newer Designer releases (e.g. for rental servers). It is, however, not possible to install different versions of *Vimba X* side-by-side. Disguise recommends installing the appropriate version (see above).

> **Note**
>
> When switching between r27.6 (or earlier) and r27.7 (or later) versions of Designer, it is necessary to enable the respective *Vimba* or *Vimba X* drivers. This can be achieved via the **Vimba X Driver Installer** included in the Vimba X installation, which is much quicker than re-installing the respective SDK. This driver tool can change or disable Vimba (X) drivers for each network adaptor separately.
>
> Make sure that no cameras are in active use (streaming) before making changes to the drivers! Disabling a driver while a camera is active can lead to blue screens of death (BSOD).

Install Vimba SDK and drivers

For simplicity, the rest of this guide will just refer to “Vimba”.

1. Disable any VPN connections before installing the Vimba drivers. They can be re-enabled afterwards.

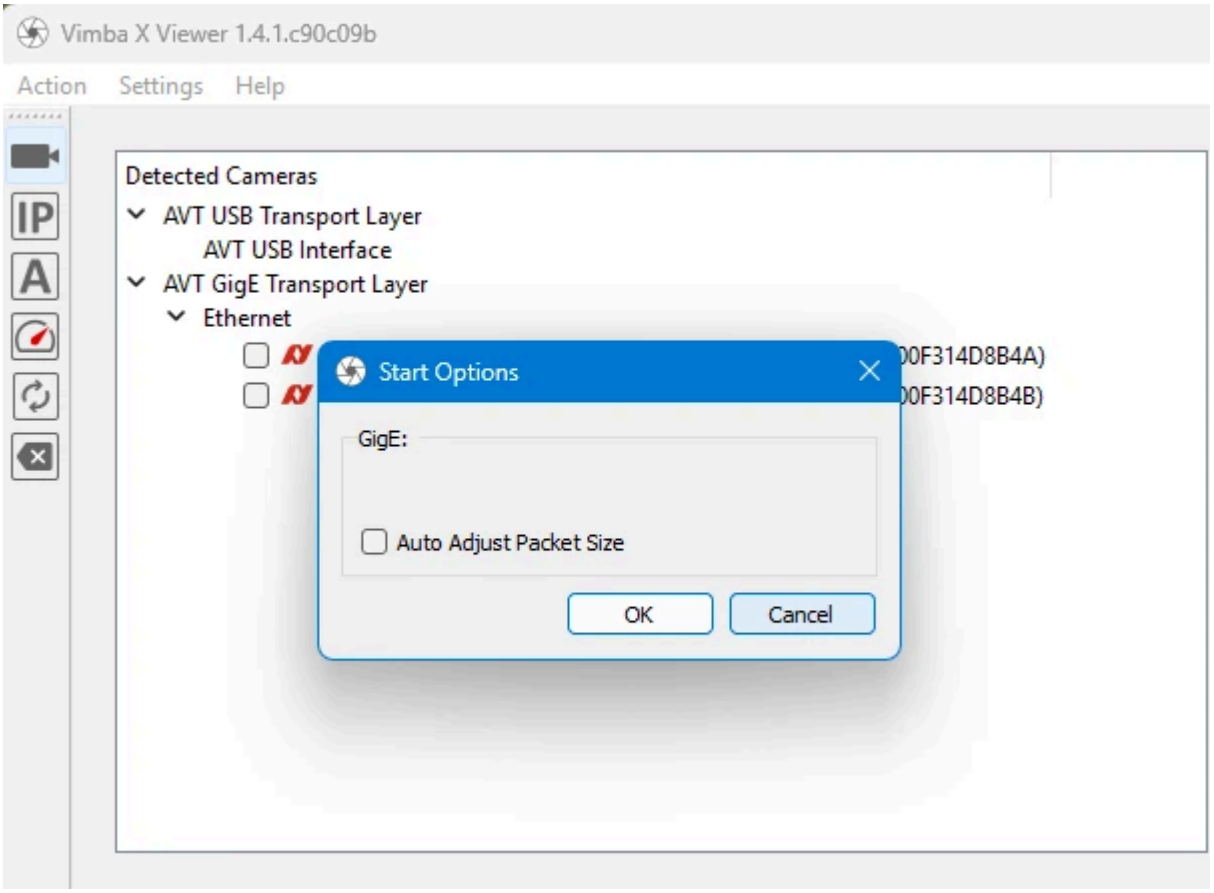
2. Quit any existing Vimba applications, and stop any ongoing OmniCal capture processes.
3. Install Vimba or Vimba X for Windows SDK from the **Disguise Download Resources**.
4. In the Vimba installer, select **Application Development**.
5. Keep **install drivers** checked and complete the installation as normal.
6. Click **Start** and open **Vimba Viewer**.
7. Plug your cameras in, if they are not already.
    1. They will appear in the **Detected Cameras** list in Vimba, in white.
    2. Entries in the camera list may display a red lock icon if the camera is already opened elsewhere (see **below**).

Disable automatic packet size adjustment in Vimba Viewer

Vimba Viewer has some default settings that should be **disabled** after installation. If they are left enabled, then opening Vimba Viewer will interfere with how Designer configures the cameras.

Please follow these steps to disable any interfering Vimba settings:

- In Vimba Viewer, go to **Settings**, then **Start Options**.
- Disable **“Auto Adjust Packet Size”** in the GigE section, see screenshot:



Verify camera communication

1. Open Vimba and select a camera.
2. Press the play button and verify images are streaming.

In case camera connections are lost and regained (e.g. unplug/plug event), the Vimba Viewer software should detect them again automatically. In case they don't, you can press the **Refresh** button in the top-left corner.

Configure cameras in Vimba

You can right-click or double-click on the cameras to see and adjust the metadata of the camera.

This window also shows the Play button in the top left hand corner, on pressing this, the camera image should appear in this window, which can be zoomed using the mouse scroll button.

Focus, aperture, and focal length

It's easiest to adjust position, orientation, focus, and aperture (iris) while looking at the live preview in Vimba Viewer. Position and orient the cameras so they look at the object that is to be projected onto. Ideally, the whole camera image should be taken up by the projected areas. It does not matter if the camera is mounted upside-down or right way up.

It is recommended to open the physical lens aperture (iris) as far as it can go (i.e. smallest F-Stop value). This will allow the most amount of light to enter the camera. You can then use the exposure time to control the total amount of light that hits the sensor for each frame. If the aperture is not fully open, then a longer exposure time is needed to achieve a similar overall brightness in the image. Any increased exposure time will also lead to slightly longer overall OmniCal capture times.

Adjust focus as needed by checking the image sharpness in Vimba Viewer. If the projected surface does not have many sharp visual features, then set up the projectors to output a suitable test pattern, so you can better assess the image sharpness. You may need to experiment with changing exposure time and focus settings, alternating between them, until you can clearly see a sharp image that is not too blown out (i.e. bright areas causing bloom/bleed in neighbouring camera pixels).

Note down the focal lengths used by each camera (they are written on the lens body); you will need these values later in Designer.

Brightness, Exposure Time, and other settings

Exposure time

Exposure time will heavily depend on the light levels in the calibration environment and the aperture setting of the lens. On the right-hand side, you will see a value in milliseconds that allows you to calculate roughly the FPS the camera is producing. As mentioned above, longer exposure times will lead to lower FPS and thus slower OmniCal captures.

Other parameters do not need to be adjusted. Gain may need adjusting in exceptional circumstances, but in 99% of all cases, adjusting aperture and exposure time is enough.

All

The “All” tab allows you to type in a filter pattern and search through all settings. This is useful for changing the DeviceUserID (see also below). Just type in the settings name and click Search. The DeviceUserID will be visible inside Disguise and is used to map OmniCal Plan cameras to physical cameras.

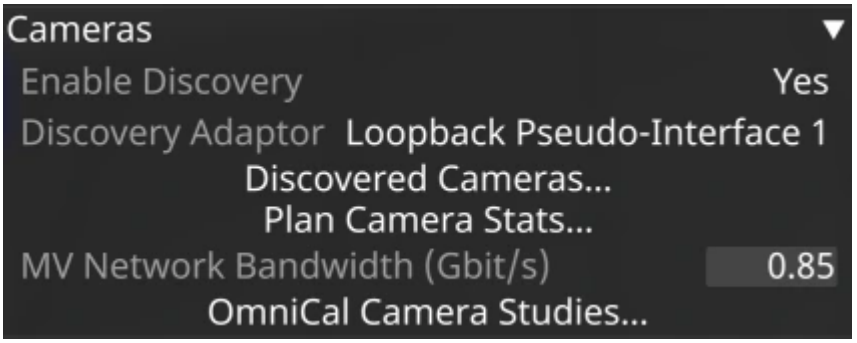
Renaming cameras in Vimba Viewer

We recommended adding unique names for each camera for easier identification within Designer. Follow these steps to set this up:

1. Close Designer.
2. Open Vimba Viewer.
3. Locate the setting “DeviceUserID” (not to be confused with a similar setting labelled “DeviceID”, which cannot be changed).
4. Rename the camera as desired.
5. Press **Enter** and close this window.
6. Close Vimba Viewer when all cameras have been renamed and re-open Designer.
    - You may need to update the OmniCal Plan settings with the new camera device names.
    - Previous OmniCal captures may no longer be fully usable due to the camera name change.

Connect to cameras in Designer

There is a separate program in the Disguise software called `VimbaCamServer.exe` which is used to discover and connect MV cameras on the network. *VimbaCamServer* will find cameras on any local network adaptor, just like Vimba Viewer. *VimbaCamServer* is a separate process that communicates with Designer via a TCP-based network protocol.



*The **Cameras** collapsible widget contains network settings and camera lists for troubleshooting.*

Camera discovery

The **OmniCal Calibration** editor configures and enables camera discovery on the network. Usually, *VimbaCamServer* is run locally on the Director server, so Designer can directly communicate with it. Set the *Discovery Adaptor* to the localhost “Loopback” adaptor, which is also the default. *VimbaCamServer* is launched automatically from within Disguise if this is set, and discovery is enabled. In this typical setup, the network switch with the cameras needs to be connected directly to a dedicated network adaptor on the Director server.

> **Note**
>
> If you have many MV cameras on a network (especially if it is only 1Gbit/s), then not all cameras will be discovered immediately. They may appear one by one over the course of several seconds.

VimbaCamServer and Designer

The default “Loopback” adaptor essentially describes a local “network” connection between Designer and *VimbaCamServer*. The latter handles the actual camera GigEVision communication and captures images as PNG files for use in Designer. It communicates via the discovery adaptor with Designer, which in turn processes information and images within OmniCal. So the discovery adaptor is different to the adaptor that actually connects a machine to the camera switch.

Therefore, regarding network bandwidth, it’s the network adaptor to the camera switch that matters, not the Loopback adaptor (since that is basically only limited by the PCI bus).

The *VimbaCamServer* can also be run separately, e.g. on a stand-alone computer. In that case, the *Discovery Adaptor* inside Disguise needs to be selected as the network port with which the Disguise server machine is connected to this other computer. The Director server does not need a direct connection to the cameras or the network switch they are on. In other words, the discovery adaptor needs to be set to the network adaptor that the camera server app is on.

The *VimbaCamServer* can be anywhere as long as it can see and connect to the cameras, and it can communicate with the Director.

Having *VimbaCamServer* on a different machine can reduce CPU load on the Director during OmniCal captures (it won't have an impact when not capturing). However, this requires manual process management on the other machine, so it is not a recommended use-case.

Network ports used by OmniCal

VimbaCamServer and Designer communicate with each other using different network protocols and ports:

1. An OSC device `omnicaldiscovery` that broadcasts from the Director, to discover the VimbaCamServer process. These OSC broadcasts are sent every 30 frames, unless OmniCal capture is in progress.
   By default, this OSC device uses port 9001, but this can be changed via the Device Manager.
   Note that the `omnicaldiscovery` OSC device is only visible in the current Device Manager while OmniCal **camera discovery** is enabled.
2. A proprietary TCP-based protocol to send image requests, etc., and reply with ACKs and actual image data.
   This protocol uses ports 10101 and 10102 for sending from and receiving to the Director. These ports cannot currently be changed.

List of discovered cameras

The **Discovered Cameras** button opens a list of OmniCal cameras that have been discovered by Designer. The background colour for each camera row will indicate the state of the camera:

- Green: This means cameras are ok and receiving data from *VimbaCamServer* (with respect to the stats measuring incomplete frames between each receipt of stats).
- Red: This means there have been incomplete frames between the last read and the current read. The count of incomplete frames will continue to increase. The red colour will reset if there have been no incomplete frames between each read of the stats.
- Grey: This indicates the camera is disabled, e.g. due to incompatibility or licensing restrictions.
- Brown: This indicates the camera is disconnected / offline.

Camera statistics

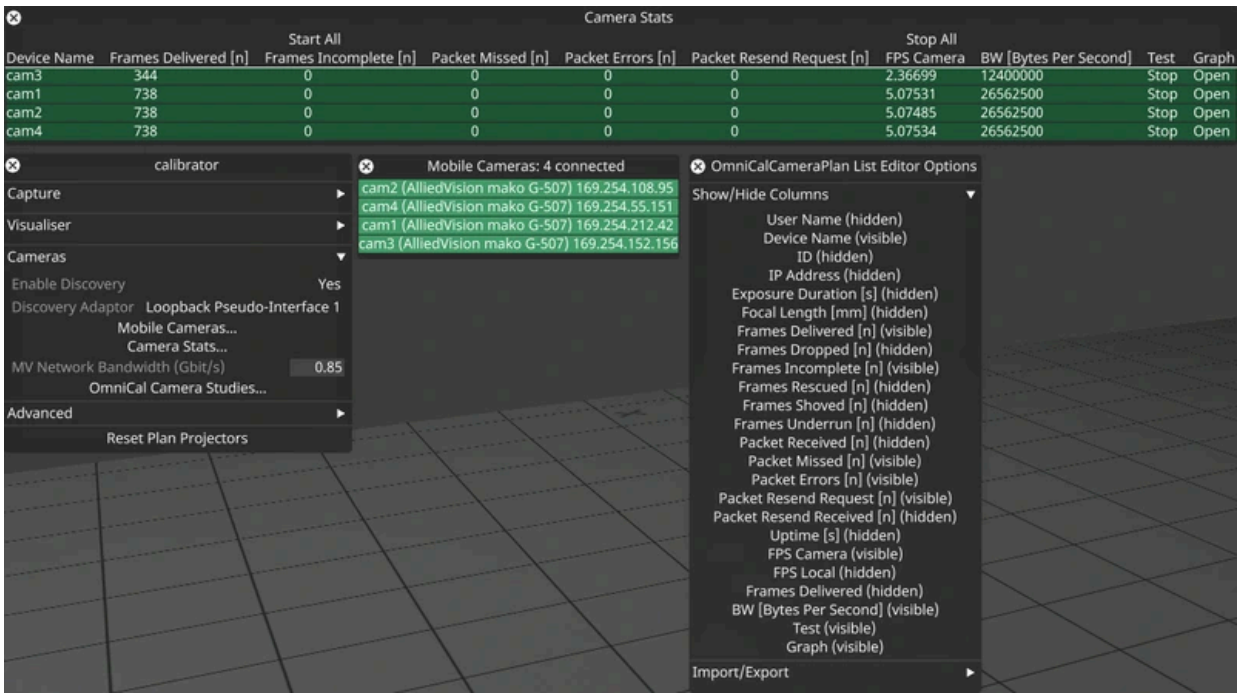
Plan Camera Stats overview

The **Plan Camera Stats** button opens a window with a list of OmniCal cameras that are in the current Plan. It offers tools to test and troubleshoot cameras and the network by starting camera streaming without capturing images to disk. The window contains a table with rows for every camera, which collect various statistics like captured and dropped packets / frames

or the camera temperature. Right-click the title bar to configure which kind of statistics should be shown in the table.

It is possible to test streaming for all cameras in the current Plan or only for a few selected cameras. This can help to identify whether an issue is specific to a certain camera or cable, etc.

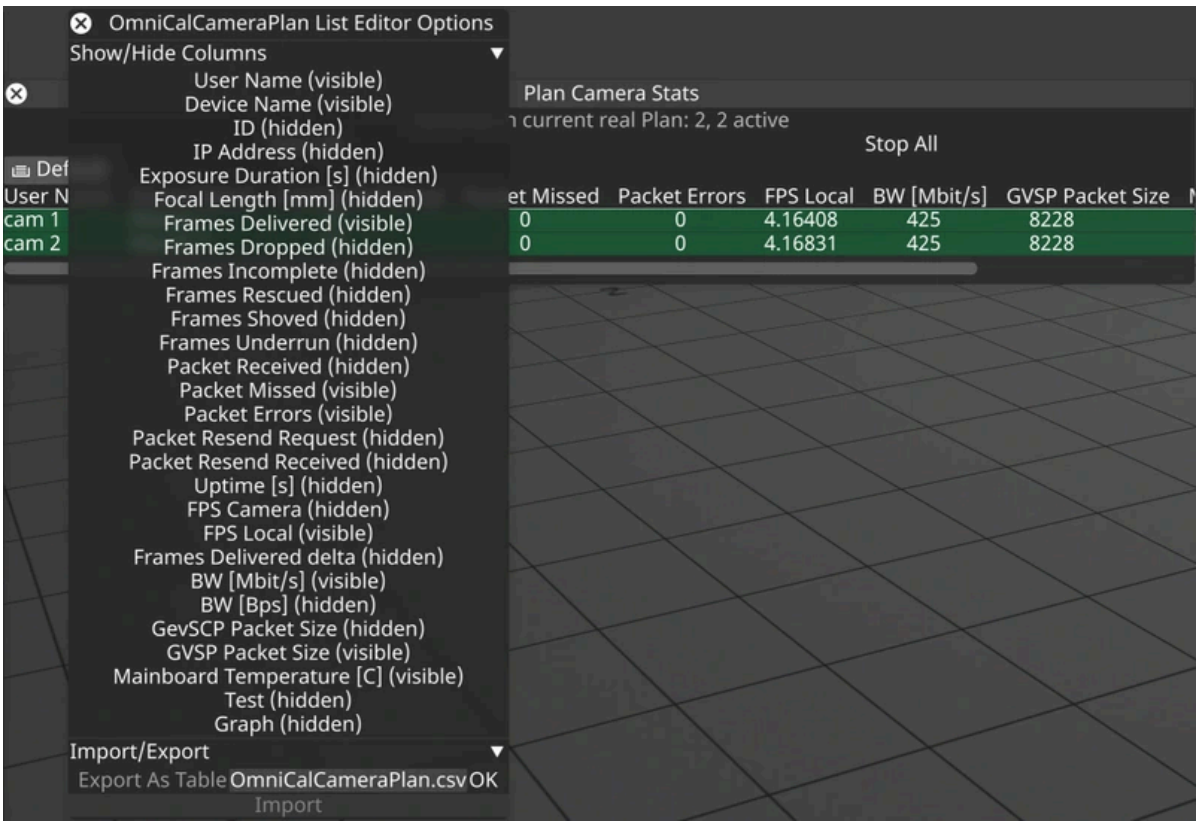
A certain amount of dropped packets can be tolerated in a properly set up camera network, but dropping entire frames should be avoided. These stats can be used to evaluate the impact of changes to e.g. network settings or the usable bandwidth (see **next section**). Checking the impact on dropped packets/frames here is much quicker than trying out a full OmniCal capture, which might time out half-way through.



How to use Plan Camera Stats

1. Make sure to assign the physical OmniCal cameras to the cameras in the OmniCal Plan. If you see **Plan Camera Stats** greyed out, then you have not finished this step, or no physical cameras have been discovered.
2. The columns display various camera stats and feedback of camera properties (such as IP, name).

3. Right-click the widget header to show available columns and enable or disable them:



4. Click **Start** to enable streaming and stats feedback for a single camera. Click **Stop** to turn the stream off again.
5. Click **Start All** to enable streaming and stats feedback for all cameras.
6. The **Open** button in the **Graph** column opens a graph window that shows how the stats change over time.
7. The **Import/Export** separator allows exporting the currently visible columns and their camera values to a CSV text file for troubleshooting analysis.

> **Note**
>
> The **Plan Camera Stats** window only displays cameras that are used in the currently active Plan.

Plan Camera Stats columns

The values in each **Plan Camera Stats** table row will update while a camera is streaming. Starting to stream will reset the values for each camera that is streaming.

Some of the collected statistics are specific to GigEVision network protocols. This will be indicated with a “[GigE]” tag at the end of the description. For additional information about

those stats, please visit the Allied Vision **GigE features reference** (chapter “Statistics”, page 163).

> ⚠ **Warning**
>
> Disguise does not recommend manually adjusting any of the GigEVision values that can be configured in Vimba Viewer for each camera (such as *GevSCPSPacketSize*). Designer configures all cameras so that the Vimba driver automatically sets the packet size (MTU) to the best value that is supported by all involved devices (camera, switches, network adaptor, cables). Frame rate and bandwidth are also automatically managed, see **MV Network Bandwidth**.

Meaning of camera statistics columns

User Name

The user-specified name given to the associated camera in the OmniCal Plan.

Device Name

The user-specified name of the OmniCal camera, as set in Vimba Viewer.

ID

The unique hardware ID of the OmniCal camera.

IP Address

The current IP address of the OmniCal camera.

Exposure Duration [s]

The exposure time in seconds. Smaller values can lead to faster capture, but also darker images.

Focal Length [mm]

The camera lens focal length in millimetres, as set in the OmniCal Plan.

Frames Delivered

The number of complete, error-free frames that were successfully delivered to the host. [GigE]

Frames Dropped

The number of incomplete frames received by the host due to missing packets (excluding shoved frames). [GigE]

Frames Incomplete

Frames incomplete provides some feedback about the stability of the camera connections in *VimbaCamServer*. The value may be larger than **Frames Dropped**.

It measures how many video frames were not completed for any reason, e.g.:

- not all packets were received, despite resend attempts (packet loss)
- frame is now obsolete (see **Frames Shoved**)
- failed to validate the frame data
- exceptions when handling frame data from Vimba API

See **Troubleshooting** below for information on how to resolve incomplete frames and other network issues.

Frames Rescued

The number of frames that initially had missing packets but were successfully completed after packet resend. [GigE]

Frames Shoved

The number of frames dropped because the transfer of a following frame was completed earlier, making the previous frame obsolete. [GigE]

Frames Underrun

The number of frames missed due to the non-availability of a user-supplied buffer. [GigE]

This means the Director was not ready to copy a completed frame from the camera. Values above zero may indicate issues with server system load, e.g. the CPU is busy with other work, or threading / priority issues. On machines with few CPU cores (e.g. 4) this may be resolved by adjusting advanced machine settings such as `omniCalMaxThreadsPng`.

Packet Received

The number of error-free packets received by the driver. This number should grow steadily during continuous acquisition. [GigE]

Packet Missed

The number of packets missed due to network issues. [GigE]

If everything is configured correctly, this number should remain zero, or at least very low compared to the **Packet Received** value.

Packet Errors

The number of improperly formed packets. If this number is not zero, it suggests a possible cable or camera hardware failure. [GigE]

Packet Resend Request

The number of missing packets that were requested to be resent from the camera. [GigE]

If everything is configured correctly, this number should remain zero, or at least very low compared to the **Packet Received** value.

Packet Resend Received

The number of packets that were actually resent by the camera. [GigE]

Uptime [s]

The elapsed time in seconds since the camera stream was started. [GigE]

FPS Camera

The rate at which the camera is acquiring frames, derived from the timestamps of completed frames. [GigE]

FPS Local

Inverse of time interval between the last two frames (faulty or not) received by the host. No averaging is performed. [GigE]

In case of error-free reception, **FPS Local** is similar to **FPS Camera**, except that the host (system) clock is used instead of frame timestamps for measuring the time interval between frames. In case of errors, the two values may differ significantly, since **FPS Local** includes incomplete frames.

Frames Delivered Delta

Difference in **Frames Delivered** between the most recently received camera stats and the previous value.

BW [Mbit/s] [2]

The network bandwidth in Megabits per second (Mbit/s) that is allocated to this camera. [GigE]

This is an even share of the total **MV Network Bandwidth** configured in Designer. Note that the total bandwidth is specified in Gigabits per second, not Megabits.

BW [Bps]

The network bandwidth in bytes per second that is allocated to this camera. [GigE]

In GigEVision protocols this value is reported as *StreamBytesPerSecond*.

This is an even share of the total **MV Network Bandwidth** configured in Designer. Note that the total bandwidth is specified in Gigabits per second, not bytes.

GevSCP Packet Size [1]

Packet size (MTU) in bytes for camera device (GigE Vision SCPS protocol). [GigE]

In a correctly set up system this value is the same as the **Jumbo Packet setting** configured for the network adaptor. If it is lower, then this indicates a problem elsewhere in the network signal chain. For example, a value of 1500 bytes indicates that Jumbo Packets are not enabled or supported across the whole signal chain. A value of around 4000 bytes may indicate a misconfiguration in a network switch. For more information, please refer to the **Troubleshooting** section.

GVSP Packet Size [1]

Packet size (MTU) in bytes for camera stream (GigE Vision Stream Protocol GVSP). [GigE]

This value should be identical to **GevSCP Packet Size**.

Mainboard Temperature [C] [1]

Temperature of the camera main board in degrees Celsius. Accuracy: +/- 1 °C [GigE]

Camera Bandwidth

The field **MV Network Bandwidth (Gbit/s)** configures the total amount of usable bandwidth for OmniCal MV cameras. The network needs to reliably provide this bandwidth. Typically, this should be set to a value about 80-90% of the theoretical bandwidth of the link between the camera switch and the server running *VimbaCamServer* (e.g. the Director). The default value is 0.85 Gbit/s, which should work for most 1G network setups. On a true 10G link to the Director a value of up to 8.5 Gbit/s should work.

If the network cannot reliably provide this usable bandwidth (e.g. due to traffic or interference from other devices), it will lead to dropped packets and potentially disconnected cameras.

In this case it may help to reduce the **MV Network Bandwidth** value. Reducing the total bandwidth value will further slow down the capture, but allow for more room for packet re-sends, to avoid dropped frames. The appropriate bandwidth value depends on the quality of the network setup and the nature of any interference.

OmniCal camera specs and bandwidth

OmniCal MV cameras have a 5.1 MegaPixel image sensor with 2464x2056 pixels and capture 8-bit monochrome images. The size of a single image is 5065984 bytes, and the respective bandwidth would be 40.5 MBit/s. At their maximum framerate of 23 FPS, a single camera would require 932.1 MBit/s bandwidth, which is roughly above the effective capacity of a 1G Ethernet connection.

In OmniCal, the typical frame rate of each camera is much lower than 23 FPS, partly because they are mostly used in dark environments, where longer exposure times are needed.

Exposure times have a direct effect on the maximum frame rate that can be used. Assuming a frame rate of e.g. 10 FPS, a single camera would need a bandwidth of about 405 MBit/s, which is almost half of the effective bandwidth of a 1G Ethernet connection.

Since OmniCal is typically used with more than 2 cameras, Designer needs to carefully manage the usable bandwidth of every camera, so the total camera bandwidth does not exceed the available bandwidth of the network connection. Note that this also has a further impact on the maximum frame rate that can be achieved: more cameras means a lower maximum framerate (assuming network bandwidth stays the same).

Bandwidth management in Designer

Every time an OmniCal capture is started, Designer (or rather its sub-process *VimbaCamServer*) sets the bandwidth for each camera explicitly. Every camera gets an equal share of the total bandwidth set in Designer. For example, when using 4 cameras and 0.8 Gbit/s, every camera will be configured to use 0.2 Gbit/s.

This will overwrite any bandwidth setting configured externally, e.g. in Vimba Viewer.

The bandwidth also has an impact on the practical FPS and capture speed for each camera. The more cameras are connected, the longer each camera will need to stream a whole frame. Therefore, with equal bandwidth, more cameras result in reduced maximum FPS and longer capture time.

Bandwidth management in Vimba Viewer

Any automatic bandwidth or packet size adjustment in Vimba Viewer should be **disabled**, because it will interfere with how Designer configures the cameras.

> **Note**
>
> Some problematic settings are enabled by a default installation of Vimba X. Please see here on how to **disable automatic packet size adjustment in Vimba Viewer**.

Troubleshooting

Always verify first that all network settings are as required for **switches** and **network adaptors**.

Camera has red lock icon in Vimba Viewer

This indicates that the camera is already opened elsewhere, for example, another laptop running Vimba Viewer or Disguise Designer.

Camera access is exclusive; if you have a camera opened for capture in Designer, you will not be able to view it in Vimba and vice versa.

No image is displayed in Vimba Viewer

On older servers, it may be worth trying to disable Jumbo Frames on the network adaptor that connects to the camera switch, or at least configuring them to a lower size. This has been observed in the past with legacy 4x4 pro servers, where Jumbo Frames with an MTU size over 2034 bytes was unable to get complete images from the cameras, due to packet loss. An alternative workaround would be to limit the packet size on the switch.

Use Vimba Viewer to verify the GVSP packet size setting is 2034 or below. This value is not set directly, but negotiated automatically between network adaptor, switch and cameras.

Network adaptor gets disabled in Windows after applying suggested settings

Try reverting the Interrupt Moderation Rate to the default value, which is *Adaptive* on most Intel adaptors. It may be necessary to re-enable the adaptor manually in Windows Advanced Network Settings.

Cameras drop out shortly after capture starts

If cameras work individually in Vimba Viewer but not when capturing multiple cameras with OmniCal, this could indicate an incorrect multicast configuration. Check whether multicast is enabled on the switch and either disable it or ensure *IGMP Snooping* is enabled. For more information, see the sections on **multicast** and **switch setup**.

If this does not help, please follow the steps below.

Very slow image capture, dropped packets, incomplete frames, or cameras become unresponsive

1. Ensure that Vimba Viewer does not overwrite the packet size set by Designer, see **instructions here**.

2. Verify that the cameras are communicating using **Jumbo Frames**.
   - The reported GVSP packet size in Vimba Viewer should match the values you set for the network adaptor and switch (e.g. 9000 bytes).
   - You can also check the GVSP value in the `console_vimbacamserver.txt` log file.
   - A value of 1500 indicates that Jumbo Frames were not enabled somewhere in the signal chain. Please check and adjust network switch settings, including for individual ports.
   - Any value between 1500 and 8000 indicates that some networking equipment in the signal chain is configured for smaller Jumbo Frames than desired (e.g. 4082). Please check and adjust network switch settings, including for individual ports. If this cannot be addressed, it may be necessary to reduce the total usable bandwidth in Disguise Designer (see **Camera Bandwidth**).
   - Any network switch that does not support Jumbo Frames must be removed from the signal chain.
3. Use the **Plan Camera Stats window** to get more information about the network behaviour.
   - Test whether any network issues are specific to a certain camera or cable by streaming them individually.
     - If issues like dropped packets only occur with a certain camera, then try swapping cables and check other network equipment in that camera's signal path.
   - Add more cameras one-by-one to test whether problems only start after using a certain number of cameras.
     - If this is the case, it may be necessary to reduce the total usable bandwidth in Disguise Designer (see **Camera Bandwidth**).
     - Reducing the bandwidth will lead to slower image capture. But in a congested network this may still improve the capture performance, as it will lead to fewer dropped packets that then don't need to be re-sent.
4. Ensure that the camera network is clean from any other interference.
   - Verify that OSC devices in Designer (including the `omnicaldiscovery` OSC device) do not clash on their port numbers. See **Network ports used by OmniCal** for more information.
   - Verify that the camera network is physically separate, with no other devices on it.
   - Use Wireshark to monitor network traffic on the OmniCal network adaptor to spot any devices sending packets on this network. Devices such as lighting desks might flood the network with messages, or other machines might incorrectly use this network for copying data.

5. As mentioned in **Network setup**, VLANs and adaptor virtualisation are not officially supported, as they make it very difficult to guarantee the required bandwidth for the OmniCal cameras.
    - If a dedicated physical network is not available, then packets will be dropped whenever there is other traffic, which can lead to camera timeouts during capture.
    - The likelihood of this happening can be reduced by reducing the total usable bandwidth in Disguise Designer (see **Camera Bandwidth**).
6. Try reverting the *Interrupt Moderation Rate* to the default value, which is *Adaptive* on most Intel adaptors.
    - This usually helps in situations where the MTU / packet size is smaller than the recommended value of 8-9 kbytes (see **Interrupt Moderation Rate** and **Jumbo Frames / Packets**).
7. Try changing the *Flow Control* setting from *Enabled* to *Disabled*, or vice versa (see **Flow Control**).

Restarting unresponsive cameras

The easiest way to restart a camera is to disconnect and reconnect it from the PoE switch. For managed switches, this can usually be done without physically touching the cables, via a configuration GUI (e.g. browser interface) or even API commands.

Further Reading

GigE Vision (R) industry standard

Allied Vision GigE installation manual

Allied Vision GigE features reference

GeniCam Network Card Performance Settings

Advanced Driver Settings for Intel® Ethernet 10 Gigabit Server adaptors

Microsoft introduction to Receive Side Scaling

Projector Calibration

Projection Calibration is the process of calibrating your projectors to the 3D space.

Designer offers three different calibration methods. Each has their own benefits and draw backs. We recommend planning which form of calibration will be used during pre-production.

- Manual calibration
- QuickCal
- OmniCal

Quick Calibration

QuickCal is a user-driven process of calibrating a virtual projector's position, orientation and lens properties to match the real-world projector. QuickCal is based on reference points on given 3D meshes for a projector's target surfaces, and user-defined 2D image coordinates that are manually assigned to these 3D reference points. As long as the 3D meshes are good matches to the real-world projection surfaces, QuickCal can accurately calculate the projector parameters.

The basic process of QuickCal is relatively simple : drop reference points onto the 3D model of the projection surface, and then 'line up' by dragging each point in the projector's output raster until it hits the corresponding point on the real surface. Once you've done enough points (about 10-15 per projector) Designer can work out exactly where the projector is, and what lens qualities it has.

3D mesh accuracy

When calibrating projectors using QuickCal it is *crucial* that the 3D mesh object is modelled accurately to the physical model. The reason for this is that Disguise's calibration algorithm assumes that the virtual reference points link exactly to their corresponding real-world points. The best way to generate a highly accurate 3D model is to laser scan the physical model, or to laser cut the physical model based on the same 3D file you later use in Designer. For building projections we recommend a mesh with a +-5mm error margin.

Using QuickCal

To start using QuickCal, first move the virtual projector into roughly the right position and orientation, and set up its lens qualities to roughly match the real projector. You don't have to be particularly accurate in this, but when you're trying to select projectors in the visualiser for editing, it's easier when they're in roughly the right place. Then move on to creating reference points, and then line them up.

Tips & Tricks

General QuickCal background information

The calibration goal is to calculate a projector's projection matrix so that it produces physically valid projections on its assigned projection surfaces in the real world (the scene). This means that the matrix does not need to be absolutely physically correct, but should be correct for at least this projection area (or rather volume). Indeed, it helps to think of the calibration as a process that works on a volume in space, rather than on 2-dimensional surfaces.

The calibration process uses as main inputs:

3D Reference Points (in world space)

These are usually created from vertices of the mesh/object. Note that the mesh needs to match the real object, at least in the vertices used for creating Reference Points. In d3 Reference Points are 3D objects themselves, and a certain point can be used by several Projectors.

2D coordinates (in the projector image plane)

These are created during line up of a Reference Point in a given Projector. In Designer the Projector Configuration stores a pair that links the 2D coordinate to the 3D Reference Point.

Projector matrix

The projection matrix is a linear transformation that represents the projector's position, orientation and internal sensor and lens properties. Note that Designer currently does not support correction of non-linear lens distortion in QuickCal. Lens distortion is only calculated and compensated for in OmniCal.

In Designer the projection matrix is applied to all 3D meshes in the Surfaces list, so they get transformed and projected on to the virtual Projector's image plane. This creates the projector's output image that is visible in the Feed Scene.

Choice of Reference Points and Order of line-ups

A Reference Point and the 2D line-up coordinate together form a correspondence point pair. Several such pairs are required for a calibration. QuickCal supports several algorithms that have different requirements on the minimum number of points (e.g. 4, 6, or more).

It doesn't matter for the calibration itself which object/mesh the Reference Points come from, as long as that 3D point exists in the real world as a recognisable feature. Object corners are usually good choices.

It is possible to use Reference Points from several objects for a single Projector.

Important requirements are:

- The real-world equivalents of the Reference Points are actually visible by the physical projector (lie inside its light cone).
- All Reference Points that are used for a projector:
  - span a large enough 3D volume. Often this is referred to as "adding enough depth". The main issue is to ensure that the Reference Points do not all lie on the same (virtual) plane in 3D space.
  - should evenly cover a large enough area in the Projector's image. It's a good idea to use Reference Points that get lined-up in all four corners of the projector output image.

Additionally, if you want to verify the wireframe of an object during QuickCal line-up, then the objects needs to be added to the Projector's Surfaces list.

It is worth to keep in mind that calibrating creates a working volume for a projector, using the 3D Reference Points as a helper. So the volume in which the projector "is valid in" is always limited by the extent of Reference Points you have lined up. As an example, lining up 6 points that are all in the same image corner of the projector will likely produce a calibrated matrix that doesn't work well for the rest of the image. The same goes for points that are in close proximity in the real world, i.e. the calibrated matrix will only be valid in the small volume within those points.

The order in which Reference Points are created and lined up does not affect the calculation of the projection matrix. The calibration will produce the same result no matter what points are lined up first.

However, to help the calibration work out things faster, it makes sense to line up Reference Points from extreme parts of the scene first, before adding points that are closer to each other. Otherwise there may not be a good visual output until enough points are lined up so that they cover the whole scene with enough depth.

Short QuickCal Rules

1. leave the Calibration Method setting at Auto, unless you really have a good reason to force a specific algorithm. Auto will choose the best algorithm based on how many Reference Points you have, and what their 3D relationship is.
2. Don't "cheat" with your line-up coordinates unless you absolutely have to.
3. Never "cheat" until all Reference Points have been added and lined-up.
4. Line up the extreme parts of the mesh(es) and projector image first (e.g. image corners Left/Right/Top/Bottom and Close/Far in the scene). Then improve on that by adding more points. E.g. concentrate on Reference Points in areas where the projected images are still "off" when looking at the real object.

Limited Scene Depth and number of Reference Points

Meshes/Objects that are flat or have little depth are more difficult to use for calibration. This is even more problematic if the real world object has few or no visible features, like a wall where only 4 corners are easily usable as Reference Points.

However, with 4 correspondence point pairs it's already possible to do a simple calibration (usually IterLM algorithm). This calibration is not able to calculate internal lens parameters such as lens shift or throw ratio. It will take values for these parameters from the manual projector settings. Note that these settings are still editable when using QuickCal with under 6 points, or if certain algorithms are set. It can be difficult to get these values right by hand, but if the throw ratio and lens shift of the physical projector is roughly known, then adjusting this can help improve the calibration significantly.

With 6 or more correspondence point pairs a different algorithm is used (usually Zhang algorithm), which also calculates lens shift and throw ratio parameters automatically. If the Reference Points provide little or no depth, then this algorithm has problems finding a good projector matrix. This is because mathematically it is very difficult to differentiate between some internal lens parameters and 3D parameters. For example throw ratio (or focal length, if you prefer) and distance to an object are interchangeable to a certain degree. Think of the famous Dolly Zoom effect used by Hitchcock in the film “Vertigo”, where the face always stays the same size, only fore- and background objects get smaller or disappear. This ambiguity can only be resolved by more depth. It is necessary to line up more points from the scene background/foreground to constrain the calibration better, essentially thereby increasing the calibration volume.

In practice, it may be preferable in certain rare situations to stick with 4 or 5 points, rather than adding a 6th, because the switch to the different algorithm may make the visual result worse rather than better.

Correspondence Point influence on calibration

A correspondence point pair is not like guide points for splines, or a fixed warp or rule that associates the two to each other.

Instead, they are inputs into an iterative algorithm that tries to solve a matrix so that all of these point pair conditions are (more or less) satisfied. But due to mesh/reality discrepancies, line-up inaccuracies, constraints of the optical model, even rounding errors, etc. there will never be a perfect matrix that fits all these pairs. There are many matrices though that will be good enough, so that the error for each of these point pairs is small (e.g. ideally below 1 pixel). If the inaccuracies in the input data are high, then some correspondence point pairs will basically contradict each other strongly. In that case the overall error will be high, too (e.g. 5-10 pixels, or even more). If the error is due to mesh/object discrepancies, then “cheating” might help (see below).

Cheating

If the 3D model and the physical object don’t match exactly, then QuickCal allows to “cheat” a bit. “Cheating” isn’t recommended, but often it’s not possible to get a better 3D model while being on-site.

There are several ways to “cheat”:

- Moving the line-up cursor slightly off from where it should be, so that the overall calibration looks better and the reprojection error gets smaller.

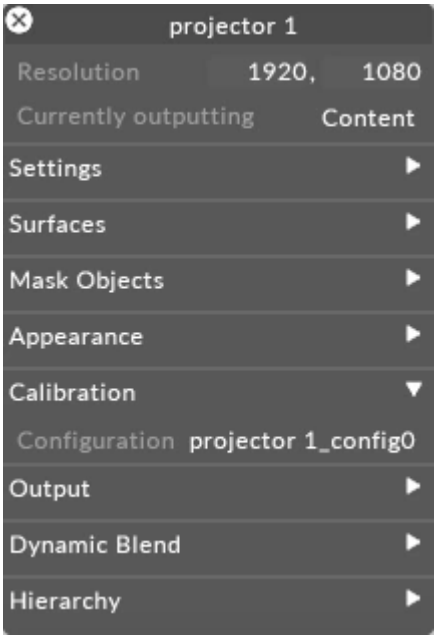
> **Note**
>
> The advanced option ‘Disable reference point bounds’ allows moving the 2D line-up coordinate outside of the projector’s image, e.g. to a negative value.

- Moving a 3D Reference Point away from its original vertex position. In QuickCal this can be done in “Manage” mode by holding the Shift key and moving the 3D Reference Point left, right, up or down. This will move the point in 3D space according to the current visualiser view, and allows placing the point in a non-vertex position. By default, Reference Points snap to the nearest mesh vertex, indicated by a green cross.

The problem with any of these tricks is to know which Reference Points to cheat with, and how it eventually affects the calibration.

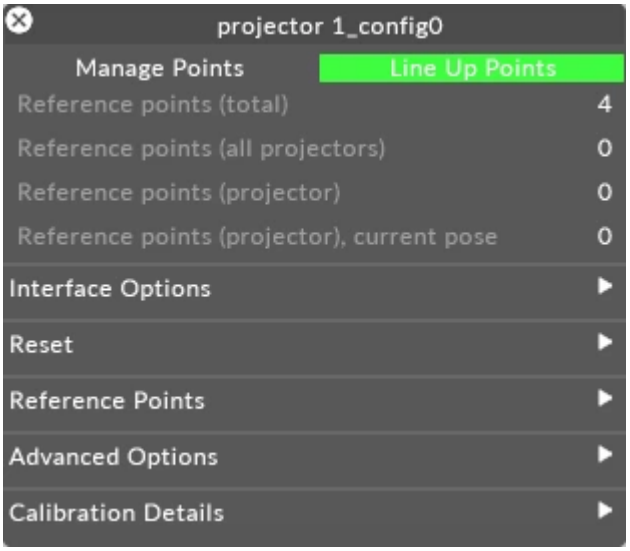
QuickCal Projectors

1. Right-click the projector you wish to line up.
2. Right-click the configuration file to open the QuickCal editor.



Projector configuration menu.

3. At the top of the QuickCal editor select **line up points**.



Line up point selection.
You must have the projector you're configuring assigned to an output otherwise the button is greyed-out

4. Left-click a point (representing a reference point on the video screen), hold the left-click and drag the cursor in the output and match it to its physical corresponding point.

> **Note**
>
> The output of the projector you working with will tinted the colour that you have set in the **appearance** tab in the projectors configuration.

5. Once the point is in the right position release the point and now its set.
6. To adjust cursor location using finer increments use the arrow keys to adjust in 1px movements.

When you have adjusted a point it will be displayed in the colour that matches the projectors colour.



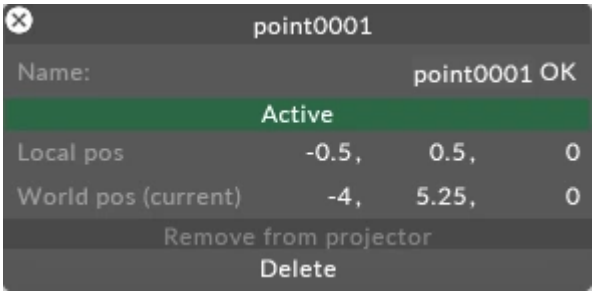
Buckingham Palace with points calibrated.

Remove a reference point from the projector

This will remove the 2D lineup between the selected reference point and the current projector. The reference point itself will not be deleted.

To remove a reference point

- Right-click on the reference point that you wish to remove from the projector lineup. The options menu will open.



To remove a reference point from a projector

- Left-click on the remove from projector button.

Rotate Controls

This option allows you to rotate your controls whilst lining up, This is especially useful when your projectors are rotated for example if they are portrait in orientation rather than landscape.

There are four options

- None: Mouse and keyboard operate normally.
- 90 degrees clockwise: mouse and keyboard are rotated 90 degrees clockwise
- 180 degrees: mouse and keyboard are rotated 180 degrees.
- 180 degrees anti-clockwise: mouse and keyboard are rotated 180 degrees anti-clockwise.

Lineup output mode

Lineup output mode allows you to change what is applied to the output whilst lining up.

During QuickCal lineup all lined up reference points will be drawn on top of the selected output.

You can choose between the following output modes:

- **Content**: Outputs the content that's on the timeline.



- **Wireframe**: Outputs the wire frame of the model.

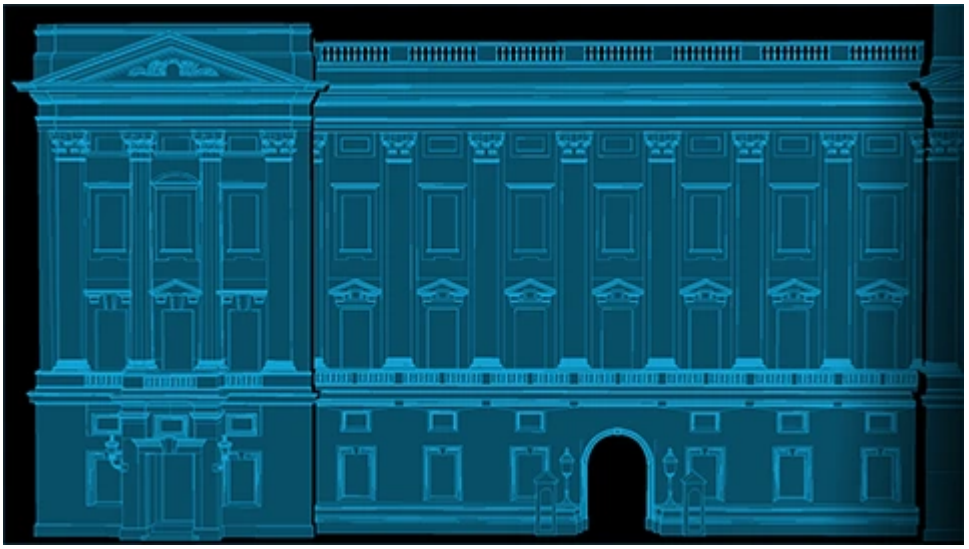


Image of wireframe applied to Buckingham Palace.

- **Identify**: Outputs a full colour grid that has the projectors name on it.



- **Grid**: Outputs a grid that is applied to the model

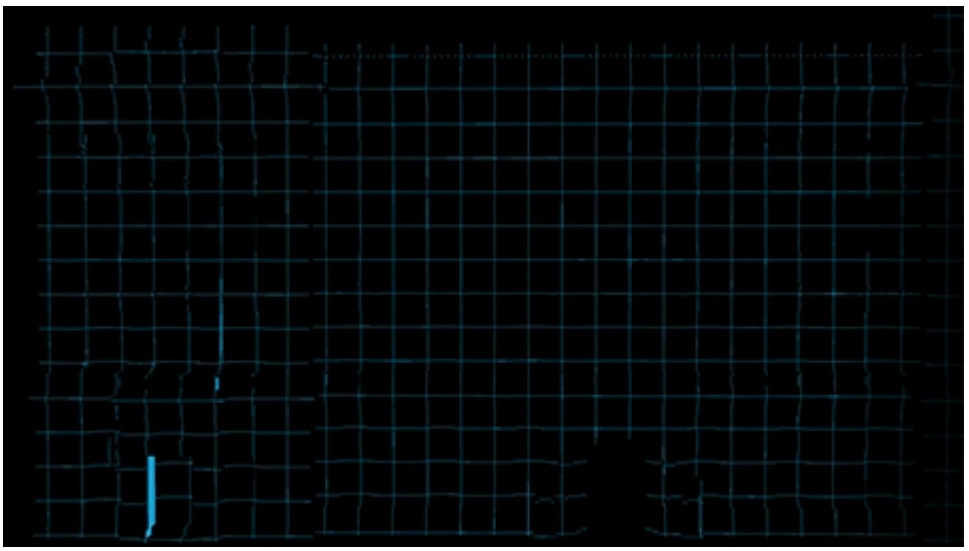


Image of grid pattern applied to Buckingham Palace.

- **None**: Outputs nothing but the line up points.

Cursor Types

There are four cursor types to choose from:

- Horizontal



Image of horizontal lineup cursor.

- Diagonal

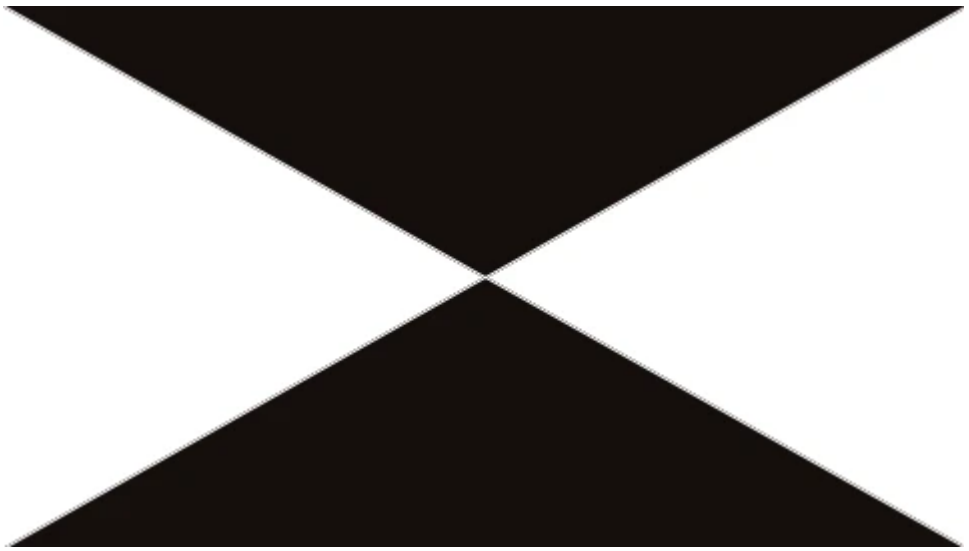


Image of horizontal diagonal cursor.

- Horizontal Lines

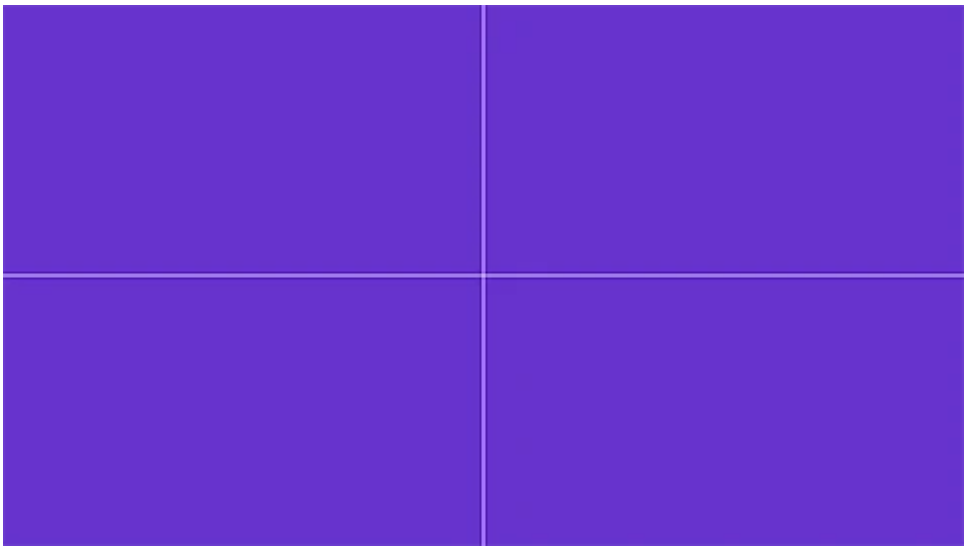


Image of horizontal lines cursor.

- Diagonal Lines

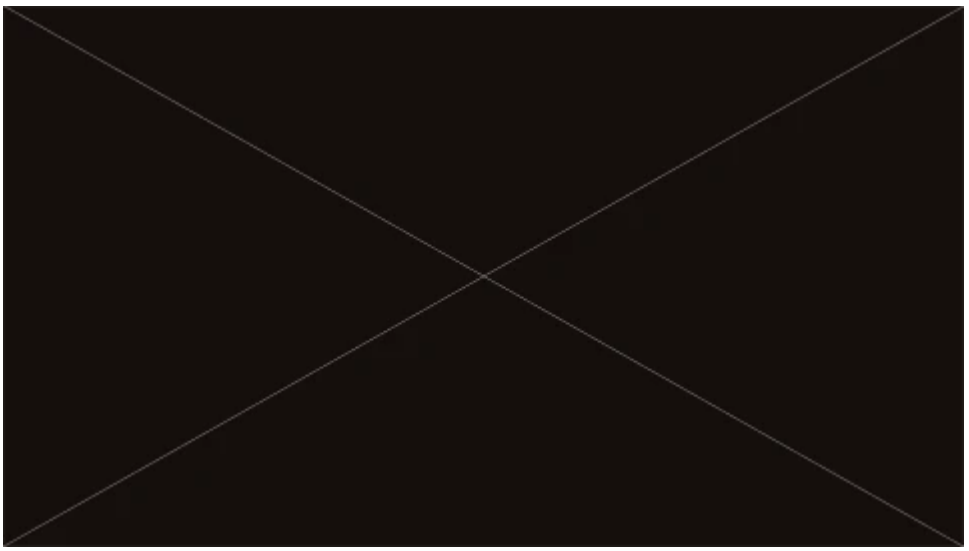


Image of diagonal lines cursor.

Marker Size

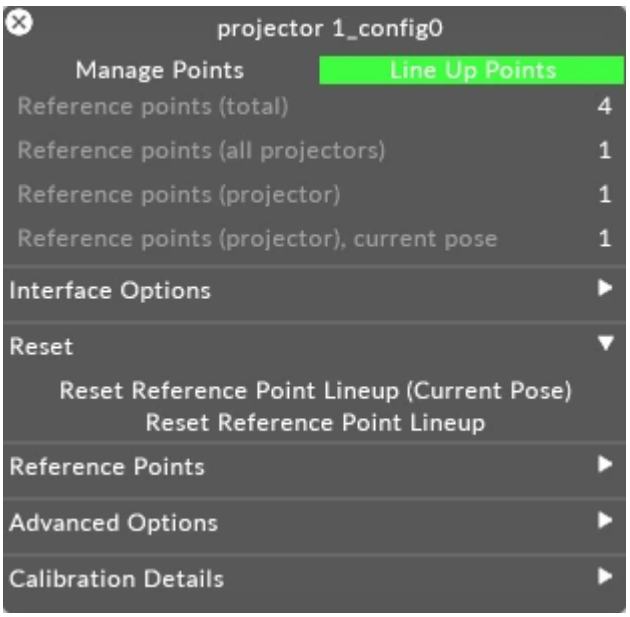
This setting allows you to adjust the size of the marker that's left behind once you have calibrated a point. The default marker size is 16.

Reset options

To reset the projector so no points have been selected or calibrated either:

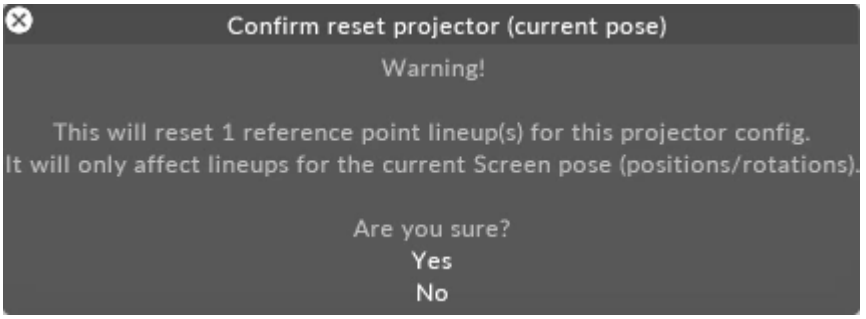
- select **reset reference point lineup (current pose)** to reset the points for that pose in a multi-pose line up (see the Multi-pose calibration sub-chapter for more info on this topic)

- select **reset reference point lineup**



Reset reference point lineup.

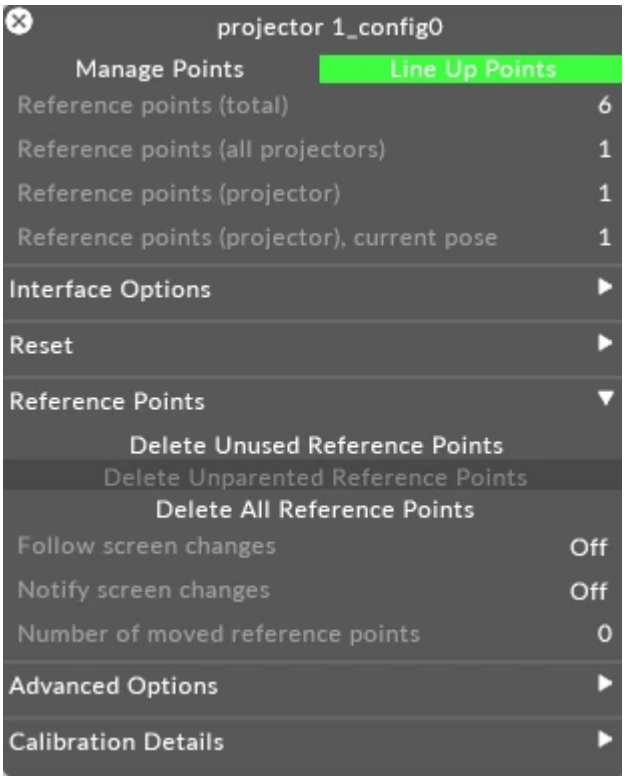
- A warning message will pop up when you select **reset projector config,**Click **yes** to **reset projector config.**



Confirm reset projection config.

Removing reference pointsS

There are 3 options for removing reference points under the **Reference points** tab:



Deleting reference points.

Delete unused reference points

This option deletes reference points which have not been associated with a projector lineup.

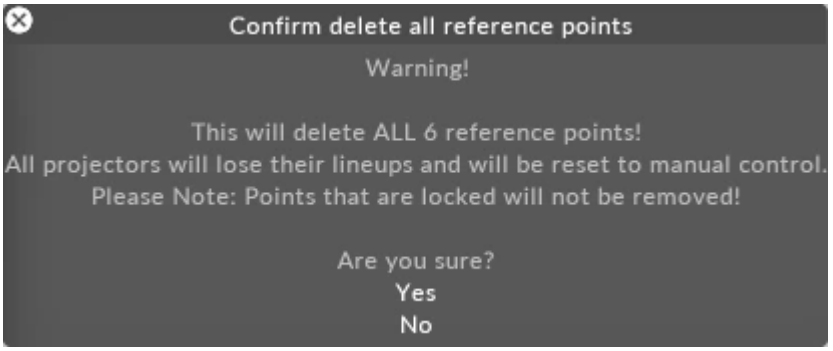
Delete unparented reference points

This option deletes reference points which are not parented to a screen

Delete all reference points

This option deletes all reference points from the virtual stage.

A warning message will pop up when you select **delete all reference points , Click** yes **to delete all reference points.**



Confirm delete of all reference points.

Delete all reference points is a global action, It will affect all the reference points on the model not just the ones associated with the current projector.

Advanced options

Follow screen changes

This option allows you to choose if the reference points follow screen changes. For example, if you change your screen position, the reference points will move with the screen.

This will automatically update any projector's QuickCal calibration using the new 3D positions of the reference points

Notify screen changes

This options allows you to choose if you want to be notified of screen changes. For example if the screen position changes and the points move with the screen you will be notified. The notification will ask you whether you want to update the QuickCal calibration with the new 3D positions. It will also show by how much each reference point has moved.

No. of moved reference points

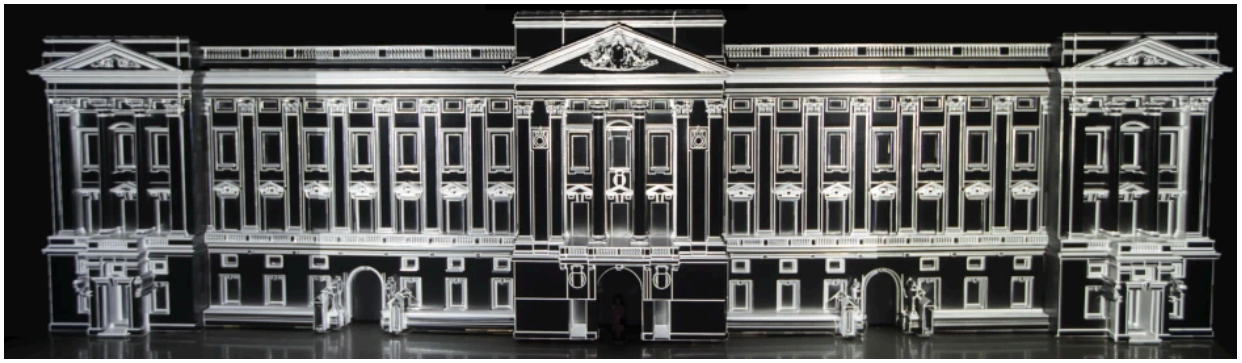
This informs you how many points have moved with a screen position change for example.

Auto z-clipping

If auto z-clipping doesn't work, this means some parts of a Screen, which are either very close or very distant, may only be partially visible. then manually adjusting these near/far values can make sure that the projector renders the whole screen.

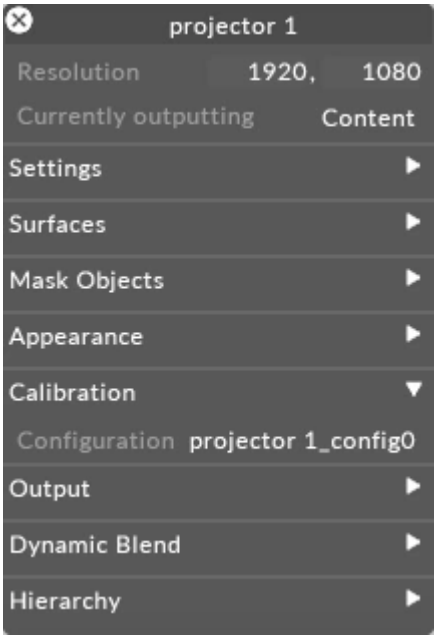
Lineup Result

Here is a real world photo of a lineup of Buckingham Palace without the edge blending.



Creating & deleting reference points in QuickCal

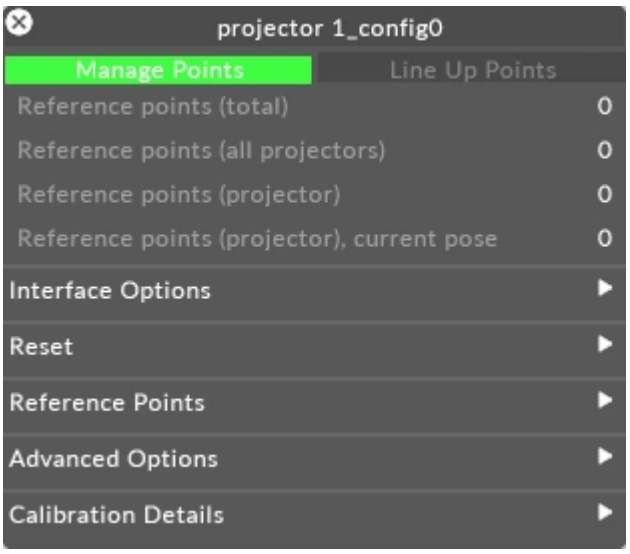
1. Open the projector editor.
2. Locate the **Calibration** tab.



Projector config editor selecting the configuration tab.

3. click the configuration file to open the QuickCal editor. If **left-clicking** you will instead open the Projector Configuration manager which stores all the configuration files for the existing projectors.

4. Select **manage points**.



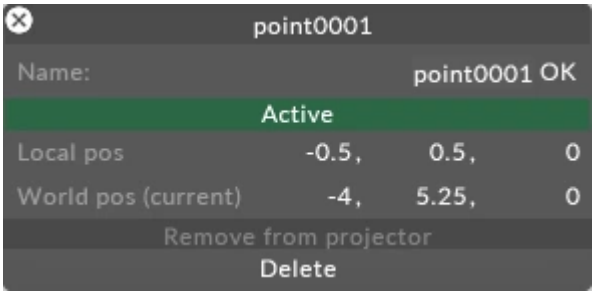
Projector config editor, Selecting manage points.

5. The d3 cursor will now turn in a circle. This indicates that you are in **manage points** mode and when you click on the model a reference point will be created at that location.
6. Create a minimum of 6 reference points and place them on **clearly** identifiable real-world reference points. This is to make it easier to link the virtual reference points to the corresponding real-world points at a later stage in the lineup process. Usually, there is no need to create more than 6-12 reference points per virtual projector but for more complex geometry it may be necessary to create more. Some complex building mapping projects have required up to 30 reference points per projector.
7. Notice that multiple projectors can use the same reference points.



To delete a reference point

1. Right-click on the point that you wish to delete.
   The options menu will open.



Delete a reference point from the virtual model. 2. Left-click on the **delete** button.

> ⚠ **Warning**
>
> Reference points that are lined up in another projector cannot be deleted (since this would affect the other projector's calibration).

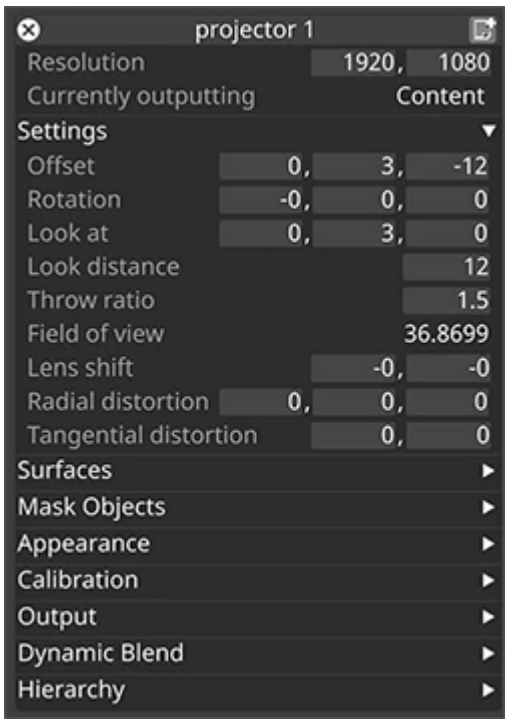
Manual Projector Calibration

> **Warning**
>
> Reset all digital and optical warps inside the projector, including lens-shift, otherwise the lineup features will be interrupted.

- Open the projector editor by either right-clicking the projector directly in the Stage, or by right-clicking the projector from the screens list in the Stage Editor.
- Familiarize yourself with the properties of a projector. After this follow the instructions explained below.

Set the correct resolution

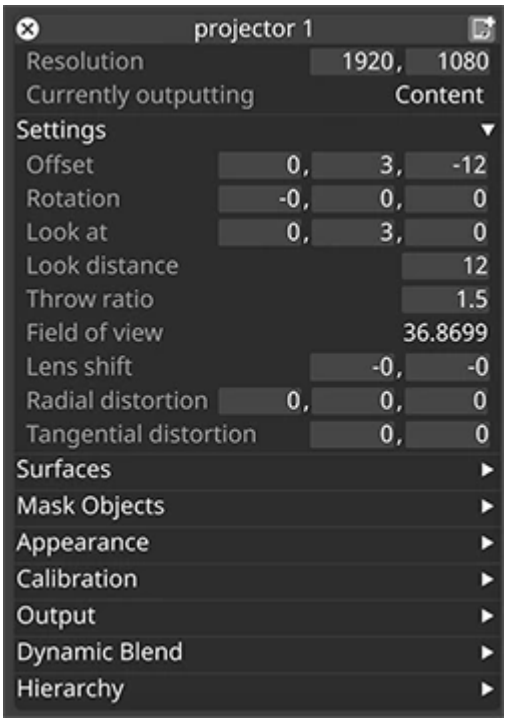
Set the resolution of the projector to match the corresponding output head's resolution.



> **Warning**
>
> If the resolution of the projector doesn't match the real world output, you will end up with an incorrect calibration.

Add surfaces

Under the **Surfaces** tab add the projection screens that the particular projector is covering.



> **Warning**
>
> If you don't add a screen to the projector the output will stay black.

Add the projector outputs to the Output Feeds

Ensure all of the Feed rectangles from the projector outputs have been added to the output heads.

Please see adding feed rectangles for information how to do this.

Place the projector correctly

Change the **pos** (projector position) and **the throw ratio** (lens value) properties so that the projector covers the required part of the screen surface. A laser measure may be required to calculate the correct position by measuring the distance from the physical projector to the video surface.

Adjust the Look at position

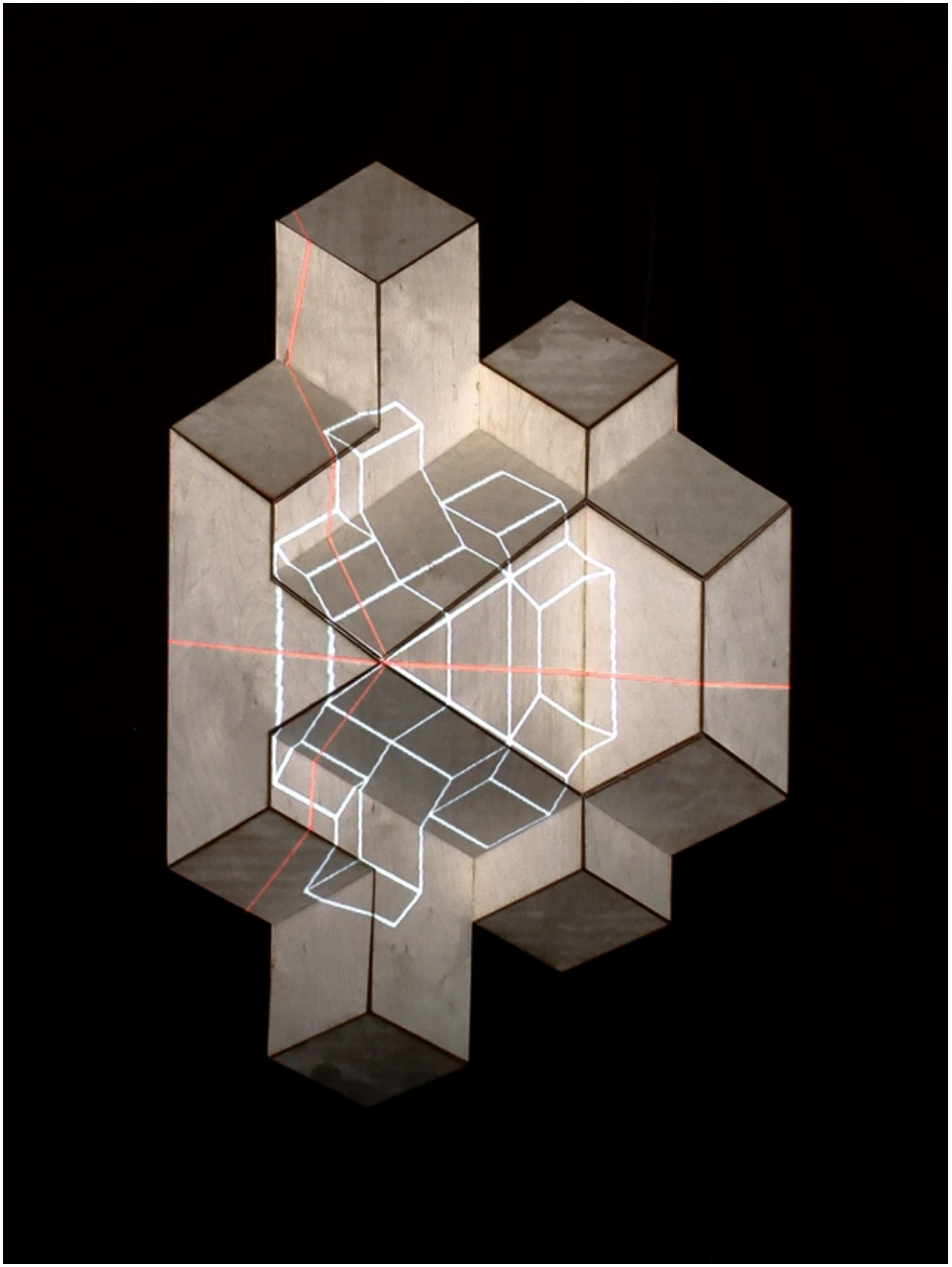
The **Look at** position of a projector defines the centre point of its corresponding output feed. When lining up a virtual projector to the physical projector it is therefore crucial to match the Look at position to its corresponding point in the real world.

Disguise Designer has a built-in wireframe feature allowing the system to generate a line-drawing based on the 3D mesh of the projection surface. In the same output frame Designer will also output a red cross positioned in the centre of the output feed. When the wireframe test pattern is applied, Designer will output this red cross regardless of the orientation of the projector.

Consequently, if the look at position of the projector is aligned to the red cross on the physical projection surface, the virtual projector and the physical projector are orientated around the same point which is a great starting point for an accurate manual lineup.

Align the look at position of the projector

- Change the output mode to **wireframe** by clicking the **output** tab at the bottom of the projector editor.
- Return to the Stage level. Set the **step** value of the look at position to 0.01 to enable smoother scrolling of the look at values. To change the step value, right-click the property **name** and change the value in the Step value property.
- Begin aligning the look at position of the projector to the red cross by comparing the look at positions crosshair in the Stage level and the red cross being outputted from the physical projector.



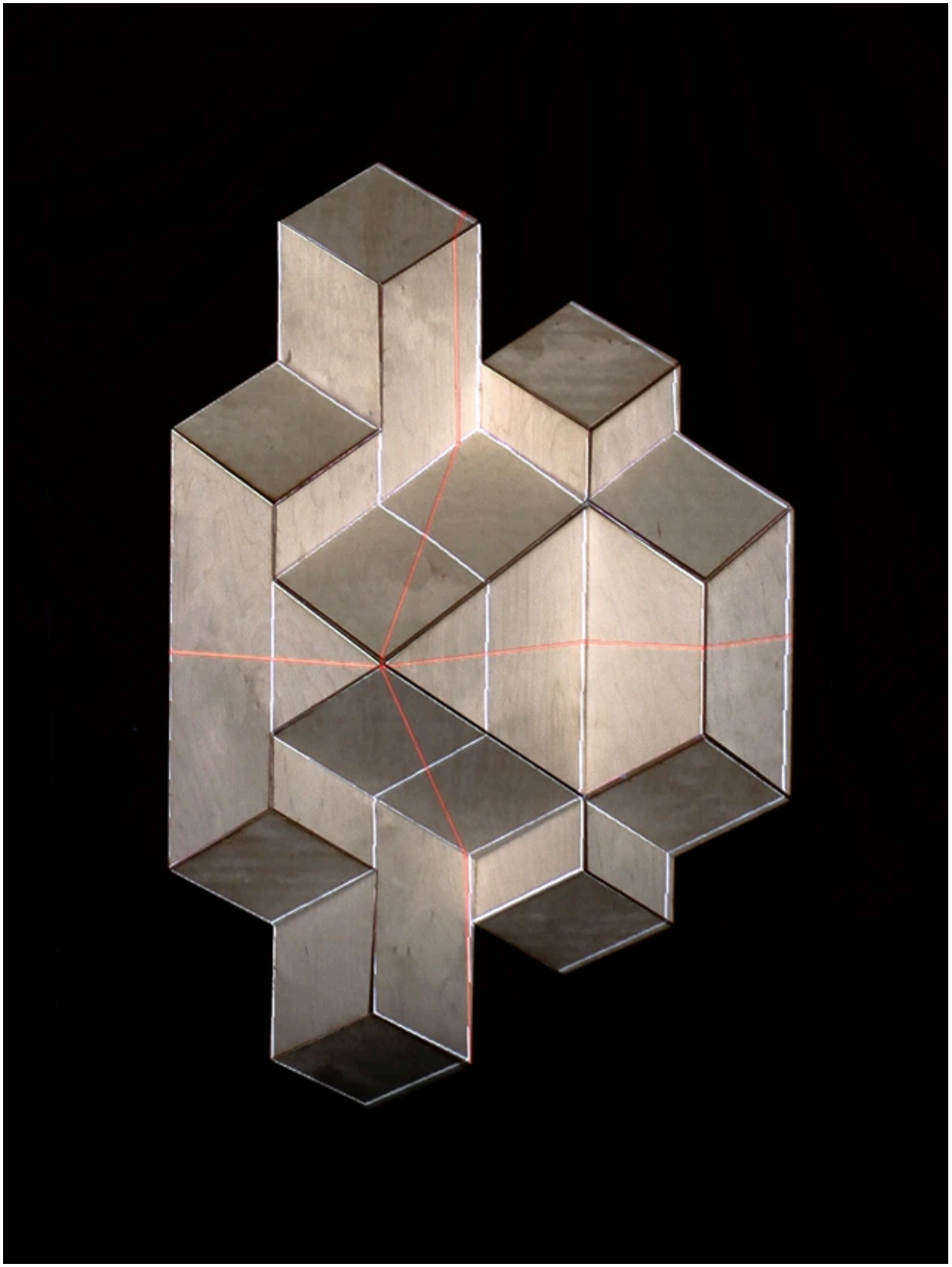
Look at position of the virtual projector now matches its corresponding point on the physical video screen, in this example a wooden sculpture.

Adjust the throw: Ratio

- To zoom in on the physical video screens content, change the **throwRatio** value. This value corresponds to the lens size of the physical projector.
- If the exact lens size is known (for example a fixed lens size is being used), type it in.
- If a zoom lens is being used, set the start value to the lowest (or highest) value in the zoom range. Slowly change the value by scrolling the mouse wheel in the property field.

Fine tune property values

- After setting the initial lens value, try not to edit the position properties. Instead, start adjusting the rotation parameters if needed, in particular the x and y rotations. Aim to establish parallel lines mapping onto the video screen globally rather than focusing only on one part of the screen. Adjust the step value if needed.
- Go back and fine tune the values of the lookAt position to center the output to the physical video screen. **Remember to establish parallel lines**.
- Adjust the throw ratio to zoom in/out of the content on the video screen. Assuming that the 3D mesh is accurate to the physical video screen, the mapping should gradually fall into place.



Projector has been manually calibrated; the 3D mesh test pattern now lines up with the wooden sculpture.

If the projection surface does not match the 3D model after carrying out manual calibration the lineup may need to be fine-tuned. Please see the sub-chapter Warping outputs for more information.

Capture

Capture can be integrated into the EVO workflow. These are suggested expressions for controlling the visualizer camera within Capture from Disguise based on the following information available from Capture documentation.

```
bit depth = 16max value = 2 pow(bit depth) = 65536

output min = -32768 output max = 32768 output range = output max - output min = 65536

output to bit ratio = max value / output range = 1
```

Capture Camera control X, Y, Z:

Value	Expression
1	`(camera:camera.offset.x*100+32768%65536)/256`
2	`camera:camera.offset.x*100+32768%256`
3	(unassigned)
4	`(camera:camera.offset.y*100+32768%65536)/256`
5	`camera:camera.offset.y*100+32768%256`
6	(unassigned)
7	`((camera:camera.offset.z*-1)*100+32768%65536)/256`
8	`(camera:camera.offset.z*-1)*100+32768%256`

Camera Control Rotation:

Value	Expression
1	`(camera:camera.rotation.y*182+180*182.044%65536)/256`
2	`camera:camera.rotation.y*182+180*182.044%256`
3	(unassigned)
4	`(camera:camera.rotation.x*182+180*182.044%65536)/256`
5	`camera:camera.rotation.x*182+180*182.044%256`

Value	Expression
6	(unassigned)
7	`(camera.camera.rotation.z*182+180*182.044%65536)/256`
8	`camera:camera.rotation.z*182+180*182.044%256`

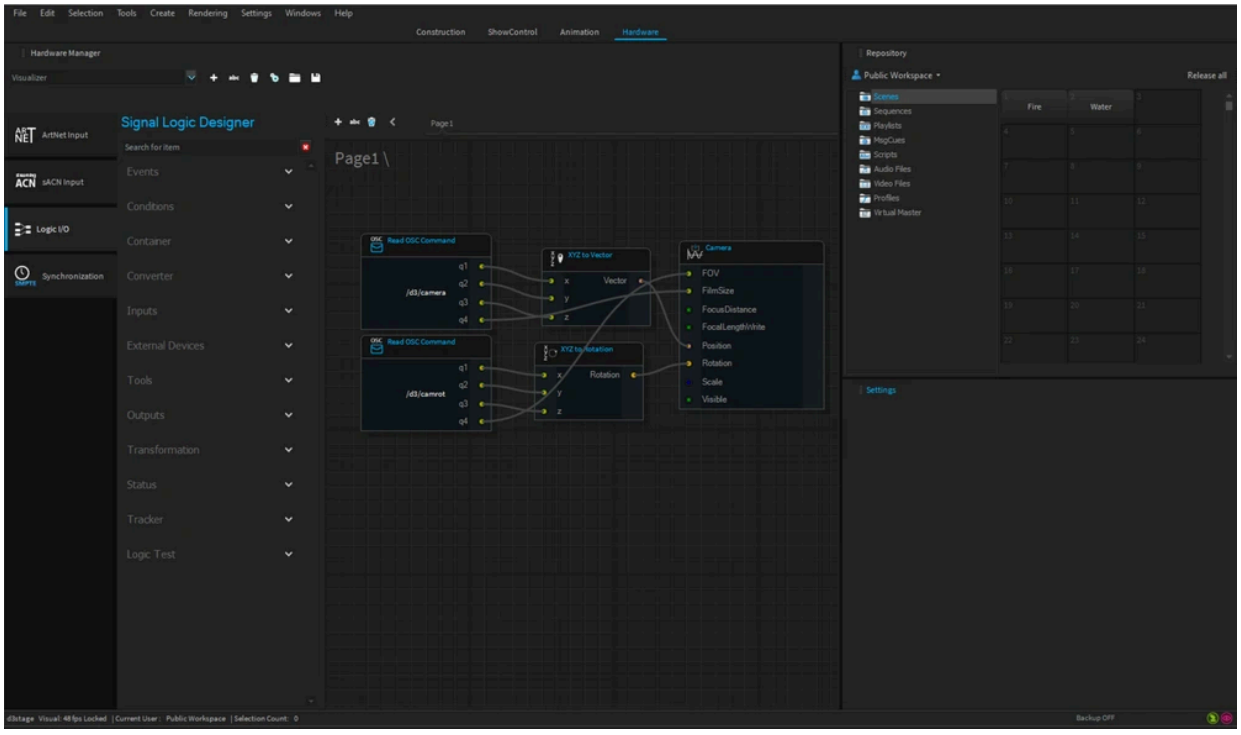
> **Note**
>
> - The Camera position range is -32768 to 32768 for X, Y, and Z; this value is in cm*.
> - The Camera rotation range is -180 to 180.
> - Capture requires 16bit resolution.
> - Z axis is inverted in Capture so you need to use camera z * -1.
> - Expressions must be converted to Metres, so we use *100 in the expressions to convert cm to m.

Depence

Depence can be integrated into the EVO workflow and overlaid on top of the Disguise visualiser. These are suggested expressions for controlling the visualizer camera within Depence from Disguise. To do so requires the Depence R3 Animate module as well as the Stage and other relevant modules your project may require.

Depence R3 Logic I/O setup

1. In Depence, create a new Logic I/O page within the Hardware tab, and add a **Read OSC Command** node for each of the parameters you wish to control.
2. In the 3D hierarchy, select your camera and drag it into the Logic I/O page.
3. Add an **XYZ** to Vector node between the Read OSC command and the Position property of your camera.
4. Add an **XYZ** to Rotation node between the Read OSC command and the Rotation property of your camera.
5. Link through any of the other parameters you wish to control, such as FOV and Sensor Size.



Depence Logic I/O Setup

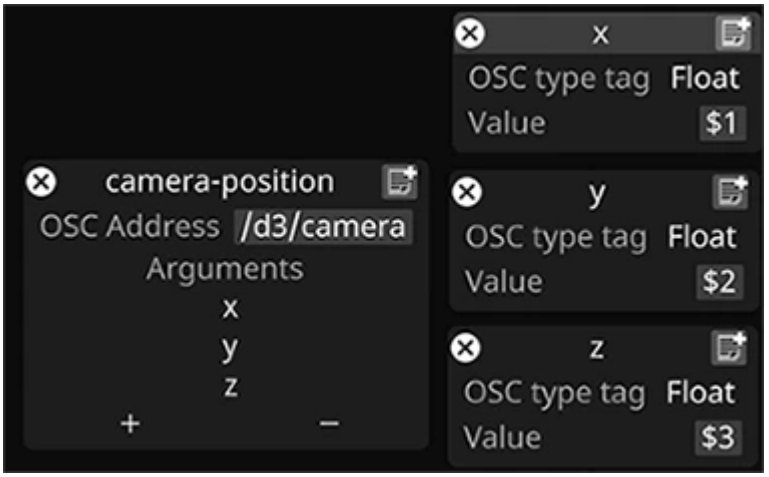
Designer Project Setup

1. In the Designer project, add an **OscControl** layer.

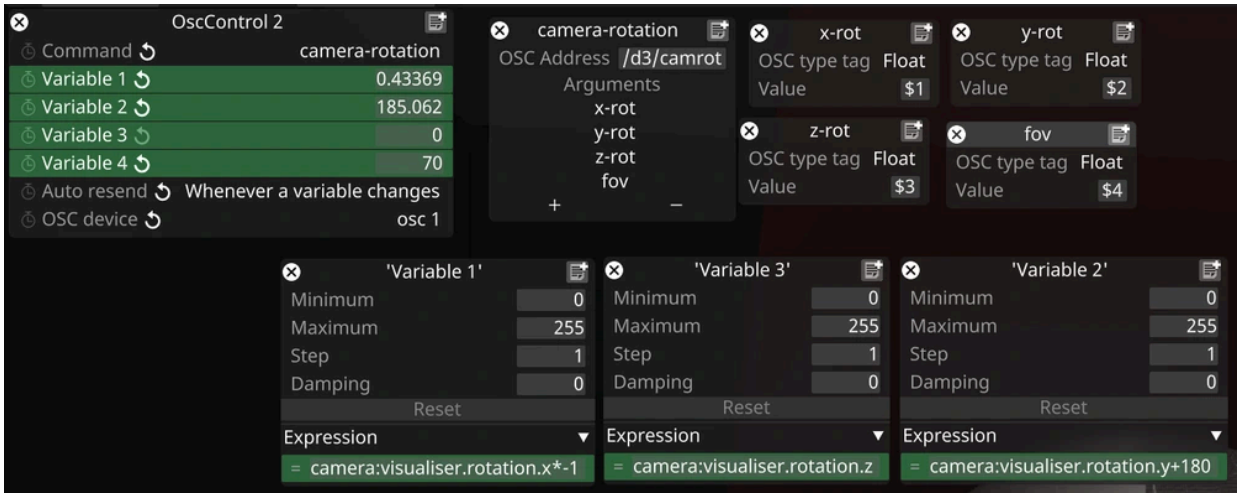
2. Set Variable 1, 2 and 3 to the X, Y and Z values of the camera you wish to control.



3. Add these expressions as arguments to the OscControl layer, using 2 and $3 for the X, Y and Z values.

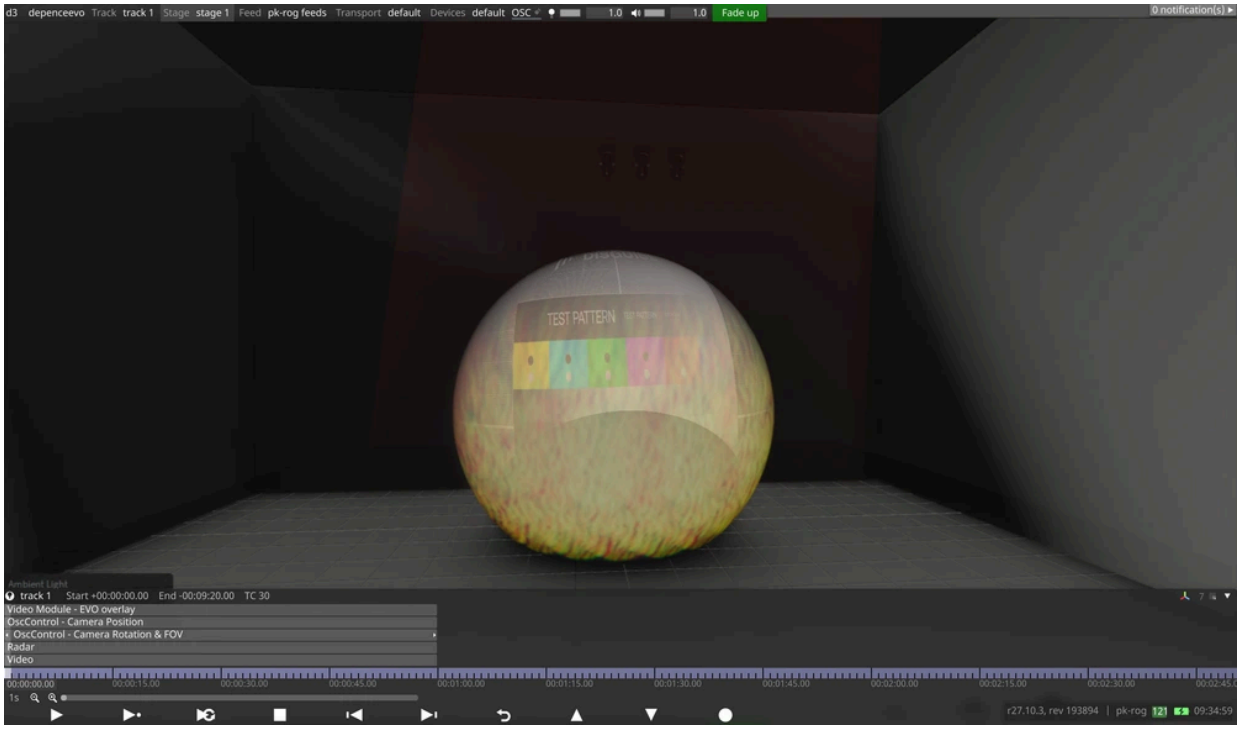


4. Repeat the above steps for the Rotation properties, using the appropriate arguments.



Control

After setting the above, moving the camera in d3 should move the camera in the Depence visualiser. If you combine this with the NDI® stream and compositing mentioned above, you will have a fully working integration.



> **Note**
>
> - Depence defaults to port 9000 for OSC communication, so you will need to change the port number in the OSC device in d3.
> - Note the above inversions and scale factors on the various parameters - this is to fit the d3 Camera coordinates to the Depence camera coordinates.

Further Information

- Depence website
- Depence documentation

EVO

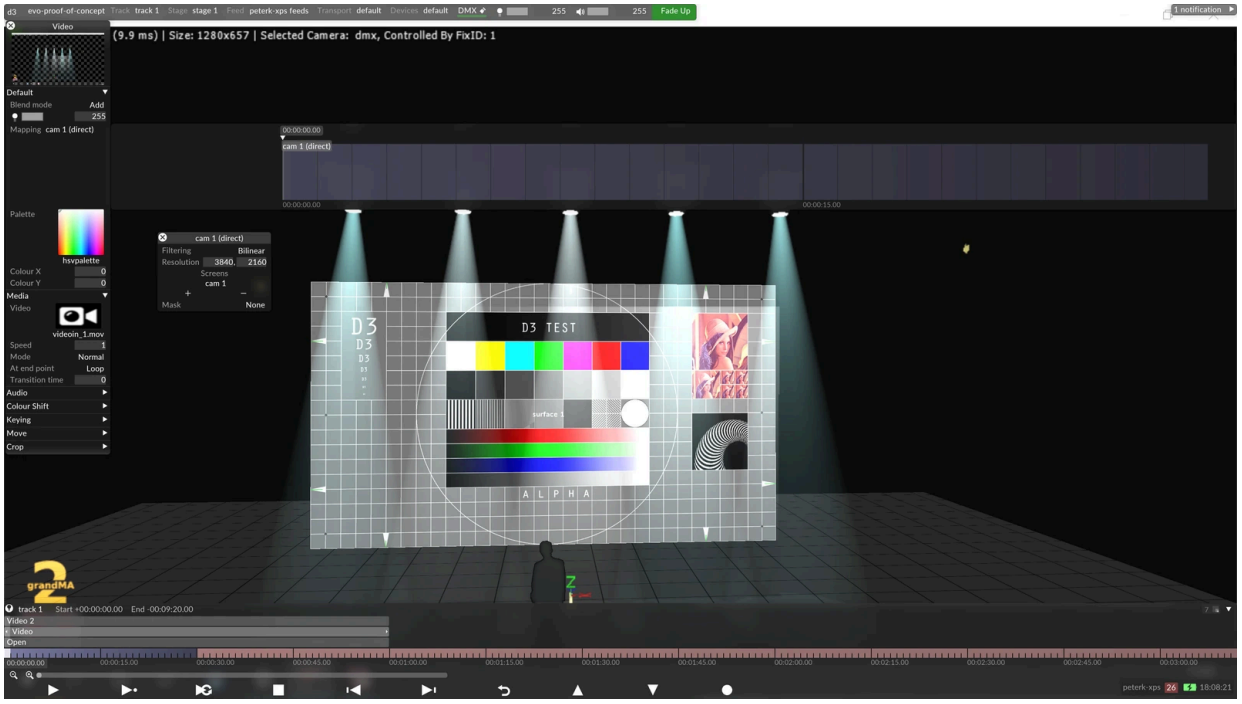
Disguise is a workflow platform, designed to be flexible and enable you to interoperate multiple functions within the platform to create your own workflows. One example of this is a collection of workflows known as EVO.

EVO (External Visualiser Overlay) is in essence two parts. An incoming video stream (NDI®) from a third party visualiser, and sharing of camera coordinates between the Disguise camera and the external visualiser's camera.

By combining these two workflows, you are able to create a seamless link between the two systems - essentially visualising the lighting and video systems together in one viewport.



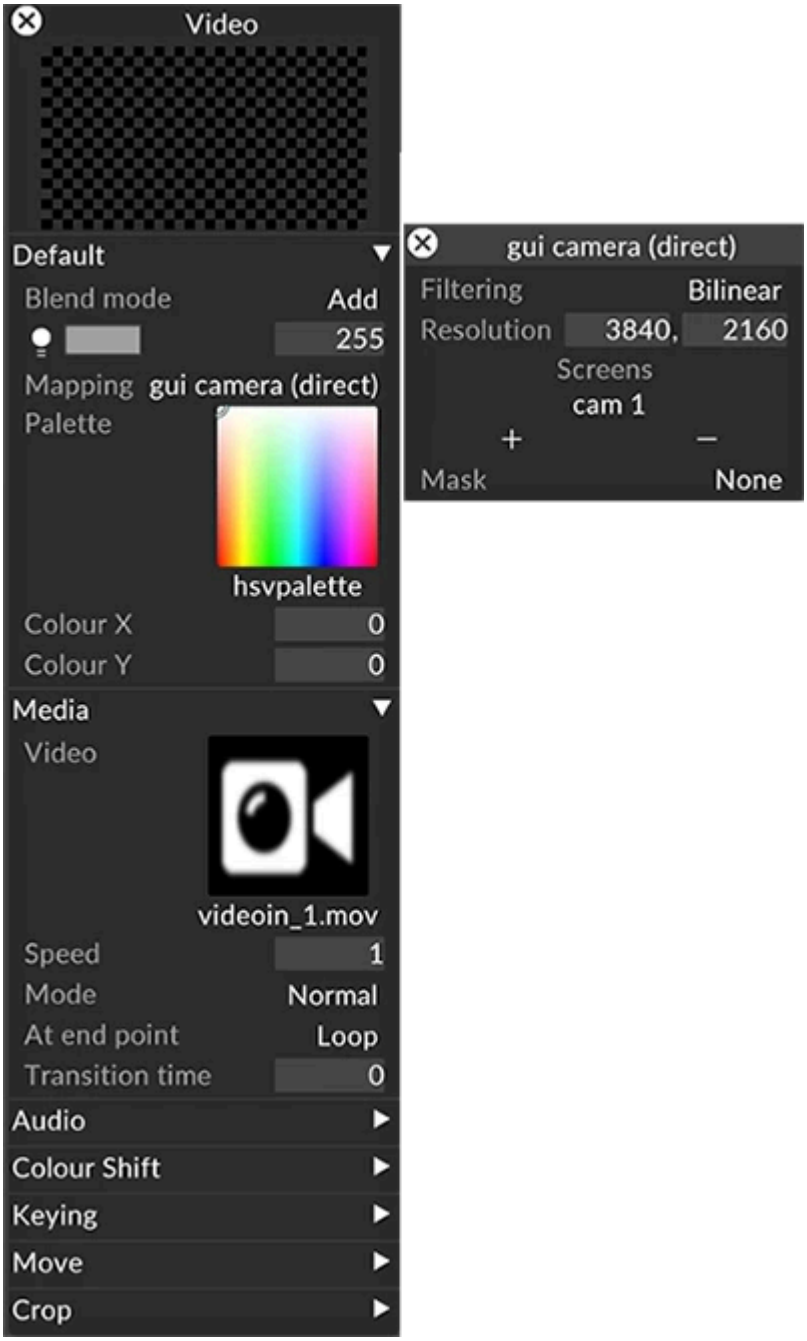
Watch on YouTube



NDI® Video Stream Setup

To set up the NDI® stream:

1. Start the **NDI® Screen Capture** on the lighting visualiser PC.
2. In the third party visualiser, set all video surfaces & props to render as black. It might be helpful to use the Export Stage to FBX option in Designer to export the stage directly into the visualiser, to ensure all objects are scaled identically.
3. Start the Designer project.
4. In Designer, create a new camera and position it as required. This will become your main visualiser camera, so you may also need to increase the resolution if you are running a 4K GUI (the new camera will default to 1920 x 1080.
5. Select the visualiser camera to be that new camera in the Stage menu.
6. In the Video Input Patch, map one of the Video Inputs to the incoming NDI® stream from the visualiser PC. Check with the preview function that this is routing correctly.
7. Add a new Video layer to the timeline.
8. In the Video layer, select the Video Input clip as the media asset.
9. Set the Video layer to the **Add** blend mode.
10. Create a new **Direct mapping** and add the new camera you created to that mapping.
11. Select the new mapping as the mapping for the video layer.



At this point the incoming NDI® stream from the external visualiser will be overlaid from the Disguise visualiser. If you manually line up the two cameras, this is all that is needed - but using the tracking and control modules in Designer it's possible to link the two cameras together, via open protocols (DMX, OSC etc).

Camera Position Setup

To set up the camera position - there are two options - either Disguise can receive the camera position from the visualiser, or the visualiser can receive the position from Disguise.

Below are generic instructions for both setups. Specific instructions for each visualiser are available on the relevant page for the specific visualiser you are working with.

Visualiser receiving position from Disguise - via DMX

In this setup, moving the Disguise camera will move the visualiser camera, leaving the Disguise operator in control of what is being looked at.

1. Add a **DMX device** to the project, and patch it to Output DMX.
2. Create a **DMX lights screen** and assign it to create an appropriate number of DMX addresses.
3. Add an **DMXLightsControl** layer to the timeline.
4. Select the DMX lights screen as the mapping for the DMXLightsControl layer.
5. Use an arrow to connect the control layer to the stage camera (the expression syntax created is `camera:{camera name}.offset.x)`.
6. Set up the appropriate commands to send from Designer to the visualiser - note that the DMXLightsControl layer sends only 8 bit values so you will need to convert these to 16 bit or 24 bit depending on the external visualiser requirements. See below.
7. Apply any scale factors needed in the expression to center the two worlds. You will need multiple DMXcontrol modules to send all the properties of the camera.
8. Patch the external visualiser according to the data stream you created.



> **Note**
>
> World Offsets - It might be helpful to set up Designer camera as a **Child** of a null object (prop). This means that you can set the world offset using the position and rotation properties of the null object, rather than modifying the expressions (above). Create the prop, then use **Add Child** to select the camera as a child of the prop. When the position of the prop is adjusted, the camera will move by the same relative value. No mesh needs to be selected on the prop.

Disguise receiving position from the visualiser - Open Layer workflow

1. Add a **DMX device** to the project file, and patch it to Input DMX.
2. Add an **Open layer** to the timeline.
3. Hold down Alt and drag an arrow between the Open Layer and the Cameras position and rotation properties. This will connect the Open layer to the camera Position & Rotation, enabling control of them from the timeline.

4. Right-click on each property and use an expression to connect each of these properties to the appropriate incoming DMX value - you may need to scale these values to match the world-scaling in the third party visualiser.

Disguise receiving position from the visualiser (or lighting console) - PositionReceiver workflow

For specific visualiser setup instructions, refer to the relevant page for the visualiser you are working with.

Specific visualiser setup instructions

- MA3D
- Capture
- Depence

MA3D

The MA3D and MA3 Visualiser from **MA Lighting** are compatible with the EVO workflow.

NDI® setup

1. Once the machine with the MA onPC and MA3D is ready, run **NDI® Scan Converter**. This app will convert the outputs of the GPU in video streams over IP.
2. Open the NDI® studio monitor and check that screen with the MA3D is working as an NDI® stream.

Disguise setup

1. Open a new project file, remove the projector out of the stage and create a new **virtual camera**.
2. Right-click on **Devices > Video input patch**. Navigate to **video.in1 > input configuration** and select the NDI® stream of the MA3D. Click on Start preview to check the stream, then stop the preview.
3. Create a **DMX device**, and use the IP address of the MA onPC or MA desk, and check the data with the DMX monitor.
4. Create a **PositionReceiver** Device and build new expressions to control the position x,y,z and rotation x,y,z of the virtual camera within Designer using the data coming from the MA lighting desk.

Expressions

Expressions are used within Designer to calculate the mathematical values needed to align the virtual worlds of both visualizers. The information that follows will be used in the expressions that need to be created within Disguise:

- The MA camera controller has a range from -1000m to 1000m for the x,y,z positions and a range of -720 to 720 degrees for the pan and tilt.
- The position x,y,z of the MA camera control has a resolution of 24bits for the x,y,z, pan and tilt. Expressions within Designer only support 16bits, meaning that the camera movement in Disguise will be smooth using 16bit data.
- The ‘position y’ of the MA camera controller is the ‘offset z’ value of the virtual camera within Designer; The ‘position z’ of the MA camera controller is the ‘offset y’ value of the virtual camera within Disguise.

These are the expressions you need to build:

Camera offset x



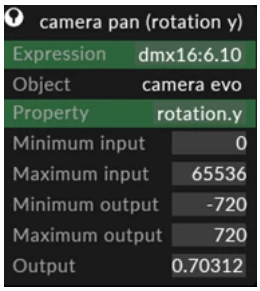
Camera offset y



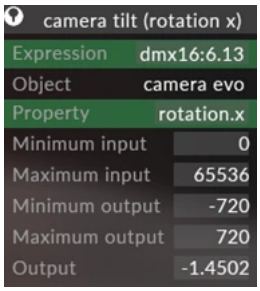
Camera offset z



Camera pan (rotation y)

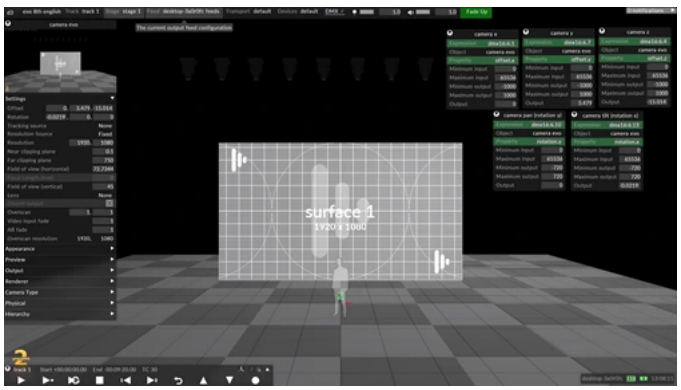


Camera tilt (rotation x)



If the expressions are correctly built the new virtual camera within Designer will move to the same x,y,z position location of the MA3D camera.

1. Create a new Video layer, map it to surface 1, and add some media.
2. Create another Video layer, change the blend mode to **Add**, and select **video-in** 1 as media; the thumbnail will display the MA3D NDI® stream with a checkerboard. Make a new **direct mapping** for your new virtual camera.
3. Go to **Stage > Visualizer** Camera and assign to the new virtual camera.
4. Confirm that the Disguise camera and the MA3D camera is aligned.
5. Open the virtual camera properties editor and change the background colour to black.



Once you have finished all the steps you can make the stage plane in MA3D invisible; it will not be needed once the alignment of the cameras is completed. You can start patching lights on the grandMA2 and add screens in Disguise to create your show.

Controlling the Disguise camera from MA3D

General Information

The MA 3D world is scaled between -1000m and +1000m, and rotation between -720 and +720°. DMX values for control are output as 24 bit control signals, using 3 DMX channels (bytes). Disguise only supports the input of 8 or 16-bit values, so we take the most significant bits from these values.

Using these real world values, we are then able to plug them into the following formulas to create the expressions needed to connect an external visualiser camera to the internal camera within Disguise:

```
{world centre offset in meters/degrees}+(dmx16:universe.address/65536)*{world size in meters/degrees}-{world size in met
```

GrandMA 3D Camera Control Expressions

Property	Expression
Position X	`1000+(dmx16:1.1/65536)*2000-2000`
Position Y	`1000+(dmx16:1.7/65536)*2000-2000`
Position Z	`1000+(dmx16:1.4/65536)*2000-2000`
Rotation X	`720-(dmx16:1.13/65535)*1440-1440`
Rotation Y	`720+(dmx16:1.10/65536)*1440-1440`
Rotation Z	No expression (GrandMA 3D does not support Rotation Z via DMX)

Note: Y and Z are flipped in GrandMA 3D, so we pick up opposing DMX values for Position Y.

Field of View

Set this manually.

MA 3D measures field of view as half horizontal value compared to Designer (eg if MA 3D is 22.5°, Designer field of view is 45°.

In the above expressions, the constants 1440 and 2000 are derived from the world scale of the GrandMA 3D scene.

- 2000 is the scale factor between the GrandMA 3D world positions into meter scaling.
- 1440 is the scale factor between the GrandMA 3D world rotations and degrees.
- The above constants can be modified for integration with other visualisation systems.
- Note that these expressions are only reading the top two bytes (16-bits) of the 24-bit values.
- At this point when you move the external visualiser camera, Designer visualiser camera will move too.

Using Disguise to control the MA3D camera

Disguise only supports the sending of 8 bit values from the DMXLightsControl layer, so we need to use expressions to split the 24 bits into separate bytes:

DMX Channel Assignments for Camera Control

Property	DMX Channel	Expression
High Byte Position X	1	`(((camera.offset.x+1000)*8388.608)/65536)`
Mid Byte Position X	2	`(((camera.offset.x+1000)*8388.608)%65536)/256)`
Low Byte Position X	3	`(((camera.offset.x+1000)*8388.608)%256)`
High Byte Position Y	4	`(((camera.offset.y+1000)*8388.608)/65536)`
Mid Byte Position Y	5	`(((camera.offset.y+1000)*8388.608)%65536)/256)`
Low Byte Position Y	6	`(((camera.offset.y+1000)*8388.608)%256)`
High Byte Position Z	7	`(((camera.offset.z+1000)*8388.608)/65536)`
Mid Byte Position Z	8	`(((camera.offset.z+1000)*8388.608)%65536)/256)`
Low Byte Position Z	9	`(((camera.offset.z+1000)*8388.608)%256)`
High Byte Rotation X	10	`((((camera.rotation.x*-1)+720)*((256*256*256)/1440)/65536)`

Property	DMX Channel	Expression
Mid Byte Rotation X	11	`((((camera.rotation.x*-1)+720)*((256*256*256)/1440)%65536/256)`
Low Byte Rotation X	12	`((((camera.rotation.x*-1)+720)*((256*256*256)/1440)%256)`
High Byte Rotation Y	13	`((((camera.rotation.y*-1)+720)*((256*256*256)/1440)/65536)`
Mid Byte Rotation Y	14	`((((camera.rotation.y*-1)+720)*((256*256*256)/1440)%65536/256)`
Low Byte Rotation Y	15	`((((camera.rotation.y*-1)+720)*((256*256*256)/1440)%256)`
High Byte Zoom	16	-
Mid Byte Zoom	17	-
Low Byte Zoom	18	-

Note: Y and Z are flipped in MA 3D world. Y is inverted in MA3D so we invert the expression with the negative conversion on the bytes.

Constants

- In the above expressions, the constants are derived from the world scale of the GrandMA 3D scene.
  - Position constant: **8388.608** is the scale factor between the GrandMA 3D world positions (-1000m to +1000m = 2000m) and the 24-bit DMX value (256 x 256 x 256) / 2000 = 8388.608.
  - Rotation constant: ((256*256*256)/1440): **11650.84444444** is the scale factor between the GrandMA 3D world rotations (-720 to +720 degrees = 1440 degrees) and the 24-bit DMX value (256 x 256 x 256) / 1440 = 11650.84444444

The above constants can be modified for integration with other visualisation systems.

You will need to patch these same values in the external visualiser.

At this point when you move the Disguise camera, the external visualiser camera will move.

The only final adjustments that need to be set manually are field of view.

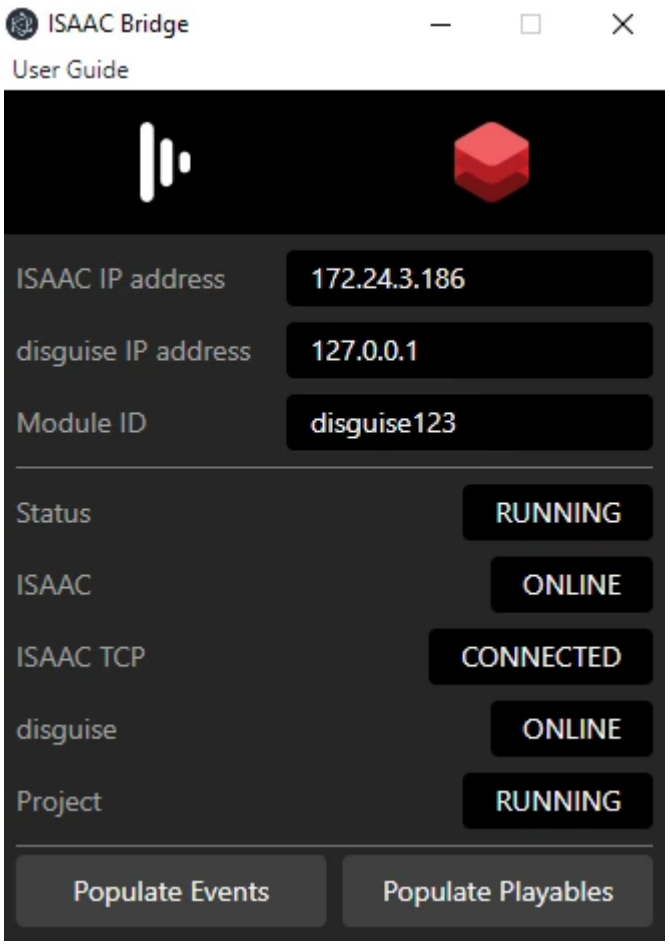
ISAAC Bridge

ISAAC is a multifaceted platform from **Smart Monkeys** that redefines the way AV systems are deployed, monitored and managed. Covering a spectrum of elements from lighting and audio to video projections and displays, it allows users to monitor and manage all elements of an AV system from a single on-premise portal without the need for internet connection. Users are also able to distribute and schedule content playback remotely using ISAAC.

Integrating ISAAC with Designer extends its functionality to both technical and non-technical users, enabling the user to remotely monitor and manage the Disguise platform alongside their wider AV system- removing the need for 24/7 on-site monitoring. ISAAC bridge creates a simplified and unified experience for users running fixed installation projects.

Learn more about ISAAC **here**.

The ISAAC Bridge app is currently still in development. For more information, please contact our **Product Team**.



Workflow

Installation

ISAAC Bridge should be installed on a machine on the d3Net network.

ISAAC Bridge installs to `Windows\Start Menu\Programs\Disguise`.

ISAAC Bridge should be installed on the Director machine when run across a multiple machine setup. When Disguise is running on a single server, ISAAC Bridge should be installed on that server.

Interface Overview

The ISAAC Bridge interface is split into three sections:

- **Configuration**
- **Status**

Configuration

On first launch, set the following:

- IP address of the ISAAC server
- IP address of the Disguise machine
- Module ID of the module in ISAAC

In a multi-machine setup the IP address of the Disguise machine will be the Director. This configuration persists between restarts.

Status

Bridge Status

Status of the ISAAC Bridge application, either `RUNNING` or `STOPPED`.

ISAAC

Status of the ISAAC server, either `ONLINE` or `OFFLINE`.

ISAAC TCP

Status of the connection to the ISAAC server, either `CREATED`, `CONNECTED`, `ERROR` or `CLOSED`. This is the connection by which scheduled events are received by Disguise.

Disguise

Status of the Disguise machine, either `ONLINE` or `OFFLINE`.

Project

Whether there is a Disguise project currently running on the specified Disguise server. Either `RUNNING` or `NOT RUNNING`.

Supported ISAAC Features

Events

ISAAC Bridge exposes two events to ISAAC:

- **Start Project** - starts the last run Disguise project
- **Stop Project** - stops the currently running Disguise project

To populate these events in ISAAC, click **Populate Events**.

Playables

ISAAC Bridge exposes Tracks on the Default Transport in Disguise to ISAAC as Playables. To populate ISAAC Playables with available Disguise Tracks, ensure that a Disguise project is RUNNING and click Populate Playables.

Variables

Variables exposed to ISAAC:

Running Project - project path of the running Disguise project.

Motion Capture Overview

Motion Capture includes:

- Skinned Mesh Skeleton
  - Skeleton
  - Skeletal Point Tracking Source
- Vicon
  - Vicon Emulator

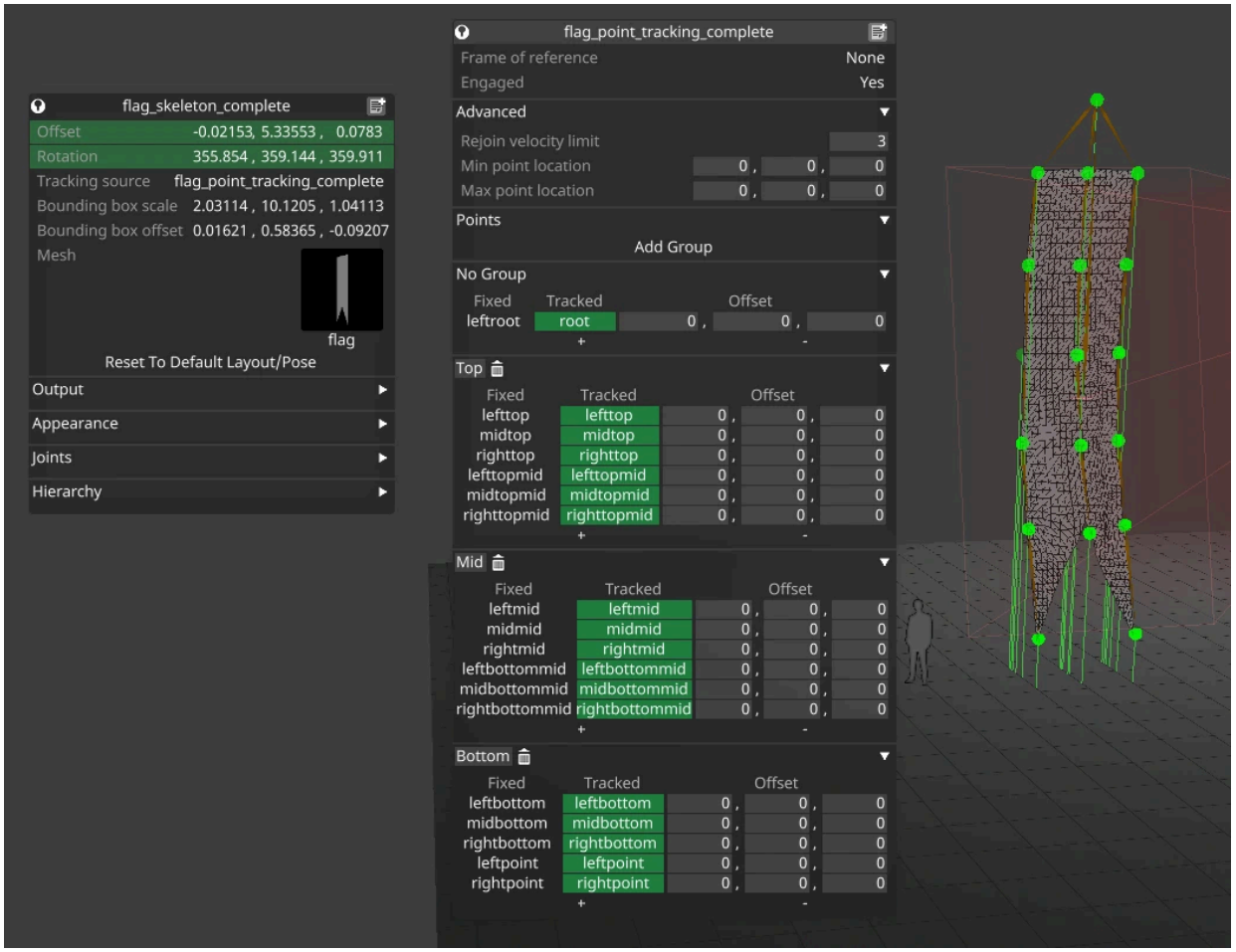
Skeletal Point Tracking Source

The Skeletal Point Tracking Source allows the joints of a skeleton to be controlled using tracked points from a marker-based tracking system. It can be used in conjunction with tracking drivers such as:

- RTTrPM Driver (BlackTrax)
- NatNet Driver (OptiTrack)
- PosiStageNet Driver

Setting up a skeletal point tracking source to control a skeleton

1. Set up a suitable tracking system and driver to receive tracked points in Disguise
2. Create a rigged mesh with joints at each tracked marker position, export as FBX and select in a skeleton
3. Under Hierarchy in the skeleton, click **Create Reference Points** to create a reference point for each joint
4. Create a new SkeletalPointTrackingSource and set it as the skeleton's tracking source
5. In the tracking source editor, add points to link each tracked point to its corresponding reference point
6. Points can be sorted into groups. If a point stops receiving tracking data, its position will be estimated based on a rigid body transform from other receiving points in the same groups
7. Each point can also have an offset applied relative to the fixed point
8. Adjust the **Rejoin velocity limit** under **Advanced** to change the speed at which points catch up with the tracked position when tracking is received again after being lost.
9. Adjust the **Min/Max point locations** under **Advanced** to set bounds on the area in which tracked points are followed.

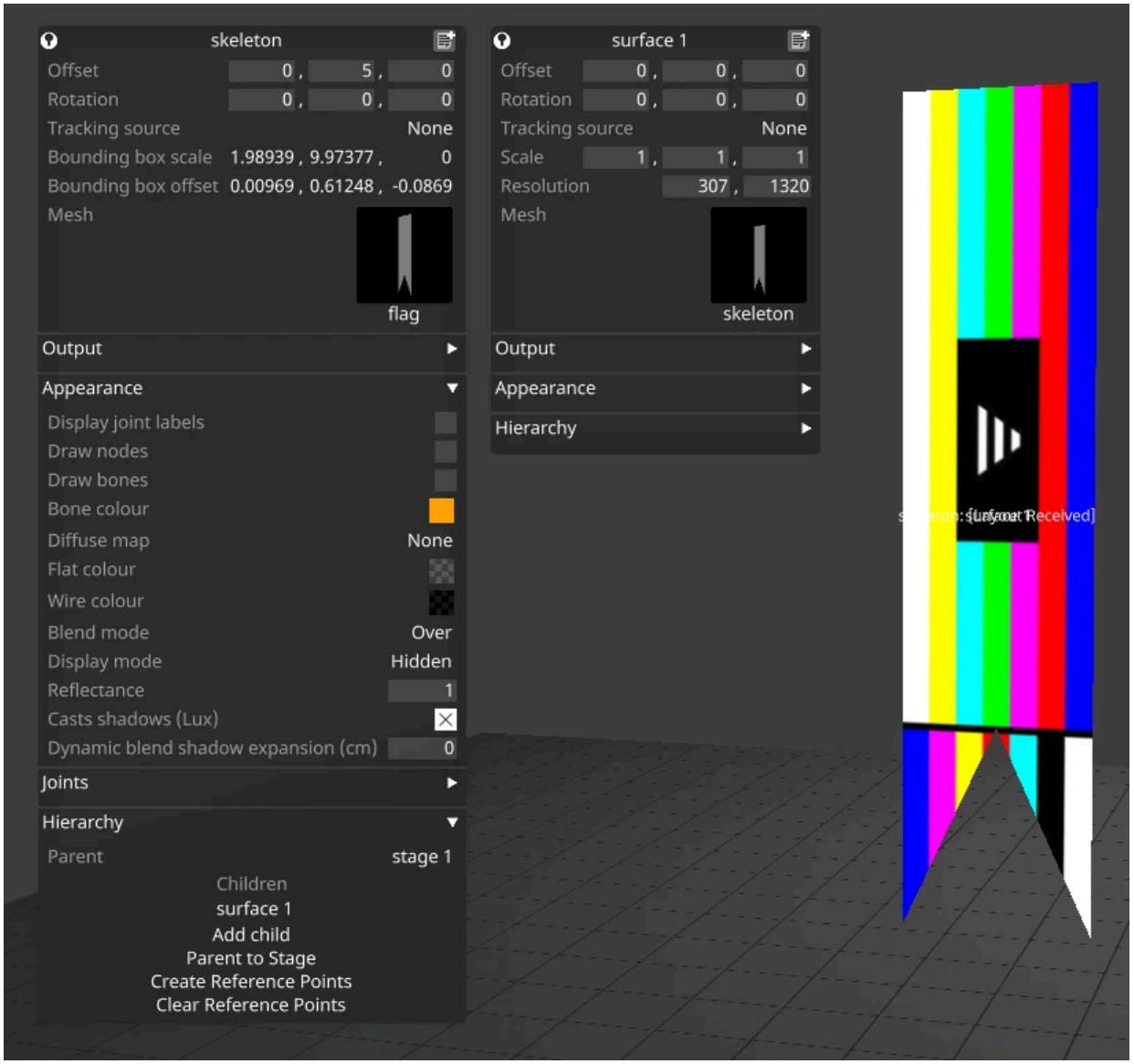


Skeletal point tracking source setup

Using a skeletal point tracking source to track a deforming surface

The skeletal point tracking source is ideal for tracking a deforming surface. To do this:

1. Create and rig a FBX skeletal mesh which matches your deforming surface. See below for tips on how to do so.
2. Set up and track a skeleton using your skeletal mesh, following the steps above.
3. Create a new surface, and select the deformable mesh which is named after the skeleton, **NOT** the original FBX mesh which is selected in the skeleton. The surface should now deform with the skeleton.
4. Make the surface a child of the skeleton and zero out its position and rotation, so that the origins are aligned.
5. Set the Skeleton **Display mode** under **Appearance** to **Hidden** if you just want to see the surface mesh.
6. Use your surface for projection or other workflows as normal.



Skeleton projection surface

Preparing your skeletal mesh

To achieve optimal tracking of a deforming surface, it is crucial to set up the skeletal mesh as accurately as possible. Below are some tips for how to model and rig your mesh:

- Create a bone structure which follows the positions of the tracked point, with a hierarchy appropriate for the structure of the surface. There should be a joint aligning with each tracked point. It is ok to have additional joints which don't correspond to tracked points at the top or bottom of the hierarchy, but it is not recommended to place untracked joints between tracked joints.

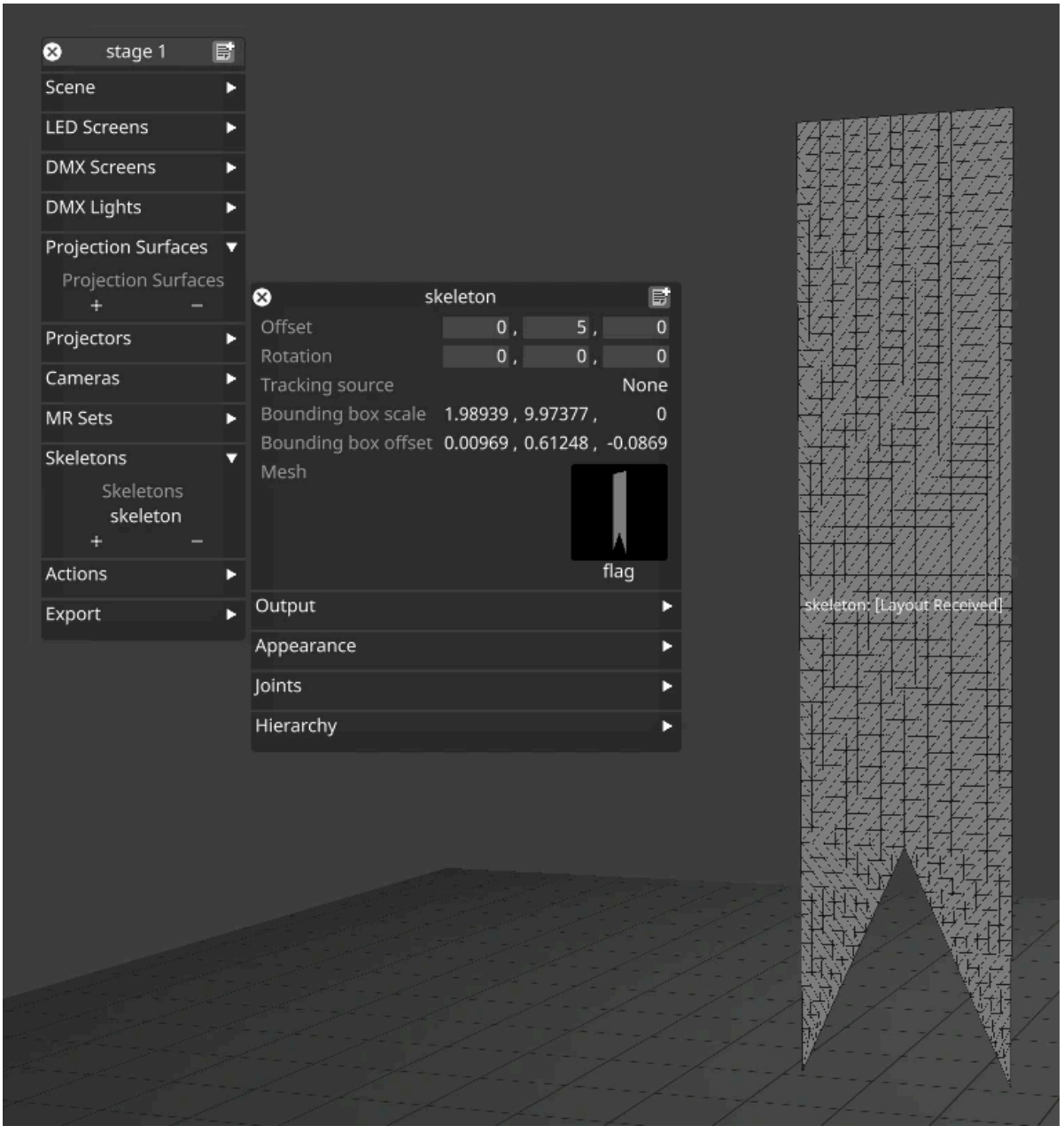
- The base layout of the skeleton should match an average/neutral pose of the real surface as closely as possible. One way to ensure this is by capturing the locations of the tracked points with the surface in place, loading these into your modelling software, and adjusting your joints to align exactly with the captured tracked points.
- The skeletal mesh should be exported with its base positioning fully captured in the layout, with a fully-zero pose. When loading the skeleton into Designer, you should see all zeros in the joint positions and rotations in the skeleton editor. If this is not the case, you may need to reset the bind pose and/or remove pose offsets and rotations in your modelling software.
- It is important to weight the vertices as accurately as possible to model the deformation of the surface as the tracked points move. The best way to do this will depend on the physical properties of the surface itself, however a good starting point is to ensure that all vertices adjacent to tracked points are fully weighted to the corresponding joint, so that they stick to the tracked point as it moves around. The remaining weightings should be applied roughly based on the distance to the corresponding joint. Note that auto-weighting algorithms often weight based on the distance to the bone rather than the joint, which can lead to the modelled surfaces diverging away from the tracking markers.
- Joints which are at the end of the hierarchy may not be able to extend along the length of the bone (e.g. to follow a stretching surface) since they do not have a bone beneath them. In this case it can be beneficial to add additional small ‘dummy’ bones at the end of the hierarchy, not weighted to any vertices. This will allow full control of the previous end joints.

Skeleton

The Skeleton object is the starting point for mocap and skinned mesh workflows in Disguise. A skeleton consists of a rigged structure of bones, which is either provided by a tracking source or imported from a rigged FBX mesh. These bones can be moved to deform a skinned mesh within Disguise or sent over RenderStream to control a Skeleton in an external render engine.

Creating and editing a new skeleton

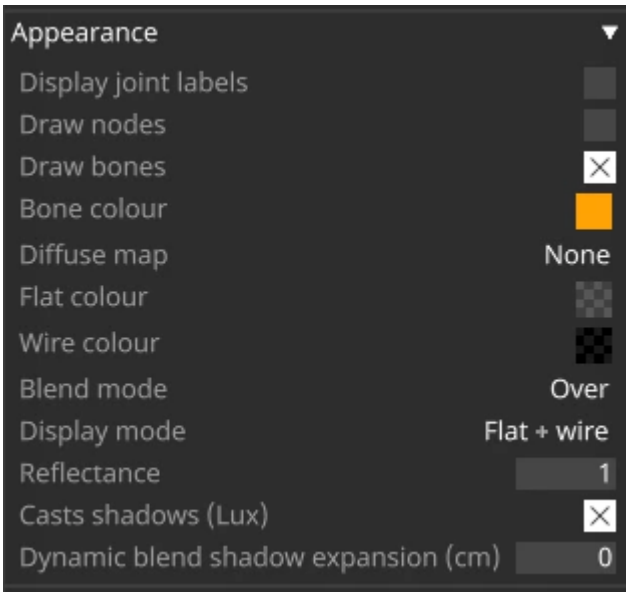
1. In the stage editor, under **Skeletons**, click the **+** button to add a new skeleton with a default bone structure.



Setting up a skeleton

2. Use the **Mesh** field to select an FBX rigged mesh for the skeleton.

3. In the **Appearance** separator options can be set to control the rendering of the skeleton in the visualiser, for example showing or hiding the bones and the mesh.



Changing skeleton appearance

4. In the **Joints** separator the skeleton can be posed manually by adjusting bone offsets and rotations.



Skeleton joint posing

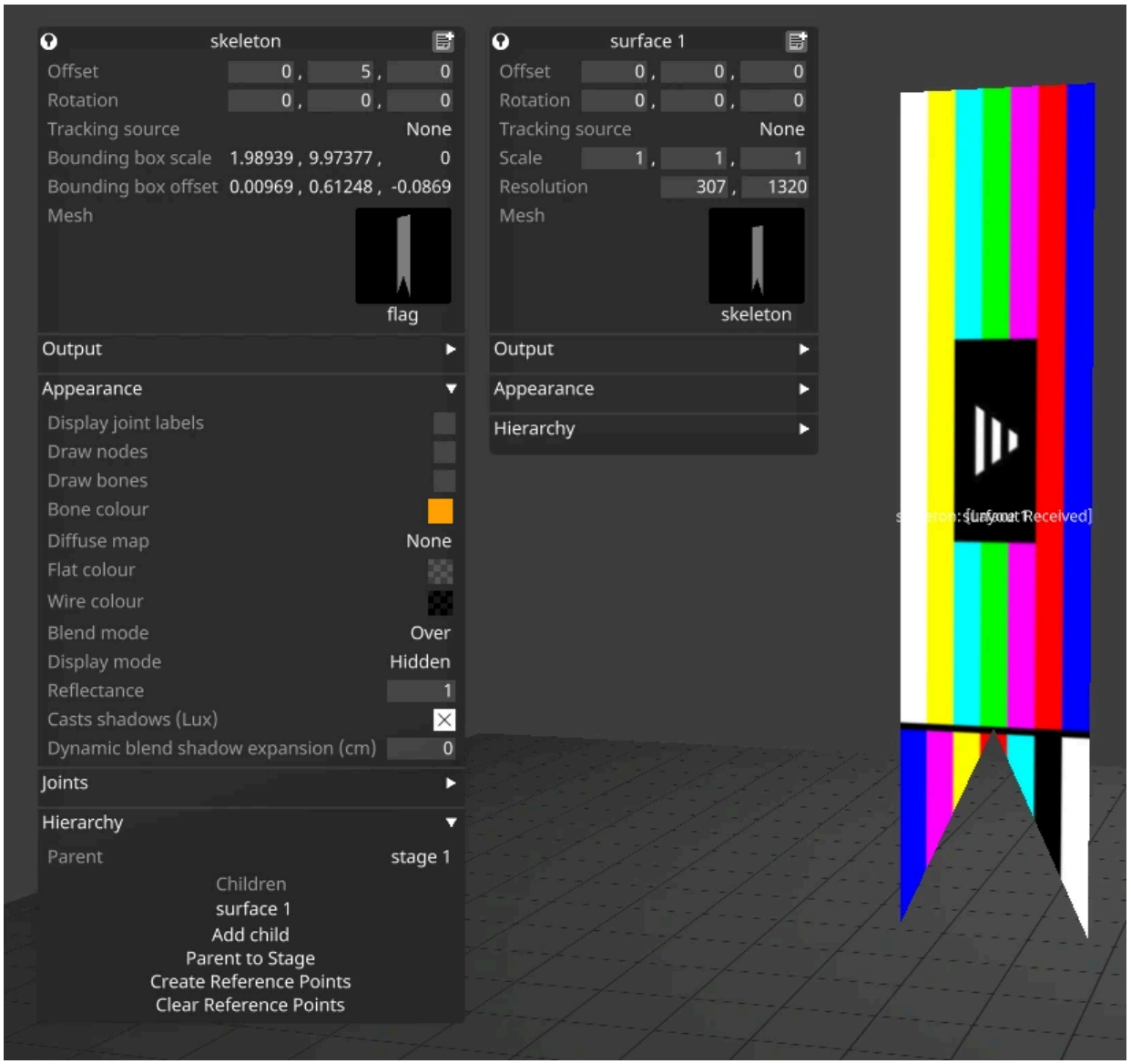
5. To reset the skeleton pose to zero, click the **Zero Pose** button in the **Joints** separator.

Setting up a skinned mesh for a projection surface

1. Find or create an FBX file which contains a single rigged mesh, and copy this into the project's **objects/Mesh** folder.
2. Create a new skeleton and select the FBX mesh in the skeleton's mesh field.
3. Create a new projection surface and select the mesh named after the skeleton (not the original FBX mesh).
4. Try moving the skeleton's bones using the manual posing controls in the skeleton editor. The mesh should deform in both the skeleton and the projection surface.

5. To align the projection surface exactly with the skeleton, add the projection surface as a child of the skeleton and set the surface's offset and rotation to zero.
6. If you want to hide the skeleton mesh, set the Display mode under Appearance to **Hidden**.

> **Note**
>
> **Please note**: FBX files containing multiple meshes are not currently supported.



Projection surface with skinned mesh

Playing back an animated skeleton

Skeleton animations can be played back on the timeline using the scene animation layer. To do this, load an animated FBX skeleton and select it as a mesh as normal. Then follow the

instructions for the scene animation layer to play back the animation.

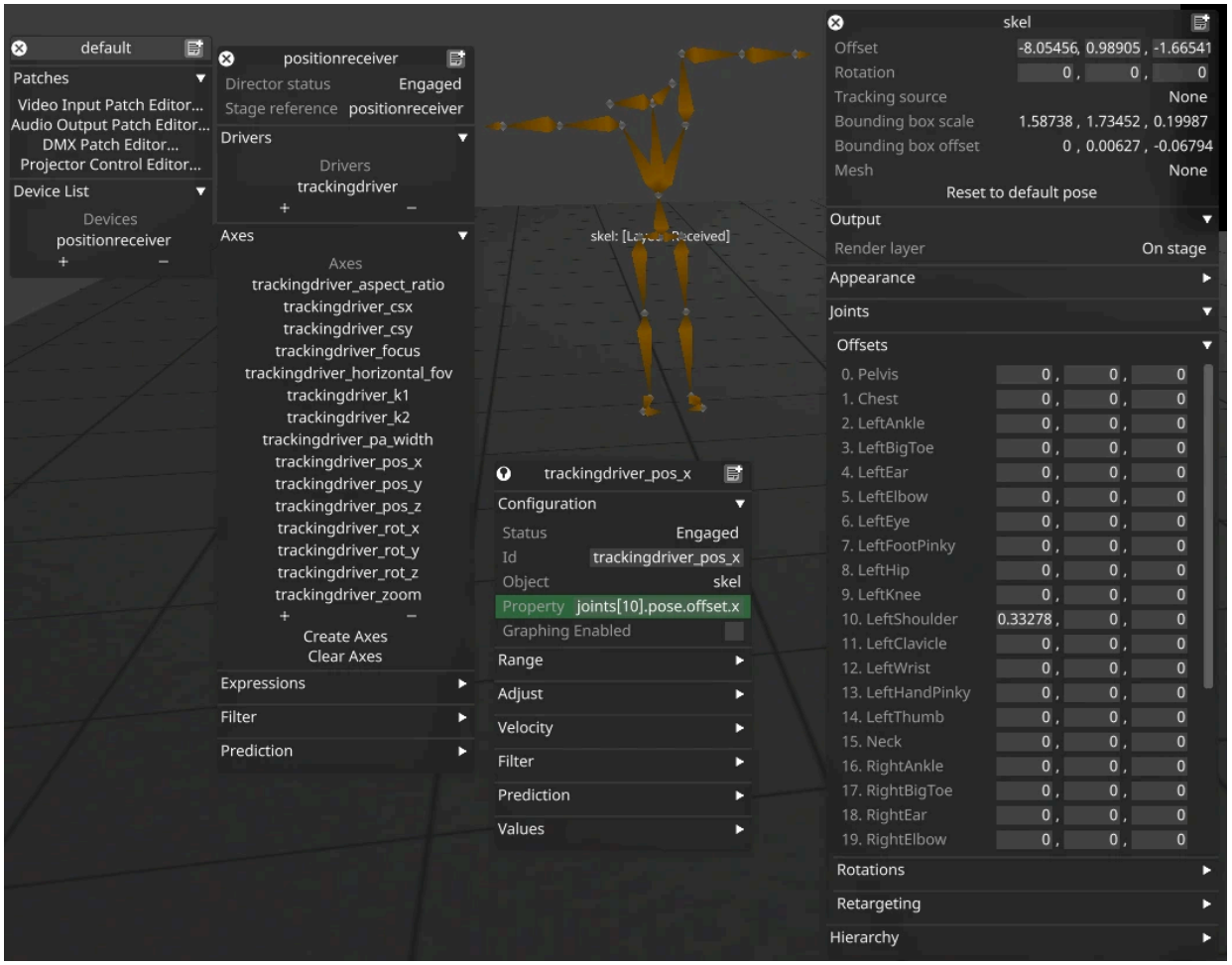
Controlling a skeleton using tracking data

To use tracking data to control a skeleton's bones, you will need to create a skeletal tracking source or driver. Available tracking sources include:

- Skeletal point tracking source

Alternatively, individual joint positions and rotations can be controlled using tracking axes. To control a skeleton joint with a tracking axis:

1. Create a new Position Receiver under **Devices**.
2. Open the Position Receiver editor, and add the appropriate Driver for your incoming tracking data under **Drivers**.
3. Under the **Axes** separator, click **Create Axes**.
4. Open the editor for the axis you want to use to control a Skeleton joint.
5. Under the **Configuration** separator, select your skeleton in the **Object** field.
6. In the **Property** field, type an equation to control the desired joint property, for example `joints[10].pose.offset.x`.
7. The expression is formed as follows:
   - The index inside the square brackets is the index of the joint. This can be found by expanding the joint offset or rotation separators in the Skeleton editor.
   - After `pose`, type either `offset` or `rotation`, depending on which property you want to control.
   - Type `x`, `y`, or `z` at the end of the expression to define which axis is being controlled.



Controlling skeleton joints with a tracking axis

Vicon Emulator

The following information will help you configure the Vicon Virtual System with Disguise systems. The Vicon Virtual System will allow you to emulate connections to a live Vicon system.

Prerequisites

- Download and install **the Shōgun software.**
- Download and install **the Vicon Virtual System.**
- Download the **Camera_Tracking_Vero_V22.zip** camera calibration sample data package.

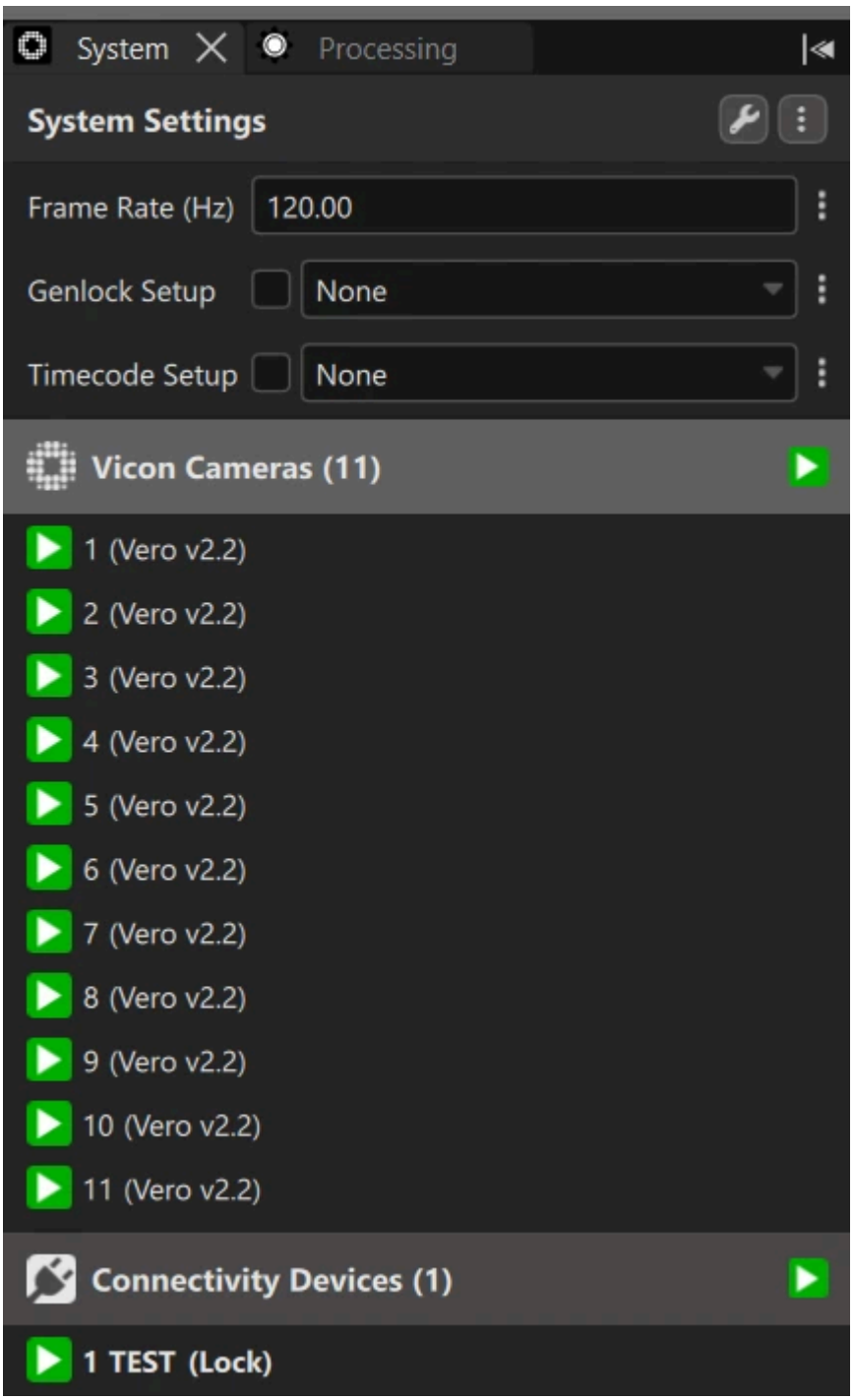
Request a license

The Vicon Shōgun Live software requires a license, which can be requested by opening the program and following the instructions for the licensing popup.

Set up the Vicon Virtual System with Disguise

1. Open the **Vicon Shōgun Live** application.
2. Open **Virtual System** and open **Camera Data File** and select oneof the **.x2d** files in the **Camera_Tracking_Vero_v22** sample data and click **Stream**.

3. In Shōgun, you will see the cameras populate the **Vicon Cameras** list.

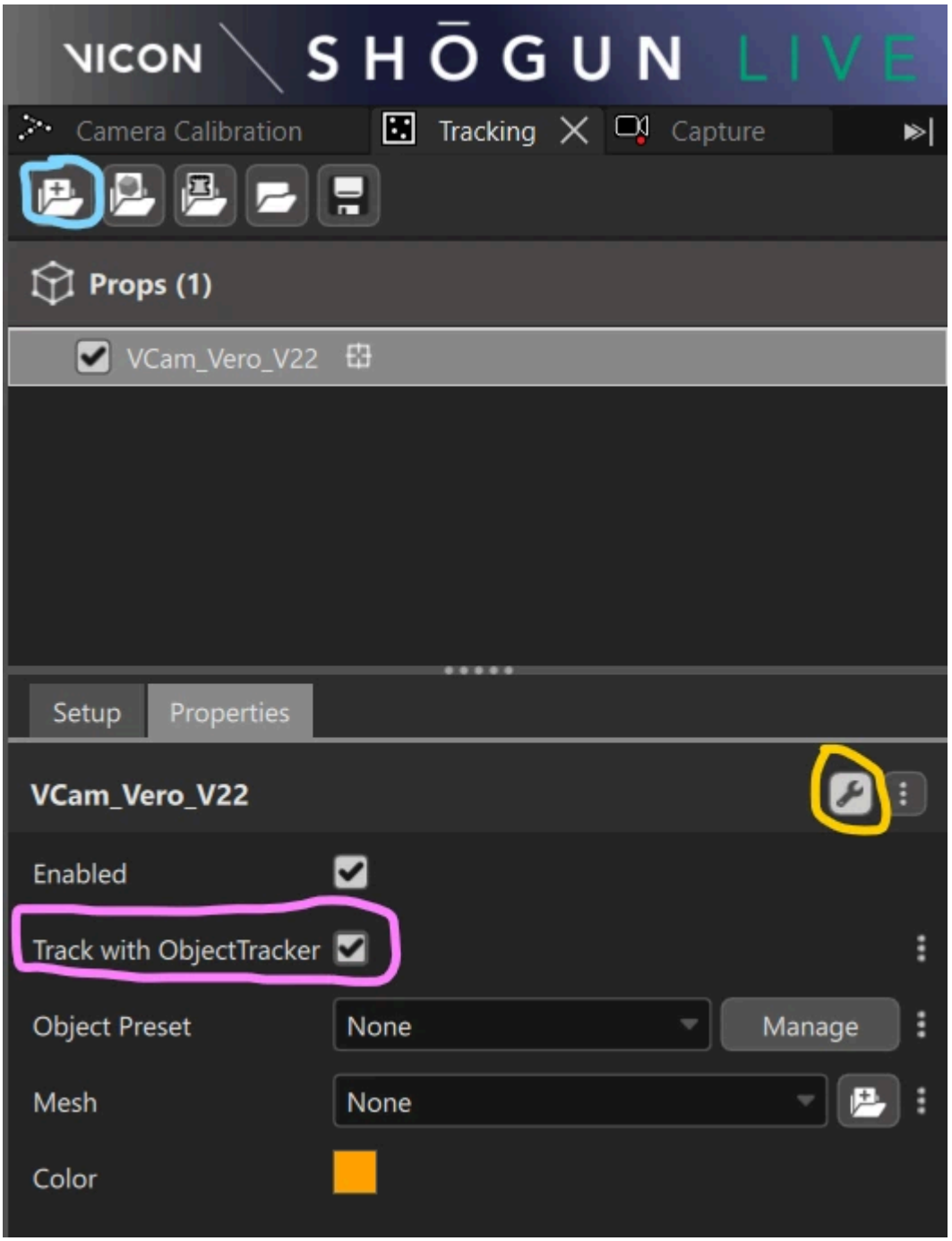


4. In the **Camera Calibration** panel, open the folder and select **Vero_V22_calibration.xcp** file in the sample data package.



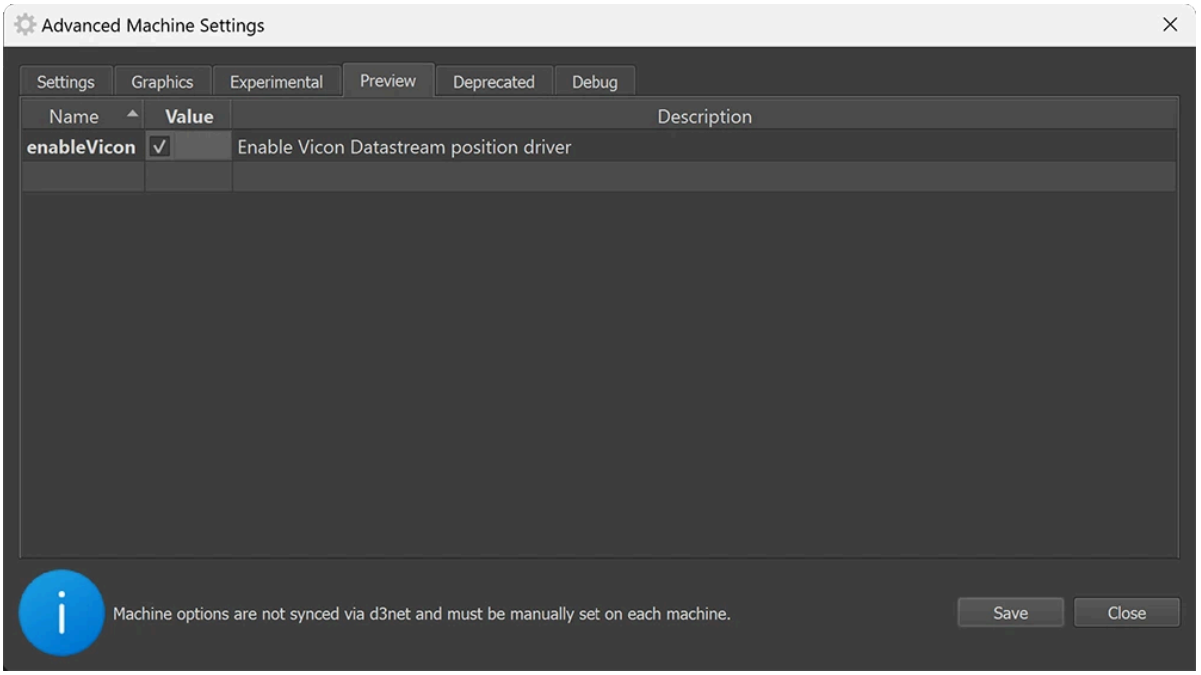
5. In the Tracking panel, click Import Subject (highlighted in blue) and select VCam_Vero_V22.vsk from the sample data.

6. Click **Advanced Parameters** (highlighted in yellow) and enable Track with **ObjectTracker** (highlighted in pink) in the **Props & Properties** panel.



7. In d3manager, navigate to **Machine Settings > Advanced Machines Settings**.

8. Click and then insert the cursor in the **Name** field of a new line and add the command **enableVicon**. All machines will need this configuring to enable the datastream.



9. Click the checkbox to enable it and then click **Save**.
10. In a Designer project, create a **Device > Position Receiver**.
11. Add a **ViconDataStreamDriver**. The default IP of 127.0.0.1 is suitable for local setups.
12. Engage the device.
13. Create a camera or a prop and set the Tracking Source to **Vicon**.

Further reading

Creating PositionReceivers and adding Tracking Sources.

OSC Workflows

Open Sound Control (OSC) is a versatile tool to control and monitor productions. In Designer, the OSC Device sends and receives OSC messages for flexible, network-based control.

It is important to note that we do not support OSC bundles, only messages.

The following pages provide information about controlling Designer:

- OSC Device need to be set up to access OSC messages on the network.
- OSC Transport Overview can be used to control and report on a Designer timeline transport.
- OSC Machine Control can be used to control and report on a Designer timeline transport.
- OSC Tester can be used to test sending and receiving OSC messages.
- OSC Sockpuppet can be used to control layers on the timeline.
- OSC Expressions can be used to build interactive capabilities within Designer-sequenced content.

OSC Sockpuppet

OSC Sockpuppet is a workflow that allows the user to control all the parameters of any layer via OSC.

Patching a layer to OSC sockpuppet

To patch a layer to OSC Sockpuppet, you can perform the following steps:

1. Right-click on the layer and select **Patch to OSC...**.
2. Select the OSC Device you would like to control your layer (you can change this later)

The layer will turn green, and each of its fields will be highlighted in green. This indicates the layer has successfully been patched to sockpuppet.

Selecting parameters to control

By default, all fields in the layer are now controlled by OSC.

> **Note**
>
> Immediately after patching, you can still control each field on the layer manually, however, if an OSC command is sent to set one of the values on one of the fields, that field will now no longer be manually controllable until the project is restarted or the field is disconnected from sockpuppet. This works the same as DMX sockpuppet, except with DMX Sockpuppet, you always have values for each parameter because there are always at least default values in the DMX buffer.

You can right-click on each individual parameter on the layer and select **Toggle Sockpuppet**, which will toggle sockpuppet control of that field, or **Isolate Sockpuppet**, which temporarily sets sockpuppet control for the field you selected and disables it for all the others. Once a field is isolated, toggling off the isolation will restore the fields to their pre-isolation state.

Controlling parameters

To control any field, you'll need to send an OSC message with the correct **address** and a valid **value**.

You can find the right address and example values to control any field by right-clicking on the layer on the timeline and selecting **Edit OSC Patch...** and then selecting **View Personality...**e OscPatch editor widget.

You can export this to a .txt file in the “output” folder next to the project so you can copy-paste them.

For resource fields, the “example” values will be the ones currently set in the layer. This means that you can you can set the field manually and then inspect the personality to find the exact value you should send.

We will give an overview of the correct formats here, however, do note that if there is a discrepancy between this page and the formats described in the personality, always use the personality formats as they will be most up-to-date.

Format of the address

The correct address format is:

```
/d3/layer/[name of layer]/[name of field]
```

The name of the layer and the field are both case sensitive. You may include spaces.

Format of the value

There are 4 kinds of parameters that you may control with OSC Sockpuppet:

1. Resources
2. Numbers
3. Options
4. Text

Resources

Resources refer to any “object” in Designer that has an editor. Examples are Mappings, VideoClips, Bitmap Textures, etc.

There are 3 ways to select a resource via OSC Sockpuppet

1. By resource path
2. By Bank + Slot Index
3. By Bank and Slot Indexes

By resource path

You can select a resource by sending its path as a string value. You must format the value you want to set as a “String” in your OSC sender. The syntax for that value is:

```
objects/[type of object]/[path]/[to]/[object]/[name of object].apx
```

The `[Type of object]` is an internal Designer type that is sometimes not user-visible. To see the correct type for your field, you should check the OSC personality for the field, which

will have the correct value.

The `[path]/[to]/[object]` is blank for objects you create within Designer, like Mappings, Textures, etc. But for objects that refer to files on disc, like VideoClips, they are the path to the object on disc starting at the first folder within the “objects” project folder.

For example, the file: `objects/VideoFile/sample/ada.jpg` Will be at: `objects/videoclip/sample/ada.jpg.apx`

The `[name of object]` is the name of the object within Designer. This is the name of an object, like a mapping, or the name of the file including its extension, like `.png` or `.jpg`.

All values for resources must be appended with `.apx`. This is an annoying implementation detail of Designer.

None of the values are case sensitive.

> **Note**
>
> Case sensitivity for the value is different from that for the address, which IS case sensitive.

You can also send an empty string to select `None` for the resource if the field supports being set to `None`

By bank + slot index

You can select a resource by sending a number as the value, which refers to a **Bank** and **Slot** that the resource is assigned to in the bank editor. You can read more about the bank editor here: bank editor. You must format the value as either an `Int` or a `Float` in your OSC Sender. The formula for working out this value is:

```
bank x 256 + slot
```

For example, if the resource is a mapping and is in bank 5 slot 26 and you would like to set it on a layer called **Video Layer 3**, you would do:

`/d3/layer/Video Layer 3/mapping`, Value: `1306`

Because `5 x 256 + 26` = `1306`

By bank and slot indexes

You can select a resource by sending two numbers at the same time, where the first number refers to the **Bank** and the second to the **Slot** that the resource is assigned to in the bank editor. You can read more about the bank editor here: bank editor. You must format the values to be `Int` or a `Float` in your OSC sender.

The correct syntax for this value is:

`bank slot`

> **Note**
>
> The above is the most common implementation, however, there are other implementations such as `[bank, slot]` or `bank, slot`. Please check the documentation of your OSC sender to see the correct syntax for sending multiple Values. (Some Senders will refer to "values" as "arguments", just to keep you on your toes!)

For example, if the resource is a video and is in bank 2 slot 12, and you would like to set it on a layer called **myVideoLayer**, you would do:

Address: `/d3/layer/myVideoLayer/video`, Value: `2 12`

Numbers

Numbers refer to any field in Designer that has a box where numbers can be entered. Examples are Brightness, Speed, Size, etc.

You can set the value of a Number by sending a number as the value, which refers to the value you would like to set the field to. You must format the values as either Ints or Floats in your OSC Sender.

The correct syntax for this value is:

`5` or `1.7`

For example, if you want to set the Brightness of a layer called *Video 5* to `0.3`, you would use:

Address: `/d3/layer/Video 5/brightness`, Value: `0.3`

Or if you would like to set the Frame Index to `243`, you would use:

Address: `/d3/layer/Video 5/frame_index`, Value: `243`

> **Note**
>
> For the above example, you could still send a Float value, for example `243.7`, but its value will be floored, so Designer will interpret the value as `243`. This behaviour will be the same for all fields that only accept integer values.

Options

Options refer to any field in Designer that presents a list when clicked. Examples are Blend Mode, At End Point, On Clock Lost, etc.

You can set the value of an option by sending a number as the value, which refers to the index of the position of the option in the list presented when the option is clicked. The list is 0-indexed. You must format the value as an Int or a Float in your OSC sender. An example of this indexing would be Blend Mode where `0 = Over`, `1 = Alpha`, `2 = Add`, `3 = Multiply`, etc.

The personality view you get when selecting "View Personality..." will print out a detailed list of all the options and their indexes for you, so you don't need to count their position in the editor. For more information, see the **Controlling Parameters** section.

The correct syntax for this value is:

`1`

For example, if you wanted to set the Mode of a video layer called *video2* to Reverse you would do:

Address: `/d3/layer/video2/mode`, Value: `5`

> **Note**
>
> You can also send a Float value, for example `5.9`, but its value will be floored, so Designer will interpret the value as `5`.

Text

Text refers to any field in Designer that has a box where text can be entered. Examples are Text on Text layer, Custom Parameters on a Web layer, a dynamic string field on a Notch layer, etc.

You can set the value of a text field by sending a string as the value, which is simply the string you want to be in the field. You must format the value as a String in your OSC sender.

The correct syntax for this value is:

`this is a string` or `"this is a string with quotes"` depending on the OSC Sender you are using.

For example, if you wanted to set the Text field of a text layer called *iHaveAQuestion* to "Why the heck is it called SockPuppet?!" you would do:

Address: `/d3/layer/iHaveAQuestion/text`, Value:
`Why the heck is it called SockPuppet?!`

Extending RenderStream

One of the most powerful parts of RenderStream is that it can be extended to support new render engines. In this page we will discuss how to extend support to new render engines.

Features

In this section we will discuss the features of RenderStream you should understand before embarking on integrating it with your chosen render engine.

Features of the RenderStream API

RenderStream is an ecosystem where a Designer server will send timestamped “frame request” messages to a render engine. These messages are accompanied by frame metadata that describe how to render the scene. The metadata types we support include:

- Camera transforms
- Text
- Numbers
- Video Textures

We expect render engines to listen for frame requests via our API and respond to them by submitting finished textures back to the API.

The renderers we support are:

- DirectX 11
- DirectX 12
- OpenGL
- Vulkan

Behind the scenes, RenderStream manages the sending and receiving of those textures over the network to display the images the render engine provides to the Disguise media server.

The render engine can also share the following metadata with Disguise via the RenderStream API:

- Definition of what metadata the engine expects to use to render (Called the “Schema”)
- Live profiling data
- Live console logging
- Custom statuses of the engine

There are also special tools within the API to support clustered rendering in-sync between multiple instances of a render engine across multiple machines.

Features that are not part of the API

Designer and the RenderStream ecosystem work together to provide additional controls of rendering which you should be aware of but do not need to implement yourself:

- Designer is capable of discovering launchable assets that exist on render nodes. This is so they can be displayed to the user and launched/closed
- Designer is capable of launching and closing the render application
- Designer can also copy assets from one render node across a cluster of render nodes for distributed rendering

Existing render engines

Before writing your own implementation it may be valuable to check if your preferred engine is already supported.

Disguise provides in-house support for the following render engines:

- Unreal Engine
- Unity
- Notch

The following 3rd parties have also developed their own RenderStream integrations:

- TouchDesigner
- Volinga
- Spout (implemented by ZeroSpace Studios)

Documentation

If you want to get started with building your own RenderStream integration you can find our official developer documentation site **here**.

We support C, C++ and Python bindings.

C and C++ bindings

For C and C++ bindings you can visit our **RenderStream github** which includes the API definition and samples for all of our supported render engines.

Additionally the following open-source implementations can be used as guides:

- Unreal Engine
- Unity
- Spout

Python Bindings

A set of Python Bindings are available in the **RenderStream-py** project.

These bindings include a script to auto configure a new asset type (`.pyrs`) which will auto install the requirements.txt and configure a virtual environment for the python project to run in.

Custom Environment Variables

We support setting a custom list of environment variables for custom engines. This can be done by adding a .env file to the same directory as the asset executable.

This file needs to be in the format assetname_variables.env, all in lowercase.

Here is an example of a environment variable file:

```
NAME=VALUE # No spaces around the equals sign
NAME2=VALUE2

# You can also define a variable over multiple lines
MULTI="""
This is a
multiline variable
"""
```

Contributing

We welcome pull requests and comments through Github if there are extensions or additions you would like to see to support your implementation. If you would like to reach out to us for support please contact **support@disguise.one**.

ONNX AI Models in Notch

From Notch 2026.2 you can run ONNX (Open Neural Network Exchange) AI models in Notch through the **AI Model Post-FX** node, processing video in real time on your Disguise media server's NVIDIA GPU. This page covers what runs on Disguise hardware and the things to watch for. For the full setup and usage instructions, refer to Notch's own **documentation** and follow the **videos**.

> **Caution**
>
> Disguise provides an integration to load ONNX AI models in Notch, but does not support creating, training, modifying or troubleshooting the models themselves, and cannot guarantee that any given model is compatible with Notch, a specific GPU architecture, or a driver version. Test thoroughly before using a model in production.

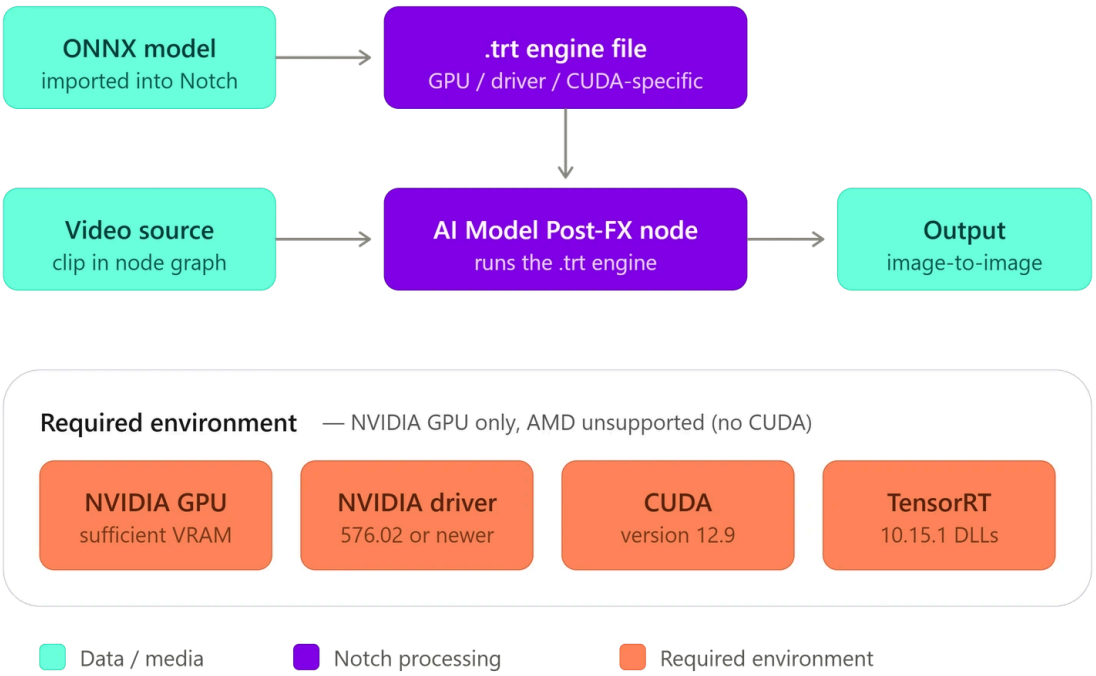
Notch also ships with built-in AI integrations, such as the **YOLO**, **AI Hand Tracker** and **AI Face Tracker** nodes not covered here.

What is supported

- **New in Notch 2026.2**, through the **AI Model Post-FX** node. This first implementation supports **image-to-image models only**.
- On import, Notch compiles the model into a TensorRT engine file (`.trt`) optimised for the exact GPU, driver and CUDA version of the machine. The `.trt` file is therefore machine-specific, so moving a project to another media server triggers a recompile.
- Some models import and run straight away. Others use dynamic tensors and need their dimensions set in the Notch **Inspector**.

Requirements on a Disguise media server

- A **supported NVIDIA GPU**. See the Notch v1.0+ Compatibility Table for which servers can run Notch. AMD GPUs do not support CUDA and cannot run AI models in Notch.
- **CUDA, TensorRT and a compatible NVIDIA driver.** On launch, Notch 2026.2 requires CUDA 12.9, TensorRT 10.15.1 and NVIDIA driver 576.02 or newer. Check Notch's documentation for the current versions and installation steps.
- Sufficient **video memory (VRAM)** to load, convert and run the model.



The Notch 2026.2 AI model workflow and required environment on a Disguise media server.

Advisories

- **NVIDIA Background Removal** may not function correctly when used alongside the Notch ONNX model workflow.
- Some Disguise media servers have **locked NVIDIA driver versions** that may not meet the requirement, so check your server can run the driver Notch needs.
- Sufficient VRAM must be available to load, convert and run AI models.
- AMD GPUs are not supported.

Setup and usage

For the full, current instructions, follow Notch's official documentation. This covers installing CUDA and TensorRT, setting the `TENSORRT_DIR` environment variable, importing a model through **Import Resource > AI > ONNX Model**, managing dynamic tensors in the **Inspector**, and troubleshooting a model that will not run.

RenderStream - Notch Integration

RenderStream is the proprietary Disguise protocol for controlling third-party render engines from Designer. This topic covers the steps specific to configuring the RenderStream workflow with Notch.

> **Warning**
>
> For cluster rendering it's recommended to use render nodes from the same Disguise product range, e.g. all RX series machines. Mixing of machines from different product ranges is untested and unsupported.

Notch is the third-party render engine available from **Notch.one**. Notch can be configured to run either internally via a Notch layer or externally via RenderStream. This topic will cover the RenderStream-Notch workflow. For more information on using a Notch layer, visit this link.

Notch Host

Notch Host is a secondary application that is included as part of the main Disguise installation process. The purpose of this application is to load Notch blocks externally Designer and create RenderStream output streams which can be accessed by all machines across the same network.

> **Note**
>
> **Please note**: Ensure the correct version is installed on all machines in the network, including render nodes.

Project Directory Setup

- Place Notch blocks in the following path: `C:\Users\USERNAME\Documents\Renderstream Projects` or `D:\Renderstream Projects` if using an RX hardware system.
- The Asset discovery system scans all sub-directories to identify content, so you can place all blocks in the `Notch` folder.

Configure a RenderStream Layer

1. Launch and create a new RenderStream layer.

2. For camera base mappings:
    1. Add a new camera to the stage.
    2. Create a new Camera Plate/Spatial mapping.
    3. Add the camera to the mapping.
3. Right-click the **Workload** field to open the **Cluster Workload** widget.
4. Expand the **Configure** separator.
5. Select **Asset** and choose your Notch block.
6. Right-click the Asset to open its editor:
    1. Set **Source Machine** to the machine with the asset (used for syncing content).
7. Select **Cluster pool** and create a new cluster.

Within the Cluster Pool

1. Add the desired machines.
2. Right-click on the **default** ClusterAssigner within the **Default assigner** field to open the **ClusterAssigner** widget.

Within the Cluster Assigner

1. Select the distribution strategy and video transport options (changes to transport settings require restarting the workload).

Within each Channel Mappings table

> **Note**
>
> Notch over RenderStream does not support multiple channels, only a single default channel will be available. When you create multiple channel mappings with the same channel, a unique notch block instance will be created for each mapping. This means the scene will be rendered multiple times.

1. Select **New channel mapping** and assign your desired mapping.
2. Repeat for all desired channel-mapping combinations.
3. Expand the **Control** separator.
4. If the machines in the Cluster Pool do not have the content or the project has changed, press **Sync**.
5. Ensure all **Sync tasks** are marked **completed**.
6. Click **Start**.
7. Wait for Workload status to switch to **Running** and confirm that all streams are received.

> **Note**
>
> **Please note**: Notch blocks can only be split if they contain an exposed camera. If you attempt to split a block that does not have an exposed camera across multiple render nodes, the content will simply be duplicated.

Official Notch Documentation

View the official Notch documentation:

- Exposed Parameters in Notch
- Camera Tracking & Exposable Cameras
- Exposing Lights
- Exposable Nulls (Objects)
- External control surfaces

RenderStream - Omniverse RTX Renderer Integration

RenderStream RTX enables real-time rendering of USD scenes in NVIDIA Omniverse, streamed to Disguise media servers via the RenderStream protocol.

NVIDIA Omniverse RTX™ Renderer is a scalable photo-real renderer offering physically accurate rendering with real-time performance. It offers high-quality ray-tracing capabilities for film, TV, commercials, and live visuals applications.

Scenes can be built in NVIDIA's Omniverse Composer and Kit App for use within Designer and streamed via LED.

This guide covers installation, scene setup, exposed parameters, and integration with Designer.

Demo video



Watch on YouTube

Requirements

Hardware

Component	Minimum	Recommended
GPU	NVIDIA RTX series	RTX 4000+ series
VRAM	8 GB	16+ GB
RAM	32 GB	64 GB

Software

Software	Version
Windows	10/11 (64-bit)
NVIDIA Driver	537.70 or newer
Disguise Designer	With RenderStream support (system requirements)

For Disguise hardware, see product compatibility and hardware OS images.

Download the installer

To request the download, please contact the Product team at **product-team@disguise.one**.

Project setup

1. Install the RenderStream-RTX plugin

Extract the `RenderStream-RTX.zip` package into a folder under the `RenderStream Projects` folder on the Disguise server:

```
RenderStream Projects\
└── RenderStream-RTX\
    ├── open_usd.exe
    ├── edit_usd.exe
    ├── rs_open_usd.json
    ├── kit\
    ├── apps\
    ├── exts\
    └── scripts\
```

Once extracted, `open_usd` will appear as an available asset in Designer.

2. Configure the file association

Set `edit_usd.exe` as the default application for `.usd`, `.usda`, and `.usdc` files. This allows you to double-click any USD file to open it in the editor for scene setup.

Supported USD formats

Extension	Description
`.usd`	Binary or ASCII USD
`.usda`	ASCII USD (human-readable)
`.usdc`	Binary USD (crate format)
`.usdz`	Zipped USD archive

3. Launch the scene

Launch `edit_usd.exe`.

> **Note**
>
> The first time you launch `edit_usd.exe`, Windows Defender Firewall prompts for network access. Allow it on both **Private** and **Public** networks so Designer can communicate with the renderer.

4. Set up the scene for RenderStream

Arrange the scene content in the USD.

5. Arranging the camera

The plugin uses a camera at `/World/RS_Cam` as the streaming viewpoint. If your scene already contains a prim at that exact path (a camera named `RS_Cam` under `/World`), the plugin adopts its saved transform as the starting view. If no such prim exists, the plugin creates one at the scene origin, which may not frame your content.

To control the default framing, in `edit_usd.exe` position the viewport to frame your scene's content, then use **Create from View** to add a new camera. The new camera is created with a default name, so rename it to `RS_Cam` in the **Property** panel — this places it at `/World/RS_Cam` where the plugin expects to find it. Save the scene.

Camera tracking data from Designer (position, rotation, focal length, focus distance, aperture) is applied each frame relative to this saved USD transform.

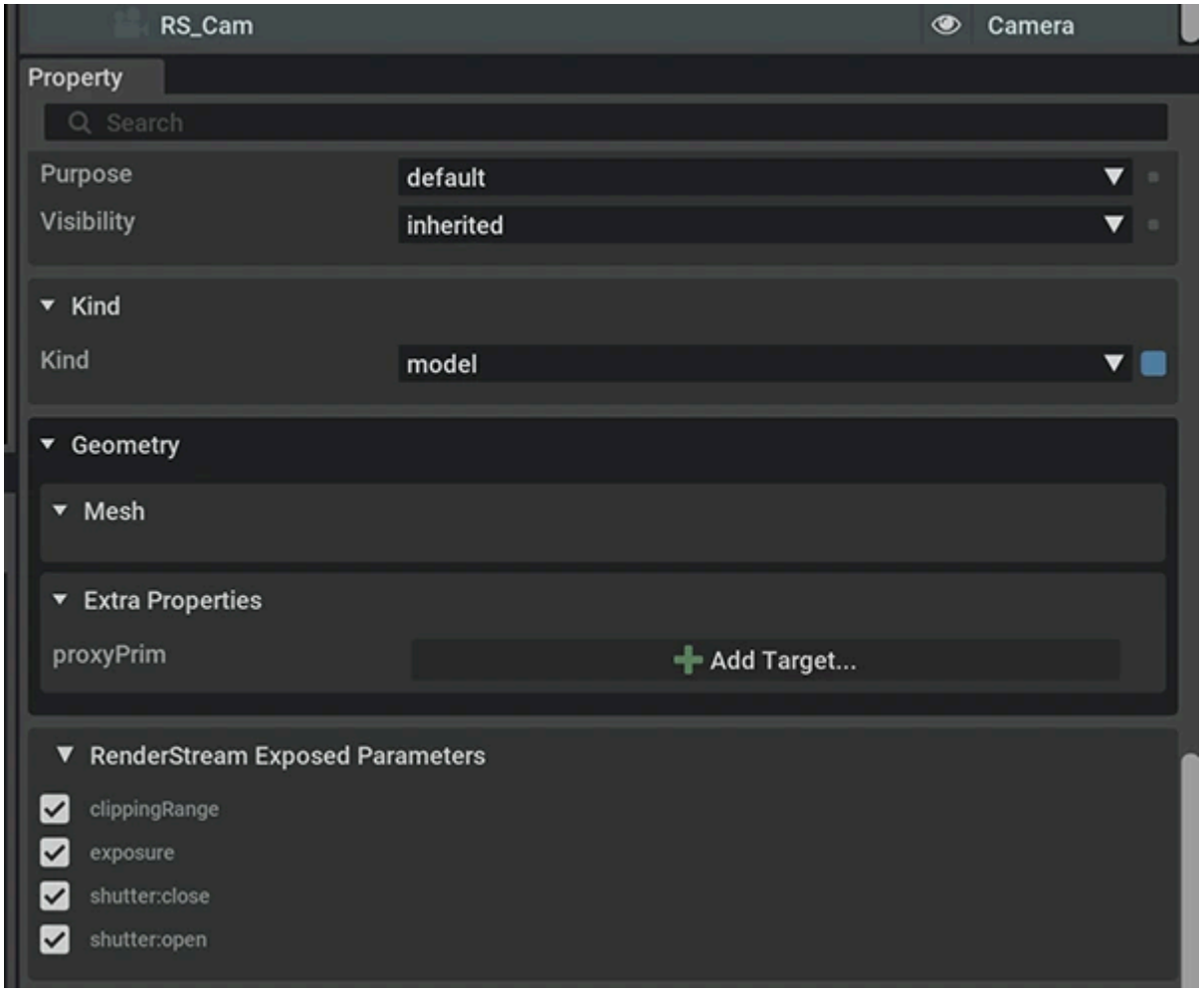


The Koenigsegg Ragnarok scene in `edit_usd.exe` after creating an `RS_Cam` camera positioned to frame the car.

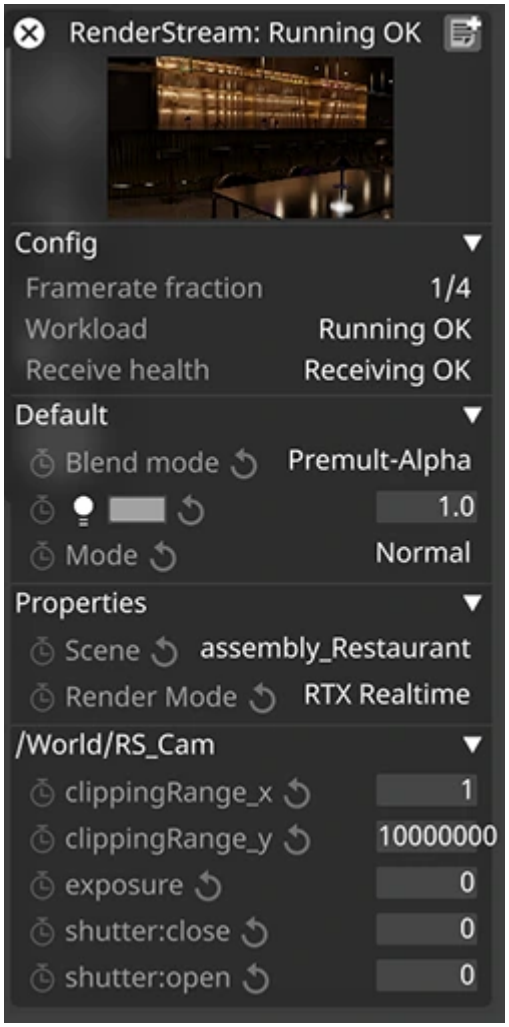
6. Expose any controllable parameters

In the Kit editor (edit_usd.exe)

1. Open your scene with `edit_usd.exe`.
2. Select a prim in the Stage panel (e.g. a mesh, light, or xform).
3. In the Property panel, expand the **RenderStream Exposed Parameters** section.
4. Check the box next to any attribute you want to control from Designer.
5. Save the scene.



Checked attributes appear as controllable values in Designer's RenderStream Layer properties once the scene is running.



7. Register the scene

Saving a scene in `edit_usd.exe` adds it to `rs_open_usd.json`, the registry Designer reads to populate its **Scene** dropdown.

1. Open a USD file with `edit_usd.exe`. This launches the Omniverse editor UI for scene preview and setup. No RenderStream connection is required.
2. Save the scene. The scene is automatically registered in `rs_open_usd.json` and will appear in Designer's scene dropdown.

> **Tip**
>
> Omniverse offers four save options. **Collect As** is the safest choice when packaging a scene for delivery to a Disguise media server, as it gathers all referenced files into a single portable folder.

Option	What it does	Best for
Save	Writes changes to the current file; references unchanged	Editing in place
Save As	Writes to a new path; references unchanged (may break if dependencies are relative)	Renaming or branching within the same folder
Save Flattened	Resolves all references into one self-contained USD; no external dependencies	Locked-down distribution; upstream files can no longer be edited live
Collect As	Copies the scene plus all referenced files into a new folder with rewritten relative paths	Production delivery — portable and still layered

> **Tip**
>
> For VRAM-constrained machines, prefer Assembly-level USD files over top-level World files where the source pack provides them — they reference a subset of the scene and load with a much smaller GPU memory footprint. Combined with **Save Flattened**, this is a useful pattern when validating a workflow on hardware below the recommended GPU tier.

> **Note:** Scene files can live anywhere on disk — `rs_open_usd.json` records each scene's absolute path. You can edit the registry directly to add or remove scenes; it lives next to `open_usd.exe`.

Scene registry format

```
{
    "majorVersion": 2,
    "minorVersion": 0,
    "engineName": "RenderStreamRtx",
    "engineVersion": "107.3.0",
    "pluginVersion": "0.2.0",
    "channels": ["RS_Cam"],
    "schema": [
        {
            "name": "MyScene",
            "path": "C:\\Scenes\\my_scene.usd",
            "parameters": []
        }
    ]
}
```

8. Designer project setup

> **Note**
>
> Mesh mapping requires the **D3D11** GPU texture path. If GPU interop initialisation fails, the plugin falls back to CPU memory transfer. Perspective and Spatial continue to work, but Mesh does not.

1. Create a new RenderStream Layer in Designer.
2. Select `open_usd` as the asset.
3. Configure a mapping type. All mapping types are supported.
4. Select a registered scene from the scene dropdown. Do not leave as `Default`.
5. Adjust the exposed parameters as needed.
6. Press **Start** to start the Workload.

To use the viewport preview mode, add `--gui` as a custom argument in the **Engine Settings** of the RenderStream Layer.

9. Select the Renderer mode

A built-in `RenderMode` dropdown is automatically exposed to Designer with four selectable modes. **RTX Realtime** is recommended for interactive ICVFX use cases.

Mode	Description
RTX Realtime (default)	Omniverse RTX Renderer's RTX Real-Time 2.0 mode
RTX Path Tracing	Omniverse RTX Renderer's RTX Interactive (Path Tracing) mode
RTX Iray	RTX Accurate (Iray) mode
Pixar Storm	Pixar Storm mode

> **Note**
>
> For more information on the RTX Render modes, see **NVIDIA RTX Renderer documentation**

Launch modes

RenderStream RTX supports three launch modes:

Command	Mode	Description
`open_usd.exe scene.usd`	Headless	Window hidden, for production use with Designer

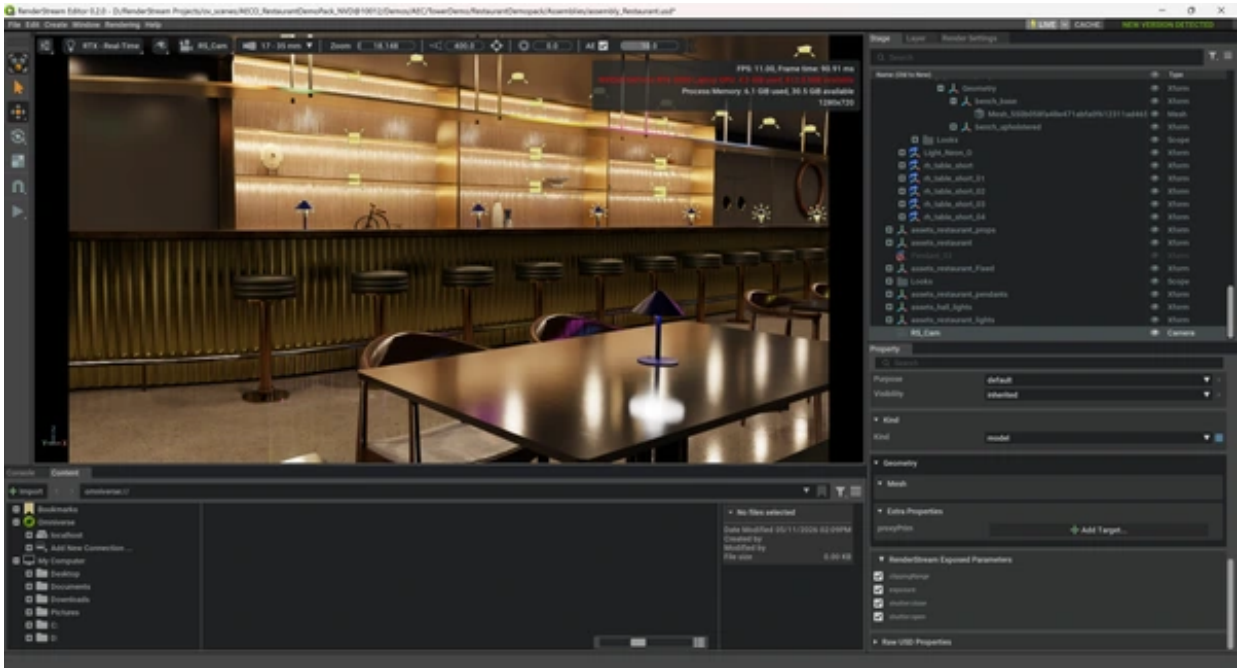
Command	Mode	Description
`open_usd.exe scene.usd --gui`	Viewport	Borderless fullscreen viewport for preview
`edit_usd.exe scene.usd`	Editor	Full Omniverse UI for scene setup, no RenderStream

With the setup complete, you can now verify your connection by testing against the sample scenes and asset packs below.

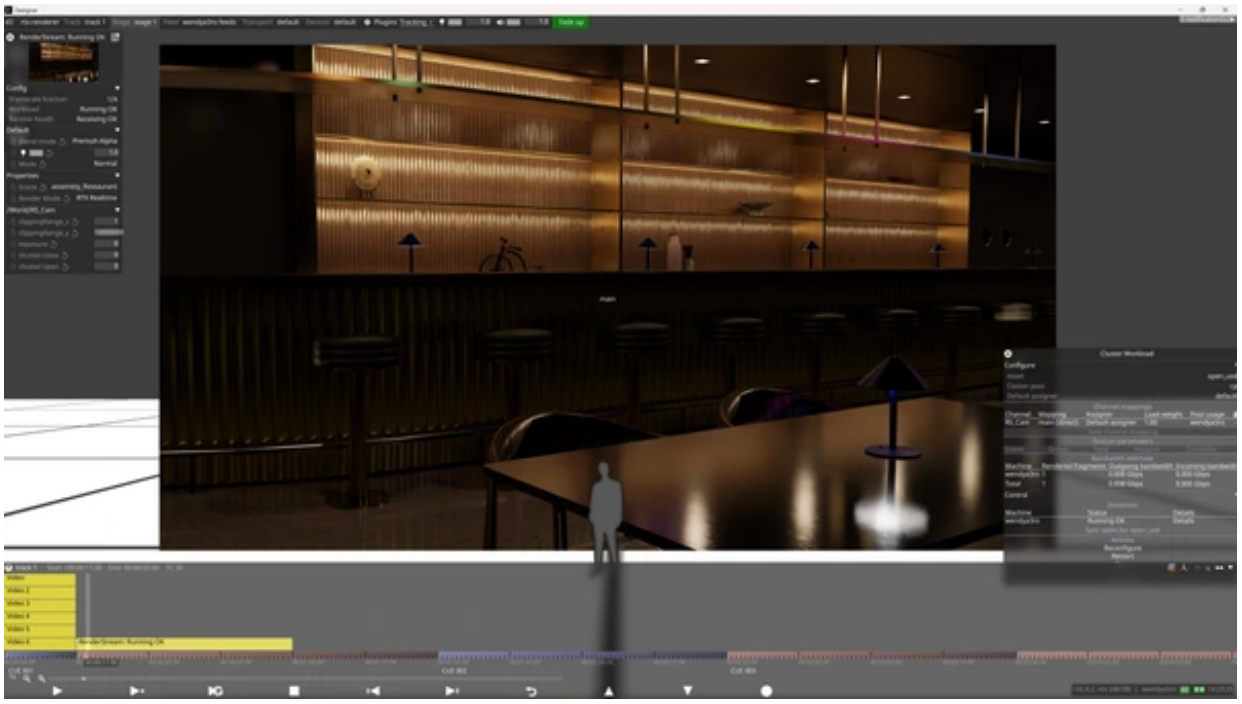
Assembly versions

Assembly versions in NVIDIA Omniverse organise complex 3D scenes by aggregating smaller, individual components (sub-assets) into a cohesive, structured USD (Universal Scene Description) stage.

For example, the Restaurant Pack has a variety of scenes and camera views. Each scene is also available as assembly versions which are smaller, with a single scene component only.



The assembly_Restaurant.usd scene in `edit_usd.exe`. Omniverse Hub update notifications appear in green on the top right of the screen. By clicking on it, you can download the update.



The assembly_Restaurant.usd scene streaming live in Designer.

Sample packs

Sample assets can be downloaded from:
https://docs.omniverse.nvidia.com/usd/latest/usd_content_samples/downloadable_packs.html



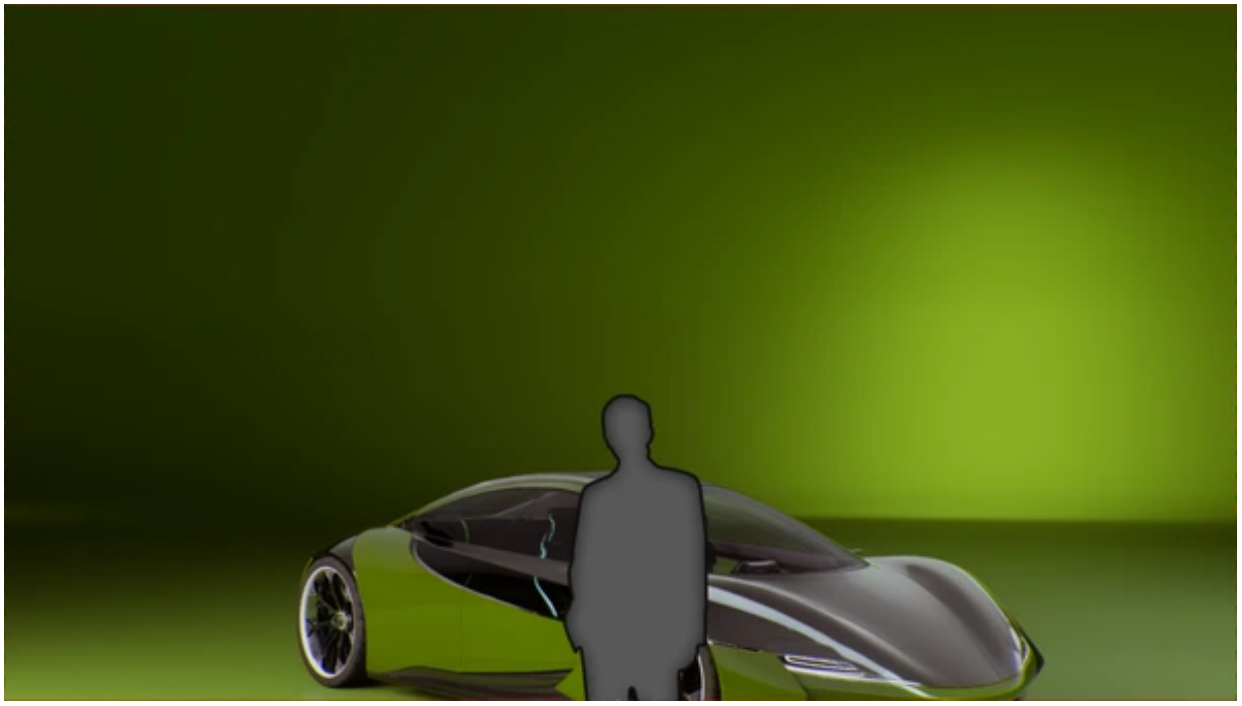
From the Residential Lobby Pack.



From the Sample Scenes Asset Pack.



From the Sample Industrial Asset Pack.



Car asset from the Sample Scenes Asset Pack.



Custom Car Scene.

Changelog

- Mesh mapping and Tiles as split strategy is supported
- Asset Discovery has been updated to only show entry files after scene registration
- Headless mode (default) and Viewport mode (`--gui`) replaced the previous editing UI
- Restructured render loop to partially resolve graphics stutter when moving camera

• Resolved framerate fraction timeout issue

• Kit app now gracefully exits when RenderStream sends quit signal • Gizmos visibility preference now persists across sessions

• First beta release of RenderStream-RTX

Tuning RenderStream Active Latency

This guide walks through tuning active latency on a RenderStream workload when the active latency oscillates instead of settling to a steady value. It covers three option switches: `renderstreamActiveLatencyPercentile`, `renderstreamActiveLatencyOffset`, and `renderstreamBufferSize`.

> **Note**
>
> Tuning active latency with the option switches described on this page requires **Designer r33.1 or later**.

The initial state we want to resolve is shown below — active latency is fluctuating over time rather than holding flat:



Active latency oscillating before tuning.

> **Note**
>
> The option switches described below should preferably be applied via Advanced project settings, so that the tuning stays with the project rather than being pinned to a machine.

Stabilise active latency

Procedure

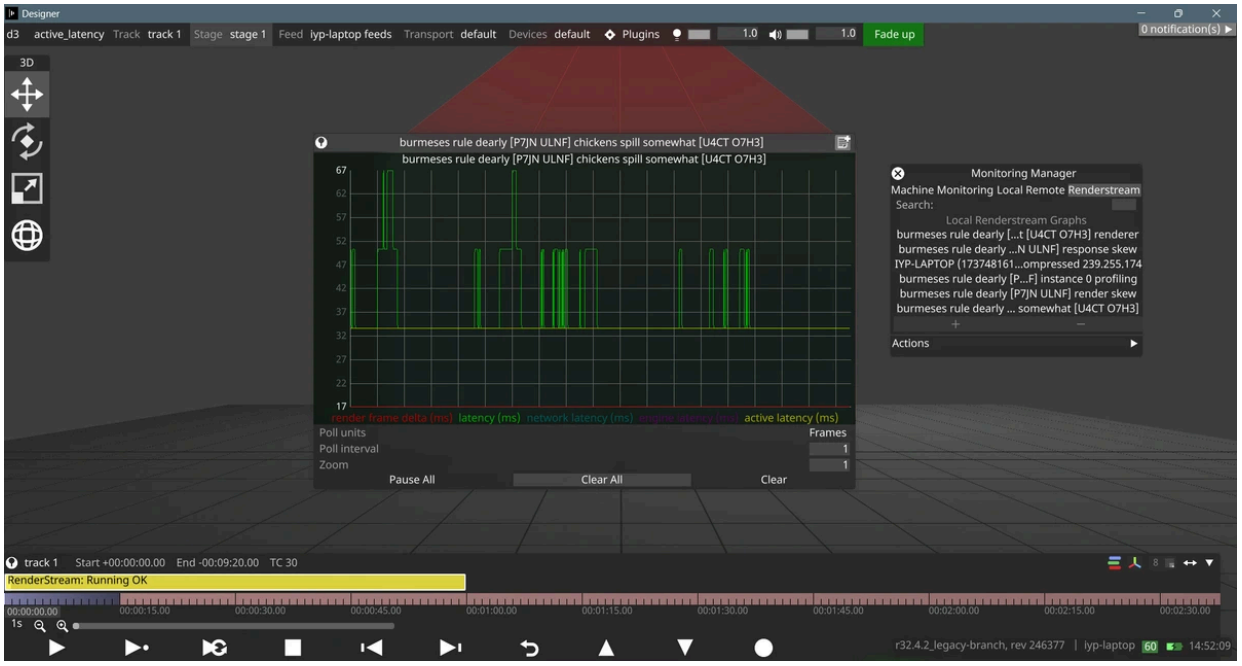
Run the RenderStream workload and observe the active latency graph:

- If active latency is oscillating up and down, reduce the active latency percentile threshold to 75% or 50%.
- The threshold can be adjusted in the Advanced project settings via the `renderstreamActiveLatencyPercentile` option switch (see note below for value range).
- Values of 750 (75%) and 500 (50%) are recommended as starting points. One of these two values should get us into a pretty stable spot.

> **Note**
>
> Since option switches do not support floating point values, the value for the `renderstreamActiveLatencyPercentile` switch is in thousands: i.e. 99.5% = value of 995.

Result

Active latency is a flat line for the duration of the RenderStream workload.



Active latency as a flat line after adjusting the percentile threshold.

Compensate for latency spikes

Procedure

Once active latency is flat, we need to be able to cope with latency spikes above the active latency:

- Visually measure the amplitude of latency spikes above the active latency line.
- Divide the amount by which the spikes exceed active latency by the length of a frame in milliseconds; this gives us the number of frames of difference we need to offset by.
- Set the `renderstreamActiveLatencyOffset` option switch to the calculated number of frames.

Result

Active latency is a flat line located just above the highest latency spikes of the RenderStream workload.

Adjust frame buffer size

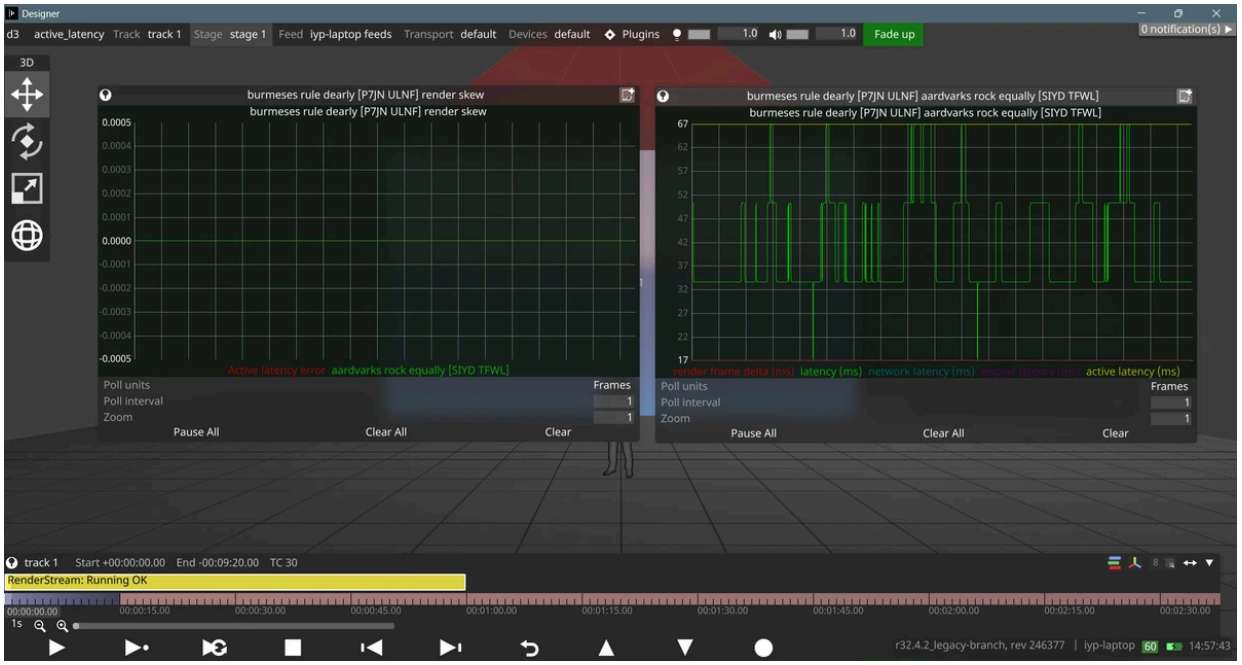
Procedure

Default RenderStream buffer size is 4. If the offset calculated in previous step is too big, it may exceed the capabilities of the RenderStream frame buffer and result in dropped frames anyway.

- At this stage, frame irregularities can be observed as spikes in the render skew graph.
- If `renderstreamActiveLatencyOffset` was set to a value greater than 2 in the previous step, increase the RenderStream buffer to be larger than the active latency offset.
- Set the `renderstreamBufferSize` to `renderstreamActiveLatencyOffset` + 2

Result

Flat active latency graph and flat render skew graph.



Flat active latency and render skew graphs after applying the offset and buffer size.

RenderStream Failover

Active backups are crucial for live events. With the RenderStream Failover functionality, you can set up rules and switch inputs to allow your servers to switch to an Understudy if a stream isn't working.

Follow these steps to configure RenderStream for failover:

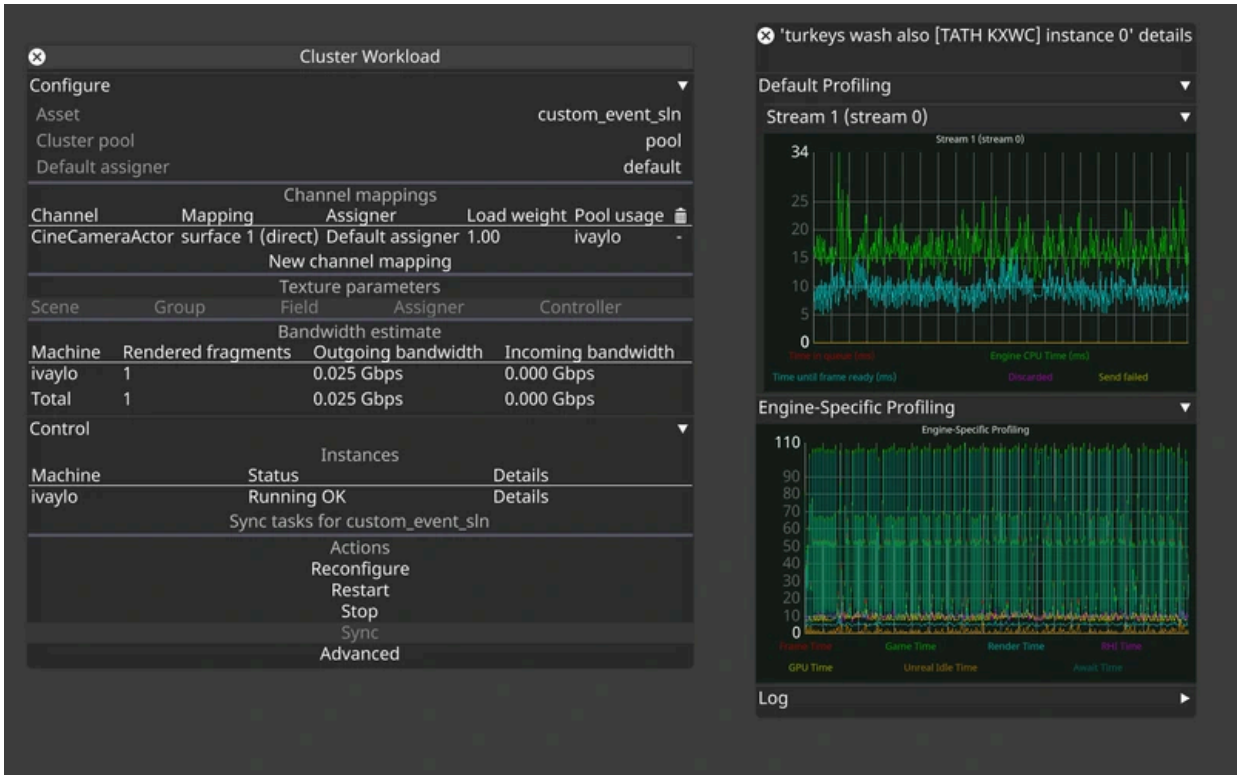
1. Create a RenderStream Layer and follow the steps on the RenderStream Layer page to configure a Cluster Workload.
2. Start the workload; all render machines and Understudy will launch their instances of the project
3. Use the d3net Network Session widget to monitor and control the render machines and Understudy; switch to the Understudy within the Network Session widget if needed using 'Mark as Failed" on the stream that has failed and Disguise will automatically switch to the Understudy.

Understanding RenderStream Graphs

Where can I find RenderStream graphs?

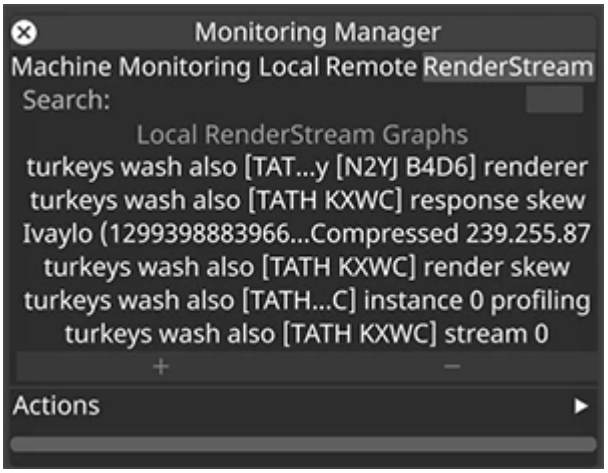
There are two places where we can find RenderStream graphs:

1. The **Details** view of one of the machines in a workload
   - shows engine and stream profiling for a specific render node machine
   - can be accessed via the ‘Details’ button next to a specific machine in workload widget



Workload widget and the stream profiling graphs that are accessible from it

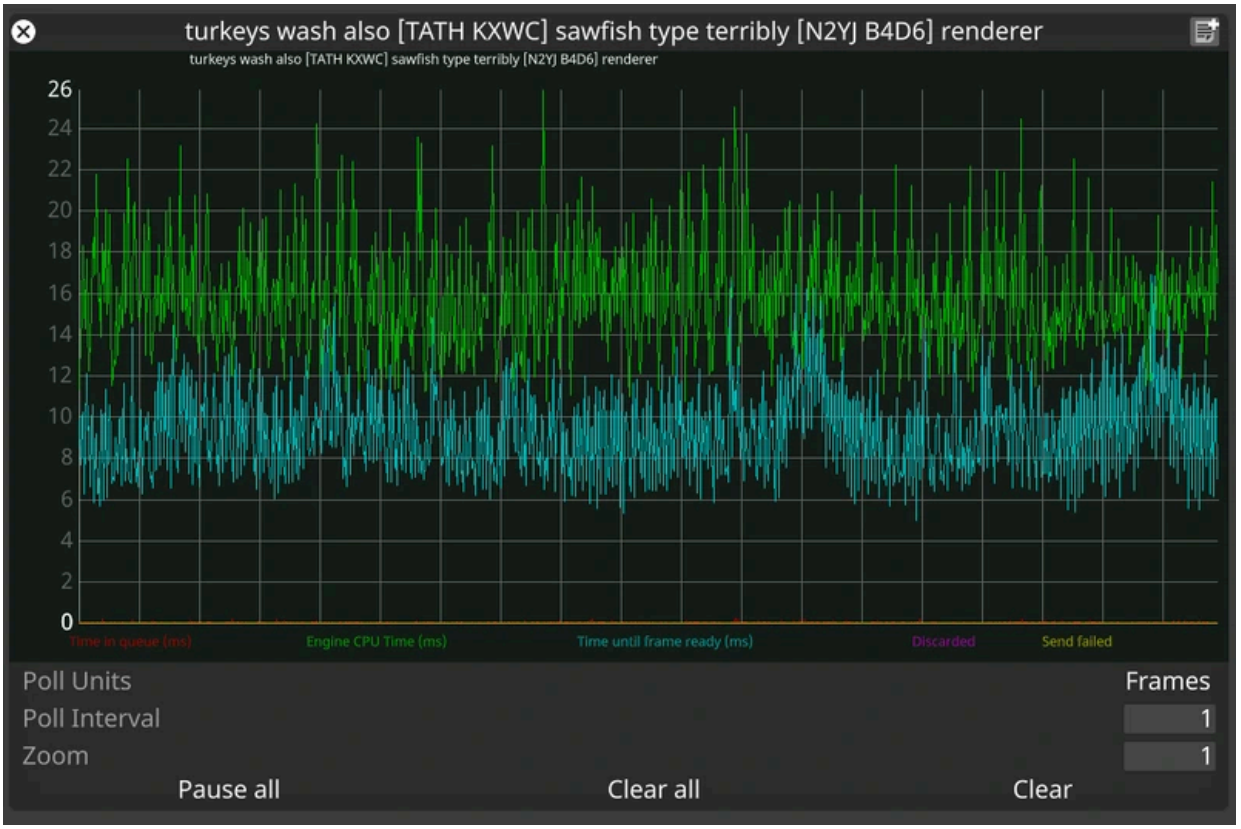
2. The ‘RenderStream’ tab of the Monitoring Manager
   - lists all graphs for all streams and workloads
   - graphs are grouped by actors receiving the streams
   - can be accessed via the Monitoring Manager (left-click on FPS bug in Disguise)



Graphs available for RenderStream in the Monitoring Manager

RenderStream graphs

Renderer graph



What is it?

Engine-agnostic profiling data captured by the RenderStream plugin from the render node.

Time in queue (ms)

The time a frame request spends waiting to be picked up for processing by the workload instance.

Engine CPU time (ms)

How much time the frame request spends being processed. It is the time between the frame request being picked up for processing and the call to send the resulting frame back to disguise.

Time until frame ready (ms)

How long it takes to send the frame.

Discarded

Shows the frames dropped by the render node.

Send failed

Shows problems in sending the frames back to disguise.

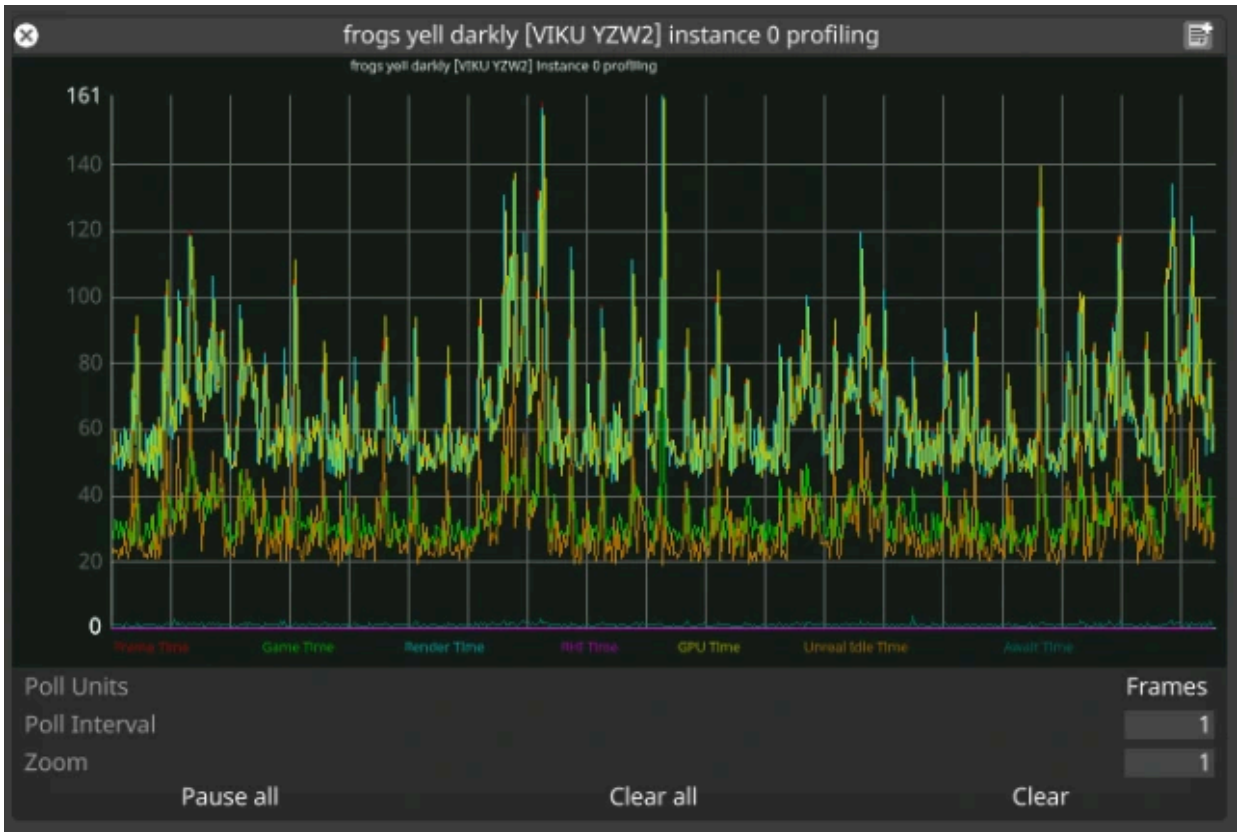
How do I use it?

Normally, time in queue should be minimal with most of the time spent generating the frame indicated by **Engine CPU time (ms)**. No requests should be discarded or marked as send failed.

High **Time in queue**: engine can't keep up with the rate of incoming requests from disguise. Eventually, if too many requests are waiting in the queue, the render node will discard request, which will be reflected in the **Discarded** line in the graph.

High **Time until frame ready**: indication of sending/networking issues

Profiling graph



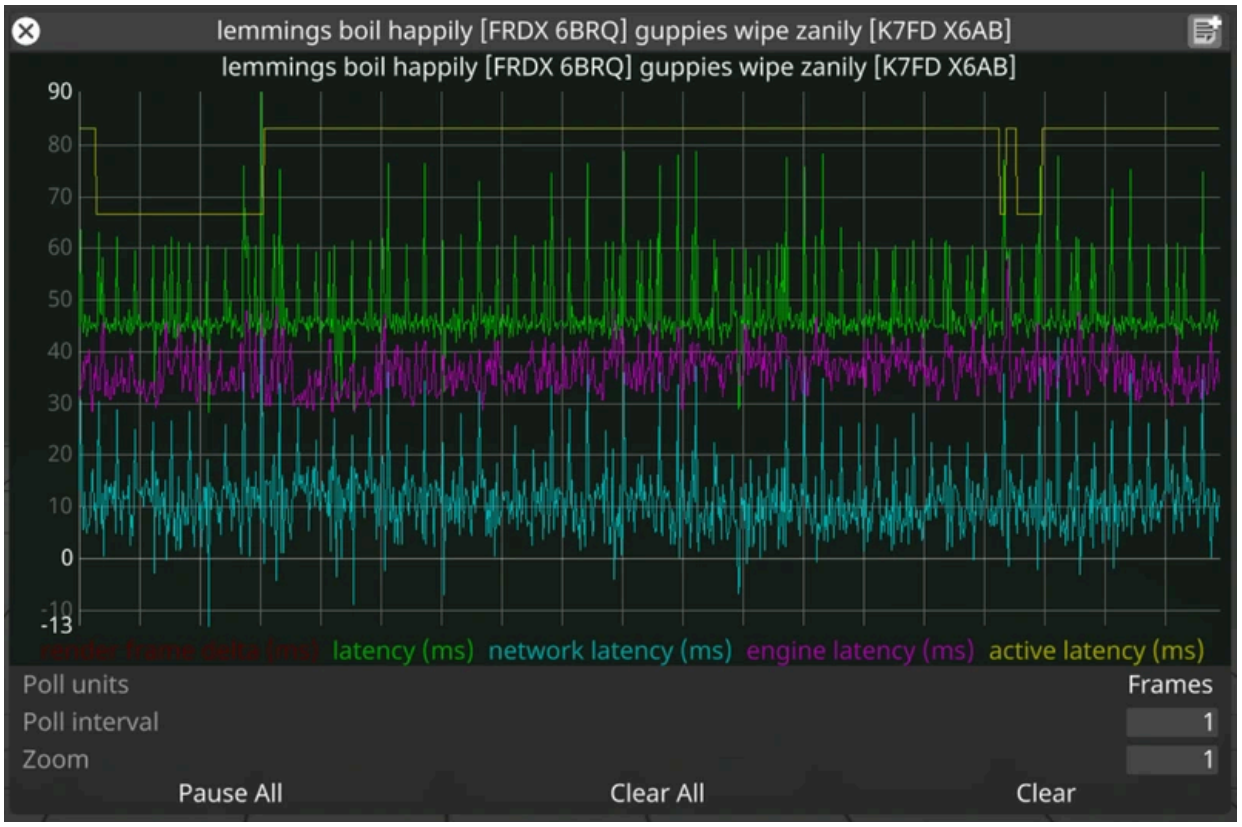
What is it?

Engine-specific profiling information for a workload instance. This data is specific to each RenderStream plugin implementation, or could be missing depending on the implementation as well.

How do I use it?

The data we get completely depends on what engine data a particular plugin implementation is tapping into. In the case illustrated above, we have Unreal Engine with granular data about how much time each step of the UE pipeline is taking. Abnormally high values in any of these sections could indicate high CPU usage (blueprints, geometry, physics, etc.), high GPU usage (resolution, post-processing, etc.), or other issues. For example, high Unreal Idle Time could indicate network slowdowns in nDisplay synchronisation.

Stream graph



What is it?

Data generated by the receiver of a stream (actor/director) describing the latency of the stream.

render frame delta (ms)

Shows the difference in timestamps between arriving frame and the frame that arrived before it.

latency (ms)

Actual latency of a stream: the time elapsed between disguise requesting a frame and then receiving back the frame for that request.

active latency (ms)

The current active latency which is based on the slowest stream in the session.

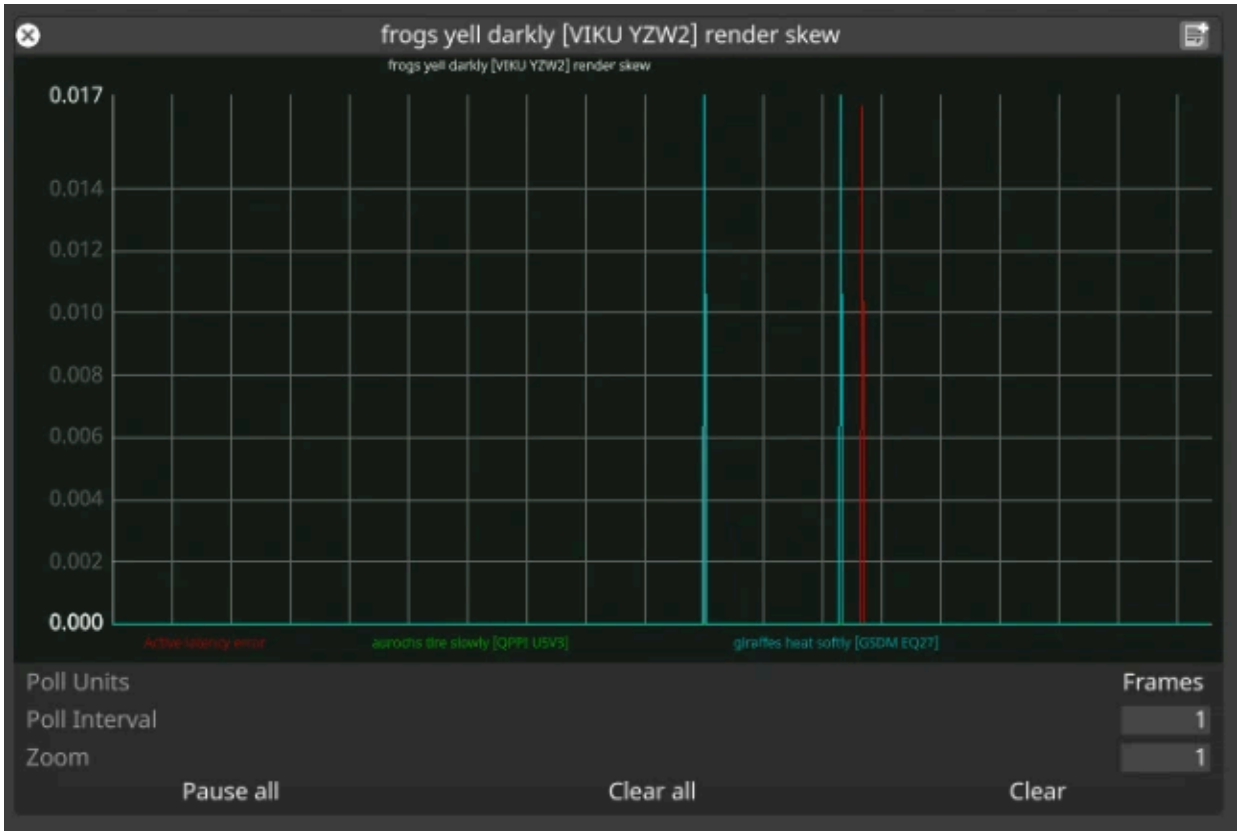
How do I use it?

Render frame delta should be constant (at 60fps, delta should be 16.6ms). Fluctuations identify either dropped frame requests or unstable framerate on the RenderStream controller machine.

Latency should not be too far off from the active latency. If there is a stream that is significantly faster than other streams, its latency will show as a lot lower than the active latency. If the difference between the two is greater than 4 frames worth of time, effort should be made to better balance the workload. Also, if using a manual active latency override, this could be an indication that the override value is not accurate.

Active latency and latency should not fluctuate wildly. That could indicate optimisation is required on the asset side.

Render skew graph



What is it?

The graph shows how well temporally matched are the frames received across the streams of a workload.

Active latency error

Shows how close to the active latency prediction are the displayed frames of a RenderStream workload. This is the difference between the expected timestamp based on active latency and the actual timestamp of the closest matching group of frames.

Streams error

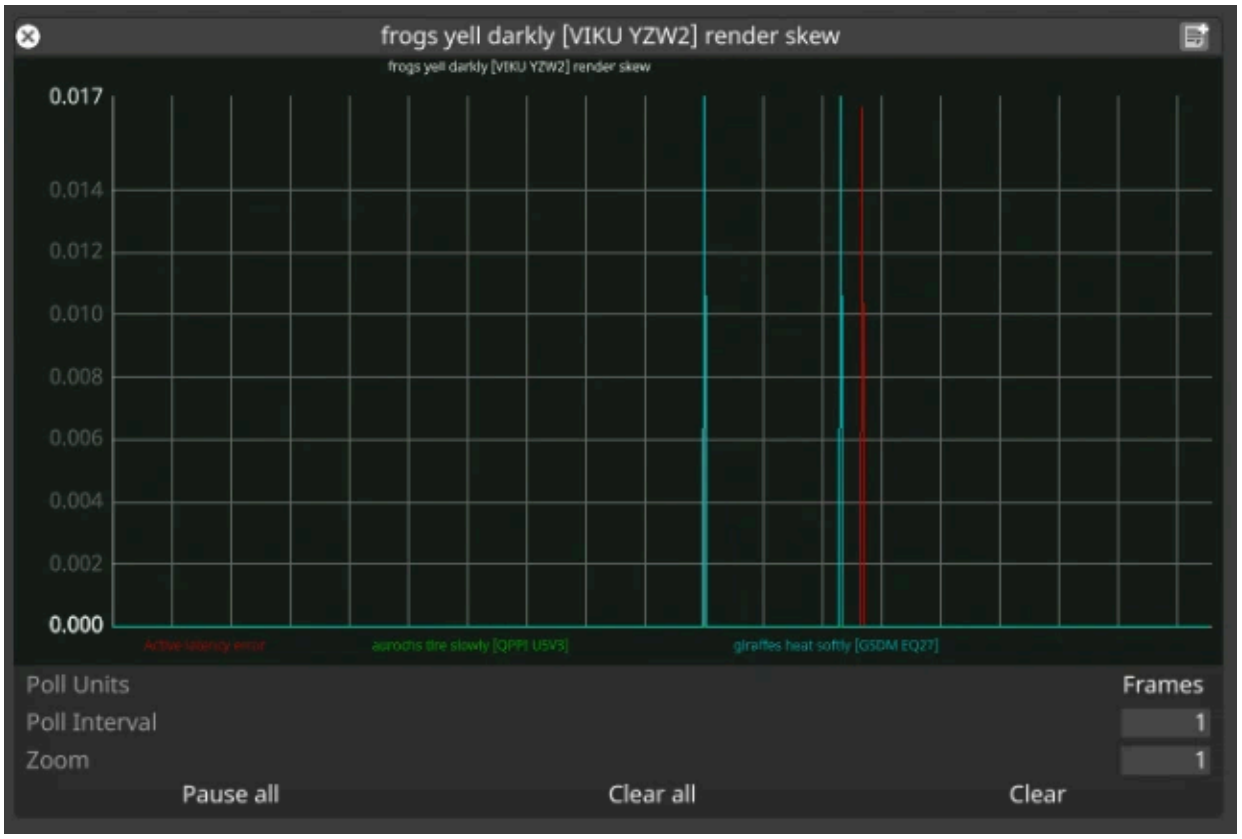
Within the best matching group of frames, these lines indicate the individual stream errors.

How do I use it?

Ideally, active latency error should be zero with the individual stream errors being less than a frame worth of time.

- If individual streams have error greater than a frame worth of time, this could be perceived as a tear between fragments that belong to the same actor.
- If the active latency error differs across multiple subscribing actors (across multiple instances of this graph), this could be perceived as a tear on the edge between the outputs of two actors.

Response skew graph



What is it?

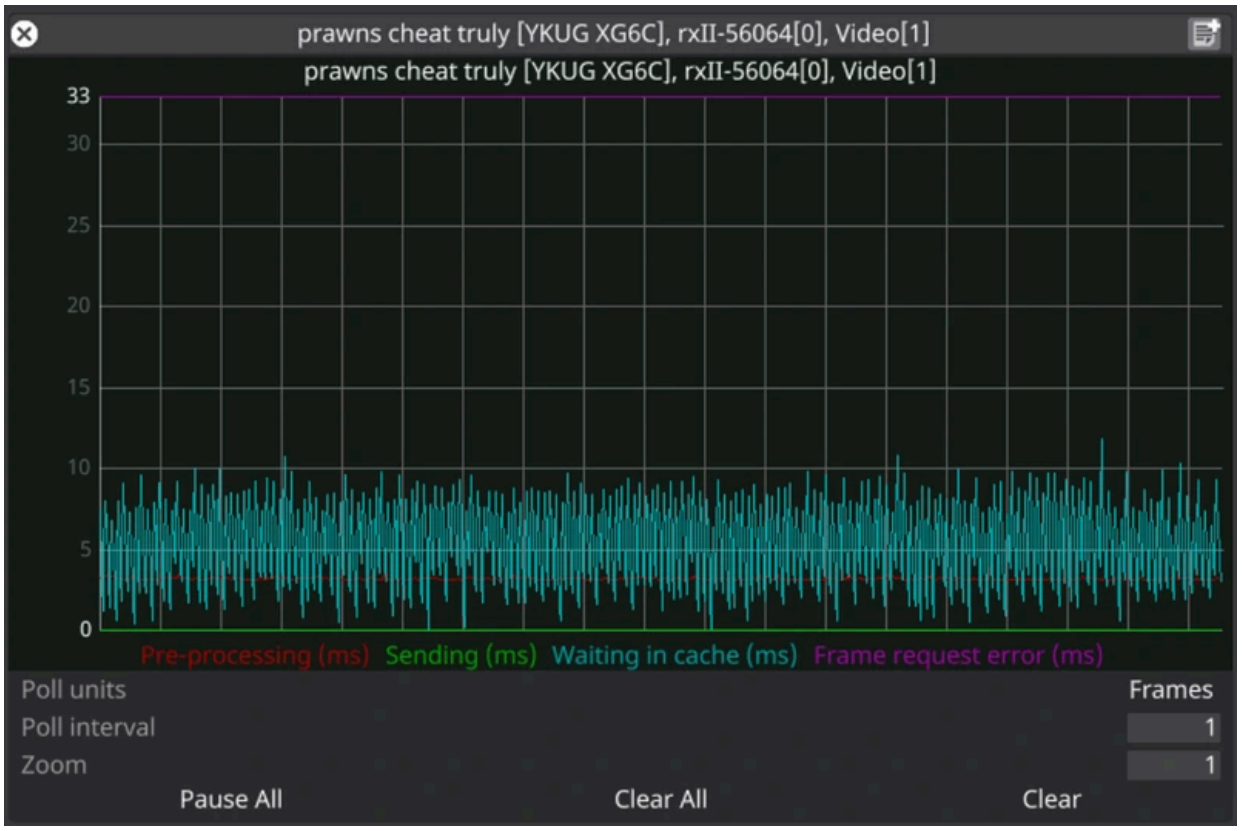
Shows how close to the active latency prediction is the currently processed RenderStream response. This is the difference between the expected timestamp based on active latency and the actual timestamp of the closest matching group of frame responses (frame sent notifications from render nodes).

How do I use it?

This can be used as another indication how well the active latency estimation fits a stream. Ideally, the error in this graph should be less than a frame worth of time. More than a frame of

error could indicate network issues on the d3net network adapter, as it is the one used for sending RenderStream frame requests and receiving the sent notifications replies from render nodes.

Texture parameter latency graph



What is it?

This graph is shown for every texture parameter stream. It shows the latency of texture parameters on their trip to the render nodes.

Pre-processing (ms)

Amount of time spent preparing the texture for sending on the controller machine.

Sending (ms)

Amount of time the sender took to dispatch the texture to the network card on the controller machine.

Waiting in cache (ms)

Amount of time the texture parameter spent waiting to be processed by the render engine on the render node.

Frame request error (ms)

Difference between the current frame request timestamp, and the texture parameter timestamp that the render engine is using for this frame.

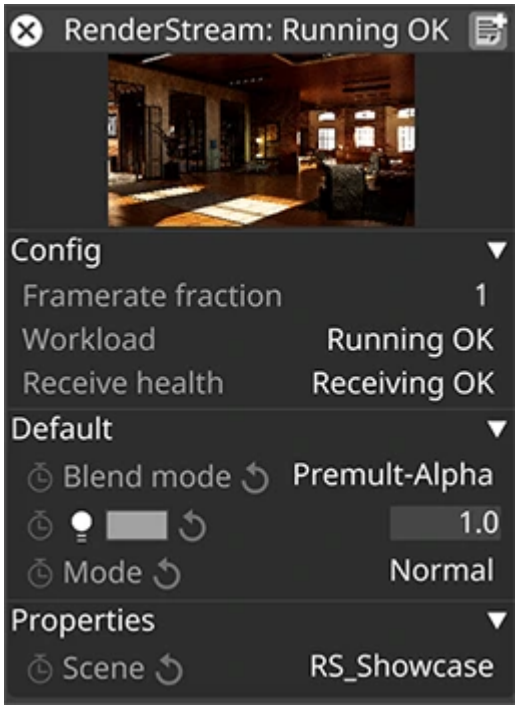
In practice, this error tends to be the sum of the latency accumulated during all previous stages of the texture parameter pipeline, including the actual network transmission time.

How do I use it?

Texture parameters experience additional latency on top of the regular stream latency (see Stream graph). The texture parameter latency graphs reveal this additional latency and can be used to diagnose network or processing performance issues specifically relating to texture parameters.

RenderStream Layer

The RenderStream Layer is used to control third-party render engines running externally to Designer.

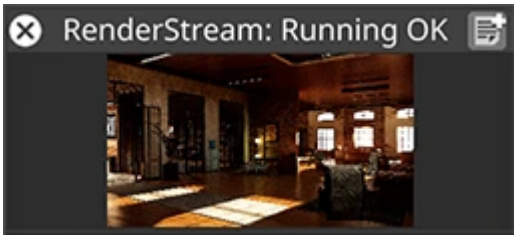


There are four main sections within the RenderStream Layer:

- Media Thumbnail
- Config
- Default
- Properties

Media Thumbnail

This area will display an image of the active stream being received. Note that in a multi-channel environment, this will only show the Camera in UE that has the RS component attached to it.



Config

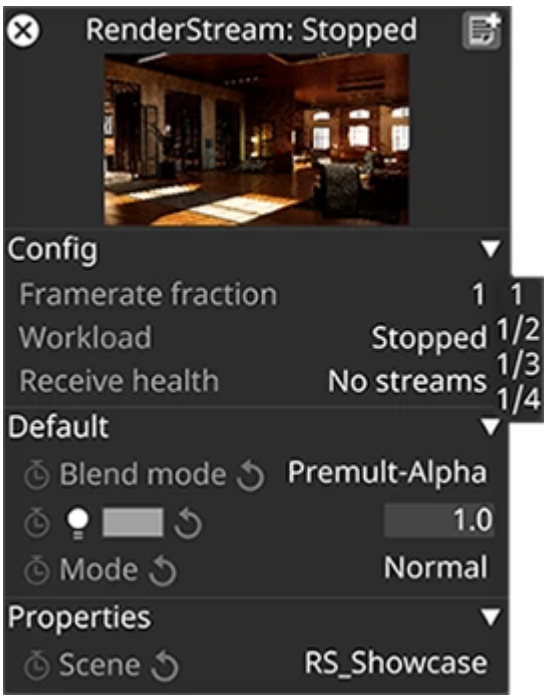
This section is where you will configure properties such as **Asset** and **Cluster Pool**, as well as monitor workload and engine health in real time.



Framerate Fraction

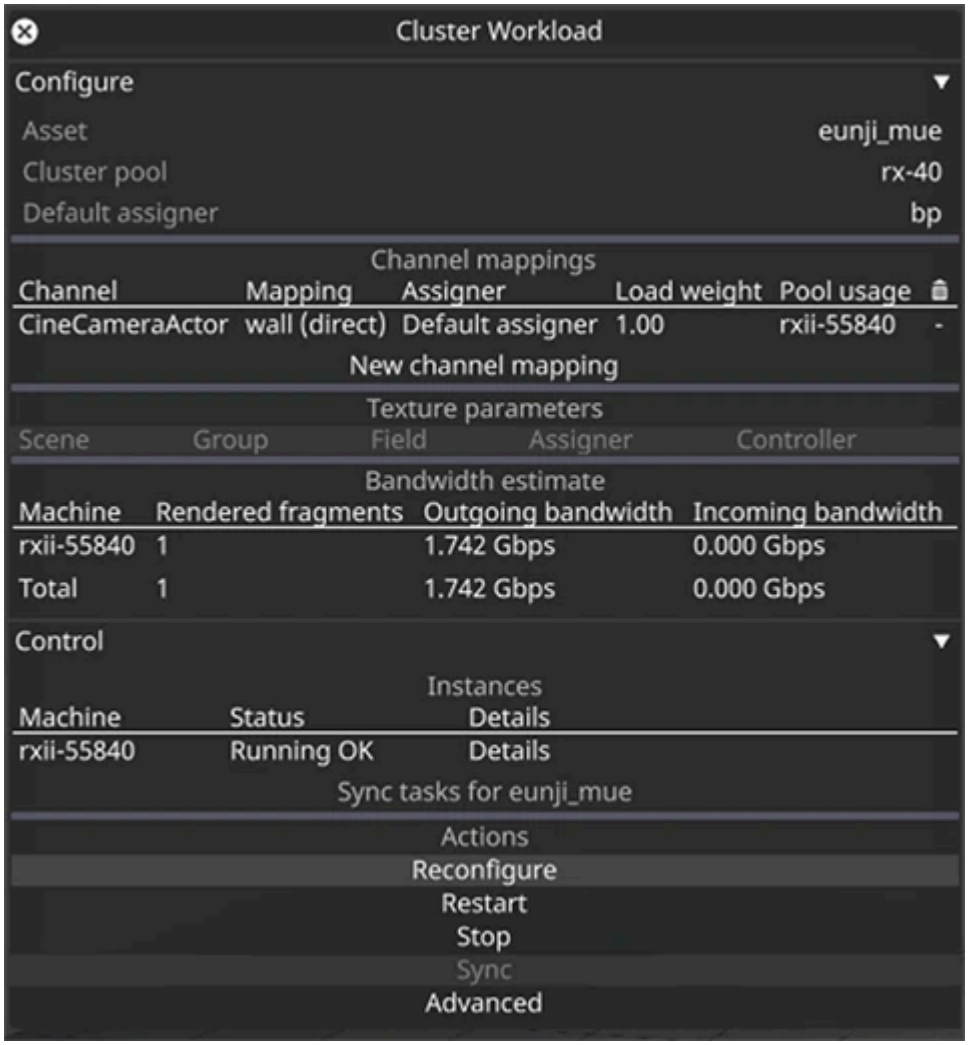
The framerate of each stream is determined by the global refresh rate set within d3. The Framerate Fraction setting indicates the fraction of the framerate this layer renders at.

The options are 1, 1/2, 1/3 and 1/4.



Cluster Workload

The Cluster Workload window contains the elements required for configuring a Cluster.



It contains the following sections:

`Configure`

The Configure section contains these elements of a Cluster:

```
- Asset
- Cluster Pool
- Cluster Assigner
- Channel Mapping
- Bandwidth Estimate
```

`Control`

Asset

This is the Render Engine project or Notch block that will be controlled by the layer. In order for the asset to be visible here, it must be present in the RenderStream projects folder.

Right-click on the asset name to open the **Asset** properties editor:

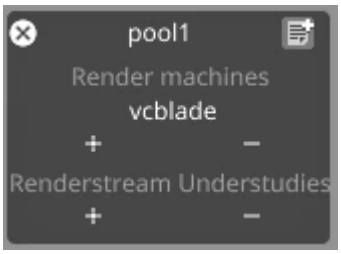
`Asset`

Properties include:

- **Asset Discovery Name**: Name of UE folder/project.
- **Target Engine**: Name of the Render Engine.
- **Engine Settings**: Engine version.
- **Colour shift**: Apply colour correction to entire asset.
- **Content Source Machine**: The render node that is running the render engine project. This is the machine that the project will be synced from.
- **Available**: Status indicator displaying if the Asset is available. Not a tick box.
- **Channels**: displays active channels defined by the CameraActors in your UE project.

Cluster Pool

The **Cluster Pool** will automatically detect all available machines on the same network. Once detected, you can assign as many machines to the **Cluster Pool** as needed and inspect each machine in the pool to see network status, IP address, current Streams and available Assets.



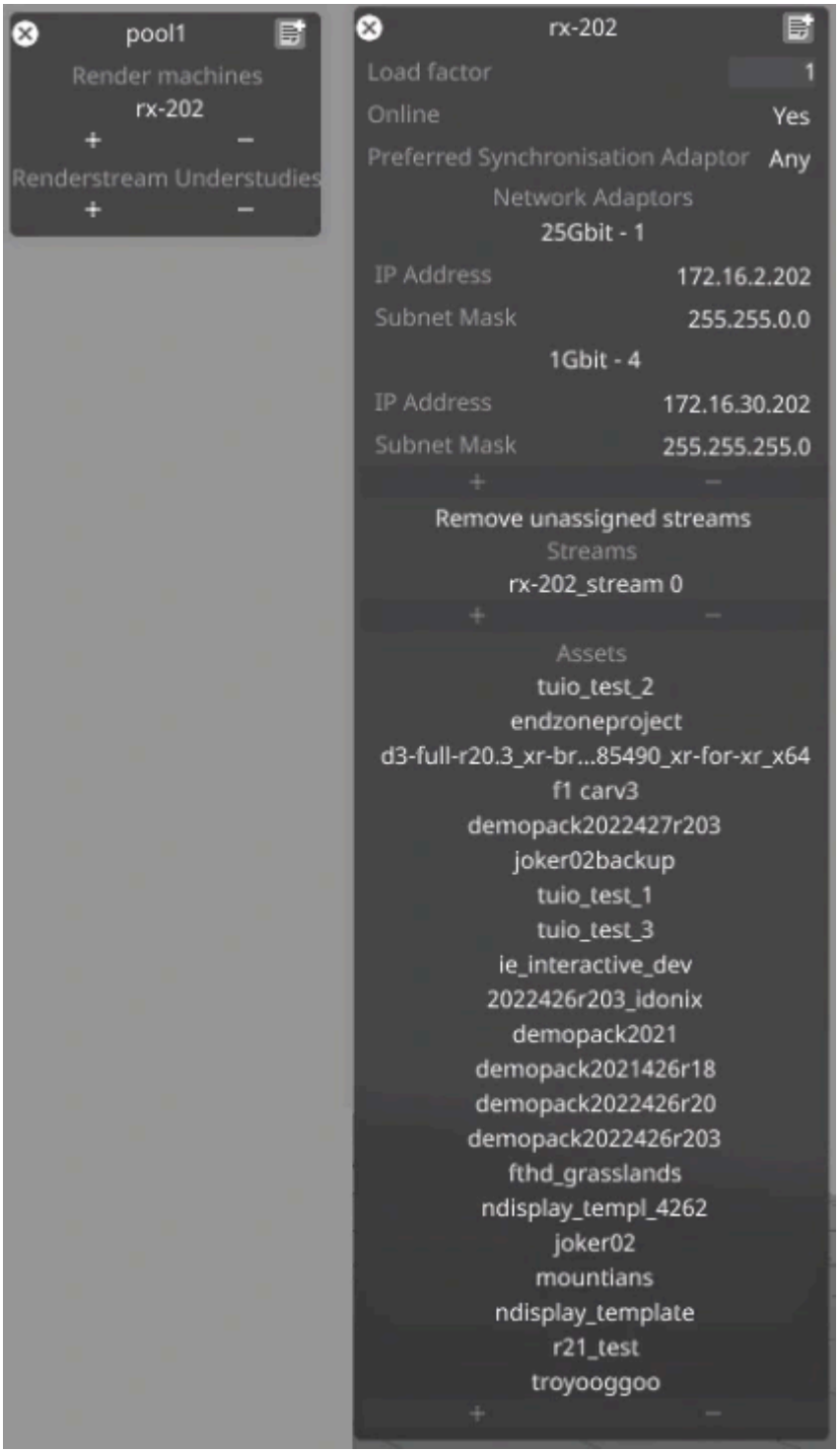
`Cluster Pool`

Properties include:

- **Render Machines**: The list of render nodes that the content will be distributed across.
- **Understudies**: Backup nodes in case of failover.

Cluster Pool Machine Properties

Right-click on the name of a machine in the **Cluster Pool** to edit additional properties related to that machine:



`Cluster Pool Machine`

Properties include:

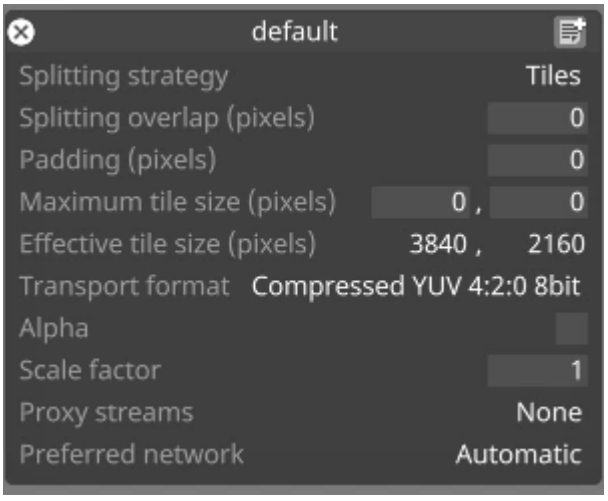
- **Load Factor**: Relative load weight this machine can handle. Weight is relative to other nodes in pool. The workload can be spread evenly across the cluster by the user using a load factor. This allows you to take into account each machine's spec and assign loads accordingly.

- **Online status**
- **Preferred Synchronisation Adapter**: This setting allows you to pick a subnet to use for sync. You should pick something fast - preferably capable of 100Gbps or more. Only used to control cluster communication and content syncing; it has no impact on how the streams are communicated to Disguise.
- **Network Adapters and settings**: Non-editable list of network adapters available on the node. To configure the system for Cluster Rendering, all machines within a Cluster Pool must be on the same subnet. If a machine is reporting an unexpected IP address (e.g. loopback address), make sure to select the specific network adapter within the 'Network' tab of d3Manager.
- **Streams**: non-editable list of RS output from the node.
- **Assets**: non-editable list of assets resident on the node.

Cluster Assigner

The **Cluster Assigner** is where we control the settings for the distribution of the content across all the machines in the **Cluster Pool**.

Cluster Assigners are used to create definitions as to how channels are delivered from the nodes. You can create as many Cluster Assigners as needed.



`Cluster Assigner`

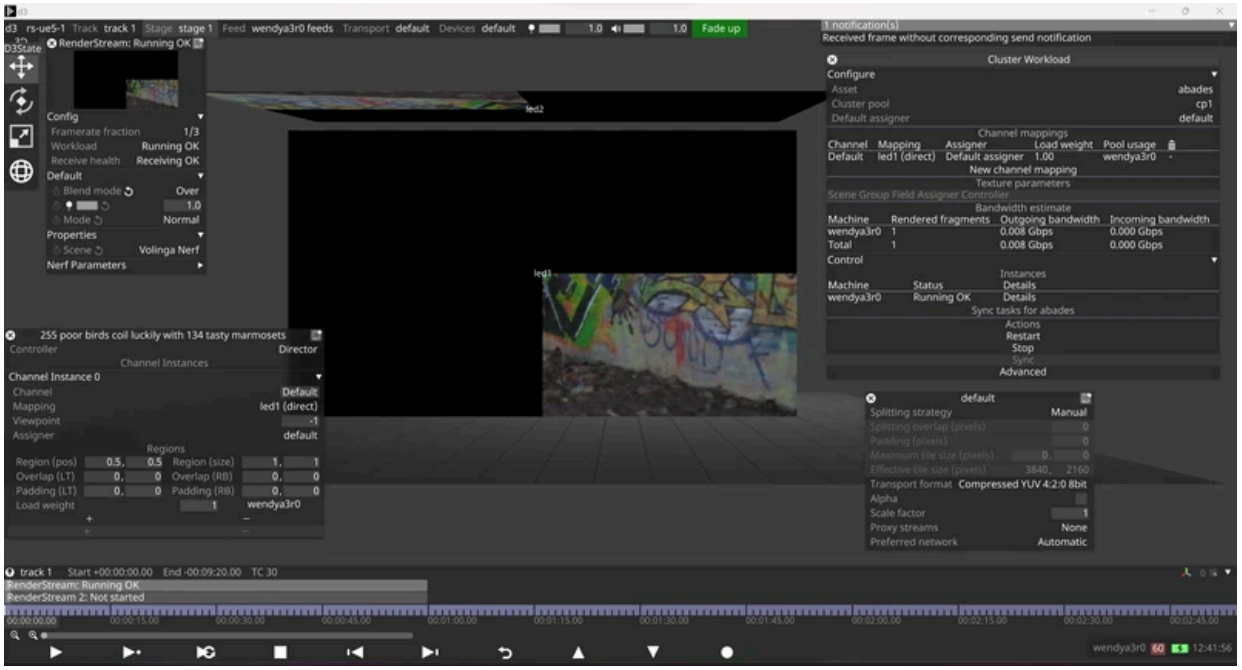
Properties include:

- **Splitting Strategies**

These are used to generate the sub-regions needed for distributing content across a set of render nodes.

There are 3 types of splitting strategies:

1. **Tiles** - Lets Designer split up the content as it sees fit to the mapped channels.
2. **Full frame** - Sends the entire stream to the mapped channel.
3. **Manual** - Splits each Viewport according to user specified instructions. When using the 'Manual' splitting strategy, the options for specifying how to split frames can be found within the Advanced workload settings.

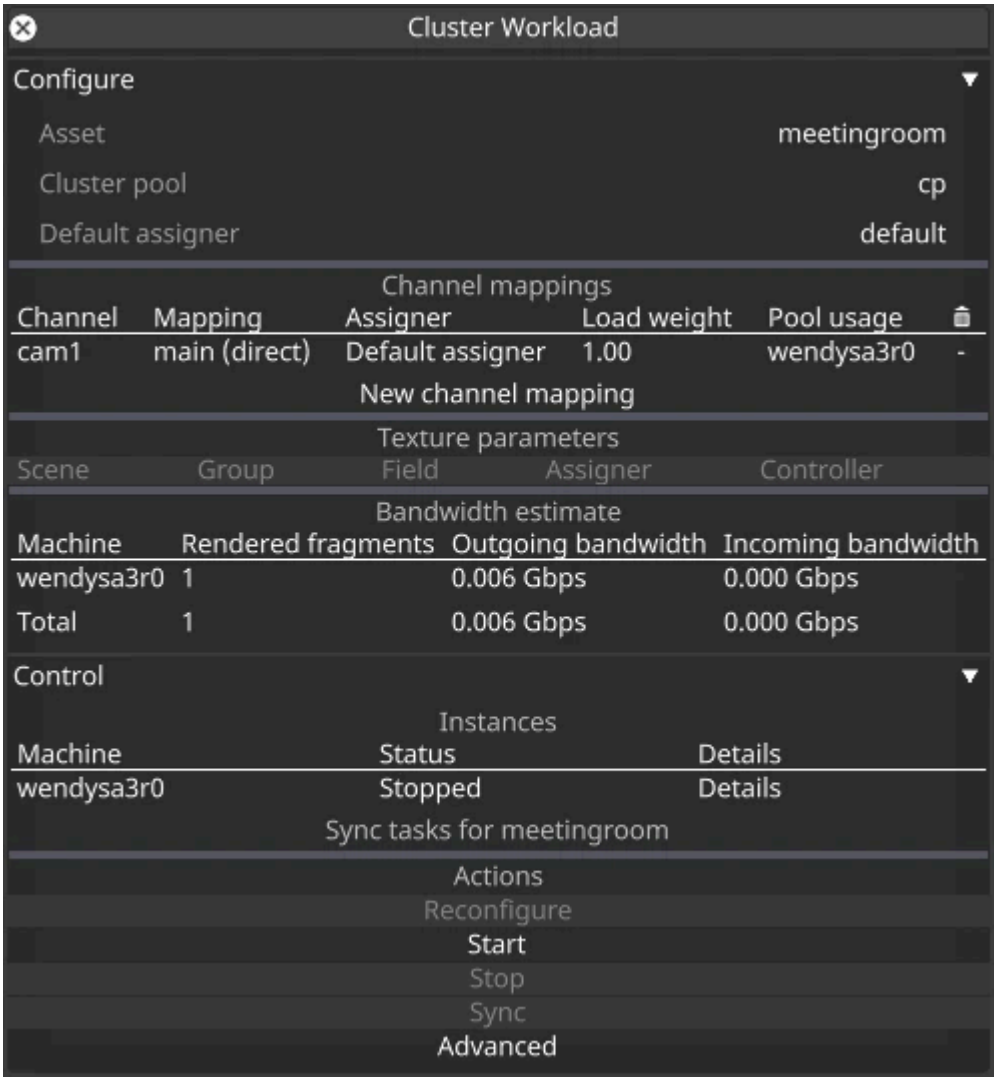


In Advanced workflow settings, note that region pos. has a range between 0 and 1. The screenshot shows both regions (pos) set to 0.5. Other property values in this editor also range from 0 to 1.

- **Splitting Overlap**: The Splitting Overlap option can be used to define a blend region at each split that hides imperfections at the seams.
- **Padding (Pixels)**:The Padding option enlarges the rendered are at each split, but does not stream the padded area, cutting off edge artifacts.
- **Load Weight**:'Load Weight' allows you to set a priority for the Cluster Assigner. The higher the weight of the assigner, the more machines will be assigned to render the content and thus more splits will be made.
- **Transport format**: The options to pick between 'Compressed' and 'Uncompressed' , 'RGB 4:4:4', 'YUV 4:2:2', and 'YUV 4:2:0', and 8-bit, 10-bit and 12-bit transport bit-depths are available.
- **Alpha**: The option to enable or disable the Alpha channel on the content is available.
- **Scale factor**: Scale factor for the resolution.
- **Proxy Streams**: A compressed stream at a lower quality or resolution used for providing a preview on ma chines where receiving the full-quality stream is undesirable or impossible.

- **Preferred network**: Select the adapter to use for video transport on any channel the assigner is associated with.

Once the cluster has been configured, the stream's playback is managed via the Cluster Workload controls.



The options for managing the workload are:

- **Instances**: There can be only one workload instance running at a time in the same cluster pool.

  When started, the Instances table will be populated with the machines that have been sent the start signal.

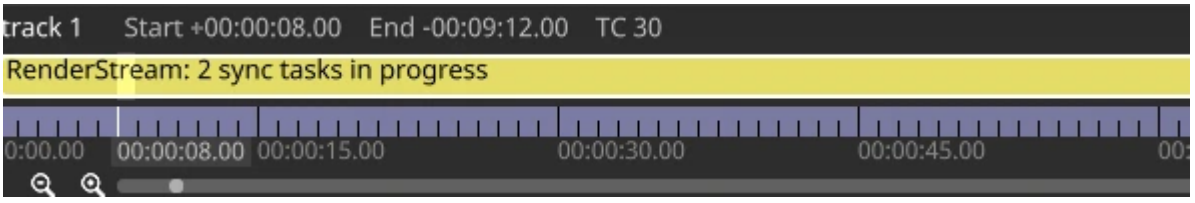
- **Reconfigure**: Applies updated workload settings directly to the running stream without requiring a full restart.
- **Start**: Sends signal to all machines in the pool to launch the Asset according to config settings.

- **Stop:** Sends signal to cease outputting a stream and quit the process sending it.

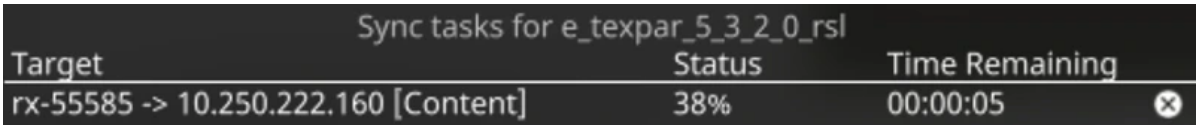
  The workload log can be opened by left-clicking on the status within the Instances table.

- **Sync:** begins the process of content sync. Content is synced from the source machine to all other machines available within the cluster pool; copies only the necessary directories and files needed.

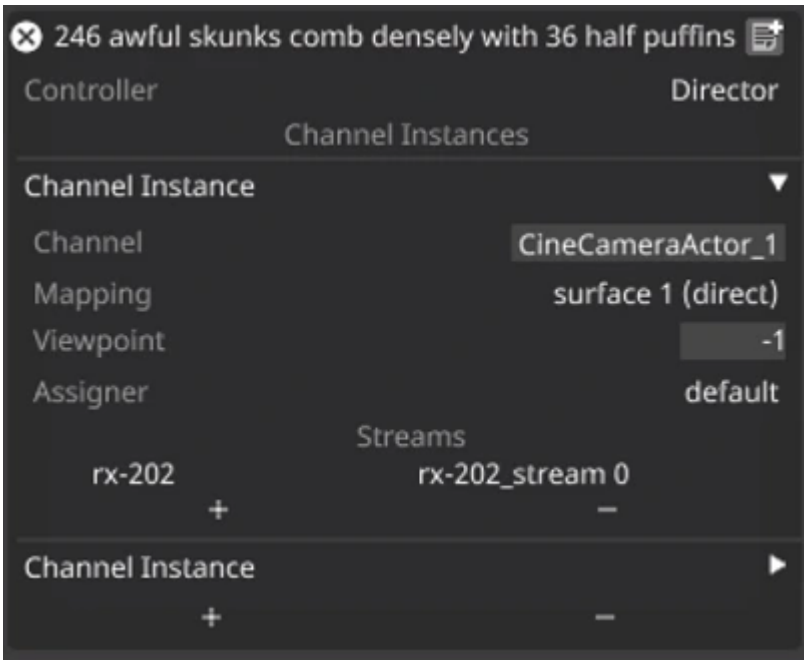
  With r31.0.3, a new workload status has been added to show sync progress (in progress, complete, failed) on the RenderStream layer.



  With r33.1.0, syncing assets is now done in 2 passes, one for content and one for metadata. A new progress indicator will provide feedback. Sync tasks can also be interrupted but the files that have already been synced will not be reverted.



- **Advanced:** right-click to open the workload's advanced options:

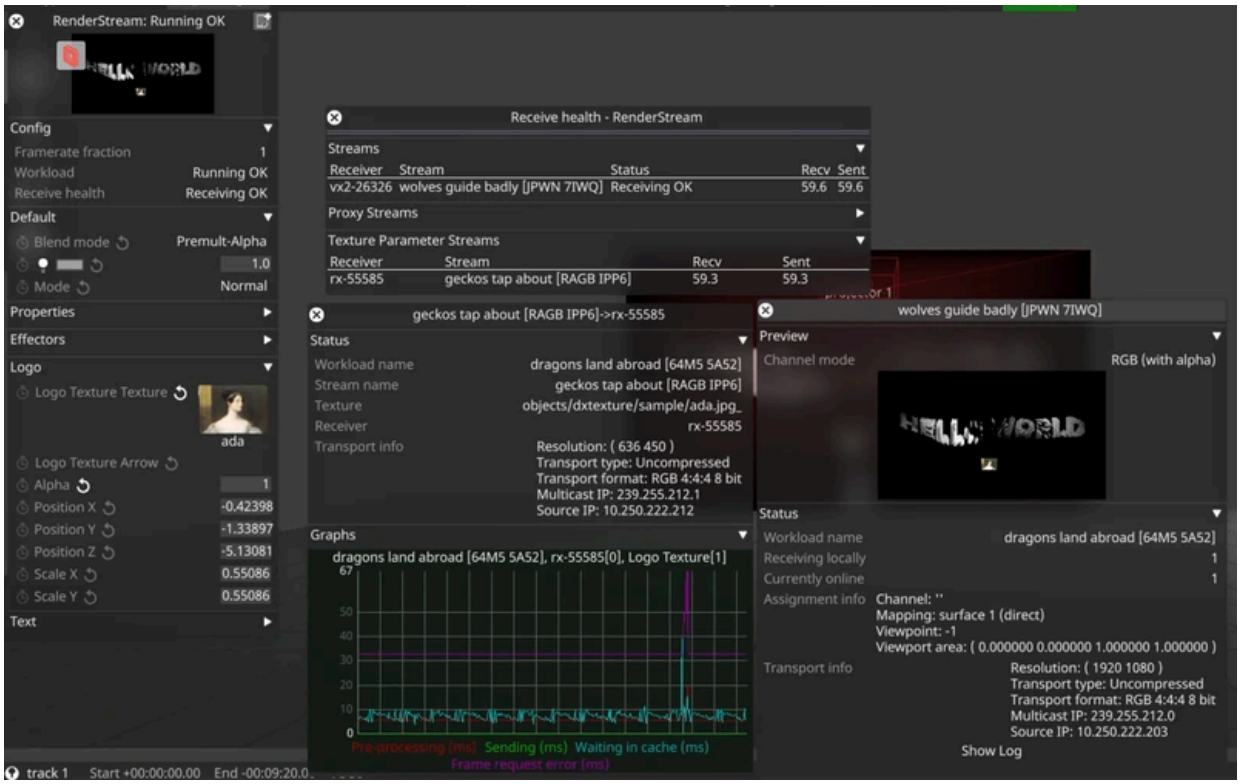


> **Note**
>
> **Please note**: Any changes to the Assigner require a restart of the workload.

Receive Health

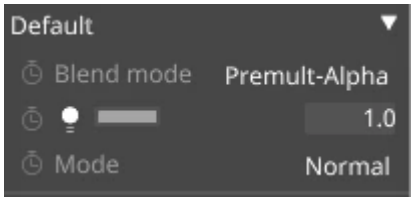
Status of entire cluster receiving streams, dynamically reported while stream is running.

Right-click on **Receive health** to open machine specific window:



Default

In the Default section of the RenderStream Layer, there are four Common Layer Properties:



- **Blend Mode**: Premult-Alpha is needed for content that contains alpha data.
- **Brightness**: Layer intensity.
- **Mode**: This is used to determine the timeline's playback behaviour as the layer is playing.

Properties Section

The last section of the RenderStream layer is asset specific and will display all exposed parameters from the asset as well as their keyframe editors



Health Monitoring

Receive Health

The Receive health field in the RenderStream Layer is used to monitor the health of all streams belonging to the workload in this layer. As the name suggests, receive health monitors whether machines that are subscribed to streams receive all the frames that are being sent from the render nodes as part of each stream.

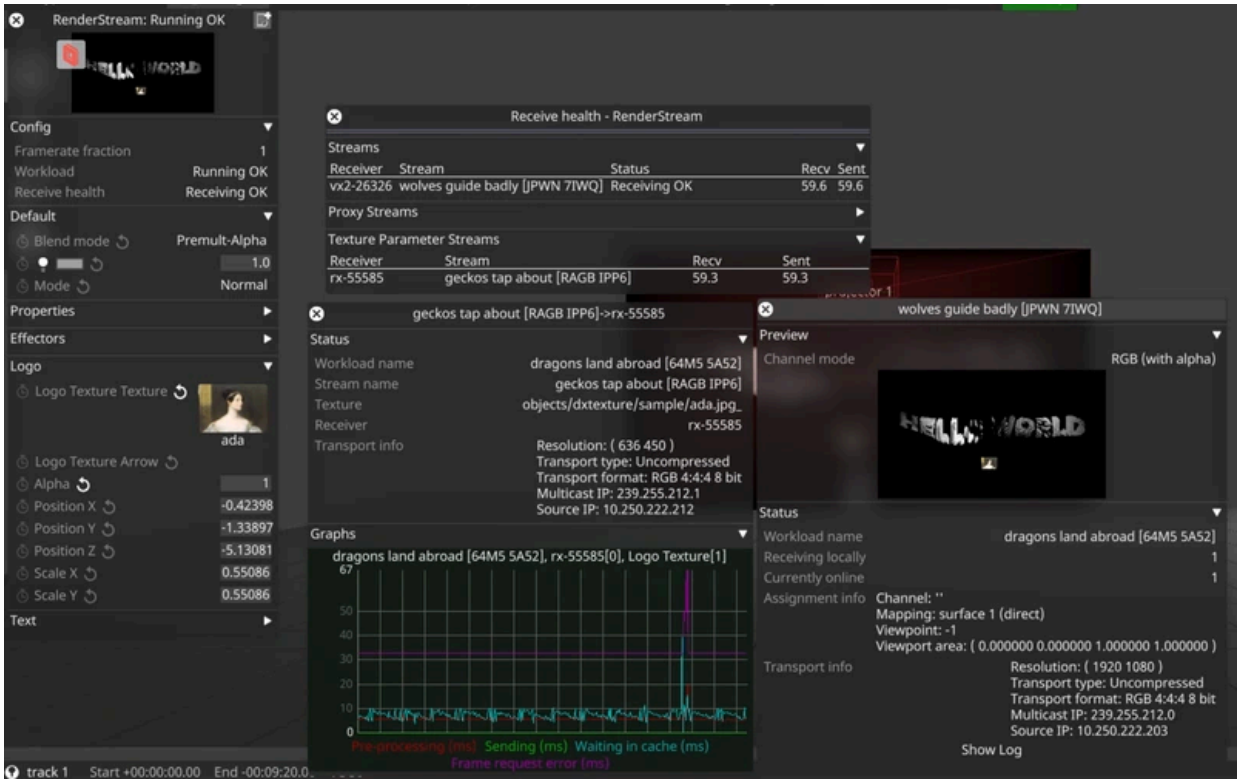
For concerns about the health of the workload render instances, check the **Workload Health** section.

The value displayed in this field is an aggregated status of all streams in the workload.

Possible values are:

- **No subscription requested**: A stream exist, but the receiver of the stream has not subscribed to it.
- **Receiving OK**: The stream is being received correctly.
- **No frames received in s**: No frames have been received in the specified amount of seconds.
- **No frames received in > 10s**: No frames have been received in over 10 seconds.
- **Bad stream ()**: There was an error with the stream, and it includes the specific error message.
- **Frames dropped recently**: A frame was dropped within the last second.
- **No frames received yet**: No frames have been received yet, and the receiver has not reported any dropped packets.
- **No frames received (dropping packets)**: No frames have been received yet because the incoming frames were dropped. This status signifies a network issue.
- **Dropping packets**: Incoming frames are reported as dropped by the receiver.
- **Subscribe unsuccessful**: A stream exists and the receiver tried to subscribe, but failed.

In the aggregated **Receive health** field, the aggregated status reflects the highest priority status of all streams in the workload. The status list above has been sorted from lowest priority to highest priority status.



Receive Health Widget

Right-click on Receive health field to open the Receive Health widget.

The Receive Health widget provides a detailed view of the health of each stream in the workload. It displays information about 3 different types of streams.

> **Note**
>
> Right-clicking on any stream in the receive health widget opens a details view for that stream containing additional information about the stream's configuration.

Streams

These are the main streams produced by render nodes and containing the final rendered image. The information listed for each stream is as follows:

- **Receiver**: Name of the machine subscribed to the stream.
- **Stream**: Unique identifier of the stream.
- **Status**: Current status of the stream. See Receive Health section for possible values.
- **Recv**: Average receive rate of the stream in frames per second. This is based on how many frames the receiver machine receives.
- **Sent**: Average send rate of the stream in frames per second. This is based on how many frames the sender machine reports as being sent.

Proxy Streams

Proxy streams are lower quality versions of the main streams meant for preview on machines that cannot or should not receive the full quality stream. The same health information is available for proxy streams, as for main streams.

Texture Parameter Streams

Unlike the main streams and proxy streams, which are sent from a render node and received by a machine running Designer, texture parameter streams originate from one of the machines in the Designer session and are received by render nodes. The following health information is available for texture parameter streams:

- **Receiver**: Name of the render node subscribed to the stream.
- **Stream**: Unique identifier of the stream.
- **Recv**: Average receive rate of the stream in frames per second. This is based on how many frames the receiver machine receives.
- **Sent**: Average send rate of the stream in frames per second. This is based on how many frames the sender machine reports as being sent.

Workload Health

Workload health is used to monitor the health of individual render instances (an instance of a render engine running on a machine) in the workload. The status shown in the “Workload” field in the RenderStream Layer is an aggregated status of all render instances running in the workload. For detailed information per render instance, right-click on the “Workload” field to open the Workload widget while the workload is running, and look at the “Instances” section.

Possible values are:

- **Unknown**: Error getting the status.
- **Crashed**: Remote engine is not responding.
- **Stopping**: The engine has acknowledged the request to shut down and is in the process of responding to that request.
- **StopRequested**: The engine has been asked to shut down.
- **Stopped**: Remote engine is not expected to be running.
- **Error**: An error occurred in the remote engine and is in a bad state. The engine is not stopped either since the process is alive.
- **Launching**: Workload has been requested to start on the remote machine and no response has been received yet.
- **Starting**: The remote engine is sending status updates but is currently not in a state where it will send frames.
- **Offline**: The RenderStream plugin in the remote engine is not sending responses, but the process hasn’t crashed.
- **Ignoring requests**: The remote engine is in a state where it can send frames but is not currently responding to any of the frame requests sent by the workload controller machine.

- **Awaiting requests**: The remote engine is in a state where it can send frames but it has not yet received any requests from the workload controller machine.
- **Warning**: Non-critical issue exist and the workload is still running.
- **Running OK**: The remote engine is processing all incoming requests and sending frames as expected.
- **Discarding requests**: The remote engine is processing some of the incoming requests, but is not fast enough to keep up with the current frame request rate.
- **Dropping input frames**: The remote engine did not receive some of the remote textures that it needed.

Workflow

Set up your environment including installation of the Render Engine and required plugin.

Use the RenderStream Layer to control the third party render engine.

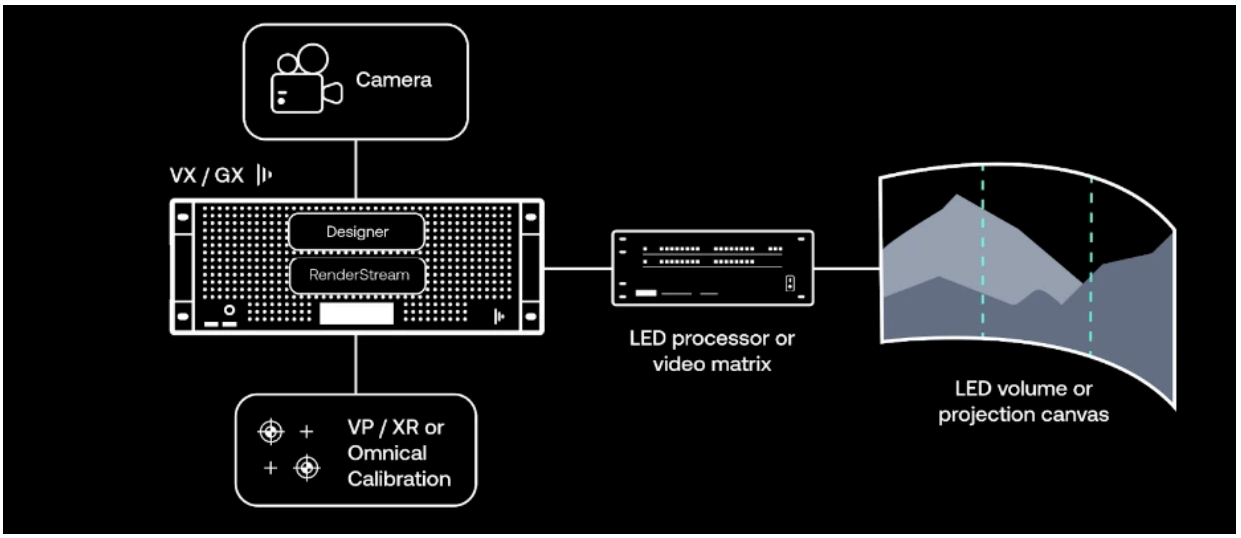
- Notch
  - Plugin - included in Designer.
  - Documentation
- Touch Designer
  - Plugin
  - Documentation
- Unity
  - Plugin
  - Documentation
- Unreal Engine
  - Plugin
  - Documentation

> **Note**
>
> The preferred sync adapter should not be left set to ‘any’, it should be set to the network of the highest bandwidth that is available to all machines in the workload, plus the Disguise machines. This network will then be the one that is used to do the project sync and for all workload comms.

RenderStream Local

RenderStream Local has been designed to provide flexible real-time control without the hardware overhead and networking complexity. The setup has been simplified with minimal physical infrastructure requirements. By hosting rendering and output on the same machine, RenderStream Local achieves lower output latency.

RenderStream Local is compatible with Unreal Engine, Unity, Notch, and TouchDesigner. Sequencing of the third-party render engine can be accomplished via the RenderStreamLocal Layer in Designer.



Features

RenderStream Local enables RenderStream workloads to run locally on VX (with the exception of the VX 4 and VX 4+) or GX range media servers with any render engine which has a RenderStream plugin. Unreal Engine, Unity, TouchDesigner, and Notch are all supported.

The VX 4 and VX 4+ do not currently support RenderStream Local as further development work is needed for AMD GPU support.

Limitations

Running a render engine on the same media server as Designer is inherently less performant. This will depend on the type of render engine and the nature of the scene. It is recommended to always test the content in RenderStream Local configuration in order to determine if the performance is satisfactory.

Compute for rendering is shared with compute for compositing and other operations, careful testing of any set up is required.

Server Support

The VX 4 and VX 4+ do not currently support RenderStream Local.

TouchDesigner is the only RenderStream plugin type which is enabled on the EX range via RenderStream Local. Notch block playback is currently not supported using the RenderStream Local layer, and should use the Notch layer instead.

Mapping

Mesh mapping is not supported on servers with **AMD** graphics cards.

Mesh mapping is only supported on servers with **Nvidia** graphics cards after r32.1.1.

Licensing

RenderStream Local Layers will show watermarked content by default unless the correct license is applied to the machine. Licensing is applied at the machine-level so every machine in your session that is expected to render RenderStream Local content must have the correct license. Which license you need depends on the machine type you have.

EX Range Machines

EX range machines support only TouchDesigner as a render engine with RenderStream Local, and require a Real-time Connector license applied to the machine rendering the layer.

VX and GX Range Machines

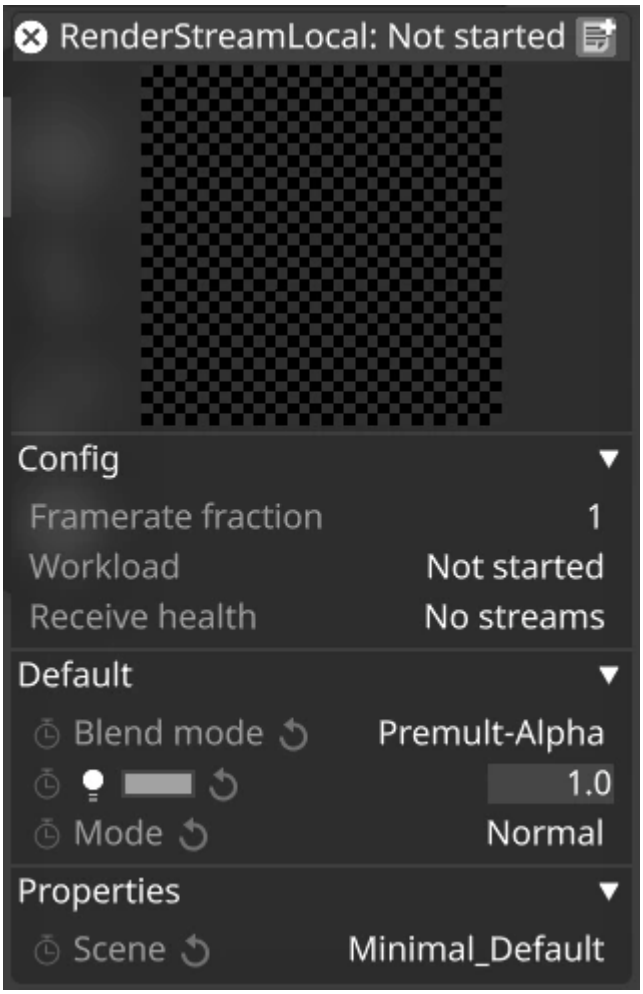
VX and GX range machines support all render engines and require a full RenderStream license applied to the VX or GX machine rendering the layer. This is the same license as a normal RenderStream license on an RX machine.

RenderStream Local Layer

The RenderStream Local Layer is used to control third-party render engines running externally to Designer locally on a VX or GX server. The RenderStreamLocal layer is a local RenderStream mode used to sequence instances of Unreal Engine, Unity, and TouchDesigner using the same RenderStream plugins as RenderStream in remote mode. Support for Notch is built into Designer.

The VX 4 and VX 4+ do not currently support RenderStream Local.

TouchDesigner is the only RenderStream plugin type which is enabled on the EX range via RenderStream Local. Notch block playback is currently not supported using the RenderStream Local layer, and should use the Notch layer instead.



There are four main sections within the RenderStreamLocal Layer:

- Media Thumbnail
- Config

- Default
- Properties

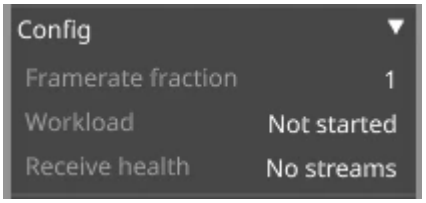
Media Thumbnail

This area will display an image of the active stream being received. Note that in a multi-channel environment, this will only show the Camera in UE that has the RS component attached to it.

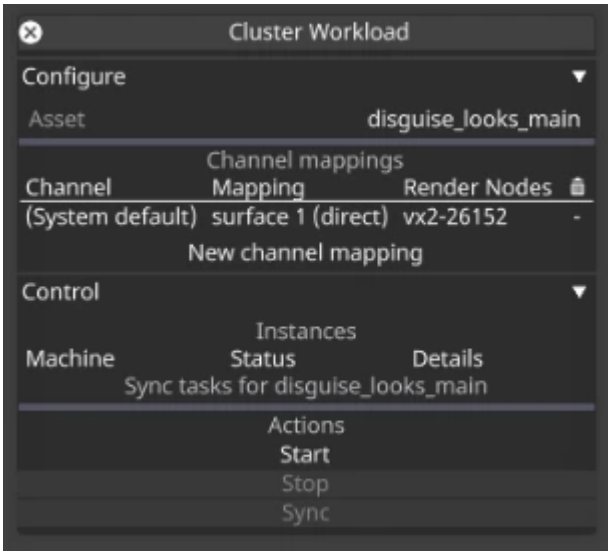


Configuration

This section describes the configuration properties, real-time workload monitoring and engine health monitoring.



Cluster Workload



The Cluster Workload window contains the elements required for configuring a workload. It contains **Configure** and **Control** sections.

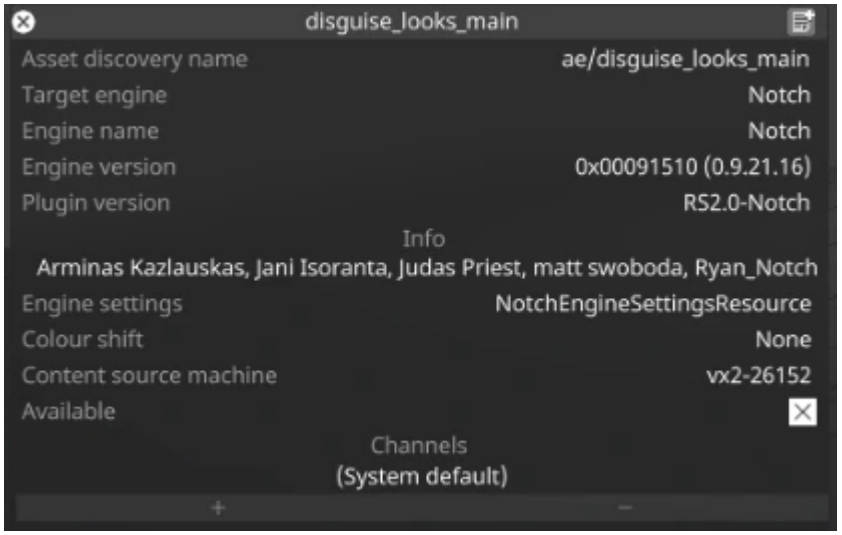
Configure

The Configure section contains elements to set up a workload.

Asset

This is the Render Engine project or Notch block that will be controlled by the layer. In order for the asset to be visible here, it must be present in the RenderStream projects folder of the render machines.

Right-click on the asset name to open the **Asset** properties editor:



Properties include:

- **Asset discovery name**: Name of the folder/project.
- **Target engine**: Name of the Render Engine.
- **Engine version**: Engine version.
- **Plugin version**: Plugin version.
- **Engine settings**: Engine-specific settings.
- **Colour shift**: Apply colour correction to the entire asset.
- **Content source machine**: The render machine that is running the render engine project. This is the machine that the project will be synced from.
- **Available**: Status indicator displaying if the Asset is available. Not a tick box.
- **Channels**: Active channels defined in the render engine project.

Channel Mappings

Channel Mappings include properties such as:

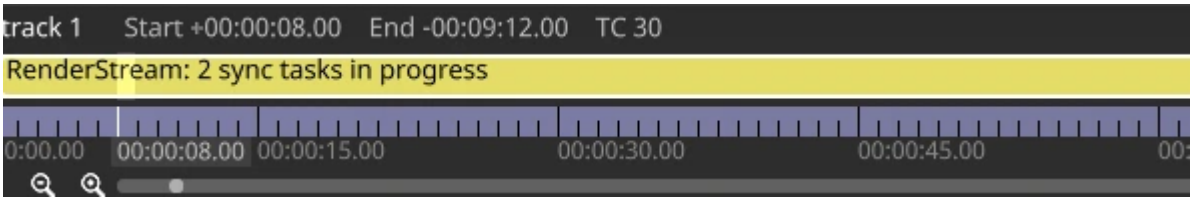
- **Channel:** active channel, editable field.
- **Mapping:** active mapping, editable field.
- **Render Nodes:** list of render machines.
  - This property has a **Manual machine selection** option that is disabled by default. In this case machines will be automatically added to the list when the content is mapped to the machine's output display head in the Feed Editor.
  - If **Manual machine selection** is enabled, the machine list field becomes editable. It will override the auto-generated list created by the content mapping in the Feed Editor.

Control

The Control section allows for managing the workload.

- **Instances:** When started, the Instances table will be populated with the machines that have been sent the start signal.
- **Start:** sends a signal to all machines in the Render Nodes list to launch the Asset according to config settings.
- **Stop:** Sends a signal to cease outputting a stream and quit the process sending it. The workload log can be opened by left-clicking on the status within the Instances table
- **Sync:** begins the process of content sync. Content is synced from the source machine to all other available Render Nodes; it copies only the necessary directories and files needed.

  With r31.0.3, a new workload status has been added to show sync progress (in progress, complete, failed) on the RenderStream Local layer.

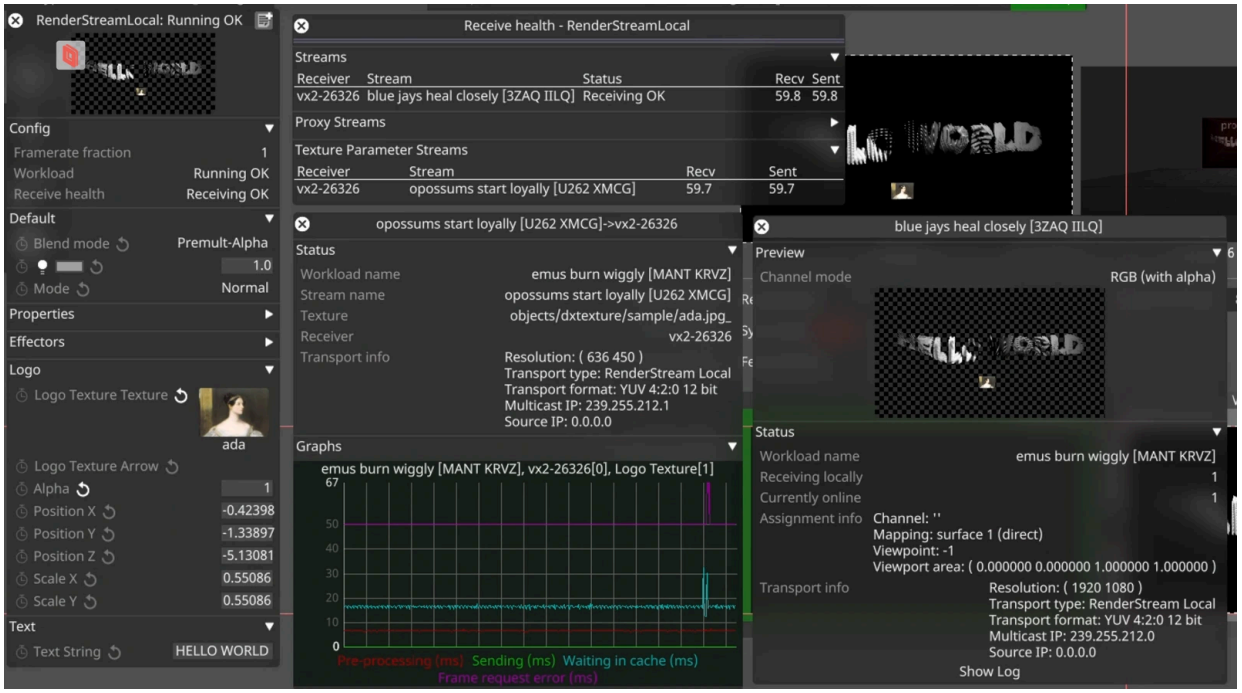


> **Note**
>
> Any changes to the settings require a restart of the workload.

Receive Health

The statuses of all render machines are dynamically reported while the stream is running.

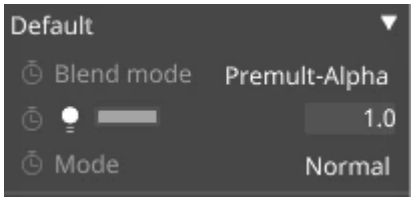
Right-click on **Receive health** to open the machine-specific window:



For more information, see [RenderStream Layer]

Default

In the Default section of the RenderStreamLocal Layer, there are four common layer properties:



- **Blend Mode**: Premult-Alpha is needed for content that contains alpha data.
- **Brightness**: Layer intensity.
- **Mode**: This is used to determine the timeline's playback behaviour as the layer is playing.

Properties Section

The last section of the RenderStreamLocal layer is asset-specific and will display all exposed parameters from the asset, as well as their keyframe editors



> **Note**
>
> The current release version does not support remote texture sharing.

Transport Format Differences

RenderStream Local operates exclusively at the highest transport quality supported by Designer. Unlike remote RenderStream workflows, the transport format is fixed and cannot be adjusted.

Key characteristics are as follows:

- YUV 12-bit is always used and is the only supported transport format.
- 8-bit and 10-bit transport formats are not supported in RenderStream Local.
- Alpha is enabled by default and is always included in the stream.

Render Engine Workflows

Set up your environment, including installation of the Render Engine and required plugin.

Use the RenderStreamLocal Layer to control the third-party render engine.

- Notch
  - Plugin - included in Designer.
  - Documentation
- Touch Designer
  - Plugin
  - Documentation
- Unity
  - Plugin
  - Documentation
- Unreal Engine
  - Plugin
  - Documentation

RenderStream Overview

RenderStream is Disguise's scalable architecture to extend and augment the platform's visual capabilities, plugging in both partner applications such as 3D realtime render engines and other visual functionality extensions.

A range of RenderStream plugins have been developed enabling the sequencing of content from a variety of sources including AI, AR, and graphics processing.

RenderStream is available for use in remote rendering and local rendering mode, and enabled with the same RenderStream license.

Remote Rendering

With RenderStream remote mode, the rendering is performed on one or more dedicated render nodes which are distinct from the media servers that are compositing and outputting the content. These are typically Disguise RX nodes. Render nodes can be used to scale content endlessly without being limited by the capabilities of a single GPU, and are connected together via a high-speed network configuration.

> **Note**
>
> Remote mode is also referred to simply as RenderStream.

Local Rendering

With RenderStream Local mode, the rendering is performed directly on the media server that is responsible for compositing and outputting the content, which minimises interaction delay by removing the need to transport frames through a high-speed network.

RenderStream Remote vs RenderStream Local

Criteria	RenderStream remote mode	RenderStream local mode
Flexibility	Provides maximum flexibility for rendering without being tied to the media server's physical output.	The workload must render what is required by the physical output of the media server.
Performance	Non-rendering operations cannot impact rendering performance.	Since rendering, compositing, and other operations are executed on the same media server, it may impact the performance.
Simplicity	Requires more complex set up and additional network configuration.	Provides simplified set up in Designer and does not require additional network administartion above a regular Designer session.
Network Latency	Includes additional network latency for a stream.	Does not include additional network latency since rendering and physical output are performed on the same server.
Rack Space	Requires additional render nodes and Fabric switch.	Requires less rack space.

For more information about these modes, check out RenderStream) and RenderStream Local.

RenderStream Assets

RenderStream assets are the files that are used to create the content that is rendered by the render nodes. These assets can be created in Unreal Engine, Unity, Notch, TouchDesigner, and other third-party render engines integrated via the RenderStream SDK.

Assets are stored in a specific location on the render node. By default this is the `D:\Renderstream Projects` folder on Disguise hardware products, and `C:\Users\USERNAME\Documents\Renderstream Projects` otherwise. This path is defined by a registry key, `Computer\HKEY_CURRENT_USER\Software\d3 Technologies\d3 Production Suite\RenderStream Projects Folder`. The path can be changed by modifying the registry key. The change will be automatically detected and the new path will be scanned for assets.

Assets are discovered automatically by d3service, which watches the RenderStream projects folder path for changes, and are shared via the network. Any Designer instance, connected to the same network will be able to select the asset.

Engine Support

Disguise provides first-party support for Unreal Engine, Unity and Notch with RenderStream. In order to communicate with Disguise, both Unreal Engine and Unity require the installation of a plugin on the render node. Visit the **Disguise GitHub** for the latest plugins.

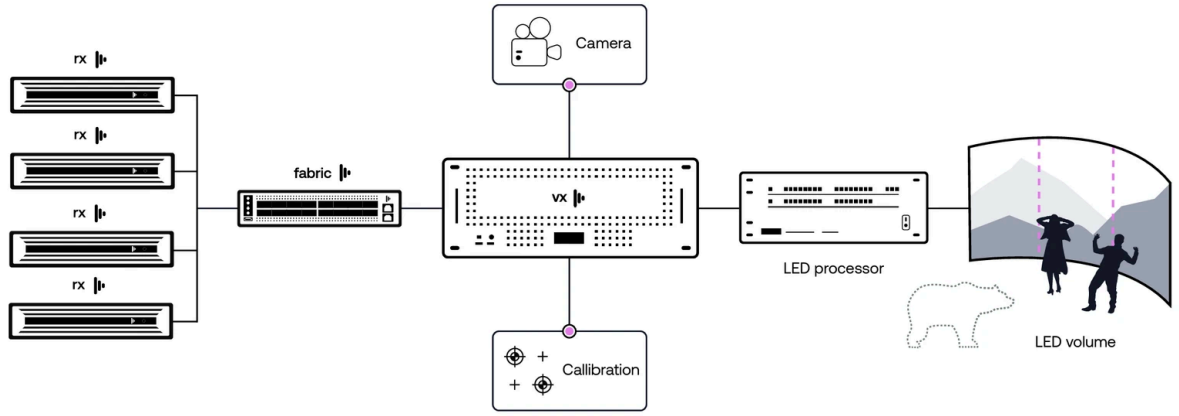
Other engines, such as TouchDesigner and Volinga, are maintained by their developers. RenderStream is open source for developers to implement their own support. Take a look at Extending RenderStream to learn about making your own implementation of RenderStream for custom engines.

Further Reading

Read the **Disguise Whitepaper** to learn more about how the Disguise architecture works with RenderStream.

RenderStream

RenderStream is compatible with Unreal Engine, Unity, TouchDesigner and Notch with the rendering performed on render nodes. Sequencing of the third-party render engine can be accomplished via the RenderStream Layer in Designer.



Uncompressed vs. Compressed

RenderStream Uncompressed requires the use of a Mellanox network interface to stream uncompressed, 10bit video data. To test RenderStream Uncompressed appropriately, access to multiple machines and the networking equipment specified is required. Testing RenderStream Uncompressed also requires both a RenderStream Send License and a RenderStream Uncompressed License.

RenderStream Compressed provides consistent content quality with advanced H.265 compression. You can now choose high frequency compression, and ensure that even the finest details of your content are shown via our superior, reliable networking.

Cluster Rendering

> **Warning**
>
> For cluster rendering it's recommended to use render nodes from the same Disguise product range, e.g. all RX series machines. Mixing of machines from different product ranges is not recommended and is unsupported. It is acceptable to mix RX and RX II types however.

Here are just some of the benefits of using :

1. Cluster Rendering allows you to span your render engine content over more than one Disguise server by scaling out real-time content up to an unlimited capacity.
2. Each machine will let you render a fragment of your final content frame to increase the render power and get your content onto your displays at your desired quality.
3. Use Cluster Rendering to render real-time content of the highest quality, detail and framerate without worrying about GPU power.

Cluster Rendering is configured within Disguise Designer using the RenderStream Layer.

RenderStream Resources

RenderStream versions, downloads, and release notes.

RenderStream is a protocol for controlling third-party render engines from Designer.

We recommend that in all instances you use the latest plugin versions, which can be found on GitHub.

RenderStream plugins support both layers, the RenderStream layer, and the RenderStream Local layer.

Unreal Engine

GitHub https://github.com/disguise-one/RenderStream-UE/releases

For release notes and full information, see GitHub.

Versions

Unreal Engine 5.7

Plugin	Compatibility
RS UE 5.7 plugin r2.0	Compatible with r25 & higher.

Unreal Engine 5.6

Plugin	Compatibility
RS UE 5.6 plugin r2.0	Compatible with r25 & higher.

Unreal Engine 5.5

Plugin	Compatibility
RS UE 5.5 plugin r2.0	Compatible with r25 & higher.

> **Note**
>
> The settings UI for this version is slightly different. Instead of the Scene Selector setting being in a separate section, it is now in the same section as the rest of the settings.

> **⚠ Warning**
>
> Due to a bug in Unreal Engine 5.5.0, DX11 does not work with RenderStream. This issue was fixed in version 5.5.1.

Unreal Engine 5.4

Plugin	Compatibility
RS UE 5.4 plugin r2.0	Compatible with r25 & higher.

Unreal Engine 5.3

Plugin	Compatibility
RS UE 5.3 plugin r2.0	Compatible with r25 & higher.

Unreal Engine 5.2

Plugin	Compatibility
RS UE 5.2 plugin r2.0	Compatible with r25 & higher.
RS UE 5.2 plugin r1.30	Compatible with r22 & higher.

Unreal Engine 5.1

Plugin	Compatibility
RS UE 5.1 plugin r1.30	Compatible with r22 & higher.

Unreal Engine 5

Plugin	Compatibility
RS UE 5.0 plugin r1.30	Compatible with r22 & higher.
RS UE 5.0 plugin r1.29	Compatible with r21.

Unreal Engine 4.27

Plugin	Compatibility
RS UE 4.27 plugin r1.30	Compatible with r22 & higher.
RS UE 4.27 plugin r1.29	Compatible with r21.
RS UE 4.27 plugin r1.28	Compatible with r20.

Plugin	Compatibility
RS UE 4.27 plugin r1.27	Compatible with r19.

Unreal Engine 4.26

Plugin	Compatibility
RS UE 4.26 plugin r1.28	Compatible with r20.
RS UE 4.26 plugin r1.27	Compatible with r19.
RS UE 4.26 plugin r1.25	Compatible with r18.

Unreal Engine RenderStream Sample projects

Sample projects include:

- RenderStream plugin
- backplate camera (cam_backPlate)
- front plate camera (cam_frontPlate)
- an auto-generated .JSON file

Each camera has a **RenderStream Channel Definition component** attached, ready to connect to a **RenderStream layer**.

Each project has a rotating Disguise logo blueprint added to the scene. A float variable parameter called “logoRotationSpeed” has been exposed to control the rotation speed of the logo via the level blueprint. This demonstrates how an exposed variable is setup in the level blueprint. This exposed parameter is set to editable and so can be controlled directly from the **RenderStream layer** editor.

Sample projects

Designer r25 and above [RS2.0]

UE Version	RS Version	Link
RS UE 5.7	RS2.0 v0 plugin	max_UE5_7_clean_26_01_27.zip
RS UE 5.6	RS2.0 v0 plugin	max_UE5_6_clean_24_12_20.zip
RS UE 5.5	RS2.0 v0 plugin	max_UE5_5_clean_24_12_20.zip
RS UE 5.4	RS2.0 v1.1 plugin	max_UE5_4_clean_24_08_28.zip
RS UE 5.3	RS2.0 v2 plugin	max_UE5_3_RS2_0-24_04_09.zip
RS UE 5.2	RS2.0 v0 plugin	max_UE5_2_rs2-0_24-01-24.zip

UE Version	RS Version	Link
RS UE 5.1.1	RS2.0 v0 plugin	max_UE5_1_Clean_240401.zip
RS UE 5.0.3	RS2.0 v0 plugin	max_UE5_0_rs2-0_24-01-24.zip
RS UE 4.27	RS2.0 v0 plugin	max_UE4_27_Clean_240401.zip

Designer r22 and above [RS1.30]

UE Version	RS Version	Link
RS UE 5.2	RS1.30 v0 plugin	max_UE5_2_rs1-30_24-01-24.zip
RS UE 5.1.1	RS1.30 v0 plugin	max_UE5_1_rs1-30_24-01-24.zip
RS UE 5.0.3	RS1.30 v0 plugin	max_UE5_0_rs1-30_24-01-24.zip
RS UE 4.27	RS1.30 v0 plugin	max_UE4_27_rs1-30_24-01-24.zip

Designer r21 and below

UE Version	RS Version	Link
RS UE 5.0.3	RS1.29 v9 plugin	max_UE5_0_rs1-29_r21_24-01-24.zip
RS UE 4.27	RS1.29 v6 plugin	max_UE4_27_rs1-29_21_24-01-24.zip

Unity

GitHub **https://github.com/Disguise-one/RenderStream-Unity**

For release notes and full information, see GitHub.

For more information, see RenderStream and Unity.

Notch

The Notch plugin is bundled with Designer.

For the Demo Notch Builder Project, visit **download.Disguise.one/#resources**.

For more information on the Notch integration, visit RenderStream and Notch.

TouchDesigner

For more information on the RenderStream and TouchDesigner integration, visit RenderStream and TouchDesigner.

Volinga

For more information on the RenderStream and Volinga integration with Unreal Engine, visit Volinga.

RenderStream Integration SDK

The RenderStream Integration SDK is available to those wishing to develop their own integrations.

The GitHub repository is for API definitions, documentation and examples. For more information, see the **GitHub RenderStream Integration SDK page.**

RenderStream Schema

When using the RenderStream plugin in a project, a JSON file is automatically generated.

> **Note**
>
> Generating a JSON file does not require a Designer Pro license.

The schema of the RenderStream JSON file is detailed below.

Top-Level Fields

Field	Description
`majorVersion`	The major version of the JSON schema.
`minorVersion`	The minor version of the JSON schema.
`engineName`	Name of the engine generating the file (e.g., “Unreal Engine”).
`engineVersion`	The version of the engine used (e.g., “5.4.0”).
`pluginVersion`	Version of the RenderStream plugin.
`info`	Reserved for additional metadata (currently empty in your example).
`channels`	A list of RenderStream channels (typically camera names or IDs).
`schema`	An array of scene-specific parameter definitions (explained below).

Schema → Parameters Structure

Each item in the schema array defines a scene and its controllable parameters. In your example:

Schema Object

```
{
    "name": "SampleScene",
    "parameters": [ ... ]
}
```

- name: The name of the RenderStream scene.

- parameters: An array of adjustable parameters in that scene.

Example Parameter Object

```
{
    "group": "Default",
    "displayName": "Message",
    "key": "Message",
    "type": 0,
    "min": 0.0,
    "max": 1.0,
    "step": 1.0,
    "defaultValue": {
        "index": 0,
        "data": 1.0
    },
    "options": ["Off", "On"],
    "dmxOffset": -1,
    "dmxType": 2,
    "noSequence": false,
    "readOnly": false
}
```

Parameter Field Breakdown

Field	Description
`group`	Logical grouping for UI display (e.g., “Default”).
`displayName`	Name shown in the RenderStream controller interface.
`key`	Internal key identifier for the parameter.
`type`	Data type (e.g., 0 often represents enum/switch-style).
`min`, `max`	Range of values allowed.
`step`	Incremental step between values.
`defaultValue`	Contains both `index` and actual `data` value.
`options`	For enumerated types, a list of string values (e.g., “Off”, “On”).
`dmxOffset`	DMX control offset (if used in lighting/control contexts).
`dmxType`	Type of DMX value.
`noSequence`	If true, disables sequence recording.

Field	Description
`readOnly`	If true, the parameter is read-only.

Channels

```
"channels": ["rscam1", "rscam2", "rscam3"]
```

RenderStream - TouchDesigner Integration

RenderStream is the proprietary Disguise protocol for controlling third-party render engines from Designer.

TouchDesigner is a visual development platform that can be used to create interactive media systems, architectural projections, and live music visuals, all in real-time. For more information on RenderStream support in TouchDesigner, please visit Derivative's website here.

Beginning with r22, Disguise added support for a new major real-time engine. Disguise's proprietary RenderStream infrastructure, enabling bi-directional data transfer between Disguise and third-party render engines, now supports the integration of TouchDesigner. This integration, made possible thanks to RenderStream's new support for Vulkan API, will allow users to bring a real-time 3D scene developed in TouchDesigner into Designer and build it into their final project.

RenderStream with TouchDesigner is supported in two different modes, RenderStream and RenderStream Local.

See How It Works



TouchDesigner Integration

- Requires TouchDesigner 2022.28040 or later
- Requires TouchDesigner Pro or TouchPlayer Pro license
- Requires Designer software version r22 or later

3 nodes have been added to for the integration. They are:

- **RenderStream In CHOP**

This node is the primary operator to control and configure a connection with RenderStream. Along with being the sync-point for when a frame starts rendering, it also brings in all of the control channels, and also takes a DAT with schema information to create controllable parameters within Disguise.

https://derivative.ca/UserGuide/RenderStream_In_CHOP

- **RenderStream In TOP**

This node is used to receive image data sent over RenderStream.

https://derivative.ca/UserGuide/RenderStream_In_TOP

- **RenderStream Out TOP**

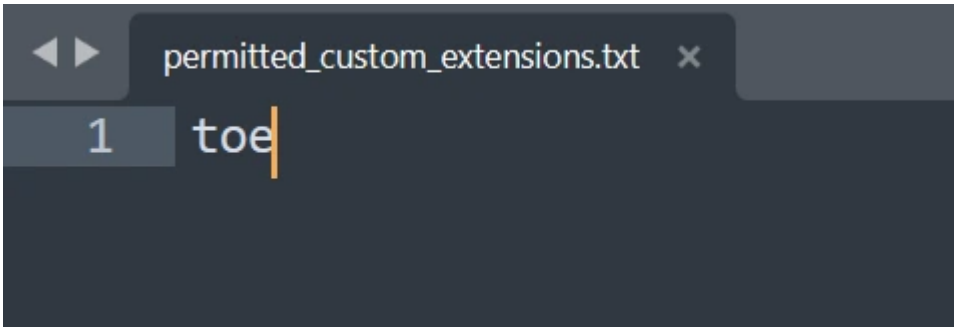
This node is used to send image data out to RenderStream.

https://derivative.ca/UserGuide/RenderStream_Out_TOP

Additional setup

In addition to the above, for TouchDesigner projects to be recognised as valid RenderStream assets, you must create a file called `permitted_custom_extensions.txt` and place it in the root of the `RenderStream Projects` folder. You must do this on any render node you want to discover the asset on.

This file will list the file extensions that Designer will identify as valid RenderStream assets, so you should add `toe` or `.toe` as the first line of the file.



Example of a simple permitted custom extensions file

You can add additional extensions if you want files with other extensions to be detected as RS assets. The default supported file extensions that do not need to be added to this file are:

- `.exe` - Unity and custom executables
- `.uproject` - Unreal Engine
- `.dfxdll` - Notch
- `.nvol` - Volinga

RenderStream Input - TouchDesigner Configuration

This page provides a quick start guide for setting up video input for TouchDesigner using RenderStream.

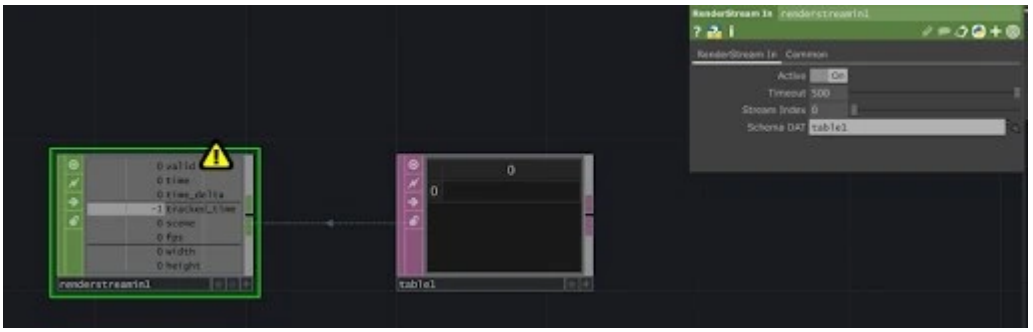
TouchDesigner officially supports RenderStream input and output. Here, we focus on input only.

Prerequisites

- Requires build 2022.28040 or later
- Requires Pro license
- Requires r22 or later
- Adding ‘permitted_custom_extensions.txt’ on the RenderStream Project folder, with ‘toe’ written

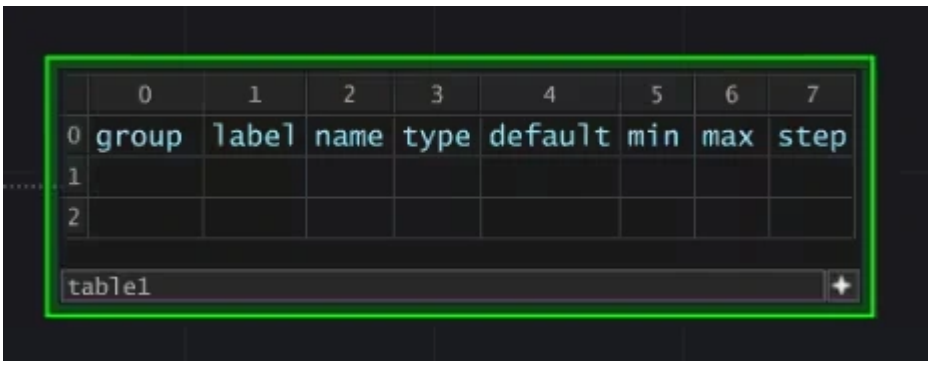
Configuration

1. Create **RenderStream In CHOP**.
2. Create **Table DAT**.

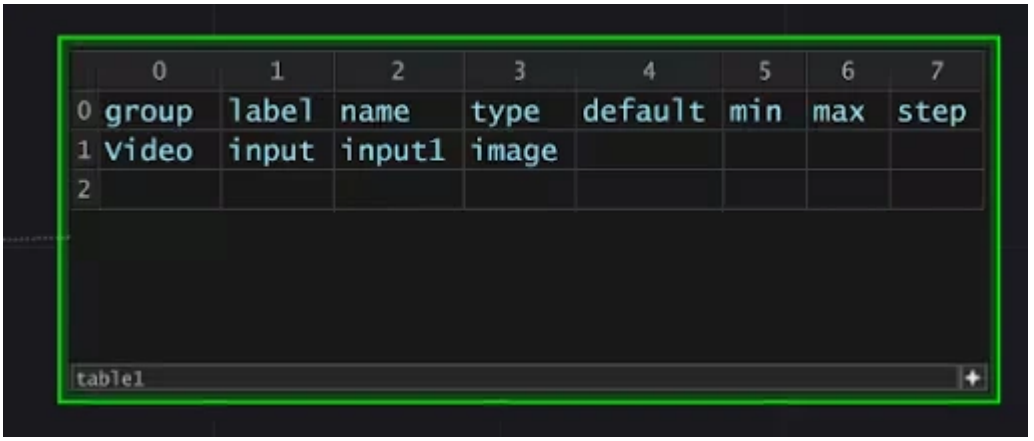


3. Add Table as **Schema DAT** for RenderStream in. Make a note of the node name.

4. Set table to be 8 columns.

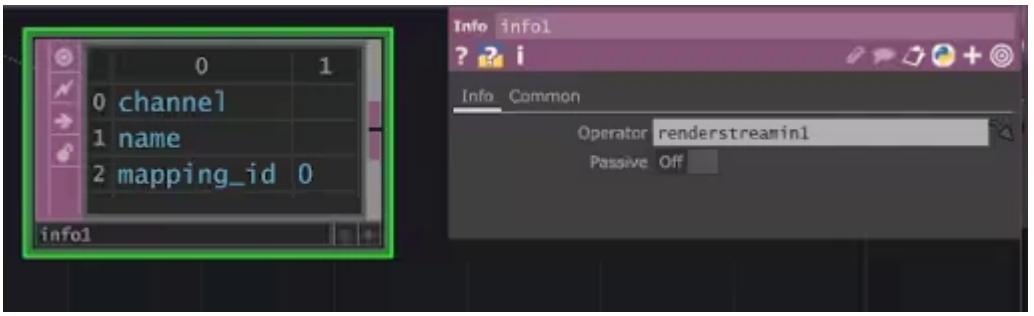


5. Set the first row with video in column 0, input in column 1, input1 in column 2, and image in column 3 as the image below.

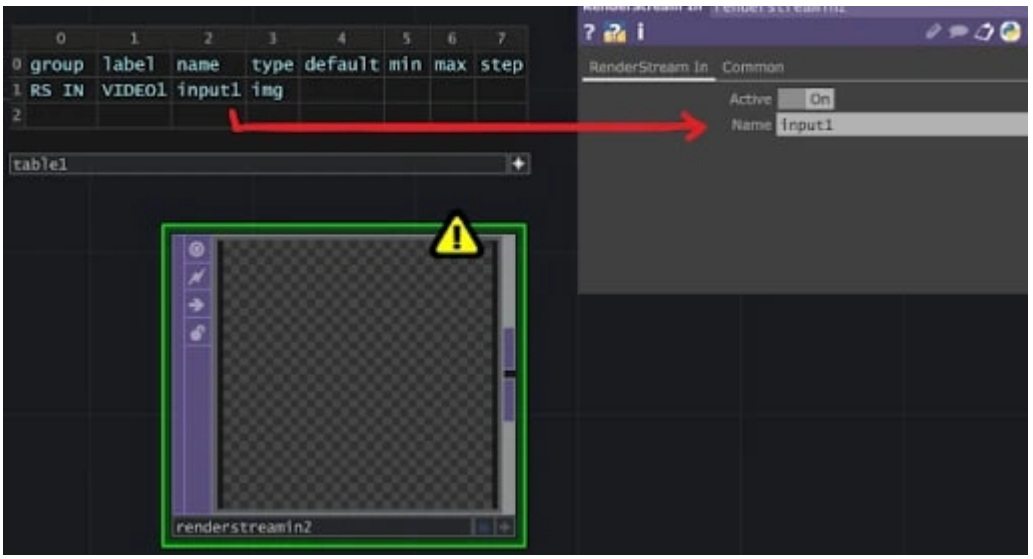


These can be exposed to d3. Note that that **Type** must be set to **Image**.

6. Create **Info DA**' and set its Operator as **RenderStreamIn** CHOP node.



7. Create **RenderStream In TOP**, and set the name to be the same as we set in the table.



These values will now be created as a JSON file.

8. Save the TD project, and run TouchDesigner with RenderStream layer in Disguise. The layer properties will show the values we set in step 5 above.
9. Set the texture using an available asset. or you can arrow the video layer into RenderStream layer.

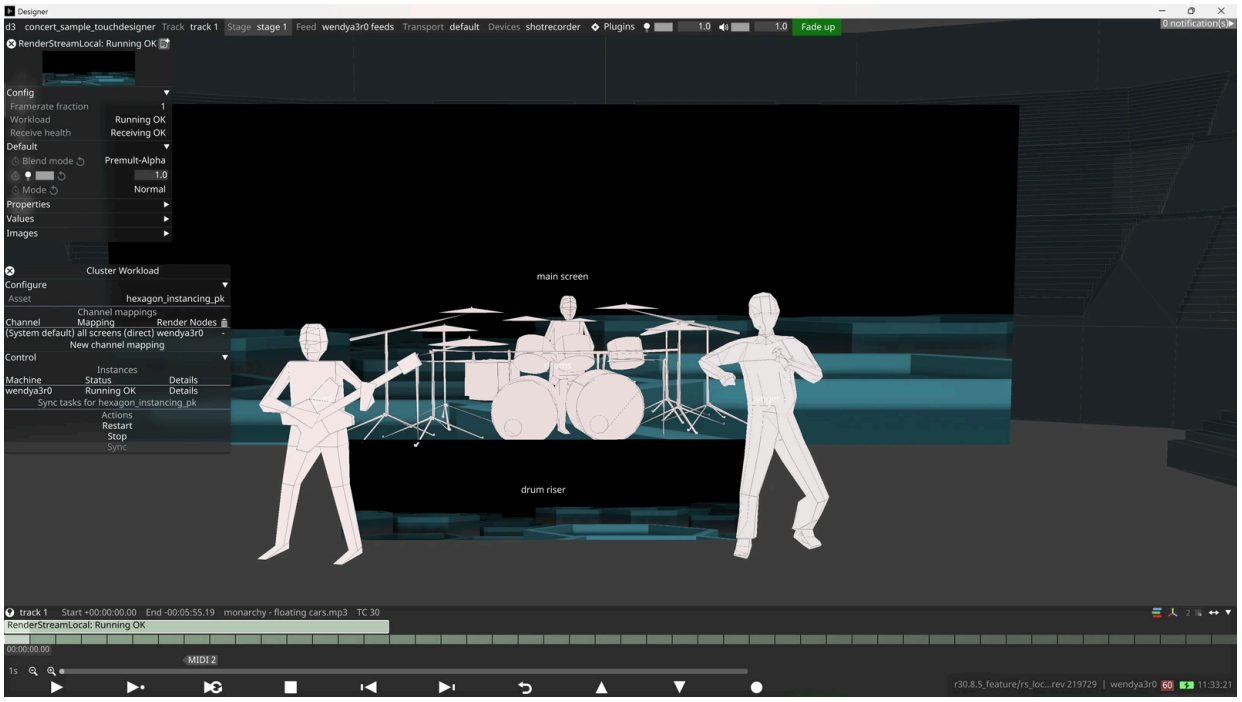
The **RenderStream in TOP** shows an image of the asset that was selected, which is sent from Disguise.

Now we can use it as a video source in TouchDesigner.

TouchDesigner on the EX range

The EX range supports the TouchDesigner RenderStream plugin only via the RenderStreamLocal layer. This is enabled with the optional EX Real-Time connector (RTC) license, which also enables a user to run a Notch block on the EX range. The Real-Time Connector license is purchased as a one-time cost. There is no need for a RenderStream license to enable this functionality. TouchDesigner using the RenderStream layer (where the RenderStream workload is deployed to an RX server) is not supported on the EX range.

TouchDesigner is the only RenderStream plugin type which is enabled on the EX range, provided the correct license is added. To use RenderStream integrations other than TouchDesigner, a VX or GX range media server must be used.



RenderStream Local with Touch Designer

TouchDesigner integration details are described at RenderStream - TouchDesigner Integration

Learn more about optional EX licensing here.

RenderStream - Unity Overview

RenderStream is the proprietary Disguise protocol for controlling third-party render engines from Designer. This section covers how to set up and use Unity with RenderStream.

Unity is a third-party game engine that can be used to create 3D scenes. Unity projects can be adapted to create RenderStream output streams using Disguise's Unity plugin. This plugin supports both camera and non-camera based mappings.

> **Note**
>
> Check your Unity license requirements before starting. Visit the **Unity website** for details.

For cluster rendering, we recommend the use of render nodes from the same media server product range, e.g. all rx series machines. Mixing of machines from different product ranges is untested and unsupported.

Key considerations

Cameras

- There is no need to attach the Disguise RenderStream script to cameras in Unity. Cameras auto-configure on asset launch.

Scene behaviour

- **Manual** mode: GameObjects from all built scenes will not appear in the **Default** scene. To merge scenes or dynamically load/unload them, a custom script must be used.
- The **Default** scene is the first indexed scene in the **Scenes In Build** table in Unity's build options.
- Exposed parameters from all scenes will still show in Designer, even if GameObjects from all built scenes are not merged into the **Default** scene.
- **Selection** mode: GameObjects and exposed parameters are unique to each scene. There is no shared object scene similar to the **Persistent** level in Unreal Engine.

HDRP requirements

When using the Unity High Definition Render Pipeline (HDRP) instead of the Universal Render Pipeline (URP):

- Both the **Windows 10 SDK** and **Game Development with C++** modules must be installed as part of your Visual Studio installation.

- The **Scripting Backend** must be set to **Mono** when building the executable.

Known limitations

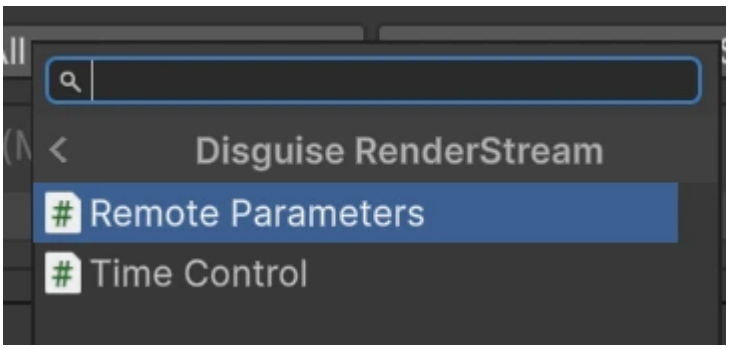
- When launching a Unity executable for the first time, a Windows Firewall popup will appear. If the executable is not allowed through the firewall, Designer will not be able to receive RenderStream data.
- GameObjects included as part of a Unity template may not be able to be controlled via Timecode. This is a Unity limitation rather than a Disguise issue.
- Unity assets are built executables, so Designer will report the engine as **Custom** rather than Unity. Designer cannot detect the plugin version used. If an incompatible plugin combination is used, no notification will be shown.

3D Object Transforms in Unity

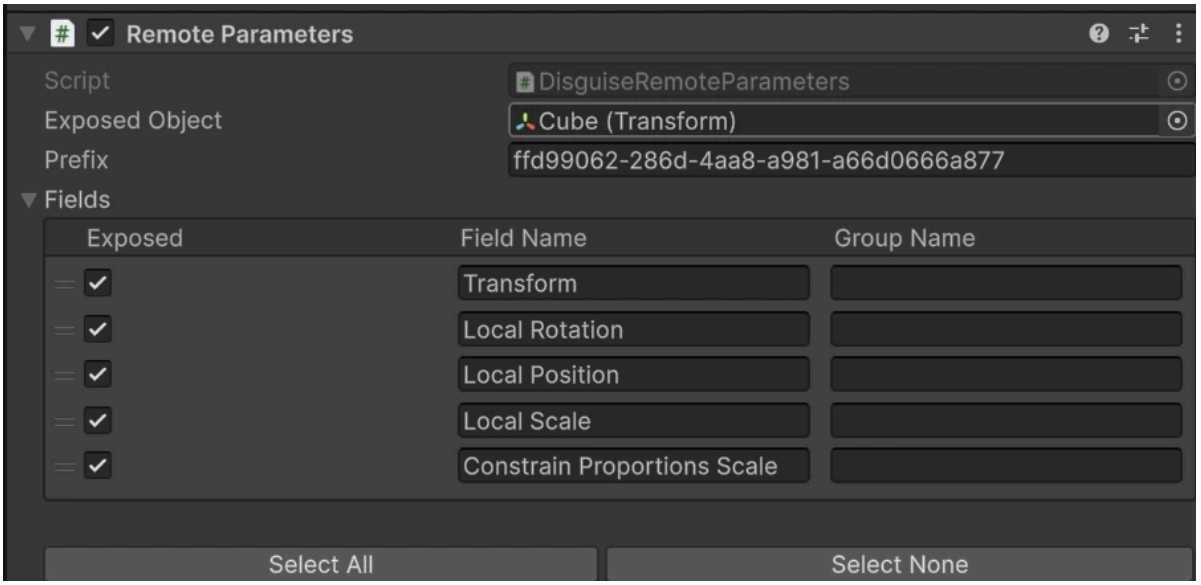
This feature allows you to control the full range of 3D object transforms (translation, rotation and scale) of a Unity GameObject from Designer using a null object.

Unity GameObject setup

1. To control the transforms of a GameObject from within Designer, select the GameObject and add the Remote Parameters component in the Disguise RenderStream category.

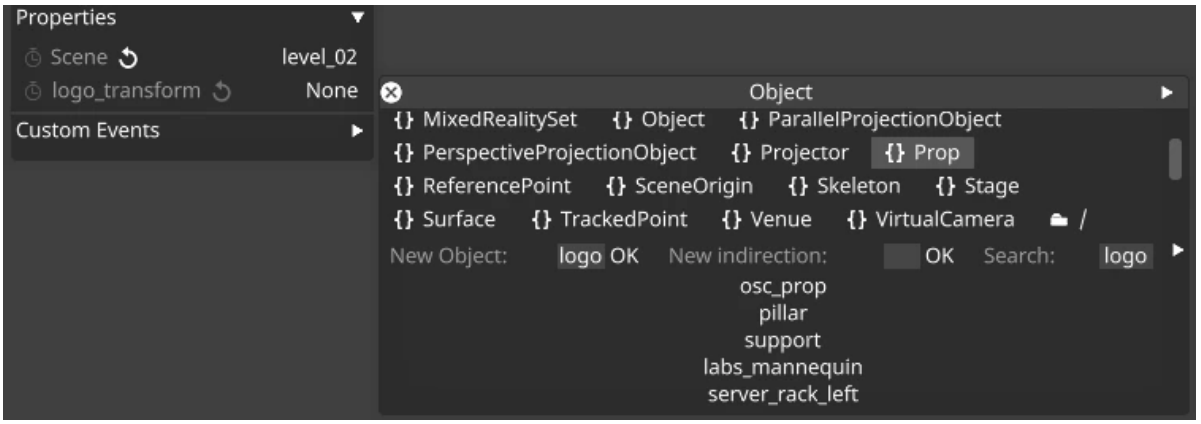


2. Drag the GameObjects Transform component into the Exposed Object variable of the Remote Parameters component. Enable or Disable the parameters of the transform you need, by default, it automatically exposes Transform, Local Rotation, Local Position, Local Scale and Constrain Proportions Scale.



3. Save and build the project.

4. You can now control the GameObject from within Designer by selecting a prop to link its transforms to from within the RenderStream Layer Properties tab.



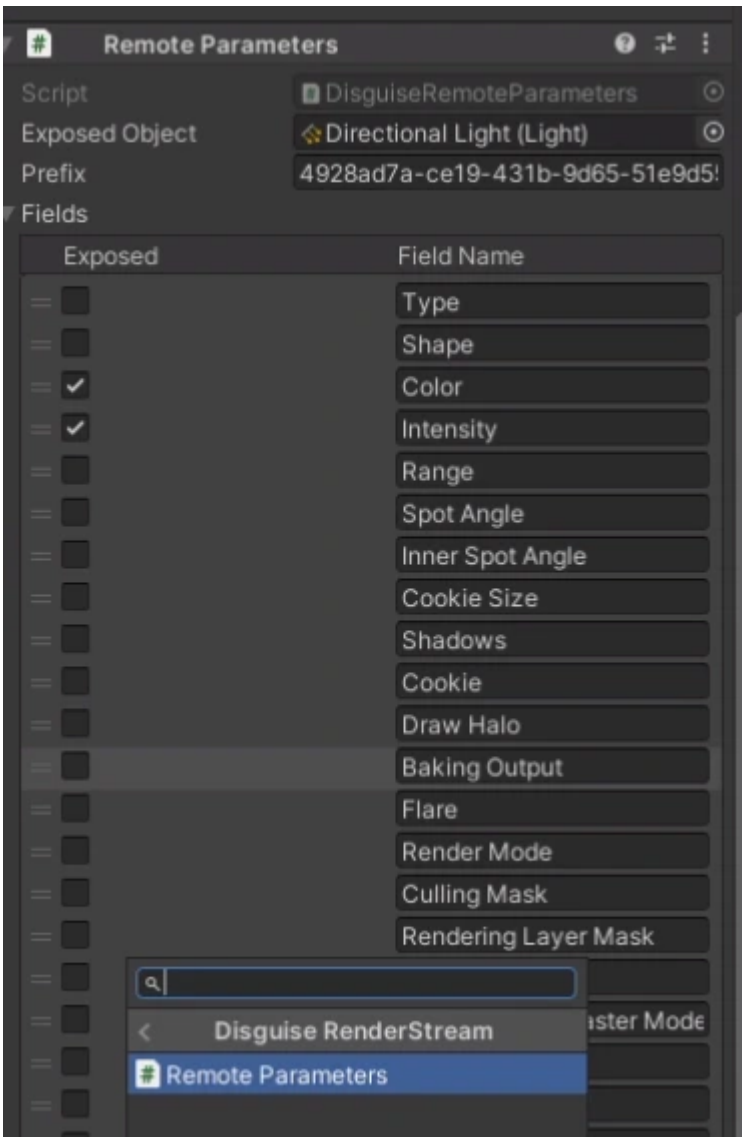
Exposed Parameters in Unity

The Unity plugin allows you to expose certain options for each component of an object available within the scene. These options will be presented as parameters within the RenderStream Layer in Designer. Modifying the value of a parameter in turn changes the value of the corresponding option in Unity thus altering the options of the selected object within the scene.

Exposing any parameter in Unity

1. Select an object from within the scene (e.g. any light source).
2. Select **Add Component** at the bottom of the Inspector panel.

3. Add the **Remote Parameters** component.



4. Drag and drop the component you wish to expose (e.g. Light) into the **Exposed Object** field.
5. Expand the **Fields** separator.
6. Select all options you wish to expose (e.g. Colour and Intensity).
7. Save all changes.
8. Build the project.
9. Save and close Unity.
10. Ensure that the build folder is copied to your RenderStream Projects folder.
11. Open the RenderStream layer in Designer and start the workload.
12. Modify parameter value(s) in the RenderStream widget in Designer.

Unity Project Setup

This topic covers how to set up a Unity project for use with RenderStream, including plugin installation, build settings, and Designer configuration.

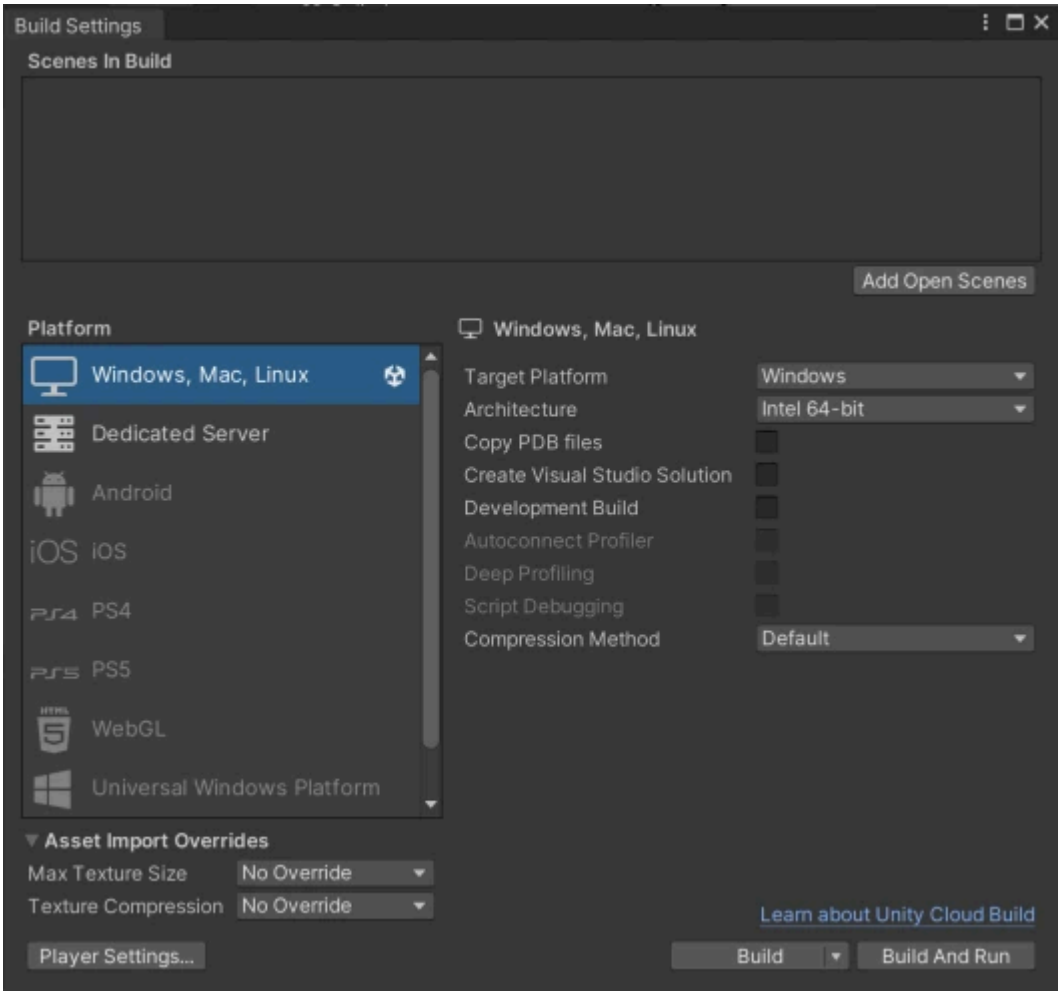
Plugins

- Unity requires a plugin to communicate with Designer. Install the plugin on each render node.
- Download the pre-packaged RenderStream plugin from the **Disguise RenderStream-Unity GitHub**. For the latest version, compile from source code under **releases**.
- Place the plugin into this folder: `PROJECT_ROOT/Assets/DisguiseUnityRenderStream`
- The plugin folder **must** be named correctly and placed in the exact location shown above, otherwise unexpected errors may occur.
- The available plugin uses DX11, `Direct3D11`.

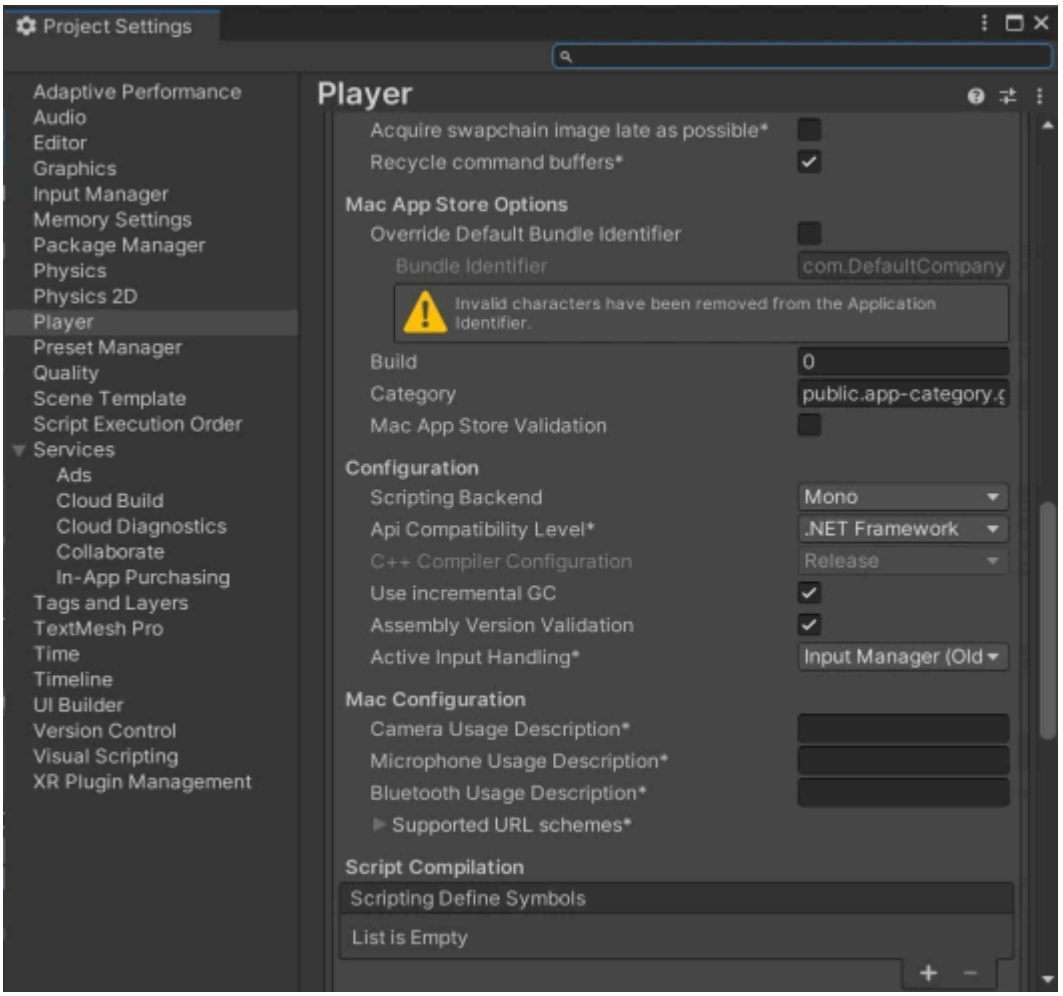
Create a new Unity project

1. Launch Unity, navigate to Projects and select **New**.
2. Create a new 3D project.
3. Name the project, set the location to: `C:\Users\USERNAME\Documents\RenderStream Projects` or `D:\RenderStream Projects` if using a system with a media drive (e.g. RX) and select **Create**.
4. Open the project folder and place the plugin inside the **Assets** folder.

5. Select **File** followed by **Build Settings**:
    - Set **Architecture** to **Intel 64-bit**.



6. Navigate to **Player Settings...** > **Configuration** and set **API Compatibility Level** to **.NET Framework**.



Set GameObject Channel visibility

1. In **Project Settings** > **Tags and Layers**, expand **Layers**.
2. Name an empty **User Layer**.
3. Select any object from the scene.
4. In the Inspector panel, add your new layer in the **Layer** parameter.
5. Select your Camera(s).
6. Open the **Culling Mask** dropdown in the Inspector panel and choose whether each Camera can see the objects in your new Layer.

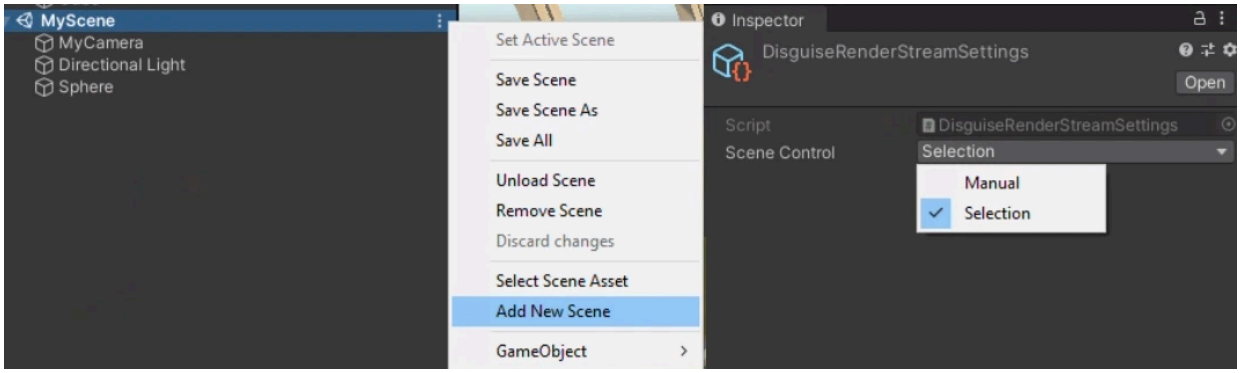
Scenes

Scenes in Unity can be composed of any number of GameObjects which are unique to that scene (by default). The Unity plugin offers two forms of multi-scene support:

Manual - this option restricts Designer's control of scenes and instead merges all Channels and remote parameters into a single scene.

Selection - this option allows scenes to be controlled from inside Designer; Channels are merged into a single list (duplicates removed) and remote parameters are per-scene.

1. Create a new scene, or open an existing scene.
2. In the Project window, open the **Resources** folder and select **DisguiseRenderStreamSettings**.
3. Set **Scene Control** option accordingly.
4. Ensure all required scenes are selected in the Build settings.
5. Build the Unity project.
6. Save and close Unity.
7. Ensure that the build folder is copied to your RenderStream Projects folder.
8. Open the RenderStream layer in Designer and start the workload.
9. Modify the **Scene** parameter as part of your normal sequencing.



Building the Unity project

RenderStream integrates with Unity builds rather than the Unity editor/game mode.

1. If you have multiple scenes in your project, ensure that the scene you wish to build appears in **File** > **Build Settings**.
2. Build the project.
3. Save the project and then close Unity.
4. Ensure that the build folder is copied to your RenderStream Projects folder.

> ⚠ **Caution**
>
> Ensure the correct version of Designer is installed on all machines in the network, including render nodes.

RenderStream Layer configuration in Designer

1. Create a new RenderStream Layer in your Designer project.
2. Select **Asset** and choose your executable.
3. Right-click the Asset to open its editor and set **Source Machine** to the machine with the asset (used for syncing content).
4. Select **Cluster Pool** and create a new cluster.
5. Within the **Cluster Pool**, add the desired machines.
6. Select **Cluster Assigner** and create a new **Cluster Assigner**.
7. Within the **Cluster Assigner**, select the Asset.
8. Select **New Channel Mapping**.
9. Within each Channel's row, select the relevant mapping type, assigner and load weight.
10. If the machines in the **Cluster Pool** do not have the content or the project has changed, press **Sync**.
11. Ensure all **Sync Tasks** are marked completed.
12. Press **Start**.
13. Wait for Workload status to switch to **Running**.

> **Firewall**
>
> You may see a Windows security dialogue the first time you run the asset.
>
> Click **Enable** / **Allow** to permit RenderStream communication to/from Designer.
>
> If communication fails, check the outbound firewall rules on the Unity machine and the inbound rules on the Disguise machine.

Unity assets can only be split across multiple nodes when using 3D Mappings (i.e. Camera Plate or Spatial). Attempting to split using a 2D Mapping will not work; all nodes will render the entire frame.

Remote Text Parameters in Unity

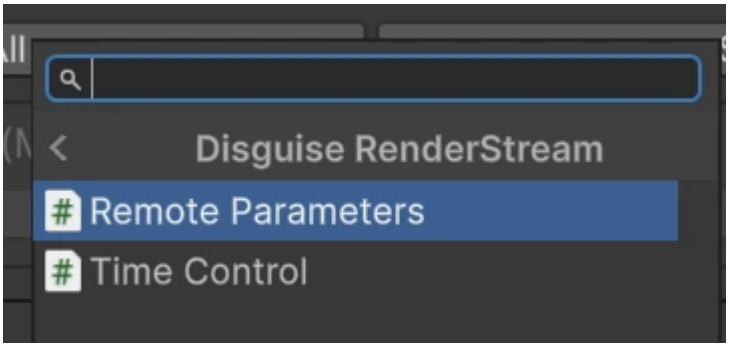
The Exposed Parameter workflow can also be used to expose live text parameters using a Text GameObject in the Unity engine. You can use the Remote Parameters workflow to expose the text input field in Designer, allowing you to edit the text in real time.

Create a Text GameObject

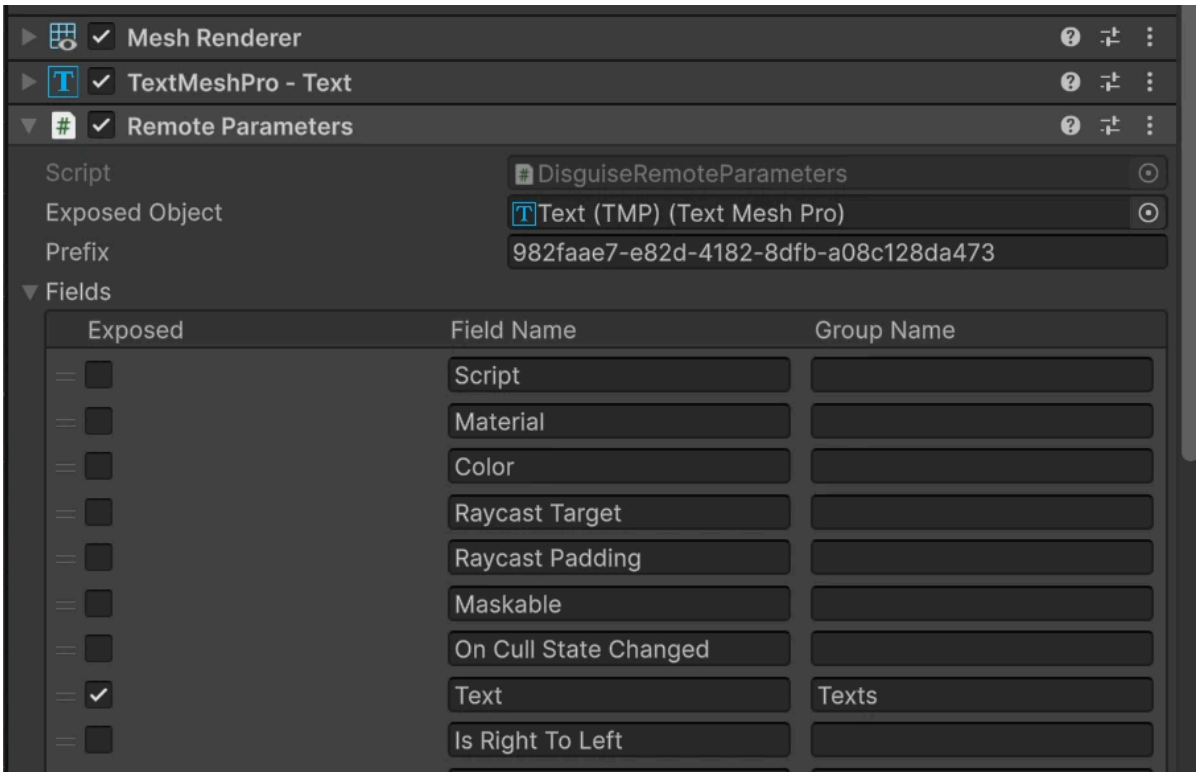
By adding a Text GameObject to your scene, you will be able to adjust the text properties such as colour, size, and text, from Disguise using the RenderStream Layer. Ensure that you have the RenderStream plugin added and enabled to the Unity project.

Remote Text Parameters setup

1. To control the text of a Text GameObject from within Designer, select the Text GameObject and add the Remote Parameters component in the Disguise RenderStream category.



2. Drag the Text GameObjects Text component into the Exposed Object variable of the Remote Parameters component. Enable or Disable the parameters you need.



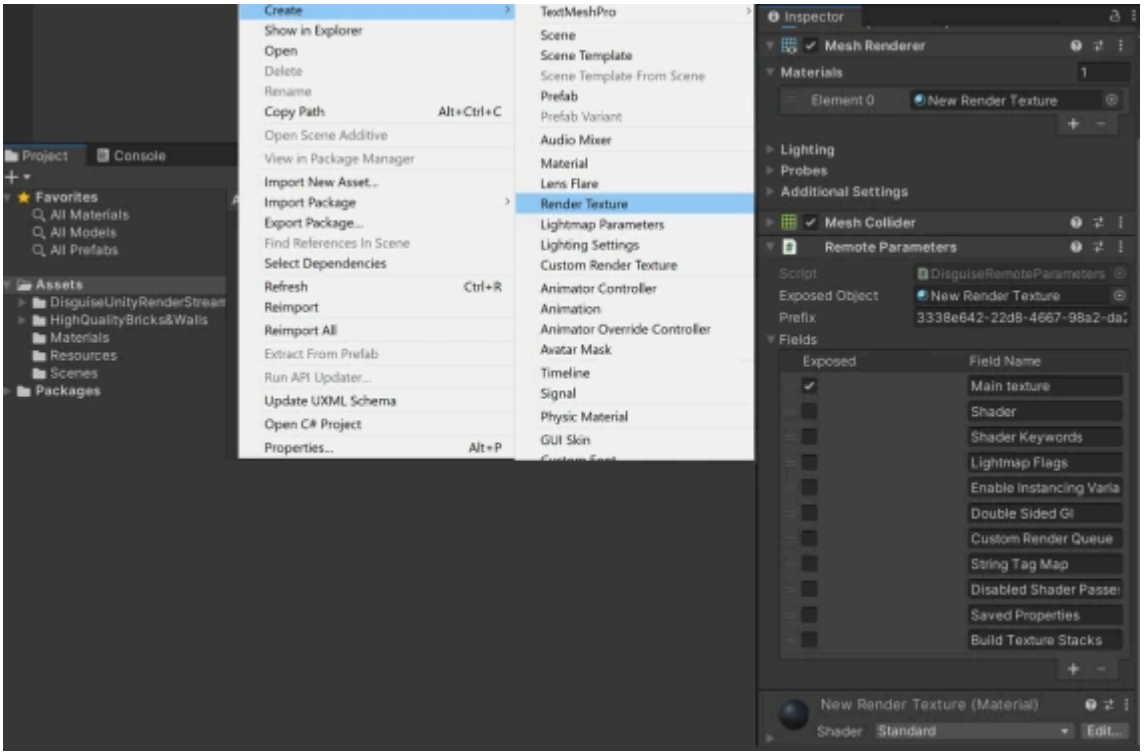
3. Save and build the project.
4. You can now control the Text from within Designer.

Remote Texture Parameters in Unity

The Unity plugin offers support for sharing textures remotely through the use of exposed parameters. This allows a two-way flow of video content between Designer and the Unity engine.

Remote Texture Parameters setup

1. [Optional] Add a Plane (or any other 3D GameObject) to the scene.
2. Create a new Render Texture: Select **Assets** in the Project panel. Right-click inside and select **Create** > **Render Texture**.



3. Drag and drop the new Render Texture onto your Plane (or 3D GameObject of your choice) in the scene. Confirm that the new Render Texture has been added as a **Material** component to your GameObject.
4. Add a **Remote Parameters** component to the Plane (or 3D GameObject of your choice). Drag and drop the new Render Texture (Material) component into **Exposed Object**. Open the **Fields** separator and ensure that **Main Texture** is enabled (no need to enable any other fields).
5. Build the Unity project.
6. Save and close Unity.
7. Open the RenderStream layer in Designer and start the workload.

8. Create a new layer (e.g. Video) and assign media (e.g. Ada).
9. Move the new layer underneath the RenderStream Layer with Ctrl+Alt+down arrow.
10. Alt+drag to arrow the newly created layer into the RenderStream Layer.
11. Confirm arrowed input appears in the RenderStream content.

Timeline and Time Control in Unity

> **Coming from Unreal Engine?**
>
> Unity's **Timeline** with a **Playable Director** is the equivalent of **Level Sequences** in Unreal Engine. The workflow is similar — you keyframe animations in the engine and control playback from Designer via Timecode.

The Unity plugin offers Timecode support. This means that if any GameObject has a **Playable Director** component and is animated using timeline functionality, it will be reflected in the Designer timeline.

Adding time control to an object in Unity

1. Select **Window** followed by **Sequencing** followed by **Timeline**.
2. Optionally, move the Timeline Window from the main panel to the bottom panel (i.e. drag and drop Timeline Window next to Console Window).
3. Select an object from within the scene (e.g. any user placed prop).
4. Click the **Create** button within the Timeline Window.
5. Save the new Timeline.
6. Hit the Record button on the newly created Animator for the chosen object within the Timeline.
7. Add an initial keyframe by right-clicking on any animatable property of the object (e.g. Position) and select **Add Key**.
8. Move the playhead along the Timeline.
9. Modify your chosen property either by using the 3D controls within the Scene or by updating the value directly from within the Inspector panel (a keyframe will be added automatically when a value is changed).
10. Hit the Record button again to stop recording.
11. Return the playhead to the beginning of the Timeline and play the sequence to confirm your animation is correct.
12. With the object still selected, select **Add Component** at the bottom of the Inspector panel.
13. Add the **Time Control** component.

Build and test time control

1. Build the project.
2. Ensure that the build folder is copied to your RenderStream Projects folder.

3. Save and close Unity.
4. Open the RenderStream layer in Designer and start the workload.
5. Play your timeline in Designer.

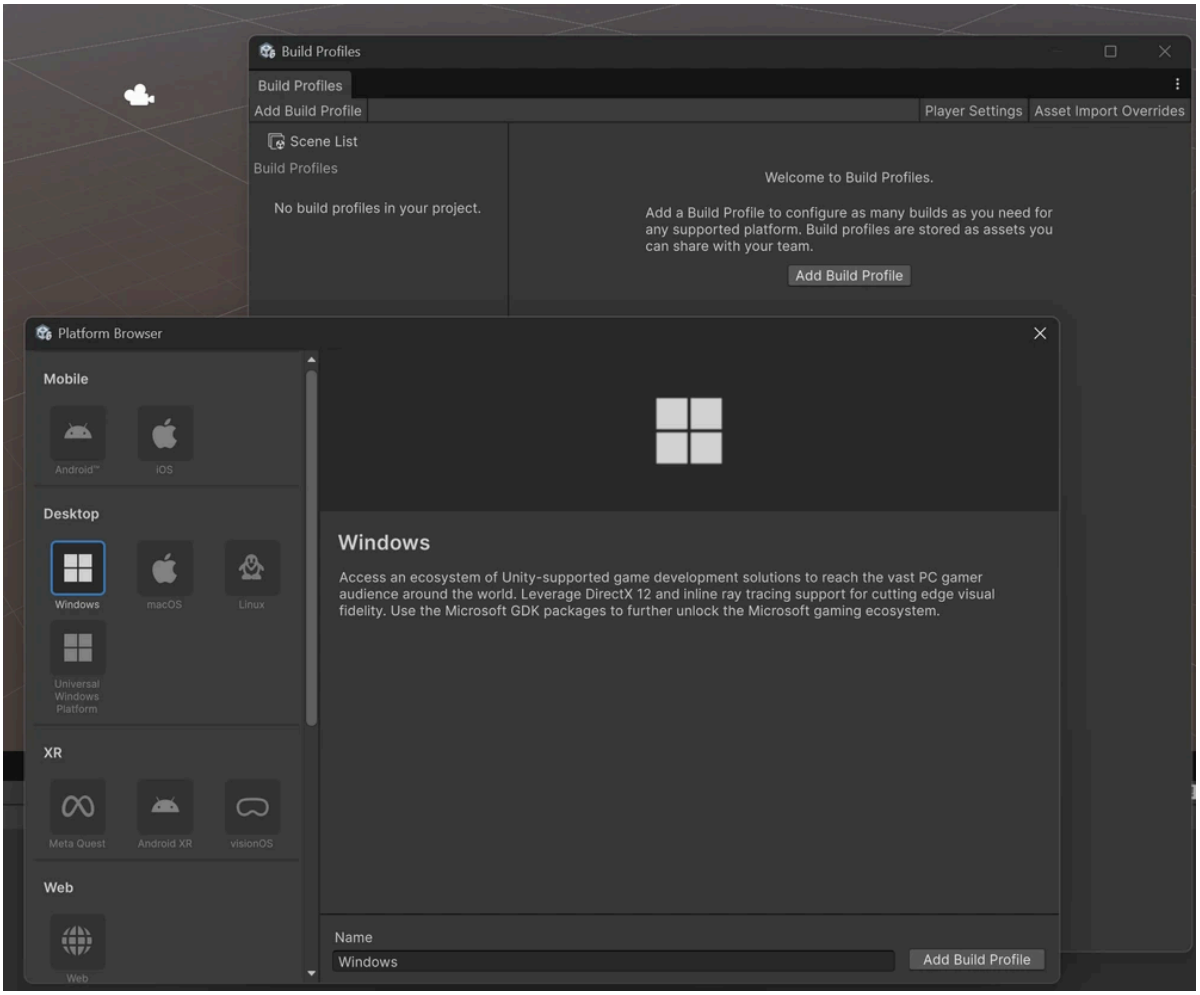
Unity 6 Project Setup

Unity 6 introduces changes to the build workflow. This page covers the Unity 6–specific setup steps.

For plugin installation and general project setup, see Unity Project Setup.

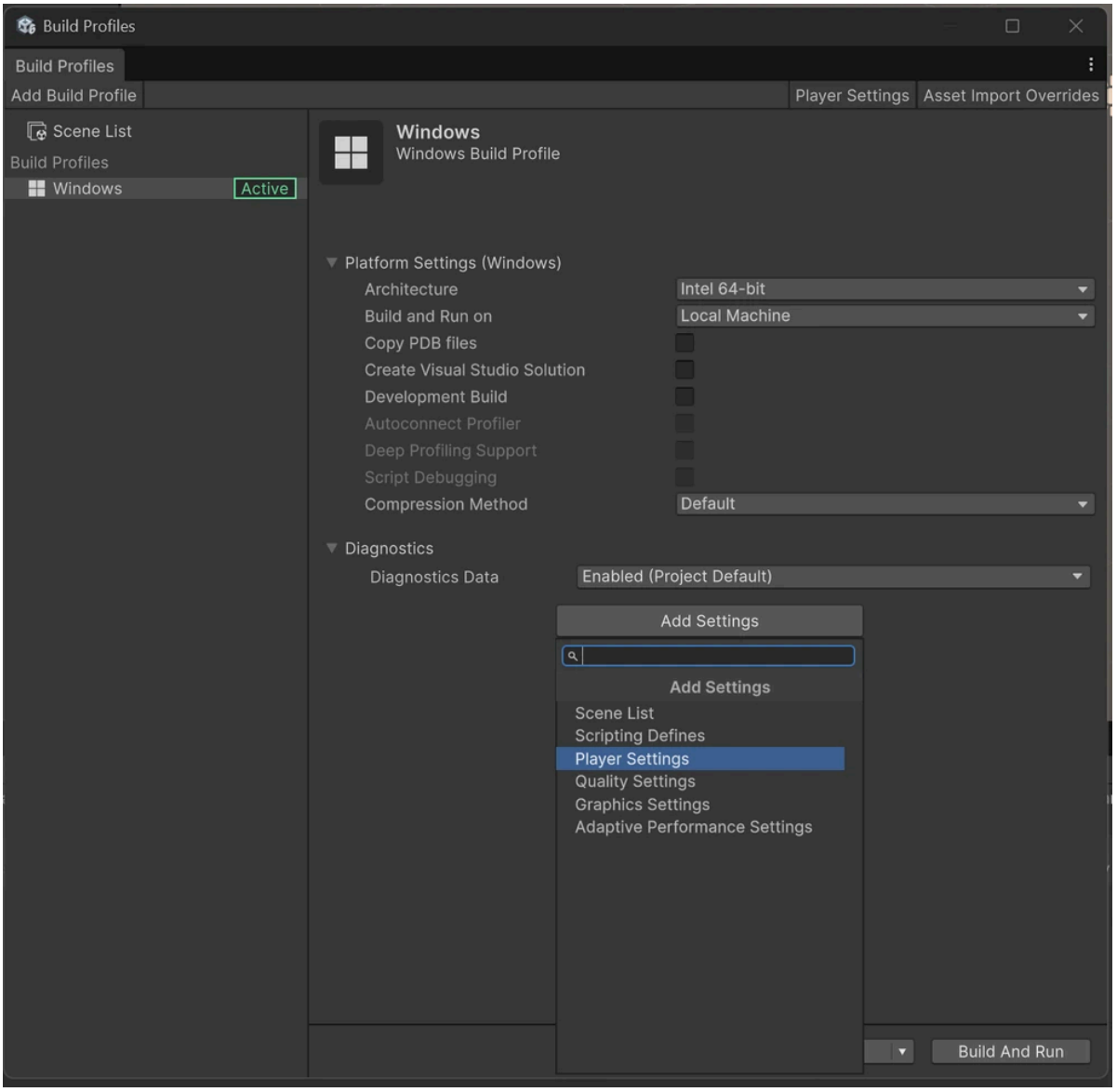
Build profile setup

1. Select **File** followed by **Build Profiles** > **Add Build Profile**.

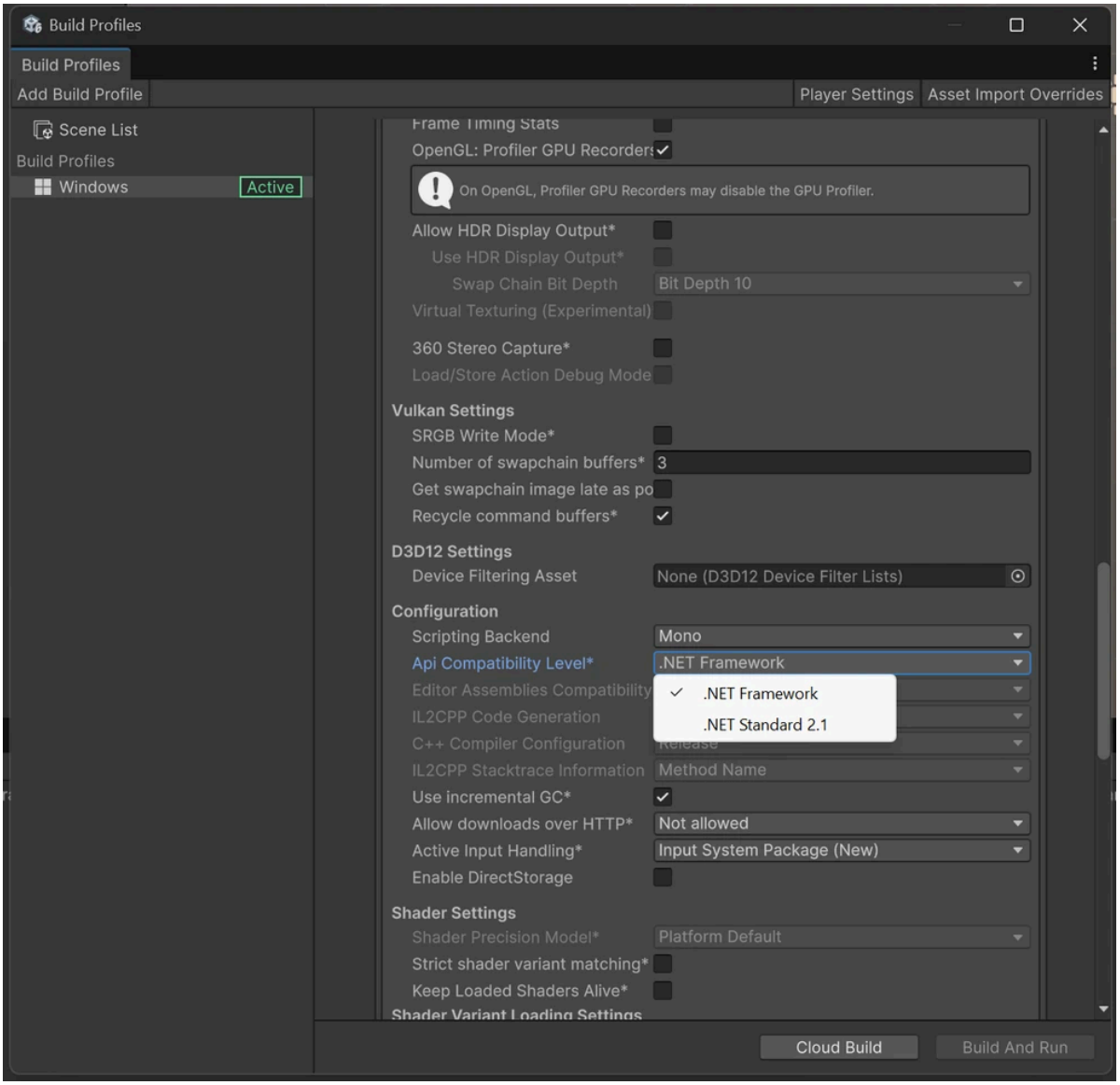


2. Select **Windows**.

3. Add the **Player Settings** to the Profile.



4. Set **API Compatibility Level** to **.NET Framework**.



3D object transforms

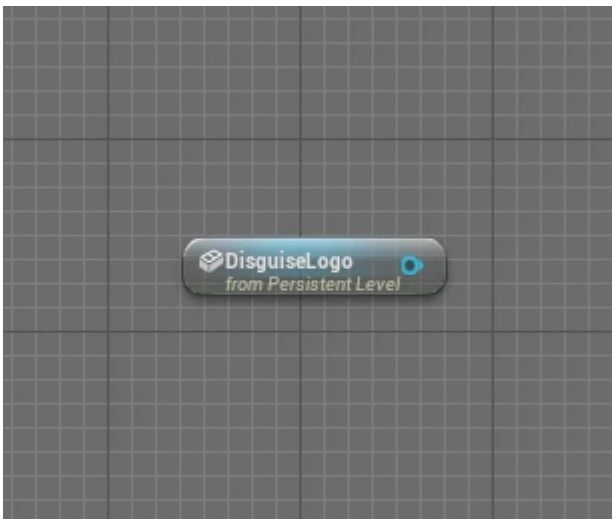
This topic covers the steps needed for configuring 3D object transforms within an Unreal Engine project for use with RenderStream. This feature allows you to control the full range of 3D object transforms (translation, rotation and scale) of an object in from using a null object.

This feature allows you to control the full range of 3D object transforms (translation, rotation and scale) of an object in Unreal Engine from Designer using a null object.

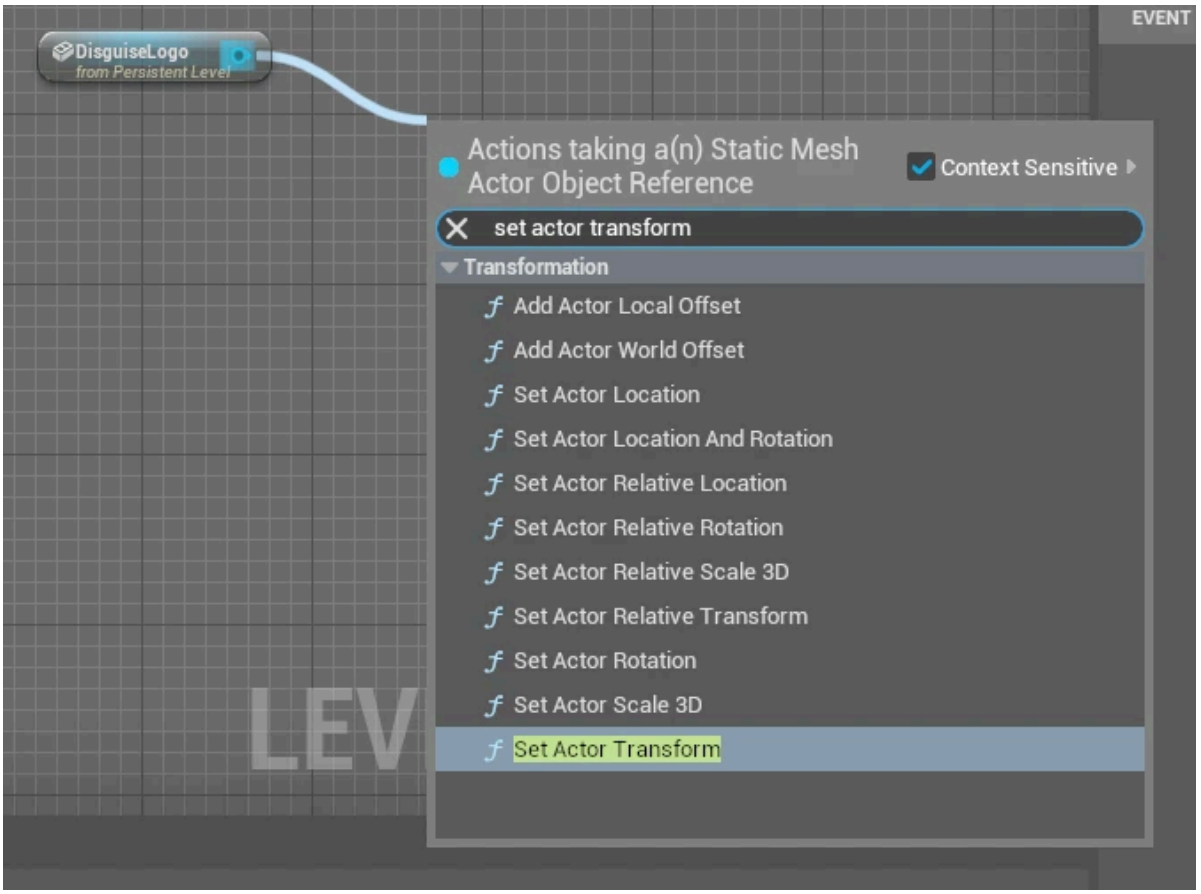
If you wish to expose the Transform (i.e. position, rotation and scale) of an Actor, you must ensure that the Actor's Mobility is set to 'Movable' from within the Details panel. If this is not done, Designer will only be able to control the Actor's scale. Follow these steps to configure the 3D object transforms of an object within an Unreal Engine sce

Unreal Engine Level Blueprint setup

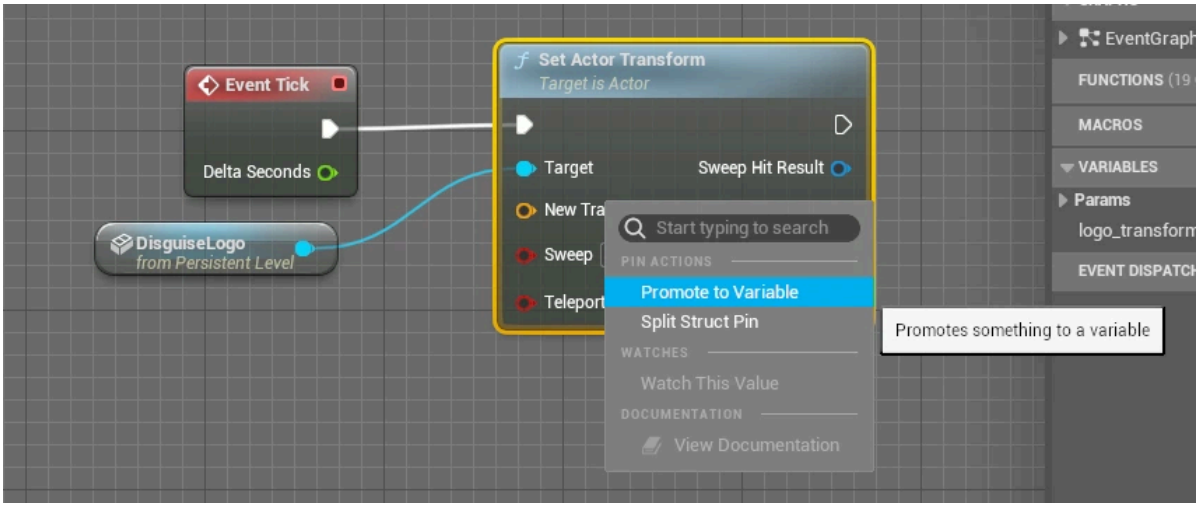
1. To control the transforms of an Actor (eg. Cine Camera Actor, Static Mesh Actor) from within Designer, start by dragging the Actor into the Level Blueprint.



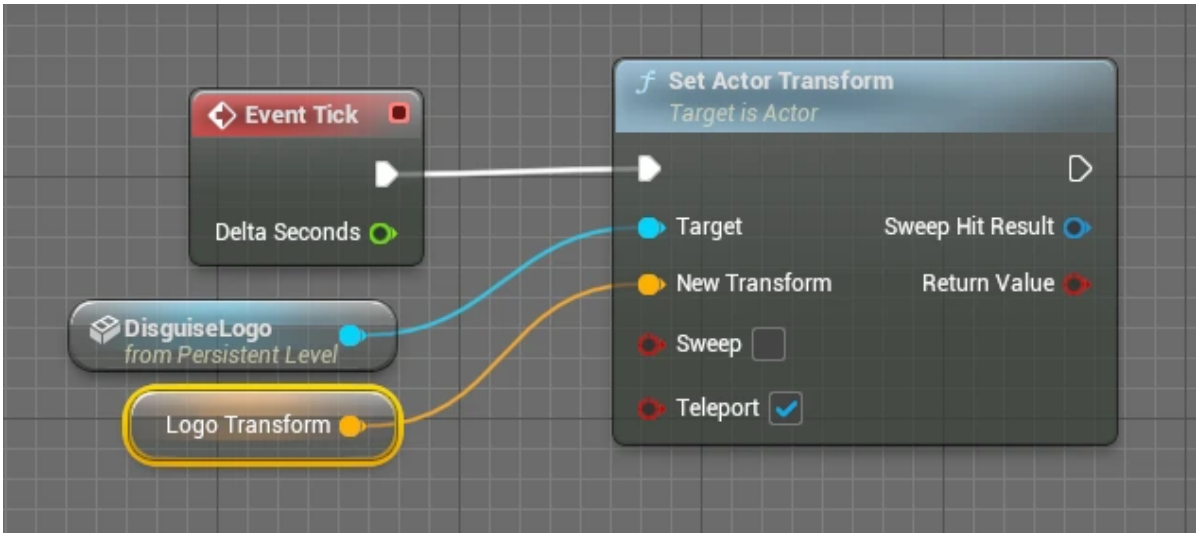
2. Drag the blue pin from the a new node in the Event Graph. When prompted to search for a new action, search for “Set Actor Transform”.



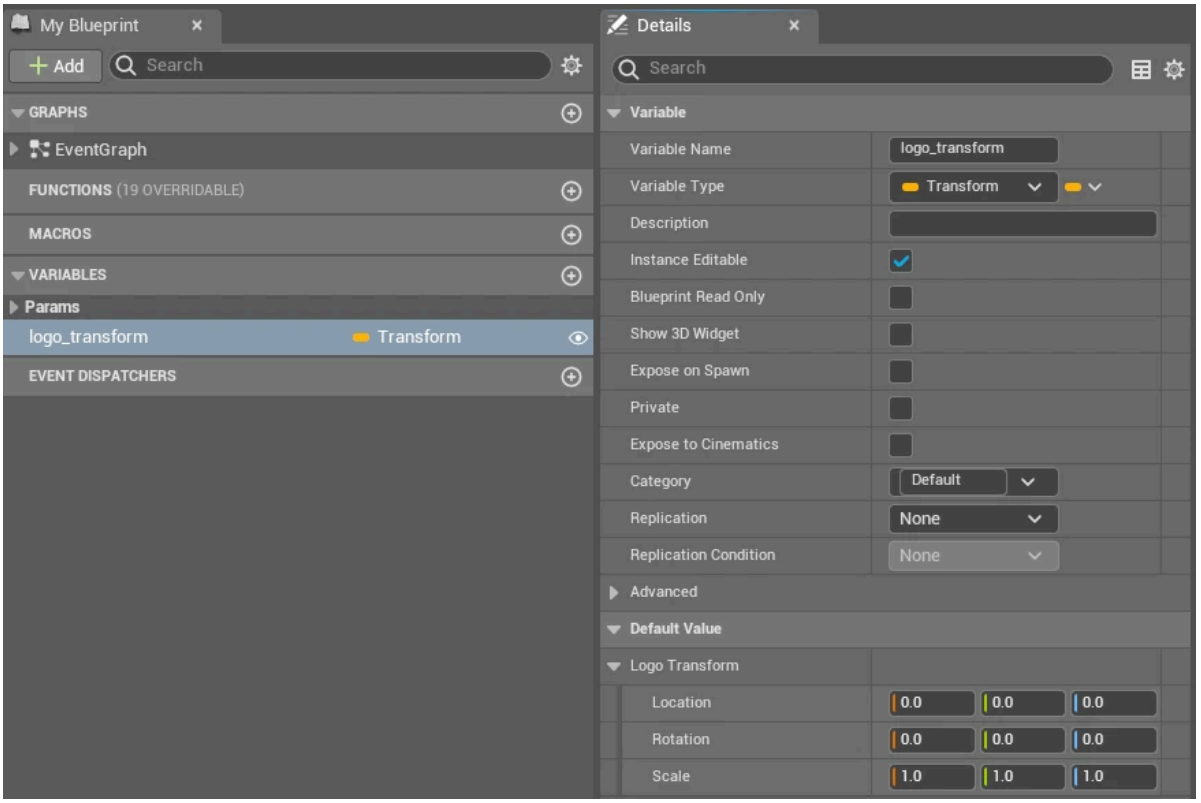
3. Right-click on the “New Transform” and select the option to “Promote to Variable”.



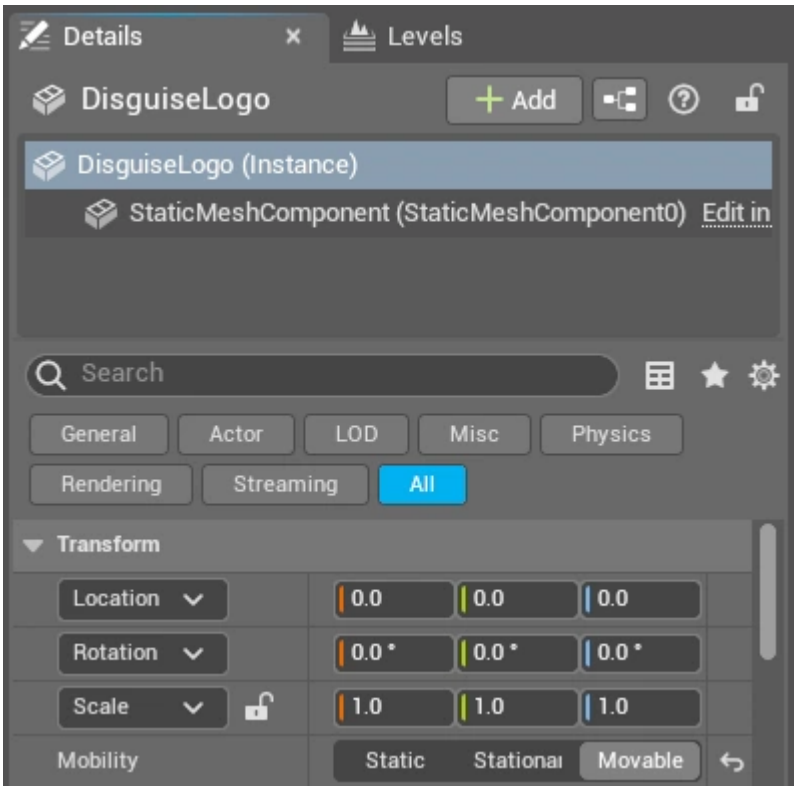
4. The next step is to link this to the “Event Tick”.



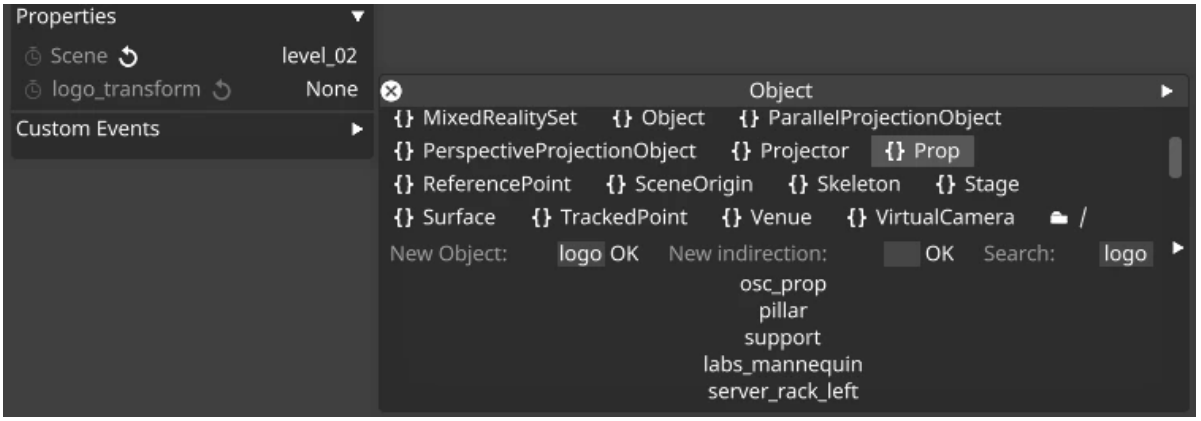
5. Now Compile the Blueprint. This will give you the ability to adjust the transforms of that object. Be sure to set “New Transform” to **Instance Editable**.



6. The last step is to make the object **Movable**. In the default scene all the objects will be set to static; this can be changed in the Object details panel.



7. Save the project.
8. You can now control the Actor from within by selecting a prop to link its transforms to from within the RenderStream Layer Properties tab.



Derived Data Cache (DDC) Setup

Configuring a Shared Derived Data Cache (DDC) will improve the startup speed of an Unreal Engine project shared across a RenderStream network. This process minimises the lengthy compilation process for Unreal projects.

The DDC is where shaders for Unreal Engine projects are compiled and stored. When opening a new project on a standalone workstation or on a Disguise render node, shaders need to compile for quite some time, even if the project is very simple.

One of the benefits of working with identical, standardized hardware like the Disguise RX range of render nodes is that the DDC can be compiled on one machine and then shared across a network to other nodes in the RenderStream cluster, eliminating the need to individually compile shaders on each render node.

Shared Derived Data Cache (DDC) Setup

For Unreal projects created externally, if the DDC is not stored within the project, a single compilation is required after the project is copied to the server to create the DDC.

Create a DDC folder on the Director server

1. Create a DDC folder on the D Drive, ensuring the URL has no spaces in the path.

- Bad example: D:/RenderStream Project/DerivedDataCache
- Good example: D:/RenderstreamProject/DerivedDataCache

Apply folder sharing permissions

1. Right-click the DDC folder and select **Properties**.
2. Click on the Sharing tab, then click **Share**.
3. Select the people you wish to share with. In the input text field type `Everyone` and click Add. Everyone is a preset sharing permission.
4. Select **Everyone** from the list and right-click the Permission Level field. Select **Read/Write**.
5. Click **Share** to confirm the settings.

Mapping the Shared folder as a Network Drive

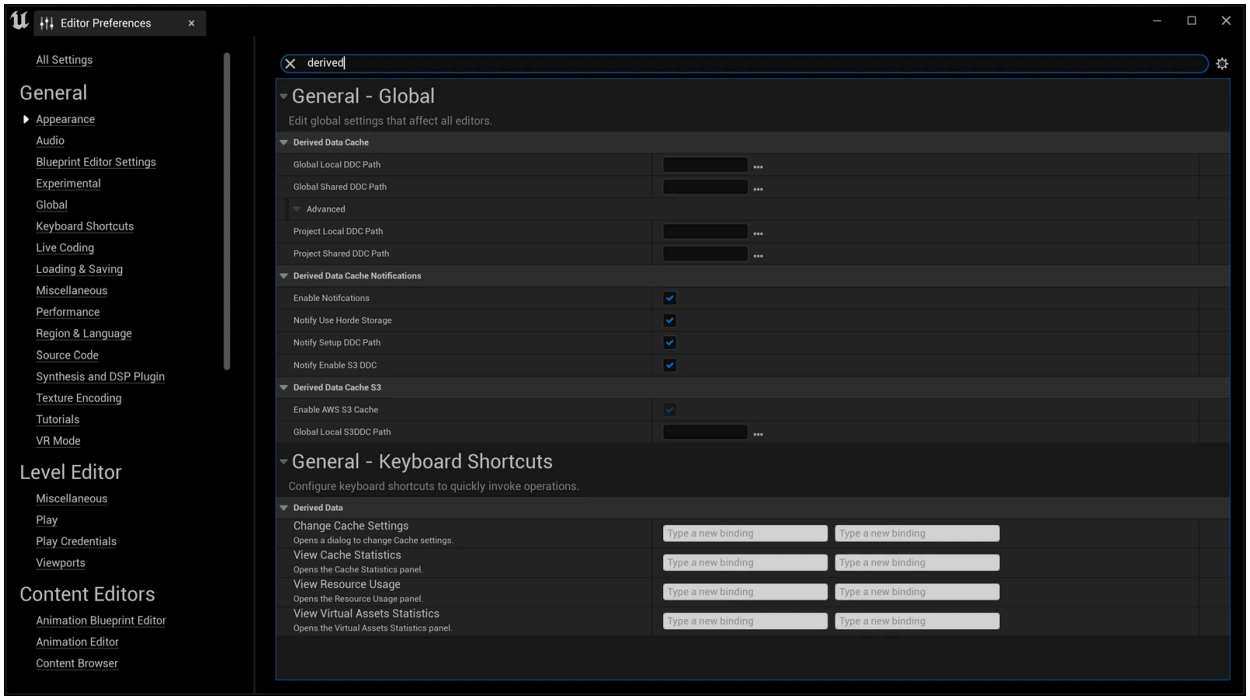
1. Type `IPConfig` in the CMD window and make a note of the IP address of the D port of the Director server. When creating a cache and storing data, you can choose the IP of the network you want to use.
2. Next, go to the Actor or RX server.
3. On the Actor or RX server, select **This PC > Open Computer** from the tab at the top.
4. Click on **Map network drive** in the Computer menu and select the option **Map network drive**.
5. Select the network folder tha you would like to map. For example, the **Z** drive.
6. Add the Director's IP address. An example for this uses the following format: `\\25.25.25.101`.
7. Click *Browse** and select **DDC** from the list of folders, then click **OK**.
8. Confirm he Z drive folder path, for example: "\25.25.25.101\DDC**
9. Click **Finish**.
10. Check that the DDC folder of the Director server is shared in **This PC > Network Locations**.

All connected Actors and/or RX servers must have the same mapped Network Drive.

Unreal Engine Network Drive location

1. In the Unreal Engine folder, go to **Engine > Config > BaseEngine.ini**.
2. Open **BaseEngine.ini** with Notepad.
3. Use **CTRL+F** to find where `DerivedDataBackendGraph` appears in the file.
4. Change the folder path to **Z:\DDC**

Alternatively, in Unreal Editor Preferences, under the General > Global header set the Shared/Local Derived Data Cache location to the same Shared and Local paths.



Derived Data Cache settings

Check DDC settings

1. Open the Unreal Project on the Actor or RX server and check if a cache folder is created in the Network drive DDC folder.
2. In the Unreal Project, click Derived Data at the bottom right of the editor, and select **View Cache Statistics**.
3. Confirm that the Z drive DDC path is listed on the Cache Statistics under **InstalledDriverDataBackendGraph > Name**.

The project also requires a single compilation after the project is first opened.

For details, please refer to Epic Games' DDC guidelines.

Local Derived Data Cache (DDC) Setup

Unreal Engine uses a local DDC by default, storing cached data on the user's machine. This setup requires minimal configuration:

1. Open the Unreal project.
2. Navigate to **Edit > Project Settings**
3. Search Derived Data Cache, and go to the Derived Data Cache section.

4. Specify the directory where the cache will be stored. Ensure there is enough disk space to accommodate the cached data.

Build the Derived Data Cache using the command line

Open a Command Prompt, enter the following [Change UE_5.o to whichever version you are using!]:

```
cd [_Drive that UE is installed to_]
```

```
cd [UE Install Location]\Epic Games\UE_5.0\Engine\Binaries\Win64\
```

```
UnrealEditor.exe "[ProjectFolderLocation]/[ProjectName].uproject" -run=DerivedDataCache -fill
```

You can click and drag the project file into the Command Prompt window instead of typing the [ProjectFolderLocation].

There are multiple storage types available for DDC. Read more about it in the official Epic Games documentation.

Exposed Parameters in Unreal Engine

This topic explains how to expose parameters in an Unreal Engine scene and enable those parameters to be controlled using the RenderStream Layer in Designer.

The Unreal Engine RenderStream plugin allows you to expose variables within the UE scene that can be used to control the parameters of the actors in the virtual environment. These variables are presented as custom RenderStream Layer Editor parameters in Designer. Modifying the value of a parameter changes the value of the corresponding variable in the Unreal Engine level thus altering the parameter/s of the selected actor or setting within the scene.

Prerequisites

- Unreal Engine Scene
- RenderStream plugin enabled in the UE project
- Designer project

View the RenderStream Unreal Engine Integration Project Setup page here.

Exposing Parameters in an Unreal Engine Project Scene

There are two methods for exposing parameters in an Unreal Engine scene.

1. Using an Event Tick.
2. Using a Custom Event.

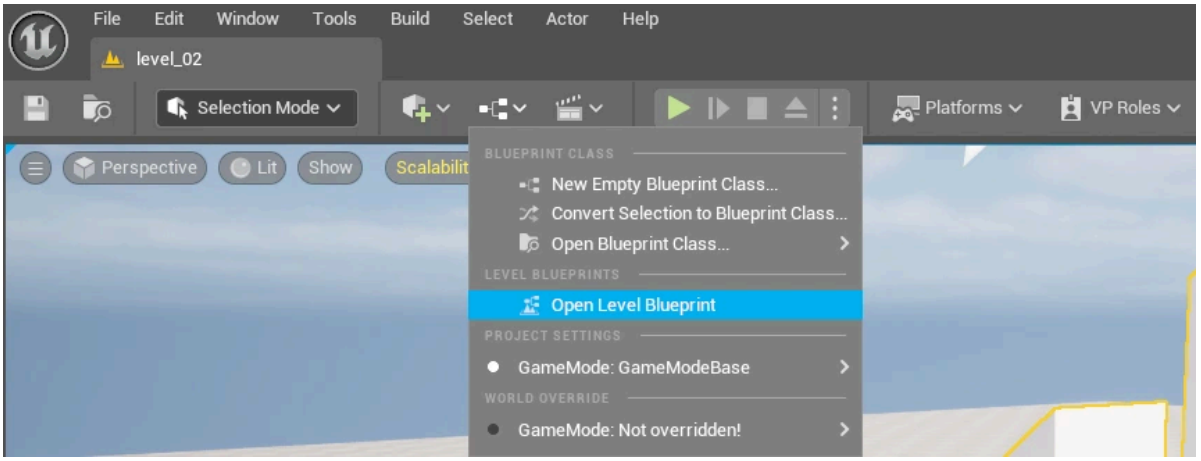
Both options can be added to a Level Blueprint to trigger an event and handle the change when this event is triggered.

Ticking is used to run a code or Blueprint script on an actor or component at regular intervals. If an Event Tick is used, an Event is called every frame. This is a particularly inefficient method of exposing parameters, but is the more widely known method for the workflow.

Custom Events in Unreal Engine are user-defined functions that allow you to trigger specific actions or logic within your Blueprints. These are reusable events that can be called whenever needed. This helps streamline complex interactions and maintain clean, manageable Blueprint scripts.

Creating and configuring a variable in the Level Blueprint

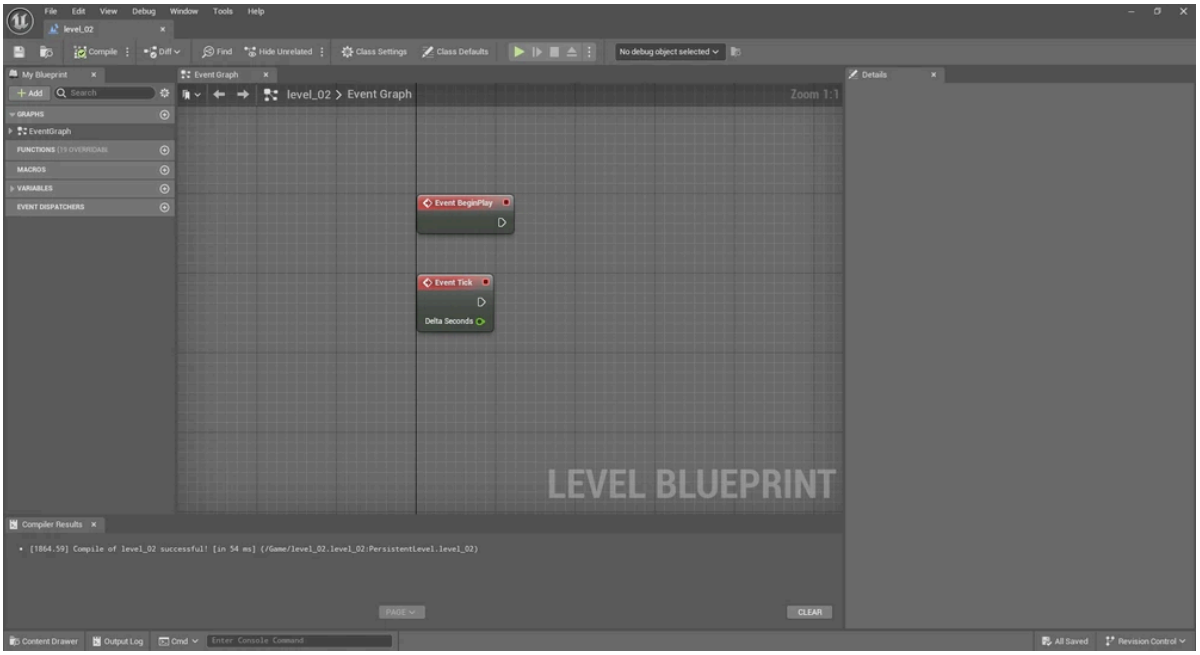
1. Click Blueprint in the Toolbar and select **Open Level Blueprint**.



2. Click the **Add** button next to Variables within the My Blueprint panel.
3. Name the variable according to the desired property (e.g. Fog Visibility).
4. Select the variable.
5. Set the **Variable Type** in the **Details** panel to an appropriate property (e.g. `visibility == boolean`).
6. Click on the check box to enable **Instance Editable**. (Alternatively click on the eye symbol.)
7. Set the **Category** to represent the parameter in Designer. This will appear as a section in the RenderStream Layer Editor.
8. When using a sliding range, configure the ranges for the value.
9. Click **Compile** and then click **Save**.
10. Next, set the Default Value for the variable in the Details panel.

1. Assigning an action to the variable in the Level Blueprint using an Event Tick

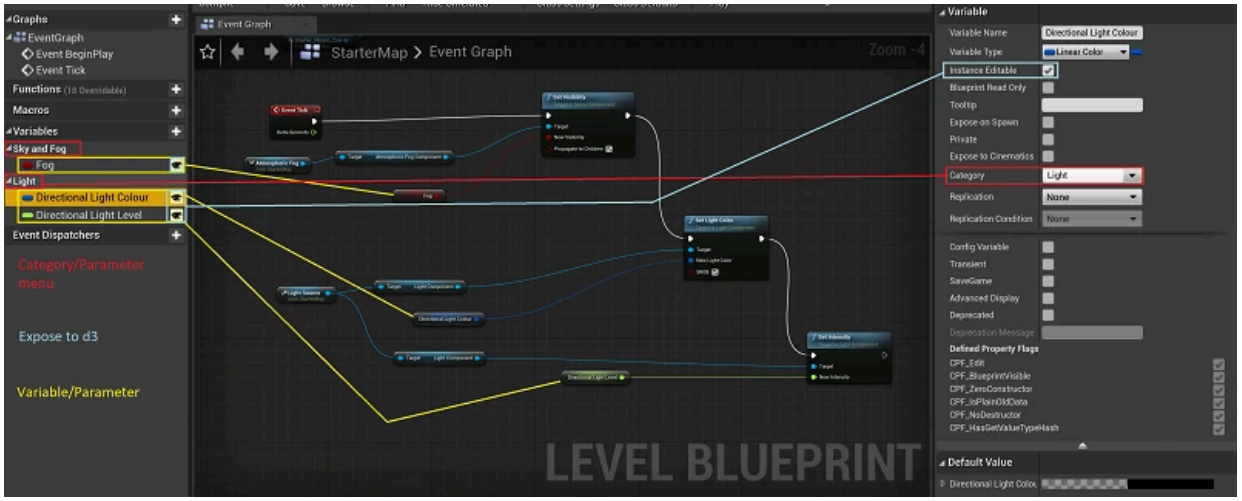
1. In the Level Blueprint, right-click anywhere in the Event Graph and create an **Event Tick** action. Depending on the project you are using, one may already appear disabled and ready for use.



2. Return to the scene.
3. Select an Actor from the Outliner panel (e.g. Atmospheric Fog).
4. Drag and drop the Actor into the Level Blueprint's Event Graph.
5. Drag out from the blue pin (Static Mesh Actor Object Reference) on the Actor component and create any new Rendering Component Action (e.g. Set Visibility or Set Intensity).
6. Drag out from the white pin (Exec) on the Event Tick action and connect it to the white pin (Exec) on the left-side of the Rendering Component Action.
7. Drag out from the **New Component_Name** pin (e.g. New Visibility) on the Rendering Component Action and create a **Get Variable_Name** action.
8. Compile and Save.

Modifying the parameter in Designer

1. Open the RenderStream Layer Editor in Designer and start the Workload.
2. Modify new parameter value/s in the layer editor as part of your normal sequencing.



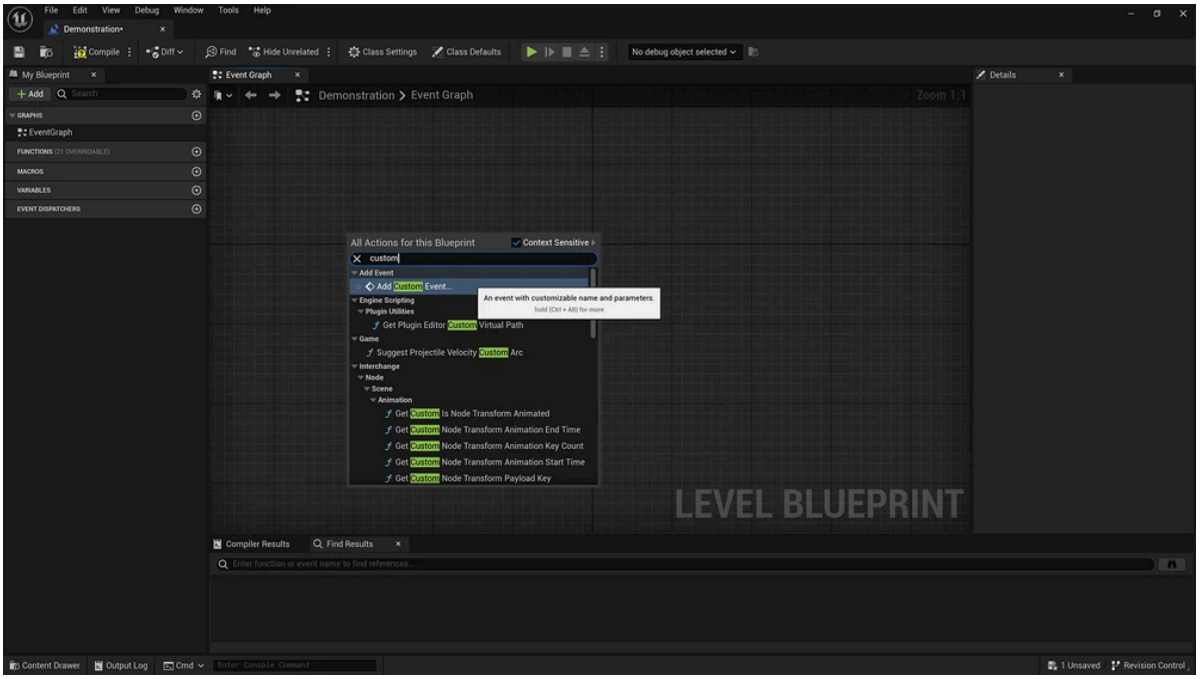
Alternatives to Event Ticks

Exposed Parameters attached to an **Event Tick** are expensive because they will be triggered every tick and re-apply the exposed parameter. To improve performance, Designer has 3 other options that will give you better performance:

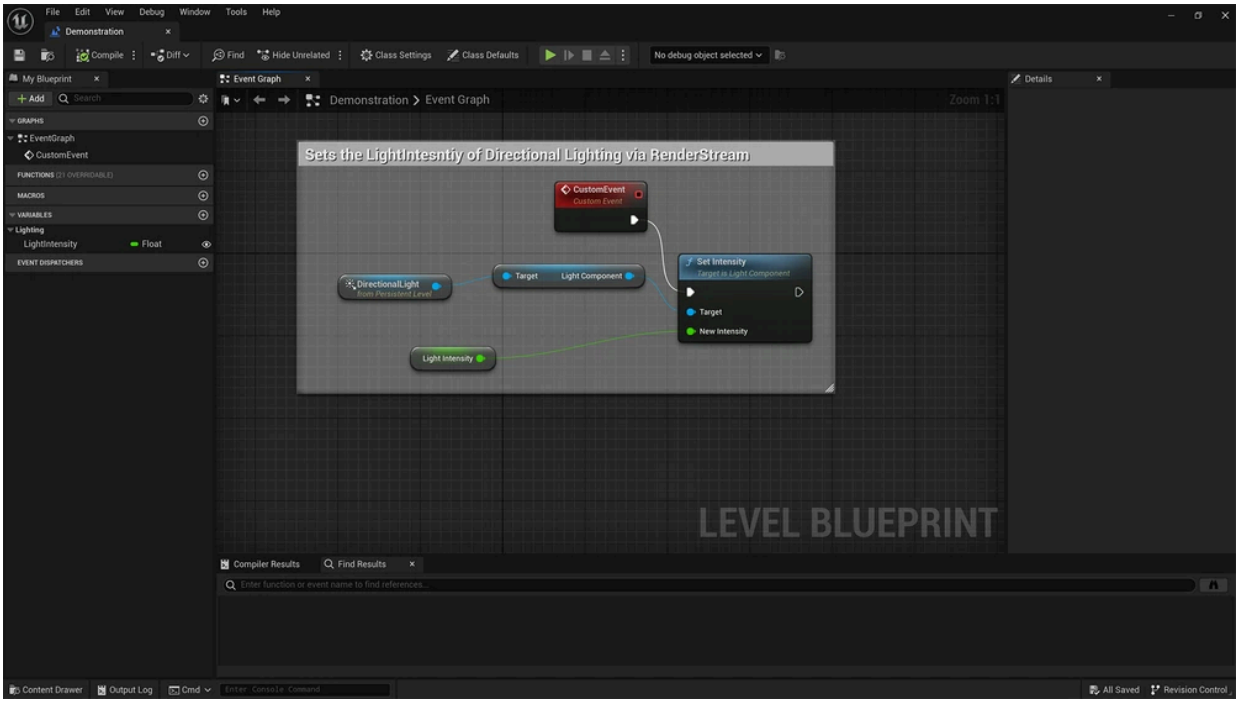
- **On Keyframe** - Will trigger the event only when a keyframe is encountered in Designer.
- **On Change** - Will trigger the event only when the parameter changes.
- **On Reset** - Will trigger the event only when the parameter is set to `0`.

2. Assigning an action to the variable in the Level Blueprint using a Custom Event

1. In Unreal Engine, right-click in the Blueprint's Event Graph, type **Custom Event** to search for the action, and click **Add Custom Event**. Then, name the event.**Custom Event** action. Where you have existing nodes such as EventPlay and Event Tick, these can be removed.



2. Name the Custom Event to reflect the parameter that has been exposed.
3. Return to the scene.
4. Select an Actor from the **Outliner** panel (e.g. Atmospheric Fog or Directional Lighting).
5. Drag and drop the Actor into the Level Blueprint's Event Graph.
6. Drag out from the blue pin (Static Mesh Actor Object Reference) on the Actor component and create any new Rendering Component Action (e.g. Set Visibility).
7. Drag out from the white pin (Exec) on the Event Tick action and connect it to the white pin (Exec) on the left-side of the Rendering Component Action.
8. Drag out from the **New Component_Name** pin (e.g. New Visibility) on the Rendering Component Action and create a **Get Variable_Name** action.
9. Compile and Save.



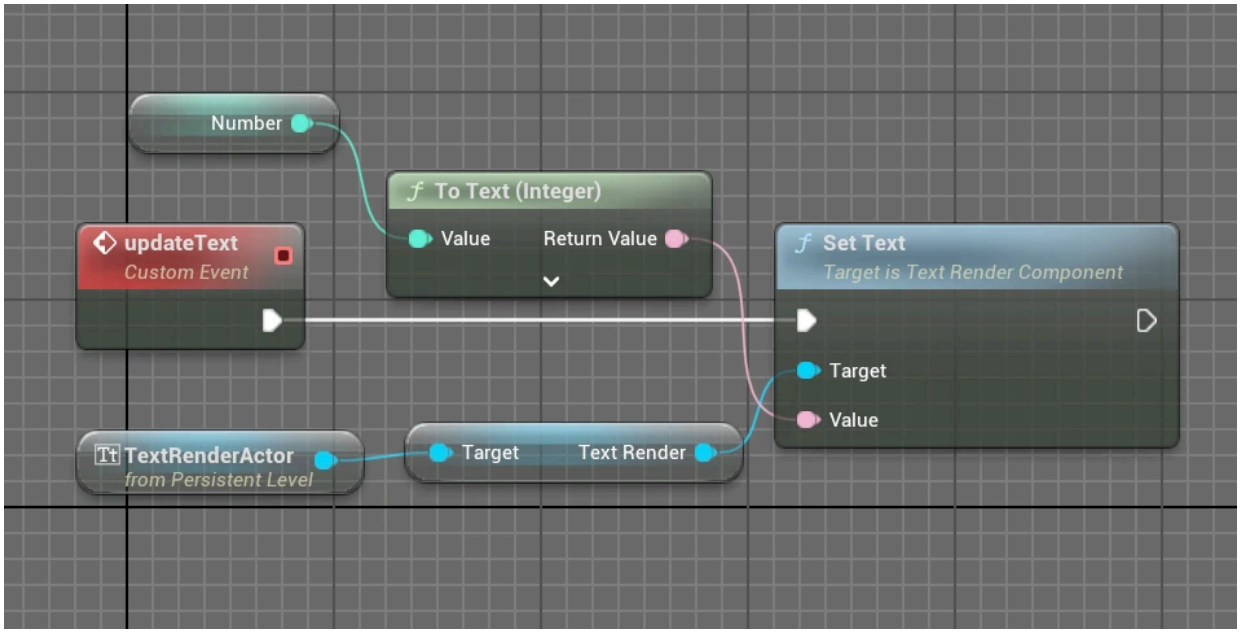
Using Triggers generated by Custom Events in Designer

1. Open the **RenderStream Layer Editor**.
2. Under **Custom Events** you fill find a field called **Trigger Mode**.
3. Select the appropriate **Trigger Mode**.
4. Modify custom event value/s in Disguise as part of your normal sequencing to trigger the custom event when required.

Unreal engine also provides workflows for controlling parameters using the Remote Control API, or their MultiEditor plugins and features. These can be configured outside of Designer entirely if none of the above options are suitable. If you are using Porta, for instance, this is a standard workflow.

Examples

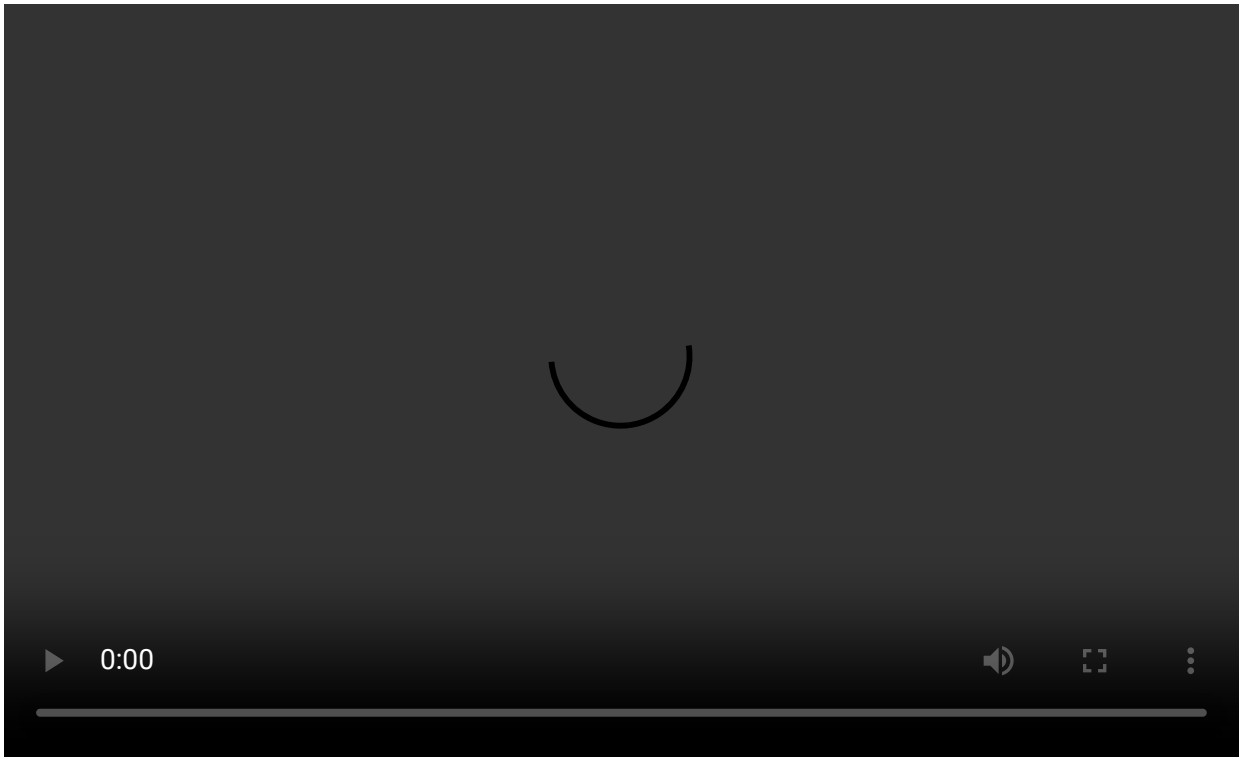
The example Unreal Level Blueprint below demonstrates triggering Custom Events in Unreal from Designer.



Level Blueprint: Creates a TextRenderActor with a number value that can be updated

On Keyframe

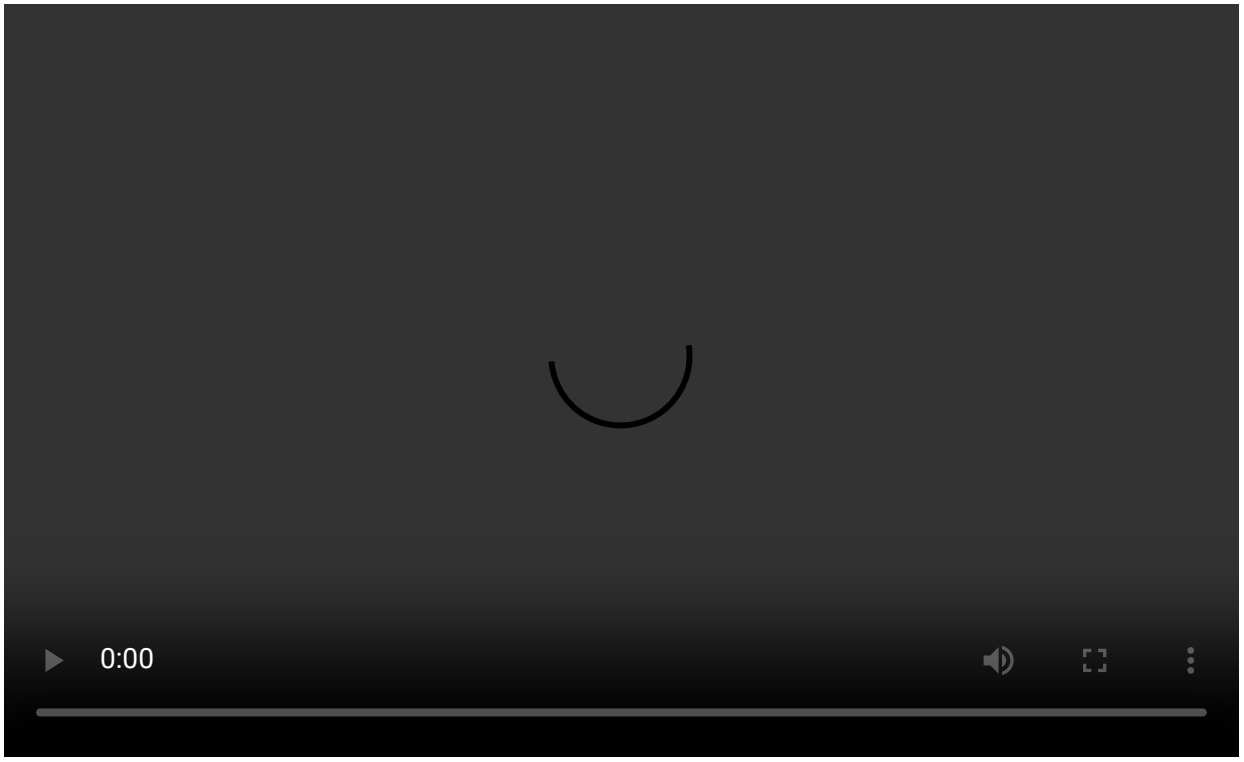
This will only trigger the Custom Event in Unreal when a keyframe is passed on the timeline in Designer.



Designer: On Keyframe, the exposed number value changes with each keyframe

On Change

This will trigger the Custom Event in Unreal when the number value in the exposed Custom Event changes. The number has been keyframed to change over time to have it trigger constantly.



Designer: On Change, the exposed number changes with each change

Level Sequences

RenderStream is the proprietary Disguise protocol for controlling third party render engines from Designer. This topic covers the steps needed for configuring Unreal Engine for use with RenderStream.

The RenderStream Unreal Engine plugin allows a Level Sequence built within an Unreal Scene to be triggered via a RenderStream Layer. This means that if any actor is animated within the UE scene using timeline functionality, it can be controlled from within Designer from the timeline.

Level Sequences & Time Control

Create a Level Sequence

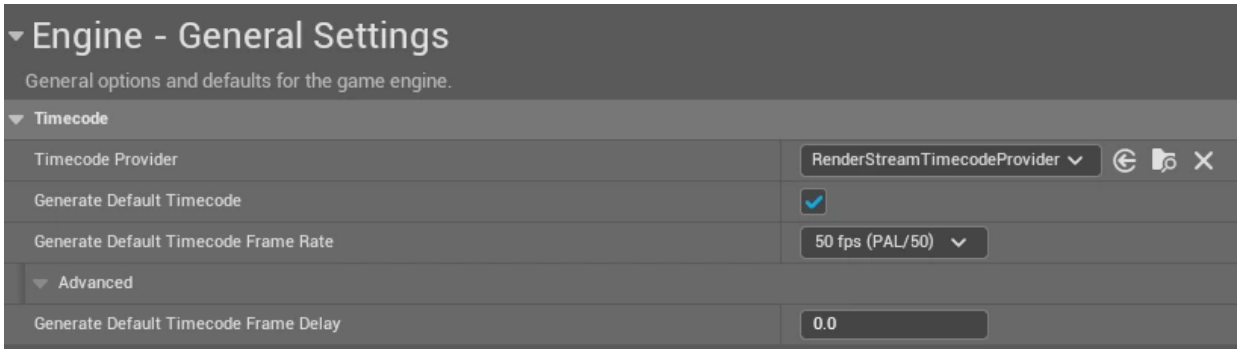
1. Open your UE project.
2. Select an Actor that you wish to animate, or add a new Actor.
3. Click Cinematics in the Toolbar and select **Add Level Sequence**.
4. Name the new Level Sequence and Save the project.
5. In the Sequencer, click the **Track** dropdown and click **Actor To Sequencer** and select the Actor you wish to animate.
6. Ensure your playhead is over the first frame, and add a keyframe.
7. Continue adding keyframes for any or all Transform properties by clicking the small + button (**Add a new keyframe at the current time**).
8. Move the playhead along the Timeline and modify the actor's properties either by using the 3D controls within the scene or by updating the value directly from within the Details panel. Add another keyframe in the same manner.
9. Return the playhead to the beginning of the Timeline and play the sequence to confirm your animation is correct.
10. Open the **Sequence Display Rate** dropdown (fps counter) and set the display rate to that of your Disguise project.
11. Set the Clock Source to **Timecode**.
12. Save the Level Sequence.

Configure the Level Sequence

1. Select the Level Sequence in the Outliner panel.
2. Navigate to the Playback tab in the Details panel.
3. Enable **Auto Play** and configure other options according to your preferences.
4. Save Current.

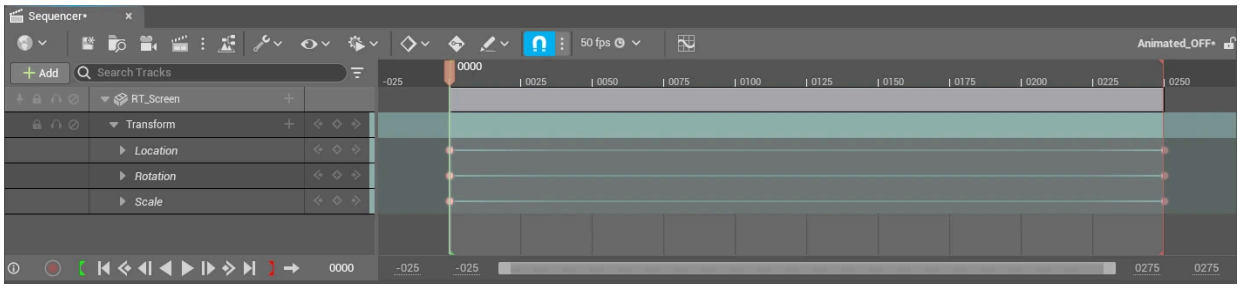
Configure project settings

1. Navigate to **Edit** > **Project Settings...**.
2. In the Engine section of the left panel, navigate to General Settings.
3. Set Timecode Provider underneath the Timecode separator to `RenderStreamTimecodeProvider`.
4. Save the sequence and scene.



Play the animation sequence in Designer

1. Open the **RenderStream Layer** in Designer and **Start the workload**.
2. Play your timeline within Designer to see the animation sequence.



Multi-User Editing

This topic outlines the workflows needed for configuring Multi-User editing within an Unreal Engine project. This includes the configuration of the UE project, and the setup of the Designer project.

If a Multi-User Server is configured and running, any additional machine on the same network as the render nodes will be able to run the project in Edit mode and make live changes. Any changes to the project made while there is an active workload will be reflected in real-time.

- Client-Server Live Collaboration
- Real-time Synchronization of Assets
- Lightweight Transaction-based Sync
- Compliments Source Control
- Not necessary to use Source control but is recommended
- Multiple platform Support During Collaboration
- Works over LAN or VPN

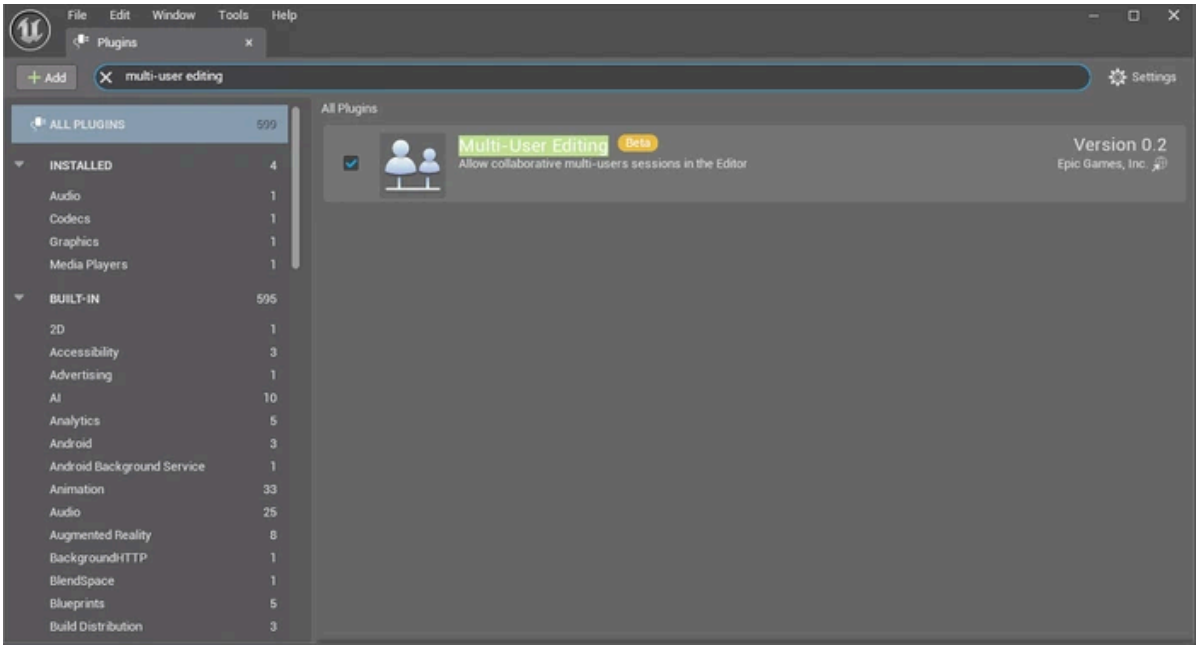
Prerequisites

- All clients must be using the same Engine build.
- All computers must be on the same LAN or VPN.
- All users must be working on matching project name.
- All users must start with exactly the same content - typically synced from source control.

Unreal Engine Workflow

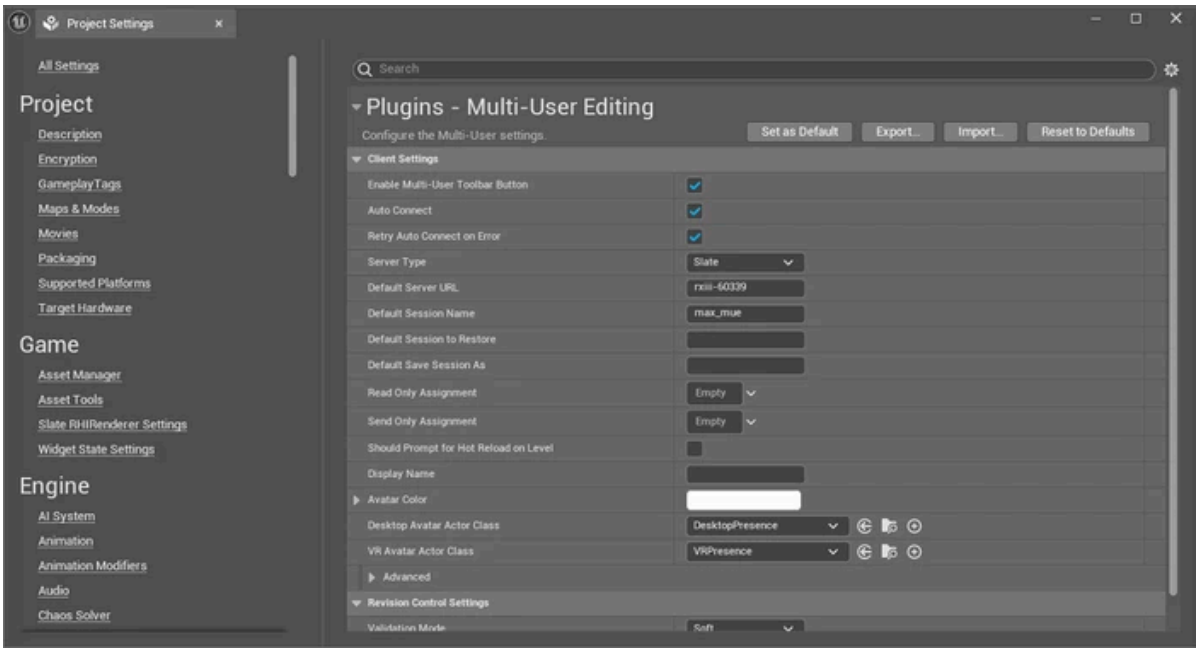
Configure Multi-User Editing in a UE project

1. Ensure the **Multi-user editing** plugin is enabled in the UE project. Navigate to **Edit** > **Project Settings** > **Plugins** > **Multi-User Editing**.



2. Ensure **Enable Multi-User Toolbar Button**, **Auto Connect** and **Retry Auto Connect on Error** are enabled.

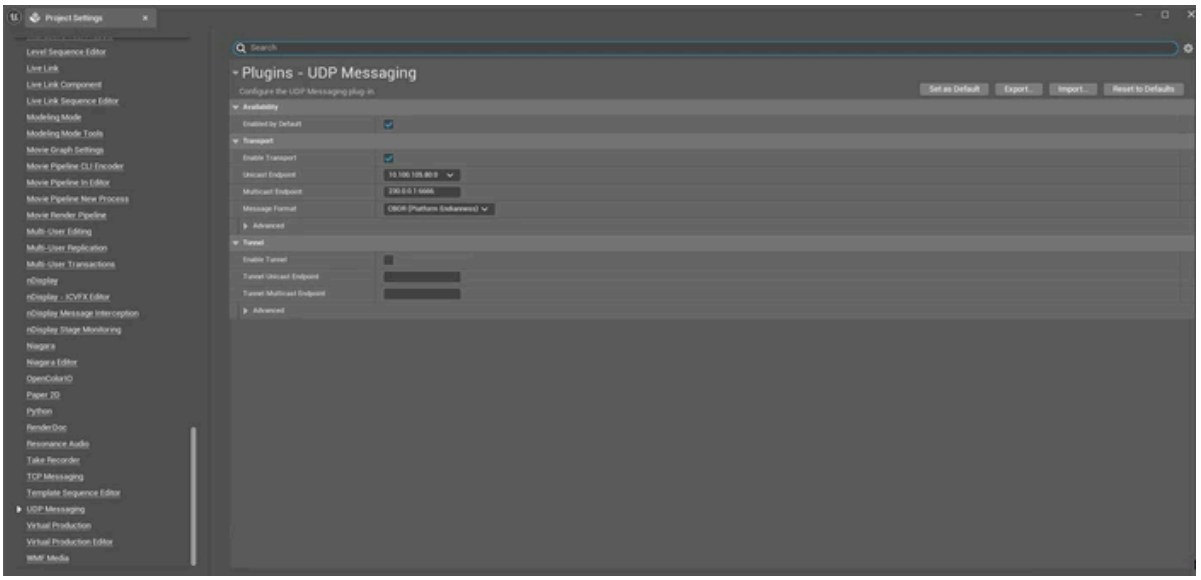
3. Set the **Default Server URL** to the name of the machine that will be running the Multi-User Server (e.g. “**rxiii-xxxxx**”).



4. Set **Default Session Name** to something unique (e.g. “MUE1”).

Configure UDP Messaging in UE

1. In **Project Settings** > **Plugins** > **UDP Messaging**, set the Unicast Endpoint to the network address that will used for the RenderStream pool Preferred Synchronisation Adaptor (preferably the Media network).



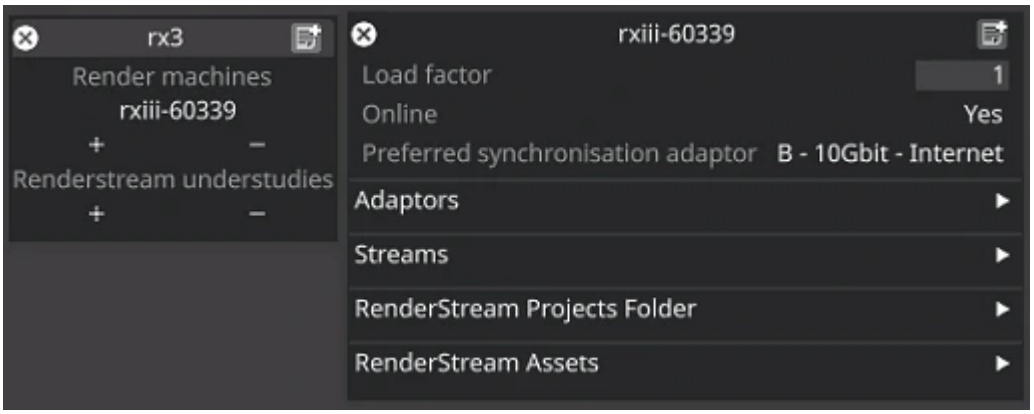
Designer Workflow

Configure Engine Settings in Designer

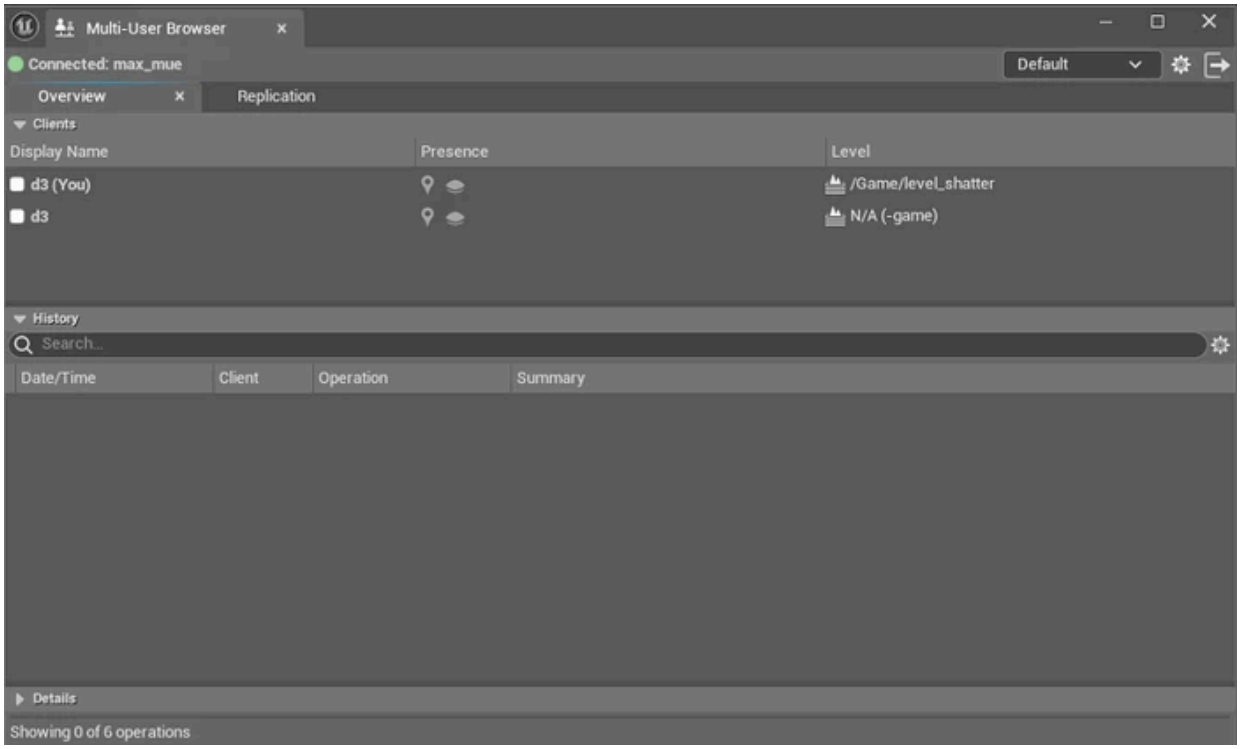
1. Open the RenderStream layer editor and right-click on the Workload name.
2. In the Cluster Workload editor, ensure a RS Asset is selected, then right-click on the Asset name.
3. In the Asset editor, right-click on the **Engine settings** property, `UnrealEngineSettingsResource`.
4. Check the box to **Enable multi-user edit**.
5. In **Multi-user session name**, add the **Default Session Name** you previously created in UE (e.g. “MUE1”).
6. In **Multi-user session host**, set the hostname to the name of the machine that will be running the Multi-User Server, the configured **Default Server URL** in UE. (e.g. “rxiii-xxxx”)

Launch a Multi-User session in Designer

1. Ensure the **Preferred Synchronisation Adaptor** has been set on all the render nodes to the same network port set in the **UDP Messaging** setting in UE (the Media Network). To select the Preferred Synchronisation Adaptor, open the Cluster Pool and right-click the machine name to edit each render node. This automatically defaults to **Any** but needs updating for MUE.



2. Sync the project to all render nodes.
3. Launch the Multi-User Server on the machine specified as the **Default Server URL** either launched standalone `UnrealMultiUserServer.exe` or through the Unreal Editor.
4. **Start the workload**. When the workload is running it will connect to the Multi-User Server.



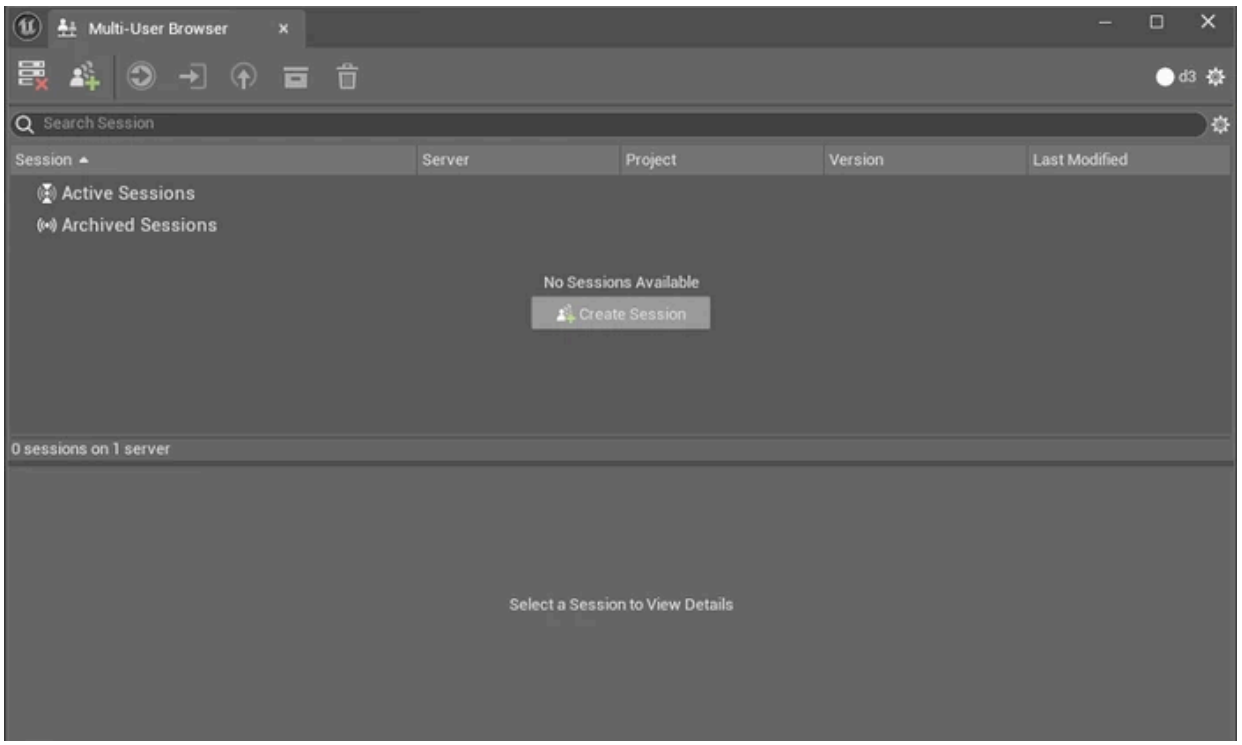
Joining a Multi-User Session

Multi-User Browser

Once a Multi-User Server and Session have been launched on your network, joining is very simple.

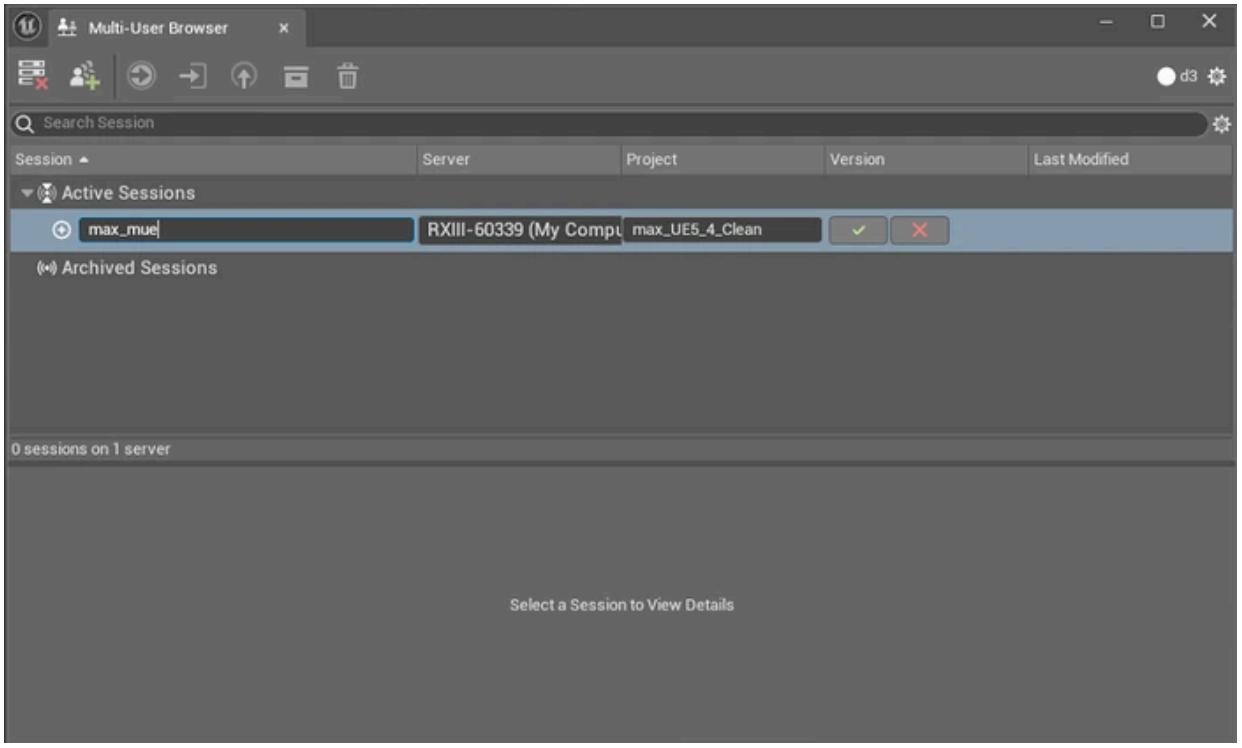
1. Open your project and navigate to **Window > Developer Tools > Multi-User Browser**. This will open the Multi-User Browser window.

-



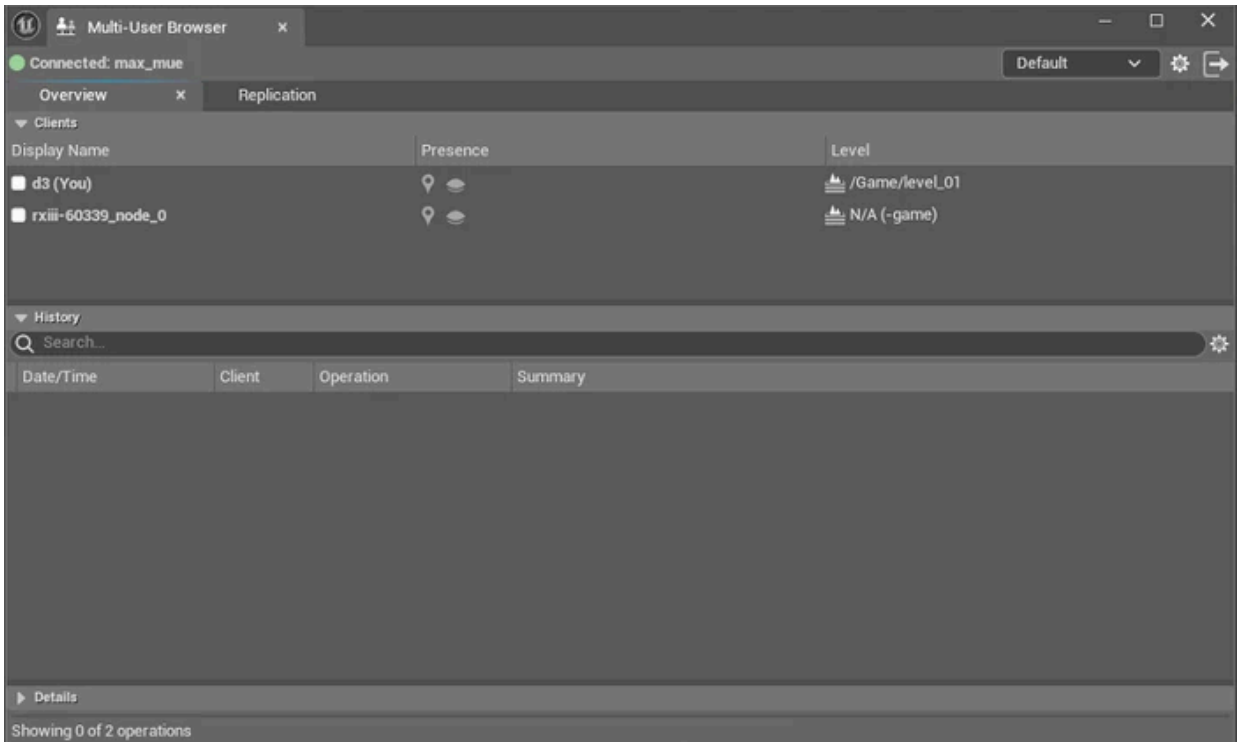
Multi-User Browser

2. If a Multi-User Server and Session have been launched, and you have correctly configured your UDP messaging settings, you will automatically see the available Sessions on your network. Double-click to join.



MUE Active sessions

3. All clients connected and in session are listed in the Multi-User Browser.

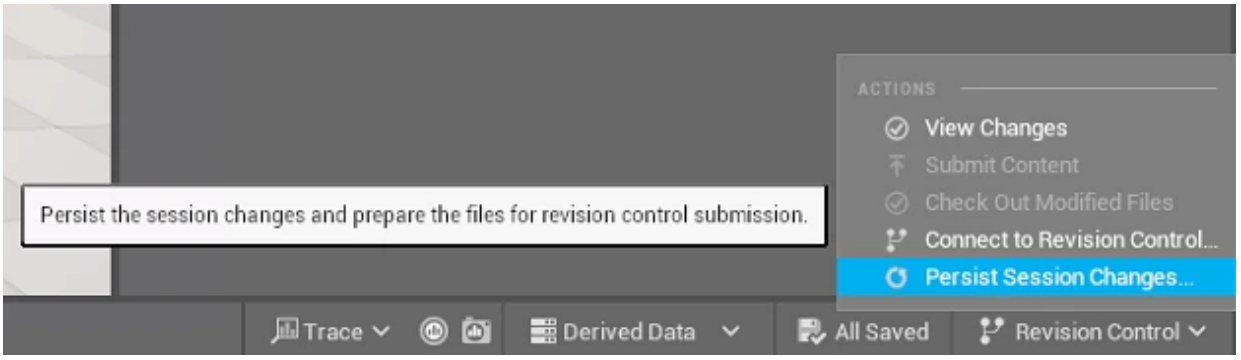


Connected clients in the MUE session

Saving changes in a session

Changes made in a Multi-user session are not persisted to the project file on the connected Render Server. If a Render Server leaves the session it will have it's original content and not the changes from the Multi-user session.

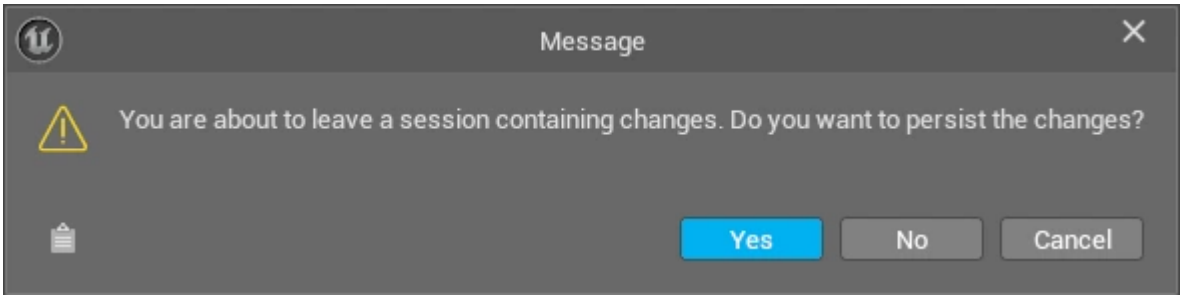
You can persist the files while editing using the **Revision Control** button in the bottom right and clicking **Persist Session Changes...**

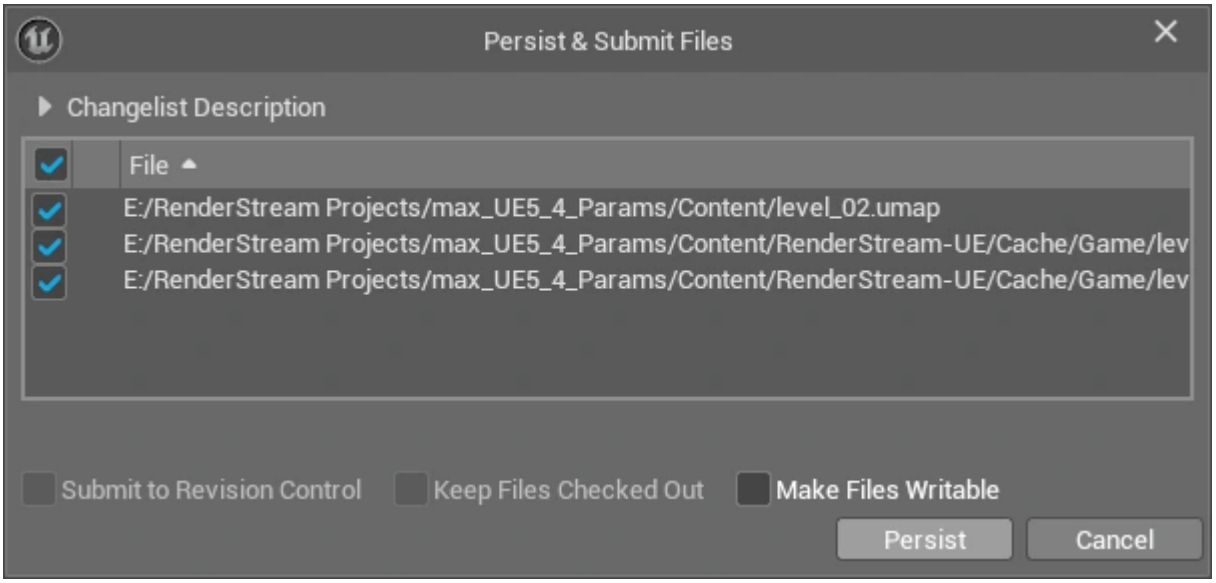


To persist the files once adjustments have been finalised, click the **Leave the current session** button, **Yes** on Do you want to persist the changes? and then **Persist** after reviewing the files to Persist from the session.

Then you can sync the project file to the Render Servers and rejoin the session.







Additional information

- Multi-User Editor will use the Preferred Synchronization Adaptor selected in the d3 project to send nDisplay communication messages, including MUE data. Therefore, all servers must be connected to a common network that can be designated as the Preferred Synchronisation Adaptor and must be able to communicate with each other via ping over this network.
- The MUE plugin must be enabled in UE and the server must be launched within UE. We've provided instructions for launching the session through the UE editor. If you prefer to use a console command, please refer to the Unreal Engine documentation.
- Adding Perforce can add a layer of complexity to troubleshooting issues, but does provide invaluable Source control.
    - When using Perforce, Source control must be enabled in the Editor and the content must be on the latest revision (ie. pull latest in Perforce).
    - It is very helpful to check out the **Engine.ini** file before making changes in Project Settings when using Perforce. You can find it under Root Project Folder > Saved > Config>WindowsEditor.
- When making large amounts of changes, make sure that you save and persist often. While persisting, it is helpful to un-toggle anything being persisted to the "UE-Renderstream-Cache" folder.

To learn more about Multi-User Editing (MUE) from Epic's official documentation: https://dev.epicgames.com/documentation/en-us/unreal-engine/multi-user-editing-in-unreal-engine?application_version=5.4

Remote Text Parameters

This topic covers the steps needed for configuring text within Unreal Engine for use with RenderStream.

Text Parameters

This feature allows you to render text in the Unreal Engine scene that can be changed live in Designer.

Create a Text Render actor

By adding a Text Render actor to your scene, you will be able to adjust the text properties such as colour, size, and text, from Disguise using the RenderStream Layer. Ensure that you have the RenderStream plugin added and enabled to the Unreal Engine project.

1. Add a **Text Render** actor to your scene. this will give you the ability to generate text in the scene.
2. Open the level Blueprint and then drag **Text Render Actor** from the Outliner into the Blueprint.
3. Drag from the blue pin of the **Text Render Actor**, this will then prompt you to choose a new action.
4. Search for and select **Set Text**.
5. In the Set Text action, right-click on **Value** and select the option to **Promote to variable**.
6. Select the Value node. This will open the Details panel where you can edit aspects of the variable.
7. Click to enable the checkbox **Instance Editable**.
8. Add an EventTick to the Event Graph, and link this to the input of the Set Text action.
9. Save and compile the Blueprint. this will now give you an option to set the default values in the Text Variable.
10. Save and close the project.

Adjusting the Text properties in Designer

1. In your Disguise Designer project, open the RenderStream Layer editor. The text parameter properties should now be visible.
2. Edit the text parameters.

Remote Texture Sharing

Textures can be shared between Designer and Unreal Engine.

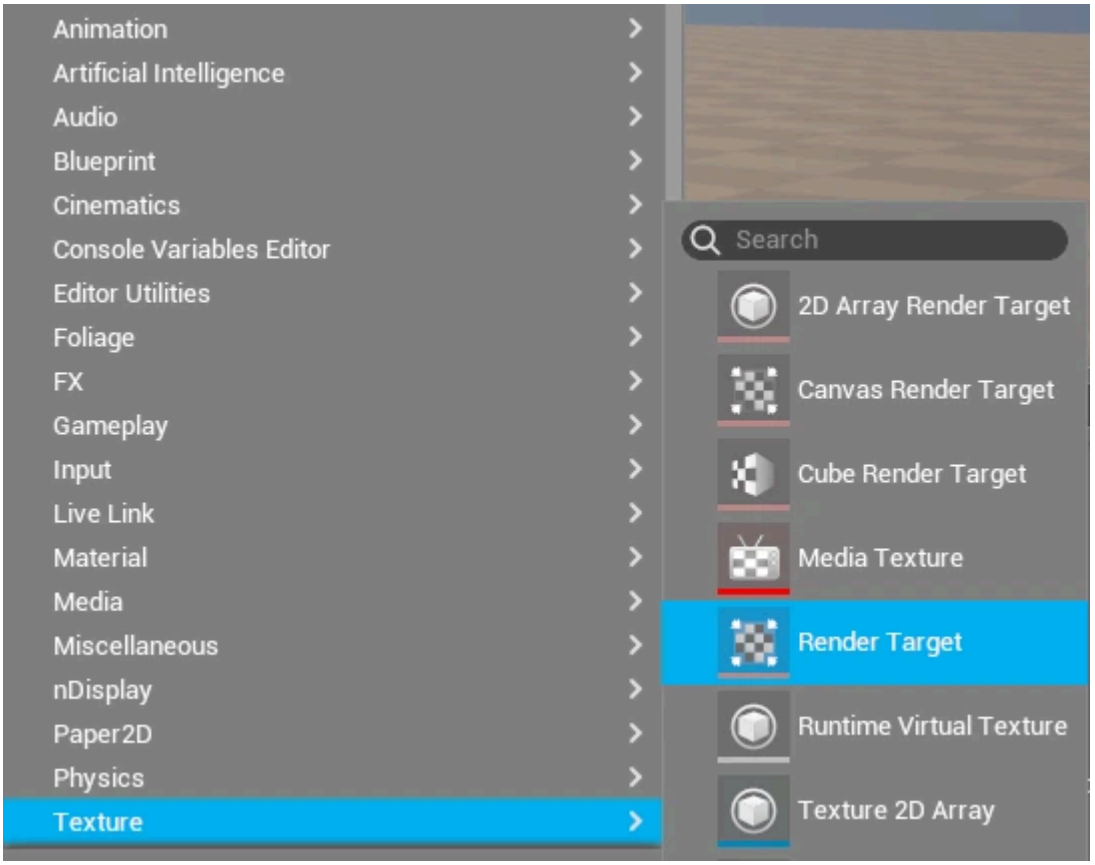
The RenderStream Unreal Engine plugin offers support for the sharing of textures remotely through the use of exposed parameters. This allows a two-way flow of video content between Designer and the Unreal Engine.

Remote Texture Sharing

Create a new material

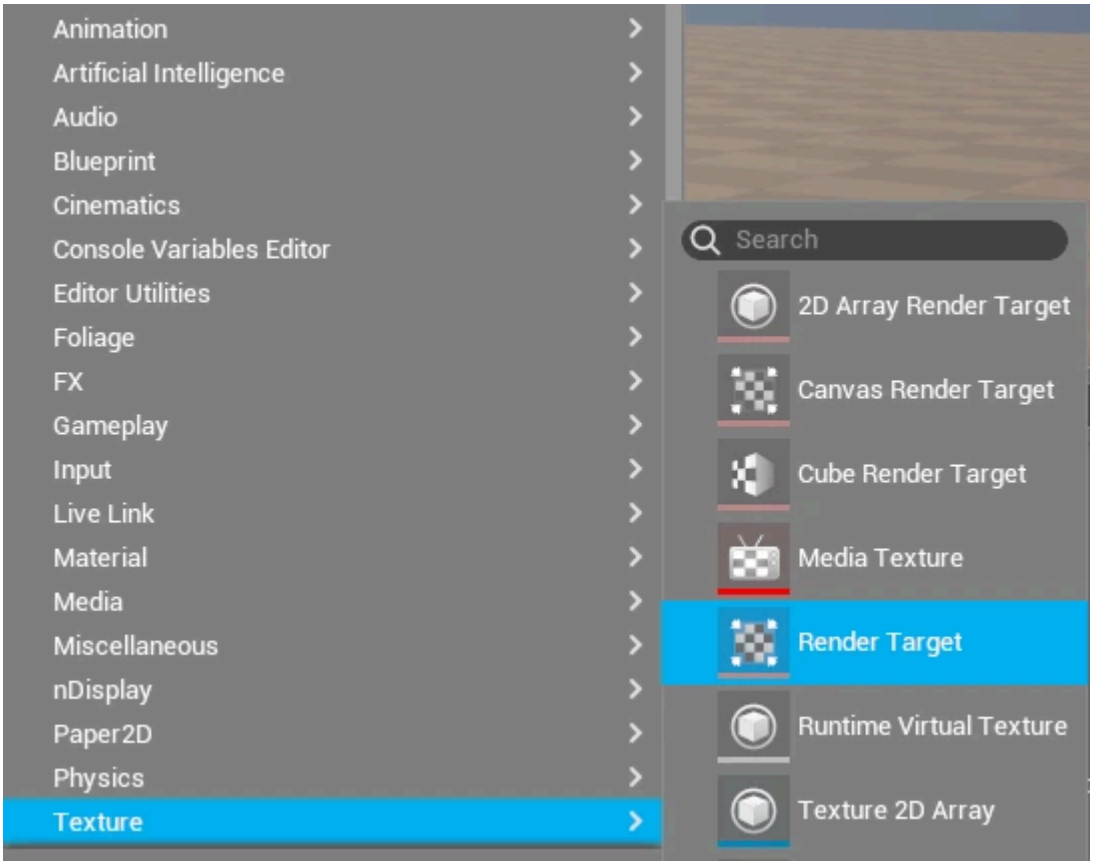
In this example, we will use a Plane to demonstrate remote texture sharing. But you can use any object.

1. Add a Plane (or other 3D object) to the scene.
2. Right-click inside the Content Browser and select **Materials & Textures** > **Render Target** to create a new Render Target.



3. Assign the Render Target Texture as a texture of the material on the plane.

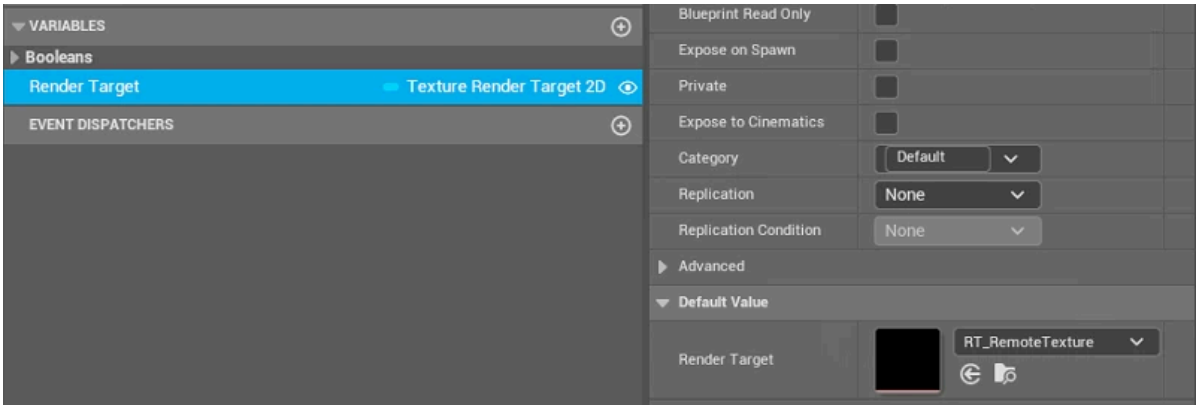
4. Confirm that the new Material has been created and set as a material element in the **Materials** component of your object in the Details panel.



Expose the Remote Texture as a remote parameter

1. Open the Level Blueprint.
2. Click the 'Add' button next to Variables and name the variable according to the desired property (e.g. Render Texture) and compile the blueprint.
3. Select the variable and set the 'Variable Type' in the Details panel to **Texture Render Target 2D**.

4. Enable '**Instance Editable**'.



5. Set 'Category' to the name of the menu you wish the parameter to appear under in the RenderStream Layer.
6. Save and compile the Blueprint.

RenderStream - Unreal Engine

RenderStream is the proprietary Disguise protocol for controlling third party render engines from Designer. This set of topics covers the steps needed for configuring Unreal Engine for use with RenderStream.

Unreal Engine is the third party render engine developed by Epic Games.



An Unreal Engine Scene on an xR stage visualised in Designer

This section covers a range of workflows to help implement real-time graphics for virtual production and xR.

Phase 1: Project & system foundation

Get your Unreal Engine project built and ensure the foundational Disguise plugins and directories are configured correctly.

1. UE Project Setup Learn how to correctly structure a Blank Game or Film project, install the RenderStream plugin, set up your CineCamera Actor, and add a RenderStream Channel Definition.
2. DDC Setup (Derived Data Cache) Optimise load times and performance by configuring your Derived Data Cache. This is essential for ensuring your render nodes don't spend unnecessary time compiling shaders.

3. OCIO Setup (OpenColorIO) Set up precise colour management pipeline rules ensuring what you see in Unreal Engine perfectly matches the output on your LED volumes or displays.

Phase 2: Scene configuration & control

Learn how to pass commands, textures, and parameters back and forth between Unreal Engine and the Designer software.

1. Scene Levels Understand how to manage Unreal Engine maps/levels and ensure the right environments are loaded via RenderStream.
2. Exposed Parameters Expose blueprint variables and properties so you can control your Unreal environment in real-time directly from the Designer timeline.
3. 3D Object Transforms Link transformations so you can manipulate the position, rotation, and scale of 3D objects in your Unreal scene directly through Disguise.
4. Remote Textures Send live video feeds or dynamic imagery from Designer straight into materials inside your Unreal Engine environment.
5. Remote Text Parameters Update text objects dynamically from Disguise—perfect for live broadcast graphics or easily changeable virtual signage.
6. Level Sequences Trigger and control pre-animated cinematic sequences (Sequencer) inside UE directly from the Disguise timeline.

Phase 3: Optimisation & troubleshooting

Ensure your project is running smoothly, beautifully, and without framerate drops across your cluster.

1. Multi-User Editing Configure your environment for collaborative workflows so multiple artists can work within the same Unreal Engine scene simultaneously on a live stage.
2. Scene Optimisation Verification Checklist Run through this critical checklist to guarantee your scene hits the target framerate without dropping frames during a live shoot.
3. UE RenderStream Troubleshooting Encountering unexpected errors or dropped connections? Check this page for common issues, error logs, and immediate fixes.

Scene Levels and Maps

This topic covers how levels and maps can be configured within an Unreal Engine scene for control via RenderStream.

The Unreal Engine plugin allows you to generate scenes from either Levels or Maps within a project. This functions similarly to how the 'Effects' parameter in Notch blocks work.

Scene selector

Levels/Maps in Unreal Engine (UE) can be composed of any number of actors. There are three options for deciding how scenes will be generated from your Unreal Engine project:

None - this offers no scene control and simply merges all Levels of your default Map into a single persistent level.

Streaming Levels - this option generates scenes from all Levels/Sub-levels within your default Map. The Actors within a Level other than the persistent level are unique to that level. The Actors within the persistent level are shared across all levels. Parameters exposed in levels other than the persistent level will only be available when the corresponding scene is chosen in the RenderStream layer. Parameters exposed in the persistent level will be available across all scenes in the RenderStream Layer.

Maps - this option generates scenes from all Maps within your project. Maps will only display the Actors and exposed parameters present within a sublevel and not include those in any parent levels.

Scene Selector	Persistent Level	Sublevel
None	Actors and parameters from all levels	X
Streaming Levels	Persistent level's actors and parameters	Persistent level's + Sublevel's actors and parameters
Maps	Persistent level's actors and parameters	Sublevel's actors and parameters only

Enable the RenderStream plug and set the Scene Selector

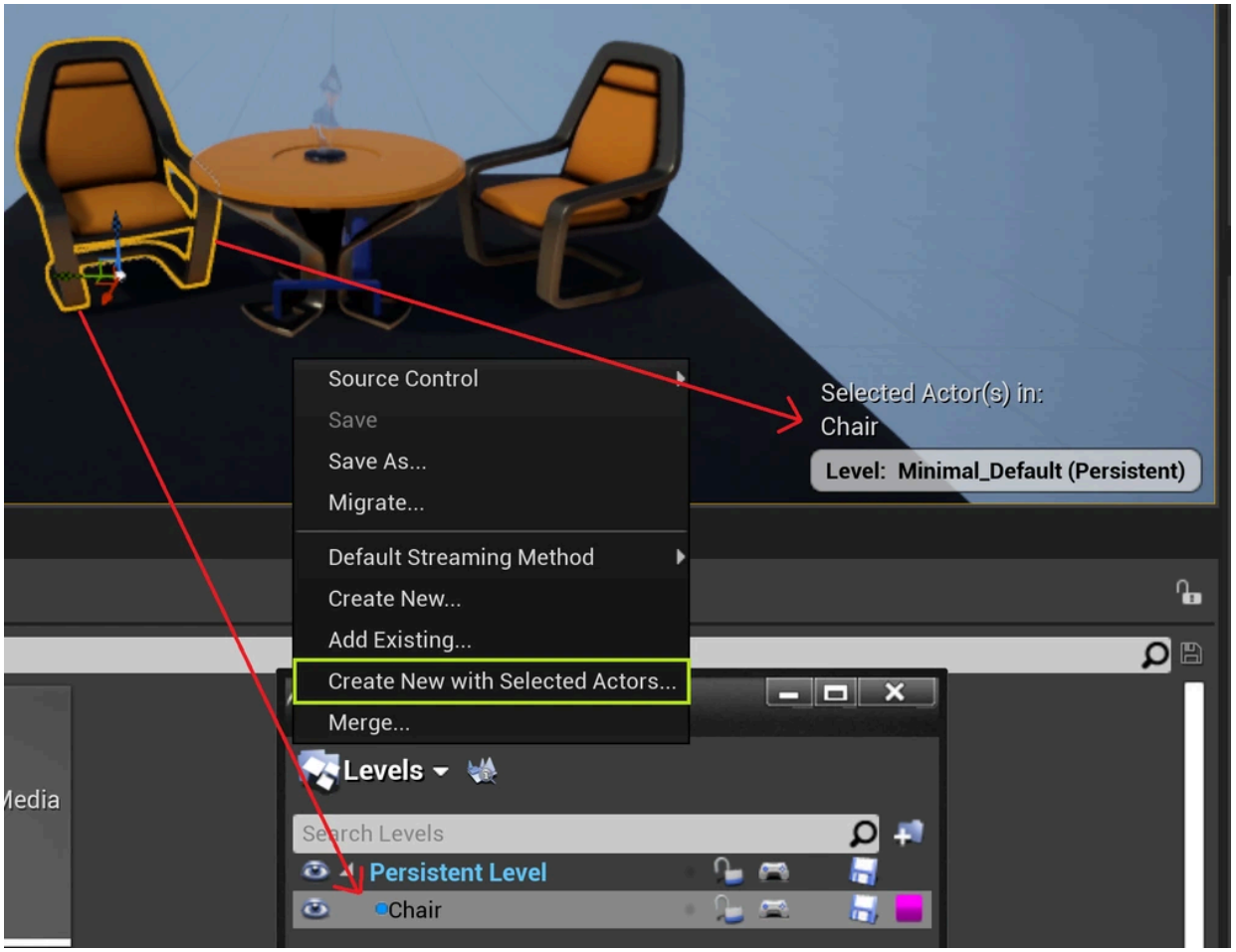
1. From the menu, select **Edit** > **Project Settings...**.
2. Navigate to Plugins/ Disguise RenderStream in the left panel.
3. Set Scene Selector as required. The options are **None**, **StreamingLevels**, or **Maps**.

Create a sub-level

1. Open the scene in the Unreal Engine Editor.
2. Select any Actor from the Outliner panel (e.g. Chair).
3. Select **Window > Levels** from the scene window.
4. Click the Levels dropdown and select **Create New with Selected Actors**.
5. Name the level and click **Save**.
6. Rebuild lighting if required (Unreal Engine may display errors at this point but it will recover).
7. Save and close Unreal Engine.

Run the workload in Designer

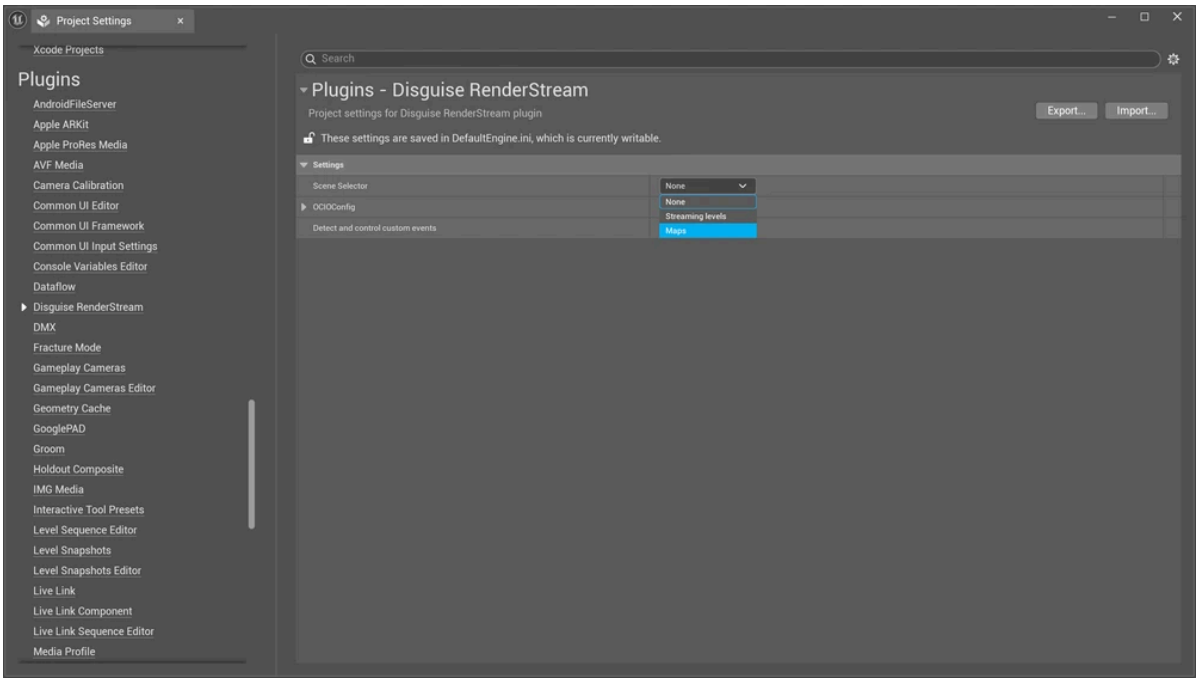
1. Open the RenderStream Layer in Disguise Designer and Start the workload.
2. Modify the Scene parameter.



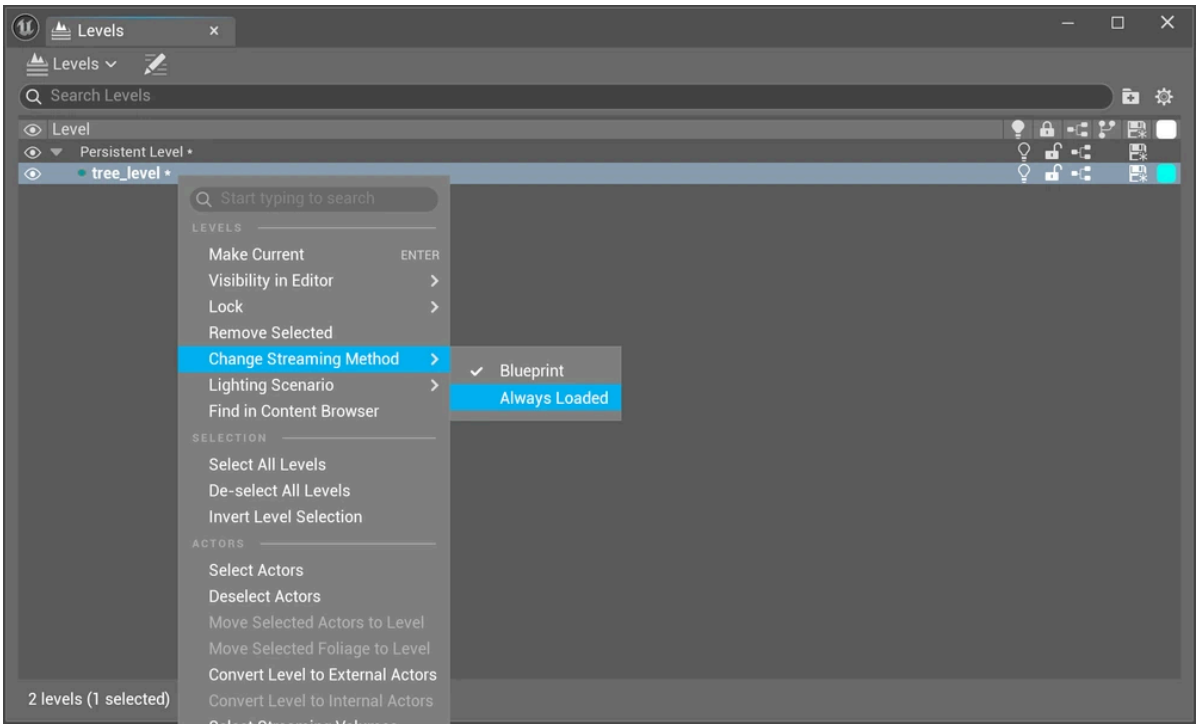
Use Console Variables (CVAR) to control Sublevel visibility

This workflow allows users to control the visibility of Levels in Multi-Level and Multi-Sublevel Unreal projects while using Multi-User Editor.

1. Ensure the Scene Selector is set to **Maps**.



2. Right-click the selected Sublevel/s in the Levels panel, and select **Change Streaming Method > Always Loaded**.



3. Start the Multi-User session in the Editor, then launch the workload.
4. Set the CVAR to 1 (Default value is 0) in the Console Variables window (or in Level Blueprint).



Notes

- When using the Maps Scene Selector option, all maps within your Unreal Engine project must be loaded in the Editor at least so that they are cached. If they are not loaded at least once, they will not appear within the scene selection.
- When using the Maps Scene Selector option, sublevels are handled differently compared to when the Streaming Levels option is selected.
  - Maps will only display the Actors present within a sublevel and not include those in any parent levels.
  - Streaming Levels will display the Actors present within a sublevel as well as those included in any parent levels.

- When using the None Scene Selector option, the scene Unreal will present when a workload is started will always be the Game Default Map set within the project settings (unless otherwise specified using the Custom Options field).

UE Project Setup

This topic covers the steps needed for configuring an Unreal Engine scene for use with RenderStream.

Unreal Engine (UE) is a third-party game engine that can be used to create 3D scenes. Unreal Engine projects can be adapted such that they create RenderStream output streams using Disguise's UE plugin. This plugin contains several components that enable both camera based mappings with tracking as well as non-camera based (2D) mappings (e.g. direct).

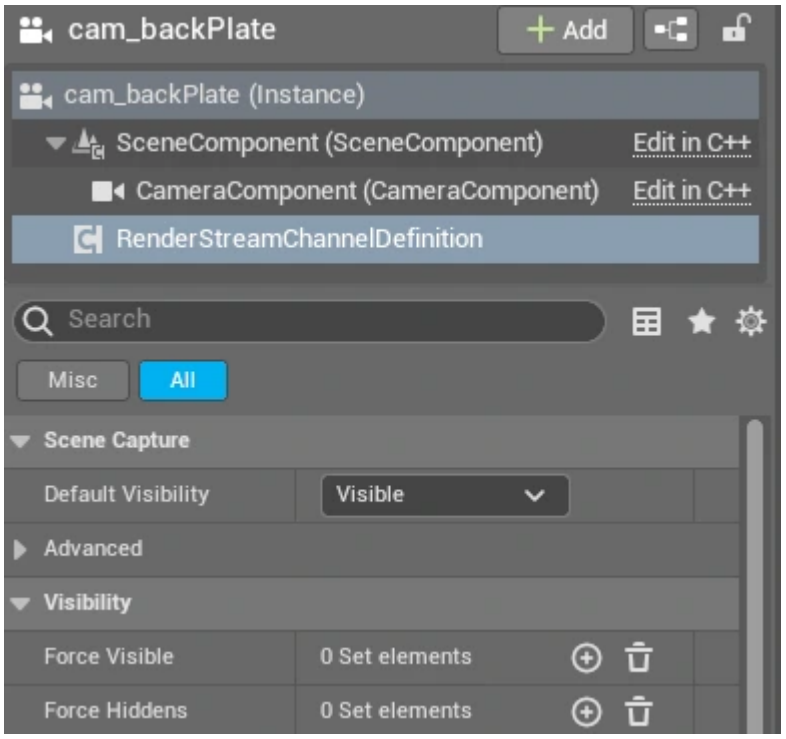
Plugins

- In order to communicate with Disguise, Unreal Engine requires the installation of a plugin on the render node.
- The RenderStream pre-packaged plugins for Unreal Engine are available in the **Disguise RenderStream-UE GitHub**.
- When adding a plugin to a UE/project, it is important that it is placed in the correct location and that the folder containing the plugin files is named correctly otherwise you may encounter unexpected errors. The plugin cannot be added as an engine plugin, it must be in the project.

Unreal Engine Project Setup

1. Launch the Unreal Engine Editor.
2. Create a new **Game > Blank**, or **Film > Blank** project with default settings and ensure it is saved in: `D:\RenderStream Projects` (or `C:\Users\USERNAME\Documents\RenderStream Projects` if you are using a personal laptop/PC).
3. Open the project folder in Windows Explorer and create a new folder with the name, `Plugins`.
4. Place the RenderStream plugin in the Plugins folder.
5. Restart Unreal Engine.
6. Search for **CineCamera** in the Place Actors panel.
7. Drag and drop a new **CineCamera** into the scene.
8. Click the Add Component button from the Camera Actor's Details panel and add a **RenderStream Channel Definition**.
9. The name of the Channel in Designer will be the name of the camera actor, so name the camera accordingly.
10. The setting Default Visibility defines whether the camera will see most actors in the scene.

11. Open **Window > Message Log > RenderStream Validation** and resolve the issues mentioned on the window, these are based on nDisplay limitations/features. Resolve these settings and save the scene making sure the notification has disappeared from the list.

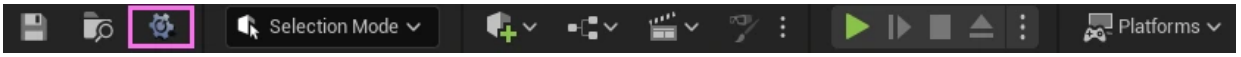


12. [**Optional**] Force the visibility of select Actors within the Camera's Channel Definition (useful for splitting content between the front and backplates): If you wish to add multiple Actors to a visibility set at the same time, lock the current selection into the Details panel, select the Actors you wish to add either from within the scene or the Inspector panel, right-click the visibility set you wish to add the Actors to, and select **Add from Selection**.
13. [**Optional**] To make Unreal Engine run at full speed when out of focus go to Edit → Editor Preferences and untick "Use Less CPU when in Background" (search "cpu").
14. Save the project.

Unreal Editor or Packaged Build?

The standard RenderStream workflow operates directly within the Unreal Editor, which offers flexibility and rapid iteration. However, as of July 2025, a new option is available directly from the UE Editor's Viewport Toolbar. This feature allows you to build and package your project into a standalone executable (.exe) for use with RenderStream, which can offer performance benefits and a more streamlined deployment.

When the build process is triggered, two .exes are generated by Unreal. One is a launcher, and the other is the actual project, which has a longer binary and will be nested in the Binaries folder. They will both appear in RenderStream's asset discovery.



Unreal Engine RenderStream Build button

There are some prerequisites to building a project that need to be observed before using this method:

1. **Environment Setup**: Install **Visual Studio Community 2022** and select the **"Game development with C++"** workload during installation, as this automatically includes the correct **Windows SDK** needed to build your project for **Windows 10** and **Window 11**.
2. **Project Configuration**: Inside the Editor, go to **Project Settings** to configure the core packaging rules. Here you must **Set Default Maps**, and under the **Packaging** section, choose your **Build Configuration** (e.g., Development or Shipping), explicitly list all **Maps to Include** in the build, and confirm **Windows** as the target platform.
3. **Asset & Lighting Finalisation**: With the settings configured, finalise all project data. This involves ensuring all shaders are compiled and, if you are not using Lumen, select **Build Reflections**. It's important to **Rebuild Lighting** on "Production" quality if you are using baked lighting. Alternatively, select **Build All Levels** to update everything at once.
4. **Final Save & Build**: Finally, perform a **Save All** to make sure every change is committed. After saving, you are ready to initiate the final build process.

For a more detailed explanation of the packaging process and the differences between engine versions, please consult the official **Unreal Engine documentation**.

Useful Unreal Engine Information

Saving a project

Unreal Engine has several methods for saving a project. When making changes to a project for use with RenderStream, it is best to close the project before attempting to start a workload. This will prompt you to save all changes to your project. If your Unreal Engine project is not saved correctly, you may experience unexpected behaviour.

Blank GAMES project or blank FILM project?

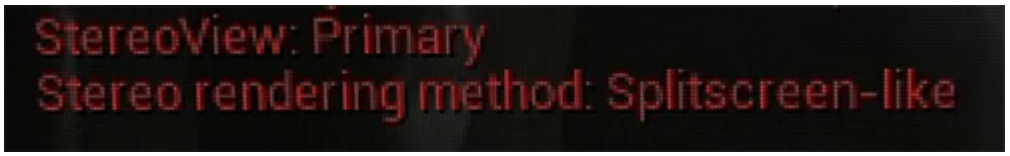
Note that a key difference between a blank GAMES project and a blank FILM project is the way that project manages the skybox. A Games project has an auto-updating skybox relative to the sunlight (Directional Light) for a day/night cycle, but a film project has a refresh material button for updating the skybox relative to the sunlight.

Unreal Engine - Troubleshooting

Troubleshooting RenderStream can be complex. This guide outlines common issues and provides best-practice solutions to help resolve them.

Remove `StereoView-Primary` Screen Message when visible in RenderStream

Below are instructions about how to remove the `StereoView-Primary Stereo rendering method: Splitscreen-like` message that appears on RenderStream using Unreal Engine 5.2 and above. Messages can appear when the **Pixel Streaming** plugin is enabled in the asset.

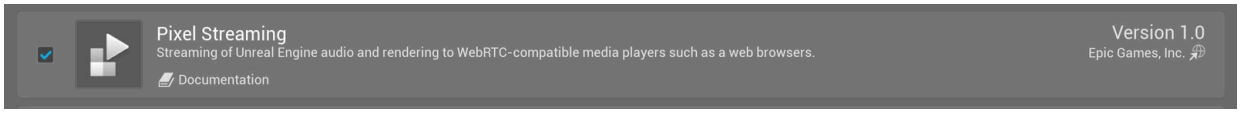


StereoView-Primary Stereo rendering method: Splitscreen-like

Disabling **Pixel Streaming** plugin will prevent this message from appearing. However, as the plugin is needed for a range of workflows, there is another solution to remove the screen message by updating the Level Blueprint in the Unreal project.

Remove the Pixel Streaming plugin

To disable the Pixel Streaming plugin, uncheck the checkbox.

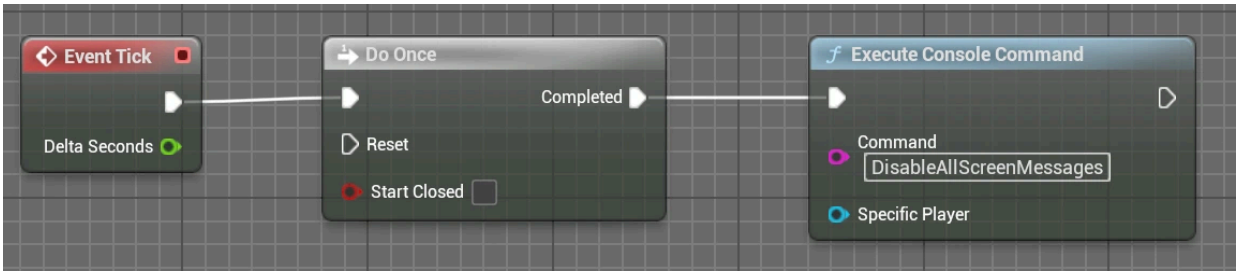


Pixel Streaming plugin shown enabled

Disable all screen messages using a Blueprint

1. Open the Level Blueprint.

2. Add and connect the following nodes to the Event Graph:
    - **Event Tick**: This event fires every frame.
    - **Do Once**: This node executes its “Completed” output only once. It has a “Reset” input to allow it to execute again. This avoids the logs spamming commands lines.
    - **Execute Console Command**: This node executes the `DisableAllScreenMessages` console command.



DisableAllScreenMessages Level Blueprint

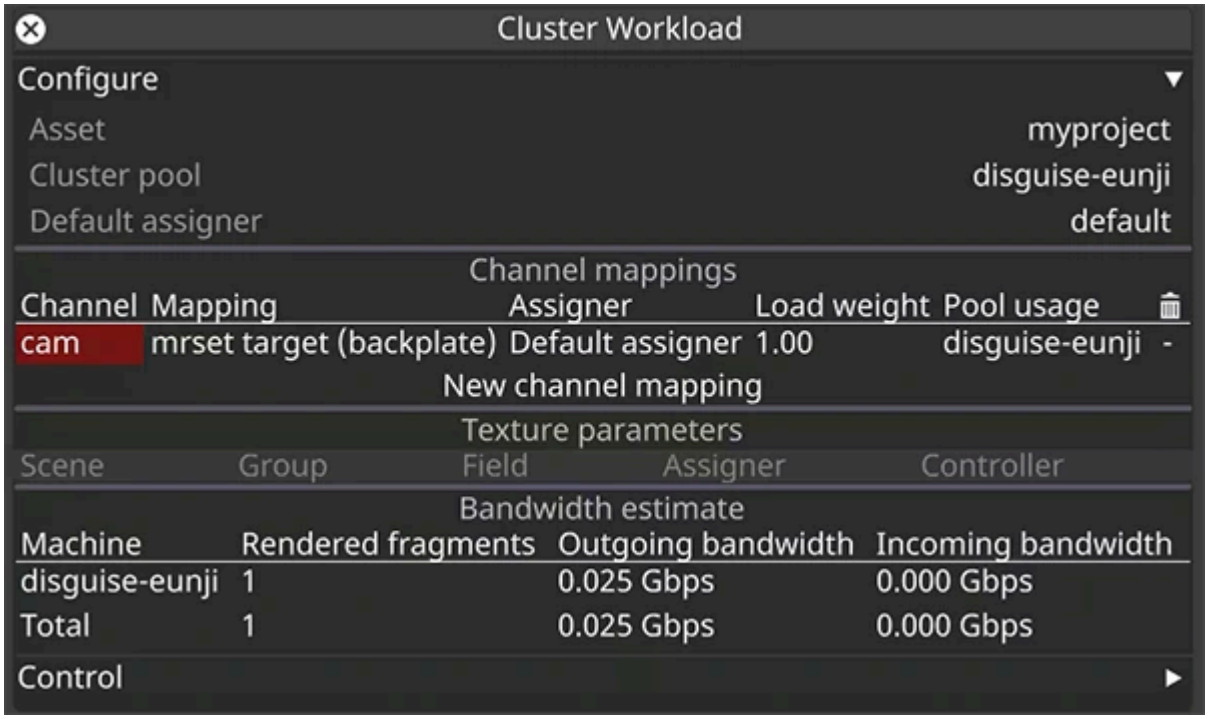
3. Compile, save and close the Unreal project.
4. Open the d3 project and run the RenderStream workload. All screen messages are disabled.

Unreal Engine Renderstream CineCameras not available for Channel mapping

When using the RenderStream plugin in an Unreal Engine project, CineCameras may not appear in the Cluster Workload Channel Mapping if the associated JSON file is not updated correctly.

After adding the plugin, restart the Unreal project.

If the JSON does not updated correctly with the cameras in the scene, it will not work properly and like the screenshot below, and the cine camera will not be available in the Cluster Workload Channel Mapping.



Regenerate the JSON file

1. Close Unreal Engine.
2. Delete the `Renderstream-UE` plugin from the Plugins folder.
3. Download and install the latest Renderstream plugin in the Plugins folder.
4. Enable the RenderStream plugin. After enabling the plugin, restart the project.



5. Open or create a level containing the CineCameras you want to use, and save the level.
6. Check the generated JSON file to ensure that the schema includes the CineCamera channel references. The file will be located at the root level of the UE project and will have a name following the format `rs_<project name>.json`

Scene Optimisation

This topic covers best practices when configuring scenes within an Unreal Engine project for use with RenderStream.

Here are several useful tips and best practices for optimizing your Unreal Engine scenes for use with RenderStream.

Alpha

Tips for using Alpha with Unreal Engine assets:

- Alpha content should be set to **Premultiplied Alpha** in Disguise.
- PostProcessingMaterials do not support alpha from Unreal Engine.
- Set post-processing and effects quality to high/cinematic/epic.
- Atmospheric fog will need to be disabled in channels rendering front plate alpha.
- When a monitor is connected to a render node, ensure that there is 100% scaling to the native resolution. A second monitor can be used as the review screen if the GUI must be scaled.
- Ensure there are no sky domes or full frame effects in the frontplate channels.
- `r.SceneColorFormat` must be set to 4.
- Turning on/off alpha or modifying the transport configuration in any other manner for Unreal assets will cause a shader recompilation and may take a considerable amount of time before the content is visible within Designer.
- Try hiding post-processing methods one by one within the RenderStream Layer as a troubleshooting test if you are not getting alpha through.

> ⚠ **Warning**
>
> Turning on alpha or modifying the transport configuration in any other manner for Unreal assets will cause a shader recompilation and may take a considerable amount of time before the content is visible within Designer. This process will be reflected within the Workload status widget.

Limitations

Limitations of using certain Unreal Engine effects with RenderStream.

There are a number of default options in Unreal Engine that are not suitable for use with any splitting strategy in a Cluster pool. In some cases this is because the whole image is required to be present in order to work; this can sometimes be mitigated with padding and overlap, but this must be evaluated on a case-by-case basis. In other cases, it is because additional buffering is required.

The RenderStream **Channel Definition** component settings contain flags allowing many of these to be enabled / disabled on a per-channel basis.

Below is a non-exhaustive list of such effects:

- Depth of Field
- Bloom
- Vignette
- Lens Flare
- Temporal Anti Aliasing (TAA)
- Screen Space Global Illumination (SSG)
- Screen Space Ambient Occlusion (SSAO)
- Screen Space Reflections (SSR)
- Raytracing (denoiser)
- Chromatic Aberrations
- Eye Adaption
- Motion Blur

> ⚠ **Warning**
>
> Many features within Unreal Engine will not work with nDisplay, specifically nodes that require determinism. Please consult Unreal Engine documentation for more information.

Post Process Volume

By default, Unreal Engine automatically sets the exposure of a map's **PostProcessVolume**. This can cause the exposure of split frames to be different, revealing a noticeable seam between frames. To correct this here are some suggested settings:

- Expand the Lens property of **PostProcessionVolume**.
- Expand Exposure.
- Change the Metering mode to **Manual**.
- Adjust the Exposure Compensation.
- Exposure Compensation can either be a user defined float value appropriate to the scene, or a Float Curve can be applied.

- Be aware there are exposure settings within camera and CineCamera objects; ensure they are set to manual exposure as well.

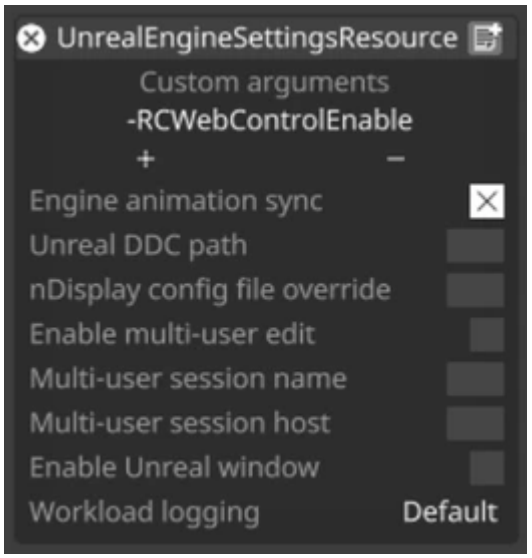
> ⚠ **Warning**
>
> Many features within Unreal Engine will not work with nDisplay, specifically nodes that require determinism. Please consult Unreal Engine documentation for more information.

Unreal Engine Settings

The **Engine settings** of a RenderStream Unreal asset control how the Unreal Engine workload is launched and behaves on the render nodes. This page describes each setting.

Open the Engine settings

1. Open the RenderStream layer editor and right-click on the Workload name.
2. In the Cluster Workload editor, ensure a RS Asset is selected, then right-click on the Asset name.
3. In the Asset editor, right-click on the **Engine settings** property, `UnrealEngineSettingsResource`.



The Unreal Engine settings

Settings

Custom arguments

Extra command-line arguments appended when launching the Unreal workload.

Engine animation sync

Uses one large nDisplay cluster to keep scene animation in sync across render nodes.

- Disguise-controlled parameters are always applied in sync regardless of this setting.

- Disguise cannot guarantee every engine feature synchronises correctly - this is an engine feature.
- Not used by RenderStream Local workloads.

Unreal DDC path

Location of the shared Derived Data Cache used by the workload. See DDC Setup for how to configure a shared cache.

nDisplay config file override

Override the auto-generated nDisplay configuration file with a custom file. The value is the filename (excluding the extension) of a config placed in the asset's workload folder, `<renderstream projects folder>\renderstream_workloads\unreal\<asset_name>\`.

Multi-user editing

Enable multi-user edit appends the command-line arguments to run the workload in Unreal's multi-user mode; **Multi-user session name** and **Multi-user session host** identify the session and server to connect to. See Multi-User Editing for the full workflow.

Enable Unreal window

Shows the Unreal window on the render node (otherwise hidden). Intended for debugging only. The workload must be restarted before this takes effect.

Workload logging

Controls how much the workload writes to its log. More logging helps diagnose problems, but the most detailed level produces a large volume of data and can reduce frame rate on heavy scenes. The workload must be restarted before a change takes effect.

- **Off** - suppresses all engine logging except errors, for maximum performance.
- **Default** - standard logging, recommended for normal operation. Includes nDisplay logs used to diagnose cluster formation, render-node connection and failover events; on a stable running cluster, log volume is low.
- **Verbose** - everything at maximum detail, including per-frame frame-lifecycle and cluster-synchronisation tracing and detailed RenderStream plugin activity. Produces thousands of log lines per second and **can reduce frame rate on heavy scenes**. Use only for deep debugging of synchronisation or timing problems.

Unreal OCIO Setup

A key component of virtual production is maintaining consistent colour across the entire rendering pipeline. This page covers the steps required to set up OpenColorIO (OCIO) in Unreal Engine to achieve consistent colour management throughout the production process.

Before proceeding, ensure you have finished setting up the project by following the steps in UE Project Setup.

Requirements

RenderStream Plugin

- See UE Project Setup | Plugins for details on setting up the RenderStream plugin.

OCIO config file

- Place your chosen OCIO config file into the **Content** folder of your chosen Unreal Project.
  - `RenderStream Projects/<UEProject>/Content/<OcioConfig>.ocio`
- A standard OCIO config file can be downloaded from the OpenColorIO GitHub.

> **Warning**
>
> Both Unreal Engine and Designer must use the same OCIO config file to ensure colour consistency. If the OCIO config includes LUTs, ensure that both the config file and its associated LUT folder structure are preserved for both Unreal Engine and Designer.

Unreal Engine Colour Validation

To ensure accurate colour representation in your Unreal Engine project, it is recommended to utilise the Unreal Validation Framework from Netflix. This framework provides tools to validate and maintain colour consistency throughout your project.

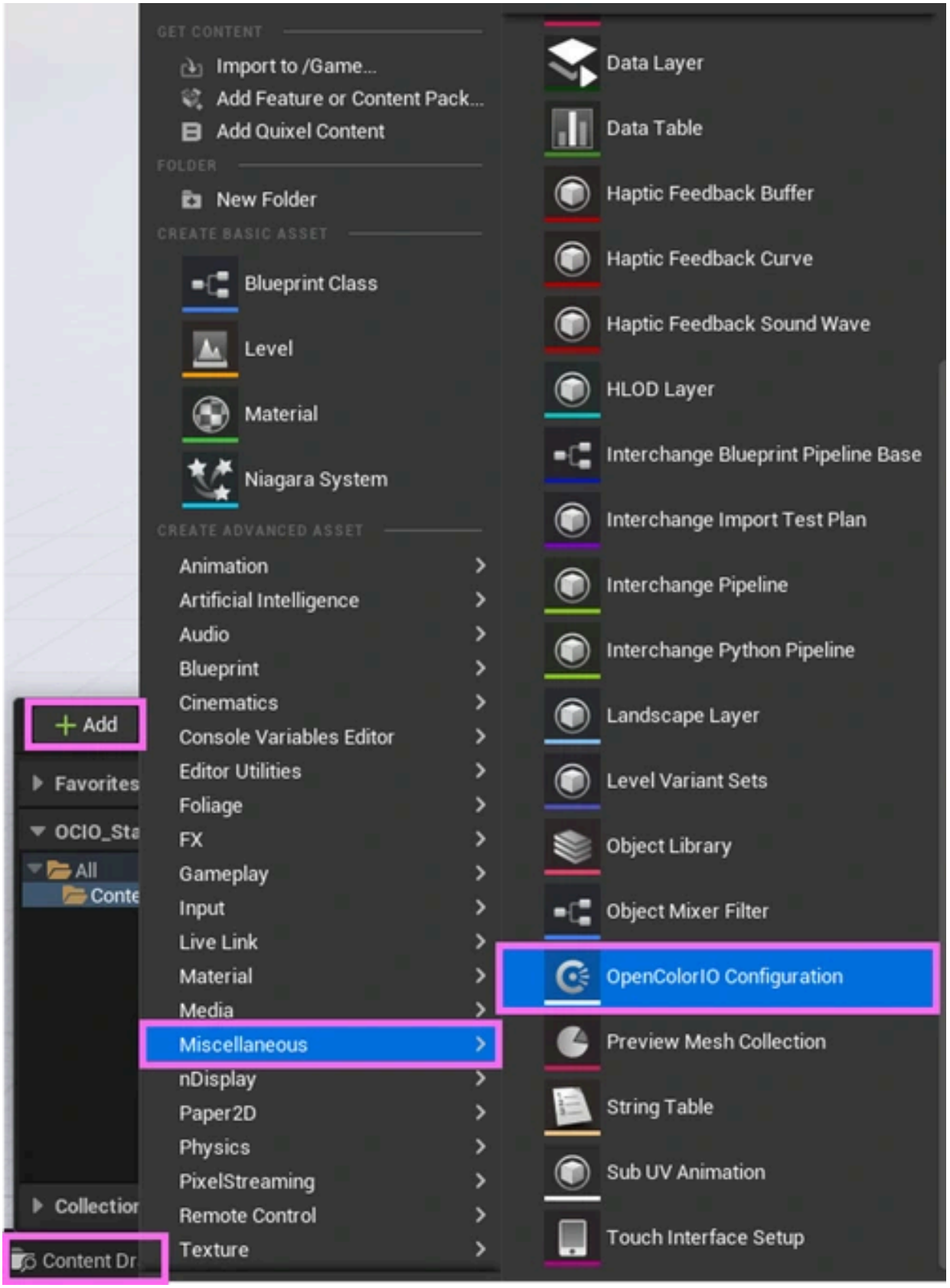
- UnrealValidationFramework GitHub
- A Validation Framework For Unreal Engine Blog

OpenColorIO Configuration

To use OCIO, Unreal requires an **OpenColorIO Configuration** to specify which specific file and colour spaces you would like to use.

Adding a new configuration

1. Open the **Content Drawer**.
2. Click the **Add** button.
3. Navigate to **Miscellaneous > OpenColorIO Configuration** and select it.

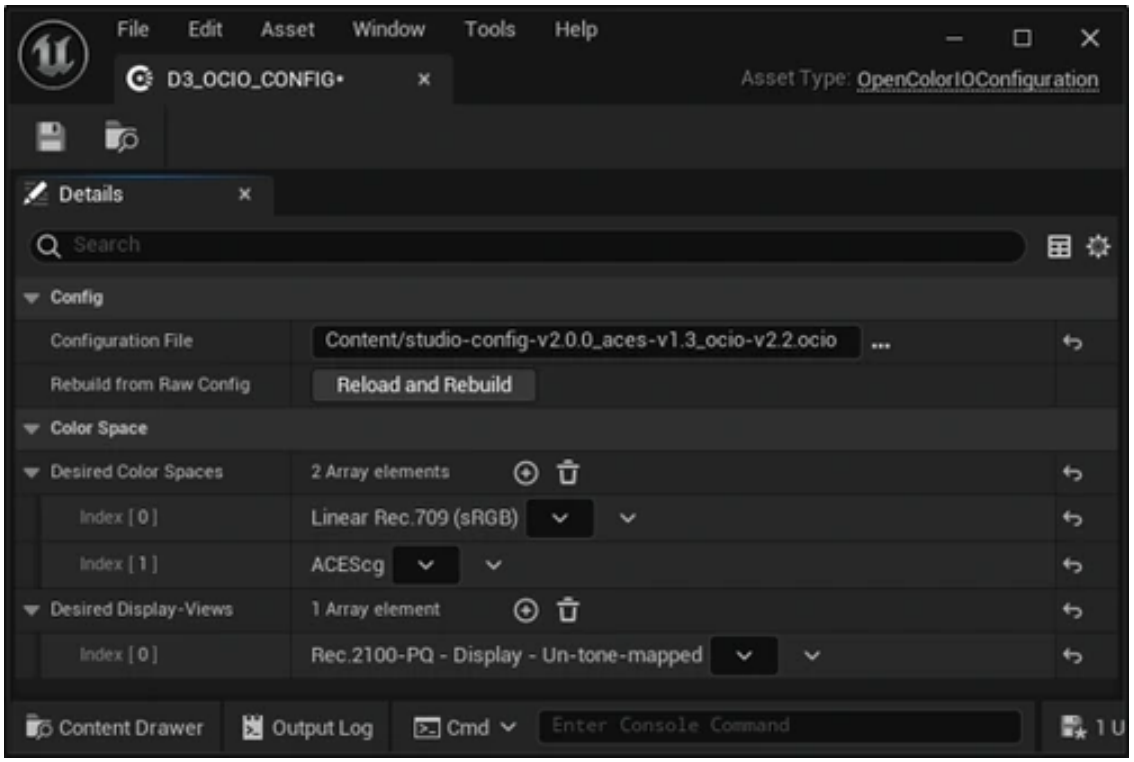


Add OpenColorIO Configuration

Prepare colour spaces

Next we need to expose the relevant colour spaces from the **OpenColorIO Configuration** to configure the colour spaces in the RenderStream Plugin.

1. In the **Content Drawer**, double-click the **OpenColorIO Configuration** you just added.
2. Under **Config**, set the **Configuration File** to the `.ocio` config file you added from the OCIO Config File section.
3. Add the **Desired Color Spaces** and **Desired Display-View** to expose the colour spaces and display-views for later use.



OpenColorIO Configuration Settings

Desired Color Spaces

Exposed **Desired Color Spaces** are typically used for source colour spaces in RenderStream plugin:

- Unreal Engine uses `sRGB / Rec709` by default as the **Working Color Space** in **Project Settings**.
  - The corresponding colour space in the OCIO config is `Linear Rec.709 (sRGB)`.
- Another typical **Working Color Space** is `ACES AP1 / ACEScg`.
  - The corresponding colour space in the OCIO config is `ACEScg`.

Desired Display-View

Exposed **Desired Display-View** are typically used for destination colour spaces in RenderStream plugin:

- `Rec.2100-PQ - Display - Un-tone-mapped` is recommended for common RenderStream use cases.
- The destination colour space refers to the colour space in which content will be sent over RenderStream

Project Settings

Once the **OpenColorIO Configuration** is set up, we must configure the **Project Settings** to apply the colour transforms properly.

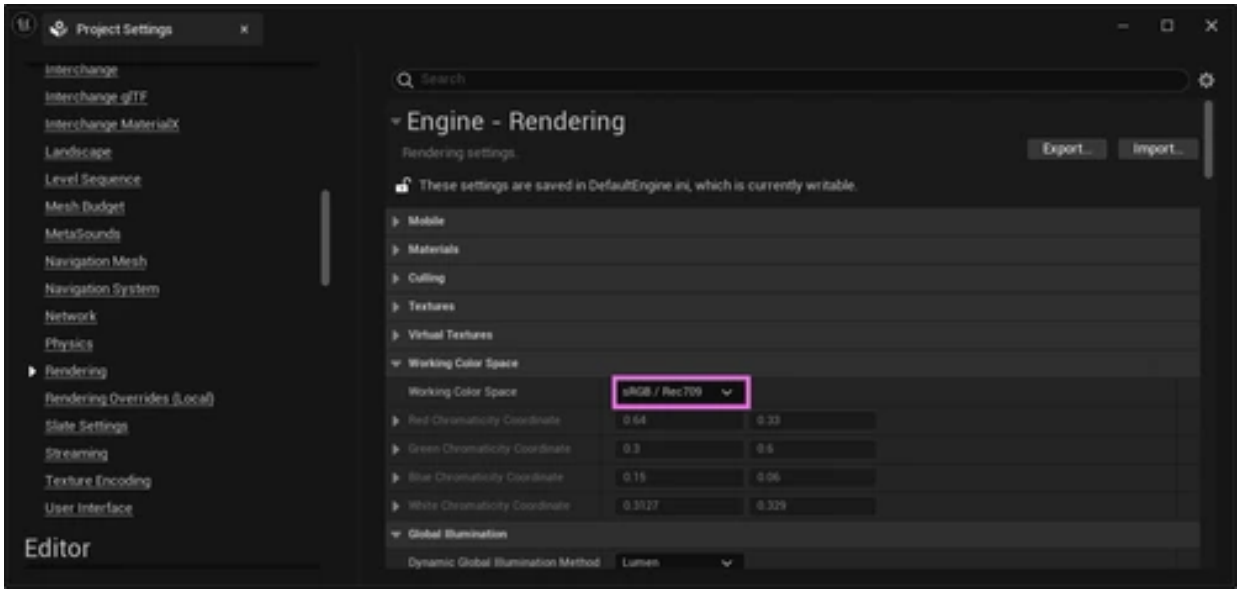
Navigate to **Edit > Project Settings**.

Engine - Rendering

In **Project Settings**, under **Engine > Rendering**, you can define the **Working Color Space** of Unreal Engine. All textures in Unreal Engine must match the colour space set as the **Working Color Space**.

For example, if the **Working Color Space** is `ACES AP1 / ACEScg`, then all textures must be in `ACES AP1 / ACEScg`. By default, Unreal uses `sRGB / Rec709`.

We advise sticking with Unreal Engine default colour space unless its strictly necessary to use a different colour space.



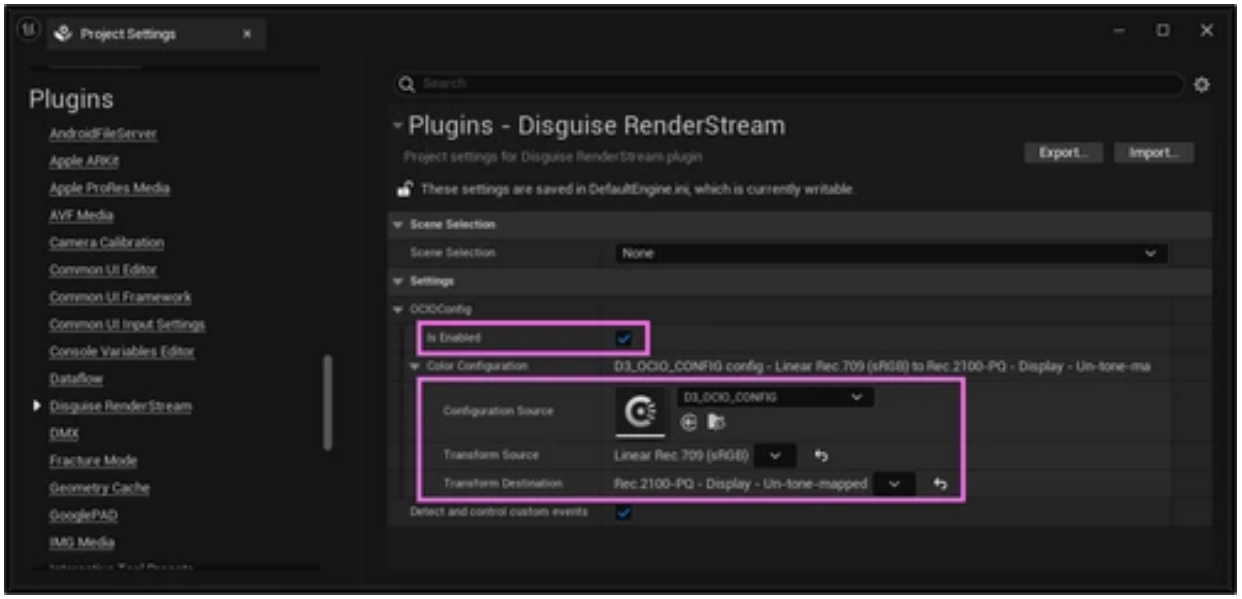
Engine Rendering Settings

> **Note**
>
> For more detailed information on colour spaces in Unreal Engine, refer to this Epic documentation - Color Pipeline.

Plugins - Disguise RenderStream

To avoid unintentional colour transforms, it's crucial to enable and configure OCIO with the desired colour spaces.

1. Navigate to **Plugins > Disguise RenderStream**.
2. Expand the **OCIOConfig** section.
3. Select the **Is Enabled** checkbox.
4. Set the **Configuration Source** to the **OpenColorIO Configuration** you created earlier. (See: Adding a New Configuration).
5. Set the **Transform Source** to match the Unreal Engine **Working Color Space**.
   - Ensure the colour space is exposed in **OpenColorIO Configuration** (See: Prepare colour spaces).
   - Refer to Transform Source for matching colour space between Unreal Engine and OCIO.
6. Set the **Transform Destination** to match the **Input transform** of the RenderStream asset in Designer.
   - The colour space must be between 0 and 1.
   - `Rec.2100-PQ - Display - Un-tone-mapped` is recommended for normal use cases.
   - See: Set Input Transform on RenderStream Layer.



Plugins - Disguise RenderStream Settings

Transform Source

UE Working Colour Space	Matching OCIO Config Colour Space
sRGB / Rec709	Linear Rec.709 (sRGB)
ACES AP1 / ACEScg	ACEScg

> **Warning**
>
> Unreal Engine provides a **UE > Working Space** option for **OpenColorIO Configuration**, but this may not produce accurate colour in RenderStream.

Transform Destination

We recommend using `Rec.2100-PQ - Display - Un-tone-mapped` as the **Transform Destination** for the following reasons:

1. **Rec.2100** closely aligns with the achievable gamut of the display.
2. PQ (Perceptual Quantizer) provides a gamma encoding that preserves details across the range. In contrast, a standard linear encoding would lose detail in the darker regions of the image. This is important because RenderStream send frames in a 10-bit signal format, rather than a 16-bit floating-point format.
3. The colour space shared between Unreal Engine and Designer is an intermediate composite stage; therefore, tone mapping is unnecessary.

Likewise, we recommend using a colour space that fits within the 0 to 1 range and with gamma curve encoding. This ensures that frames can preserve as much data as possible within the RenderStream 10-bit signal format. Note that colors outside the 0 to 1 range will be clamped.

Camera Actor Settings

Unreal Engine applies several post-processing effects which change colour grading. To maintain consistent colour through the rendering pipeline, it's important to disable any unnecessary settings affecting colour.

1. Open the **Details** section of your **CameraActor** or **CineCameraActor**.
2. Navigate to **Post Process > Lens > Bloom**
   - Set **Intensity** to `0.0`.

3. Navigate to **Post Process > Lens > Exposure**
   - Set **Metering Mode** to `Manual`.
   - Set **Exposure Compensation** to `0.0`.
   - Set **Apply Physical Camera Exposure** to `Untick`.
   - Set **Min EV100** and **Max EV100** to `1.0`
     - This will disable auto exposure of lens.
4. Navigate to **Post Process > Lens > Image Effects**
   - Set **Vignette Intensity** to `0.0`.
5. Navigate to **Post Process > Color Grading > Misc**
   - Set **Blue Correction** to `0.0`.
   - Set **Expand Gamut** to `0.0`.
   - Set **Tone Curve Amount** to `0.0`.

OCIO settings in Designer

After configuring Unreal Engine, you must set up the colour settings in Designer accordingly to produce a consistent colour.

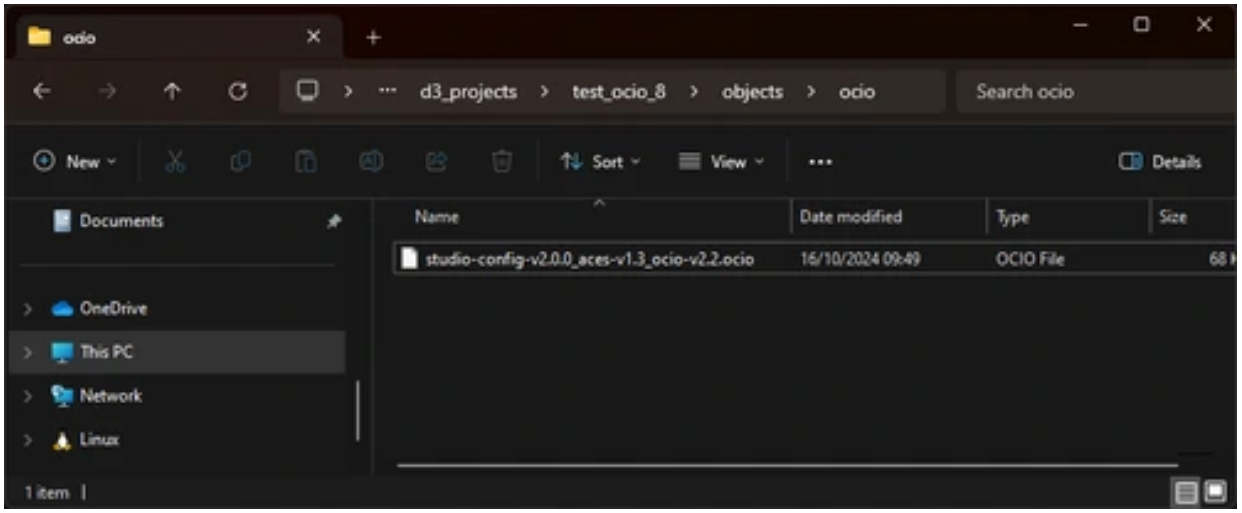
Follow the OCIO page to configure Designer, but with specific focus on matching the OCIO config file and the **Input transform** of the RenderStream.

Importing OCIO Config file into Project

It is recommended to use the same OCIO config file for both Unreal Engine and Designer.

Alternatively, ensure that the OCIO config file contains the same colour space used in the **Transform Destination** in Unreal (See: **Plugins - Disguise RenderStream**).

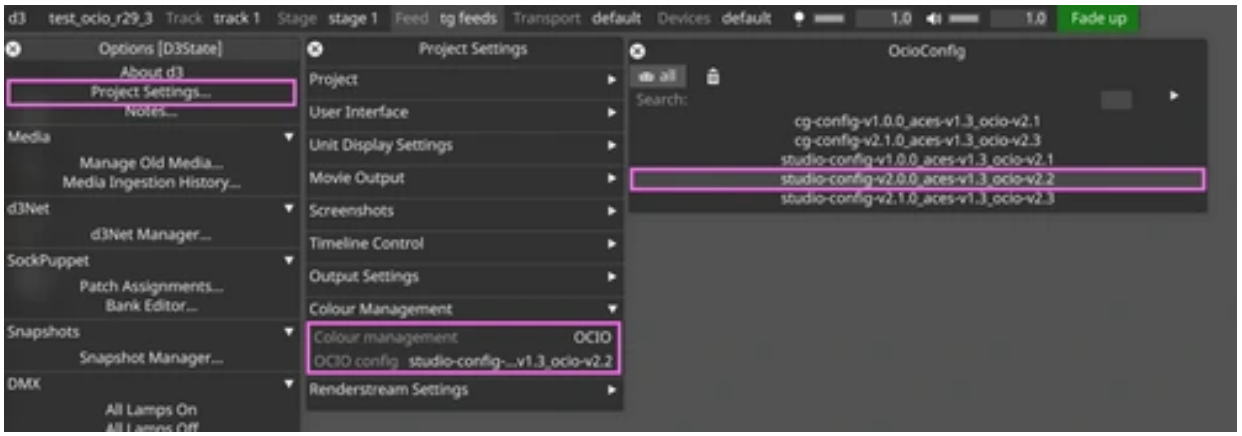
1. Copy the OCIO config file from `RenderStream Projects/<UEProject>/Content/<OcioConfig>.ocio`.
   - See: **OCIO Config file**.
2. Place the copied config file into the following directory:
   - `d3_projects/<PROJECT_DIR>/objects/ocio/`.



Copied OCIO Config File

Apply OCIO settings in Designer

1. Open **Project Settings...**.
2. Set **Colour management** to `OCIO`.
3. Set **OCIO config** using the OCIO config file used for the Unreal Engine project.

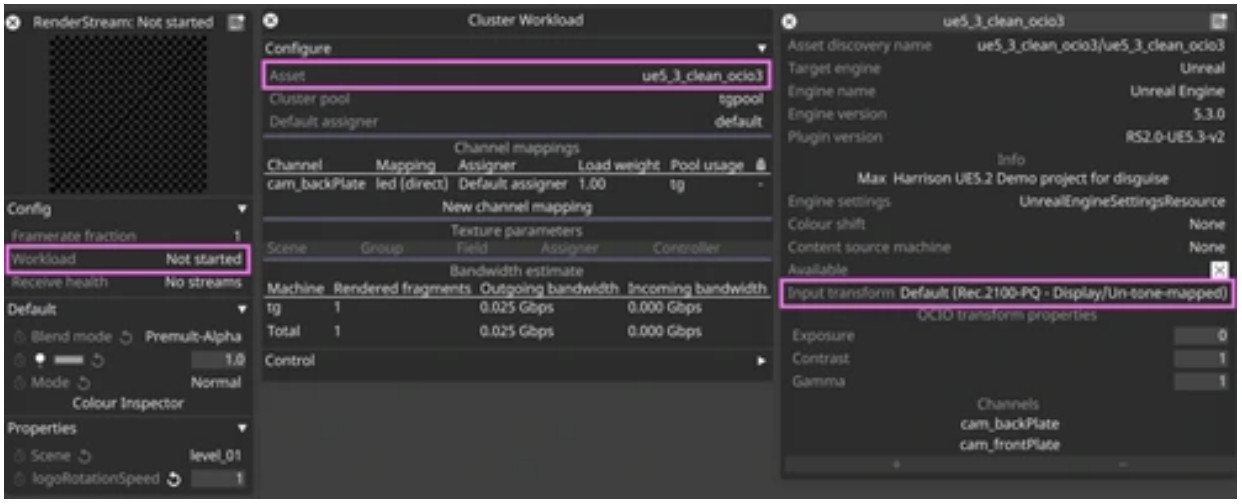


Selecting OCIO Config File

Set Input Transform on RenderStream Layer

Ensure the **Input transform** of the RenderStream layer matches the **Transform Destination** of **Unreal Engine Plugins | Disguise RenderStream**.

1. Open the RenderStream layer widget.
2. Right-click the **Asset**.
3. Set the **Input transform** to match the **Transform Destination** from Unreal.



Input Transform of RenderStream Layer

Verifying Colour with a Colour Checker

It's a good idea to scientifically validate the colour pipeline using a colour checker. This section will guide you through setting up the pipeline to validate the colour accuracy of your rendering using a colour checker.

Designer provides a **Colour Inspector** tool to inspect the pixel values of the final output, ensuring colour accuracy.

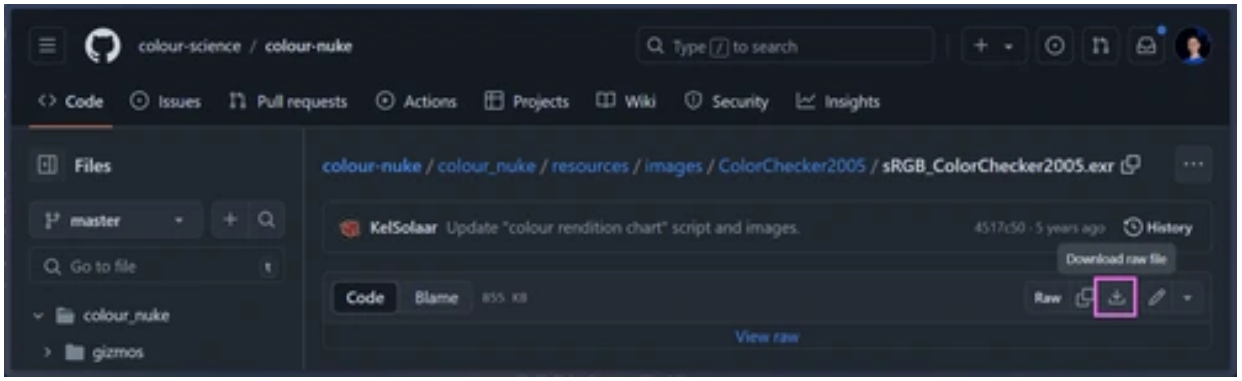
Colour Checker Setup

We'll use a colour checker from Color-Nuke GitHub. Select the `.exr` file based on your **Working Color Space** of Unreal Engine.

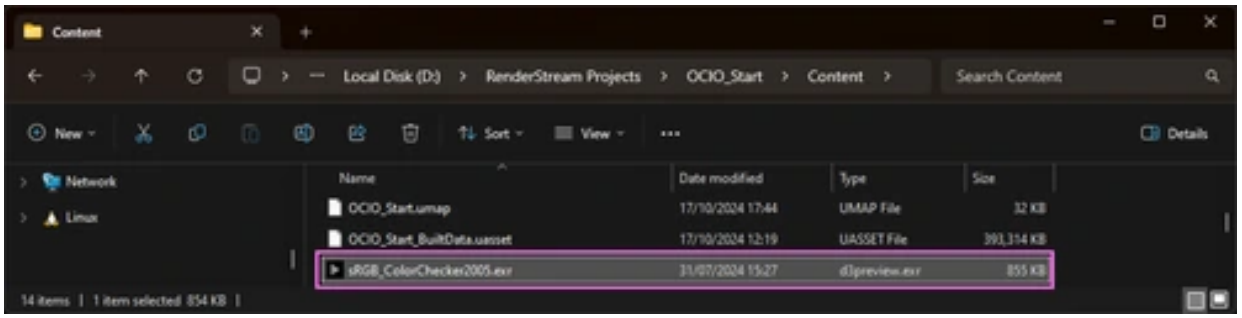
Working Color Space	Link
Rec.709	sRGB_ColorChecker2005.exr - Color-Nuke GitHub
ACES AP1 / ACEScg	ACEScg_ColorChecker2005.exr - Color-Nuke GitHub

Place the downloaded file in the Unreal Engine **Content** folder:

- `RenderStream Projects/<UEProject>/Content`



Color Nuke - sRGB Colour Checker

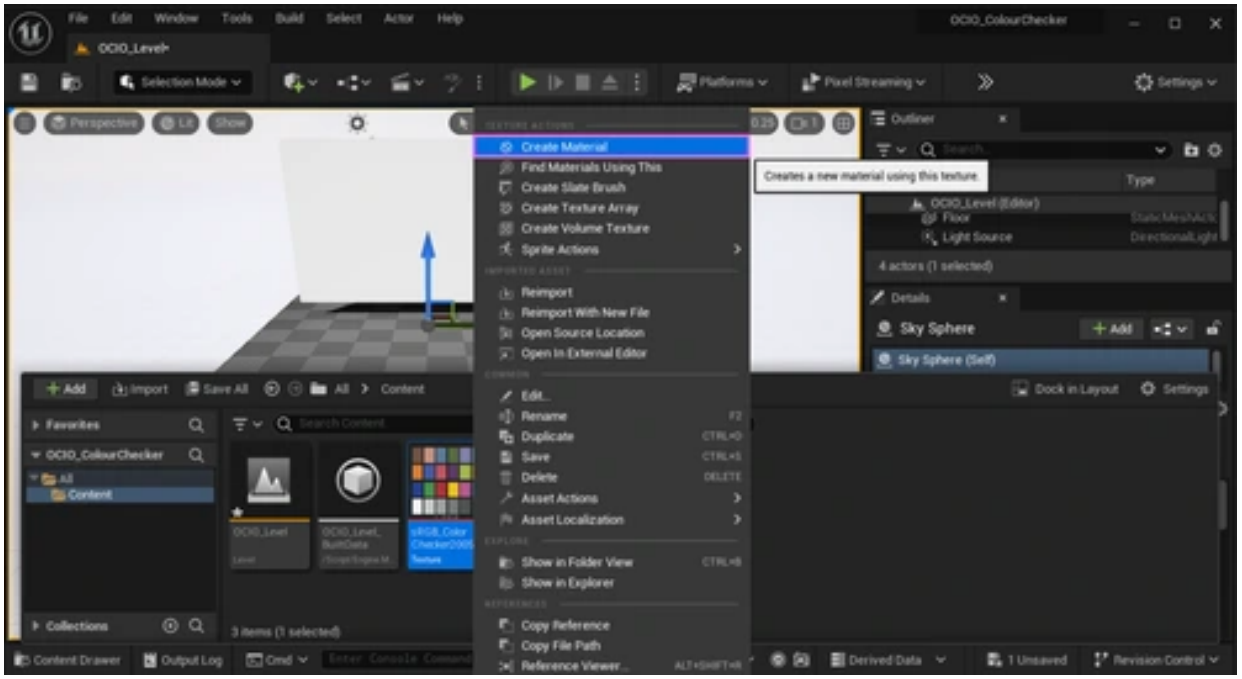


sRGB Colour Checker in Content Folder

Creating a Material in Unreal Engine

Once the colour checker is added as a texture, follow these steps to create a material:

1. Right-click the texture in the **Content Drawer**.
2. Select **Create Material**.

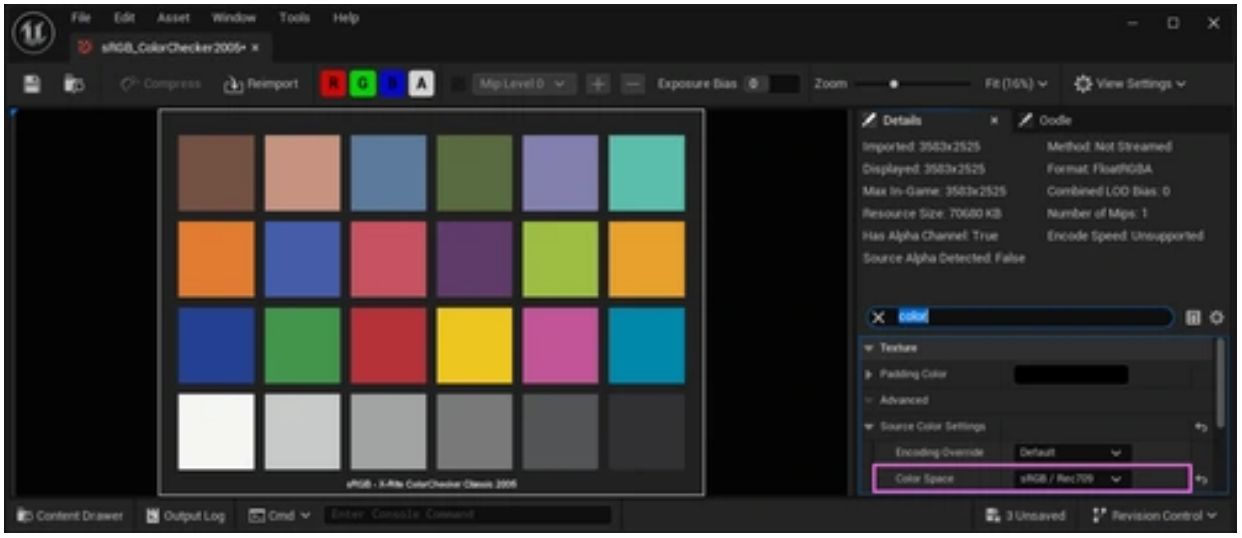


Create Material from Colour Checker Texture

Set colour space of texture (Optional)

If the colour space of the texture is different from your **Working Color Space**, adjust it:

- Double-click the texture.
- Under **Texture > Source Color Settings**, set the **Color Space** accordingly.
  - `sRGB / Rec.709` for sRGB
  - `ACES AP1 / ACEScg` for ACEScg

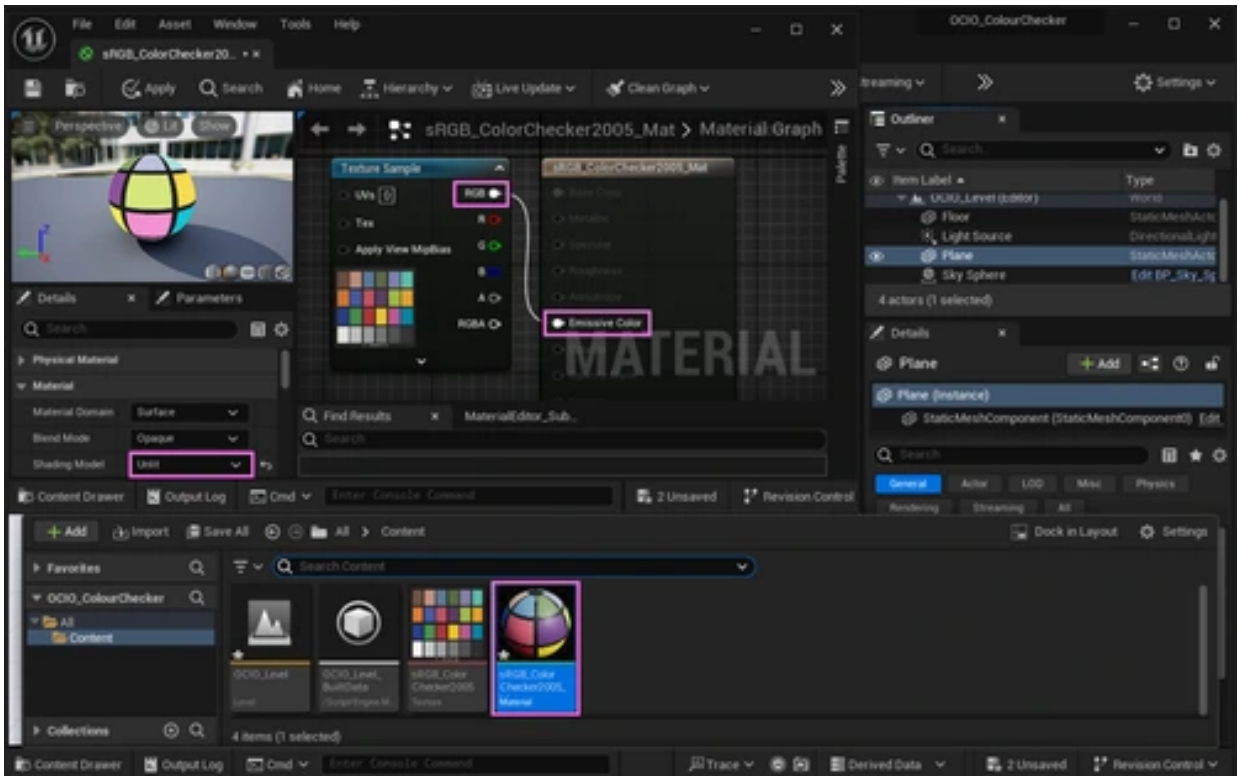


Color Space of Colour Checker Texture

Configure the Material

To avoid lighting effects impacting the colour checker, you need to configure the material to be **Unlit**:

1. Double click the material created from the colour checker texture.
2. Set the **Shading Model** to `Unlit`.
3. Connect the **RGB** node of the **Texture Sample** to the **Emissive Color** input.

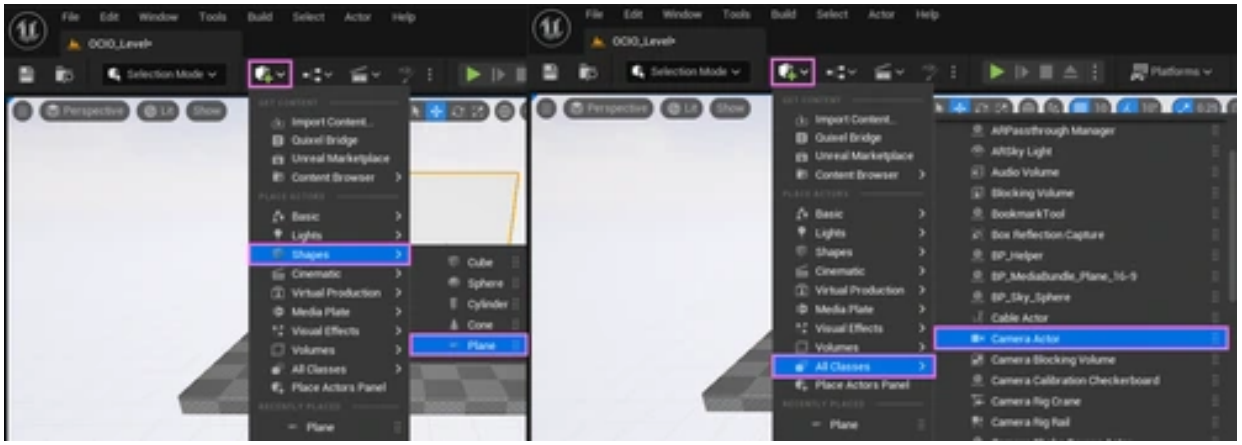


Colour Checker Material Settings

Viewport for Colour Checker

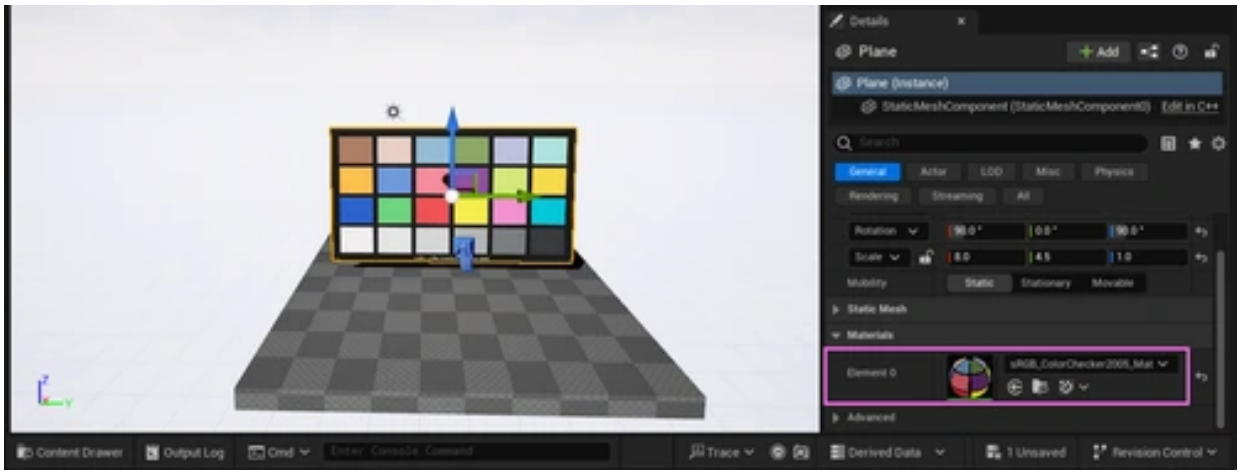
To create a viewport fully filled with the colour checker, it is recommended to add a dedicated **Plane** and **CameraActor** pair. While it is possible to use an existing **CameraActor** and **Plane**, using a dedicated pair ensures better control over the colour checker output.

1. Add a **Plane** and a **CameraActor** (Optional).



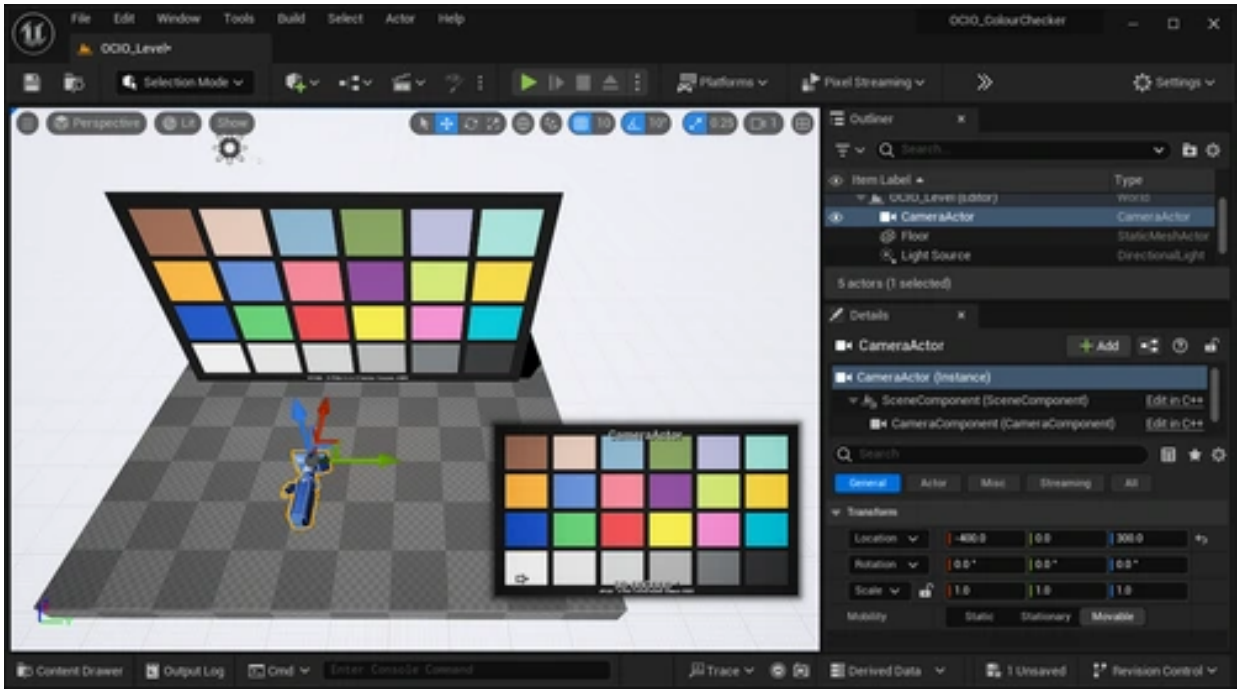
Plane and Camera Actor

2. Adjust the **Transform** of both actors.
    - See: Recommended Transform settings.
3. Select the **Plane** and open the **Details** panel.
4. Expand the **Materials** section.
5. Under **Element 0**, assign the created colour checker material to the **Plane**.



Setup Plane Material

6. Select the **CameraActor**.
7. Verify that the viewport is fully filled with the colour checker.



CameraActor Result Viewport

> **Warning**
>
> Ensure you have followed the instructions in **Camera Actor Settings** to prevent any unintended post-processing effects.

Recommended Transform to achieve the colour checker viewport

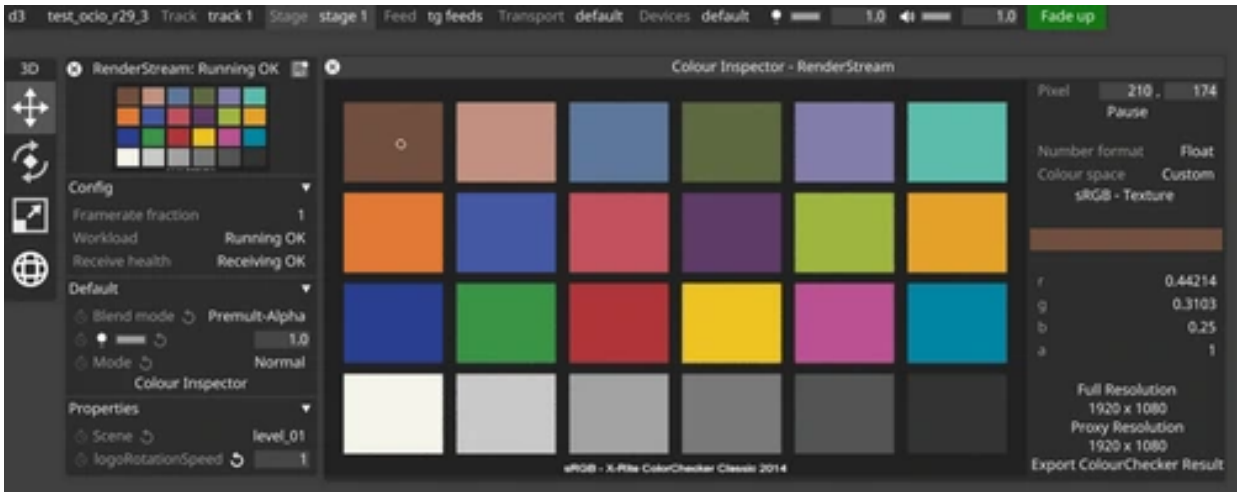
Actor	Location	Rotation	Scale
Plane	`0.0`, `0.0`, `300.0`	`90.0`, `0.0`, `90.0`	`8.0`, `4.5`, `1.0`
CameraActor	`-400.0`, `0.0`, `300.0`	`0.0`, `0.0`, `0.0`	`1.0`, `1.0`, `1.0`

Designer Colour Inspector

> **Note**
>
> Before proceeding, ensure that Designer RenderStream has been properly configured with OCIO (See: **OCIO settings in Designer**).

The Designer **Colour Inspector** tool allows you to inspect colour values at different stages of rendering. Since we are working with a RenderStream layer, follow these steps to use the **Colour Inspector** for the RenderStream layer:

1. Start the RenderStream workload.
2. Open the RenderStream layer widget.
3. Expand the **Default**.
4. Select **Colour Inspector**.
5. Change the **Colour Space** to `Custom`.
6. Set the **Colour Space** to `sRGB - Texture`:
   - Use `sRGB - Texture` for any type of colour checker (i.e. `ACEScg`).
7. Click on any pixel within the colour checker texture to view its value.
   - You can adjust the **Number Format** if needed.



Colour Inspector

8. Compare the pixel values with the **Manufacturer's sRGB color values** from Wikipedia:
   - https://en.wikipedia.org/wiki/ColorChecker

Natural Colours

Colour Format	Dark skin	Light skin	Blue sky	Foliage	Blue flower	Bluish green
Hex	#735244	#c29682	#627a9d	#576c43	#8580b1	#67bdaa
RGB Floats 0-1	0.450980 0.321569 0.266667	0.760784 0.588235 0.509804	0.384314 0.478431 0.615686	0.341176 0.423529 0.262745	0.521569 0.501961 0.694118	0.403922 0.741176 0.666667

Miscellaneous Colours

Colour Format	Orange	Purplish blue	Moderate red	Purple	Yellow green	Orange yellow
Hex	#d67e2c	#505ba6	#c15a63	#5e3c6c	#9dbc40	#e0a32e

Colour Format	Orange	Purplish blue	Moderate red	Purple	Yellow green	Orange yellow
RGB Floats 0-1	0.839216 0.494118 0.172549	0.313725 0.356863 0.650980	0.756863 0.352941 0.388235	0.368627 0.235294 0.423529	0.615686 0.737255 0.250980	0.878431 0.639216 0.180392

Primary and Secondary Colours

Colour Format	Blue	Green	Red	Yellow	Magenta	Cyan
Hex	#383d96	#469449	#af363c	#e7c71f	#bb5695	#0885a1
RGB Floats 0-1	0.219608 0.239216 0.588235	0.274510 0.580392 0.286275	0.686275 0.211765 0.235294	0.905882 0.780392 0.121569	0.733333 0.337255 0.584314	0.031373 0.521569 0.631373

Greyscale Colours

Colour Format	White	Neutral 8	Neutral 6.5	Neutral 5	Neutral 3.5	Black
Hex	#f3f3f3	#c8c8c8	#a0a0a0	#7a7a7a	#555555	#343434
RGB Floats 0-1	0.952941 0.952941 0.952941	0.784314 0.784314 0.784314	0.627451 0.627451 0.627451	0.478431 0.478431 0.478431	0.333333 0.333333 0.333333	0.203922 0.203922 0.203922

Verification checklist

This topic covers some recommended practice information for those working with RenderStream and Unreal Engine.

General

- The **ValidationFramework plugin** is enabled to check for any potential nDisplay / RenderStream issues.
  - Supported Versions
  - UE4.27+: Supported v1.0.1 Only: ✅
  - UE5.0: Testing: ❗
  - UE5.1: Supported v1.1.0+: ✅
  - UE5.2: Supported v1.2.0+: ✅
  - UE5.3: Supported v1.3.0+: ✅
- Verify all required plugins are in the project directory and enabled.

Channel Definitions

RenderStreamChannelDefinitions have been added to each Cine Camera Actor in the specific scene

Frontplate

- Frontplate cameras are set to Default Visibility Hidden.
- All components to be added to frontplate are added to Force Visible section.
- Frontplate cameras have the following disabled (unchecked)
  - Fog
  - Atmosphere

Preparation for Source Control Push

Before a push to source control, and especially after making any changes, the Unreal scene should be tested by launching RenderStream via d3. Check for frame drops:

- During operator camera movements
- When triggering exposed parameters
- Test ALL exposed parameters.

Trigger via a RenderStream layer inside d3 to ensure nDisplay / RenderStream is handling these parameters as the artists intended.

Test ALL frontplate objects to ensure they are rendering as the artist intended.

Sometimes these objects need to be built as Actor Blueprints in order to attach specific lighting to them and make sure the object maintains correct lighting conditions on both the backplate and frontplate. See below for example.

Step through all view modes to check for any glaring issues.

For more information on view modes, see Epic's Documentation .

The Viewmodes most relevant to optimization include:

- Light Complexity
- Lightmap Density
- Stationary Light Overlap
- Shader Complexity
- Stationary Light Overlap
- Shader Complexity & Quads
- Quad Overdraw

If any issues persist, use Unreal Insights to diagnose them.

Documentation on Unreal Insights (UE4.26) is available from Epic **here**.

Derived Data Cache

For information about configuring DDC with Disguise see the DDC page.

DDC PakS

If you download Unreal Engine from the Epic Games Store, the engine will come with a DDC Pak (.ddp). The DDC Pak contains derived data for all engine content, so you can start working without compiling shaders and so on. Similarly, some samples are shipped with a DDC Pak for the same reason.

- Engine DDC Pak

For Example: `EngineDir/DerivedDataCache/Compressed.ddp`

- Project DDC Pak

For Example: `ProjectDir/DerivedDataCache/Compressed.ddp`

Building a project

Considerations while building a project.

An example of an Actor Blueprint with lighting attached:

Actor Blueprint with Lighting attached

Optimization

Optimization is a complex subject influenced by multiple variables such as (but not limited to):

Mobility status for mesh actors and lighting actors

Render settings

Complexity of materials

Amount of Parent Materials vs. Material Instances used.

Complexity of meshes (and for UE5 - whether they are Nanite meshes or not)

Complexity of lighting actors / how many lighting actors are in the scene.

Optimization Recommendations

Use Oodle Texture compression.

When using Lumen, due to the nature of how the light is calculated based on the view of the rendering camera, this may cause seems to appear when using tiled rendering.

Screen-Space Global Illumination should be fine (change this setting under Project Settings > Global Illumination > Dynamic Global Illumination Method).

When using Post Processing Volumes, change this setting by ticking the check box under the PostProcessingVolume Actor under Global Illumination, and changing to Screen Space.

Consider GPU baking as many lights as possible and avoid using Ray Tracing.

Use as few lights as possible.

If you must use a Rect Light, don't use too many and make sure they're baked.

Turn off shadows under individual Light Actors when they're not needed.

Reflection captures don't need a resolution higher than 512.

Learn about Temporal Super Resolution and lower your screen percentage for when using it.

If you're using TAA, use Temporal Upsampling.

Here are some amazing tools to use DURING dev:

UE stat commands

A list of all stats commands for: https://docs.unrealengine.com/5.4/en-US/stat-commands-in-unreal-engine/

Optimise the amount of draw calls

> "UE[4] calculates scene visibility to cull objects that will not appear in the final image of the frame. However, if the post-culled scene still > > contains thousands of objects, then draw calls can become a performance issue. Even if we render meshes with low polygon count, if there are too many draw calls, it can become the primary performance bottleneck because of the CPU side cost associated with setting up each draw call for the GPU. Both UE4 and the GPU driver do work per draw call.

> However, reducing draw calls is a balancing act. If you decide to reduce draw calls by using few larger meshes instead of many small ones, you lose the culling granularity that you get from smaller models."

- Consider combining actors for less draw calls.
- One mesh with 50 mat IDs is better than 50 meshes with one mat ID each (51 vs 100).
- Use the console variable editor.

General Onsite Advice

- If the player can't see an object, don't bother rendering it.
- Trees can be the biggest challenge especially when filling a scene with them. They have an impact on draw calls. High poly assets with multiple materials slots are problematic.
- Using a visual LOD system can be one solution with better assets closer to the camera, and lower quality ones behind. While a treeline texture plane is useful for the background.
- Also, turning off all shadows and systematically turning them back on can create the desired effect and a lighter weight project. To compensate for highlights appearing flat as a result, the light function on the Directional Light can be altered to help fake slight foliage shadows.
- Replacing the Atmospheric Sky and Volumetric Clouds with a sphere that has an unlit shader is a good solution when the time of day does not change in a scene.

- Volumetric fog can be improved by:-
  - Tweaking the View Distance space
  - Using the following console commands:

    `r.VolumetricFoc.GridPixelSize`

    `r.VolumetricFog.DepthDistributionScale`

    `r.VolumetricFog.GridSizeZ`

Bank Editor

> **Note**
>
> For best results have the console set up to work in **decimal** rather than percent.

What is the Bank Editor?

The Bank Editor enables us to assign DMX values to the various resources required within a layer. Examples of resource parameters include video or bitmap files, mapping types, or HTML bookmarks. This process is managed on a bank-and-slot basis.

Banks & slots

Within the layer personality, Sockpuppet assigns two channels to each resource parameter. The first channel is for the resource bank, and the second is for the resource slot. For example, within the video layer personality, channel 8 is for the video bank and channel 9 is for the video slot.

Example: If we have a video asset assigned to video slot 5 in video bank 3, we would need to output the following from the lighting console to recall it:

```
channel 8 @ 3, channel 9 @ 5.
```

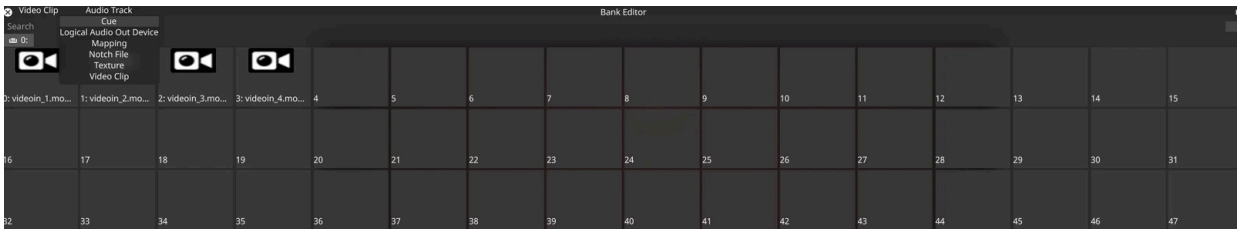
This means that we can have a maximum of 255 video banks and within each of those we can have 255 video slots, giving us a total of 65025 assignable video slots (255*255) for each resource type.

Main interface elements

To open the Bank editor right-click on the state menu (top left) and underneath the sockpuppet tab left-click **Bank**.



At the top of the window, the currently selected resource type is displayed (in this case, Video Clip). Left-click Video Clip to open a menu of other resource types, such as Audio Track, Cue, Logical Audio Out Device, Mapping, Notch File, and Texture.



You can populate the resource bank with resources by dragging them from the resources view in the bottom of the window to empty bank slots.

Preferences

The Bank Editor preferences can be opened by left-clicking the small white triangle in the top-right corner of the window.

View type

Select how you would like to view the Bank Editor. **Grid** displays the slot window in a grid format, and **List** displays the slot window as a list.

Columns

Specifies the number of columns displayed by default.

Parameter tracking

By left-clicking on this field and setting it to **On**, we will have a visual representation of which slot we currently have selected; so as the console programmer scrolls through the slots and banks on the encoders, a red square will be drawn over the slot we currently have selected.

Auto-populate

When disabled, it stops assets being added automatically based on their file name.

Search function

Allows you to search through assets already assigned to slots. Matching results are highlighted with a light blue square.

Working with banks

Banks are configured and managed using the tabs bar above the slot layout. By default, bank 0 is already created.

To open the bank options window, right-click on an existing bank (including bank 0).

Rename

Specify a custom name for the bank, then click **OK** or press **Return**.

Duplicate

Copy the contents of the selected bank into another bank. Specify the destination bank number, then click **OK** or press **Return**.

New bank

Create a new bank by entering the desired bank number, then clicking **OK** or pressing **Return**.

Auto-populate banks from directory

Please see **Adding Assets to Slots** below.

Reset bank

Returns the bank to its default state and clears any populated slots.

Remove missing

Removes missing media from the selected bank.

Delete bank

Left-click to permanently delete the bank from the Bank Editor.

Adding assets to slots

Manually add assets to slots

To manually add an asset to a slot:

1. Select the resource type you wish to assign (for example, Textures).
2. Left-click the thumbnail in the library.
3. Drag and drop it onto the slot you wish to assign. Repeat this process for all required content.

If you have your content organised into files and boxes (read about organising your content here) then you can quickly populate your slots with whole boxes at a time. To do this simply hold down Alt on the keyboard and left-click over the box you wish to use, this will turn our cursor into a white arrow which we can drag from our box to the first slot we wish to use, release and it will populate the slots with the contents of that box.

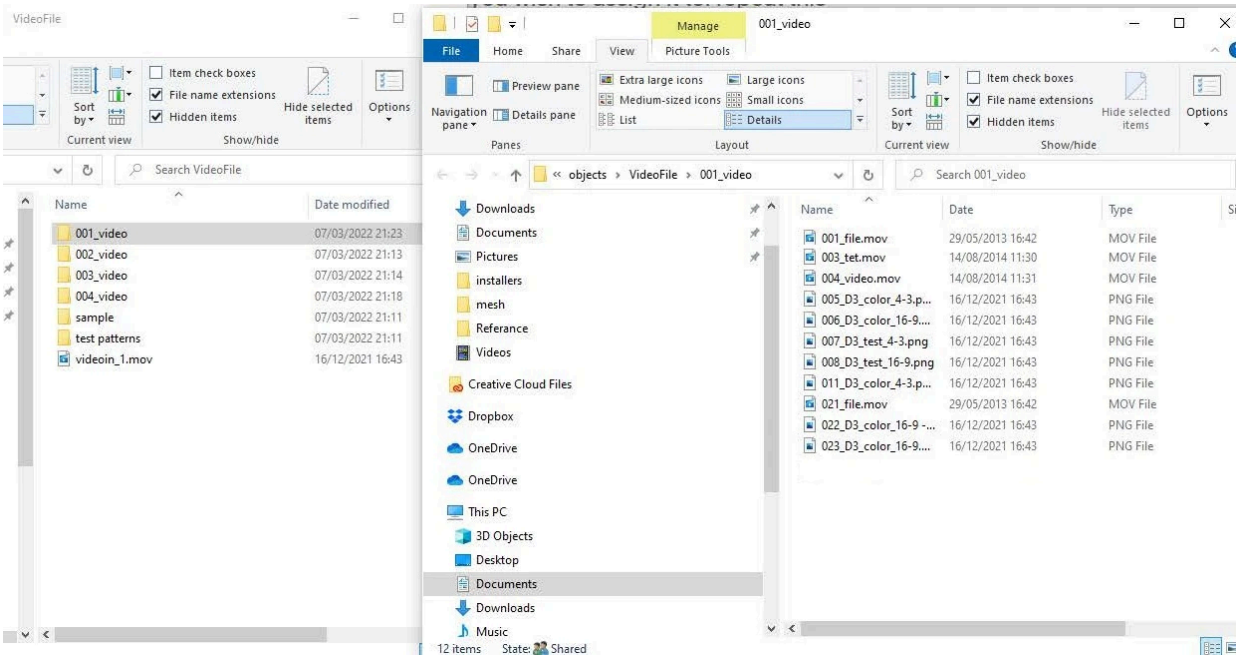
Using auto-populate to add assets to slots

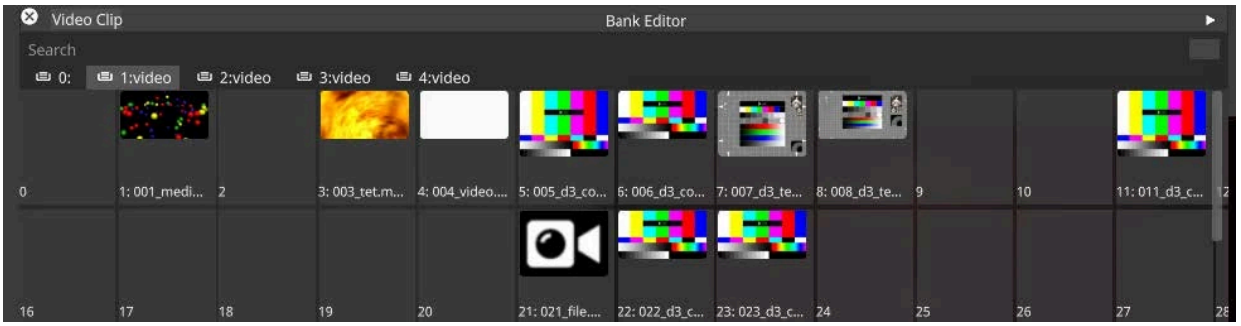
Another widely used method of assigning DMX values to assets, is adding numerical values to folders and files within your assets library. Designer also supports this workflow and is managed via the auto-populate field in the bank options (see above for how to access).

Auto-populate file structure:

Each of the content folders located within the objects/videofile folder needs to be labelled numerically, for example: `001_Foldername`

Files within this folder should follow this same numeric labelling scheme: `001_filename`





Auto-populated results within the Bank Editor

Creating a directory

When using this method to populate your banks and slots, you will need to start by numbering your folders and files within the project directory in Windows.

Navigate to the resource folder you wish to use (we will be using DxTexture as an example) and number your folders within the DxTexture folder, these will become your bank numbers. Within each of these folders you will need to number your asset files, these will become your slot numbers.

Clearing assets from slots

To clear a slot, overwrite it with the **None** thumbnail from the resource library. Left-click the **None** thumbnail and drag it onto the populated slot.

Alternatively, use the **Reset Bank** option to clear the entire bank.n to clear out the entire bank.

Banks with OSC

As of r17.3, banks can also be used with OSC sockpuppet.

- The path is always the same: `/d3/layer/Typeoflayer/Nameoflayer`.
  For example: `/d3/layer/Video/video`
- It's always one message (One address/path + one or two integers)
- **Option one**: One path and one integer with bank and slot encoded into one number.
  For example: `bank 1 slot 1` is `256+1=257`.
- The formula for a single integer is `bank*255+slot`
  For example: `bank 0 slot 1` is `0*255+1`.
- **Option two**: One path and two integers with bank in the first integer and slot in the second integer.

HTTP Sockpuppet

HTTP Sockpuppet allows sockpuppet control of layers via a HTTP API. This page will give an overview of the functionality possible with HTTP sockpuppet, its limitations and how to set it up in Designer.

Patching a layer

To control the layer via HTTP Sockpuppet, the layer must be patched.

1. Right-click the layer on the timeline.
2. Click **Patch to HTTP...**.

The layer will turn green and by all fields of the layer will be patched, turning green. When a field is patched, it can no longer be controlled with keyframes and will only be controlled by HTTP sockpuppet.

Unpatching a layer

Individual fields can unpatched by:

1. Right-click the field on the layer.
2. Click **Toggle Sockpuppet** to patch / un-patch this specific field.
3. Click **Isolate Sockpuppet** to un-patch all other fields on the layer.

Controlling the layer

Once patched the layer can be controlled with the `/api/session/sockpuppet` endpoints. Querying the available patches with `/api/session/sockpuppet/patches` will return the available patches that can be controlled, and the fields available for each one. Values can then be changed with the `api/session/sockpuppet/livechange` endpoint. For more detail see the **API documentation**

Animating numeric values

HTTP is not suitable for streaming values, animations are implemented to support animating values over time, rather than sending a stream of values like you would with DMX over ethernet or OSC.

Animations can be applied to a numeric field of a patch (e.g a layer) and the animation will be executed in sync across all the machines in the session. If a machine is dropping frames, you

may see issues with synchronisation.

Animations are triggered with a start value, end value, a duration of the animation and the easing method to use. The start value will be set on the field and interpolated to end value, over the course of the duration using the easing method supplied.. Examples of interpolation methods are Linear, Cubic, Quadratic.

Easing methods available can be queried with the `api/session/sockpuppet/easingfunctions` endpoint.

Considerations

HTTP sockpuppet changes are executed with a ~2 frame delay, to allow the change to be distributed across the session, and applied in a synchronised manner.

Once a value had been set via HTTP sockpuppet, it will always be set to the last value set (or final value of the animation) until d3 is restarted. There is no expiration.

The current value or a field on a patch (e.g field on a layer) is provided in the result of the `api/session/sockpuppet/patches` endpoint, but it is not possible to stream the realtime values of a field.

HTTP sockpuppet changes should be sent to the acting Director. This will depend on failover state.

Patch Assignments

Sockpuppet treats all of Disguise's layer types as fixture personalities. The Patch Assignments window is where we patch or assign our layers on our Timeline to incoming DMX values or channels. For OSC and HTTP the process is slightly different.

DMX

> ⚠ **Warning**
>
> In r31.1, we broke existing DMX personalities. This has been fixed in r31.2. If you have experienced this issue, please update to r31.2.

Patching a layer to DMX control

1. Access the patch assignments window by right-click on the d3 icon in the top left corner of the interface.
2. Navigate down to the Sockpuppet tab.
3. Beneath this you will find two fields, the first will be **Patch Assignments** and the second **Bank Editor**.
4. Left-click Patch Assignments to open the patch assignments window.

View types

Click the right triangle next to Patch Assignments, and click on the view type field to open the list of available view options.

Patch grid

Displays all 512 channels in a grid format. You are able to patch to any free channels here or view which channels you have already populated with a patch. Left-click on Patch Grid to view different options to change the layout of the patch window.

Please note: this is the view type you will need to be in to patch your layers.

Patch list

This shows us a list of all of the current layers patched and their start channels within any selected universe (selectable from the Viewing Universe field).

Global patch list

This follows the same format as the Patch List, however this will show us a full list of all layers patched regardless of which universe they start on.

Universe occupancy

This will show us in grid format which of our universes we currently have layers patched to.

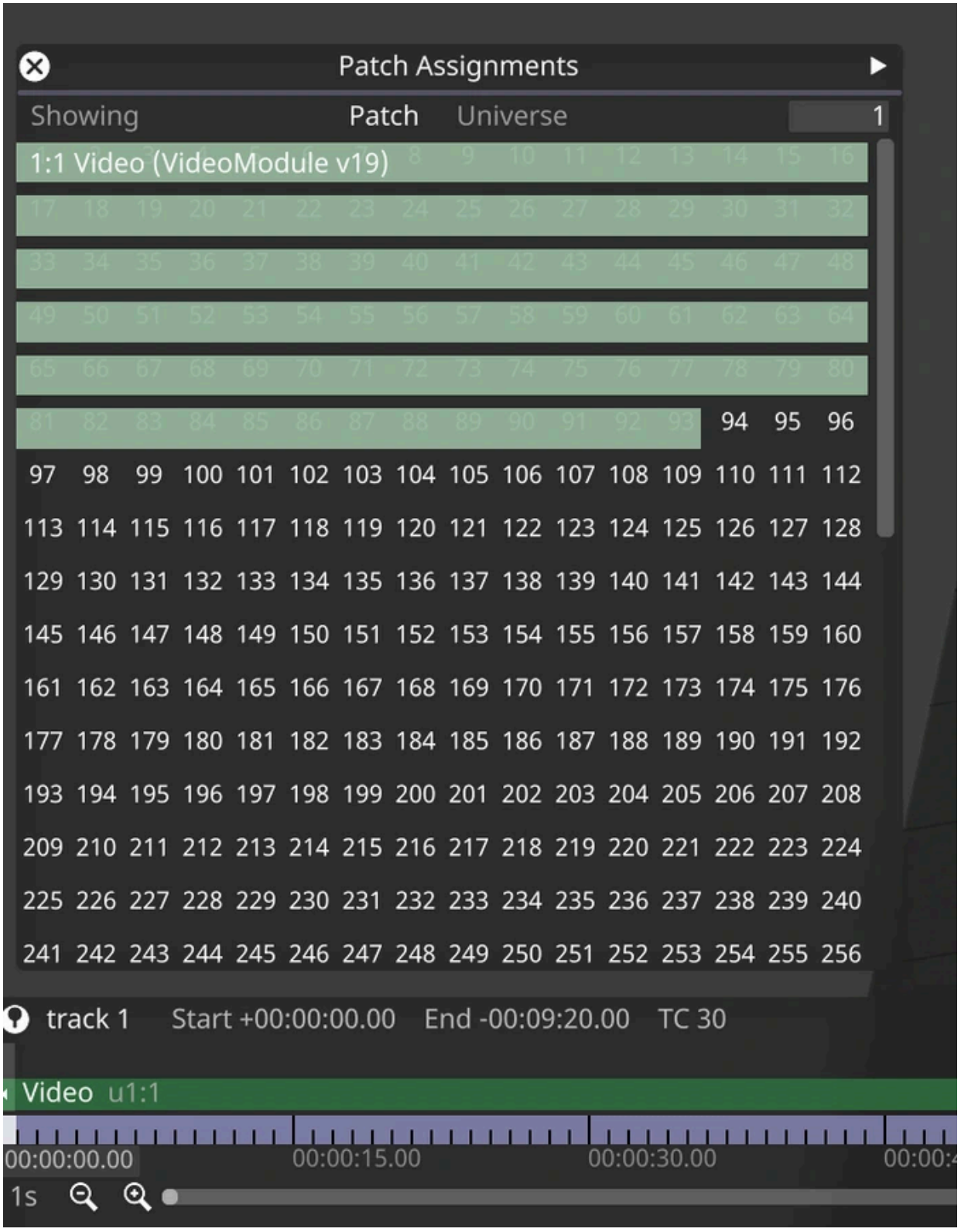
Patching layers

To patch layers within Designer ensure:

- The Patch Assignments window is open & in the patch grid view type.
- The layer you want to patch is added to the Timeline. Click here for more information on working with layers.
- Hover the cursor over the DMX channel you want to patch to in the Patch Assignments window.
- Select the DMX channel while holding down **ALT** to generate a white arrow, which should be dragged down to the layer on the Timeline that you want to patch to.

This will create a green block over the channels in our patch grid that the layer will take up, and also turn the layer on the timeline green to signify the layer is patched and only controllable through Sockpuppet DMX.

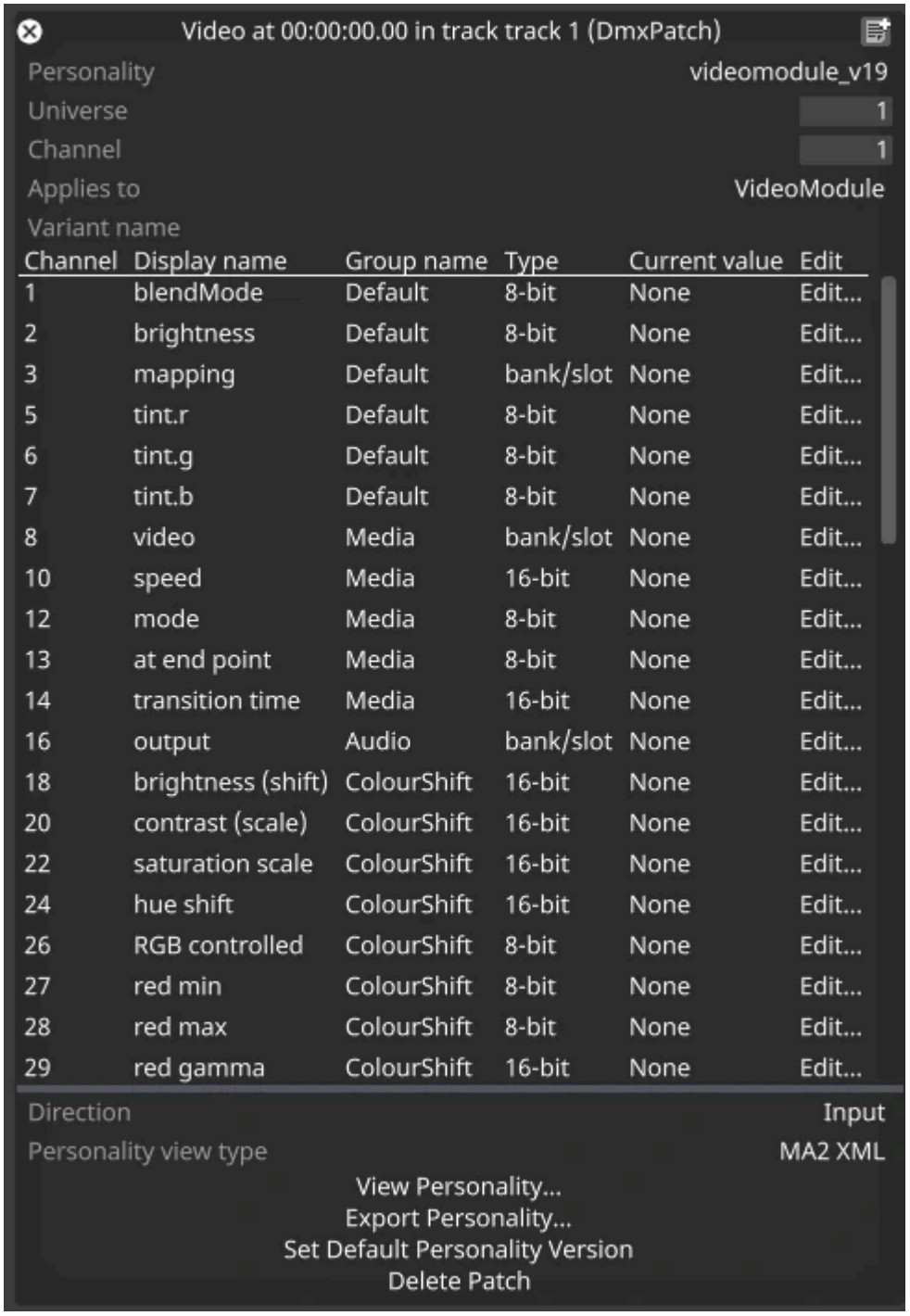
We will also be presented with some key information regarding our patch. This will include the start address, a user specified name (this will be “untitled” by default) the layer type, and the personality version.


Patch Assignments
Showing
Patch
Universe
1
1:1 Video (VideoModule v19)
track 1
Start +00:00:00.00
End -00:09:20.00
TC 30
Video u1:1
00:00:00.00
00:00:15.00
00:00:30.00
1s

> **Note**
>
> **Please note**: Any previous keyframing / sequencing done on the layer will be overwritten and deleted by the default values sent from the desk once the layer is patched.

Patch settings

To access this patch settings menu, right-click on the green patch block, this will open the patch settings.



Personality

Here we can select the version of the sockpuppet personality we would like to use. A personality profile may be updated / changed with a new release of Designer, this function will allow you to roll back to the personality version that you originally programmed your show with, meaning you will not have to update any of the programming on your console. The current selected personality is displayed as a table below the Variant name field.

Universe

Here we can specify the universe we want to patch our layer to.

Channel

Here we can specify the start channel we want to patch our layer to.

Applies to

This displays the layer type the sockpuppet personality applies to.

Variant name

This is not relevant for sockpuppet patches, and is only used for Event Transport patches.

Direction

Here we can set whether we want input values to control the layer's values, or output the current values of the layer.

Personality view type

Here we can select whether to view and export the personality as a GDTF file, a text-formatted chart, or a (deprecated by MA) MA2 XML file.

View Personality

Opens a window displaying the personality with the chosen Personality view type.

Export Personality

Exports the personality as a file with the chosen Personality view type.

Set Default Personality Version

Sets the default version of sockpuppet personality for the current layer type.

Delete Patch

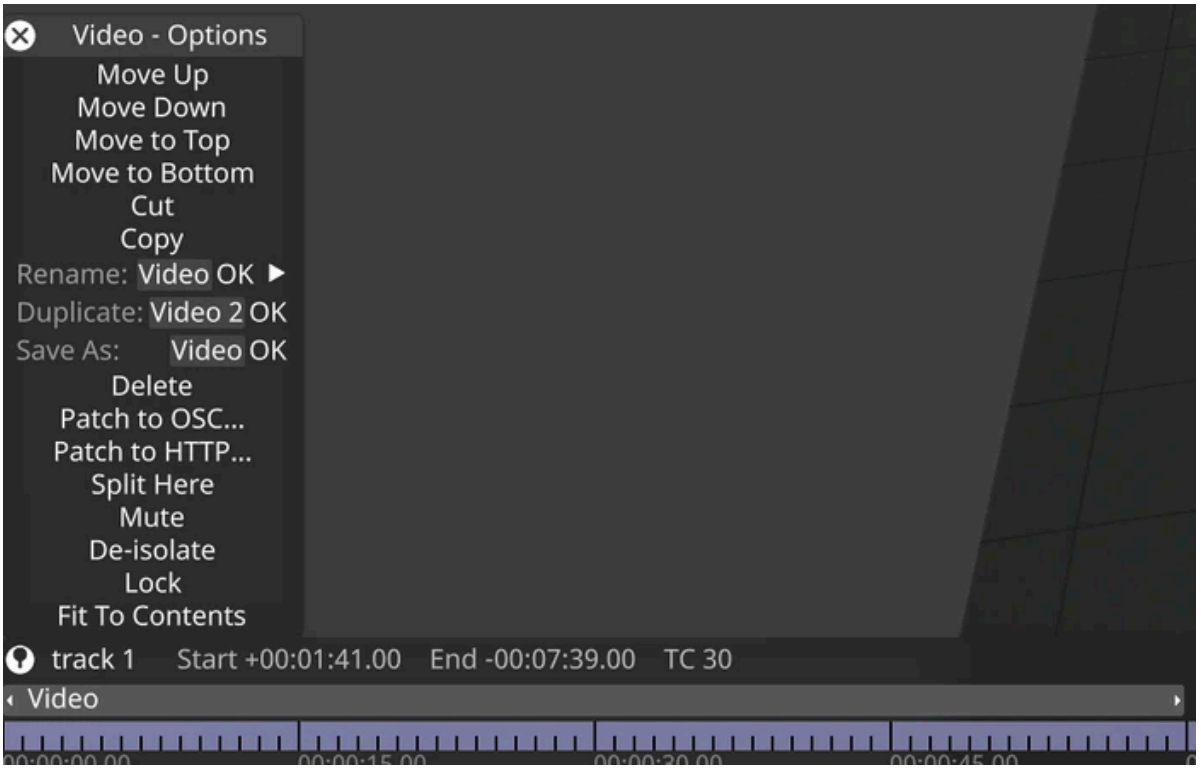
By left-clicking on delete patch we will remove the selected layer from our patch assignment. This will return it to its standard operating mode (controlled through the timeline & keyframable)

OSC

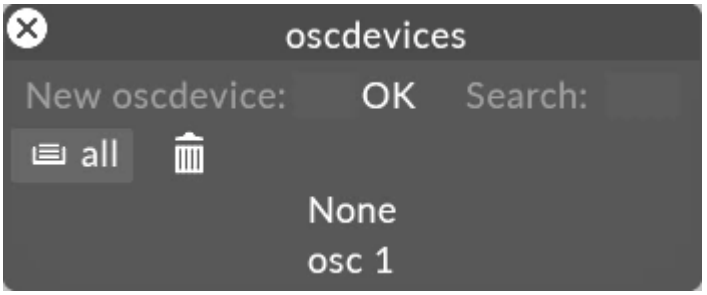
Patching a layer to OSC control

1. Right-click a layer on the timeline.

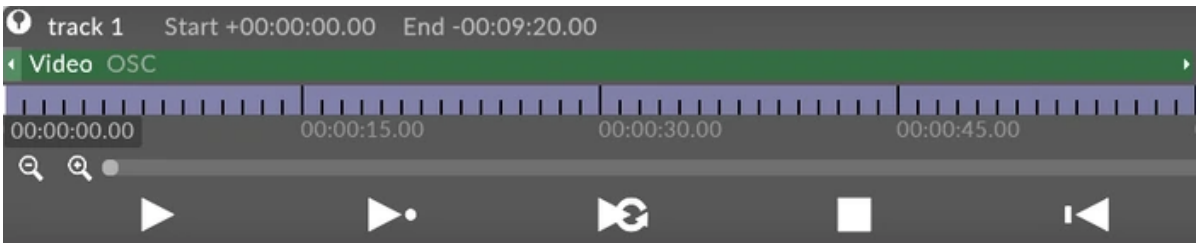
2. Left-click Patch to OSC.



3. Choose OSC device.

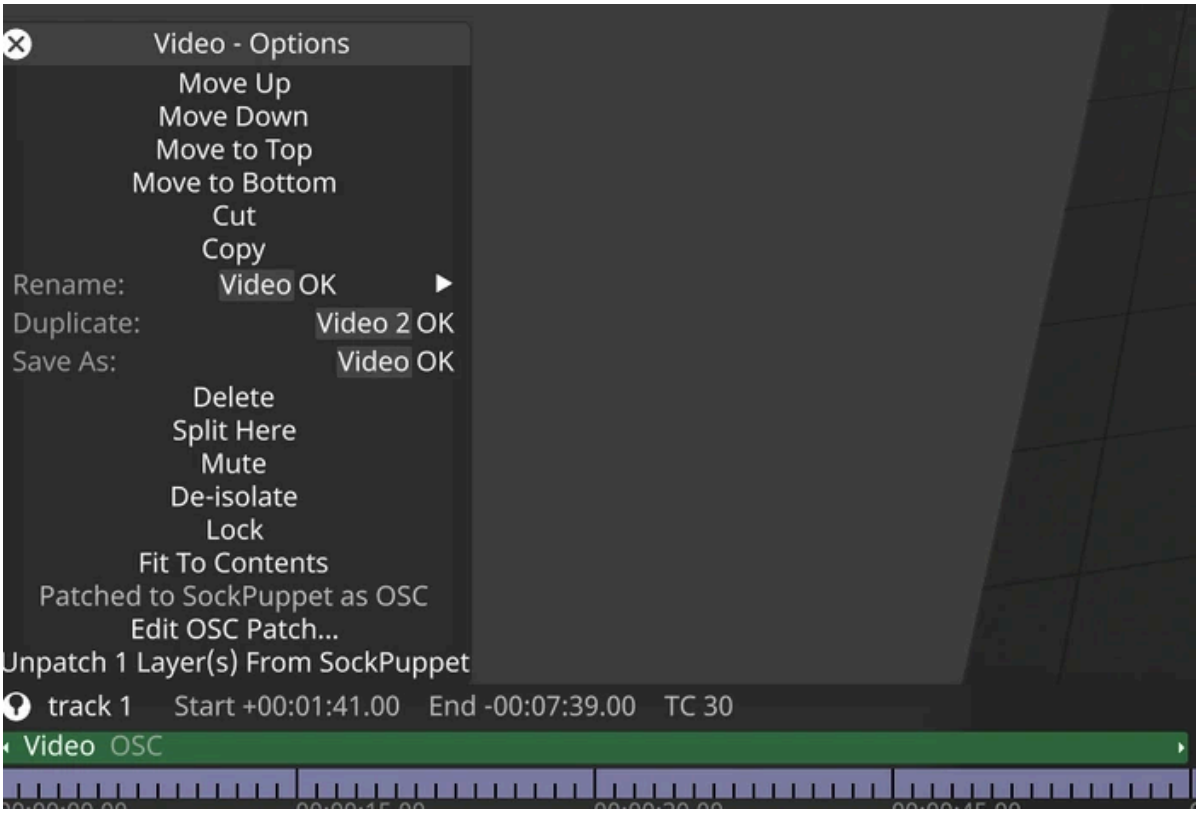


The layer will now turn green, indicating that it is controlled by an external sockpuppet system.

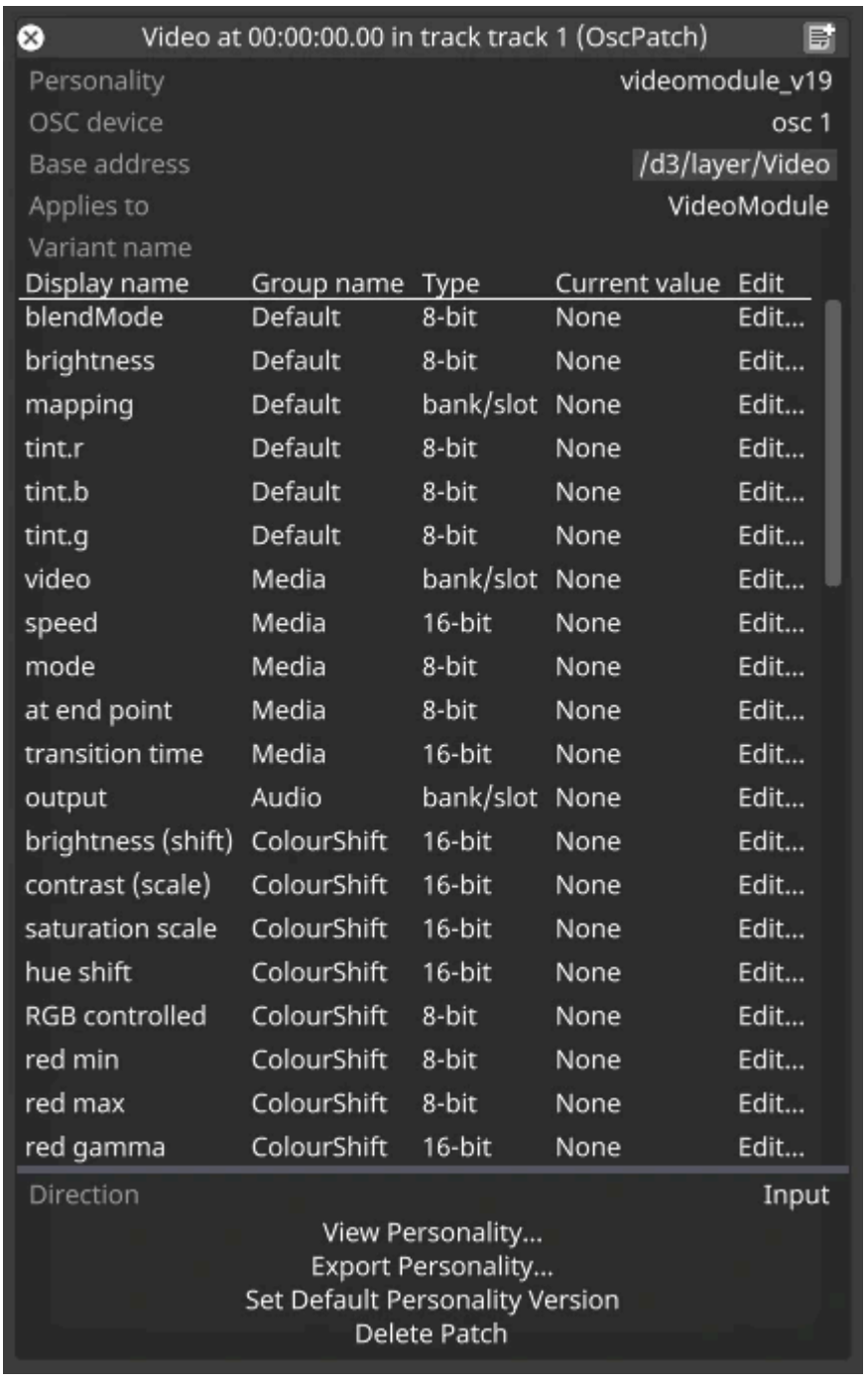


View the personality

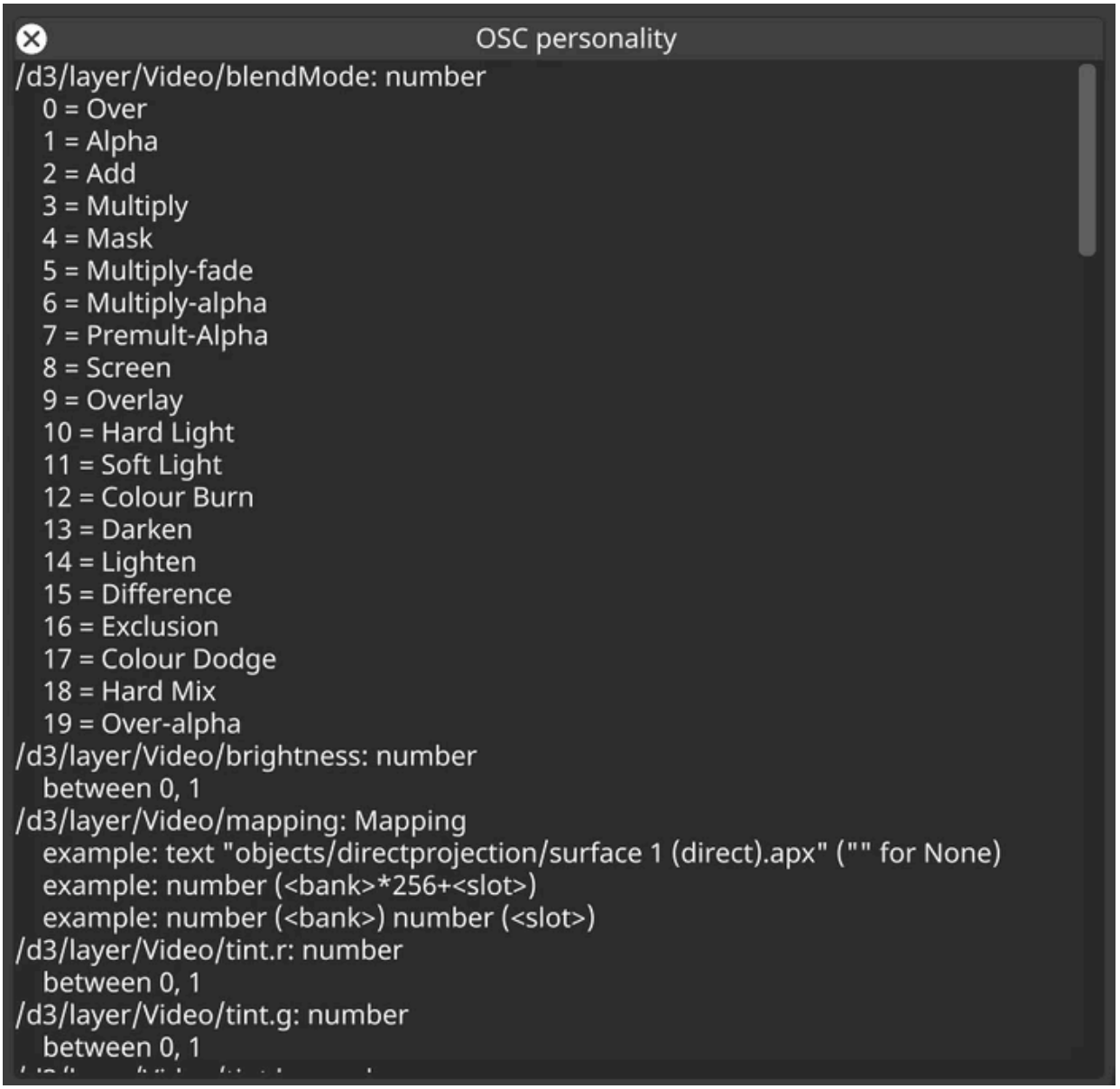
1. To view the personality of the layer for OSC, right-click the layer and choose Edit OSC patch.



2. Left-click **View personality**



The default OSC personality opens.



Export the personality

1. Repeat the previous steps to view the OSC patch.
2. Once the patch is open, left-click the Export Personality button at the bottom of the window to export the OSC personality as a txt file.

Sequencing with Sockpuppet

There are a number of changes to the way in which layers are programmed or sequenced when running in Sockpuppet mode. The following section will outline these differences.

Layers with extended Sockpuppet functionality

Below are some layers which gain additional or changed functionality when controlled by Sockpuppet:

- Video Layer
- Notch Layer
- Gradient Layer
- Chevron Layer

Dormant layers

Dormant layers are a feature that enables the stacking of large numbers of layers on the timeline. The issue with this previously was that each layer on the timeline required a certain amount of system resources in order to run, which would quickly add up when working with large numbers and result in a significant drop in performance. Now, when a layer is set to be dormant, it will not require any system resources, and therefore mean we can have large stacks of layers on our timeline and not have to worry about performance issues.

Setting a layer to be dormant

To make a layer dormant, simply set the brightness to 0. This will change the colour of the layer to dark green to signify that the layer is now dormant. Raise the value above zero to make the layer active.

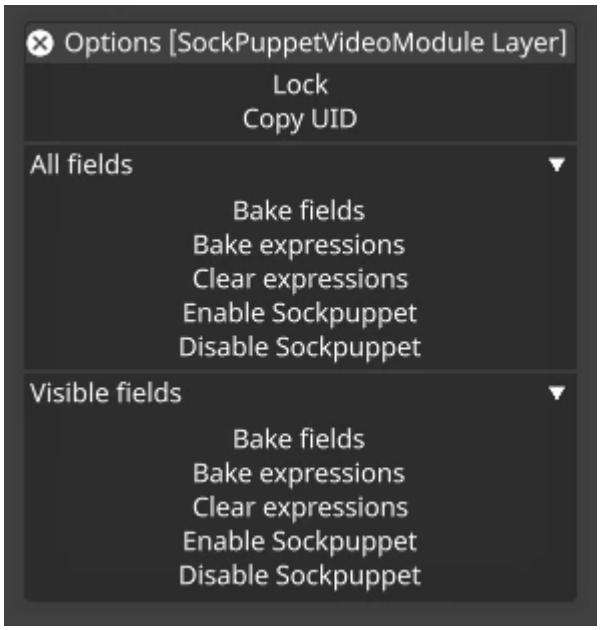
RGB colour overview

When running in Sockpuppet mode, the colour palette system with its X and Y values is ignored and instead replaced by an RGB colour system. This is to reflect the typical way of working with colour on a lighting console.

Layer field options

When editing a layer that is being controlled by Sockpuppet, there are additional controls available to change how each field of a layer is controlled.

Layer options



When right-clicking on the titlebar of a layer, there are additional options to control the enabling or disabling of Sockpuppet across the entire layer. There are three different rollouts that you can control, they are:

1. All fields
2. Selected fields (when editing multiple layers)
3. Visible fields (If a section/group is closed, it will not be impacted)

These buttons allow users to quickly disable Sockpuppet across an entire layer and re-enable only the fields that should be controlled.

Field options

When right-clicking on a single field, there are changes to the field options when the layer is controlled by Sockpuppet.

Metafield

Metafields do not affect fields when they are being controlled by Sockpuppet; ranges and step size should be controlled through the personality editor instead.

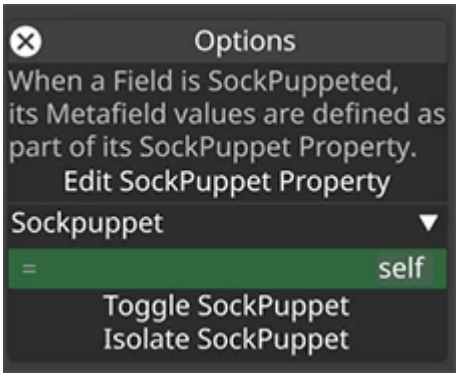
Toggle Sockpuppet

The Toggle Sockpuppet feature allows you to selectively disable the Sockpuppet functionality for any parameter within a patched layer.

For example, if you have a Bitmap layer patched and you want Sockpuppet control over all parameters except Brightness, which you want to keyframe, you can now right-click on the Brightness parameter and select “Toggle Sockpuppet”.

This action removes that parameter from Sockpuppet mode, allowing it to be animated or keyframed independently.

When a field is Sockpuppeted, its metafields are determined by the Sockpuppet property, as part of the layer’s Sockpuppet personality. The widget is linked to this property, allowing you to edit the associated metafields directly.



Isolate Sockpuppet

The Isolate Sockpuppet feature keeps Sockpuppet enabled only on the selected parameter, while disabling Sockpuppet functionality on all other parameters within the patched layer.

This allows you to focus Sockpuppet control exclusively on a single parameter without interference from others.

While an isolate is active, the other Sockpuppet-enabled fields on the layer are tinted a muted, darker green to show that they are still configured for Sockpuppet control but are not currently being driven. This leaves only the isolated field in the regular, brighter Sockpuppet green, so you can see at a glance which parameter the layer is actually responding to. It is the same muted green that Designer uses to mark a temporarily disabled expression. Clearing the isolate restores the regular green to those fields.

To revert this change, use De-isolate Sockpuppet, which restores the original Sockpuppet settings for all parameters in the layer.


Options
When a Field is SockPuppeted, its Metafield values are defined as part of its SockPuppet Property.
Edit SockPuppet Property
Sockpuppet
=
self
Disable SockPuppet
Isolate SockPuppet

Sockpuppet

Sockpuppet fully implements DMX, OSC and HTTP controls into Designer. This feature enables the user to fully control all layers and their parameters from a lighting desk or OSC/HTTP application. As a result, the operator is no longer restricted to timeline based sequencing, but can now program their project using the lighting desk's cue stack, or a combination of both; by having certain layers controlled from the lighting desk and others controlled from the Timeline. In short, Sockpuppet works by treating all of the layer types as fixture personalities.

Compatibility

Sockpuppet is fully compatible with any lighting desk capable of outputting Art-Net or sACN, as well as any OSC/HTTP platform capable of sending OSC/HTTP control strings.

Additionally, for added usability XML personalities can be exported from Designer and imported into any XML compatible console.

Synchronisation across machines

Prior to Designer r30.8, frame accurate sync across multiple machines cannot be guaranteed. From r30.8 onwards, the director now receives control data and distributes it synchronously to machines across the session, rather than have each machine process DMX data locally.

Network setup - console

First ensure the lighting desk and server are networked together and able to ping each other. You will need to assign the IP address and Subnet mask on both the lighting desk's Art-Net port and the server's Art-Net port. These will normally be addressed as shown below:

- server - DMX port - 2.0.0.x - 255.0.0.0
- lighting desk - Art-Net port - 2.0.0.x - 255.0.0.0

> **Note**
>
> **Please note**: Each device needs a unique IP address within the same IP range and subnet

Network setup - OSC

First ensure the OSC app and disguise server are networked together and able to ping each other. You will need to assign the IP address and Subnet mask (ensuring they are both set to the same IP and Subnet range) on the system hosting the OSC application and the server's

network port that is receiving the data. For OSC sockpuppet, ensure the following are configured correctly:

- OSC application send IP
- OSC application receive IP
- OSC application outgoing port
- OSC application incoming port
- Designer OSC device send IP
- Designer OSC device receive IP
- OSC Designer outgoing port
- OSC Designer incoming port

Network setup - HTTP

> **Note**
>
> **Please note**: Designer can only receive HTTP sockpuppet commands, and cannot send live sockpuppet values.

HTTP sockpuppet network configuration is setup in Manager > Machine Settings > Advanced Network Configuration > API http port.

Confirm the connection

To check the two devices can communicate with each other, a command line called ping should be used.

Setup

Once network connectivity has been confirmed between the server and the lighting desk, the next step is to create a DMX or OSC device in Designer. For HTTP sockpuppet please see **this page** for details on how to set it up.

Further reading

- DMX setup
- OSC devices
- **HTTP sockpuppet**

Sockpuppet Personality Editor

The **Sockpuppet** personality editor is a feature of Designer that allows users to edit the personality of a patched layer, and export it in either GDTF, .txt chart or MA2 XML format.

It's important to note that currently, the functionality is limited to patched layers, and you cannot store a custom personality for use with other layers of the same type.

The functionality is useful for setting 16-bit control of some control channels, as well as removing parameters from the personality.

Accessing & using the personality editor

DMX

1. Patch a layer as specified in the patch assignments topic.
2. Right-click the patched layer in the patch assignments widget.

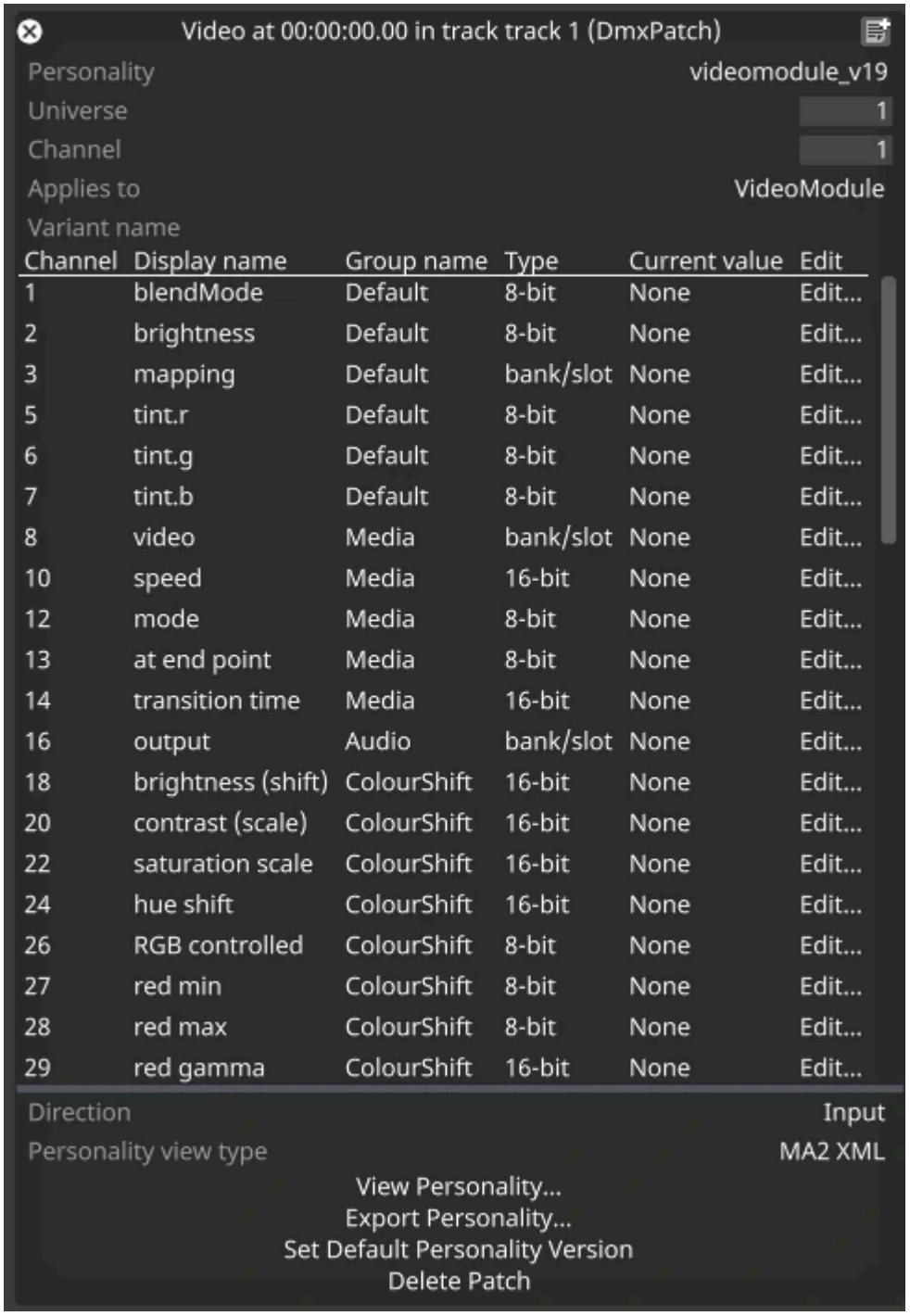


OSC and HTTP

1. Right-click the patched layer on the timeline.
2. Click Edit OSC/HTTP Patch.

Patch editor

You can now edit values in the Patch editor, which will be stored to the personality in use for that layer.

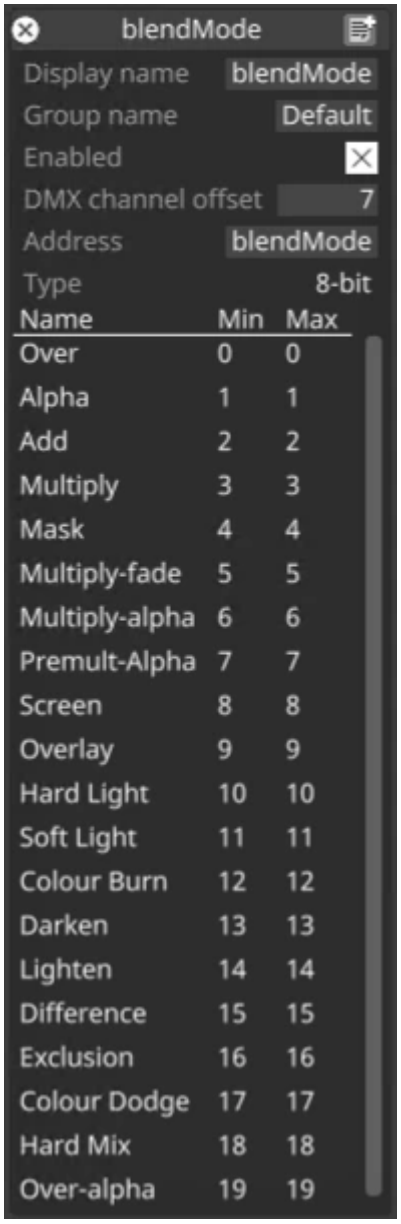


Use the **View/Export Personality** buttons to show or export the personality in either GDTF, text or MA2 XML format.

The editor automatically sorts personality properties in ascending order based on their assigned channel values.
Changing a channel value automatically moves the selected row according to its new channel value.

Editing and creating a custom DMX personality

Channels can be removed from a personality as well to create a custom DMX profile. Click on **Edit...** on the right-most column of the personality table to open the sockpuppet property editor.



Properties can be disabled and removed from the personality by unticking the **Enabled** checkbox. The Channel Offset, Display Name, Group Name, and Min/Max/Default Values can also be customised in this editor and exported.

If a property has options assigned, the corresponding table is displayed as well, allowing you to edit the values of the accepted options. Editing these values affects only the incoming ranges, not the actual value applied to the controlled layer.

Editing multiple properties

The multi-editing feature allows assigning similar values to multiple properties at once. Use the following shortcuts to control selection:

- **Ctrl + Left Mouse Button** — toggles the selection of a property.
- **Ctrl + A** — toggles the selection of all properties.
- **Shift + Left Mouse Button** — selects a range of properties, from the currently clicked property to the previously selected one.

Selection (**LMB**, **Ctrl + LMB**, **Shift + LMB**) only occurs when clicking on a read-only field or the row background.

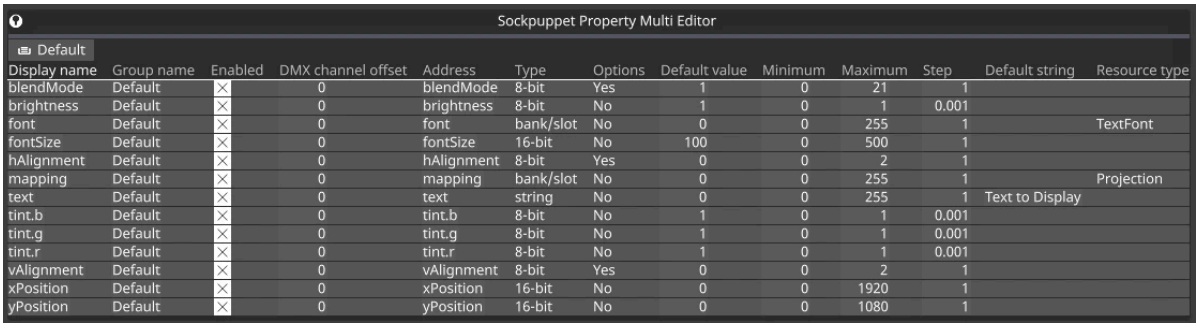
Clicking on an editable field preserves the current selection and applies the entered value to all selected properties after pressing **Enter**.

Special cases

- **Channel column:** When editing multiple properties, it assigns channel values to ensure that the edited DMX offsets align sequentially without gaps, starting from the chosen base address while preserving order.
  For example, if the selected properties have channels **7**, **15**, **23**, and **42**, typing in a channel value of **5** and pressing **Enter** assigns these properties the values **5**, **6**, **7**, and **8** respectively, preserving their order.
- **Type column:** This column is mainly read-only, except for numeric types.
  Fields with types **8-bit** or **16-bit** are editable and allow selecting a type from a dropdown menu.
  When multiple properties are selected, and a numeric type is changed, the change applies only to fields of the same type, and all others remain unchanged.

Sockpuppet property multi editor

- **Edit...** column opens a special **MultiEditor** widget when multiple properties are selected.


Sockpuppet Property Multi Editor

Default

Display name	Group name	Enabled	DMX channel offset	Address	Type	Options	Default value	Minimum	Maximum	Step	Default string	Resource type
blendMode	Default	☒	0	blendMode	8-bit	Yes	1	0	21	1		
brightness	Default	☒	0	brightness	8-bit	No	1	0	1	0.001		
font	Default	☒	0	font	bank/slot	No	0	0	255	1		TextFont
fontSize	Default	☒	0	fontSize	16-bit	No	100	0	500	1		
hAlignment	Default	☒	0	hAlignment	8-bit	Yes	0	0	2	1		
mapping	Default	☒	0	mapping	bank/slot	No	0	0	255	1		Projection
text	Default	☒	0	text	string	No	0	0	255	1	Text to Display	
tint.b	Default	☒	0	tint.b	8-bit	No	1	0	1	0.001		
tint.g	Default	☒	0	tint.g	8-bit	No	1	0	1	0.001		
tint.r	Default	☒	0	tint.r	8-bit	No	1	0	1	0.001		
vAlignment	Default	☒	0	vAlignment	8-bit	Yes	0	0	2	1		
xPosition	Default	☒	0	xPosition	16-bit	No	0	0	1920	1		
yPosition	Default	☒	0	yPosition	16-bit	No	0	0	1080	1		

The editor displays all selected Sockpuppet properties with all available parameters for editing. When first opened, all rows in the table are preselected, allowing you to edit multiple properties by typing a new value and pressing **Enter**.

The table supports sorting — simply click any header to sort properties by the corresponding field value.
By default, the table sorts properties by their display name.

Use the following shortcuts to control selection:

- **Ctrl + Left Mouse Button** — toggles the selection of a property.
- **Ctrl + A** — toggles the selection of all properties.
- **Shift + Left Mouse Button** — selects a range of properties, from the currently clicked property to the previously selected one.

Columns

- **Type column:** This column is mainly read-only, except for numeric types.
  Fields with types **8-bit** or **16-bit** are editable and allow selecting a type from a dropdown menu.
  When multiple properties are selected, and a numeric type is changed, the change applies only to fields of the same type; all others remain unchanged.
- **Options:** Read-only field indicating whether the Sockpuppet property has attached options for supported values.
  See **editing a single DMX personality** for details.
- **Default string:** Editable only for properties that store text. For all others, this is a read-only empty field.
- **Resource type:** Read-only field for properties that provide resource selection, such as mappings or media.

Personality export

The Personality Editor allows you to view or export the Personality in one of three formats: **GDTF**, text chart or MA2 XML. The exported Personality is created from the current state of the Personality, so you can (for example) disable channels and see this change reflected in the export.

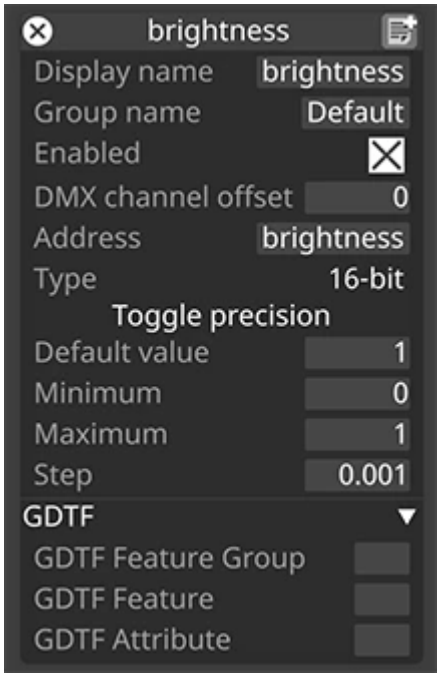
This editor also allows you to provide manual values for the Property's matching GDTF Feature Group, Feature and Attribute. If not set, Disguise will automatically match the Property to a suitable Feature Group, Feature and Attribute.

GDTF

GDTF (General Device Type Format) is a format that is designed to be interoperable between many different products and manufacturers. It does this by trying to describe every fixture using a limited number of **Normative Attributes**, such that two different manufacturers, for example, can treat a fixture's RGB channels the same, and additionally support things like colour palettes.

Automatic attribute matching

For every Property in a Personality, we use the address and Group to work out a corresponding GDTF Feature Group, Group and Attribute. Where possible, we map onto a normative Attribute (which also specifies the Feature Group and Feature), but where that's not possible, we ensure that the same address and group always results in the same Attribute definition, to keep consistency between different modules.



Both the Group and Address can be edited from the Property editor - Address is by default the same as the display name of the field.

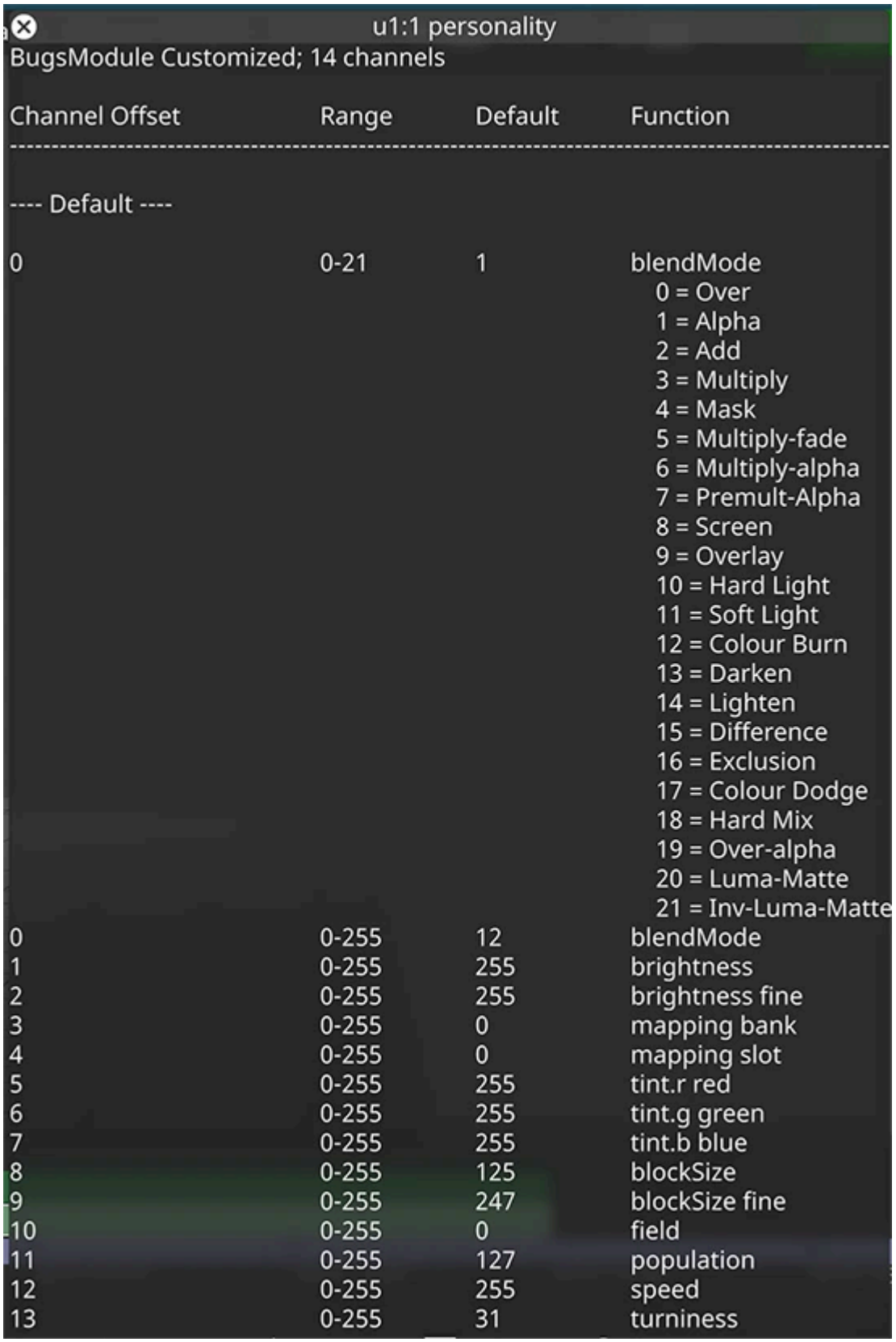
Disguise Attribute matching will always result in a normative Feature Group, but we don't promise normative Features or Attributes when there is simply no GDTF Normative Attribute that matches, for example, the Bugs module's 'turniness' property!

Manual attribute specification

If the automatically matched Attribute doesn't match your needs, it can be manually overridden by opening the Sockpuppet Property editor and typing in the desired Feature Group, Feature and Attribute. Any of these that are not set will continue to be matched automatically.

This feature is particularly useful for grouping things like exposed parameters in Notch, which Disguise has very limited information about.

DMX chart



u1:1 personality

BugsModule Customized; 14 channels

Channel Offset	Range	Default	Function
---- Default ----			
0	0-21	1	blendMode 0 = Over 1 = Alpha 2 = Add 3 = Multiply 4 = Mask 5 = Multiply-fade 6 = Multiply-alpha 7 = Premult-Alpha 8 = Screen 9 = Overlay 10 = Hard Light 11 = Soft Light 12 = Colour Burn 13 = Darken 14 = Lighten 15 = Difference 16 = Exclusion 17 = Colour Dodge 18 = Hard Mix 19 = Over-alpha 20 = Luma-Matte 21 = Inv-Luma-Matte
0	0-255	12	blendMode
1	0-255	255	brightness
2	0-255	255	brightness fine
3	0-255	0	mapping bank
4	0-255	0	mapping slot
5	0-255	255	tint.r red
6	0-255	255	tint.g green
7	0-255	255	tint.b blue
8	0-255	125	blockSize
9	0-255	247	blockSize fine
10	0-255	0	field
11	0-255	127	population
12	0-255	255	speed
13	0-255	31	turniness

The DMX chart format is designed to allow you to easily reference DMX channel values for manually setting up fixtures when working with equipment that doesn't support GDTF files.

MA2 XML

We also support export into MA's proprietary MA2 XML format. Please note that MA have deprecated this format, and MA3 supports GDTF. We recommend that you only use this with legacy MA2 systems.

Virtual Reality

Virtual Reality visualiser is an OpenVR / Steam compatible visualiser mode allowing the user to enter and navigate through the scene.

VR was designed to primarily work with Designer machines, utilising GPU's such as GTX 1060 & higher (or other manufacturer equivalent).

Supported headsets

We have tested HTC and Meta headsets on Designer, which are known to work. We have also used Apple Vision Pro with Designer, through the ALVR system.

> **Note**
>
> **Any headset that supports Steam VR can be used with Disguise.**
>
> Please check the manufacturer's specifications of the headset type you would like to use to confirm if it supports Steam VR. Some headsets, such as **Apple Vision Pro**, support this via third-party plugins. For example, for **Apple Vision Pro**, this functionality is provided via the **ALVR** application, which must be installed on the host machine alongside SteamVR *and* on the Vision Pro (via the App Store) to enable VR previsualisation.

HTC Vive

- The machine needs to be restarted after the first installation, otherwise, the headset will not be detected
- All EDID's need to be de-emulated otherwise the headset will not work
- The box needs to be plugged into a USB 3 port.

You need to have the SteamVR system running; you should be able to get to the point where the headset and one controller are reporting green and working, and the headset should show the Steam basic scene. Once that's working, if steam is installed, and the VR equipment is connected - when starting a Disguise project, you will automatically be placed into VR mode.

- The visualiser shows you the position and orientation of the headset in stage space (small white cuboid about the same size as a headset, with an orange line down to the floor). It also shows you where the controller is pointing (white line when it hits the floor level, blue line otherwise).

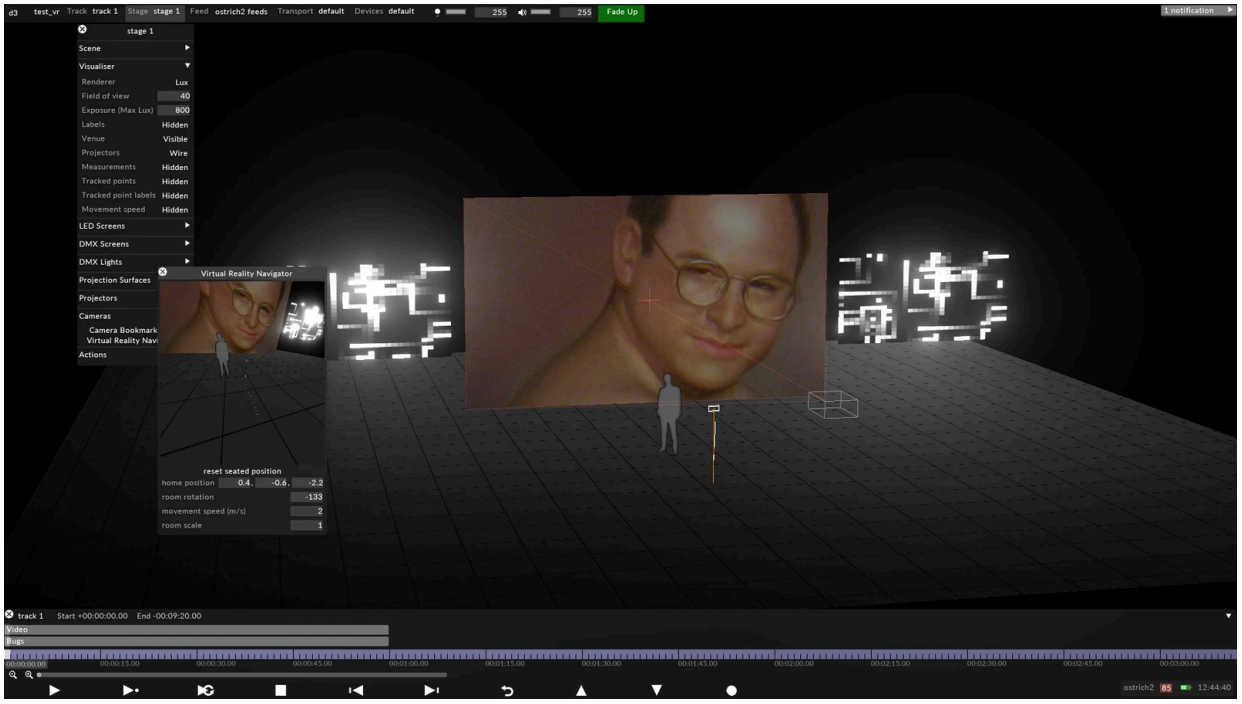
- Navigation - the VR user navigates by pointing the controller at the floor location they want to go to; it goes white; they click the button and they jump there. The property movement speed in the VR Navigator window can be set to zero (jump immediately) or some non-zero number, which moves the VR world in a straight line on a linear path. This gives you a little 'jerk' at start and end but doesn't seem to result in nausea. It's less confusing for new users, but may be annoying for experienced users.

The Virtual reality navigator also lets you set up the position and orientation of the scene relative to the physical world. The VR experience keeps this orientation constant to avoid users getting lost. They still get lost of course, and when they do you can hit the reset button to bring them back to the center.

Opening the virtual reality navigator

1. Open the stage editor by right-clicking **Stage** from the dashboard or by right-clicking the floor in the visualiser.
2. Select the **Cameras** tab.
3. Left-click Virtual reality navigator and then you can see what the VR user sees.

> **Warning**
>
> Navigation is restricted to floor level. We need to be able to move to the nearest horizontal surface on whatever venue / stage you're on.
>
> ⚠️ There's no **reverse** button; the workaround is just to point behind you and hit the button.



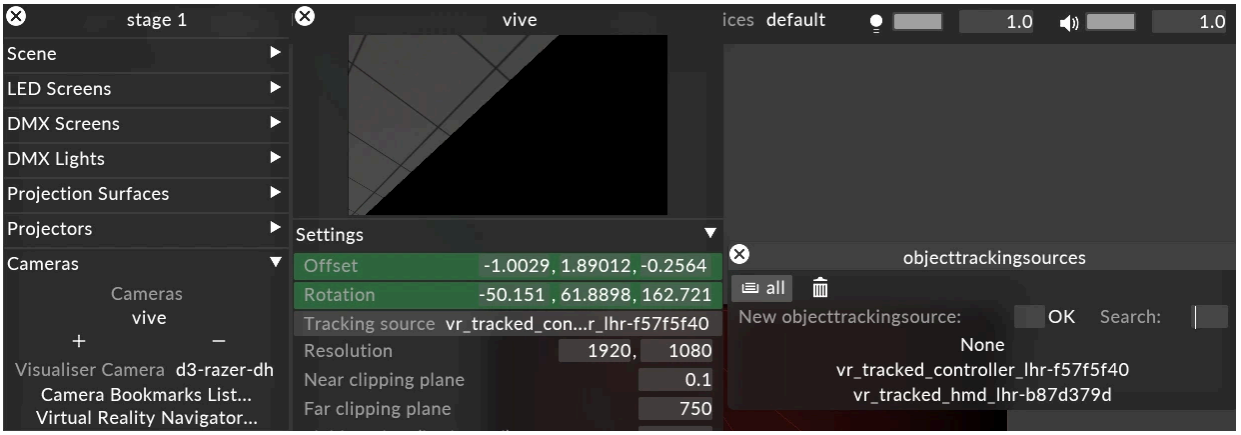
The image shows the basic elements of VR functionality.

Using a VR device for camera tracking

Cameras and other stage objects can be tracked by the headset or controller of a compatible VR headset

To assign a VR device as a tracking source for a camera

1. Connect your VR headset to your machine and ensure the device is working in SteamVR.
2. Launch your Disguise project (version r17.2 or later).
3. Create a new virtual camera in your project file by right-clicking on the Stage menu.
4. Hit the + icon under the Cameras tab and input the name and specifications of your camera.
5. Open the camera's menu by right-clicking on its name from the Stage menu, or on the icon of the object in the visualiser.
6. Under the first tab called Settings, right-click on the Tracking source field.
7. The VR's headset and any active controllers will be listed here; left-clicking on one will assign the position of the camera to it.
8. The Offset and Rotation fields of the virtual camera's menu will turn green when receiving a working signal.



To use an animated object as a moving VR platform

In some situations, the VR viewpoint may need be a part of a moving element, such as a ride or some vehicle. In this case, the VR floor position can be parented to an animated object.

1. Have the VR system set up and working in Designer, with your project loaded.
2. Create the animated object you want to parent the VR camera to.
3. Open the virtual reality navigator from the Stage menu.
4. In the VR navigator window, left-click on the “User parent” field.
5. From the list of objects, left-click on the animated object you want to parent the VR camera to.
6. The VR camera will now move along with the animated object.

To reset the VR camera back to the stage floor, left-click on the “User parent” field again and select “Stage” from the list.

2.5D Workflow

With Disguise's 2.5D workflow tools, you can achieve the parallax effect of real-time 3D content with the simplicity of video plates.

What is a 2.5D workflow?

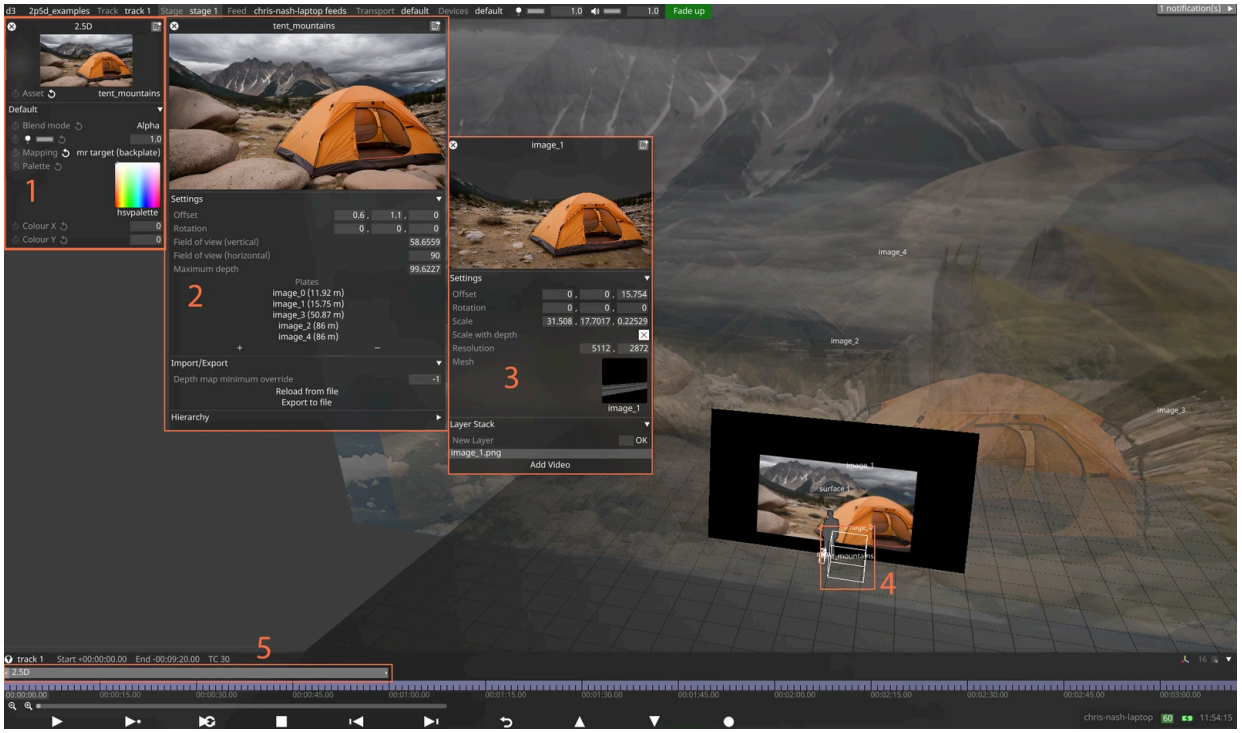
2.5D workflows bridge the gap between traditional 2D video plates and full 3D generative scenes. By building up a scene with layers of images or video plates, with the possibility to add depth or shaping to the plates, users can quickly create a realistic looking scene with parallax. 2.5D assets can be saved as .2p5d files and shared across projects, or created using external integrations such as Cuebric to harness the power of generative AI.

> **Tip**
>
> See the **Developer Documentation** site for a description of the data format used for .2p5d files.

2.5D workflow

This section details the following how-to guides:

- Set up a 2.5D asset from an existing .2p5D file
- Create a new 2.5D asset from scratch
- Modify 2.5D asset properties
- Modify 2.5D plate properties
- Advanced workflows



Key

1. 2.5D Layer editor
2. 2.5D Asset selector
3. 2.5D Plate editor
4. 2.5D Asset origin
5. 2.5D Layer

Set up a 2.5D asset from an existing .2p5D file

Use this workflow when receiving assets from Cuebric or another existing project.

1. Copy the **.2p5d** file to **objects/2p5DFile** in the project folder.
2. Add a 2.5D layer to the timeline.
3. In the **2.5D** layer editor, click on the **Asset** field. The copied 2p5d file should appear in the list of assets in the **2.5DAsset** selector.
4. Click on the asset to select it. It will then load and be visible in the stage.
5. In the 2.5D layer editor **Mapping** property, select the desired 3D mapping e.g. MR set backplate.
6. To reload the asset from file and overwrite any local changes, click **Import/Export & Reload from file** in the property editor of the 2.5D asset.

Create a new 2.5D asset from scratch

Use this workflow to build a layered parallax scene directly inside Designer.

1. Add a 2.5D layer to the timeline.
2. In the 2.5D layer editor, click on the asset field and create a new 2.5D asset.
3. Add a new 2.5D plate to the **plates** field in the 2.5D asset.
4. Under **Layer Stack** in the plate editor, click **Add Video** to add a video or image to the plate.
5. Continue adding plates and modifying their properties until the desired scene composition is achieved.
6. Select the desired 3D mapping in the 2.5D layer, e.g. MR set backplate.
7. To export the asset for use in other projects, click **Export to file** under Import/Export in the 2.5D asset editor. The exported .2p5d file will appear under objects/2p5DFile in the project folder.

Modify 2.5D asset properties

The 2.5D asset acts as the “container” for all plates.

- **Origin (asset origin box)**
  The 2.5D asset is an Object which can have its offset and rotation set by changing the values in the editor, or moving the 2.5D Asset origin (white box) in the visualiser. Doing so will move all the plates and change the origin point of the 2.5D scene. It is recommended that the origin is set roughly in the middle of the range of movement of the camera, to achieve the most realistic looking parallax.
- **Field of view** & **Maximum depth**
  The **Field of view** and **Maximum depth** fields can be adjusted to scale the total area encompassed by the 2.5D scene. This can be used to ensure that the edges of the plates are not seen when moving the camera within its expected range.
- **Managing plates**
  Plates can be added to or removed from the asset using the **+/-** buttons in the **Plates** field of the asset editor. Plates are ordered by depth, and reordering the plates in the list will update the plates’ depth to reflect their new positions.
- **Import/Export controls**
  The **Import/Export** settings can be used to load or save .2p5d files. When loading files which contain depth maps, the **Depth map minimum override** setting can be used to change the minimum distance from the origin, represented by full white in the depth map.
- **Mode: Normal vs Locked**
  The **Mode** option allows switching between **Normal** and **Locked** mode:
  - In **Normal** mode, playback of 2.5D scenes containing video runs independently
  - In **Locked** mode, playback of videos in the plate’s **Layer Stack** is synchronised to the global track playhead. This ensures the videos in the plate behave like standard video layers and respond consistently to global playback controls and modes.

- **Visibility**
  Enable **Show in stage** to make the asset always visible. If it is not enabled (ticked), the asset will be visible only when a relevant editor is open.

Modify 2.5D plate properties

Each plate acts as a layer inside the 2.5D scene.

- **Depth (z)**
  The plate depth can be changed by modifying the z offset value, or by dragging the plate in the visualiser. If the option **Scale with depth** is ticked, the scale and x/y offsets will automatically be adjusted with depth so that the plate looks the same when viewed from the asset origin. If **Scale with depth** is not ticked, the scale and x/y offsets will not change, so the plate will appear smaller as it moves further away.
- **Scale & position**
  By default, new plates will be scaled to match the total field of view of the asset. However, the scale values can be adjusted in the 2.5D plate editor to change the scale. Similarly, the x and y offsets can be adjusted to move the plate position.
- **Plate mesh**
  The plate's mesh can be modified to introduce depth to a layer, enhancing the realism of the parallax effect. Some .2p5d files will contain depth maps, which are automatically converted into meshes upon import. To remove the depth from the plate, the standard rectangle mesh can be selected instead. It is also possible to add a video depth map using a Depth Map Mesh.
- **Layer Stack**
  The plate **Layer Stack** is used to set up the layers appearing on the plate. To quickly add an image or video to the plate, use the **Add Video** button. Otherwise, layers can be created as normal and stacked to create effects such as blur or colour adjust. Note that these layers can't be keyframed, see **Advanced Workflows** for methods to keyframe layers on plates.

Apply depth of field to 2.5D assets

You can apply DOF to 2.5D assets on virtual cameras.

Depth of field can be applied to renders of 2.5D assets on camera frontplates and backplates, using the **Focus** properties in the camera's **Lens** settings. See Camera Properties for more information about these settings.

To use lens focus parameters with a 2.5D layer:

1. Set up a 2.5D layer as described above.
2. Map the layer to a Camera or MR set's Backplate or Frontplate.
3. Set the active camera's **Focus mode** to **Manual** or **Object tracking**.
4. Adjusting the lens focus parameters in the camera should cause the depth of field effect to change in the rendered 2.5D asset.

[Animated GIF: Depth of field for a 2.5D layer]

Advanced workflows

The 2.5D layer and assets are designed to provide a user-friendly way to quickly create 2.5D scenes which are portable between projects. The standard workflow should allow for the majority of use-cases, however more advanced workflows can also be achieved by combining 2.5D assets with other tools in Designer.

- **Layer stack for quick composition**
  Generally images, videos and effects should be added to plates using the plate **Layer Stack**. However, this does not allow for keyframing within these layers. To keyframe content on plates, layers should be added to the timeline as normal. Content can be mapped to 2.5D plates from the timeline similarly to any other display.
- **Keyframing via the main timeline**
  To keyframe plate content (e.g. opacity, transforms, effects), add layers to the timeline instead of the Plate Layer Stack, then map those layers to the plate like any other display.
- **Animate assets and plates as Objects***
  Both 2.5D assets and plates are full Designer Objects, which means they can be animated on the timeline or parented to tracking-driven objects.
- **Legacy Stage Render workflow (pre-r26.3)**
  The **Stage render layer** which was used for 2.5D workflows prior to r26.3 still functions as it did previously, so it is still possible to use the original workflow if desired.
- **Using video-driven depth on plates**
  For dynamic depth shaping, set a plate's mesh to a Depth Map Mesh as the plate's mesh, and adding a Depth Video Layer to the plate's layer stack.

Original workflow (available prior to r26.3)

Preserved for historic compatibility.

1. Using the stage menu, add an LED surface and a camera to your project.
2. Create 3 projection surfaces and position them behind the LED screen incrementally with a gap of several metres between each.
3. Label each surface in the composition stack to reflect it's location. e.g. "foreground', "midground", and 'background".
4. Make the following changes:
    1. Set foreground and midground surfaces to **Transparent**
    2. Set the blend mode for the foreground and midground to **Alpha**.
    3. Change the render layer of each surface to **Backplate (MR)**.
5. Using the stage menu, create an MRset.
6. Assign the LED screen to the MRset and change the Camera property to **Camera override**.

7. Add a StageRender layer to the timeline above the other content layers and map it to the backplate.
8. Move the camera within the MRset to activate it.
9. The perspective projection will appear on the LED screen and tracks the movement of the camera.

Related topics

- MRset
- Cuebric Integration
- Depth Workflows

Anamorphic Lenses

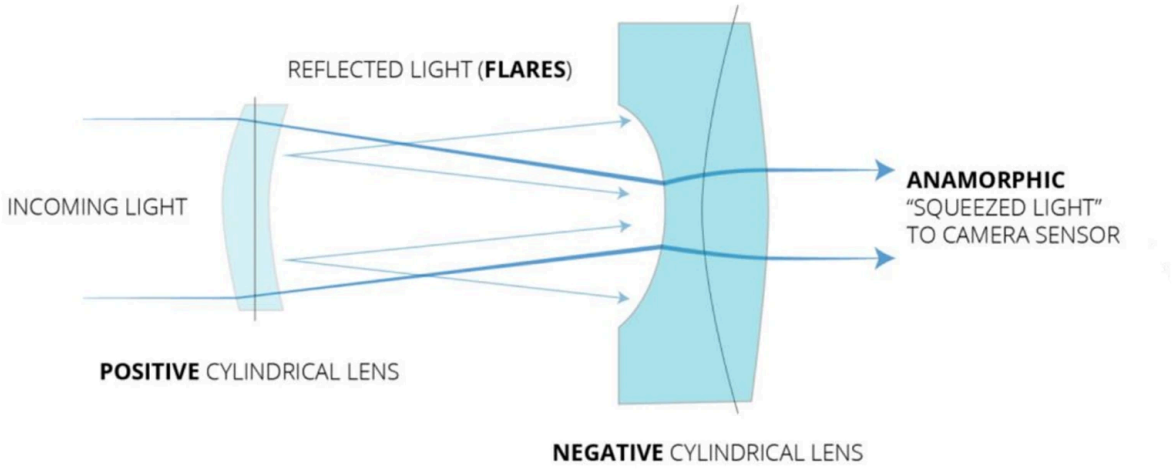
Anamorphic lenses are increasingly used in virtual production due to their unique optical characteristics, which bring both creative and technical benefits.

Anamorphic lenses compress (or squeeze) images to capture widescreen aspect ratios whilst using the same camera sensor size as spherical lenses.

Designer VP workflows fully support the calibration of these lenses.

How Anamorphic lenses work

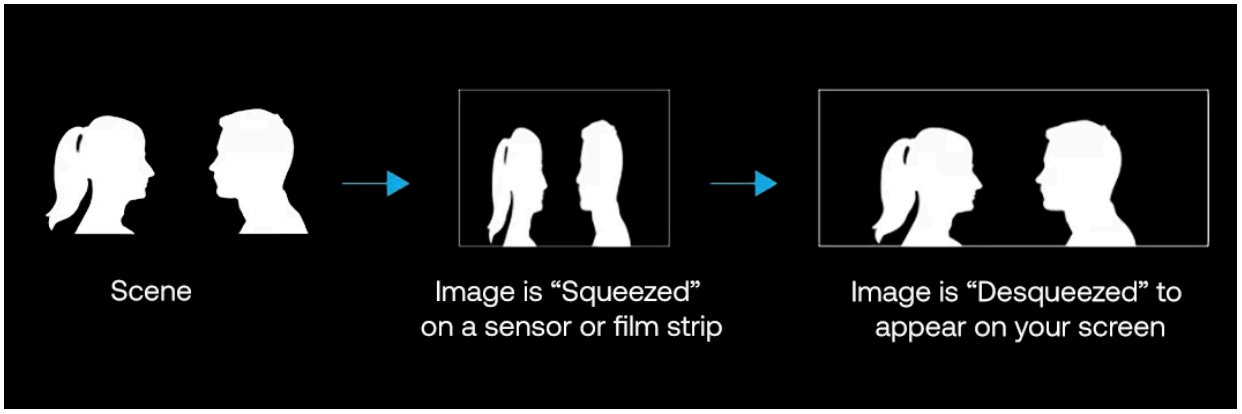
Anamorphic lenses have a unique optical design that captures images in a widescreen format by compressing the horizontal field of view. Unlike standard (spherical) lenses, which capture an image with equal proportions horizontally and vertically, anamorphic lenses compress the image only along the horizontal axis. This compression results in a “squeezed” image where objects appear thinner and taller than they are in reality.



What is De-Squeezing?

De-squeezing is the process of restoring the image to its intended aspect ratio by stretching the horizontal axis back to its correct proportions.

For example, a common anamorphic lens might have a 2x squeeze ratio, meaning it compresses the horizontal field of view by a factor of 2. So, a 2.39:1 aspect ratio scene (common in cinema) will be captured as a distorted 1.19:1 ratio image.



Video in crop feature

Frequently when data captured from non 16:9 lenses are output from camera sensors and transmitted using formats such as SDI, black bars are added to the edges of the frame to conform to the standards of the output format. To allow this data to be used in Designer in the intended aspect ratio, the video input feed can be cropped to remove these black bars. Performing this cropping on input rather than through feed mappings allows anamorphic lenses to be used for spatial calibrations like any other 16:9 spherical lens.

Further information

For more information on creating video inputs with different aspect ratios see the setup-video-input page.

ARRI Skypanels Setup

This guide explains how to configure ARRI Skypanels for control from the Disguise platform using Mode 24. The setup applies to Skypanel 30C, 60C, 120C, and 360C.

1. Selecting the Correct Skypanel Mode

To control any Skypanel model from Disguise

1. Set the fixture to Mode 24 – LE CCT & RGBW (8-bit). This mode provides full RGBW control.
2. Ensure Art-Net is enabled so the panel can receive DMX data from Disguise.

Mode 24 Channel Map (8-bit)

Mode 24: LE CCT & RGBW, 8 bit resolution per function

DMX Channel	Value Range	Percent	Function
1	0–255	0–100	**Dimmer** closed → open
2	0–255	0–100	**Color temperature CCT** 2,800 K → 10,000 K
3	0–10 11–20 21–119 120–145 146–244 245–255	0–4 5–8 9–47 48–57 58–96 97–100	**Green–Magenta Point** neutral / no effect full minus green −99% → −1% neutral / no effect 1% → 99% full plus green
4	0–255	0–100	**Crossfade to Color** White → RGBW color
5	0–255	0–100	**Red Intensity** 0% → 100%
6	0–255	0–100	**Green Intensity** 0% → 100%
7	0–255	0–100	**Blue Intensity** 0% → 100%

DMX Channel	Value Range	Percent	Function
8	0–255	0–100	**White Intensity** 0% → 100%

> **Note**
>
> To enable full RGBW colour mixing, Channel 1 (Dimmer) and Channel 4 (Crossfade) must be set to 255. This should be included in your driver commands.

2. Disguise Configuration

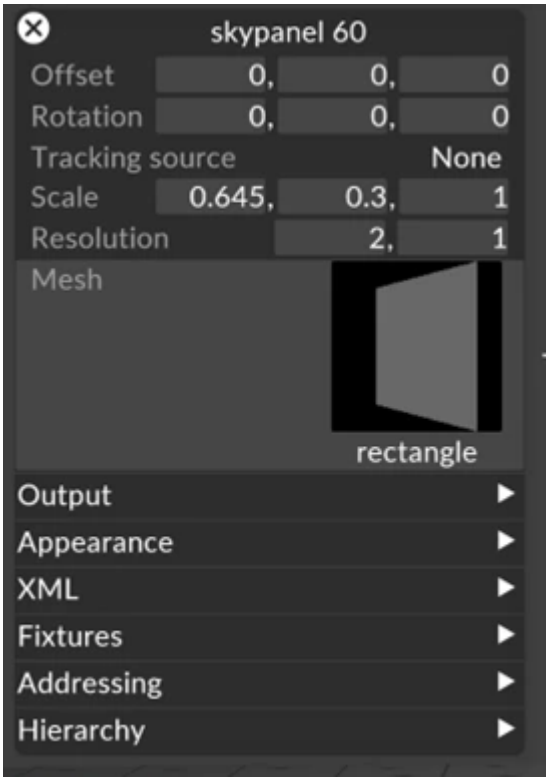
This example uses the **Skypanel 60C**, but the steps apply to all models.

Only the **fixture size** and **resolution** differ:

Model	Physical Size (approx.)	Resolution (engines)
30C	~0.35 × 0.3 m	1 × 1
60C	~0.645 × 0.3 m	2 × 1
120C	~1.29 × 0.3 m	4 × 1
360C	varies	4 × 3

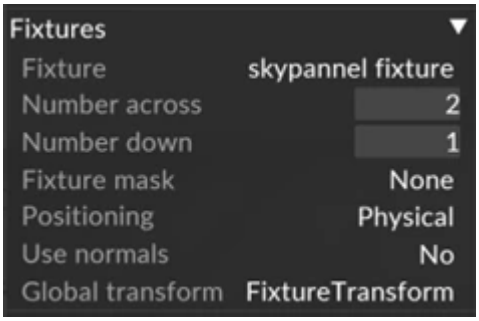
Create a new DMX Light

1. Go to **Stage** → **DMX Light**.
2. Click **+** to add a new DMX light.
3. Set the size of the **Skypanel 60C to 0.645 m × 0.3 m**.
4. Set the resolution according to your Skypanel model.

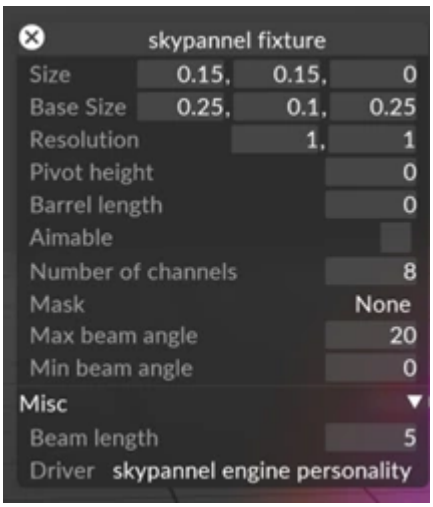


4. Fixture Configuration

1. Go to **Fixture** and create a new fixture type.



2. Set the number of channels to **8** (one RGBW engine).



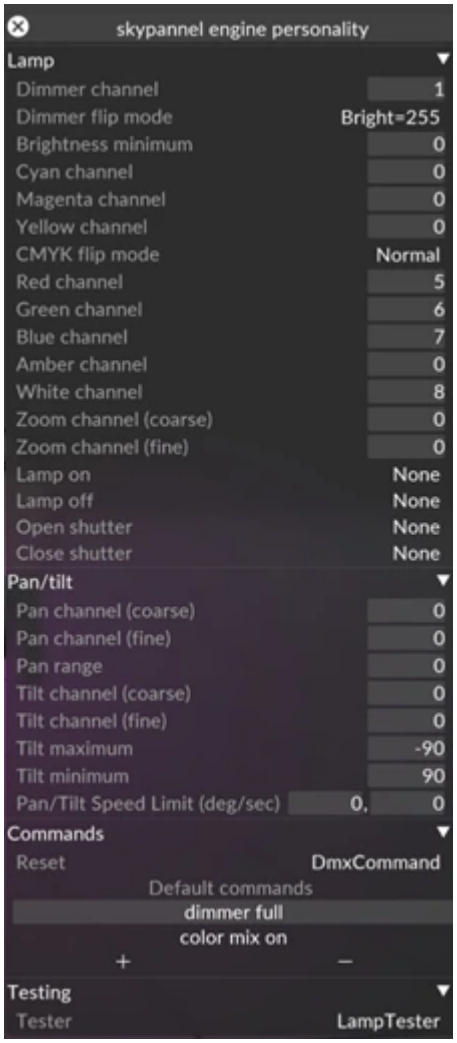
3. Set the fixture layout (number of engines):
   - 30C → **1 × 1**
   - 60C → **2 × 1**
   - 120C → **4 × 1**
   - 360C → **4 × 3**

5. Driver Setup (DMX Personality)

Create a new **driver** that maps each DMX channel:

- Channel 1 → **Dimmer**
- Channel 5 → **Red**
- Channel 6 → **Green**
- Channel 7 → **Blue**
- Channel 8 → **White**

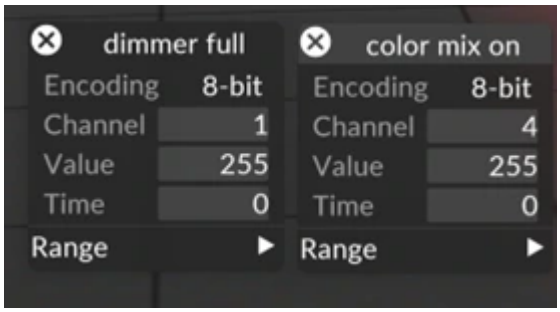
All other parameters (including pan/tilt) should be set to **0**.



Required Commands for RGBW Mixing

Create two commands in the driver:

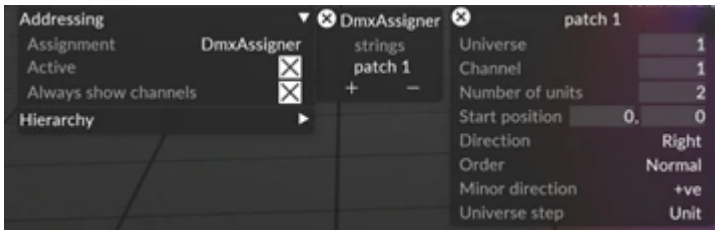
1. Set Dimmer (Ch. 1) → 255
2. Set Crossfade to Color (Ch. 4) → 255



6. Addressing

The addressing configuration allows Disguise to activate the DMX data and patch the fixture to a universe and channel.

1. Enable **Active** to output DMX data.
   If this is disabled, the fixture will receive **no DMX**.
2. Create a new **Assigner** and set:
   - Universe
   - Starting channel
   - Number of units (engines):
     - 30C → 1
     - 60C → 2
     - 120C → 4
     - 360C → 12



7. Outputting DMX data

To output DMX to the Skypanel, set up a DMX device in Disguise.
Follow the instructions in our user guide:

DMX device

Troubleshooting

Symptom	Likely Cause	Fix
Fixture stays white	Channel 4 not set to 255	Check driver commands
No output	“Active” not enabled	Enable in Addressing
Colour incorrect	Wrong Skypanel mode	Set Mode 24
Only part of fixture responds	Incorrect unit count	Verify resolution mapping

Cuebric Disguise Integration

Cuebric is an AI-powered creative production studio that provides filmmakers and other content creators with powerful and easy-to-use tools to generate and edit photorealistic, fully segmented, textured, virtual environments in seconds.

2.5D versus 3D content on volume stages

For virtual production to work, the content on the volume stage needs to be dimensionalised. For the scene to be credible, the background must also move left with the actor when the actor moves left. The Unreal Engine is used on set by CGI environment designers to render the assets they've already made in real-time. These backgrounds are three-dimensional, just like in a game. Creating realistic, three-dimensional Hollywood-quality backgrounds typically requires an army of CGI artists to work for months.

If 3D is the option that can be fully controlled, then the volume stages also let you film in what is called "two and a half dimensions," which offers less control over movement. Simply put, a 2.5D image is a two-dimensional image with a parallax effect. Cuebric was designed to enable the creation of 2-D landscapes that could be built on set in real-time. It is a quick, cost-effective alternative to labour-intensive 3-D environments and works well with them.

How does Cuebric work?

Cuebric's Plug & Play 3D solution allows you to turn your 2D assets into near-3D rapidly. Create, segment and dimensionise scenes in Cuebric, and then seamlessly export them with a single click to Disguise, where your scene's layers are automatically mapped to an LED environment, with the correct Z-depth, ready to shoot.

Cuebric includes a range of editing tools for creators to use in real-time to manifest their immediate idea or vision on a volume stage. Create, segment, and dimensionize 2.5D scenes without noise or distortion.

Cuebric's AI Depth Package enables creators to Export AI Depth Map and Export Depth Information, allowing users to rapidly layer these files as plates in Designer.

How can I use Cuebric with Disguise?

Watch on YouTube

Workflow

1. Sign up for Cuebric here.
2. Create a new project.

3. Create a prompt and generate the image.
4. Adjust the image using Cuebric's tools.
5. Use the segment tool to automatically or manually segment the image.
6. Export the scene has a depth package ready to import into Designer.
7. To set up a 2.5D asset from the Cuebric in Designer, follow the steps on this page.

Further Reading

- Sign up for Cuebric
- Cuebric website
- 2.5D Workflow

Depth Workflows

With Designer's depth tools, you can use black-and-white depth maps to deform meshes in real time, creating parallax and volume from flat plates or video content. The **depth video workflow** ties together **Depth Map Meshes**, **Depth Map Mappings**, and the **Depth Video Layer** into a single, repeatable setup detailed here.

What is the depth video workflow?

The depth video workflow uses a **Depth Map Mesh** as a deformable geometry, whose shape is driven by a depth map image or video. Depth can be applied in two main ways:

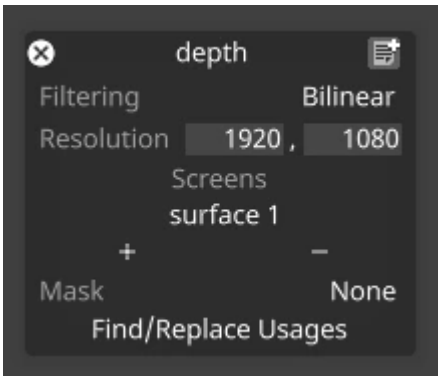
- **Depth Map Mapping** — the recommended, flexible approach that lets you drive a mesh from any layer that outputs a depth map.
- **Depth Video Layer** — a specialised content layer that sends a depth map video directly to a Depth Map Mesh, useful when mappings are not available (for example, inside a Layer Stack).

In both cases, the mesh occupies a frustum defined by **Field of view** and **Min/Max depth**, and the mesh vertices' z positions are updated dynamically based on the depth values in the content.

Depth video workflow

This section groups the how-to guides that make up a complete depth workflow:

- Set up a Depth Map Mesh
- Control the mesh using a Depth Map Mapping
- Refine depth and frustum settings



Example of a Depth Map Mesh driven by depth content

Workflow elements

1. Add **Depth Map Mesh** object to the stage.
2. Assign the **Depth Map Mapping**.
3. Create a **Depth Video Layer** on the timeline.
4. Assign **Depth map source content** such as an image or video clip.
5. Target the screen or object using the Depth Map Mesh.

Set up a Depth Map Mesh

A Depth Map Mesh is the core of the workflow: it's the geometry that will be deformed by the depth map.

1. In the **Stage** view, select the target stage object (for example, a screen or prop).
2. In the object's **Mesh** property, create a new **Depth Map Mesh**.
3. Confirm that the mesh appears in the stage with its default frustum (you can enable **Show frustum** on the mesh later if needed).

At this point, you have a mesh ready to receive depth information but it will still appear flat until you map depth content to it.

Control the mesh using a Depth Map Mapping

Use this path when you want **maximum flexibility** and the ability to reuse existing layers or complex setups.

1. Add or identify a layer on the timeline that outputs a **depth map** (for example, a Video layer playing a depth-map plate).
2. Place the depth-map media into the project structure (for example, under `objects/VideoFile`) and assign it to the layer.
3. Open the **Content Mapping** panel and create a new mapping of type **Depth Map Mapping**.
4. In the mapping, add the target screen (which uses the Depth Map Mesh) to the **Screens** list.
5. Scrub the timeline or play the track. The screen's Depth Map Mesh should now deform in real time based on the brightness values in the depth map (black/white representing relative depth).
6. Adjust any **Common Mapping Properties** (crop, scale, transforms) to align the depth map with the visible content on the screen.

This approach lets you keep your depth content in standard layers and reuse it across different meshes or screens simply by changing mappings.

Refine depth and frustum settings

Once the mesh is being driven by depth content, refine its properties to get clean parallax and minimise artefacts.

1. **Depth type**
   - Choose how the depth map is interpreted:
     - **Raw** – 0 is near plane, 1 is far plane.
     - **Relative inverse** – inverse normalised, where 0 is far plane and 1 is near plane (the default for many depth maps).
2. **Resolution**
   - Set the mesh **Resolution** to match (or broadly match) the resolution of the depth map texture. Higher resolution gives smoother deformation but uses more vertices.
3. **Field of view**
   - Adjust the mesh's **Field of view** so that the frustum encompasses the region of interest in your scene. This controls how "wide" the depth volume is relative to your stage.
4. **Min/Max depth**
   - Set **Min depth** (near plane) and **Max depth** (far plane) in metres.
   - These values convert the normalised depth in the texture into real-world distances.
5. **Depth offset**
   - Use **Depth offset** to shift the frustum's eye point relative to the mesh origin. This is useful to centre the mesh around the average depth of your scene.
6. **Blur / Dilate radius**
   - Increase the **Blur** and **Dilate radius** to soften edges and reduce artefacts around objects, especially where depth maps have noise or hard transitions.
7. **Show frustum**
   - Enable **Show frustum** to visualise the volume in the stage and confirm that the mesh's depth matches your camera and scene scale.

Advanced workflows

Once the basic depth video workflow is working, you can combine it with other Designer tools:

- **Composite with other content**
  - Map standard video plates or 2.5D assets onto the same screen or related geometry, using the Depth Map Mesh as a foreground or background element.
- **Use Layer Stacks**
  - Place a **Depth Video Layer** inside a Layer Stack for plates that already include effects (e.g. blur, colour adjustments) before or after depth deformation.

- **Animate or track the mesh**
  - Remember that the Depth Map Mesh is just another object; it can be parented, animated, or driven by tracking devices in more complex virtual production setups.
- **Match camera depth of field**
  - Combine the depth video workflow with camera **Focus** settings to add depth-of-field to your rendered scene, aligning the mesh frustum to the expected focus range of the camera.

Related information

- Depth Map Mesh
- Depth Video Layer
- Depth Map Mapping
- 2.5D Workflow

Green Screen Workflow

1. Set up the keyer for video input using one of the following two workflows below:
    1. Setting up keyers -
    2. Setting up keyers - Hardware keyer
2. Set up tracking for the camera (if not static) and perform spatial calibration. This can be one of three techniques listed below.
    1. Calibrate the tracking system outside Disguise.
    2. Or use an LED screen to perform the usual spatial calibration workflow.
    3. Or take manual observations to calibrate your camera as show at the bottom of this page.
3. Calibrate the camera's tracker delay.
4. Ensure the camera's video receive delay is set to 0.
5. If you want to use set extension, model the green screens and add them to your project.
6. Map content to camera front and backplates as in the standard XR workflow.
7. To achieve camera switching, add your cameras to an MR set as normal.

Setting up keyers

a. Notch

1. In the video patch editor, add layer stack on the videoin.
2. Create a new notch layer in the layer stack.
3. Select chroma keyer notch block.
4. Ensure blend mode is set to Over-Alpha.
5. Calibrate notch keyer using the instructions at Chroma Key.

b. Hardware keyer

1. Connect the cameras feed into the input of the hardware keyers.
2. Connect the Key and fill feed from the keyers to d3 machines (Mustbe connected to 2 separate video inputs).
3. In the video in patch editor, create a video in or select the "new luma keyed input" opt
4. Map the chroma and luma key souces.
5. Select the luma key to Opaque white or black depending on the format coming from the hardware keyers.

Camera calibration using manual observation

1. Accurately model a real-world object within d3 to use for calibration. A flat-screen won't work very well as you need at least 6 points for calibration. A (cuboid) box is an easy way to do this.
2. Open up the spatial calibration editor from the camera.
3. Under **Manual Observations**, add your alignment object.
4. Under **Calibration**, set your calibration scope to **Registration only** if you already have calibrated lens values, or **Registration and focal length** if not. Manual observations are unlikely to contain enough points to accurately calibrate the lens distortion parameters.
5. Click **Add manual observation**. This will take a picture of the stage and capture the current tracking data. The new observation will appear under **Observations**.
6. Right-click on the new observation to open up the alignment editor, similar to Omnical's QuickAlign tool.
7. If you do not see the wireframe of your alignment object, increase the stage render opacity to see a render of the stage, and adjust the solved pose manually to get the object into view.
8. Left-click on the vertices of the alignment object wireframe to add alignment points, and drag these to the corresponding points in the captured image.
9. Once you have 6 or more points aligned, click **update calibration**. The wireframe of the alignment object should move to align much more closely with the real object.
10. If you are using a static camera, the calibration is completed.
11. If the camera is not static, similar to the XR workflow, keep moving the camera and taking and aligning observations until you are happy with the calibration over the whole movement area of the camera.
12. You can also take observations at different zoom/focus levels to calibrate the lens if required.

Using set extension

1. Create green screen objects in d3 from **Stage > MR Sets**. Model the screens as accurately as possible, although it's best to keep them slightly smaller than the real green screens to allow for small inaccuracies.
2. Ensure your camera is spatial calibrated.
3. Create a new MR set, add the green screens to the **on-stage** list, and add your camera via the override parameter or using an indirection controller.
4. Any backplate content outside your camera's view of the modeled green screens will be rendered as a set extension.

Green Screen Setup with Layer Stack

With the addition of the new Layer Stack feature in r20.0 it is now possible to do a quick Green Screen setup while applying a Notch Chroma Key asset to a VideoIn object and here is a quick

way of how to do that.

What you need for Basic Green Screen setup

- A Green Screen or a green cloth that is similar to a green screen that is positioned in front of the camera you will be using. In this basic setup we'll be using the webcam of our work laptops but any camera can be used with this workflow.
- The Notch block with the Notch keyer, which will need to be added to your d3 project's **NotchFile** folder.

How to setup Green Screen with Layer Stack

1. Launch new d3 project on any r20.0 build.
2. Add Video input to VideoIn object.
    1. Right-click on the 'Devices' tab at the top of screen
    2. Click on **Video Input Patch Editor**.
    3. Click on the black window under VideoIn_1 and then expand the **Input configuration for VideoIn_1** field to open its input configurations.
    4. Now click on **Input** and choose the camera feed of your choice. In case your don't have a real camera connected to d3, you can use your laptop's web camera.
    5. Look for names like **USB2.0 HD UVC WebCam**.
    6. Click on **Start Preview** under the VideoIn_1 to make sure the camera is working alright.
3. Create new Layer Stack.
    1. While in the input configuration field for VideoIn_1, click on **Layer Stack.**
    2. Insert the name for your new Layer Stack and click **OK**.
4. Add and configure the Notch layer in Layer Stack
    1. While in your Layer Stack, give a name to the layer you want to create and then from the list that comes up select a Notch layer.
    2. Then right-click on the newly created layer in your stack and press **Edit**.
    3. Now go to the **Effect** field and select the block with the Notch keyer.
    4. Open the **Default** tab and change the **Blend Mode** to **Over-Alpha**.
    5. Under the **Image 2D** tab, change the **Image Texture** to your VideoIn_1.
5. Add VideoIn and Content to your Surface
    1. To your timeline add a Video layer named **Camera** that is mapped to Surface 1 and as content add your VideoIn_1 to it.
6. Underneath the **Camera** layer add another Video layer, that's mapped to Surface 1 as well and to it add any content you like.
7. Observe how the content gets applied to the green screen correctly and that any real world objects in front of it appear as intended.

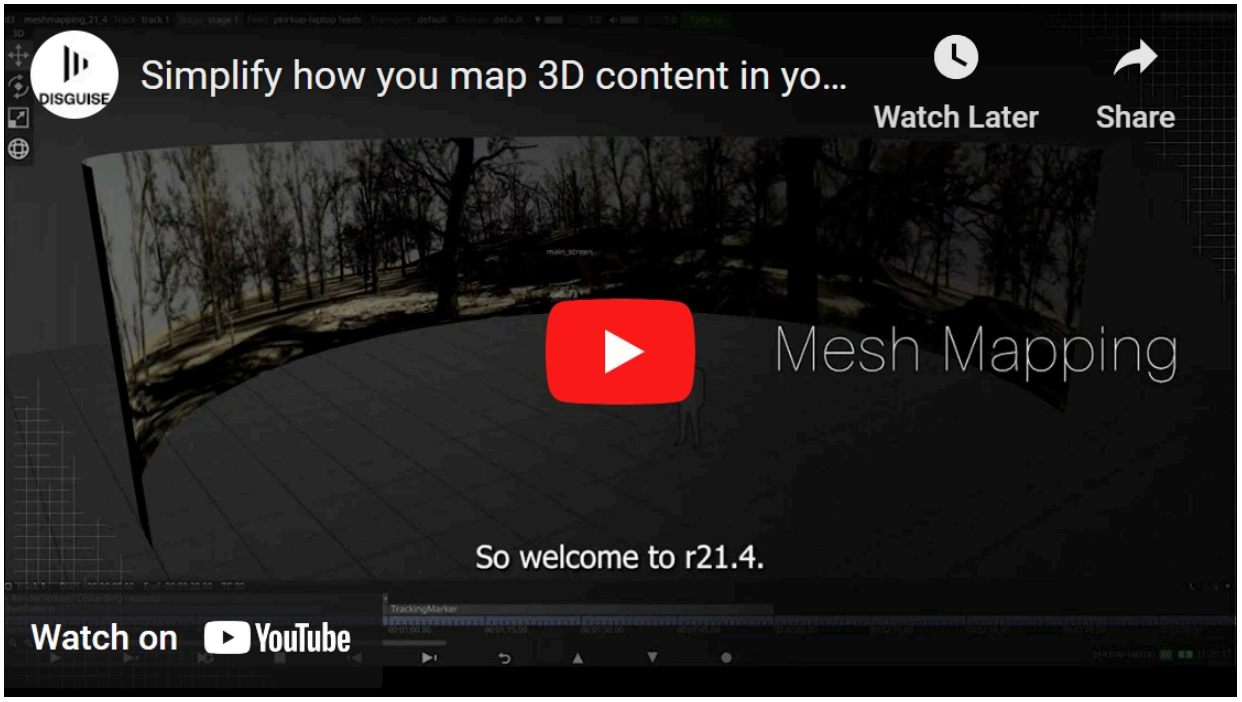
Mesh Mapping Workflow

Mesh Mapping enables you to easily set up a screen projection that automatically adjusts to the extent of the surface you're targeting.

As of r21.4, experience more creative flexibility when mapping 3D content onto your volume.

This type of Mapping is aware of the surfaces that it's mapping toward, even when dealing with UV-mapped surfaces, screens, and things within your space.

See How it Works



Watch on YouTube

Workflow

Mesh mappings are in the same locations as other types of managers, from within a layer's Mapping field. For instance, in this video, the Mesh Mapping has been created from within the RenderStream Layer's Channel Mapping field.

Typical content mapped to surfaces via RenderStream is perspective projected and then cropped off by the geometry within our stage, which is inefficient. Mesh Mapping allows us to create a perspective render from an eye point that you define, so that only the pixels that are relevant to that particular mesh are streamed across RenderStream.

When using a mesh mapping, the content being delivered from the render engine will be rendered from the perspective of the eyepoint that you determine in the mesh mapping before it's delivered to the target surface within Designer. This is very efficient from a bandwidth perspective as RenderStream only sends the exact pixels that the screen needs.

Increasing the pool size also allows the mesh to be subdivided into multiple perspectives that will line up to create a single contiguous scene.

Mesh mappings also support rendering to surfaces greater than 180 degrees. When the cluster assigner's channel mapping targets the Mesh mapping, Designer will determine that it needs more render instances based on available bandwidth and resolutions within the individual fragments, subdividing until it reaches the appropriate amount of fragments to match the screen resolution.

Resolution Scale is another feature available when using a mesh mapping. It allows you to reduce the scale of your content in order to decrease the number of fragments that your mesh mapping needs to provide full coverage around the volume.

Using Mesh Mapping in a Cluster Workload for an Inner & Outer Frustum Setup

1. Set up a single channel within your Cluster Workload that is targeting MR set (backplate)
2. Create another channel that targets a mesh mapping. For a pool size of 2, this will generate 2 streams for the mesh when RenderStream is started.
3. Be sure to use the same scene origin object in both so that they have the same reference point.
4. Start the RenderStream workload. You will see 3 total streams across the RenderStream network as it receives the renders for both in-frustum and out-frustum.

Best Practices for Eyepoint and Mesh Positioning

Avoid positioning the mesh and the eyepoint at the same coordinates to prevent generating a frustum with an infinite field of view.

If you need to reproduce a view at the world origin (0,0,0), you have two options:

- Slightly offset the mesh within the Disguise stage while keeping the eyepoint aligned, or
- Offset the eyepoint and use Scene Origin to re-align the resulting offset.

Both approaches maintain a valid frustum while preserving the intended viewpoint at the origin.

Shot Recorder Setup

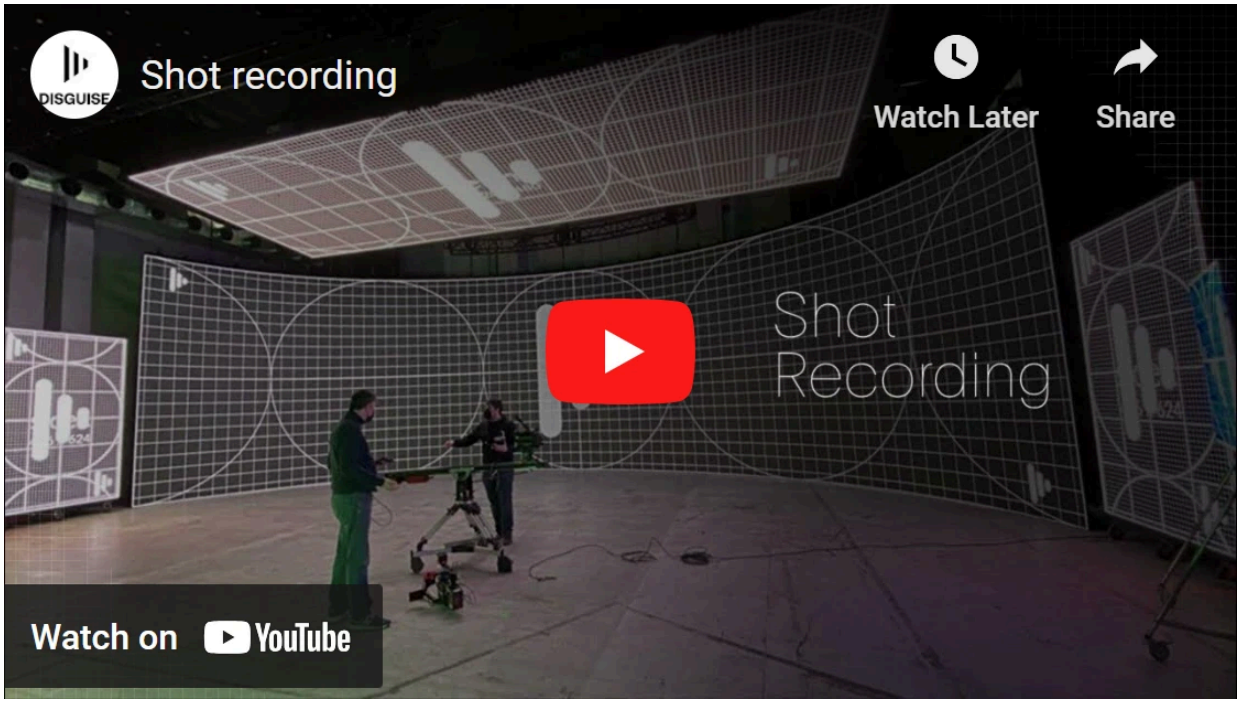
The Shot Recording system allows users to record and export parameters from within Designer, ready for use in post-production workflows.

What is the Shot Recording System?

The Shot Recording system is designed as a generic system to allow users to record any fields or properties displayed in the GUI. Users can build up their own collections of parameters they want to record. In addition, the system has a quick and easy workflow for recording commonly-used sets of parameters, such as camera tracking.

Unlike device recordings, which are played back within Designer, the data recorded by the ShotRecorder Device can be used by external applications.

See How it Works



Watch on YouTube

Components of the Shot Recorder

The main components of the ShotRecorder Device are:

- The **ParameterCollection** containing the parameters to be recorded.

- A **TimecodeTransport** used to assign timestamps to the recorded parameters.
- Recording and export settings.

Parameter Collection

ParameterCollection is a resource that allows users to create several different collections and switch between them when deciding which parameters to record. It contains an array of ParameterSources, each of which is one **parameter**, e.g. field/property to record.

ParameterCollections can also contain a list of nested ParameterCollections, allowing users to build up collections in a modular way and add them all to one outer collection which is used for recording.

Some ParameterCollections are auto-created with sets of parameters which are commonly required. For example, each Camera auto-creates a **tracking** collection containing all the parameters commonly required for recreating camera tracking data. Similarly, each **SpatialMap** also creates a similar tracking ParameterCollection - the main difference is that this accounts for offsets of the world zero point in the spatial map. It also references the currently active camera if using an MR set.

Parameter Sources

ParameterSources contain a list of field ParameterSources for compound types (e.g. Vec contains x, y, and z, Resource can contain its fields). For compound types, the value of the ParameterSource is found by populating the values of its fields. By contrast, the values for basic types are populated using the expression system, which can return floats or strings. Any limitations of the expression system, or particular fields which cannot be accessed by expressions, will also be limitations of the shot recording system.

Shot Recorder Workflows

Setting up the Shot Recording system

1. Create a **ShotRecorder Device** in the current Device Manager. This device will become the master of the shot recording system.
2. Name the **Slate** for the current shot.
3. Create a new ParameterCollection in the ***Parameters** field and add the desired parameters. ParameterCollections are a collection of different parameters that we are interested **in recording and getting the data out of i.e. camera tracking, MR set etc.
4. Add the desired Timecode provide to the ‘**Timecode**’** field.
5. The **Take Snapshot** and **Take Screenshot** options can be selected to take a project snapshot and/or screenshot at the end of each take.

Adding parameters to a ParameterCollection for recording

1. Open the **ParameterCollection** editor.
2. Alt+drag from the Sources **+** button to any field in the UI to add it as a parameter source
3. Several ParameterCollections are automatically created for convenience, such as camera tracking collections. These, or other user-created ParameterCollections, can be added to the ParameterCollections list in the editor to allow the parameters to be organised into smaller separate collections.
4. Click the arrow on the right hand side of a parameter to expand it and view its fields. Resource parameters do not have their fields added by default, but they can be added by clicking the plus button on the right hand side of the parameter.
5. Timecode can be set up inside the shot recorder in order to reference timecode in the recordings using **TimeCodeTransport**.

To make a recording

1. To start a recording, click the button displaying **Disengaged** to engage the recorder and start recording.
2. Click the same button again to stop the recording. The take number will automatically increment, or it can be changed manually.
3. Alternatively, use the API commands documented at `http://localhost/docs/v1/index.html` to start and stop recordings externally
4. Slates will be listed under the **Recordings** separator. Right-click on a slate to see the takes for that slate.

To export recordings

1. Select the desired formats under the **Export** tab.
2. Either click **Export all recordings**, or export recordings individually under the **Recordings** tab
3. Select **Auto-export** to automatically export in the selected formats when each take is finished.
4. Click **Export comparison table** to export a CSV table comparing the first value of each parameter for each recording
5. You can also enable to take a snapshot or a screenshot of each recording if desired.

Recordings can currently be exported in the following formats

- **JSON**: A compact JSON representation which contains the changed parameter values for each timestamp, similar to the .shot file
- **CSV (Compact)**: A compact CSV representation which contains only the changed parameter values for each timestamp
- **CSV (Dense)**: A dense CSV representation which contains all values for each parameter at each timestamp

- **FBX**: An FBX file containing meshes and pose information (position, rotation, scale etc.) of all recorded objects, where available. Any additional properties not represented within the FBX specification are recorded as custom properties.

A new sub-folder will be created in the project called `output`. Within there we have `shots` and in there will be the slate. In the slate, there will be the .shot recording in addition to the recording in the chosen format.

Recording timecode with a Shot Recorder device using Expression variables

The Recording Timecode with Expression variables and a Shot Recorder device workflow can be found here.

Limitations

- The shot recording system only writes data out of Designer. There is no capability to read recordings back into Disguise directly to replay the data. This is what device recordings should be used for.
- The shot recording system and the device recording systems do not interact with each other. They can still both be used at the same time.
- There is not currently an easy way to get all the recorded camera tracking data into Unreal Engine to re-render shots. Epic have outlined a workflow **here** to import and export FBX files which allows camera positions, rotations and FoV to be imported.

Using Sony's Moiré Alert with Designer

Sony's Camera and Display Plugin for Unreal Engine has a Moiré Alert feature that can warn a user if moiré is likely to be captured by a camera pointing at an LED display wall.

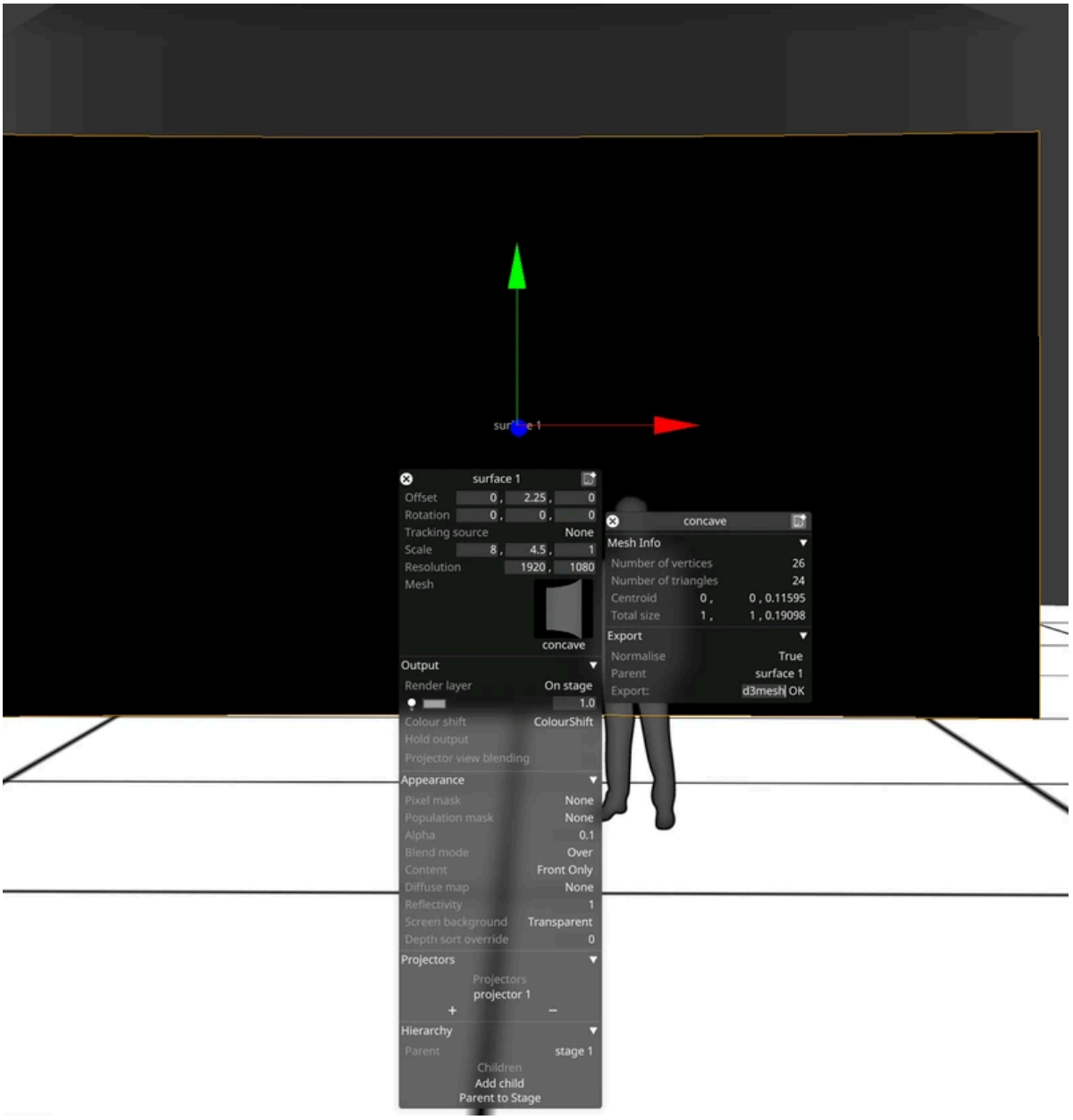
The **Sony Camera and Display** plugin can be requested and downloaded for free from the Sony website: **Sony Virtual Production Toolset Downloads**.

As the Sony plugin is for Unreal Engine (UE), not Disguise's Designer application, the Moiré Alert feature cannot currently be used directly inside Designer. However, by running the Unreal Editor alongside Disguise Designer the Moiré Alert can be used effectively for either On-Set or in Pre-Viz.

To do this, we need to export the mesh used as the LED wall layout from Designer and import it into Unreal Engine. This document describes the steps necessary to do this.

Export from Designer

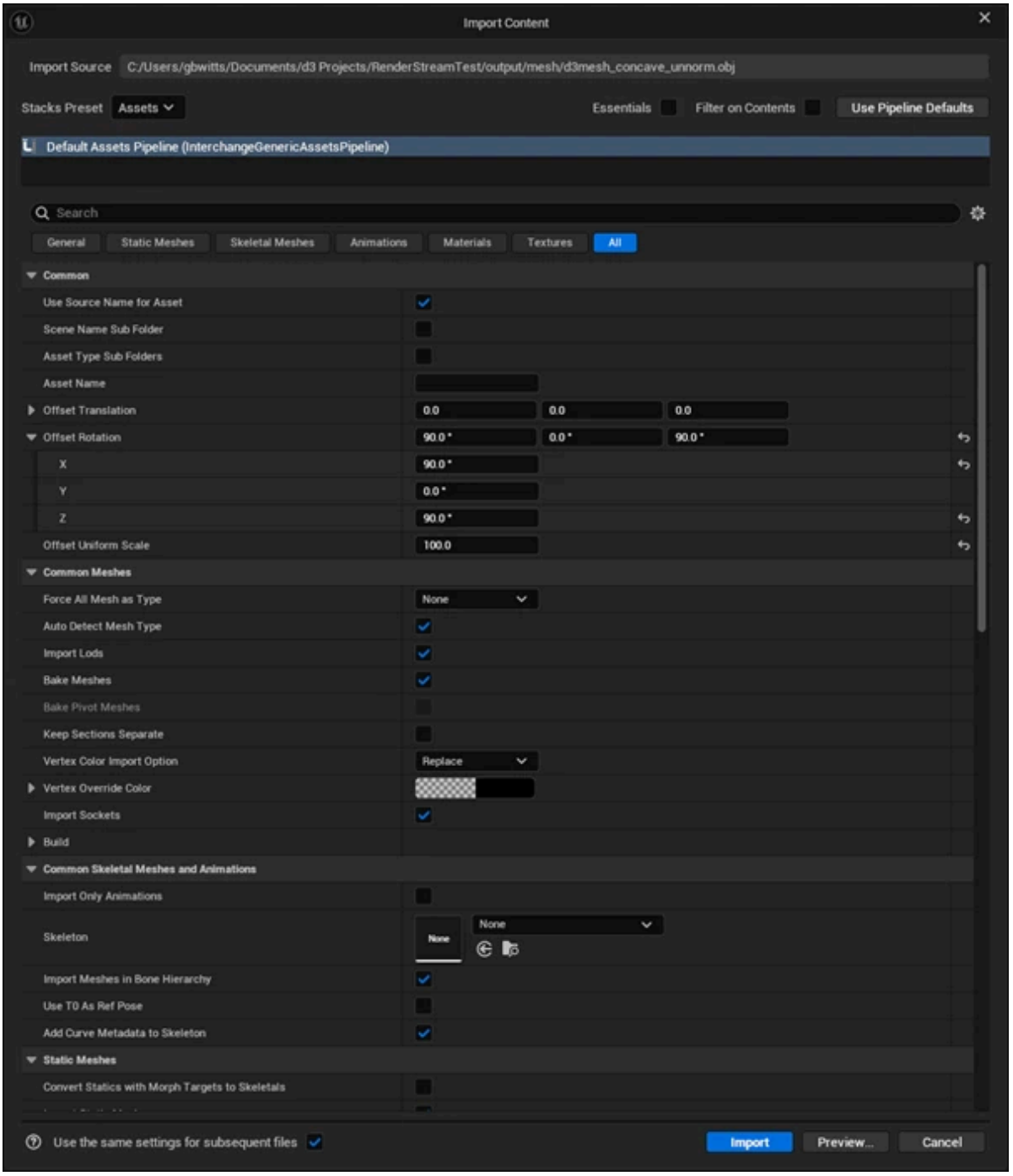
1. In Designer, right-click on the LED surface mesh, then right-click again on the Mesh thumbnail to show the menus as in the screenshot below.



2. Under **Export** select True for **Normalise** (this actually seems to do the reverse of the tooltip: setting to True maintains the current translation, rotation and scale).
3. Enter a filename in the **Export** line at the bottom, and press **Return**, or click **OK**.
4. This will save an .obj file (a text file containing the vertices etc) and a .mtl file for the material (note that changing the **Screen Background** and/or **Alpha** for the surface in Designer does not seem to affect the exported Material).

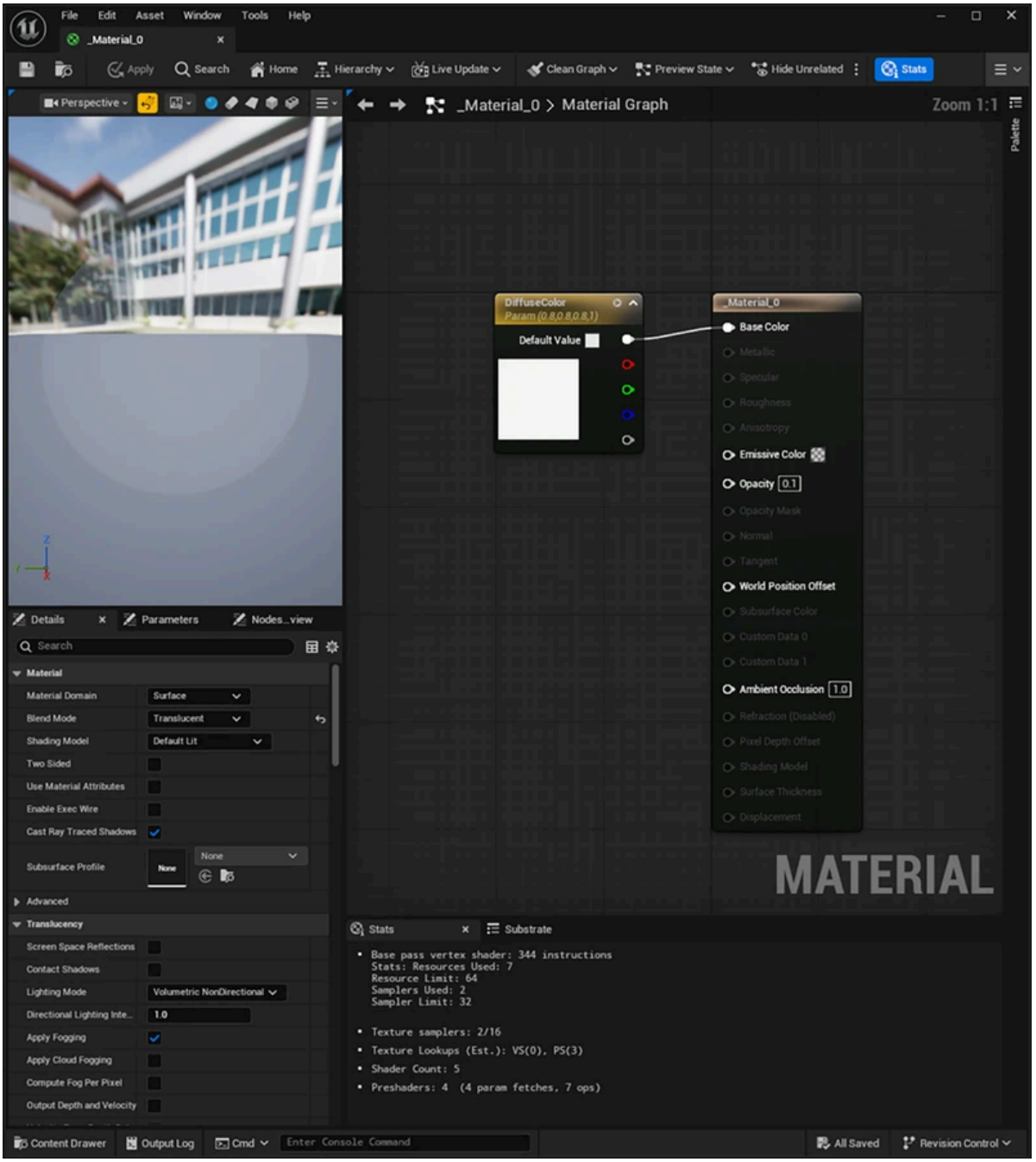
Import into Unreal Engine

1. Open the relevant project in Unreal Engine 5.7 – this could contain the 3D scene that will be rendered via Disguise's RenderStream, or it could be an empty level to reduce rendering requirements, if only the Moiré Alert is of interest.
2. Add a CineCameraActor to the level, with Sony's On-Set Camera Component attached.
3. In the Content Browser, right-click and select **Import to Current Folder**, or click on **Import**, and select the .obj file exported from Designer. The **Import Content** dialogue should appear, as shown below.



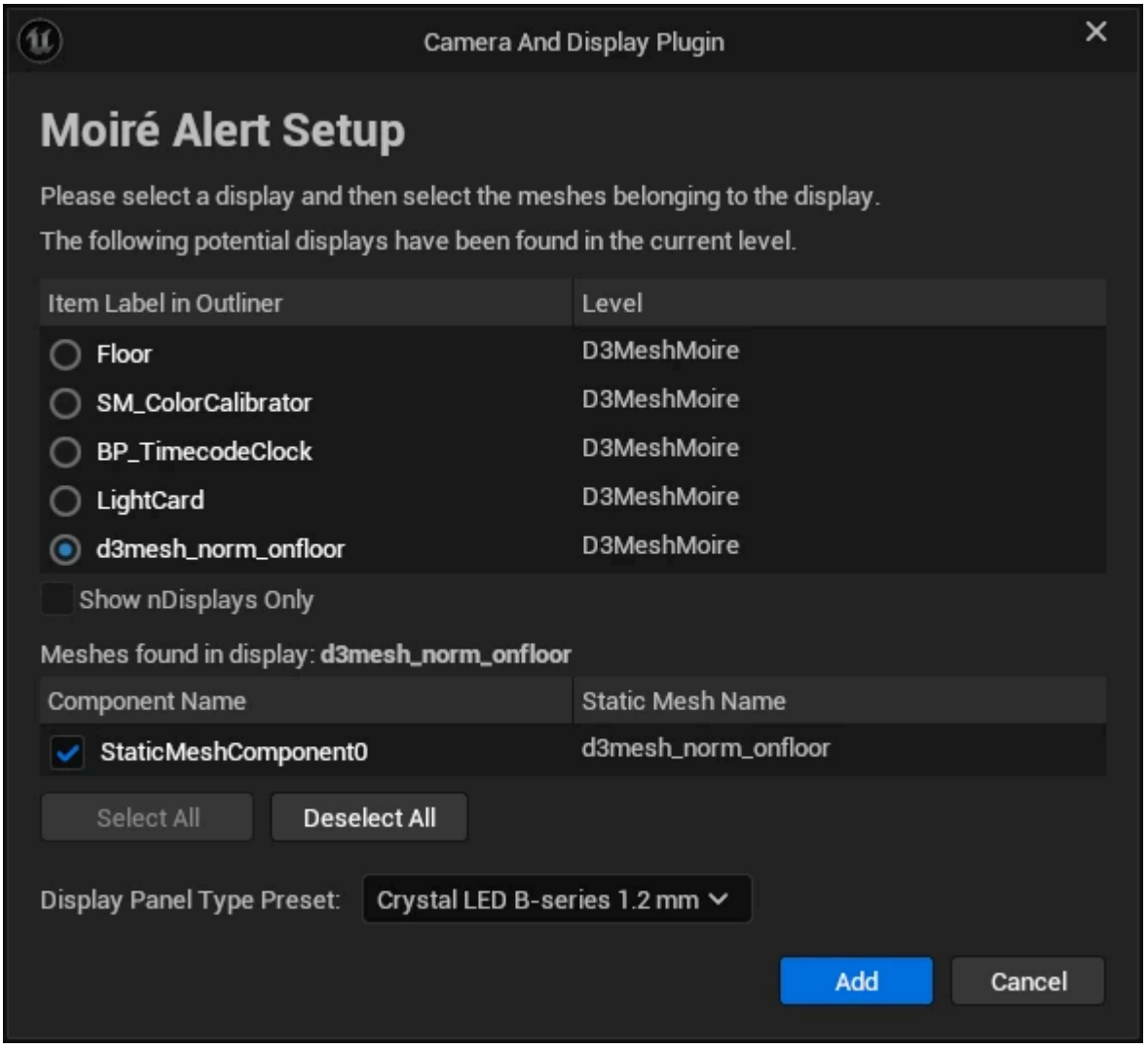
4. As Designer has units in metres, but Unreal Engine uses **cm**, we recommended to set an **Offset Uniform Scale** to 100.0 so that the scale is maintained.
5. Similarly, the XYZ axes are different between Designer and Unreal Engine, so it is recommended to set an Offset Rotation of (90, 0, 90) degrees.
6. All other Import Settings can be left as default.
7. Click the blue **Import** button at the bottom of the dialogue.
8. A Static Mesh and Material should now be visible in the Content Browser. Both need to be opened and saved.

9. If the LED screen mesh is being added to a level that has the original 3D scene in it, then it is probably preferable for this mesh to be mostly transparent when added to the level. To do this you will need to open the imported Material. Change the **Blend Mode** to **Translucent** and set the Opacity to something less than 1.0 (e.g. 0.1).

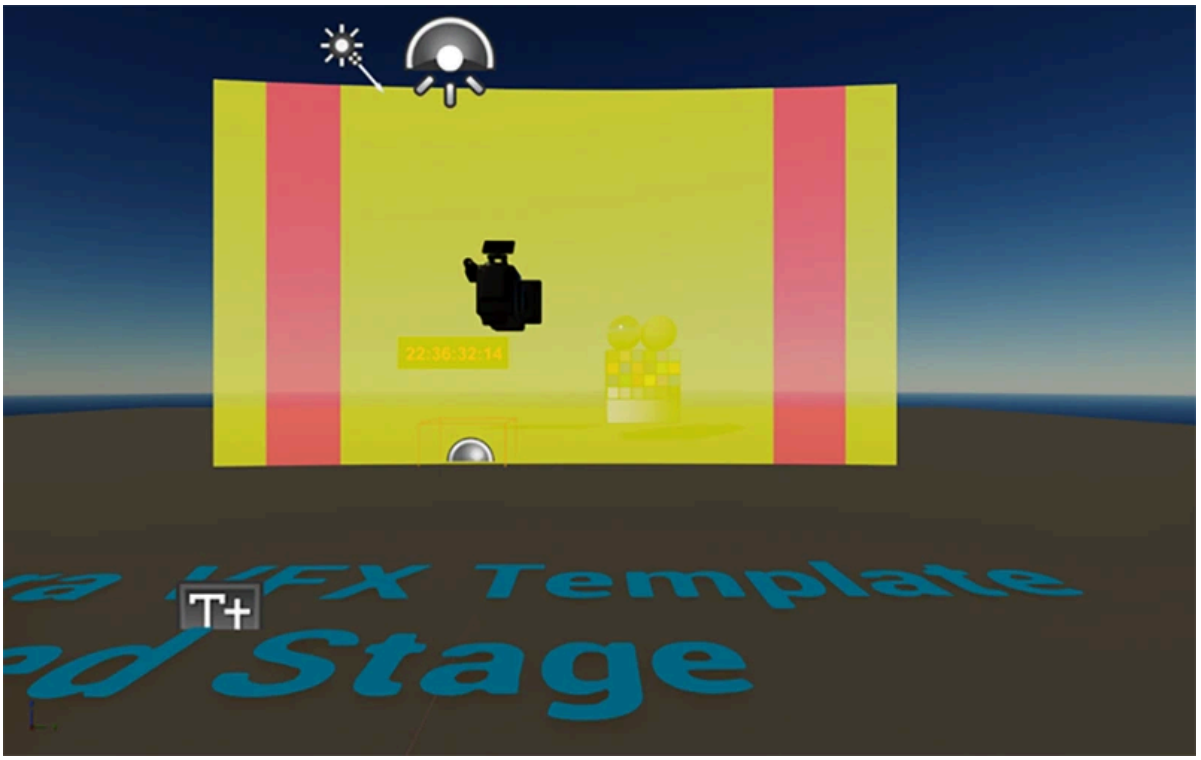


10. Drag and drop the mesh into the level, and place at the origin (location (0, 0, 0), rotation (0, 0, 0), scale (1, 1, 1)) so that its position matches that in Designer.

11. In the CineCameraActor's On-Set Camera Component, under Moiré Alert, click **Add Display** to setup the mesh up as the LED display for Moiré as shown in the screenshot below. Select the appropriate Sony LED display type.



12. Enable Moiré Alert in the On-Set Camera Component – you should see the Moiré colours appear in front of the mesh.



Camera Tracking

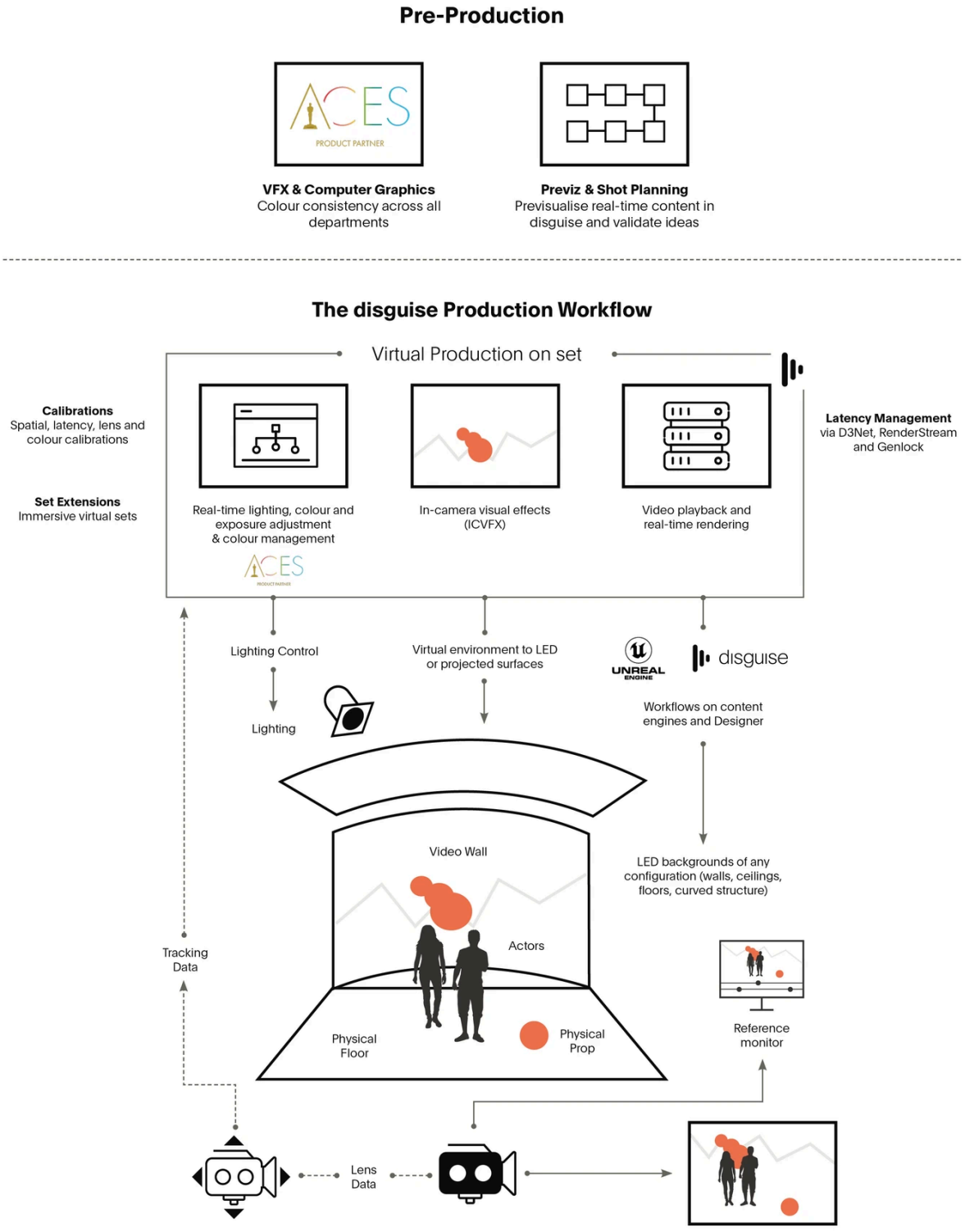
To ensure that the Moiré Alert is correct in a live situation, the CineCameraActor needs to be configured correctly (Camera Mode/Type, Imager Mode, etc), but also needs the correct camera position and rotation, and lens information (focal length, focus distance and aperture) from the real camera. Different Camera Tracking systems are set up in different ways, so are not detailed here, but it is recommended that the tracking data are sent to both Disguise and Unreal Engine at the same time as both systems need to know the values at the same time.

Virtual Production Overview

The Disguise virtual production workflow enables production teams to capture the creative magic of working together as they would with physical sets, while minimising the amount of time and resource needs of conventional post-production VFX.

Virtual Production Toolkit

Using state-of-the-art technology that enables real-time visuals to be shown live for actors and crew to respond to, virtual production opens up a world of opportunity. The toolset is already pushing the boundaries for filmmakers, with more exciting uses rapidly emerging.



The Disguise Production Workflow

Virtual Production Workflows

The Virtual Production Workflows at Disguise include:

- 2.5D Workflow
- Anamorphic Lenses
- ARRI Skypanels Setup
- Cuebric Integration
- Green Screen Workflow
- Mesh Mapping Workflow
- Shot Recorder Setup
- Sony's Moiré Alert in Sony Cameras

Camera Switching

While there can only be one target camera in an MR set at any given time, an MR Set can contain multiple cameras that can be switched between using an Indirection Controller.

The target camera of an MR set determines the video input being routed to the MR set. However, multiple cameras can be added into an MR set.

Camera switching in xR requires all delays in the system to be compensated for perfectly, so that all parts of the output switch view in the same frame. This requires introducing a delay between the user requesting a switch, and the switch being visible in the output.

> **Note**
>
> **Please note**: Delays must be perfect to then get in sync switching.

Controllers

Inside Disguise Controller we have 6 Indirection Controller Types:

- DMXIndirectionController
- ListIndirectionController
- MachineListIndirectionController
- ManualIndirectionController
- SequencedIndirectionController
- OSCIndirectionController
- UDPIndirectionController

These allow multiple protocols to be used to switch the active camera inside Disguise, as well as non-external trigger based.

Workflow

DMXIndirectionController

This allows for Cameras to be selected in a Bank and Slot mechanism.

1. Ensure you have set up Disguise to receive DMX.
2. Create and assign a DMXIndirectionController to the MR Set.
3. In the Sockpuppet bank editor, a Camera bank list is now made available.
4. Populate banks and slots with Cameras you wish to select.

5. Enter the Universe and channel you wish to select the Camera bank with into the controller.
6. The slot is the next channel immediately after the bank, so you must specify 2 channels in your DMX sender.
7. From the DMX sending device, send the appropriate 2 channel identifier to the universe and channel you selected.

ListIndirectionController

This allows for Cameras to be selected on a 0 Based index

1. Create a ListIndirectionController.
2. Add the Cameras as Resource.
3. The order of the Cameras as the Index Number.
4. Scroll through the Index to then choose the active cam.

The selected index is 0-based, meaning the first item in the list is selected by index 0.

Right-clicking on the selected index allows the user to enter an expression to control the index (e.g. allowing control from an external protocol.)

If the selected index is less than 0 or greater than or equal to the number of elements in the list, then the controller selects `None` as the Resource.

MachineListIndirectionController

This allows for certain machines to only output the perspective of specified cameras. A use case for this is when splitting up Front and Back plate rendering over multiple machines.

1. Create a ManualIndirectionController
2. Select a Camera.

SequencedIndirectionController

This is controlled by keyframes in an IndirectionControl layer. The indirection control module allows indirections to be sequenced on the timeline. One Indirection control module controls one indirection.

To sequence an indirection:

1. Add a SequencedIndirectionController in the controller field of the indirection.
2. Add an IndirectionControl layer to the timeline.
3. Select the controller in the Indirection control module.

OSCIndirectionController

This allows you to force a camera to be active over OSC.

1. Create an OSCIndirectionController
2. Create an OSC Device
3. Add the OSC device to the Controller.
4. Remove the $ sign from the OSC address field.
5. The string to recall the Camera to be active is the camera's name inside Disguise. Currently the OSC indirection controller requires you to use the full path of the object you are selecting such as:

path: `/d3/indirection/osc`

value: `objects/camera/cam1.apx`

> **Note**
>
> **Please note**: Confirm that the labels for camera objects and the OSC indirections match and are named using the same format.

UDPIndirectionController

This allows you to force a camera to be active over UDP.

1. Create a UDPIndirectionController.
2. Add the number of Resources needed. This will be the number of cameras in the scene.
3. Add a Key to trigger that active camera, and add a resource which would be the Virtual Camera.
4. Add the receive port number from the UDP sender.
5. Send the command to Disguise and see the Current Target change. Turn on Verbose Logging to check incoming strings in the console (alt+c).

Debugging Camera Switching

Clean camera switches in XR depend on the whole system being correctly calibrated, configured, and performing as expected. A switch draws on the combined accuracy of tracking, calibration, camera setup, rendering, and system timing. As a result, problems can originate anywhere in that chain.

Use this section to investigate camera switching issues and identify the most likely root cause.

Prerequisites

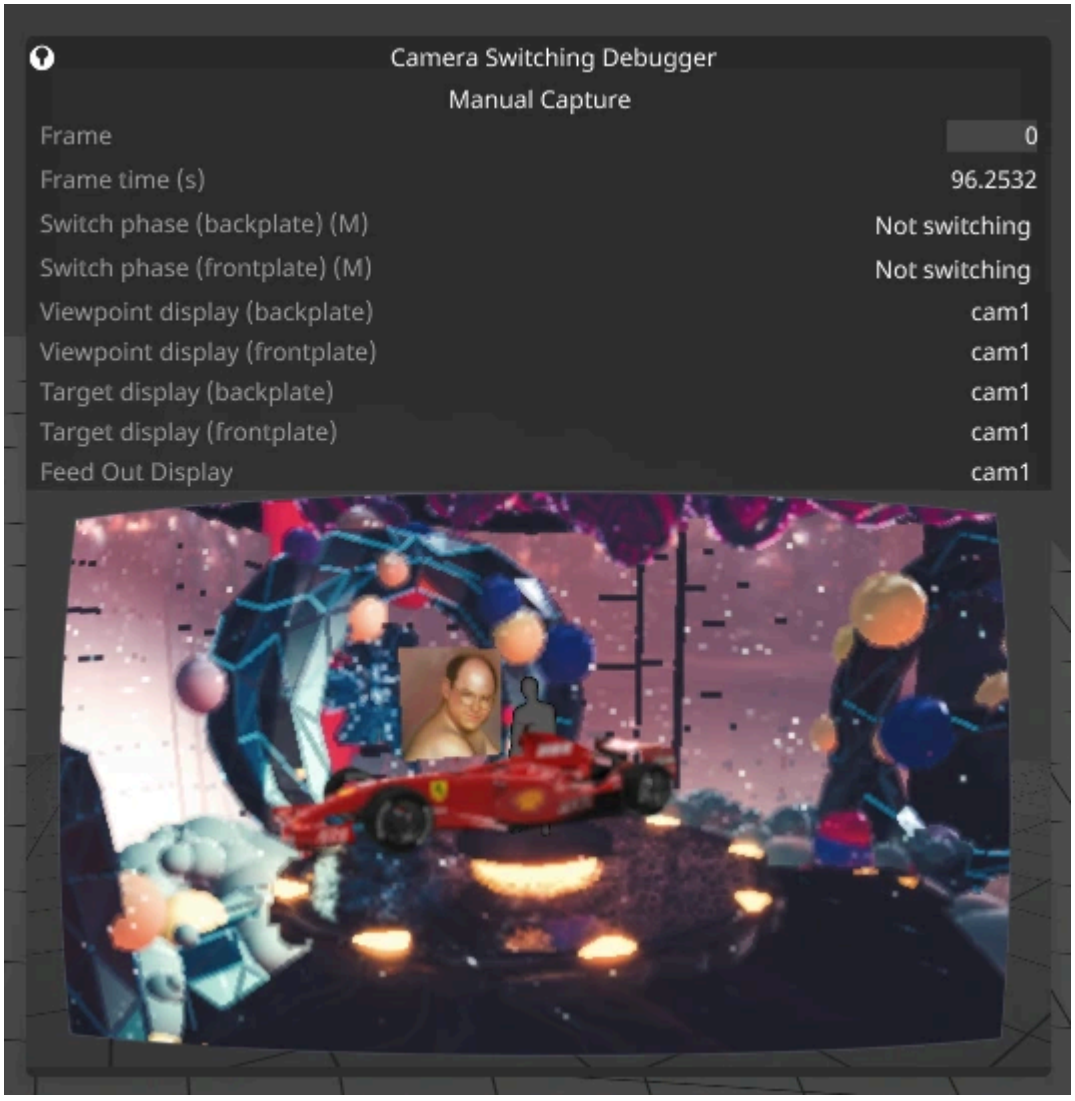
Camera switching has several prerequisites. Fix any that aren't met before diagnosing further.

- The system must be fully genlocked.
- The system must not be dropping frames.
- The camera delays must be calibrated.
- Each camera must see exactly one full frame of white in the calibration widget.
- Any RenderStream assets must be running smoothly without dropping frames.

How to debug

Debugging can be performed using the Camera Switching Debugger. This can be accessed via:

- `MR set → Delay Calibration → Camera Switching Debugger`.



camera switching debugger widget

When the widget is open, it will automatically detect camera switches in the MR set and update accordingly. Change the index in the `frame` field to step through frames rendered

around the switch. If everything is correct, you should see a clean switch between frames `-1` and `0`.

Module rendering vs XR compositing issues

Once the prerequisites above are met, camera switching issues fall into two areas:

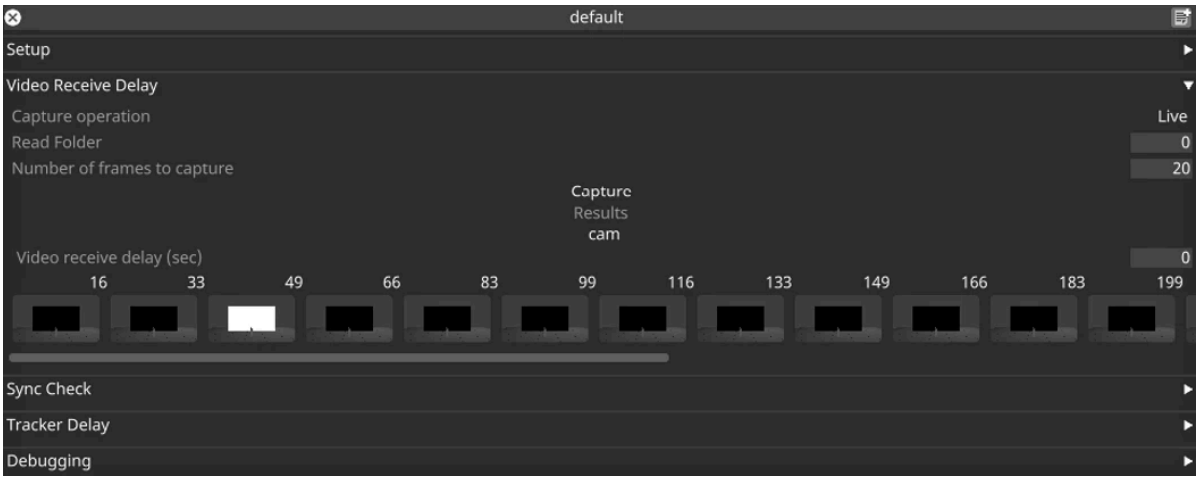
- Module rendering (e.g. compensating for RenderStream latency)
- XR compositing (Syncing content between LED walls and set extension)

To diagnose which area the error is stemming from, attempt a camera switch with a single video layer mapped to the backplate. If that is clean, the issue is likely stemming from module rendering, otherwise it must be stemming from XR compositing.

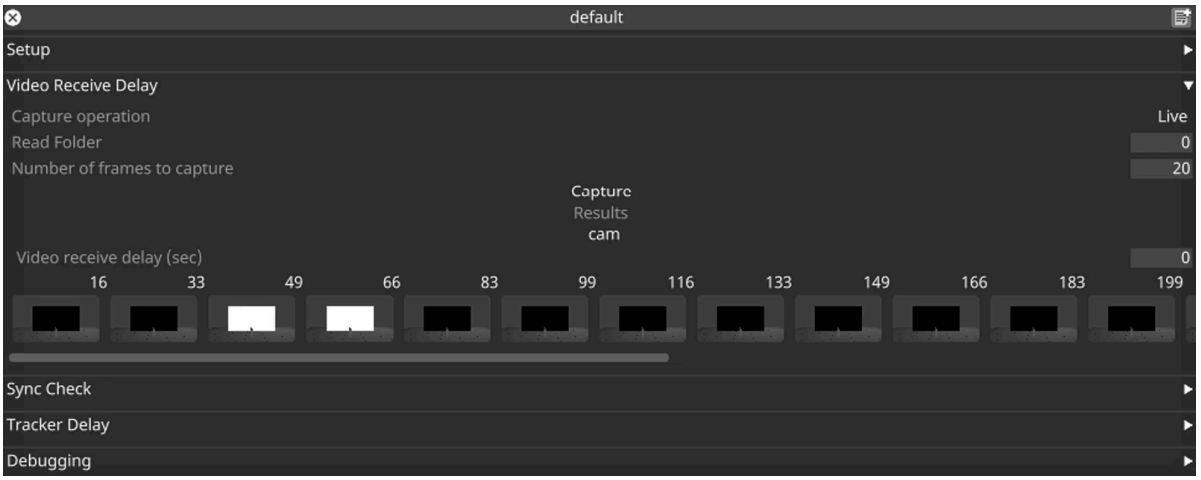
Diagnosing XR compositing issues

1. Firstly, ensure the system is genlocked and not dropping frames.
2. Use the delay calibration tool to ensure each camera's delay is calibrated.

3. While doing delay calibration, ensure each camera sees exactly one full frame of white on the screen. If not, the camera shutter settings must be adjusted until that is the case.



Single white frame is captured (Good)



Two white frames are captured (Bad)

4. Try using the sync check tool in the delay calibration widget.

If issues persist, then you may require assistance from support as it could be a software bug, hardware issue or a combination of the two.

If you reach this point, contact support and send a diagnostic log with the following:

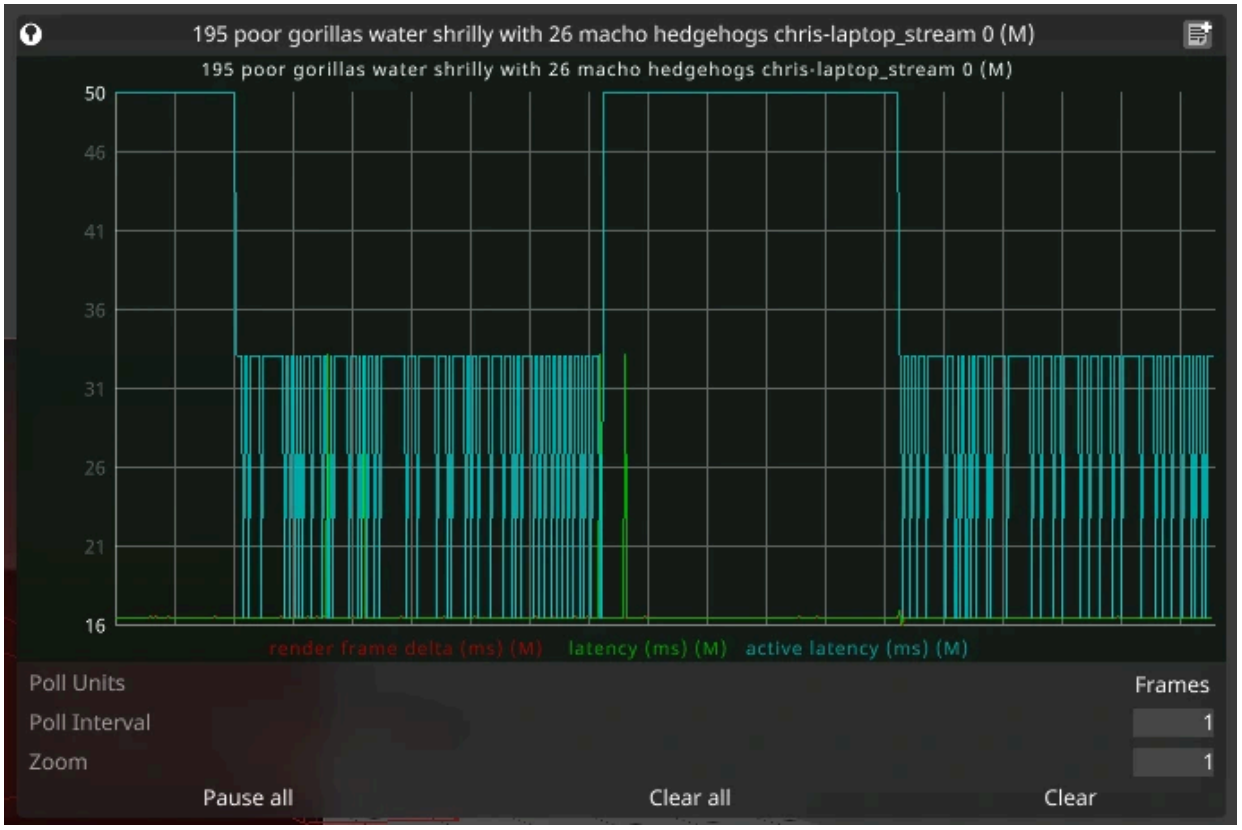
- Hardware setup.
- Outcomes of the steps above.
- Frontplate reprojection mode for each camera (in particular, whether any use “Minimal Latency”).

Diagnosing module rendering issues

This is most likely caused by latency compensation in RenderStream modules, which you can often diagnose from the stream graphs.

View the stream graphs in the performance monitor, accessed by clicking the FPS counter in the bottom-right corner of the screen.

Stream graph



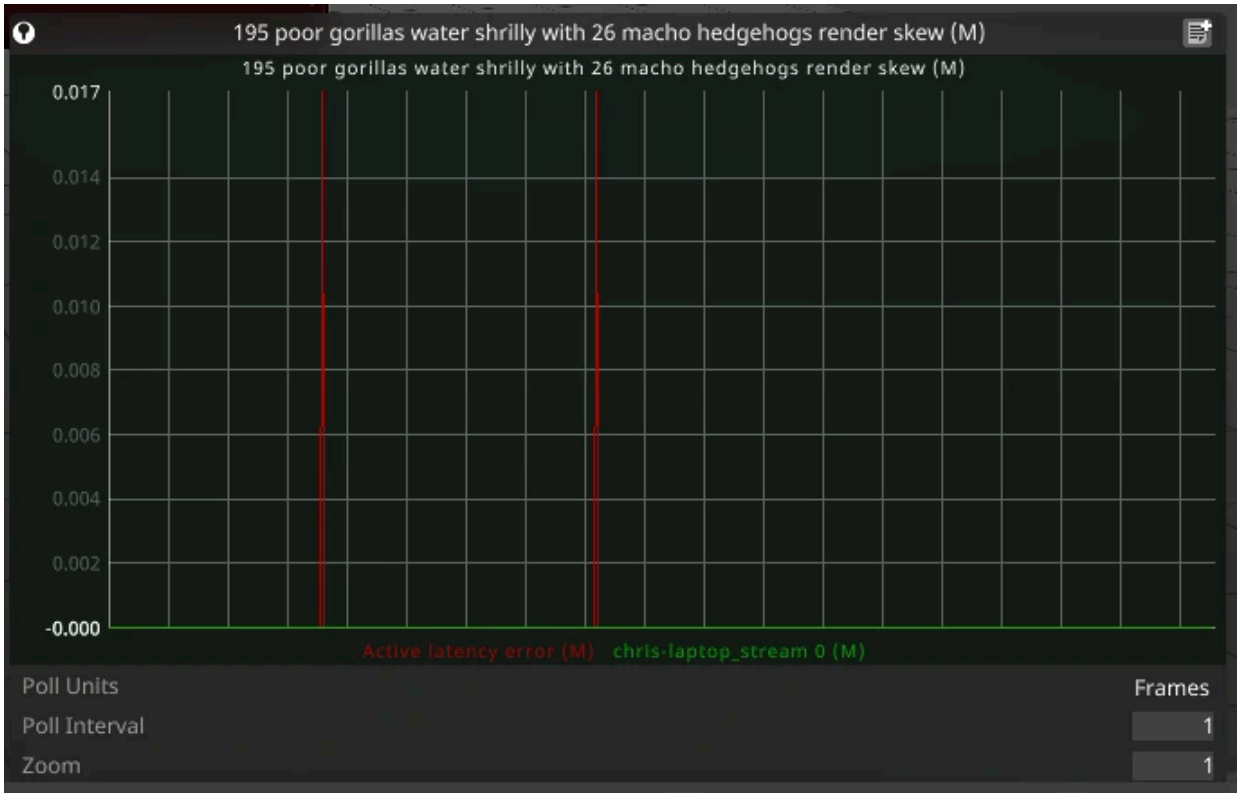
Stream graph

This graph tracks three separate performance metrics:

- Latency: The continuous receive latency for each frame. It should be relatively stable (doesn't have to be perfectly flat), and not too high.
- Active latency: The total latency for the module, which includes a buffer to account for variations in the stream latency. It should be stable (unlike above) and higher than the latency value.
- Render frame delta: The difference in the receive time between each frame. It should be relatively stable, around the expected difference between render frames.

If the graph shows issues with active latency, you can set an 'Active Latency Override' value in the project settings. Set it to a value high enough to encompass all the expected latency spikes when looking at the graphs. You should then see the active latency being a flat line at the set value.

Render skew graph



Render skew graph

- Active latency error shows periods where the stream latency has exceeded the active latency (see above). It should be zero, otherwise you are likely to get frame drops.
- Render skew shows the difference between expected and actual times for the frame fragments retrieved from the buffer. It should be zero.

If the graphs show issues with the performance of the stream, it may be that the scene has not been sufficiently optimised. Try to reproduce with a lighter scene to see if that is the case. If issues persist even with a lighter scene, it may require a dev or support to take a look. Send a diagnostic log and include the following information:

- Hardware setup
- Images of the stream graph and render skew graph
- Do the cameras use ‘Minimal Latency’ for frontplate reprojection mode?
- Are any of the modules using non-1 frame rate fractions?

Colour calibration

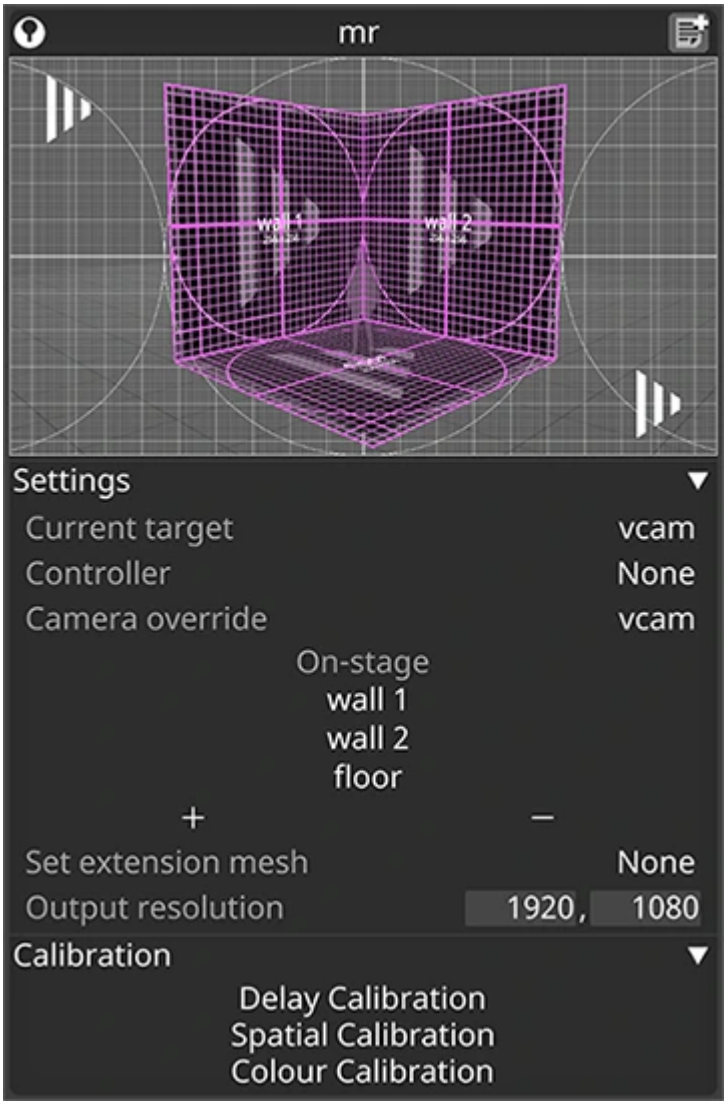
Disguise Colour Calibration is a process used to standardise colour representation across physical LED panels and virtual set extensions in an xR environment.

Variations in LED panel output, due to differences in manufacturer specifications, panel age, or batch inconsistencies, can result in perceptible mismatches between physical and virtual elements. The colour calibration workflow compensates for these discrepancies by generating a 3D LUT (Look-Up Table) that characterises and adjusts the LED output to align with the intended virtual colour space.

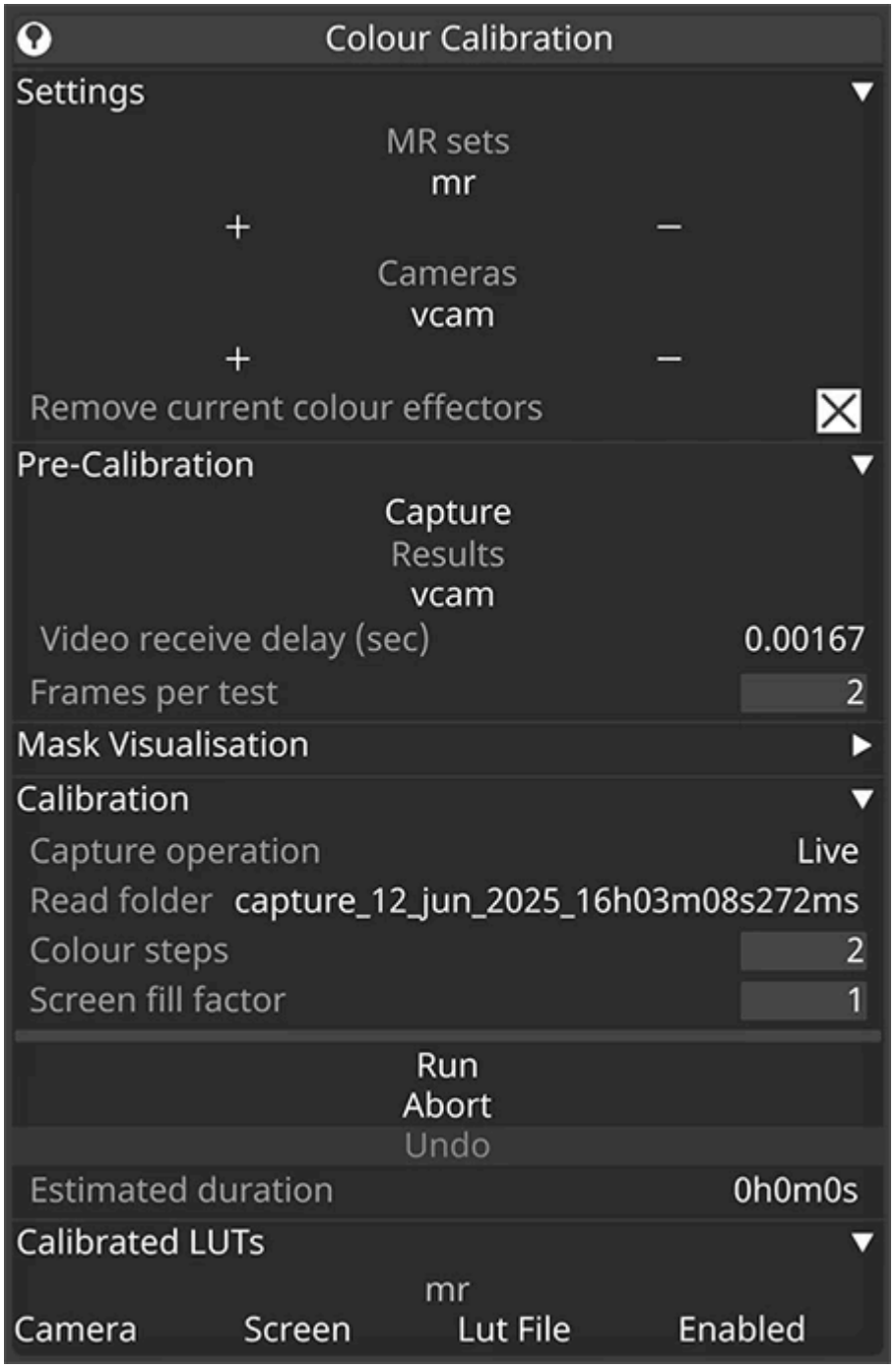
The calibration process measures the LED display's colour response and reconciles it with the system's reference values, ensuring consistency across all visual surfaces. This enables accurate blending of content between real and virtual components, even when using LED panels from different vendors or with different physical properties.

Workflow

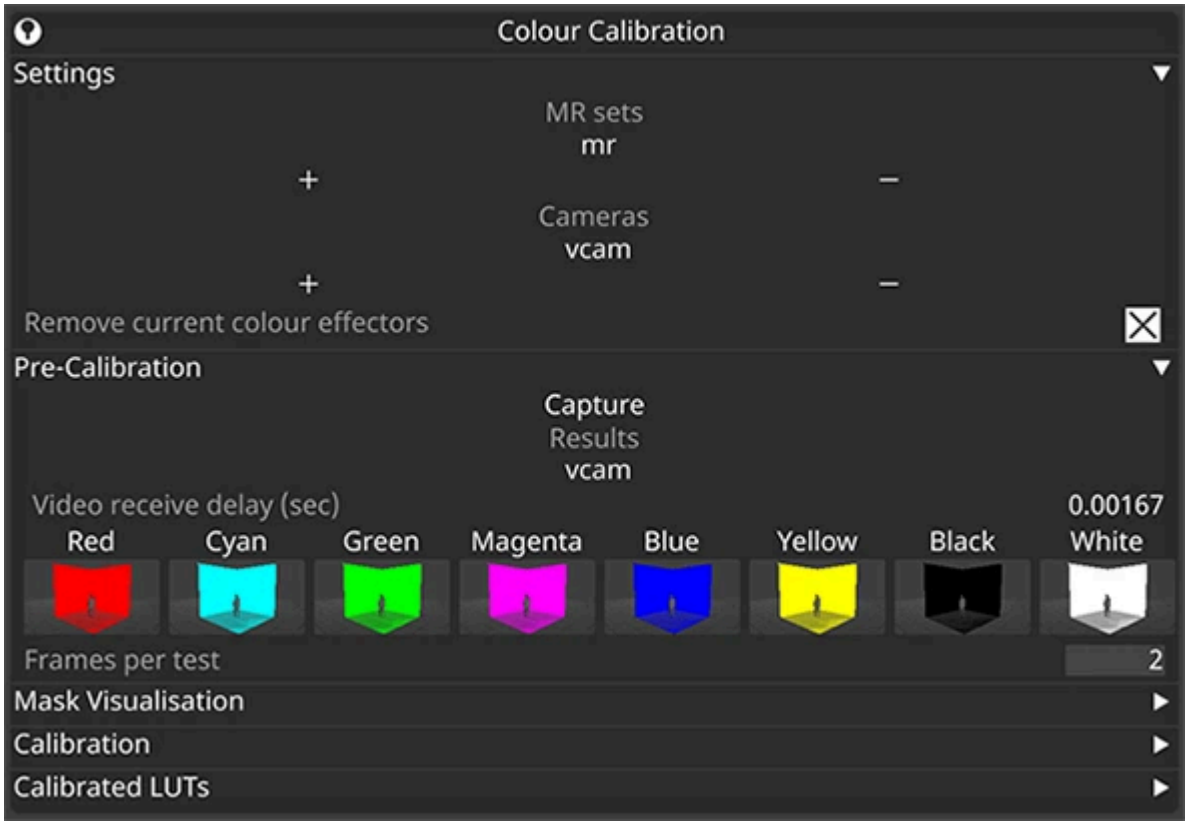
1. Complete spatial and delay calibration in full.
2. Bring all lighting, LED and cameras to optimal settings and clear the stage of any physical items.
3. Fill the camera frame with LED pixels.
4. Open the MR set.



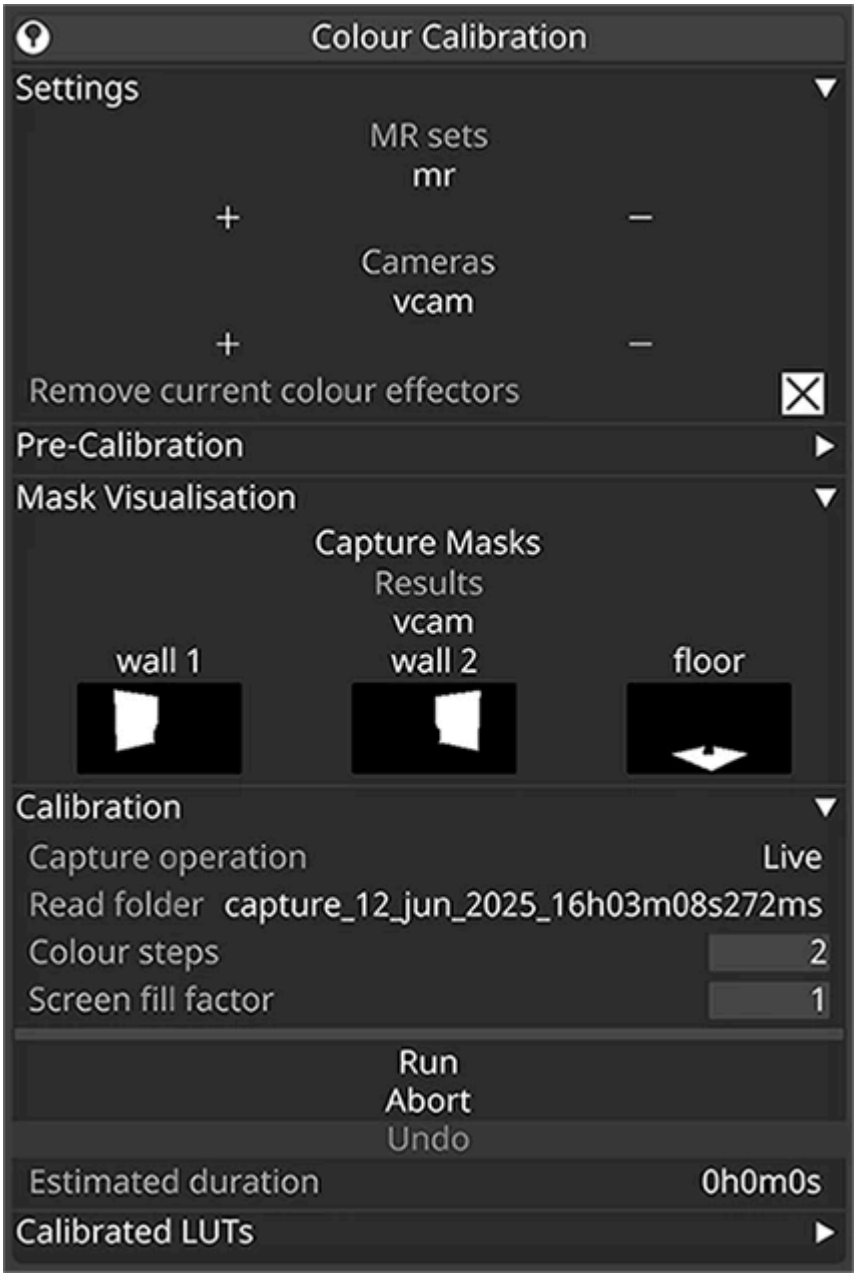
5. Open the **Colour calibration** menu.



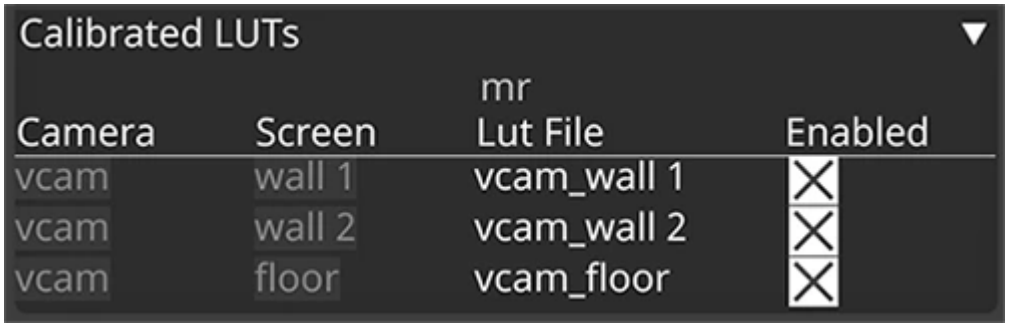
6. Ensure the correct MR sets to be calibrated have been populated in the **Settings** tab.
7. Expand the **Pre-Calibration** tab. The Video receive delay should be autopopulated from the Delay calibration. The camera will be automatically taken from the active camera of the MR set. For multicam setups, include all cameras to be calibrated.
8. Click **Capture**.



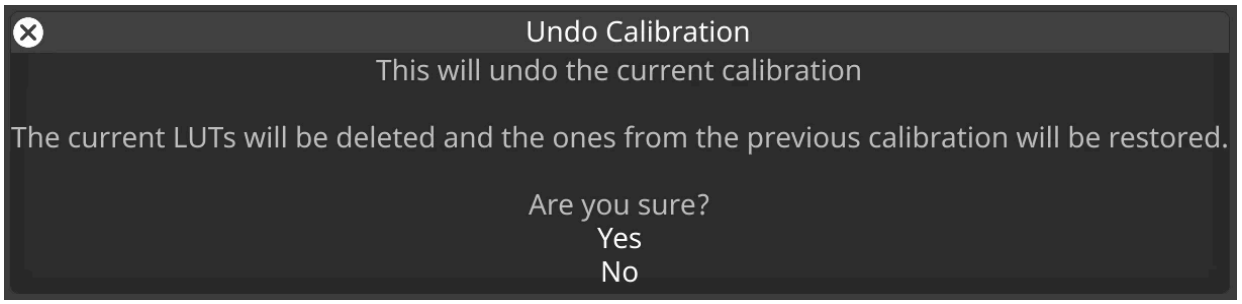
9. Step up incrementally in the **Frames per test** field until the colours in the preview are saturated and appear to be true representations of each colour.
10. This ensures that all steps of each colour range are correctly captured by the camera.
11. Optionally, expand the **Mask Visualisation** tab.
12. Hit **Capture Masks** to generate a preview of the calibration mask for each LED-screen/camera pair. Review that any occlusions are correctly masked in black and that the white regions cover only the screen surfaces used for calibration. To make this pre-flight check meaningful, ensure the setup remains unchanged between previewing masks and performing the actual colour calibration. – These preview masks are for inspection only; fresh masks will be generated during the actual colour calibration.



13. Expand the **Calibration** tab.
14. Hit **Run** to start the calibration. Ensure the camera does not move and lighting levels do not change. Once complete, a mapping will be created for each combination of camera/LED screen/LUT file as determined by the elements included in the MR set object.
15. Expand the **Calibrated LUTS** tab to toggle on and off each LUT if needed.



16. Increase the value of the **Screen Fill Factor** if lighting from each LED is spilling onto the edges of the floor and affecting the calibration result. When the value is set to 1, the colour output will fill 100% of the screen.
17. If a previous colour calibration was in place before running the current one, it will be automatically backed up. You can restore the LUTs from the previous calibration by clicking the **Undo** button under the **Calibration** tab and selecting **Yes** when the confirmation prompt pops up.



Each physical camera will require its own colour calibration, the LUTs are switched automatically by the indirection controller when it switches cameras.

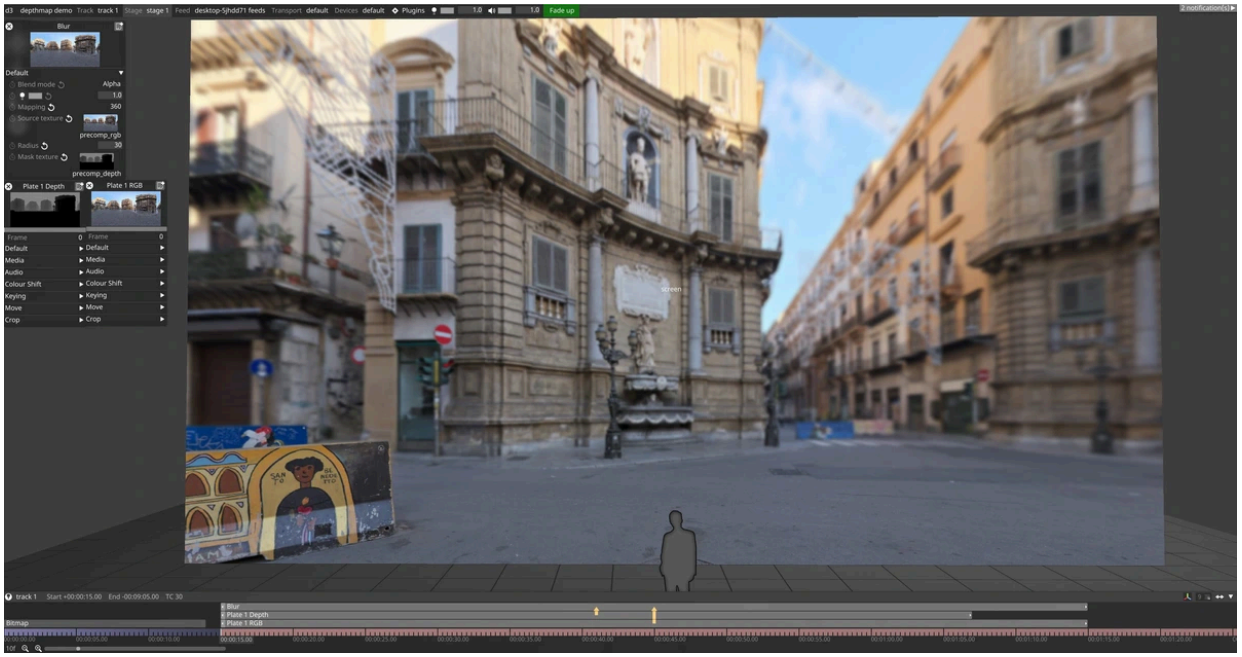
If the **Capture operation** mode is set to **Write**, thumbnails of each colour calibration step will be written to the debug captures folder within your project. This can be useful for sending to the support team to reproduce any issues you may encounter.

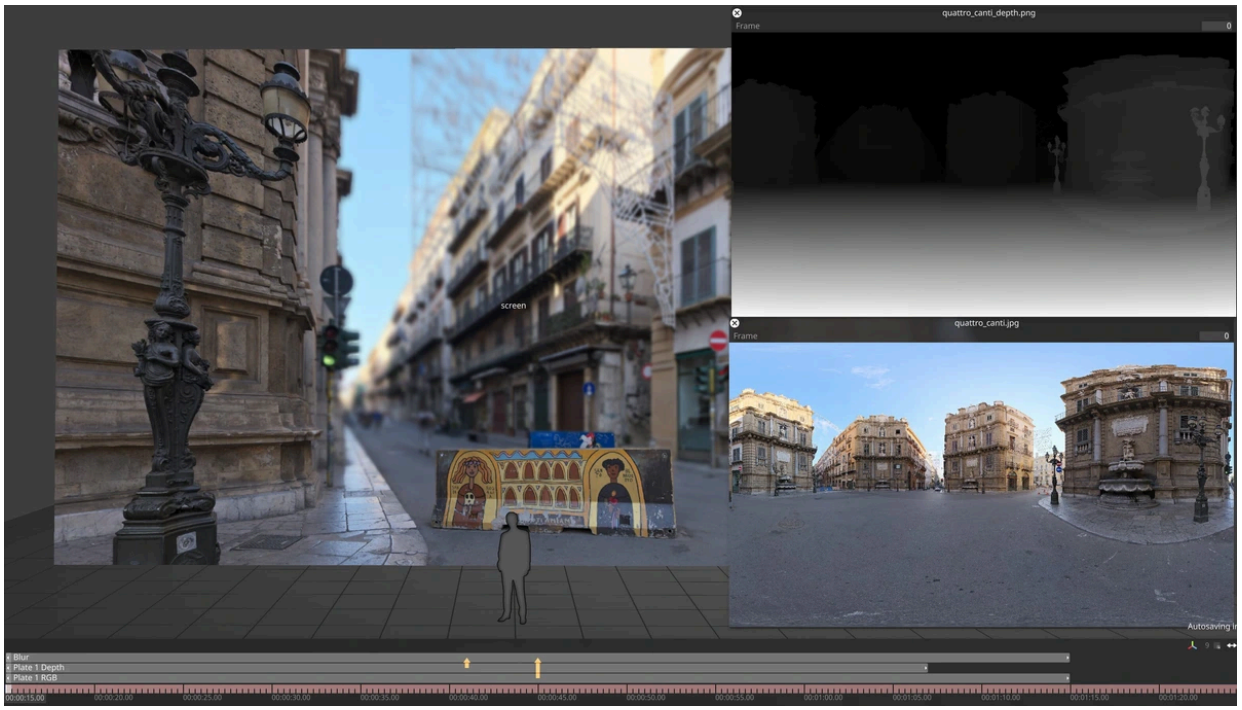
For further colour adjustment to the set extension, a Colour Adjust layer can be created and assigned a CamPlate Mapping set to backplate with all cameras used for the MR transmission added as the mapping objects.

Depth of Field Workflow

Depth of Field Using a Blur Layer and Depth Map

This guide provides the direct steps to set up depth-based blur on 2D content using a depth map and the Blur layer in Disguise Designer.





Example images

Workflow

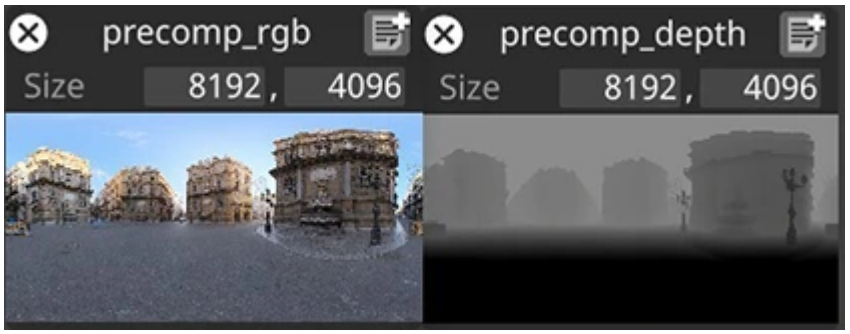
Prerequisites

- RGB content (video/still) imported into Disguise.
- Corresponding Depth Map content (video/still) imported into Disguise.

1. Create 2 Pre-Comp Textures

Also see the PreComp page.

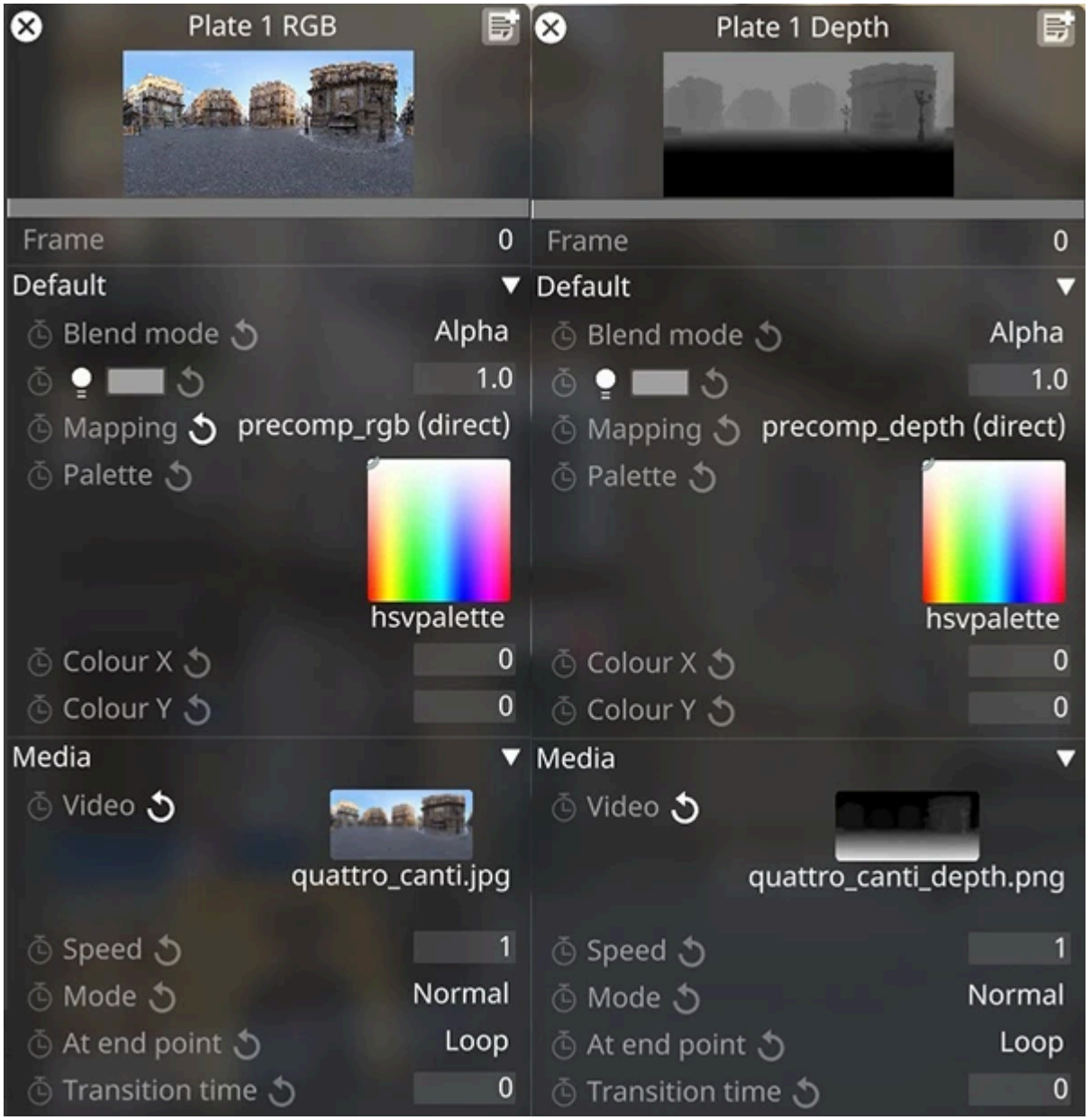
1. Create a **Bitmap Layer**
2. Open up the Media drop down, open the Texture window.
3. Create a **PreCompTexture** (e.g. `precomp_rgb`).
4. Set the **PreCompTexture** Size/Resolution to the Source content Resolution.
5. Create a second **PreCompTexture** (e.g. `precomp_depth`).
6. Set the **PreCompTexture** Size/Resolution to the Source content Resolution.
7. You can now delete the **Bitmap Layer**.



Precomp image

2. Create Video Layers

1. Add a **Video Layer** for your RGB content. Assign the RGB media.
2. Set the Mapping to `precomp_rgb`.
3. Add a second **Video Layer** for your Depth Map content. Assign the Depth Map media.
4. Set the Mapping to `precomp_depth`.



Video layers

3. Configure Depth Map Layer

1. Select the **Depth Map Video Layer**.
2. Go to its **Colour Shift** settings.
3. **Invert** the colours so close objects are black and far objects are white. Use RGB controls to invert.
    - `RGB controlled: Together`
    - `Red minimum 1.0`
    - `Red maximum 0.0`

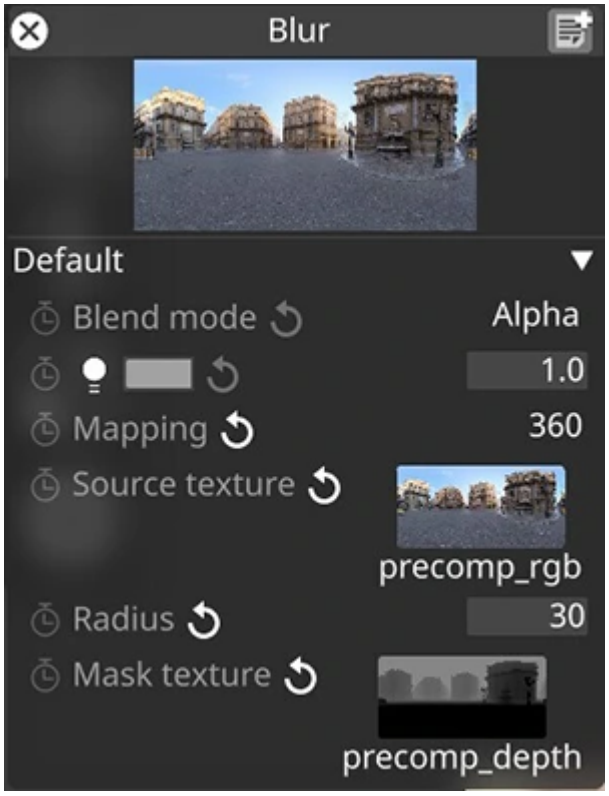
4. **Adjust Brightness/Contrast** in the Colour settings to fine-tune the blur falloff.
    - `Brightness (shift) - Controls the 'distance' of the blur`
    - `Contrast (scale) - Controls the size of the min-max blur`
5. **Fine-tuning** the brightness/contrast of the depth map is essential to achieve the desired look and requires artistic judgment.



Depth Colour Shift

4. Apply and Configure Blur Layer

1. Add a **Blur Layer** effect to your timeline.
2. Creating Mapping (e.g., Direct, Spherical, etc.)
3. Set `Source Texture` to `precomp_rgb`.
4. Set `Mask Texture` to `precomp_depth`.
5. Adjust the Blur Layer's `Radius` parameter to control the maximum blur for the 'furthest' elements.



Blur layer

Result

The RGB content will now have blur applied based on the depth map, with the amount controlled by the Blur Layer settings and the depth map's contrast/brightness adjustments.

Inner-Outer Frustum Workflow

Not only can content be mapped to the within the camera's frustum, another stream of content can simultaneously be mapped to the outside of the camera's frustum.

Inner - Outer Frustum workflow

This workflow allows natural lighting and colour from content streaming via RenderStream to illuminate talent or objects within the performance area while the camera tracks through the space.



Use these steps to set up this workflow:

1. Create an MR set and add the LED surface(s).
2. Create a new camera in the Stage menu, move it back from the default position, and assign as the Current target in the MR set.
3. Create a RenderStream Layer.
4. Right-click on Workload.
5. Add an asset to the Cluster Workload and select the desired stream from the autopopulated Asset list.
6. Confirm that the RenderStream Layer is assigned to the Backplate for the MR set.

7. Select the desired scene level. At this point content mapped to the inner frustum will be visible on the LED screen.
8. Open another instance of the Unreal Engine project in order to create a second stream.
9. In Designer add another camera to the stage. Rename this camera “outer frustum camera” or similar label.
10. Position this camera in approximately the same location as the first camera and change the field of view to a larger value such as 120 so that the entire LED can be seen within the camera’s thumbnail.
11. Create a second MR set that references the second camera, and select the same LED screen as the target.
12. Duplicate the RenderStream Layer.
13. Create a new Cluster Workload.
14. Add an asset and choose the second instance of RenderStream in the asset list.
15. Change the mapping to the second MR set.
16. Set the camera plate of the second MR set to Backplate At this point you will have content mapped to the LED screen outside of the camera’s frustum.
17. In order to add some feathering to the edge of the inner frustum stream, you may wish to add a slight amount of overscan such as 1.2 to the first camera in its property window to make it slightly wider.
18. Then, add a soft edge mask to the MR set mapping on the first RenderStream Layer as well. Open the RenderStream Layereditor and right-click on the MR set (spatial) mapping. Once open, you can create a new softedge mask for this layer. To read more about creating masks, visit this link.



The Inner frustum highlighted with different machine inputs identified

Further Reading

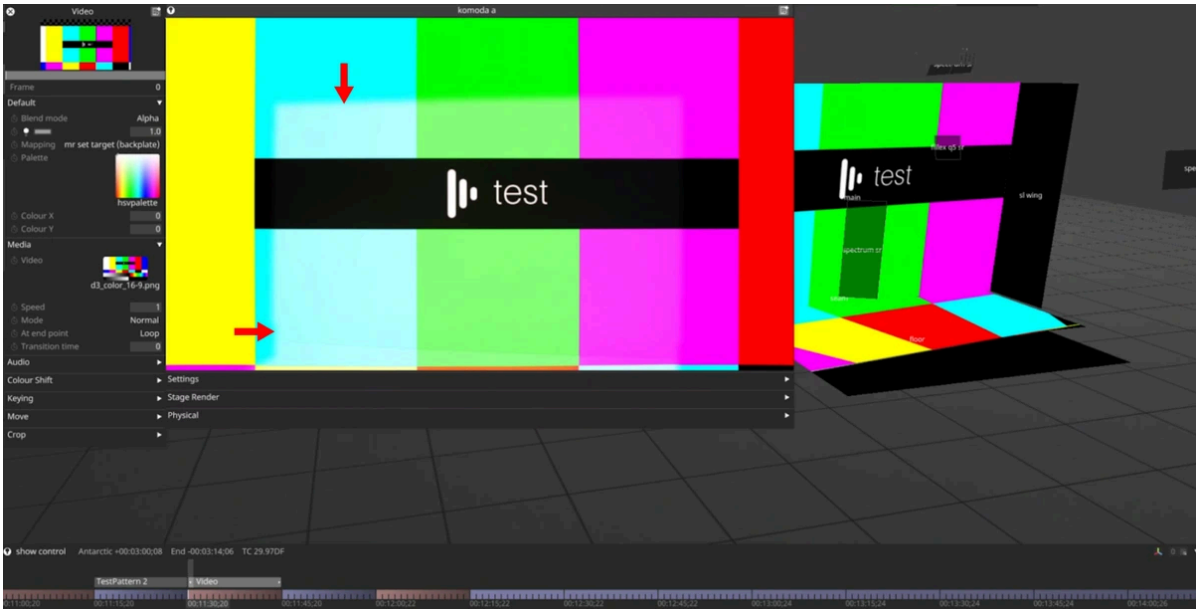
Read the **Disguise Whitepaper** to learn more about how the Disguise architecture works with RenderStream.

Inverse LUT Method

The Inverse LUT colour calibration method builds upon the existing colour calibration workflow, with the key difference being that instead of using the calibration to adjust the colors going to the LED to match a specific color space that may not be possible with the LED, the generated Lut will be able to adjust the color of the set extension to match the LED.

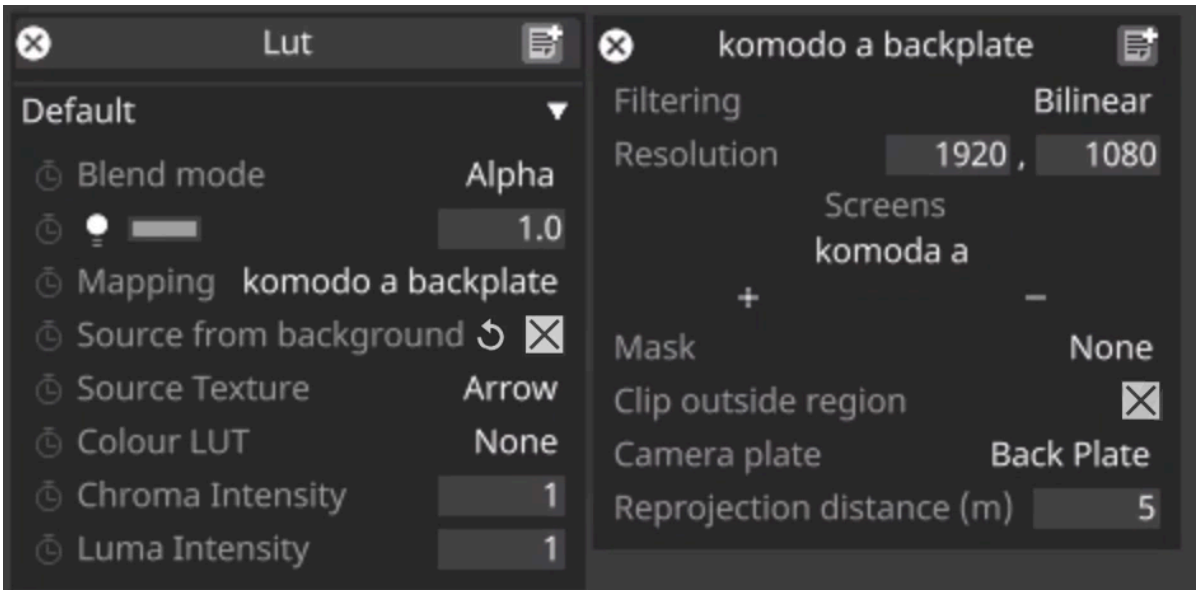
Workflow

1. Set up your LED screen(s), camera, and MR set as normal and continue with the regular delay and spatial calibrations.
2. To test the effectiveness of this process you can create a video layer with a colour test pattern selected, mapped to the MR set target “backplate”. When positioning the camera to show the set extension you will see a clear difference in color between the LED and set extension.

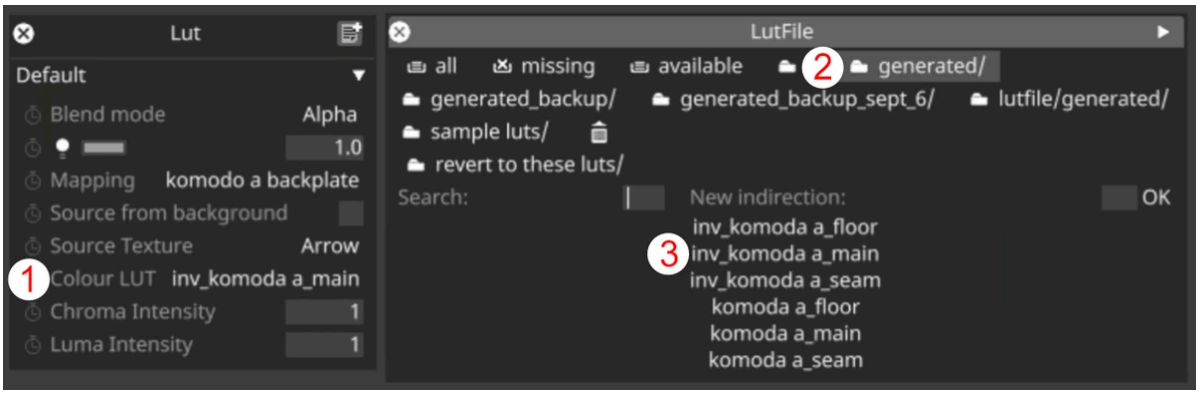


3. Run the colour pre-calibration and calibration like normal but when completed it will automatically enable the generated LUTs to the LED screens, you will need to disable these.

4. On the timeline, create a LUT layer, you will need this layer to extend anywhere where content with set extension or AR is used.

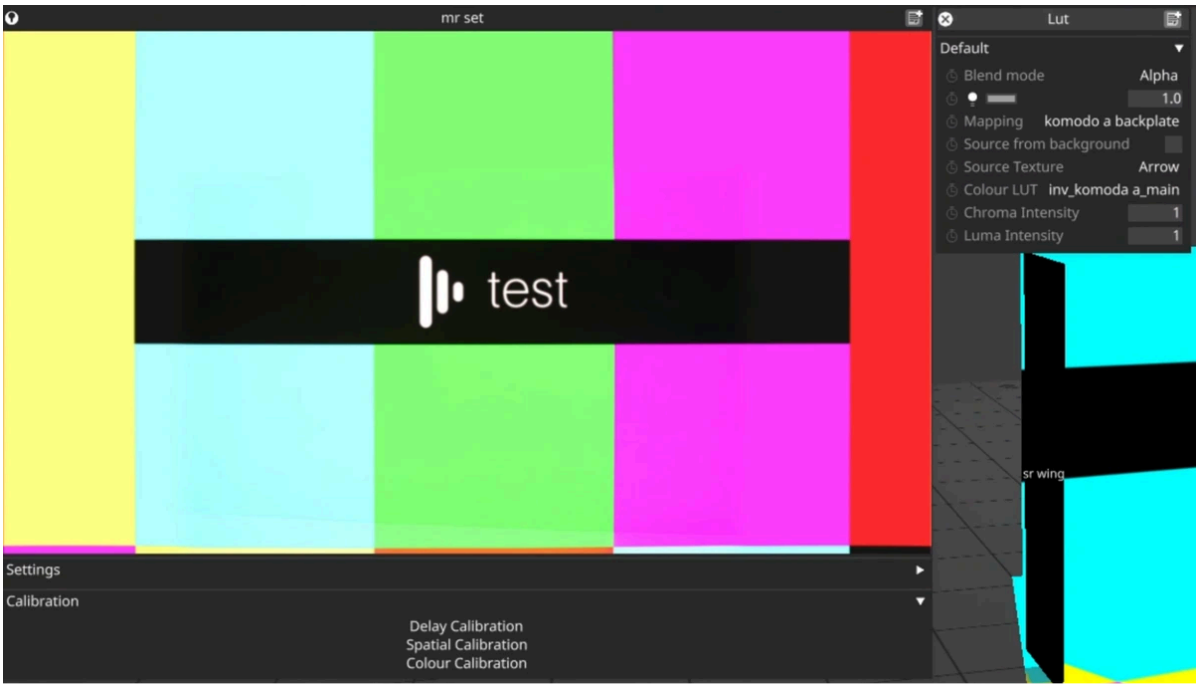


5. In the LUT layer create a “camera plate” mapping with the camera added in the “screens” section, set the camera plate to back plate and enter the camera’s resolution.



6. In the “Colour LUT” section, go to the “generated” tab and for every lut created there will be an inverted LUT as well. Select the LUT labeled “Inv_(camera name)_(main LED screen)”

7. Now the set extension will match the same colors at the LED screen. You can also play with the “Chroma and Luma Intensity” variables to fine tune your results.



8. You can also create a second Lut layer with the camera plate mapping to the camera but instead selecting “Camera Plate” to “Front Plate” this will affect any AR composite elements.

MR Set

An MR set contains all the components of your virtual set and the camera(s) you will be using to capture that virtual set for transmission.

> ⚠ **Warning**
>
> **Warning**: xR will not work properly if the configuration is not completed properly. For more information on the configuring xR, please visit the xR workflow page.

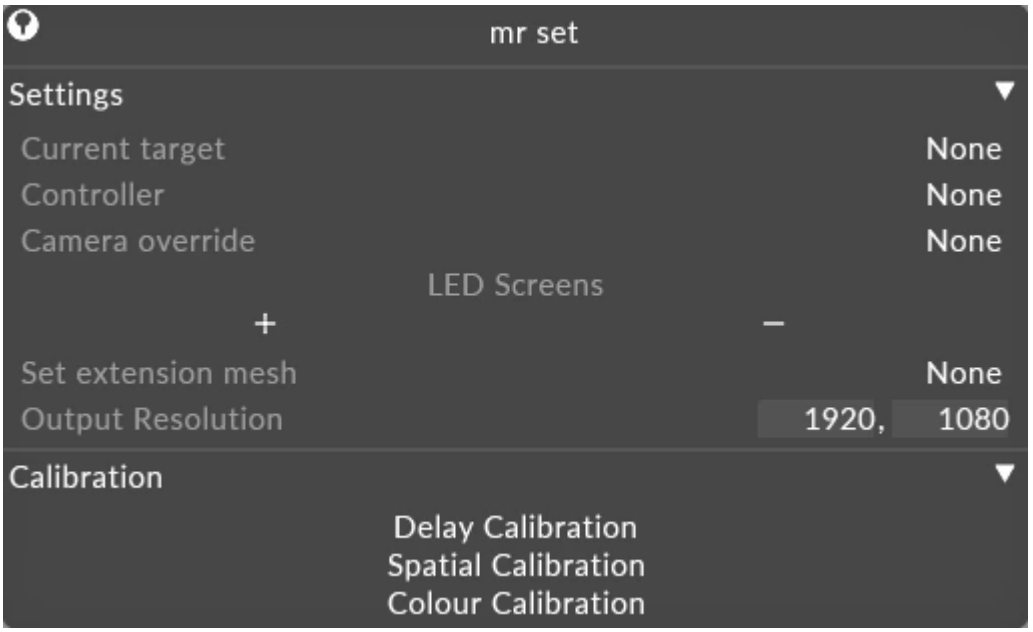
Workflow

To create an MR set

1. Open the Stage properties widget and navigate to the MR Set tab. It can be useful to pin this widget open.
2. Add LED screens to the MR set.
3. Add an Indirection Controller (if needed).

Properties

Settings

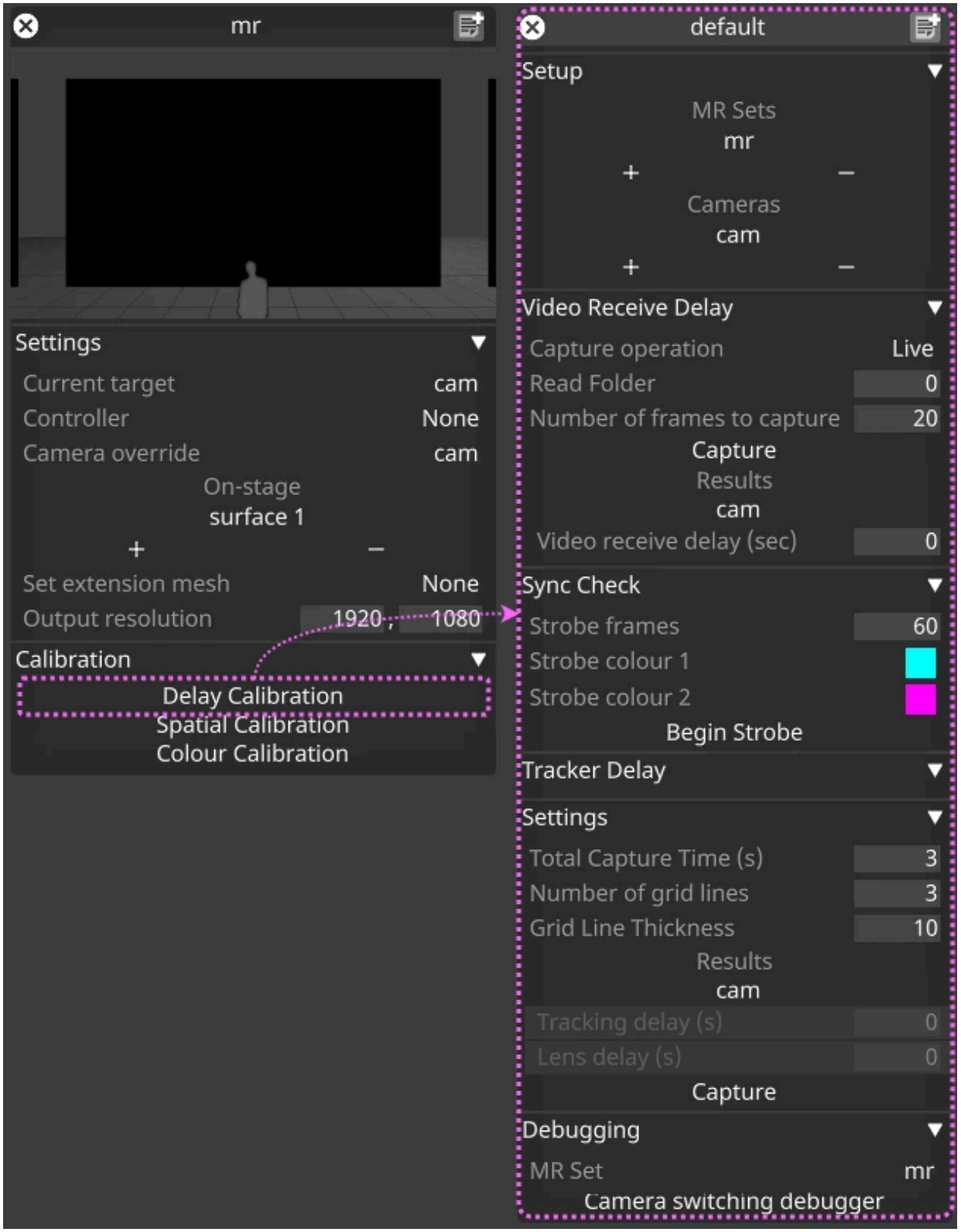


- `Current target` - Defines the camera that the content is being rendered from.
- `Controller` - Defines the indirection controller that controls the camera switching.
- `Camera override` - Allows you to set a camera override for whatever the current controller is set to.
- `LED Screens` - Defines which LED screens are included in the MR Set.
- `Set extension mesh` - Defines the mesh used for the set extension. This property reads from the mesh folder of your project folder.
- `Output resolution` - Defines the final output resolution of the MR Set.

Calibration

Delay calibration

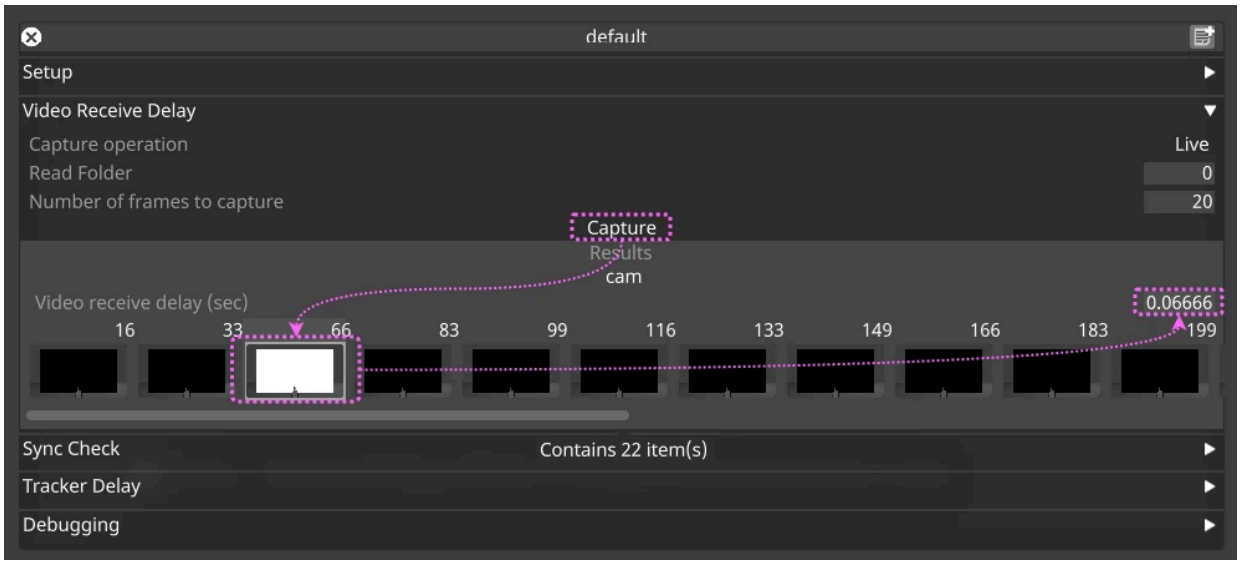
Left-click this button to open the calibrate displays editor.



Setup

- `MR Set` - defines which MR Sets are used.
- `Cameras` - defines which cameras are included.

Video Receive Delay



Workflow

1. Click **Capture**.
2. The LED wall displays one white frame among black frames.
3. The captured frames appear below the **Video receive delay (sec)** field.
4. Click the white frame.
5. The **Video receive delay (sec)** value updates accordingly.
    - This is the capture delay of the camera.

It is absolutely crucial that only a single frame of white is visible in order for xR to work correctly. If there is more than one white frame in the capture, then a combination of shutter angle and/or genlock phase offset on the camera and LED processor will likely need to be adjusted.

Capture operation. There are three options

- `Live` - The live setting will use the live captured images to do the calibration.
- `Write` - The write setting will write the images captured to disk so they can be used for debugging later.
- `Read` - The read setting will read back the images you previously wrote to disc, this is useful for debugging.

Sync check

- `Strobe frames` - defines the FPS for the sync test.
- `Strobe colour 1` - Defines the colour for part one of the strobe alternation.
- `Strobe colour 2` - Defines the colour for part two of the strobe alternation.

Tracker Delay

Settings

- `Total capture time` - Defined in seconds. This is the total capture time of the calibration.
- `Number of grid lines` - Defines the number of grid lines.
- `Grid line thickness` - Defines the thickness of the grid lines. Increase or decrease thickness based on specific stage setup.
- `Results` - Left-click Results to open the results dialog.
- `Capture` - Left-click capture to run a calibration.

Debugging

- `MR set` - Defines the MR Set to debug.
- `Camera switching debugger` - Left-click to open the camera switching debugger.

Spatial calibration

Left-click this button to start a spatial calibration.

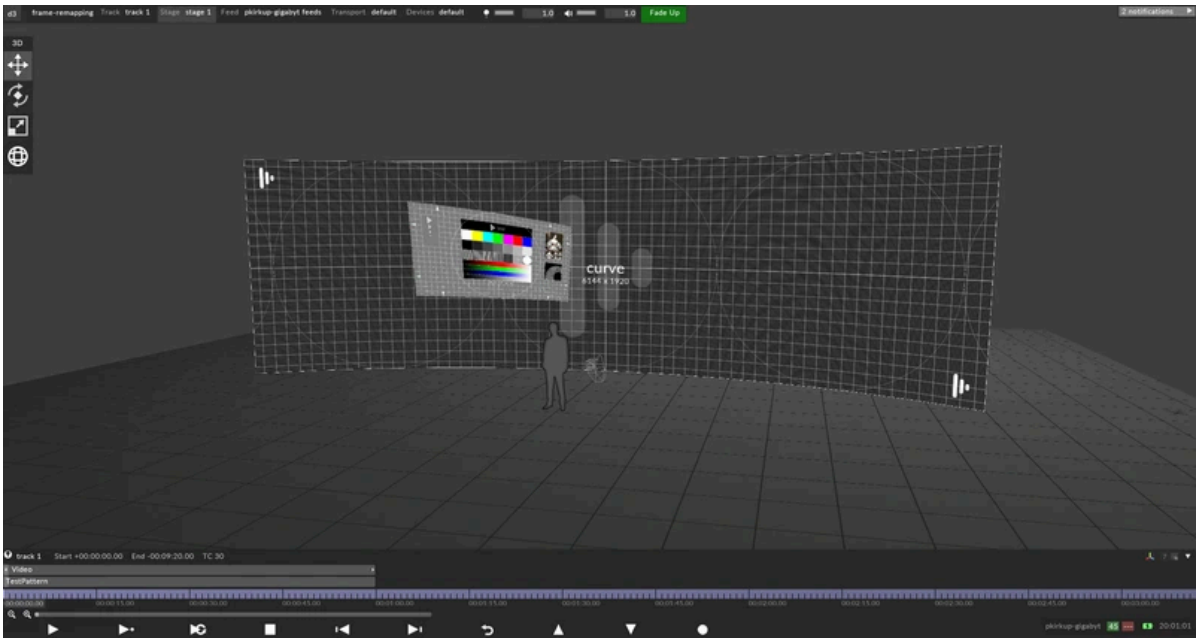
Multi Frame LED Processor Mapping

Frame Remapping (Brompton) and GhostFrame (Megapixel) enable multiple frames from the server to be perceived by multiple cameras shooting out of phase with each other.

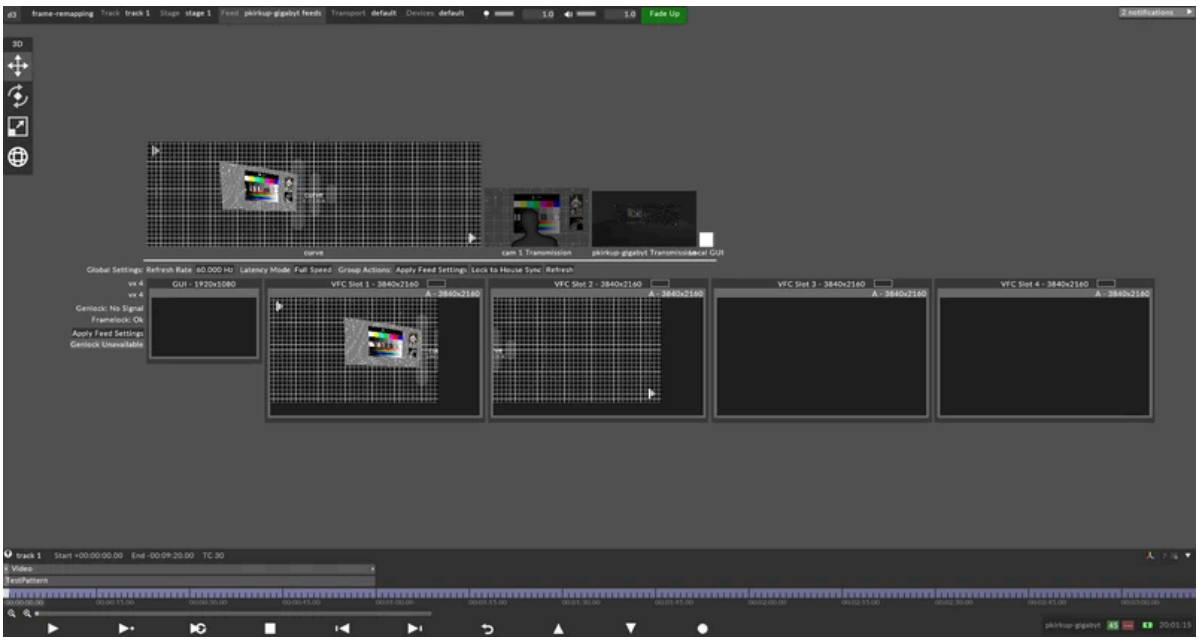
From Disguise's perspective, we are still sending a 4K60 signal to the processor - the processor is doing the job of sending multiple frames one after another, with the frames sourced from different regions within the input raster.

Workflow

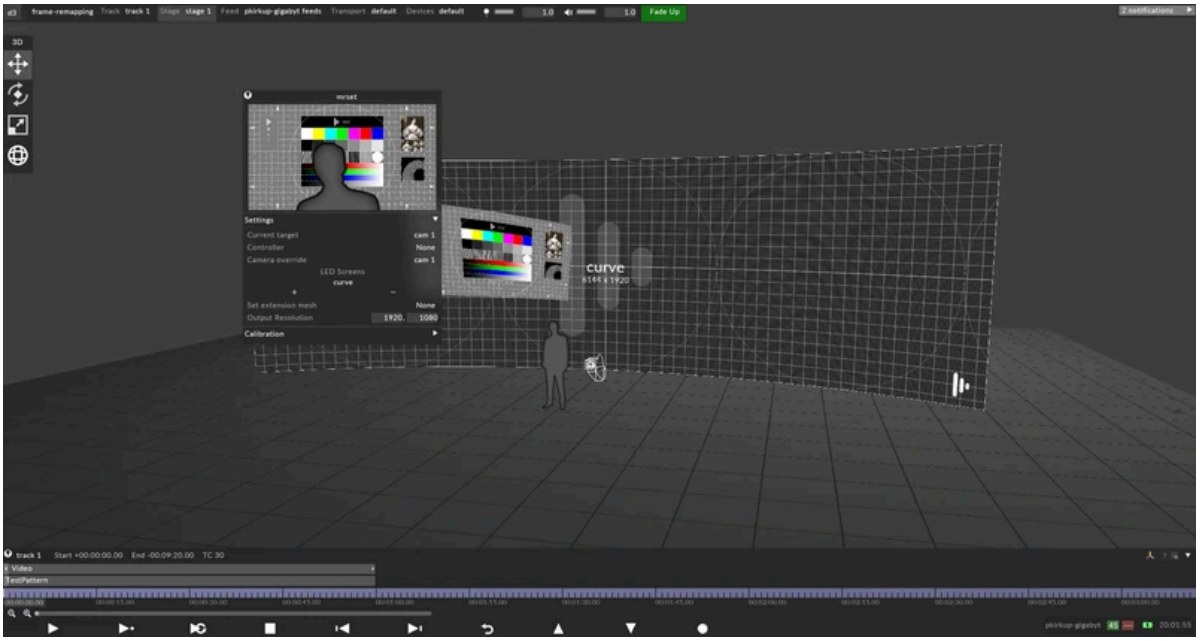
1. Begin with a basic (non multi frame) setup. In our example we've used a large curved LED screen and a single camera:



- This is mapped out of a vx 4 to 2x 4K capable LED processors:

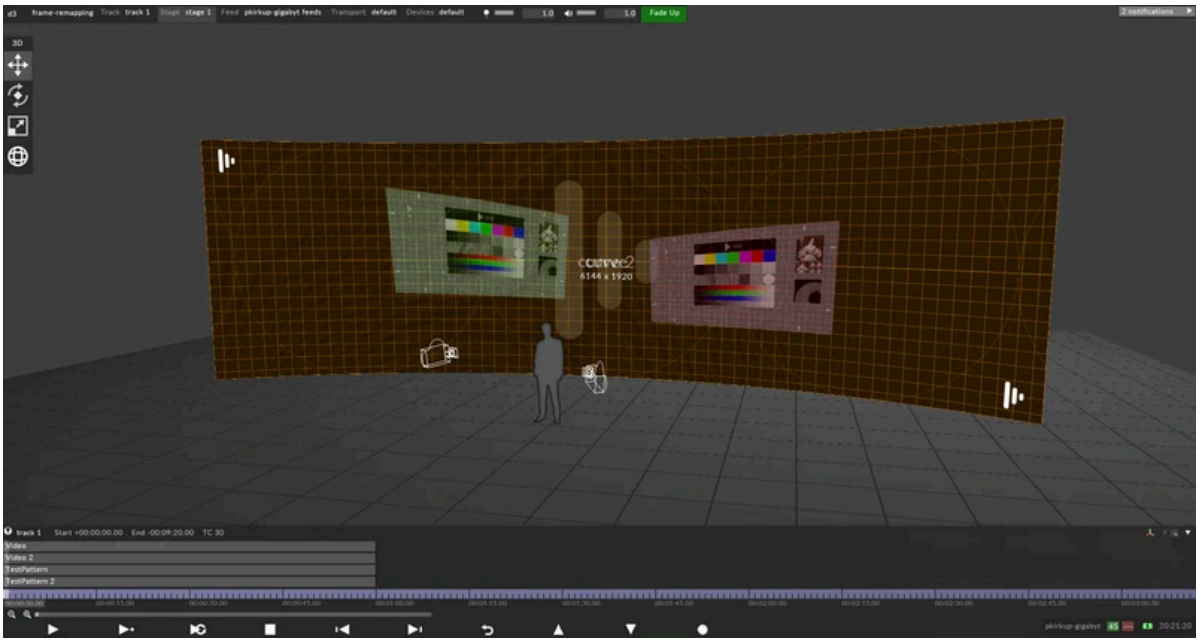


- The LED screen and camera are connected together in a single MRset object. This is the standard workflow, and everything so far is normal:



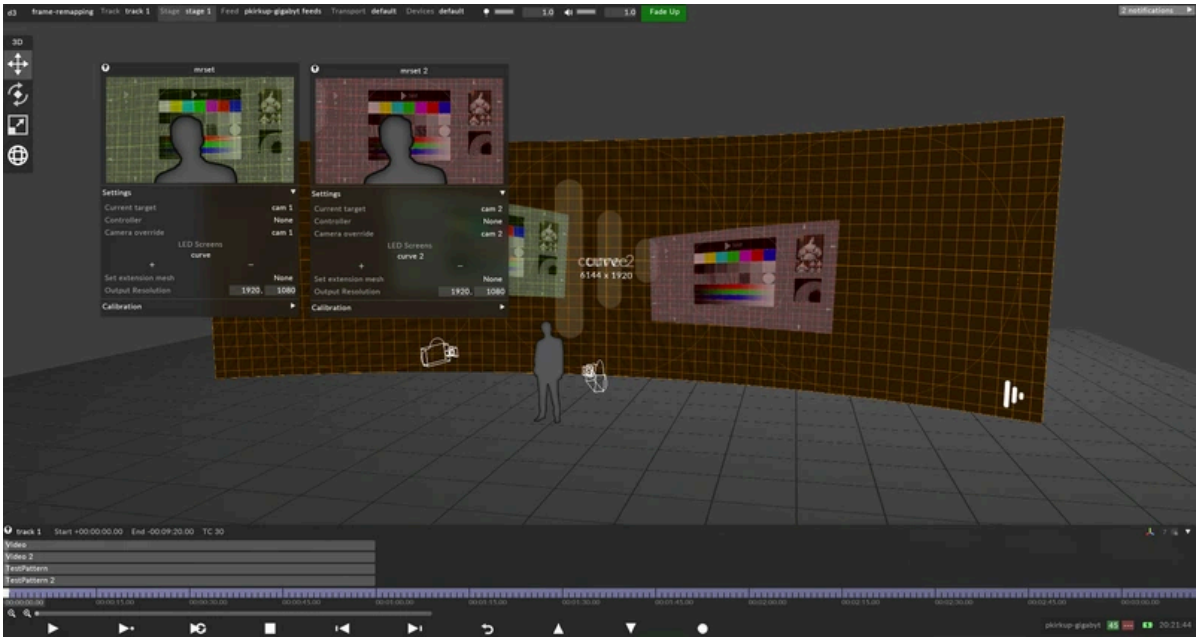
2. Next, place a second LED screen on top of the first one (set to Alpha blend, and with 50% alpha).

- This allows us to pre-viz the overall effect of the frame remapping. Two LED screens placed on top of each other:

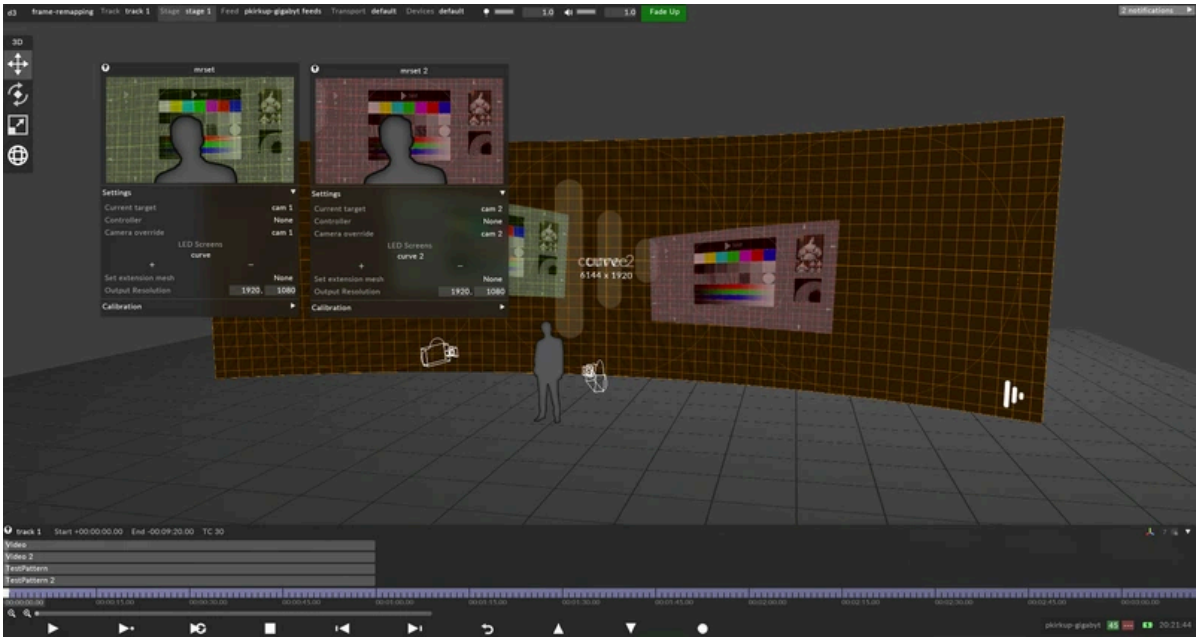


3. Create a second MRset with the new LED screen and a new camera.

- Since we can use two MRsets, the two cameras will only see their own content (although it will be at 50% alpha)::

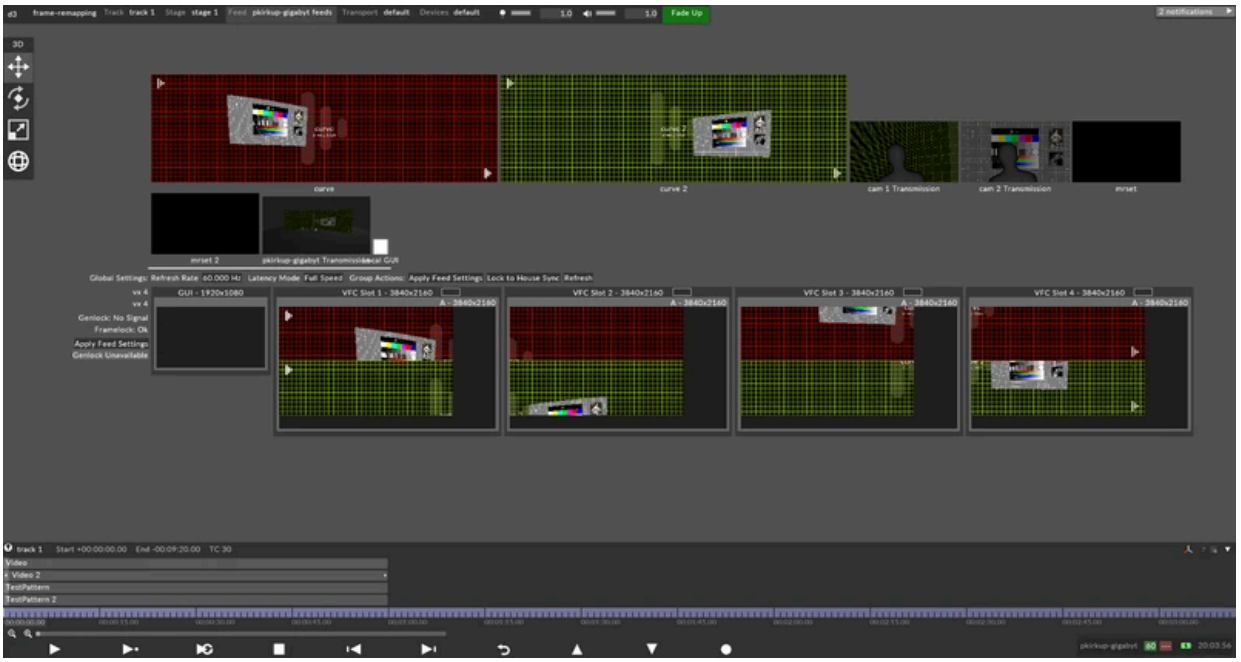


4. **Example#1: Brompton Frame Remapping** Once configured in the Feed output window, the video will be output on top and bottom fragments across 4 outputs on the VX 4 -with the top representing LED screen 1 and the bottom representing LED screen 2.



Example#2: Megapixel GhostFrame

Once configured in the Feed output window, the video will be output on left and right fragments across 4 outputs on the VX 4 -with left representing LED screen 1 and right representing LED screen 2.



In the LED processor software, the regions sampled for the multiple frames should match the Disguise output feed rectangles.

> **Note**
>
> **Please note**: Different LED processors sample multi-frames differently and the above are two examples. Consult your LED processor manufacturer/user guide for more information about specific workflows. For example: **Megapixel user guide** for HELIOS LED processor (GhostFrame) **Brompton user guide** for Tessera LED processor (Frame Remapping)

Observations

An observation is a set of images of the stage captured by the camera of white dots on a black background (called structured light.) The number of dots and their size/spacing is determined by the user.

Observations are used as data points within the spatial calibrator, which is the predefined algorithm Disguise will use to align the tracked camera with the stage and set up the lens characteristics.

Observations are split between primary and secondary. Primary observations let Disguise determine the position of the camera and the position of the screens which make up the MR Set. We also determine the lens characteristics in that primary configuration.

Secondary observations contribute to Disguise's understanding of variable zoom and focus settings on the camera lens.

Adding observations is a cumulative process, and each "primary" observation will equally affect the overall calibration results. This can mean that one bad observation will spoil the lot, but that is something we want to hear about to fix it. It is critical to review each observation after it has been taken to determine if it will improve or worsen the overall primary calibration.

Workflow

1. Check camera tracking data.
2. Set your first camera position.
3. Select the target camera you wish to calibrate.
4. Select spatial calibration.
5. Use live blob preview.
6. Set your first zoom position.
7. Focus the camera.
8. Lock zoom & focus values (optional).
9. Set adjust screen position to on or off in the calibration widget.
10. Add your first observation.
11. Troubleshoot any issues with the observation.
12. Delete observations (if necessary).
13. Reset observations (if necessary).
14. Add more observations from new positions.
15. Repeat process for secondary observations.
16. Test zoom interpolations.

Example

Check camera tracking data

1. Check that the camera tracking system can see its location dots, and that it is outputting good data.
2. Check that zoom and focus encoder information is reaching Disguise. Wiggle the encoders on the camera and see the change in the automation monitor.
3. Check that you are receiving the correct movement in each axis: move the camera along the x y and z axes and pan, tilt and roll (where possible) making sure that the movement of the virtual camera in Designer matches the real world movement.

Set your first camera position

1. Choose where you want to take your first observation from on the floor. Pick a position and lock the camera off.

> Try to remove as much negative space from the frame and fill the monitor with as much of the LED as possible.

2. Select The Target Camera You Want To Calibrate.
3. Select Spatial Calibration in the MR set.
4. Use the Live Blob Preview tool to visually ensure the blobs are on the stage.
5. Set your first zoom position by zooming the camera out to the first level of zoom you need.
6. Focus the camera.
7. Set whether the calibration should set both the camera and LED screen positions (on by default), or just camera position (off by default). This can be done in the calibration editor.

> For stages that comprise of multiple screens, the screen at the top of the list in the mr set will be the main screen, and will remain unchanged while the other screens and cameras move around it. If you monitor the MR Set on your monitor, you should see the virtual line up layer pop into place and align with the test pattern the LED is outputting.

> **Note**
>
> You may see the edges of the screen looking distorted, this is due to lens distortion. You can add overscan in the camera widget to see 100 % of the virtual line up layer alignment with the test pattern.

8. Click Add Observation.

Designer will display a blob pattern on stage and capture the blobs as they appear. When the observation is finished, it will appear in the observation list.

Add more observations from the first position

As you add more observations they will appear in the observation list; Disguise automatically calibrates all the observation in a list.

- For A/B testing the effect an observation has on a calibration you can mute or delete observations from the observation list.
- After taking your first observation then take additional observation from that same location pointing the camera at different places on the set.
- Try panning left, right and tracking up, down to cover all the pixels you will use in your show.

Add more observations from new positions

- Now move your camera to other positions and start at 0 level of zoom and 0 focus, try to cover all the pixels from other angles.
- Monitor your MR Set Output notice when the virtual line up layer appears out of place, take observations at these points.

Secondary observations

- With our primary observation calibrated, we now want to repeat the above steps at the next zoom and focus level you require for your show.
- Disguise will calculate the interpolation between zoom and focus levels automatically.
- Repeat these step for as many zoom and focus level you require.
- Check after each observation that the zoom and focus values match those of other observations taken at the same zoom / focus level. If they do not, edit the zoom / focus value to match.

> **Note**
>
> **Please note**: A common issue is lens encoder jitter. This means that while optically nothing has changed in the lens, the encoders may have ‘jittered’ very slightly, giving a marginally different value. This different encoder value will result in another pose, despite the lens not having changed zoom or focus. This can adversely affect camera registration.

Testing zoom interpolations

To test if Designer is interpolating between different zoom positions, zoom in and out on the camera and watch the MR Set. If Designer is interpolating correctly, the virtual line up layer should zoom in with the camera and stick to the test pattern on the stage.

Troubleshooting an observation

Understanding why an observation is bad can be achieved with the observation debugger.

The Current Observation parameter allows you to cycle through the captured observations. Different colour squares are overlaid on the blobs which help Designer differentiate which screen the blob was seen on.

You can rectify what blobs Designer is able to see by increasing or decreasing the dot size and grid spacing parameters in your spatial calibration settings.

Users can change the **Tracker Distortion Compensation** to **Matrix**. This will attempt to resolve the calibration using another method.

Deleting an observation

Deleting an observation will remove it from the observation list.

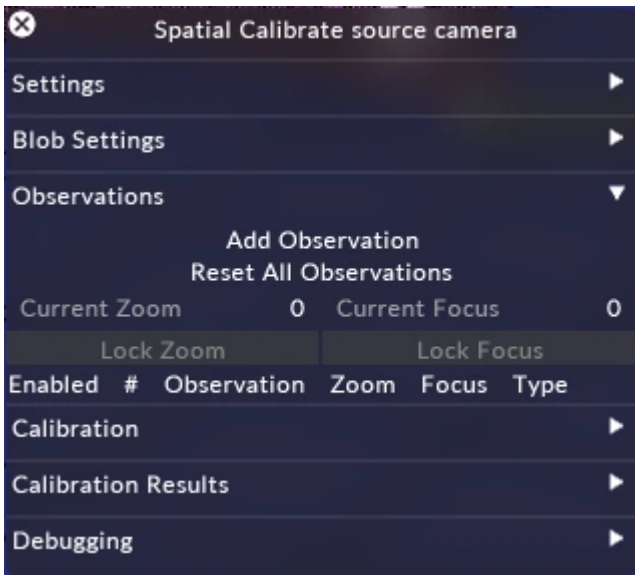
To delete an observation

1. Left-click the trash icon next to the observation to delete it.

Resetting all observations

It is possible to reset all observations, rather than deleting them one by one. **Reset all Observations** will completely reset the spatial calibration of the camera. Confirmation is required when clicking this button.

Properties



Set Extension

A set extension is a virtual extension of the digital content being displayed on the LED screens in the MR set. It is used to fill the in-camera space surrounding the LED screens.

Workflow

1. Configure set extension mask.
2. Configure set extension addition.
3. Configure set extension feather.
4. Configure set extension mesh.

Example

Set extension mask

For using objects in the visualiser to mask to areas of the set extension, perform the following steps:

1. Add an LED screen to the stage.
2. Set this LED screen render target to Set extension mask.
3. Define the screen's mesh to whatever masking shape you want.
4. Add the LED screen to the MR set.

This screen will mask the set extension, leaving only live video and AR effects.

Set extension addition

This functionality allows objects on the stage to mask out live content and show set extension in their place.

1. Add an LED screen to the stage.
2. Set this LED screen render target to Set extension addition.
3. Set this screen's mesh to whatever masking shape you want.
4. Add the LED screen to the MR set.

This screen will mask the live content, set extension is displayed instead

Set extension feather

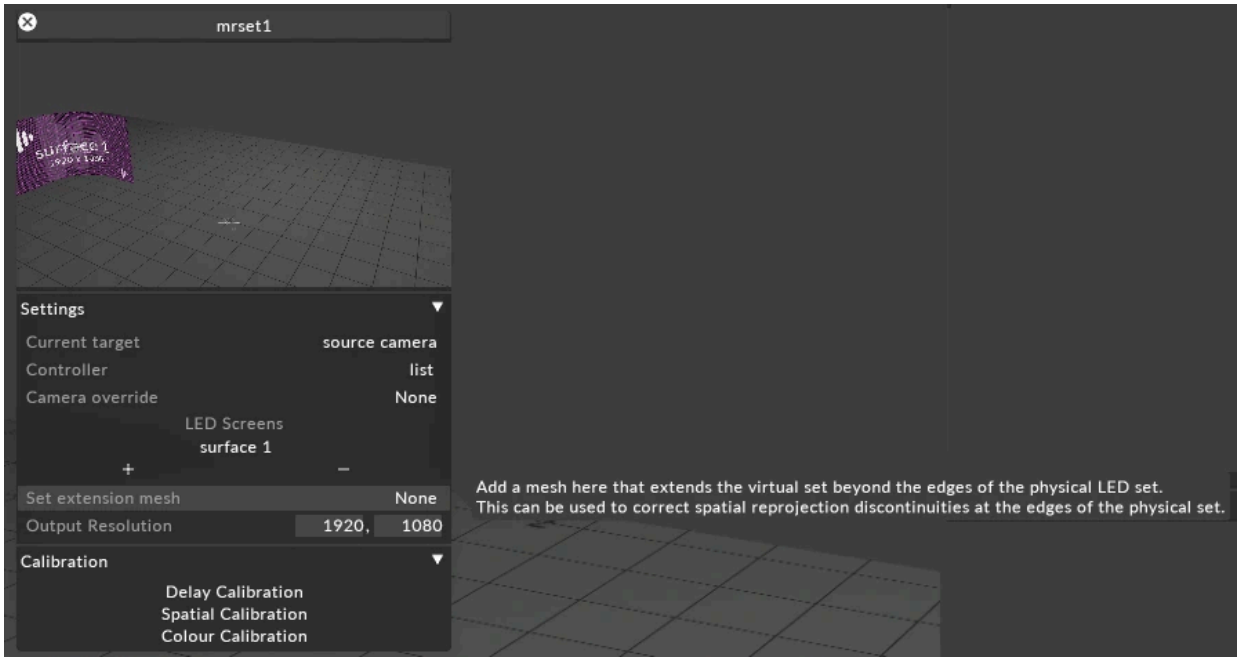
To adjust the feather of your set extension, navigate to the target camera and adjust the Set Extension Feather in the settings.

Set extension mesh

Set extension meshes were added to prevent tearing between the set extension and the LED screens when the camera moves. Content is reprojected based on the position of the camera so as to maintain the correct perspective as the camera travels.

Previously, the reprojection was done using a 2D plane at a reprojection distance that was a best fit for the varying reprojection distances required. Set extension mesh is used to virtually extend the geometry of the LED screens, so that content can be reprojected to the correct planes at the correct distances. Set extension meshes should be extrusions from the outer edges of the screens only.

1. Create the set extension mesh object.
2. Copy it into meshes folder of your project folder.
3. Open your MR set editor.
4. Set the Set extension mesh to be the relevant mesh.



Spatial Calibration

Here we will cover the basic steps of aligning the physical and virtual worlds within Designer for xR and VP workflows. For this guide we will focus on xR workflows because the tolerance for error is much lower in xR than in VP. The same steps are suitable for both.

A well calibrated xR stage will reveal no seams or visual artifacts that break the seamless blend between the real and virtual environments, and with adequate preparation, can be fully calibrated in less than a few hours.

Prior to beginning spatial calibration, ensure that:

1. A camera tracking system is set up and receiving reliable data.
2. The xR project has been configured with an MR set, accurate OBJ models of the LED screens, and tracked cameras with video inputs assigned.
3. The cameras, LED processors, and all servers are receiving the same genlock signal.
4. The feed outputs have been configured and confirmed working.
5. The Delay Calibration has been completed.

Concepts

A **calibration** is a mathematical equation that converts from the tracking system's coordinate space to Designer's coordinate space. Designer will figure out this equation for you if you give it **observations**.

An **observation** is created by a set of images of the stage captured by the camera of white dots on a black background (called structured light). Designer uses the structured light to work out where the camera actually is relative to the LED surfaces. At the same time, Designer captures the position of the camera according to the tracking system. These two positions form a data point that Designer uses to create a calibration.

There are two types of observations: **Primary and Secondary (P and S)**.

- **Primary observations** are used to align tracking space to Designer space. A minimum of five primary observations are required for the solving method to compute, so aim for five good observations when you begin your calibration process. Sometimes this alignment is referred to as "Registration".
- **Secondary observations** are used to align zoom and focus encoder data to Designer's lens model.

Observations are automatically marked as Primary if they have the same Zoom and Focus values as the majority of the observations.

There is no need to assign a zero point in Designer. Minimal offsets and transforms can be applied to align the tracking data and Disguise origin point prior to starting the Primary calibration, but this is not generally required.

Workflow

In this section we will outline the basic spatial and lens calibration workflows.

Pre-calibration setup

Prior to beginning spatial calibration, ensure that:

1. Your LED screens are configured with an accurate 3D model loaded in Designer. The closer your model is to real life, the better your calibration will be.
2. The cameras, LED processors, and all servers are genlocked to the same signal.
3. The outputs have been configured and confirmed working.
4. Video receive delay has been calibrated. You can find instructions here
5. A tracking system has been attached to the camera and configured both outside and inside of Designer. This is not required if you do not intend to move the camera.
6. Optional: To proceed with lens calibration, a lens encoder should be attached to the lens and configured both outside and inside of Designer.

Virtual set preview setup

Before calibrating, it is good practice to set up your stage to make it easy to assess the quality of your calibration.

To do this follow the following steps:

1. Create a test pattern layer
2. Assign a Direct mapping to this layer containing all screens that are used within the MR set being calibrated.
3. Configure your feed outputs to send content to the LED screen.
4. Create a virtual line up layer.
5. Assign a spatial mapping set to frontplate as the mapping for this layer. This will show the representation of the virtual set and will move/deform during the calibration process.
6. Right-click on the MR set widget to open it.
7. Optional: Use Ctrl + left-click on the header of the editor to pin the window to the GUI.

The MR set preview will show the current active camera view, the AR Virtual Lineup overlay, and the test pattern mapped to the LED screen outputs. You're now ready to calibrate!

Spatial Calibration Workflow

The spatial calibration process aligns the tracking world with the Designer world. It only uses primary observations which are automatically defined as any observations that share the most numerous pair of zoom/focus values within the list of all observations.

To carry out spatial calibration you should take the following steps:

1. Open the spatial calibration editor by left-clicking spatial calibration button on the MR set.
2. Ensure the correct MR set is selected and the camera being calibrated is the current target.
3. Verify the camera tracking system is outputting the correct data and there is no scaling applied from the tracking source.
4. Set the base/most consistent shot for the project. This is called the “hero” shot.
5. Adjust zoom and focus values to their most consistently used levels for the show (If this changes later in your shoot, don’t worry, you won’t need to re-do your calibration).
6. In the calibration editor, left-click **Lock Zoom** and **Lock Focus** to fix the current zoom and focus values. This will ensure that all the observations you’re taking will be marked as Primary and used for spatial calibration.
7. Begin taking primary observations. Primary observations will be notated in the list with a **P** indicator.
8. Take a minimum of 5 good observations from different camera angles/positions that will be used in the show.
9. After each observation, the alignment should look good from the current camera position. If the alignment begins to fail, review all observations and remove suboptimal ones.
10. Move the camera around to a representative range of positions that you expect to move it near during the shoot. If you leave a part of the room without any observations near it, the calibration the camera uses when in that region may be inaccurate.

> **Tip**
>
> Don’t take too many observations too close together. This will result in Designer “over-fitting” the calibration which makes the results poor. A good rule of thumb is that each observation should be about a meter apart.

Lens Calibration Workflow

Lens calibration does the same thing for lens and focus data that spatial calibration does for position and rotation data. If you plan to only use a single zoom or focus setting on your lens then you don’t need to do this step at all.

Focus calibration is specifically intended to account for the problem of “lens breathing”. If you do not have this problem you can simply ignore the steps about focus calibration below.

If you do plan to use zoom and/or focus you should follow the following steps to calibrate them:

1. Return the camera to a “hero” or central camera position.
2. Unlock Focus.
3. Adjust the focus value to the end of the range in one direction.
4. Capture a Secondary observation. Secondary observations will be categorized with an **S** indicator.
5. Repeat steps 3 and 4. Each new observation with a new focus value will create a new Lens pose. You should normally expect to use 3 observations, one at each end of the focus range, and one in the middle. If you need more you can take them but be careful not to take them too close together to avoid overfitting the curve.
6. Unlock Zoom.
7. Adjust the zoom by 10% of the range you expect to use.
8. Lock Zoom.
9. Repeat steps 3-8 until each zoom level has several focus levels captured as observations.
10. Zoom the camera in and out and adjust the focus as needed. View the MR transmisison output to see if there are obvious points where the virtual zoom and focus of the stage elements do not match the real world. At those values, add more zoom and focus observations as needed.

Spatial Calibration Properties

Here we will give an overview of all of the settings within the spatial calibration widget. Some of these are utilized in the standard workflows above and some are for more advances usage or troubleshooting.

Settings

In this section you can configure which MR sets you want to calibrate. You can add multiple MR sets for advanced ghost-frame workflows.

Blob Settings

This allows you to configure the spacing and size of the dots displayed on the LED walls. These dots needs to be clearly detected by the camera in order for spatial calibration to give accurate results.

The optimal size and spacing of the dots generally depends on the size of the volume and the lens of the camera, so it often differs between positions based on the camera’s distance from the stage. There is no consistent range of values that works for all stages, so it is critical to find time to experiment with large and small dots to compare the results on your system.

Tips and Tricks

Here are some tips and tricks for setting up good blob settings:

- The default blob size and spacing is sufficient to get a good calibration in most scenarios.
- Calibration does not require that dot size and/or spacing be consistent between observations.
- Sometimes when you zoom in very close to an LED wall, the individual pixels of the LED may have visible dark-space between them which can be detected as separate blobs. This leads to poor spatial calibration. You can reduce blob size and change blob spacing to avoid this.
- You can use the observation debugging tools to look at the images captured in the observation and see if the blobs line up with reality as you expect.

Observations

Settings under this heading allow you to take and manage observations.

It has the following options:

Use Legacy Capture

This allows the user to toggle on a slower capture process which is more tolerant of dropped frames. This is not selected by default.

Pre-Calibration

This exposes a Capture button which will send a fixed set of colours to the LED wall in a certain order. The widget will display captured frames in order. If the images do not capture what they should (based on the description) then you are not receiving frames consistently and observations will fail to capture.

You can try the following troubleshooting steps:

1. Check if you are dropping frames. Calibration will not succeed when dropping frames.
2. Validate that video receive delay has not changed or drifted. You can find instructions on how to do this here
3. Validate that your servers and camera are still genlocked. If they are not then observations may fail.

If you cannot solve the problem, you can try ticking Use Legacy Capture which is slower but more tolerant of frame drops and other configuration issues.

Observation Controls

Here there are two buttons:

1. Add Observation - Creates a new observation
2. Reset All Observations - Deletes all observations (asks for confirmation first)

Observations List

A list of all observations that can contribute to your spatial and lens calibrations.

The listed data for each observation includes:

1. A toggle to enable and disable the observation
2. The index of each individual observation.
3. The tracked position of the camera when the observation was taken. (You can right-click on this to access the observation debugger)
4. Zoom encoder value of the observation. (user editable)
5. Focus encoder value of the observation. (user editable)

> **Note**
>
> Zoom and Focus are user editable because sometimes you cannot get the zoom or focus back to exactly where you had them when doing primary observations. Editing them manually allows you to achieve this.

5. RMS Error of the observation. This is a numeric representation of how close the observation is to the true location of the camera after calibration. Smaller values are better and you can use this to help detect outliers in your observations.
6. Type of the observation: **P** for Primary or **S** for Secondary.
7. A button to delete the observation.

Manual Observations

This section allows you to calibrate your camera manually for purely AR workflows. You can read more about this workflow in a guide coming soon.

Calibration

Adjusts global settings regarding the calibration.

- Observations image source: Live, Write, and Read.
  - Live (default): Images captured in the observation process are stored within the observation object itself and cannot be recovered if the observation is deleted.
  - Write: Backs up all captures in the observation process to a newly created folder within the Windows project folder, called /debug. (Typically only used for troubleshooting)
  - Read: Will read captured images from disc to recreate a calibration offline. (Typically only used for troubleshooting). When in Read mode you can also select the index of the folder you want to read from with the `Read images from` field.
- Adjust screen positions
  - This property defines whether the calibration solver can slightly adjust screen positions while solving. You can try using this if you don't have a very accurate 3D model to see if it improves results.

- Detect outlier blobs
  - This property is on by default and will ignore blobs that don't fall nicely within the observation model. You can disable this for some advanced troubleshooting workflows.
- Tracker Distortion Compensation
  - This property defines how the calibration system will attempt to match the tracking system's space to Designer's space and which factors it is allowed to change in order to get a better calibration. In general this should be left as default unless you know something special about your tracking system. You can also experiment with different options to see if one gives you better results. The available settings are:
    - **None**: Only accounts for the physical offsets (tracker -> focal point and tracker origin -> Disguise origin) between the tracking system and Disguise. In theory in a perfect setup this should be all you need.
    - **Single gain**: Allows for a single scaling factor between the tracker and Disguise measurements.
    - **Gains**: This is the default setting. It allows for different scaling factors in X/Y/Z axes.
    - **Gains and Skews**: Also adds skews, roughly equivalent to the tracker axes not being perpendicular.
    - **Matrix**: This is able to account for the most distortions but also is the most liable to "Over-fit" the calibration which can lead to bad extrapolated results in places outside where you've actively taken calibrations.
- Calibration scope
  - This property lets you define which parameters are solved for in the calibration. The available settings are:
    - **Lens and Registration**: Optimise both the lens intrinsics and the camera-tracker registration.
    - **Lens Only**: Optimise the lens intrinsics, take the position/rotation directly from the tracker.
    - **Registration Only**: Optimise the registration, take lens intrinsics from the tracker (if provided) or camera.
    - **Lens and Manual Registration**: Use regular observations to calibrate lens intrinsics and manual observations to calibrate registration.
    - **Registration and Focal Length**: Optimise the registration and camera focal length, but not distortion parameters.

> **Note**
>
> Here "Registration" refers to the spatial calibration.

Calibration Results

Provides a list of all lens poses created by secondary observations. You can click on each one to manually edit it. This is sometimes used in advanced troubleshooting or to correct for a change in incoming data format.

Debugging

Following the standard calibration process correctly and consistently is very reliable and typically results in very good calibrations. Despite this, errors can and do still occur. If you are getting poor calibration results this is the section for you!

The Debugging sections offers 3 tools to help with debugging bad spatial calibrations.

- Observation Debugger - the most commonly used tool
- Plot Calibration Errors - advanced
- Show 3D Observations

Observation Debugger

This is the tool you will most often used when debugging a bad calibration, because most of the time a bad calibration is caused by a bad observation. The observation debugger gives you options to view each individual observation to see if they are of good quality or not. You can look at each captured image to determine if the blobs were properly identified, clearly visible, and matched with the right virtual blobs. You can see if the image had a lot of light spill, reflection, poor masking, etc.

You can view Primary observations, either in “Solved” pose mode or “Tracked” pose mode. Tracked displays the values that we get from the tracker and from the camera, Solved displays the values transformed in to Designer space by the calibration and so is dependent on all the observations currently active that contribute to that calibration.

Secondary observations do not have a “Solved” mode to view because they are not used for the spatial calibration.

Troubleshooting a bad calibration with the observation debugger

If you have a bad calibration you will see the virtual lineup layer does not match the actual LED of the set in the background. This problem can have multiple causes, so we recommend followin this step-by-step troubleshooting guide:

1. Carry out initial checks:
    1. Press the ‘Re-run calibration’ button to ensure the set is in a fully calibrated state. This is especially important when re-opening or updating the project file.
    2. Check the primary/secondary observations are labelled as expected. It’s possible that a zoom or focus value has changed and caused them to be misinterpreted as the incorrect kind.
    3. Check the desired observations are enabled in the list editor.
2. Check whether the ‘solved’ results look good in the **observation debugger**

If not, this indicates a problem during the blob detection stage. Possible causes could be:

- Blobs have been detected in the wrong places, e.g. due to reflections. Check in the observation debugger or viewer for any detected blobs that look wrong.
- The camera moved during the observation.
- The stage model is not accurate, or the UVs are incorrect (e.g.pointing the wrong way so the screen is flipped).
- Feed output mappings are incorrect

4. Check whether the ‘tracked’ results look good in the **observation debugger**

If not, this indicates a problem with the tracking system registration. Possible causes could be:

- The tracking system is not engaged and receiving reliable data.
- The tracking system has physically moved, or something in the setup has changed between observations.
- The tracking system coordinate system is wrong, e.g. flipped axes or incorrect rotation order. Some of the debugging tools may help diagnose this.
- The tracking system is encoder-based, and physical components are mis-measured or bending.
- Try changing the solving method of the calibration.
- If none of the above help, a normal diag with the bad observations in should be enough to look into the issue.

5. If the observation debugger looks good, but Virtual Lineup layer/content looks bad, this indicates that something in tracking or registration is not being applied properly.

Possible causes could be:

- The calibration is not up to date. Press the ‘Re-run calibration’ button to be sure.
- The tracking system has physically moved, or something in the setup has changed.
- The camera has moved into a position where it is not well calibrated. Try taking another observation in this position.- The zoom/focus has changed.

6. If none of these issues are found, go through the following steps to create a project diagnostic with the information necessary for disguise support to debug the problem at HQ:
    1. Take an observation which shows this issue (for example, it looks fine in the observation debugger but the Virtual Lineup Layer is not aligned).
    2. Leave the camera in the same position that the observation was taken.
    3. Take a short device recording of the tracking data for the camera.- Take a screenshot of the camera feed, with the test pattern on the screens but without the Virtual Lineup Layer overlay
    4. Take a screenshot of the camera feed with the blob pattern preview displayed on the screens.
    5. Take an observation in Read mode which will write the images to the projects output folder and be included in a diagnostic.
    6. Export a diagnostic of the project, and along with screenshots of the MR set preview, send to **support@disguise.one**

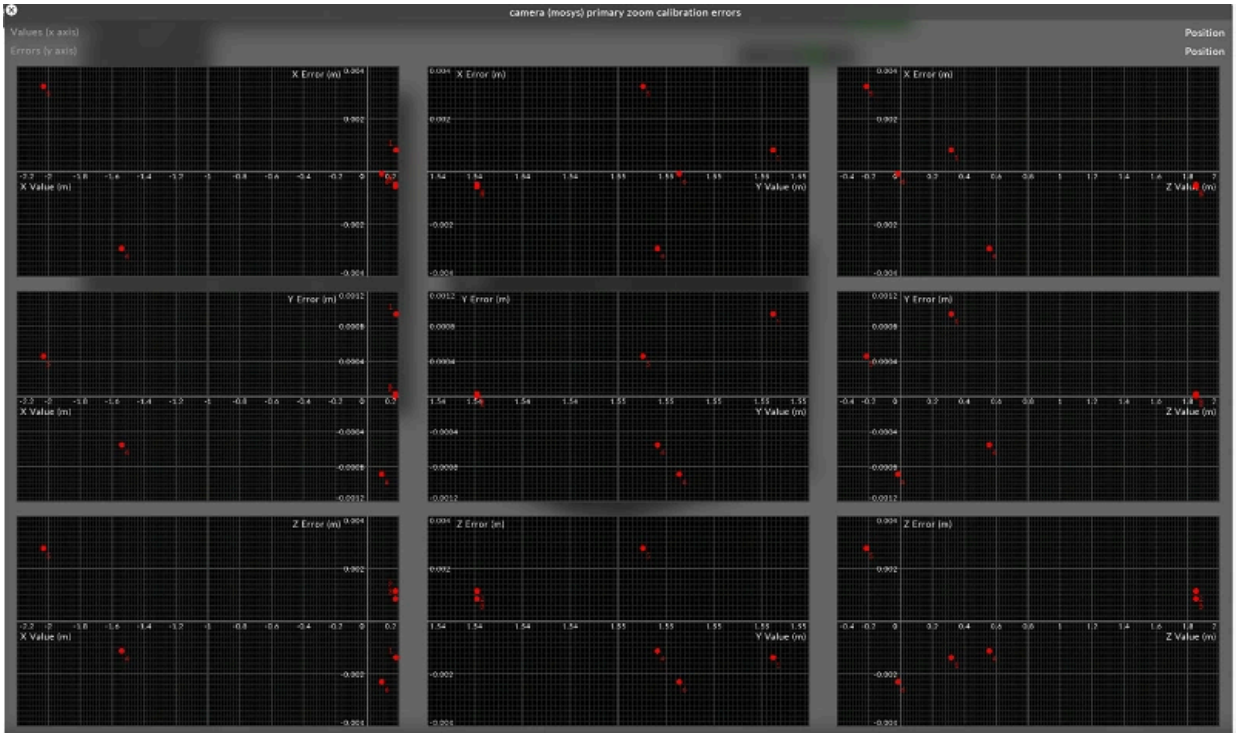
Plot Calibration Errors

This shows you plots of each spatial dimention X/Y/Z and rotations Pitch/Roll/Yaw plotted against every other dimension and rotation. This allows you to detect biases in the tracking coordinate space. You would expect each graph to look like a roughly scattered set of points with little to no correlation.

If you see an obvious pattern like a clear linear or quadratic correlation between two of the axes, this may indicate that they are unexpectedly correlated. For example, when I move the camera left and right, my tracker is also sending me movements forwards and backwards.

The Designer calibration system can account for these kinds of correlations, however this can give a very good indication of where problems within the tracking system may exist if you're having trouble with camera moves.

An example where this might be important is a mechanical tracking system like a jib. In mechanical systems we receive tracking data based on what the motors tell us, but if the jib arm flexes as it extends, the tracking system is not aware of this flex. In this case we will see a correlation between the extension of the job arm the its vertical height which can be viewed in this debug widget.



Plot calibration errors interface

Show 3D Observations

This will render 3D arrows on stage where each of the observations were taken in 3D space. This is useful if you have a part of your stage where you may have very few observations or you're trying to take your observations in an evenly spaced manner.

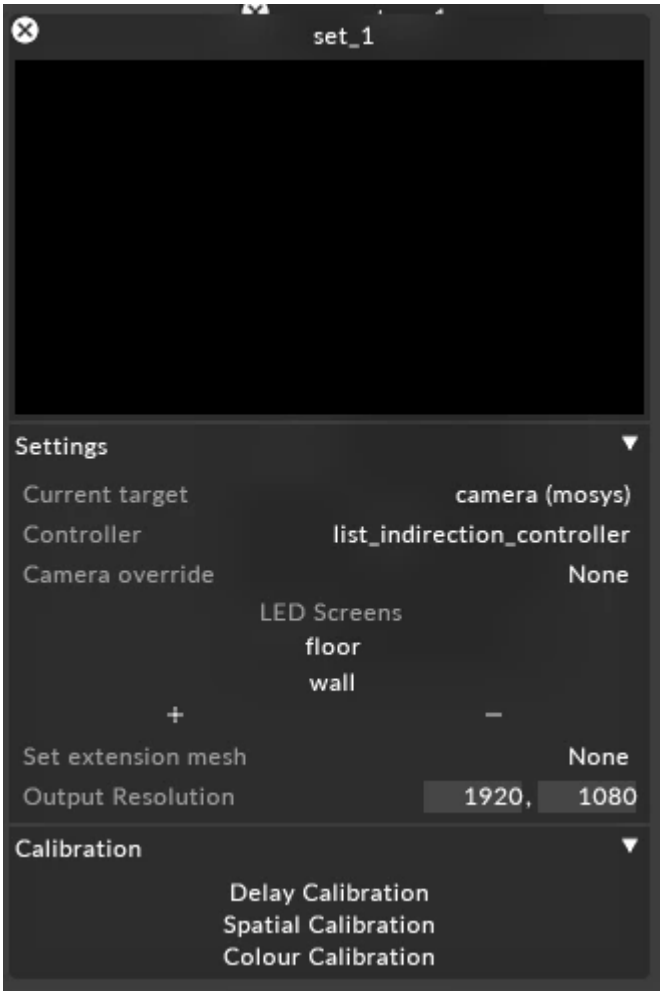
It can also be useful for visualising the alignment of the tracking coordinate system with the Designer coordinate system. If there is a systematic error between the two tracking systems then you can see the areas where they align and mis-align in 3D space.

Spatial Tracker Delay

The “Spatial Tracker Delay” field refers to the time difference between Disguise receiving an image from the camera and receiving the associated tracking data from the tracking system for a given frame

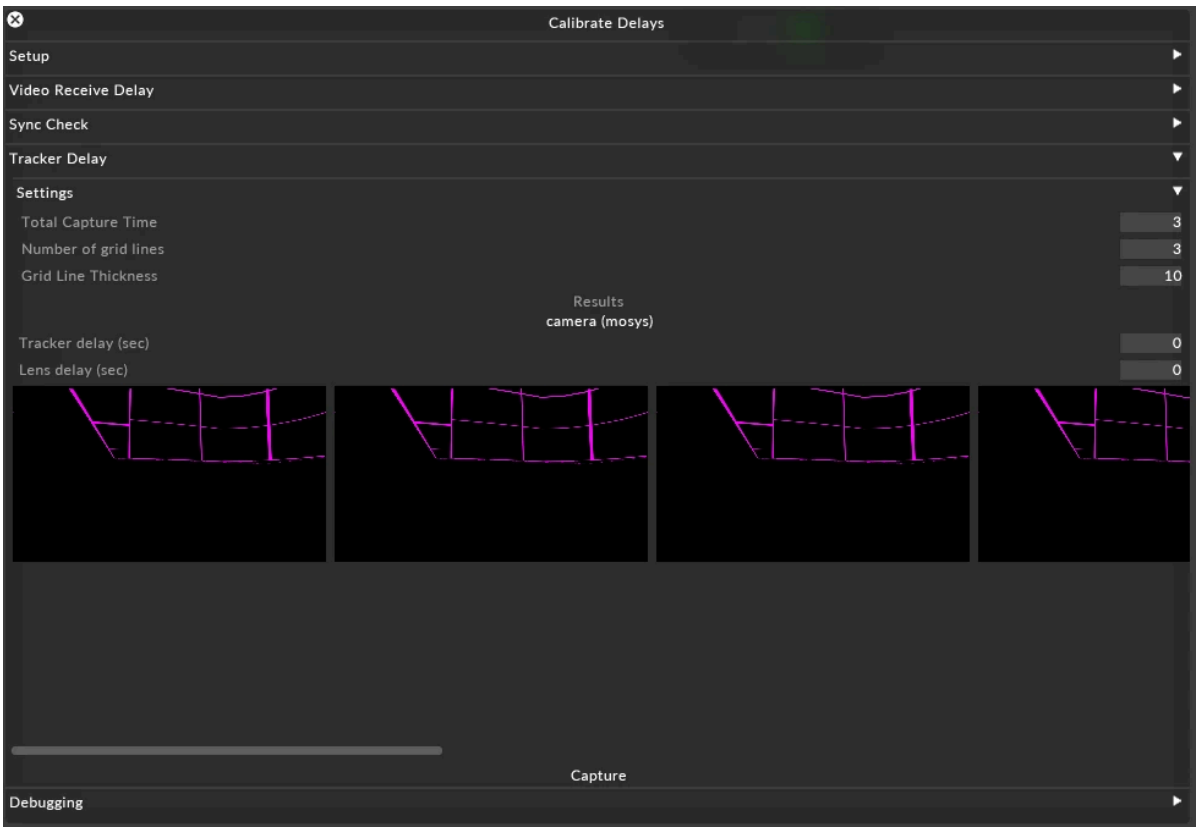
Workflow

1. Open the properties editor.



2. Navigate to **Calibration** and left-click on **Delay Calibration**

3. Open **Tracker Delay > Settings**.



4. Left-click on **Capture** while moving the camera along a single axis to capture the camera movement
5. Select the image in which the grids are most closely aligned
6. Adjust the Tracker Delay field as needed to align the remaining grids (this is a subjective decision based on your visual preference).

Properties

- Total Capture Time: Total time in seconds captured during the tracker delay calibration capture
- Number of Grid Lines: The number of gridlines displayed on the backplate during the tracker delay calibration capture
- Grid Line Thickness: Thickness of lines displayed on backplate during the tracker delay calibration capture
- Tracker delay (sec): Amount of time between receiving a video frame and receiving the corresponding tracking data:
  - If negative, tracker data arrives before the video frame
  - If positive, tracker data arrives after the video frame

- Lens delay (sec)Seconds in between spatial tracking data arriving and lens data arriving.
  - If negative, lens data arrives before the spatial frame
  - If positive, lens data arrives after the spatial frame

  Calibrating the Spatial Tracker Delay typically requires a second person to operate the camera while the calibration process is running. For this reason, Lens delay can be useful when performing the Spatial Tracker delay calibration process alone as it allows you to delay the start of the Spatial Tracker Delay calibration capture.

Video Receive Delay

Calibrating delays is an important part of the xR workflow. Failure to complete this configuration correctly will result in the set extension and LED screen output not being in sync.

There are two user calibrated delays in every system that must be determined.

The first is the amount of time between the Disguise hardware rendering a frame and receiving the corresponding video frame. This is called the Video Receive Delay.

The second is the time between when the tracking system calculates a camera's position and when it is received and processed by Designer. This is called the Tracker Delay.

MR is a game of latency - all components of the system are moving independently, and the preservation of a unified image requires compensating for distortions after an image is taken. These delay values allow Disguise to catch up to the camera sensors and tracking sources.

Workflow

Setting the Video Receive Delay will allow the camera to capture the blobs that are outputting to the screen correctly. If the delay is too high or low, the correct frame will not be captured, which could mean that the structured light pattern is not recognised.

To set the video receive delay

1. Open the MR set editor.
2. Navigate to the calibration tab.
3. Add MR set to the calibrate delay tool.
4. Click **Delay Calibration**.

> The calibrate delay function is pre-populated with the current camera target, but you can add or remove different combinations of cameras.

5. Click **Capture**.

> Designer will output one frame of white to all outputs assigned to the MR set.

6. Look at the captures:

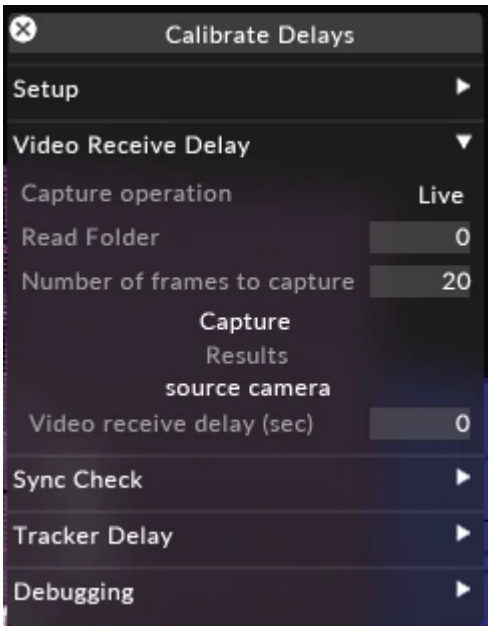
> - If the white frame is splitting across two frames, you may need to adjust the phase offset of the LED processors.
> - If the white frame is fully present in multiple frames, adjust the shutter angle of the camera. This will close the camera shutter faster resulting in only one frame of white to be captured.

7. When a single white frame has been captured, left-click the white frame; the delay value will autopopulate in the editor.
8. Test your screens are in sync:

> At this point you should check that your screens are in sync with each other; you can use the Sync Check tool found in the calibrate delay widget to accomplish this.

9. Expand the Sync Check tab to ensure that the set extension and LED screens flash at the same frame.
10. Begin Strobe and view on the xR transmission output if the set extension and LED screens seem in or out of sync.

Properties



Capture operation

Determines if the captured images during testing are archived to the debug folder of the Windows project file structure, or captured and assessed Live.

Number of frames to capture

The user defined number of frames to be captured for the capture to be registered.

Capture

Clicking will capture the set number of frames on output. Video Receive Delay (sec): The delay value of the incoming video frame that will be autopopulated by clicking on the correct white frame.

Sync Check

The tool used to ensure the Video Receive delay value is correct.

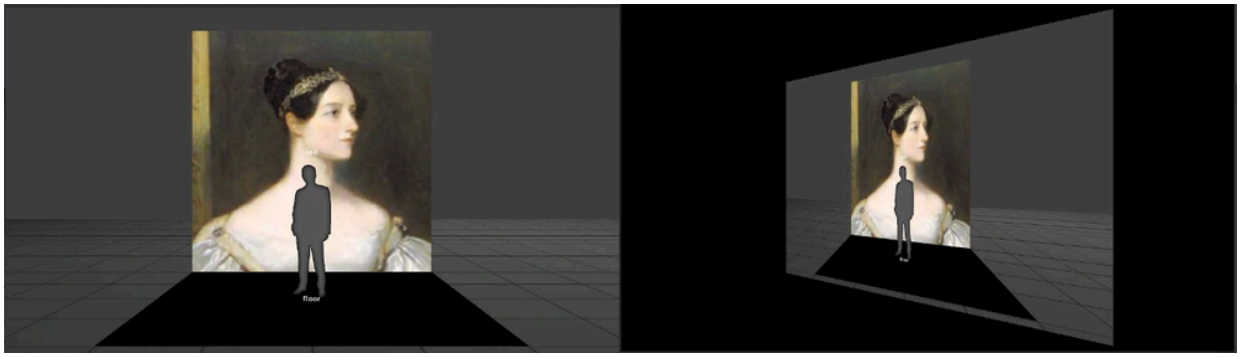
Virtual Cameras

Virtual cameras can be used as part of MR or green screen workflows to allow shots to be captured from positions outside of the range of the physical cameras. By reprojecting the filmed action and virtual content to a new viewpoint, wide shots can be captured for small stages with limited space.

A virtual camera can also be used to traverse a large virtual scene, such as a cityscape. It is possible to start by moving through the streets rendering the virtual scene, and end by transitioning into the view of the real camera on an xR stage, capturing the people on the stage within your virtual scene.

Background

Virtual cameras are designed to be interchangeable with real cameras within a MR or green screen setup. They should be interacted with in similar ways to a real camera. Virtual cameras work by reprojecting the filmed content from a parent camera to the virtual camera's viewpoint:



Reprojection of the content filmed by the parent camera

We render the virtual scene from the virtual camera's viewpoint, add set extension to the outsides of the reprojected plane, and account for the reprojection in the content we send to the screens. This gives us the virtual camera viewpoint:



Reprojection with translucent set extension



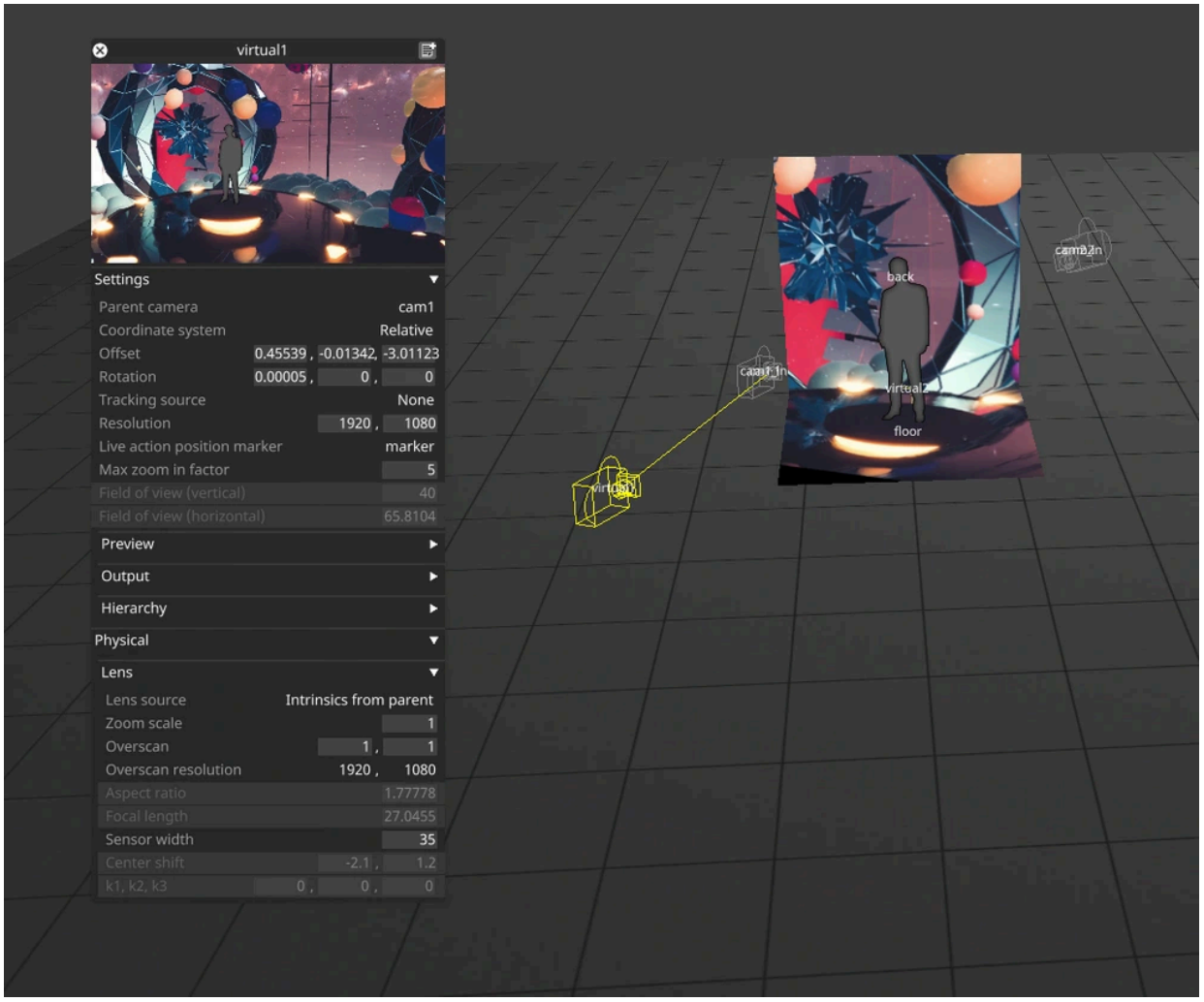
Final composite, from initial and reprojection viewpoints

> **Caution**
>
> If the angle between the viewing directions of the parent and virtual camera is too large, the people and props on stage can look flat, as seen in the images above.

Workflow

To set up a virtual camera

1. Create a new virtual camera in the Cameras list in the stage.
2. Set the **Parent camera** property to the desired real camera.
3. Add a **Live action position marker** located at the average position of live content on the stage (e.g. people). This will ensure that the live content appears with the correct perspective relative to the virtual content when the virtual camera moves.
4. Set the virtual camera as the target camera of the MR set.
5. Map content to the MR set front and backplates as normal.



Virtual camera setup

Virtual camera properties

There are several properties than can be set on virtual cameras to control their behaviour. Many of these are the same as regular cameras. Other notable properties to be aware of for virtual cameras specifically include:

- **Max zoom in factor** can be set to restrict how much the filmed content can be zoomed into before purely virtual content is displayed. This prevents excessive pixelation when moving the virtual camera towards the live action.
- Lens settings can be set under **Physical→Lens**. These can be defined locally in the virtual camera, set to follow the zoom of the parent camera (with an optional scaling applied), or set to follow all the intrinsics of the parent camera (with an optional zoom scale).
- **Output type** under **Output** can be set to **Spherical** to output spherical content for viewing in VR. See xR for VR for more details about this workflow.

To control a virtual camera

There are various ways for controlling the position of the virtual camera. You can either:

- Use the 3D object manipulators to move the virtual camera object around in the stage.
- Edit the values in the virtual camera editor. Note that values can be defined in a **Global** coordinate system, or **Relative** to the parent camera.
- Use a tracking source: A tracking source can be used to control the pose and lens intrinsics for a virtual camera in the same way as a real camera.
- Keyframe camera animations using AnimateCameraPreset or AnimateCameraControl.

To keyframe virtual camera animations

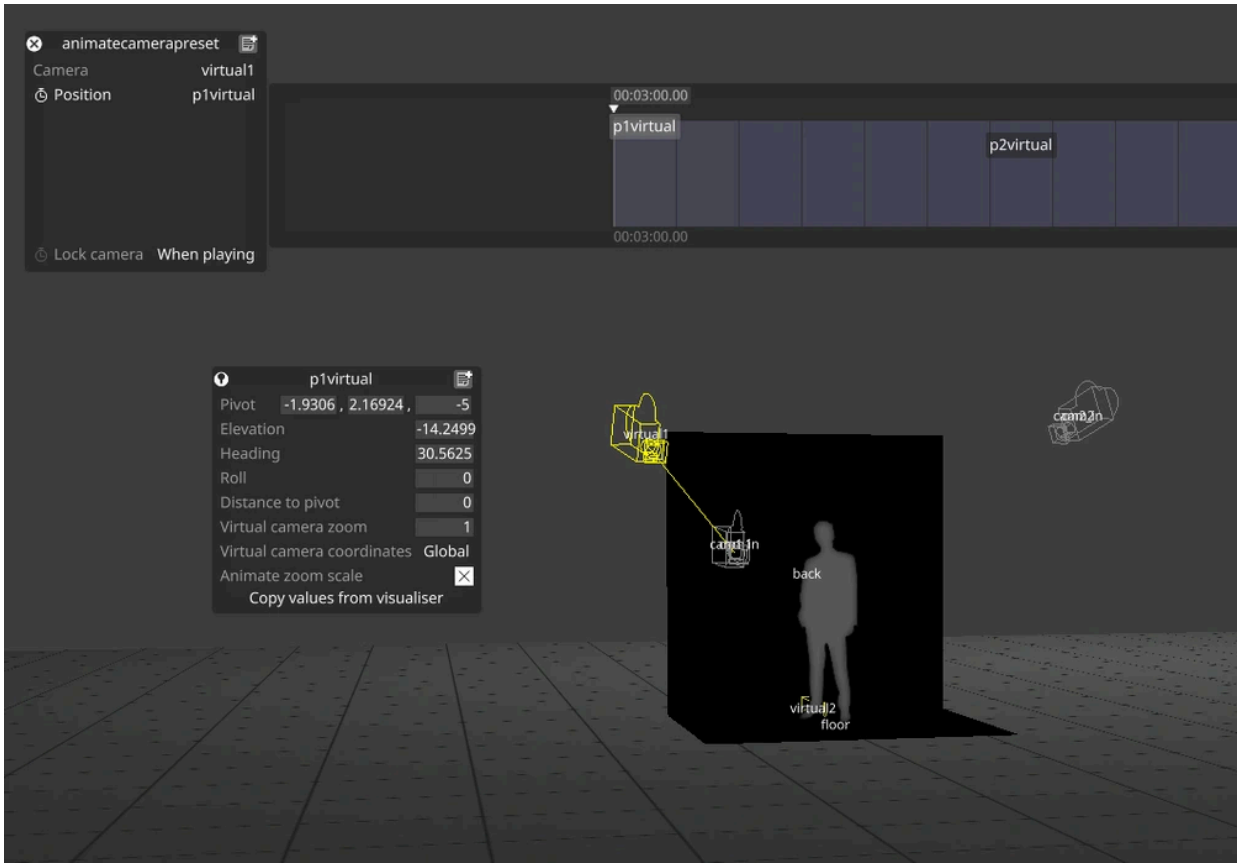
Virtual camera animations can be keyframed similarly to standard cameras using the AnimateCameraControl or AnimateCameraPreset layers.

AnimateCameraControl:

1. Add an **AnimateCameraControl** layer.
2. Set the camera to the virtual camera you wish to animate.
3. Set the coordinate system to **Global** or **Relative** as desired.
4. Keyframe virtual camera properties. In addition to the standard properties for a normal camera, zoom scale can also be keyframed.

AnimateCameraPreset:

1. Add an **AnimateCameraPreset** layer.
2. Set the camera to the virtual camera you wish to animate.
3. Add new virtual camera positions to the **Position** property.
4. Set the coordinate system to **Global** or **Relative** as desired.
5. In addition to the standard properties for a normal camera, the virtual camera's zoom can be set. Toggle the **Animate zoom scale** option to choose whether to animate zoom scale or global field of view.
6. Keyframe several virtual camera positions to animate the camera between these positions. Positions in Global and Relative coordinates can be mixed, and the camera will move between the coordinate systems.



Keyframing virtual camera positions

Limitations

- If the virtual camera is significantly off-axis from the real camera, the live objects (e.g. people) will become skewed. The projection can be thought of as looking at a 2D cardboard cutout from a different angle.
- All live action must be completely within the frame captured by the real camera. If not, it will be cut off during the reprojection.
- If the lens is heavily distorted, there maybe be distortion artifacts. A radial mask can be set in the editor to remove these effects, which are most pronounced at the edges of the image.
- If you attempt to move the virtual camera forwards towards the live action, the picture will become progressively more pixellated. This is because you are zooming in on the captured image at fixed resolution. This can be mitigated by setting the **Max zoom in factor**.
- If the virtual camera moves behind the live action, it will render virtual content only.
- If the parent camera moves quickly, there may be some noticeable discontinuity between filmed content and the set extension. This may be more noticeable if the virtual camera is near to the parent camera. For fast camera moves it is recommended to use a real camera rather than a virtual camera.

Legacy Workflow

Virtual camera animations could previously be keyframed using additional options in the AnimateCameraControl or AnimateCameraPreset layers. The new workflow supersedes this method, however for backwards compatibility the old workflow can be enabled by setting the option switch **enableLegacyVirtualCameraWorkflow**.

xR for VR Workflow

The xR for VR workflow enables the production of Spatial Video (VR180 or VR360) content for consumption in Spatial Computing devices from a typical LED xR production stage, using standard broadcast cameras and lenses.

Once the stage and project are set up correctly for xR, a spherical output can be produced in just a few clicks, using a **virtual camera**.

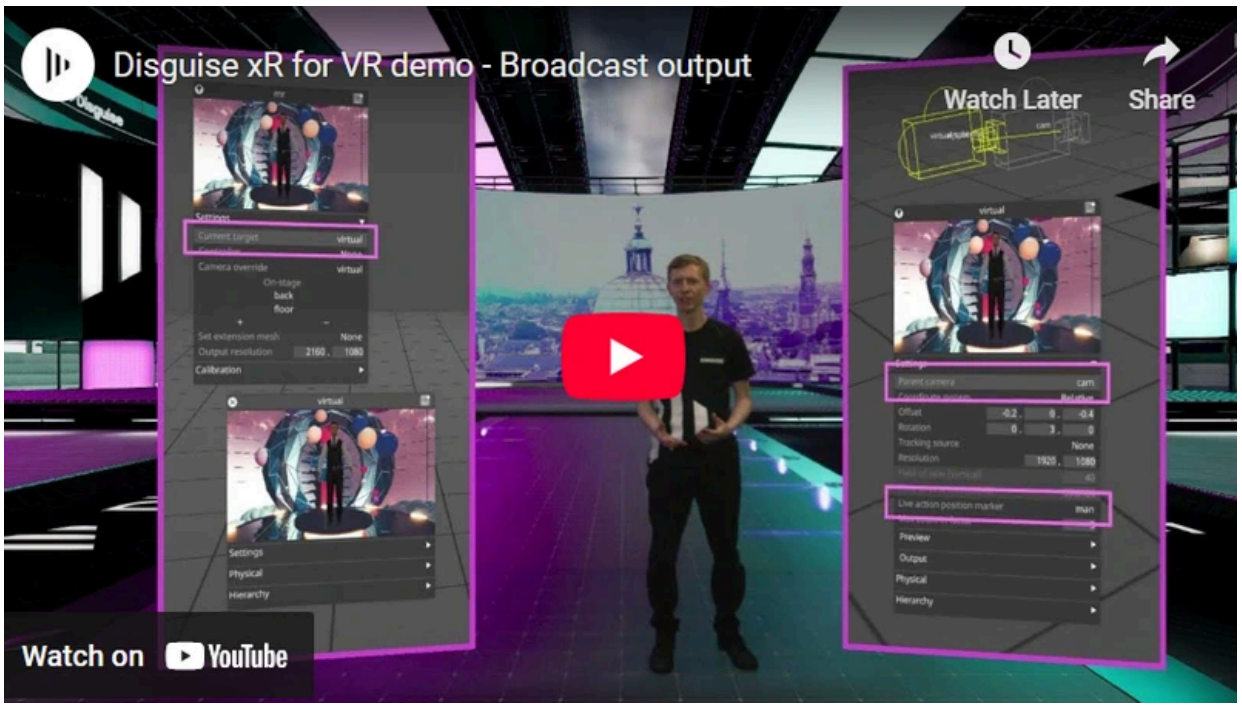
Demo videos

Check out our demonstration of the xR for VR workflow in the two videos below. We recorded simultaneous VR and broadcast outputs, following the process described **here**.

VR output video



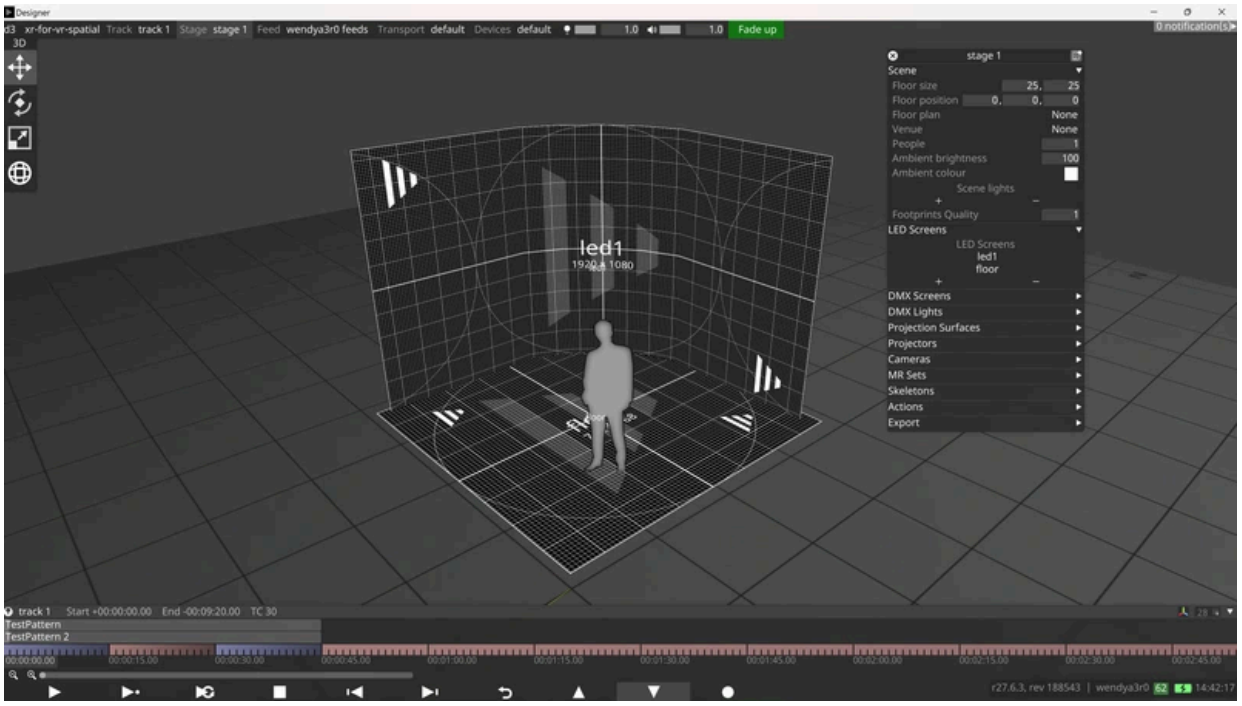
Broadcast output video



Stage setup

The stage must be set up correctly for xR. See **xR stage setup** for more detailed instructions. In brief, the steps are:

1. Create a standard xR LED stage in the Disguise software. Add an LED wall and floor to the stage.
2. Add a broadcast camera. In this example, it is called “d3cam”.
3. Create an MR set, and add your screens and camera to it.
4. Setup and calibrate the stage ensuring lens, colour, and delays are fully calibrated.
5. Position your broadcast camera so that it covers all participants on the stage from head to toe. You can preview this in the stage visualiser and use the mouse to pan, rotate, and zoom the stage into view.



The xR Stage with Test Patterns

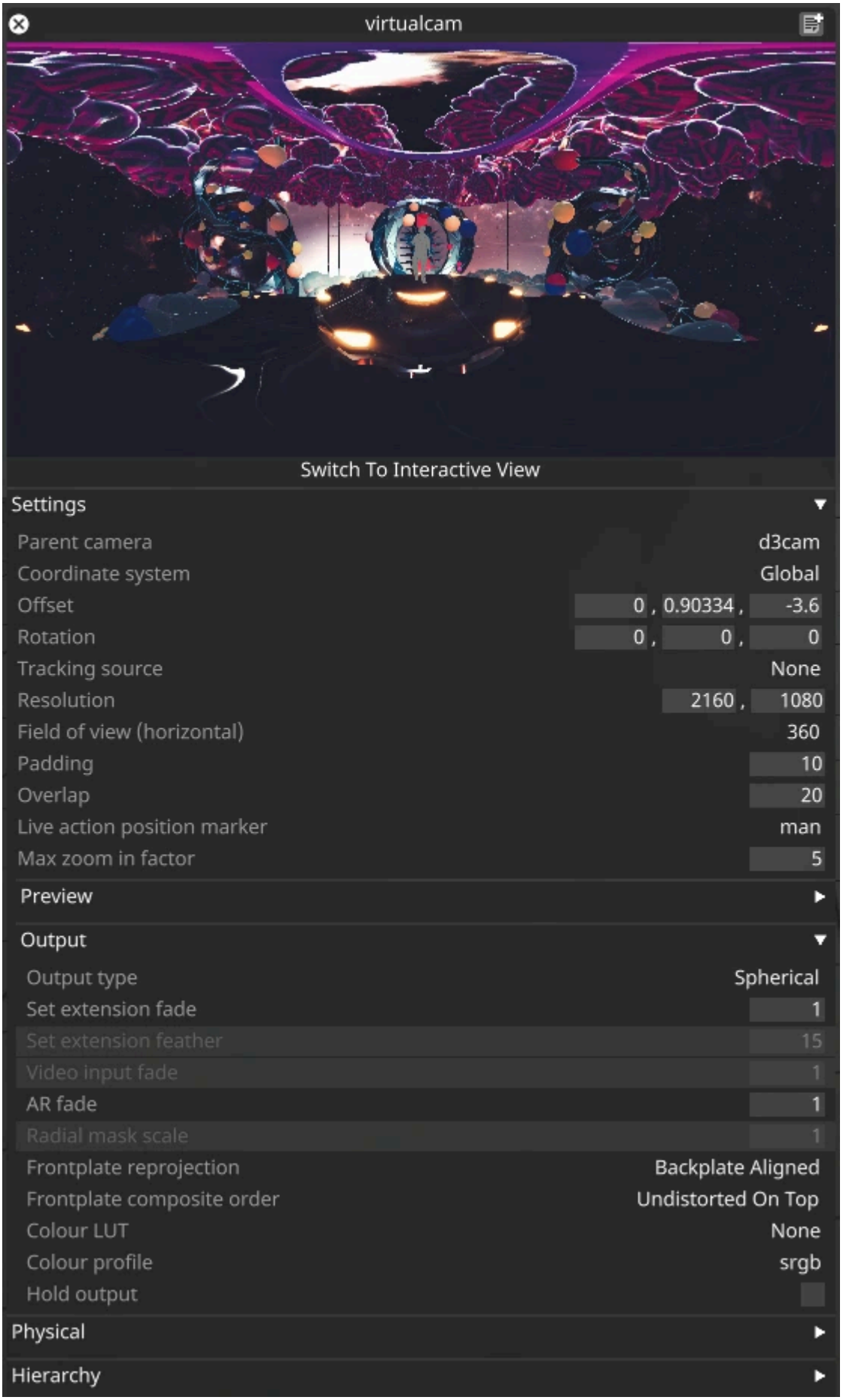
Add and configure virtual camera

In Designer, add a **virtual camera** and configure it as follows:

1. Add a new virtual camera to the list of cameras in the stage.
2. Set the virtual camera as the target of the MR set. This will allow you to see how changing the virtual camera properties affect the mapped content.
3. Set the **Parent camera** of the virtual camera to the Camera object representing the broadcast camera (d3cam in this example).
4. Set the **Live action position marker** to an object in the stage positioned at the average position of real on-stage people and props, for example at the position of the main presenter. This is necessary to to avoid sliding of the people relative to the virtual scene as the virtual camera moves.
5. Set the **Coordinate system** to **Global**, and zero out the pitch (X) and roll (Z) rotations. **It is important that the virtual camera pitch and roll rotations are zero in global space, otherwise the camera horizon won't be aligned with the centre of the output, which may cause the scene to appear misaligned when viewed on VR devices.**
6. Adjust the **Offset** and yaw (Y) **Rotation** of the virtual camera to the desired position. This can be anywhere, although if it is positioned at too large an angle relative to the parent camera the people captured on-stage may appear flat.
7. Expand the **Output** separator, and change the **Output type** to **Spherical**. The camera will now output a VR360 spatial video feed.
8. If desired, the **Field of view (horizontal)** can be set to 180 for a VR180 output.

9. Set the **Resolution** of the virtual camera to the desired output resolution of the camera.

> ⚠ **Caution**
>
> By default, the MR set will have a resolution which is more suitable for standard camera feeds. It is likely you will want to set the MR set resolution to match the virtual camera resolution.


virtualcam
Switch To Interactive View
Settings
Parent camera
d3cam
Coordinate system
Global
Offset
0 , 0.90334 , -3.6
Rotation
0 , 0 , 0
Tracking source
None
Resolution
2160 , 1080
Field of view (horizontal)
360
Padding
10
Overlap
20
Live action position marker
man
Max zoom in factor
5
Preview
Output
Output type
Spherical
Set extension fade
1
Set extension feather
15
Video input fade
1
AR fade
1
Radial mask scale
1
Frontplate reprojection
Backplate Aligned
Frontplate composite order
Undistorted On Top
Colour LUT
None
Colour profile
srgb
Hold output
Physical
Hierarchy

Example setup for the virtual camera

Avoiding seams in content

Rendering of the spherical content is achieved under the hood by rendering the 6 faces of a cube, then combining and warping them to the correct spherical output. Certain screen-space effects used when rendering the virtual scene can cause visible seams between the faces. See **UE scene optimisation** for tips on how to avoid this in Unreal Engine.

If some screen-space effects are required for creative reasons, it is possible to mitigate their effects and avoid seams by setting **Padding** and **Overlap** in the virtual camera:

- **Padding**: This value sets a number of additional pixels which are rendered outside each face, then cut away when combining the faces. This can be used to mitigate effects such as blur which exhibit edge effects on the extremities of the rendered image.
- **Overlap**: This value also renders additional pixels outside each face, then smoothly blends between the pixels of adjoining faces on each edge. This reduces the appearance of seams between faces by smoothing over the join, so you don't get a hard line.

> **Caution**
>
> Both padding and overlap will increase the render resolution of each face, and therefore will increase the GPU resources required to render the content. It is recommended to set these to the smallest values required to remove visible seams.

Add VR180 or VR360 Content

Using RenderStream

1. Add a RenderStream Layer to your track.
2. In the RenderStream Layer Editor, select your VR180 or VR360 asset, such as an Unreal project.
3. Add a Cluster Pool of render nodes on the layer.
4. Add a Channel, and set the mapping to the backplate of the MR set.
5. Start the Workload.

> **Note**
>
> The spherical camera output requires 6 viewpoints to be rendered. The number of render nodes required for this workflow depends on the resolution of the mapping, and the complexity of the virtual scene.

Using other 3D modules

Other modules which render 3D content can also be used for spherical camera outputs, such as locally hosted Notch blocks, or the Stage Render or 2.5D layers. Simply set the module mapping to the backplate of the MR set while the virtual camera in Spherical mode is set as the MR set's target.

> ⚠ **Caution**
>
> Using local 3D modules rather than RenderStream will require all 6 viewpoints to be rendered on the same local machine. This may impose a large GPU load on the machine, depending on the setup of the module and mapping.

Using a video layer - static camera

If you are not planning on moving the virtual camera, then it is simple to map video content to the camera:

1. Add the video to the project folder. The video should be equirectangular content, formatted in the same way as the intended spherical camera output.
2. Add a Video layer, and select your media.
3. Set the video layer mapping to the backplate of the MR set.

Using a video layer - moving camera

If you want to add video content while also having the flexibility to move the virtual camera, you will need to map the video to a spherical mesh, and use the stage render layer to map this to the MR set backplate.

Add a spherical mesh:

1. In the Stage editor, create a virtual projection surface, name it "sphere", and select the **puffersphere mesh**.
2. Scale the sphere to a large value, e.g. (10, 10, 10)
3. Set an appropriate resolution for the video content
4. Set the virtual projection surface to **Backplate (MR)** in the Render layer.
5. Set the position of the sphere to the desired eye point of the content (not too far from the position of the camera)

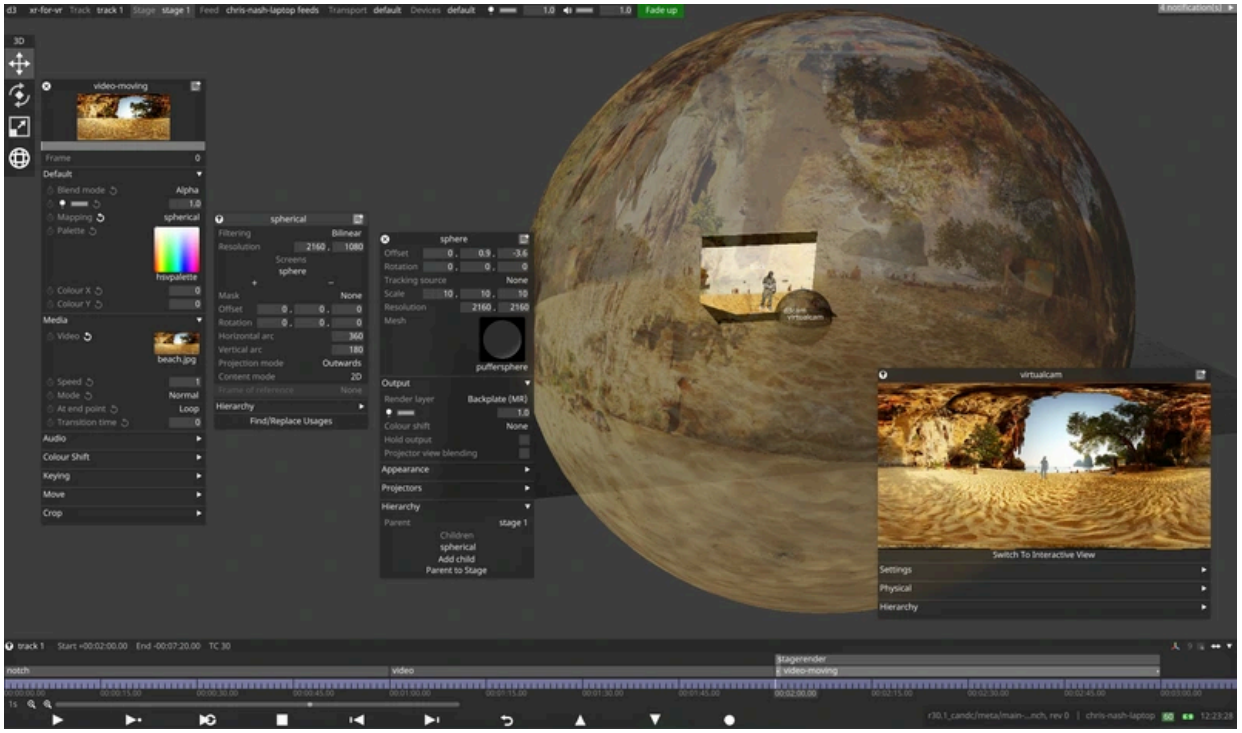
Map the video to the spherical mesh:

1. Add a video layer and select the desired content.
2. Create a new spherical mapping, and set this as the mapping for the video layer
3. Set the resolution of the spherical mapping appropriately for the content

4. Add the sphere projection surface to the list of screens in the spherical mapping
5. Set the spherical mapping as a child of the sphere projection surface, under **Hierarchy** in the projection surface editor

Add a stage render layer:

1. Add a StageRender layer to the timeline.
2. Set the **Render layer** to **Backplate**.
3. Map the StageRender layer to the MR set backplate.



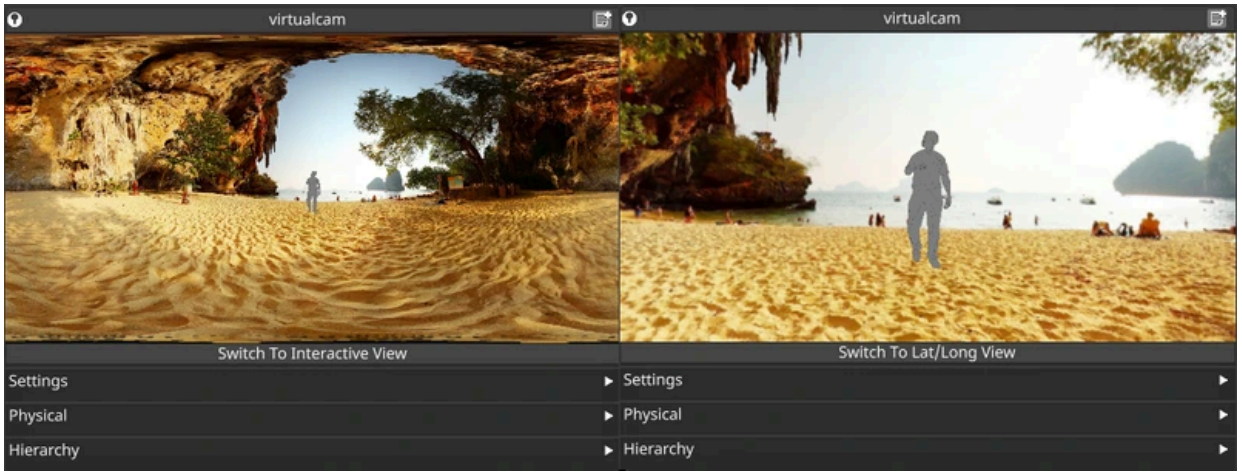
Setting up spherical video content for a moving camera

> **Note**
>
> If you don't want to see the virtual sphere projection surface in the stage, open the visualiser camera editor from the Stage menu. Open the editor for the camera's **Render settings**, under **Stage Render**. Then set the **Virtual object alpha** to zero.

Viewing the content

To preview the spherical camera output within Designer, you can use the 'interactive view' in the camera widget. When the **Output type** of a virtual camera is set to **Spherical**, A button will appear below the camera preview allowing you to **Switch To Interactive View**. By default the camera preview will show the equirectangular Lat/Long output image. Switching to the

interactive view gives an interactive perspective view of the scene, which can be navigated by holding the left mouse button within the preview and moving the mouse.



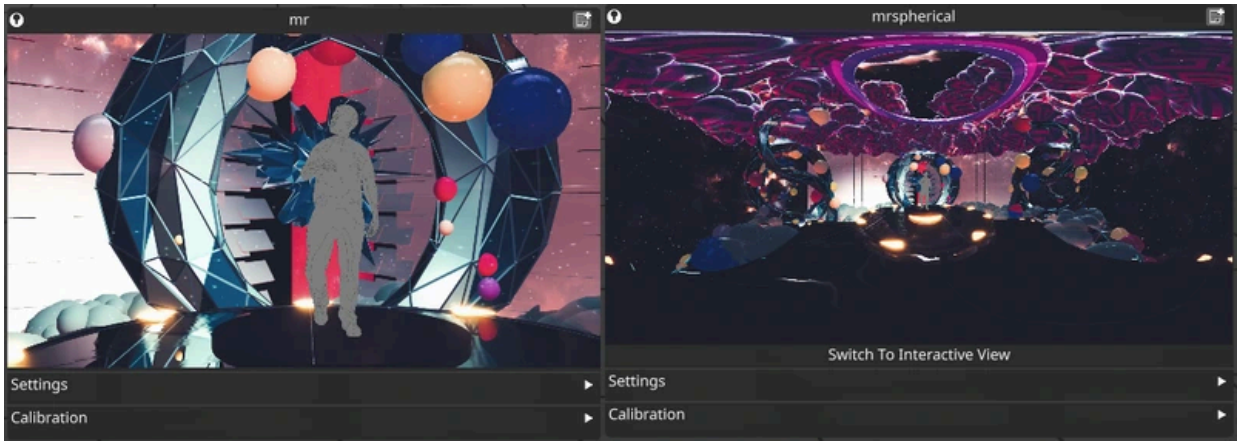
Interactive and Lat/Long spherical camera preview modes

Simultaneous spherical and regular outputs

Sometimes it may be desirable to output a regular perspective camera output alongside a spherical output, to produce a traditional broadcast feed alongside a feed for consumption in VR. Since spherical and regular cameras both project onto the screens from the same eye point, it is possible to produce both types of output simultaneously from a single broadcast camera.

To output spherical and regular outputs simultaneously:

1. Set up the stage and configure a virtual camera in **Spherical** output mode, as described above.
2. Create a second virtual camera, in **Regular** output mode.
3. Set the **Parent camera** and **Live action position marker** in the second virtual camera to match those in the first.
4. Make the second virtual camera a child of the first (from the **Hierarchy** separator), so that both cameras have the same position and rotation.
5. Set the other properties of the second virtual camera as desired.
6. Creating a second MR set, add the LED screens, and set the second virtual camera as the target.
7. Map any content to the backplates of both MR sets. This may require duplicating layers to enable mapping the content to two mappings with different resolutions. However, in the RenderStream layer this can be achieved by adding a second channel.
8. Ensure the content mapped to the Regular output is above the content mapped to the Spherical output. This is because the content projected onto the screens is likely to appear at higher resolution for the Regular output.



Simultaneous spherical and regular outputs

xR Workflow Overview

This workflow guide is intended to give users an end to end example of how to get up & running with the Disguise xR workflow.

The Disguise xR workflow consists of the following key topics:

1. xR Project Setup
2. xR Stage Setup
3. MR Set
4. Video Receive Delay
5. Observations
6. Spatial Calibration
7. Spatial Tracker delay
8. Colour Calibration
9. Inverse Lut Method
10. API xR Calibration
11. Set Extension
12. Virtual Cameras
13. Camera Switching
14. Cluster Rendering
15. Frustum Workflows
16. Multi-frame Remapping
17. Depth of Field
18. xR for VR Workflow

xR Project Setup

This topic will explain the basic principles of setting up a project for use with the xR workflow.

1. Create a new Disguise project if required.
2. Configure your Director/Actor setup if required.
3. Create an accurate representation of your LED setup in the stage.
4. Configure your cameras.
5. Configure Genlock
6. Ensure project refresh rate and output refresh rates match.
7. Ensure feed output resolutions are configured.
8. Perform a spatial calibration as required.
9. Configure RenderStream content if required.

xR Stage Setup

This topic covers setting up your virtual stage and cameras in Designer for xR calibration of an LED stage.

Workflow

1. Add LED screens to the stage. For the xR workflow, LIDAR scanned and UV unwrapped OBJ meshes are best.
2. Add virtual cameras to the stage.
3. Connect the video output of the physical stage camera to a video input on the Disguise server.
4. Check and configure physical camera settings, including white balance, framerate, and genlock status.
5. Patch the video input(s) to the virtual cameras in the stage in the Video Input Patch Editor.
6. Run preview in the video input patch editor to ensure the camera feed is being received at the correct signal.
7. Check & configure camera tracking system.
8. Create a position receiver to link to the camera tracking system.
9. Add tracking drivers dependent on your camera tracking system to the position receiver.
10. Engage the camera tracking drivers.
11. Assign the driver in Designer to a virtual camera.
12. Monitor the incoming data from the camera tracking system to ensure it is being received in time.
13. Create an MR set.
14. Optionally, add a set extension mesh.
15. Add LED screens to the MR set.
16. Add camera to the MR set if required.
17. If using multiple cameras, configure and test the indirection controller.

Further Reading

- Creating Screens
- Virtual Cameras
- Video Input
- Automation - Creating a new Motion Controller
- MR Set

- Indirections