2016 GETTING STARTED GUIDE

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LET'S GET STARTED

VECTORWORKS®
RENDERWORKS

VECTORWORKS RENDERWORKS GETTING STARTED GUIDE

Vectorworks Renderworks Getting Started Guide

Created using: Vectorworks Renderworks 2016

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GETTING STARTED WITH VECTORWORKS RENDERWORKS

Introduction

Welcome to the Renderworks Getting Started Guide. This guide was designed to give you as much experience as possible, with the most important tools, in an order that makes sense. However, the order in which you go through this guide does not matter. **All chapters work independently of each other** unlike the other Industry Series guides, where you should complete each chapter in order. Feel free to jump to a particular chapter if you would like to learn about a particular topic or follow the chapters in order. **Just be sure to open the accompanying exercise file at the beginning of each new chapter.** The first chapter will cover Renderworks Cameras.

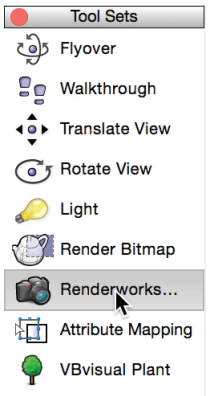
Renderworks Cameras

Placing a Renderworks Camera

Before we place a camera, let's take a look at the model. In this file, we have a main house then a pool and a small patio and front porch.

1. First, go to the Visualization tool set.

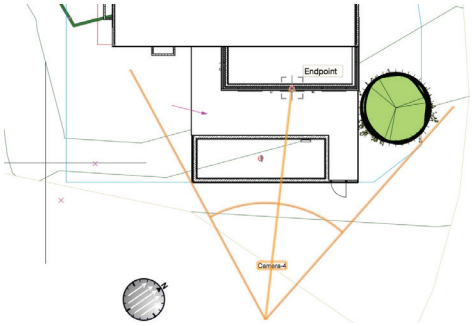
2. Click on the **Renderworks Camera** tool.



3. Click once, below the pool to set the location of the camera.

If you were holding a physical camera and taking a picture of the house, this is where you would be standing. Now, we want to aim the camera at the middle of the front porch of the house.

4. Click a second time on the middle of the front porch. This will



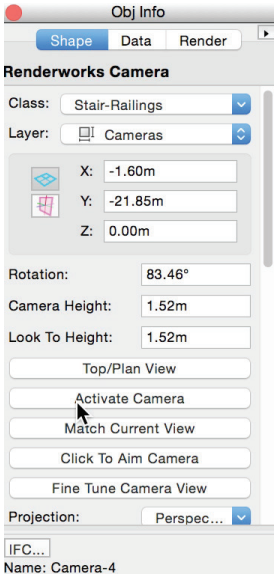
set the look-to point for the camera.

If you look in the Object Info palette, you will see the Renderworks Camera object is selected.

Editing the Camera View

Next, we edit the view of the camera we just created and review some of the Renderworks Camera settings.

1. In the Object Info palette click the **Activate Camera** button.



This will change our view to show what that camera is looking at. This view is almost what we want. You'll notice it doesn't look like a rendering. That is because we created the camera in a Top/Plan view and the render mode in Top/Plan is Wireframe. There are two places where we will need change the render mode, so that the camera will render in OpenGL instead of Wireframe.

2. In the Object Info palette, scroll down and click on the **Render Mode** pulldown menu.

3. Choose OpenGL from the list.

4. Now, change the current render mode by going to **View > Rendering > OpenGL**.

The first time you render in OpenGL it will take a while for the geometry calculate. However, after the initial render, switching between other render modes and OpenGL will be much quicker.

5. Go back to a Top/Plan view.

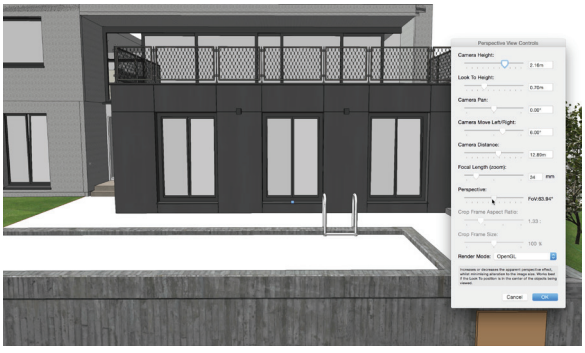
6. With the Renderworks Camera still selected, click **Activate Camera** in the Object Info palette.

The camera view now renders in OpenGL automatically. This is because we set that rendering mode for the camera in the Object Info palette. Now, we want to adjust this view just a little bit.

7. Click on the **Fine Tune Camera View** button in the Object Info palette.

The view is currently a little off-center. Let's adjust the view so it is looking straight on at the building.

8. Using the camera **Move Left / Right** slider, adjust the position of the camera until the house is straight on in the view.



This will move camera in relation to the look-to point. You will see the control handle for the look-to point, stays in exactly the same spot. Now, let's adjust the camera height.

9. Use the camera **Height** slide to increase the height of the camera slightly.

Again, you will notice the look-to height does not change. Next, let's adjust the look-to height slightly.

10. Using the **Look To Height** slider, adjust the look-to height until you can see a little be more of the sky.

We do not need to adjust the camera distance or focal length for this camera. However, note that the camera distance physically moves the camera forward or backwards and the Focal Length, zooms in or out. Also, you will generally not change the perspective to much. The default Normal Perspective setting is okay for most views.

11. Click **OK** to save the view changes.

Now, let's place another Renderworks Camera. However, before we do we want to make sure we deactivate this camera first. If we do not deactivate the camera before changing our view, we will actually change this camera's view.

12. In the Object Info palette, click the **Deactivate Camera** button.

13. Now, press the X key on your keyboard twice to deselect the Renderworks Camera.

Next, let's adjust our view.

14. Activate the **Walkthrough** tool in the Visualization tool set.

We are going to use the Walkthrough tool to move inside the building.

15. In the Tool bar, switch to the **Gamer** mode.

The Gamer mode allows you to use your mouse and the W A S and D keys to move around in the file.

16. Click once any within the document window to use your mouse to change the direction of your view.

As you can see, if you move your mouse around your view changes, but your position is fixed. To move we need to use the W A S and D keys. We are going to move into the second floor of the house. You will see the front entrance to the left of the pool.

17. Using the mouse, point the view directly at the house.

18. Press the W key to move forward a little bit.

19. Now, use the A key to move to the left until the door is in view.

The Z and C keys will adjust the view height.

20. Use the Z key to move up to the second floor.

Now, let's move into into the building.

21. Use the W A S and D keys as needed to move into the building through the second floor window above the front entrance.

Once inside we need to strafe to the right.

22. Use the D key to move to left.

23. Now, use the mouse to look at the left side of the couch.

24. Then, use the S key to backup slightly.

Adjust the view until the chair, table and couch are in view. Now, we need to create another camera.

25. Activate the **Renderworks Camera** tool.

26. Now, click anywhere in the document window to place the camera.

The location of the camera does not matter, because were are going to match the camera view to our current view, next.

27. In the Object Info palette, click the **Match Current View** button. The camera has now taken the current view.

28. Click the **Activate Camera** button.

You will see that the view does not change, but the render mode does change from OpenGL to Wireframe. This is because the camera is set to a Wireframe render mode again.

29. Change the **Render Mode** pulldown for the camera to OpenGL in the Object Info Palette.

30. Now, change the current render mode to OpenGL, using the **Render** pulldown menu in the Tool bar.

Creating Viewports from Renderworks Cameras

We now have two Renderworks Cameras. One showing an interior scene and exterior scene. Next, we will link these cameras to sheet layer viewports.

1. Go back to a Top/Plan view.

You will see we have the two cameras, Camera-4 and Camera-5.

2. Select the first camera we created.

3. Now, click **Activate Camera**.

The first view we set up will be shown.

4. Now go back to a Top/Plan and repeat this for the second camera

As you can see, Renderworks Cameras make it very easy to quickly navigate back to places in your document without having to use the Walkthrough tool every time. In addition to adding in navigating your document, Renderworks Cameras can also be

attached to viewports.

5. Make sure you have the interior Renderworks Camera selected and go to **View > Create Viewport**.

A dialog will appear, asking if you want to link the selected Renderworks Camera to the viewport.

6. Click **Yes**.

7. In the Create Viewport dialog, click on the **Create on Layer** pulldown menu.

8. Choose New Sheet Layer.

9. Set the **Sheet Number** to My Renderworks Cameras, then click **OK** and **OK** again to create the viewport.

A new sheet layer will be created with the viewport on it. Currently the viewport is showing in Wireframe. This is because it needs to be updated.

10. Move the viewport to the right of the page area and then, click on the **Update** button in the Object Info palette.

The viewport will be rendered in OpenGL. Now, let's link the exterior Renderworks Camera to a viewport.

11. Use the **Layers** pulldown menu in the View bar to activate the Cameras design layer.

12. Switch to a Top/Plan view.

13. Select the exterior Renderworks Camera.

14. Click **Active Camera** in the Object Info palette.

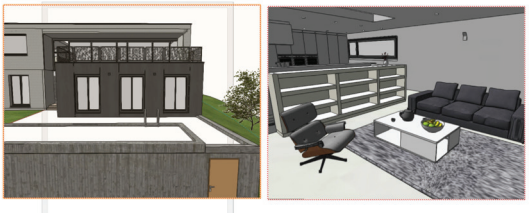
15. Now, go to **View > Create Viewport**.

The dialog will appear again, asking if you want to link the Renderworks Camera to the viewport. You can check the Always do the selected action option, however it is a good idea to leave the option unchecked as you may not always want to link the Renderworks Camera to the viewport.

16. Click **Yes**, to link this camera to the viewport.

17. Choose the My Renderworks Cameras from the **Create on Layer** pulldown and click **OK**.

The viewport will be placed on the same layer as the first viewport. We now have our exterior and interior renders.



18. Update the exterior viewport.

19. Go back to the Cameras design layer and switch to a Top / Plan view.

You will notice that the Renderworks Cameras are no longer present on the design layer. This occurs when you link a Renderworks Camera to a viewport. To edit these cameras, we need to go back to the viewports.

20. Navigate to the My Renderworks Cameras sheet layer.

21. Double-click on one of the viewports.

22. Choose **Camera** from the Edit Viewport dialog and click **OK**.

A dialog will appear, letting you know that you can edit the linked camera or delete the camera if you want.

23. Click **OK**.

You will see in the Object Info palette, that the Renderworks Camera is selected. You can edit the all of the camera settings from this view.

24. Click the **Return to Viewport** button in the upper right corner of the document.

In the next chapter, we will cover Renderworks Camera effects using these two viewports.

Renderworks Camera Effects

Render Mode

Let's start with the two viewports we created in the previous chapter. These viewports are currently rendered in OpenGL.

OpenGL will not show Renderworks Camera effects so we need to change their render mode.

1. Select both viewports.

2. In the Object Info palette, scroll down and click on the **Background Render** pulldown menu.

3. Under **Renderworks Style**, choose **High Quality Render**.

We will go into more detail on the different Renderworks modes and Renderworks Styles later. For now we will just use this predefined Renderworks Style. Let's check the settings for this style.

4. Go to the Resource Browser.

5. Click on the **Home** icon, to make sure you are looking at the active document.

6. Scroll down to the Render Styles section.

7. Right-click (Windows) or Ctrl-click on (Mac), on the High Quality Render Style and choose **Edit**.

8. In the Edit Renderworks Style dialog, switch to the Options tab.

You will see that the option for Camera Effects is enabled. Now, let's render these viewports before we adjust the camera effects.

9. Click **OK** to exit the Renderworks Style dialog.

10. With the two viewports selected, go to the Object Info palette and click the **Update** button.

This render mode will take a little while to finish. The amount of time will vary depending on your machine's hardware. Once the render completes, move on to the next step.

Exposure

Now, let's take a look at the various camera effects. The High Quality Render Style we are using, will not produce the highest quality you can get, however it will be good enough to see the camera effects were going to apply.

1. Double-click on the exterior viewport.

2. Choose **Camera** and click **OK**.

3. Go ahead and click the Don't show this dialog again, option and click **OK**.

The Renderworks Camera is selected and the camera view will be displayed in OpenGL, since the camera set to OpenGL. Before we adjust the Exposure setting, a quick note about exposure in renderings. ISO Film Speed and Shutter Speed are not exactly the same as they are with film. These effects can easily brighten a view, but there is a limit to how dark you can make a view without modifying the lighting. So, let's use the lowest ISO and Shutter settings to create a darker, rainy day look.

4. In the Object Info palette, scroll down to the Camera Effects section and enable the Exposure setting.

5. Set the I**SO Film Speed** to 50.

6. Then, set the **Shutter Speed** to 1/1000 s.

7. Click the **Return to Viewport** button.

Before we update this viewport, let's duplicate this viewport and adjust the exposure of the duplicated viewport.

8. Use the Ctrl + click + drag shortcut (Windows) or Option + click + drag shortcut (Mac), to duplicate this viewport and place it below the original.

9. Double-click on the new viewport.

10. Choose **Camera** and click **OK**.

If you look at the exposure settings in the Object Info palette, you will see they are the same as the original. Let's increase the shutter speed to create a brighter, day view.

11. Change the **Shutter Speed** to 1/250 s.

12. Click the **Return to Viewport** button.

13. Select both of these viewports and click **Update** in the Object Info palette.

When the renders complete, you will see the first viewport now

has a rainy day look. The sky is now a darker gray. The other viewport is now extremely bright in comparison. These two, drastically different lighting effects we achieved, by just changing exposure not actually changing the light at all.

Bloom

Next, we will go over bloom. Bloom will add a glowing halo around the brightest areas of the render. We will use the interior viewport to show the bloom effect. Let's start by duplicating this viewport.

1. Use the Ctrl + click + drag (Windows) or Option + click + drag (Mac) shortcut to duplicate the interior viewport.

2. Place it below the original.

3. Double-click on the duplicated viewport and choose to edit the camera.

4. In the Object Info palette, under the Renderworks Camera Effects section, set the **Bloom** to 25%.

5. Click the **Return to Viewport** button.

Let's leave the original interior viewport alone. We will use this for comparison to the duplicated viewport with a 25% Bloom effect.

6. With the duplicated viewport selected, click **Update** in the Object Info palette.

As the viewport renders, you may notice that it does not appear much different from the orignal viewport. This is because bloom is not applied until the very end of the rendering process. When the render completes, you will the bloom effect. A 25% bloom setting will give you a nice bright halo effect.

Vignetting

Now, let's take a look at vignetting. Vignetting creates a circular darkening of the image to its edge. We will go ahead and change the camera effects on the same viewport.

1. Double-click on the viewport with the bloom effect.

2. Choose **Camera** and click **OK**.

3. In the Object Info palette, first set the **Bloom** to 0%.

4. Set the **Vignetting Intensity** to 80%

The intensity, controls how dark the vignetting will be. We will leave the vignetting offset alone. This setting will just offset vignette effect from the corners toward the center of the image.

5. Click the **Return to Viewport** button.

Now, let's duplicate this viewport, so we can create a second example.

6. Use the Ctrl / Option + click + drag shortcut to duplicate this viewport.

7. Place it to the right of the original.

8. Double-click on the new viewport, choose **Camera** and click **OK**.

9. For this, viewport, set the **Vignetting Offset** to -50%.

A positive offset will move the vignetting away from the center of the image. A negative offset will move the vignetting in towards the center. So a negative offset, will create a keyhole effect.

10. Click the **Return to Viewport** button.

11. Select both of these viewports and click **Update** in the Object Info palette.

When the render completes, you will see the first viewport with a vignetting intensity of 80% and an offset of 0, has slight darkening around the edges. The second viewport has a much more extreme vignetting effect. The negative offset brought the dark effect in towards the center of the image.

Depth of Field

Finally, let's take a look at depth of field. Depth of field is the area in which objects appear relatively sharp, while the rest are blurry. We are going to adjust the f-stop and focus distance of this last viewport.

1. Double-click on the viewport, choose **Camera** and click **OK**.

2. First, in the Object Info palette, set the **Vignetting Intensity** and **Vignetting Offset** to 0.

3. Check Depth of Field and set the **F-Stop** to f/20.0.

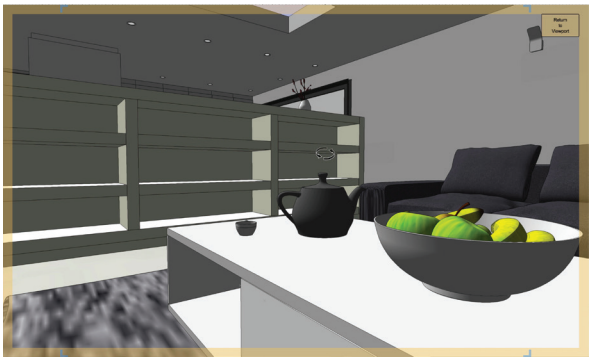
4. Then set the **Focus Distance** to about 0.5m.

Now, let's adjust the view of the camera.

5. Click the **Activate Camera** button in the Object Info palette.

6. Activate the **Walkthrough** tool in the Visualization tool set.

7. Using the **Gamer** mode, press the W A S and D keys to adjust the view as shown.



In general you will want the view to be pretty close to an object when using depth of field.

8. Once you have adjusted the view, click the **Return to Viewport** button.

9. Next, duplicate this viewport using the Ctrl / Option + click + drag shortcut, show we can create a second example.

10. Place it to the right of the original viewport.

11. Double-click on the viewport, choose Camera and click OK.

12. Change the F-Stop to F/2.2 and click **Return to Viewport**.

We will keep the same focus distance for this viewport, because the objects we want in focus are about half a meter away from the camera.

13. Select both of the viewports and click **Update** in the Object Info palette.

When the renders complete, you will see we have two very different renders. The first, viewport is focused on the bowl and the rest of the image is not too out of focus. This is because we used an f-stop of F/20.0. The other viewport is quite different. The f-stop setting of f/2.2 caused most of the image to be out of focus. Just the bowl is in focus in this render.

In the next, chapter we will go over the different render modes.

Basic Render Modes

Wireframe

We will start with the default render mode, Wireframe. Wireframe is the default render mode for Top/Plan and all 3D views.

1. In the View bar, click on the **Saved Views** pulldown menu and choose the 2.0 Renderworks Modes.

2. Activate the **Walkthrough** tool in the Visualization tool set.

3. Use the **Gamer** mode to move around the model in Wireframe.

You will see, Wireframe is the fastest render mode. For, most files, there will be no delay when navigating in this mode. However, no shading or textures are visible in this render mode.

4. Use the **Saved Views** menu, to return to the 2.0 Renderworks Modes, view when finished.

OpenGL

OpenGL will create good-quality rendering previews that are fast and interactive. Before we talk about OpenGL in more detail, let's see how to change render modes.

1. First, go to **View > Rendering**.

You will see you can choose from all of the available render modes in this menu. You can also use the Render Mode pulldown menu in the View bar.

2. Click on the **Render Mode** pulldown in the View bar.

The same render mode options are available here.

3. Go ahead and choose OpenGL from the list.

As we mentioned previously, the initial OpenGL render will take some time, but after that switching from any other render mode to OpenGL will be very quick. Now, let's take a look at the OpenGL render options.

4. Go to the **View > Rendering > OpenGL Options**.

5. Move the OpenGL Options window off to the side so we see the changes as we modify the options.

The first option is Detail. This will increase the overall quality of the render. However, this mainly affects curved geometry. So switching from high to low will not cause a noticeable change in this document. For most files, a Medium or High setting is recommend.

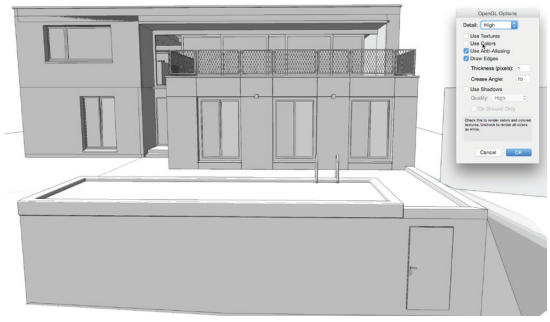
6. Set the **Detail** to High.

Next, we have several options. Let's start with textures.

7. Uncheck the Use Textures option.

This option will turn off all textures and just show the fill color applied to the objects.

8. Now, uncheck Use Colors as well.



This will disable all colors as well. So we currently have no colors or textures. On more complex models, this will speed up navigation while in an OpenGL render mode. Combinations of these two options on and off can also create interesting renders.

9. Go ahead and re-enable Use Textures and Use Colors.

10. Now, uncheck Anti-Aliasing.

Anti-Aliasing smooths the edges of objects. Depending on your screen resolution, this option may make little to no difference or a major improvement on the smoothness of objects.

11. Uncheck Draw Edges.

You can see the edges are on all of the objects are now gone. With this option disabled, objects appear a little more natural, but tend to blend into each other.

12. Re-enable the Draw Edges option.

13. Now, set the **Thickness** to 2.

14. Then, change the **Thickness** to 3.

15. Finally, back to 1.

The thickness option will increase the pixel width of the drawn edge. The next option is the Crease Angle. A Crease Angle of 70° is the default setting.

16. Set the **Crease Angle** to 1°.

The lower the angle, the more lines are drawn. You can see the render became much darker. Generally 50 or 70 is a good crease angle.

17. Set the **Crease Angle** back to 70°.

18. Next, enable the Use Shadows option and set the **Quality** to High.

OpenGL, shadows will give you a fast, interactive representation of shadows in the file. So you can adjust lighting and see the changes is shadows live. In addition to the Quality setting, there is also a On Ground Only option for OpenGL shadows.

19. Toggle the On Ground Only option on and off.

You will see the shadows disappear and reappear. You may be wondering why you do not see the shadows on the Site Model. This is because, On Ground Only, is referring to the ground plane and not the ground of the Site Model. This site model is sitting above the ground plane, so we do not see any shadows. In most cases, you will want to leave this option off.

20. Uncheck the On Ground Only and Use Shadows options.

21. Click **OK** to exit the OpenGL options dialog.

Fast Renderworks

Fast Renderworks is fast render mode that will show, shadows, textures and transparencies, but at a low detail level.

1. Click on the **Render** pulldown menu in the View bar and choose Fast Renderworks.

When the render completes, you will see that overall, the render may appear lower quality than OpenGL, however, the transparencies, shadows and reflections are now more accurate. You would use fast Renderworks, to get produce a quick render will editing objects or even lighting in a file.

Final Quality Renderworks

Final Quality Renderworks will render with a much higher detail level. textures, transparencies, geometry, will all be shown in more detail.

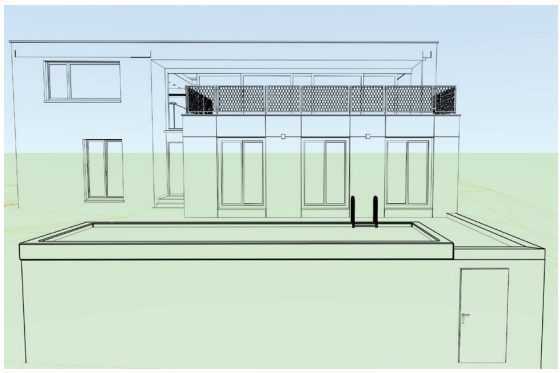
1. Go to **View > Rendering > Final Quality Renderworks**.

This render mode will take much longer to complete. As the render completes, you will notice the edges of objects are much sharper. This because Anti-Aliasing is enabled in the Final Quality Renderworks mode. Also, textures their shaders are rendered to a higher level of detail. You will see the bump map on the pool wall and the water give the objects more depth. As well as the reflections in the window are more apparent.

Hidden Line

Hidden Line, hides the edge lines of objects that are behind other objects, which gives a solid appearance.

1. Go to **View > Rendering > Hidden Line**.



As you can see Hidden Line does not show any textures or shadowing, but does hide lines to give a solid appearance to objects.

2. Now, go back to the **View** menu and under **Rendering**, choose **Line Render Options**.

As you can see there are a few options. We are not going to cover all of the settings at this time. However, let's a look at the Smoothing Angle option. This setting will reduce the number of lines drawn. The edges around the pool are a good example. If you increase the Smoothing Angle, it will reduce the number of lines drawn around the pool.

3. Set the **Smoothing Angle** to 30° and then click **OK**.

When the render completes, you will see the lines around the pool, no longer appear as thick. This because less lines were drawn. Let's take a look at some of the other Line Render options.

4. Go back to **View > Rendering > Line Render Options**.

5. Uncheck Generate Intersecting Lines and click **OK**.

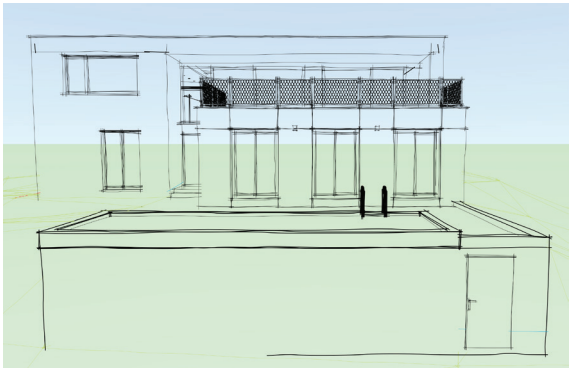
The Generate Intersecting Lines option, draws edges where ever two objects intersect. When the render completes, you will see that the walls touch the ground, the lines are no longer drawn.

6. Go back to **View > Rendering > Line Render Options**.

7. Re-enable Generate Intersecting Lines.

8. Then, enable Sketch Hidden Line Results.

9. For **Sketch Style**, choose Quick and click **OK**.



Sketch is applied overtop of the Hidden Line render. When the render completes, you will see the Sketch Style give the render, more of a hand drawn effect.

Coming up in the next chapter, we will cover Custom Renderworks and Renderworks.

Custom Renderworks and Styles

Rendering Resolution

In the previous chapter, we did most of our rendering on the design layer. When using more detailed render modes, such as Final Quality Renderworks, Custom Renderworks or Renderworks Styles, it is best to create a viewport and render on a sheet layer. This is because you have limited control over the rendering resolution on a design layer. It is controlled by your screen resolution and zoom level. So, let's create a sheet layer viewport.

1. Go to **View > Create Viewport.**

2. In the Create Viewport dialog, click on the **Create on Layer** pulldown menu.

3. Choose New Sheet Layer...

4. Set the **Sheet Number** to Custom Renderworks Styles.

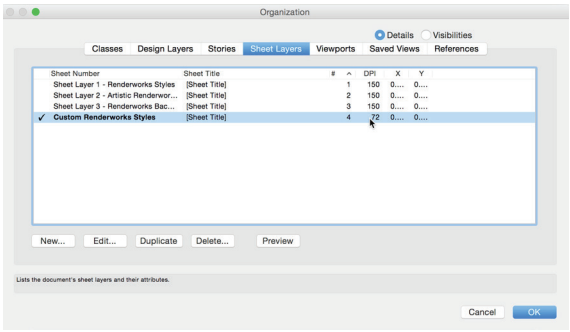
5. Click **OK** and then **OK** again to create the sheet layer and viewport.

6. Move the viewport to the right of the page area.

7. Go to **Tools > Organization**.

8. Switch to the Sheet Layers tab.

9. Select the Custom Renderworks Styles sheet and click **Edit**.



The resolution of a viewports is controlled by the sheet layer DPI setting. You can see that the sheet layer we created, has defaulted to 72 DPI. In general, 72 DPI is good for on screen viewing of your render. However, if you plan on printing or exporting the render or it is a larger render you will want to increase the DPI. Increasing the DPI will increase render times.

10. Leave the **DPI** set to 72.

11. Click **OK**.

Creating a Renderworks Style

Renderworks Styles are predefined Custom Renderworks settings, that can be quickly applied to a viewport or on the design layer. Let's start by creating a Renderworks Style.

1. In the Resource Browser, click on the **Home** icon.

2. Now click on the menu button below the Home icon.

3. Choose, **New Resource in…** and choose **Renderworks Style…**

The Edit Renderworks Style dialog will appear. You can see there are multiple tabs with many options. By default, many of the Options are disabled and all the Quality settings are set to Low. So, let's create a Renderworks Style with the default settings.

4. Name the **Style**, My Custom Renderworks Style.

5. Click **OK**.

6. In the Object Info palette under **Background Render** choose My Custom Renderworks Style.

7. Click the **Update** button to render the viewport.

You will notice the viewport will update much faster than it did on the design layer. This is because the fixed 72 DPI resolution is much less than the resolution on the design layer.

Anti-Aliasing

Now, let's adjust this render style. If you look at the edges of objects, you will see they are very jagged. This is aliasing. Let's enable the Anti-Aliasing option to improve the edges.

1. In the Resource Browser, locate the My Custom Renderworks Style, right-click or Ctrl-click on the style and choose **Edit**.

2. In the Edit Renderworks Style dialog under Options, enable the Anti-Aliasing option.

3. Now, switch to the Quality tab.

4. Set **Anti-Aliasing** to High.

5. Click **OK** to save the changes.

We want to compare the changes to the style from the original settings. So let's duplicate this viewport.

6. Use the Ctrl / Option + click + drag method to duplicate this viewport.

7. Place the new viewport to the right of the original.

8. Now, with the new viewport selected, click **Update** in the Object Info palette.

When the render completes, you can see the Anti-Aliasing option cleared up the jagged edges and drastically improved the quality of the render.

Shadows

Now, let's turn off the Shadows option and see the effect on the render.

1. Right-click or Ctrl-click on the My Custom Renderworks Style in the Resource Browser and choose **Edit**.

2. Under Options, disable Shadows and click **OK**.

Now, update the first viewport. Remember that both of these viewports are using our Renderworks Style. However, they will not display the changes to the style until we update them.

3. So with the viewport on the left selected, click **Update** in the Object Info palette.

Let the render complete. You will notice all of the shadows are gone. You may see what appears to be a shadow on the front wall but this is actually a reflection from the texture.

Textures

Next, let's disable textures.

1. Edit the Renderworks Style again.

2. Re-enable the Shadows options.

3. Now, disable Textures.

4. Click **OK**.

5. Update the viewport on the right.

When the render completes, you will notice a few things. First, of course the textures are gone and we just see the fill colors of the objects. You will also notice the transparency on the windows is gone. This is because transparency is texture shader. Without textures, there is no transparency or reflectivity. Also, you will notice the tree now shows as two intersecting planes. The tree is an image prop, we will go into image props in more detail in a later chapter, but an image prop is essentially just a texture applied to a 3D plane, so with textures disable, they are not visible.

6. Edit the Renderworks Style again.

7. Re-enable Textures.

Under Textures, you will see some additional options, Blurriness, Displacement Mapping, Caustics and Grass. These options enable specific shader options for textures. Currently, the textures in our file are not using any of these texture shaders. So enabling these options will have no effect.

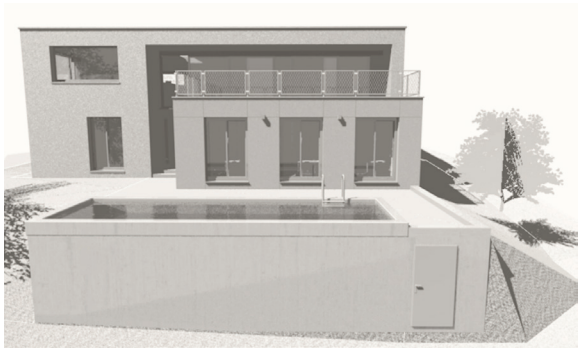
Colors

Let's move on to Colors. Disabling colors is a little different than just disabling textures. Colors will not only disable the fill colors of objects, but if you leave textures enabled will also disable the color of textures.

1. In the Edit Renderworks Style dialog, disable the Colors option.

2. Click **OK**.

3. Now, update the viewport on the left.



You can see with colors disabled and textures enabled, the color of the textures gone, but their transparency, reflectivity, or bump remains. This gives us, what is known as a white card rendering. There is a predefined Renderworks style called, Realistic Colors White that creates this effect as well.

In the next chapter, we will cover indirect lighting which is one of the keys to achieving a realistic render.

Indirect Lighting

Enabling Indirect Lighting

Now let's talk a little bit about indirect lighting. Interior renderings are more difficult to properly light than exterior renders. For the exterior renders we only had a single Heliodon light source. This lit the exterior renders without any additional lights or lighting options. So or interior renders we need to enable indirect lighting.

1. Using the **Saved Views** menu in the View bar, navigate to the Renderworks Camera Interior view.

2. Go to **View > Creative Viewport**.

3. Place the viewport on the Custom Renderworks Styles sheet layer.

4. For Rending, under **Renderworks Style**, choose the **My Custom Renderworks Style** and click **OK**.

5. Move the viewport below the other viewports.

Before updating the viewport, let's re-enable the Colors option we disabled in our Renderworks Style.

6. Edit the Style.

7. Enable the Colors option.

8. Also, enable the Fullscreen Preview option and click **OK**.

9. Now, update the viewport.

The fullscreen preview option will allow you to see a low detail preview of the render early in the rendering process. Allowing you make a lot of small changes to the render faster.

When the render completes, you will see the overall render is fairly dark. It is hard to make out the detail of the shelves, since no light strikes these directly, no shadows are created. Let's edit our Renderworks Style and enable indirect lighting.

10. Edit the Renderworks Style again.

11. First, under **Ambient Info**, choose Off.

We do not want any ambient light for this render.

12. Under **Lighting**, enable Lighting Options.

13. For I**ndirect Lighting**, choose Exterior, 3 Bounces.

Even though we are rendering an interior view, we are going to start with the Exterior, 3 Bounces option. This, mode will render faster than the Interior, 8 Bounce mode for these examples. Now, for Environment Lighting, we first need to set a Renderworks Background. The Environment Lighting will come from our Renderworks Background.

14. Switch to the Background tab.

15. Check the option for, Apply Renderworks Background.

16. For **Renderworks Background**, choose HDRI Day.

This background will simulate a nice sunny day outside. Next, we need to adjust some of the Quality settings.

17. Set both, **Indirect Lighting** and **Environment Lighting** to Medium and click **OK**.

Again, we want to compare our changes, so first let's duplicate the viewport.

18. Use the Ctrl / Option + click + drag shortcut, to create a duplicate of this viewport.

19. Place it to the right of the original.

20. Now, update the duplicated viewport.

When the update completes, you will see we now have a brighter render with more definition. However, we also have a some splotches in the corners of objects and where the walls intersect the ceiling. This is caused by the amount of bounces as well as the quality settings for both Indirect and Environment Lighting.

Editing Indirect Lighting Settings

Let's improve this render by first, turning up the quality settings for both Indirect and Environment Lighting.

1. Edit the Renderworks Style again.

2. Increase both the **Indirect Lighting** and the **Environment Lighting** to High.

3. Click **OK**.

4. Select the viewport on the left and click **Update** in the Object Info palette.

When the render completes, you will see that it is better, but just turning the quality up did not completely solve this problem. In order to completely fix the splotches in the corners we need to adjust the number of bounces.

5. Edit the Renderworks Style again.

6. Under Lighting, change the **Indirect Lighting** to Interior, 8 Bounces.

7. Click **OK** and then update the viewport on the right.

This render will take significantly longer than the previous render. We are trading render time for quality. Let the render complete. You will see that the render is now much brighter than the render on the left. Not only did increasing the number of bounces solve the splotchy problem, but also it gave us a much more realistic interior render. Properly lighting an interior scene, generally requires a medium or high quality setting for Indirect and Environment Lighting. As well as turning the number of bounces up to 8. So, let save this as a separate Renderworks Style.

8. Right-click or Ctrl-click on the Style in the Resource Browser.

9. Choose Duplicate.

10. Name the new style, My Custom Interior Renderworks Style and click **OK**.

Now, we know that this style is good for an interior rendering in this file and most likely in other files as well. Renderworks Styles can be imported into other documents or even saved in a Template file for later use.

So let's see how far we have come. Let's compare the original High Quality Renderworks Style to our updated Interior Style.

11. Right-click or Ctrl-click on the High Quality Render Style in the Resource Browser.

12. Choose **Edit**.

You will see that Indirect Lighting was set to Normal, 4 Bounces and under Quality everything was set to High. We didn't need all

of these settings turned to High. Simply, increasing the number of bounces, enabling Environment Lighting and increasing the quality of just the lighting effects was all that was needed.

One last thing on Environment Lighting. The majority of light for this render is coming from the Renderworks Background. If you disable the background the render will be much darker.

13. Edit the our new My Custom Interior Renderworks Style.

14. Under Background, uncheck Apply Renderworks Background.

15. Then, under Lighting set **Environment Lighting** to None and Click **OK**.

16. Now, select the viewport on the left.

17. In the Object Info palette, click on **Background Render**, then under **Renderworks Style**, choose the new **My Custom Interior Style**.

18. Click **Update**.

You can see how much of a difference the Environment Lighting makes for this render. Simply, by disabling the Renderworks Background we have created a completely different interior render.

In the next chapter we will talk about Artistic Renderworks modes.

Artistic Renderworks

Artistic Renderworks Styles

Next, we are going to look at Artistic Renderworks. Artistic Renderworks will create a hand-drawn or artistic look for a 3D rendering.

1. Go to the **Saved View** menu.

2. Choose the 2.2 Artistic Renderworks view.

You will see two examples here. These are both set to the Artistic Renderworks mode, just with different style setting. They are not using a Renderworks style, however you can use artistic styles as Renderworks styles. So let's create one.

3. In the Resource Browser, right click or ctrl click in a blank spot and choose New Renderworks Style in… and click **OK**.

In the Edit Renderworks Style dialog, you can see at the top, there is an option to change the Type. You can choose either Realistic or Artistic.

4. Choose Artistic for the **Type**.

Artistic Renderworks Styles only have two tabs, Artistic Style and Background. Let's start with the Background.

5. Switch to the Background tab.

Generally, if you apply a background, you should use the HDRI White background. Depending on the Artistic Style you choose, most of the other backgrounds, will not appear properly.

6. Enable the Apply Renderworks Background.

7. Then, choose HDRI White from the **Renderworks**

Background pulldown menu.

8. Now, switch to the Artistic Style tab.

The various style options, here all essentially create a Hidden Line render with added effects.

9. Toggle between a few of the styles to see the different looks available.

You will notice the preview will change to give you an idea of what each style will look like. Depending on the Style selected, you may have additional options to adjust the style. Let's create a Cartoon Artistic Style.

10. Choose Cartoon from the **Style** pulldown menu.

11. Name the style, Cartoon Artistic Style and click **OK**.

12. Now, click on the top viewport.

13. In the Object Info palette, scroll down to **Background Render** and under **Renderworks Styles**, choose the **Cartoon Artistic Style** we just created.

14. Update the viewport.

Generally, Artistic Renderworks renders, do not take very long. They will take about as much time as a standard Hidden Line render. When the render completes, you will see the Cartoon Artistic Style, shows textures, colors and edges. So it will looks similar to OpenGL with Draw Edges enabled. However, the textures, transparencies and reflectivity are much more accurate in this mode.

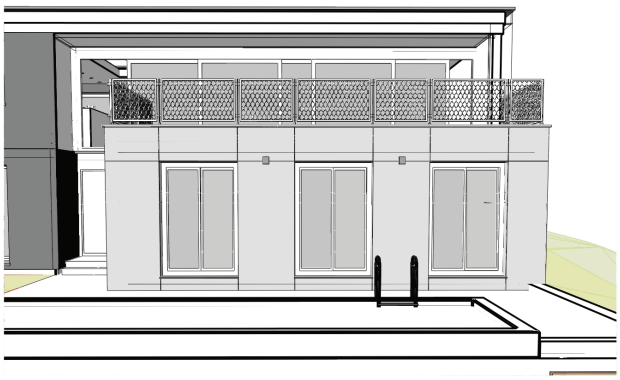
Shaded Polygon

Next, we will go over the Shaded Polygon modes. Let's render the bottom viewport in a Shaded Polygon mode.

1. Select the bottom viewport.

2. In the Object Info palette, set the **Background Render** to Shaded Polygon.

3. Now, Update the viewport.



Shaded Polygon will give you a similar effect to OpenGL with textures turned off and draw edges turned on. However, this mode uses shading instead of shadows, so it can create an interesting Artistic render. In most cases, you would use OpenGL or even Artistic Renderworks to create a similar look as this render mode, does take a longer to render.

In the next chapter, we will be discussing Renderworks Backgrounds in a little more detail.

Renderworks Backgrounds

Applying a Renderworks Background

Now, let go over Renderworks Backgrounds in a little more detail. Renderworks Backgrounds can include clouds, colors, images, a physical sky, or panoramic image files, as well as lighting effects.

1. Go to the **Saved Views** pulldown menu.

2. Choose the Renderworks Background Saved View.

On this sheet layer, we have two viewports. The viewport on the bottom, is not using a Renderworks Background. The one above it, is using a Renderworks Background. That is the only difference between these two renders. The blue background color and all of

the additional light, are coming from the Renderworks Background. Let's go ahead and add a Renderworks Background to the bottom viewport.

3. Select the bottom viewport.

4. In the Object Info palette, scroll down until you see RW Background.

If this viewport was using a regular render mode, you would be able to choose a Renderworks Background here. However, you will notice that the option is grayed out. This is because the viewport is using a Renderworks Style and Renderworks Backgrounds are set within the a the style settings. Let's find out, which style this viewport is using.

5. Click on **Background Render**.

6. Then, under **Renderworks Styles**, note which style is checked.

The Quick Render - No Background style is being used for this viewport. So we will need to edit that style.

7. Locate the Quick Render - No Background style in the Resource Browser.

8. Right-click or Ctrl-click on the style and choose **Edit**.

9. In the Edit Renderworks Style dialog, switch to the Background tab.

10. Make sure, Apply Renderworks Background is checked.

11. Then, for the **Renderworks Background** choose HDRI Sky Sunset.

12. Set **Environment Reflections** to From Current Background.

13. Now, switch to the Lighting tab.

14. Make sure **Environment Lighting** is set to From Current Background.

15. Rename the style to Quick Render - Sunset and click **OK**.

We do not need to re-apply this new style to the viewport because we just renamed the edited and renamed the style, instead of duplicating it. You can check the Background Render mode for this viewport to confirm it is set to Quick Render - Sunset.

16. Now, click Update to render the viewport.

When the render completes, you will see the feel of this rendering is now completely different than the one above it. All we did was change the Renderworks Background to get this effect.

Creating a Renderworks Background

You may have noticed, that the HDRI Sky Sunset background does not completely fill the background. The HDRI Sky backgrounds, only contain the top part of the image they don't contain anything below the horizon line. There are a few ways to fix this, you can adjust the angle of this view, choose a different Background or even make your own background. So let's make a new Renderworks Background.

1. In the Resource Browser, click on the menu button under the Home icon.

2. Choose **New Resource in…** and then select **Renderworks Background**.

We are going to create a Chroma Key background.

3. Name the Renderworks Background, Chroma Key Background.

4. Then, for **Background** choose One Color.

5. Click the Options button.

6. Click on the Color pulldown and choose a bright green color.

7. Click **OK** and then **OK** again, to create the Renderworks Background.

The green color may appear to be a little strange, but will explain why we chose this color shortly. Before that, we need to edit our Renderworks Style and apply the new background.

8. Locate the Quick Render Sunset style in the Resource Browser and edit it.

9. Switch to the Background tab and for **Renderworks Background**, choose the Chroma Key Background we just created.

Now, we need to adjust some of the reflection and lighting settings, so the green color from our new background doesn't affect our render.

10. Switch to the Quality tab and set the **Max Reflections** to 0.

11. Then, under Lighting set **Environment Lighting** to None.

12. Finally, rename the style, Quick Render - Chroma Key Background and click **OK**.

13. Now, update the bottom viewport.

When the render completes, you will see it looks very strange. The bright green color, we used has created a chromakey background. If you export this rendering to an image file and bring it into a photo editing software, you can easily select that green color and make it completely transparent. This will make it easy to replace the background with any image you would like.

Lights

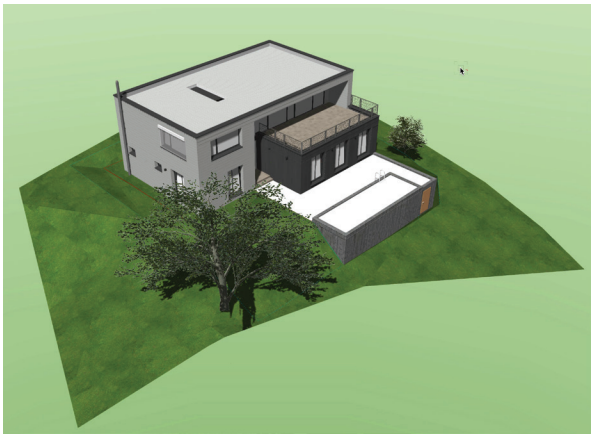
Directional Lights

Next we are going to cover lighting. Lighting is extremely important to producing quality renderings as you have seen with the Indirect and Environmental lighting from the previous chapters. We are going to start with Heliodons and directional lights.

1. Go to the **Saved Views** menu in the View bar.

2. Choose Setting up Lighting - Heliodon and Directional Lights.

This will take us to an OpenGL rendering of the model. Let's take a look at the lights in this file. The easiest way to control lights, is by using the Visualization palette.



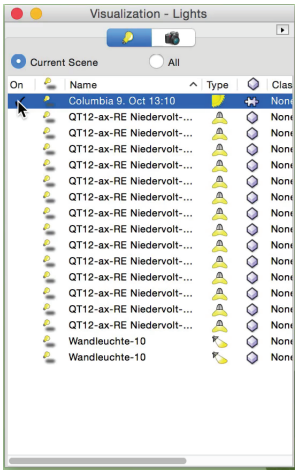
3. Go to the **Window** menu.

4. Under **Palettes**, turn on **Visualization**.

The Visualization palette will open. You can see there are quite a few lights in this file, but only one is currently turned on. This light is a Heliodon. You can think of a Heliodon as an advanced directional light. However, since the Heliodon is only available in Design Series versions of the software, we are going to focus on

directional lights.

5. In the Visualization palette, click on the checkmark in the On column to the left of the Heliodon to turn it off.



When you turn off the light, the objects will go dark.

6. Now, minimize the Visualization palette and move it out of way for the moment.

7. Go to the Visualization tool set and activate **Light** tool.

8. In the Tool bar, make the first mode, **Directional Light** mode active.

9. Click once in the bottom right corner of the document to place the directional light.

10. In the Light Preferences - Directional Light dialog, leave the default settings and click **OK**.

Our model is now lit again, but depending on your preference settings you may not see the light object.

11. Go to **Tools > Options > Vectorworks Preferences…**

12. Under the Display tab, make sure the **Display light objects** pulldown is set to Always and click OK.

In the bottom right corner of the document you should now be able to see both the Heliodon and the directional light we just placed.

13. Select the directional light object.

You will see two blue control handles.

14. Click once on the bottom control handle.

15. Move your cursor to the left and right.

As you move your cursor, you will see the direction the light is coming from changes.

16. Click a second time to set the direction of the light.

17. Now, click once on the other control handle and move your cursor up and down.

This will change the angle at which the light is coming from. You can use more than one directional light object, but generally only one should be used for exterior lighting.

18. Select the directional light object, then in the Object Info palette click on the Color.

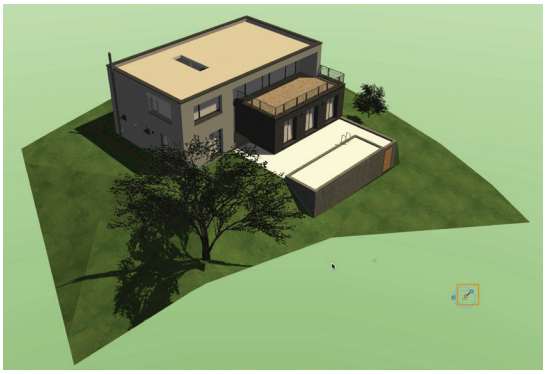
19. Choose a bright red color and click **OK**.

Generally, you will not want use this extreme of a color, but it does clearly show the effect that adjusting the light color will have on the render.

20. Edit the color of the light again.

21. This time choose light, yellow and click **OK**.

22. Now, try a light orange color and click **OK**.



Adding a little yellow, orange or even blue will enhance the lighting effect.

23. Finally, go ahead and delete this directional light, as it is no longer needed.

Point Lights

Next, we are going to take a look at Point Light Objects.

1. Go to the Saved Views menu and go to the 3.3 Setting up Lighting - Point Lights.

This will takes us inside the model, looking up a stairwell. In the ceiling on the left, we have geometry representing recessed lighting.

2. Use the **Pan** tool, from the Basic palette or your middle mouse button / Spacebar to pan up slightly, so you can see both recessed lights.

3. Now, activate the **Light** tool in the Visualization tool set.

4. Switch to the **Point Light** mode.

A point light will emit light in all directions from the point where it is placed. You will see the first recessed light, already has a Point Light in it.

5. Click once in the center of the other recessed light to place the point light.

6. In the Light Preferences - Point Light dialog, enable the Soft Shadows options and click **OK**.

The light emits evenly from that point in all directions. You can see shadow on the wall created by the grating along the stairs. The first Point Light is off at the moment. Let's turn it on.

7. Select the first point light.

8. In the Object Info palette, click On.

This give us some additional light in the hallway and across the stairs. A quick note about light in OpenGL. A maximum of eight lights will show, when in OpenGL. So when initially setting up your lighting, make sure to turn off any lights that you do not need. If you need more than eight lights, you will need to render in a Renderworks mode.

9. Select both of the point lights.

10. In the Object Info palette, click Off.

Spot Lights

Next up, are Spot Lights. Spot Lights are similar to directional lights, in that will emit light in one direction. Let's change the first Point Light to a Spot Light.

1. Select just the first point light.

2. In the Object Info palette, for **Kind** change it from Point to Spot and choose On.

3. Click once on the blue control handle and move your mouse around.

As you move you mouse, the direction of the light will change. You can use this control point to set the direction of the light or enter the Pan and Tilt angles directly, in the Object Info palette.

4. Click once anywhere to change the direction of the light.

5. Now, in the Object Info palette, scroll down and set the **Tilt** to 90°.

This will point the light straight down. Generally, spot lights work

well for recessed lighting. However, you can see here that the light is not showing against the wall. This is because the spread and beam angles are a little too low. We can adjust those values in the Object Info palette.

6. With the Spot Light selected, set the **Spread** and **Beam** to 90°.

You can see that the light now hits the wall and shows on the stairs as well. We set the spread and beam the same angle, so the edge of the light is a little harsh. Let's adjust the Spread angle to soften or fade the edge of the light.

7. Start, by setting the **Spread** to 100° in the Object Info palette.

You will see the edge is now softer, sort of fuzzy. Now, let's decrease the beam angle to make the effect even more apparent.

8. Set the **Beam** angle to 80°.

The fade is now much more natural.

Repeat this process for the other light.

9. Set the **Kind** to Spot and turn the light on.

10. Point the spot straight down, by setting the **Tilt** to 90°.

11. Finally, set the **Spread** to 100° and the Beam to **80°**.

This will give you a nice effect of light coming down from the ceiling. This method, is much easier than trying to use a Point Light in conjunction with a reflective texture to replicate this effect.

Ambient Lighting

We have show Ambient Lighting briefly before, but now we will go over it in more detail. First, let's switch to a different view.

1. Using the **Saved Views** menu, switch to the 3.3 Setting up Lighting - Set Lighting Options view.

2. Turn off any lights that are still visible.

We no longer want to see the light objects anymore. So let's adjust that preference setting.

3. Go to **Tools > Options > Vectorworks Preferences**.

4. Under the Display tab, change the **Display light objects** to Only in wireframe

5. Click OK.

6. Now, go to **View > Set Lighting Options...**

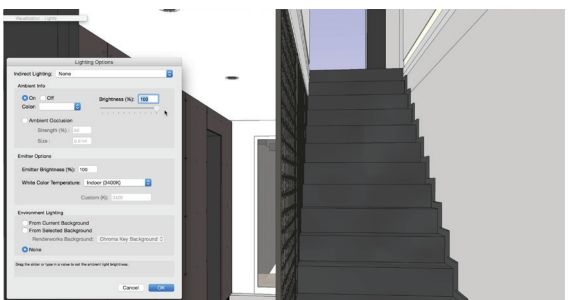
Here we can adjust the Ambient settings. Ambient lighting will universally increase or decrease how bright objects appear.

7. Move the Lighting Options dialog off to the side of your screen, so you can see more of the model.

8. Now, drag the **Brightness** slider to the left to 0%.

At zero, everything except for the Blue Renderworks Background is completely black. There is a small amount of the light coming from the background hitting the fencing next to the stairs.

9. Now, slowly scroll up to 100%.



This will give even bright light on everything. Normally, you do not want to heavily use Ambient lighting for renderings. It is preferable to add additional light sources or indirect lighting, to get a more realistic render.

10. Go ahead and reduce the Ambient lighting to about 60%.

Next, let's take a look at Ambient Occlusion. First, let's switch to a different view, to better show off this effect.

11. Click OK to exit the Lighting Options dialog.

12. Go to the Saved Views menu and choose the Setting up Lighting - Ambient Occlusion view.

This is a similar view, but both colors and textures have been disabled in the OpenGL render options. You can see it is very difficult to see the difference between the objects. Unless there is light creating a shadow, most of the stairs and the hallway blend into each other. We can use Ambient Occlusion to improve this render.

13. Go to **View > Set Lighting Options…**

14. Again, move the dialog off to the side and then Enable Ambient Occlusion.

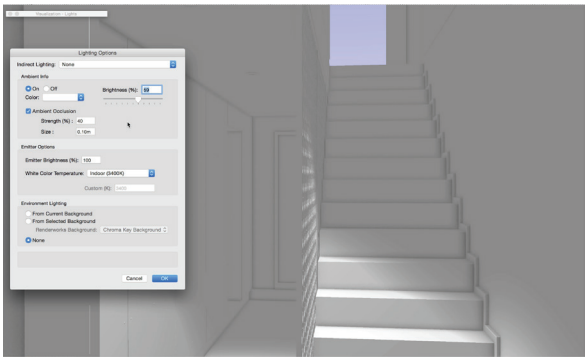
As you can see Ambient Occlusion has added shading that naturally occurs when there are two surfaces next to each other. Let's adjust the strength and size of this effect.

15. Go ahead and increase the **Strength** to 100%.

This is a little too strong. Let's reduce the strength and adjust the size as well.

16. Set the **Strength** to 40%.

17. Then, set the **Size** to 0.1m.



This is much better. It really brings out the edges objects.

Ambient Occlusion is essentially, emulating effect of indirect lighting set to a high number of bounces. So this is quick way to achieve this effect, but for best results use indirect lighting in a Renderworks mode.

In the next chapter, we will be working with an exterior landscape scene and take a look at textures.

Applying Textures

Applying Textures

Here we have an exterior landscape render. This render is already pretty good, but there are a few issues, that we will resolve.

1. Start by going to the **Saved Views** pulldown menu and choose the 1 - Applying Textures.

This is simply a closer view of the fire pit from the previous view. As you can see the stones for the fire pit, do not have a texture. Let's apply one now.

2. In the Resource Browser, click on the **Home** icon.

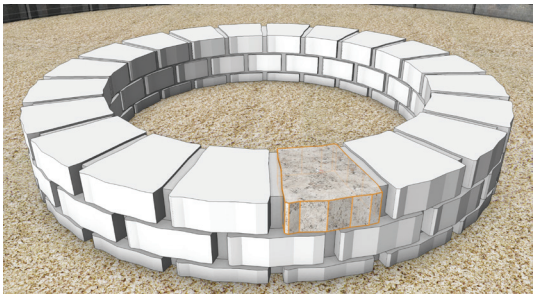
3. Click on the **Resources** pulldown menu and choose Top Level.

4. Scroll down to the Render Textures section and locate the White Gray Rock RT texture.

5. Click and drag this texture onto one of the top stones.

6. When one of the top stone extrudes highlights in red, release your mouse button to apply the texture.

The texture will be applied to the extrude. This is one way of applying a texture.



You can also apply a texture to a selected object, by simply doubles clicking on the texture in the Resource Browser.

7. Use the Shift key to select two of the top stone extrudes.

8. Now, double-click on the White Gray Rock RT texture in the Resource Browser.

The texture is applied to both of these extrudes. Now, let's apply this texture to the rest of the stone extrudes.

9. In the Basic palette, activate the **Select Similar** tool.

10. In the Tool bar, click on the **Preferences** button.

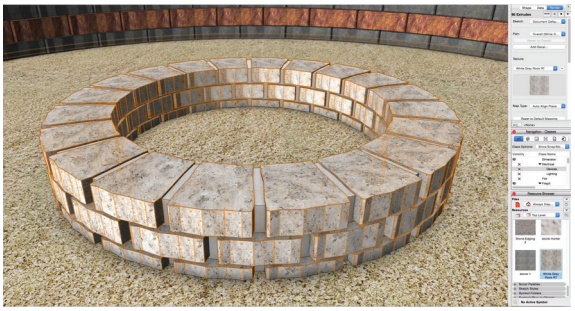
11. Make sure only Class and Object Type, under Other Attributes are checked and click **OK**.

12. Now, click on one of the stone extrudes to select them all.

All of these stones are in the same class, so they were all selected. Next, we will use a third method to apply a texture to the rest of these extrudes.

13. Go to the Object Info palette and click on the Render tab.

14. Click on the **Texture** pulldown menu and choose the White Gray Rock RT texture from the list.



All of the fire pit stones now have a texture. These 3 methods are the most common ways to directly apply a texture to an object. You can also apply textures by Class. Which will allow you to quickly apply the same texture to any object in a particular Class. So let's go ahead and do that now.

15. First will go the Navigation palette, then in the Classes tab, set the Firepit-Stones class to invisible.

The stones will disappear. Now, have another extrude that represents the mortar between the stones.

16. Select the object.

17. Then in the Object Info palette under the Render tab, make sure the **Texture** is set to Class Texture.

18. Now switch to the Shape tab.

You will see this object is in the Firepit–Mortar Class.

19. Now, go to **Tools > Organization**.

20. In the Classes tab scroll down and select the Firepit-Mortar Class and click **Edit**.

21. In the Edit Class(es) dialog, go to the Other tab.

Other is used for texturing anything that is not a wall or a roof.

22. Check the Texture / Surface Hatch option.

23. Then click on the Texture thumbnail and choose the Stone Mortar texture.

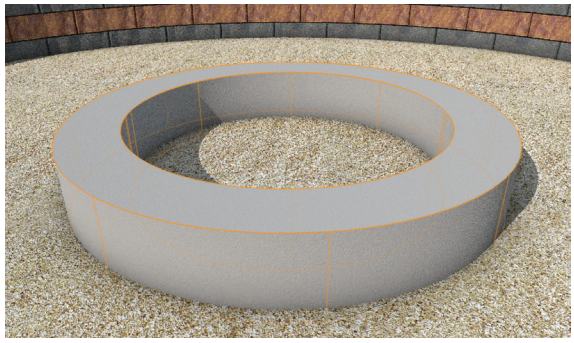
24. Click **OK** and then **OK** again.

You will see the texture was only applied to the top of the object. This is because, this object has multiple parts, that can be textured individually.

25. In the Object Info palette, Under the Render tab click on the **Part** pulldown menu.

The overall class is currently set to Class Texture, but the sides are set to None. You can set each side to a different texture or set the Sides part to use the Overall texture.

26. Choose Sides from the **Part** list and then click the **Revert to Overall** button.



Now, the top bottom and sides will all use the overall texture, which is currently set to Class Texture.

Scaling Textures

Next, let's go over how to scale or map textures on objects.

If you scroll down in the Render tab of the Object Info palette, you will see mapping options. We will start with the texture scale.

1. With the extrude still selected, click and drag the Scale slider to the right and left.

As you move the slider the texture will resize.

2. Set the scale back to 1.

You may have noticed that at a scale of 1, the texture appears to have a clear repeating pattern. You may think this is incorrect and scale the texture to adjust the pattern. However, you should always do a quick Renderworks render to confirm the actual pattern of the texture.

3. Go to **View > Rendering > Fast Renderworks**.

As the render processes, you will see the pattern we saw in OpenGL disappears and now we have grainy mortar look. You do not need to wait for this render to finish, just switch back to OpenGL to stop the render.

4. Go back to **View > Rendering > OpenGL**.

There are additional mapping options in the Object Info palette, but there is a more direct method of mapping textures. We are going to use the Attribute Mapping tool to map the sand floor below the fire pit.

5. First, set the Firepit-Mortar class to invisible in the Navigation palette.

6. With the sand floor selected, in the Basic palette activate the **Attribute Mapping** tool.

A dialog will appear asking you to change the map type.

7. Choose Plane and click **Yes**.

By default the Attribute Mapping tool also started with the texture applied to the sides of the object. Let's choose the top of the object.

8. Click once on the object to choose the top plane.

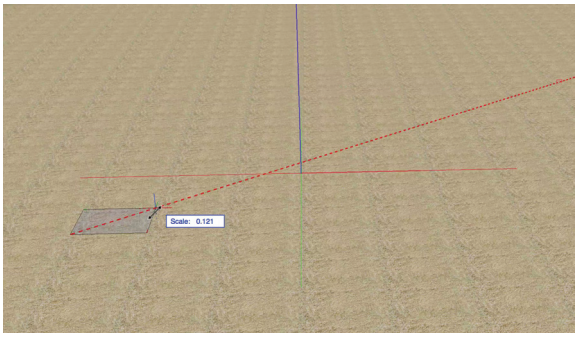
We now have a small sample of the texture showing. Currently, this sand texture is a little large for this object. This is even more noticeable if you switch to the second mode of the Attribute Mapping tool.

9. In the Tool bar enable the **Original Repeat** mode.

You can now see the repetition of the texture over the whole object. Let's scale this texture.

10. Click once on one of the corner control handles and move your cursor inwards.

This will reduce the size of the texture. The smaller we make this texture the more noticeable the repeating pattern becomes.



11. Click a second time to stop scaling the texture.

12. Now, click once on one of the middle control handles.

13. Move your cursor down slightly, until to rotate the texture.

14. When it is at about a 25° angle, click a second time to complete the rotation.

The pattern effect, is much less apparent when the texture is rotated slightly. Go ahead and use the corner control handles to scale the texture to about 0.5. Both the Floating Data Bar and the Object Info palette will indicate the scale of the texture. You can also clicking inside of the control handles to adjust where the pattern starts. However, this does not make a big difference on this type of texture.

So let's take a look at our changes.

15. Switch to the **Selection** tool in the Basic palette to disable the **Attribute Mapping** tool.

16. In the Navigation palette, set the Firepit-Mortar and Firepit-Stones classes to visible.

17. Now, render in Final Quality Renderworks, by going to **View >**

Rendering > Final Quality Renderworks.

Coming up in the next chapter we will go over creating a texture from scratch.

Creating Textures

Stone Texture

We are going to create a new stone texture from scratch. Let's start by turning off all other objects, so we can focus on a single brick.

1. Start by rendering in Wireframe, by going to **View > Rendering > Wireframe**.

2. In the Navigation palette, set the **Class Options** to Active only.

3. Now, make the Special Brick Class active, by click to the left of the Class name in the Navigation palette.

4. Next, go to **View > Set Renderworks Background** and choose None.

5. Render in OpenGL, by going back to **View > Rendering > OpenGL**.

We now have just one brick visible, that does not have a texture. Now, let's create a stone texture.

6. In the Resource Browser, right click or Ctrl-click in a blank area and choose New Resource in…

7. Choose Renderworks Texture from the list.

8. In the Edit Texture dialog, name the texture A New Stone Texture.

Here we have multiple Shaders. Let's start with Color. The most common Color Shaders are a single color or image. We will use a single color.

9. Click on the **Color** pulldown menu and choose Color.

10. Click the **Edit** button.

11. Now, choose a dark gray color.

For a stone texture, we do not need to add a Reflectivity or Transparency Shader, but we do want to add a Bump Shader. Bump will create an effect, that will give the texture more depth or appear more 3D.

12. Click on the **Bump** pulldown menu and choose Noise.

13. Now, click the **Edit** button.

There are several noise patterns available. Generally, Turbulence or Wavy Turbulence will work well for a rocky effect or even water.

14. Click on the **Pattern** pulldown menu and choose Wavy Turbulence.

By default, a Bump Shader will just apply a shading effect to make the texture appear more 3D, but we can add displacement mapping to actually generate 3D geometry.

15. At the bottom of the dialog, set the **Displacement Mapping Height** to 0.01m, with a **Detail** set to Medium.

If you look at the preview, this setting appears a little extreme.

16. Change the **Height** to 0.001m and change the **Detail** to High.

That looks a little better, let's enable the Self-Shadowing as well. This will let the displacement create shadows.

17. Check the option for Self-Shadowing and click **OK**.

18. Click **OK** again to create the texture.

19. Now, select the extrude.

20. In the Object Info palette under the Render tab, choose the A New Stone Texture from the **Texture** pulldown.

As you can see, the extrude just shows a gray color. We do not see the bump or displacement mapping. This is because OpenGL does not display these texture attributes. You must render in a Renderworks mode to see these Shaders.

21. Go to **View > Rendering > Final Quality Renderworks**.

As the render starts to process, you will see the Color and Bump Shader, but you still do not see the displacement mapping. This is because displacement mapping is not enabled in Final Quality Renderworks. We need to use the Custom Renderworks mode.

22. Press the Esc key twice to stop the render.

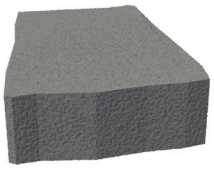
23. Go to **View > Rendering > Custom Renderworks Options...**

24. Under Textures, enable the Displacement Mapping option and set the **Displacement Mapping** to High.

25. Click **OK**

26. Now, select Custom Renderworks from the Render pulldown menu in the View bar.

When, the render completes you will now see the Displacement Mapping. It looks like create a contoured 3D surface.



However, all we did was create a texture with Color, Bump and Displacement Mapping Shaders.

Glass Texture

Now, let's create a reflective glass texture. We will just edit this same texture.

1. Right-click or Ctrl-click on the A New Stone Texture in the Resource Browser and choose **Edit**.

2. Rename the texture, A New Glass Texture.

3. Click the **Edit** button for Color.

4. Click on Standard Vectorworks Colors and choose a light blue color.

We want the glass to be smooth so we need to disable the Bump Shader.

5. Click the **Bump** pulldown menu and choose None.

Now, let's add some reflectivity and transparency to the texture.

6. Click on the **Reflectivity** pulldown menu and choose Glass.

7. Then for **Transparency**, choose Glass as well.

This will give you a very basic glass texture.

8. Click on the **Edit** button for Reflectivity.

You will see there are multiple settings. You can adjust the edge and center color as well as add blurriness to create a frosted glass look. However, blurriness does need to be enable in the Custom Renderworks options and it will significantly increase render times.

9. Leave the settings at the defaults and click OK.

10. Now, click on the Transparency **Edit** button.

Here you can edit the Transmission percentage. 100% is effectively invisible and 10% is almost solid. For the Index of Refraction, glass typically has a value of 1.5.

11. Set the **Index of Refraction** to 1.5.

The Color option, will allow you to tint the transparency. Next, we have Blurriness, which has a similar effect to the Reflectivity Blurriness option. Absorption Color, will cause the texture to appear closer to the chosen color as you increase the amount of light hitting the texture.

12. Click **OK** and **OK** again to create the texture.

When the render completes, you see the glass texture on the extrude. The object does look a little odd. This is because there are no objects around it to reflect. When creating glass textures it is best to have other objects.

Brick Textures

Finally, let's create one more type of texture. We will create a brick texture next.

1. Edit the texture, A New Glass Texture.

2. Rename it, A New Brick Texture.

For the Color Shader, we are going to choose an Image.

3. Click on the **Color** pulldown and choose Image.

4. Choose Reuse an Image From Another Resource and choose Brick Wall Color and click **OK**.

5. Click **OK** again in the Edit Image Color dialog to accept the defaults.

6. Go ahead and set both the **Reflectivity** and **Transparency** to None.

Now, let's apply a bump image shader.

7. Click on the **Bump** pulldown and choose Image.

8. Click Reuse an Image From Another Resource.

9. Choose the Brick Wall bump and then **OK**.

You will notice the image is slightly different from the original brick image. This is a displacement map image. There is shades of white and black. The whiter areas will be higher and the darker areas will be lower.

10. Set the **Displacement Mapping Height** to 0.02m.

11. Set the **Detail** to High and enable Self-Shadowing.

12. Click **OK**.

When the preview updates, you will see that it does not look correct. This is because we are currently showing a very small object in the preview window.

13. Increase the **Obj Size** to 1m.

Next, we need to adjust the size of the image, with will represent the actual size of the bricks.

14. Under Size, click the **Set by Image** button.

15. Choose Color and click **OK**.

In the Set Image Size dialog, you will see there are two white handles. We will use these to determine the size of an individual brick, which is about 1.2m.

16. Drag one of the handles to the the end of a single brick.

17. Then drag the other handle to the opposite side of the brick.

18. Now, set the **Feature Size** to 0.2m and click **OK**.

The preview now looks much better. Let's see how it looks.

19. Click **OK** to create the texture.

The texture is applied to our single stone, but it does look a little odd. Let's replace this object with something a little more reasonable.

20. Delete this extrude.

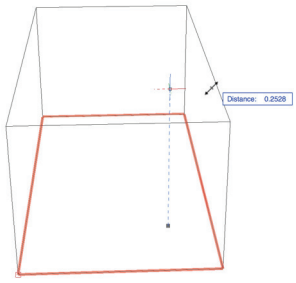
21. Activate the **Rectangle** tool in the Basic palette.

22. Draw a rectangle that is about 0.35m wide.

23. Then, move your cursor over top of the Rectangle.

24. When it highlights in red, click once to activate the Automatic Push/Pull mode.

25. Move your cursor up until the extrude is about 0.27m and click a second time to create the extrude.



26. Now, in the Object Info palette, under the Render tab, choose A New Brick Texture from the **Texture** pulldown menu.

27. Zoom in a little so we can see the detail of the texture.

28. Finally, go to **View > Rendering > Custom Renderworks**.

When the render completes, you will be able to really see the true

effect displacement mapping can have on an object.

In the next chapter, will cover some more advanced texture options, such as backlit and glow.

Backlit and Glow Textures

Backlit Texture

Now, let's take a look at Backlit textures.

1. Go to the Saved Views menu and choose 3 - Glow and Backlit Shaders.

This will bring you to a view of a lighting fixture. It contains a light object, and geometry representing the bulb and outer glass housing. Let's render this view and see what the object looks like currently.

2. Go to the **Render** pulldown menu in the View bar and choose Custom Renderworks.

When the render completes, you will see the glow of the light as well as the transparency and reflectivity of the outer glass housing.

3. Switch back to an OpenGL render mode.

This object is a symbol. So in order to edit or apply a texture to the objects within the symbol, we must first, edit the symbol to access the geometry.

4. In the Resource Browser, click on the **Home** icon to make sure you are looking at the active document.

5. Now, scroll down to the Symbol Folders section, open the Sconces folder and locate the B10.5 Candelabra 60W symbol.

6. Right-click or Ctrl-click on the Symbol and choose Edit 3D Component.

7. Zoom in on the objects.

You will see, we have Sweep representing the bulb and a Point Light object within the Sweep. Let's take a look at these objects in OpenGL.

8. Go to the **Render** pulldown menu in the View bar and choose OpenGL.

The Sweep that represents the bulb is solid, there is not a transparency applied to the texture on the blub.

9. Render in Fast Renderworks.

Now, we are seeing light through the Sweep. This effect is caused by a Backlit texture. Let's see how this works.

10. Select the Sweep and go to the Render tab in the Object Info.

You will see the Sweep is using the Lamp Material RT texture. Let's edit this texture.

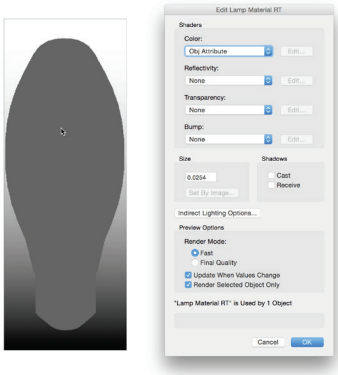
11. Click on the menu button to the right of the Texture pulldown menu in the Object Info palette.

12. Choose, Edit Lamp Material RT Resource…

13. An edit dialog will appear and the bulb now appears in a preview state. At the bottom of this dialog, you will see that the option to Update When Values Change is enabled. This means that as we adjust the texture settings, this preview will update. If you look at the Reflectivity Shader, you will see it is set to Backlit.

14. Move the dialog off to the side, so you can see the preview.

15. Set **Reflectivity** to None.



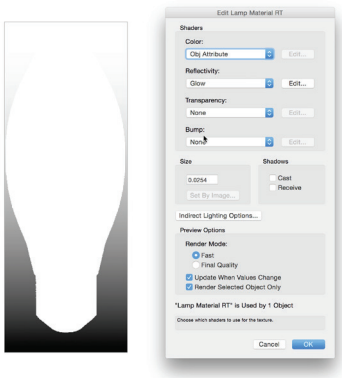
The sweep for the bulb now appears solid. So you can see the Backlit Reflectivity Shader, is allowing you to see the light through the bulb.

16. Set the **Reflectivity** back to Backlit.

Glow Textures

There is another way, to get this type of effect. Using the Glow Reflectivity Shader, we can get similar, but slightly different effect.

1. In the Edit Lamp Material RT dialog, set the **Reflectivity** to Glow.



You will see that the entire bulb is now bright white. The texture itself is now, emitting light.

2. Click OK to save the changes.

3. Click the **Exit Symbol** button in the upper right corner.

Now, let's turn off all of the lights in this document, so we can see just the light being emitted by this Glow texture.

4. Go to the **Window** menu, then under **Palettes**, choose **Visualization**.

5. In the Visualization palette, uncheck all of the lights.

You will see there is no longer an light in this file. Now, let's render in Fast Renderworks.

6. Minimize the Visualization palette.

Before rendering, let's turn off the glass housing, so we can just see the bulb.

7. In the Navigation palette, set the Electrical-Devices class to Invisible.

8. Now, choose Custom Renderworks from the **Render** pulldown in the View bar.

So you can see, the entire bulb now glows, without any lights turned on in this file.

In the next chapter, we will show you have to create an image prop.

Image Props

Creating Image Props

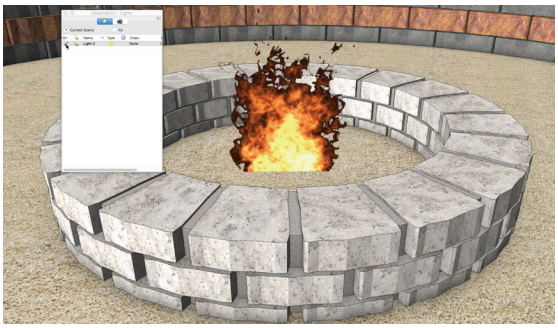
Next, we will cover image props. In previous chapters we had a few trees that were image prop objects. In this example file, the fire in our fire pit is also an image prop. You will need to download the Campfire-unlit image file for this chapter.

1. Go the **Saved Views** menu in the View bar and choose 4-Image Props.

It is a little dark, so let's go ahead and turn on our directional light object.

2. Either expand the Visualization palette or if you have closed the palette, go to **Window > Palettes > Visualization**.

3. Enable the directional light.



4. Minimize the Visualization palette.

You will see the fire Image Prop. Image Props are based off of a texture. This is simply and image based texture, that has a transparency mask. So we do not see the background of the image. In addition, this particular Image Prop also has a Glow Reflectivity Shader.

5. Go to the **Render** pulldown in the View bar and choose Fast Renderworks.

You will see the warm orange glow around the sides of the fire pit.

6. Switch back to an OpenGL render mode.

A bright lit campfire, does not make sense in the middle of the day. So let's delete this image prop and create an unlit campfire image prop from scratch.

7. Select the image prop and delete it.

8. Now, go to the **Model** menu and choose **Create Image Prop…**

9. Choose to Import an Image File and click **OK**.

10. Navigate to the Campfire-unlit image file.

11. Select the file and click **Open**.

The Image Prop Options dialog will appear. We will start by editing the Mask Options.

12. Under Mask Options, choose **Use Mask…** and then click **Create Mask…**

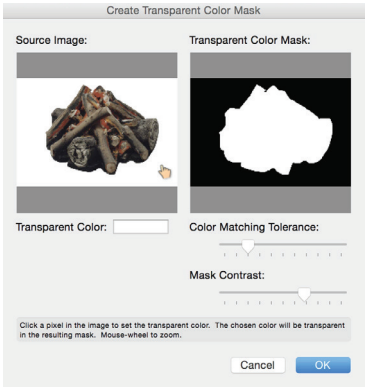
13. Choose Reuse an Image From Another Source.

14. Then, choose This Prop's Color and click **OK**.

15. For the **Source For Mask**, choose Transparent Color and then click **OK**.

The Create Transparent Color Mask dialog will appear. Here, we can choose the color we want to be transparent. There are two previews, one of the source image and the other of the transparent color mask. Currently, the transparent color is set to black. However, the background for the source image is white.

16. Click once on the white background of source image.



You will see the Transparent Color, is now white.

17. Click **OK** and **OK** again to create the image prop.

The image prop is placed in the document and shows as selected in the Object Info palette, but is not currently in view. Let's zoom in on the object.

18. Go to **View > Zoom > Fit To Objects**.

This will zoom in and center our view on the selected image prop. You will see the image prop is far too large. Let's edit the size of the image prop.

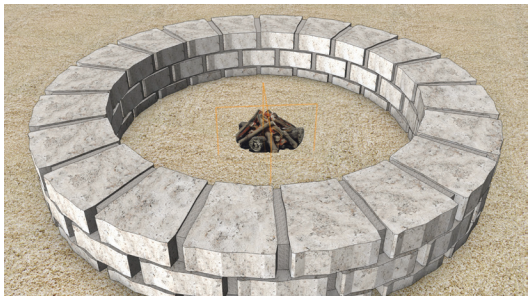
19. In the Object Info palette, set the **Height** to 0.55m.

When adjust the Height, the Width will also change. This is because the Lock Aspect Ratio option is enabled. Now, let's move the image prop into the fire pit.

20. Click and drag the image prop into the middle of the fire pit.

21. Once you get it close, you can use the 4 - Image Props Saved View, to center your view over the fire pit again.

22. Once the image prop is in the center of the fire pit, set the **Z** height in the Object Info palette, to 0.



Creating trees, plants or anything that you do not want to model, is very easy with image props. Also, it is more efficient to use an image prop for these logs instead of modeling each individual log. Modeling each object will significantly increase both the complexity of the file and how long it takes to render.

In the next chapter, we will look at Decal Textures.

Decal Textures

Creating a Decal Texture

Now, we are going to take a look at Decal textures. A Deal texture, can be thought of like a sticker that you put on top of another texture. Decals do not interfere with the mapping of the base texture, they are mapped independently.

1. In the **Saved Views** menu, choose 5 - Decal Textures.

We are going to use a Decal texture to place a plaque on the end of this stone wall. The top stone on this wall is in a group, so we need to edit the group.

2. Double-click on the top stone to enter the group.

We do not want to change the mapping for the stone texture that is already applied to this object. So let's extract a surface from the end face of this object.

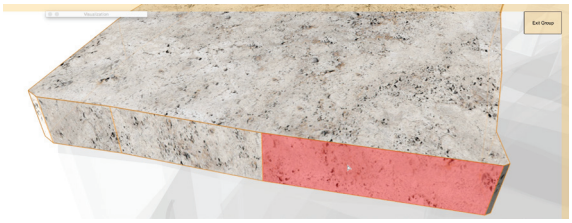
3. Go to the 3D Modeling Tool set in the Tools Sets palette.

4. Activate the **Extract** tool.

5. Enable the fourth mode, **Extract Surface** mode.

6. Move your cursor over the right side of the from face of the object.

7. When the face highlights in red, click once to select the face.



8. Click the green **checkmark** button in the Tool bar, to extract the surface.

A NURBS surface will be created. We need to move this surface away from the face of the main object slightly.

9. In the Object Info palette, set the **Y** to 9.5564m.

You could also switch to a Top/Plan view and use Shift + Down Arrow shortcut to Nudge the surface away from the face of the object. Now, let's apply the same base texture as the original object.

10. Activate the **Selection** tool in the Basic palette.

11. With the NURBS Surface selected, go to the Render tab of

the Object Info palette and choose the White Gray Rock RT texture.

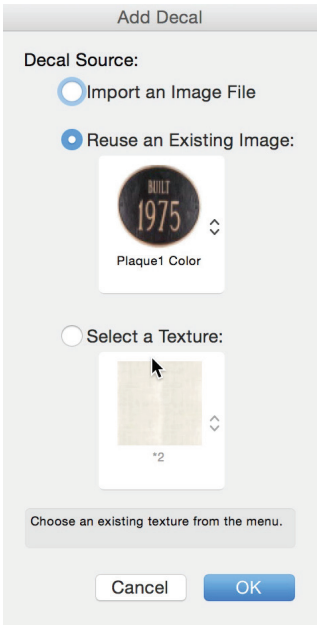
Now, let's apply a decal texture.

12. In the Render tab of the Object Info palette, click on the **Add Decal…** button.

13. Click **Yes**, in the Change texture map type dialog.

14. In the Add Decal window, choose Reuse an Existing Image, then click on the Texture thumbnail and choose Plaque1 Color.

15. Click **OK**.

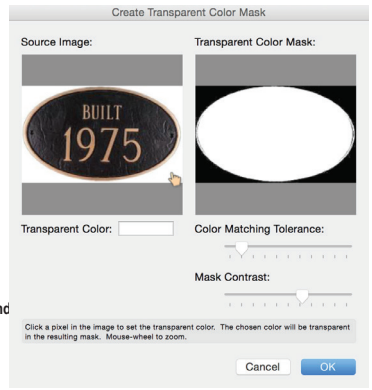


16. In the Decal Options window, choose Image Mask, then click the **Choose Image…** button.

17. Choose Reuse an Image From Another Resource, then This Decal's Color and click **OK**.

18. Now, choose Transparent Color and click **OK**.

19. Click on the white background of the source image, to set the transparent color and click **OK**.



20. Name the Decal, Plaque Decal and click OK to create the decal texture.

Now, we need to use the Attribute Mapping tool, to adjust the Decal texture mapping.

21. Activate the **Attribute Mapping** tool in the Basic palette.

22. Click once on the surface.

23. Click once on one of the corner control handles and increase the scale of the texture to about 7.5.

24. Click a second time to set the scale.

25. Now, click in the center of the texture and drag it to the center of the surface.

26. Switch back to the **Selection** tool, to disable the Attribute Mapping tool.

The decal will disappear. This is because we are currently in an OpenGL render mode. OpenGL does not display Decal textures. We need to render in a Renderworks mode.

27. First, click **Exit Group** in the upper right corner.

28. Then, in the **Render** pulldown, choose Fast Renderworks.

As the render processes, you will see the decal texture appear. Decals are great for plaques like this, inscriptions, signs, graffiti, really any time you need have an interruption in a main textures.

You can even place multiple decals on a single object.

Coming up in the next chapter, we will go over solar animations.

Solar Animations

In this chapter, we will be covering solar animations. We will use the Heliodon tool from the Visualization tool set, to create a solar animation. If you do not have the Heliodon tool, this means you have just Fundamentals with Renderworks. If this is the case, you will not be able to complete this section. Go ahead and move on to the next chapter now.

1. Switch to an OpenGL render mode, in the **Render** pulldown in the View bar.

2. Go to the **Saved Views** pulldown in the View bar and choose 6 - Solar Animations.

For this solar animation, we want the only light in the file, to come from our Heliodon object. So we are going to turn off all lights in this file.

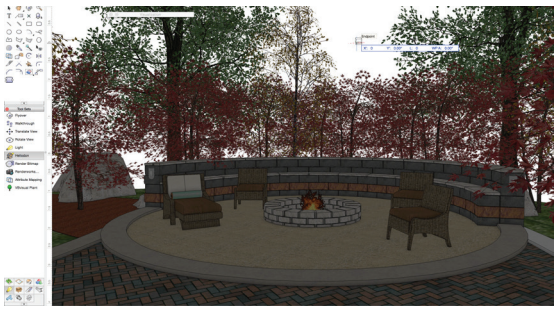
3. Expand the Visualization palette, or if you closed this palette, go to **Window > Palettes > Visualization**.

4. Uncheck all of the lights.

Now, let's place a Heliodon.

5. In the Visualization tool set, located in the Tool Sets palette, activate the **Heliodon** tool.

6. Now, click once anywhere in the document to place the Heliodon.



The location of the Heliodon object will not affect the renderings. If you look in the Object Info palette, you will see the Heliodon is selected. So let's create an animation.

7. First, if you do not see a background, go to V**iew > Set Renderworks Background…** and the choose HDRI Meadow background.

8. Click **OK**.

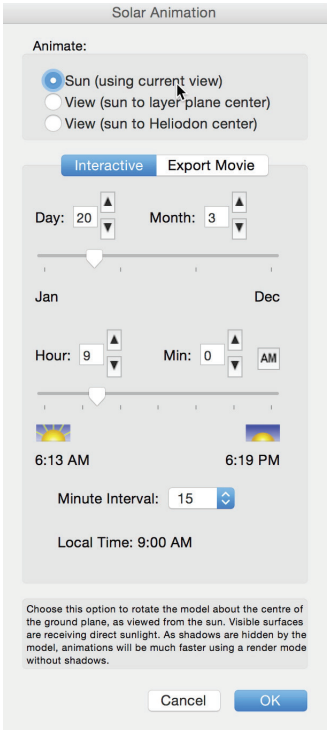
9. Now, render in Wireframe and then back to OpenGL to refresh the background.

10. Now, in the Shape tab of the Object Info, scroll down and click on the **Solar Animation…** button.

The Solar Animation dialog will appear. Here you can choose what to animate. The first option, Sun (using current view) will animate the movement of the sun from the current view. The next two options, View (sun to layer plane center) and View (sun to Heliodon center), will set the view to the location of the sun and face either the layer plane center or the location of Heliodon. The most commonly used mode is the first mode. You can also set the day, month and time.

11. Choose to animate the Sun (using current view).

12. Set the day and month to today's date.



13. Then, click the **Export Movie** tab.

Some additional options will appears. Leave the Start Time set to Sunrise and the End Time set to Sunset. Also, leave the Time Interval set to 15 Minutes. This will render a frame, once every 15

minutes from sunrise to sunset.

14. Uncheck the options for Show time of day and Show month and day.

15. Then, click **OK**.

16. In the Compression Settings dialog, set the **Frames per second** to 23.98.

17. Then set the **Quality** to Very High (best quality) and click **OK**.

18. Choose to save the animation to your desktop.

This animation, will render fairly quickly. This is because we are currently in OpenGL. The animation will use your current render mode, when rendering each frame. Because OpenGL is a fast rendermode, the animation is created quickly. If you were in a Renderworks mode, this animation would take longer. Generally, it is best to initially create an animation in OpenGL and then choose a Renderworks mode, to create a higher quality animation. This allows you to resolve any issues with the animation quicker.

19. When the animation export completes, navigate to your Desktop and open the video.

You will see an animation from sunrise to sunset. The shadows will move across the scene as the sun move across the sky. However, the sky remains the same. This is because our background is just an image. If you use a Physical Sky background, the background will be animated as well.

Coming up in the next chapter, we go over projected sections.

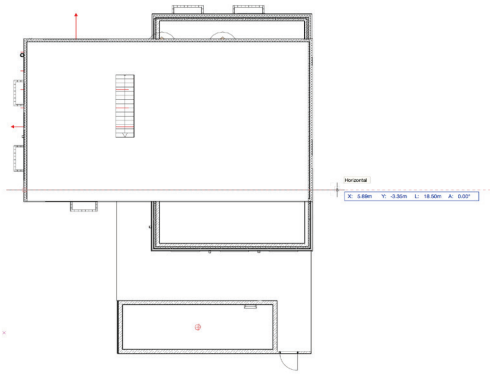
Projectected Sections

In this chapter, we are going to show how to create a projected section. A projected section is a type of section viewport.

1. Go to the **View** menu and choose **Create Section Viewport…**

2. Click once to the left of the house as shown.

3. Then, move your cursor to the other side of the house, hold the Shift key to constrain the cursor horizontally and click a second time.



4. Now, move your cursor up vertically past the rear of the house and double-click to create the section line.

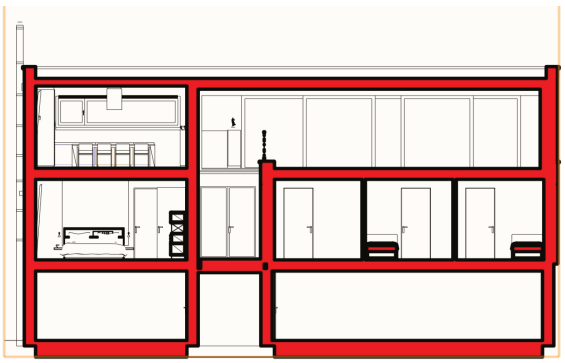
5. In the Create Section Viewport dialog, click on the **Create on Layer** pulldown menu and choose New Sheet Layer…

6. Set the **Sheet Number** to Projected Sections and click **OK**.

7. Now, click on the **Render Settings…** button.

8. In the Hidden Line Render Settings dialog, uncheck Sketch Hidden Line Results and click **OK**.

9. Click **OK** again to create the section viewport.



Here we have a standard section viewport. Let's adjust the

projection, to create a projected section viewport.

10. With the section viewport selected, go to the Object Info palette.

11. Scroll down and click on the **Projection** pulldown menu.

12. Choose Oblique Cabinet 45.

13. Now, click the **Update** button to render the viewport.

When the render completes, you will now have a projected section. Just one more quick tip. You may notice that you can see through this viewport. the solid white sections are actually transparent. There is because the Section viewport has a Fill of None.

14. In the Attributes palette, set the Fill to Solid.

The viewport will now have a solid white fill.

In the next chapter, we will show you how to properly export your renders to an image file.

Exporting an Image File

Next, will go over exporting images. As we have mentioned throughout this guide. It is a good practice to always use sheet layer viewports for your final renders. Sheet layer viewports give you the highest level of control over the quality of the final render. Let's start with exporting this viewport to an image file.

1. Go to **File > Export > Export Image File…**

We are going to use the Draw Marquee option to set the export area for out image.

2. Under Export Area, choose Marquee and click the **Draw Marquee** button.

3. Click once, on the top left corner of the viewport.

4. Then click a second time, on the bottom right corner of the viewport to specify the export area.

You may have noticed, we did not have any Snap Points at the top or bottom corners. If you set your viewport to and exact size, you will want to make sure the Marquee is the same size as well. So let's add a crop to the viewport, so we have exact Snap Points.

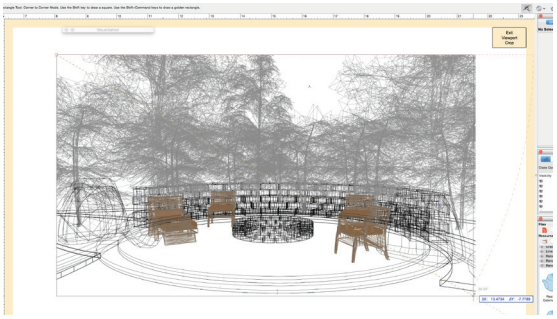
5. Click **Cancel**.

6. Double-click on the viewport, select **Crop** and then click **OK**.

7. Activate the **Rectangle** tool.

8. Click once on the top left corner of the viewport.

9. Then, click a second time on bottom left corner of the viewport.



This will give us Snap Points to use when drawing the marquee.

10. Click **Exit Viewport** Crop.

11. In the Object Info palette, click the **Update** button to render the viewport.

12. When the render completes, go back to **File > Export > Export Image File…**

13. Choose Marquee again and click the **Draw Marquee** button.

14. Now, move your cursor over the top left corner, it will snap to the corner of the viewport.

15. Click once in the top left corner and then a second time in the bottom right corner to draw the marquee.

Now, let's look at the Resolution. This will, will be set to the last used DPI setting. The image export DPI should always match the actual DPI of your sheet layer.

16. Click **Cancel** again.

17. Go to **Tools > Organization**.

18. Switch to the Sheet Layers tab.

You will see the sheet layer is currently set to 150 DPI.

19. Click **OK**.

20. Go back to **File > Export > Export Image File…**

21. Choose Marquee and click **Draw Marquee** again.

22. Draw the marquee.

Now, set the Resolution to match the sheet layer DPI.

23. Set the **Resolution** to 150 px/in.

Next, let's adjust the file format. The default is JPEG. JPEG provides a high compress level. So the image file size will be smaller, but generally the image quality will be slightly lower than, PNG or TIFF. For a final export PNG or TIFF is recommended over JPEG.

24. Under Format, choose PNG.

25. Click the **Update** button to see the estimated file size.

We already updated our viewport, so you will want to make sure both to the options at the bottom of the Export Image dialog, are unchecked. These options can cause the viewport to require re-rendering.

26. Click Save.

27. Save the file to your Desktop and click OK.

The image file will be created from the rendered viewport. You can navigate to your Desktop and view the image.