

# DIALux evo HDR Export

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## Content

DIALux evo is able to export a raytrace picture in a file following the "OPEN EXR" standard.

A HDR picture means, that for each pixel in the visualization the real luminance and color information is saved. In a "normal" 3D view in DIALux the luminance is "compressed", so the dynamic range of maximum and minimum luminance can be displayed on the screen.

## Exporting a HDR file

A HDR file can be exported after calculating the scene. The tool is found in the menu "Export".

## The HDR file

The Open EXR file is defined here: <http://www.openexr.com/openexrfilelayout.pdf>

Open EXR has been developed by Industrial Light and Magic (ILM) for movies. There are several viewers for EXR pictures available.

While in the "real world" HDR pictures are made with a camera and the photographer needs to take several pictures to make a HDR photo, in DIALux the correct luminance and color information is already given through the calculation.

DIALux writes into the EXR file the luminance and color information for each pixel visible in the raytrace view.

- A HDR "picture" is a table with pixels in x and y direction, like a cell sheet in excel (or a BMP file)
- Each pixel has three values, one for Red, one for Green and one for Blue, coded in sRGB
- In opposite to the 3D rendering we show in DX, the HDR picture includes the "real" luminance values (more like the 3D false colours).
- DX Evo 3 can export HDR, any software can import HDR as EXR files as this is an open format
- Some manufacturer use the information for calculating a "quality lighting factor" based on luminance (Lavg and root mean square deviation of L in the field of vision)
- With this formula, you can calculate the Luminance [cd/m<sup>2</sup>] on each pixel:

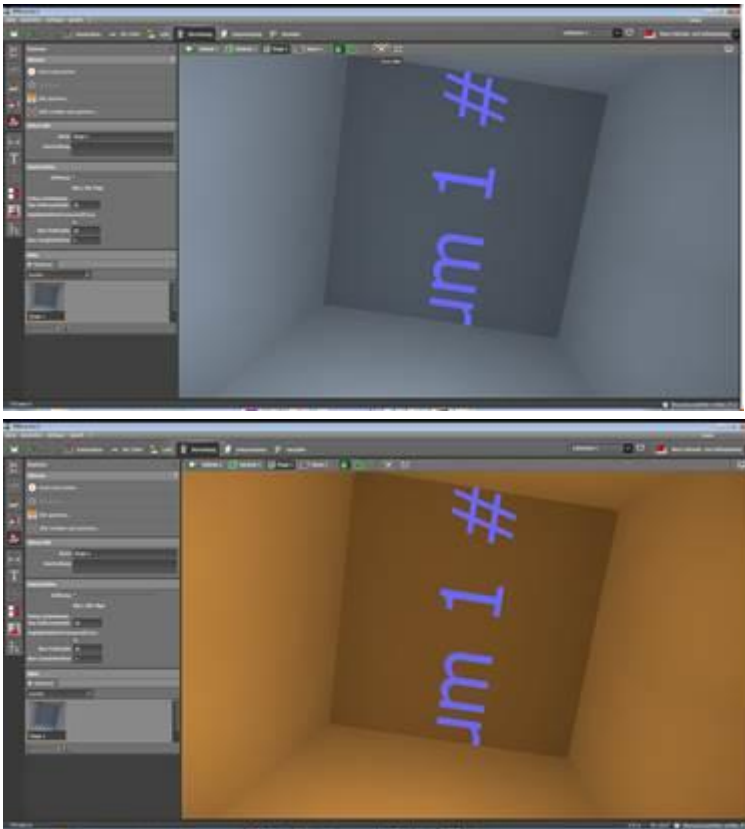
$$L = 0,213 * R + 0,715 * G + 0,072 * B$$

# DIAL

The adjustment of the brightness setting in the rendering does not change the luminance values in the HDR. No value has to be set by the user. The HDR includes all necessary data.

The user can adjust not only the brightness but also the whitebalance in DIALux evo. Again the adjustment of the white balance has NO influence to the results saved in the HDR export.

Example of different white points. A different white point leads to different "pictures" in DIALux.



These pictures have 10.000K and 2.700K as white points.  
The top left pixel in these "arrays" have these RGB values:

Pixel 1/1	R	G	B
2.700K	15,559	19,109	23,715
10.000K	35,284	15,428	2,973

Calculated Luminance (L) from sRGB as given in the formula

L(2.700K)	18,61671	cd/m <sup>2</sup>
L(10.000K)	18,6217476	cd/m <sup>2</sup>

As we can see, the color appearance is completely different, but the luminance is the same.

## Example for easier understanding

As written, the EXR file is a specific format defined by ILM. The format has been chosen by DIAL to enable any tool to use the data exported by DIALux evo.

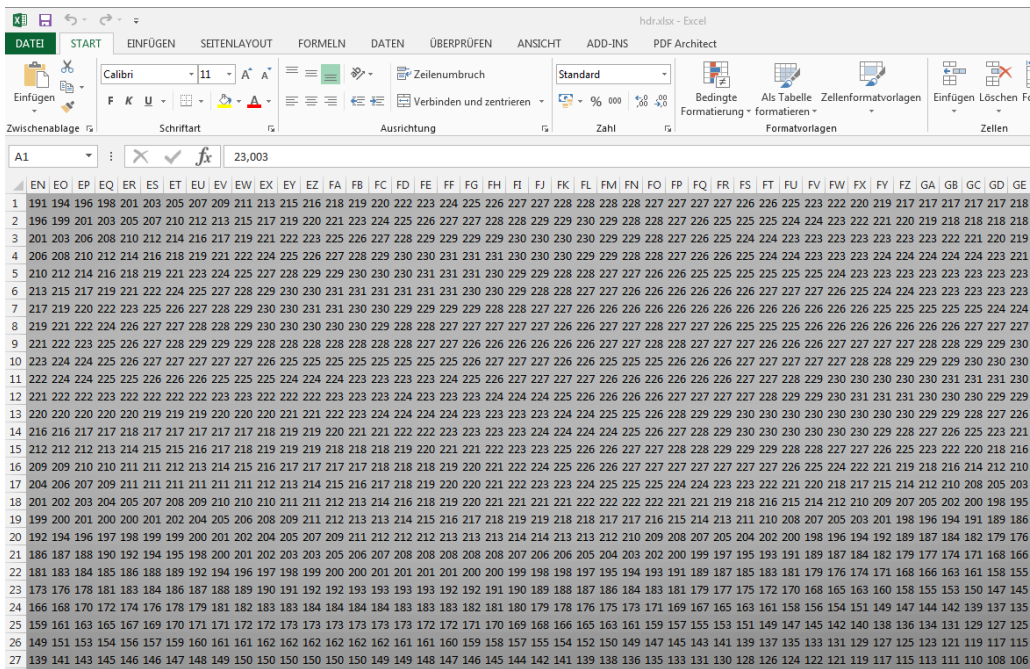
For an easier understanding we converted one exr file into a simple text file. The text file includes the luminance values calculated from the sRGB values according to the formula mentioned above. All pixels are listed row by row. Individual values are separated by a semicolon “;”.

ATTENTION: a comma “,” is used as a decimal separator (German standard) if you are using a dot “.” as a separator please replace comma by dot before importing into Excel.

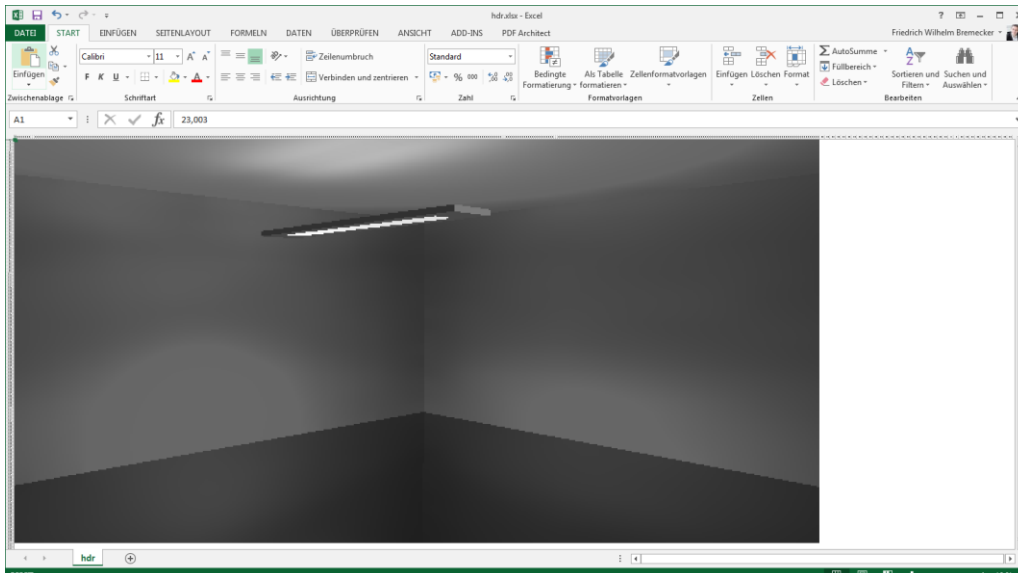


This picture shows the visualization in DIALux.

The values imported in Excel looks like this:



Using "conditional formatting" a feature offered by Excel, you can give a specific grey tone to a range of values. Doing this, you can make the 3D scene visible in Excel:



Zoomed down to 10% the scene becomes visible in Excel.

The HDR export of DIALux writes the information about color and brightness of each pixel into a file.

Further information about the file format can be found here: <http://www.openexr.com/index.html>