

Illuminating With HDRI

HDR (High Dynamic Range Image) rendering is a method of illuminating a CG scene with a special type of bitmapped image that allows a far greater dynamic range of exposures (i.e. a large difference between light and dark areas) than normal digital imaging techniques or photographs. The intention of HDRI is to more accurately represent the wide range of intensity levels found in the real world, ranging from direct sunlight to the deepest shadows. With this type of image, the image itself can be used as a source of illumination for the scene instead of a traditional 3D light such as a Spot Light or Area Light.

modo Setup

To set up an **HDRI** scene in modo, open the **Environment** tab under **Render Settings**. Select **Environment Material** and LMB-click on **Add Layer** (Fig. 1). Select **Image Map**. Load an HDR im-

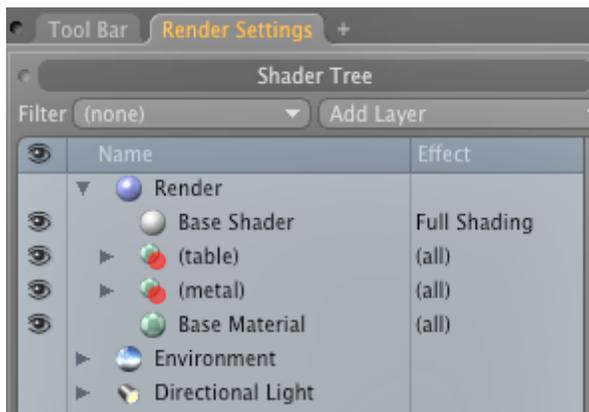


Fig. 1

age. This will load the image into the **Shader Tree** above the default **Environment Material**, thereby overriding it (Fig. 2).



Fig. 2

Note: At this point, you could eliminate the default Environment Material if you wanted to since it is being overridden; or keep it if you think you might want to use it later.

Select **Render Settings > Render > Render Properties > Global Illumination > Enable**. Global Illumination is necessary for modo to read the HDRI values and apply them to the scene.

3D Lights

You can freely mix 3d lights—say an Area Light—with HDRI illumination, usually aligning it with the main source of light in the HDRI to reinforce the shadows created by the HDRI, thereby using HDRI primarily as a fill light.

However, if you do not want a 3D light in the scene, you can either delete it entirely, turn it off in the Shader Tree, or select **Base Shader** and under **Render Properties** reduce the **Direct Illum Multiplier** value to zero (Fig. 3).



Fig. 3

Note: you may globally adjust the strength of the direct illumination from 3D lights within modo from this dialog by adjusting the **Direct Illum Multiplier**; and the strength of indirect sources, such as an HDRI map, by adjusting the **Indirect Illum Multiplier**. However, since adjusting these values *does* adjust them globally within the scene, you should use other

means (see ‘Brightening the Scene’ below) if you want more specific control.

HDRI types & mapping

In modo, you can use either an HDRI **Dome** style image or **Light Probe** image. The Dome style is a 360-degree panorama-type image (Fig. 4), where-as



Fig. 4

the Light Probe is a spherical image that has been created by photographing a scene while aiming a camera at a chrome reflecting ball (Fig. 5). The Dome style



Fig. 5

image does not include a lower half, but is considered more effective because it contains more information across the entire image while the Light Probe is easier to create, but compresses light information around the periphery of the image.

Regardless of which style of image you use, make certain that modo knows which style it is. To do this, select **Render Settings > Environment > Image > Render Properties > Texture Locator > Projection Type**. For the Dome style, select **Spherical** from the drop-down menu, while for Light Probe, select **Light Probe** (Fig. 6).

Adjusting the Dome

Since Dome images do not have a lower half, it may be necessary—or you might



Fig. 6

just prefer—to move the image downward in the background so that the black strip at the bottom of the image is hidden. To do that, select the image map, then open **Render Properties > Texture Locator > Position** and move the image downward on the **Y Axis** (negative Y) (Fig. 7).

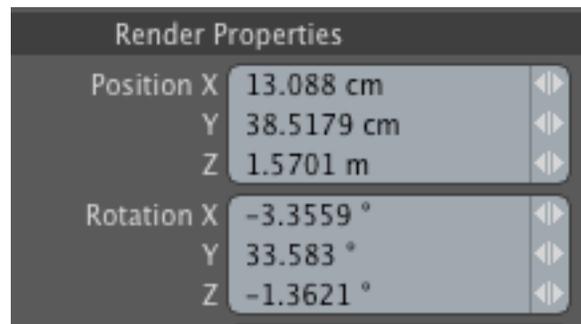


Fig. 7

Note: For this, you might want to view your scene without disturbing your primary camera. When you want to ‘look around’ in the scene, but don’t want to change the primary camera angle, activate **Render Tri**, then select **Camera** in the **Item List**, RMB-click and select **Duplicate**. This will create a second camera (Camera 2). Make sure it is selected in the **Item List**, then in the **Render Settings > Render > Render Camera** select **Camera 2** from the drop-down menu. Now you will be able to manipulate the scene in the Camera View from the point of view of Camera 2 and see the results in the Preview window so you can make adjustments

as needed without affecting the original camera placement (Fig. 8). Once you are finished, you can delete Camera 2 (or keep it for later adjustments), and return to Camera 1 (by selecting it in both **Item List** and **Render Camera**).



Fig. 8

Getting ‘Specularity’ Back

When the **Direct Illum Multiplier** is turned off, or there are no 3D lights in the scene, there will be no specularity on a material since specularity is a ‘trick’ of 3D lights. To get the ‘specular’ effect back, turn **Fresnel** on the material. To do this, go to **Render Settings > Material > Render Properties > Material Ref.** First, turn on **Conserve Energy**. Then, set **Fresnel** to 100% (or less, if you wish). This will cause the HDRI map to be reflected in the material (Fig. 9).

Note: The higher the Fresnel percentage, the brighter (stronger) the Fresnel effect.

If you also desire the material to have some reflectivity, set the **Reflection**



Fig. 9

Amount percentage in this panel to the desired amount.

Adjusting the Shadows

The HDRI image will usually feature a ‘hot spot’ such as the sun or a strong light coming from a window, or some other bright light area (Fig. 4, 5). Depending upon the intensity of this hot spot, it may provide enough illumination for a beautifully-soft cast shadow to appear in the scene. The orientation of this cast shadow can be adjusted by rotating the HDRI map so that the hot spot is in the position desired. To do this, select **Render Settings > Environment > Image > Render Properties > Texture Locator > Rotation**. Adjust the **Y Axis** rotation (using Camera 2 and referring to the **Preview** window, if necessary) until the hot spot is in the desired orientation.

If additional strength is needed for the cast shadow, or for additional illumination, a 3D light—such as an **Area Light**—can be added to the scene and aligned in such a way as to cast a shadow in the same direction as the HDRI hot spot.

Note: Remember if you add a 3D light to the scene, you will need to re-activate the **Direct Illum Multiplier** if you had previously turned it off.

Effective Hot Spots

For the most effective illumination from an HDRI map, images that feature a larger, more diffuse area of bright light (Fig. 4) generally work better than smaller, tighter lights since they provide a larger area from which modo can sample the light.

Spot Size / Blurry Reflections

By default, the reflections/specularity on a material from an HDRI are sharp and crisp. This can be modulated by activat-

ing **Blurry Reflection**. This is found in **Render Settings > Material > Render Properties > Blurry Reflection**. Activate the checkbox.

The problem with Blurry Reflections is that, by default, render times go way up, plus **Reflection Rays** will undoubtedly need to be increased from 64 to something like 512 or even much higher in order to smooth the noise that will result from Blurry Reflections. This will add *significantly* to render time.

A much less ‘expensive’ method of getting blurred reflections from the HDRI is to raise the value on **Minimum Spot**. The **Minimum Spot** is the size of the area on the HDRI map that is sampled for illumination data. The default is 1. This means that one pixel of ‘light’ is sampled for each pixel that is rendered on the material, resulting in a sharp, focused reflection. Raising this number means that a larger number of pixels are sampled for each ray that is fired at the HDRI map and then averaged to arrive at the reflection on the material, thereby ‘smoothing’ or blurring the reflection. To do this, go to **Render Settings > Environment > Image > Render Properties > Texture Layer > Minimum Spot** (Fig. 10). The default is 1; by increasing this value (to something like 20 or higher), the reflections will become blurred with a minimum render-time hit.

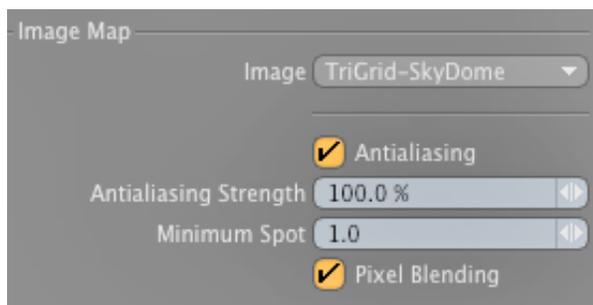


Fig. 10



Reflections with Minimum Spot = 1



Reflections with Minimum Spot = 20

Note: Be aware that this technique will only work with ‘reflections’ caused by Indirect Illumination; it will *not* affect the reflections that are a result of the Reflection Amount on the material, itself. You will have to use Blurry Reflection for that.

Brightening the Scene

Often times the level of illumination provided by an HDRI map is too low for your scene (or too bright). If so, levels of illumination can be increased or lowered by changing the **Indirect Illum Multiplier** values for the **Base Shader**. The problem with this method is that it will increase the illumination for *everything* that contributes to indirect illumination within the scene. So, in order to increase the illumination from *just* the HDRI map, go to **Render Settings > Environment > Image > Texture Layer > High Value** (Fig. 11). The default percentage for High Value is 100%; increasing this value to two or three hundred percent will strengthen the high values in the image, thereby brightening the scene.

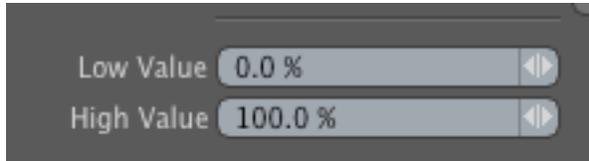


Fig. 11

Conversely, if the scene initially seems overexposed, lowering the percentage will lower the high values, thereby darkening the scene.

Lastly, lowering the **Low Value** will make the darks in the image map even darker so the darks in the scene will become richer while maintaining the intensity of the high values. Raising the Low Value will make the darks lighter while not affecting the bright values. Raising it too high will result in the dark values becoming so light they will become virtually useless.

That's It

Well, that's about it.

Hopefully, this little explanation of HDRI lighting has been of some help to those who have not yet tried it, or for those—like myself—that have a hard time remembering from one month to the next how to do something.....