Make/Fake an HDRI for IBL in Bryce for Bryce

Part 3: Merging the rendered panoramas to an HDRI

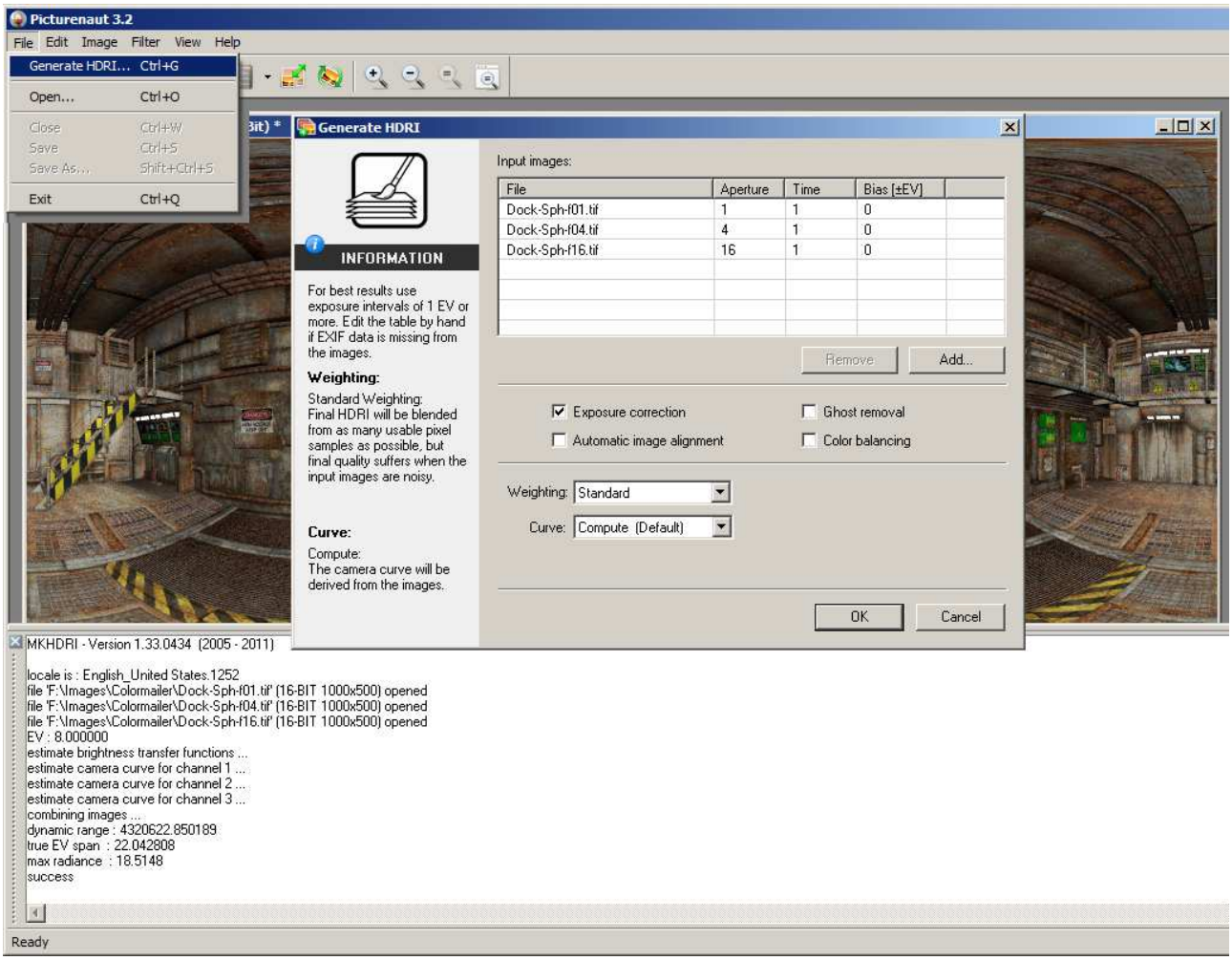
To merge the exported renders to an HDRI, an additional program is needed. The video "*Why you should consider exporting your renders as HDRI*" (http://www.youtube.com/watch?v=gHCCKF-ssII) mentions several free programs for the Mac and PC. We will use Picturenaut to assemble the HDRI and HDRShop to transform the spherical projection to an angular map. HDRShop can also assemble the individual renders to an HDRI but Picturenaut is more flexible and gives better results.

Bryce can use light probes in the spherical projection as well and a transformation is not mandatory. However, it appears that Bryce prefers the angular map. The HDRI light probes in the spherical projection can also be used in Carrara and DAZ Studio (a bit tricky) and several other 3D programs. If you prefer building and rendering your scenes in another 3D application, you can still use Bryce to create light probes for them.

The picture below shows several steps in Picturenaut 3.2. Once started, click on File, then Generate HDRI… The dialog Generate HDRI opens. Click on the Add button and in the Open dialog that pops up; select all files that will make up the HDRI by holding down the [Ctrl] key.

The loaded pictures are listed in the Generate HDRI window with their names. For Aperture and Time, there are ones, for Bias zeroes. Now modify the Aperture column so that the f-stops match. This has already been done in the picture below. For Time, leave it at 1 second and there is no Bias, so keep it at 0.

There are some options that can be selected. Keep Exposure Correction enabled. There is no need to enable Automatic image alignment since the Bryce camera is on a quite stable tripod. Ghost removal is neither necessary – there are no moving objects like people or cars in the image. You can try Color balancing; I balance colours with an external program if necessary.



Use the Standard Weighting and have the camera curve be computed. This usually gives the best results. For photographic pictures, I usually have it that way, then save the curve to assure that all HDRIs for a panorama look the same. Here, we have only one position.

However, if you render the 6 faces of a cube to create a really large light probe, you would assemble the face with the highest contrast first using Compute, then save the curve and use it for the remaining five cube faces.

Click on OK and the HDRI will be created. At the bottom, the job statistics are shown. Picturenaut found an EV range of 8 from the table but calculated it as 22. The dynamic range was established to be 4.3 Million to one and the maximal radiance as nearly 19. Just from looking at the statistics, we can tell that this HDRI is a success. The HDRI is also shown, linearly tone-mapped. That means that the whole range is squeezed into the limited range of the graphics card and hence the monitor.

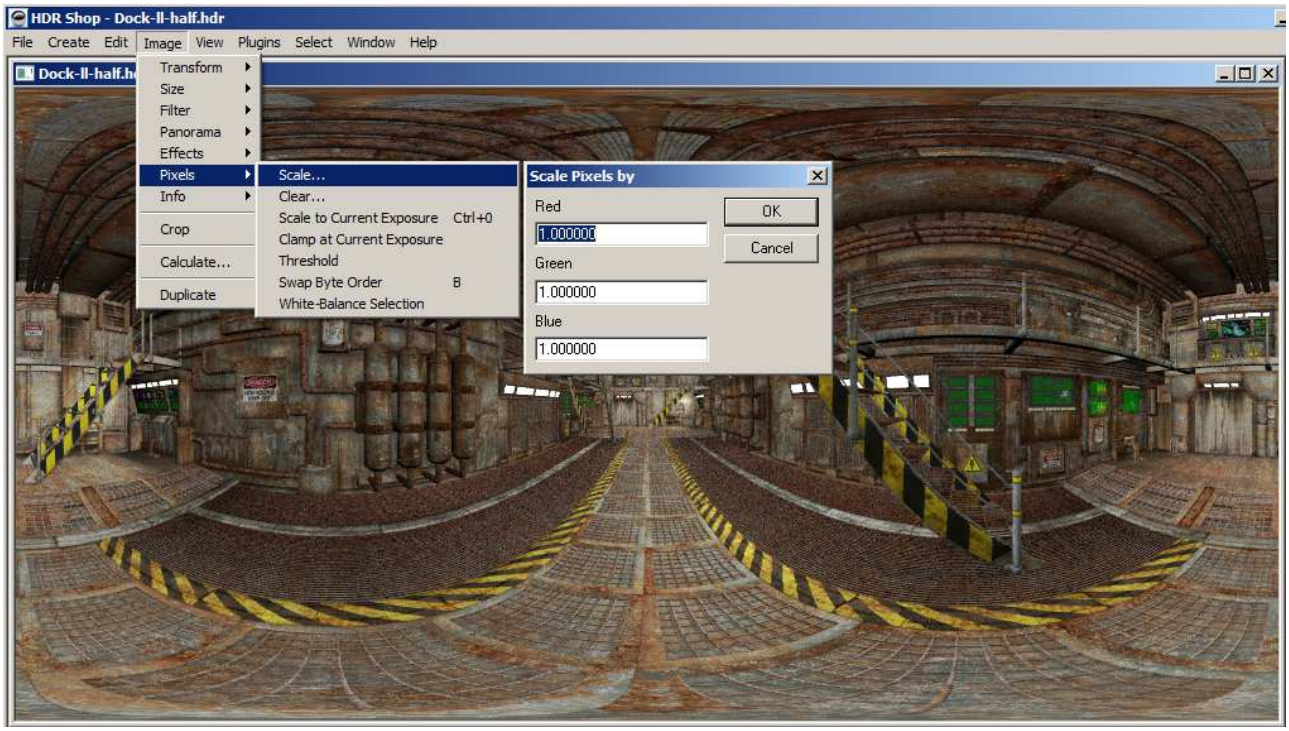
You can now save the HDRI. File > Save As, then select Radiance RGBE (*.HDR; *.PIC) and you have your light probe in the spherical projection. This is all Picturenaut can do for us.

This HDRI can be tested in Bryce and we will find that it is a bit low in light. For the backdrop, we have to set Intensity to 30 but even with HDRI Effect at maximum, there is not enough light. If we enable Apply to light source next to Intensity, we get ample light because this is a brightness multiplier. We end up at around 75 for HDRI Effect.

The disadvantage of using the Apply to light source multiplier is that the background brightness is coupled to the light generated. This is fine if the HDRI is not used as backdrop. But if it is used as backdrop, the range of the Intensity value is limited because it is coupled with the HDRI Effect as was the case in Bryce 6.

We would rather prefer to have Intensity (background brightness) and HDRI Effect (light generated) independent. Do be able to do this; we need more power from the HDRI.

This is where HDRShop comes in. There is an option to multiply all pixel values with a constant, independent for red, green and blue.



The Scale Pixels by dialog in HDRShop. All pixels in the image are multiplied by the value entered.

Launch HDRShop and load the HDRI. Image > Pixels > Scale opens the Scale Pixels by dialog. What values do we enter now for Red, Green and Blue?

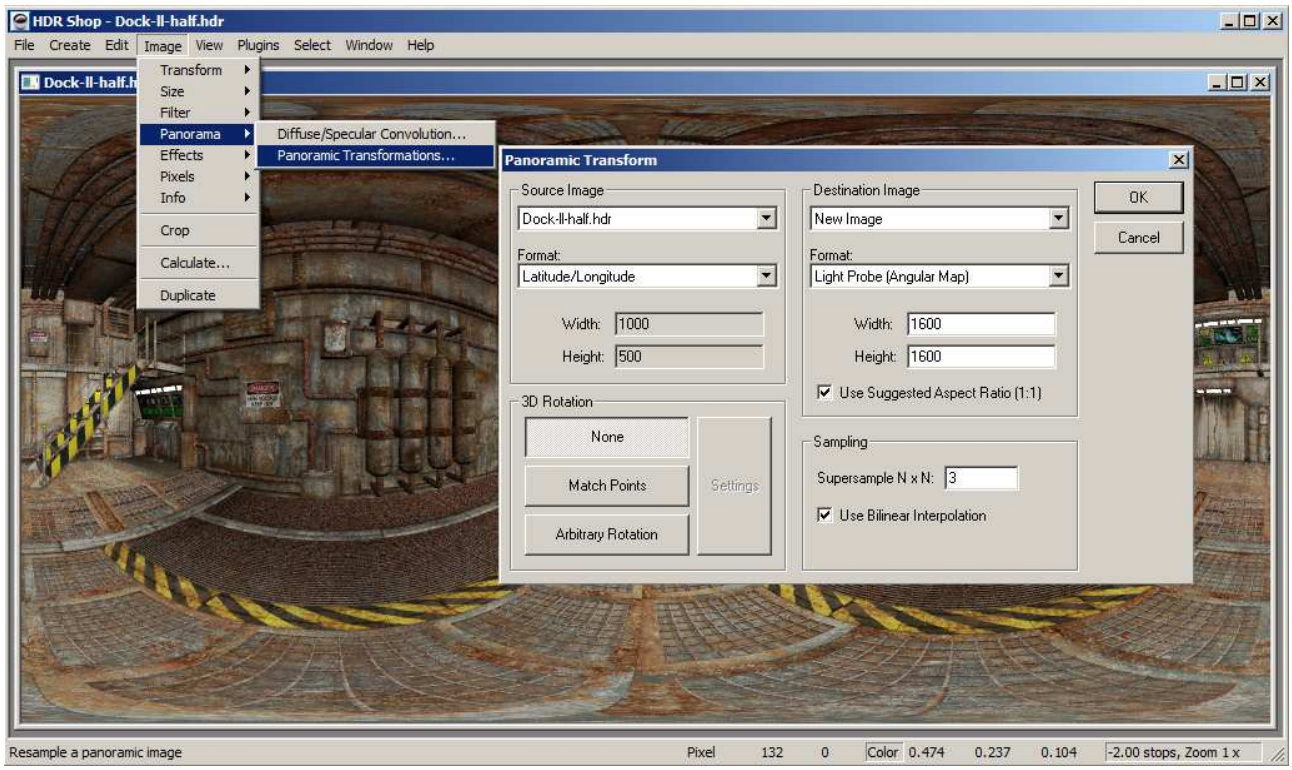
The short test in Bryce showed that we had to set Intensity to 30 for sensibly bright backdrop and Apply to light source to get some light from the HDRI. In fact, HDRI Effect at 75 gave good light. How Intensity as multiplier for HDRI Effect works is described in the PDF document *Brightness and Falloff* (https://www.horo.ch/docs/mine/pdf/Brightness.pdf) and if we multiply the pixel values by 4 we can reduce Intensity to a fourth to 7.5. If Apply to light source is still enabled, HDRI Effect stays at 75. If we disable Apply to light source, there is no light booster and we have to double HDRI Effect from 75 to 150.

To sum it up: multiplying the pixel values by 4 (adding 2 full f-stops) results in a nicely balanced HDRI for Bryce IBL, the backdrop gets good light at Intensity 7.5 and there is ample light at HDRI Effect 150. Enter 4 for Red, Green and Blue and hit OK. The HDRI displayed in HDRShop gets brighter, hit the minus (-) key twice to step down two f-stops and it looks the same as before.

Multiplying all the pixel values by a constant is not mandatory but in the example we are using, we get a better range for Intensity and HDRI Effect. We could multiply the pixel values by only 2. Intensity would have to be set to 15 and if Apply to light source were engaged, HDRI Effect would still be good at 75. However, if Intensity is not used as light multiplier, HDRI Effect would have to be moved up to 500. That would still be good, but there were only 1 EV we could increase and this is a bit of a limit. Therefore, multiplying the pixels by 4 is a good compromise.

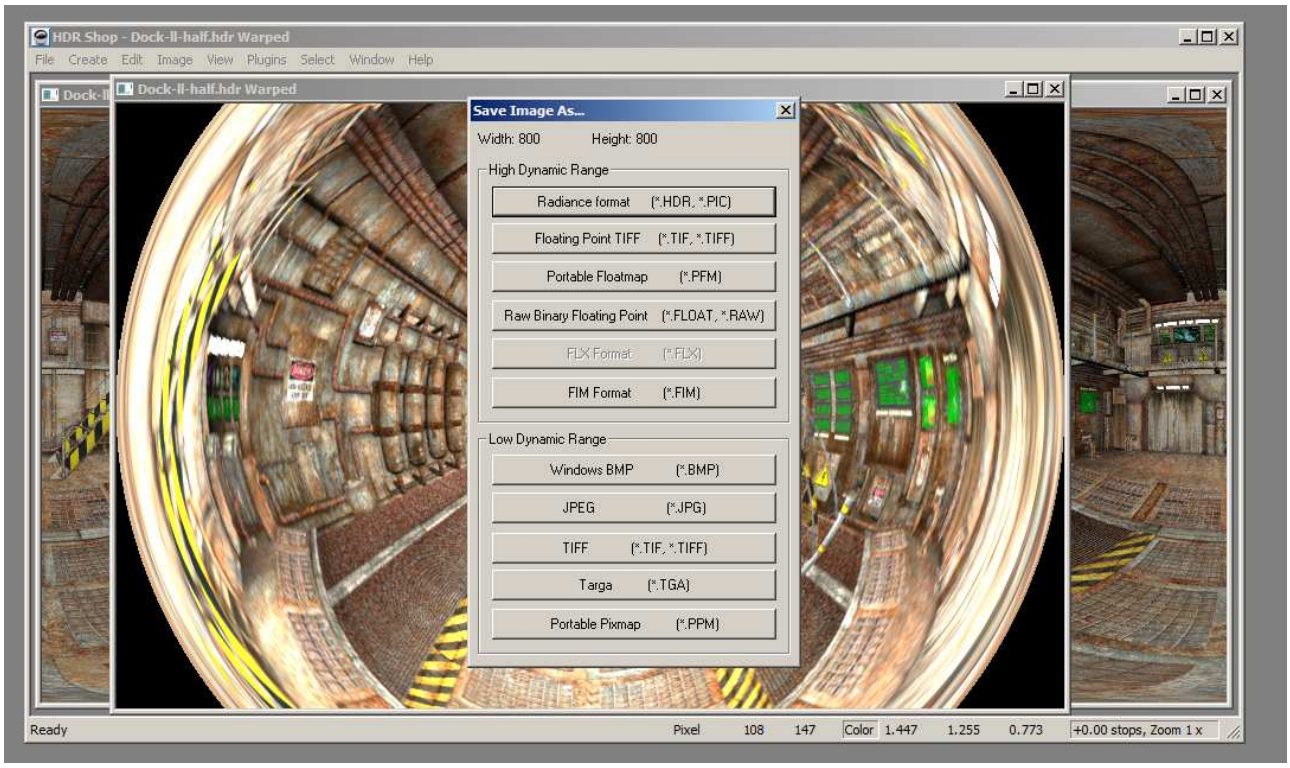
To transform the spherical projected HDRI to an angular map, we use HDRShop again. Click on Image > Panorama > Panoramic Transformations… to open the Panoramic Transform dialog as shown below.

The Source Image is the one loaded and the format is spherical, called Latitude/Longitude in HDRShop. The size is filled in automatically. As Destination Image we want a New Image and the format Angular Map (Light Probe). Using Supersample N x N = 3 prevents fine lines to get interrupted, though this function makes the transformation take more time. This is usually worth the while but there are also images that can do without it. Bilinear Interpolation should also be enabled. It gives better results if a picture is scaled and we know it from many graphics programs.



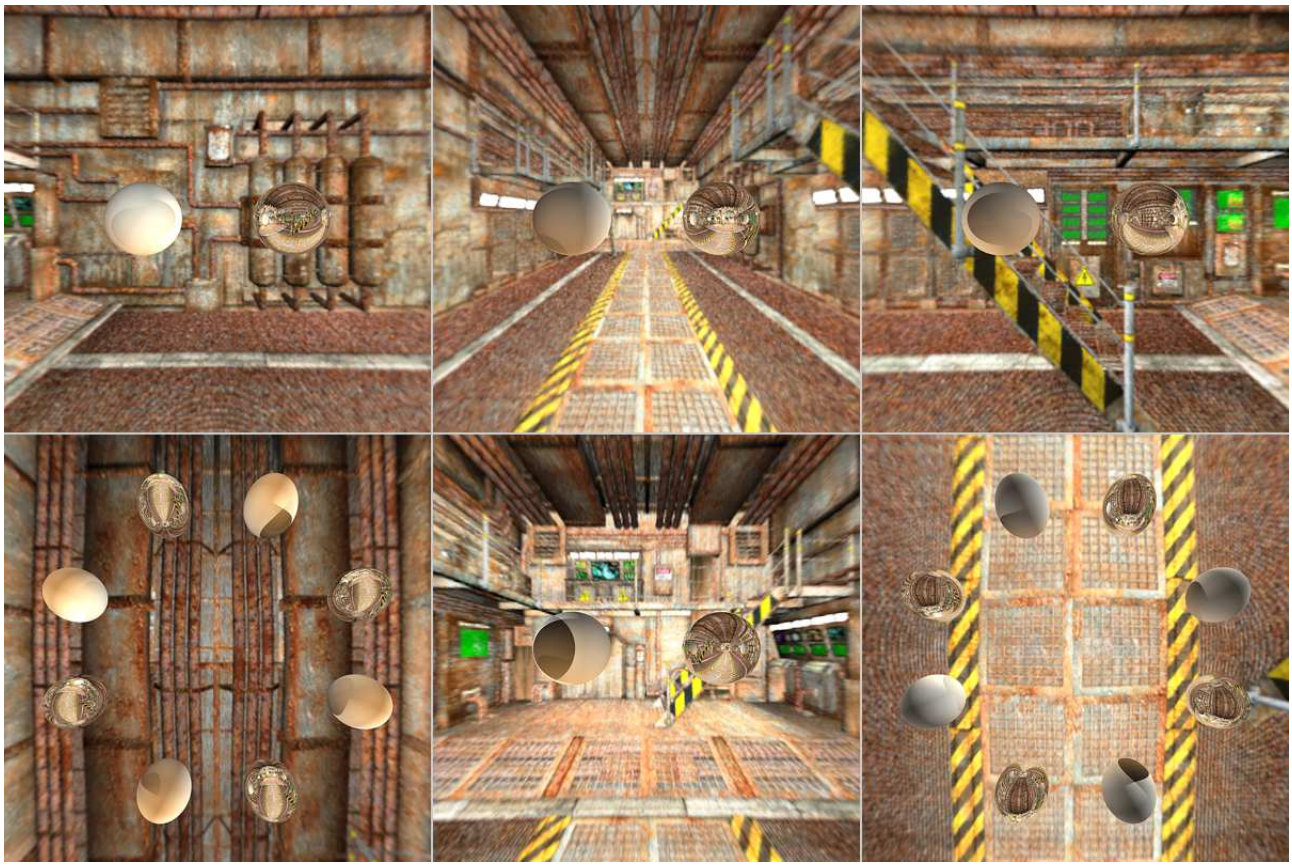
The Panoramic Transform dialog in HDRShop.

To save the final image, we click on File > Save As… which opens the Save Image As… dialog shown below. Here we see all the options and we use the High Dynamic Range Radiance format (*.HDR, *.PIC). This will give us a Bryce IBL compatible light probe.



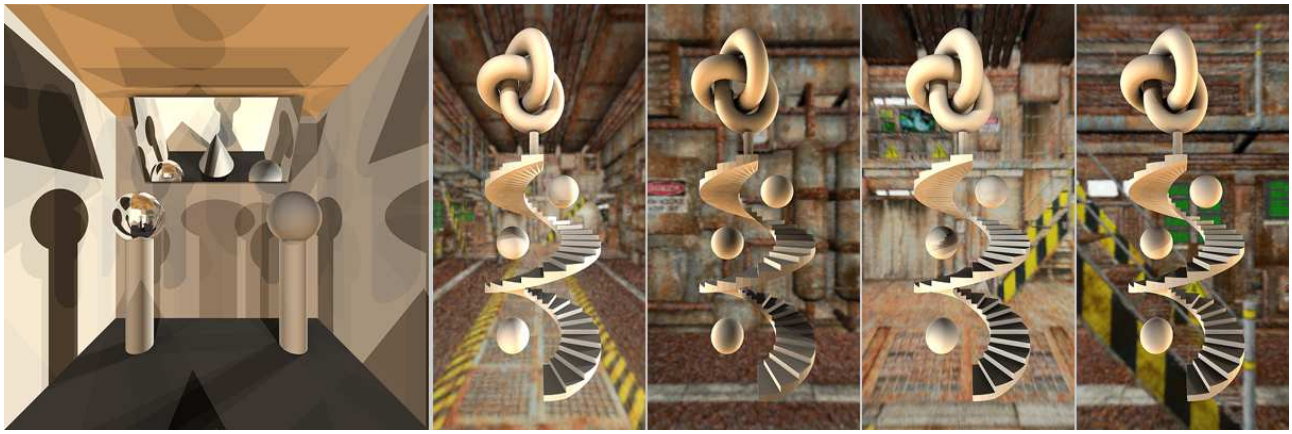
The Save As dialog in HDRShop.

Now, we finally have our light probe and we can test its light properties in Bryce. Additionally to the «Sundial» setup above, I also use some scenes that show light, backdrop and ambient light as well.



Light and backdrop: left to right, above west, north and east; below ceiling, south and floor.

There are Bryce-grey spheres and mirror balls. The backdrop is tone-mapped. The effect of the prominent light sources and the ambient light is shown on the grey spheres. This was rendered with Quality 16.



Light and shadows in a room; staircase with HDRI Yaw at 0°, 90°, 180° and 270°.

The last examples show again light, shadows and ambient light on the walls in a closed room and on floating objects with the HDRI at different orientations. HDRI Effect was always 110 and Quality 16. Such setups help assessing what an HDRI could be good for.

I hope this gets you going to experiment with this light probe and even create your own.

Products used: http://www.daz3d.com/shop/the-loading-dock and http://www.daz3d.com/shop/bryce-7-pro-spherical-mapper.

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