

Ambient Occlusion and Clay Renders

Bryce does not have an engine to render Ambient Occlusion (AO). A Clay render is an approximation to AO but the term is not used consistently. Bryce can render a scene that comes close to a Clay variant.

Introduction

Ambient Occlusion is a quick way of rendering the ambient light without shadows. In a room, the walls are brighter than the corners. Ambient light is the light that is reflected from surfaces and also from the air molecules. The materials and textures on the object are ignored. Clay renders also ignore the textures on the objects and it is used for checking the lighting. Both methods, when implemented, remove the textures, render and re-apply the materials.

Bryce 7.1

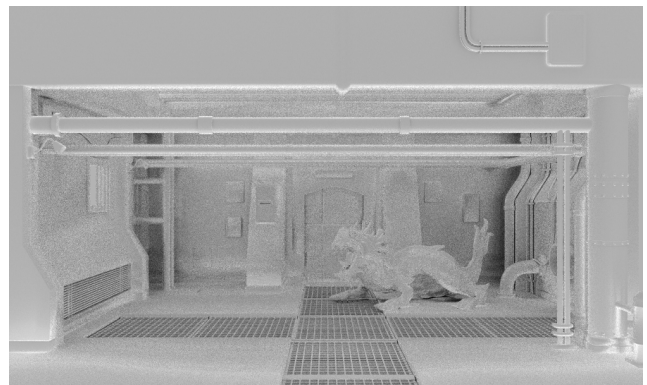
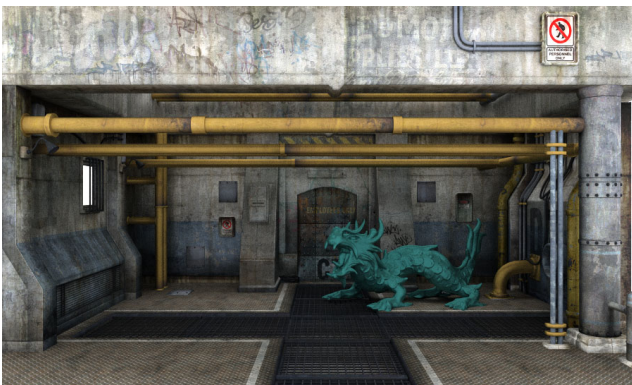
To render a scene that looks a bit like a Clay Render, all objects must be manually set to default grey or white diffuse. The scene must be lit by a uniform white light source using *True Ambience* (TA), which is the Bryce name for Global Illumination (GI). A dome light is often recommended, in Bryce a fully white HDRI rendered as background but without the light: *HDRI Effect = 0* is mandatory.

Intensity, which controls the brightness of the backdrop, also emits light for TA. The contrast of the result can be controlled with the amount of white *Diffuse* and the *Intensity*.

Experiments

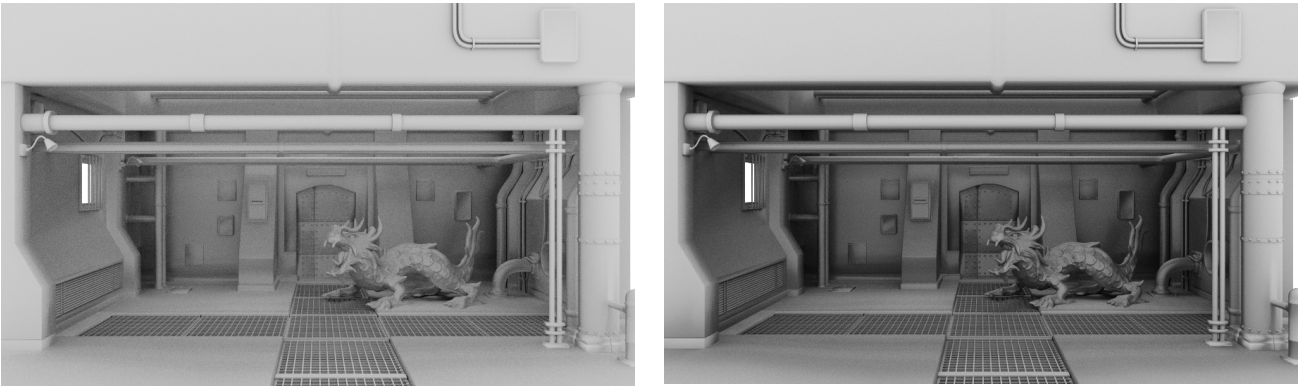
All renders Premium with 256 rays per pixel (rpp), maximal ray depth (mrd) 4, *True Ambience*, *Scattering Correction* and *Boost Light*. All example renders took the same amount of time (22 minutes as 900 x 540 pixel), except the coloured one that came close to half an hour. All materials have fully white *Diffuse* (except the coloured one).

The scene at left uses the original colours: *Dark Places* by *Stonemason* and the *xyzrgb_ dragon* from the *Stanford Scanning Repository*; *HDRI Intensity* is set to 12.



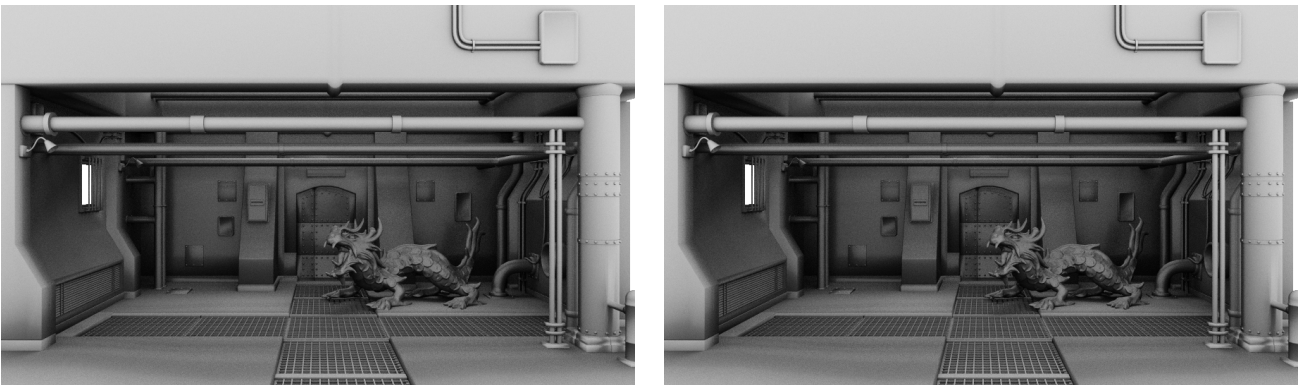
At right, an unfortunate result. The white materials were boosted with a one-component Phased Hyper-Texture (PHT, phase 500) and *Diffusion* set to 4, the *HDRI Intensity* also to 4. It appears that parts of the result got the light inverted, the tubes have bright shadowy parts but the corners of the room look correct.

This example has the material on the objects very bright and the *HDRI Intensity* very low. The best results are obtained with the opposite setting: dark materials and a very bright *HDRI* backdrop.



Above at left, *Diffusion* is set to 100 and *Intensity* to 7.5. The result looks acceptable, though a bit low contrast. At right, *Diffusion* is only half (50) and *Intensity* accordingly double (15). This gives the same amount of light, but the contrast increased and the noise reduced, it appears.

In the next examples, increasing contrast was attempted. At left, *Diffusion* is a low 7.5 and *Intensity* is at 100, the maximum. Obviously, more light on objects farther away makes the corners darker.



At right, the pixel values of the HDRI were doubled, the *Intensity* left at 100 and *Diffuse* reduced to 3.75. The left and the right render look alike but it can be measured that the contrast increased by a very few percent at right — actually not worth the trouble.

Conclusion

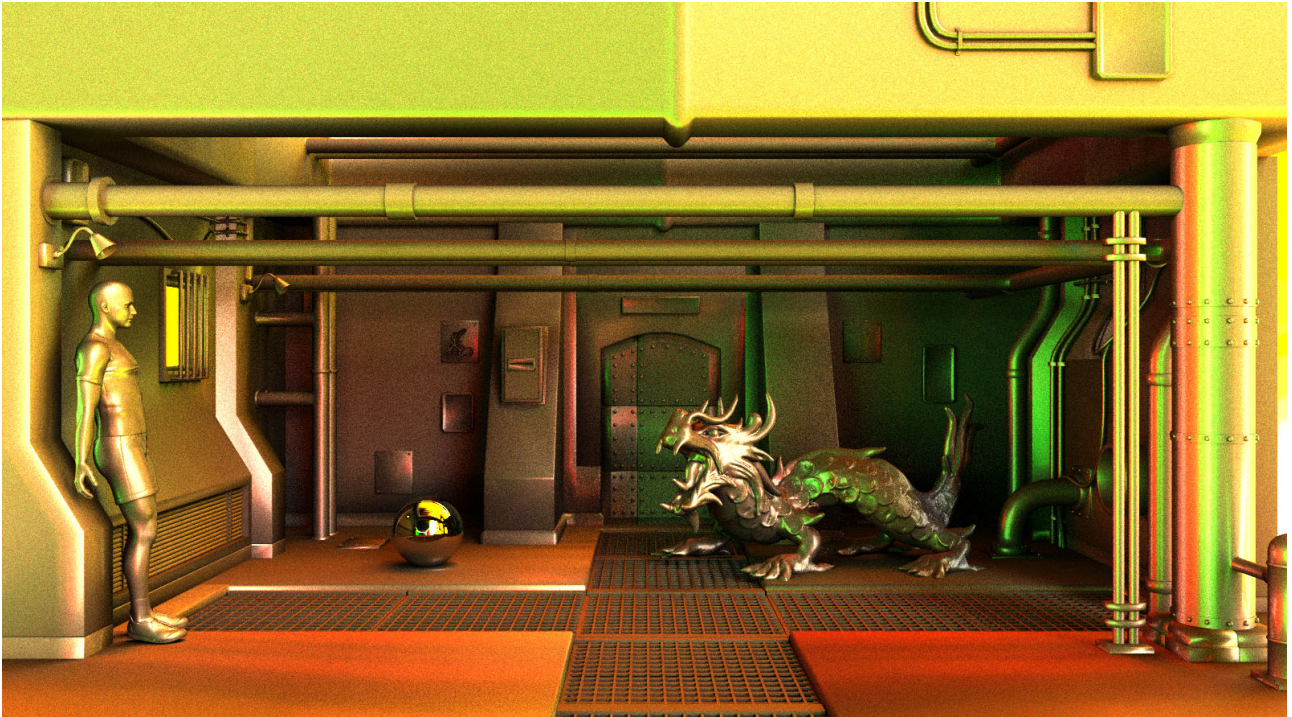
TA works with an HDRI backdrop without any IB light. The *Intensity* of the backdrop is gathered beyond the full white on the display by the TA feelers. The white HDRI used gives a fully white background on screen at *Intensity* 5.69; there is yet a long way up to 100.

If the backdrop is rendered without 48 bit dithering and the rendered image exported as 48 or 96 bit TIFF, there is no difference if *Intensity* is set to 5.7 or 100. But the TA feelers do see the difference. If the backdrop in a render is not visible, trying to boost *intensity* and keep *HDRI Effect* at zero may be worth a try. The option *True ambience optimization* has no effect if *HDRI Effect* is at 0.

If *HDRI Effect* is used to light the scene, the backdrop *Intensity* does not matter. To use the backdrop as dome light for a TA render, *HDRI Effect* must be zero; otherwise, it will not work. With *HDRI Effect* 33 and *Intensity* anywhere between 0 and 100, I got about the same result like on top left of this page in roughly the same time. There is no possibility to boost the contrast.

Alternate Uses

This is about Clay Renders; the method of having all materials white at some *Diffusion* level and a white HDRI as backdrop but no light sources whatsoever, coloured HDRIs can also be used.



The HDRI used above is *WpH41_1024*, there is no difference when using the specular convolved HDRI. The HDRI Yaw, Pitch and Roll are all 0° , *Intensity* 100. *Diffusion* is set to 9 for the room and the dragon, to 8 for Michael. The mirror ball has 60% Reflection.



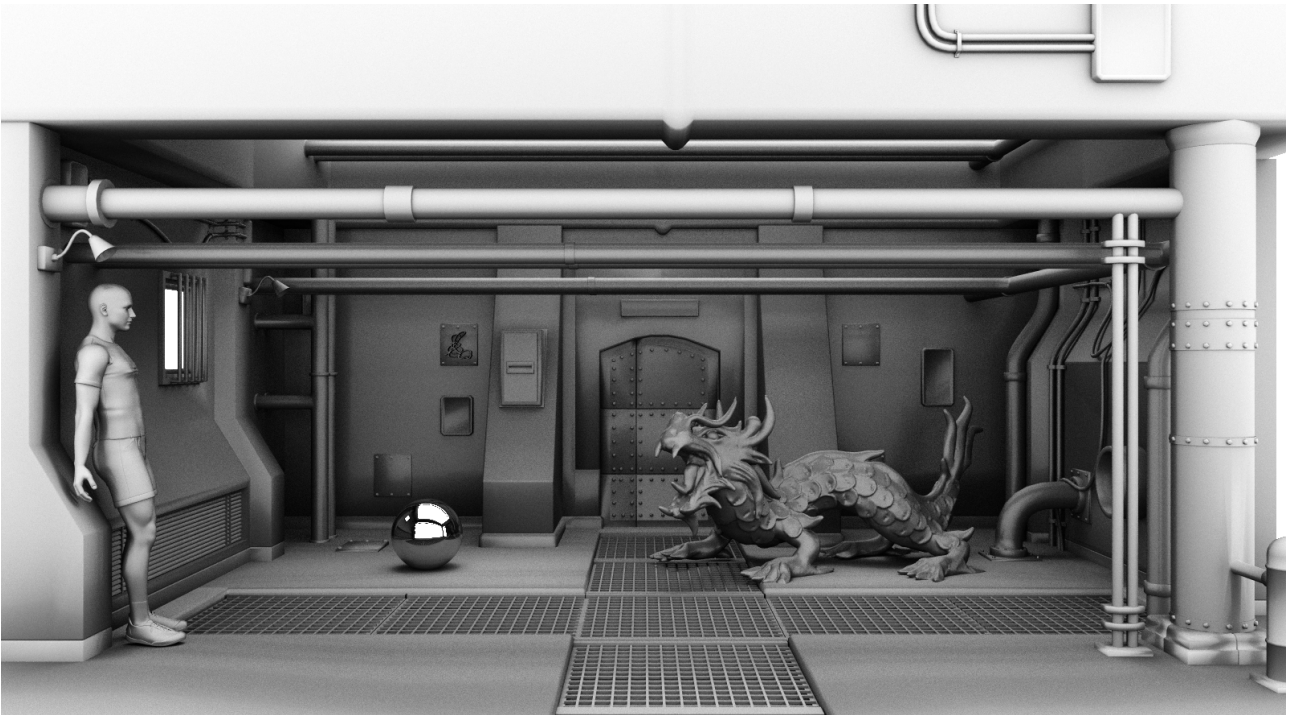
The HDRI used is *Rainbow3_1024* at Yaw 330° and Pitch 60° ; the room *Diffusion* is 17, for Michael and the dragon 20.

Bryce 7.1 Pro — Ambient Occlusion and Clay Renders

Instead of using a coloured HDRI, the white diffuse on the objects can be coloured. Fully saturated colours are probably not a good choice but some desaturated ones may give a water colour look.



Coloured objects are not white anymore and hence darker; this must be compensated with Diffusion. Michael 17 (orange 255/222/145), Dragon 20 (green 145/255/183) and room 16 (blue 145/238/255).

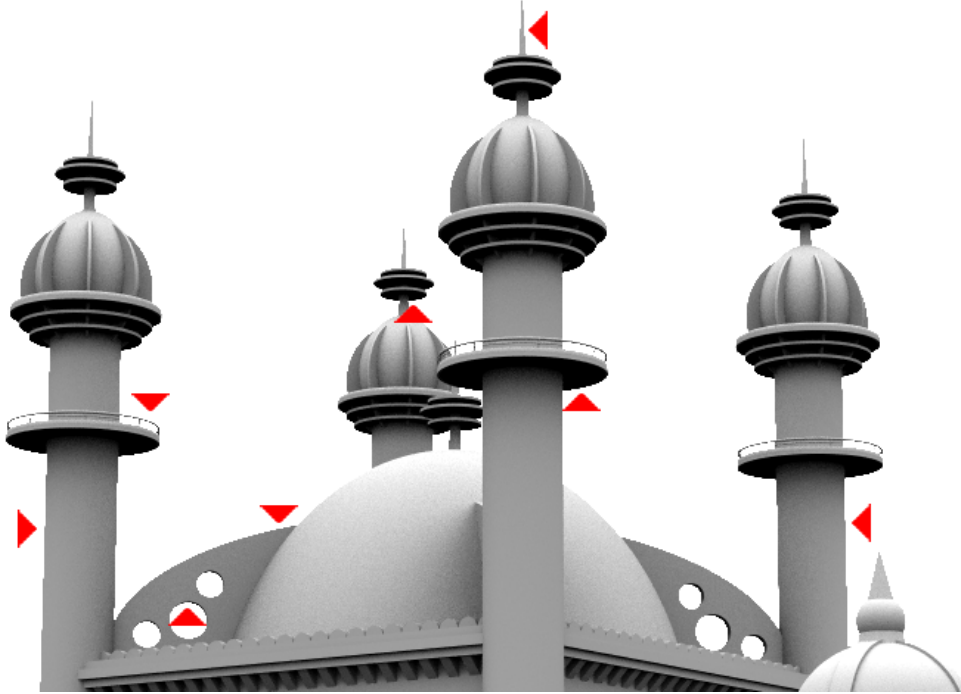


Finally the same render monochrome as a Clay Render is supposed to be. All objects have *Diffusion* 10, the HDRI WhiteSphereB7 is used.

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Anti-Aliasing Issues (Boost Light)

The contrast is controlled by the HDRI *Intensity* and the *Diffusion* setting of the object. The lower *Diffusion* and the higher *Intensity*, the more contrast. Using *Boost Light* yet increases the contrast. A white HDRI is more than white, if it is a true HDRI, this is not only so for the light (*HDRI Effect*) but also for *Intensity* if rendered as a backdrop and used as the light source for a True Ambience (TA) render. We do not see the difference but the render engine does.

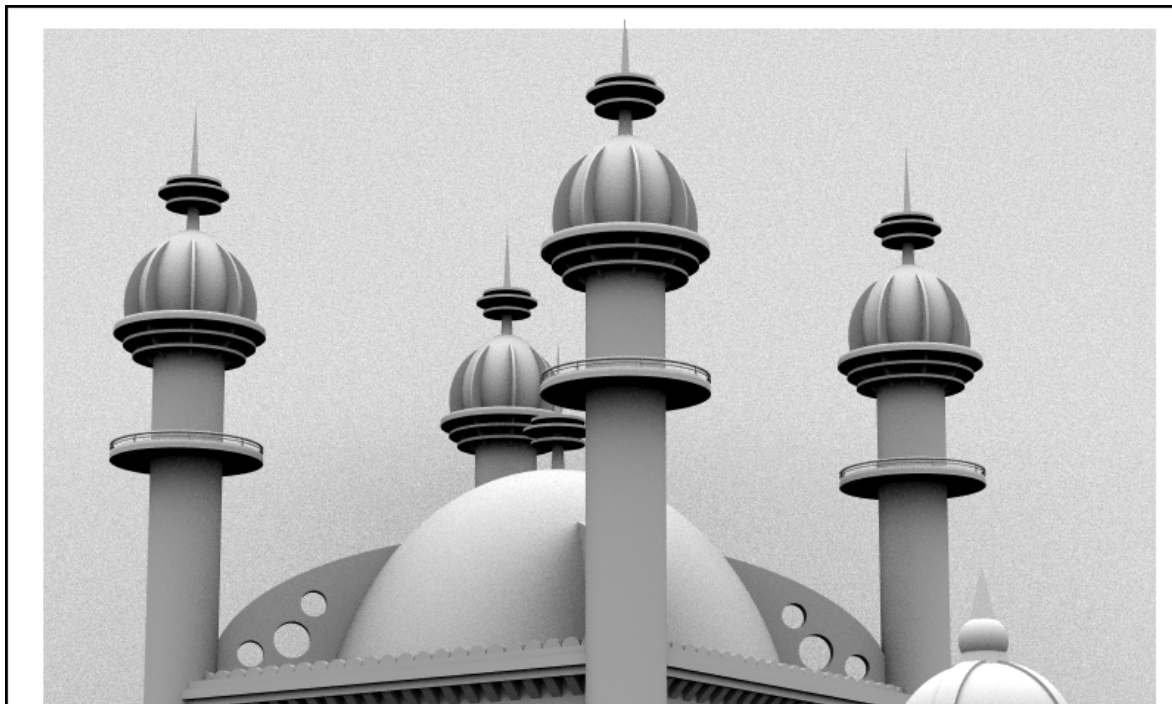


The render above uses the *Desert Temple*, a beautiful free Bryce model by *Dave Savage*. The temple has white *Diffuse* with *Diffusion* at 15; the *Intensity* of the *White Sphere* HDRI is set to 90 and rendered with TA at 256 rays per pixel. Look closely at the picture (enlarge in your viewer), some issues are identified but there are more. Anti-aliasing (AA) failed completely at the transition of the object to the backdrop because *Boost Light* was enabled.

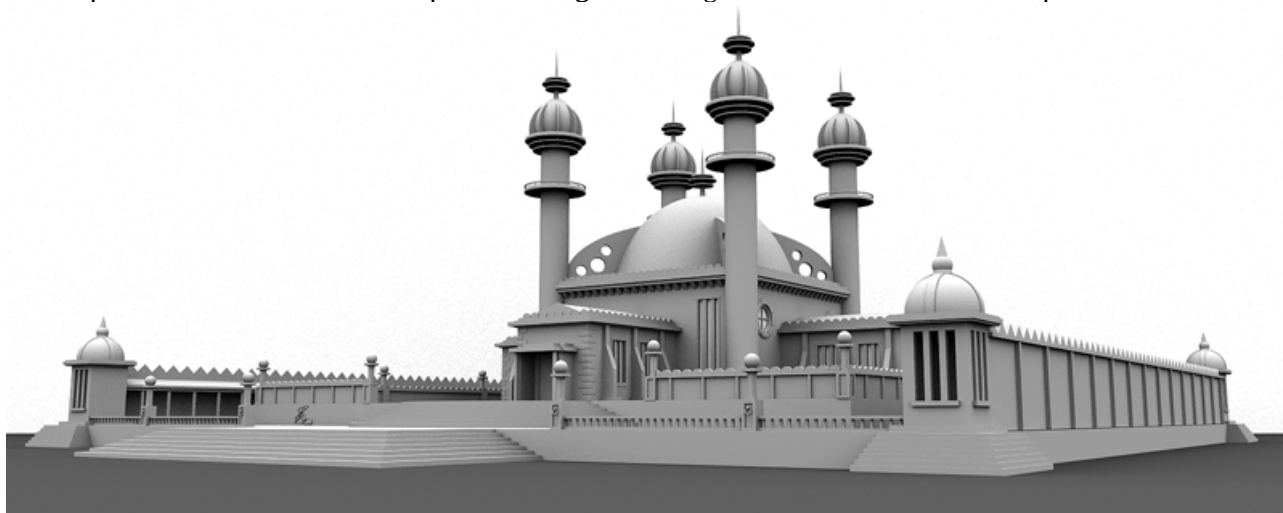
The render below looks fine, AA worked a treat, and the backdrop looks the same.



So what is the secret? A simple 2D-Face was positioned behind the temple. It has also white *Diffuse* with *Diffusion* at 33. It is indeed R/G/B 255/255/255 and therefore not whiter than white, just normal white. AA can cope with such a background.



Above *Diffuse* for the 2D-Face was reduced to 25 to show where is located. This additional 2D-Face to hide the whiter-than-white HDRI backdrop should have all shadow options disabled (cast, receive and self) so the feeler rays find the light of the HDRI backdrop. The fully white part is the HDRI backdrop. Disabling *Boost Light* would be the other option.



Above the complete Desert Temple render with the white 2D-Face, it is invisible in the render but makes the anti-aliasing happy.

Conclusion

Whenever an object meets the HDRI backdrop and the lines are not completely horizontal and vertical, shield the backdrop behind the object with a normal white 2D-Face. The *Boost Light* option is responsible for this. However, without *Boost Light* there will be less contrast because the *Diffusion* for the material must be increased to have the object well lit.