Architectural Exterior

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This is a tutorial for making a rendering with V-ray for Rhino of an exterior perspective of a building.
Main basic settings

The tutorial base on the following settings:

Image sampler - Adaptive QMC 0/50
QMC sampler - adaptive amount 1 + noise threshold 0.05 + min samples 8 + subdiv mult 1
Color mapping - Reinhard + multiplier 1 + burn 0.5 + clamp output + affect background
Indirect Illumination - "on" + no caustics + primary engine QMC + secondary engine light cache
Light cache - subdivs 600 + sample size 0.02 + num phases 1 + adaptive disable

The LC and QMC GI modes help to create nice consistant images without any attention to setting lots of options. The "Reinhard" color mapping helps the burn option to keep the brightest areas of the image. The QMC settings are used to set Vray in full adaptive mode. In this mode, the noise quality is controlled by only one option - the noise threshhold.

The advantage of the GI LC pass is that it produces a fast preview of the scene very quickly and is used to help the user answer basic questions like: Is the lighting right? Are all objects at in right place? Are the materials assigned correctly? This raw physical lighting sample of the whole scene is calculated first and all following passes are based on it.

Scene setup An architectural scene is shown in Image 1: A model of a house is placed in a simple surroundings. The goal is to show the model with natural lighting: Diffuse lighting from the sky and the sun. The simplest method is to set a blue environment color/background and distant light (for the sun). A more advanced method is to use a texture map as the environment. Using a high contrast HDRI (i.e., something with a bright sun) is not recommended. This causes a slow and noisy GI calculation. A better method is to use a low contrast environment map of the sky (Shown in Image 2) and an additional distant light source for the sun.

- Image 1: Rhino3D Architecture scene:

- Image 2: Environment map:

As a start, we set the environment at intensity 14 (Image 2) and render the scene without anylight from the top view (Image 4). After seeing the lighting of the environment, we can if necessary correct the alignment of the environment by manipulating the environment settings or editing the texture in image editing software. We then add a yellowish distant light (i.e., RGB 255,218,180) so that it matches the lighting of the environment map.

The advantage of a single color environment instead of a texture map is that the "mood" of the color can be changed much easier and no alignment of sun light source and texture is needed.

- Image 3: Environment setting for map used in Image 2:

- Image 4: Top view of the scene without and with additional sun light (screnshot LC pass):

Image 5 shows the first test render - the background is too dark and can be adjusted using the environment option. The ground around the house is to blue because the blue environment is stronger than the sun intensity. In reality, the blue light is seen only in the shadows of the sun. New sun intensity is 2 and to avoid a burn out of the whole image, the GI environment intensity is decreased to 8. Image 6.

- Image 5 First test: GI Environment intensity 14 + backgound 14 + distant light 1:

- Image 6 Final raw image (noise threshhold 0.01):

Post work It is often easier to adjust the mood of an image using some post work instead of manipulating the rendering parameters. A vingnetting effect increases the realism of the image and can be added easily during postwork using a free Photoshop plugin PTLens. I often use an additional warm look. Example options show Image 7 with less blue and more red.

- Image 7: Warm mood color correction using Photoshop:

- Image 8: Final image:

Materials Important: Caustics need a lot of calculation power and are not necessary for architecture visualization. The simplest glass is a single surface object with a single reflection layer in fresnel mode. If colored glass is needed, than an additional refraction layer with a refraction color must be set. The affect shadow option must also be enabled so that the material acts as transparent material with shadows that are the color of the refraction color. If the refraction IOR is set to 1, the object can be a single surface object.

- Image 9: Flat glass material good for architecture visualization:

Very important: materials and colors should not be brighter than color value 200 - approx. 80% reflectance (the maximum real world reflectance of white colored objects). If the brightness of a color is too high, too much indirect light will be reflected, the lighting could look wrong, and the image can be dull. A good way to control colors are the HSV values (Rhino3D color chooser). For example, the V value of the wall color is 150 only - a medium grey.

Render speed optimization The usage of full adaptive sampling mode helps to avoid the setting of material based subdivs. Only one general noise threshhold parameter controls the quality of the image. The same for the primary GI engine - the QMC GI mode is controlled by the adaptive sampling.

The noise threshhold should be set at 0.01 or 0.005 for very little noise. But for high resolution images a higher noise level is often good enough, the small amount of "grain" is sometimes seen in photos as well.

- Image 10 Higher resolution and higher noise threshhold 0.02:

If more speed and less noise is needed, changing the secondary engine doesn't help much because the LC mode is very good and quite fast. The primary engine can be changed at Irradiance Mode, but for small details you must be careful usin the IM settings. Here is a download for an animated GIF with three IM tests in comparison to the QMC GI. As you can see, low IM settings destroy the details of the lighting.

- GI_test_animation.gif (800k) The best solution is to use the IM at very high settings: min/max -1/1 and 128 samples. Image 11 shows the result.
- Image 11: Rendered per GI LC+IM and noise threshhold 0.02:

Rhino mesh settings My favorite mesh settings are shown in Image 12. The mesh is controlled by the single parameter Maximum distance, edge to surface. For architecture renderings, simple planes, is very useful ".

- Image 12: Rhino3D mesh controls: