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Undergraduate Architecture Program
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Class 2—Introduction to VRAY

Basic Workflow

Rendering always requires six basic steps:

1. Assigning a render engine
2. Setting global options
3. Lighting the scene
4. Applying materials
5. Choosing views
6. Hitting the render button

Preliminaries

In the VRAY render options tab, make sure the following settings are enabled:

Presets

Use gi_irmap_low for working images
Use gi_irmap_very high for final images
We can also control render quality with the Vray render utilities toolbar

Global Switches

Uncheck Hidden Lights and Default Lights
Check Low Thread Priority
Set Gamma at 2.2

Camera

Use Physical Camera.
Intitial Settings: Fstop = 16, Film Speed = 200, Shutter Speed = 125

Output

Override Viewport and choose Output Dimensions
Use small output dimensions for test renders
Minimum acceptable screen resolution is 72 dpi
Minimum acceptable print resolution is 240 dpi (300 better).

Color Mapping

Reinhard, burn value about 0.5

Environment

GI (Skylight)—color white, intensity 1
Background—color white, intensity 1
(This setup produces neutral lighting. We always start from neutral)

Materials

Material Editor

This is where you can add, import, rename, remove, and **preview** Materials

Nomenclature: Layers vs. Channels vs. Channel Mappings

Layer Types:

Diffuse Layer, used to:

Apply color (color channel)
Control transparency (transparency channel)
Add pattern (channel mappings)
Black = 100 pct opacity, White = 100 pct transparency

Reflection Layer, used to:

Control reflective properties of material
Black = no reflection, White = 100 pct reflection
Reflection controlled by Fresnel IOR in Channel Map
Fresnel IOR controls amount of reflection based on viewing angle High IOR = reflections start with very small angle
Eg. Metals have high IOR, Glass has IOR of about 1.51
Reflection glossiness controls the sharpness of reflections
Glossiness = 1 means reflections perfectly sharp

Glossiness < 1 means reflections go blurry
Do not use glossiness value < 0.5
Reflection color used to apply color to reflective highlights

Refraction Layer, used to:

Control way material refracts (ie bends) light that passes through it
Must enable some transparency in Diffuse transparency channel
Use Fog Color to add color to transparent materials
Fog Color should be a desaturated variant of diffuse color
Effect Fog Settings depend on object size and fog multiplier
Object size affects how much light is absorbed and thus fog color
Fog multiplier can compensate for object size differences
Refraction IOR controls behavior of internal reflections
Default refractive IOR is 1.55, which is close to standard glass.
Diamond, which sparkle, have high refractive IOR, about 2.4
Refraction Glossiness is used to create frosted materials
Frosted glass has blurry refractions
Thus, reduce glossiness factor in refraction channel
Check affect shadows in refraction layer for greater realism
Ordinarily, double sided materials should always be checked
The exception is when you want to simulate translucency
Translucency:
uncheck double sided materials
IOR =1
Refraction Glossiness < 1
Color between 80-150 for best results

Emissive Layer, used to:

Make objects into sources of light
Example: Light Bulb
Emissive Behavior controlled by several factors
Intensity
Emissive color channel
Emissive transparency channel
Diffuse color channel
Diffuse transparency channel
Intensity must be increased dramatically if using Physical Camera
Do not use emissive materials for main scene lighting

Creating Textures

Basic idea of texture mapping is to add information to a material surface
The information we add is usually contained in a bitmapped image file
(Sometimes we add information using procedural (ie mathematical) modifiers)

Concept of UV mapping

When we apply an image to a surface, we are basically stretching the image to fit the surface
The way in which the image is stretched is controlled by the mapping coordinates we create on a per object basis
UV mapping types are applied and controlled in the object properties mapping rollout.
Check “advanced UI”, click add, choose and adjust appropriate mapping type
Mapping widget can be manipulated in Rhino like any other object
Example mapping types: planar, spherical, cylindrical
We build up credible textures with three types of information:
Image Maps—Map RGB values of image to object surface
Bump Maps—Uses grayscale values of image to simulate depth
Displacement Maps—Uses grayscale values of image to move geometry

Image Maps:

Load bitmap file in mapping channel of diffuse color channel
Set appropriate UV mapping for object to which material is applied
Control brightness of image with bitmap multiplier and gamma

Bump Maps:

Enable by checking “Bump” in Maps area of Material Editor
Load grayscale version of image map in Bump mapping channel
Be sure that UV mapping and repeat settings are identical to those used in the image mapping channel or material and texture will not align
Bump amount controlled by multiplier. Start with values around 0.1.

Displacement Maps:

Recreates surface texture by using grayscale values of image bitmap to actually move (ie displace) geometry at the render stage.
Displacement is a more credible technique for creating textures than bump mapping, but it is also more computationally demanding
Enable by checking “Displacement” in Maps area of Material Editor and enabling displacement in object properties.

Displacement is controlled in two areas.
Locally (ie per object) it is controlled by the displacement multiplier in the displacement map channel
Globally, it is controlled in the displacement rollout of Render Options
Displacement quality can be improved at the global level by increasing max subdivisions or decreasing edge length.
In general though, it is better to have a denser mesh and fewer max subdivisions than a looser mesh and higher max subdivisions.

Transparency Mapping

We can also use bitmaps to control material transparency
This is useful for creating product logos, decals, stickers, etc than seem to be applied directly to the object
Add masking bitmaps to the mapping channel of diffuse transparency
It is sometimes necessary to remove bitmap image backgrounds in photoshop before mapping to get the right effect.

Two Sided Material Rendering Trick

For interior renderings, it is sometimes desirable to be able to see through walls while still allowing wall materials to affect the scene lighting.
There is a trick to how this is done. Create a vraySKP2sidedMat, set one side to the material of the wall, and leave the other side blank
If the material is on the wrong side of the wall, use _flip to flip the wall's direction
This trick is also very useful for setting up sectional perspectives

Lighting

In general, material parameters will affect lighting. Lighting will also affect the appearance of materials. While it might be possible to improve a lighting setup by changing materials, this is not recommended. Rather, it is usually better to accept the materials as given and change the lighting setup instead.

Always begin with neutral lighting, ie set environment GI (Skylight) color to white and multiplier to 1.

Lighting must be balanced. If you add lights in on top of GI (Skylight), for example, you must decrease the environmental multiplier to compensate. This can only be done by trial and error. There is not "scientific" solution.

Light Types

- Rectangular
- Directional
- Point
- Spotlight
- Sun

Generally, we use rectangular lights because they produce the most realistic lighting setups. A rectangular light in VRAY can be though of as analogous to a “softbox” light diffuser in photographic lighting. Always be sure that decay is enabled in the light properties rollout of object properties. It can frequently be useful in interior renderings to make lights invisible and double sided.

Rectangular lights and GI (skylight) create soft, diffuse shadows. Point lights, Directional Lights, and Spotlights create strong directional shadows. Shadow quality is controlled with subdivs and shadow bias. The default value for shadow subdivs is 8. These shadows are frequently noisy. You can increase shadow quality by increasing the subdiv amount; subdiv = 32 produces almost perfect noiseless shadows, but at a high cost in rendering time. You can also soften the edges of shadows by increasing the shadow radius above its default value.