Lesson 4

The forth lesson covers the wide range of materials and textures that come with V-Ray

- Library Materials – we will see how to fine tune the materials in the V-Ray Materials Library to match our needs
- New Materials – we demonstrate how to setup some of the most commonly used shaders like plastics, metals, glass etc.
- Procedural Textures – we will discover some of the procedural textures that come with V-Ray and see how they can be useful.
- Displacement – we will use displacement mapping to further enhance the way our shaders look
- Export materials to library – we will see how to save and reuse or share materials that we've created

Each section is annotated in the video. You can find scene files with the same names in the Lesson 4 folder. These were made so that you can start at any one of these stages and follow the steps in the video to the end.

Library Materials

V-Ray for Sketchup comes with an extensive materials library that can be used directly. Since some of the materials use textures it is necessary for the user to manually set up the tiling of the texture by either adjusting its size or changing the UV tiling as seen in the video. All materials in the V-Ray materials library can be edited which allows us to start with a material that is similar to what we need and then further adjust it to meet our needs.

New Materials

In this section, we will shade our scene starting from scratch and using the **Generic** V-Ray material. This is the standard V-Ray Material which allows us to create a wide range of physically accurate shaders. You can use textures to control most of its settings like diffuse, reflection, refraction, glossiness etc. and add bump and displacement mapping. We will create materials like Paint, Metal and Glass and in the process, we you will be able to see how the main parameters of the Generic material work. The commonly used parameters are:

- **Diffuse** – this is the diffuse color of the material and it is used to create flat non-reflective like walls or carpets. Note that most materials in the real world however have at least a bit of reflectivity
- **Reflect** – specifies the reflection color of a material. Can be used to create reflective materials like metals.

- **Use Fresnel** – when this checkbox is enabled the reflections depend on the angle at which we are viewing the surface. This is used in simulating materials that have a thin transparent coat that also reflects, like plastics or varnished wood. Additionally, most refractive objects like glass reflect light in this manner. The effect of this parameter also depends on the Index of Refraction – **IOR** of a material, which is a physically measured value of how light is refracted by a material.
- **Reflection Glossiness** – controls the sharpness of the reflection. A value of 1.0 means perfectly clear reflections (like a mirror). Lower values make the reflections blurrier.
- **Refract** – specifies the color of the refractions. Note that in order to create materials like glass you also need to have Fresnel reflections enabled.
- **Fog color** – this parameter specifies the color of a refractive object inside its volume. It allows us to simulate the effect where thick refractive objects look less transparent than thin ones.
- **Glossiness** – specifies the sharpness of refractions. A value of 1.0 means perfect clear glass refractions and lower values make the refractions look blurrier i.e. frosted glass.

Some of the parameters like **Diffuse, Reflect** and **Refraction** are controlled by a color swatch. It is a good idea to avoid setting those to completely black or completely white as this is not physically accurate. Setting the **Diffuse** or **Reflect** to completely black means that the object reflects no light at all (it is a black hole) and setting those parameters to completely white means that the object reflects all the light back to the environment which is again impossible. Additionally, if you set the **Diffuse** to completely white this may lead to slow render times when GI with **Light Cache** is used. You may use black for **Reflect** and **Refract** if you want to create a material that is completely diffuse. But those parameters should never be pure white even for very reflective or refractive materials

The **Emissive** material is used to shade objects which are supposed to emit light i.e. phone or tv screens, lights with a complex shape etc. The material settings are pretty straight forward but it is important to note that objects with this material do not shine direct light into the scene. This means that if we want the objects to illuminate the scene we require GI with very high settings

- **Emissive Color** – Specifies the color of the light. A texture can be specified as well.
- **Intensity** – Controls the strength of the light.

The **Two Sided** material is used to simulate thin translucent materials like paper, fabric, thin leaves etc. The effect of the material can be seen only when we have a direct light source behind the geometry and the geometry doesn't have a volume i.e. it is a plane. The settings are very intuitive:

- **Front** – Sets the material to be used for front faces as defined by the object normals.
- **Back** – Sets the material to be used for back side faces as defined by the object normals.
- **Translucency** – Controls the transparency of the material. By default, this color is black (0.0), which means that only the **Front** material will be visible. Setting this color closer to white makes the material more transparent – more of the **Back** material is visible.

- **Multiply By Front** – When enabled, the Translucency is multiplied by the Front material.

Procedural Textures

This section covers the usage of procedural textures to control some of the parameters of the V-Ray Material. Procedural textures are textures that are generated using a mathematical description or algorithm.

The **Color Correction Map** allows us to color correct a texture (bit map or procedural) inside SketchUp. This can be useful when we need to fine tune the colors of a texture and we do not want to constantly switch between photoshop and SketchUp. Using V-Ray Interactive rendering and the color correct texture we can quickly get the result we need.

The **Noise** texture is commonly used in CG. It allows us to add some randomness to a parameter. In this case we use it as a bump map to add small detail to the wall. **Bump mapping** is a shading technique to fake small bumps and dents on the surface of our geometry.

Displacement

In this section, we use **Displacement** mapping instead of **Bump** mapping. The difference between the two is that bump mapping is a shading effect - it changes the surface normals of the shaded point so that it looks as if there are dents and bumps but the original geometry remains unchanged. This is clearly visible if you look at the geometry at a steep angle, you will see that the surface is actually flat. **Displacement** on the other hand subdivides the original mesh into much finer mesh and then displaces the new faces based on the texture. This creates brand new geometry. The effect is much more accurate and looks much better than bump mapping but it is also harder to calculate as it requires more RAM (to store the new geometry) and more raytracing for all the new faces in the scene.

Export Materials To A Library

In this section, we cover the process of exporting a material to a library. This allows us to store materials that we often use or to share materials with coworkers