

## Lesson 4 Extra Modules

This lesson comes with 2 Extra modules. For each module there is a video, and a scene file with the same name in the Lesson 4 folder.

### Advanced Materials

In this module, we go over some of the less commonly used materials:

**Car Paint Material** - created to simulate car paints the material can be used to simulate a wide range of metallic surfaces that have a clear coat on top of them. It has three layers - **Base**, which gives the base color and reflectivity of the material, **Flakes** which allows us to add tiny flakes on top of the base layer and **Coat** which adds a clear coat layer over the bottom two layers.

- **Base Color** – controls both the **Diffuse** and **Reflective** colors of the base layer.
- **Base Reflection** – controls how reflective the layer is. Lower values make the layer more diffuse and higher values make it more reflective
- **Base Glossiness** – controls how blurry the reflections in the **Base** layer are. Higher values make the reflection more clear and lower values make them blurrier.
- **Flake Color** – controls the color of the metal flakes. Usually this color is very similar to the **Base Color**
- **Flake Glossiness** – controls the glossiness of the metal flakes and works like any other glossiness parameter. It is not recommended to set this above 0.9 as it may produce artifacts.
- **Flake Orientation** – controls the orientation of the flakes relative to the surface normal. When it is set to 0.0, all flakes are perfectly aligned with the surface. When it is set to 1.0, the flakes are rotated completely randomly with respect to the normal. Usually this parameter should not have values larger than 0.5
- **Flake Density** – controls the number of flakes for a certain area. Lower values produce less flakes and higher values produce more flakes. Setting this parameter to 0.0 completely removes the flakes
- **Flake Scale** – controls the scale of the entire flakes texture. Increasing this parameter increases both the size of the individual flakes and the distance between them.
- **Flake Size** – controls the size of the flakes relative to the distance between them. Higher values produce bigger flakes and lower values produce smaller flakes.
- **Flake filtering** – controls how V-Ray is going to filter the flakes so that there is no noise in the final image. You can choose between Simple – a fast but less accurate method and Directional – a more accurate method that needs more RAM and is a bit slower.
- **Flake map size** – determines the resolution of the **Flakes** texture. This value should be close to the resolution at which you will render the final result. This map is kept in the memory and can

get very big if the **Flake map size** is set to a very high resolution, especially when the **Flake filtering** is set to **Directional**

- **Flake seed** – a random seed number from which to generate the **Flakes** texture.
- **Mapping Type** – Specifies the method for mapping the flakes. **Explicit Mapping Channel** is used when your geometry has proper UV coordinates. In most cases however you will use **Triplanar Projection in Object Space** which allows V-Ray to automatically compute the mapping coordinates.

The **Coat** layer is similar to the **Reflection layer** of the **Generic V-Ray Material** but with **Fresnel Reflections** always enabled. This allows us to quickly add a thin reflective coat over our **Base** and **Flakes** layers:

- **Coat Color** – controls the color of the coat layer.
- **Coat Strength** – controls the strength of the coat reflections when the surface is viewed directly from the front.
- **Coat Glossiness** – Controls the glossiness of the coat reflections.

**Blend material** – A special material that allows us to combine multiple materials and blend them together using a grayscale value (color or texture).

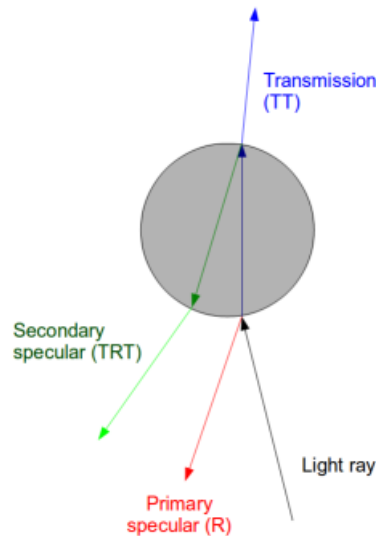
- **Base Material** – specifies the material that is used as a base and over which we will add **Coat** materials
- **Add Coat** – clicking this button adds a new Coat material to the stack
- **Coat** – specifies a material to be used as a Coat layer
- **Blend** – controls how much of the final result is contributed by the corresponding coating material. If the **Blend amount** is white, the final result is comprised of the coat material only, and other materials below it are blocked. If the **Blend** is black, a coat material has no effect on the final result. Gray scale values blend between the current **Coat** material and all the materials below it. This parameter can also be controlled by a texture map.

**Bump material** – allows us to add a bump map to any material we have in the scene - some materials do not have a bump map slot in their settings and this material is the only way to add bump to them. Stacking multiple Bump Materials together can create a more complex surface material by allowing the use of several bump maps together easily

- **Base Material** – specifies the material to which we are going to add a Bump Map
- **Map** – specifies the map that is going to be used to generate the bump effect
- **Bump Mult** – controls the strength of the bump effect

**Hair material** – a material designed for shading of hair specifically. It has a **Diffuse** component, two different reflective components and a **Transmission** (translucent) component. The **Diffuse, Primary and Secondary Specular layers** contribute to the way the hair looks when illuminated from the front. The

secondary reflection layer represents the part of the light that enters the hair strand and is reflected back to the camera, that is why it depends on the transmission color. The **Transmission** color contributes to the way the hair looks when it is illuminated from behind.



- **Overall Color** – a multiplier for all color components in the material used to easily change the look of the entire hair material. It doesn't affect the **Transparency** color.
- **Diffuse Color** – specifies the color of the diffuse component of the shader. This is used for materials made out of cloth threads or other non-translucent fibers, as well as for dirty hair. Note that clean hair or fur does not normally have a diffuse component. We can remove the diffuse component by setting the **Diffuse Amount** parameter to 0.0.
- **Diffuse Amount** – a multiplier that controls how much the diffuse component affects the final look of the shader.
- **Primary Specular** – specifies the color of the primary specular component, which corresponds to light that is reflected off the outer surface of hair strands (see the image above).
- **Primary Amount** – a multiplier that controls how much the primary specular component affects the final look of the shader.
- **Primary Glossiness** – controls the glossiness for the primary specular component. Values closer to 1.0 make the hair shinier and sleeker. Lower values give it a matted look.
- **Lock to Transmission** – when enabled (the default), the **Secondary Specular** color is derived from the **Transmission** color. Having this option enabled is the physically accurate way of controlling the secondary specular component and the hair color is mostly determined by the **Transmission Color** component. You can disable it and manually set the **Secondary Specular** color to get more artistic control over the way the hair looks.
- **Secondary Specular** – specifies the color of the secondary specular component, which corresponds to light that is reflected off the back surface of the hair strands (see the image above).

above). If **Lock to Transmission** is enabled, this value is ignored and the **Secondary Specular** color is derived from the **Transmission** color.

- **Secondary Amount** – a multiplier that controls how much the secondary specular component affects the final look of the shader. If **Lock to Transmission** is enabled, this value is ignored and the **Secondary Amount** is derived from the **Transmission Amount**.
- **Secondary Glossiness** – controls the glossiness for the secondary specular component. Values closer to 1.0 make the hair shinier and sleeker. Lower values give it a matted look
- **Transmission** – specifies the color for the transmission component, which corresponds to light that goes through the hair strands. This value greatly affects the way hair looks when it is illuminated from behind.
- **Transmission Amount** – a multiplier that controls how much the transmission component affects the final look of the shader.
- **Transmission Glossiness Length** – controls the glossiness of the transmission along the hair strand length.
- **Transmission Glossiness Width** – controls the glossiness for the transmission component across the hair strand width.

## Advanced Textures

**Dirt Map** – a V-Ray specific map that is procedurally generated during rendering. It returns one of two colors (occluded or unoccluded) or a blend between the two depending on whether or not there is geometry close to the shaded point. This allows us to simulate effects like dirt gathering in crevices or wear on edges of the geometry. However, the texture is mainly used to create an ambient occlusion pass. The AO pass darkens the image where the objects are close together in a way fake-simulating contact shadows.

- **Unoccluded** – specifies the color that will be returned by the texture for unoccluded areas. A texture map can be used for this parameter.
- **Occluded** – specifies the color that will be returned by the texture for occluded areas. A texture map can be used for this parameter.
- **Radius** – specifies the amount of area (in scene units) where the Dirt effect is produced. A texture can be used to control the radius. The texture intensity is multiplied by the radius to calculate the final radius at a given surface point. If the texture is white at a given surface point, the full radius value is used. If the texture is black, a radius of 0.0 is used.
- **Distribution** – controls how the dirt effect is distributed in relation to the contact edges. Larger values concentrate the Dirt effect closer to the contact edges. To generate proper Ambient Occlusion this value should be kept at 1.0
- **Falloff** – controls the speed of the transition between occluded and unoccluded areas. Larger values make the occluded color fade out faster.



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- **Bias X/Y/Z** – These parameters force the dirt effect to those directions. Negative values can be used for inverting the direction of the effect

**Curvature** - the curvature texture is somewhat similar to the **Dirt Map**. It allows us to sample a geometry and detect its curvature. The texture will then return dark values for areas that are dents or holes and lighter values for the peaks. We can then use this texture to shade these areas differently by using it to control a **Blend Material** and blend different shaders. Setting up this texture requires a bit of experimentation because it greatly depends on the scene scale.

**Edges texture** - returns one color for the faces of a mesh - **Background Color** and another color for its edges – **Edges Color**. The texture can be used in a **Bump map** slot of a material which will smooth out the sharp edges of the geometry. It is important to note that this is only a shading effect and the original geometry will not be smoothed.

**TriPlanar** - this texture allows us to assign bitmap or other 2d textures to objects that do not have proper UVs. The texture projects (one or more) textures along the local axes of the object.