Lesson 8 – Advanced Materials and Mapping

General Materials – Work in all rendering engines. Choices may vary by engine

Physical Material – Additional advanced properties

1. Emission (self-illumination) – Light energy transmitted
   Color of transmitted light and amount (glow color vs surface surface)
   Luminance - Light energy (1500cd approx. = 100 watt)
   Kelvin – Light "temperature". Color (Warm < 6500k "daylight" < Cool)

   Settings - Casts light energy. Likely use "Solid" setting for base.
      Emission amount (glow color vs surface surface)
      Emission color = Color of light transmitted

      Luminance = Amount of light energy (1500cd approx. = 100 watt)

      Kelvin – Light "temperature". Color (Warm < 6500k "daylight" < Cool)

2. Anisotropy – Shape and angle of highlight.

3. Sub-Surface Scattering (translucency)
   Color - Color of translucency
   Amount - Sub-Surface + Transparency (amount) = 1.0

   Scatter color – Color of internally bounced light
   Depth

   Settings - Use Standard or Advanced

      Base color - Amount = **1** + Swatch color

      Transparency = **1 (*or less*)**.

      Sub-Surface Scattering = **1 (*or less*)** + Swatch color (same as Base)
         Depth = Depth of translucency
         Scatter color = Under surface color. Swatch color

4. Coating Parameters – Acts as a clear coat

Lesson 8 – Advanced Materials, Mapping and Lighting (cont…)

General Maps - Texture mapping (Mapped Material)

"Grayscale Maps" - When setting is a number:
White – Maximum setting, Black – Minimum setting
Result = Lightest areas of Bitmap/Procedural will maximize the setting.
i.e. Reflection Roughness - White = shiny, Black = matte

Special Maps – Use grayscale
Bump Map - Adds relief (texture). White is maximum "bump"
Casts shadows.

Cutout (Opacity) – "Removes" geometry.
White is opaque. Black is transparent.
Alpha Channel (if present – i.e. PNG). Use "Mono Channel Output"
Casts shadows.

"Procedurals" – Internal (stored in MAX file). Generally Seamless.
Arnold – Must set "3ds Max Maps Support" (default) in "Render Setup"
Specific controls for each. Use "Phase" for animation

Tiles – Pattern of rectangular regions
Running Bond and Stack Bond most common.
Tile Setup
Texture (color). Count = number tiles in coordinate
Grout Setup
Texture (color). Gap = width of grout

Noise – Random pattern of Color #1 + Color #2.
Size – NOT dimensional
Can replace one (or both) colors with maps

Gradient Ramp – Click to place marker. Double-click for color.
Type - Linear (rotate "W" to go vertical). Radial (left color is center)
Noise – Adds to underlying pattern

Environmental

Physical Sun and Sky – Required for the Sun positioner.
Assigned automatically
To adjust, drag from "Environment" into "Materials Editor"

Lesson 8 – Advanced Materials, Mapping and Lighting (cont…)

Arnold Materials - Surface

Standard Surface - Main material, similar to "Physical Material"
Physical material converts to standard surface, when Arnold is the current renderer

Settings
Base – Weight and Color

Specular (shininess) – Weight, Color, Roughness and IOR

Transmission (transparency) – General, Color, Depth, Thin wall

Subsurface (sub-surface scattering) – Weight and Color

Emission (glow) – Weight and Color

Lambert – True matte material. Color is main setting

Clip Geo – Creates clipping plane
Trace Set – Must match name applied to "Arnold Properties" modifier
Intersection – Color where objects intersect

Steps:
1. Apply "Arnold Properties" modifier to geometry to be "cut" (can be group)
2. Enter a name in the "Trace Sets" field of the modifier
3. Create "Clip Geo" material, enter name used in #2.
4. Apply to "clipping object"

Arnold Materials - Other

Ray Switcher Shader – For changing materials to rays (i.e. reflections). "Utility" type

Mix Shader – Mixes between two materials. "Math" type

Matte – Creates a matte object (i.e. "hides" geometry behind). Saves to Alpha channel

Lesson 8 – Advanced Materials, Mapping and Lighting (cont…)

Arnold Mapping

Image (Texture rollout) – No real world size. Must use tiling.
General's "Bitmap" is more intuitive

Color Jitter (Color rollout) – Randomizes colors on object

"Non-Texture" Mapping - Maps directly applied without material properties
Use "Map to Material" material (Utility)

Toon (Surface) – "Cartooning" material. Will work as "Base Color" map
MUST set "Sample Filter Type" to "Contour" in Render Setup
"Edge Color" and "Edge Width Scale" are the outline settings
"Angle Threshold" – smaller provides more detail
"Base Color" is the paint color
Specular will create reflections
No GPU

OSL (Open Shader Language)

Arnold, V-Ray, etc… (**NOT** ART Renderer)
Developed internally by Sony Picture Imageworks, released as open source.
Allows user to download or develop (program) their own shaders

Some basic shaders included with 3ds MAX:

Simple Tiles (Texture) – Similar to "General's" Tile. Uses tiling.

Rivets (Texture) – Pattern of "metal" plates

Noise/Noise (3D) – OSL noise textures

Wireframe – Better than "Arnold" wireframe texture. Needs Mapping coordinates
Wires – Color of lines.
Space – Area between lines (wires).
Tiling – Wire density (repeating pattern)
Width – Size of wire

OSL Map – A "General" map. For loading 3rd-Party OSL shaders.
Click on bar under "OSL Map Parameters" and choose
Can edit the code within the loaded shader

Lesson 8 – Advanced Materials, Mapping and Lighting (cont…)

Mapping Coordinates – Advanced tools

Face map – No scale. Applied to paired faces (rectangles)

Unwrap UVW modifier – When basic mapping coordinates do not work.
Can be quite complex.

Apply “Unwrap UVW” modifier to geometry

In the command panel, under “Edit UV’s”, click “Open UV Editor…”

Use existing coordinates (as displayed) or “Peel/Quick Peel”

Two approaches:

1. Unwrap coordinates to fit an existing bitmap
   Display checker or bitmap – Upper right rollout
   Select coordinates sub-objects (lower left)
   Transforms to position/orient/scale to checker (or bitmap)
   Close dialog box

2. Export coordinates (default or peeled) to create a bitmap
   Under “Tools/Render UV’s”
   Set “Render Output” – use a PNG for alpha channel
   Click “Render UV Template”

   Open image file in Photoshop

Importing and Materials/Mapping

3D Studio MAX (merge) – Materials directly import if “Engine” is present.
Otherwise, “Scene Converter” is activated

Texture map coordinates will also import

3DS – Converts to “Physical Material”.
No imported coordinates. Must apply UVW Map modifier

Lesson 8 – Advanced Materials, Mapping and Lighting (cont…)

Revit – "Autodesk" materials directly imported

NOT compatible with the Arnold or V-Ray GPU renderers

Options:

1. Use the "Rendering/Scene Converter" & a preset:
    a. "Arnold" – Converts "Autodesk" to "Physical". Also will convert "Physical" to "Arnold Std".
    b. Create one that converts "Autodesk" to "Physical" only.
2. May also switch to the ART or V-Ray renderers

Texture mapping baked into meshes. Typically "Real-world" size

Autodesk Material

Streamlined Interface
Multiple materials, each with sub-templates

1. Material Specific Settings
    Type – Within material type (i.e. different plastics)
    Color, Finish

2. Finish texture – bumps, etc…

Sketchup – Converts to "Physical Material". Max 2022: SKP 2020 or newer

Surfaces with no materials are assigned a generic material
Multiple materials on surfaces may become Multi/Sub-Object materials

Imbedded texture maps extracted. Coordinates are "tile", baked into mesh.
Changing map will likely need "UVW Map" modifier to override.

Rhino – No materials are imported

Need to add mapping coordinates.
NURBS will likely need to use "unwrapped" coordinates

AutoCAD – Geometry assigned mapping coordinates (default).
Mapping coordinates will likely need to be changed (UVW Map Modifier)

Other File Formats – Most other formats are geometry-only