VRED Introduction

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Class summary

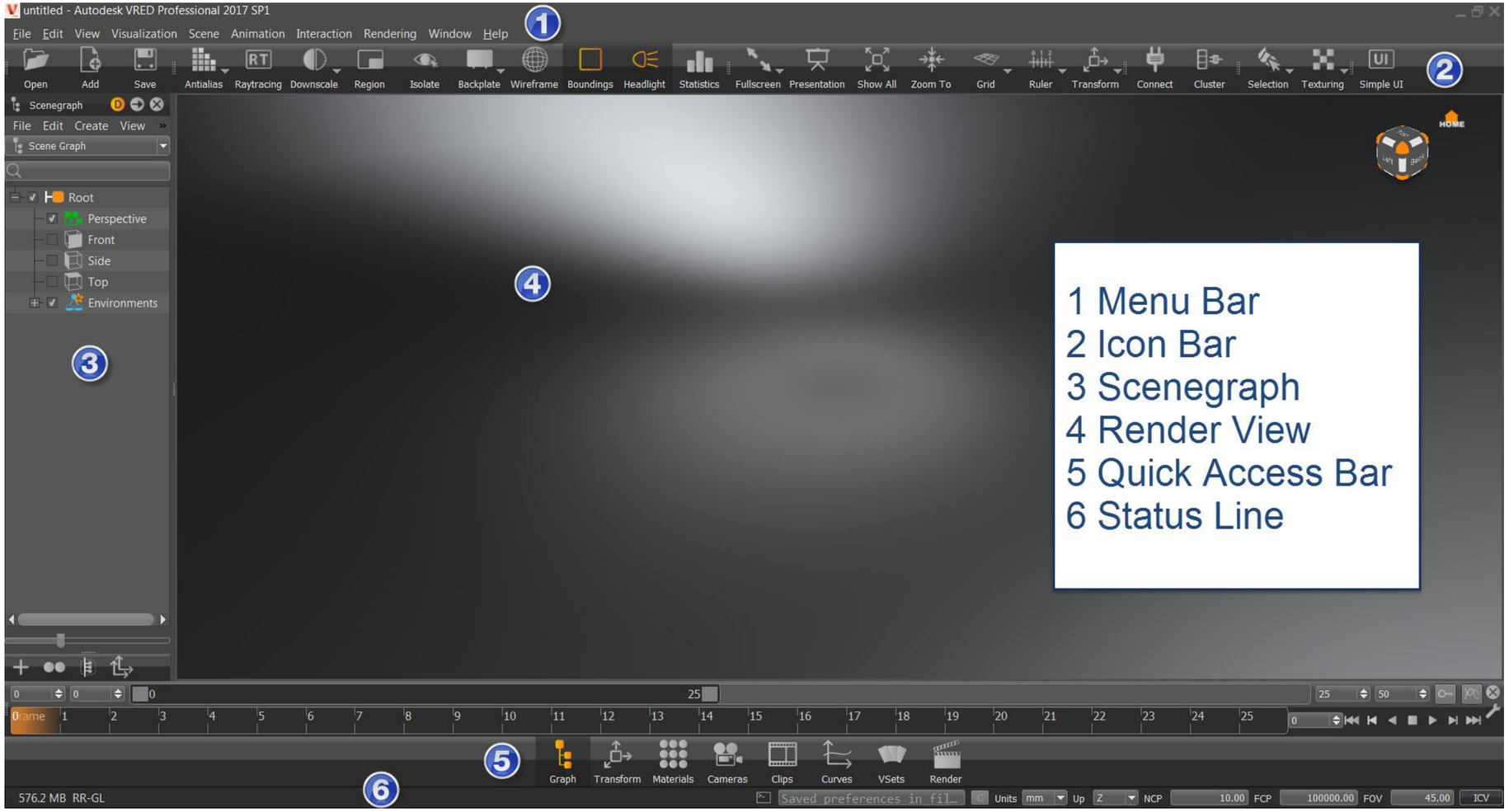
This course will guide through the first steps of doing high-end visualization using Autodesk® VRED™ Professional.

Key learning objectives

At the end of this class, you will be able to:

- to import and prepare 3D data
- to create materials in VRED
- to work with lights and environments
- how to work with material and geometry variants
- How to use Variant Sets

UI Overview of Autodesk® VRED™



About the Toolbars

File

 **Open**: Open or import established geometry (3D) formats or VRED scenes. The existing scene is destroyed.

 **Add**: Same as open but the imported geometry merges with the current scene. Adding a VRED scene opens a dialog box where you can choose whether to merge variants, touch sensors, sequences, or environments.

 **Save**: Save the current scene.

Render Options

 **Antialias**: Activate stillframe antialiasing in the render view. Keep mouse button pressed for further options:

- **Enable Downscale Antialiasing** (configuration settings from the downscale button are used for calculation)
- **Enable Raytraced Antialiasing**

 **Ray Tracing**: Turn on raytracing in the render view.

 **Downscale**: Control the calculation of the raytracing and therefore the quality of the raytracing inside the render view. Keep mouse button pressed for further options: Off, Low, Medium, High.

 **Region**: Hold the R key and drag in the render view to generate a region. Only this region is updated within the render view when antialiasing and raytracing are activated.

 **Isolate**: Hide everything but the selected object.

About the Toolbars


Backplate: Use a background image in the render view. Keep mouse button pressed for further options:

- **Create Backplate**: Select a backplate image.
- **Delete Backplate**: Delete the backplate from the render view.


Wireframe: Apply a wireframe to all selected objects.


Boundings: Show or hides a bounding box for the selected object. The bounding box is an orange cube that frames the selection.


Headlight: Enable/Disable headlight in scene.


Statistics: Open a window displaying information such as Frames per Second (FPS), Triangles drawn displayed, and more.

View


Fullscreen: Enable fullscreen mode. Keep the mouse button pressed to see an option to enable multi-display fullscreen. Press `Esc` to deactivate.


Presentation: If enabled, only the hotkeys from the variants module are available.


Show all: Zoom out so that all objects inside the scenegraph are visible inside the render view.


Zoom To: Zoom to the objects selected in the scenegraph.


Grid: Show or hide a grid for measurements that can help to identify geometry proportions. Keep the mouse button pressed for further options:

- **xy/xz/yz**: Change the orientation of the grid.
- **Show labels**: Show or hide the measurement values within the grid.
- **Settings**: Open a dialog box so you can adjust grid size and subdivision.

About the Toolbars

Ruler: Show or hide a ruler on the floor to help with estimating distances.

- **Show Manipulator**: Enable a transformation and rotation manipulator for positioning the grid in scene. Shift-click to position the ruler on a geometry point.
- **Show Grid**: Show a grid with the ruler.
- **Fix Axes**: If disabled (default), the ruler scale markings and the grid adapt to the distance of the camera to the ruler origin. If Fix Axes is activated, the scale and grid remain static during camera movement.


Transform: Show a transform manipulator in the render view so you can reposition the selected geometry. Keep mouse button pressed for further options:

- **Local Mode**: If enabled, the translation manipulator is oriented by the local coordinate system of the object.
- **Use Fixed Steps**: Enable only full numerical transformation/rotation/scales. During manipulation, the relative translation/rotation/scale values snap to a multiple of the step size defined in the Preferences Transform.
- **Size**: Show a control for changing the size of the transformation tool.
- **Translation, Rotation, or Scale Manipulator**: Show these specific manipulators.
- **Universal Manipulator**: Do any type of manipulation.
- **Pivot Transform Manipulator**: Reposition the pivot point of the selected object.


Texturing: Toggle the ability to change the texture mapping settings on a selected object. Can be used for UV mapping, planar, triplanar, and tire projection. When Texturing Mode is activated, Shift-click in the render window to open the appropriate texture manipulator so you can select the texture.

- **Planar Projection Manipulator**: Change the visibility of the planar projection plane when using a decal image. Adjust Opacity from 0 (not visible) to 1 (fully visible).
- **Cylinder Opacity**: Used for tires.

Simple UI: Toggle between Standard and Simple UI.

About the Statusbar

The Status bar provides information about memory usage. It allows you to change the up vector as well as near and far clipping planes and the field of view.

- **Info**: Size of the scene, id, and resolution of the current Render View.
- **Terminal**: Quick access button to enter the terminal module and field that shows the last entry in the terminal window.
- **Connector**: Quick access button to open the Connector module.
- **Units**: Defines the mapping of the scene units to a physical unit of length. Values are mm, cm, and m.
- **Up**: Sets the axis of the up vector. Values are: Z and Y.
- **NCP**: Defines the distance of the near clip plane.
- **FCP**: Defines the distance of the far clip plane.
- **FOV**: Sets the field of view in degree.
- **ICV**: Saves the current view as the initial camera view.

Navigation

Rotate the current camera around a point

Hold down the left mouse button (LMB) and drag.
To set the point, double-click with the right mouse button in the render view.

Pan Hold down the middle mouse button (MMB) and drag. The camera moves in the direction you move the mouse.

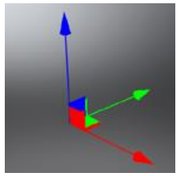
Zoom Hold down the right mouse button (RMB) and drag. The camera moves forward or backward depending on the direction you move the mouse.

Zoom to Selection: press F on your keyboard

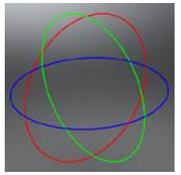
Select Objects in Render View

To:	Do this:
Select an object	Shift+click the object.
Deselect an object	Shift+right-click the object.
Select objects fully enclosed in the selection frame	Shift+drag with the left mouse button from top left to bottom right.
Select objects fully and partially enclosed in the selection frame.	Shift+drag with the left mouse button from bottom right to top left.
Deselect objects in the selection frame.	Shift+drag with the right mouse button.
Add an object to a selection.	Shift+Ctrl-click the object.
Remove an object from a selection.	Shift+Ctrl-right-click the object, or on an empty space to clear the selection.

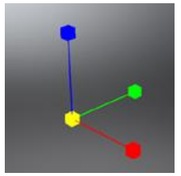
Transforming Objects in the Renderview



Shift + W Translate/ Move Objects



Shift + E Rotate



Shift + R Scale

Select the handle you want to transform your object with, using the Shift key as well

By Entering Values

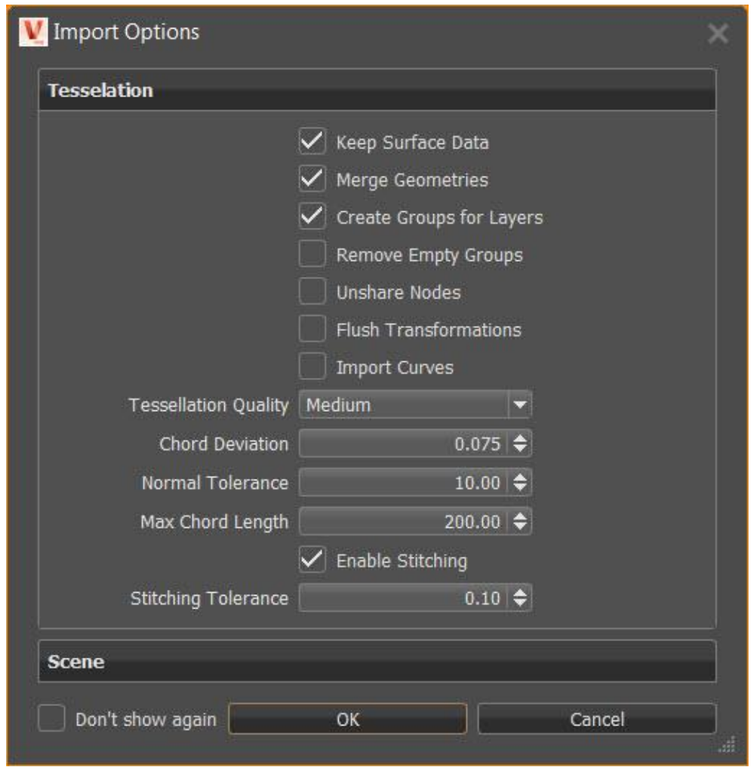
1.Select objects to transform.

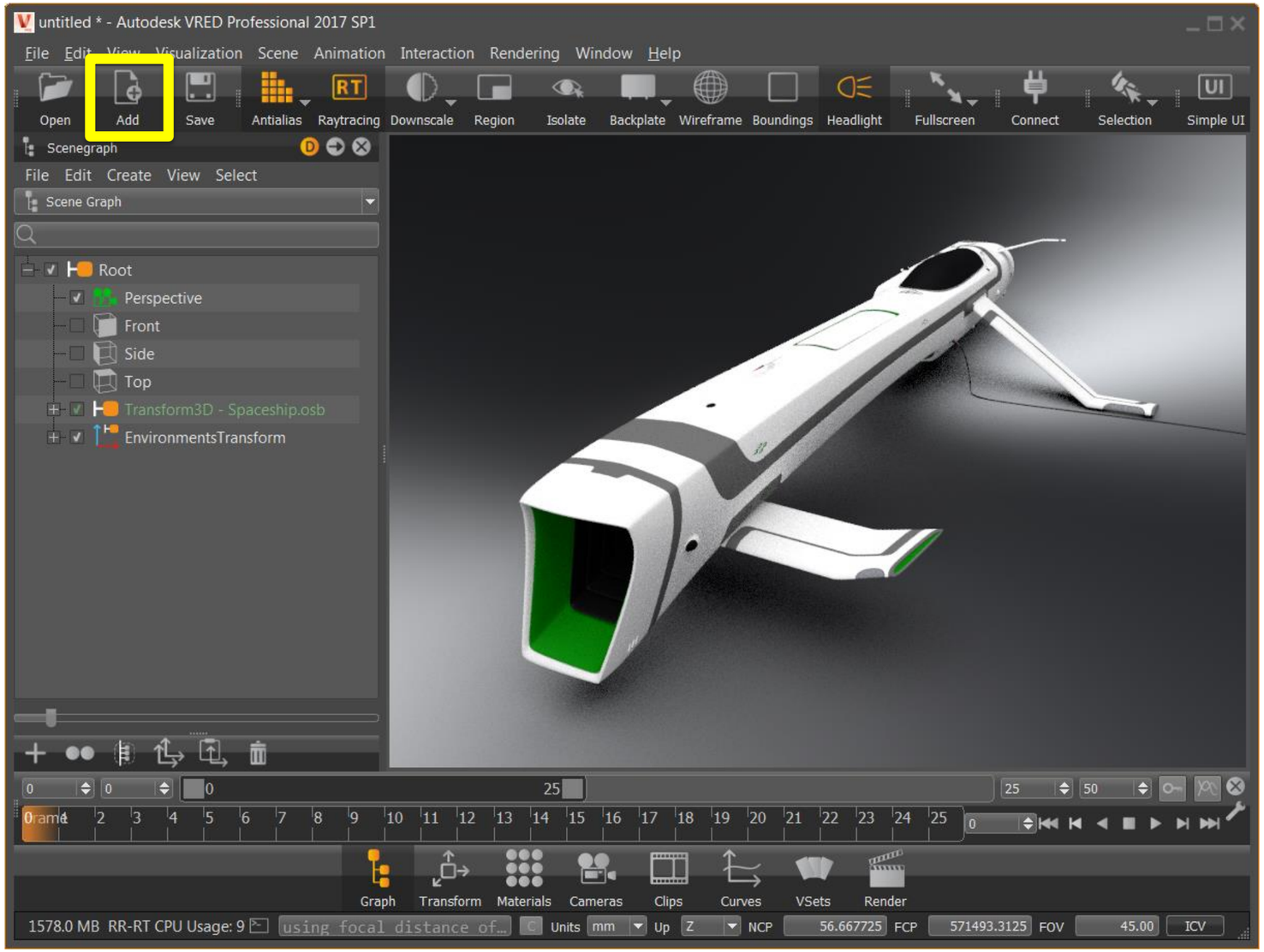
2.Toggle the Transform icon on the quick access bar. The Transform module opens.

Import and Prepare 3D data

File > Add : Spaceship.osb

Use the import options like shown below:

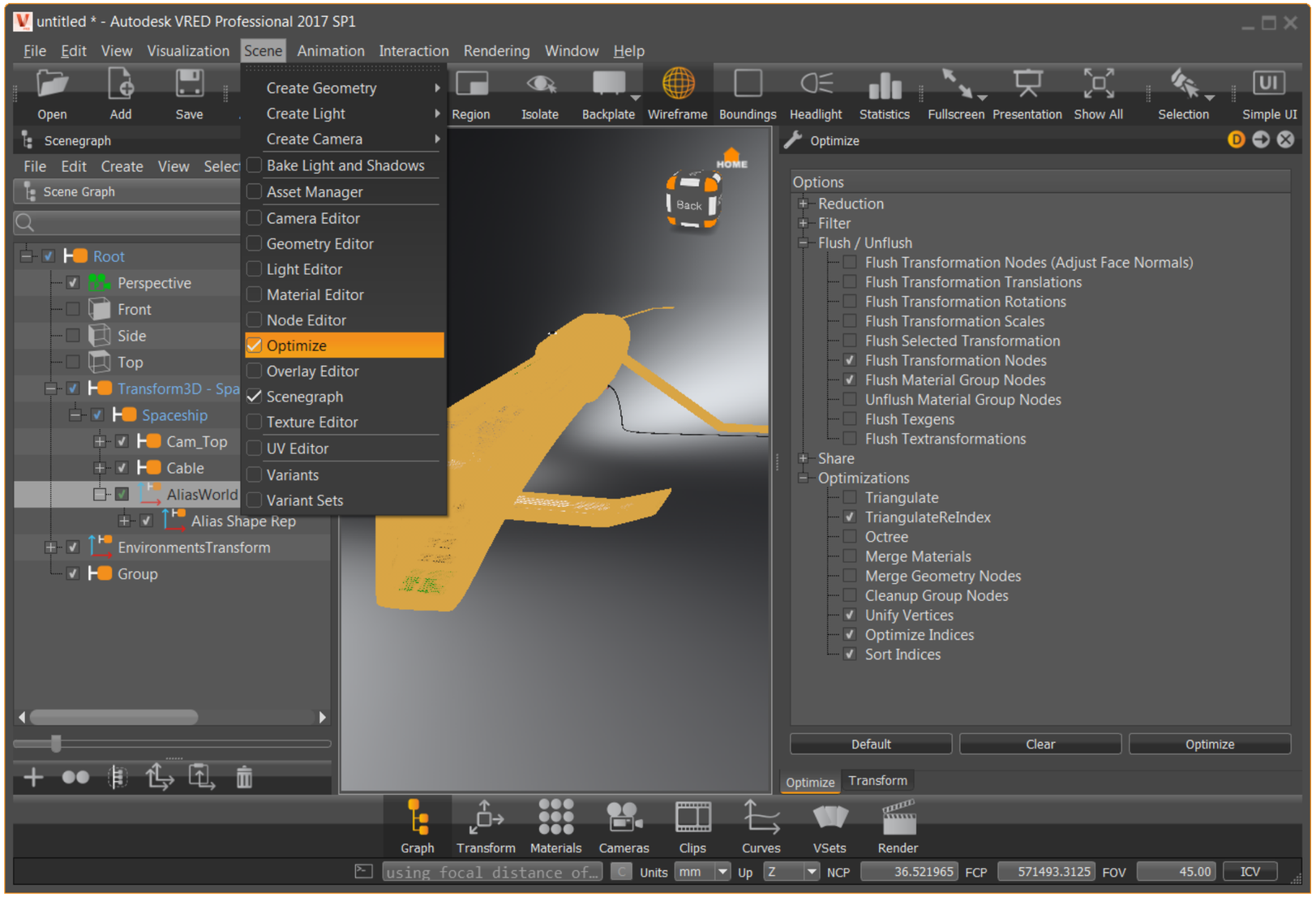




Optimizing the Scene

In order to get rid of node/ groups transformations, the scene should be optimized for further work, like restructuring the hirachy.

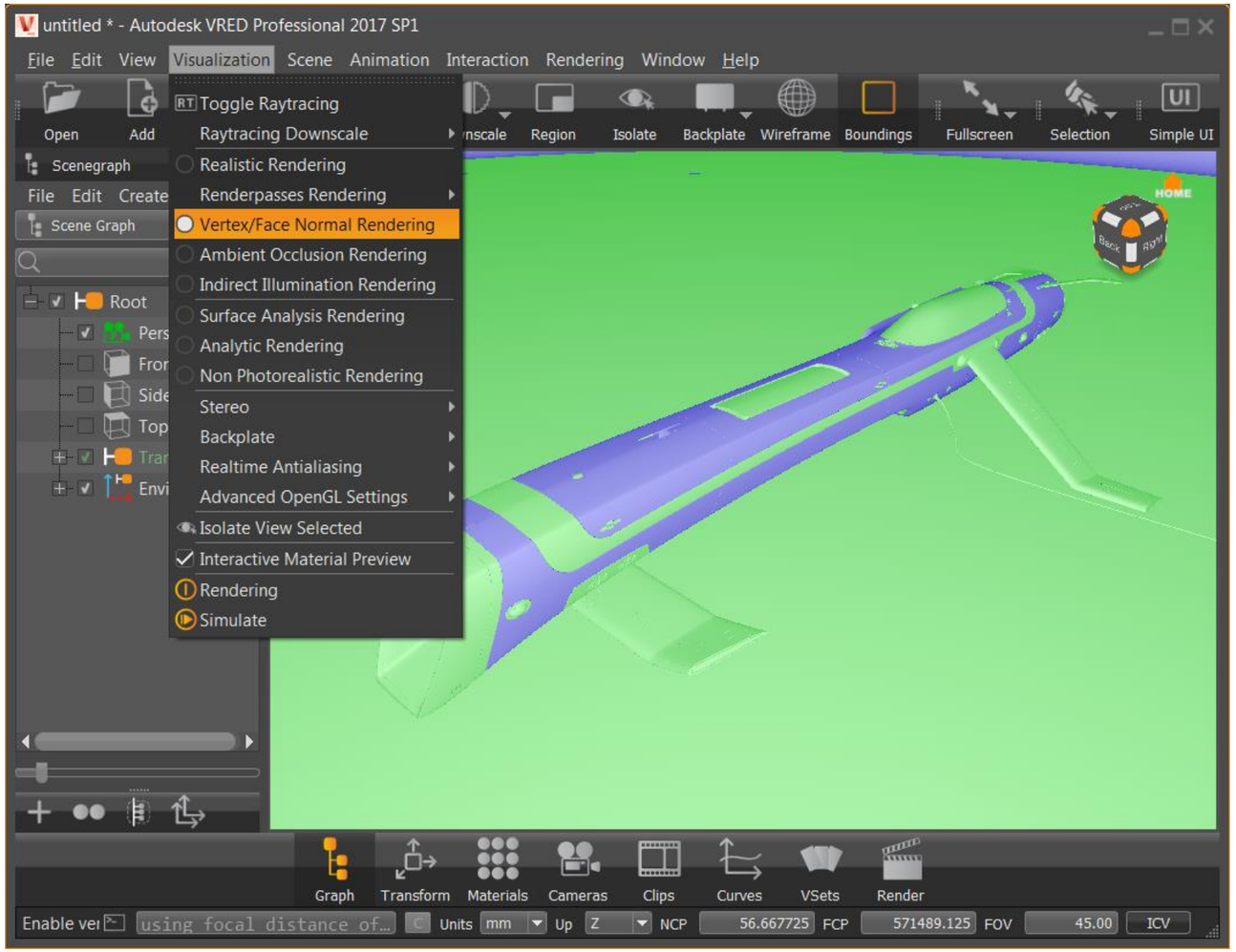
- Therefore select the Node that needs to be optimized
- go to Scene > Optimize
- Select the needed Flush options and press „Optimize“.
- Note: This command is undoable!



Correcting Normals

Enable Vertex/ Face Normal Rendering mode under Main Menu >Visualization.
Flip Normals by using the following mouse shortcuts to turn (flip) the normals of a selected object inward or outward.

ALT-left button	Flip whole shell
ALT-middle button	Flip selected patches only
ALT-right button	Flip connected patches



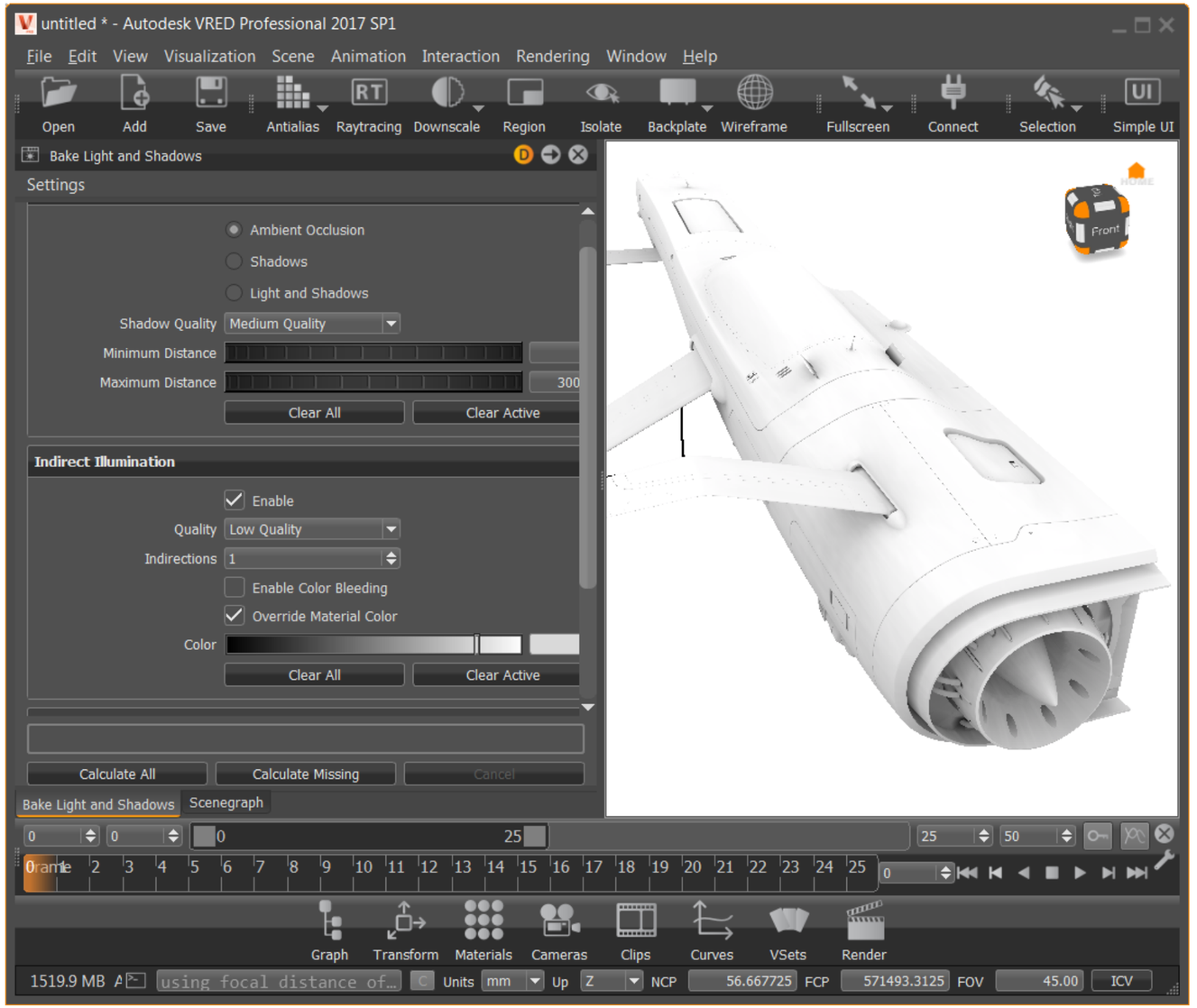
- Green: Face and Vertex Normals are consistent and point toward the camera.
- Blue: Face and Vertex Normals are consistent and point away from the camera.
- Gold: Face and Vertex Normals are inconsistent. The Face Normals point away from the camera, while the Vertex Normals point toward the camera.
- Magenta: Face and Vertex Normals are inconsistent. The Face Normals point toward the camera, while the Vertex Normals point away from the camera.

Ambient Occlusion and Shadow Baking

Ambient Occlusion simulates soft global illumination by computing shadows resulting from light coming from all directions

1.Click Scene > Bake Light and Shadows.
2.Adjust settings in the Ambient Occlusion dialog box.
3. Select the object
4.Click on Calculate all (use low settings for the first run)

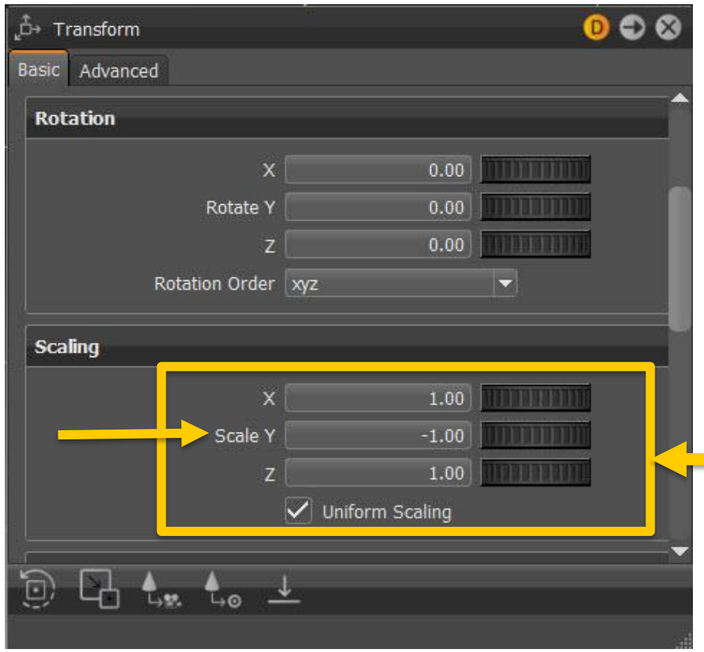
The Ambient Occlusion calculation is a preprocess and takes place during data preparation; results are baked on the geometry's vertices. The smoothness of the Ambient Occlusion depends on the detail level of a geometry. Therefore VRED offers several ways to increase the quality on low-level geometries, like subdividing triangles, and predefined quality presets.

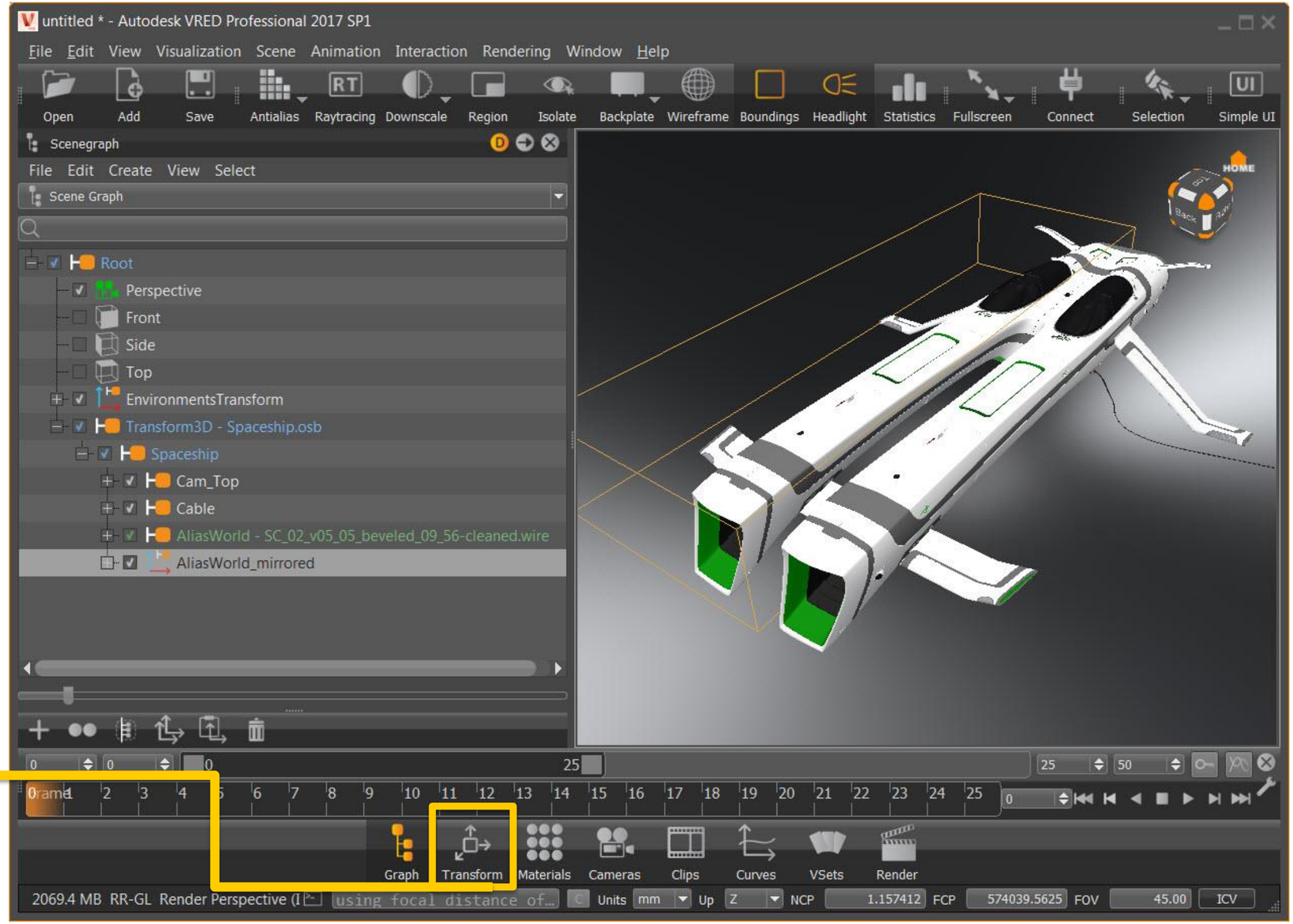


Mirror the Object:

- - Select Node: AliasWorld
- - Right click onto Group Node „AliasWorld“ within the Scenegraph
- Edit > Duplicate > Duplicate Mirror Y

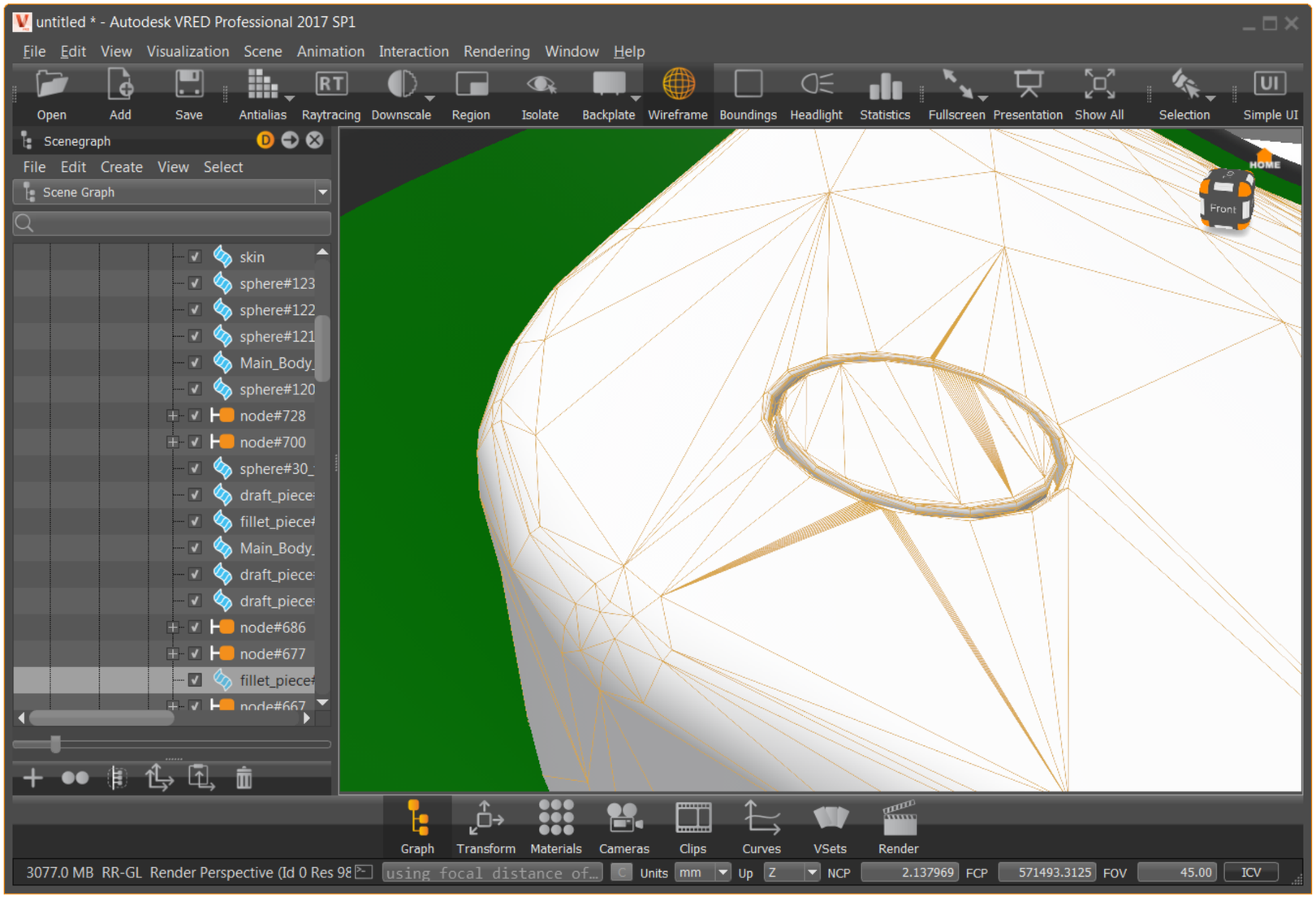
The new created node has a Transform Information of Y= -1 which can be seen within the Tansform Information Window:





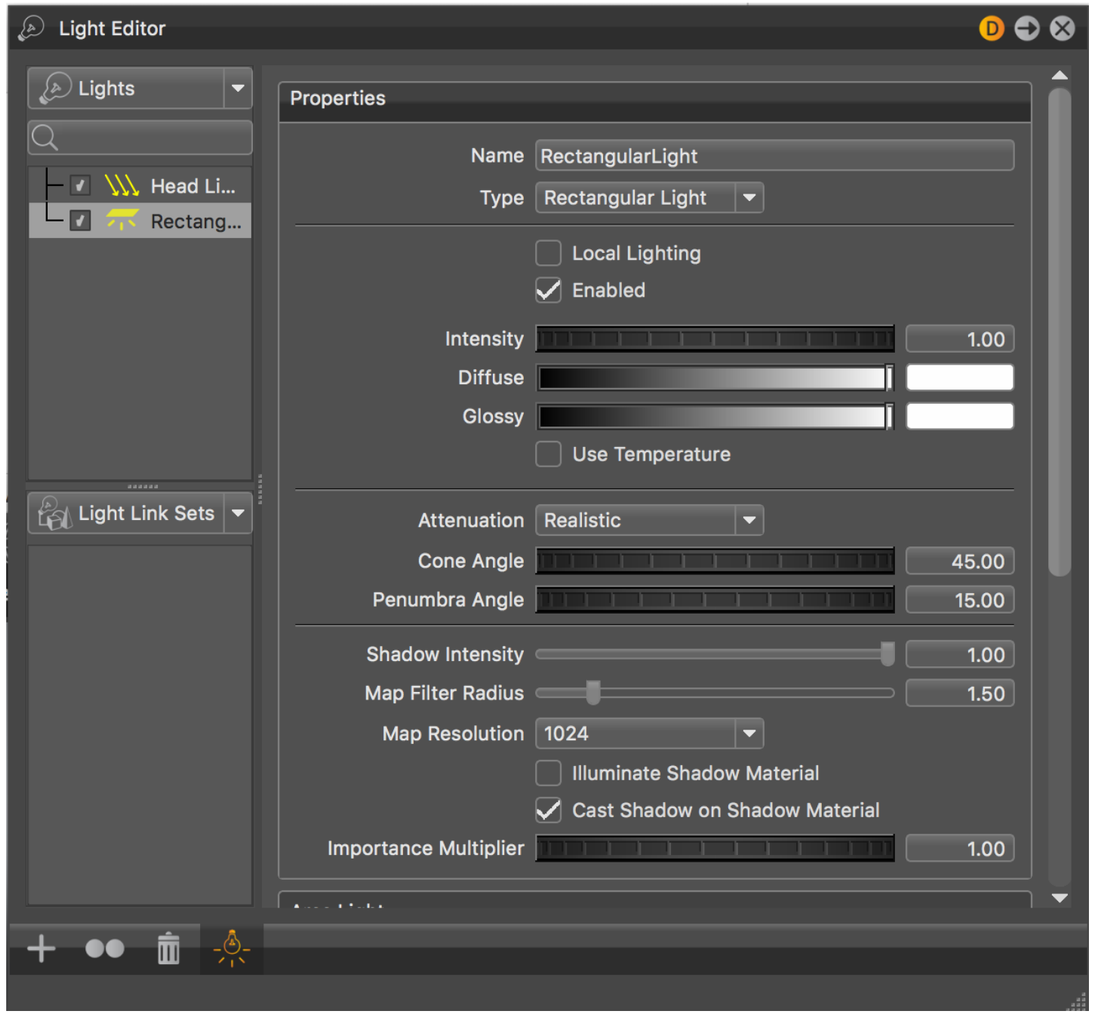
Retesselating NURBS surfaces:

- For getting a denser mesh quality do a right click > Edit > Surfaces >Tessellate Surfaces onto the objects node within the Scenegraph and choose the tessellation option as needed.



Lights

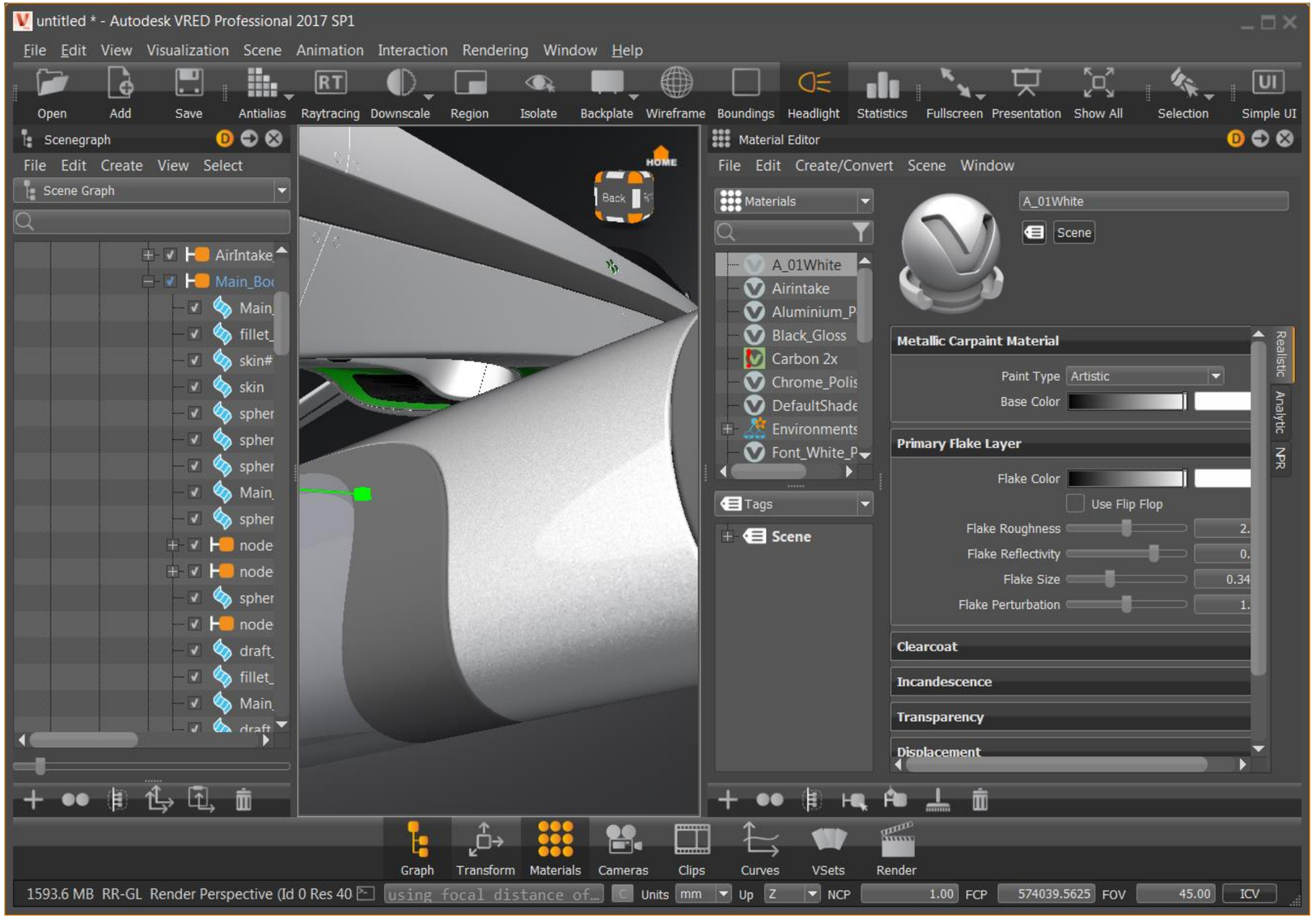
- Light Attributes like Color and Intensity can be changed and edited within the Light Editor under Scene > Light Editor



Materials

Metallic CarPaint

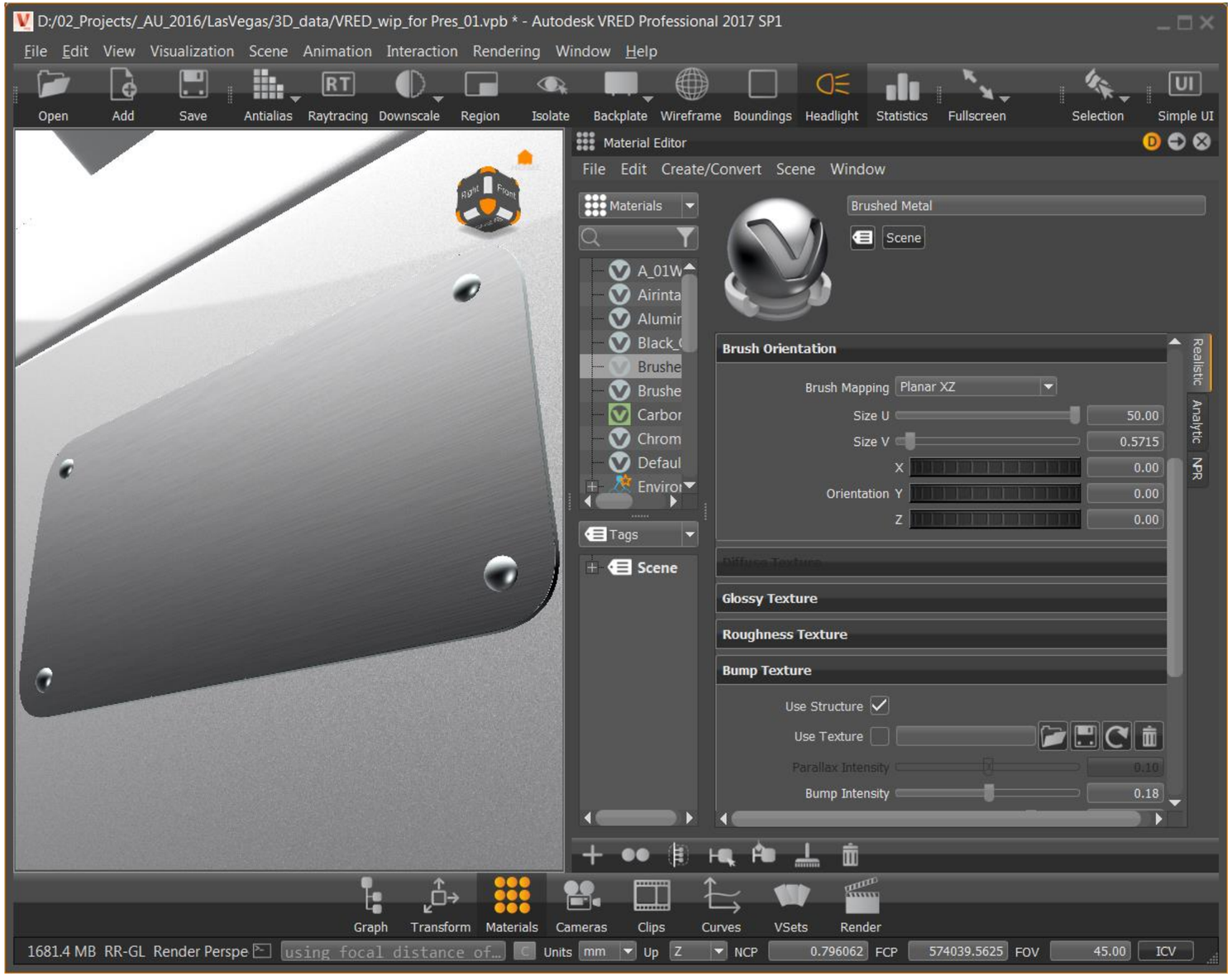
- Shift + left click onto an object within the Render View, that you want to convert.
- → The applied material of the selected object will be selected within the Material Editor
- → Right click > Convert > To Truelight Material > Metallic Carpaint
- → The Plastic Material will be converted into a Carpaint Material
- → change the Flake color to white
→Metallic Flakes will be visible



Materials

Brushed Metal

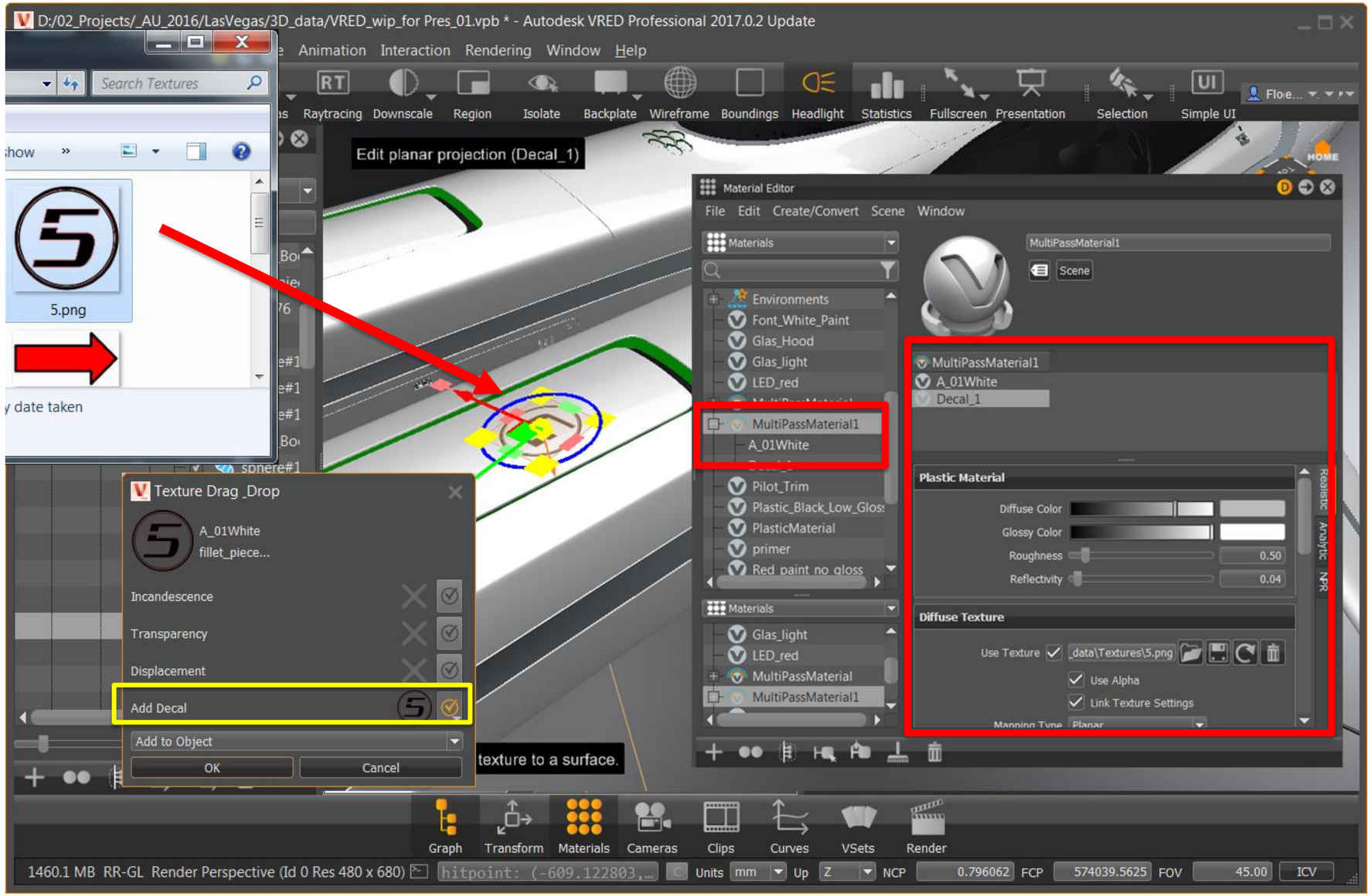
- Shift + left click onto a Metal Object
- Create a new Material called „Brushed Metal“
- Under „Bump Texture“ enable „use Structure“. The bump intensity value is controlling the Bump height of the structure. For a slight brush effect, a value of 0.8 to 0.5 is enough
- For getting a brush effect, increase one of Size Values within the Brush Orientation area, depending on the direction of the brush effect



Materials

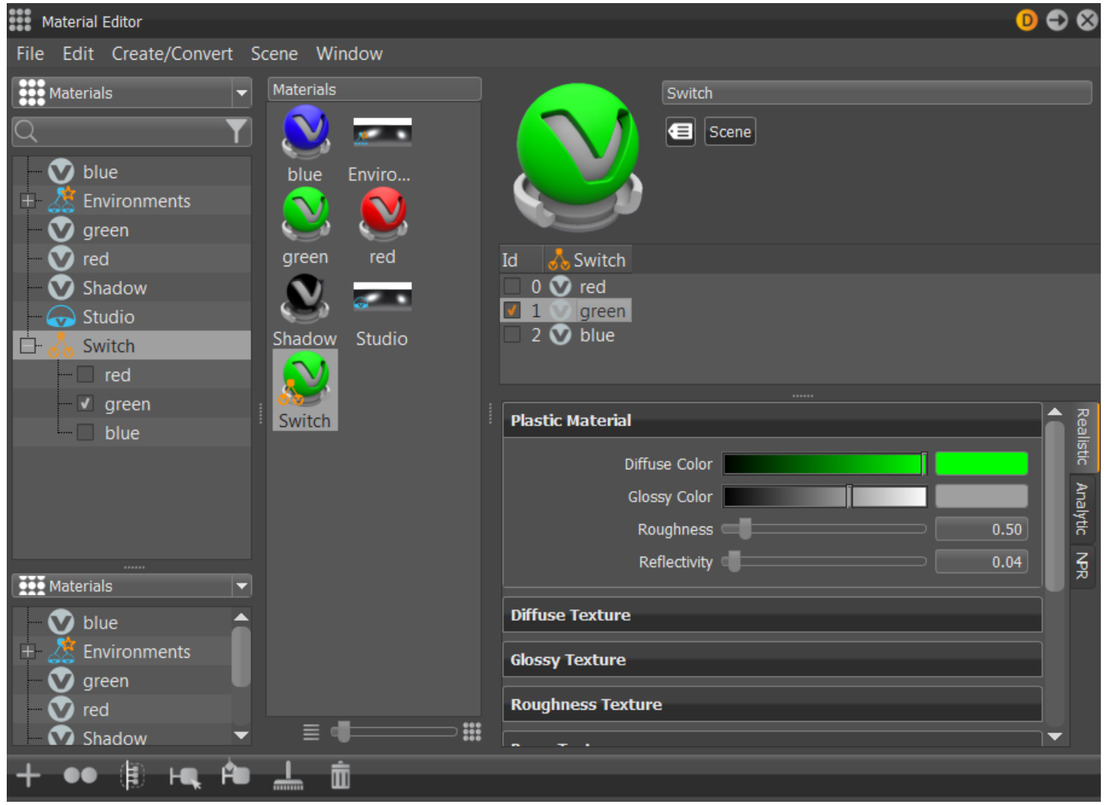
Decals

- For applying Decals to objects, simply drag and drop the desired texture file from out of the Explorer or Finder of the Operating System onto the object within the Render View
- For applying the texture on top of the existing material, choose the option “Decal”
- → this will automatically create a Multi Pass Material



Material Switches

- Go to Create / Convert > Create Material > Switch or go to create > Create Switch from Selection in case the materials are already selected that should be included into the Switch
- Drag and drop the different material into the Switch
- Assign the Material Switch to the geometry
- Check the material variant you want to show. In the screenshot, “green” is enabled

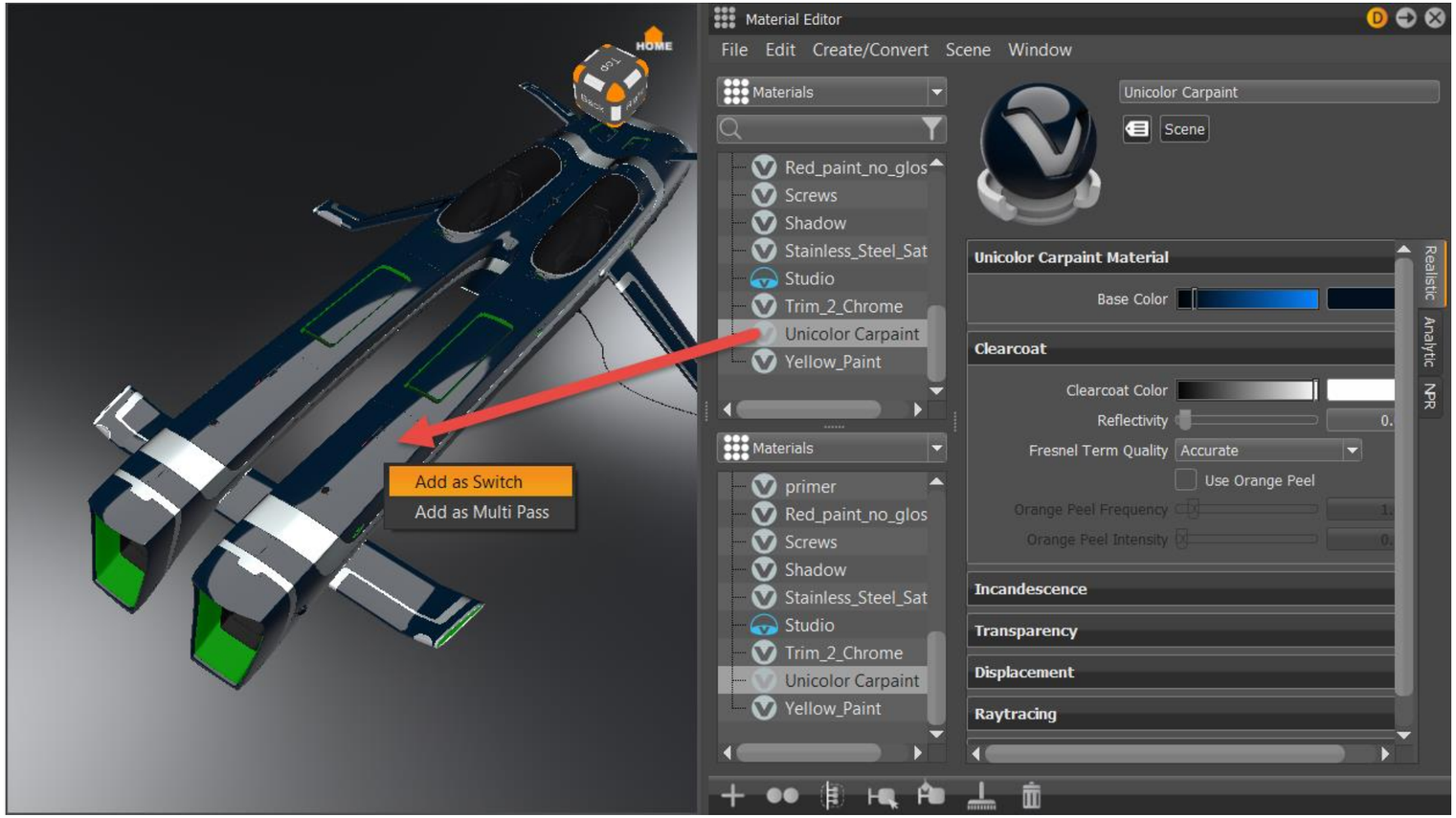


Material Switches

Or:

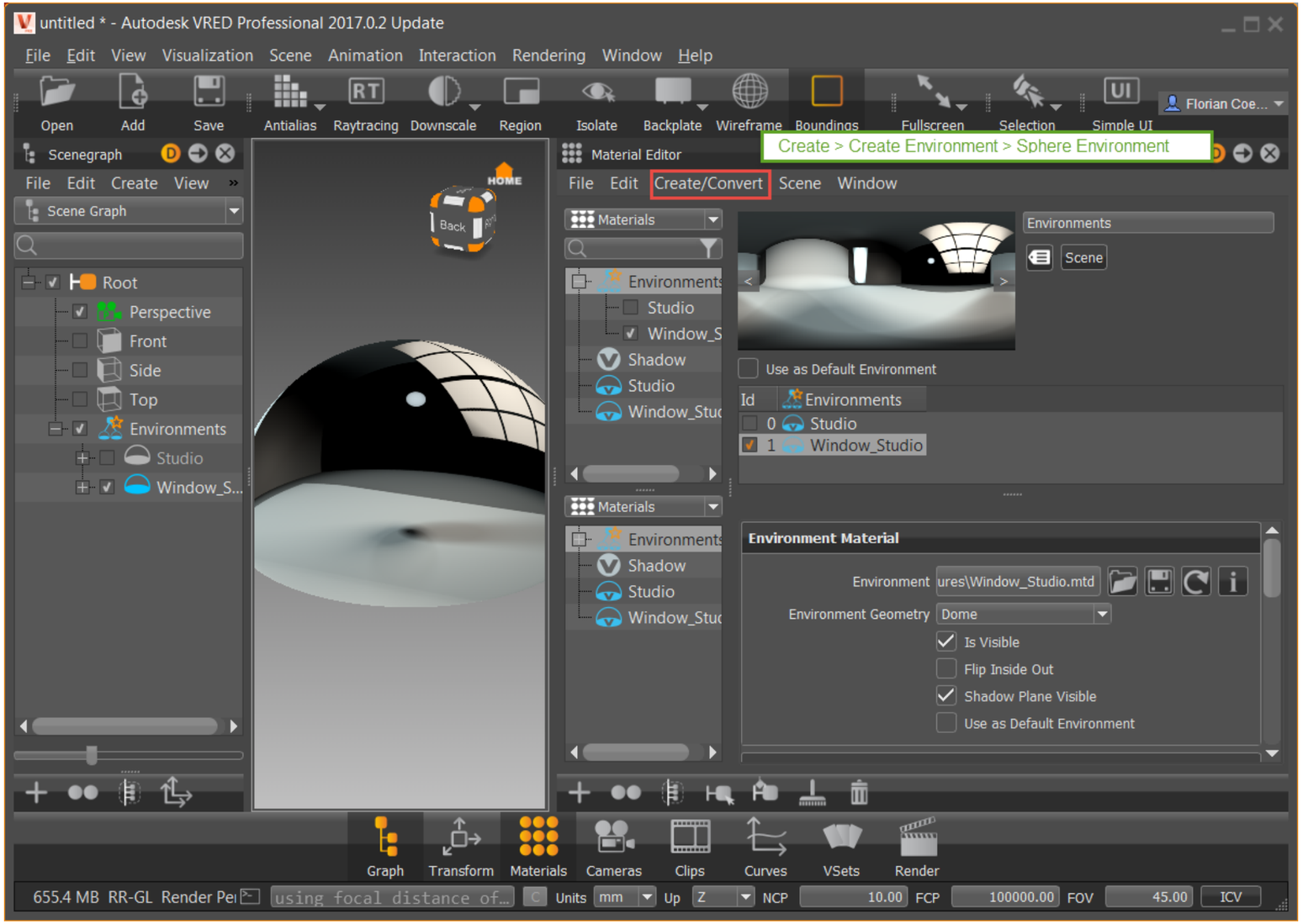
- Create a new Material
- Drag and drop the Material onto the object where the Switch should be created using the right mouse button
- Click on „Add as Switch“

→ New Switch Material is created, where the user can switch between the color alternatives



Environments

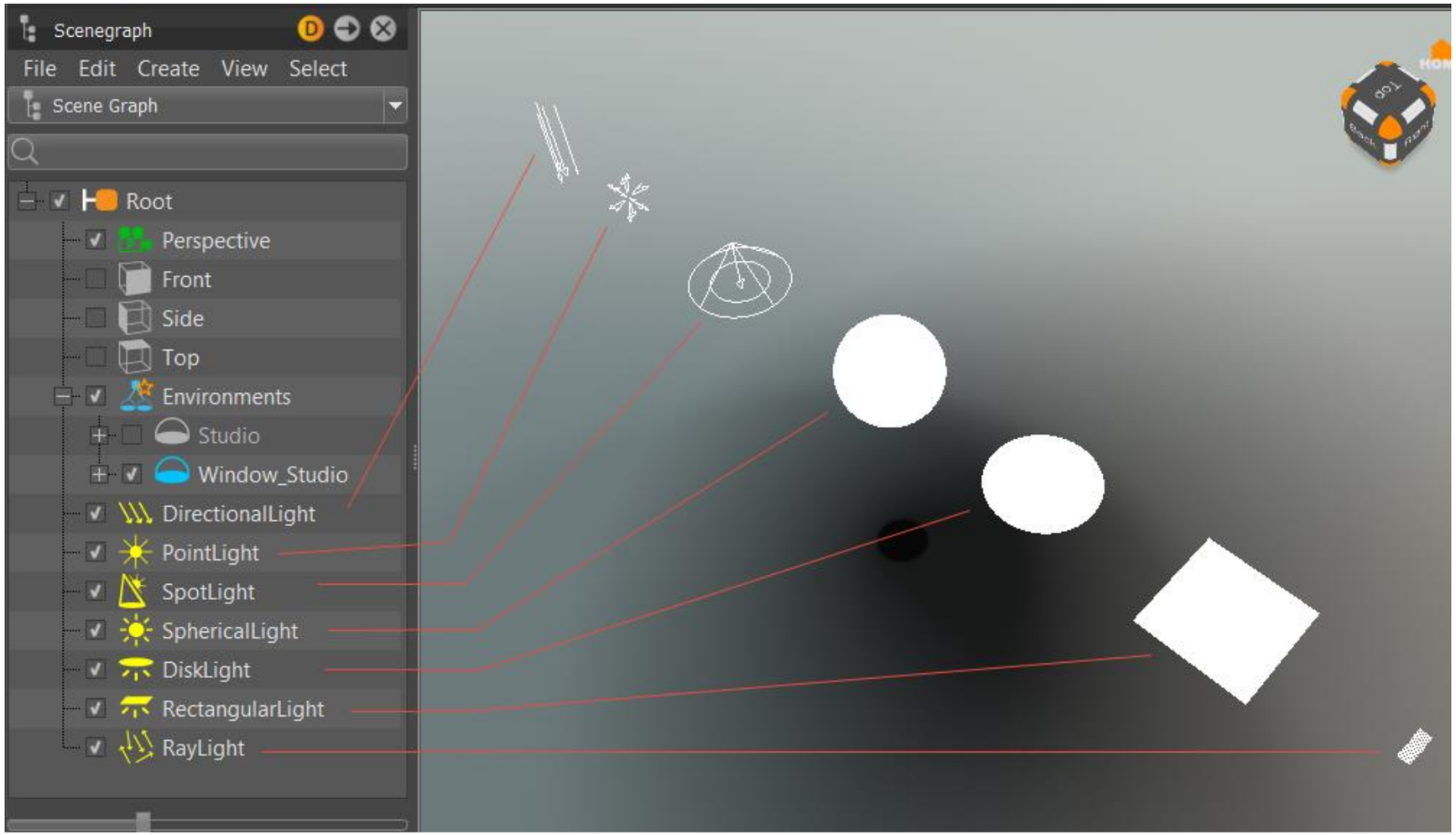
- Create a new environment within the Material Editor
- Create/Convert > Create Environment > Sphere Environment
- Browse to a new HDRi image in order to be used within the new environment
- The new environment will automatically placed into the Default Environment Switch, where the environments can be switched easily
- Custom Environments can also be stored within the Asset Manager by drag and drop them into the environment area within the Asset Manager under Scene > Asset Manager



Lights

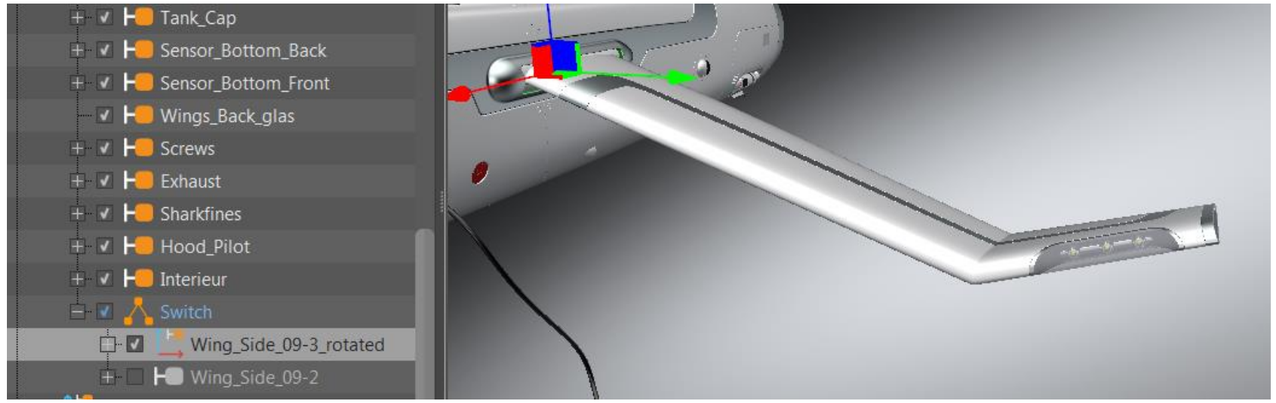
- Create new Lights under
  Scene > create Light

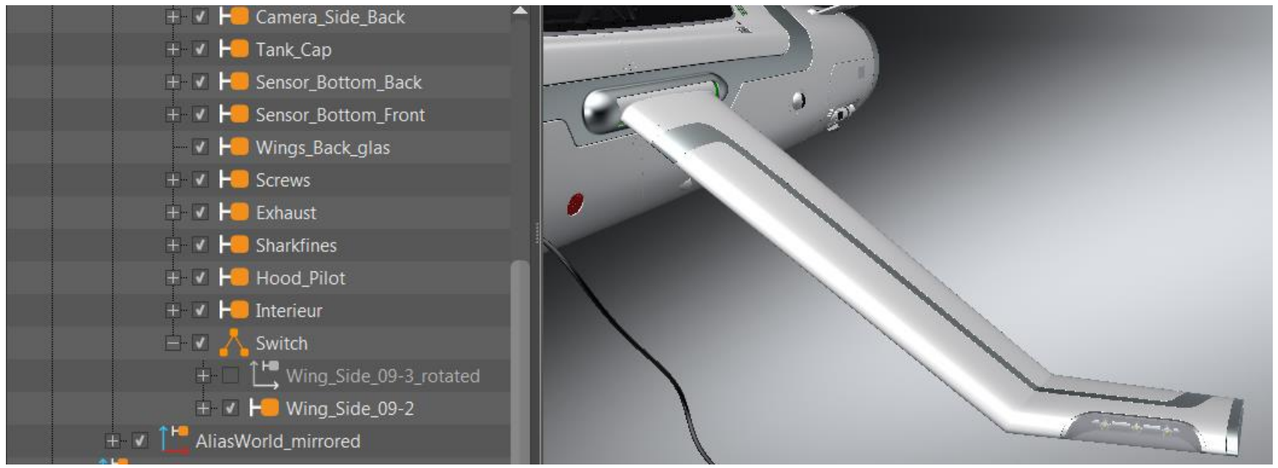
- See here the different Light types that can be created



Geometry Switches

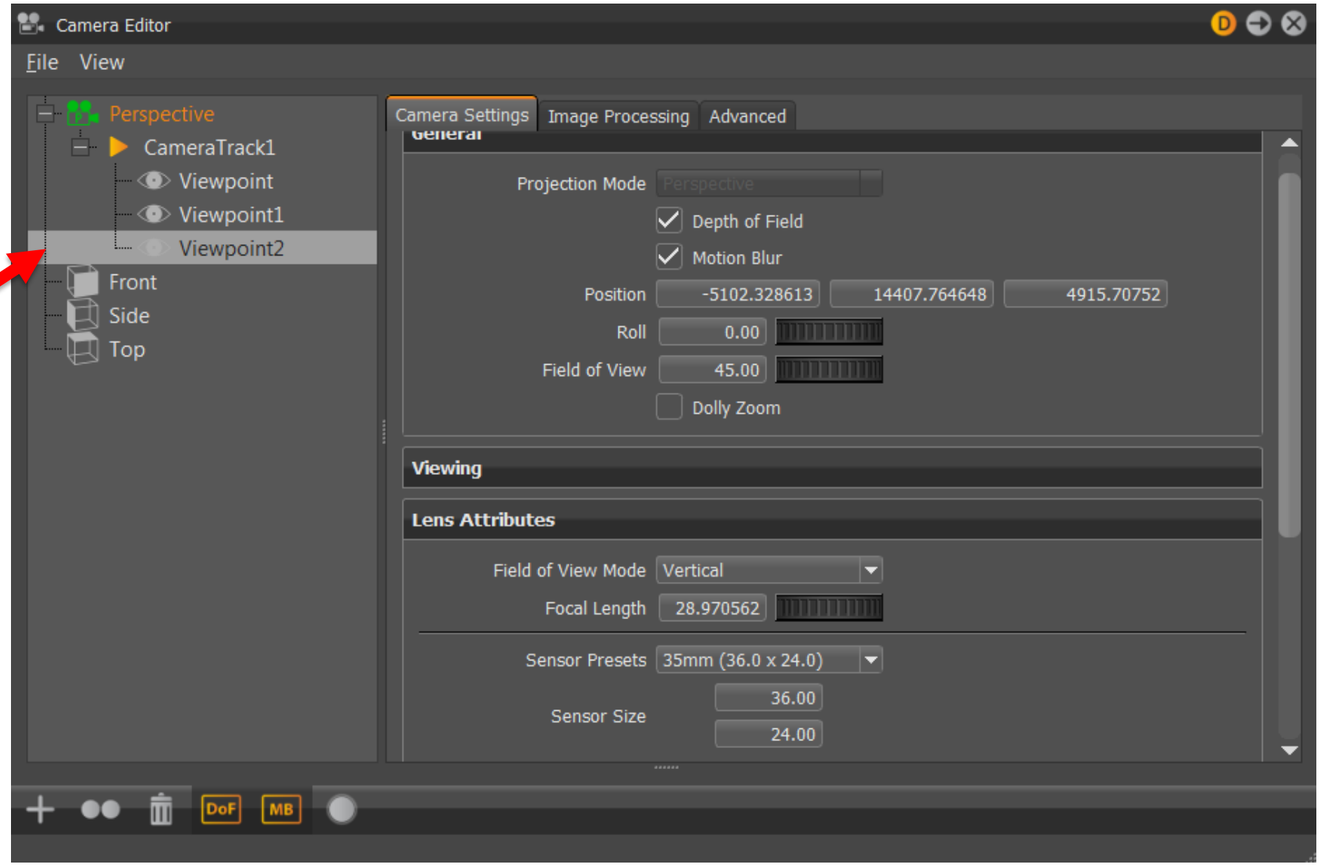
- Right click within the Scenegraph > Create > Switch
- Drag and drop the different geometry variants into the Switch
- Check the variant you want to show





Camera Viewpoints

- For storing different camera positions and controlling them afterwards within a Vset as well, open up the Camera Editor under Main Menu > Scene
- Navigate within the Scene till the right camera position is found
- Right click into the left area of the Camera Editor > Create > Viewpoint. Now a Viewpoint/ Camera Bookmark will be created



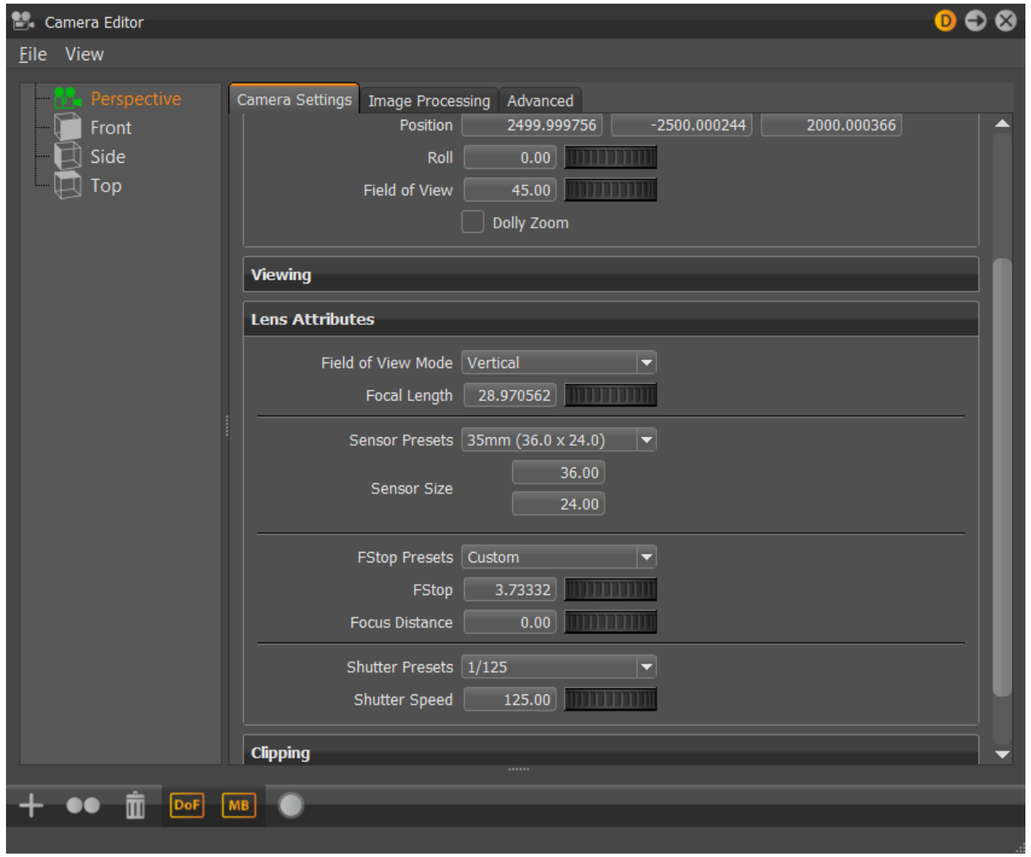
Camera Editor

In the Lens Attributes area, settings can be set for:

- Depth of field,
- Focal length
- Focus Distance
- Fstop
- Shutter Speed
- Sensor Size

Under Image processing settings can be done for:

- Tonemapping
- Blending
- Color Correction
- Glow
- Glare



Vsets

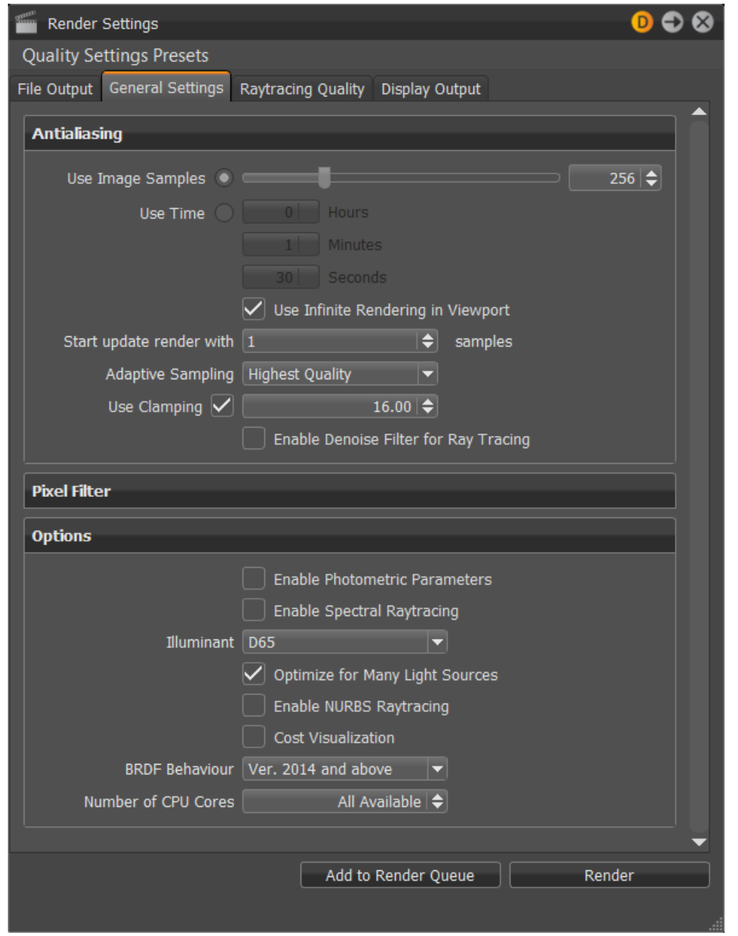
Use variant sets, or Vsets, to define multiple states for different properties at same time. In many cases, a variant alone is not enough for managing complex models; for example, where many different switch nodes are needed to represent a specific version of the loaded model. Variant Sets provides more functionality, allowing you activate many states simultaneously. For configurators, logical connections can be generated.

1. Cick Scene > Scenegraph to open the Scenegraph.
2. Click Scene > Variant Sets to open the Variant Sets dialog box.
3. Right-click inside the list area (left side) of the Variant Sets dialog box and select New Set.
4. Click the name of the new set to rename it.
5. In the Variant Sets dialog box, click the tab corresponding to the type of object for which you want to create a variant: Geometry, Material, or Light.
6. Drag a node or switch node from the Scenegraph under the appropriate tab of the Variant Sets dialog box.
   The node name is added to the tab, with supported states listed in a drop-down box.
7. To enable a state, select it from the drop-down box.
8. Optional: Create a hot key for the variant set in the General tab.

In addition to hot keys and the Variant Sets dialog box, you can use VRED python scripting to switch between Variant Sets. Use the function `selectVariantSet(name)`, where `name` is the name of the variant set.

Rendersettings

- Render Settings can be found under Main Menu > Rendering > Render Settings



Render Mode
Sets the illumination mode to apply for rendering the image to a file.
The following render modes are available:

- **CPU Rasterization**: This mode does not compute direct reflection, nor does it compute refraction or any other sophisticated visual effect.
- **Precomputed Illumination**: This mode is comparable to VRED OpenGL rendering mode. It uses precomputed Ambient Occlusion and indirect illumination for rendering and calculates specular reflections and refractions and correct shadows from light sources.
- **Precomputed + Shadows**: This mode uses precomputed image-based lighting and indirect illumination but doesn't use precomputed Ambient Occlusion values. Instead, it calculates shadows based on the active environment.
- **Precomputed + IBL**: This mode uses precomputed indirect illumination and samples the environment.
- **Full Global Illumination**: The Full Global Illumination Mode doesn't use any precomputed values but accurately samples everything in a physically based approach. Other features like Photon Mapping require the render mode to be set to Full Global Illumination.

Miscellaneous

- NURBS Raytracing (VRED pro only)
- Linear scaleable Cluster Raytracing → higher Quality or higher Framerates