3DS MAX: OBJECT and OPEN SCENE GRAPH Setup and Export

3DS Max is a 3D modeling software, which, when used properly, has the capacity to set up and export objects (OBJ) and open scene graph (OSG) files to the VS Visualizer. The purpose of this document is to walk through basic setup and export processes of these particular file types, that can be used with the VS Visualizer to create advanced render features. This document assumes you will be using version 2015 of 3DS Max. Later/Earlier releases have not been validated by Mechanical Simulation Corporation.

> **Note** This document assumes you have a basic knowledge of 3D modeling and basic knowledge of UV/texture setup in 3DS Max.

Before You Start

Below is a list of general guidelines and best practices to get your asset set up prior to exporting. These are good habits to get into to avoid potential shading and converting issues.

- Maintain good edge flow, such as avoiding long tri's and pinched geometry
- Set display units and system units to **metric** (meters)
- Proper UV layout
    - Every face should have some form of UV layout, and no uvs collapsed to zero
    - Checked for overlapping or inverted faces and correct orientation
- Welded verts
- Reset **xform**
- Zero out transforms
- Set the **Diffuse** and **Ambient** color swatches of your materials to **white** in the material editor
- Collapse stack

3DS Max OSG Plugin

The 3DS Max OSG Exporter can be downloaded here:

http://sourceforge.net/p/osgmaxexp/mediawiki/Main_Page/

Documentation for the OSG Exporter and how to use the OSG helpers can be found here:

http://sourceforge.net/p/osgmaxexp/mediawiki/Documentation/

Here is a list of the OSG helpers that have been validated in the VS Visualizer.

- Billboard
- StateSet
- Occluder
- Level of Detail **(LOD)**

Standard OBJ and OSG Shape Setup

Both OBJ and standard OSG files are set up the same way, and use the same texture naming convention. All UVs are on channel 1 in 3DS Max.

> **Note** Only the base diffuse map is assigned in 3DS Max with a standard shader. All other textures are optional and are loaded automatically based on the below naming convention.

Given a referenced base diffuse texture within the OSG file named "`example_texture.tga`", you can provide the following override textures beside it:

- Base Diffuse (`example_texture_di.tga`)
- Normal Map (`example_texture_nm.tga`)
- Light Masks (`example_texture_lm.tga`) have a grayscale effect on light contributions per pixel.
  - Red Channel- diffuse (mask for primary light)
  - Green Channel – specular multiplier. Also multiplies by object shininess when computing lighting
  - Blue Channel- ambient (ambient occlusion)
- Fresnel (example_texture_fr.tga)
  - o Fresnel maps affect the reflectivity of an object.
    - Red Channel = Power – How sharply reflections ramp up with respect to viewing angle to the surface normal.
    - Green Channel = Scale – The amount of reflectivity added, controlled by the viewing angle and Power.
    - Blue Channel = Bias – The amount of reflectivity that is always present, regardless of viewing angle.
    - Alpha Channel = Alpha – The alpha is used to scale (or mask) reflectivity.
  - o The Fresnel Term is computed by adding the computed Scale and the Bias value. If the term is 0.0 there is no environment reflected, and if the term is 1.0 the pixel will be fully reflective.

Advanced OSG shape setup

With the OSG format you can access an advanced multi-texture shader that uses three UV channels for blending multiple diffuse textures and a normal map (Figure 1). The first channel is for the base diffuse texture ①, the second channel is for the blend diffuse ② and the third channel is for the normal map ③. This will allow you to have a very tightly tiled base-diffuse (**UV channel1**) with a larger tiled blend-diffuse (**UV channel 2**) to break up the repeat patterns. The normal map (**UV channel 3**) can be matched to the base diffuse or tiled differently to add more variety to your material. The Light Mask (**lm)** and Fresnel (**fr)** textures are optional and use **UV channel 1**.

- Base Diffuse (`example_texture_di.tga`) uses UV channel 1
- Blend Diffuse (`example_texture_di1m.tga`) uses UV channel 2 and is multiplied over the base diffuse texture
- Normal Map (`example_texture_nm.tga`) uses UV channel 3
- Light Mask (`example_texture_lm.tga`) also uses UV channel 1
- Fresnel (`example_texture_fr.tga`) also uses UV channel 1

To get the OSG file to export with the 3 UV channels, the use of a mix node plugged into the standard shader diffuse color channel is required. The base diffuse texture will be assigned to **color 1** ④, the blend-diffuse assigned to **color2** ⑤ and the normal map assigned to the **mix amount** ⑥.
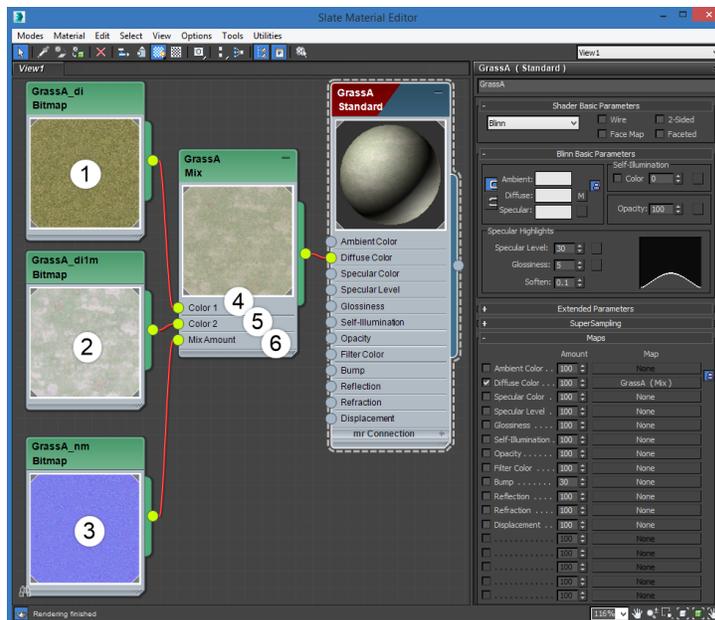

Figure 1. Blending multiple diffuse textures.

Alpha Blending

The VS Visualizer currently supports two modes of alpha blending, **standard** and **on/off**. You can manually set the mode by placing objects into specific **renderbins** (1).

1. Standard alpha blending (bin name **DepthSortedBin**)
   a. The objects are sorted back to front by the object's center point before rendering. This could cause issues with large objects, or objects close enough that the center point doesn't provide enough information to properly sort from every angle. This would manifest by objects appearing to flicker in front of each other, depending on view angle.
   b. Z buffering is disabled
2. On/Off alpha-blending (bin name **OnOffAlphaBin**)
   a. The objects are not sorted before submission to the hardware. The result is that no blending occurs, pixels aren't written unless they're at 1.0 alpha (completely opaque).
   b. Z buffering is enabled
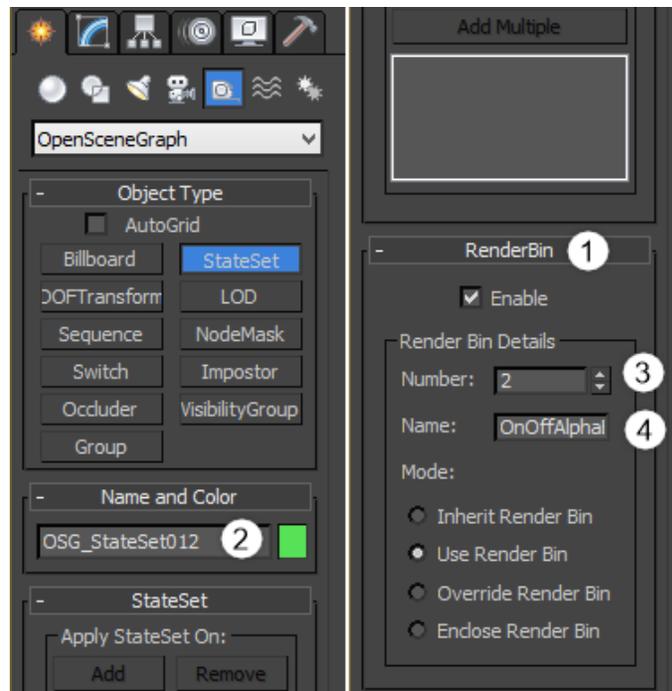
Figure 2. OSG Exporter Helper Node (formatted to fit on page).

OSG Exporter Helper Node

Objects are put into the standard **DepthSortedBin** by default. Any objects intended for use with On/Off alpha should have the bin appropriately named (2), as in items 1 and 2 above. The bin number (3) only matters for manually setting their render order. An object's render bin can be manually specified by using the OSG **StateSet** helper node in 3DS Max. Just create the **StateSet** node, add your object, assign a number and add the bin name (**OnOffAlphaBin**) (4).

Note	You may need to create manual **mipmaps** with On/Off alpha, as the automatic mipmap creation will blend the alpha into the object, which can make it appear to shrink as lower mip levels are used.

Exporting

To properly export OBJ from 3DS Max, the following settings need to be applied (Figure 3). If these settings are not checked and configured properly, things will not import correctly, and issues will arise. Please check your settings, and confirm the below boxes and fields are filled in or populated as shown.
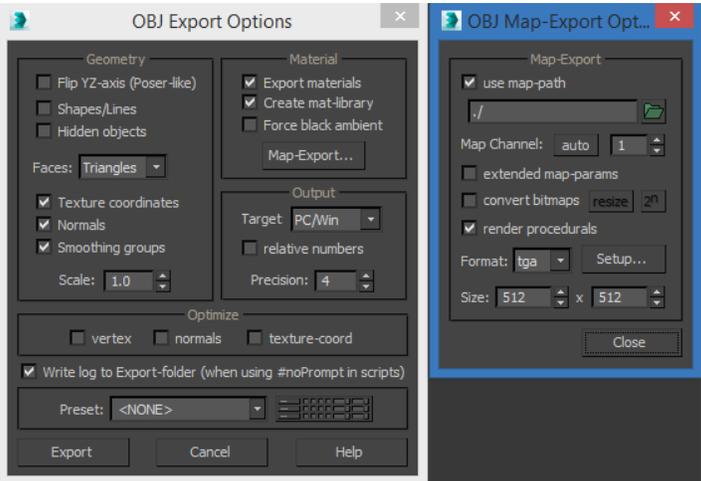
Figure 3. OBJ Export Settings.
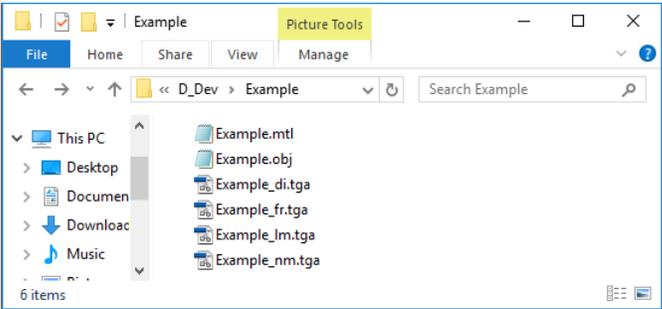
Figure 4. Objects and textures file structure.

| **Note**	All your objects and textures should be placed in the same folder as objs.
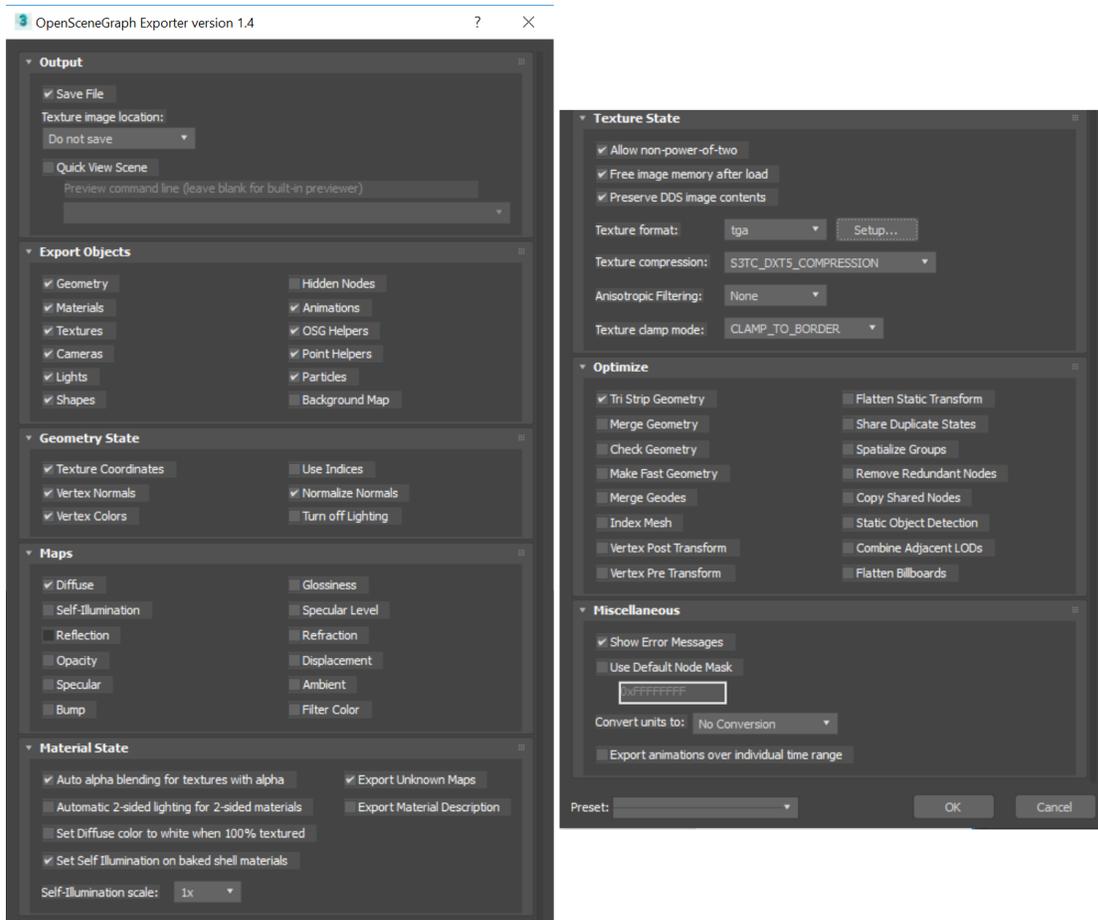
Figure 5. OSG Export Settings (formatted to fit on page).

> **Note** OSG files should have images in an images directory at the same level as the OSG file.
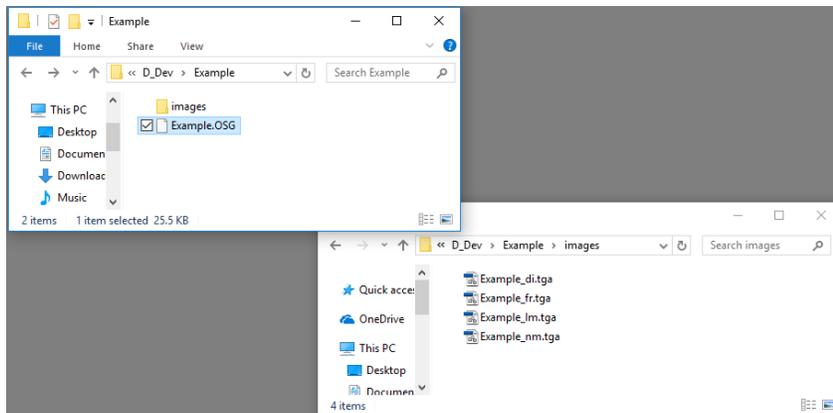
Figure 6. OSG file structure.