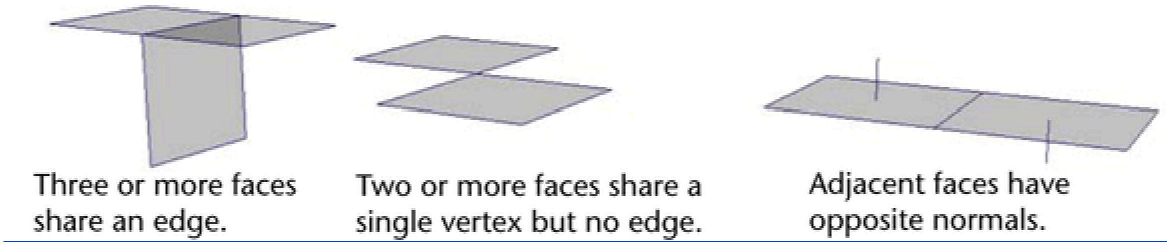
Prepping 3D models for VR and Rhino 3D to game engine tips

Preface:

It is easy to become distracted by new toolkits/workflows or competing software. This guide will briefly go over the most important requirements for prepping your model for a game engine

1. Fixing Non-Manifold Geometry:

These will produce errors in the game engine.

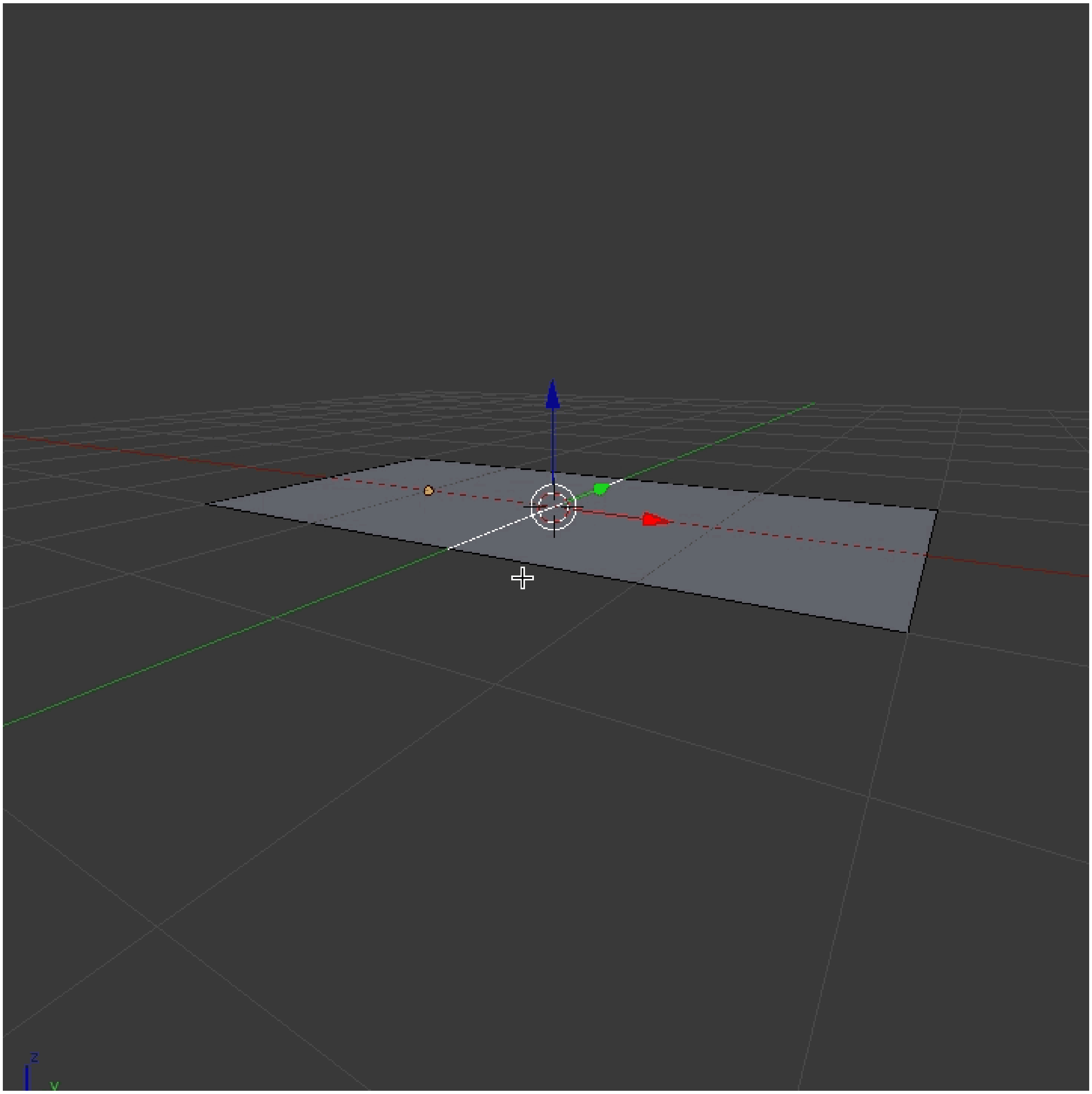


Three or more faces share an edge.
Two or more faces share a single vertex but no edge.
Adjacent faces have opposite normals.

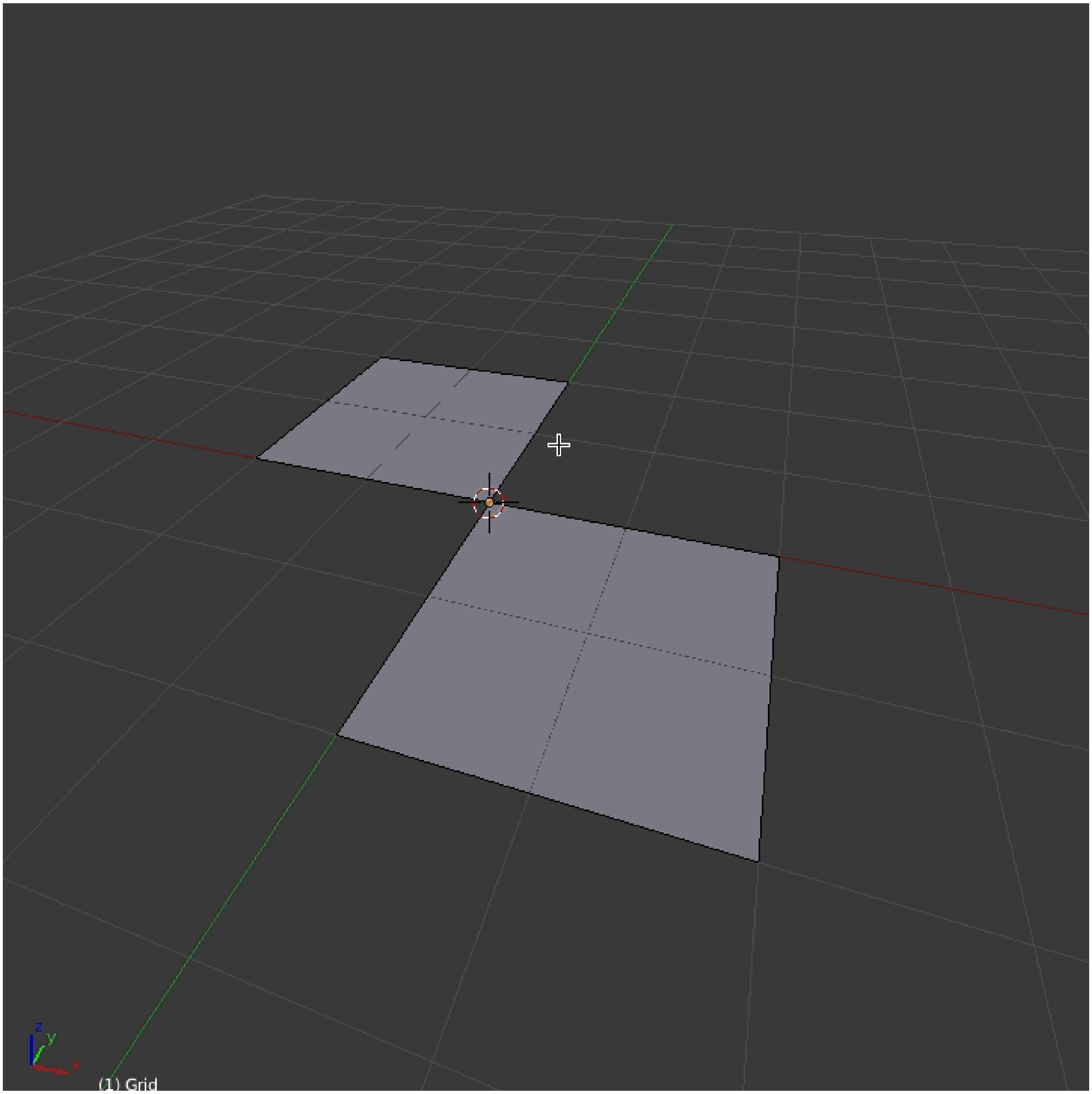
image from Autodesk

Below are 3 alternatives/ fixes to create proper Two-manifold geometry. The un-extruded faces are an intermediate shape. The extrusions are to show how this would look as a structure (architecture models).

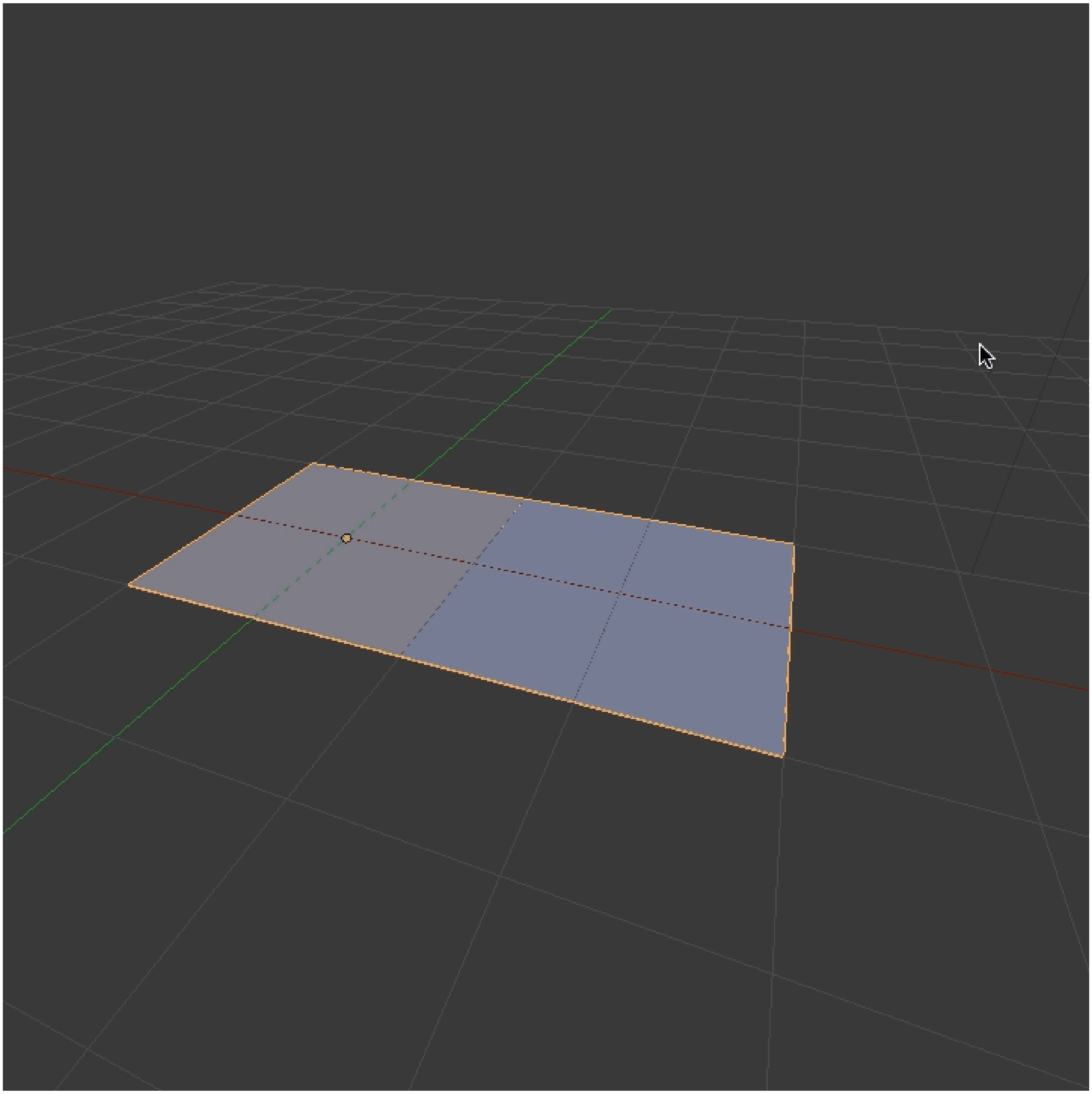
Fix Three or more faces that share an edge:



Two or more faces share a single vertex but no edge:

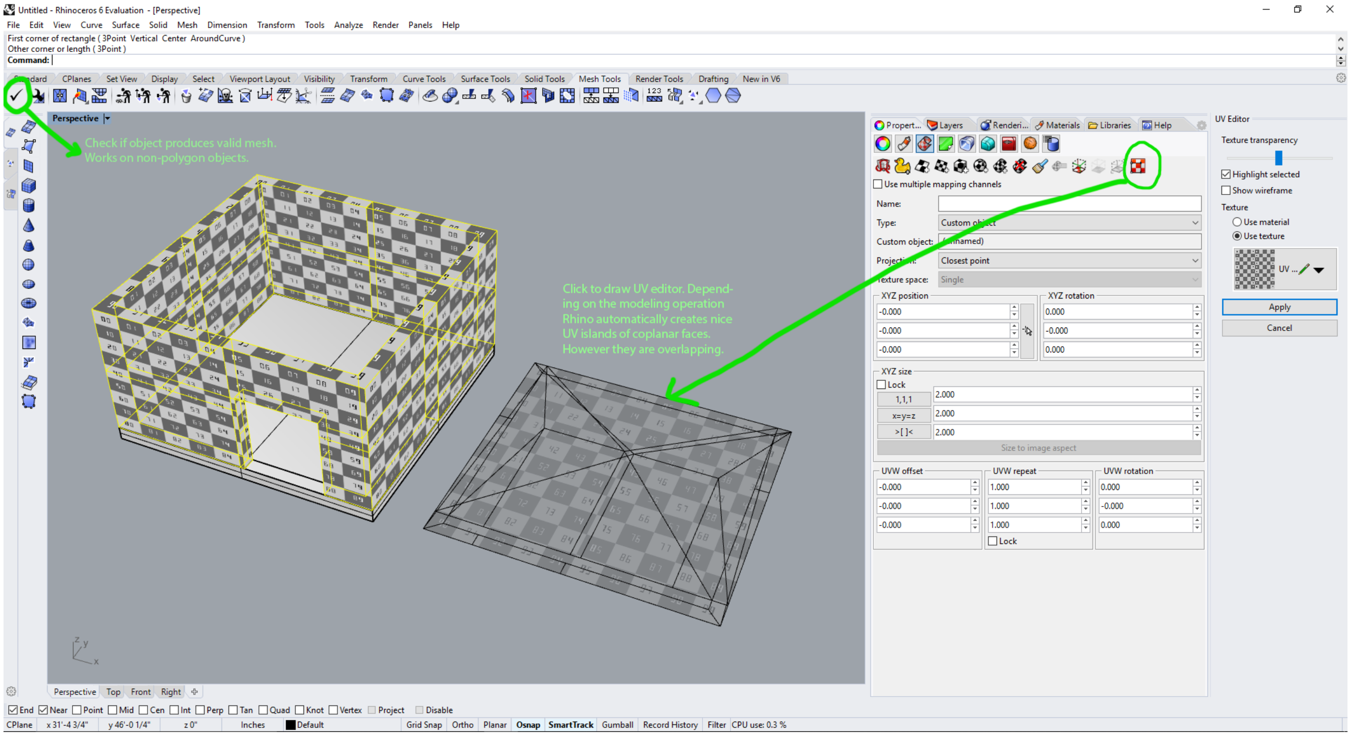


Adjacent faces have opposite normals:



2. Overlapping UVs

In the case of Rhino 3D your model will already have decent UVs that were created during the modeling process. One could use the UV editor in Rhino and use Align->Distribute commands and transform tools to manually package UVs. This would become tedious with many separate objects and Rhino's limited UV toolset. Therefore I would suggest exporting to Blender or another DCC software to package the UV islands.



Untitled - Rhinoceros 6 Evaluation - [Perspective]
File Edit View Curve Surface Solid Mesh Dimension Transform Tools Analyze Render Panels Help
Standard CPlanes Set View Display Select Viewport Layout Visibility Transform Curve Tools Surface Tools Solid Tools Mesh Tools Render Tools Drafting New in V6
Perspective
Propert... Layers Renderi... Materials Libraries Help
UV Editor
Apply
Cancel
Size to image aspect
Perspective Top Front Right

```
First corner of rectangle ( 3Point  Vertical  Center  AroundCurve )
Other corner or length ( 3Point )
Command:
```

Check if object produces valid mesh. Works on non-polygon objects.

Click to draw UV editor. Depending on the modeling operation Rhino automatically creates nice UV islands of coplanar faces. However they are overlapping.

□ Use multiple mapping channels

Name:

Type: Custom object

Custom object: (unnamed)

Projection: Closest point

Texture space: Single

XYZ position	XYZ rotation
-0.000	0.000
-0.000	-0.000
-0.000	0.000

XYZ size

□ Lock

1,1,1	2.000
x=y=z	2.000
>[ ]<	2.000

UVW offset	UVW repeat	UVW rotation
-0.000	1.000	0.000
-0.000	1.000	-0.000
-0.000	1.000	0.000
	□ Lock	

Texture transparency

☑ Highlight selected

□ Show wireframe

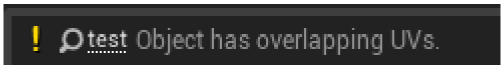
Texture

○ Use material

● Use texture

☑ End ☑ Near □ Point □ Mid □ Cen □ Int □ Perp □ Tan □ Quad □ Knot □ Vertex □ Project □ Disable

CPlane x 31'-4 3/4" y 46'-0 1/4" z 0" Inches Default Grid Snap Ortho Planar Osnap SmartTrack Gumball Record History Filter CPU use: 0.3 %

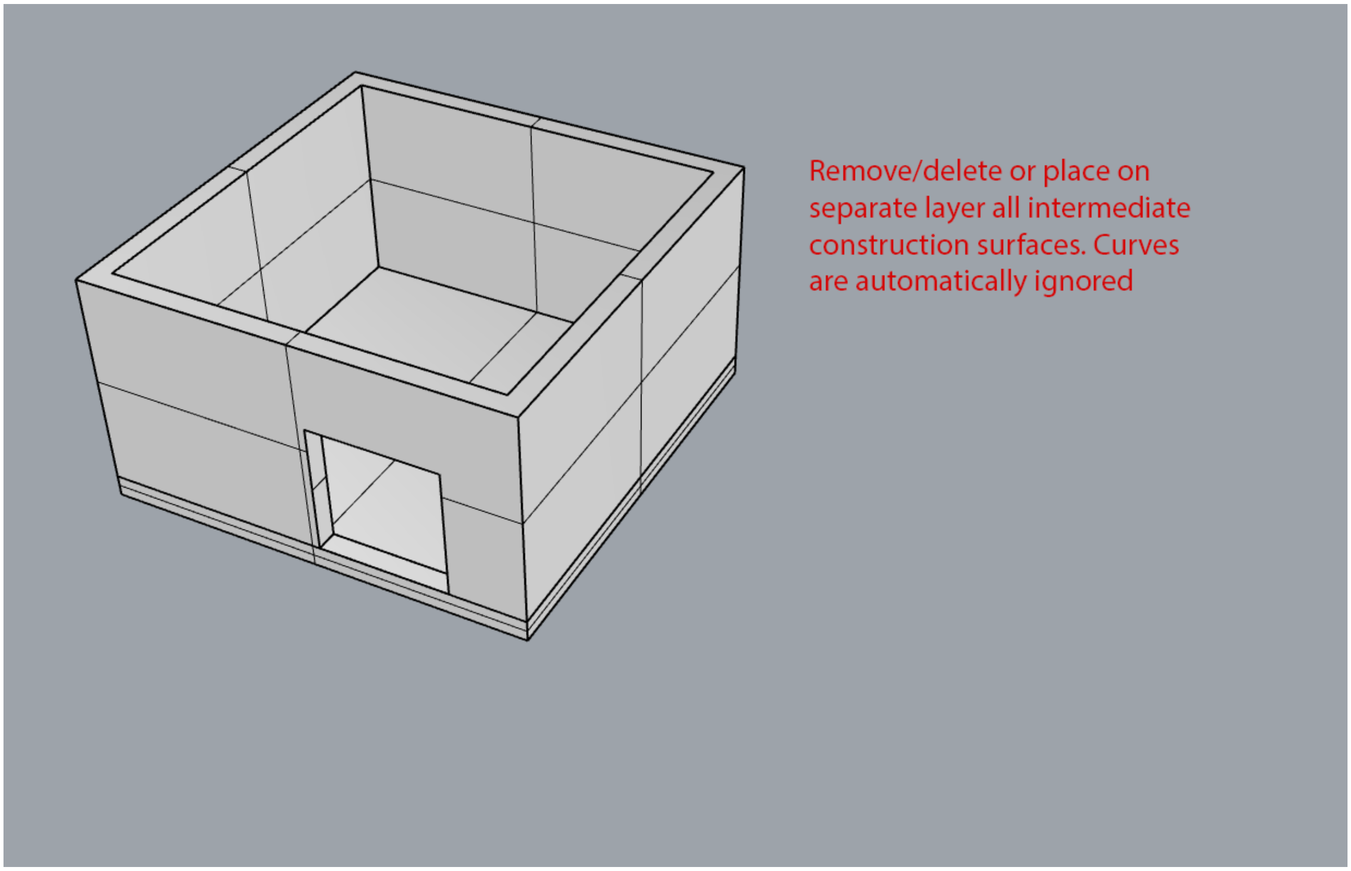
Unreal Engine warning if this model is exported as is: 

! test Object has overlapping UVs.

3. Fixing Overlapping UVs

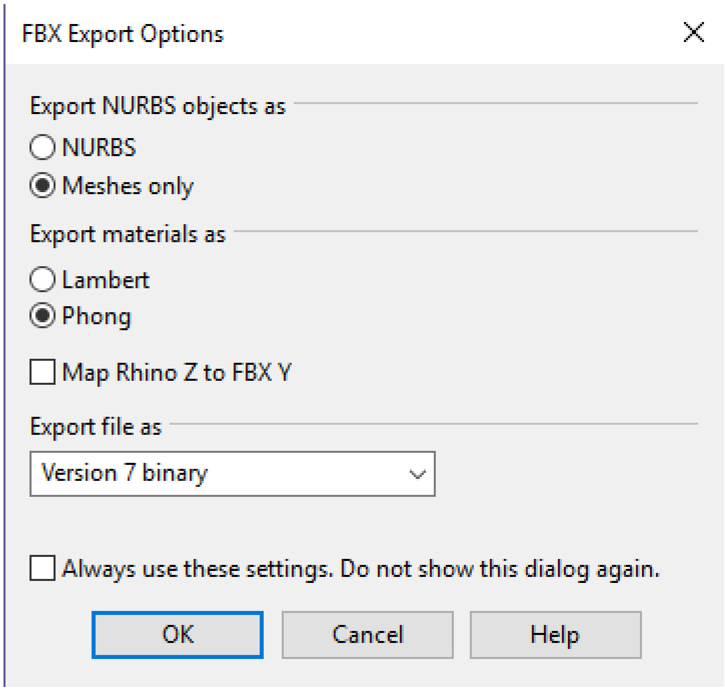
The game engine will bake a lightmap which is a file texture of all the polygon face's interactions with light. It is important for depicting realism. Below is a tutorial for exporting your model as .FBX into Blender to package the UVs for lightmapping. As a side note, a separate UV set can be created for image textures such as a wood grain or marble texture, these allow for overlapping UVs but that is for another tutorial.

Step 1: **Important!** In Rhino or other modeling program, delete/remove or place on a separate layer all redundant construction items so they are not accidentally exported. Depending on your personal style of modeling, there might be a lot of extra surfaces hiding throughout. This should be a familiar process for submitting final drawings:



Remove/delete or place on separate layer all intermediate construction surfaces. Curves are automatically ignored

Step 2: In Rhino, select all final objects of your model and File -> Export Selected -> "Motion Builder (*.fbx)".



FBX Export Options

Export NURBS objects as

○ NURBS

● Meshes only

Export materials as

○ Lambert

● Phong

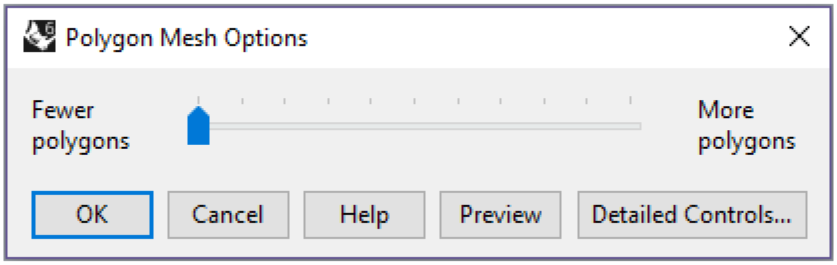
□ Map Rhino Z to FBX Y

Export file as

Version 7 binary

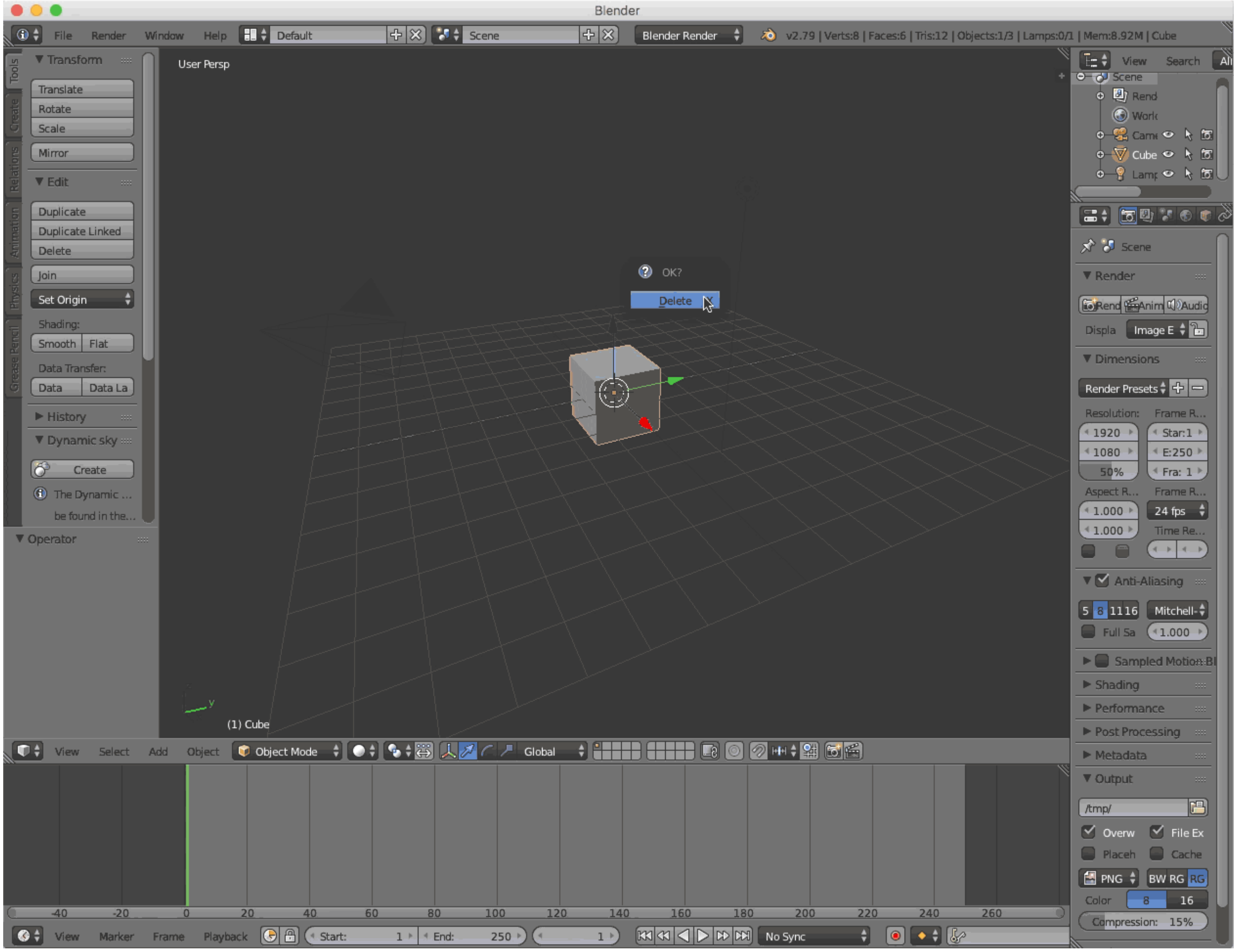
□ Always use these settings. Do not show this dialog again.

The lowest polygon tessellation will do. If the model has curved surfaces, this setting would need to be tweaked. Depending on the modeling operation Rhino may create too many polygons from a curved surface for the game engine to handle well.



step 3 : Import model into Blender and package UVs. This is the minimum requirement for the game engine. In a proper model, one would spend more time stitching neighboring UVs together and maximizing texture space.

- File->Import FBX
- Select objects **(important! right-click selects in Blender!)**
- Move cursor to top right of "3D view" panel. Cursor will become cross-hair. Left-click and drag to split "3D view" into 2 "3D view" panels. Change right panel to "UV/Image Editor"
- Select now joined objects in "3D view" and hit TAB to enter edit mode
- Move cursor to "UV/Image Editor" and hit "A" to select all UVs. **(important! you should have UVs already from Rhino)**
- Select "UVs" then "Pack Islands" in the "UV/Image Editor" panel. Use .05 as margin.
- Move cursor back to "3D view" panel and hit TAB to go back to object mode. Right click select your model if not selected and export as .FBX. Make sure "selected objects" option is ticked.


Blender
File
Render
Window
Help
Default
Scene
Blender Render
v2.79 | Verts:8 | Faces:6 | Tris:12 | Objects:1/3 | Lamps:0/1 | Mem:8.92M | Cube
Transform
Translate
Rotate
Scale
Mirror
Edit
Duplicate
Duplicate Linked
Delete
Join
Set Origin
Shading:
Smooth
Flat
Data Transfer:
Data
Data La
History
Dynamic sky
Create
The Dynamic ...
be found in the...
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User Persp
OK?
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View
Select
Add
Object
Object Mode
Global
Marker
Frame
Playback
Start: 1
End: 250
1
No Sync
Scene
Render
Dimensions
Render Presets
Resolution:
1920
1080
50%
Frame R...
Star:1
E:250
Fra: 1
Aspect R...
1.000
1.000
24 fps
Time Re...
Anti-Aliasing
5 8 11 16
Mitchell-
Full Sa
1.000
Sampled Motion Bl
Shading
Performance
Post Processing
Metadata
Output
/tmp/
Overw
File Ex
Placeh
Cache
PNG
BW RG RG
Color 8 16
Compression: 15%