

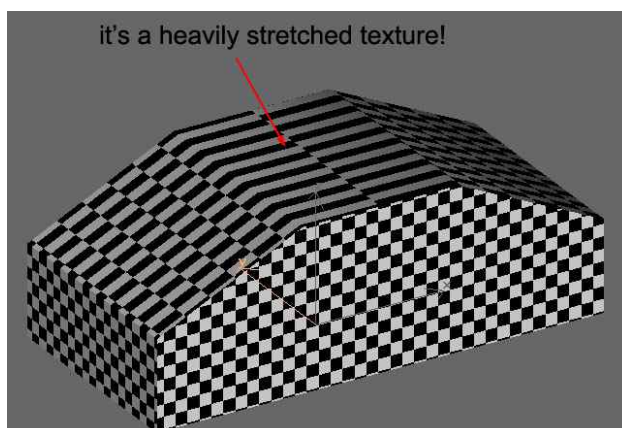
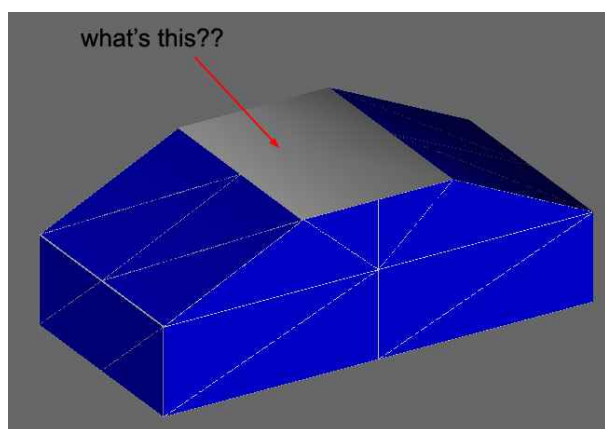
Part 3: Mapping more complex objects

So far we've only looked at buildings such as might be used in scenery or airports and it's time to move on to aircraft models. If you've jumped to this part and immediately feel lost and bewildered, please understand this section builds on what has been covered in the first two parts. If you read the word "aircraft" and think there's nothing here for scenery and building modellers, please stick with it and read on!

Stretching

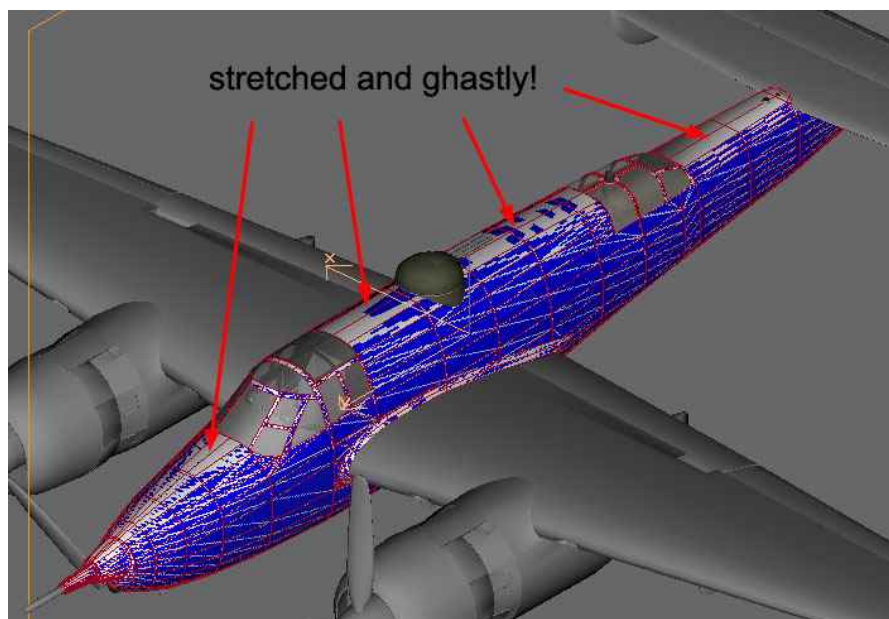
Aircraft, with a few exceptions, are not straight-sided with square corners: they are often outstanding examples of sheet metalwork with smooth, flowing lines and beautiful curves. This makes them more difficult to map accurately and stretching is a common problem.

This is the building from part 1 and instead of mapping the roof separately, the roof polys have been added to the left and right mappings:–



The chequered texture shows the sloping portions of the roof are badly stretched and the top is severely stretched. A planar mapping which tries to map the flat top of the roof by looking at it from the side is just not going to work!

This is Milton Shupe's Beechcraft XA-38 Grizzly for FS9, with the fuselage mapped (by me, not Milton!) using two Planar mappings from Left and Right views: this is not going to work either:–



(sorry Milton, *mea culpa*!)

We have to plan our mapping to avoid stretching faults like these. Some painters have said “I’ve seen – and painted – worse!” but if you’re painting your own textures you’ll curse a mapping like that. Furthermore, other painters will be “too busy...” to paint more skins for your model!

Mapping sizing

The following is from a design forum conversation:–

Q. I'm ready to create templates. Before I begin there's one thing that comes to mind based on how I want to, or "should" do this for best results. The more thought process I put into it, the more it shouldn't really make a difference as long as I lay things out right. However, I think one might have a slight advantage over the other. My wing span is 36 feet. I plan on making the template 38x38ft.

Should I;

1. Map entire Wing top, Wing bottom to span the full width of the template,

or

2. Map Left wing top/Left wing bottom, Right wing top/Right wing bottom and then stack as needed on the templates.

I like option one. Will it work alright?

A. In my opinion, you should start with a different question. What texture size do I want to use in FSX? For FSX, let's assume 4096 for fidelity.

Then there is that second question: What scale size should I map to for conformity in detail resolution consistent among major body parts. (i.e. How many pixels per inch minimum do I need?, and I want that same resolution across major body part maps)

Generally, painters will like it best if the wings, fuselage and empennage are of the same scale. With that done, panel lines and rivets will all be the same size over the whole aircraft. You might include leg struts, wheel pants, and any other sheet metal in that scale.

So, the new question should be based on level of detail required to satisfy the appearance of rivets and panel lines, and that should be sufficient for lettering and markings.

So decide if a 1" panel rivet of 9, 16, or 25 pixels is the minimum required. (that's 3x3, 4x4 or 5x5 pixels)

Assume a rivet is 1" in diameter, and you want at least 16 pixels to make a good rivet.

16 pixels per inch is 192 pixels per foot.

A map size of 38' times 192 pixels per foot, you have 7296 pixels to cover your wings to get the resolution you want.

So, a 4096 X 4096 template will not cover the wing using option 1. You would have to use option 2.

Now assume that with 9 pixels, you can make an acceptable looking rivet.

9 pixels per inch is 108 pixels per foot. Map size of 38' times 108 pixels is 4104 pixels.

At 38', you have 4104 pixels and that does not work with a 4096 X 4096 sheet either.

But, if you mapped it using 37' (11.227 meters) it would work (3996 pixels), and you could put the fuselage and tail on the same sheet easily.

Generally, you want to map to the smallest size possible to get the highest resolution and that is why I stack the wings on a smaller texture sheet. But, maintaining the same UVWMap size across the fuse, wings and tails is also important. On larger aircraft, you may also want to split the fuselage in half.

This neatly sums up how to size your texture(s). There are some other considerations: FS9 has a maximum texture size of 1024×1024 (1024^2), FSX will use 4096^2 with a system setting, otherwise 2048^2 is the maximum. For CFS3 to show damage like bullet holes the exterior has to be mapped to a single texture up to 2048^2 : in practice more textures can be used but are kept for details like wheelwells and undercarriage mechanisms.

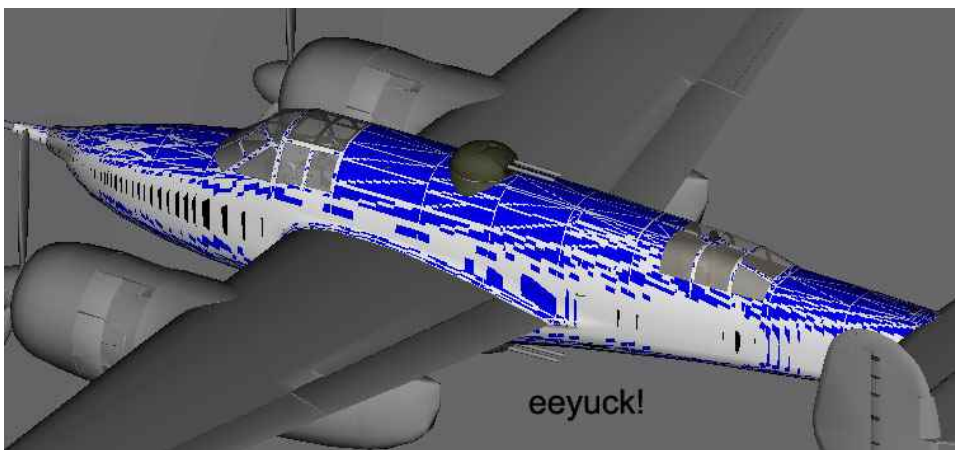
Bear in mind too that 4096^2 textures use **four** times the memory of 2048^2 and this makes for very large texture files for the sim, plus really big files in a paintkit. Older bitmap editing software may struggle as the number of layers racks up. Paint.NET is available in 64-bit if you're using a 64-bit version of Windows, so will cope with these huge paintkits. Photoshop (if you're lucky enough) has been available in 64-bit since version CS4 and other editors will no doubt follow the 64-bit route in time.

So, work out how much detail you want first and then decide the mapping size.

Poly selections for mapping – the visual way

This is the XA-38 Grizzly seen above. For FS9 with the 1024^2 texture limit, the mapping size here is 12m x 12m to retain the amount of detail wanted. The Grizzly has a fuselage nearly 15m long, so the fuselage mapping has to be split in two parts along its length to fit on the texture.

As already seen, using planar mapping from side views will lead to stretching over the top and bottom of the fuselage, but here's what happens if we map from top and bottom instead:–

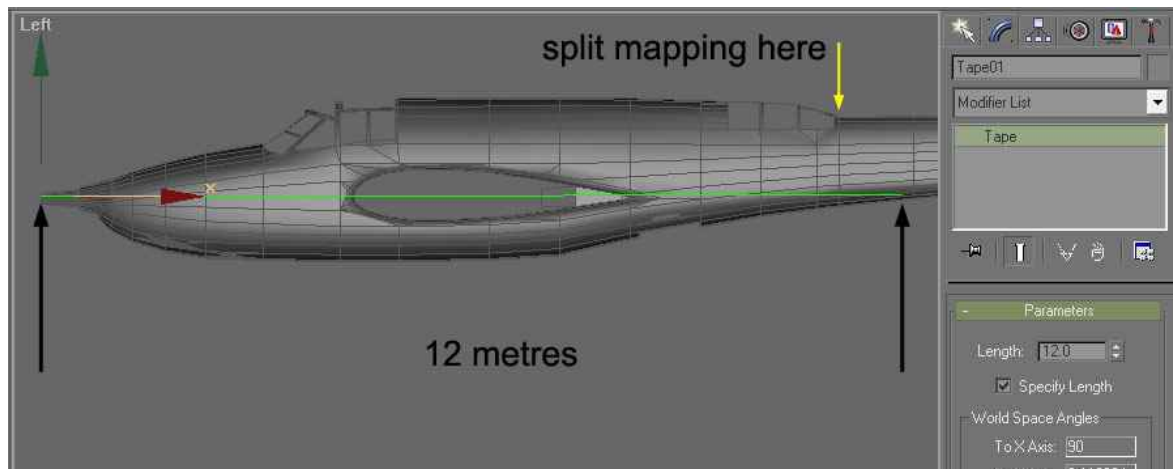


This is no better, in fact it's worse! However, you may have noticed the top maps very nicely here while the sides are horribly stretched. The bottom is also nicely mapped. What is needed is a combination approach: map the side areas separately from top and bottom.

The plan then is to map the majority of the fuselage from both sides, top and bottom and then the remainder from both sides, top and bottom. When done we will have a stack with 8 Poly Select (or Mesh Select) modifiers and 8 UVW Mapping modifiers. If this sounds complicated, you should know this is not at all unusual: after all, we mapped the controllers' nest in Part 2 in 9 sections – 8 sides plus the top.

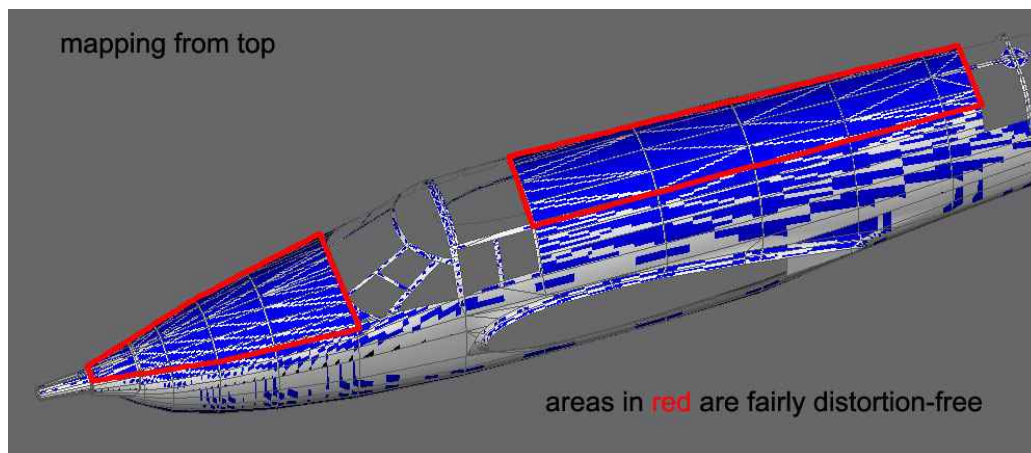
Now let's plan how much of the fuselage gets allocated to which mapping and start selecting polys.

The easiest decision is where to 'split' the mapping between the rear and the remainder of the fuselage. I've hidden everything but the fuselage and a Tape helper object (green line) is used to measure 12 metres from the nose tip back along the fuselage:—

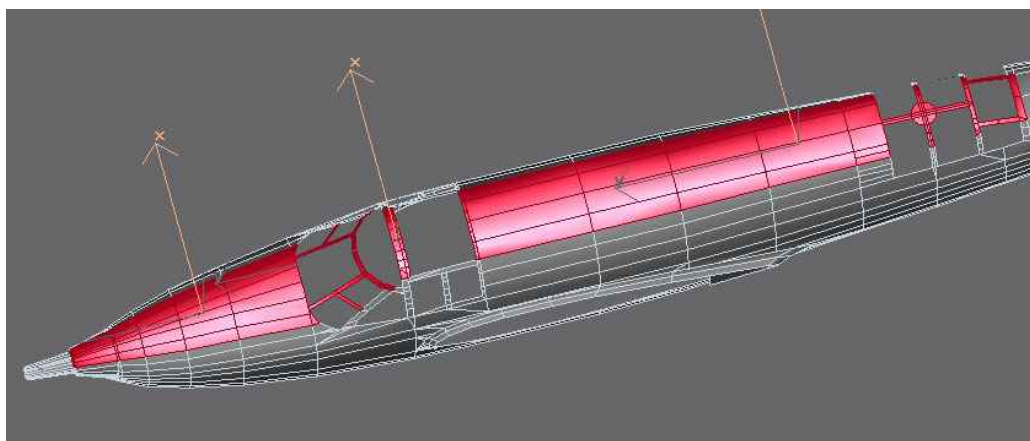


12 metres extends beyond the vertical seam just aft of the rear canopy, but not as far as the next one, so we will 'split' our 12m x 12m mapping at that seam (arrowed in yellow).

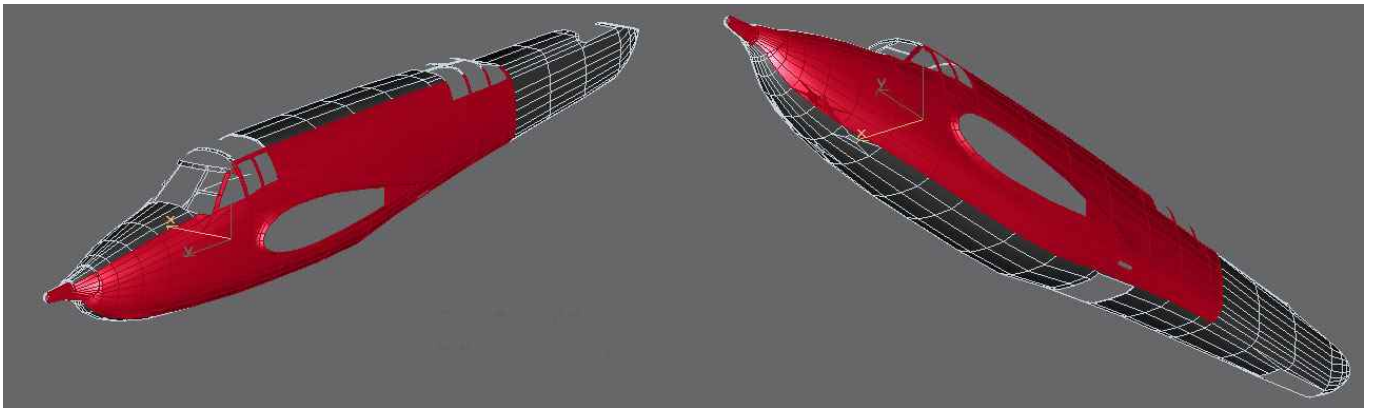
Looking at the pictures of stretched textures above, the stretching gets very noticeable past the level of the cockpit side window's top framing:—



So we select the polys to be mapped in Top view like this:—



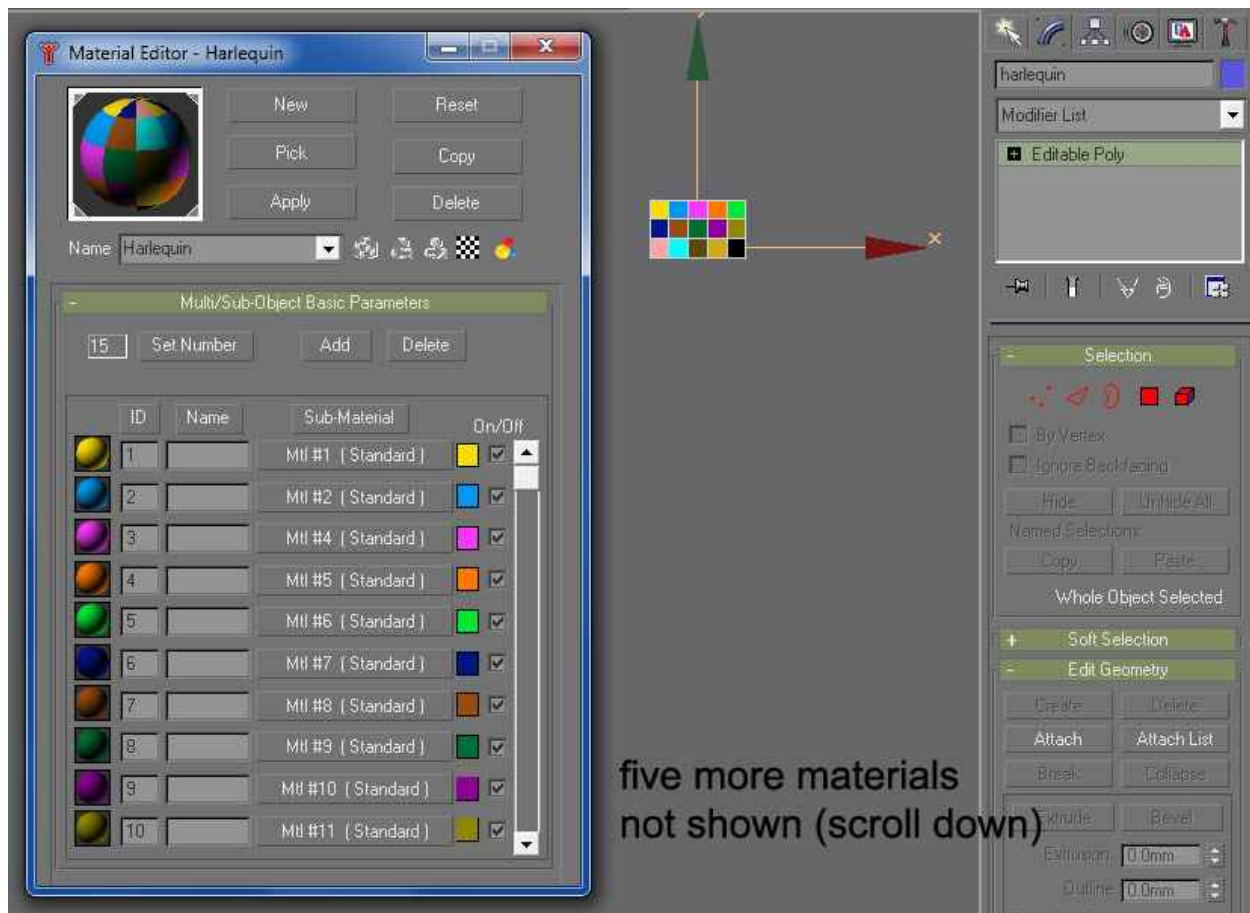
The polys to be mapped in Left view (remember F2 toggles Shade Selected Faces):-



and so on.

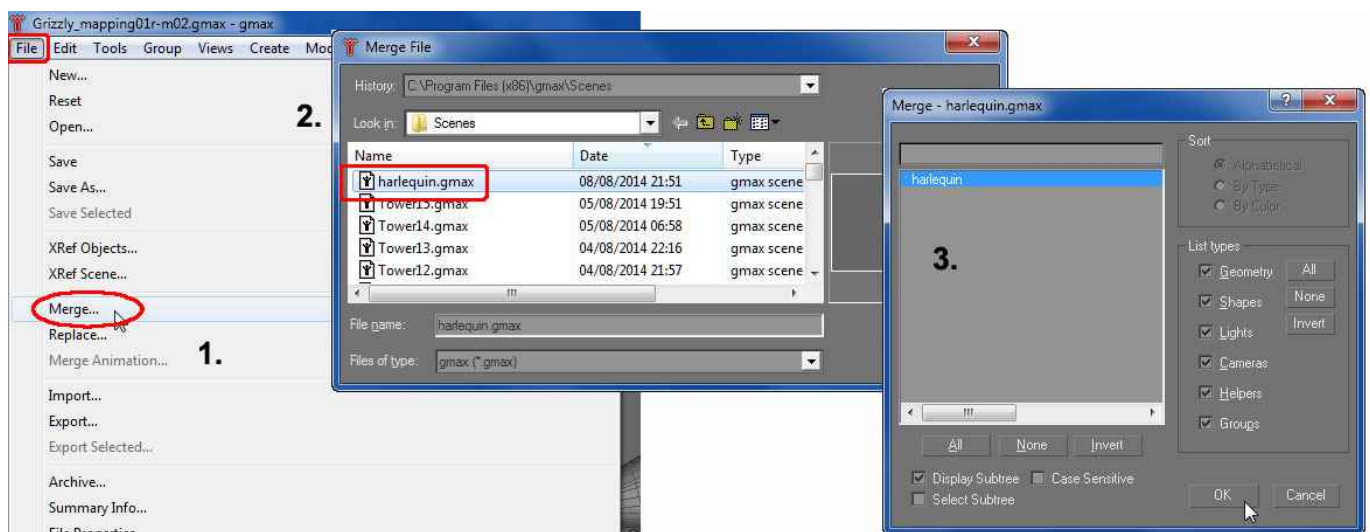
Now this sounds very easy until you try to keep an accurate track of which polys belong to which mapping. Near the change from one mapping to the next you'll often misplace or omit some and it soon gets to hair-tearing stage (if you have any left...).

So here's how to mark your selections and give a visual check on which polys will be assigned to which mapping. Included with this tutorial series is a Gmax file called **harlequin.gmax**. If you load it you'll see it has just one tiny object, *harlequin*, divided into 15 polys, each a different colour. Open the Material Editor and Pick the material from this object: the material is a Multimaterial of 15 different colours:-

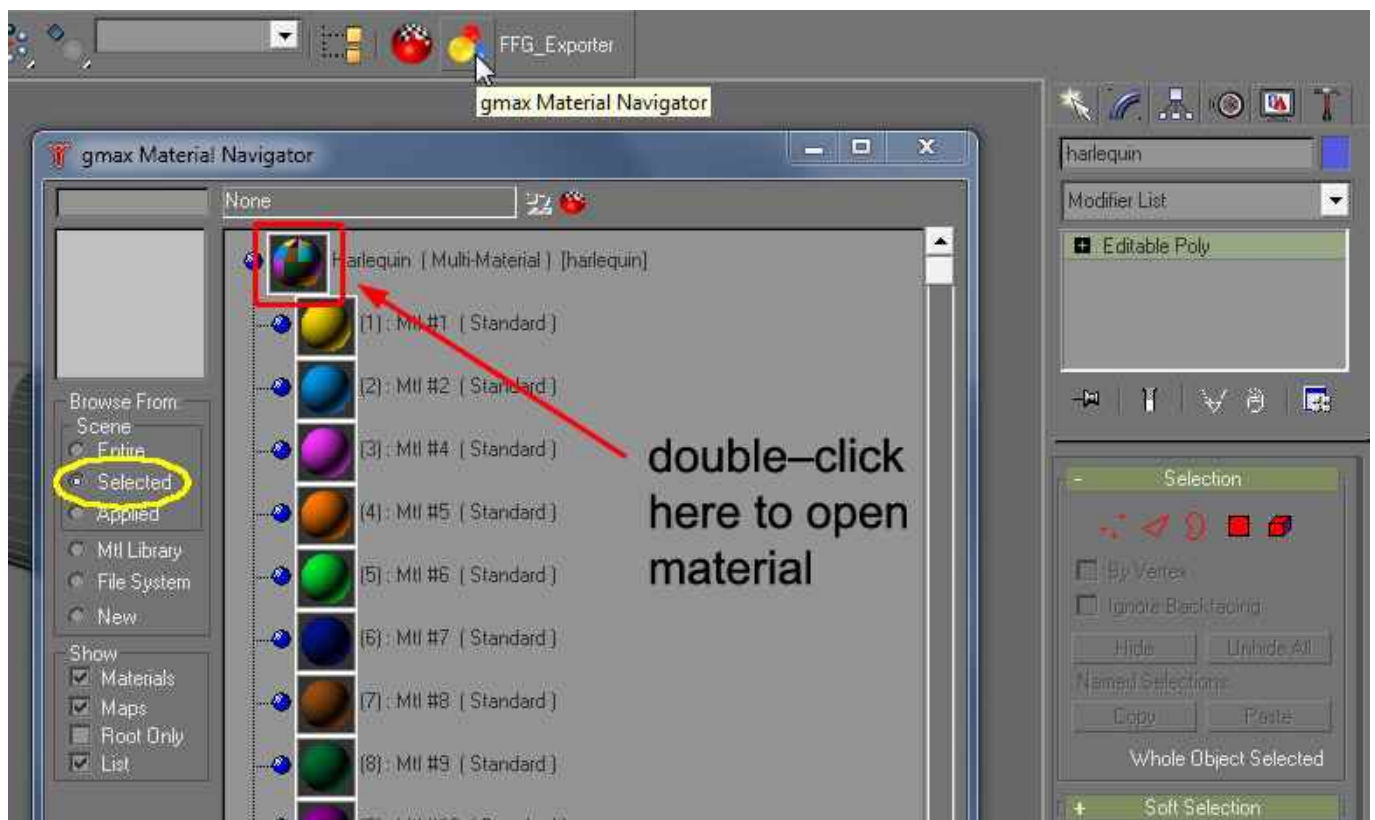


This is how we're going to mark our poly selections.

Back to the Grizzly to be mapped and Merge *harlequin* into the model:–

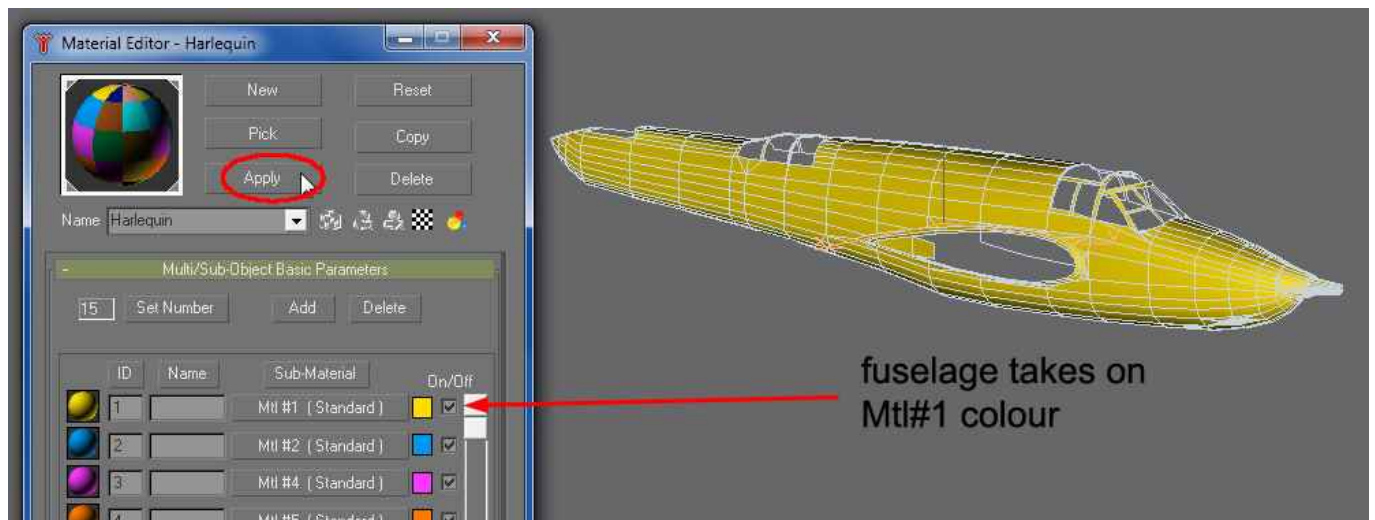


How do you get the material you want into the Material Editor? Especially when it's only applied to a titchy teeny object *somewhere* in the middle of your model? Select *harlequin*, open the Material Navigator and tick Selected:–

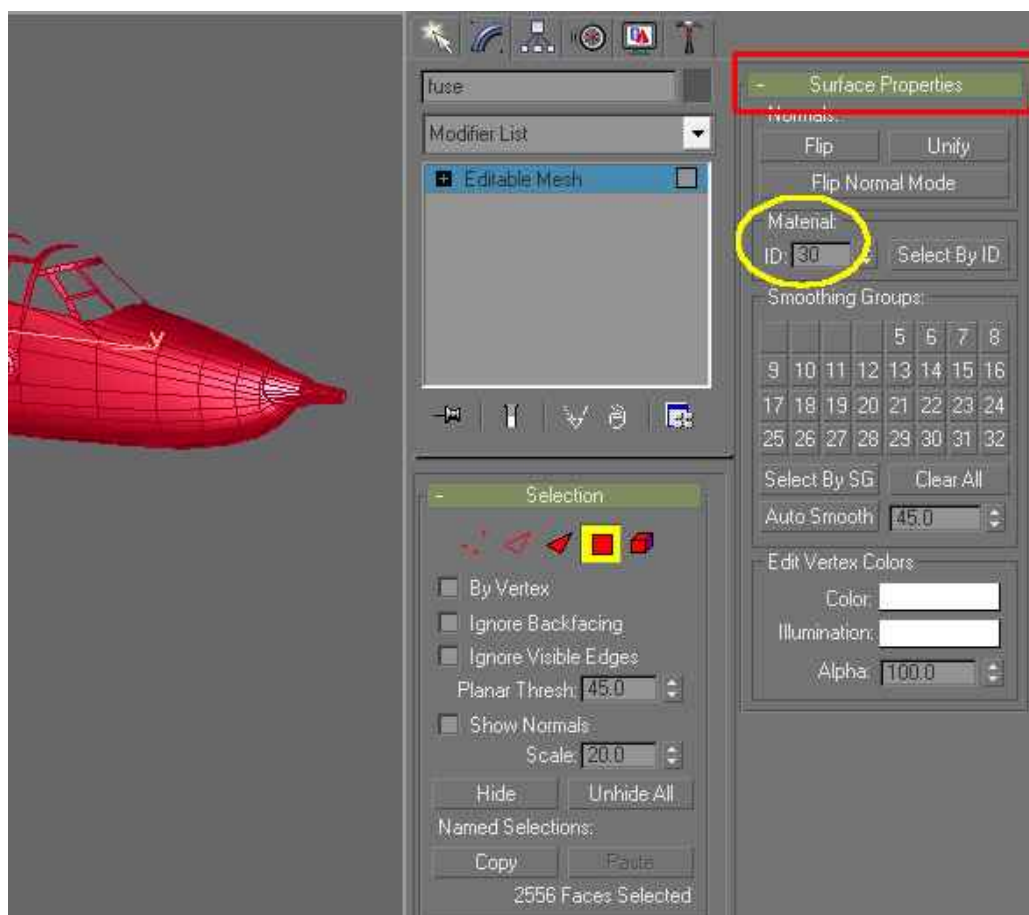


(or click on the Material Editor icon in the Material Navigator)

Now apply this multicoloured Multimaterial to the fuselage:-

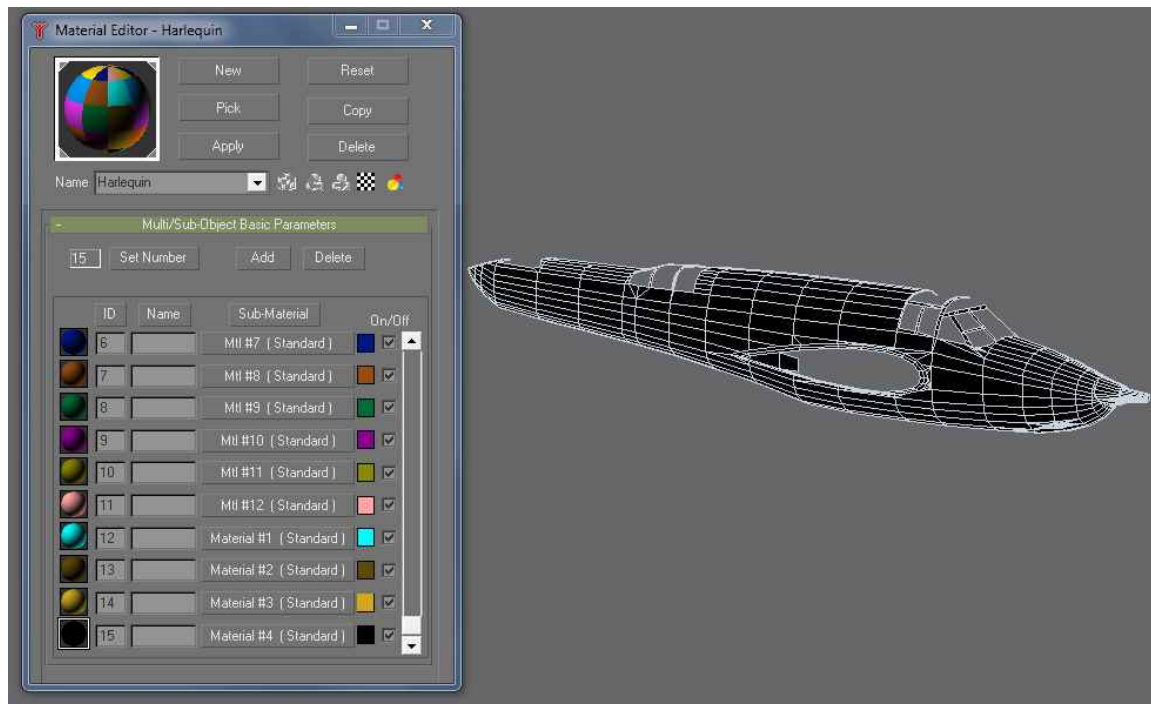


Now select all polys and change the **Material ID** to 30:-

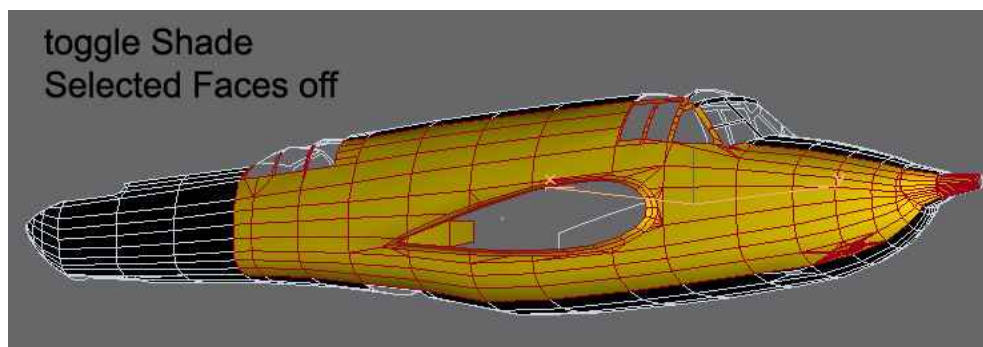
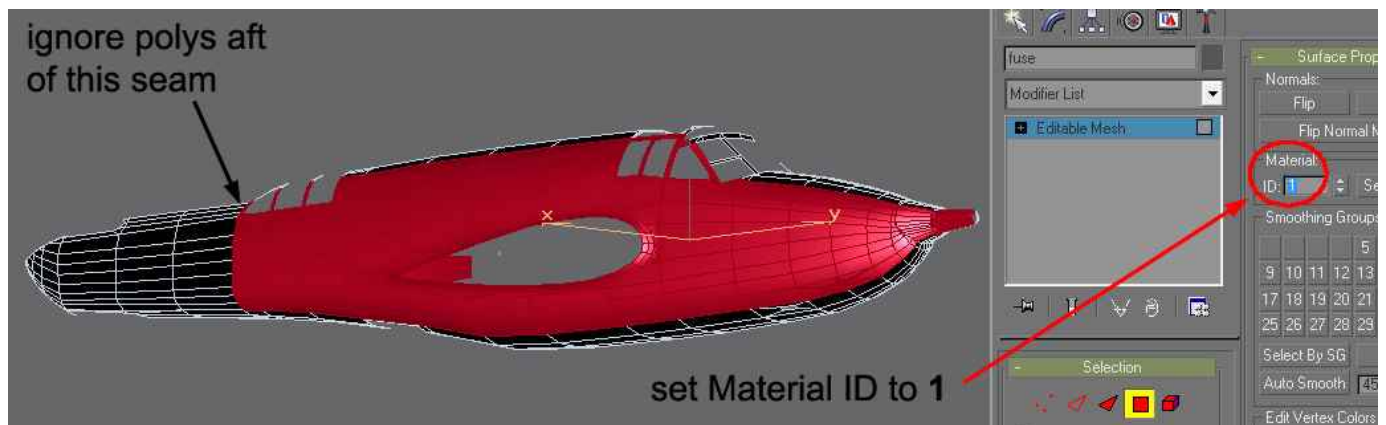


Notice none of the Harlequin colours is red – the reason why should be obvious...

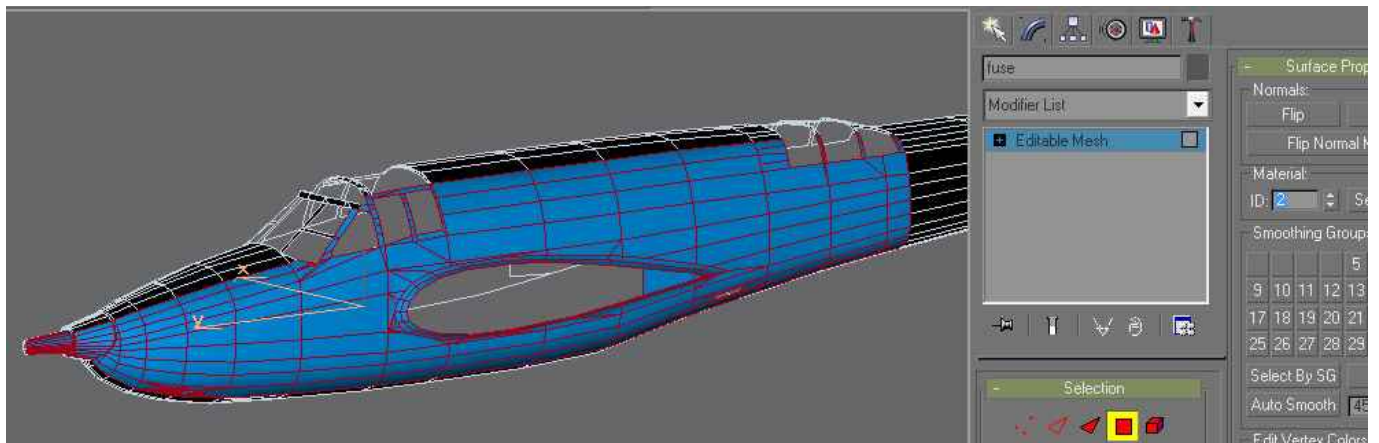
Because there are 15 differently coloured materials in the Harlequin material, the polys now take on the colour of the highest numbered material, which is 15 and is black:—



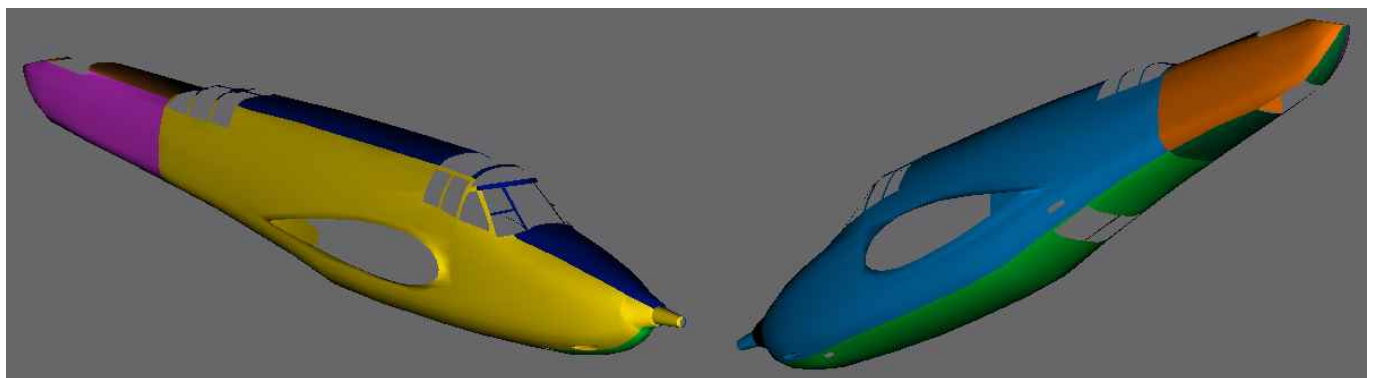
Now the fun begins! Still in Editable Poly (or Editable Mesh as in this model), select the polys we want to map from one side:—



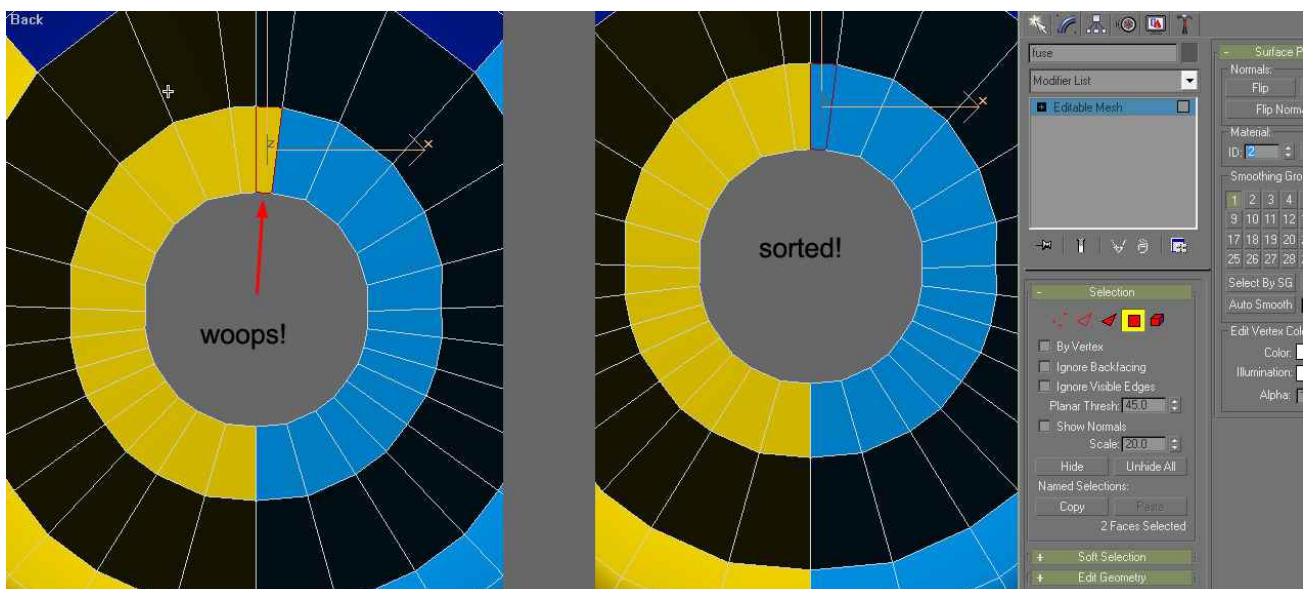
Select the polys on the other side and give them Material ID 2:-



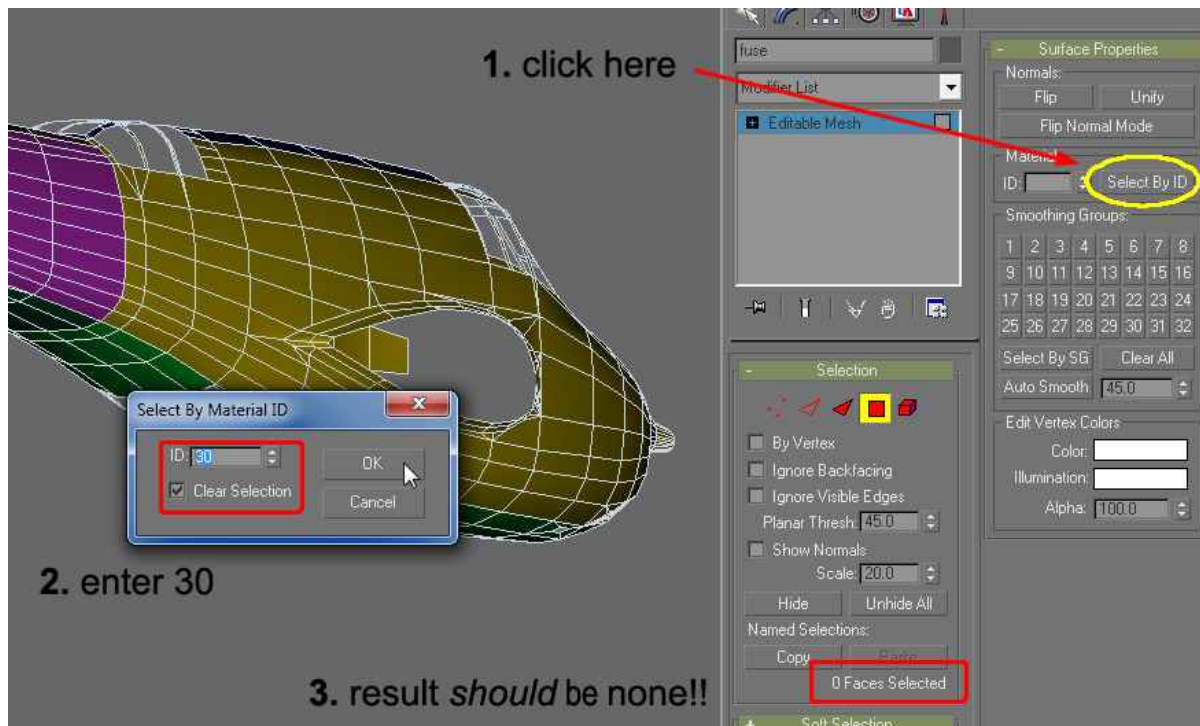
You should be getting the idea now. Continue with the top and bottom selections and the rear selections too and you'll have a multicoloured set of polys of various IDs which correspond to how you want to map them:-



And you can spot mistakes easily: here I've zoomed in very close to the nose and found one:-



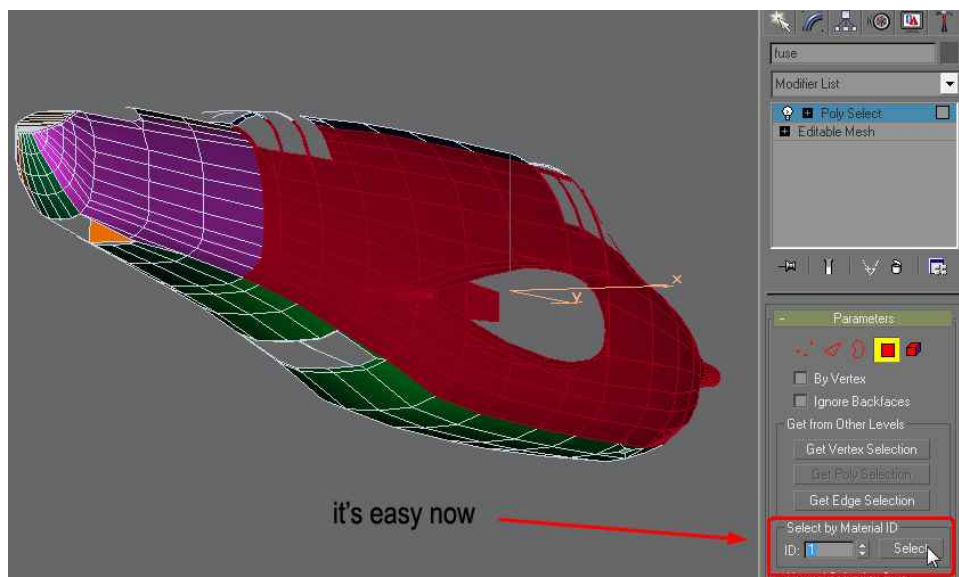
For a final check before mapping this funky fuselage, click on Select By ID and enter **30**:-



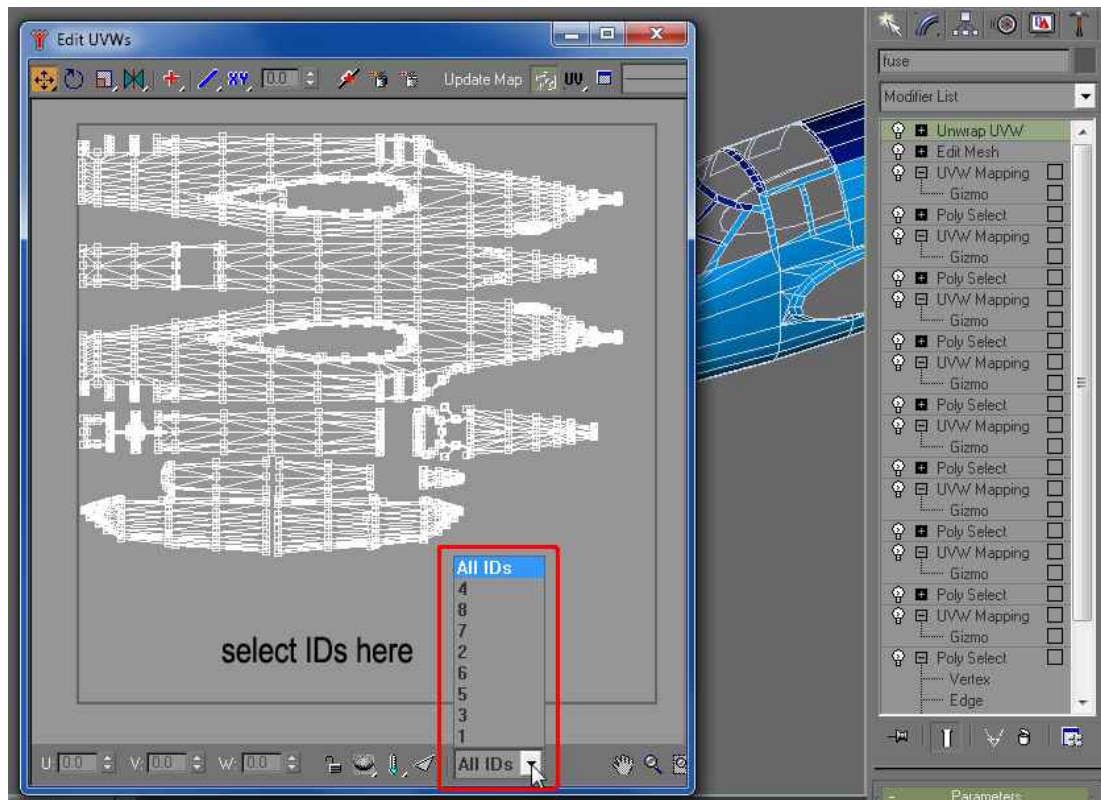
If the result is anything else, there are polys somewhere still to be set to a suitable ID before mapping.

Mapping with Material IDs

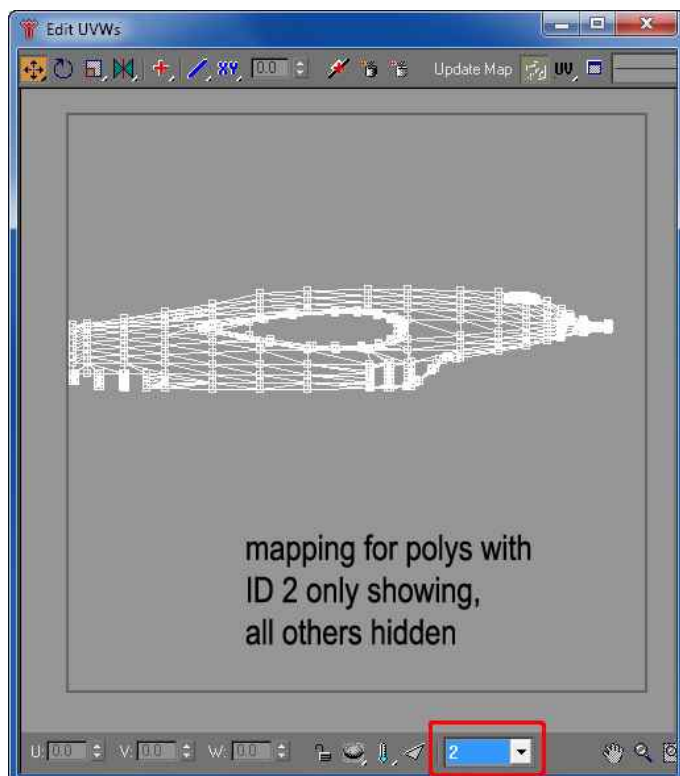
Having set Material IDs for all the fuselage polys we continue with the Poly Select/UVW Mapping procedure. You could use the colours to guide your selections, but that's double the work necessary. When applying a Poly Select modifier, in poly sub-object enter the appropriate ID in Select By Material ID and click Select – job done!



We're not finished with material IDs yet, once we've applied the Edit Mesh/UVW Unwrap modifiers, the IDs are still available in the UVW editor for editing our mapping:—

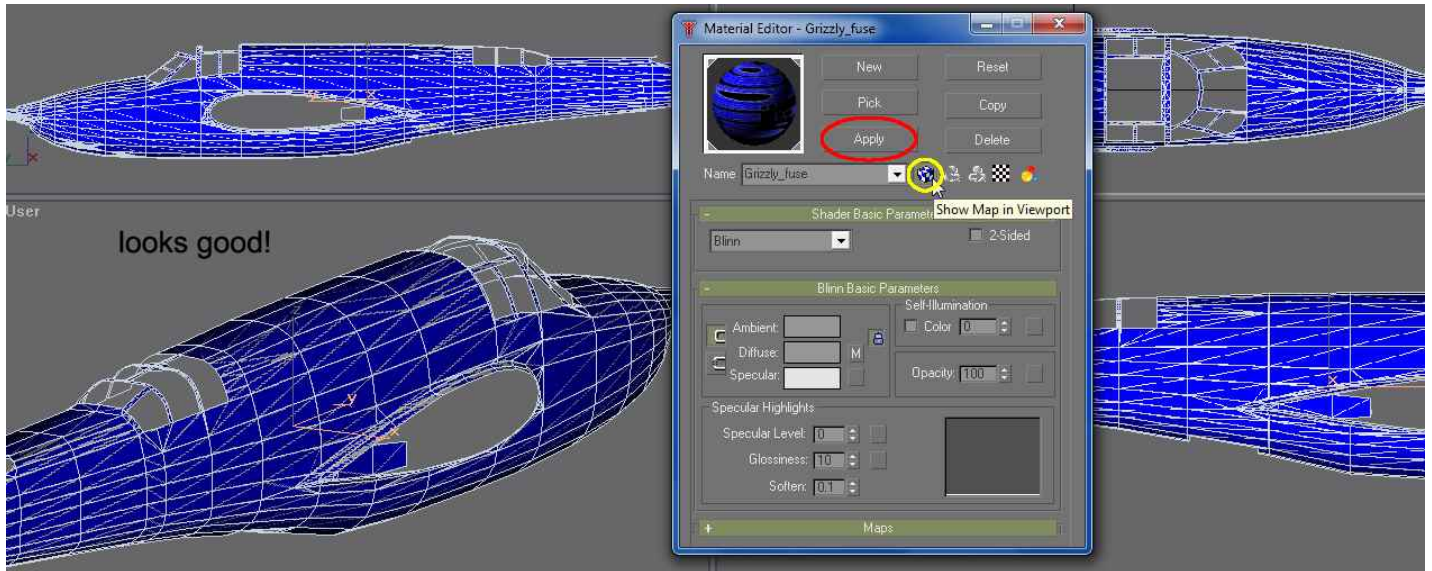


If we select a particular ID, all the other IDs' mappings will be hidden:—



Export the fuselage to LithUnwrap and make a 1024^2 texture. Make a new Standard material for the fuselage and add the new texture to the Diffuse channel.

Apply this material to the fuselage (and remember to turn on Show Map in Viewport): the Harlequin colours disappear and the mapping texture shows instead:-

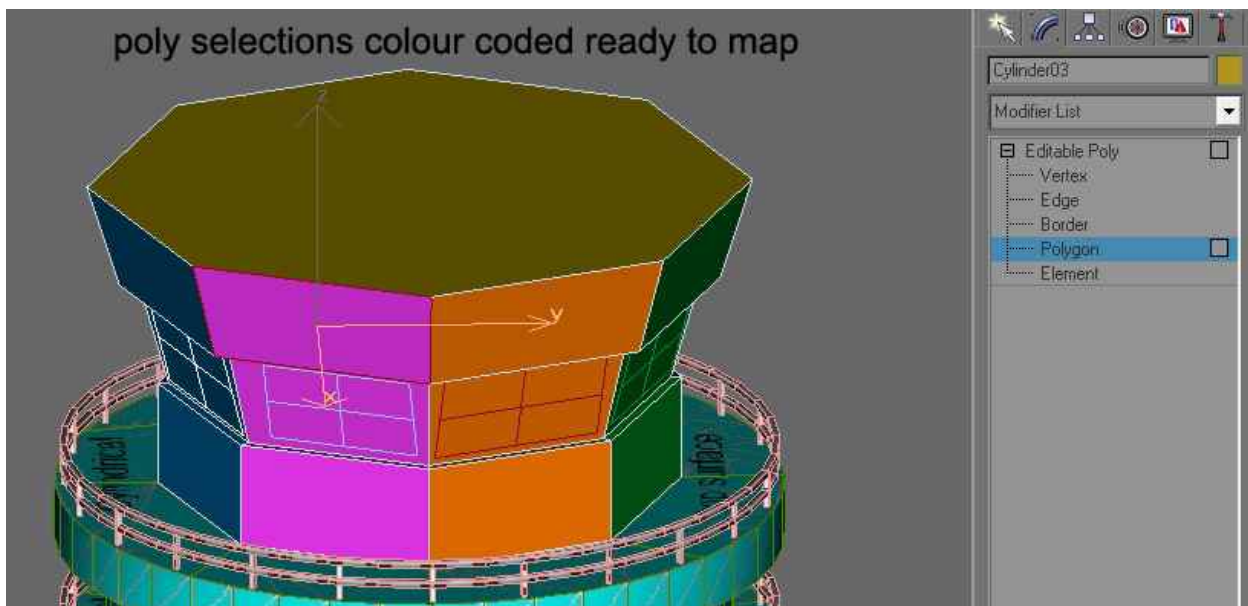


This is a vast improvement on what we started with.

If the mapping is now acceptable, collapse the stack for *fuse* to reduce memory overhead in Gmax. You'll find the material IDs are still assigned to the collapsed mesh.

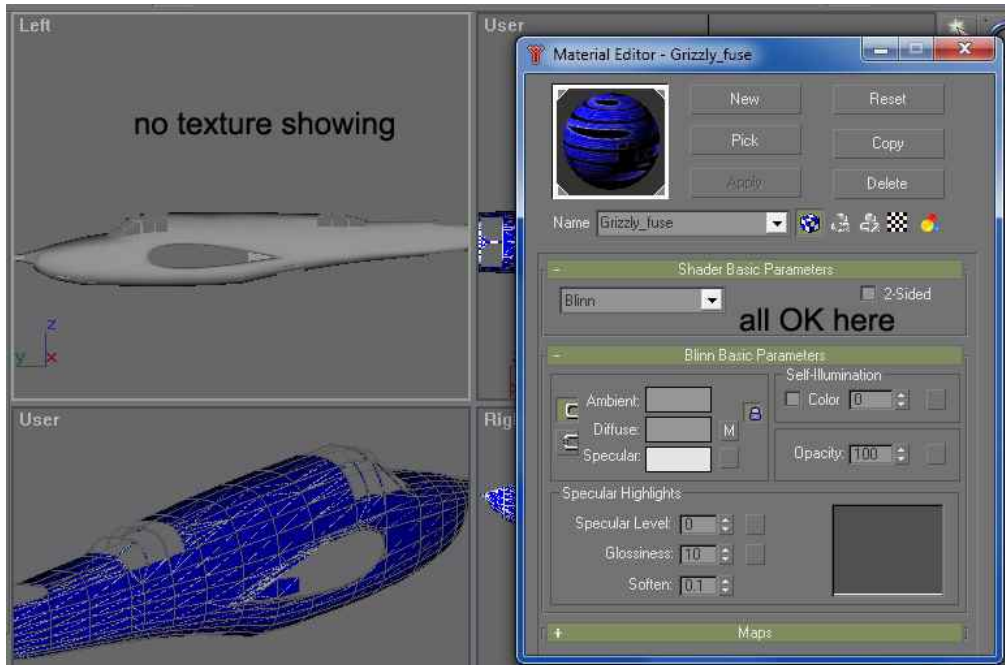
If 15 different colours are not enough, more can be added by adding more coloured materials to the Harlequin multimaterial. When beginning selecting, be sure to set all polys to a higher Material ID than your highest Harlequin value before setting IDs for mapping selections – which is why we used an ID of 30 in the example.

For a final example, here's what might have been done before mapping the controllers' nest in Part 2:-

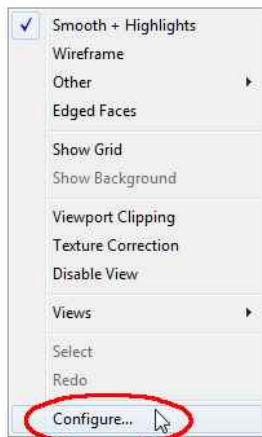


More problems

Here's a really frustrating situation when the textured object shows only grey in one or more viewports:—

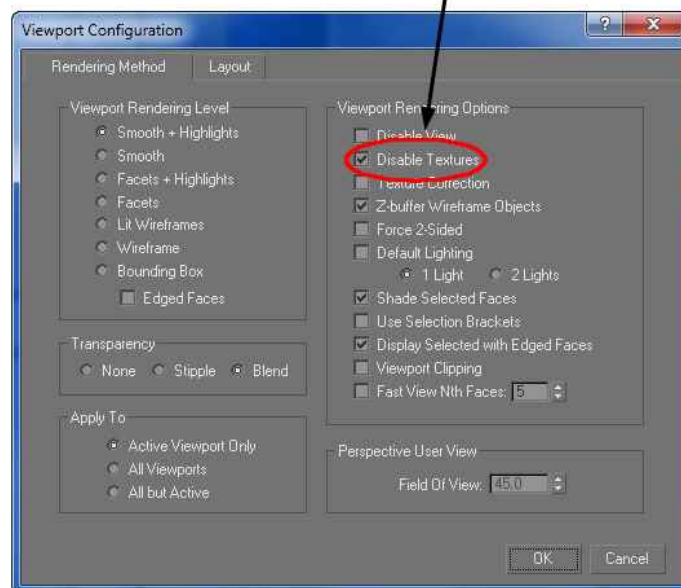


No matter how often you apply the texture to the object or click on Show Map in Viewport, a viewport stubbornly refuses to show it:—



right-click in top left
of problem viewport

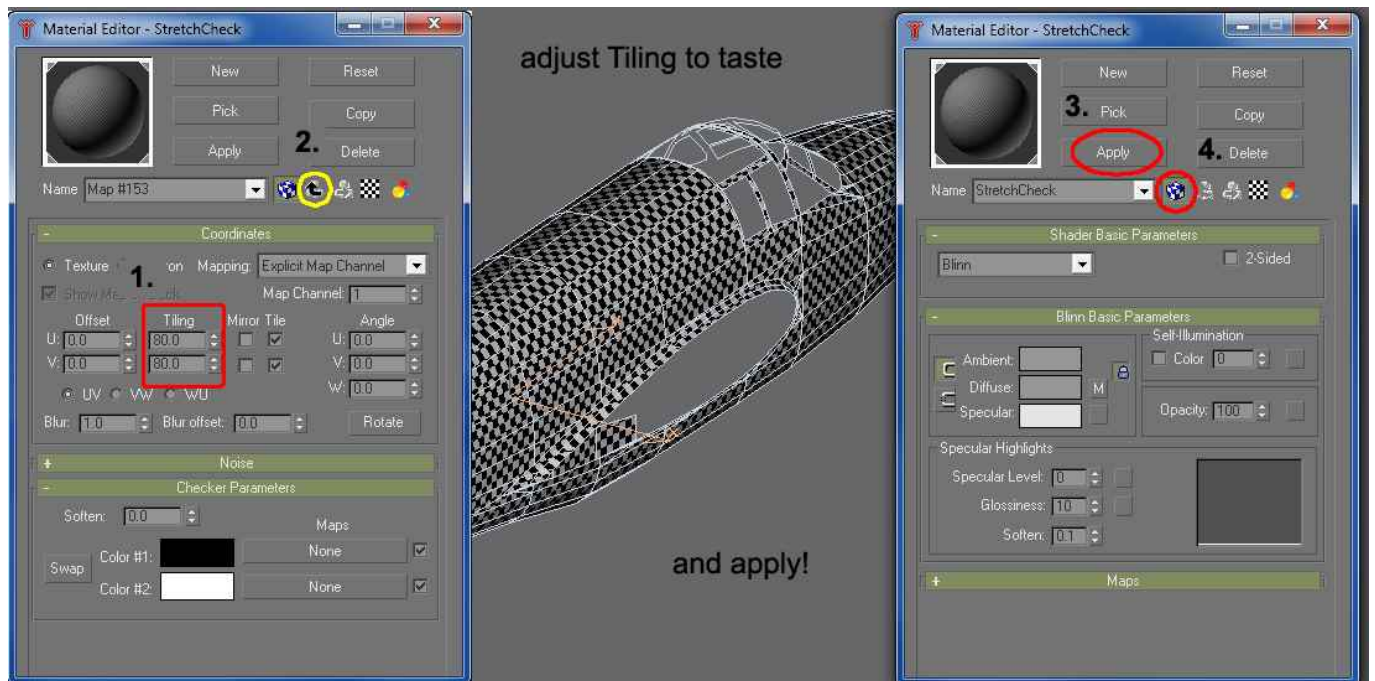
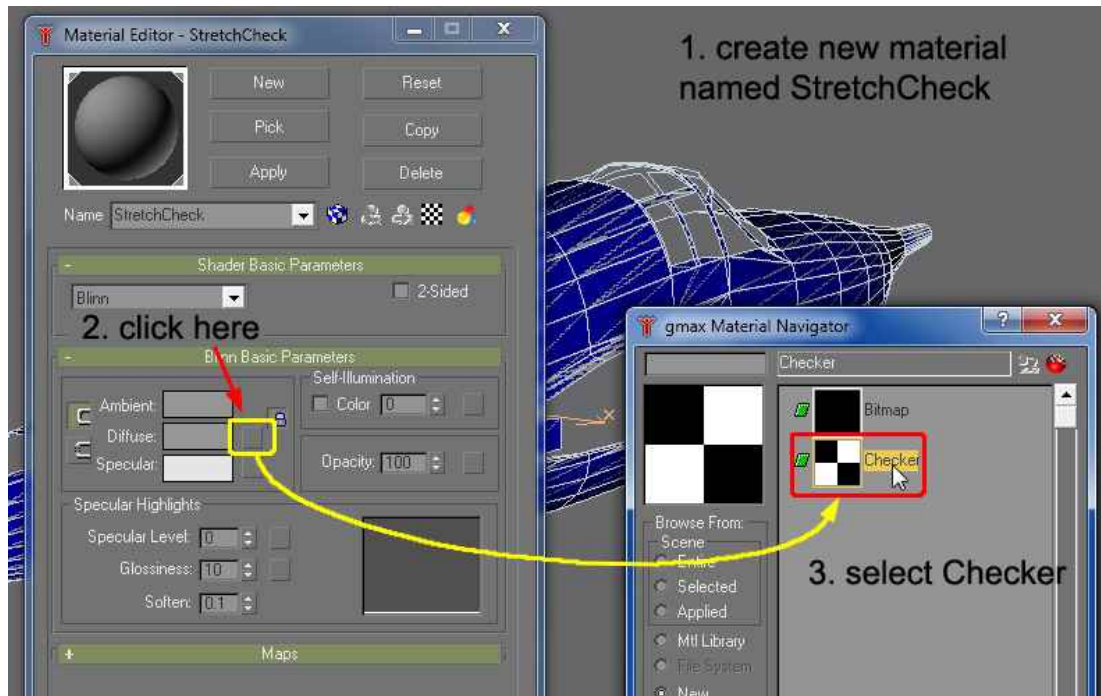
this is the problem



Untick Disable Textures and the texture will now show. No, I don't know how or why I ticked it!

Checking stretching with a chequered material

This is really easy to do in the Material Editor, although this will replace any material already assigned to an object:–



This gives a quick check on stretching without making a texture file and the Tiling can be varied in Gmax to suit our needs: the smaller the setting, the bigger the chequering.

(End of Part 3)