The Pits 3DSMax Car-Building Tutorial

Editor's Note: This tutorial should really be your starting point from the basis of a knowledge level of wanting to get started with 3dsMax modeling and rFactor. We also have a Q&A doc that should assist you with many of those questions that everyone assumes you know the answer to, so check that out as well. This document starts with a preface from one of The Pits Crew asking about modeling, thereafter Scott gets into mirroring an already half-built car.

Chapter 1: The Starting Line

Hi guys,

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Recently I've started attempting to learn 3D modeling. It's hard when you
start out but I've been watching video tutorials and reading quite a lot.
Some of it seems to be rubbing off - I sometimes look at the Peugeot 205 I'm
modeling and delete large chunks because I've learnt better ways of doing
something. I would post a pic but I'm at work and don't have the file here.
However, the shape is getting there now and the bunch of polys has started
taking form and looking like a car.

One difficulty I've found is having to use a bit of artistic license because
blueprints can only tell you so much. Lots of photos really help!

Of course, the end goal is getting models I've made into rFactor, but I'm
quite a way off that at the moment! One thing I'm slightly unsure about is
keeping the polys down, but keeping a nice arc shape at the same time. Can
you use smoothing groups in rFactor to help you out?

Also, any other tips or things I should be aware of?

Rob
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Nice to hear you're getting into this some.

I think it's a lot of fun, as long as you don't bite off more than you can chew...

The artistic license bit is where you will run across the most criticism of your work from others. Fact: Even if you laser scan a car, you won't necessarily have a model that accurately represents all cars of the same make. Without laser scanning, there are choices you have to make, compromises you have to make. That's what makes 3d modeling as much art as science.

As far as the low poly thing and how to approach it... This is another of those choices/compromises things. You really have to pick your battles when doing a low poly model. I can tell you that for me personally it's generally easier to add polys than to reduce them. It's also common to set a goal and then exceed it. With that in mind, it's my opinion that your best bet is to build the lowest poly model you can, and then add detail when/if needed. You can cover up a lack of polys using smoothing (rFactor doesn't specifically support smoothing groups, but it's very, very easy to get the same effect in rFactor and you can get there easily if you model using smoothing groups, so I highly recommend it). The trick is to figure out what areas need more polys to look smooth and what areas don't. In general, the edges will need more polys than the middle of panels. You can also cover up a lot with a good texture/paint template, as well as add a lot of detail that isn't in the model. I tend to use more polys around the wheel openings, on the nose of the car, along the top of the front fenders and along the outer edges of the roof and trunk/hatch.

Back to the smoothing groups thing. You can take a 3d object, select the faces by smoothing group, detach them to an element (keeps them as part of the same object, but breaks the seams between the selected and unselected polys), then export to the rF gmt format and the model will show up in game with the same kind of smoothing as it has in 3dsmax using the smoothing groups.

Last bit, and this is another personal preference thing. If a line on a car is even somewhat crisp, I tend to use the smoothing group stuff and create a sharp edge there instead of trying to model a crisp turn. When you get the model in-game it will give it a certain definition and will usually be at an angle where you can't tell it's a sharp crease. An example would be where the roof meets the body on most cars. There's usually a small fillet type transition between the panels. I model it with a very sharp transition between the two, as if the roof were just set upon a surface. Between the paint template, the angles and distance in game, etc you get a well defined transition that doesn't look as sharp as it does in 3dsmax.

Here's a couple of quickie screen pics to show some of what I'm talking about. I included the face edges in one of the pics so you could easily see what parts of the car have higher poly counts and what parts don't, as well as a general feel for a decent poly model for rFactor. Of note, anywhere that you see a very defined body line, it was originally done in 3dsmax with smoothing groups and then went through the whole detach to element thing for ingame. This is the case for the fender flares, the concave curve at the top of the fenders leading to the convex curve of the hood. It also applies to the upper part of the sides that is separated from the lower part to give the side of the car that 8" beveled off look at the top of the sides.
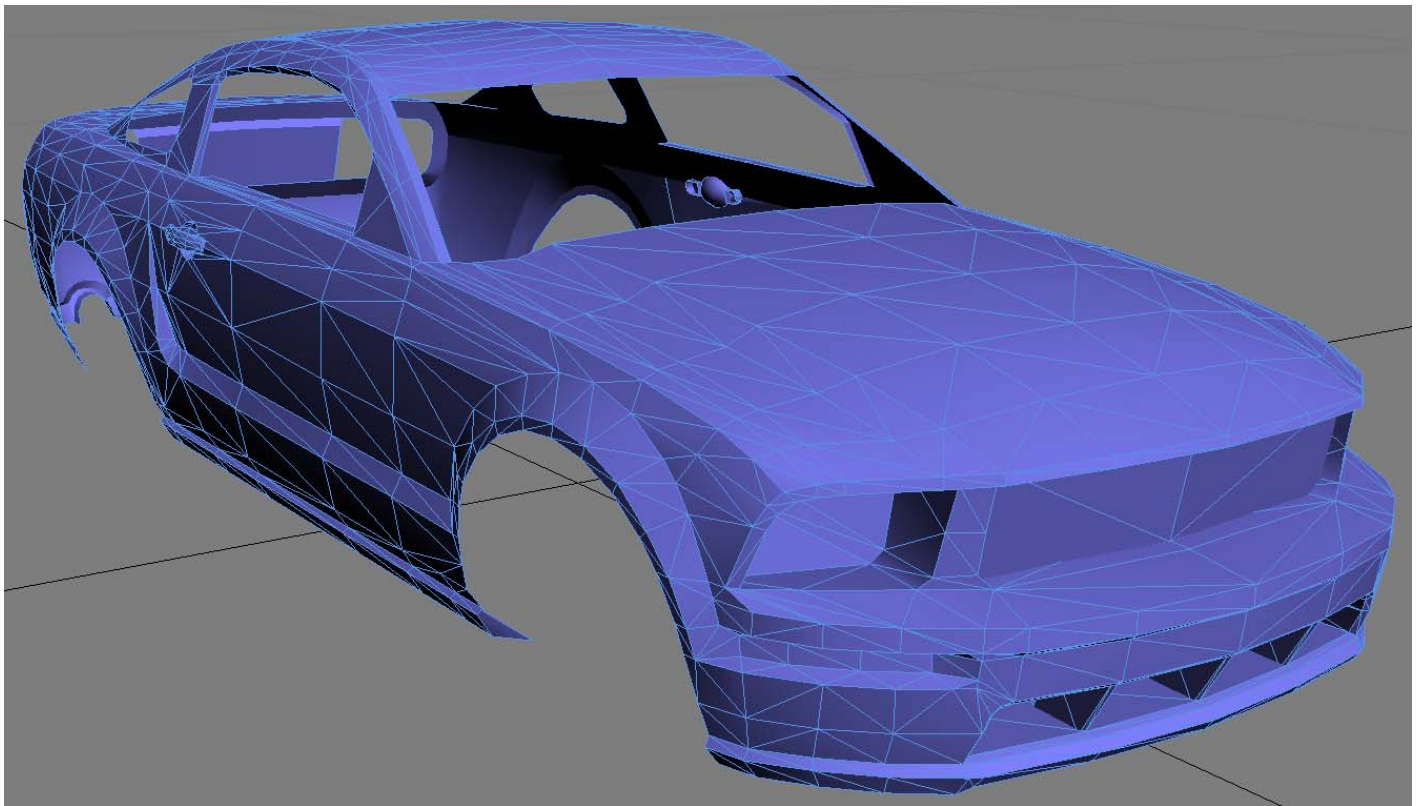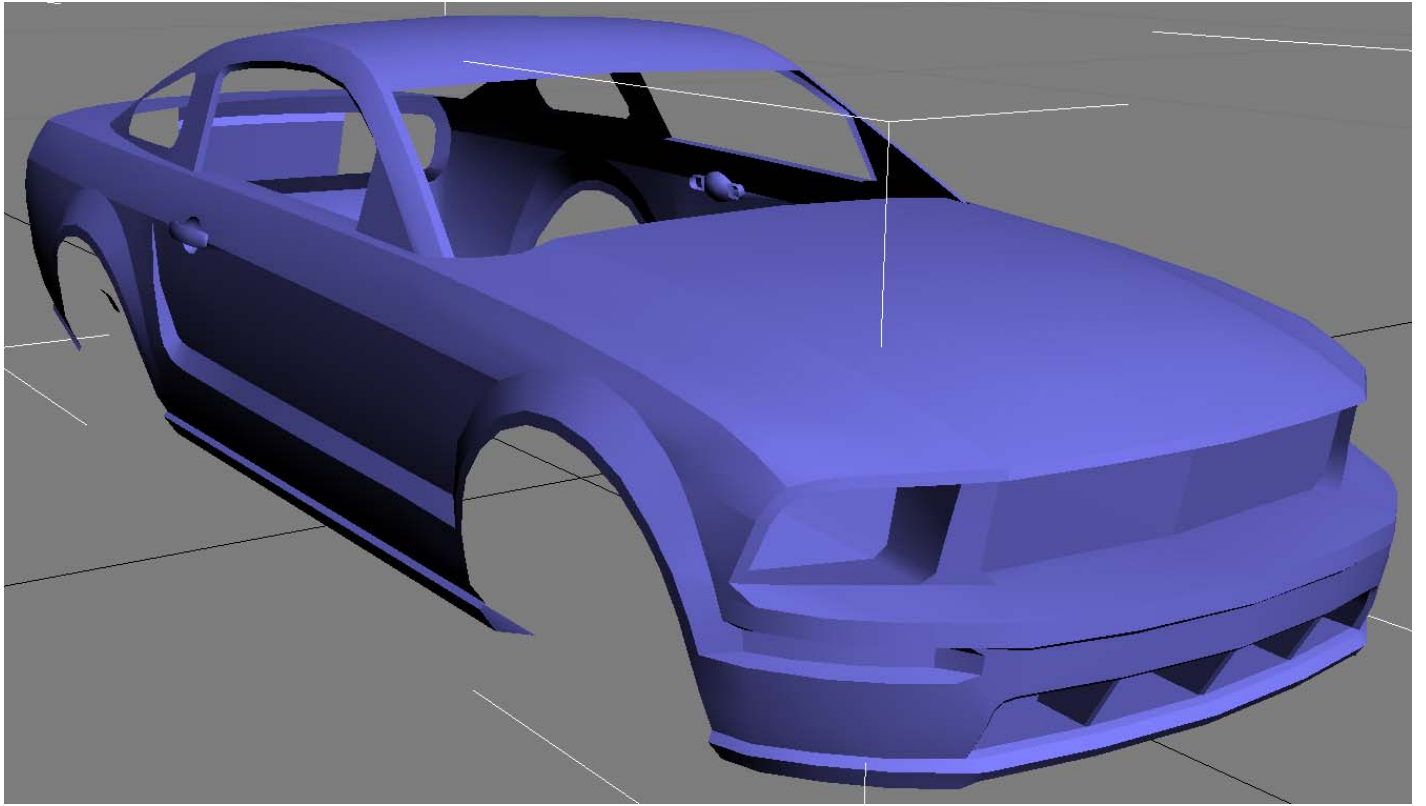
One last thing on this. There are times where you will want the transitions to be more smooth, less sharp. In those cases, you can end up with some really odd smoothing results unless you use some really small polys along the body line. The small polys help transition the smoothing from large flat surfaces to small curved services without causing hot spots (bulges and/or dents that shouldn't be on the mesh). Attaching two screen pics of a hood from the CoT stockcar. Instead of the hood lines having really strong edges, I smoothed it out some by creating a pair of thin rows of polys to transition across the body line. This entire section of hood is in one smoothing group.
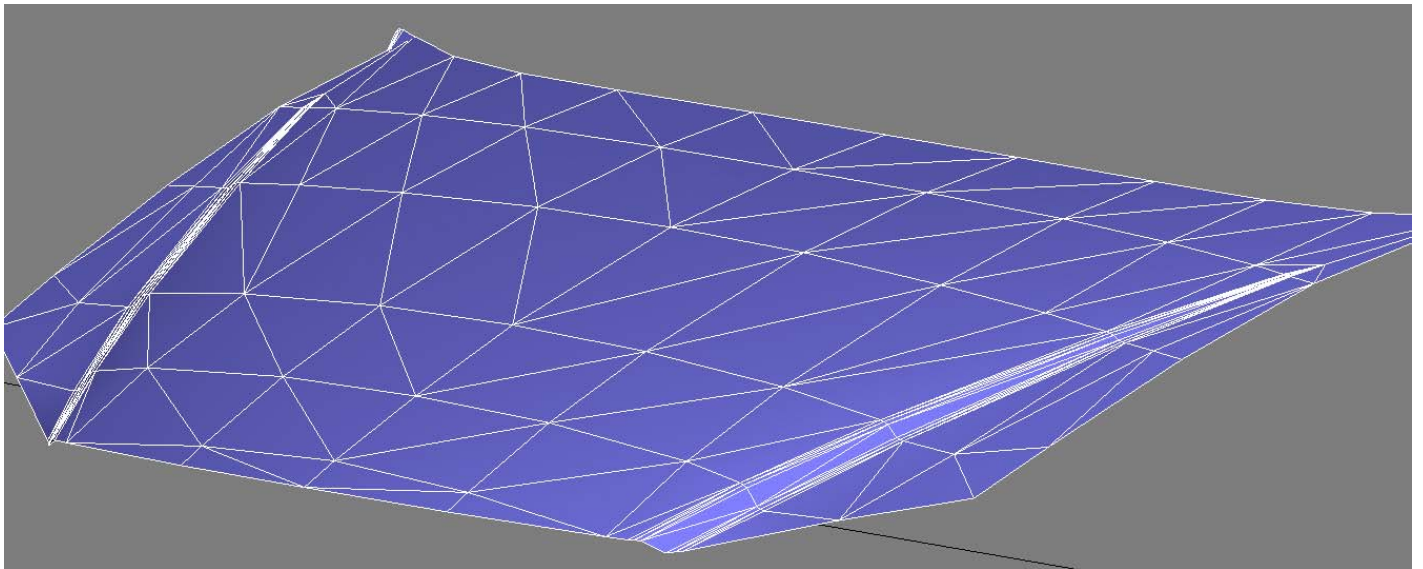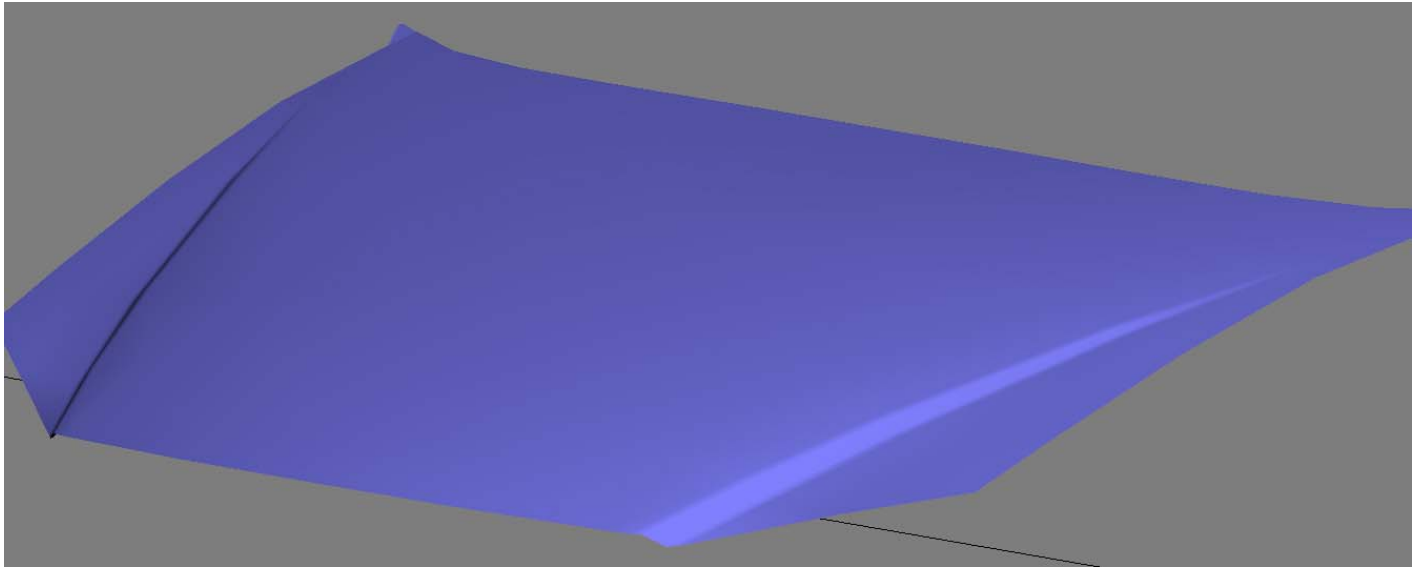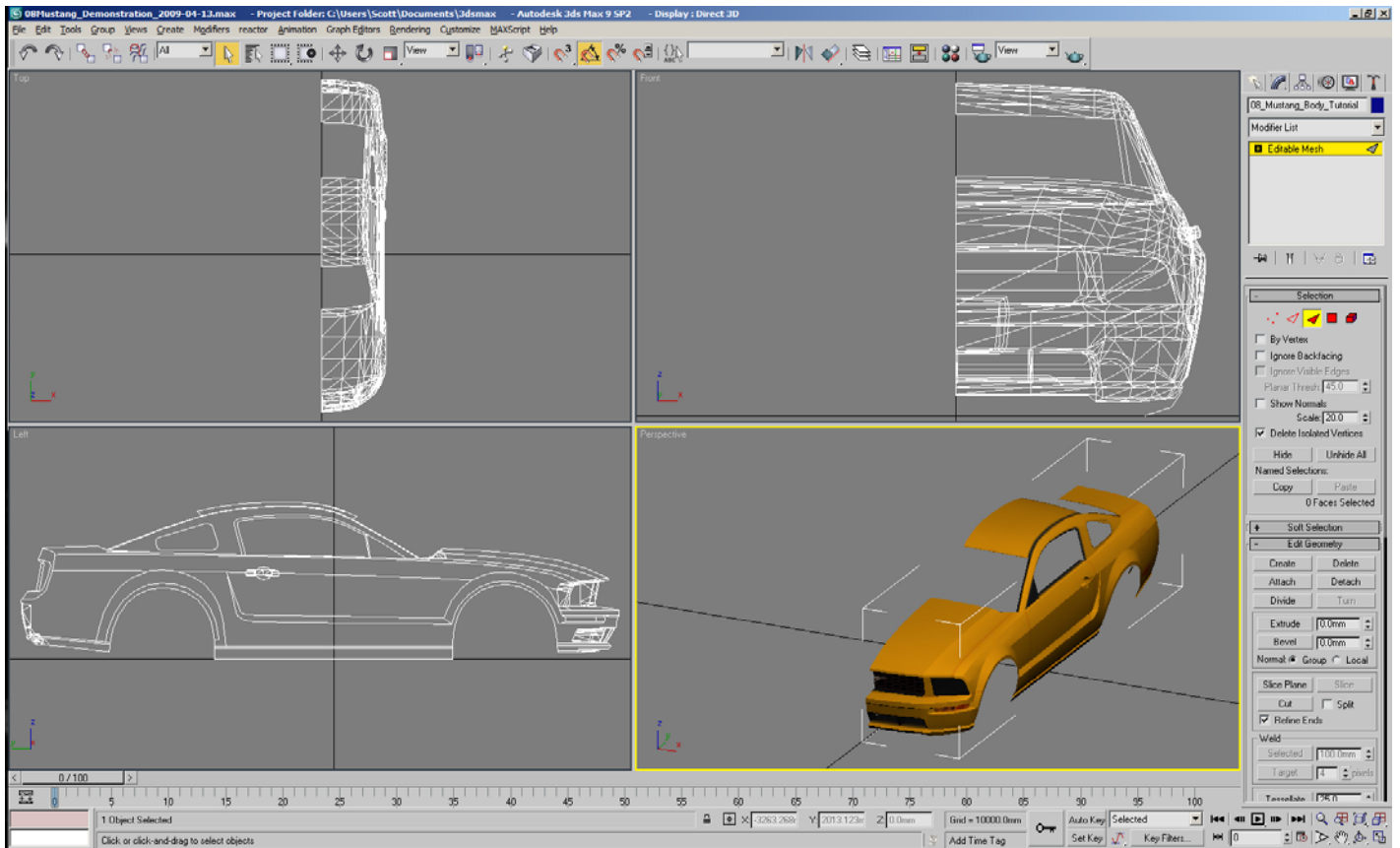
Tah Tah For Now
Scott Stockton

Ah, that's interesting.

Thanks for that tip. I haven't got around to doing the roof yet but I'll bear that in mind when I get there! I guess you must do something similar where the hood meets the side of the car?

Rob

Chapter 2 – Mirror, mirror

The first thing to do is to pick the model you want to work with and in mesh edit mode just delete one half of the car. Pick either half. In the screen pics here I picked the passenger side to delete. I'll take this moment to give you some input on the model to pick. After looking through the different LOD models that are included with this Lexus, I think your best bet would be to start off with the really high poly version and manually weld verts together where you can, create new individual faces that span multiple faces in the original model, etc, until you have a reasonable poly count. The lower poly models for this thing were all auto generated and the automatic choices that were made were not that good. It will be more difficult to get a clean model out of the lower poly ones due to the way some important polys to the shape of the car were removed while others that don't matter much were left in place. For the door seams and such, I'd recommend creating polys that span the gaps and then delete the old ones. The hood and trunk will probably be better if you just weld them to the body.
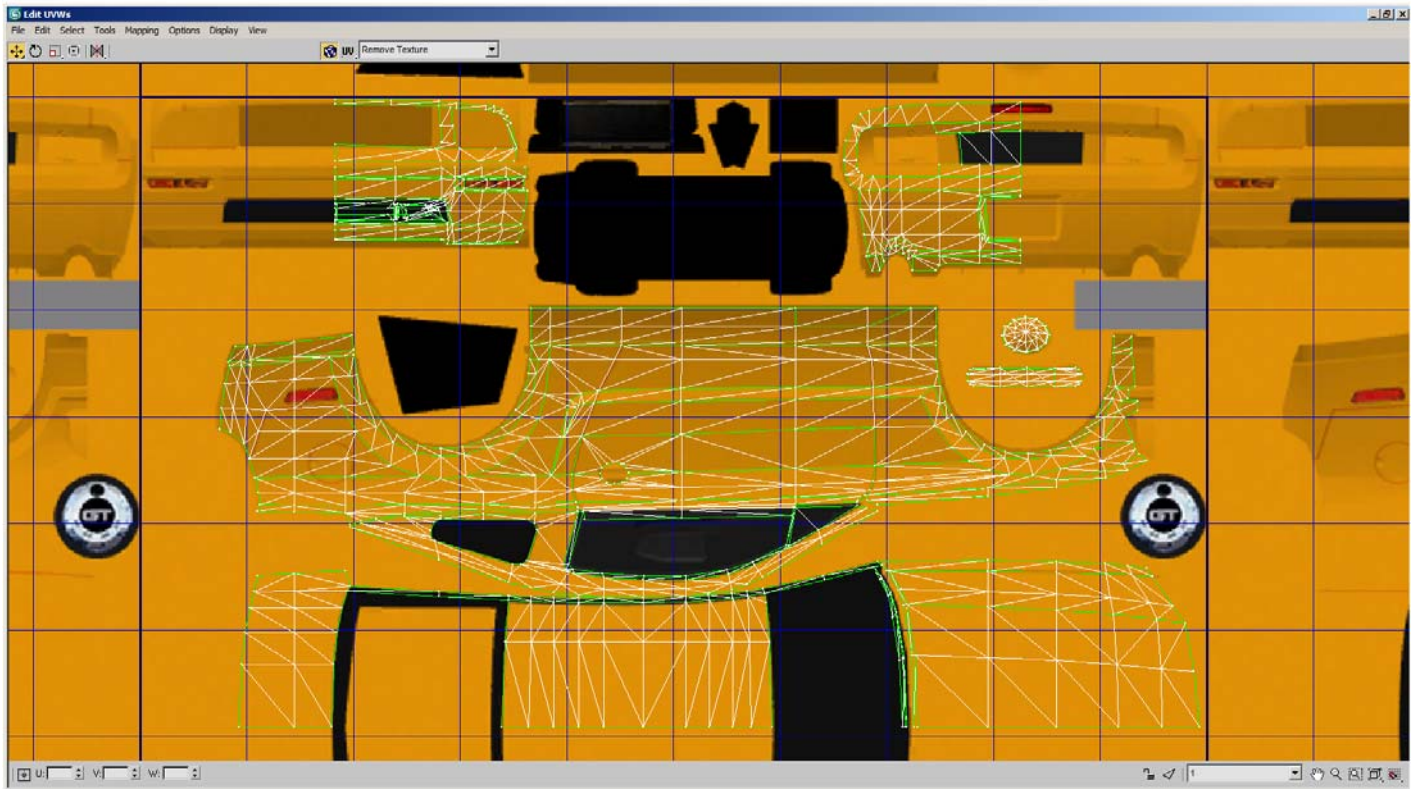
 Moving on... With half a car, you can tweak the mesh anyway you want, make any additions, changes, etc. Once you've got the half mesh the way you want it, then map or remap anything that needs to be adjusted or mapped (in the case of new polys and such). Do this while you're still working with half of a car.
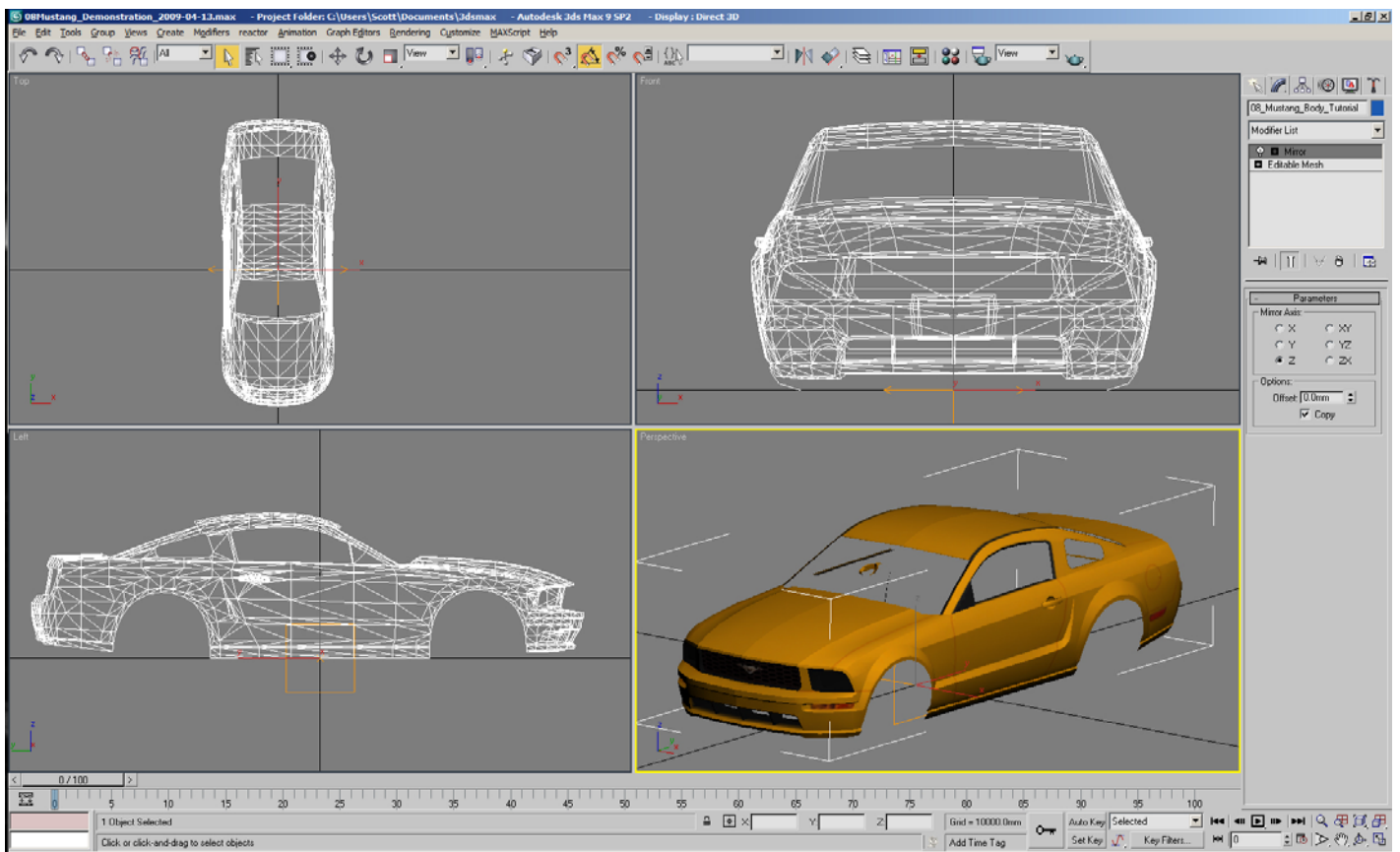
  Once you've got the half car mapped the way you want it, it's time to mirror the car. Note the settings I've got on the "Mirror" modifier. You will need to select "Copy" and then you'll need to check each axis until you get the equivalent of a passenger side of the car from the driver side (or vice versa depending on which half you originally chose to work with). If the mirrored halves don't line up correctly, delete the Mirror modifier to get rid of it and adjust the pivot point for the model to make certain it's setting at 0,0,0, then re-add the Mirror modifier. Once you've got a whole car body, collapse the Mirror modifier (right click on Mirror just below the Modifier List, select collapse all). That's something to make note of, every time you finish working with a modifier collapse it, otherwise you can find you work will get blown away by any other editing you do. This goes for the Unwrap UVW thing especially. Once you've got the mapping done on the half car, collapse the Unwrap UVW modifier or your mapping will be lost when you've finished up with the work from the Mirror modifier. Someone used to ignore me when I'd tell him to collapse the modifiers and he was constantly complaining about losing his mapping and warning that using the Mirror modifier would create bunches of extra polys. All he needed to do was collapse the modifiers and it would resolve a lot of the problems he used to blame on 3dsMax.
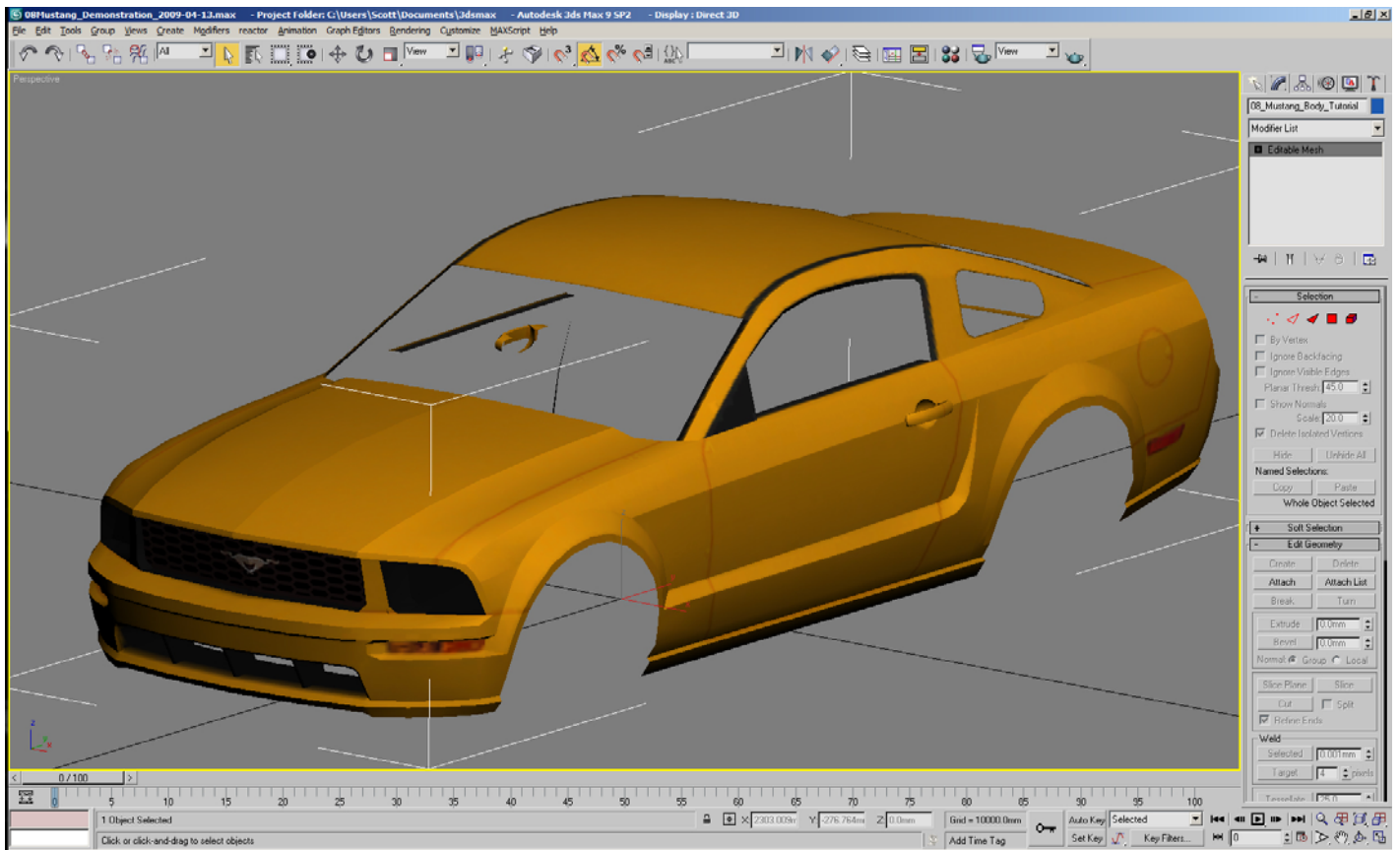
Now that you've got a full body and no modifiers applied, you'll likely need to go in and weld some of the vertices together to smooth out the panels on each half of the car (see the image above, and compare the roof of the Mustang to the way it looks in the image on the previous page just after the Mirror was applied). The way I handle this is when I've still got half a car, I select groups of faces and create smoothing groups that create sharp edges where I need them and smooth surfaces where I need those. After I mirror, I go into vertex editing mode for the mesh, I adjust the distance on the Weld Selected option to .0001mm (this will force it to only weld verts that are on top of each other), then select all verts, click Weld Selected, and then switch to face edit mode, select face smoothing groups one at a time, and click Detach and select "To Element". This is done because the rFactor export tool doesn't support smoothing groups very well.
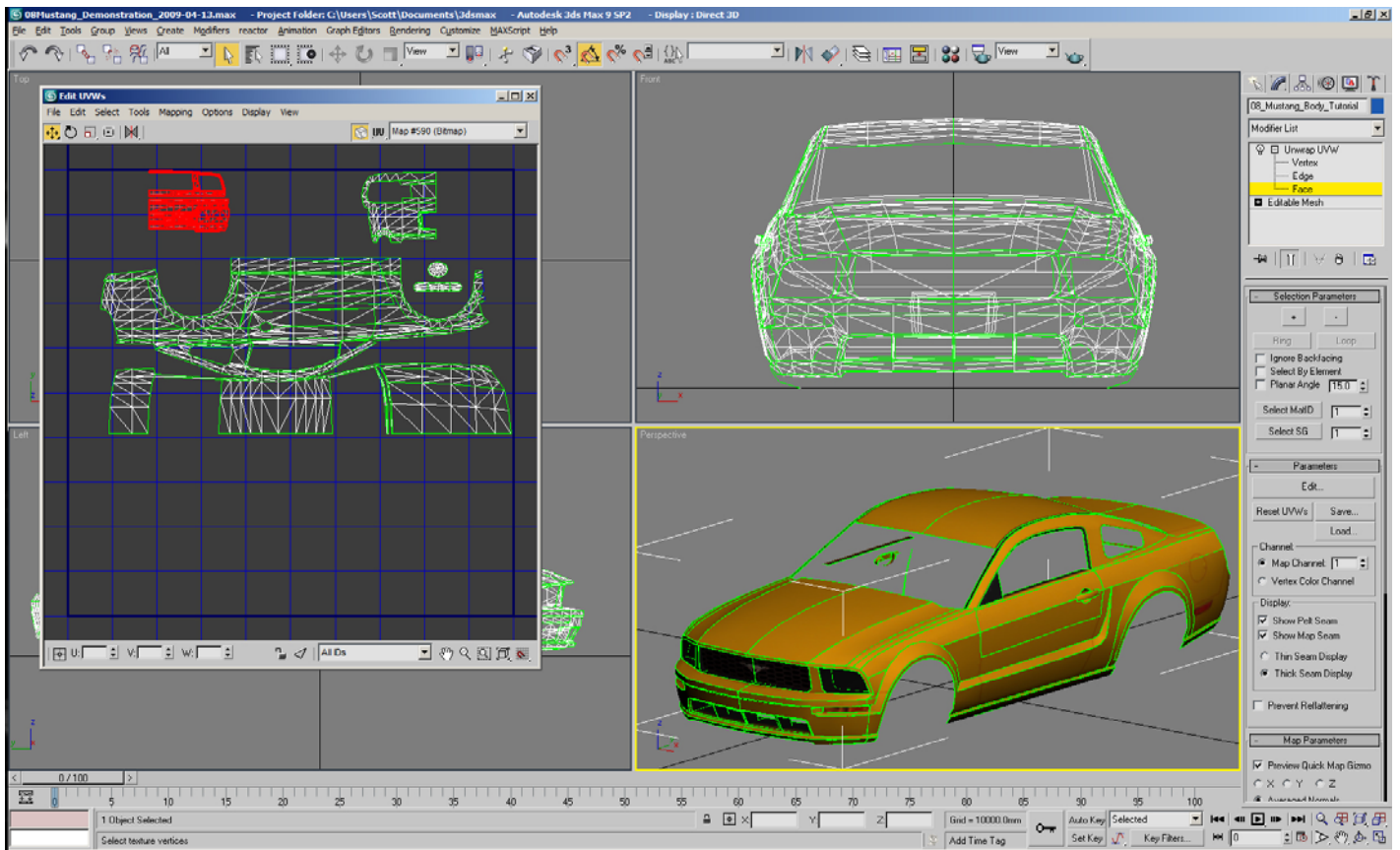
    Once you've got your whole car mesh looking the way you want, it's time to add the Unwrap UVW modifier again. You'll notice that while you've got a whole car, you've still only got what looks like half a car mapped. The mirrored side of the car retained the mapping of the original half car, and the mapping did not get altered by the mirror modifier. At this point, you can select whole sections of mapping in the Unwrap UVW Edit screen. You should be able to select the nose, the tail, the main body, any other separated mappings you need. When you select the faces in the UVW Edit screen, it will highlight the faces on both the driver side and the passenger side.
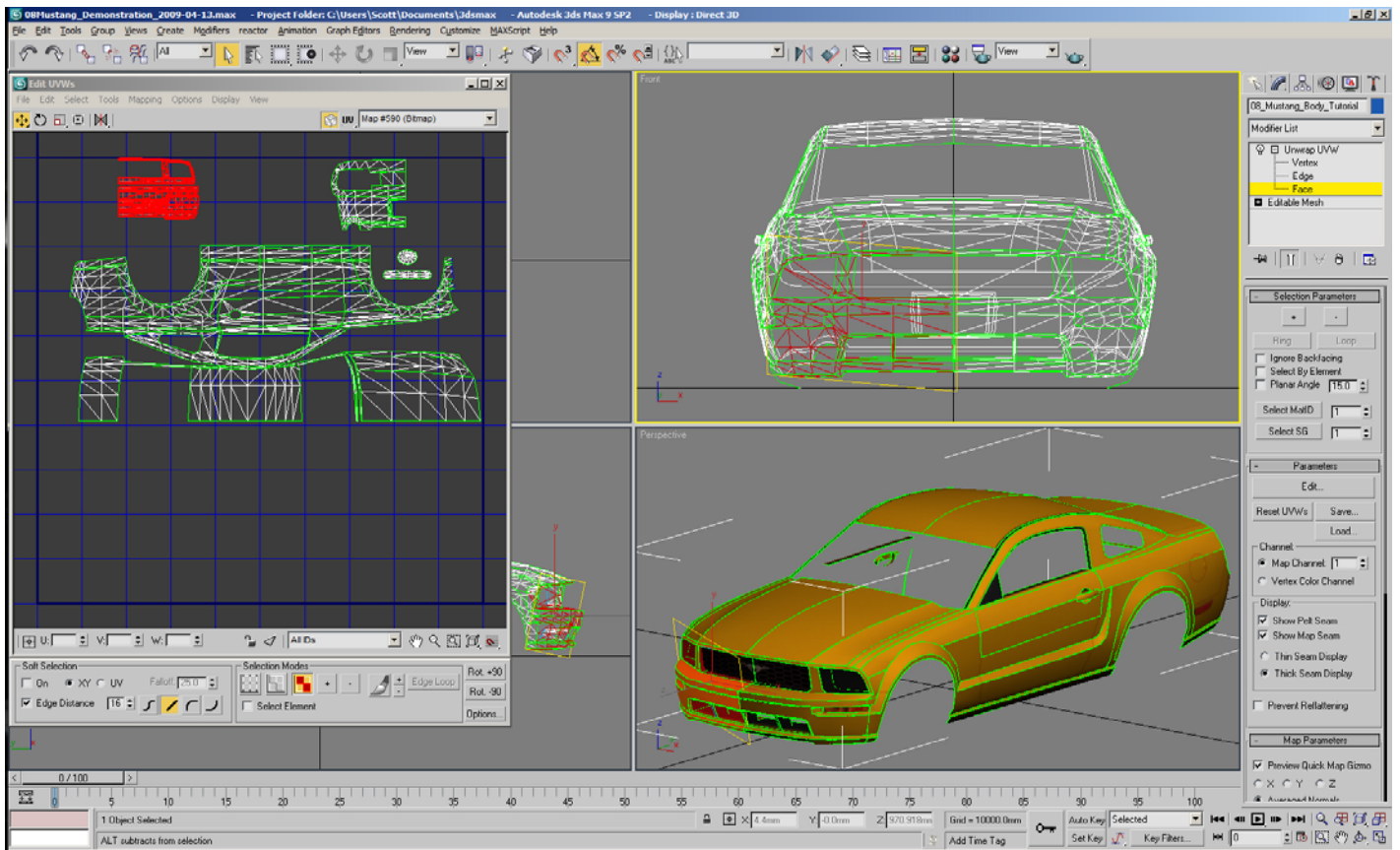
In the mesh editing screen you can deselect the faces that are correctly mapped (in the case of the example pics, deselect the driver side faces and you'll be working with only the passenger side in the UVW editor).
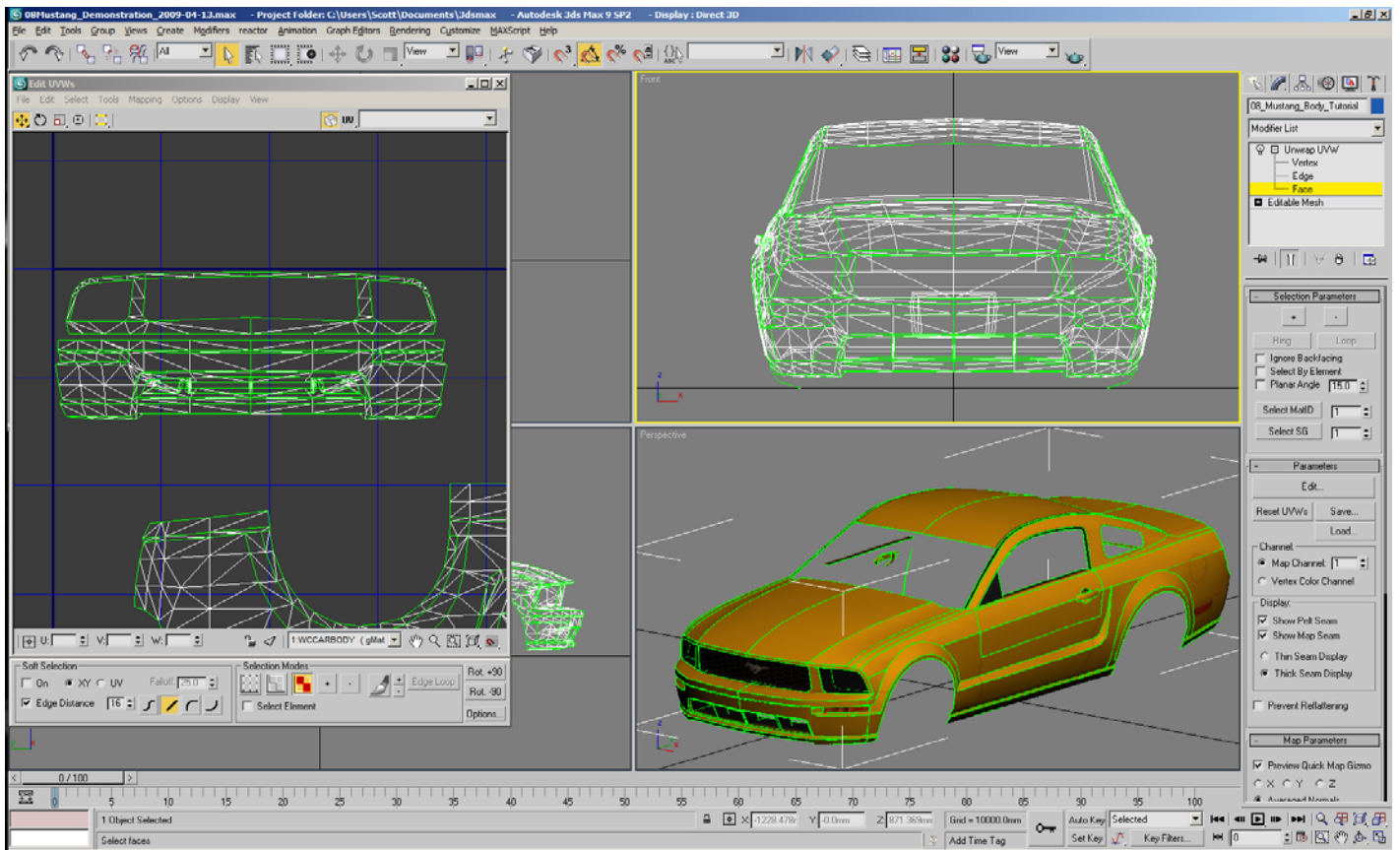
   Now you can click on the Tools menu in the UVW Edit screen and select Flip Horizontal or Flip
Vertical in order to get the mapping correct for the side of the car you're working on (see image 07).
Once you've flipped the mapping you can reposition it so that you get the entire nose, tail, body, etc
of the car. One trick here when repositioning, if you hold down the Shift key it will force the
movement to be either vertical or horizontal, so you can keep the mapping lined up (in the case of
the pic above, I moved the mapping of the nose to the left while holding down the shift key, so the
mapping staid lined up vertically). You'll need to zoom in quite a ways to get the flipped mapping
lined up with the original mapping, but it doesn't take long to get the two halves lined up nicely.
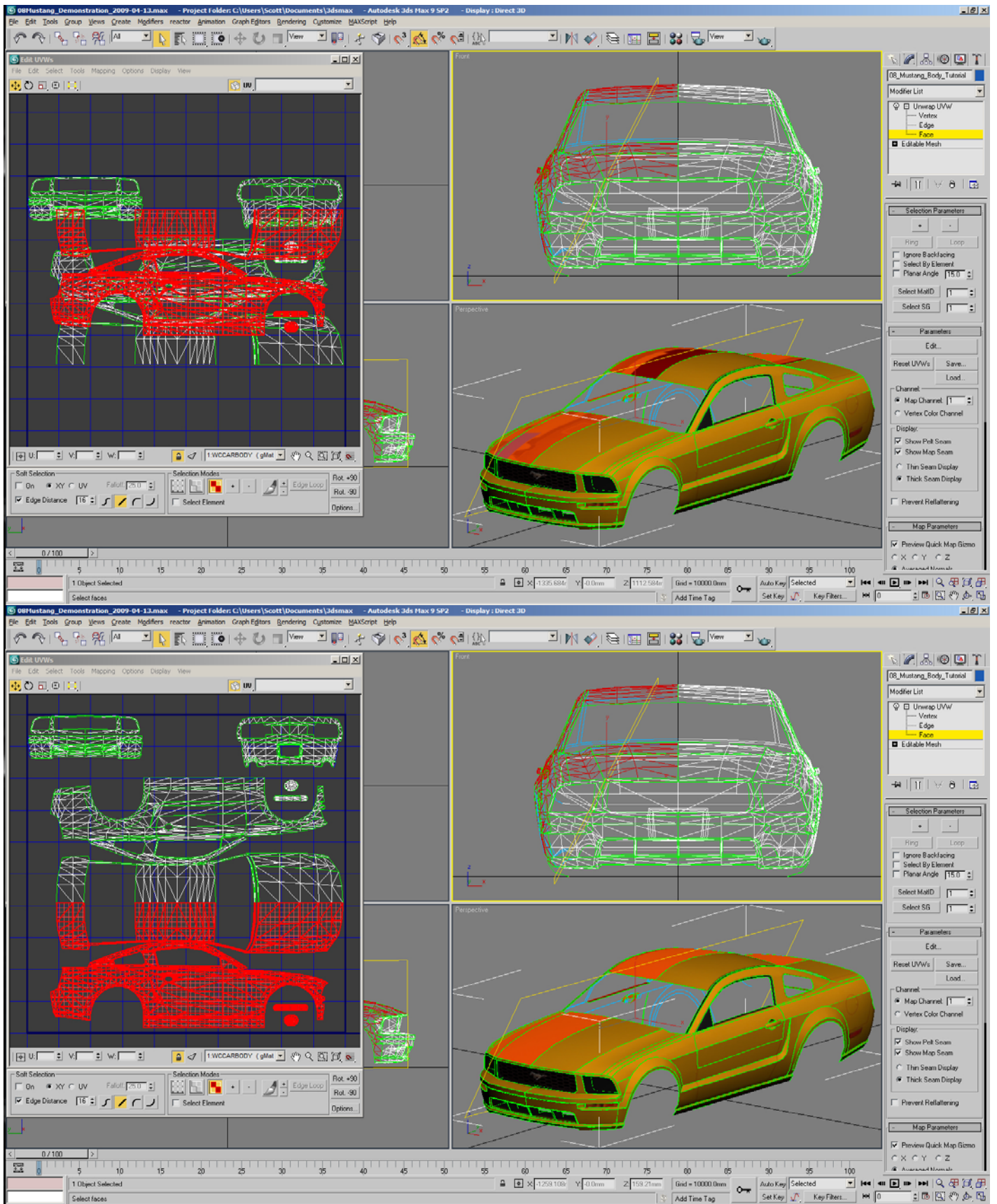
These two images show some continued progress in flipping the mapping on the passenger side of the car and getting it lined up.
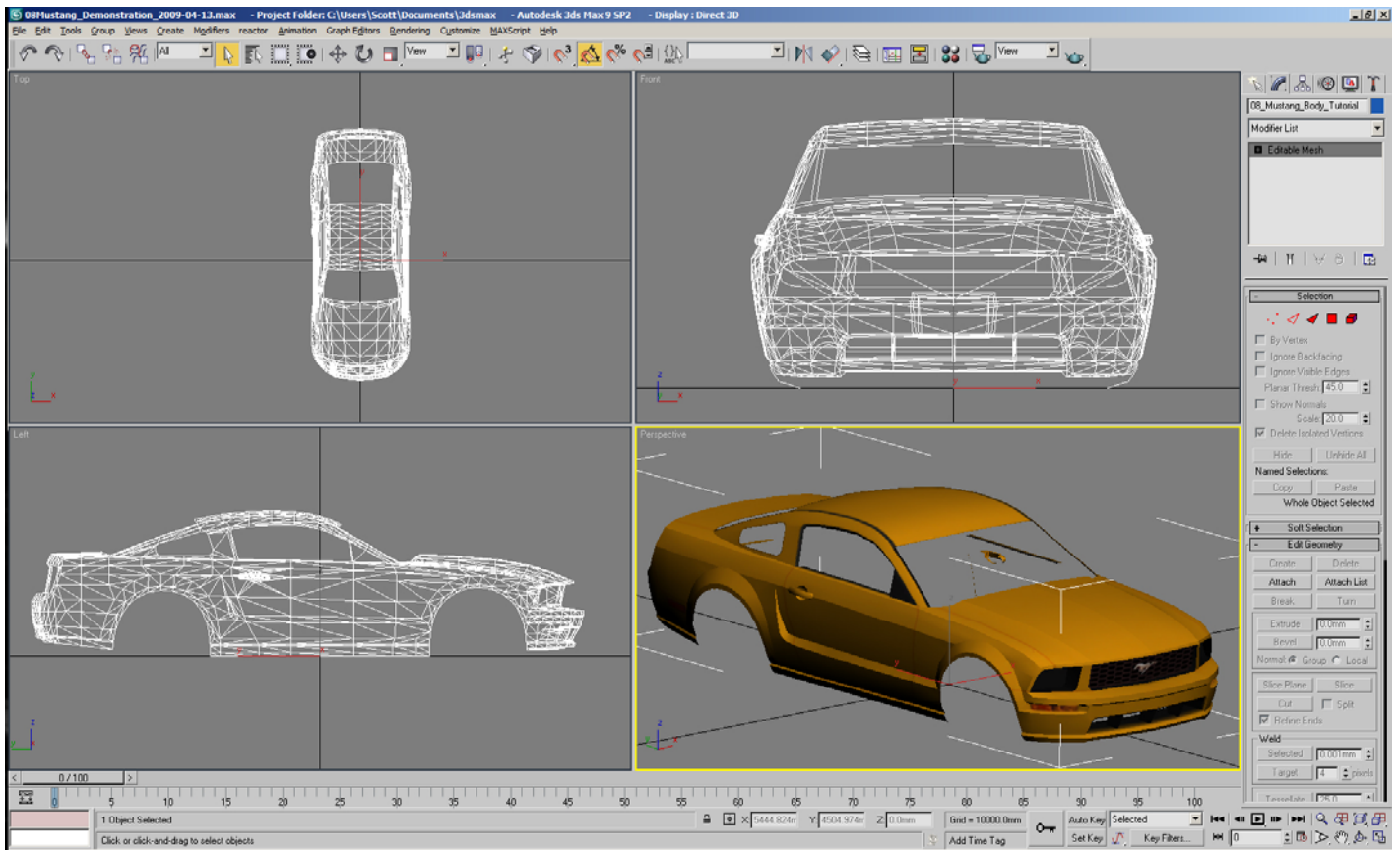
　　Once you've completed flipping all of the mapping and getting it aligned, you should have a completely mapped car with no issues of mirror images of the graphics and such.

　　Also attached in the rar file are two images I use when mapping a car body to show me quickly any places where there might be warp. It's impossible to eliminate all warp in a model, but you can minimize and/or control where the warp is on a model and the two mapping grid textures come in handy for me when working in 3dsMax. I picked orange and black simply because my monitor showed up the contrast in the two better than any other combinations I tried (all the others tended to be a bit blurred due to the high contrast in such a tight pattern). I haven't messed with mapping a car body since I went to an LCD monitor, so you might want to modify these files to better suit your monitor.

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Tah Tah For Now
Scott Stockton