Recoloring ScissorsAndPlanes models with Inkscape
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Introduction

This is a quick and simple tutorial on getting started with Inkscape, specifically geared towards using it to recolor or modify any of the many wonderful models produced by Bruno Vanhecke, aka ScissorsAndPlanes in the forums at papermodelers.com. These models can be found in the thread One model per (non-working) day. Bruno has graciously given his permission for anyone to recolor his models, and take credit for the recoloring, as long as he is credited as the original designer.

Since the models are all vector based and in PDF format, Inkscape is the perfect tool for recoloring them. It's free and open source, available for Windows, Mac and Linux, opens and saves PDF files directly, is fairly easy to learn, and tips and tutorials are easily found on the internet.

The major limitation of Inkscape is that it does not support multi-page documents. If a model consists of multiple pages you have to open each page as a separate Inkscape file, then save them individually. The good news is that there is another free and open source tool that lets us fix that up too.

Get Inkscape

If you don't already have it, click on over to Inkscape.org and download the latest stable version (0.48.4 at the time of this writing). Install it as you would any other program, then run it. I leave those details up to you.

Get Started

There is a handy list of all the keyboard shortcuts available here

The remainder of this tutorial will be presented as annotated screen shots with notes thrown in as required. Skip to the next page and get started.

The Inkscape Screen

The screen shot below shows the default Inkscape screen. For our purposes you can ignore pretty much everything that I don't specifically draw your attention to.

Highlighted below are the main document area, the main toolbar along the left of the window, and the tool specific options and operations bar near the top. If you hold the mouse over any of the items a tooltip will pop up telling you what it is.
Clicking a tool in the main toolbar will cause the upper toolbar to change, displaying options specific to that tool.
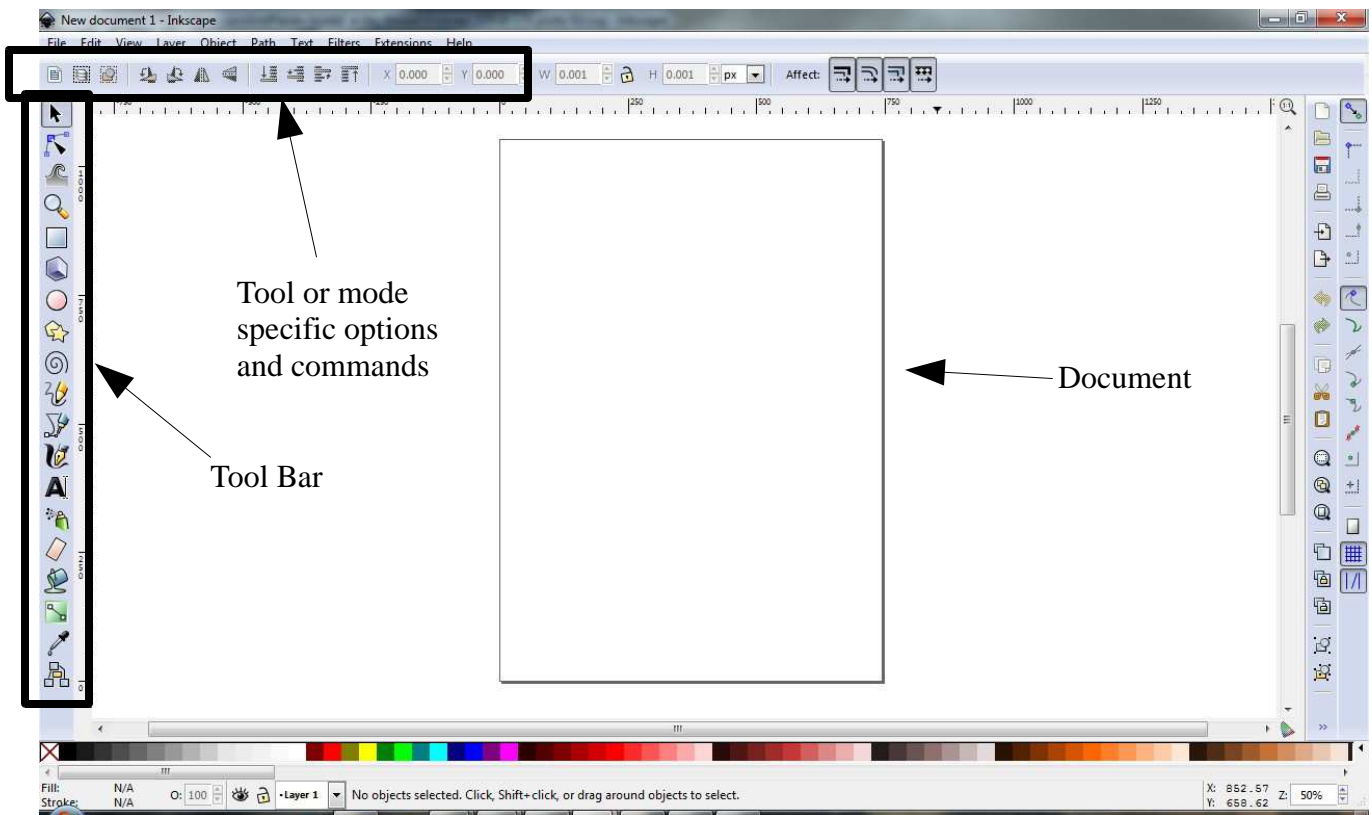
Opening a Model

Now, let's open one of Bruno's models and play with it. For this tutorial I will use the **A320 Lufthansa** which can be found in this post: http://www.papermodelers.com/forum/aviation/25109-one-model-per-non-working-day-49.html#post390697
If you don't already have it, go get it.

Click the File menu, click Open, navigate to where you saved the model and open it. You will be presented with the PDF Import window as shown here. As you can see a preview of the file is shown at the right. Just click OK to accept the default settings.
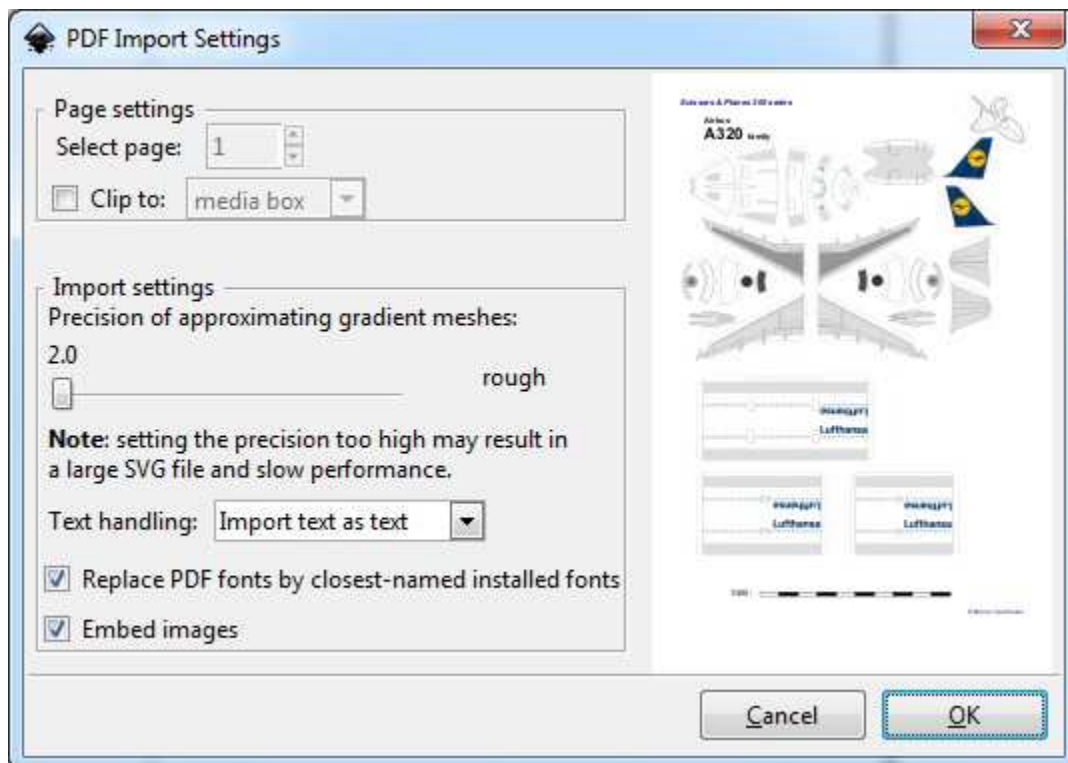
Inkscape will import the model. On my system it usually opens in a small window and I then have to click the maximize button, leaving me with a postage stamp sized page in the middle of the window, like this:
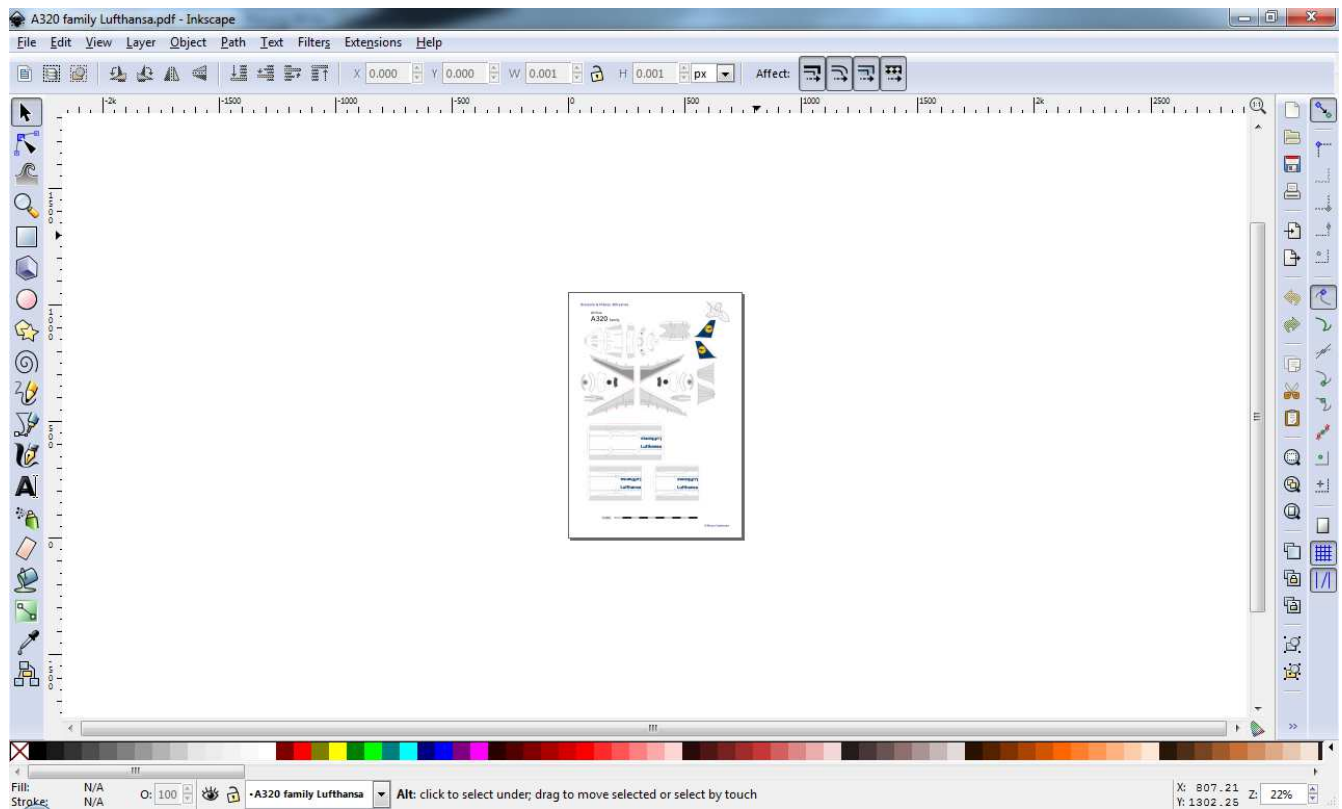

Zooming In and Out

Position your mouse over the center of the diagram and **press** the mousewheel/middle button to zoom in. Inkscape will zoom in towards the spot under your mouse cursor.

Hold down Shift and click the button to zoom out.

You can customize the keyboard and mouse by editing one of the Inkscape configuration files. I have modified mine so that rolling the mouse wheel zooms in and out. I find it much faster and easier.

Grouping and Ungrouping Objects

Zoom in/out until the diagram fills the window as shown below:
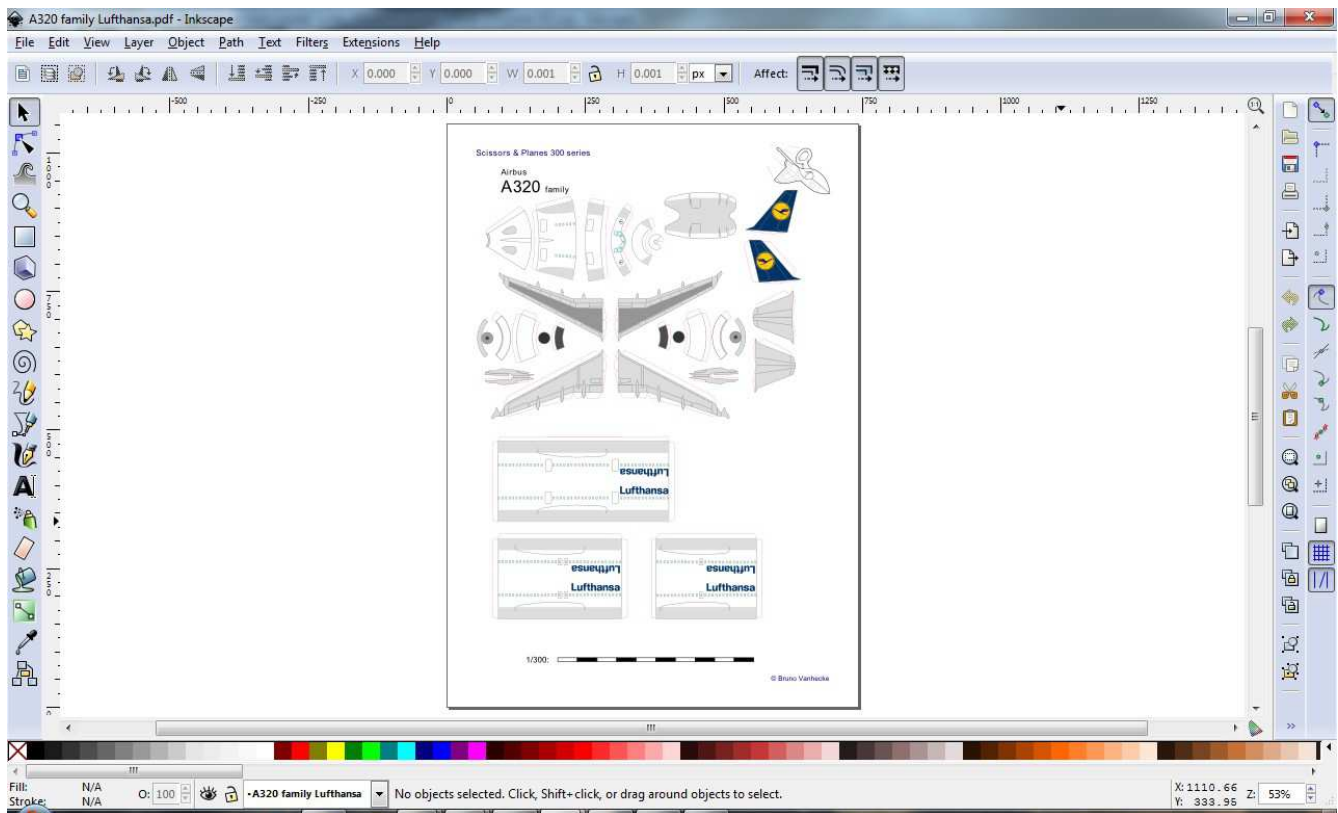
Click anywhere in the diagram and you will see that the entire diagram is selected as shown here:
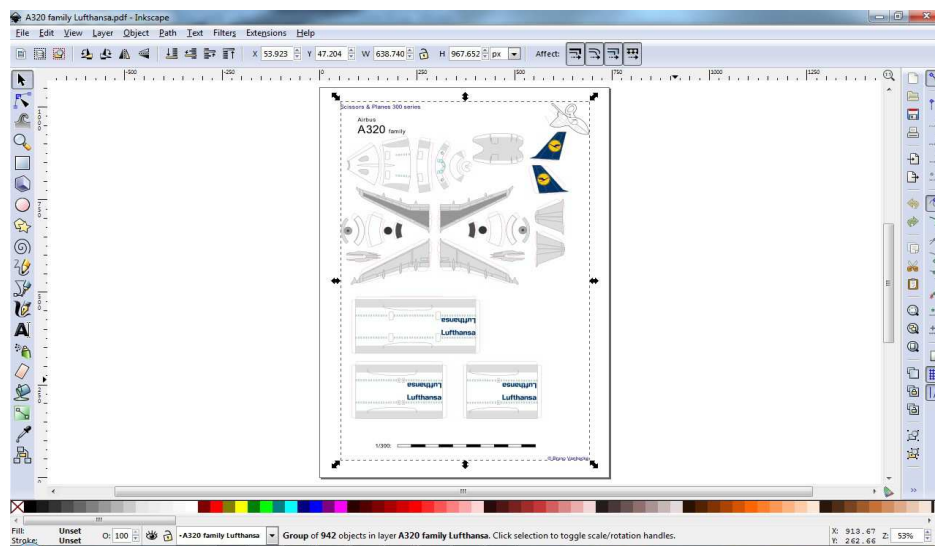
If you click and drag anywhere in the diagram you should find that the entire diagram moves around. This is because the entire diagram is treated as a single object.
Press Ctrl-Z (undo) to move the diagram back to it's original position. Ctrl-Z can be used to undo any operation in Inkscape. So if you ever do anything you didn't mean to, don't panic! Just press Ctrl-Z.

Now, with the entire diagram selected as shown above press Ctrl-Shift-G (hold down control and shift and tap G).
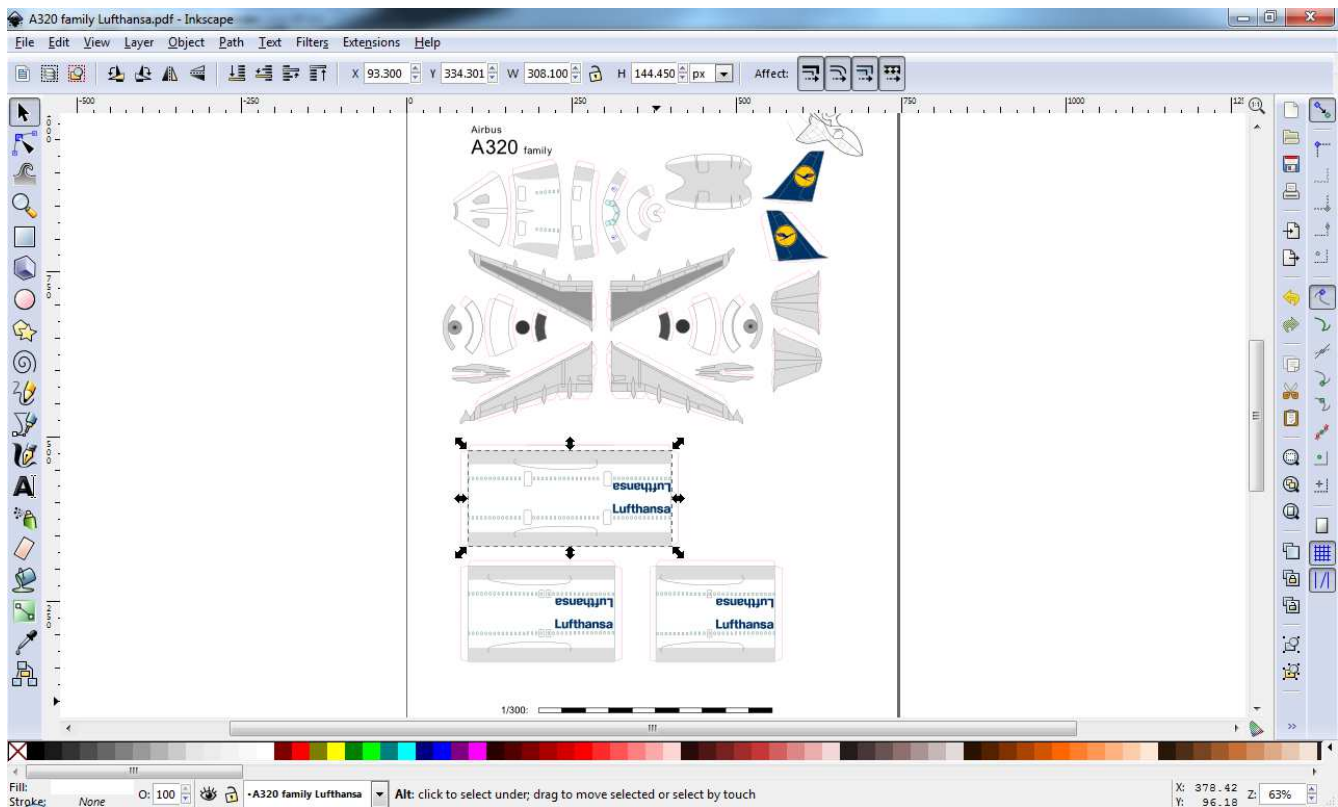The display should change to something like this (on my older, slower computer this takes several seconds):
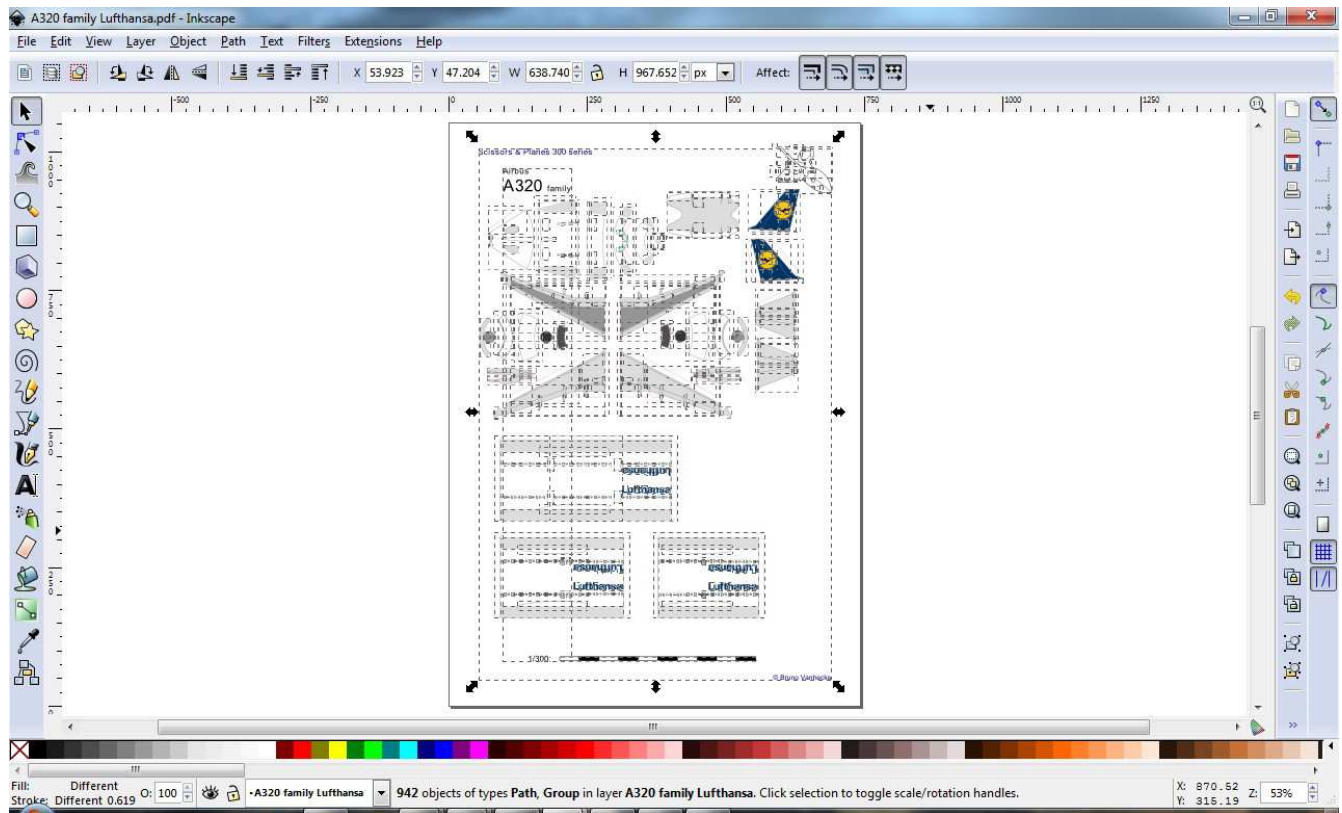
Click anywhere in the white areas off the page to de-select everything.

Now click on one of the fuselage pieces. You should see it selected individually as shown below.

When we pressed Ctrl-Shift-G above we "ungrouped" the diagram back into it's component pieces. We can now select and edit each piece.

Try dragging the fuselage piece around and see what happens.
You will find that instead of the fuselage moving, some small part of it will move instead. Which part depends on exactly where you click your mouse. This is because <u>everything</u> in the diagram is an individual line, or shape.

Press Ctrl-Z to undo any changes you make, then continue to the next page.

Make sure the Selector tool is selected and then drag a box around the fuselage piece.
Be careful where you start dragging. Inkscape will sometimes grab another piece and drag it around if you are too close to it.

Selector tool

Drag out a box around a fuselage section.
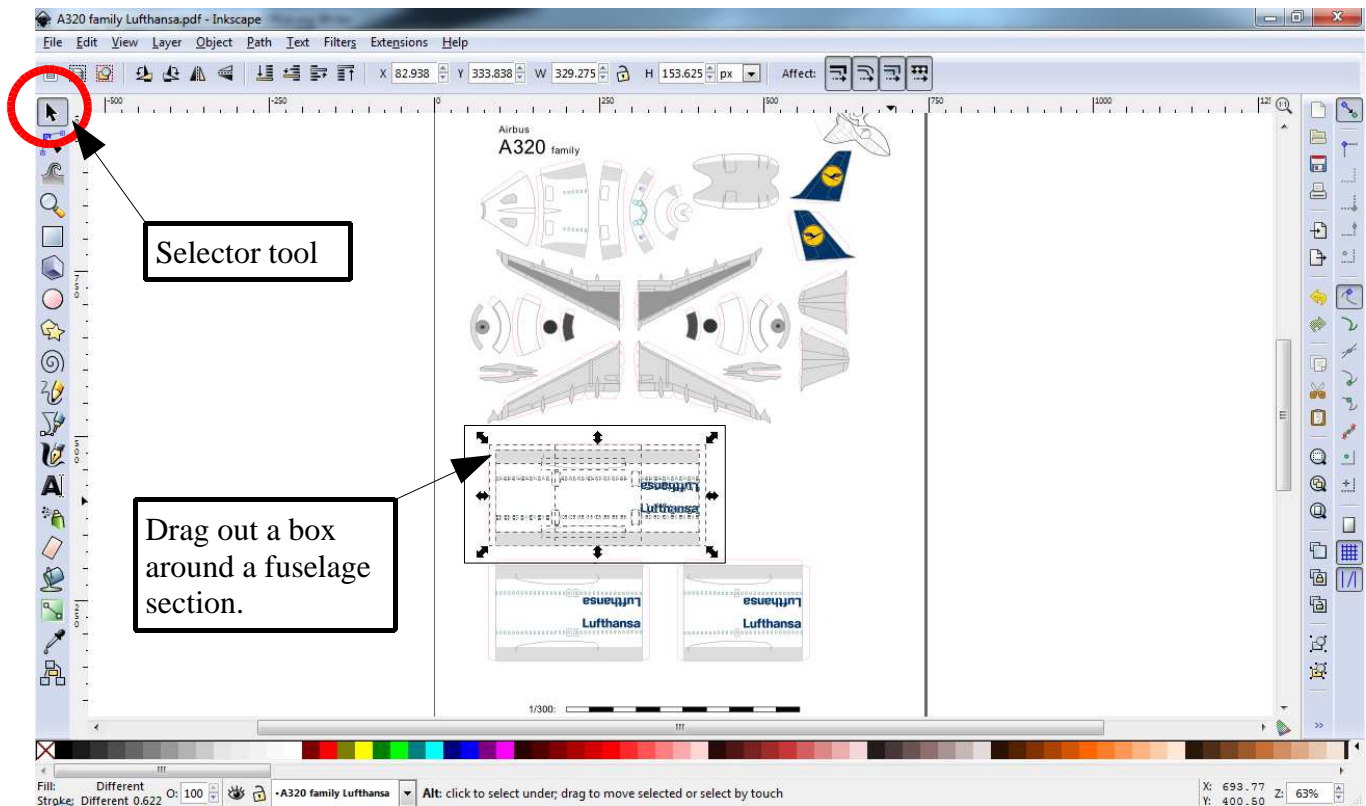
This will select all of the pieces of that fuselage section.
Now press Ctrl-G.
This will group the selected pieces so they will be treated as a single object.
Try moving the fuselage section around now. The entire section should move as a unit.
Press Ctrl-Z until the section is back in it's original position.

Using Grouping

Next we'll see how grouping objects can be used to more easily alter the model and the model layout. First zoom in on the engine on the right, near the tail pieces as shown below.

On some of the earlier model releases there was a small layout error with the engines on some of the civilian liners. The part circled below had the fan blades on the wrong side of the curved piece.
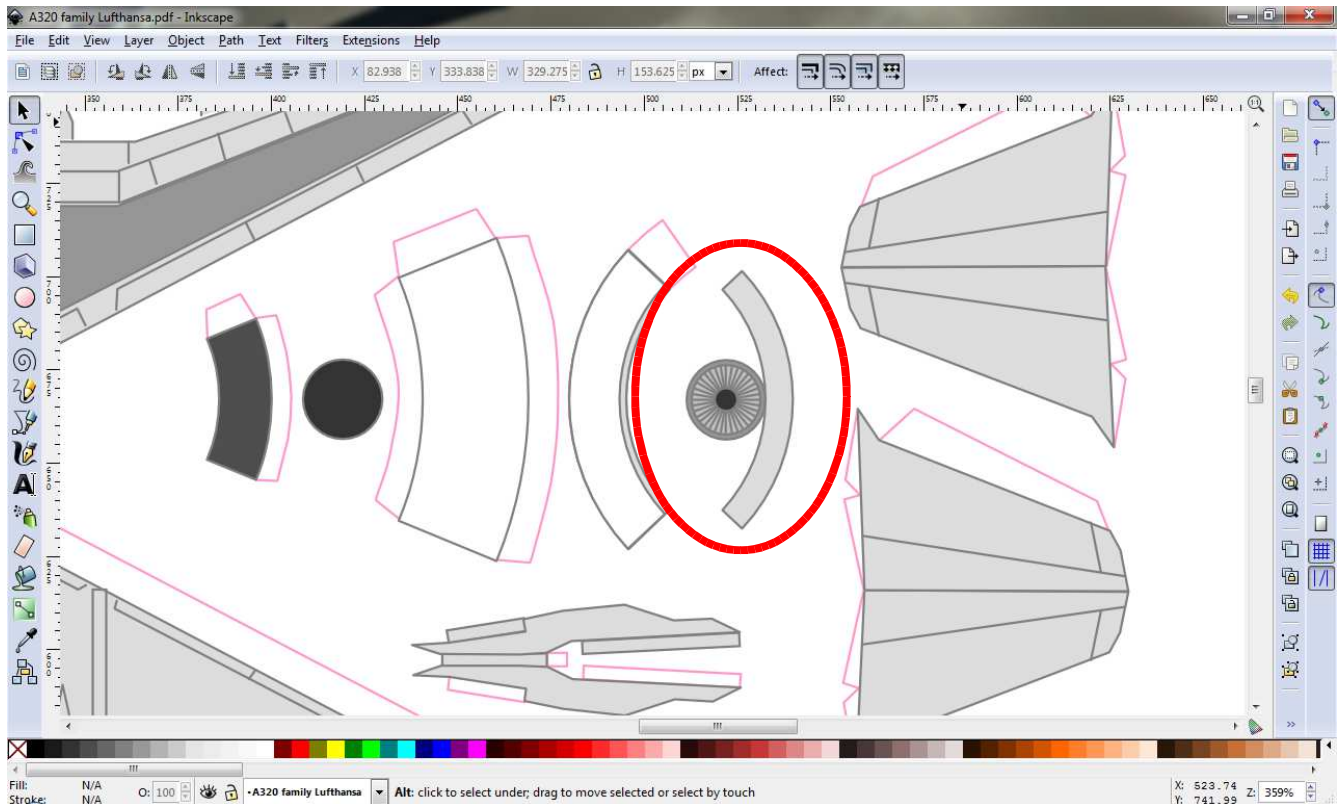

If you click in the center of the fan blades you will highlight the small black circle in the center. Experiment a bit and you will see that the fan blade component is composed of a set of circles and lines.
Drag a box around the whole thing to select it. You can now drag it around as a unit.

Alternatively you can press Ctrl-G to group these pieces together. This makes selecting and dragging the assembly easier.

Parts grouped to make it a unit
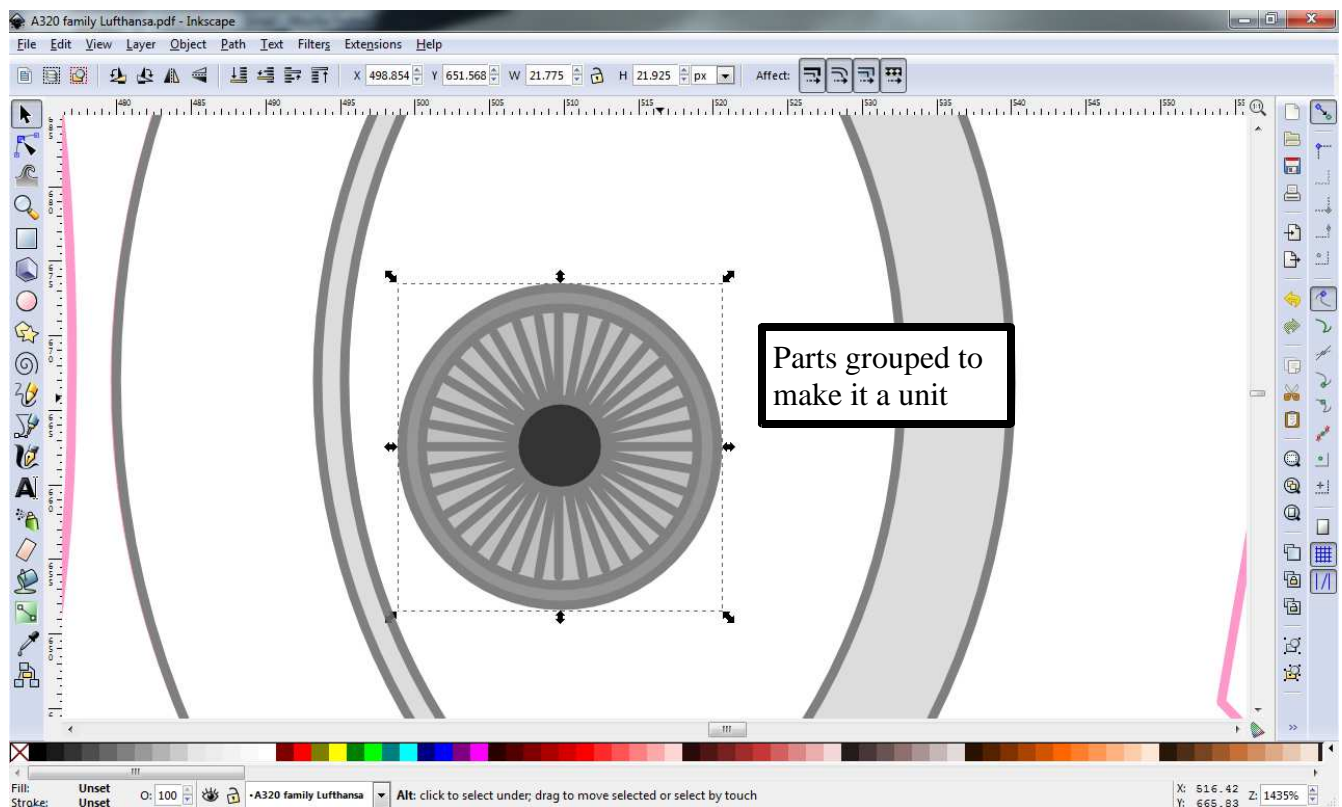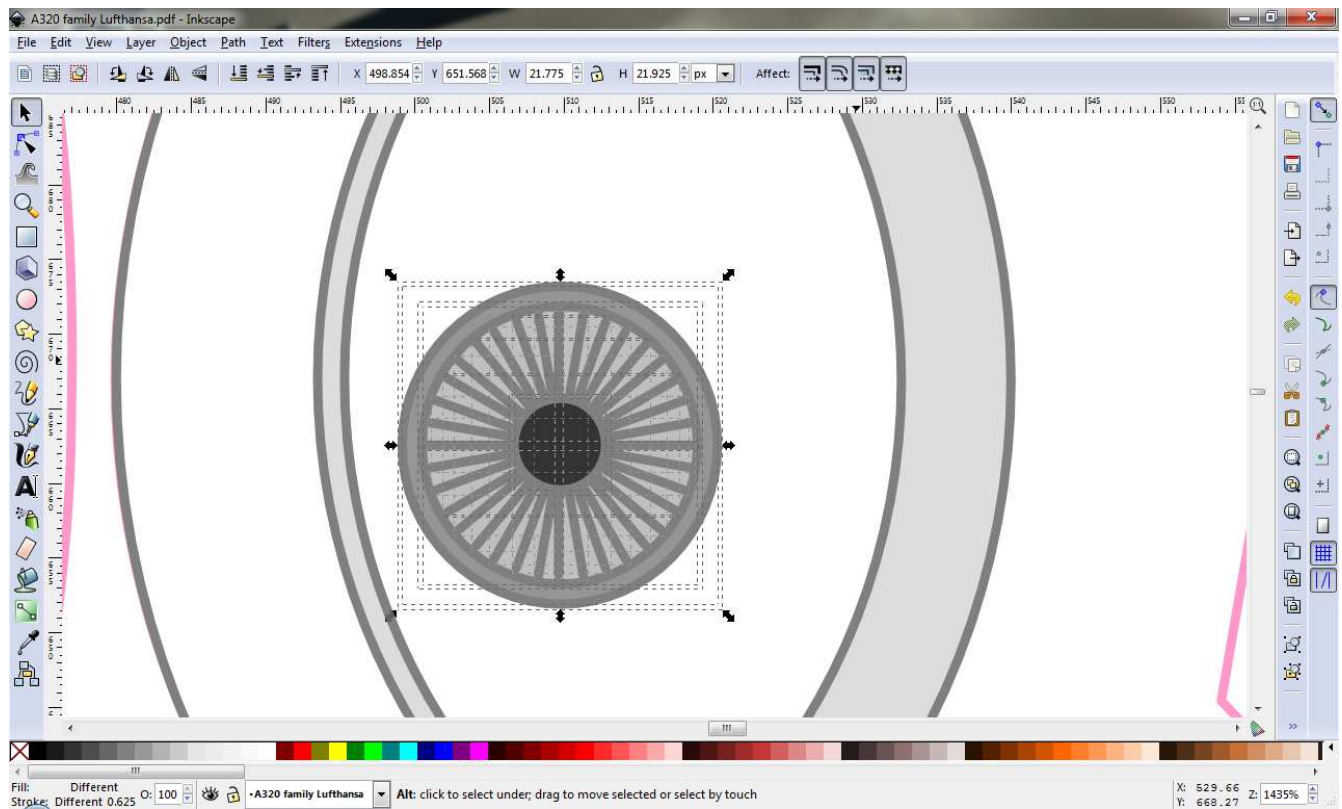
Zoom out a little and position the fan blade assembly on the other side of the curved piece.
Next try dragging a box around both pieces to select them.
Quite often you'll get extra bits selected as illustrated below.
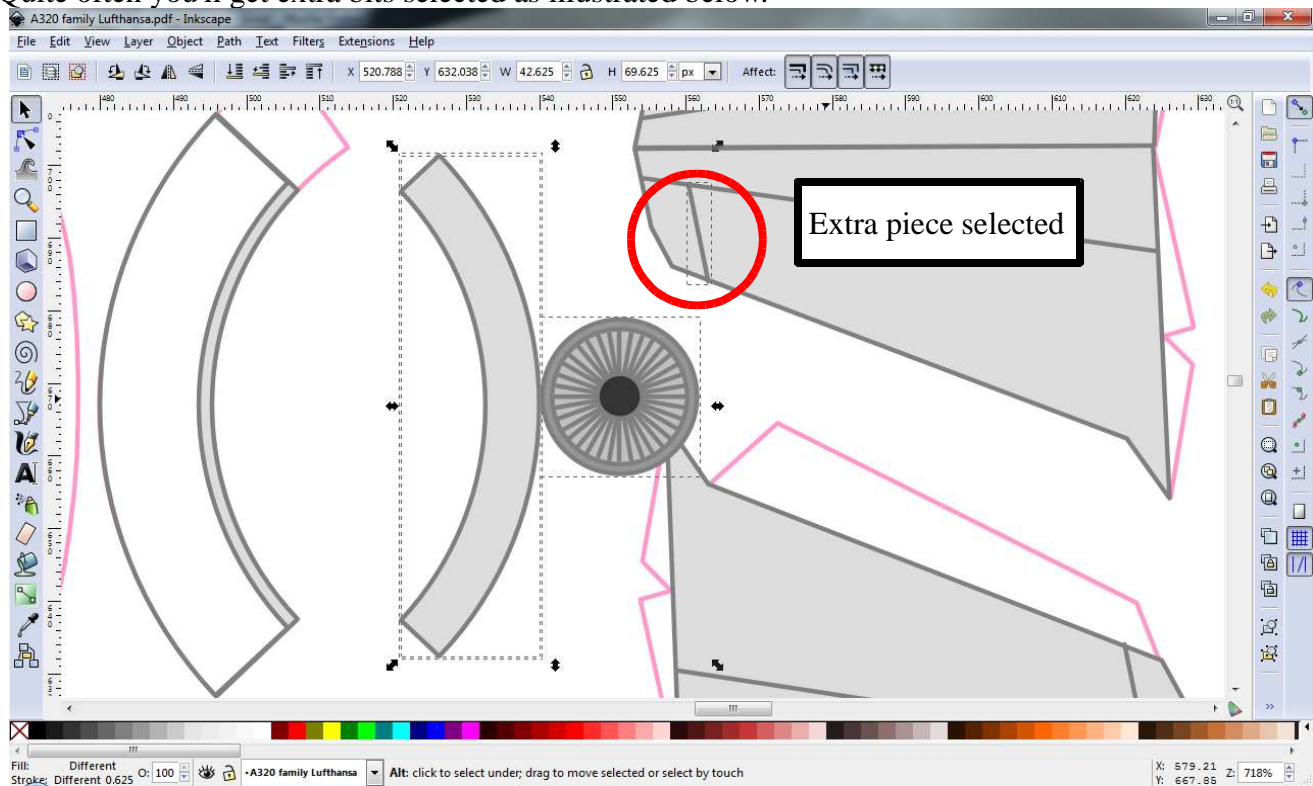
Position the mouse over the extra piece, hold down Shift, and click to remove that piece from the selection. You can also Shift-Click to add additional pieces to the selection.
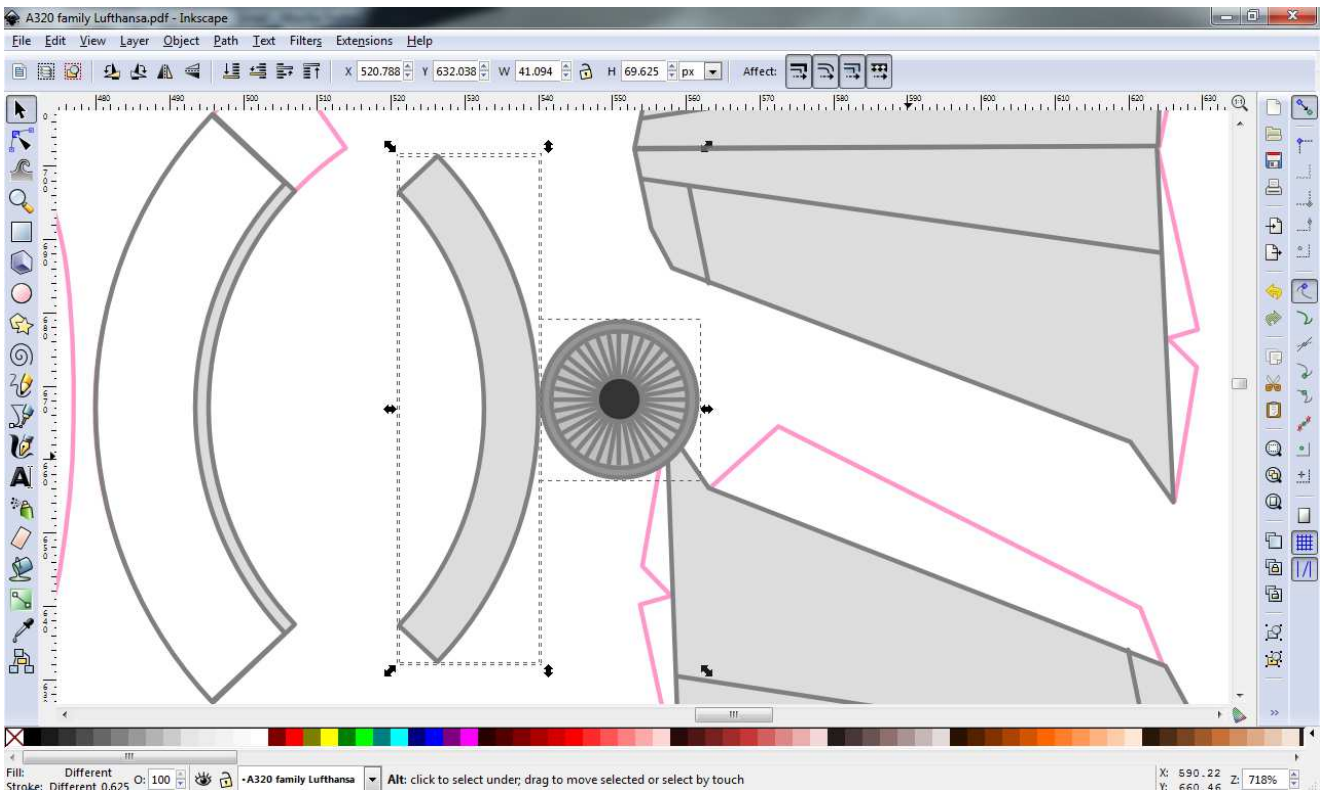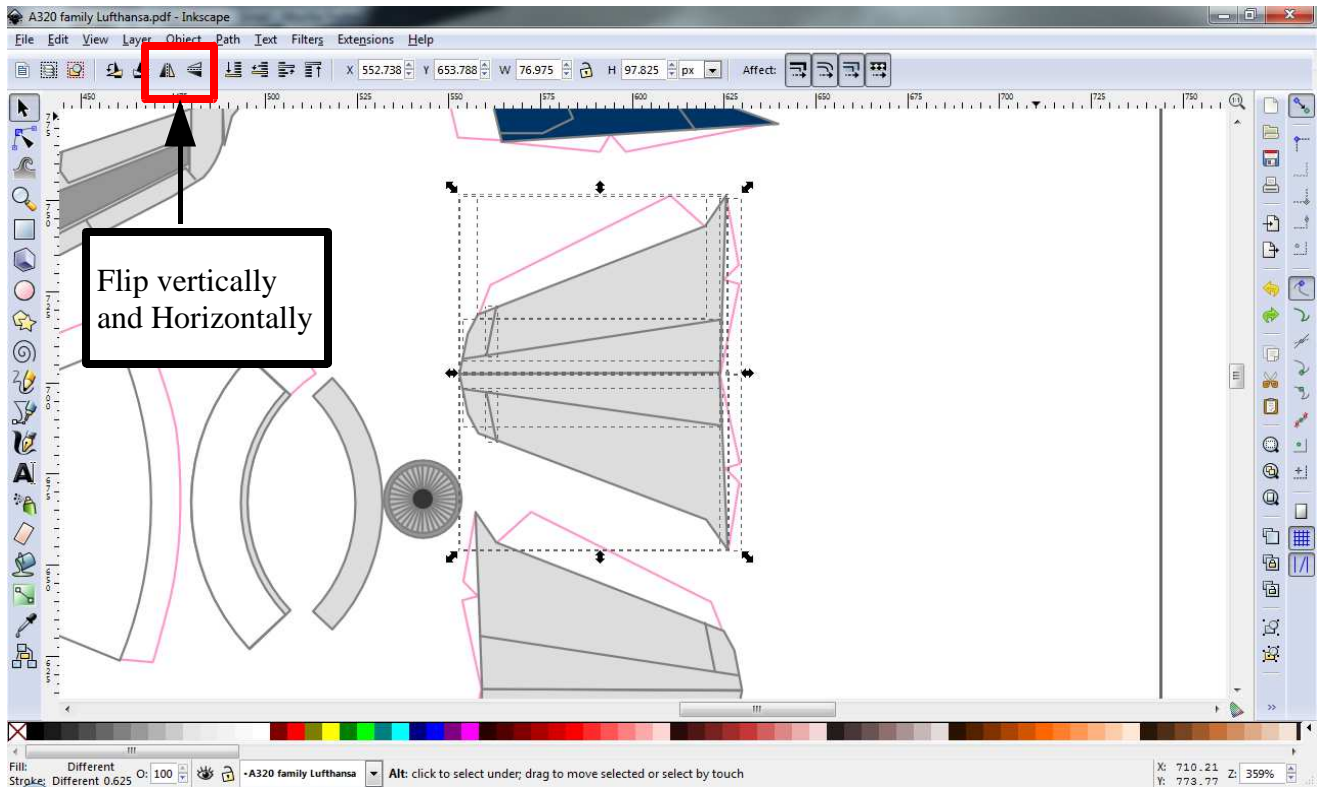
Press Ctrl-G to group these pieces. You can now drag the assembly so it doesn't overlap the tail piece.

The Flip and Rotate Tools

Zoom out a little so we can see the upper tail piece, then drag a box around it to select the tail piece. Highlighted in the screen shot below are the Flip Horizontally and Flip Vertically tools. Try them out.
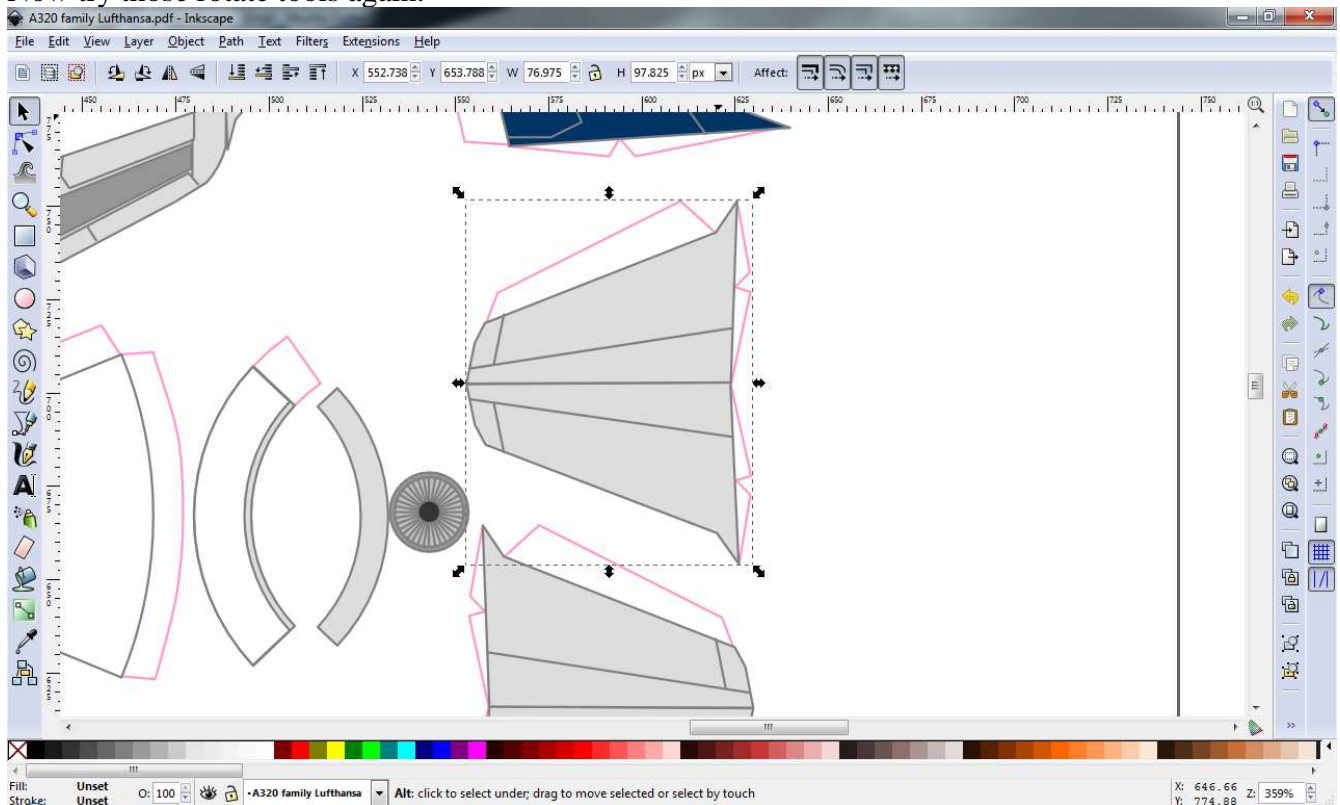
Right next to the Flip tools are the Rotate tools.
Try the rotate tools and see what happens. In this case they make a mess of the parts.

Rotate Tools

After rotating.
Yikes!
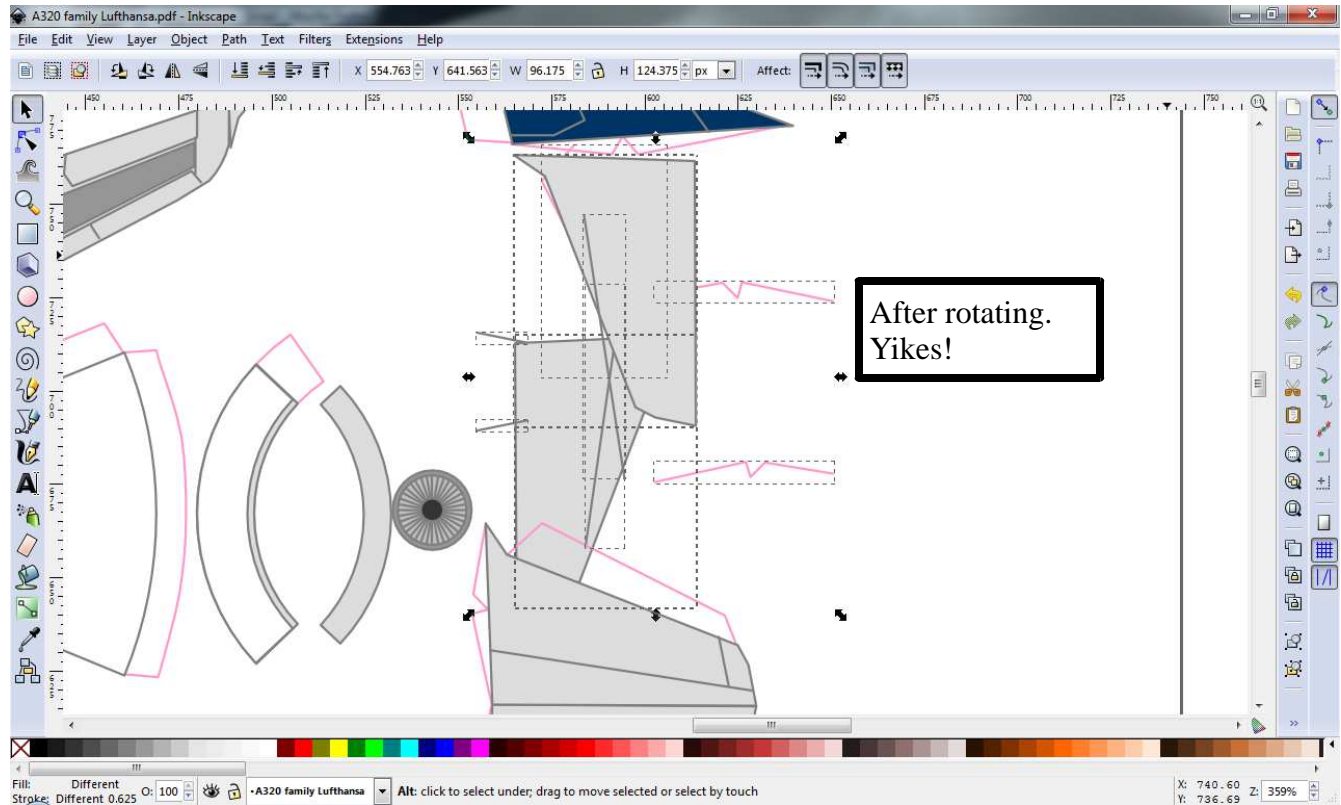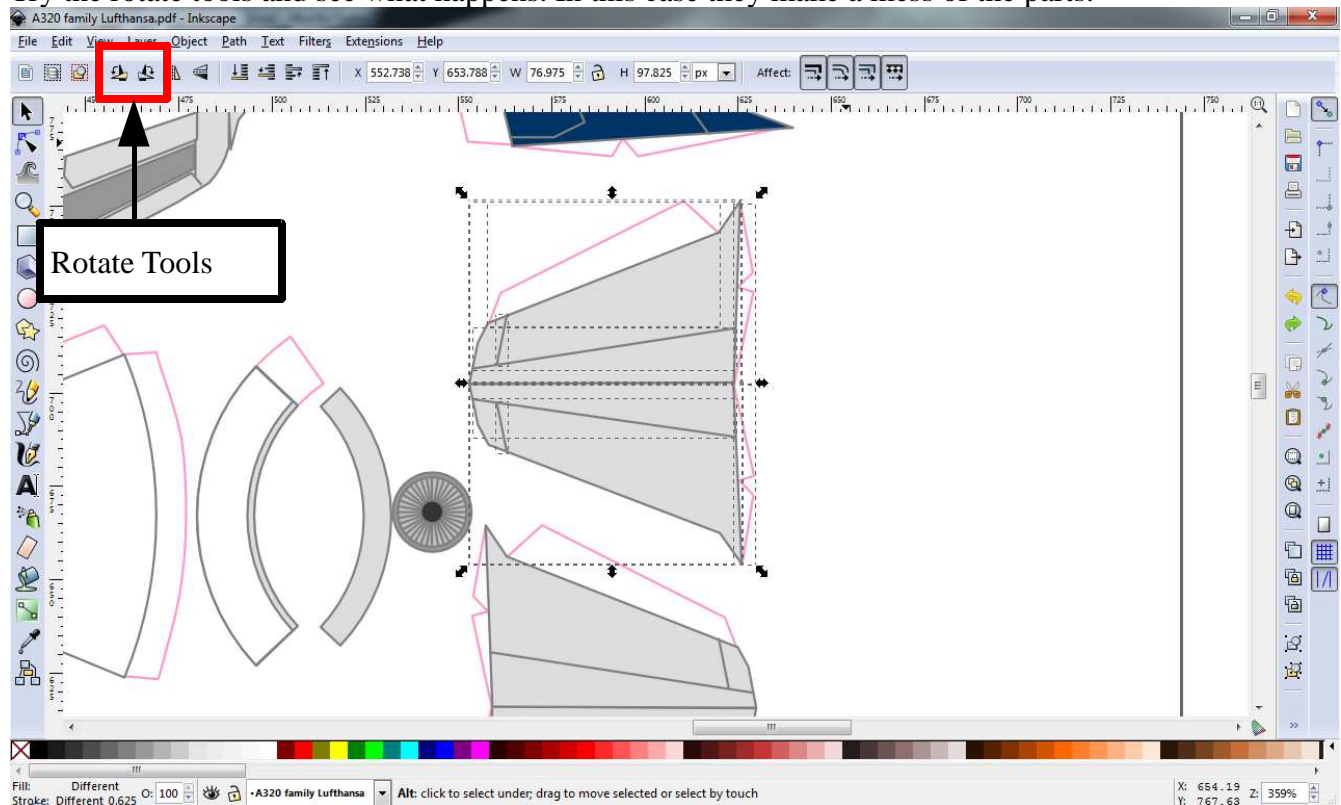
Press Ctrl-Z to undo that, then press Ctrl-G to group these parts of the tail assembly.
Now try those rotate tools again.

When multiple elements are selected the rotate tools rotate each element individually. Grouping them casues them to be rotated as a whole. Much better.
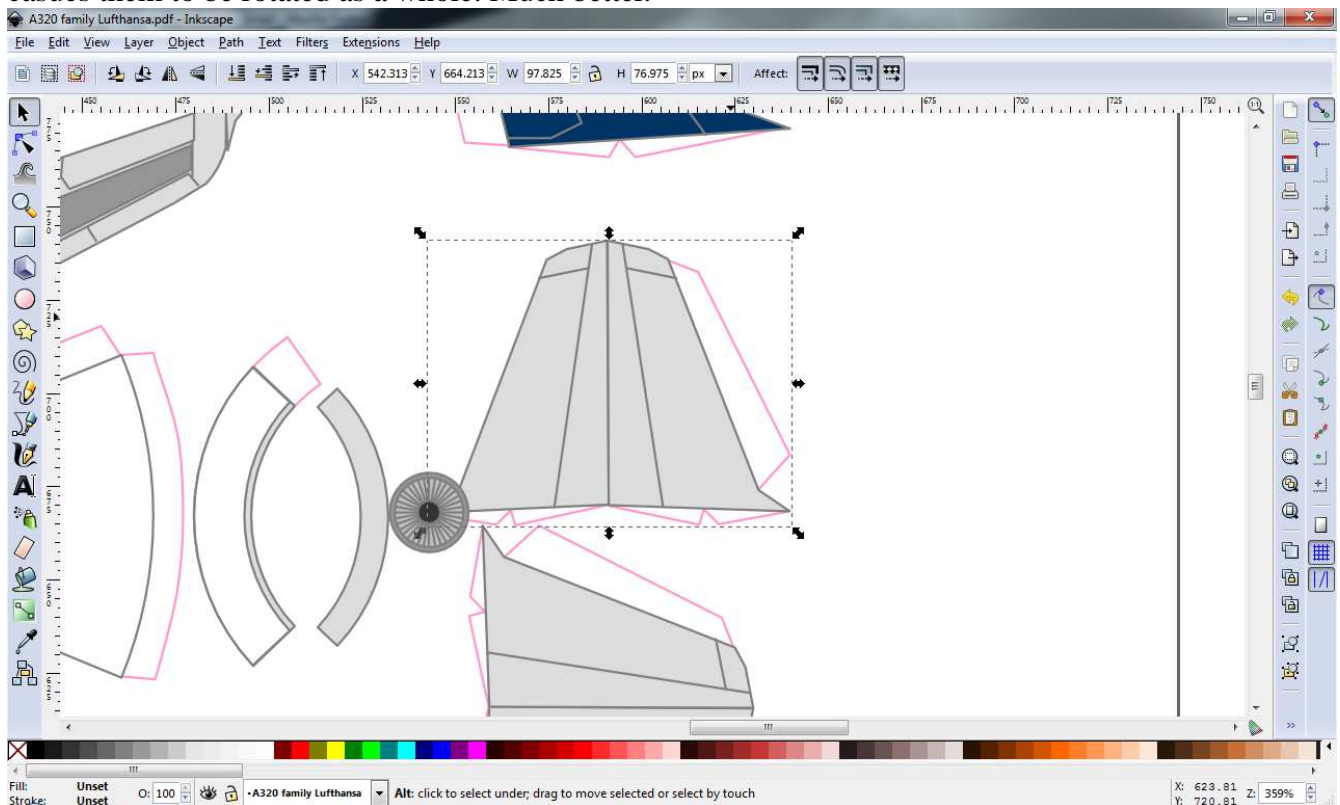
Dissecting the Model

Now lets move up to the vertical tail piece. Click and drag using the <u>middle</u> mouse button/wheel and you'll see that you can drag the view around. Drag the tail into view, click on the yellow circle to select it, and drag it away from the tail. You'll find that there are actually two yellow circles there. I don't know why, and it doesn't matter. There just is.
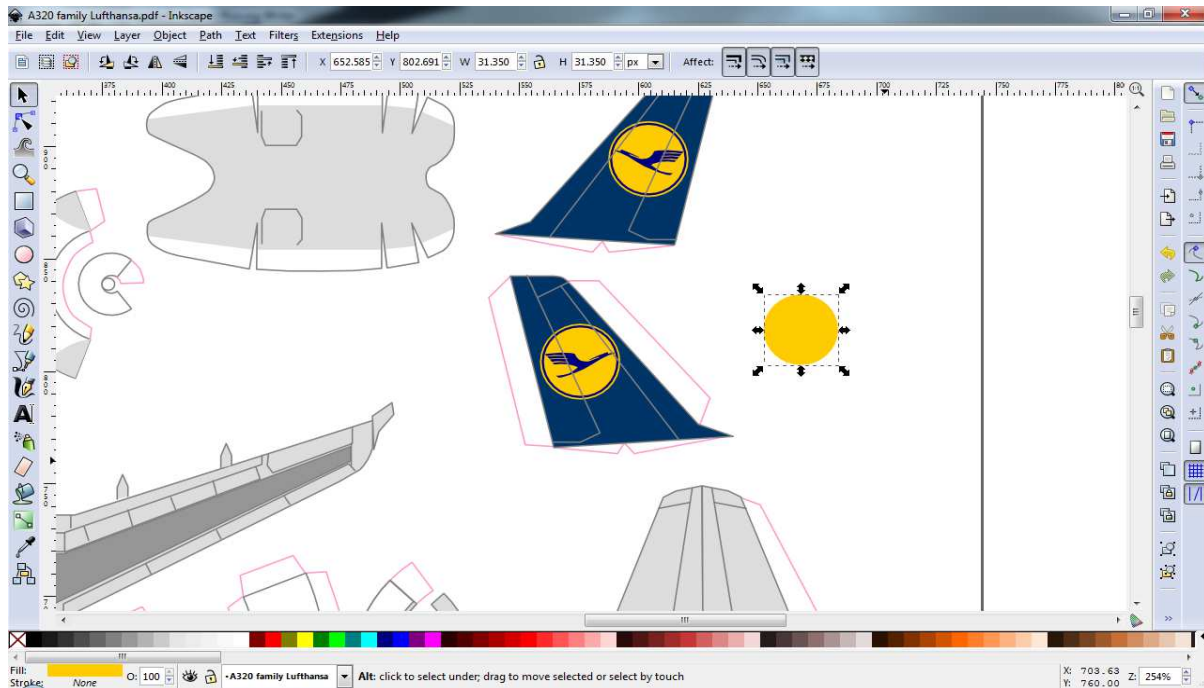

Click on the yellow circle you dragged off the tail and press delete. We don't need that extra circle. Next left-click and hold anywhere in the blue area of the tail and drag it to the side. You should get something like this:
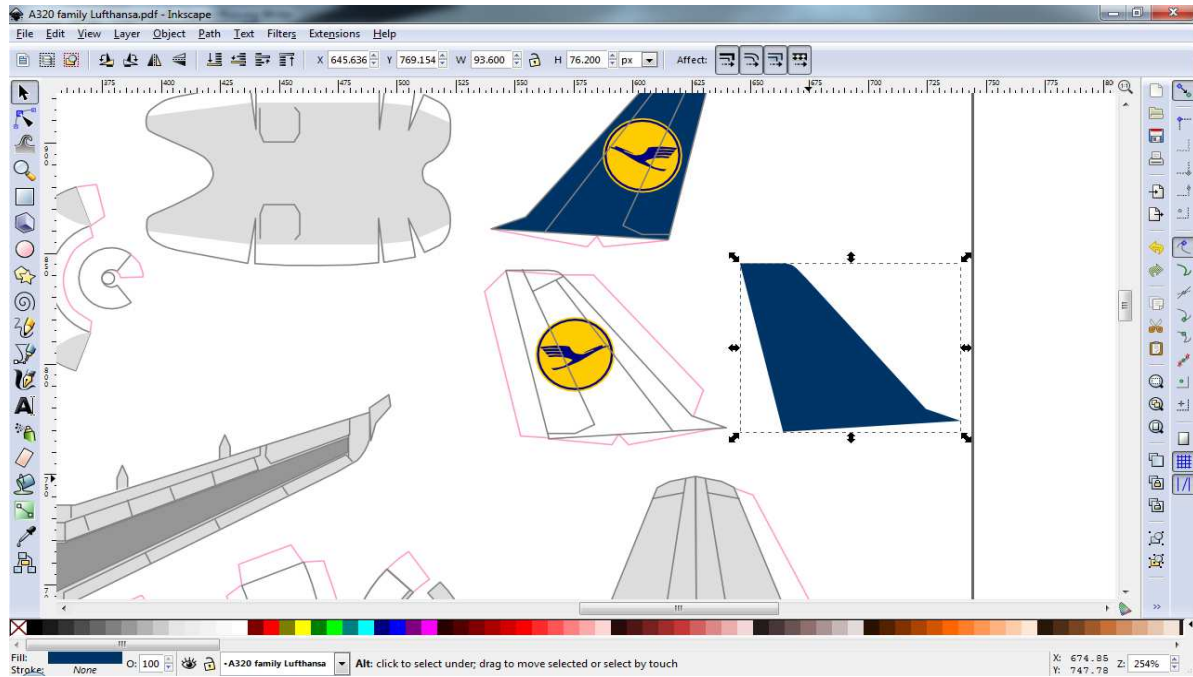
Now you have the outline of the tail with the yellow circle and blue bird-shaped logo, and a tail-shaped blob of blue. Play around a bit and you will see that the yellow circle/bird logo stuff is composed of a solid yellow circle, a blue empty circle, and a blue bird shaped bit. You could select this, copy and paste it, then use the flip horizontally tool to reproduce it for the other side of the aircraft

The Edit Paths Tool

Now let's focus on the blue tail shaped blob. Left-click to select it, then select the Edit paths tool in the toolbar (right below the Selector tool):
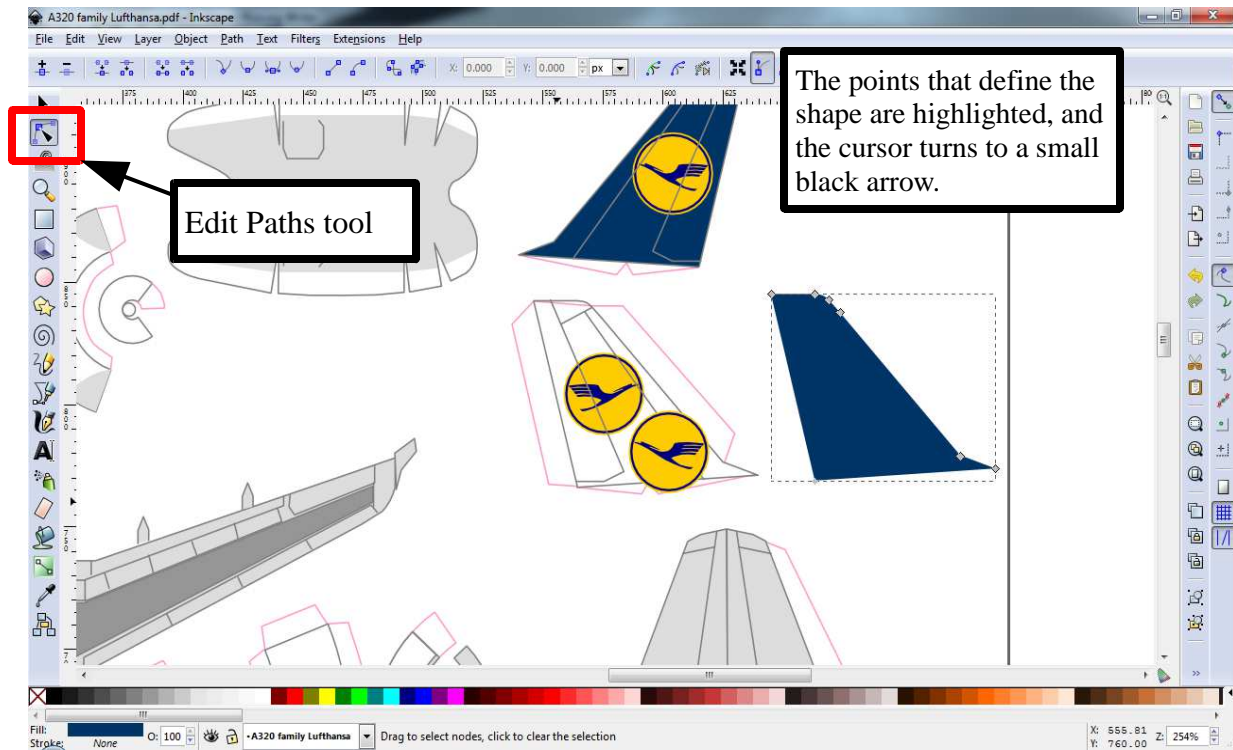
Point the cursor at one of the 'points' in the object. The point will turn red. Grab and drag the point around to see what happens. All of the lines and shapes in the pattern can be edited using this tool. Just drag the points around as required.
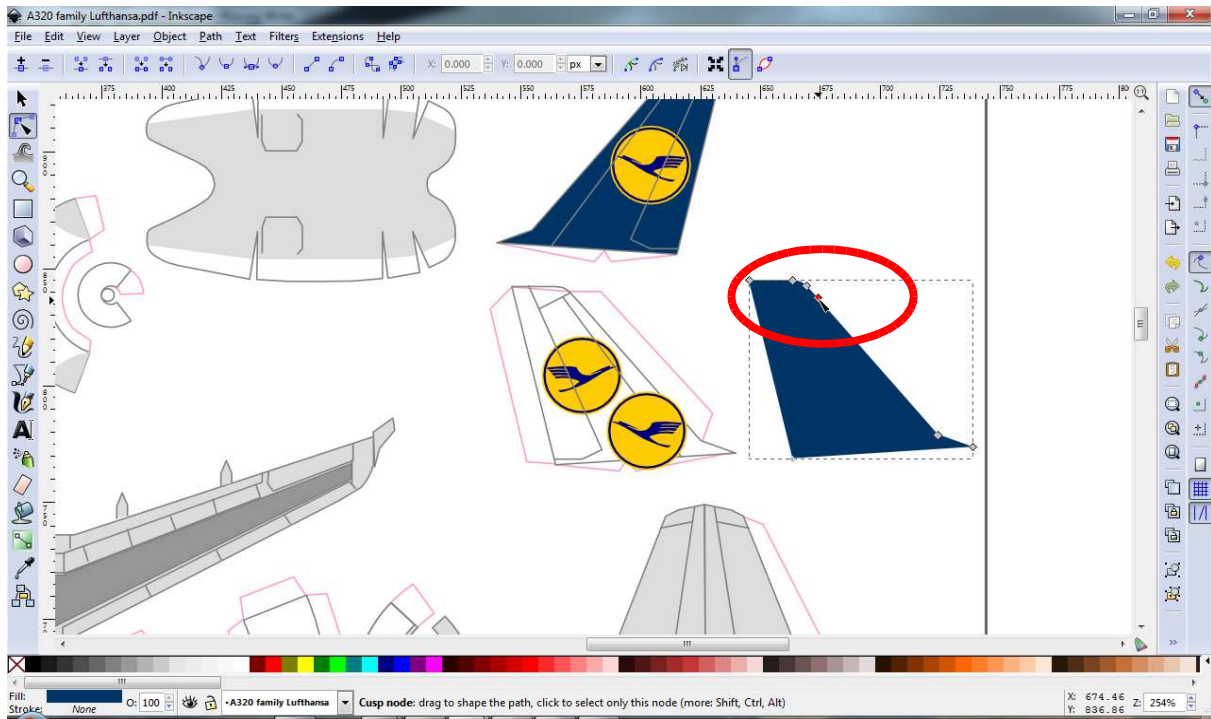

Making a White Version of a Model

Taking one of the original patterns and turning into a White version for recoloring is a simple matter of selecting and deleting all of the color blobs (or changing the color where appropriate).

Changing Colors

Now lets do some actual color changing. Zoom in a bit on the blue tail blob.

Take note of the color bar along the bottom of the Inkscape window, and also note the small boxes labeled *Fill* and *Stroke* in the lower left corner. You can see that the fill color is blue, and the Stroke box says *None*.
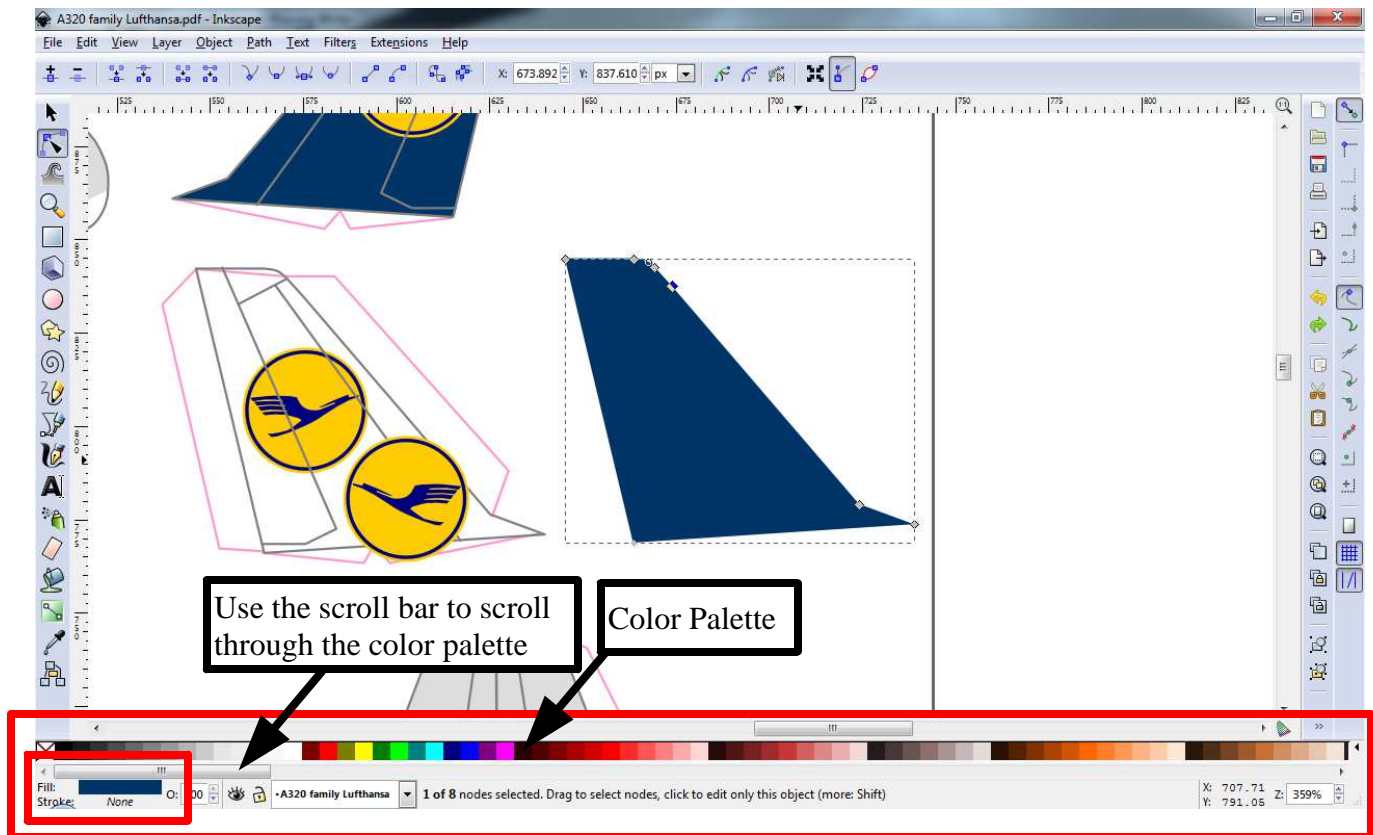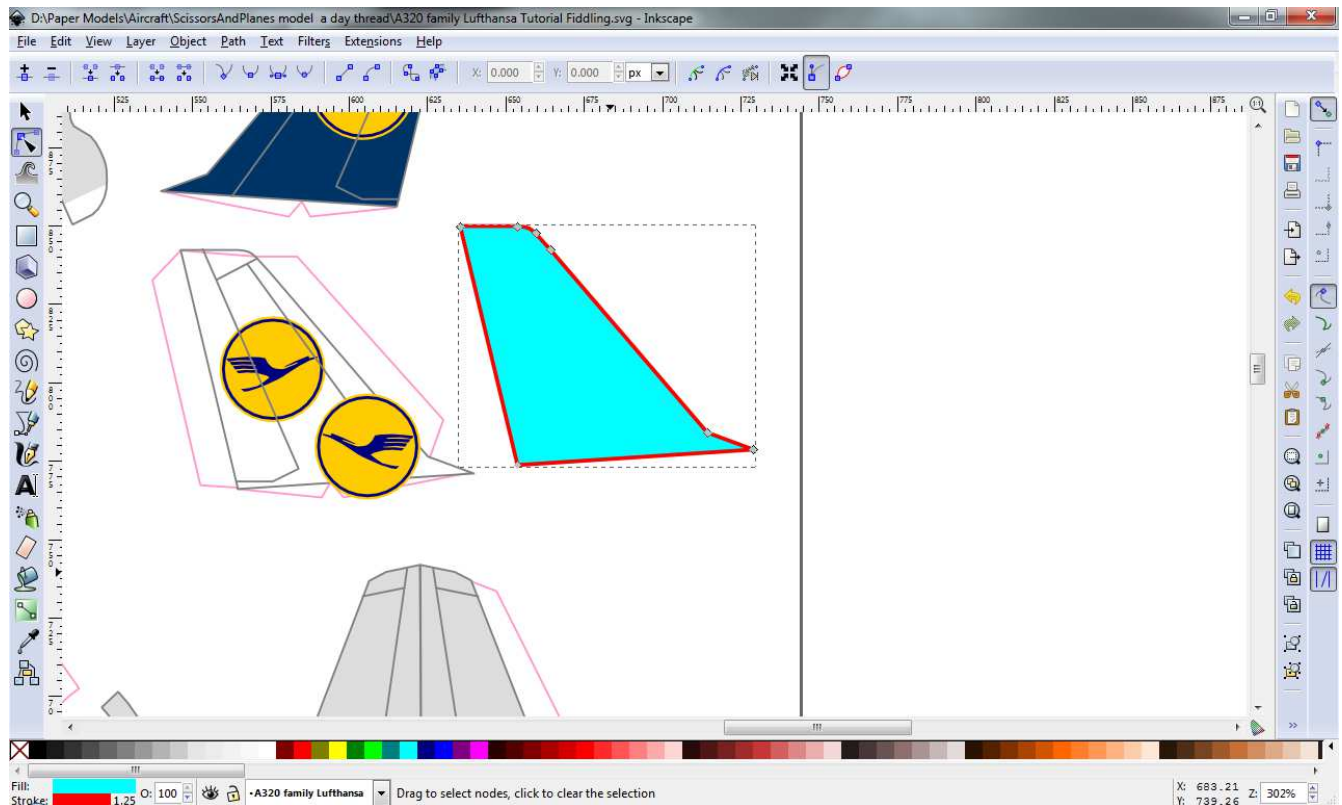

Now, grab a color from the color palette and drop it in the Fill area. The color of the object instantly changes.
Now grab another color and drop it in the Stroke area.
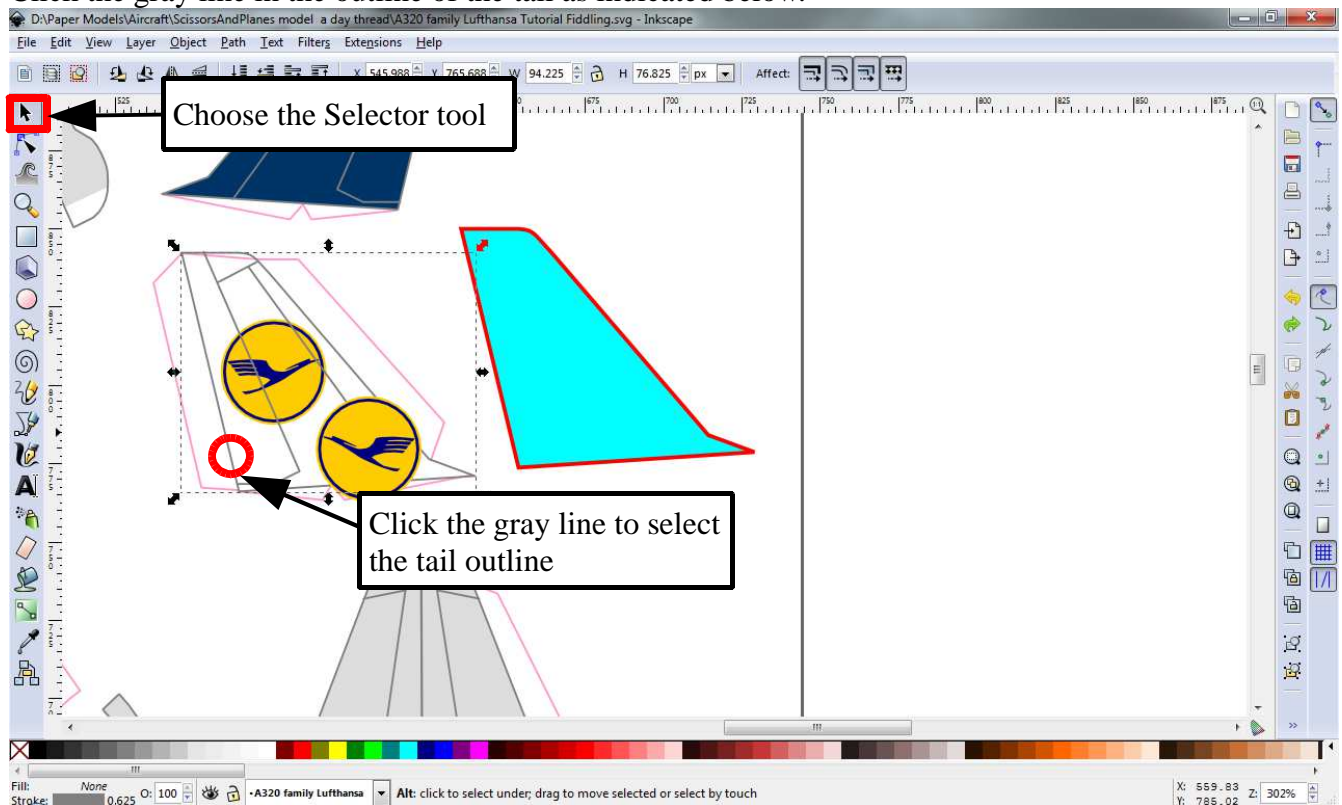I used Cyan and Red. The results are shown below.

As you can see the color of the tail piece has changed, and it now has a red outline.
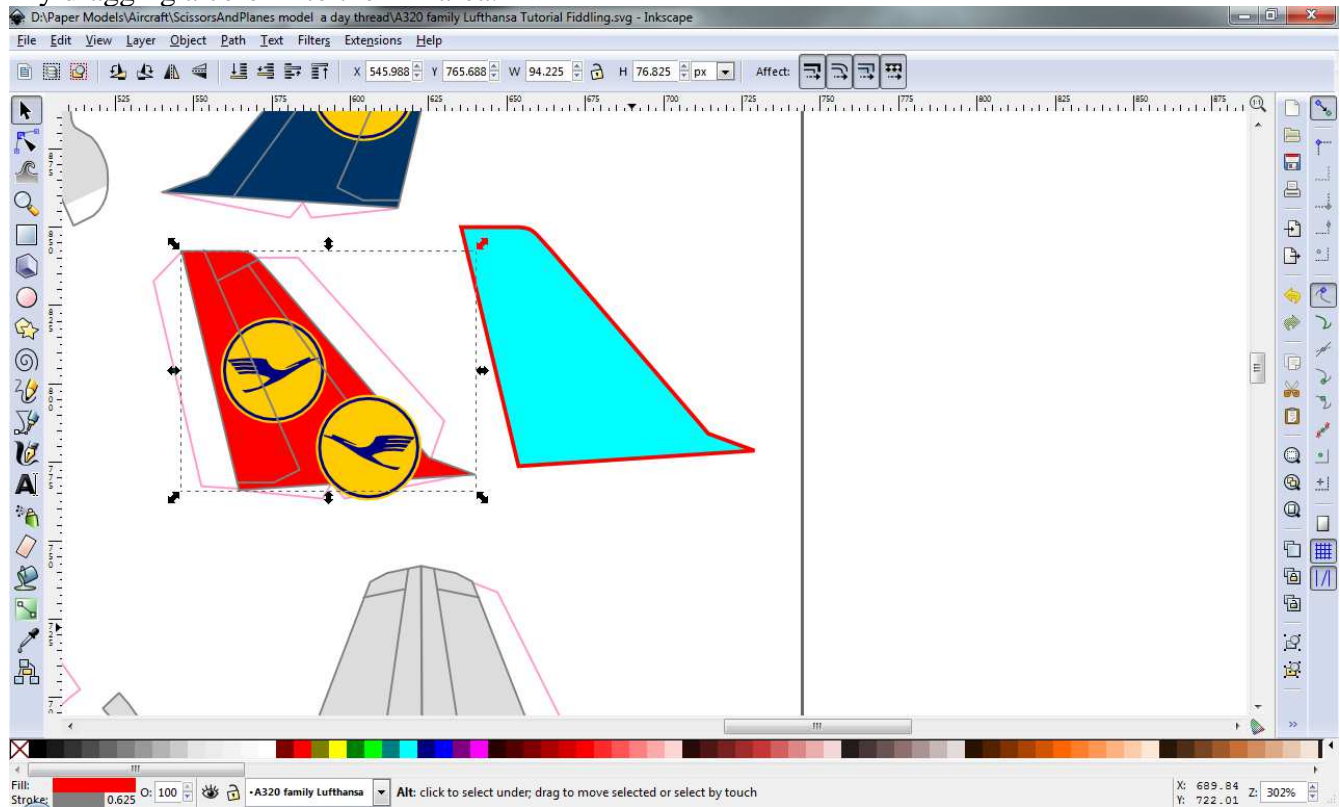

Now, switch back to the selector tool.
Click the gray line in the outline of the tail as indicated below.

Choose the Selector tool

Click the gray line to select
the tail outline

If you look at the Fill and Stroke values you'll find that the Fill is now *None* and the *Stroke* is Gray, the opposite of what we had with the tail color.

Try dragging a color into the Fill area.

You should end up with a colored tail, with a gray outline.

Now remember earlier we dragged the blue fill color out of the tail?
Bruno generally uses this technique of an outline filled with a separate color shape.
This is not always necessary. A single shape can be used to create both the outline and the color.

Now scroll your diagram to the left and down a bit to bring the 'belly bulge' piece into view as show below.
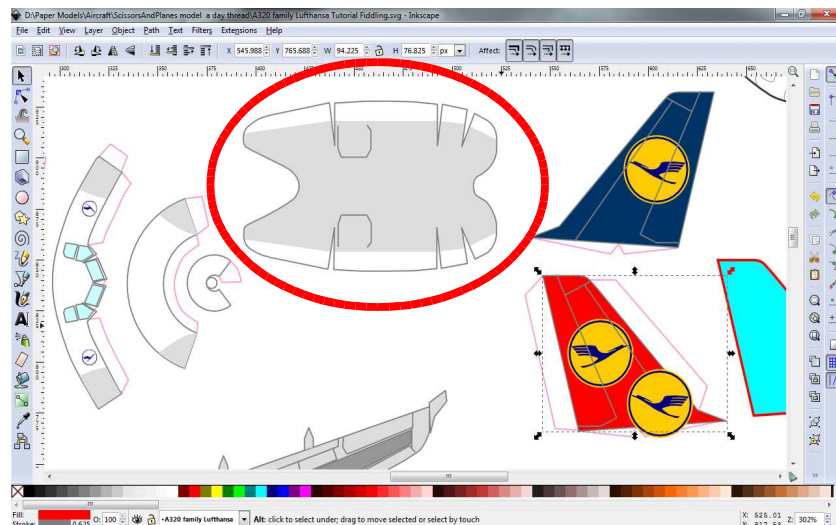
If you poke around you will find that this piece is composed of a number of objects. There is the gray outline, the large gray color blob, some white color blobs, and the outlines of the landing gear doors.

The four white areas inside the outline are separate objects
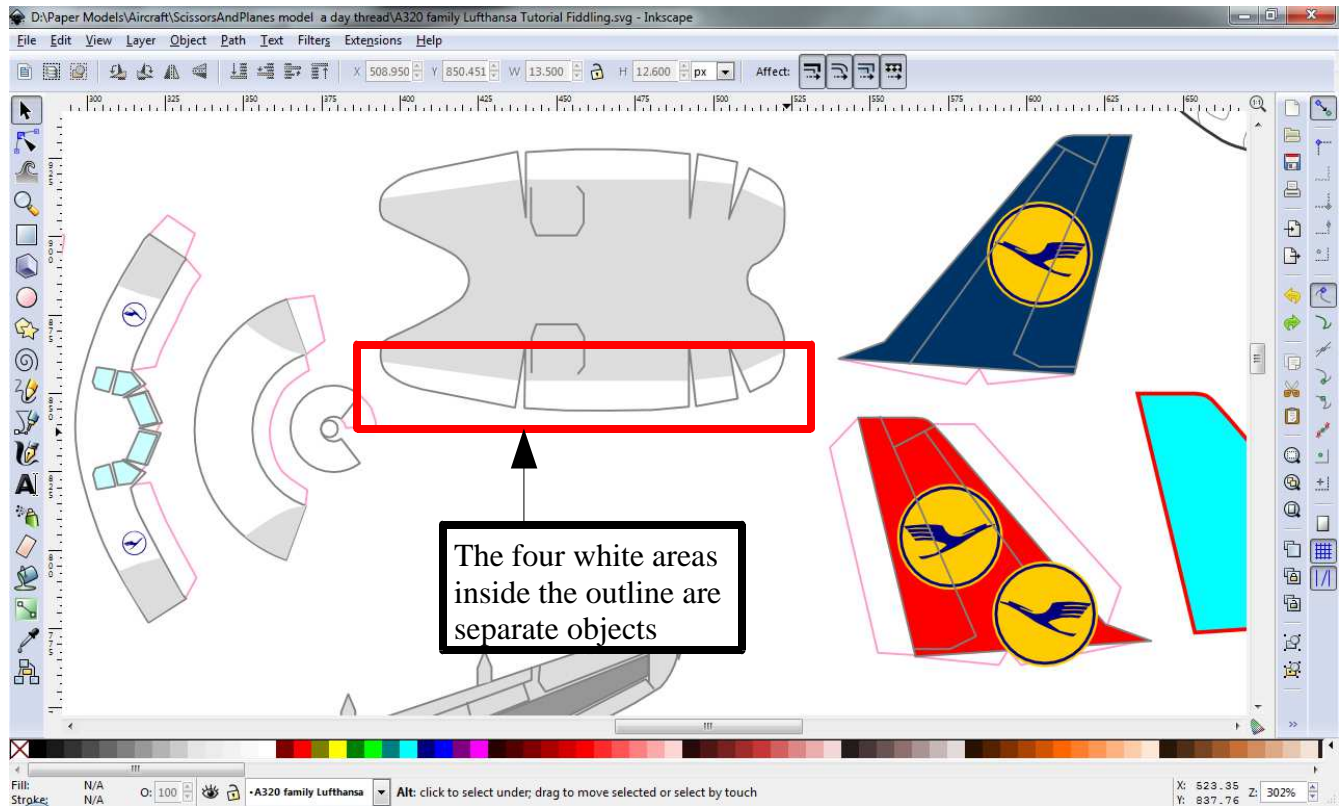
The white areas are a good example of using an area that is 'fill'ed with color, but does not use a *stroke* to outline the shape. This gives a seamless transition from one color to the next like you would find on a painted object like an aircraft.

An unfilled area that uses a stroke to outline it is useful for panel lines, as illustrated here by the landing gear door outlines.
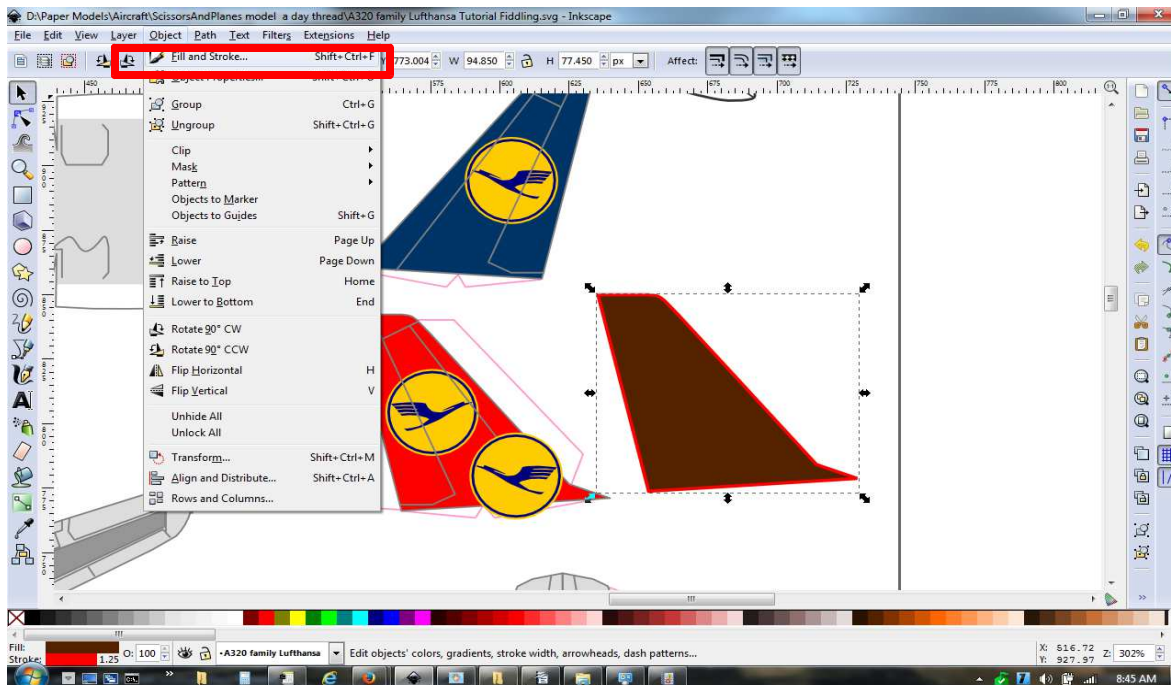
Gradients

While we're on the subject of colors let's take a quick look at gradients. These are common in more elaborate aircraft liveries.

Go back over to the vertical tail pieces we played with earlier and change the color of the tail-shaped blob to a darker color. I've picked a darkish brown.
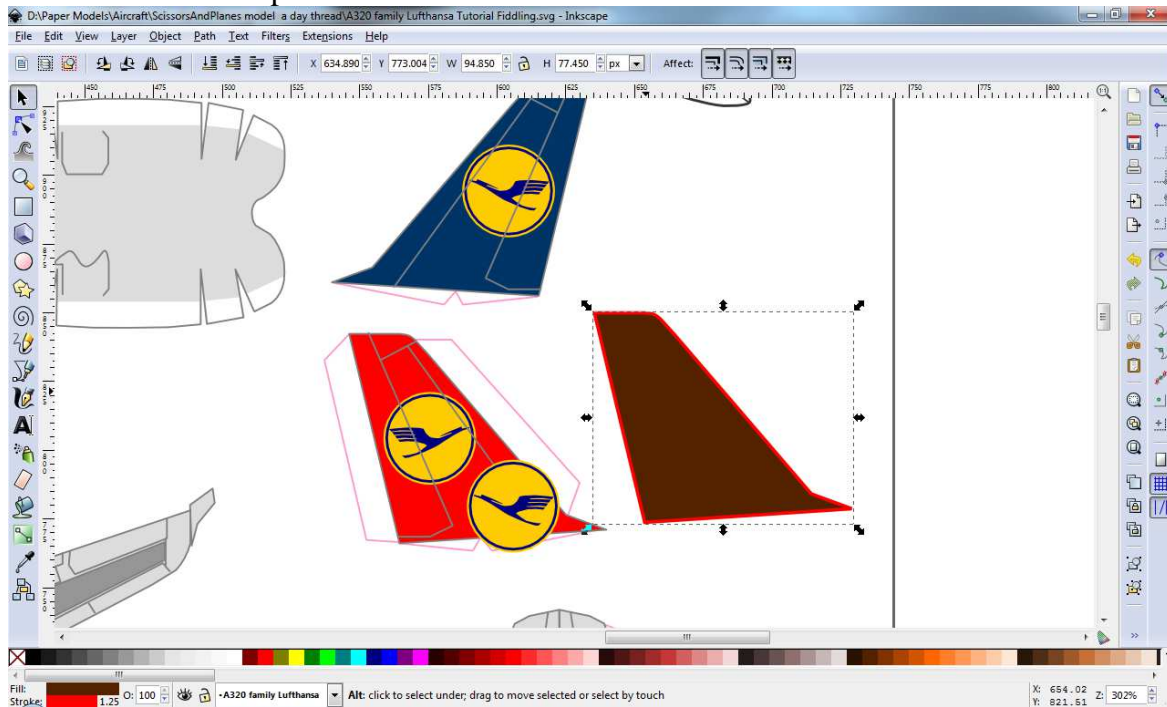

Now go to the object menu and pick Fill and Stroke

The Fill and Stroke panel appears at the right of the window. I'll focus on the Fill tab and leave exploring the *Stroke paint* and *Stroke style* tabs to you.

The primary items we are interested in are the Fill type, and the color values. The color values are easily adjusted with the slide controls so I won't go into detail there. Just play with it.

The real magic is in the fill type.
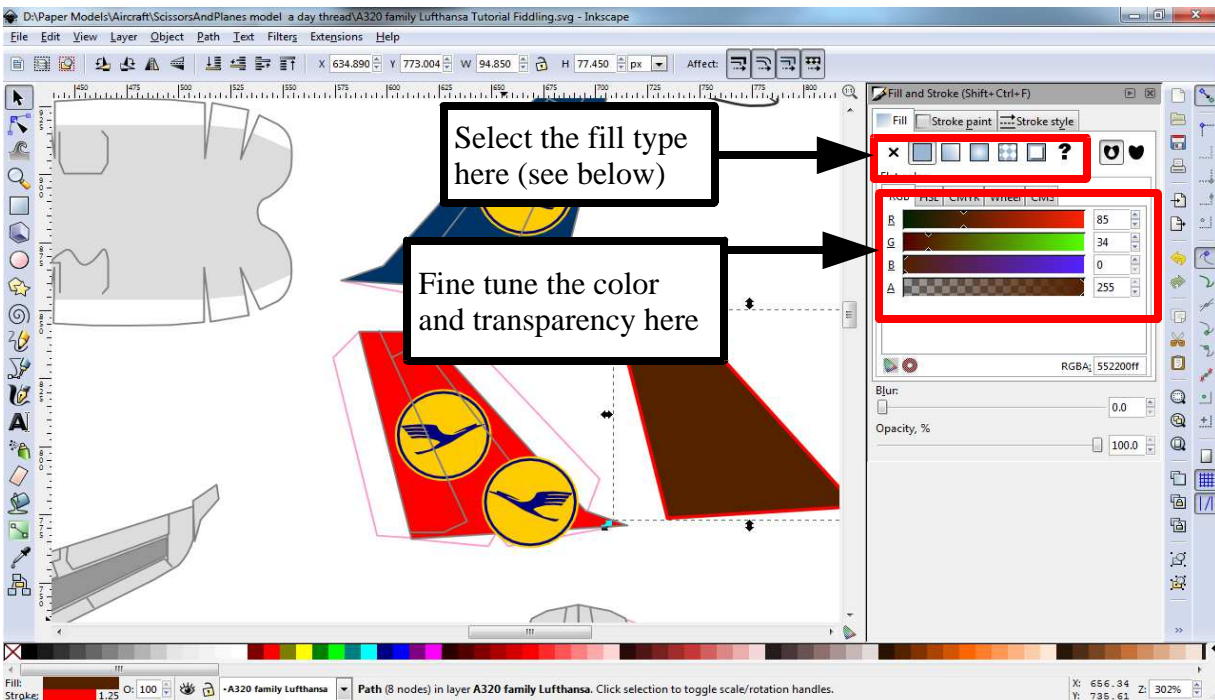
The various fill types are highlighted below. I will focus on the two gradient types, but play with the Pattern fill type as well. There's some great stuff there that will be useful to you.
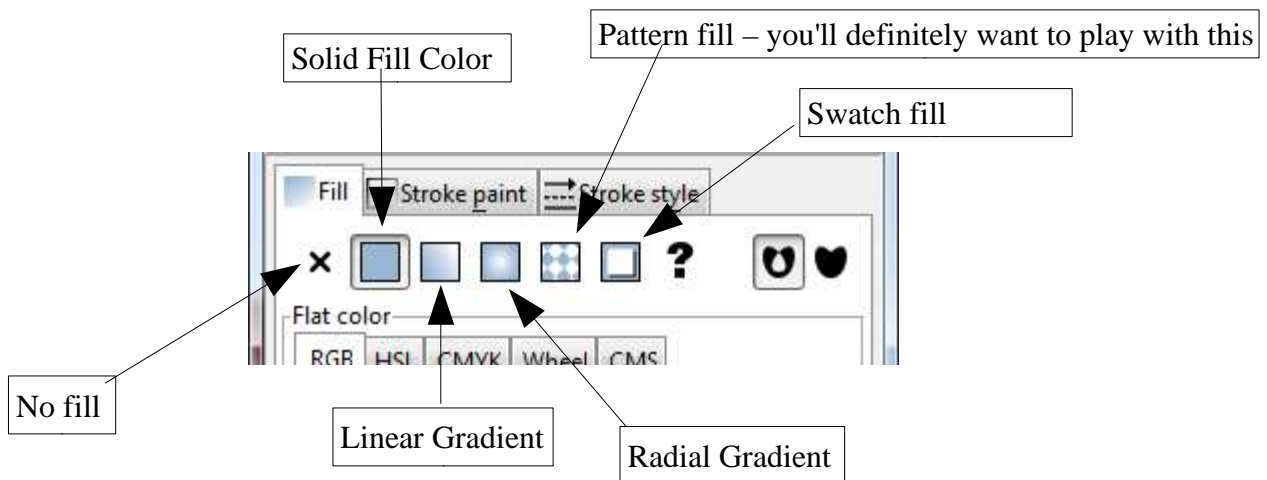

You will primarily use the Solid Fill setting, however some of the more elaborate liveries out there require use of the Pattern fill, and gradients.

Linear Gradients

With the color blob selected click on the Linear Gradient button to change the fill type.
You should see the color change to a gradient, and two new handles appear.

By default the gradient fades the current color to white. The handles let you alter where the base color starts, and which direction it fades off in.
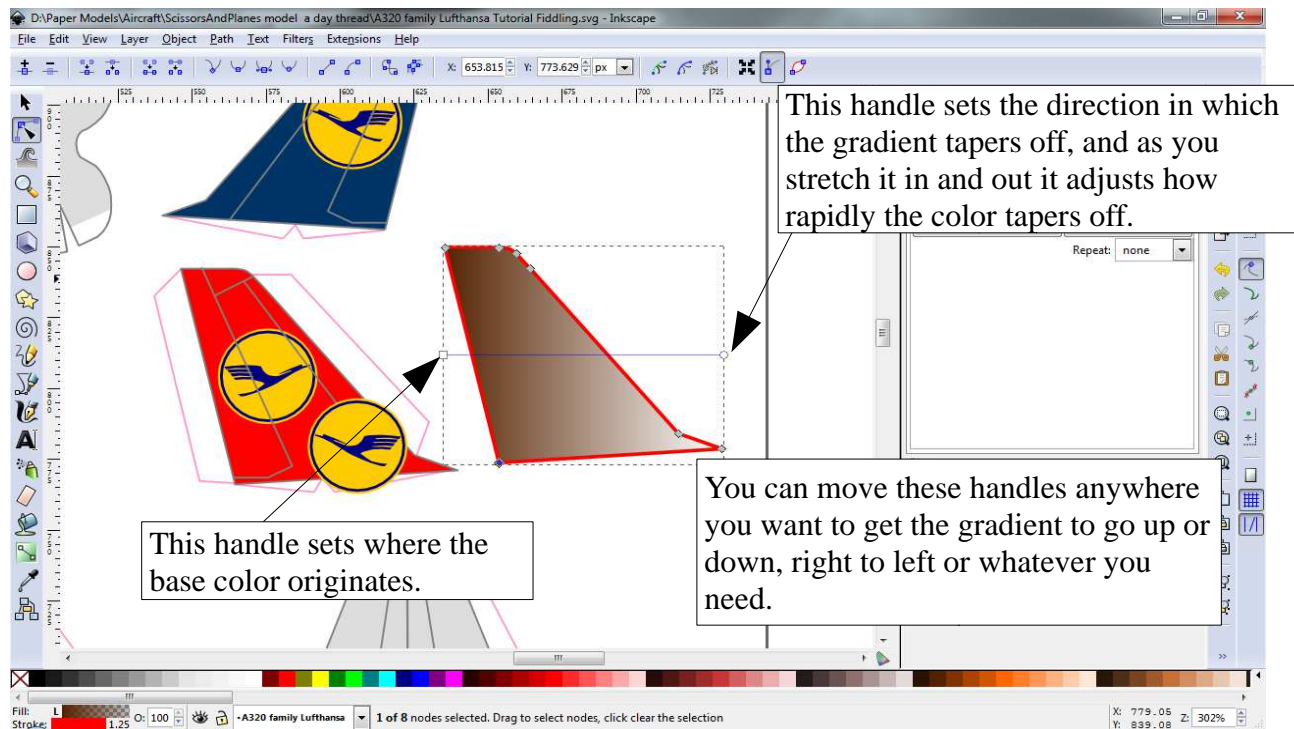
Try dragging the handles around and see what happens, then flip to the next page.

In the sample below I have moved the origin of the gradient to the bottom left of the tail, moved the other handle towards the upper right, and stretched it out so the color fades more slowly.
This results in the color being darkest at the bottom left and lightest as you move up or towards the right.
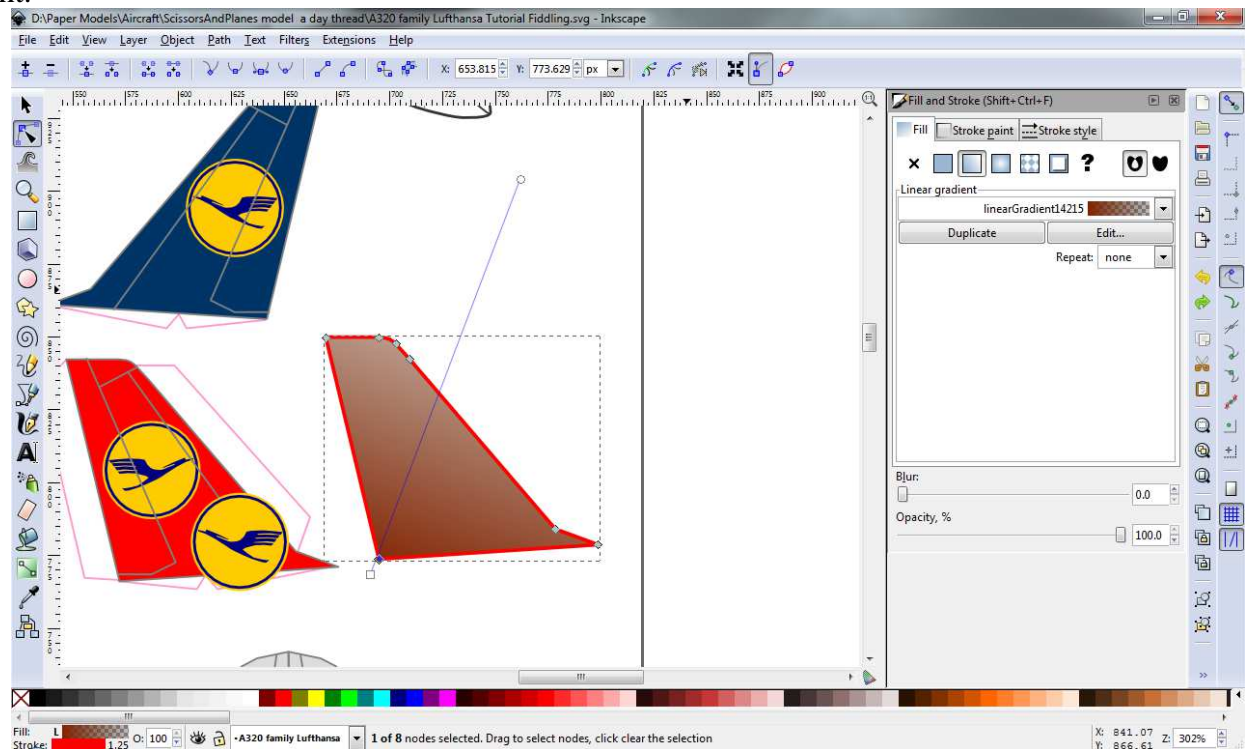
Now lets get fancy. Click the edit button to edit the gradient.

The Gradient Editor opens.
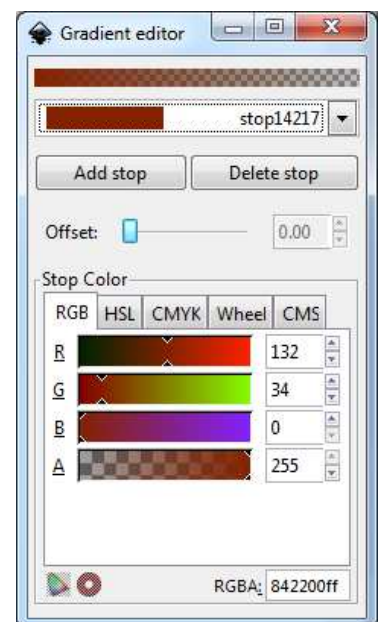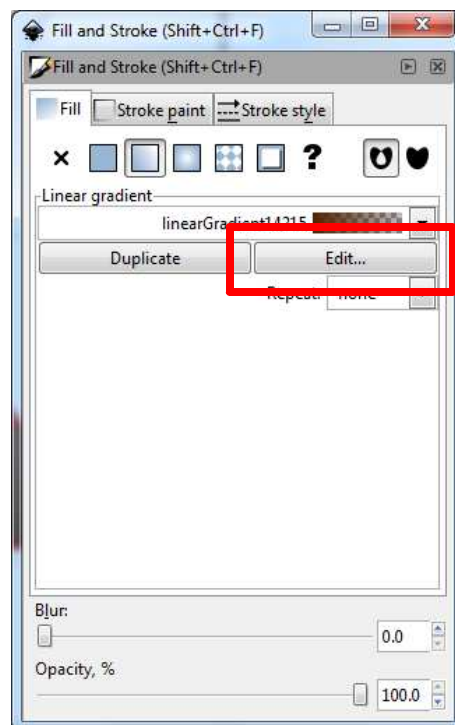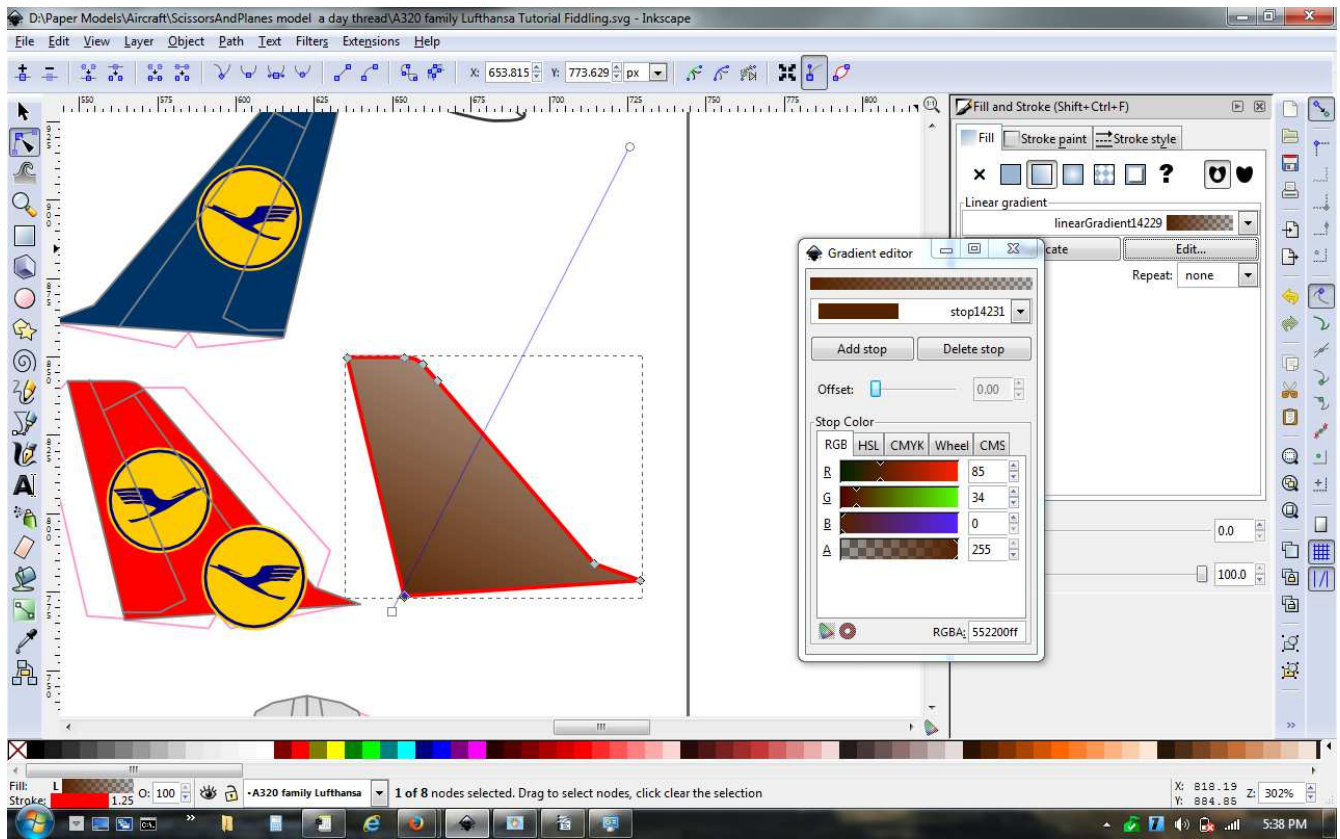
Radial Gradients

Radial gradients operate much the same as linear gradients except that the color fades outward in a circle from a center point. Play with it and you'll see how it works.
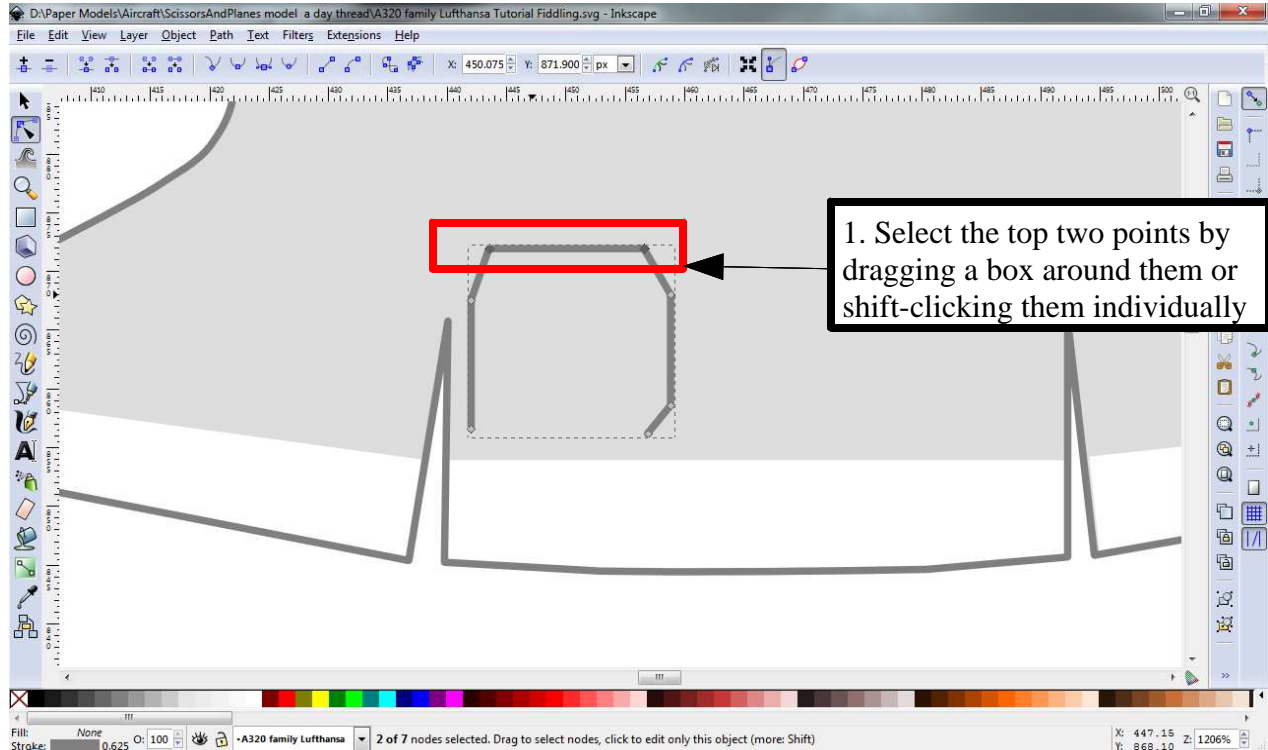
More Editing

Now we're going to do a little more advanced editing.
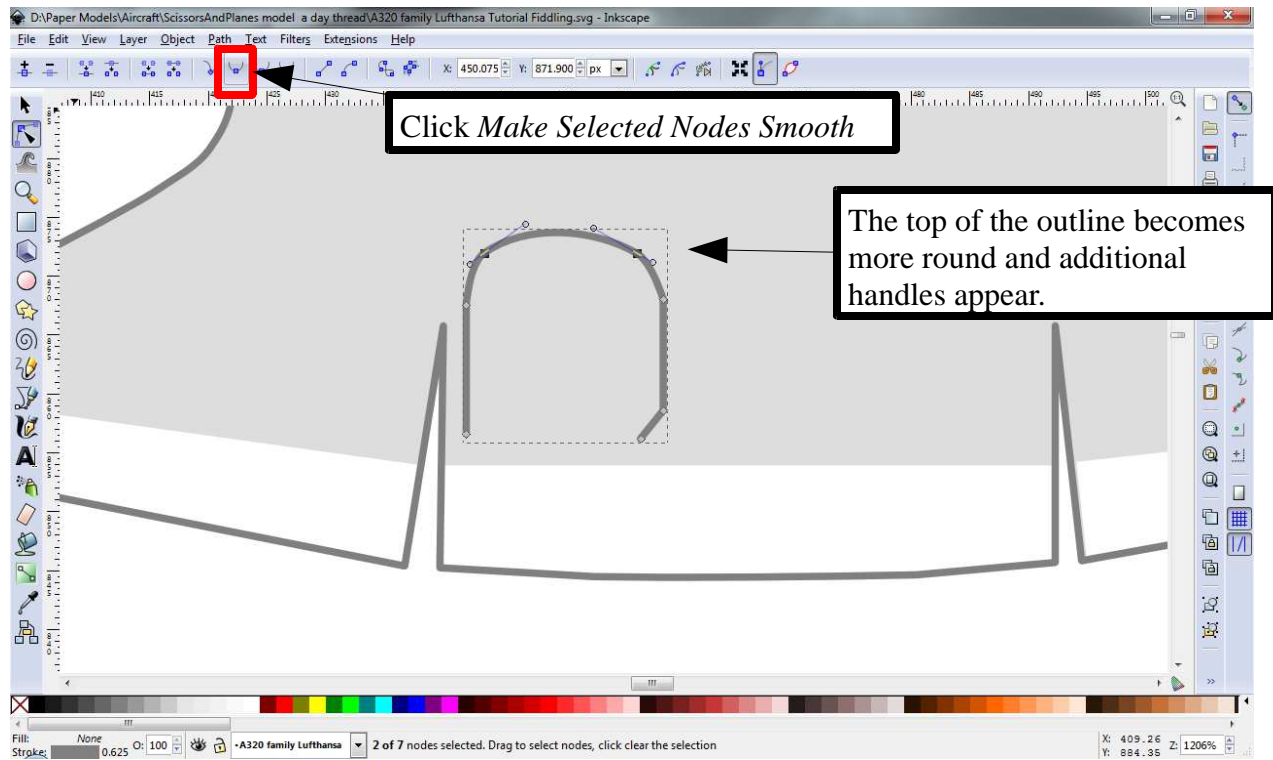Bring the belly bulge area back into view and zoom in on the landing gear door outline.
Click to select it, so you have something like this.
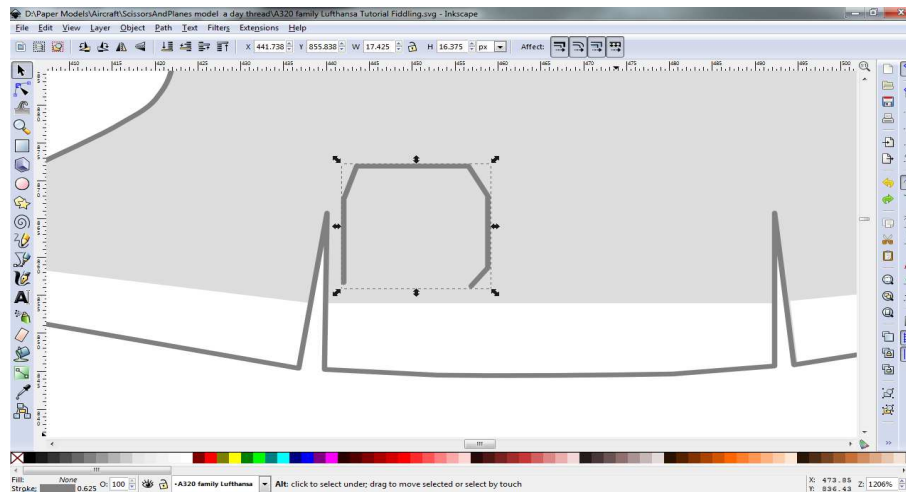
Switch to the Edit Paths tool then select the top two points by dragging a box around them or shift-clicking them individually.

1. Select the top two points by dragging a box around them or shift-clicking them individually

Click *Make Selected Nodes Smooth*

The top of the outline becomes more round and additional handles appear.
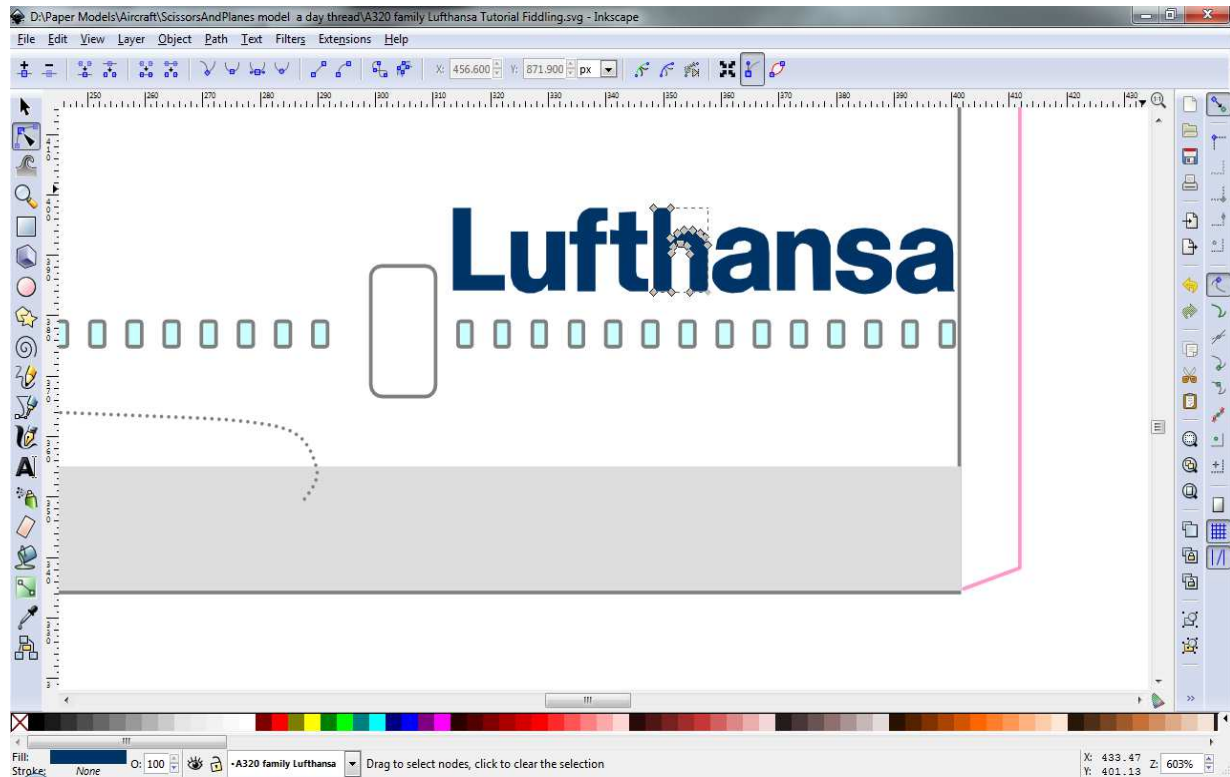
Experiment with grabbing the handles, stretching them out and moving them around. A sample of what can be done is shown below.
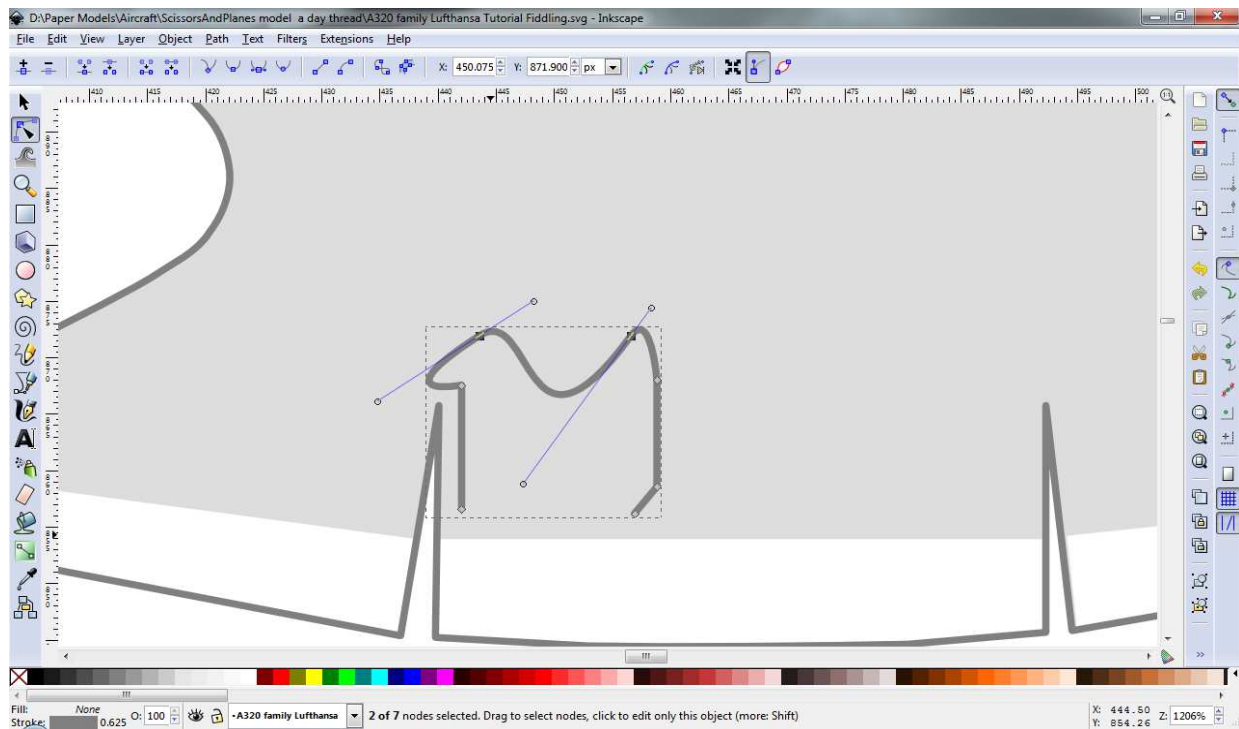
Editing the points in this way lets you easily create complex shapes, like lettering for example. If you scroll down to the fuselage section and select one of the letters in Lufthansa you'll find that this is exactly how they are made.

Now zoom out, then zoom in on the text at the upper left of the page. Click the Selector tool, click the text "A320", then in the tool bar click the Text tool.
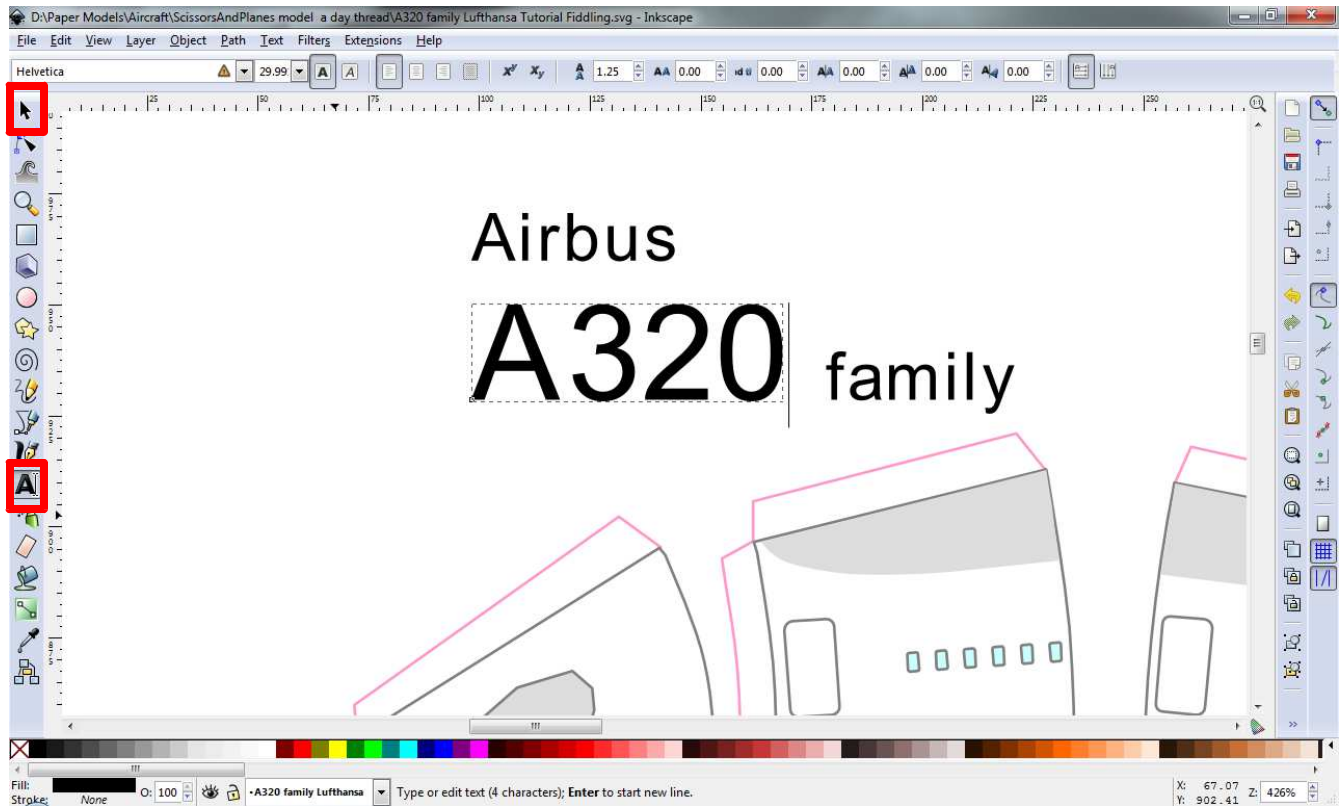
You will find that this is a text object that you can edit as in any other text editing program.
Now on the Path menu select Object to Path.
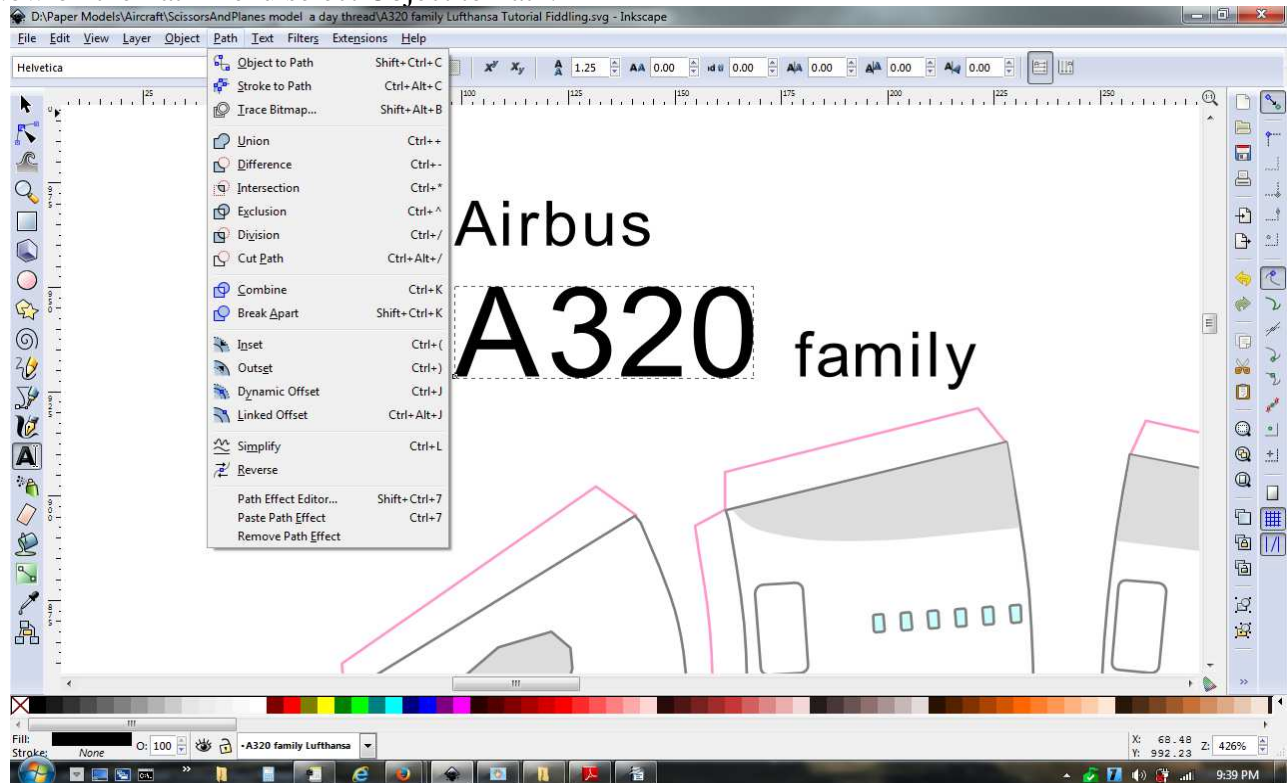
Next Select the Edit Paths tool and click on the letter A. You should see something like this.
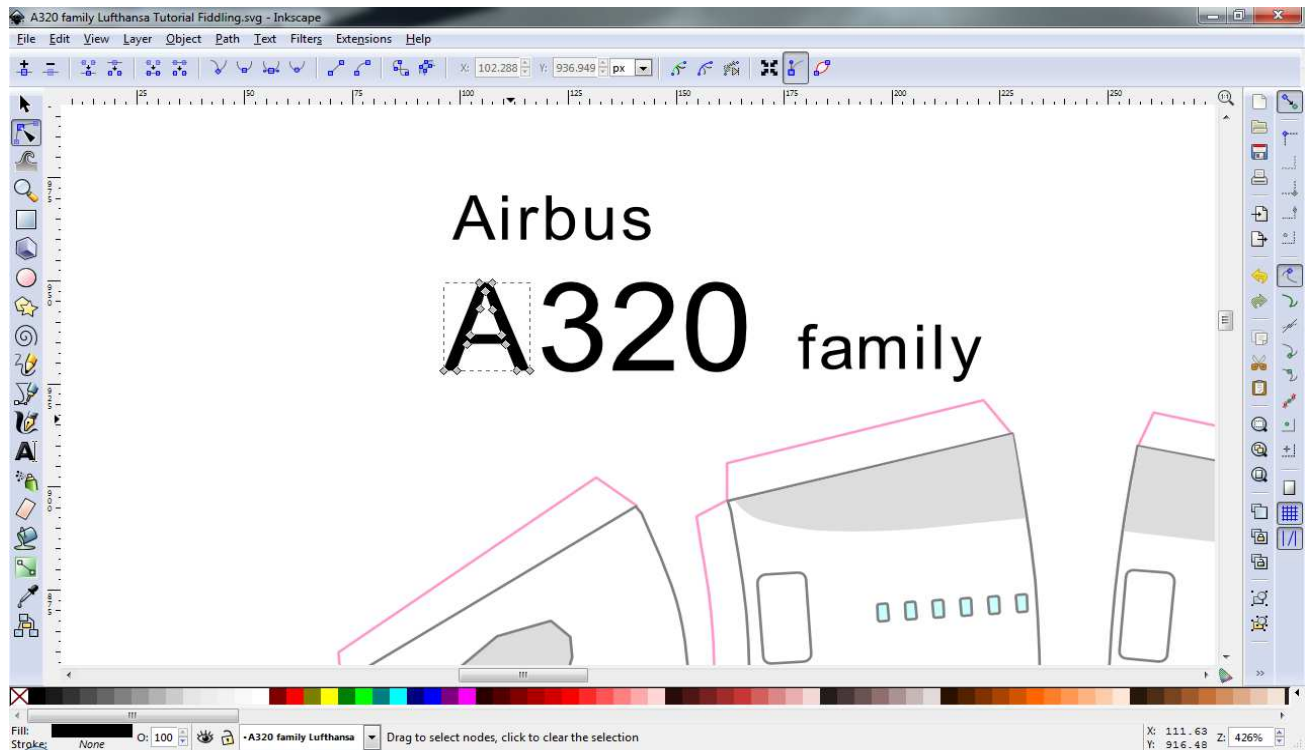

Converting a text object to a Path like this lets you fine tune text shapes as required to match a specific logo, or to fine tune how the text wraps around a curved surface, like an aircraft fuselage

Texture Checking and Alignment

In this section I discuss some simple techniques for helping to ensure that textures align properly between sections. Make sure you read through the entire section. At the end I discuss another way to put it all together and make even more advanced edits to the model patterns.

The current stable release of Inkscape lacks a useful Measure tool, although one is currently in development. In the meantime the Draw Bezier Curves tool is a very useful alternative.

For this example I'm using the "Embraer 170 et 175 FDA 2" model, which includes the yellow and blue versions of the aircraft.
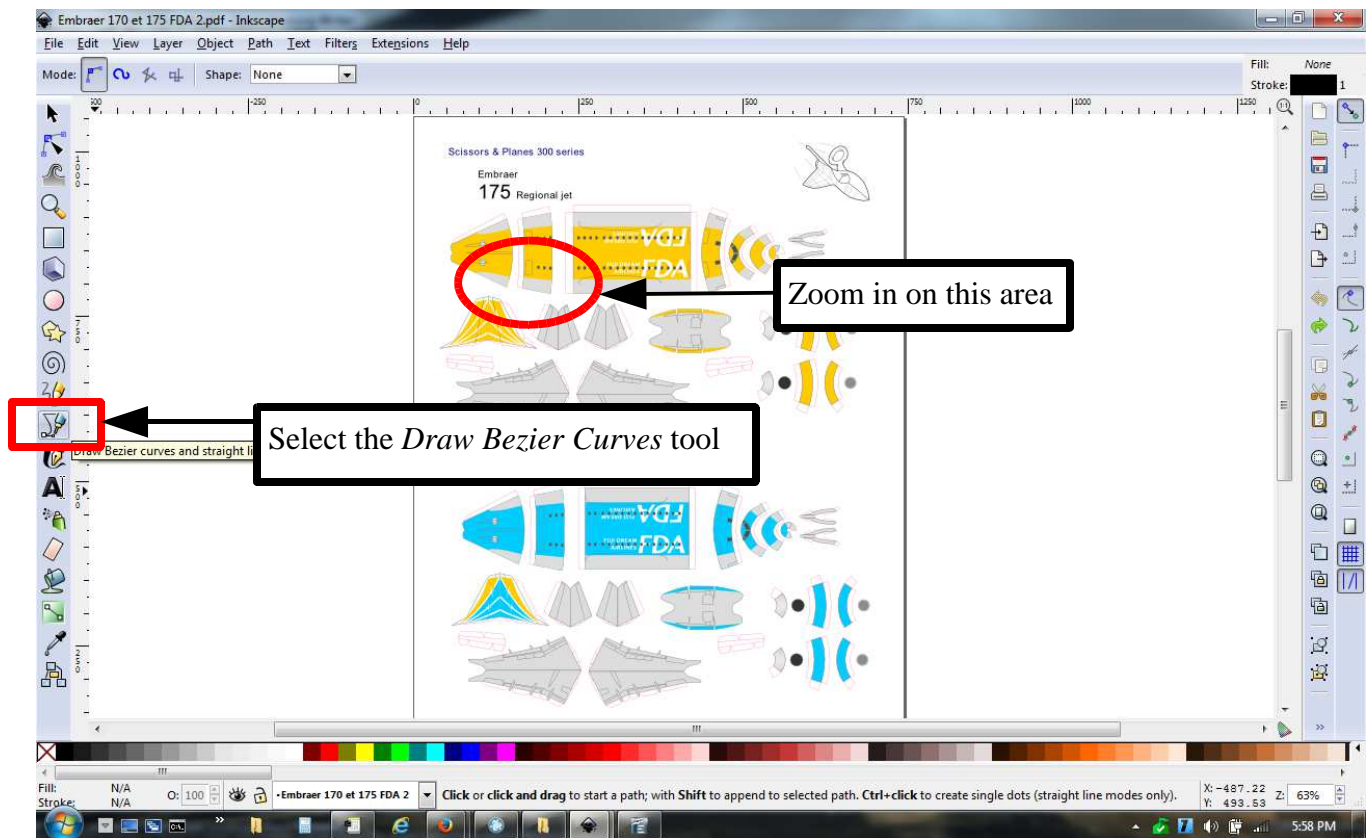
Click to select the Bezier Curves tool then zoom in on the indicated area of the model.
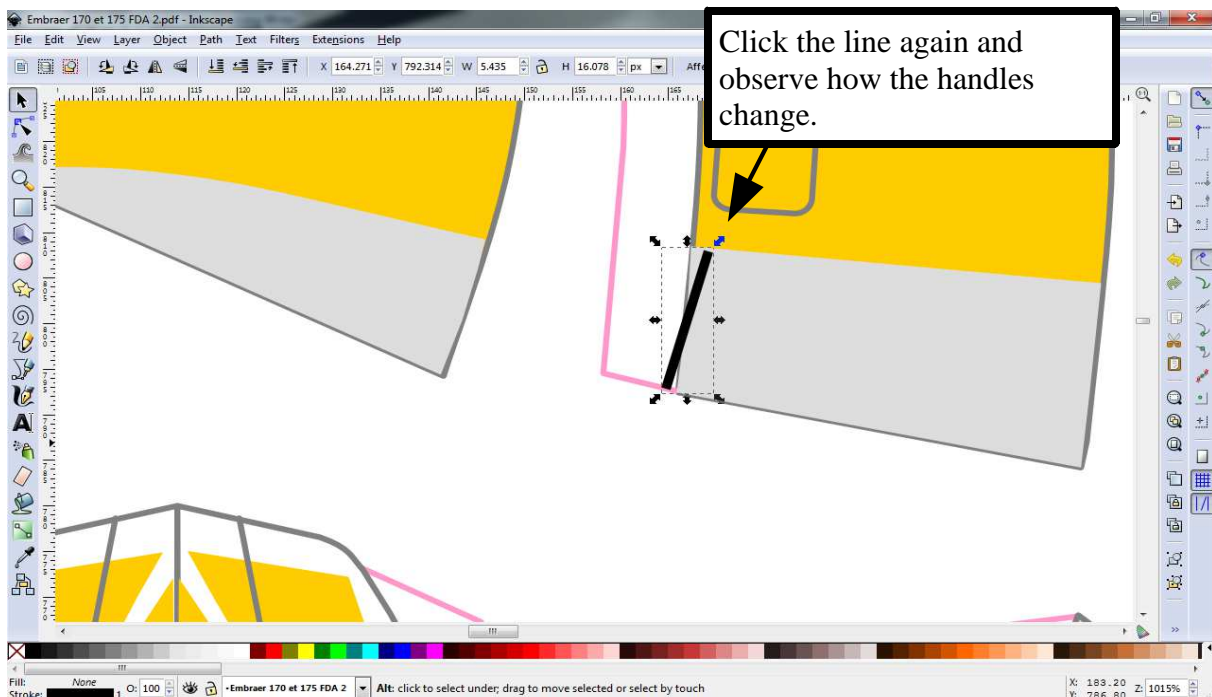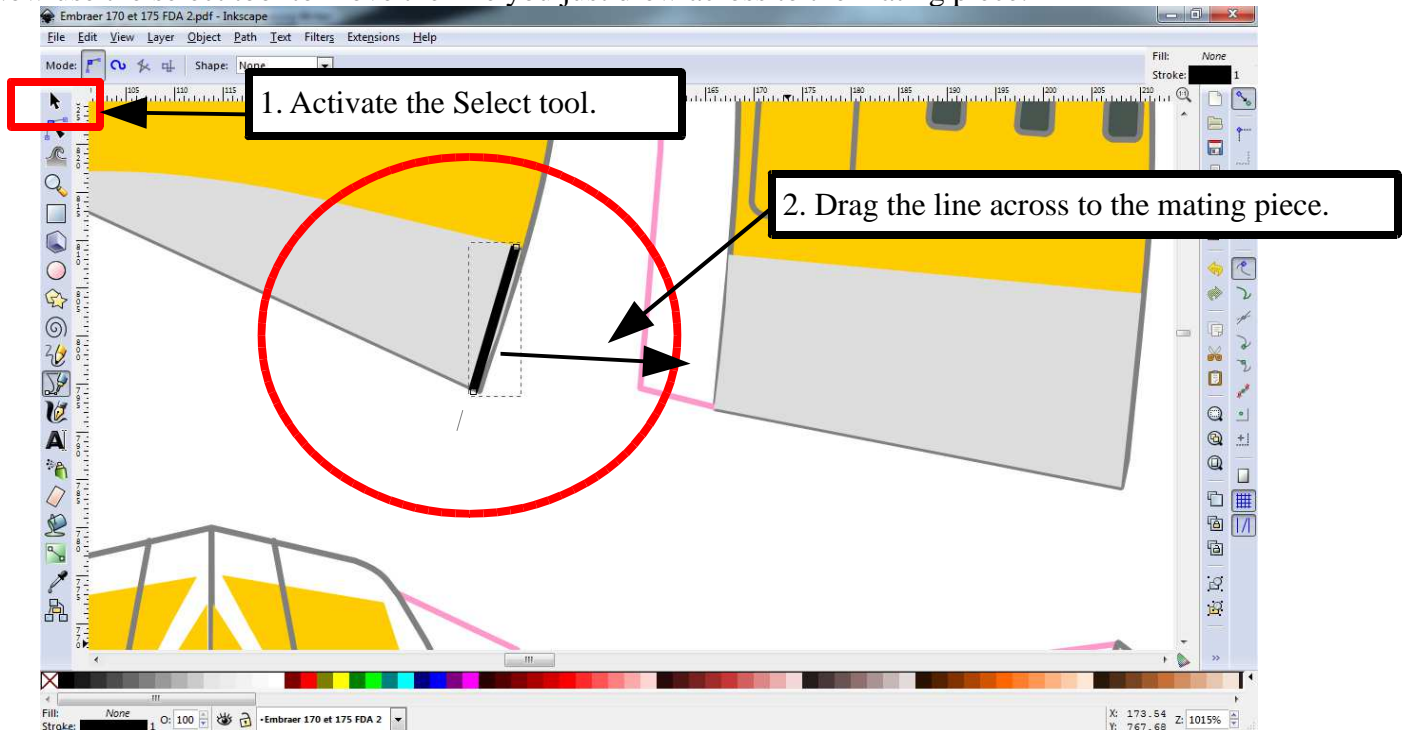
The Bezier Curves tool starts drawing a curve when you click the left mouse button, and adds another point in the curve at each place you click the left button.

To end the line double-click the final point. (can also _right_-click _after_ clicking the final point to end the line)

For this first section we only need two points, so click to start a line segment at one edge of the gray area, move the mouse to the the other side of the gray area and double-click to draw the line as illustrated below.

This line segment effectively measures the width of the gray area.

Now use the select tool to move the line you just drew across to the mating piece.

1. Activate the Select tool.

2. Drag the line across to the mating piece.

Click the line again and observe how the handles change.

When you click the selected line a second time the handles change to the Rotate and Skew handles.

Grab one of the corner handles and rotate the line to match the segment we want to measure.
Align one end of the line with one edge of the gray area.

Using this line segment as a small ruler you can see there is a slight difference in the width of the gray area on this side.
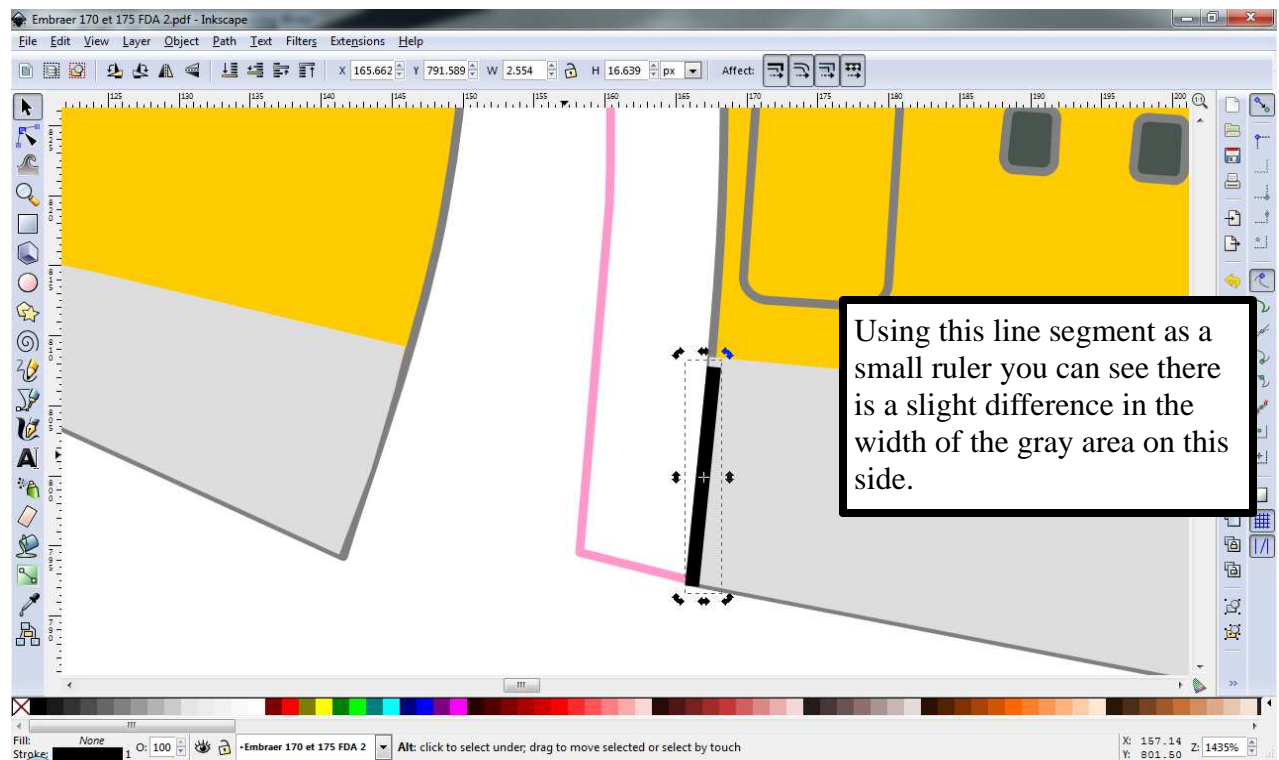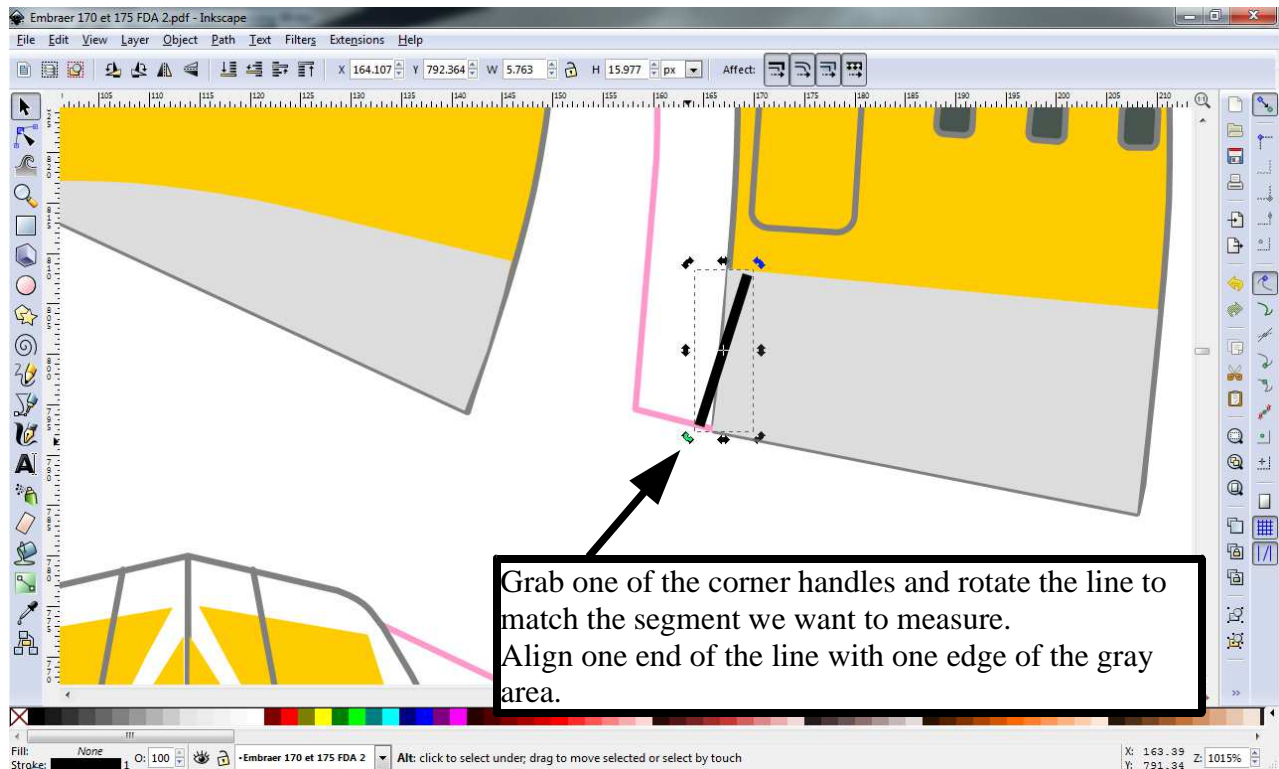
To correct this activate the Edit Paths tool, then click in the gray area to display the nodes.

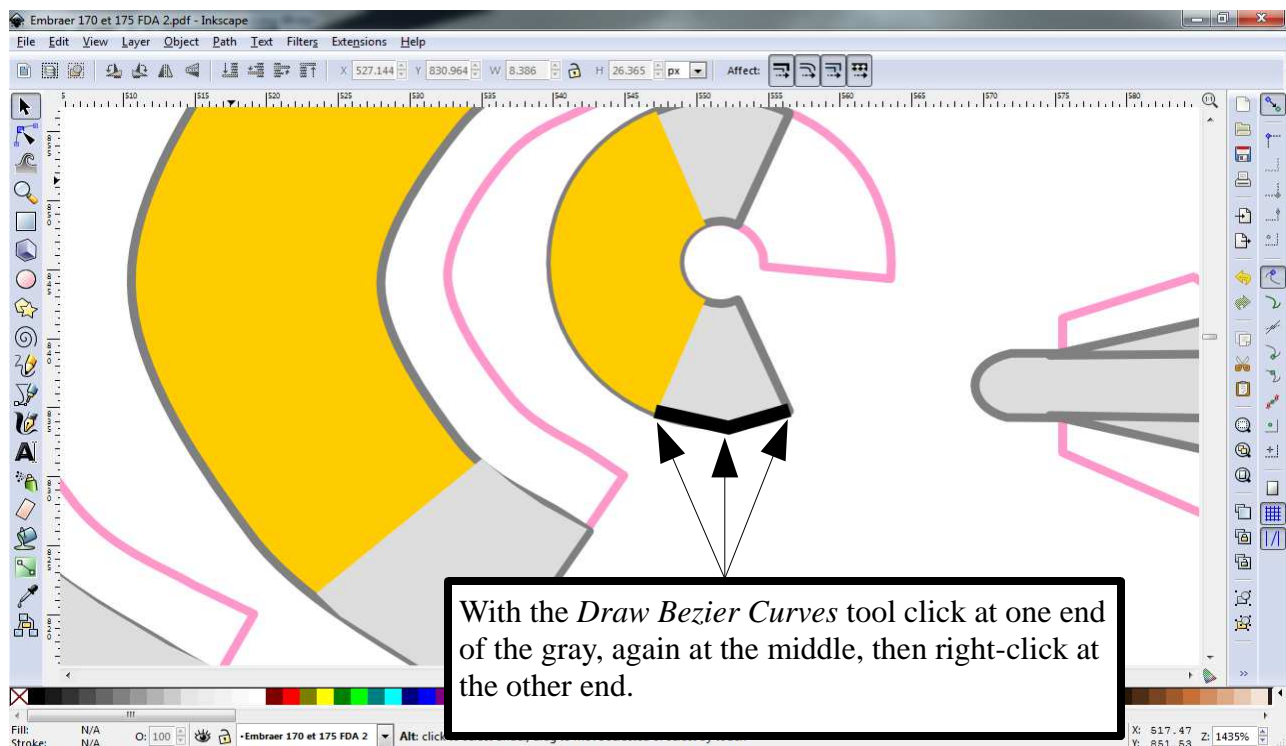Drag the upper point down.
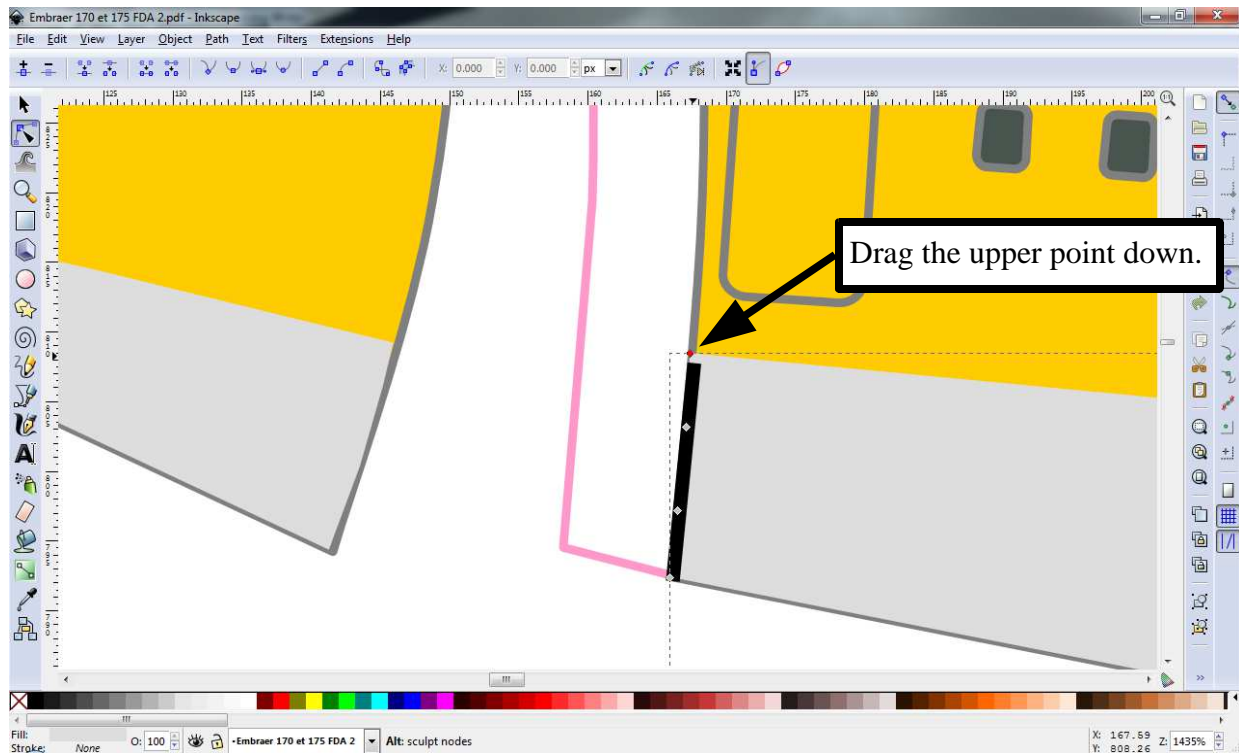
Now lets check the other side. Zoom out as shown below and drag our line segment up to the top using the select tool.

Move the line segment up here and use it to check the width of the gray area on both sides
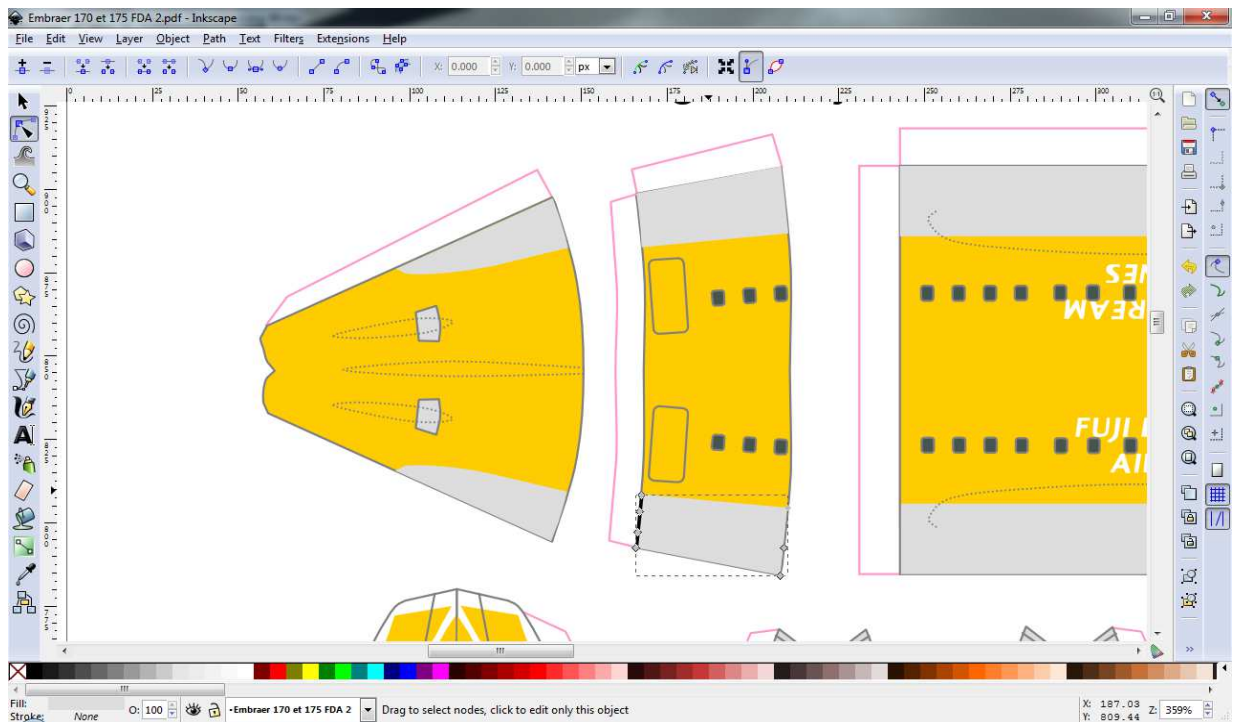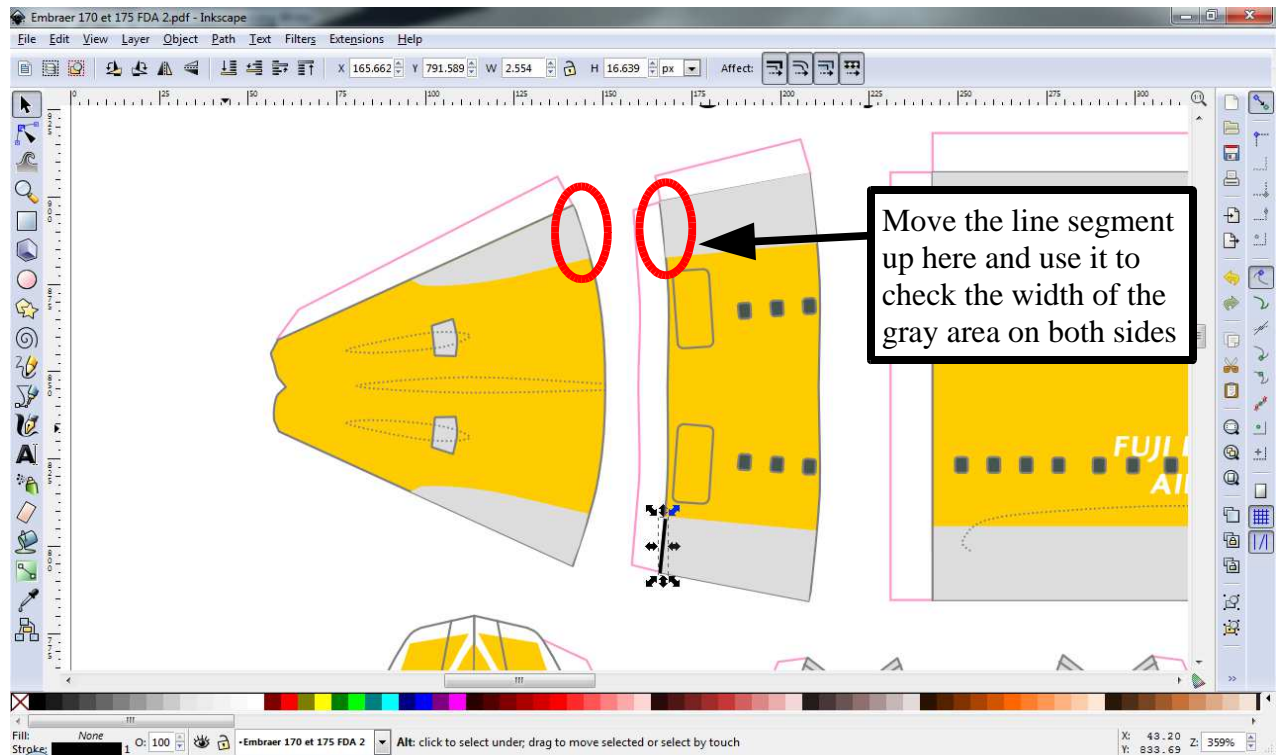
You can use this same technique to set the distance between elements, like from the gray area to the bottom of the doors for instance, or from the edge of the door to the first window and so on. Normally your would repeat this process at each joint between pieces. For now though, move up to the nose of the aircraft and zoom right in on the nose cone.
Here I'll show you how to use a multi-segment line to measure curved pieces.

With the *Draw Bezier Curves* tool click at one end of the gray, again at the middle, then right-click at the other end.

Now, activate the Select tool and click the line you just drew. The usual handles appear. Drag the line up to the top part of the nose cone.
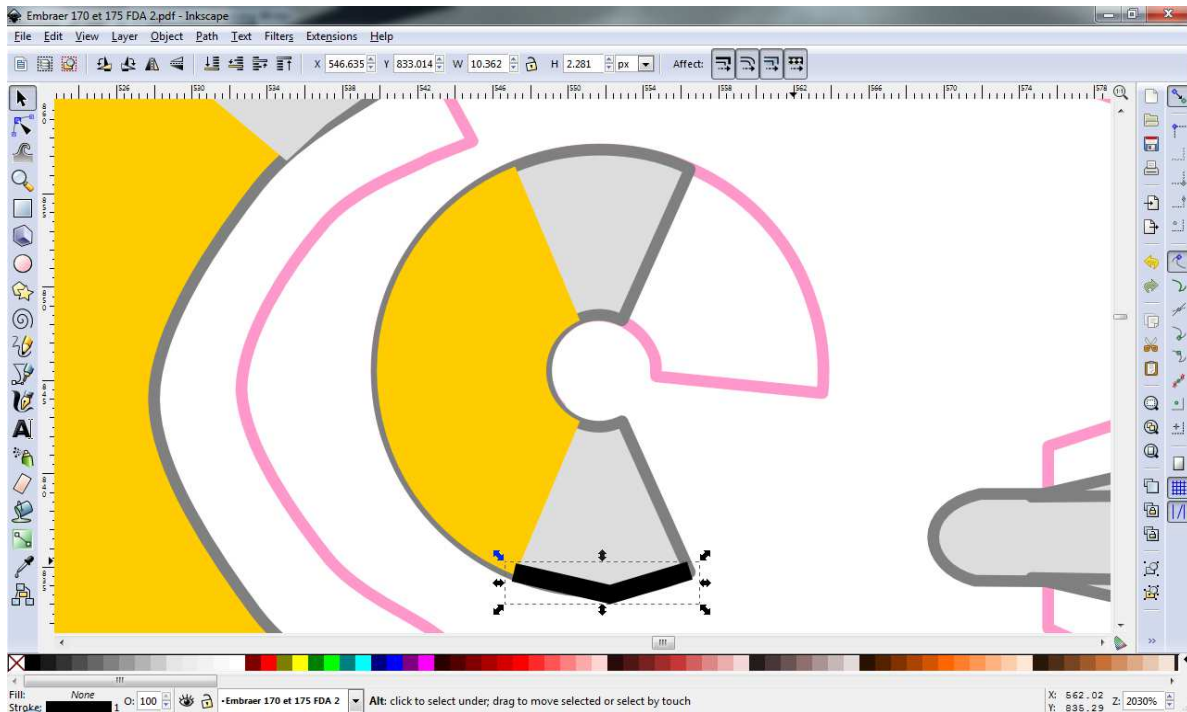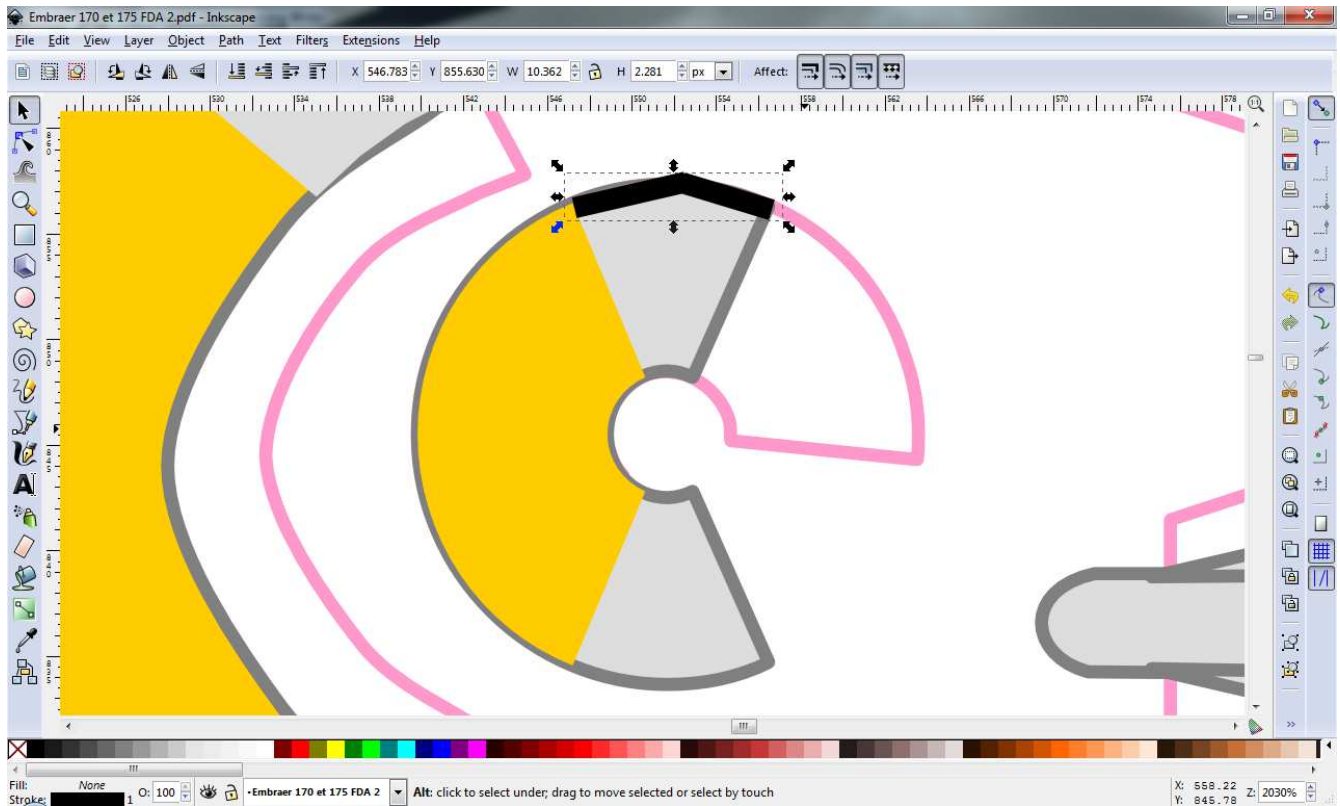

Now use the Flip Vertically tool to flip the line segment. The result is shown below.
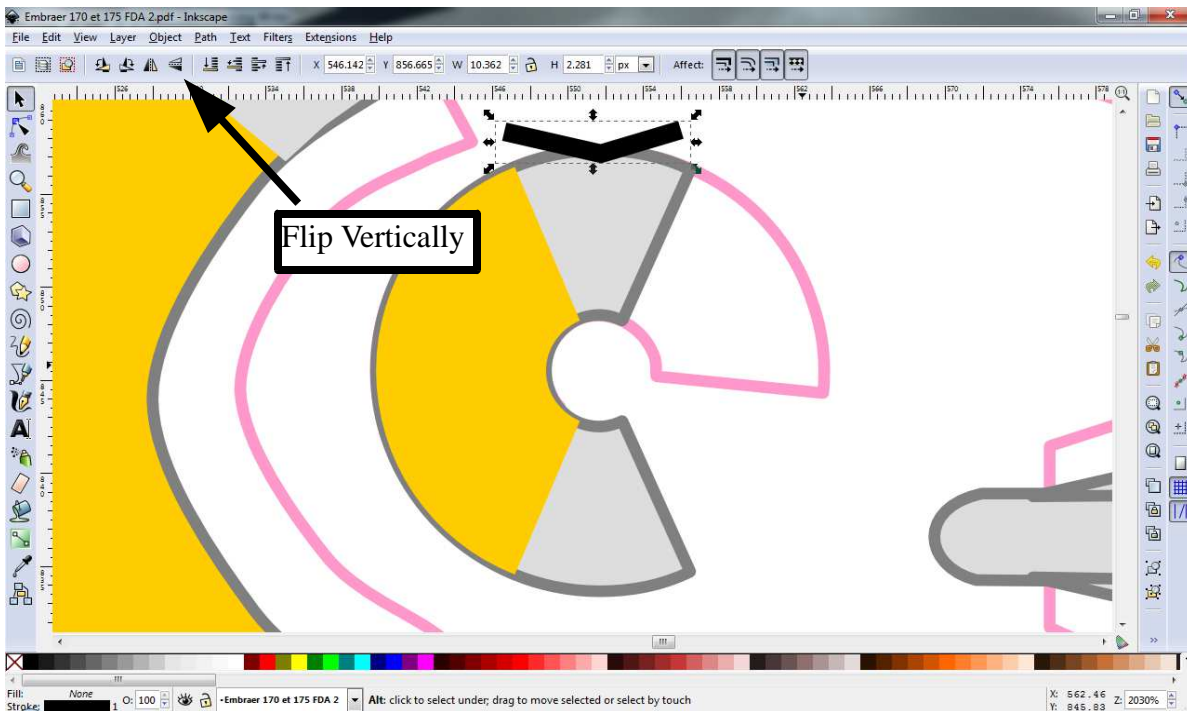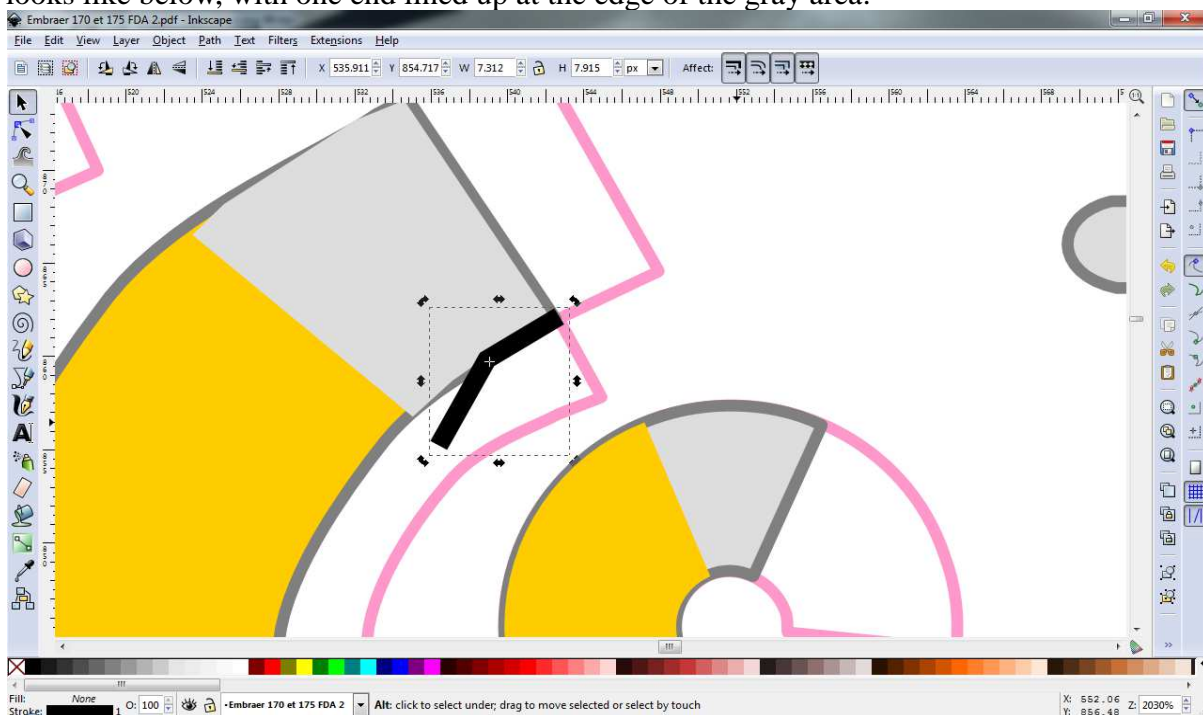
In this case the gray areas match up nicely on the cone itself. Now let's see how to use this on the mating piece.


Drag the view down a bit, then drag the line segment over to the mating gray area.
Click with the selector tool to change to Rotate and Skew mode. Rotate and position the line segment so it looks like below, with one end lined up at the edge of the gray area.

Note the tiny cross hairs in the center of the line segment. This indicates the point of rotation used when you rotate the line. Careful repositioning of the cross-hairs allows you to fine tune how the line segment rotates. This is very useful with longer, multi-segment lines and very curved areas, which I'll demonstrate next.

With the cross-hairs at the center like this. You can now rotate the line segment to see how the rest of the gray area matches up.

After rotating the line segment we can see that it seems to match up pretty well.
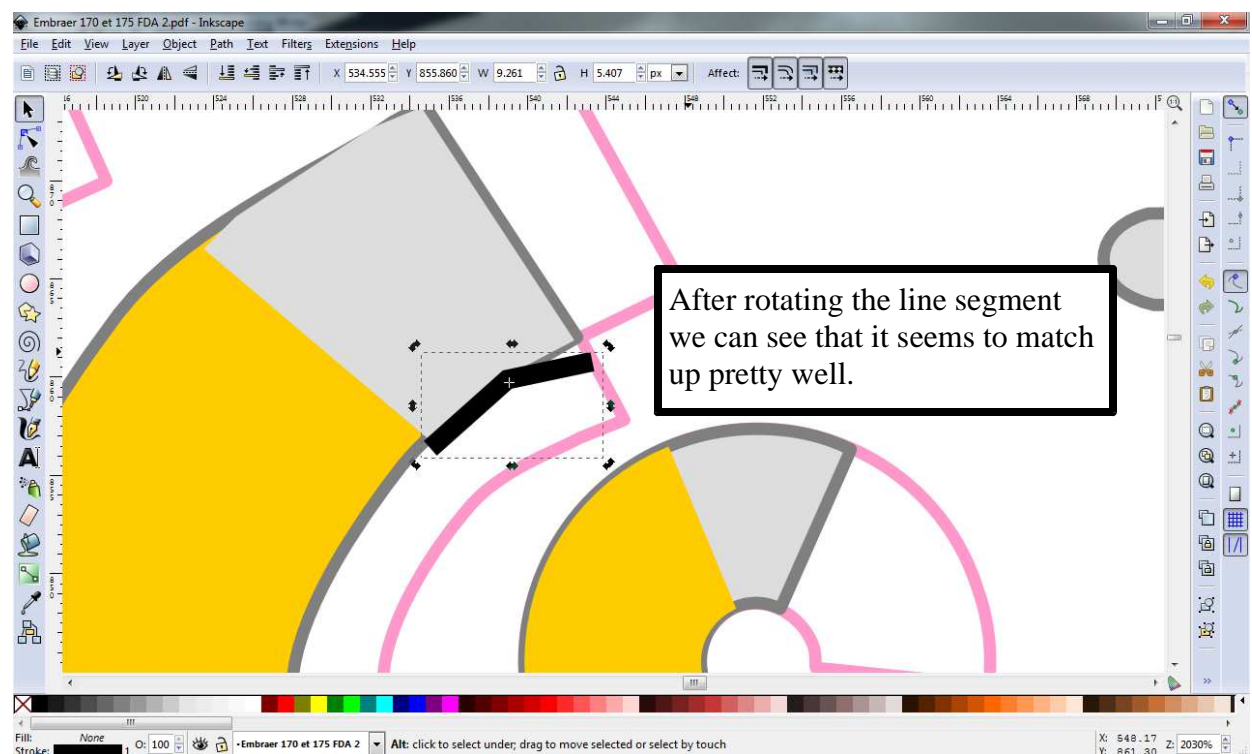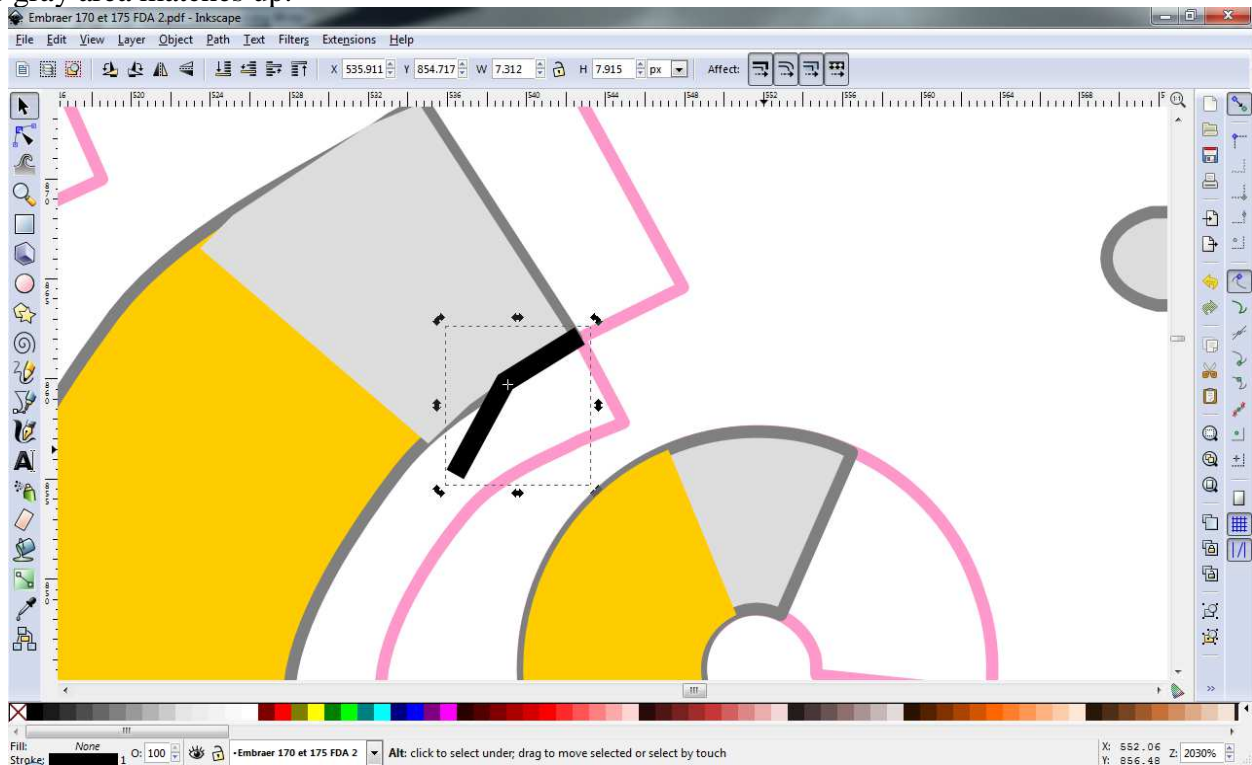
Now let's look at a more advanced example. In the screen shot below I've drawn a multi-segment line along the yellow portion of the nose cone.
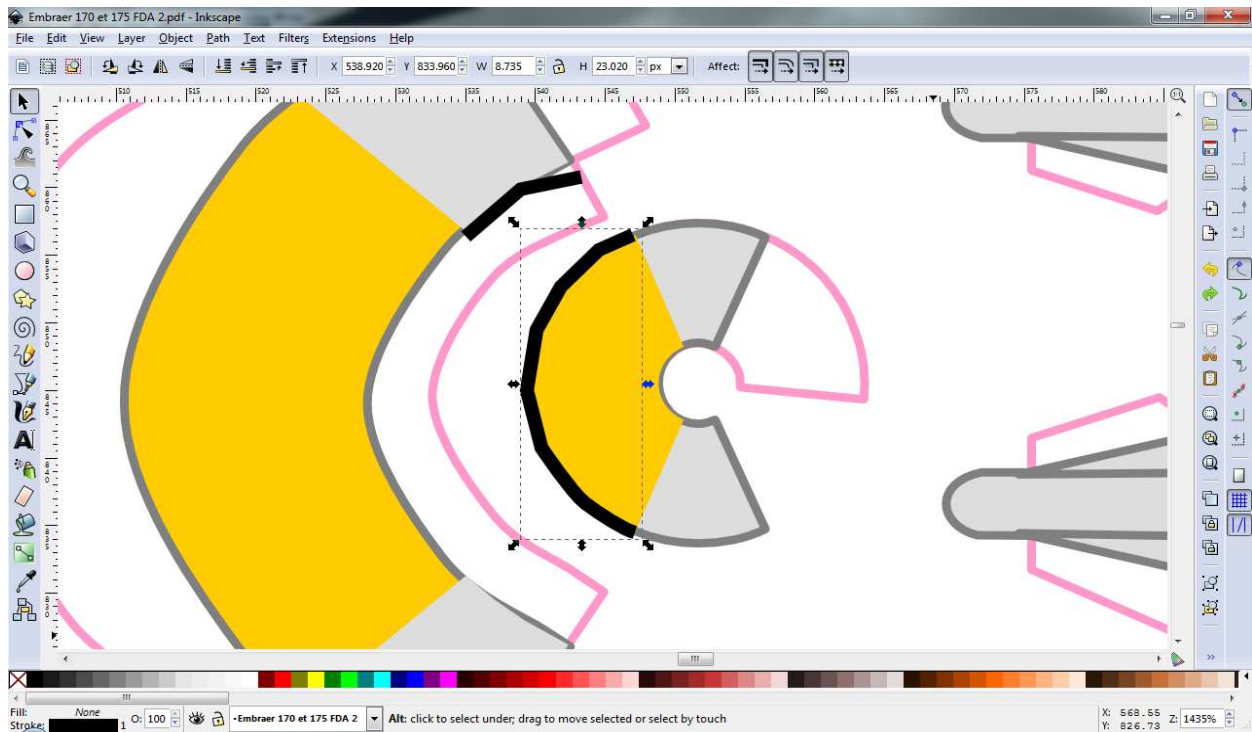
Now I drag it over to the matching model piece, placing one end of the line segment at the point where the yellow and gray meet.

Move cross-hairs then rotate
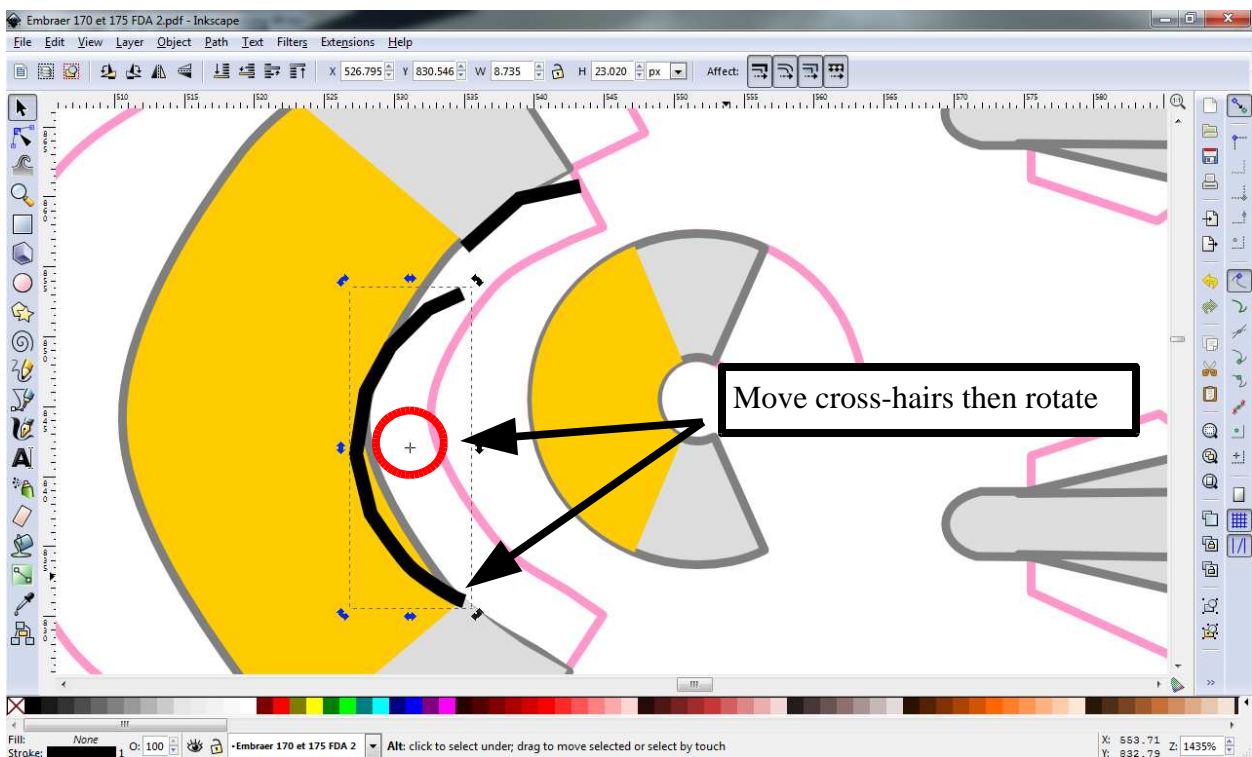
Next I reposition the cross hairs to the point where the yellow and gray meet, then rotate the line segment a bit. The result is on the next page.

This is what it looks like after moving the cross-hairs and rotating the line.

Cross-hair repositioned and line rotated.
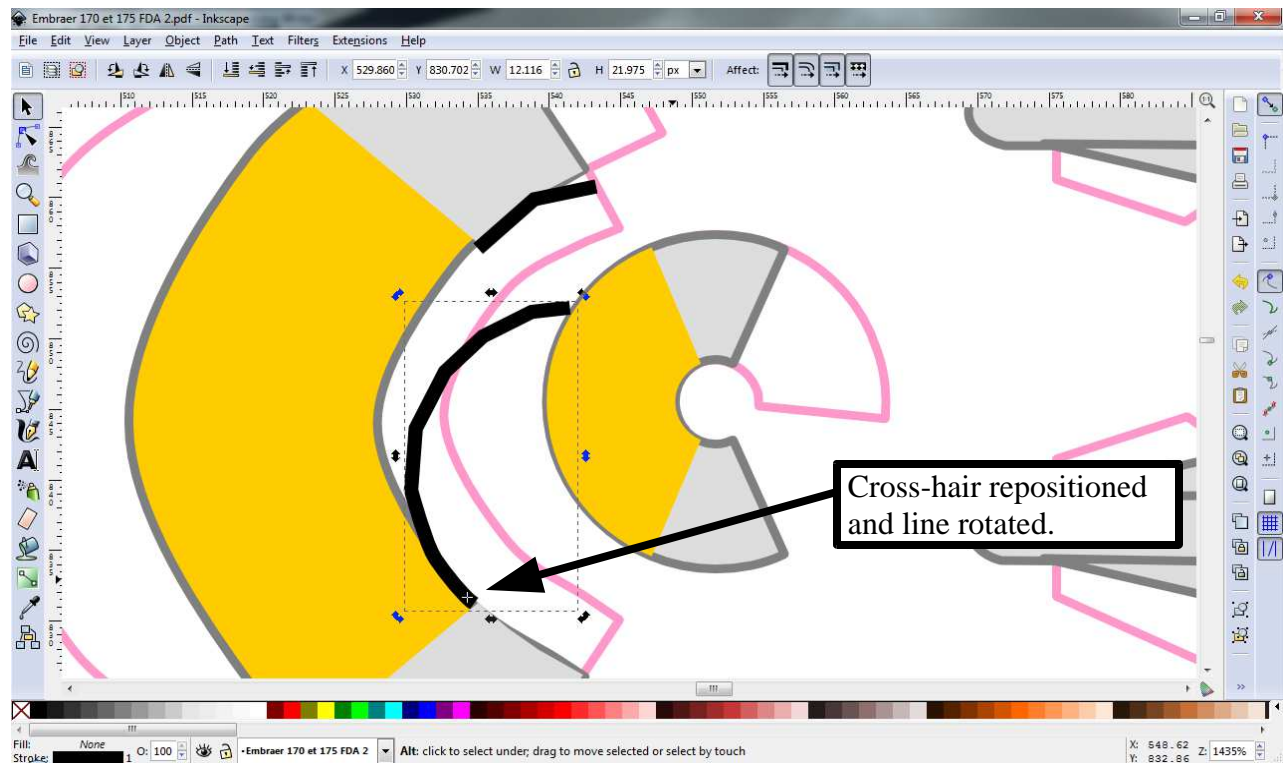
Now I can move the cross-hairs to the next 'node' of the line segment and rotate again.

Cross-hair repositioned

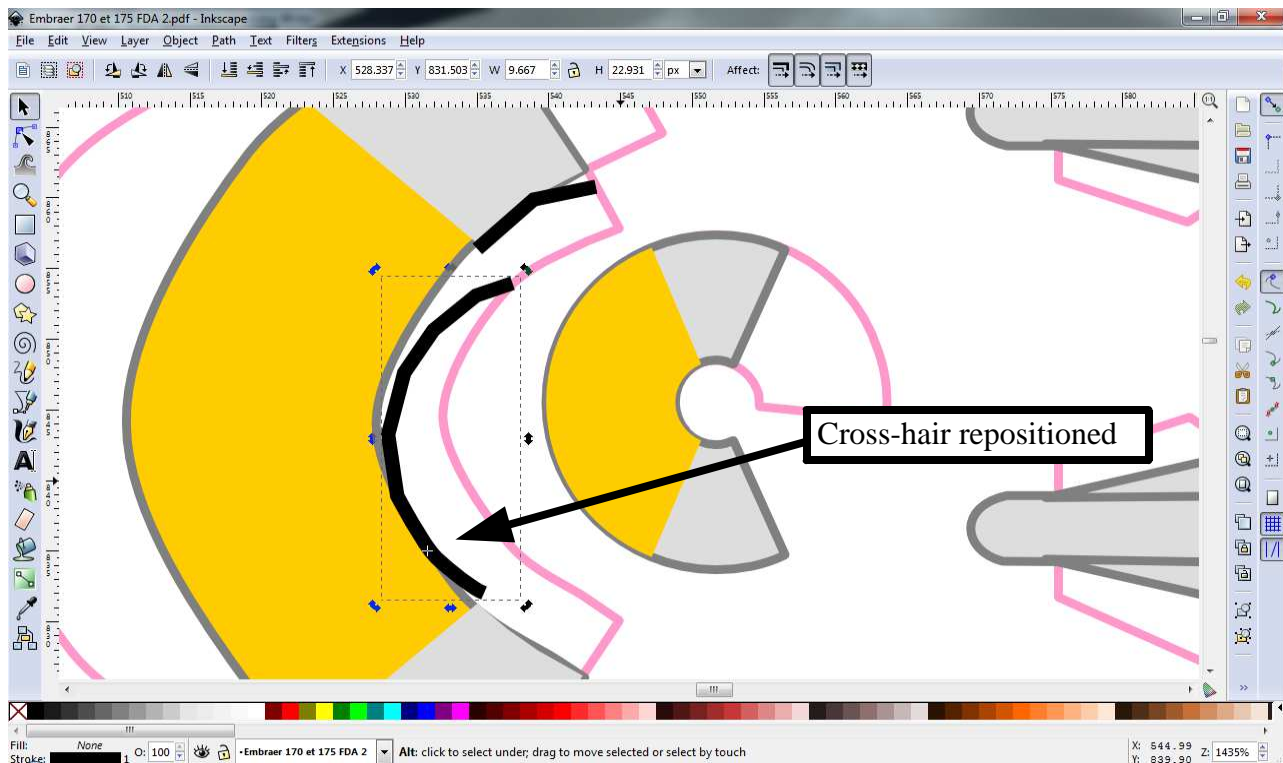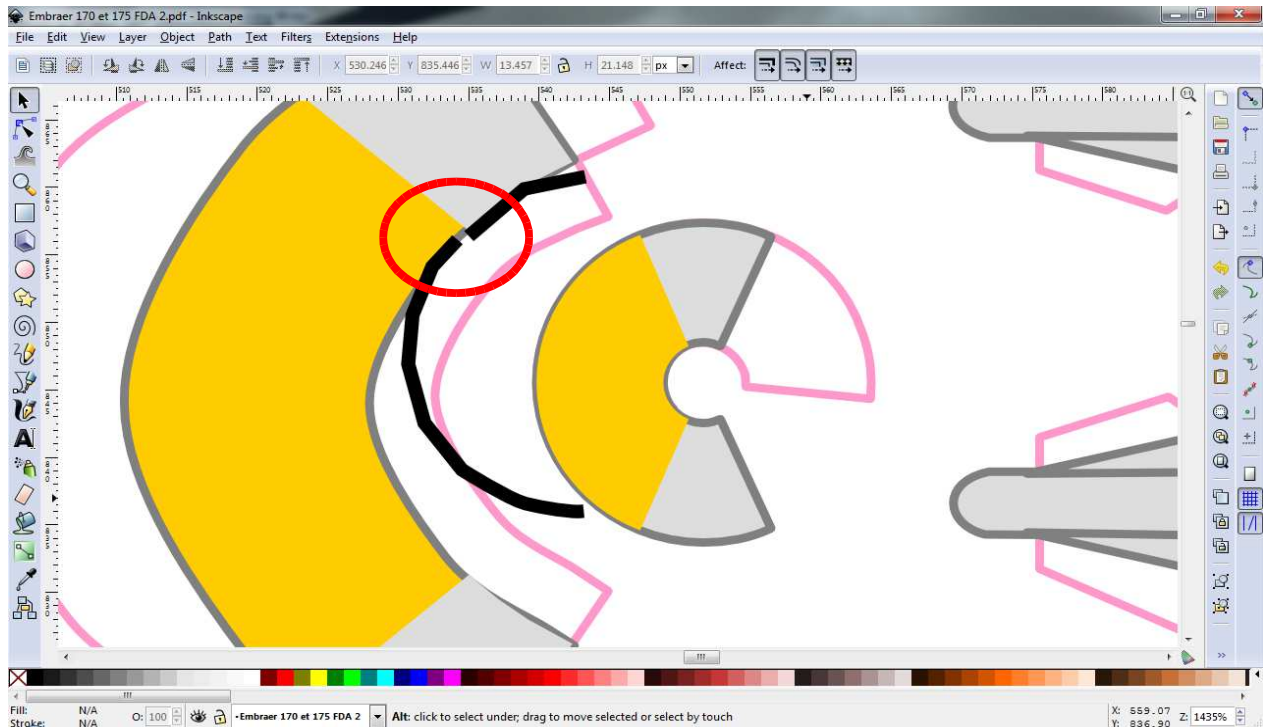By repeatedly repositioning the cross-hair and rotating the line I can "roll" the line segment along the curve of the fuselage segment until I get to the other end, when it looks like this.

Note that there is a bit of a gap from the end of the line segment to the end of the yellow area. This suggests that the yellow segment on this fuselage piece is longer than the yellow segment of the nose cone. However, at this scale (1/300) it's a pretty small difference and is likely the result of inaccuracies in the technique, but it illustrates the process of using these line segments to check alignments and lengths in more complex circumstances.

Advanced Texture Alignment and Pattern Editing

Now, you may have realized that matching up model sections like this can also be done directly with the parts themselves. For example, I could have grouped the elements of the nose cone into a single object, then simply moved and rotated it, and adjusted the color lines of the other segment to match. You can actually make significant alterations to the layout of the model using that technique. For example, in the screen shot below I have 'grouped' one of the fuselage sections and moved it to it's mating section, then rotated it, shifted the rotation point and repeated a couple times to check the door alignment. You can see that there is quite a difference, and this was evident when I actually built the model.
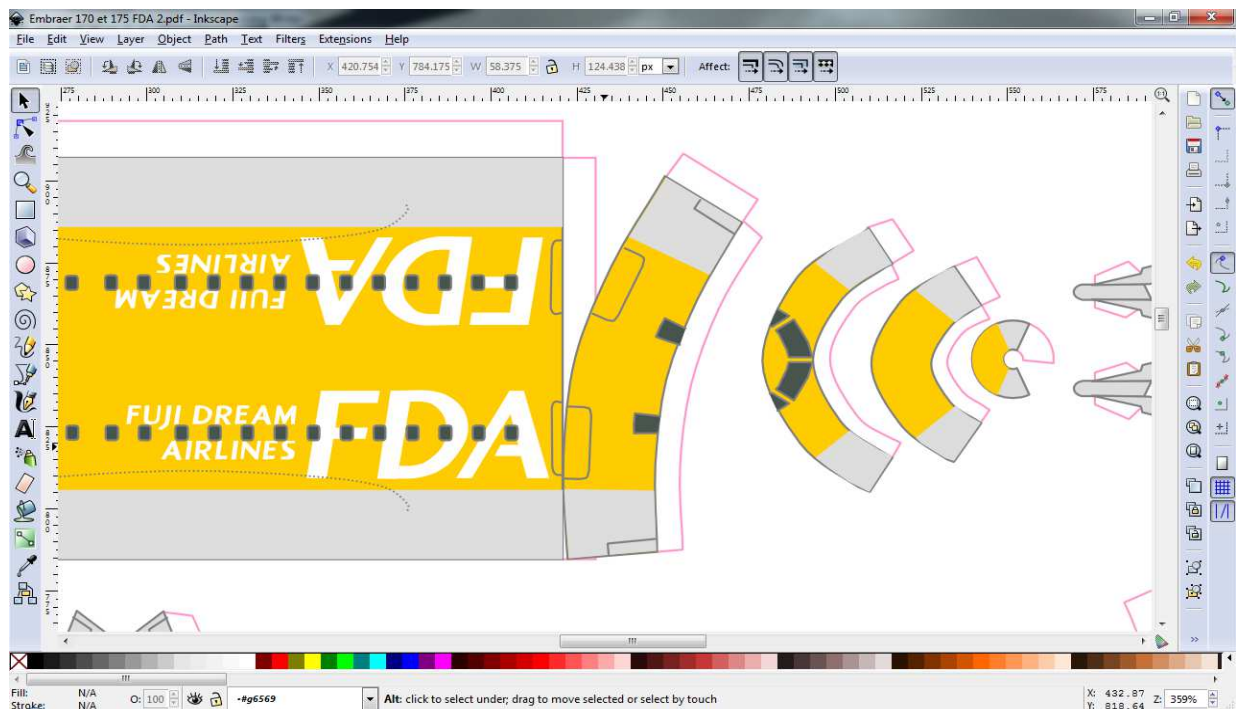
Taking this a few steps further I 'rolled' the forward fuselage section along the other section, aligned the doors and color lines, and edited the color layers to remove as much of the gray outline as possible, and then left the two sections attached.

The result is shown below.
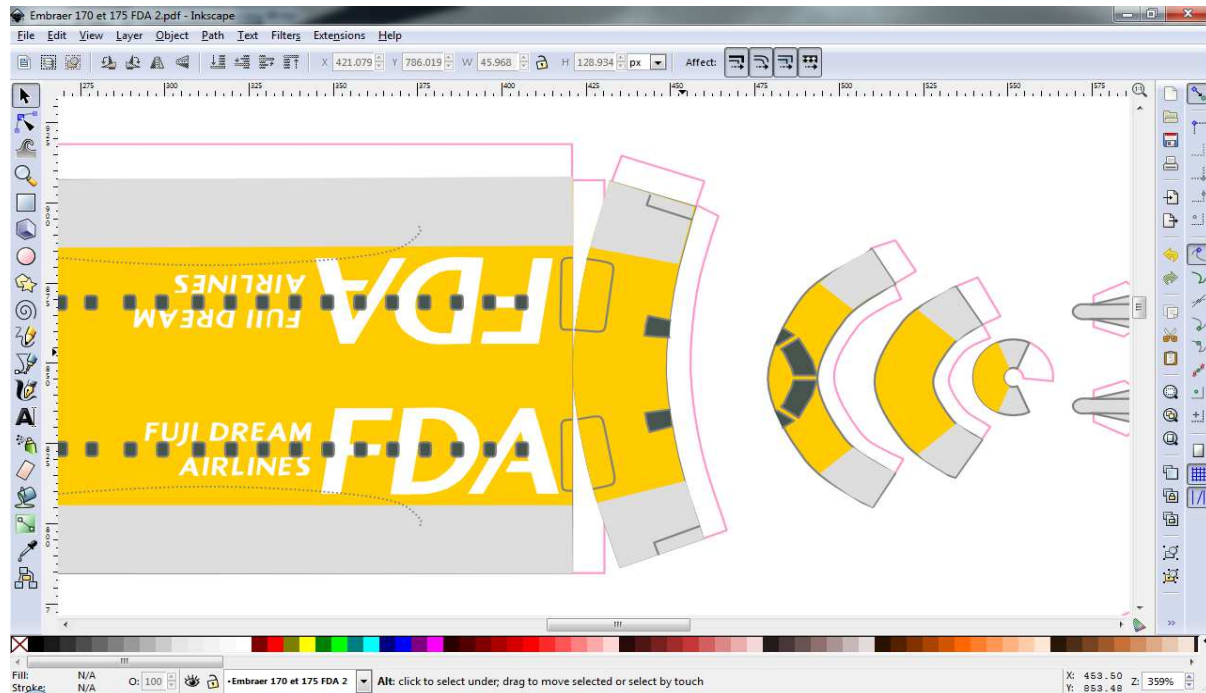
Other tools

Using just the tools described above you can do a lot. However, Inkscape includes a variety of other tools that will be of use to you, particularly the "Draw Bezier Curves" tool. Explore the toolbar and play with some of the other tools like "Draw Freehand lines", "Create circles and ellipses" and "Draw stars and polygons". You'll be glad you did.

Also, refer back to the section on Gradients and play around with the other fill types like Patterns.

You can also import a bitmap image (like a decal set) and trace the image to convert it to a vector based set of lines and shapes that can be scaled and transformed easily. See *File/Import*. If there is sufficient interest I will do a brief tutorial on working with images and decals.

Saving Your Modified Model

Inkscapes native file format is SVG (Scalable Vector Graphics). If you simply click *File/Save* your edited model will be saved in this format. Inkscape can also save directly to a PDF file. Simply click *File/Save As*, click the drop down beside *Save as type* and select *Portable Document Format (*.pdf)*.
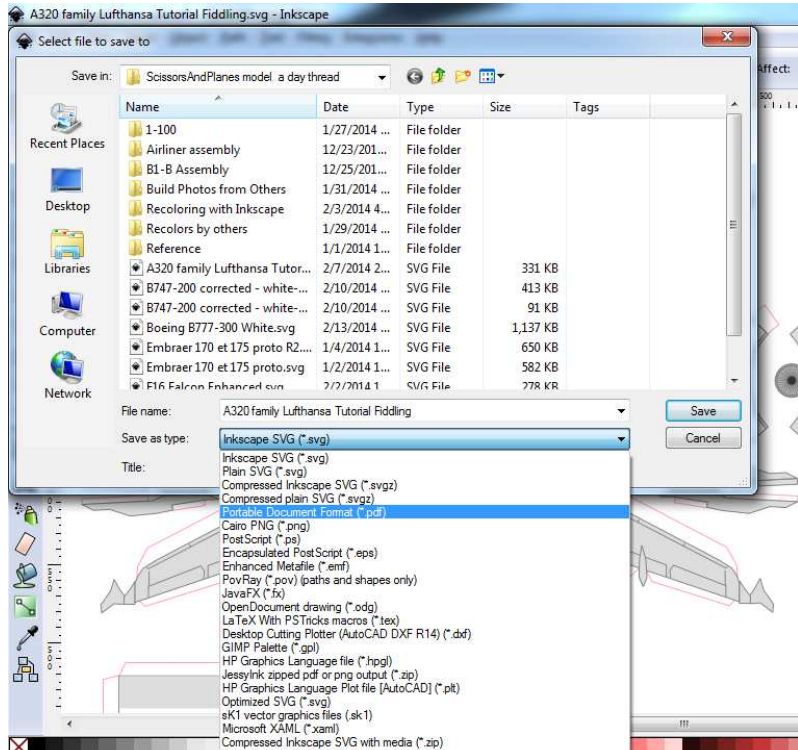
Multipage Models

Some of the larger ScissorsAndPlanes models cover more than one page. Inkscape does not currently support multipage documents (although it's apparently planned for a future version), so handling these models requires the help of another tool.

I use PDFCreator, but there are other tools that do the same job, including Adobe Acrobat. PDFCreator is another free and open source tool that can convert anything you can print to a PDF file. You simply print the document to the PDFCreator printer, it prompts you for a file name and then saves it as a pdf file.

First go to http://sourceforge.net/projects/pdfcreator/ and download and install PDFCreator. After it's installed you will have a new printer named PDFCreator, and some new menu items.

Now, in Inkscape open one of the two page models such as a Boeing 747. Select page 1, make your edits and save the file in Inkscape SVG format. (Saving in SVG format isn't really necessary, but since you'll be saving your work regularly as you go this is a good option)
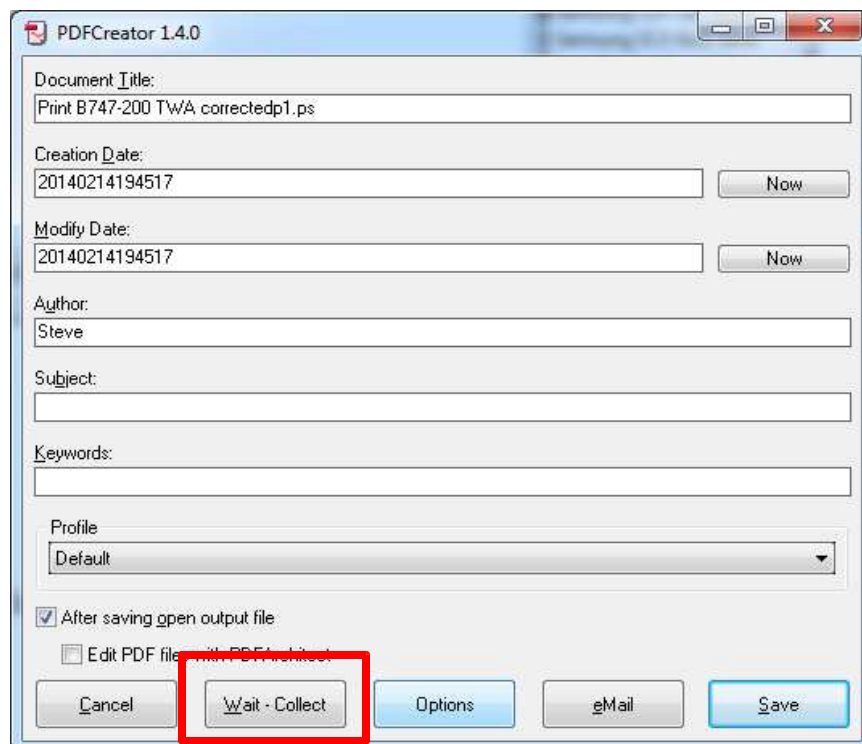
Now open the file again, selecting page 2, make your edits and save the file (again in Inscape SVG format).

Combining the pages with PDFCreator

Now open your modified page 1 in Ikscape and select File/Print. Select PDFCreator as the printer, and click Print.
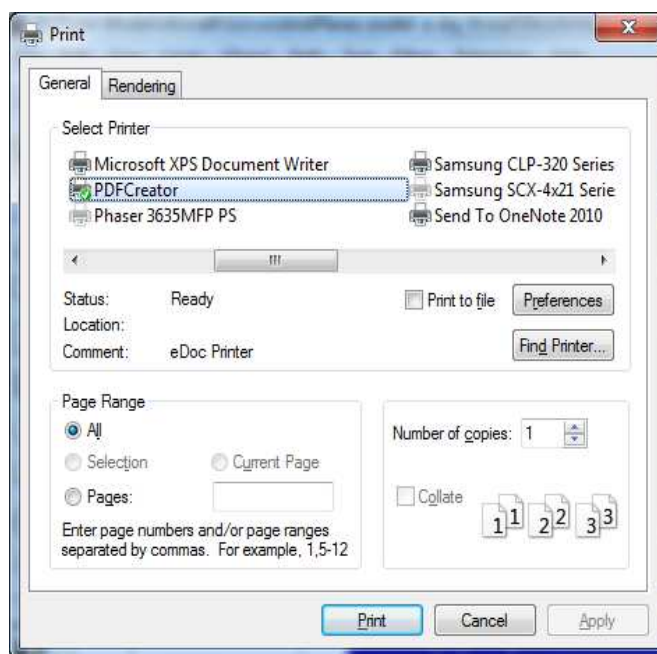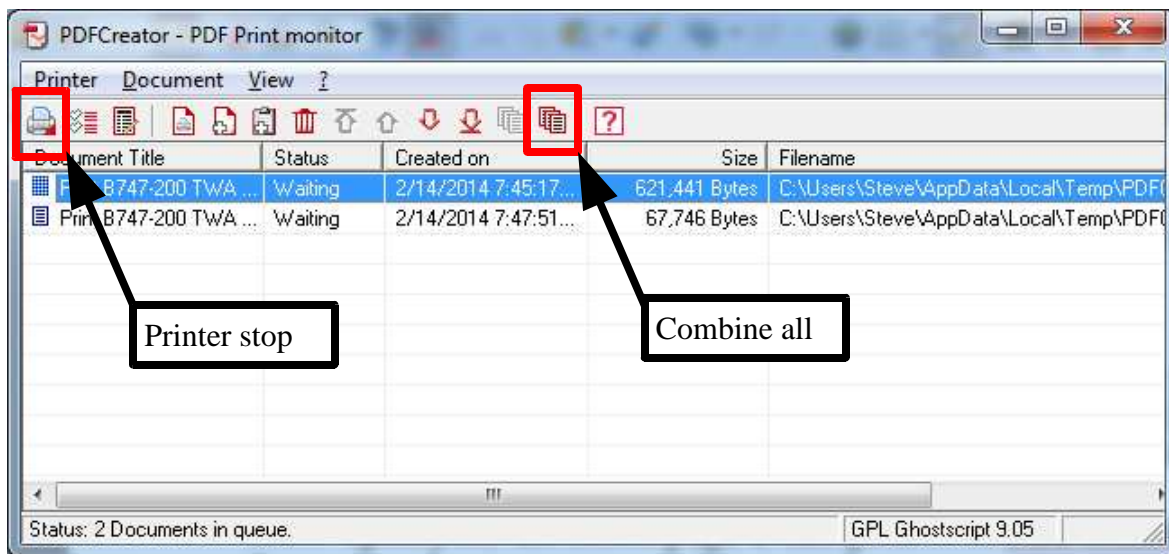
In the PDFCreator window click the Wait/Collect button.

Now open your modified page 2 and print it to PDFCreator.
The document will be added to the PDFCreator queue.

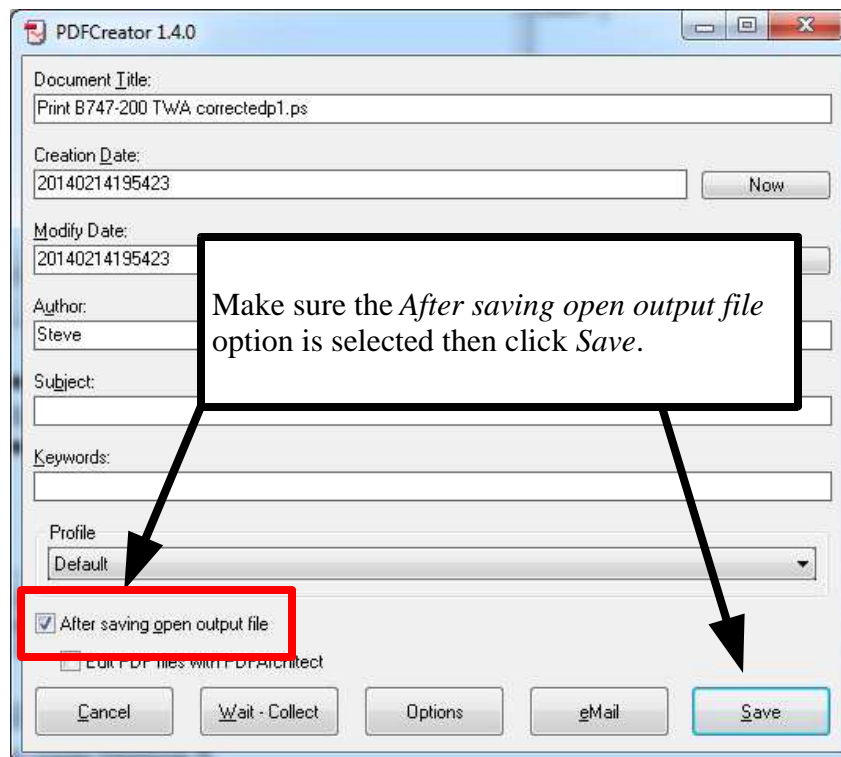The PDFCreator window should now look something like this.

Click the *Combine all* button. PDFCreator combines the queued documents.
Now click the *Printer stop* button.
Select the *After saving open output file* option and click Save.
Name the new file as appropriate and save it. The modified file should open in Adobe Reader.

Final notes

With all that knowledge you can start modifying and recoloring any of the ScissorsAndPlanes models using Inkscape, and produce nice small PDF files just like Bruno does. I hope this tutorial is useful to you. If you have any questions you can send me a private message on the forums at papermodelers.com or zealot.com, username sjsquirrel.