

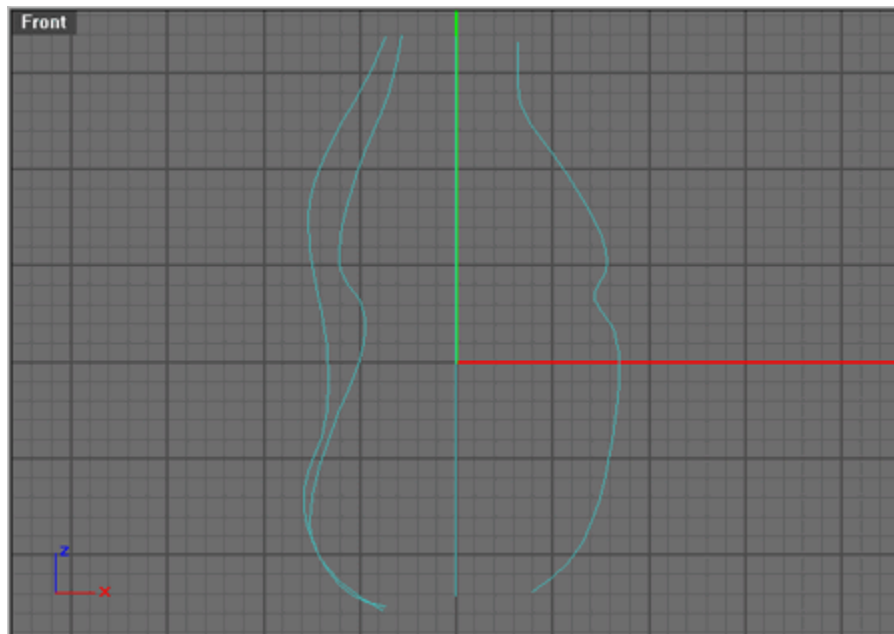
This tutorial covers the modeling of a character, including defining some of its musculature. Note as you proceed through the project that a rough form will be created first, and then detail such as musculature will be added to the different body parts.

Torso

Open trog1.3dm and save it out as trog1.3dm on your local drive in a new subdirectory called trog. The 'reference curves' layer has curves that you can use or reference through out the tutorial. This tutorial is structured so that you can do everything yourself and use your file all the way through or you can merge reference layers as you go or you can open completed files that are current up to that point in the tutorial.

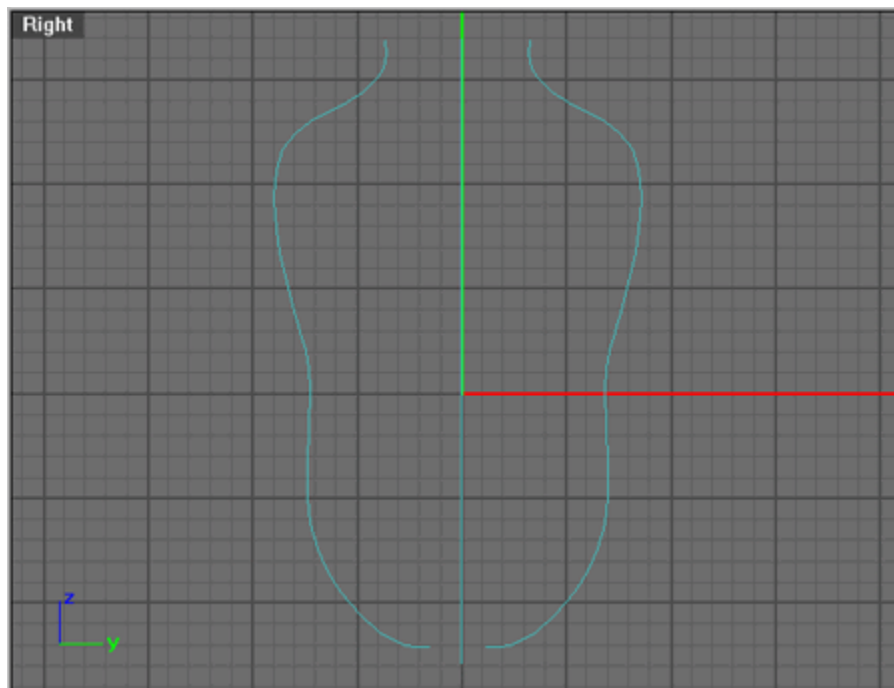
From the right view sketch out a curve roughing in the shape of the chest and torso as shown below.

Draw another curve defining the back and buttocks. Also add a second reference curve for the ridge on the back.



Go to the front view and draw a curve defining the neck, shoulder, ribs, and stomach. **Mirror** the curve to the other side.

Select the curves and show control points **PtOn** and tweak to get the general form you want, adding knots if necessary (Edit/Point Editing/Insert knot). Also make all the curves end at about the same height as shown below.

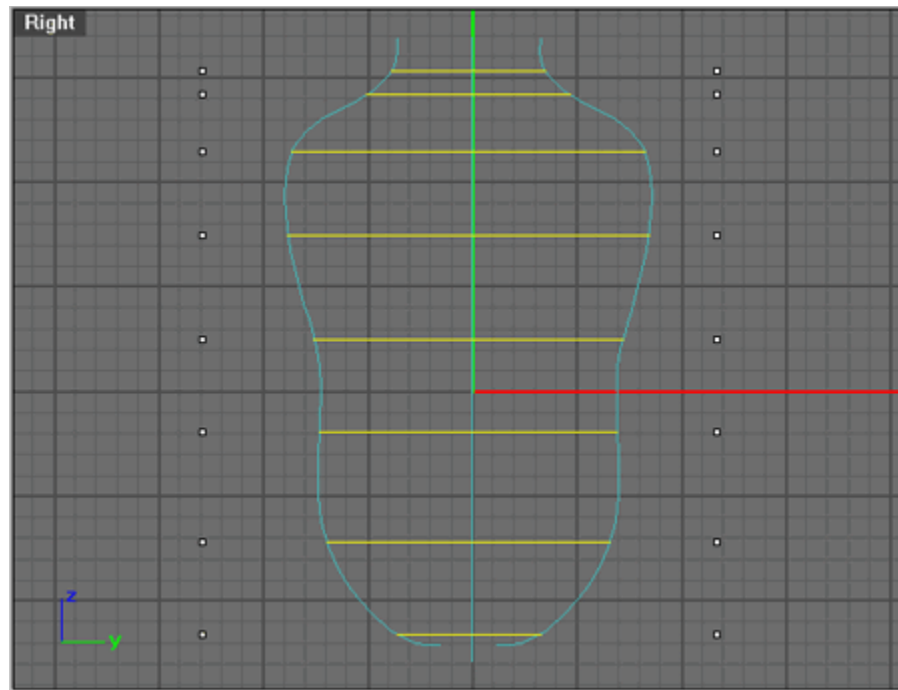


On this next part it is important that the **CSec** sections are in the same places on the torso. Turn on the layer 'point snap.'

Select the profile curve that forms the back (not the ridge reference curve) and then pick the right side, front and left side curves in that order and then hit Enter.

The next thing **CSec** will ask for is for the first and last point of the cross section line, which will create a

cross-section of the profile curves. With the 'Point' osnap on select the upper left point and the point directly to the right of it and continue connecting the points creating **CSec** curves across the profile curves as shown below and hit Enter after completing the curve.

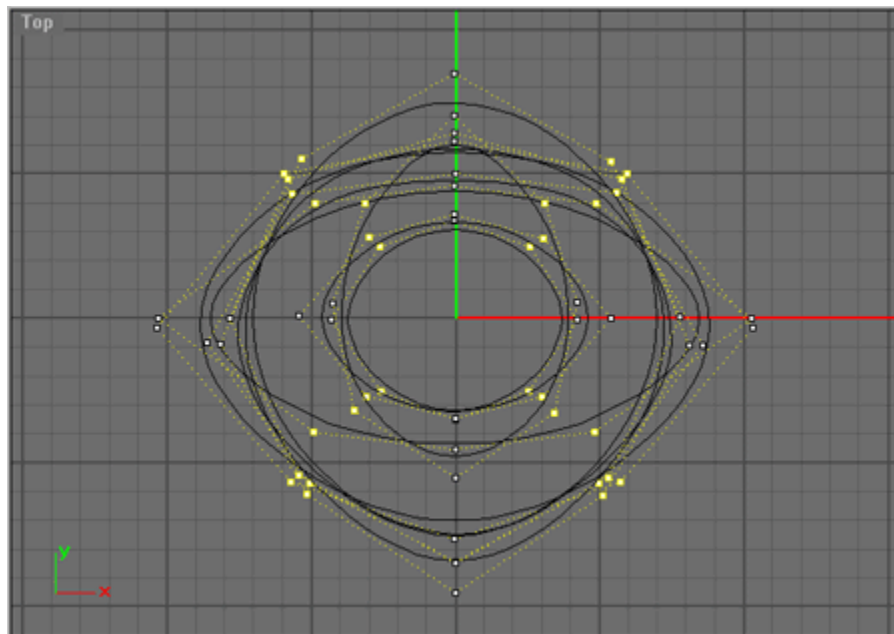


Note: Where you put the cross sections is important to the result of the loft surface. The basic rule of thumb with the **CSec** command is that you need to put more cross sections where you need pick up more detail, for instance if you were doing a arm you would want more cross-section's around the elbow.

A different approach would be that we could select the four profile curves and loft them and perhaps use 'Rebuild with 10 control points' option. But a more advisable approach for a tubular object like a torso, arm or leg is to use **CSec** on the profile curves to get a series of curves running down the torso which can be lofted in a more controlled manner.

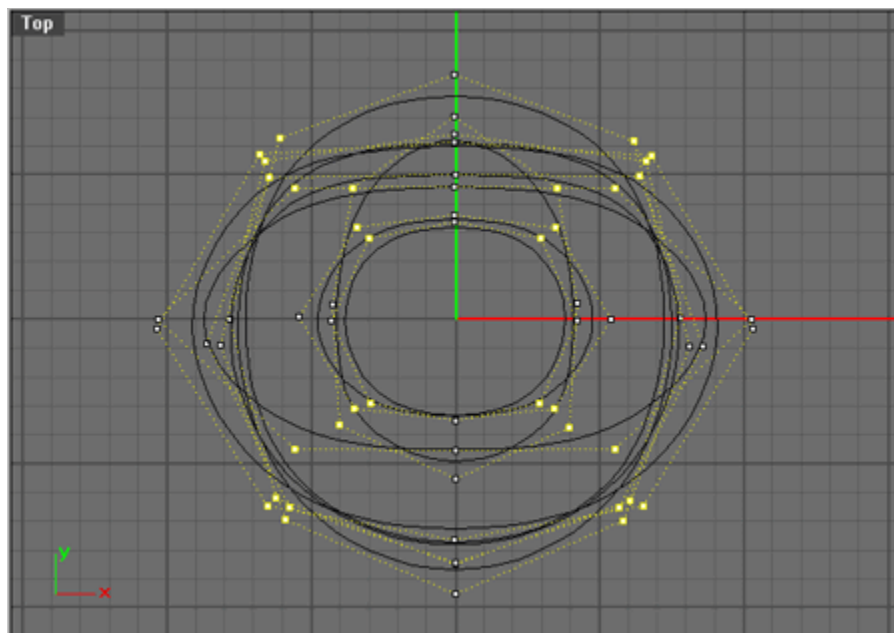
Select the new curves generated by **CSec** and hit 'Rebuild with 8 points.'

With the curves still selected hit **PtOn** and select all the points that form the corners of the curves from the top view as shown below.



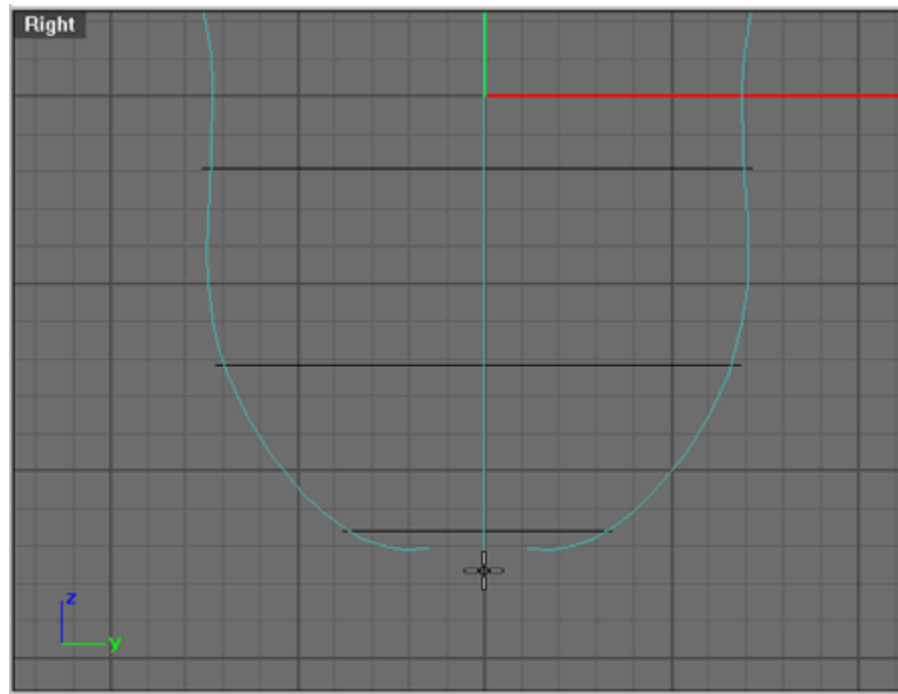
Square up all the curves with **Scale2D** all at the same time by selecting the approximate center of all the curves as the origin point and with shift pressed pick a point outside the curves as the first reference point and pick and point a little further out than the first reference point or type in **1.14** as the scale factor.

Or watch the scale factor (after picking the origin and first reference point) in the lower left corner of the workspace (just to the right of the X: Y: Z: info and drag until you have a factor of about **1.14**. as shown below.



Note: Or you could eyeball it, which is the way I hope you start doing it. Try to go with lines that look right to you and try to get into a creative flow whenever possible.

Hit **Loft** and drag select all the section curves (not the profile curves) and notice that there's a **'Point'** option in the command line. Type in **p** and hit enter and notice that the cursor turns into cross hairs and in the front view place the starting of the **Loft** as indicated by the cursor cross hairs shown below.



Select the rest of the **CSec** curves from the bottom to the top in order and then hit enter to bring up the loft dialog box and use 'Rebuild with 16-control points' option.

Select the new surface and hit **Dir** (short for direction) and be sure that the surface normals are pointing out. If they are not pointing out you can flip them by typing in **f** (short for 'FlipNormal') and hitting enter and hit enter again to exit the **Dir** command.

Note: The direction of the normals were determined when the profiles were selected. If the profile curves had been selected in a counter clock wise sequence (looking from the top) the direction of the surface normals would have been facing inwards.

Hit **SelCrv** to select the **CSec** curves and **ChangeLayer** them to the 'curves' layer and hide the layer.

Save out your file

Ridge on the back

Overview: Here's good place to open up your 'Select Points' toolbox and get setup to do some point editing.

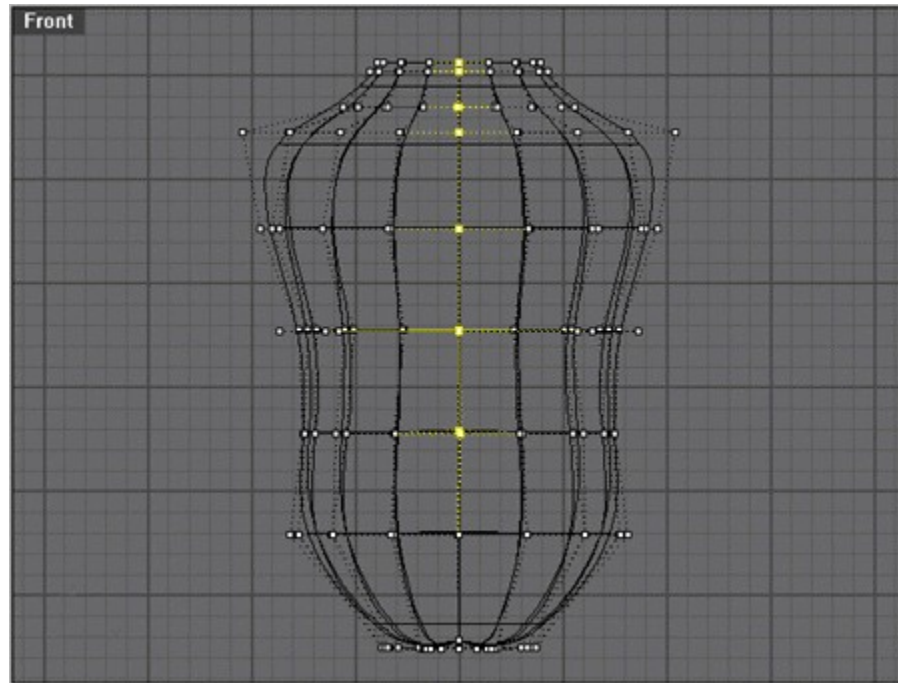
Continue with your current file or you can open trog2.3dm for a complete version.

Make the perspective view active and use the **CullCp** command so only the points that are on the surface facing you are showing. Also turn on **DynamicShadingPerspective**.

Tip: make a hot key for **CullCp**, go to Tools/Options/Aliases and click on the new button and type in '**cx**' for the hot key and **CullCP** for the command. The reason this is so useful is that in the side view you want to see the points on the far side of the object so you can select the points on both sides of the object and transform them symmetrically. On the other hand when working on the front of an object you usually don't want to inadvertently select the points on the back of the object. The following is an exception to that rule.

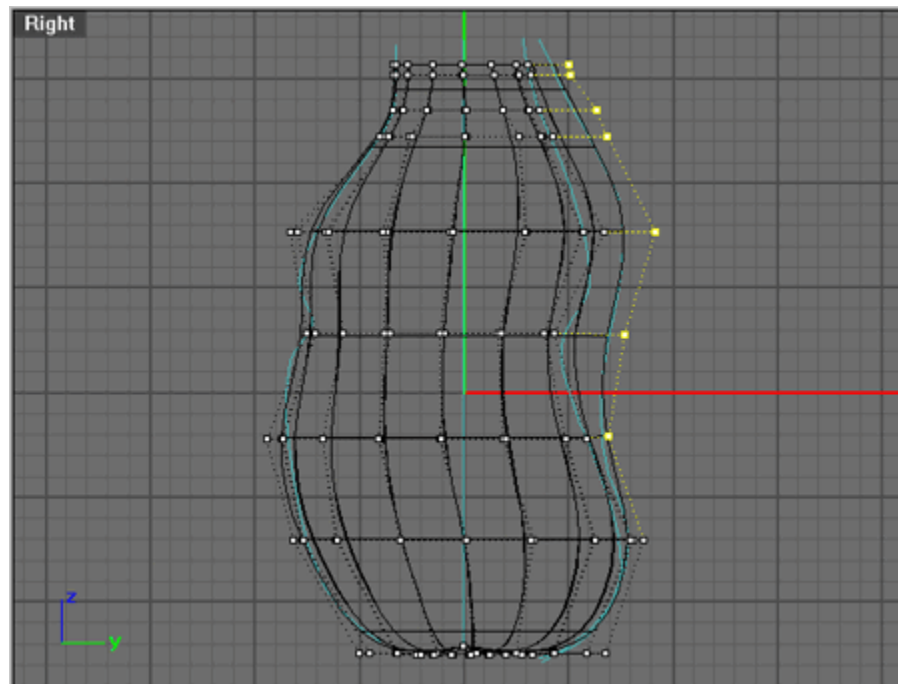
Hide the profile curves except for the ridge curve.

What we need to do here is select the top 7 points in the vertical middle of the back and pull them out. The best way to make this selection is to turn off **CullCp**. Drag a selection box around the top 7 middle points in the right view shown below.



In the front view hold 'Ctrl' down and drag a selection box around the points on the front or stomach of the torso to de-select them.

Drag the selected points to the right about 2 grids as shown below.



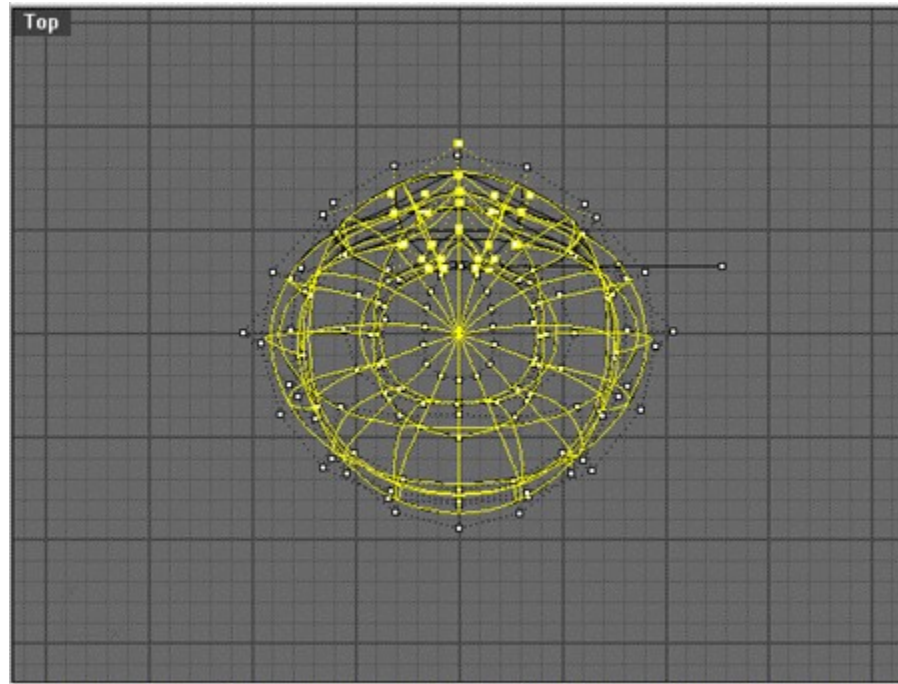
Note: This is a common way of selecting points. Sometimes it's easier to select more points than

you need and de-select what you don't need.

Select the previously selected points individually, and line them up to the ridge reference curve.

Reselect the original 7 Points and hit **AddPrevV AddNextV** so that you have the middle three rows selected from the lower back up to the neck.

In the top view use **Scale1D** to make the ridge more pronounce by bringing in the outer rows of points closer to the middle row of points with a scale factor of about **.5** which can be viewed in the lower left of the Rhino interface, just to the right of the X Y Z coordinates. With **DynamicShadingPerspective** on you can see the results interactively in the perspective view.



Save your work.

Select Point Toolbox













Let's stop here to get familiar with the 'Select Points' Toolbox. If you're using the 'dakind.ws' workspace you'll find the 'Select Points' toolbox in the 'demo' toolbox shown to the right above under the edit points on/off icon (shown with red outline).

If you want to use the workspace your using now and you do not have a 'Select Points Toolbox go to the menu Tools/ Toolbar Layout / Edit and hit the 'Import' button and import the selpoint.ws workspace off the CD-

ROM in the '/workspaces' directory on your CD and import the toolbox 'Select Points' and 'demo' and save out your workspace.

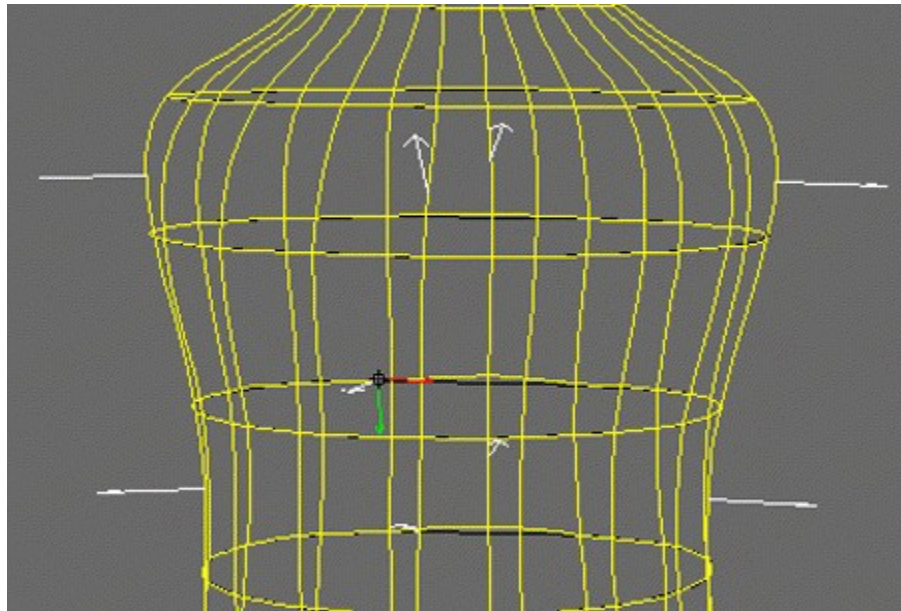
Click and hold down on the control points on/off icon (shown with red outline above) in the 'demo' toolbox and then click on the 'Select Points' title bar and drag to the side. The icons in the 'Select Points' Toolbox are:

	Control points on/off (left click turn on the control points and right click turns them off)
	SetPt (which moves all the selected points to the same plane, X, Y or Z)
	Nudge (which moves selected points in increments you determine with the arrow keys), SelConnected (expands the connection from the selected point)
	Expands the selection of the selected points in both the U and V direction by 1 point.
	Select U or V (left click selects all the points in the U direction and right click selects all the points in the V direction from the point selected)
	Selects all the points in the U or V direction from the point or points selected.
	PrevU NextU (left click moves the selection to the previous point in the U direction and right clicks moves the selection to the next point in the U direction from the point or points selected).
	PrevV NextV: left click moves the selection to the previous point in the V direction and right click moves the selection to the next point in the V direction.
	AddPrevU AddNextV: left clicks add a point in the U direction and right clicks add point in he V direction.
	AddPrevV AddNextU: left click adds a point in the U direction and right click adds a point in the V direction.

Another place to access the select points toolbox is from the demo toolbox under the lasso icon. Lasso is another important point selecting tool with which you can freeform draw a selection of points. Lasso only select points and not objects.

Setup the direction **Dir** of the U and V of the surface so that the arrows on the U and V icons in the 'Select Points' toolbox coincide with the U/V direction of the surface. This makes control point selecting much faster and intuitive an shouldn't interfere with any other commands other than **SrfMerge**, which is dependent upon the U/V of the surface, and is an easy fix using the **Dir** command.

Hit **Dir** and click on the torso, the white arrows are showing the normal's direction and there is a red and green arrow coming from the center of the cross hair's. The way the arrows are pointing as shown below is correct for this tutorial.



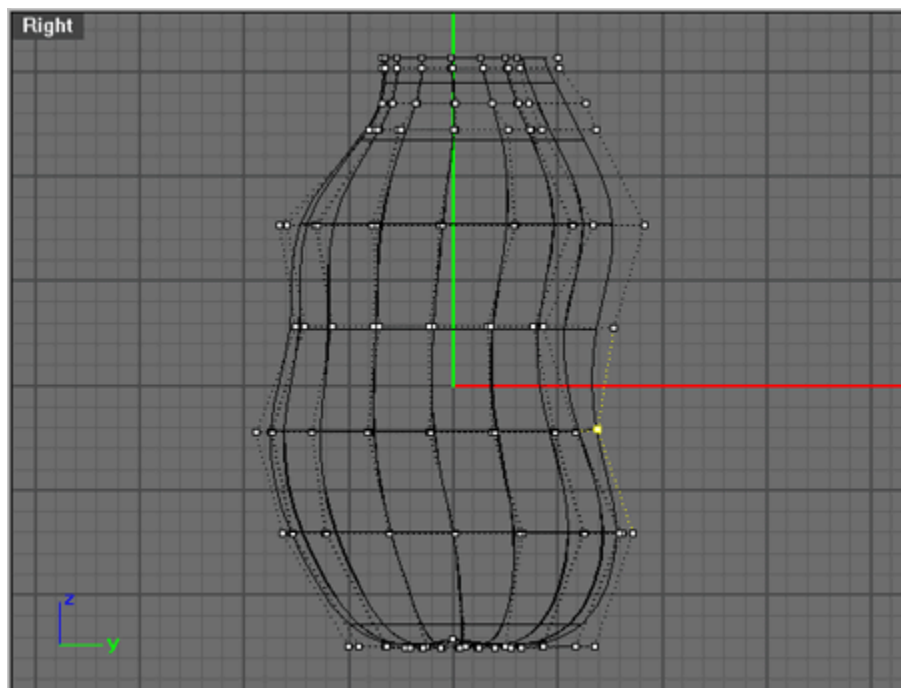
If the green arrow was pointing up then you would enter 'v' (short for 'VReverse') and if the red arrow was pointing to the left you would enter 'u' (short for 'UReverse'.) If the green arrow was pointing horizontally and the red arrow vertically you would enter 's' (short for 'SwapUV') which swaps both the U and V directions.

Booty

Save your file or open trog2.3dm for a complete version.

Similar modeling methods need to be used for the buttocks as compared to the ridge except the opposite as you will see in a minute.

Select lowest point that we used to make the ridges as shown below.



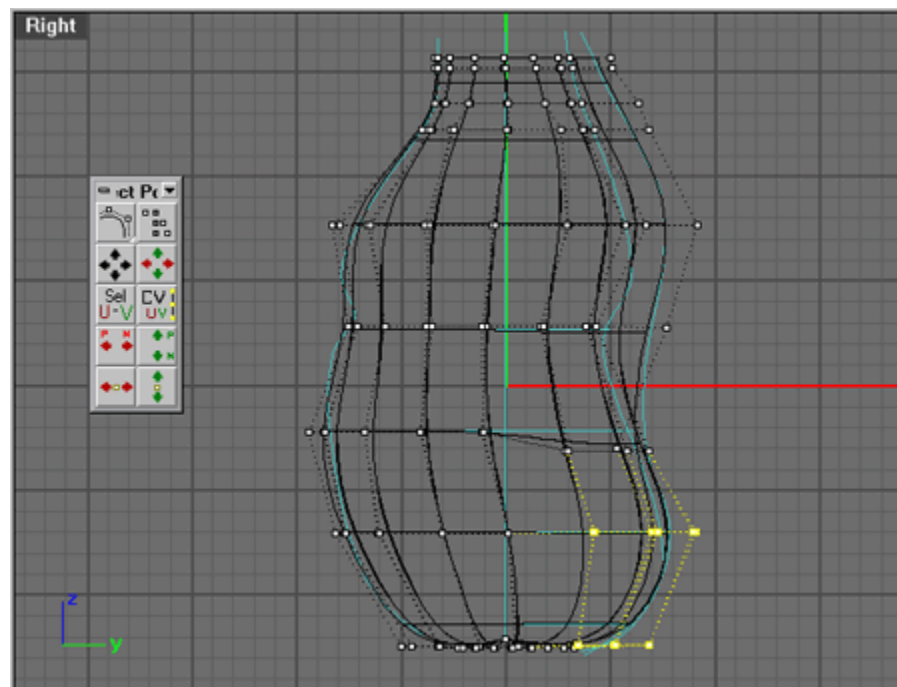
Right click the **AddNextV** twice.

Drag the points to your left about **2.5** units

Left and Right click **AddPrevU AddNextV**.

In the top view **Scale1D** the selected points together with the origin point being approximately on the center line and picking a first reference line out side them and dragging the points close together with shift held down to pinch the booty.

De-select the top row of points then left and right click **AddNextU AddNextV** twice each, in which order doesn't matter. Drag the points to the right about **1.3** units to the left or until they line up with the booty profile curve as shown below.



Move the points up about **1** grid to get rid of some of that "sitting at the computer too long spread".

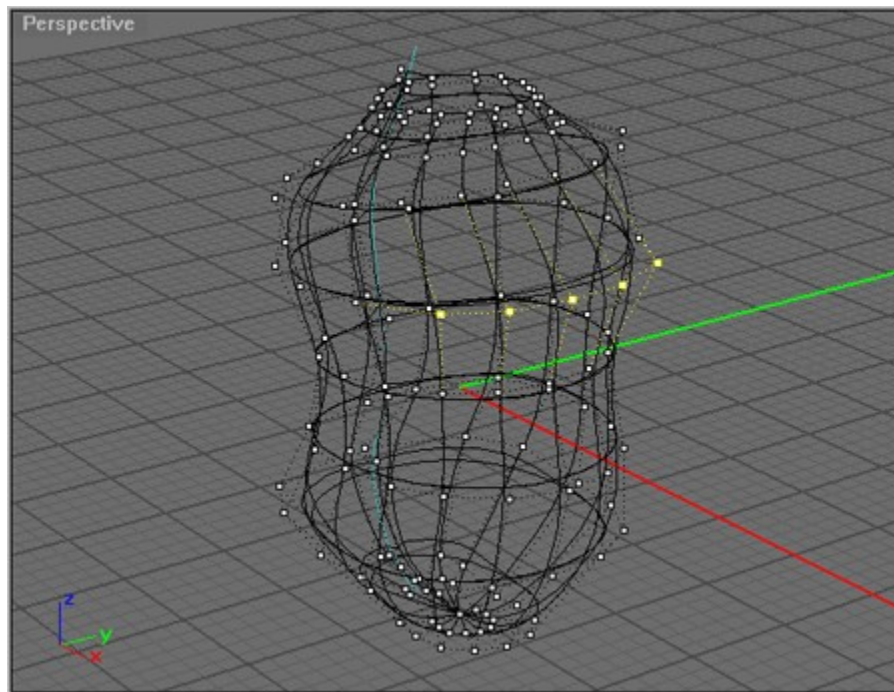
Things to remember are keep things symmetrical (not perfect but close enough to keep the points organized) use the shift key to keep things **Ortho**. Use the stretch tool. Many times you can enter '0' to establish the 'Origin Point' and use the shift key for temporary Ortho when using the scale tools to keep the points symmetrical. Use Next and Prev to navigate your selection around.

Chest

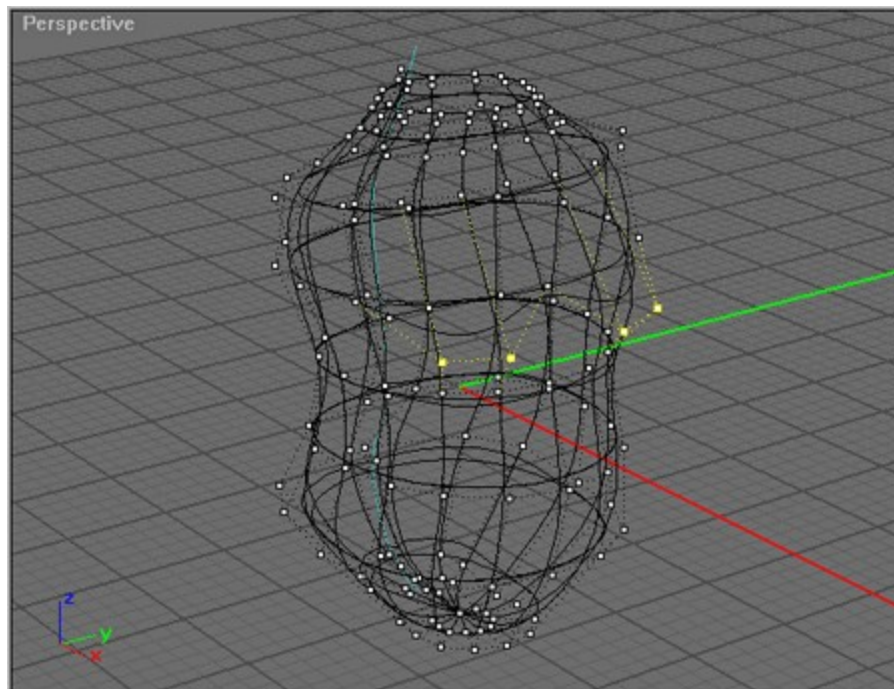
Save your file or open trog3.3dm for a complete version.

Turn on **DynamicShadingPerspective**.

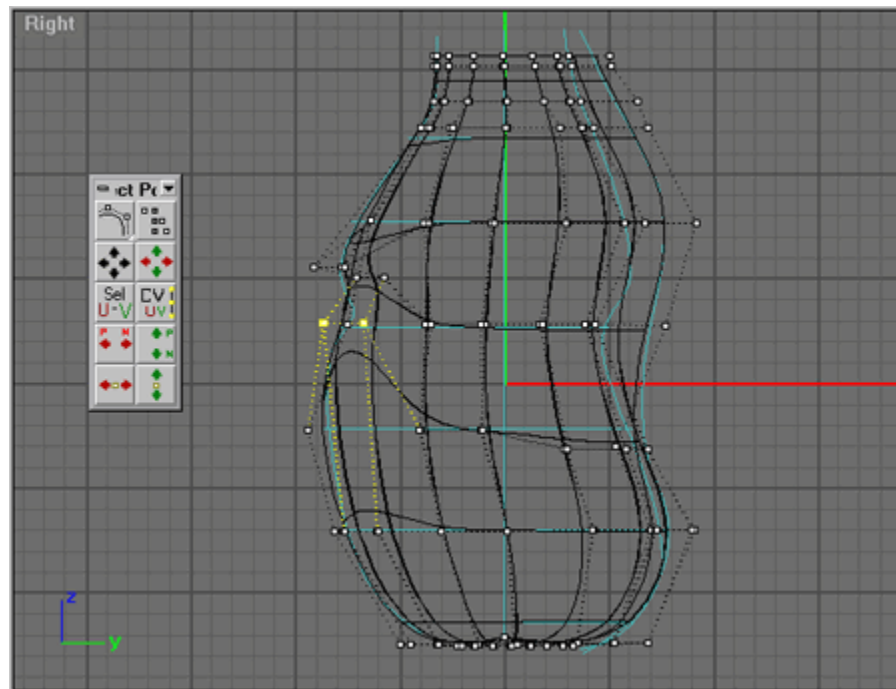
From the right view select the middle 5 points of the chest (which is the 5th row down) and move them out to the left from the right view about **1** grid. Drag the middle point back in for the solar plexus about **4** grids as shown below.



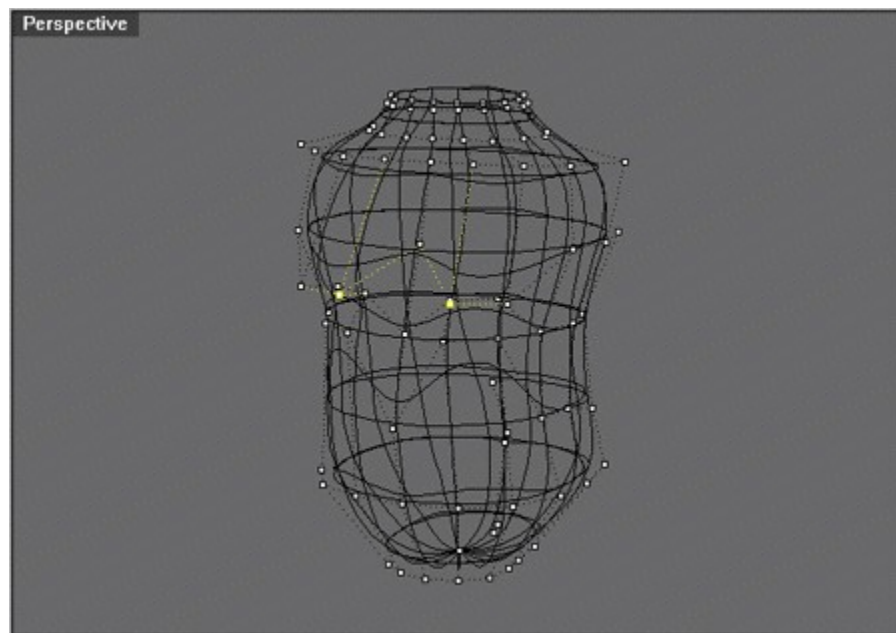
Selected the 4 outer points from the center, 2 on each side, and move them down about **2.5** grids as shown below.



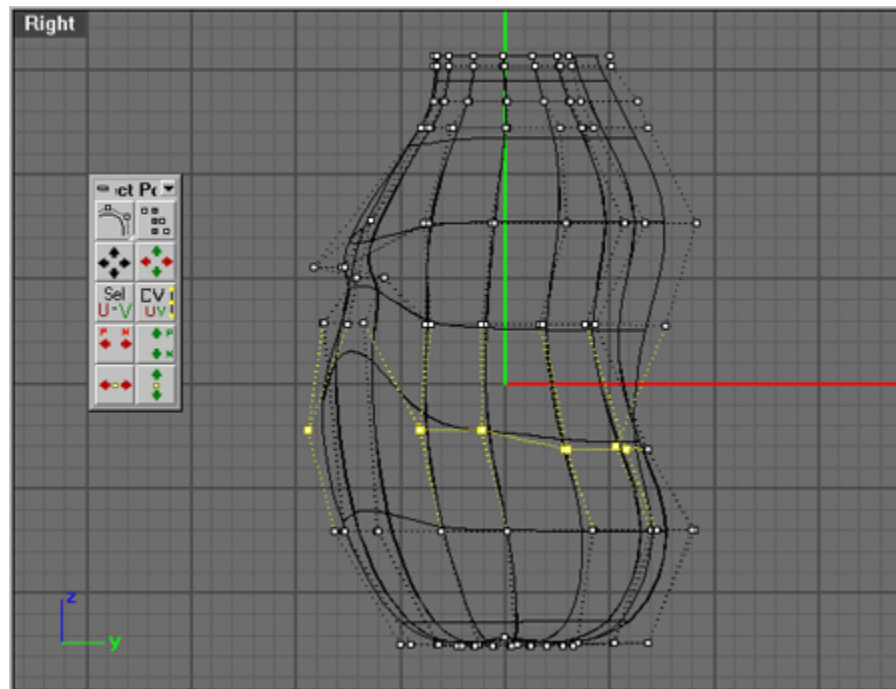
Hit **NextV** once and drag the points up about **2** grids. Hit **NextV** once again and drag the points up about **5** grids as shown below.



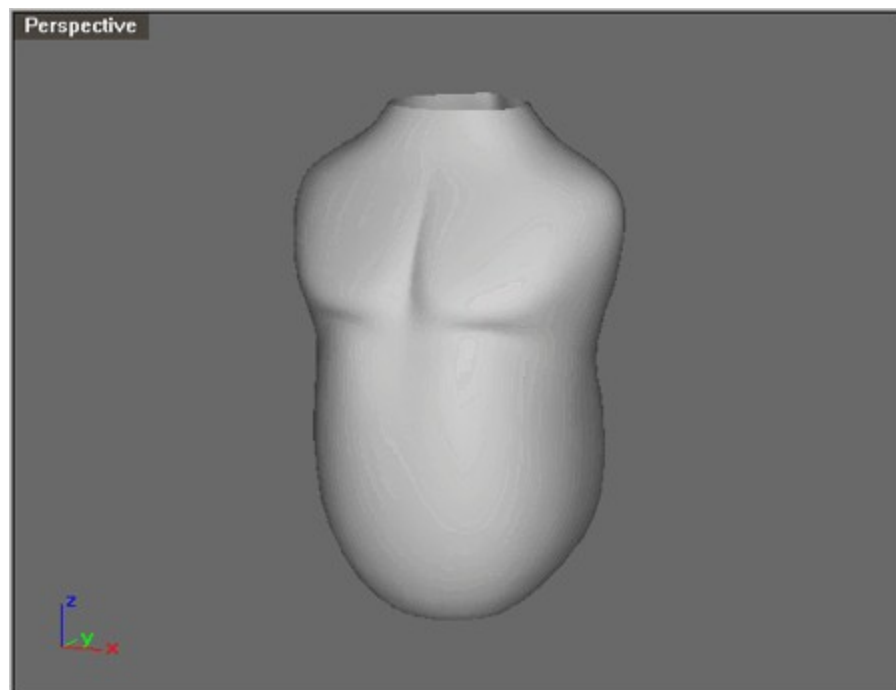
Select the points as shown below and **Scale1D** until they are about **1** grids apart.



With **CullCp** off select the points shown below and drag them up about **4** grids and then select just the single left point of the points selected and watching the perspective view port carefully and drag it to the right until there is a slight crease defining the stomach muscles.



Conclusion: The basic things to note so far is that we don't have too many points to deal with. This is because of the way the model was planned. But it's also important to have enough points to get the job done. Finding that balance and using **CullCp** and using the **DynamicShadingPerspective** along with the 'Select Point' toolbox can make point editing much easier to deal with.



Abdominal Muscles

Save your file and **Merge** t4.3dm or open trog4.3dm for a complete version.

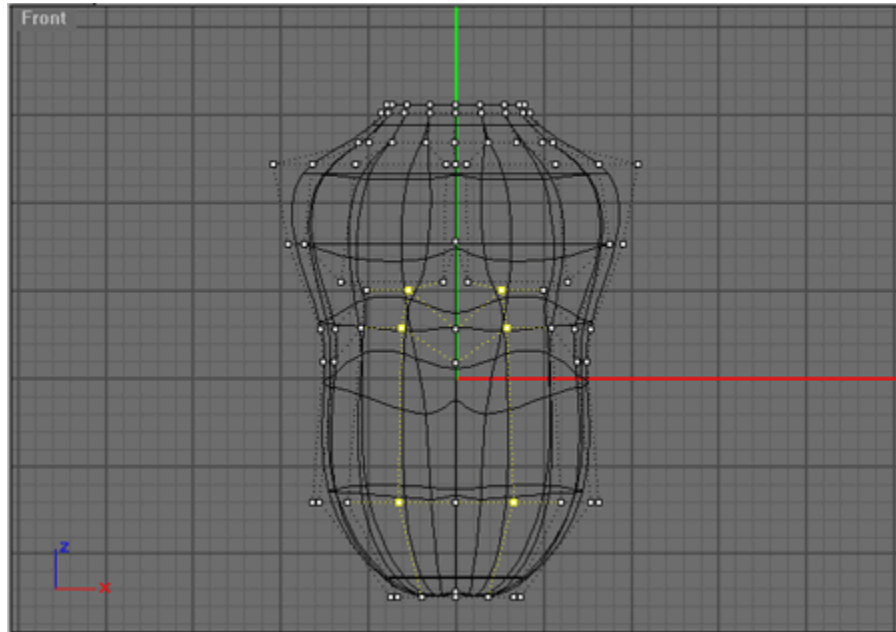
Overview: The reason 'Rebuild with 8 points' originally was used was so that the points wouldn't be hard to choose, the reason 'Lofted with 'Rebuild with 16 points' was used was for the same reason. The abdominal muscles will add a lot of complexity to the torso, which is why we saved it for last.

Note: Showing the definition of the ribs can also be accomplished using displacement or bump

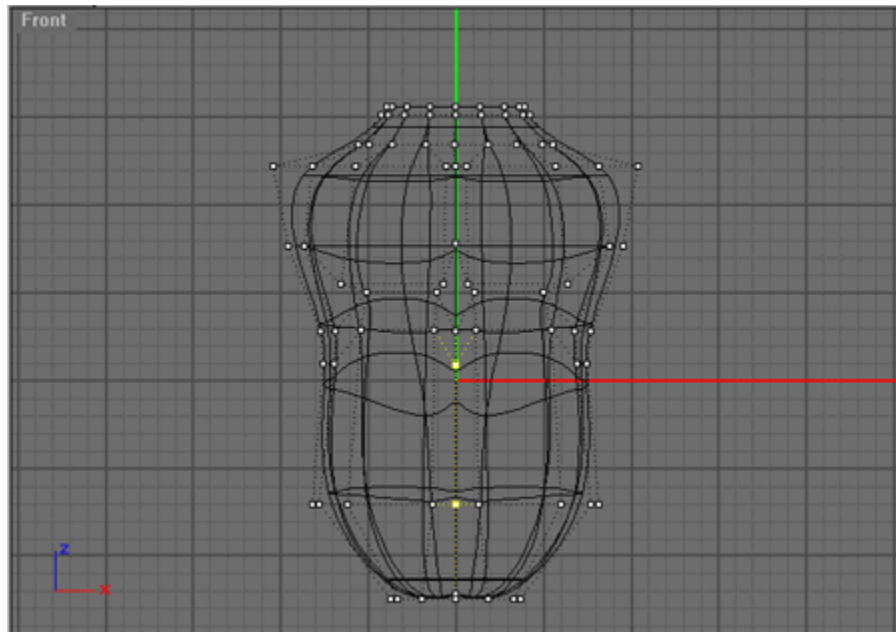
mapping. Bump mapping can be a very effective tool for smaller details like the texture of scaly skin or wrinkles on the forehead or on the fingers and it takes no extra geometry. But for this modeling exercise everything will be done with geometry.

Unless you are doing this tutorial from scratch you can **Delete** the 'reference curves' and 'reference points' layers.

Turn **CullCp** on and select the points shown below and **Scale1D** them in until they are about **1.5** grids apart.

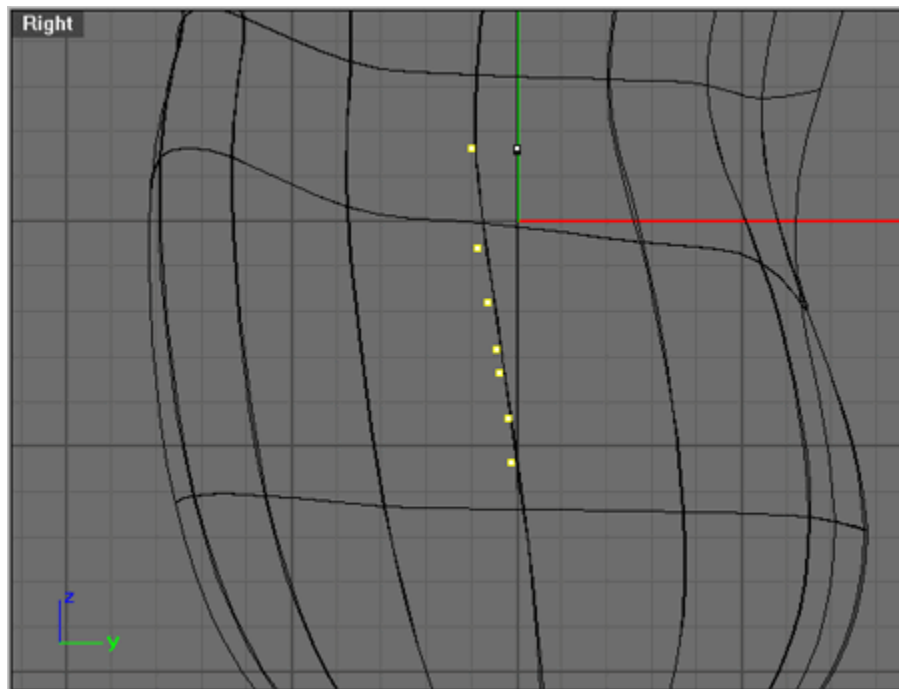


Select the points shown below and in the right view drag them about **.75** to the right.

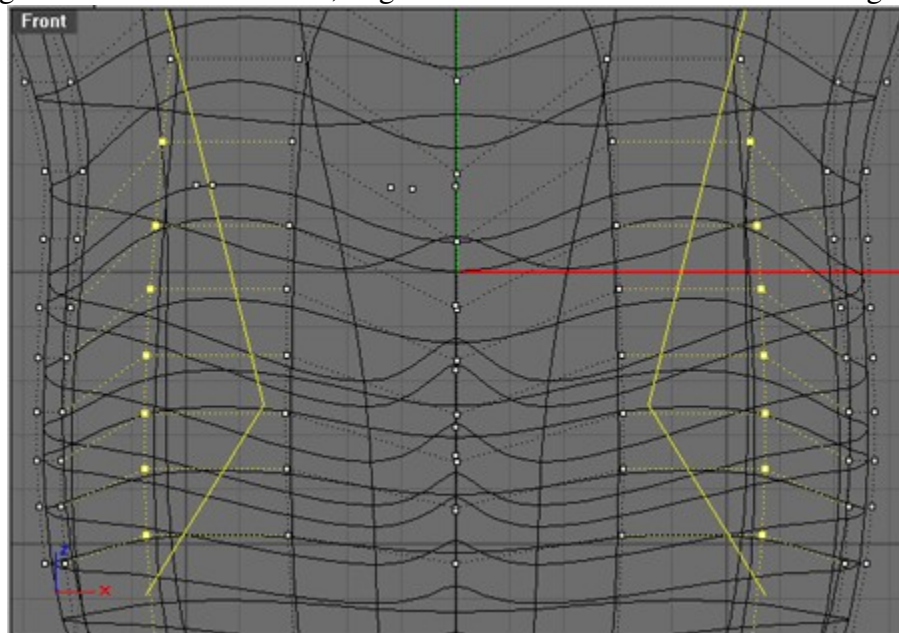


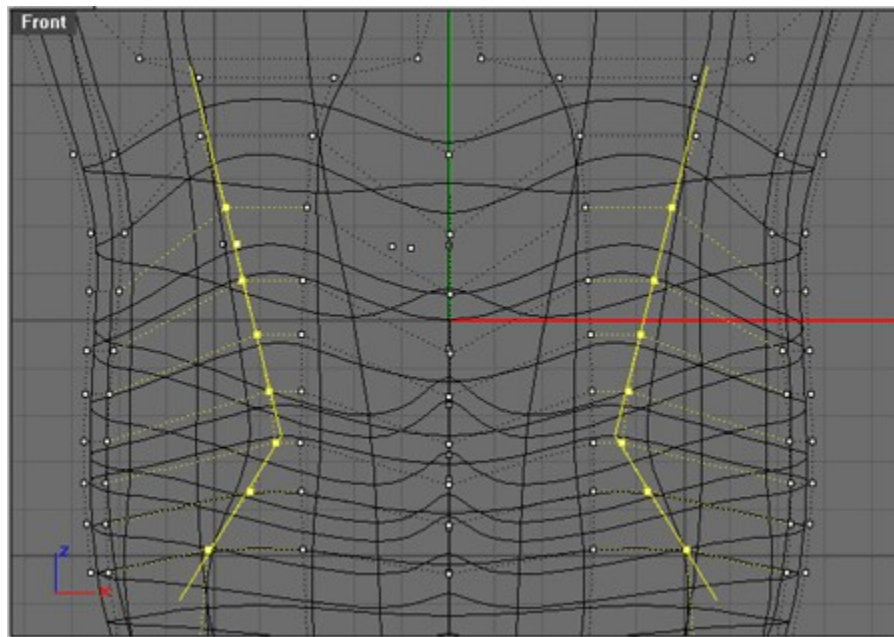
From the right view hit **PtOff** and turn on the 'points guide' layer.

With **CullCp** on, hit **InsertKnot** and select the torso as the surface for knot insertion, use the 'Direction' option and enter 'U' and add knot's according to where the selected points are shown below.

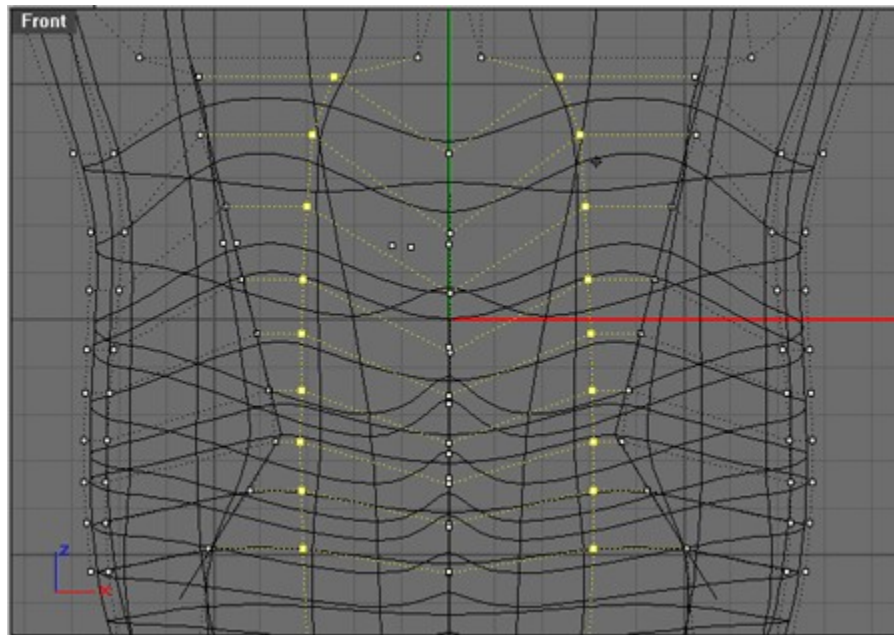


Turn on the 'abbs guide' layer and drag the points shown selected below and individually align them with the 'abbs guide' from the front view, to get the result shown in the second image below.

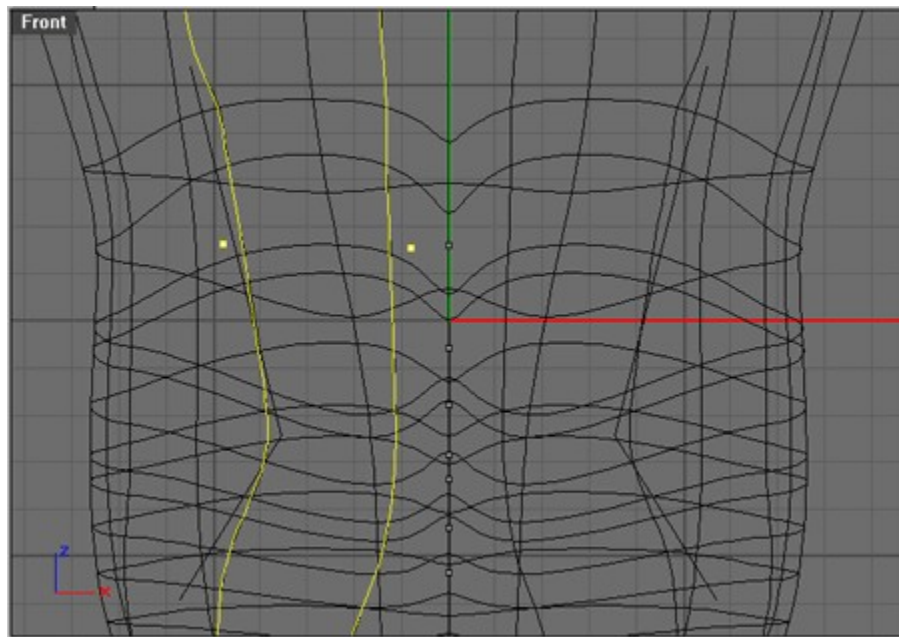




Select the points shown below and **Scale1D** them towards the center until they are about 1.5 grids apart.

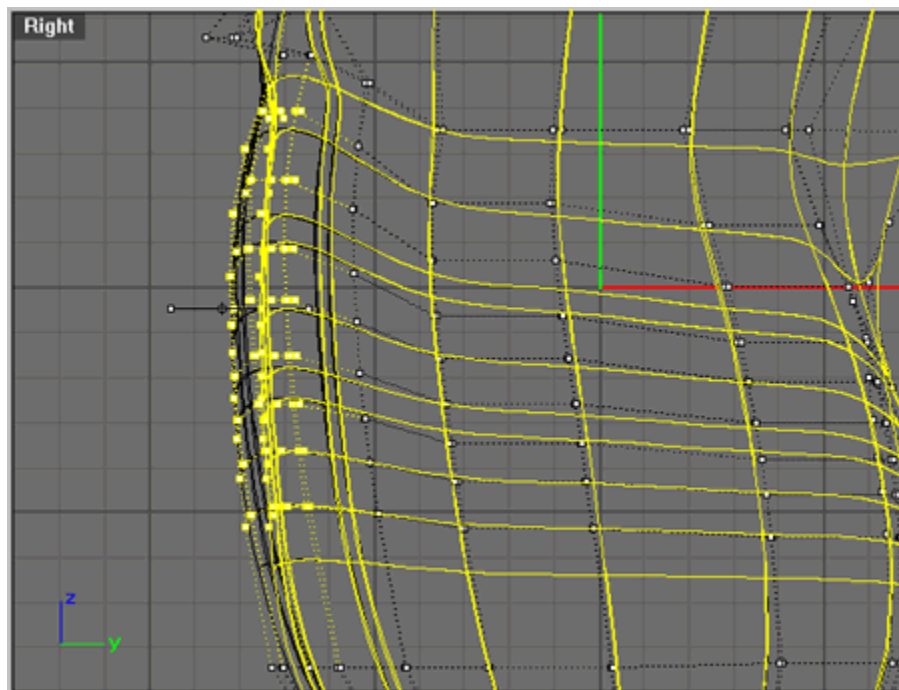


Hit **InsertKnot** and select the torso and use the 'Symmetry' option and place a row of knots just to the right and left of the Isoparm's highlighted below

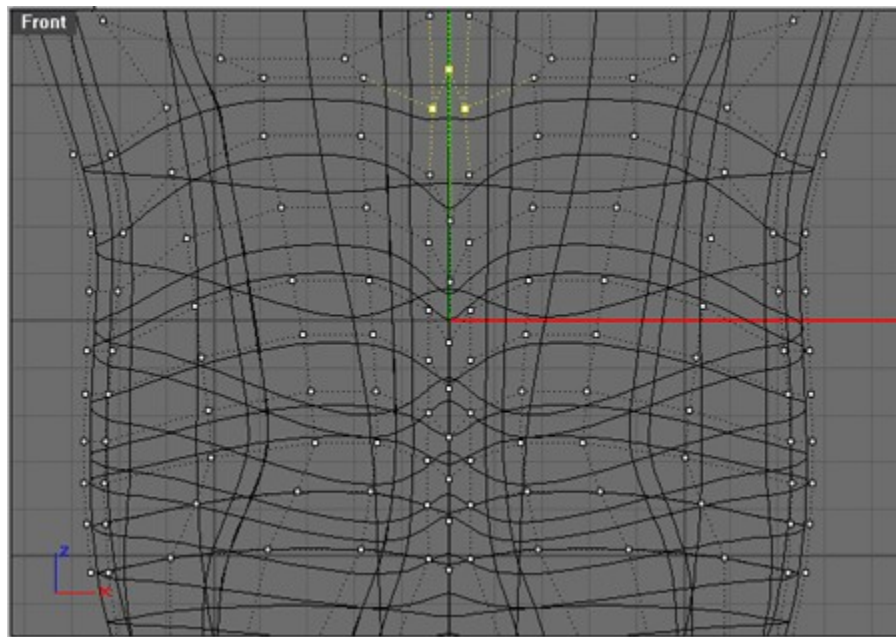


Turn off the 'points guide' and 'abbs' guide layers.

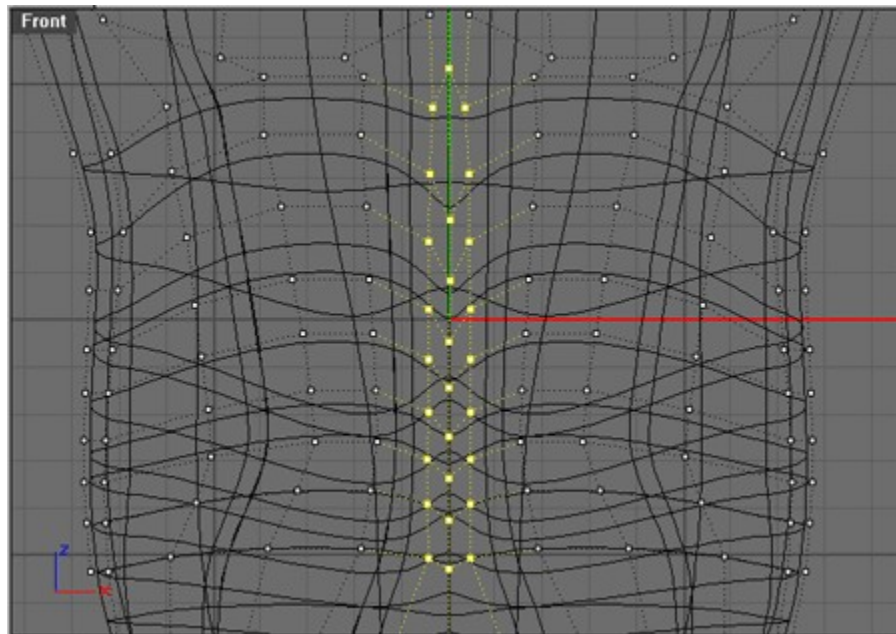
Turn off **CullCp** and in the right view select the points shown below and **Scale1D** them about a factor of **.5** with the 'origin point' of the scale being just to the right of the selected points so as to flatten the stomach. Shown in progress below.

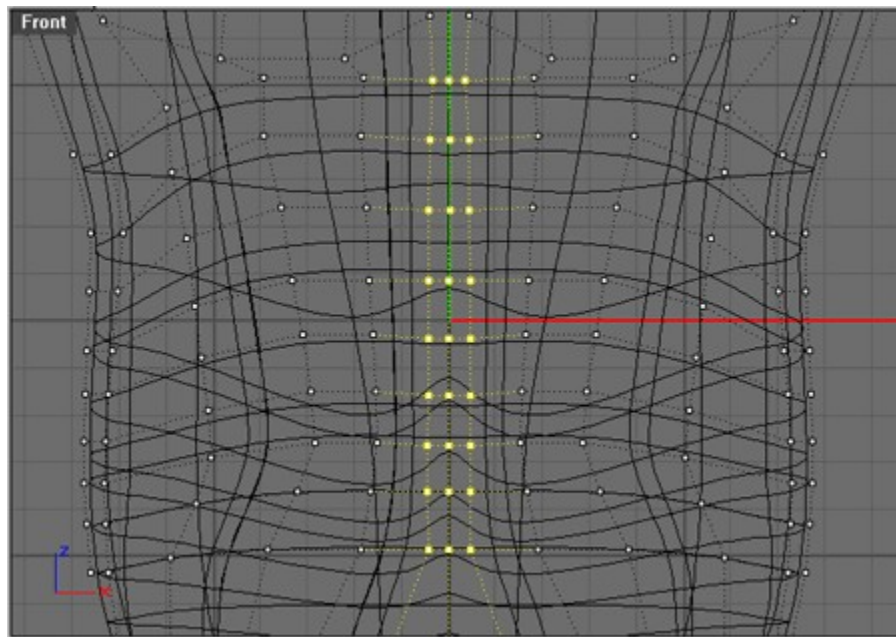


With **CullCP** on select the points shown below and hit **SetPt** with only the 'Z' box checked in world coordinates and click OK and line the points to the unselected points to either side.

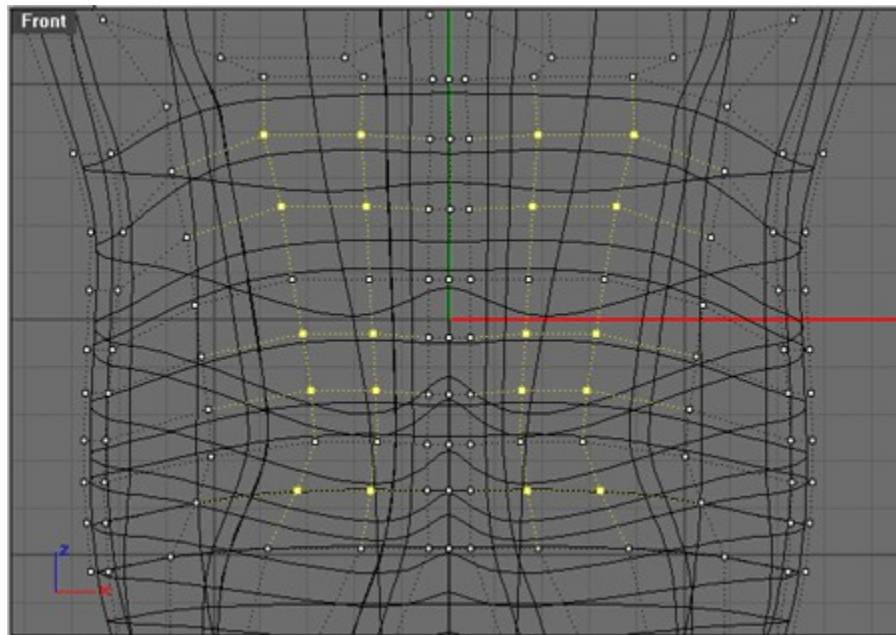


Right click **NextV** and hit **SetPt** and repeat the previous step by lining up the points to the unselected points to either side the overall idea is to the points shown selected below to be in the position shown in the second image below.

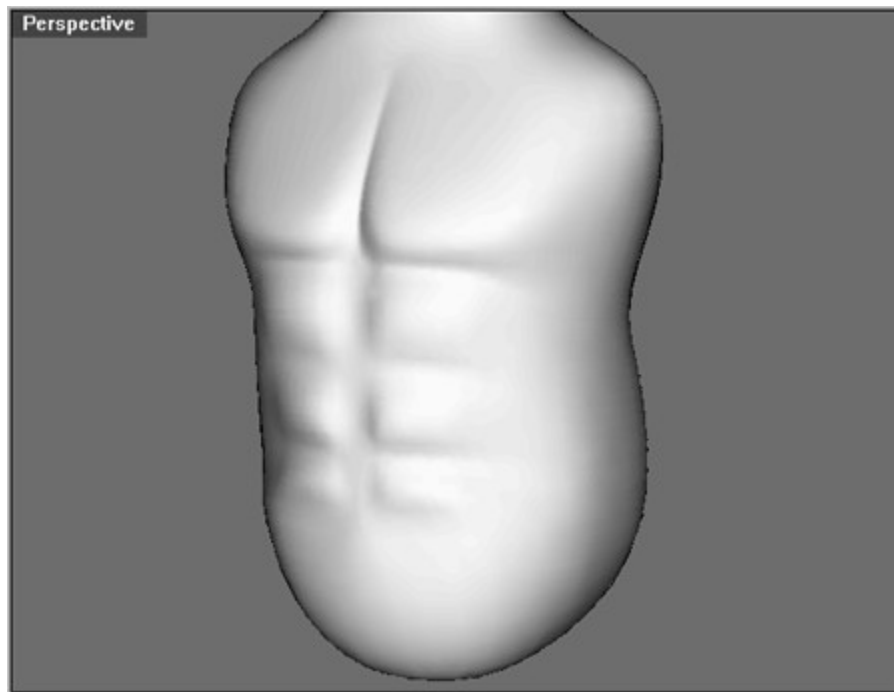




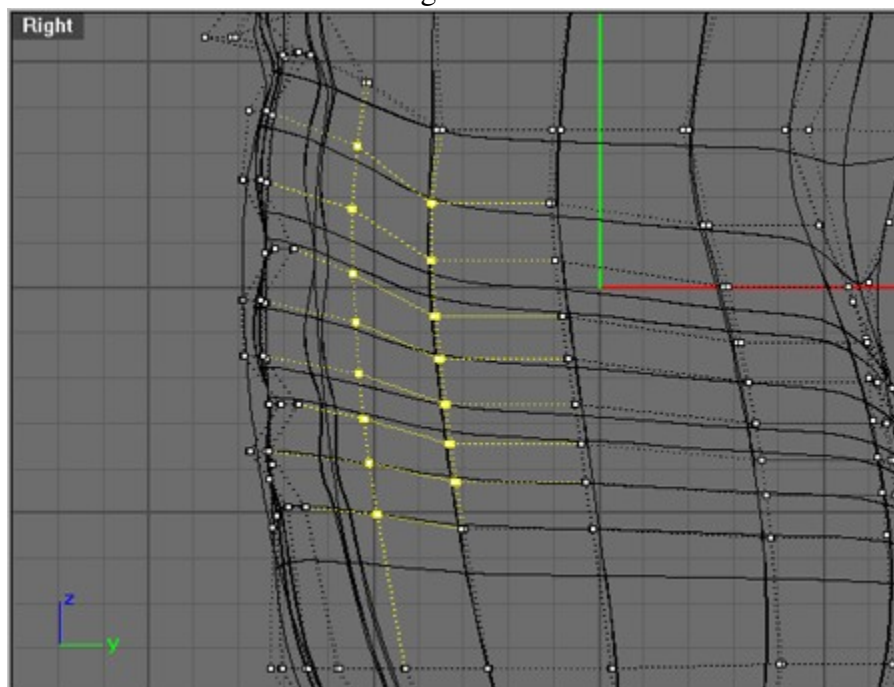
Select the points shown below and from the right view drag them to the left about **.75** of a grid.

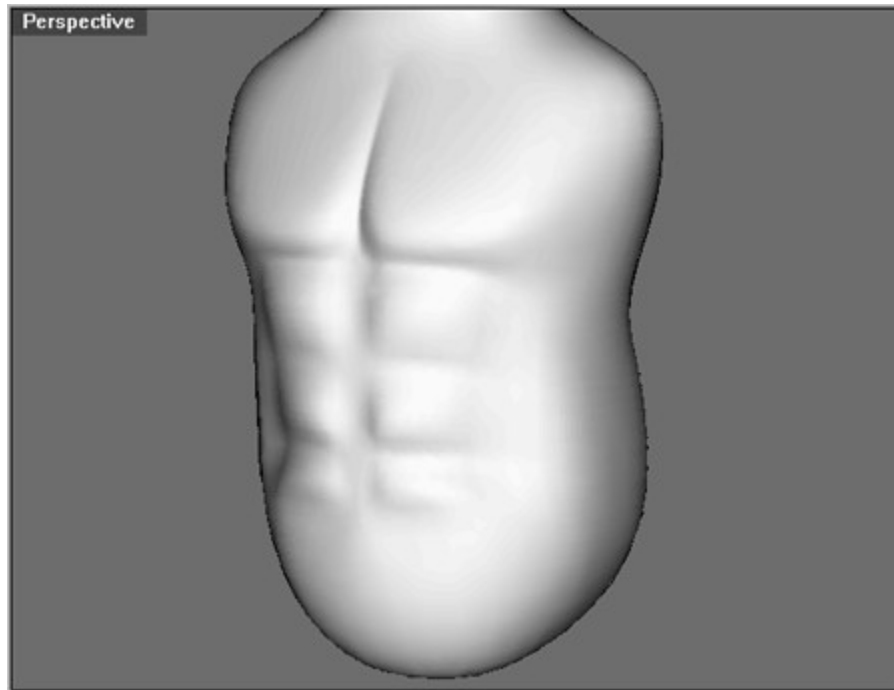


At this point you should have results similar shown below. If the results are not quite as defined below, try using **ClearAllMeshes** in the render menu.



Turn **CullCp** off and from the right view select the points shown below and **Scale1D** them tighter together placing the first reference point at about the center of the selection to get the result shown in the shaded image below.

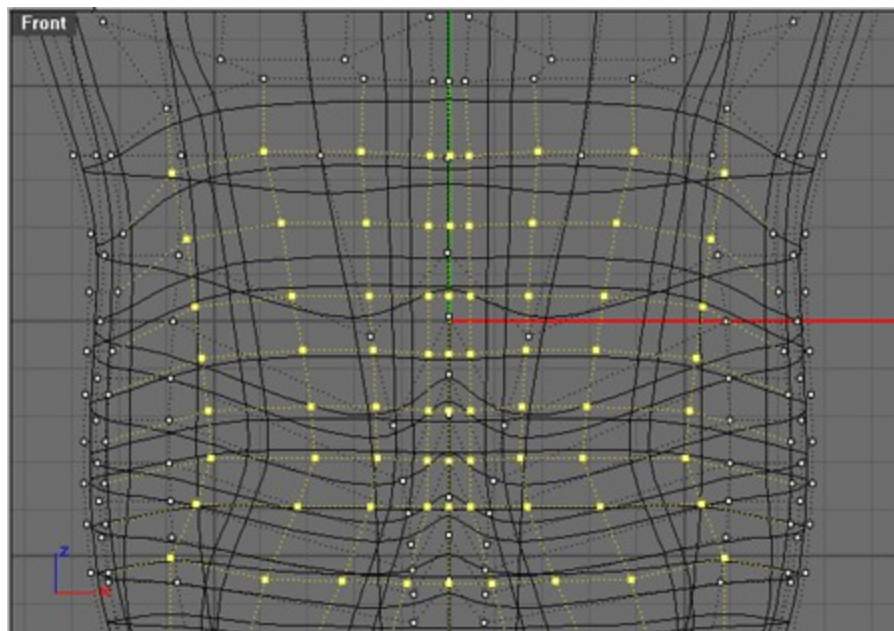




In the Render options you should change the render mesh options to 'smooth & slower.' If this slows your computer you can change it back when you are satisfied that the ribs look okay.

If there is no visible improvement you can use the **ClearAllMeshes** command. The present mesh will be cleared and when you re-render a new mesh will be created and the detail will come through.

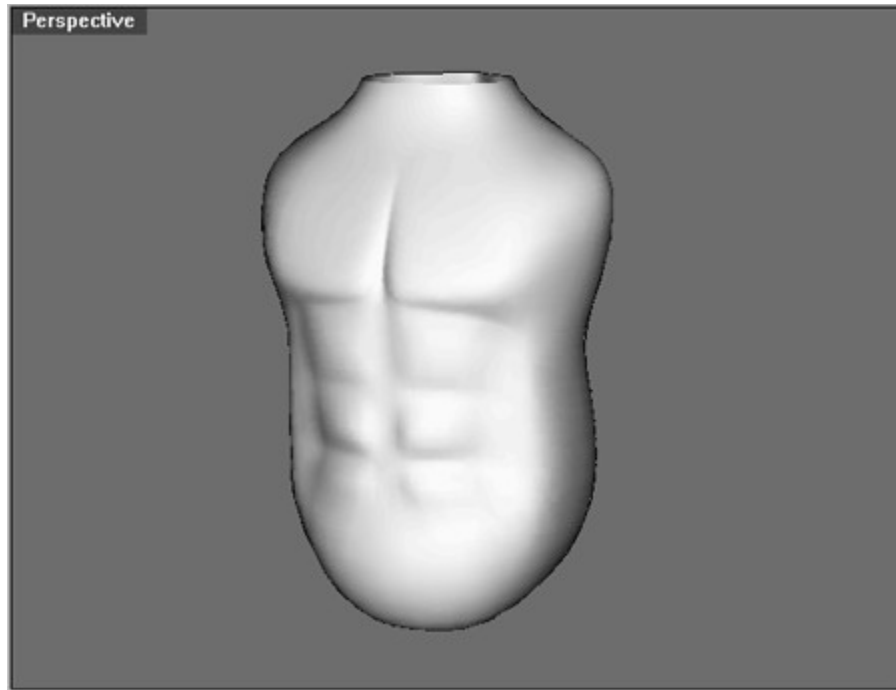
From the right view (shown from the front view for clarity) select the points shown below and moved them to the right and back about .5 of a unit.



This is kind of a departure from the original curves drawn at the start but it achieves the objective of having a character that looks a little overweight but strong 'Trog.'

That's about it. If you want you can tweak some more and maybe make the pecks a little wider and smooth

out the lower abdomen but be sure to save the file out incrementally as you go. Keep in mind that more changes will be needed later when the arms and legs are attached. The image below shows the torso after some tweaking to cleavage, solar plexus and pecks area.

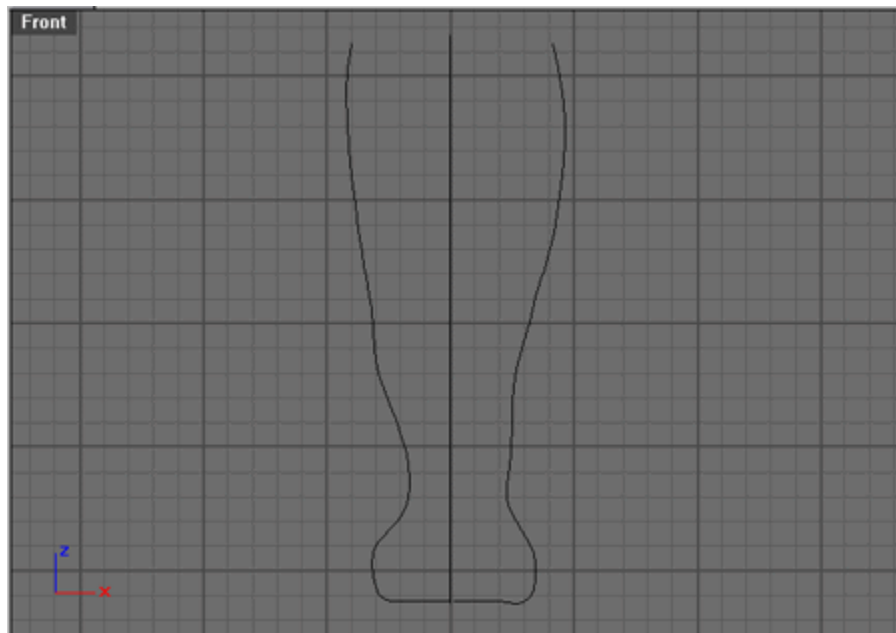


Create a new layer and name it 'torso' and **ChangeLayer** the torso to the new layer and save out your file.

Legs

Save your file and merge the t5.3dm file or open trog5.3dm for a complete version.

Turn on layer 'leg curves'. In the front and left view we see a reference sketch of the legs. You'll see that the leg isn't positioned right (directly under the torso) but rather than go into a tutorial on construction plane's let's construct it where it is and move the leg over after it's roughed in.

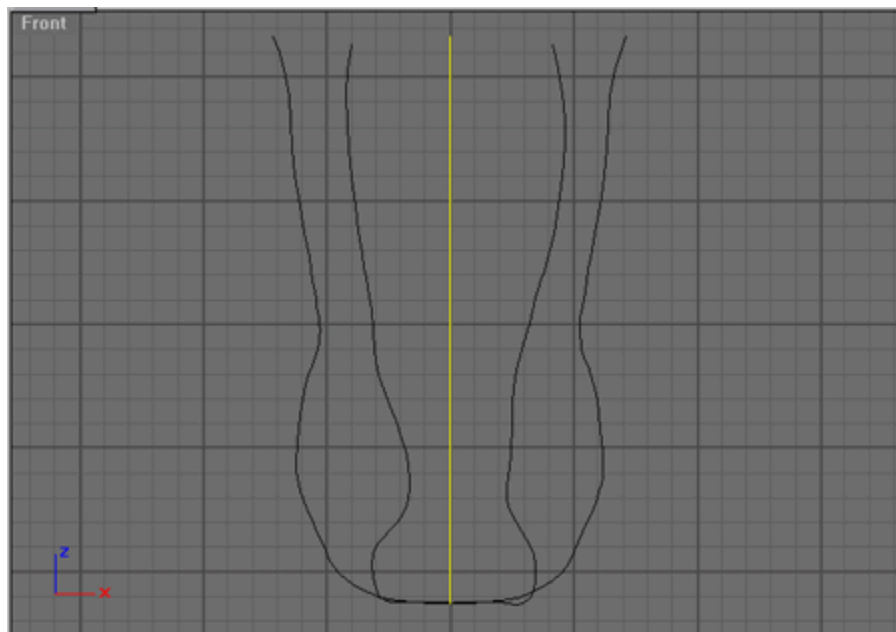


NOTE: In the right view select the 'back of the leg' curve and turn on the points, the thing to note here is that there are intentionally more points in the areas where more detail is needed in the resulting surface. Another thing to note is that the three last points at the lower end of the curve (shown selected below) are at the same height, which was accomplished using **SetPt** to make sure, the final lofted surface has a smooth end.



Hit **PtOff** and select the 'back of the leg' curve and in the top view and with 'End' osnap on hit **PolarArray** and snap to the lower end of the curve and left click.

When prompted for 'Number of elements< 1 >:' enter **6** and at the angle to fill prompt except the default of **360**. Result shown below.

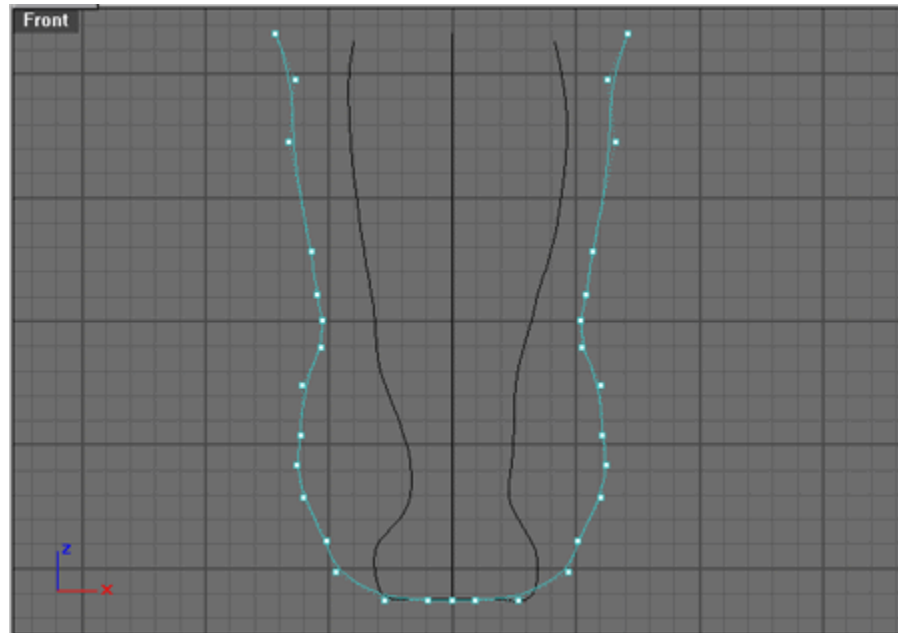


Select the 6 new curves and hit **PtOn**.

Conclusion: So what we have here, are six lines which all have the same point count and all the points are at the same height relative to one another which is the main advantage of this method. I should caution here that this is not the only method and can be an undesirable method for some models that are going to be animated. The reason is that around the ankle area it is easier to setup the skin to the bones of the character if the points go around the ankle in more the fashion a bent tube would. But I have done some animation with this character and I didn't have any problems.

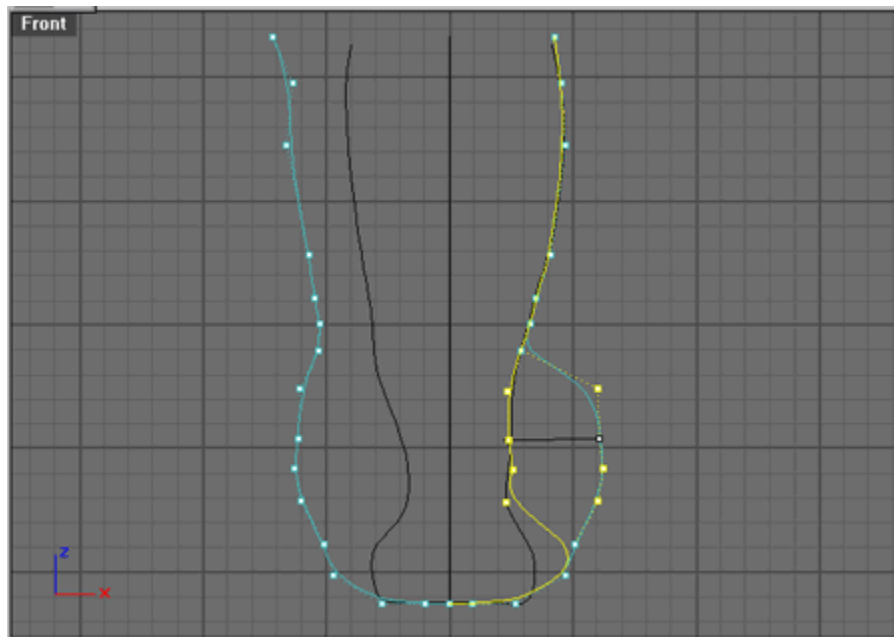
Create a new Layer and name it 'array' and give the layer a light blue color. **ChangeLayer** the new curves to this layer.

In the front view select the left curves and the right curves and turn points on as shown below.



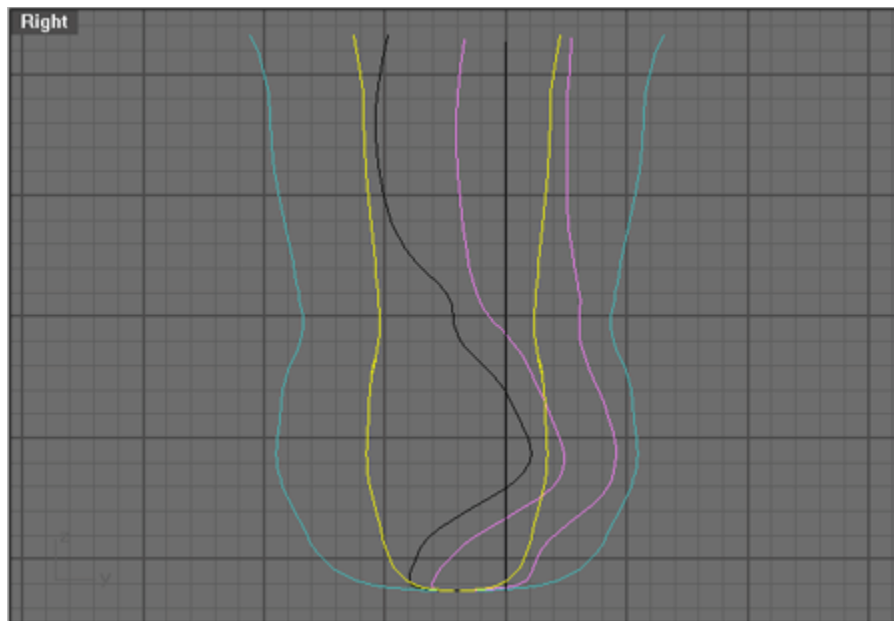
Overview: what needs to be done here is by hand move the control points to the right or left so that the 'array' curves line up the profile curve from the front view maintaining the height of the points. After that we'll go to the left view and lined them up there, always maintaining the height of the points using the shift key for temporary **Ortho**.

Turn **CullCp** off and Lock Osnaps. Window select a few points at time moving them roughly into position (holding the shift key for temporary **Ortho**) and then individually aligning them with the profile curve. Make sure when selecting points that you are selecting the points of both curves (seen and unseen.) The way to be sure of doing that is to always window select. Shown in progress below.

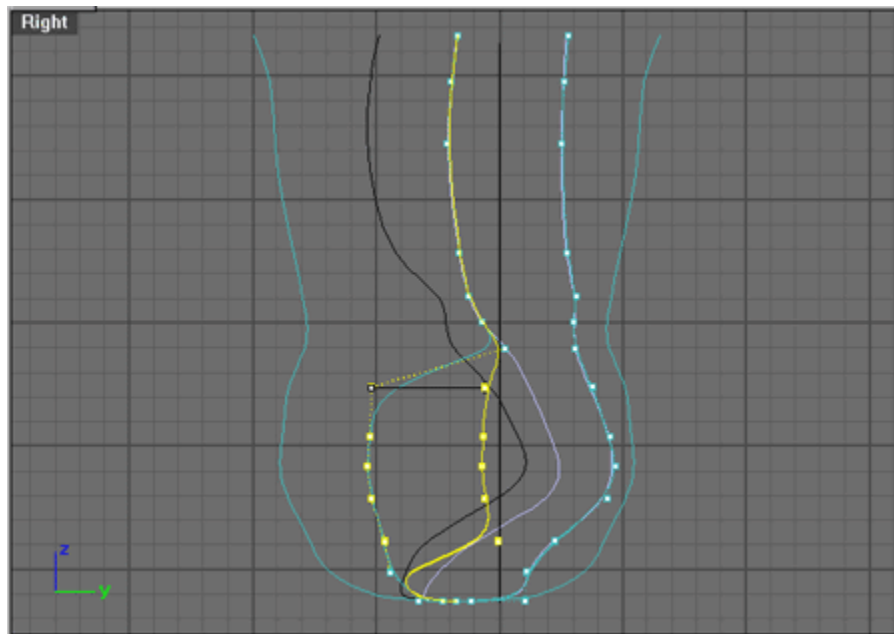


Go to the right view. You have a choice here, you can either turn on the guides layer (actually switch the guides to Lock (**LayerLock**) and line up the 'array' curves shown highlighted below to the guide curves or you can line them up on your own and reference the 'guide' layer once in awhile.

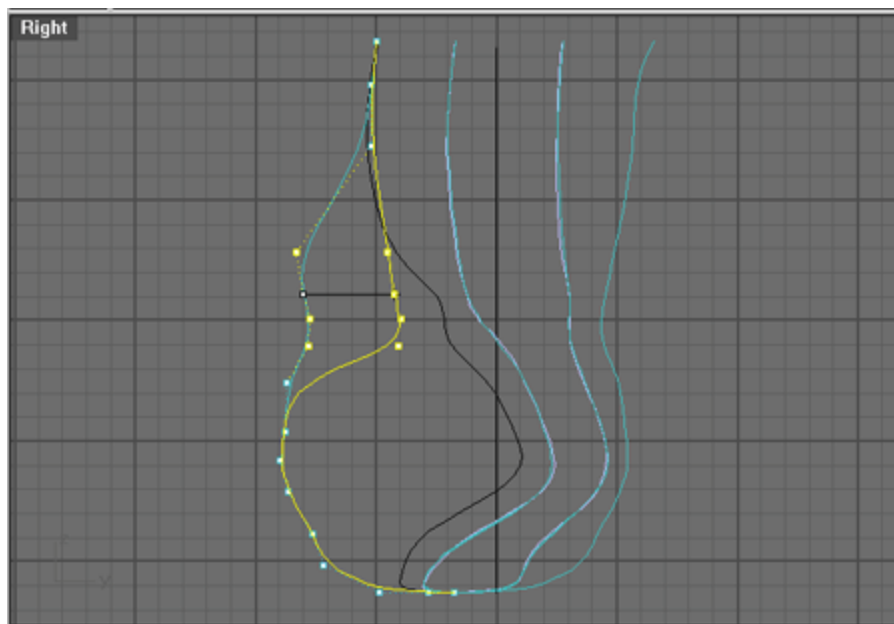
Overview: For starters the thing we're trying to accomplish here is to roughly align the array curves shown highlighted below to form the shape of the leg sides. One thing to know when you're editing the curves shown highlighted below is that the closer they are to the outside profile curves the flatter that area will become on the back or front of the leg.



With the points still on '**PtOn**' line up the points to the guide curves (purple) or line them up so they are equal distant from the outside profile curves as shown below which shows the right curves aligned and the left curves in the process of being aligned.



While still in the Right view line up the left most 'array' curve to the left left most profile curve which shapes the front of the leg, shown in progress below.

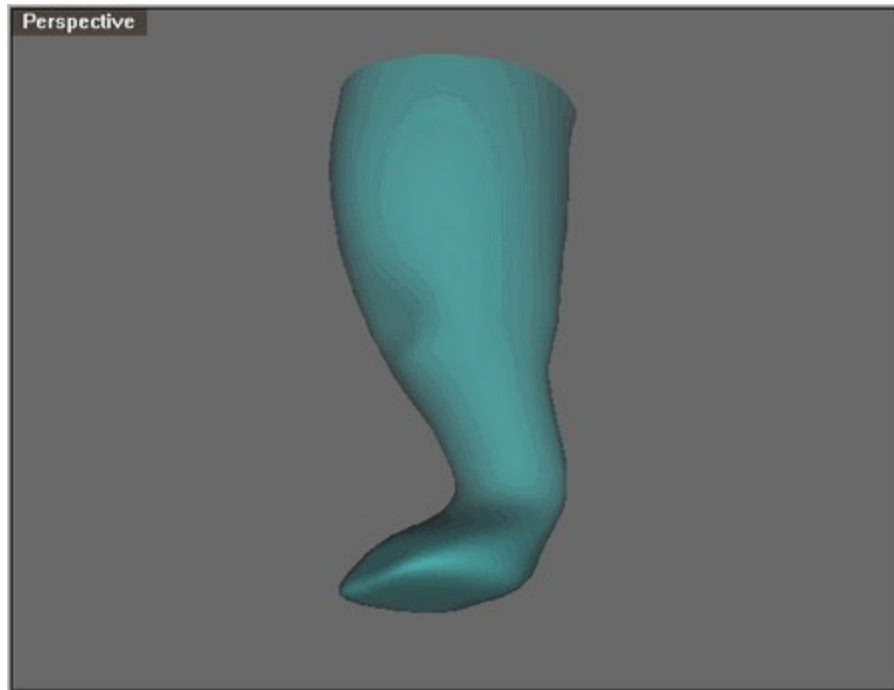


Note: You might be wondering why we don't just use the existing profile curve, but remember that the profile curve was drawn for artistic effect rather than for surface construction purposes and does not have the correct point count.

Turn off all the layers except the 'array' layer. This is to be sure that no profile curves can be selected in the step below.

Select the curves and hit **Loft**. Check the 'Closed loft' box and use the 'Do not simplify' option, click OK.

Shade the perspective view and tumble the object around. Note that the bottom of the foot doesn't have a dimple where the curves converge, as shown below. This is because was used **SetPt** on the last three points of the original curves, as mentioned in the Notes on page 13.

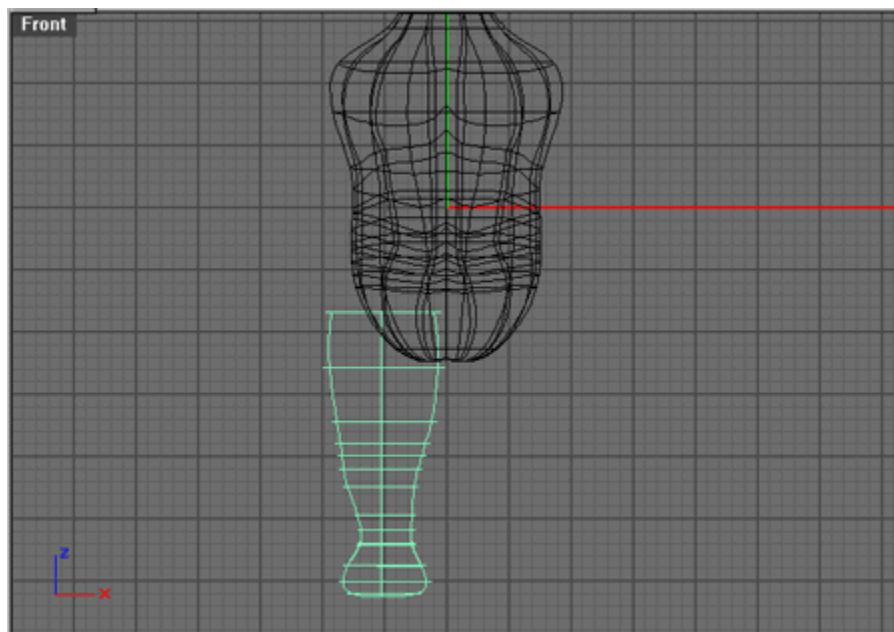


Conclusion: Of course this method would go much faster if you knew before hand what you needed to do and/or didn't have to glance at the written material. And of course there is not much muscle detail yet but we have a good general form to work with and the points are distributed in a controlled manner. Another thing to think about as far as "why use this method as compared some other" is that say for instance you used **CSec** (to be covered in more detail in the 'Arm' section) instead of **Loft** in the final step, the result would be quite similar but if you you used **CSec** directly on the profile curves without the array curves you would have something quite different and much more surface point editing would be needed.

Leg Detail

Open trog6.3dm for a complete version to this point if you wish.

Turn on the 'torso' layer. And in the front view move the leg over so the inside of the leg is just beyond the centerline as shown below.

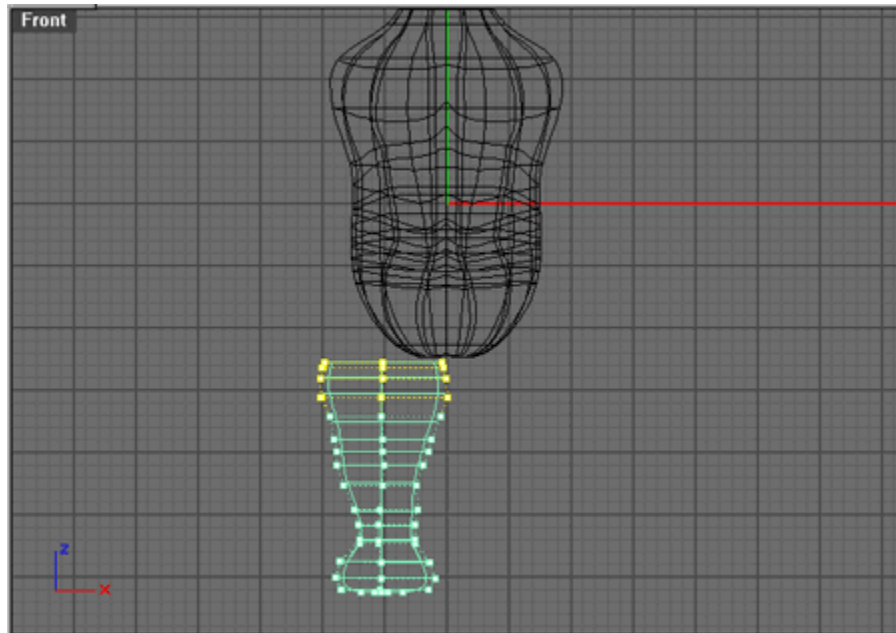


ChangeLayer the leg without the array curves to the default layer if necessary, and turn off the 'array' layer. Make the default layer a different color if you wish.

Select the leg and turn points on **PtOn**.

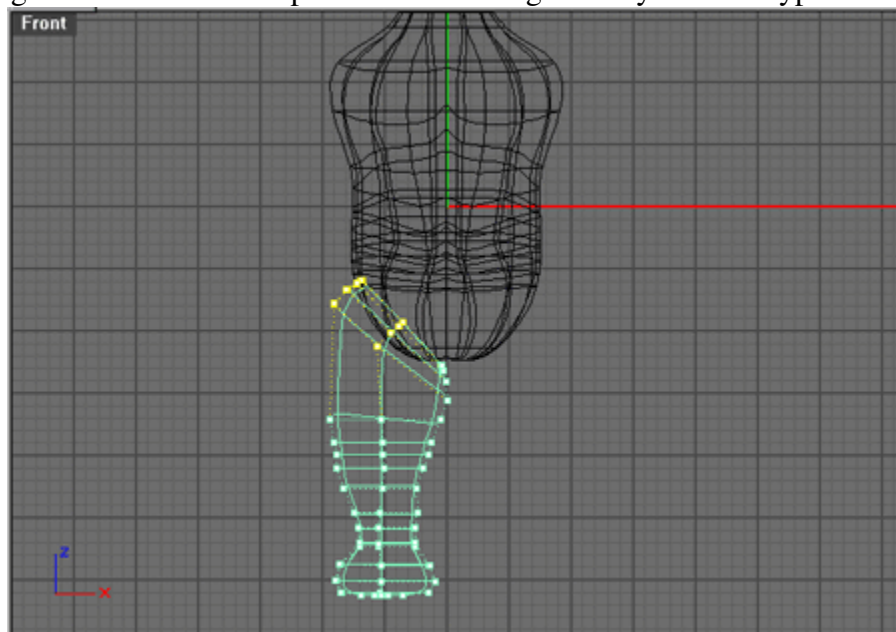
Going from the top-down **Insertknot** between the first and second knots in 'Direction =U.'

Select the top 4 rows of knots and **Scale1D** them to below the body with the first reference point being placed just above the kneecap and holding shift down for temporary **Ortho** as shown below.

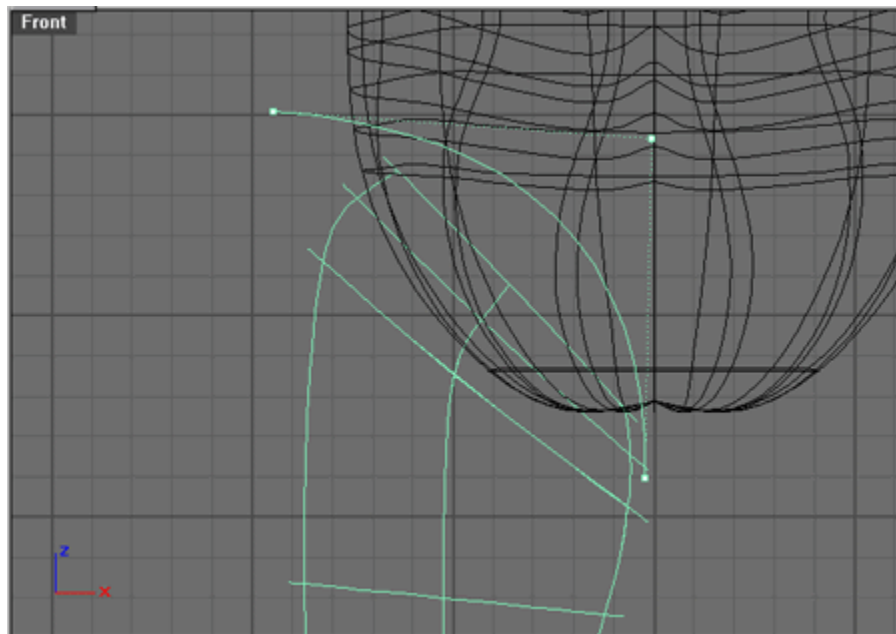


De-select the points on the inner thigh by holding control down and dragging a window over them

Rotate the remaining selected points with the first reference point being at approximately the upper right hand corner of the leg and then **Rotate** the points about 45 degrees or you could type in **-45**, shown below.

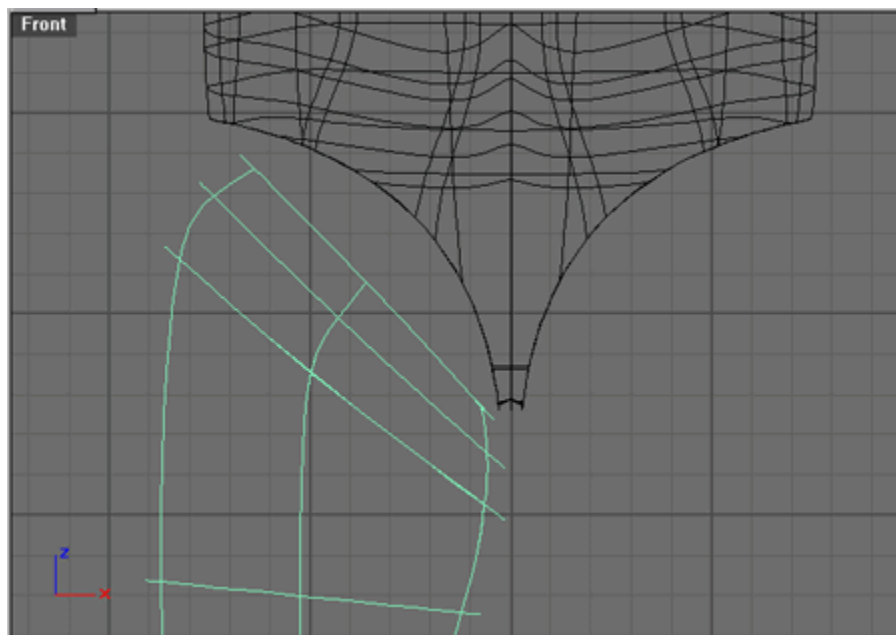


Zoom in on the area where the leg and body intersect and draw curve shown below.



Simply hitting **Split** and selecting the curve as the cutting object and selecting the body will **Split** the body. Select the trimmed off piece and **Delete**.

This would be a good time to **Mirror** over the trim curve. Use the 's' hot key to turn on **GridSnap** and select the trimmed curve, and **Mirror** over the trimmed curve and **Split** the other side as outlined above. Make a 'trimmed curves' layer and **ChangeLayer** the trim curves to it and hide that layer. Results shown below.



Hit **MatchSrf** and select the top edge of the leg as the 'surface to change' and select the trimmed edge of the body as the 'surface to match' and use the '**Automatic**' option.

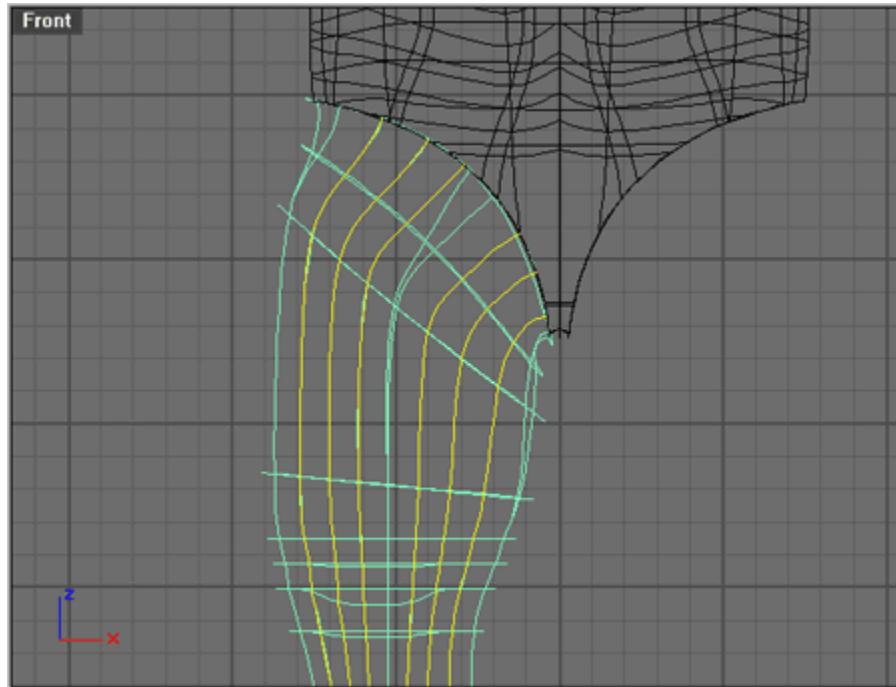
Hit enter to open the MatchSrf dialog.

In the **MatchSrf** dialog choose the tangency option, uncheck the 'refine' option and hit OK.

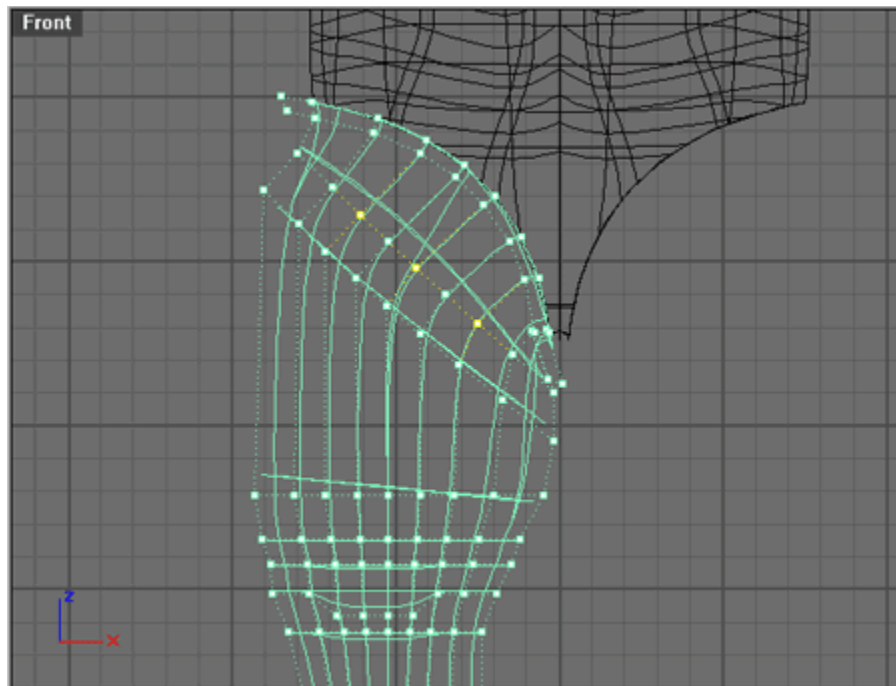
Overview: The curvature option is a more refined surface match and we will use that later after the leg has

been refined manually which will help keep the geometry simpler. Also we will not mirror the leg over to the other side until the leg we're working on is sculpted to our satisfaction. If you render the leg you will see that the edges don't match well at all yet.

From the front view hit **InsertKnot** and add three knots in the 'V' direction to each side of the center Isoparm. Another way to do it is to use the 'Symmetry' option and add 3 Isoparm's to 1 side of the center isoparm as shown below.

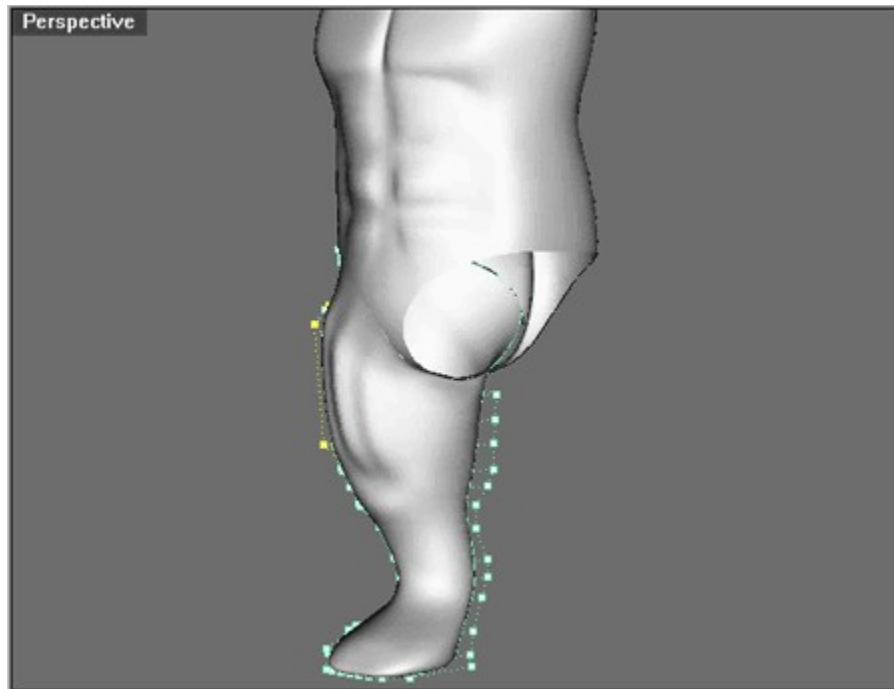


Select the leg and turn on the control points **PtOn** and make sure **CullCP** is on. Select the 3 points as shown below and hit **AddNextV** twice which should select the 2 rows of points below the points selected.

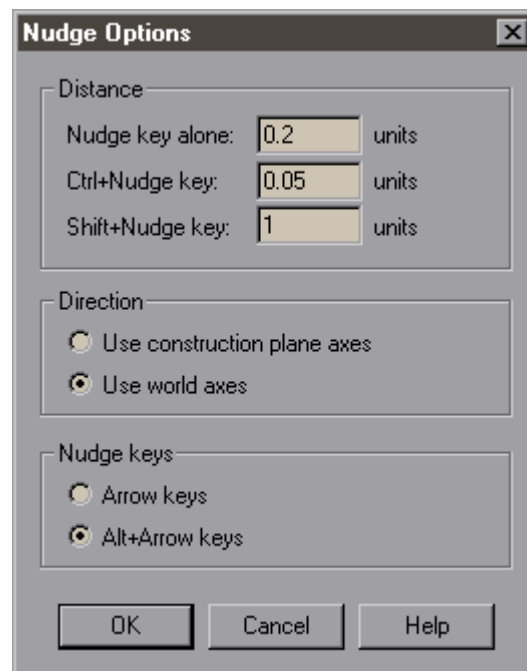


Make sure **DynamicShadingPerspective** is on, go to the right view and move the points to the left a little say about .6 of a unit. If the detail is not coming through hit **ClearMeshAll** and re-render **Shade** with the perspective view active.

Note for clarification: The grids are setup to be one grid equals one unit.



Optional: another thing you might want to experiment with here is the **Nudge** command. Hit **Nudge** and give it the settings shown below.



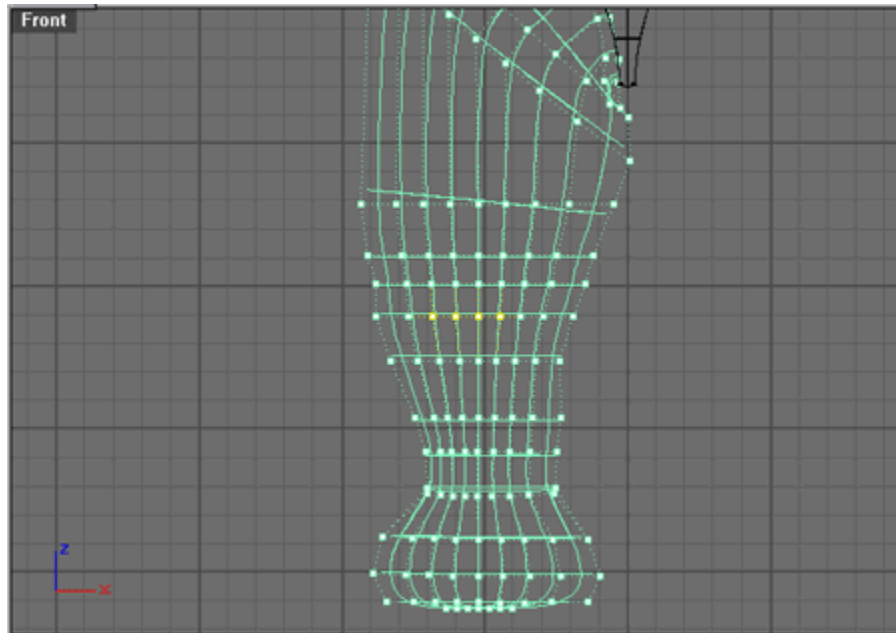
Undo the points move. **Shade** the perspective view. While holding down the Alt key press the down arrow 3 times. Tap the spacebar to refresh the perspective view. Again pressing the Alt key down, press the up arrow and then tap the spacebar (with no Alt key) to refresh the view. So as you can see, with some practice, this is kind of a nice way to make minor incremental modifications and get some quick feedback.

Also you can adjust how much the points move by hitting the **Nudge** icon and making changes in

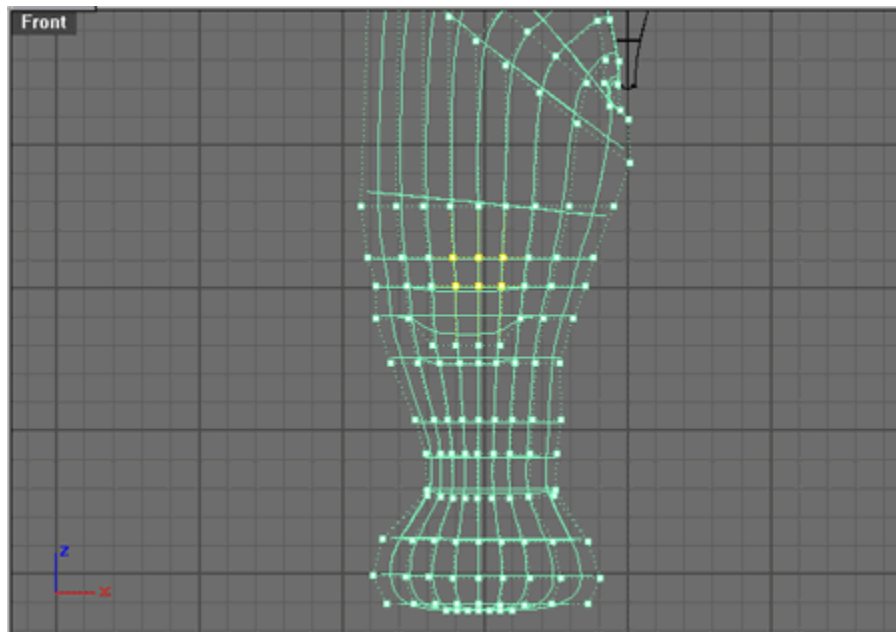
the distance part of the dialog box also you'll notice that you can change how far the points move with different key combinations. **Undo** any nudge experimenting.

Kneecap

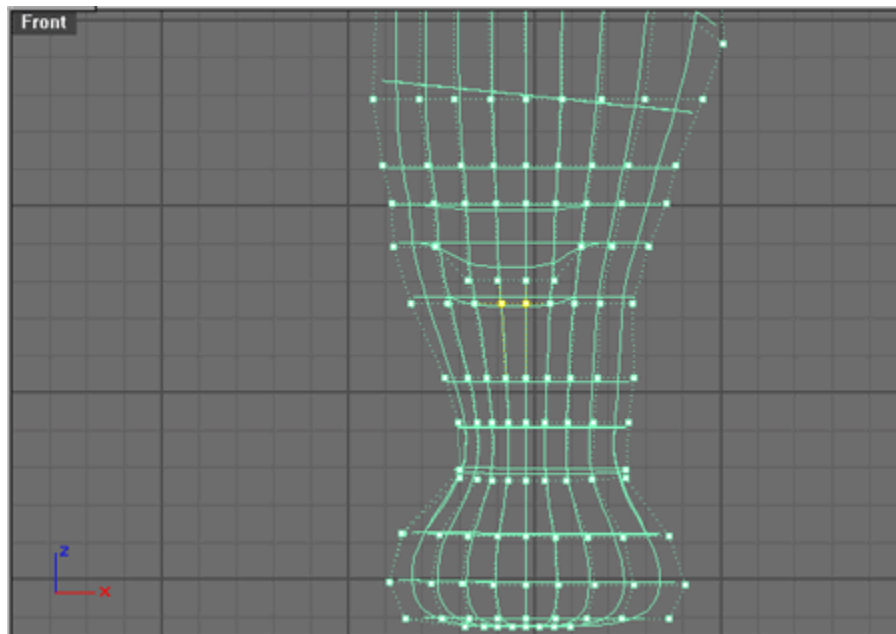
Select the 4 points shown below and drag them down about 1 unit.



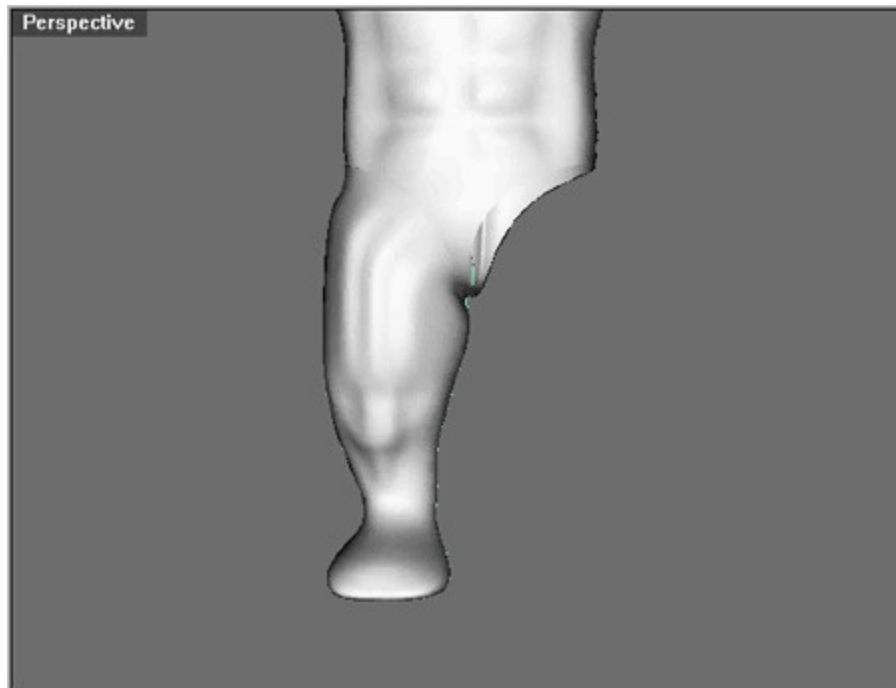
Select the six points shown below and in the right view, drag them to the left about 1 unit or hold Shift + Alt and hit the down arrow key.



Select the two points shown below and in the right view drag them to the left about 1 unit or hold Shift + Alt and hit the down arrow key.

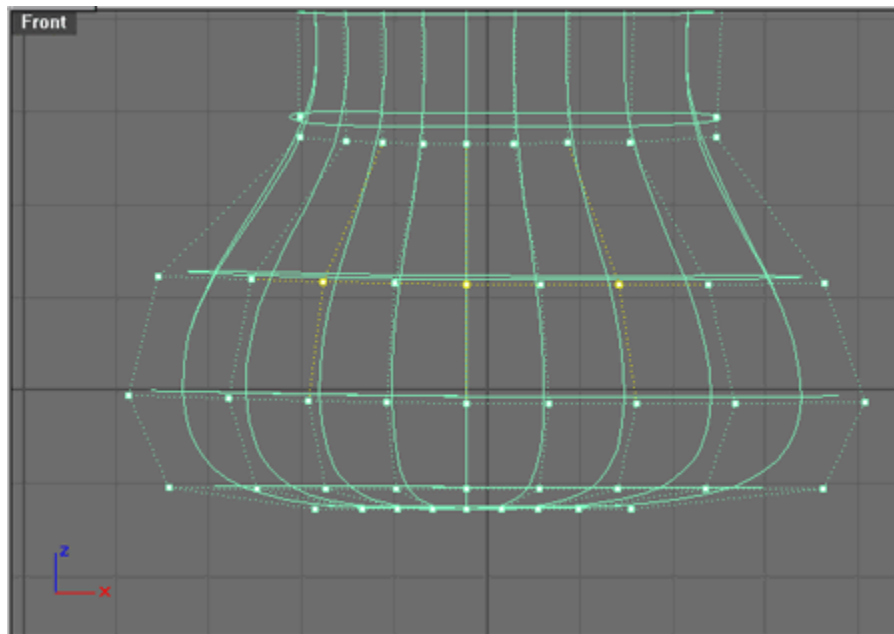


So far the leg should something the results shown below.

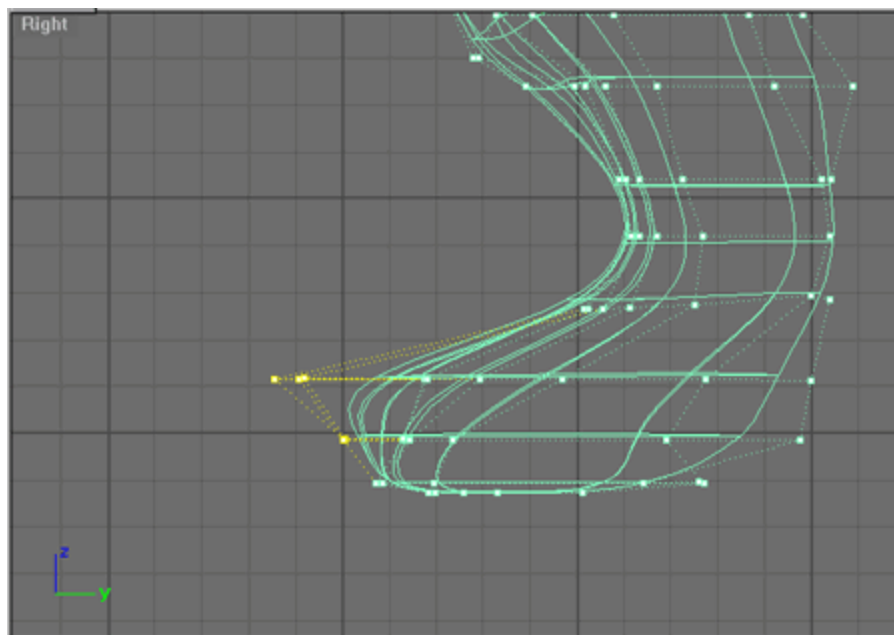


Foot Detail

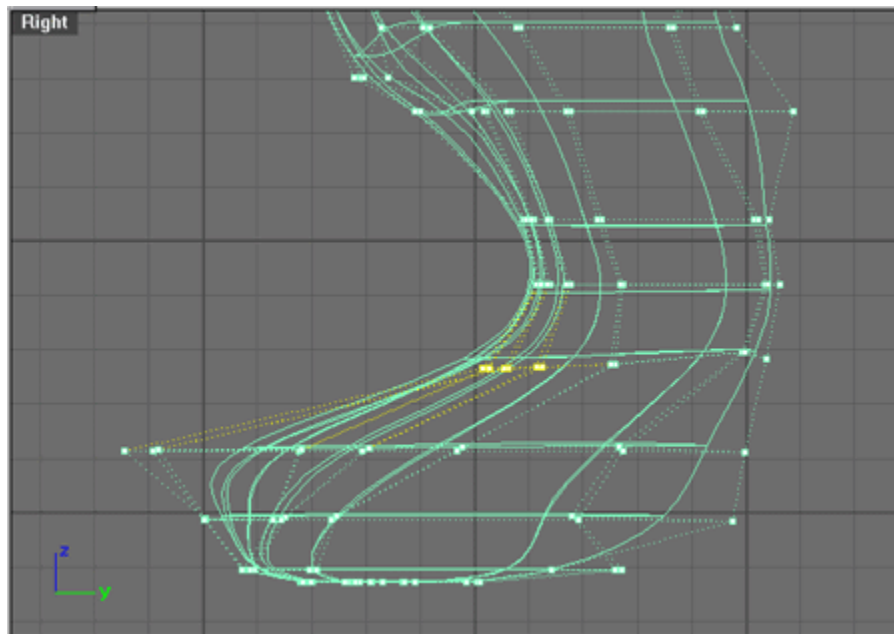
Selected the points as shown below and in the right view drag them to the left about $1\frac{3}{4}$ units.



Hit **AddNextV** and again in the right view drag them about another $1 \frac{1}{2}$ units to the right and a $\frac{1}{2}$ unit down as shown below.

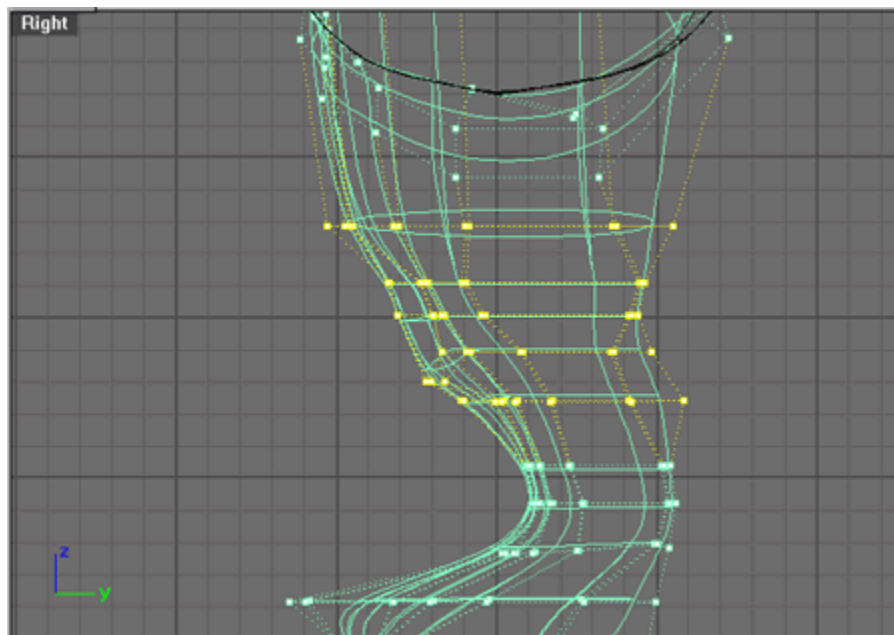


In the right view select the points shown below and drag them straight down 1 unit.

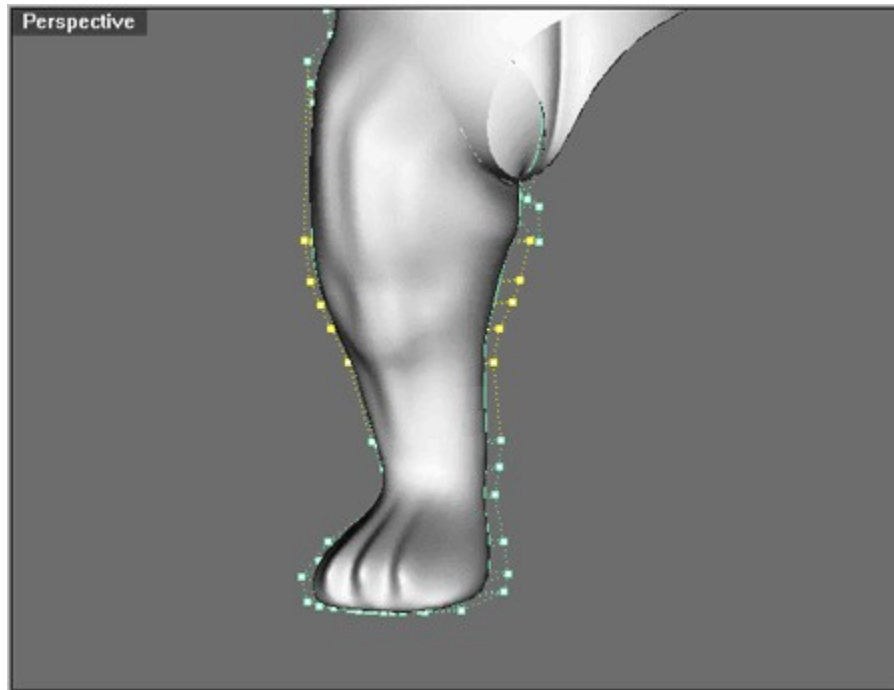


Conclusion: That just about does it for the front detail of the leg. Check it out in the perspective view and see if it looks okay with you. To me it looks like the knee is to low. On the next page we'll see what it looks like with the knee a bit higher.

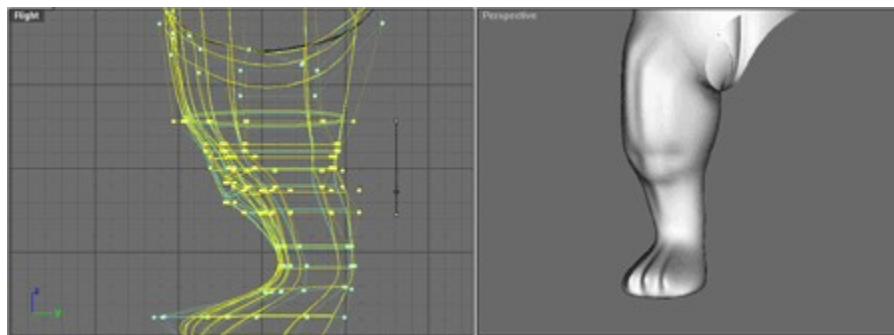
With **CullCp** off, in the right view drag select the 5 rows of points that shape the knee and move them up **1.5** units as shown below.



Conclusion: Check it out in the perspective view shaded, shown below. What I'm seeing are some lumps and bumps that don't look right to me especially on the inner leg. **Undo** the points move.



Hit **Scale1D** and place the first reference point about level with the top row of the selected points and place the second reference point about level with the lowest row of selected points and drag/scale the points up about 1 grid up. Shown in progress below left.

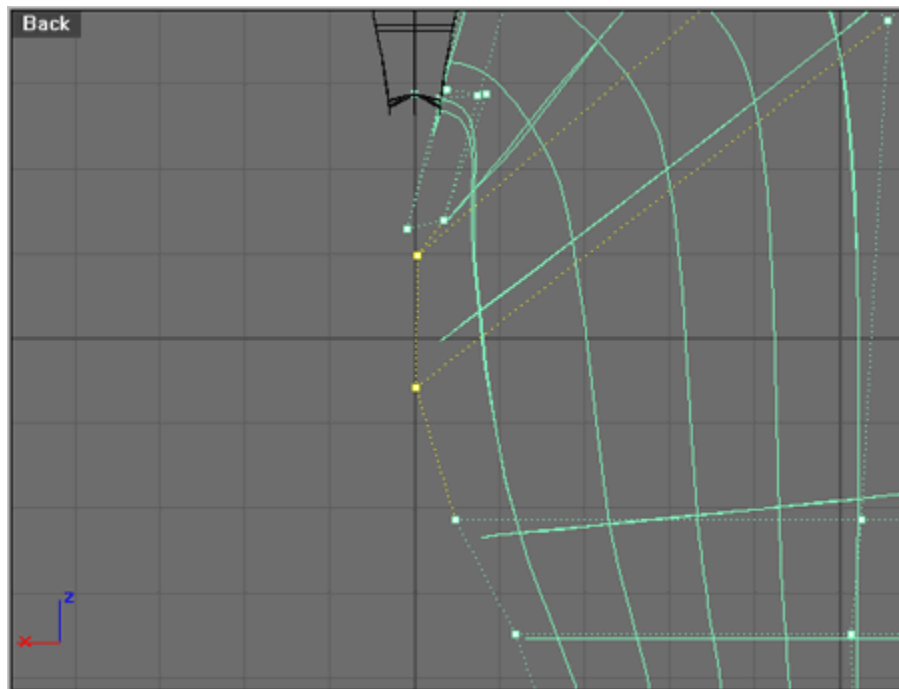


Conclusion: To me the results look much better. Now all we need to do is add some detail to the back of the leg, to define the calves and tendons.

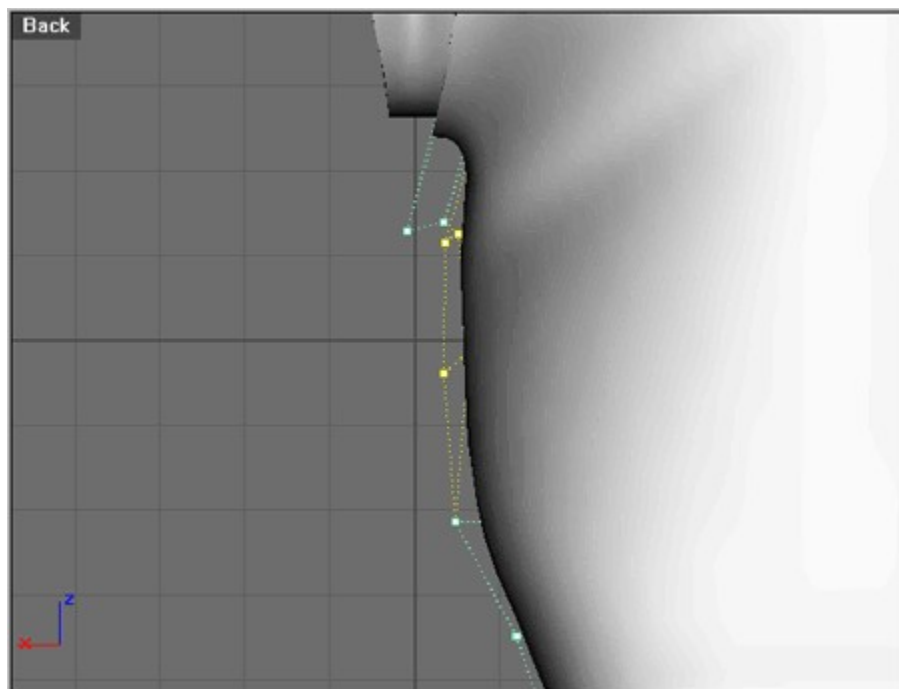
Back leg

Change the front view to the back view and the right view to the left view. **Shade** the back view. I think there's too much of a bulge on the inner leg where the leg meets the body.

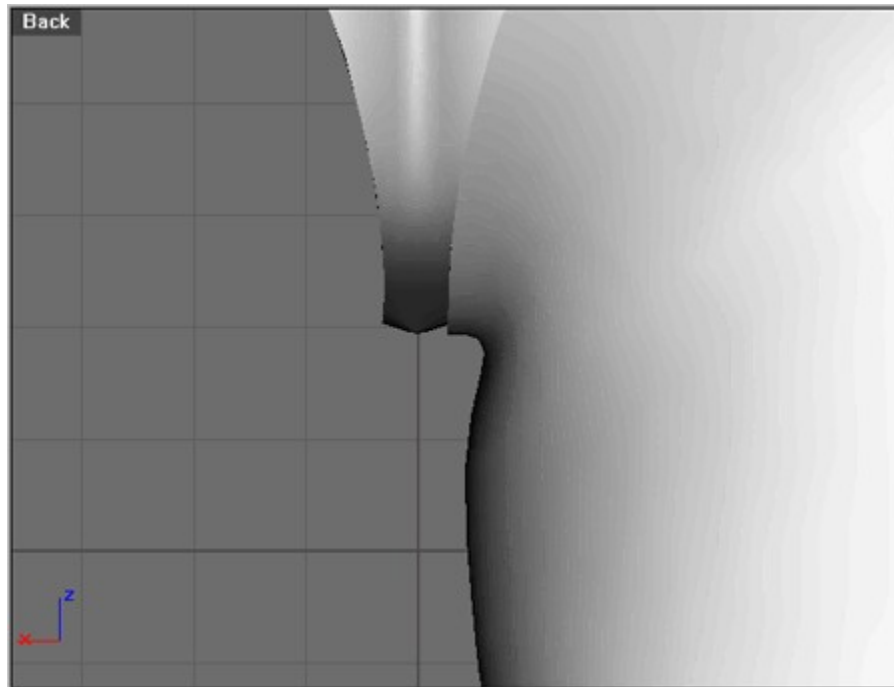
With **CullCp** still off, select the four points shown below and hit **Smooth** and with a smooth factor of **.1**, **Smooth** the points.



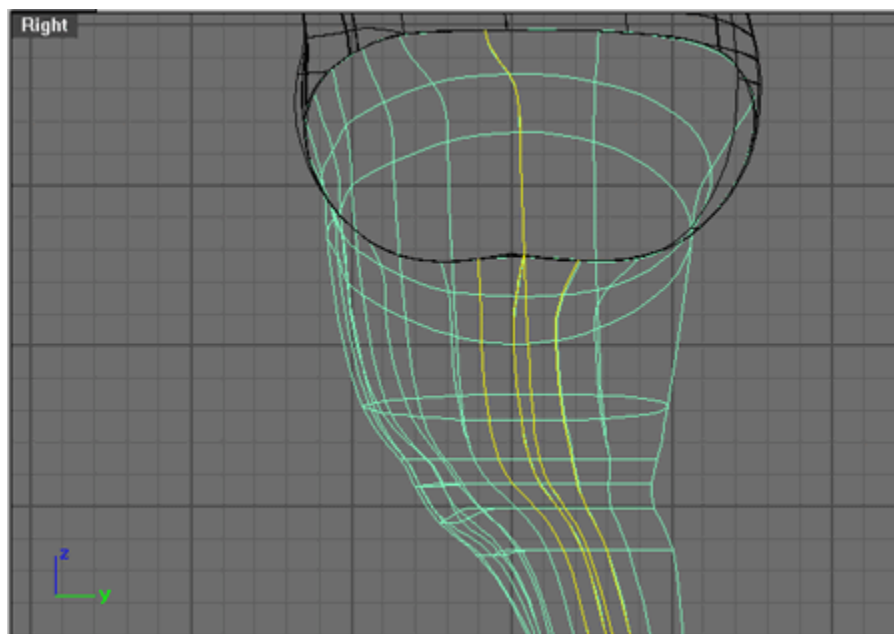
Shaded results shown below.



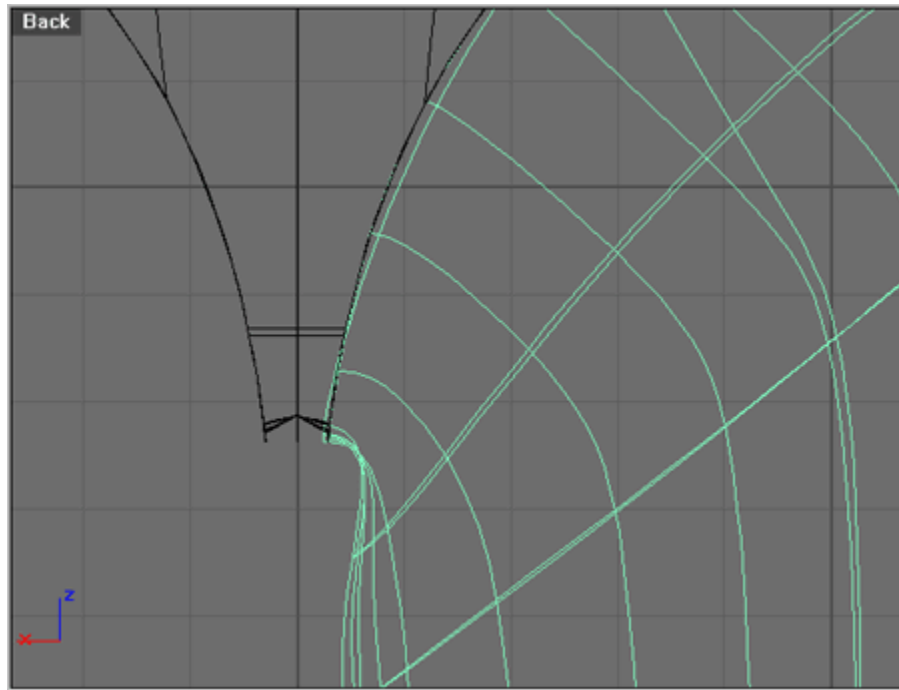
Conclusion: Well, it looks much better but it's not matching up to the body very well.



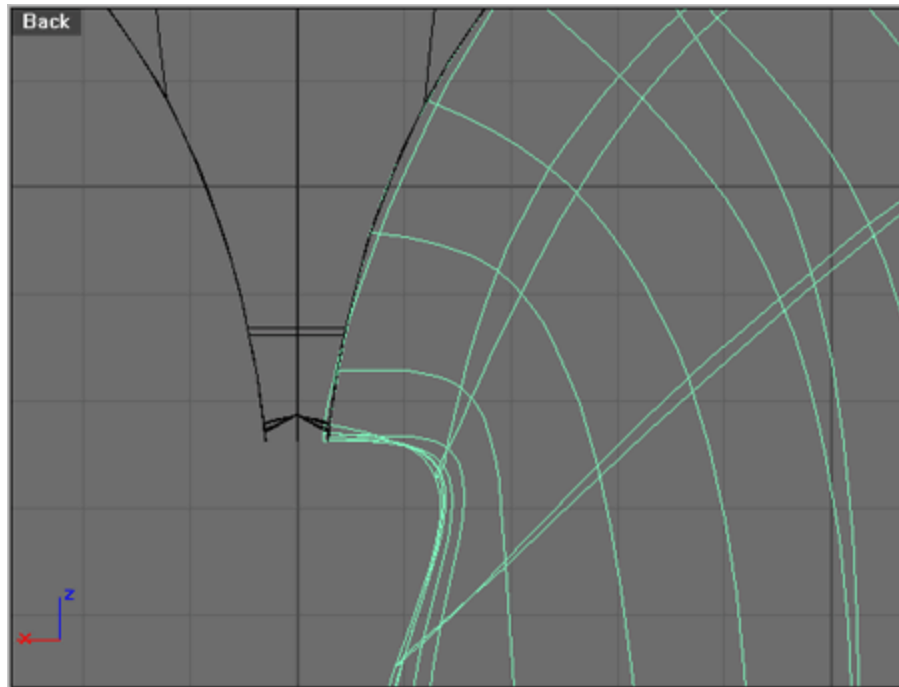
Go to the right view and **InsertKnot** to the middle of the inner leg with the 'Symmetry' option still on, and with the **InsertKnot** still active turn off 'Symmetry' and add 2 knots to both sides of the first knot inserted to just the inside part of the leg as shown below.



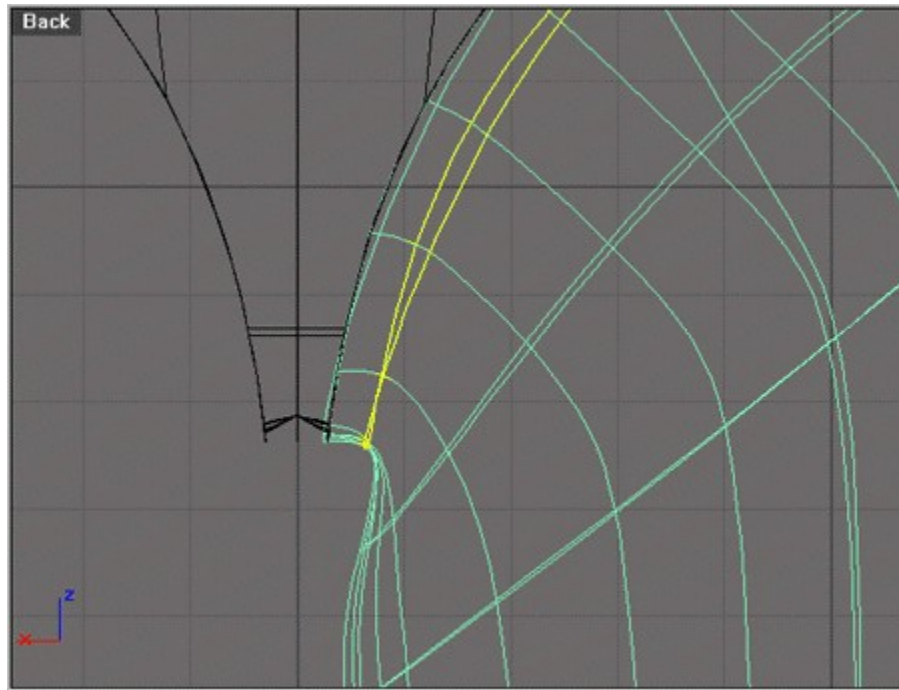
Hit **MatchSrf** and select the leg edge as the surface to change and select the body edge as the target surface and use the 'Automatic' option. And check off the curvature option. Hit okay. Result shown below.



MatchSrf the same surfaces together again but this time use the 'Curvature' option in the MatchSrf dialog box.

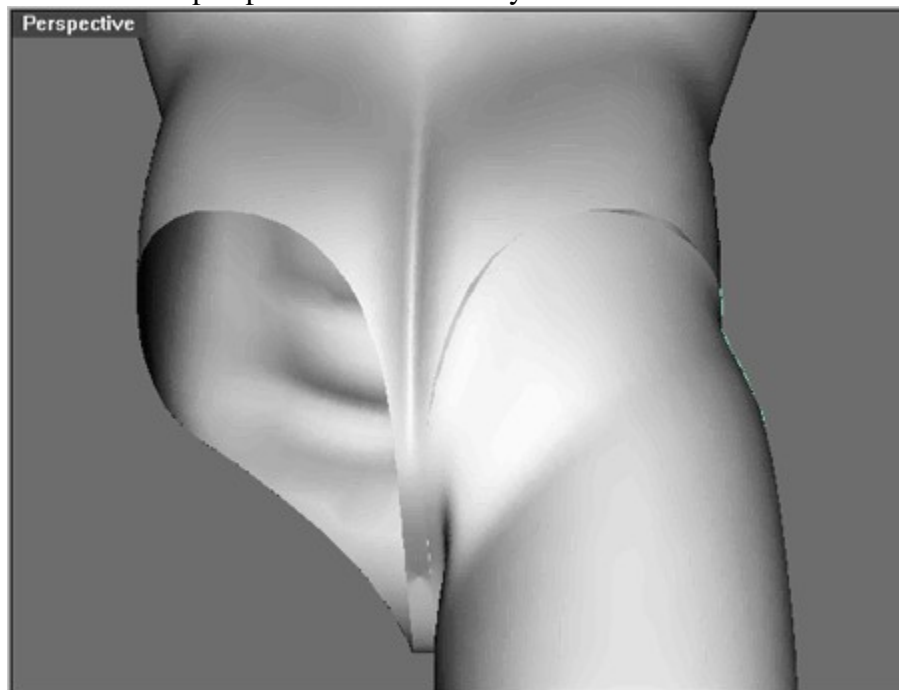


Hit **Undo** and hit **InsertKnot** with 'Direction=U' as shown below and **MatchSrf** the 2 surfaces back together as before but with the curvature option.

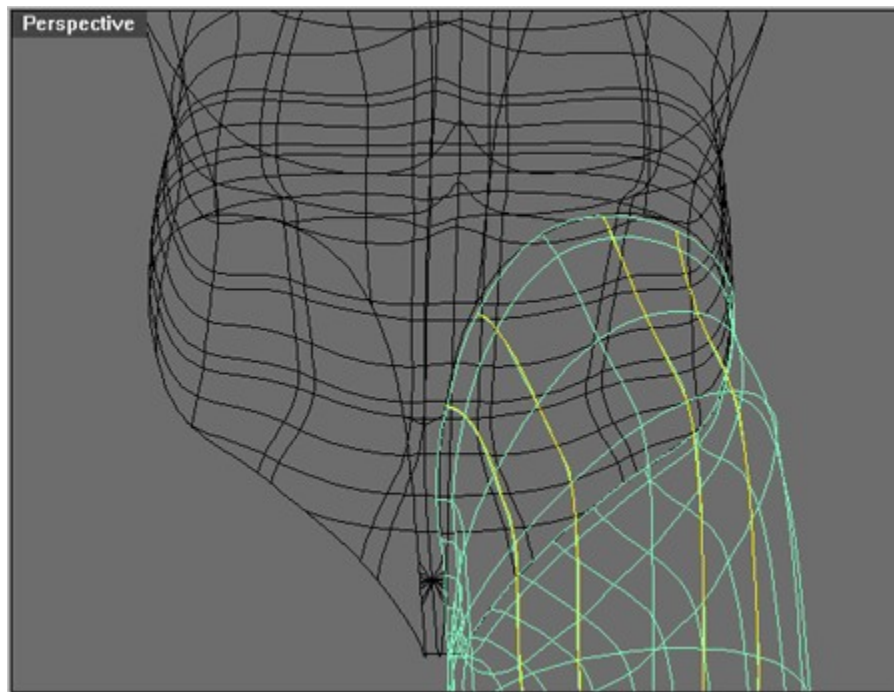


Note: The only reason we inserted knot's to the inside of the leg was so that **MatchSrf** had enough Isoparm's to blend correctly. We could have used the refine option in the **MatchSrf** dialog box which will add Isoparm's automatically but that will add to much complexity to the object.

Overview: This is where things start getting cluttered up so to be able to see "what's what" tumble the perspective view to how you see it below.

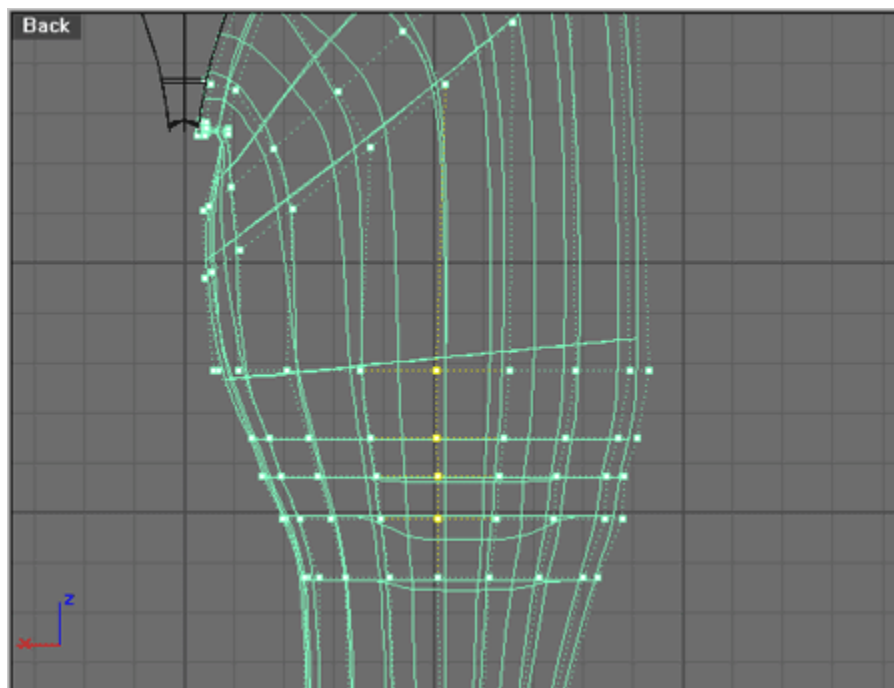


InsertKnot 4 Isoparm's into the back of the leg, 2 on each side of the center Isoparm or you can use the 'Symmetry' option and put 2 Isoparm's on one side of the center Isoparm as shown below.

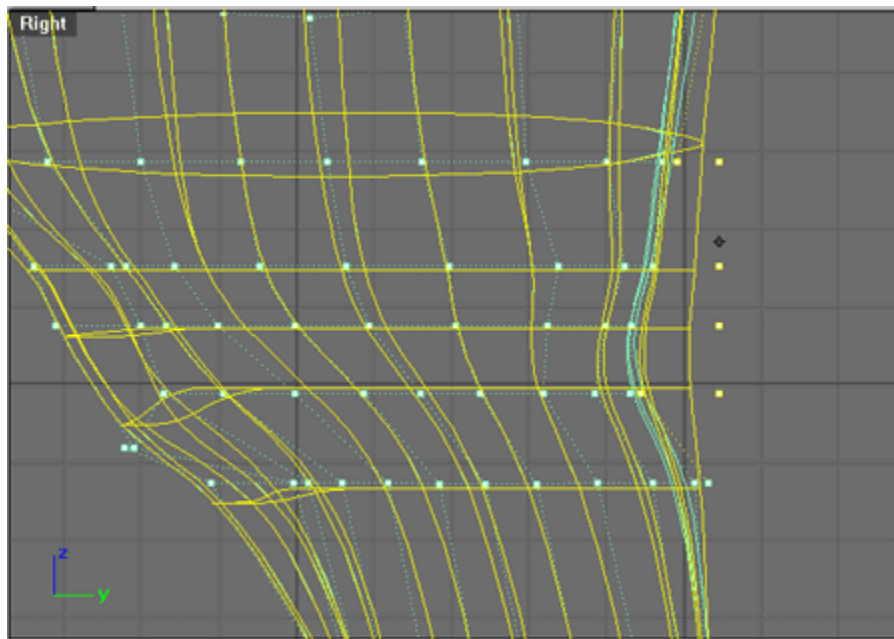


MatchSrf the leg to the torso.

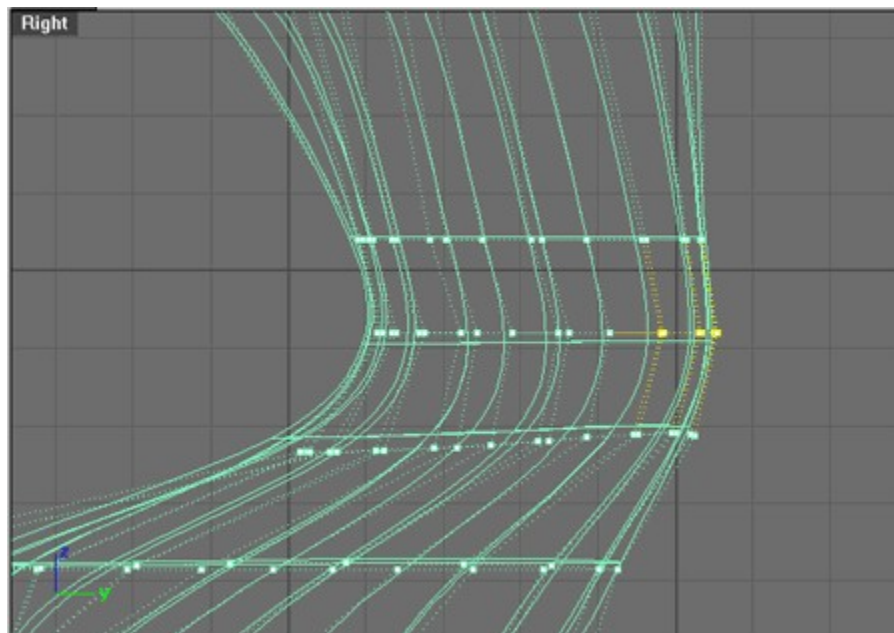
With **CullCp** on select the four points shown below.



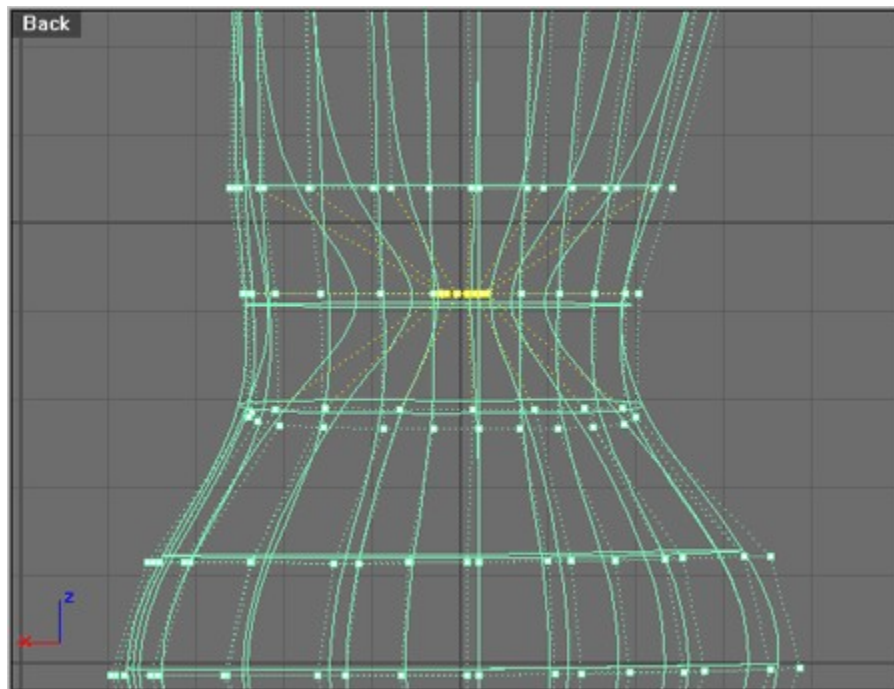
In the right view hit **SetPt** and check off 'Y' in the world coordinates. Drag the points to the right until the back of the leg is practically vertical as shown below.



With **CullCp** off in the right view select the points shown below.



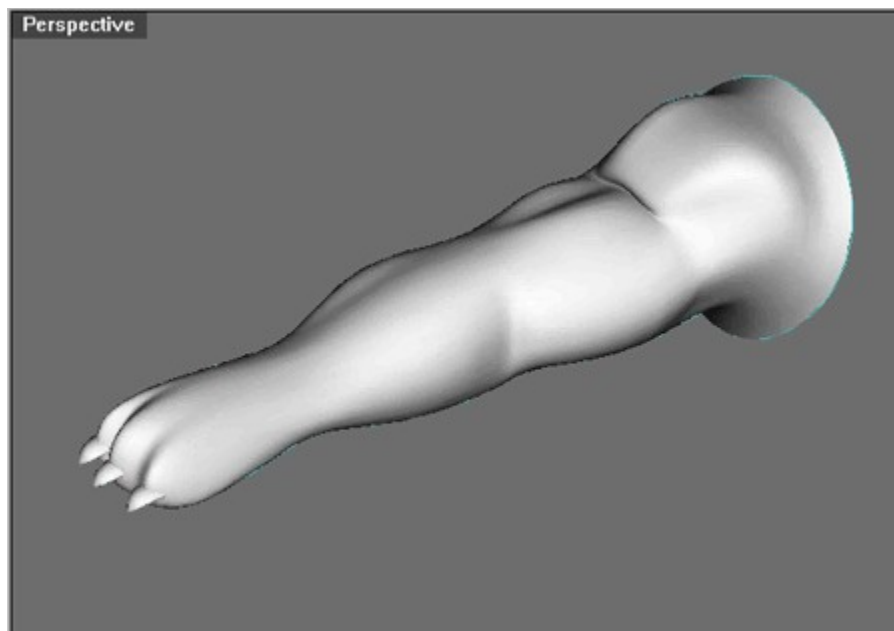
In the back view **Scale1D** them in towards the center of the leg as shown below.



Hit **PrevV** and in the right view drag them about $1 \frac{1}{2}$ grids up and right $\frac{1}{2}$ grid.

Conclusion: Well that's about it. I'm not sure what we can do to improve it from here. Perhaps the points that we dragged up and a little right could be dragged down the little further and maybe the ligaments on the back of the leg are bit too much (where the points were pinched in) but it's a matter of preference. I'm calling it good but feel free to experiment and save it out. It won't hurt the tutorial any.

Arms



Open file trog7.3dm or merge t7.3dm

Overview: What we have here is the profile curves for the arm. If you were doing this yourself you would either scan in a sketch or I usually just draw some curves that look approximately right. However the thing to note here is that I had end osnap on and ended the curves at the same point.

The geometry of the arm is going to be created from the using the command **CSec** which is a tool that creates section curves, the shapes of which are determined from the profile curves.

This would also be a good time to clean up the layers and discard any layers no longer needed, like leg curves, array, guide and trim curves. Make a layer called 'leg' and hide it and **ChangeLayer** the leg to the hidden layer. Also give your layers some colors.

Make the layer called 'section curves' and make it the current layer. Turn on layer 'annotate'.

With 'Point' Osnap on, hit **CSec** and select the profile curves in order according to the numbers on the 'annotate' layer and hit enter.

Note: If the curves had been picked in the opposite order the curves would have been going in the opposite direction and the surface normal's resulting from lofting the curves would have been flipped in towards the center of the arm.

When prompted for 'Start of cross-section line (Closed=Yes):' snap to the points on the layer 'annotate' starting with the top left point and ending with the point below it to create the **CSec** sections.

Note: The curves created are basically at areas that denote change in the profile curves. Where the section curves are placed is important because we need section curves wherever there are definite transitions in the profile curves (like around the elbow) in either the top or front views.

Make a new layer called 'arm' and make it current layer.

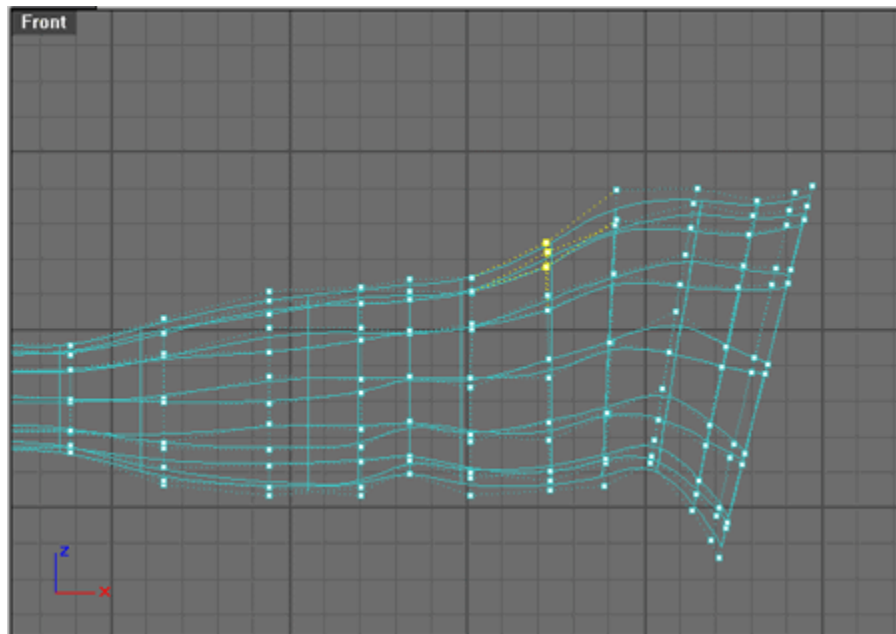
De-select everything by clicking anywhere in the view and turn on 'End' osnap.

Hit **Loft** and type 'p' for the 'Point' option and click on the end of the profile curves where they all meet and then click on the rest of the section curves in order.

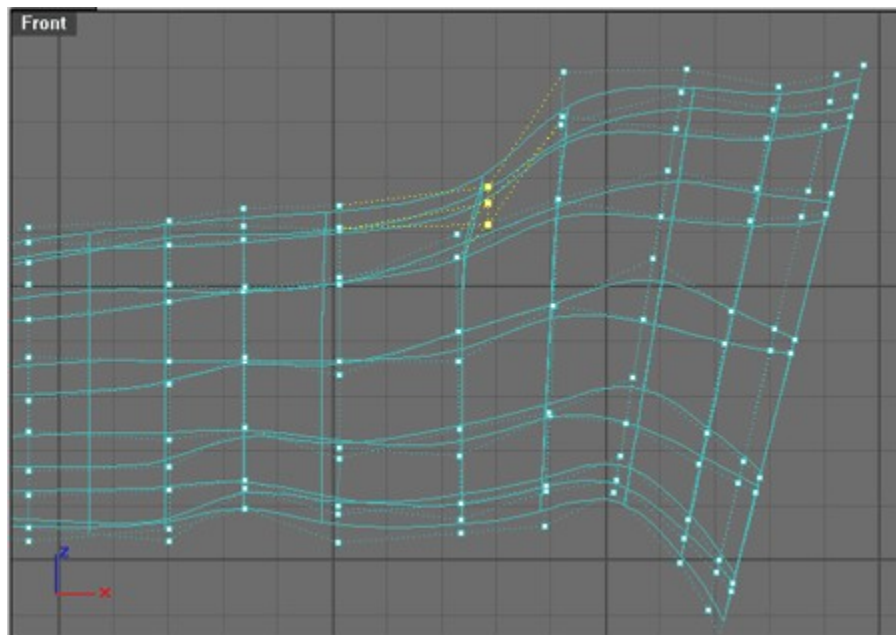
Use the 'Rebuild with 12-control points' option and hit OK.

Turn off the 'profile curves', 'section curves' and 'annotate' layers.

With **CullCp** off in the front view and with **DynamicShadingPerspective** on, select the 3 points shown below.

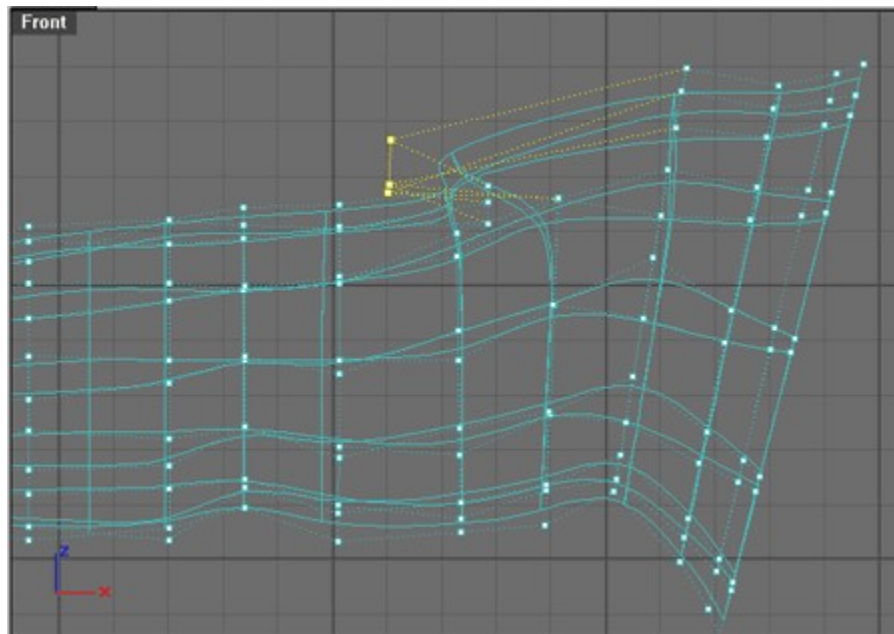


Drag the points down about $\frac{3}{4}$ grid and to the right about $.5$ grid as shown below.



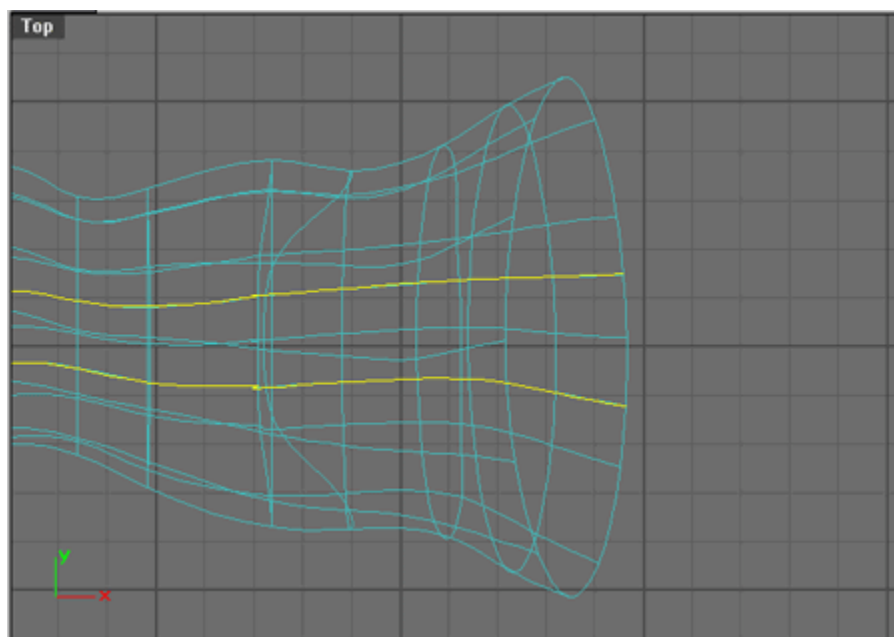
Check the direction **Dir** of the arm and **FlipNormal** the 'U' direction so that the 'select points' toolbox corresponds to the object.

In the front view hit **NextU** and drag the 3 Points about **2.5** grids to the left and **1.5** grid down as shown below.

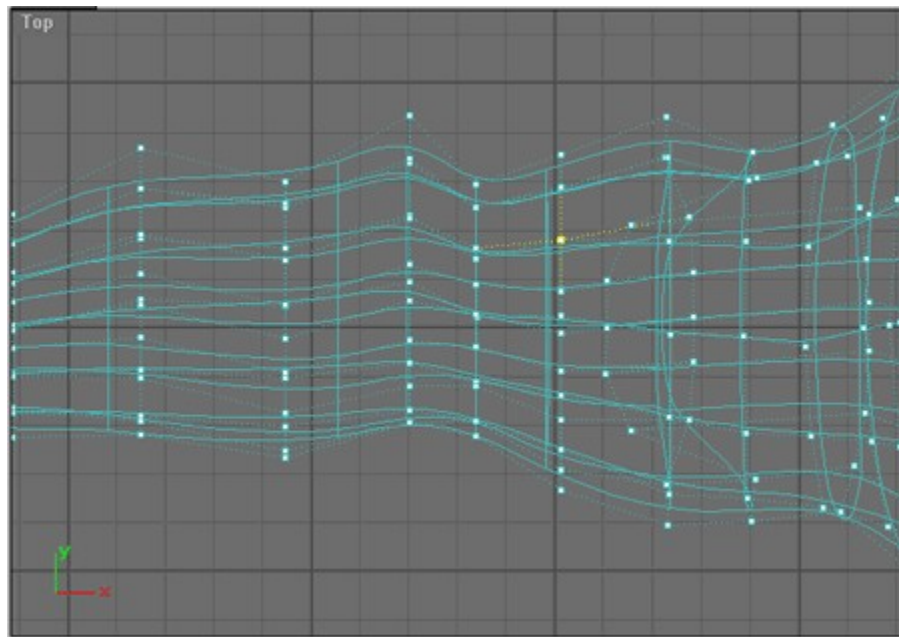


Hit **NextU** once and drag about **1.5** grids to the left and about **.5** grid down.

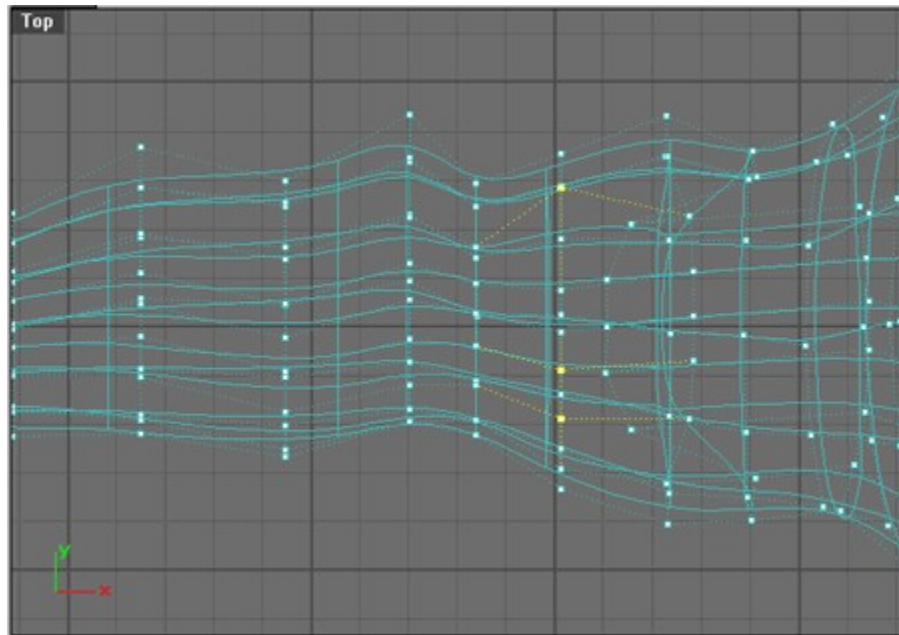
Hit **ClearMeshAll** and quick render to bring out the detail. In the top view **InsertKnot** 2 times on each side of the center Isoparm running in the U direction as shown below.



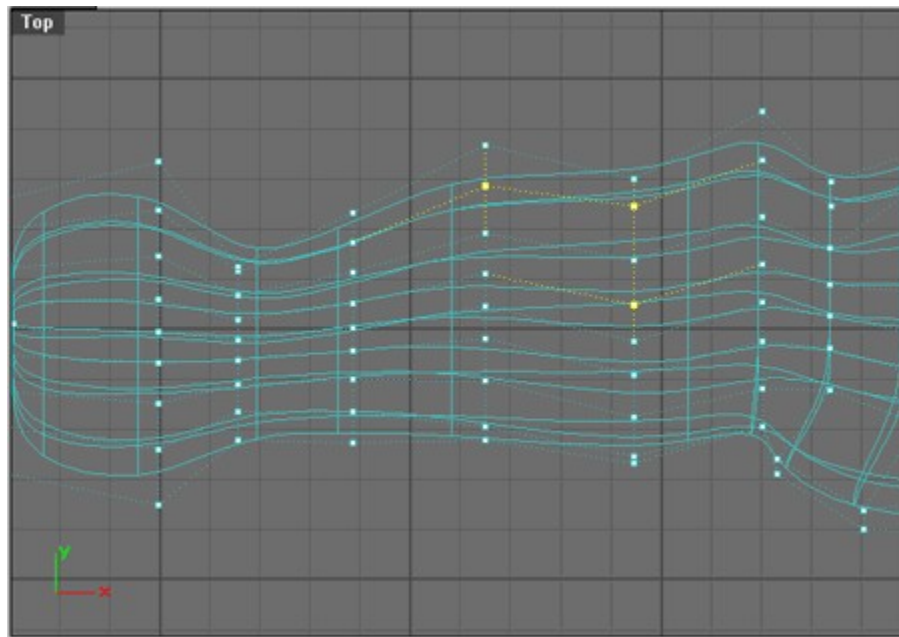
With **CullCp** on and from the top view select the 1 point shown below and in the top view drag it up about **1** grid.



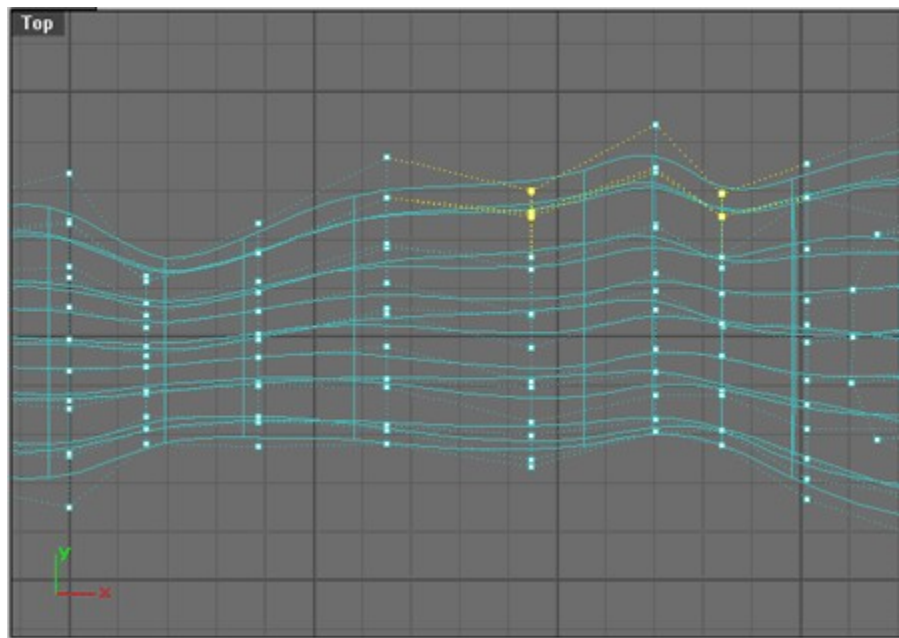
Select the 3 points shown below and in the front view drag them all up almost 1 grid.



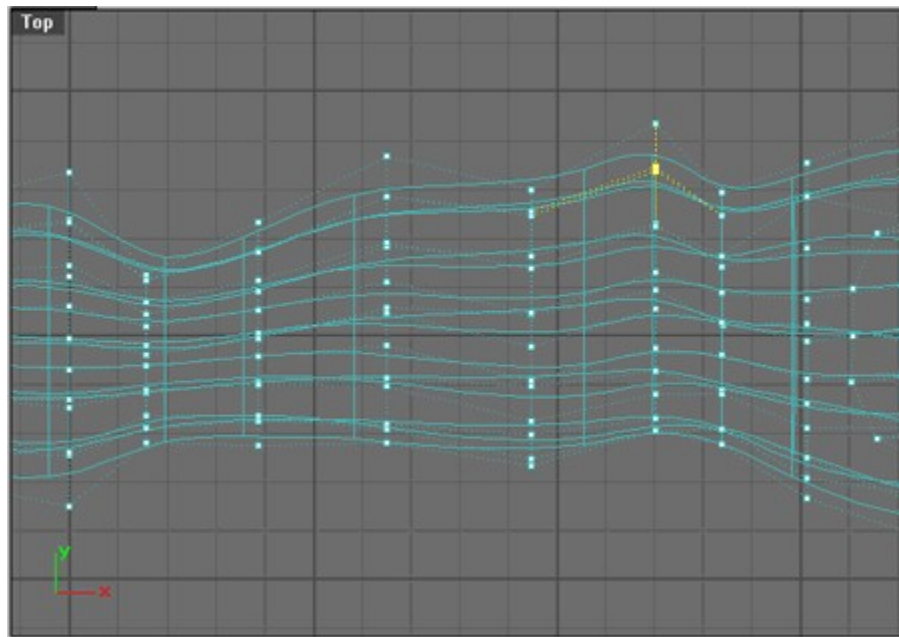
With **CullCp** on, select the 3 points shown below and in the front view drag them up about .5 grid.



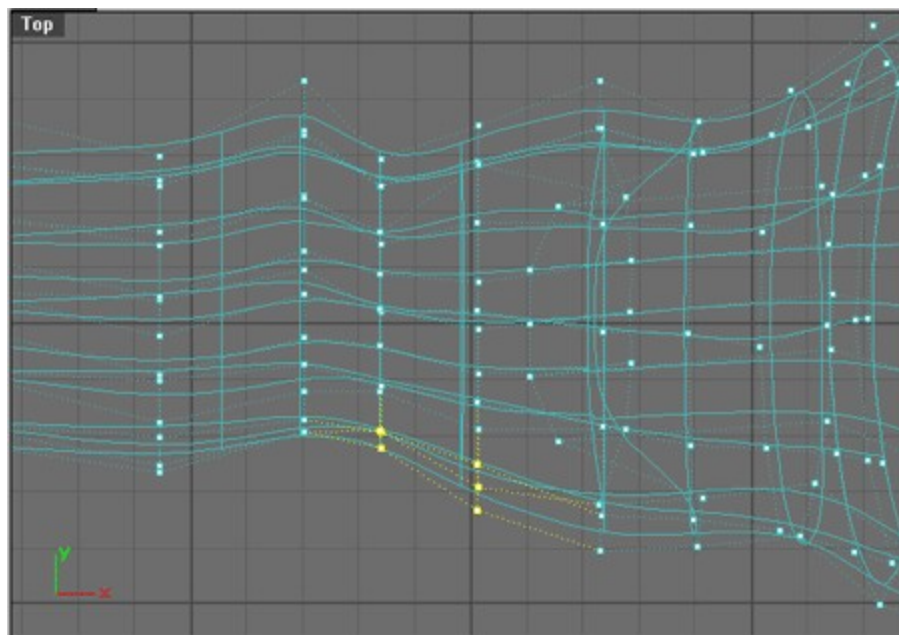
Overview: That should be good for the top part of the arm but feel free to tweak away some refinements. We still need to work around the sides of the arm and define the elbow and the biceps.
 With **CullCp** off in the top view select the points on both sides of the pointy part of the elbow shown below and drag them up about .6 of a grid.



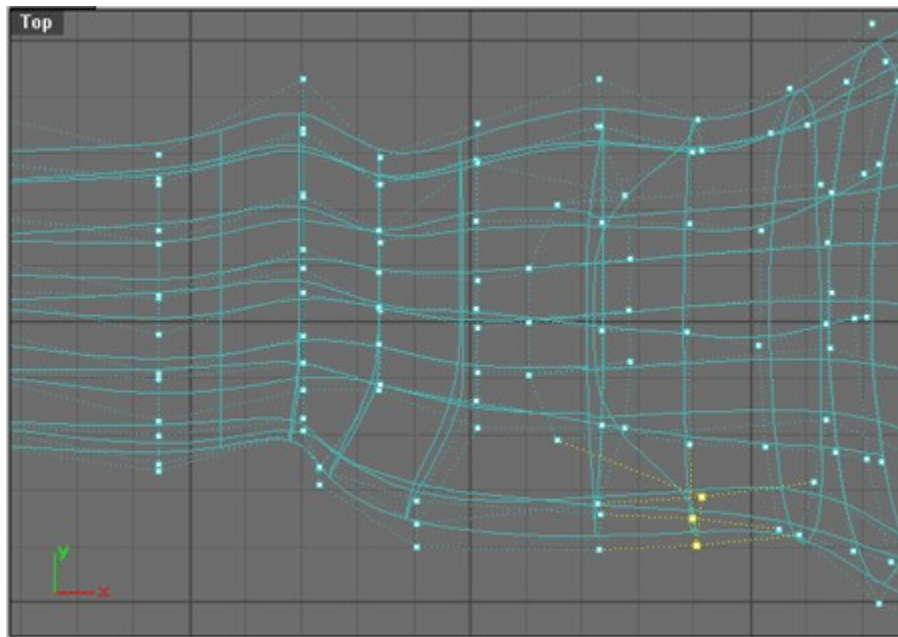
From the top view select the points shown below and drag down about 1 grid .



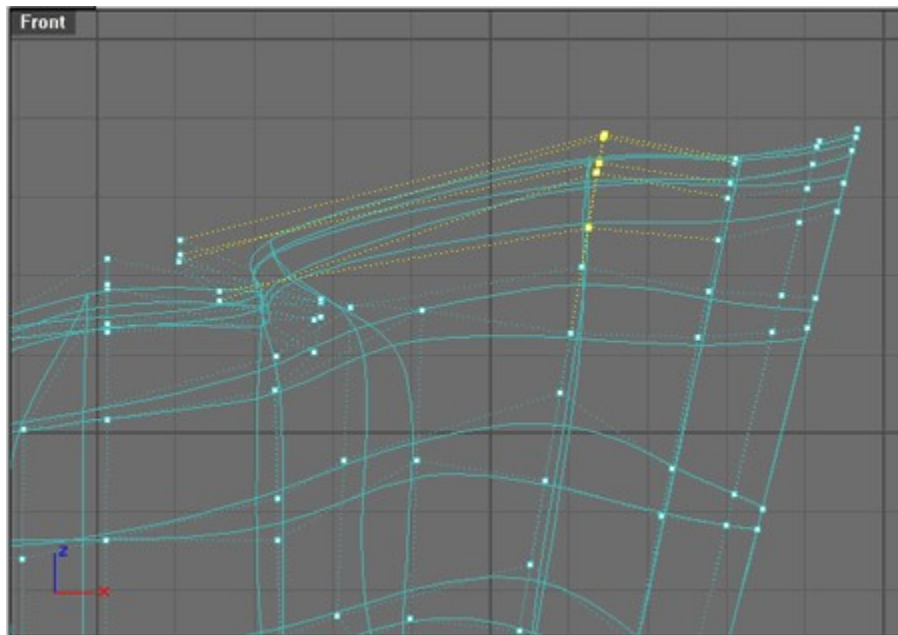
To define the biceps select the points shown below and drag them about **1** grid to the left and **.5** grid down from the top view.



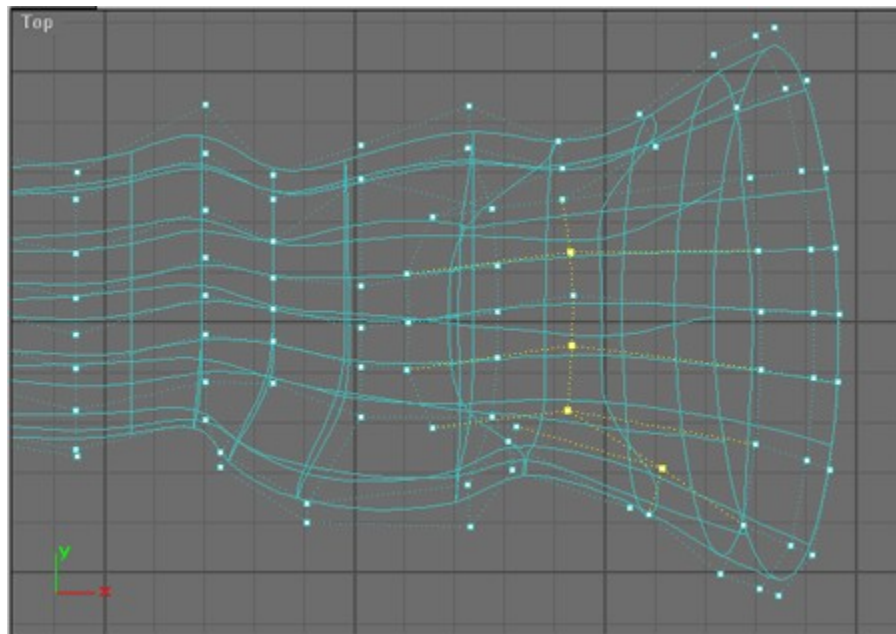
To define the area where the Biceps meet the shoulder select the points shown below and drag them up and to the left **1** grid.



With **CullCp** off and from the front view off select the points shown below and drag them about **2** grids to the left.

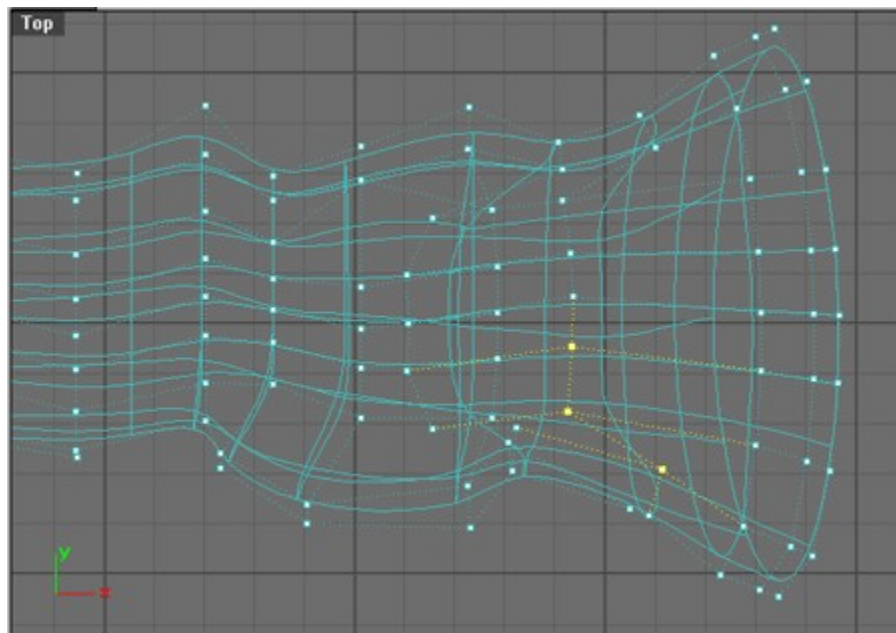


Select the points shown below and in the front view drag them up **1** grid.

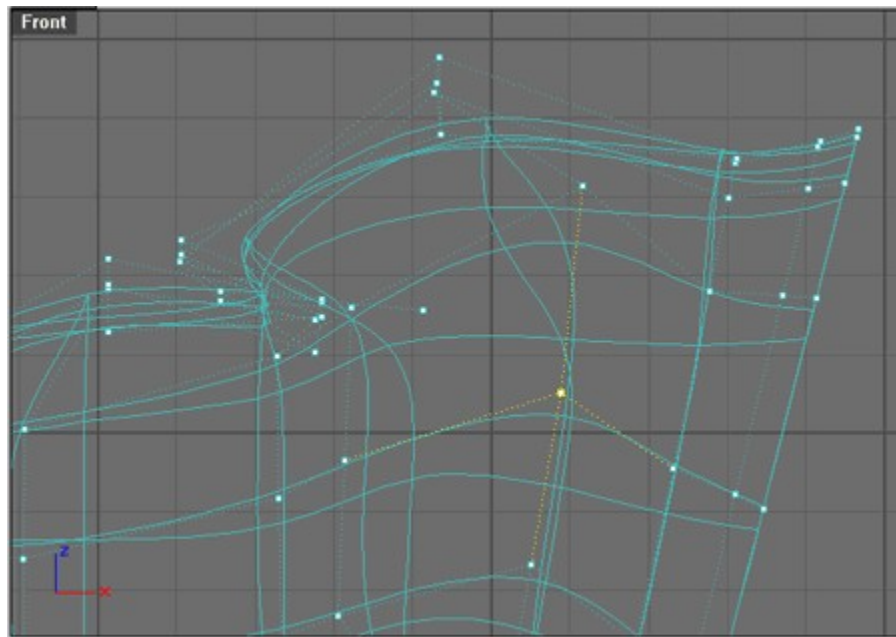


Note: The more detail that you put in the more realistic it tends to look. What you want to get away from is something that looks like it was revolved. Now that we have the arm roughed in the modeling becomes more fun and all the detail you put in adds to the realism.

De-select the top point so you have the points selected below and while still in the top view drag the points down 2 grids.



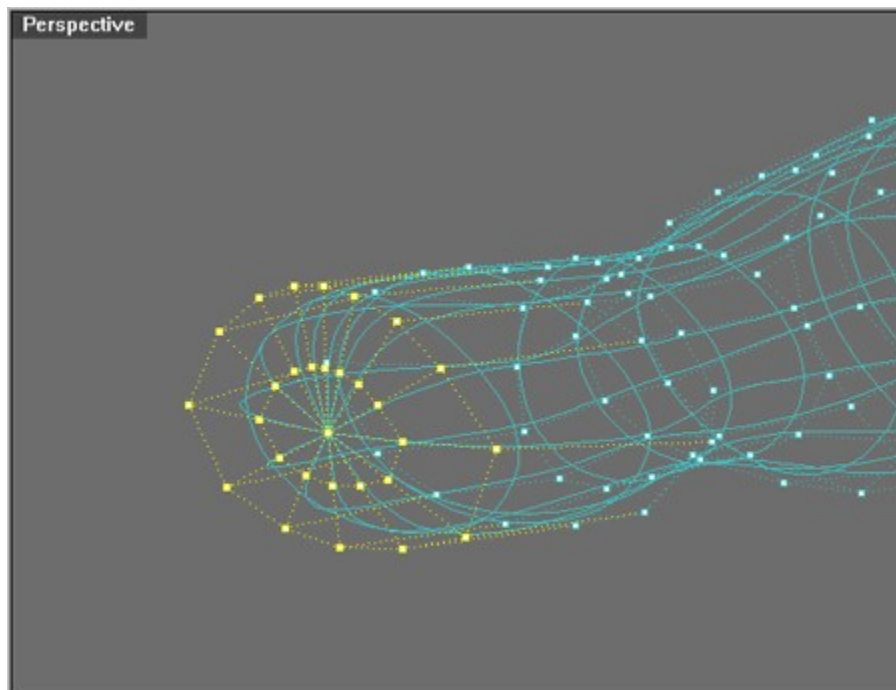
In the front view turn **CullCp** on and select the point shown below and in the top view drag the point to the left 2.5 grids.



And that's it for the arm. Feel free to 'tweak' the control points as much as as you feel is necessary.

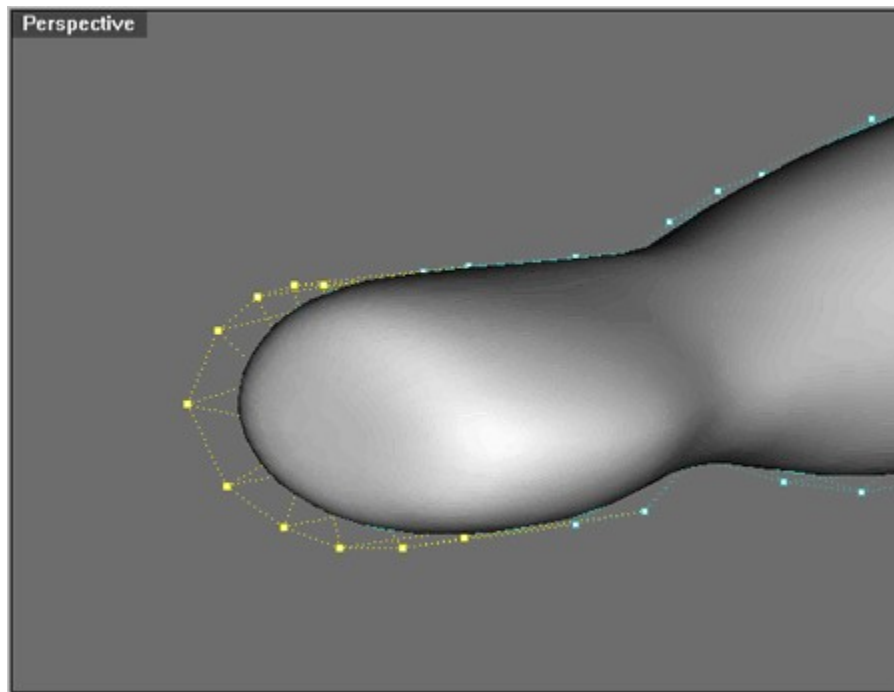
Paws

In the front view with **CullCp** off, window select the all of the end points, there should be 3 concentric rings. If you're not sure their selected, select the center point at the pole and 2 more going out from it in any direction and hit **SelV**. Selection shown below.

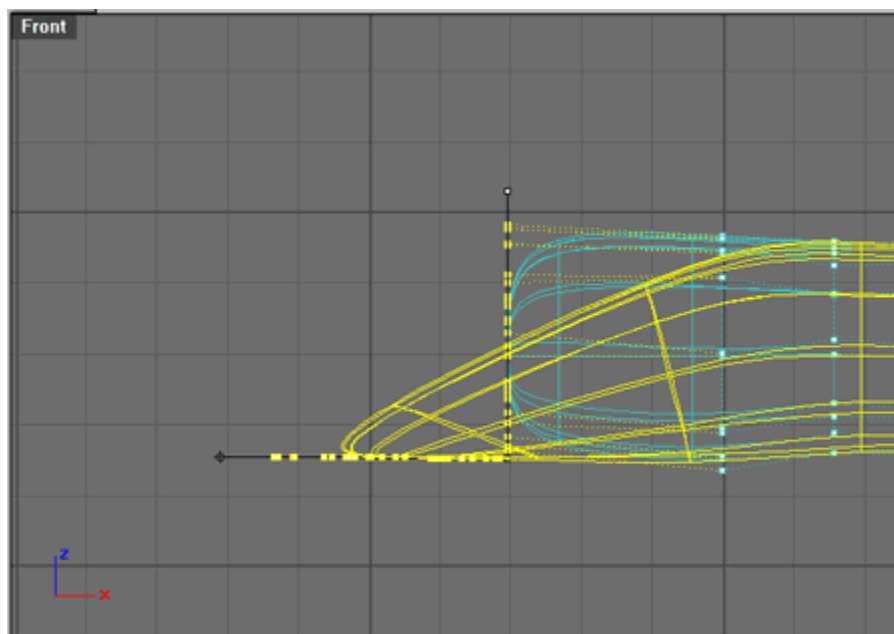


With the front view active hit **SetPt** and check off only the 'X' box and line up the points to about where they were.

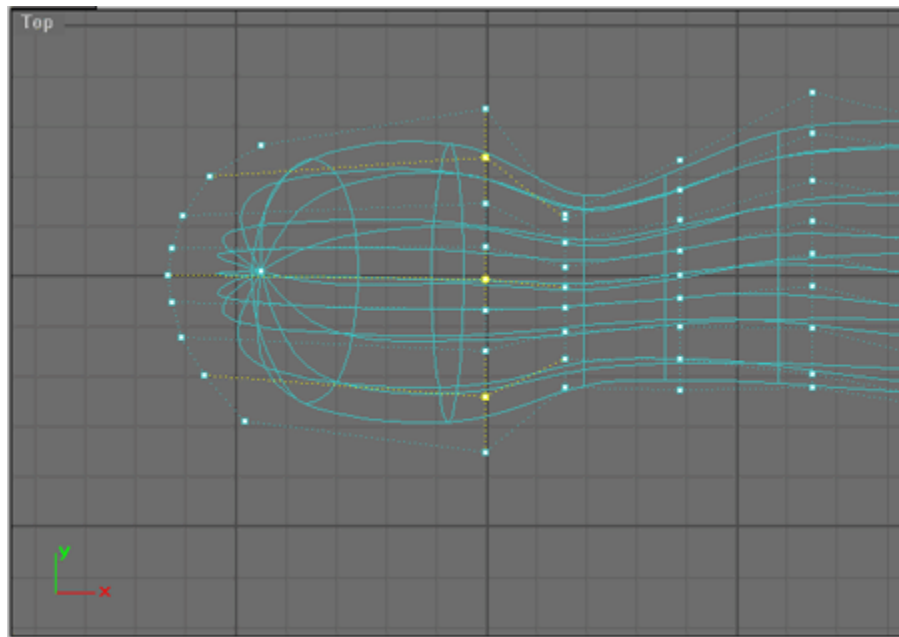
Note: The difference is that they are all lined up going to the pole which as the effect on any surface of rounding the end without any creases or folds as shown below.



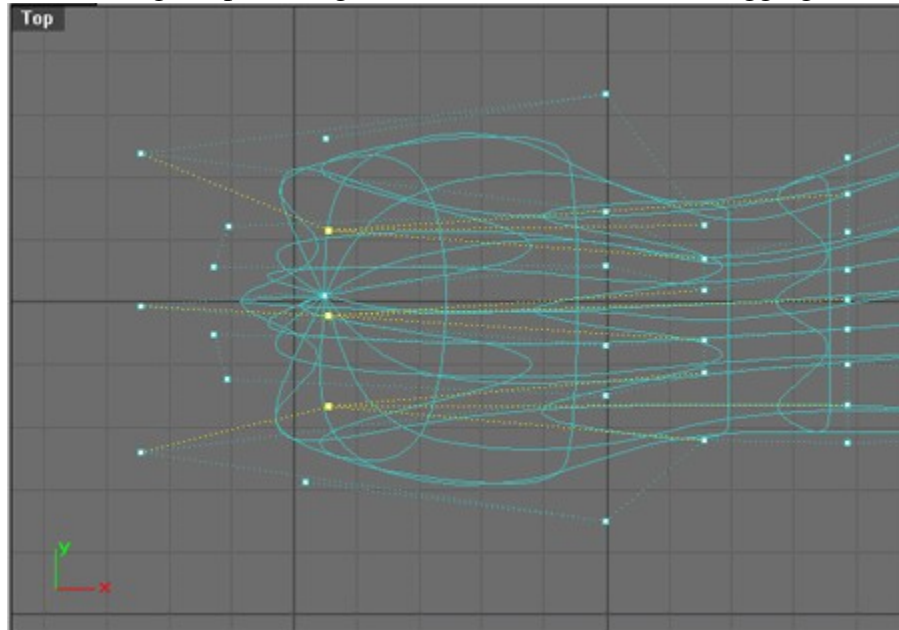
From the front view hit **Rotate** and click a position at the base of the selected points and at the second reference point click straight up above the select points and then swing the points **90** degrees to the left as shown below.



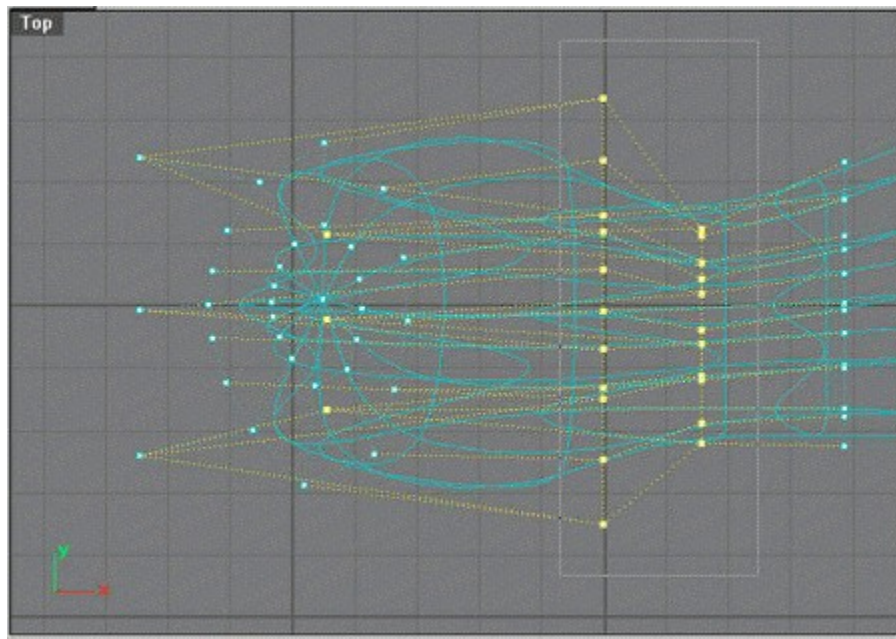
In the top view select the 3 points shown below and drag to the left **7.5** grids.



Hit **NextU** and drag the points **6** grids to the left. Result after dragging shown below.



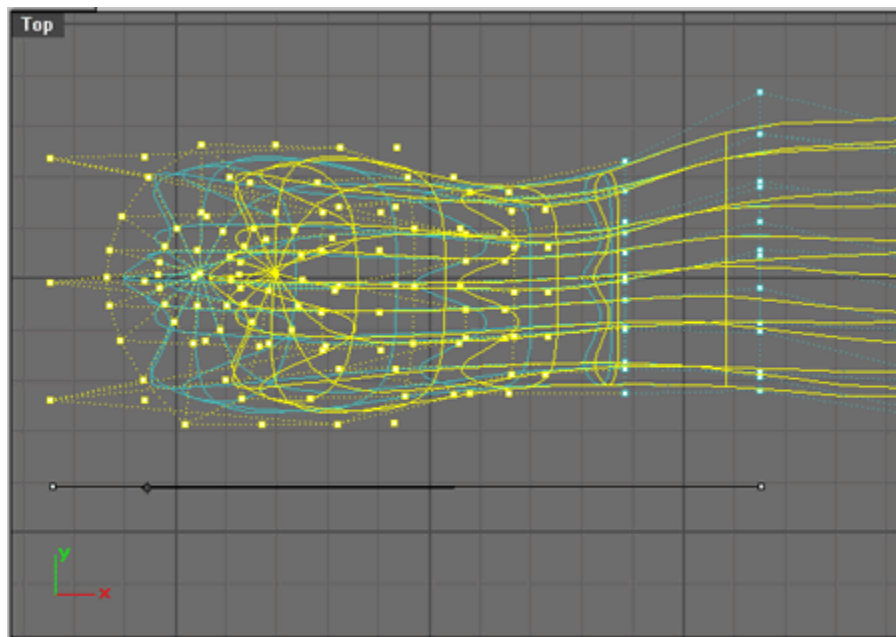
Turn **CullCp** off and holding shift down, window select the points shown below to add them to the previous selection.



Right click on the **Smooth** options and if the 'Smooth factor' is at **0.1** click OK and left click on the **Smooth** icon once more. Or the Smooth option could be changed to **0.2** and hit once, but it should be mentioned that the result is not quite the same.

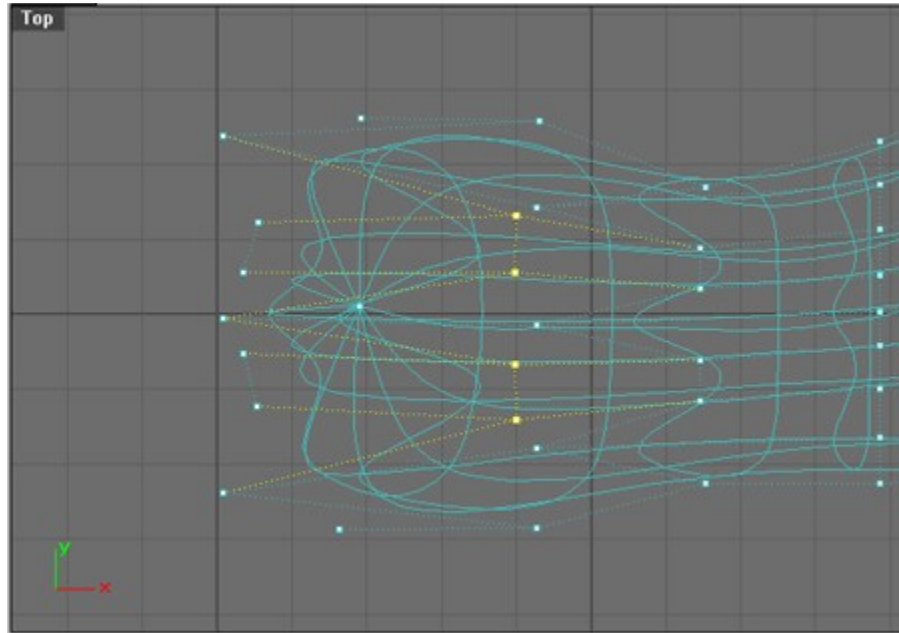
Note: Looking at the arm over all it doesn't look proportionately correct. Let's start off by making the paw shorter using **Scale1D**.

With **CullCp** off select all the points of the paw. Refer to the black line below the paw, shown below for where the first reference point is (to the right), and the second point is (end of the paw tips), and the where the scale factor point is, at the cross hairs (scale factor of **.8**).



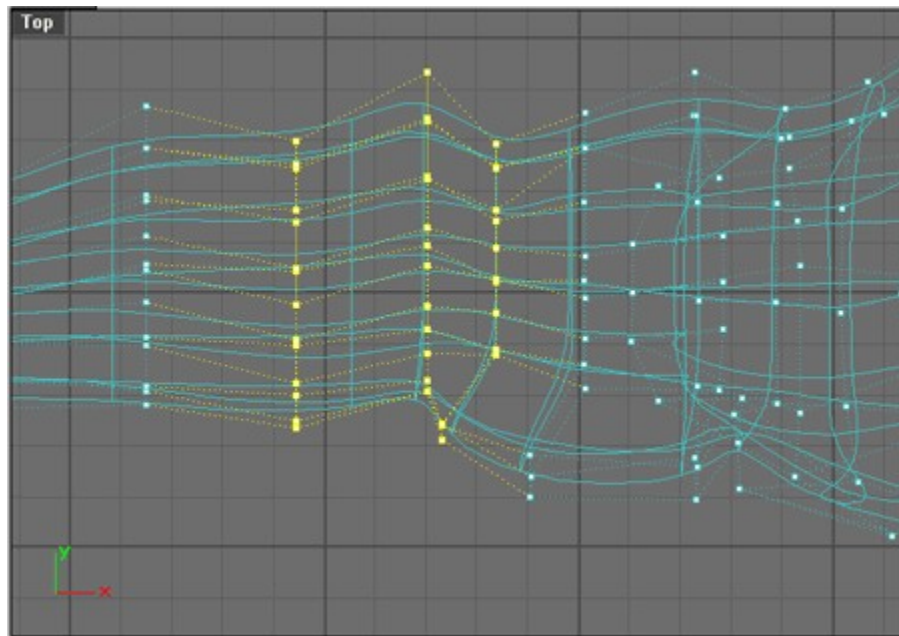
Note: I almost always hold the shift key down when scaling. However after the second reference point is established you can type in the scale factor.

With **CullCp** on select the points shown below and drag them **2** grids to the left.

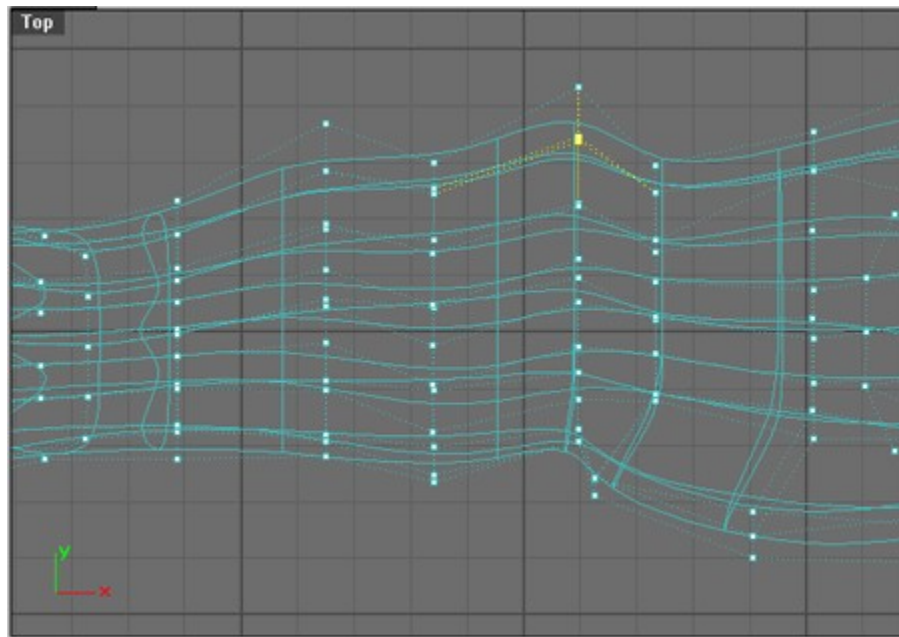


Overview: The other thing about the proportions that could be improved is that it looks like the elbow area is too close to the shoulder.

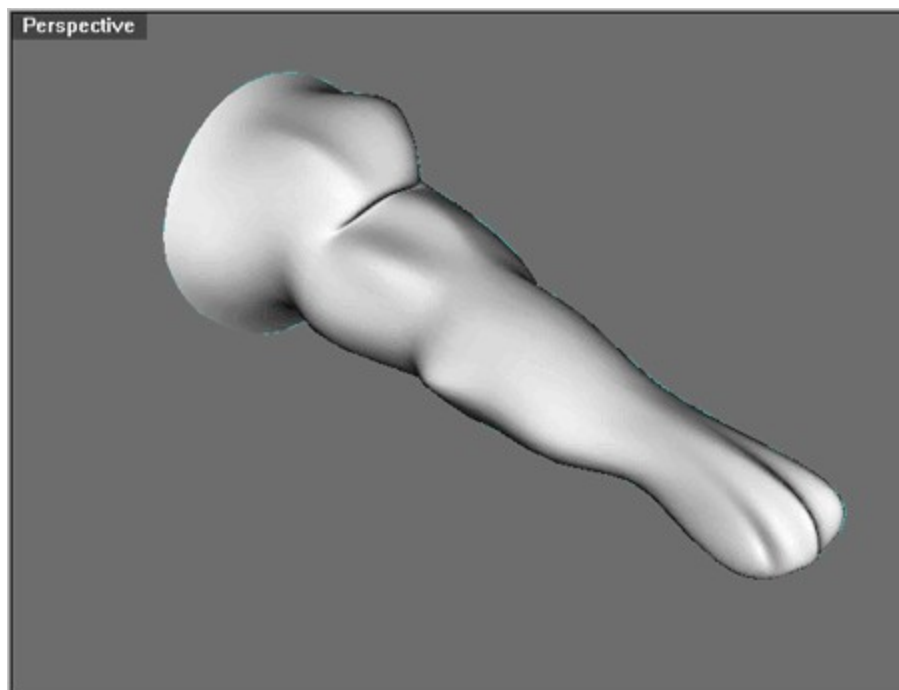
Window select the points shown below and move them 1 grid to the left.

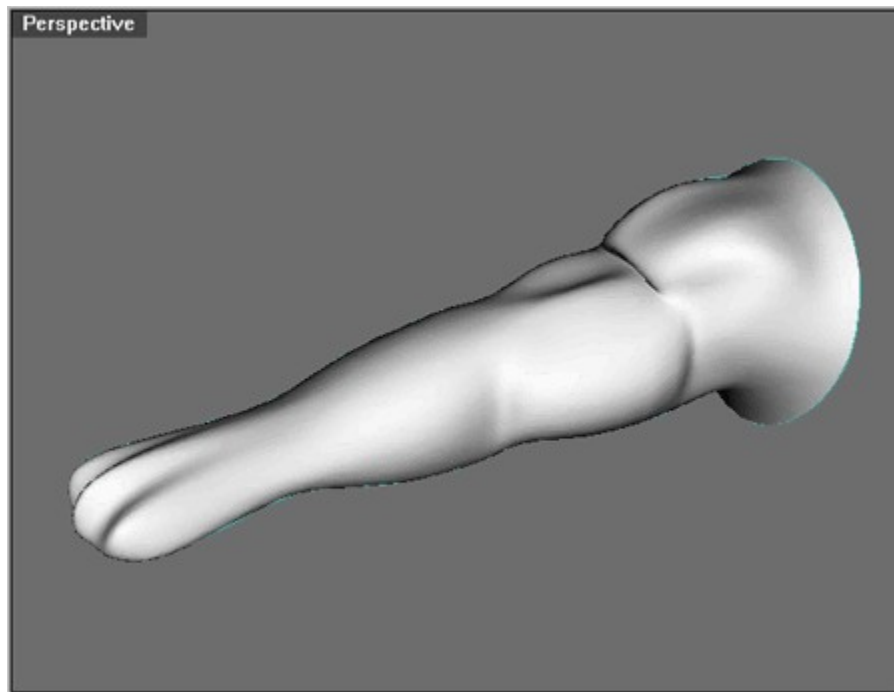


With **CullCp** off select the 2 points shown below and in the front view **Scale1D** them together with a scale factor of **.5**.



The arm is detail is finished and the results should look similar to the images below.





Claws

Overview: Let's add some claws which can be relatively easy but mistakes can be made which I'll point out along the way for future reference.



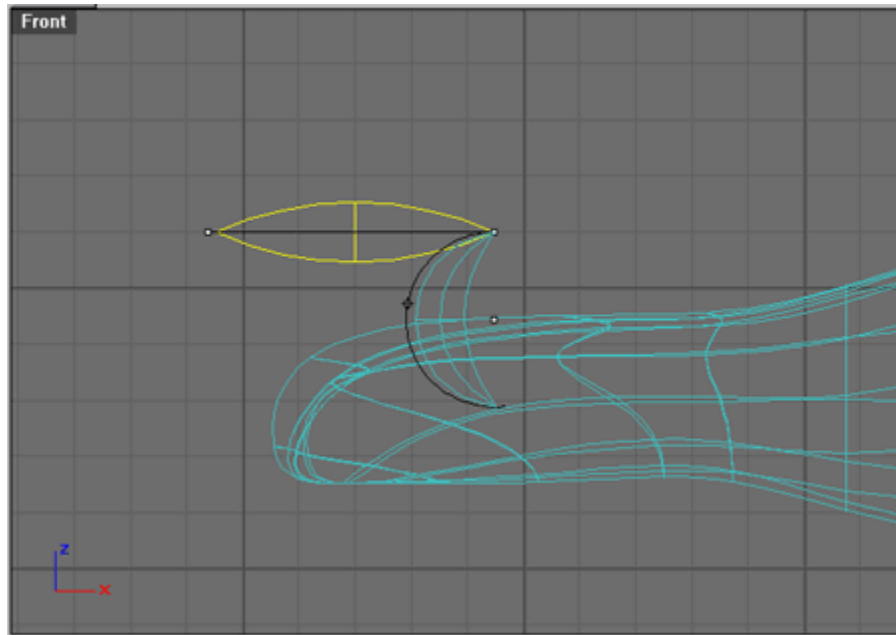
From the top view hit **Ellipsoid** and place a point above the paw to establish the center of the ellipsoid and drag it to the left about **2.5**, which you can see in the status bar.

After you established the end of the first axis you can type in the distance of the other two axis, **.5** and **.4**

Note: What could have given unexpected results at this time was if you had dragged down instead of sideways to establish the first axis. The first axis establishes where the poles are oriented.

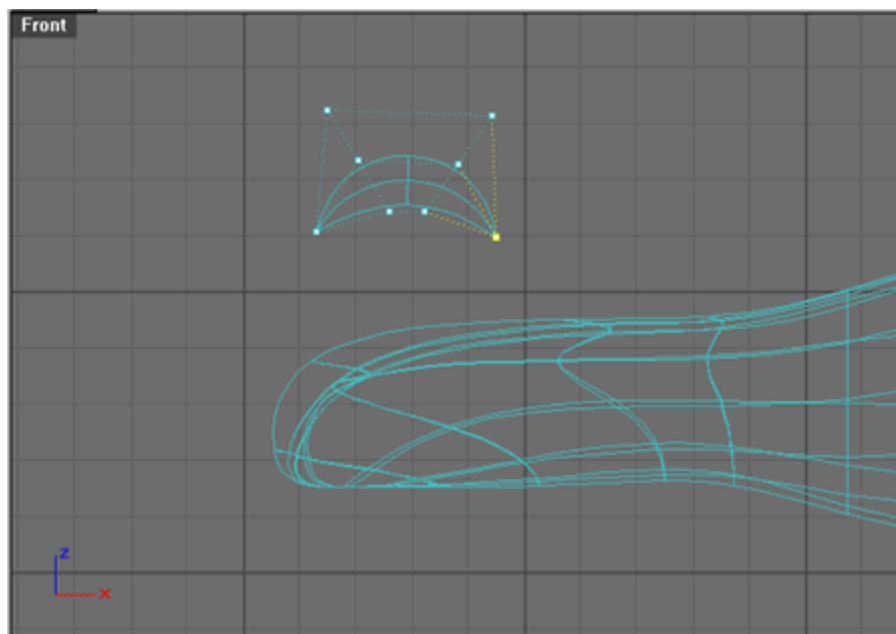
Select the ellipsoid and hit **RebuildSrf** and give it '4 points U' and '4 points V'

In the front view with the ellipsoid selected hit **Bend**. For the 'Start' of spine point click the right end of the ellipsoid and for the 'End' of spine point click on the left side of the ellipsoid (make sure you click just beyond the end of the ellipsoid or you will get weird results). For the 'Point' to bend through drag down until the ellipsoid is bent down about **90** degrees as shown in progress below.

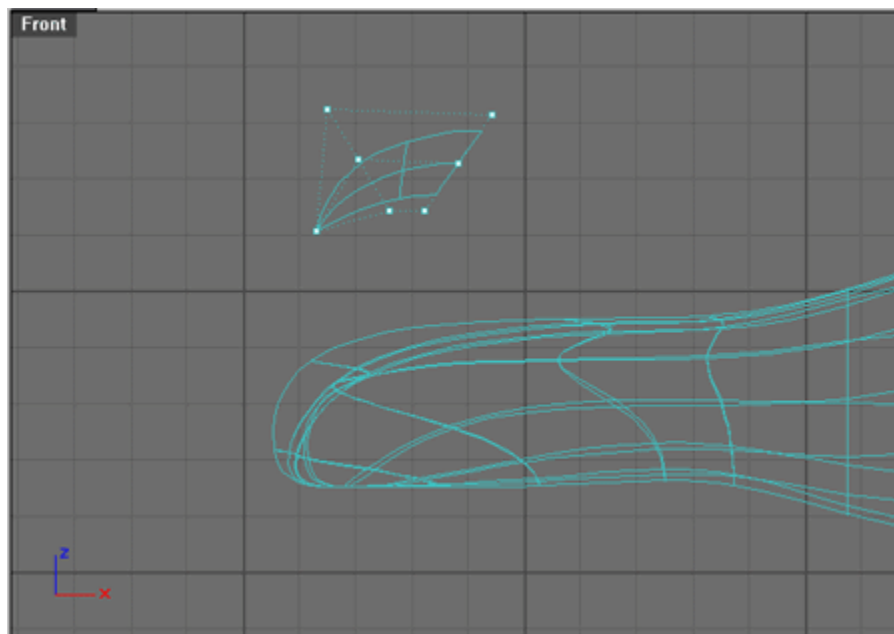


Rotate the claw **90** degrees.

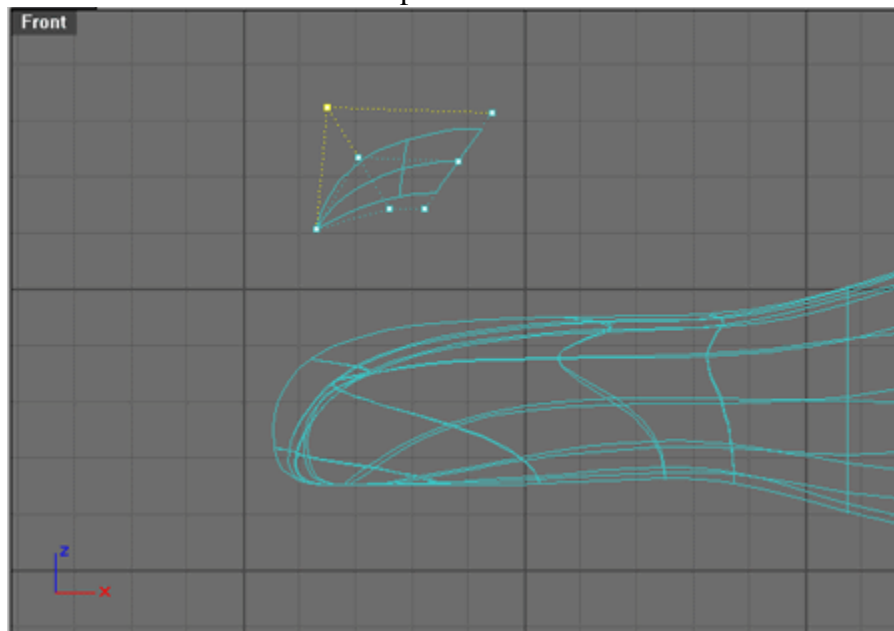
Select the point shown below and right click on the **Smooth** icon to get the smooth options and for smooth factor type in **1**, and hit OK.



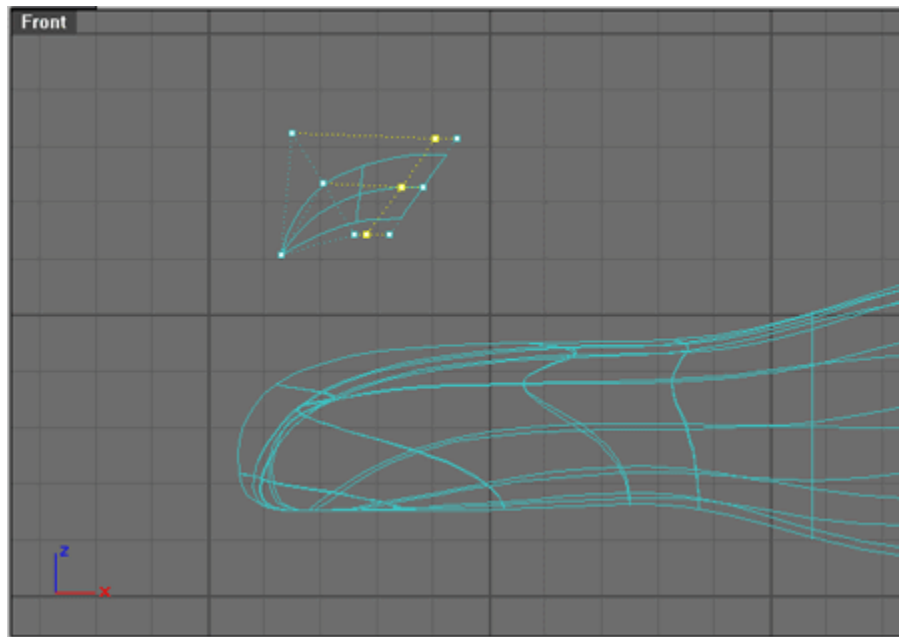
This should give the results shown below.



Select the point shown below.



Hit **SeIU** and hit **PrevV** and drag the selected points to the left just enough to uncover the points that are being covered by the selected points shown below.

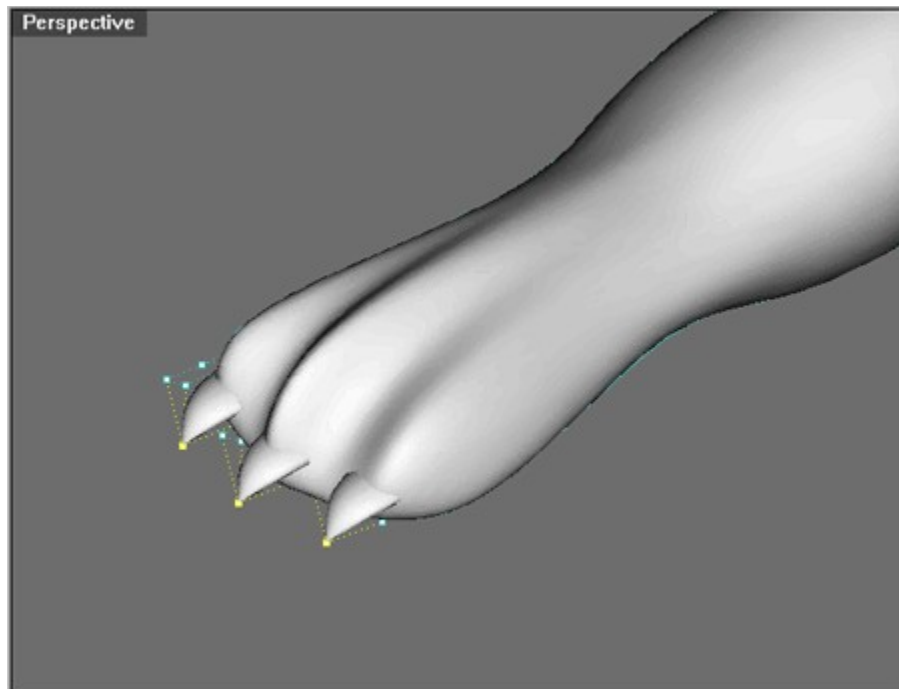


Hit **PrevV** again and drag the points about **1** grid to the left.

From the front view hit **Scale2D** and scale the claw down a factor of **.5**.

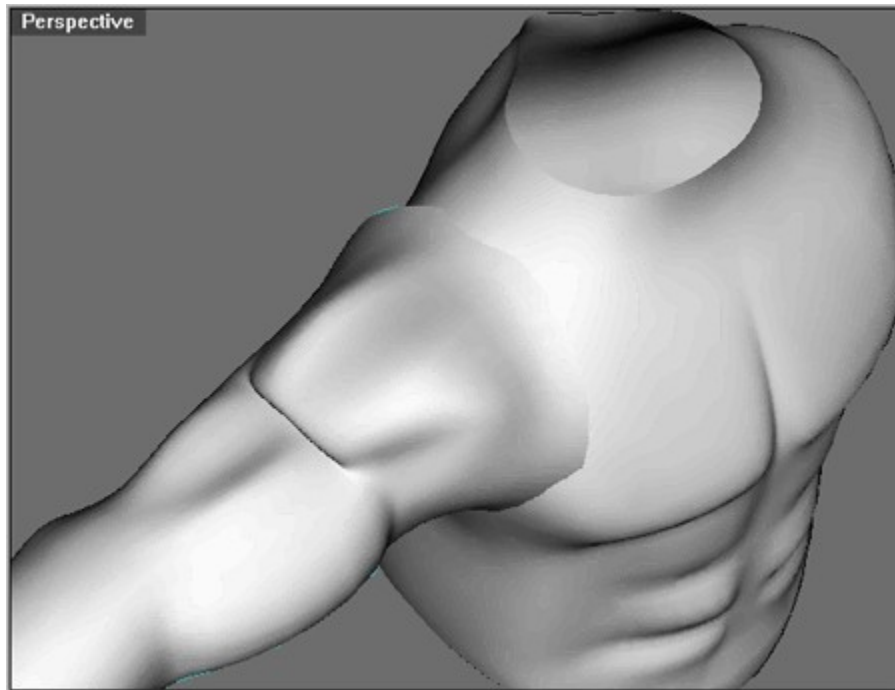
Turn points off **PtOff** and drag the claw into position on the paw.

Drag the claw into position for the first claw and in the top view hit **Copy 'InPlace'** and drag down to position the middle nail and **Copy 'InPlace'** again and drag down to the position of the third claw shown below.



If you turn the points on **PtOn** and select the end points of the claws you can move them around for different looks.

Joining the Arms to the Torso

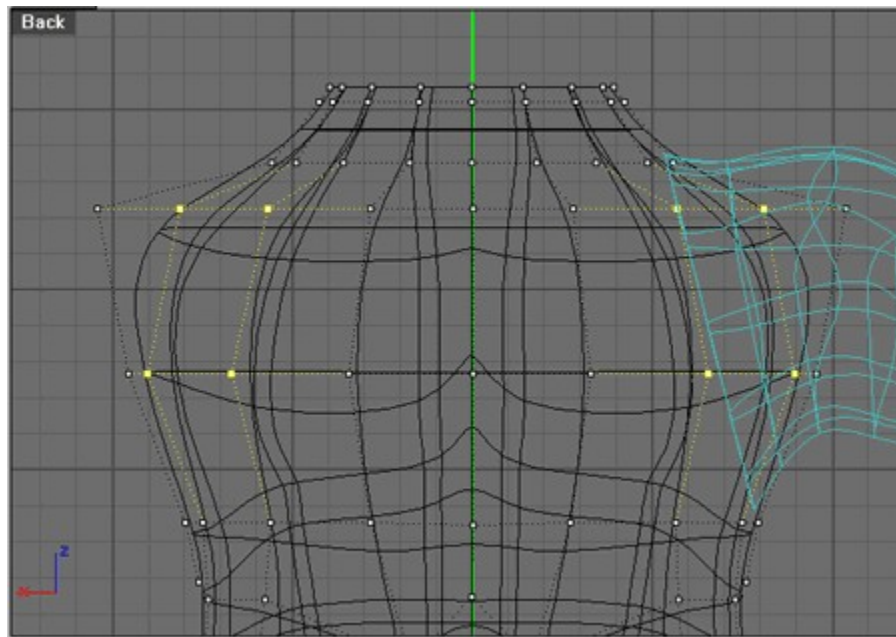


Overview: The actual blending of the arm to the torso is an easy thing to do but some modeling adjustments need to be made to make it look right. Now I could have structured this tutorial so that no adjustments would have been necessary but that wouldn't be realistic. It's a natural process to have the model evolving as you go and discovering new things about the character that you hadn't thought about when you started. Actually that's what makes modeling a character interesting to me. When I started the character I wasn't really satisfied with back and shoulder but I figured I would come back to it when I had the arm finished and I had something to go from. So let's do this let's bring the shoulder and back area closer to where the arm is and add some detail to the back as well.

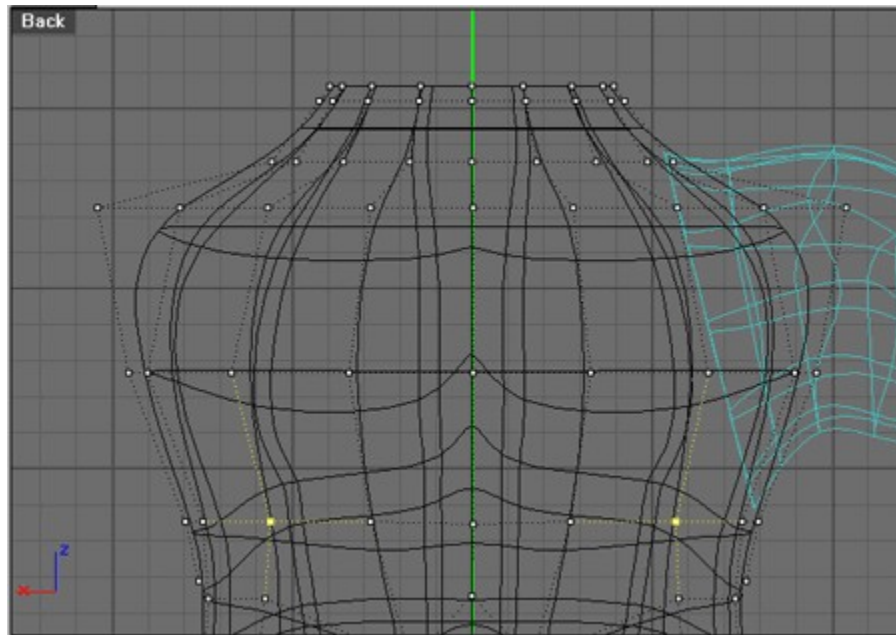
As you can see from the view above the back of the arm is quite a ways away from the back.

Change the front view to the back view.

Turn **CullCp** on and select the 8 points shown below and in the left view drag the points about 1.4 grids to the left. Be sure to have **DynamicShadingPerspective** on and have the perspective view similar to the top image so that you can eyeball it.

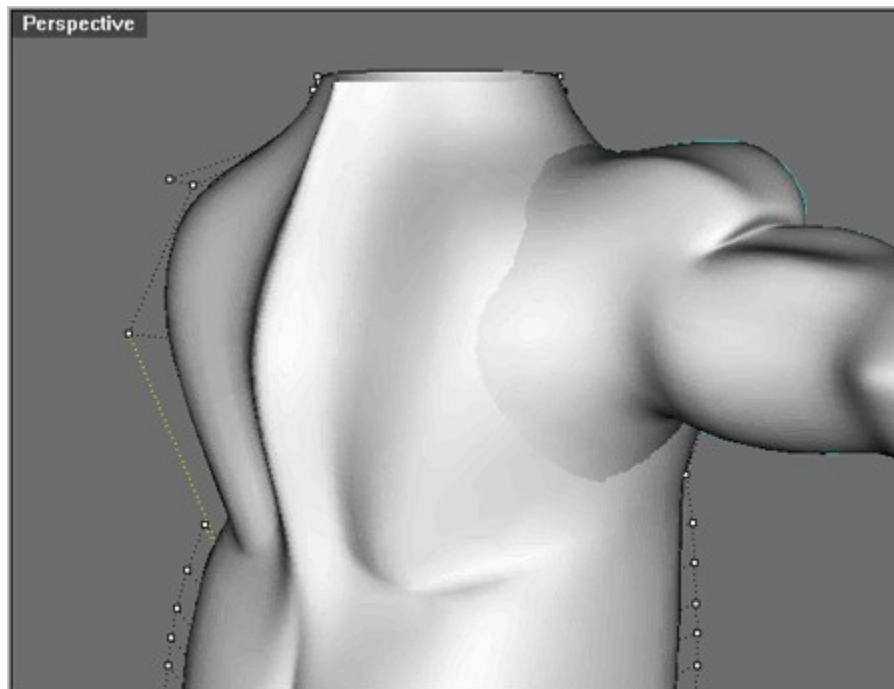


Select the points shown below and drag them down about **4.25** grids.



In the left view drag the points to the left about **2.5** grids.

Scale1D the same points closer together with the center of the back as the origin point ('0' + enter) and enter **.25**, hold down the Shift key for temporary **Ortho** and click to the right of the origin reference point. Result shown below.



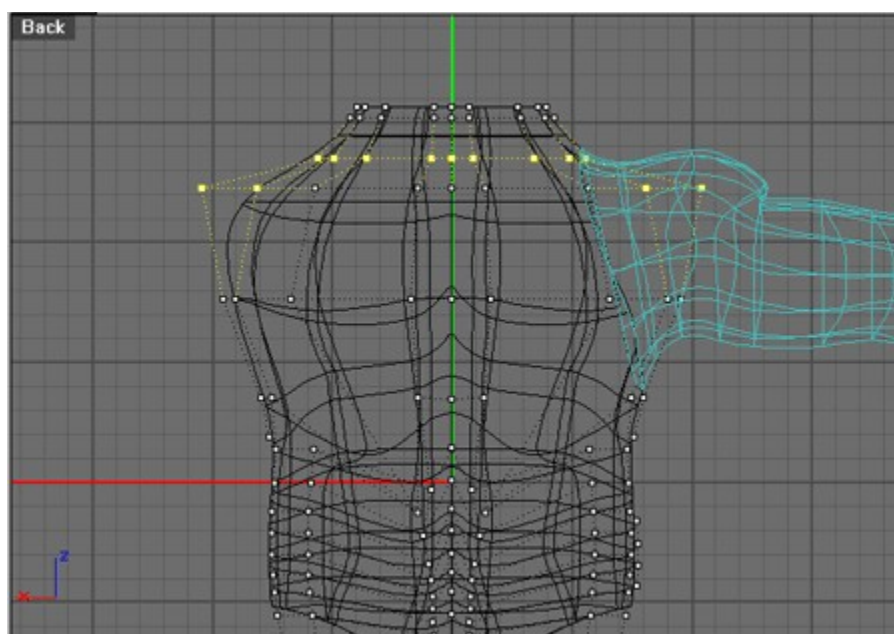
Note: We're going to **MatchSrf** the arm to the torso to get a better idea of how things are taking shape.

Hit **Pull** (which is a tool that pulls a curve towards a surface by its nearest points) and select the edge of the arm when prompted to 'select curves to pull back' and select the 'torso' when prompted to 'Select surface that pulls:'

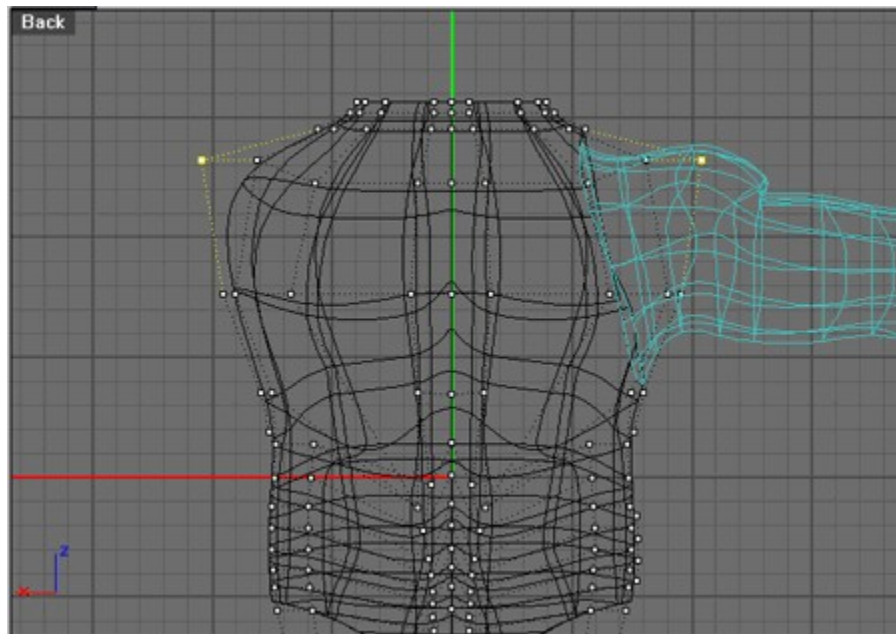
Split the 'torso' with the curve that was pulled to the surface and **Delete** the shoulder part of the 'torso.'

MatchSrf the arm to the torso. Hit **MatchSrf** select the edge of the arm and then the edge of the trim on the torso and use the 'Automatic' option. Hit enter, and in the **MatchSrf** dialog select 'Curvature' and uncheck everything else.

With **CullCp** still on and from the back view select the 12 points shown below and drag them up 1 grid.



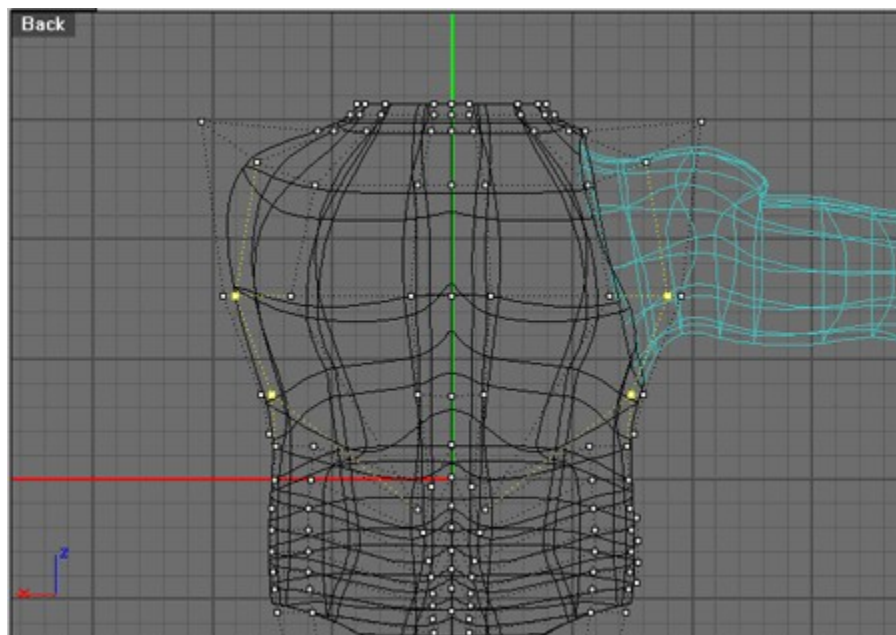
Select the 2 points shown below and drag them up 2 grids.



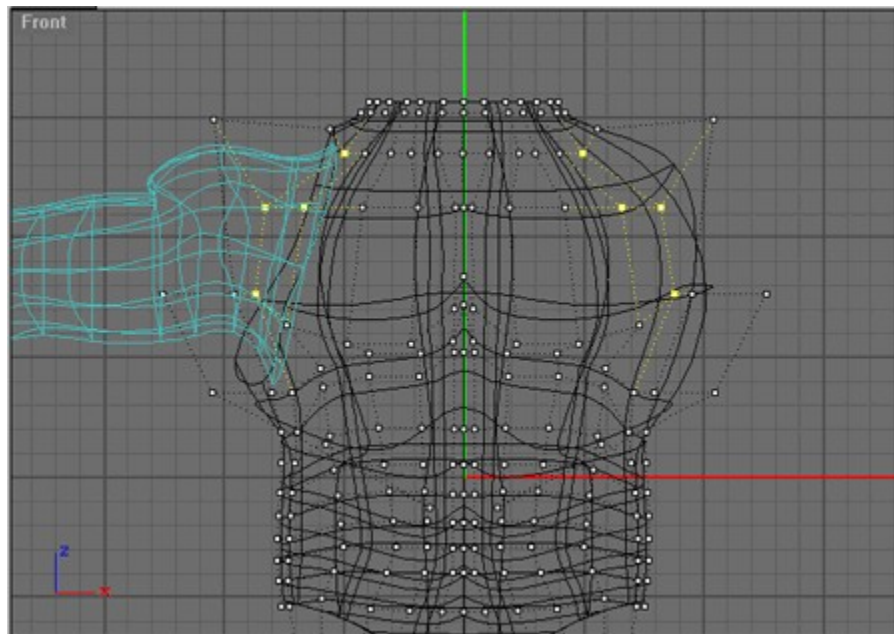
One thing to do on the back that really looks good is to widen out the lattes.

Select the 4 points shown below and **Scale1D** with the origin point in the center (0 + enter.)

Enter **1.4** when prompted for the 'Scale factor' and hold down the Shift key for temporary **Ortho** and click to the right of the origin reference point.

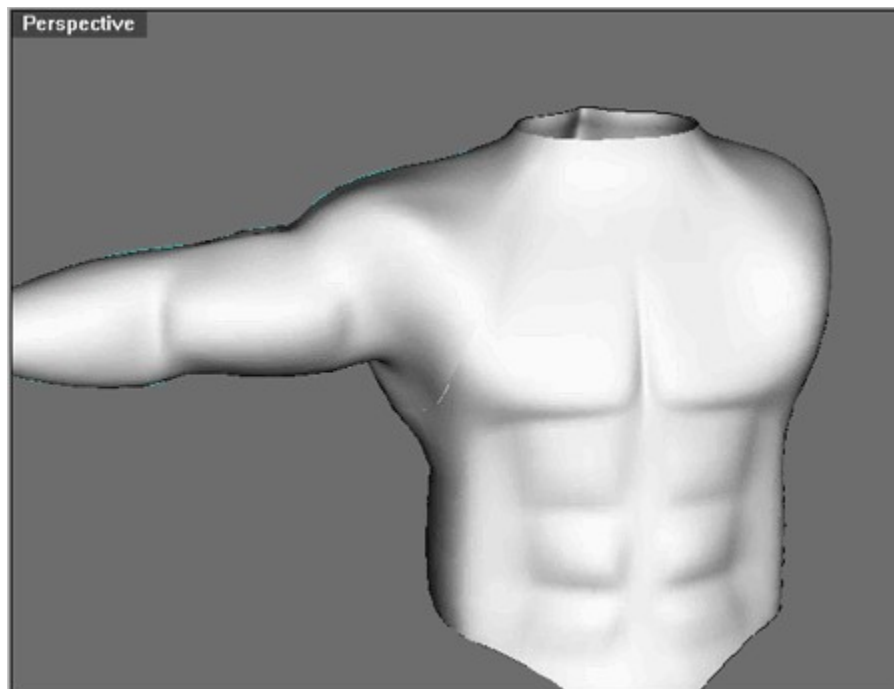


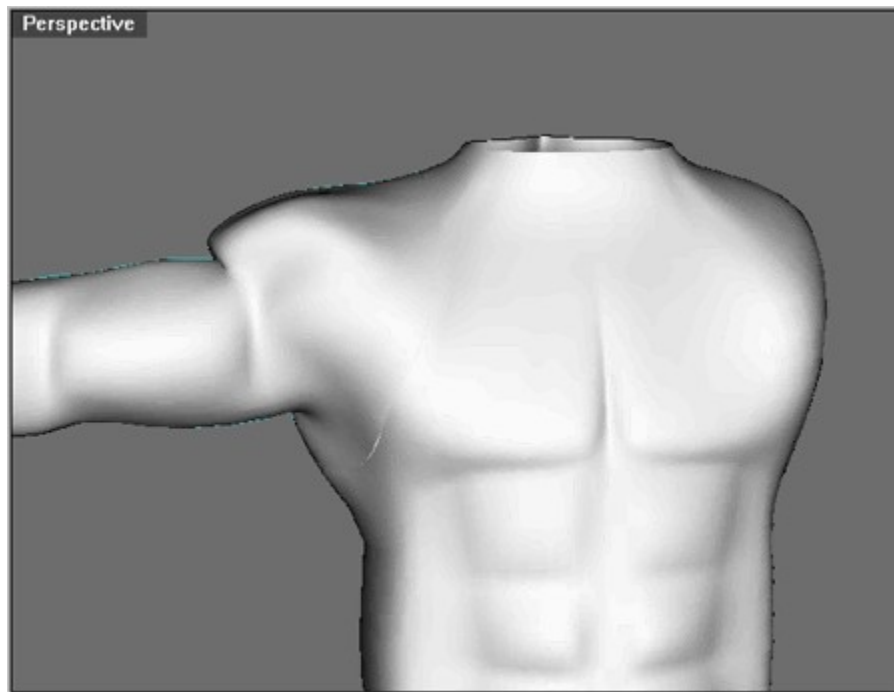
Change from the back view to the front view and select the 8 points shown below and in the left view drag them to the left about **2** grids.



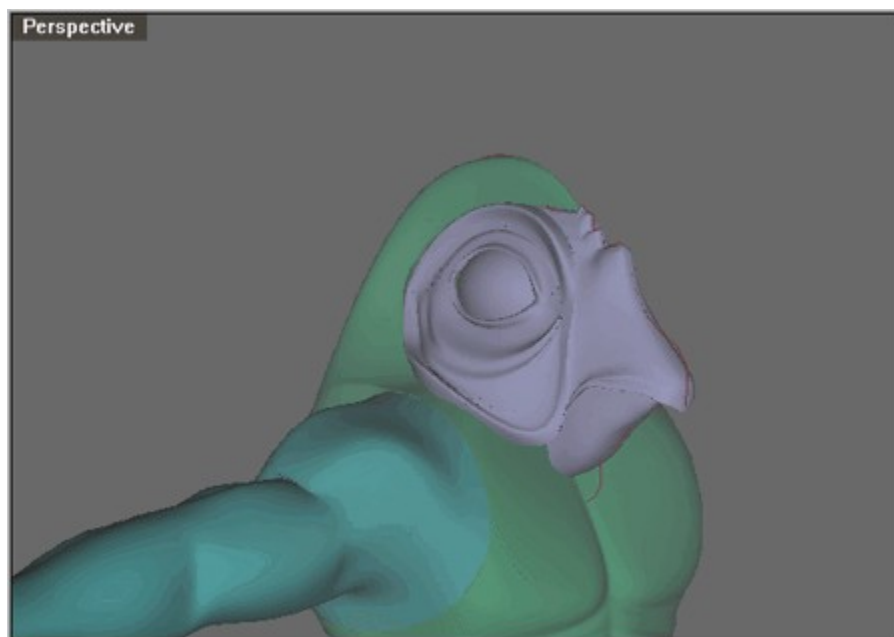
MatchSrf the arm and that's it, there's probably going to be some more adjusting around the neck and collar but that's better left until the head finished.

Save out your file and do any tweaking you feel would be an improvement and remember to re- **MatchSrf** the arm to the torso when done. If you want a more human result I would smooth out the ridge over the biceps and smooth the front of the biceps just below the ridge. Shown below.





Part 3: Head
Crest

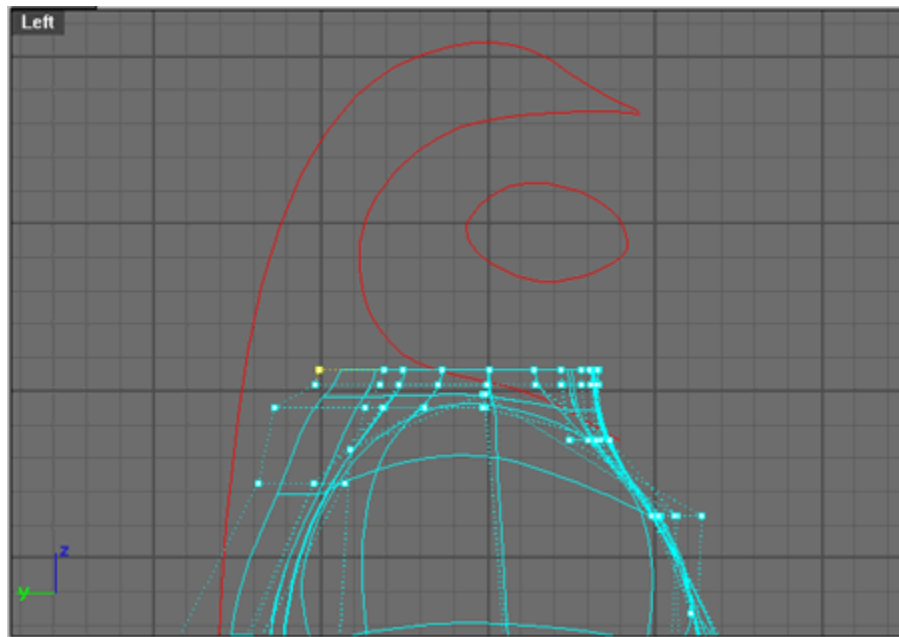


Save your file and merge t8.3dm or open trog8.3dm

Turn off **DynamicShadingPerspective** for this part if it slows you down. Also make sure **CullCp** is off.

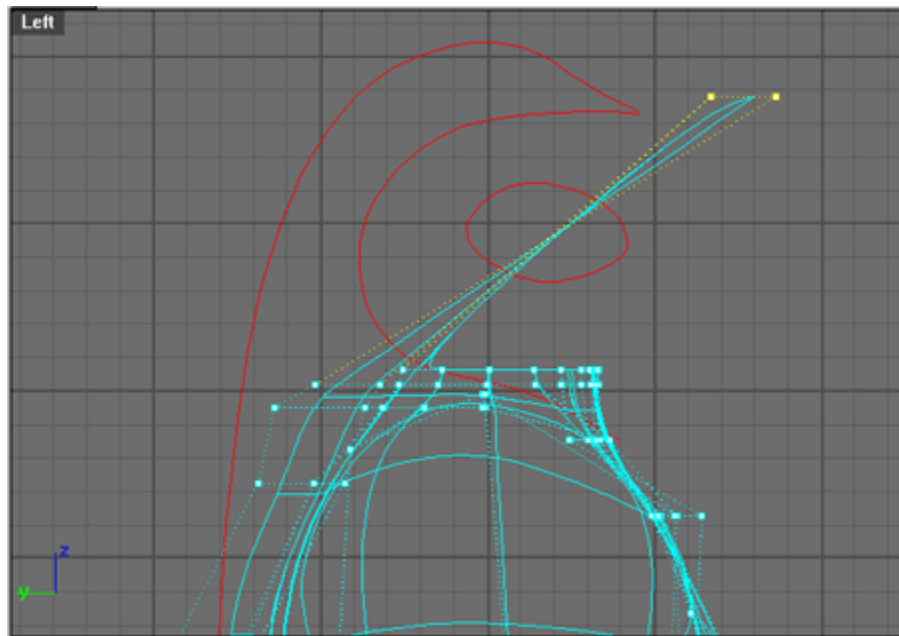
Delete the 'profile curves', 'section curves' and 'annotate' layers.

Select the torso and turn on the points and select the upper left point shown below.

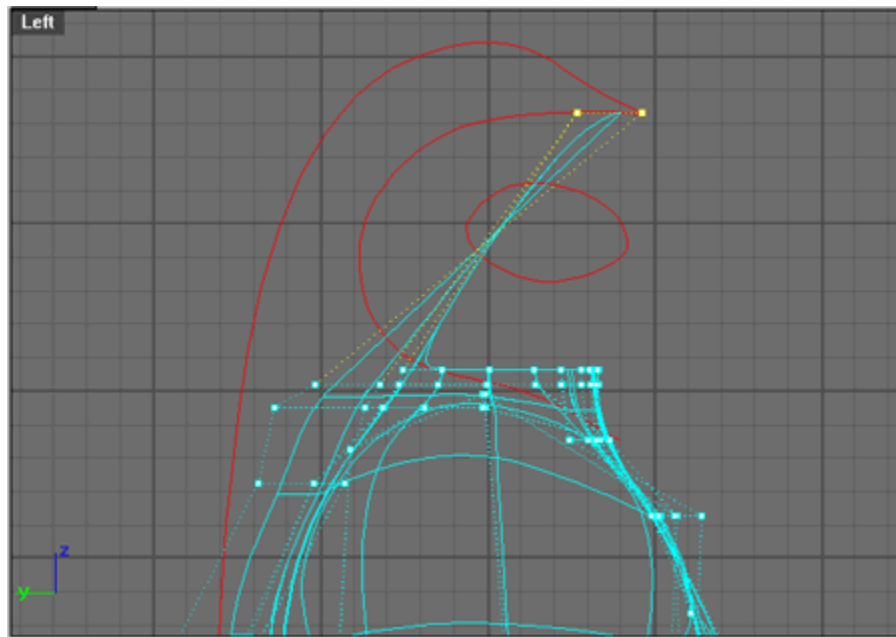


Hit **AddPrevU** and then right click for **AddNextU**.

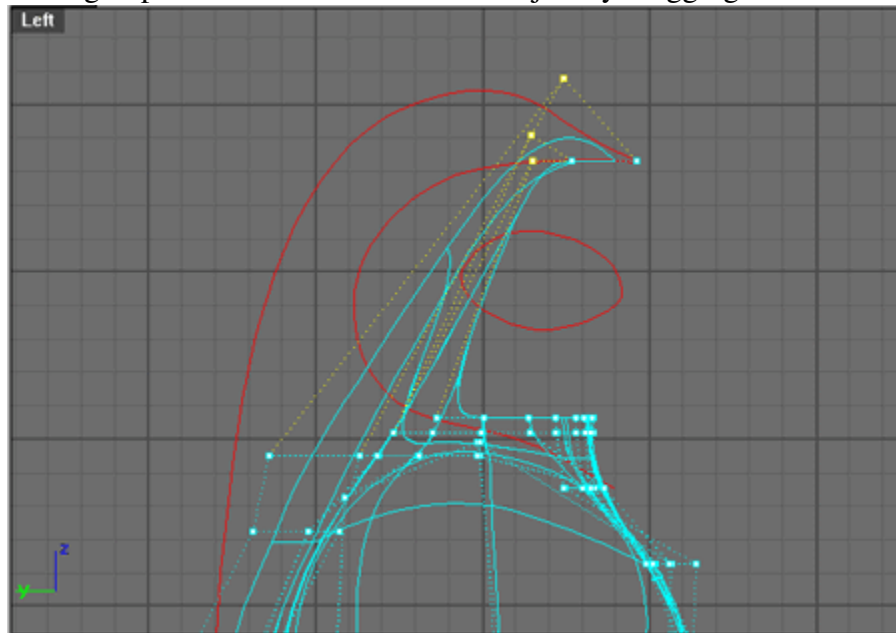
Hit **Rotate** and for the 'Center of rotation' click somewhere within the eye and type in **180**. As shown below.



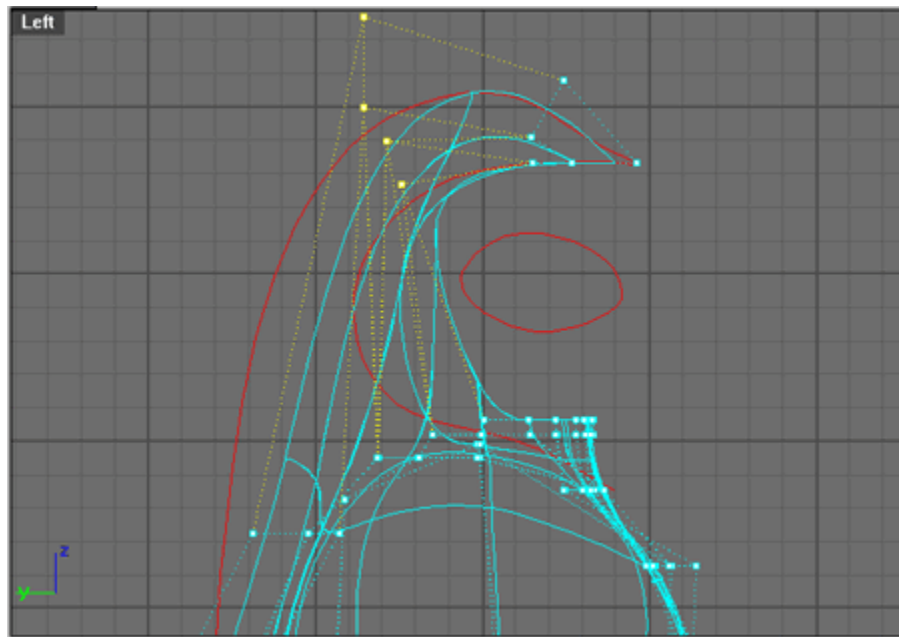
Reposition the 3 selected points so they form the point of the crest as shown below.



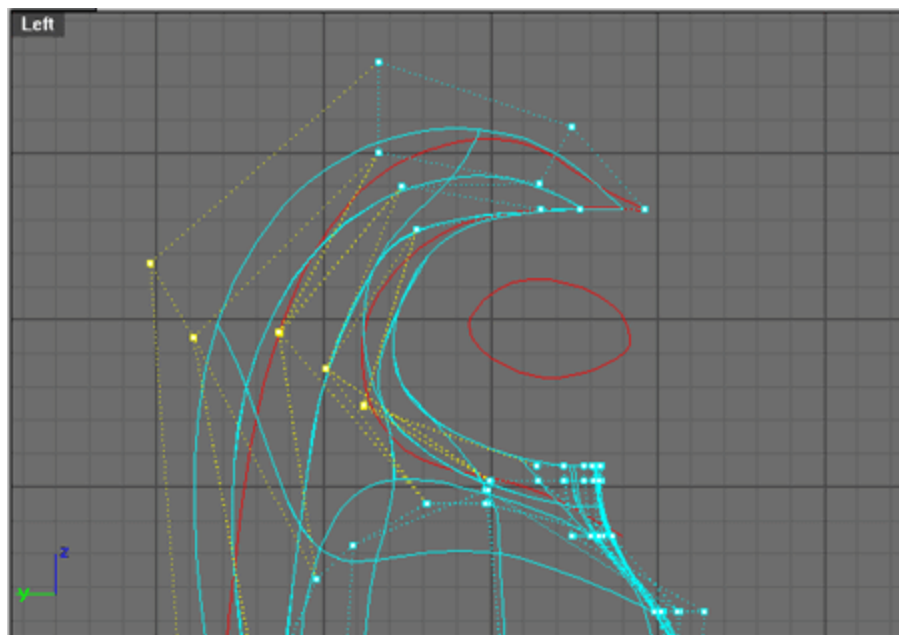
Hit expand selection **SelConnected** and de-select the previously selected points and **Rotate** the currently selected points with the 'Center of rotation' being positioned approximately at the lower part of the eye and type in **120** or swing to position as shown below. Readjust by dragging the selection if necessary.



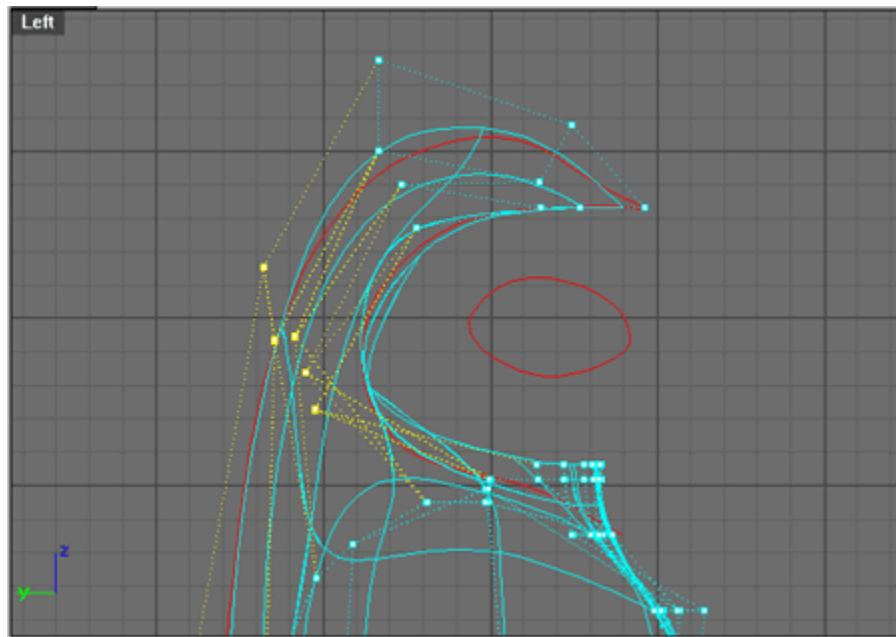
Hit Expand Selection **SelConnected** and de-select all the previously rotated and repositioned points and **Rotate** with the 'Center of rotation' being positioned at the center of the eye and type in **90**. As shown below.



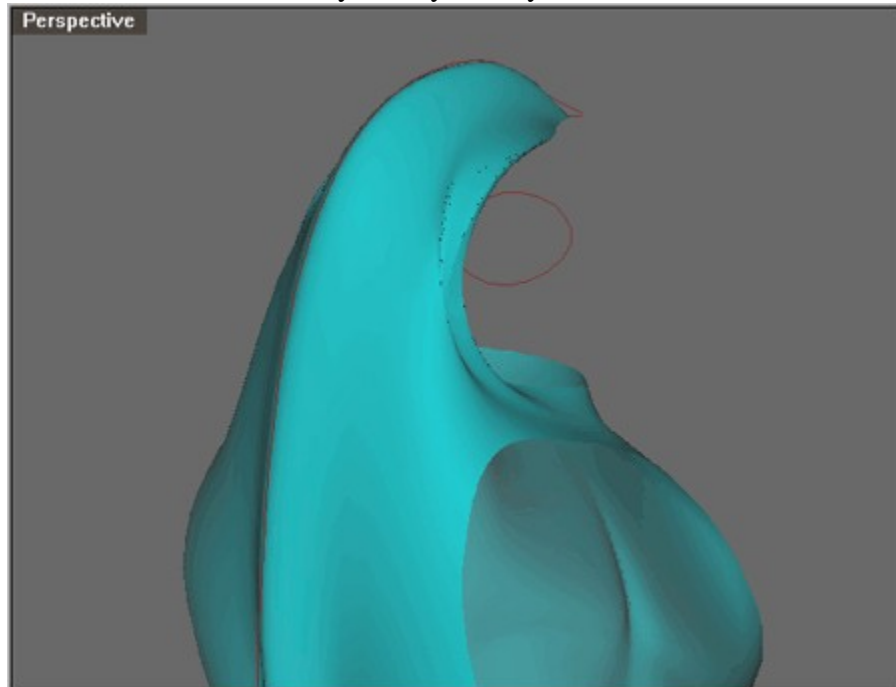
Hit expand selection **SelConnected** one more time and de-select all previously rotated in repositioned points in **Rotate** with the 'Center of rotation' being at the back of the eye and type in **60** as shown below



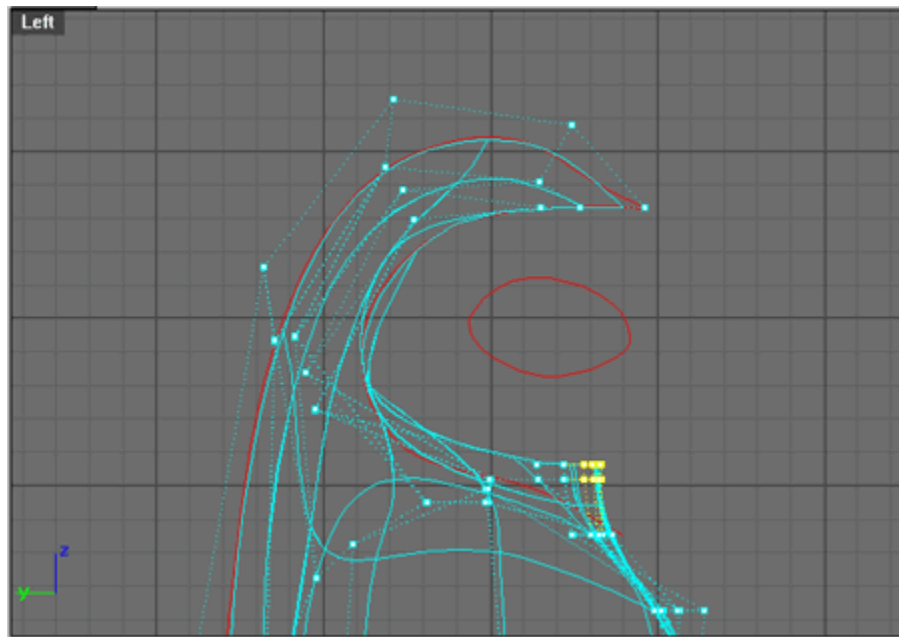
Hit **Scale1D** and scale the selected points in towards each other from the center until they approximately match up to the profile curves. As shown below. The points that were rotated in step 6 may also need to be **Scale1D** closer together.



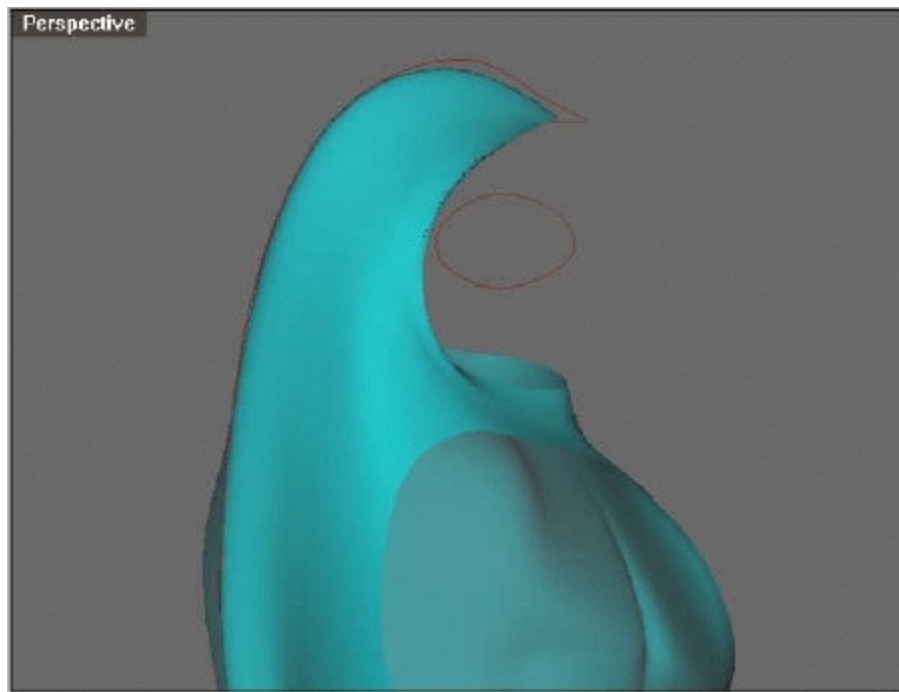
Check out the crested head in the perspective view port as shown below. There is the kind of a ring around the inner curve of the crest, which you may or may not want. I vote for smoothing it out.



Select the points shown below and hit **SeIU** to select the first 2 rows of points around the inner curve of the crest.



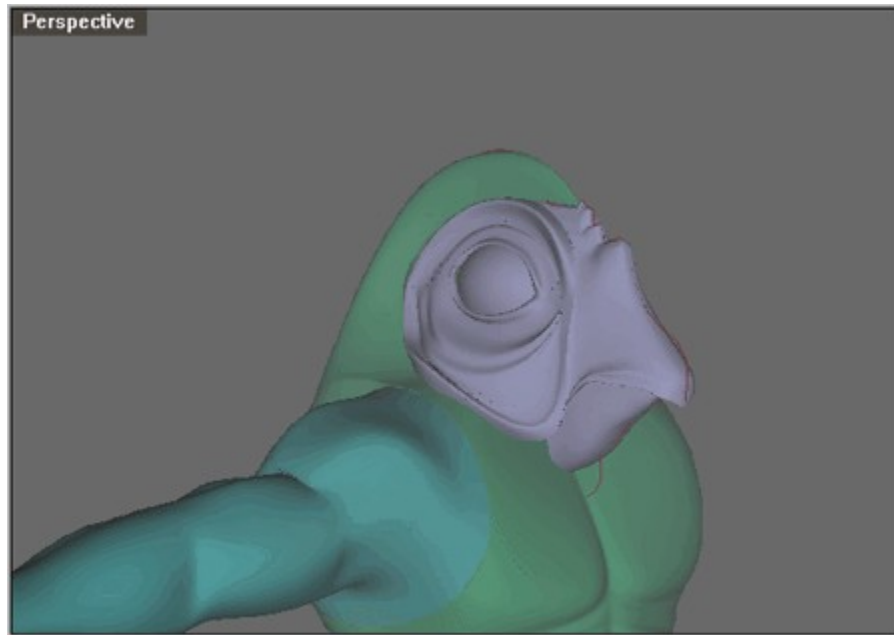
Right click on the **Smooth** option to make sure it's set at **.1** click Ok and hit **Smooth**. Results below.



You may need to select and pull some points to line them backup to the profile line.

Do any point adjusting necessary to follow the profile curve but it doesn't have to be perfect.

Baggie Eyes

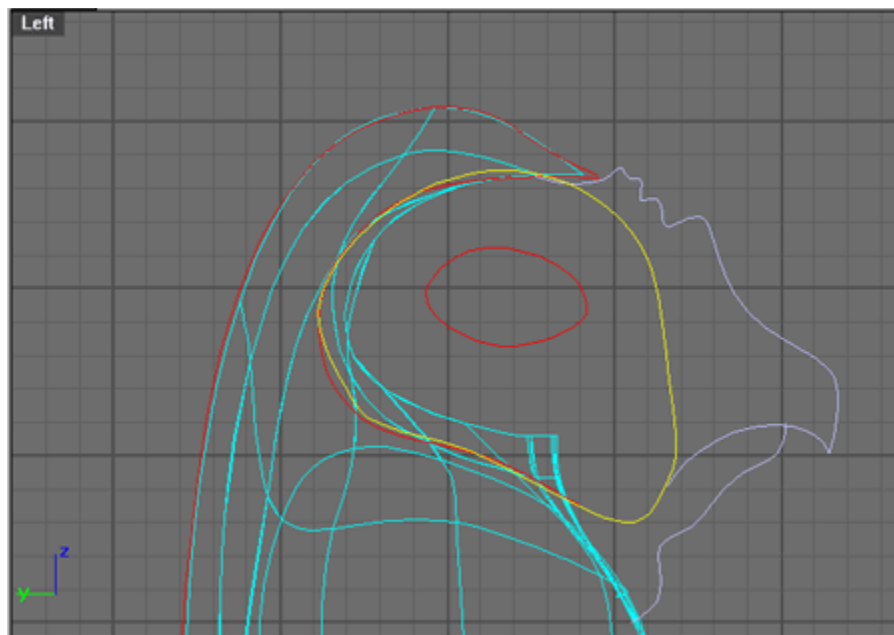


Overview: the next part here will cover some basic modeling techniques using **Sweep2**, **Project**, and working with profile curves and 3-D geometry together using Osnap. If you don't have an alias-key setup for osnap this would be a good time to do it. I use the 'f' key for freeze, unfreeze osnap.

Overview: The first thing needed is to make a curve that forms the outside ring of the 'baggy eyes' that corresponds to the profile curve and the geometry of the torso and will also be a foundation for the beak.

Save your file or open trog9.3dm

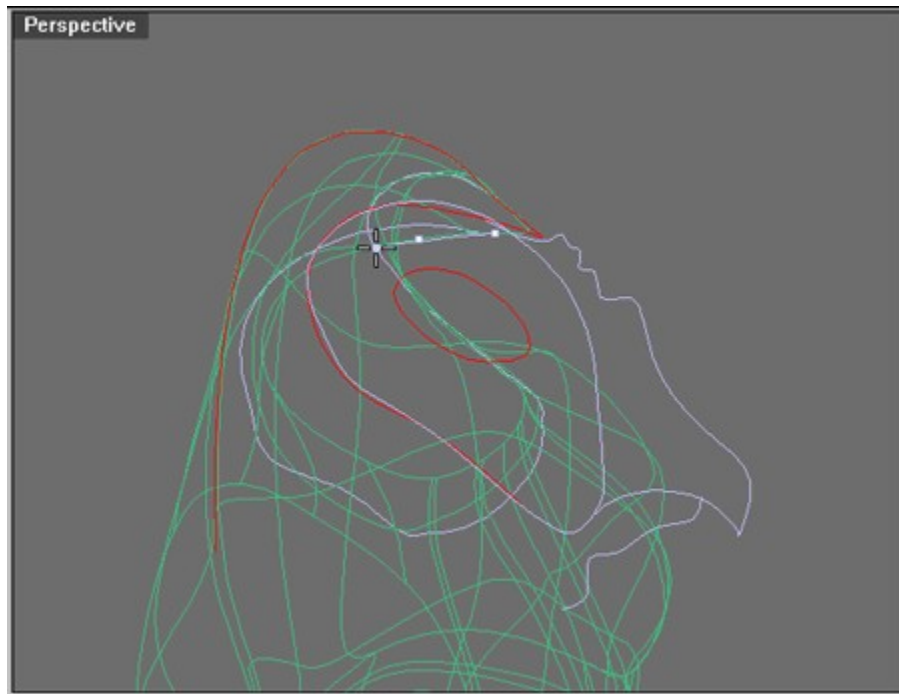
In the left view select the outer ring shown below and **Project** it to the surfaces of the torso and shoulder.



In the perspective view turn 'Near' Osnap on and hit **InterpCrv**.

Place the starting point of the curve just a little back from the tip of the top of the crest as shown below.

Note: If there is a inadvertent point created in the wrong place type in 'u' + enter.

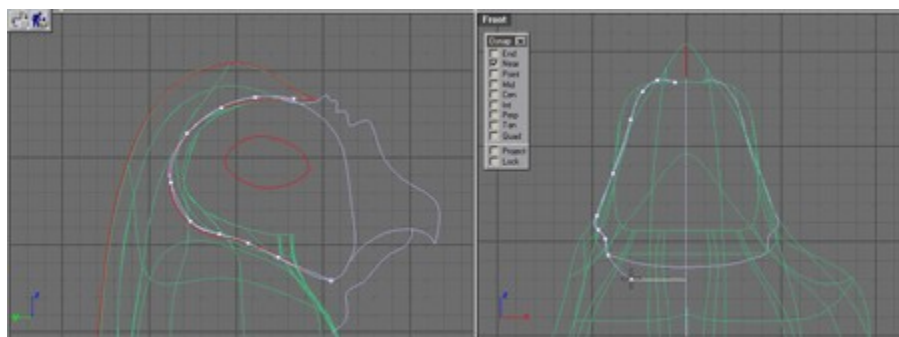


As you're working the curve around the edge you'll notice that the light purple curve starts to trail away from the edge of the crest. Start following the projected purple curve instead of the edge.

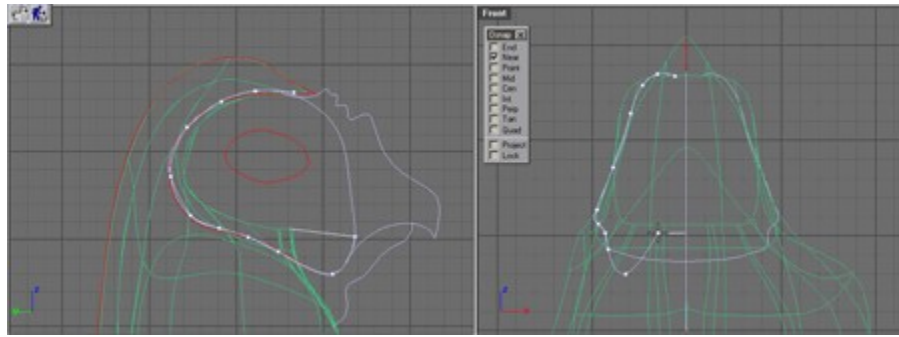
Continue the curve snapping to the light purple projected curve around until you get to the front of the shoulder.

Note: At this point we only have the profile curve in the left view to go by and we need to place the control points in 3-D space back to the beginning of the curve.

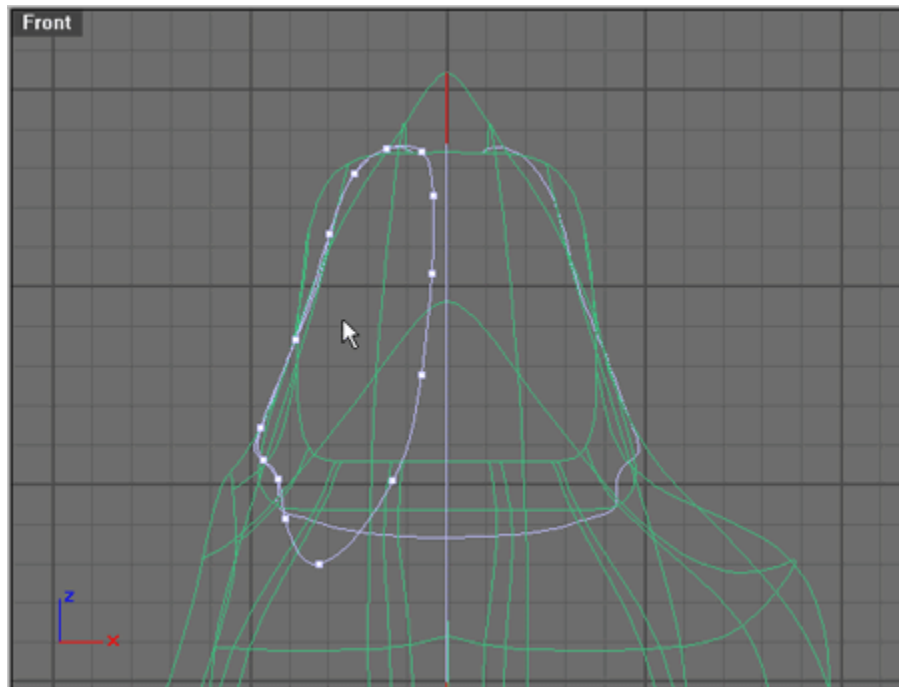
Turn off Osnaps and in the left view hold the 'Ctrl' key down and place a point at the lowest part of the profile curve. At this point you'll notice in the front view, a white line is attached to the point and you can finish the placement of the point in the front view, shown below.



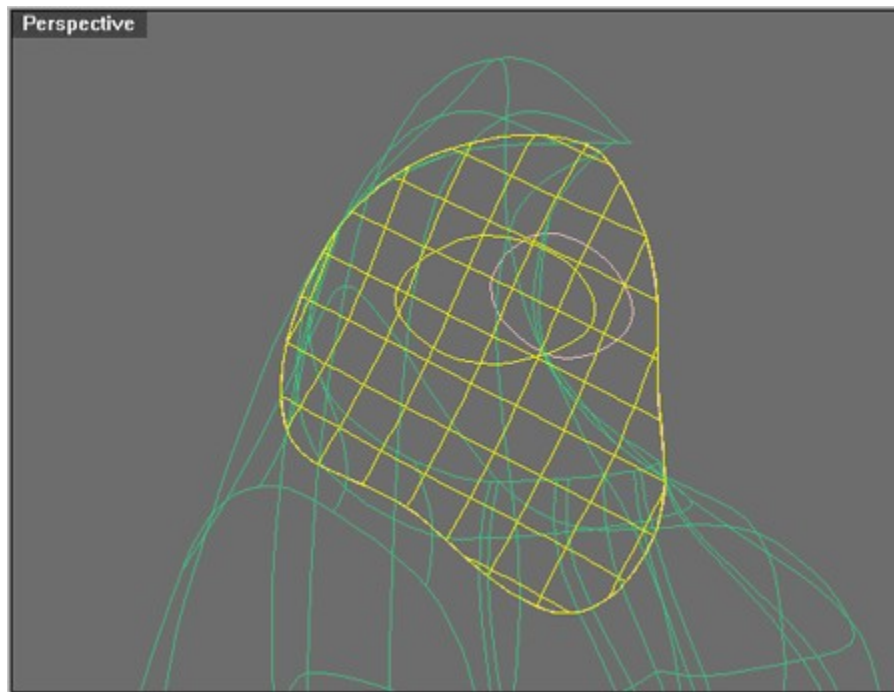
Go back to the left view and holding the 'Ctrl' key down again place another point on the profile curve and in the front view finish the placement of the point working your way closer to the beginning point of the curve, shown below.



Continue working your way up the profile curve placing points in 3-D space using the 'Ctrl' key and close the curve, shown below.



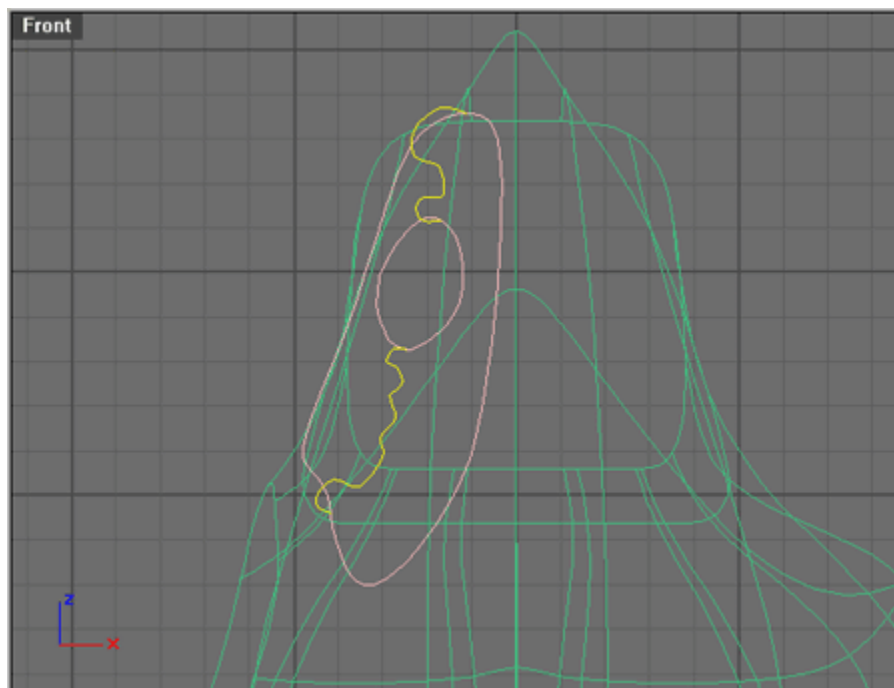
Note: now that we have to our outer ring we need to place the inner ring which forms the eye lids somewhere on the same general plane. Here's a quick and easy way to do it. Select the outer ring and hit **Patch** and uncheck the 'tangency' option and click Ok. Result shown below. Some curves are hidden for clarity.



In the left view select the inner ring and hit **Project** and select the patch as the surface to project to. **Delete** the patch.

Select the new projected curve and the outer baggy eyes curve and **ChangeLayer** them to the 'baggy eyes' layer. Turn off the 'head profile 2' layer.

In the front view with Osnaps off draw a couple curves similar to the selected curves shown below, with no Osnaps on.

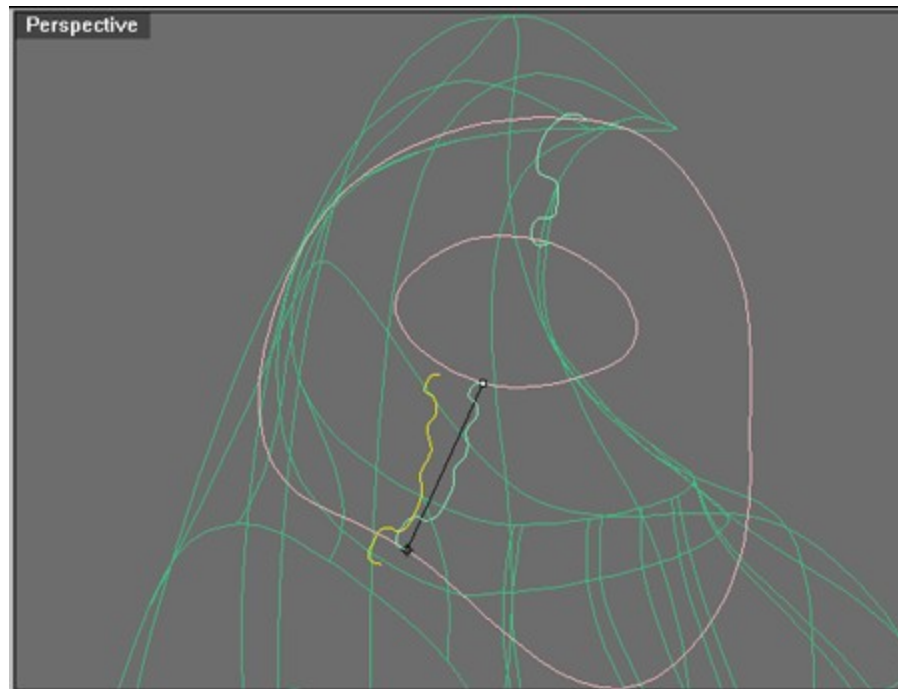


In the perspective view and with the 'End' and 'near' Osnap on select the upper cross-section curve.

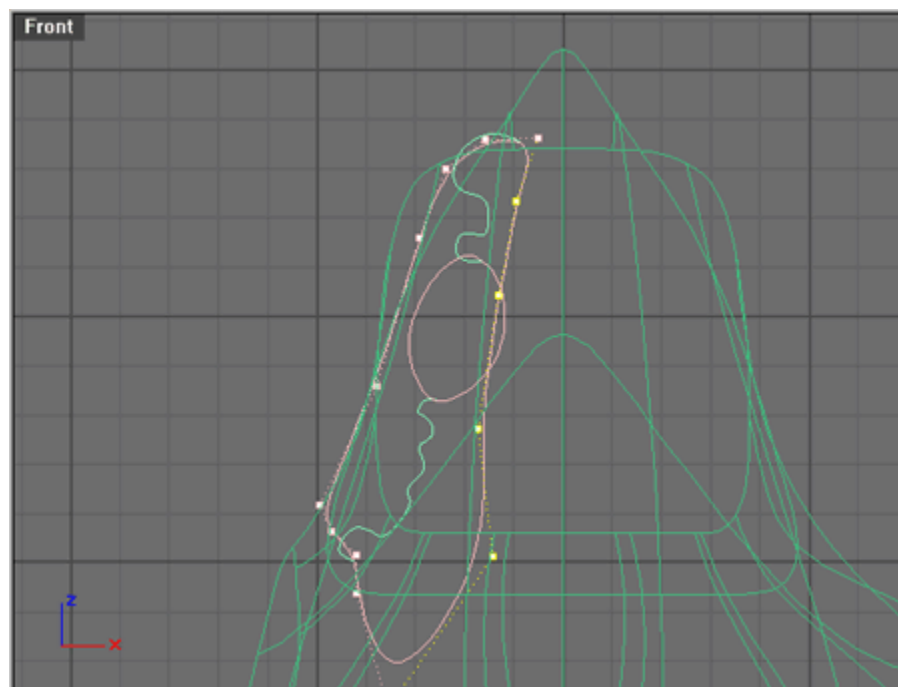
Hit **Orient** and select the upper and lower ends of the curve when prompted for 'reference point' 1 and 2.

For target point 1 select the end point of the outer ring and for target point 2 near snap to the inner ring and (while keeping a eye on the left view) position the reference point so that the cross-section curve is approximately perpendicular to the two ring curves.

Repeat for the lower curve as shown below.

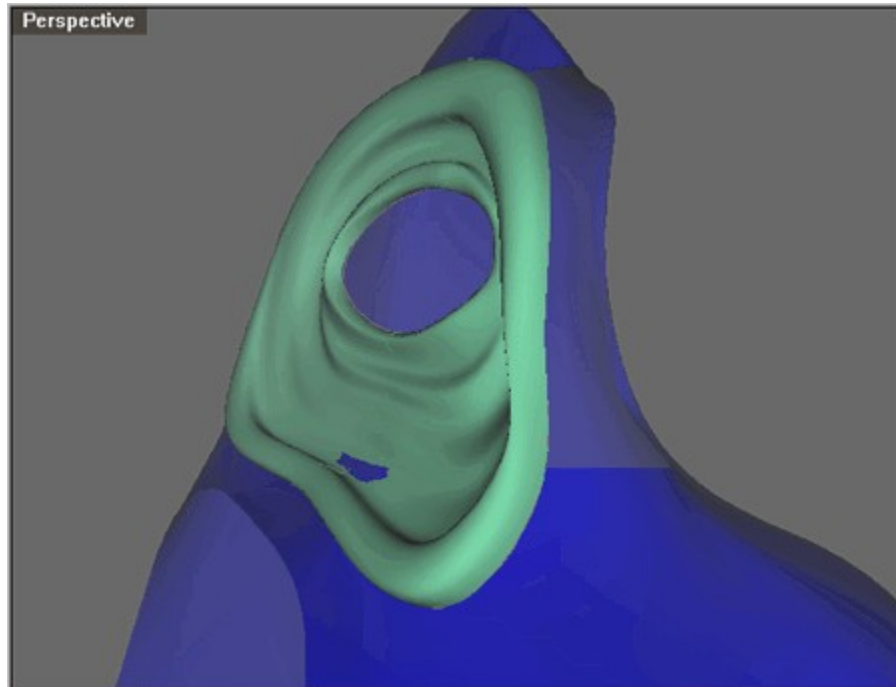


Note: Actually right here we need to make a small adjustment. When I originally showed how to place points in 3-D space using the control key to form the outer ring I didn't allow enough room for the beak. In the front view select the outer ring and turn points on and adjust points to be similar to the selected points shown below.



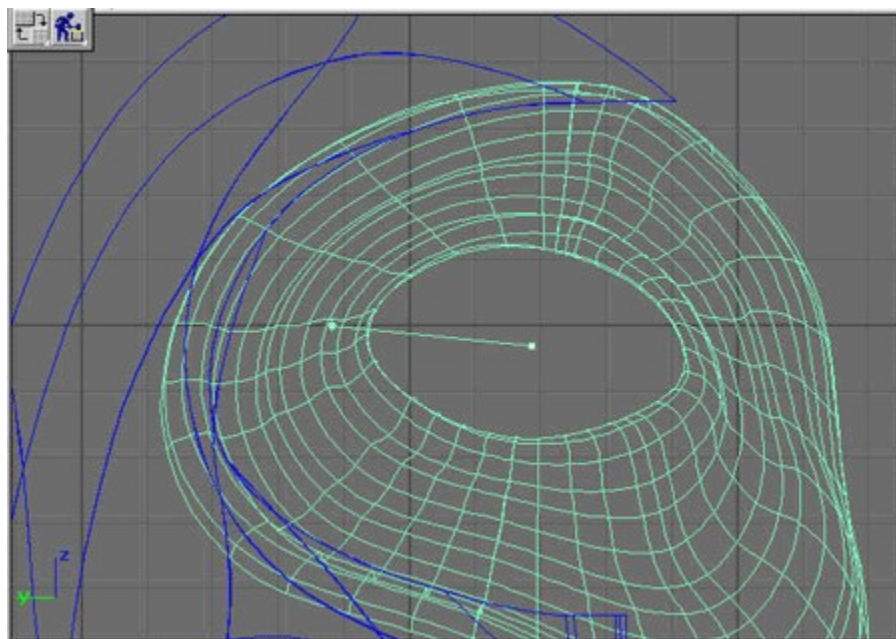
Turn points off and select the two rings and the 2 cross-section curves and then hit **Sweep2**. Make sure 'Closed sweep' is checked off and 'Rebuild with 15 control points.' You can also checked on Shaded preview

and Rebuild with more or less points and hit preview until you get the desired results. Click OK. If the torso skin shows through as shown below, **Undo** the **Sweep2** and adjust the lower curve and repeat **Sweep2**.

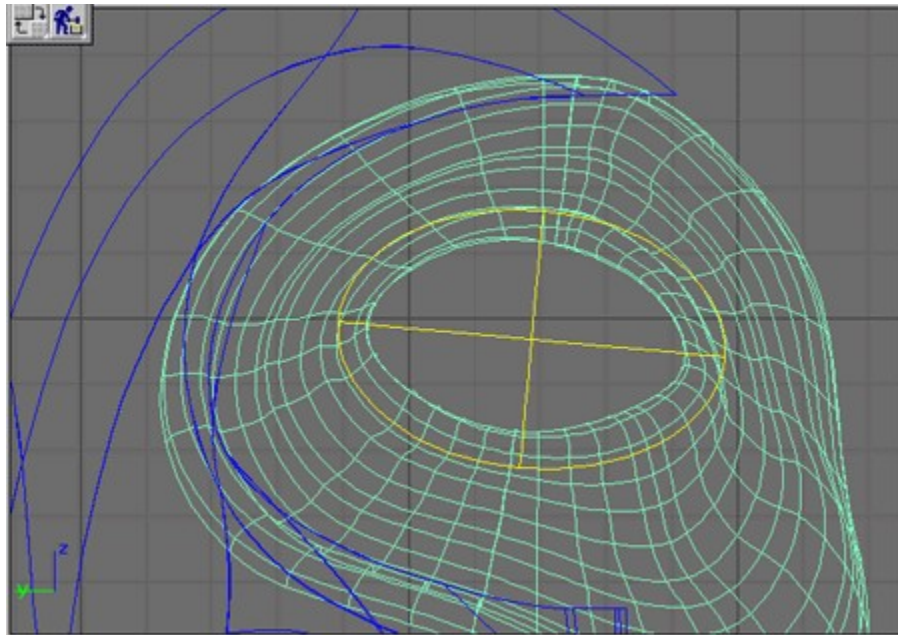


The Eye

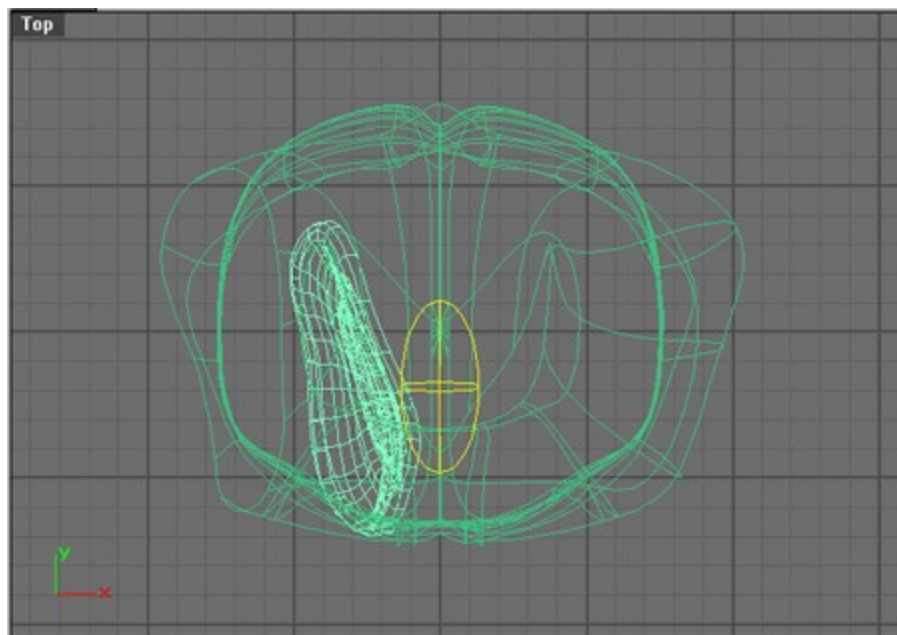
In the left view make a **Ellipsoid** placing the center of the ellipsoid at the approximate center of the inner ring and the end of the first axis being placed a little beyond the back of the inner ring as shown below.



For the end of the second axis stretch the ellipsoid out to the approximate shape of the eye as shown below.



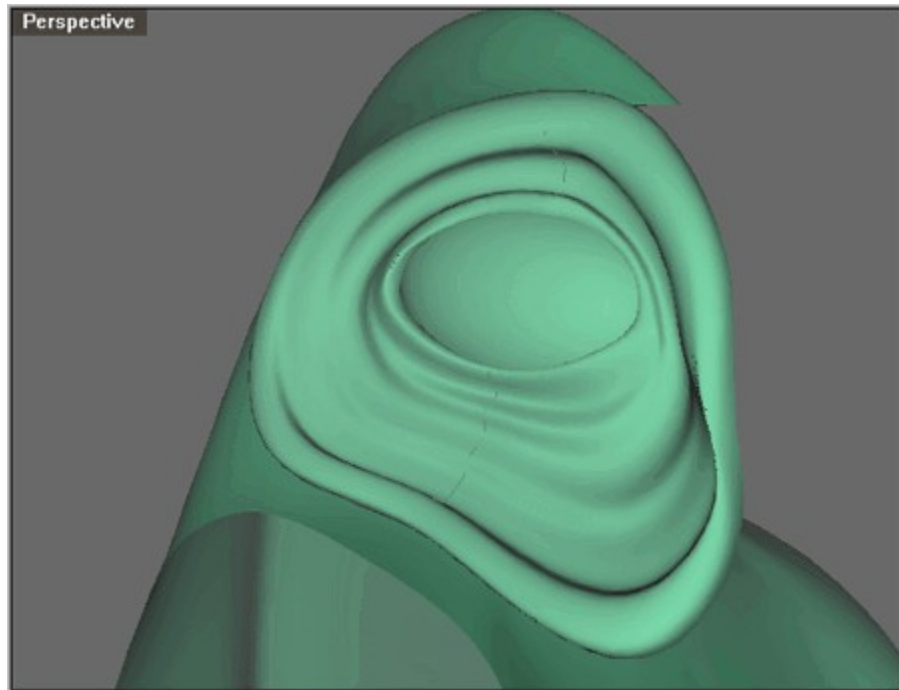
For the end of the third axis go to the top view and stretch the ellipsoid out to the approximate shape shown below.



Now you need to position the eye in the eyeball socket so to speak.

Rotate it about **15** degrees in the top view and move it closer to position. I use an alias key 'q' for Shade, to quickly check how the dragging and rotating is progressing.

Rotate the eye in the front view and adjust how far it is from the centerline so that the eye does not go through the geometry of the baggy surface and does not show any gaps between the eyelid and eyeball. Result shown below.



Upper Beak

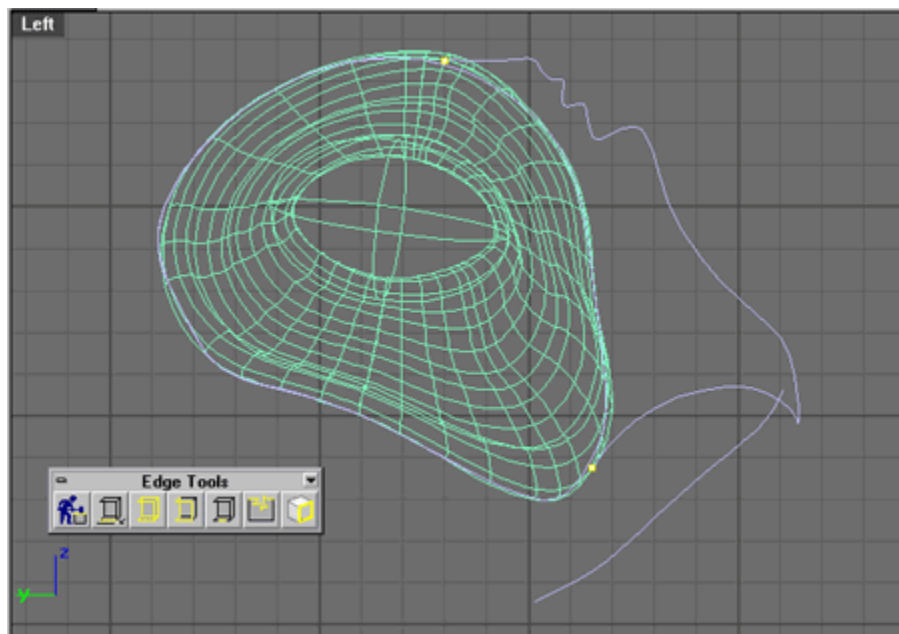
Overview: To create the beak we'll use the profile curves and the edges of the eye bags.

Save your file or open trog10.3dm

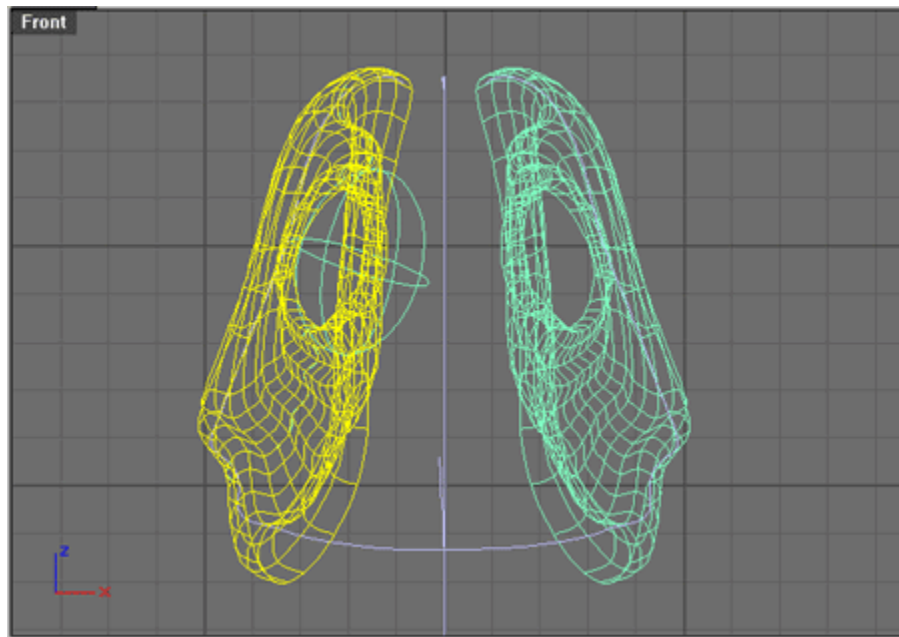
Turn off the 'torso' layer and turn on the 'eyes and beak curves' layer.

Hit **SplitEdge** and select the outer edge of baggy eyes. At the 'Select edge to Split:' prompt pick a point near the top end of the beak profile curve, shown below, with a selected point.

Hit **Split** and select the outer edge of baggy eyes again. At the 'Select edge to Split:' prompt pick a point near the bottom of the upper beak profile curve, shown below.

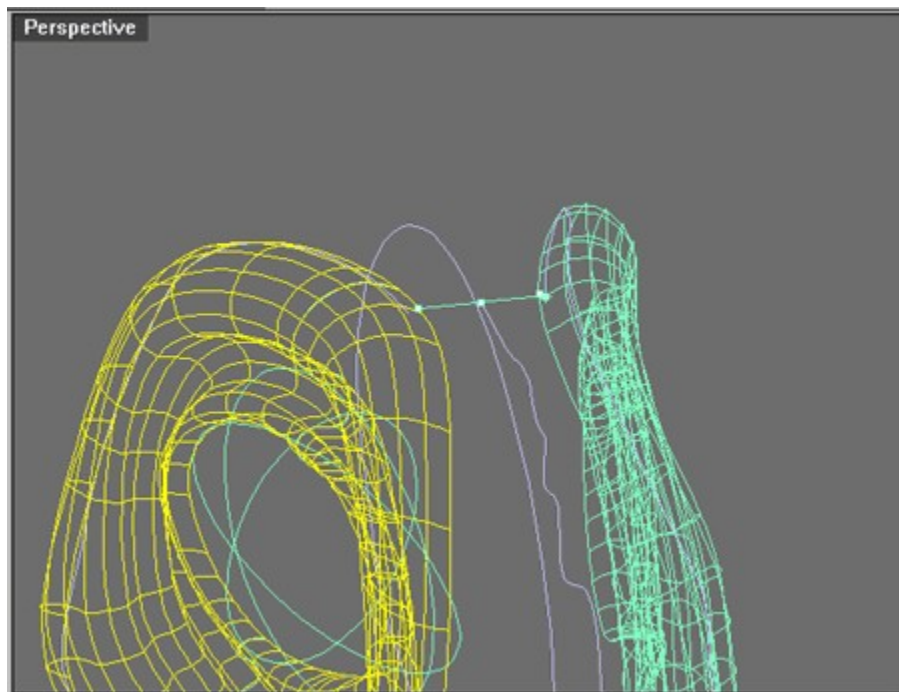


In the front view select baggy eye and with **GridSnap** on **Mirror** it over as shown below.

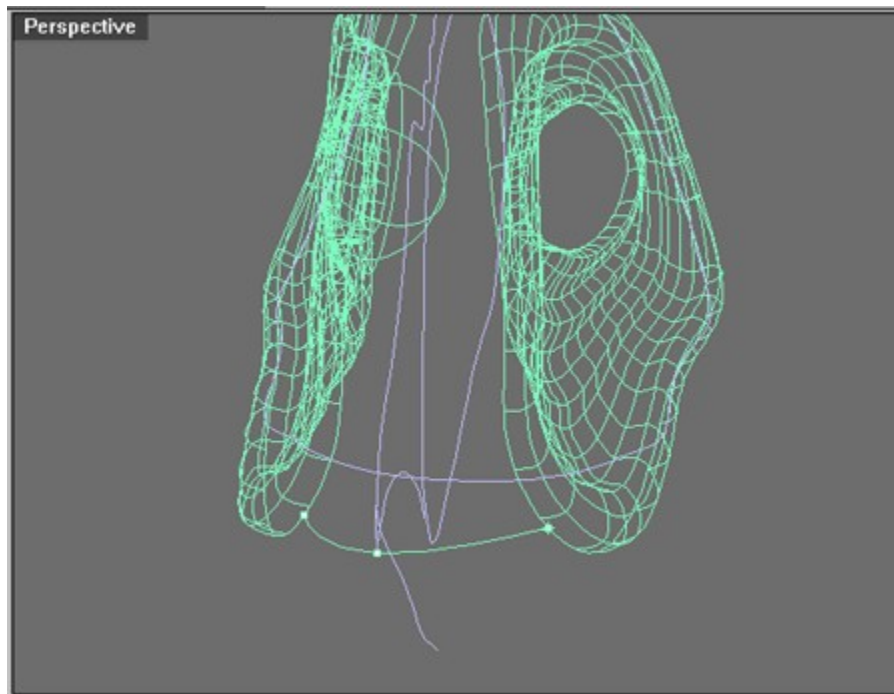


Here is where we need to connect the ends of the **SplitEdge(s)** to the ends of the profile curve to create two rails, which we need for a two rails sweep.

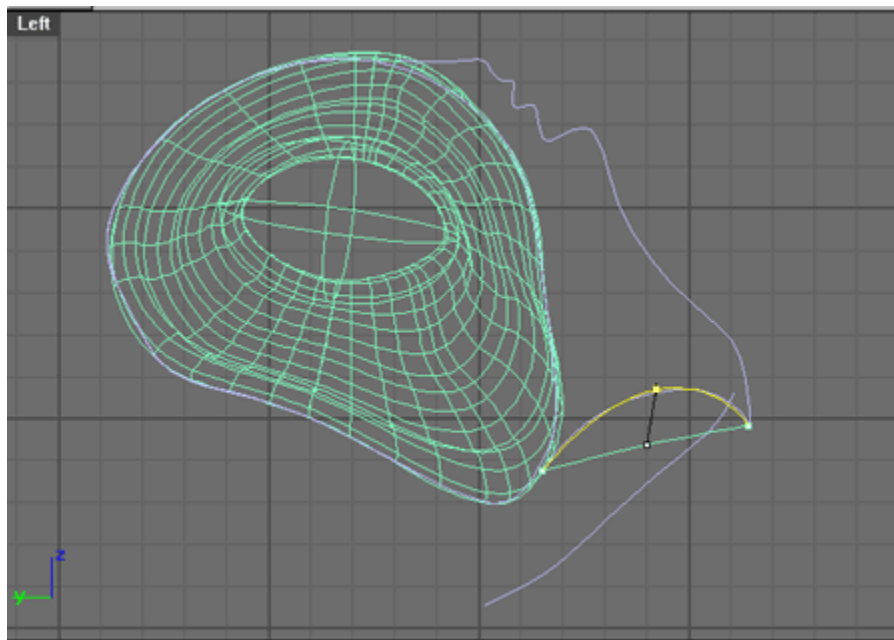
In the perspective view hit **InterpCrv** and with **GridSnap** off and 'End' osnap on connect the end of the 'split edge' on the left to the end of the profile curve and then to the end of the 'split edge' on the right as shown below.



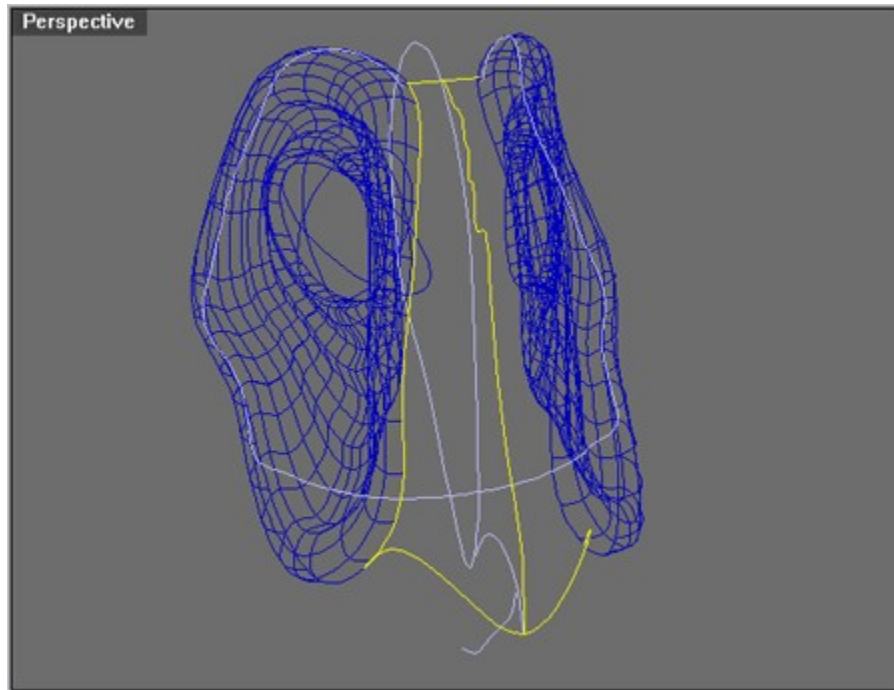
Repeat the last step for lower rail of the beak to get the result shown below.



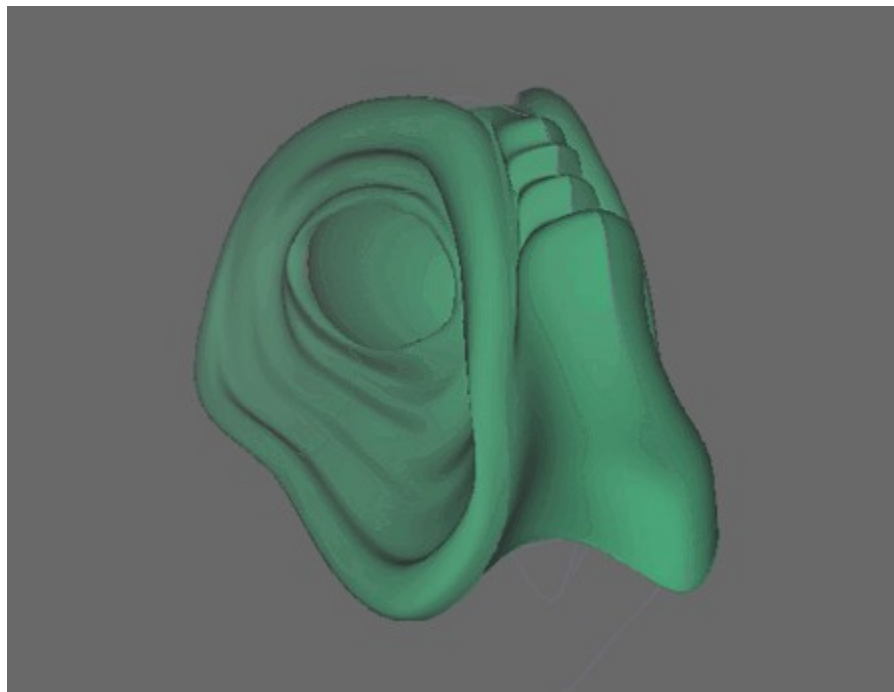
Note: Another approach to this method would have been to create the 2 beak rail curves first using the 'Near' Osnap and then splitting the baggy eyes edges using the 'End' Osnap and snapping to the ends of the rail curves. In the left view select the newly created curve and hit **EditPtOn** and select the middle points. Be sure **CullCp** is off. And drag the points so the curve approximates the profile curve as shown below.



Right click **PtOff** and hit **Sweep2**. When prompted for the rail curves pick the top and bottom newly created curves. When prompted for the cross-section curves, pick the edge of the left baggy eye then the profile curve and then the edge of the right baggy eye, as shown below in progress before the last pick. Layer color is change for clarity.



In the **Sweep 2 Rails** Options dialog box pick 'Do not simplify' option and hit OK. Results shown below.

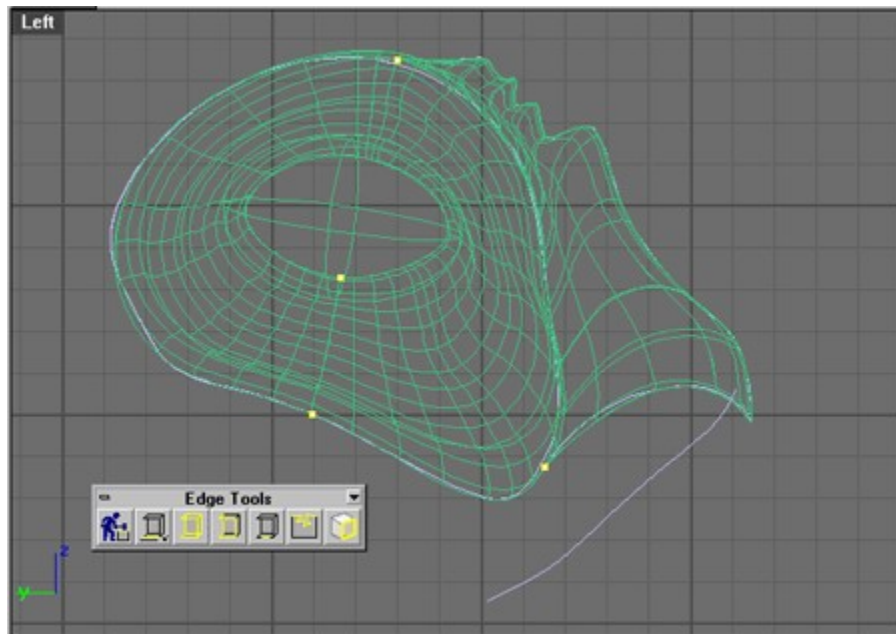


Lower Beak

Overview: the lower beak is done the same way as the upper beak but we'll need to repair the **SplitEdge** we did for the upper beak and then **Split** that edge in a new area.

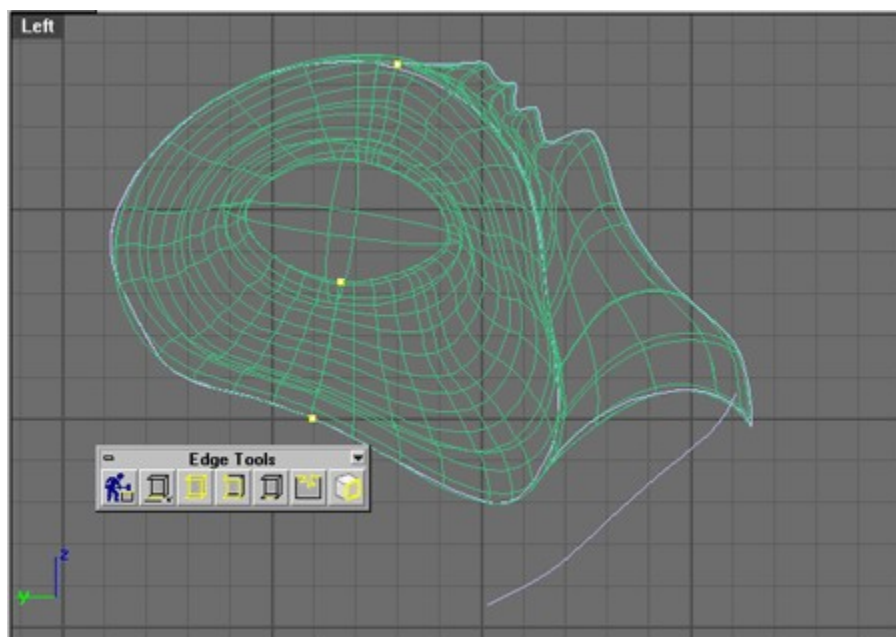
Delete the left eye.

Open the 'Edge Tools' toolbox. Select the baggy eye and hit **PointsAtNakedEdges**. This shows you where the edges stop and start as shown below. **Delete** the points.

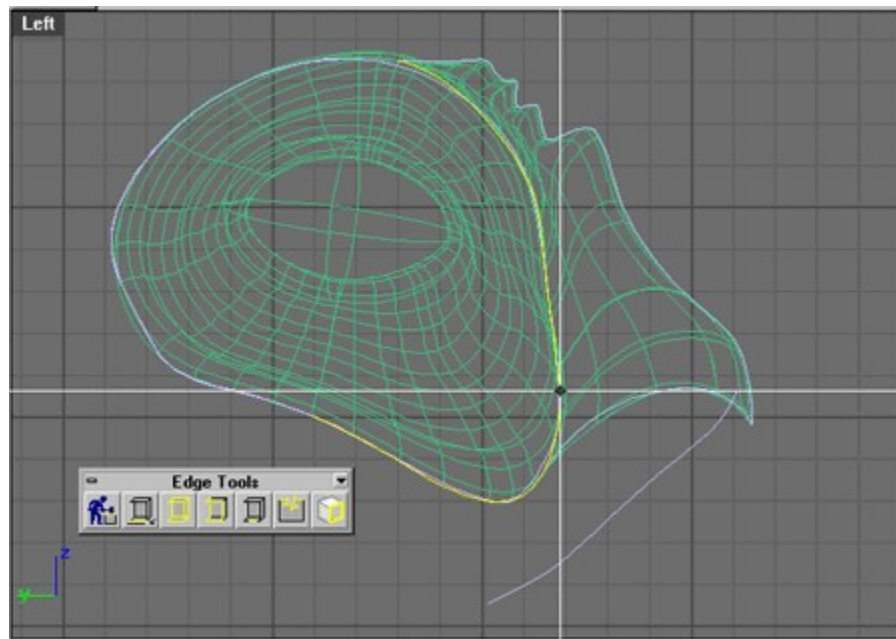


Hit **MergeEdge** and click on the front edge of baggy eyes.

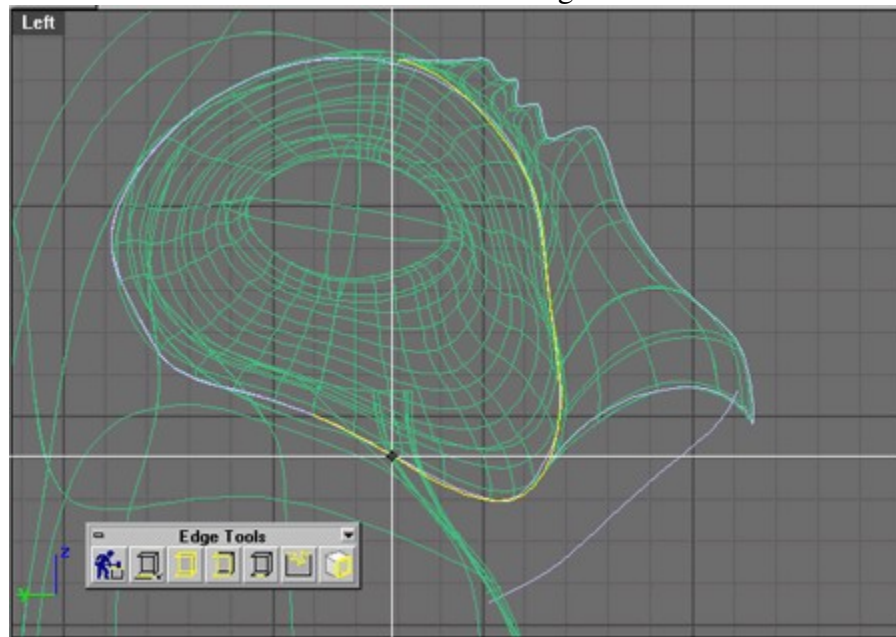
Hit **PointsAtNakedEdges** to check if the edges merged as shown below. **Delete** the points.



Hit **SplitEdge** and select the right edge of baggy eye and 'split' it at about the same height as the lower beak profile curve. Shown below with cross hairs for clarity



Turn on the torso layer and hit **SplitEdge** again and select the lower right edge of baggy eye and 'split' it a little to the left of where the torso begins as shown below.

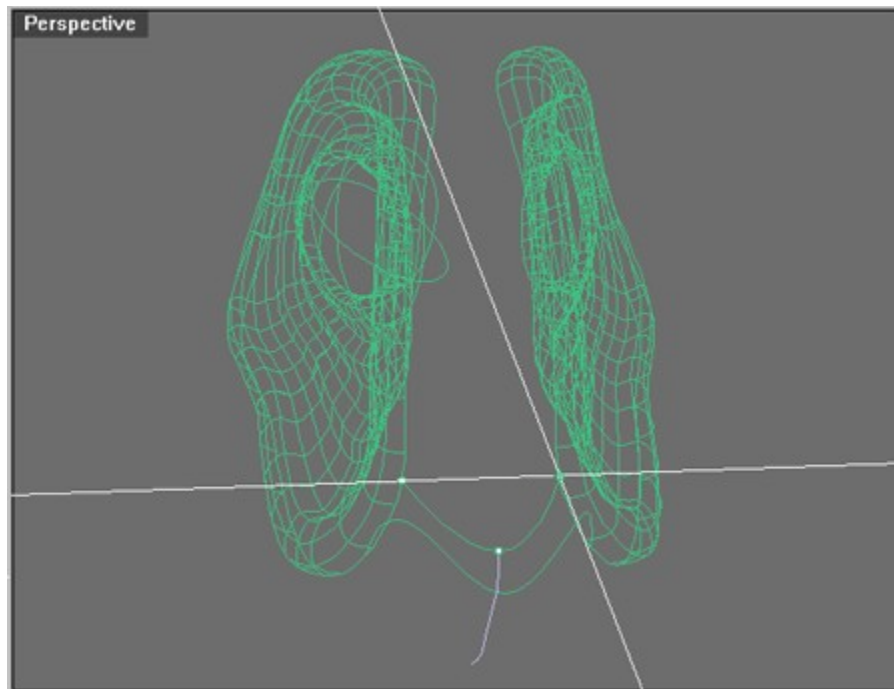


Select baggy eye and in the front view with **GridSnap** on. **Mirror** the baggy eye across the centerline or hit **Mirror** and type in '0' and with Shift held down for temporary **Ortho** click above the 'Origin point.'

Select the upper beak and the torso and **Hide** them. Also **Hide** the 'profile curves' for the upper beak.

To make the ends of the edge curves easier to find select both baggy eyes and hit **PointsAtNakedEdges**.

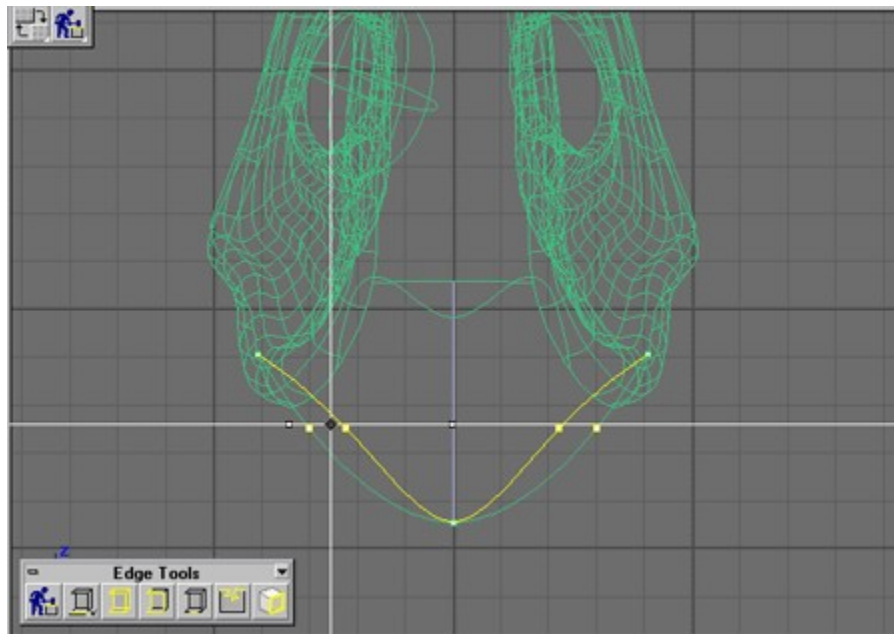
With 'Point' Osnap on hit **InterpCrv** and draw a curve snapping to the ends of the 'split' edge and then the end of the profile curve and ending at the end of the 'split' edge on the opposite side as shown below.



Repeat the above steps with the lower ends of the 'split' edges and profile curve as shown below.



Select the lower curve just created and hit **EditPtOn** and in the left view select the middle edit points and in the front view **Scale1D** them closer to the center as shown below.



Hit **Sweep2** and select the upper and lower newly created curves when prompted for rail one and rail 2 and select the left 'split' edge and then the profile curve and then the right 'split' edge when prompted for the cross-section's. Shown in progress (just before the last split edge pick) below.



And that's it! Well just about. Hit **Show** and select the eye and with **GridSnap** on in the front view, **Mirror** and type in '0' and with Shift held down for temporary **Ortho** click above the 'Origin point.'

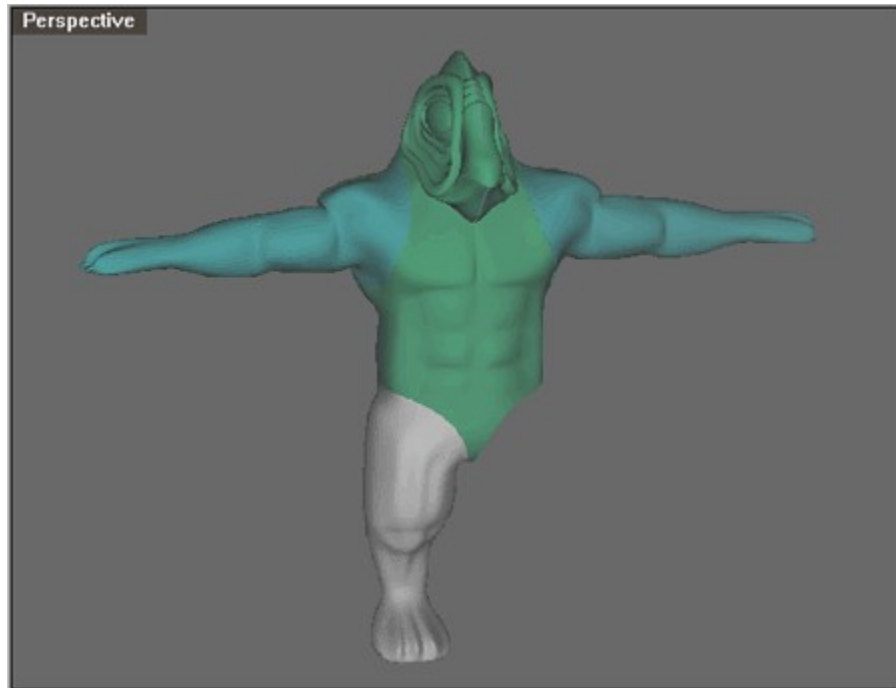
Hit select all points **SelPt** and **Delete** them.

Turn on the layers 'arm,' 'leg' and 'torso.'

MatchSrf the 'arm' to the 'torso' with the curvature option if it needs updating.

Select the 'arm' with the 'claws' and **Mirror** and type in '0' and with Shift held down for temporary **Ortho** click above the 'Origin point.'

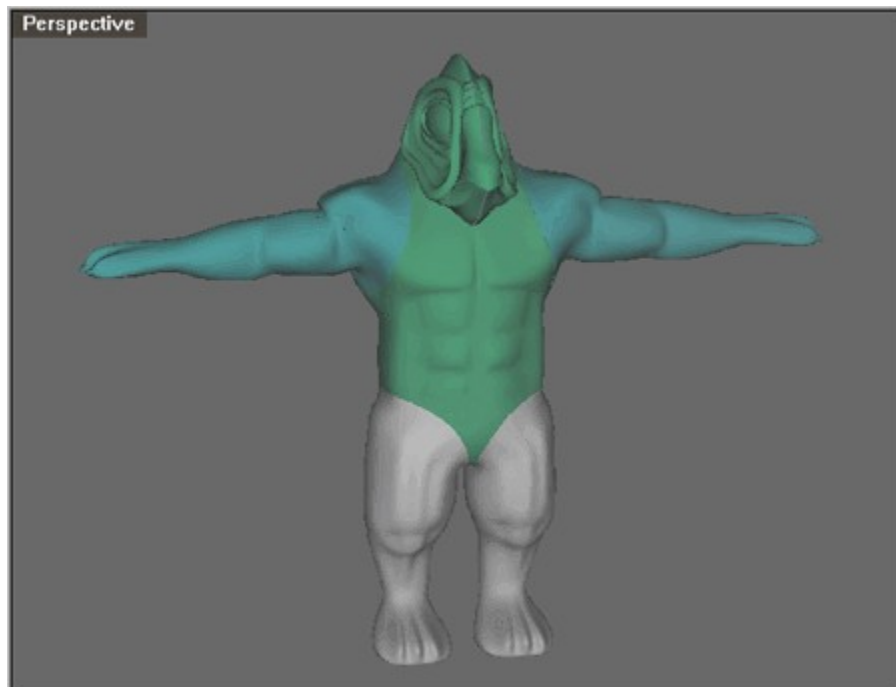
Hit **Pull** and when prompted for 'curves to pull back,' select the edge of the arm and hit spacebar and when prompted for 'surface that pulls,' select the torso. Use the new curve to **Split** the torso and **Delete** the small 'split' off part. Result shown below.



MatchSrf the arm to the trimmed torso using the 'Automatic' option.

Do the same with the leg as you did with the arm. **MatchSrf** the leg if it needs updating and **Mirror** it over and hit **Pull** and Select the top edge of the mirrored 'leg' as the 'Curve to Pull' and the 'torso' as the 'surface that pulls.' **Split** the torso with the 'pulled' curve and **MatchSrf** the leg to the torso.

Hurrah! We're done. Finished file is trog11.3dm



Perspective

