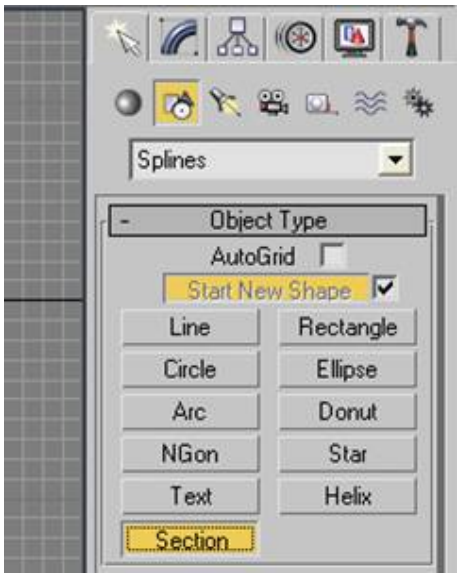
Making 3d (2.5d) models of an object in 3ds max

Often a shape looks great on screen using max, but if you want to actually make it in 3d then it's a bit tricky seeing as we don't have access to a rapid prototyping machine or a CNC mill, but we do have a laser cutter. So this explains how to turn a 3d studio model into a real thing made up of laminates of card, paper, ply, Perspex whatever you want. This tutorial assumes a basic knowledge of 3DS Max an AutoCAD.

It's worth using the measure distance tool in the tools menu to see how big it is, then measuring your hand or foot or something so you actually have an idea about how big it's going to come out.

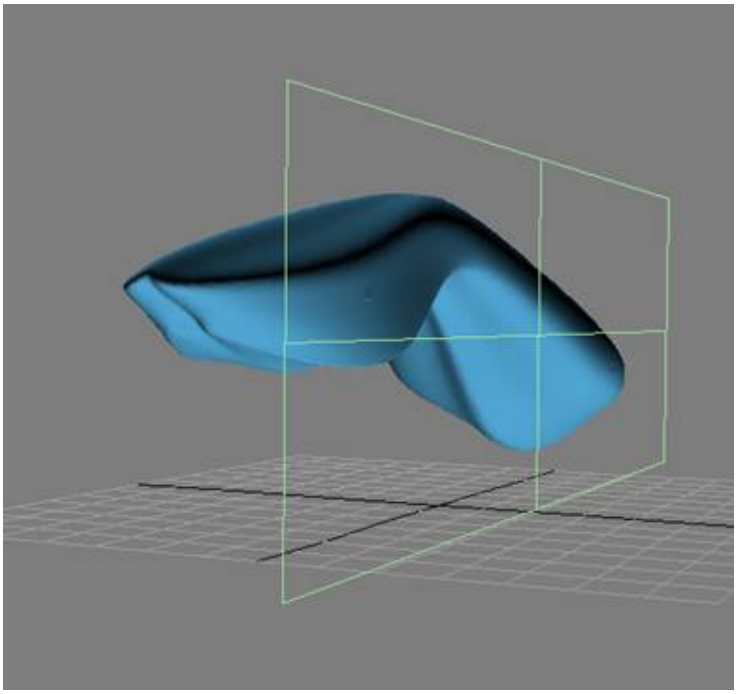
Once you are happy with an object that you have designed in max and want to actually see what it looks like then you need to make a decision about what you are going to make it out of. as the model is going to be made up of layers the thickness of the material will affect the curve resolution, there will be steps in one direction, so the thinner the layers the finer the curve resolution, but the more layers, so more work and more material.

As the layers are going to sit on top of each other they will need to have some sort of key or registering point to make sure they line up in the same place as they did on the computer model. the easiest way to do this is to do a Boolean subtraction of a shape all the way through your object wherever you think it's necessary (anywhere the last key no longer has any influence.) the simplest shape is a square or rectangle with one dimension the same as the thickness as your material, this means that you can make the keys at the same time as you are cutting the shape.

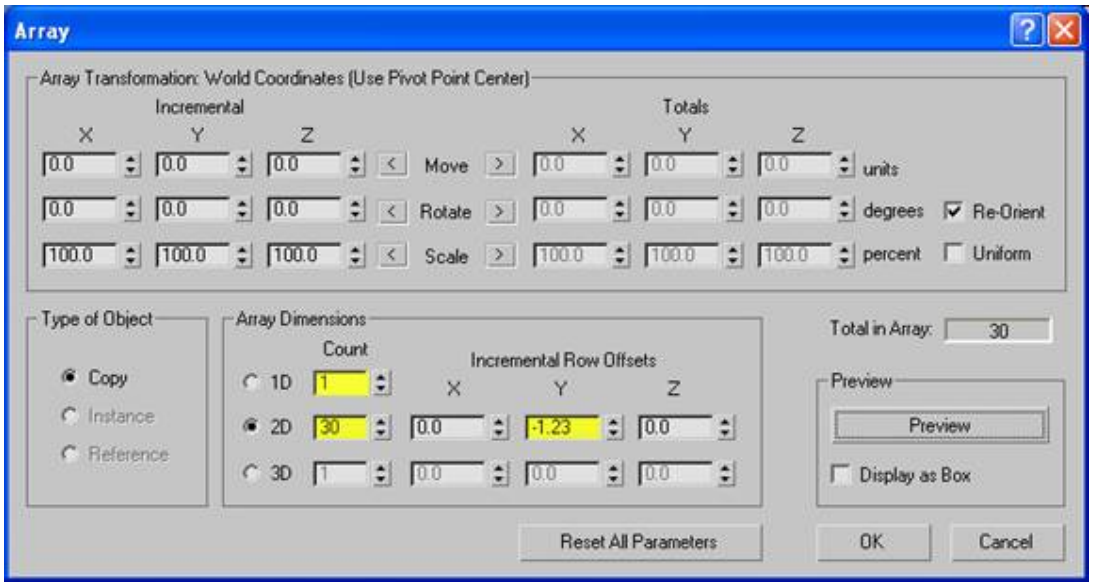


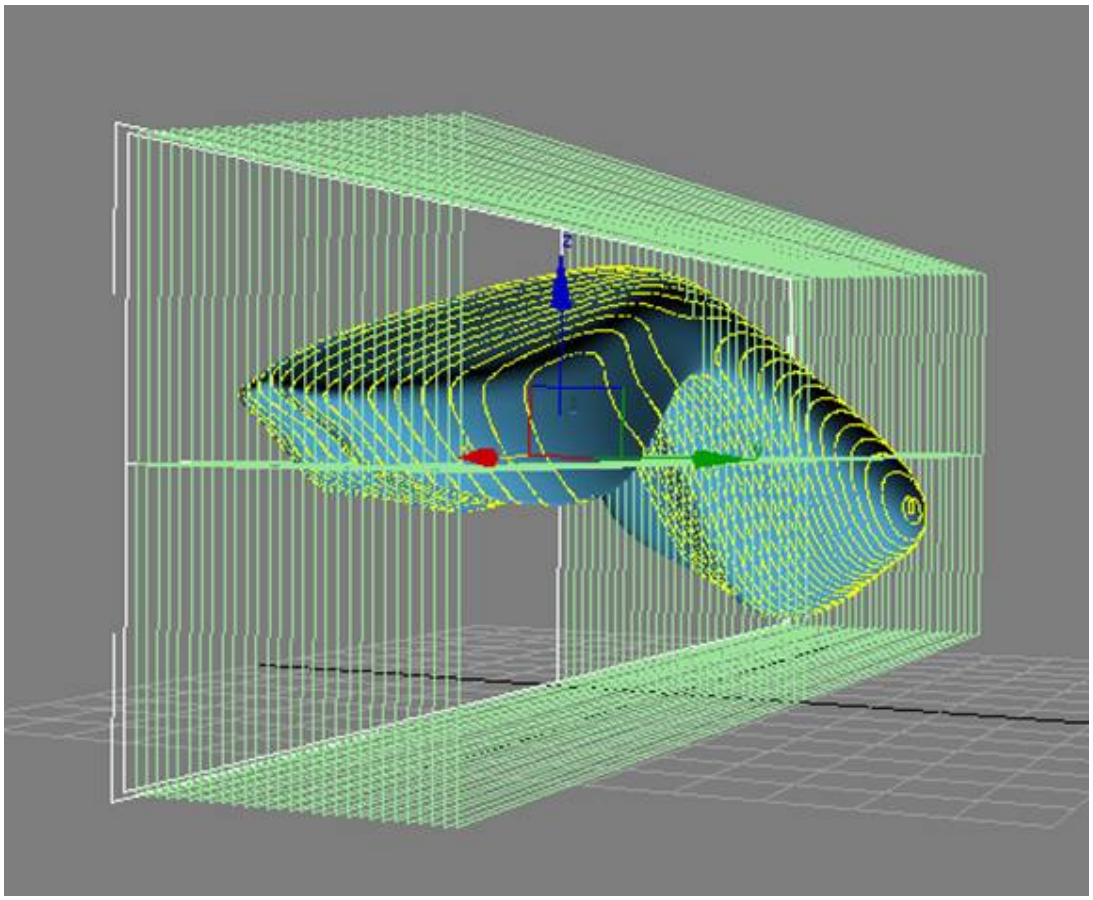
To slice up the shape you use the section tool, which is in the shapes pallet.

Draw a section in the plane that you want to cut the sections in and place it to one side of the object.

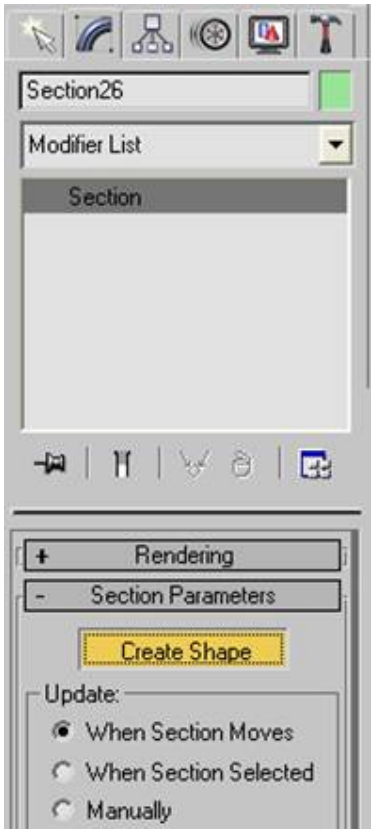


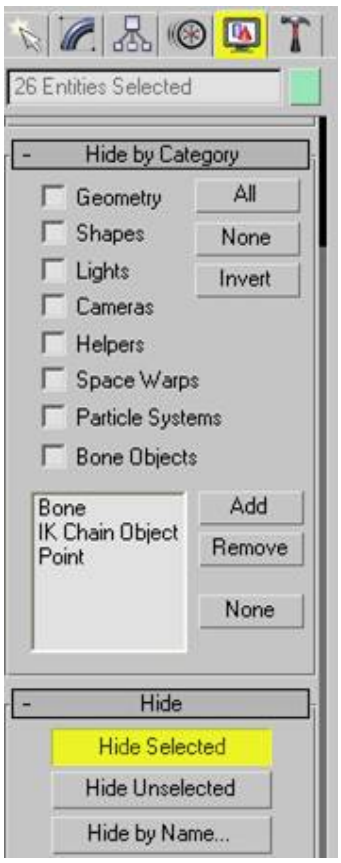
Select the section and then make an array of sections (tools array). make sure that the 1d box is set to 1, put in the number of slices that it will take to cut your object into the 2d box, this might take time, and put the thickness of your material into one of the offset boxes but if you have max 7 the preview feature is very handy for this.





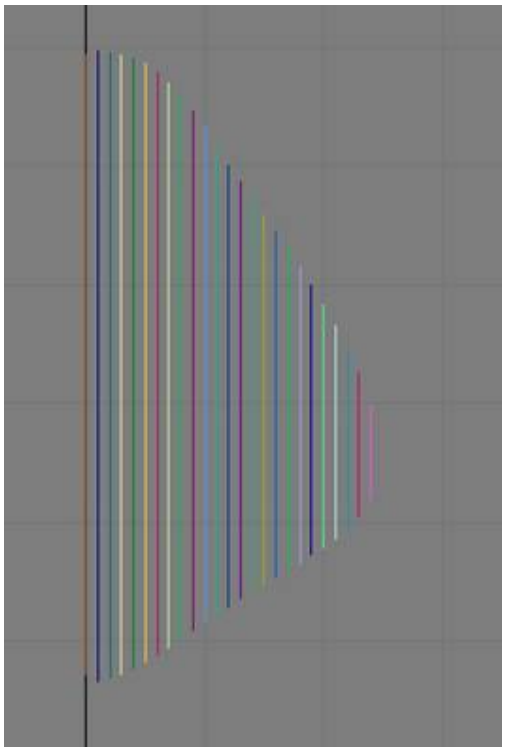
Once you are happy with the sections positions delete any that don't touch the object to tidy things up, and then star the slow process of extracting the sections. Click on the first section and go to it's modify pallet and click create shape. You might as well accept the default naming because it numbers them and it doesn't really make any difference otherwise. Go through all the sections and do this.





Once all the shapes are made (these will eventually be the cutting paths) select the object and all the section planes and hide them to make everything a bit simpler.

Go to a side view of your sections so that they appear as lines and separate all the sections so that when viewed from the front they aren't touching. Once this is done, select them all and then align them (tools align) so that they all sit in one plane. Group them (group group) and rotate them so that they are parallel to the xy axis. Select them again and export them as a dwg (file export selected) and make sure that the AutoCAD version setting is set to 2000 not 2004.



Open the exported paths in AutoCAD, and explode them (explode, all,) then save the file and open it again in illustrator, save it as an AI file, close it, and open the AI file and save that as a dwg. this sounds like a massive faff, but max doesn't export beautiful closed poly line curves, which what you need for the laser cutter, it outputs nasty 3d faces, which acad can't turn into lines, so pushing it through illustrator makes them into nice simple line segments. If you are lucky then after you have exploded the paths in acad they will be lines already and it will save you all the hassle. If your paths come out looking skewed they are in an isometric viewport, switch to a plan view and they will be straight on.

Open the newly simplified dwg file in acad again and you need to join up all the line segments into closed poly line loops. Luckily in recent versions of acad there is a tool that does the hard work for you. make sure nothing is selected and type `pedit` then `m` (for multiple) then depending on the complexity of the drawing/speed of your computer select as much as your computer can cope with (the uni computers can take three or four thousand objects) at the next prompt type j for join, you will then get a fuzz distance prompt put in 0.3 and press enter, hold your breath and the machine will join up most of the loops. You will need to go round and join up the remaining gaps yourself, but the fuzz distance will do most of the hard work.

```
Command: pe
PEDIT Select polyline or [Multiple]: m
Select objects: all
112 found
9 were on a locked layer.
Select objects:
Enter an option [Close/Open/Join/Width/Fit/Spline/Decurve/Ltype gen/Undo]: j
Join Type = Extend
Enter fuzz distance or [Jointype] <0.0000>: .3
0 segments added to polyline
Enter an option [Close/Open/Join/Width/Fit/Spline/Decurve/Ltype gen/Undo]:
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At this stage it makes sense to number your slices so that when you have a big pile in front you you will know what order they go in. also the numbers will tell you which side is which and which way is up.

draw a rectangle 594 x 420 which is the size of an a2 sheet (the size of the cutting bed) and start to arrange your pieces inside the rectangle (make sure it is landscape because otherwise the cutter will resize your portrait page to fit on the landscape bed and it will be much smaller that you'd expected. it's a good idea to leave some gaps in the middle and at eh edges to put weights on. there are some big lumps of metal that are good for edges in the workshop, but to keep the middle from bowing something like a stack of 2p's would be fine.

Once the paths are arranged on the sheet color anything that needs to be cut in red, scored in blue and engraved in black. Save it stick it on a disk or a memory stick or a cd and take it over to Humphrey.