

## **Background on Nelson Au**

I am an industrial designer and I recently made the decision to add SolidWorks to my skill set. Prior to this, I have been a very long time user of Ashlar Vellum Cobalt, a very good 3D Surface/Solid modeler. However, it's not a mainstream CAD program. I was finding it increasingly difficult to work with clients who were mostly using SolidWorks. I had also learned that many industrial designers have started to switch to SW too at some of the ID firms.

I had been dabbling with SolidWorks for the past year. In the past few months I got serious and I have been working with the tutorials that come with the 2008-2009 Student Edition of SolidWorks. So I am a pretty new user. I was finding that the tutorials were mainly mechanical design based. Being an industrial designer, I felt it was important to understand the surfacing tools to really evaluate how capable they were in order to do the kinds of soft and organic forms that industrial designers may be designing. Things like handheld products or medical devices that require soft forms for where a surgeon may be holding the device.

I did some study on various websites and found some tutorials on surfacing that were pretty helpful. But I wasn't really able to learn the more advanced stuff! I had seen a tutorial that Mark Biasotti had put out of a razor handle and felt that was what I needed to learn. I know Mark Biasotti from our days at IDEO years ago when we both worked together there.

I contacted Mark and over the course of months. He very kindly gave me access to the razor video. But it was difficult to follow as it discussed some things I just didn't know yet. So over the course of month, Mark coached me on an original design I was playing with to learn the process for creating sketches for Fills and Boundary surfaces. This was crucial and jump-started my learning by quantum leaps!

## **The Inspiration**

I had seen the discussions on the Product Design Forums about trying to build an iPhone and thought it would be a great project to tackle. I felt the bottom would be a fun challenge. And it would allow me to practice the other tools to build up the whole externals of the phone.

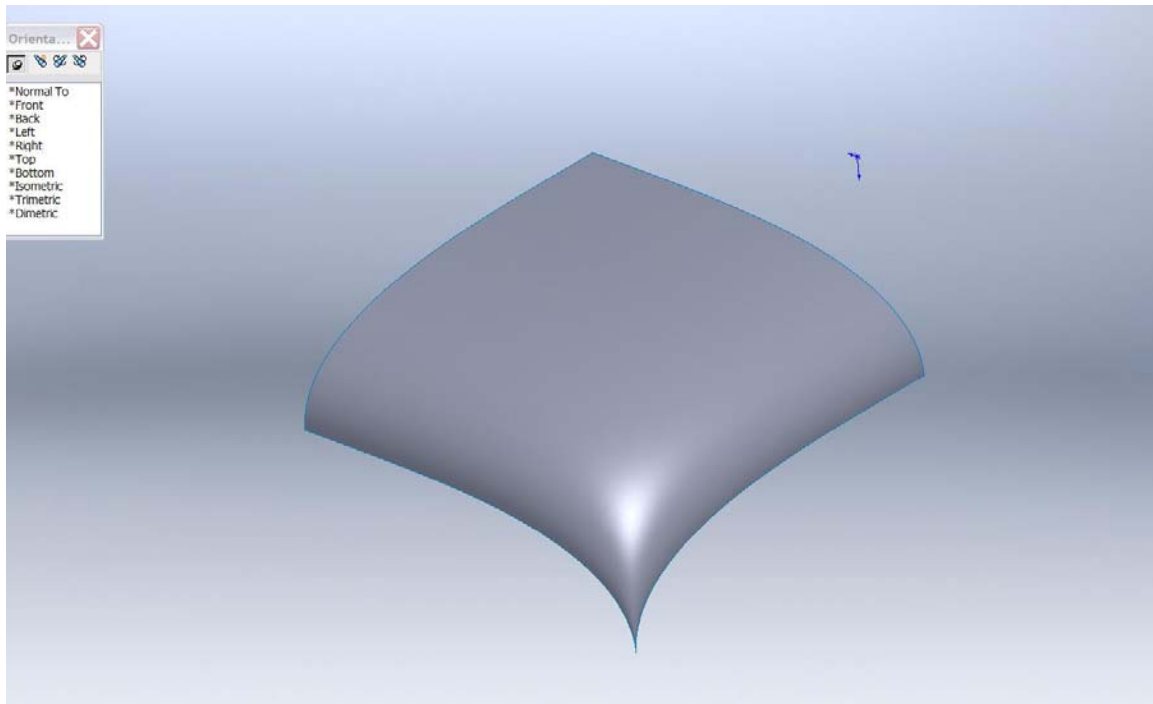
I did see that Josh had posted his take on the phone and Mark Biasotti had also shown how he would do the phone! That got me to try it too.

## The Process

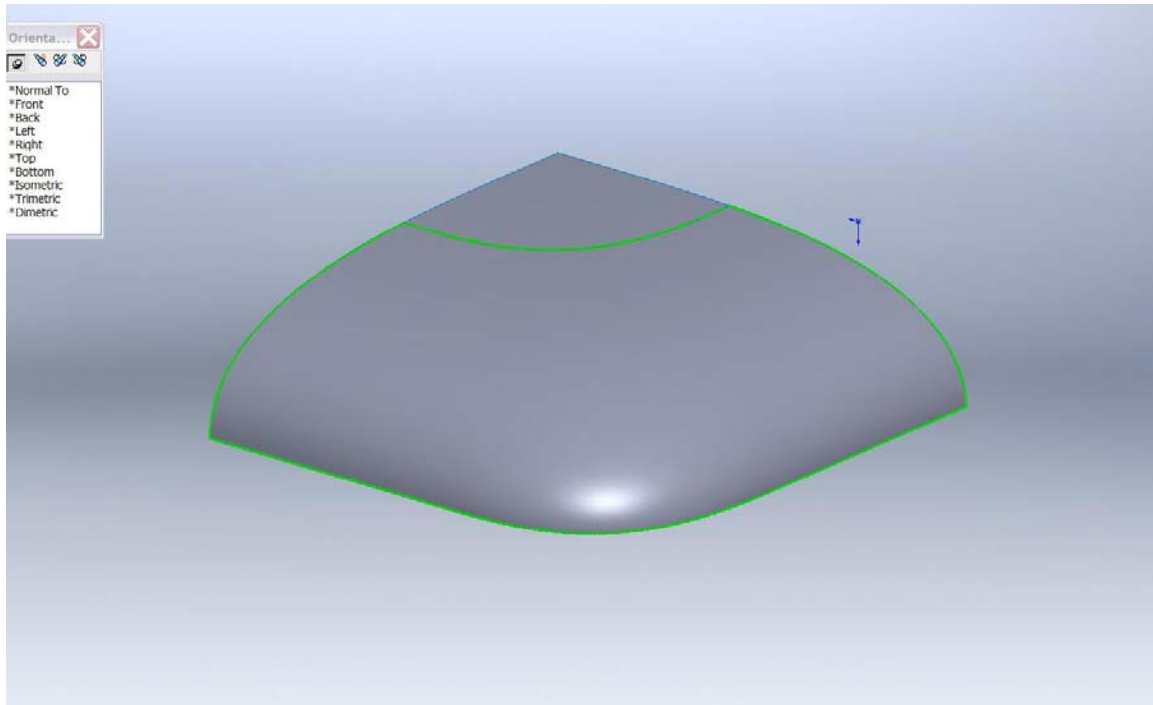
At first, I wanted to see if I could do the iPhone's corners as one Boundary surface. I quickly found that it can be done, but I could not control it to my satisfaction and I found the surface at the sharp corner end to be slightly distorted.

My process to building the phone is very much the same as how Mark showed earlier on this blog. But I chose to break the surfaces at the same locations they are shown broken on the Apple PDF 2D drawings we downloaded from Apple's developer page.

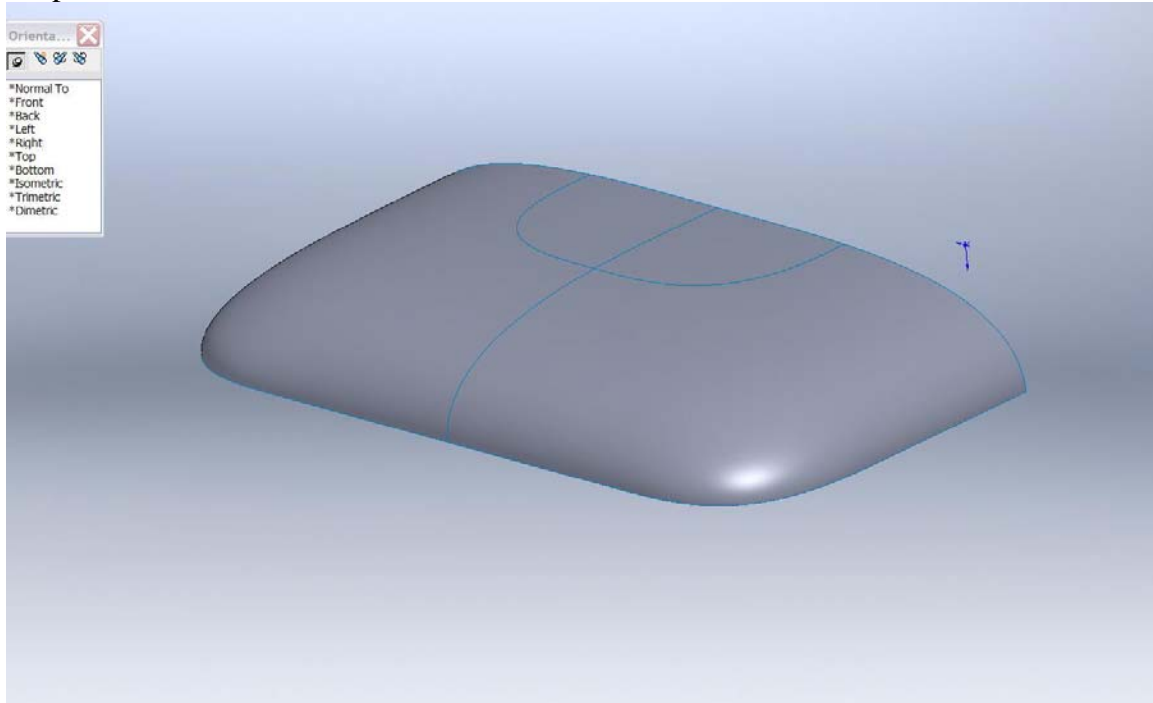
**Step 1** - I used the 2D drawings by placing each view in the top, right and front planes and traced my sketches from them. Each view is a separate sketch. As Mark had done, I first created a Surface Sweep of the corner area. This will be used to create the flatter area of the bottom. I experimented with curves that would trim the surface to get the right shape; I then extruded a surface and trimmed the Sweep to the shape shown.



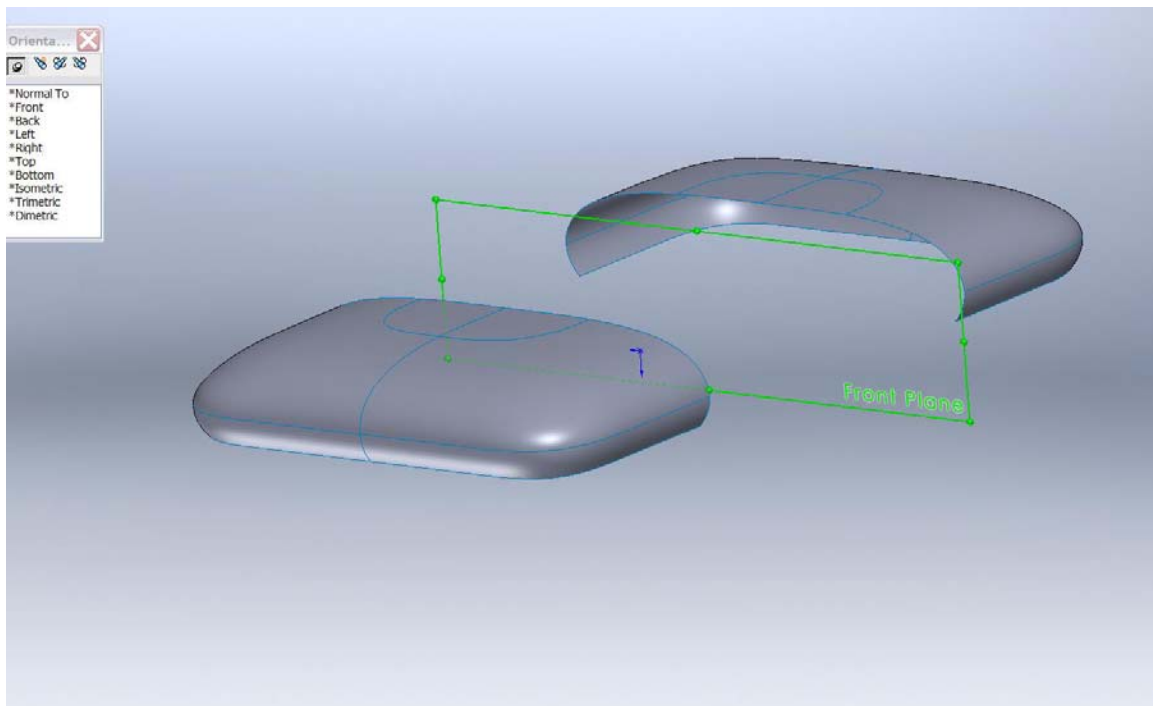
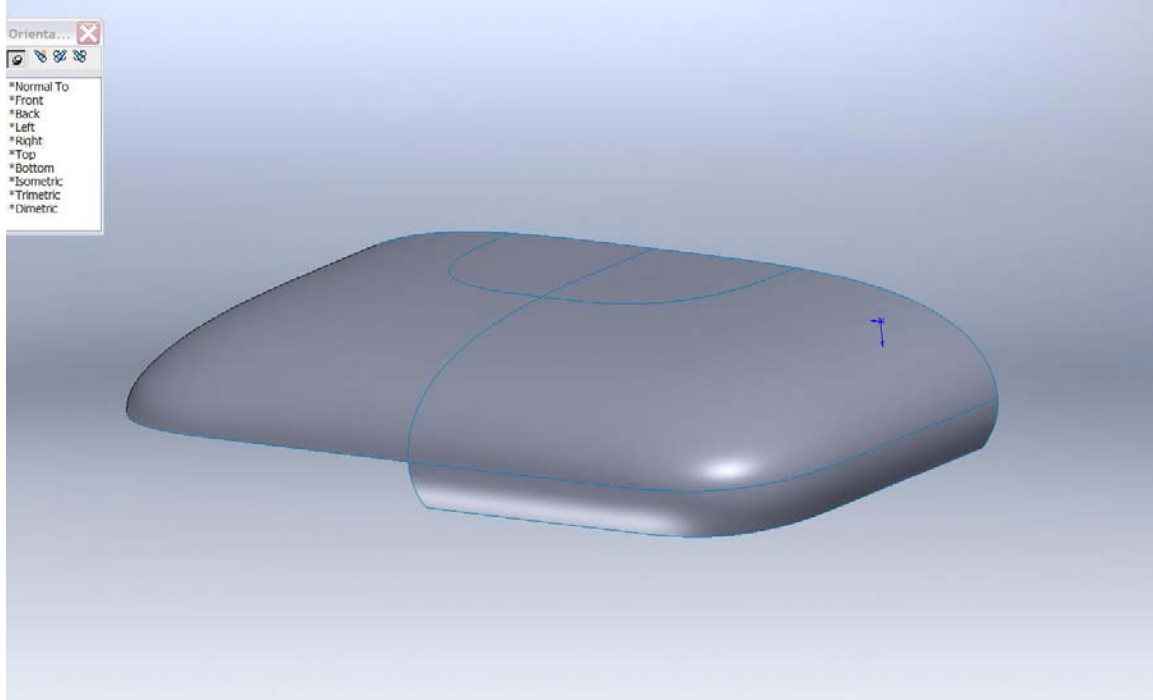
**Step 2** - The next step was to use the Boundary Surface tool and create the corner of the phone. The surface meets the newly trimmed Sweep and at the phone's widest point, which is also at the quadrant of the side and end view curve and allows the curve to end normal to the top plane. The Boundary Surface Direction one and two curves were all set to be normal to the curve and tangent to surface as appropriate. Pretty cool tool!



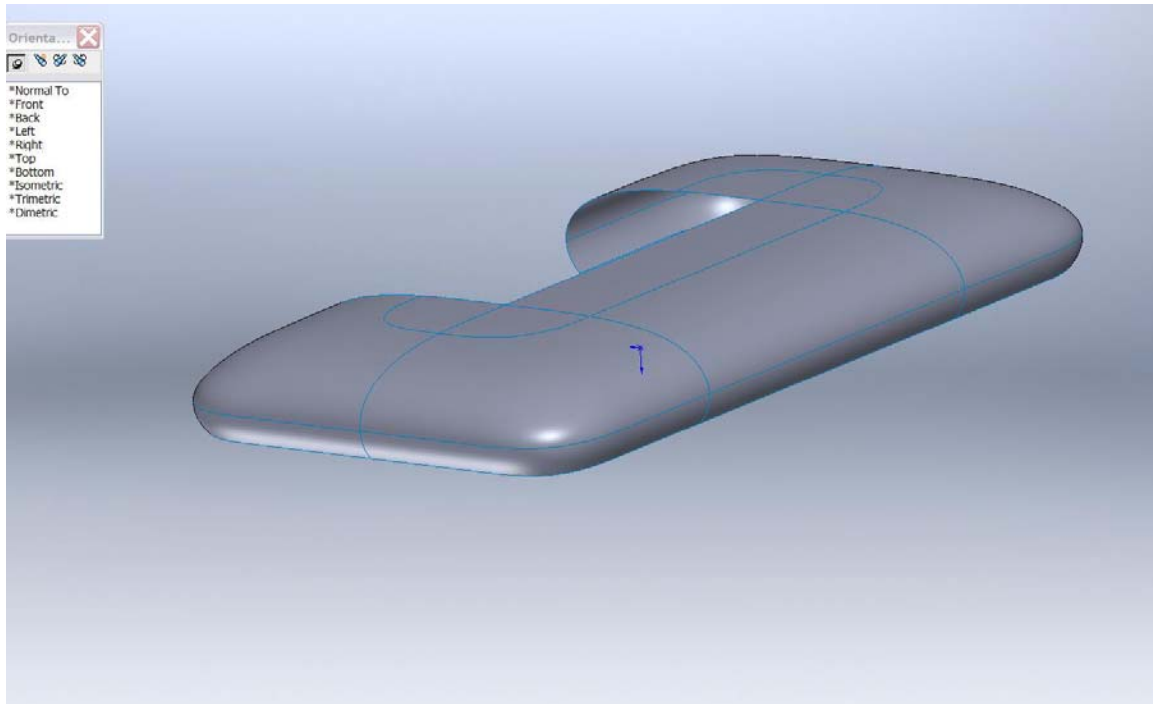
**Step 3** - I then mirrored the two surfaces about the Right Plane and used the Zebra Stripes to check the surfaces.



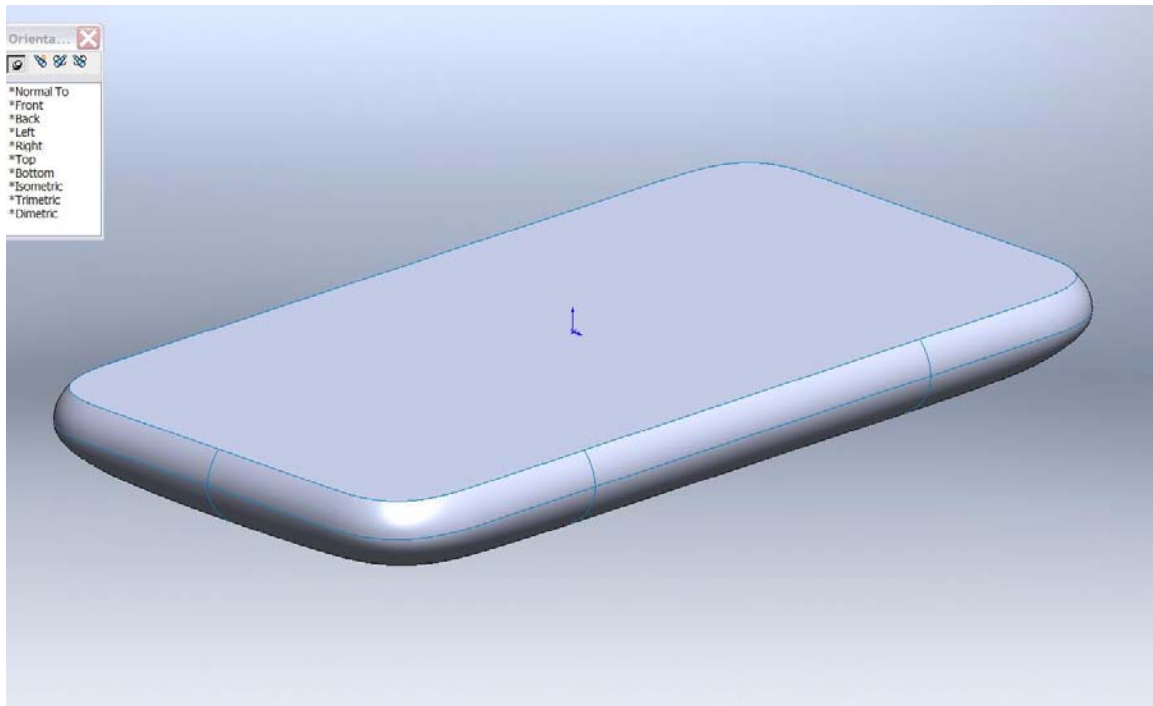
**Step 4** - The corner of the phone was completed by creating the surface that would wrap from the Boundary surface edge up to the top of the phone. I found the Loft tool gave me the surface I wanted. This was mirrored and then the entire end of the phone is mirrored about the Front Plane. This would give both ends of the phone.



**Step 5** - I used the three edges of the 3 surfaces to extrude surfaces to fill in between the ends of the phone. These are then mirrored about the Right Plane to complete the bottom. These surfaces were then knitted together.



**Step 6** - To finish the body of the phone, I then selected the edges and used Fill Surface for the final planar surface. This was knitted to create a solid.



**Step 7** - From this point forward, I used the Apple 2D drawing to locate a surface to split the phone body to separate the upper chrome area and plastic lower body. All the details of the top lens areas and buttons were all done using the drawing as reference.



This was a very satisfying project. Since I completed it, I decided to buy SolidWorks. The iPhone was done using the Student Edition so I may rebuild it in SW2008 or 2009 and see if I can get the bottom of the phone better! I'm still a new user and I have a lot to learn still.

An industrial designer needs to be able to define the design before handing the file over to the mechanical engineer; he must be able to define the surfaces exactly as he needs to in order to maintain the design intent. I was pleased I was able to do it in SolidWorks, rather than Alias, which is the common tool in ID for freeform surface construction, as that will require exporting a file. This will give him a native file, if he/she uses SW.

You can contact Nelson at [n.au@sbcglobal.net](mailto:n.au@sbcglobal.net)