Using the Roland LPX-250 Laser Scanner and Pixform Software to generate a Surface Model of the TV Remote
Spring 2005

A **Planer** scan (6 side) was performed on the TV remote (mounted in the vertical position). Of course this collects the support shaft information at the bottom.

An additional Planer (1 direction) scan was performed of the tail (end). The hole was filed with clay so that the hole did not get scanned.

Start up Pixform on the computer tied to the Laser Scanner. This is the only computer that has this software installed.

Remember to save your Pixform work often!

Select Edit – Enable Undo otherwise you have no undo option. This does chew up RAM.

Note that upon import there are six shells.

Play with F1, F2, F3 and F4 (View – Display Mode) to get an idea of how this data can be viewed on the screen.
Merge these together to start.

Select the Scan tab then Build – Merge select all the shells then RMB and All.

Select the points representing the support shaft. Select – Entities – Vertex.

Edit – Delete – Vertex removes these.

Import the end shell and change the color. (RMB the feature in the model tree and select Change Material).
Now edit the end set. Points are selected (RMB Select-Vertex), a box dragged around points and then the Delete key hit.

When selecting vertices, you might have to activate the points by selecting the set from the model tree as shown below. In other words, if you drag a box around them to select them and they do not highlight, pick on the vertex set for that shell.
After using Edit – Transform – Shell (Green arrow is Y axis, Red is X, Blue is Z) to get the shells a little closer and in the correct orientation:

Using Build – Register – 2 Shells – Initial

After selecting Done (fairly close registration)

The shells are now close. Finish this by doing a Build – Register – Fine. Select the two shells and RMB and Done.
Select Measure – Shell/Shell Deviation. If the deviation is large, repeat the Fine Registration a few times.

Merge the shells by selecting Build – Merge shells.

Note the shell name. This is due to the order in which the shells were picked when merging them and is not significant.
Change the Tab to Polygon. Select Clean – Find abnormal faces. If any are found, select Clean non-manifold or Clean Crossing.
Hit F5 (Display will be Shaded with Edge Display). Fill the holes in the shell by selecting Tool – Fill Holes – Shell. Holes are shown in red. RMB and All was selected (automatically fill holes),

Another Clean was done, this time there were some issues.
An attempt was made to Clean – Fix Singularities but that didn’t help. There is also an issue at the front. The Result of Clean – Find Self Intersection, then Information – Region shows the following:

Selecting and deleting vertices in this region:

Filling the holes (one by one) leaves us with:
Performing the same operations (delete vertices and fill hole) nets:

The following is from the Pixform Tutorial (Roland):

6. Smoothing

1) Press F4 key on the keyboard. The display mode will be “Shaded display”. Change the size (SHIFT+Mouse) or move (CTRL+Mouse) shell if necessary for next operation.

From [Tool] menu, choose [Smooth], and click [Paint]. Then change the size of brush tool (trackball) with SHIFT+Mouse. Move the trackball on the rough part like a tracing.
When doing this, no trackball was displayed on my system. The brush size can be changed by selecting Select – Option – Set Brush Size. This didn’t seem to change anything.

The easiest way might be to select faces (Select – Entities – Face) then to Tools – Smooth – Shell and select the inside region button (to the right of the question mark).

Or, simply decide that the entire shell is going to be smoothed and simply pick on OK.
We did lose some resolution on the raised area due to this.

The next step is to remesh the surface. Select F3 (Hidden line mode) then Tool – Remesh – Global. “The scalene triangles that faces will be converted to isosceles triangles faces to improve the quality of object data.”

If this starts to take too long, (like forever? 10 minutes of processor time and remeshing still at 1%), then you have real problems with your data set. Normal time is about one minute.

Decimate (reduce) the number of faces. Select Tool – Decimate and select the shell. A reduction ration of 25 might be good.
F4 to look at this shaded:

Environmental mapping allows us to check the condition of the surface. Select Measure – Environment mapping. Stripes show differences of the level.
Now create surface geometry. Select the Surface tab. From the Surface menu button select Auto Surfacing. “Click the shell twice with LMB then click RMB once. Choose Done.

100 surfaces yields the following:
Check the surface again. Select Surface – Analyze – Environment Mapping. RMB and select True Sphere. Spin the remote noting the reflections.

Now, output this data. File – Export – Iges.

Importing this into Pro/E, and creating a cross section yields the following:
Setting the tangent edge display to None results in:

This geometry could be used as a starting point to produce a parametric solid model if required.