A few weeks ago, a question was posted in our Technical Support section of our Web Forum asking how to model a pecten shell.

We repeat here the little tutorial we responded with. Because pecten is only one type of a shell and possibly even more challenging are the helical shells, we take this opportunity to also include a tutorial on how to model a snail shell. Needless to point out that each is done using a different technique.

A pecten shell

We shall model the pecten shell shown in the rendering above. While it may not be obvious at first glance, an excellent method for modeling a pecten shell is the (sometimes controversial) skinning operation. The key is, of course, drawing the source and the path profiles correctly. While we shall not attempt to describe the drawing process in detail, you should be able to follow our illustrations and draw your shapes with no major difficulty.

• The four sources we use are in 1.
• The seven paths are shown in 2.
• The sources and the paths are shown together, as they need to be positioned relative to each other, in 3. The sources are in red and the paths in black. There is a small source shape at the beginning (front) of the paths, which we show in detail in 4.

As is usually advisable for skinning, we tried our best to do “clean” modeling.

All our source shapes are accurately symmetric, all our paths have the same number of points properly distributed, and the points where the sources and the paths touch are exactly coincident.

• After setting the proper # Sources and # Paths (4 and 7) in the Skin Options dialog, with the Skin tool active, click first on the four sources, then on the seven paths. If the profiles you drew are similar to ours, then so should be the final model. Ours is shown in 5, and also in the rendering at the top of this column.

A snail shell

The shell shown at the bottom of this column is modeled by placing copies of a profile on a path line and then executing a c-mesh. The hardest tasks are the construction of the path line and the transformation of the profile as it is placed on the path line. Macros are used for both.

• Define the macro as shown in 1 and assign it to the Macro-1 icon.
• Working in front view, draw a line roughly 2/3 the length of the completed shell as shown in 2.
• Set the # Of Copies in the Transformation Multi-Copy dialog to 125 and set the Sel/Copy mode to Multi-Copy.

• With the MacroT-1 tool active click on a then on b. 125 transformed copies of the line are made in a helical pattern, as shown in 3. You will next trace the outer points of this pattern to derive a helical path line.
• With Point Snap on, draw a line by snapping to the outer points of the helical pattern shown in 4.
• Next, working on top view, draw a closed rounded profile, roughly as shown in 5.

• Slightly rotate the profile, first about the Z and then about the X axis, as shown in 6. Note that the first point should be where the bullet is in 5. If it is not already there, use the Topo Attributes tool to place it there.

You are now ready to place and do a c-mesh, but first you need to define the macro shown in 7. You will use it to transform the profile as it is placed on the path line.

• In the Place Options dialog select First Point for Alignment, turn on Apply Macro Transformation and select Tmac 2 in its pull down menu, turn on Generate C-Mesh, and select End-To-End and On Point Bisectors.
• In the C-Mesh Options dialog, select # Of Segments for both length and depth and set them to 64 and 128, respectively. Also, for Type Of Object select Open Ends.

• With the Place tool active, click on the profile and on the path line. The snail shell should be as shown.

Concluding we need to note that this is not a “clean” solid model because it is self-intersecting. However, it certainly produces a nice image of a shell with relatively little effort.