Basic NURBS curve drawing in Maya

Introduction
NURBS curves are very different to polygonal curves, not least in that they can be made in several different ways. They can started with the various icons from the left side of the same shelf of icons as creating NURBS objects or with the Create – Curve Tools menu. There is another, which is to go to the Create – NURBS Primitives menu as for objects but choose Circle or Square; once done, these turn into NURBS curves. Many people like to start NURBS modeling using curves rather than primitives, so let’s look at the six ways that Maya can draw NURBS curves.

CV curves
CV stands for Control Vertex, the points of the mesh-like arrangement that define a NURBS curve. The CV Curve tool is used to place control vertices (usually in an orthogonal view) to build up an interpolated curve; the curve doesn’t appear until the fourth point is placed because of the nature of the mathematics. You should note as well that the first and last control points are shown as squares because they are also control vertices, whereas all the others are shown as U’s. The first control point determines the start of the curve, which is a vector; hit Enter to finish the curve. When editing you’ll note that most of the control vertices don’t fall on the curve (apart from the first and last); they are used to define the control cage or hull, very much the same way as a subdivision surface control cage works though the math and the results are slightly different.

EP curves
The EP Curve tool is simply another way to input a curve; the result will be still be a CV curve. As you lay down points the curve will appear after the third point but now it will pass directly through all the points you have entered – rather like the Pen tool in Illustrator. So this is a much more intuitive way to create a NURBS curve. Once you’ve ended the input process with Enter, however, the result switches to being a CV curve with a hull of control vertices away from the curve.

Bezier curves
The Bezier Curve tool is very different, however. It works identically to the Pen tools in Adoble Illustrator and Photoshop, using clicks to define sharp corners and click-drag to define points on a curve. Interactive handles control the direction and strength of influence of the points. When you use Enter to end the input process, however, and go into editing mode the control points remain on the curve along with their associated handles (if not a corner; corner points have no handles).

Pencil curves
This tool is freeform: you draw a shape, which when complete becomes a high resolution CV curve.

Three point and Two point circular arcs
The Two and Three Point Circular Arc tools are simple ways of creating arcs using two and three input points; they are better learned intuitively than being described.

Chris Yonge 20190112