How to Evaluate Curves and Surfaces Continuity

Continuity between curves can be verified both analytically and graphically.

**Analytically:**

- Click on the “Curve Tangent and Curvature” tool.
- Click on the first curve and drag the evaluation point up to the endpoint of the curve to be evaluated.
- Take note of the curvature value displayed in the Modeling Tool panel (open it, if necessary, with Ctrl+2).
- Click on the “Curve Tangent and Curvature” tool again.
- Click on the second curve and drag the evaluation point up to the endpoint of the curve to be evaluated.
- Compare the curvature value displayed in the Modeling Tool panel to the previous value. If the tool used to join the curves support C2 continuity, the curvature value should be the same (as much as the global tolerance specified in the preferences may allow).

**Graphically:**

(Note: this can be actually used to graphically plot the curvature of a curve, and is especially valuable for curves lying on a plane)

- For each curve to be evaluated, create an extrusion surface.
- Select all the surfaces created.
- Make sure that the perspective camera is the currently active camera (eventually click on its caption to make it active).
- Open the Shading panel (Ctrl+3), select “Current camera” as the object to be rendered in preview, either select “Medium” or “Fine” for the preview resolution depending on the speed of your computer. Make sure that “Auto apply material” is enabled.
- Right-click on “Color” in the shader tree and select the “mean curvature” shader. In the rendering preview appear a curvature plot of the surface (and thus of the curve). Adjust the shader parameter values, setting min curvature to -1 and max curvature to 1 as starting values is good enough for most cases.
- Verify that the color change continuously between surfaces.
- Eventually adjust the perspective camera position (zoom, orbit), the rendering preview is instantly updated.
- Eventually adjust the dimensions of the Shading panel. The curvature plot obtained in this way is calculated at least for each pixel (more than once per pixel when relevant changes are detected at adjacent pixels -- antialiasing), thus it is very precise, especially compared to “real time” visualizations of other packages which highly depends on the resolution of the tessellation used to approximate the NURBS surfaces.

The same two methods above can be applied to surfaces.