

## Extrude & Revolve

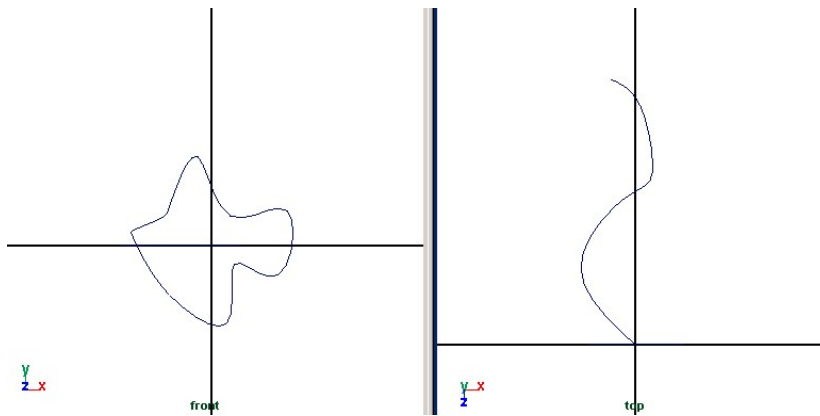
*Maya 2013*

### Concept

- There are several basic modeling techniques shared by all 3D programs
- These can be used either
  - to create your final model
    - For example, a vase
  - or
  - to create a preliminary model
    - which you then refine to get your final model
- All these techniques make use of curves
  - See the *Introduction to Curves* and *More Curve Editing* tutorials in this set before proceeding
- All the techniques can produce either polygon or NURBS models

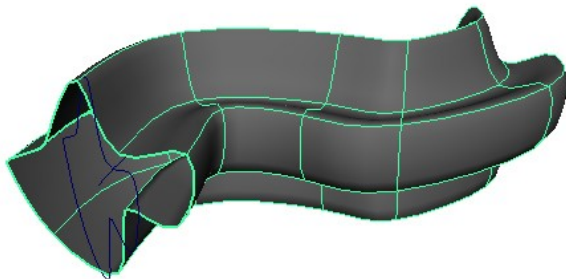
### Extrusion

- Go to the *Surfaces* module
- This pushes a “profile” curve back in space
  - creating a surface as the profile curve moves through space



- In the Front window, draw a profile curve
  - (See the illustration on the left)
  - This curve will become a cross-section of your model
  - The profile curve can be open or closed
  - It is easiest to center your curve around 0,0,0

- In the Top window, draw a path curve
  - (See the illustration on the right)
  - Make your path approximately perpendicular to the X axis
  - Again, it is easiest to start your curve at 0,0,0
- **WARNING:**
  - You can use other windows than the Front and Top,
    - but this combination gives the most predictable results
- First, select your profile curve
- Second, shift-select the path curve
  - **WARNING:** the order of curve-selection is important
- >Surfaces >Extrude []
  - >Edit >Reset Settings
    - to get defaults
  - Result Position = At Path
    - to place your model on top of your path curve
  - Select geometry type: polygons or NURBS
    - (See the *Introduction to NURBS Patches* and *Intro to Polygonal Modeling* tutorials for the advantages and disadvantages of each)
  - >Extrude



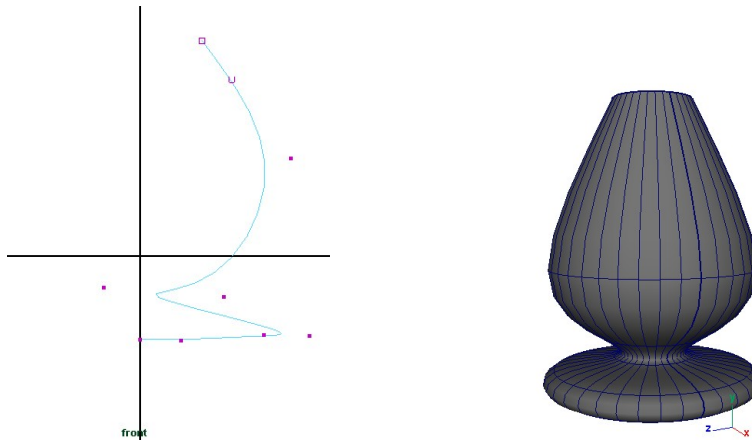
- Maya creates a surface
  - The cross-section is the shape of your profile curve
  - The surface bends along the path curve you drew

### Construction History

- If construction history was on for the object,

- (See the *Construction History* tutorial in this set)
  - then the two curves are part of the *Input* node information
    - – that is, they are part of the construction history
- So, changing the shape of either curve,
  - automatically changes the shape of extruded surface
  - So....
- Select the profile curve
  - (If it's difficult to select, use the Outliner or Hypergraph windows)
  - Scale the profile curve
    - The extruded surface changes size
  - Rotate the profile curve
    - The extruded surface twists with it
- Now select and move some of the CVs of the curve
  - The extruded surface changes shape
- Move a CV of the path curve
  - The bend of the surface changes
- To make your model independent of your curves,
  - you need to delete the construction history
- Select the model
  - >Edit >Delete by Type >History

### Revolved Surface



- This rotates a profile curve about an axis,

- creating a surface as the curve rotates
- Sometimes also called a “lathe” operation,
  - like an table-leg made on a woodworker’s lathe machine
- In one of the Front window, draw a profile curve
  - similar to the illustration on the left
    - (You can use other windows, but the Front window is most intuitive)
  - Use Snap to grid to make the bottom of your curve end
    - exactly on the Y axis
    - **WARNING:**
      - If your curve crosses beyond the Y axis,
      - the resulting surface will intersect itself
- >Surfaces >Revolve []
  - >Edit >Reset Settings
    - to get the defaults
  - >Revolve
- Maya creates a vase-like surface
- Since Construction history is on,
  - your Inputs are active
  - So...
    - In the Channel Box
      - under Inputs
        - click `revolve1`
          - Change the *End Sweep* to 180
      - Your surface is sliced in half
- To change the shape of your profile curve...
- In the Outliner window,
  - click on *curve1* to select your curve
- In the top menu bar,
  - Click on the tiny “Select by component type” icon
    - The CVs of the curve appear

- Select and move a CV of the profile curve
  - The shape of your surface changes

### **Further Surface Editing**

- Once you have created your basic model,
  - you can change the surface directly
    - by moving its surface points
      - See *Introduction to Shape Editing* tutorial in this set for more details
    - by using a deformer to change its shape
      - See *Non-linear Deformers* and *Shape Deformations...* tutorials in this set
  - or by any other modeling technique