Editing polygonal models at object level in Maya

Introduction
Apart from extrusion modeling and moving vertices in component mode (Maya’s term for subobject elements such as faces and vertices) Maya provides many tools for editing polygonal models on the object level. These include changing their original specifications through parametric editing, combining and separating meshes, Boolean operations, sculpting, deformation, and changing the density of meshes. We’ll look at each of these in turn.

Parametric editing
Strictly speaking this isn’t an edit process, but it is a feature of all parametric modeling softwares that the creation parameters of an object can be changed during its existence (up to a point).

Combining and separating meshes
This is the simplest means of making a single object out of two or more, and the process is easily reversible even if the history has been deleted.

Make two (or more) polygonal objects and shift select them. Then use the Mesh – Combine command from the Menu line, hold down the spacebar to access the same command from elsewhere on the screen, or enable the Modeling Toolkit and click on the Combine button. The objects will select as one item. To separate them simply use the Separate command, which is always next to Combine.

There is a video about this in (Maya 2016) at https://youtu.be/_7hADOcte4I.

Boolean operations
There are three Boolean operations in 3D modeling: Union (adding two meshes and deleting the common volume), Subtract (removing the overlap of one object from another), and Intersection (where only the common volume remains). In all three the order of selection matters. For both Union and Intersection, the last item selected will have its name and history preserved. In Subtract, the last item selected will also have its overlapping volume removed from the previous one and then disappear.

There is a video on Boolean operations at https://youtu.be/aQn2f1Z3Tp4.

Sculpting
You can access the sculpting tools through Mesh Tools – Sculpting Tools or choosing the Sculpting tab in the Shelf. Make sure that you can see the tool settings by holding your cursor over the small square box to the right of the tool name if you’re using the first method, or by double clicking the icon for the second. Once you have the tool settings panel open the Size slider is self explanatory (though it’s insensitive at low values and you’re better holding down the B key and left dragging the mouse in the 3D window to adjust the size; you also want to be sure you’re working in Screen Pixels rather than World values. Check the drop down box under the Strength slider). Strength works with Buildup further down to control how much the vertices are dragged; always look at your model in Subdivision style with the 3 key to see what is happening. To push vertices in rather than out, check the Invert box under the Strength slider.

Sculpting is best practiced and experimented with rather than described. There is a good introduction at https://youtu.be/N9V_npJHDF0.
Deformation
Maya includes a great number of what it calls Deformers. These can be accessed through the Deform tab in the top menu bar, and have the characteristic that they are non-destructive. That is, the original object can always be recovered unchanged if required.

There is not enough space here to describe even one deformer, but there is an excellent introduction to the Lattice deformer – the one you will probably most use, and which resembles the control cage for a subdivision surface – at https://youtu.be/ENMyA978LmA

Changing mesh density
Maya can increase or decrease the complexity of a mesh using the Mesh – Smooth and Mesh – Reduce tools. These have corresponding icons in the Shelf for Poly Modeling as shown left, and the Smooth tool also has an icon in the Modeling Toolkit which looks like the Smooth icon in the Shelf, though the options aren't available by double clicking.

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