



Professor Deb's SketchUp Pointers

Notes on using SketchUp by Prof. Deborah Oakley
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There are several basic concepts to keep in mind when learning SketchUp that can lessen your learning curve significantly. While the basic use of SketchUp is fairly straightforward, it is a deceptively complex program and has its own unique nuances that can be very aggravating if you don't understand exactly why it behaves as it does. It is also essential to have a well-organized model to efficiently work with the software. So if you're new to SketchUp, please carefully read and keep these comments in mind as you are learning to get the most out of the software with the least frustration. Experiment on your own models with these notes and see what happens!

A Surface Modeling Program

- Think of SketchUp as a virtual chipboard model. It is a **surface modeling** program only, not **solid modeling**. Remembering that you are working in faces of objects and surfaces is a key to success with SketchUp.
- Surfaces are comprised of a minimum of three lines defining a triangle. There are no true curves in SketchUp. Curves are actually approximations by using line segments (for 2D curves) and triangular planes (for 3D curved surfaces).
- Faces are **automatically** created any time you have a close-bounded planar element shared by other elements. Thus a face is automatically created by three connected lines forming a triangular surface. Faces may be deleted yet their outer boundaries retained. This is useful to easily create openings. Openings may be healed by drawing over one or more of the boundary edges.
- All edges that adjoin surfaces are connected to and are shared by each adjoining surface. When moving an edge or surface, all connected edges and surfaces will be affected. When you create a line, or when a face is formed, it is automatically "glued" to the adjoining elements. **This is a critical understanding for this software package!**
- The basic action of working on a surface is the "push-pull" tool to create three-dimensional space. This in one step essentially replicates a several step act of copying a surface and then connecting the copy to the original together for form a space.

Organizing Your Drawing: Groups and Components

- Learning to work with groups (and at a more advanced stage, components) is critical to effective mastery of the software. It gets nerve-racking in attempting to make models of any complexity otherwise Remember that everything is connected when you initially create a model. It is therefore necessary to combine multiple elements together in a way that will not change other geometry that is otherwise attached.
- Basically, groups combine elements into independently editable sub-structures within the overall model. Components do the same, but are *instances* of the same bunch of elements. Redefining one component thus changes every instance of the component in the model. This very similar to blocks in AutoCAD, for those who are familiar with that software.
- If something is already connected to another object but you want to move it separately from, and without disturbing, other connected geometry, make the objects of concern into a group or component first...it will then be free of the other geometry.

Layers

- Like many CAD programs, SketchUp has layers. But unlike most programs, layers are used in SketchUp **only to control visibility**. In SketchUp, layers do not separate elements...they remain connected even if on different layers.
- The best approach for working in SketchUp that gives the maximum flexibility and control is to **draw all elements on layer zero**. Once elements are separated into a group or component, move that group to the desired layer to control its visibility.

For Intermediate Users

- Complex geometry is often best worked out in a separate smaller model and then imported as a component or group, especially on slower computers. This also allows experimentation with variations in an easy manner.
- **Components:** Be sure you are aware of the location of component axes as this will control the positioning when inserted into other models. If you change the axes and then re-import the sub-model, your overall model will change.
- More complex arrangements of nested/composite groups are most readily controlled through the Component Outliner by using meaningful names for the groups. Please refer to the SketchUp documentation for information on the Component Outliner.
- There are several features or quirks about groups, nested groups and layers as related to visibility that are not immediately obvious. While this can cause frustration for the beginning user who does not take note of these nuances, more advanced users can employ this understanding to great utility:
 - Layers that are turned off in nested groups or components will remain off even when the overall group layer is turned on. On the other hand, *even if turned on, elements on layers in a nested group will not be visible if the parent group layer is not visible.*
 - Elements hidden within groups will remain hidden even when the overall group or component is visible. And as with layers, even elements in nested groups that would otherwise be visible, will not be visible if the overall group is hidden.
 - Active section cuts embedded in a group or component will remain active when the group or component is closed to editing.
 - Section cuts embedded within a group will only cut those elements within that group and not outside of it.
 - Additional section cuts taken elsewhere on the model outside of a group will add to any active section cuts inside of a group or component. This may be used to good effect in making an array of two or more active sections on a model to open it up from multiple sides.

Other Issues, Quirks and Comments

- If you do use SketchUp as a primary modeling tool, be patient to develop your own way of working with it. Like everything else, mastery takes time and practice.
- This cannot be overemphasized: **Save, save, save your work frequently! Make backups of backups!** Don't lose hours of work for the sake of saving a moment to do a simple "Control-S"!
- When something doesn't work like you expect it to (e.g., a surface won't fill, etc.), there is typically some reason why that may not be apparent. For example make sure that all elements form a closed loop to make a surface, and that all endpoints of a surface are on the same plane. It does take getting used to. Sometimes simply erasing a line and then redrawing it will do the trick.
- Healing mistakes, filling holes, etc. can be accomplished by simply redrawing a line.
- To divide a line, simply draw over it or select it and select "divide" from the tools pull-down menu.
- For those familiar with more advanced solids modeling software such as Viz, FormZ or Rhino, the program does not have a Bezier spline curve built in or editable undo stacks (although for advanced users, a Bezier spline Ruby script is available that does work reasonably well to give an editable curve).
- **SketchUp can become very graphically intensive.** If you have a slower machine, use texture and shadow visibility sparingly and keep your model small. Build up larger models of components made from smaller ones that can be swapped out for simpler elements until you're ready for a final presentation. Be sparing in your use of pre-made components, especially things like 3D trees, people, vehicles, etc. The more "realistic" they look, the larger the file size. Many complex models contain hundreds or thousands of faces which if capriciously used will rapidly balloon the size of your model and slow even the fastest computer to a crawl.
- Don't draw what you can't see! There is no sense in detailing a schematic design model down to the screw head...it will merely make your model that much larger and unwieldy.
- The "softer" the model appears, it means that more faces have been used, which in turn makes a larger model. Be careful with this if you have a complex model on a slower machine!