Revit Architecture – Family Editor
Method for Tilting Geometry in Elevation
D. Congour Revised 03/07/12

Rotation in the family editor is fairly easy, and is often used for doors, etc. It's also useful for, say, moving furniture items to non-orthogonal positions.

Rotation of a object (geometry) in elevation views, however, takes a little more care. The following method should help when trying to make an object "tilt up" in an elevation view. For the purposes of this demonstration, a simple rectangular box will be created with instance parameters for length, width, and height. An angular dimension will be added so that the box can be tilted up on edge.

Before using this method, it is highly recommended that the user be familiar with the general operation of the Family Editor. It is hoped that the method will help others with the dilemma I faced in trying to tilt an object in elevation view, and being faced with seemingly endless error messages.

During the following steps, be aware that the biggest challenge is to ***properly*** align reference planes, reference lines, and their attached geometry, between the host family and nested families. A little more time spent developing a "strategy" for proper alignment up front is well worth the effort on the front end, by saving against time consuming errors later.

The reference planes/lines that you create in the family to be nested aren't directly visible once hosted in the host family, but they are "there", hidden as ghost images. They can be seen when using the alignment tool. If the planes/lines important to placement are misaligned even slightly between "nestee and nested", the operation won't work. Alignment must be "perfect", if you are 0.00001 mm off, it won't work! Avoid this problem by aligning references carefully in both families before nesting, and thinking about the origin and placement of the "nested" family carefully before nesting. If you still have problems after nesting, using the "hide" feature to get clutter out of the way helps greatly when aligning host family references to "ghost" references from the nested family.

Method for creating a "tiltable parametric box":

1. Create a new family with a "Generic- Face Based" template, name it "face based box" (I'll refer to it as fbb).
2. In an elevation view(choose right for now), "hide" the slab extrusion and the Ref Level. This will reveal the "unnamed" reference plane hiding underneath. Assign the name "placement plane" to this reference, and work with it (not the Ref Level or slab extrusion) in subsequent steps. Assign "defies Origin" to this plane. This will be the plane that gets "locked" to the tiltable reference line. You can align this placement plane to the Ref Level and Slab Extrusion (not sure if necessary, but a good idea).
3. Back in Floor Plan view, create four reference planes to be used to form sides for a box, "EQ" them about the Center F/B and Center L/R planes. Create instance parameters from the length and width using these ref planes. Flex the length and width to ensure that they work.
4. Create an extrusion, locking extrusion sides to the above planes.
5. Go to an elevation view, and create a reference plane that will represent box height. Lock the geometry to it, and create the height parameter.
6. Create a second face based family, call it "tiltable face based box" (tfbb). This will be the "host" family.
7. In "Elevation View-Right" of tfbb, create another "placement plane"(anywhere you want in elevation, doesn't have to be on "Ref Level" or the slab surface). Now create a reference line at the origin of the new placement plane and the Center L/R plane, and tilt it at any angle between 0 to 90 degrees (just choose 20 degrees). To align the ref line for proper rotation, use the align tool to align to the "blue dot" at the intersection of the Center L/R and placement planes.
8. Assign an angular rotation parameter between the reference line and the placement plane. Call it tilt. Flex it to 90 degrees, 0 degrees, and back to, say, 20 degrees to ensure proper tilt action. If you have problems,

repeat previous step and make sure that the ref line origin is aligned with both Center L/R and placement planes.

9. Load the fbb, nesting it onto the tiltable ref line in tfbb as follows.
   a. In tfbb, go to 3D view.
   b. Using “Set” command with “tab” on the keyboard, choose the proper “placement” orientation on the reference line.
   c. Using “Home-Component”, place fbb onto the reference line, and use space bar to orient it as desired before left clicking mouse to place. Be sure to use ”Place on Work Plane” option. Don't worry about where you place the object along the reference line, as long as it's *on* the reference line (that can be adjusted later).
   d. Cancel out (to get out of placement mode), and click placement arrows, if desired, to flip the box to the top of the reference line.
10. Now you need to link the dimensional parameters from fbb into the tfbb family:
    a. Create new width, length and depth parameters in tfbb, assign values to them.
    b. Highlight the fbb, and use the radio buttons next to the Dimensions in the Properties sidebar to link the parameters to the newly created ones from tfbb.
11. Flex to make sure that you can change length, height, depth and angular parameters without the model blowing up. If not working, go through the previous steps again to make sure you didn't miss something.

That should do it – Feel free to respond with suggestions to improve on this method.

Further Guidance and Observations

The component to be nested, and subsequently rotated, needs to:

1. Have part of it's geometry aligned and locked with a “placement plane” before it is placed into the nested family. The placement plane hides underneath the face of the extrusion (hide the extrusion and Ref Level to access it). The part of the geometry aligned to the placement plane in the family to be placed is what will latch onto the tiltable reference line. If this alignment is not solid, you will get constraint errors when flexing the angle in the host family.
2. If there is no geometry available to align in this way, you can create two new reference planes intersecting (in the above example, along the “long axis” inside the family geometry). At the intersection of these two planes, create a reference line (of any length). This reference line must then be aligned and locked with the placement plane, in the family to be nested, before nesting it onto the tiltable reference line in the host family. This will give a solid connection to the tiltable reference line in the host family.
3. Note that the geometry that you have placed on the tiltable reference line has the ability to “slide” along that reference line; just slide it to approximately where you want, in this case, alignment is not crucial to “tilting”.