Drawing Chair Slats in Sketchup
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Curved chair slats are easy to draw in Sketchup if the profile is rectilinear (e.g., as shown in Figure 1). A rectilinear representation is probably good enough for a working drawing, even if you intend to cut a profile on the slats. A two-dimensional profile would be easy enough to draw separately. For a rendered drawing, however, you might want to show the appearance of the slats.

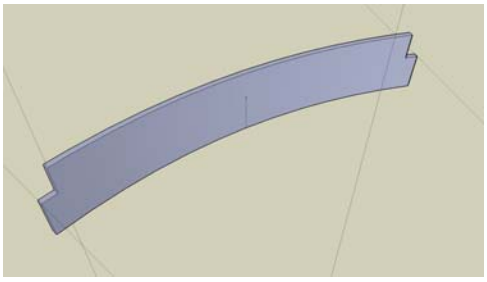

Figure 1. Curved (Bent) Chair Slat with Plain Profile.

Curved chair slats are more complicated and tedious to draw in Sketchup if they include arched profiles, as in Figure 2, because these require drawing compound curves. I cannot draw an arc in the *x* and *z* dimensions (e.g., red and blue) while following a surface that is curved in the third (e.g., green) dimension.

The only way I have discovered to accomplish this is to draw a "flat" slat and then introduce the "bend" using the *intersect with model* feature. This approach starts with a drawing of a dimensioned block of wood and is quite analogous to cutting out a curved slat with a bandsaw.

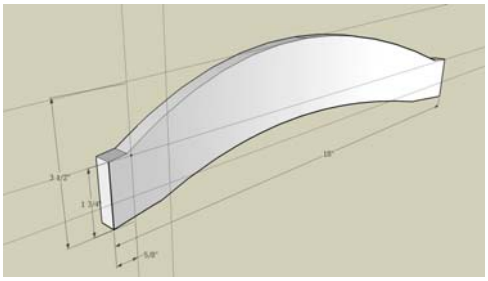

Figure 2. Curved (Bent) Chair Slat with Arched Profile

1. Draw a "flat" chair slat of desired width and height. The thickness should be the depth (sagitta) of the bend plus the thickness of the slat. For example, a ¼" thick slat with a 1½" bend should be drawn as 1 ¾" thick.

You can start by drawing a horizontal rectangle and then extruding it with the push/pull tool. This is your block of wood.

2. Draw the profile on the front face. This is easier to get right if you use guidelines and Front View.

3. Draw the desired arc on the top of the "block". (It is easier and more accurate to do this in parallel projection using Top View.) Make a copy of the arc and locate it so that the two arcs are ¼" apart (or whatever thickness you want for the slat). The rear arc should just touch the back of the block. The result should look like a block of wood ready to be cut out on a bandsaw (Figure 3).

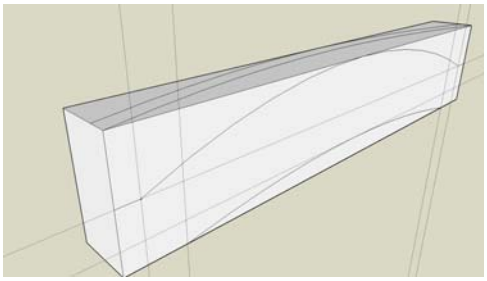

Figure 3. "Block of Wood" with profile layout drawn on face and bend layout drawn on top..

4. Still using Top View, select both arcs, one at a time, using the shift key to select both of them. You do not want to select a closed shape, just the two arc lines. Click Edit, Cut. (The top of the block should not show any trace of the arcs.)

5. Apply the push/pull tool to the front face, to remove unwanted "wood" from the profile. Now the

desired profile appears on the front/back views, but the block is still too thick and is not bent. Make the block of wood a group or component.

6. Return to Top view and click Edit –> Paste in Place. The arcs should reappear. (They may seem to be out of position if you have perspective turned on but should appear to align correctly in parallel perspective.) Draw straight lines exactly connecting the ends of the arcs. If you do this correctly the shape will fill, indicating the lines are all in the same plane and touching. Sometimes it helps to draw a third line between the arcs, e.g., between the midpoints, or to select all four lines and then use the *weld* Ruby Script. This prompts Sketchup to make the correct inference.

7. Use Push/Pull to extrude the arc to the bottom of the "block". Select the extruded shape and make it a group. The result should look like Figure 4.

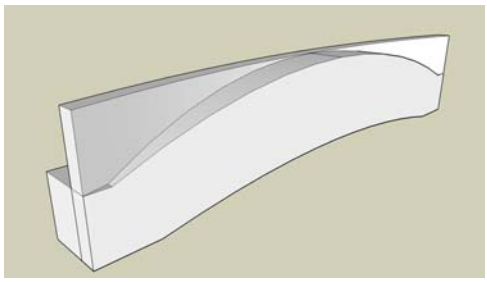

Figure 4. Intermediate result

8. While the extruded slat is selected, click Edit –> Intersect With Model.

9. Select the "block" and, again click Edit –> Intersect With Model. (I think this step may be necessary).

10. Explode both the group made from the "block" and the curved slat. It should now be possible to select and delete unwanted lines and faces while keeping the parts you do want, until you get something like Figure 2.

Intersect with Model is supposed to make lines and faces within the model where they would be expected, for example, where the extruded, curved slat penetrates into the block. This does not always happen to every intersection, for reasons that I do not yet understand. It may involve the order in which lines and faces are removed. You have to remain alert to accidental deletions of faces, especially when you are trimming away thickness from the front and the back of the slat. When you select a face, you should be able to see if the intersect tool had worked as expected. If it had not, you may need to draw lines to demarcate the parts you want to keep from those you want to delete.