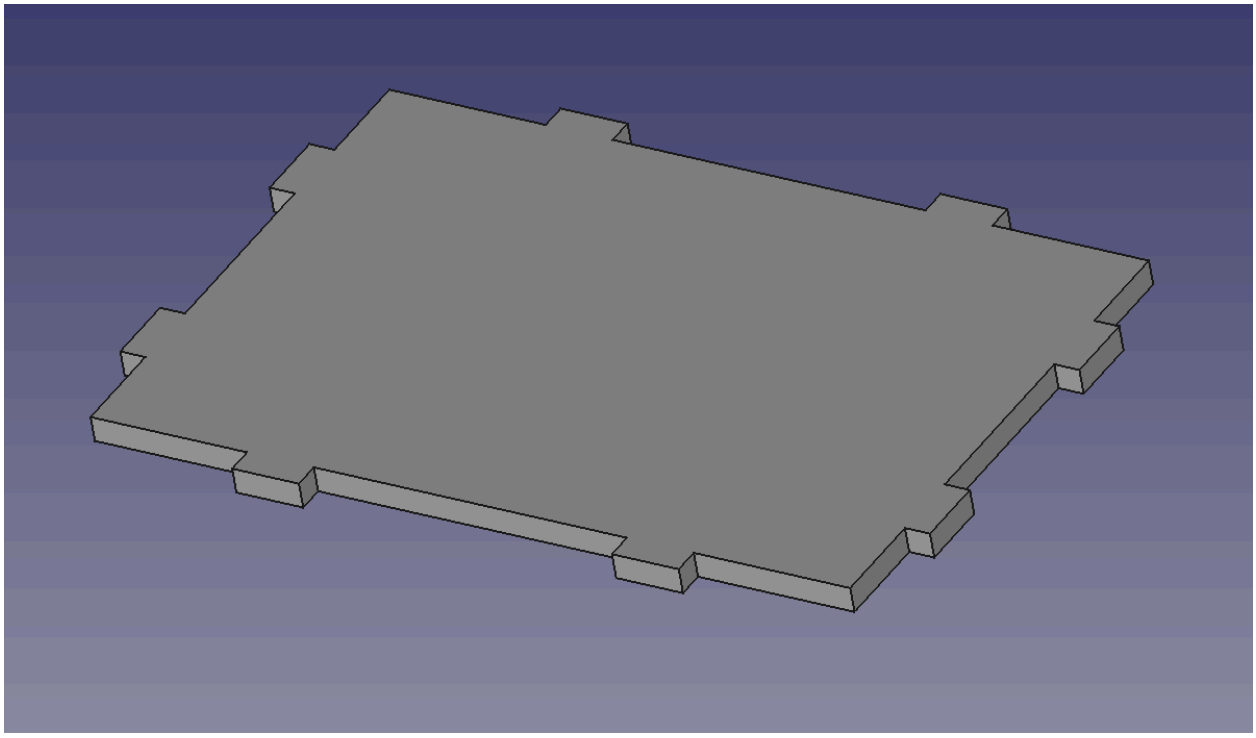
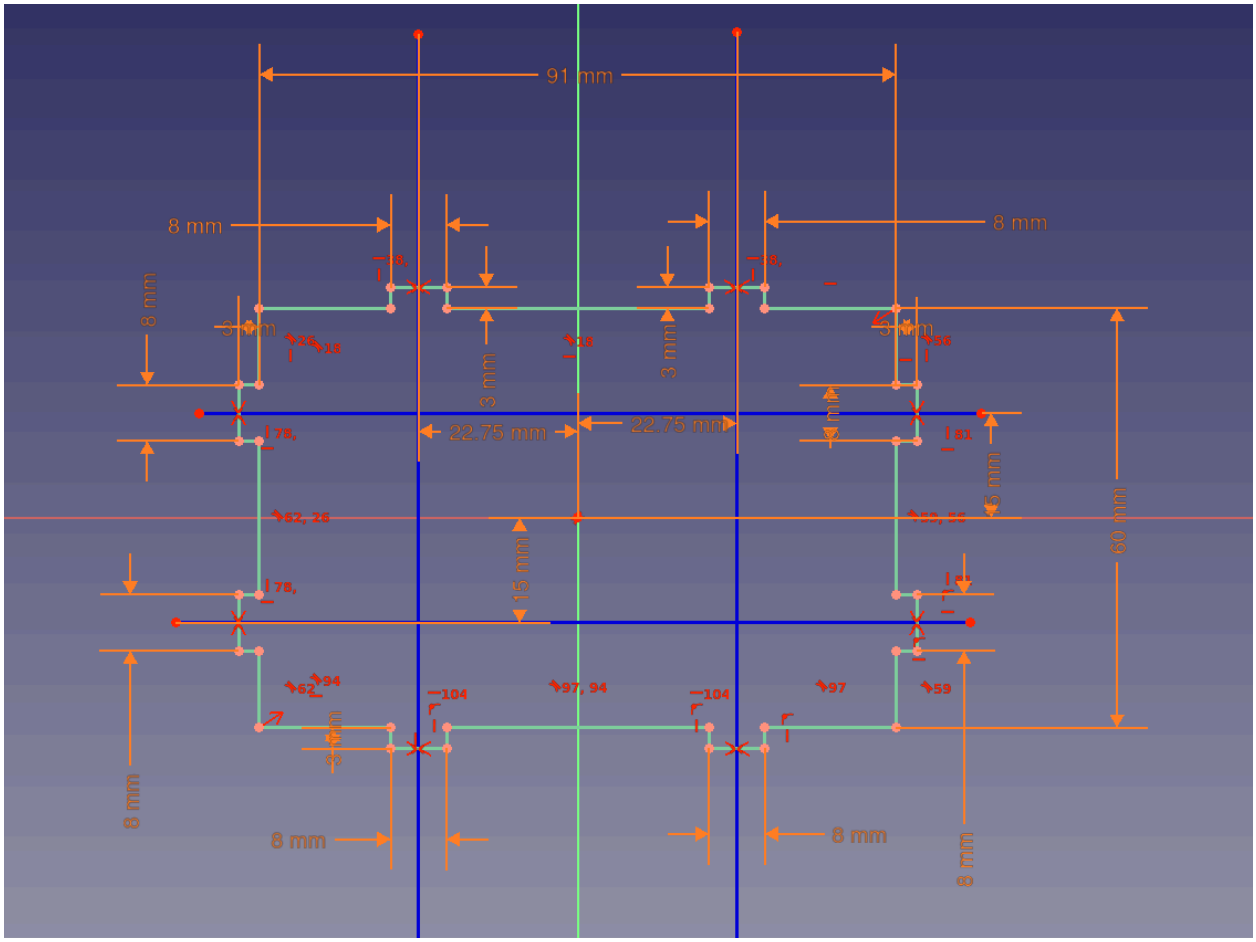
Week5 Actual

In the last lesson of week 4 we dove into using CAD to create constructable designs that can be cut with a laser.

In that lesson we designed the base of a parametric box meant to be joined together using tabs-and-slots joints.



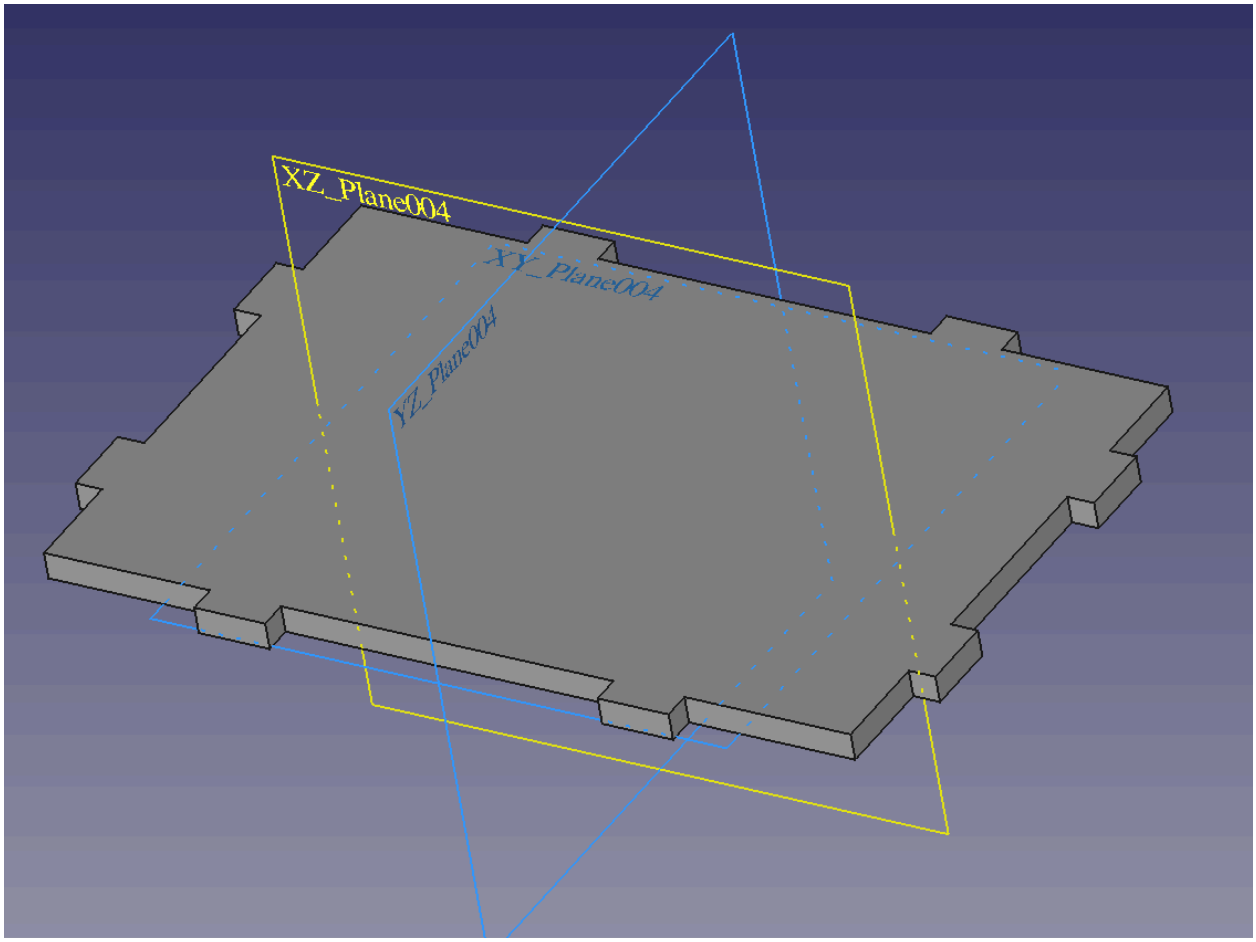
We learned to use the Sketcher workbench, and we learned to use the Spreadsheet workbench to create “Alias” - dimensions that we will be able to modify as we iterate on our design.



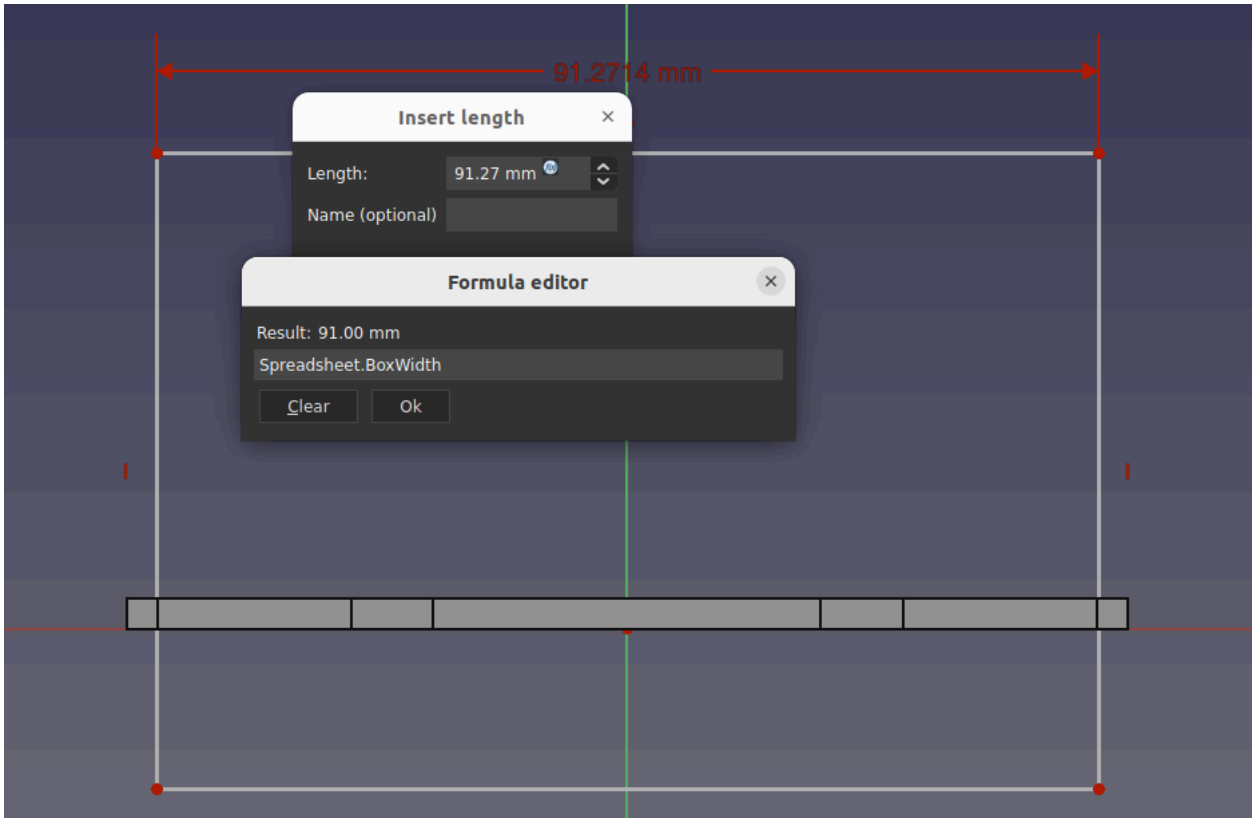
This week we will create the rest of our design by creating two more sides for the box. The good news is that we will find that as we go our design gets a little easier, as we will be able to reference features we have already created in our new bodies.

To do this, we will be getting familiar with a tool called the “sub-object shape binder”.

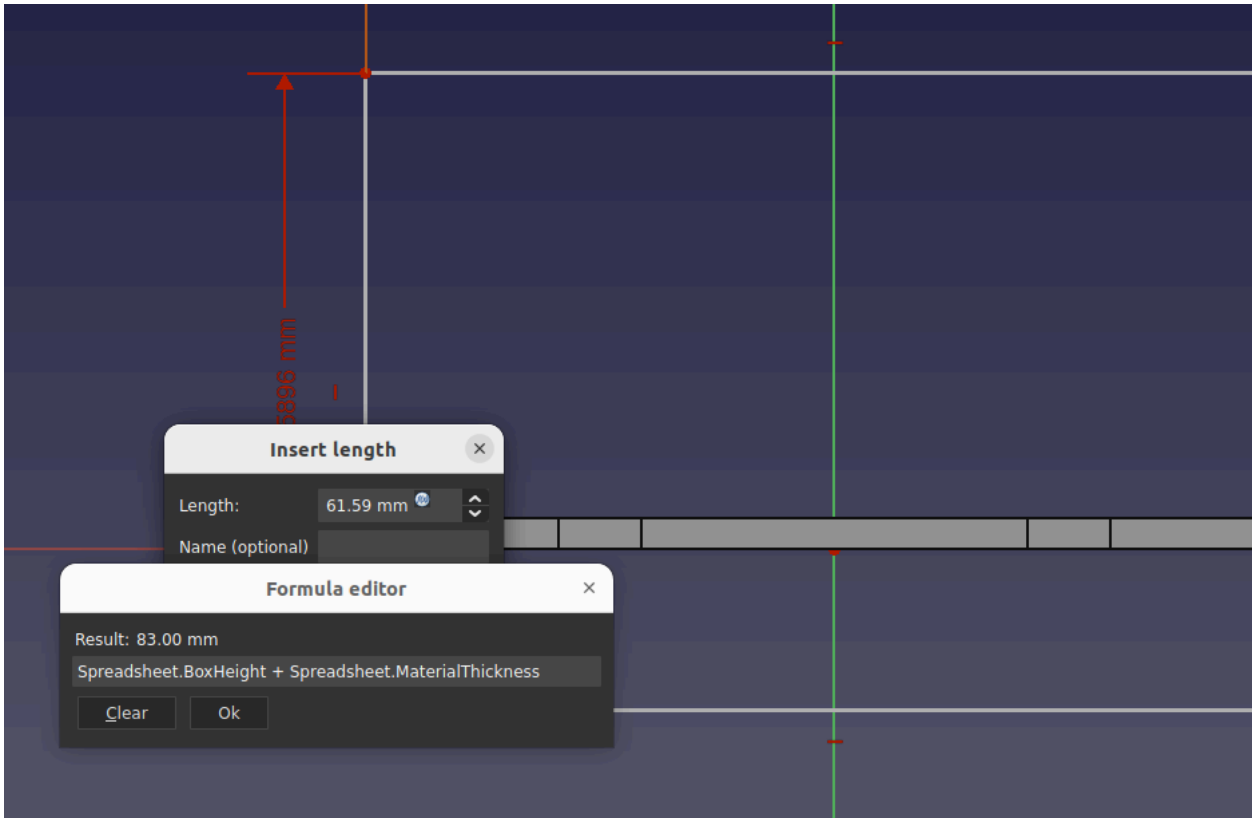
Create a new body, add a sketch in the XZ Plane.



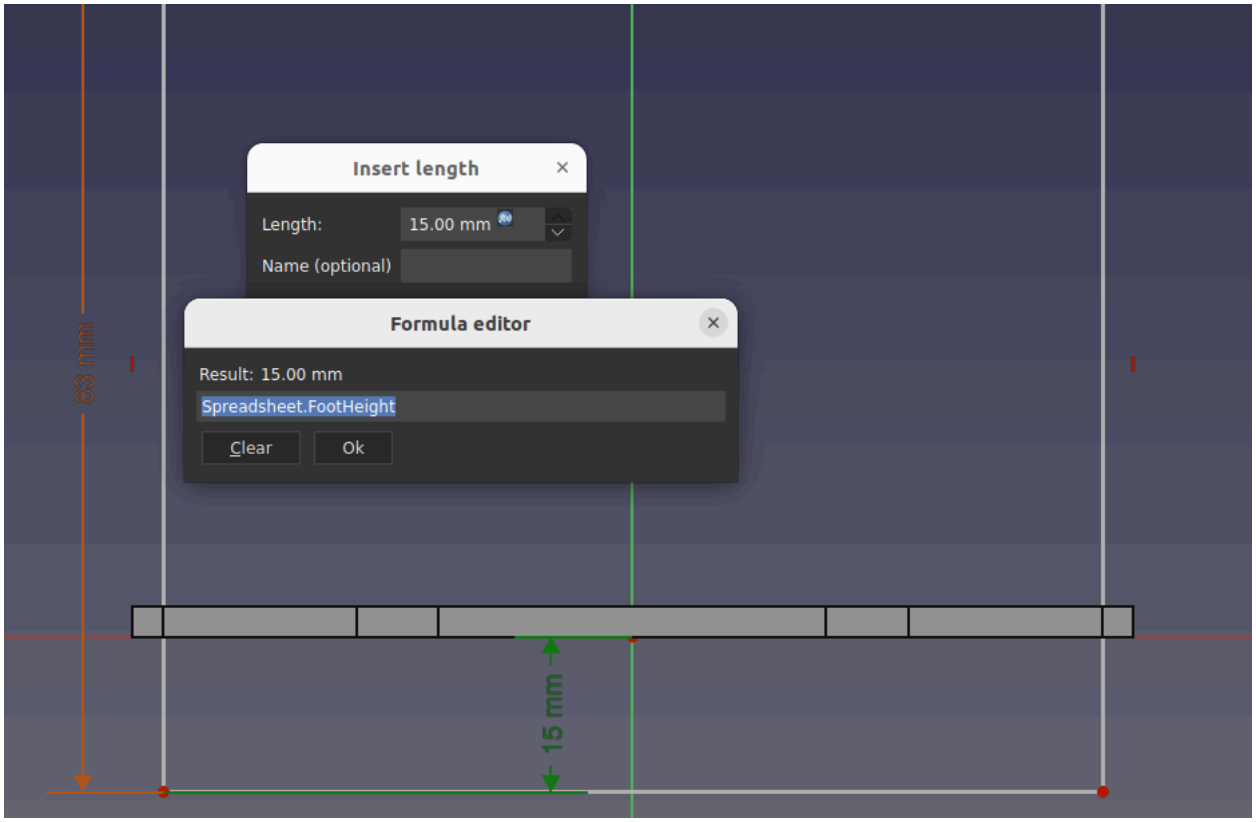
Make a box. Set the horizontal distance constraint like so:



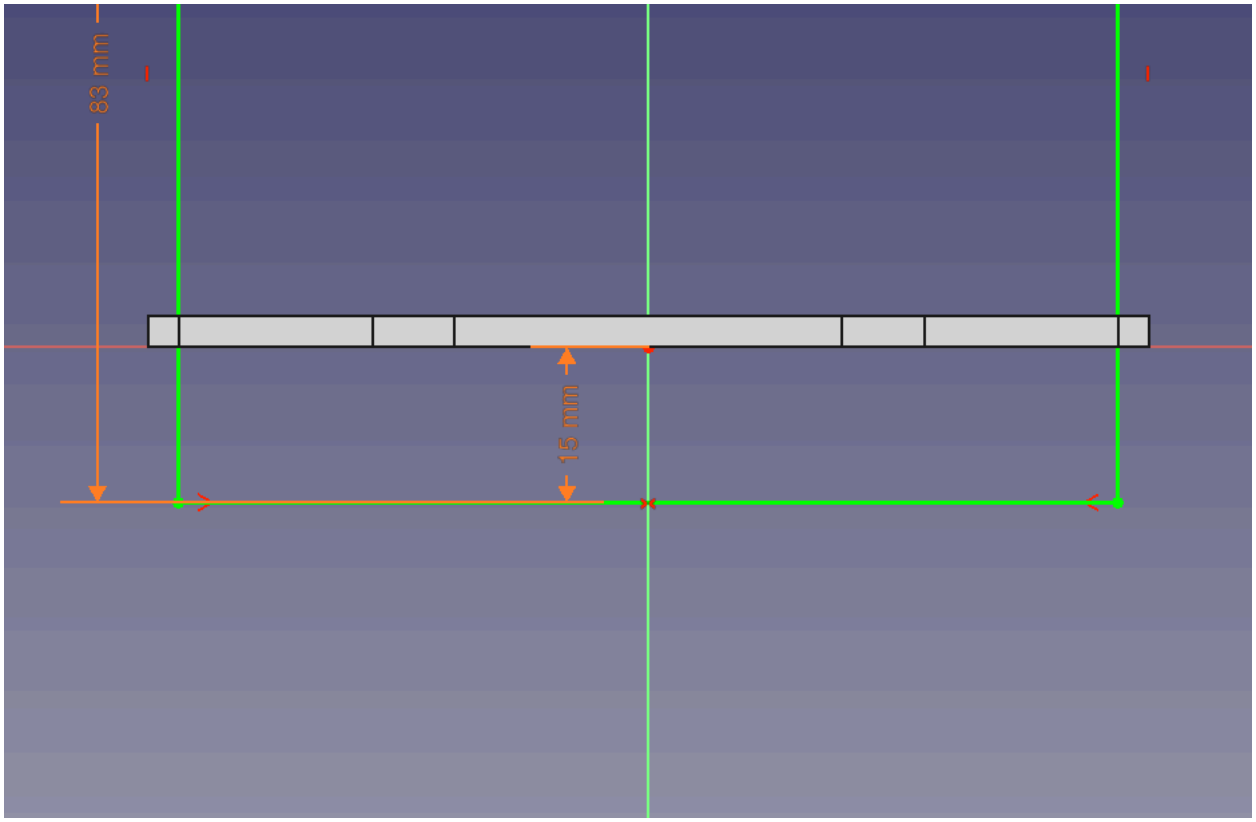
Set the Vertical Distance constraint like so:



Set the distance for the foot using a vertical distance constraint:

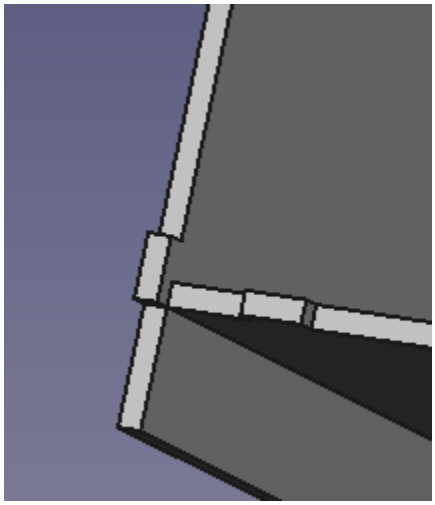


Now position the whole box by making it symetrical to the center line - note you will NOT be making it symmetrical to the center point here.

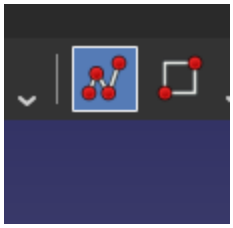


Adding in Tabs.

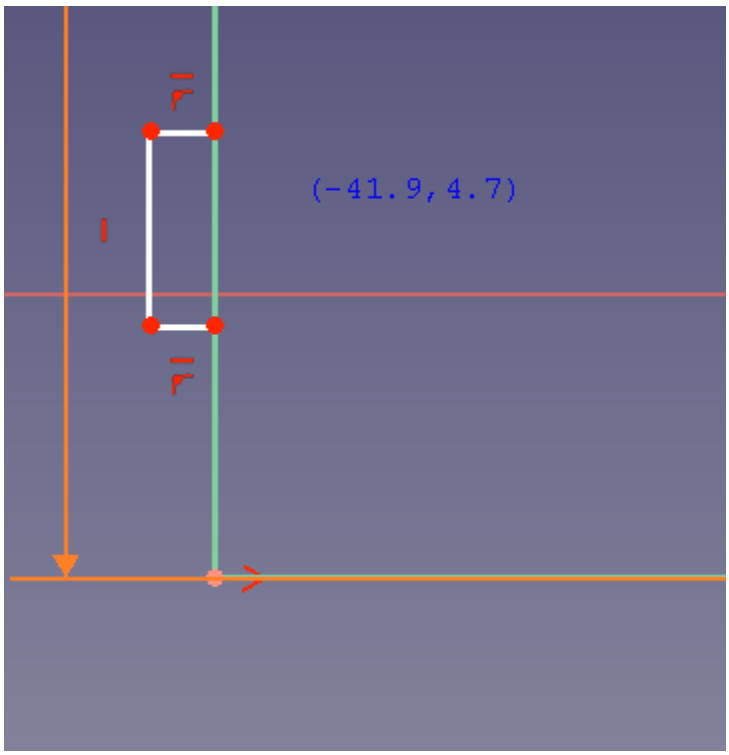
Note that we are going to be adding tabs into this part as well, and our plan is to have them start at the height of the “foot”.



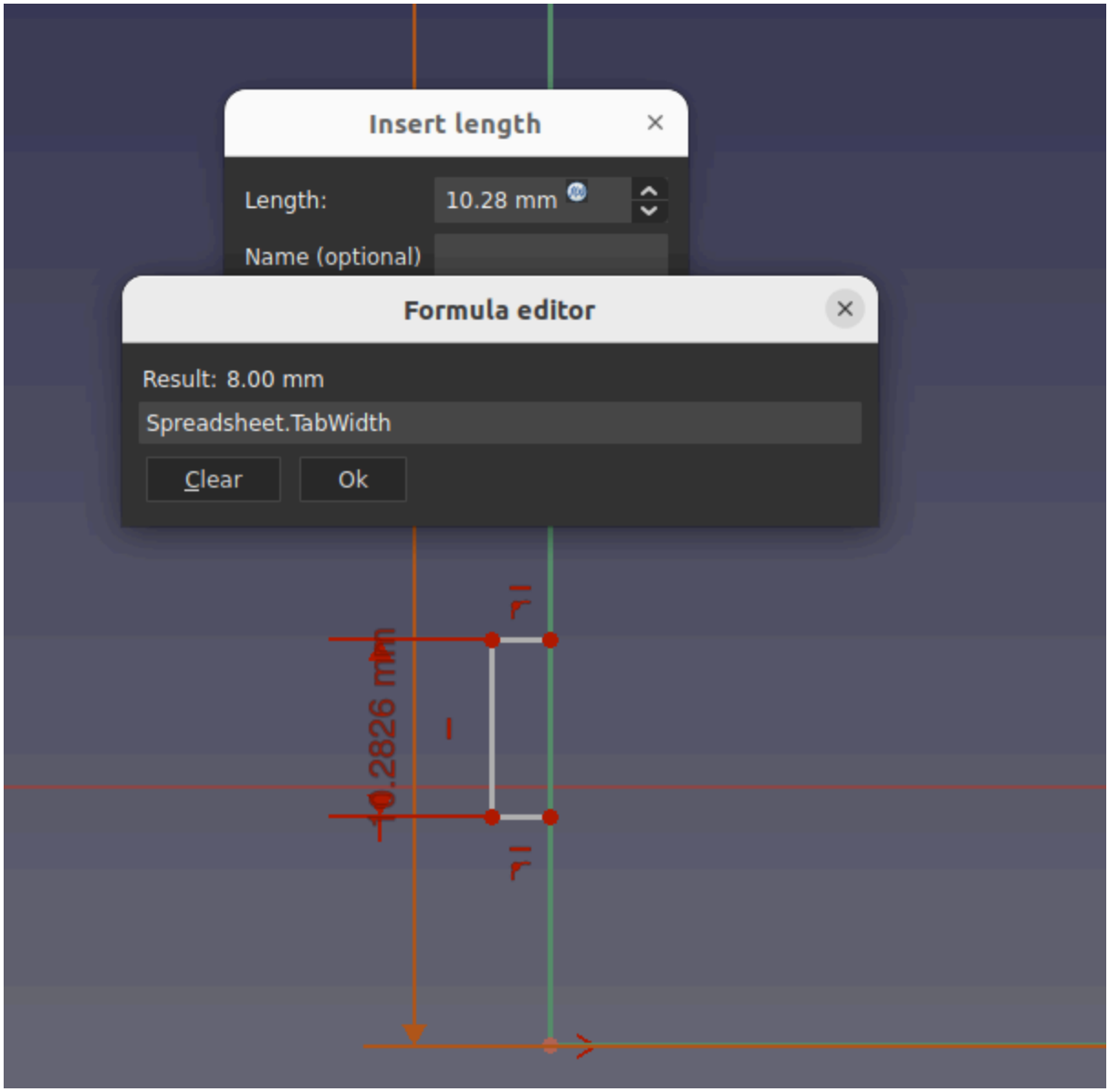
Back in our sketch we will be using the polyline tool to rough in the first tab.



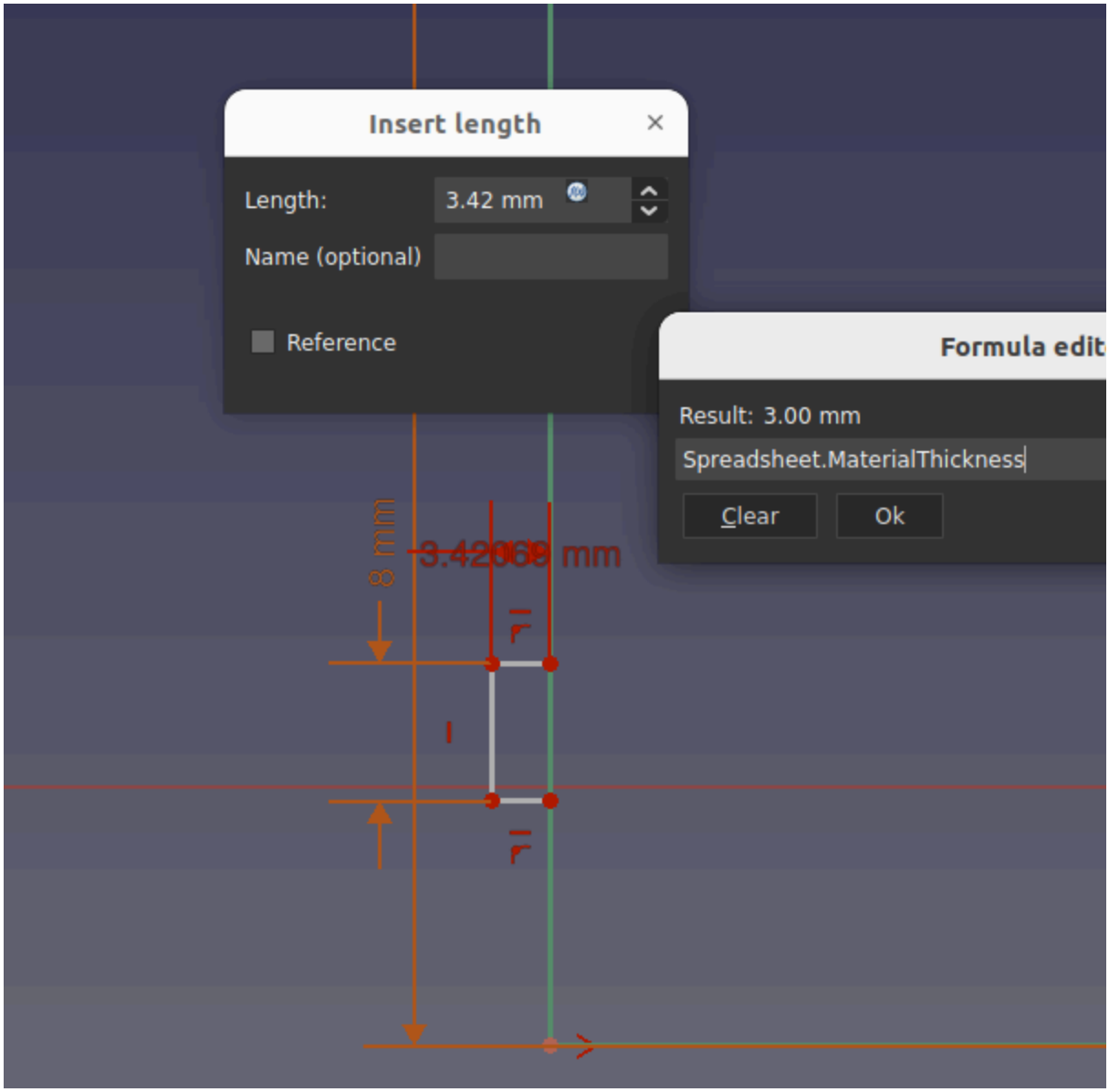
You can draw this in being careful to start the drawing from the vertical line so that it becomes anchored to the line via the point-on-line constraint.



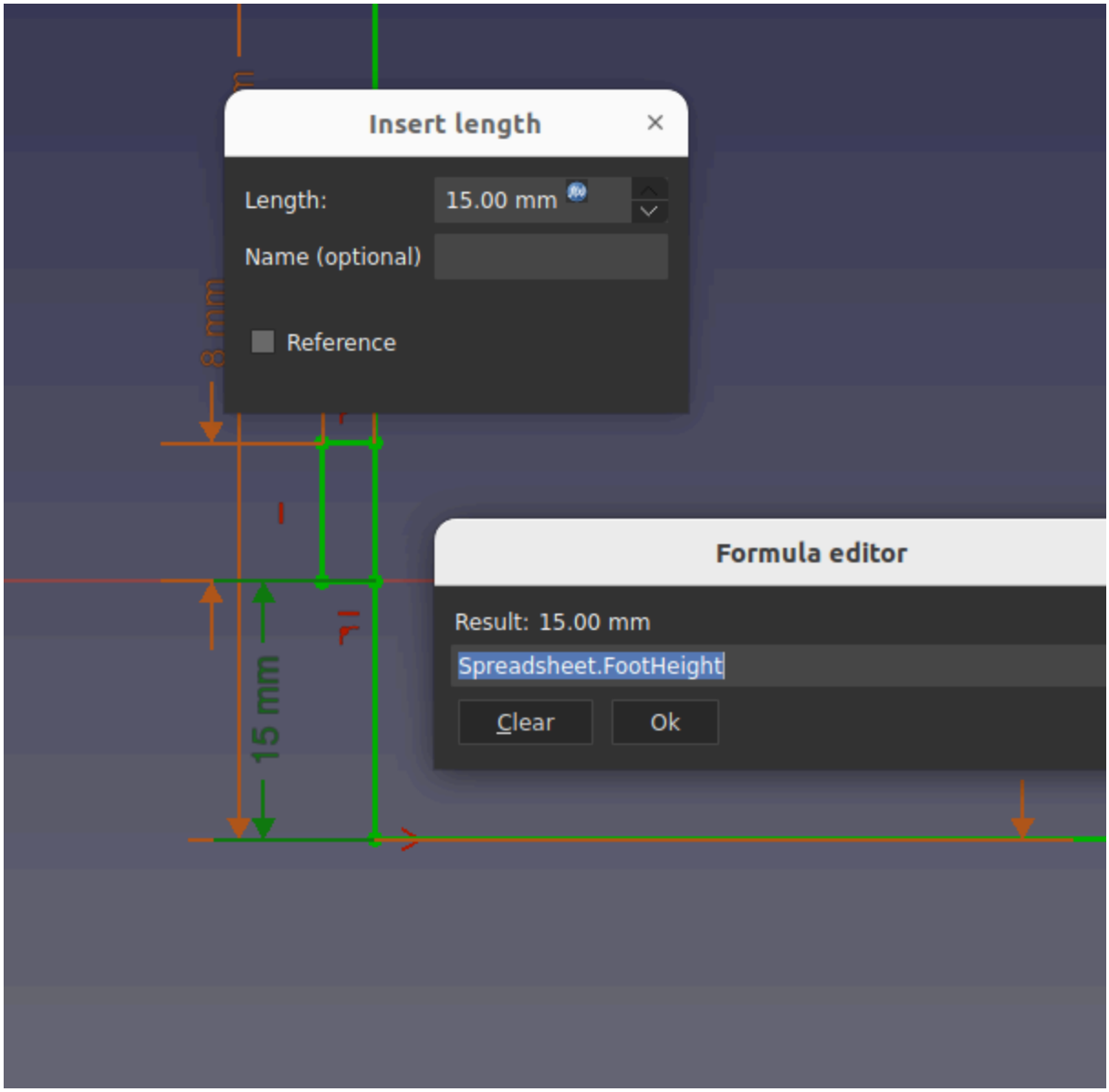
Now we can dimension the tab.



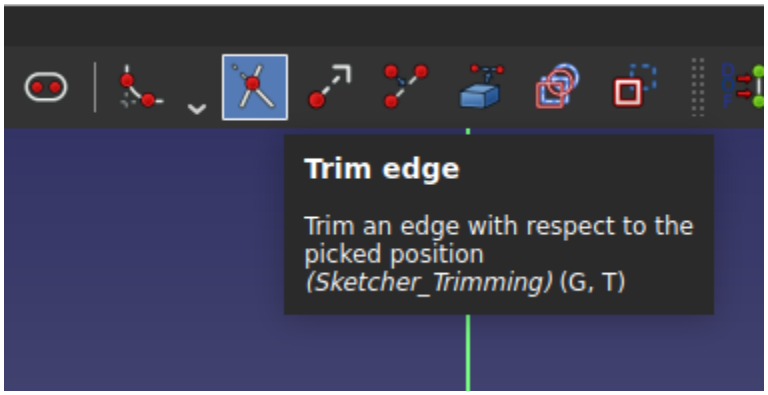
Use the material thickness alias to dimension the depth of the tab. This will allow it to be exactly flush with the slot this tab gets inserted into.



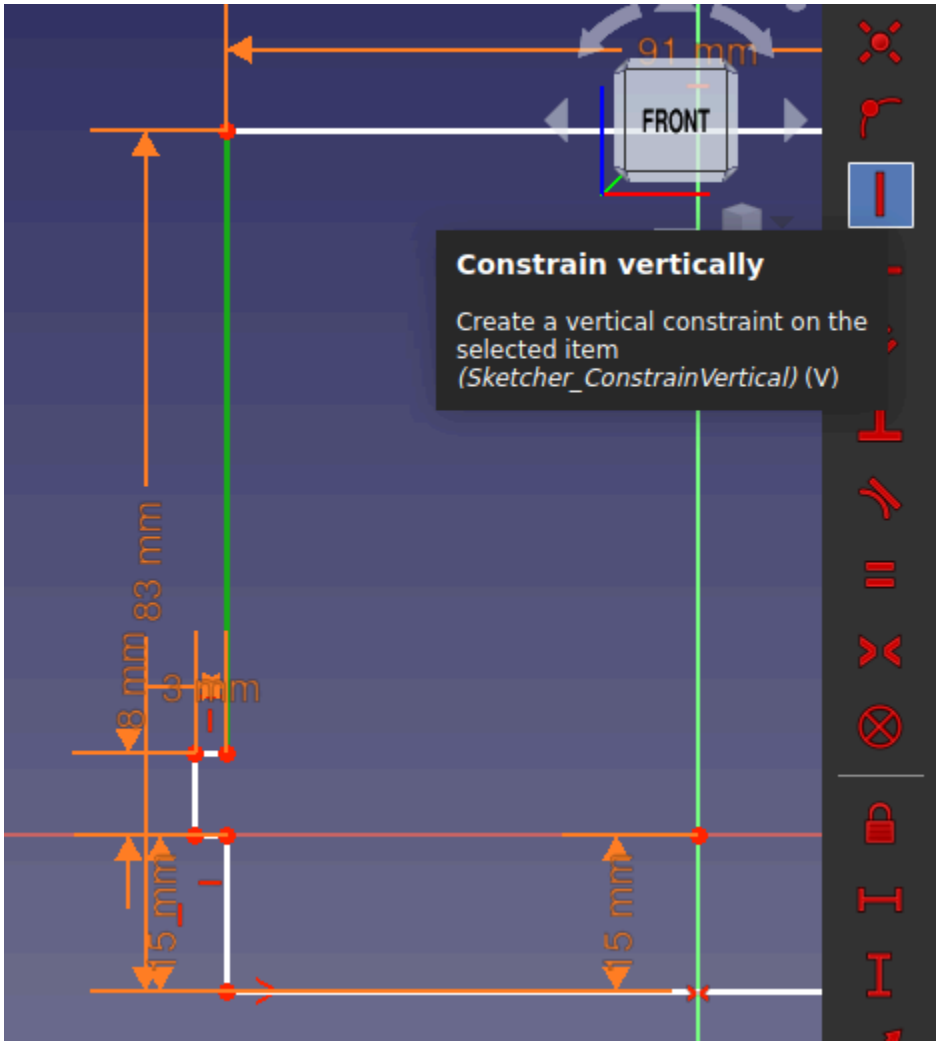
Position the tab using a vertical distance constraint based on the foot height.



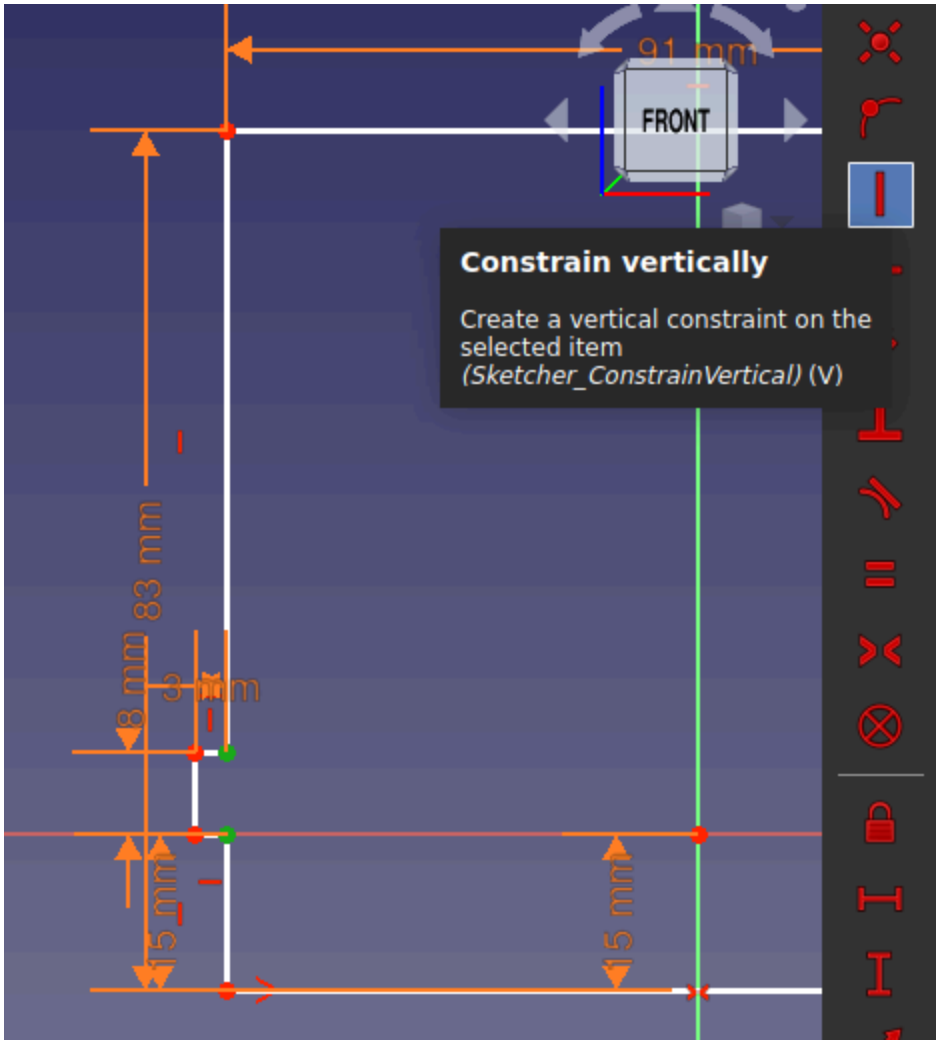
We can now use the Trim Edge tool to get rid of the extra geometry created.



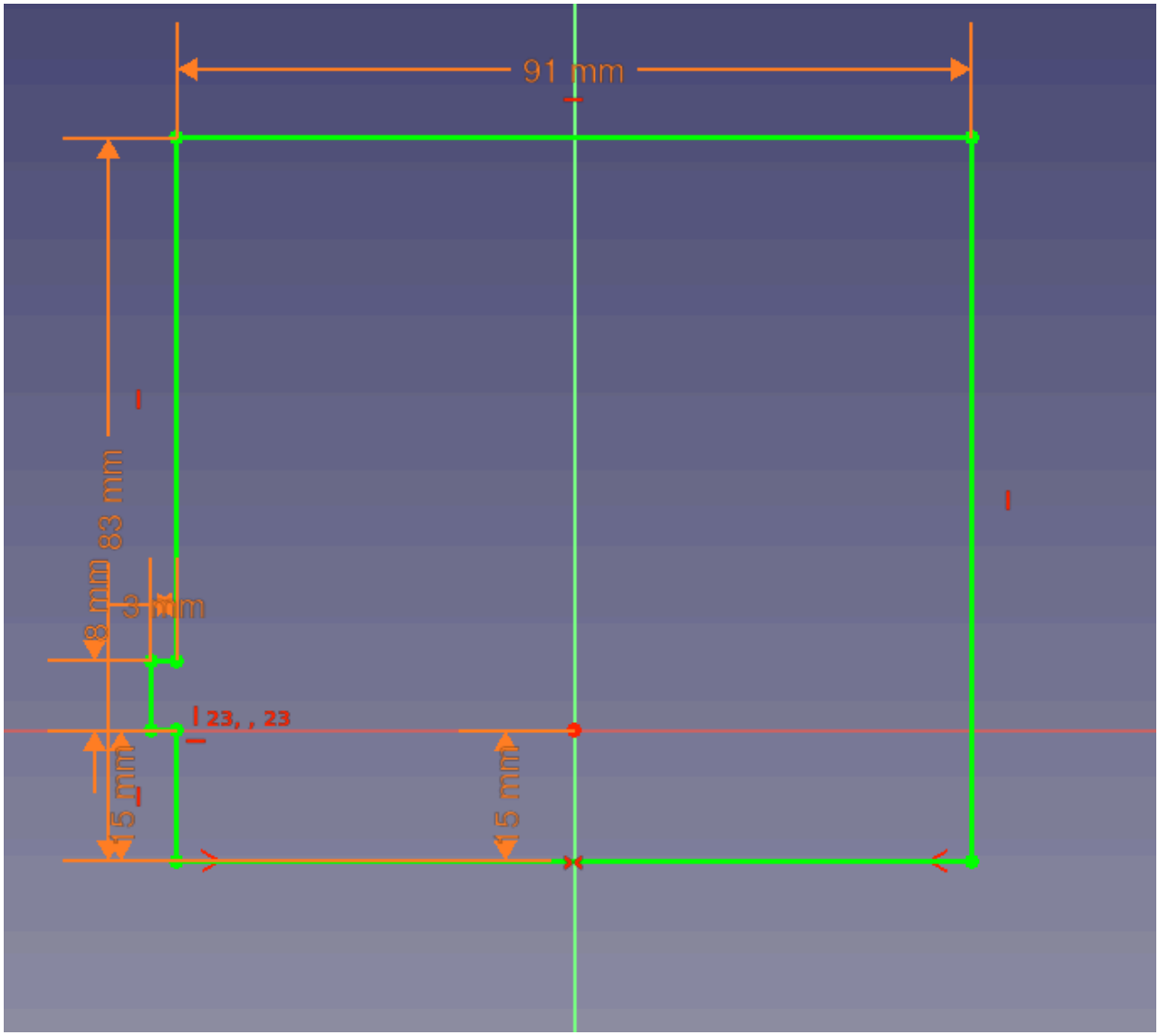
The break in the line created by our trim operation causes things to be unconstrained. Select the line segment that has no vertical constraint, and apply it in.



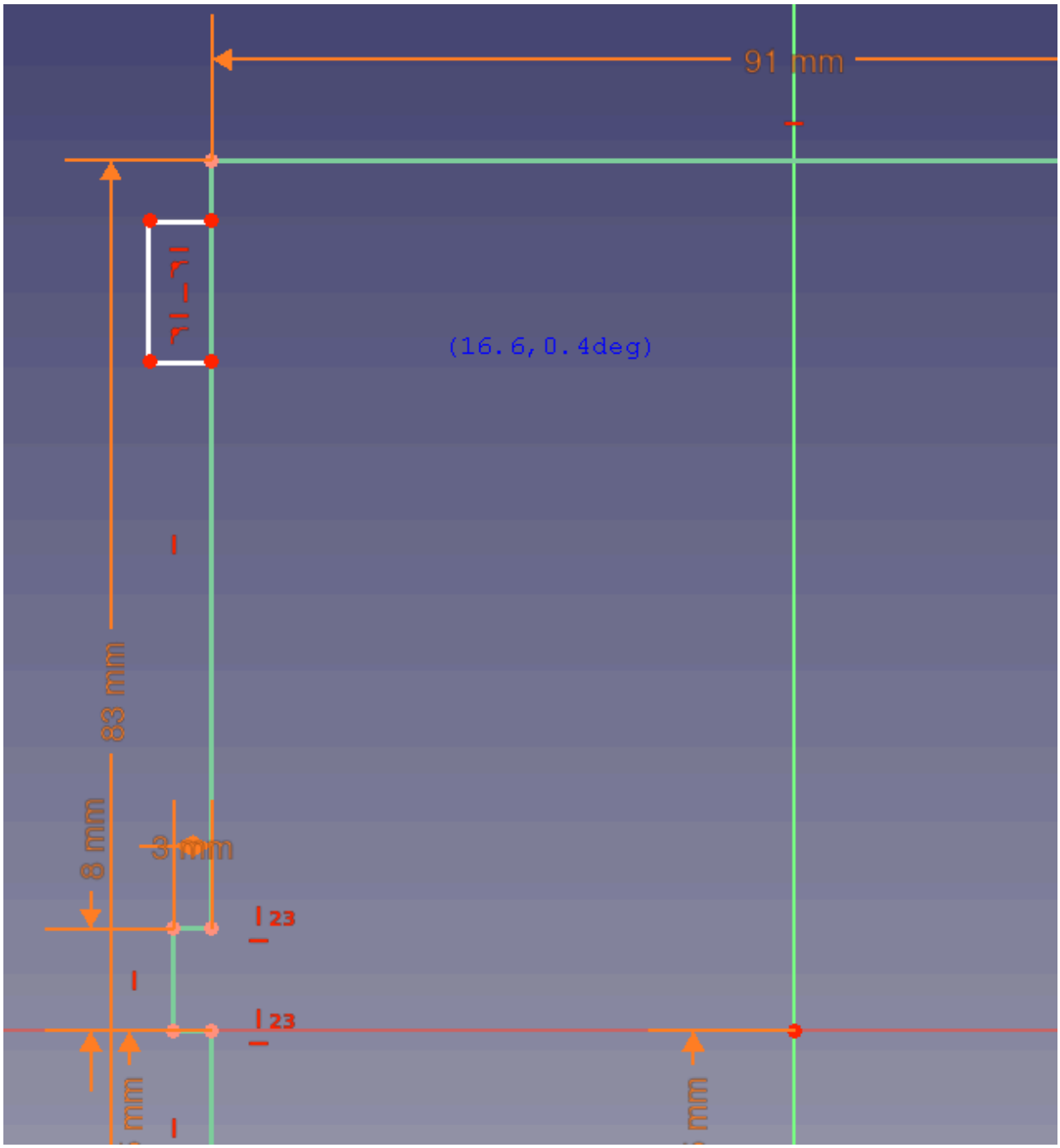
Then make the two corner points vertical under each other as well.



At this point your sketch will be nicely constrained.



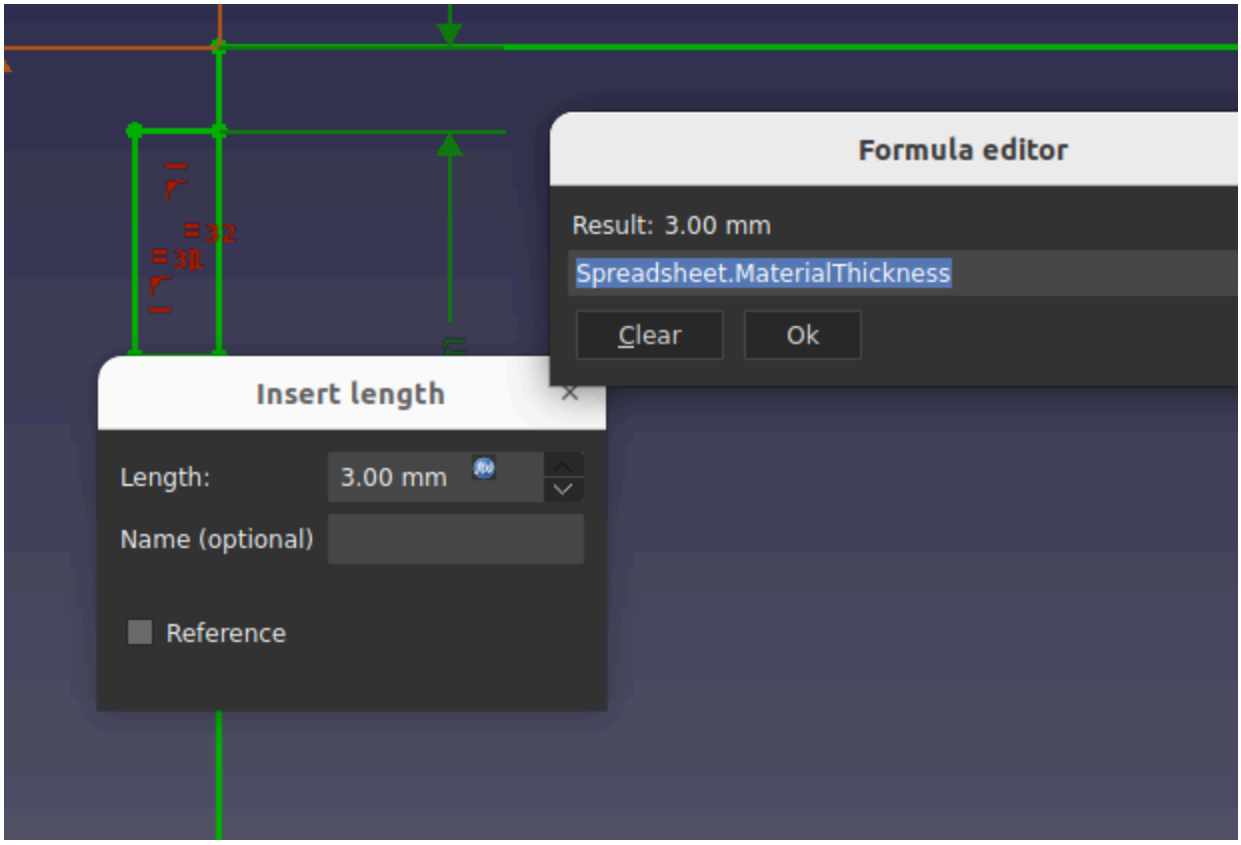
Lets rough in another tab on the top left corner.



Can you think of more than one way to constrain this tab? Consider the following constraints:

- Equality
- Vertical
- …or using an Alias

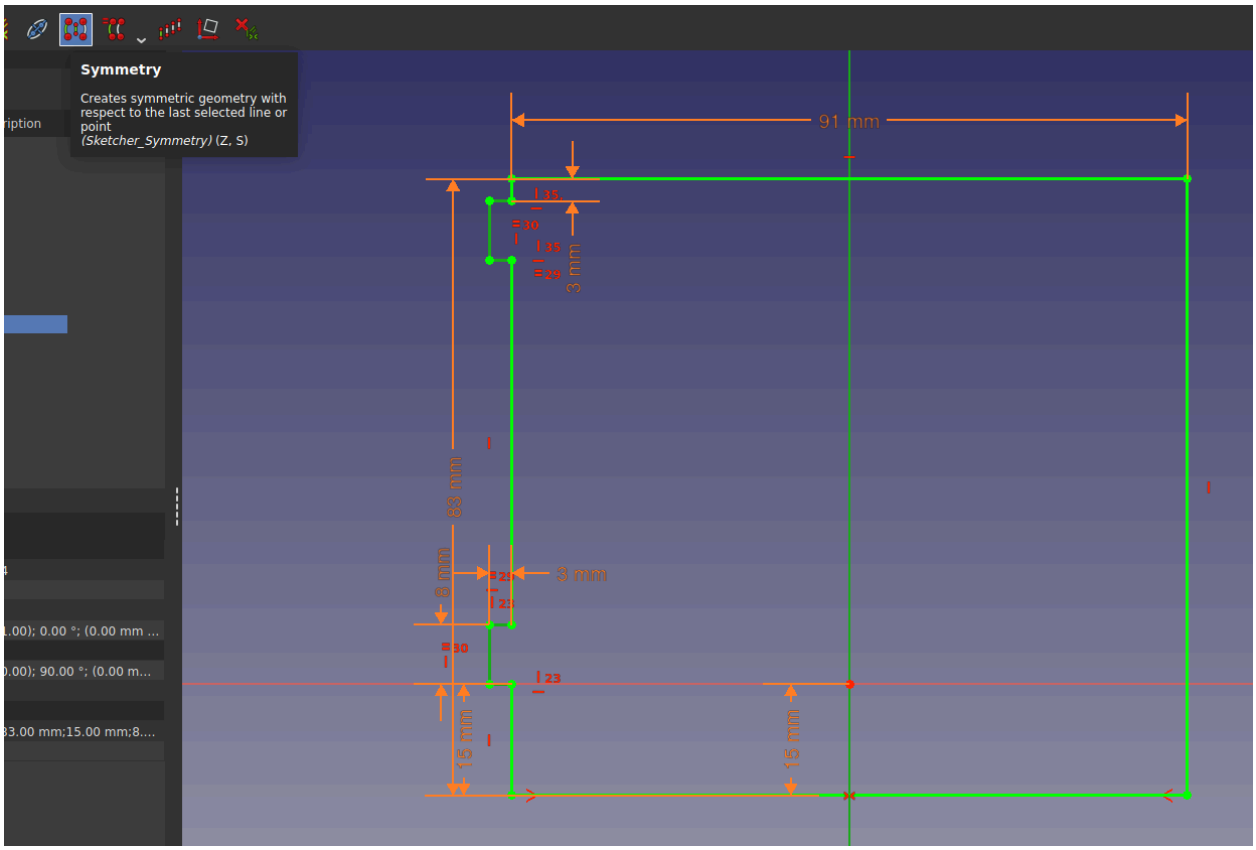
Use the material thickness alias to position the tab from the top.



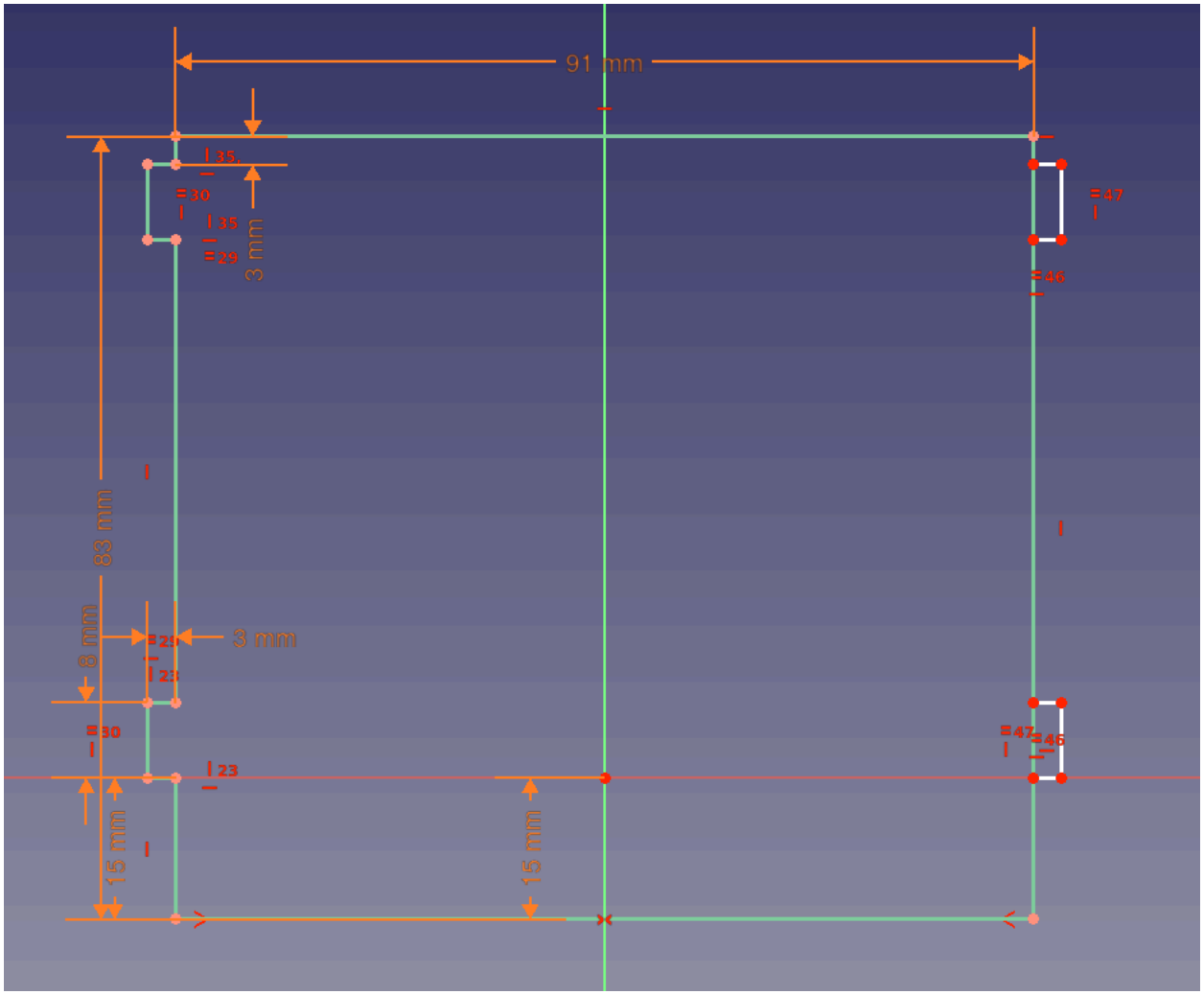
Trim out the extra geometry and be sure to set the corresponding line segments to vertical to create a fully constrained sketch.

Using Sketch Symetry

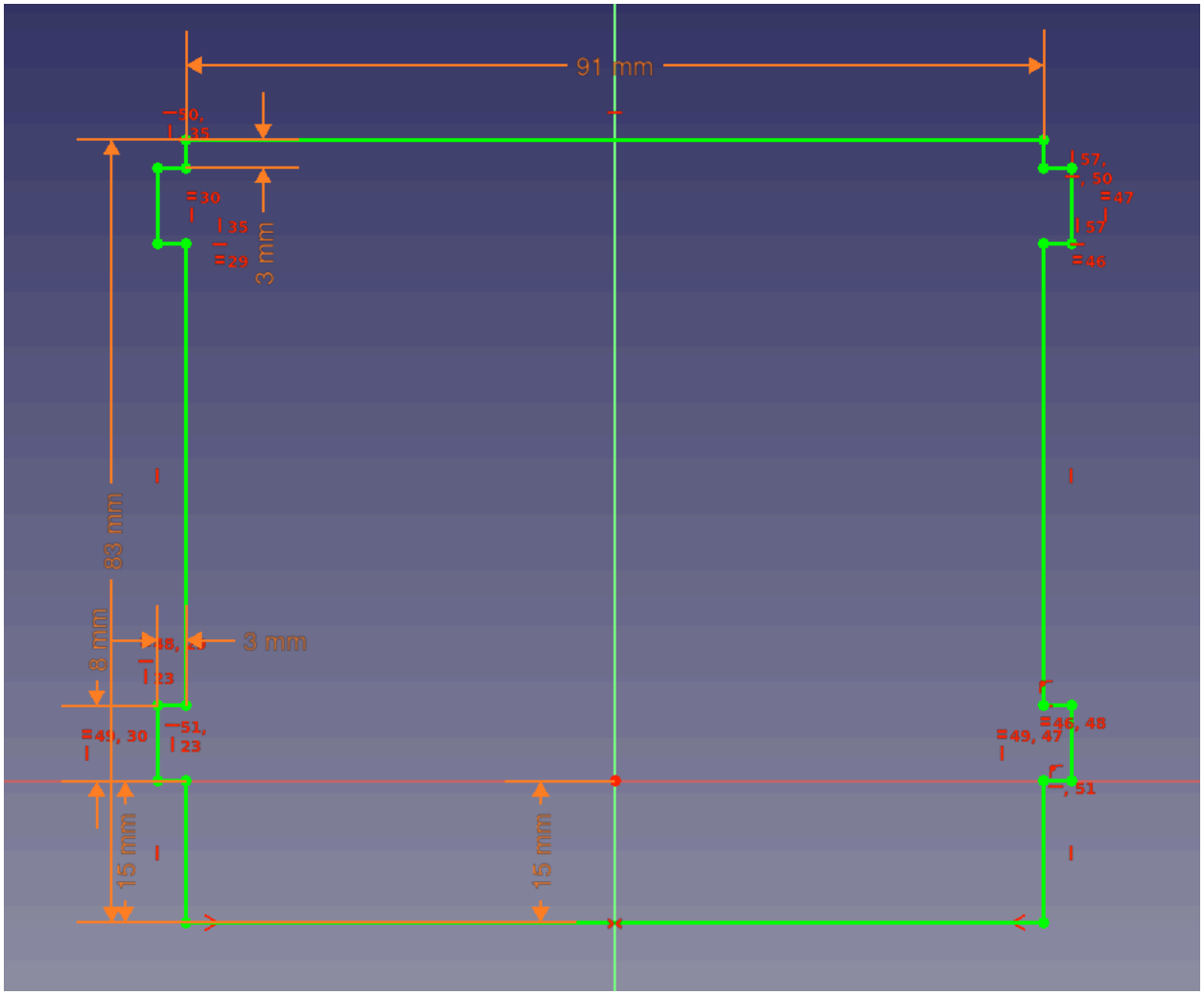
Select all the geometry of our tabs, then lastly select the center axis. The sketch symmetry tool lets us mirror geometry. Order matters here, we want to select the feature to use as the axis of our mirror operation LAST.



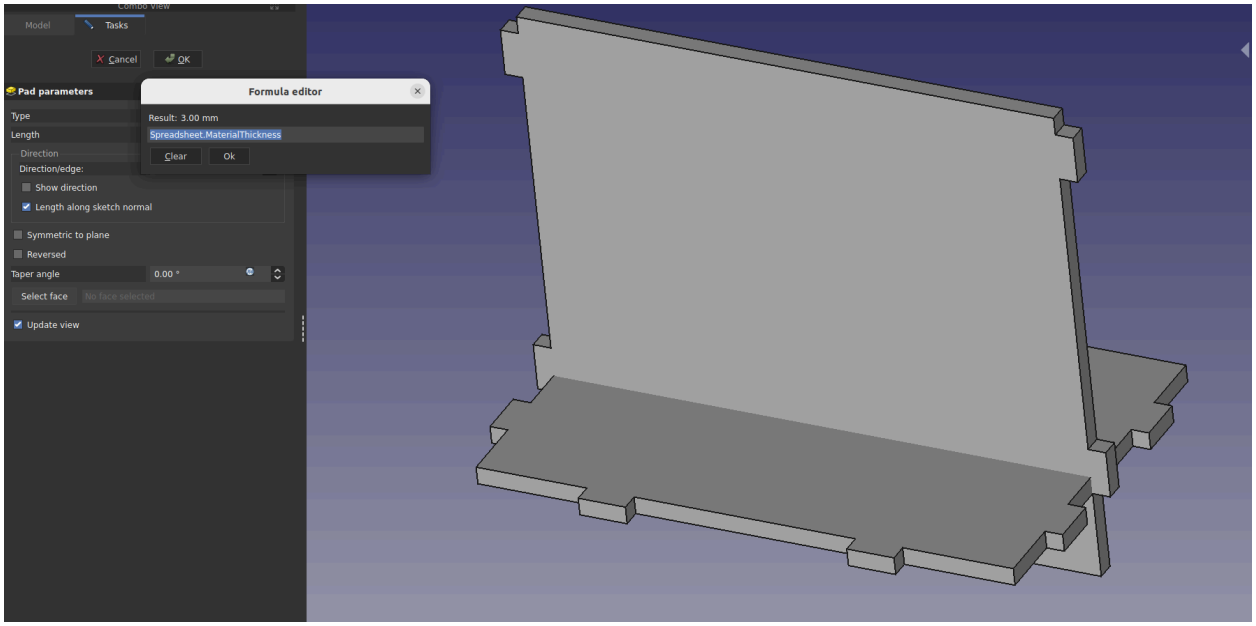
The result will create a copy of the geometry mirrored around the z axis, but will not copy any of the constraints.



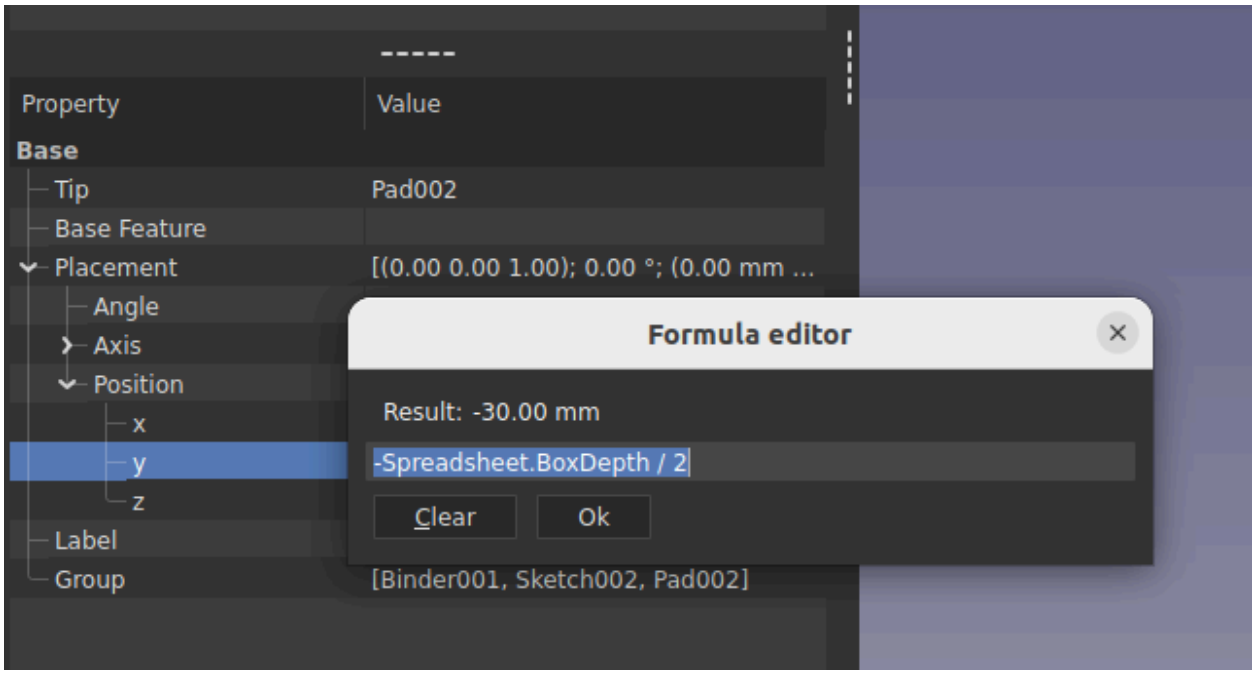
Can you constrain the sketch by locking down the newly created tabs?



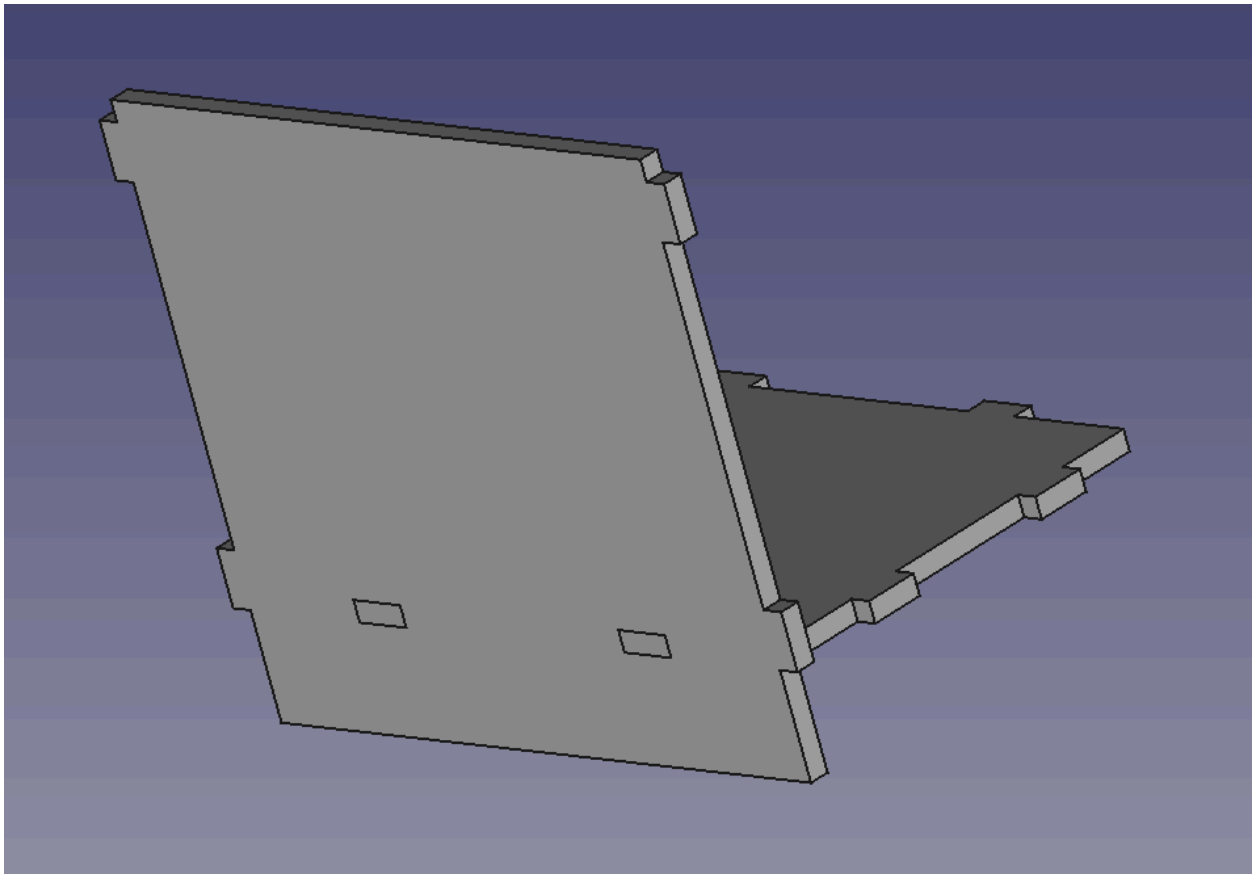
When your sketch is complete, close out of it and pad the body.



Now we can position the new body by bringing it forward in the Y direction. However let's position it dynamically using a formula, so that it will stay correctly positioned.



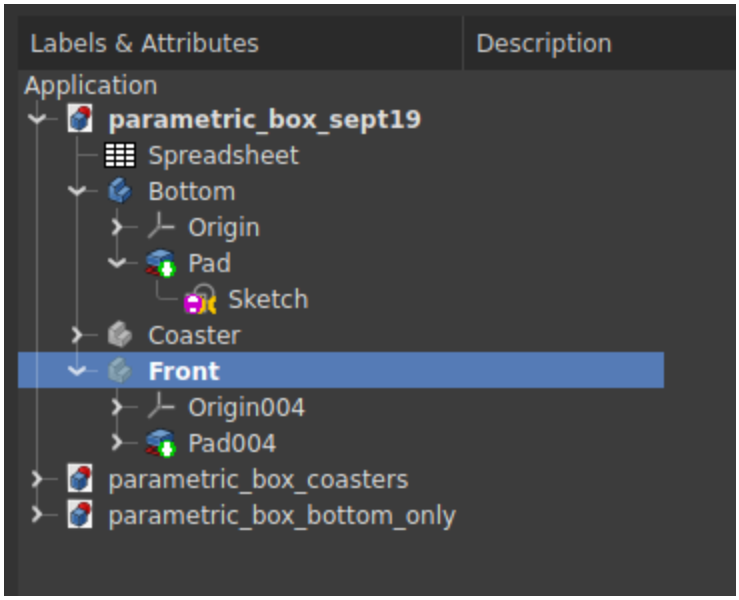
The resulting body will be perfectly positioned so that it is flush with the faces of the tabs from the bottom part.



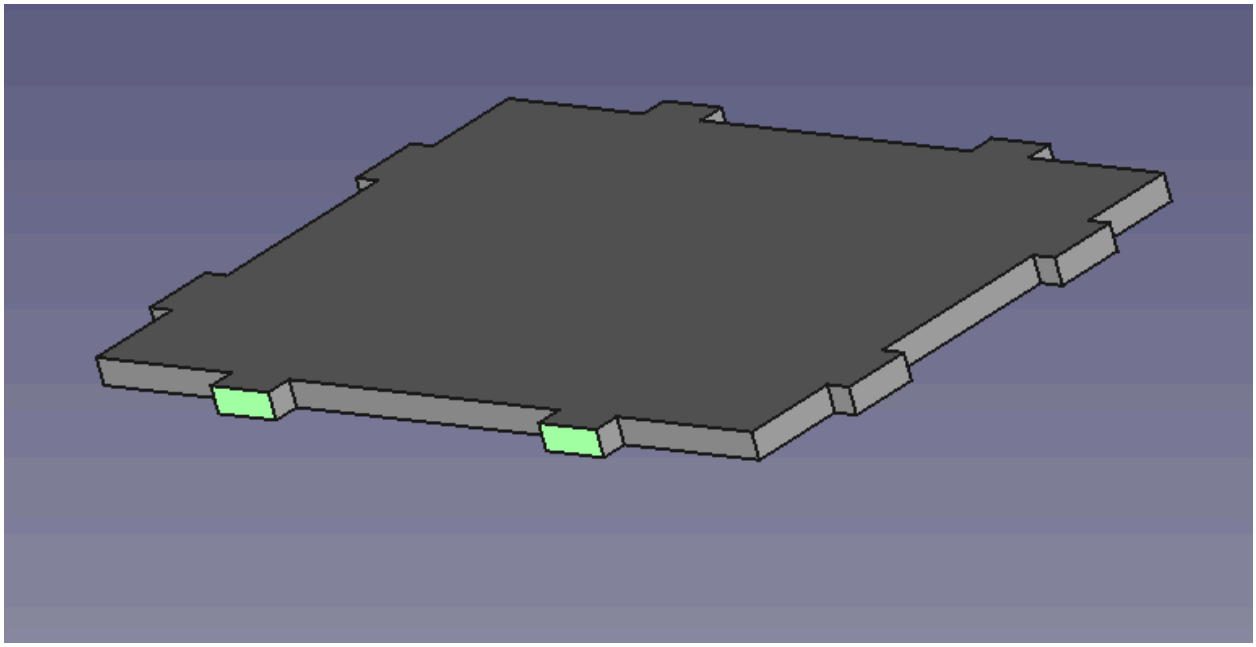
Cutting out the slots:

We will use a reference to the tabs from the bottom part for cutting out the slots in the side part. To do it we will learn about the sub-object shape binder.

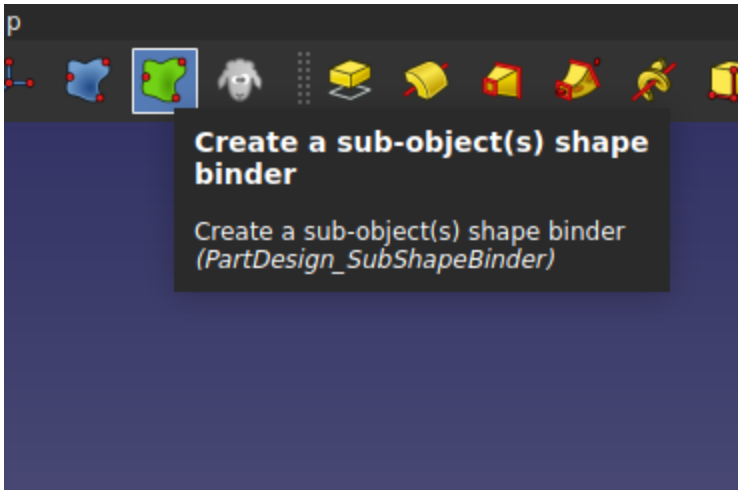
Being sure the front part is active, we will hide it so that we can select faces fro the bottom part.



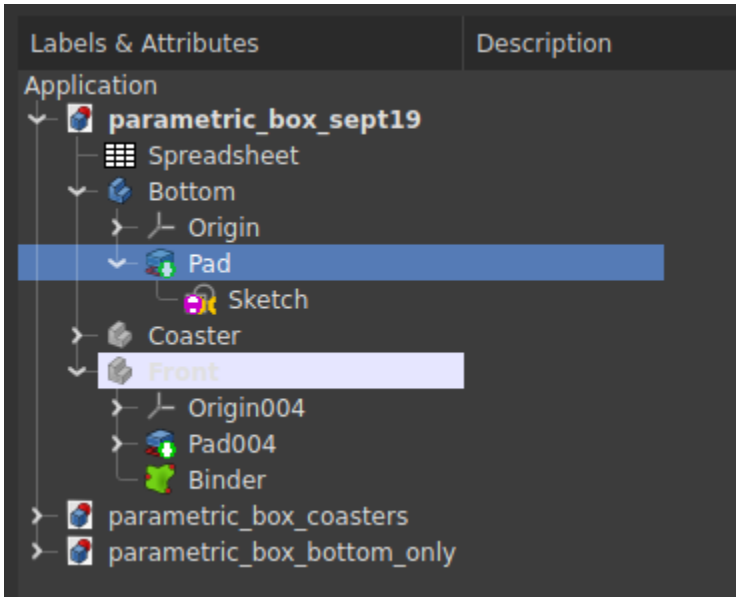
We select the faces of the tabs:



And we use the sub-object shapebinder button.

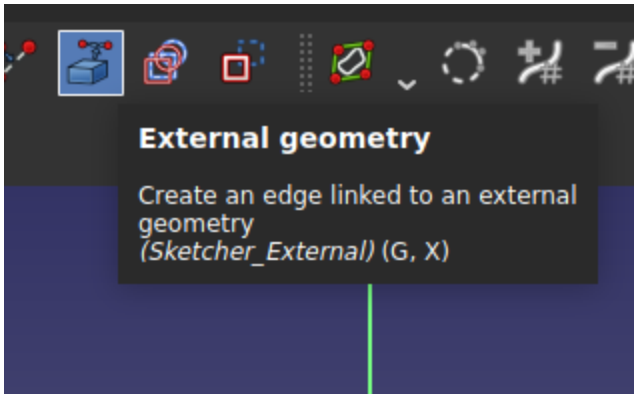


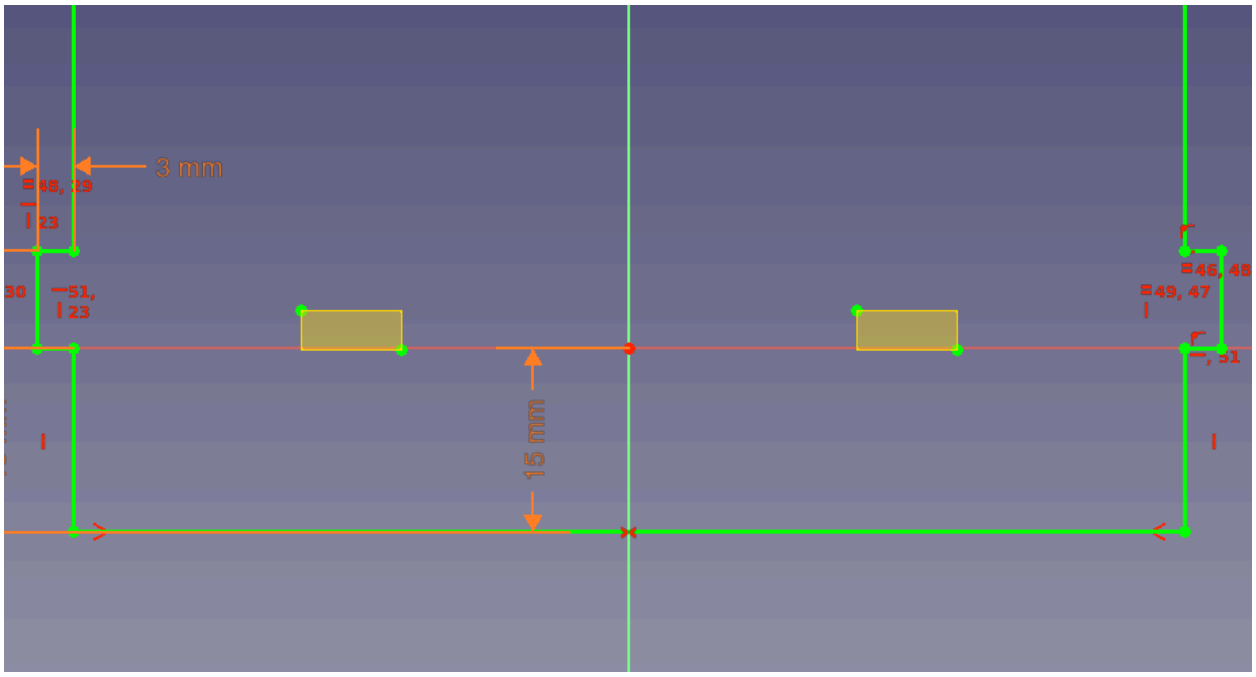
The resulting shapebinder is created in the active body.



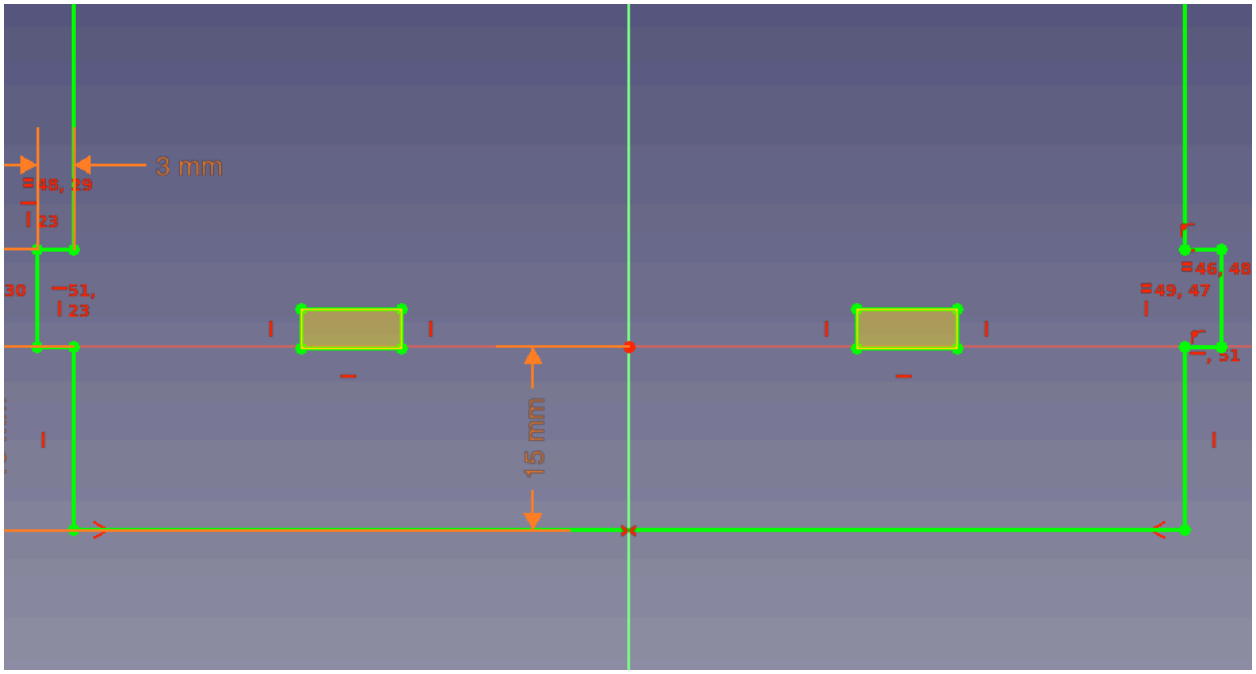
This can now be used to cut out the slots by going back into our sketch for the front part.

In our sketch, use the External Geometry tool to select the corners of our newly created facebinder.

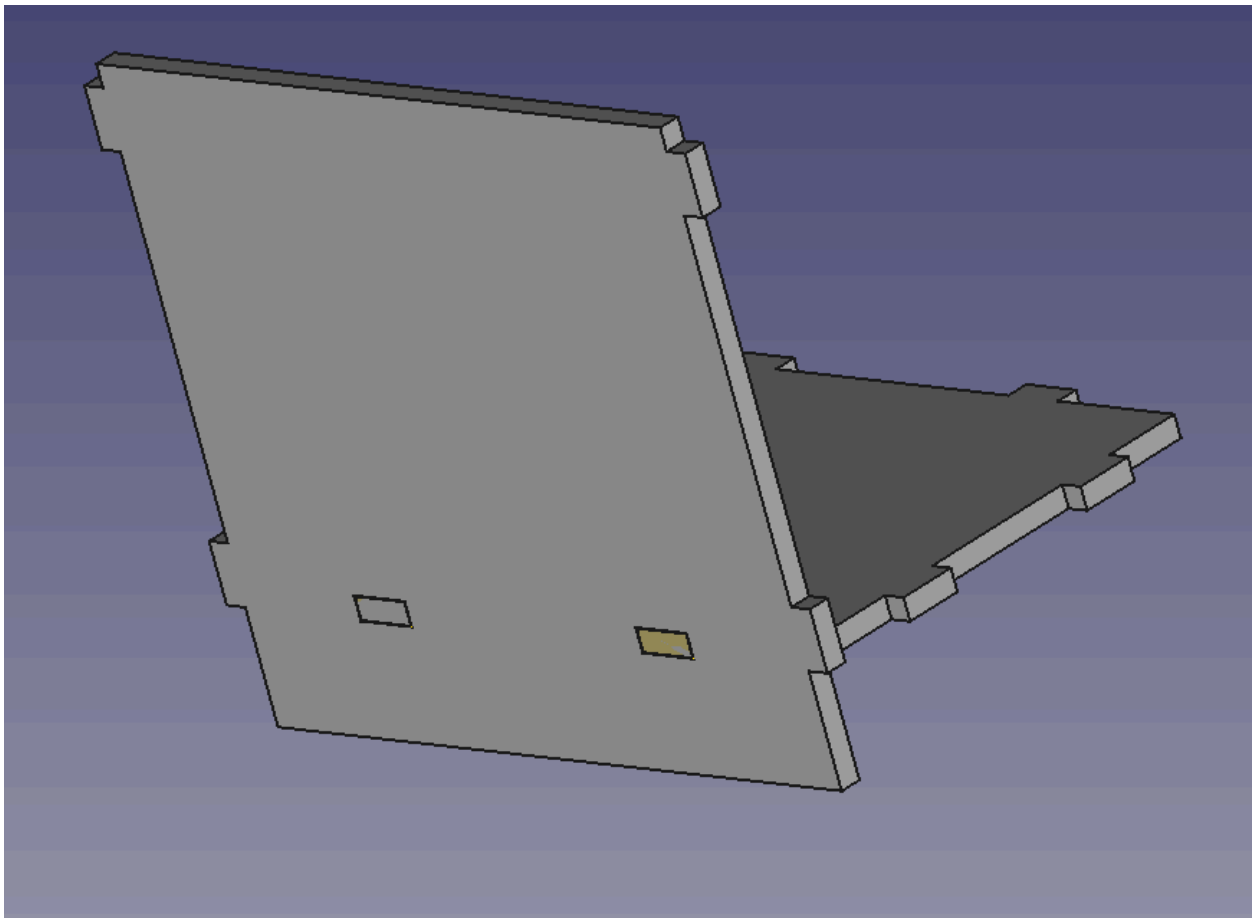




And cut them out using the rectangle tool.



That’s all there is to it! The slots will correspond perfectly with the tabs.



Making the Third Part

Creating the last part is even easier, since you can make facebinders for all the tabs that need to get created.