

LASER CUTTING BEST PRACTICES

revised 03-16-2018 by Professor J.Love

This document has been written to support students who will be using the Snell Library's Epilog Zing 30 Watt laser cutter in the 3D Printing Studio on the 2nd floor. Go to <http://library.northeastern.edu/services/3d-printing-studio> for hours, pricing and more information.



As of Spring 2018 semester, laser cutting costs \$5 for up to 3 minutes of operation, then \$1 for each additional minute (most cutting jobs take between 10 – 15 minutes unless there is a lot of engraving detail). Students can pay with Husky dollars or a credit card. The laser cutter is run on a first-come, first-serve basis, provided you bring your own material to cut (acrylic or wood, for example) and your file. **Your file must be either an Illustrator file (.ai), PDF (.pdf) or SVG file.** AutoCAD or SolidWorks files can easily be converted into .pdf files from within their own software but must be converted before you arrive at the 3D Printing Studio.

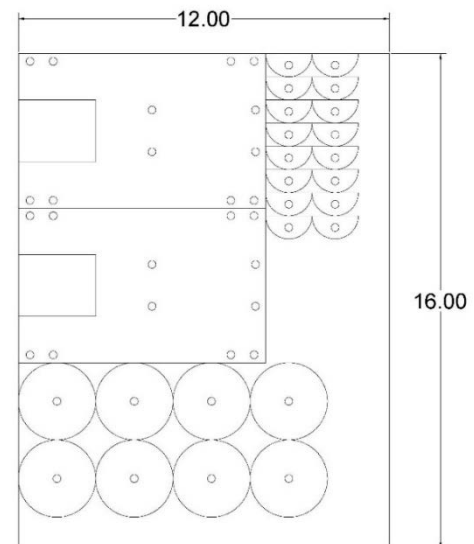
Set your line width to the default line width or 0.001 pt for cutting. Thicker line widths will result in partial cuts or an engraved effect (see next page). For multiple jobs, please make multiple artboards or PDF pages in a single file.

If you have text in an Illustrator file, select the text and go to Type>Create Outlines. This converts the text to vector shapes, and avoids any font changes when the 3D Printing Studio opens your file. If you just want to engrave, a JPEG or PNG also works.

The **maximum cutting area on the laser cutter in the Snell Library is 12 inches by 16 inches** but you should design your project with a 1/8 inch to 1/4 inch border inside your design area.

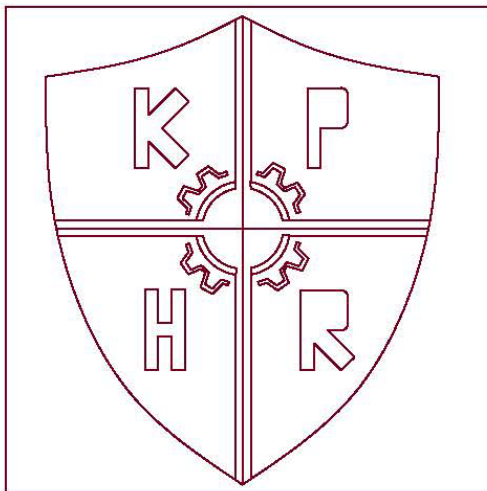
You should draw a 12 inch × 16 inch rectangle (or smaller dimensioned reference object) in your AutoCAD or SolidWorks drawing which will serve as a “reference frame” for the laser cutter operator to be able to properly scale your drawing to 1:1.

1/8 inch (or 3mm) thick wood or acrylic can be laser cut in 1 pass of the laser so this thickness is strongly recommended for most First Year Engineering projects assigned through your course. 1/4 inch thick wood or acrylic requires 2 passes (and therefore costs twice as much to laser cut).



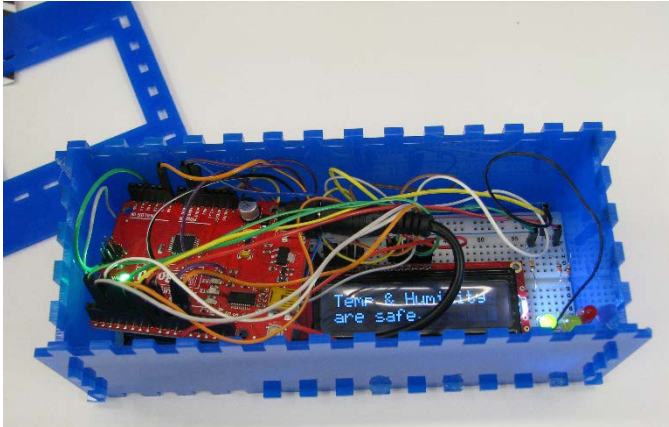
Line Width Specifications

Cutting – set your line width to the default line width in AutoCAD or 0.001 pt for cutting completely through:

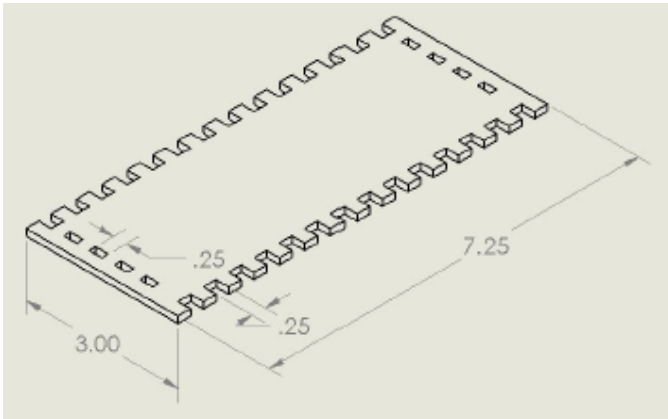


Engraving – set your line width greater than 0.001 pt and shade in (use fill or gradient, not hatch) any areas that you want engraved. Expect that engraving will add to the time and cost:

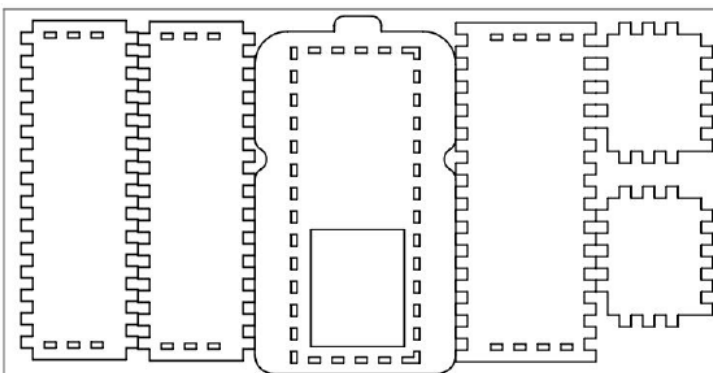
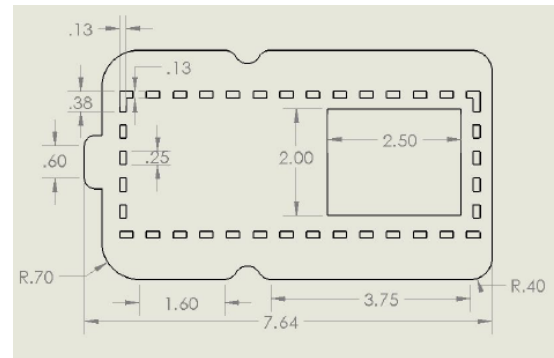
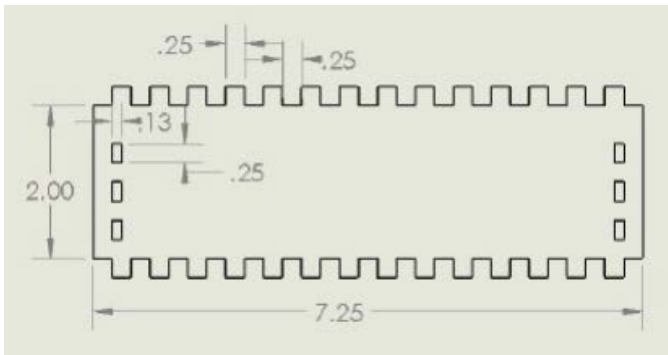
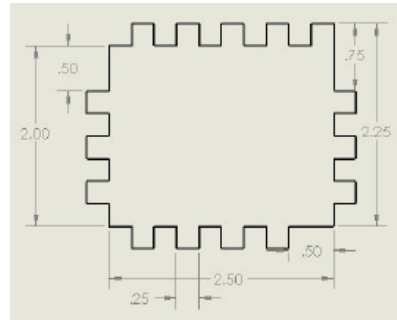




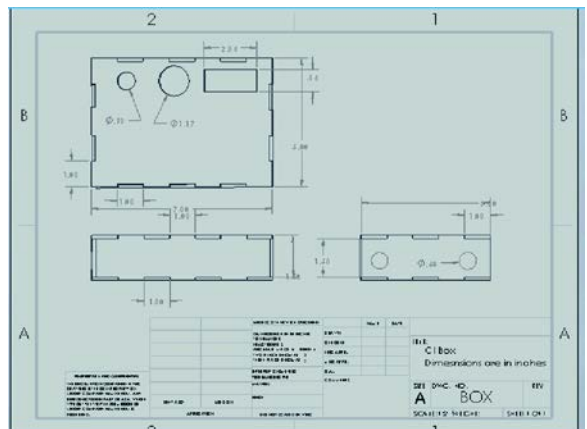
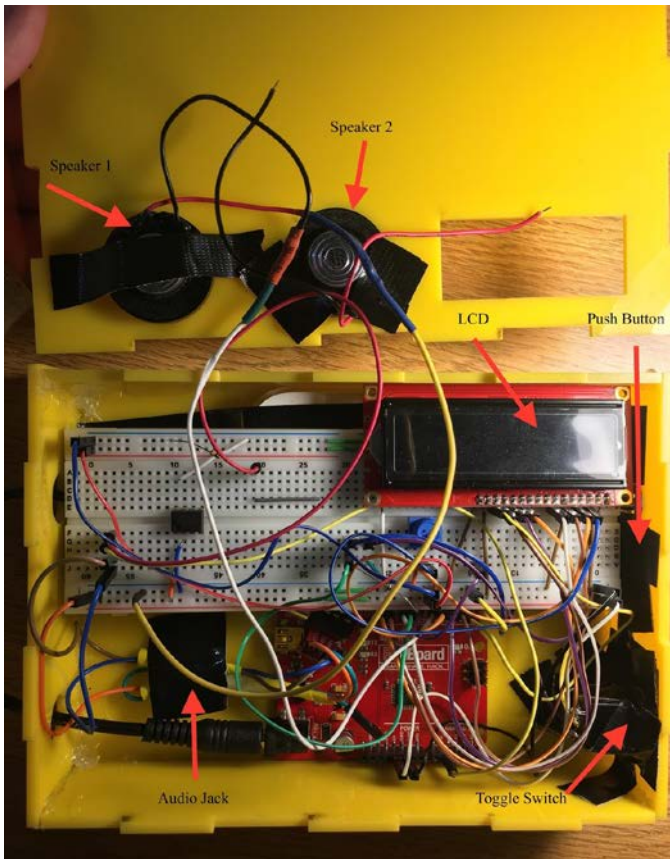
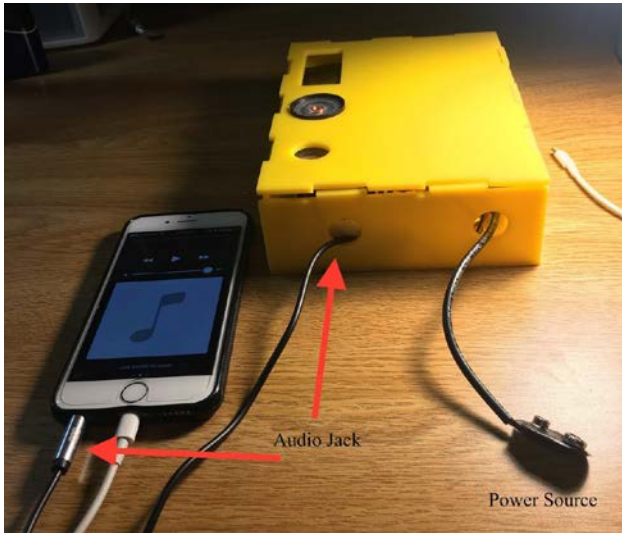
Laser cut cast acrylic box with notching system.



Laser cut base with deep notches (box panels not flush to each other when assembled).



.pdf file for laser cutter (labelled as 8 inches by 15 inches outer perimeter).



INSTRUCTIONS ON HOW TO DESIGN YOUR NOTCHED BOX IN SOLIDWORKS (NEXT PAGE)





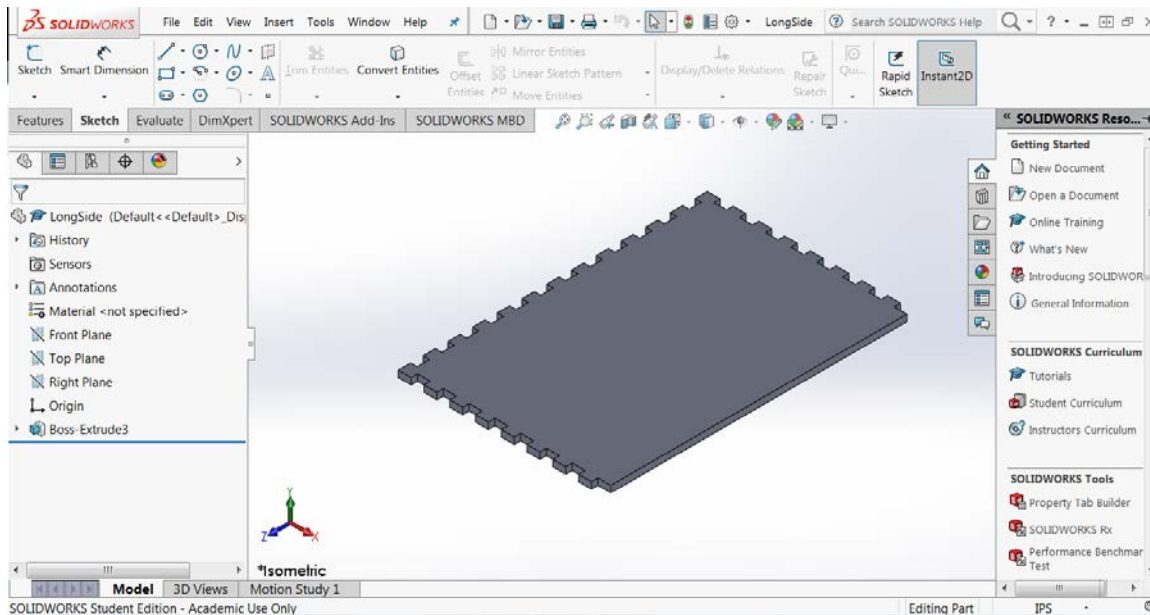
INSTRUCTIONS FOR CREATING A LASER CUTTING TEMPLATE USING SOLIDWORKS:

Example, if you would like to make a notched acrylic box like this to hold your SparkFun electronics:

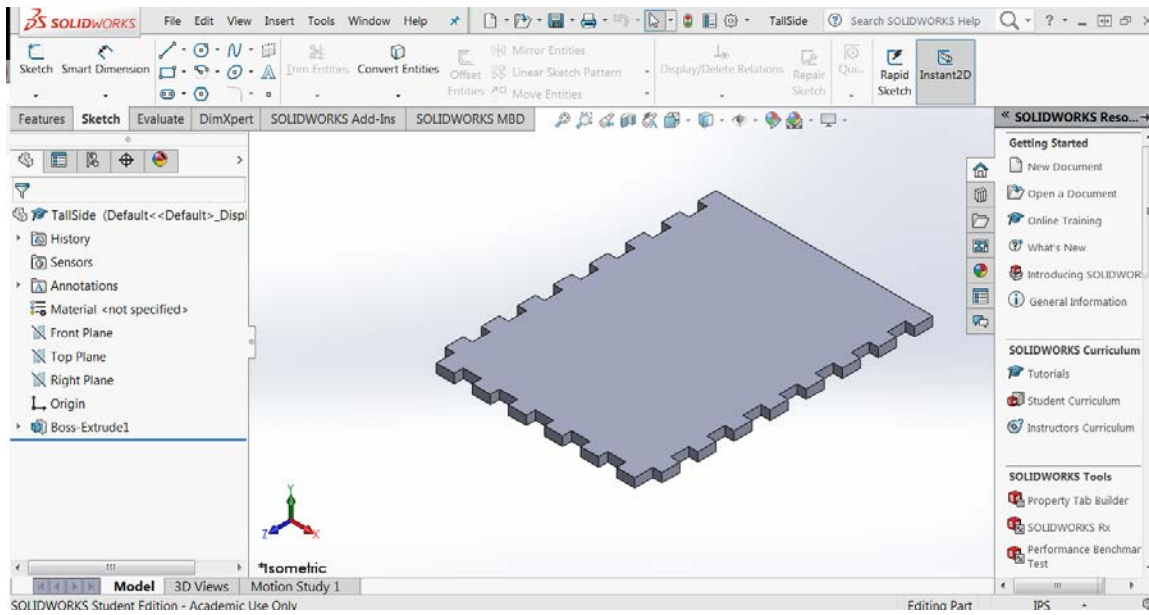


You can design it in SolidWorks like this:

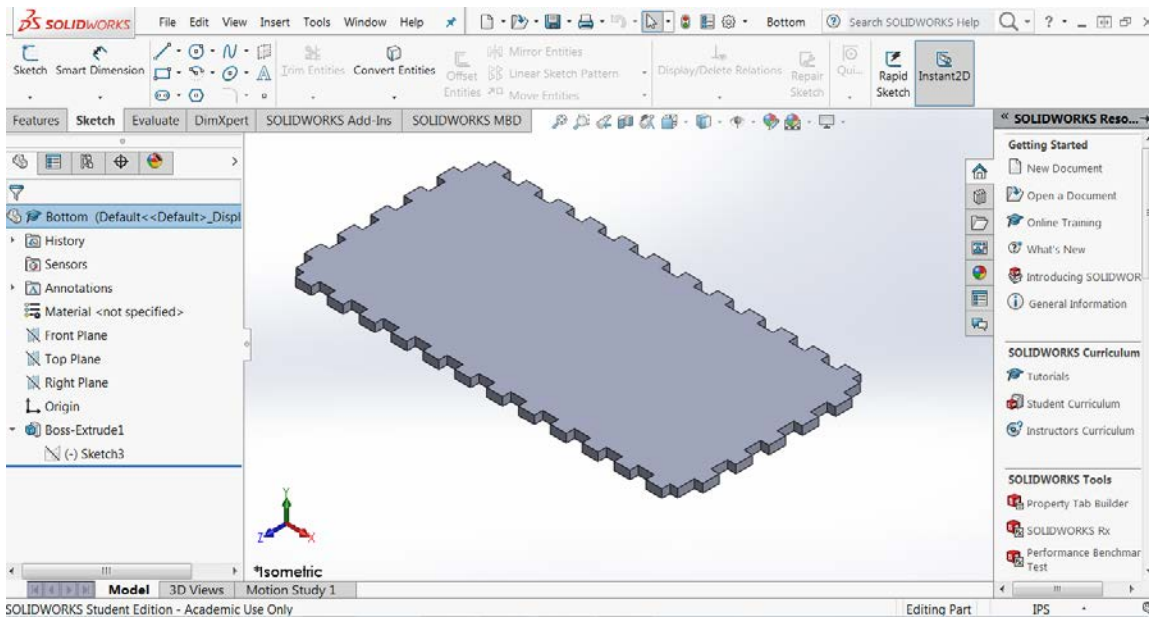
1. Create the SolidWorks part file(s) (1 part per .sldprt file).



Long Side – component #1 (SolidWorks .sldprt)

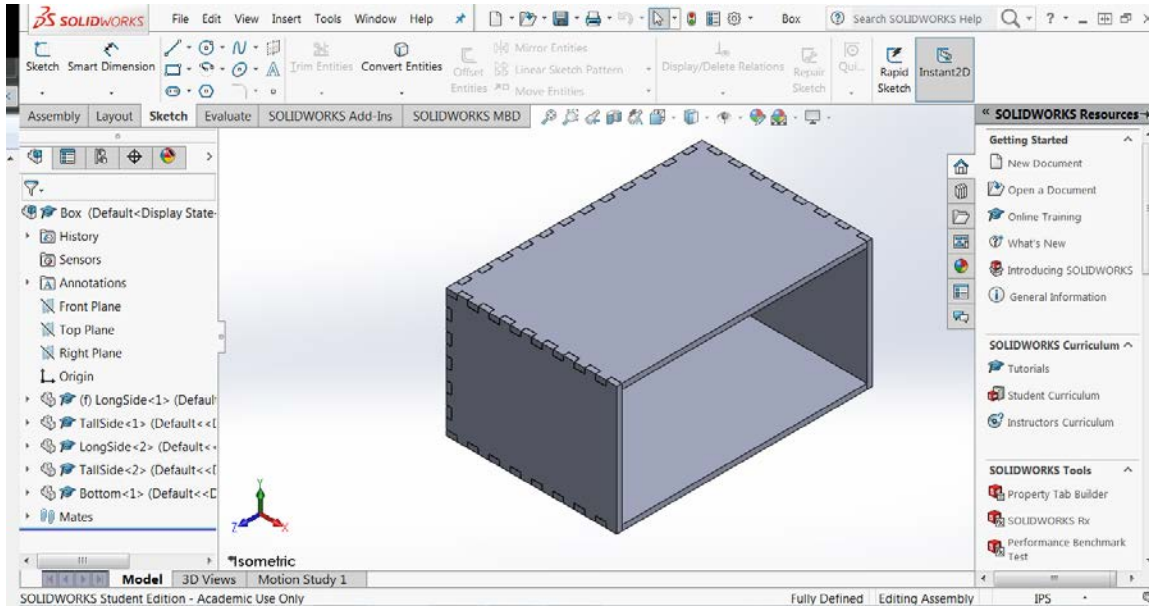


Tall Side – component #2 (SolidWorks .sldprt)



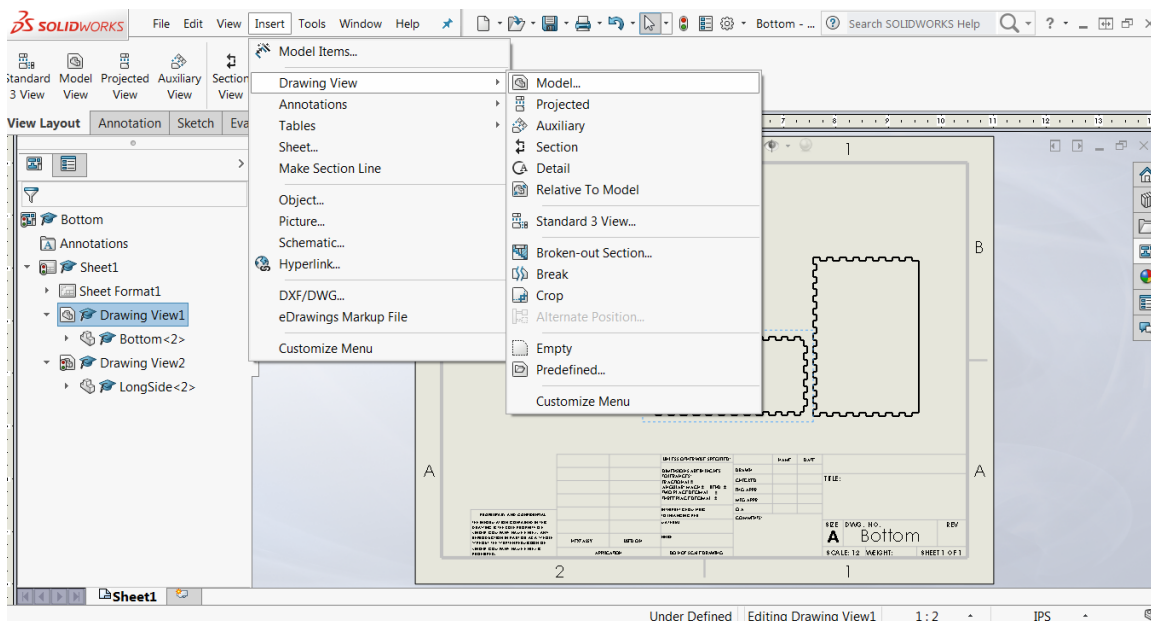
Bottom – component #3 (SolidWorks .sldprt)

2. Create the assembly file using your part files. You can insert duplicate part files. Verify your design and that all parts line up correctly.

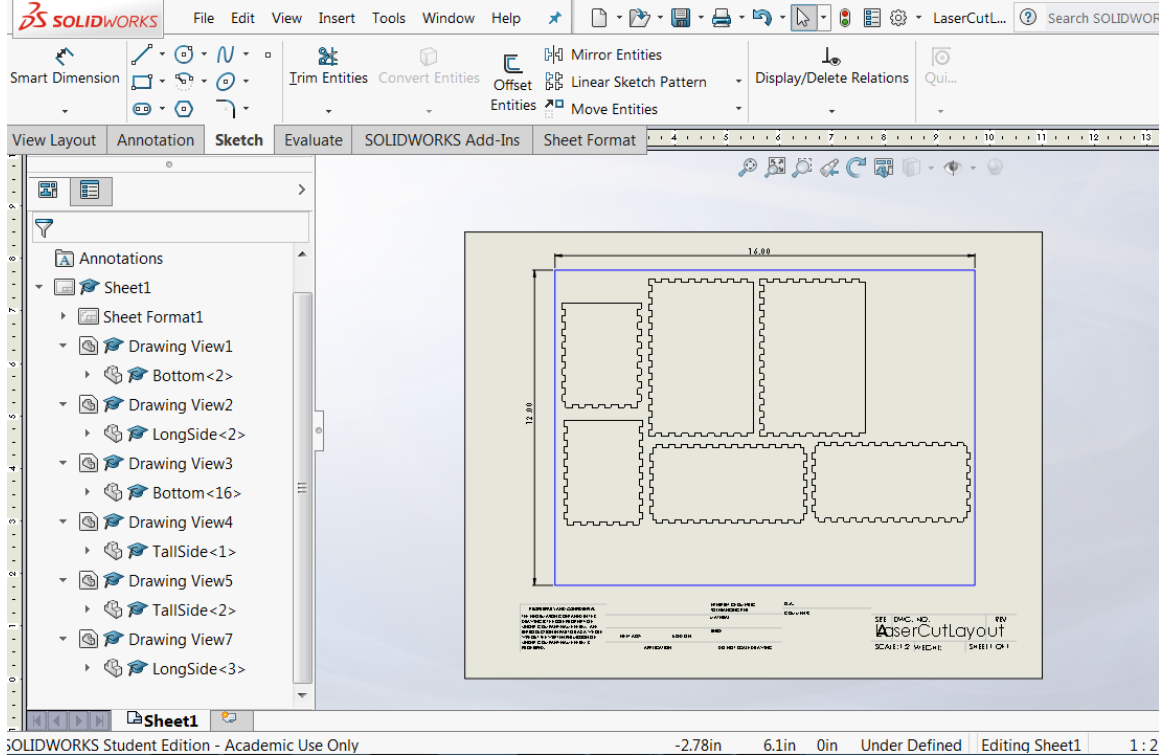


Assembly – insert each part file and mate them together (SolidWorks .sldasm)

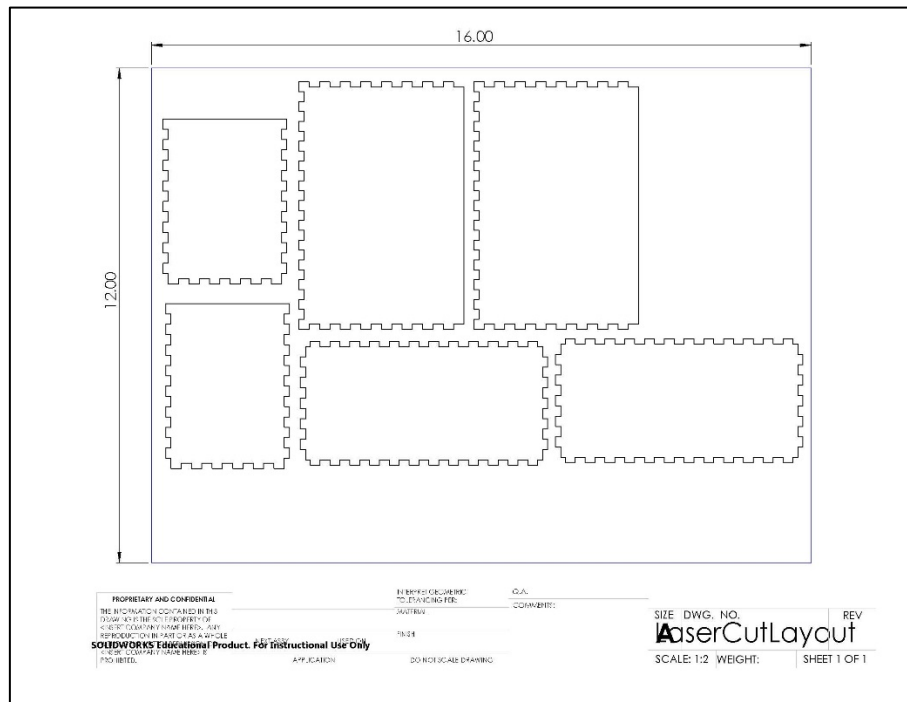
3. Insert each top view of each SolidWorks part file to a SolidWorks drawing file (choose a large enough template to accommodate 12 inches × 16 inches) using the Insert / Drawing View / Model commands (screen shot shown below) and browse for each part file. Each part file and any duplicates will be separate Drawing Views.

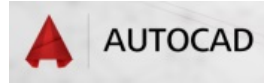


4. Add a sketch with a 12 inch \times 16 inch outer rectangle so the laser cutting technician knows how to accurately scale your drawing 1:1 to create the correct sized parts.



5. Save your SolidWorks drawing file with the laser cutting layout to a .pdf. This is the file you take to the laser cutter in the Snell Library, 2nd floor. The laser cutting technician can delete the title block lines and the 12x16 dimensioned rectangle prior to actual laser cutting.





Instructions for creating a laser cutting AutoCAD template and final pdf file:

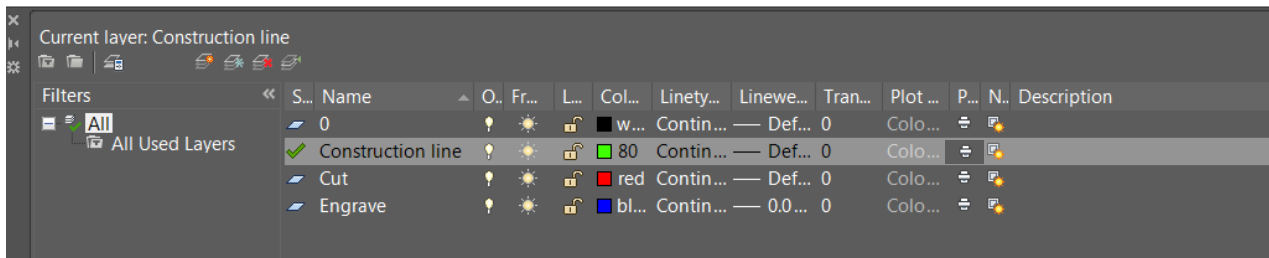
Step 1. Start a new drawing file from “acad.dwt” template.

Step 2. Save it as “**YourName_LaserCutting.dwt**” template.

Step 3. Select the Layer Properties tool from the ribbon to open the Layer Properties Manager window. Add a new layer and name it “Cut”. Specify any color (if desired). Click on Default under Lineweight and select 0.00 mm line weight.

Step 4. Add a new layer and name it “Engrave”. Specify a different color (if desired). Click on Default under Lineweight and select 0.05 mm line weight.

Step 5. Add a new layer and name it “Construction layer” (any color).



Step 6. Make sure the units are set to inches and precision to 0.000.

Step 7. In the command line, type “limits”, hit enter and follow the directions. Enter 0,0 for the left corner, 16,12 for the right corner. We just specified the maximum cutting area for the machine. Type zoom and select all to see the maximum limits.

Step 8. Go to grid setting and turn off the grid beyond the limit.

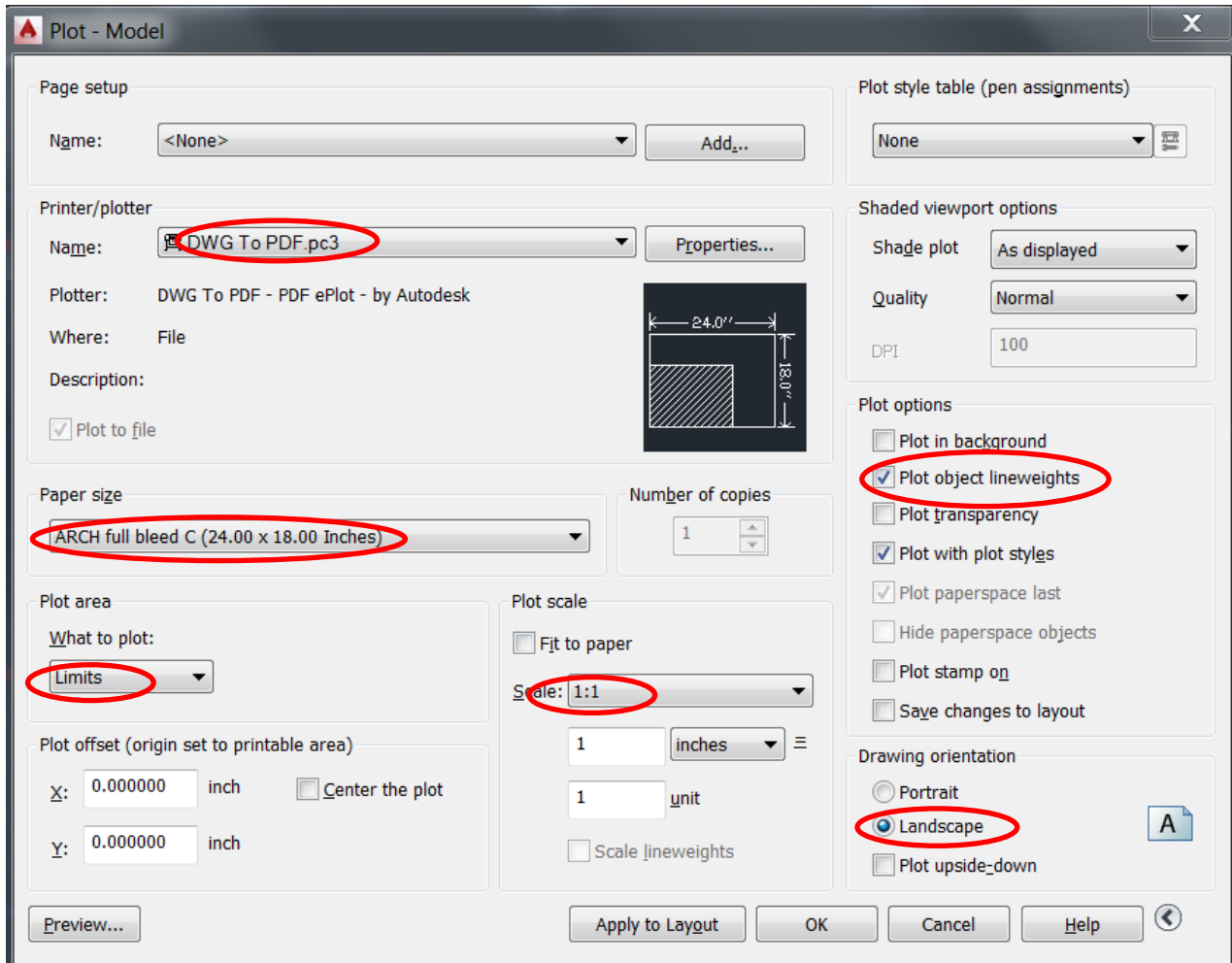
Step 9. Using the construction line, draw a 16 inch × 12 inch rectangle in your AutoCAD drawing which will serve as a “reference frame” for the laser cutter operator to be able to properly scale your drawing to 1:1. Use your construction line layer to draw the reference frame.

Step 10. Save the template created as “Yourname_LaserCutting.dwt”. You can use this template for your future laser cutting projects.

Step 11. Start a new drawing file from the template created before and sketch your design according to the specifications/constraints mentioned before in one of the corners.

Step 12. Add one dimension line (using your construction line layer) to your sketch to help the laser cutter operator verify your drawing scale.

Step 12. To embed your layers (colors and line width) to your pdf. Plot your drawings created (Ctrl+P) and fill out the printer name, Paper size, what to plot, plot scale, plot options and drawing orientation according to the following figure. (**Print to scale!**).



Step 13. Take the pdf (in a flash drive) and your material to the Digital Media Common (DMC) for laser cutting.