# Using the Laser Cutter and AutoCAD Template

This tutorial outlines the best way to cut and etch using the laser cutter. Your project is important to you, and you want to finish it efficiently. Using this tutorial will increase your efficiency and decrease your material cost and time. If you can quickly use the laser cutter with few mistakes, then you will spend less time working and more people can use the laser cutter. If you do not know how to use AutoCAD, Rhino, or some other program that produces vector line work, ask another student, professor, or refer to the AutoCAD Command Help document found on the woodshop website for help. The laser cutter technician can help you cut materials, but will **not** teach AutoCAD or appropriate file layout.

Using the AutoCAD Template

This tutorial includes an AutoCAD template as a guide to formatting your files. The template has preset layers, associated colors, and line widths. Copy the objects you wish to cut and/or etch into the template. The image below shows how to set up layers in AutoCAD.
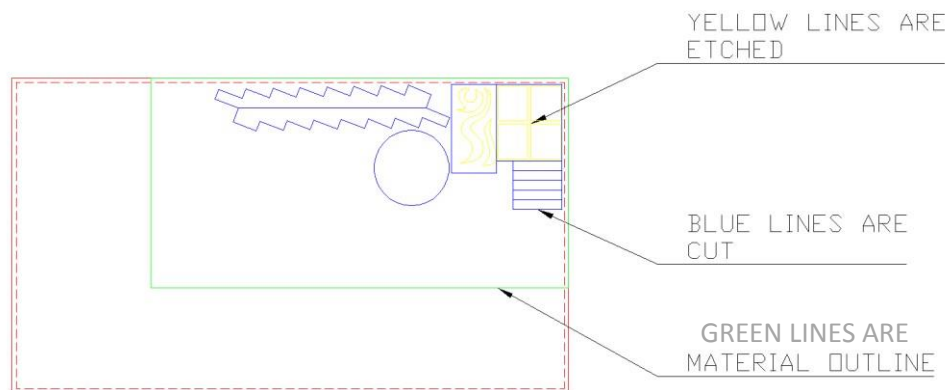
The template has multiple cutting and etching layers. Use blue for the primary cut color and use yellow for the primary etch color. The image below shows which colors the laser cutter associates with each action. All of these layers are set up on the Template file.

Allowing for Margins and Boundaries

Before cutting:

- • Make sure you have a ¼" margin around your material
- • Place etching on a separate layer
- • Format so you can cut details and holes before cutting the final object

Your layout can dramatically improve the efficiency of laser cutting. You need to layout your files before you try to cut. Because technicians cannot help you format your file you will have to leave to reformat it. The following images and descriptions will help you determine how to create an efficient layout that will use the least material and make the fewest cuts.

The laser cutter has a 32" x 18"bed and a margin of ¼" around all margins. Just like printing with paper include the ¼" margin in your file.
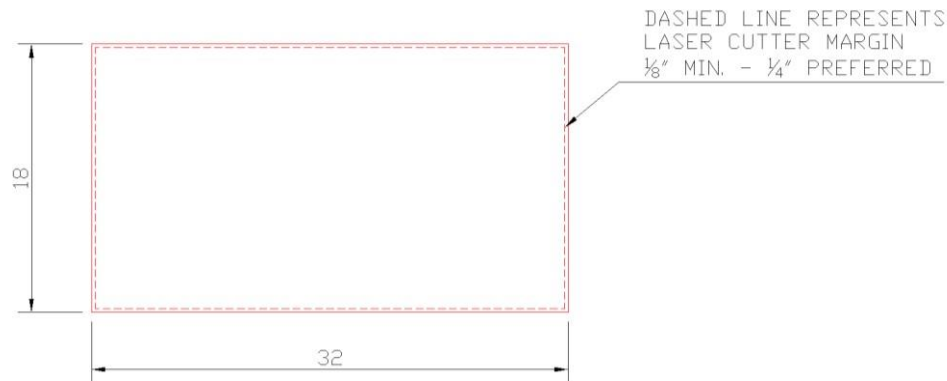
 If you want to cut material that does not completely fill the laser cutter bed create a boundary to represent the size of the available material. Put this boundary on the "02Material Outline" Layer (GREEN). With material like 24" x 4" Balsa and Basswood strips remember not to place your objects to the extreme edges. Leave a ¼" margin.
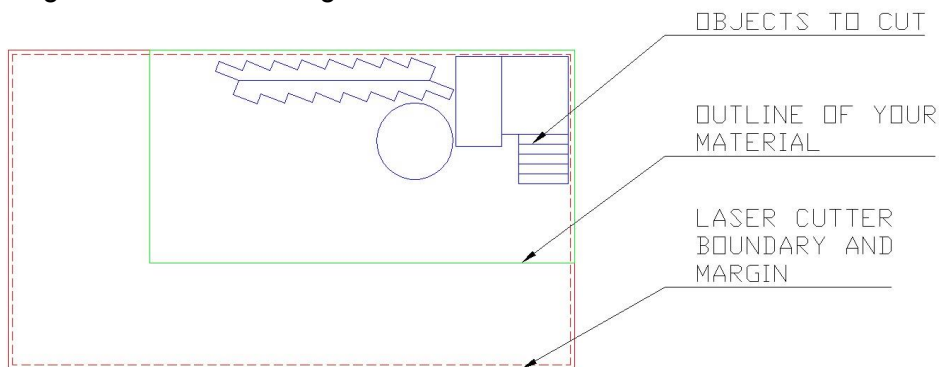

How you layout the object will make a difference in how much material you use and the time it takes to cut. In many cases, you can reduce the number of cuts by almost half if you lay things out correctly. The images below show how to do this. If you have overlapping or double lines, the laser cutter will cut **each** line; cutting a line twice may result in burning the material.

FAIL

EPIC FAIL

CORRECT
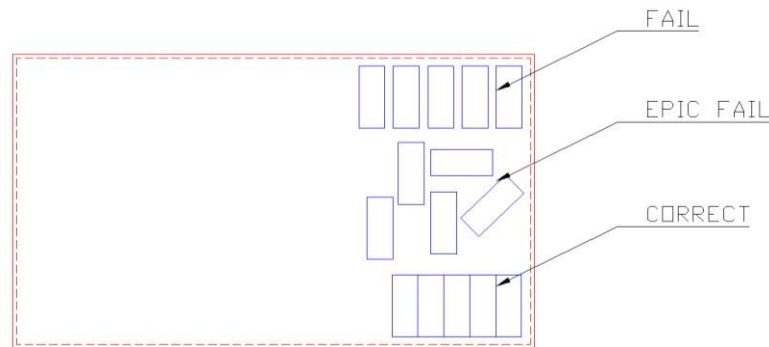
To delete overlapping or double line, you can use the "overkill" command in AutoCAD, but some versions of AutoCAD do not know this command. Be careful and thoughtful to decrease your number of overlapping lines. If you determine that you will need to cut multiple sheets or you have multiple materials, please do not have a separate file for each sheet or each material. Use the following instruction to find out how much material you will need. We recommend bringing extra material in case of mistakes.

1. Use one of the boundaries that represent the laser cutter table (There are four on the template file just in case you need more than one.)
2. Fill it with objects to cut or etch
3. Repeat until you have accommodated all objects.

CORRECT - INSIDE MARGIN

FAIL - OUTSIDE MARGIN

EPIC FAIL - NOT LAID OUT
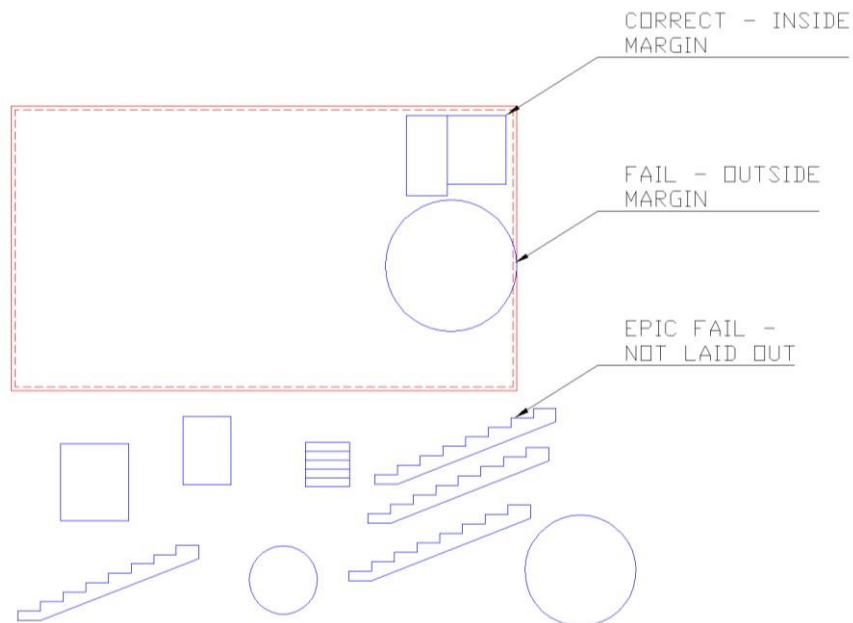
Changing Etch and Cut Order

The template uses multiple cutting and etching layers, and the laser cutter uses a color based hierarchy to decide what to cut first. Use the color codes to make sure you cut your objects in the correct order. The code allows you to cut holes or smaller portions before you cut out the main object. Put the object on the last cut layer. The laser cutter does not automatically cut in a logical order. If you cut the main piece first the force of the exhaust fan may shift the entire project and place the next cuts in the wrong place. The image below shows how to set you cut layers to cut smaller holes before the main object.

REFER TO LASER CUTTER COLOR HIERARCHY   CUT HOLES FIRST

THEN CUT MAIN
OBJECT

MATERIAL OUTLINE
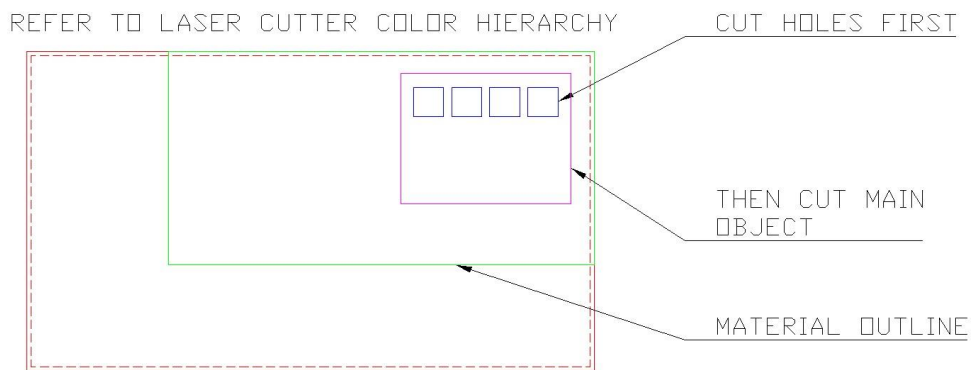
If you need to etch lines with different depths then you would need to put each etch depth on a different layer. If you only have one cut or etch use blue for the cut layer and yellow for the etch layer. The image below shows the color hierarchy used by laser cutters, and the order that it process lines and curves. Black goes first and orange last. **Do not** use black as a cutting, etching, or raster layer.

Color	Mode	Power	Speed	PPI	Z-Axis
● Black	Rast/Vect	100.0%	100%	500	Off
● Red	Rast/Vect	50.0%	100%	500	Off
● Green	Rast/Vect	50.0%	100%	500	Off
● Yellow	Rast/Vect	50.0%	100%	500	Off
● Blue	Rast/Vect	50.0%	100%	500	Off
● Magenta	Rast/Vect	50.0%	100%	500	Off
● Cyan	Rast/Vect	50.0%	100%	500	Off
● Orange	Rast/Vect	50.0%	100%	500	Off