

Welcome to the Laser Cutter tutorial!!!

There are now two laser cutters available to you; the V-460 has a bed size of 18"x24" and the X-660 which has a bed size of 18"x32". The laser cutters can do many things, like cut and engrave (or score).

For more information on approved materials the laser cutters can cut and score please refer to the "Laser Resources – Materials and Suppliers" document. General safety information is contained in the "Laser Resources – Materials and Safety" document.

This tutorial covers using AutoCAD to print to the laser cutters. There will soon be more tutorials for advanced techniques and the use of other programs that will allow raster engraving, like Photoshop.

The last section of the tutorial covers common problems and their solutions.

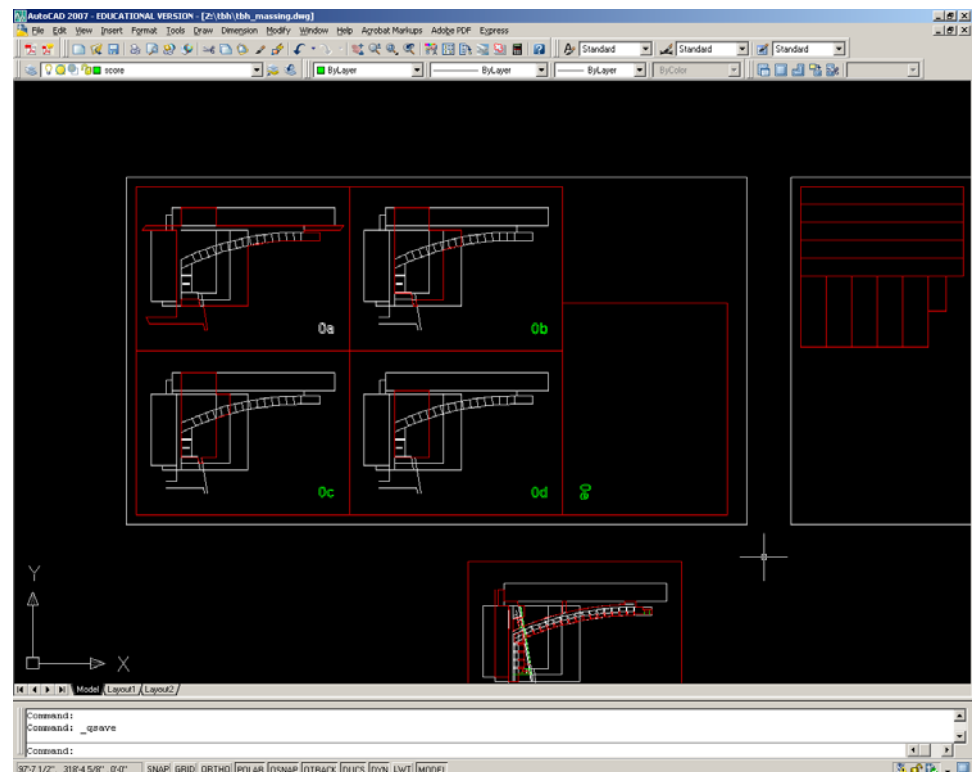
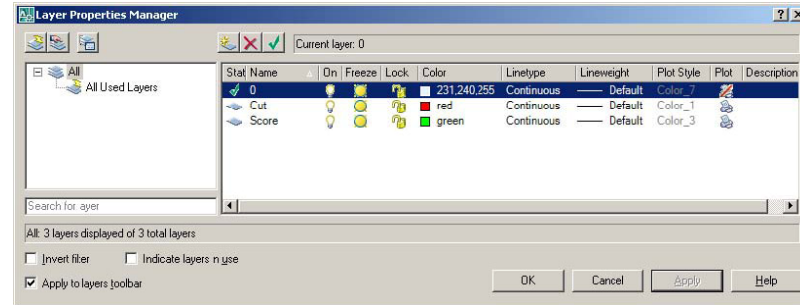


Creating Your File

The first few steps of this tutorial involve setting up your AutoCAD file and these steps must be completed on your own. **Time is precious and this should not wait until you are logged onto the TBH 20 computers.**

The laser cutter assigns a power and speed settings (determining whether objects are cut or scored) by color. If you are creating a new file, we recommend making two new layers for ease of management, named “Cut” and “Score”, and assigning colors to those layers. The settings that have been created for the laser plotters are this; The “Cut” color is RED (index color 1) and the “Score” color is GREEN (index color 3).

Place the lines you wish to cut your material with on the cut layer (red), and likewise with the lines you want scored on the score layer (green).



Preparing your AutoCAD files

Creating a material template

- To make sure all your cutting will fit on your material you might want to make a template of the laser cutter bed.

For example if you are cutting at 1"=64', create a rectangle that is 18"x24" (V-460) or 18"x32" (X-660) (with an offset interior edge of 1/4") then select both those rectangles and scale them by 768 (64 [scale] × 12 [amount to get it to the correct inches]).

Or

You could scale your drawings to the scale you are going to print. So when it comes time to select the scale, you will select 1:1 in AutoCAD. Then draw a box measuring 18"x24" or 18"x32", make sure everything fits and then...

Remember your printing margins

- Remember, every printer has margins! The Laser cutters are generically 1/4", so when you create your template be sure to offset that margin! Do not expect to use every last bit of your material, and do not expect cuts to line up with the edges of your material. The easiest way to keep track of these is to offset your material template box by the margin amount. This is the quick explanation; if want a more in-depth explanation, see the Advanced Tutorial.

Preparing your AutoCAD files

Creating fast and efficient files

•To make sure the laser cutter goes as fast and efficiently as possible; there are a few things in AutoCAD that you can do to assure a quick and efficient cutting:

- 1- When you have your layers separated, turn off (or lock) your cut layer.
- 2- Type the command “flatten” (this command will take all the geometry and place it on 0 in the Z direction). If you are certain that you have not worked with 3D geometry, skip this step, as this command runs very slowly.
- 3- The next command is “overkill” (this command will look at all the geometry and find all the places it overlaps and delete those areas, this is important because the laser cutter will cut every line that is in the drawing. For instance, if there are lines drawn on top of other lines, the laser cutter will cut or score those lines twice, adding time and maybe an unwanted amount of scoring in some areas.)
- 4- Now you are ready to repeat this for your score layer.

Preparing your AutoCAD files

Objects with thickness

Objects that have a thickness, such as solid hatches, text, and lines with lineweights associated get treated differently than objects composed of lines with zero thickness, resulting in vastly longer cutting times. We recommend removing all solid hatches (other hatch patterns will be relatively fast, but can be a problem if used excessively). Lineweights may be disabled during plotting, so it is not necessary to remove them from each object.

Creating efficient text in AutoCAD

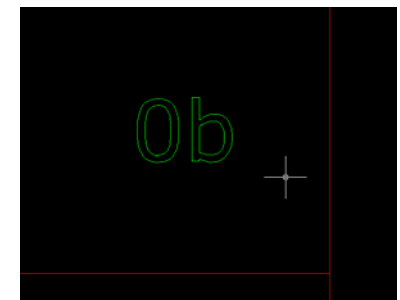
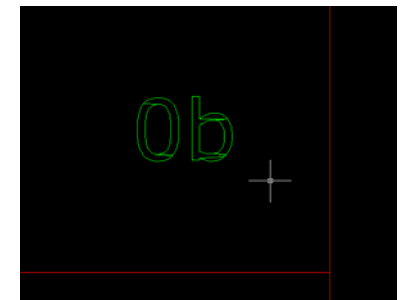
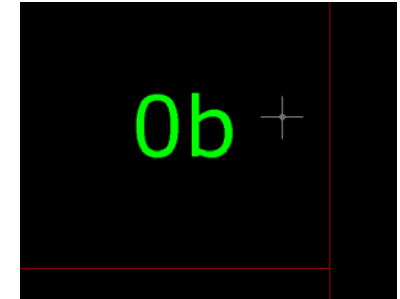
•AutoCAD does offer a tool that can convert text objects into polyline outlines, which can be cut much faster:

1- Create your text. Choose font and size. Keep in mind though, while you can scale the text up and down, once you go through this process you will not be able to edit the font, so make a copy of you original text before you go any further!

2- Now type in the command “ttextp” this is the Text Explode command (you can also get there by going to “Express” ► “Text” ► “Explode Text”). This command will basically explode the fill of the text to create edges.

3- This command will create polylines and some superfluous lines in the middle of text. The best way to handle this is to explode all the lines the Explode Text created and delete the unwanted lines.

4- Now place them on their respective layers and cut or score away!!!



Cutting

Now you are ready to go log onto the computers in TBH 20 reserved for laser cutting (as see in the image at the beginning of this tutorial). Then go to “File” ► “Plot”. From the drop down list of plotters select either the V-460 (left) or X-660 (right)



After you select your laser cutter it will give you this warning, just click “OK”

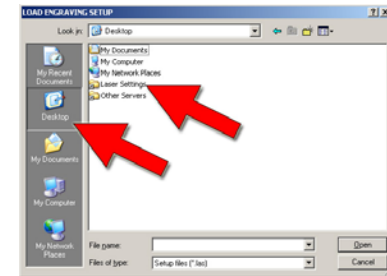
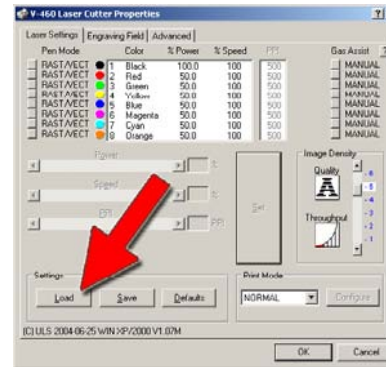


Then go to “PROPERTIES”, “CUSTOM PROPERTIES”



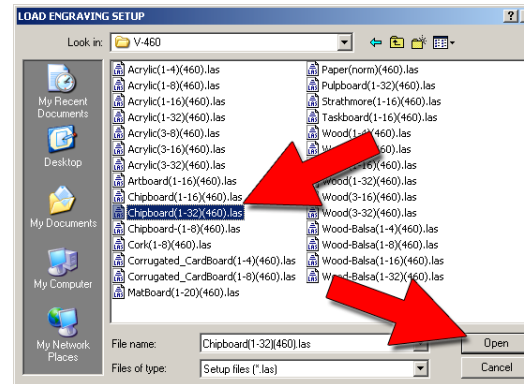
Cutting

“LOAD” then go to the
“DESKTOP”, then
“LASER SETTINGS”



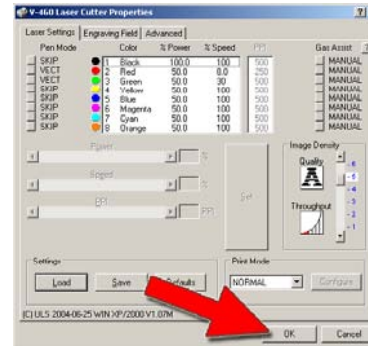
Pick the folder corresponding to your laser
cutter, then..

Find the appropriate laser file and click “OPEN”



Cutting

Click “OK” after the laser setting have loaded



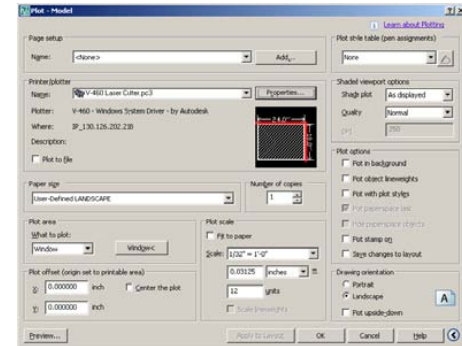
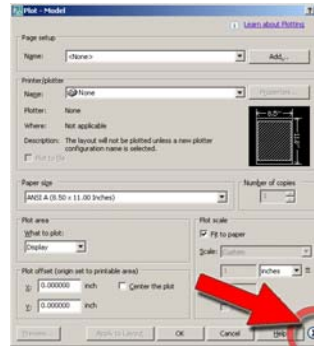
Then click “OK”. Click “OK” again, and then “OK” one more time and you should be back to the printer dialogue.



FYI – AutoCAD will not remember the material you picked here from cut to cut – you will need to re-pick your material for every cut you make.

Cutting

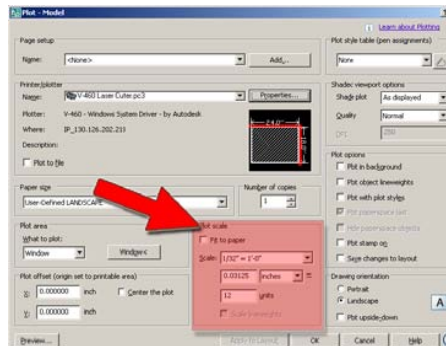
When you get back to the generic printer dialogue box, (if you don't have the information on the right, click this arrow to expand).



Make sure that you un-check all the options on the right.



Also, scale your print accordingly.



Cutting

Then select “Window”, then the area you want to print.



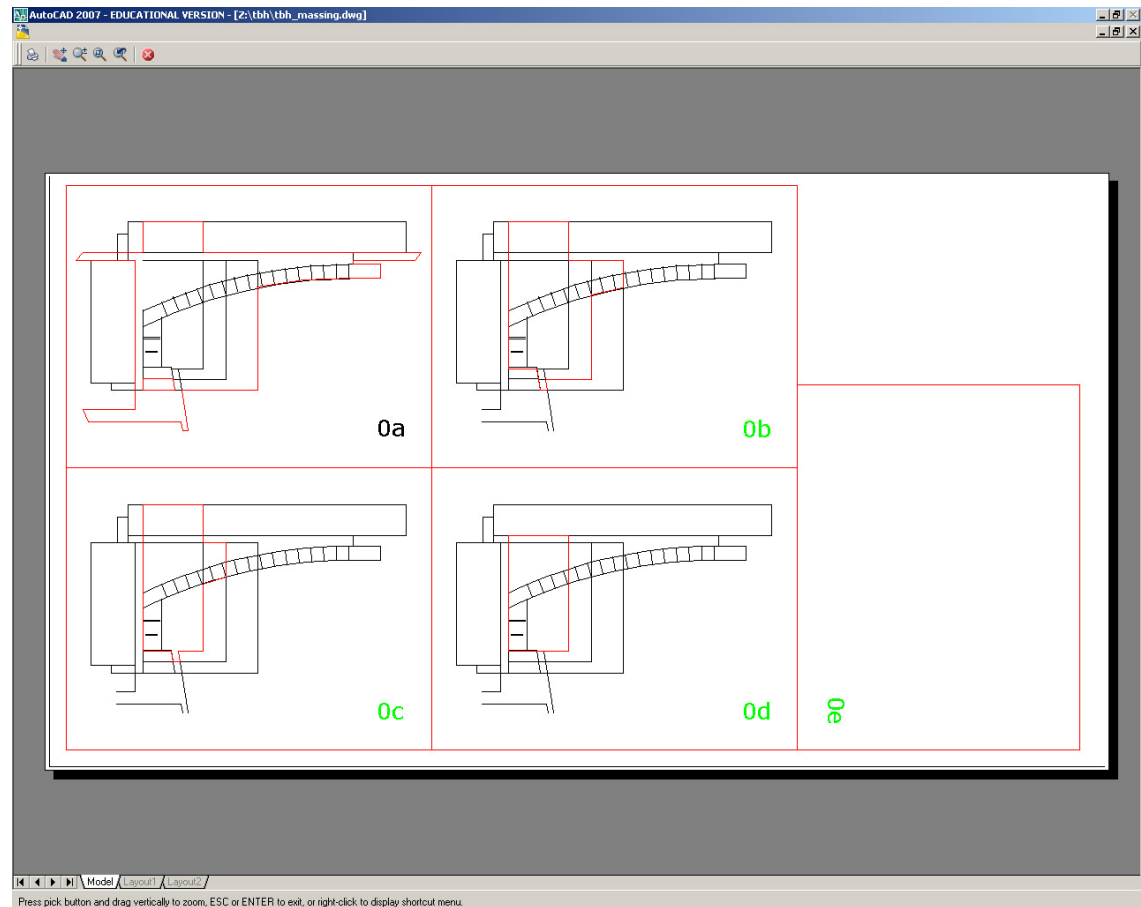
Now press the “Apply to Layout” button. This will save your settings for the next time you send a cut.



Cutting

Use the Preview in AutoCAD! If parts of your drawing are missing in the preview, they will be missing when you cut! Also, don't worry about colors other than red or green – the cutter will ignore these objects.

Comparing AutoCAD's preview to the actual cut is much easier if you leave the laser cutter's 'paper' oriented landscape wise (and orient your drawing accordingly) – as in the screenshot here.



Cutting

Now go over and turn on the Laser Cutter.



It will go through an initialization phase and then it will say "READY". The laser cutter command terminal should look like this when it is ready to receive your file.

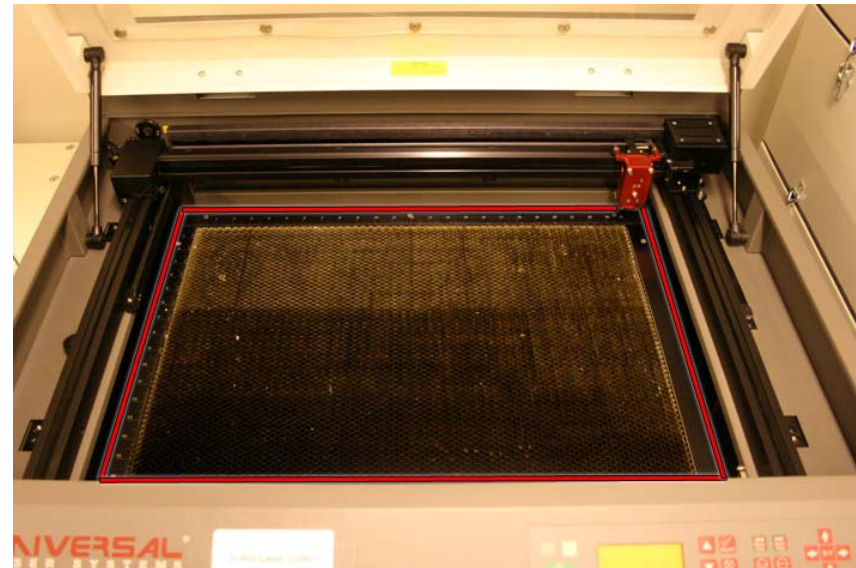


Cutting

Now, preview your print to make sure it looks right and press “OK”. Once you have sent (or printed) your file, go to the Laser Cutter terminal and it should now look like this.

FYI - Pay attention to the numbers appearing after ‘PWR’, ‘SPD’ and ‘PPI’. If they are all zeros, you may have sent lineweights (page 10), solid hatches, or unexploded text to the cutter. If they are 50, 100, 500; you may have forgotten to select a material (page 8).

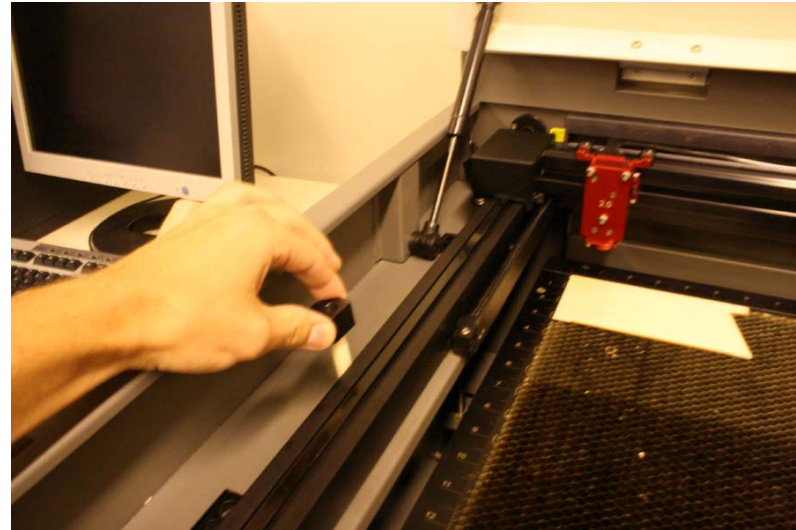
Open the lid (the red light should start to blink, it is normal), and check the position of the honeycomb bed (outlined in red). Gently slide it as far left as it will travel, then all the way back. This ensures that the bed is aligned properly with the rest of the laser system, so your cut will happen in the right spot.



Cutting

Press the “Z” button on the right hand side of the laser cutter command panel.

Now get the focus tool located behind the left rail of the laser cutter.



When you pressed the “Z” button the focus cartridge (red thing, laser) moved to the upper left hand corner of the laser bed and now you will see a menu has opened on the LCD screen; this menu is used to raise or lower the laser table (honeycomb) bed to focus the beam. You can now use the up and down arrows just right of the LCD screen to raise and lower the laser table (NOTE: Pressing “SELECT” will toggle between moving between increments of one tenth or one one-hundredth.).

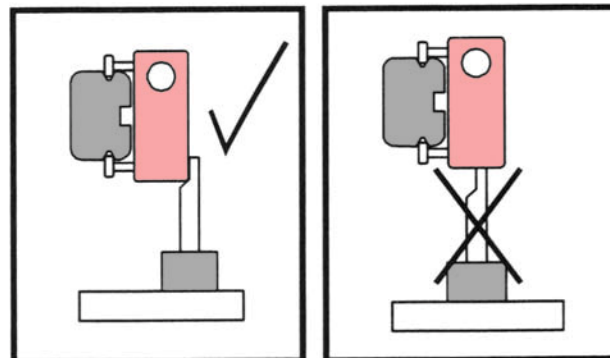
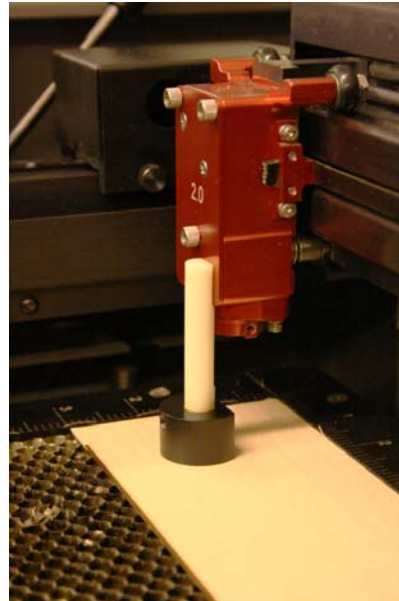


Cutting

Set the focus tool on top of your material, press the up and down arrows accordingly until the focus tool fits onto the focus cartridge (red thing, laser) like this.

Now press the “Z” button again and the focus cartridge will go back to the upper right hand corner of the laser cutter. Replace the focus tool.

FYI – Focusing is very important to getting crisp cut and scores. If your material does not lie flat on the honeycomb, areas of the material may be out of focus, and you may not have crisp cuts and scores. With thinner materials such as chipboard, it is possible to tape the edges to the rulers in order to hold it flat.

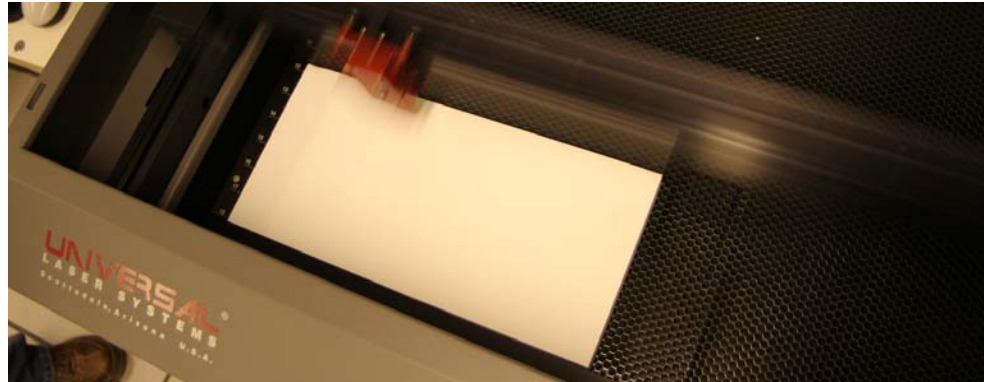


Cutting

Then slide your materials to the lower left corner. Note: when you previewed your document in AutoCAD it defaulted the point 0,0 at the lower left corner of the material (or laser bed), so you should slide your material to the lower left corner of the laser cutter.

Now, with the lid open, press the “START” button. While the lid is up the laser cutter will trace the path of the laser, this way you can make sure the path of the laser will stay on your material. To escape from this process press the “PAUSE” button, the laser cartridge should retreat to the upper right corner.

Now go and turn on Air recovery system.



Cutting

!!!!!!! If the air filter is not on, **DO NOT USE THE LASER CUTTER**, no exceptions !!!!!!!

!!!!!! During the laser cutting process your material being cut will produce hazardous fumes !!!!!!!

!!!! **DO NOT TURN ON THE LASER CUTTER OR AIR FILTER UNTIL YOU ARE READY TO CUT !!!!**

!!!If there is something going wrong and you cannot pause it, **TURN OFF** the laser cutter!!!

Cutting

Now you are ready to cut. Close the lid (the green light should start - if the red light is on, make sure all doors are fully closed) and press the “START” button again. Now sit back and watch the marvels of modern technology doing your bidding. However, be warned, the safety instructions state that “prolonged viewing of the laser cutting process is not recommended”.

FYI – The length of time your file will take to cut/score depends on the complexity of your file, and the material being cut.

FYI – The laser cutter will only save one file at a time. So if you send your file it will be the only file on the machine, and the next file you send will delete the previous file.

FYI – If you see your cut is doing something wrong, or you want to stop the operation, press the “PAUSE” button on the command panel. If this does not work, lift the lid of the laser cutter very slightly, not all the way, this should also stop the cutting process. In case of a fire, or excessive smoking, turn off the cutter instead of opening the lid.



Cutting

!!!! If your cutting is taking too long and you want to go get a drink or use the restroom, you must **PAUSE THE CUTTING PROCESS!** The laser cutters must be monitored **AT ALL TIMES**, no exceptions!!!!

!!!! The materials you have just cut are still producing fumes well after they have been cut. Let your material sit in the bed with the lid closed for 30 – 120 seconds before opening the lid!!!!

Cutting

When the air filter has vented for 30-120 seconds, turn it off. Now remove your cut materials as well as your scraps; be sure to clean up after yourself!

Close the lid and log off the computer. Also, if no one else is waiting for the laser cutter, please turn this off as well.

This is the end of the tutorial proper; an index of common problems and solutions follows.



The laser cutter has received the file, but refuses to cut anything.

Often in such a case you may notice that the LCD on the laser cutter, where it displays power settings will display all zeros, or all very high, round numbers (e.g.: 50, 100, 500).

There are several possible causes:

- The most frequent is that lineweights have been sent to the cutter for a layer that has raster objects set to be skipped (on the laser cutter LCD you will see all zeros for the power settings). The solution: make sure that in the plot dialog, on the extra options panel on the right ‘Plot with Plot Styles’ and ‘Plot Object Lineweights’ are unchecked.
- A material present may not have been selected in the laser cutter driver (you may see all zeros under the power settings on the LCD, or more likely the large, round numbers).
- The file may appear empty to the laser cutter; make sure that in the ‘Layer Properties Manager’ any layers containing objects to be cut have ‘Plot’ enabled (in this case again, you will see all zeros for the power settings displayed on the laser cutter LCD). Any layers with the ‘Plot’ option disabled will not be sent to the laser cutter (and will not show up in AutoCAD’s plot preview).

The laser cutter is moving side-to-side rapidly, instead of tracing outlines.

The cutter is 'rastering' an object that has some thickness to it (chiefly lines with weights assigned, text (the characters have non-negligible thickness), or a solid hatch. The objects will be reproduced, but it may take a long time. Usually that length of time will be unacceptable, so to stop it:

- For lineweights, disable them in the plot dialog: make sure that in the plot dialog, on the extra options panel on the right 'Plot with Plot Styles' and 'Plot Object Lineweights' are unchecked.
- There is a small chance that for a polyline, a thickness has been specified with the pedit tool, not through the normal (universal?) lineweights system.
- For solid hatches, get rid of them unless you really want the effect and have the time to spend on it. Hatches other than solid will be treated as the constituent lines (just like any other lines). Be careful of the density of other hatches, as it is possible to specify a line hatch dense enough to be almost as time-consuming as the solid hatch.
- For text, the quickest alternative is to specify a single line font (e.g.: 'txt'), which may be ugly, but will be treated like any other line. Normal font with thickness may be exploded into polyline geometry which outlines each character, which preserves the prettiness of the font, and is much faster to reproduce. The tool to use is the 'Text Explode Tool' available under the 'Express' menu, or by typing 'txtexp'. Note that the normal explode tool does not work. Note also that fonts appearing in the AutoCAD font selector which have a caliper icon in front of them are composed of linework and no fills, some of which approximate a fill with dense linework (e.g. 'bold').

The cutter is cutting a line excruciatingly slowly.

If all of the settings are correct for the power and speed of the cutter, check to make sure that the line in question does not have a linetype applied (e.g.: dashed) at an extremely small scale (most likely not visible at a normal zoom).

The cutter is producing a lot of smoke.

- Make sure the air filter is on and functioning properly, and that all hoses are completely connected!
- The material may be slightly out of focus.
- It is normal to see more smoke when scoring than when cutting; most air and smoke flows down through the honeycomb and then out the back when the cut goes completely through the material.
- There are other possible problems that the lab tech would need to fix.

Material is not cut all of the way through.

- The material may be slightly out of focus.
- Make sure the proper material was specified.