

Laser Cutting at AUT



- 60W power
- 18" x 32" bed
- 457.2mm x 812.8mm

Laser access is open to all students so long as they are supervised by one of their tutors or by staff at the Rapid Prototyping Lab.

Students must supply their own material

ACCEPTABLE MATERIALS

- Papers (mylar, vellum, etc.)
- Chipboard, MDF
- Museum board
- Woods (basswood, plywood, balsawood, etc.)
- Plastics
 - Acrylic (This generally gives the best results)
 - Styrene
- Fabric



* if cutting very thick materials, be aware that multiple passes may be required

UNACCEPTABLE MATERIALS

- Metals
- Glass
- Plastics other than acrylic and styrene
 - Lexan
 - PETG
 - PVC

* Fumes from cutting plastics are generally not healthy. Those produced by these materials are especially toxic.

Costs

SHEET SIZE	COST A (less than 30 mins)	COST B (more than 30 mins)
A3 (420mm x 297mm)	\$5	\$40 per hour
A2 (594mm x 420mm)	\$10	
MAX (812.8mm wide x 457.2mm)	\$15 Please remember, also, that you must bring your own material, and that it should be cut down to a size that fits into the laser cutter	

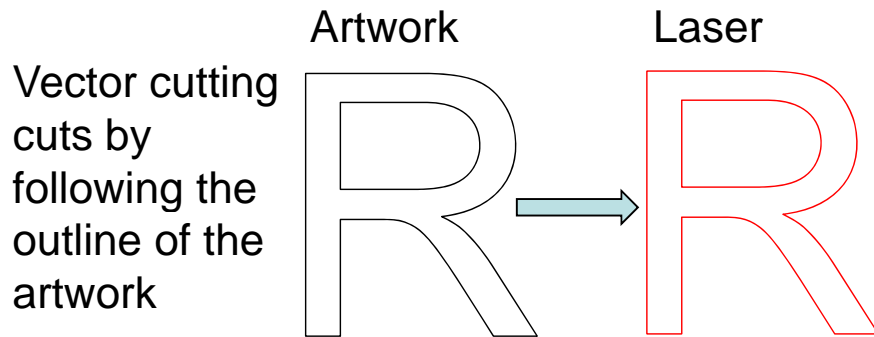
Preparing your artwork

- All instructions, and an Adobe Illustrator template can be found at:
www.ciri.org.nz/rplab/laser.html

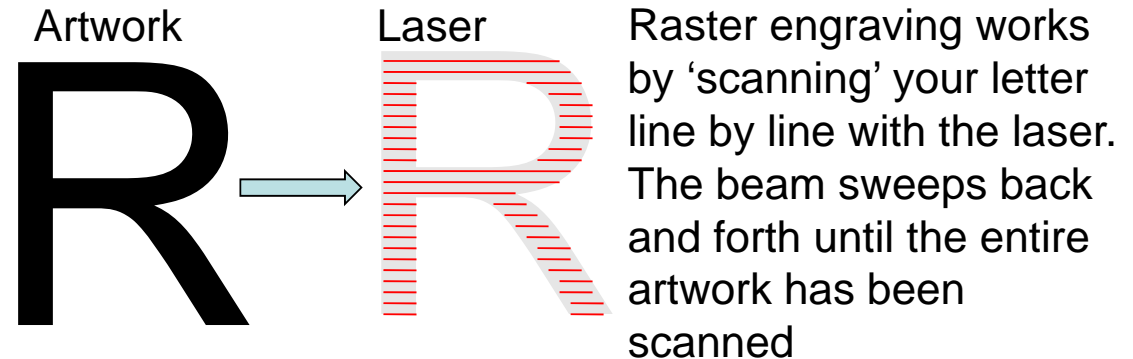
Things you need to know

- The laser cutter can do Vector cutting or Raster engraving

Vector Cutting



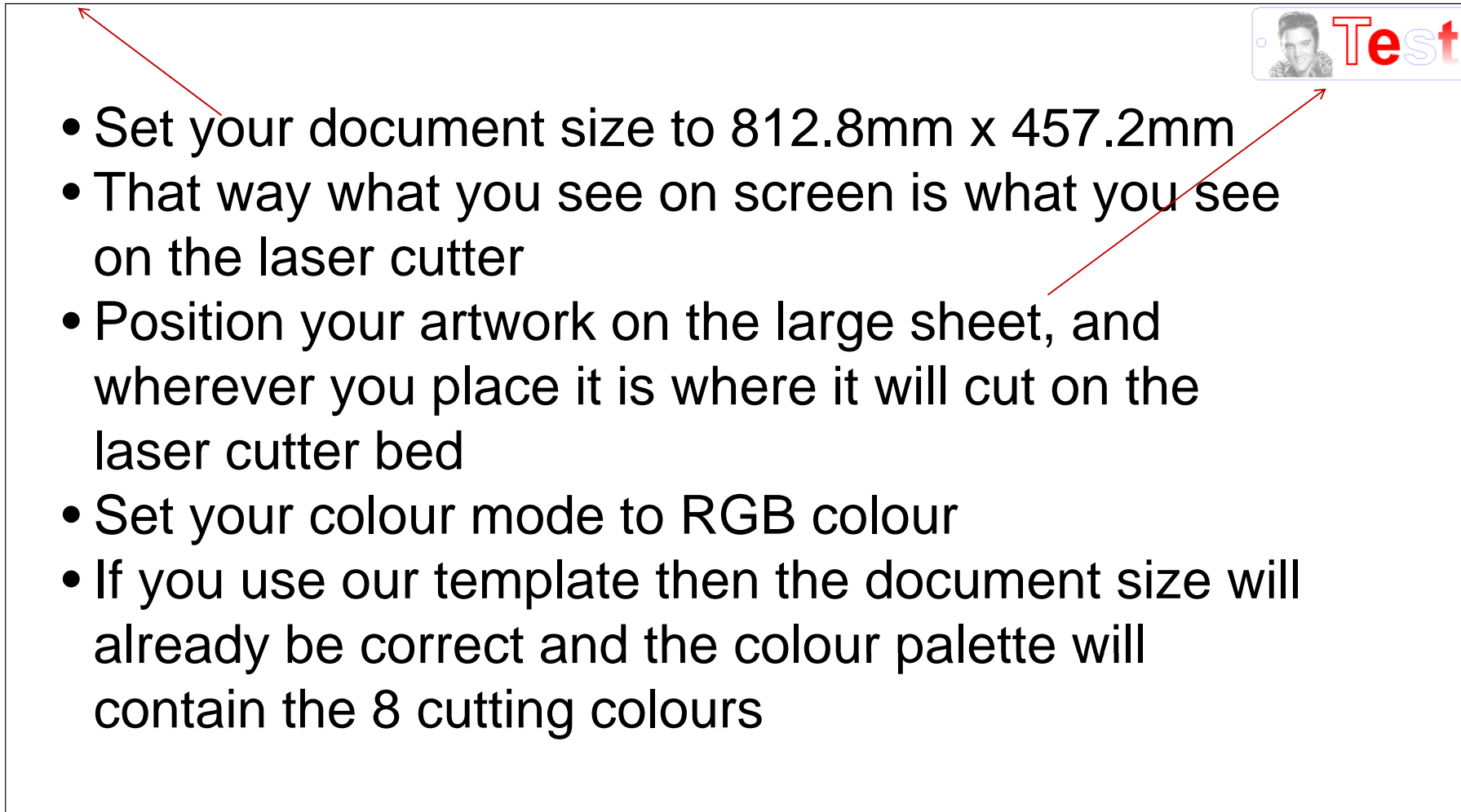
Raster Engraving



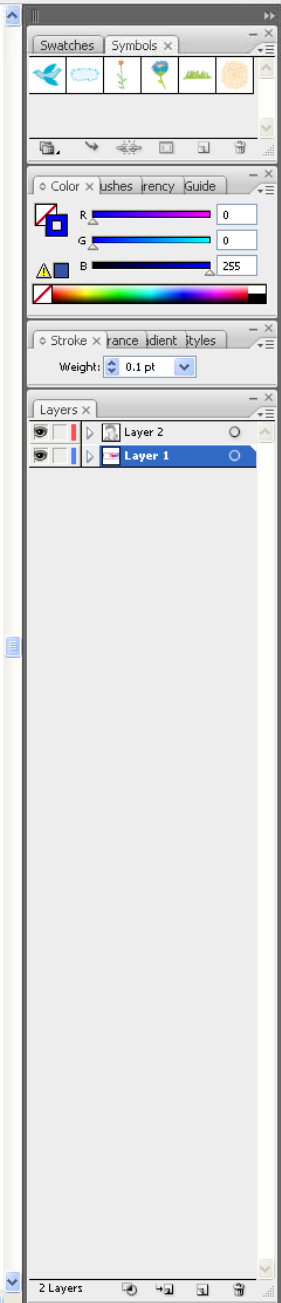
- The only way the laser knows whether you are trying to vector cut or raster engrave is through the **line thickness** you use.
- If your line thickness is **0.1pt** then you are vector cutting. Any other thickness (or fill) and you are raster engraving!

More things you need to know

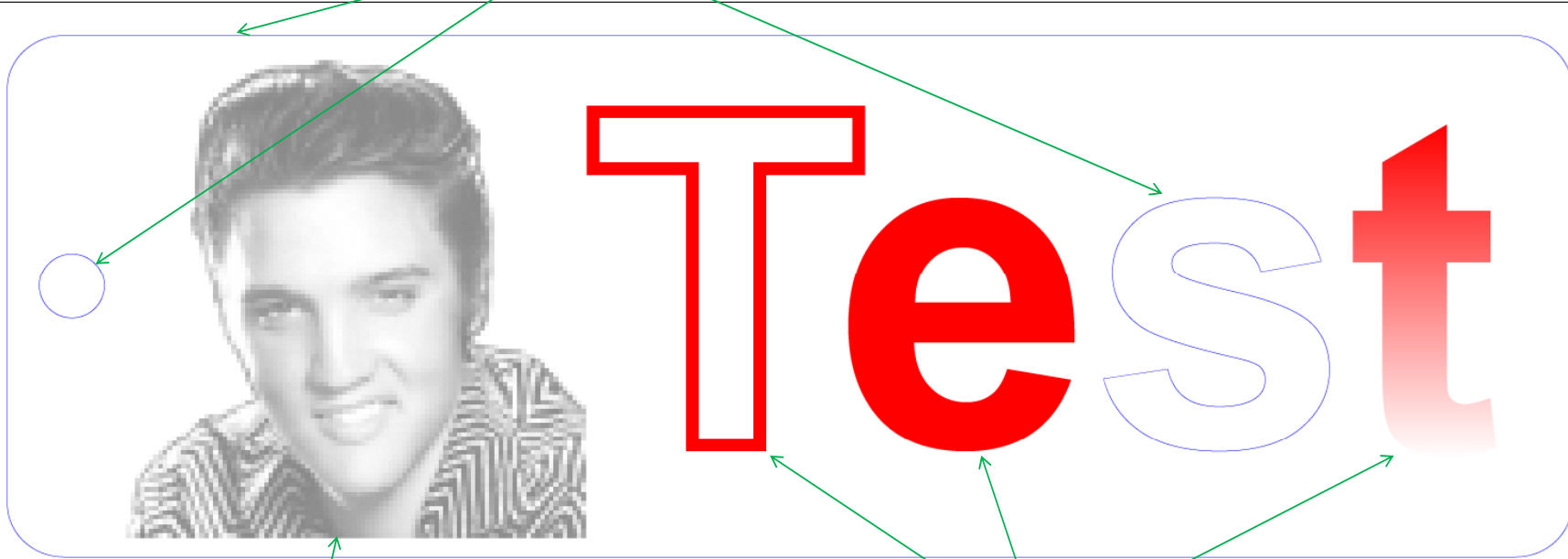
- In your artwork you can use up to 8 different colours, each of which can have the laser set to a different power and speed.
- So Blue could, for example, be set to cut all the way through the material. Red to Engrave Lightly and black to engrave deeply, etc.



- Set your document size to 812.8mm x 457.2mm
- That way what you see on screen is what you see on the laser cutter
- Position your artwork on the large sheet, and wherever you place it is where it will cut on the laser cutter bed
- Set your colour mode to RGB colour
- If you use our template then the document size will already be correct and the colour palette will contain the 8 cutting colours



The blue line is 0.1pt so will therefore vector cut, and the power settings for blue are set to cut through 3mm MDF, for example



The colour black is set to lightly raster engrave this grey-scale artwork

The red will be vector engraved (as it is not 0.1pt), and the power settings for red are set to deeply engrave MDF, for example

Swatches Symbols ×

Color × Ushes Ireny Guide

R	0
G	0
B	255

Stroke × Iance Iclient Ityles

Weight: 0.1 pt

Layers ×

- Layer 2
- Layer 1

2 Layers

Setting up the machine

Power up the machine and the extractor fan by switching on BOTH the plugs on the wall.



Focus the machine



Place your material onto the laser bed.

Press the “Z” button to begin focusing the machine. The laser-head will move across the bed.



To properly focus the machine to your material, you must align and contact the **notch** on the focus stick to the **edge** on the laser-head.

Frequently, the bed is too low to be focused. We will have to raise the bed and focus stick to meet the laser-head.

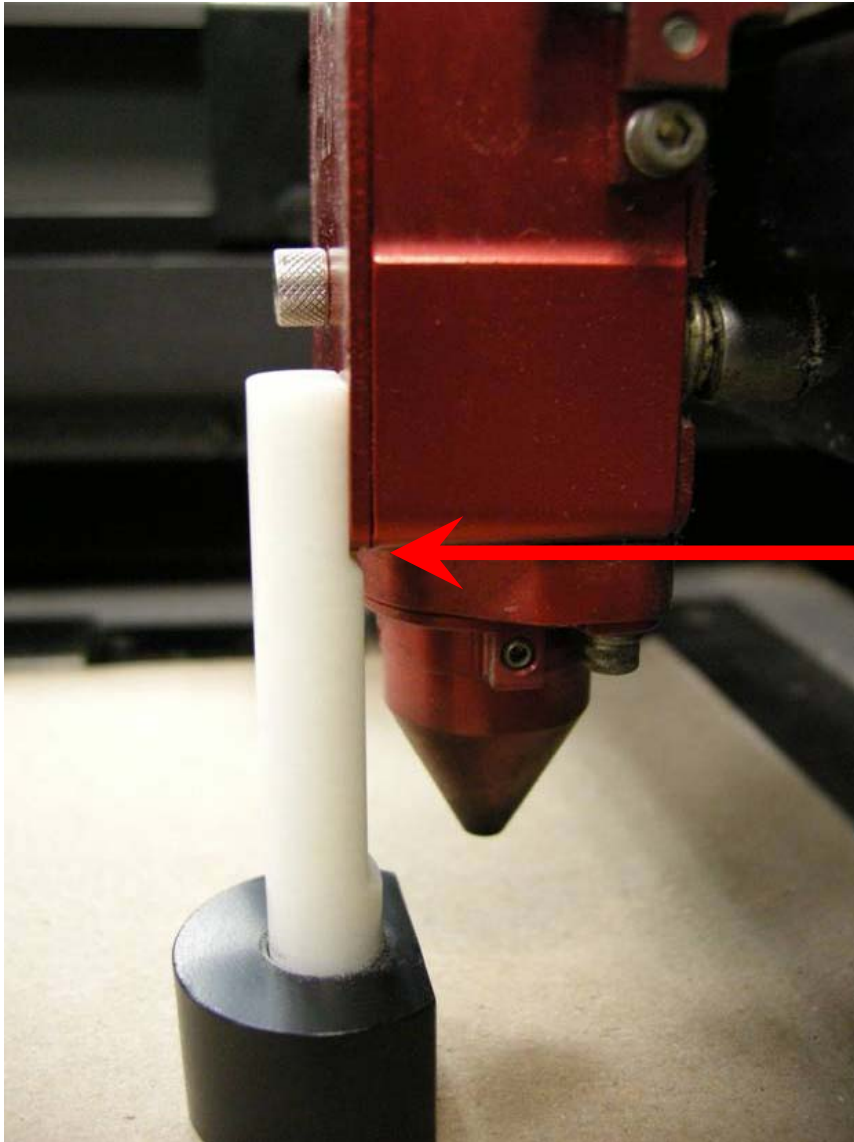
Trust the Auto-focus function at your own peril! It always pays to check the focus is correct with the focus stick

For precise focusing, toggle between tenth-inch increments and hundredth-inch increments by pressing the “SELECT” button and then move the bed.

To raise or lower the laser bed and focus-stick into place, press the up and down buttons.

Once you’ve properly aligned the focus stick to the laser head, press the “Z” button to complete the focusing.





Shown here is a properly focused laser head with material beneath.

The machine is now ready to begin cutting. We will now prepare the files.

Nearly ready to print

- From Illustrator go to File/Print and make sure the X660 is selected as your printer.
- On the bottom left of the print screen you should see a 'setup' button. Click this to go to the printer setup screen and click on 'preferences' for the X660 printer.
- The Laser cutter setup screen should now appear. This is where you set the power and speed for each colour of your artwork

What does this all mean?

Four modes:

Vector: This forces it to ignore everything that is not a 01.pt line

Raster: This forces it to ignore all 0.1pt lines

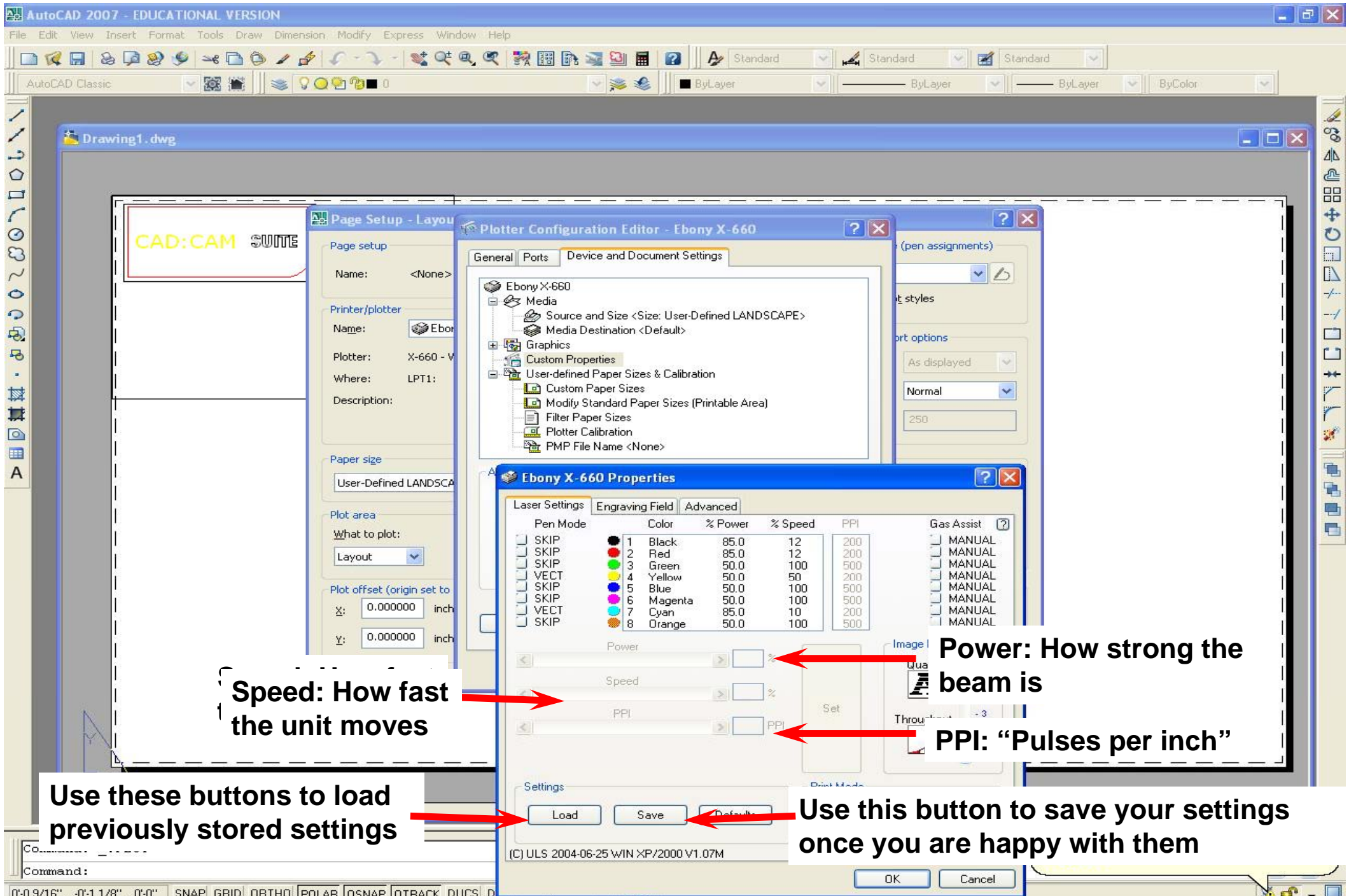
Raster/Vector: This allows it to do both vector cutting and/or raster engraving

Skip: This skips all artwork of that colour

Pen Mode	Color	% Power	% Speed	PPI	Gas Assist
<input type="checkbox"/> SKIP	1 Black	85.0	12	200	<input type="checkbox"/> MANUAL
<input type="checkbox"/> SKIP	2 Red	85.0	12	200	<input type="checkbox"/> MANUAL
<input type="checkbox"/> SKIP	3 Green	50.0	100	500	<input type="checkbox"/> MANUAL
<input type="checkbox"/> VECT	4 Yellow	50.0	50	200	<input type="checkbox"/> MANUAL
<input type="checkbox"/> SKIP	5 Blue	50.0	100	500	<input type="checkbox"/> MANUAL
<input type="checkbox"/> SKIP	6 Magenta	50.0	100	500	<input type="checkbox"/> MANUAL
<input type="checkbox"/> VECT	7 Cyan	85.0	10	200	<input type="checkbox"/> MANUAL
<input type="checkbox"/> SKIP	8 Orange	50.0	100	500	<input type="checkbox"/> MANUAL

Communication Center

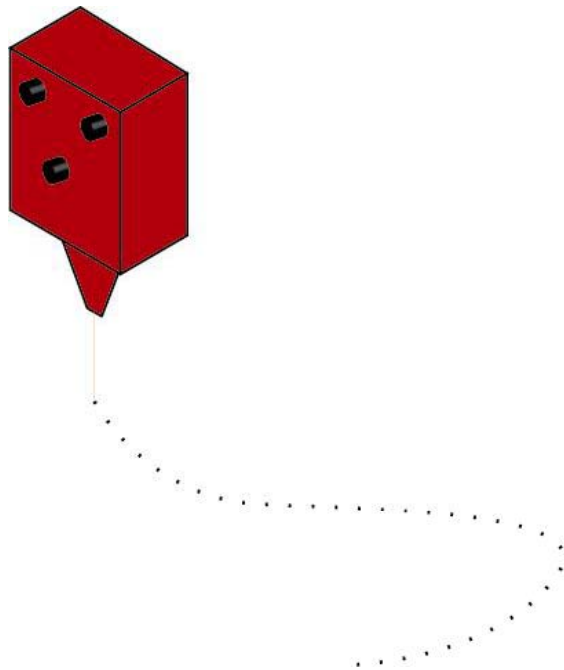
The easy way to keep you and your software up-to-date.
[Click here.](#)



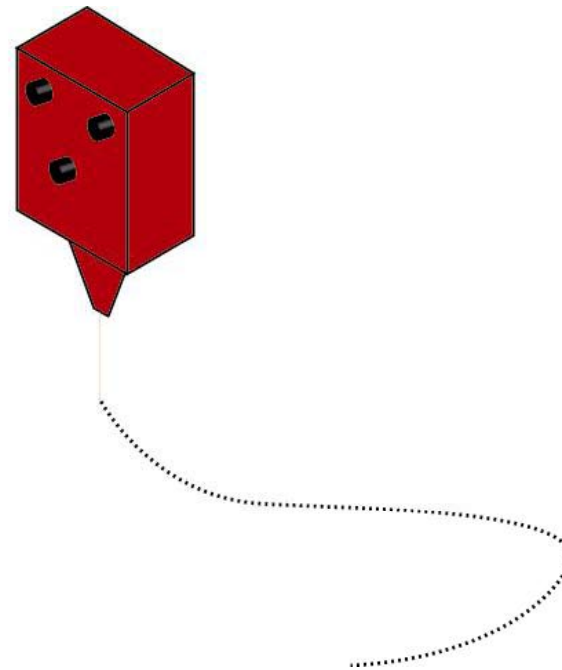
Pulses per inch:

PPI stands for pulses per inch. The laser beam is not a continuously firing beam, but shoots short beams at a set interval, so PPI is how many times it fires per inch over which it travels. This means the denser the interval, the hotter the material gets when it is cutting. Paper and wood based material should be set to 250 ppi, while acrylic and styrene should be set to 500 ppi.

Low PPI

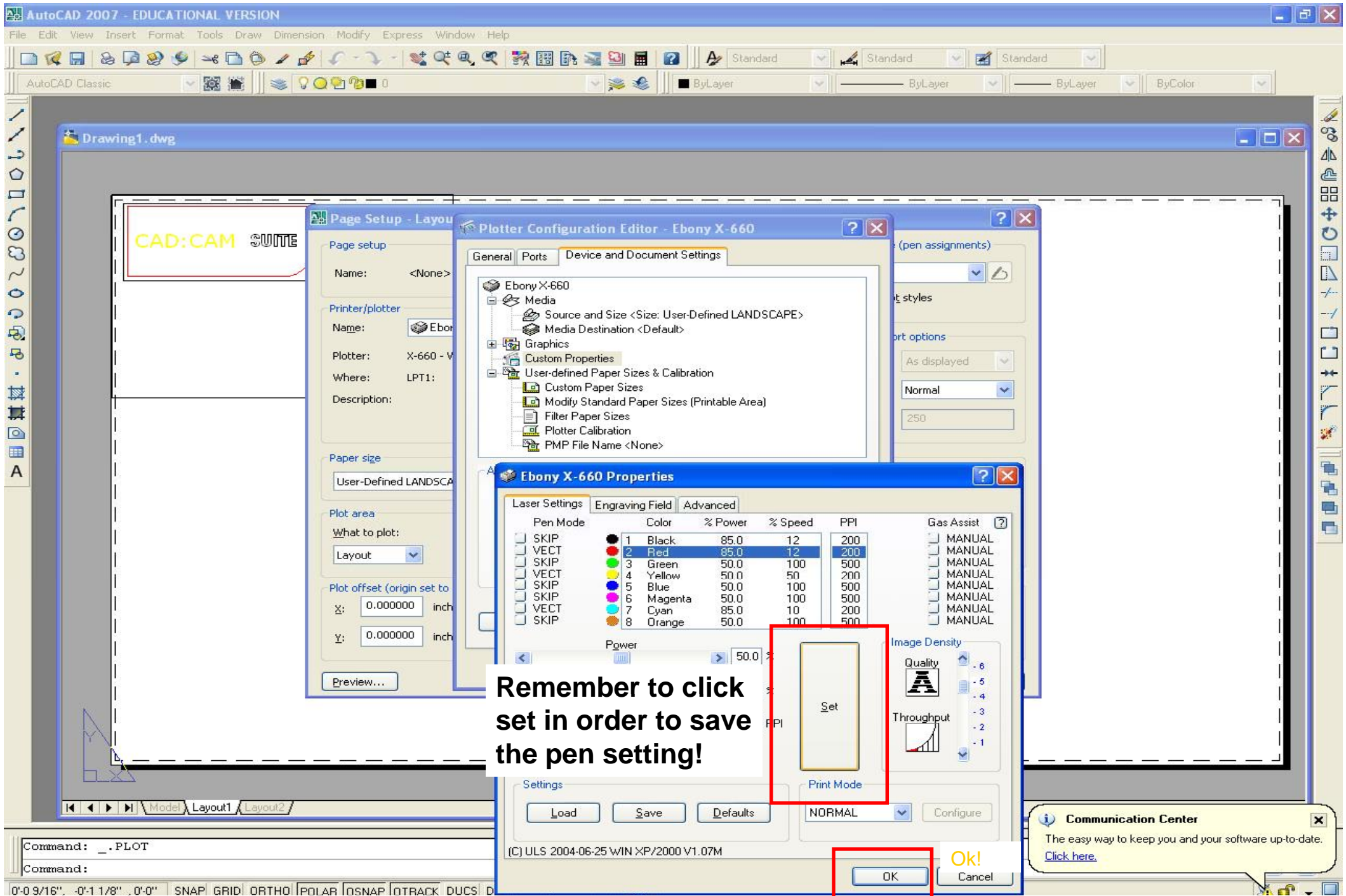


High PPI



Power speed & PPI work together

- High power sometimes burn material – especially wood and paper based products. The less power, the cleaner the cut will be.
- High speed sometimes compromises the accuracy of the beam.
- If the material doesn't seem to be cutting through, try increasing the power or reducing the speed.
- If the material is producing a constant small flame, reduce the power – The beam should look like a white point of light.
- Thick material should be cut using several passes to achieve the cleanest result.



Final Checklist before cutting

Did you put in your material?

Did you focus?

Is the lens clean?

Is the extractor fan on?

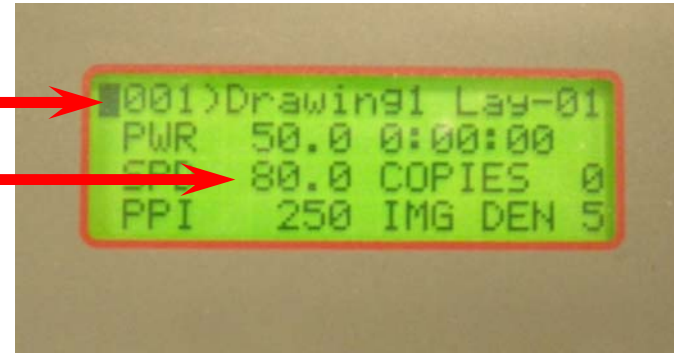
Is your artwork correct?

Are your laser cutter colour settings correct?

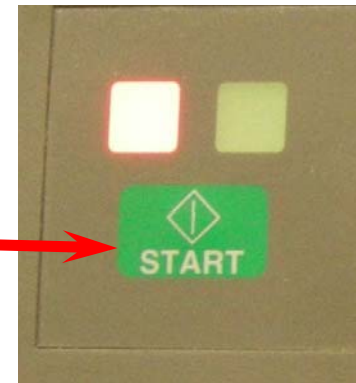
Check the machine's display

1. Is this the name of your file?
2. Do you recognize these power settings?

If it reads 0 power, 0 speed, 0 PPI, the file was set up incorrectly. Make sure the basics are covered – colors, lineweights, pen settings. You can also cut and paste your drawing into a new autocad file and try sending it again.



Once everything's checked out, hit Start and let it rip!



Tip: if you are not sure that your material is positioned right for your artwork to fit on it, you can hit the start button while the laser cutter lid is open. This will allow you to “print preview” your job with a red laser pointer instead of the real cutter.

Things you can do while your job is running



If you want to pause your job to check something out, hit the 'pause' button. To resume the job where it left off, hit the 'resume' button.

Tip: if the same file needs to be cut multiple times, simply hit start again. There's no need to resend the file.

Watch your cut!

- It is possible to start fires when laser cutting, so if it is necessary to walk away from the laser cutter, ask somebody to supervise your machine while you're away. The laser cutter will be turned off (and you will therefore lose your job) if found cutting unsupervised.
- If the material seems to be flaring up too much, stop the cut immediately, readjust power/speed settings and send the cut again.
- If the material is on fire, there is a fire extinguisher on the wall to the right hand side of the laser cutter



Changing settings during a cut

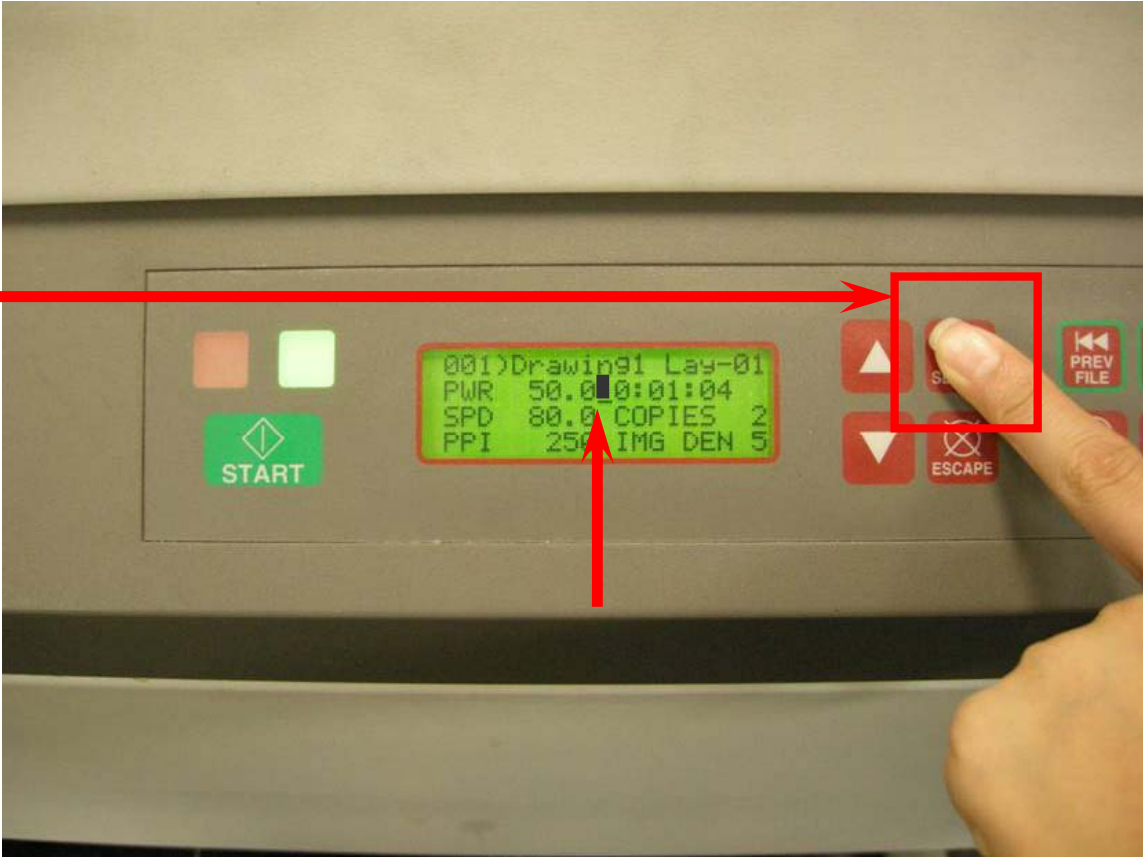
A useful thing to know (especially when testing power settings on scrap material) is how to change laser settings on the fly without having to dive back into the Illustrator drawing.

Notice the rectangular blinking cursor.

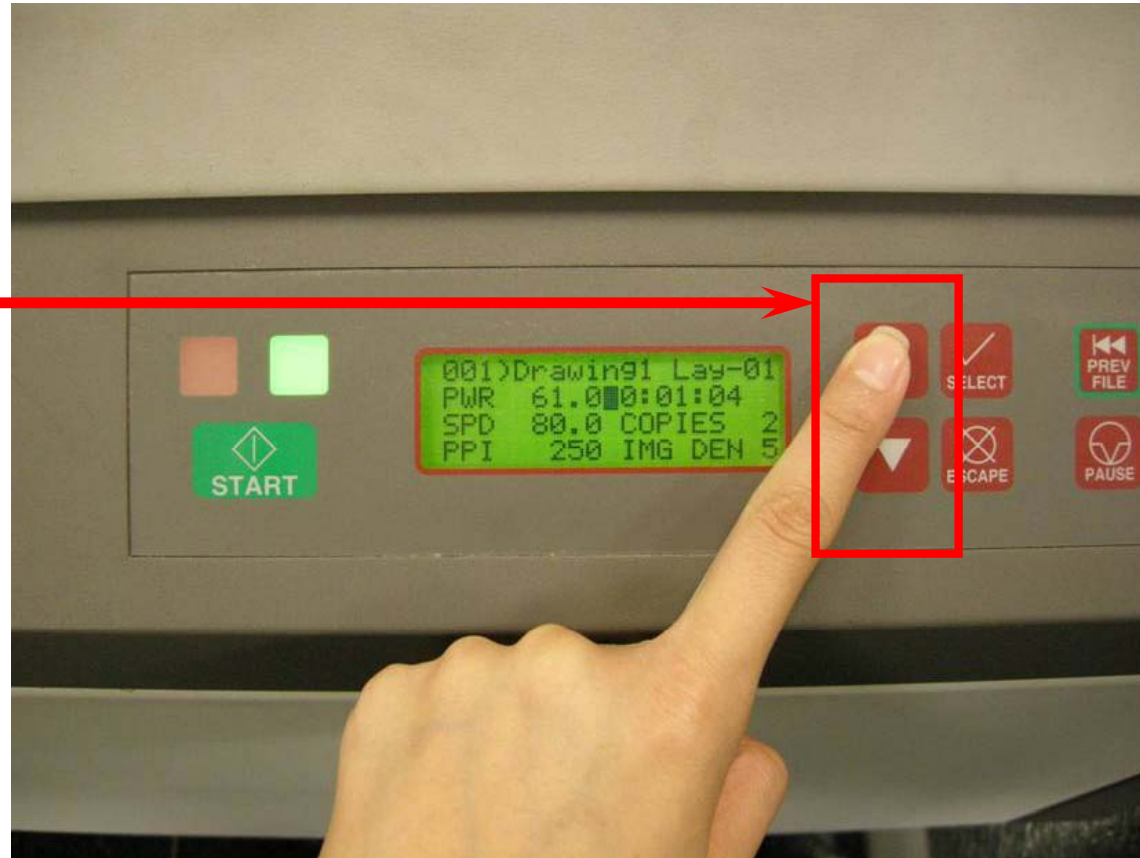
Use the arrows to toggle the cursor down to the setting you want to change



Press select to change the selected item. The cursor will jump to the right of the numbers



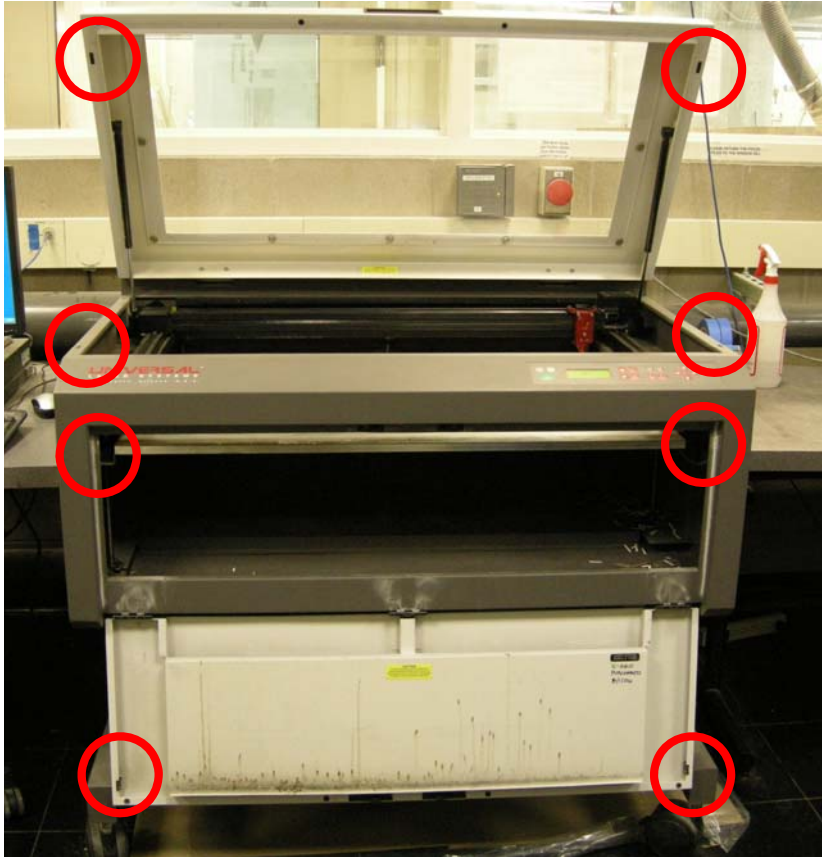
Use the arrows to toggle the setting up or down



Press escape when you're done to bring the cursor back to the left of the numbers.

This menu power change does not alter the laser settings in your file. If you find a setting you like, go back and change it in custom properties for it to save.





When opening and closing the front flap and the top lid, make sure you close them all the way.

There are four pairs of contact points that need to touch in order for the machine to cut. If either the lid or flap is slightly ajar, the machine will not cut.

Don't lean on the machine while it is cutting. This could cause the machine to stop cutting and ruin your job!

**Clean up the laser cutter bed,
and any other mess you may
have made before leaving the
laser cutter.**

**Remember to treat all
equipment in the Rapid
Prototyping Lab with RESPECT,
otherwise you will not be
allowed to use it!!!.**

Thank you!