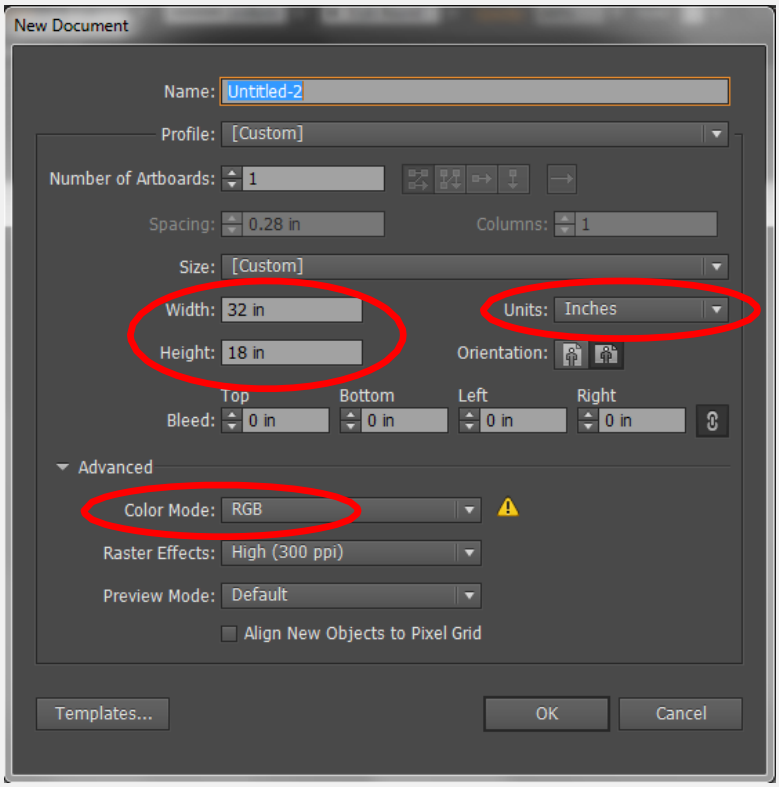
Laser Cutting in CAP Laser Lab

1) Cut your material to 18” x 32” or smaller (or 18” x 24” for the smaller laser machines).

2) Turn on the laser machine (if it is not already on) by flipping the wall switch behind the computer desk. You will hear the cooling fan and compressed air assist turn on.

3) To start a new document on a machine in the Laser Lab:

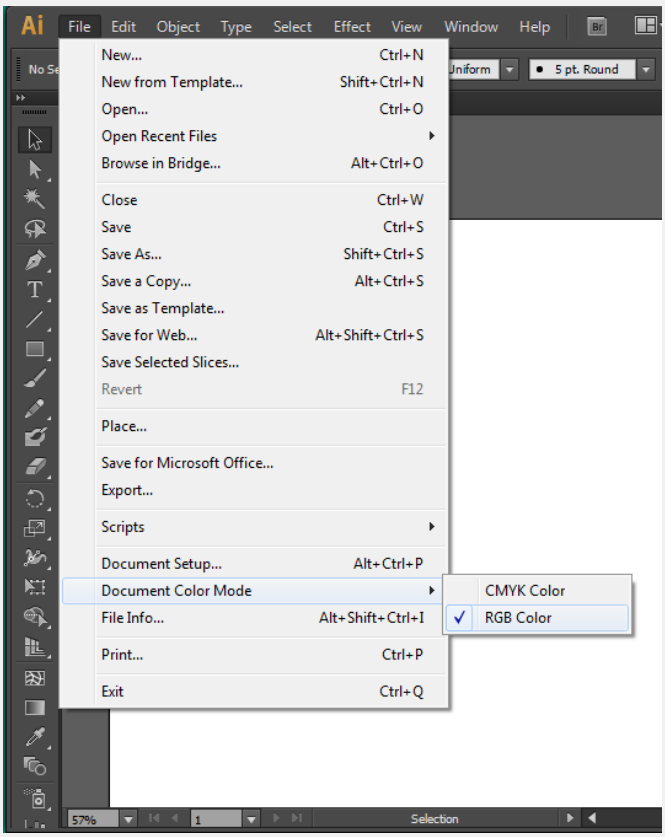
a) Open Illustrator. Choose **File** and click **New…**.
b) Set the **Units** to **Inches**.
c) Set the **Width** to 32” (or 24” for the smaller laser cutters) and the **Height** to 18”.
d) Set the **Color Mode** to **RGB**.



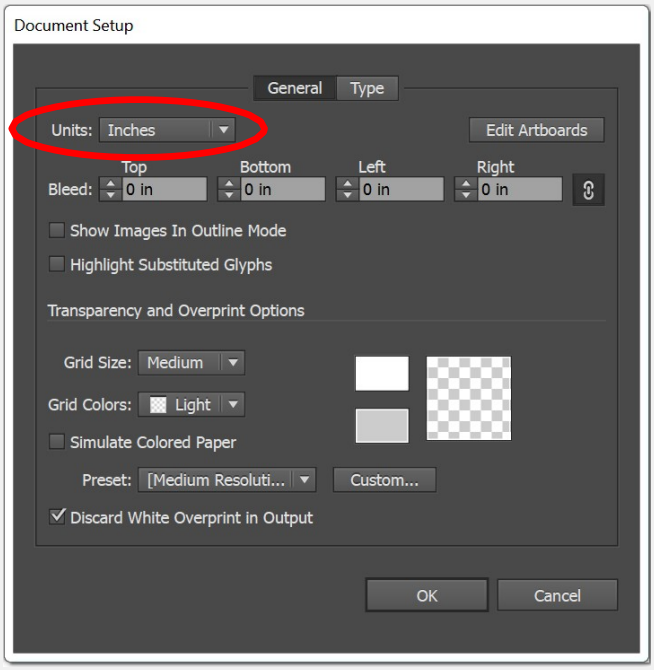
e) Click **OK**.

4) If you are opening a previously created file…

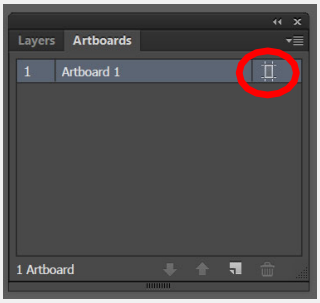
a) Under **File->Document Color Mode** make sure **RGB Color** is set.

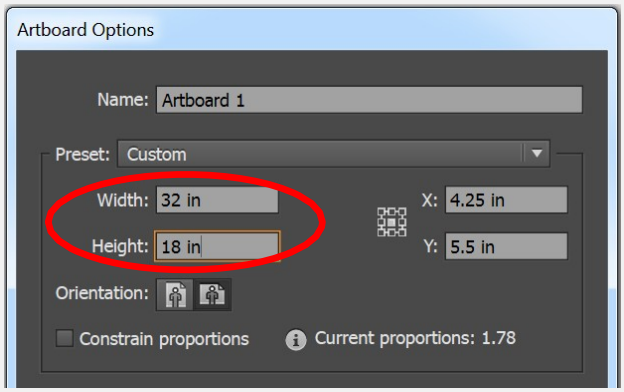


b) Choose **File->Document Setup…** and make sure the **Units** are set to **Inches**.

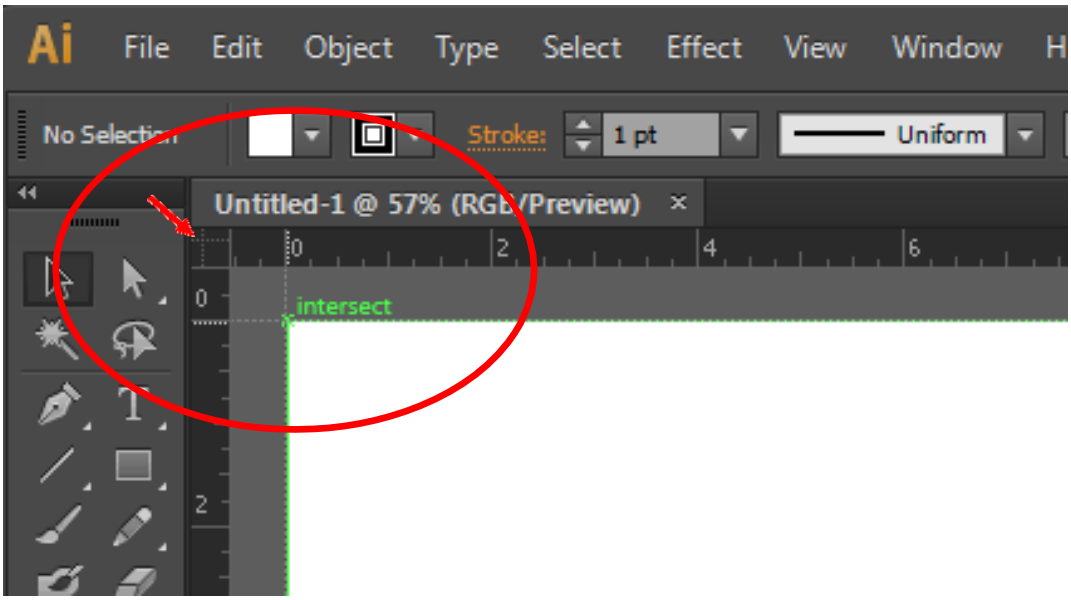


c) Choose **Window**->**Artboards**. Click the icon to the right of your artboard (see below). Make sure your Artboard **Width** is set to 32” (or 24”) and **Height** is set to 18”.

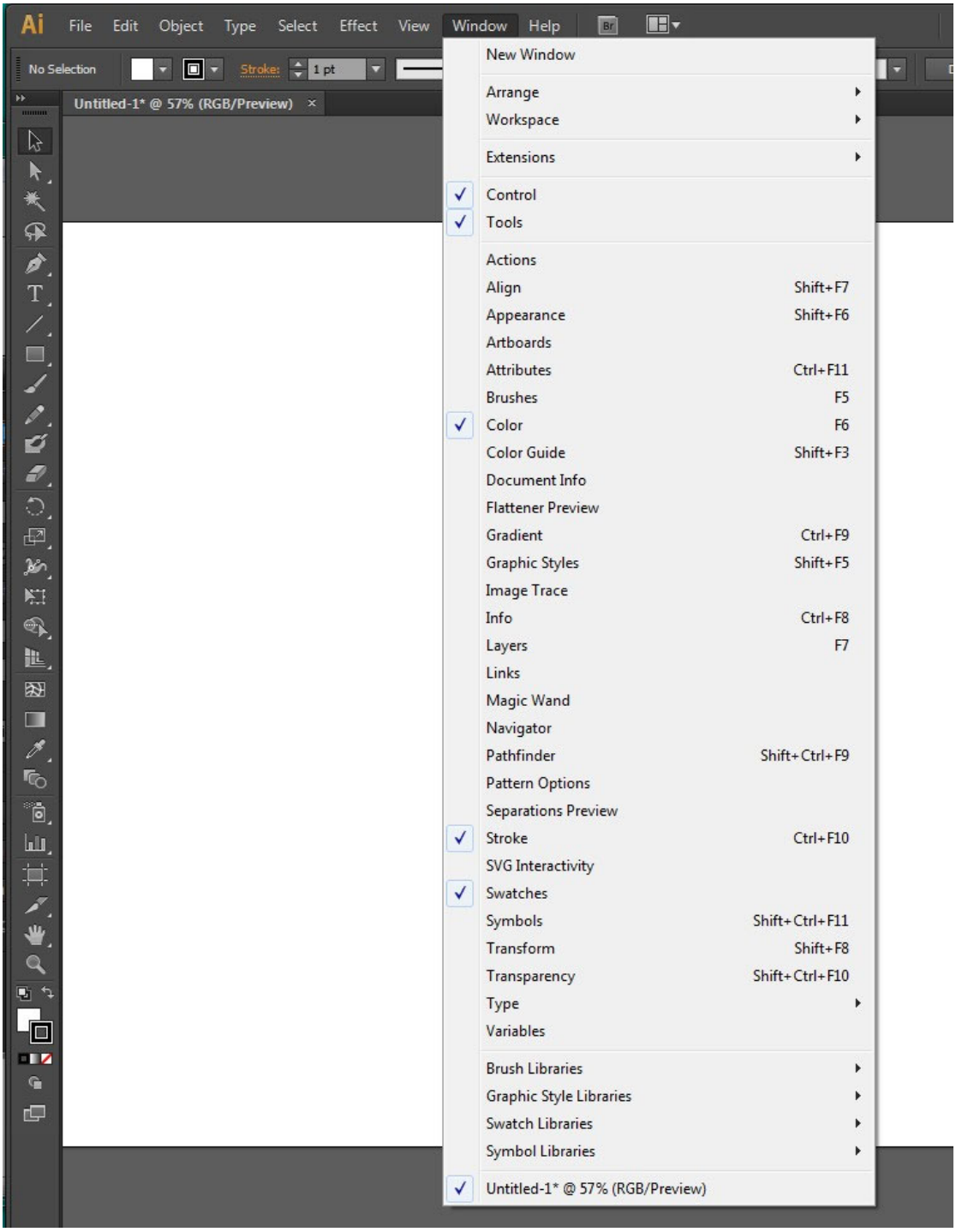




5) Turn on rulers by pressing **Ctrl + R**, or select **View**->**Rulers**->**Show Rulers**.
Make sure the document origin is set correctly by dragging from the upper left corner until the crosshairs line up with the upper left corner of your artboard.

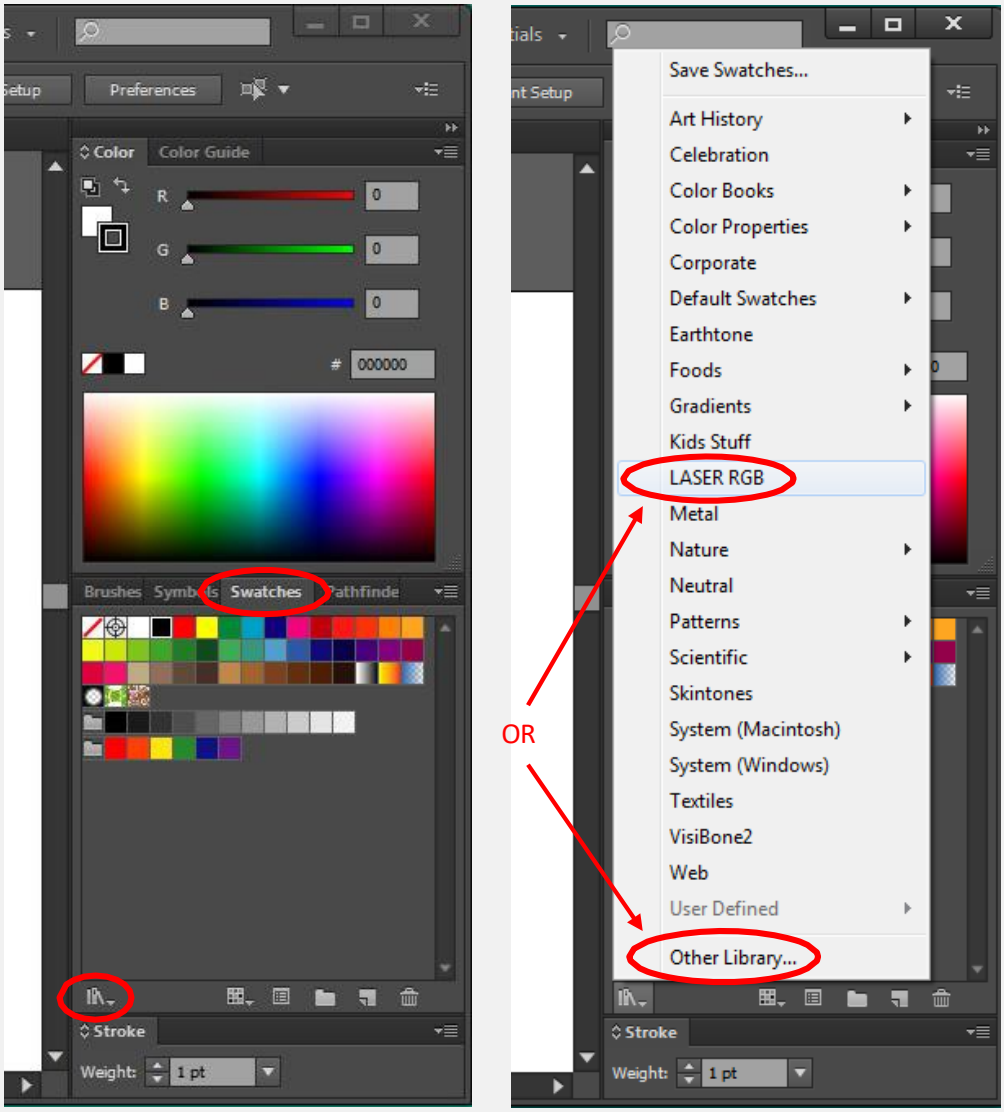


6) Open the **Window** menu and make sure **Control**, **Tools**, **Color**, **Stroke**, and **Swatches** are turned on.



7) On the **Swatches** panel click the **Swatch Libraries** icon in the lower left corner.

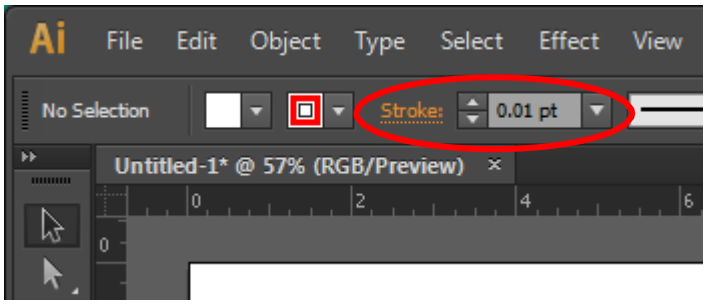
a) If you are working on one of the Laser Lab machines, choose **LASER RGB** from the list. This swatch gives you the eight colors you can assign cut values to for the laser cutter.



b) Otherwise, make sure you have downloaded the provided **Laser RGB Swatch Library** (e.g. from Blackboard), then select **Other Library, or Book Stack Icon…** from the **Swatch Libraries** menu (see above) and select the downloaded file.

8) **Check to make sure you have the desired scale** by comparing the size of your drawing against the rulers and the Artboard and visually inspect your file to make sure it is still drawn and laid out as you intended.

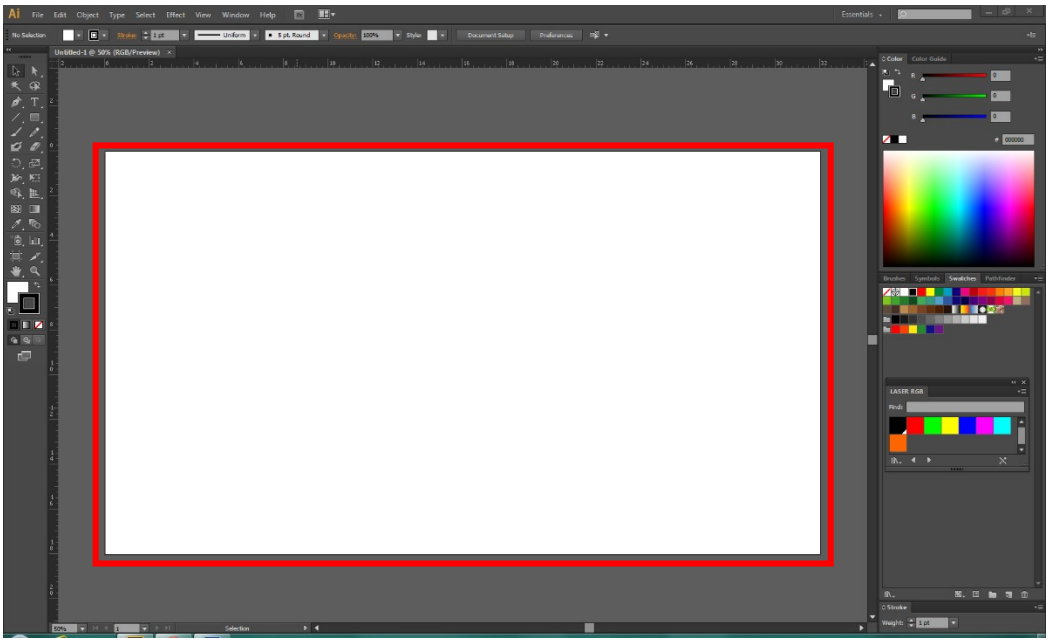
9) Make sure that any lines you intend to use for vector cuts have their line weight set to **0.01pt** in the **Stroke** dialog box. Raster cuts can be any line weight.



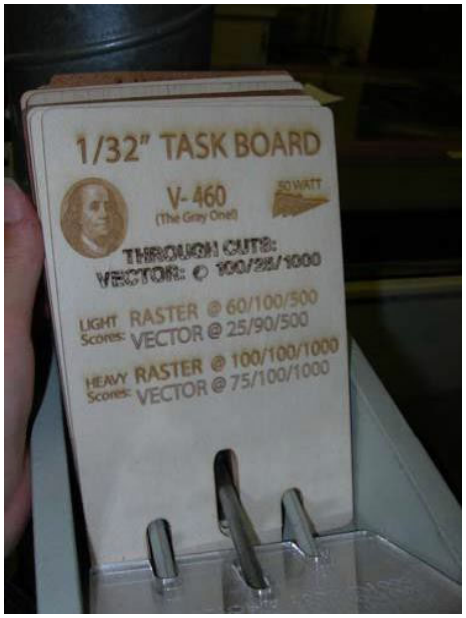
10) Assign colors to your drawing from the **LASER RGB** swatch.

Remember that the laser will cut colors in order *starting with black and ending with orange but that it will also cut rasters before vectors, regardless of color. As a general rule, it works best to assign your raster or "scoring" cuts first, and your vector or "through" cuts last, so that you are not trying to score or engrave into loose pieces which may move or be blown around.*

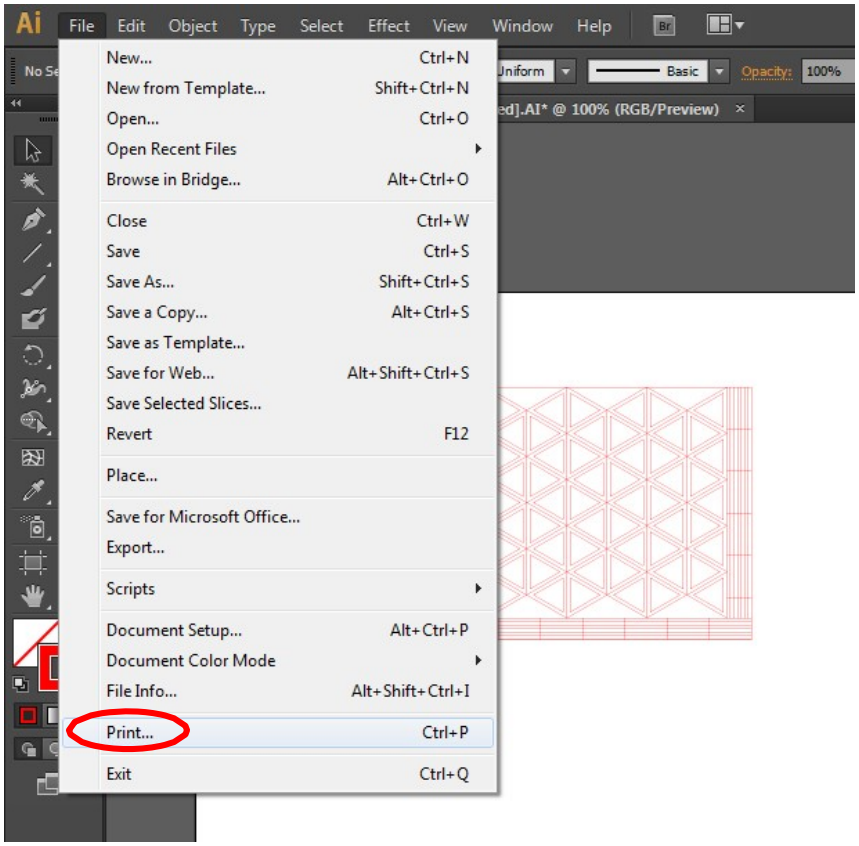
11) The laser machine will only cut/raster the parts of the object that have been placed inside the Artboard area, a white-filled rectangle with the black border. Place the part of your design you wish to cut inside the rectangle, making sure that none of it is touching or overlapping the edges of the box.



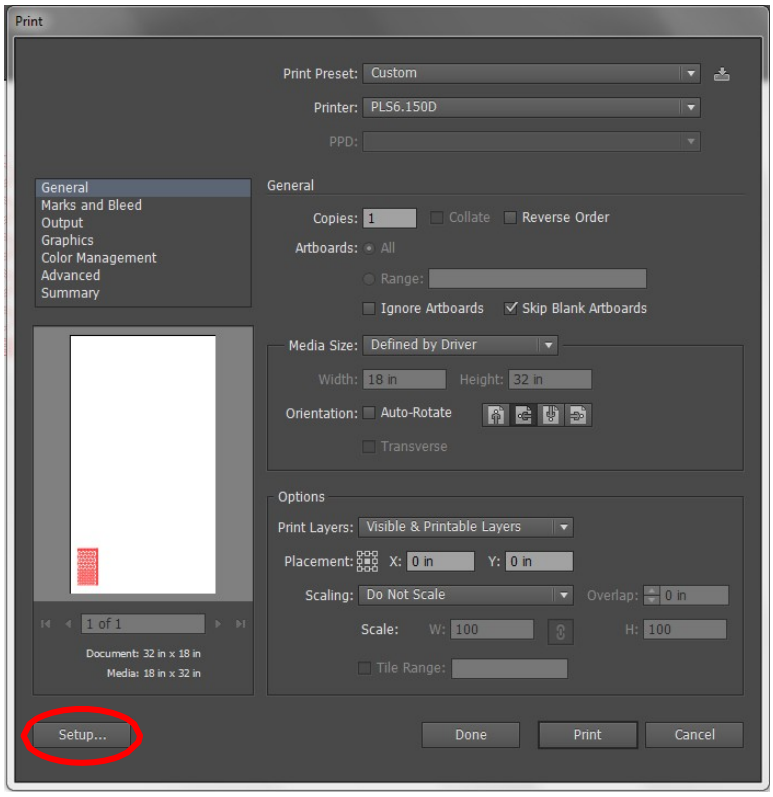
12) Once you have positioned the material you wish to cut, look through the materials settings box at your station, find the card that most closely matches the material you are using. Take note of specific settings on that card, and of which colors you want to assign each setting to. Materials not in the box should be approved by lab manager. Materials not permitted in lab are: concrete, cement, metal of any kind, reflective materials, PVC, foam core, and Vinyl.



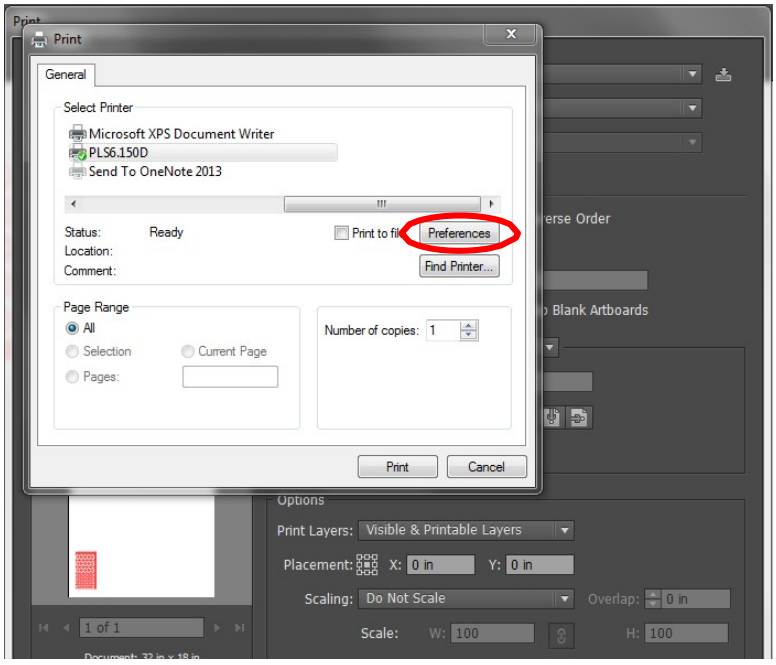
13) To access the laser settings, go to **File**->**Print…**



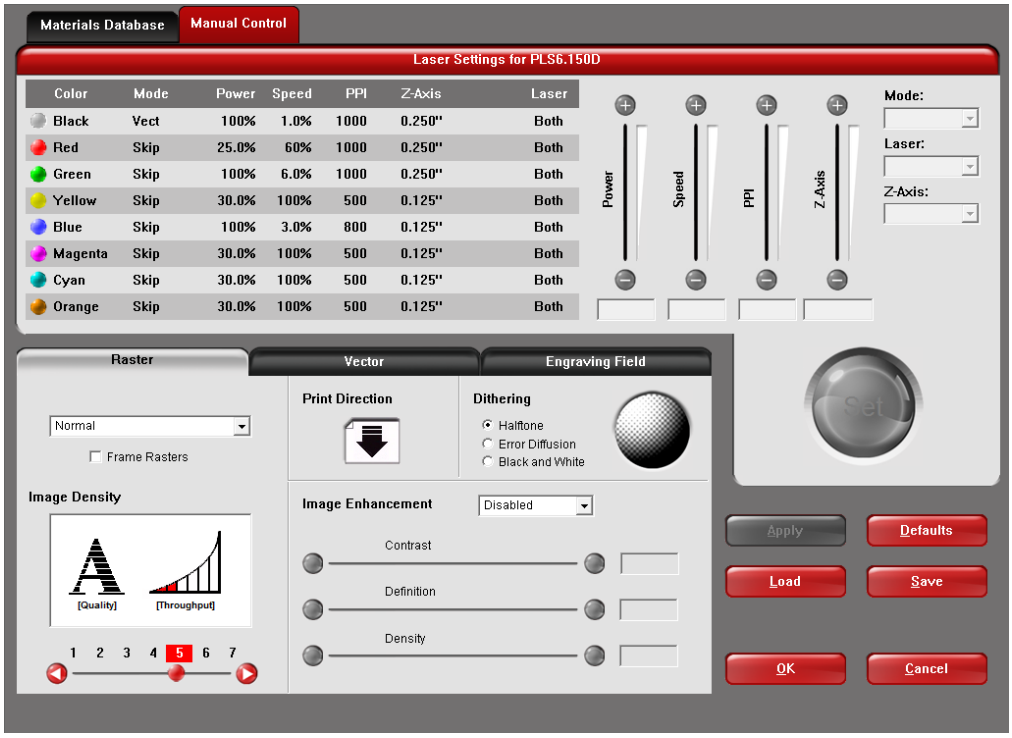
a) Click **Setup…** in the lower left corner of the Print dialog box.



b) Click **Preferences** when the Print Setup dialog box pops up.

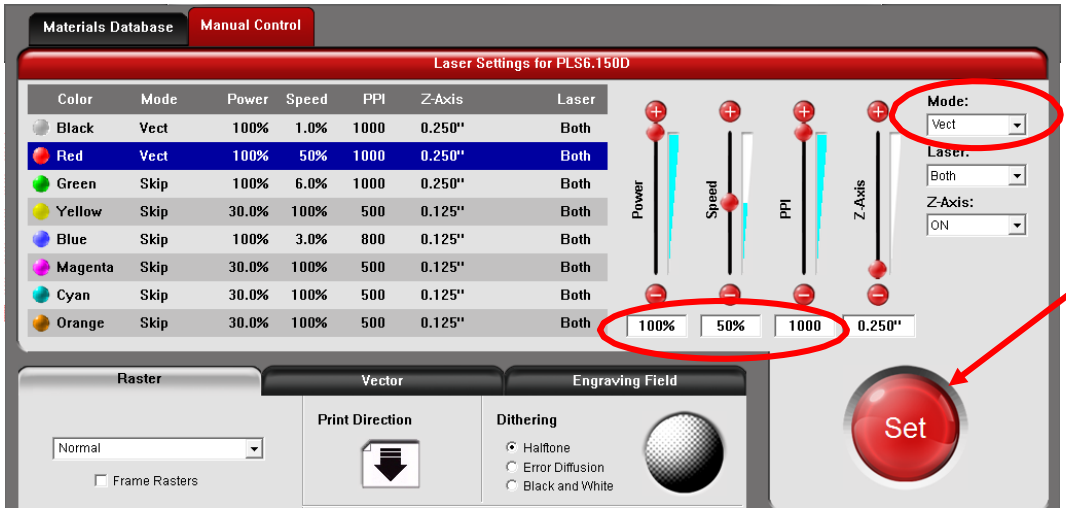


c) You should now be in the **Laser Settings** view and should see a list of the same eight colors in your **LASER RGB** swatch (at left).

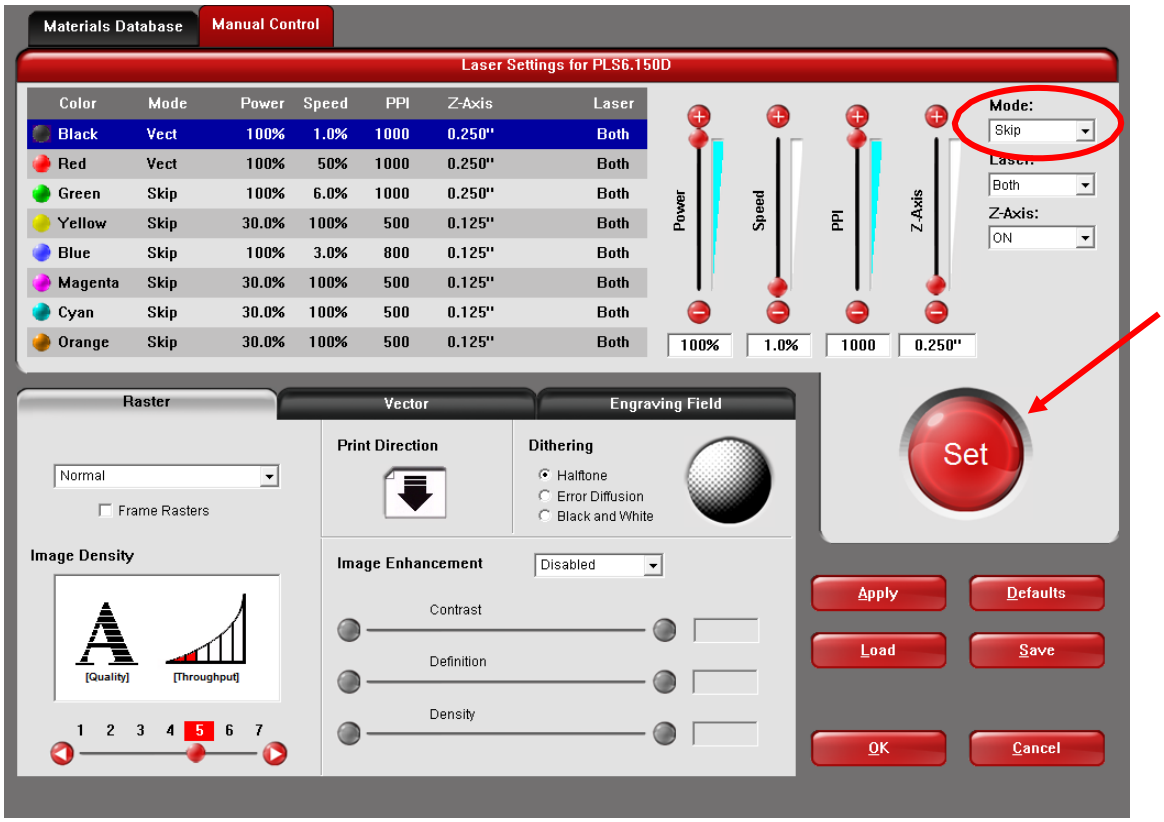


14) For each color you used in your document, the **Mode** needs to be set to **Vect** (typical) or **Rast** (less often used) and the **Power**, **Speed** and **PPI** values need to be set according to the sample cut card for the material you are cutting.

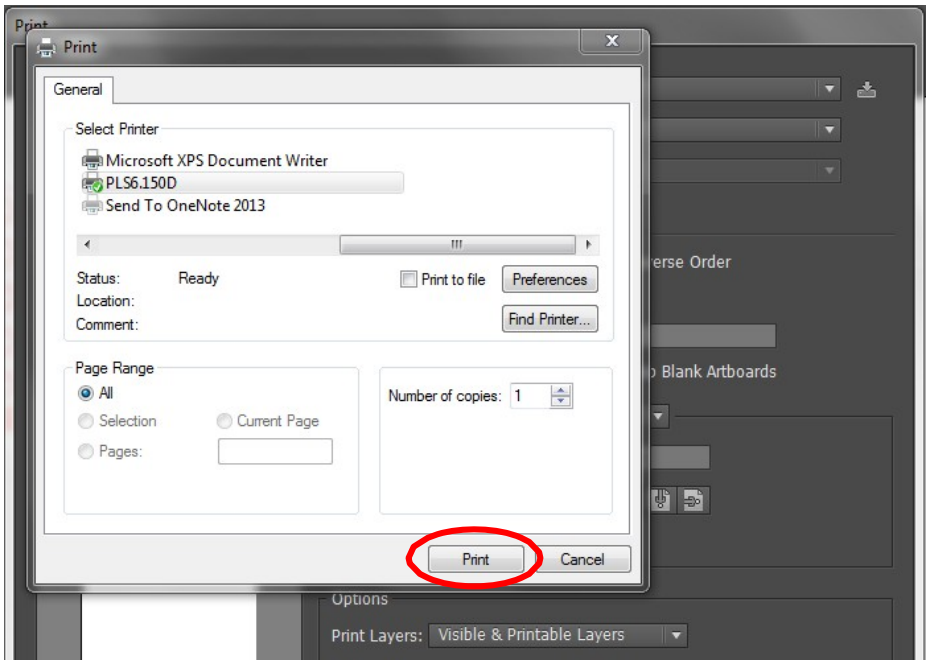
Select the first color you used in your document, then use the boxes at right to configure the cut for the lines in that color. Be sure to click the big **Set** button to save your changes.



15) For each color you do NOT want to cut, make sure to set the **Mode** to **Skip**. Then click **OK**.

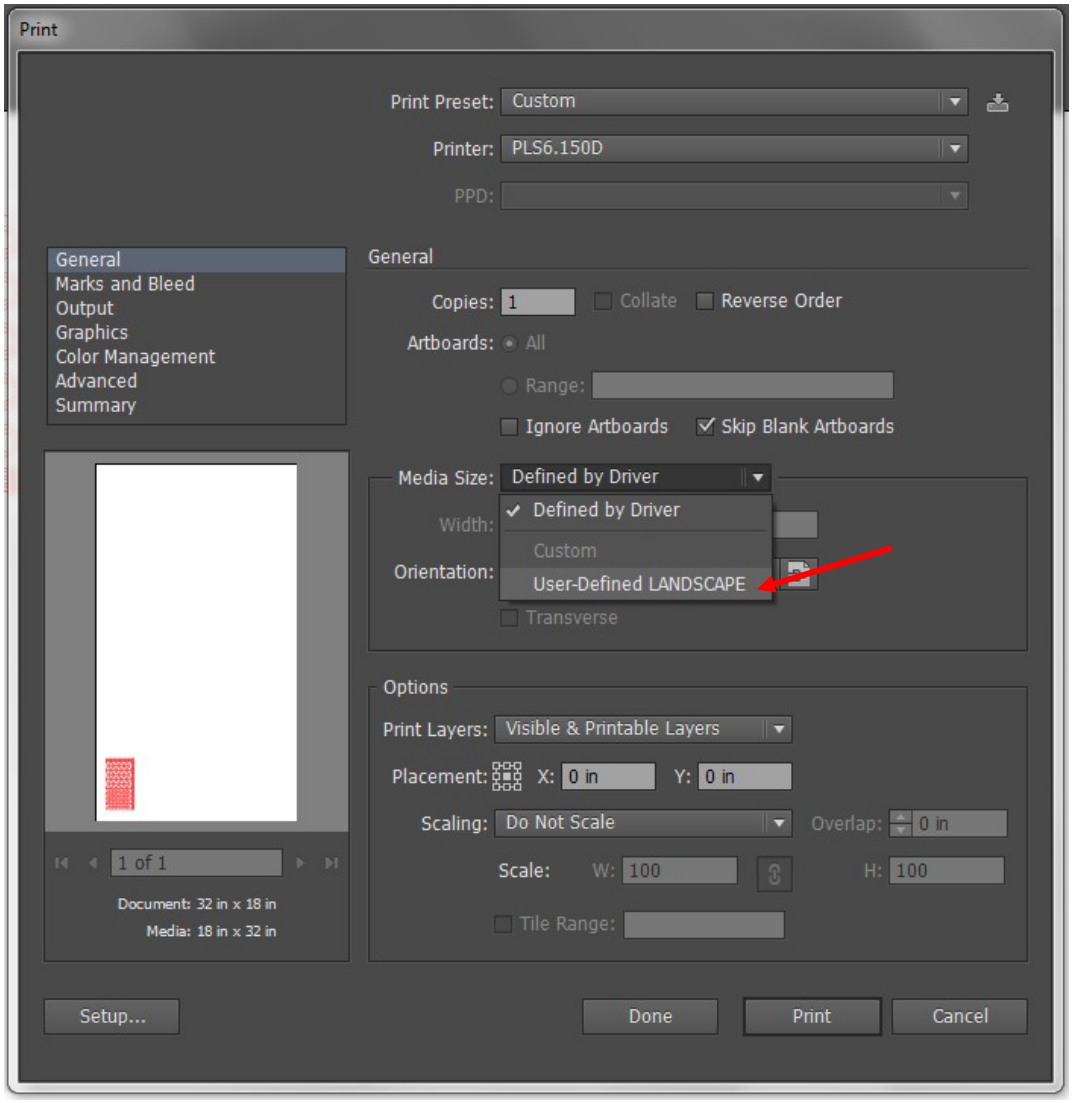


16) Click the **Print** button at the bottom of the Print Setup dialog box.

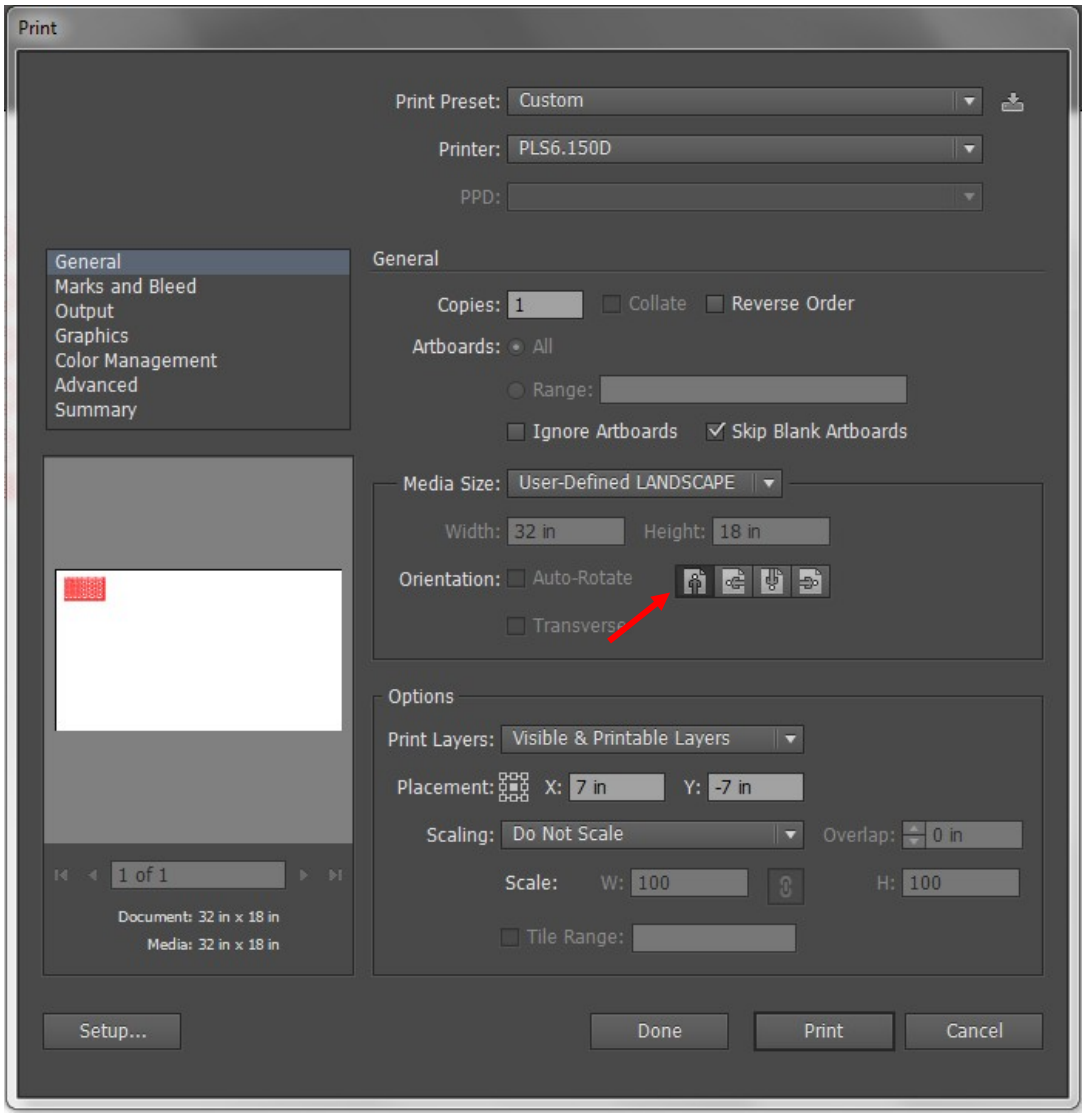


17) In the **Print** dialog box

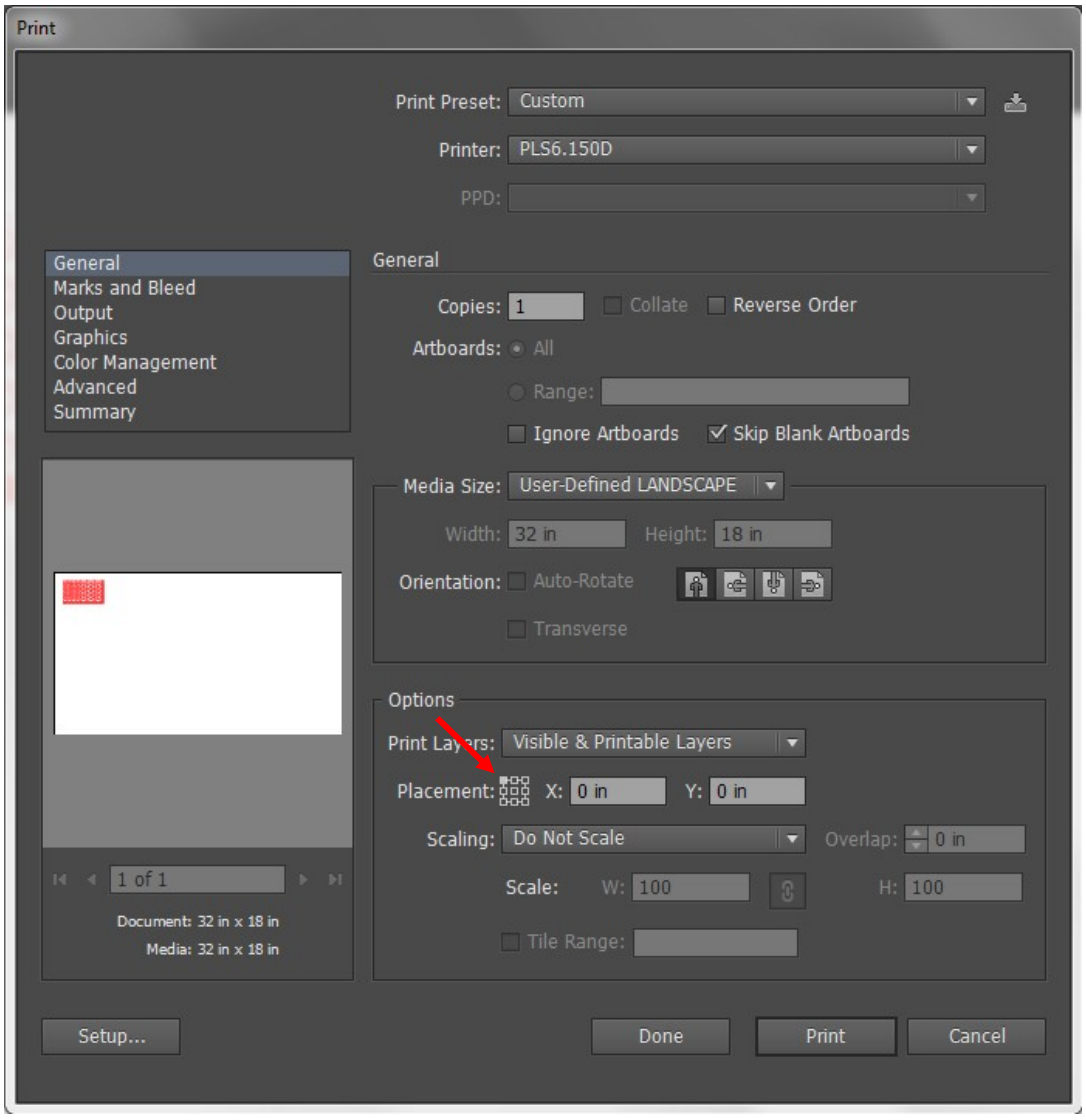
a) Under **Media Size**, select **User-Defined LANDSCAPE**



b) Then for **Orientation**, click the button for portrait orientation (the first of the four). Counter-intuitive, but it fixes the orientation.

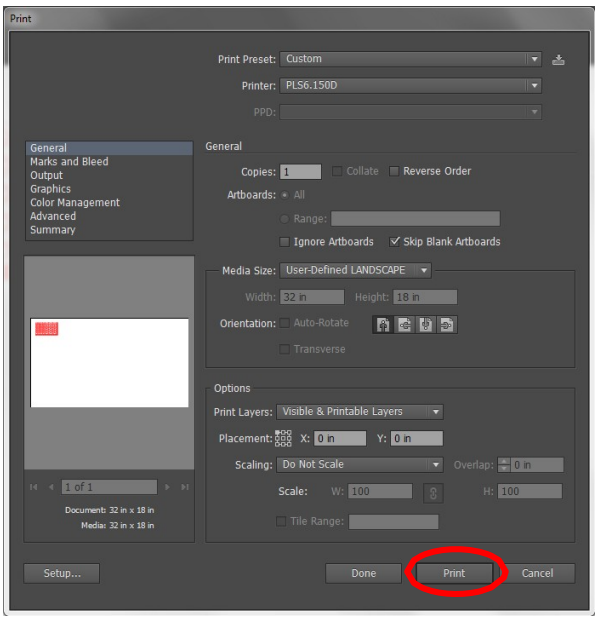


c) Under **Options** click the top left corner of the square in the **Placement** box.



18) Click the **Print** button at the bottom of the Print box.

After a few seconds, you should see your filename on the screen on the control panel of the laser cutter in a format like "301 OF 301 MY CLASS PROJECT."

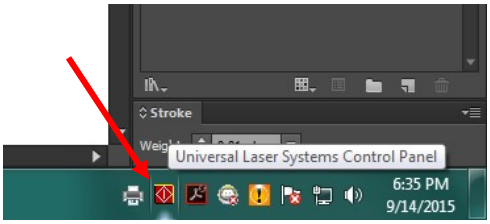


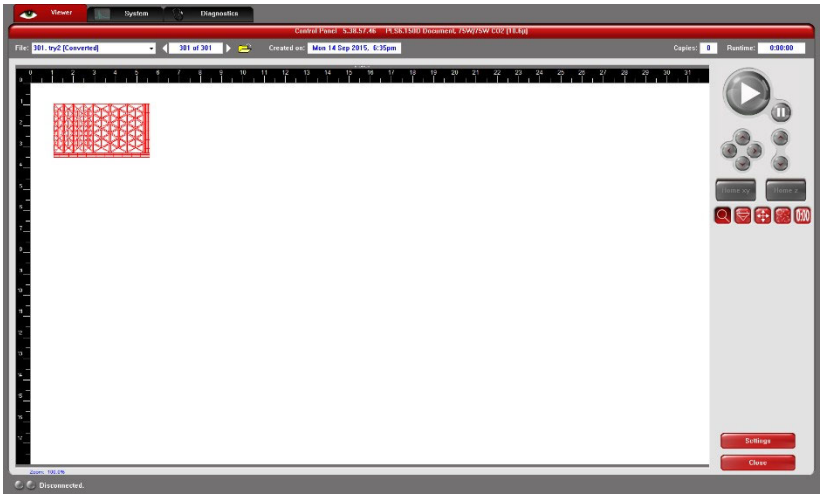
19) Open the lid of the laser machine fully, making sure it does not drop when you let go of it. **Place your material in the bed of the laser**, making sure
- That it lines up with the steel rulers on the top and left sides of the bed,
- That the height of your material will not interfere with the nose cone of the laser,
- That it does not hump up in the middle of the sheet or curl up sharply on the edges.

All of these situations will cause the nose cone to catch on your material and ruin your work.

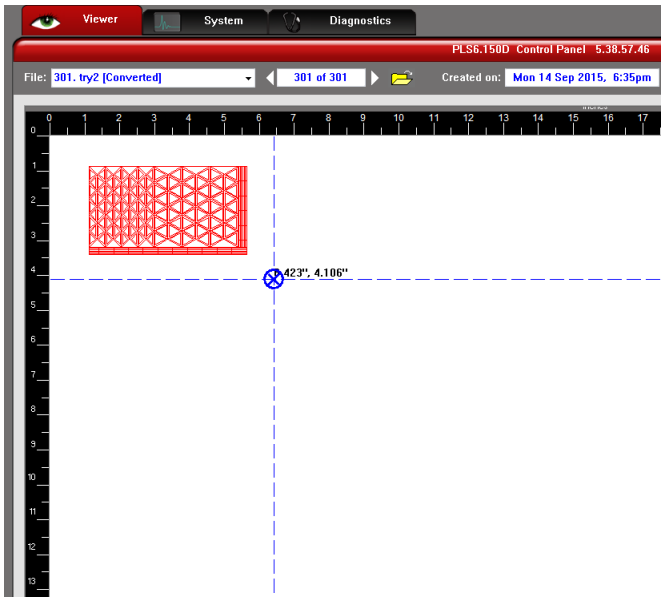
20) Click the **Universal Laser Systems Control Panel** icon in the lower right corner of the screen to open the Control Panel.

The Control Panel displays a virtual view of the laser cutter bed and allows for calibration and cut control.



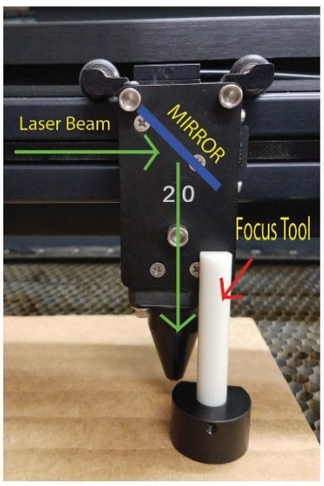


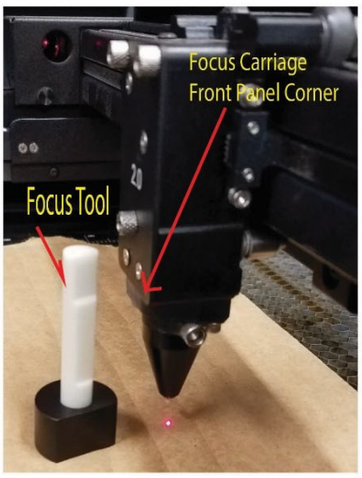
21) Click the Focus icon on the right hand side of the screen, then click on a location, near the middle, over your material. The laser focus carriage will move toward the location you clicked.

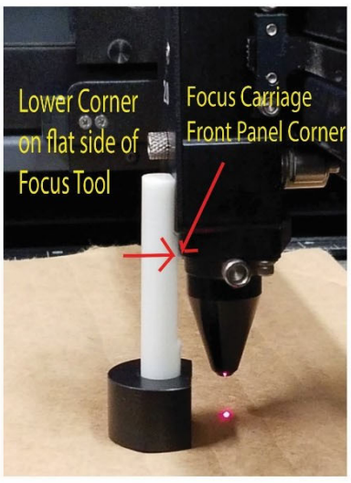


22) Find the back and white plastic focus tool on the right-hand shelf inside the laser machine.

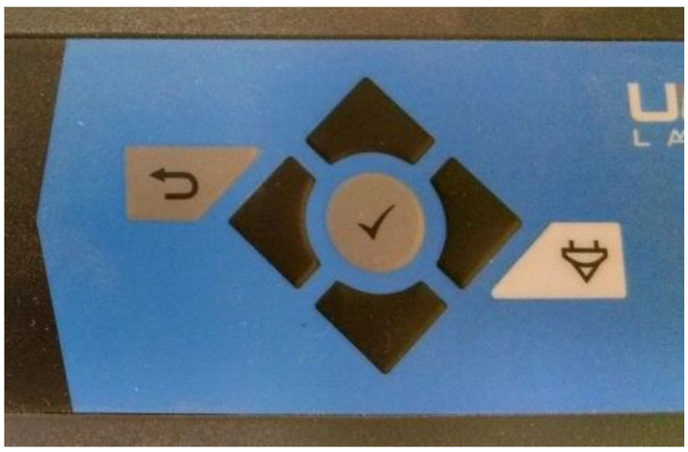
23) Place the focus tool on top of the material, near the laser focus carriage. Raise or lower the bed using the UP and DOWN buttons on the machine so that the lower corner on the flat side of the focus tool rests against the lower front corner of the focus carriage. See below.







24) Select Z, from the menu on the laser machine.
Slowly raise the bed until the lower corner of the front panel on the focus carriage meets the bend on the focus tool (above). As you adjust the Z height
up, you will see the focus tool start to tilt away from the focus carriage. Move the bed back down slightly until the tool sits perfectly flush with the front panel on the focus carriage. To see this accurately, you will need view the focus carriage on the right side.



Pro tip: Press the **Select** (checkmark) button on the machine to change move increment per press of the UP and DOWN buttons

Next: Close lid. See attendant so they can verify your settings and focus is correct.

Tips:

- If you send a file and nothing happens or nothing shows up on the Control Panel screen, check your color mode, check your stroke weight, and check your line colors. This fixes 90% of the problems.

- Don't forget that you can score with vectors as well as through-cut. This is usually much faster than scoring with rasters.

- The lasers will cut all rasters first, and then all your vectors. If you have several vector cuts, the laser will cut them in order of color from black to yellow, just like in the LASER RGB color swatch. Use this to organize your objects so that you cut your scores first and through-cuts last. This will help keep you from losing small pieces and snagging your sheet on the nose cone.

- **Plan to complete your process over the course of a couple or several days, rather than in one**. Bear in mind that the more complex your design, the lower your speed settings are, or the more rastered artwork you have, the longer you will need to cut your file. Laser Lab appointments are limited to 1 hour per day. If no one is scheduled after you, the lab attendant will let you stay until you are done. When the lab is busy, we can not guarantee you will be permitted to stay beyond 1 hour.

- If you have a huge file that you know will take a long time to run, such as a sheet with hundreds or thousands of parts, you can divide it into several areas with a margin in between each, and output them as separate files. Doing this will allow you to pull your sheet off the laser while only partially complete and come back to finish your work later without having to throw your material away and start over.

- If you have very tiny pieces please use "tabs" or "bridges" on them: tiny gaps in the outlines of your pieces that leave them connected to your skeleton. The easiest way to do this in Illustrator is to simply make very small rectangles or circles with white fills and no stroke and position them over the perimeters of each shape in one or two spots. The laser will "see" a gap in your vector. As an added benefit, this allows you to quickly pick up your whole sheet and trim pieces off as you need them at your desk. This works very well for paper and cardstock.

- **If you are unsure about your settings, or still becoming comfortable with the laser machine, make a small test cut** either on a part of your sheet you will not need, or on a separate piece of scrap of the same material you're using for your finished file.