SPEEDY 300 LASER MANUEL

SPEEDY 300

The laser machine Speedy 300 in invention studio makes it possible to cut and engrave different materials with great accuracy (+/- 0.05mm). It is a good way to create an accurate model of your design. This manual provides information on what should be done before using Speedy 300 and how to use Speedy 300. Please read this manual carefully before start using Speedy 300. Note that the use of Speedy 300 is allowed only under supervision of qualified staff of the workshop.

Powering On:

Power switch

After turning on the power, the table will drop to the "zero" Z axis position. Do not interfere with the laser while it's doing this.
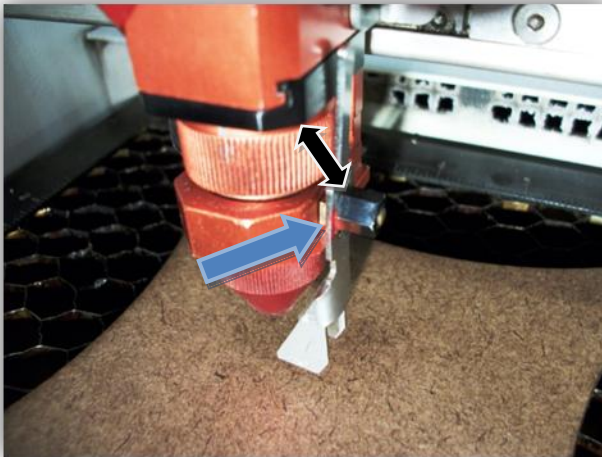
XYZ Controls:

- The **red** arrow keys control XY movement
- The **black** arrow keys control the Z axis
- The only other button you may use on this control pad is the "Pause" button. *DO NOT USE AUTOFOCUS, IT DOES NOT WORK*

Connecting the laser (Job Control):
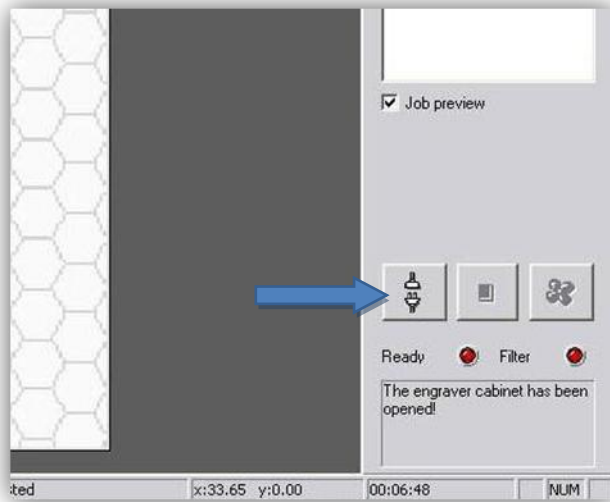
Click the plug and socket button

Focusing on your material:

Find the focusing probe that has a **pin color** that matches the **lens color** and rest in on the edge of the laser head. Bring the Z axis up until it's about 2mm above the surface and tap it the rest of the way until the focusing probe just falls off.

Job Control Setup:

Click "File" ➔ "Print" ➔ "Properties" and make sure:

Process Mode = Standard or Relief   *Minimize to Jobsize = Checked*
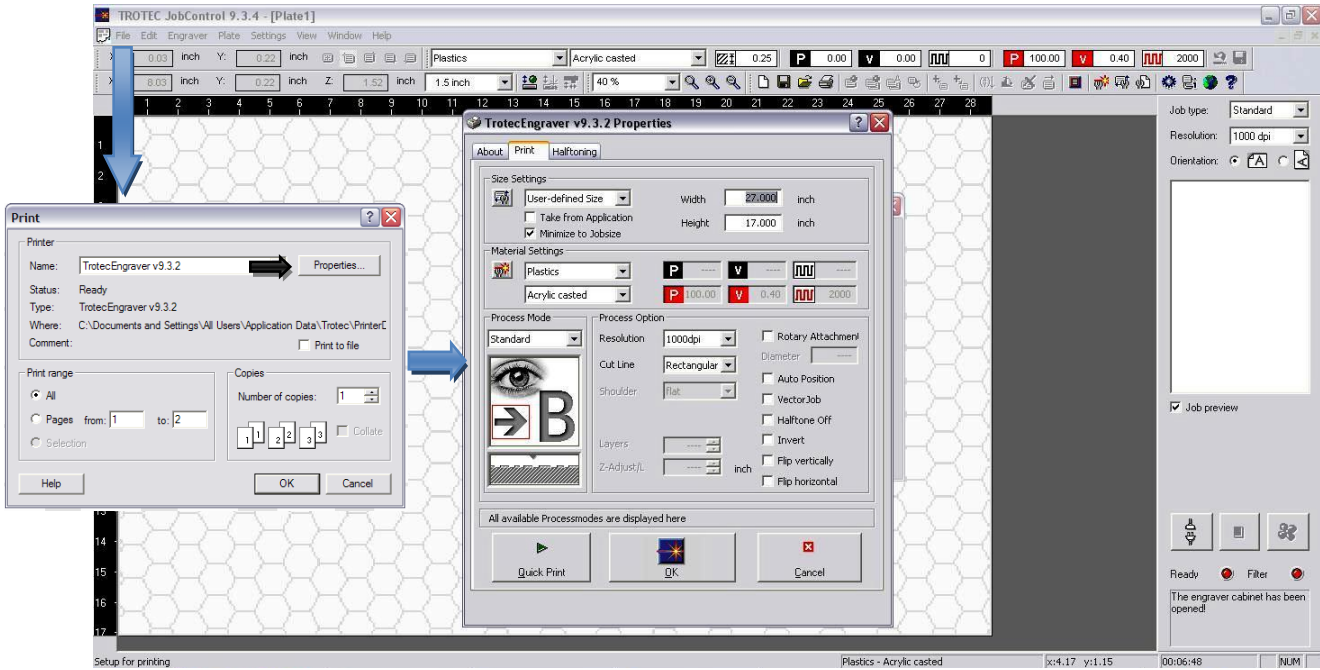
Width = 28.740 in.   *Cut Line = As you desire*

Height = 17.086 in.   *Resolution = As you desire*

For standard jobs (Vectors and Fills):

Process Mode = Standard

Halftone Off = Checked (If job contains colored fills)

Vector Job = Checked (If job contains ONLY vectors)

For relief jobs (Varies laser power w.r.t. grayscale):

Process Mode = Relief

Invert = Checked (If etching photo)

Flip Horizontal = Checked (If etching on the back of a plate)

Color Settings (Job Control):

Double click plate area:

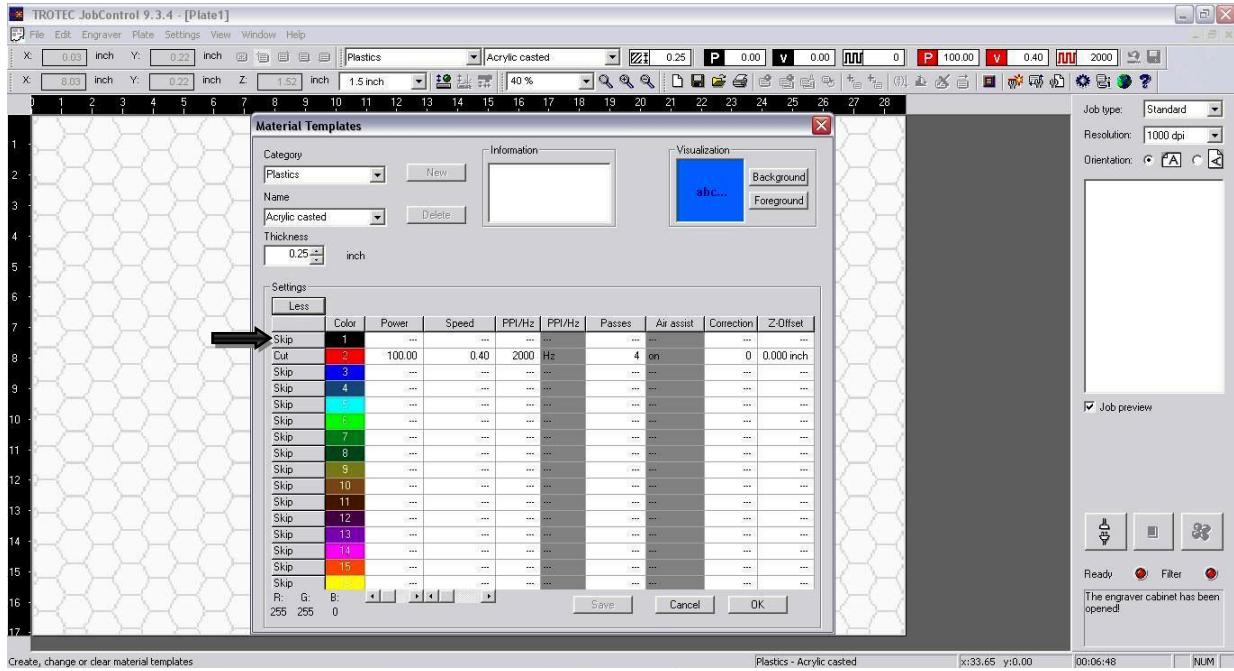Click "Skip" to define whether the color will etch or cut.
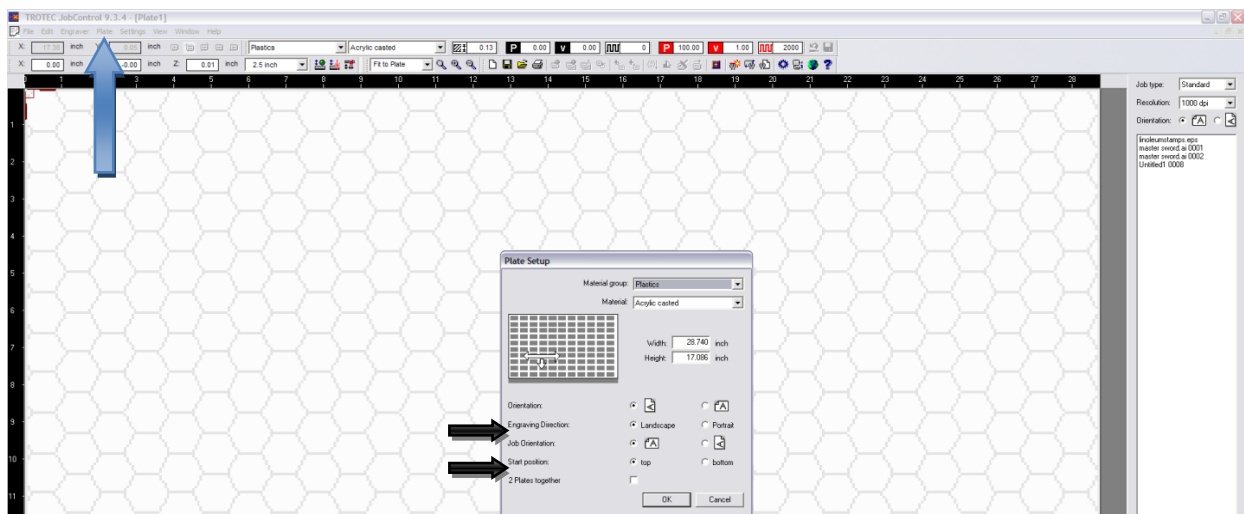

Plate Setup (Job Control):

Click "Plate" → "Plate Setup"

*Engraving Direction =* Defines which axis the laser will raster on

Start Position = Defines whether the laser will raster from bottom to top or vice versa

Units in Job Control:

Click "Settings" → "Options"

Select units in pull down menu and press "OK" (Note: If units are in inches, it will tell you to select a number within some range, this is a bug in the software so ignore it and exit out, the changes will still be made)
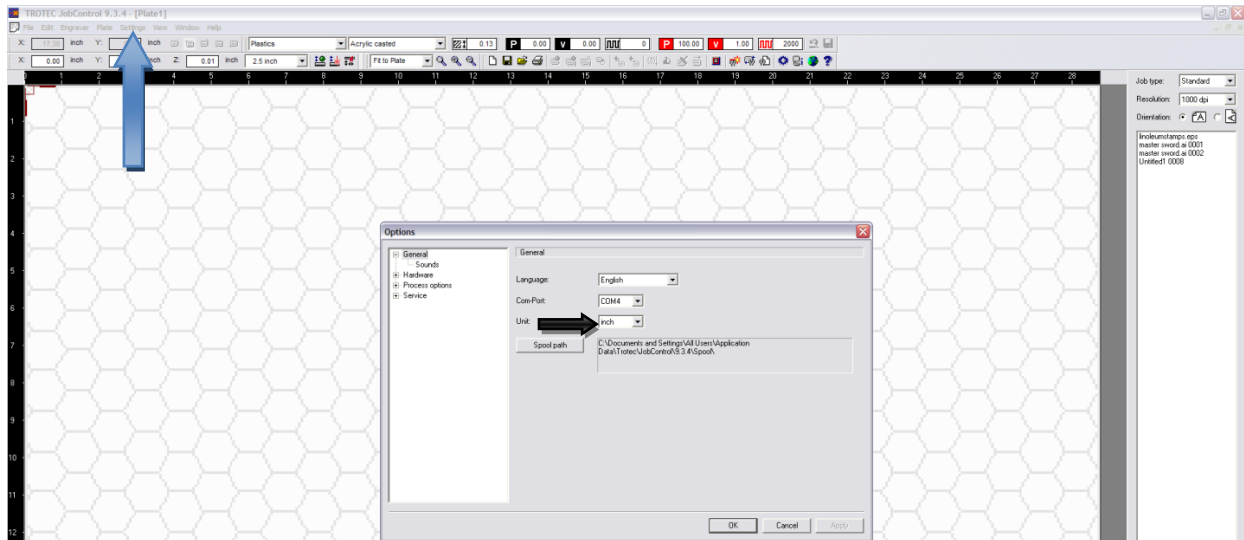
Materials we can laser cut:

We can cut the following materials. If you do not see your material listed, please ask a ULI if the material is okay to use.

- Plastics:

    o   ABS (acrylonitrile butadiene styrene)

    o   Acrylic (also known as Plexiglas, Lucite, PMMA)

    o   Delrin (POM, acetal) — for a supplier, try www.mcmaster.com.

    o   Kapton tape (Polyimide)

    o   Mylar (polyester)

    o   Nylon — melts badly

    o   PETG (polyethylene terephthalate glycol)

    o   Polyethylene (PE) — melts badly

    o   Polypropylene (PP) — melts somewhat

- o   Styrene

- o   Two-tone acrylic — top color different than core material, usually for custom instrumentation panels, signs, and plaques.

- Foam:

   - o   Depron foam — often used for RC planes.

   - o   EPM

   - o   Gator foam — foam core gets burned and eaten away compared to the top and bottom hard shell.

- Other:

   - o   Cloths (leather, suede, felt, hemp, cotton)

   - o   Magnetic sheets

   - o   Papers

   - o   Rubbers (neoprene)— for a supplier, try www.mcmaster.com.

   - o   Teflon (PTFE, Polytetrafluoroethylene) — for a supplier, try www.mcmaster.com.

   - o   Woods (MDF, balsa, birch, poplar, red oak, cherry, holly, etc.) — for a supplier, try www.midwestproducts.com.

Materials we cannot laser cut:

We do not or cannot cut the following materials:

- Metals — We cannot cut through any metals. We do stock an acrylic-based, dual-tone plastic with a faux-metal finish on one side. If you need metal parts, www.dcwaterjet.com might be able to help you.

- Polycarbonate (PC, Lexan) — we stopped cutting Lexan due to the fumes.

- Any material containing chlorine

- PVC (Cintra) — contains chlorine

- Vinyl — contains chlorine

- Glass — you can engrave glass, but trying to cut it will cause cracking or breakage

- Fiberglass

- Printed circuit board (FR4 and other material types)

- Carbon fiber

Accepted file types for laser cutting:

We use EngraveLab 8, CorelDRAW X5, Adobe Illustrator CS5, and AutoCAD professional version 11 to draw and laser-cut parts. We can also use files from a variety of other programs as long as you can export or save as one of the vector-format file types below.

DXF (AutoCAD)   JPG

CDR (CorelDRAW)   TIFF

AI (Adobe Illustrator)   EPS

SVG   PDF

Printing Directly from AutoCAD:

1. Open your file in Autocad
2. Check to make sure it has the properties below. The easiest is to throw all your cut lines onto one layer of a RED color and all your engrave lines on another layer with a BLACK color
   a. Document Color Space =RGB
   b. Cut Lines are 100% Red (R=255, G=0, B=0) and Line weight =.13mm
   c. Engrave lines are 100% Black with a minimum line weight of .13mm
3. Go to the FILE menu and choose Print -> PLOT
   a. Select as your Printer the TrotecEngraver
   b. In the "What to Print" dialogue select "Extents" or "Window"
   c. Don't fit to paper, and select 1:1 as your scale and the correct units
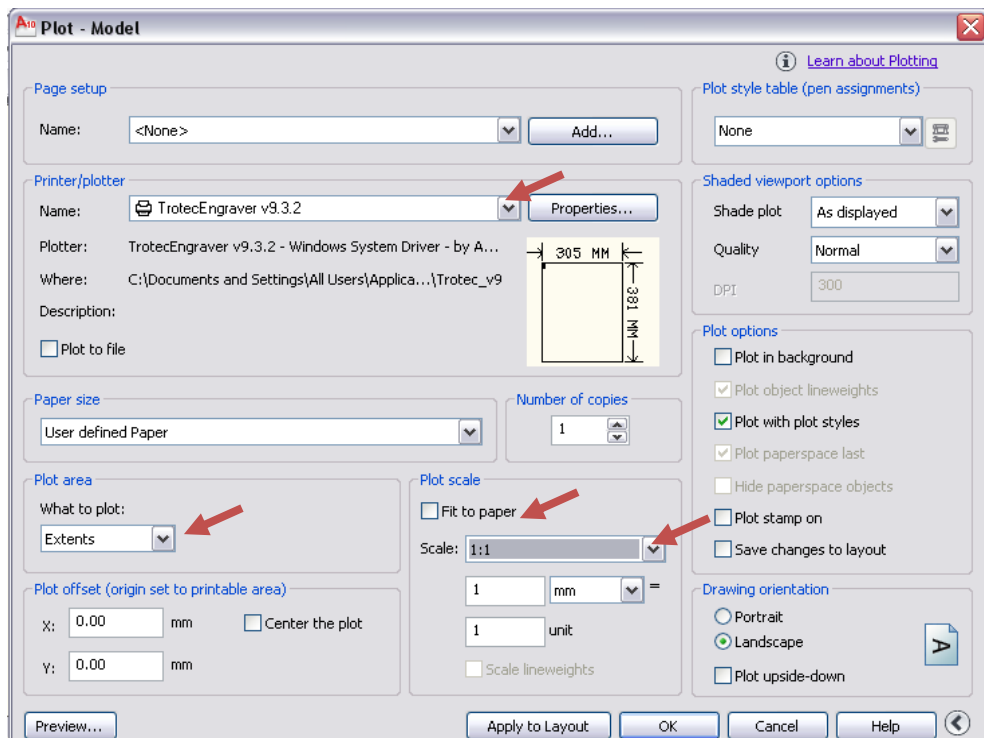
4. To print to the correct paper size, select "Properties" of the Trotec Engraver
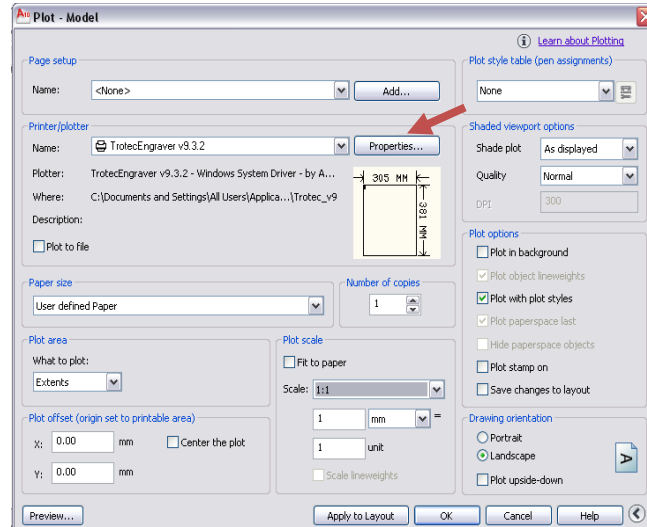
5. Select the "Custom Properties" Dialogue so the Trotec Printer Properties panel comes up and then Input your material size/print area size
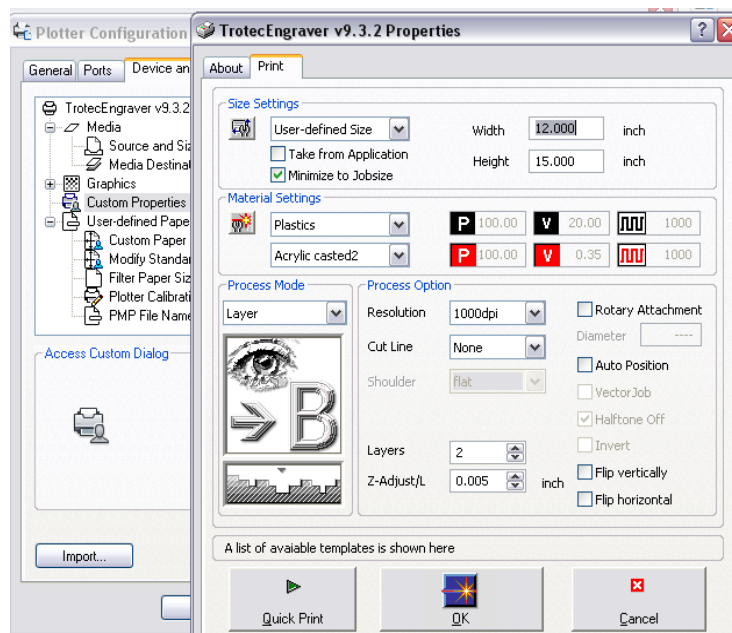
6. Select okay, and then Print your file. It will show up in the JobControl program and you can send it to the laser from there. **NOTE: Make sure your file is saved somewhere on the C: drive for it to print to the Job Control Program. For some reason, files opened off thumb drives don't like to print to the Trotec Job control and won't show up.**

AutoCAD File Preparation:

• Draw to scale 1:1 (1 unit = 1 millimeter). The maximum size of the material is 700x400mm, so make sure that the drawing is divided into areas that are equal to or smaller than this size. Place all objects close together for an efficient use of the material.

- Draw each line only once, so that no overlapping will occur.

- The order in which the lines are drawn is the order in which Speedy 300 will cut and/or engrave.

Because the material is placed on a honeycomb in Speedy 300, smaller parts will fall down and parts of the material which are cut could slightly move. To improve the cutting and engraving process, try to draw parts which need to be engraved and smaller areas first and parts which are larger afterwards. In this way, Speedy 300 will cut or engrave the smaller parts first and the larger areas in a further stage. To be sure that the lines are drawn in the right order layer colors can be used. The best way to build up file is by using the colors in the following order. Make different layers for each color that is used. Make sure the colors are given "by-layer" and not "by-object".

Printing Directly from Illustrator:

Click "File" → "Print" and make sure *Size = User Defined Paper*
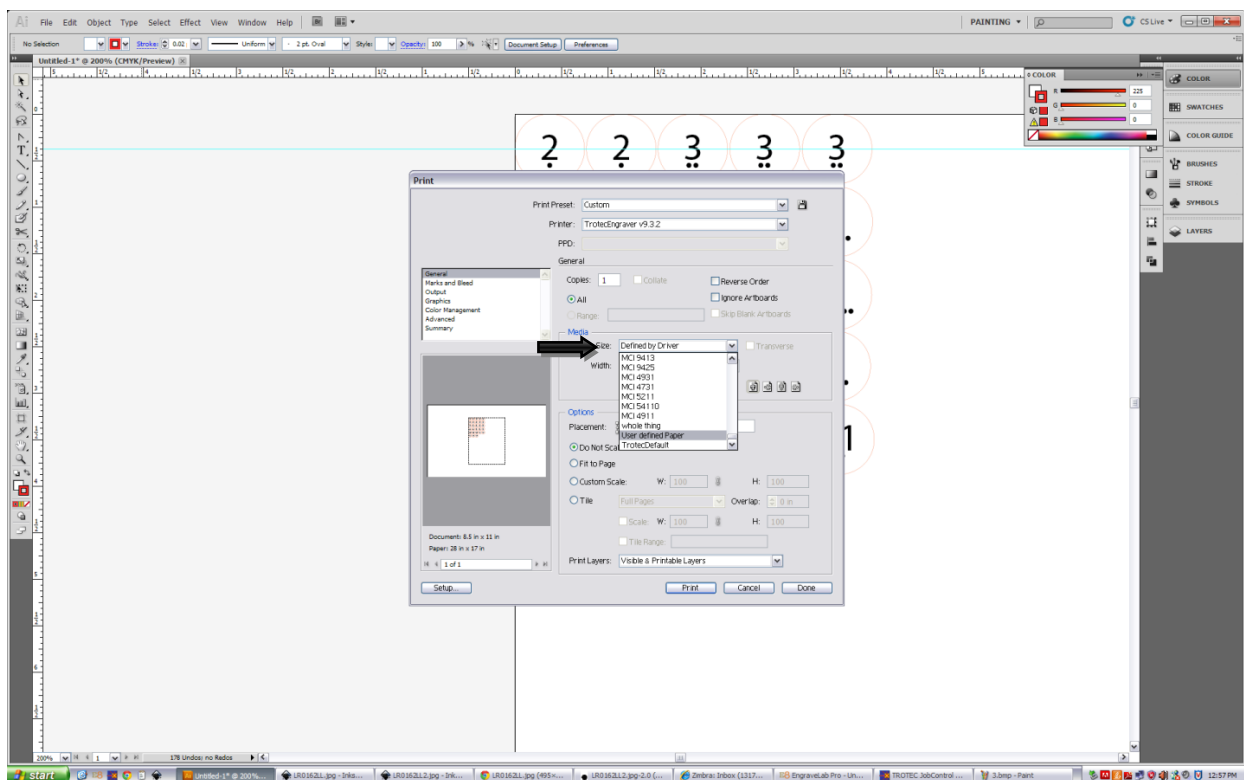
Printing to "Job Control":

- When the print job is sent to the Trotec printer, the program "Trotec Job Control" will automatically start up. Go to this program. On the right side of the screen, the print job will appear. Double click on the print job. It will appear on the center of the screen as a black square. If you would like to see the lines to be cut and/or engraved, click the red lined square in the top bar.

- Double click on your print job. A table with colors and settings will appear. Select the right job for each color by clicking it. (For example: click black and set it to 'skip', click red and set it to 'cut'.)

- Check the settings of each color. These settings depend on the material which needs to be cut and/or engraved. There is a list available at the workshop with standard settings of each material. These settings can be changed to create a different effect of cutting and/or engraving. Remember which setting you are using if you need to use Speedy 300 multiple times. The settings can be changed for power (P = 0-100%), speed (V = 0-100%) and Hertz (WW = 10-20000Hz). The depth of the cutting and/or engraving depends on power and speed.

- Place the material which needs to be cut or engraved on the honeycomb and be sure it is sitting flat, if it is not flat the laser will go out of focus on the uneven regions. When this is done, press the play-button on the bottom-right side of the screen. Speedy 300 will now start cutting and/or engraving.

- If you notice that the print job isn't performed in the right way, never press the stop-button but always press the pause-button on the screen. In this way it is possible to change something and continue the job. After pressing the stop-button, the print job will be stopped and has to be reset before Speedy 300 will continue. This means new material has to be used while the cutting job is only half-way.

- When you need to cut or engrave multiple times with the same material, delete the print job after it is done (right mouse button – 'delete job') and load a new one from the right side of the screen (by double clicking it). Check the settings. If you want to cut and/or engrave the same job again, click on the right mouse button and click 'reset job'. Check the settings. Before cutting or engraving a new material, the laser needs to be focused again.

Cutting and/or Engraving Text and/or Photos

If you would like to cut and/or engrave text and/or photos, there is a different way of preparing. Make text in CorelDraw or open a photo in CorelDraw and convert this to Bitmap. Text can be created with only outlines, filled or anything in between by using grayscales. Photos can be created in grayscale or black-and- white. By using grayscale a 3D-effect can be created. If needed contrast, brightness and intensity can be adjusted.

When you have converted the text or photo to Bitmap, it can be printed in the same way as line drawings. Go to 'file' and click 'print'.

Troubleshooting

- If Speedy 300 won't cut and/or engrave in the right way, press 'pause' on your screen. Check in the AutoCAD file if you have drawn all lines as polylines, splines or circles. Check if you placed all lines on the same layer in the layer control. Check if there are no overlapping lines