

Laser Cutter Engraver Introduction



Laser Training Outline

- Laser Use Guidelines and Policies
- Introduction to Laser Equipment
- Introduction to Laser Software
- Laser Safety Review
- Rotary Tool Issue
- Tips, Hints, and having FUN
- Hands on Training and Use



Guidelines and Policies

- **Have you signed the Waiver Form?**
- **This is a Red Tool** – Red tools require safety training on a specific machine to operate unsupervised for safety and to prevent damage to the machine.
- **Scheduling** – Login to Makersmith.org. Go to Members Only Content. Fill out the reservation form.
Limits: - 2 hours per day (can tentatively schedule 4 hours)
- 8 hours/week if time is open
- Priority of scheduling given to Members over Non-Members
- **Usage Fees** – collected to cover consumables (cleaning supplies, upgrades etc.)
 - Members – first hour free (per month), \$6 an hour after that
 - Non-Members - \$45 an hourBillable time is based on using the machine or schedule on the google calendar (not print time)
Payment: Cash Box (note date and laser time on envelope),
....future, RFID chip lock that will interface with billing system
- **Log Book** - Keep track of print time /cut time in the logbook next to the laser computer (used to determine maintenance/cleaning)



Laser Equipment

- Universal Laser System (ULS) – PLS6.150D
<https://www.ulsinc.com/products/platforms/pls6-150>
- Uses two 50 watt sealed glass CO2 cartridges
- Cutting area is 32” by 18” – Material bed adjustable for height/thickness
- Rotary attachment available (separate training session)



Laser Software

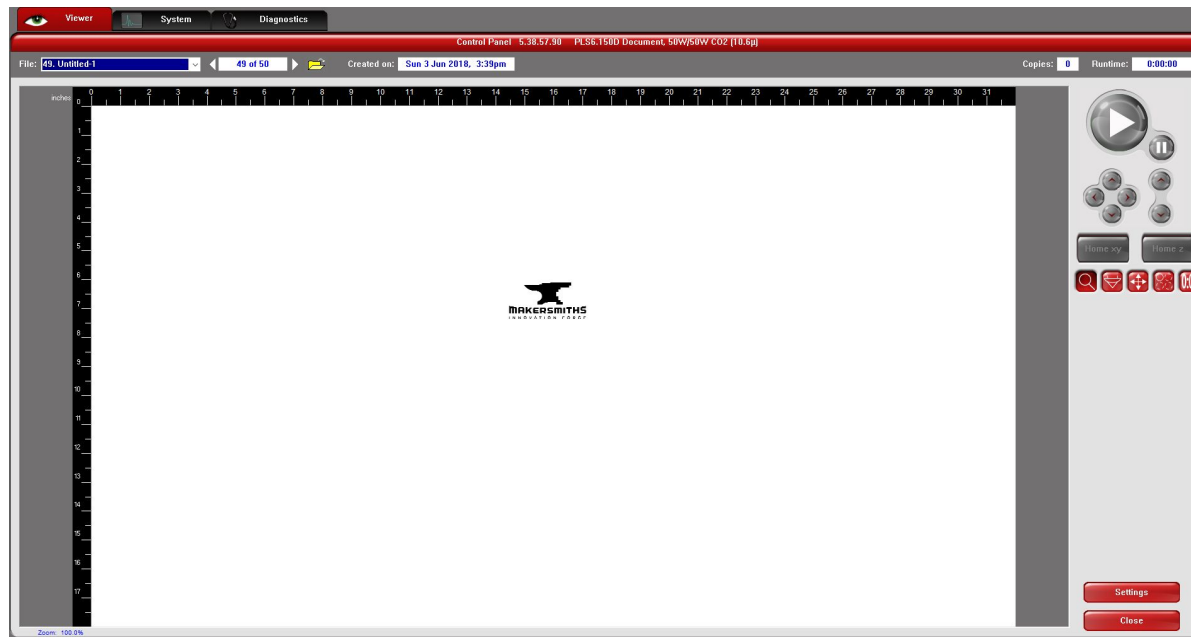
ULS Print Driver

- Previews artwork and controls laser cutter
- Check out Makersmiths Wiki under tool references/laser cutter to download driver on your personal computer. You can set up your print, save and export it.

Corel Draw 2021

- Used to “Print” the Drawing file from the Laser Computer thru the ULS Driver over the USB link to the Cutter/Engraver. When File->Print is used, select the Laser device, and click properties to set proper information on which material and thickness is being used

Other Drawing tools: Adobe Illustrator (\$49 a month), Inkscape (free, but not perfect), Fusion 360



Laser Safety Review

Personal Safety

- **Don't stare** at the cutting point – Not dangerous but is very bright. The window shields harmful light but prolonged exposure can give you headaches and more.
- Don't cut or engrave materials that will **create fires or produce toxic gases**
- **Pause at end** of execution to allow air inside the chamber to fully vent.
- Engrave mirrors from the backing side, not the front side. If double sided, please cover all sides with an opaque film.



Device Safety

- Always be sure the External Exhaust Fan is in operation cutting/engraving.
- Be sure the bed is clean and has no debris from previous uses. (Always clean it when you are done.)
- Make sure you have **focused** the Laser Optics to the top of your material.
- **NEVER Leave the Running Laser Unattended!**
- If material catches fire, don't Panic. Try blowing it out, remove it from the device, cover fire blanket, and as a last resort use the fire extinguisher.
- Opening any door will stop the laser from firing. Use pause button to resume.

Laser Safety Review

- **Materials**

- **No-Nos.**

- PVC, ABS, or any material that won't cut well or emits gases: Polycarbonate/Lexan (which might look like Acrylic but is not), Artificial Leathers (pleather), HDPE (milk bottle plastic, melts and creates fires), Foams (PolyStyrene or PolyPropylene) catch fire, Fiberglass (emits fumes), cellulose (combustible)

- **OKed**

- Cuts: wood, plywood, acrylic/lucite/plexiglass, paper, cardboard, fabric (most), leather, cork, Gator Foam, Depron foam, plastics (without Chlorine), dry celluloid sponges (always double check what they are made from), Craft Foam/EVA , wool felt, acrylic felt (may melt down a bit), Foamcore/Foam board (the inside melts away faster than the outside), Laserable Rubber (low odor or red)
 - Engraves: Materials above plus Metal with coating, glass, ceramic tile glaze, stone, painted or powder coated tumblers

- A very good reference page is available online from ATX HackerSpace, A maker group in Austin Texas http://wiki.atxhs.org/wiki/Laser_Cutter_Materials



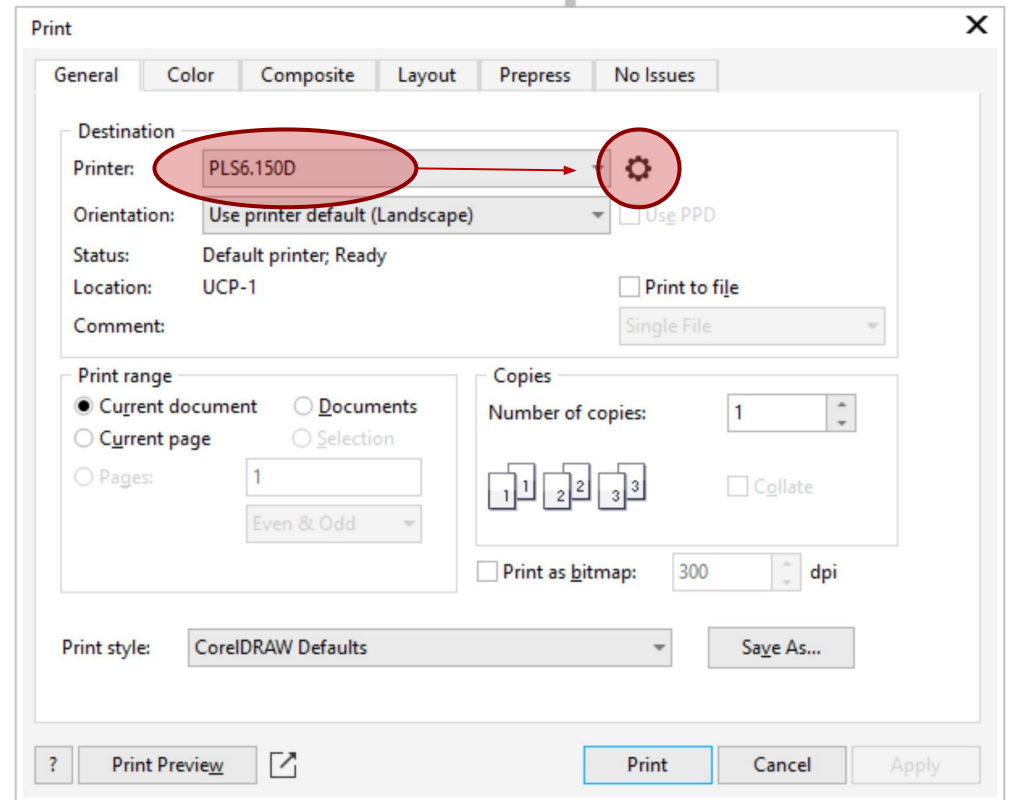
Process

1. Create Artwork

- Vector Cut Lines (**RED**)
 - RGB: Red 255, Green 0, Blue 0
 - Hairline or .0014”
- Etching
 - Vector (**BLUE**)
 - RGB: Red 0, Green 0, Blue 255
 - Hairline or .0014”
 - Raster (**Black/Gray**)
 - Everything else

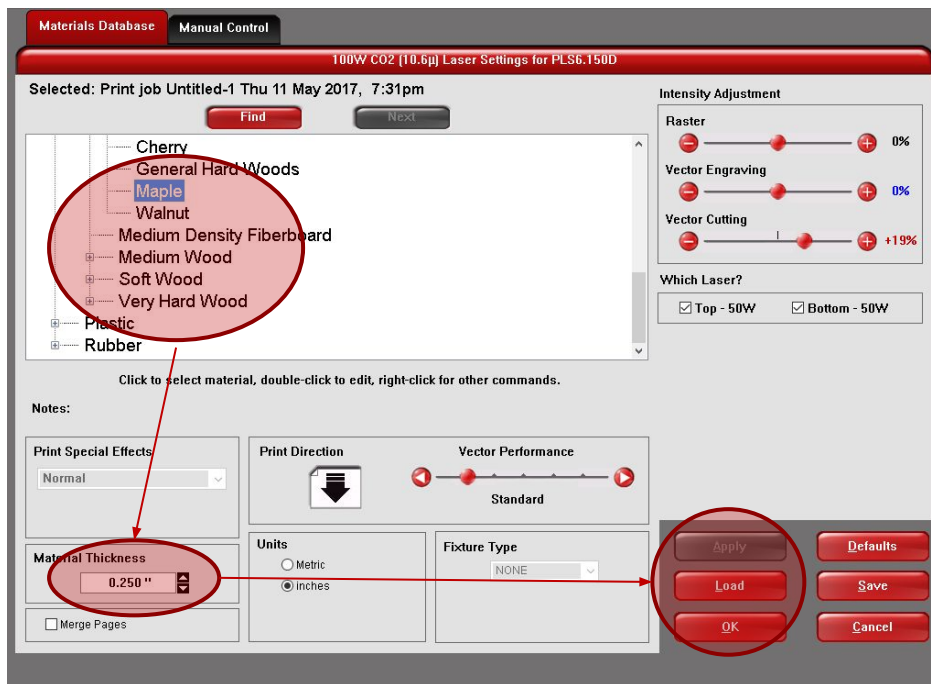
2. Print

- Select Laser Print Driver
 - -PLS6.150D
- Select preferences box



Process Cont.

3. Select material, thickness, Apply Button and OK. Select OK again in the art software.



4. Open the ULS print Driver (lower right screen)



5. Turn Laser ON (if not already)
 - Toggle switch in front of power cord - right side of machine
6. Position your art work



Moves
Tool Head
around bed

Moves
Artwork
around bed

Tip: use "to
pointer" button to
move art work to
tool head
location

Process Cont.

7. Focus Z Axis

- Use machine key pad and focus tool.
- You can also turn on the auto z under the System tab and the bed will adjust to what you entered as thickness. This will happen when you run the laser.
warning bed may not be calibrated for auto z, and we can't guarantee the laser will be 100% focused

8. Turn on Ventilation

9. Run Laser

10. Clean up

Issues?

Laser does not turn on?

- Make sure power cord is plugged at wall outlet by copier

Air assist error

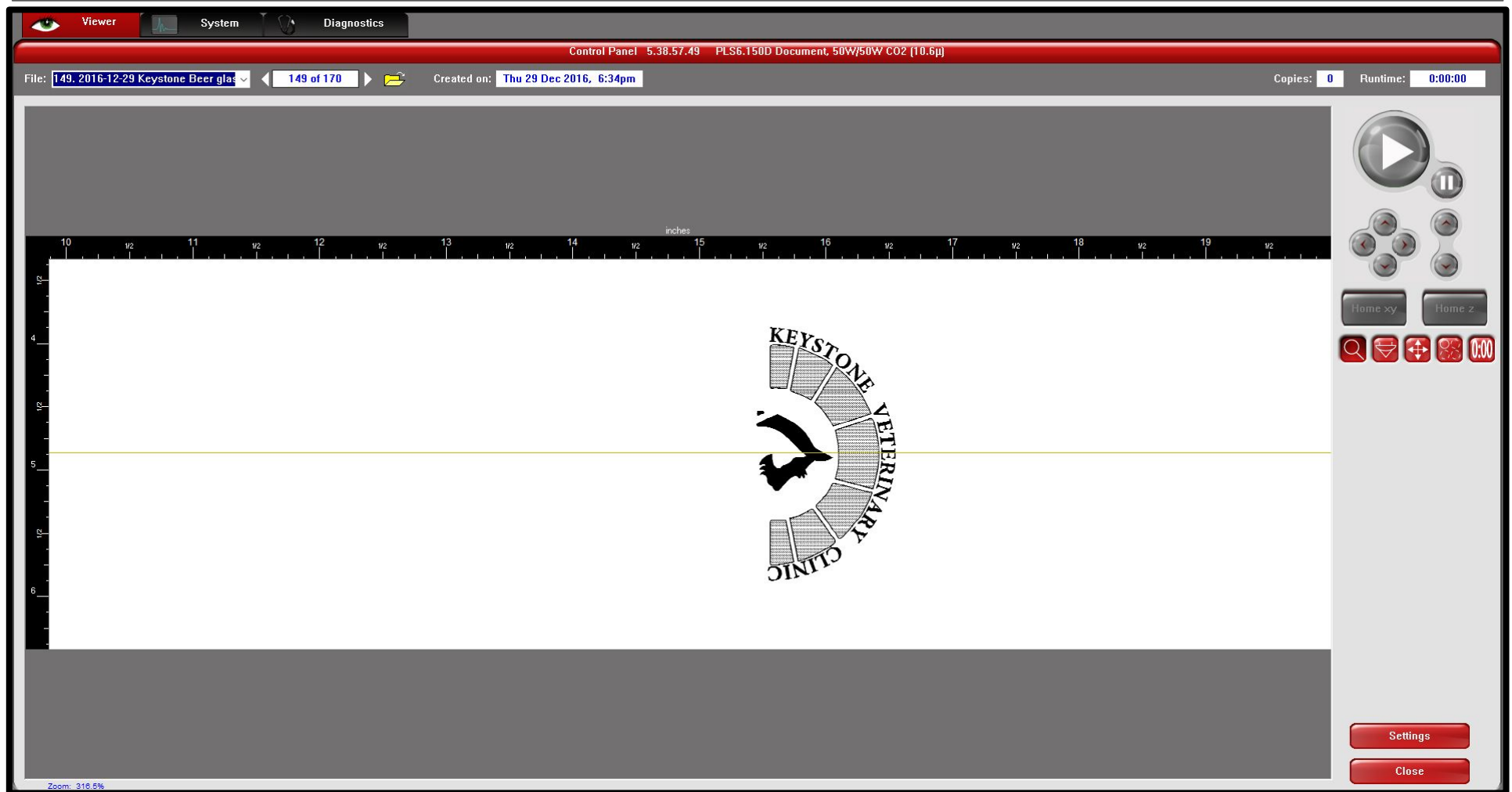
- Make sure ventilation is on If happens during long runs...close print diver and open again to clear.
- Strange yellow line across screen and can't move art work around.
- See next set of slides on Rotary Tool Issue



Rotary Tool Issue



What is happening?



I printed to the laser and there is a yellow line and can't move the artwork up and down?



Rotary Tool Settings

Cause

- Someone before used the rotary tool and the settings stayed in the print diver.

Fix

- Go back to the art work software (Coral Draw)
- Select print Preferences Manual control Engraving Field uncheck rotary tool box
- Double check that your material database setting are ok and click apply ok
- See next slide to walk through



Fix

- Open print dialog box, select Laser Cutter and print properties(1)
- Select manual control tab (2)

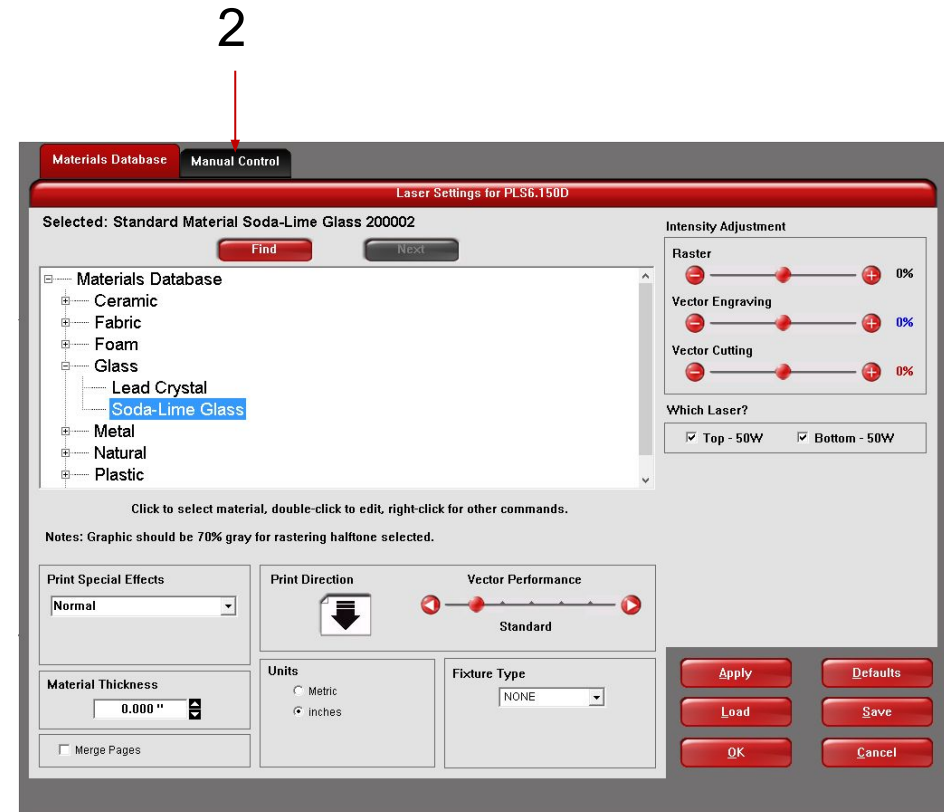
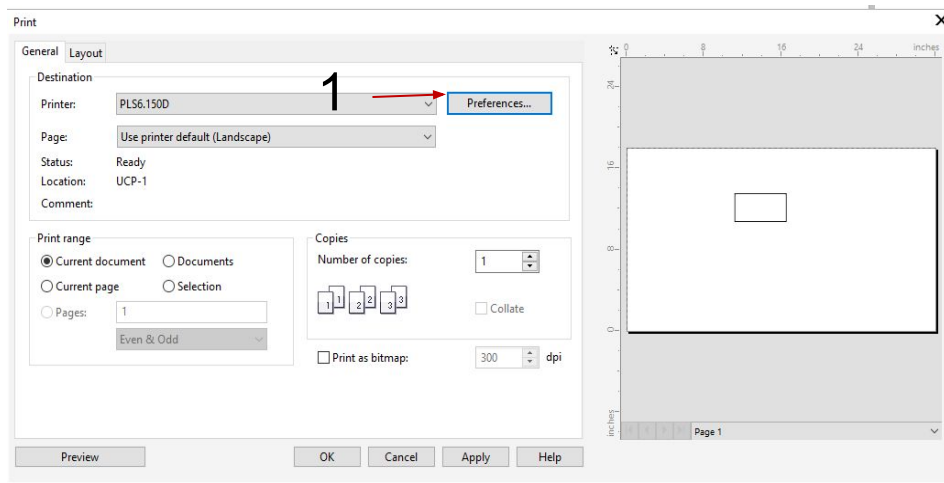


Image Creation cont.

Select Engraving Field tab (3)

Select Enable check box (4)

Hit apply & OK (5)

Laser Settings for PLS6.150D

Color	Mode	Power	Speed	PPI	Z-Axis	Laser
Black	Rast	100%	95%	500	0.000"	Both
Red	Vect	10.6%	24%	165	0.000"	Both
Green	Rast/Vect	50.0%	100%	500	0.000"	Both
Yellow	Rast/Vect	0.0%	100%	500	0.000"	Both
Blue	Vect	10.6%	24%	165	0.000"	Both
Magenta	Rast/Vect	50.0%	100%	500	0.000"	Both
Cyan	Rast/Vect	0.0%	100%	500	0.000"	Both
Orange	Rast/Vect	50.0%	100%	500	0.000"	Both

Power: 100% | Speed: 95% | PPI: 500 | Z-Axis: Off

Engraving Field

Enable

Diameter: 2.000"

Rotation Factor: 1.0000 (Normal: 1.0000)

Dual Head
 Center Image
 Merge Pages

Pin Table Enable

Buttons: Apply, Load, Save, OK, Cancel

3

4

5

Tips, Hints, & Have Fun

Other Sources of information

- 10 Tips and Tricks for Laser Engraving and Cutting
<http://www.instructables.com/id/10-Tips-and-Tricks-for-Laser-Engraving-and-Cutting/?ALLSTEPS>
- Material Safety and your Laser
<http://support.epiloglaser.com/article/8205/30188/material-safety-and-your-laser>
- How to test if a material is safe to laser cut!
https://www.reddit.com/r/glowforge/comments/3no1vj/how_to_test_if_a_material_is_safe_to_laser_cut/
- Visit the Engravers forum at: <http://www.sawmillcreek.org/>
- Laser Engraving Tips: <http://www.inoplas.com/techtips/laserengrave.asp>
- Maker Case: a super easy to use website that will design box files for you! You just input the demensions
<https://www.makercase.com/>
- **Remember that the kerf is .003” when building things that need a tight fit!**



Tips, Hints, & Have Fun (cont)

Where to buy Acrylic

- Canal Plastic (closest to us) <https://www.canalplastic.com/collections/acrylic-sheets>
- Johnson Plastics <https://www.jpplus.com/engraving/sheet/laser/plastic>
-
- Tap Plastics (furthest, longer shipping) https://www.tapplastics.com/product/plastics/cut_to_size_plastic
- Inventables (great place to buy small sheets of 1/8" wood too. Just double check it is laser safe)
<https://www.inventables.com/categories/materials>



Laser Hands On

- Hands on use of the Laser
- Some sample projects with various materials
(Designs prepared by others ahead of time, so you won't need to design something today. But this will give you some experience in how to “Print” and actually produce a product on our system.)
- The start of something... Build something today...
- Calendar Link: <https://makersmiths.org/LaserReservations>
or go to Makersmiths Wiki look for calendar under tool resources/laser cutter

