Universal 2.30 Desktop Laser

Training:	Required
Reservation:	Required

Please check with Library staff to confirm minimum age certification requirements to use this machine with supervision and without supervision as provided on the Equipment Usage Chart.

Certification

To become certified on this piece of equipment you will need to attend a training class that lasts approximately 60 minutes. By the end of the class you will be able to:

- Identify approved safe laser material
- Generate laser files
- Adjust laser settings
- Load material into the laser
- Execute your laser job
- Install the rotary fixture
- Install the engraving fixture

To sign up for a training session please see the training binder (available at the front desk).

Reservation

To reserve this piece of equipment you will need to first be certified on this equipment. After you have attended a training for the equipment you may sign up for a time slot. To see available time slots and sign up for one please see the Reservation Binder (available at the front desk).

Your reservation reserves the equipment for you to use during that time, if you are more than 5 minutes late to your reservation time you will lose your reservation and the machine may be used on a first come-first served basis.

Reference Sheet

Approved Materials. Maximum Cut Depth is Material and Job dependant.

- Glazed Tile
- LaserTile
- Saltillo Tile
- Ballistic Nylon
- Denim
- Felt
- Film with Heat Activated Backing
- Tackle Twill
- Select Stahls' Fabric (See Print Dialog for details)
- Foamcore
- Tool Foam
- Lead Crystal Glass
- Soda-Lime Glass
- Anodized Aluminum
- Markable Aluminum
- Painted Metal
- Powder Coated Metal
- Cork Board
- Leather
- Mat Board
- Mother of Pearl
- Construction Paper
- Copy Paper
- Granite
- Marble
- Vellum
- Natural Woods
- MDF
- Plywood
- ABS
- Acrylic
- Nylon 6/6
- Mylar
- PET
- Polypropylene
- Polystyrene
- Delrin
- Select Rowmark Plastics (See Print Dialog for details)
- Laser Rubber
- Silicone Rubber
- Cotton Fabric
- Denim
- Stone
-

Banned Materials:

- Vinyl
- Fiberglass
- Fr4 Boards
- Materials containing Chlorine (PVC, Moleskin)
- Polycarbonate
- Lexan

Maximum Engraving Volume:

16” x 12” x 4”

Rotary Fixture Maximum Diameter: 5.5”
Rotary Fixture Minimum Diameter: 1.0”
Rotary Fixture Maximum Height: 9.5”

Machine Accessories:

- Engraving Table
- Cutting/Vector Grid
- Rotary Fixture
- Focusing Tool

Important Information:

Vector Cutting - Lines must be “Hairline Thickness” and perfectly red
(R - 255 G - 0 B - 0)

Workflow:

Download or Design
Process in Corel
Edit settings in Print dialog
Setup Machine
Laser Material
Remove finished part(s) and waste material

Software:

CorelDraw
Universal Laser Systems Control Panel

Universal 2.30 Desktop Laser

Materials and Software:

Universal 2.30 Desktop Laser
12” x 16” x 1/8” Plywood
Digital Calipers
Spray bottle of water
Corel Draw

Overview

Makers will learn how to:
Safely operate the Universal Desktop Laser to laser engrave (raster) and laser cut (vector)
Identify approved and banned materials for the Universal Desktop Laser
Identify machine layout and parts
Engrave and cut an example using Standard Operating Procedures

Safety

- The Maker must remain present with the machine during all laser operations, if they need to leave the area the job should be paused.
- Laser smoke should be filtered.
- Lasers emit high frequency light which can damage eyes. Do not look directly at the laser beam.
- If the machine is not setup correctly material may ignite or smolder. In the event of a small fire stop the laser by lifting the lid and smothering the fire with a smaller piece of wood. In the event this does not solve it use the spray bottle of water. In event of a large fire keep the lid closed and call for library staff.
- Only one table should be inserted into the machine at a time, stacking tables will result in incorrect focus height.
- Incorrect thickness/height measurement can result in wedging objects between the table and the laser head.
- Unapproved materials should never be lasered as they may emit noxious fumes or damage the equipment. If you are unsure what the material is you cannot laser it. See Reference section for approved materials. The following materials are banned and under no circumstance should be cut or engraved on the laser.
    - Vinyl
    - Materials containing Chlorine (PVC, Moleskin)
    - Fiberglass
    - Polycarbonate
    - Fr4 Boards
    - Lexan

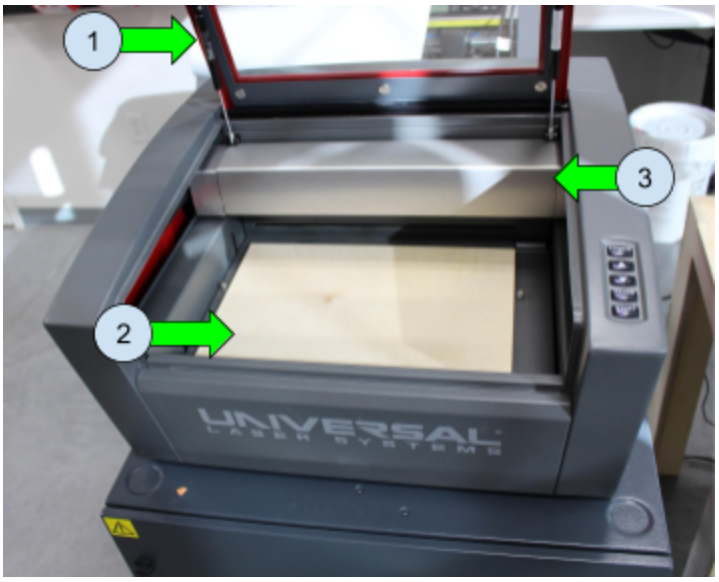
Set Up

This demonstration works best if you limit the number of attendees to no more than 6.

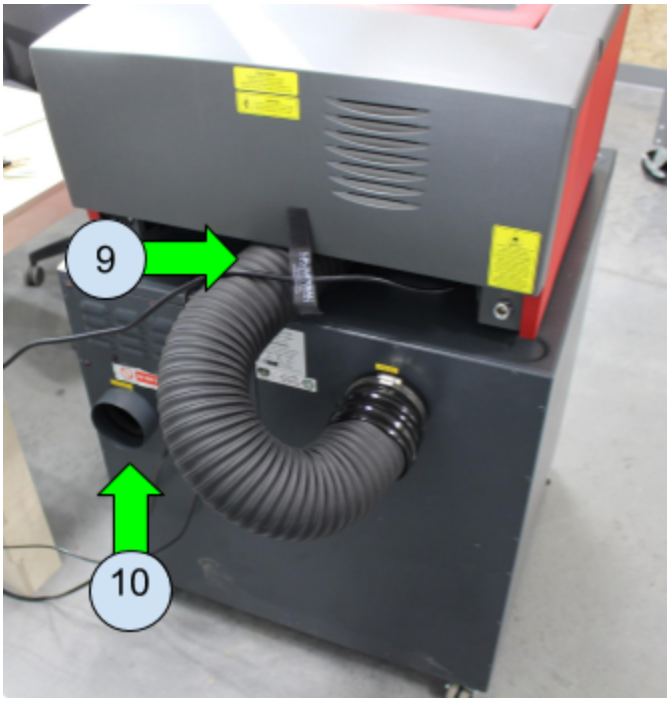
Ensure machines are connected and powered on. The USB Cable must be connected to the computer for the laser to power on.

Download the laser file in advance, an example laser file may be found at:
http://nlc.nebraska.gov/grants/innovationstudios/downloads

Machine layout



1 - Lid
2 - Cutting Area
3 - Gantry
4 - Power Button
5 - Raise Cutting Bed
6 - Lower Cutting Bed
7 - Pause Job
8 - Start Job
9 - Untreated Exhaust Port
10 - Clean Exhaust Port



Key Concepts

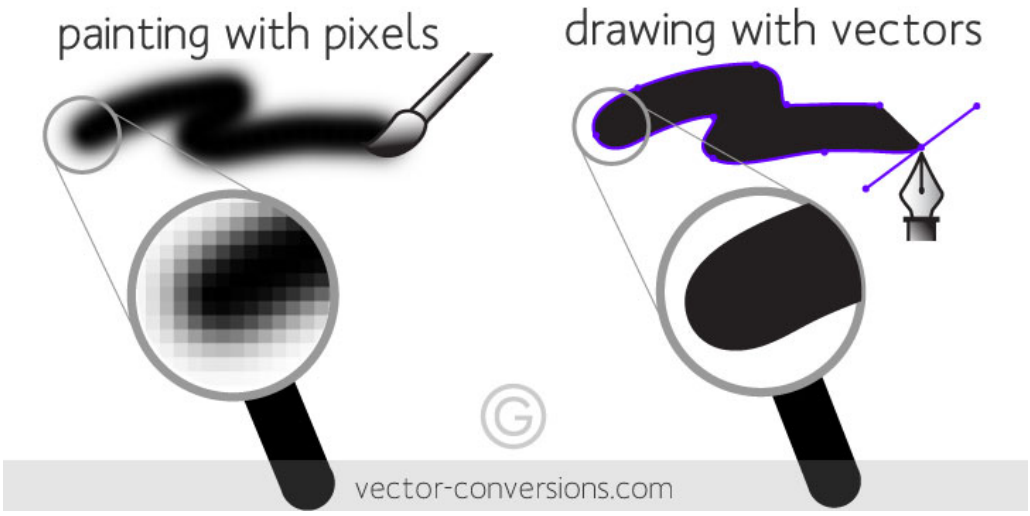
Lasers

Lasers use a tube of noble gases to generate a high intensity beam that can mark, engrave, and cut material. Similar to a pocket laser the beam can be quickly turned on and off, but the desktop laser uses a much more powerful beam and it's capable of varying the power applied to the laser, thereby controlling how much material is removed. For maximum control the laser beam needs to be in a specific focus, which is affected by the material thickness. Not all materials will be successful in this laser, see the Reference Sheet for a full list of banned and approved materials.

Raster vs. Vector

Two-dimensional images can be created using two different methods, either a raster or a vector. Raster images are composed of pixels and are capable of capturing a lot of detail, photographs are an example of raster images. Vector images are composed of perfect mathematical curves and can be infinitely scaled without a loss of quality, text in a text editor is is an example of a vector image.

The laser cutter uses both raster and vector images. In order to cut through a design a vector must be used.



Laser Engraving

When engraving the laser head moves left and right rapidly and slowly moves down, similar to how a traditional inkjet printer works. Raster designs and large vector designs may be engraved into objects.

Laser Cutting

When cutting wit the laser the head will slow down and follow the specific path of the cut. In order to cut a design on the laser the image must be a vector, it must be a certain color, and it must be a certain thickness.

Generating your file

1. Open CorelDraw and open the example file. This file will need to be corrected before it's ready for the laser.

2. The Universal laser will only cut lines that are perfectly red and have a thickness of "Hairline". Click on the outline of the nametag to select it and adjust the outline color to red by right clicking on the red swatch in the color panel. Adjust the thickness by clicking on the "Outline Width" dropdown and select "Hairline" (Figure 1). Check that you adjusted it properly by comparing it to the object properties shown in Figure 2 and the image shown in Figure 3.

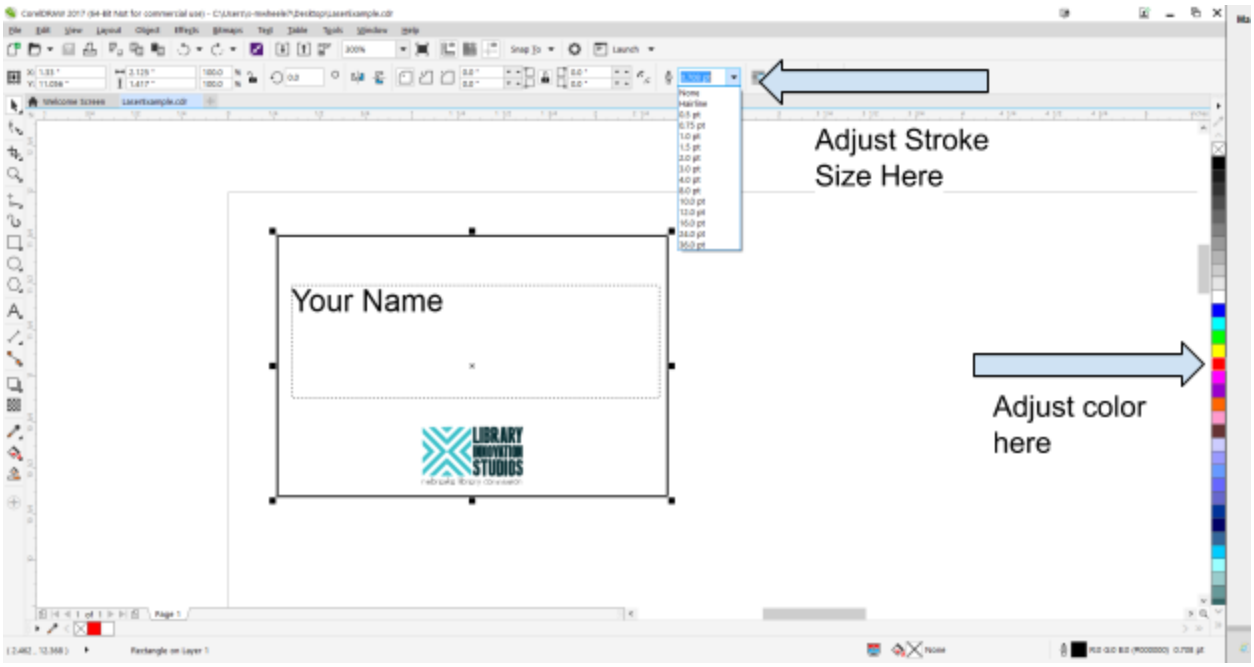


Figure 1 - Editing Properties

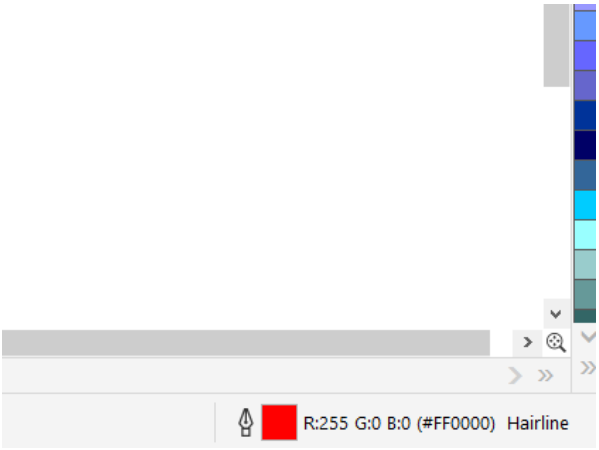


Figure 2 - Checking Properties

Figure 3 - In Process Design

3. Next change the text box to your name. Double click on “Your Name” to highlight the text and replace it with your name. Double click the text again to highlight it and adjust the alignment to “Center” and the font size to as large as you would like (Figure 4).

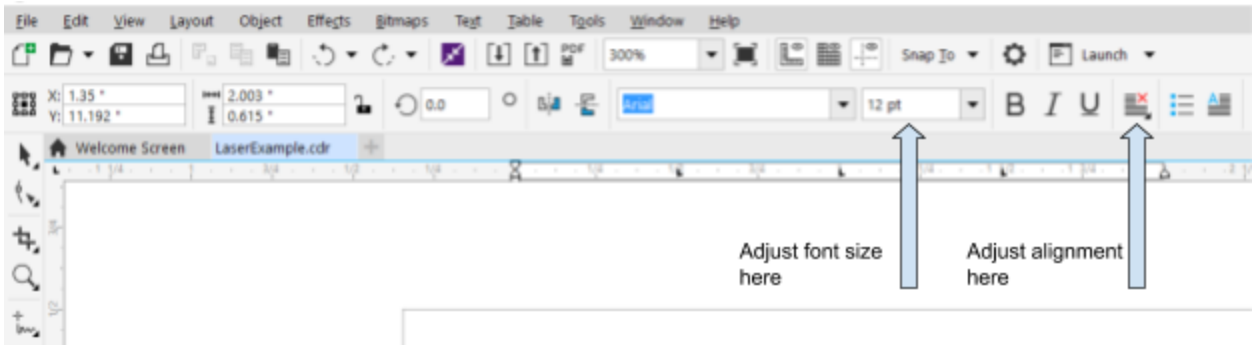


Figure 4 - Adjusting Font

Material Setup

1. Using the digital calipers measure the thickness of your material and write this value down (Figure 5). When lasering engraving a box or a dish measure the height from the table to the surface that will be lasered (as seen in Figure 6).

Figure 5 - Measuring Thickness

Figure 6 - Measuring height

2. Open the lid of the laser and place your material up against the upper left hand corner of the hex grid (Figure 7). Leave the lid open.

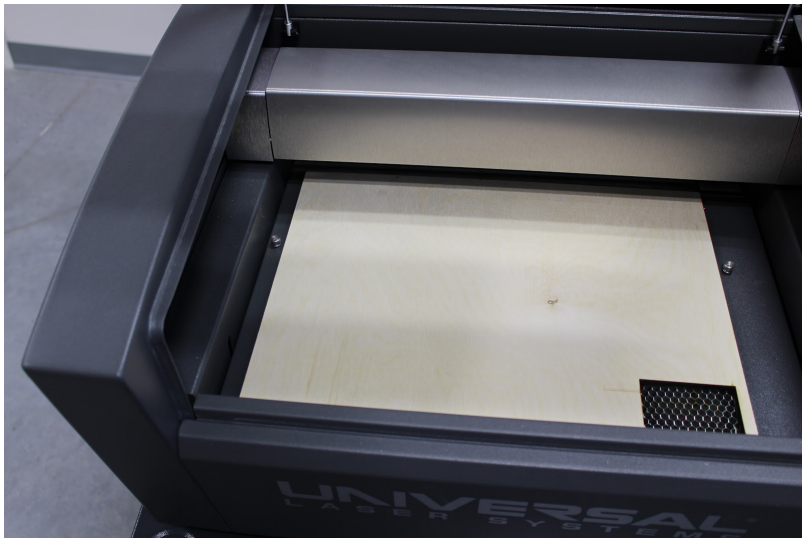


Figure 7 - Loading Material

Configure Laser Settings

1. Send your file to the laser by selecting File -> Print. Set the Printer to “VLS2.30” and then click Preferences. (Figure 8).

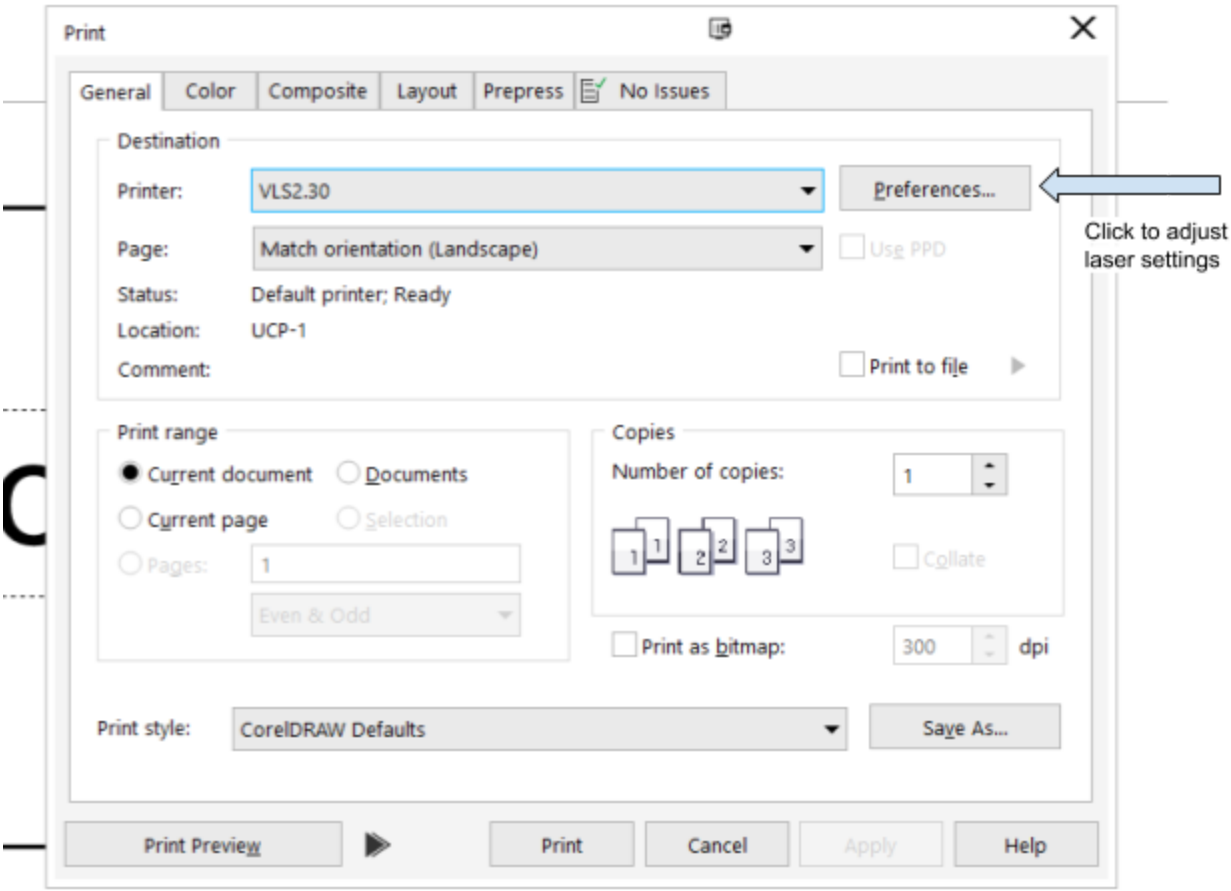


Figure 8 - Print Dialog

2. Begin by setting the material in the Universal interface.

   Navigate to Materials Database/Natural/Wood/Medium Wood/Birch.

   Next, specify the material thickness by typing in the material thickness you measured in the previous step.

   Finally, verify that the Fixture Type is set to none. Before you proceed compare your settings to Figure 9. Click “Apply” and then “OK”

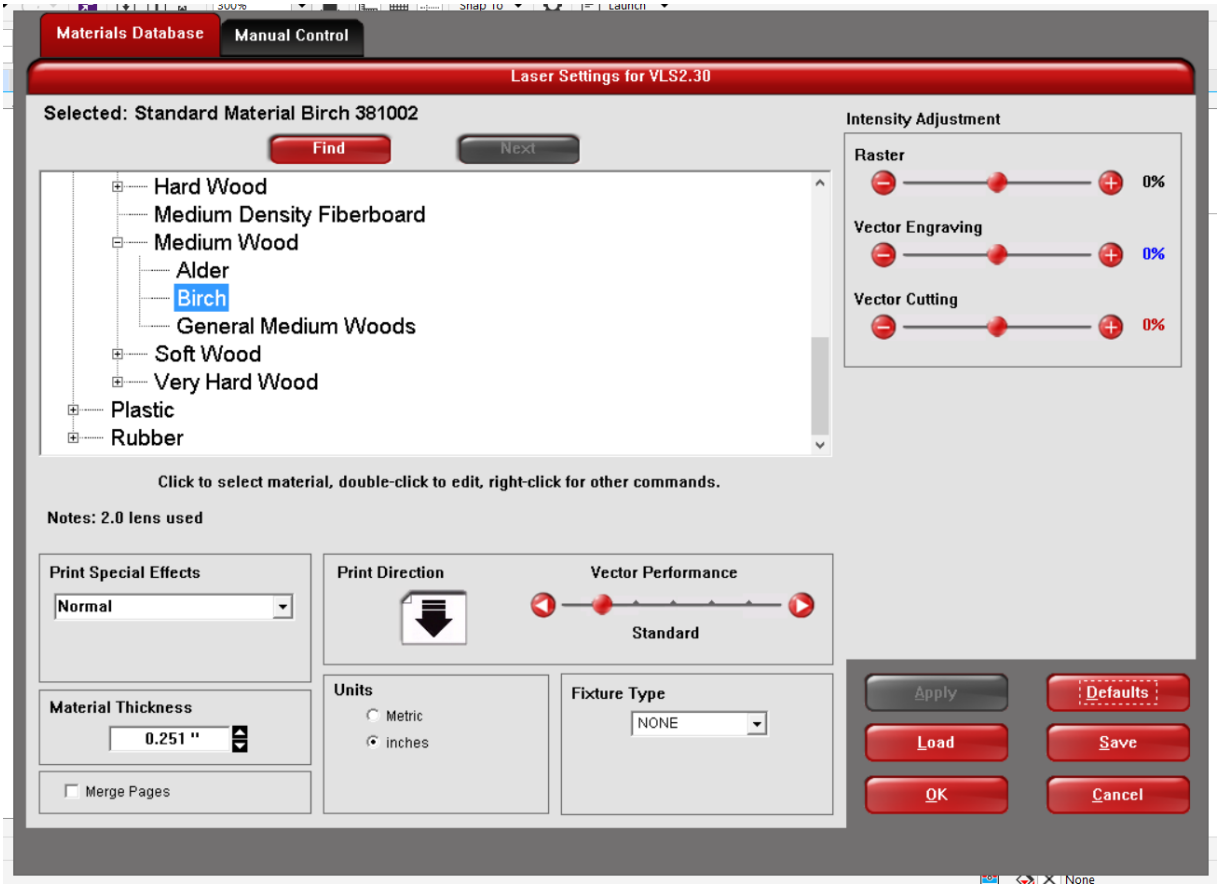


Figure 9 - Laser Settings

3. Back in the print dialog send your file to the printer by pressing “Print” (Figure 7).

Laser Material

1. Turn the Ventilation System on by pressing the switch on the front of the exhaust unit (Figure 10), wait until you hear the exhaust fan turn on before proceeding.

Figure 10 - Laser Settings

2. Open the Universal Laser System Control Panel by opening your system tray and clicking on the icon (Figure 11).

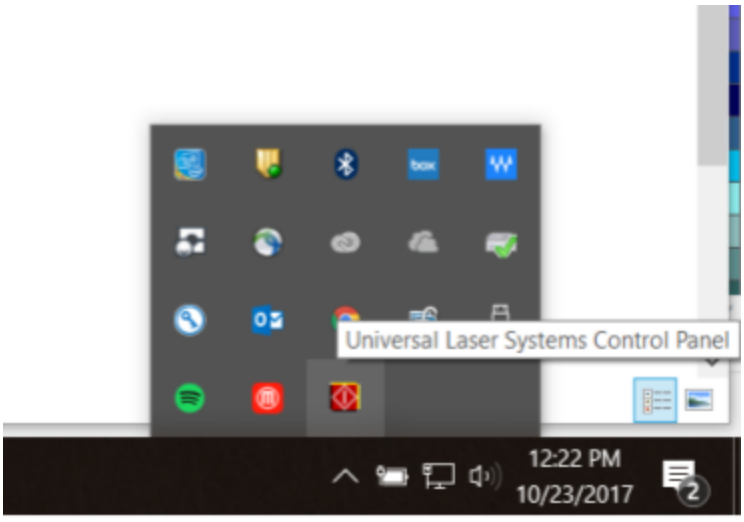


Figure 11 - Windows System Tray

3. The Universal Laser System Control Panel (Figure 12) has a Preview Panel, which shows a layout of your job and gives a preview as the laser is engraving and cutting. The Laser Control Panel allows you to configure your job. The row of five buttons under the “Home xy” and “Home z” buttons allows you to:
    i. Zoom - Magnify your job to inspect potential problem areas
    ii. Focus View - Click to move the laser head unit
    iii. Relocate View - Move your job around the laser cutting area
    iv. Duplicate View - Create Duplicates
    v. Estimate View - Estimate how long the job will take

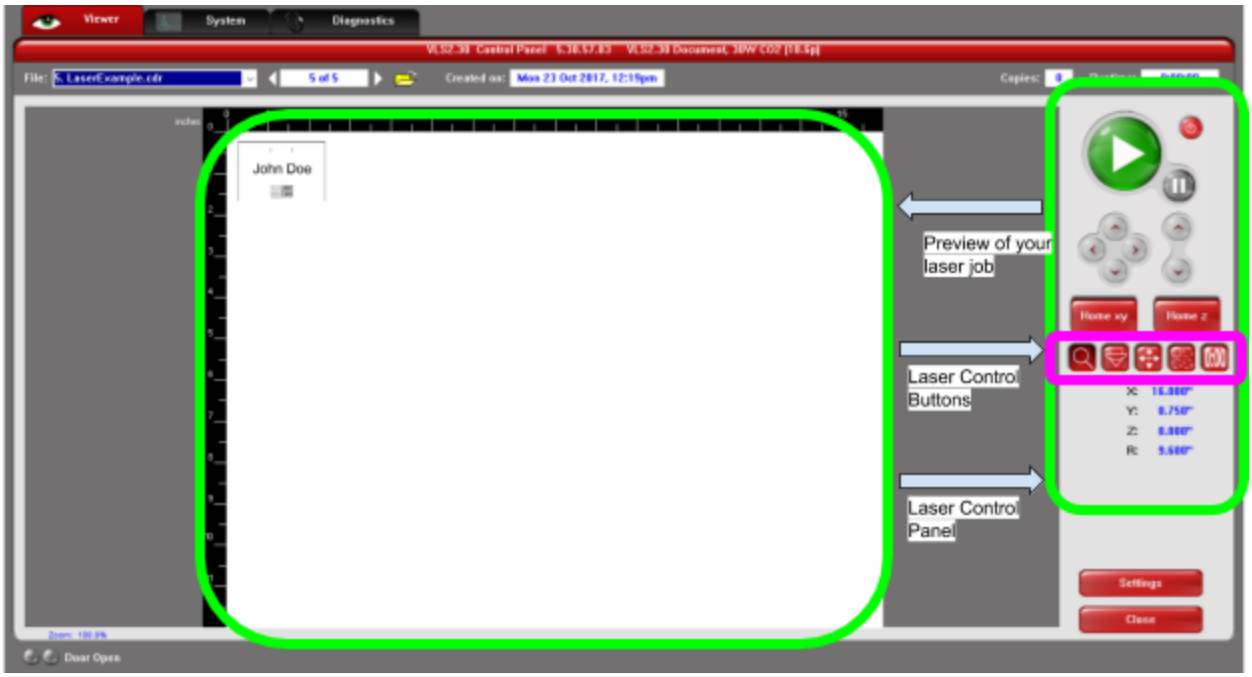


Figure 12 - Universal Laser Systems Control Panel

4. Complete one final check to ensure your material is properly loaded and leave the lid open. Press the green play button in the Laser Control Panel (Figure 12) and the machine will do a ghost cut which will let you verify you’ve correctly placed the job in the laser area. You may need to move the design around to avoid material defects. To stop the ghost cut press the pause button in the Laser Control Panel

5. When you are ready to laser cut your material close the lid, double check that the exhaust fan is on and press the green play button in the Laser Control Panel.

6. When the job is finished the laser head will return to its home position. Turn off the exhaust fan and open the lid to remove your completed project.

Inserting The Rotary Fixture

1. Remove the existing table by powering on the laser and fully lowering the table by pressing and holding the down button on the right hand side of the laser (Figure 13). If you do not lower the table to the very bottom you may damage the laser in a future step.

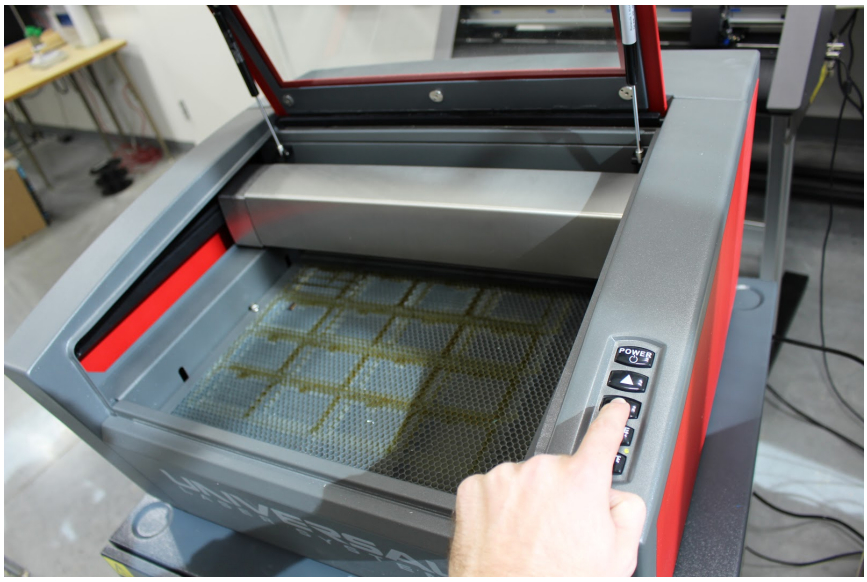


Figure 13 - Lowering the Laser Bed

2. Lift the cutting/vector table up and out (Figure 14).

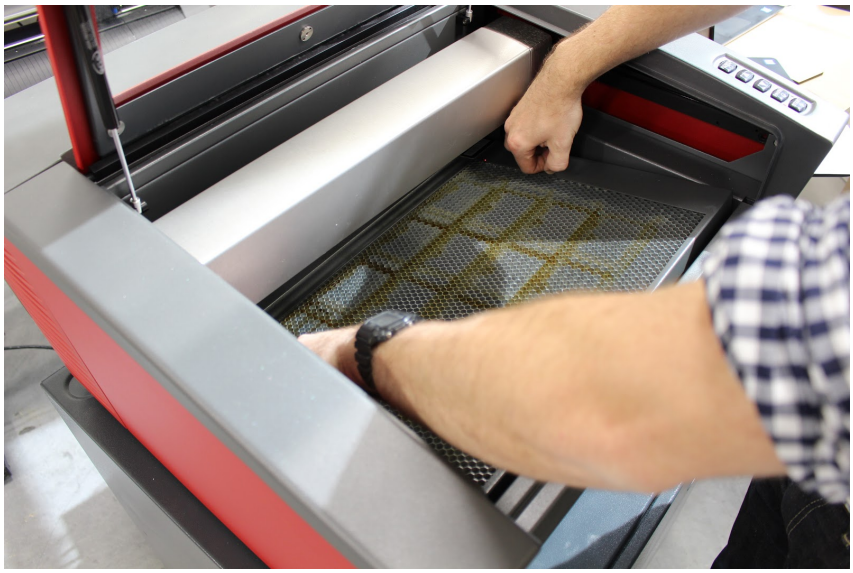


Figure 14 - Removing the Cutting Table

3. Take note that each table insert uses an electronic clip to communicate with the laser (Figure 15).

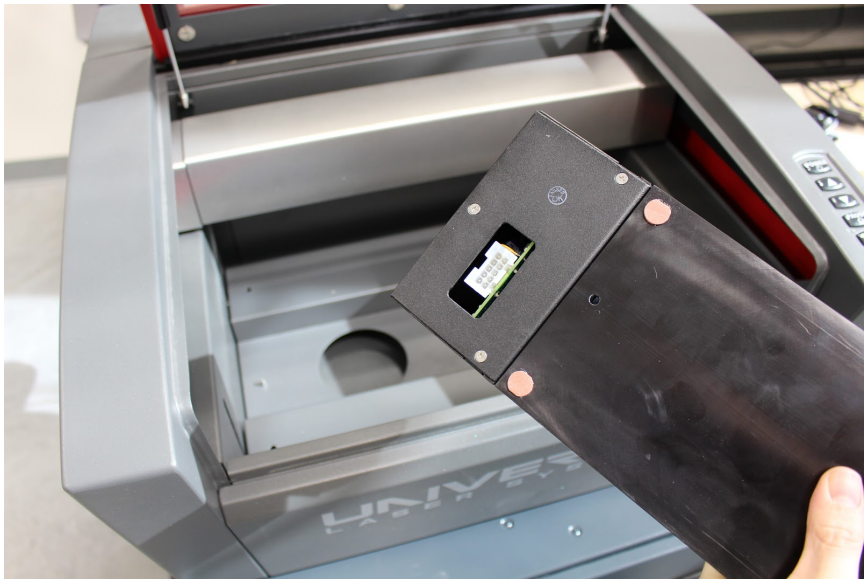


Figure 15 - Accessory Communication Clip

4. Insert the Rotary Engraving fixture by holding the side with the clip in your right hand and slowly lowering it onto the bed. When the clip seats correctly the headstock will initialize and rotate.

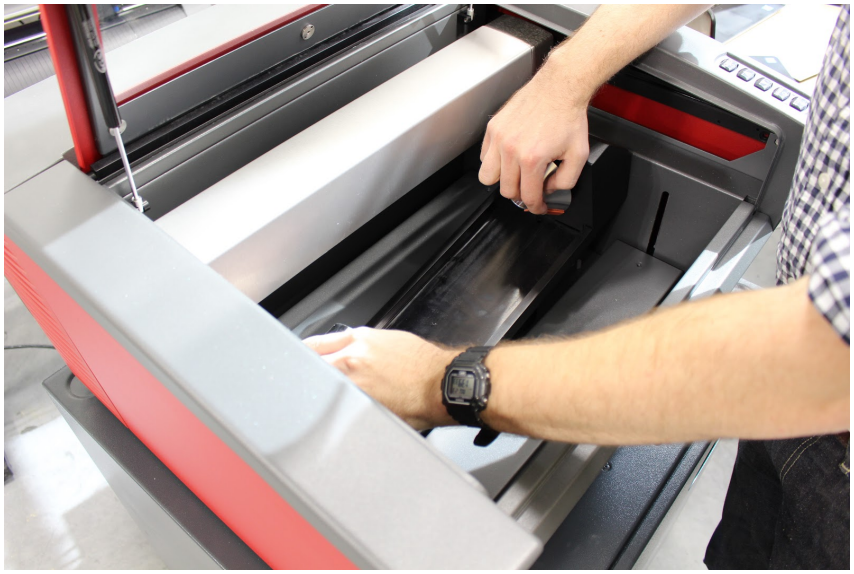


Figure 16 - Installing the Rotary Fixture

5. Measure the diameter of your object and write it down (Figure 17). See “Lasering Glassware Guide” in supporting documents for glass best practices.

Minimum Diameter:	1.0 inches
Maximum Diameter:	5.5 inches
Maximum Height:	9.5 inches

Figure 17 - Measuring Diameter

6. To load cylindrical stock lift up on the red button on the Rotary Engraving Fixture and slide the tailstock up against your material (Figure 18). Your object should be snug enough to not fall out of the fixture during the engraving operation.

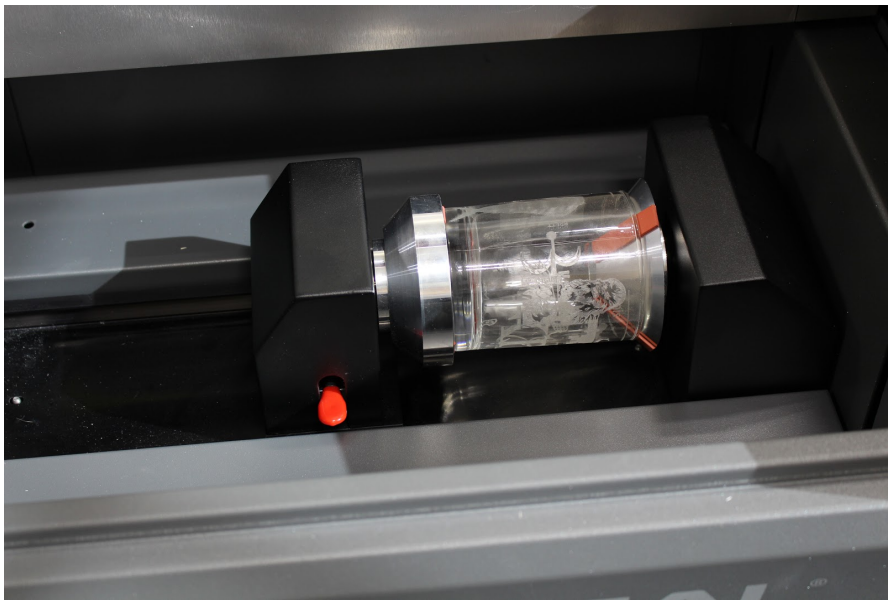


Figure 18 - Cylindrical Object Loaded

7. When engraving a cylindrical object open the VLS 2.30 settings (Figure 8). Change “Fixture Type” to “ROTARY” and enter the diameter of your object. Press “Apply” and “OK”. In the Print Dialog Press Print.

8. From here continue with the section “Laser Material.” When you are finished with your job remove the Rotary Fixture and replace the Cutting/Vector Table.

Installing the Engraving Table

1. To engrave a heavy object, or an object taller than 3” the cutting/vector grid will need to be replaced with the engraving table. Begin by powering on the laser and fully lowering the table by pressing and holding the down button on the right hand side of the laser (Figure 13). If you do not lower the table to the very bottom you may damage the laser in a future step.

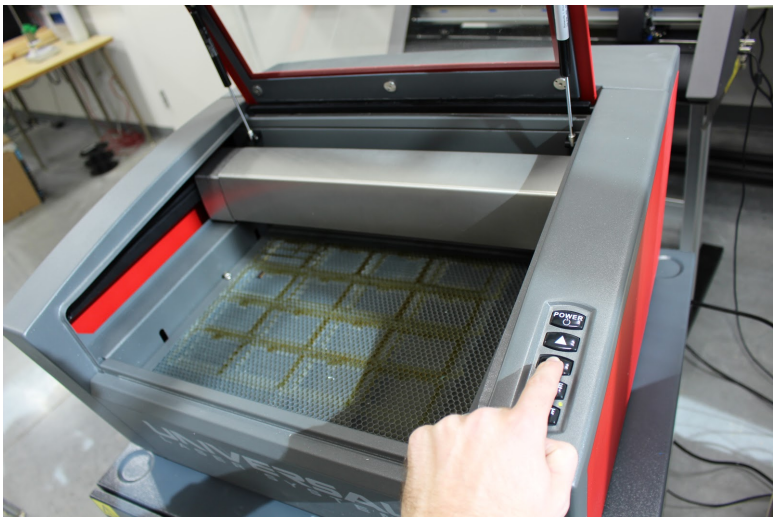


Figure 13 - Lowering the Laser Bed

2. Lift the Cutting/Vector table up and out (Figure 14).

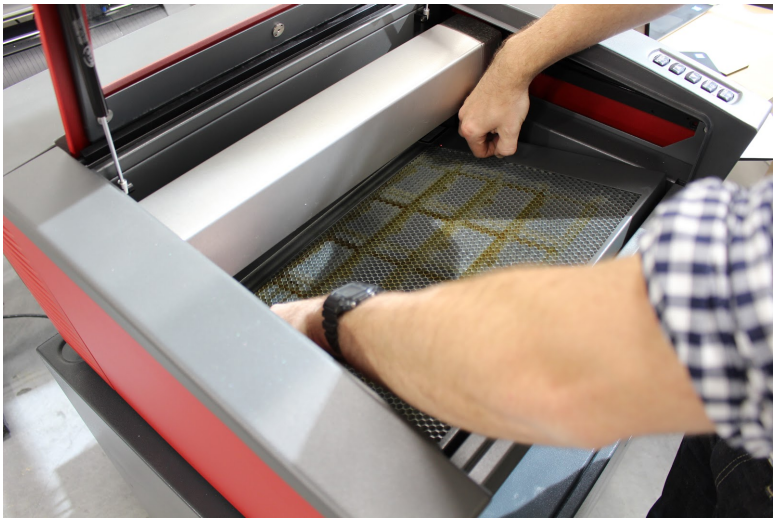


Figure 14 - Removing the Cutting Table

3. Install the Engraving/Raster table by inserting your fingers into the holes and placing the table into the bed of the laser.

4. Continue with the section “Laser Material”. When you are finished with your job remove the engraving table and replace the cutting/vector grid.

Shutdown Procedure

1. Turn the laser off by holding the power button until the green and red LEDs turn off
2. Turn off the air filter by pressing down on the power switch
3. Clean up loose pieces of lasered material around the area

Additional Resources

The following links may come in handy as you seek to expand your laser skills

PDF Box Maker
http://boxdesigner.connectionlab.org/

Photo Engraving software

Troubleshooting

Problem: Laser will not power on
Solution: Make sure the laser is connected to a functioning outlet or power strip AND make sure the USB cable is properly connected to a powered on computer, if the USB cable is not plugged in the laser will not power on.

Problem: The laser produces blurry images, does not cut as expected, or produces large flames
Solution: Double check that your calipers are properly calibrated by fully closing them and checking that the display reads 0.000. Confirm the measurement of your material in the Laser Settings (Configure Laser Settings Figure 8). Additionally in the laser settings confirm that “Auto Z” is enabled.

Problem: Blurry images and reduced power persist after confirming material thickness
Solution: Your laser mirrors and lenses may need to be cleaned, contact the Library Innovation Studio staff for more information.

Problem: Blurry images and reduced power persist after changing the computer attached to the laser
Solution: You will need to calibrate the laser. Contact the Library Innovation Studio staff for more information.

Lasering Glassware Guide

Laser engraving glassware is an easy way to permanently customize a glass, a baking pan, or another piece of glass.

Be aware that there are limitations with lasering glass, namely that glass doesn't etch with different shades. Glass is either etched or it isn't, so everything will appear to be the same color when etched onto glass. Manipulating designs by increasing contrast may yield good results.

Note that when glass is etched a very bright light is given off. It's not enough to harm the user, but it is best to cover the viewing window with a piece of paper to prevent people from looking directly at the glass.

When etching a pan or anything that will come into contact with food it's wisest to etch on the reverse side so bits of food don't get stuck in the etching. Designs etched in this way must be mirrored so they are the correct orientation when the pan is flipped rightside up.

If etching the bottom of a glass bake dish make sure to measure the height of the pan and not just the wall thickness when setting it up in the Laser Preferences.

When glass is etched there are small burrs created at the edge of the etching. These will come off when washed for the first time.

If mirror is being etched the etching must be done to the dull side of the mirror. When done this way the reflective backing is removed leaving just the negative of the design. Lasering the reflective side of the mirror will cause the laser beam to be reflected back into the laser, potentially damaging it.