

Universal VLS6.60

Laser Engraver/Cutter



ULS VLS6.60 Training Guide - NC STATE Entrepreneurship Garage

Requirements

Be Certified

You must complete Laser Certification Training before using the Laser Cutter. By using the Entrepreneurship Garage Laser you certify that you have been trained by Garage Staff and agree to abide by all rules set forth by the Entrepreneurship Garage.

Be Present During Operation

You must always be present when using the Laser Cutter to monitor for fires and other potential hazards! If you walk away, staff or other member are authorized to stop the machine due to the fire hazard.

Materials must be Verified to be Laser Safe

If you bring in your own material, you will be required to provide the Material Safety Data Sheet (MSDS). If you cannot provide proof that your material is one of the approved materials you will be turned away.

Buying Materials

Materials can be bought at the Hill Library, Home Depot, Lowes, Hobby Lobby, Amazon or other online sites like Instructibles.com. Look for laser certified materials.

Guidelines

Certain items are not allowed to be cut or engraved with this device due to them **catching fire** or **emitting carcinogens** and **lethal fumes**.

See the list of acceptable materials in this document. Before using any material you must make sure that you know what it is and from where it was sourced.

If you are unsure of the material you have, you are not allowed to use it on the Laser. If you would like to use a material not listed, you must provide the material MSDS sheet and get approval from Garage Staff prior to use.

We use CO2 laser machines. This involves firing a laser which cuts by melting, burning or vaporizing your material. You can achieve a really fine level of cutting detail on with a wide variety of materials.

Material Processing Information:

Laser Material Processing Area:

(W x H) 32 x 18 in (813 x 457 mm)

Maximum Part Size:

(W x H x D) 37 x 23 x 9 in (940 x 584 x 229 mm)

Maximum Engraving Material Height:

6 in (152 mm)

Maximum Cut Material Thickness:

1/4 in (6.25 mm)

Do Not Attempt to Cut through material thicker than 1/4"

Safety

EXPOSURE TO THE LASER BEAM MAY CAUSE PHYSICAL BURNS AND CAN CAUSE SEVERE EYE DAMAGE. PROPER PPE IS REQUIRED WHEN OPERATING THE LASER. (Black Laser Safe Safety Glasses)

NEVER OPERATE THE LASER SYSTEM WITHOUT CONSTANT SUPERVISION OF THE CUTTING AND ENGRAVING PROCESS.
You must remain at the laser for the duration of your cut.

NEVER LEAVE MATERIALS IN THE LASER SYSTEM AFTER LASER PROCESSING HAS FINISHED.
Materials left in the laser cutter are a fire hazard.

ENSURE THE VENTILATION SYSTEM IS OPERATING PROPERLY.
Listen and ensure ventilation system is activated.

SOME MATERIALS, WHEN ENGRAVED OR CUT WITH A LASER, CAN PRODUCE TOXIC AND CORROSIVE FUMES.
These fumes pose a high health risk and can cause death.



Approved Materials

Category Materials

Woods **Untreated Plywoods, Untreated Hardwoods, Basswood, Balsa Wood, Masonite or Hardboard (etch only)**

Plastics **Acrylic (Cast, Extruded, non-reflective), Mylar (non-reflective)**

**Paper/
Cardboard** **Construction paper, Corrugated Cardboard**

Other **Soda lime glass (will only etch, cannot be mirrored), Kapton, Carbon Fiber Mat (untreated, no resin)**

If your material is not listed, DO NOT USE on Garage Lasers.
Consult with Staff if you have questions.

Banned Materials

Material	Danger	Cause/Consequence
Food	Carcinogens	Residues in the laser cutter can be carcinogenic. It's disgusting, dangerous, and you don't want to eat it.
Acrylonitrile butadiene styrene (ABS)	Emits cyanide gas, melts, bursts into flame	Tends to melt rather than vaporize, leaving behind gooey deposits on the honeycomb bed. Easily bursts into flame. Also engraves poorly (again, it melts rather than etches).
Coated carbon fiber	Emits dangerous fumes	The coating emits dangerous fumes. Thin, uncoated carbon fiber mat can be cut, but will fray along the cut edges
Chlorinated plastics (PVC, vinyl, pleather/artificial leather, Sintra, Kydex)	Emits chlorine gas when cut	Destroys the focus lens and mirrors, corrodes metal parts and motion control system.
Polyoxymethylene (POM) or Delrin	Emits dangerous fumes	Formaldehyde cause skin, eye, and respiratory irritation and allergic reactions and cancer in rat studies.
Dureflex	Emits dangerous fumes	Produces hydrogen cyanide; it will kill you.
Fiberglass	Emits dangerous fumes	Glass can't be cut, and the resin emits dangerous fumes.
Galvanized metal	Emits dangerous fumes	Zinc fumes are poisonous. Galvanized metal should never be super-heated (so don't weld on it either).
High-density polyethylene (HDPE)	Catches fire and melts	Do we need to say more? Don't use it!
Medium-density fiberboard (MDF), light-density fiberboard (LDF) or other particle board	Generates high amounts of smoke	Detrimental to lenses and mirrors.
Mirrored surfaces	Will not cut, reflects laser beam	Mirror surfaces can reflect the laser beam, damaging the cutter's interior components. Some mirrored materials can be placed reflective-side down and cut.
Polyetherimide (PEI), EVA foam, or any other plastic/foam	Emits chlorine gas	Laser cutting these materials produces smoke and toxic gases that corrode the interior of the laser cutter.
Polycarbonate/Lexan	cuts poorly, discolors, catches fire	Polycarbonate absorbs infrared energy, and thus cuts very poorly—tends to melt or burn instead. Surfaces near cut edges discolor badly.
Polystyrene foam	Catches fire	This is the #1 cause of laser fires!
Polypropylene foam	Catches fire	Just as bad as polystyrene, with the added feature of leaving behind rock-hard deposits.
Pressure treated wood	Emits dangerous fumes	Should never be burned – not in your fireplace, and definitely not in our laser.

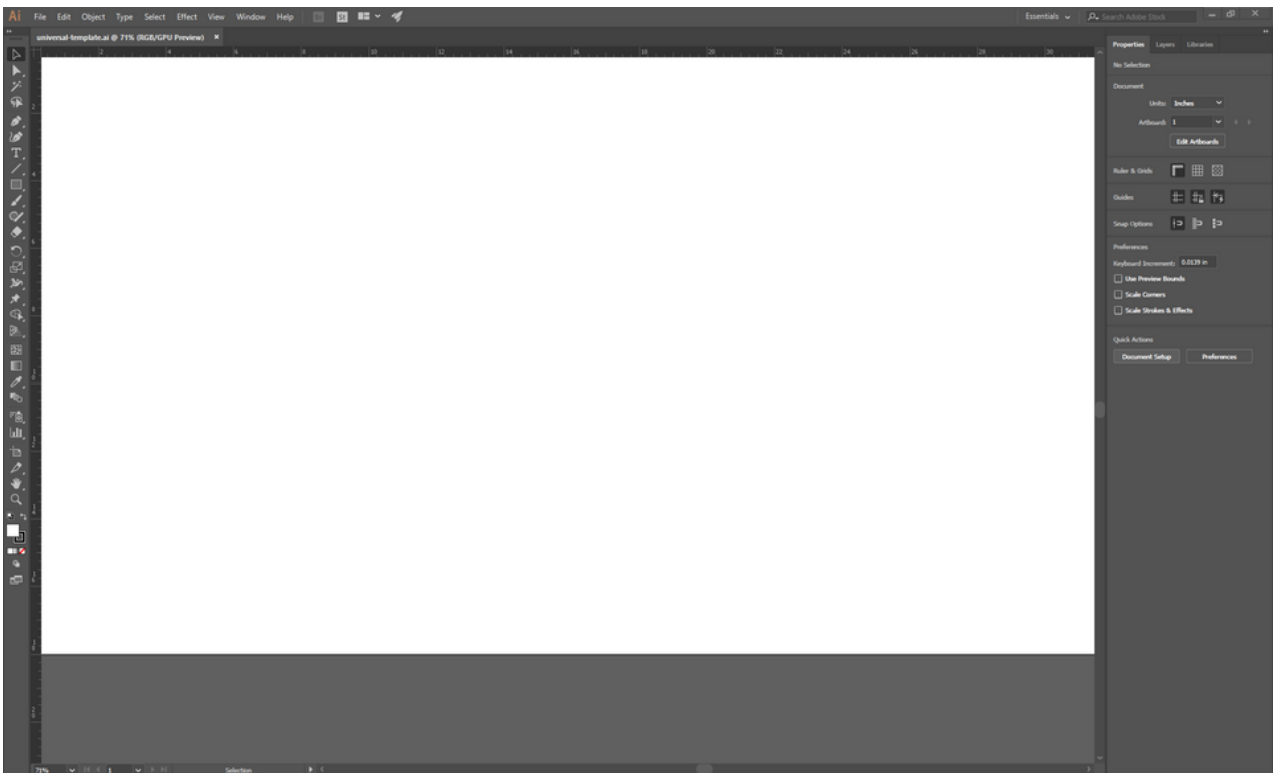
Getting Started

Before using the VLS6.60 you must prepare your artwork in Adobe Illustrator. Follow the guidelines below to ensure that your artwork is readable by the ULS software. We've streamlined the process by creating a VLS6.60 Illustrator Template, which can be found on the desktop.

1. Open the Universal-Template.ai file from the desktop



2. Create or import/copy your artwork into the defined artboard (whitespace)



3. Edit your stroke/fill properties to adhere to ULS specifications

Vector Cut

Stroke: .001pt

Color: RGB (255,0,0)

Vector Mark

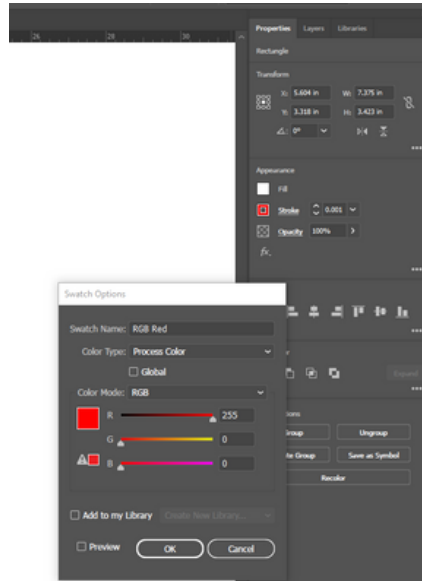
Stroke: .001pt

Color: RGB (0,0,255)

Raster Engrave

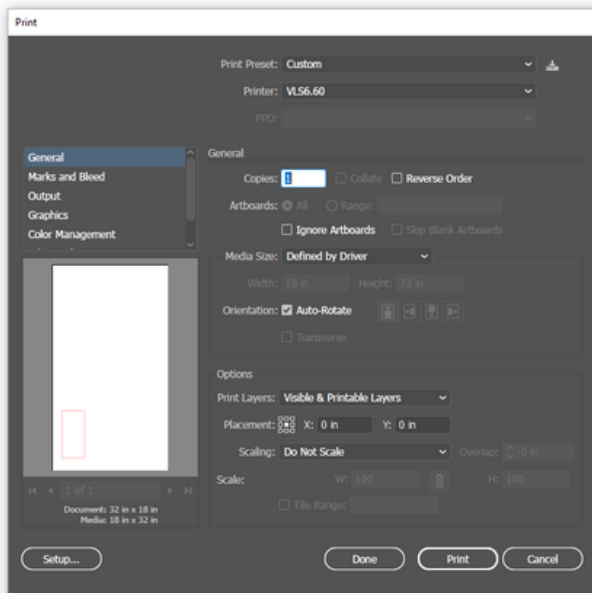
Stroke: none

Color: RGB (0,0,0)

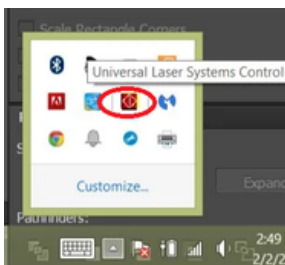


4. Once your artwork is properly setup you're ready to print

- File > Print (ensure that the selected printer is the VLS6.60)



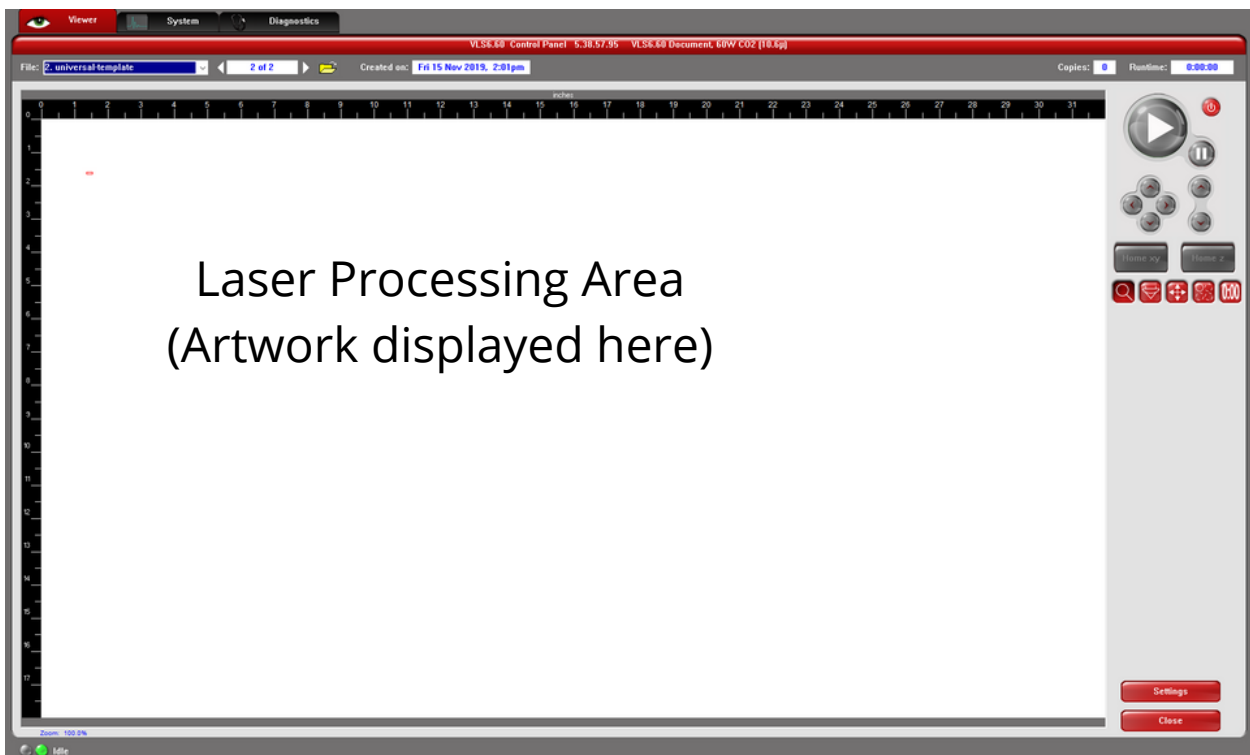
5. Open the ULS Software by clicking on the icon found on the desktop or tray



ULS Software

Now that you've sent your artwork to the ULS software you can begin the Laser Cutting/Engraving process.

1. The ULS software should be open and your artwork should be displayed in the laser processing area.



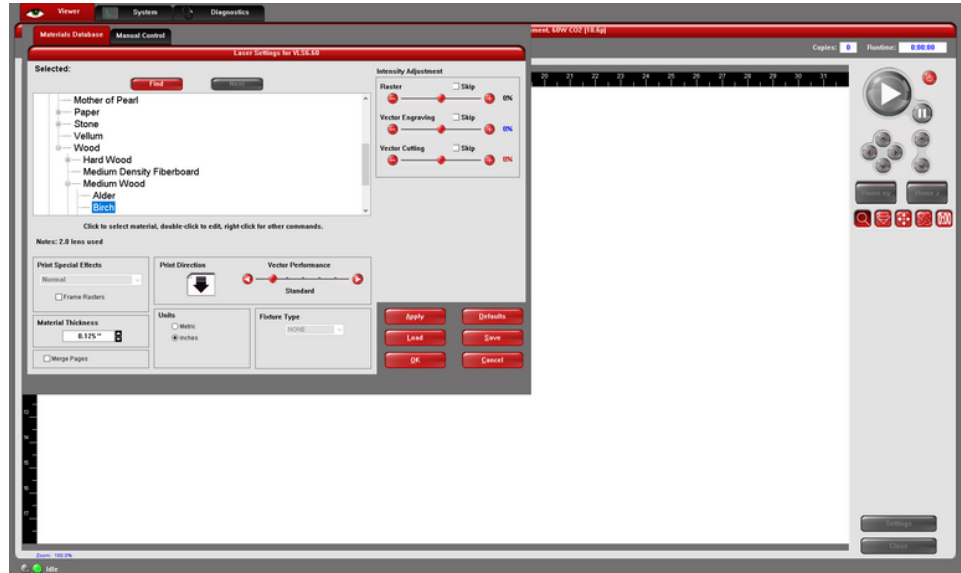
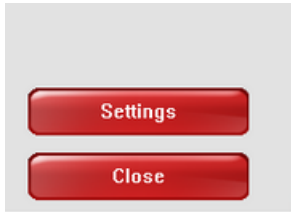
2. Before continuing, ensure that the laser table clear of all materials.

3. Verify that your material is safe to use on the Garage Laser Table. (see approved materials list, if you have questions consult shop staff or send an email to ncstate-ent-garage@ncsu.edu)

4. Measure and Verify Your Material Thickness with Calipers.

5. Open the settings tab and define and Material and Thickness.

- Viewer Tab > Settings > Materials Database > Select your Material
- Set your Material Thickness as measured with the calipers
- Set "Vector Performance" to Normal



6. Place your material on the laser bed and align to the top left corner.

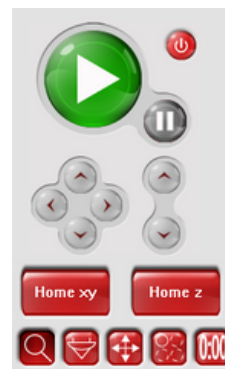
Note: For materials thicker than 2" you will need to remove the cutting table from the machine.

7. Check laser mirror locations and guides and verify they are free of dust and debris.

8. Power On The Laser with the power button (software or hardware switch).



OFF



ON

9. Use the Focus Tool (Located to the left of the Y-axis arm) to adjust the Z-axis and properly focus the laser. This can be done in the software or with the manual Z adjustment buttons. (figure a)

10. Close the lid of the Laser.

11. Position Your File in Software with the "Move" button. (figure b)

12. Verify Laser Boundaries with "Focus View" button. Ensuring that you will not cut into the rulers on the laser table and your artwork is properly positioned on your material. (figure c)

Note: You can lift the lid while the laser isn't running to see a visible red indication of the laser boundaries.

13. You're Ready to Print! Use The "Play Button" to Start Your Laser Job. (figure d)

**Stay By the Laser for the Entire Duration of your Cut!
DO NOT OPEN the Lid while the Machine is Operating!**



figure a

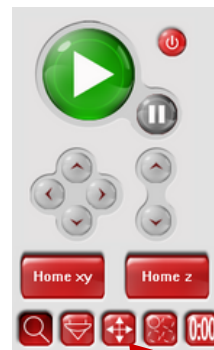


figure b



figure c



figure d

Addressing Errors and Problems

1. If your laser operation produces a **large flare up (1/2 distance to lens)** while operating, immediately press the **"Pause"** button to stop your job. This is an indication that your Power setting is too high for the intended operation/material. This is also a sign that you may be using the wrong or incompatible material.
2. If you are unable to cut through your material cleanly after a few attempts, this is an indication you are using a material that is not laser compatible.
3. If you experience skipping or misaligned prints, first try reducing the speed in the Manual Settings window. If you continue to experience issues stop use and alert Staff.
4. If the lens housing hits the left or right side rails, stop the operation immediately by pressing the "Pause" button. Stop your operation and try moving your material to a new location on the cutting table. If this doesn't remedy the issue, stop use and alert Staff.
5. If your **Material Catches Fire**.
 - **Stop the operation Immediately** by pressing the **"Pause"** button and **Unplug** the device.
 - **Alert Staff**. If Staff is unavailable and the fire hasn't died down, **Use the Fire Extinguisher** to extinguish the fire.
 - If the Fire has become **Uncontrollable - Pull the Red Emergency Pull Station** to alert the Fire Department.

For all other issues alert Staff or send an email to ncstate-ent-garage@ncsu.edu

Post Cut Process: Clean-Up & Shutdown

Follow the steps outlined below before removing your completed parts.

- 1. Once cutting is complete allow the laser cutter to sit for a minute or two as the vent clears smoke and other particulate matter.**
- 2. Gently lift your material without moving it to ensure that all cuts went all the way through the material. You may need to run your cuts again if the laser didn't cut all the way through the material.**
- 3. Remove all material and debris from the laser processing area.**
- 4. Clean up the area around the laser.**
- 5. Make sure to return the focus tool to the proper location in the laser machine.**
- 5. Turn Off the ULS6.60 with the Power button in software or hardware.**
Note: The hardware button will only work if the ULS software is open on the computer.
- 6. Log Out of the computer.**
- 7. Marvel at your finished creation!**

Never Leave Material or Debris in the Laser Machine as this poses a fire risk.

Make Sure to Turn off the Laser and Log Out!