Laser Cutter Beginner Class

Thunder Nova 24 & Nova 51

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REVISED 05/03/2026

Laser Training Outline

- Introduction to Laser Equipment in Leesburg & Purcellville
- Guidelines and Policies
- Laser Safety Review
- Getting to Know the Machine
- Laser Cutting & Engraving Process
- Introduction to Laser Software: LightBurn
- Tips, Hints, and having FUN
- Hands on Training and Use

Laser Equipment: Leesburg

- Nova 51: https://www.thunderlaserusa.com/machine/nova-51/
- Uses one 100 watt sealed glass CO2 cartridge
- Cutting area is 51.2" x 35.4" - with a max thickness of 9.1”
- Pass through closed: 55.1" x 40.6" x 9.1"
- Pass through open: 55.1" x ∞" x .8"
- Rotary attachment available
  (separate training session)

Laser Equipment: Purcellville

- Nova 24: https://www.thunderlaserusa.com/machine/nova-24/
- Uses one 60 watt sealed glass CO2 cartridge
- Cutting area is 23.6" x 15.7" - with a max thickness of 6.1”
- Pass through closed: 27.6" x 20.9" x 6.1"
- Pass through open: 27.6" x ∞" x .8"
- Rotary attachment available
  (separate training session)

Differences Between Locations

- The NOVA 51 is larger than the NOVA 24 so you can do larger projects.
- The NOVA 51 has a 100 watt laser and the NOVA 24 has a 60 watt laser. Do not use the same speed and power settings between laser cutters.
- The compressors are different units so turning them on/off is slightly different.
- The extractor fan is turned on manually in Leesburg on the NOVA 51 and turns on automatically in Purcellville on the NOVA 24.

Around the Laser

- Cleaning materials
- Trash location
- Scrap material location
- Vacuum location
- Pville Only:
  - Temperature control when you leave
  - Wearing protective glasses if fiber laser is in use at the same time

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Policies, Safety & Materials

Guidelines and Policies

- **Sign the Makersmiths Waiver Form** - This can be done at the iPad in the Leesburg classroom or the Purcellville Green Room
- **The Laser 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.
- **Schedule Your Time on the Laser** – Login to Makersmith.org. Go to Reservations > Laser Reservations and fill out the reservation form
  - Which laser, start and end times, your name
  - You will receive an email confirming your reservation. You can cancel your reservation from that email.
  - Limits:
    - 2 hours per day/10 hours per week
- **Record Time** - There is a poster on the wall with QR code, a label on the laser computer/desk, and a shortcut on the desktop that you can use to record your time on the laser. This is used to determine maintenance/cleaning routines. This does not require you to be logged into anything.

Laser Safety Review

Personal Safety

- **Don't stare at the cutting point:** it 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:** a list of these is in this presentation and at wiki.makersmiths.org.
- **Pause after project completion:** allow air inside the chamber to fully vent outside.
- **Engrave mirrors from the backing side:** not the front side. If double sided, please cover all sides with an opaque film.

Device Safety

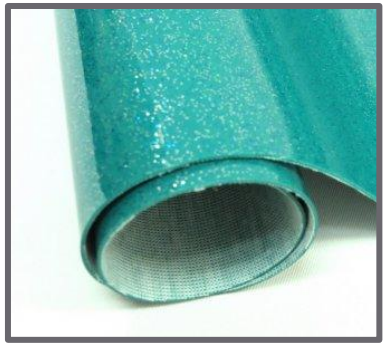
- **Always be sure the External Exhaust Fan is in operation** before cutting/engraving.
- **Be sure the bed is clean and has no debris from previous uses.** Always clean it when you are done.
- **Make sure you have focused the Laser Optics** to the top of your material.
- **NEVER Leave the Laser Running 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.
- **Make sure that the material is supported outside the machine (front and back) if using the passthrough.** There are stand up rollers nearby each machine.

Laser Safety Review: DO NOT LASER

DO NOT LASER List

- Any material that won't cut well or emits gasses
- PVC: produces hydrochloric acid and toxic fumes
- ABS: emits cyanide gas and tends to melt
- Polycarbonate/Lexan: cuts very poorly, discolors, catches fire, may contain chloride which is bad, might look like acrylic but is not the same thing
- Artificial leathers, Pleather: contains PVC and produces toxic gasses when lasercut
- High Density Polyethylene (HDPE): milk bottle plastic, melts and creates fires
- Foams like PolyStyrene or PolyPropylene: they catch fire
- Fiberglass: emits fumes
- Cellulose: combustible





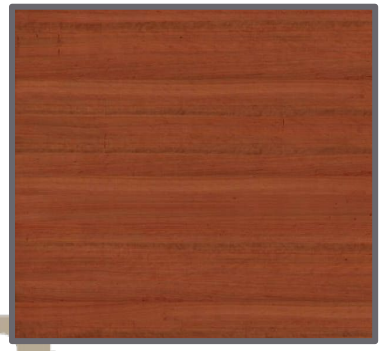

Laser Safety Review: OK Materials

OK to Cut or Engrave:

- Wood: hardwood, softwood, plywood, cork
- Plastics: acrylic, lucite, plexiglass
- Paper
- Cardboard
- Fabric: most kinds
- Leather: real animal hide, not pleather
- Foam: Gator Foam, Depron foam, plastics (without Chlorine), dry celluloid sponges (always double check what they are made from), Craft Foam/EVA
- Felt: 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)

OK to Engrave Only Only:

- All materials above plus metal with coating, glass, ceramic tile glaze, stone, painted or powder coated tumblers





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Getting to Know the Thunder Laser

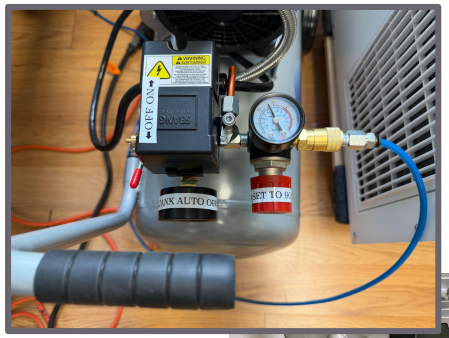
Laser Hands On

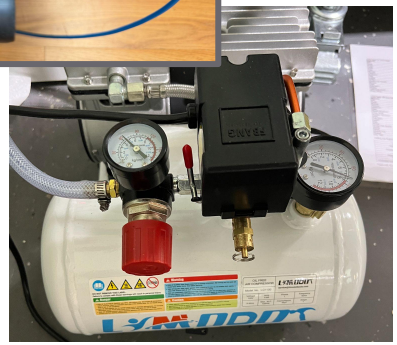
- You will want to practice and test a lot. The “same” material may not always be exactly the same.
- Buy extras of whatever you want to engrave/cut so that you can spend some time testing.
- There is no substitute for hands on use of the Laser
- Book your time on the laser Laser Reservations. Remember that you have to be logged into makersmiths.org to book time.
- wiki.makersmiths.org has lots of other information on the laser cutters, including this slide deck.

Getting to Know the Machine: Switches & Air

- The “Main switch” turns on the power to the control panel
- The “Laser switch” provides power to the Laser and the water cooler. The fume extractor and compressor must be turned on individually.

- The air compressor at each location has both a tank pressure and a regulated/supply pressure rating.
- The regulated/supply pressure from the air compressor should be ~90psi and is adjusted with the red knob.





- Compressed air goes from the compressor into the regulator. The regulator can be adjusted by pulling down and turning the grey dial. The regulator should be set to 50psi and no higher.
- Make sure that the water cooler, fume extractor, compressor, and both the Main and Laser switches are on before starting your job.

Getting to Know the Machine: Important Buttons

- Both machines have Air-assist.
- **Do not adjust the levels using the silver screws.** The stewards manually set them the to optimal levels.
- You should press the green High Volume Test button when you set the PSI on the regulated pressure on the compressor and the regulated pressure on the secondary regulator attached to the laser.

- There is an emergency stop button on each machine!
- This is the quickest way to stop the machine in case of a fire, the nozzle hitting something, etc.
- You can pause the machine from the control panel by pressing the “Start-Pause” button.
- You can also stop the machine by pressing “Stop” in LightBurn. If need be, opening the top door will also stop the laser.

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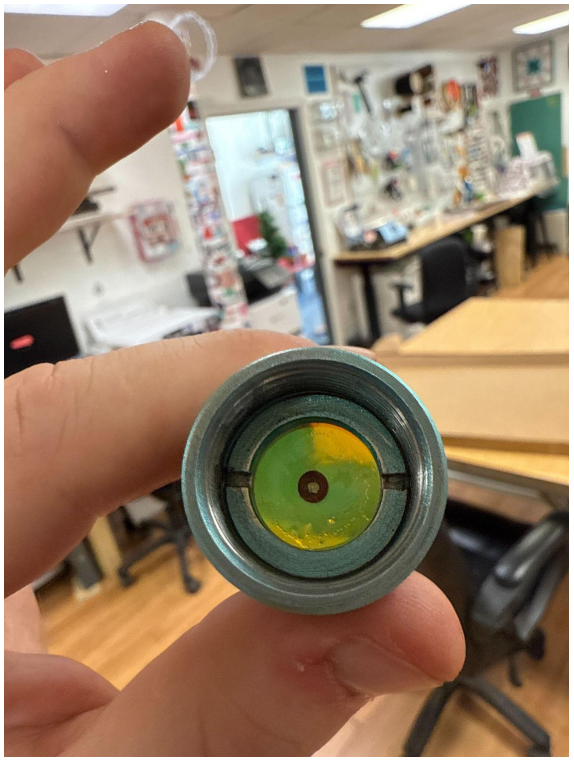
The Importance of Compressed Air

If compressed air is not utilized when the laser is cutting, it damages the lenses, which cost $65 each to replace. Below is a photo of a lens that had to be replaced because the compressed air was not set correctly. The black dot is a burnt lens.



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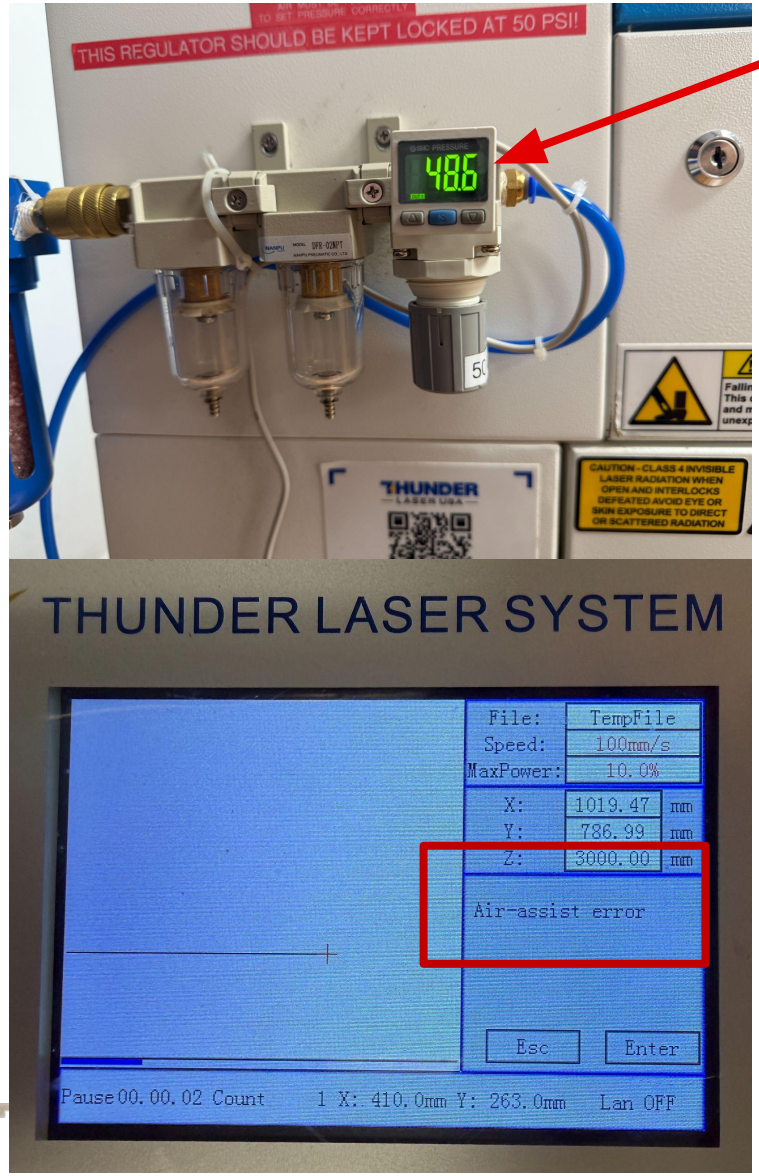
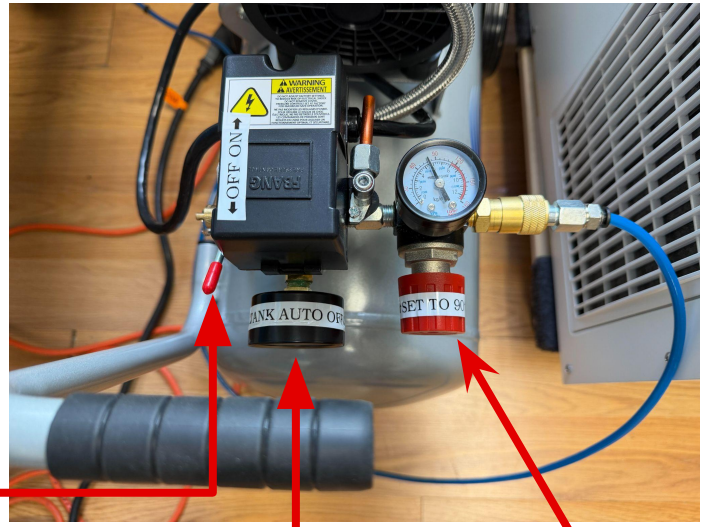
Compressed Air - Pressure Sensor



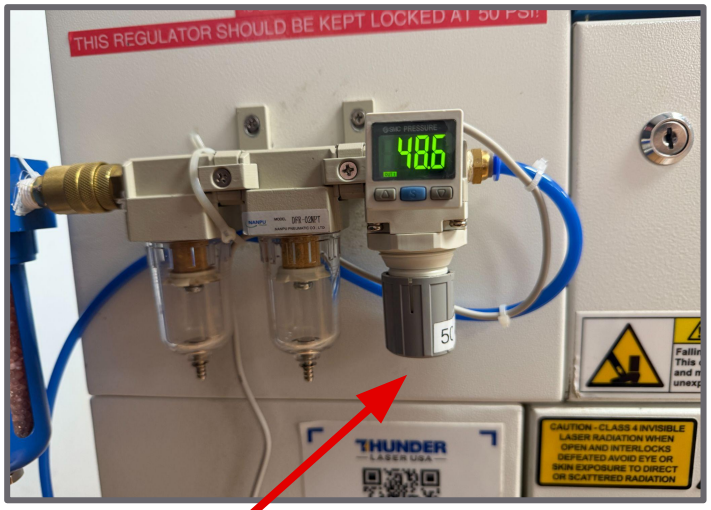
- Both lasers are setup with a digital pressure gauge attached to the front of the laser.
- Both lasers are setup so that if compressed air is less than 4psi, the laser will stop and show “Air-assist error” on the control screen.
- To avoid this error message, follow the instructions in the next slides to ensure that compressed air is setup correctly.
- If you try to start your project with less than 4psi, your project will run for a few seconds, and then the laser will shut off. The error message on screen will be “Air-assist error.” You must press ESC on the control panel and you will have to start over.
- If you start your project with greater than 4psi and the pressure drops to less than 4psi during the project, the laser will shut off. The error message on screen will be “Air-assist error.” You must press ESC on the control panel and you will have to start over.

Compressed Air - Leesburg - Standard



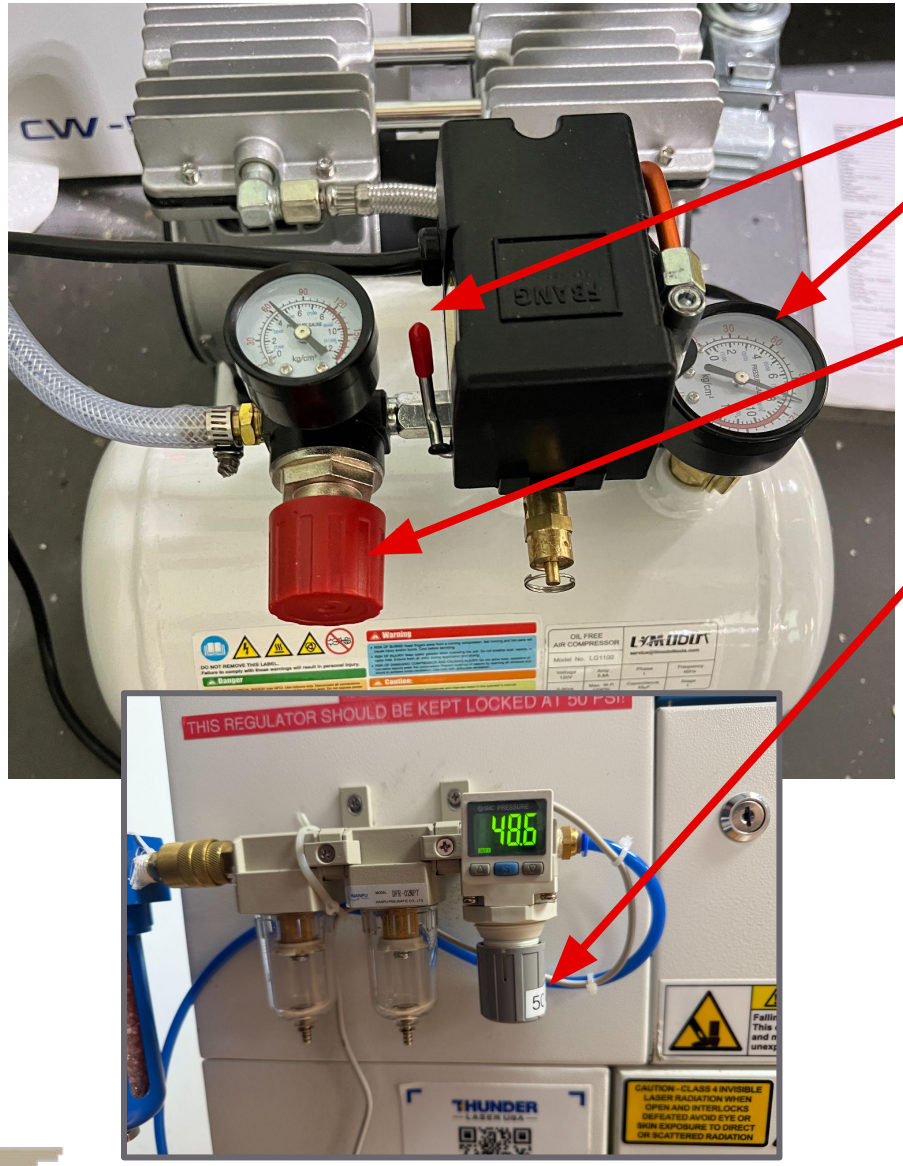
- Turn on the MAIN laser switch.
- The red switch turns the compressor on and off.
- The **Tank Pressure Gauge** is not adjustable by users. It may go into the red while filling and that's OK. If it goes halfway into the red, turn the compressor off and let a steward know.

- The red dial adjusts the "Regulated Pressure Gauge" on the right, NOT the "Tank Pressure Gauge" on the left.
- Turn the red Pressure Regulator dial until the Regulated Pressure Gauge reads 90PSI. Press **TEST** on the Air-assist Control panel to verify it stays at 90.



- There is a second regulator on front of the laser. Pull down on the grey dial, and set it to 50 PSI.
- You need to have air going through the lines to ensure that the pressure is correct by pressing **TEST** on the Air-assist Control panel to verify the PSI is correctly set to 50.

Compressed Air - Purcellville



- Turn on the MAIN laser switch.
- The red switch turns the compressor on and off.
- The right side pressure gauge is not adjustable by users. It may go into the red while filling and that's OK. If it goes halfway into the red, turn the compressor off and let a steward know.
- The red dial adjusts the regulated pressure, not the tank pressure. Turn the red dial until the Regulated Pressure Gauge reads 90PSI. Press **TEST** on the Air-assist Control panel to verify it stays at 90.
- There is a second regulator on front of the laser. Pull down on the grey dial, and set it to 50 PSI.
- You need to have air going through the lines to ensure that the pressure is correct by pressing **TEST** on the Air-assist Control panel to verify the PSI is correctly set to 50.

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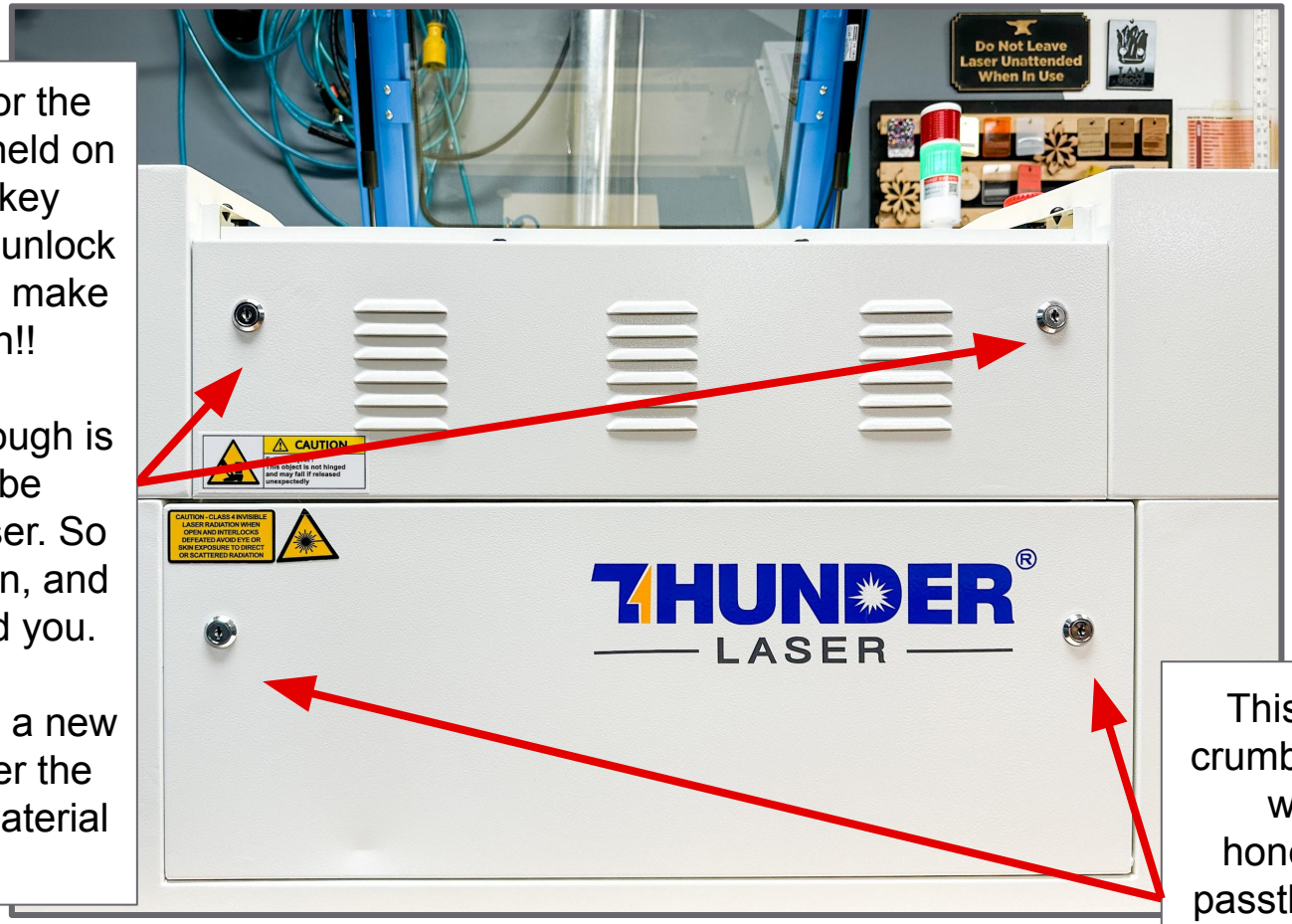
Getting to Know the Machine: Doors

This is the door for the passthrough. It is held on ONLY with two key latches. Once you unlock them, it will fall, so make sure to hold on!!

When the passthrough is open, you will be exposed to the laser. So please take caution, and alert those around you.

We are working on a new door that will cover the area, but still let material through.

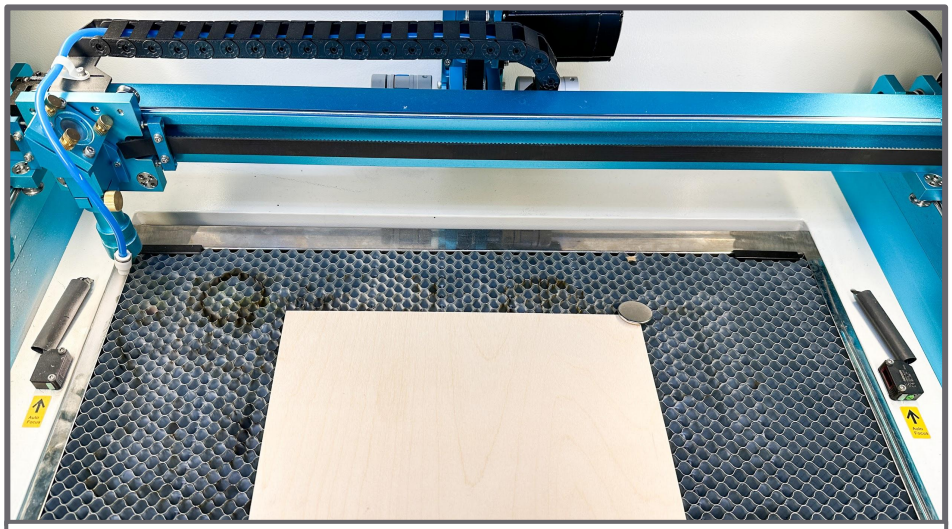


This is the door for the crumb tray, and where you would remove the honeycomb. Unlike the passthrough door, it's held on with a spring hinge. Please still be careful and don't let it drop against the machine

Getting to Know the Machine: Extraction

- On both machines, the air extractor comes on automatically. The extractor will start about 10 seconds after the project starts, and end about 90 seconds after the project is complete.
- On the NOVA51 in Leesburg, if you need the extractor to be on for a longer period of time after you complete your project (cutting acrylic is a good example) you can unplug the orange extension cord that powers the extractor from the black plug on the back of the laser and plug it directly into a wall outlet. Just remember to plug the extractor back into the laser when finished, otherwise it won't turn on automatically for the next user.

Getting to Know the Machine: Beds



Magnetic Honeycomb Bed

Blades

Crumb Trays (pulled out for cleaning)

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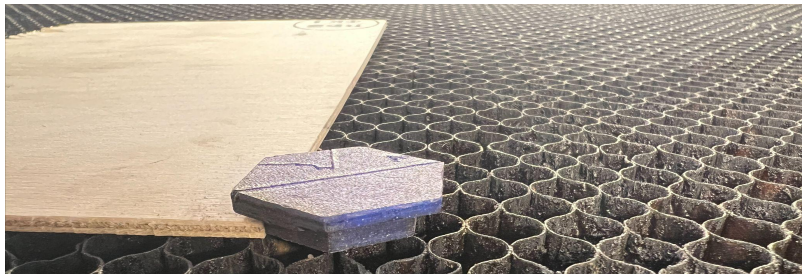
Getting to Know the Machine: Beds

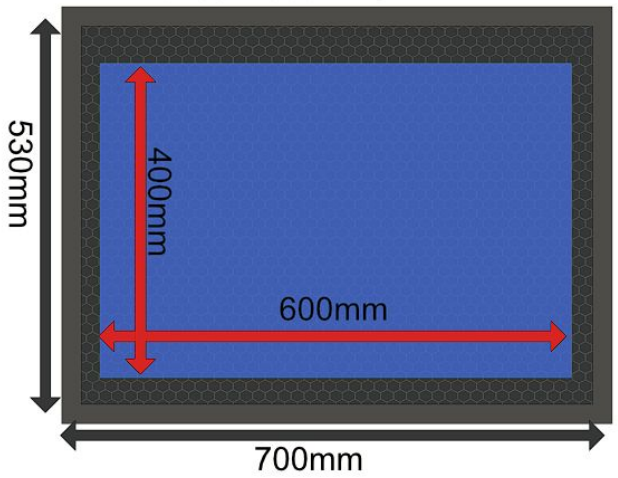
- You have the choice between using the honeycomb or the blades as your bed.
- If your piece is too tall to fit under the nozzle on either the honeycomb or the blades, you can place your work directly onto the crumb tray.
- If you are engraving/cutting material that is light enough to be blown around by the air assist, or that is warped, there are multiple ways to hold your workpiece down to the honeycomb bed.
- There are 3D printed hold downs available for use that fit into the honeycomb bed.
- The honeycomb is magnetic and the blades are not. This means you can use magnets to hold down your material on the honeycomb! Your hold downs shouldn't extend above your material far enough that the laser nozzle hits them as it moves around.
- You don't have to put your workpiece in any particular place on the bed. You can change the X & Y origin so that your project begins anywhere on the bed.
- Be aware that the available engraving and cutting area is not the same as the edges of the honeycomb, and putting your work material too close to the edges of the honeycomb can result in your engraving failing and a "Frame Slop" error warning on the laser control panel.
- You can also use magnets to secure your workpiece to the honeycomb.



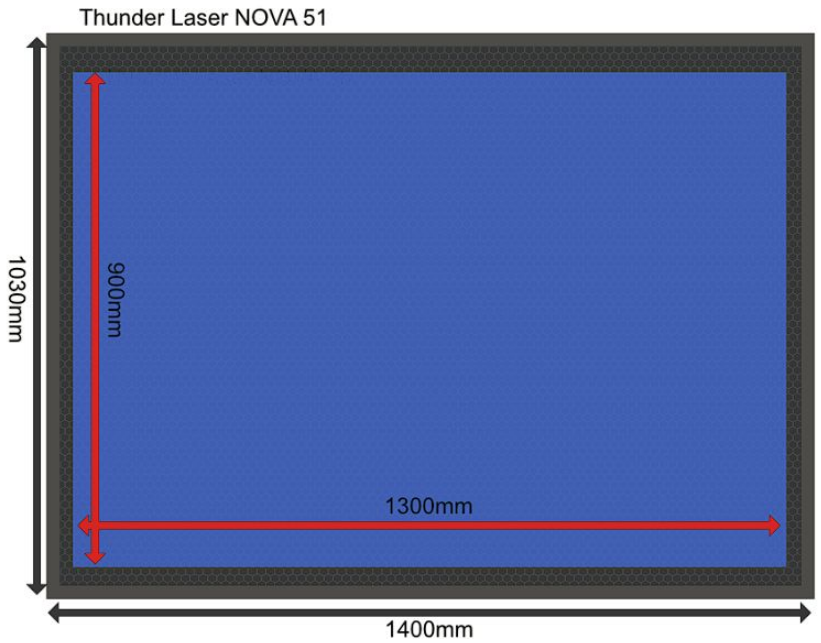
Honeycomb Size vs Cutting Area

- The working space is smaller than the honeycomb. Smaller machines will have a proportionally larger honeycomb since the amount of space required for the machine gantry components to be able to move the laser head is the same no matter the size of the machine.
- Users may get a "Not enough Extend Space" Error when they feel their artwork and material is far enough from the edge of the honeycomb when it is not far enough from the edge of the working space of the laser.
- The illustrations below are a representation of the workspace size. Note that the workspace is not necessarily centered on the honeycomb. This is a visualization, not an exact representation. More explanation can be found here.

Nova 24:



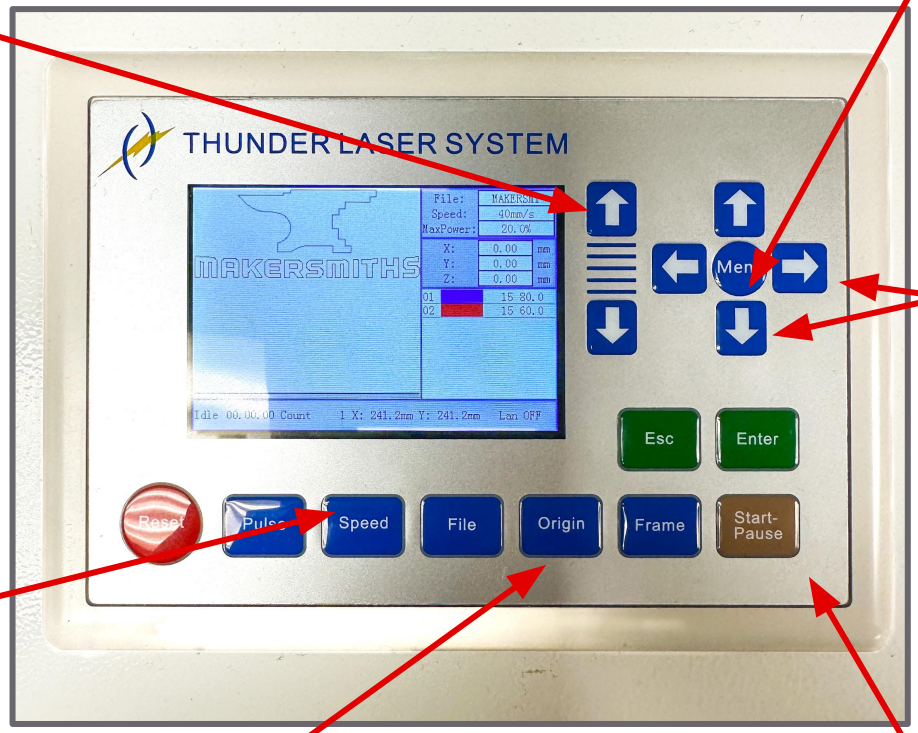
Nova 51:



Getting to Know the Machine: Control Panel

Z Axis Controls
- This moves the bed up and down.
- Please keep an eye on the laser head when moving the Z, so you don't hit it.

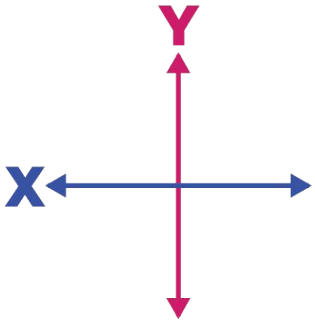
Speed Control
- Controls the mm/s speed that the X and Y move when you manually move the machine.
- Faster speed is good for setting your origin, and lower speed is good for pinpointing registration marks or the center of an object.



Origin
- If you prefer "User Origin" in LightBurn, you will press this button so that jobs sent to the machine start in the place the head was when you pressed User Origin

Menu Includes
- Auto Level / Auto Z

X & Y Axis Controls



Start - Pause
- You can pause your job here, and restart it by pressing start.
- If it's an emergency stop, please hit the big red button

Getting to Know the Machine: Laser Head

- The entire component that includes the metal housing, lens, nozzle and air attachment is called the head.
- The lens is inside the head and should not be touched, cleaned or changed except by a laser steward. Care should be taken when removing the nozzle from the head and exposing the lens.
- The nozzle is at the end of the head that is closest to the bed when installed and is where the air assist flows through. This can be unscrewed for cleaning, or to change between sizes. Always unscrew/remove the nozzle before cleaning it.
- The compressed air attachment is connected to the nozzle and is the connection point between compressed air and the nozzle. The air hose must be removed prior to changing heads or removing the head and nozzle for cleaning.

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Setting Up to Laser Cut/Engrave

Laser Setup: Cleaning and Nozzle Sizes

Don’t be the Member who leaves a mess for the next user…

Before starting your project, make sure the nozzle is clean, and always clean the nozzle after you have finished your session on the laser. This requires removing the entire head, then removing the nozzle from the head.

To Clean:

- To remove the head, first press down on the white fitting around the blue air hose, and after feeling/hearing a click, gently pull the blue air hose up to remove it.
- Lower the bed far enough so that when you loosen the gold nut, you can remove the entire head.
- Loosen the gold nut while holding the head. Lower the head so that the entire head is removed from the machine.
- Unscrew the nozzle from the head and clean the nozzle with alcohol and a paper towel and/or swabs. Clean the inside and outside of the nozzle.
- Reverse instructions above to replace the nozzle and head.

After taking the Advanced Laser class which includes using the HR and 4” lenses, use the same procedure for focusing the lens and cleaning the nozzle, but be sure to use the relevant height on the acrylic focus tool for the lens you are using to focus.

Laser Setup: Focusing the Laser

The laser lens must be adjusted to the correct focus on your material **every time**. **Don't assume** that because you are using the same material each time, that it doesn't need to be checked.

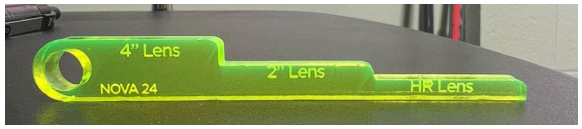
For the beginner class we will focus on the **2" / Standard Lens.** It requires a **7mm distance between the end of the nozzle and your work material.** Use the acrylic focus tool to correctly focus the lens.

To Focus:

- Put your workpiece on the bed.
- Loosen the gold nut and raise the head as far up as it will go. Tighten. This will minimize the risk of material hitting the nozzle and damaging the head, nozzle, material or gantry.
- Move the laser head so that it is over your workpiece.
- Place the acrylic focus tool on top of your workpiece, directly between the nozzle and your workpiece. Raise the bed so that your material is around 10mm from the nozzle. Leave some wiggle room.
- Loosen the gold knob while holding the head. Slowly lower the nozzle to the 2" Lens position on the focus tool. Tighten the gold knob.
- The laser/lens is now focused.

Do not use tools to tighten or loosen the knob, but do make sure it is firmly hand-tightened.

You can find a great article about focusing here: **The Basics of Focus**



Acrylic Focus Tool

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Getting to Know LightBurn

Laser Software - LightBurn

LightBurn Software

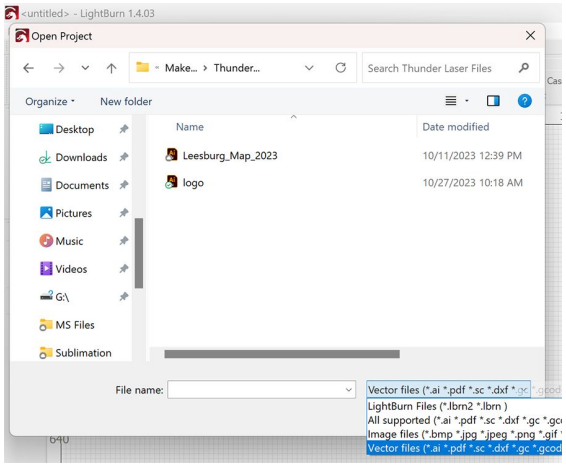
- In Lightburn you can preview, edit or create artwork. It also controls the laser cutters.
- We have a limited number of Makersmiths licenses available. There is one for each computer attached to a laser, and one for the Leesburg Classroom.
- You can download a 30 day trial and/or purchase your own copy. If purchasing you will need to buy the Lightburn Pro License Key.
- Lightburn has a program for members of makerspaces to get a 75% discount on a single seat license of the software. This is so members can work on their own computers to design their projects and then just jump straight into cutting when they come in to use the cutter. NOTE: this is only for use with the lasers in the space. If you own your own laser, you need to buy a full priced license. The code is a pinned message in the #lasercutter Slack channel but not in this slide deck because these slides are posted publicly.
- This is good for the DSP (thunder lasers) and Galvo (fiber laser) licenses.
- The device/machine and preferences files for LightBurn are on the wiki so you can setup your own copy exactly as it works on the computers attached to the lasers.

LightBurn: Creating Your Artwork

To get the most of out of a laser cutter, your files will primarily be vector files. The laser uses the vector pathways as a guide when cutting. Raster files can also be used, but are not as vector files. You can find more info here: Raster vs Vector Files

Commonly Used Vector Drawing Programs:

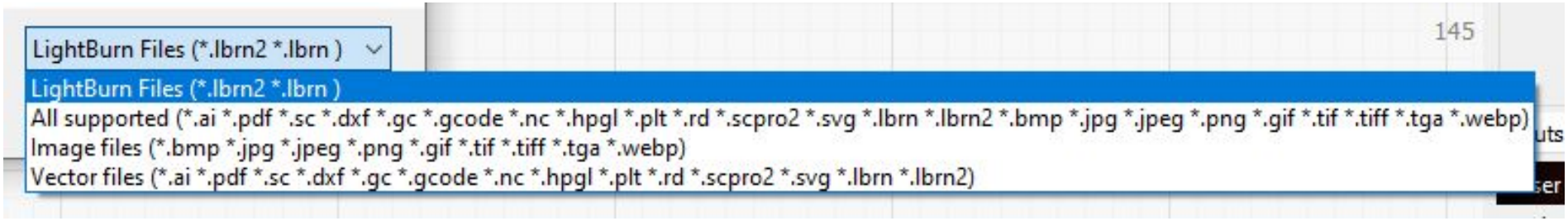
- LightBurn: You can create your artwork in LightBurn but it is not as fully featured as dedicated vector drawing applications.
- Adobe Illustrator: Subscription based, around $50 a month, with discounts for students. We have a license available at each location.
- CorelDraw: One time cost. We have a license available at each location.
- InkScape: Free, with some small limitations relative to the paid options. A copy can be found on most of our computers.
- Fusion360: Free “Hobbyist” version, sketches can be exported as .DXF files for import to Lightburn. Useful for very precise drawing.
- Others: Other vector/CAD drawing programs are available, but may take some more work to get the file ready.



Open LightBurn and go to File > Open and choose your file. You may not see it right away, since LightBurn defaults to its own file format. To get to your file go down to the bottom right corner, next to the “File name” bar and click the extension box to see other file options.

LightBurn: File Types

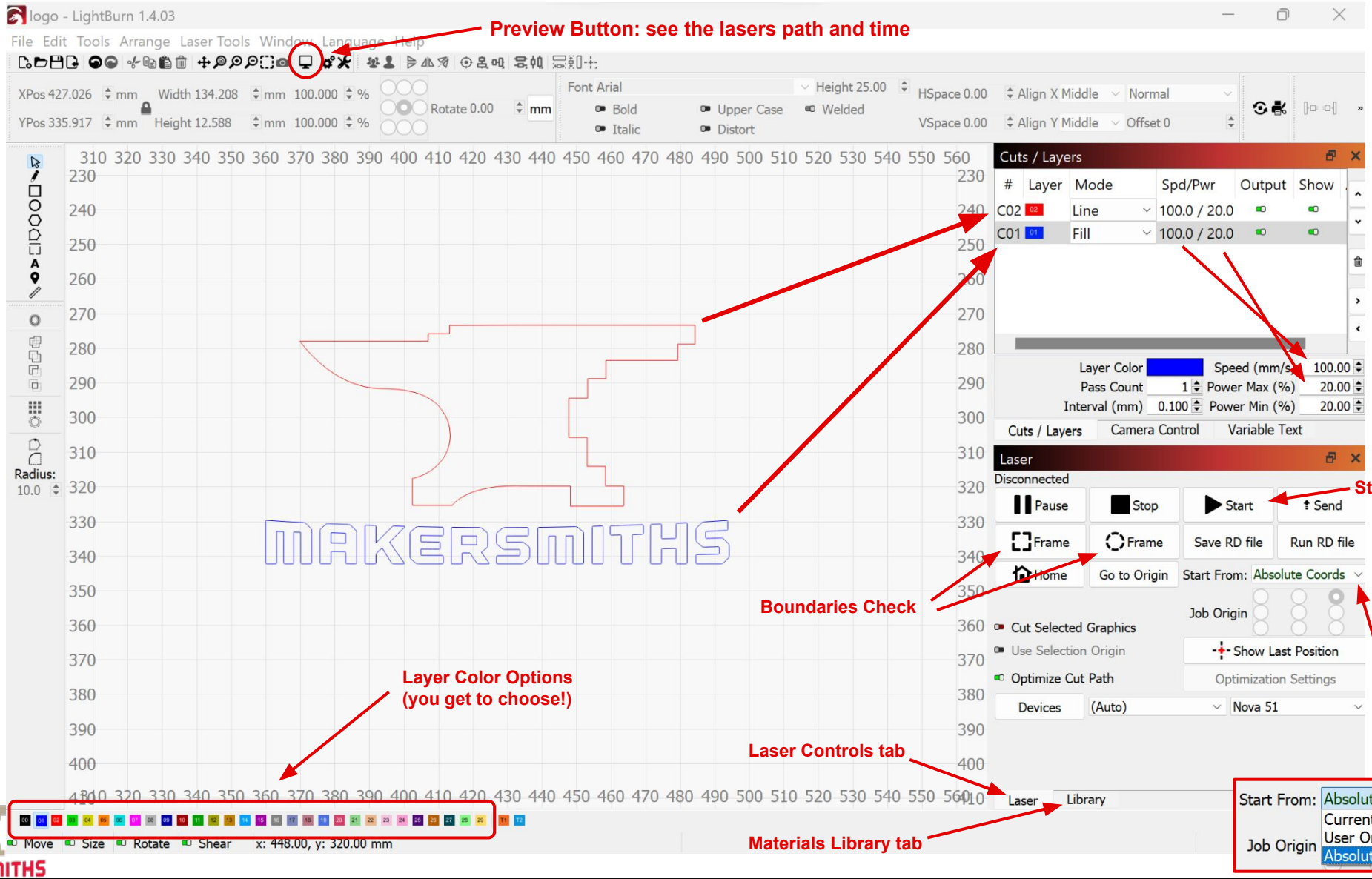
- LightBurn can accept many file types!
- LightBurn requires the SVG import source to be set in the LightBurn software, else your design may import and be the wrong size, particularly if you use Illustrator. When you start your project, you should go to File - Preferences- Import Prefs. Load the Default Preferences file from the Desktop folder based on whether you will be importing SVGs from Inkscape or Illustrator. If you don't want to use or can't find the Default Preferences file, you can go to Edit - Settings - Import/Export tab at the top, and on the right side choose the SVG Import Settings that match the SVG source. If using Corel Draw, either setting will work.



- LightBurn does not require specific line weights and colors. It just needs vector lines or shapes and you specify what is done with each object.
- You can also import raster files for photo engraving.
- If you want specific shapes to be engraved with the same power/speed etc. settings, make them the same color in your original art. This will save you time later on.

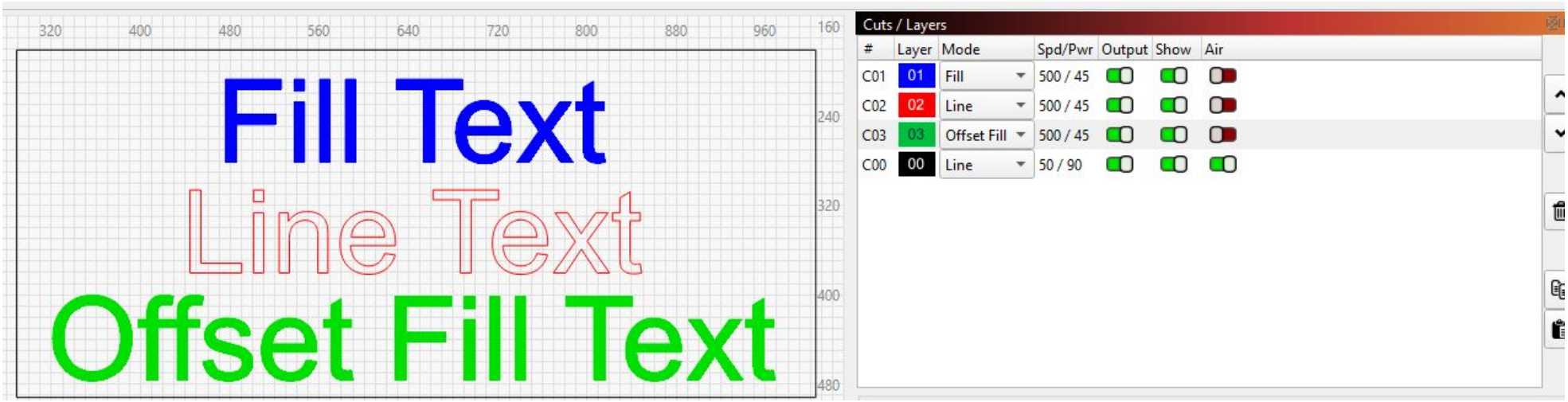
LightBurn: File Setup

Let's get to know this screen…



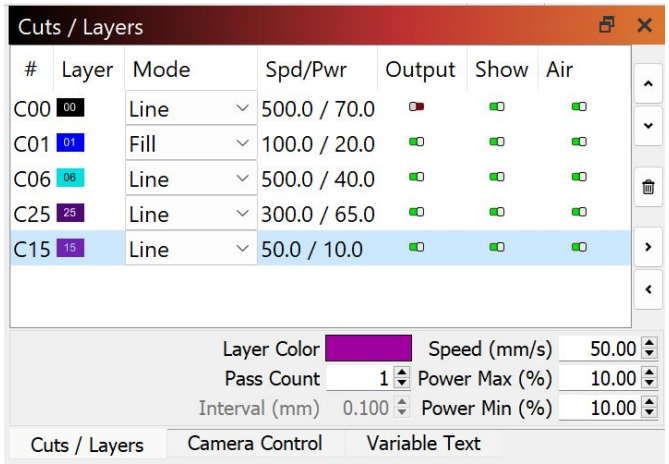
LightBurn: Cuts / Layers

- Adding Cuts / Layers instructions to each part of your artwork is how you tell the laser what to do.
- These are similar to toolpaths in CNC applications where you can use different settings for different parts of the artwork.
- For each part of your artwork, you can set the Mode to Fill, Line or Offset Fill.
- Fill and Offset Fill are used to engrave art, text, etc. into your workpiece.
- Line can be used to engrave a line in your workpiece, or cut through your workpiece, depending on the power and speed settings applied.

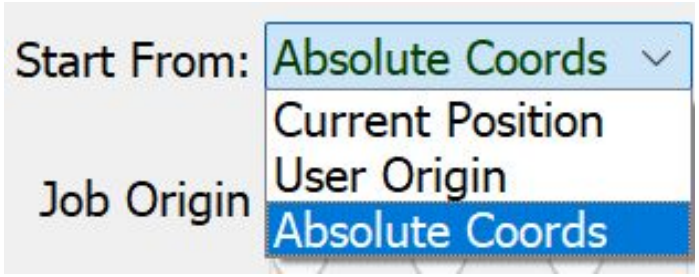


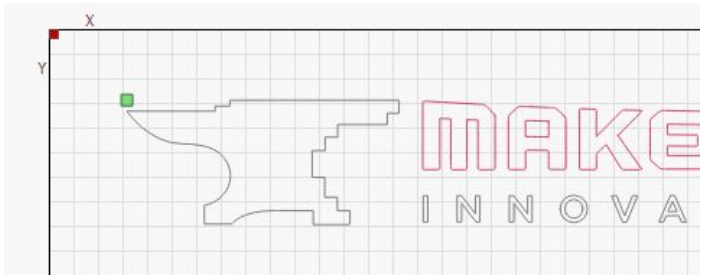
LightBurn: Speed & Power

- The ratio of Speed (how fast the head moves) to Power (the intensity/power of the laser) makes a substantial difference in the quality of the final result of your engraving, whether you cut all the way through, and well as how long it takes you to complete your project.
- There is a sheet with Thunder Laser's recommended base settings relevant to the location's lasercutter attached to the laser computer. It is strongly recommended that you use LightBurn's built in Material Test Card each time you have new project materials.
- TEST TEST TEST. Always test your material with different fill and line settings before doing your final project.
- Once you find a Power/Speed profile that works for your material, save that information (Google sheet, notebook, OneNote etc.) so you can use those settings again in the future.
- Remember that the Nova 24 and the Nova 51 are different wattages. Settings that worked on one will NOT work on the other.
- You can choose the order in which the laser cuts and engraves by pressing the arrows on the far right of the "Cuts / Layers" window.
- If the Output in the Cuts/Layer window is green, it will cut/engrave, if it's red the laser will skip it.
- Power Min (%) is the setting used when the laser changes direction. It can help avoid scorching. The minimum power threshold for the Nova 51 is 3%, and for the Nova 24, 7%.



LightBurn: Origin

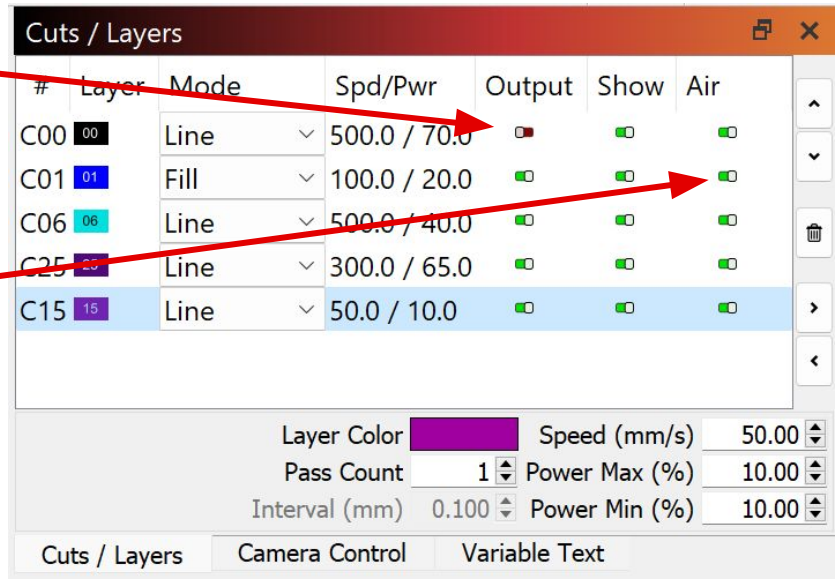


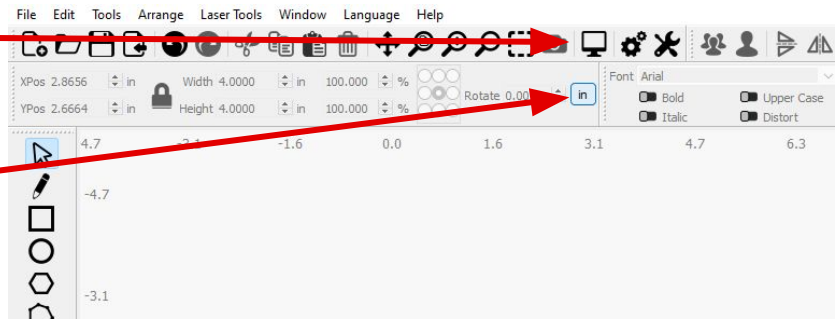


- LightBurn gives you multiple options to set the origin (X & Y) for your project.
- **Start From: Absolute Coordinates:** means that the project origin is the same as the machine's absolute X-Zero & Y-Zero position, which is the top left of the work area. If you select Absolute Coords, the "Job Origin" option will be greyed out because the software assumes the Job Origin as Top Left.
- **Start From: User Origin:** lets the user set their project to start from anywhere inside the cutting area. Move the laser to where you want your project to start from, set the "Job Origin" accordingly, then press the Origin button on the laser control panel to communicate the "User Origin" to LightBurn.
- **Start From: Current Position:** means that the project will start from wherever the laser is positioned when you press Start.
- **Job Origin:** If you use either User Origin or Current Position, you can select whether the origin is in the upper left, upper middle, upper right, etc.of your design.
- The absolute X & Y origin of the machine is indicated by a red square. The Start From position is indicated by a green square.

LightBurn: Other Tips & Tricks

- Air Assist can be turned on and off for each layer/color. High Air is for cutting through materials, especially acrylics. It helps cool it so it doesn't melt back together.
- When the Air Assist is turned on it will activate the "High Power" air. When turned off the "Low Power" air will be used.
- Both machines have a top engraving speed of 1000mm/s. At that high rate of speed, the gantry and even sometimes the entire machine can shimmy a bit. This is why it's important to firmly tighten the gold thumbscrew holding the laser head and often helpful to secure your material to the honeycomb, especially on the smaller Nova 24.
- The "Preview" button at the top of the screen is useful to find out how long your project will take as well as make sure your cut/fill/layer settings are correct before you get started.
- If you want to change between metric and imperial, you can do so by clicking on the button here.





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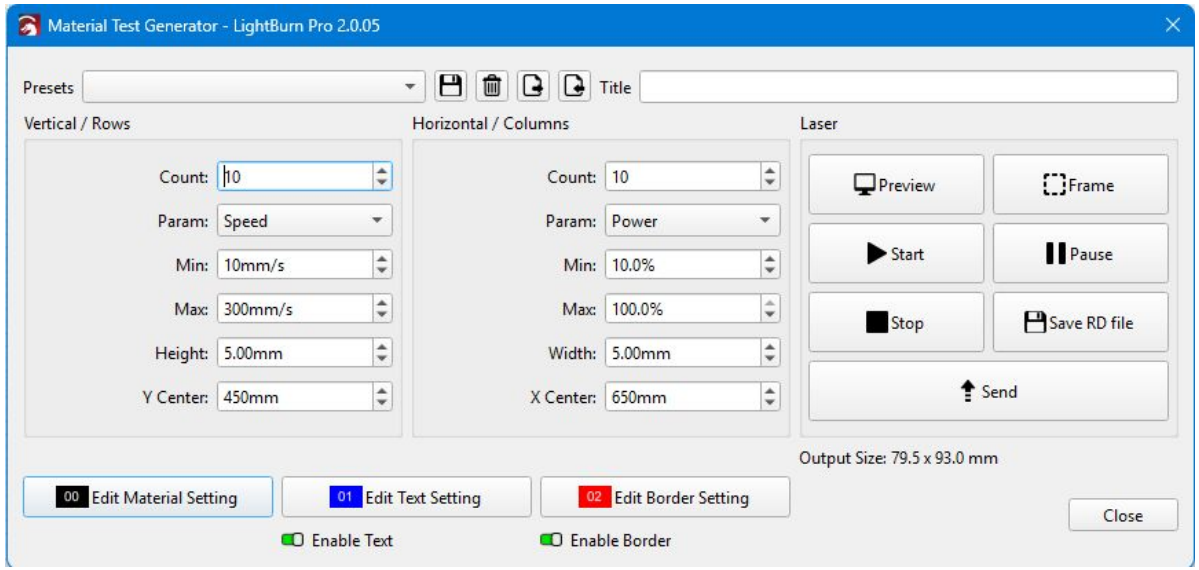
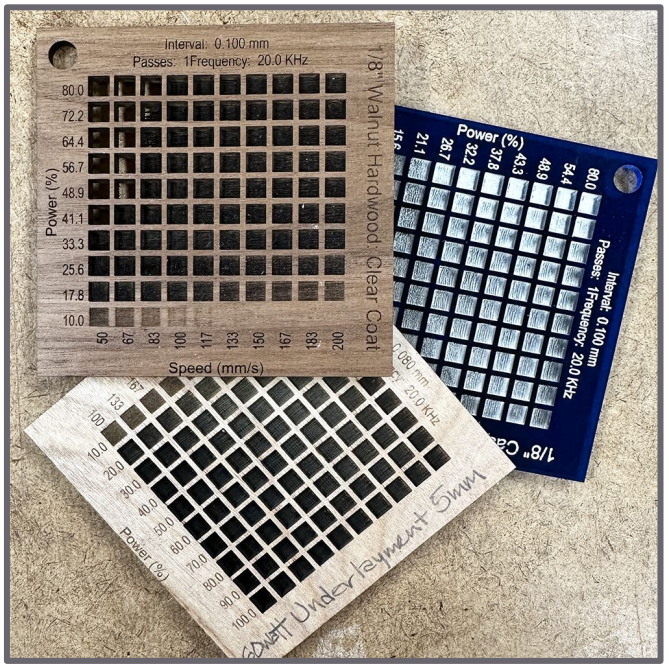
LightBurn: Material Test Cards

Thunder Lasers provides a limited library of materials with preset speed/power, but these are only starting points and not necessarily the best settings. You should do a test on your material before starting your full project. This will allow you to see what the engraving will look like with different speed/power combinations AND if your speed/power settings are correct to cut all the way through.

LightBurn has made it super simple to make one with different settings for your material. The widget can be found in the top left menu > Laser Tools > Material Test.

LightBurn tutorial: https://docs.lightburnsoftware.com/Tools/MaterialTest.html or other YouTube videos.





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Checklists

CO2 Pre-Cut Checklist - Long Version

- ❑ Turn on the computer and monitor if they aren't already on.
- ❑ Turn on the "Main" switch on the laser.
- ❑ Turn on the "Laser" switch on the laser. This turns on the watercooler. Check that it is on.
- ❑ **Turn on the compressor. Check that the regulated supply on the compressor is 90 PSI and that the PSI on the secondary regulator attached to the laser is set to 50. Press the Test button on the Air-assist Control High to verify that both regulators are correct. Adjust as needed.**
- ❑ Add/remove the honeycomb and knives as needed. Secure your workpiece as needed.
- ❑ Check that the 2" lens is installed and that the nozzle is clean. The HR and 4" lenses/heads are covered in the advanced class and should only be used if you are trained to do so.
- ❑ Holding the head, loosen the gold knob and raise head all the way up to the stop collar.
- ❑ Adjust the bed height so that you can place your work material on the bed. Place the acrylic focus tool on top of your material. Raise the bed until it is about 5-10mm from the focus tool. Hold the head, loosen the gold knob, and lower the nozzle until it touches the acrylic focus tool. Re-tighten the knob and remove the focus tool.
- ❑ Open LightBurn on the computer.
- ❑ Go to File - Preferences - Import Prefs. Go to the "Thunder Laser Default Preferences" folder on the desktop. Then select file labelled Illustrator if you are importing vectors from Adobe Illustrator, or select the the file labelled Inkscape for all other programs. These files are also on wiki.makersmiths.org.
- ❑ Import/open/create your art as appropriate
- ❑ Check or set all speed/power/passes/interval layer settings. Check that your origin in LightBurn is correct.
- ❑ Move the laser/set your origin location as appropriate.
- ❑ In LightBurn, press the "Frame" button which will move the machine around the outside edges of the area to be cut, to make sure your project will be cut in the correct location.
- ❑ Check that the air extractor is plugged into the back of the laser so that the extractor comes on automatically.
- ❑ Press Start.

CO2 Pre-Cut Checklist - Short

- ❑ Turn on the computer, monitor, “Main” and “Laser” switches. Check the watercooler is on.
- ❑ **Turn on the compressor and set regulated supply on the compressor to 90 with red knob. Set PSI on the secondary regulator on the laser to 50 with the grey knob.**
- ❑ Add/remove the honeycomb and knives as needed. Secure your workpiece as needed.
- ❑ Check that the 2” lens is installed and that the nozzle is clean.
- ❑ Holding the head, loosen the gold knob and raise head all the way up to the stop collar.
- ❑ Adjust the bed height so that you can place your work material on the bed.
- ❑ Place the acrylic focus tool on top of your material. Raise the bed until your workpiece is about 5-10mm from the focus tool. Hold the head, loosen the gold knob, and lower the nozzle until it touches the acrylic focus tool. Re-tighten the knob and remove the focus tool.
- ❑ Open LightBurn on the computer.
- ❑ Go to File - Preferences - Import Prefs, go to the “Thunder Laser Default Preferences” folder on the desktop and select the file labelled Illustrator if you are importing vectors from Adobe Illustrator, or select the the file labelled Inkscape for all other programs.
- ❑ Import/open/create your art as appropriate
- ❑ Check or set all speed/power/passes/interval layer settings. Check that your origin in LightBurn is correct.
- ❑ Move the laser/set your origin location as appropriate.
- ❑ Use “Frame” in LightBurn to make sure your project will be cut in the correct location.
- ❑ Check that the air extractor is plugged into the back of the laser so that the extractor comes on automatically.
- ❑ Press Start.

CO2 Post-Cut Checklist

Main List

- ❑ Wait 10 seconds for the laser bed to exhaust before opening top.
- ❑ Retrieve object(s) from laser bed.
- ❑ Turn off the compressor. You do not need to adjust the red or grey knobs that regulate pressure.
- ❑ NOVA 24 - Bleed the compressor tank using the black switch on the front of the tank.
- ❑ NOVA 51 - You do not need to bleed the compressor tank. If you plugged the extractor directly into the wall, reattach it to the laser
- ❑ Clean nozzles with alcohol, paper towels and swabs.
- ❑ Vacuum out all little pieces in the honeycomb and tray.
- ❑ Save your file and exit Lightburn.
- ❑ Turn off “Laser” and “Main” switches.
- ❑ Record your time on the laser using the QR code near the laser or the link on the desktop.
- ❑ Pickup around the machine - throw away cutoffs, put away tape and calipers, etc.
- ❑ Leave the computer and monitor on at both locations.

If you are and Advanced User or if you changed anything from the normal setup:

- ❑ Replace the front and rear panels if they were removed for passthrough. Put away any supports that were used.
- ❑ Replace the stop collar on the 2” lens/head if it was changed or removed for your project.
- ❑ Replace the 2mm nozzle on the 2” lens/head and reinstall it in the machine if it was changed for your project.

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Additional Resources & Advanced Classes

Useful Videos:

- Computer Creationz: https://www.youtube.com/channel/UCB3-k4fmkVqTTjAhb0Cdd_g
- LightBurn Official YouTube Channel: https://www.youtube.com/@lightburnsoftware7189
- The Louisiana Hobby Guy: https://www.youtube.com/@TheLouisianaHobbyGuy
- 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

Some of the above are more geared towards CO2 than Galvo lasers.

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Tips, Hints, & Have Fun

- 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/

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 ⅛" wood too. Just double check it is laser safe) https://www.inventables.com/categories/materials

Advanced Classes

Laser Rotary: This class will go over how to use the rotary tool on both the Nova 24 & 51.

Advanced Laser Cutter: This class will go over how to safely use the many advanced options the Thunder Lasers offer. These include: **:**

- Passthrough
- Print and cut wizard
- HR & 4” lenses
- Nozzle Sizes
- Camera Calibration