

Laser Cutter Beginner Class

Thunder Nova 24 & Nova 51



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 It must be turned on manually on the NOVA 24 in Purcellville.





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 Members Only Content. Fill out the reservation form.
 - Please include the location before your name in the reservation
 - Limits:
 - ≤ 2 hours per day. You can schedule 4 hours with permission from a laser steward.
 - 8 hours/week if time is open
 - Priority of scheduling given to Members over Non-Members
- **Pay Your 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 hour
 - Billable time is based on using the machine or schedule on the google calendar (not print time)
 - Payment: Cash Box, iPad, QR Code or on the Tool Reservation Page
- **Record Time in the Log Book** - Keep track of print time /cut time and material cut in the logbook next to the laser computer. This is used to determine maintenance/cleaning routines.



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

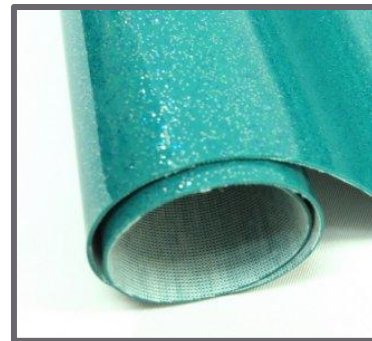
- **Always be sure the External Exhaust Fan is in operation** before cutting/engraving.
- **Be sure the bed is clean and has no debris from previous uses.** Always clean it when you are done.
- **Make sure you have focused the Laser Optics** to the top of your material.
- **NEVER Leave the Laser Running 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

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



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



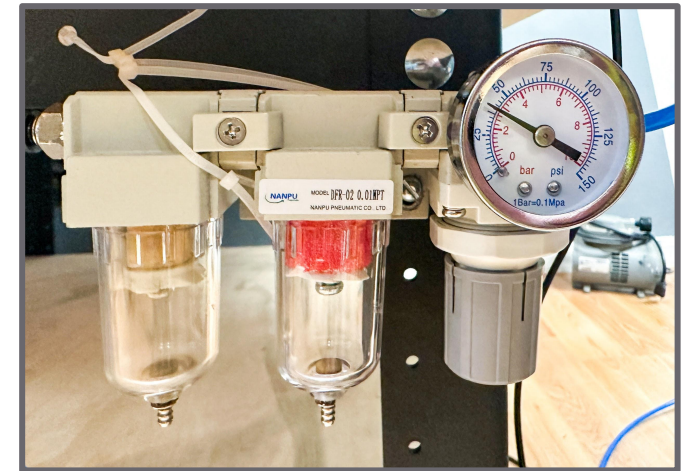


Getting to Know the Thunder Laser

Getting to Know the Machine: Switches & Air



- Both locations' air compressor have both a tank pressure and a regulated/supply pressure rating.
- The regulated/supply pressure from the air compressor should be ~60psi and is adjusted with the red knob



- 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.



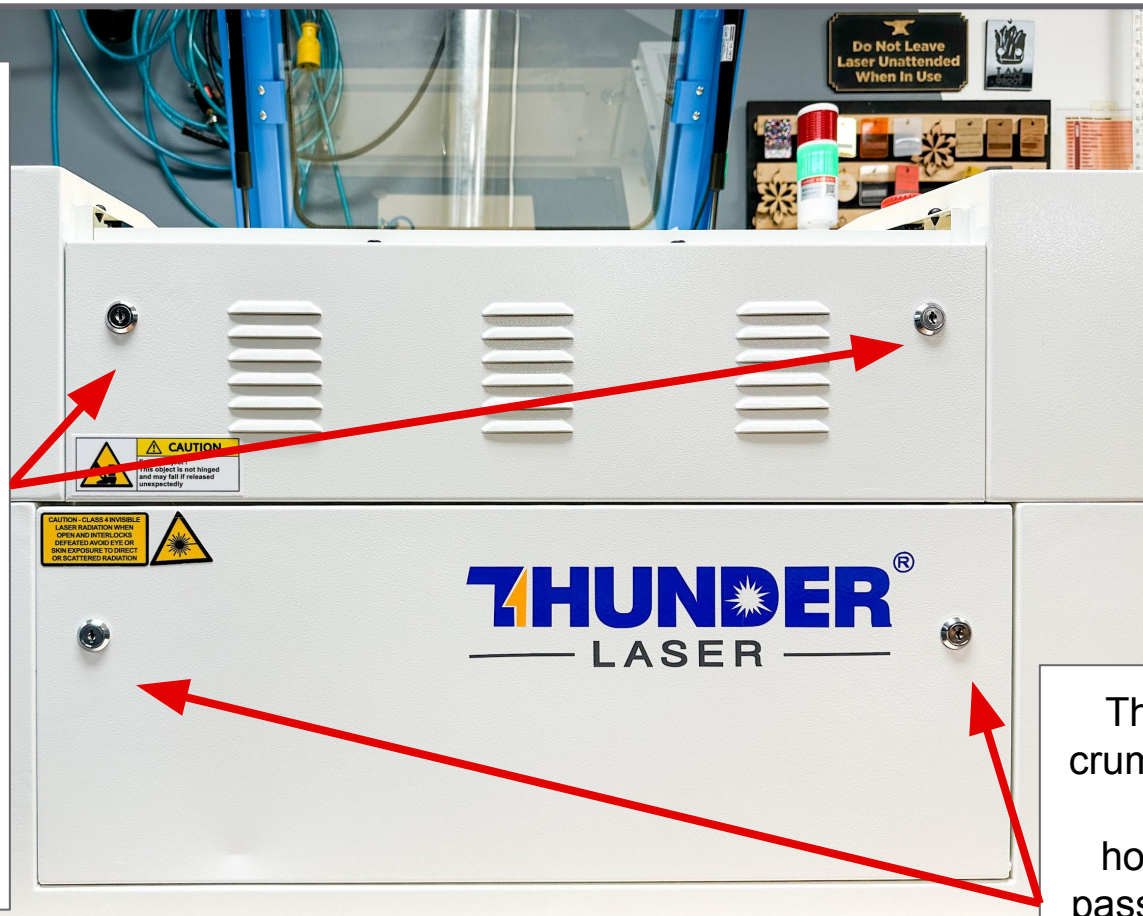
- Compressed air goes from the compressor into the regulator. The regulator can be adjusted by pulling down and turning the grey dial. The regulator should be set to 50psi.
- Make sure that the water cooler, fume extractor, compressor, and both the Main and Laser switches are on before starting.

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!!

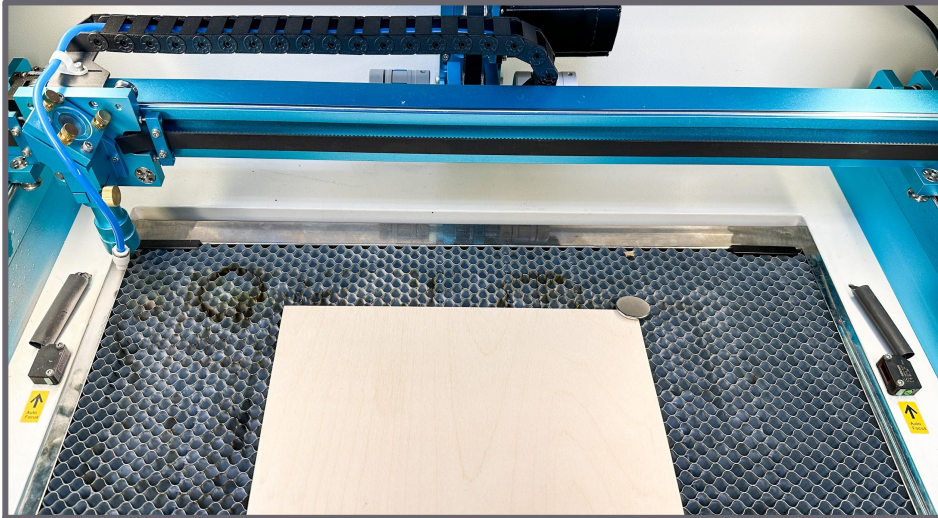
When the passthrough is open, you will be exposed to the laser. So please take caution, and alert those around you.

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: Beds



Magnetic Honeycomb Bed



Knives



Crumb Trays (pulled out for cleaning)



Getting to Know the Machine: Beds

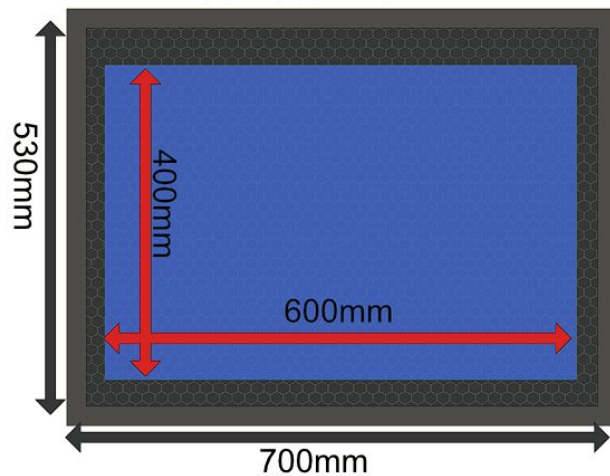
- You have the choice between using the honeycomb, the knives or the crumb tray as your base. We suggest the first two options before trying the crumb tray
- The honeycomb is magnetic and the knives are not. This means you can use magnets to hold down your material on the honeycomb! Just make sure it doesn't get in the way of the nozzle, i.e., your hold downs shouldn't extend above your material far enough that the laser nozzle hits them as it moves around.
- If your piece is too tall to fit under the nozzle on either the honeycomb or the knives, you can place your workpiece directly on the crumb tray.
- You don't have to put your workpiece in any particular place on the bed. You can change the X0 Y0 origin so that your project begins anywhere on the bed.
- Be aware that the X0 Y0 position is not the same as the edges of the honeycomb bed, 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.



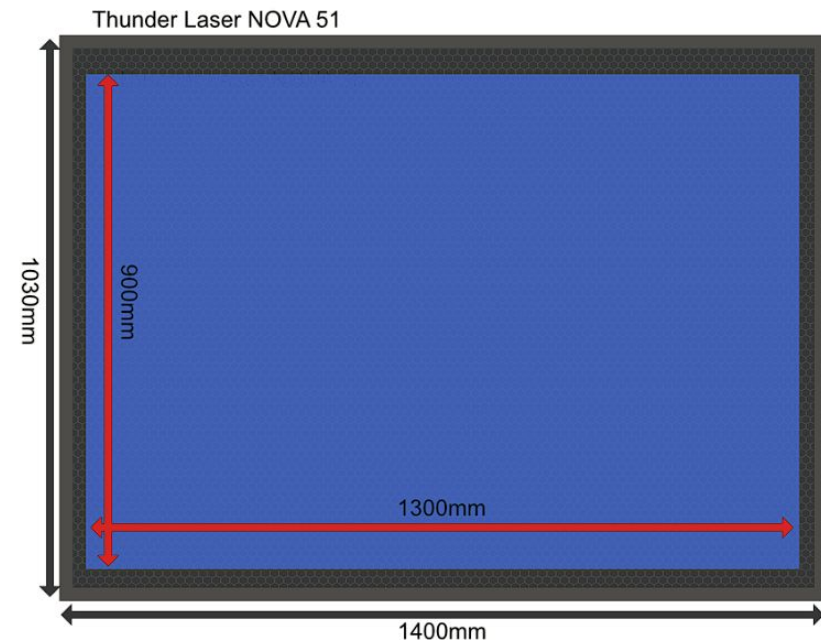
Honeycomb Size vs Cutting Area

- 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 will often 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 blue box area is 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: Important Buttons



- Both machines have Air Assist!
- The dials aren't marked with numbers/gauges/etc, so the stewards have manually set them to optimal levels. **Please do not re-adjust them without permission from the Laser Stewards.**
- We will be installing digital gauges down the road.
- You can press the "Test" button to help set the PSI on the compressor or regulator if you need to do so.

- 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 also stop the machine by opening the top door pressing "Stop" in LightBurn.
- You can pause the machine from the control panel by pressing the "Start-Pause" button.



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.

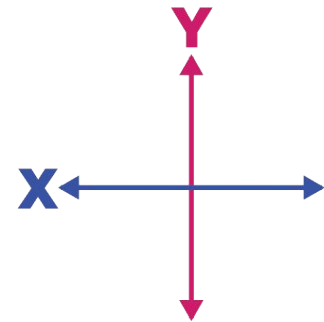
Speed Control

- 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.

Menu Includes

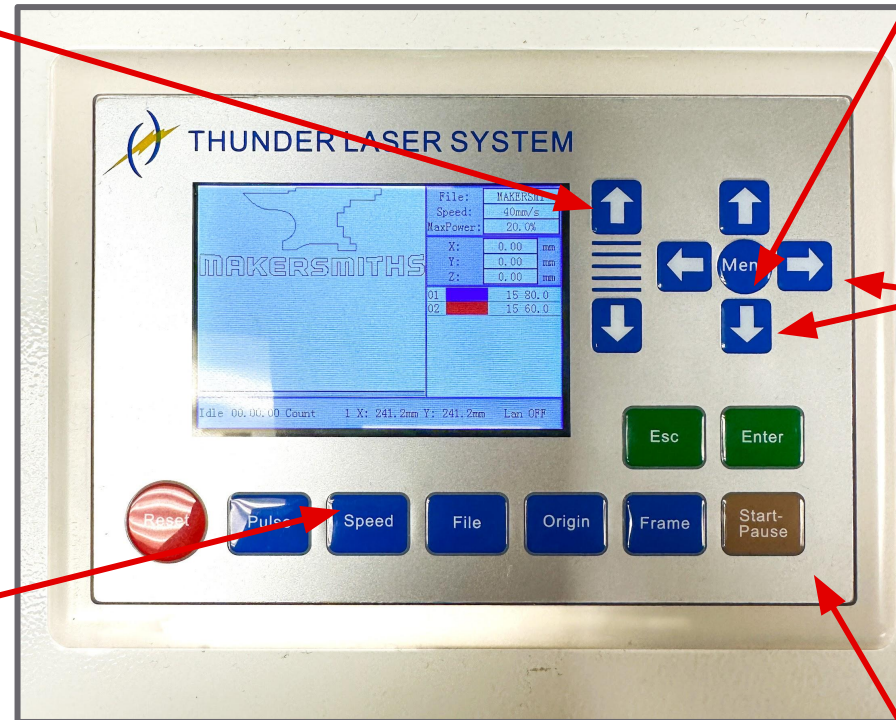
- Auto Level / Auto Z

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.



Setting Up to Laser Cut/Engrave

Laser Setup: Focusing the Laser

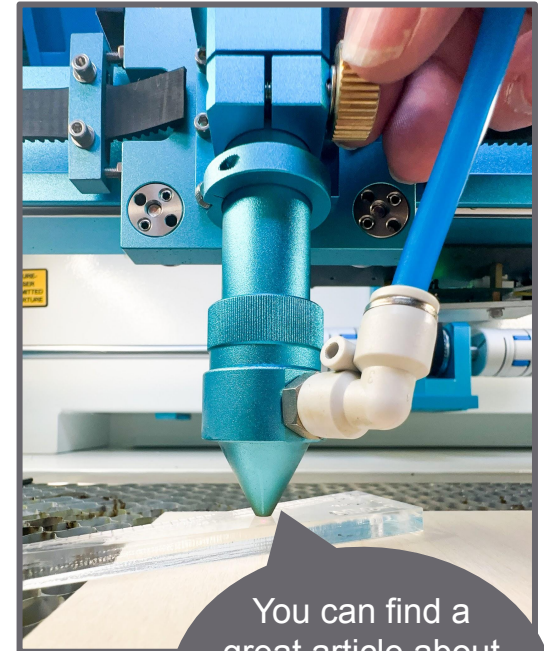
The laser lens must be adjusted to the correct focus on your material **every time**. **Don't assume** that because you are using the same material each time, that it doesn't need to be checked.

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.

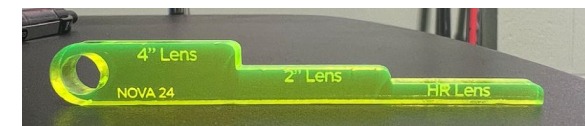
To Focus:

- 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 over tighten the gold knob, but also do not leave it loose. Do not use tools to tighten or loosen the knob.



You can find a great article about focusing here:
[The Basics of Focus](#)



Acrylic Focus Tool



Laser Setup: Cleaning and Nozzle Sizes

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 use the relevant height on the acrylic focus tool for the lens you are using to focus.



You can find a great article about focusing here:
[The Basics of Focus](#)





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 [DSP License Key](#).

Design Software

- If you want to design outside of Lightburn (and you probably will) you can use a vector drawing program such as CorelDraw, Adobe Illustrator, Canva, Inkscape, Fusion 360 or any software that will export vector graphics in the file types shown later in these slides.

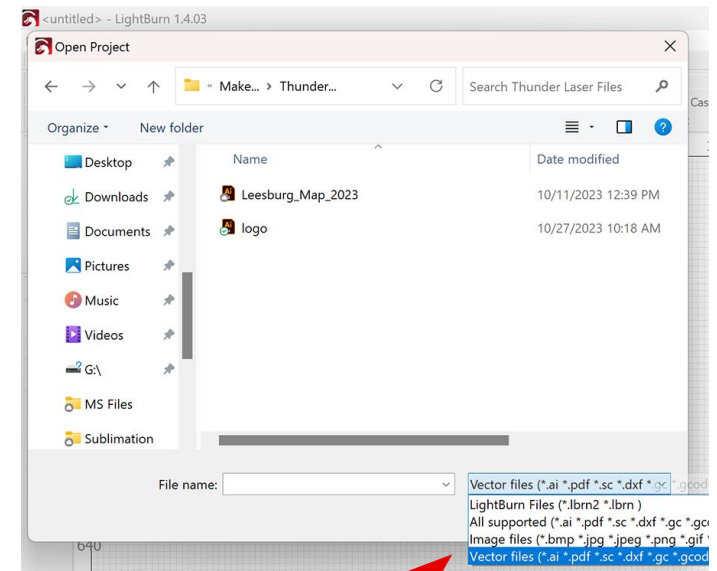


LightBurn: Opening/Importing Your File

To get the most 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 will need to be converted before the laser will recognize it. You can find more info here: [Raster vs Vector Files](#)

Most Commonly Used Vector Drawing Programs:

- 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.



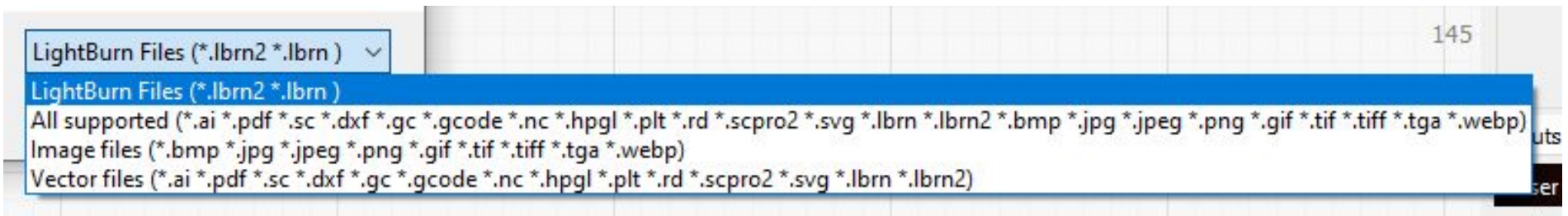
Open LightBurn and go to File > Open and choose your file. You may not see it right away, since LightBurn defaults to its own file format. To get to your file go down to the bottom right corner, next to the “File name” bar and click the extension box to see other file options.



LightBurn: File Types

LightBurn can accept many file types!

We have tested many of them, and most open perfectly fine with the exception of .svg's. When imported, the object in the .svg file is smaller than the original design. Always double check that ANY file you import is the correct size!



With past laser cutters, you were required to have specified line weights and colors.

LightBurn does not require that! It just needs vector lines, or fills and you get to choose what each line does before you begin cutting/engraving.

If you know ahead of time that you want all of the lines to cut with the same power/mms, then group them together. Same with your fill lines. This will save you time later on.

If you use Inkscape, make each type of cut you want to do a different color in your drawing and LightBurn will import them as separate layers/cut profiles and assign them the closest color. This can save time.

LightBurn: File Setup

Let's get to know this screen...

The screenshot shows the LightBurn 1.4.03 interface with several red annotations and arrows pointing to specific features:

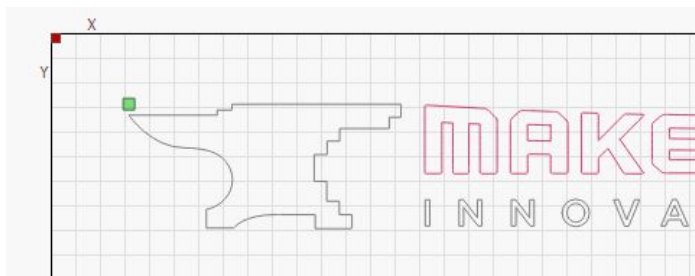
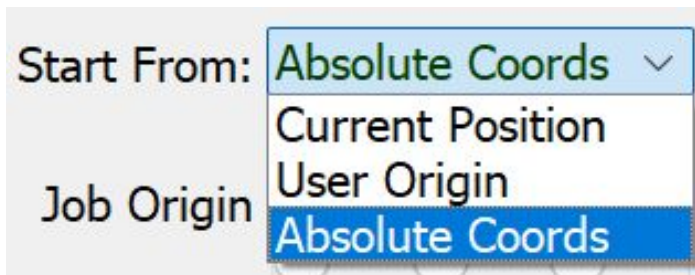
- Preview Button:** A red circle highlights the preview button in the top toolbar, with an arrow pointing to the text "Preview Button: see the lasers path and time".
- Order of Operations:** An arrow points to the "Cuts / Layers" panel on the right, which contains a table of operations.
- Start Job:** An arrow points to the "Start" button in the "Laser" control panel.
- Boundaries Check:** An arrow points to the "Boundaries Check" checkbox in the "Laser" control panel.
- Layer Color Options:** An arrow points to the "Layer Color" dropdown menu in the "Cuts / Layers" panel.
- Laser Controls tab:** An arrow points to the "Laser" control panel.
- Materials Library tab:** An arrow points to the "Library" tab at the bottom of the interface.
- Start From:** A red box highlights the "Start From" dropdown menu in the "Laser" control panel, which is set to "Absolute Coords".

The "Cuts / Layers" panel contains the following table:

#	Layer	Mode	Spd/Pwr	Output	Show
240	C02	Line	100.0 / 20.0	<input type="checkbox"/>	<input type="checkbox"/>
250	C01	Fill	100.0 / 20.0	<input type="checkbox"/>	<input type="checkbox"/>

The "Laser" control panel includes buttons for "Pause", "Stop", "Start", "Frame", "Home", "Go to Origin", "Save RD file", "Run RD file", and "Start From: Absolute Coords". It also features checkboxes for "Cut Selected Graphics", "Use Selection Origin", and "Optimize Cut Path".

LightBurn: Origin



- LightBurn gives you multiple options to set the origin (X0 Y0) for your project.
- **Start From: Absolute Coordinates:** means that the project origin is the same as the machine's absolute X0 Y0 position, which is the top left of the work area. If you select Absolute Coords, the "Job Origin" option is greyed out.
- **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 control panel to set the "User Origin" in 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 X0, Y0 origin of the machine is indicated by a red square. The Start From position is indicated by a green square.



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.
- The biggest difference between the ULS software and LightBurn is that in LightBurn you need to be prepared to set the Speed and Power for each cut/layer type.
- There is a sheet with Thunder Laser's recommended base settings relevant to the 60 watt Nova24 or 100 watt Nova51 on or around the laser computer. These should be treated purely as suggestions and it is strongly recommended that you use LightBurn's built in Material Test Card is run 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 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 its red the laser will skip it.
- Minimum power threshold is 3%
- Power Min (%) is the setting used when the laser changes direction. It helps avoid scorching and is lower than the Power Max (%).

#	Layer	Mode	Spd/Pwr	Output	Show	Air
C00	00	Line	500.0 / 70.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C01	01	Fill	100.0 / 20.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C06	06	Line	500.0 / 40.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C25	25	Line	300.0 / 65.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C15	15	Line	50.0 / 10.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Layer Color: Speed (mm/s): 50.00
Pass Count: 1 Power Max (%): 10.00
Interval (mm): 0.100 Power Min (%): 10.00

Cuts / Layers Camera Control Variable Text

LightBurn: Other Tips & Tricks

- If you turn off “Output” then that cut/layer will not be executed by the laser when you start your project.
- 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. Please keep in mind that the Nova 24 is on a stand, so it may shake a bit at that speed. So make sure the material is held down in some way.
- 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.

The screenshot displays the 'Cuts / Layers' panel in LightBurn. The table below shows the settings for various layers:

#	Layer	Mode	Spd/Pwr	Output	Show	Air
C00	00	Line	500.0 / 70.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C01	01	Fill	100.0 / 20.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C06	06	Line	500.0 / 40.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C25	25	Line	300.0 / 65.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C15	15	Line	50.0 / 10.0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Below the table, the settings for the selected layer (C15) are shown:

- Layer Color:
- Speed (mm/s): 50.00
- Pass Count: 1
- Power Max (%): 10.00
- Interval (mm): 0.100
- Power Min (%): 10.00

The main toolbar at the bottom shows the 'Preview' button (a magnifying glass icon) and the 'In' button (a button with 'in' text), both highlighted with red arrows.

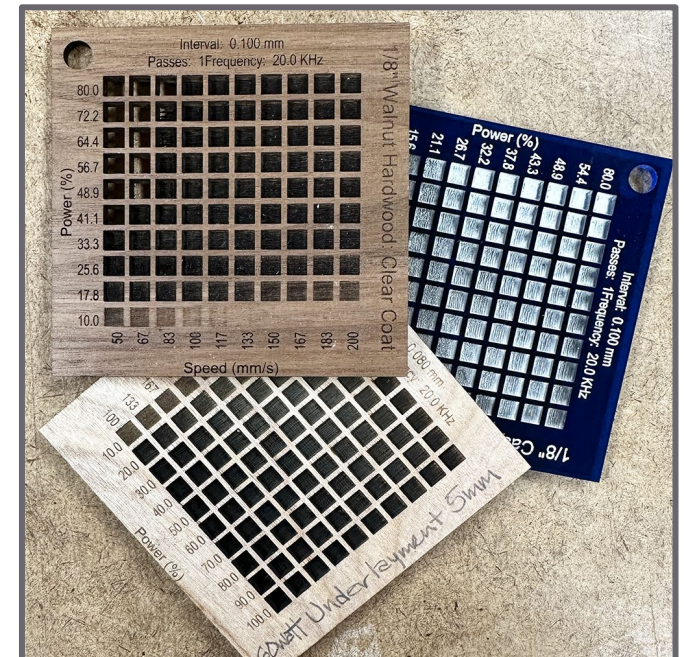
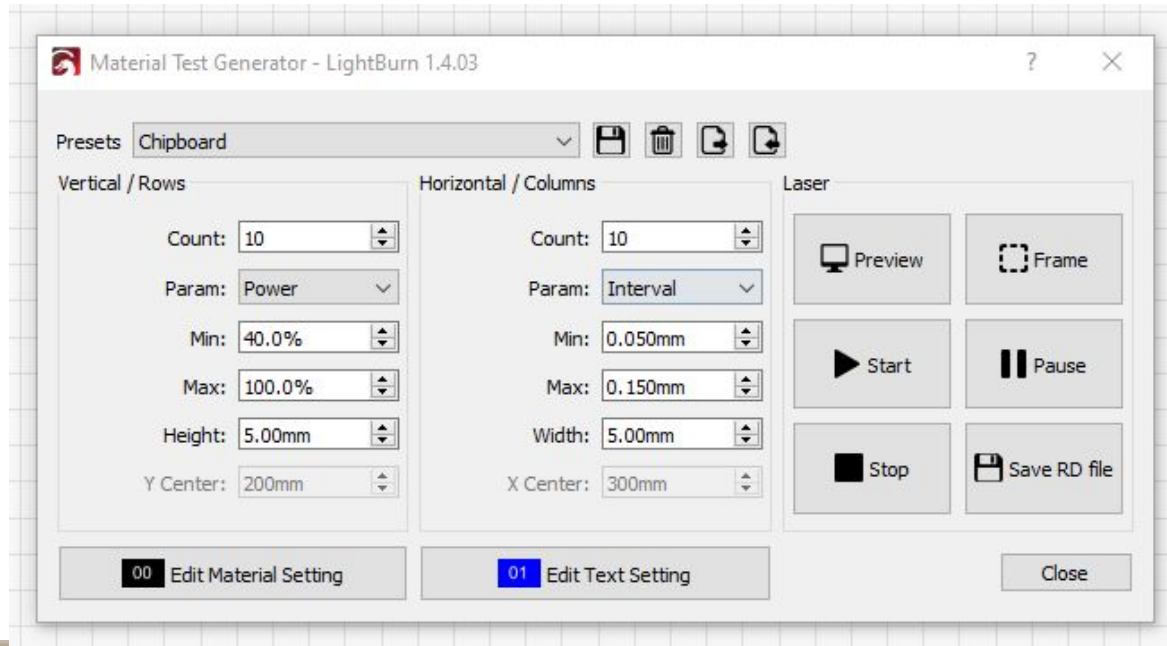


LightBurn: Material Test Cards

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.



Pre-Cut Checklist

- Turn on the computer and monitor.
- Turn on the “Main” switch on the laser.
- Turn on the “Laser” switch on the laser.
 - This turns on the watercooler in Leesburg and Purcellville. Check it is on.
- Turn on the compressor. This is required in both locations but the on/off is different.
 - Check that the regulated supply on the compressor is 60psi and that the psi on the secondary regulator is at 50. Press the Test button on the Air-assist Control High to verify that both regulators are correct.
- Add/remove the honeycomb and knives as needed for your project. Most projects will use the honeycomb bed.
- Check that the correct lens head is installed. The standard lens head is the 2” lens. The HR and 4” lenses/heads are covered in the advanced class.
- Holding the head, loosen the gold knob and raise head all the way up.
- Place your work material on the bed. Place the acrylic focus tool on top of your material. Raise the bed until it is about 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.
- File - Import Prefs - goto Thunder Laser Default Preferences folder on the Desktop choose the default settings file based on whether you will be importing SVGs from Inkscape or Illustrator. These files are also on the wiki.
- 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.
- Turn on the fume extractor fan: Leesburg: Plug in the orange extension cord to the same outlet as the laser, next to the ductwork. Purcellville: Press the black button on top of the laser. Each press is 10% power so press at least 5 times, more if you need more extraction.
- Press Start.



Post-Cut Checklist

- Wait 10-15 seconds for the laser bed to exhaust before opening top.
- Retrieve object(s) from laser bed.
- NOVA-24: Turn exhaust fan off by pressing button so all lights are on, then press one more time and the lights will go out.
- NOVA-51: Turn off the power strip where the exhaust is plugged in.
- Turn off compressor. Bleed the compressor tank. Turn the red knob on the regulated/supply pressure all the way to the left until the pressure is zero. Turn the valve on the output to the left so that the handle is parallel to the dials. Press the Test button on the Air-assist Control High to bleed any remaining air from the system.
- Turn off “Laser” switch.
- Turn off “Main” switch.
- Replace the front and rear panels if they were removed to use the pass through function.
- Replace the stop collar on the 2” lens/head if it was removed for your project.
- Replace the 2mm nozzle on the 2” lens/head if it was changed for your project.
- Clean all nozzles that were used with alcohol, paper towels and swabs.
- If the HR or 4” lens/head was used, replace it with the 2” lens/head in the machine.
- Vacuum top of bed. Remove all little pieces that you can vacuum or find.
- Open tray door and vacuum out all little pieces in tray.
- Save your file and exit Lightburn.
- Purcellville: Turn off the monitor but leave the computer on.
- Leesburg: Leave the computer and monitor on.





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>



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 1/8" 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
- Z-control

Laser Hands On

- Practice and Test! A LOT!
- Hands on use of the Laser
- Calendar Link: <https://makersmiths.org/LaserReservations>
or go to Makersmiths Wiki look for calendar under tool resources/laser cutter



Passthrough: Safely Moving the Machines

The Nova 24 & Nova 51 both have a passthrough option. This means you can cut and/or engrave items larger than the bed size. The width will be the same, but the length is only limited by the space around each machine.

How to use the pass through, as well as print & cut options will be covered in our Advanced Laser Class. **DO NOT attempt to use it without training.**

Please keep in mind that the Nova 24 in Purcellville has VERY limited space around it. We would prefer to not use the passthrough in that space and ask that you just use the Nova 51 in Leesburg instead.

- Keep all cords clear of the wheels.
- Make sure the exhaust hose has enough slack, as well as the power cords.
- Please move the computer along with the machine.
- If you know you will need help, please let a steward or site manager know ahead of your reservation and we will try to get everything ready for you. Otherwise put a call out on SLACK. We have a handful of members who live very close to each location and have been known to run over and help out.
- Each location has a limited amount of space around their laser cutter, so please account for this when choosing your materials and which machine you'll be using.
 - Leesburg can handle up to a 4'x8' board
 - Purcellville can't handle much, so we would prefer to not use the passthrough in that space and ask that you just use the Nova 51 in Leesburg instead.



Hands on Topics

- Walk around machine
- Compressor turn on/off
- Ventilation turn on/off
- Power switches
- Emergency stopping the machine
- Restarting machine
- Adjusting power speed
- Focusing Auto/manual
- Setting up software
- Setting up material
- Camera
- Trash location
- Fire extinguisher and blanket
- Vacuum locate
- Cleanup of machine and area
- Logging time
- Paying for use



Differences from ULS Laser

- Your power, speed, interval, etc. settings save within your Lightburn save file. If you do multiples of the same project on the same material, this should reduce your setup time.
- You can change the direction that the laser does raster engraving to any direction which could speed up projects where there is a lot of tall but narrow text. You can also use Offset Fill to engrave more like a CNC.
- On the ULS, if it fit on the honeycomb bed, you could cut/engrave it. The honeycomb bed of the Thunder Laser is not equal to the area you can cut on. It's easy to hit the limits of the machine and this can happen even if the "Frame" preview looked fine.
- On the Thunder Laser, you have to make sure that the engrave/cut order is right. The software won't do it for you.
- Print and Cut is a great feature if you want to print and cut, or to line up jigs for repeated use.
- You have two air assist levels with the Thunder Lasers.

