

# Fiber Laser Rotary Class

## Engraving Round Objects



# Laser Training Outline

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- Fiber Laser Rotary Attachment
- Policies, Safety & Materials
- Laser Safety Review
- Getting to Know the Rotary Attachment
- Laser Engraving Process
- Introduction to Laser Software: LightBurn
- Tips, Hints, and having FUN
- Hands on Training and Use



# Fiber Laser Rotary Attachment

- We have a rotary attachment for the fiber laser with 2 chucks, and a set of mandrels for small objects such as rings.
- Cutting area is the same as if engraving objects on the bed, but the rotary has limitations of where it can fit on the bed.
- You will have to remove the outer case (passthrough) to use the rotary attachment, so extra precautions should be taken when using the rotary
  - Lock the main door from the inside
  - Put the sign in the window of the main door
  - Always wear your glasses
  - Block off the lower level of windows
- If you are engraving on round objects but not engraving all the way around, LightBurn's Cylinder Correction function may be an easier method of engraving and can be done after the regular Fiber Laser Red Tool class. [Laser Everything Cylinder Correction](#)





# Policies, Safety & Materials

# Guidelines and Policies

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- **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

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- **DO NOT look at the laser while it is in operation.** This is even more important when using a fiber laser than a CO2 laser. It can blind you.
- **Wear 1064nm OD6+ safety glasses.** Even with them on, do not look at the laser as it is cutting.
- **Protect others.** Lock the door from the inside when the laser is in use, put the sign in the window, if you have half the case removed for passthrough, cover the windows through which people can see the machine.
- **The fiber laser DOES NOT shut off if the door is opened.** If you need to shut off the fiber laser in an emergency, press the Emergency Stop button. Do not open the door without turning off the laser.
- **Always be sure the external exhaust fan is in operation** before cutting/engraving.
- **Make sure you have focused the laser optics** to the top of your material with the right height for the lens you are using.
- **NEVER leave the laser running unattended!** Lightburn will let you pause mid project and start again right where it left off.
- **If material catches fire, DON'T PANIC.** Try blowing it out, remove it from the device, cover with a fire blanket, and as a last resort use the fire extinguisher.
- **Make sure that the material is supported outside the machine (front and back) if using the passthrough.** There are stand up rollers under/by the CO2 laser.
- **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](http://wiki.makersmiths.org).



# Laser Eye Safety

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- When using passthrough and the rotary, eye protection is even more important.
- The fiber laser is more powerful than the CO2 Thunder Lasers we have at Makersmiths and while it is unlikely you'll hurt your eyes, it's better to take precautions and be prepared.
- We recommend that you purchase a pair of safety glasses to wear when using the fiber laser.
- These glasses should block the 1064nm wavelength and be rated OD6+ or higher.
- You can find these glasses from many online suppliers.

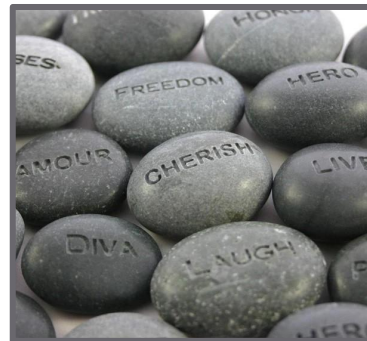


# Laser Safety Review: OK Materials

## OK TO LASER List:

- **Metals:** Stainless steel, aluminum, brass, titanium, gold, silver, and tungsten. Care should be taken when engraving Manganese, Chromium, Nickel, Cobalt, Copper, Lead
- **Coated Metals** - powder coated, anodized, or painted metals like tumblers, business cards, dog tags etc.
- **Plastics:** acrylic, lucite, plexiglass (won't cut through clear)
- **Stone:** Brick, granite, and marble
- **Tile:** Can be engraved with a fiber laser

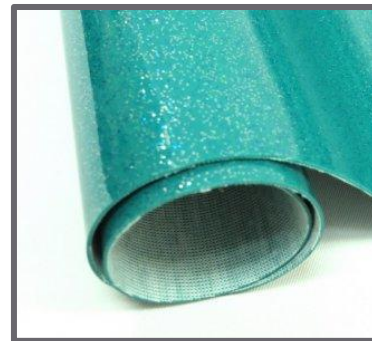
Other materials either should not be, or simply won't cut on a fiber laser. Use the CO2 laser for wood, leather, and other allowed materials.



# Laser Safety Review: DO NOT LASER

## DO NOT LASER List

- Galvanized metals - releases harmful gases
- Carbon Fiber - the resin can melt and release harmful gases
- 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





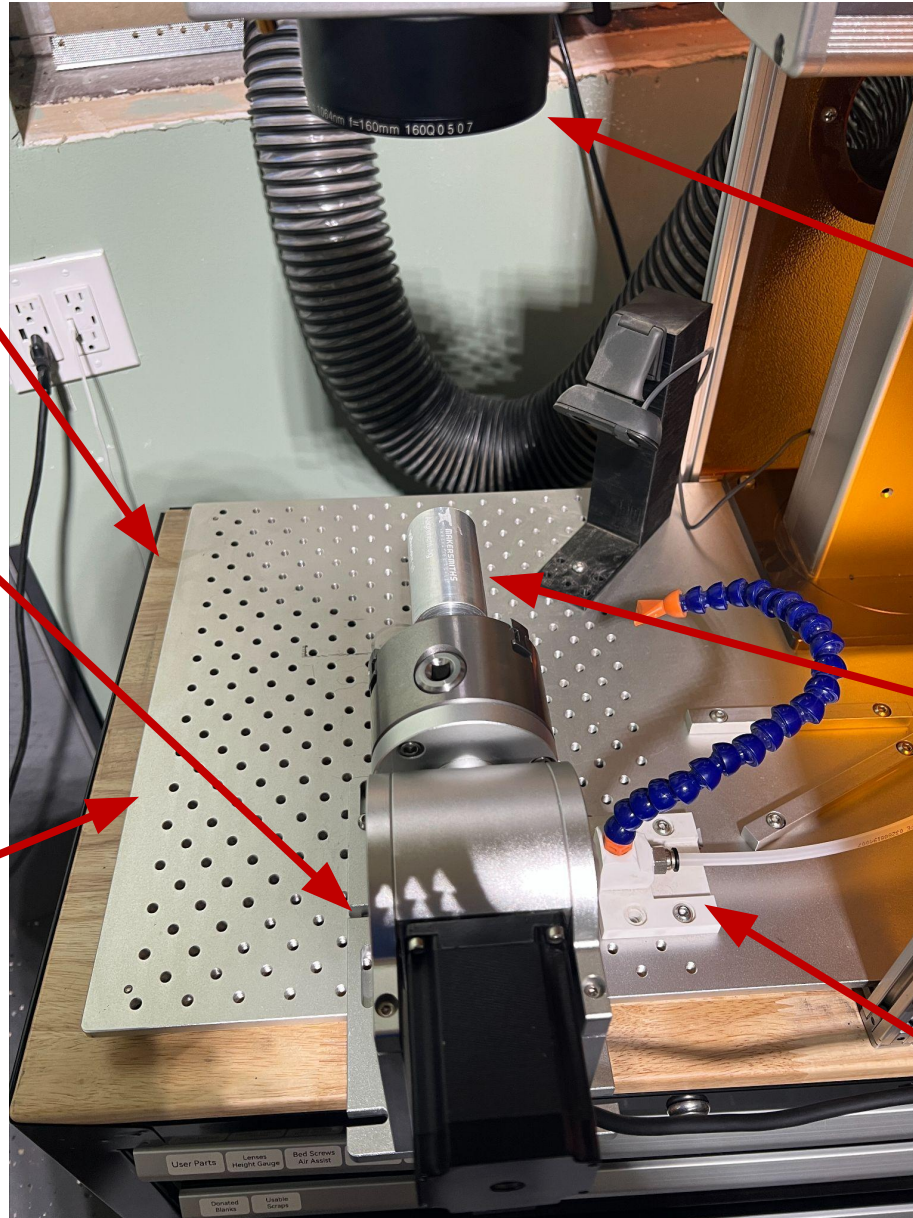
# Getting to Know the Rotary Attachment

# Attaching the Rotary

You will need to remove the side of the case in order to use the rotary attachment.

The bed has M6 holes for attaching the rotary to the bed of the laser.

The rotary can also be attached 90 degrees to the way pictured and that will require some Lightburn settings changes to work correctly.



Any of the lenses can be used with the rotary, but most likely you'll use the 100mm or 160mm lenses because of the engraving area on your round object.

An alignment jig has been made to make it easier to ensure the rotary is in line with the center line of the fiber laser.

Move the camera and/or air assist as needed.

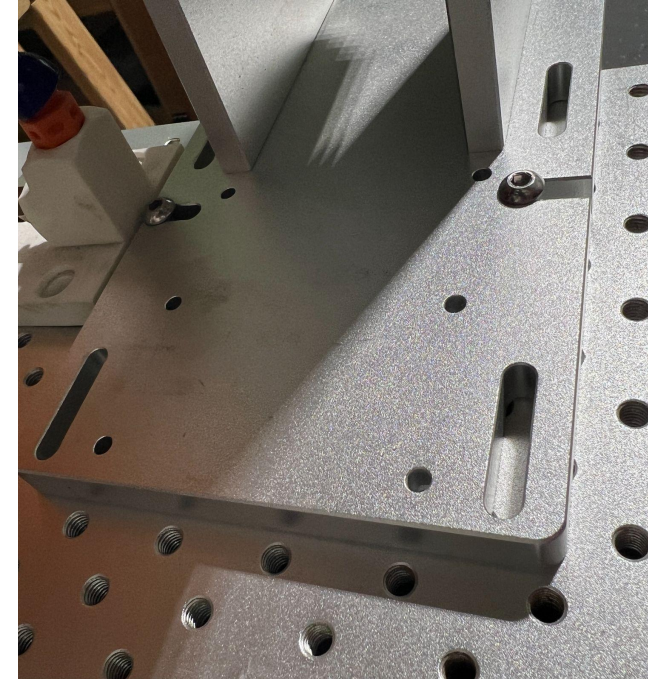
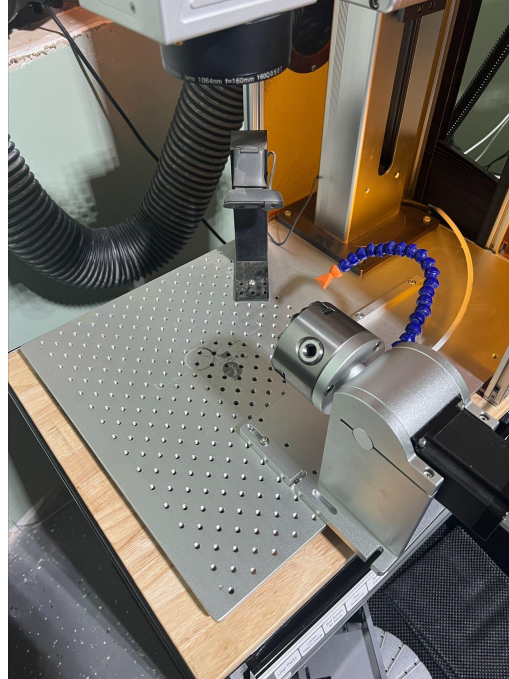
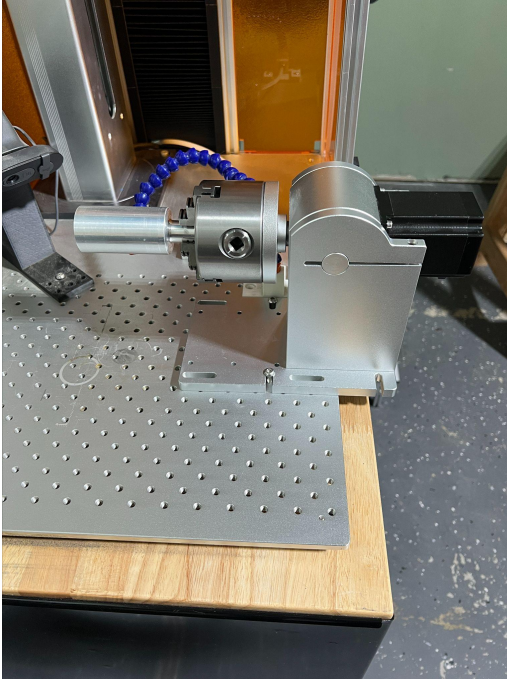
# Insert the Right Jaws

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- There are two types of jaws - those that are meant to clamp your work from the outside by pressing in towards the middle of the object being held, and those that clamp from the inside and hold your work by pressing outwards from the middle.
- Both sets of jaws have numbers on them and the rotary has corresponding numbers. Make sure to put the right numbered jaw in the same numbered space in the rotary if you need to change the jaws.
- Jaws are removed by opening them all the way up, at which point they can be pulled out of the slots.

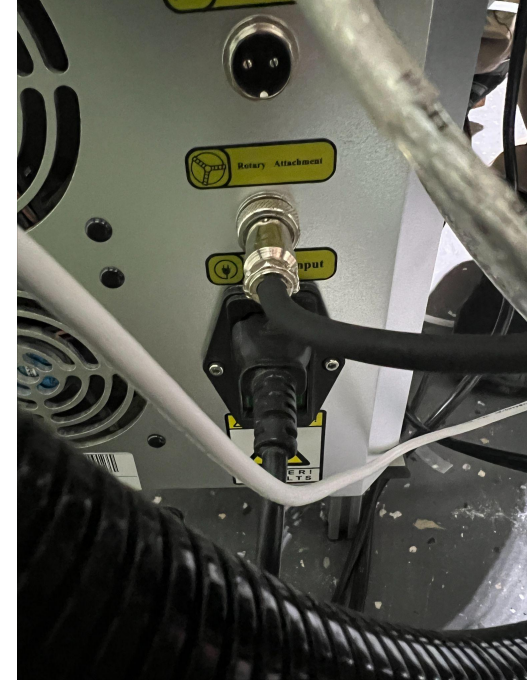
# Attaching the Rotary to the Bed



- The rotary will likely hang off the edge of the bed, so make sure to hold it when attaching it to the bed so it doesn't fall off.
- The rotary attachment attaches to the bed of the fiber laser using the same M6 screws as the camera, air assist, and other guides/jigs you use.
- The rotary attachment is heavy so be careful when attaching it to the bed.
- Suggest using either two vertical or two horizontal slots, not one of each after lining up the middle of the rotary with the middle of the lens. This will give you a little bit of wiggle room to align the rotary to the lens in the next steps.



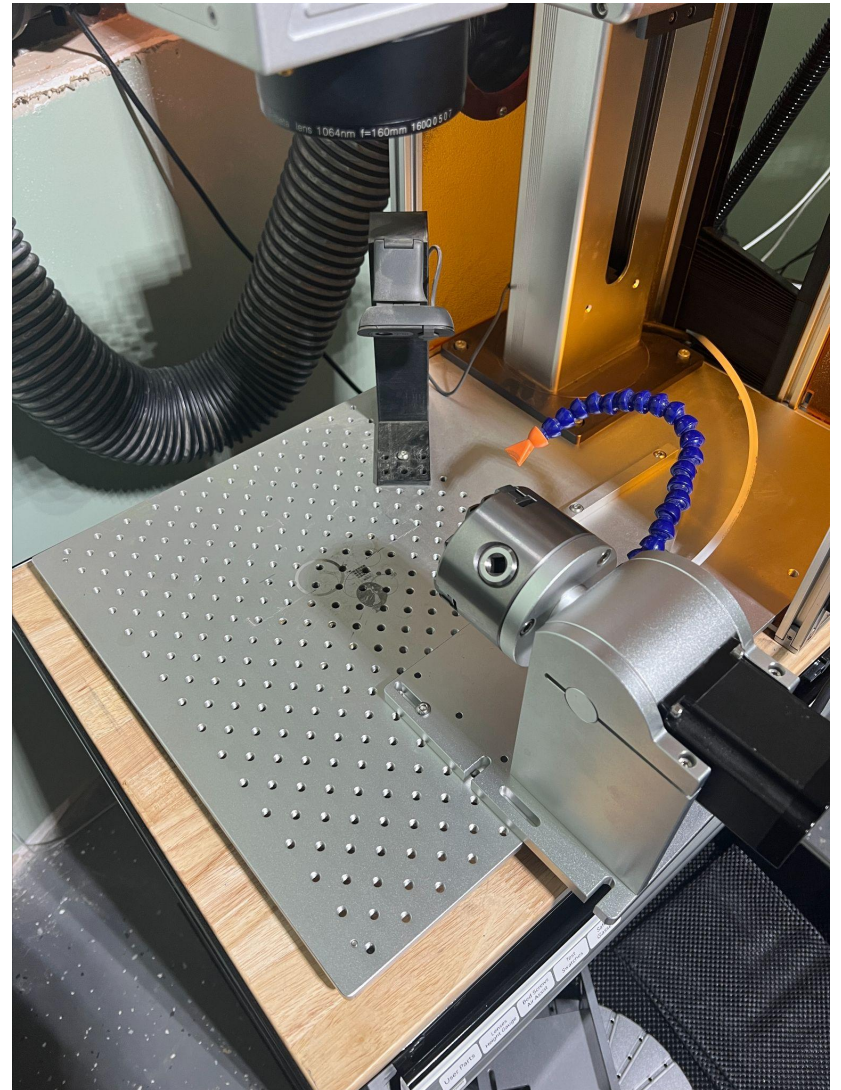
# Attaching the Rotary to the Laser



- After attaching the rotary to the bed and before plugging the rotary into the laser, turn off the laser tower at the switch.
- There is a port on the back of the laser tower labeled “Rotary Attachment” which is the port right above the power cord.
- There is a notch at the bottom of the port that needs to align with the notch on the plug.
- The notch on the plug should be facing down when you plug the rotary in.
- Plug the rotary attachment into the back of the laser tower. Tighten down the ring to a light finger tightness.
- Turn on the laser at the main switch. The rotary is powered through the plug you just plugged in.

# Aligning the Rotary

- Before putting any material in the chuck, use the chuck key and ensure that the chuck keys line up when closed all the way.
- If the rotary is mounted perpendicular to the laser arm (as shown in the image to the right) then the rotation will be on the X axis in Laser Settings.
- If the rotary is mounted parallel to the laser arm (90 degrees to what is shown in the image to the right) then the rotation will be on the Y axis in Laser Settings
- This is one of the Rotary Settings you will need to change prior to starting your engraving.



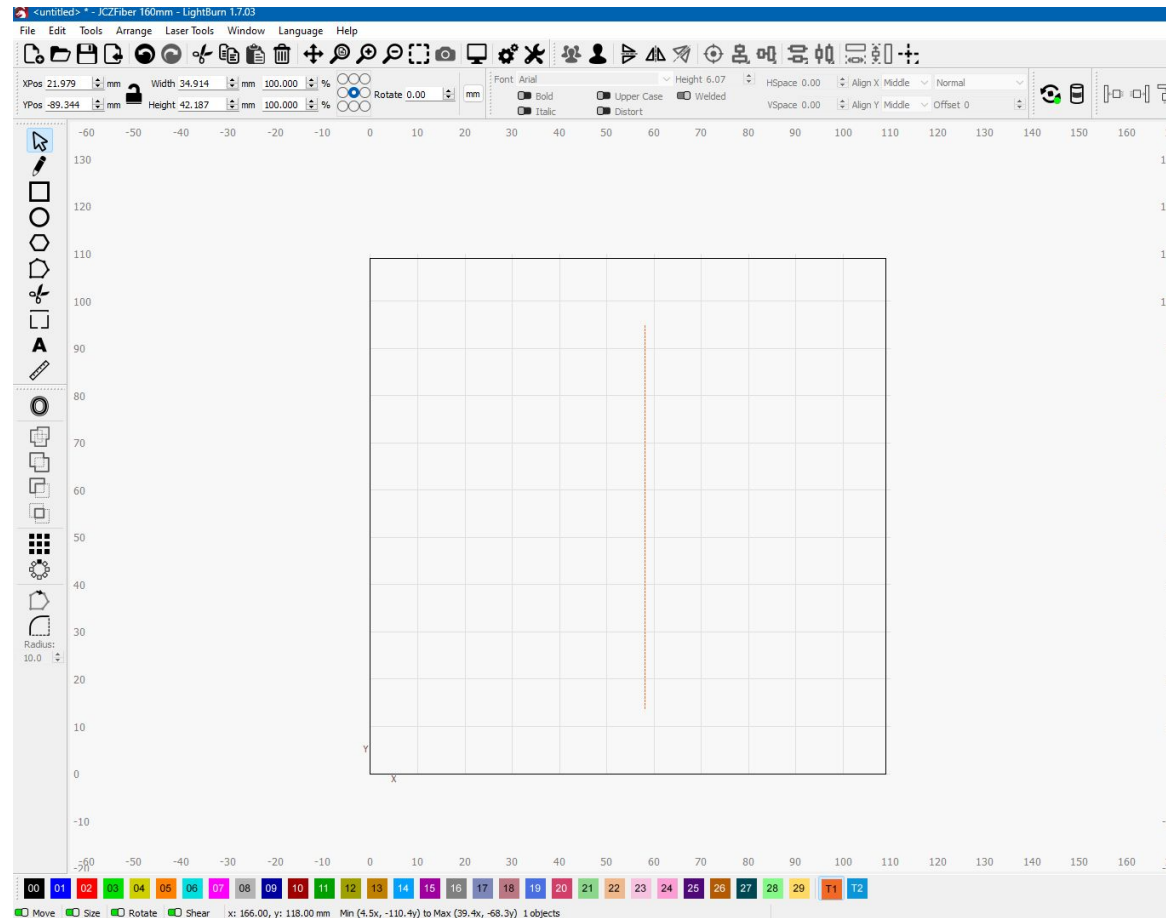
# Aligning and Focusing the Rotary

- Mount the aligning cylinder in the chuck and tighten with the chuck key.
- You don't have to tighten the chuck overly tight because there is no friction pushing against the workpiece as there would be if this were a wood or metal lathe.
- Manually turn the chuck so that the aligning groove is facing up.
- Focus the lens to the top of the aligning cylinder using the correct focus length tool for the lens you want to use.



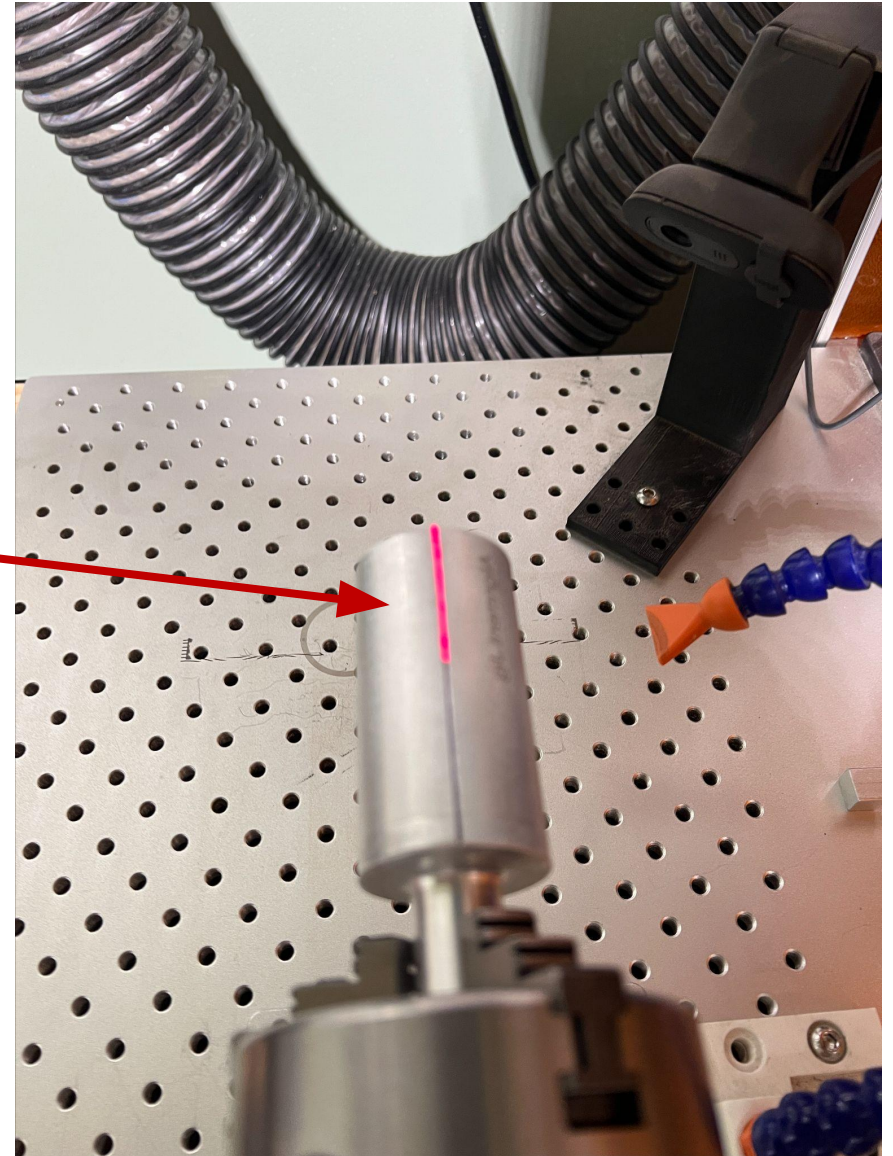
# Aligning the Rotary

- Open Lightburn.
- If you mounted the rotary perpendicular to the laser arm, draw a vertical line. If you mounted the rotary parallel to the laser arm, draw a horizontal line.
- Make the line at T1 or T2 line.

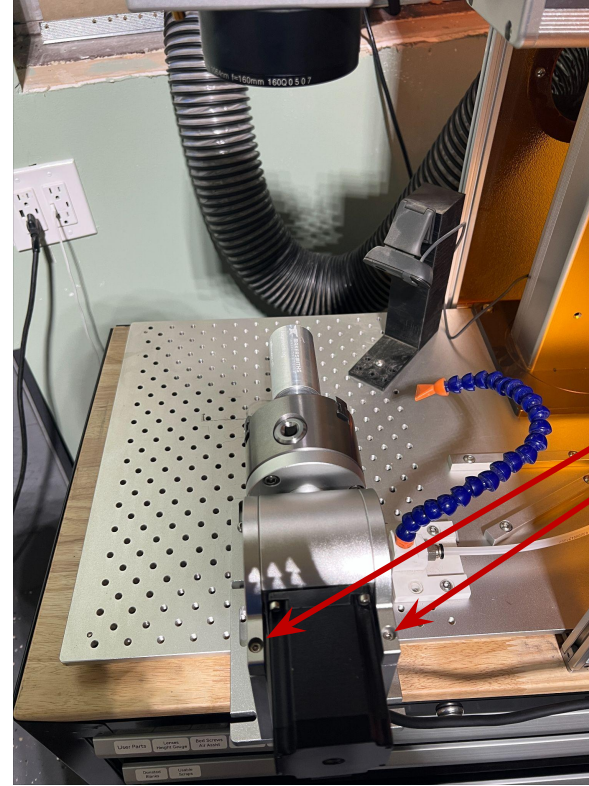


# Aligning the Rotary

- Press “Frame” and use the keyboard arrow keys to move the line so that it is close to the engraved line in the alignment cylinder.
- Loosen the M6 bolts on the rotary attachment and move the rotary as needed to finely align the laser line with the alignment cylinder.
- The ends of the line don't need to match the alignment cylinder.
- Once you are happy with the alignment, tighten the M6 bolts holding the rotary to the bed.



# Aligning and Focusing to the Material



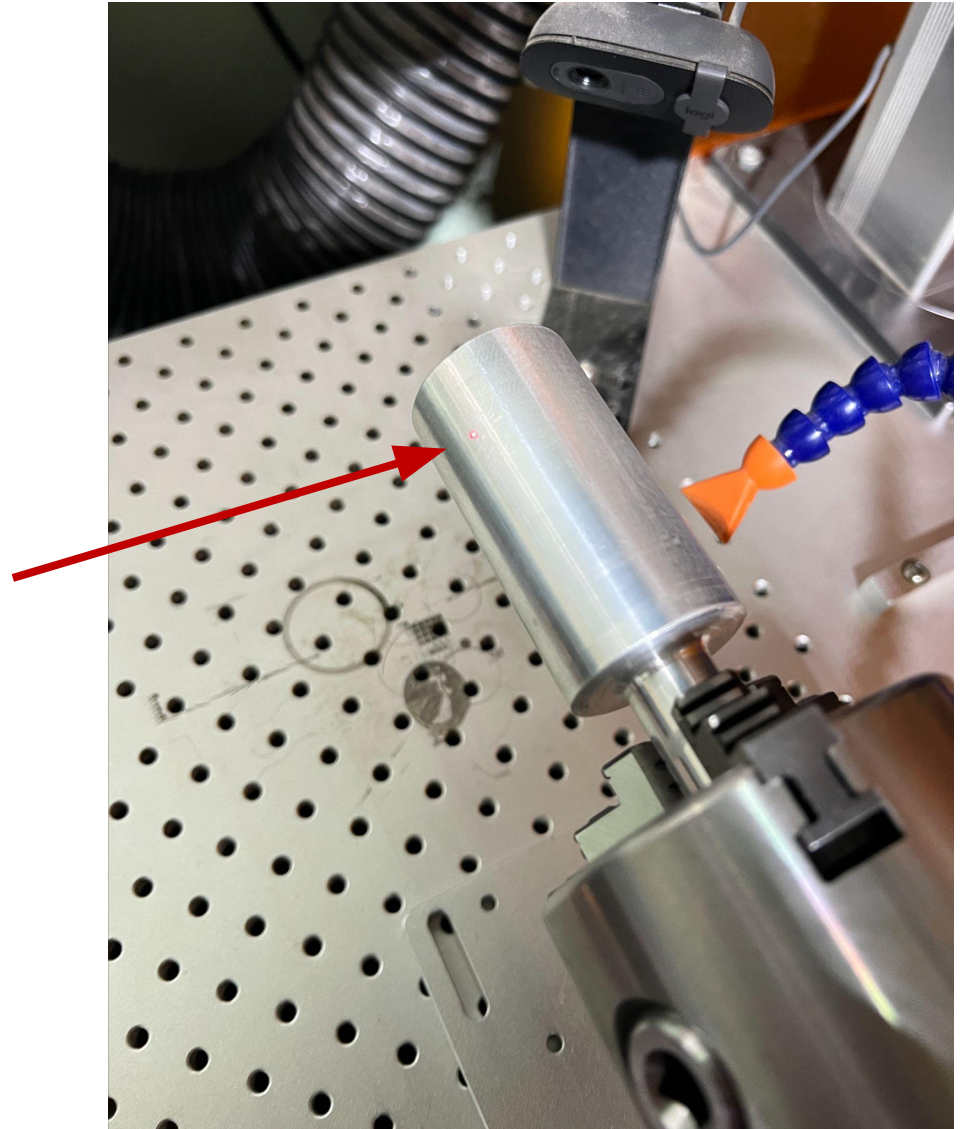
H3 hex key to loosen or tighten if needed.

- Mount the item you want to engrave in the chuck. The chuck does not have to be gorilla tight and if you tighten to far, it may mark your workpiece. (The alignment cylinder was used in the photo above because no other material was available at the time the photo was taken.)
- Place a bubble level on your material. You should be able to gently nudge the rotary on the chuck end up and down until your workpiece is level. If it is too tight or too loose, use a H3/3mm hex key to loosen then re-tighten the two bolts on either side of the black motor piece on the back of the rotary.



# Aligning and Focusing to the Material

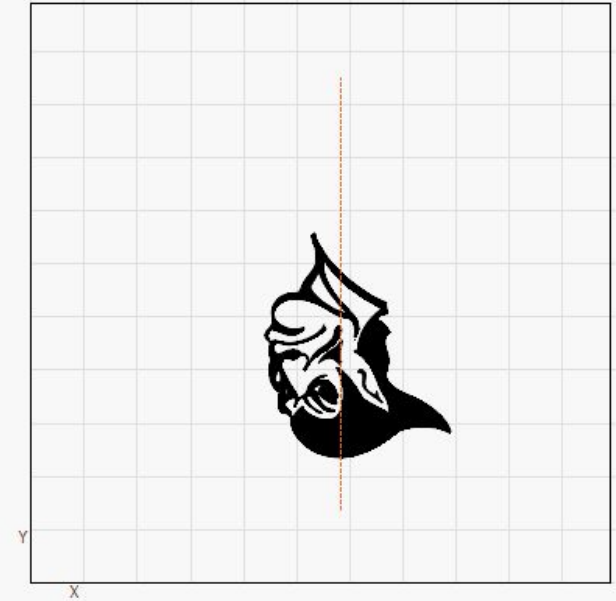
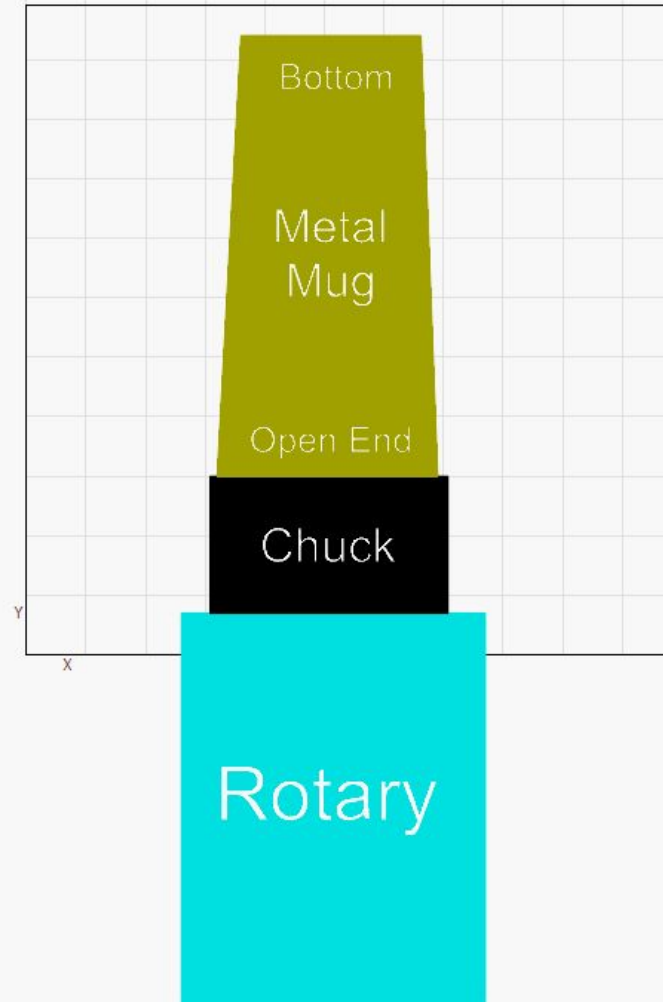
- Focus the lens to your workpiece using the appropriate height gauge for the lens you are using.
- Rather than use the center of your workpiece/material, focus to the centering red dot that should be showing on your workpiece. I.e. if the dot is not on the center of your workpiece, use the dot, not the center of your workpiece as the focal point.
- The closer to the center of your workpiece the laser dot is, the easier it is to focus. However at this point, moving the center dot to the middle of your workpiece will involve moving the rotary unit, in which case you will need to redo the prior steps of alignment and leveling.



# Aligning the Art

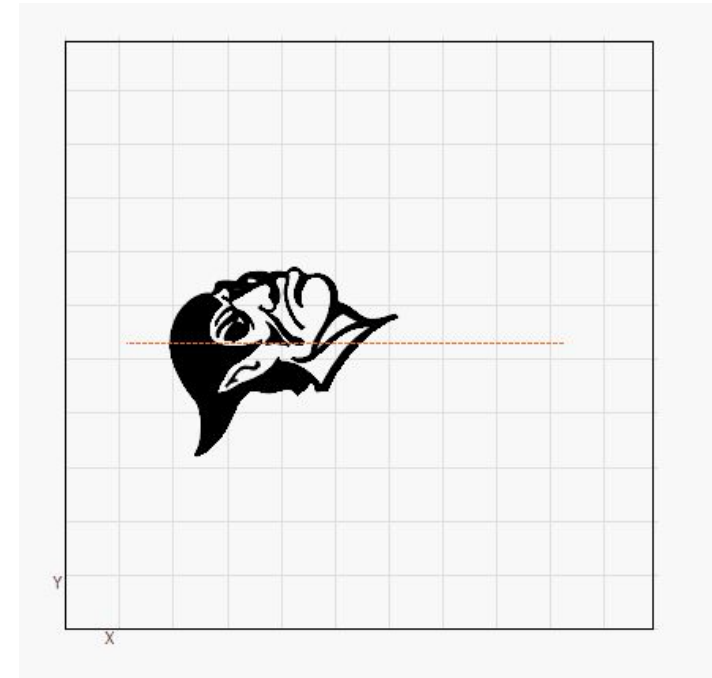
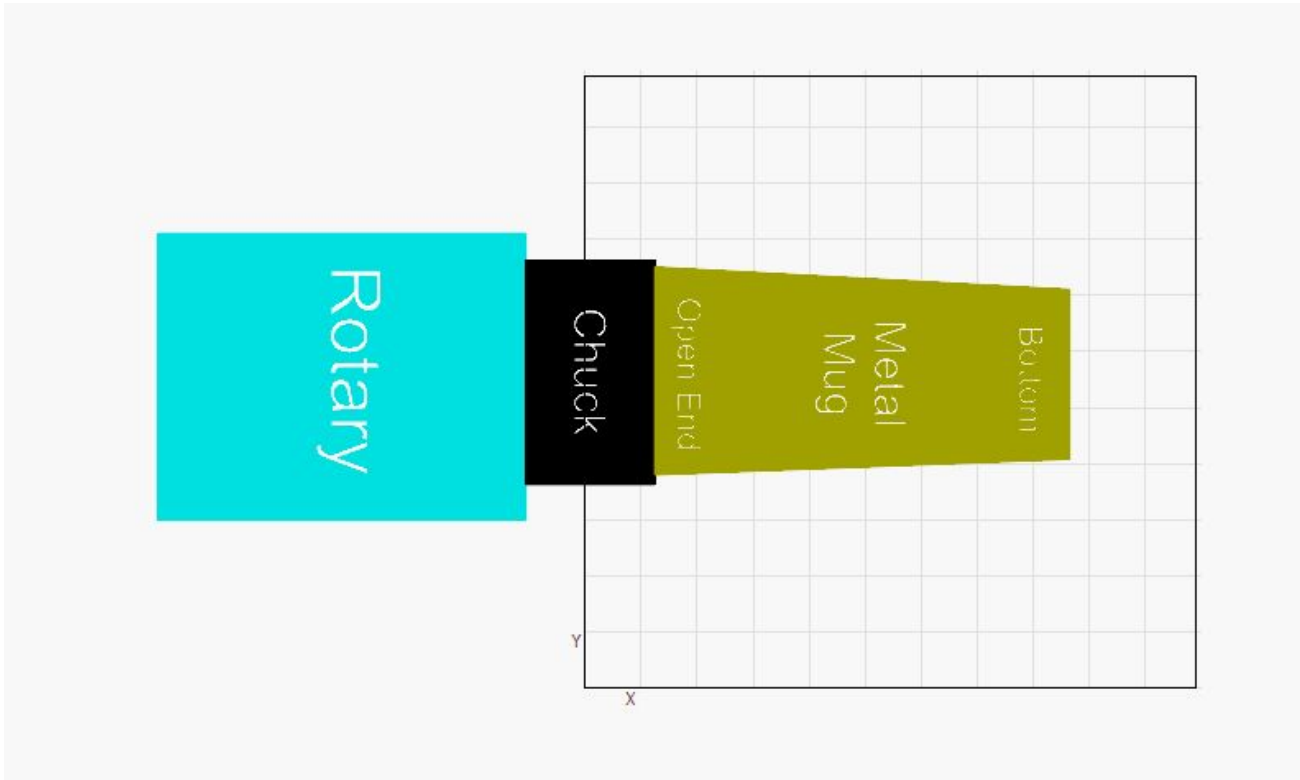
Depending on how your workpiece is mounted, you may need to have your art positioned upside down on the canvas in Lightburn.

In the example on the right, the mug is mounted so that the open end of the mug is facing the rotary, so if you want the logo to face up when holding the mug, your art needs to be upside down.



# Aligning the Art

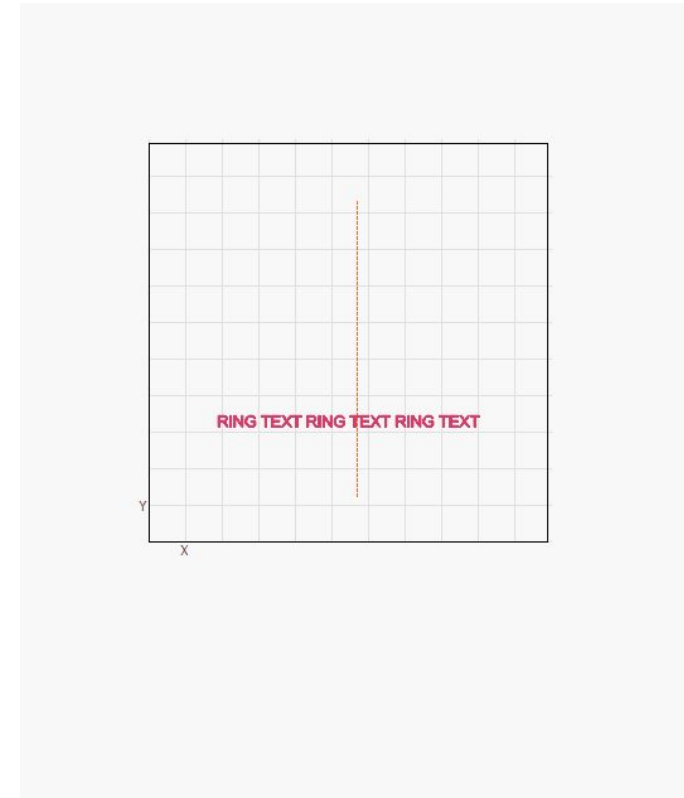
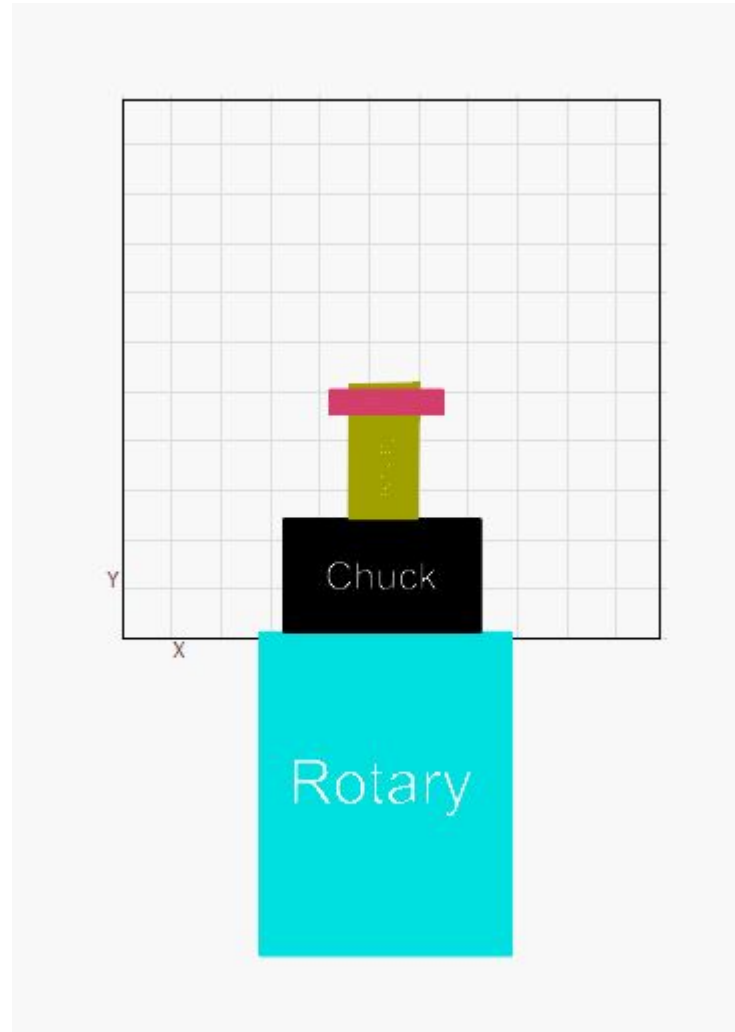
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If your workpiece is mounted from left to right (parallel to the laser arm) then your artwork will be aligned 90 degrees to the previous example.

# Aligning the Art

If you are engraving a ring mounted on the mandrel with the rotary in the orientation on the right, your artwork will be horizontal. The art width will be less than or equal to the circumference of the ring, depending on whether or not you are trying to wrap text/art all the way around the ring.

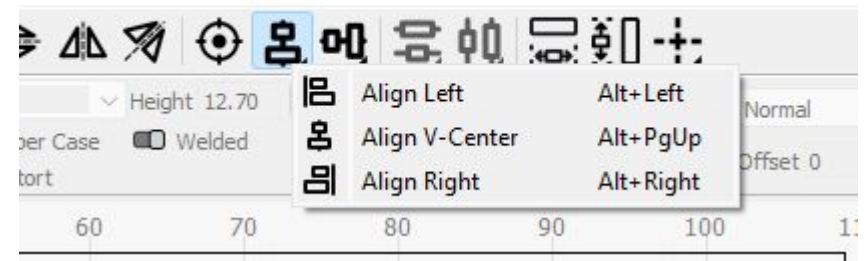
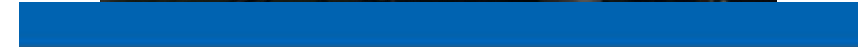
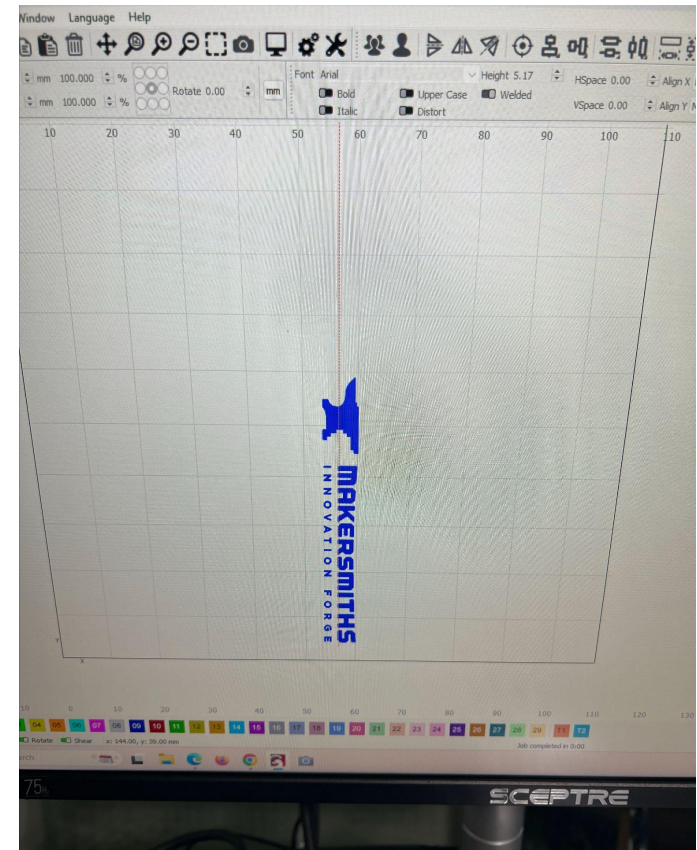


# Aligning the Art

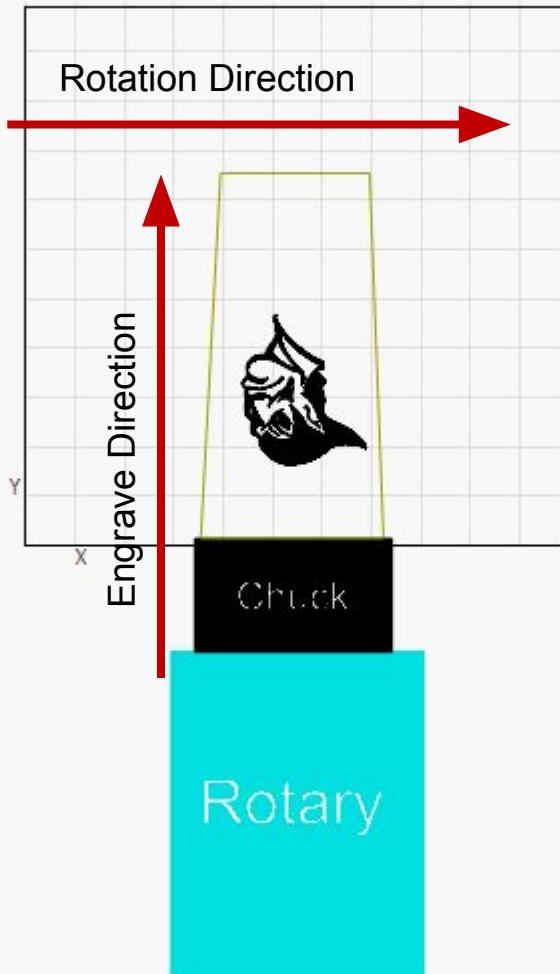
Once you have the correct orientation of your artwork, align your artwork to the center line you used earlier to align the laser - this may or may not be the actual center of the canvas in Lightburn.

In the image to the right, the alignment line is slightly to the right of 55mm which would otherwise be the center line if engraving on the flat bed.

In Lightburn, if you hold shift and click more than one object, the objects will align to the last item you selected.



# Engraving Settings



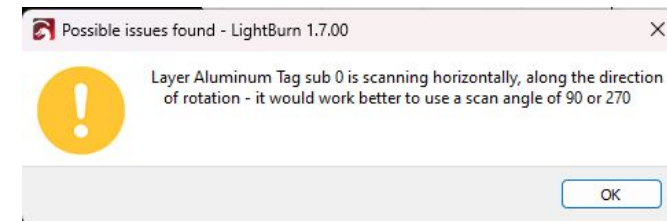
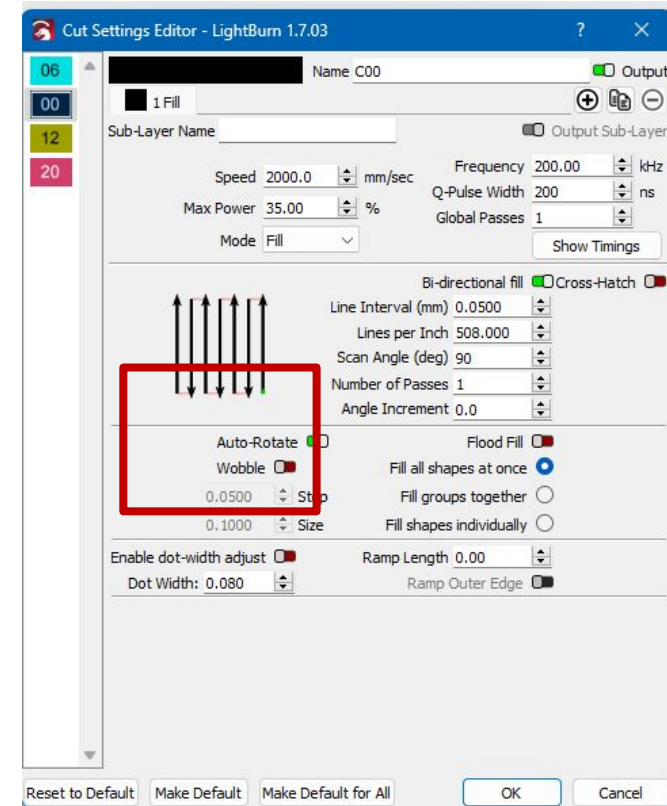
For the best results, you want the laser to engrave perpendicularly to the rotation of your workpiece.

In the example logo to the right, you want the laser to move vertically only, as the workpiece rotates horizontally. Lightburn warns you if you have it wrong.

Turn OFF Cross-Hatch, set the scan angle to 90 or 270 (same thing), enable Bi-Directional fill, and click the radio button next to “Fill all shapes at once”.

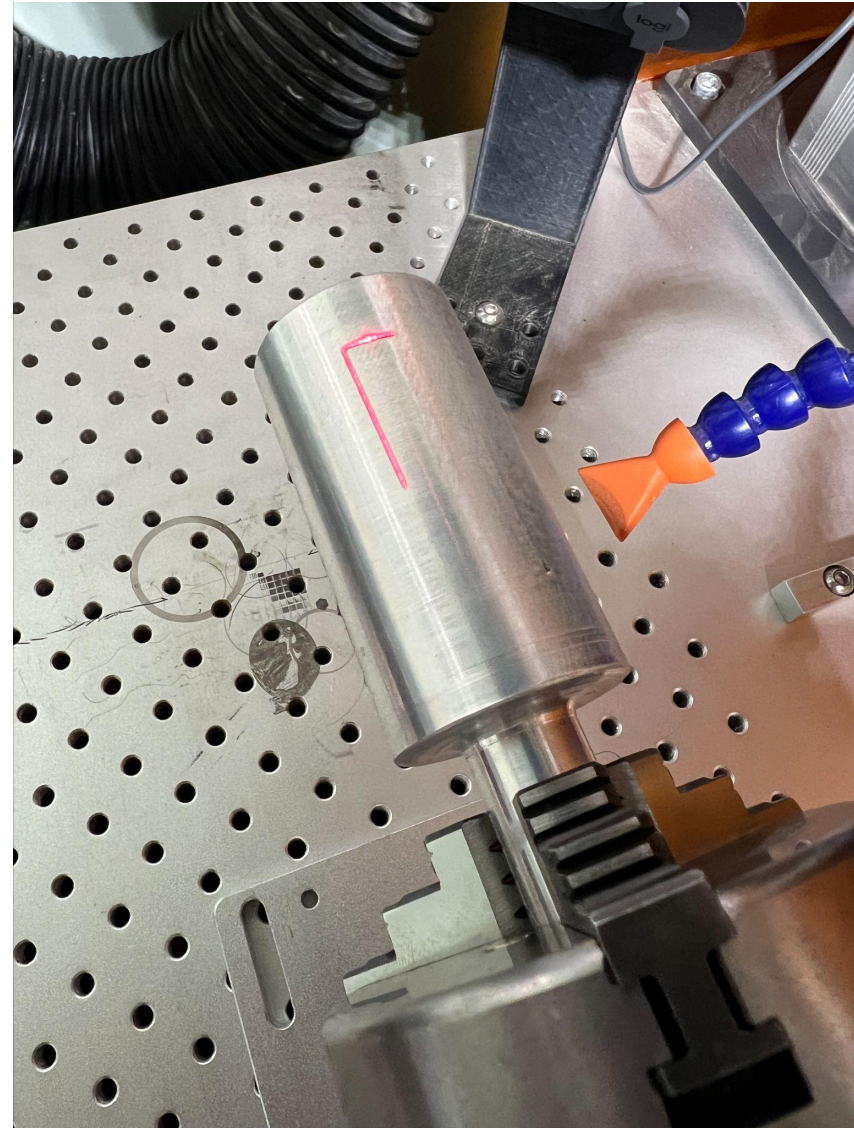
If the rotary is mounted parallel to the laser arm, then the Scan Angle will be 0 or 180 (same thing).

All Speed, Power, Frequency etc. settings should be based on the material you are engraving.

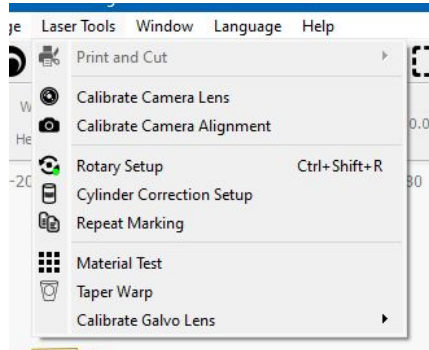


# Framing Before Engraving

Once the rotary is lined up, leveled, and your art is setup in Lightburn correctly, use the Frame function in Lightburn to make sure that your art is where you want to it to be on your workpiece. If you aligned your art to the T1 or T2 line, it should line up correctly on on your workpiece.



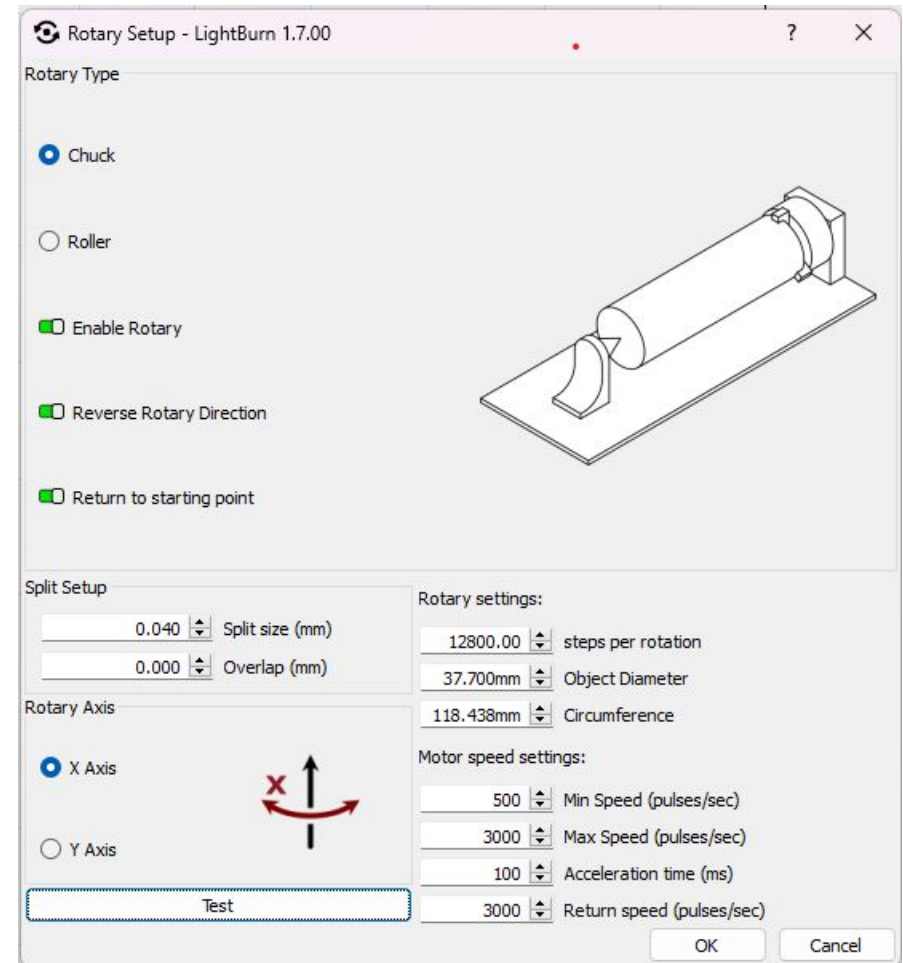
# Rotary Chuck Settings



Open the Rotary Settings from the Laser Tools menu.

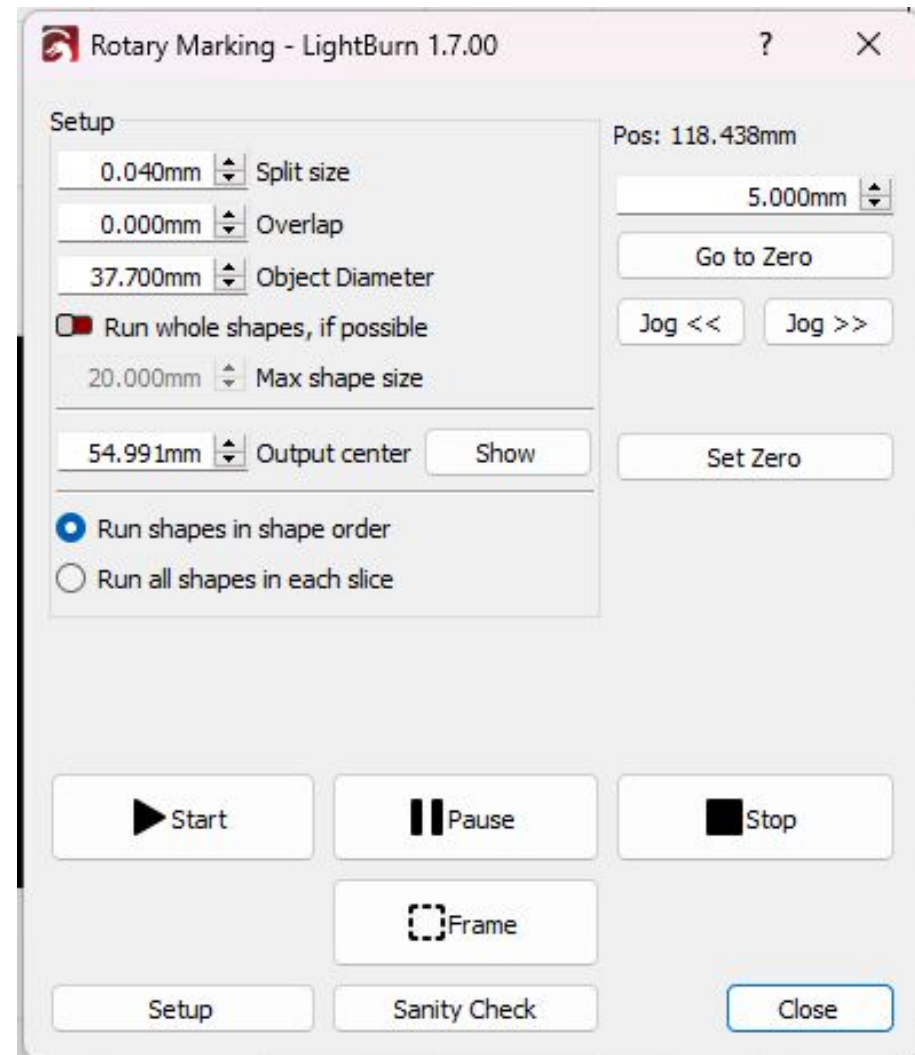
Your settings should be the same as those to the right with the following exceptions:

- The “Split size (mm)” should be the same as or double your Interval setting. You can change this setting if you find better information or for your specific project.
- The “Overlap (mm)” setting should normally be 0.00. You can change this setting if you find better information or for your specific project.
- The “Rotary Axis” setting should be “Y axis” if you mounted the rotary parallel to the laser arm.
- You must change the “Object Diameter” or “Circumference” to match your workpiece. Changing one will change the other automatically.



# Rotary Chuck Settings

- When you are happy that the fiber laser is aligned correctly, leveled correctly and that your artwork is lined up correctly, pressing “Start” in Lightburn will bring up the following screen.
- This is your chance to ensure that your settings are correct. You shouldn’t need to change anything at this point if you did all the prior steps correctly.
- You can click “Sanity Check” which checks to see if the engraving direction is correctly aligned to the direction of rotation.
- Press “Start” when you are ready.



# Fiber Rotary Pre-Start Checklist Page 1

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- Turn on the computer and monitor. Open Lightburn and Load the default preferences as normal.
- Remove the pass-through side of the case, and set to the side. Insert the lens you want to use.
- Get the Rotary out, place it on the workbench and put the alignment cylinder in the Chuck.
- Place the rotary on the bed and plug the rotary cable into the back of the laser and hand tighten the nut.
- Turn the laser on.
- Measure the diameter or circumference of your workpiece at the location where you will be engraving and write this down.
- Raise the laser arm up high enough so that you can attach the rotary and your material.
- Align the rotary so that it is centered to the laser head and use 2 M6 screws to hold the rotary down to the bed. Do not fully tighten them but make sure they are secure enough that the rotary doesn't fall.
- Open LightBurn and draw a vertical tool line (T1) line if the rotary is aligned perpendicular to the laser arm and a horizontal line if the rotary is parallel to the arm. Press Frame and then use a combination of moving the line with the arrow keys and physically moving the rotary so that the alignment jig lines up with the framed line. The laser line framed line will fall into the groove on the alignment cylinder. Once you're happy with a position, tighten down the M6 screws. Do not move the line on your canvas in LightBurn after this step.
- Remove the alignment cylinder and replace it with your work piece.
- Place a bubble level on your workpiece. If your workpiece isn't big enough to place the bubble level or your workpiece is an odd shape, you can put the level on top of the chuck. Use a 3 mm hex key to loosen the nuts on the side of the rotary, angle the rotary until the bubble is in the middle of the level, then tighten the nut.
- Using the red dot of the center of the laser, adjust the height of the lens to match your work piece. Do not set the height to the center of your workpiece as it may not be 100% centered with the red dot.
- In LightBurn, import or create your art, group all of your art together, select it then the T1 line you drew earlier, and align your art to the center of your tool line. Press Frame. Choose the kind of framing that suits your workpiece and project. Use the arrow keys (or CTRL and arrow) to move your art up or down until it aligns correctly on your work piece.



# Fiber Rotary Pre-Start Checklist Page 2

- ❑ In LightBurn, go to the Laser Tools menu, select Rotary Setup, and enter the information displayed in the image on this page with the exception of project specific settings which are that Split Size which should be 1x or 2x your Interval setting and the diameter/circumference should match your workpiece.
- ❑ Check the layer settings for the material you are about to engrave. The angle of engraving should be perpendicular to the direction the material will be rotating. Be sure to turn off cross hatch.
- ❑ Put on your glasses, latch the door to the room, and put the laser sign in the window.
- ❑ Turn on Air Extraction.
- ❑ From the Frame screen, press Start and you'll get the normal checks to accept. Pressing yes will bring up one more window for you to verify your split size, overlap object diameter. You can press Sanity Check here and LightBurn will tell you if you have your scan angle correctly aligned with how you set up the rotary. When you're ready to go hit start.

Rotary Setup - LightBurn 1.7.00

Rotary Type

Chuck

Roller

Enable Rotary

Reverse Rotary Direction

Return to starting point

Split Setup

0.040 Split size (mm)

0.000 Overlap (mm)

Rotary Axis

X Axis

Y Axis

Rotary settings:

12800.00 steps per rotation

37.700mm Object Diameter

118.438mm Circumference

Motor speed settings:

500 Min Speed (pulses/sec)

3000 Max Speed (pulses/sec)

100 Acceleration time (ms)

3000 Return speed (pulses/sec)

Test

OK Cancel

# Fiber Rotary During the Project

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- ❑ Keep your laser glasses on at all times, even if the enclosure is closed, while engraving.
- ❑ Stay with the laser while engraving.
- ❑ The door should be locked so no one should be able to walk in unexpectedly. If you forgot to lock the door and someone does walk in, press “Pause” in LightBurn, especially if you have removed the front half of the enclosure. Pressing Pause will allow you to restart at exactly the same position.
- ❑ You can watch your project through the webcam.



# Fiber Rotary Post-Cut Checklist

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- Wait 10-15 seconds for the laser bed to exhaust before opening the door.
- Retrieve object(s) from laser bed.
- Turn off Air Extraction on the power strip.
- If you are done engraving, save your file and close LightBurn and the Camera app.
- Remove the rotary from the bed and put it back in the bottom drawer.
- Turn off the “Laser” switch on the power strip.
- Replace the front of the enclosure. Clip the front and back halves together.
- Wipe off the bed by spraying a cleaning spray on a paper towel and wiping the bed.
- Put away any auxiliary parts, alignment jigs, etc.
- Record your time on the laser using the QR code near the laser or the link on the desktop.
- Leave the computer and monitor on.
- Cleanup the room. Set the min-split to 70 degrees.

