

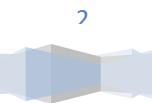
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**INSTRUCTION MANUAL – J TECH ROTARY TOOL**



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## GENERAL

### OVERVIEW

The J Tech Photonics Rotary accessory extends the laser applications to be able to engrave on cylindrical objects like tumblers, cups, glasses, and wine glasses. It can open up a whole new avenue in your hobby or business by custom engraving cups and tumblers.

### SAFETY

- Operate rotary accessory with caution when lasering materials.
- Glasses and cups can be reflective. Use proper safety precautions and wear protective glasses.

## GETTING STARTED

### UNPACKING

Inspect the shipping container for damage. Verify the contents of the package:

1. Rotary Base
2. Front Tumbler Holder and Screw Bag
3. Back Tumbler Holder
4. Level
5. Motor Cable Bag
6. Black Metal Protection Card for Glass Engraving



## ASSEMBLY AND USE

The front tumbler holder needs to be installed onto the rotary base. The back tumbler holder only needs to be installed when you need it.

1. Put the m3 screw in the holder and push it through the back plate and put the nut on it.



2. Tighten the screw to hold down the tumbler holder.



For the back tumbler holder, you can install it when you have a cup that needs to be held in the back.

3. Take the bottom t nut off the holder.



4. Place the t nut in the slot on the bottom of the rotary base.





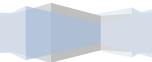
5. Hold the t nut in the slot and screw in the thumb screw until it locks.



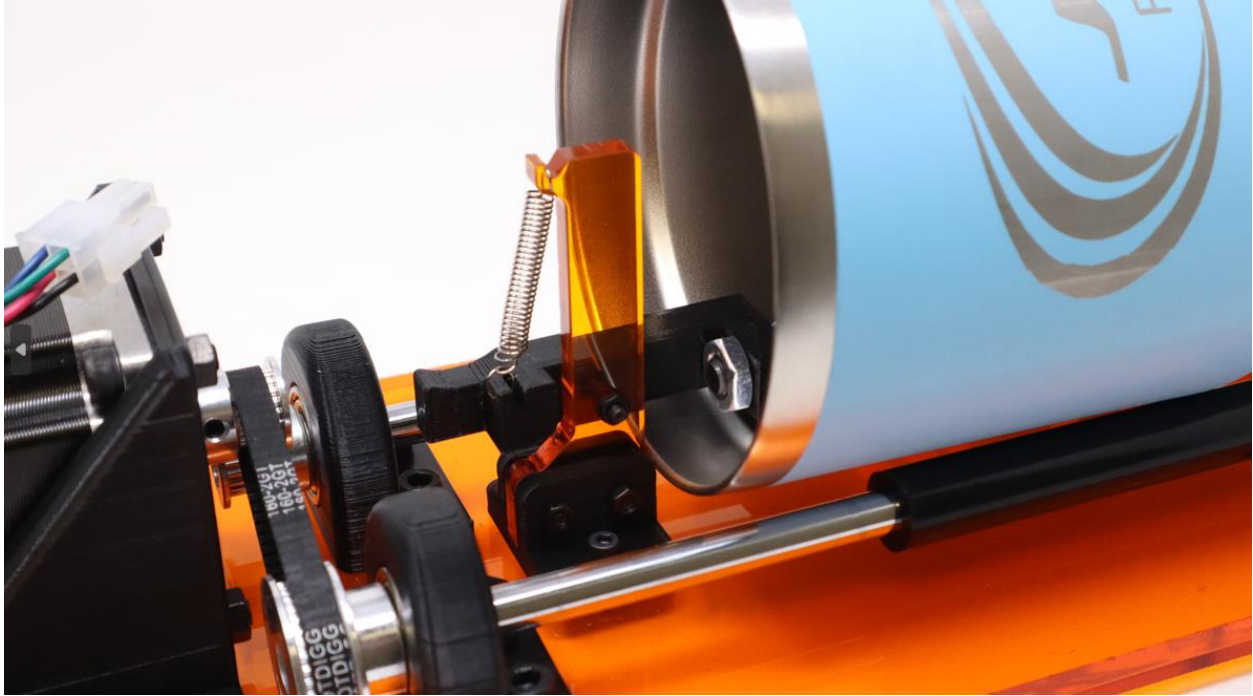
## SETTING UP A TUMBLER

If you have a tapered cup, you can use the tumbler holder to get it into position. Here is how to set it up.

1. Place the cup onto the rods and press the spring level to put the wheel into the cup.



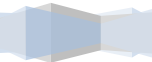
Make sure the cup is pushed all of the way so that it is hitting the plastic tumbler holder.



2. Adjust the back tumbler holder so the back of the cup hits the wheel on the holder.



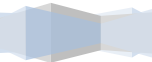
3. Place the level on the area you want to engrave on. Adjust the height of the back tumbler holder until you have the bubble in the level between the two lines.





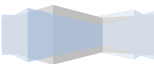
## EXAMPLE CUPS YOU CAN USE

There are a lot of cups and containers you can engrave on. The easiest will be flat cylindrical ones.



## ADJUSTING WINE STEM HOLDER

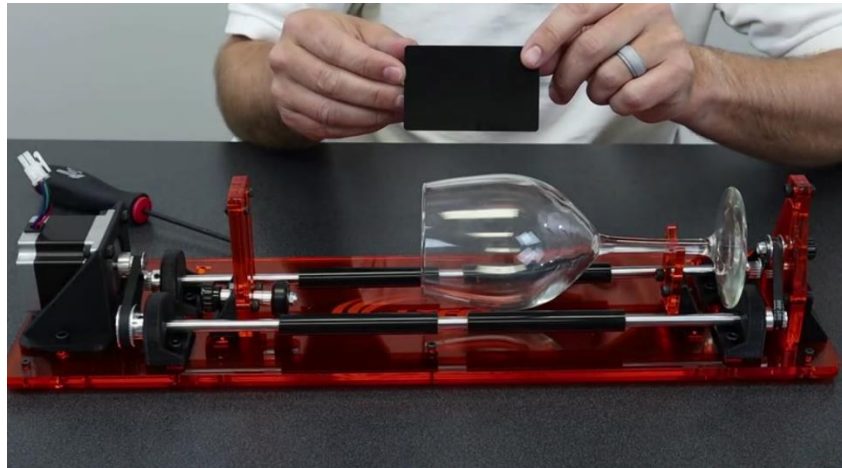
In order to engrave on wine glasses, you might need to adjust the wine stem holder. Use a M5 screwdriver to release tension on the screws holding the stem holder in place. Adjust the stem so the wine glass is level. Try to get the engraving area as level as possible.



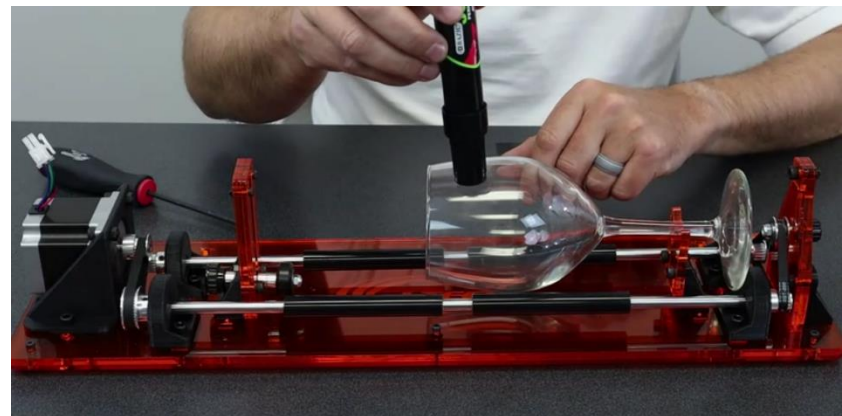
## GLASS ENGRAVING

The rotary can engrave on glass, but it needs a coating to be able to. Since the laser is in the visible wavelength, light will travel right through anything clear. To be able to engrave on clear objects, you will need to put an opaque dark coating on the top where you want to engrave. We like to use a large sharpie marker to coat the area where we want to engrave. After using the laser to engrave, then you can wipe away the rest of the coating with isopropyl alcohol and a towel.

In the kit is included a black metal card to put underneath glass objects when engraving them.



Mark the glass area with the permanent marker.



Place the metal card under the glass and then engrave.



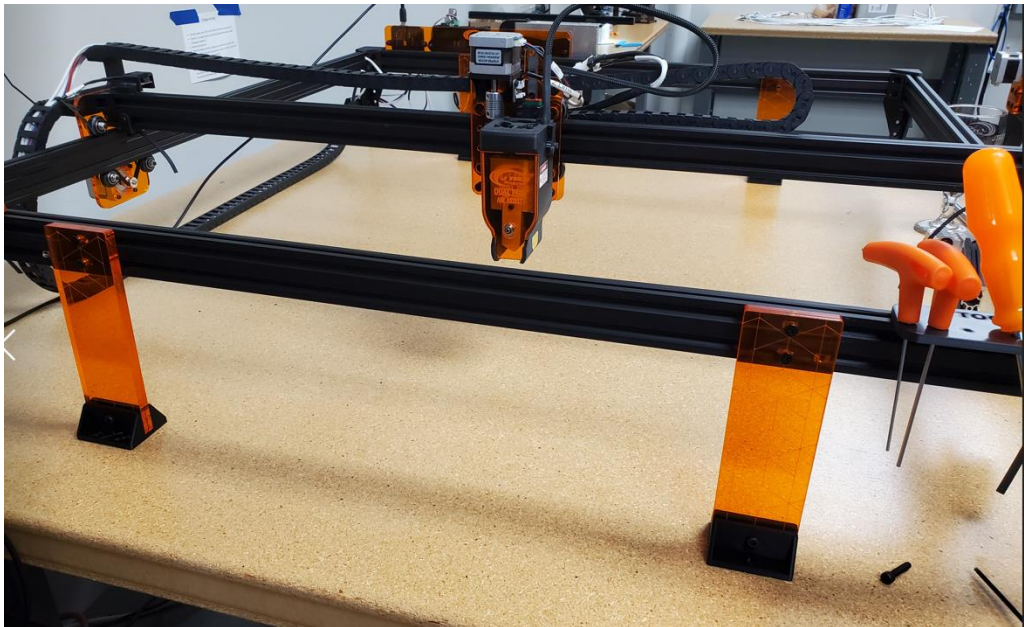


## MACHINE INSTALLATION

### PRO SERIES MACHINE

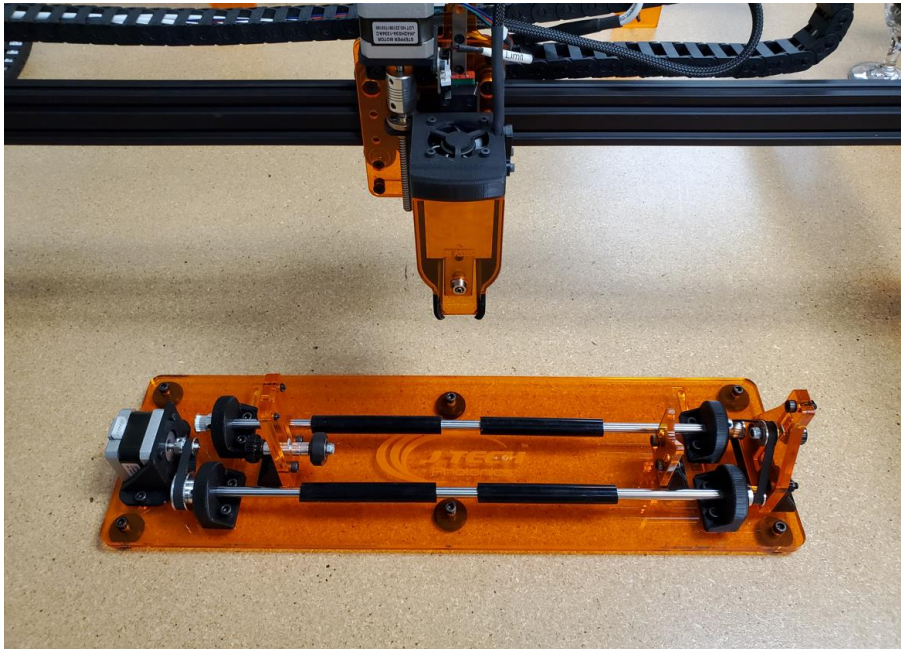
For the PRO Series laser machine, we will be taking the Y and A motor cables off the GRBL board and installing the rotary motor cable in the Y plug. Here are the instructions for doing this.

1. Turn the machine off.
2. Place the risers (if needed) to raise the machine up. These pictures show the front and the back.





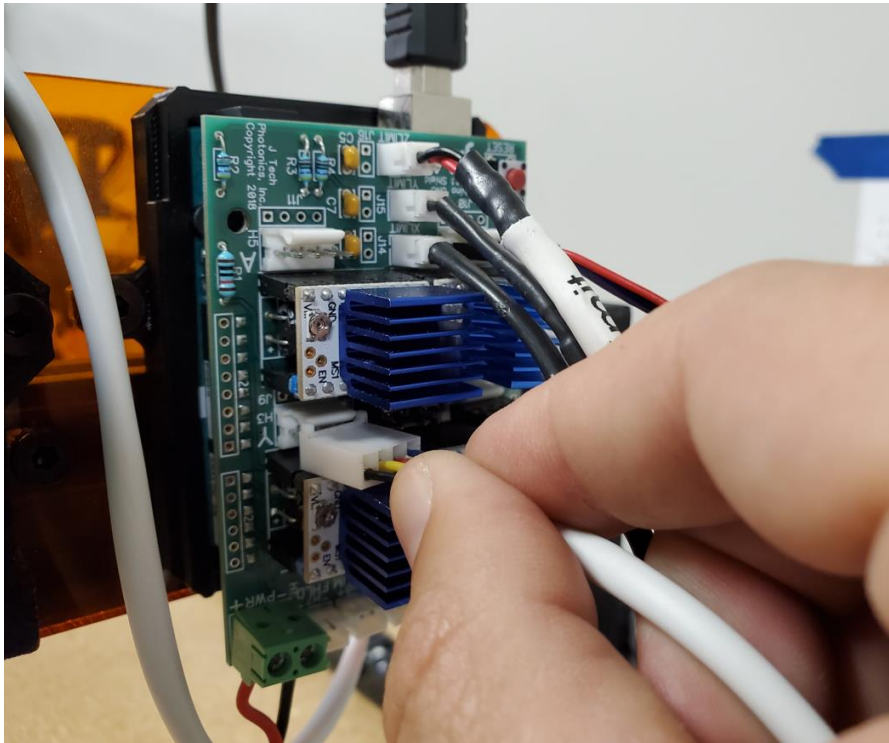
3. Place the rotary on the machine bed with the motor to the left side looking from the front of the machine.



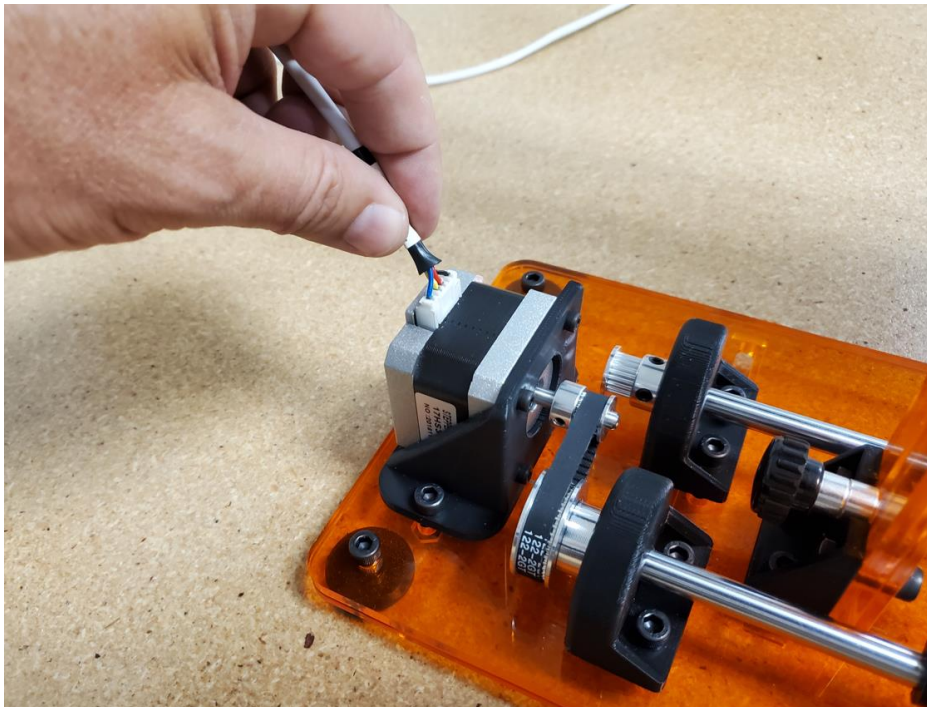
4. Take the Y and the A cables off the GRBL board.



- Put the rotary cable in the Y position.

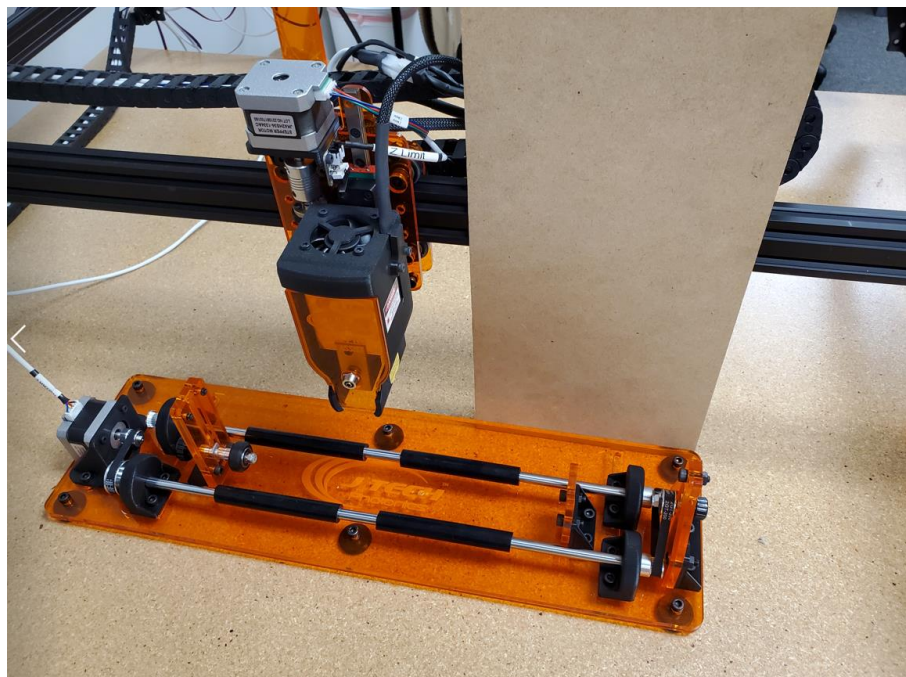
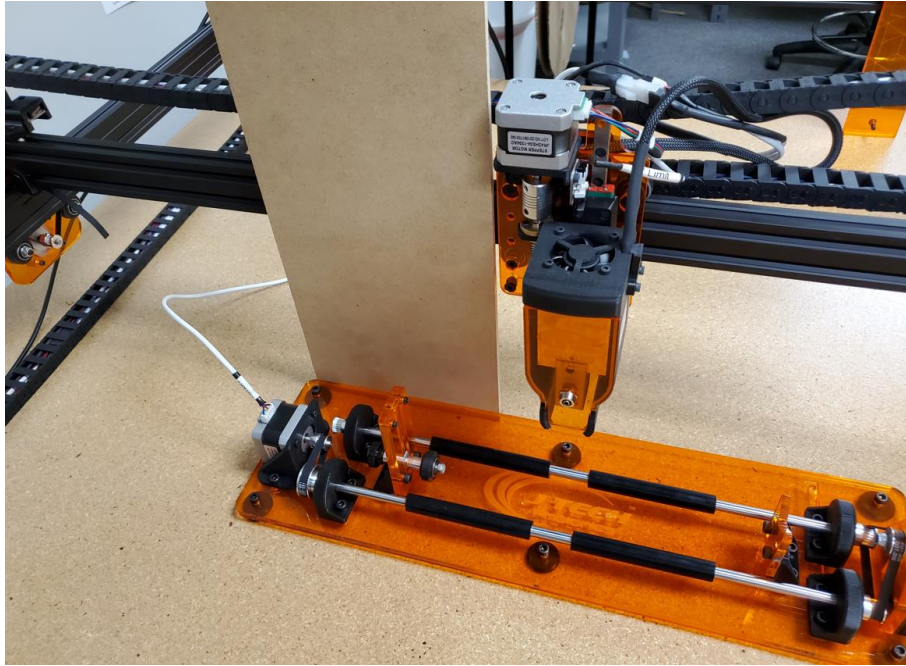


- Plug the motor cable into the stepper motor on the rotary.

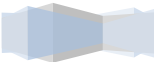




7. Square the rotary to the x axis. We used a scrap board to line it up.



8. You can now turn the machine on and use the rotary.

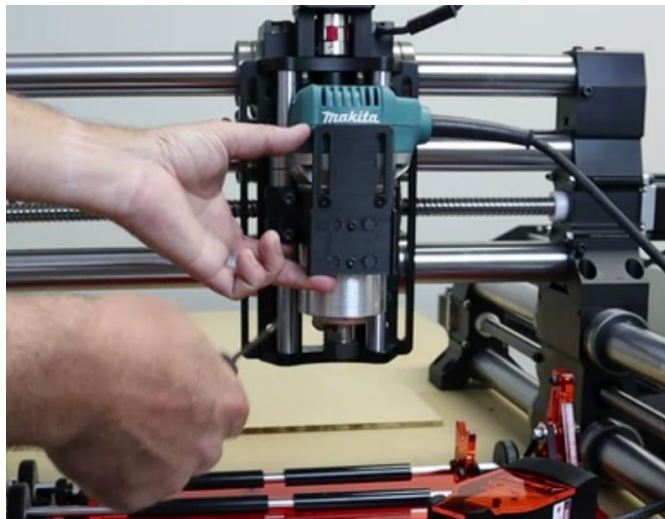


## ONEFINITY

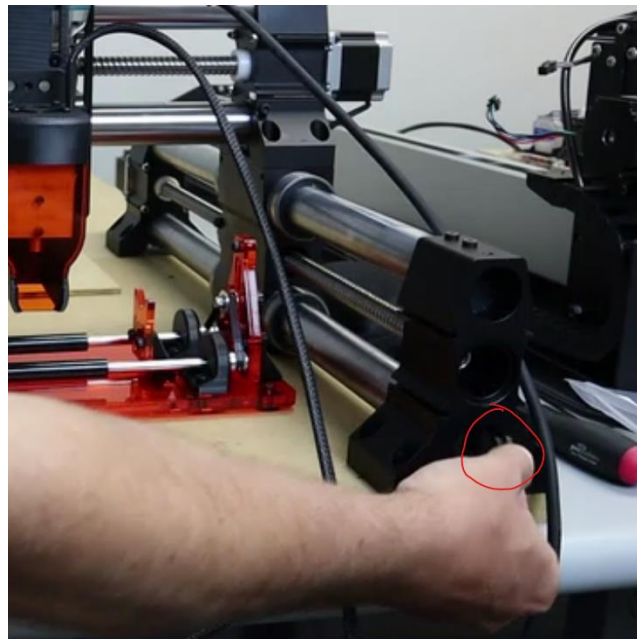


The Onewfinity machine is great for a rotary tool. It has a tall enough Z axis to accommodate the rotary and large cups. Here is how to hook it up.

Remove the two bottom screws on the mount and move the two-piece mount up as high as it can go. If you don't have the two-piece mount, it is available in the magnetic mounting kits section at the J Tech Photonics website.



Unplug the right side Y axis cable from the machine.

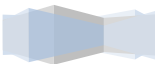




Unplug the Y motor cable in position “M2” and put the rotary cable in it’s place.

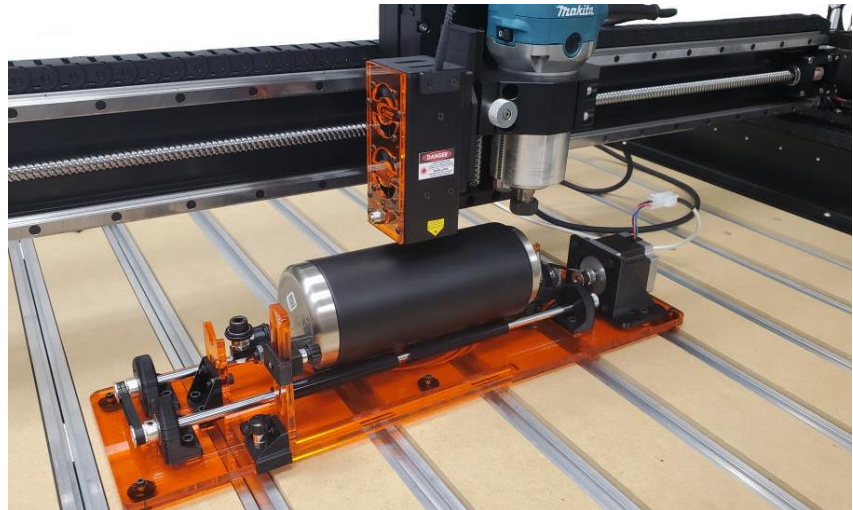


Plug the motor end of the rotary cable into the rotary.

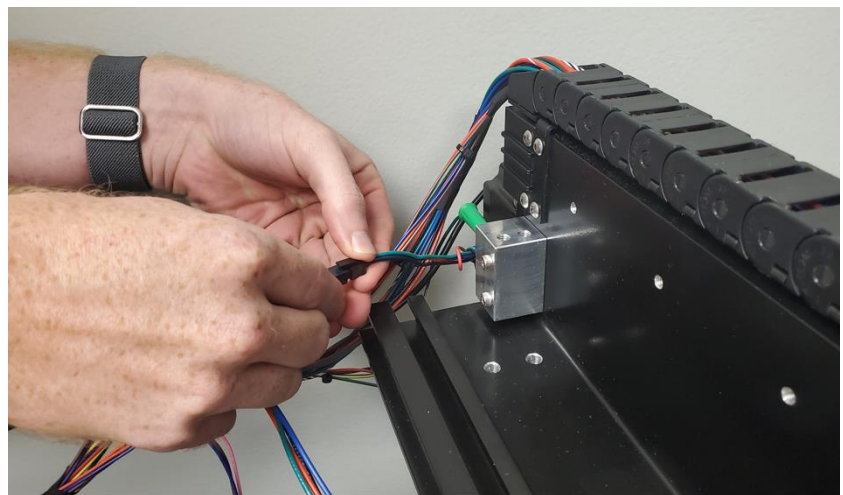


SHAPEOKO 5 PRO MACHINES

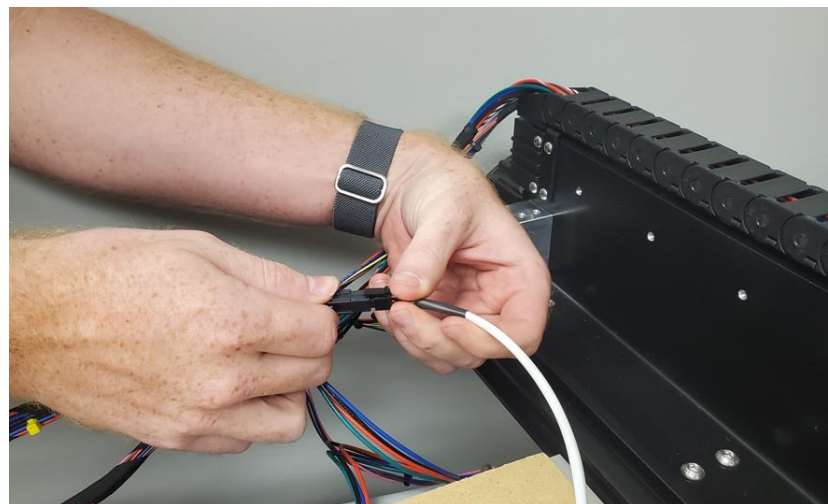
The Shapeoko 5 machine is great for a rotary because the mount can be moved up in the dovetail by twisting on the screw holding it in and then you can move it so your cup can fit under the laser. It is great for engraving larger cups.



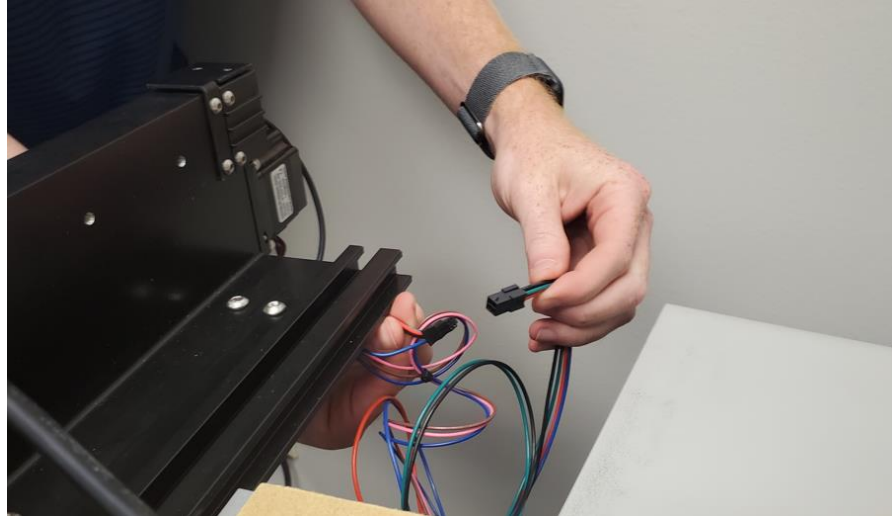
To install the rotary, remove the right side Y Axis motor connection cable.



Replace the connection with the rotary cable supplied in the rotary accessory kit from J Tech.



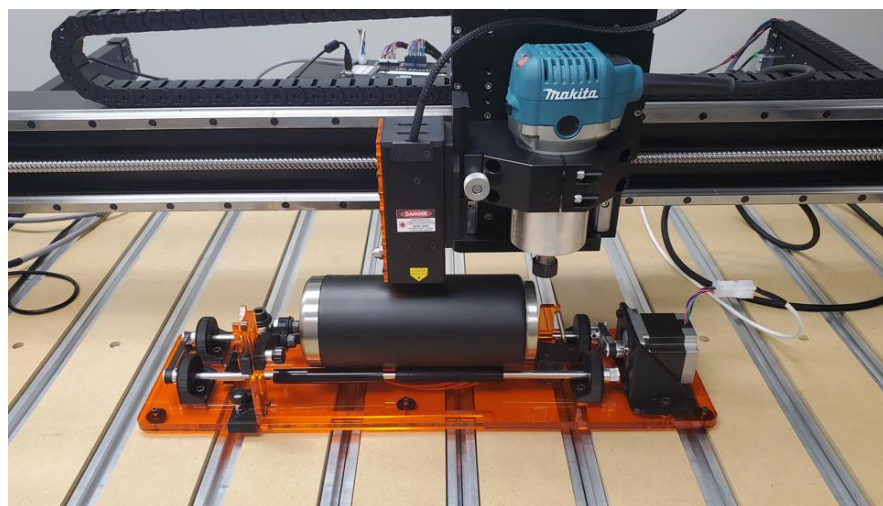
Make sure to remove the motor connection on the left side of the machine for the other Y motor.



Then connect the other end of the rotary cable to the rotary motor.



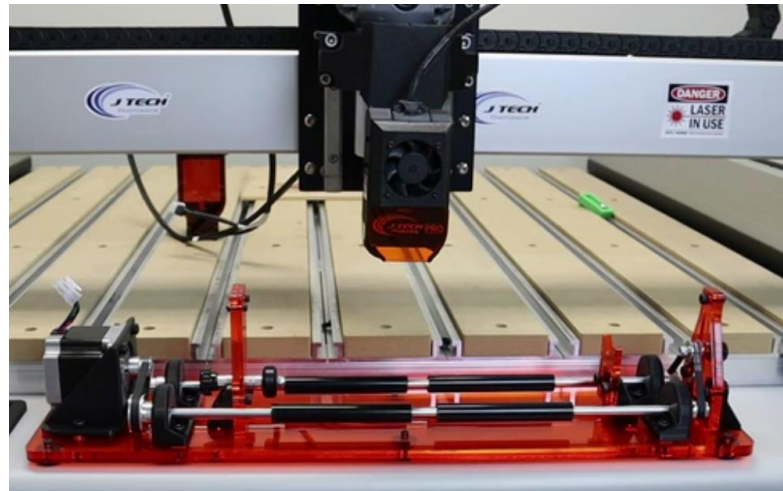
You can then adjust the height of the laser mount to place the laser correctly for your cup size.





## SHAPEOKO 4 AND SHAPEOKO PRO MACHINES

The Shapeoko4 and PRO machines can have the rotary in a couple of configurations. If you have the front mount, you can place the rotary in front of the machine off the table to get more z clearance for larger cups. If you don't have the front mount or don't have a big enough table, then you can use the provided side mount for the laser that will raise the laser up to be able to fit larger cups.



If you don't have the front mount, you can install the side mount for the laser. There are two screws to mount it on the router holder on the left side.



Depending on where you have your router placed, you may need to lift it up to make room for the rotary.





Connect the rotary cable to the rotary motor.



Unplug the Y Right cable and plug in the rotary to it. You can look at the motor on the right side and trace the wires to the Y right connector.

Find the "Y L" connector (Y Left) and unplug it.



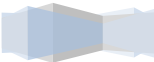
## SHAPEOKO3

The Shapeoko3 machine is great for the rotary, but the z axis will need a bit more room to do larger cups. The kit includes a new mount that will be placed in the normal holder.

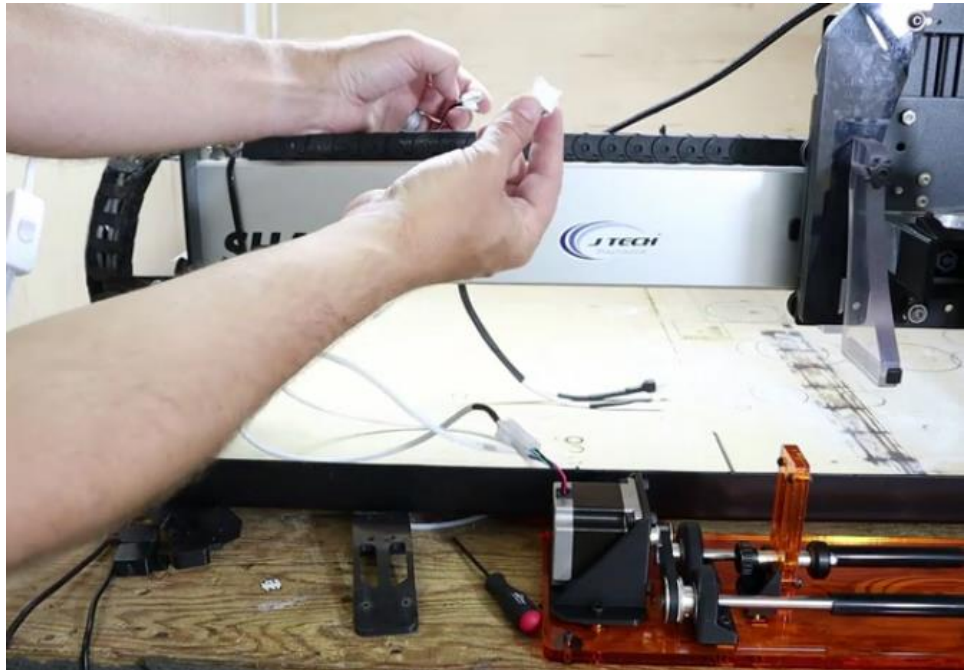
Remove the old mount and replace it with the new smaller mount. Note the placement of the holes. They will be placed so they are on the top of the mount.



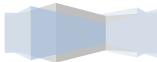
Connect the motor cable for the rotary into the rotary motor.



Unplug the Y1 motor cable on the back of the machine and plug in the rotary cable into it.



In the center back of the machine you can see the Y2 connector. Unplug this cable when you use the rotary.

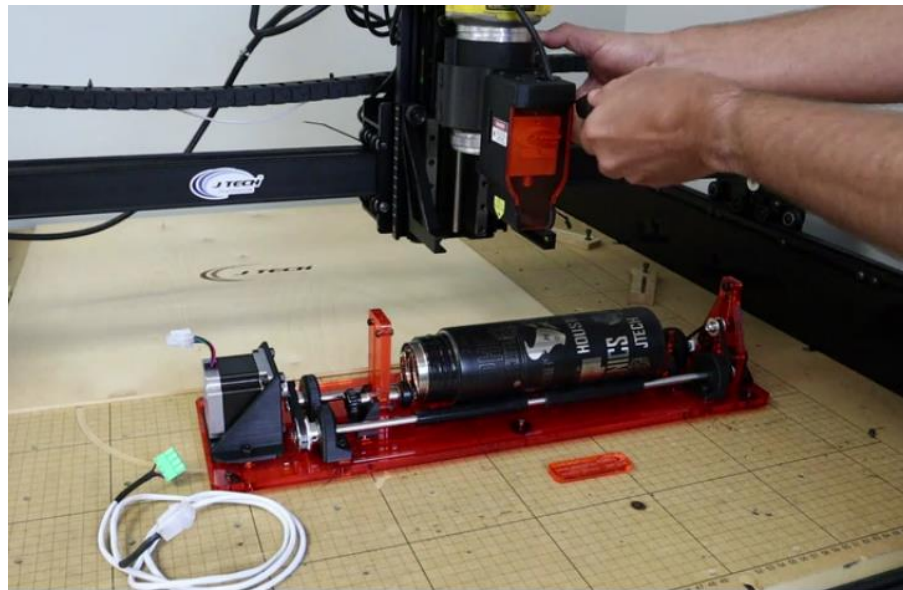




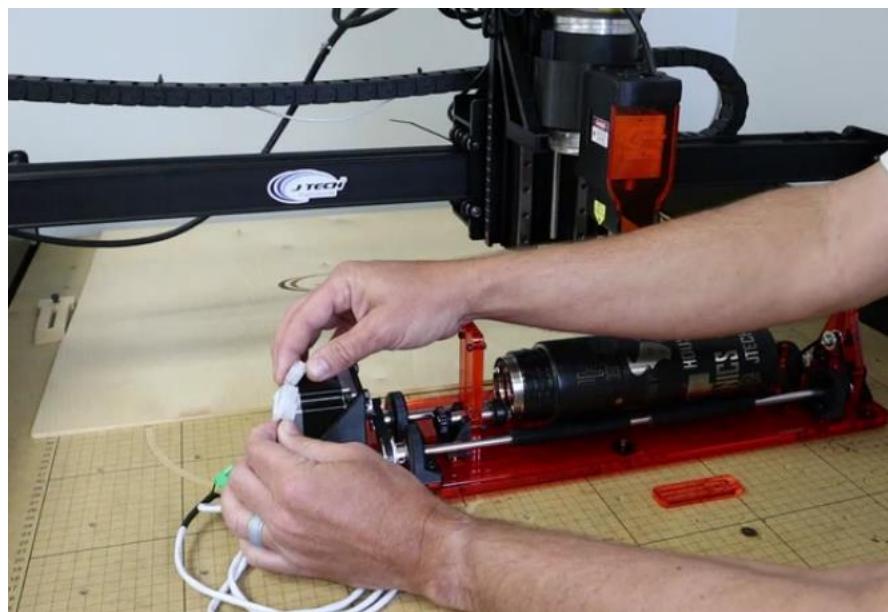
## X CARVE MACHINE

The newest version of the x carve already includes the risers and the dual linear rail z stage with added height, so you won't need to do anything with the machine to get it working. If your machine is an older machine without the risers, then you will need to get the upgrade kit from Inventables for the new z axis and risers before you can use the rotary tool.

If you have the newest version, then you can adjust your front mount on the router holder up if you need more room. You can also move the mount to the higher screws if you need even more room. The z axis has a lot of height, so you might not need to adjust anything.



Plug in the rotary connector to the rotary motor.



Remove the Y2 connector from the back of the X Controller.



Remove the Y1 connector and replace it with the rotary connector.

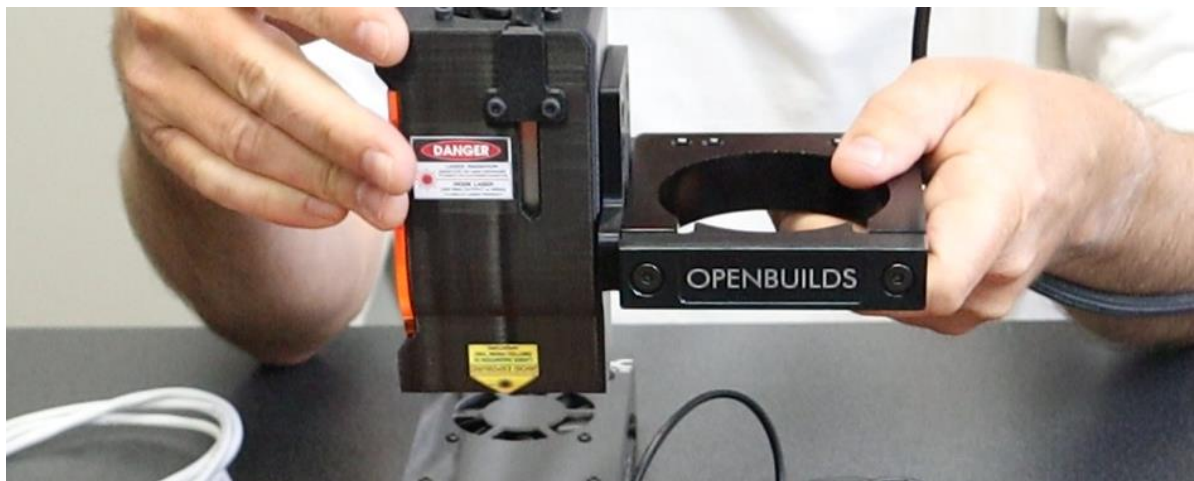


## OPENBUILDS MACHINES

There are many configurations for openbuilds machines, but this will cover most of them that use the BlackBox controller.

If you have the extended Z axis, then you might have enough travel in your z axis to accommodate larger cups under your laser using the standard mount. If you don't, then we have included another mount that will raise the laser up to allow for more room. You might need to also move the router out of the way as well when using this mount.

The mount is upside down from the original J Tech mount, so put the mount on the router holder like the picture.

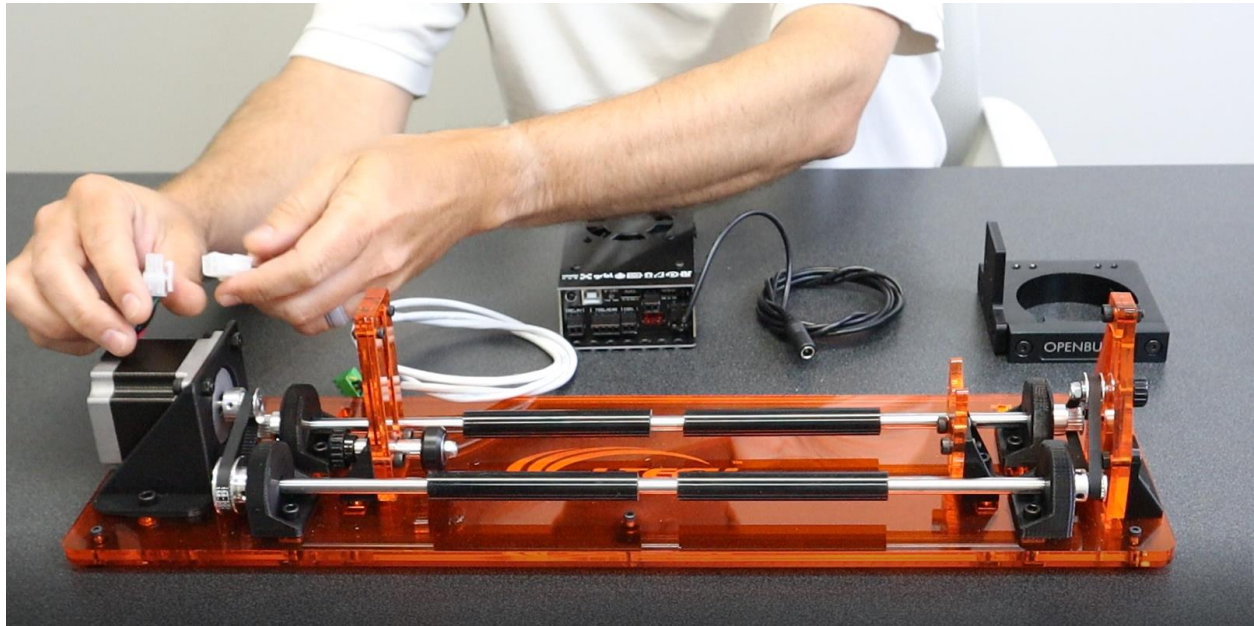


This will allow a lot of room under the laser for engraving large objects.

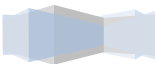
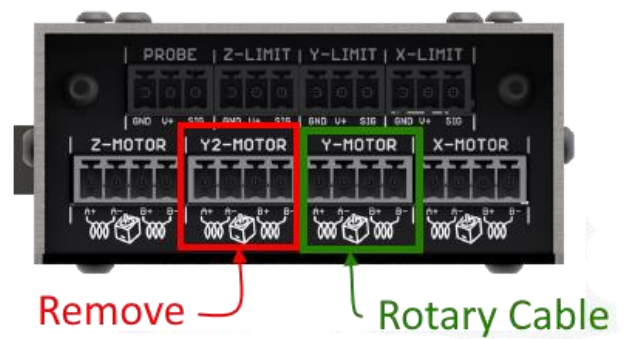




To attach the cable, first start with attaching the cable to the rotary.



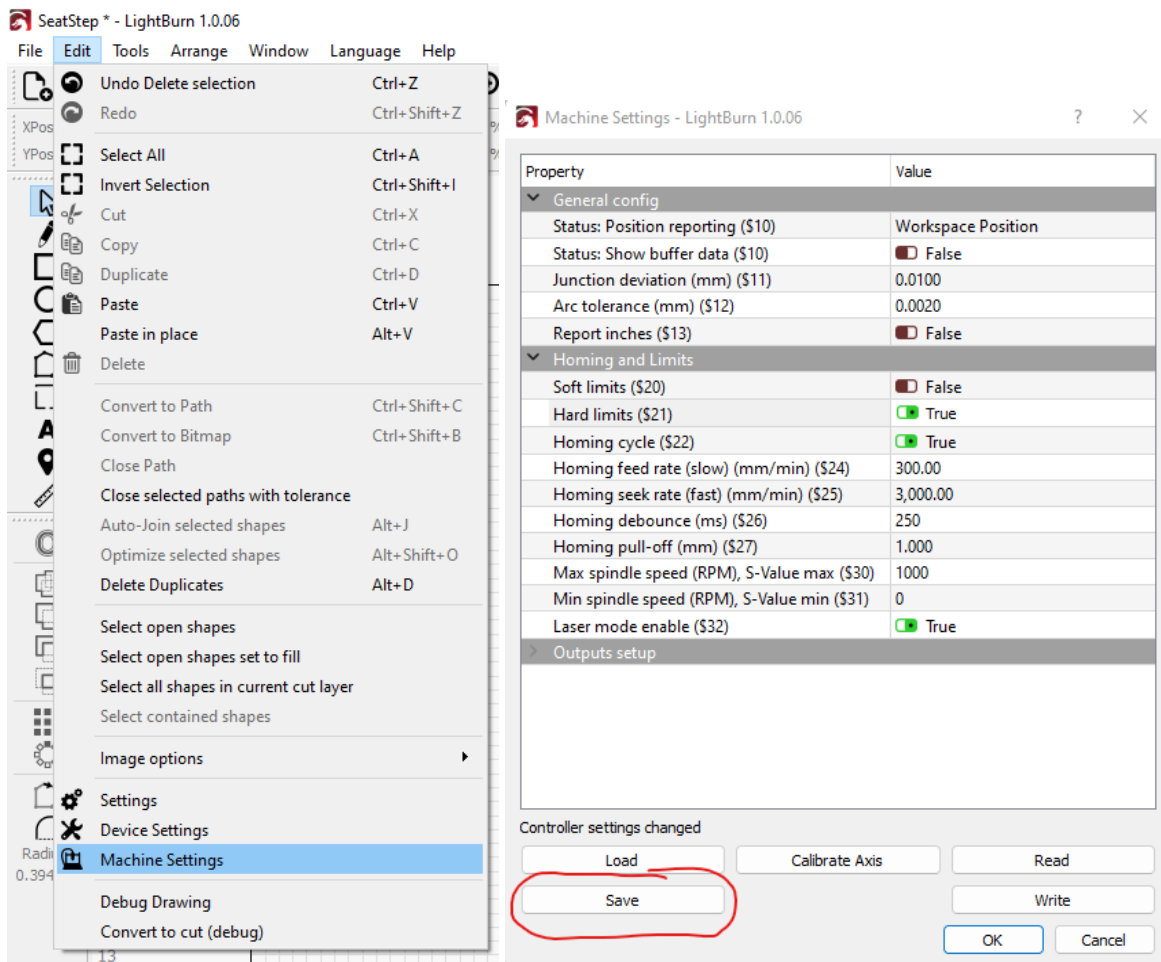
Attach the other side by removing the Y axis connector and replacing it with the rotary connector.

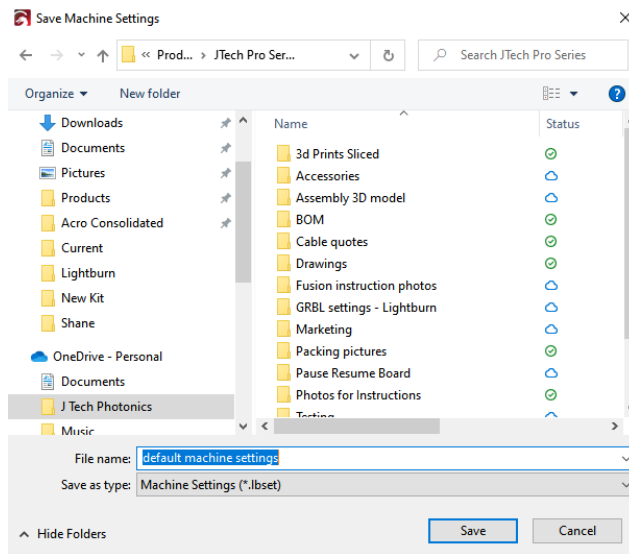


## LIGHTBURN CONFIGURATION

In order to use the rotary, we must first configure LightBurn and the machine. If you are using lightburn to only generate G Code files (ONEFINITY) then you can skip to page 28. We need to save the current machine configuration and then make a new one for the rotary. When you are done with the rotary, you will then put back the original machine configuration file.

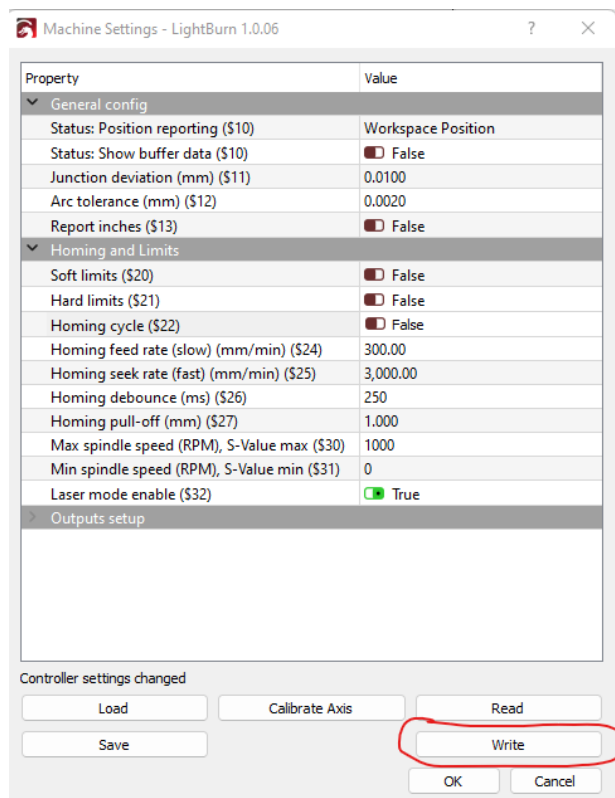
1. Access the machine setting menu (Edit – Machine Settings)  
 Before making any changes save the current settings by pressing the save button at the bottom of the window. Save the current settings using file name “default machine settings”.





2. Check the following settings to ensure that they are off. Press the “write” button to send the new configuration to the machine.

- Soft limits – OFF
- Hard limits – OFF
- Homing Cycle – OFF





Machine configuration for the Onefinity CNC:

When using the rotary on the Onefinity, you might need to set your rapid speed lower than the speed used when using the CNC. The first move to go to the origin when you are starting a file will be the rapid move speed. If you have this set too high, then you will throw the cup off the rotary when it first moves to the origin. Here is how to reduce the speed of the rapid move so this doesn't happen.


Click on the Motor 1 settings and change the value for max-accel. Write down the current value and then change it to about 1/3 lower for using the rotary. This will allow the cup not to slip on the first move. If you still see it too fast, then decrease it more. After you are finished, set it back to the original value.

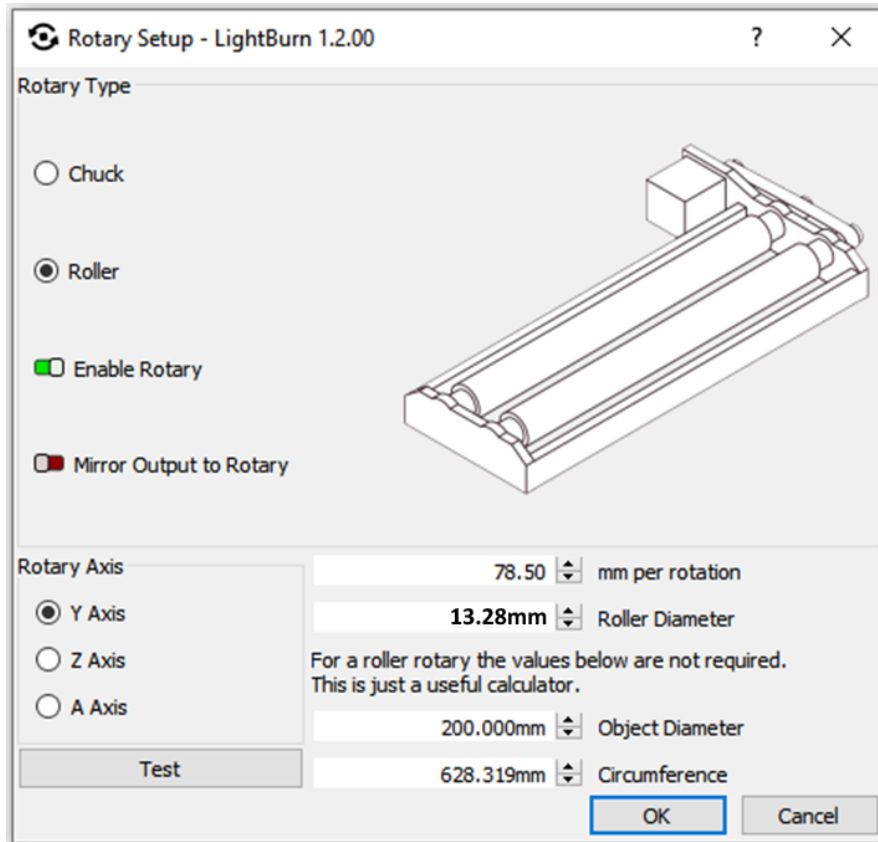
The screenshot shows the Onefinity CNC configuration interface. The left sidebar contains a menu with categories: CONTROL, SETTINGS, MOTORS, TOOL, I/O, ADMIN, CHEAT SHEET, and HELP. Under MOTORS, Motor 1 is selected and highlighted with a red box. A red arrow points to this box with the text "Click for Motor 1 Settings". The main content area is titled "Motor 1 Configuration" and is divided into three sections: General, Power, and Motion. The "Motion" section contains several settings, with "max-accel" highlighted by a red box. A red arrow points from the text "Write down your value you have currently for max-accel. Lower this by about 1/3 the value for using the rotary. Put it back when finished with rotary and using the router/spindle." to the "max-accel" input field. The "max-accel" value is 750.002 km/min<sup>2</sup>. Other settings in the Motion section include: reverse (unchecked), microsteps (16 per full step, 53.3k µstep/sec), max-velocity (10 m/min, 1000 RPM), max-jerk (1000 km/min<sup>3</sup>, 28.33 g/min), step-angle (1.8 degrees, 200 steps/rev), and travel-per-rev (10 mm, 50.0 µm/step).

Section	Parameter	Value	Unit	Equivalent
General	axis	Y		
	enabled	<input checked="" type="checkbox"/>		
Power	drive-current	1	amps	
	idle-current	0.5	amps	
Motion	reverse	<input type="checkbox"/>		
	microsteps	16	per full step	53.3k µstep/sec
	max-velocity	10	m/min	1000 RPM
	max-accel	750.002	km/min <sup>2</sup>	21.244 g
	max-jerk	1000	km/min <sup>3</sup>	28.33 g/min
	step-angle	1.8	degrees	200 steps/rev
	travel-per-rev	10	mm	50.0 µm/step



**LIGHTBURN ROTARY SETUP**

Select the  icon from the top row of buttons or navigate to rotary setup through the menus (Tools – Rotary setup)



- Rotary Type – Roller
- Enable rotary – ON
- Mirror output to rotary – OFF
- Rotary Axis – Y
- Roller Diameter – 13.28mm / 0.523in

**MM per rotation numbers:**

PRO Series Machine = 78.5

Shapeoko3 and X Carve = 100

Shapeoko4 and Shapeoko PRO = 80

Shapeoko5 = 40

Oneworld = 20

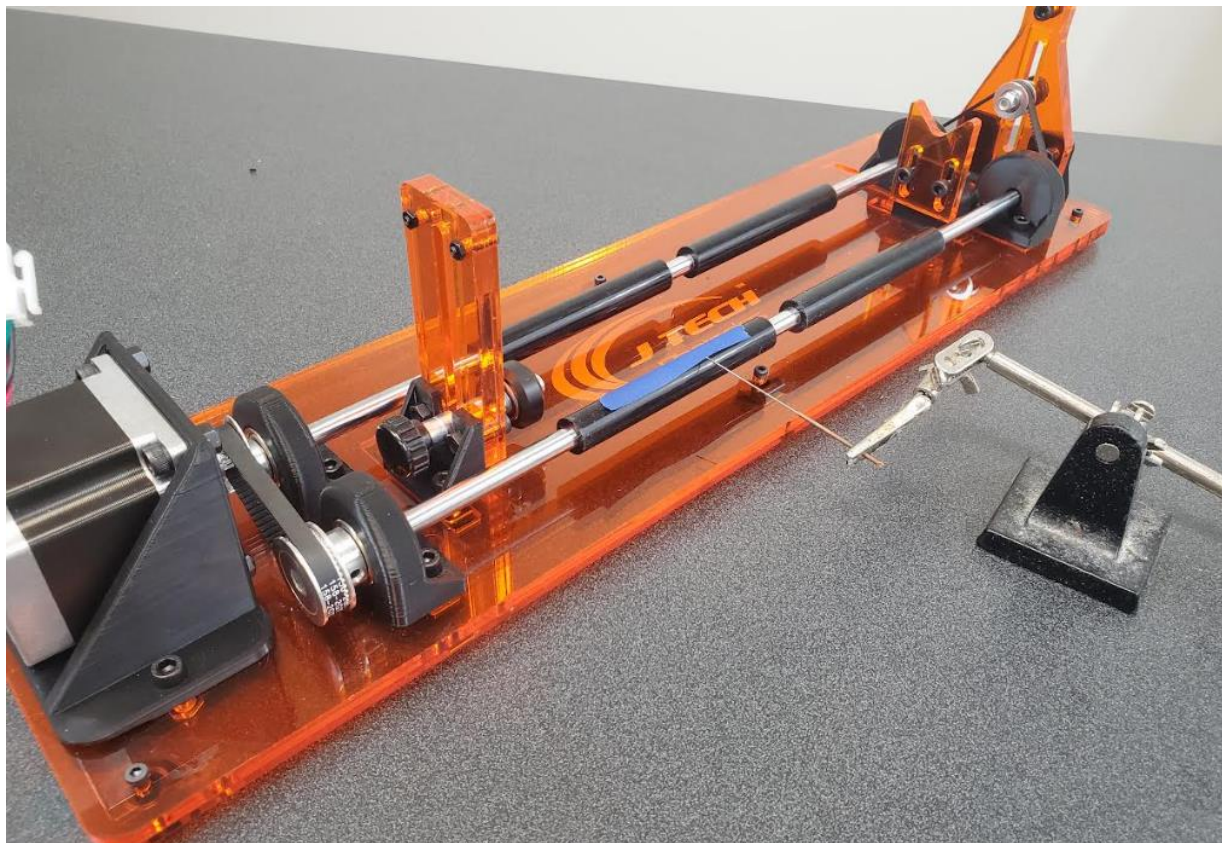
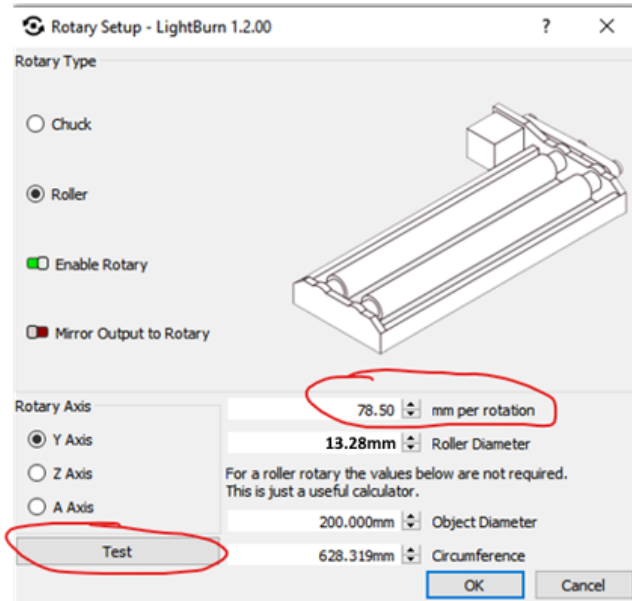
Openbuilds = On a 1010 lead machine with the Y steps per mm (\$101) the MM per rotation should be 16.33.



## CALCULATING MM PER ROTATION

If you don't know the mm per rotation, then you can find it by setting up a test on the rotary. Here is how to find the number.

1. Place tape on one of the rods to mark the position.
2. Use a wire to mark the position off the rotary.
3. Press the test button to rotate the device the distance in the mm per rotation.
4. Change the mm per rotation until you get exactly one rotation.

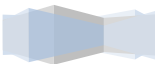
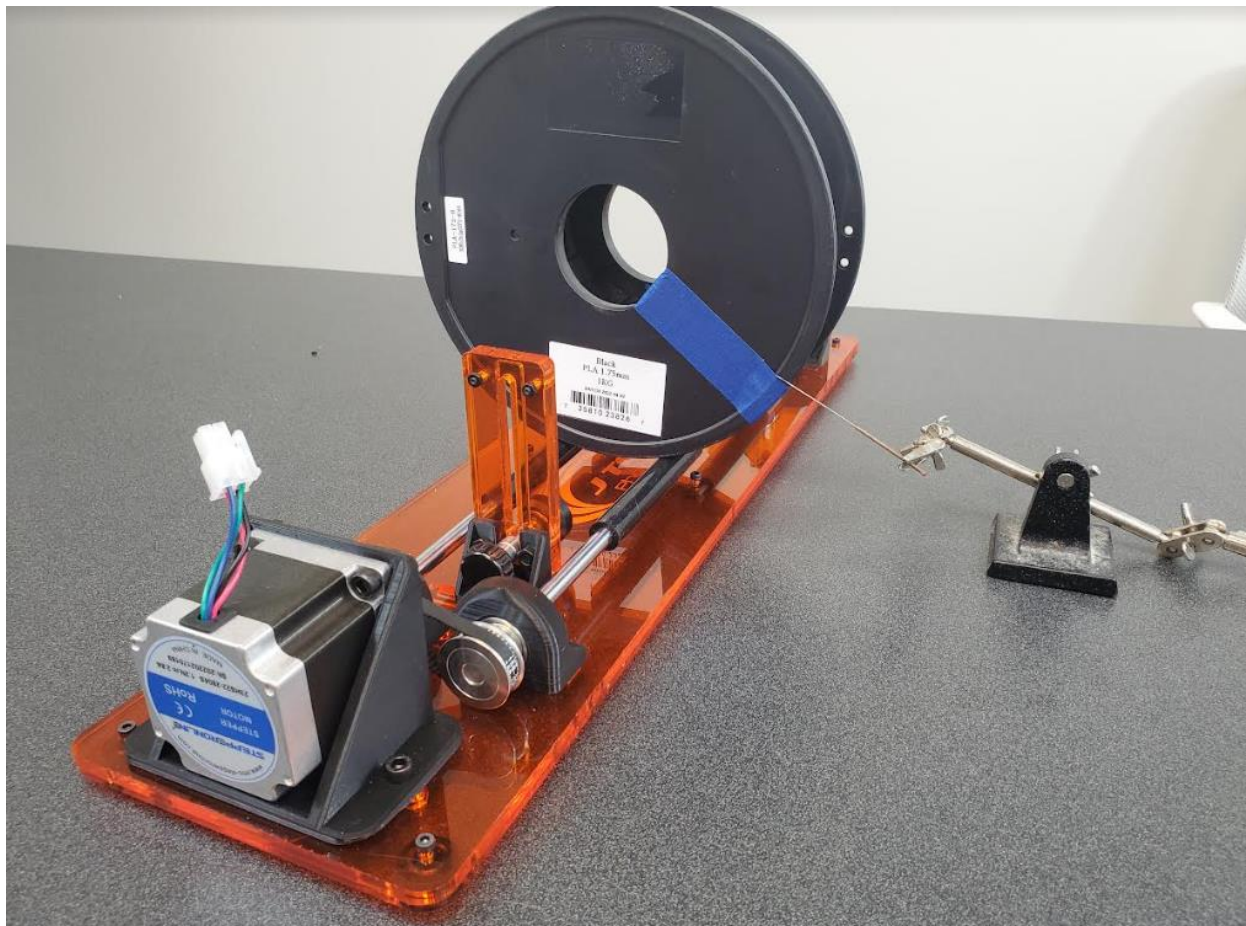




To find a more refined number you can then use a known diameter that is larger than the rod to see if your number is correct.

5. Use a known diameter object and place it on the rotary.
6. Mark a line with tape or a marker on the object.
7. Use something to judge where the mark is located off the rotary. We use a small wire to be able to tell when the tape goes by.
8. Jog the Y axis the circumference and see if it moves exactly one rotation. Change the mm per rotation until it is exact.

For example, we used a 3D printer roll to check.



## SETTING UP YOUR FIRST FILE

This section outlines the process for setting up your file to engrave on your rotary. Here is the process:

1. Measure the diameter in inches of the object you want to laser.
2. Input that number into the object diameter space under tools-rotary
3. Use the circumference that Lightburn outputs
4. Measure the vertical area of the object
5. Draw a rectangle using the rectangle tool with the circumference as the height dimension and the vertical space on the object as the width
6. This is now the perimeter of your workspace on your object.

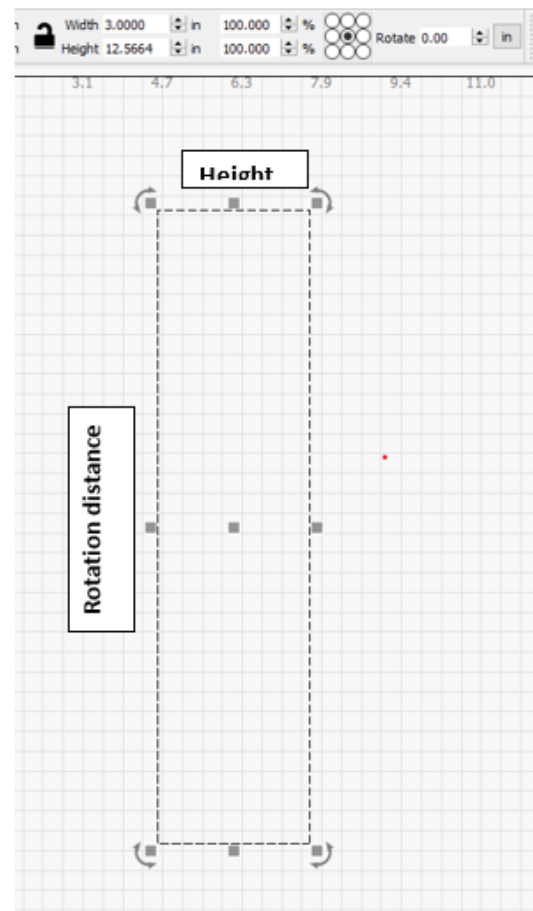
**Example:** 4in diameter Yeti cup with 3in of laserable space

Enter the diameter of the cup in the rotary setup tab

The circumference of the cup is shown as 12.5664in

Make the rectangle with width of the laserable space 3.00 inches

Make the height of the rectangle 12.5664



Turn OFF the output of the rectangle

Rotate the file want to laser on the cup 90 degrees counterclockwise

-Select the file

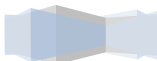
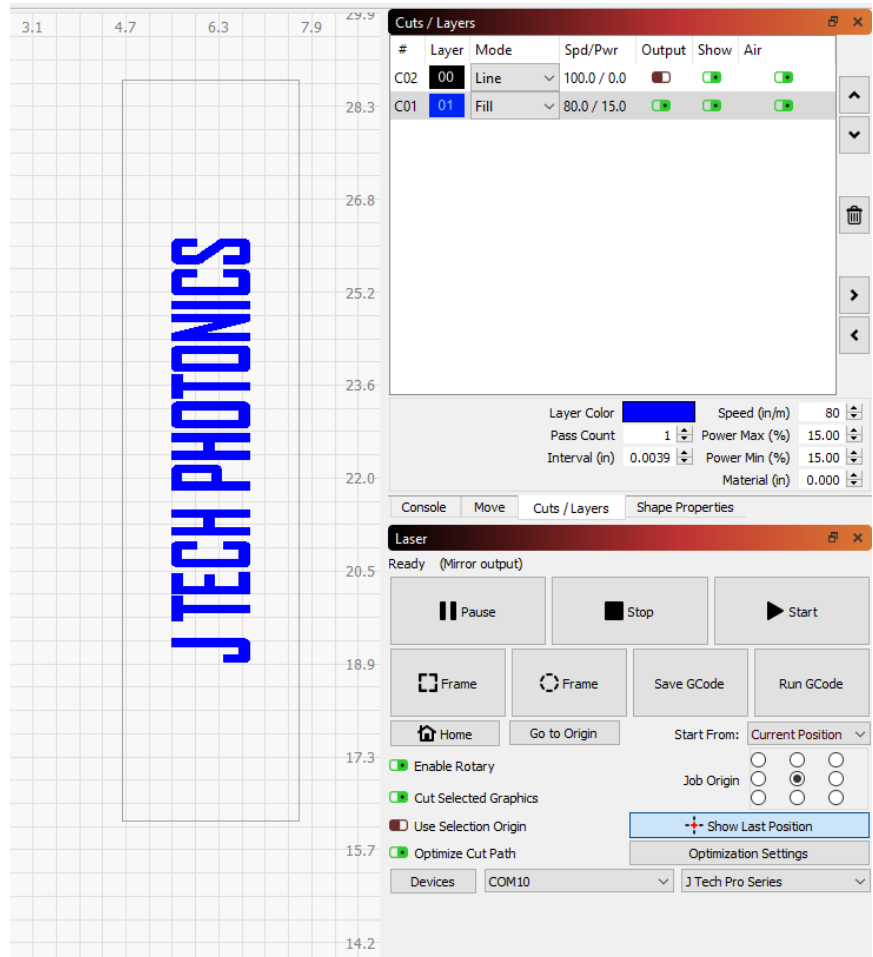
-Press the comma key once or Arrange – Rotate 90 degrees counterclockwise

Place the file you want to laser in the center of the rectangle

Set the job origin to center

Start from current position

Jog to the position you want to start on the cup/tumbler and then press frame to make sure it is correct and then start your program.





## TIPS FOR ENGRAVING REAL LIFE CUPS

1. Get a practice cup first and try your settings on it. Re-use the cup as your test cup for trying new settings.
2. If you don't have a lot of practice cups, then put a couple of layers of painter's tape on the cup and engrave in low power as not to go through the tape. Figure out your placement and then take the tape off when you are ready to engrave.



3. Speed: Don't go over 40 inch/min. Higher speed will throw the cup off the rollers. Lower speed will get better results.
4. For better results, use the "FILL" method in Lightburn. It will raster in X axis and only move the Y for each line, which is super small. It won't throw the cut out of balance.
5. Power: For removing paint, it doesn't take as much power as you would think. Do not use too much power on paint removal because the higher power lasers will also then mark the stainless steel underneath in places. The 24W can engrave on stainless steel directly at 100% power.
6. If your settings are wrong, it will be obvious on the test cup. This example on the right needs to be rotated 180 degrees in Y and the MM per rotation is wrong. You can see it is squished, so the MM per rotation needs to be increased. Once you get your machine calibrated, make sure you save your numbers. Lightburn sometimes resets them when you update. Always, check your settings against your "known good" settings or you will get mistakes like this one on a perfectly good cup.

