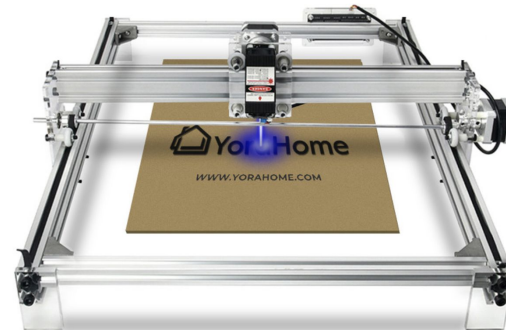# YoraHome

YORA CNC LASER ENGRAVING MACHINE 6550

USER MANUAL

Version 2.1 • March, 2021

Purpose

This Manual is intended for assembly of the YoraHome 6550 Laser Engraving Machine.

Before beginning assembly, we recommend conducting an inventory using the Packing List to ensure all components are present. NOTE - there may be extra hardware included; this is normal, in case items get dropped or lost.

Please read these instructions carefully before assembling your machine to prevent possible damage to your machine.

YoraHome
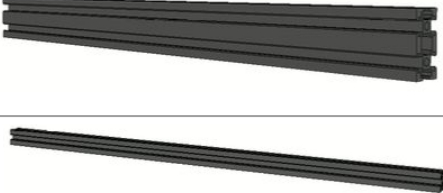
Contents

Part 1: Packing List

Part 2: Mechanical Installation

Part 3: Software Introduction
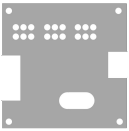
Part 4: Recommended Settings

Part 5: FAQ

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Name	Model	Parameter	Quantity	Picture
Aluminium Profile		610 mm	2	
		740 mm	1	
		690 mm	2	
Linear Axis		590 mm		
Corner Connector			4	
Bolt	M6x12		12	
	M5x10		12	
	M5x45		4	
	M5x30		8	
	M3x25		4	
	M3x8		22	

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Name	Model	Parameter	Quantity	Picture
Acrylic Sheet A			1	
Acrylic Sheet B			1	
Acrylic Sheet C			1	
Acrylic Sheet D			1	
Acrylic Sheet E			4	
Board Mount Plate A			1	
Board Mount Plate B			1	

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Name	Model	Parameter	Quantity	Picture
Stepper Motor			2	
Laser Module			1	
Synchronous Wheel			3	
Guide Wheel			12	
Coupling			1	

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Name	Model	Parameter	Quantity	Picture
Washer			12	
T-Slot Nut		M5 Threads	13	
Square Nut		M3 Threads	7	
Hex Wrench		2 | 2.5 | 3 | 4	1 of each	
Copper Coupler		M3 Threads	4	
Nylon Spacer		M5x12	16	
		M3x16	4	
Hex Nut		M5	13	
Nylon Washer		L3	1	
Bearing		F685Z	1	

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Name	Model	Parameter	Quantity	Picture
Timing Belt		710mm	2	
		840mm	1	
Stepper Motor Cable			2	
USB Cable			1	
Control Board			1	
Power Supply			1	
Cable Tie			1	
Cable Wrap			1	
Safety Glasses			1	

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Name	Model	Parameter	Quantity	Picture
Brass Standoff		M3x6mm	4	
		M3x17mm	4	
T-Nut		M4	2	
Phillips Head Screw		M4x8mm	2	
Cap Screw		M3x8mm	4	
Cap Screw		M3x10mm	2	
Hex Nut		M3	4	

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Step 1

→ Base Assembly - note the front and rear rails mount inside the side rails

Aluminium Profile
610 mm

Aluminium Profile 690 mm

← T-Slot Nut
← Corner Connector
← Washer
← Bolt M5x10

690 mm

610 mm

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Step 2

→ **Acrylic Sheet A Assembly - Left side of machine**

Acrylic Sheet A

Nylon Spacer M5x12

Guide Wheel

Hex Nut

Bolt M5x30

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Step 3

→ Acrylic Sheet B, Coupling - Right side of machine
Y-Axis Stepper Motor Assembly

Hex Nut

Guide Wheel

Nylon Spacer M5x12

Bolt M3x25

Acrylic Sheet B

Nylon Spacer M3x16

Stepper Motor

Coupling

Bolt M5x30
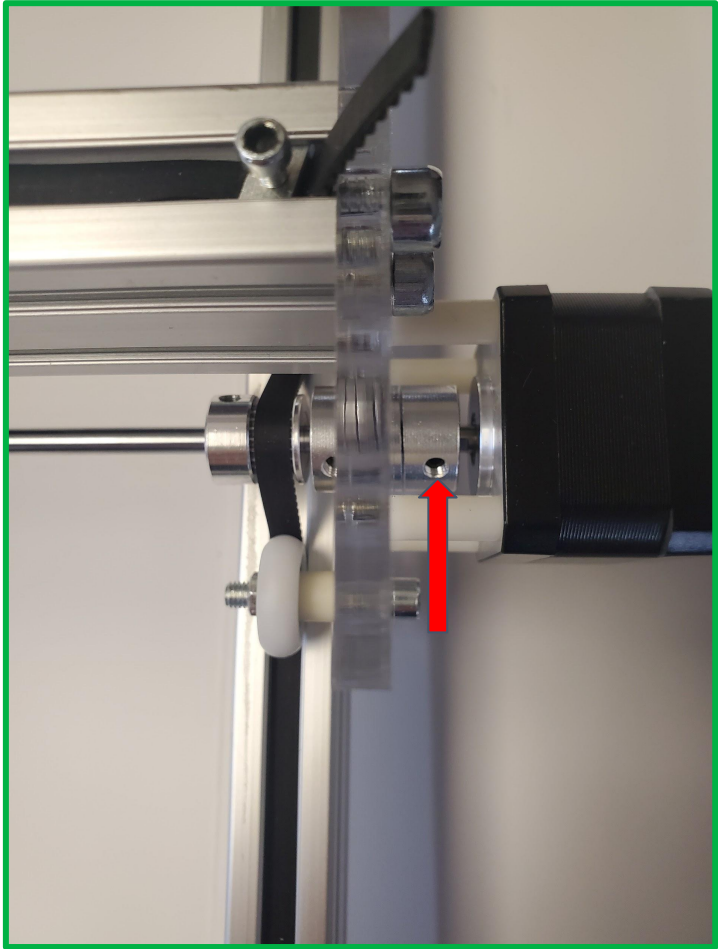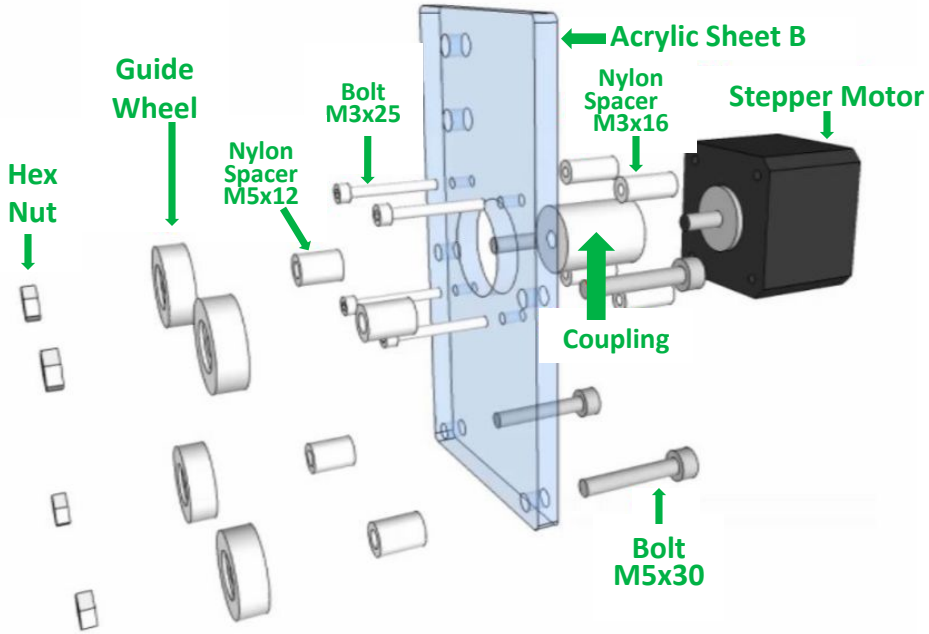
NOTE - Ensure there is a gap between the Coupling and Motor housing to prevent binding.

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Step 4 1/2

→ **Laser Module, X-Axis Stepper Motor,
Acrylic Sheets C and D Assembly**
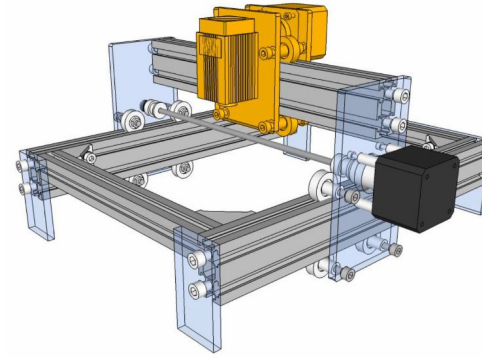
1. Laser Module Assembly

Laser Head

Acrylic Sheet D

Bolt M3x8

Bolt M5x45

Nylon Spacer M5x12

Guide Wheel

2. X-Axis Stepper Motor

Acrylic Sheet C

Bolt M3x8

Synchronous Wheel

Stepper Motor

Hex Nut

Nylon Column M5x12

3. Assemble 1. & 2.

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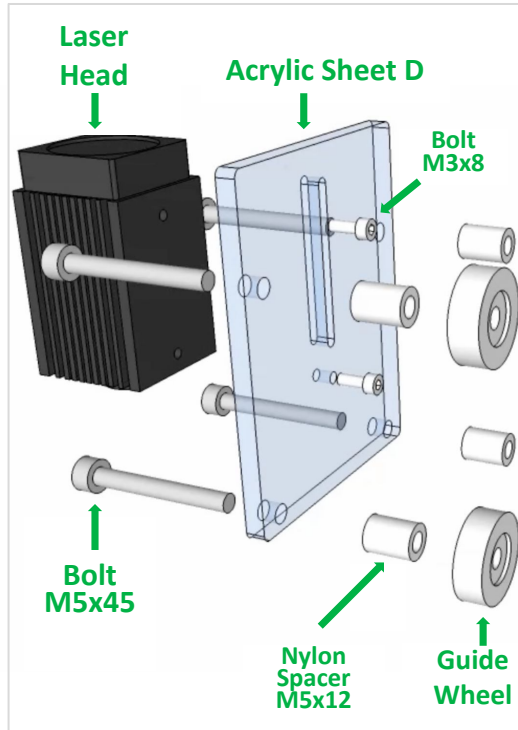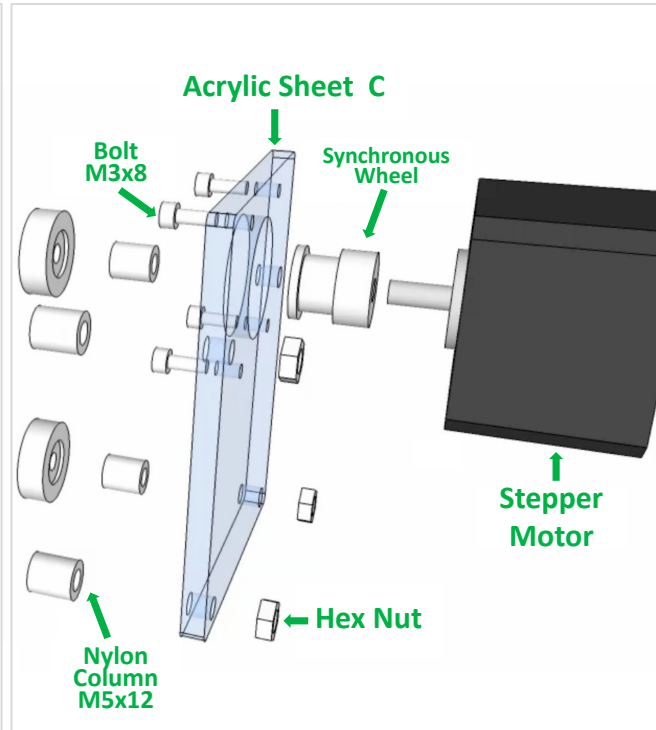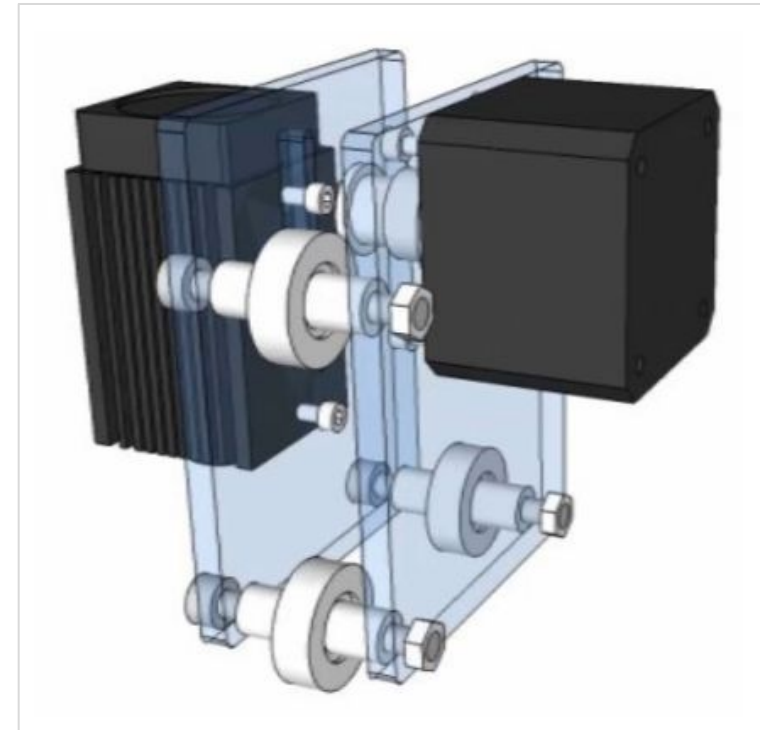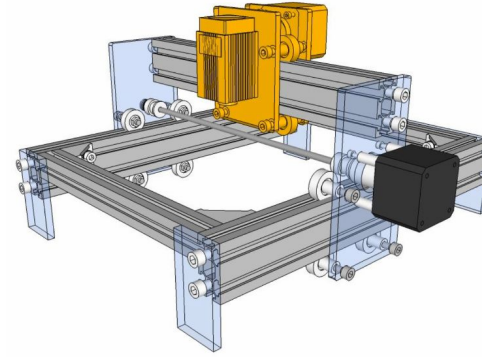
Step 4$_{2/2}$
⟶ **Laser Module, X-Axis Stepper Motor,**
Acrylic Sheets C and D Assembly
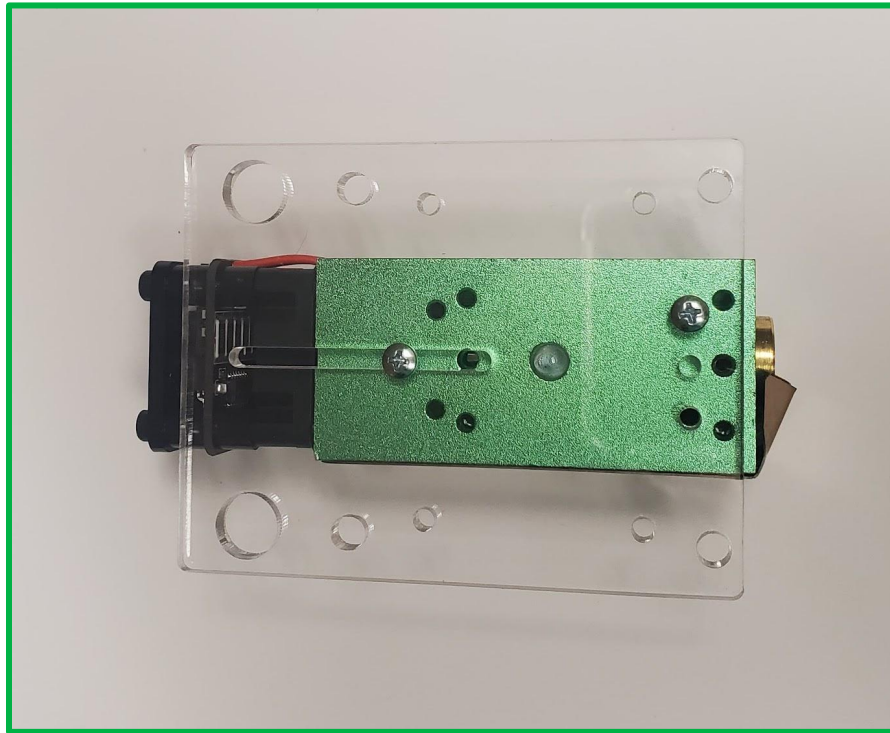
**Laser Mounting to Acrylic
Sheet D (with 2 M3x10)** ✓
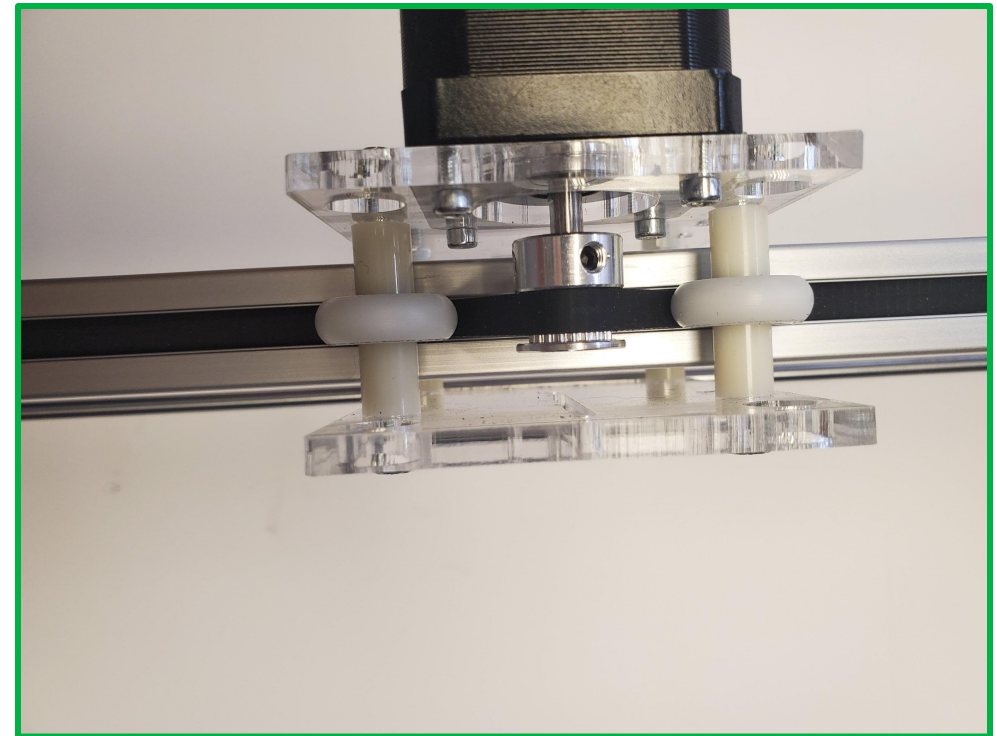
**Stepper Motor Mounting
to Acrylic Sheet C** ✓

Step 5₁/₂
→ Top Rail Assembly

Pass the aluminum profile 740mm through the installed laser module. Insert the X-Axis Timing Belt too.

740 mm

Timing Belt
840 mm

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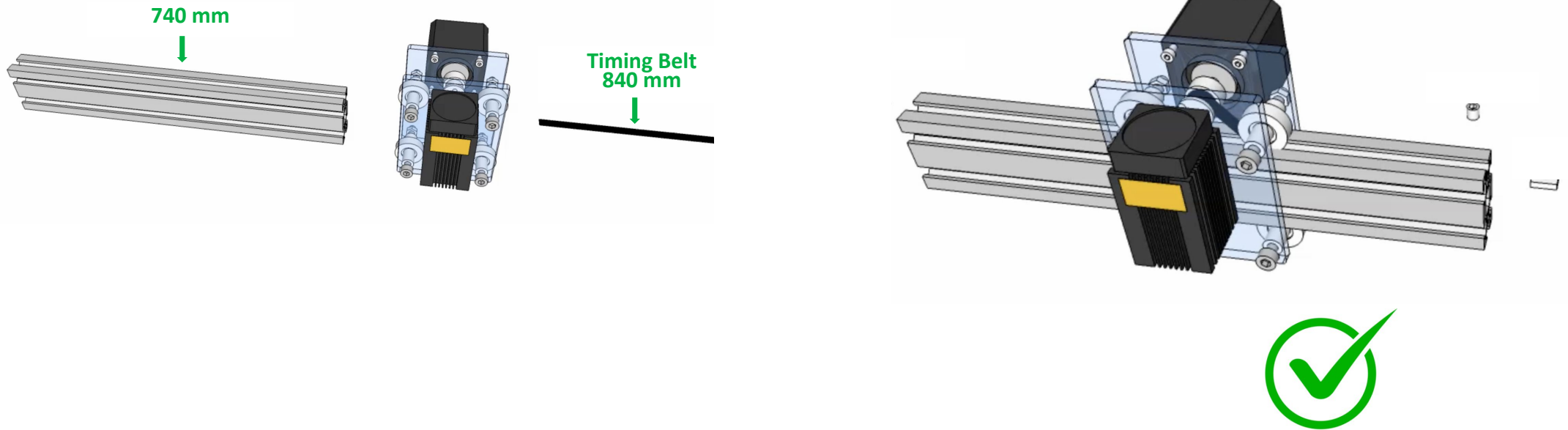
Step 5₂/₂

→ **Top Rail Assembly**
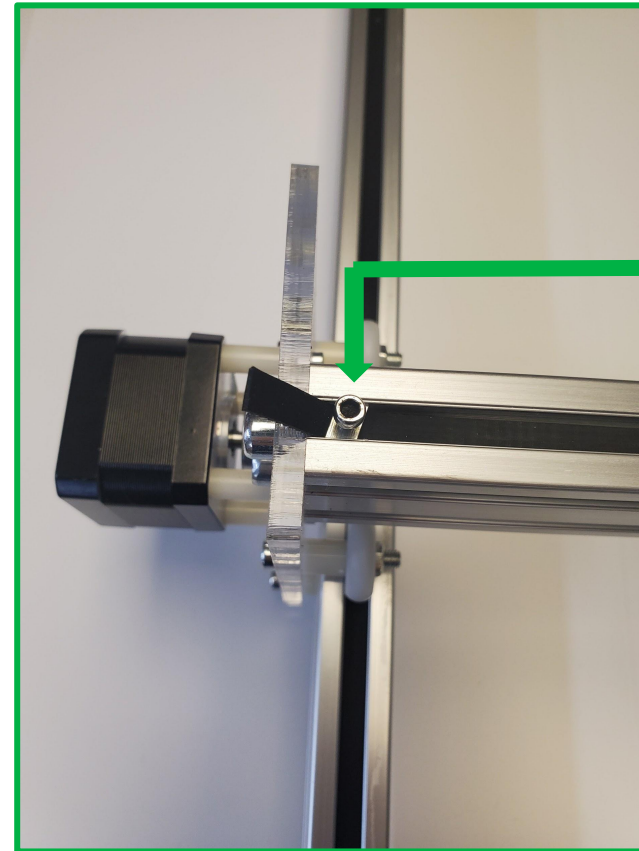
Bolt M3x8 and Square Nut

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Step 6
→ **Top Rail with Linear Axis Assembly**

Linear Axis

Bolt M6x12

Bearing F685Z

Nylon Washer

Synchronous Wheel

YoraHome
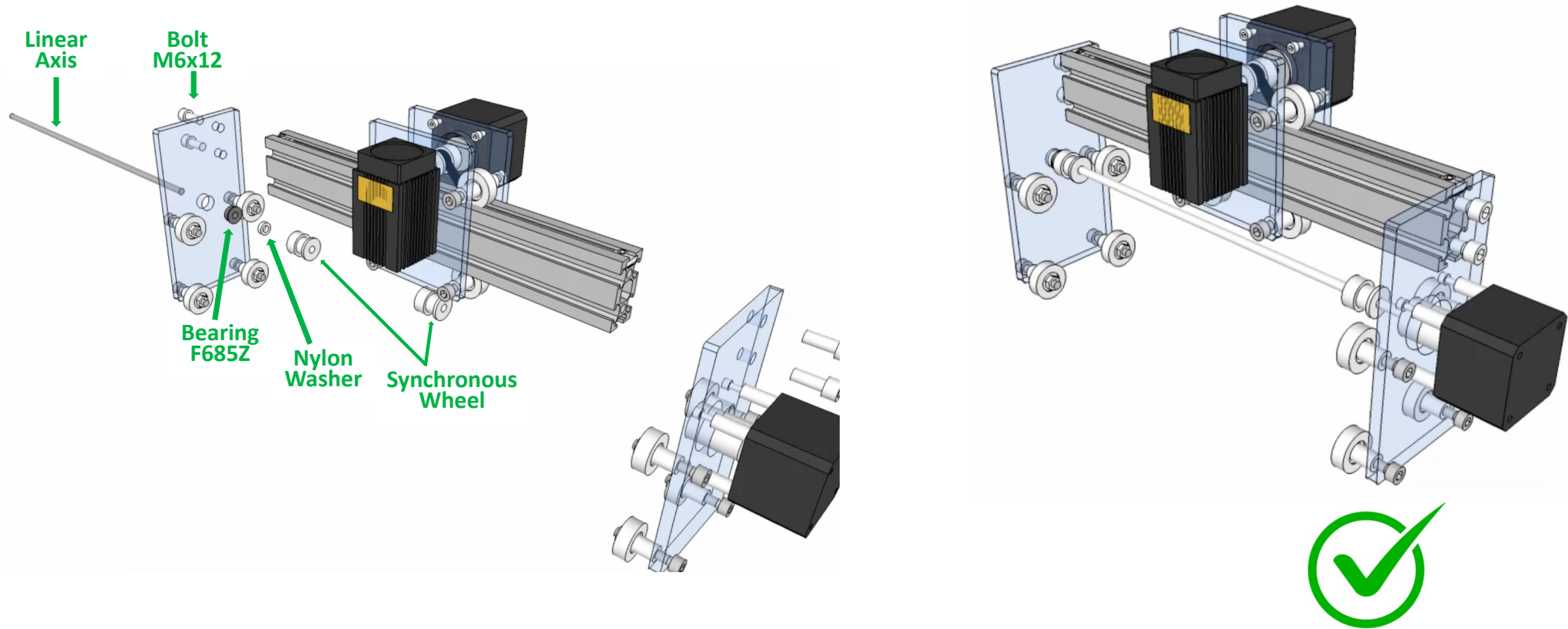
Step 6

→ **Top Rail with Linear Axis Assembly**
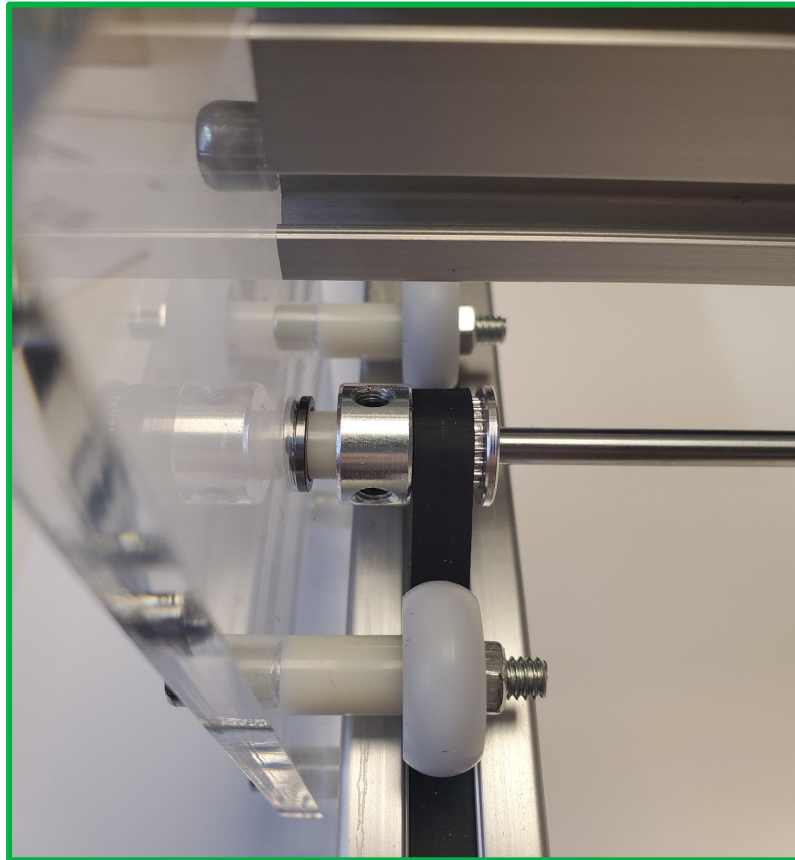
Note proper orientation of Synchronous Wheels

YoraHome
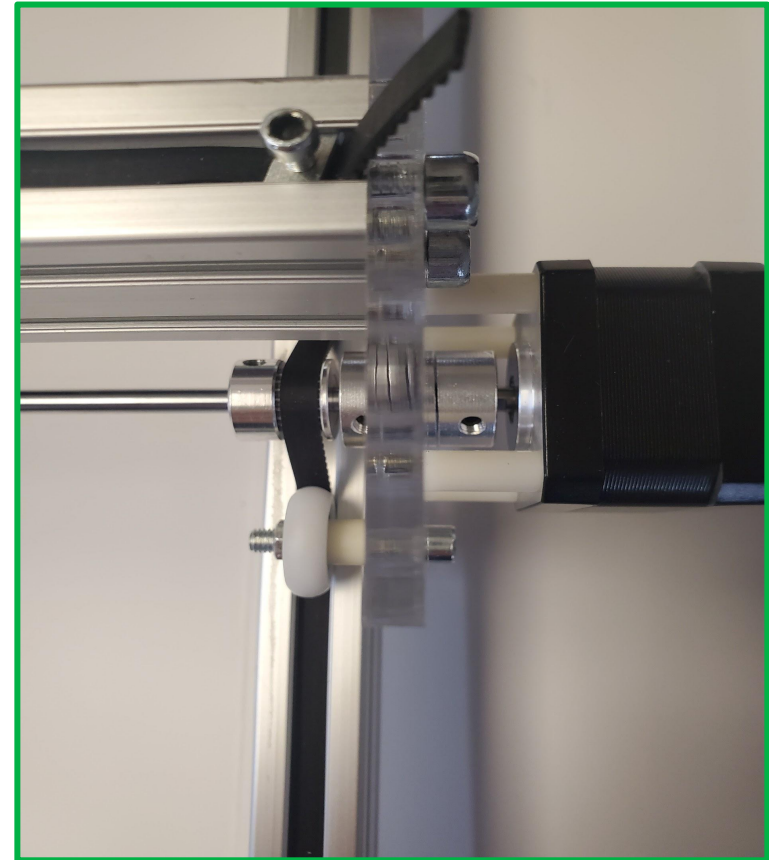
Step 7$_{1/2}$

→ **Top Rail Kit with Base Assembly**
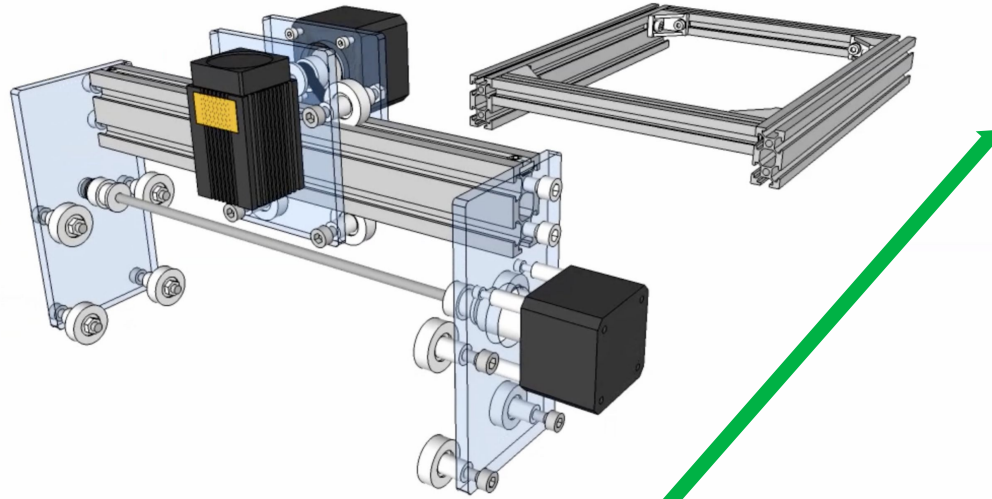
Pass the assembled kit into the base.

YoraHome
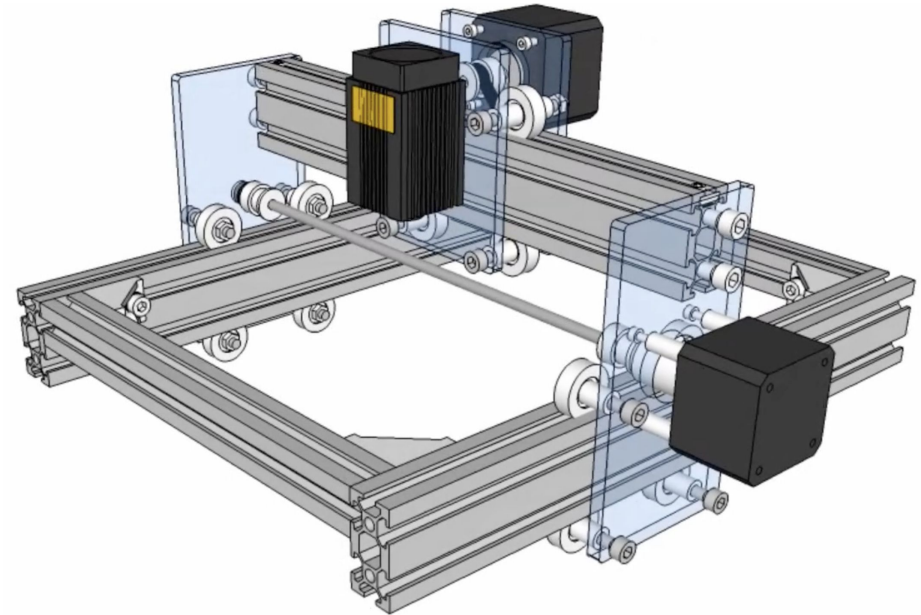
Step 7 $_{2/2}$
→ **Top Rail Kit with Base Assembly**

Bolt M3x8

Timing Belt 710 mm

Square Nut
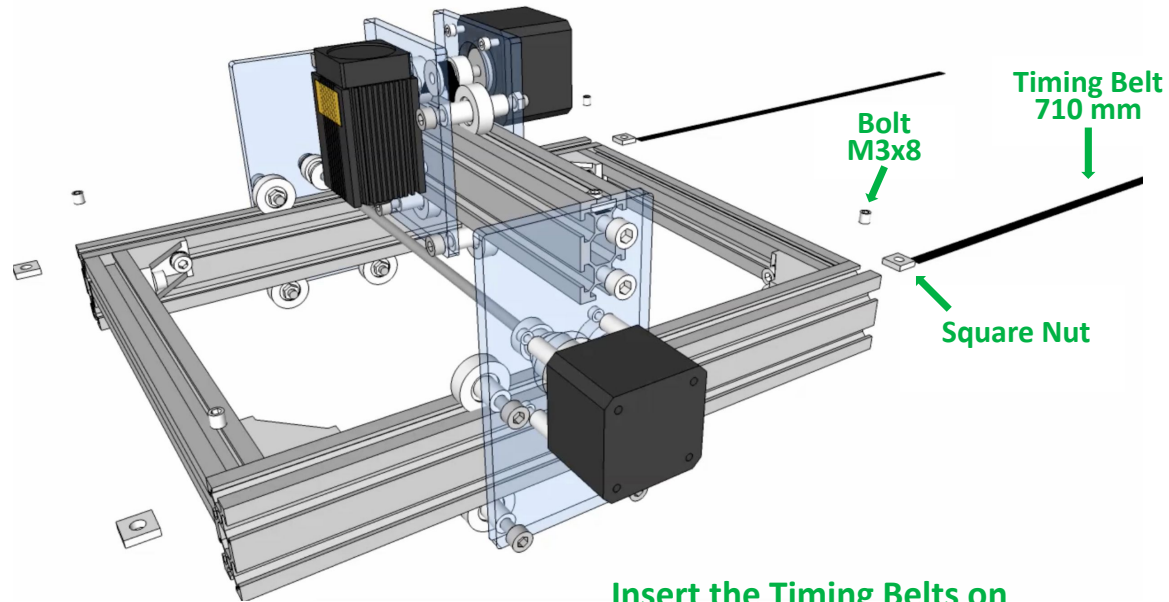
Insert the Timing Belts on both sides of the Y-Axis.

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Step 8

→ **Acrylic Sheets E Assembly - Assemble Acrylic Sheets E to each corner of the frame.**

YoraHome
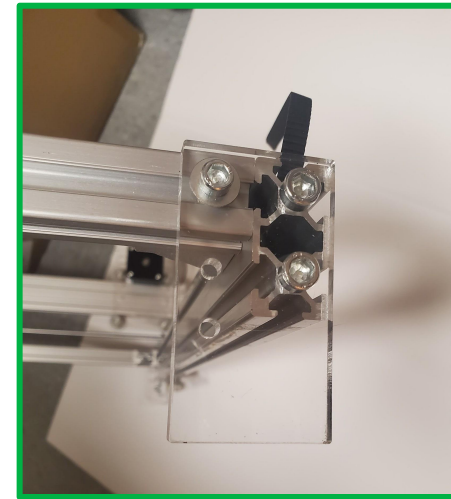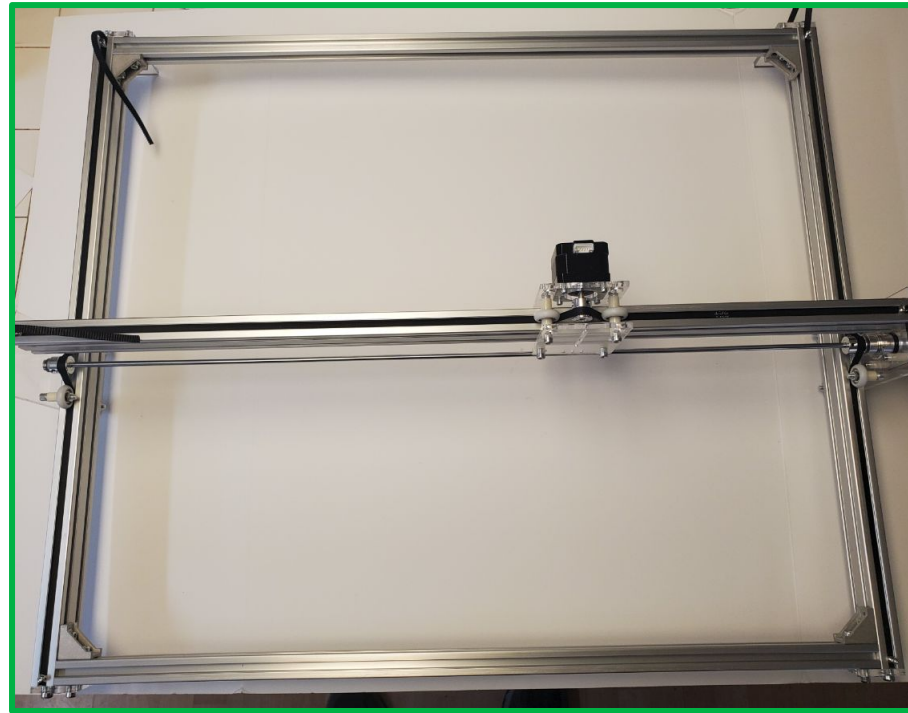
Step 1

Using the M4 Phillips Head Screws and M4 T-Nuts, attach Acrylic Block A to the outside of the 6550 frame in the right rear corner; same location noted in the manual.

Use the lower 2 holes to position the board properly for installation.

YoraHome
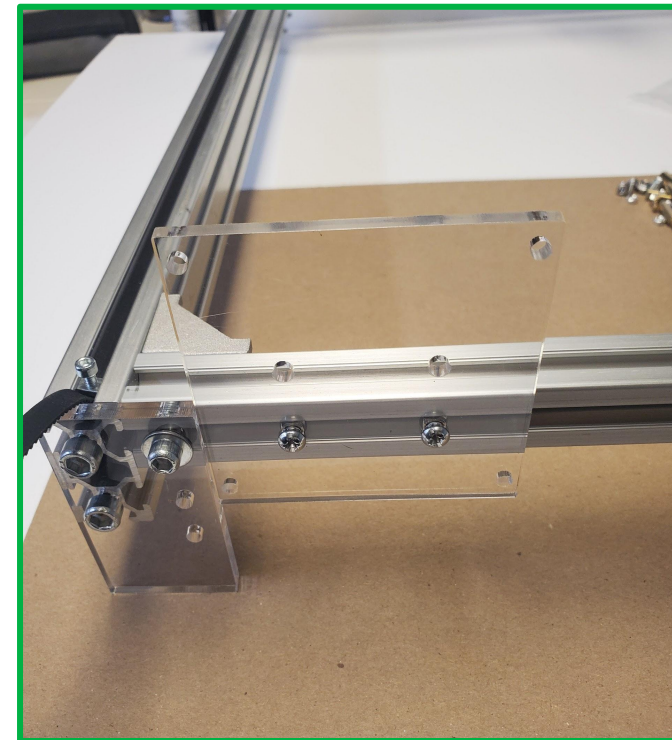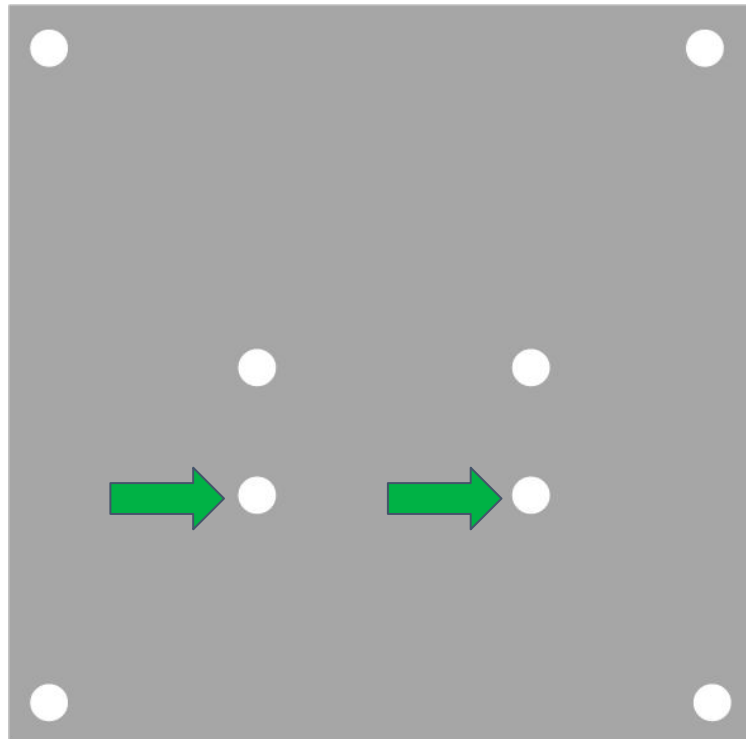
Step 2

→ **Using the M3x6 Brass Standoffs and the M3x17 Brass Standoffs, attach them to the control board as shown.**

Ensure that the M3x6 are on the back of the board, and the M3x17 are on the front.

YoraHome
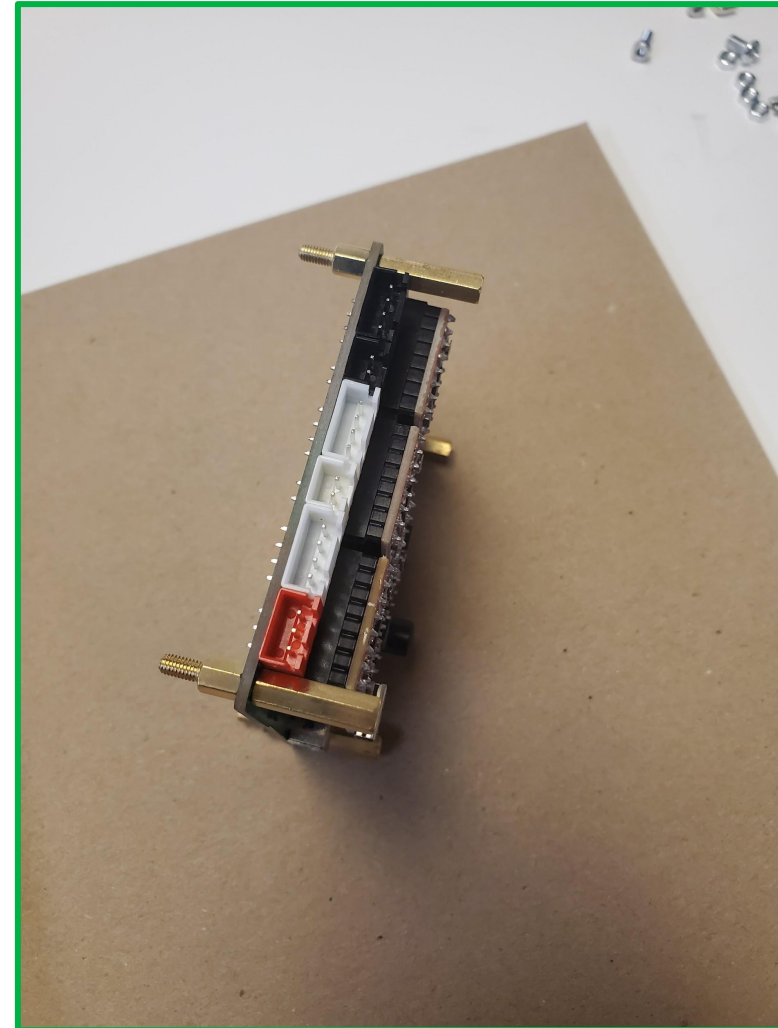
Step 3

→ **Using 4 of the M3 Hex Nuts, attach the Control Board to Acrylic Block A.**

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Step 4

→ **Using 4 M3x8 Cap Screws, attach Acrylic Block B to the front of the Control Board.**

YoraHome
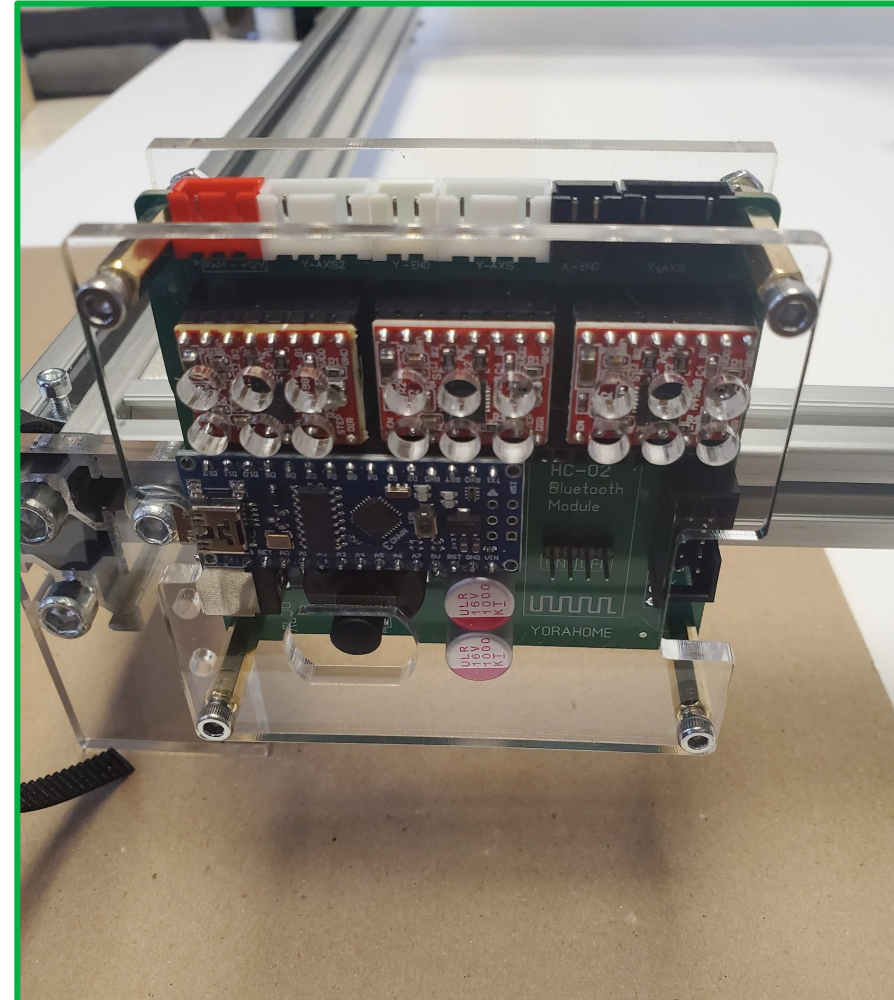
Part 2 Controller Board Wiring

Connect the X and Y stepper motor wire harnesses, and the laser module harness to the control board as shown.

NOTE - See next section for proper laser harness selection.

3P Laser

Y Axis

X Axis

USB Connection

HC-02 Bluetooth Module

Offline Controller

Power Jack

Power LED

Power Switch

YoraHome
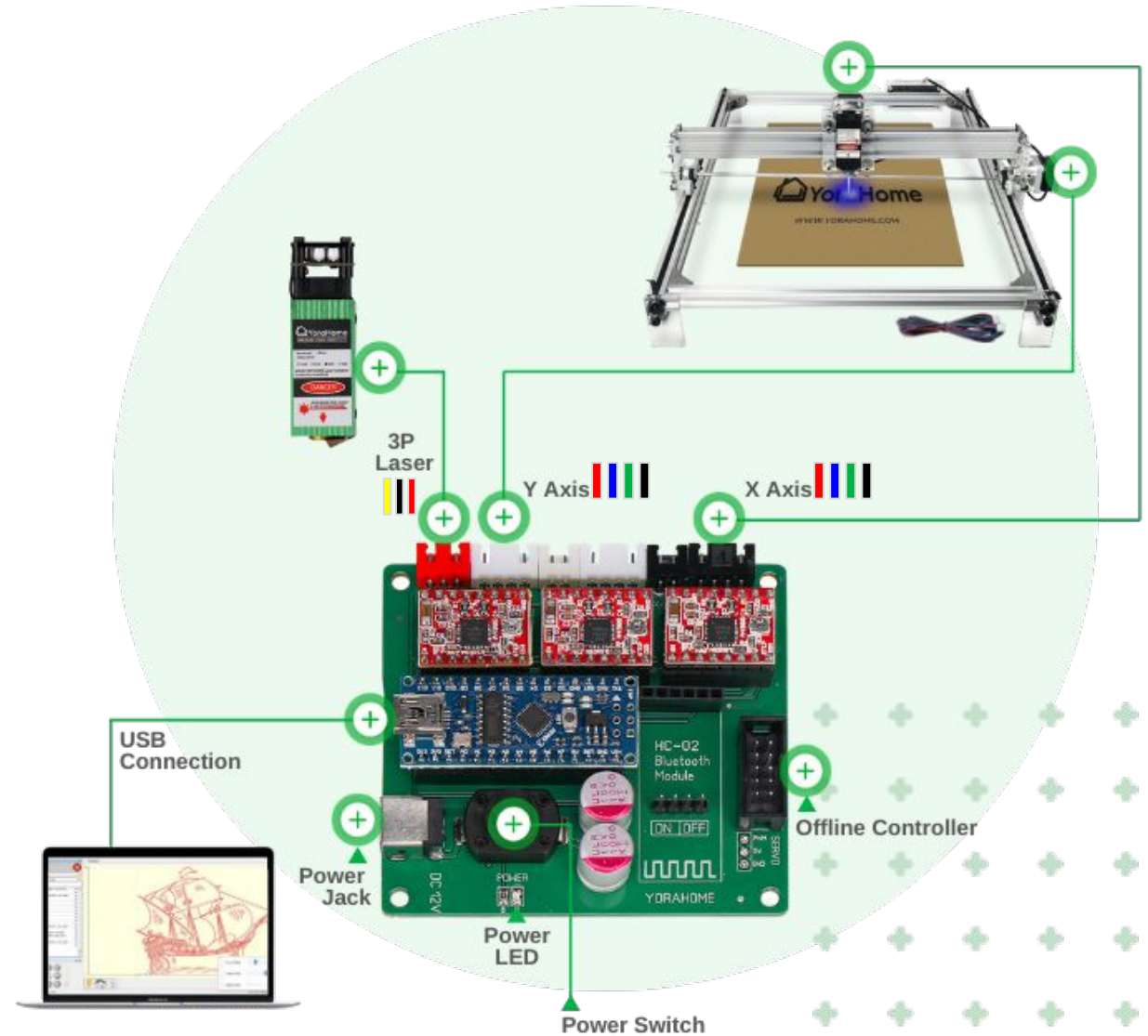
Part 2 Laser Installation

Connect the laser module to the controller board using the provided harness (encased in a black plastic sheath).

Do NOT use the other 3-wire harness with exposed conductors (red/white/black); this will cause the laser to not operate properly!

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Part 2 | Laser Installation

Note that the ideal focal length for the lasers differs, depending on the laser power.

See below for correct distance from laser lens to workpiece.

Metal cylinder (20mm height) to set the distance for fixed lens

3.5W and 5.5W (adjustable lens)
Focal length = 45mm

15W and 40W (fixed lens)
Focal length = 20mm

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Part 3 Software Introduction

1. **Install the machine's driver (CH340SER). Download it online [here](#).**
   NOTE FOR MAC USERS: If your Mac is running Mojave OS or higher, do NOT install the driver, as the OS has native support for the CH340. If you are running Sierra or High Sierra, please contact YoraHome Technical Support for additional guidance.

YoraHome
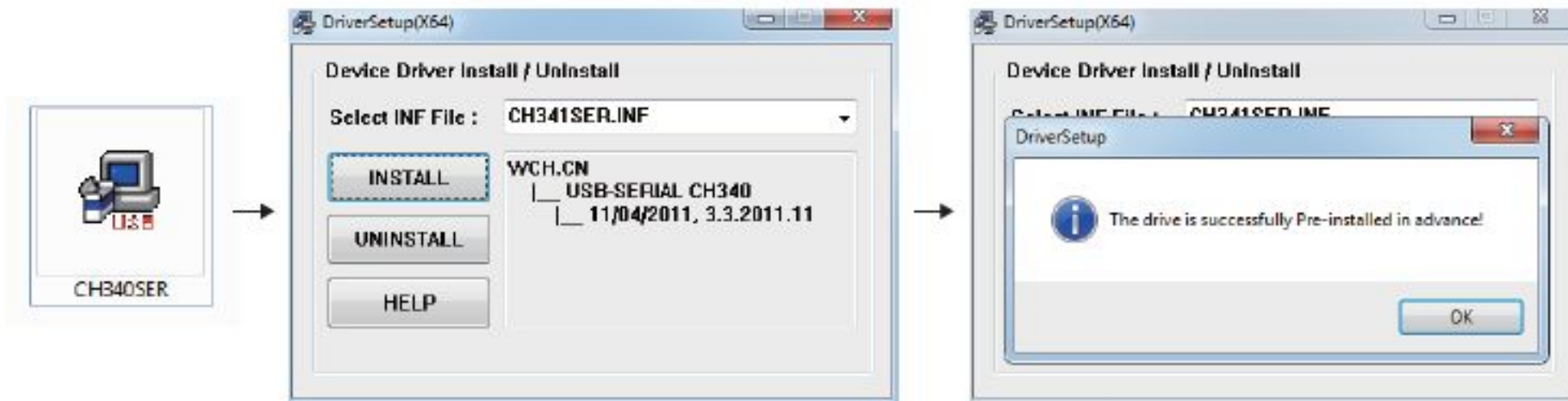
Part 3 Software Introduction

2. Determine your machine COM's port

- **Windows XP:** Right click on *My Computer*, select *Manage*, then *Device Manager*.
- **Windows 7:** Click on *Start* on the taskbar, right click on *Computer*, select *Manage*, then *Device Manager*.
- **Windows 10:** In the search box on the taskbar, type *Device Manager*, then select it from the menu.

Note - Machine must be connected to your computer in order for a COM port to be assigned.
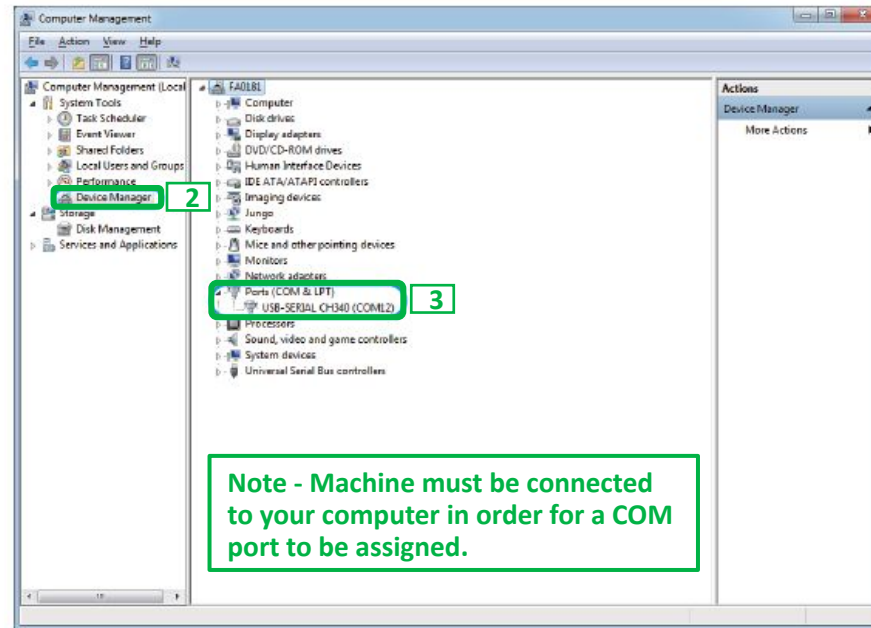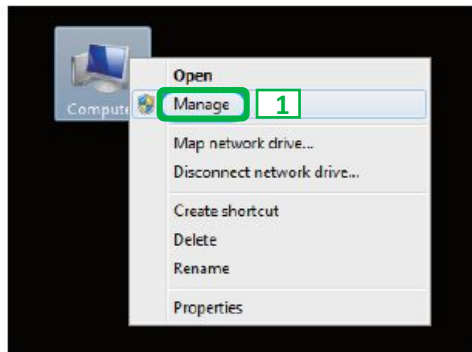
In the tree, expand *Ports (COM & LPT)*. Your machine will be identified by the USB Serial Port (COMX), where the "X" represents the COM number, for example COM3.

If there are multiple USB serial ports, right click on each one and check the manufacturer, the machine's should be "CH340".

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Part 3 Software Introduction

3. Install Your Laser Engraving Software

LaserGRBL is one of the best Windows GCode streamers for DIY Laser Engravers. LaserGRBL is able to load and stream GCode path to your control board, as well engrave images, pictures and logos with internal conversion tool.

The software is free and it is available on the CD or the USB disk that comes with your machine. You can also go to the LaserGrbl official website to download the latest version. You will also find on the website many tutorials showing show how to use this powerful software.

If you own a Mac computer, we recommend LightBurn (premium software with a free trial available) which is a laser engraving software that delivers great results too.

In the next pages, we will provide a quick introduction on how to use LaserGRBL; followed by a quick introduction to the basics of Lightburn.

Only For Windows Users

For Windows & Mac Users

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Part 3 Software Introduction - LaserGRBL

1. **Open the LaserGRBL Software**

2. **Select the desired COM port, then click the "Connect" icon**

![LaserGRBL v3.8.7 window showing COM COM5, Baud 115200, Filename, Progress fields and type gcode here input]

YoraHome
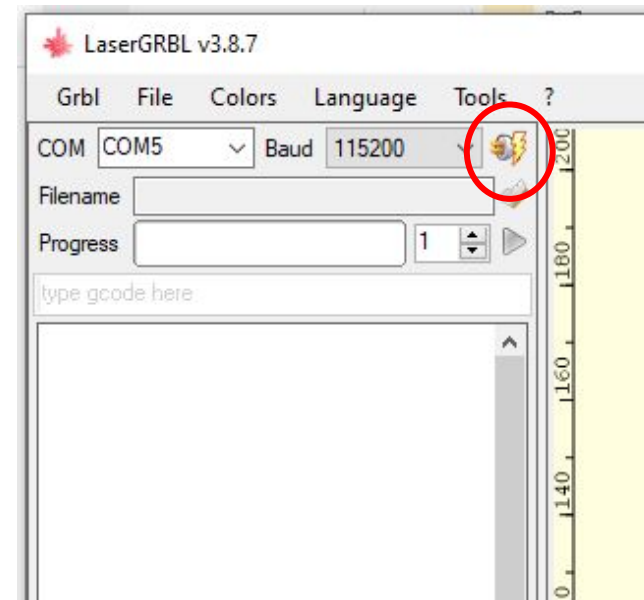
Part 3 Software Introduction - LaserGRBL

3. If the connection is successful, you will see the message below in the Console window
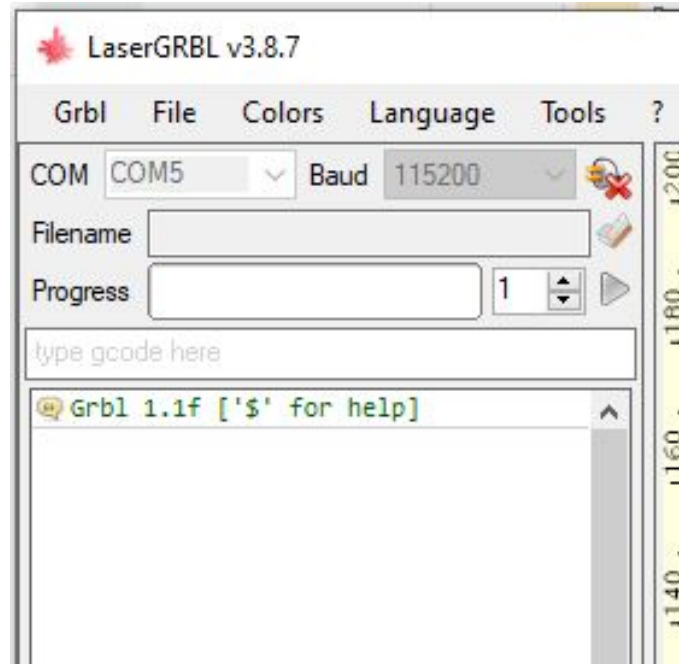
4. Test your machine for proper motion control using the "Jog" buttons - if the Y axis is reversed, switch the motor cable to the other white port on the control board.
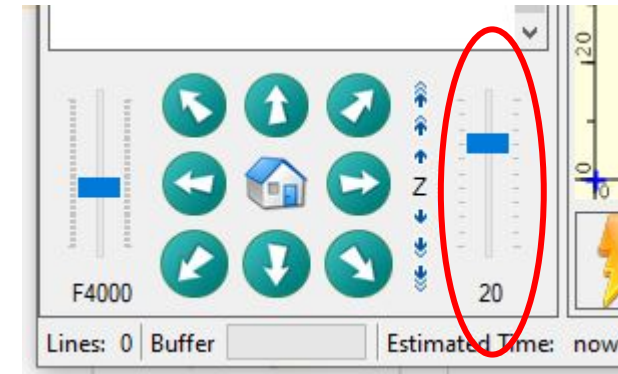
The highlighted "slider" indicates the distance the machine will move when a "Jog" button is clicked; in millimeters

5. If your machine is equipped with either the 3.5W or 5.5W lasers, the lens must be focused at the appropriate focal height of 45mm. Click the "Focus" button at the bottom of the program window to turn the laser on at low power for focusing, click again to turn the laser off.
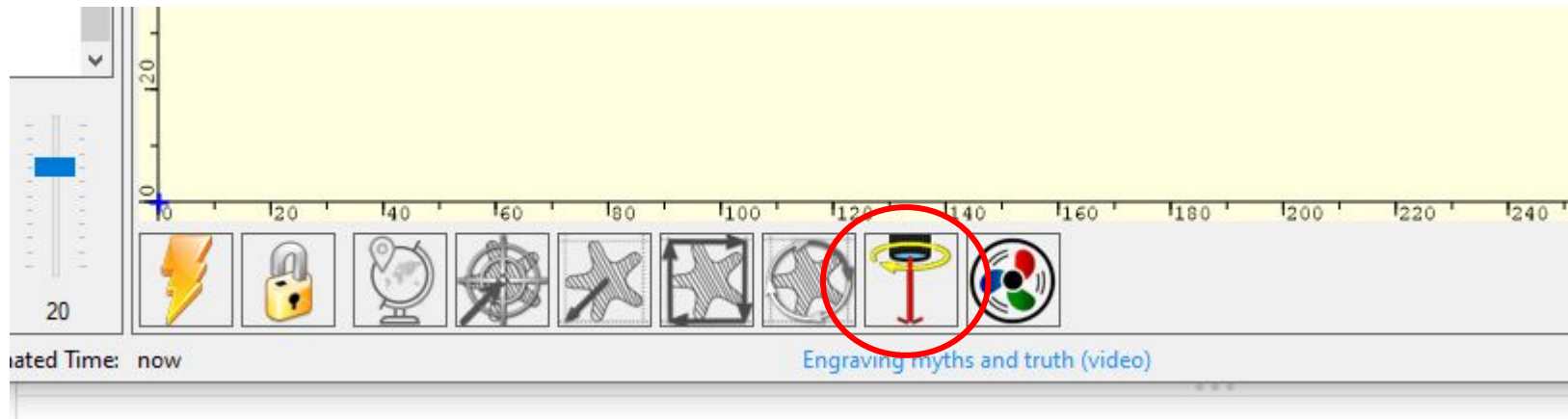
Note that your screen may have a different appearance or label, depending upon program version installed.

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6. To load an image for engraving, click on the "File" menu, then select "Open File". In the Windows Explorer window; navigate to the desired image file on your computer. Common file types are JPG, BMP, PNG, SVG.

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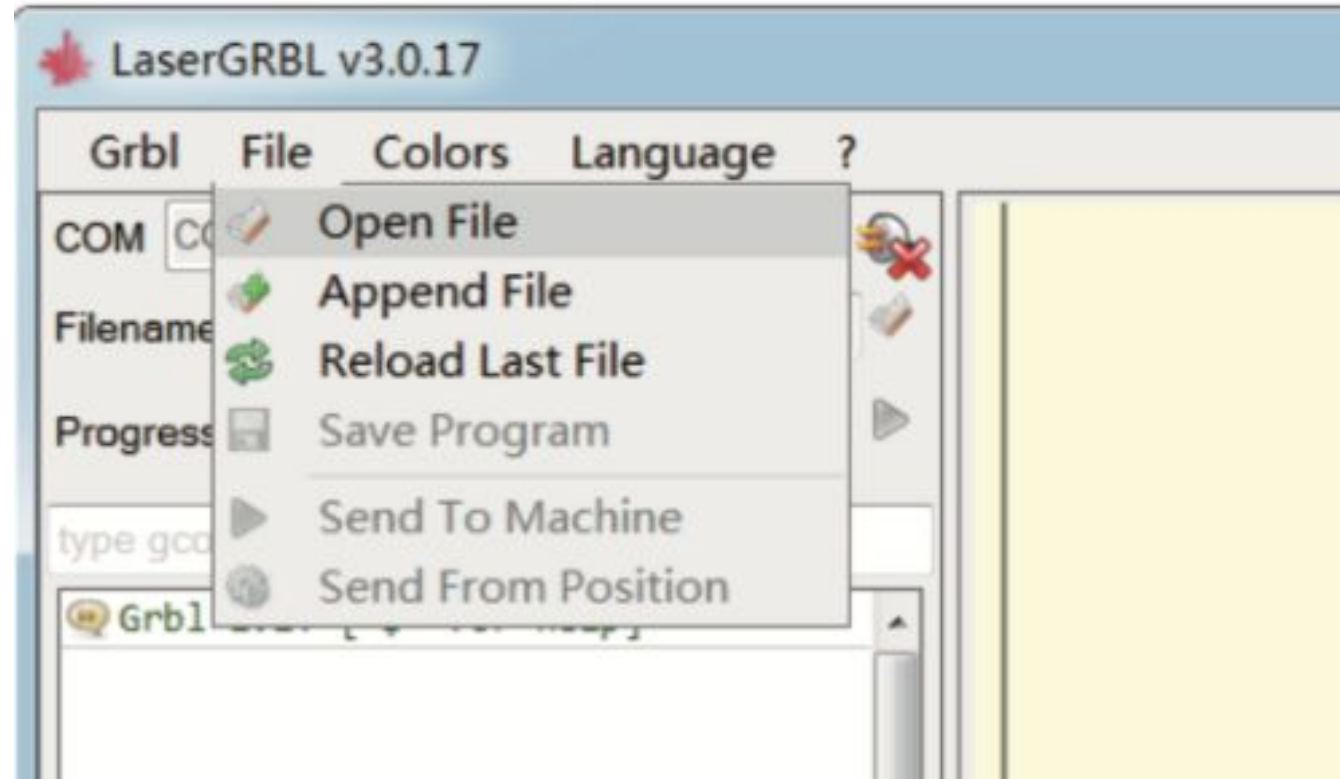
Part 3 Software Introduction - LaserGRBL

7. **Parameters default, click next**
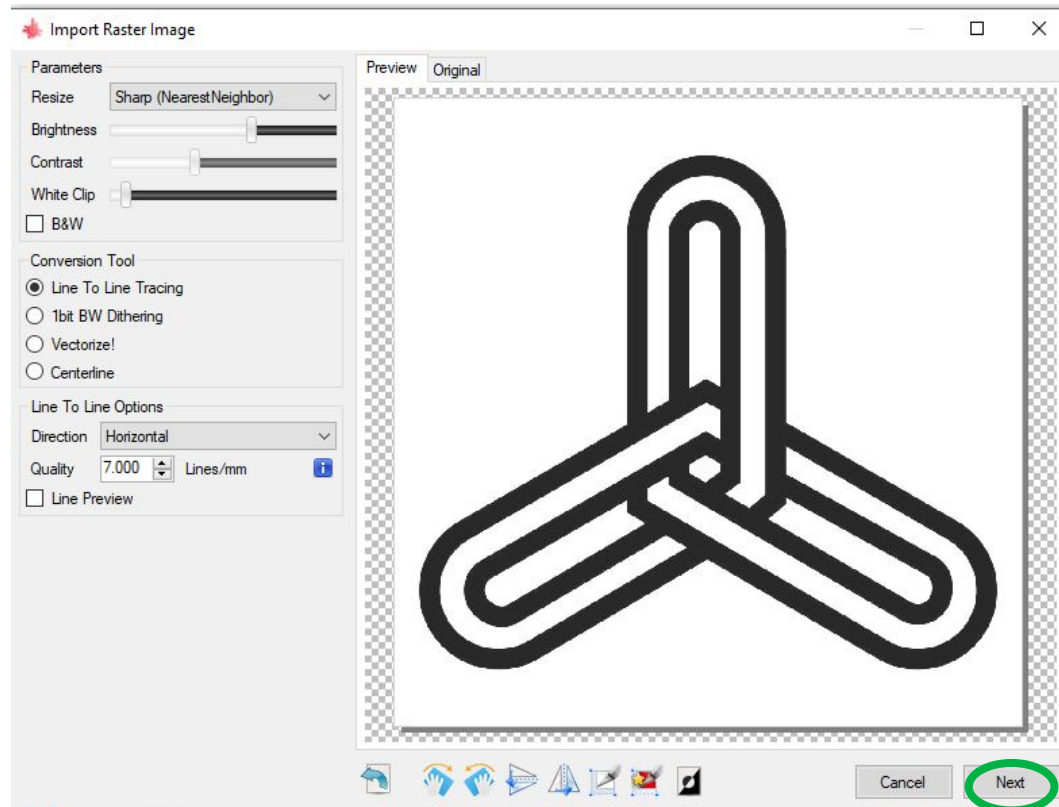
You can use the default settings or adjust them - see our tutorial videos in the Facebook Users Group for additional information.

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8. **The engraving speed and MIN/MAX settings will need to be adjusted to meet the material being engraved.**

Note that the size values will automatically update whenever one is changed in order to maintain the aspect ratio of the origin image.

Then click the "Create" button

Target image

Speed

Engraving Speed 1500   mm/min

Laser Options

Laser ON M3 ∨   Laser OFF M5 ∨ ℹ

S-MIN 0   S-MAX 1000 ℹ

Image Size and Position [mm]

☐ Autosize 300   DPI EXIF

Size W 75.0   H 75.0

Offset X 0.0   Y 0.0

Cancel   Create!

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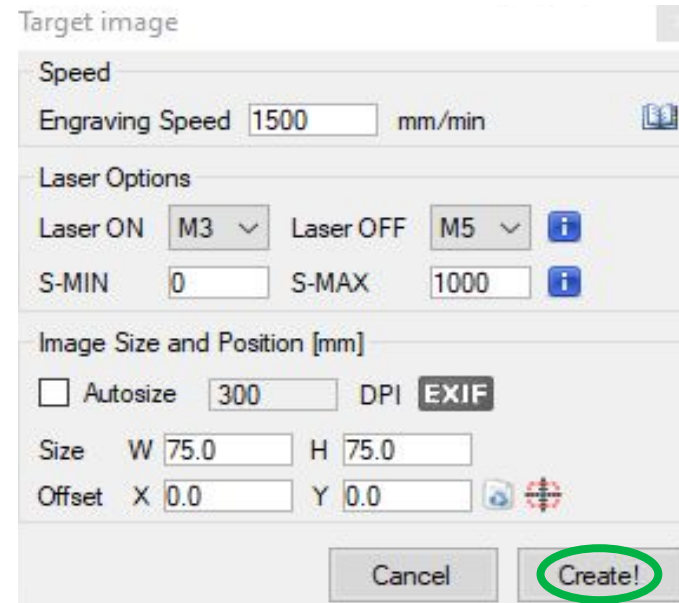
9. **Using the jog buttons, position the laser to the lower left corner of the desired burn location; then click the "Globe" button to set the origin.**
Then click the "Play" button to start the laser engraving process.
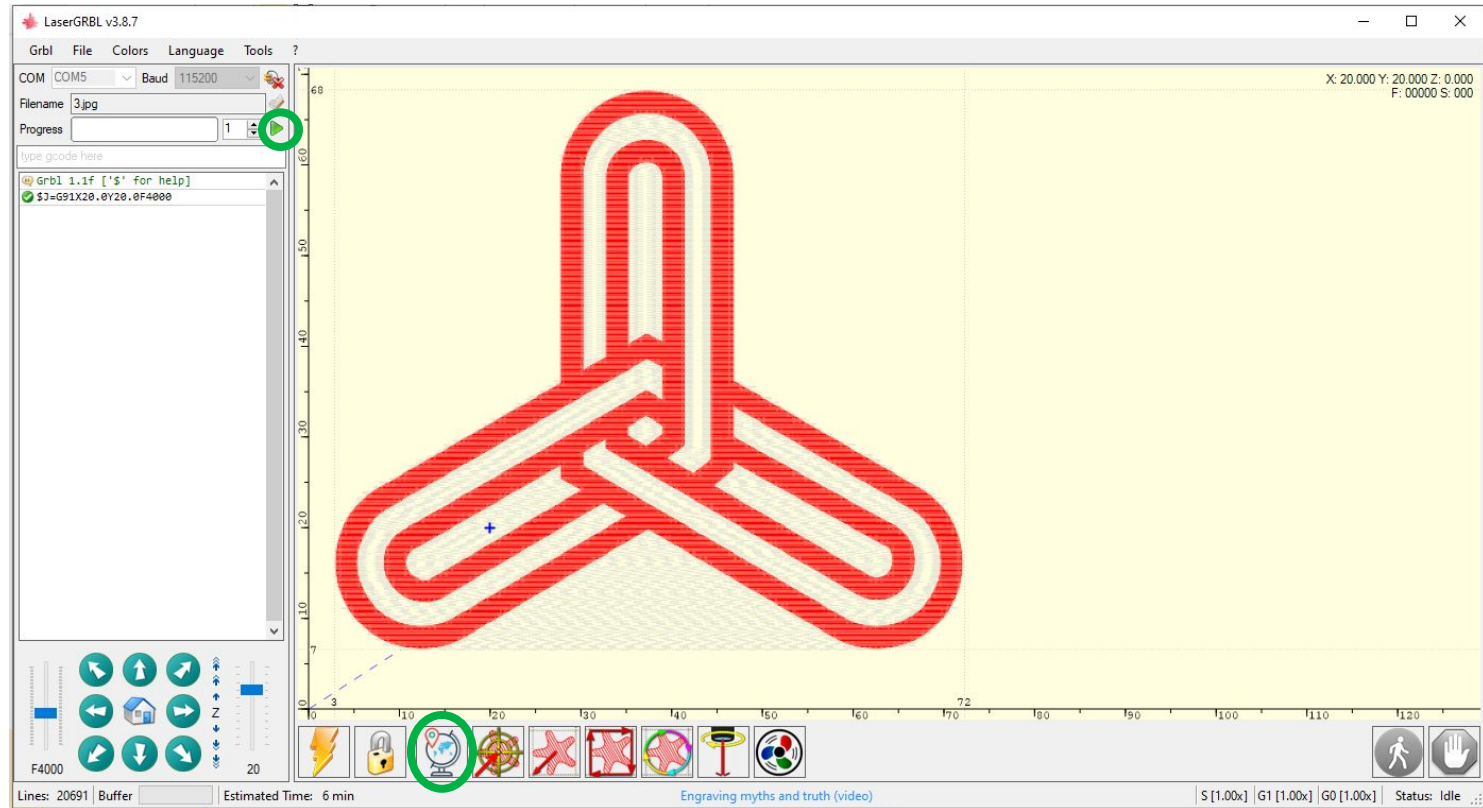
1. **Open the Lightburn Software**

2. **In the lower right of the screen, in the "Laser" pane, click on "Devices"**
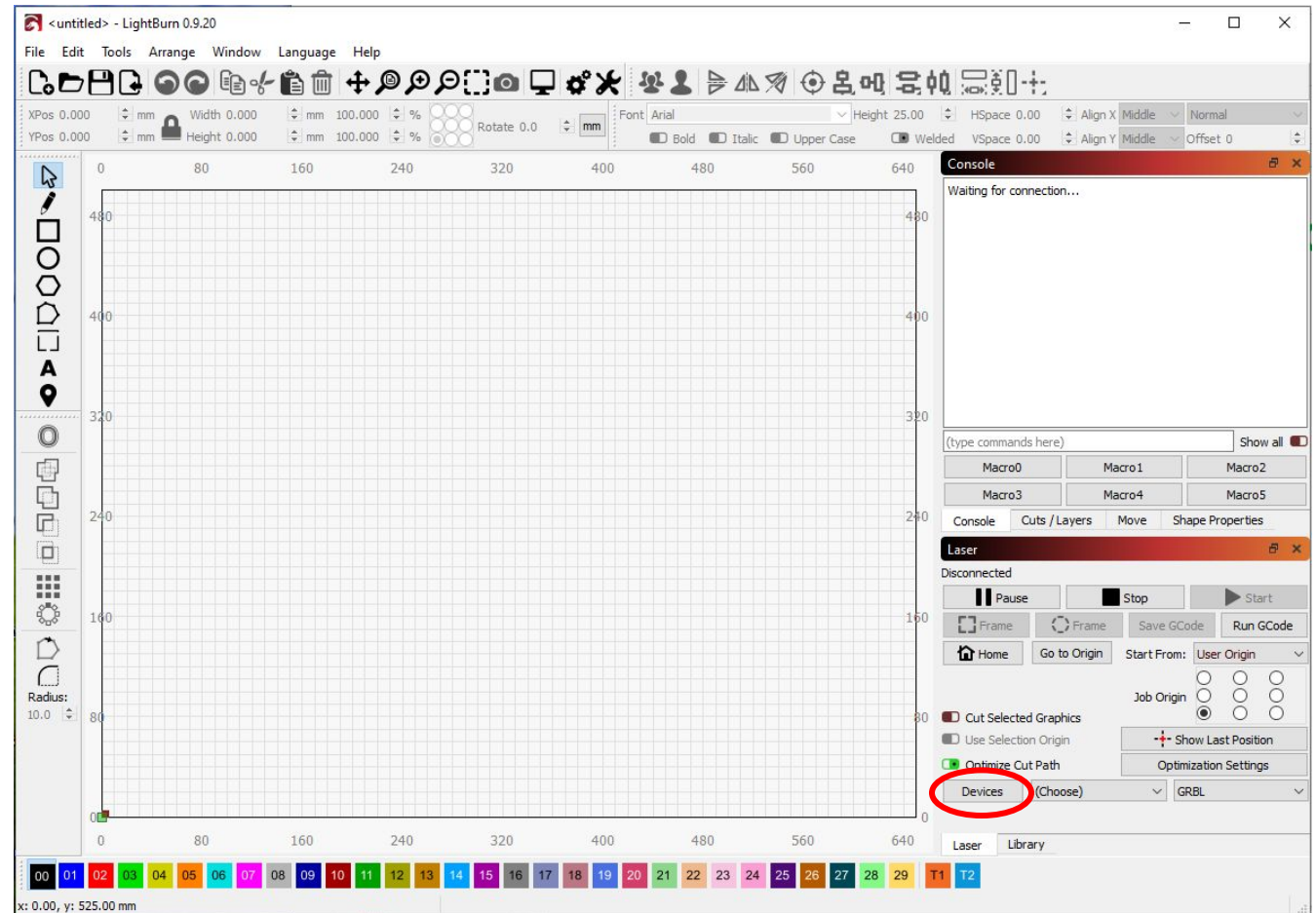
3. In the Devices dialog box, click on the "Create Manually" button.
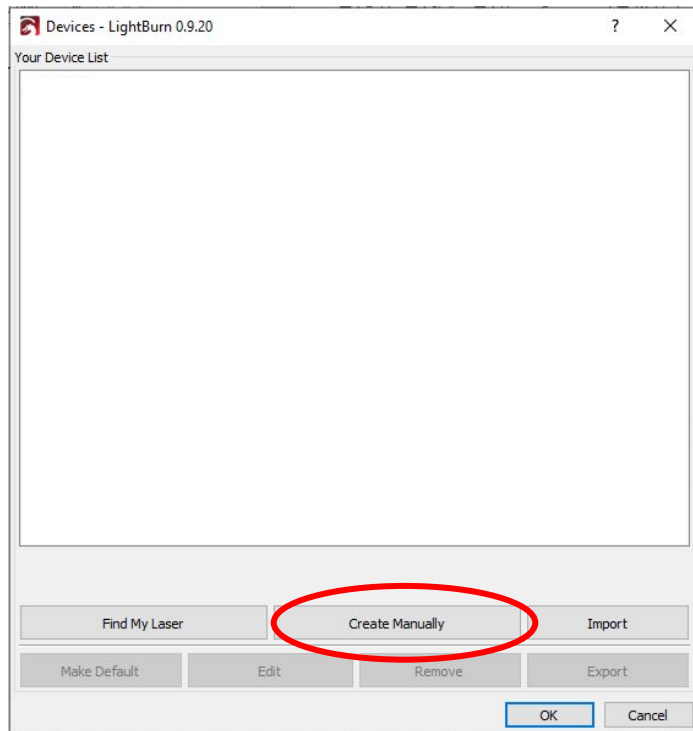
4. The "New Device Wizard" will start - select the "GRBL" option, and click "Next"

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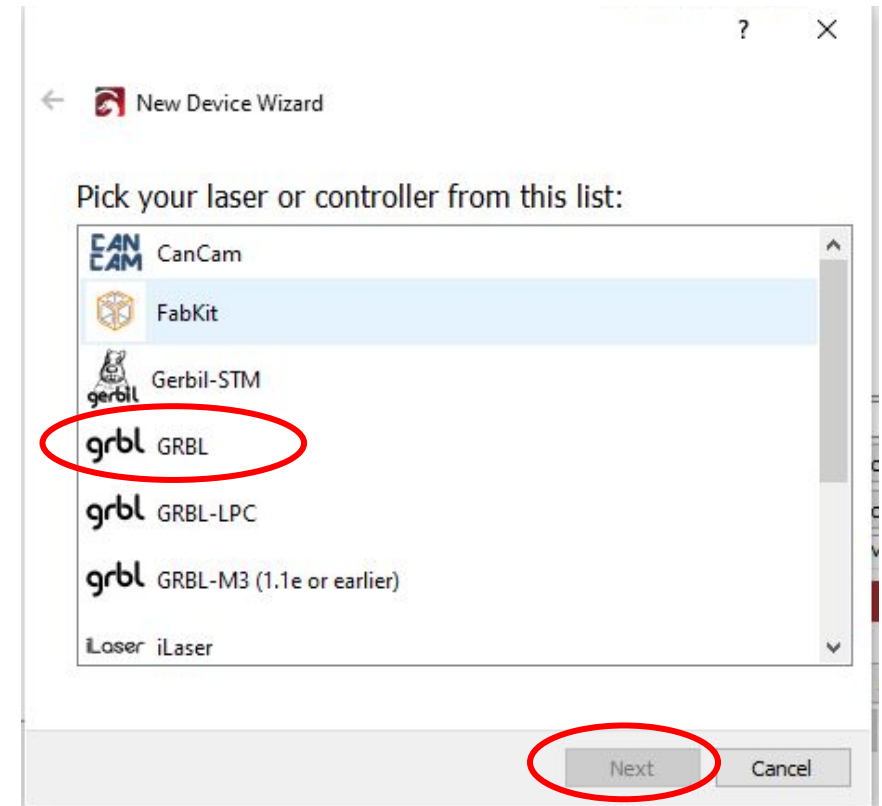
5. The default connection method should be "Serial/USB" - click "Next".
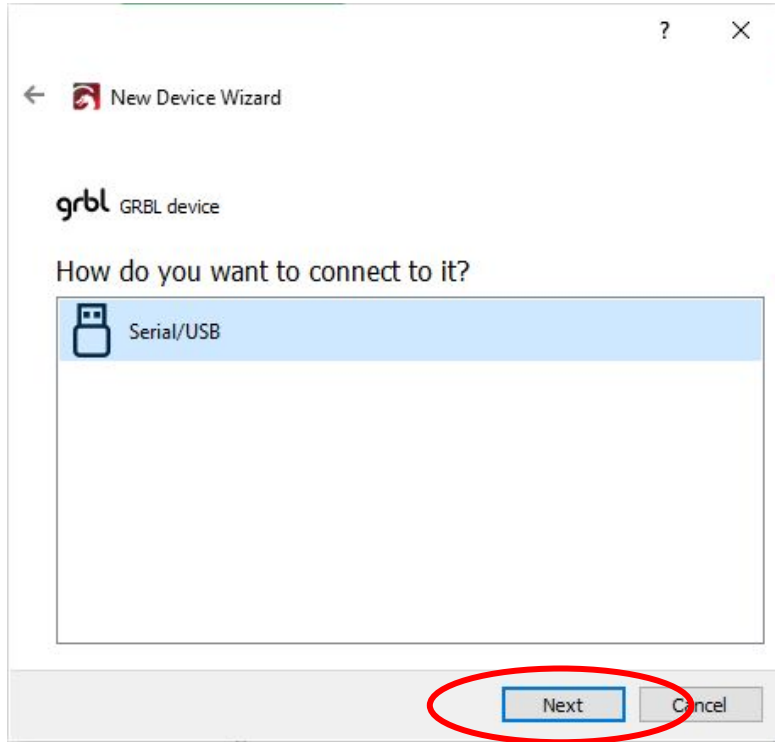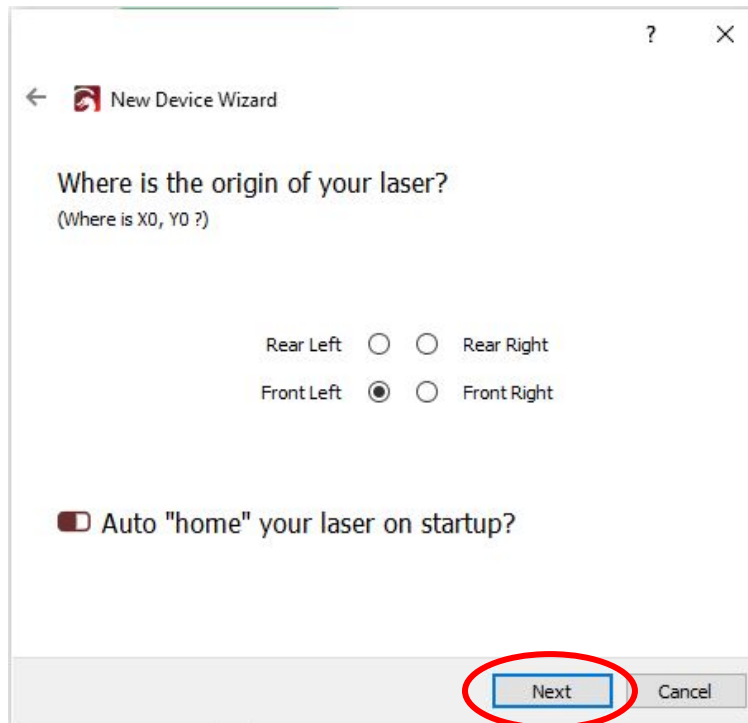
6. If you would like to name the machine, you may do so here. Set the work area dimensions as shown - X=650; Y=500 - click "Next".

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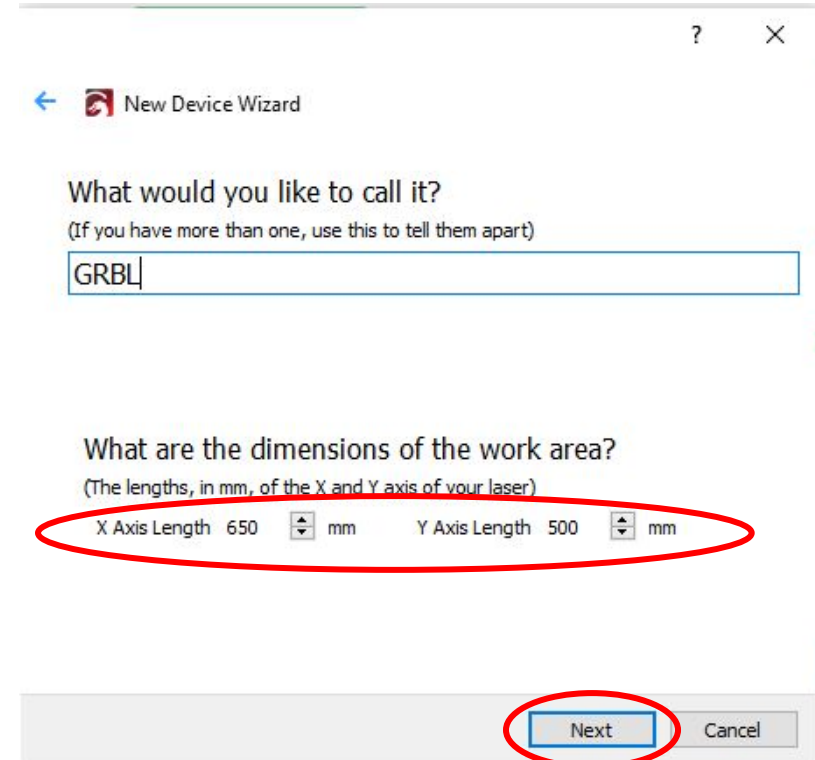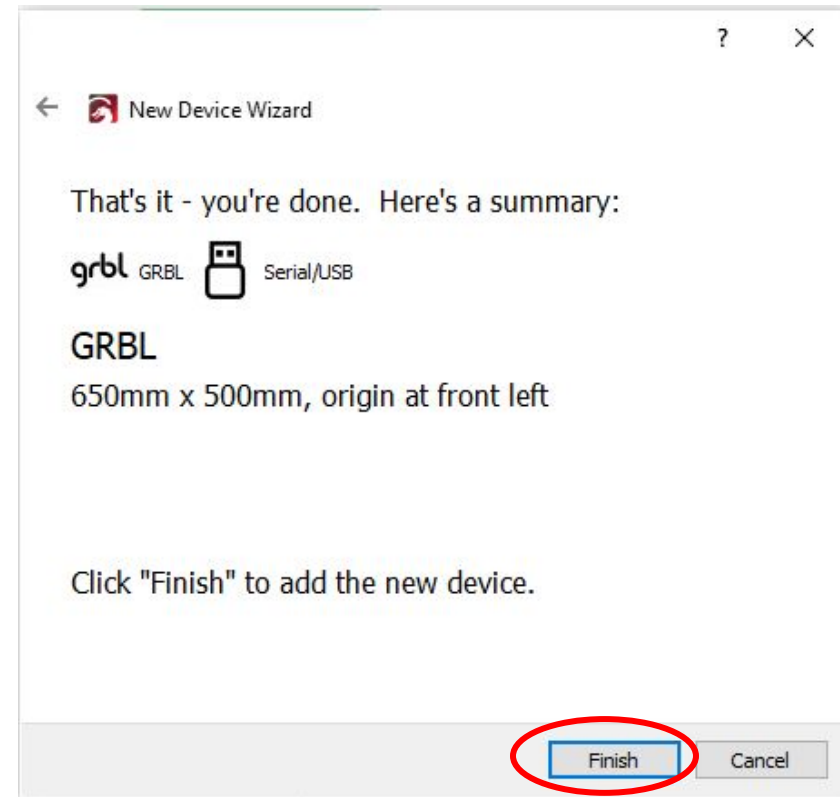
Part 3 Software Introduction - Lightburn

7. **Set the origin for your laser - on the 6550, that is the Front Left. Ensure the Auto "Home" option is off; otherwise errors will occur - click "Next".**

New Device Wizard

Where is the origin of your laser?
(Where is X0, Y0 ?)

Rear Left ○ ○ Rear Right

Front Left ◉ ○ Front Right

🔲 Auto "home" your laser on startup?

Next Cancel

8. **Confirm your settings, then click "Finish" to return to the Devices screen.**

New Device Wizard

That's it - you're done. Here's a summary:

grbl GRBL 📇 Serial/USB

GRBL
650mm x 500mm, origin at front left

Click "Finish" to add the new device.

Finish Cancel

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9. Click on "OK" to return to the main Lightburn screen.
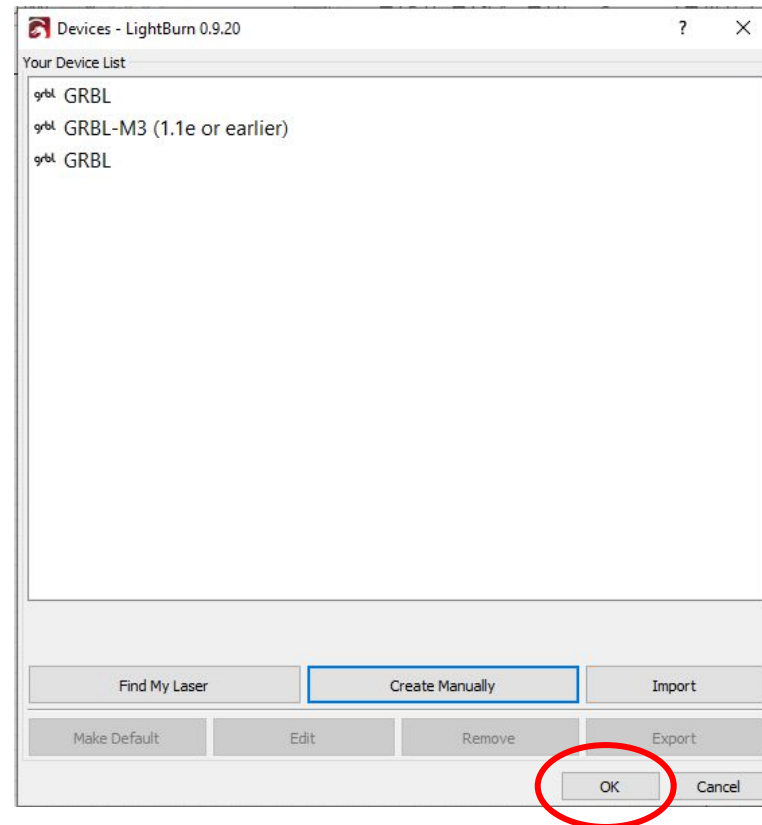
10. **Click on the "File" menu, then select "Import" to open an image file.In the Windows Explorer window; navigate to the desired image file on your computer. Common file types are JPG, BMP, PNG, SVG.**

YoraHome
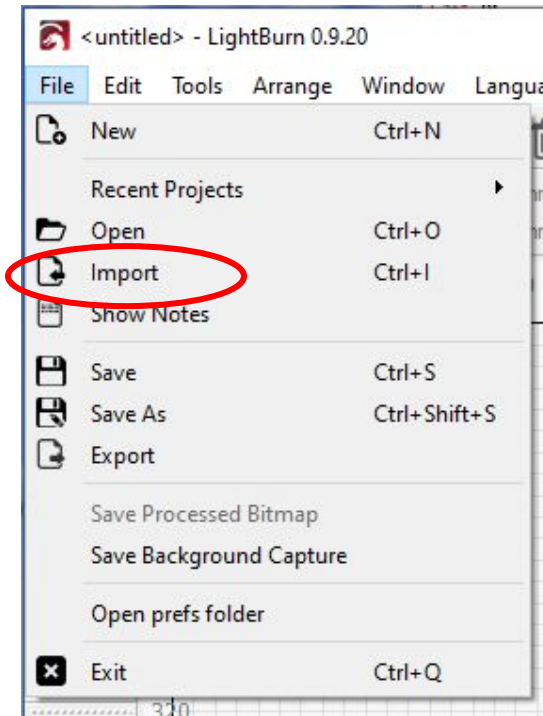
11. **To set the engraving parameters, select the image on the grid, then go to the "Cuts/Layers" tab in the upper right pane (see next page for detail).**

YoraHome
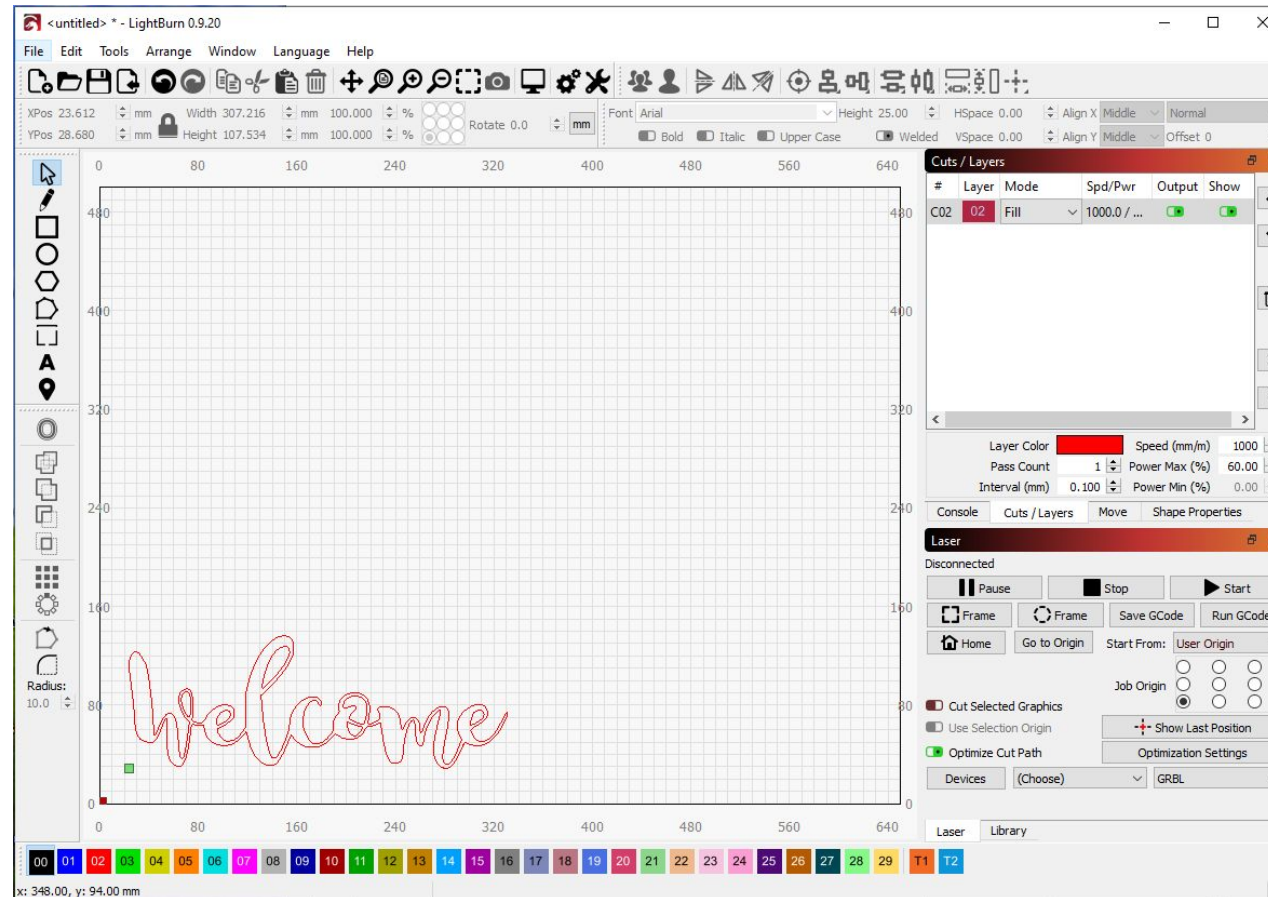
12. Select your imported image, then select the parameters for your engraving - in the example below, we have selected a engraving speed of 1000 mm/min, at a power of 60%; with the mode set to "Fill". This will direct the machine to burn the entire image and fill in the shape.

YoraHome
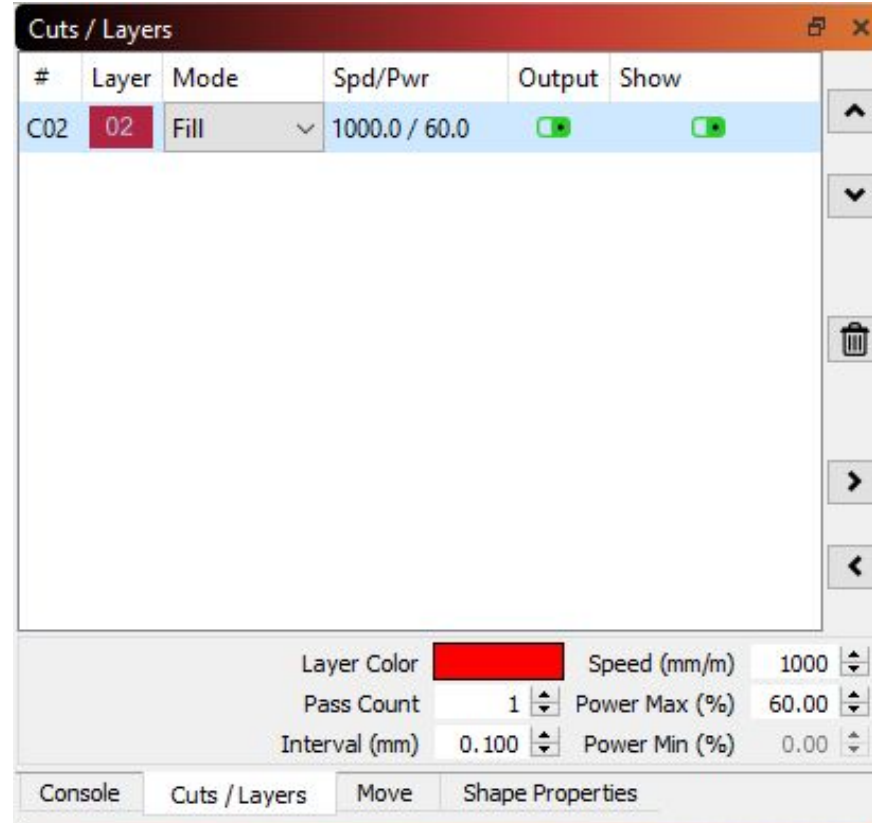
Part 3 Software Introduction - Lightburn

13. Select the "Move" tab, and use the jog buttons to position your laser at the lower left corner of where the design is to be burned. Click on the "Set Origin" button to set the start position.

YoraHome
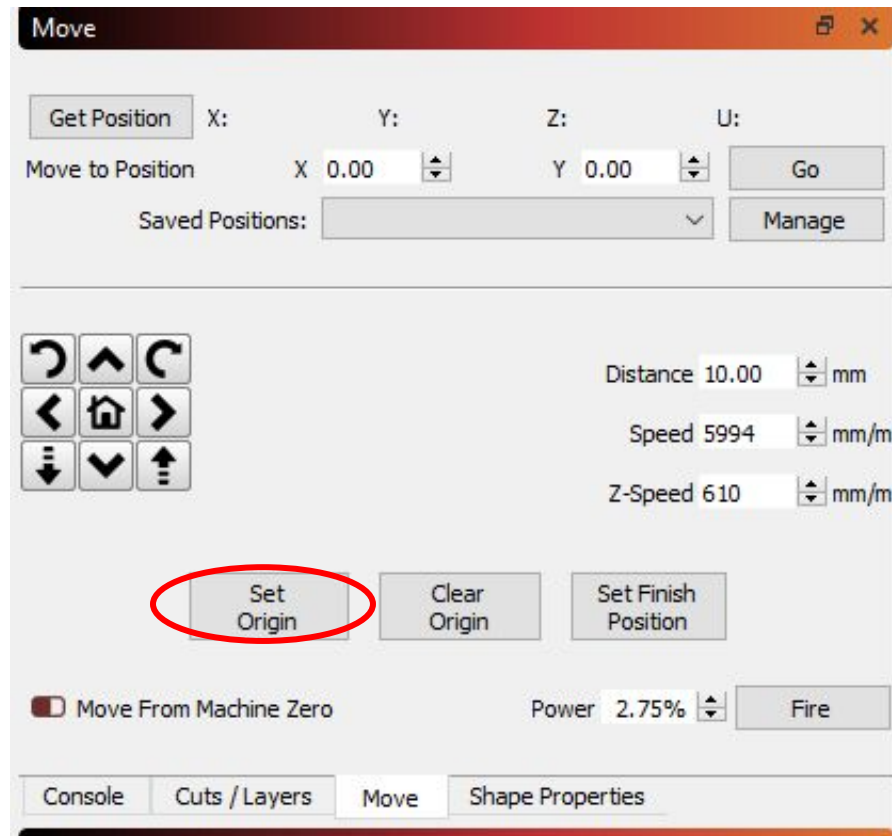
14. Use the Power setting and the "Fire" button to turn the laser on at low power for focusing, click again to turn the laser off.
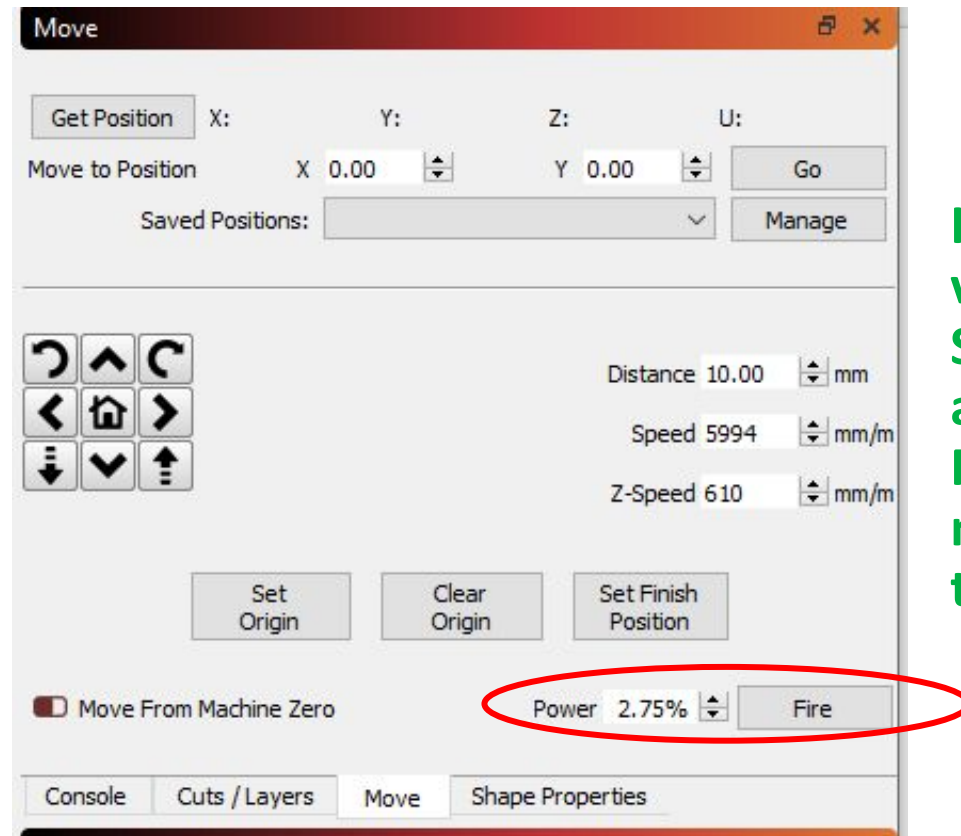
If the "Fire" button is not visible, go to the Device Settings on the "Edit" menu, and select the "Enable Laser Fire Button" option. Lightburn must be restarted to activate this option.

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15. Finally, click on the "Start" button in the Laser pane to start the laser engraving process.
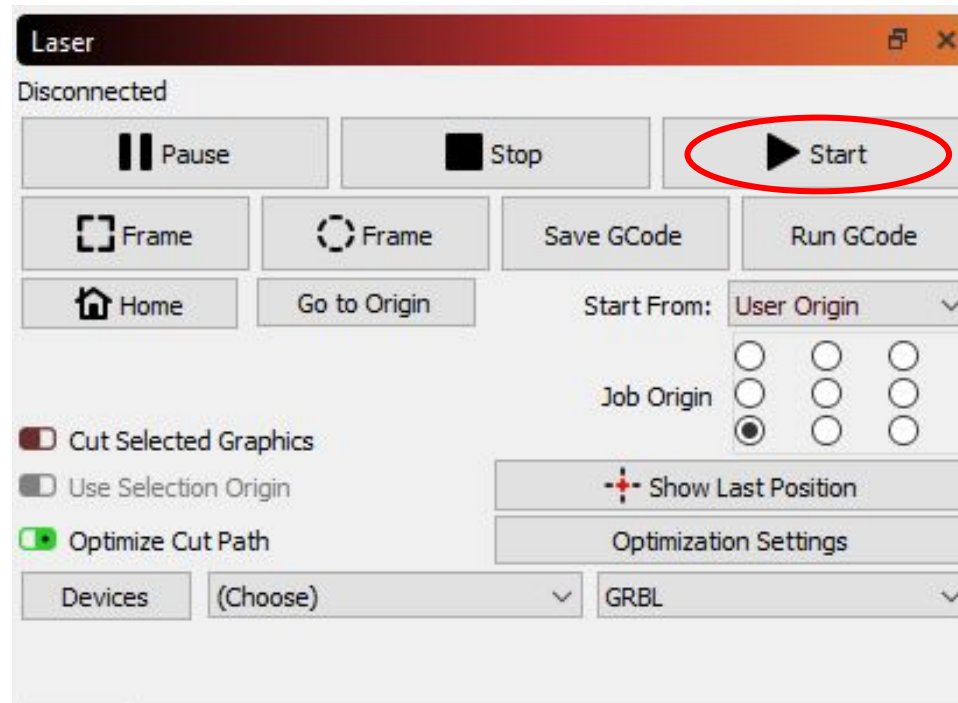
Part 4 | Recommended Settings

Key GRBL Settings

Intro

The Yora 6550 motherboard has a series of settings on it that allow your machine to work correctly. Some may be wrong (which shouldn't be the case), so you may have to adjust them to take a full advantage of your machine.

Go to Easel » Advanced » Machine » Machine Inspector » Settings. This will display all the Grbl settings values from the router. Copy these into a text editor and save the file somewhere as a baseline. No matter how much you may mess up the settings, you will always have a previous set to go back to.

You will see a list of $xx=yy lines where xx is the setting number and yy is the current value. To change a value send the command of $xx=zz in the console, where xx is the setting number and zz the new value. These will be permanently stored on the motherboard so they only need to be changed once.

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Key GRBL Settings

$3 - Direction port invert mask 1/2

If an axis is moving in the wrong direction, you need to change one of the settings, namely $3, the direction port invert mask to be precise.

This is very easy to do. But before doing that:
- Check the connections from the stepper motors and make sure they are plugged into the correct X, Y and Z axis connections on the router board.
- Check that the axis is not binding by turning the screw by hand (disconnect the coupler first).
- Check that the grub screw on the coupler connecting the threaded rod to the stepper motor are tight and the coupler is not slipping.
- Swap the connection for the stepper motor into the router motherboard for that axis with another one. If it now moves (remember it is now a different axis) and the other one doesn't then it is likely to be a motherboard failure. Or possibly a faulty cable, so swap the cable with a working one just to be sure.

If your connections are fine along with your cables, stepper motors and board, then you need to change your $3 value stored in the motherboard.

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Key GRBL Settings

$3 - Direction port invert mask 2/2
Use the following table: Select the row for your current $3 value, go across to the column for the axis to change and the value there is your new $3 value. This only allows you to change one axis at a time. If you need to change more than one, make multiple passes through the process.

Examples:
- Current $3 value is 2 and the X axis needs inverting: Select the 2 row and the X column, the new $3 value is 6.
- Current $3 value is 3, and the Y and Z axes need inverting: To invert the Y axis, select the 3 row and the Y column, the new $3 value is 1. To invert the Z axis, select the 1 row and the Z column, the new $3 value is 0.

Current $3 Value	New $3 Value		
	Invert X	Invert Y	Invert Z
0	4	2	1
1	5	3	0
2	6	0	3
3	7	1	2
4	0	6	5
5	1	7	4
6	2	4	7
7	3	5	6

In Easel, type $3=x in the console command box where x is the revised number and hit enter to send it to the route motherboard. Everything should now be moving in the correct direction. If you changed any settings, make a note in your file containing your original settings just in case.

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Part 4 Recommended Settings

Key GRBL Settings

$100,$101,$102 - [X,Y,Z] steps/mm

These parameters controlled the distance travelled by each axis. These values are the number of microsteps required to move the spindle on each axis by 1mm. $100 sets the X axis, $101 the Y axis, and $102 the Z axis. These should all be the same. Because of the standard components that tend to be used, the likely values on a 3018 are going to probably be 800 or 1600. If they are not all the same, then the first step is to send $101/2/3=800/1600 commands to make them all the same. Now that they are all the same, we suggest a quick visual check by jogging all the axes by 10mm and making sure the distance travelled looks like 10mm.

$30 and $31 – Max and Min Spindle Speed (RPM)

This sets the spindle speed for the maximum 5V PWM pin output. For example, if you want to set 10000rpm at 5V, program $30=10000. For 255rpm at 5V, program $30=255. If a program tries to set a higher spindle RPM greater than the $30 max spindle speed, Grbl will just output the max 5V, since it can't go any faster. It seems to be roughly 8,500 RPM not under load! So we recommend setting $30=9000 and $31=0.

$32 – Laser Mode

This is a Boolean value or on/off. 1 is on (laser connected) and 0 is off (spindle connected). If you don't have a Laser module then just leave this set to 0. If you do, we strongly recommend setting Laser Mode on (1) when using the laser module.

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Part 4 Recommended Settings

Key GRBL Settings

$110, $111 and $112 – [X,Y,Z] Max rate, mm/min
Set in mm/min, these set the maximum rate each axis can move. Whenever Grbl plans a move, it checks whether or not the move causes any one of these individual axes to exceed their max rate. If so, it'll slow down the motion to ensure none of the axes exceed their max rate limits. This means that each axis has its own independent speed, which is extremely useful for limiting the typically slower Z-axis. Leave them at $110=1000, $111=1000 and $112=600.

$13 - Report inches, boolean
Grbl has a real-time positioning reporting feature to provide a user feedback on where the machine is exactly at that time, as well as, parameters for coordinate offsets and probing. By default, it is set to report in mm, but by sending a $13=1 command, you send this boolean flag to true and these reporting features will now report in inches. $13=0 to set back to mm. We want to work in mm. So leave $13 at 0.

You can check all the defined GRBL settings and what they mean using the link below:
https://github.com/gnea/grbl/wiki/Grbl-v1.1-Configuration

Note – changing GRBL settings beyond those mentioned above is not recommended by YoraHome, and is done at your own risk.

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Q. How to identify the X and Y axis and make sure the wires are properly connected?
A. All plug-in ports are clearly marked on the control board. The 6550 has two axis : The X moves your laser left or right, the Y axis moves forward or backward.

Q. How tight should my timing belts be on the 6550?
A. Timing belts should be tight enough to not slip, but not so tight as to make smooth movement an operation's issue.

Q. What speed and max power do I need to use?
A. This is not a firm value we can provide for every situation; please check our blog page for recommended settings for some materials.

Q. Where do I find GRBL settings or configuration?
A. Open LaserGRBL software. Select GRBL -» GRBL Configuration, then make a screenshot to save all the current and original settings of your board before making any changes.

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Q. What do I check if my laser does not power up?
A. Go to GRBL configuration. Find the $32 value and make sure it is equal to 1. If it is equal to 0, change it to 1, click on the Write button on the bottom of the window to store this information on the board, and reboot your machine.

Q. I hear my stepper motors humming, but nothing moves?
A. Check all the set screws and wire connections. Make sure they are all tight and the wiring into the correct ports. Make sure the wheels and coupling are not rubbing against the stepper motor. Double check your timing belts tension too.

Q. How to I focus my laser on my work piece?
A. There are two ways to focus the laser: Fixed and Adjustable. The fixed focus lasers (15W or 40W) needs to be 3/4in or 19.05mm from your workpiece so as to get the best pinpoint focus. For the adjustable lasers (3.5W or 5.5W), you must move your laser about 1-3/4 inches or 45mm) away from your work piece and twist the laser tip until you get the smallest pinpoint focus.

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Q. How to I adjust the laser power and speeds?
A. Look at the override status control at the bottom of the LaserGrbl preview screen. You should see 3 rectangles titles S, G1, G0. You can click on them to adjust the actual speed and power override, even during the burning process.

Q. How to I set home?
A. Once your picture is imported, jog your laser over to the bottom left corner of your workpiece. Then, click on the Globe button at the left of your screen next to the padlock. You must reset home every time you start a new project or reset the program.

Q. What if we have missing or broken parts?
A. Please notify: support@yorahome.com

Q. Where can I find additional resources for the Yora 6550?
A. In our Facebook group: https://www.facebook.com/groups/YoraHome.CNC

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SUPPORT@YORAHOME.COM
WWW.YORAHOME.COM