SainSMART
POWER TO THE MAKERS

GENMITSU CNC Laser Engraver Machine LE5040

USER MANUAL

Contents

Welcome

Thank you for purchasing the Genmitsu CNC Laser Engraver Machine LE5040 from SainSmart.

Included in your package will be a USB flash disk.

These contain:
• Manuals
• Windows USB Driver
• Software LaserGRBL
• Sample files

These files can also be downloaded from the SainSmart Wiki Page http://wiki.sainsmart.com/index.php/101-60-LE5040

Help and support is normally available from our Facebook group.
(SainSmart Genmitsu CNC Users Group, https://www.facebook.com/groups/SainSmart.GenmitsuCNC)

For any warranty or support problems please email us at support@sainsmart.com.

You can visit our helpdoc page https://docs.sainsmart.com to get more user guides about CNC & Laser engraving.

Warnings

As with any tool it is essential you take proper precautions and care in its use.

A Laser is capable of damaging your eyesight or causing Blindness.
A Laser is capable of burning skin and flesh.

It is essential that when in use proper precautions are taken to prevent this Proper care and use includes but is not limited to:
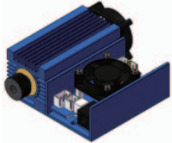
• Follow all instructions carefully
• Ensure appropriate eye protection is worn by anyone who can see the Laser this includes any Pets.
• Make sure the Laser Beam does not contact any skin.
• Depending in the materials being cut make sure the Laser is used in a well ventilated area and appropriate breathing protection is used.
• Take extra precautions for any material which may be flammable or produce harmful fumes when burnt.
• Do not leave unattended while it is operating
• Make sure you follow any specific regulations appropriate to your location.
• Use this laser engraver machine under adult supervision if you are underage
• Any modification of the Laser or the use of accessories provided by a third party will void any warranty.

SainSmart does not accept any responsibility or liability for any use or misuse of the Laser Engraver Machine LE5040 including any accessories.
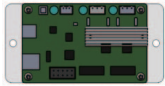
Section 1: Package Contents

NO.	Description	SPEC	PHOTO	QTY.
1	Slotted Aluminum Frame	20 x 40 x 480 mm		2
2		20 x 40 x 579 mm		1
3		20 x 20 x 530 mm		2
4	Linear Rail	Ø5 x 590 mm		1
5	Y-Plate-Left	128 x 70 mm		1
6	Y-Plate-Right	128 x 70 mm		1
7	X-Plate-Front	98 x 75 mm		1
8	X-Plate-Back	98 x 75 mm		1
9	Laser Mounting Plate	65 x 55 mm		1
10	Support Feet	60 x 60 mm		4
11	42 Stepper Motor	NEMA17 34 mm		2

Section 1: Package List

NO.	Description	SPEC	PHOTO	QTY.
12	Flexible Coupler	5 mm-5 mm		1
13	Pulley			3
14	Timing Belt	2 m		1
15	POM Wheel	MR105zz		12
16	Bearing	F685Z		1
17	Drag Chain			1
18	Drag Chain Bracket	18 x 14 x 38 mm		1
				1
19	5.5W Laser Module	65 x 33 x 33 mm		1
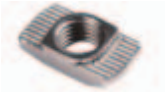
Section 1: Package List

NO.	NAME	SPEC	PHOTO	QTY.
20	Laser Module Wire	150 cm		1
21	Control Board			1
22	USB Cable	Type A Male - Type Micro B Male		1
23	12V power supply	12V 5A		1
24	Power cable (US)	1.2 M		1
25	Power cable (EU)	1.2 M		1
26	Stepper Motor Connecting Wire	X Axis 163 cm		1
		Y Axis 100 cm		1
27	Allen Keys	2.0 mm 3.0 mm 4.0 mm		3
28	Lock Nut Spanner	8 x 70 mm		1
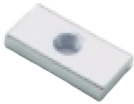
Section 1: Package List

NO.	Description	SPEC	PHOTO	QTY.
29	Laser Protection Safety Glasses			1
30	Cable Management Flex Wrap	100 cm		1
31	Cable tie	3 x 80 mm		10
32	U Disk	Contains: Manuals, Software, Sample files.		1
33	User Manual			1

Section 1: Package List

NO.	Description	SPEC	PHOTO	QTY.
34	M3 Hex screw	M3 x 6 mm		8
35		M3 x 8 mm		8
36		M3 x 10 mm		4
37		M3 x 25 mm		4
38	M5 Hex screw	M5 x 6 mm		1
39		M5 x 10 mm		18
40		M5 x 25 mm		4
41		M5 x 30 mm		8
42		M5 x 45 mm		4
43	T-Slot Nut	20M5		7

Section 1: Package List

NO.	Description	SPEC	PHOTO	QTY.
44	Square Nut	M4 x 6 x 9		6
45	Grub Screw	M4 x 8		6
46	Lock Nut	M5		12
47	Aluminum Spacer	8 mm x M5.1 x 10 mm		16
48	ABS Spacer	7 mm x M3.2 x 16 mm		4
		8 mm x M5 x 2 mm		1

Section 2: Mechanical Installation

Base Assembly

Tip: Install the screws a turn loose to ensure you can check the squareness prior to tightening

Bolt M5 x 25

Aluminum Profile 2040 x 530

Aluminum Profile 2040 x 480

Bolt M5 x 25

Aluminum Profile 2040 x 530

Aluminum Profile 2040 x 480
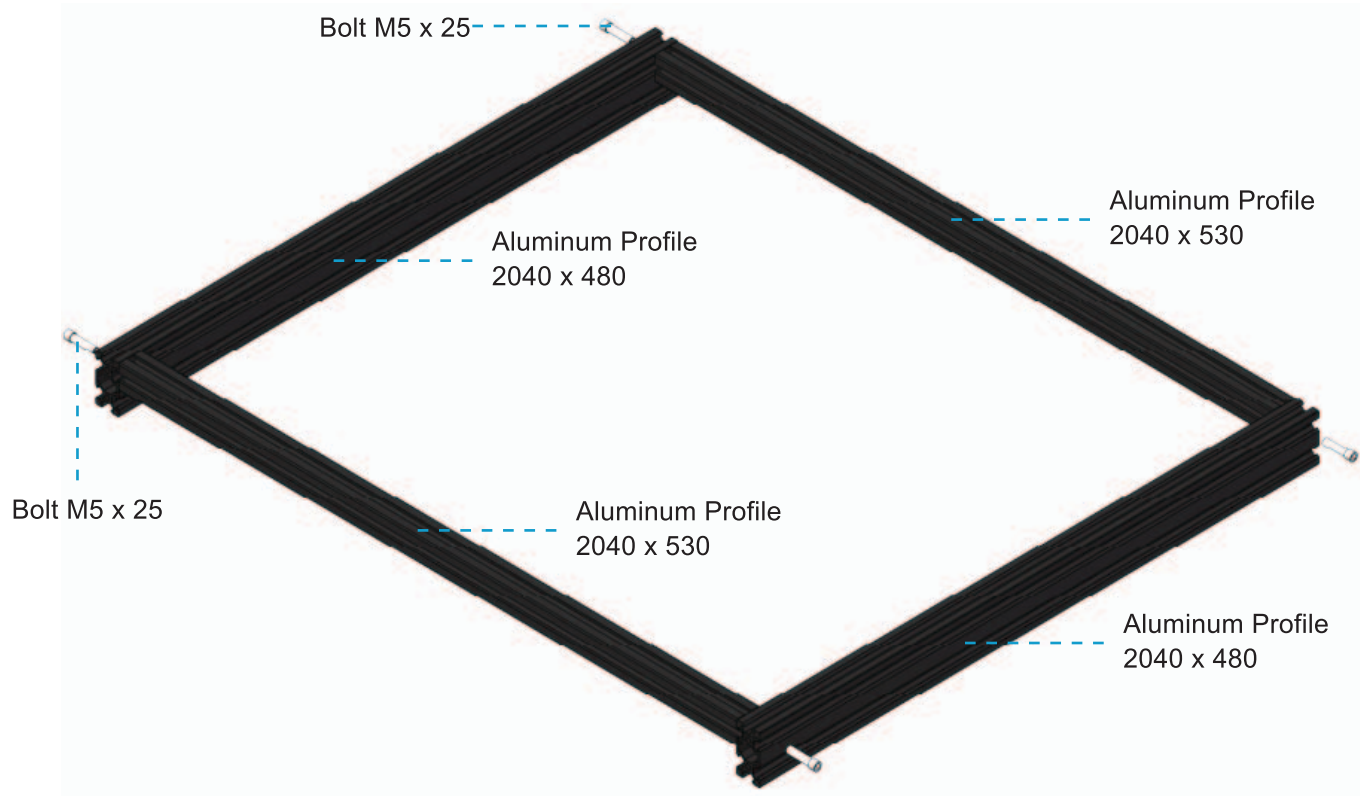
Section 2: Mechanical Installation

Y-Plate-Right Assembly

Step 1: Insert (4) M3 x 25mm into the smaller holes of the Y-PLATE RIGHT that align with the NEMA Stepper motor, then place (4) M3 x 16mm ABS spacers on the M3 x 25mm bolts between the plate and the motor. Tighten the bolts.

Step 2: Install the flexible coupler to the NEMA motor shaft and be sure the flat part of the shaft aligns with the screw holes of the coupler to ensure a secure connection.

Before you tighten the coupler, be sure there is a clearance of 2mm between the motor and coupler. An easy way to do this is with a coin and in this case a nickel is 2mm. Slide the coin behind the coupler and ensure its snug, then tighten everything up.

Step 3: Insert (4) M5 x 30mm bolts to the Y-PLATE-RIGHT (Bolt head on the same side as the motor) then 8mm Aluminum spacer (opposite side of motor) followed by the POM Wheels and then tightened down with Nylon Lock Nuts (4).

Y-PLATE-RIGHT

Bolts M3 x 25

Nylon Lock Nut

Y-axis motor

ABS spacer M3 x 16

Flexible Coupler

Bolts M5 x 30

POM Wheel

Y-axis motor and coupler spacing 2 mm

Y-Plate-Left Assembly

• Be sure to orient the plate with the rectangle notch in the top right.

Step 1: Insert M5 x 30mm bolts as shown below. Lay the plate down to make it easier and then add your Aluminum

Spacer followed by a POM Wheel and then a Nylon Lock Nut.

Step 2: Insert bearing with the flanged side up (facing you) into the Y-Plate-Left as shown below.

Y-Plate-Left

Bolts M5 x 30

Aluminum Spacer

POM Wheel

Nylon Lock Nut

FL685ZZ
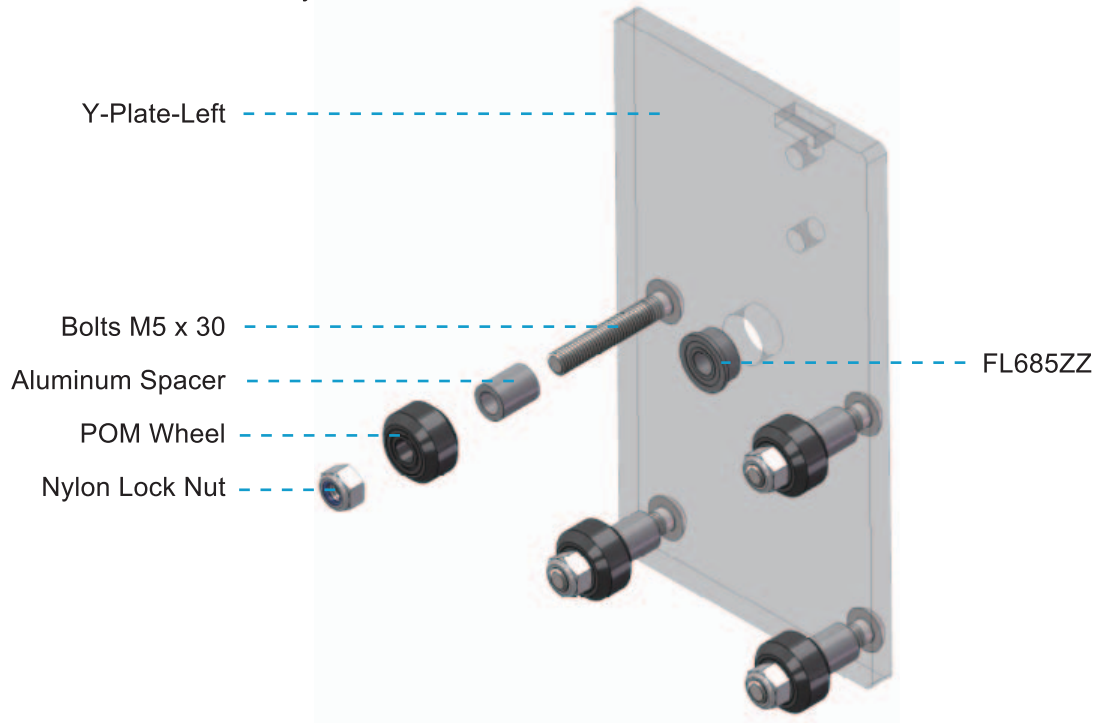
Section 2: Mechanical Installation

Mounting the Laser Module

Step 1: Attach the Laser Module to the Mounting Plate with (4) M3 x 6mm

Step 2: Attach the Laser Module and Mounting Plate to the X-Plate-Front with (4) M3 x 10mm bolts.

Step 3: Mount X Axis NEMA Stepper to X-Plate-Rear with (4) M3 x 8mm bolts.

Step 4: Install Pulley to Stepper motor shaft.

• Be sure to align pulley screw hole with flat side of stepper motor shaft **AND** leave a 3mm space between the pulley and X-Plate-Rear.

Step 5: Mount the Laser Driver Module to the X-Plate-Rear with (2) M3 x 8mm screws as shown below.

Step 6: Insert (4) M5 x 45mm bolts through the X-Plate-Front followed by an Aluminum Spacer, POM Wheel, another Aluminum Spacer, mount to the X-PLATE-Rear and install a Nylon Lock nut and tighten it all down.

Bolts M3 x 8

X-Plate-Rear

Pulley

X-Plate-Front

Bolts M3 x 10

Laser module mounting plate

Laser module

Blots M3 x 6

Bolts M5 x 45

X-axis motor

Laser Driver module

Bolts M3 x 8

Lock nut M5

V-slot bearing

Aluminum spacer M5 x 10
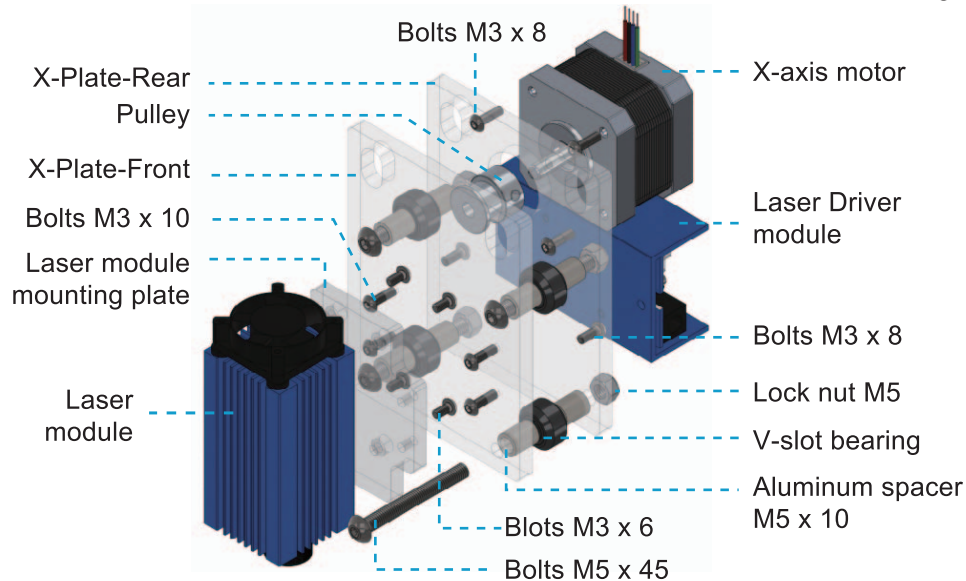
X-Plate-Rear Plate Pulley Clearance 3 mm

Assembly Effect
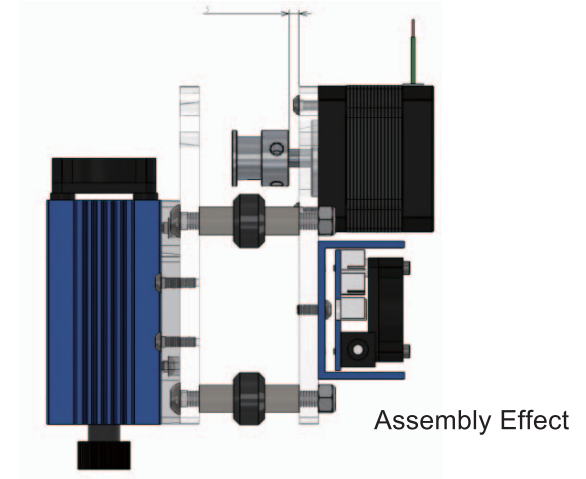
Section 2: Mechanical Installation

Finishing the X-Axis Assembly

Step 1: Mount the completed Laser Module assembly to the Slotted Aluminum profile (570mm) by sliding the rail through the installed laser assembly.

Step 2: Install the Linear Rail. On the A-End (Right side with the Laser Module Facing you) install the pulley with the

Teeth towards the Stepper Motor leaving a 2mm clearance between the Pulley and Flex Coupler. For the B-End Install the Pulley with the teeth facing the same side (A- End) use a ABS spacer (2mm) between the Pulley and Flanged Bearing to the Y-Plate-Left as shown in the figure below (Enlarged PART-C) and ensure the Flanged side of the bearing is facing the Pulley, Using (4) M5 x 10mm to attach B-End to Y-Plate-Left and A-End to Y-Plate-Right.

Aluminum profile 2040 x 579

B-End

Linear axis

A-End

Bolts M5 x 10

Enlarged B-End

ABS Spacer (2 mm)

Bolts M5 x 10

Enlarged A-End

Pulley

Pulley and Flexible coupler clearance 2 mm

PART-C

FL685ZZ

Pulley

Enlarged Part-C
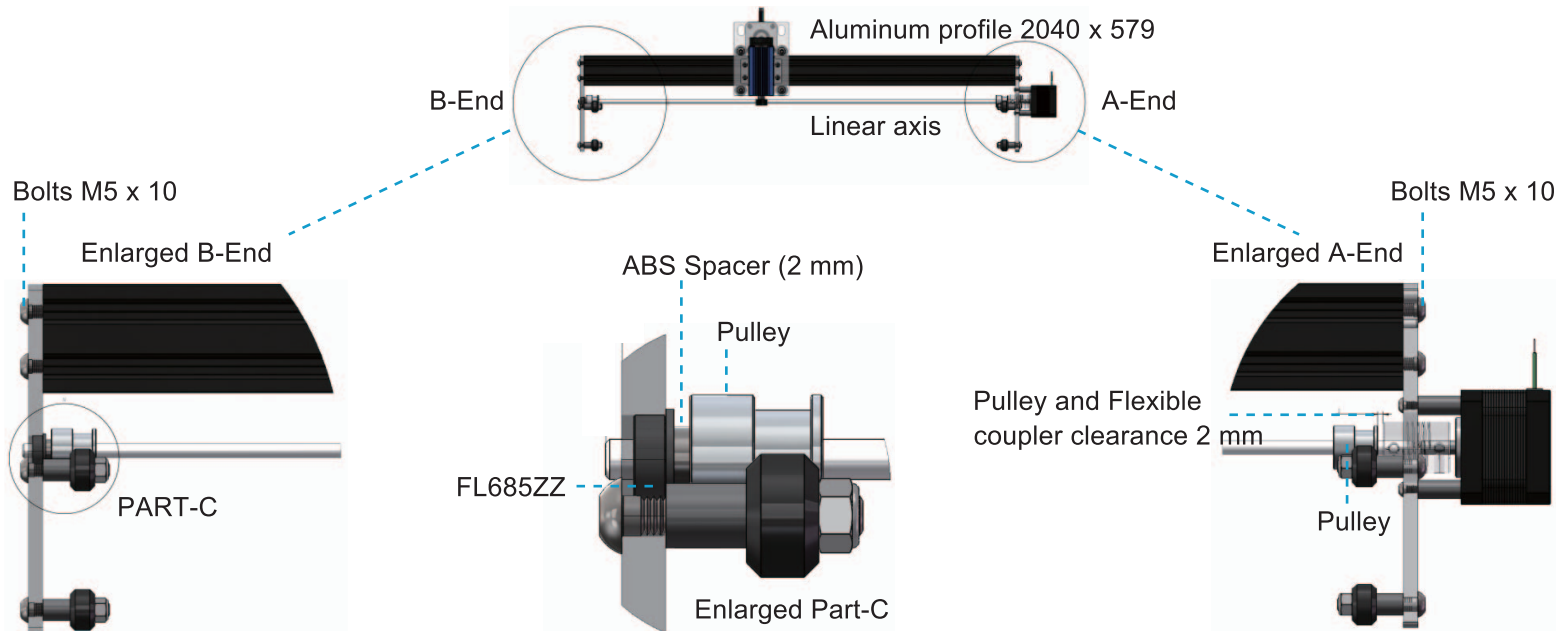
Section 2: Mechanical Installation

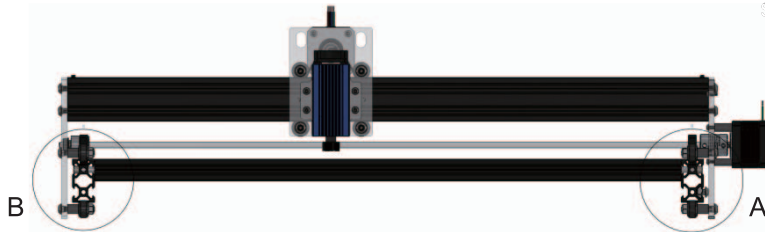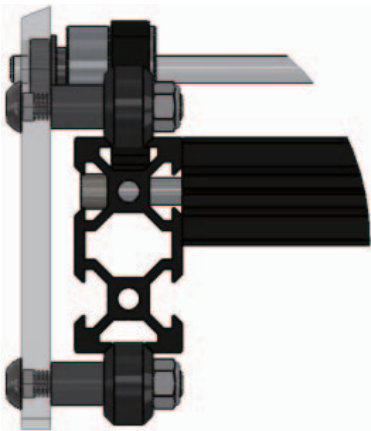## Installing the X-axis to the Base Frame

Step 1: Orient the Base Frame so the thinner Slotted rails are facing front and back.

B   A

Enlarged Part-B   Enlarged Part-A

Step 2: Slide the Base Assembly through X-Axis Assembly as shown below and be sure the POM wheels are sitting in the slotted rail.
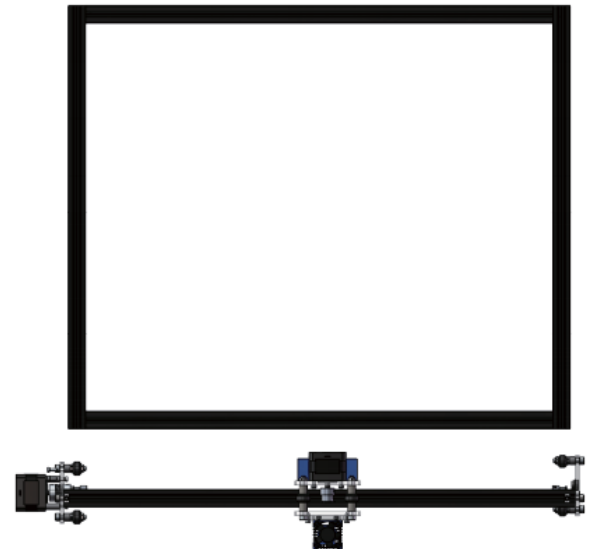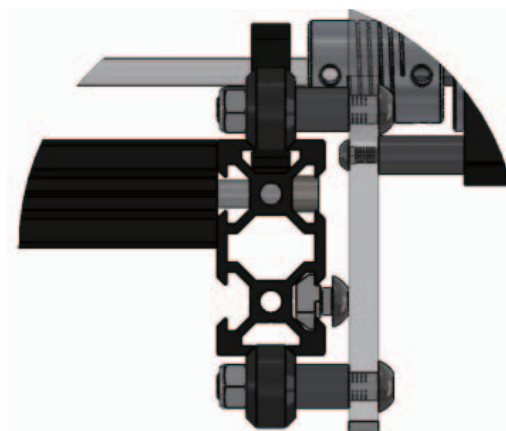
Section 2: Mechanical Installation

Install Base Support feet

Step 1: Insert (1) T-slot nut 20M5 into each corner of the Slotted 530mm Rail (Front and Back) as shown in the Enlarged PART-A below.

Step 2: Insert (3) M5 x 10mm screws for each Support foot, (2) go into the end of the slotted aluminum rail and (1) to the T-slot M5 nut.

A

Enlarged Part-A

T-Slot Nut M5

Support foot

Bolts M5 x 10

Section 2: Mechanical Installation

Mounting the Control Board Assembly

Step 1: Insert (2) T-Slot Nuts 20M5 into the rail as shown below.

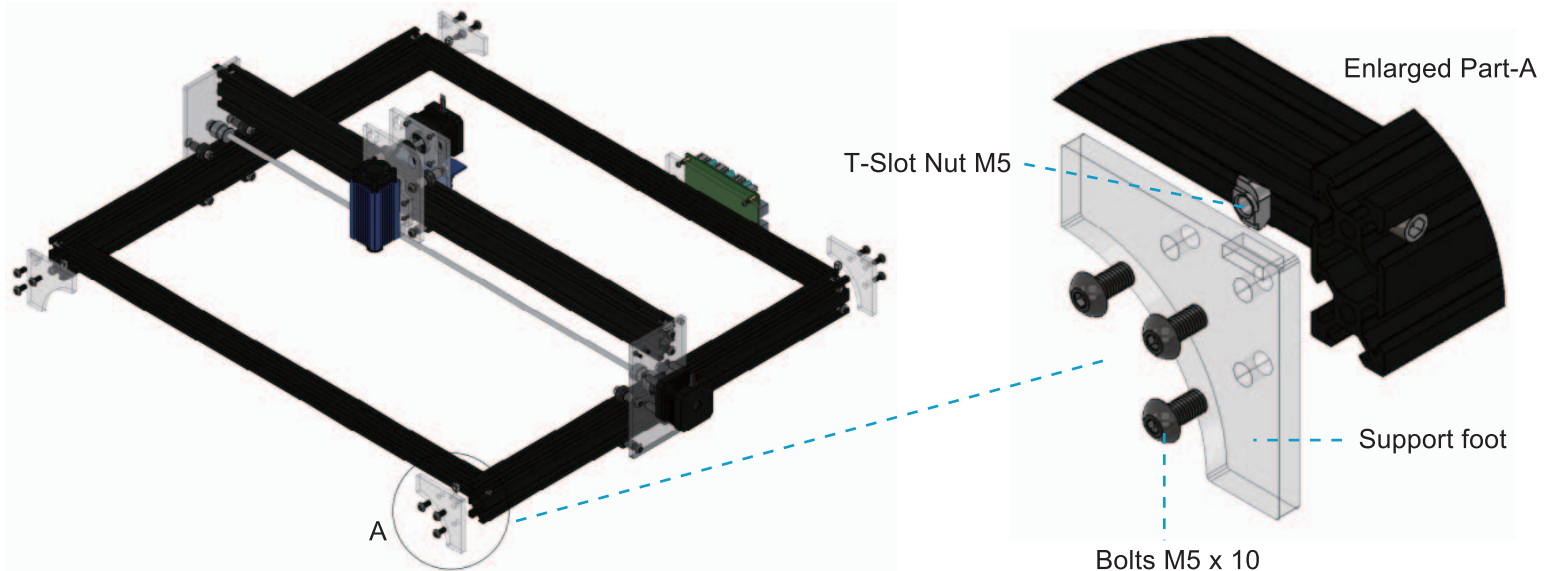**Step 2:** Install Control Board assembly to rail with (2) M5 x 10mm screws.
Leave an 80mm spacing between the Stepper Motor side as shown below.
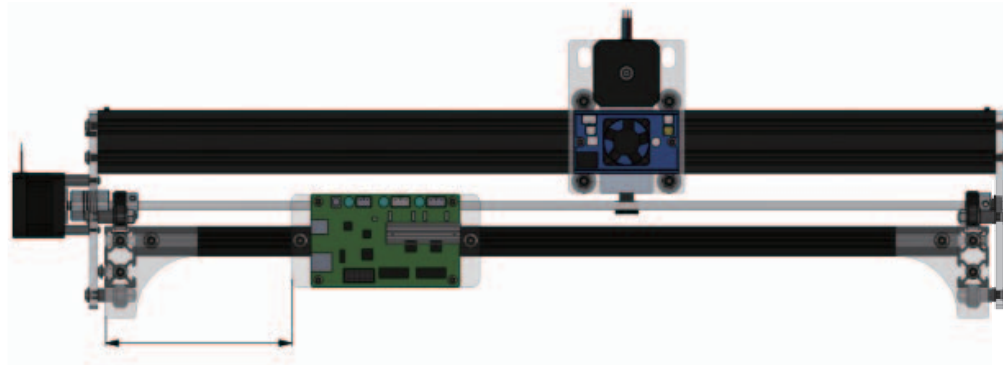
The gap between the control board and the base bracket is about 80mm.

T-Slot Nut 20M5

M5 x 10 screw

Section 2: Mechanical Installation

Install Y-Axis Timing Belt

Step 1: Insert an end of the 570mm Timing Belt through the support feet as shown in Figure below (A). Using an M4 Square nut and M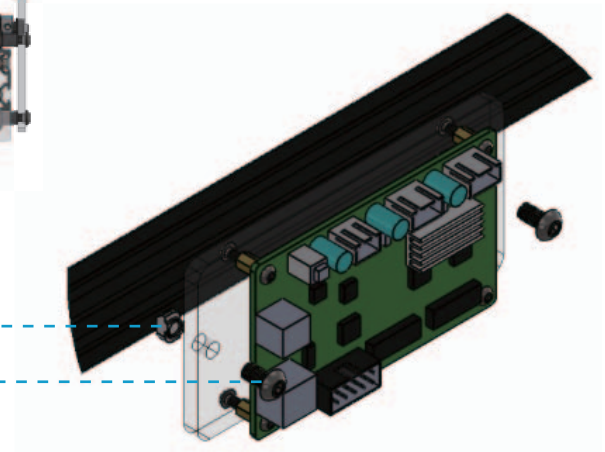4 x 8mm screw to secure it. Mount the timing belt L570 on both sides of the Y-axis so that the belt is between the timing wheel and the pulley as shown in the figure below (B) and feed the other end of the belt through the Support foot.

Before tightening this side be sure there is about 10mm of extra belt running through the slot, you will need this to adjust the tension and ensure the Y axis moves smoothly.

Step 2: Pull the extra 10mm of the belt to apply some tension, not too much just enough to ensure there is no slack in the belt. Then tighten the T-slot nut and screw.

Bolt M4 x 8

A

Square Nut M4

A

B

B

Zoom A

Timing Belt
Length 570mm
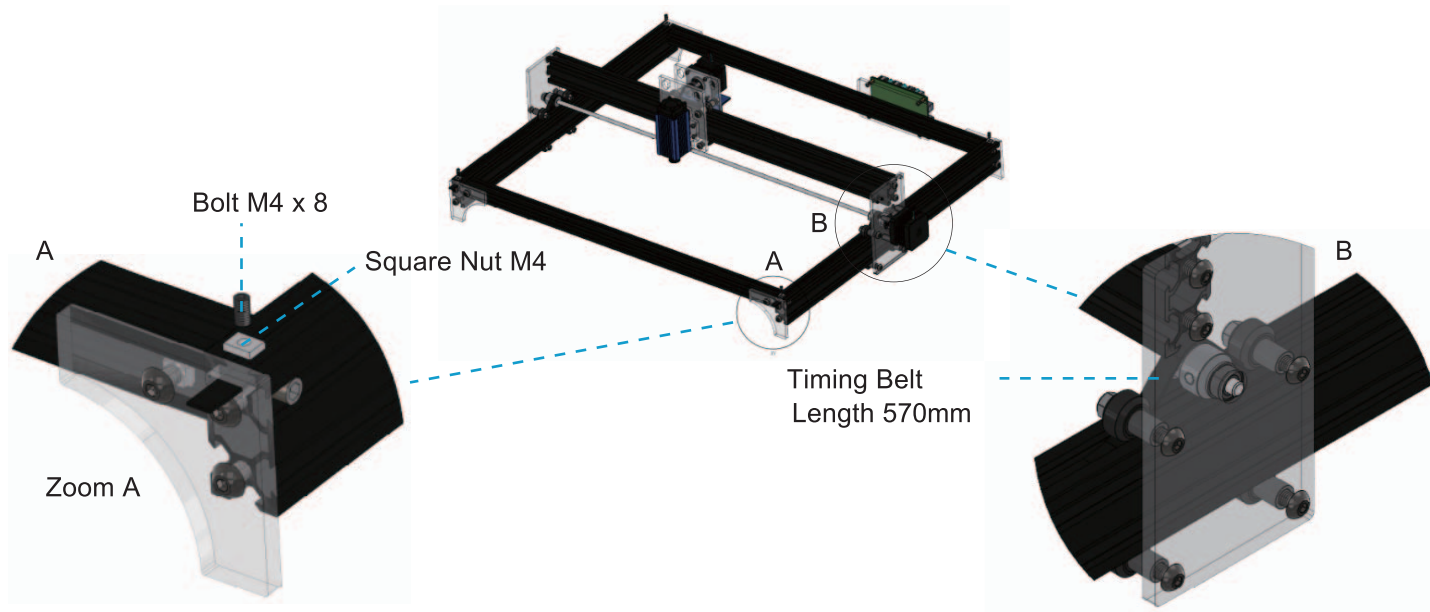
Section 2: Mechanical Installation

Install the X-axis Timing belt

Step 1: Just like the Y-Axis belt. You will feed one end of the belt through one of the Support feet and secure with a Square nut M4 and a M4 x 8mm screw.

Step 2: Feed the Belt through the X axis assembly and pulley as shown below.

Step 3: Pull the extra 10mm of the belt to apply some tension, not too much just enough to ensure there is no slack in the belt. Then tighten the T-slot nut and screw.
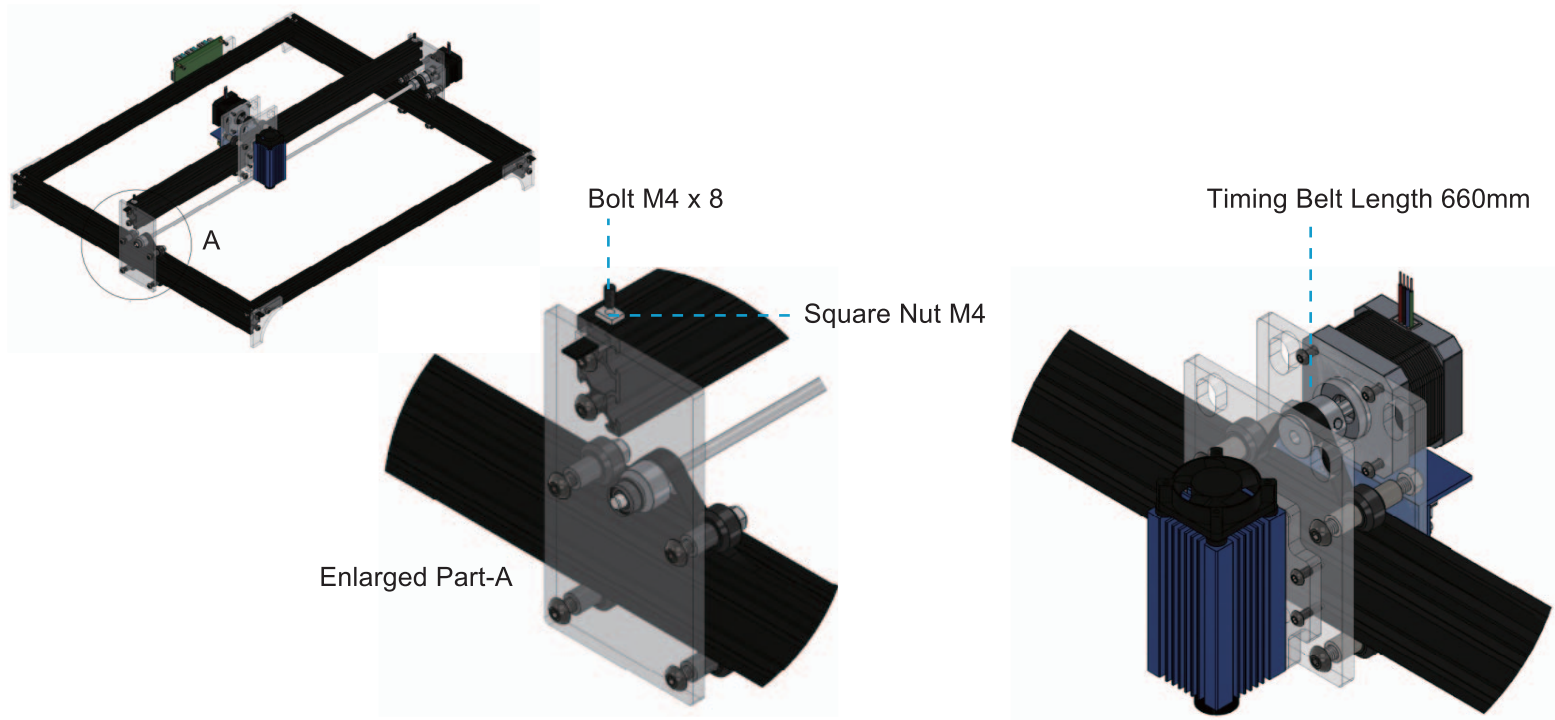
A

Bolt M4 x 8

Square Nut M4

Enlarged Part-A

Timing Belt Length 660mm

Section 2: Mechanical Installation

Installing the Drag Chain

Pass the two stepper motor wires and the laser head cable through the Drag Chain
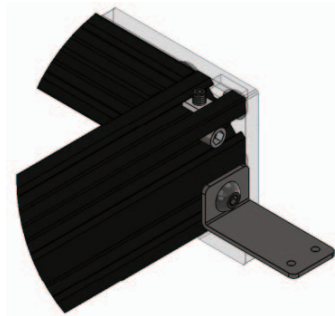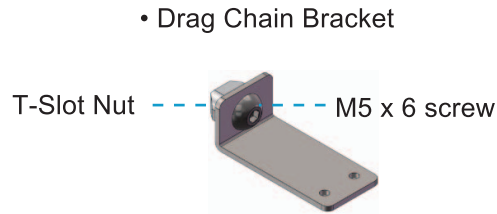
Tips: Bend the terminal 90 degrees and then wrap it in some tape to ease feeding it through.
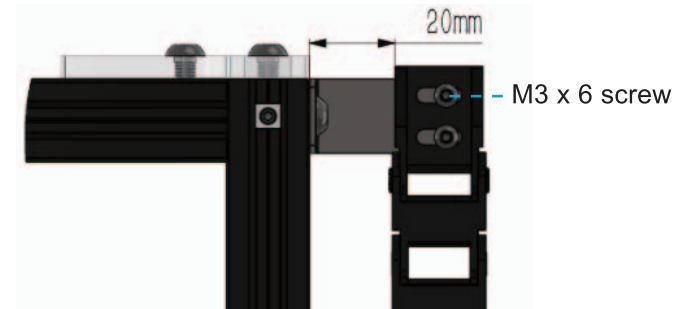
Section 2: Mechanical Installation

Installing the Drag Chain

Step 1: Install Drag Chain Bracket to the rear of the right side (near the control board) using (1) T-Slot nut M5 x 20mm and (1) M5*6mm screw.

Step 2: Install one end of the Drag chain to the top of the brack using (2) M3 x 6mm screws.

• Drag Chain Bracket

T-Slot Nut — — — — — M5 x 6 screw

M3 x 6 screw

Step 3: Mount the 2nd Drag chain bracket using M3 x 8mm screws directly to the Y-Plate-Right.

Step 4: Install Drag chain with (2) M3 x 6mm screws. Ensure there is a 10mm gap between the Y-Plate and Drag chain as shown below.

M3 x 8 screw — — — — — — M3 x 6 screw

10 mm
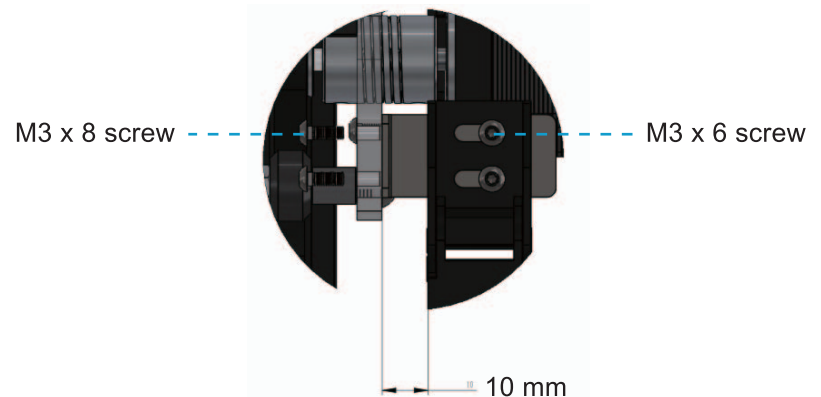
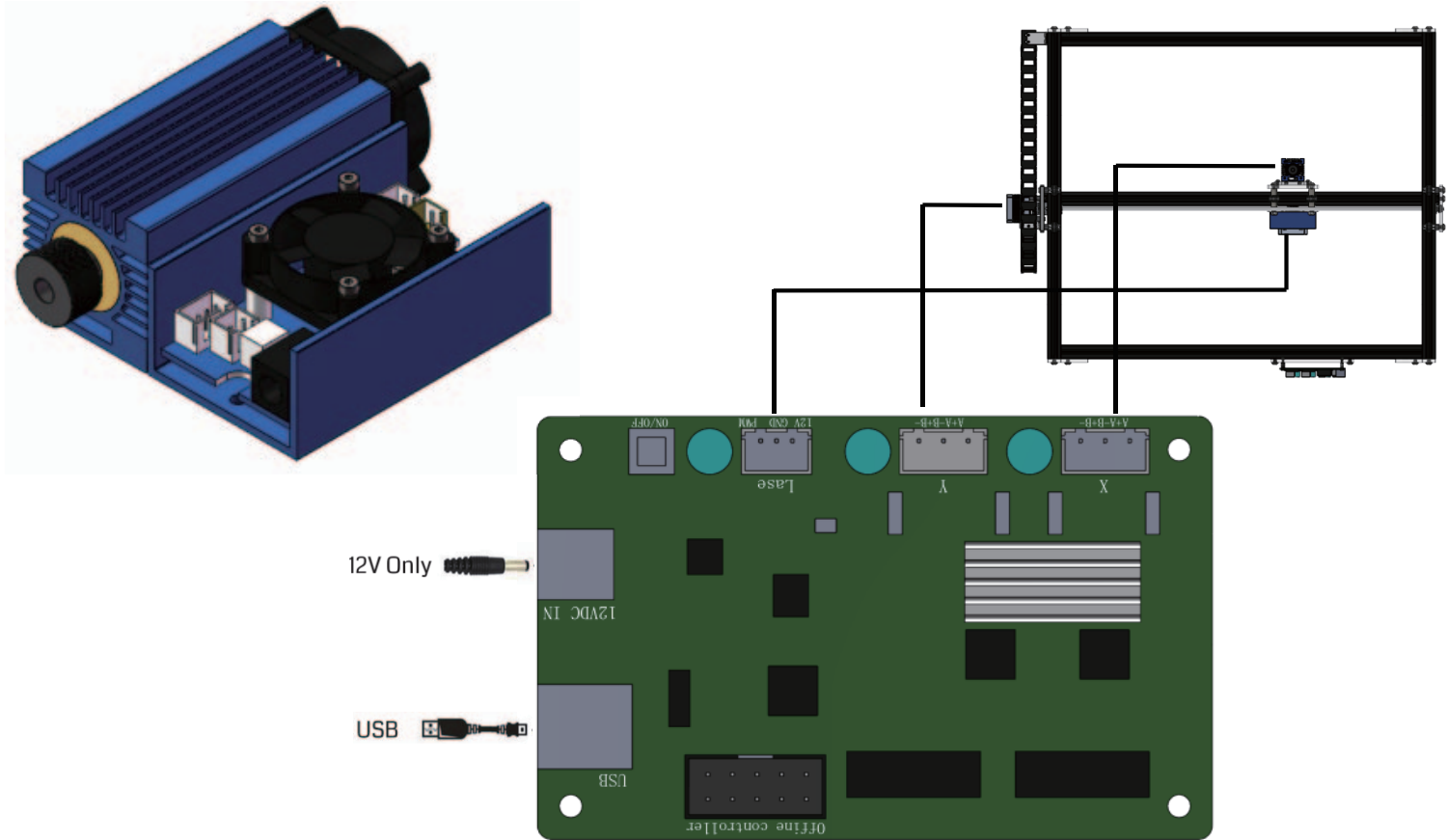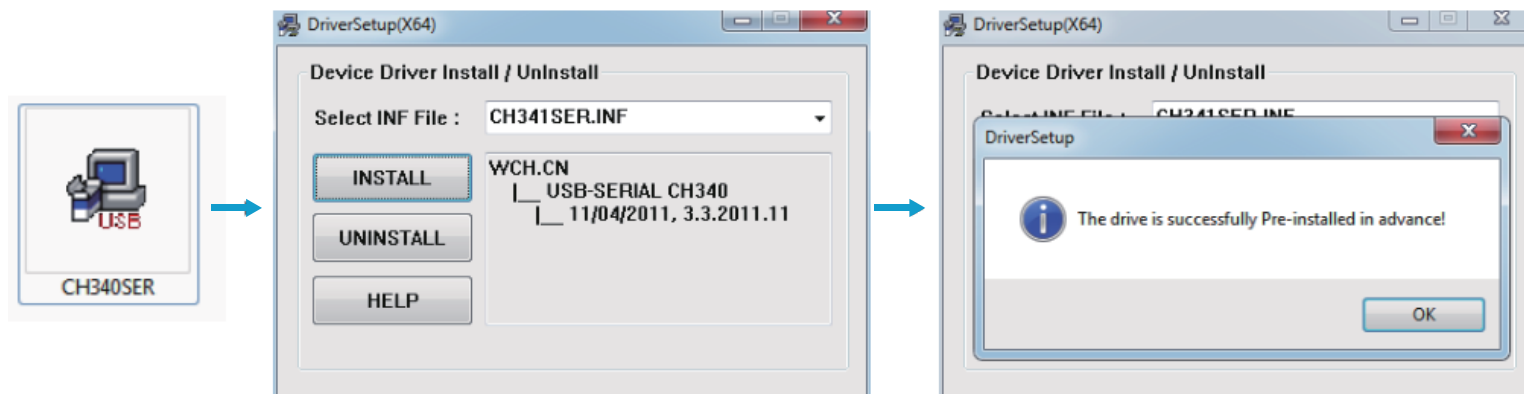# Section 2: Mechanical Installation

Control board wiring

Section 3: Driver Installation

Installing USB Drivers

Section 3: Driver Installation

Tip: To Determine your Machine's COM port:

• Windows XP: Right click on "My Computer", select "Manage", select "Device Manager".

• Windows 7: Click "Start" Right click "Computer" Select "Manage" Select "Device Manager" from left pane.

• In the tree, expand "Ports (COM & LPT)"

• Your machine will be the USB Serial Port (COMX), where the "X" represents the COM number, for example COM12.

• If there are multiple USB serial ports, right click each one and check the manufacturer, the machine will be "CH340".
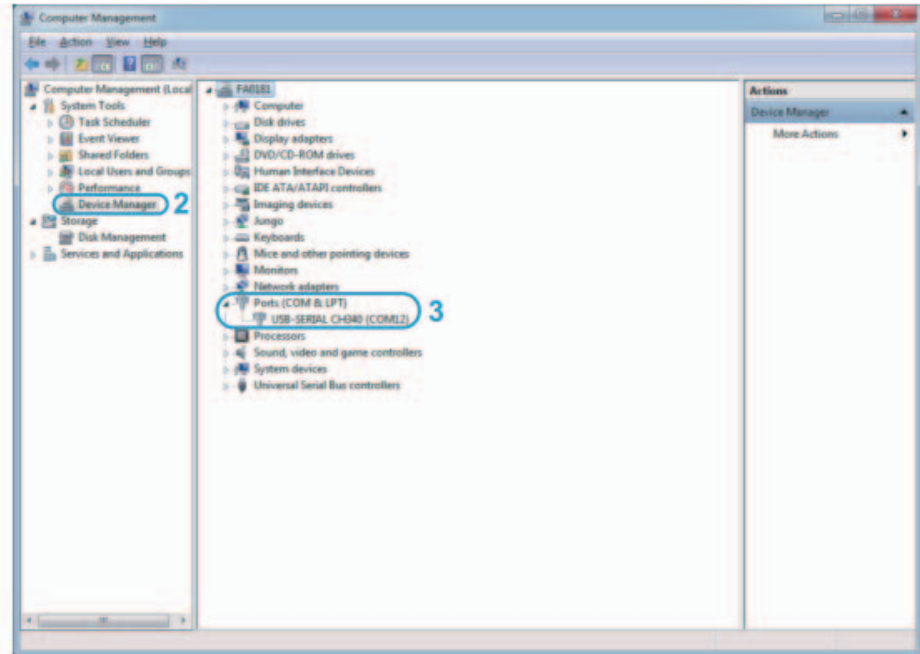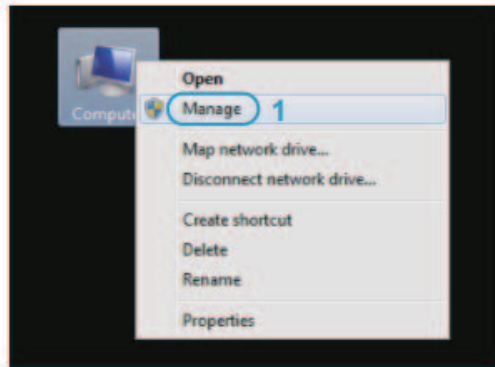
Section 4: Software Installation

Setup-LightBurn

You can use the laser engraving and cutting software Lightburn or LaserGBRL

LightBurn

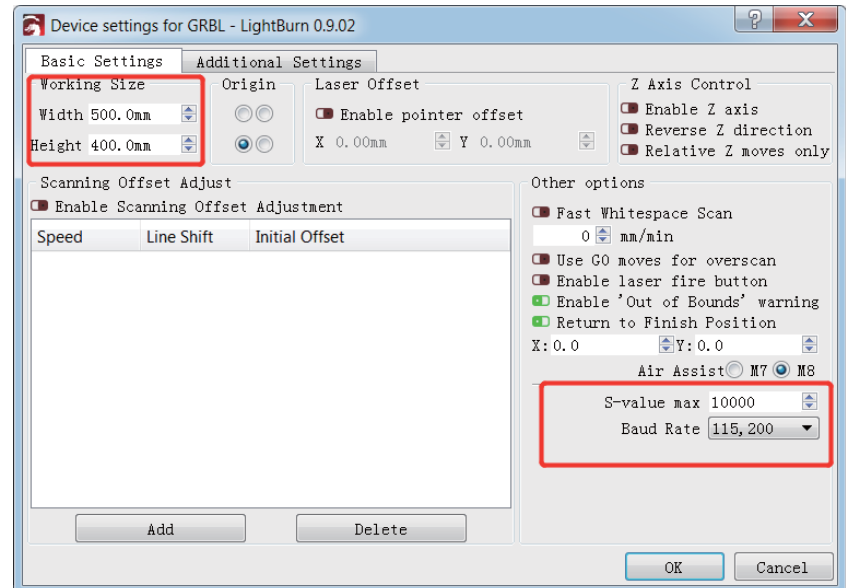**Step 1:** Install LightBurn and run the program.

Step 2: Connect your PC to the Control board with the included USB cable.

Step 3: Select the appropriate COM Port and then click the Plug/Lightning Icon to connect.

You can open this link or scan to get the LightBurn GCode License Key from SainSmart
https://www.sainsmart.com/products/lightburn-gcode-license-key

SCAN TO SHOP

Device settings for GRBL - LightBurn 0.9.02

Basic Settings   Additional Settings

Working Size
Width 500.0mm
Height 400.0mm

Origin

Laser Offset
☐ Enable pointer offset
X 0.00mm   Y 0.00mm

Z Axis Control
☐ Enable Z axis
☐ Reverse Z direction
☐ Relative Z moves only

Scanning Offset Adjust
☐ Enable Scanning Offset Adjustment

Speed   Line Shift   Initial Offset

Other options
☐ Fast Whitespace Scan
        0 mm/min
☐ Use G0 moves for overscan
☐ Enable laser fire button
☑ Enable 'Out of Bounds' warning
☑ Return to Finish Position
X:0.0   Y:0.0
        Air Assist☐ M7 ☉ M8

S-value max 10000
Baud Rate 115,200

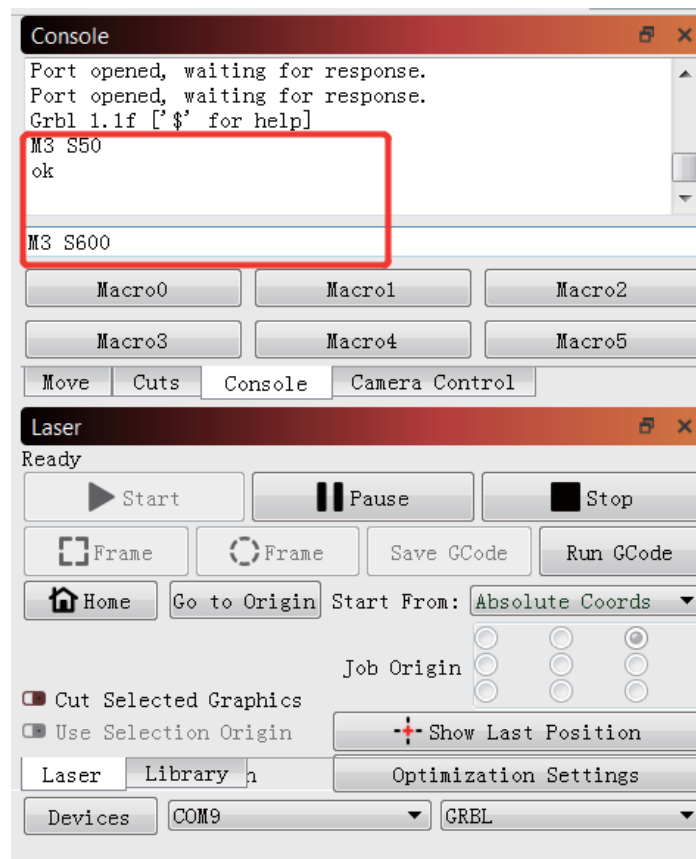Add   Delete

OK   Cancel

Section 4: Software Installation

Step 4: With a successful connection you will see text in the console window that says "Grbl 1.1f ['$' for help] and show "Laser Ready".
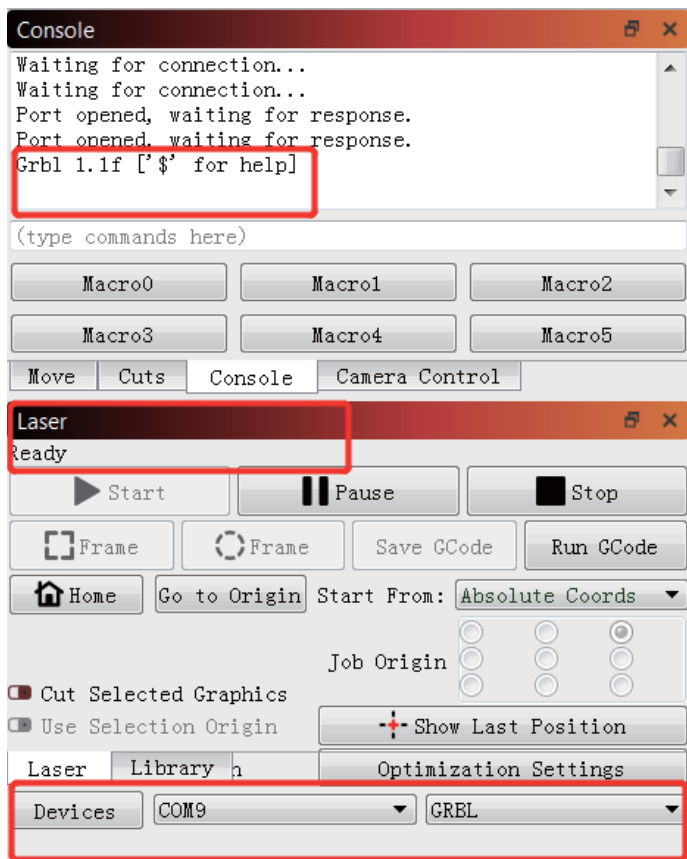
Step 5: Enter the command "M3 S2500" in the command window, then press Enter. (Turns on laser @ Low Power)

Section 4: Software Installation

Step 6: Put on your Laser Protection Glasses and Focus the laser lens. Turning the lens to focus until the beam spot is as small as possible.

Enter the command "M5" to turn the laser off.

Wear the glasses! Do not set them down like this with the laser on.
This is for illustrative purposes so you can see the focused beam better in photos.
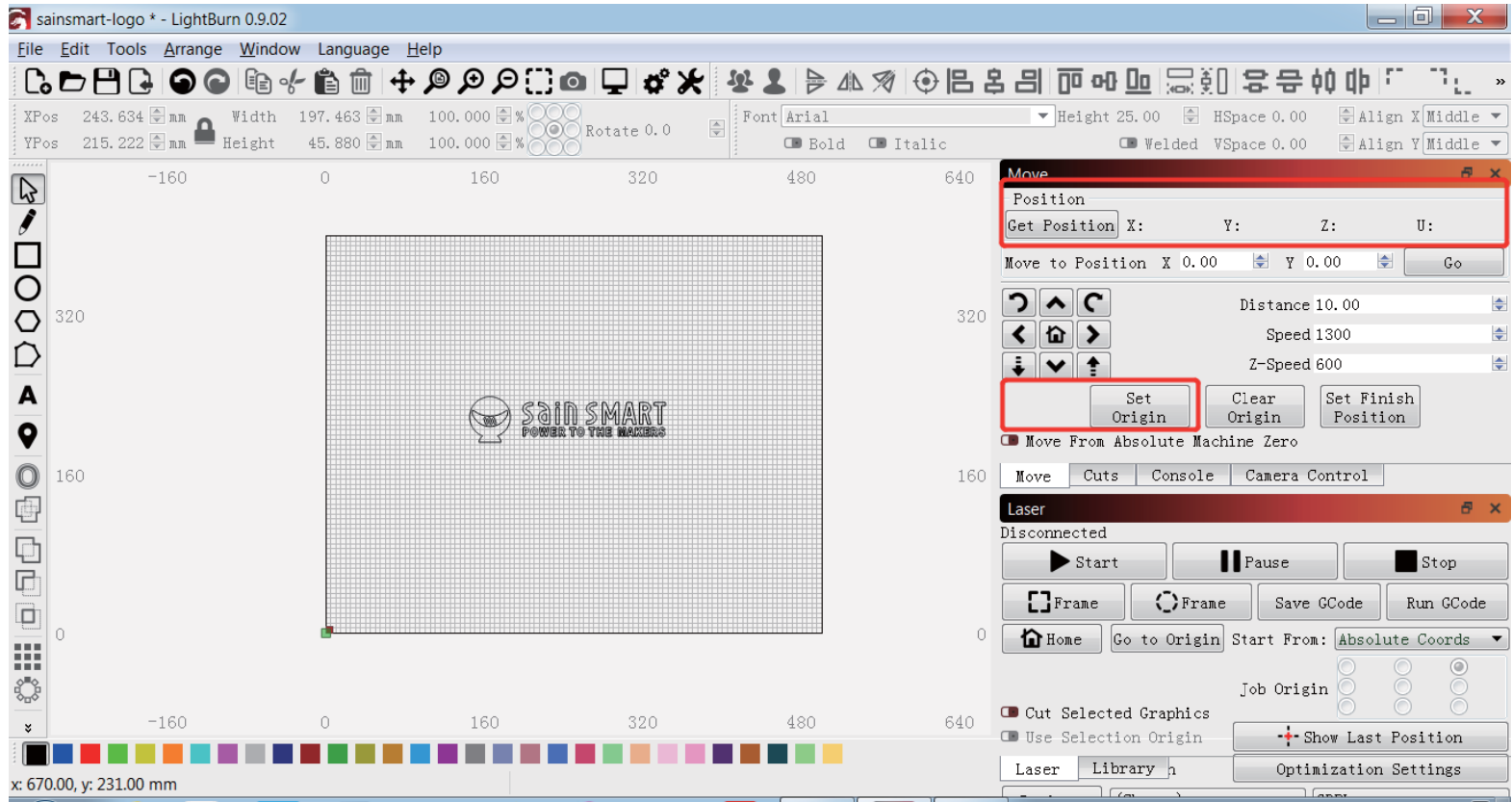
Section 4: Software Installation
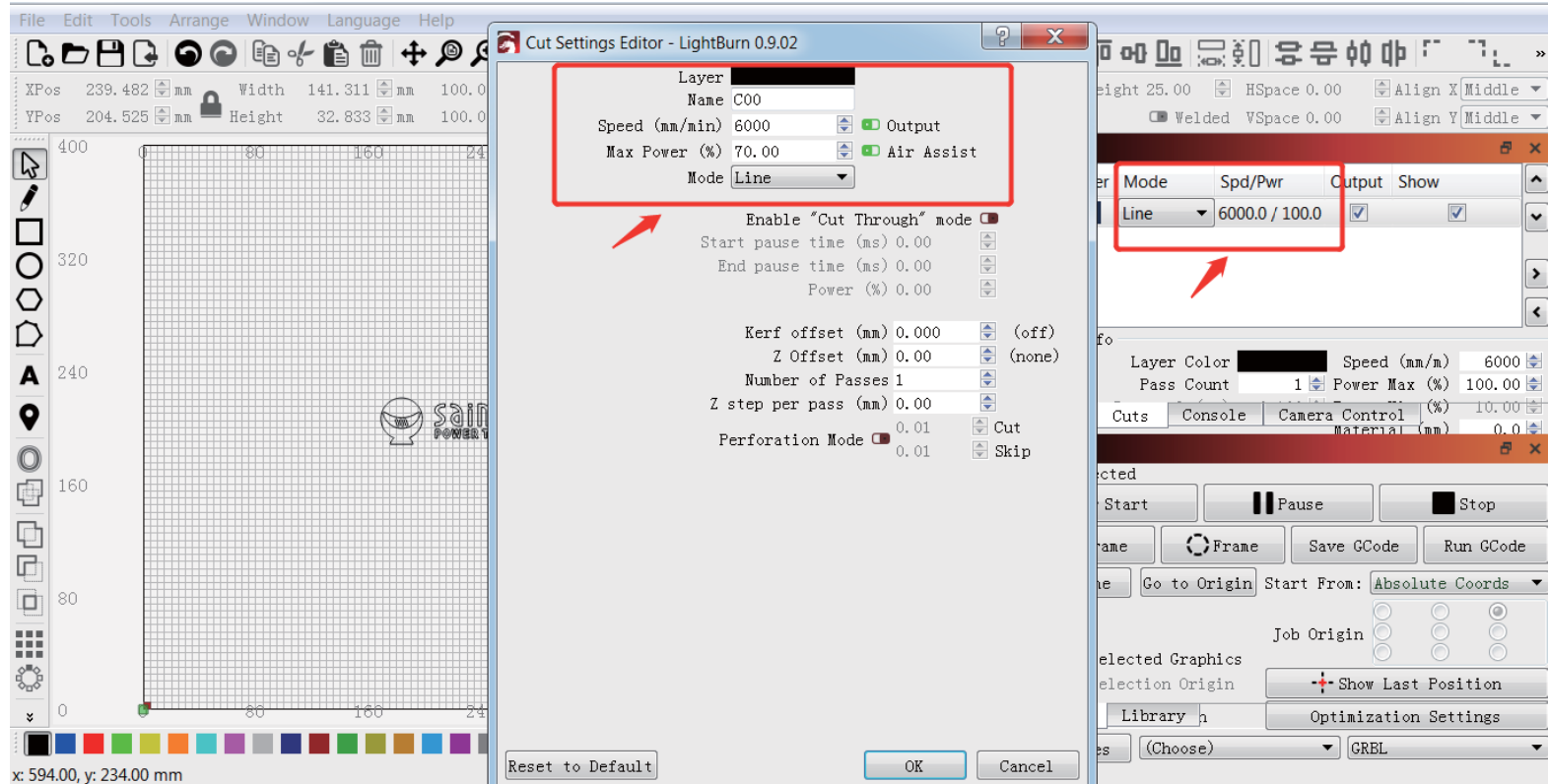
Engraving the test file-LightBurn

Step 1: File→Open File: Open GCODE file or Image format file

Step 2: Set the Origin Zero Position（Starting Point）

Step 3: Set Laser Intensity (S value) and Travel Speed

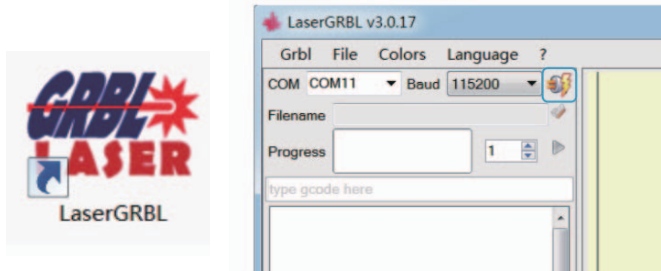**Step 4:** Click "Start" to begin

Section 4: Software Installation
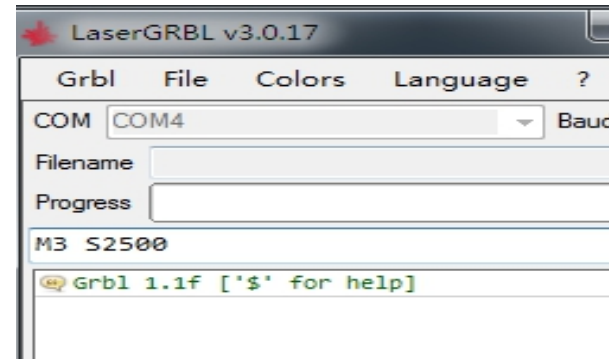
Setup-LaserGRBL

Step 1: Install Laser GRBL and run the program.

Step 2: Connect your PC to the Control board with the included USB cable.

**Step 3:** Select the appropriate COM Port and then click the Plug/Lightning Icon to connect.

Step 6: Put on your Laser Protection Glasses and Focus the laser lens. Turning the lens to focus until the beam spot is as small as possible.

Step 4: With a successful connection you will see green text in the console window that says "Grbl 1.1f ['$' for help]"

Step 5: Enter the command "M3 S2500" in the command window, then press Enter. (Turns on laser @ Low Power)
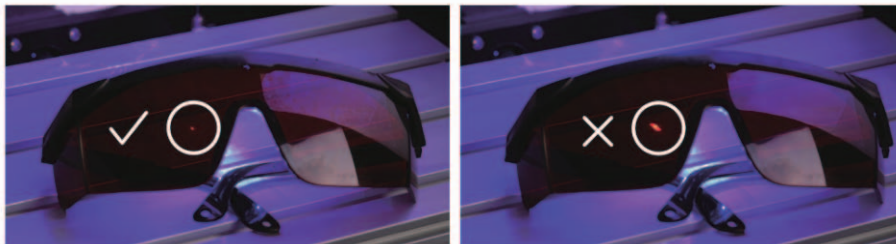
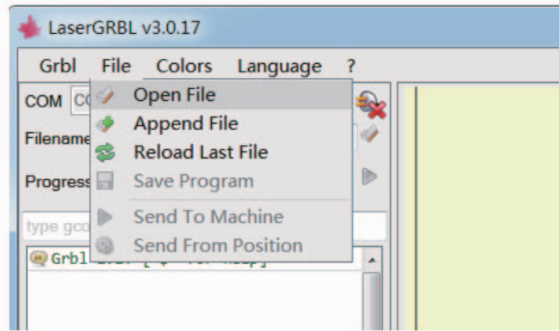**Enter the command "M5" to turn the laser off.**

Wear the glasses! Do not set them down like this with the laser on.
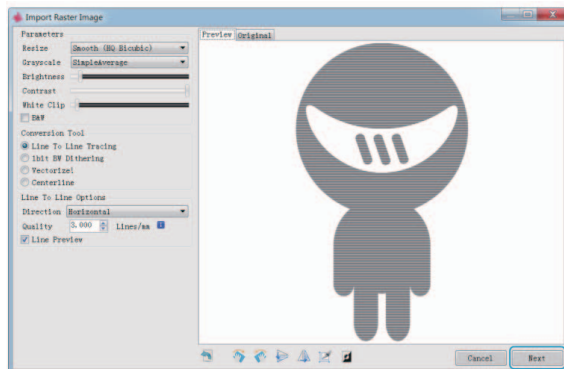This is for illustrative purposes so you can see the focused beam better in photos.

Section 4: Software Installation

Engraving the test file-LaserGRBL
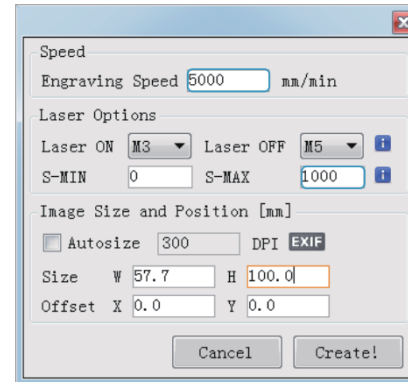
Step 1: File→Open File: Open GCODE file or Image format file.
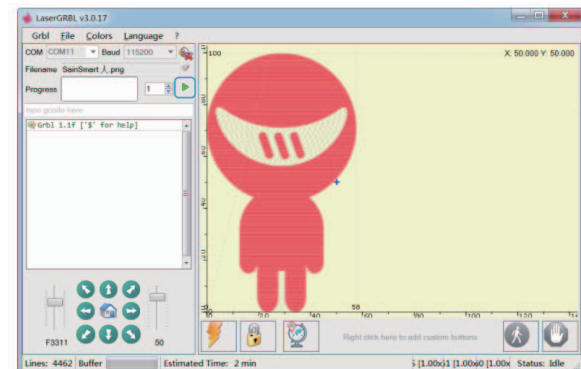

Step 2: Select Default Parameters.

Step 3: Set the Speed and S Values
Depending on Materials they will require different speeds and Values

Step 4: Set the Zero Position (Starting Point) then click "Run Program" to start engraving.

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