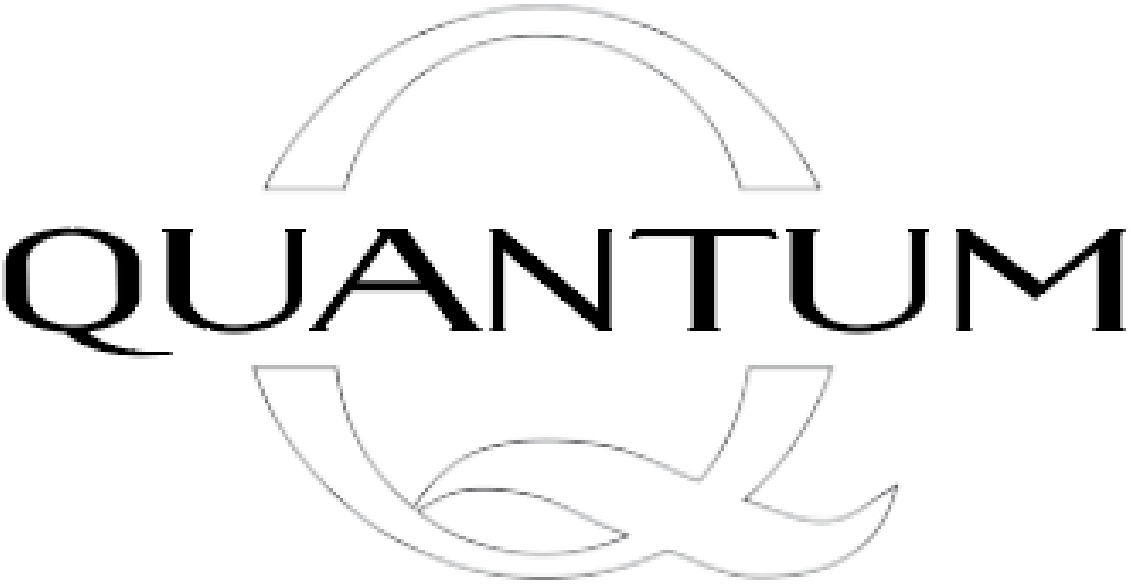
BobsCNC

Unleash Your Creativity



TO QUANTUM MAX

Assembly Manual

Rev 1.00

Welcome to the Family.

We're excited that you purchased the Quantum to Quantum Max CNC Router Kit from BobsCNC, and we know you're just as excited to put it together. This manual gives you step by step instructions to ensure your success in assembling the Quantum Max CNC Router and provides all the information you need to get your machine up and running.

Before beginning the assembly, take all the time you need to completely review the manual. It's good to be familiar with the entire assembly process before diving in. Be sure to check out the recommended tools you'll need for the assembly.

Welcome to the BobsCNC family. It's time to… *Unleash Your Creativity!*

Contents

Information/Warning Boxes 5

Safety Precautions and Warnings 6

Getting Started 7

- Required Tools to Assemble the Quantum CNC Kit: 7
- To Operate the BobsCNC Quantum CNC Router, you need will need: 7
- Recommended for the electronic setup include: 7

Assembly Recommendations: 8

Removing Quantum components 9

- Illustrated Step by Step Instructions 9

Quantum MAX X-Frame Assembly 14

- Required Wood Components 14
- Required Hardware 15

Final Assembly 36

- Required Hardware 36
- Illustrated Step by Step Instructions 36

Wire Harness 46

- Wood Components 46
- Required Hardware 46
- Illustrated Step by Step Instructions 46

T-Slot Spoilboard 49

- Wood Components 49
- Required Hardware 49
- Illustrated Step by Step Instructions 49

Completed Views 54

Tramming 56

Clamping System 58
Wood Components (Included with Kit) 58
Required Hardware 58
Congratulations! You Just Completed the Assembly of Your BobsCNC Quantum CNC Router. 59
Appendix 60
Firmware Values 60
Quantum Washer Size Table 61

BobsCNC Quantum Specifications

Feature list

The assembled footprint:

Length: 63" (1600 mm)

Width: 40" (1016 mm)

Height: 22” (560 mm)

Assembled Weight: 50 lbs.

Cutting Area:

X: 50.5" (1283 mm)

Y: 24" (610 mm)

Z: 3.8" (98 mm)

Safety is always the First Priority. Always wear proper protective equipment and use "safety sense" when assembling and operating your Quantum Series CNC Router.

Information/Warning Boxes

	**CAUTION** Indicates a possible risk of injury that can result from failure to follow this instruction
	**WARNING** Indicates the possible damage to the machine, its components, the work piece, or injury that can result from failure to follow this warning.
	**DANGER** Indicates a serious risk of bodily harm, injury and death. This is a serious warning and should not be ignored. Any work must be carried out with extreme caution.
	**TIPs** Contains helpful information, shortcuts, and hints to simplify assembly and make machine operation easier and safer.

Safety Precautions and Warnings

BobsCNC Routers have a 110 v. Power Supply and use bits that spin at 30,000 rpm with cutting edges that are sharp and hazardous. The operator must understand the potential hazards and is responsible to take appropriate safety precautions before operating the Router.

- Only use extension cords rated for 20 amps plugged into a dedicated outlet.
- Inspect the machine before every use for maintenance issues: loose fasteners, belts, etc.
- Do not operate the machine with dull or damaged router bits.
- Always unplug machine after each use and when cleaning the router or changing router bits.
- Remove rings, bracelets, watches, necklaces before using the machine.
- Wear snug fitting clothing and/or roll up long sleeves to prevent snagging.
- Use appropriate personal protective equipment (PPE) when operating machine including safety glasses and hearing protection.
- Keep hands, hair and clothing away from the moving parts of the machine.
- Do not operate the machine when under the influence of alcohol or prescription medications.
- Make certain the workpiece is clamped securely in place before starting the machine.
- Never leave the machine running unattended.
- Children must be supervised by adults when operating the machine.
- Do not operate the machine in the presence of flammable materials.
- Keep floors clean, dry, and free of debris to eliminate slip and/or trip hazards.
- Have a suitably rated fire extinguisher on hand when the machine is in operation.

Getting Started

Required Tools to Assemble the Quantum CNC Kit:

Metric Socket Set

#1, #2 and #3 Phillips Screw Drivers

Needle Nose Pliers

Set of Metric Allen Wrenches

Pliers

Utility Knife

Clear Nail Polish or LOCTITE 242

Scissors

Blue Painter's Tape

To Operate the BobsCNC Quantum CNC Router, you need will need:

Computer with control software for GRBL.

Materials for Projects.

1/4" Shaft Router bits.

Recommended for the electronic setup include:

Multimeter to correctly connect the Power Supply and to set the current for the Stepper Motors (a great tool for general electronic trouble shooting).

Assembly Recommendations:

Use a large, flat, clean work surface for assembling your Quantum Max.

All Screws (unless noted) should be installed snug, then rotated 1-2 ½ turns.

Apply LOCTITE 242™ or clear fingernail polish to all M4 X 16 mm Machine Screws that are used to secure plywood pieces. Machine Screws that are secured with Lock Nuts do not need LOCTITE™.

Light sanding of the wood components may be performed if desired.

Painting or applying stain with a clear coat will provide extra protection to the wood components.

Clean the rails with acetone to remove rust preventative and apply a light coat of PTFE (Teflon®) lubricant.

We recommend using strips of 1-inch blue painter's tape behind the T-Slots to help hold the Nuts in place during assembly.

Lock Nuts are never used to secure components that have T-Slots. They are only used to mount components where the Nut is not held in a T-Slot.

CAUTION This kit contains numerous small components that pose a choking risk for small children and pets. Keep kit pieces in a secure location out of the reach of small children and pets.

Removing Quantum components

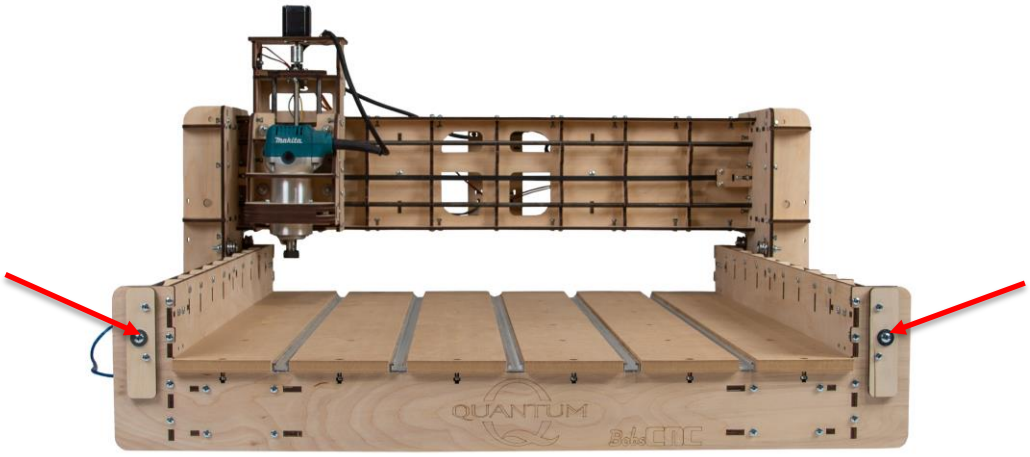
Illustrated Step by Step Instructions

Step 1 Remove and discard spoilboard

Step 1a Remove all M4x16 Machine Screws, then remove all MDF and Aluminum T-Slots from the X Frame Assembly.

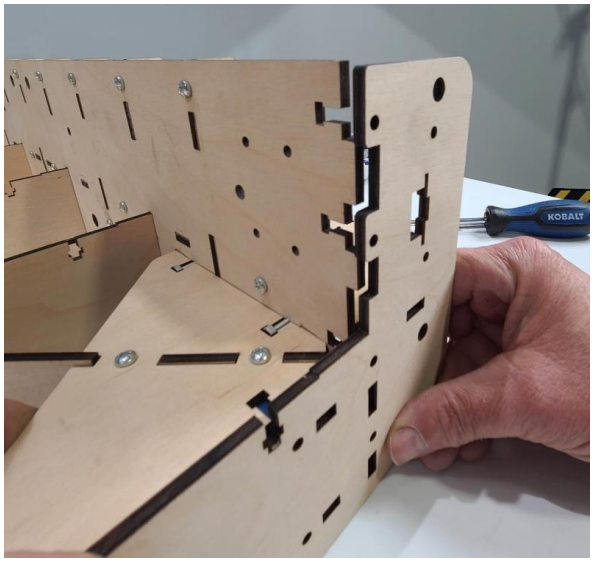
Step 2 Remove Gantry Assembly and X parts.

Step 2a Loosen and remove the Belts by loosening the two M5 Machine Screws as shown.

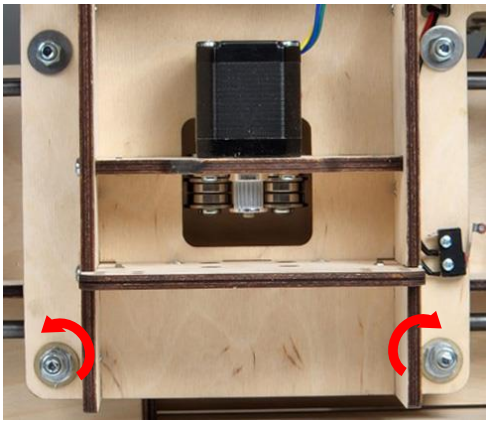


NOTE: Keep the Belt Retainer parts to rebuild the longer Belts.

Step 2b Remove the Frame End Support by removing all sixteen M4 x 16 Machine Screws. **Retain Frame End Support.**

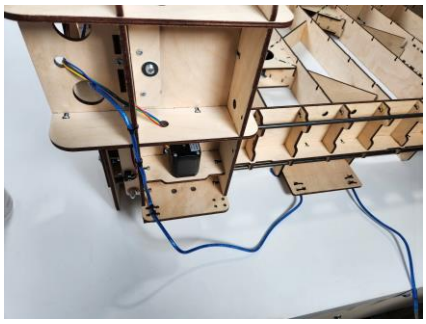


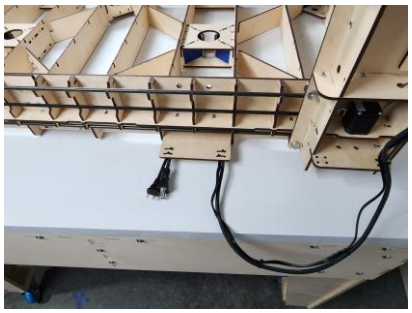
Step 2c Loosen both sides of the Gantry Side Bearings by adjusting the Eccentric Spacers so that the bottom Bearings rotate freely.



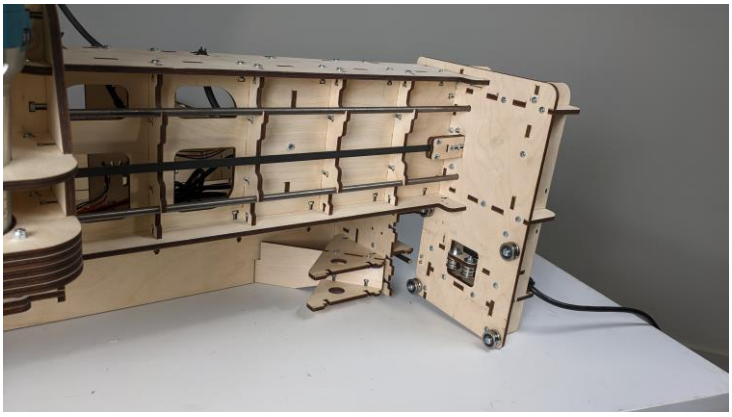
Rotate Counter-Clockwise **Rotate Clockwise**

Step 2d Cut all the zip ties holding wires to the Wire Harnesses on the X Frame Assembly.

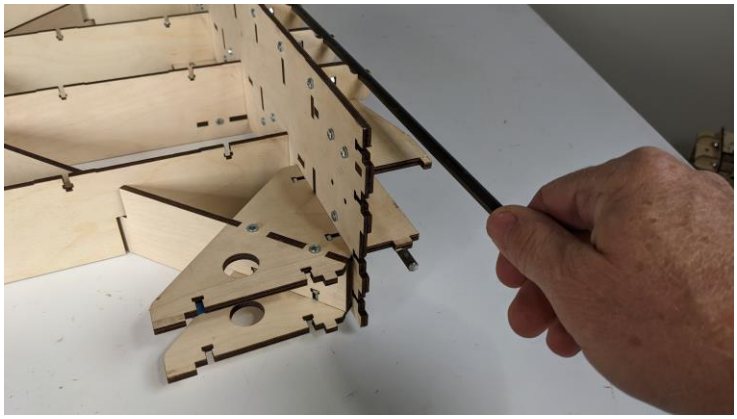




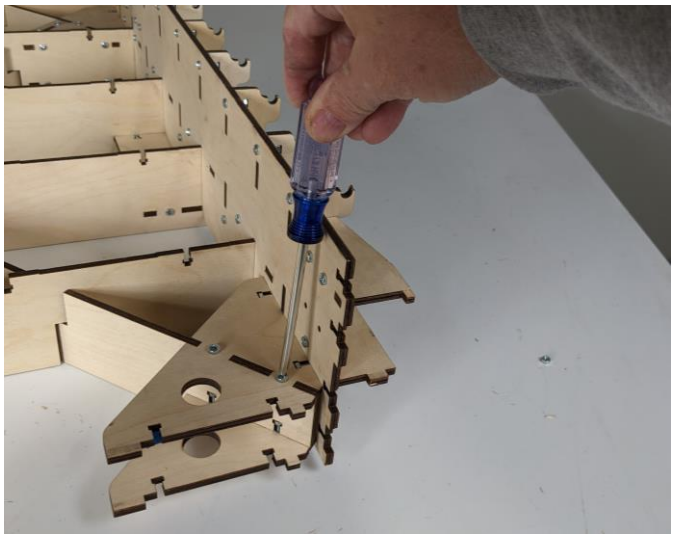
Step 2e Slide the Gantry to the front and gently remove the Gantry from the machine.

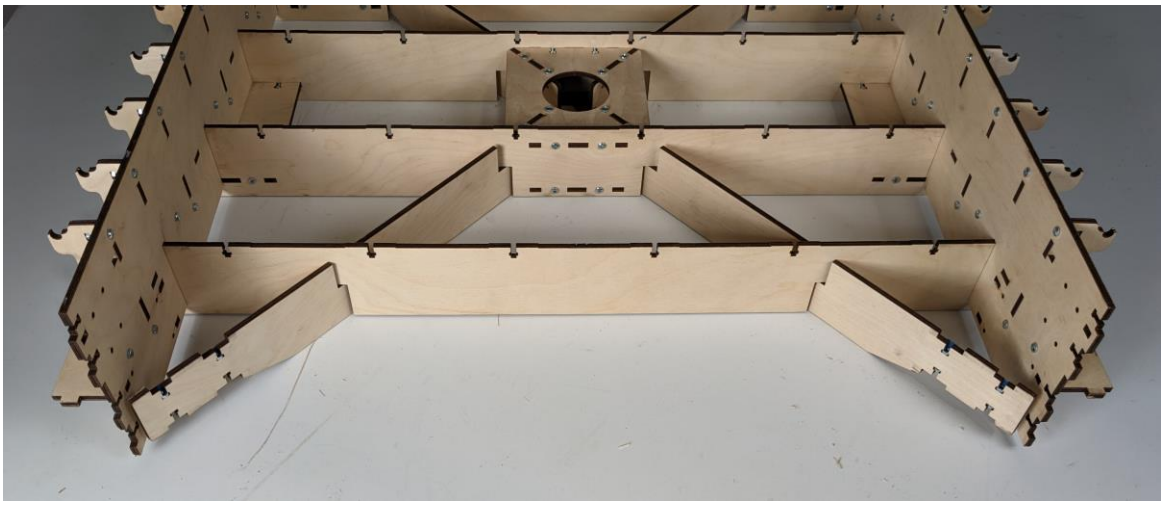


Step 2f Remove all 4 X Rails.



Step 2g Remove both Frame Corner Supports and Belt Support from each side of the X Frame Assembly. **Retain all four of the Frame Corner Supports and Both Belt Supports.**

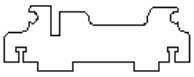
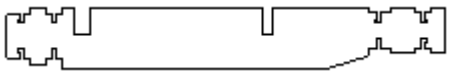
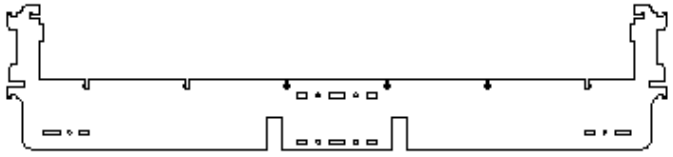
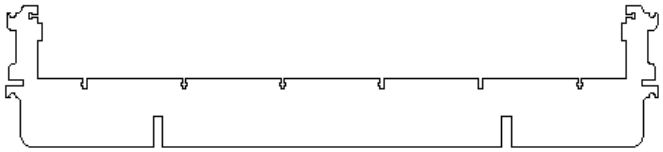
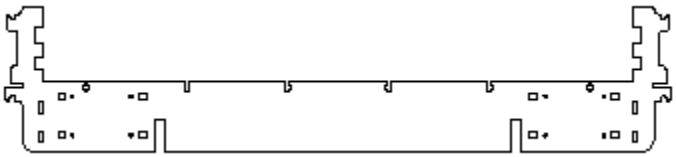
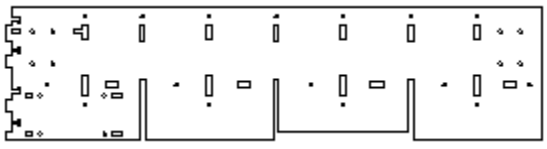
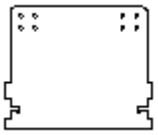


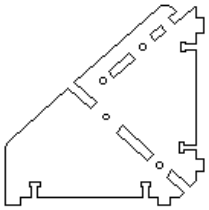
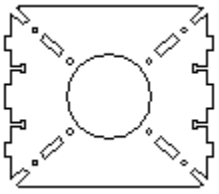
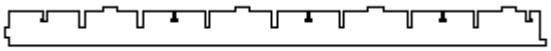
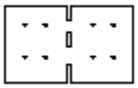


Finished view of Quantum X Frame ready to be lengthened.

Quantum MAX X-Frame Assembly

Required Wood Components

Part #	Description	Qty	Photo
QX1	Rail Support	8	
QX2	Torsion Arm	2	
EQX2	Extension Torsion Arm	2	
QX3	Inner Frame Mid Support	2	
QX4	Outer Frame Mid Support	1	
EQX4	Extension Frame Mid Support	1	
EQX5	Extension Frame Side Support	2	
QX7	Wire Harness Support	2	

EQX8	Extension Frame Corner Support	4	
QX9	Torsion Plate	2	
EQX10	Extension Frame Side Brace	2	
EQX12	Extension Coupling Plates	2	

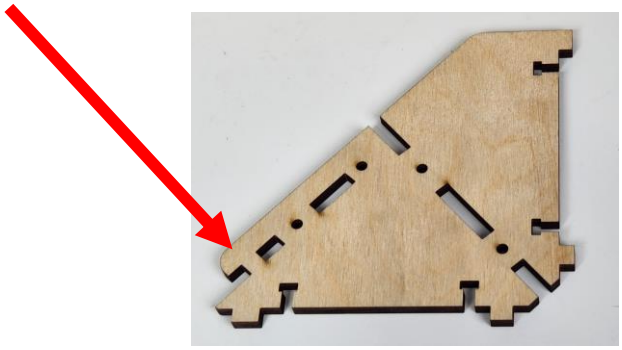
Required Hardware

Part #	Description	Qty	Photo
H14	M4 x 16 Machine Screw	182	
H15	M4 Nut	182	

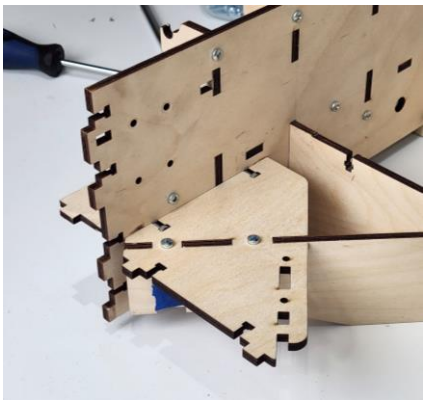
Illustrated Step by Step Instructions

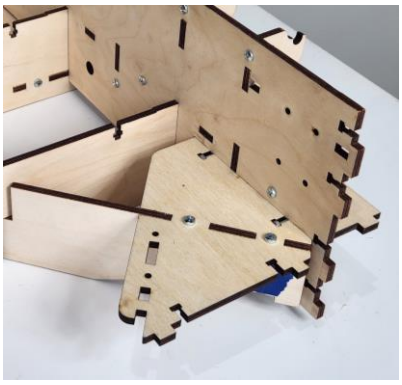
Step 1 Attach two Extension Frame Supports to Quantum Frame.

Step 1a Attach two Extension Frame Corner Supports (EQX8) on the Torsion Arms (QX2). Note the notch in the Corner Support should be oriented toward the front and the center of the Assembly.



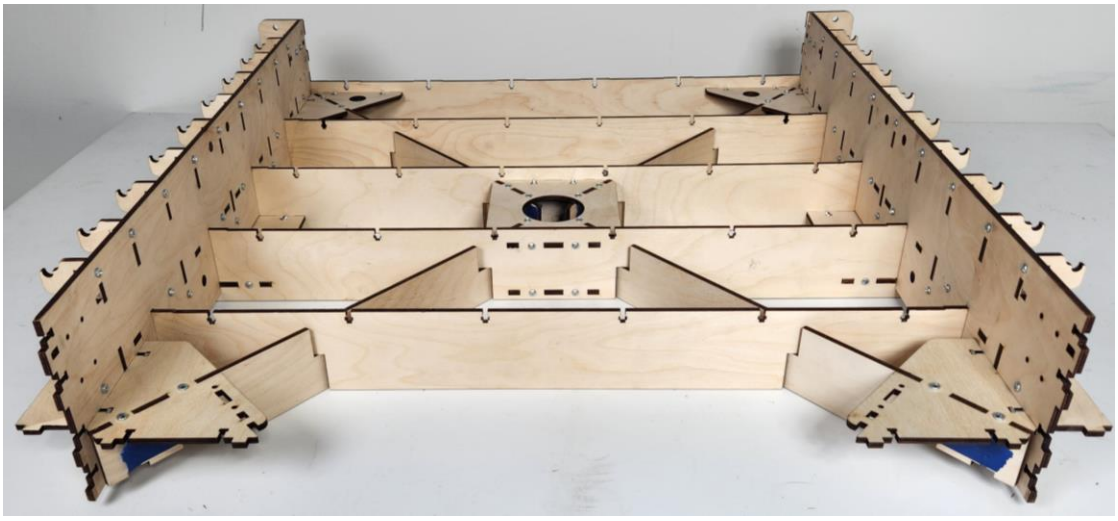
Step 2a Align the slots in the Frame Corner Supports (QX8) with the tabs on the Torsion Arms (QX2). Slide in place and secure with four M4 x 16 Machine Screws. Repeat for each of the corners.





Only install the top Supports. The Bottom Supports will be installed in a later step.

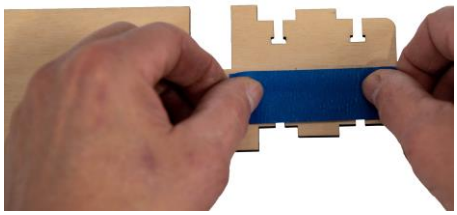
.



Step 2 The following steps will cover building the Front X Frame Assembly.

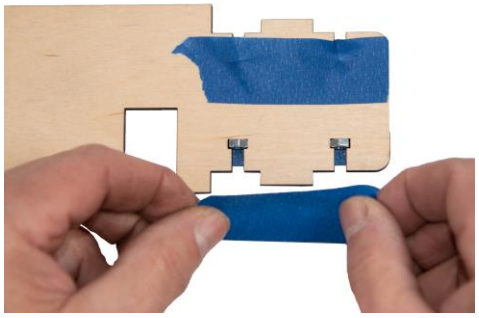
WARNING There are two long and two short Torsion Arms in the Max Front X-Frame Assembly. The long Torsion Arms are located on the front of the Assembly. The short Torsion Arms are located at the rear of the Assembly.

Step 2a Use strips of painter's tape to cover all the T-Slot cutouts in each of the four Torsion Arms (QX2 and, EQX2) and Torsion Plates (QX9) as shown.



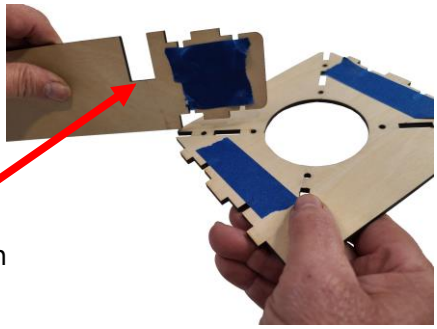
Step 2b Turn the Torsion Arms over and install a M4 Nut in each of the T-Slots as shown below.

Cover the installed M4 Nuts with strips of painter's tape.



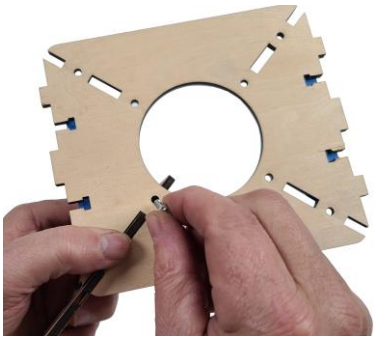
This will hold the nuts in place to make it easier to connect the Torsion Arms (QX2 and EQX2) to the Torsion Plate (QX9).

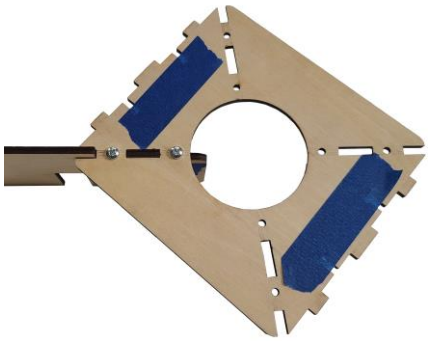
Step 2c Align the tab of the Torsion arm (QX2) with the corresponding slot in the Torsion Plate (QX9). Notice how the rectangular notch is oriented. Make sure the cutout in each of the arms is oriented in the same way in the Assembly.



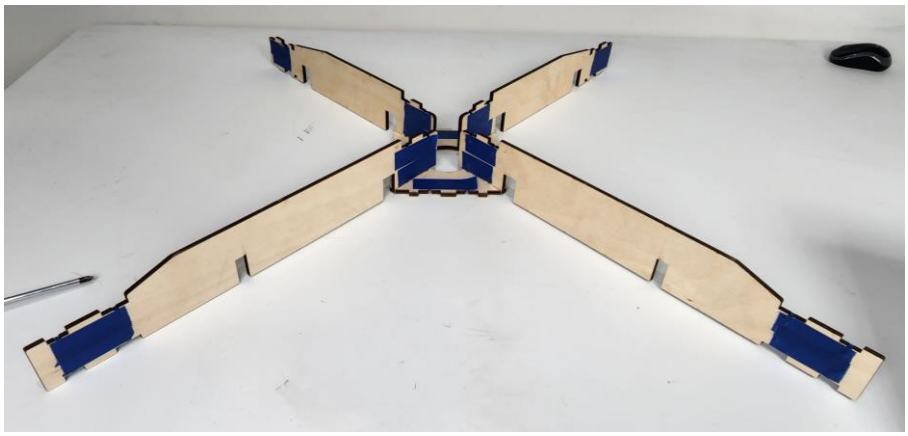
Rectangular Notch

Step 2d Secure the Torsion Arm (QX2) to the Torsion Plate using two M4 x 16 Machine Screws as shown below.

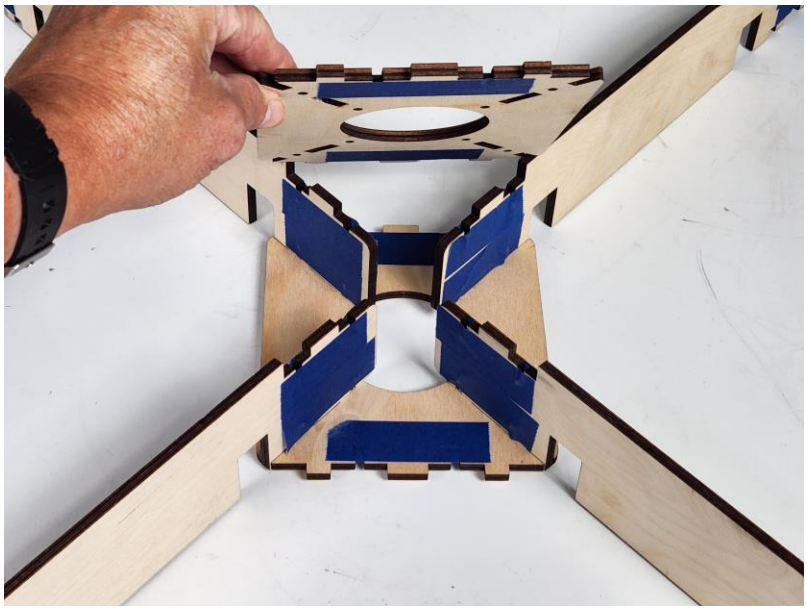




Step 2e Repeat to secure the Extension Torsion Arm (EQX2) to the Torsion Plate using two M4 x 16 Machine Screws each.

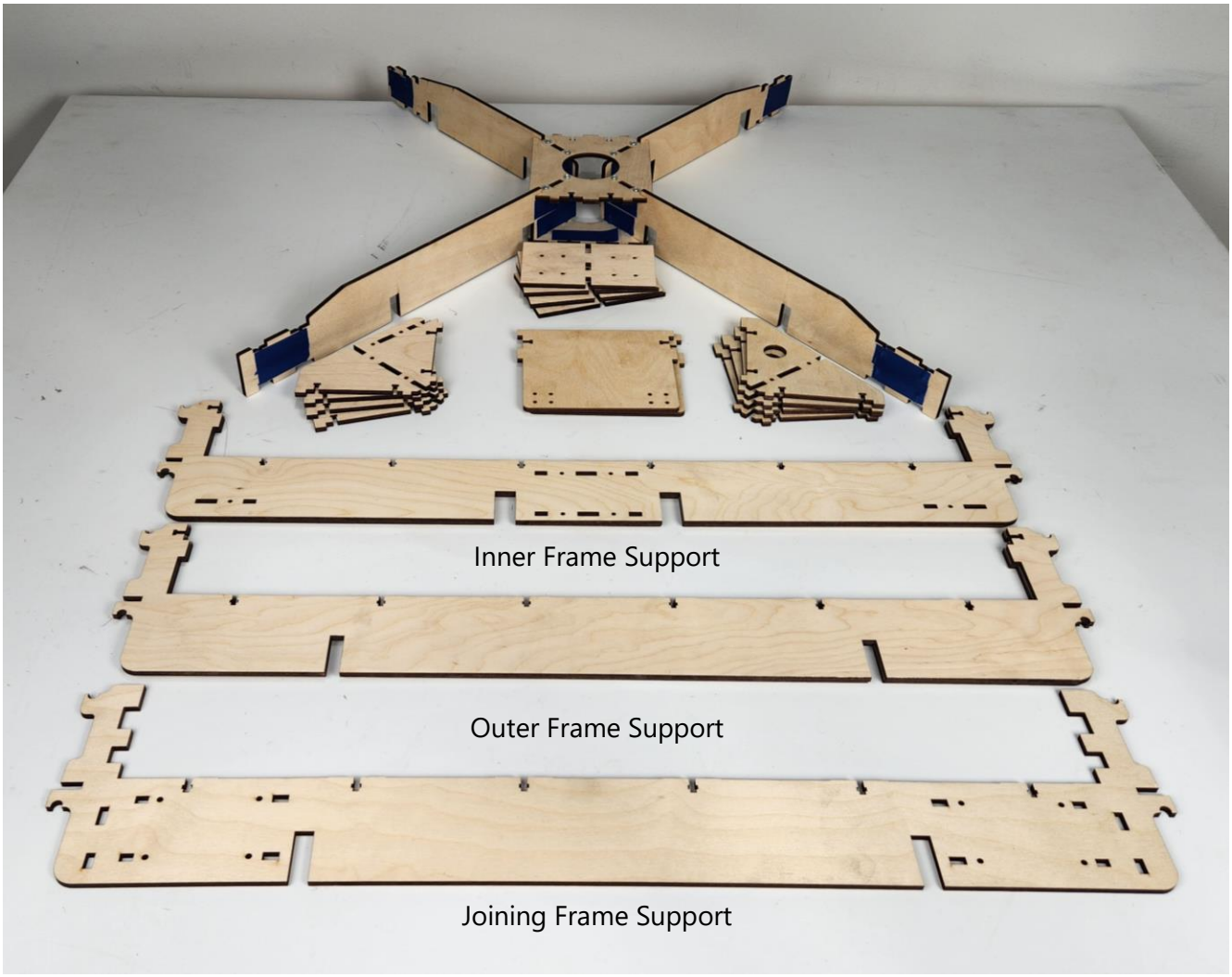


Step 2f Carefully turn the Assembly over and align the slots in the Torsion Plate with the tabs on the Torsion Arms.

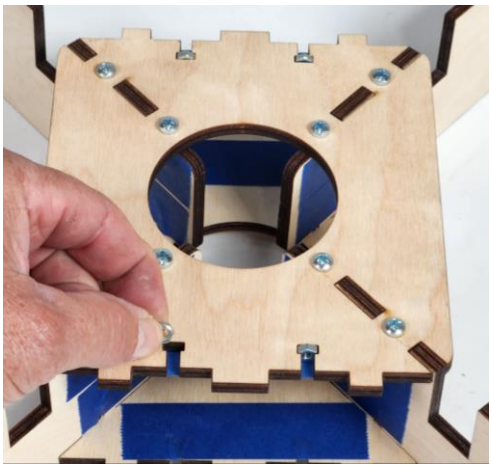


The taped side will be turned over before securing with eight M4 x 16 Machine Screws as shown below.

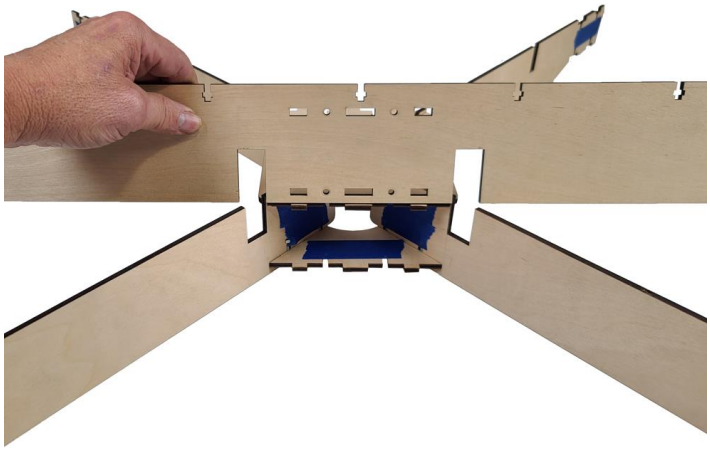
Step 3 Installing the Inner Mid Frame Supports (QX3), Outer Mid Frame Support (QX4), Wire Harness (QX7), Frame Corner Supports (QX8), Extension Frame Supports (EQX8), and Extension Coupling Plates (EQX12).



Step 3a Cover the T-Slots on the inner sides of the Torsion Plates with strips of painter's tape to hold the four M4 x16 Nuts inserted, as shown below.

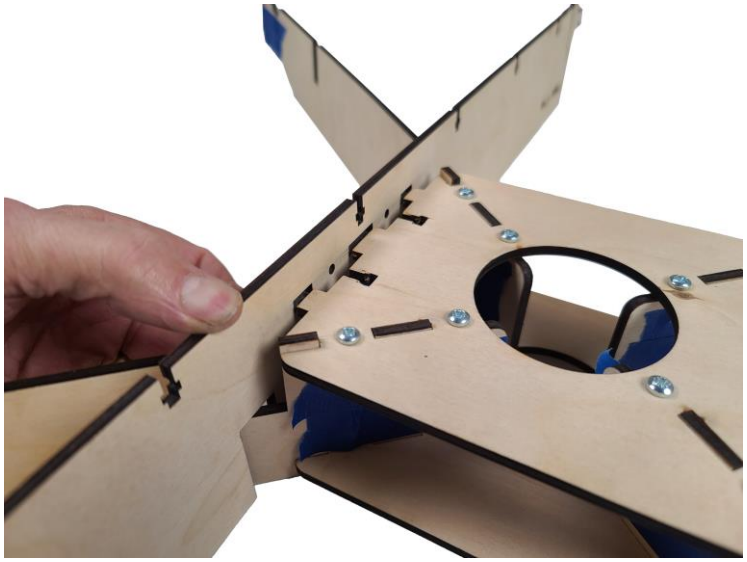


Step 3b Align the large slots of the Inner Mid Frame Supports (QX3) with those of the X-Frame Assembly. Carefully lower the Support into place as shown.

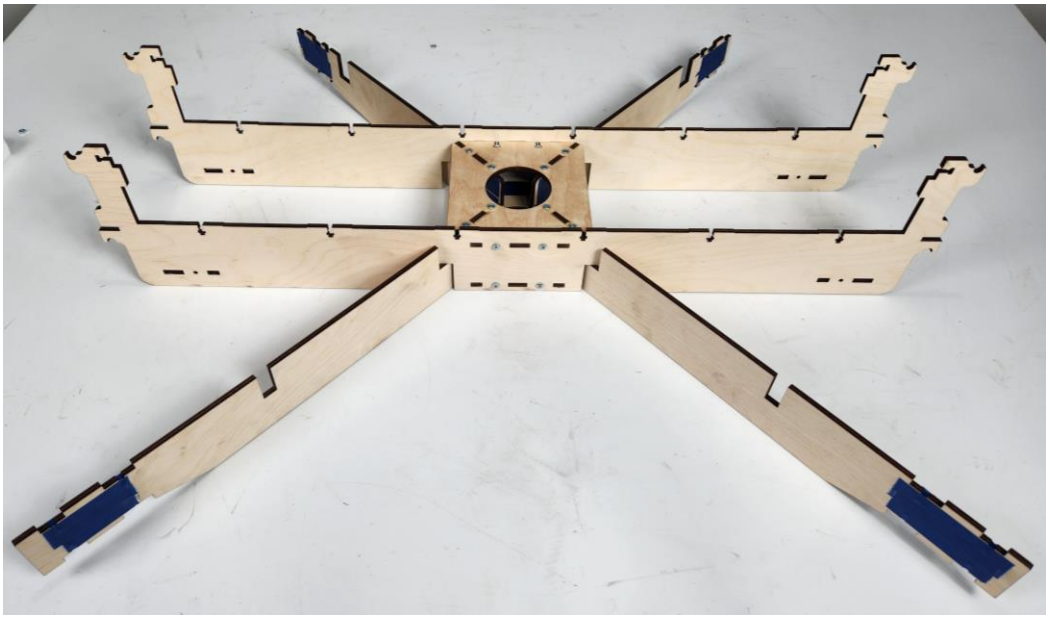


Align the slots in the Inner Mid Frame Support (QX3) with the tabs of both Torsion Plates.

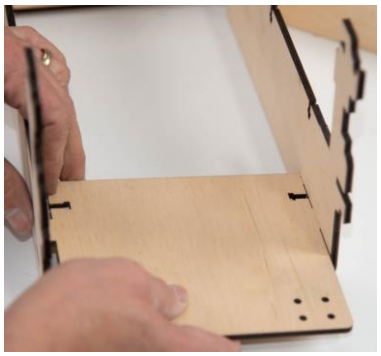
When the tabs are fully seated, secure with four M4 Machine Screws and Nuts in each Plate.

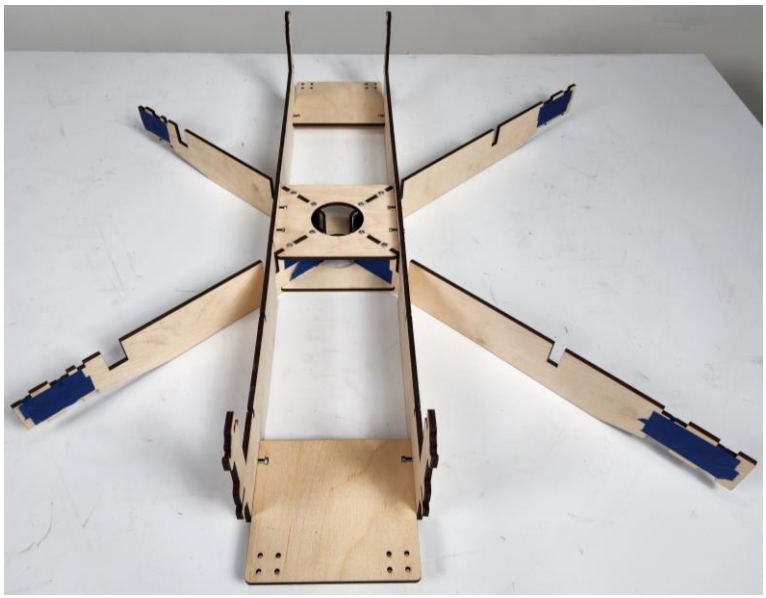


Repeat to attach the top and bottom of the second Inner Mid Frame Support.



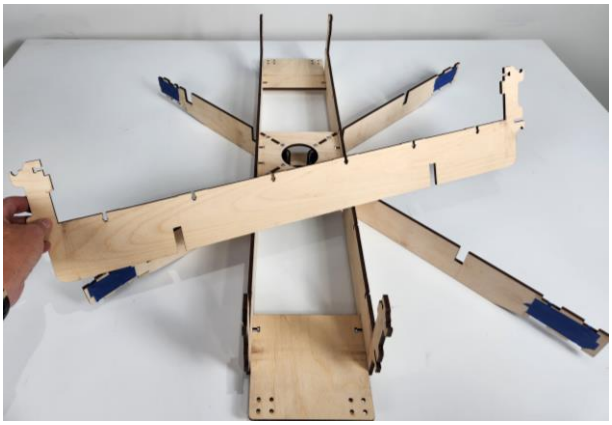
Step 3c Insert the tabs of the Wire Harness Support (QX7) into the slots at the end of the Inner Frame Mid Frame Supports and secure with two M4 x 16 Machine Screws and Nuts for each.

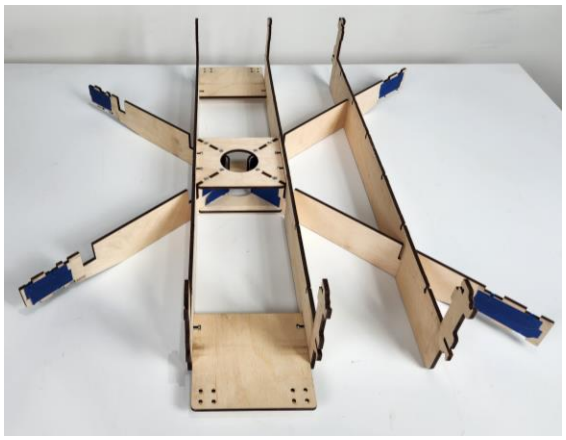




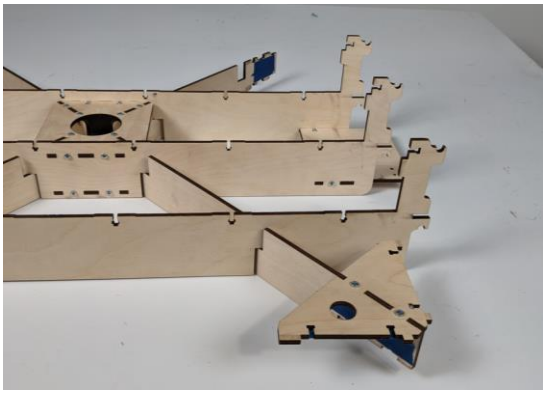
Both Wiring Harness Supports attached.

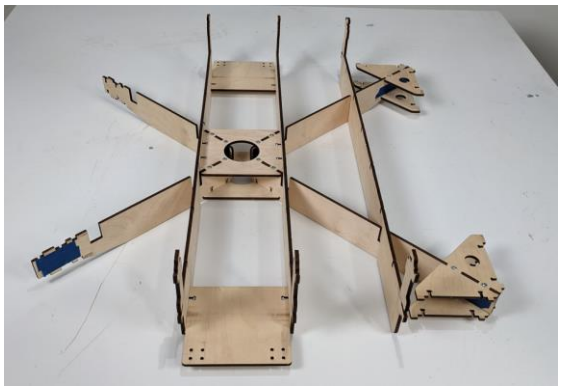
Step 3d Align the slots of the Outer Frame Mid Support (QX4) into the slots at the end of the Slots of the Torsion Arm (long) Assembly and slide into place as shown.



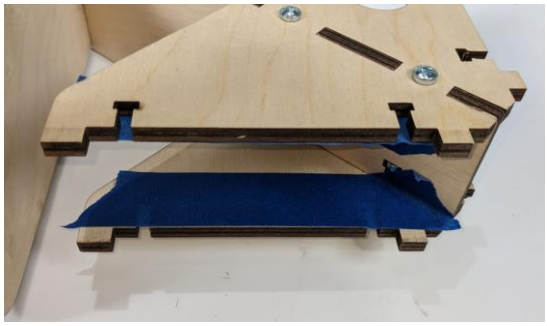


Step 3e Install four Frame Corner Supports (QX8) and secure with two M4 x 16 Machine Screws and Nuts each, closest to Outer Frame Mid Support (QX4) as shown.

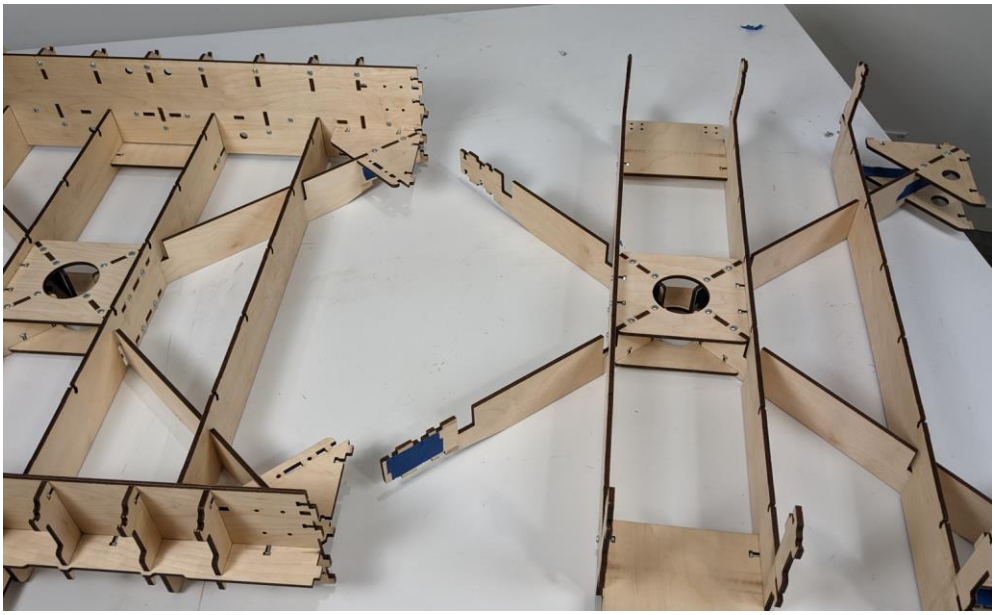




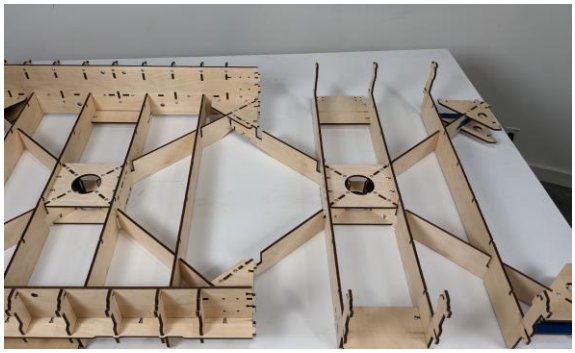
Step 3f Install blue painter's tape on both sides of the EQX8 (upper and lower sides), as shown.



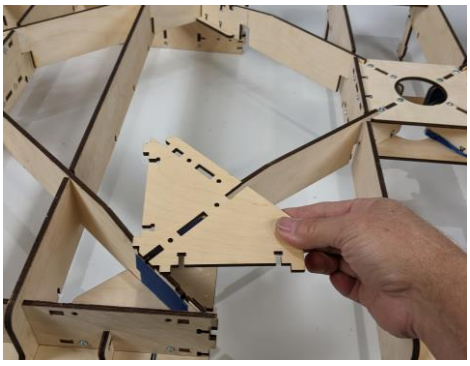
Step 4 Attaching the Front and Rear Assemblies

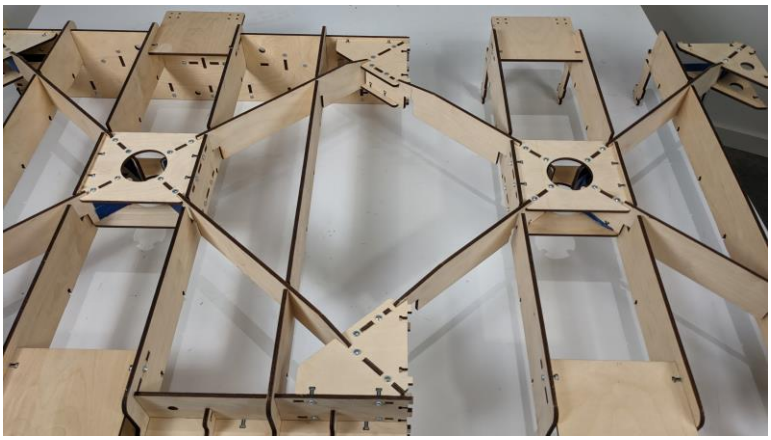


Step 4a Position the Front Assembly to the Rear Assembly, secure with two M4 x 16 Machine Screws to each side as shown.

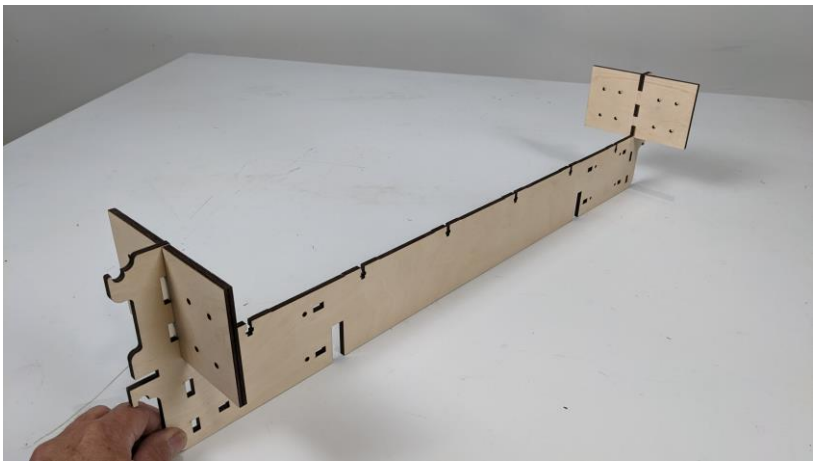


Step 4b Gently, flip entire X-Frame Assembly over and install the remaining two Extension Frame Corner Supports (EQX8) to the X-Frame Assembly, as shown and secure with six M4 x 16 Screws and Nuts.

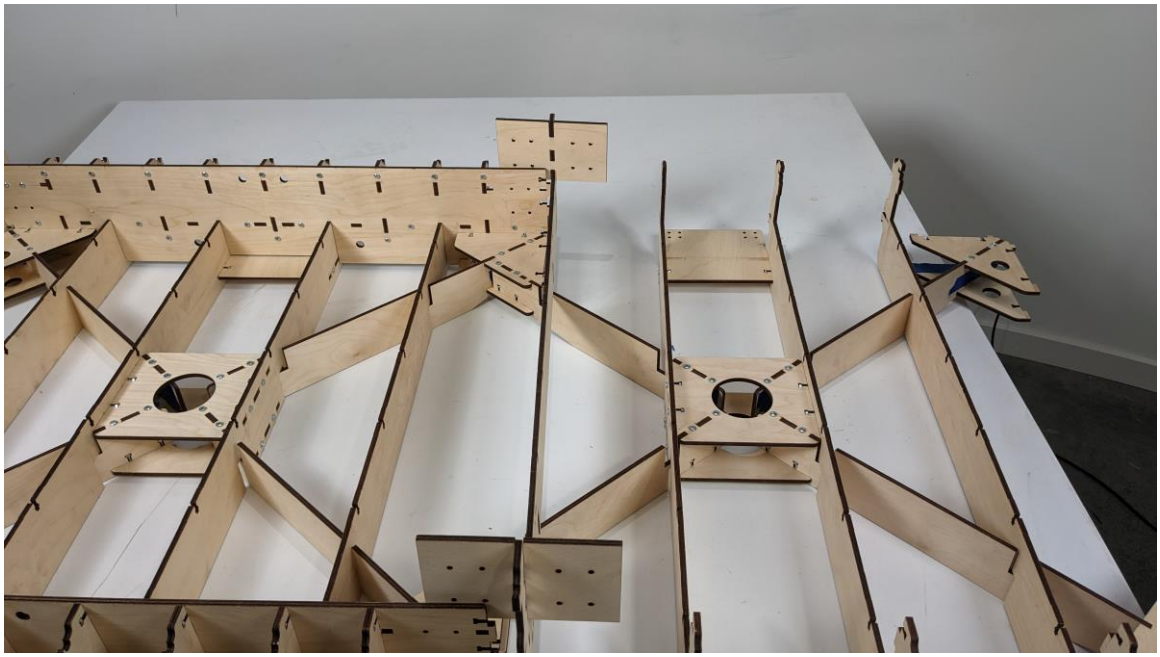


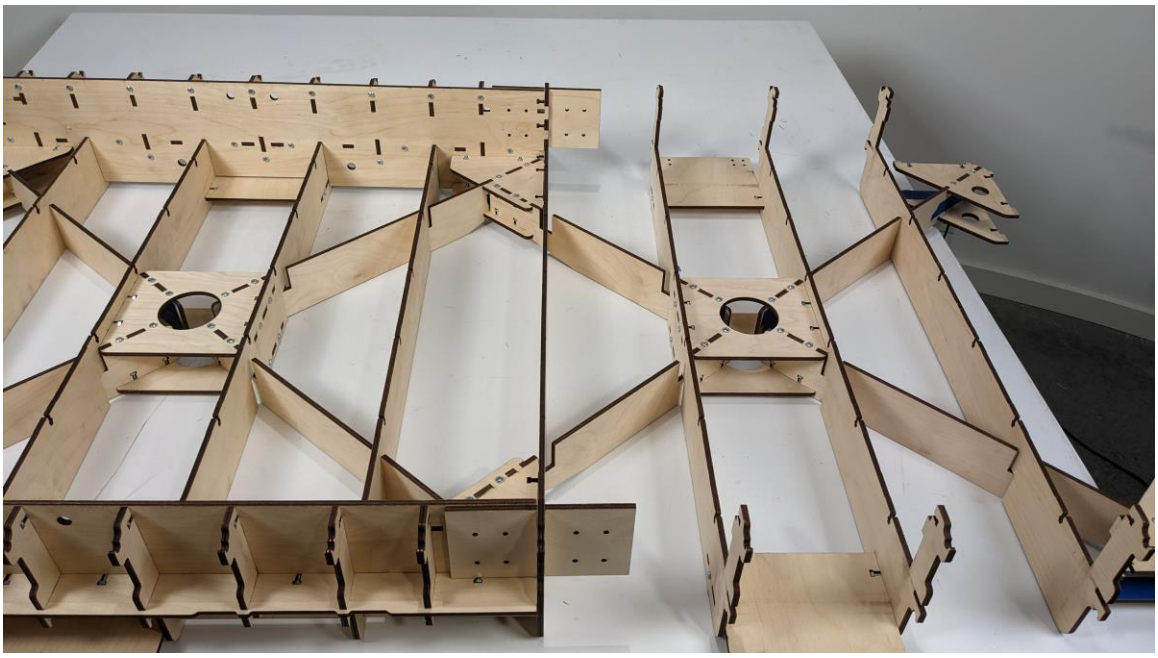


Step 4c Position both Extension Coupling Plates (EQX12) and onto the Extension Frame Mid Support (EQX4), as shown.

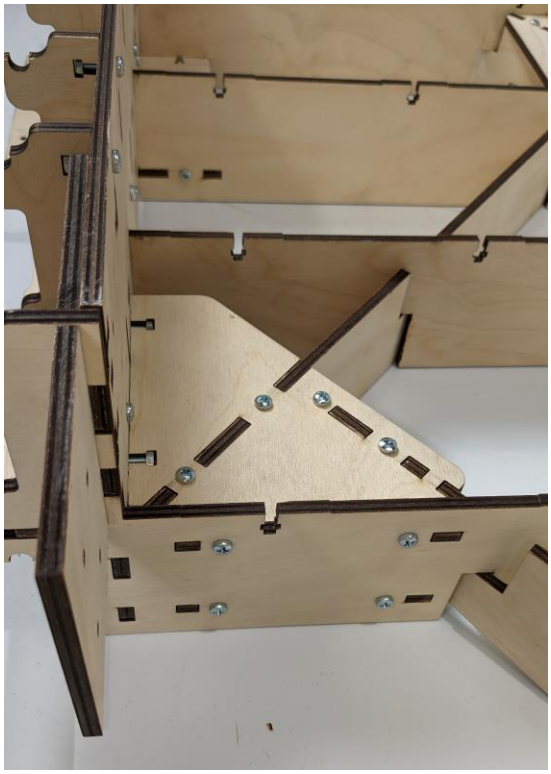


Step 5 Gently, flip the entire X-Frame Assembly back over and gently and evenly slide the Extension Coupling Assembly onto the X-Frame Assembly. Adjust so that all the tabs are inserted into the slots, as shown. Note that the Extension Coupling Plates are on the outside of the X-Frame Assembly.

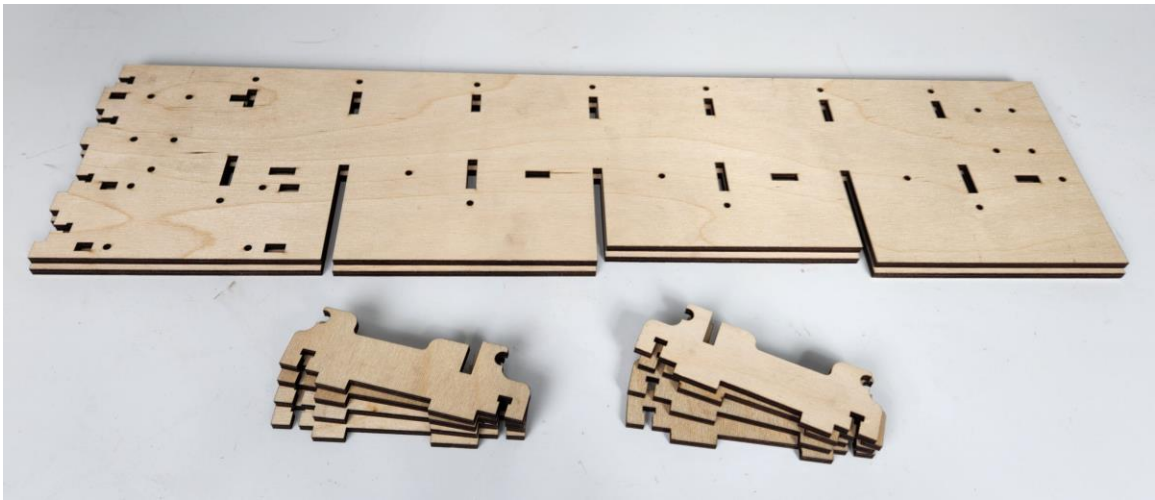




Step 5a Secure the Extension Frame Assembly to the X-Frame Assembly with four M4 x 16 Machine Screws and Nuts on each side, as shown.

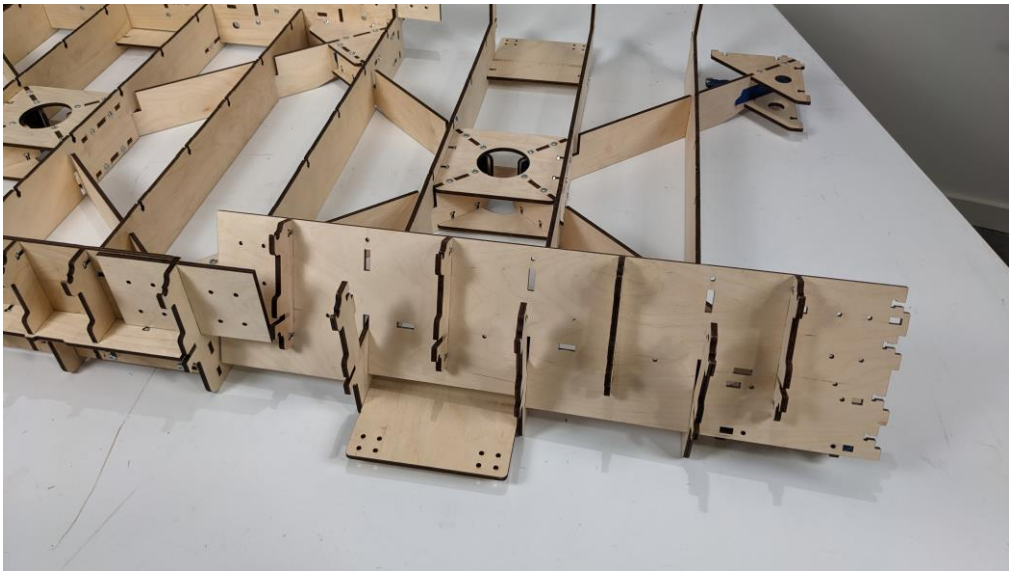


Step 6 Attaching the (QX1) Rail Supports to the (QX5) Frame Side Support.



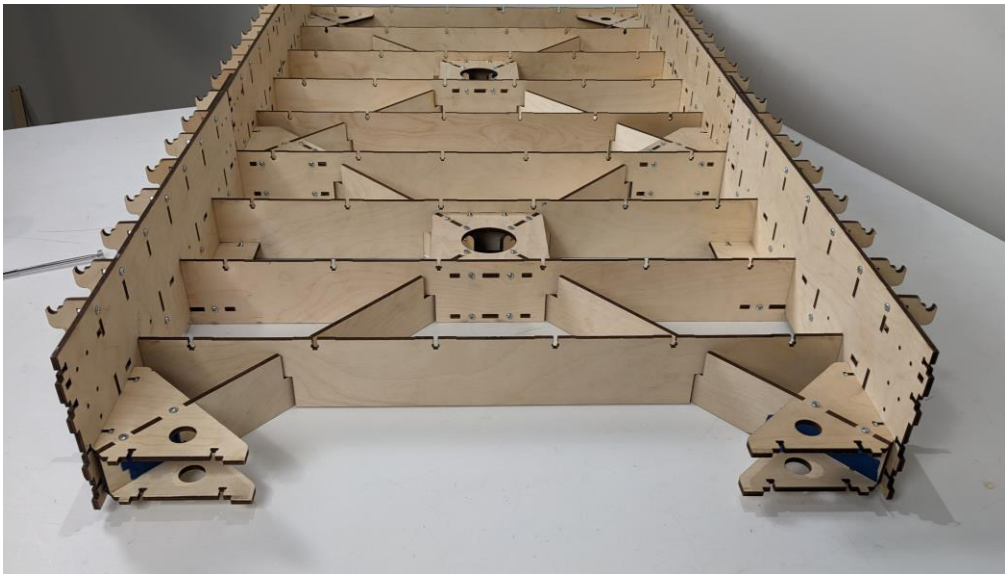
Step 6a Insert the tabs of the ten Rail Supports (QX1) into the corresponding slots of the Frame Side Supports (QX5) as shown and secure each with two M4 x 16 Machine Screws and Nuts.

Step 7 Attach the Side Frame Assemblies to the X-Frame Assembly as shown.

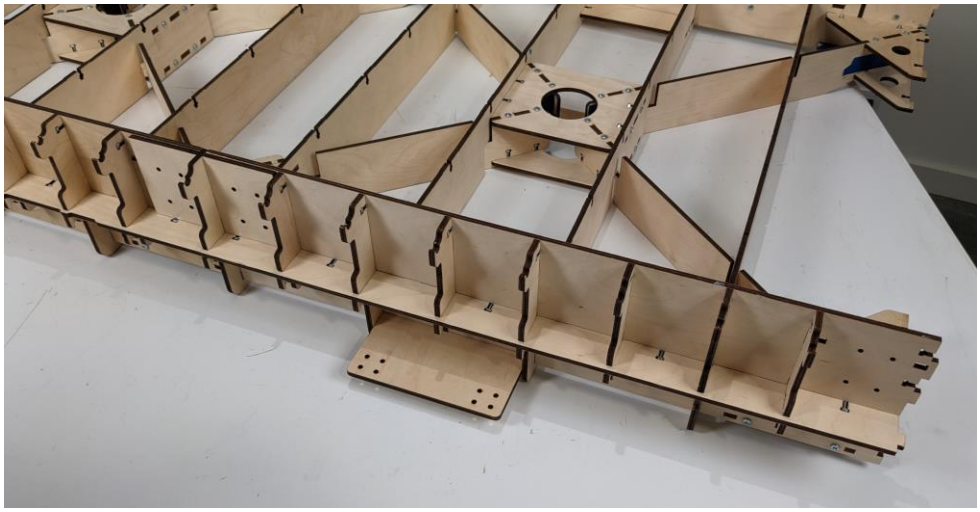


Step 7a Position the tabs of the Frame Corner Support to the X-Frame Assembly, as shown.

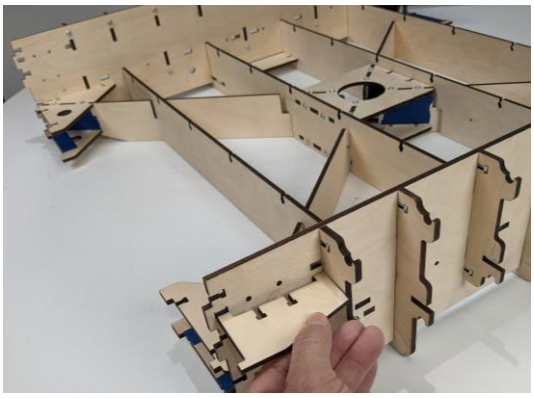
Step 7b Secure each side with seven M4 x 16 Machine Screws and Nuts, as shown.

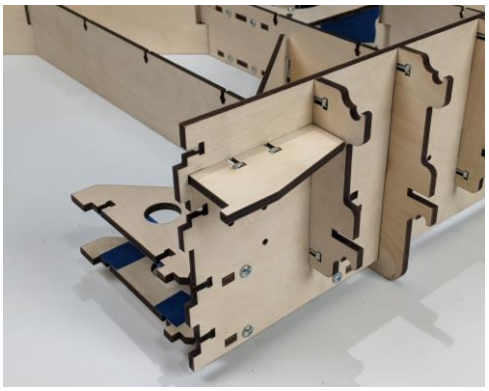


Step 8 Install the Extension Frame Side Brace (EQX10) on each side of the X-Frame Assembly, using five M4 x 16 Machine Screws and Nuts, each side, as shown.

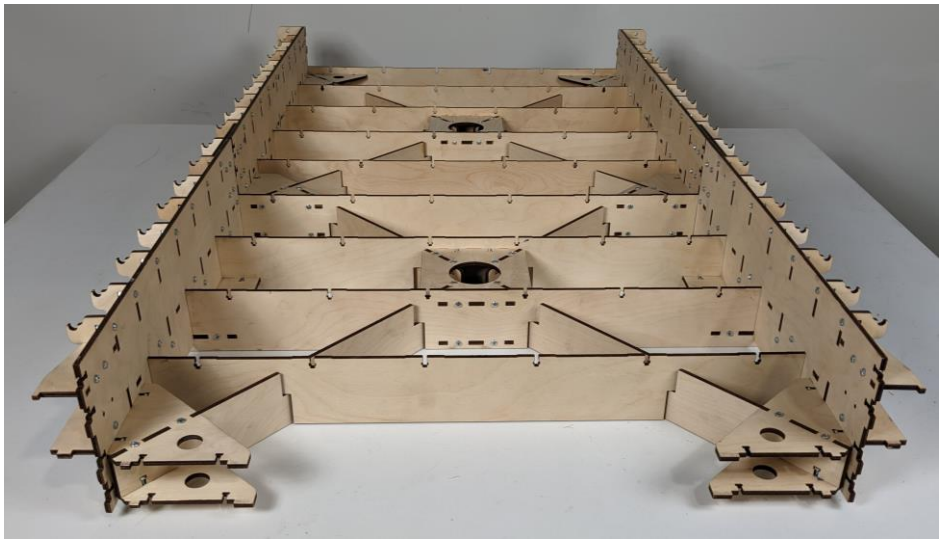


Step 9 Align the tabs of the each of the Belt Supports (QX11) in slots located at each end of the X Assembly and secure with two M4 x 16 Machine Screws and Nuts for each.





Step 10 Secure the Coupling Plates (EQX12) with eight M4 X 16 Machine Screws and Locknuts each as shown.



View of Quantum Max X Frame

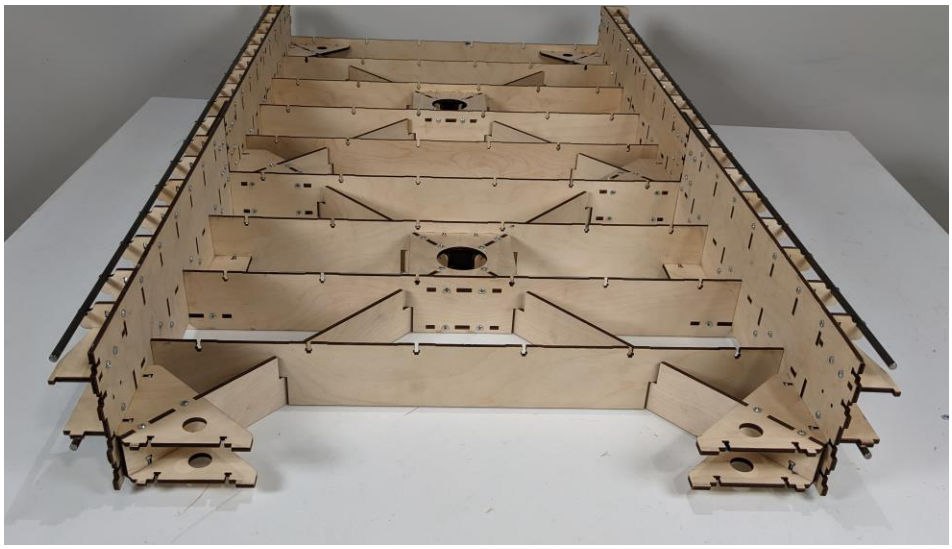
Final Assembly

Required Hardware

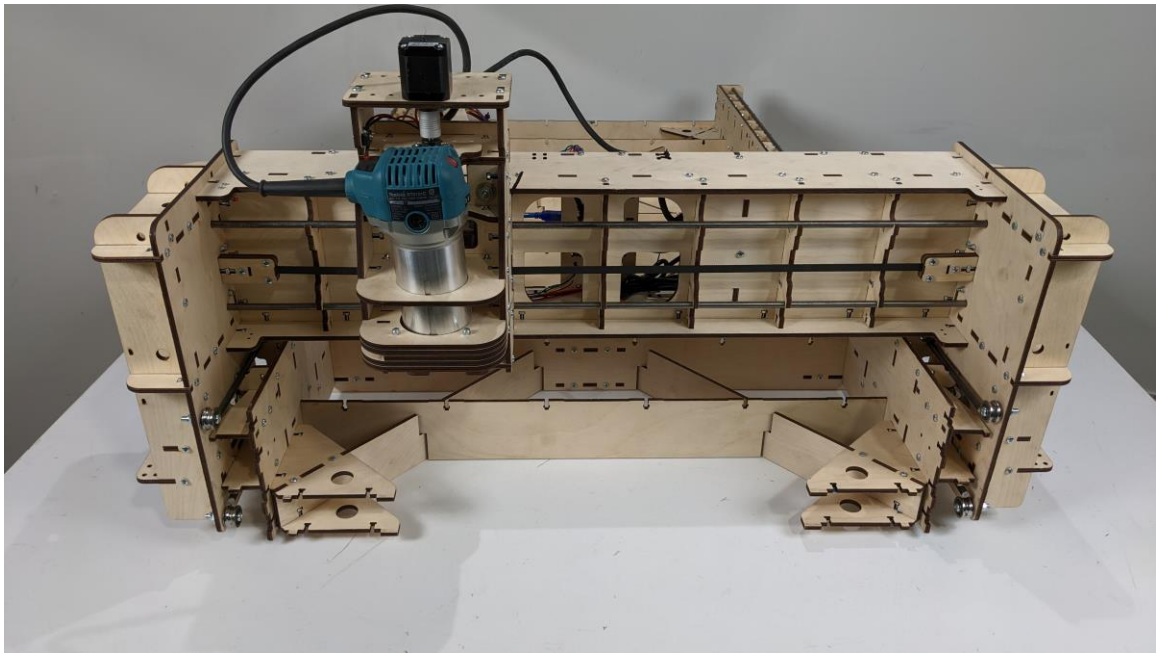
Part #	Description	Qty	Photo
H53	Stress Proof Steel XY-Rail	4	
H14	M4 x 16 Machine Screw	18	
H15	M4 Nut	18	
H83	GT2 – 9mm Belt	3	

Illustrated Step by Step Instructions

Step 11 Insert four X rails onto the X Rail supports as shown.

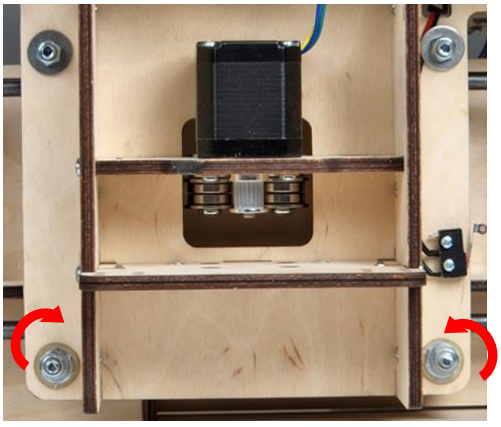


Step2 Gently install the Gantry Assembly onto the X Rails as shown.



Step 3 Adjust the Eccentric Spacers until the Bearings are snug against the Rails

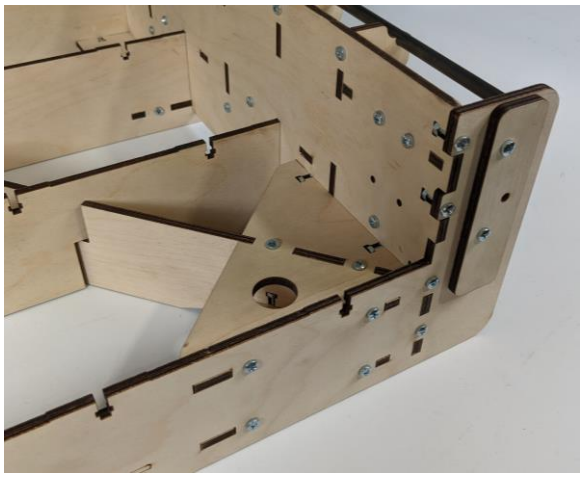
Rotate Clockwise



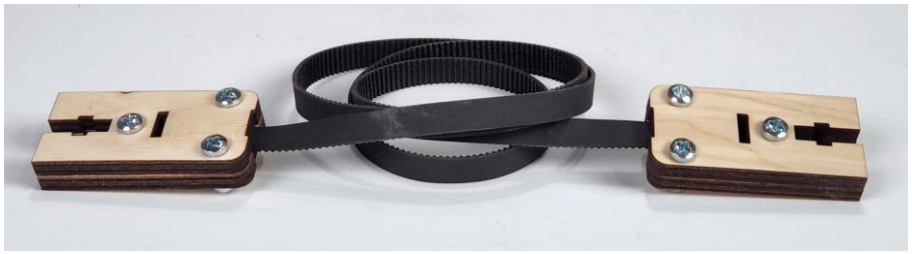
Rotate Counter-Clockwise

When adjusted, the position of the right and left Eccentric Spacers should mirror each other.

Step 4 Align the tabs and slots of the Frame End Support (QX6) with the tabs and slots of the Side Assembly and secure with eight M4 X 16 Machine Screws and Nuts for each side.



Completed X-Frame Assembly



Step 5 Attaching the GT2 9mm Drive Belts.

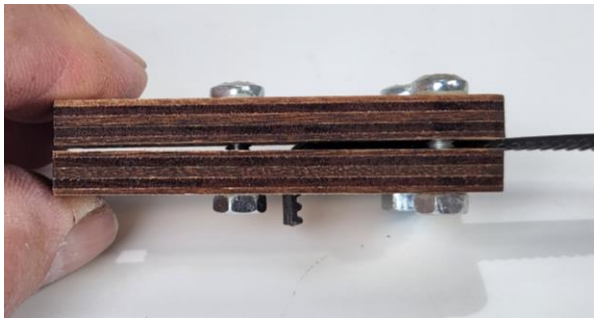
Step 5a Cut two lengths of the GT2 9mm Belt 60 inches long.

Step 5b With the teeth of the Belt facing down, thread one end of the 9mm Belt through the rectangular slot in a Belt Retainer as shown.

Step 5c Cover the Belt with the teeth still facing down with the second Belt Retainer.

Step 5d Sandwich the Belt between the two Belt Retainers and bolt them together with three M4 x 16 Machine Screws and Nuts.

After installing the first Screw and Nut, it is possible to adjust the amount of belt installed through the bottom of the clamp by gently pulling the belt until only two or three of the teeth are visible. Then, insert the remaining two M4 x 16 Machine Screws and Nuts.



When properly installed and tight, there shouldn't be a visible gap between the two Belt Retainers.

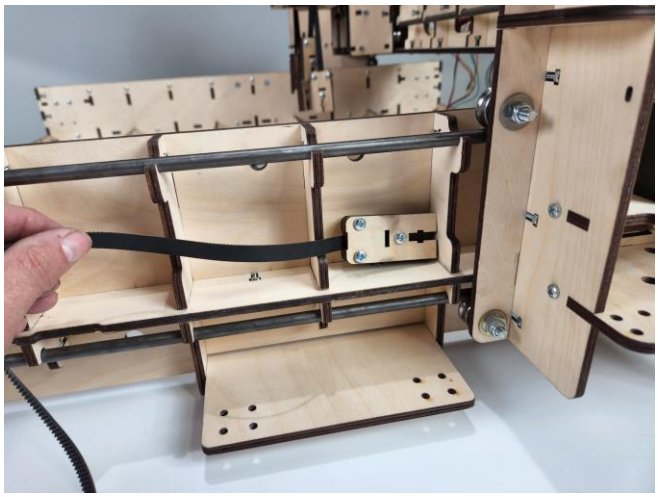
Step 5e Stretch the Belt Assembly out and measure the distance between the two notched ends in the Belt Retainers. The distance should be 57¼ inches for both X Belts.

Simply loosen the M4 x 16 Machine Screws and Nuts and gently adjust the belt to the correct length, as needed.

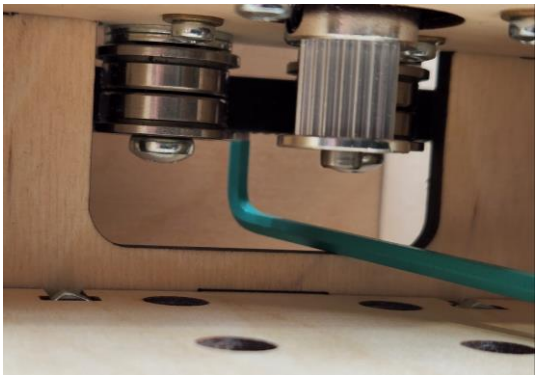
Step 5f Insert a M5 x 30 Machine Screw (H48) with a Idler Fender Washer (H50) through the Rail Stop mounted on the front Frame End Support. Then thread a M5 Square Nut (H93) on the exposed threads. Repeat for the Rear Frame End Support.

Step 5g Slip a Belt Retainer end over the exposed thread so that the Nut is seated in the cutout of the Retainer. Be sure the smooth side of the Belt is visible with the teeth oriented toward the X Frame Assembly.

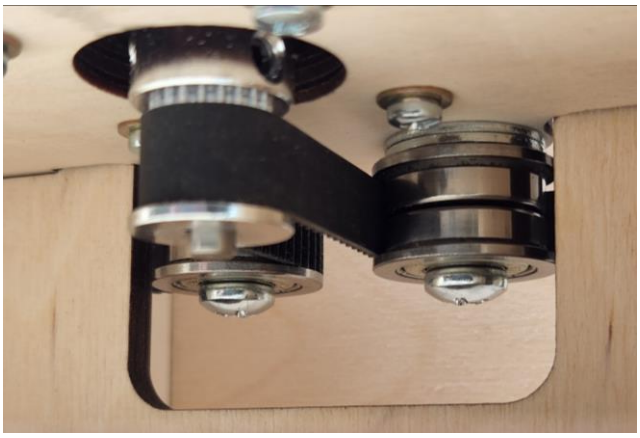
Step 5h Tuck the other Belt Retainer between two Rail Supports as shown. Hold the Belt in the notch in the Rail Support and slide the Gantry past the Retainer.

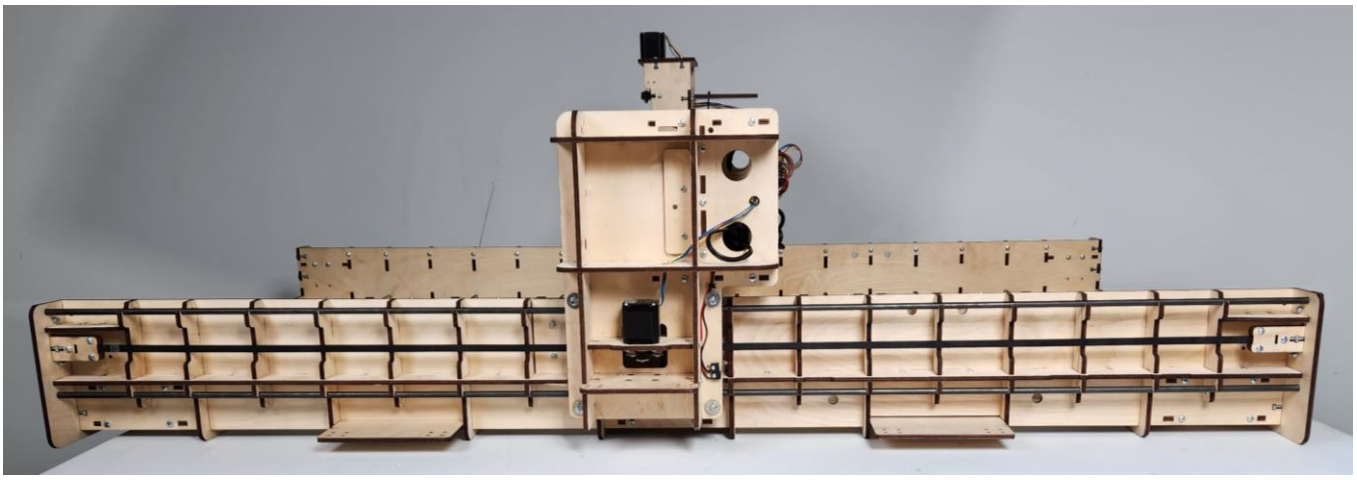


Step 5i Pull the slack belt tight and notice its location behind the GT2 Pulley and the Idler Pulleys. Gently position the Belt behind the Idler Pulleys. Using a long Allen wrench or a stiff piece of wire (e.g., AWG 12 solid core copper wire), bend a small hook into one end of the wire. Slip the short end behind the Belt and pull it between the Idler Pulleys and create a loop, as shown.

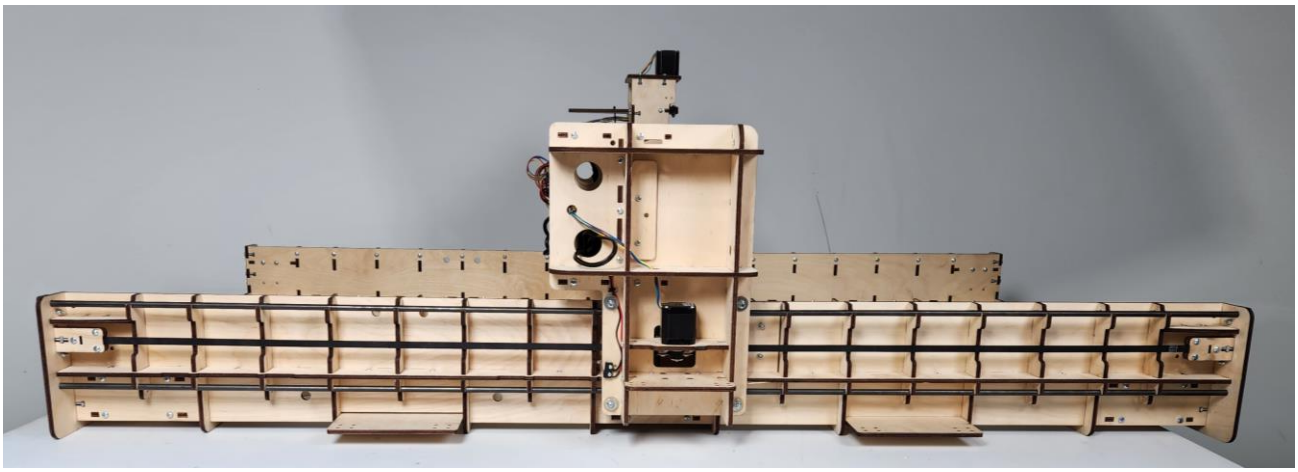


Slide the loop in the Belt over the GT2 Pulley, keeping tension on the Belts so they do not slip off the Idler Pulleys.





Step 6 Repeat these same steps to install the X2 Belt on the other side of the Gantry.



Wire Harness

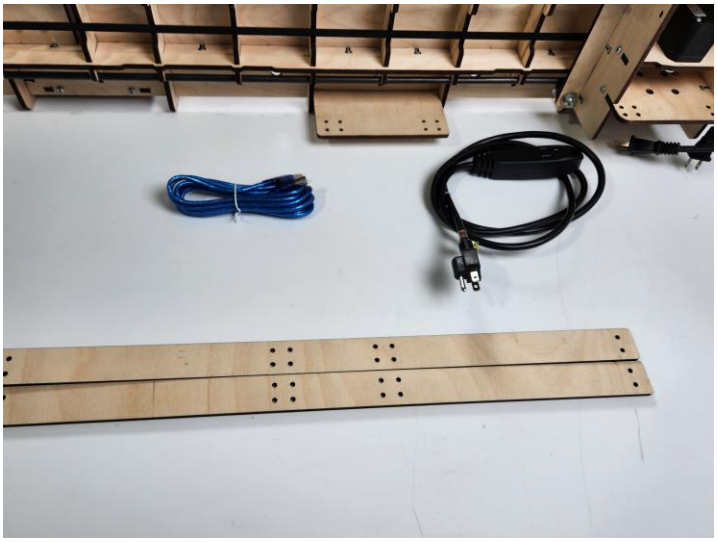
Wood Components

Part #	Description	Qty	Photo
EQX7	Extension Wire Harness	2	

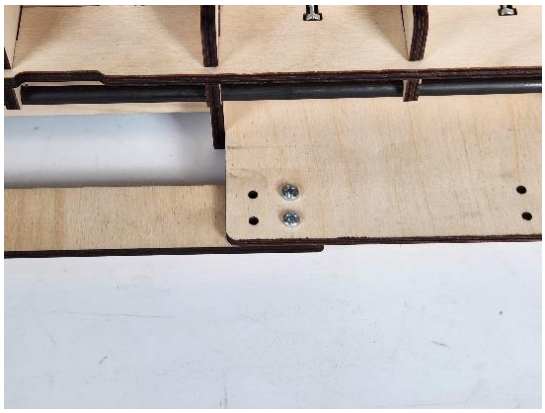
Required Hardware

Part #	Description	Qty	Photo
H14	M4 X 16 Machine Screws	8	
H15	M4 Nut	8	
PS4	Extension Cord	1	

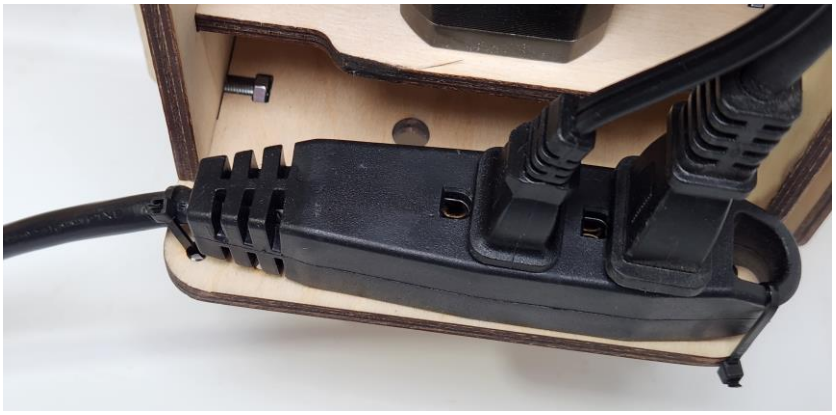
Illustrated Step by Step Instructions



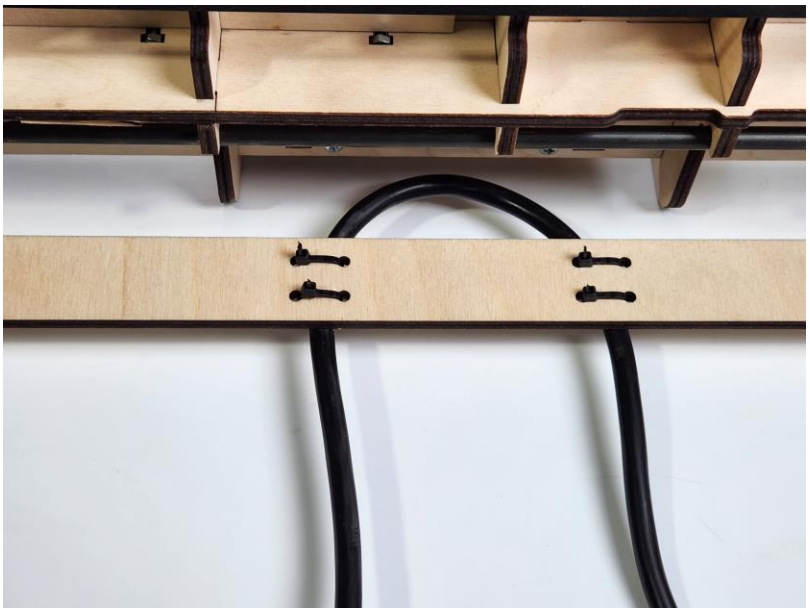
Step 1 Secure each of the Extension Wire Harness (EQX7) using four of the M4 X 16 Machine Screws and Nuts



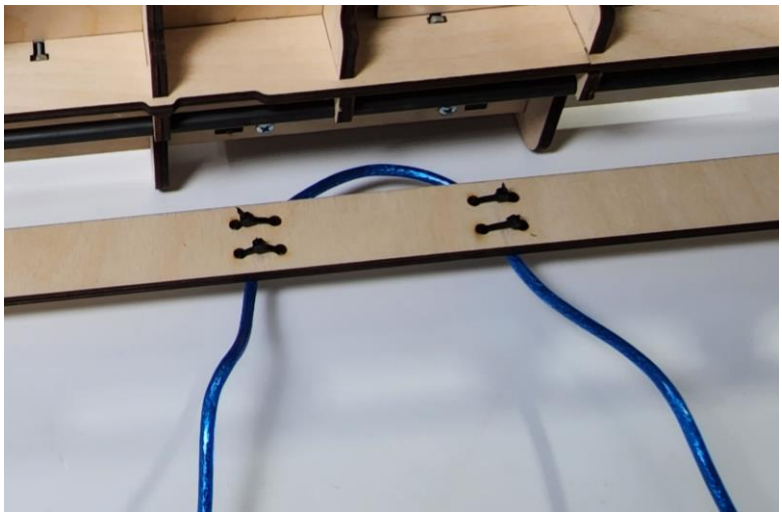
Step 2 Place the large female end of the Extension Cord and Zip Tie it to the side of the Gantry Frame Assembly. Plug in the Makita and Power Supply to the Extension Cord



Step 3 Attach the Extension Cord to the Extension Wire Harness with four Zip Ties so that the Extension Cord has plenty of slack when the Gantry is at each end of its travel range.



Step 4 Attach the USB Cable to the Extension Wire Harness so that the USB Cable has plenty of slack when the Gantry is at each end of its travel range.



T-Slot Spoilboard

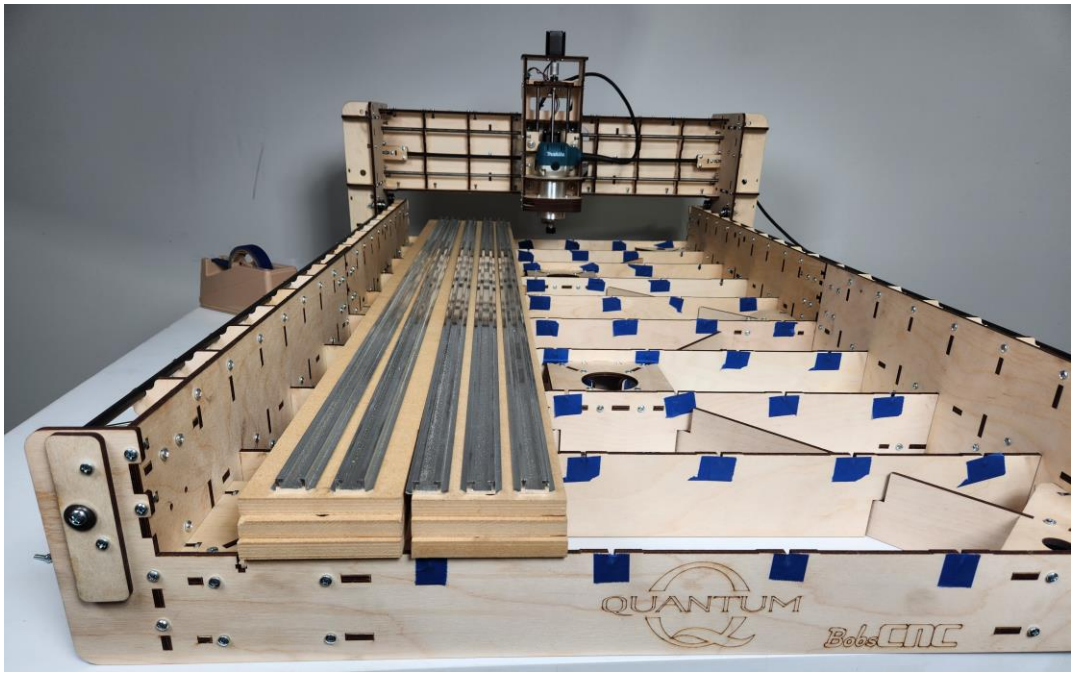
Wood Components

Part #	Description	Qty	Photo
QSB59	MDF Section	6	

Required Hardware

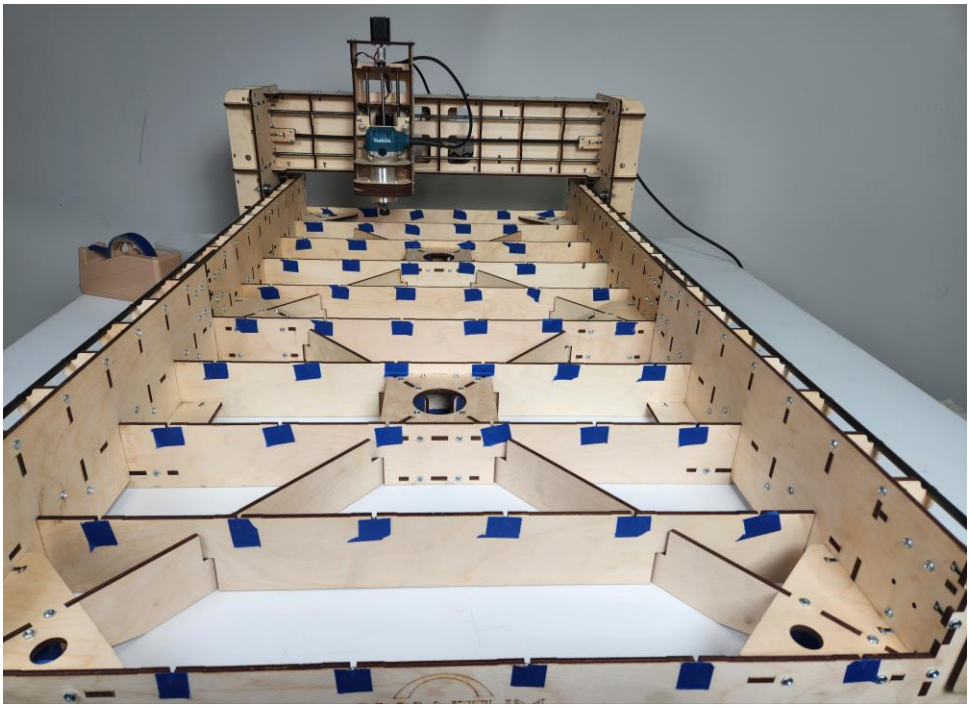
Part #	Description	Qty	Photo
H14	M4 X 16 Machine Screws	36	
H15	M4 Nut	36	
SBT58	Aluminum T-slot	5	

Illustrated Step by Step Instructions



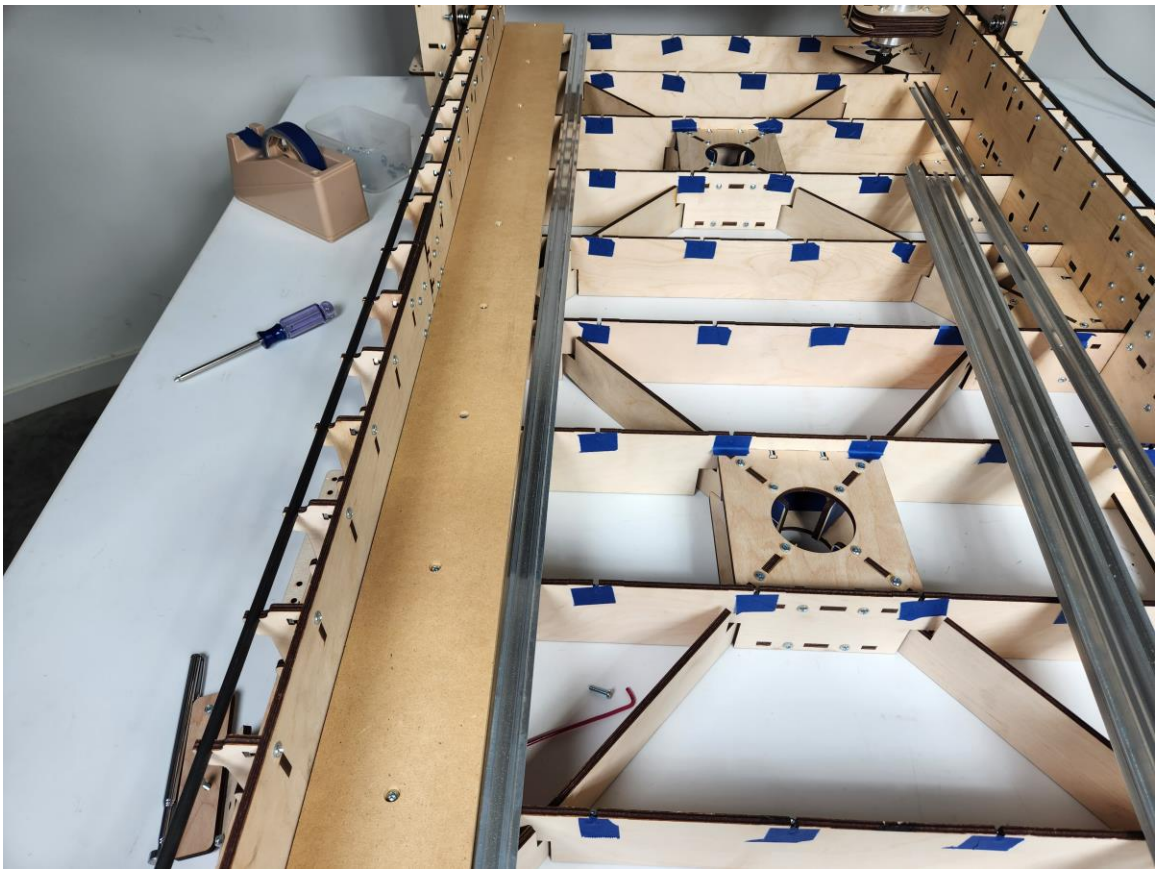
Step 1 Attaching the Spoilboard to the Torsion Box Assembly. The MDF Sections will overhang the Front and Back End Supports ⅛ inch. The Aluminum T-Slots will fit flush to the front and back of the end supports.

Step 1a Fill the T-slots with sixty M4 Nuts. Cover the T-slots with blue painter's tape to hold the M4 Nuts in place during the installation process.

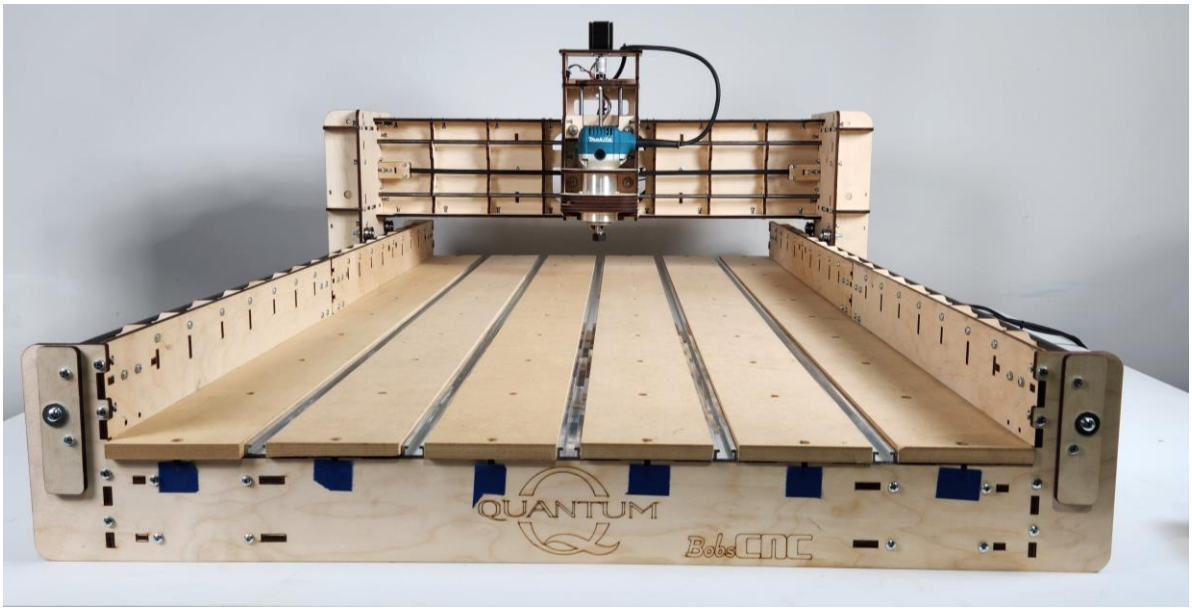


Step 2 Lay the first MDF Section against the left side of the X Frame Assembly as shown. Make sure the countersunk openings are facing up. Align the holes with the installed M4 nuts beneath. Install the Machine Screws to hold each Section in place but do not tighten them at this time.

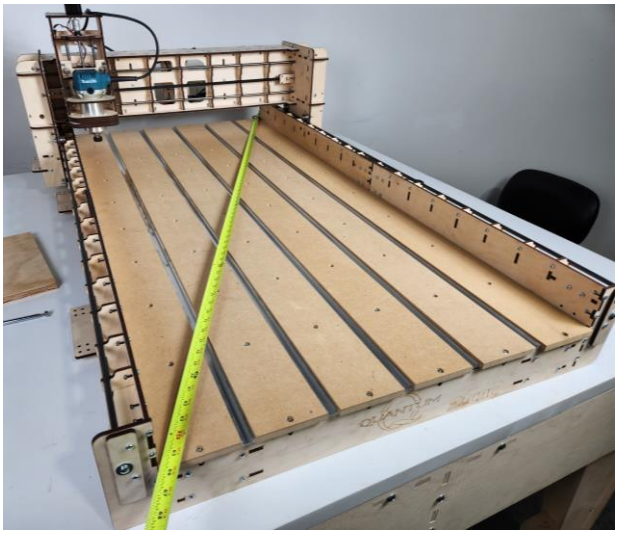
Step 3 Lift the MDF Section and set the flange of the Aluminum T-Slot so that the MDF covers it completely. Align the front and back end of the Aluminum T-Slot flush with the front and back end panels as shown.



Step 4 Repeat to install the remaining Sections and Aluminum T-slot extrusions.

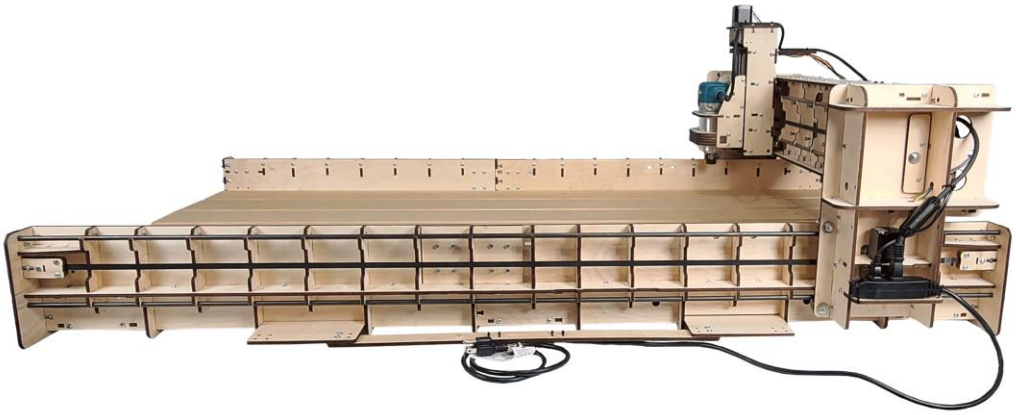


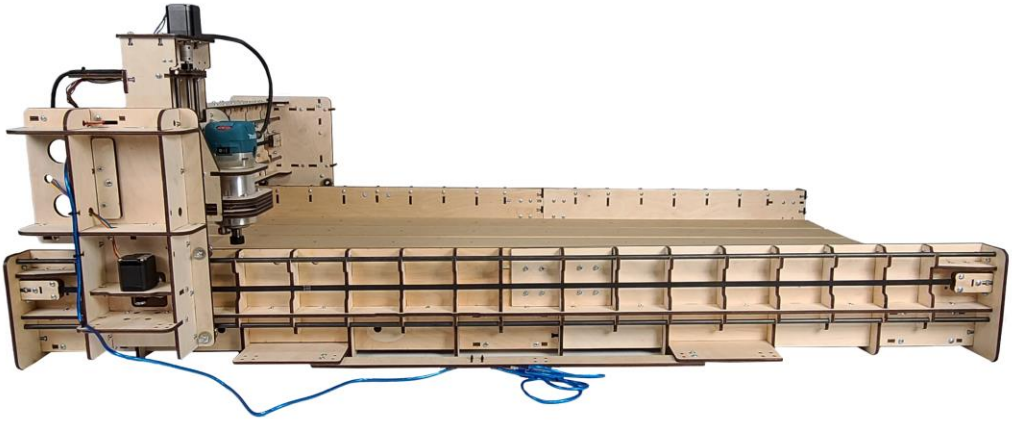
Step 5 Snug the sixty M4 x 16 Machine Screws into the M4 Nuts but do not fully tighten them. Measure the Spoilboard diagonally from corner.

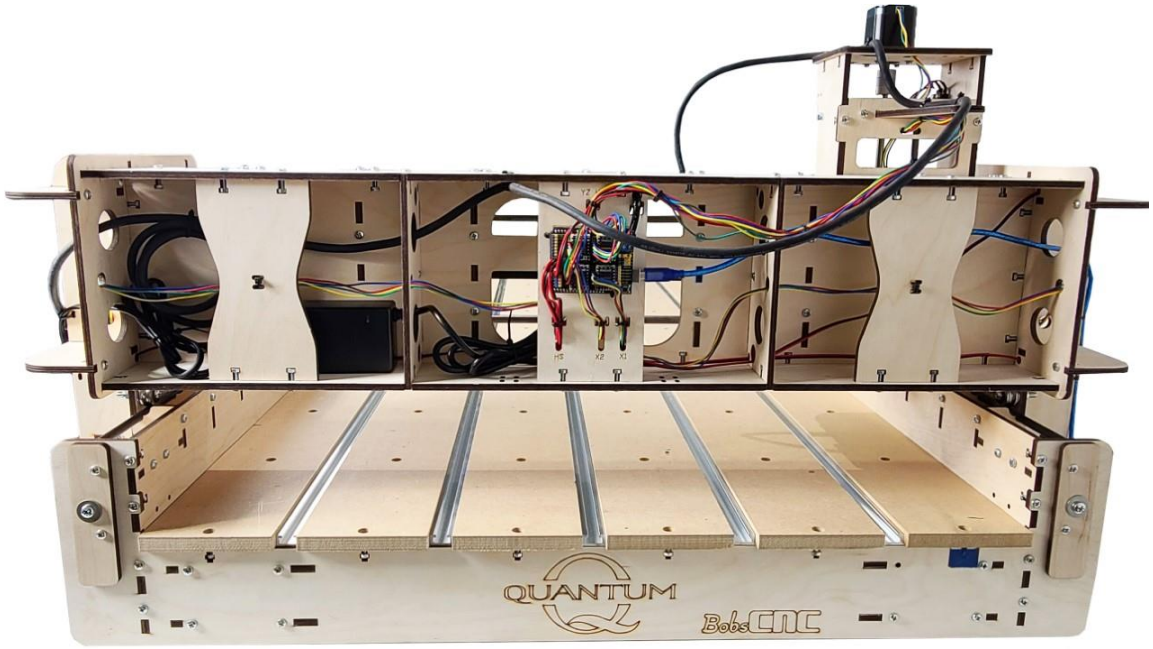


When both measurements match, the spoilboard is square and the Machine Screws can be securely tightened.

Completed Views

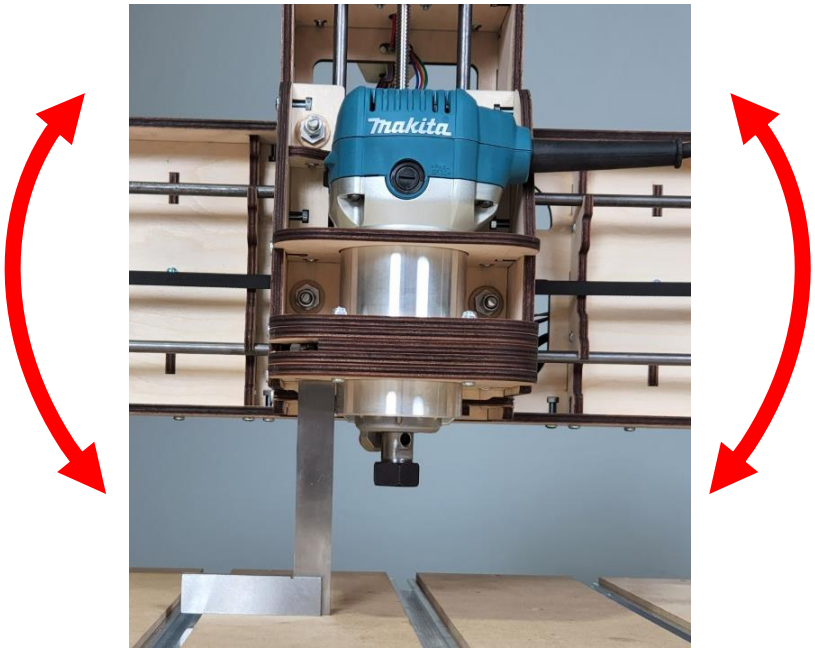




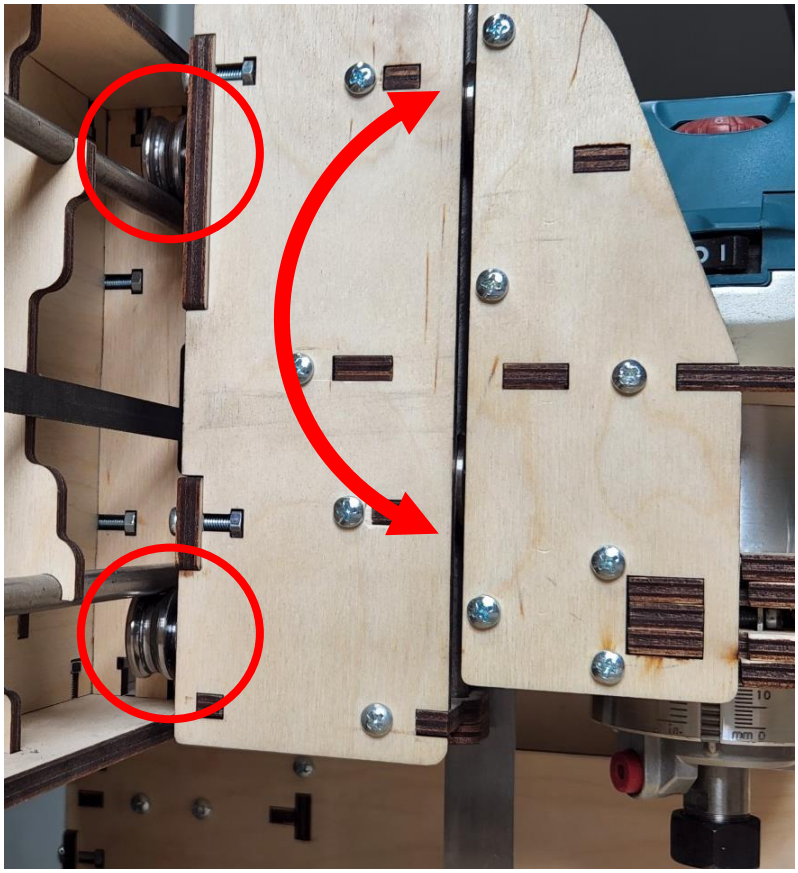

QUANTUM
BobsCNC

Tramming

Tramming is the process of adjusting a CNC Spindle (Router) so it is perpendicular to the spoilboard. The simplest method to do this is to use a square as shown. If the Spindle is not perpendicular, the Evolution Series CNC Routers can be trammed on the X axis by adjusting the four Eccentric Spacers on the Z Carriage.



The Spindle (Router) can be trammed on the Y axis by placing shims behind the SG20U Bearing Fender Washer on the upper or lower Y Assembly. Placing the shim on the top will tilt the axis clockwise. Placing the shim on the bottom will tilt the axis counterclockwise.



Clamping System

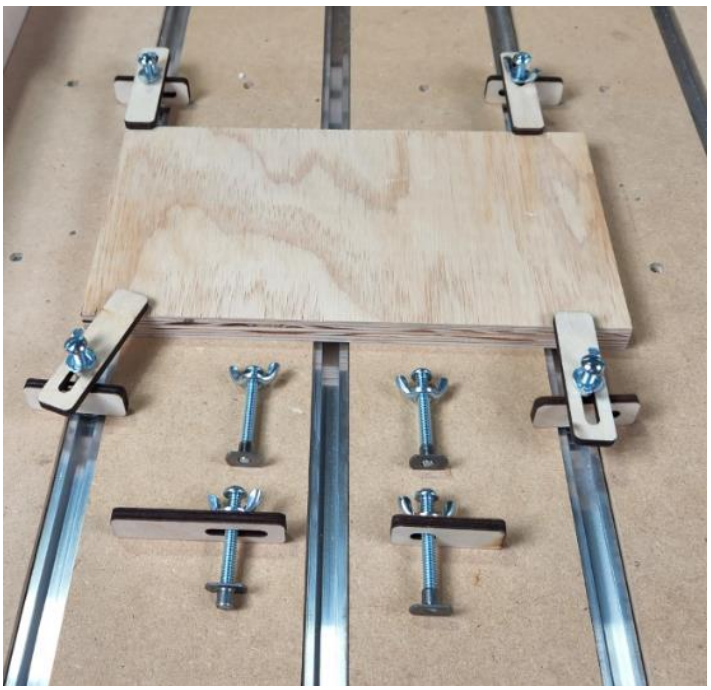
Wood Components (Included with Kit)

Part #	Description	Qty	Photo
A1 A2	Clamp (long) Clamp (short)	4 4	

Required Hardware

Part #	Description	Qty	Photo
H9 H45 H62	1/4- 20, 2” Screws, Wingnuts, T-Nuts	8 ea.	

The BobsCNC supplies wooden clamps that are secured to the aluminum T-Slots using ¼ X 20 Machine Screws in conjunction with T-Nuts and Wingnuts. The T-Nuts slide into the aluminum T-Slots and can be tighten within the slot. The Wingnuts tighten the wooden clamps against the workpiece to hold it in position during the cutting process.



Congratulations! You Just Completed the Assembly of Your BobsCNC Quantum to Quantum Max CNC Router.

Please use the link where to download our Basic CAM and Basic SENDER

Basic Software Suite

Note: Once connected to Basic SENDER you will need to go to the **Firmware Flashing Tool** in the **Tools and Wizards** menu, select the Quantum Max, and the correct com port, then flash the controller.

Appendix

Firmware Values

Key	Value	Description
$0	10	(step pulse, usec)
$1	25	(step idle delay, msec)
$2	0	(step port invert mask:00000000)
$3	0	(dir port invert mask:00000000)
$4	0	(step enable invert, bool)
$5	0	(limit pins invert, bool)
$6	0	(probe pin invert, bool)
$10	1	(status report mask:00000011)
$11	0.01	(junction deviation, mm)
$12	0.002	(arc tolerance, mm)
$13	0	(report inches, bool)
$20	1	(soft limits, bool)
$21	0	(hard limits, bool)
$22	1	(homing cycle, bool)
$23	3	(homing dir invert mask:00000011)
$24	250	(homing feed, mm/min)
$25	2000	(homing seek, mm/min)
$26	250	(homing debounce, msec)
$27	5	(homing pull-off, mm)
$30	1000	Maximum spindle speed, RPM
$31	0	Minimum spindle speed, RPM
$32	0	Laser-mode enable, boolean
$100	80	(x, step/mm)

$101	80	(y, step/mm)
$102	400	(z, step/mm)
$110	10000	(x max rate, mm/min)
$111	10000	(y max rate, mm/min)
$112	2000	(z max rate, mm/min)
$120	500	(X-axis acceleration, mm/sec^2)
$121	500	(Y-axis acceleration, mm/sec^2)
$122	500	(Z-axis acceleration, mm/sec^2)
$130	1283	(X-axis maximum travel, millimeters)
$131	610	(Y-axis maximum travel, millimeters)
$132	98	(Z-axis maximum travel, millimeters)

Quantum Washer Size Table

Part number	Description	ID	OD	Thickness (min)	Thickness (max)
H41	Eccentric Washer	0.453	0.750	0.059	0.063
H42	Bearing Fender Washer	0.250	0.750	0.060	0.090
H50	Idler Fender Washer	0.203	0.750	0.043	0.051
H57	Bearing Retainer Washer	0.172	0.050	0.050	0.080
H66	¼ inch Shim Washer	0.256	0.500	0.028	0.035
H88	M3 Washer	0.125	0.312	0.025	0.040
H89	Small Black Washer	0.078	0.188	0.016	0.025