

You will need:

2X Leg 2040 Type 1

2X Leg 2040 Type 2

4x 2040 End-Cap/feet

Instructions:

Hammer in the feet into the base of the extrusions.

Identifiers of the aluminium's correct side are that there is no thread in the centre holes, and this side has the drilled through bore holes or the registration slot.



INSPECT FOR:

Edges of alu for deformities

Dints in the V groove

After assembly, overall squareness.

Repeat for all 2040 legs.

You will need:

2X Leg 2040 Type 1 with feet from previous page

2X Bottom X 2020

2X Bottom Y 2040

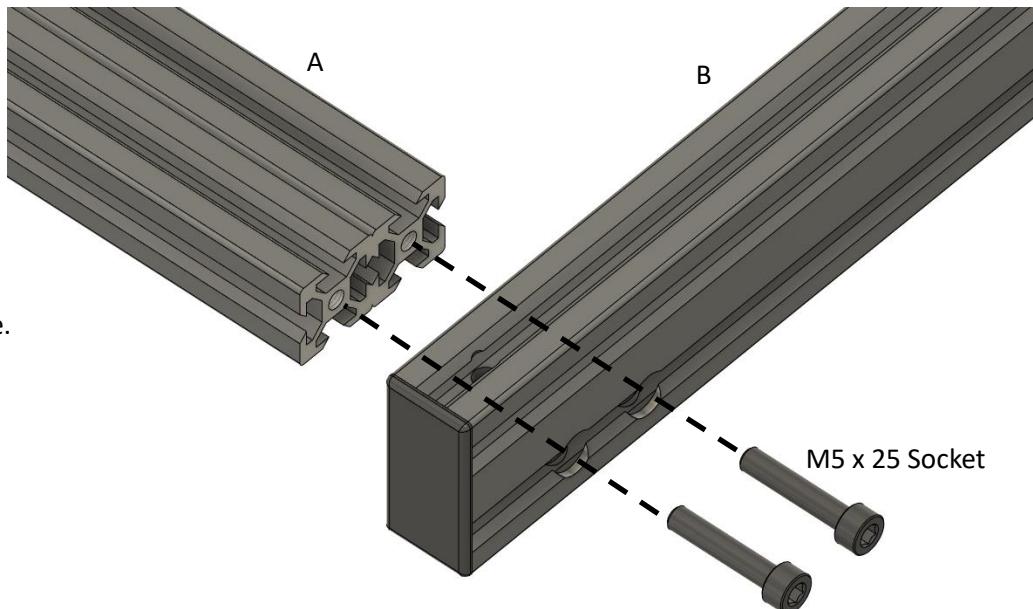
6X M5 x 45 Socket

6X M5 x 25 Socket

Instructions:

Place the Bottom Y 2040 (A) extrusion against the **granite surface**, and align the Leg 2040 [Type 2] (B) so when **A is bolted against B**, they will both be perfectly flat to the granite surface.

Use **M5 x 25** Socket bolts (yellow Allen Key) to **tighten them both together**.



INSPECT FOR:

Non Flatness against granite block. This could be twisting or warping.

You can check this by putting the extrusions flat to the surface and checking if there is any rock when applying pressure to either end.

Alternatively you can rock the extrusion on its edge and check for gaps by viewing if light bleeds under .

Repeat once more.

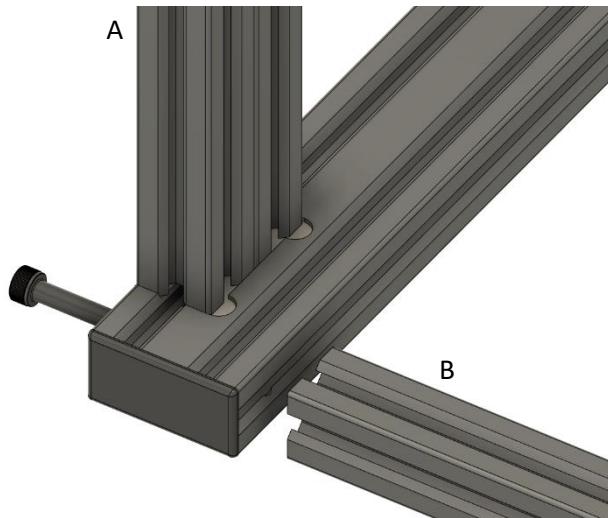
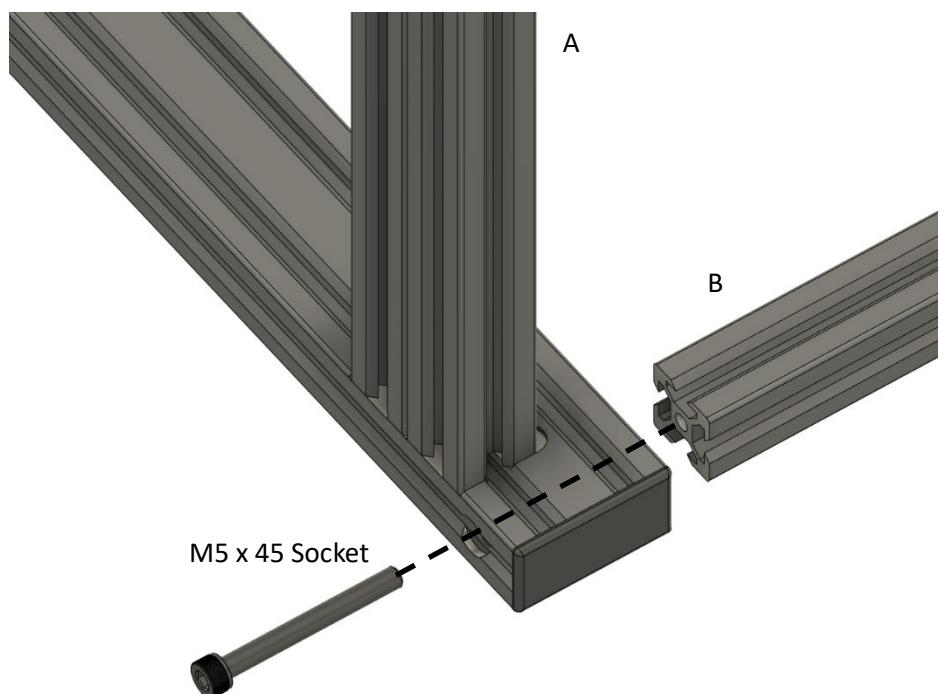
Instructions:

Rotate the assembly (**A**) so that the Bottom Y 2040 is facing upwards.

The Bottom X 2020 (**B**) extrusion should sit against the **granite surface**.

Bolt B to A with **M5 x 45mm Socket Bolts**

Use M5 x 45 Socket bolts (yellow Allen Key) to tighten them both together.



INSPECT FOR:

Non Flatness against granite block. This could be twisting or warping.

You can check this by putting the extrusions flat to the surface and checking if there is any rocking when applying pressure to either end.

Alternatively you can rock the extrusion on its edge and check for gaps by viewing if light bleeds under .

You must check for squareness

Repeat once more.

Instructions:

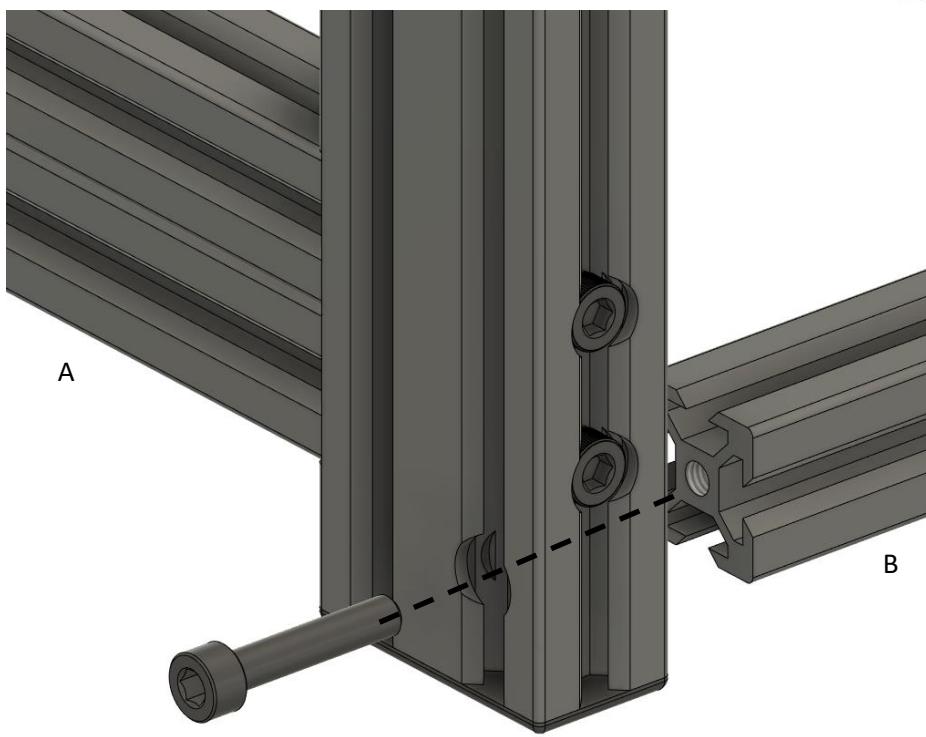
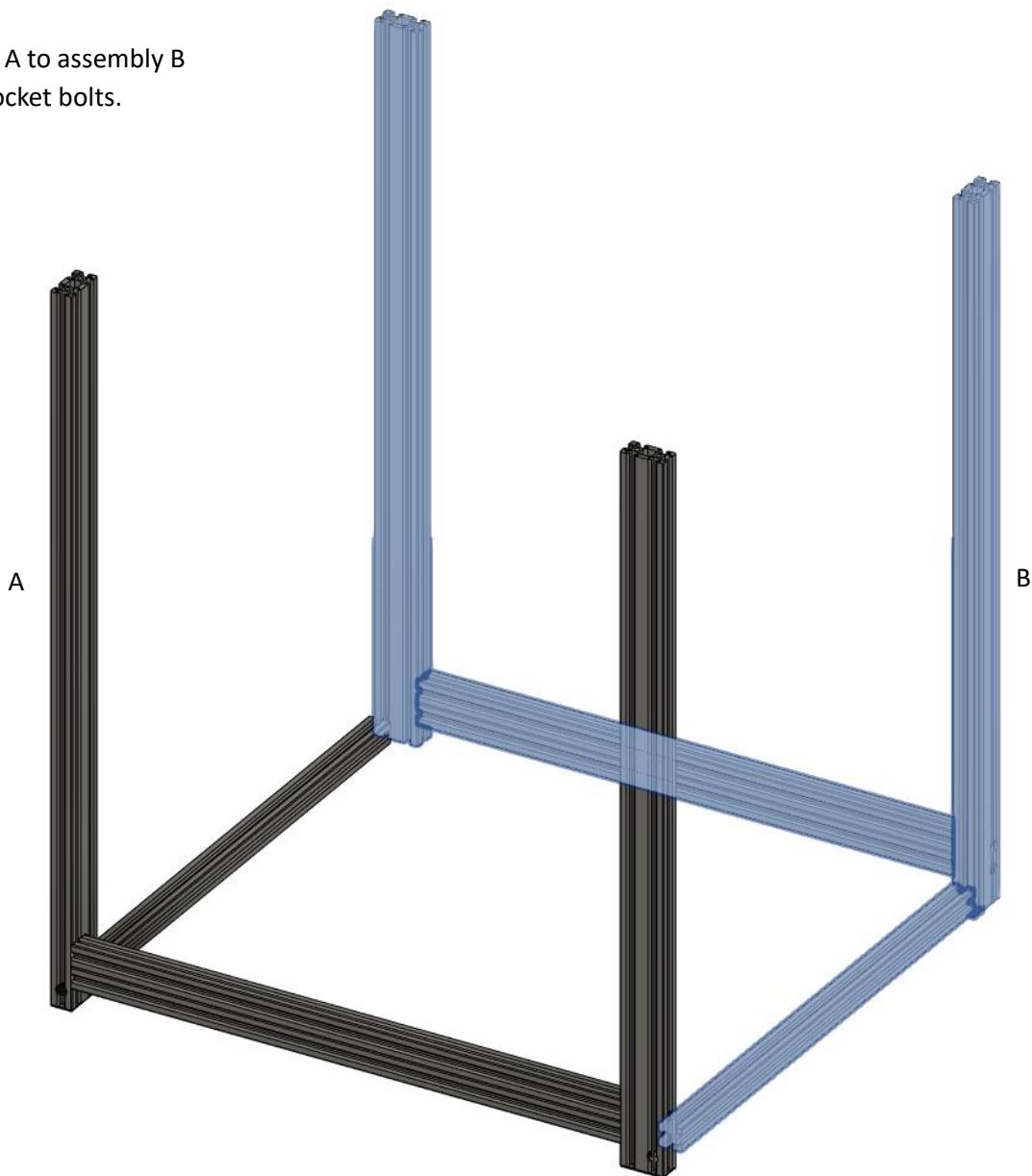
Take the assembly (A) and attach one of the remaining Leg 2040 [type 1] (B) with **M5 X 45 Socket** bolts.

Rotate A so B can sit flat against the **Granite Block**



Instructions:

Attach assembly A to assembly B
using M5 x 25 Socket bolts.



M5 x 25 Socket

You will need:

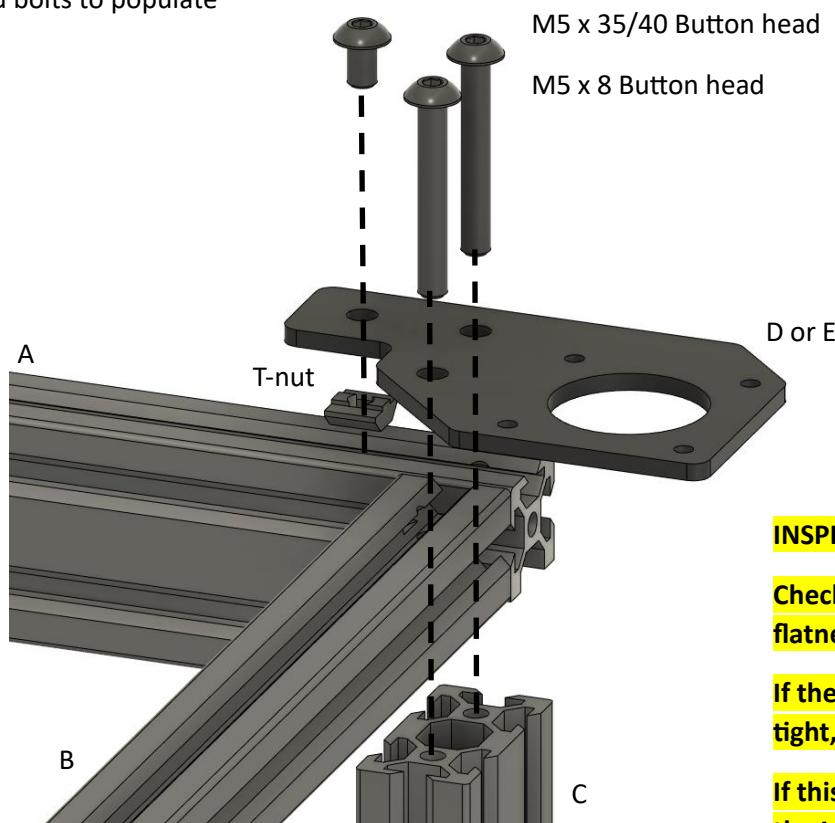
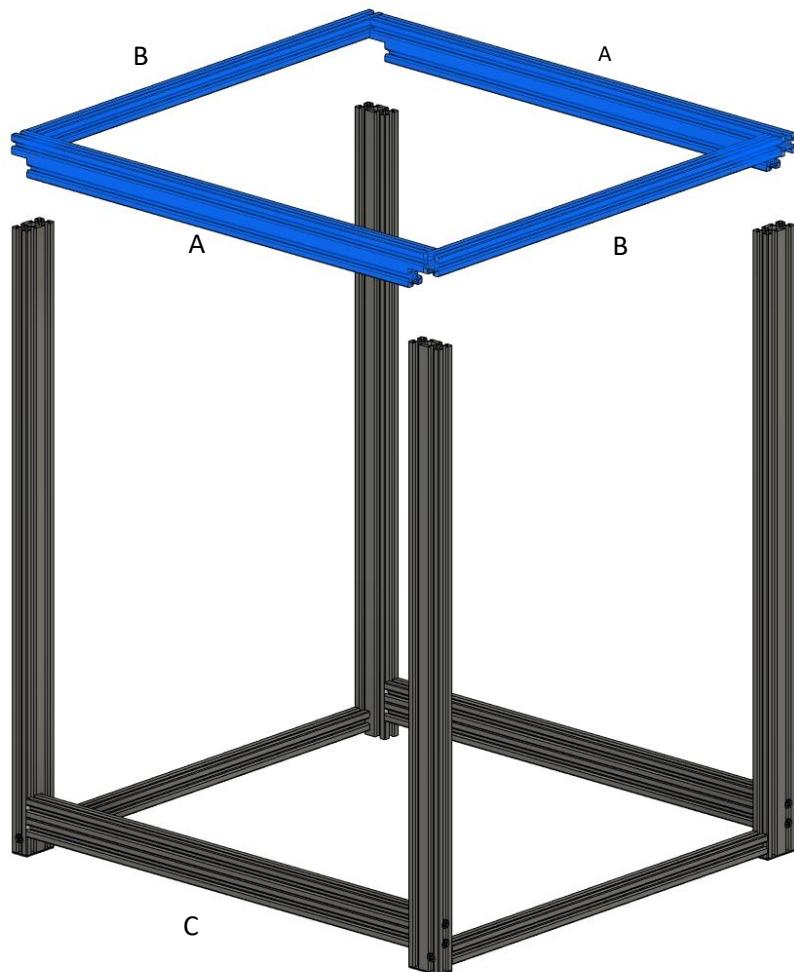
- 4X Rollin T nuts
- 4X M5 x 8 Button Head
- 8X M5 x 35/40 Button Head
- 2X Upper Y gantry 2040
- 2X Upper X gantry 2020
- 2X Angled Bracket
- 2X XY Motor Bracket

Instructions:

Take 2 of the Upper Y Gantry 2040 (A) and 2 of the Upper X Gantry 2020 (B) and rest them on top of the assembly (C)

Take 2 Angled Brackets (D) and 2 XY motor brackets (E) and bolt them to the frame, with M5 x 35/40 Buttonhead bolts going through A and B

Insert Rollin T nuts where the addition holes are present within the metal brackets, and use M5 x 8 Button head bolts to populate these holes



INSPECT FOR:

Check for machine squareness and flatness.

If the machine rocks when all bolts are tight, you can try twisting the frame.

If this doesn't work you can ease out the Lower X 2020 bolts to relax the stress on the frame – use Threadlocker

Repeat 3X more.

You will need:

1X Middle 2020

2x Corner 2020 Brackets

4X M5 x 8 Buttonhead

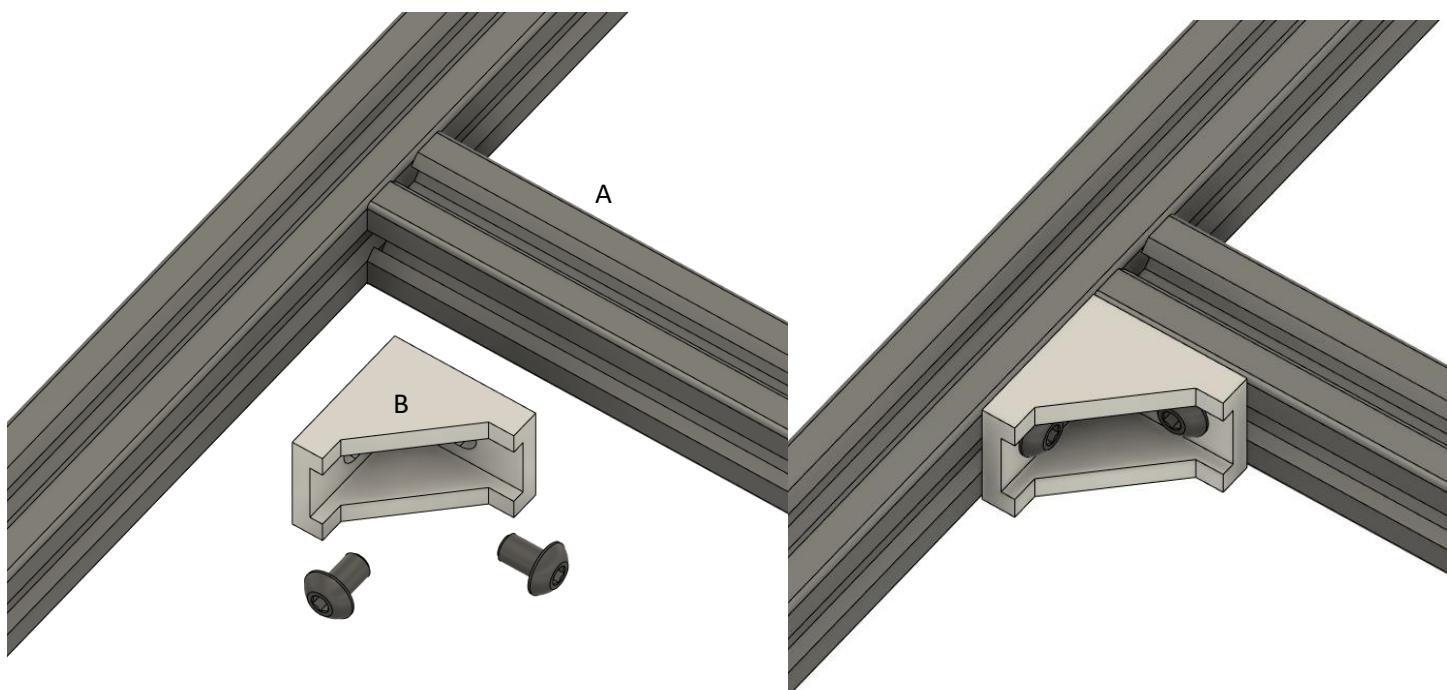
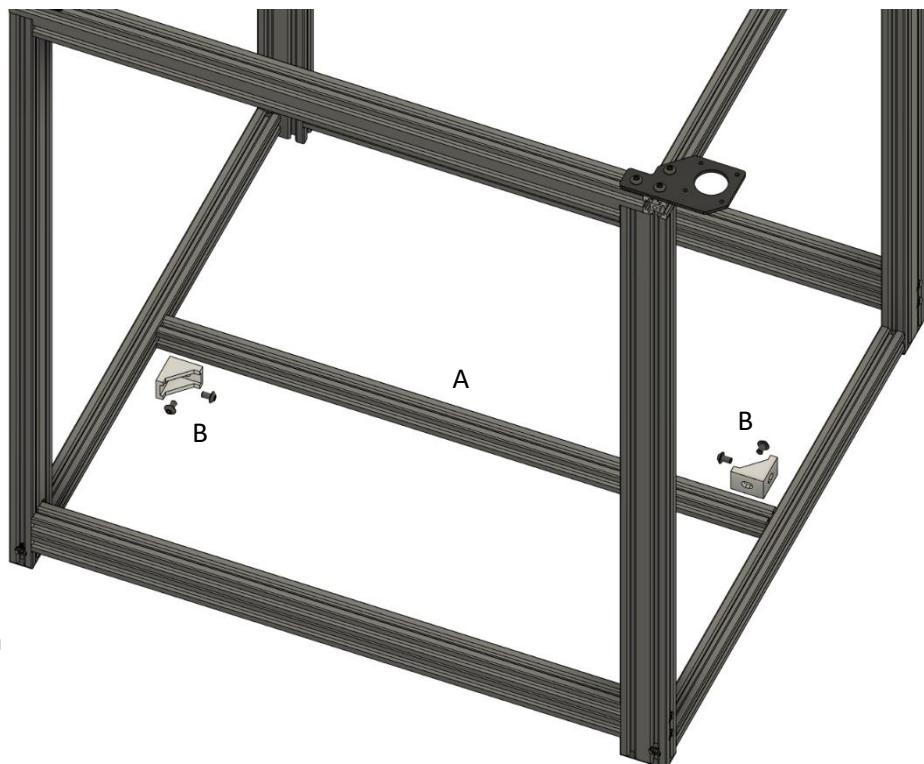
5X Rollin T-nut

Instructions:

Attach to the Middle 2020 extrusion (A) two Corner 2020 brackets (B) held on with rollin T nuts **at the ends** of the extrusion.

In the top facing side of A, place a rollin Tnut in the centre

Affix A to the centre of the assembly with 2 rollin Tnuts and 2 M5x8 bolts



INSPECT FOR:

Make sure that the 2020 brackets are on different sides of the middle extrusion.

You will need:

1X Floor Panel

6X Rollin T-nuts

7X M5 x 10 Button Cap

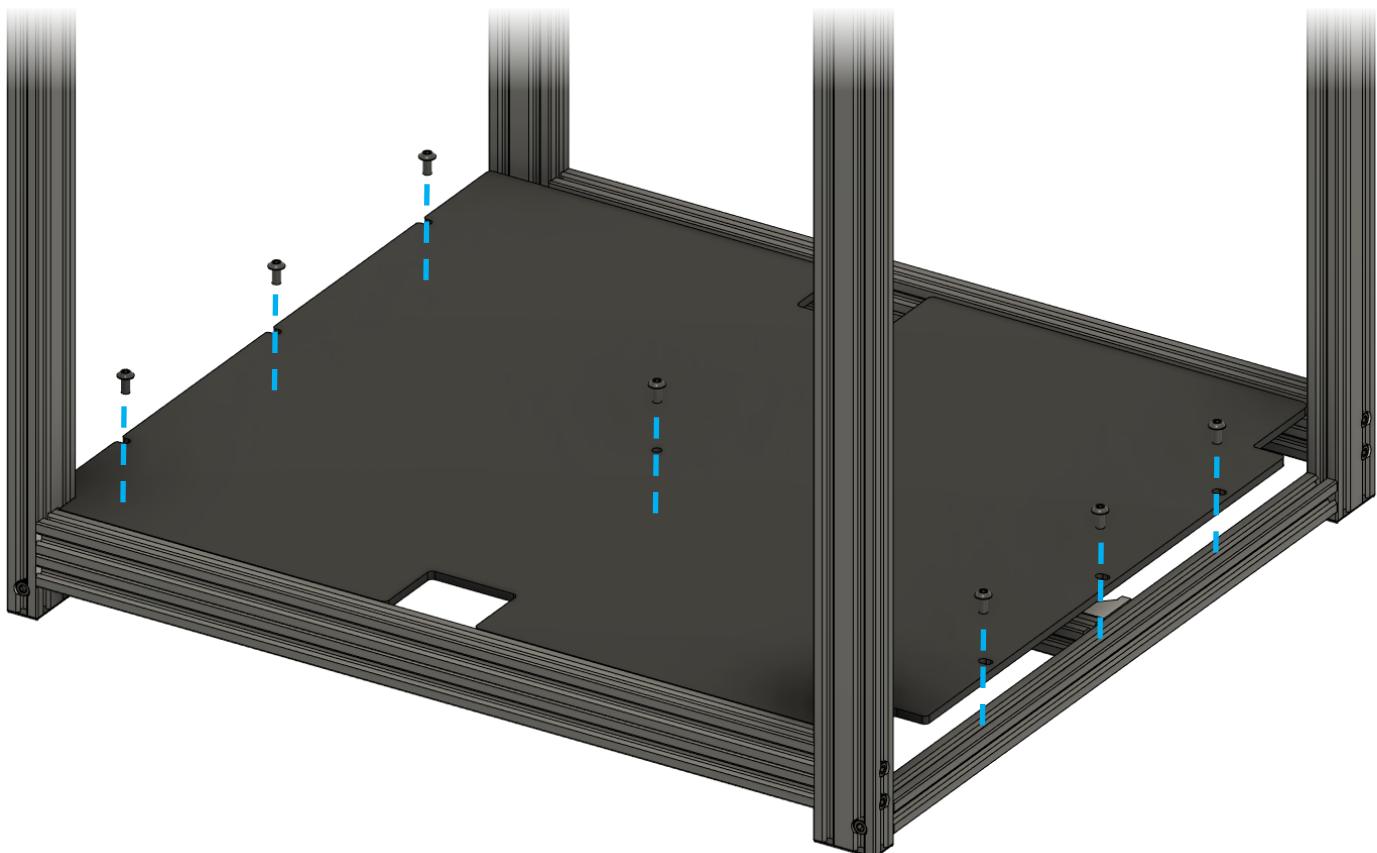
Instructions:

Start by inserting 3 T nuts into each of the 2020 lower X extrusions

Insert the Floor Panel and bolt down with M5 x 10 button cap bolts

The floor panel has 3 bolt holes that are open, and 3 that are fully encapsulated, the 3 that are open face towards the front.

Insert one final bolt to the centre where the spool holder would go in order to lock the previous TNut into place.



INSPECT FOR:

Burn marks caused by laser cutting. If present wipe down with Isopropyl

You will need:

1X Cassette spool holder

1X M5 x 25 Socket/Button cap bolt

Instructions:

Remove the middle M5 x 10 button cap bolt from the centre of the bottom panel

Fix the Cassette spool holder into the centre of the bottom panel using a single M5 x 25 bolt



INSPECT FOR:

Wording on cassette is facing front of the machine

You will need:

2X Z motor

2X Z motor bracket

8X M3 x 6 Socket bolts

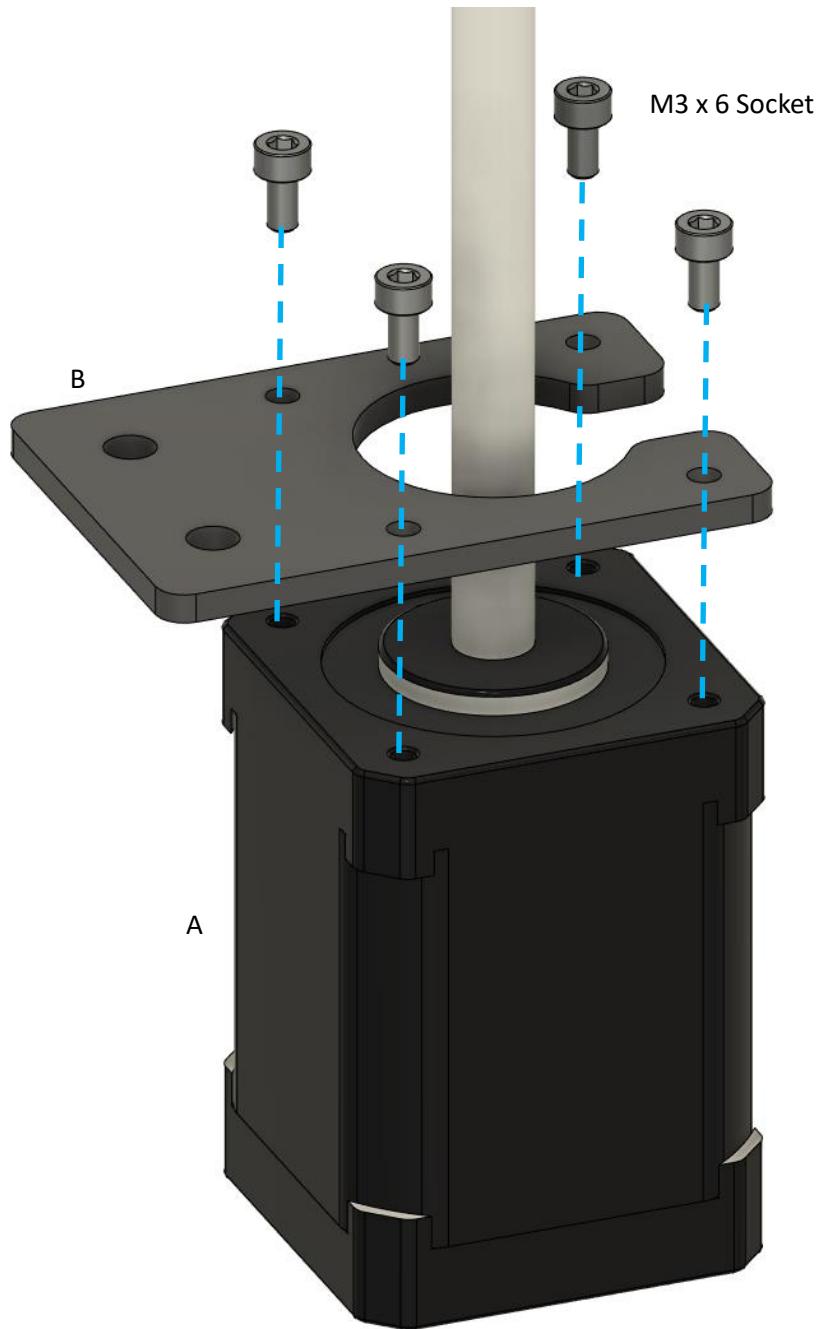
Threadlocker

Instructions:

Using the Z motor (A) as the base, place the Z motor bracket (B) on top of the motor.

Make sure that A's cable connector header is not facing towards or away from the two unused bolt holes present in B

Use 4x M3x6 socket bolts, with Threadlocker to attach A to B



INSPECT FOR:

Repeat once more, Mirroring the Z motor bracket.

Straightness of Z motor rod, by spinning it checking for any wobble

You will need:

2X Z-motor and bracket assembly
(from previous)

4X M5 x 8 Button cap

4X Rollin T nut

2X Motor Wires

Instructions:

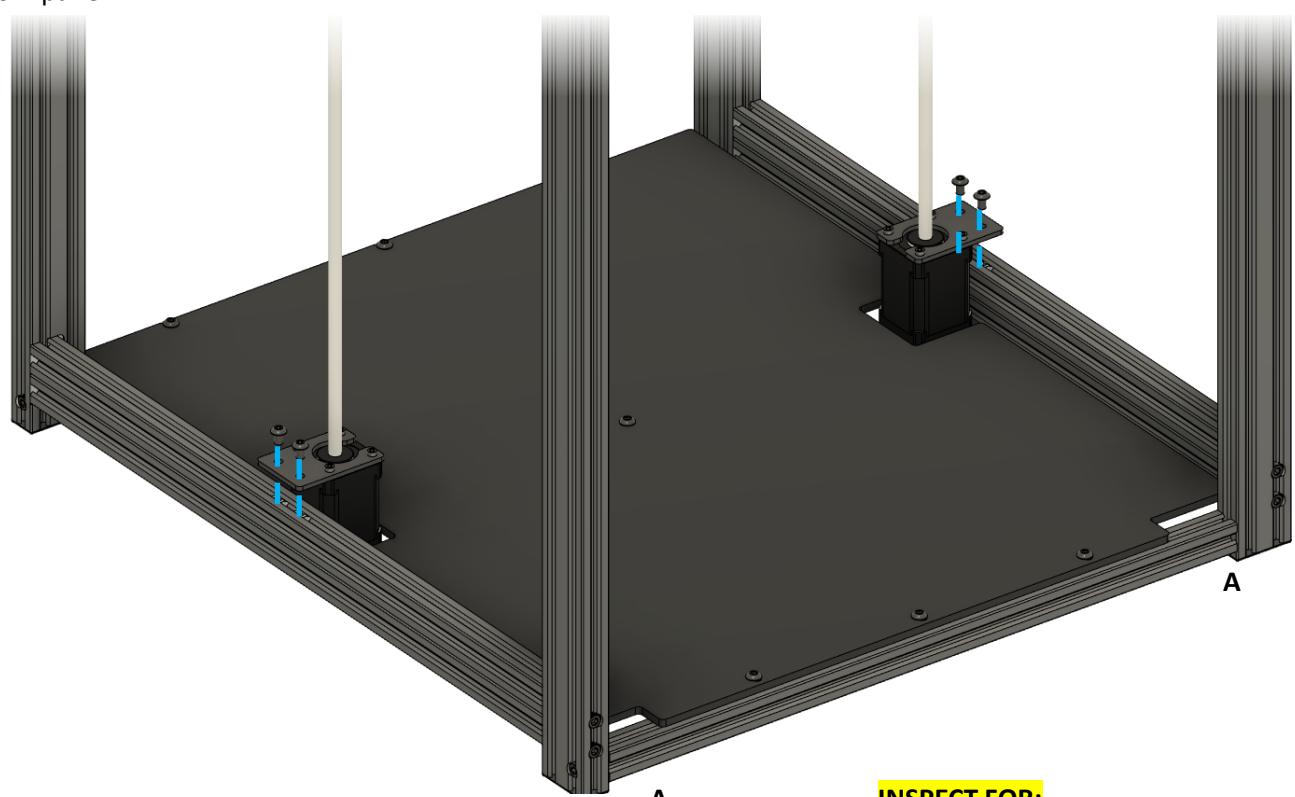
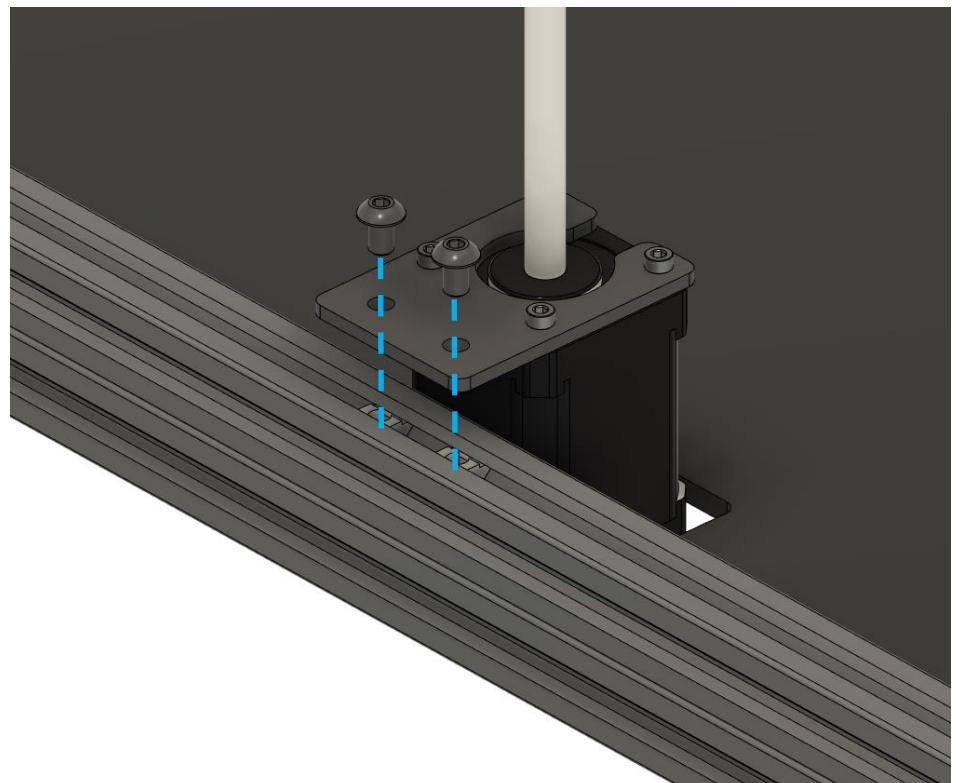
Insert 2 Tnuts into the 2040 Y aluminium profile.

Take the previously made Z motor assembly and use 2 M5 x 8 button cap bolts to mate it with the printer frame.

Repeat for the other side

Connect motor wires to Z motors and feed them through the rear facing bottom panel access holes (A)

Kink the wire at the motor connector (for slack) and tape the wires to the underside of the bottom panel.



Repeat once more.

INSPECT FOR:

Make sure that the Z Motor cable connector location is facing towards the back of the machine – the back of the machine is the side with the XY motor brackets

2X WobbleX Top
 2X Wobble X Middle
 2X Wobble X Bottom
 2X T8 Pom nut
 4X M3 x 6 Socket bolt
 16X Metal Dowel pins

Instructions:

Prep the Wobble X printed parts by inserting the metal dowels into the slots.

Glue the metal dowels into the Printed parts. Make sure the glue is only applied to the printed parts and does not get on the surface side of the dowels.

Let glued parts sit to one side for 1 hour before adding to the assembly

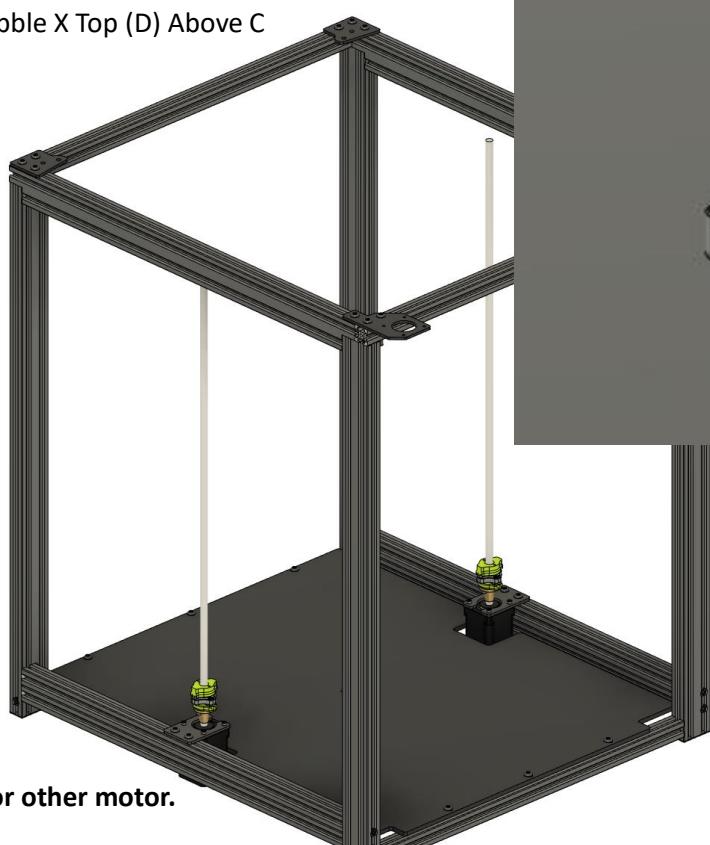
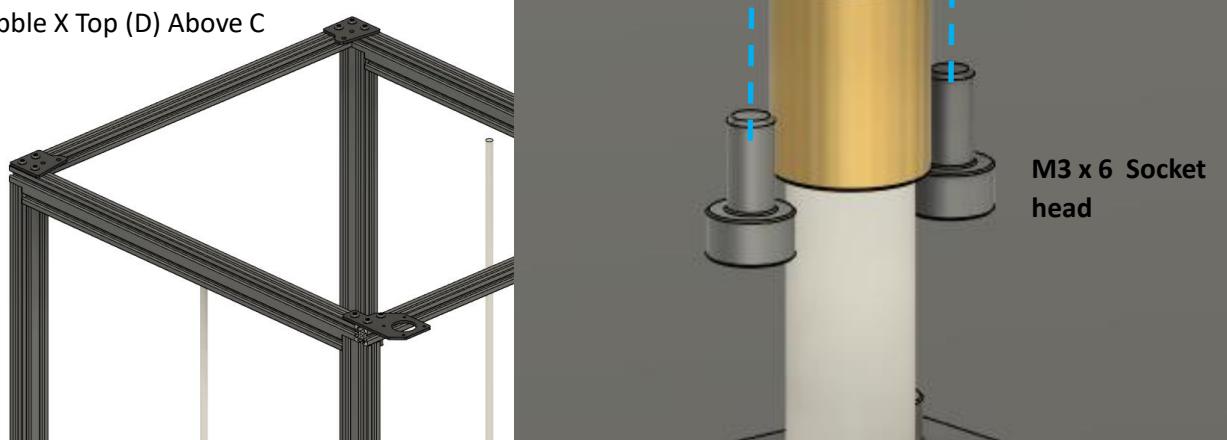
Ensure the T8 Nut (A) flange is facing upwards.

Place Wobble X Bottom (B) above of A

Use 2x M3 x 6 Socket head bolts to mate A to B

Place Wobble X Middle (C) above B

Place Wobble X Top (D) Above C



Repeat for other motor.

INSPECT FOR:

Lower A to the bottom of the motor.

You will need:

8X SK12

16X M5 x 10 Button-Cap bolt

16X Rollin T-Nut

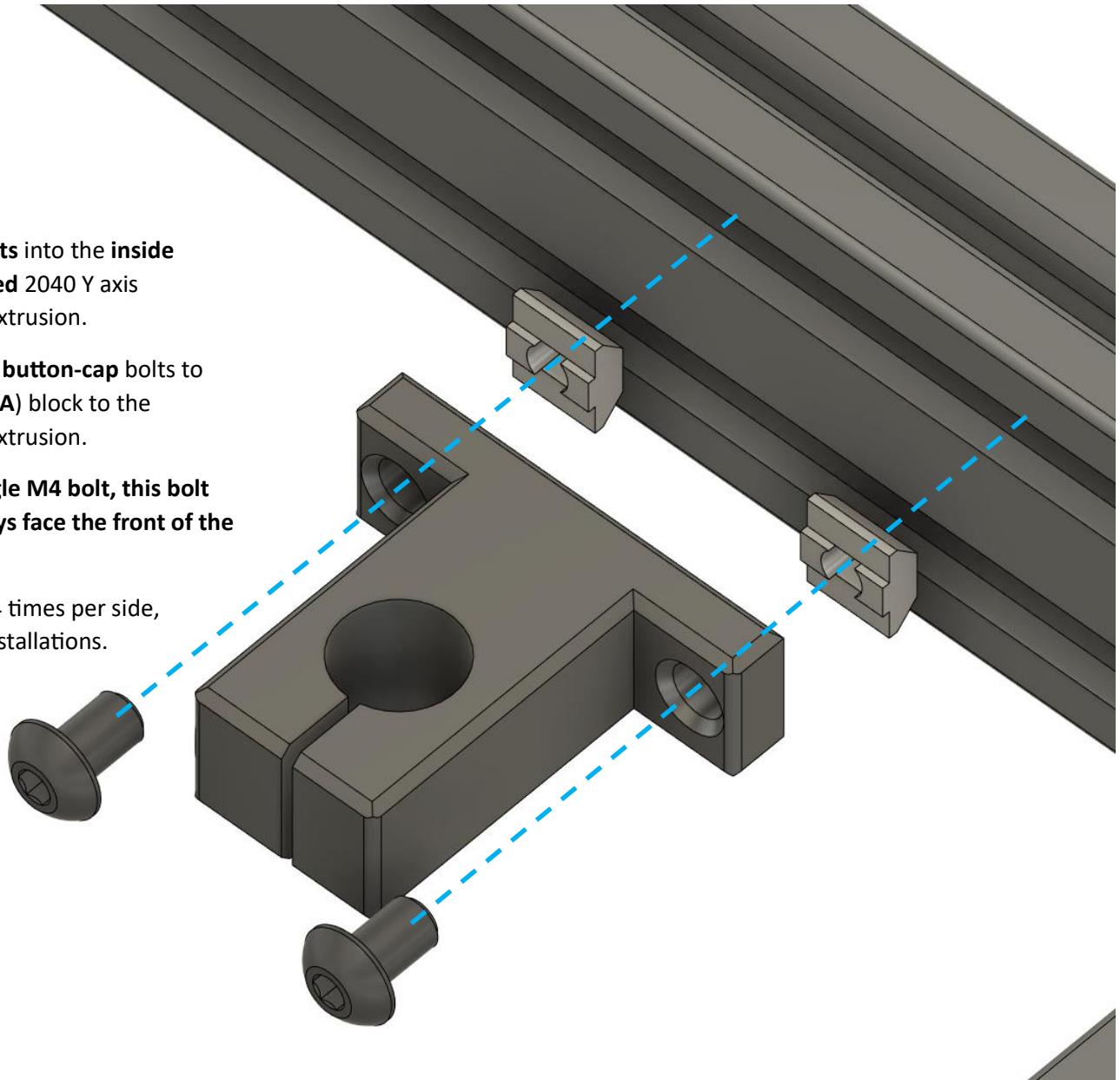
Instructions:

Place **2X T-nuts** into the **inside centre aligned** 2040 Y axis aluminium extrusion.

Use **M5 x 10 button-cap** bolts to affix a SK12 (**A**) block to the aluminium extrusion.

'A' has a single M4 bolt, this bolt should always face the front of the machine

Repeat this 4 times per side, totalling 8 installations.

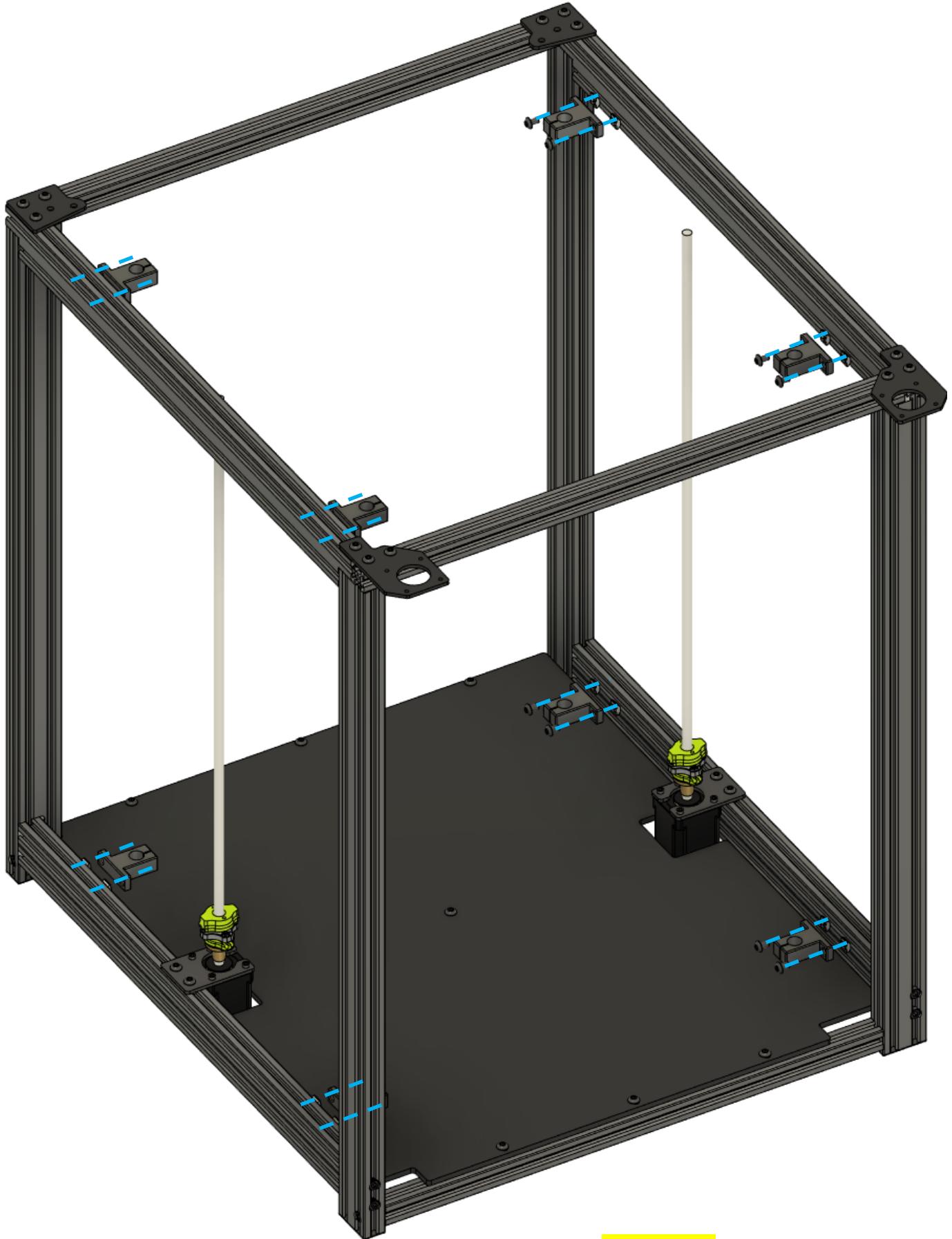


Repeat 7 times more.

INSPECT FOR:

M4 bolt being present inside the SK12 block

The M4 Bolt faces the front of the machine

**INSPECT FOR:**

The SK12 blocks on the **bottom** of the machine, are in the **top** position in the 2040 extrusion

The SK12 blocks on the **Top** of the machine, are in the **Bottom** in the 2040 extrusion

You will need:

4X LMK12LUU

1X Stamped Bed Gantry

4X Z-Axis Linear Rods

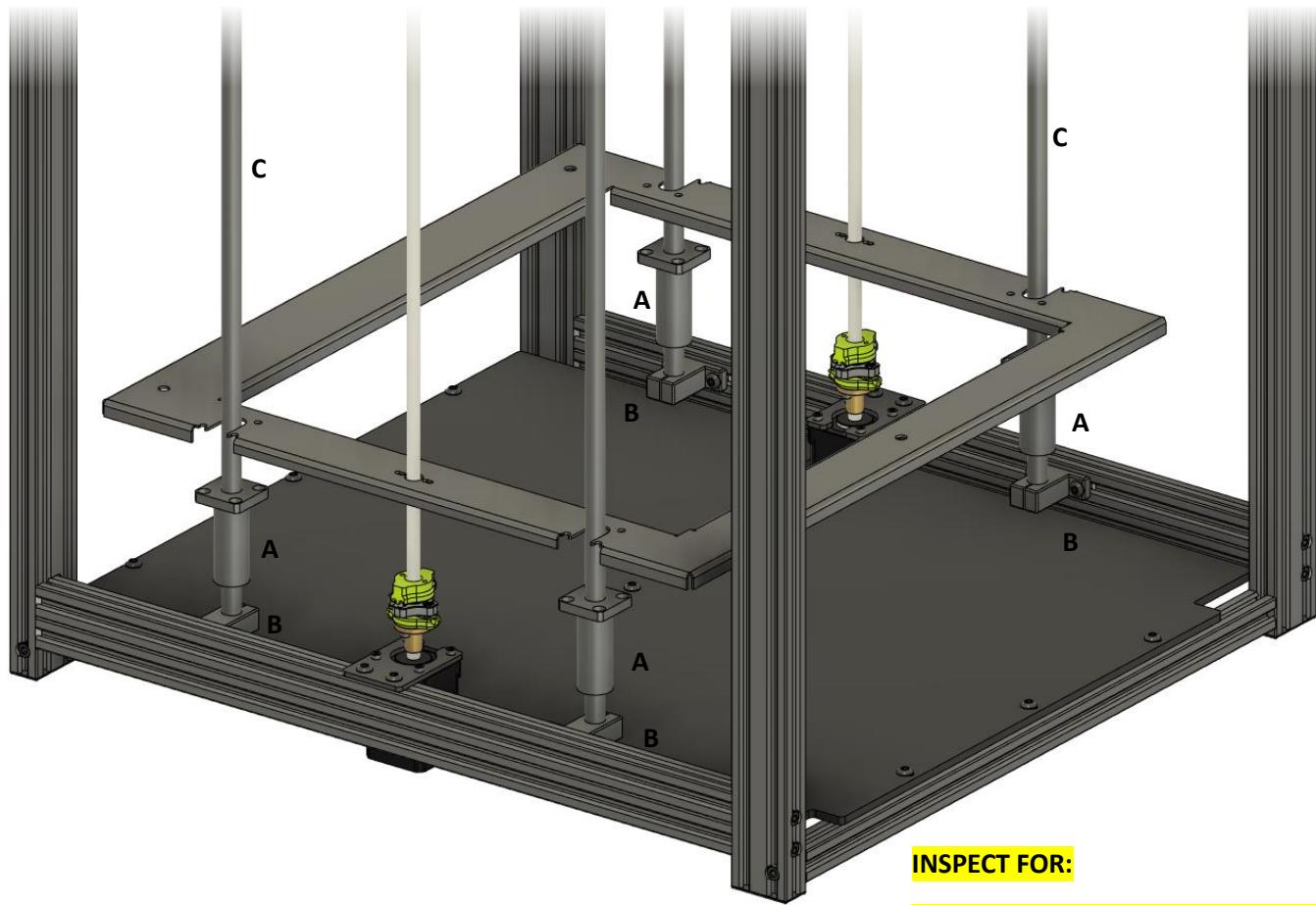
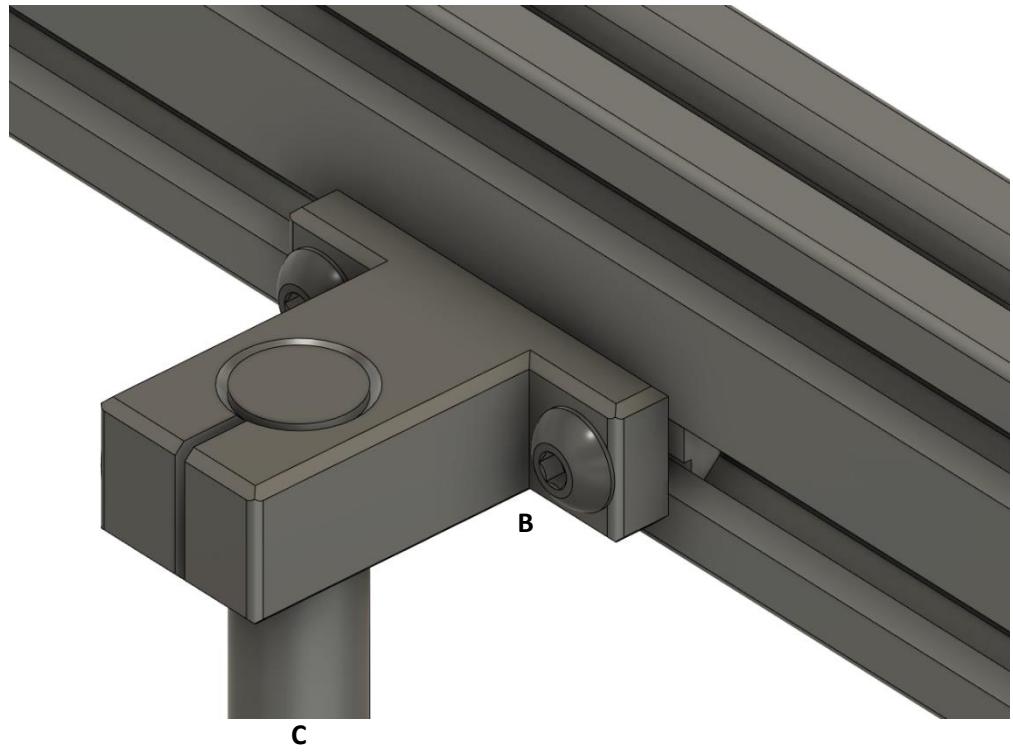
Instructions:

Preplace 4X LMK12LUU (A) Linear guides on top of the bottom SK12 (B) blocks

Preplace the Stamped Bed Gantry on top of A, using the Z motor threaded rods as a guide.

Insert 4X Z-Axis Linear rods (C) into the previously inserted SK12 blocks, passing C through A

Tighten C in the top SK12 block to be flush, leave the bottom SK12 blocks untightened.



INSPECT FOR:

Non Flatness against granite block. This could be twisting or warping.

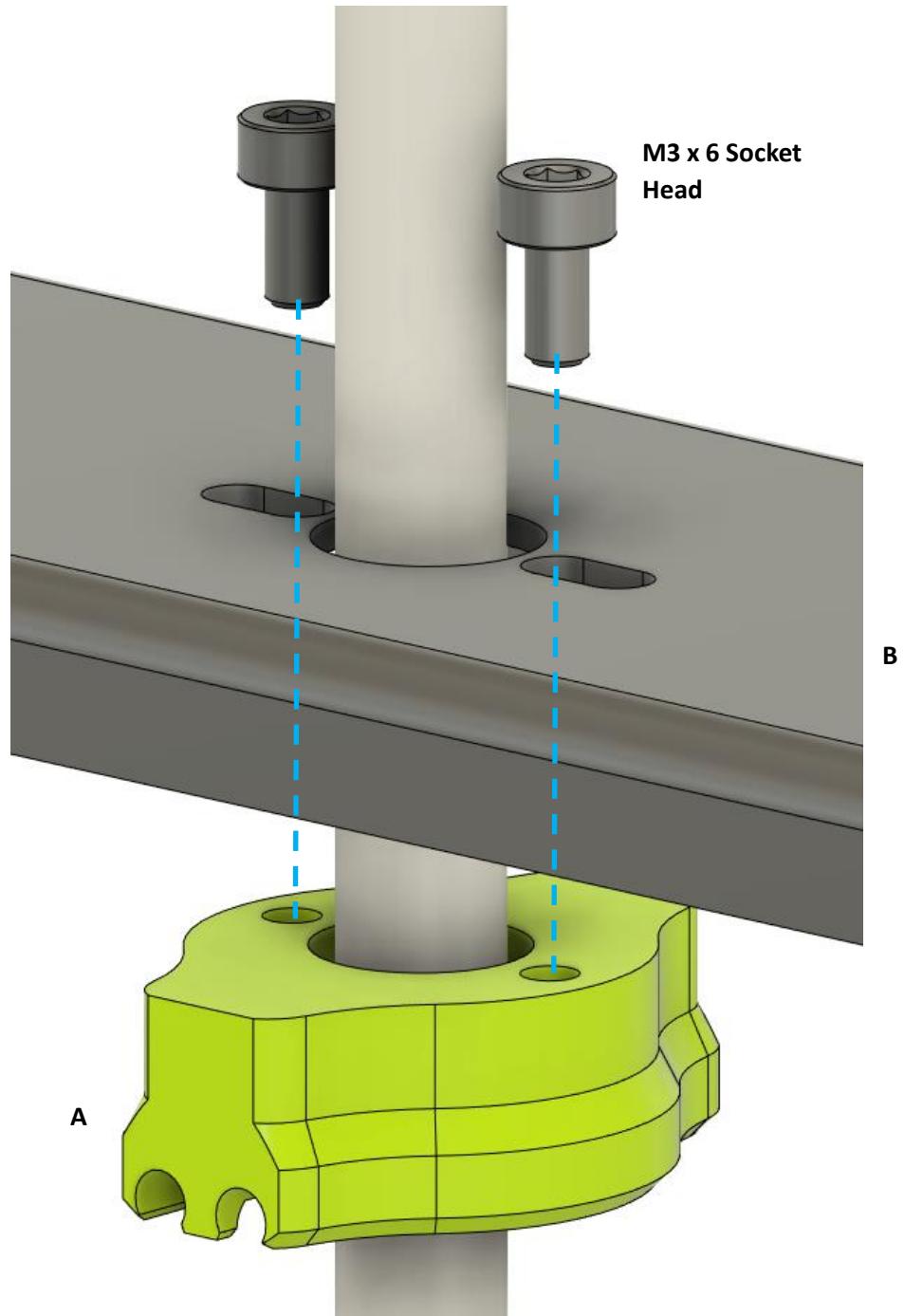
Gantry bed mounting points are facing correct way – 2 holes towards the front of the machine, 1 hole towards the back

You will need:

4X M3 x 6 Socket Head bolt

Instructions:

Use M3 x 6 Socket bolt to mate the Wobble X Top 3D printed bracket (A) to the Stamped Bed Gantry (B)



INSPECT FOR:

Wobble X Top is properly seated to the Gantry.

Check if the Wobble X Top can be moved by hand – It should not

Repeat once more.

Instructions:

Loosen the front SK12 blocks

Use 3D printed alignment jigs to align Z axial rods with the front legs of the machine.

Tighten each rod independently to ensure they are square to the front of the frame.



You will need:

16X M4 x 12 Socket head

16X M4 Full Hex Nut

Instructions:

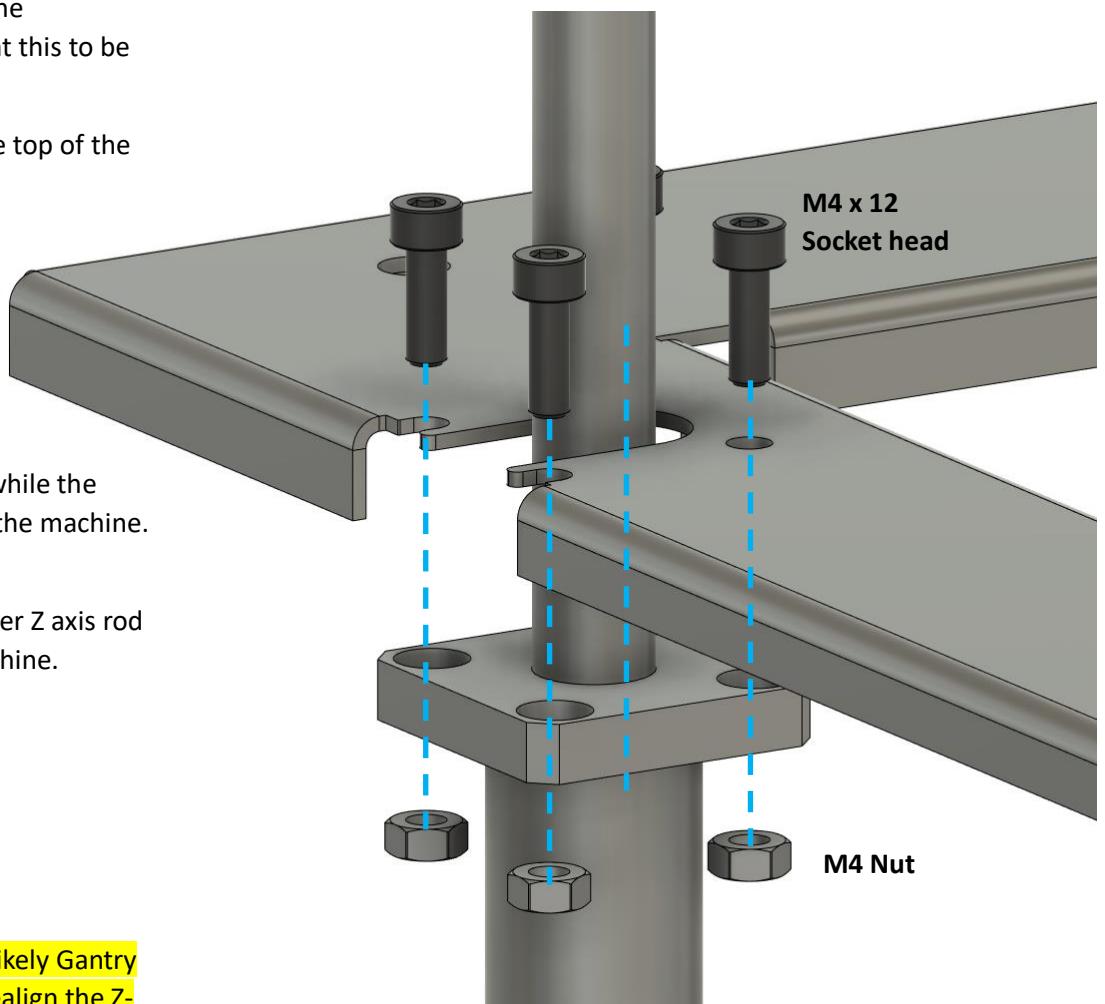
Loosely bolt the LMK12LUU Linear bearings to the gantry plate using M4 x 12mm Socket head bolts

Do not tighten down the LMK12LUU as you want this to be able to self align

Move the gantry to the top of the machine

Tighten the M4 bolts while the gantry is at the top of the machine.

Repeat this for the other Z axis rod in the front of the machine.



When doing this, it is likely Gantry may move position, Realign the Z-Motor bracket position to be centred to the Gantry hole.

INSPECT FOR:

Check for binding of the bearings as you move the gantry up and down, it should move smoothly!

Ensure the Gantry is as square as possible to the Z rods, check for tilt, twist or non-concentricity

Repeat once more.

Instructions:

Choose one of the remaining Z-axis axial rod and loosen the SK12 blocks

Align the Z rod and SK12 brackets to match the gantry slots

Raise the gantry and tighten the TOP SK12 bracket

Tighten the LMK12LUU to the gantry while the gantry is raised to the newly locked SK12

Lower the gantry and tighten the lower SK12 block

Apply threadlocker to each M5 x 10 button head bolt fixing the SK12 to the printer assembly

**INSPECT FOR:**

Check for binding of the bearings as you move the gantry up and down, it should move smoothly!

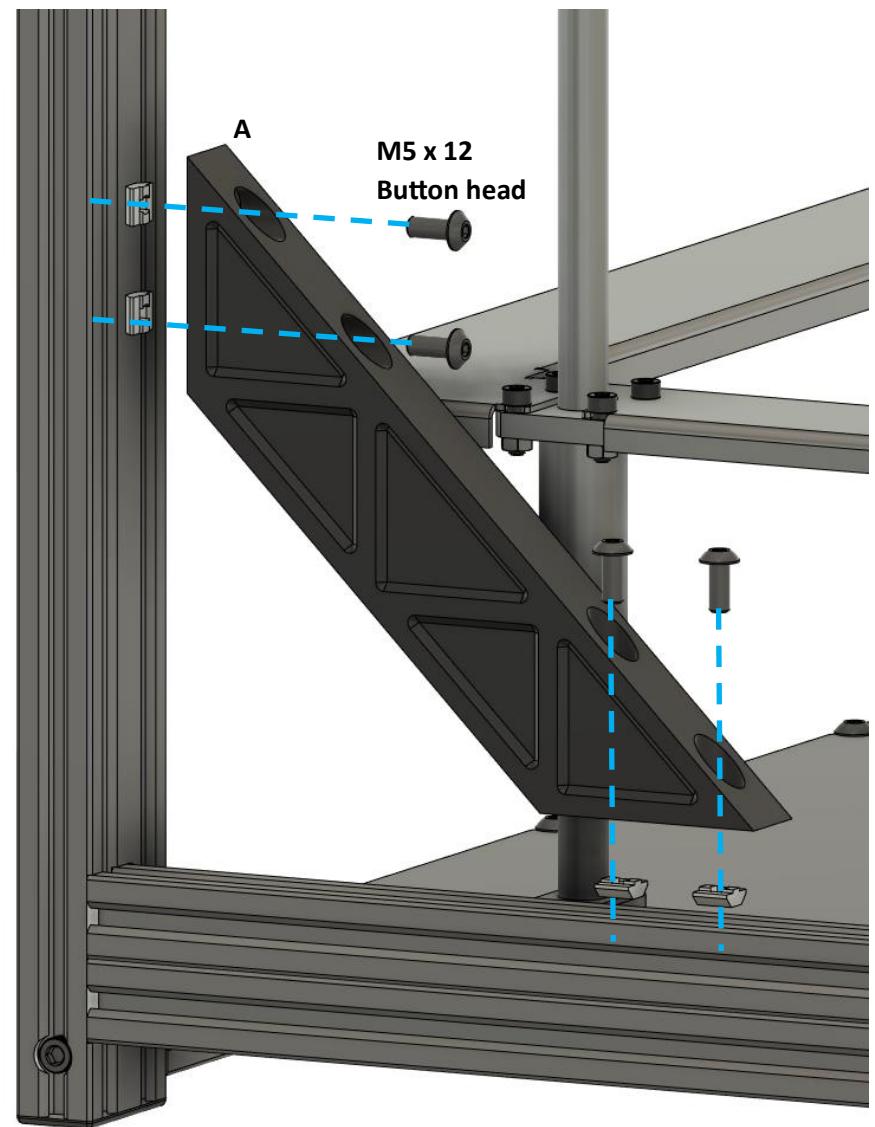
Repeat once more after inspection.

You will need:

10X Corner Brace

40X M5 x 12 Button Head

40X Rollin Thut



Instructions:

Roughly place the Thuts inside the aluminium frame.

Use an Allen key to align the Thuts into the final position using the Corner Brace (**A**) as a guide

Tighten **A** to the frame by using **M5 x 12mm Button cap bolts**

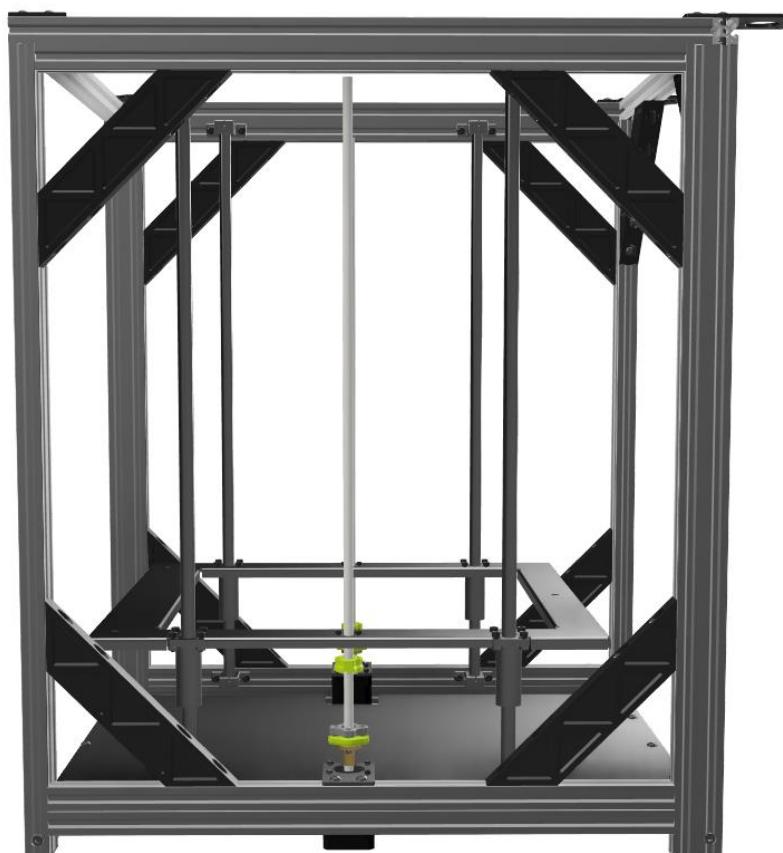
There should be 4x **A** on the left and right sides of the assembly, and 2x on the rear facing top side



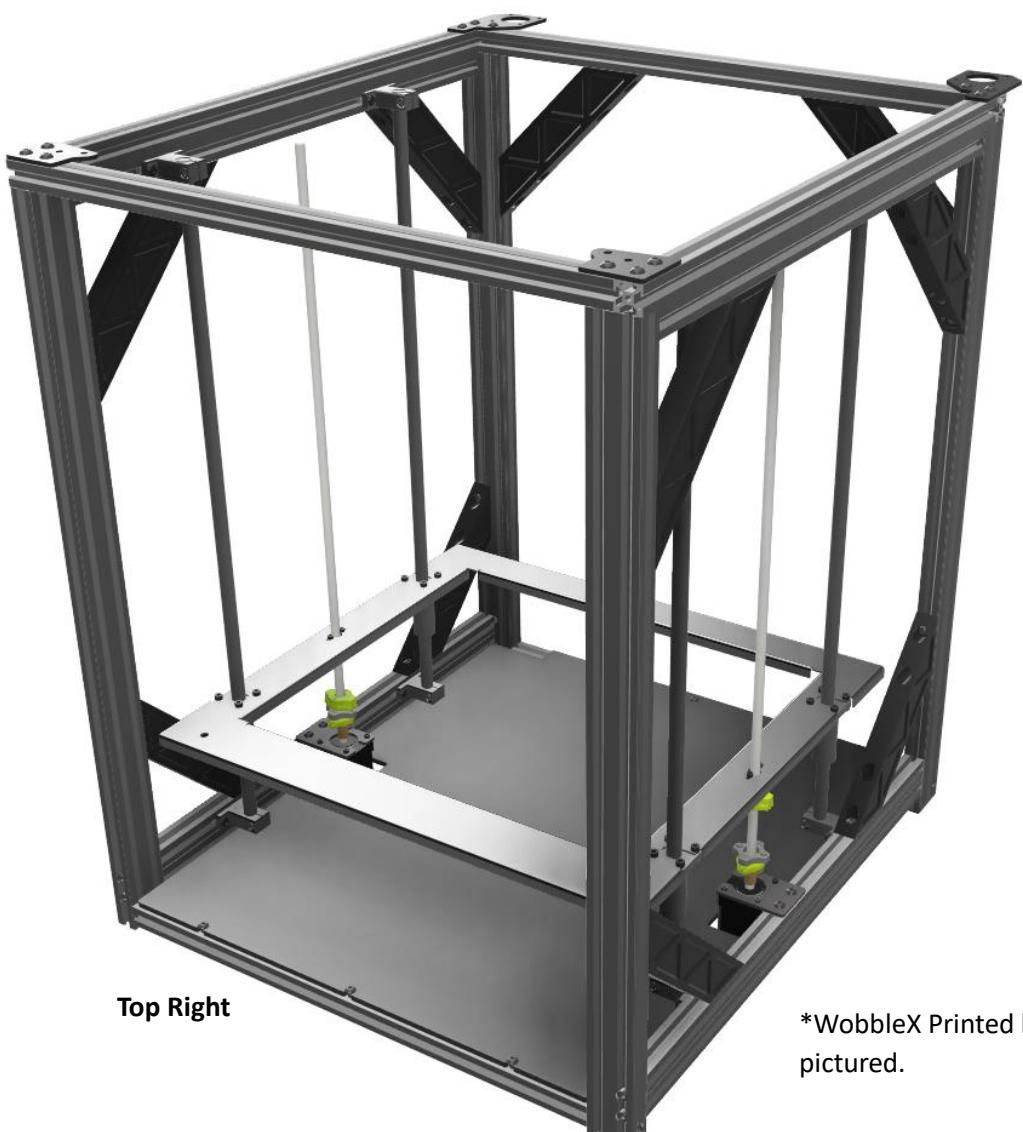
THE MACHINE SHOULD LOOK LIKE THIS



Front



Right



Top Right

*WobbleX Printed brackets incorrectly pictured.

You will need:

2X Compliant T8 Rod Clamp

4X M5 x 20 Button Head

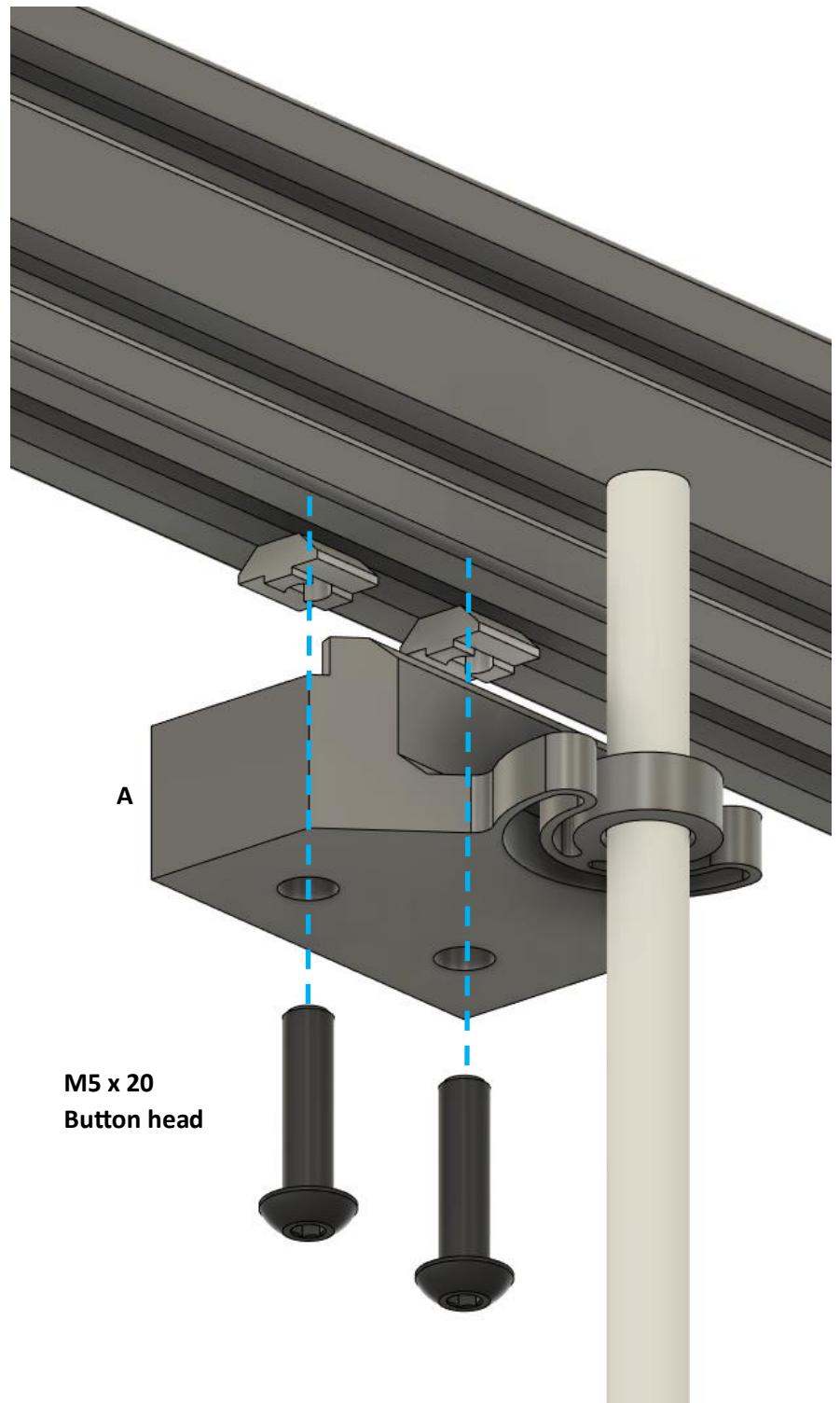
4X Rock In Tnut

Instructions:

place the Tnuts inside the aluminium frame.

Place Compliant T8 Rod Clamp (A) over the threaded T8 Z rod

Tighten **A** to the frame by using **M5 x 20mm Button cap** bolts



INSPECT FOR:

Ensure the compliant clamp can move freely up and down the T8 rod, If not then file the inside to fit.

Move gantry up. Align the T8 bracket with the centre of the gantry.

Repeat once more.

You will need:

4X Left Back Bracket

4X Right Back Bracket

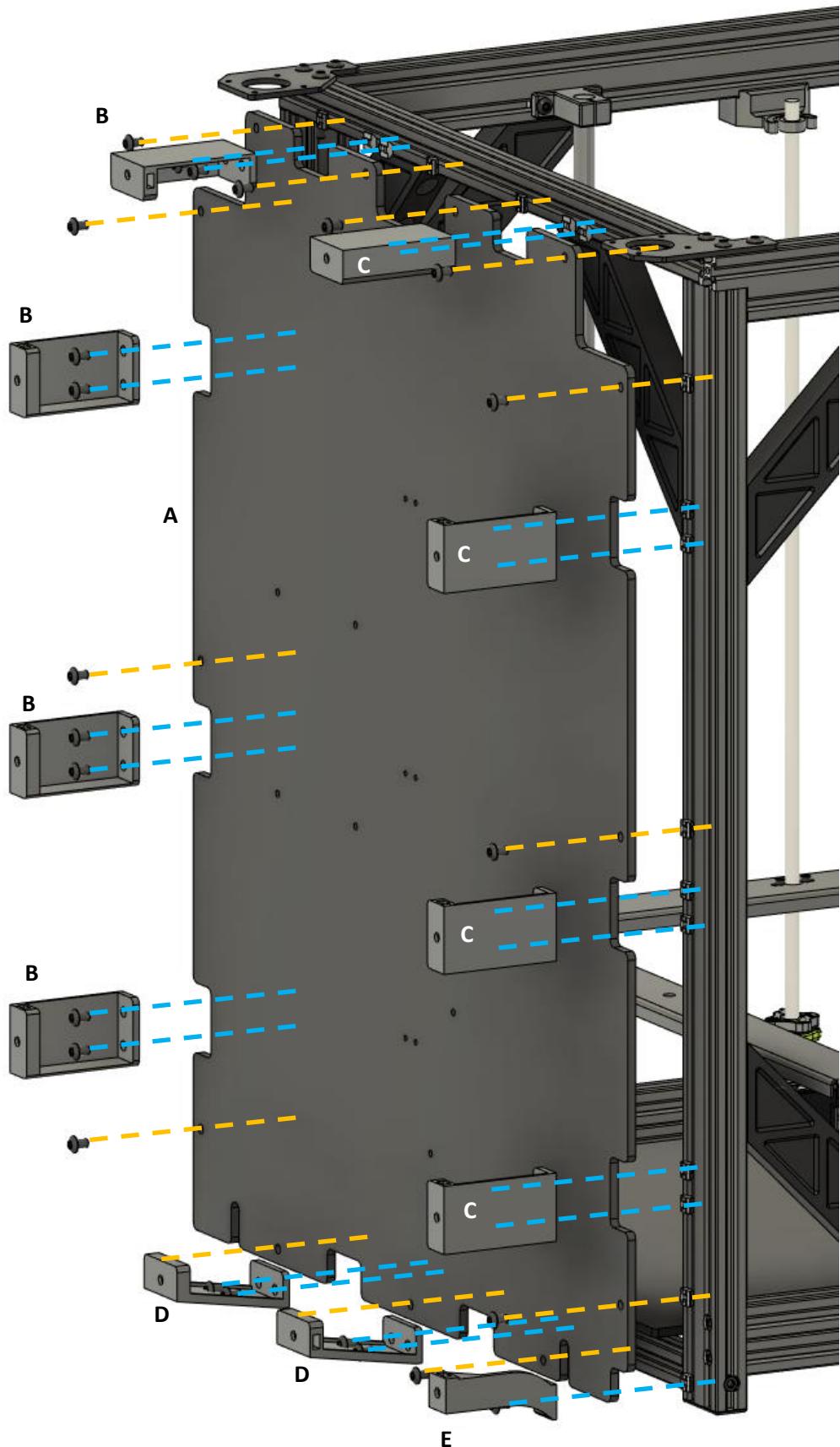
2X Bottom Back Bracket

1X Bottom Right Back Bracket

1X Back Inner Panel

34X Rollin Tnut

34X M5 x 10mm Button Cap



Instructions:

Rotate the assembly so the back of the machine is facing upwards – this makes placement of Tnuts easier

Place the back panel against the surface

Move the Back Panel (A)

left,right,up, and down by 20mm each time using the gap created in order to place and align the Tnuts inside the aluminium extrusion

At the same stage as above, also place in the extra Tnuts that will be used for the back brackets (Left[B] Right[C] Bottom[D] Bottom right[E])

Screw A into the assembly using **M5x10 button head (orange)**

Screw in **B,C,D,E** into the assembly using **M5x10 button head**

INSPECT FOR:

Back panel textured side faces inside the machine.

Back brackets are of the correct side (curves face curves)

Make sure Z Motor wires are correctly placed through the back panel

You will need:

2X XY motor

8X M3 x 6 Socket

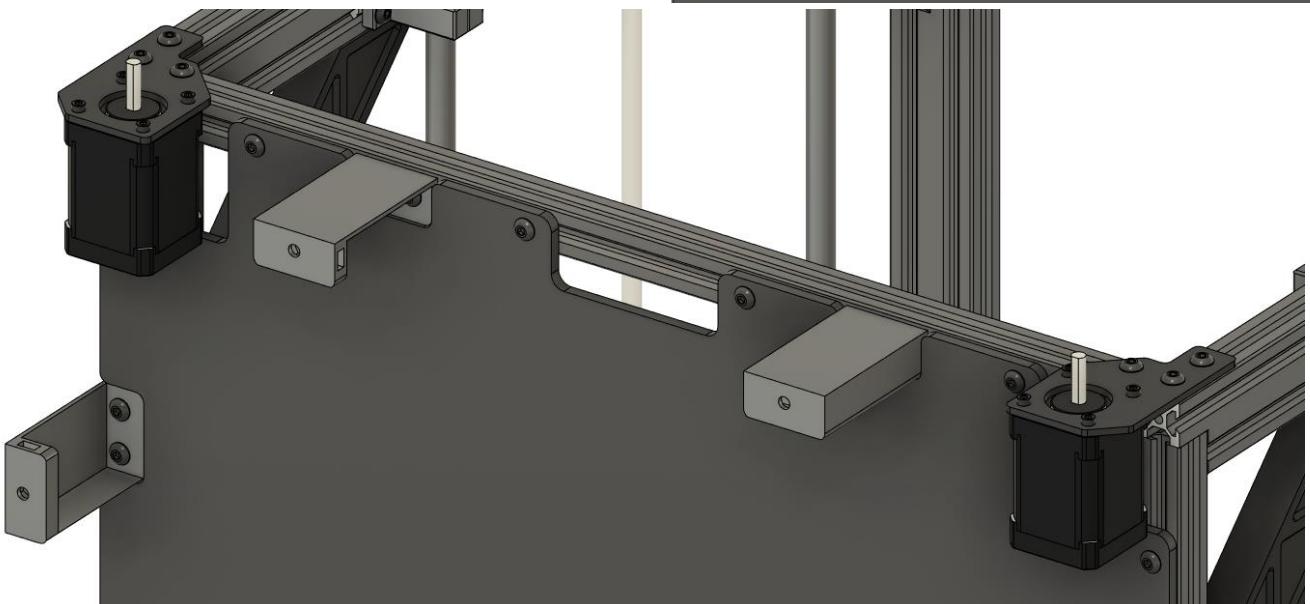
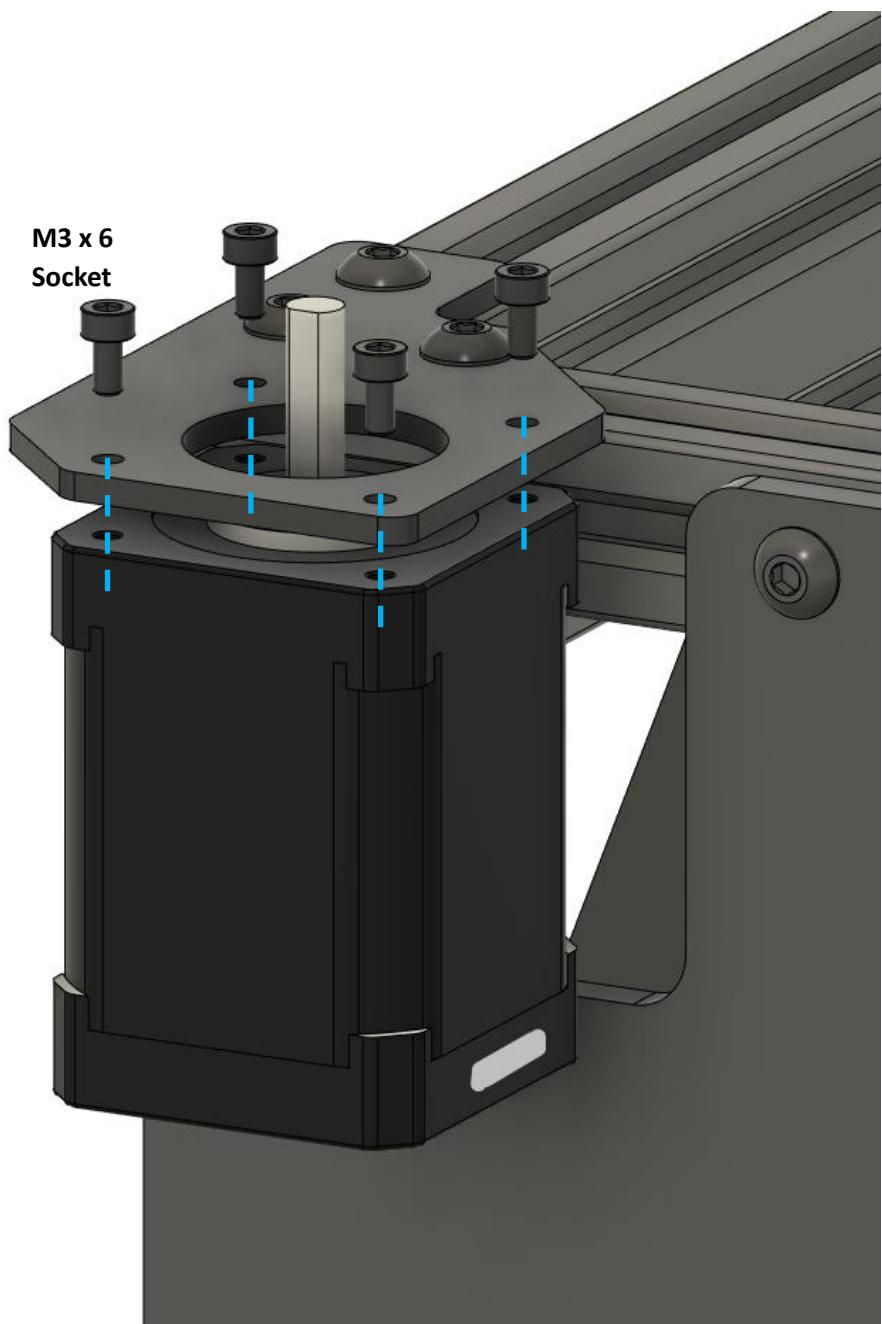
Threadlocker

Instructions:

Use **M3x6** Socket bolts to mate the XY motor to the XY motor bracket.

Use Threadlocker on the M3 bolts.

Point the XY motor bracket motor wire port towards the centre of the back panel.



INSPECT FOR:

Motor wire direction

You will need:

1X Duet2
4X M3x20 Countersunk bolt

4X 10mm printed Spacer

4X M3 nut

Threadlocker

Instructions:

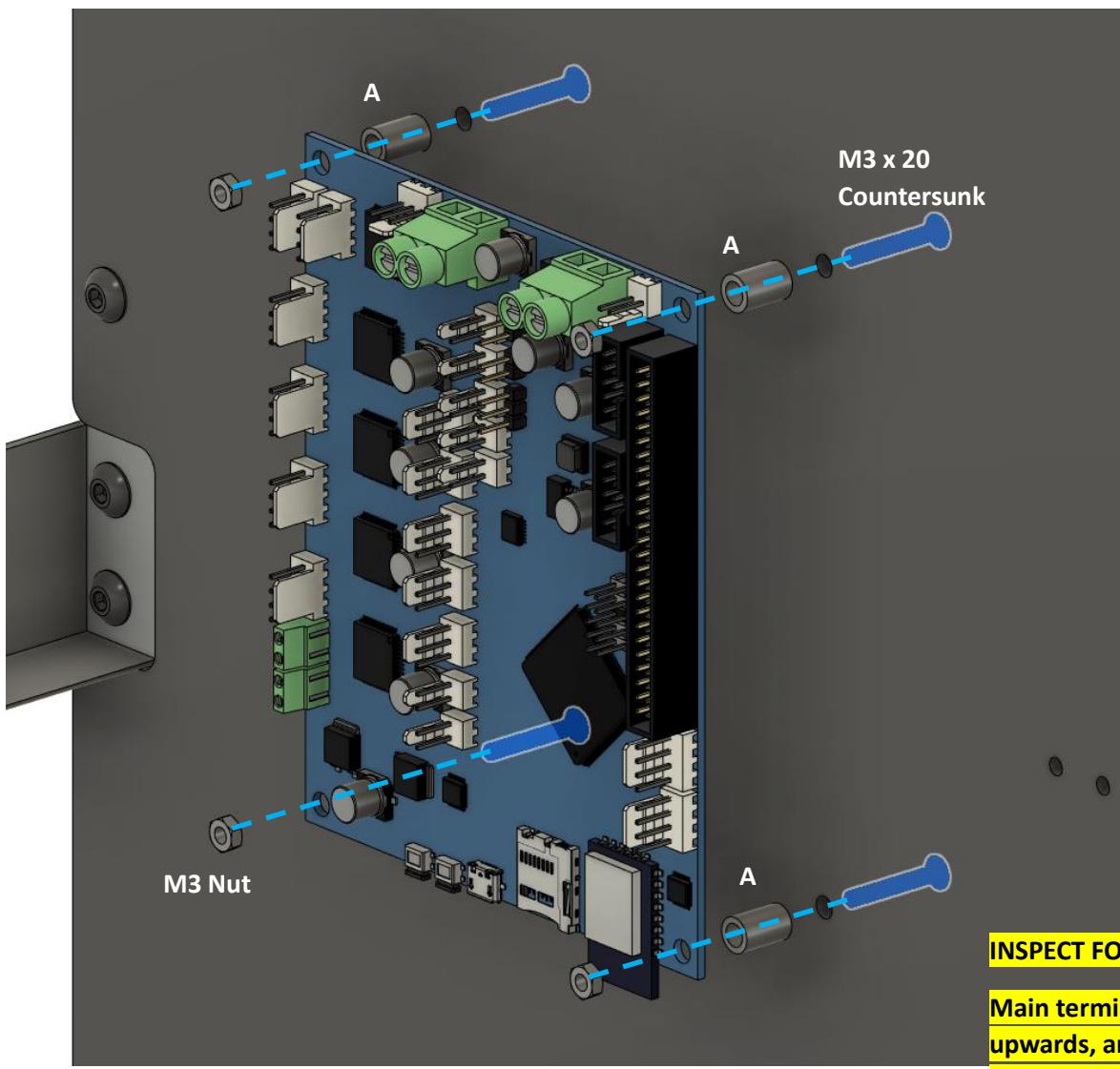
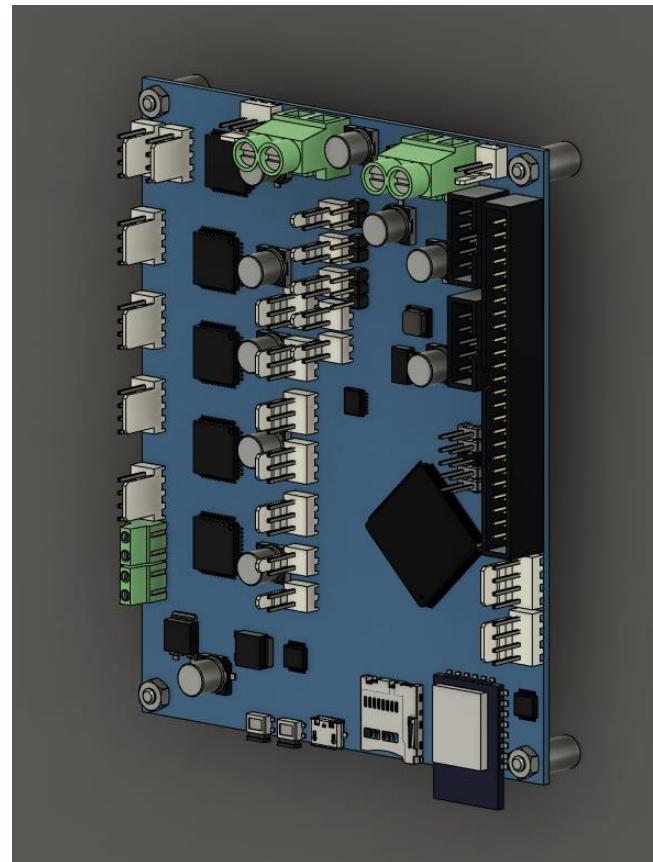
From the inside of the frame, insert
M3x20 Countersunk bolts through
the back panel

Place onto each bolt a printed
spacer (**A**)

Push a Duet2 (**B**) onto the 4
exposed bolts, making sure the
green terminals are facing upwards

Apply Threadlocker to bolt tips

Use M3 Nut to tighten Duet2 to
assembly



You will need:

3X Zip ties

Instructions:

Place a zip tie in area **A** and **B** with the zip tie locking lug on the same side as the Duet2 motherboard

Place one more additional zip tie in position **C** with the locking lug flush against the back panel - the lug should be facing the inside of the machine in the opposite direction to the other 2 zip ties



INSPECT FOR:

Ensure the position C zip tie locking lug is as flush as possible to the back panel

Ensure the position C ziptie locking lug is positioned on the inside of the assembly

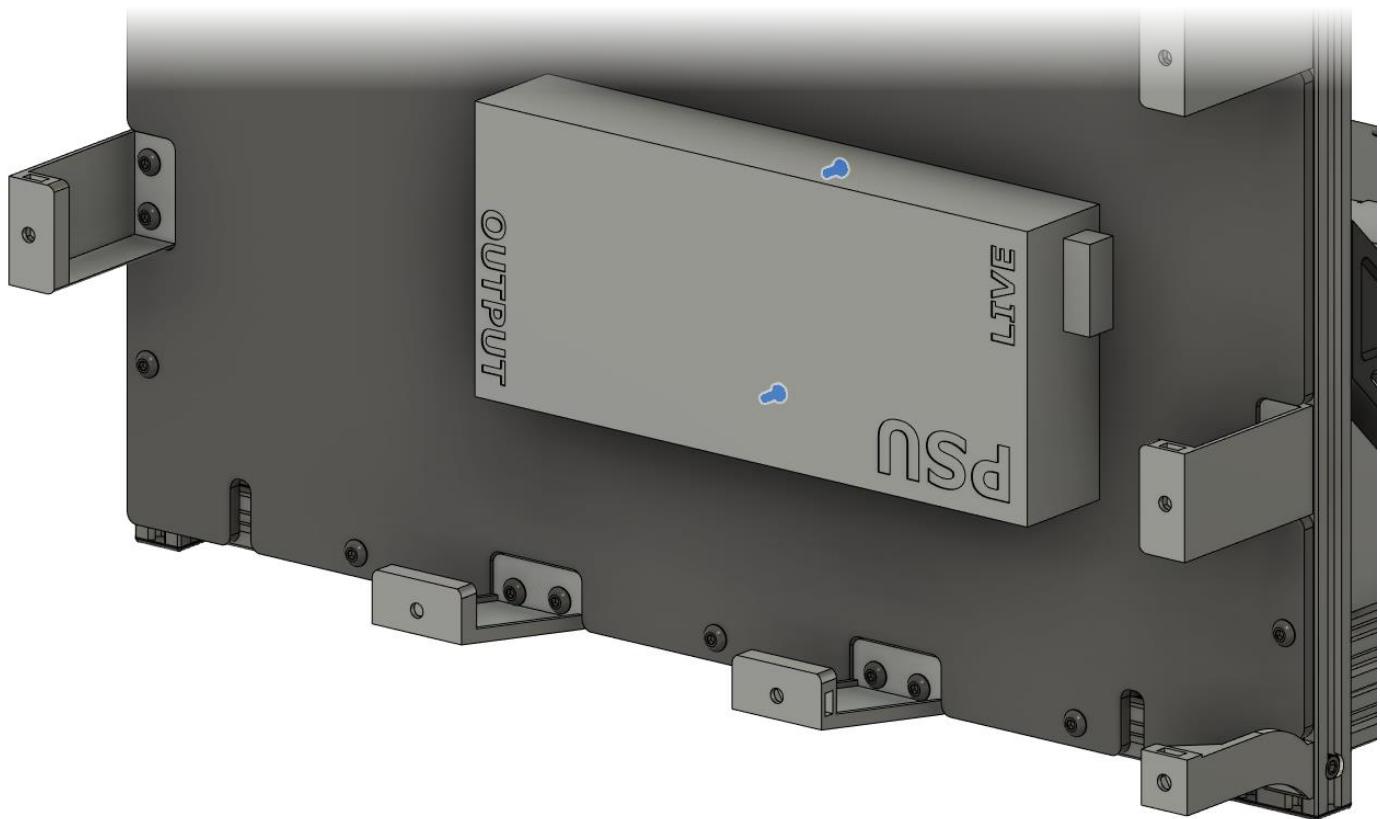
You will need:

1X Powersupply

2X M3 x 8 countersunk bolt

Instructions:

Use M3x8 countersunk bolts to fix the Power supply unit to the back panel



INSPECT FOR:

Ensure the Countersunk bolts are flush in the back panel

The live side of the PSU is facing the right

You will need:

2X X-Gantry bracket

8X Polycarbonate VWheel

8X M5 x 25 Buttonhead Bolt

4X Eccentric nut

4X 6mm Aluminium Spacer

8X M5 Nyloc Nut

Instructions:

Use M5 x 25 Button head bolts, and place them through the marked holes.

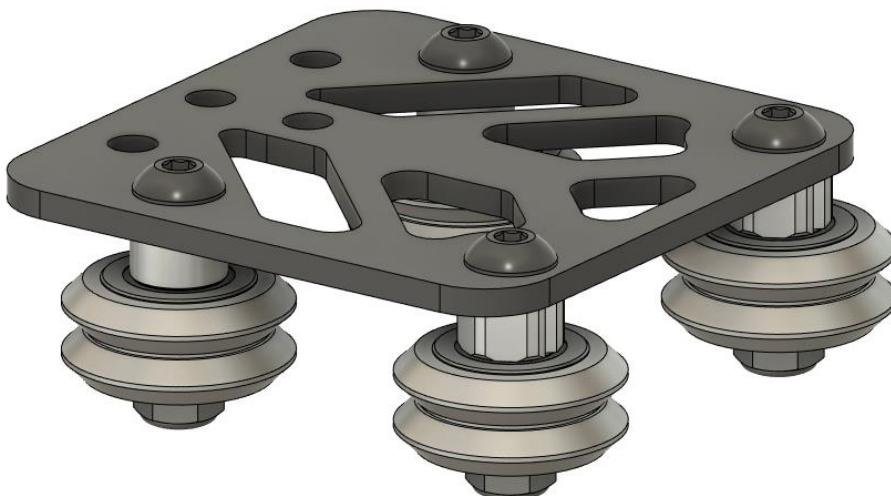
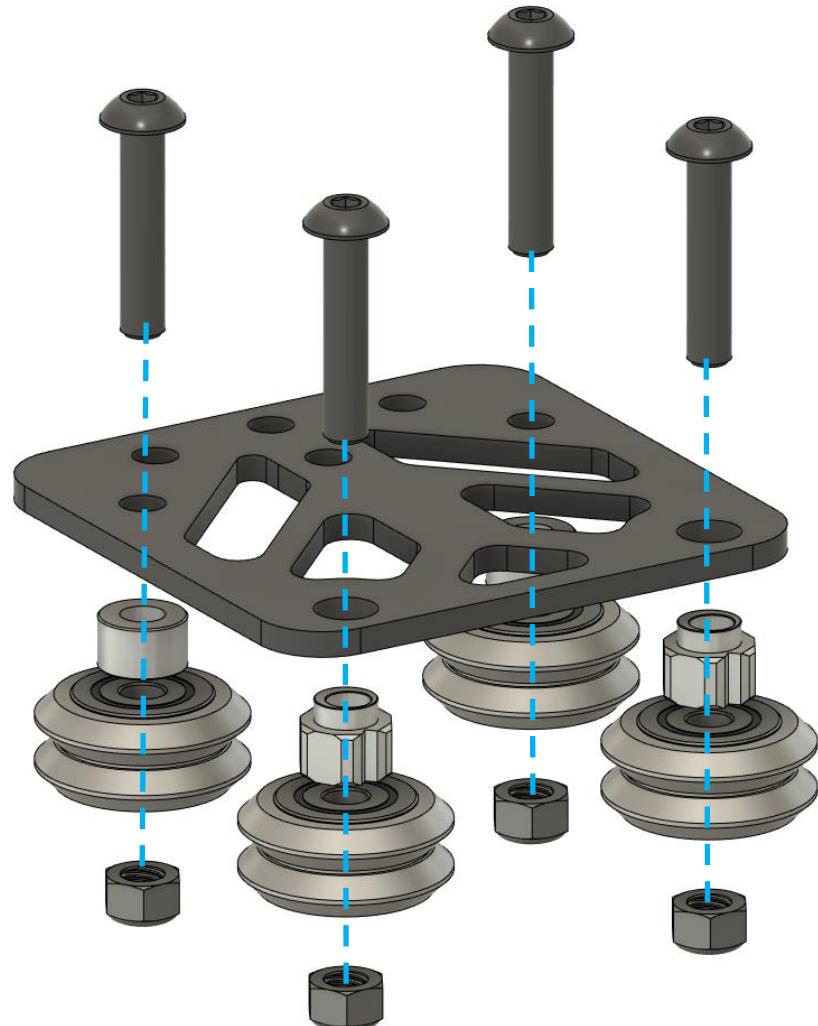
Insert onto the exposed **M5 x 25** thread **either 1 spacer, or 1 eccentric nut**

The eccentric nut should be on the **outer most bolt holes**, which are **larger** in size

The eccentric nut has a **groove** to indicate the direction, this should be **facing the edge of the bracket**

Place a V wheel onto the M5 bolt **after** the spacer/nut has been applied.

Cap off the **M5x25** bolt with a **Nyloc Nut**. Only use finger strength to put the nut into place allowing the Vwheels to be loose and can wobble on the bolt shaft



INSPECT FOR:

Eccentric Nut is facing towards the edge of the bracket

Imperfections on the X-Gantry Bracket eccentric nut edge

Ensure that the nyloc nuts are loose allowing the wheels to wobble

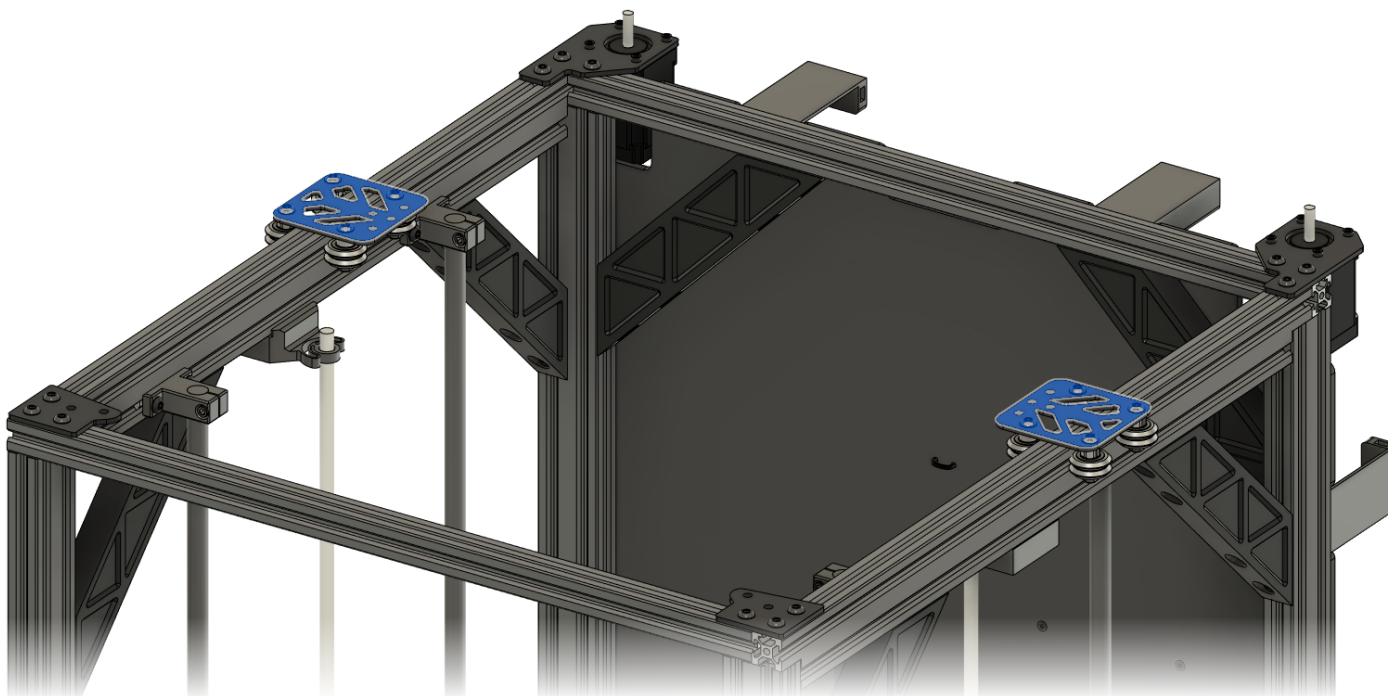
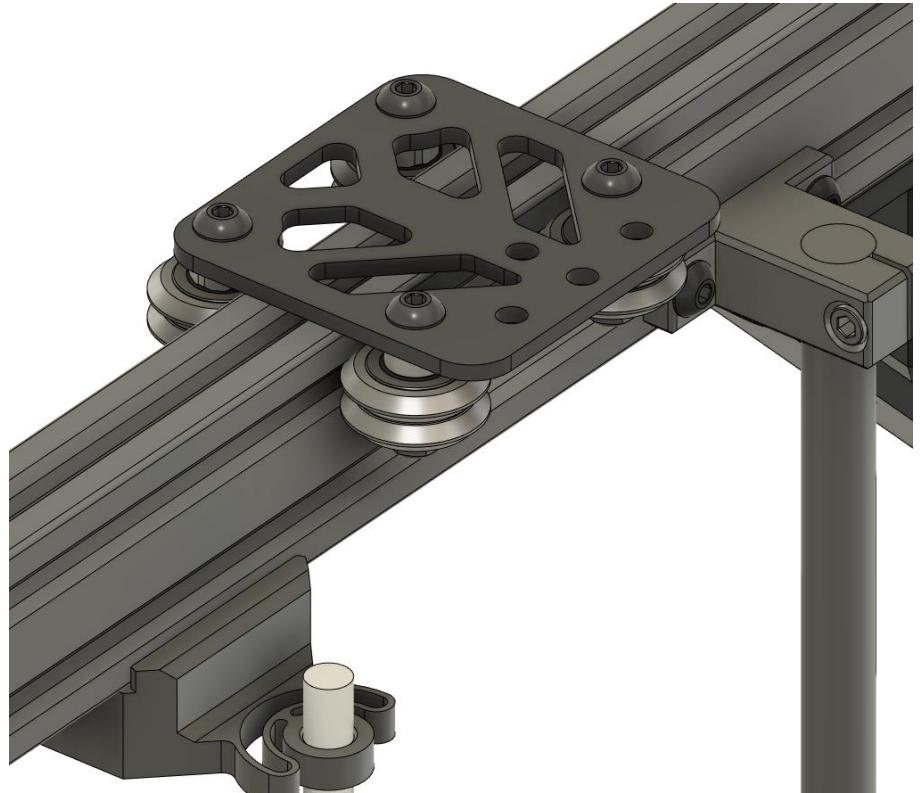
Repeat once more.

Instructions:

Push the assembled X-Gantry bracket onto the top of the Y2040 Aluminium extrusion

Tighten the Nyloc Nuts to fix the bracket in to place.

Use a spanner to turn the eccentric nut of each Vwheel so the wheels gently bite the aluminium extrusion.

**INSPECT FOR:**

The eccentric nut should be facing the outside of the machine

Overtightening of the eccentric nuts, all 4 Vwheels should have friction against the 2040 extrusion but slip if enough finger force is applied

You will need:

1X W-70 SSR Relay Heatsink

2X M4 x 12 Socket Head

2X M4 Nut

1X Drill with 4mm Bit

Threadlocker

Instructions:

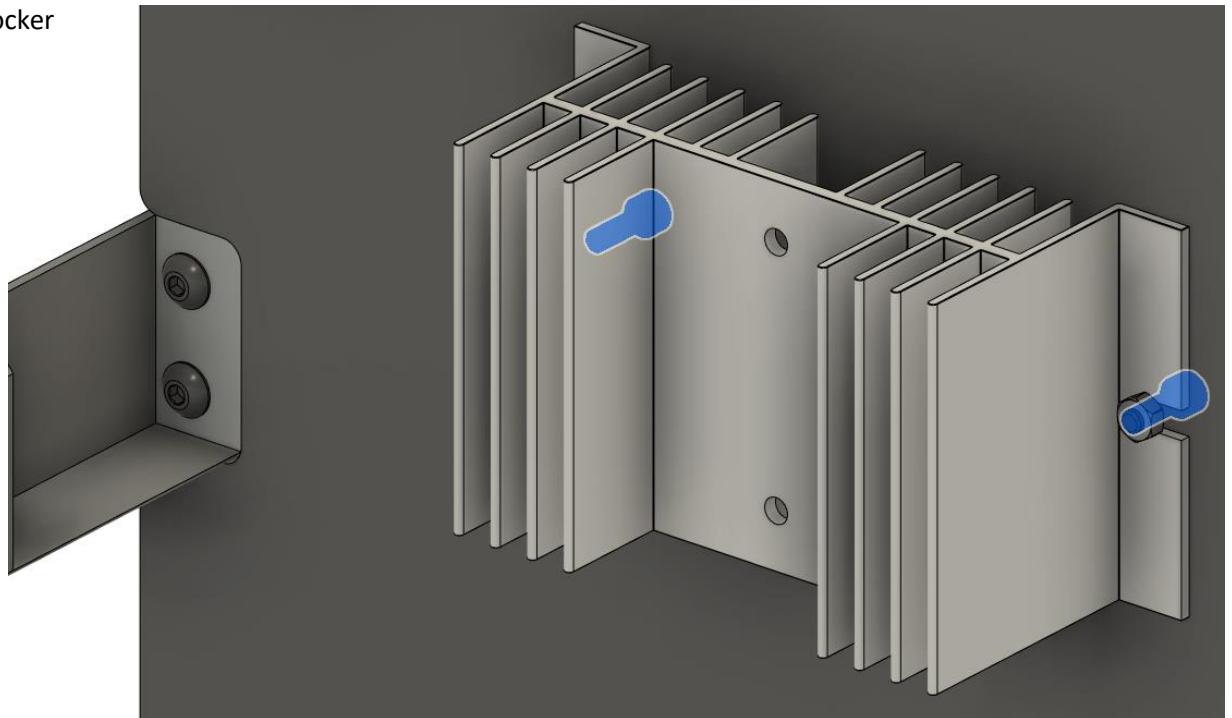
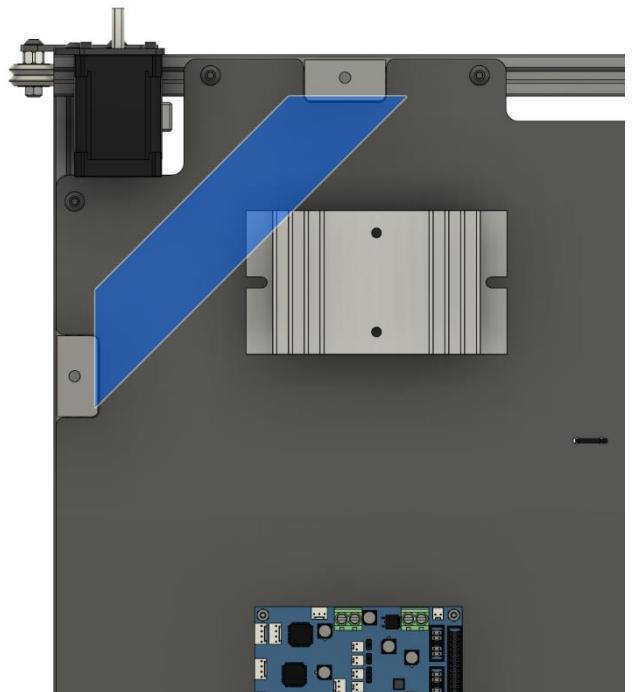
Use a printed corner brace as a guide and position the W70 heatsink in the correct location.

Mark out the two drill locations needed for the M4 bolts

Drill the mounting holes

Use M4 x 12 socket head bolts and nuts to affix the heatsink to the back panel

Use Threadlocker



INSPECT FOR:

Drilled hole location does not intersect with printed corner brace

You will need:

2X M4 x 12 socket head

Thermal paste

1X SSR Relay

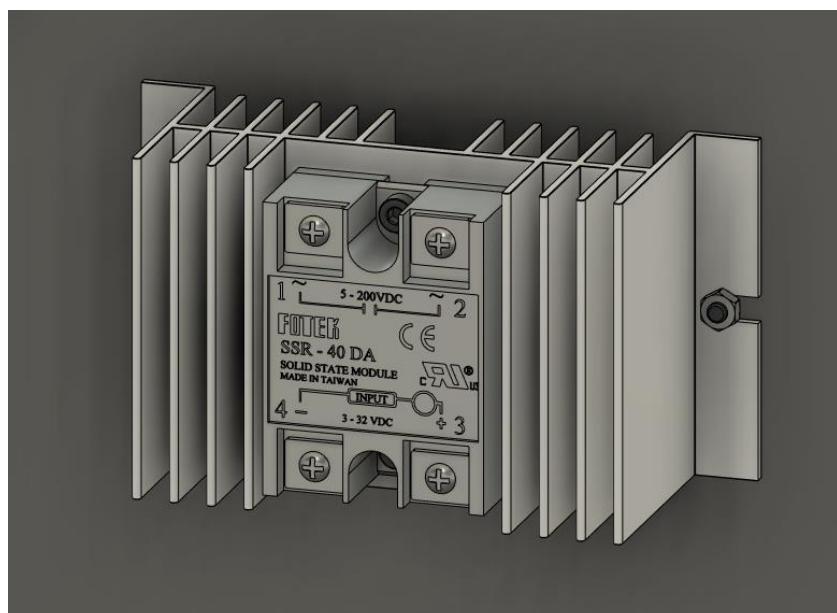
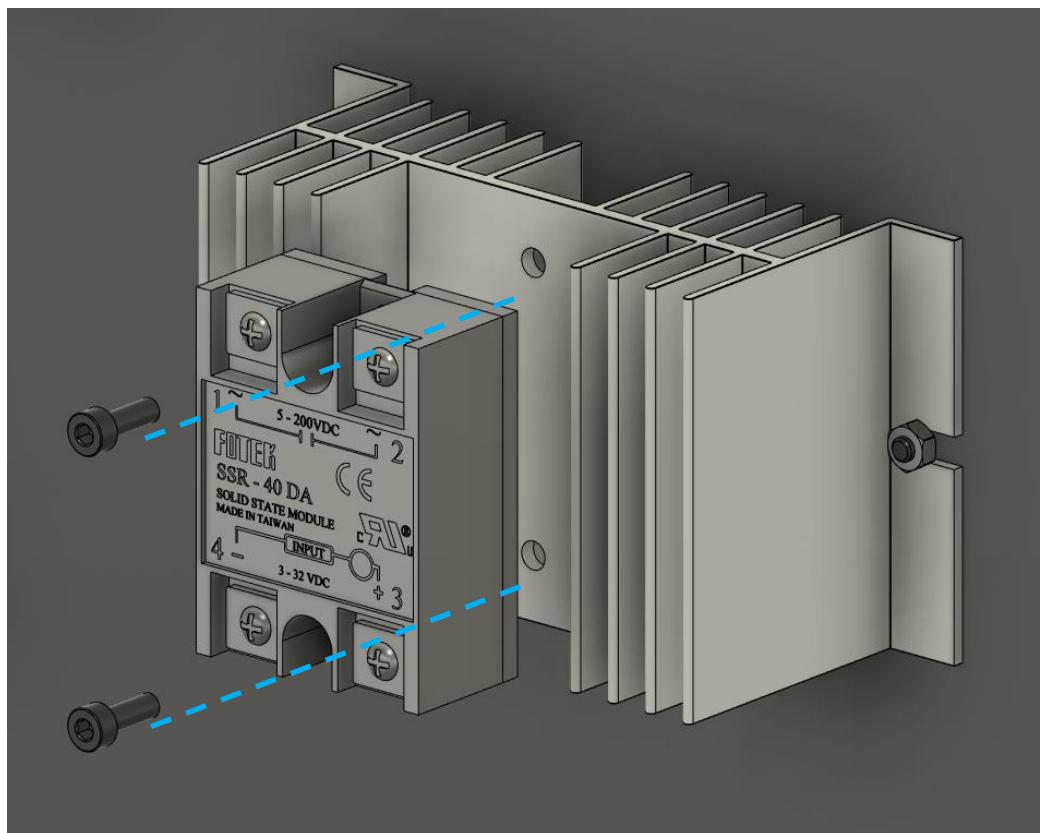
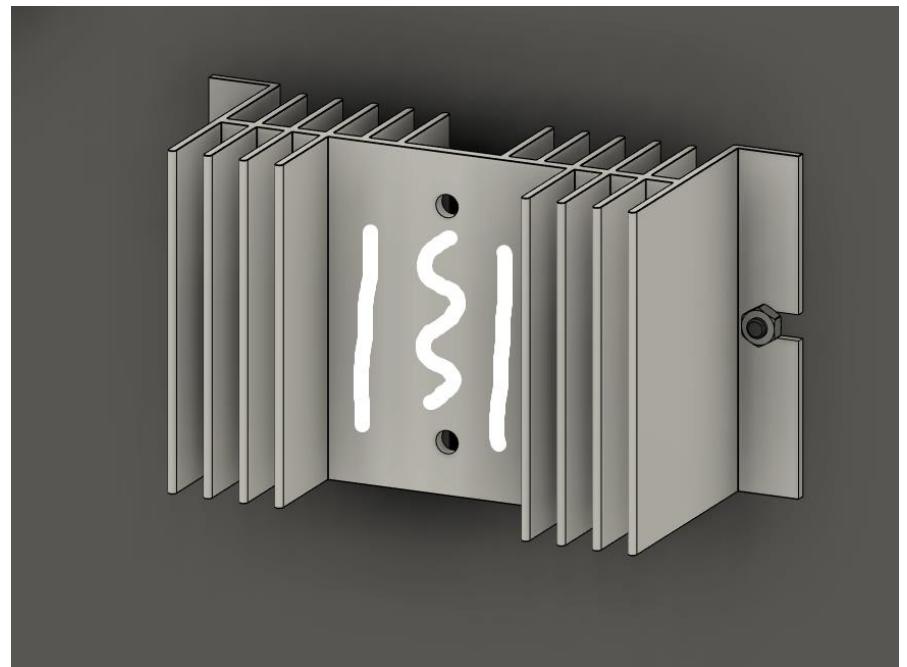
Instructions:

Apply Thermal paste to the location where the SSR Relay will be mounted

Remove plastic cover from the SSR relay.

Use **M4 x 12** Socket head bolts to fix the relay to the heatsink

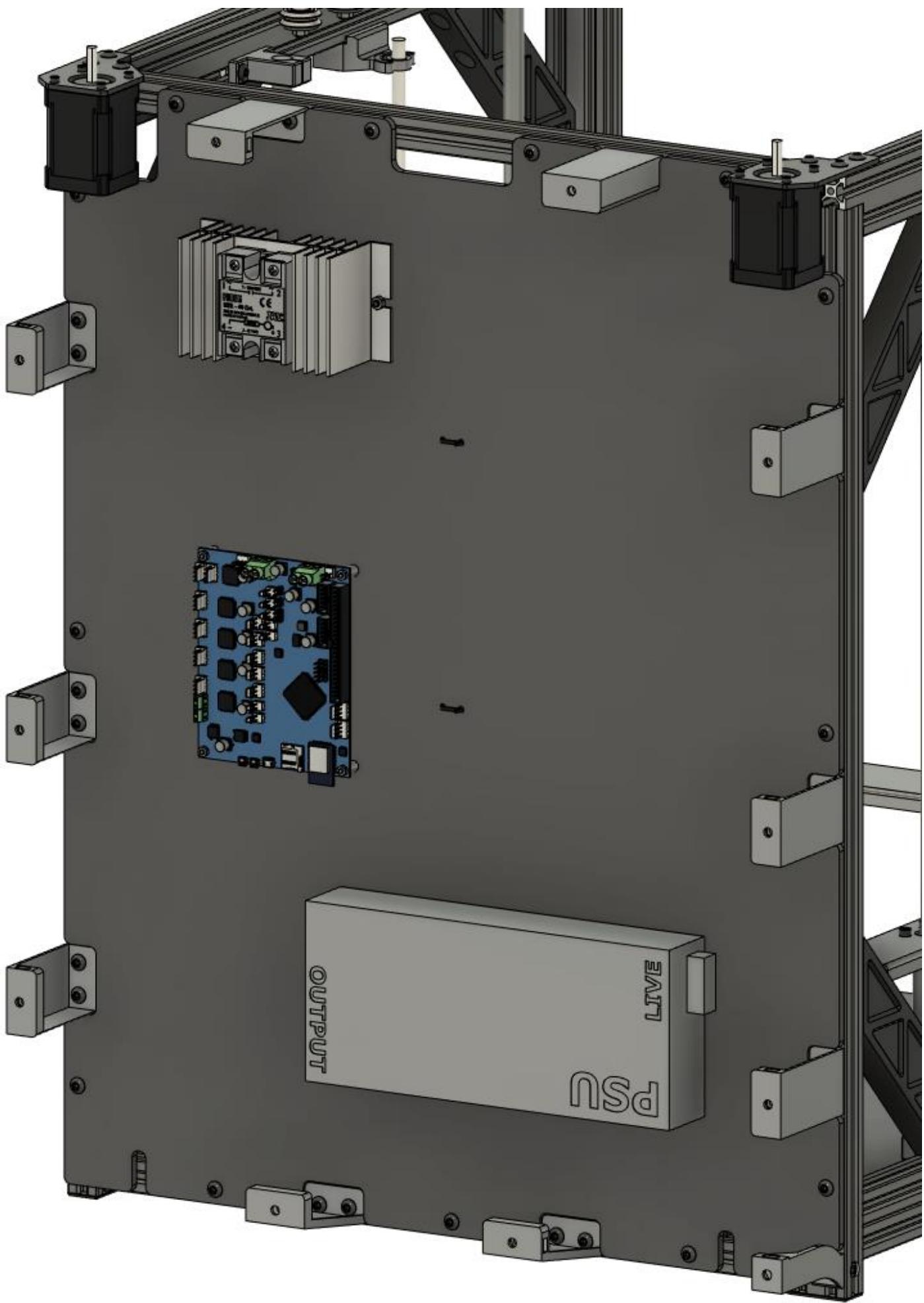
Replace plastic cover on SSR.



INSPECT FOR:

Enough thermal paste has been added to the centre of the heatsink

Failure to use thermal paste can be deadly



You will need:

1X Aluminium rail support

4x M5 x 25 Button head bolts

4X M5 Nyloc Nuts

Instructions:

Place two **M5 x 25 button head bolts** into the X-Gantry bracket

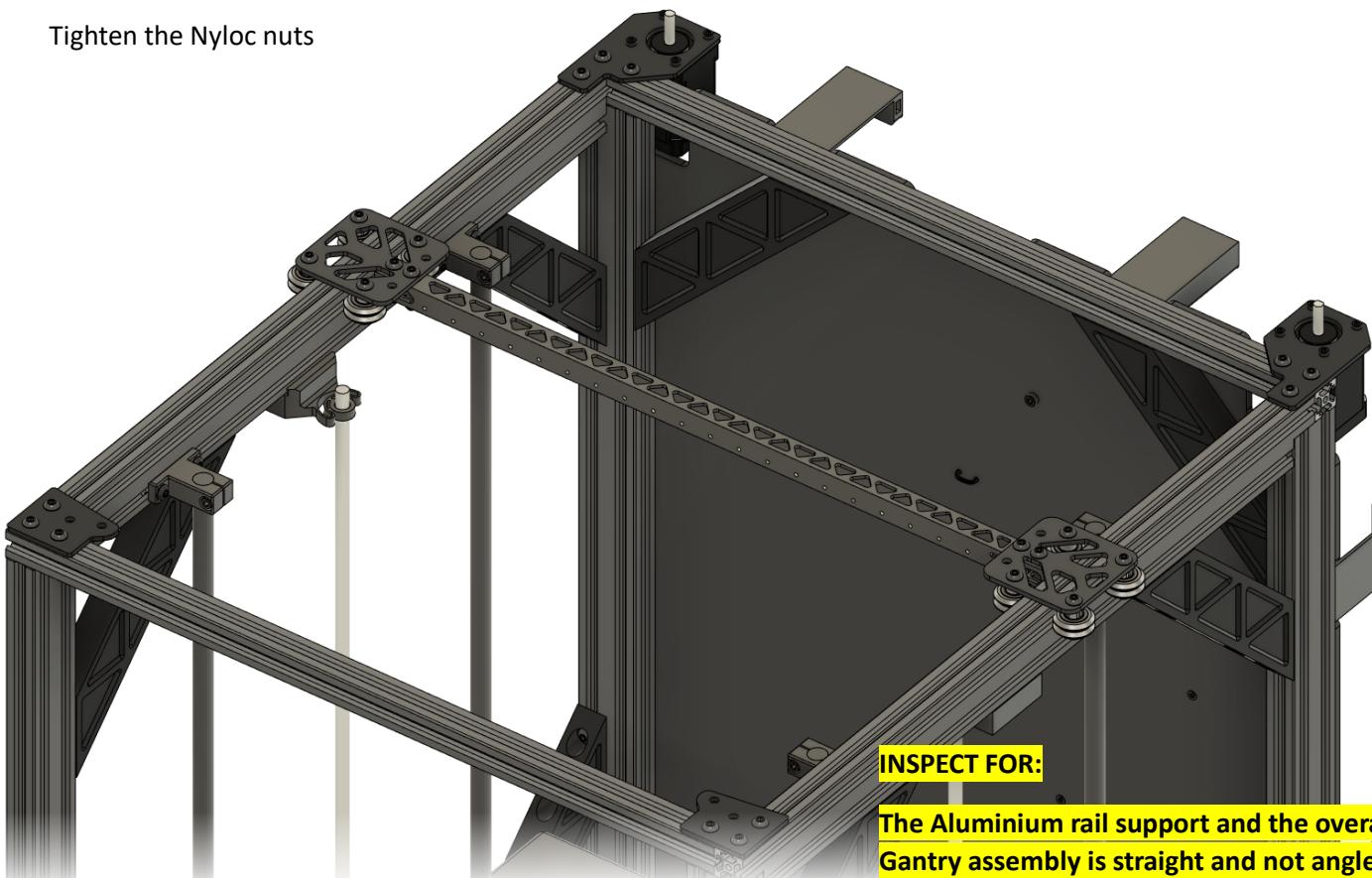
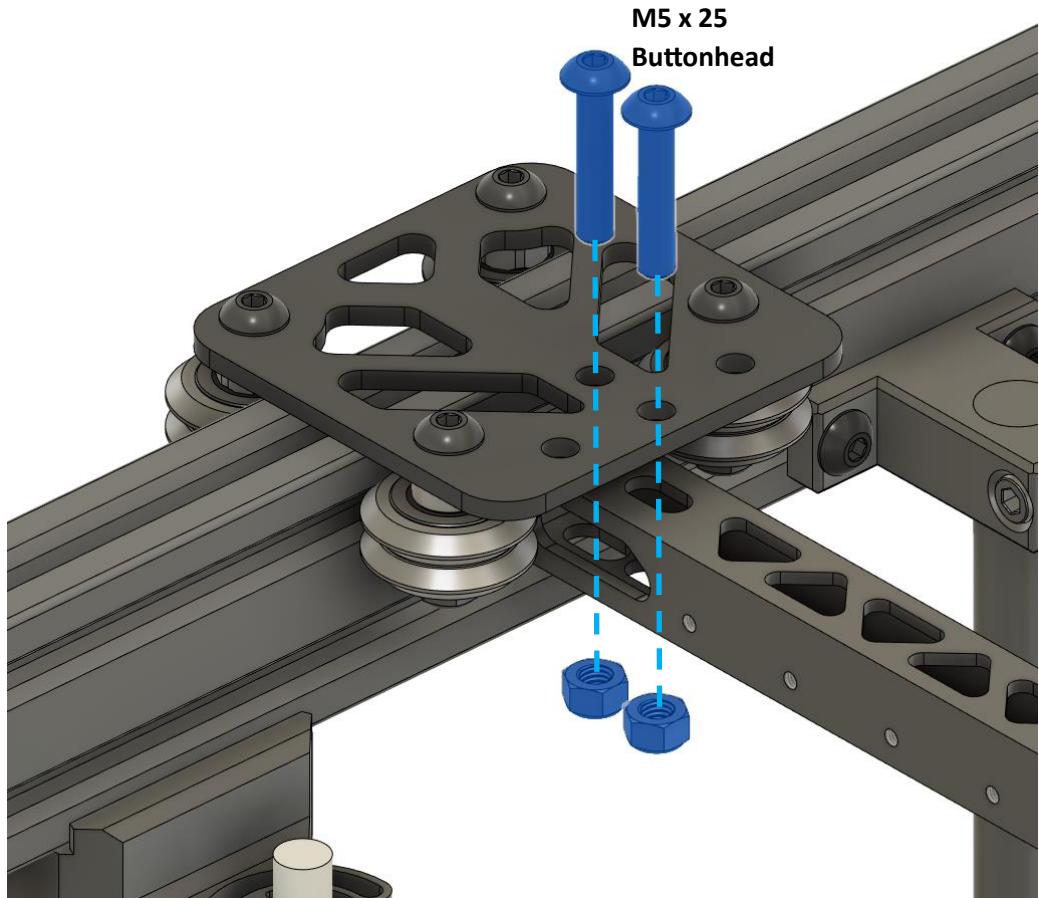
Lift the Aluminium rail support up to the X-Gantry bracket allowing the bolts to pass through the rail

Add **Nyloc Nuts** onto the end of the M5 bolts, finger tight

Do this for the other remaining side

Push the rail towards the back of the machine, so the X-Gantry brackets are **pressed against the XY Motor brackets**

Tighten the Nyloc nuts



INSPECT FOR:

The Aluminium rail support and the overall X-Gantry assembly is straight and not angled

Aluminium rail M3 mounting points are at the bottom and facing towards the front of the assembly

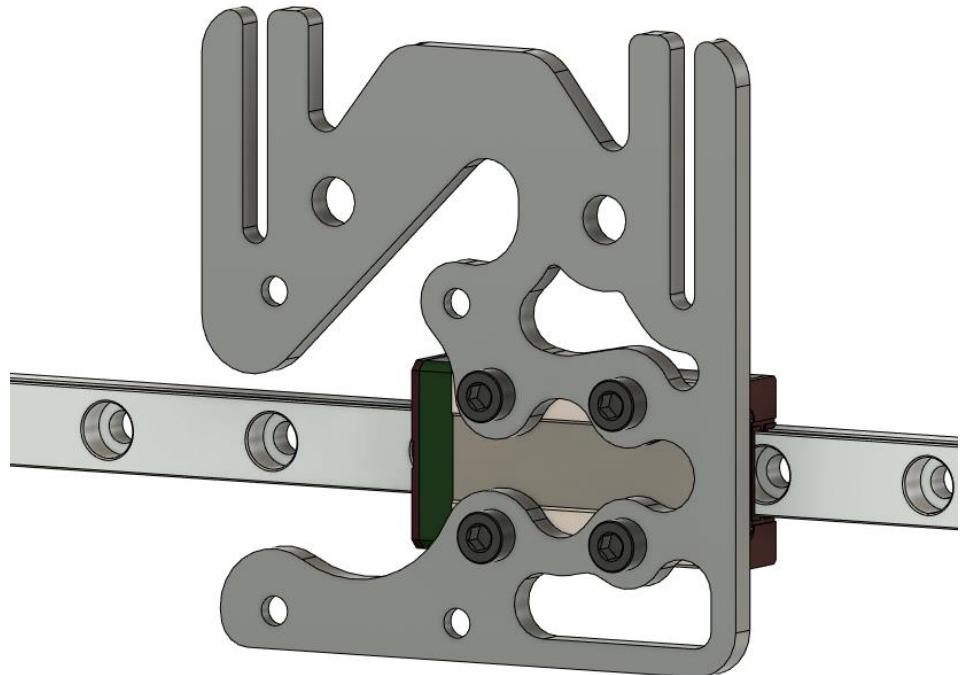
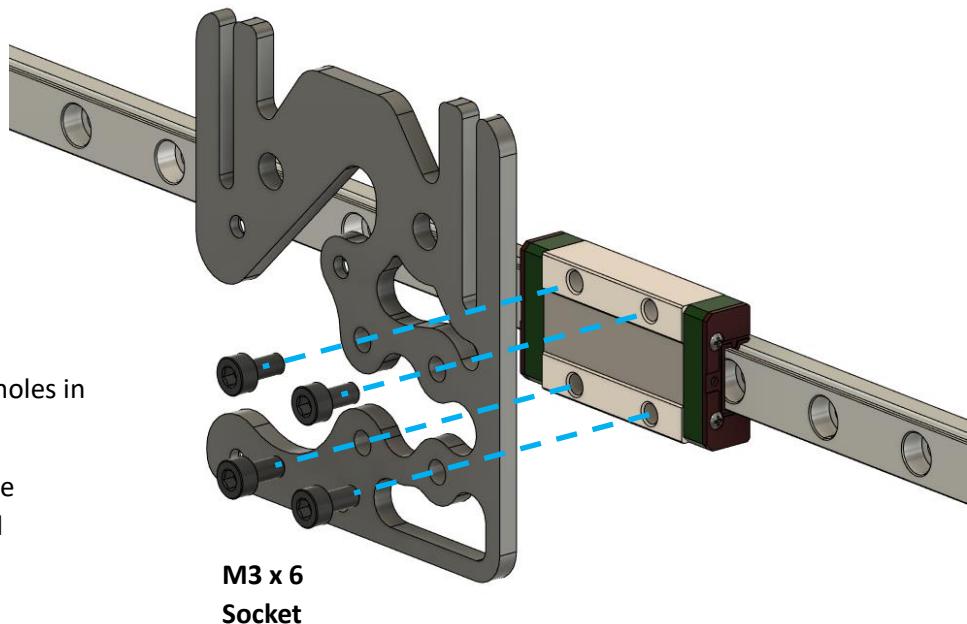
You will need:

- 1X Linear Rail
- 4X M3 x 6 Socket head
- 1X Extruder frontplate
- Threadlocker

Instructions:

Apply Threadlocker to the 4 threaded holes in the linear rail carriage.

Use **M3x6 Socket** head bolts to affix the Extruder front plate onto the linear rail carriage.



INSPECT FOR:

Squareness of extruder bracket onto the linear guide carriage

You will need:

12X M3 x 6 Socket bolt

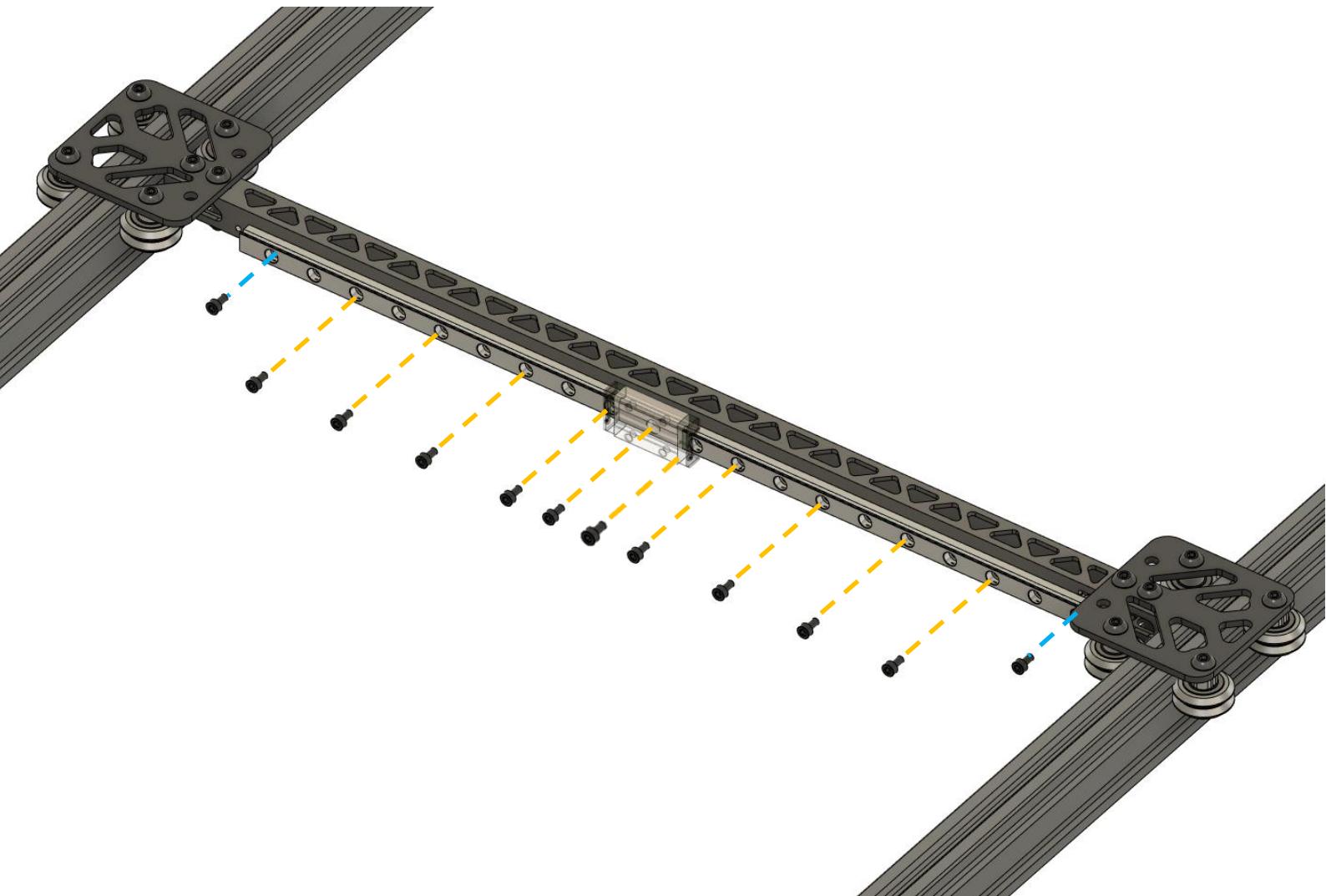
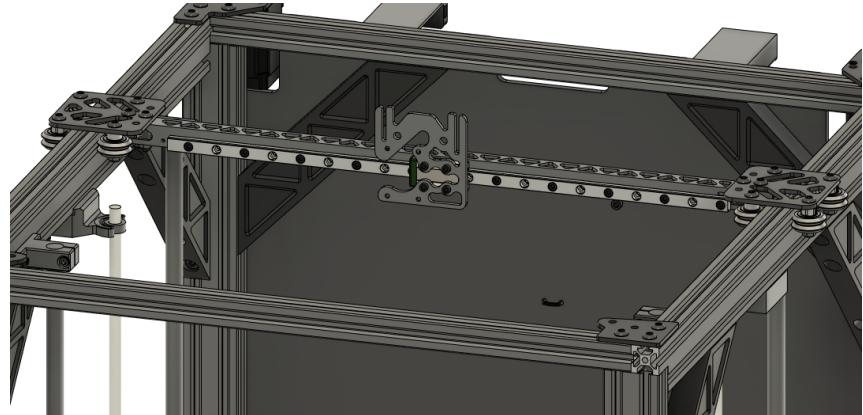
Instructions:

Attach the Linear rail to the X-Gantry aluminium backing beam with **2x M5x6** Socket bolts (Blue)

DO NOT LET THE LINEAR RAIL CARRIAGE BE REMOVED FROM THE RAIL

The rail should be flush with the bottom of the aluminium backing beam

Fix attaching the rail to the aluminium backing beam with the remaining 10 bolts (orange)



INSPECT FOR:

Linear rail should have a single unused bolt attachment point on the left side (when facing the machine)

Linear rail should be aligned to be flush with the BOTTOM of the aluminium backing beam

You will need:

- 1X Hemera main body
- 1X Hemera fixings kit
- 1X Thermistor cartridge
- 1X Heater cartridge
- 1X Thermal paste
- 1X Titanium heat break
- 1X Copper Heat Block

B with thermal paste



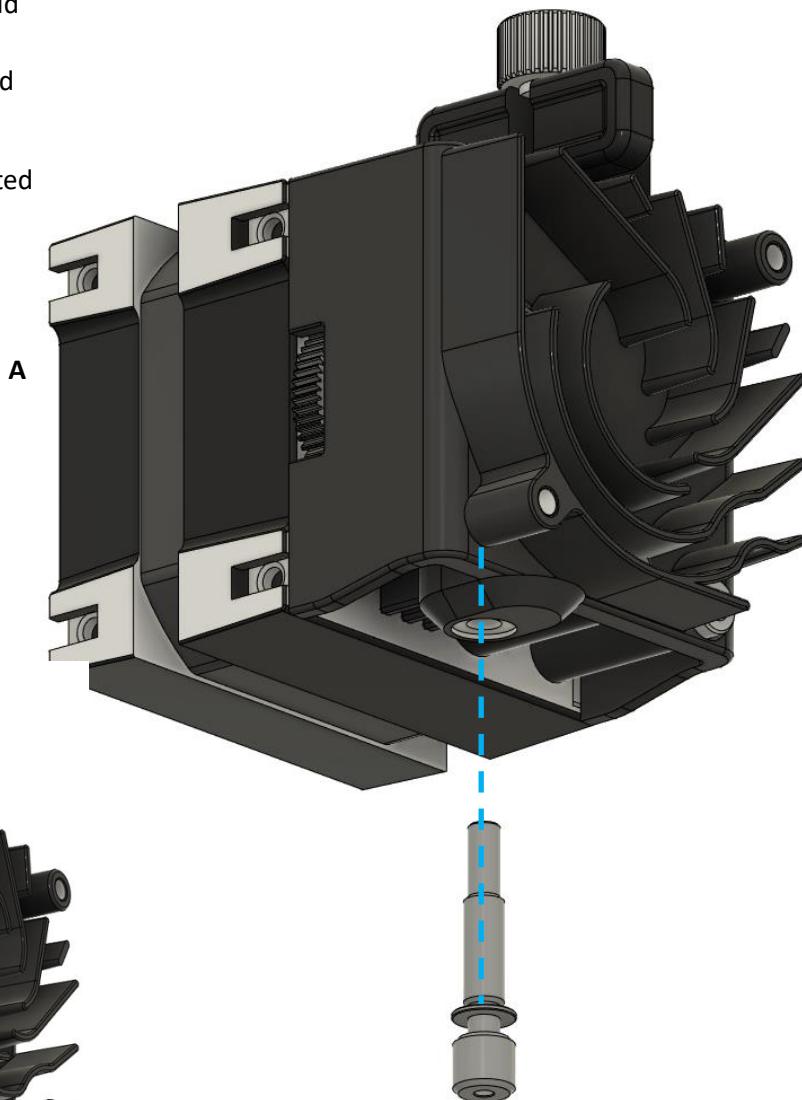
Instructions:

Take the Hemera main body (**A**) and locate the heat break port on the **bottom**

Apply **thermal paste** to the Titanium heat break (**B**) cold side. The thermal paste should be at the top of the threaded part so it can spread to the lower threads as it is tightened into **A**

Insert **B** into **A**, Use pliers to ensure **B** is mated to **A**

DO NOT DAMAGE THE THREADS OF B

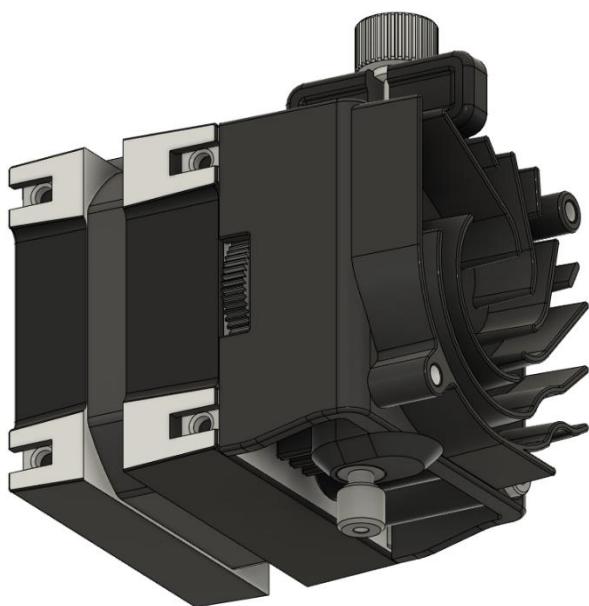


INSPECT FOR:

Thread damage to B

Thermal paste splurge – Clean if needed

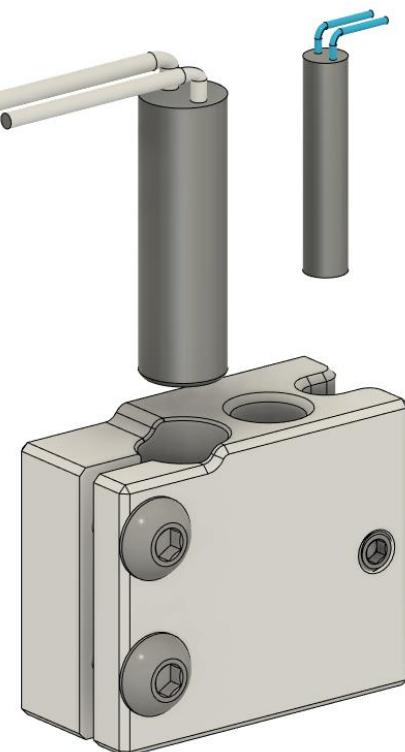
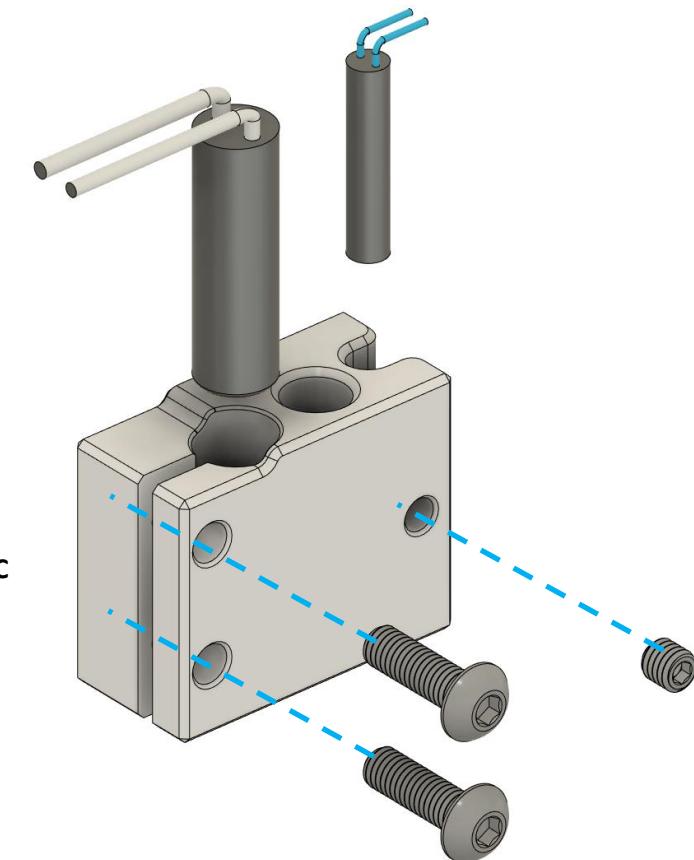
B cannot be removed using hand only



Instructions:

Take copper heat block (**C**) and pre insert two **M3 x 10 Button** cap bolts and a single M3 grub screw

Do not tighten these down in this step

**INSPECT FOR:****Orientation of Heat block**

Instructions:

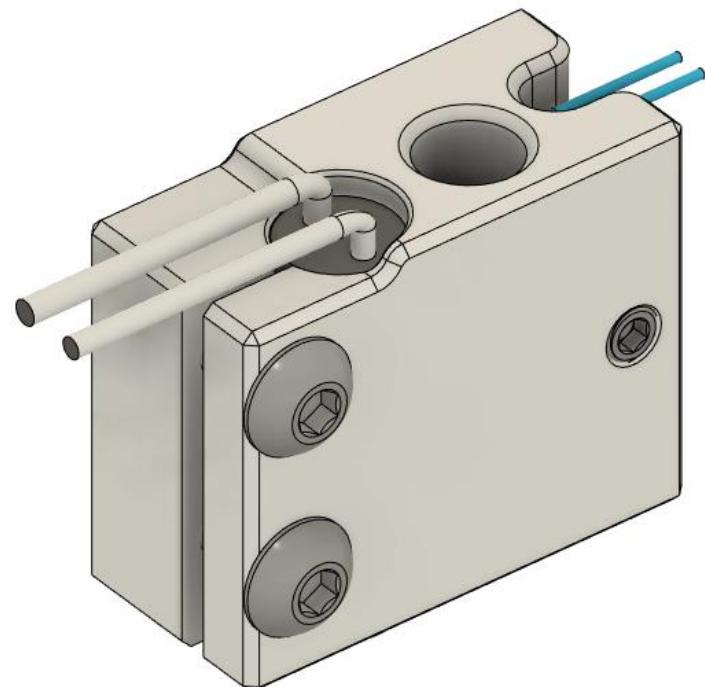
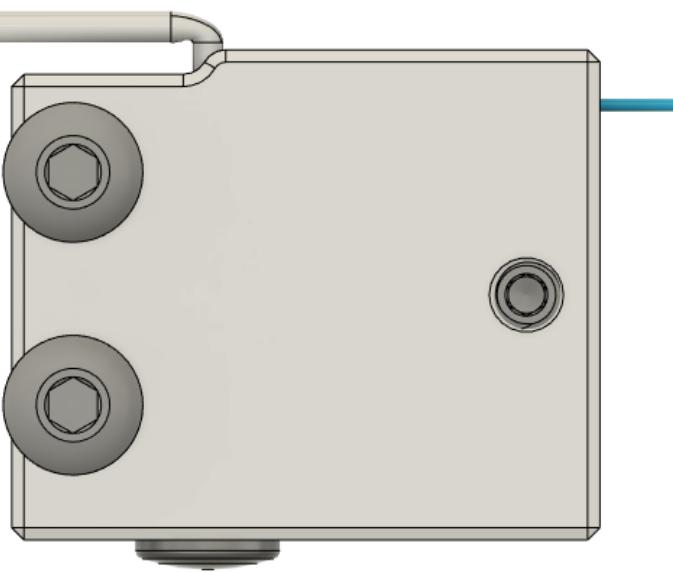
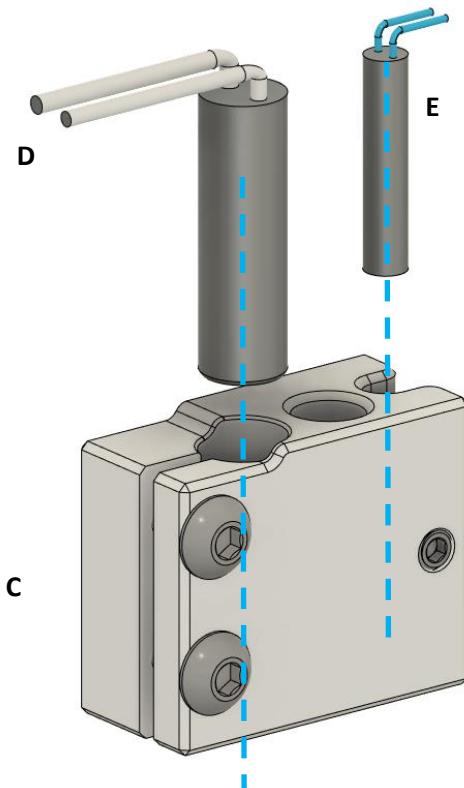
Insert Heater Cartridge (**D**) in to **C**

Insert Thermistor (**E**) into **C**

Tighten M3 bolts to clamp **D** into **C**

D Should be **slightly protruding** the bottom of **C** by ~1mm

Tighten M3 grubscrew to hold **E** into **C** – Be careful not to overtighten the grub screw – **E** is fragile

**INSPECT FOR:**

Heater cartridge protrusion

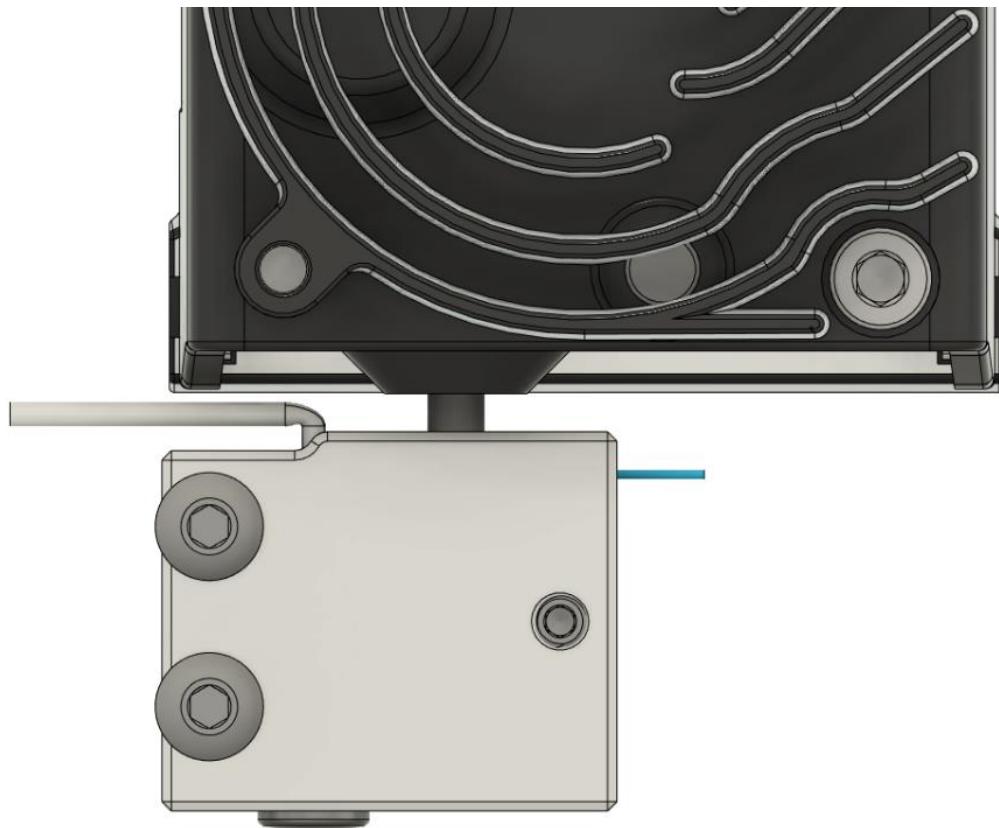
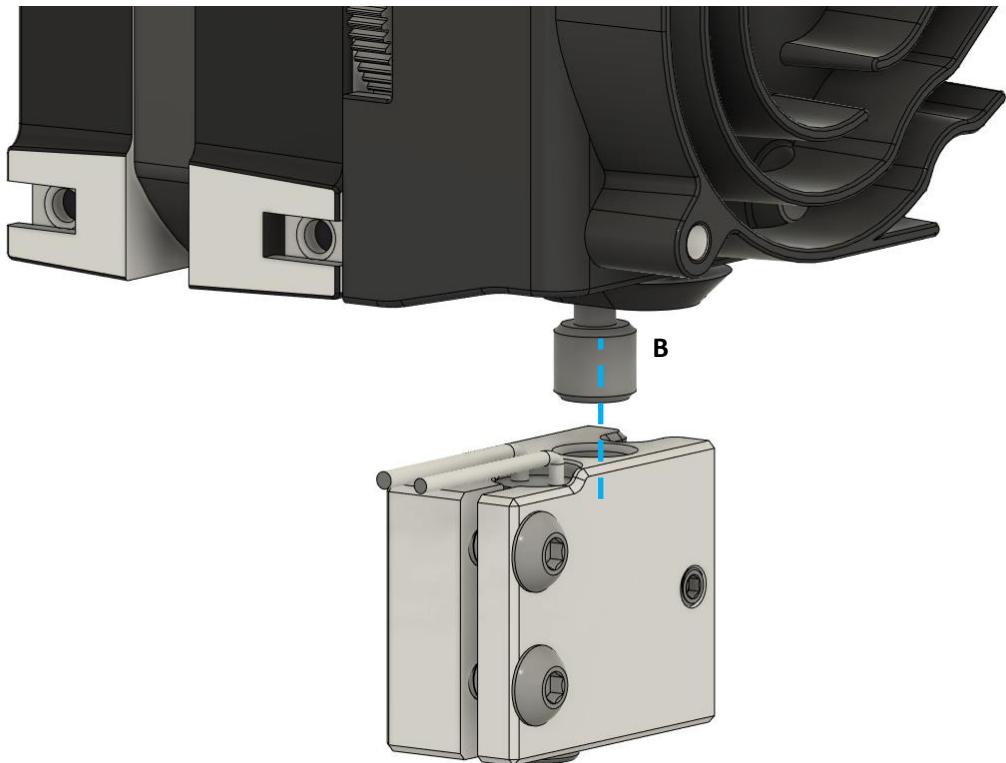
No damage to thermistor caused by grubscrew overtightening

Instructions:

Insert the newly completed Heater block assembly onto the exposed threads of **B**

Do so by **twisting** the Heater block assembly onto **B** until no threads of **B** is visible.

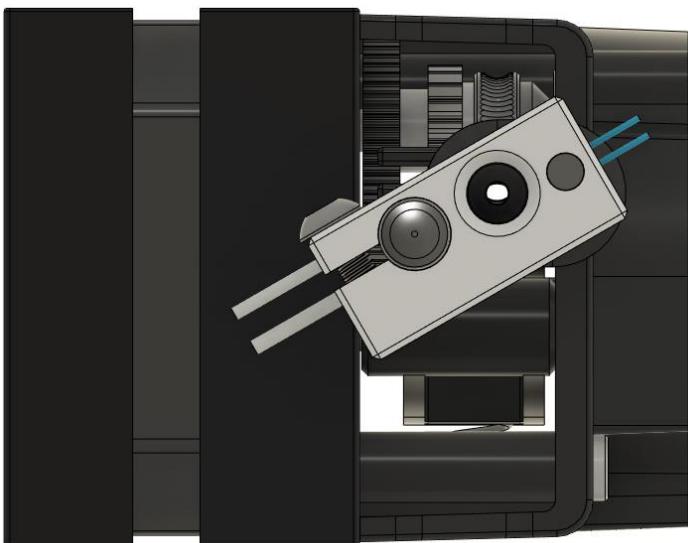
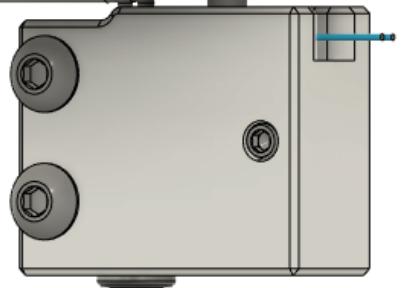
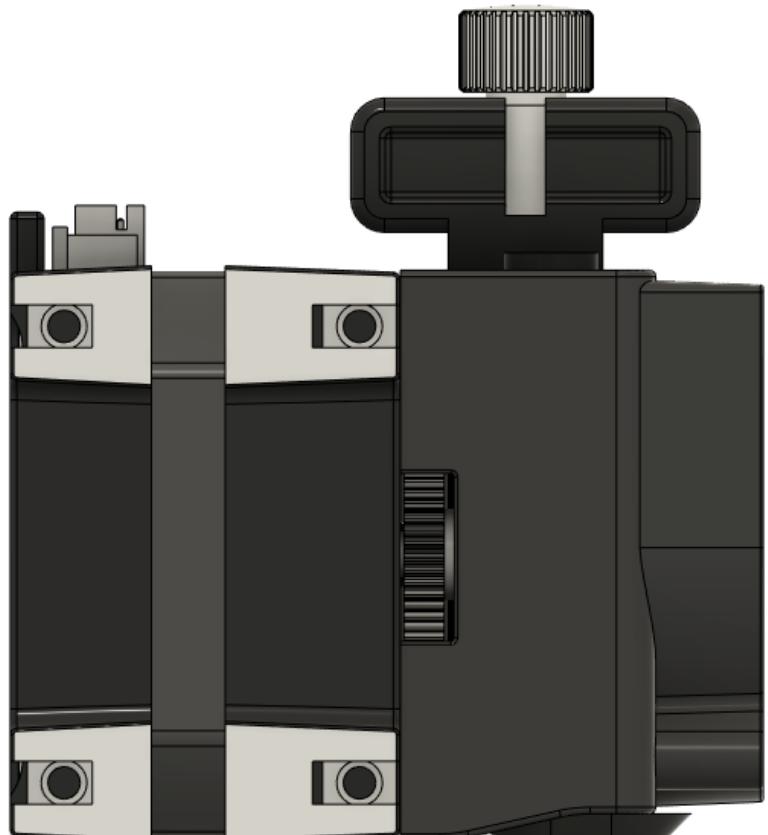
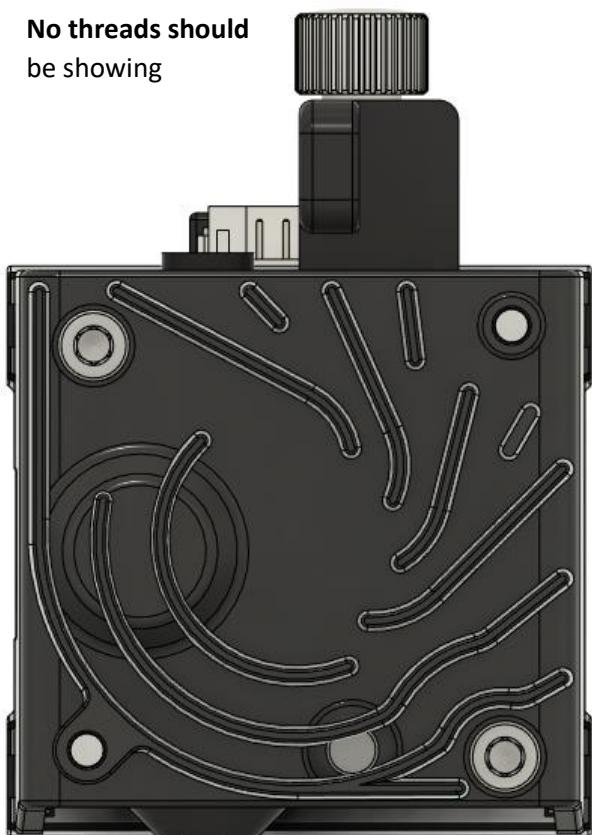
CHECK NEXT STEP FOR HEATER BLOCK FINAL ORIENTATION



Instructions:

Rotate the Heater block assembly so it is rotated as follows.

No threads should
be showing

**INSPECT FOR:**

Heater Cartridge wires are pointing towards the back left of the extruder

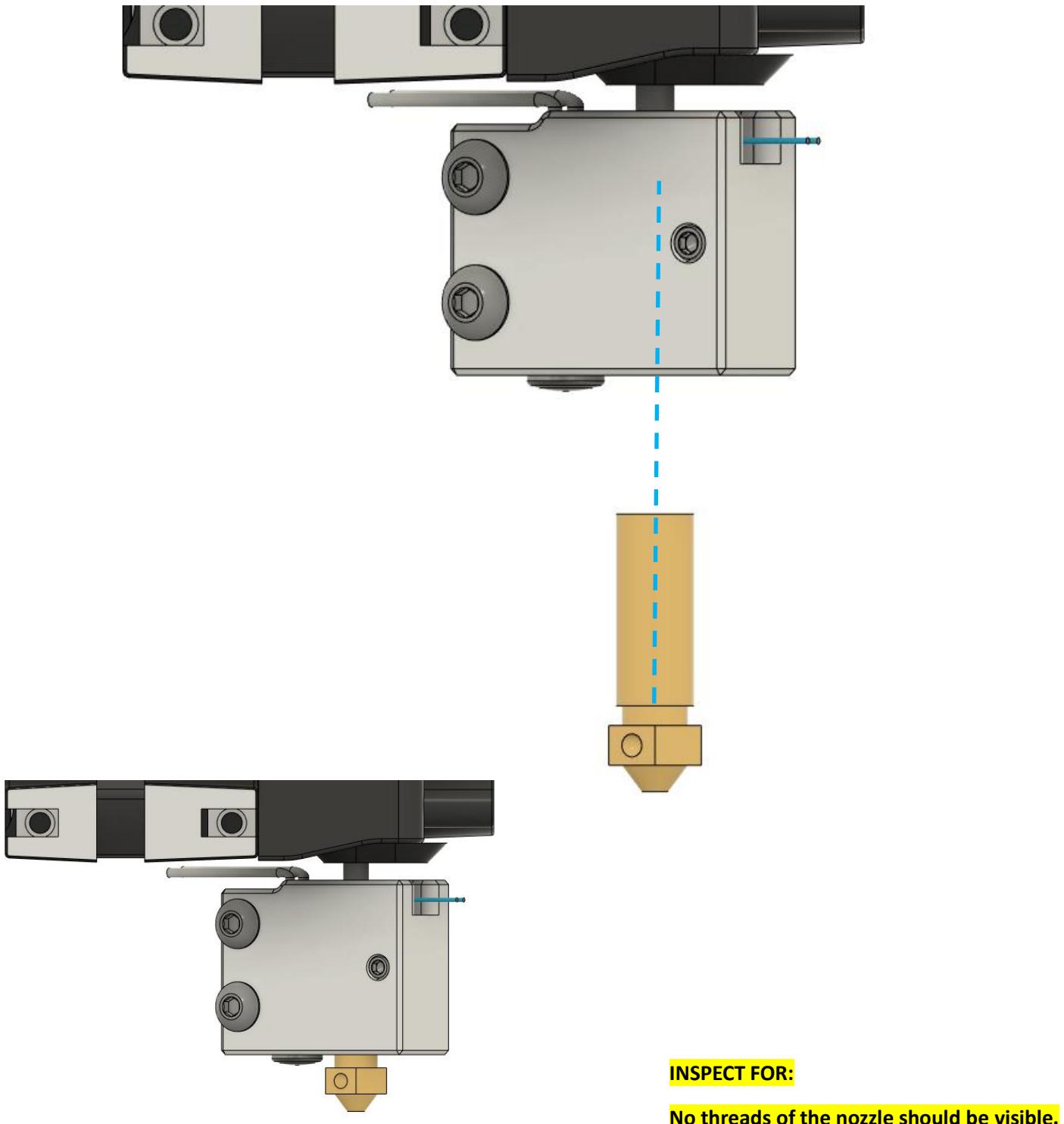
You will need:

1X Volcano Nozzle

Instructions:

Insert the volcano nozzle into the extruder assembly until it is **finger tight**.

If the nozzle does not go in fully, you can use the torque wrench to assist.



You will need:

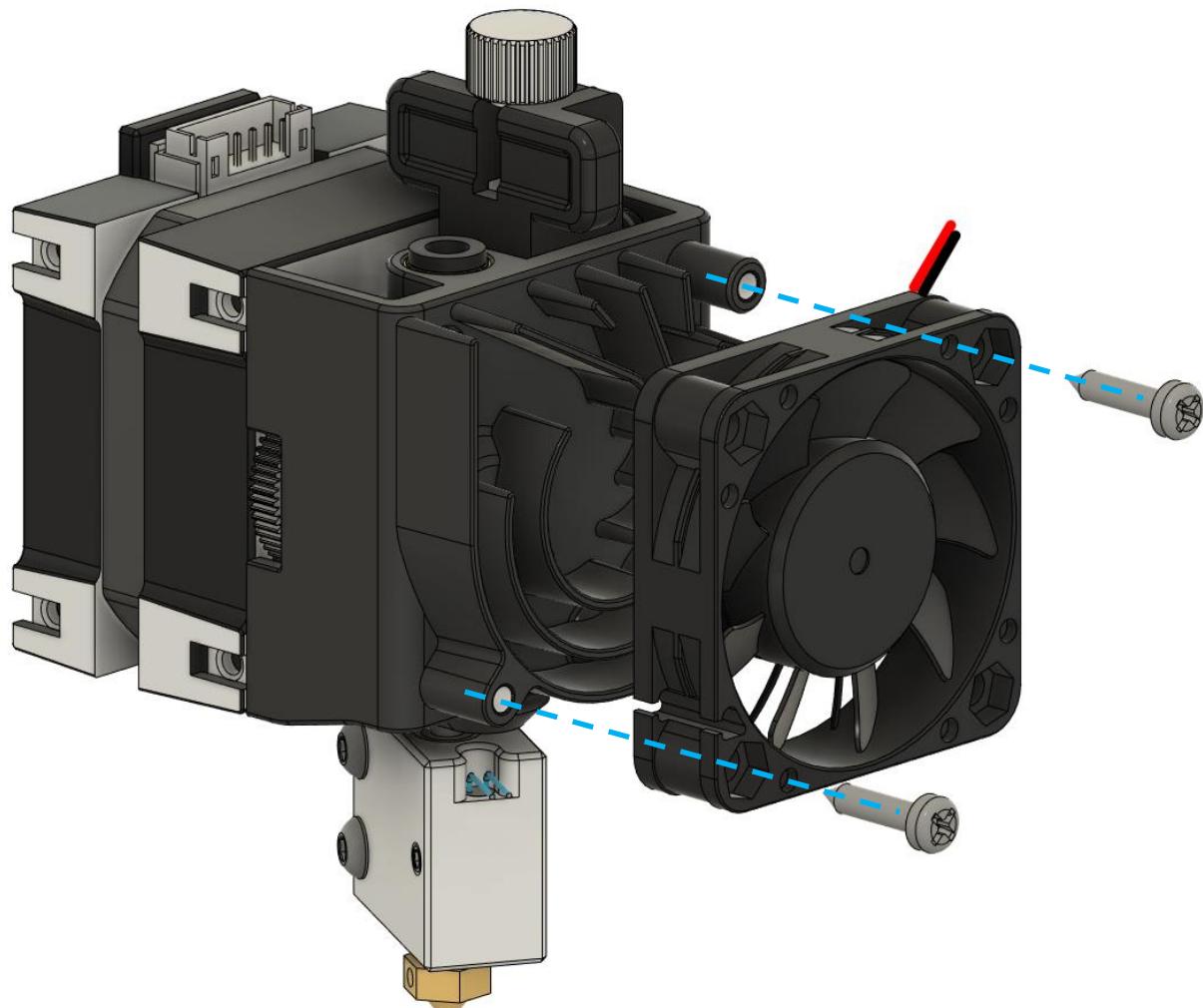
1X Hemera 4010 cooling fan

2X Self Tap screws (hemera fixings kit)

Instructions:

Apply Hemera cooling fan to the Hemera assembly using 2x **self-tapping** wood screws.

Ensure the fan wires are facing the **top right** of the extruder



INSPECT FOR:

Wood screws are fully torqued-down

Wire orientation

You will need:

4X Aluminium 6mm spacer

4X M3 x 12 countersunk bolt

Instructions:

Start with bolting the Hemera Extruder assembly to the Extruder front bracket

Use **M3 x 12 countersunk** bolts inserted from **behind** into the countersunk holes in the back of the extruder bracket

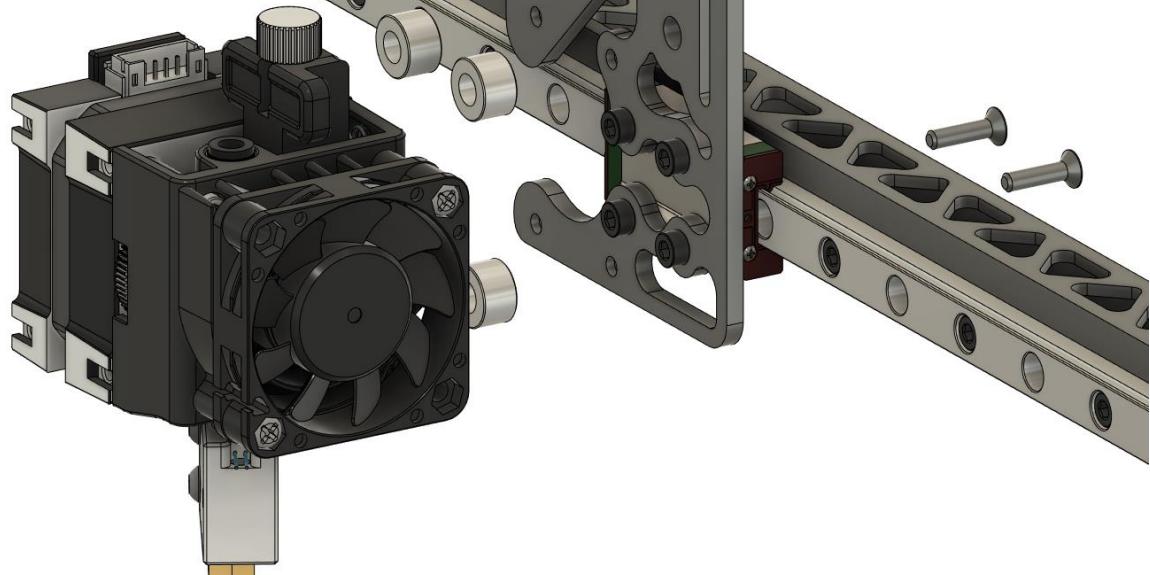
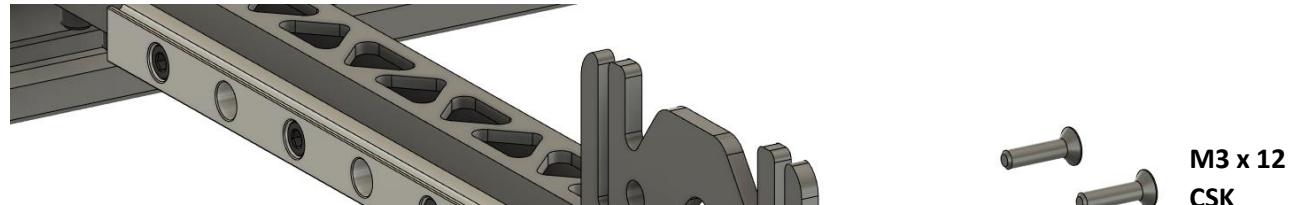
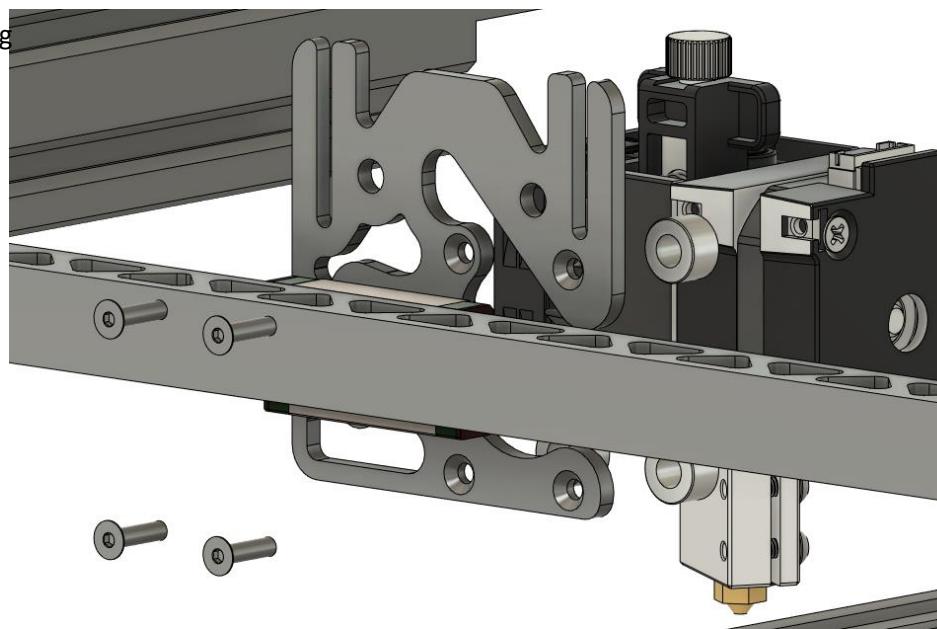
The **two closest** ports to the Hemera cooling fan should be done **first**

Use a **6mm aluminium spacer** between the Hemera extruder bracket and the Hemera assembly when bolting together

Feed the Heater cartridge wires **under** the Hemera assembly and then into the middle section of the front bracket (pictures to follow)

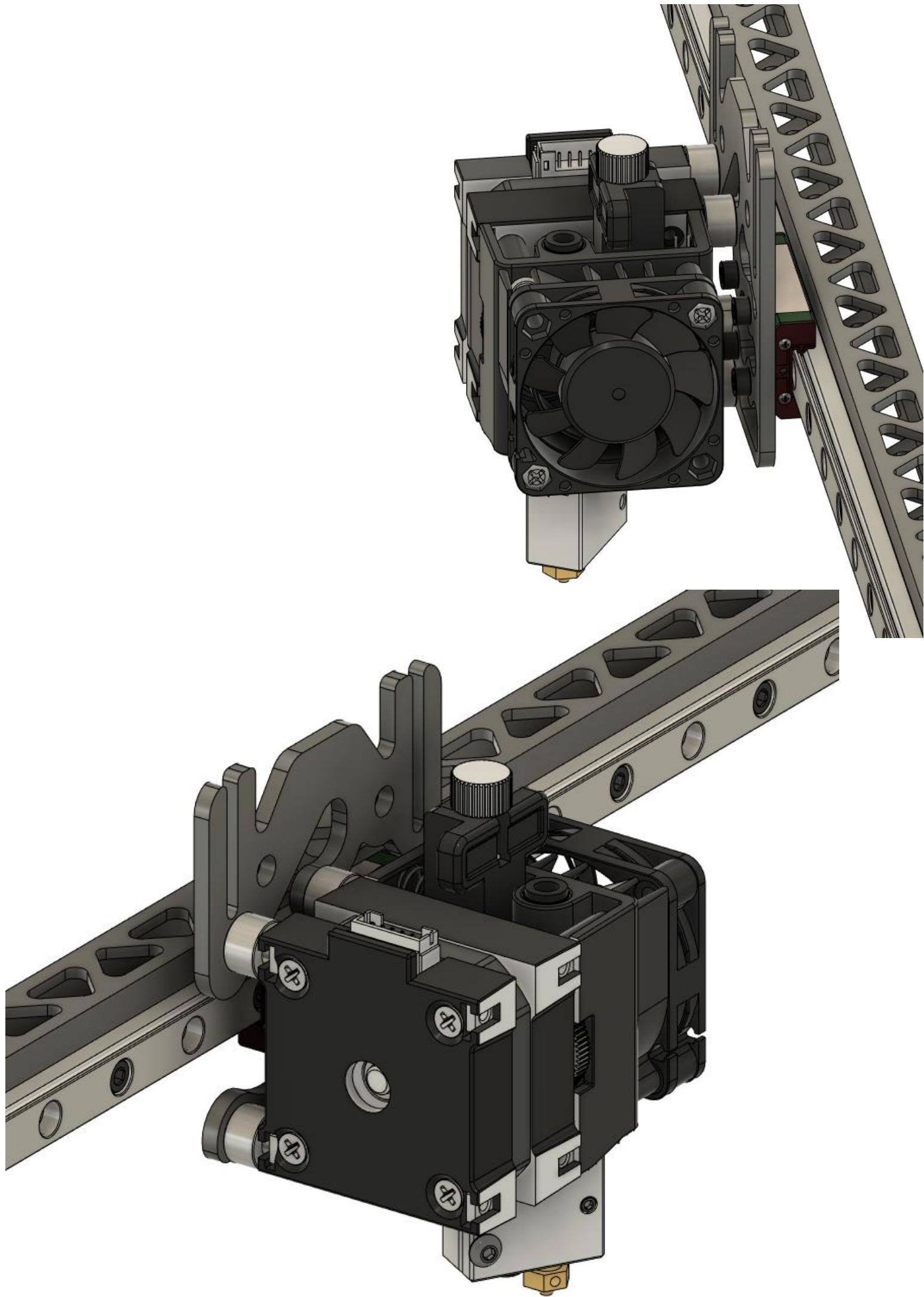
Insert 2 square nuts (from fixing kit) into Hemera body.

Complete the mating process by fixing the remaining two bolt locations



INSPECT FOR:

Extruder is mounted securely without wobble



You will need:

1X Thermistor Extension wire

1X Extruder Motor Wire

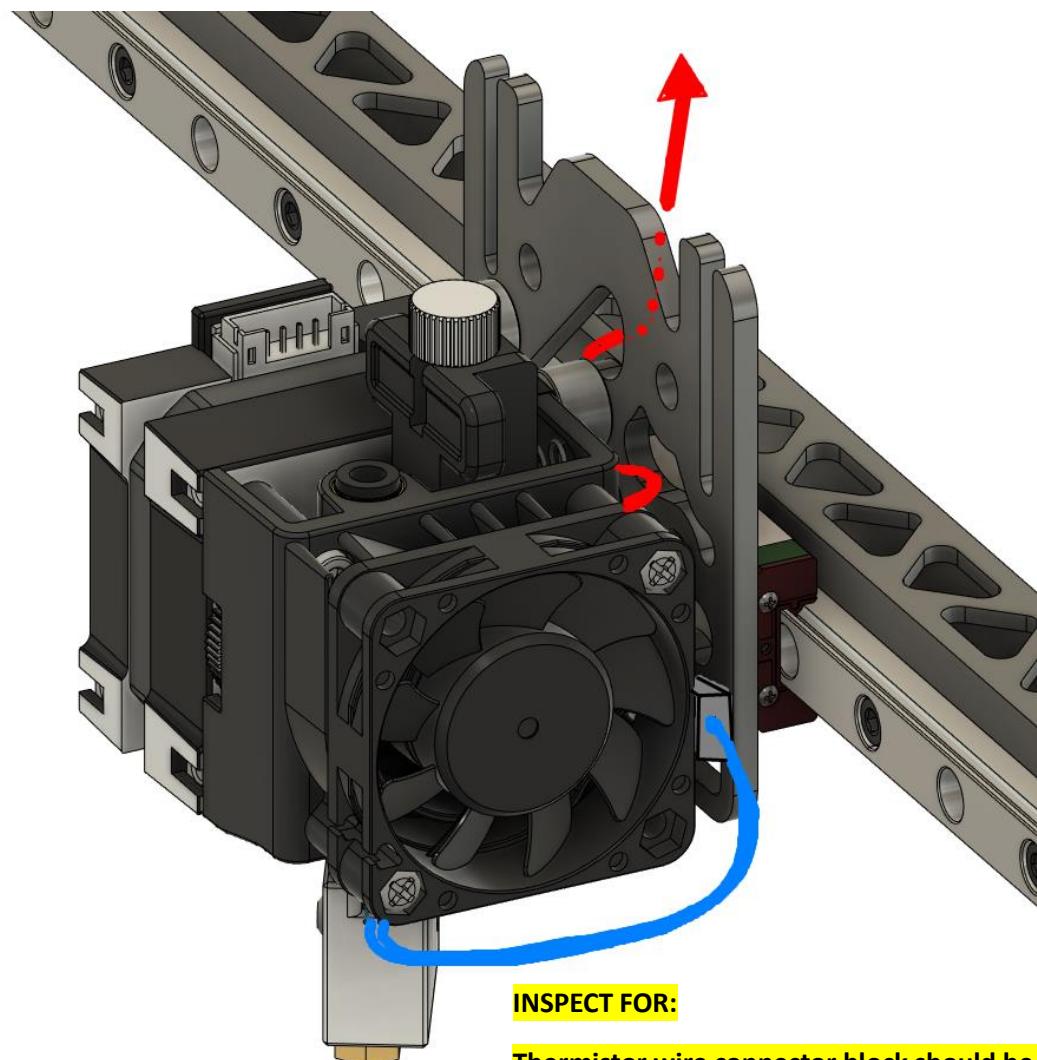
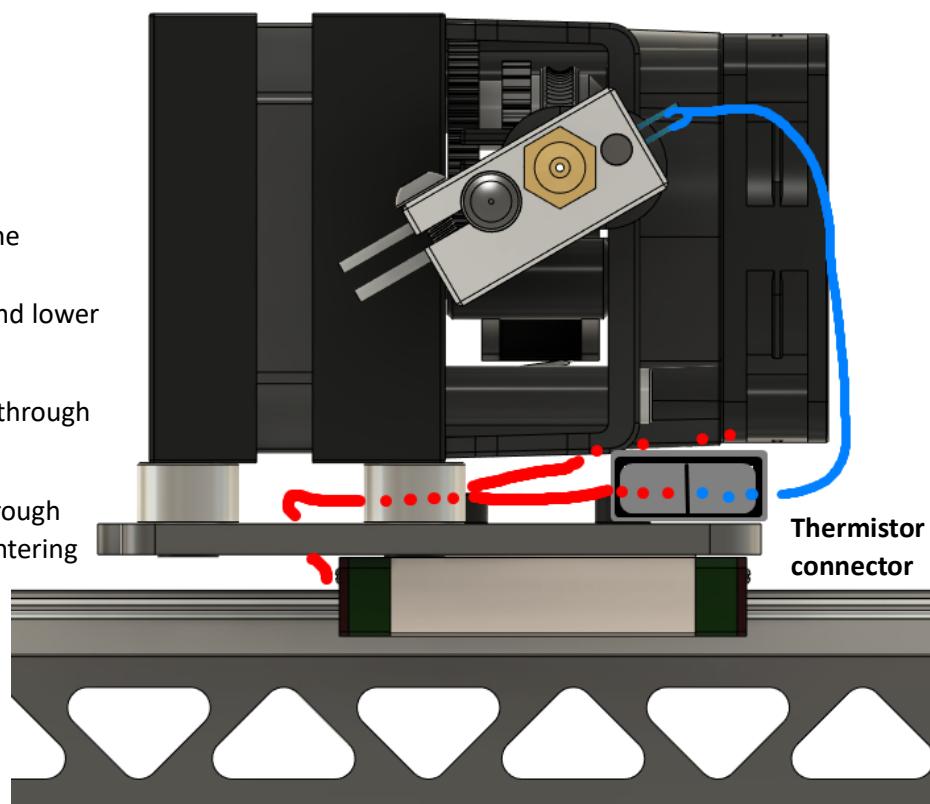
Instructions:

Attach Thermistor extension wire to the thermistor (**blue wires**) and feed the connector block between the upper and lower aluminium spacers

Feed the red/black extension wire up through the **middle** of the extruder front plate

Feed the Hemera cooling fan wires through the same aluminium spacers before entering the middle extruder bracket slot

Additionally, attach the extruder motor wire to the Hemera and feed the extruder motor wire along side the other wires

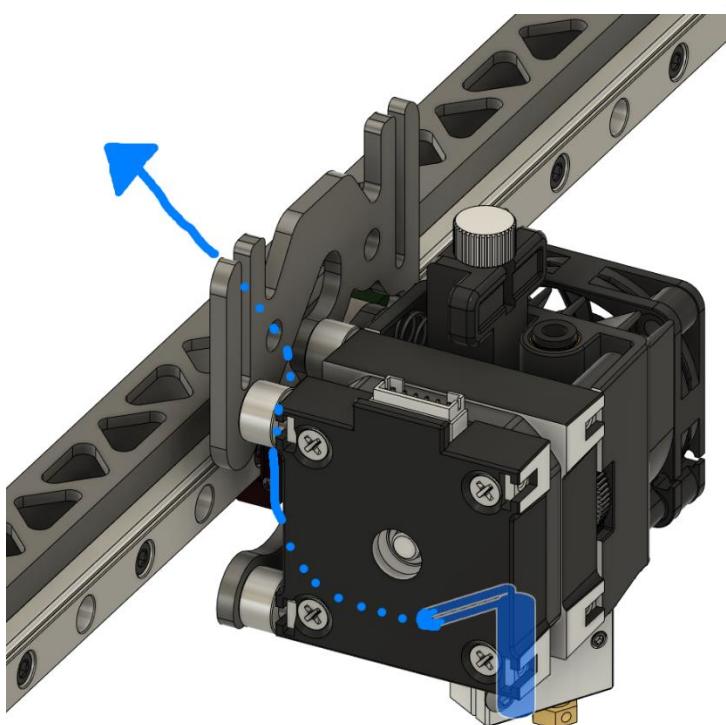
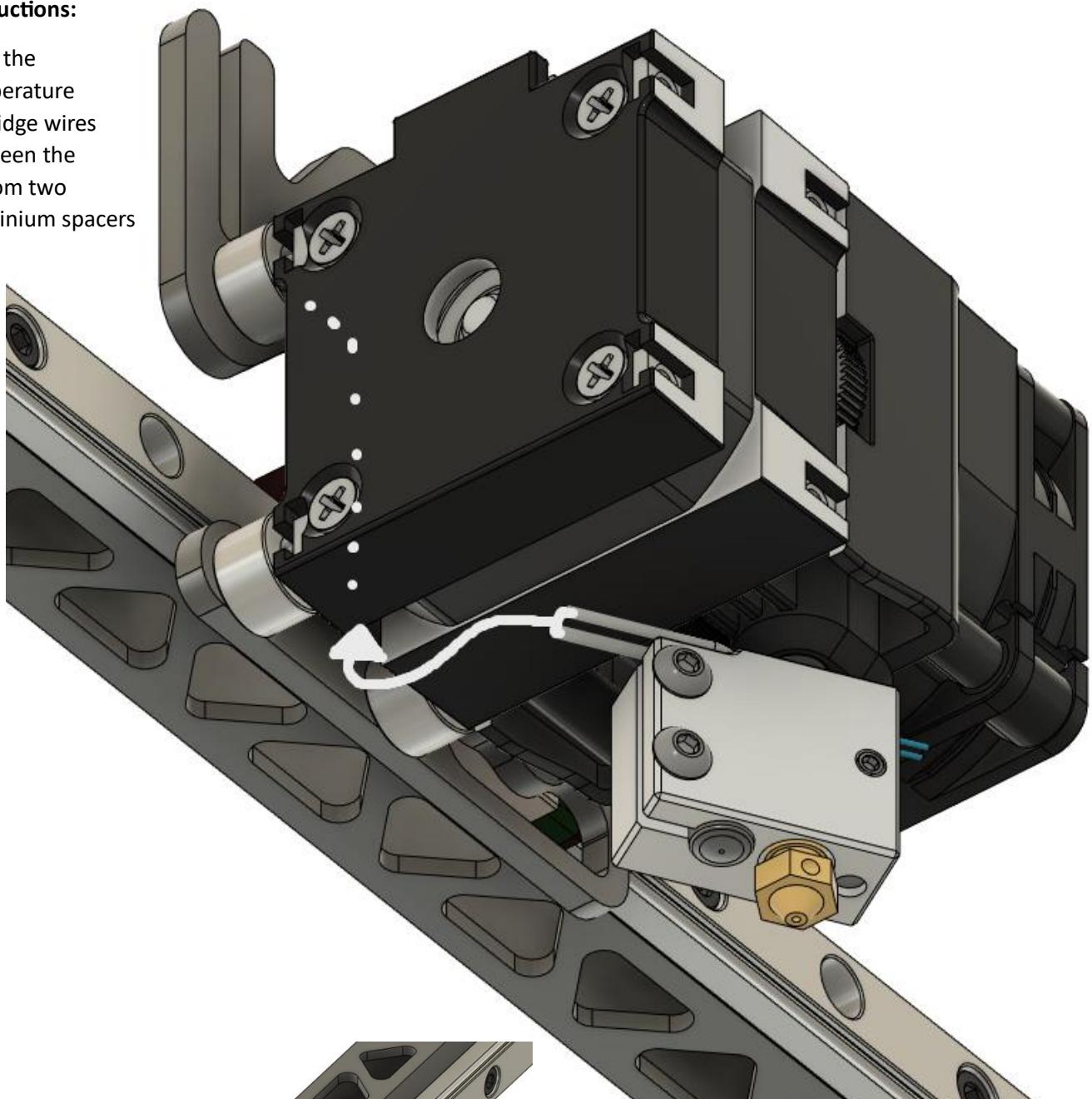


INSPECT FOR:

Thermistor wire connector block should be friction fit between the extruder and the extruder front plate

Instructions:

Feed the temperature cartridge wires between the bottom two aluminium spacers



INSPECT FOR:

Heat cartridge wires are tight with no slack

You will need:

1X Z-Probe mount

2X M3 x 8mm Countersunk bolt

Instructions:

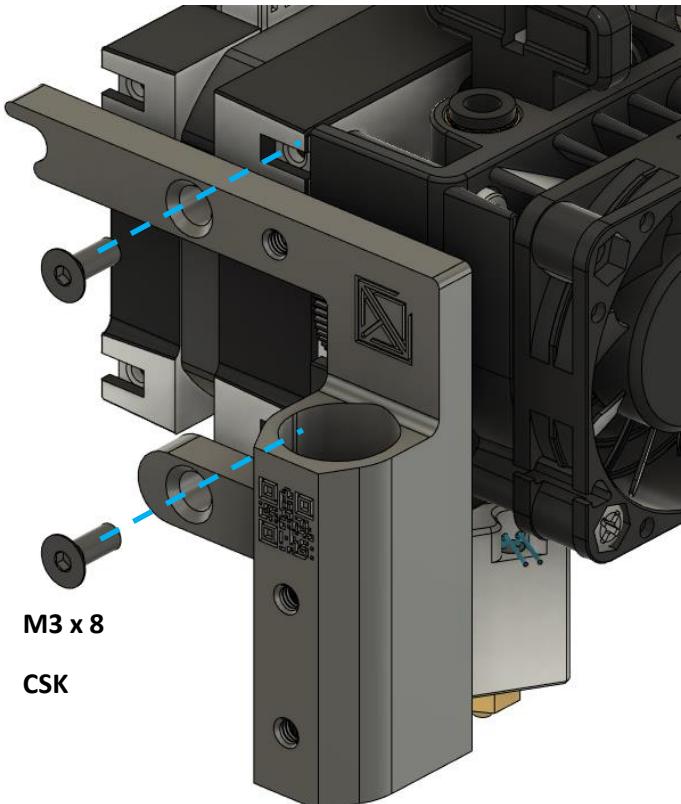
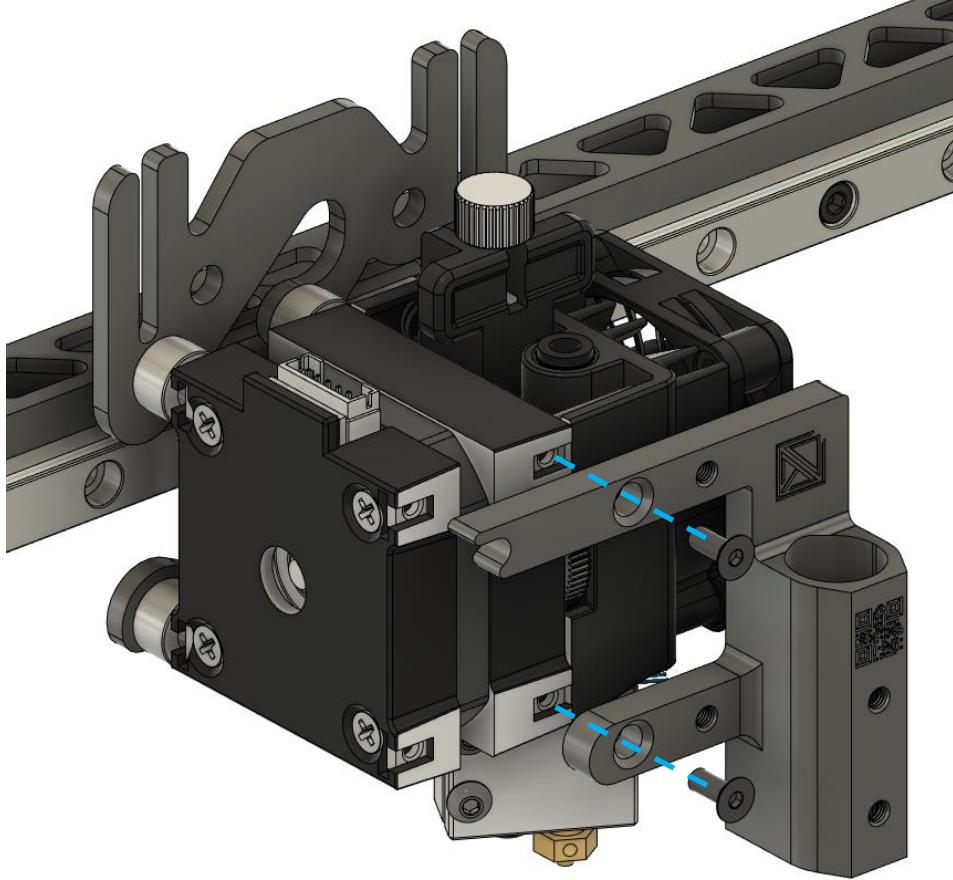
Use 2 **M3x8** countersunk bolts to affix the Z-Probe mount to the front of the Hemera assembly

Start by loosely getting the bolts to bite

Push the bracket as far right as possible, and tighten the M3 bolts while the bracket is forced right

This will stop unwanted movement later

There is a fine line between over and under tightening



INSPECT FOR:

Z-Probe bracket cannot be twisted by hand

Z-probe bracket is flat and not tilted

You will need:

1X Z-Probe

2X M3 x 4 GrubscREW

Instructions:

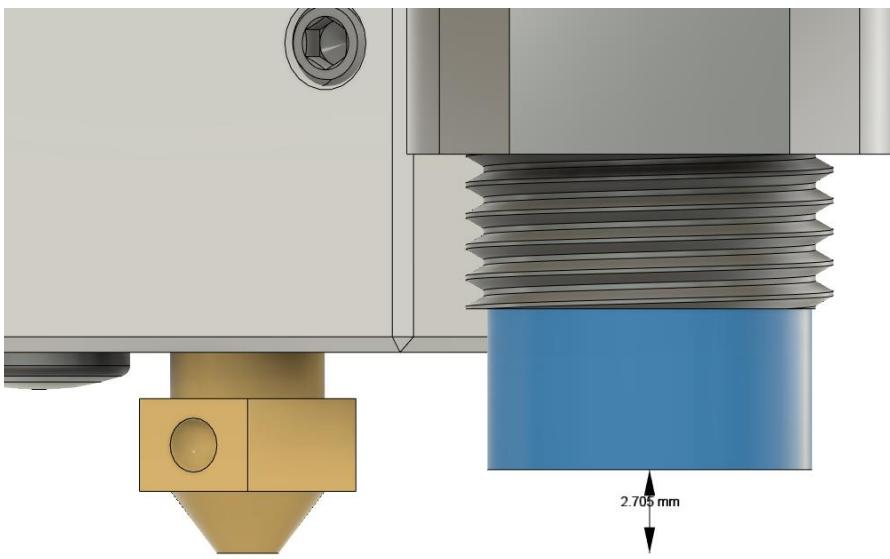
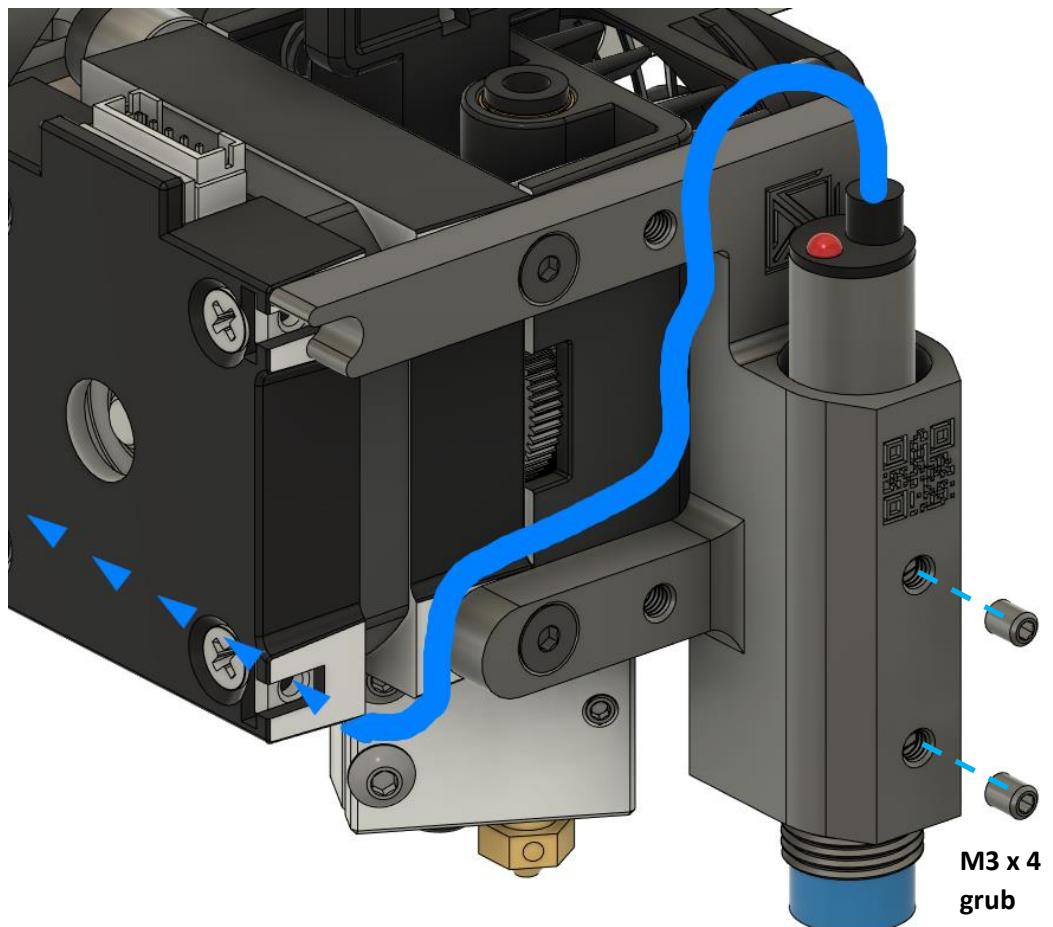
Insert Z- probe into the Z-probe bracket.

Ensure the tip of the Z-probe is between **1mm and 3mm** height difference of the nozzle tip.

Use two **M3 x 4 grubscrews** to pin the Z-probe in the Z-probe bracket.

When tightening the Z-probe grubscrews, only use **two fingers** on the shaft of the Allen key. The bracket is **fragile**.

Route the Z-Probe cable (blue) **under** the Hemera and up between the two aluminium spacers to join the rest of the bundle



INSPECT FOR:

Cracks in the Z-probe bracket caused by overtightening

Z-probe is close enough to the nozzle for initial calibration

You will need:

2X M3 x 20 Socket head bolt

1X M3 x 25 Socket head bolt

1X 4020 Turbo Fan

9x Individual 1mm Nylon Spacers | 3X Printed Spacers

Instructions:

Affix the 4020 turbo fan to the Z-probe bracket

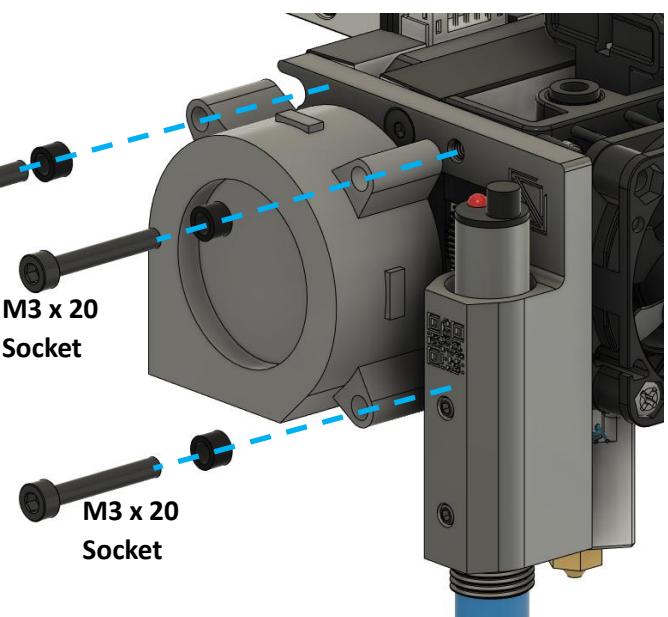
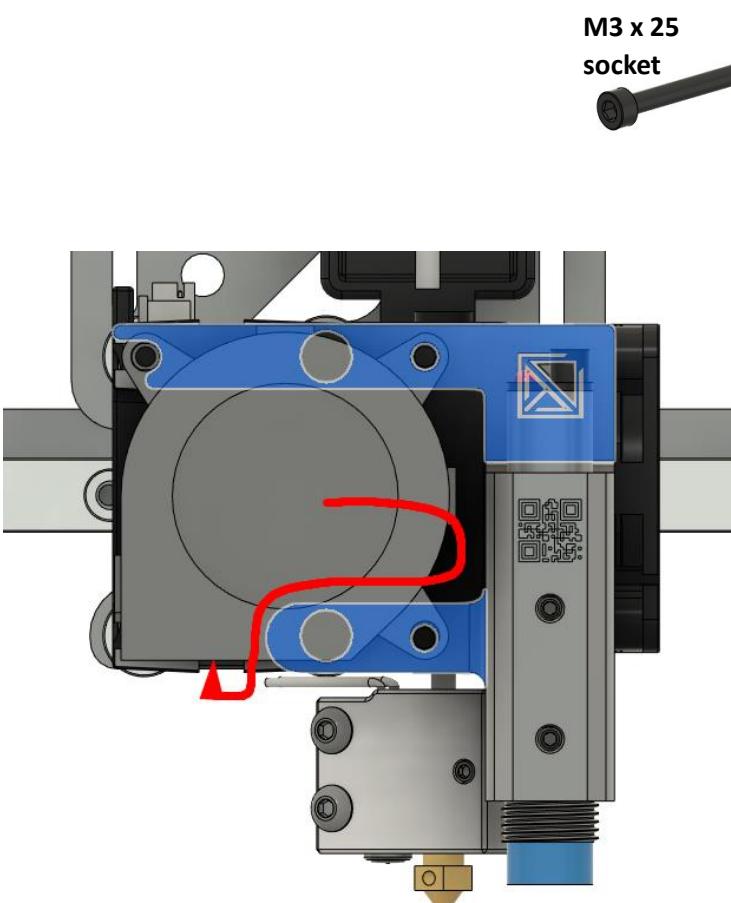
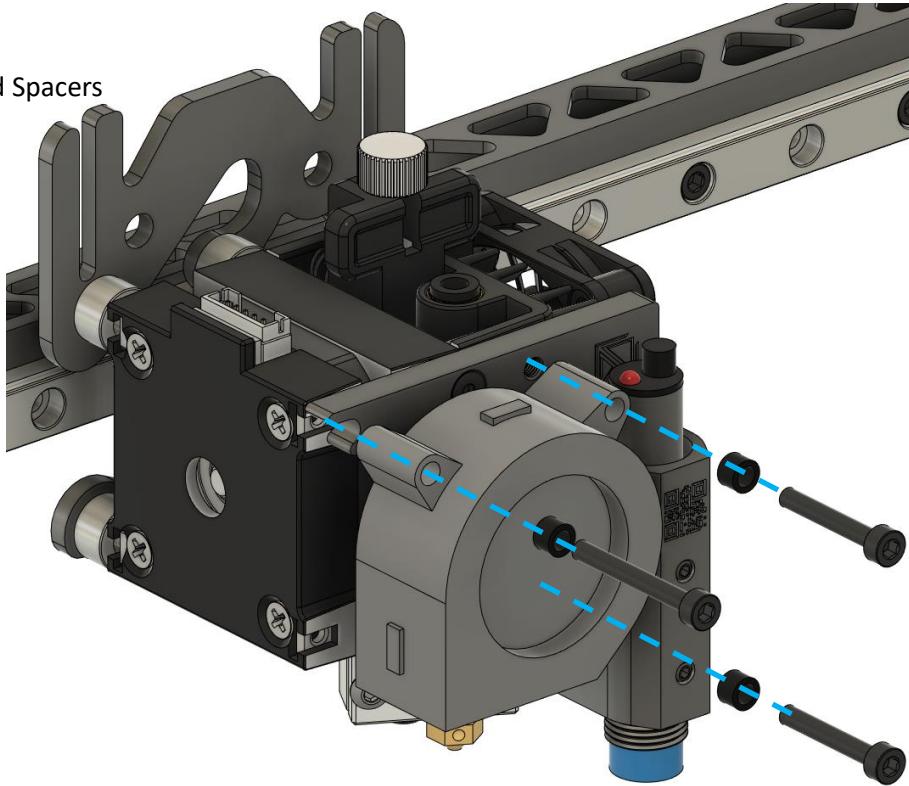
The two **M3x20** bolts go on the probe side and the 25mm bolt goes in the top left

You will need a **square nut** from the **Hemera fixings kit**

Each bolt will need 3x 1mm spacers, **or** 1x 3D printed spacer.

Be careful not to over torque the bolts as the printed bracket is **weak**

Route the Fan wire to sit **behind** the fan and feed the wire underneath the Hemera and up between the two aluminium spacers to join the rest of the wiring bundle.



INSPECT FOR:

Wire is correctly routed behind fan

No loose wire hanging below Hemera

You will need:

1X Front Fan duct

1X M3 x 4mm grubscrew

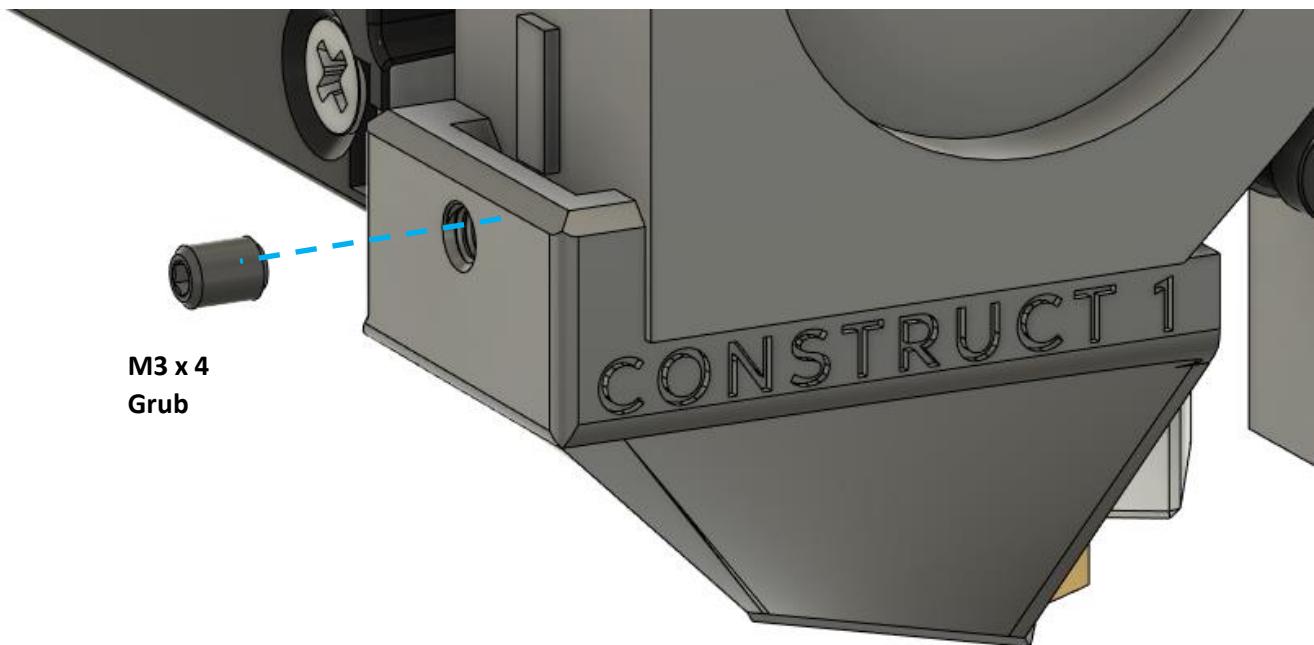
Instructions:

Preplace grubscrew inside of the front fan duct

Place fan duct onto front 4020 fan

Gently tighten M3 grubscrew to pin the fan duct to the 4020 turbo fan

[REVO ducts are indicated on the duct itself]



INSPECT FOR:

Cracking in duct housing caused by
Grubscrew

Duct output is not blocked

You will need:

1X Extruder Back bracket

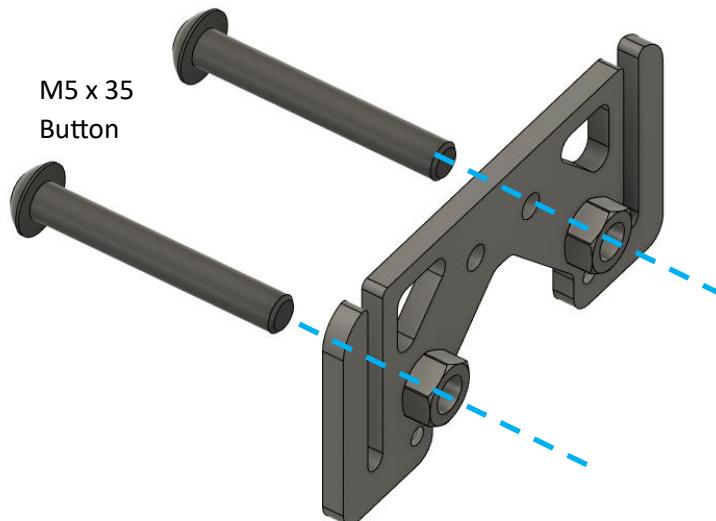
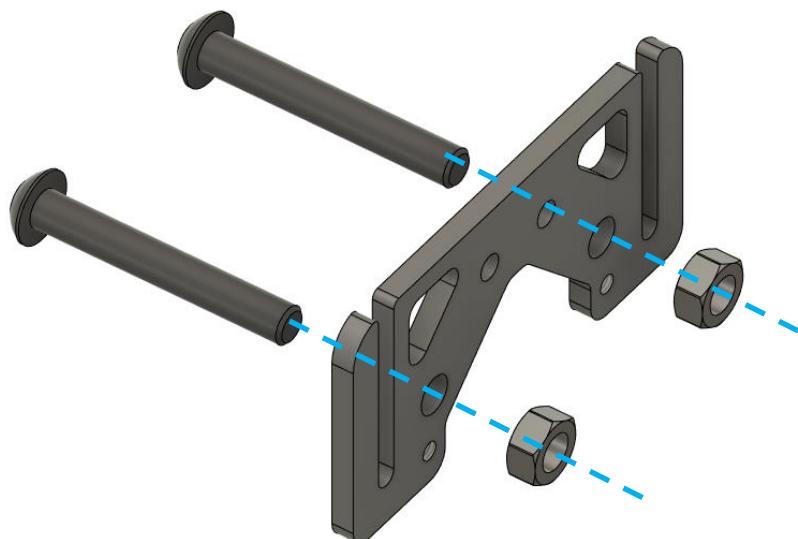
2X M5 full Nut

2X M5 x 35 Button cap bolt

Instructions:

Use **M5 x 35 button** cap bolt and a M5 full nut as pictured

Make sure the nut is fully tight as this will be needed for latter steps



INSPECT FOR:

Bolt/Nut should be tight.

You will need:

3X M5 Full Nut

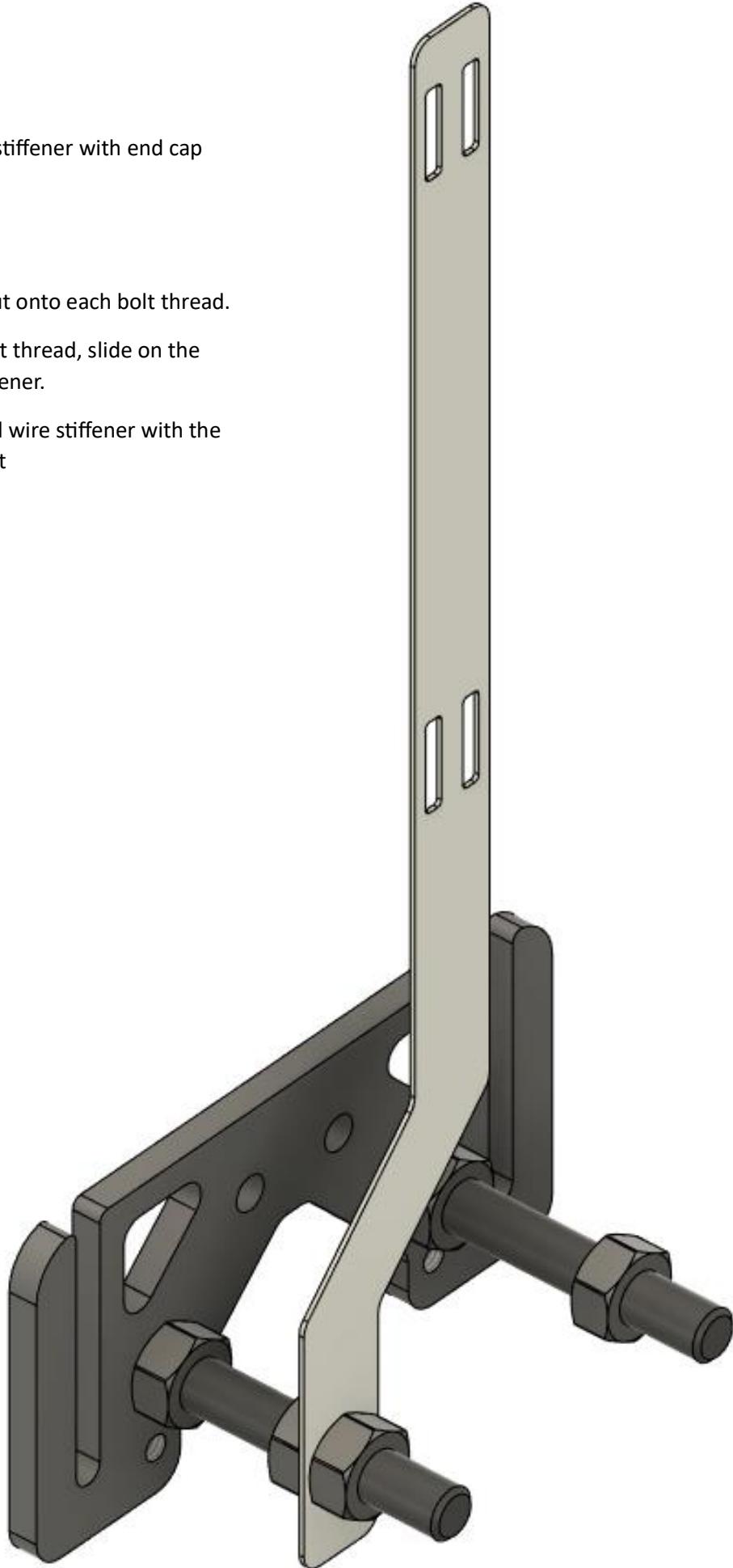
1X Spring Steel wire stiffener with end cap

Instructions:

Insert one M5 Full nut onto each bolt thread.

On the **left** facing bolt thread, slide on the Spring steel wire stiffener.

Pinch the spring steel wire stiffener with the remaining M5 full nut



INSPECT FOR:

The spring steel is on the correct side

You will need:

2X M5 full nut

Instructions:

Push the Rear bracket assembly into the two holes in the extruder front plate

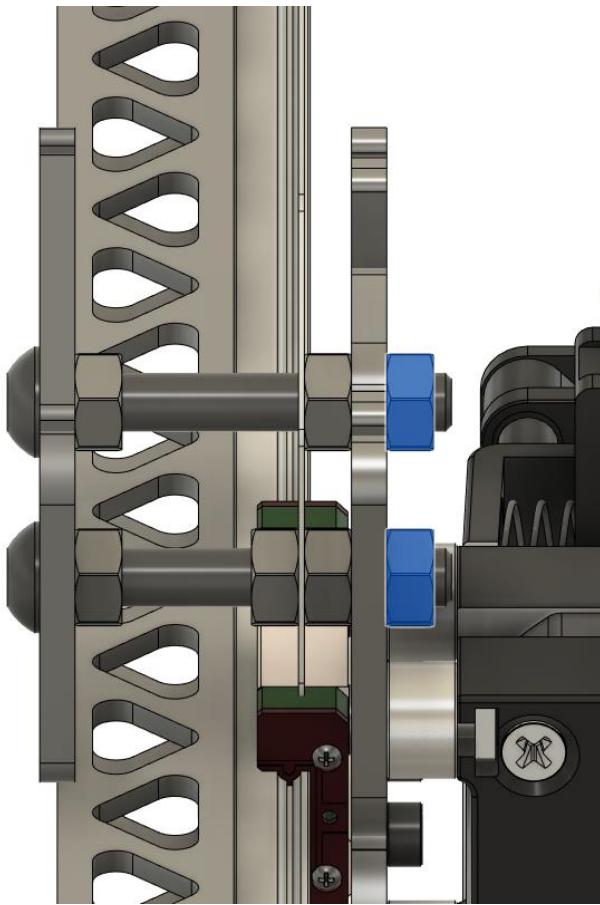
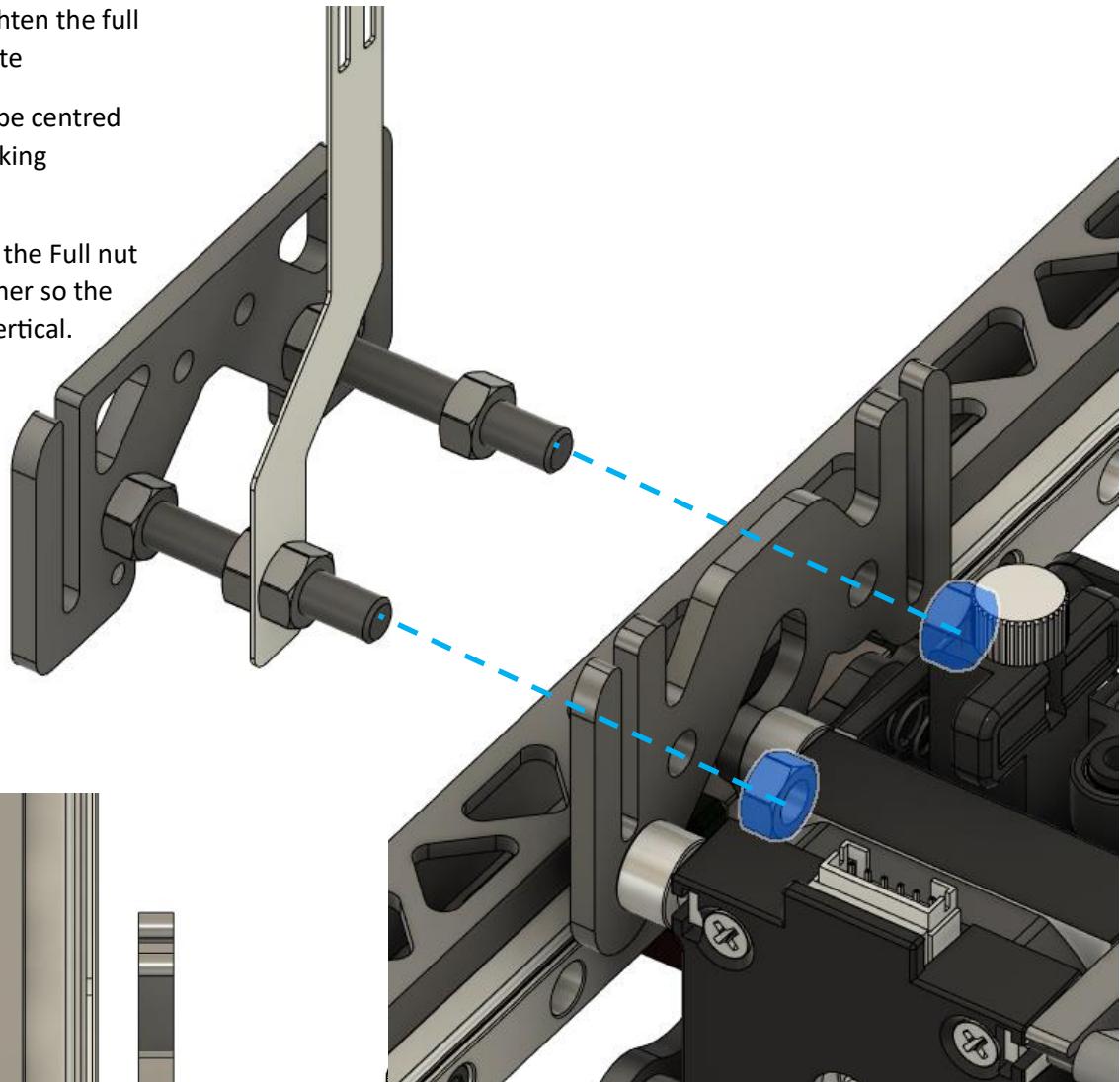
Apply a M5 full nut on the exposed threads

Use two **spanners** to align and tighten the full nuts to bite the extruder front plate

The rear extruder bracket should be centred over the aluminium linear rail backing support.

Use the same spanners to tighten the Full nut behind the spring steel wire stiffener so the wire stiffener is facing **perfectly** vertical.

Use spanners to torque the nuts against the Extruder Back Bracket



You will need:

1X 4020 turbo fan

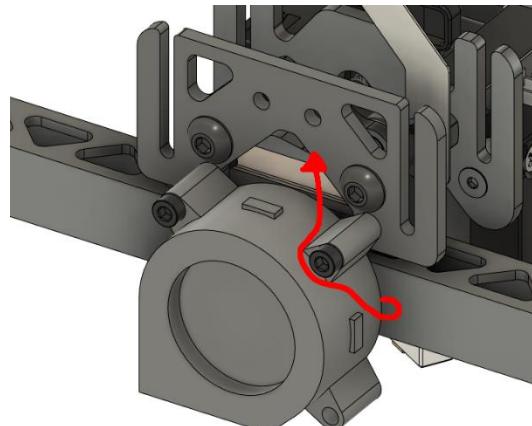
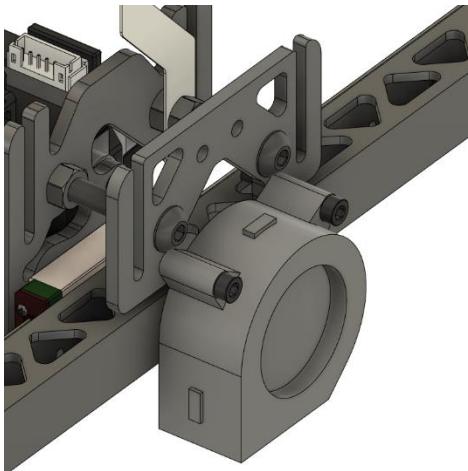
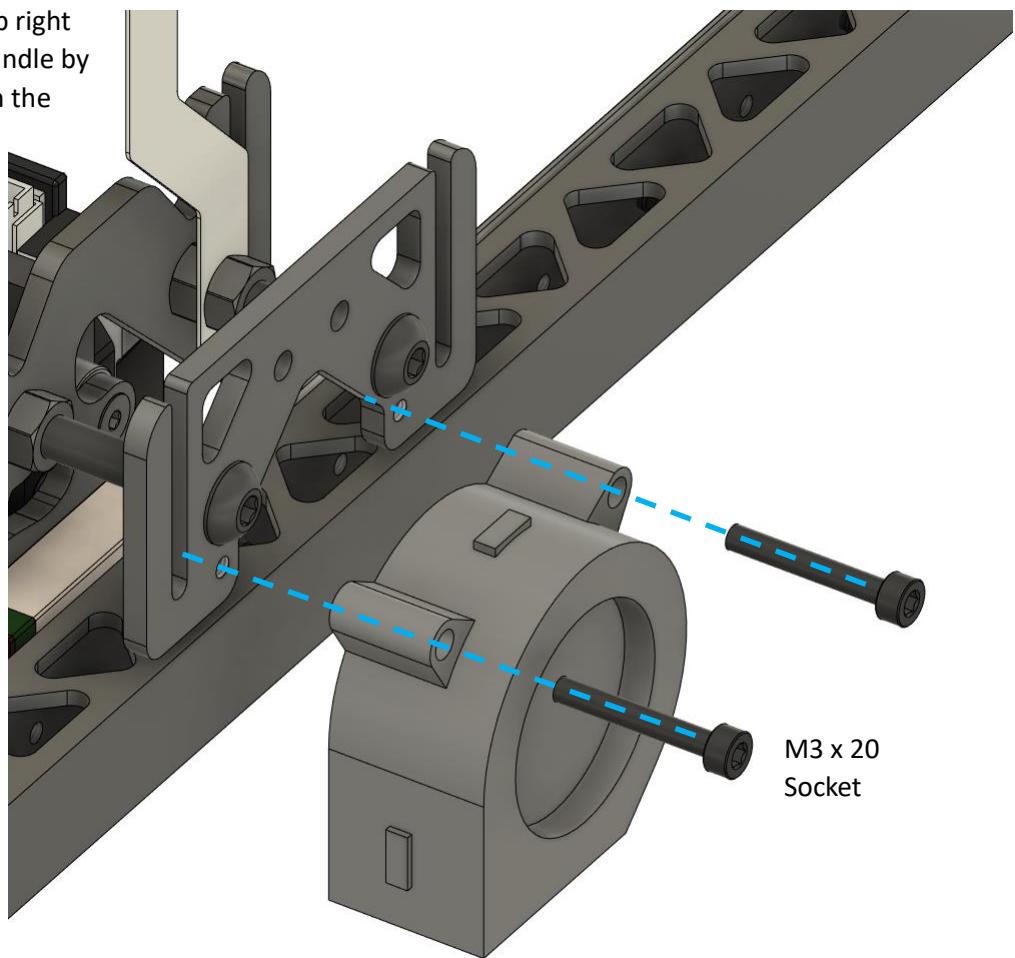
2X M3 x 20mm socket bolt

Instructions:

Mount the 4020 turbo fan to the back of the extruder backplate with **M3 x 20** socket bolts

Be careful not to overtighten the bolts due to the plastic of the fan being able to shatter

Route the fan wire in front of the top right bolt before joining the rest of the bundle by being passed through the opening in the extruder backplate



You will need:

- 1X Rear fan duct
- 1X M3 x 4mm grubscrew

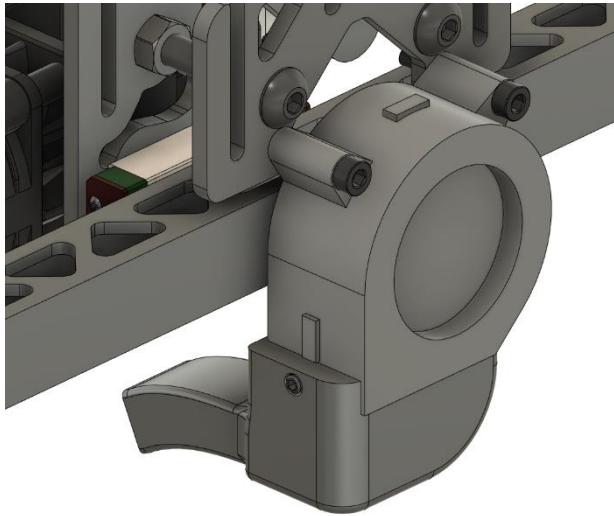
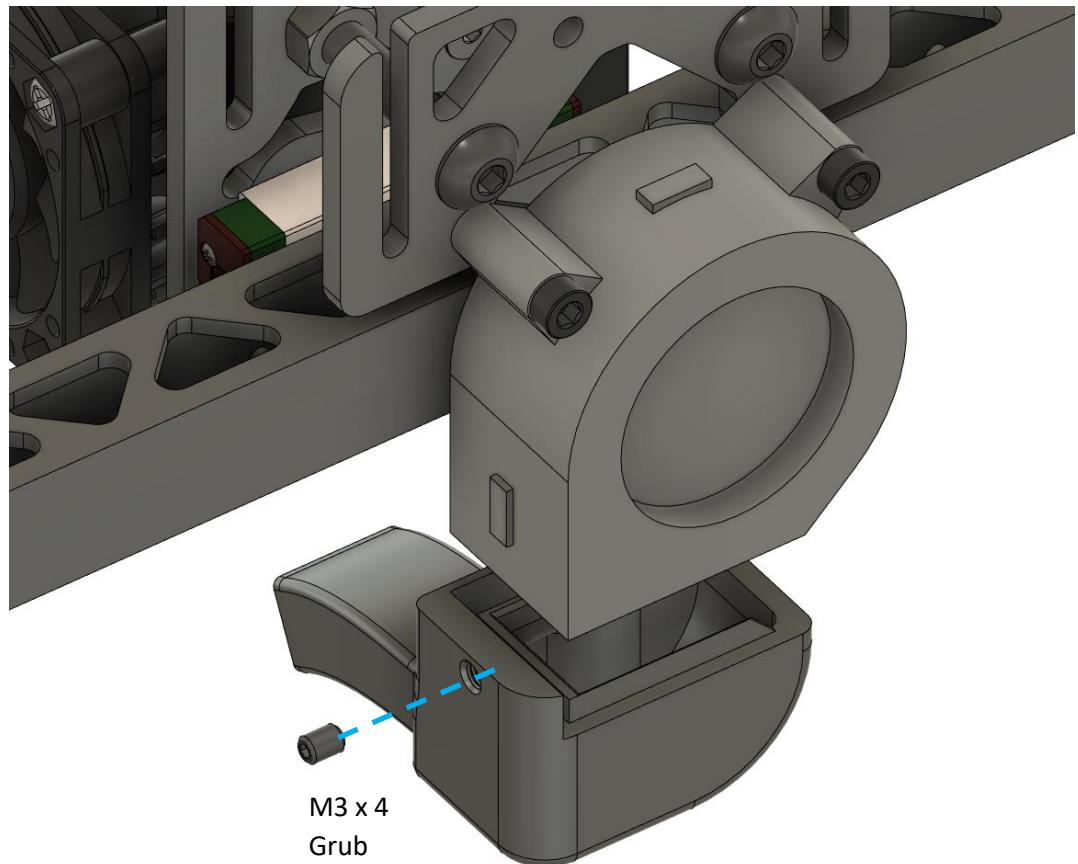
Instructions:

Preplace grubscrew inside of the rear fan duct

Place fan duct onto rear 4020 fan

Gently tighten M3 grubscrew to pin the fan duct to the 4020 turbo fan

[REVO ducts are indicated on the duct itself]

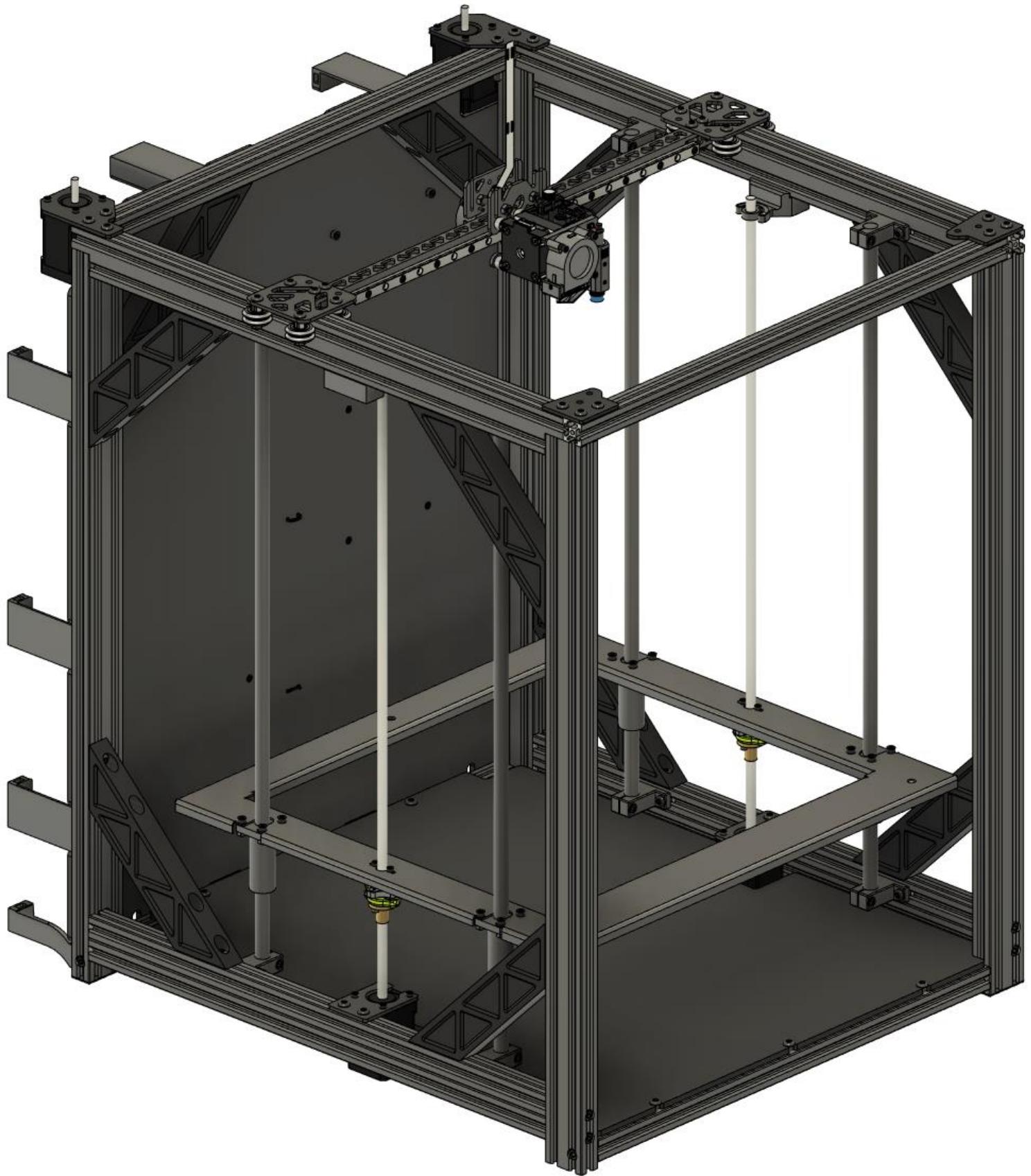


INSPECT FOR:

**Cracking in duct housing caused by
Grubscrew**

Duct output is not blocked

Extruder assembly complete



You will need:

2X Smooth Idler bearing
6X Toothed idler bearing
4X M5 x 40mm socket bolt
4X M5 x 25mm socket bolt
10X M5 full nut
2X M5 lock/half nut

Instructions:

Produce 3x toothed Idler pulley assembly Tall (A) and 1x smooth idler pulley assembly Tall (A)

Use M5 x 40mm socket head bolt

Feed onto A, a toothed idler bearing

Use M5 Full nut and tighten the nut until it bottoms out on the unthreaded part of the bolt

Add another M5 full nut underneath

Allocate 1 nyloc nut for the bottom to be attached later

Produce 2x toothed Idler pulley assembly small (B)
1x toothed idler pulley assembly extra small (C)
1x smooth idler pulley assembly extra small (C)

Use M5 x 25mm socket head bolt

Feed onto the bolt a toothed or smooth idler bearing

Use M5 Full nut for B or a M5 half/lock nut for C

Tighten the nut until it touches the idler bearing, and then untighten the nut by $1/8^{\text{th}}$ turn

Allocate 1 nyloc nut for the bottom to be attached later

A



B



C



INSPECT FOR:

Idle bearings can spin freely on bolt

Damage caused by overtightening the nuts onto the bearing must result in replaced bearing

Instructions:

Attach to the angled belt brackets 1X A and 1X B

The order of the idlers should be 1 Short then 1 Tall

All the idler assemblies for the angled belt brackets are **Toothed**

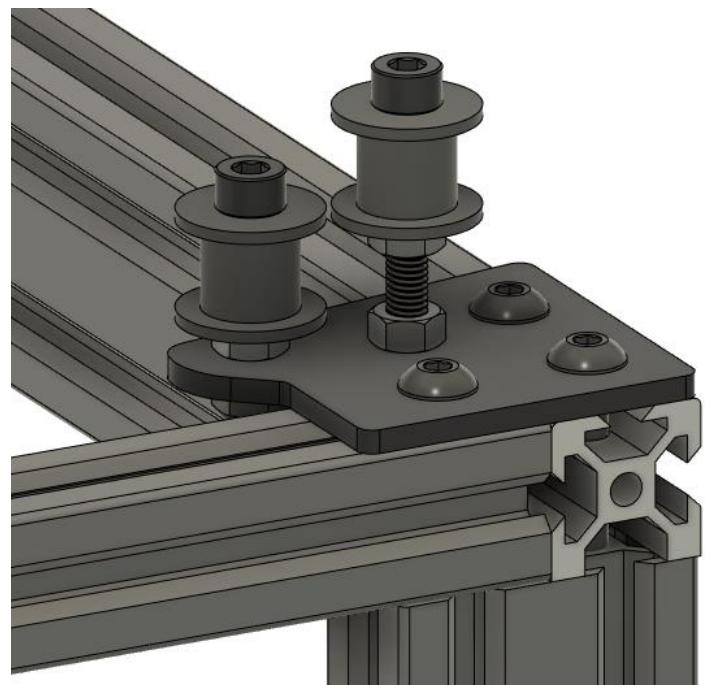
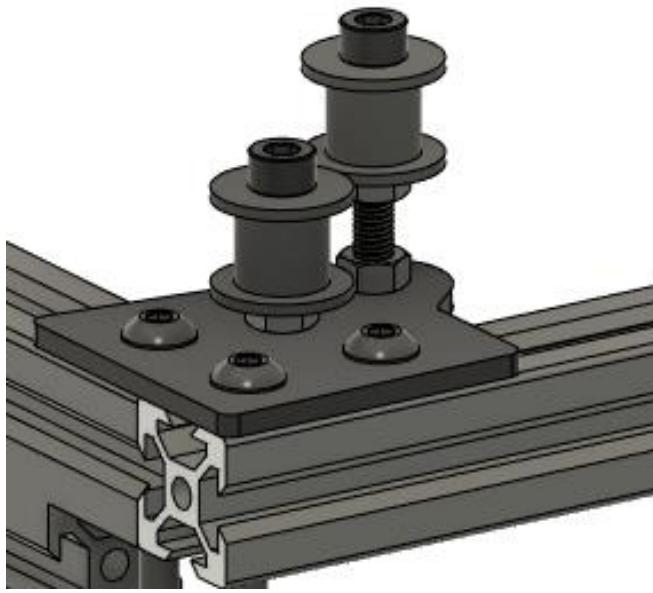
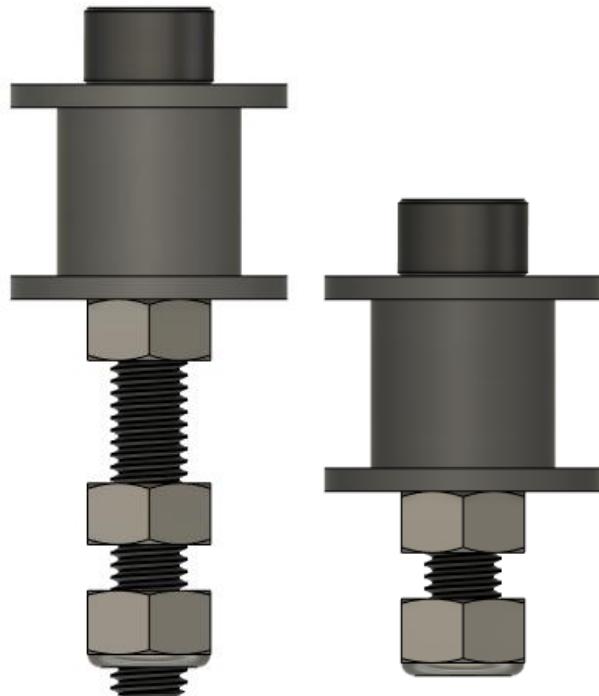
Once the bolt is applied to the bracket, use the Nyloc nut from underneath.

The Nyloc nut should be flush or almost flush with the tip of the bolt

Adjust the height of the Idler assembly by modifying the lower most M5 – this adjusts the resting position of the idler assembly.

To lock the idler assembly into place use spanner on the lower most M5 nut and use an Allen key on the bolt. By loosening the bolt, it forces the M5 nut downwards biting into the angled belt bracket, locking the idler assembly into place.

JIGS ARE AVAILABLE FOR THIS STAGE



INSPECT FOR:

Heights of Tall and Small idler bearings are correctly spaced

There should be no wobble to the main bolts

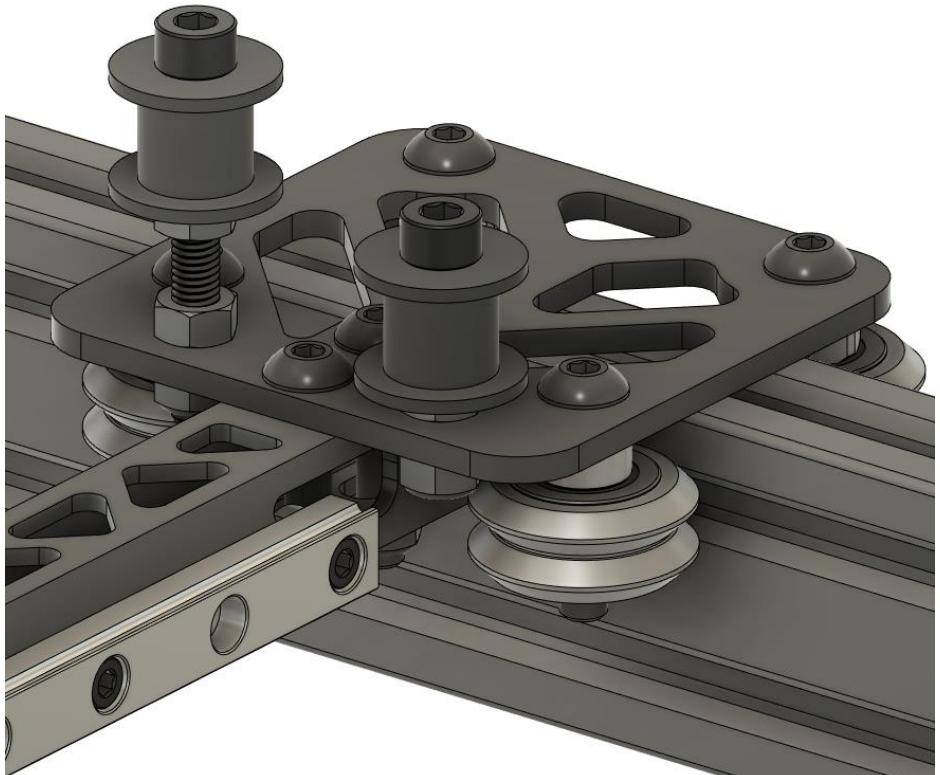
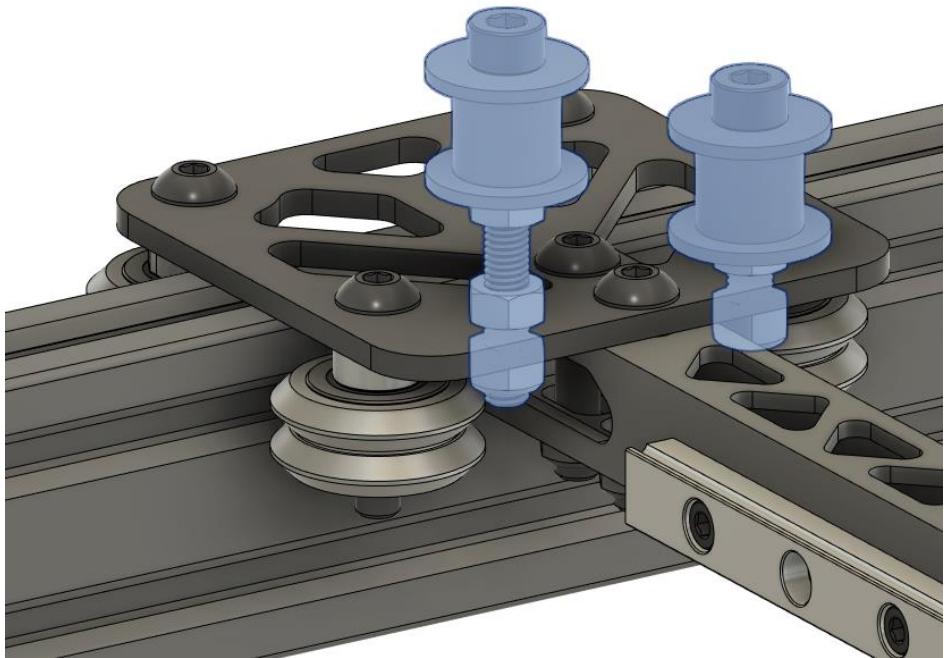
Instructions:

Attaching the Idler assemblies to the X-Gantry bracket it is important to have the idler assembly that is closest to the XY motors **ALWAYS** be the smooth idler

The small idler are also **ALWAYS** type C which uses the half nut

For the left side X-Gantry bracket, the idler facing the XY motor is a smooth extra small, and the remaining bolt hole is a type A toothed Tall

For the right-hand side X-Gantry bracket, the XY motor facing slot is a type A Smooth idler assembly, and the other slot is a type C extra small toothed assembly



INSPECT FOR:

Smooth idler assembly is closest to the XY motor side

Extra small Idler assembly is using half nuts

Height of idler assemblies NOT facing XY motors are same height when compared to the angled belt bracket idler position

You will need:

2X 20tooth drive pulleys

Instructions:

Take note of the orientation in the pictures.
When facing the front of the machine, place a 20 tooth drive pulley on the left XY motor

The pulley should be orientated so the grub screw fasteners are at the top of the motor shaft

The drive shaft should be almost flush with the drive pulley [Current pulley setup has the drive shaft being 0.5mm higher than the top of the drive pulley]

On the right hand motor, the drive pulley grub screw location should be opposite the left hand motor – the grubscrew fixing location should be closer to the motor base

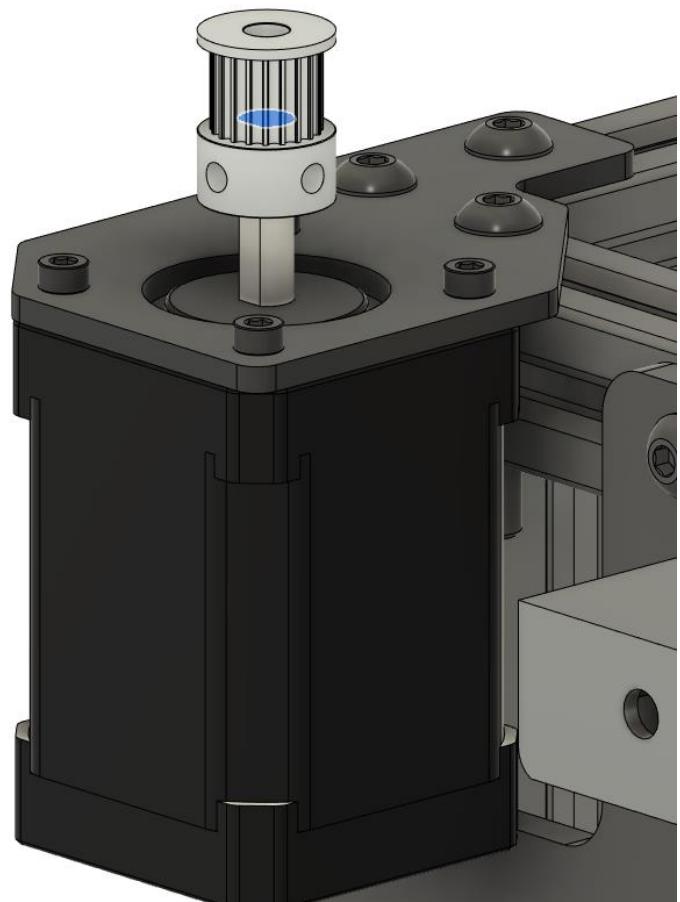
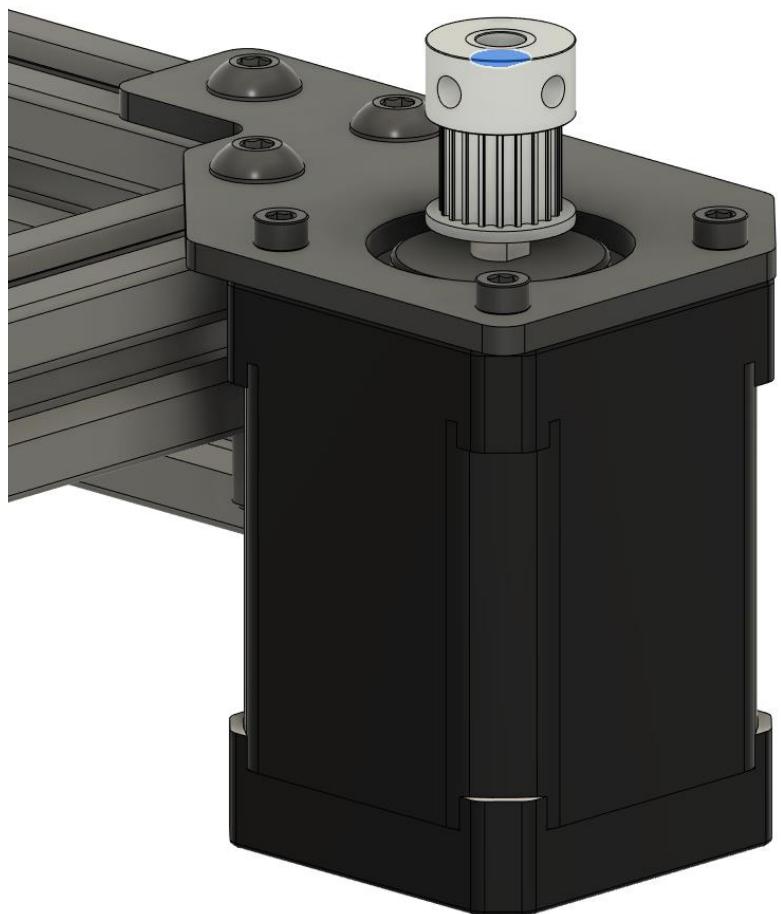
JIGS ARE AVAILABLE FOR THIS STEP

The drive pulley on the right hand motor should protrude the drive shaft by a considerable margin

When fixing the pulleys into place with the grub screws, locate the flat surface on the motor drive shaft

Slowly tighten down one of the grubscrews while aiming for the flat spot – it is easy to slightly wiggle the drive pulley as you tighten the bearing to ensure the grub screw is perfectly centred

Tighten the remaining grub screws



INSPECT FOR:

One of the drive pulley grubscrews are located within the 'D' shaft

Drive pulley when spun do not wobble

You will need:

Fabric Tape

Reinforcement tubing

2X Zipties

Instructions:

Cut a length of reinforcement tube to [L_E_N_G_T_H]
and place it inside the wiring bundle

Tape the wiring bundle together into a single cable
harness

Tape a length of [L_E_N_G_T_H]

The application of the tape should be done at an angle
for easier application

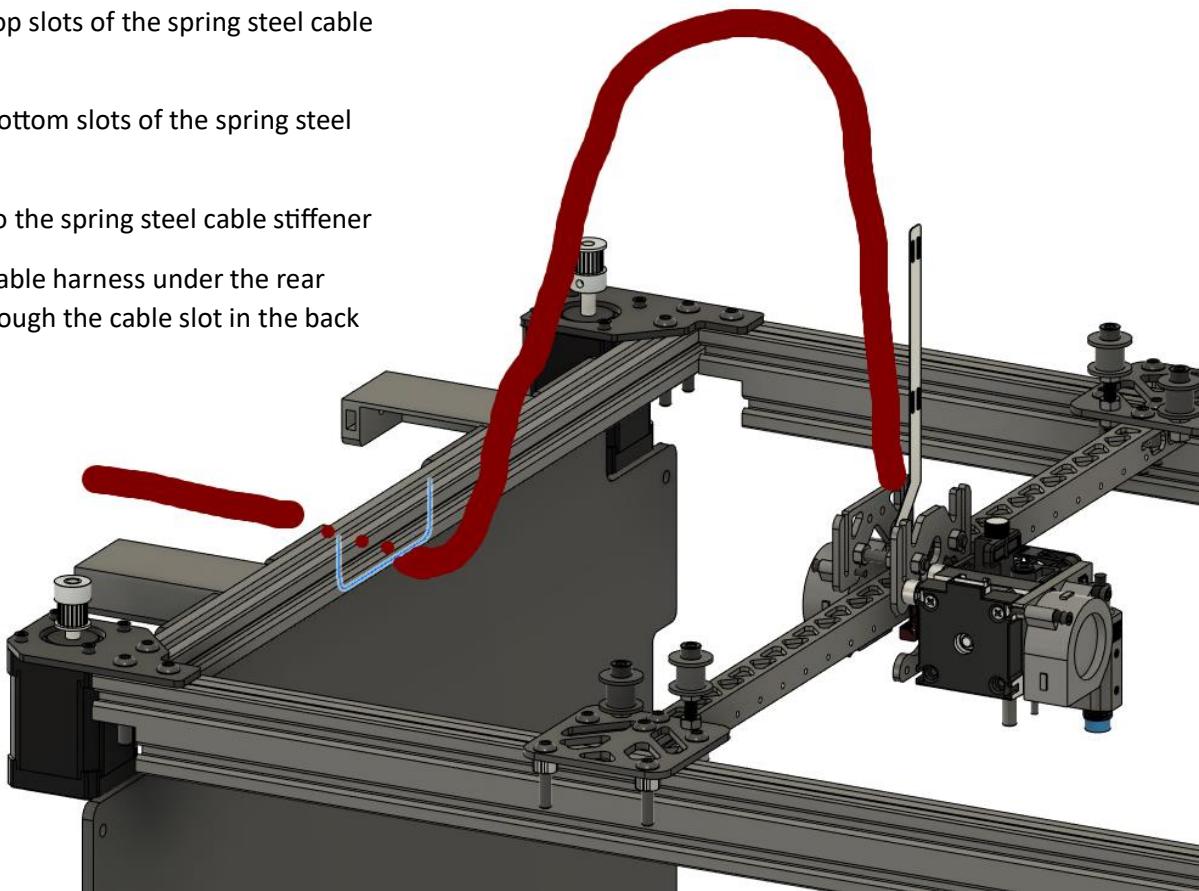
The tape should be consistent, neat and with no gaps
or voids

Feed a ziptie into the top slots of the spring steel cable
stiffener

Feed a ziptie into the bottom slots of the spring steel
cable stiffener

Ziptie the cable loom to the spring steel cable stiffener

Once taped, feed the cable harness under the rear
2020 extrusion and through the cable slot in the back
panel



INSPECT FOR:

Gaps or voids in the tape

Length taped is sufficient

Taped length should be able to create a nice arched cable loom when the extruder is at the front of
the machine – if the amount of exposed harness is too little, pressure will build up when applying the
cable clamp later

The wire harness after being inserted into the back panel should be able to reach the motherboard
cleanly, and the Z probe wire should be able to reach the PSU output terminals

You will need:

- 2X Belt clips
- 2X Belt locking clips
- 9mm Gates gt2 belt
- superglue

Instructions:

Take the belt stock and cut it to [LENGTH]

Trim the cut belt so the ends match perfectly with the end of a tooth profile

Apply superglue to the belt and push on one of the belt clips making sure the belt is pushed all the way to the bottom of the clip

Repeat for another belt.

Push the gantry to the back of the machine (XY motor side)

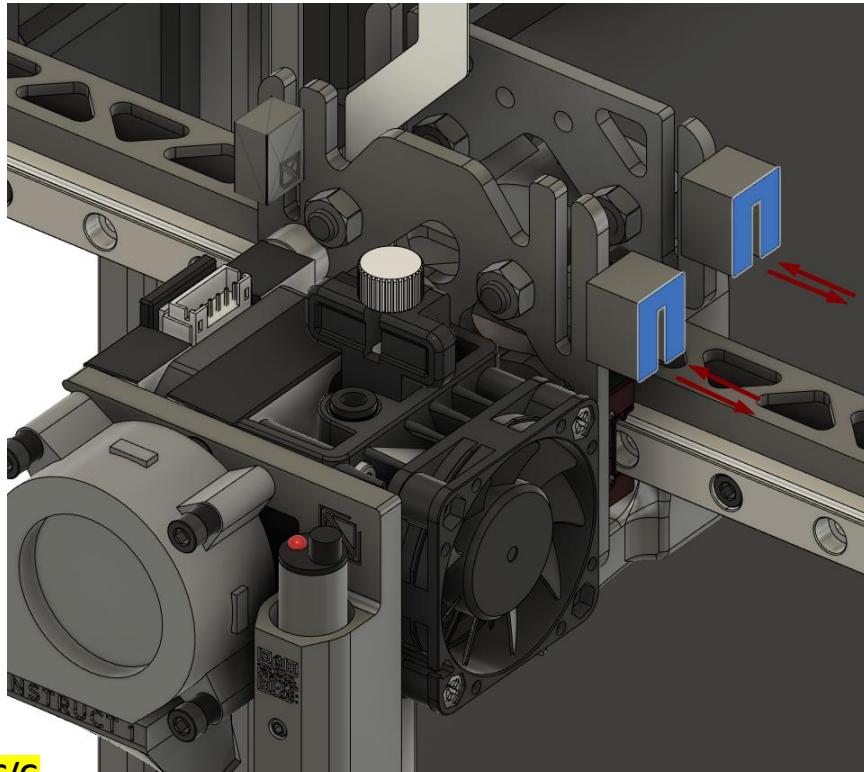
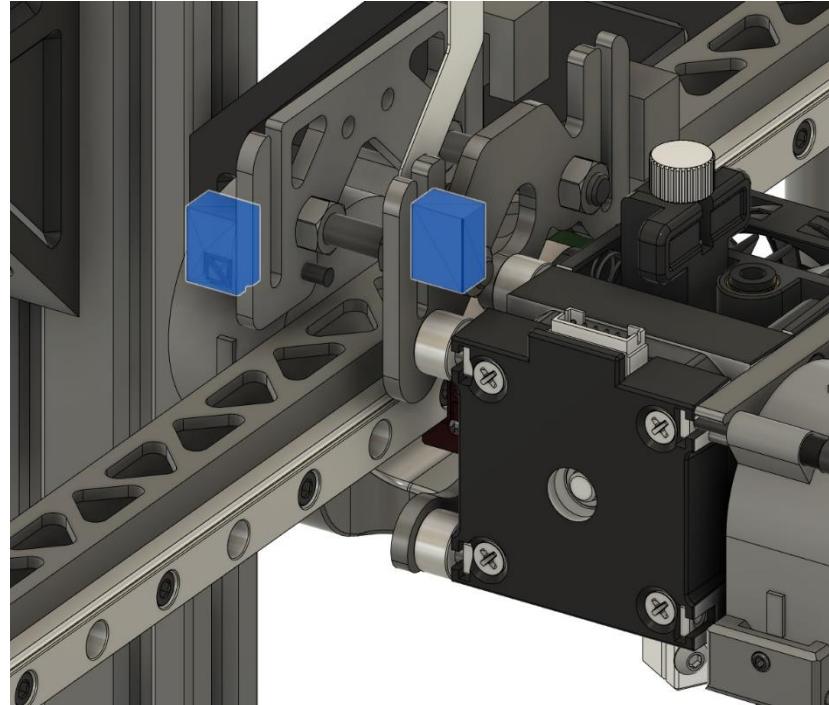
Push the extruder to the left hand side (when facing the machine)

Use a C or G clamp to hold the X-Gantry rail at the back of the machine – only a little force is needed otherwise the beam bends causing damage

Feed the belts onto the printer, keeping the belt path tensioned during the process.

Terminate the belts by pushing on a Belt locking clip over the doubled up belt

Release the C/G clamp



INSPECT FOR:

The X-Gantry having a twist when releasing the C/G clamp

Smooth movement when moving the extruder gently

You will need:

- 1X Bed plate
- 1X Silicone Heater
- Fabric tape

Instructions:

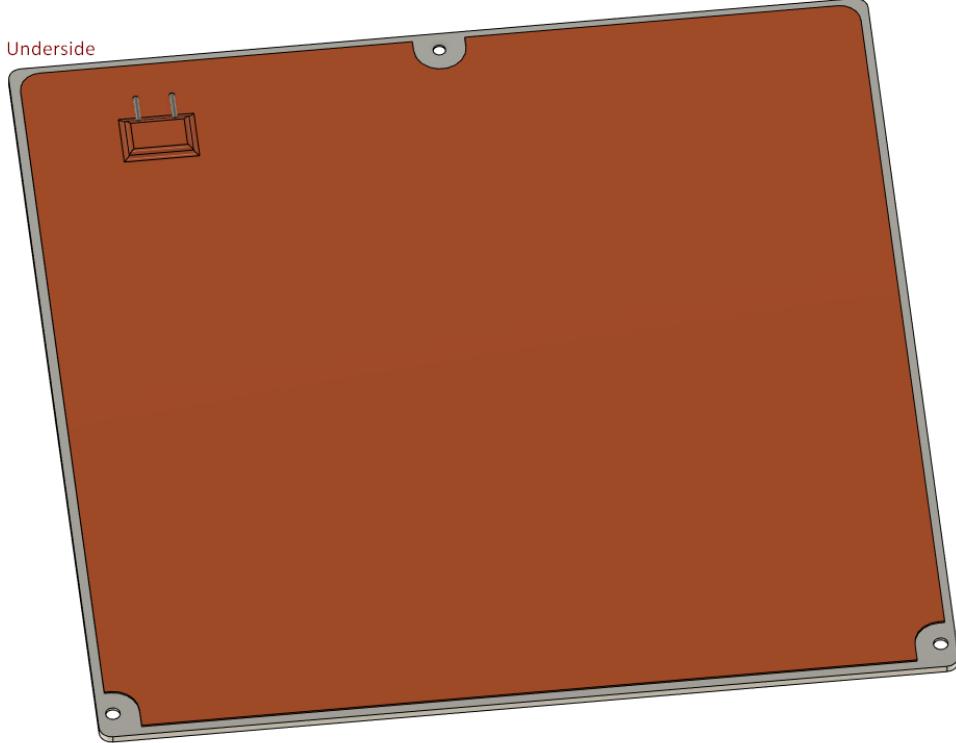
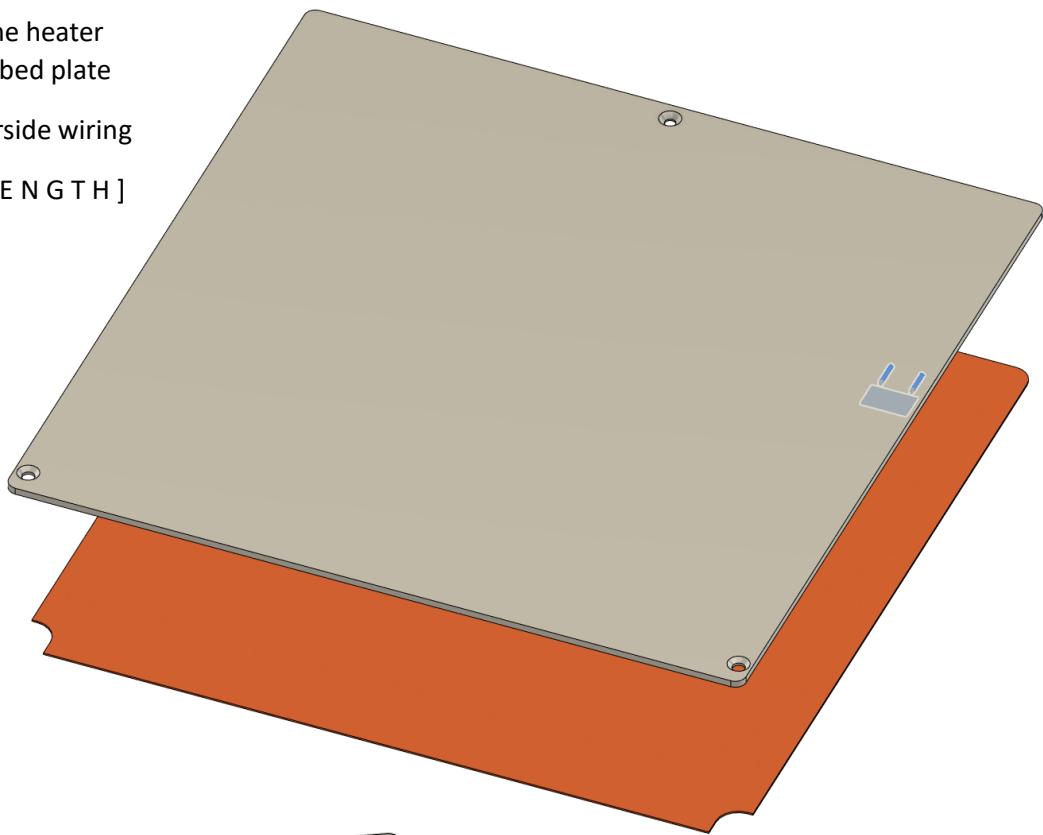
Take the Bed plate and clean it down with isopropyl alcohol to remove any grease

Apply the Silicone heater pad to the underside of the Bed

Use a roller to make sure the silicone heater pad has made full contact with the bed plate

Be careful not to damage the underside wiring

Tape up the heater pad wires to [L E N G T H]



INSPECT FOR:

Lifting of the silicone pad

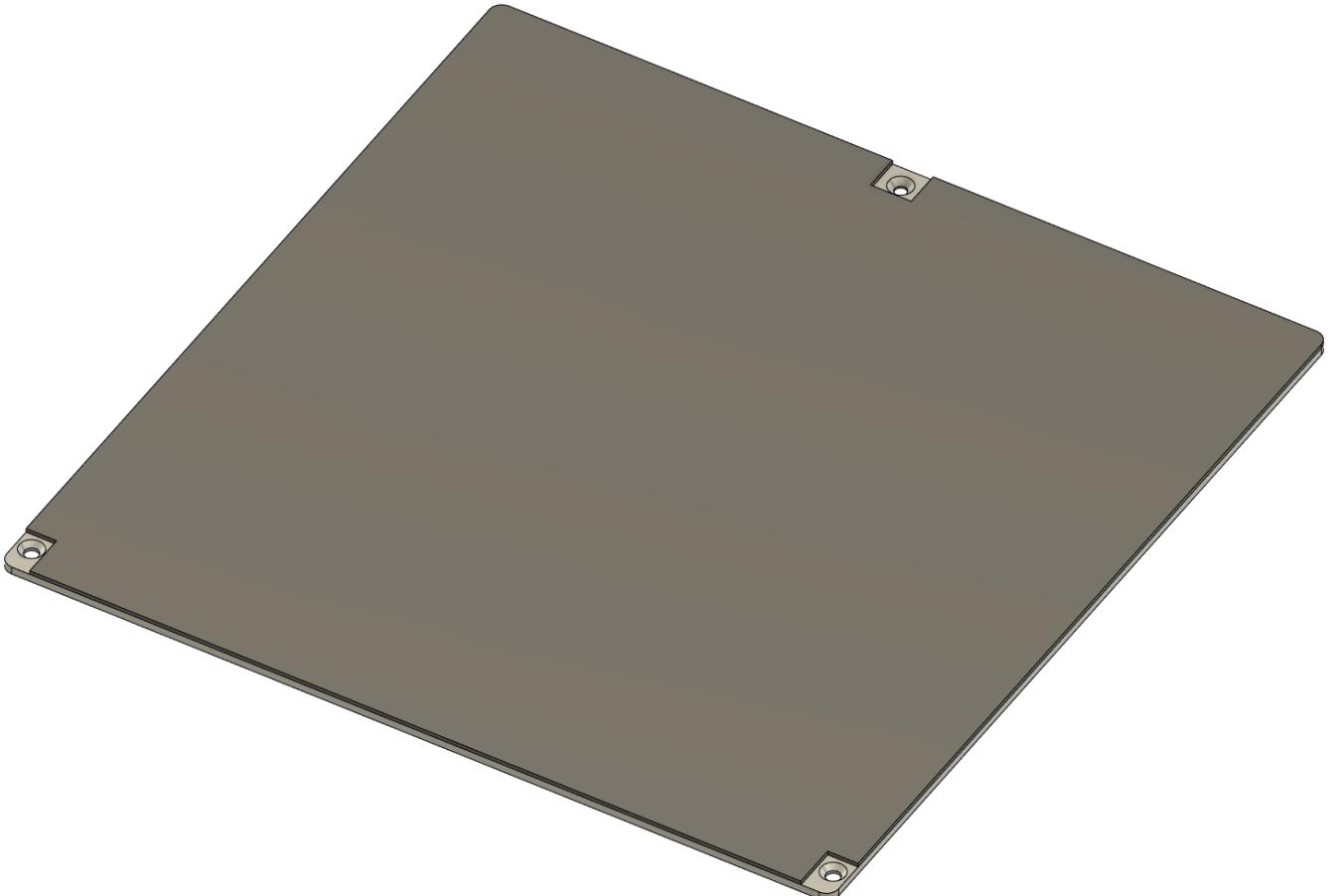
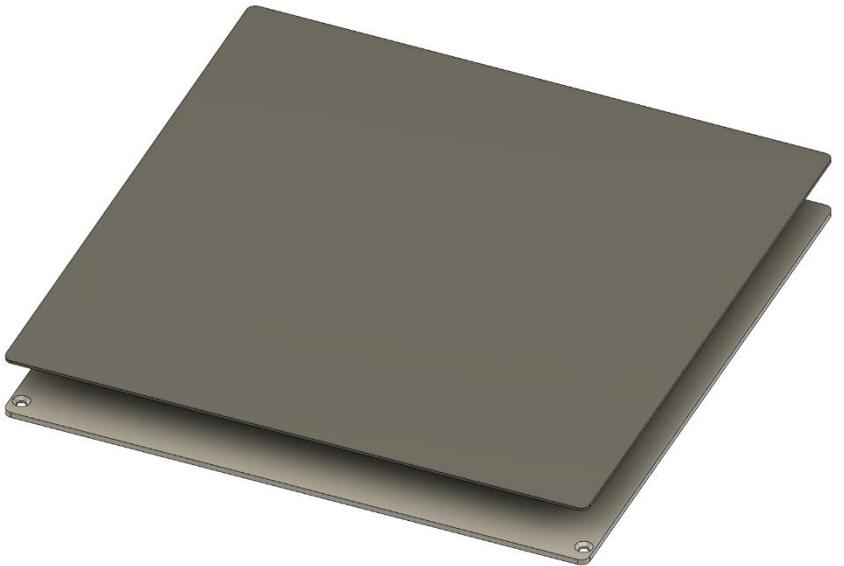
You will need:

1X magnetic bed sheet

Instructions:

Cut out from the magnetic bed sheet the holes for the bed fasteners

Place onto the heated bed the magnetic bed sheet



INSPECT FOR:

Bubbles in the magnetic sheet

You will need:

3X M5 x 30 countersunk bolts

3X Silicone Bed spacer

3X Nyloc M5 Nut

Instructions:

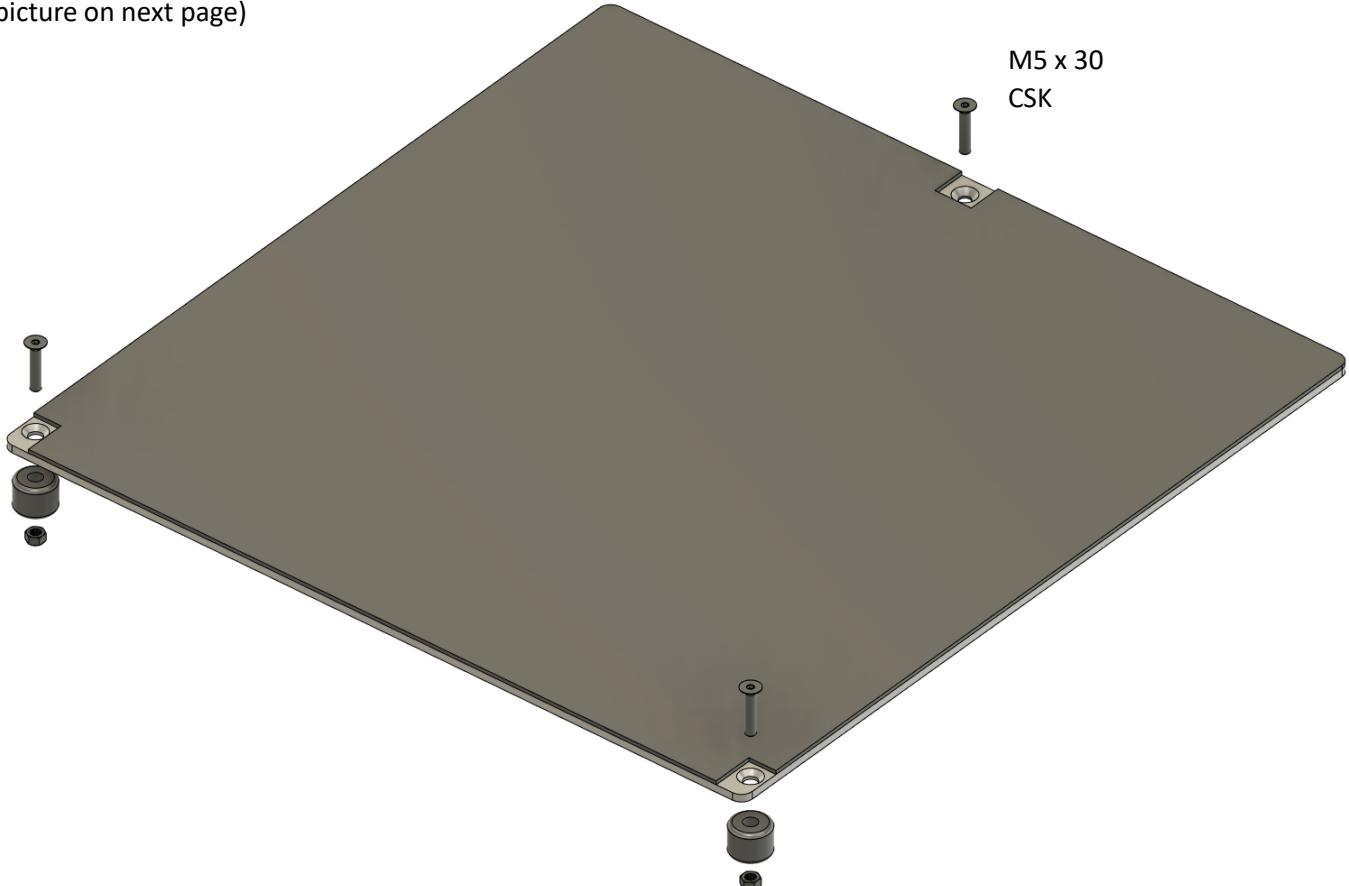
For each bolt point on the bed plate, feed a M5 x 30 countersunk bolt to rest inside.

Push onto each bolt a silicone spacer

Move the bed plate with the bolts in place over to the printer assembly, and insert the bed into the bed gantry – the bolts will line up with the bed gantry holes

Tighten the bolts down so no play is possible with M5 Nyloc nuts

(picture on next page)



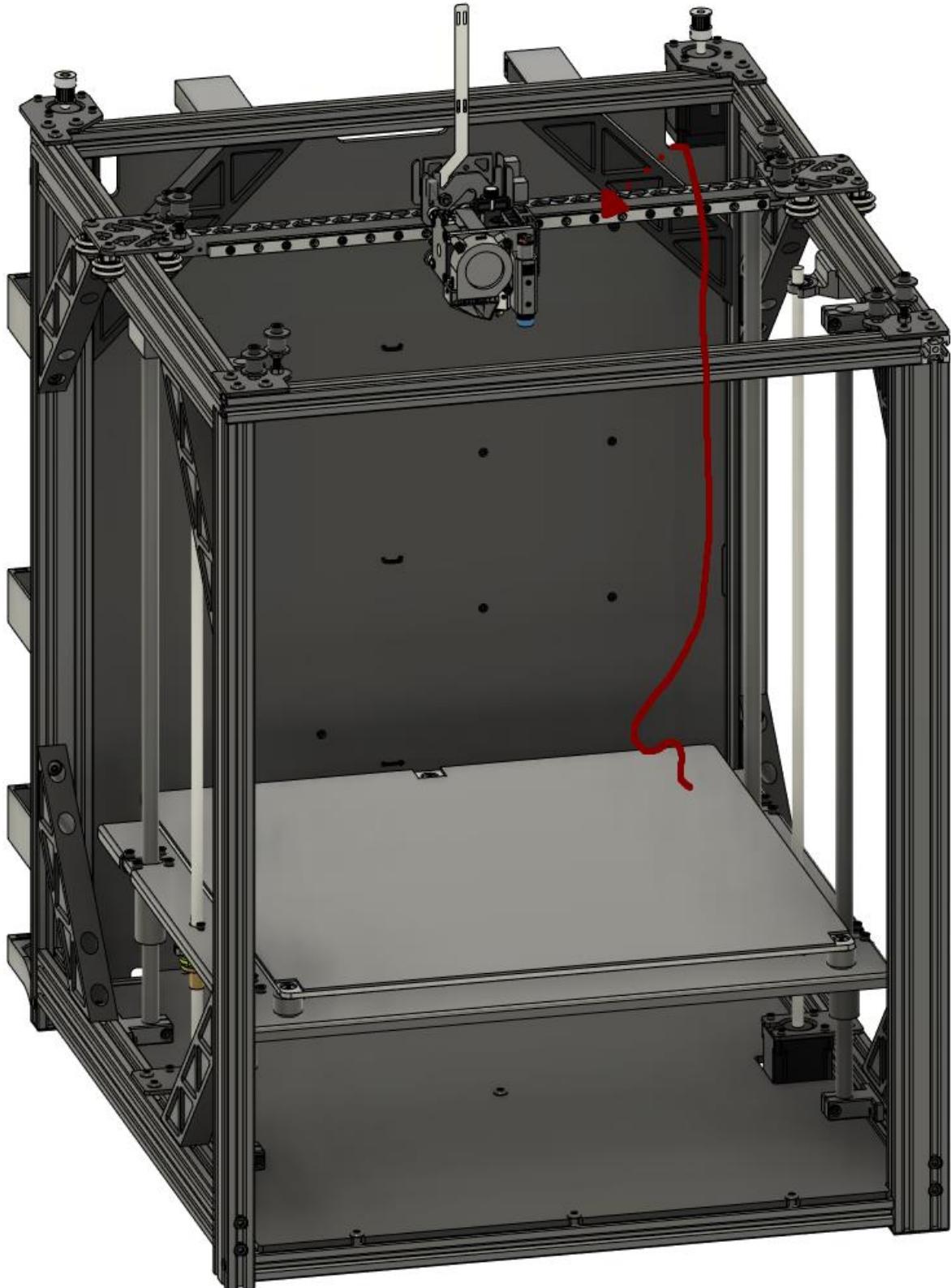
INSPECT FOR:

The bed once mounted does not rock or wiggle in place

Instructions:

Feed the bed wires through the top in the gap near the top right XY motor

When the bed moves up, the wires should form a U shape without twisting

**INSPECT FOR:****Wires are not twisted**

You will need:

2X 4020 turbo fans

VHB tape

Crimps, wires & electrical connectors

5X Stepper driver heatsinks

Instructions:

Wire the motherboard, PSU and SSR relay (see separate diagram)

Add VHB tape to the back of the 4020 fan: place tape in top left corner and bottom right corner. Stick fans to the panel under the SSR relay and under the motherboard.

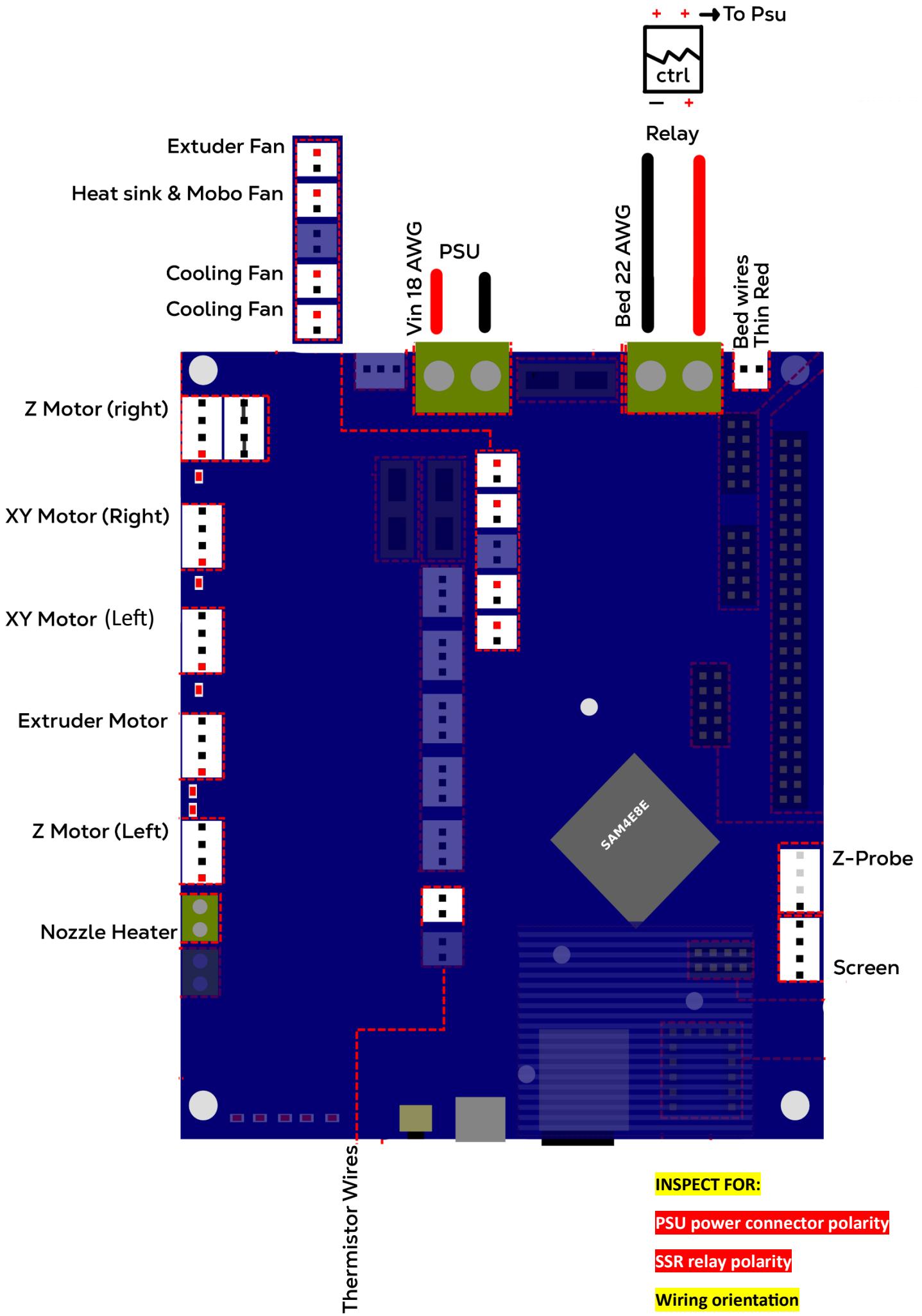
Merge 2, 4020 blower fans into a single output

Stick stepper driver heatsinks onto motherboard – heatsinks fins should be vertically aligned



INSPECT FOR:

Heatsinks on stepper motors



MACHINE TESTING

MOVE TO MACHINE TESTING MANUAL

You will need:

2X Bamboo side panels (one left one right)

24X M5 x 12mm button cap bolts

24X Rollin Tnut

Instructions:

Place 12 rollin T nuts into the side of the printer assembly

Use the Bamboo side panel as a reference for location

Align all Tnuts with the holes for the bamboo panel

Use M5 x 12mm button cap bolts to fix the bamboo panel into place

Don't torque the bolts down until the side panel has been fully fitted flush with the front of the machine and push as vertical as possible

Fully torque the bolts down at this stage

**IF BAMBOO THICKNESS IS LESS THAN 7mm,
THEN M5 X 10 BOLTS SHOULD BE USED**



INSPECT FOR:

Damage on the bamboo

All bolts are torqued into position

Repeat once more for other side.



INSPECT FOR:

Bamboo is flush on the front of the machine

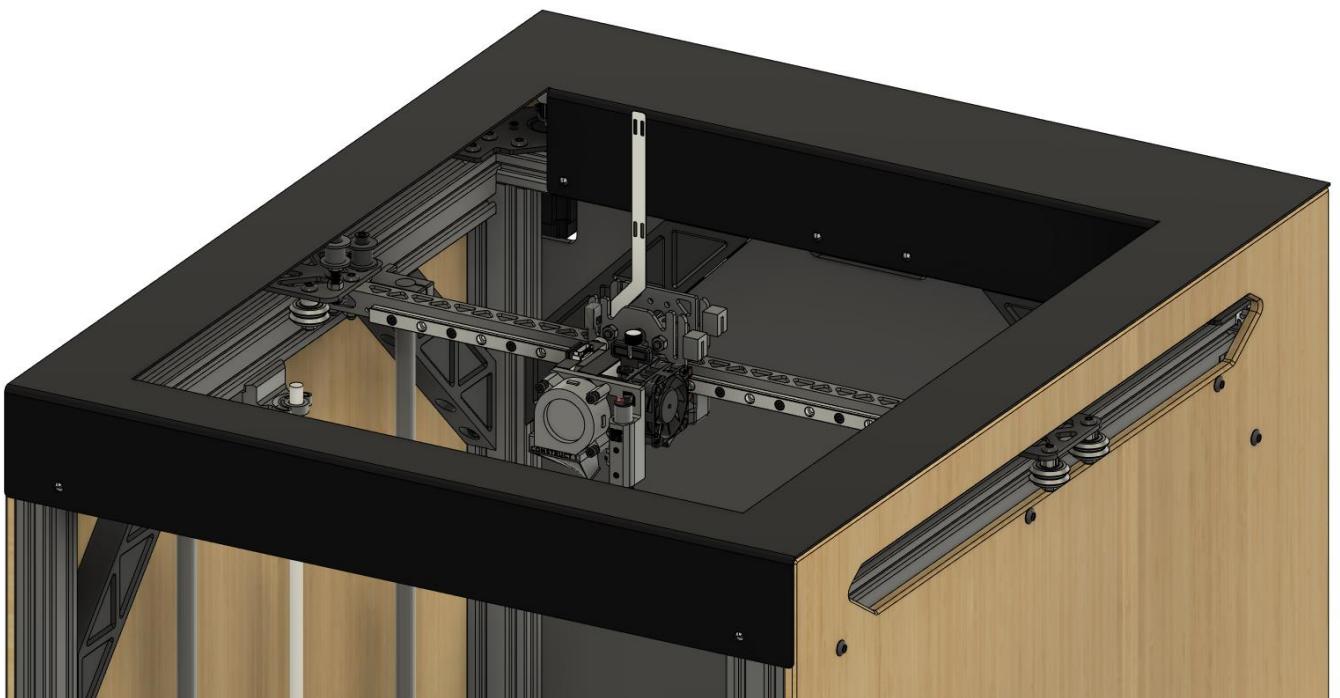
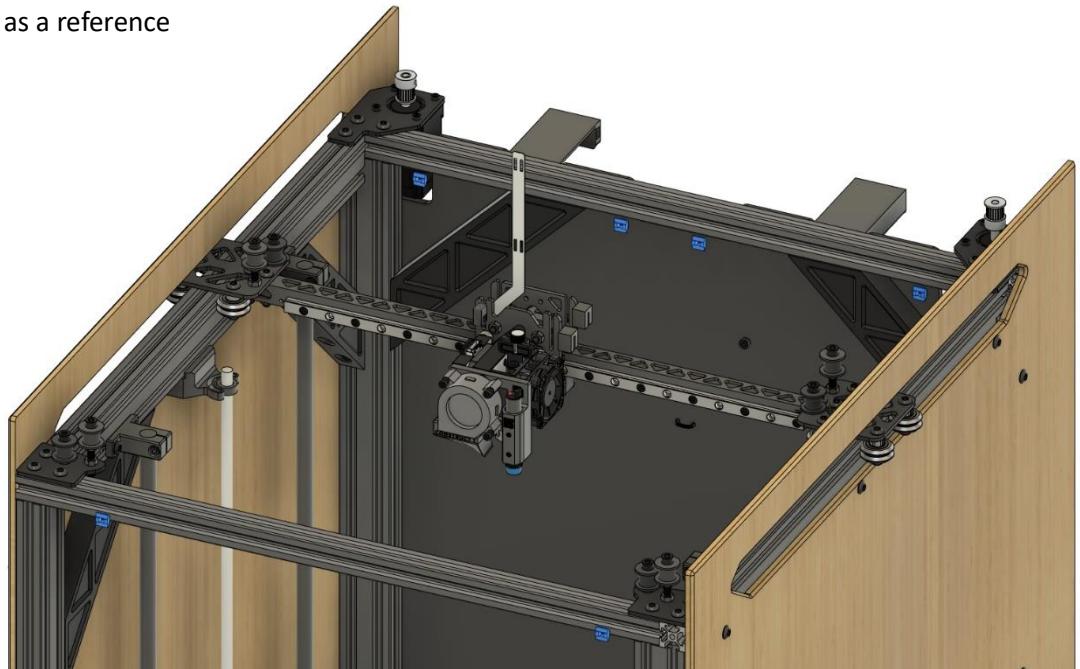
You will need:

6X rollin Tnut

1X Top Stamped metal

Instructions:

Preplace rollin Tnuts by using the Top Stamped metal sheet as a reference



You will need:

4X M5 x 6mm Button Cap bolt

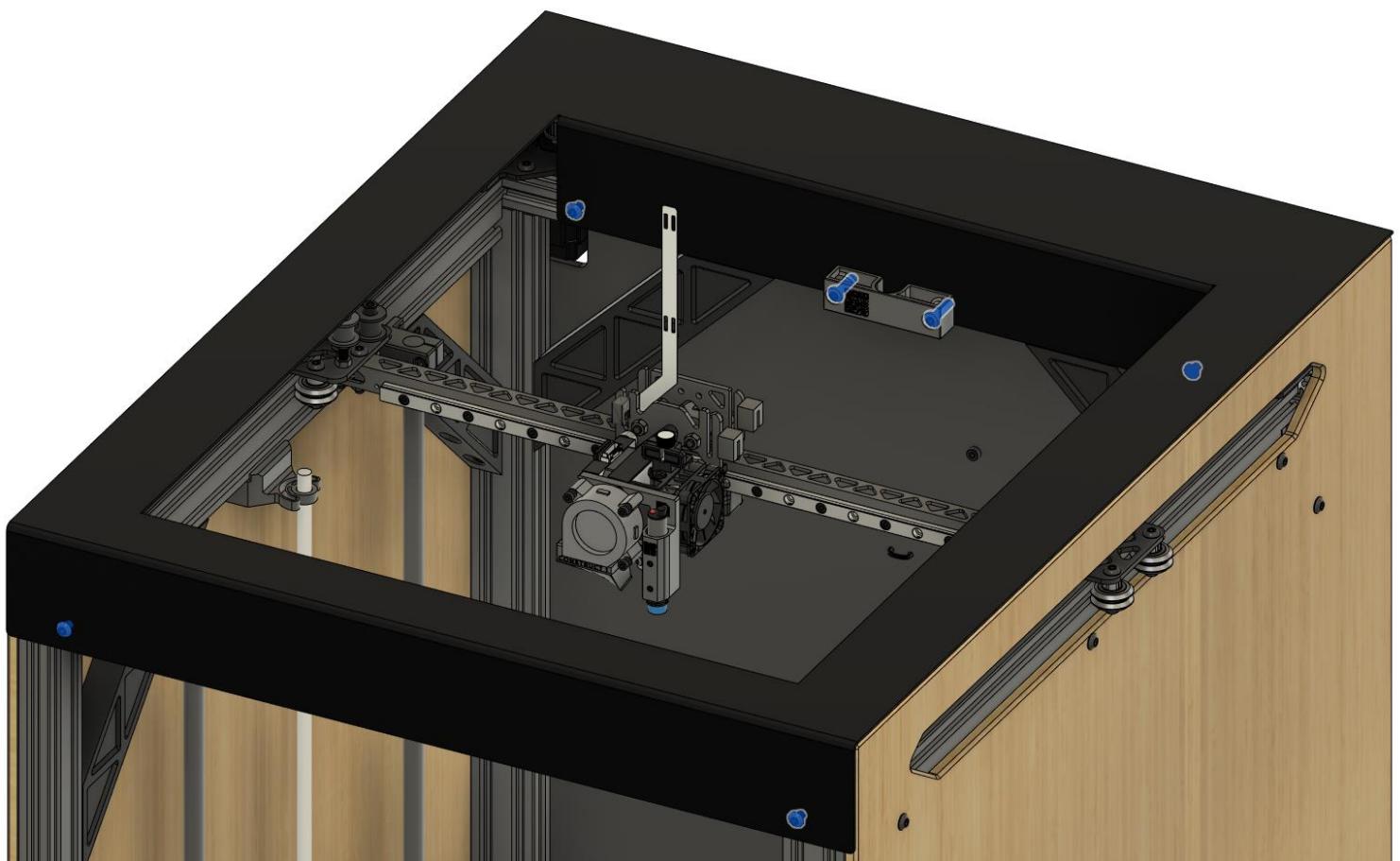
2X M5 x 20mm Button Cap

1X Wire clamp

Instructions:

Use 4x M5 x 6mm button cap bolts to fix the top metal panel into place.

Bolt the cable harness wire clamp into place with M5 x 20mm button head bolts.



INSPECT FOR:

Flatness of the metal top panel resting against the bamboo – a bent flat surface indicates a warped frame if extreme

Alignment

You will need:

1X French cleat

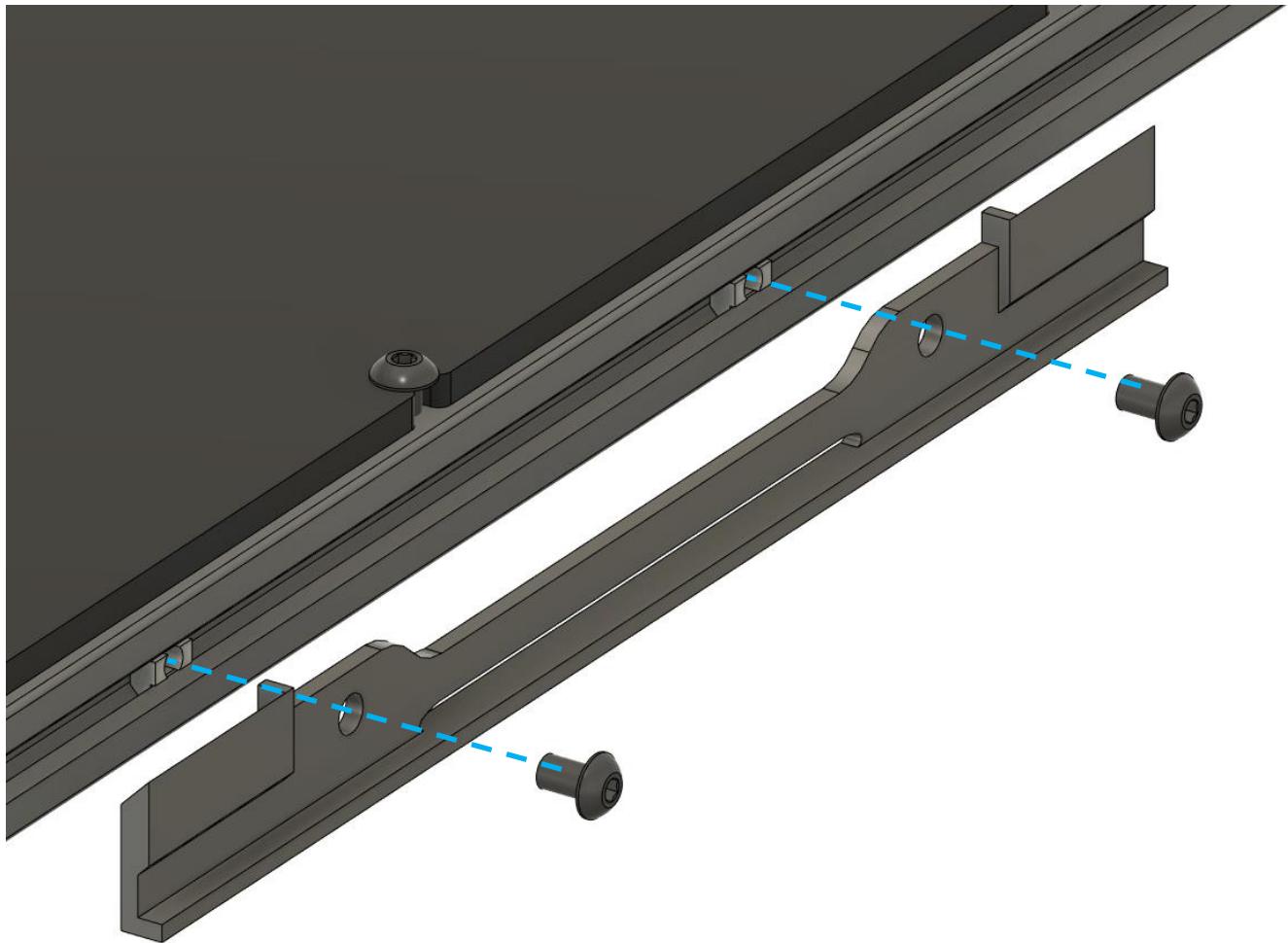
2X M5 x 8mm button cap bolt

2X Rollin T nut

Instructions:

Place two rollin T nuts into the lower 2020 X extrusion

Fix the French cleat to the centre of the extrusion with 2X M5 x 8mm button cap bolts



You will need:

8X TWIST in Tnut (M4)

16X M4 x 8mm countersunk bolt

2X Acrylic door

4X Door hinge

Instructions:

Use a M4 tap in a drill to apply the threads to the Acrylic doors

Attach the door hinges to the acrylic doors with M4 x 8mm countersunk bolts

Attach the doors to the printer assembly with M4 x 8 countersunk bolts with twist in Tnuts applied to them



You will need:

2X Door handle (one left one right)

1x rollin Tnut

1X Door latch

1X M5 x 6mm button cap bolt

Instructions:

Apply double sided tape to the Door handles

Peel back the acrylic door protective sheet where the handles would be placed

Stick the handles to the door, taking note the direction the handle faces in (pictured the left handle is pointing incorrectly)

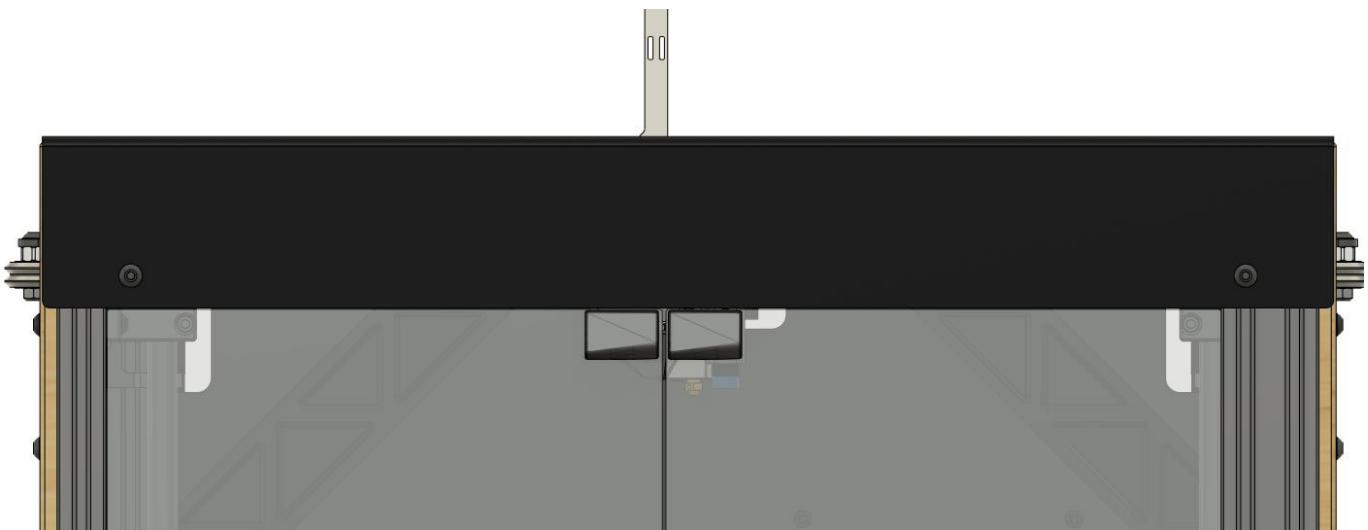
Open the doors, and insert a rollin t nut into the top 2020 X extrusion.

Attach the door latch so the flat face is towards the front of the printer assembly

Gently bolt down the latch with a M5 x 6mm button cap bolt

Close one of the doors to use as a guide for where the centre point for the latch should be

Finish tightening down the bolt – the bolt is semi fragile



INSPECT FOR:

Handles are aligned with the metal top with no tilt

Doors open freely without hitting the handles

You will need:

10X M5 x 12 button cap bolts

1X M5 x 10mm button cap bolt

11X M5 Full Nuts

1X Back Outer panel

Instructions:

Insert 1 x M5 Full nut per back panel 3D printed standoff

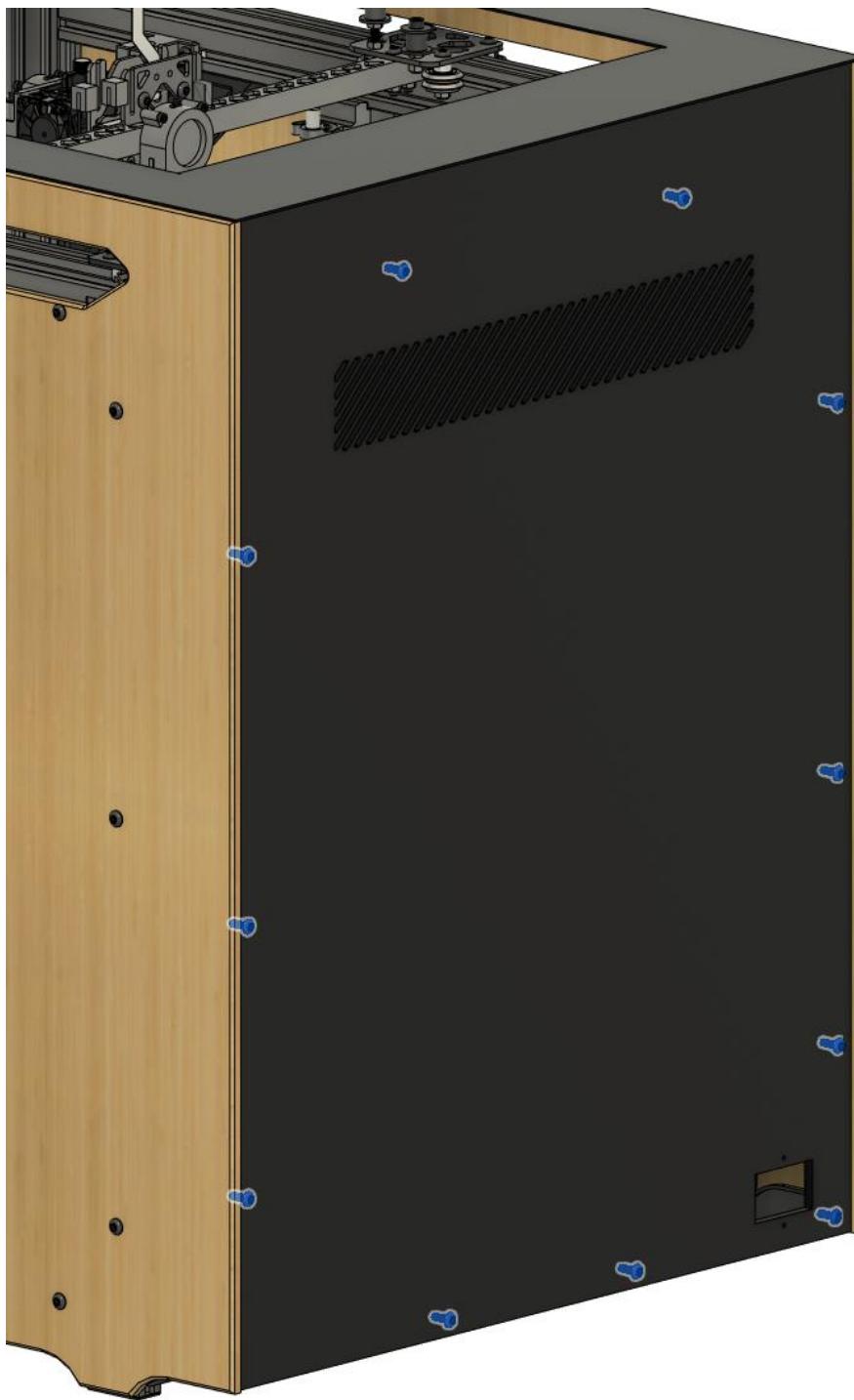
Connect the PSU wires to the back outer panel filter plug (not pictured)

Double check the filter plug is correctly mounted. The switch should be on the right most part of the panel with the kettle plug spades on the left side facing into the machine

Connect the wires to the filter plug, with Blue at the top, Earth at the side, and Red facing down

Fix the back panel onto the printer with 10X M5 x 12mm bolts

Use the Single M5 x 10mm bolt in the bottom right bracket closest to the plug receptacle



BUILD COMPLETE