

## BugBu 300 V1 Assembly Guide

**(Recommended print settings for printer parts is no less than 6 walls and no less than 20% infill)**

Welcome to the assembly guide for the BugBu corexy printer. This guide will serve as assembly instructions for the printer. It is a “300” as this is the footprint of the printer 300mm cubed. Upon completion, the printable area will be 215x/200y/200z or slightly bigger.

Any questions during assembly, please contact someone within the group on Discord here <https://discord.gg/AV9FpYKB>

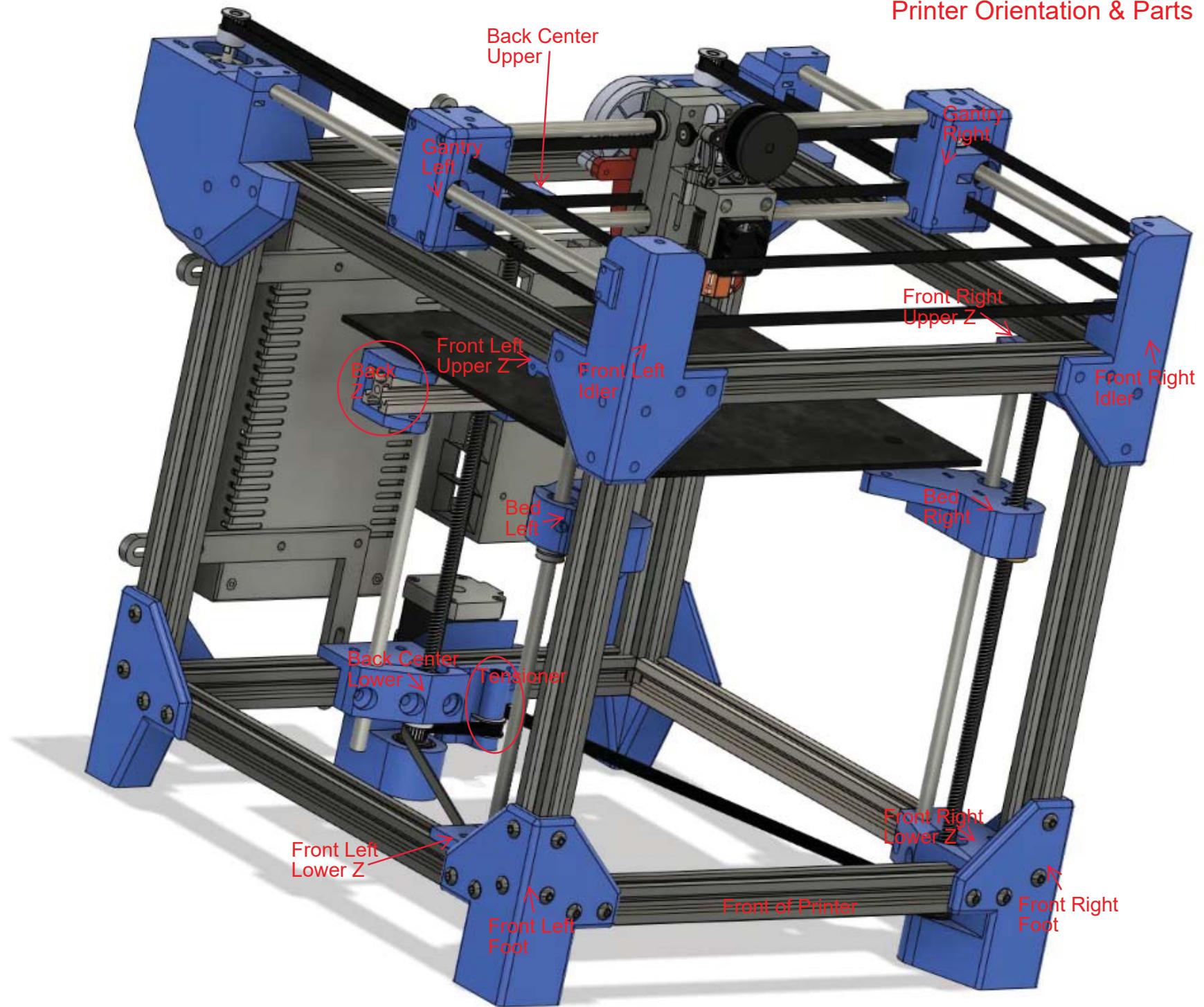
The github <https://github.com/Rolls17/BugBu> as well as printables <https://www.printables.com/model/415677-bugbu-corexy-3d-printer> will have the most recent updates in STL’s and CAD. Please refer to the github page for all slicer configurations and klipper firmware configurations or updates.

This is meant to be an affordable corexy build that is relatively easy to build, high print speed, and quality prints. Any feedback is always welcome as we are always striving to make it better with a great experience for all users.

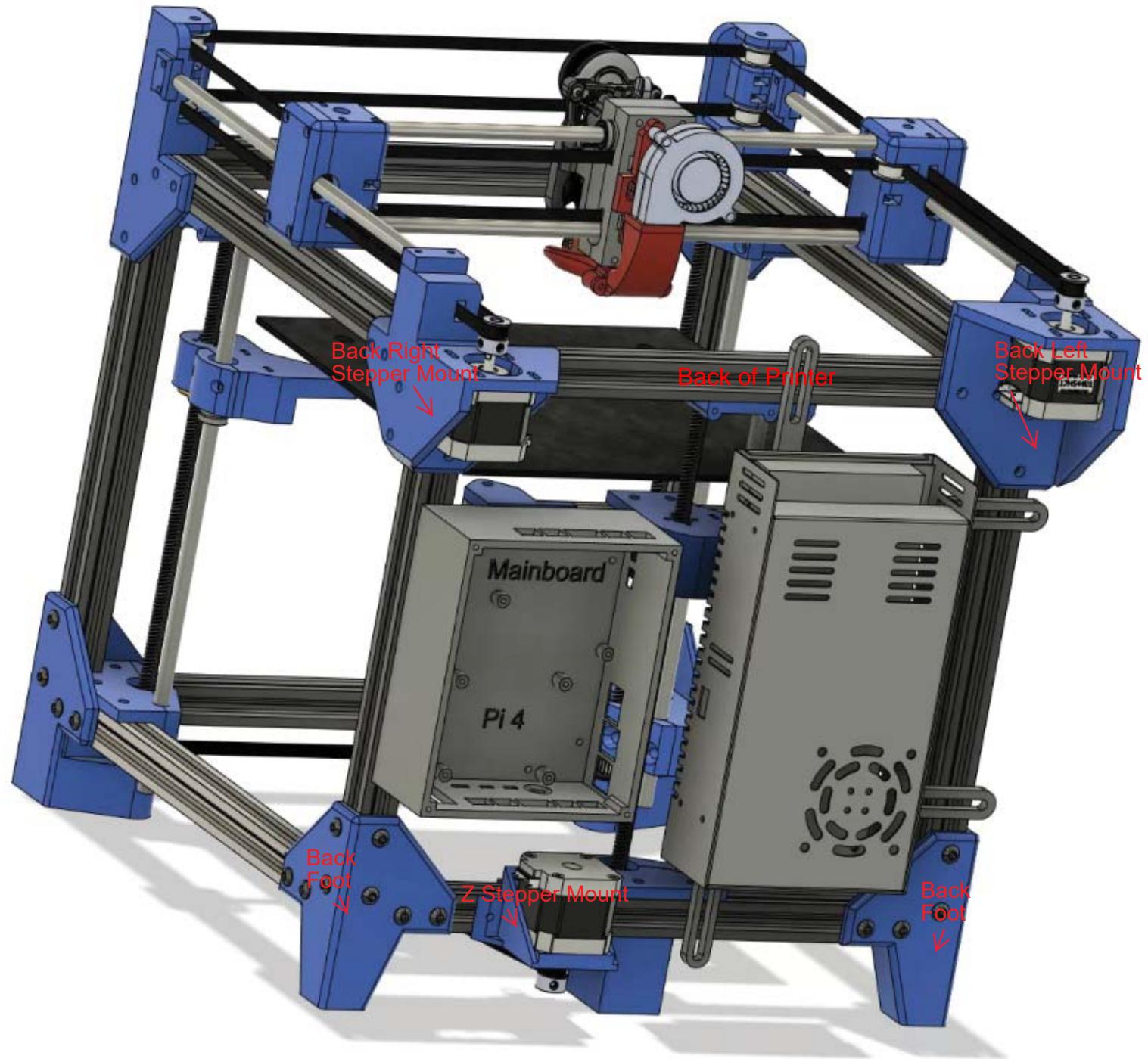
## Index:

1. Frame Assembly:	5 - 33
2. Gantry Assembly:	34 - 60
3. X/Y Belt Routing:	61 - 64
4. Z System Assembly & Belt:	65 - 104
5. Bed Assembly:	105 - 110
6. Printhead & Extruder Assembly:	111 - 131
7. Mainboard Wiring Diagram:	132 - 133
8. Pi Setup and Firmware Install:	134
9. Initial Startup:	135
Last Page and Closing Comments	136

## Printer Orientation & Parts



## Printer Orientation & Parts



# **Section 1:**

## **Frame Assembly**

### **Components needed for this portion:**

<b>M5x12 or (M5x10) Button Head Screws</b>	<b>x64</b>
<b>M5 T-nuts</b>	<b>x64</b>
<b>M5x25 Button Head Screws</b>	<b>x4</b>
<b>M5 Nuts</b>	<b>x4</b>
<b>Front Right Foot</b>	<b>x1</b>
<b>Front Left Foot</b>	<b>x1</b>
<b>Back Feet</b>	<b>x2</b>
<b>Front Left Idler</b>	<b>x1</b>
<b>Front Right Idler</b>	<b>x1</b>
<b>Back Left Motor Mount</b>	<b>x1</b>
<b>Back Right Motor Mount</b>	<b>x1</b>
<b>300mm 2020 Extrusions</b>	<b>x12</b>

Single 200mm 2020 for Bed



12 PCS 300MM  
2020 for Frame

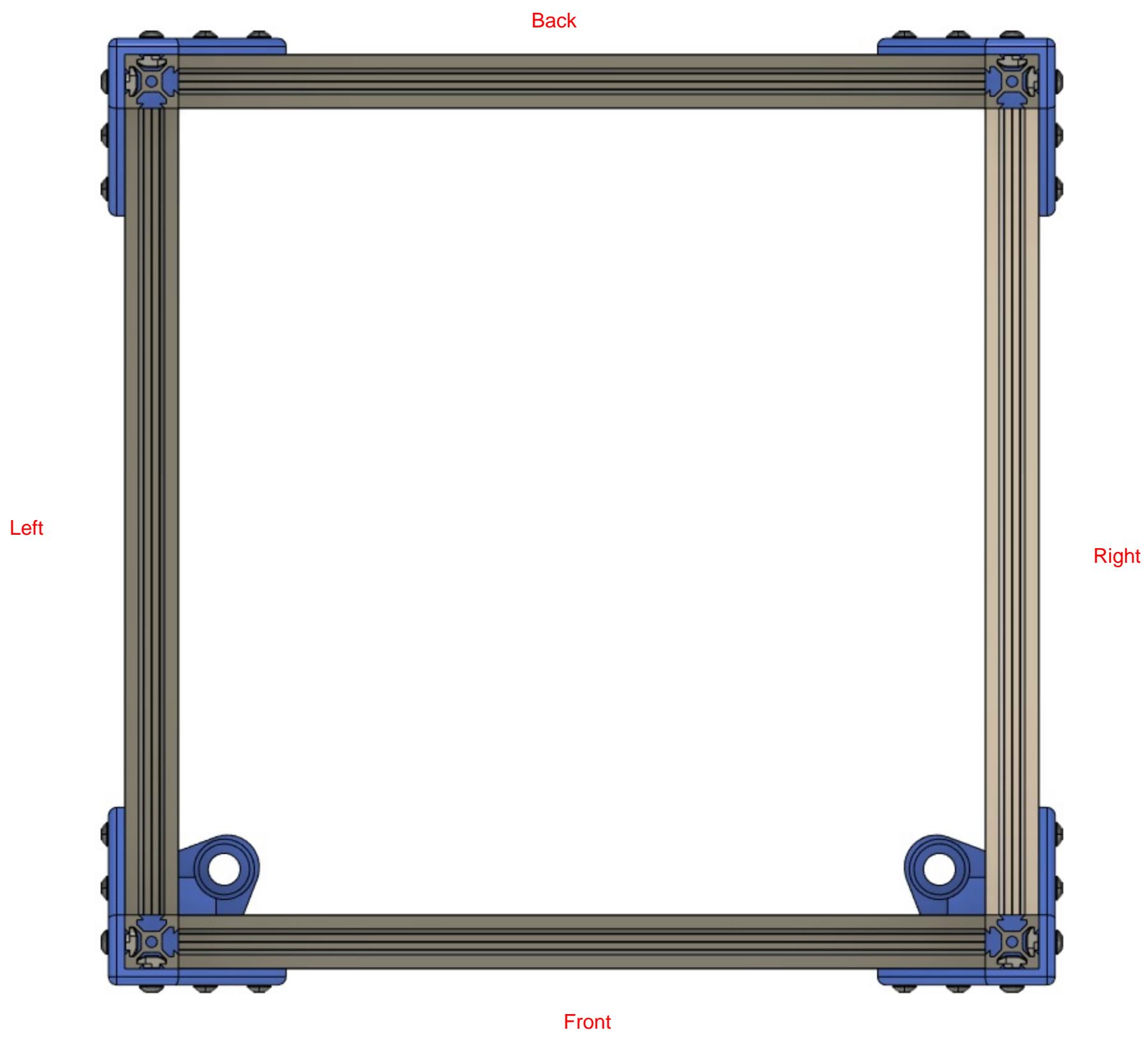


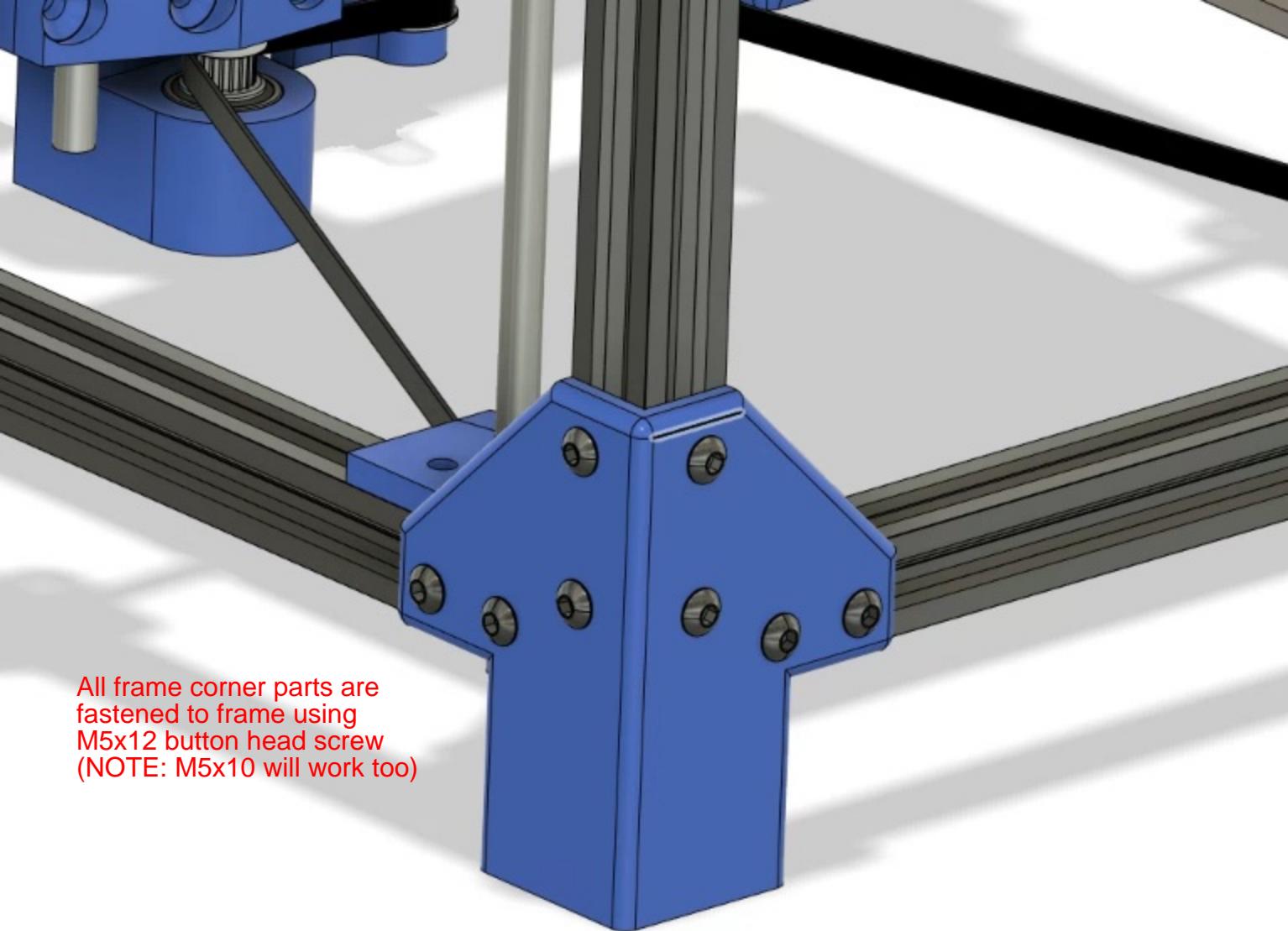
## The Frame

1. Place one 608 bearing in each of the front feet
2. Using 4 m5x12 screws and T nuts, insert the vertical 300mm extrusions into the front feet first.
3. Using 2 m5x12 screws and T nuts on each side, insert the horizontal 300mm extrusion between the two verticals. Ensuring a strict 90 degree angle on both sides, secure all 4 screws.
4. Using 4 m5x12 screws and T nuts, insert the vertical 300mm extrusions into the rear feet.
5. Using 2 m5x12 screws and T nuts on each side, insert the horizontal 300mm extrusions between the front and rear verticals, ensuring a strict 90 degree angle.
6. Using 2 m5x12 screws and T nuts on each side, insert the rear 300mm horizontal extrusion.
7. Begin assembly on the upper frame by inserting two GT20 20T or toothless idlers into the top front brackets. Insert an M5 nut into the captive slot, and secure with 1 M5x25 bolt from the top, and 1 M5x25 bolt from the bottom. Do not over tighten these bolts, as that will cause binding on the idlers.
8. Start in one corner and attaching the bracket to the vertical 300mm extrusion using 4 m5x12 screws and T nuts.

\*\*NOTE: While in most cases the screw type (button head, socket head, etc) are interchangeable, there is not enough clearance for a socket head m5 bolt on the motor mount brackets. Ensure to use button head bolts otherwise you will not be able to mount the motor.

9. Attach the next top corner in the same manner.
10. Using 2 m5x12 screws and T nuts on either side, connect the two corners using a 300mm extrusion.
11. Repeat this process working your way around the top frame until it is complete. The top rear corners will require m5x20 screws and T nuts.
12. Congratulations on completing the assembly of the BugBu Frame!



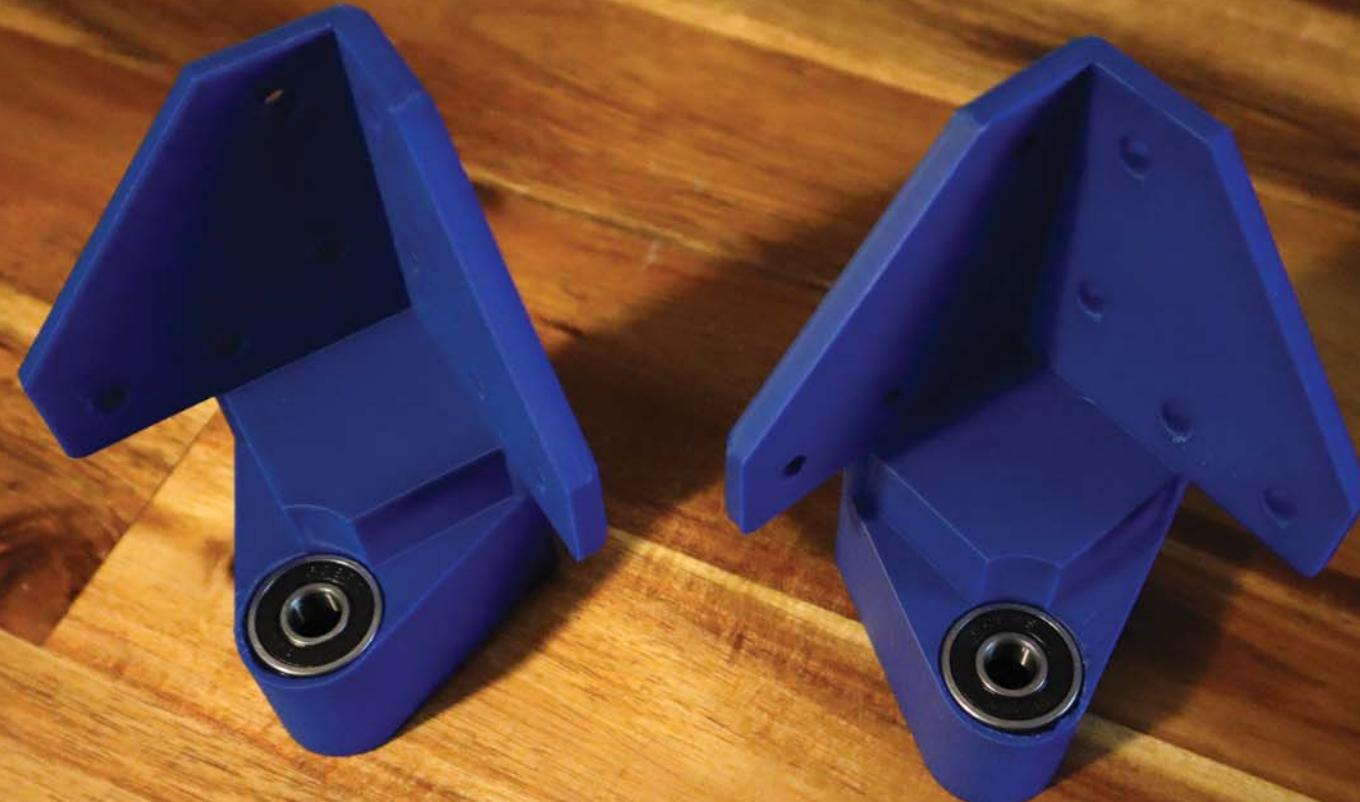


All frame corner parts are  
fastened to frame using  
M5x12 button head screw  
(NOTE: M5x10 will work too)

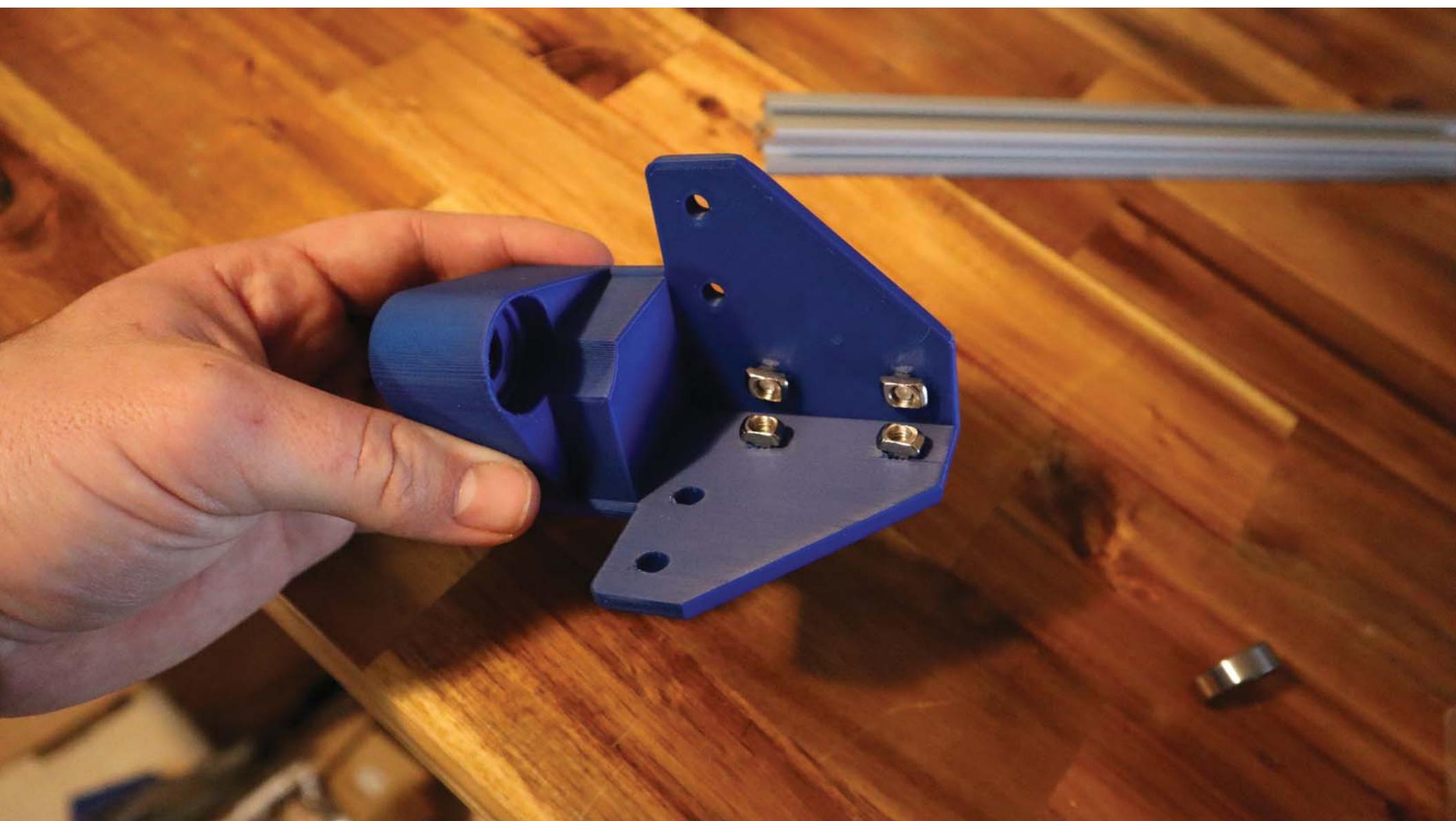
STEP 1:



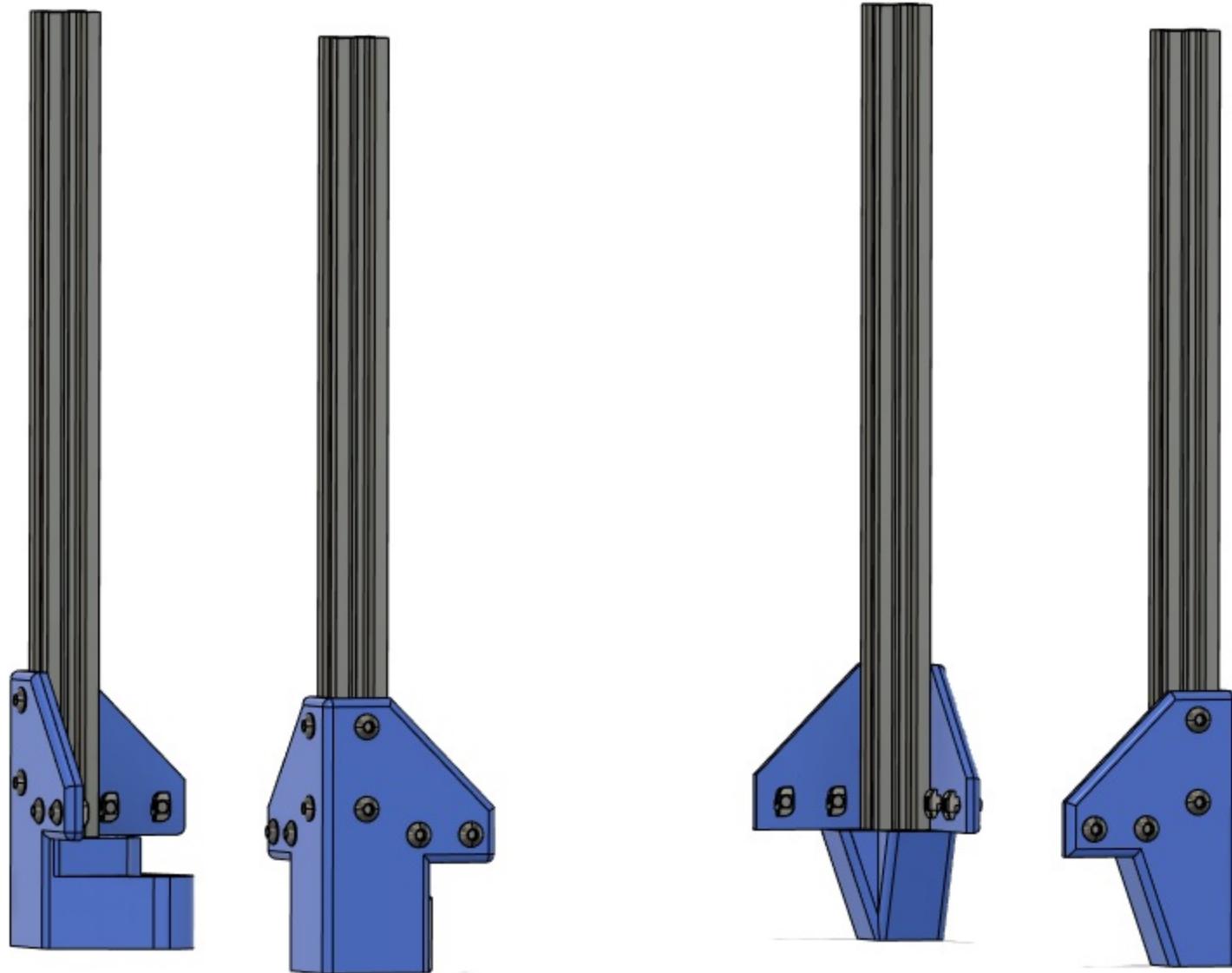
STEP 1:

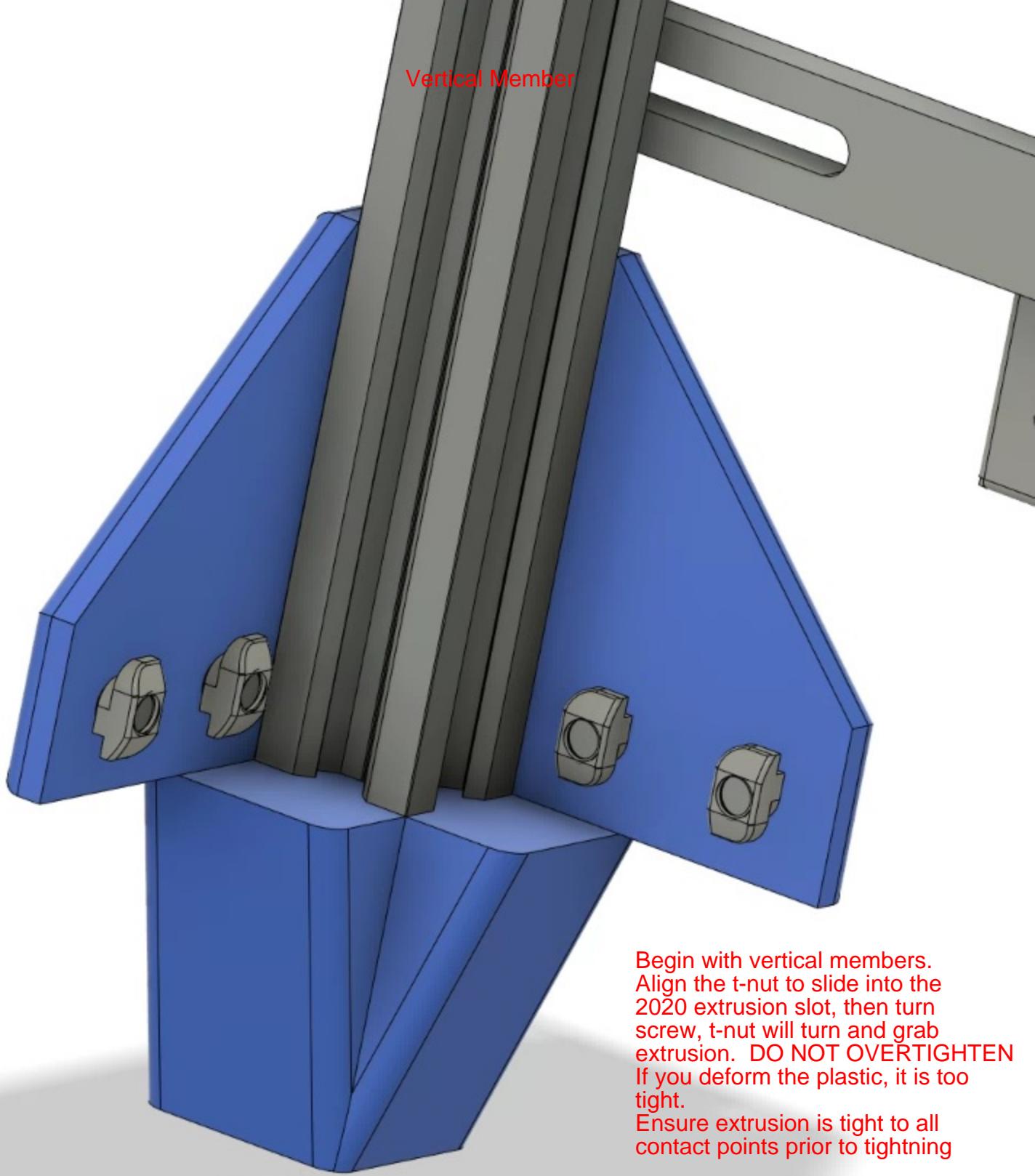


STEP 2:



STEP 2:





Begin with vertical members.  
Align the t-nut to slide into the  
2020 extrusion slot, then turn  
screw, t-nut will turn and grab  
extrusion. DO NOT OVERTIGHTEN  
If you deform the plastic, it is too  
tight.  
Ensure extrusion is tight to all  
contact points prior to tightening

STEP 2:



**STEP 2:**



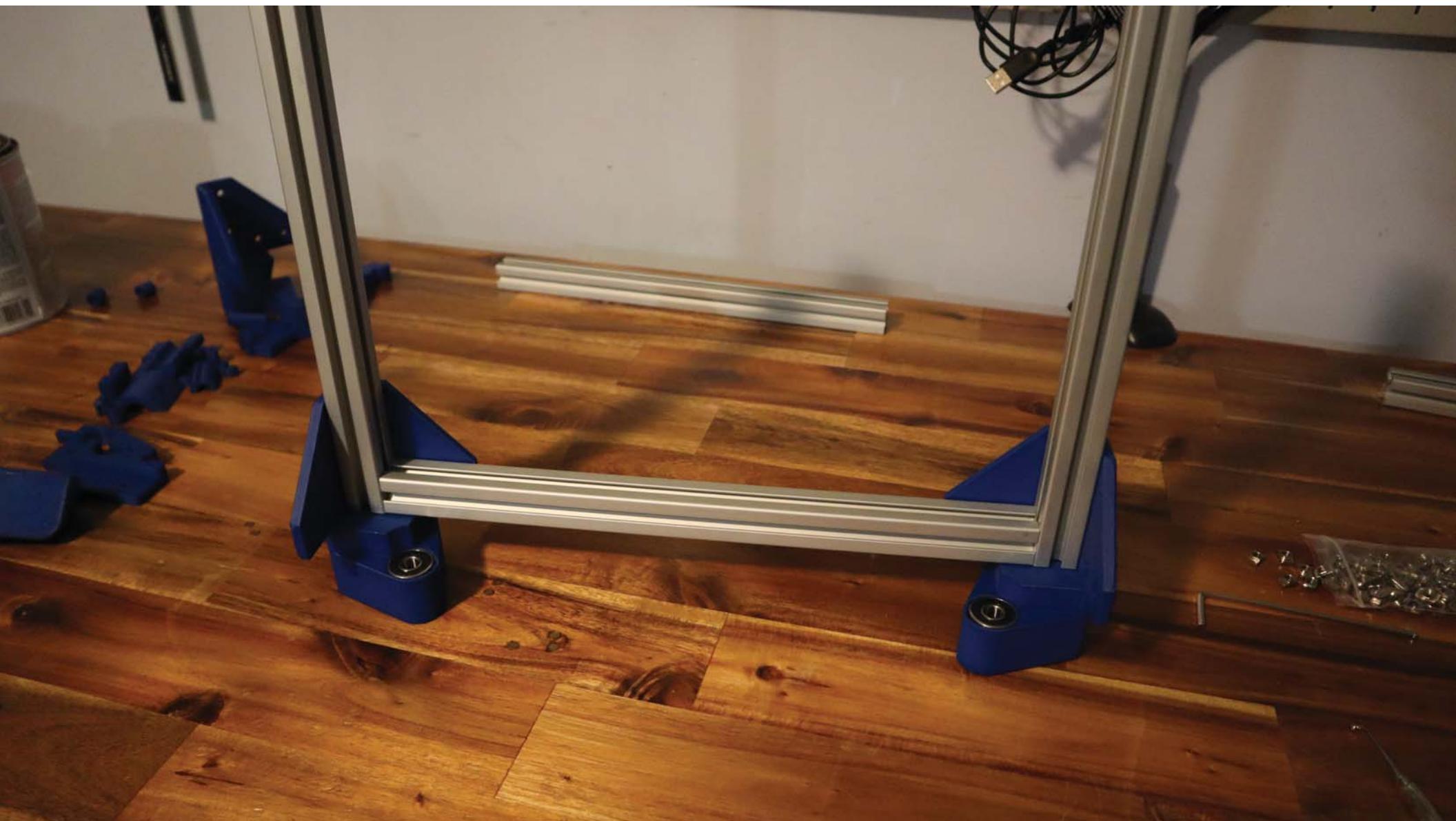
Install horizontal members  
after vertical. Affix with t-nut

Vertical Member

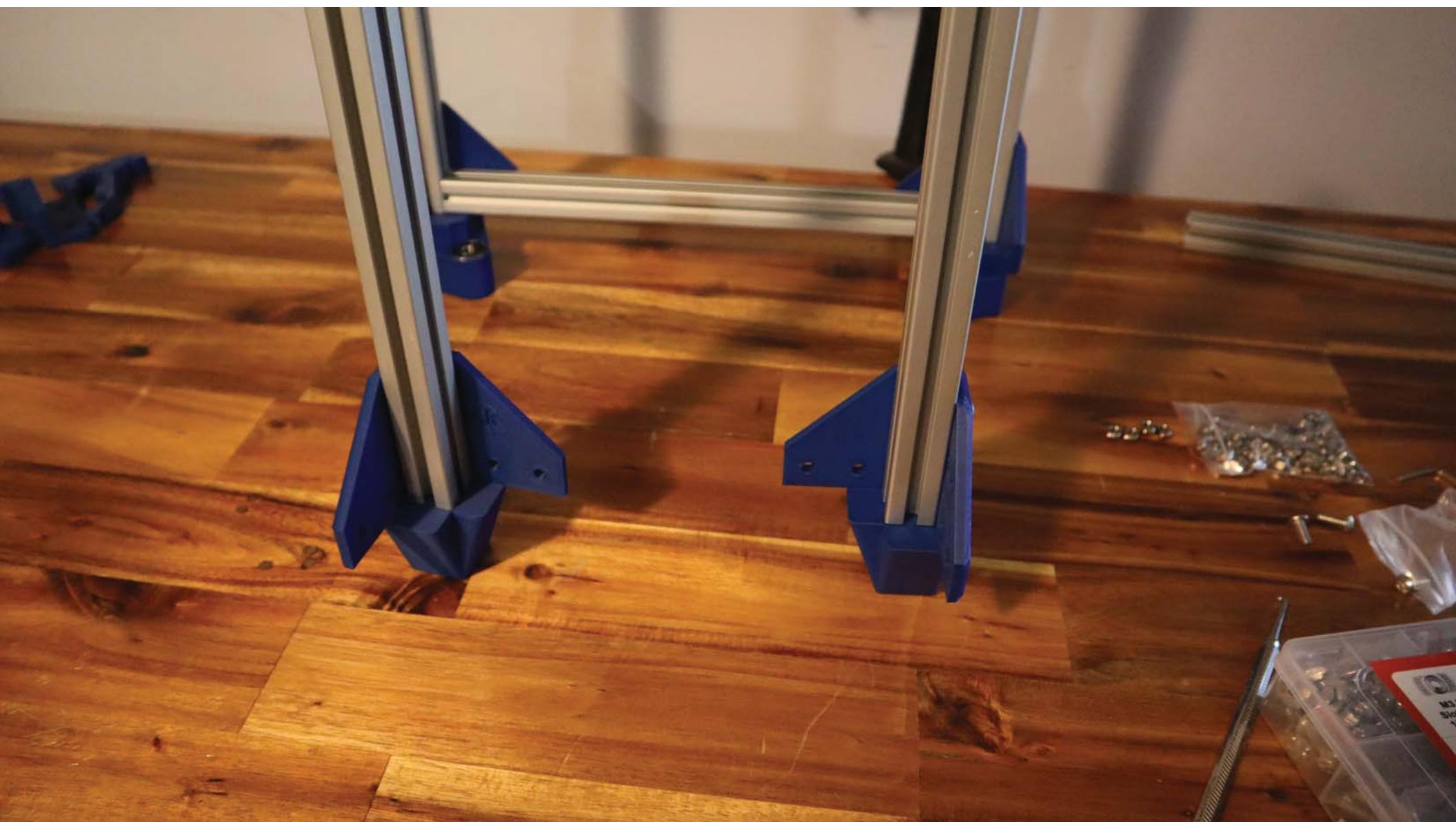
Horizontal Member

Horizontal Member

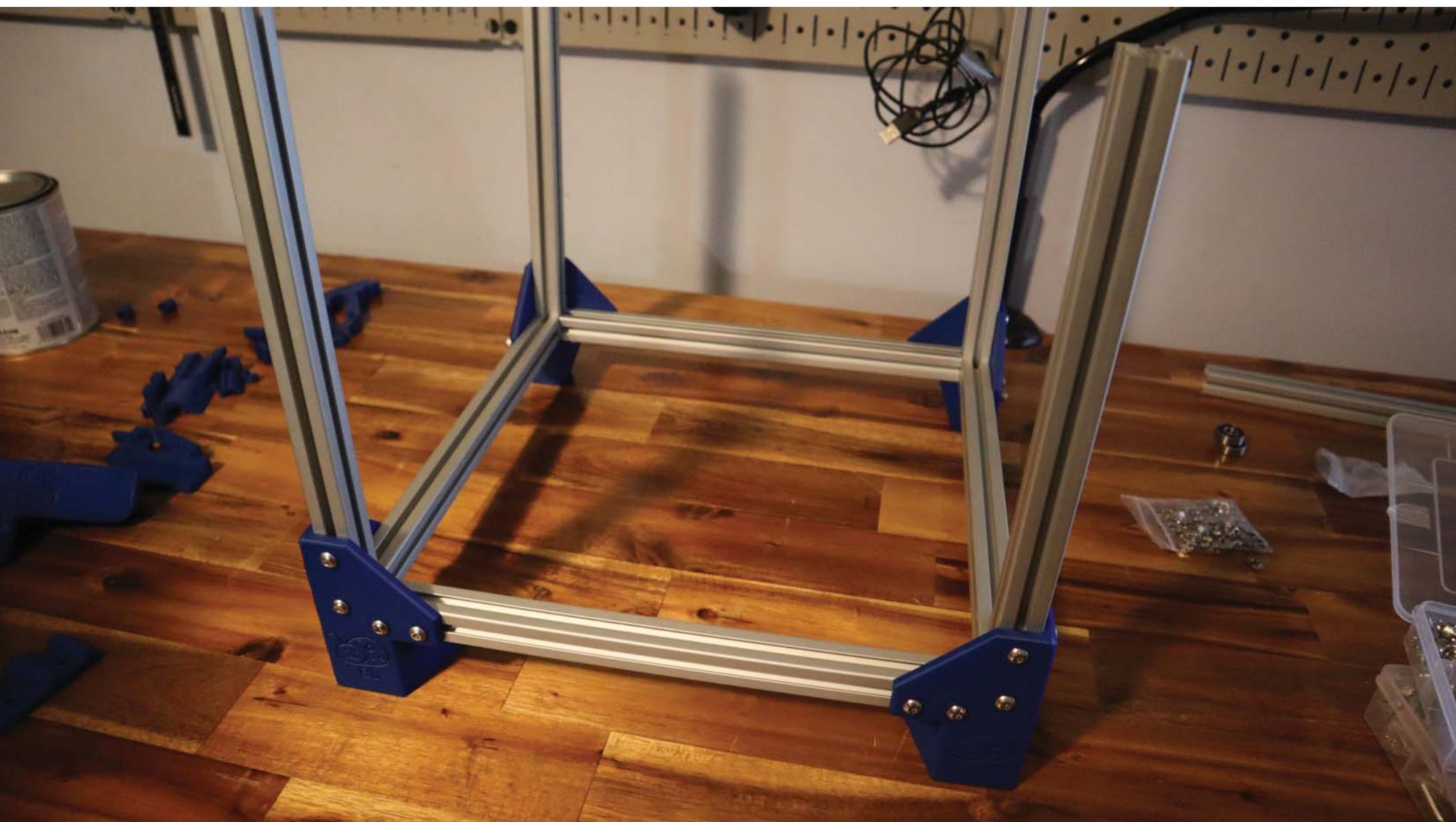
STEP 3:

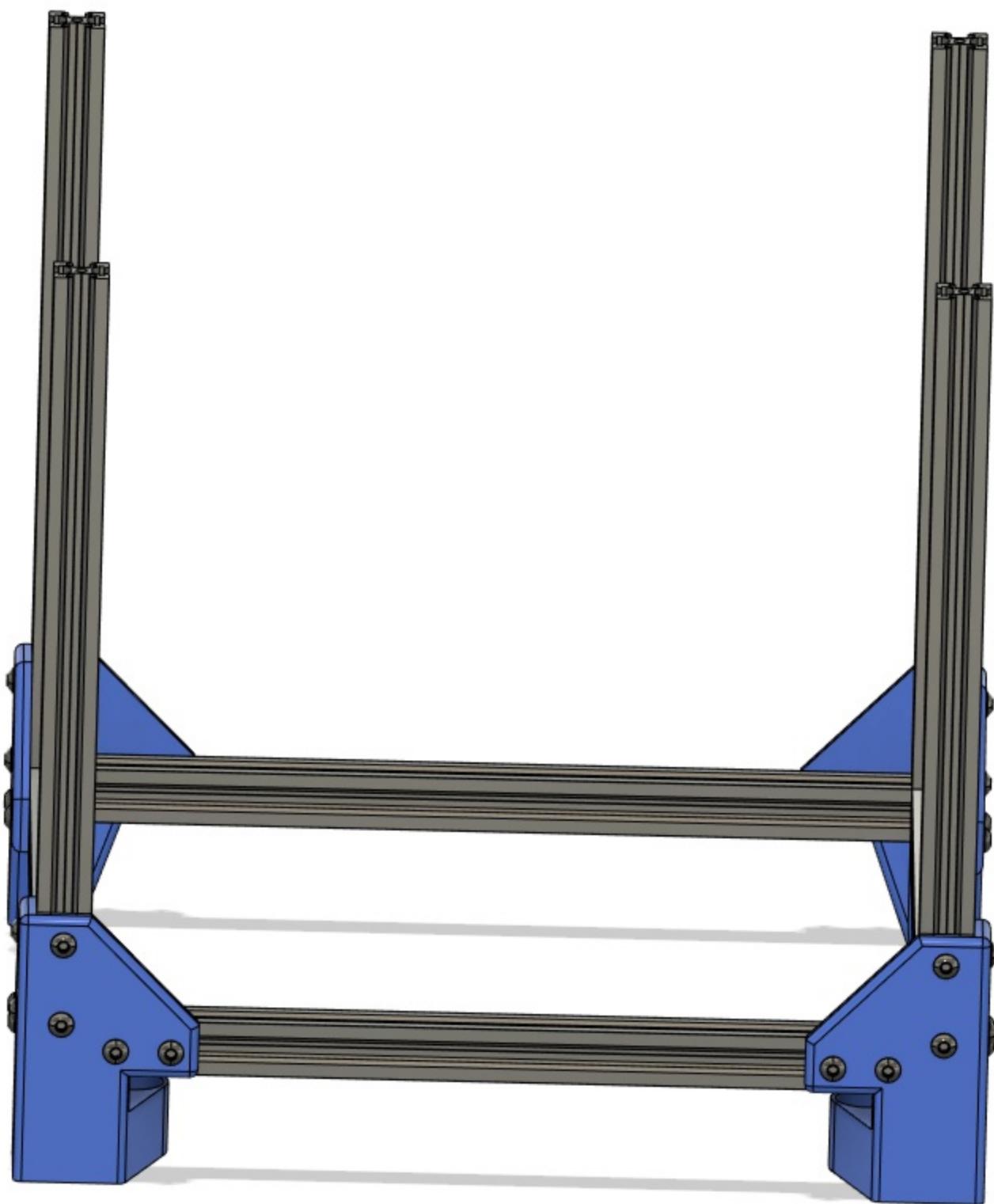


STEP 4:



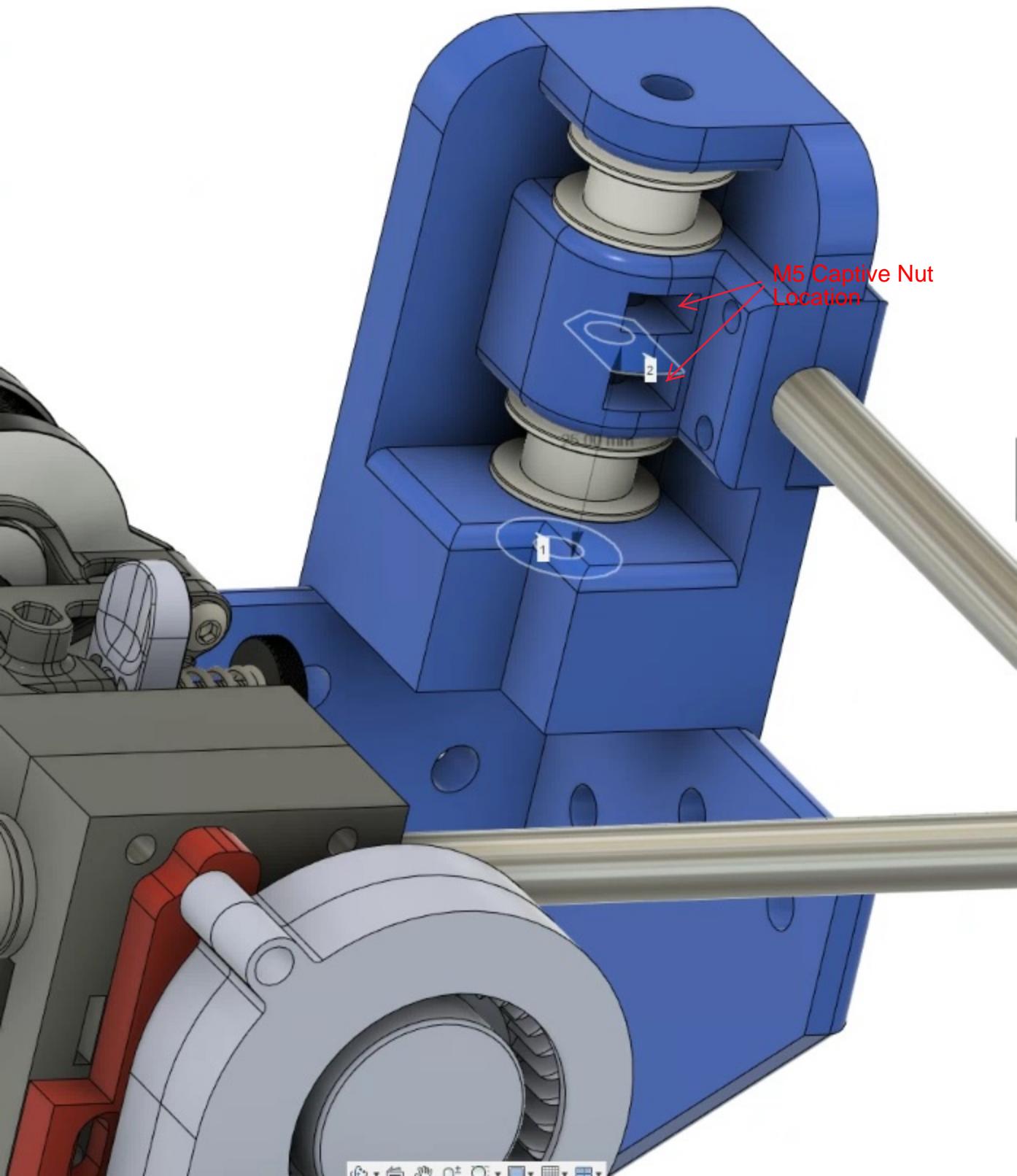
STEP 5/6:



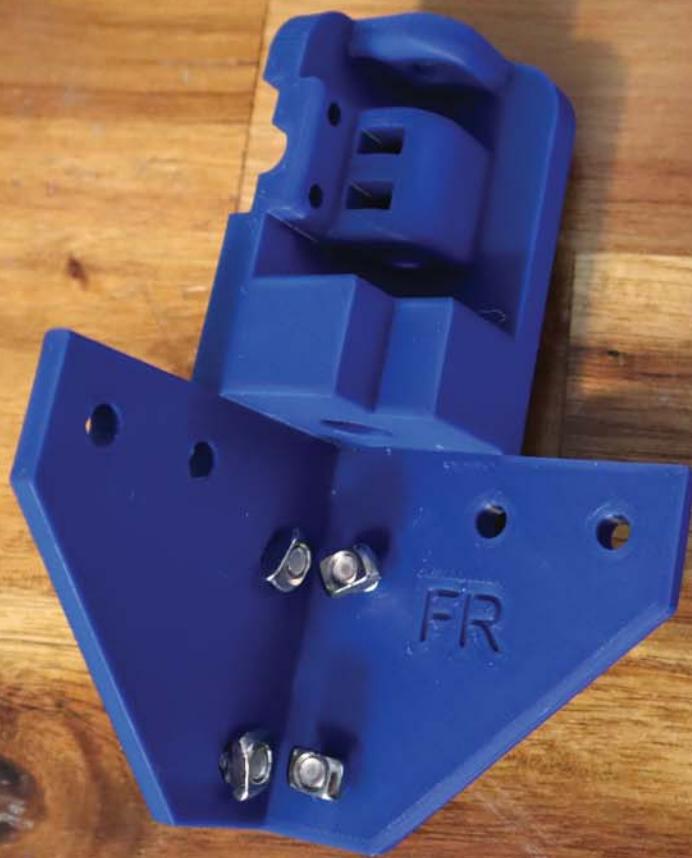




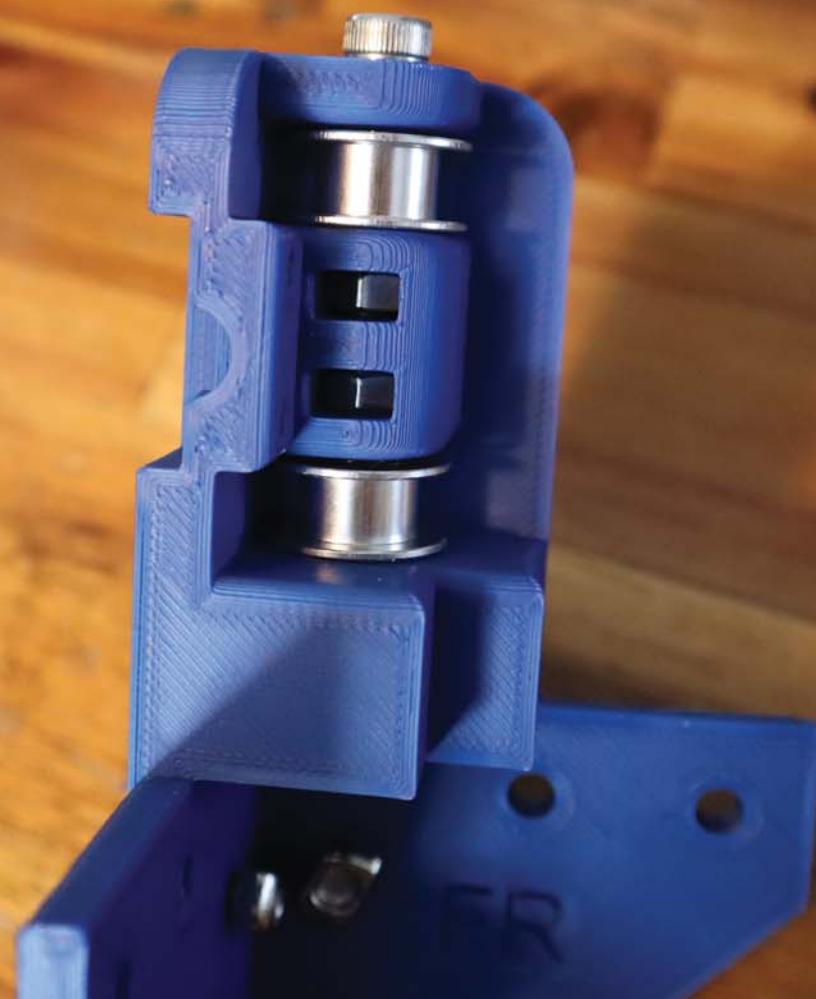
Prior to attaching the front idlers to the frame, the 20t gt2 idlers must be installed  
Toothed or smooth idlers is fine, toothed is slightly more recommended  
Using 2 M5 nuts per idler, insert into captive nut location  
Use one M5x25 from bottom through idler and one M5x25 from top through  
idler. Tighten bolts, do not over tighten



STEP 7:

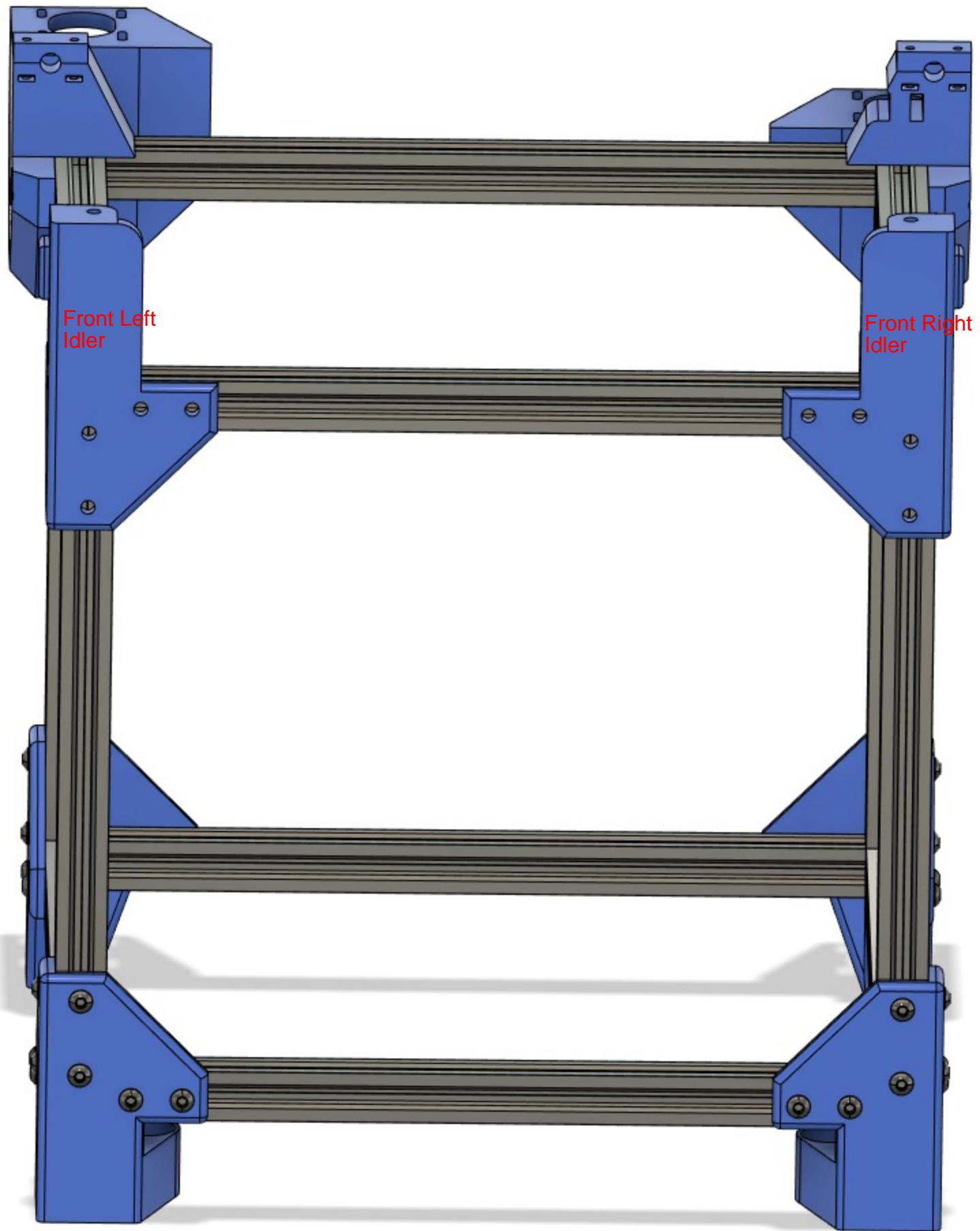


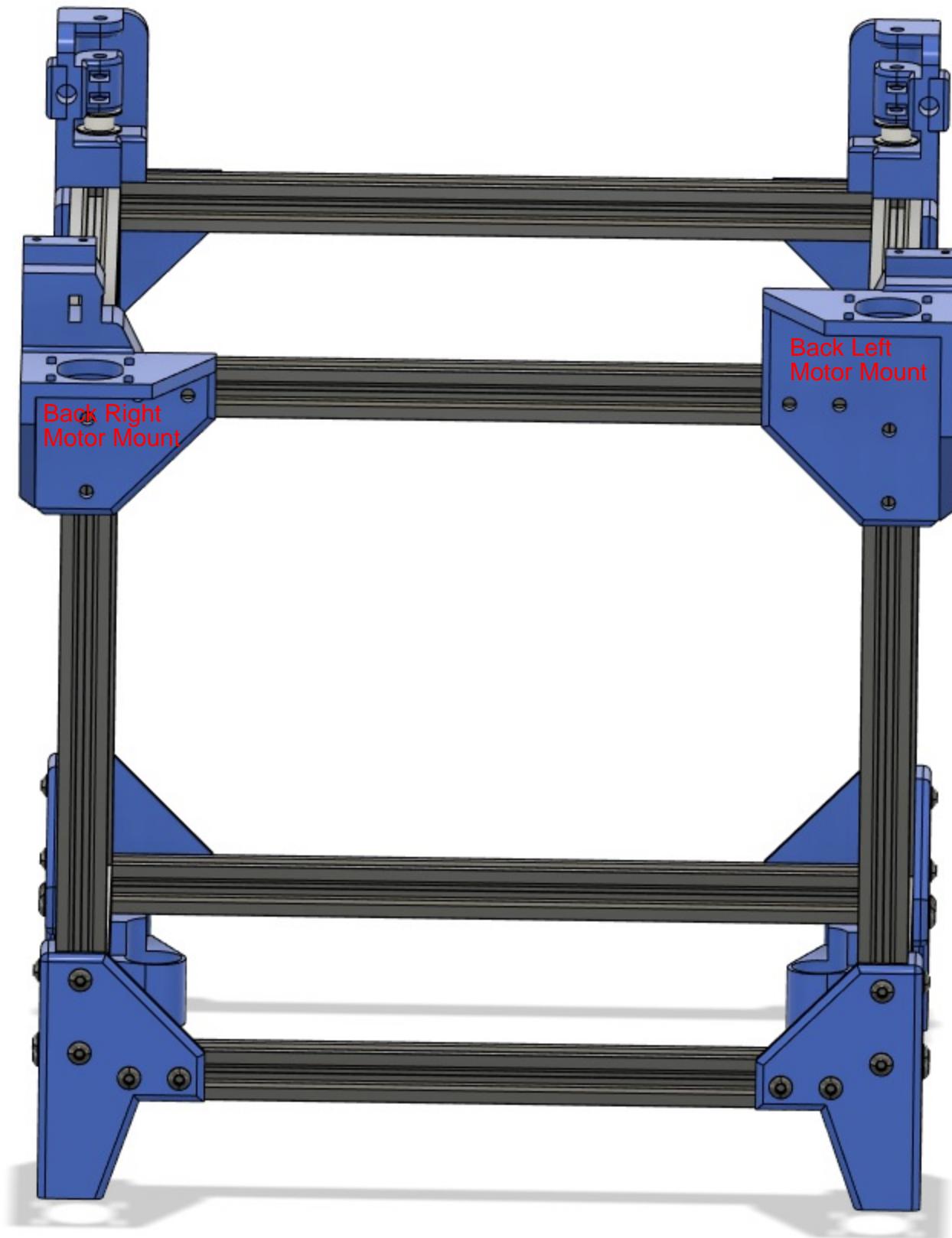
STEP 7:



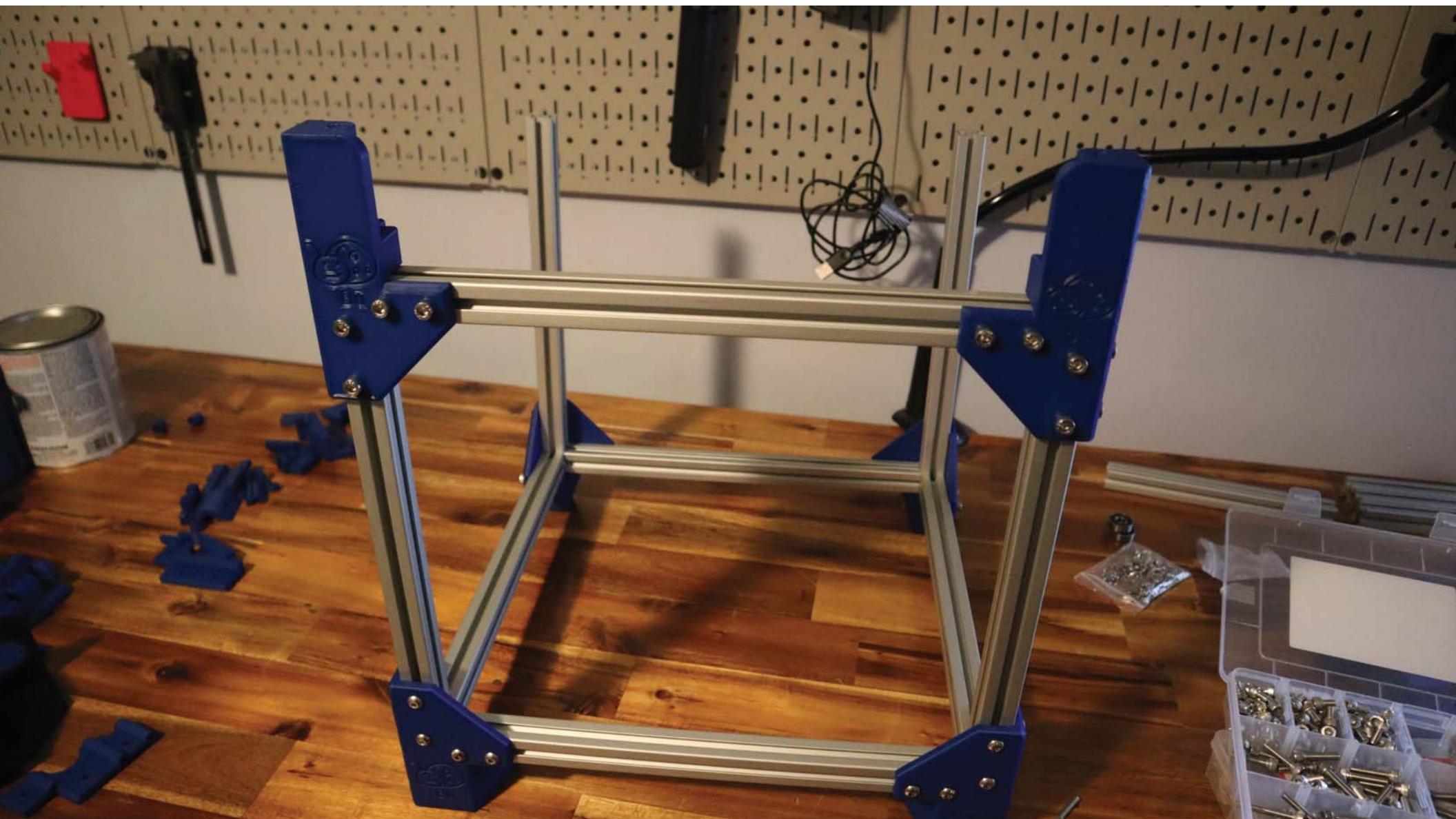
STEP 8/9:

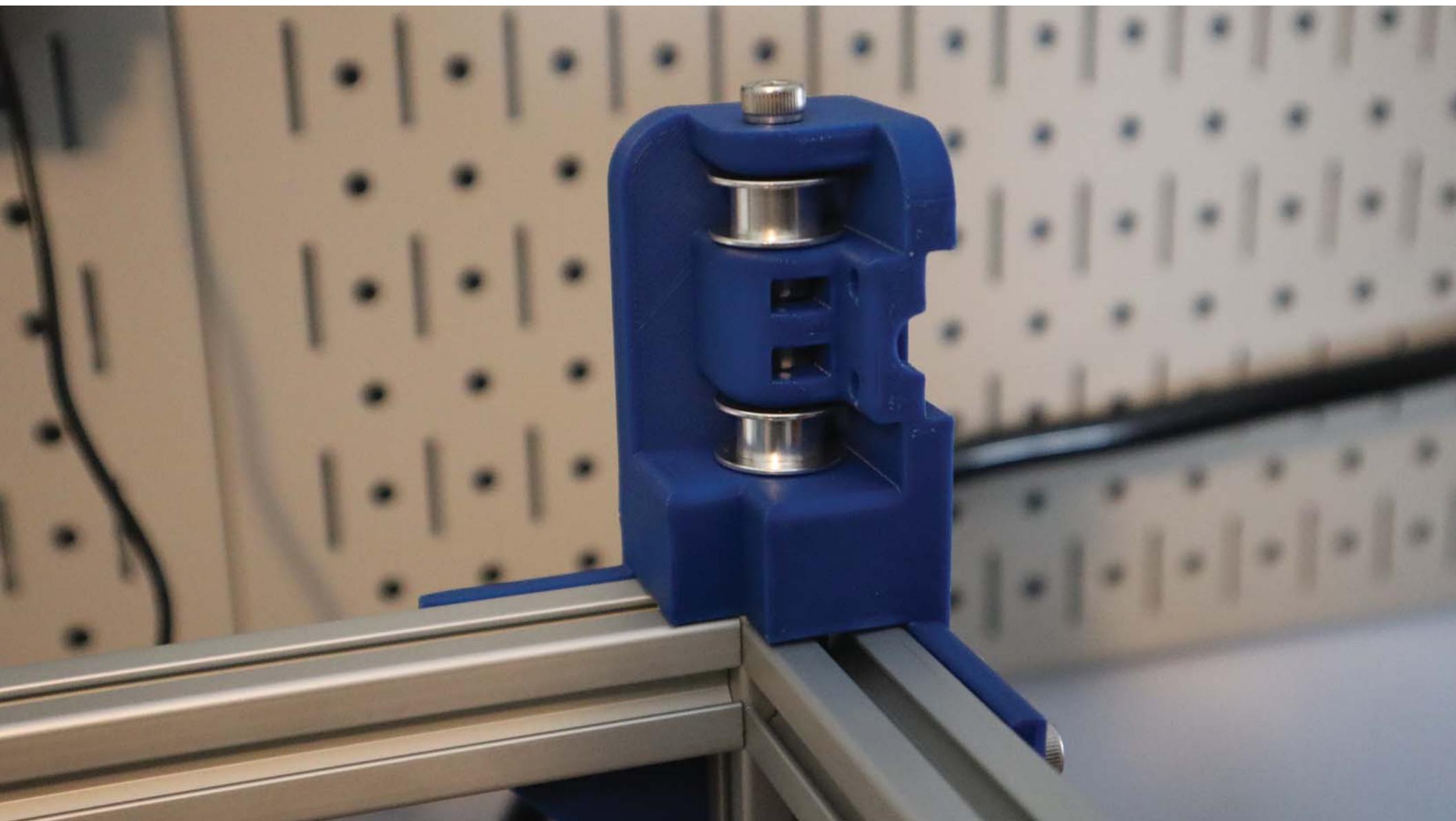






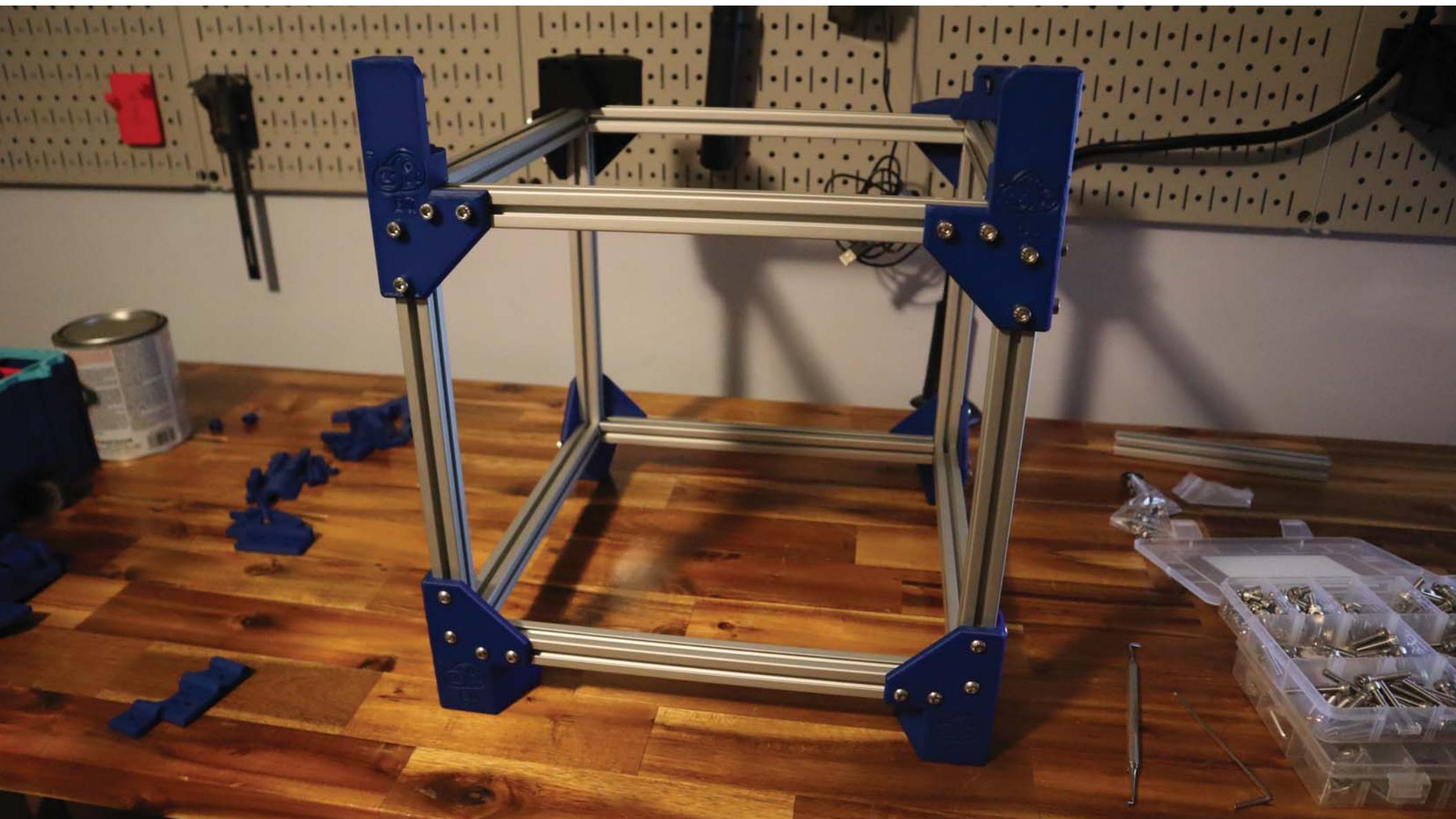
STEP 8/9



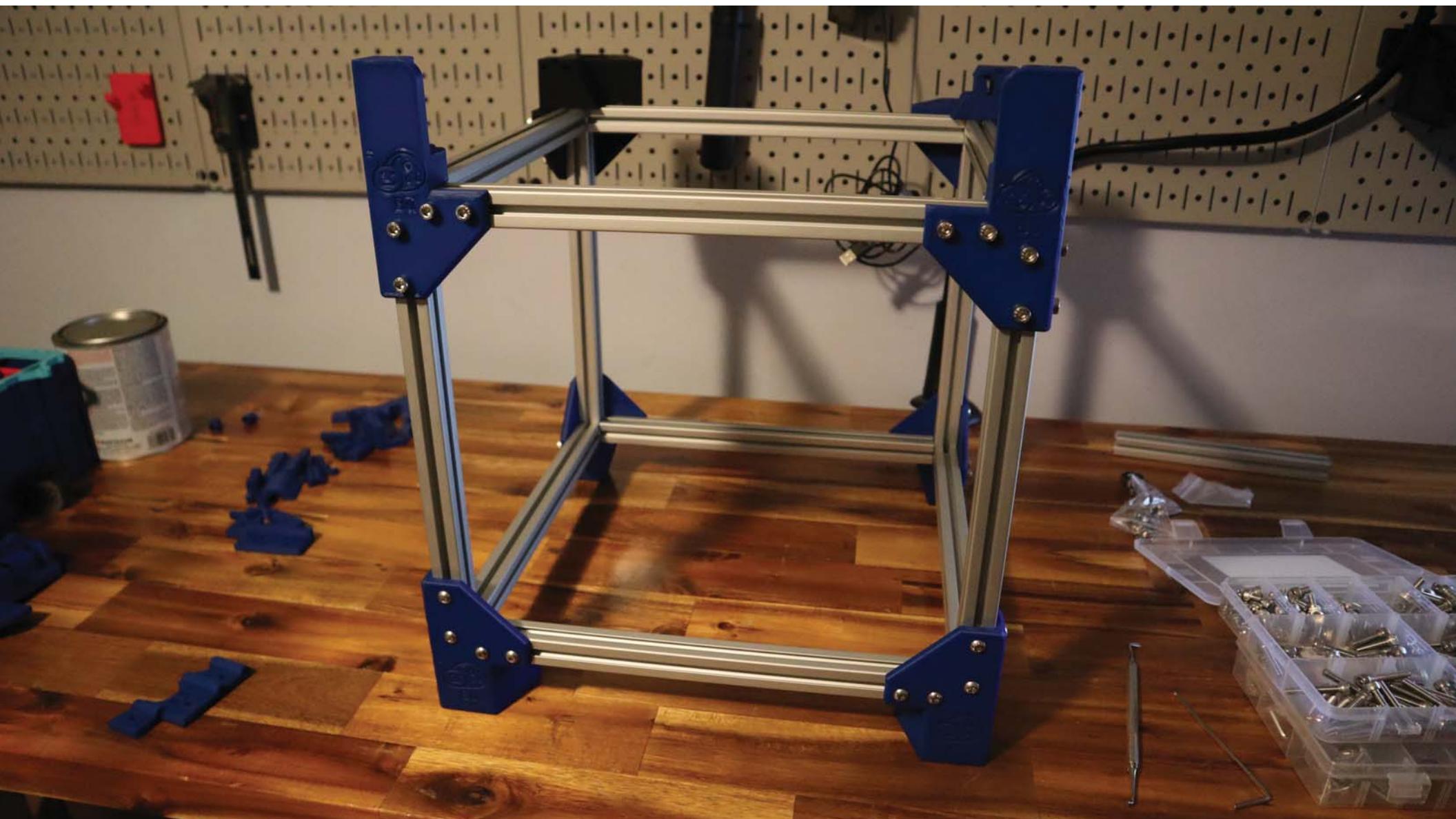




STEP 8/9



COMPLETED FRAME

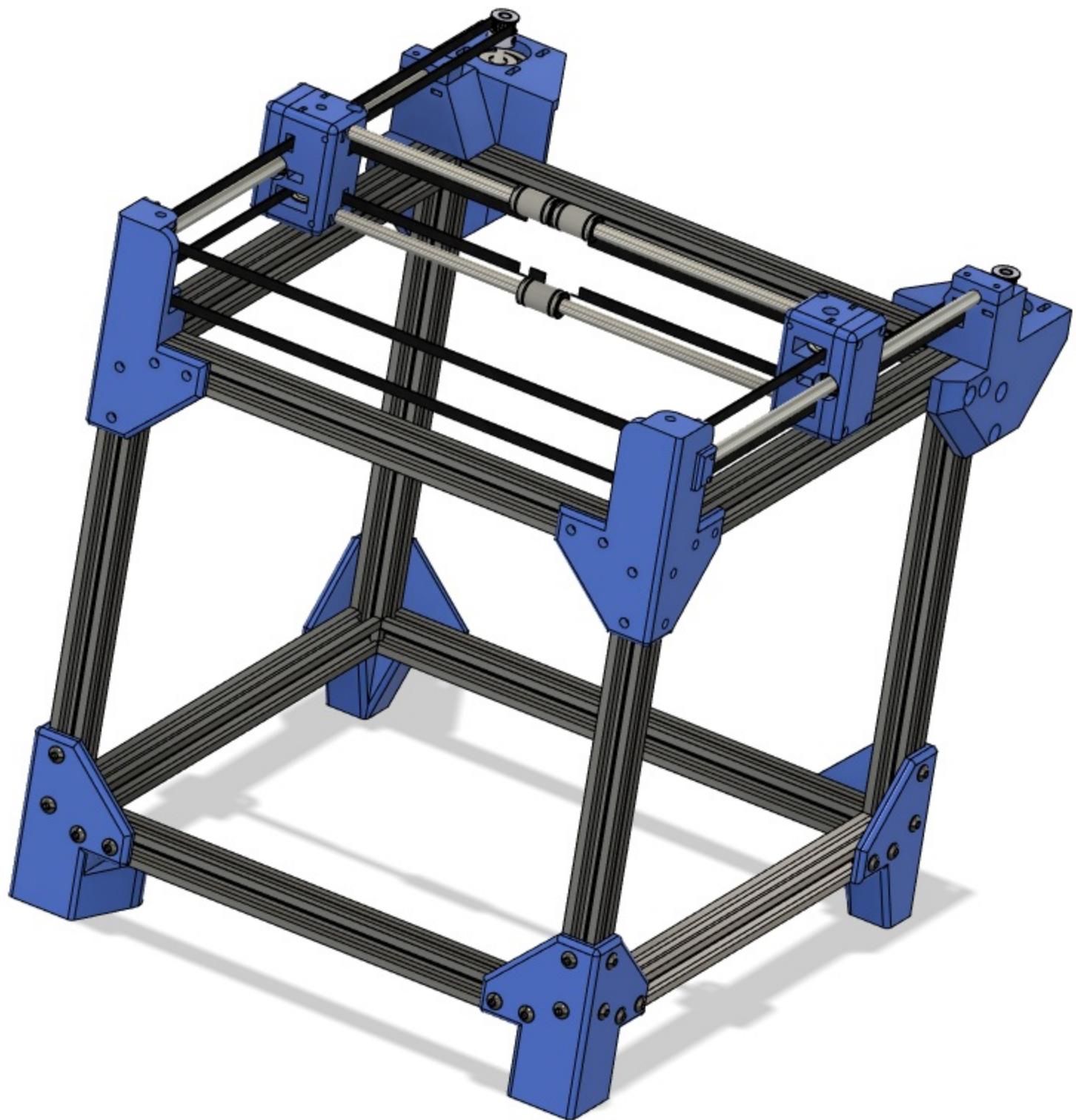


## **Section 2:**

### **Gantry Assembly**

**Components needed for this portion:**

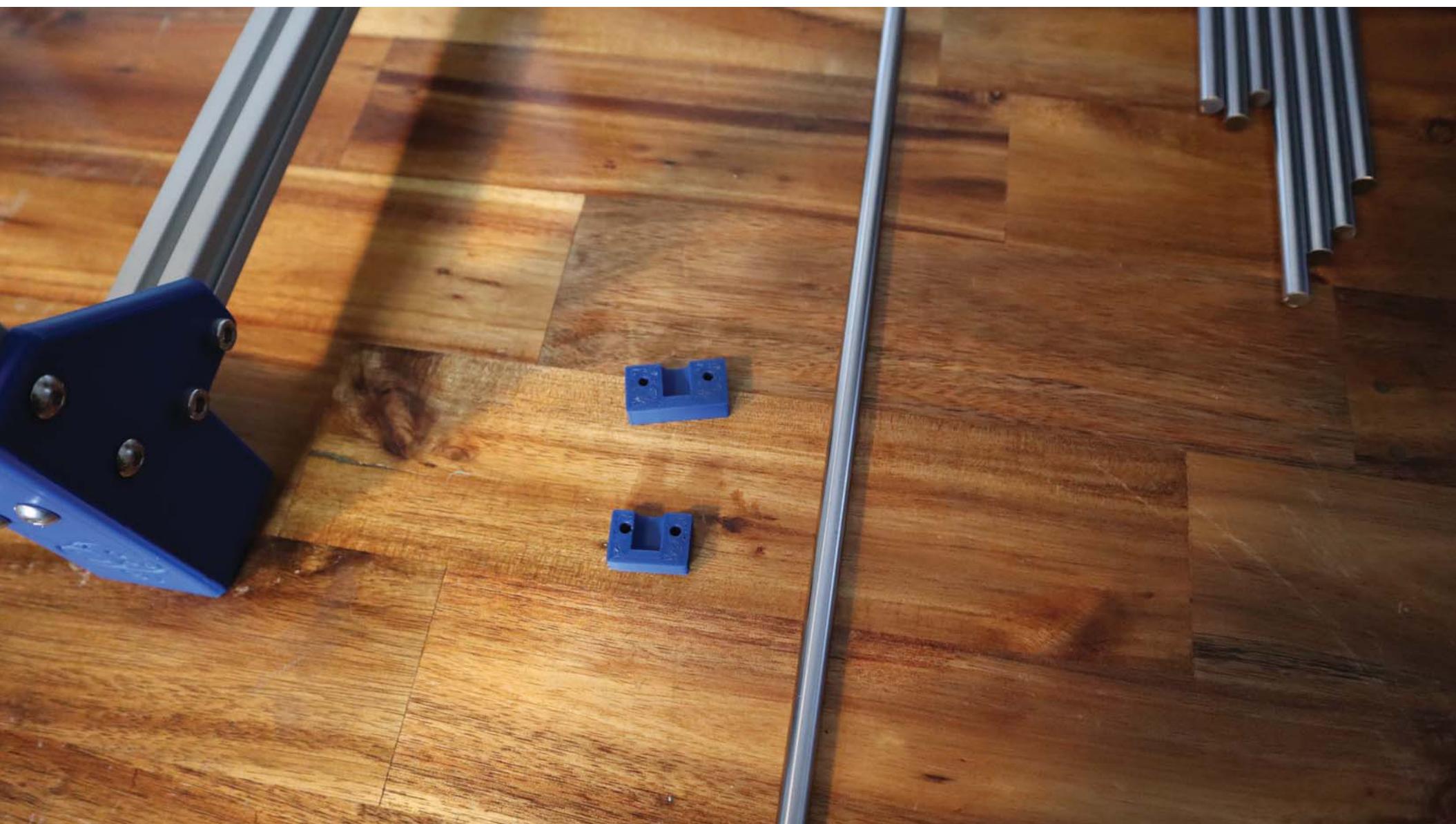
M3x8	x8
M3x16	x8
M3x20	x20
M5x35	x4
M3 Nuts	x28
M5 Nuts	x4
300mm Linear Rods	x4
8mm Linear Bearings	x4
20t GT2 idlers	x4
Nema 17 Stepper Motor	x2
5mm Bore 20T GT2 Pulley	x2



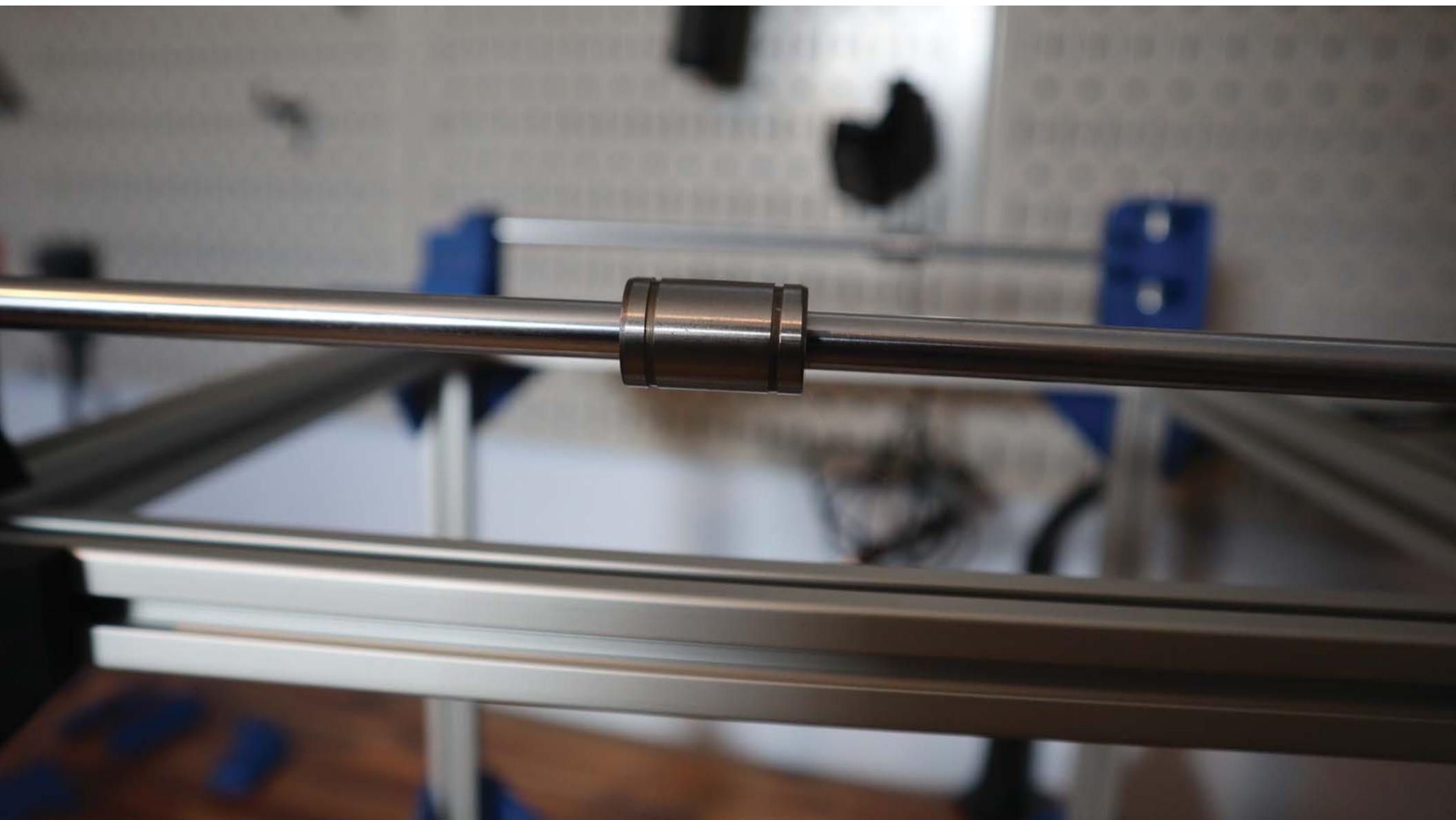
## The X/Y Gantry

1. Place one linear bearing on each of the Y gantry linear rods.
2. Assemble the left and right Linear rods by attaching them to the corner brackets with the mount and 2 m3x20 bolts and nuts in the front, and 2 m3x16 bolts and nuts in the rear.
3. Attach the motors to the rear motor mounts using 4 m3x8 bolts each. Ensure that the connector on each motor is facing in.
4. Using 2 m5x35 bolts and nuts, insert the captive m5 nuts into the holes on the X gantry mount. Insert the gt2 toothless idler into the recess and slide the m5x35 bolt through and screw into the captive nut. Repeat for the bottom. Do not over tighten, as this will cause binding on the idlers.
5. Repeat for the other side of the X gantry.
6. Using 4 captive m3 nuts and 4 m3x20 bolts, secure the two halves of the X gantry mount to the linear bearing. Be sure to keep the large half toward the center, and use the correct mount on the left and right side.
7. Repeat the previous step for the opposite side.
8. Insert an m3 nut into the captive slot next to the linear rod slot. Insert the linear rods into one side of the X gantry and secure with an m3x16 bolt. Do not over tighten.
9. Place one linear bearing on each linear rod.
10. Remove the front mount from the opposite X linear rod. Move the X gantry all the way forward and line up the Y gantry rods with the holes in the opposite mount. Slide the linear rods into the holes and secure with two captive m3 nuts and 2 m3x16 bolts. Do not over tighten.

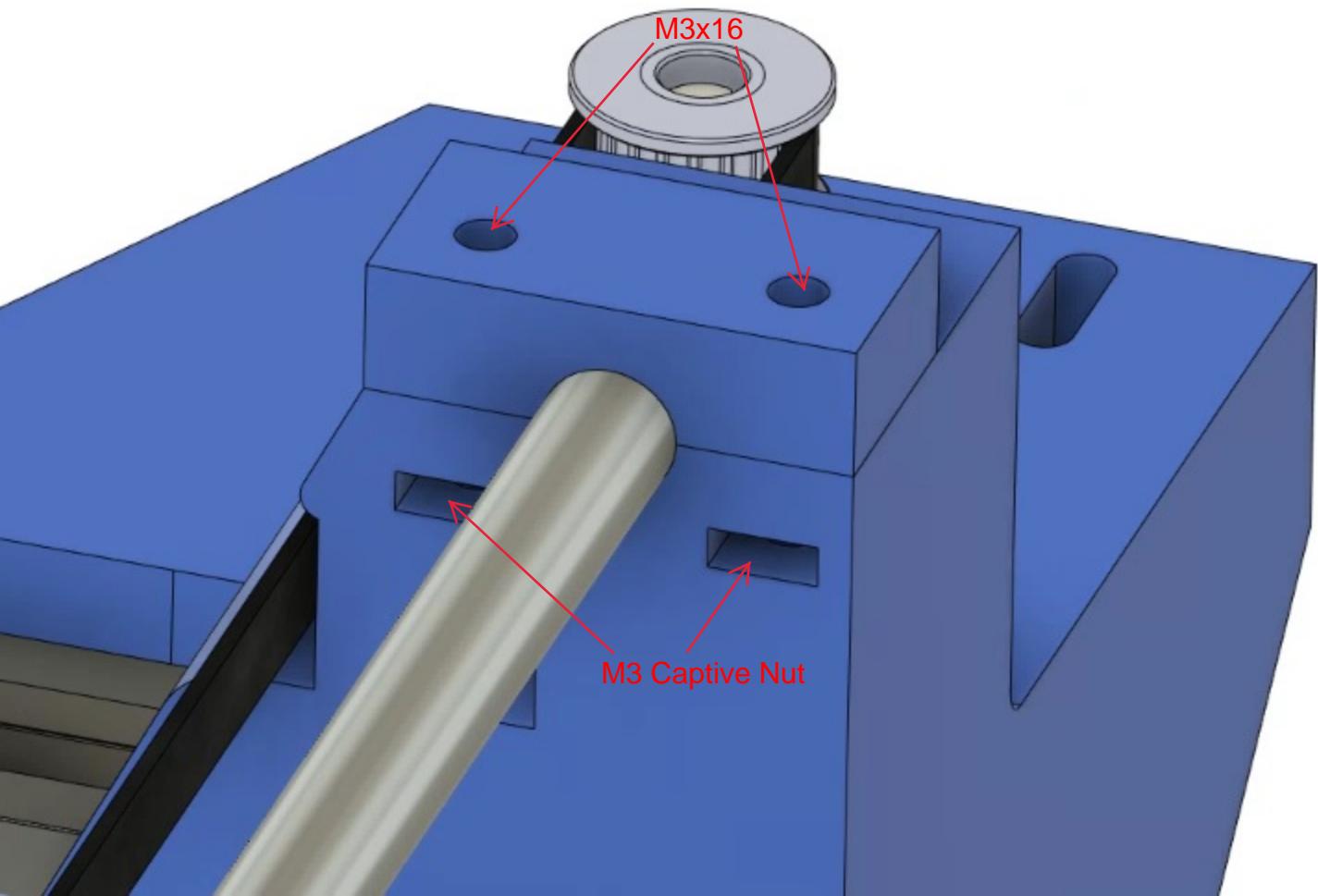
STEP 1



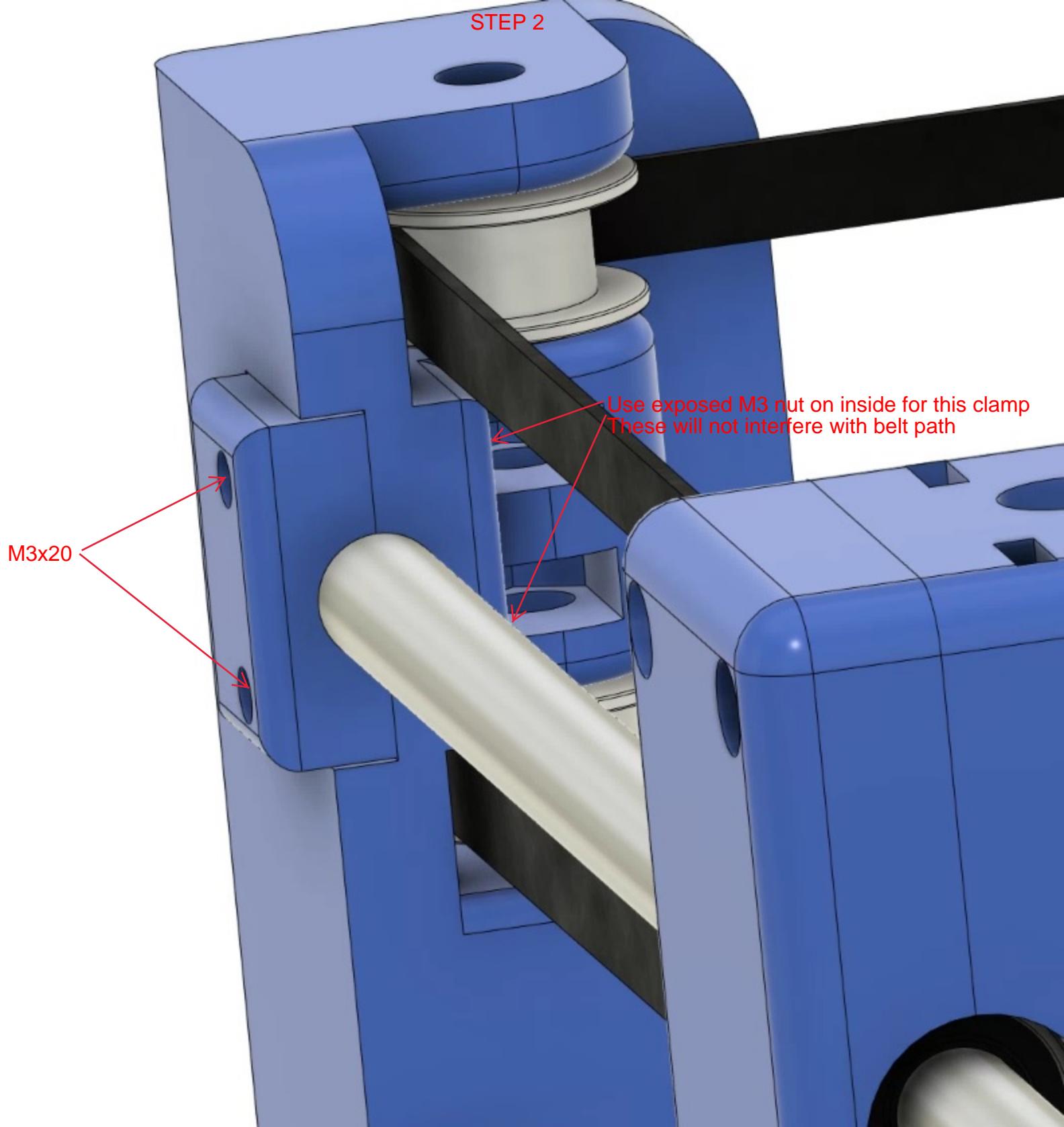
STEP 1



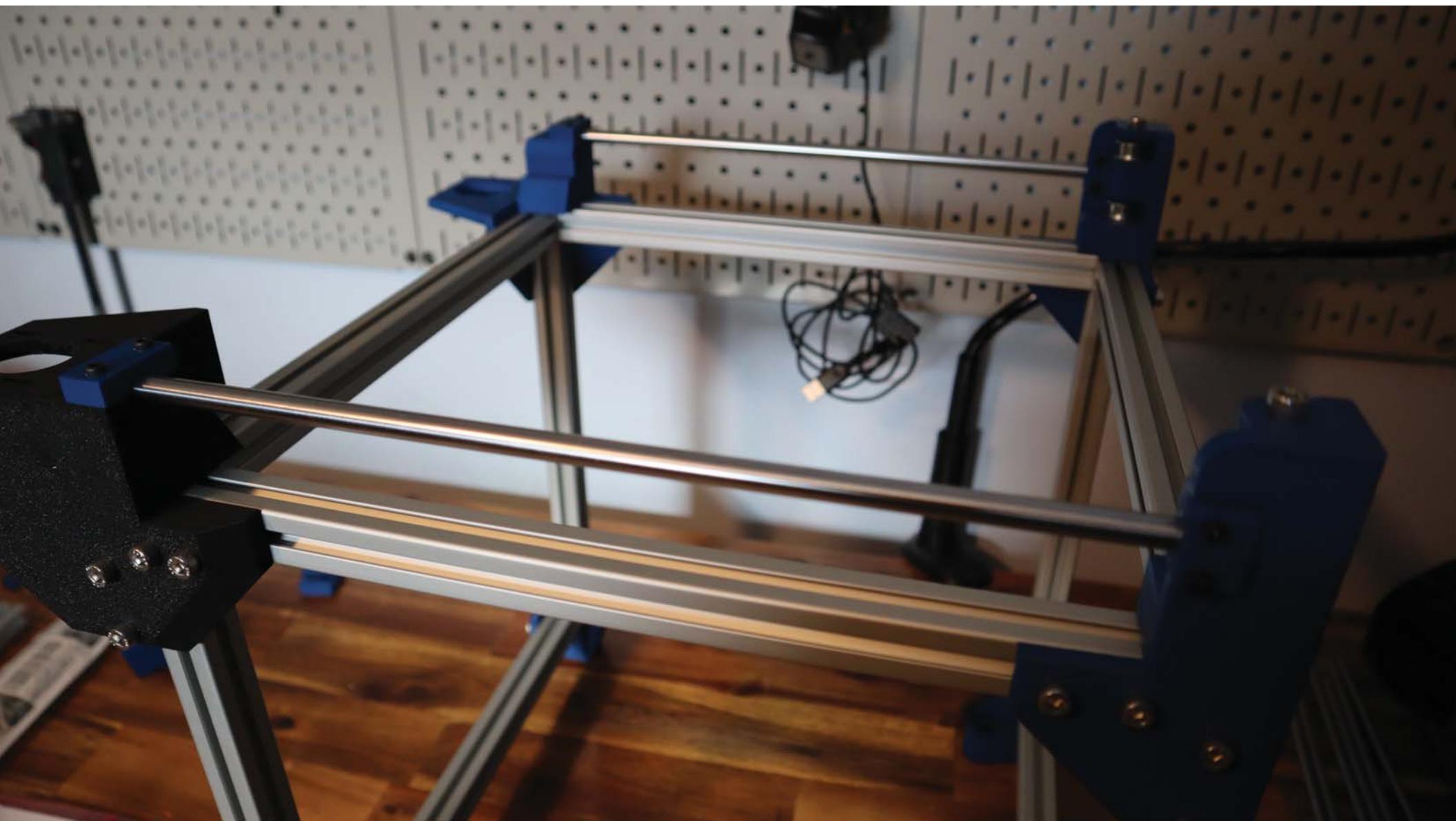
## STEP 2



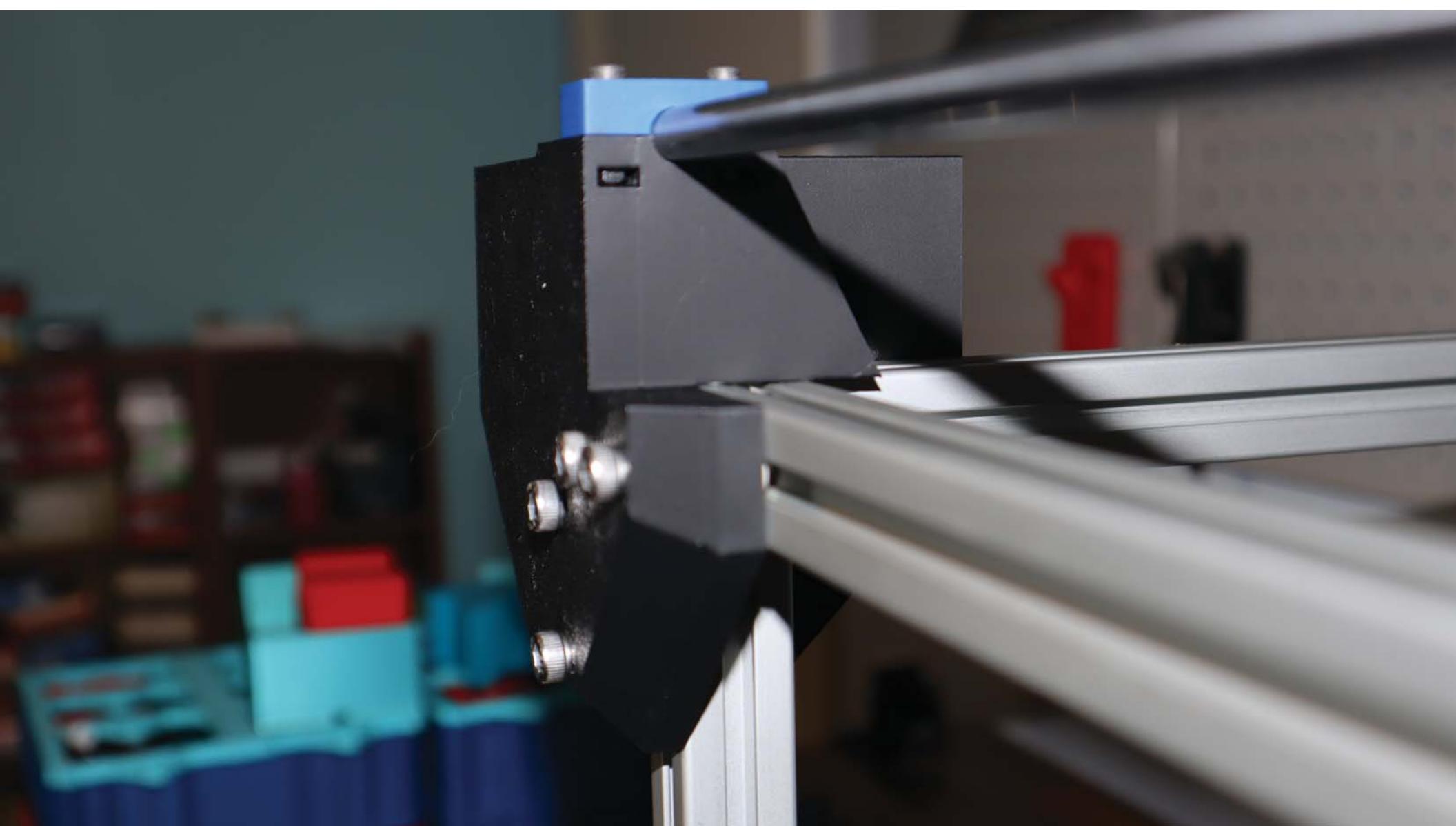
STEP 2



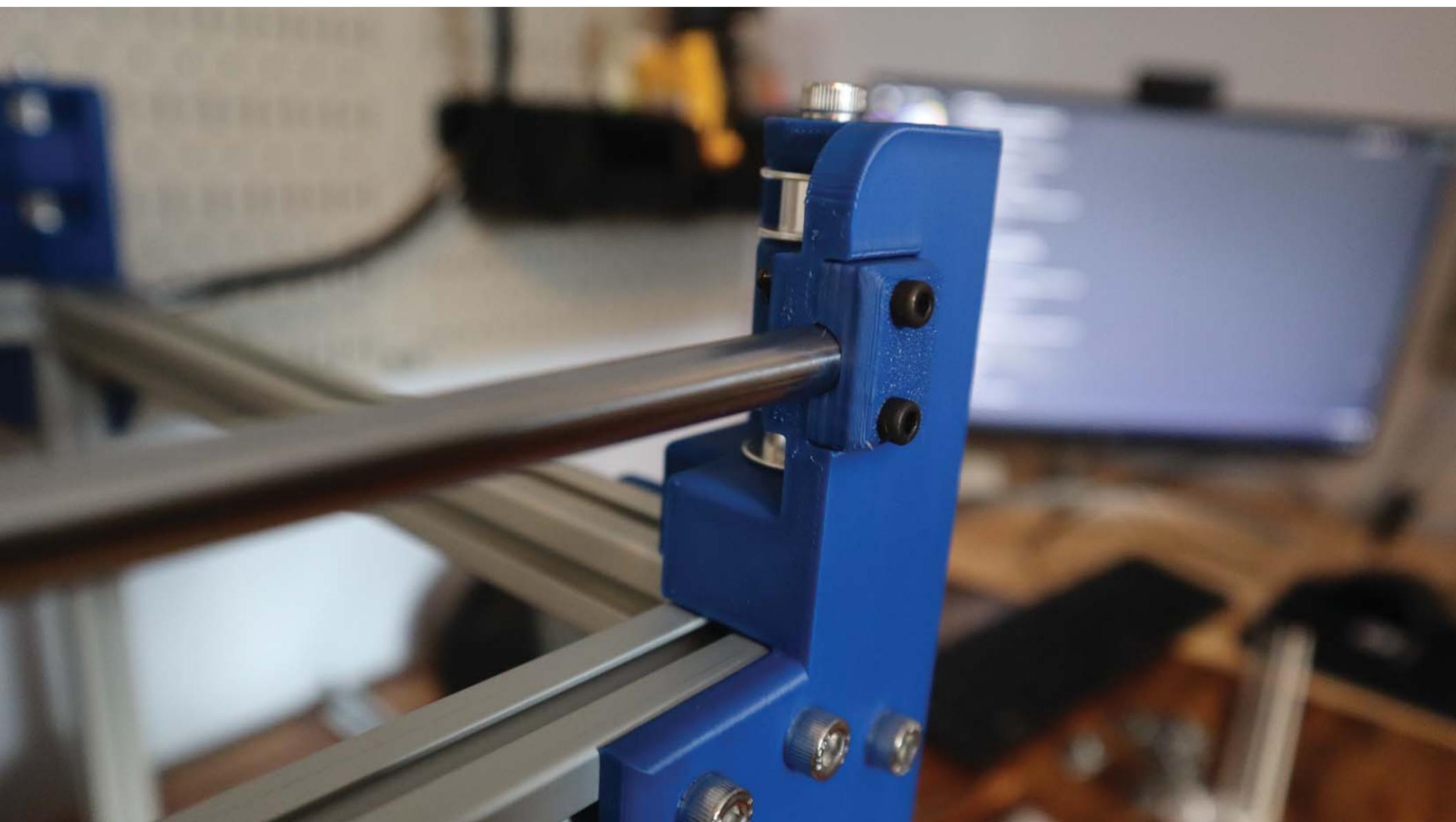
STEP 2



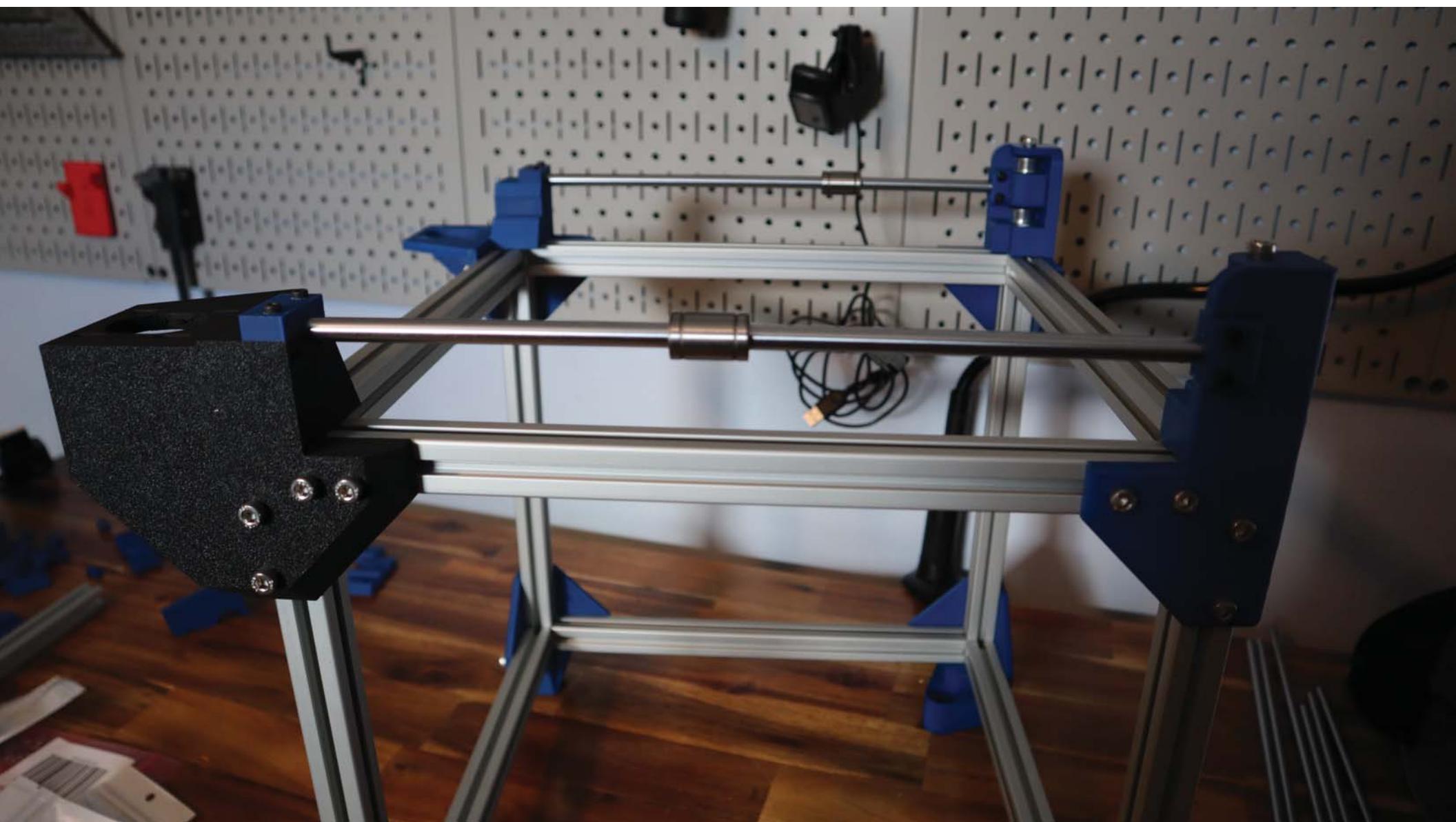
STEP 2



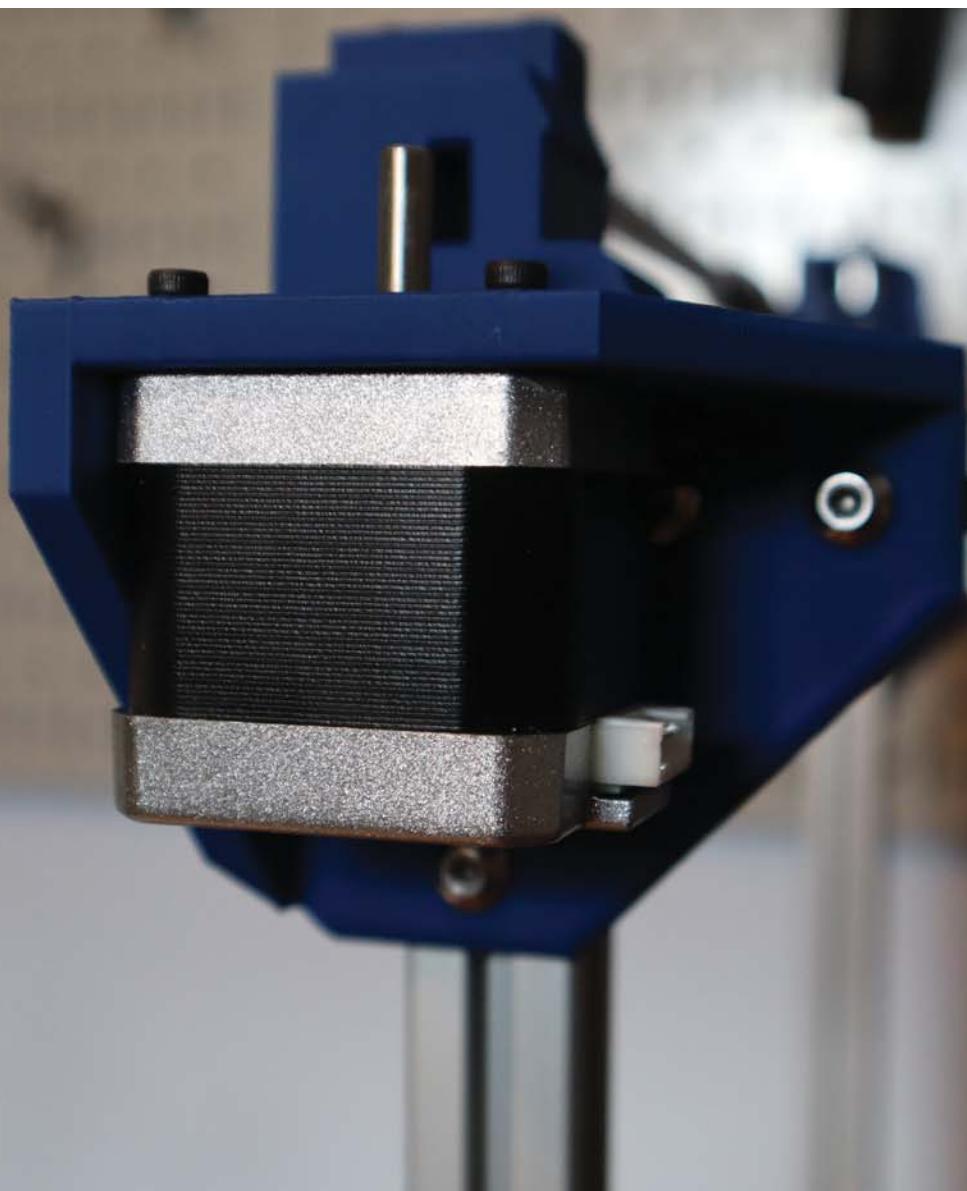
STEP 2



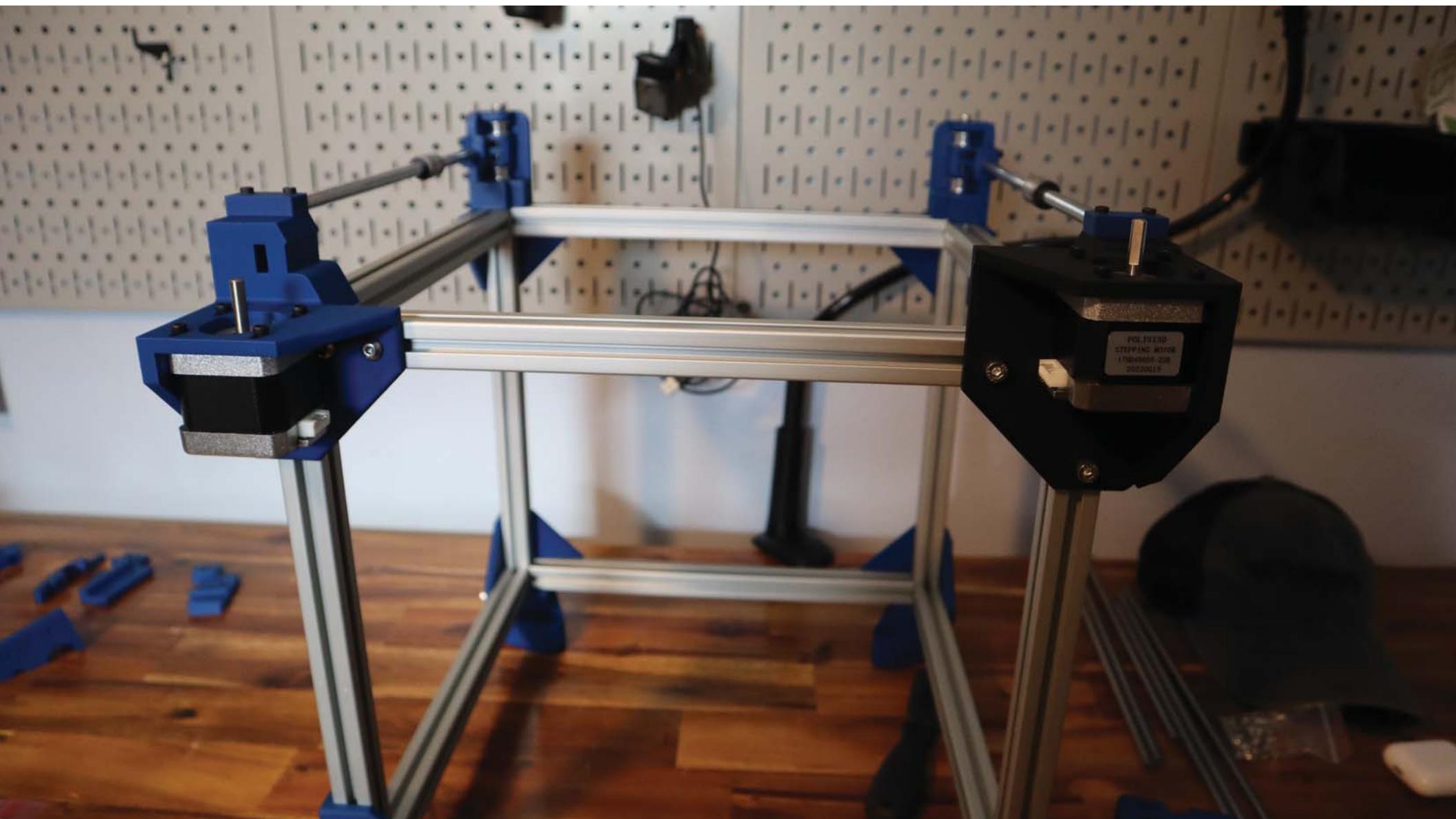
STEP 2

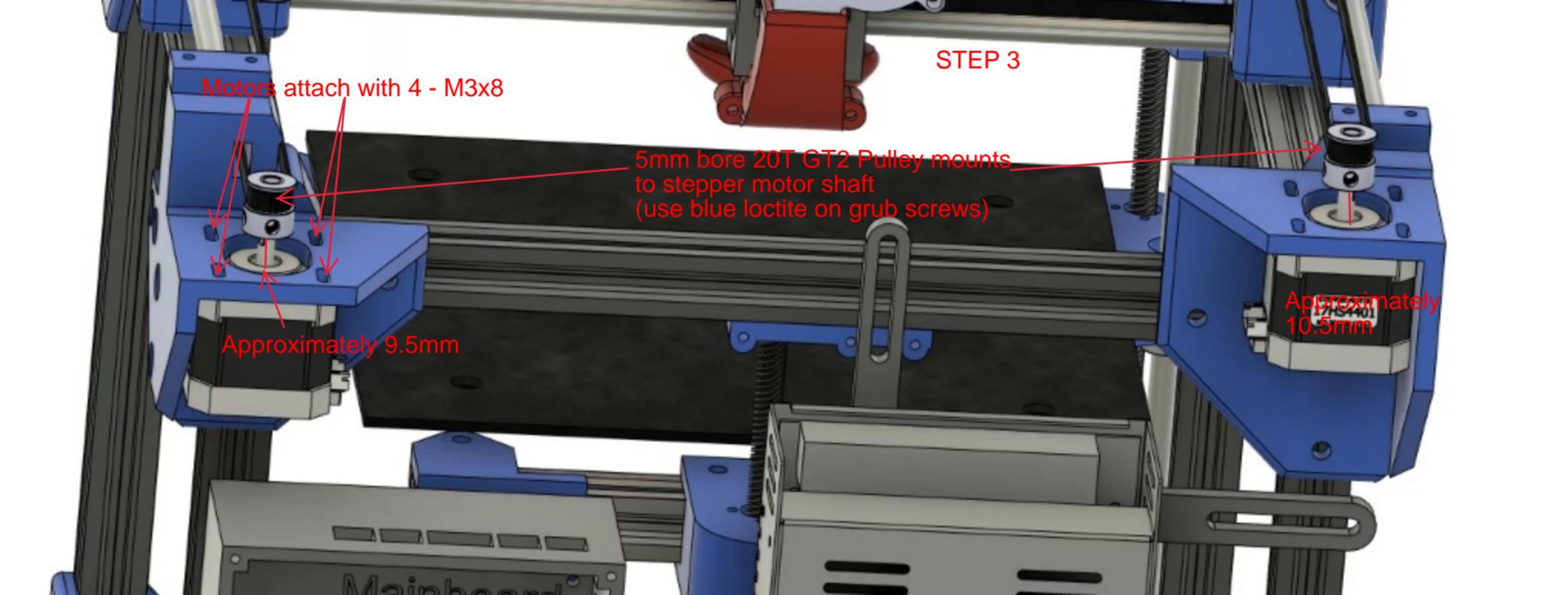


STEP 3



STEP 3





STEP 3

Motors attach with 4 - M3x8

Approximately 9.5mm

5mm bore 20T GT2 Pulley mounts  
to stepper motor shaft  
(use blue loctite on grub screws)

Approximately  
10.5mm

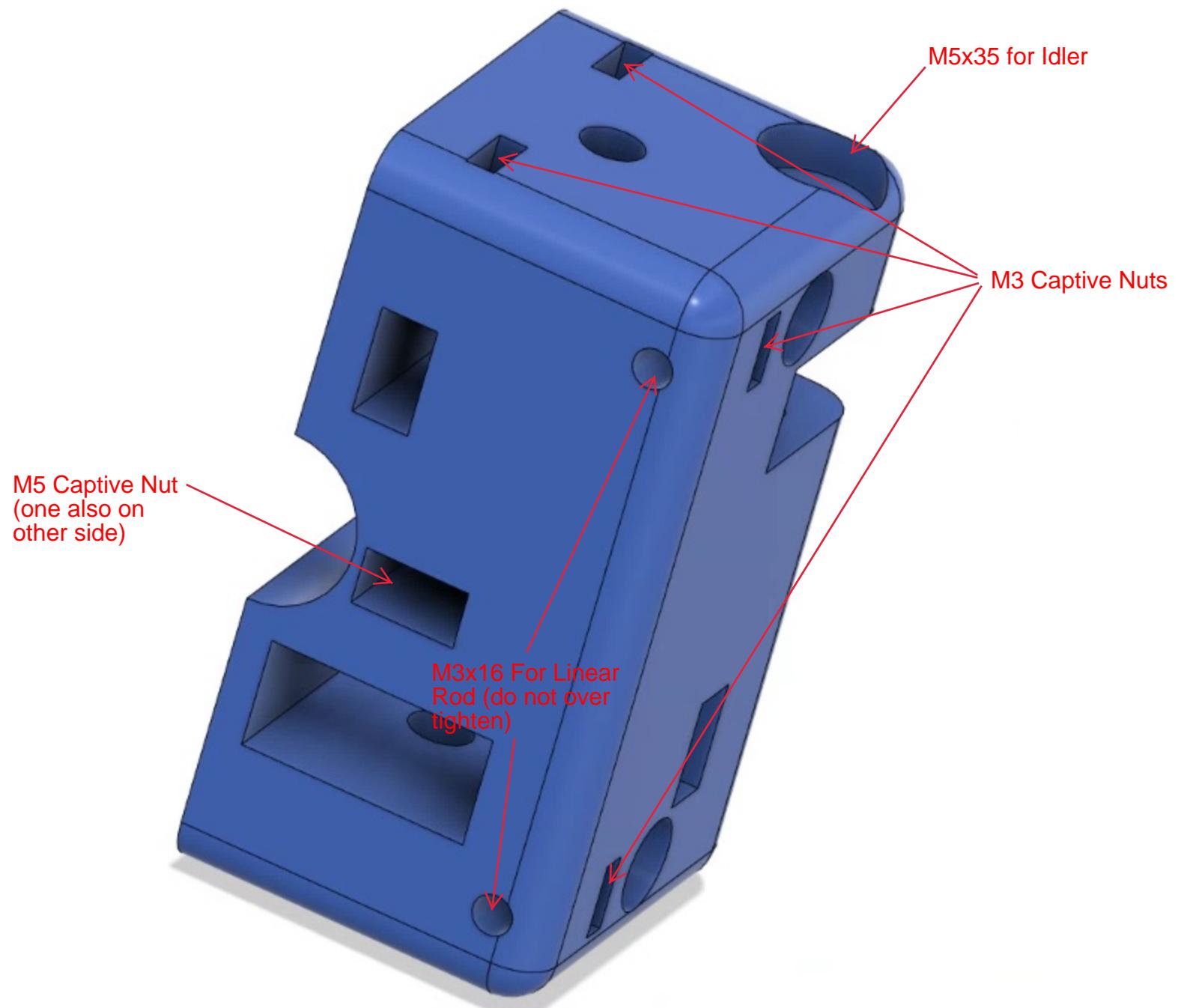
STEP 4/5

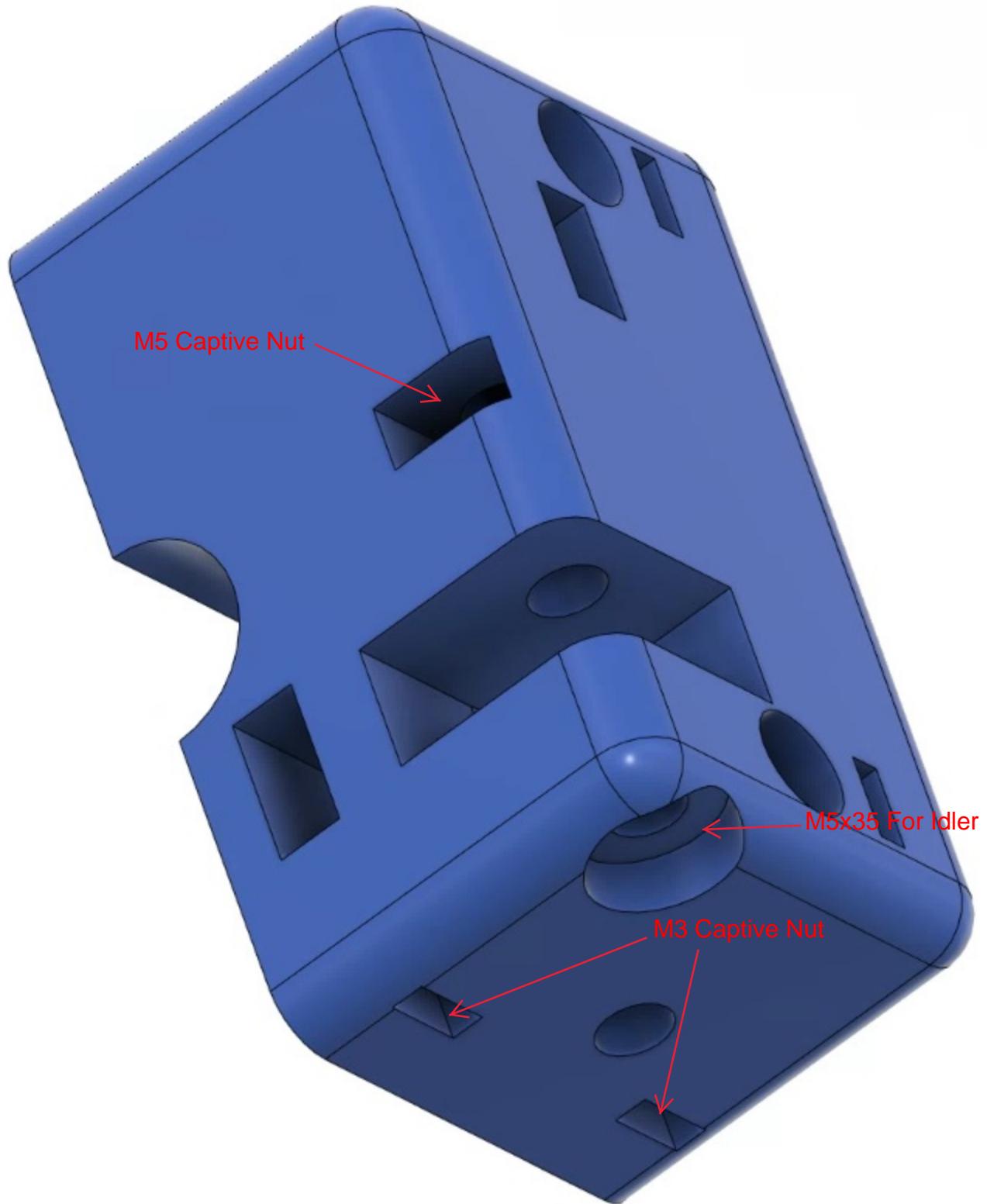


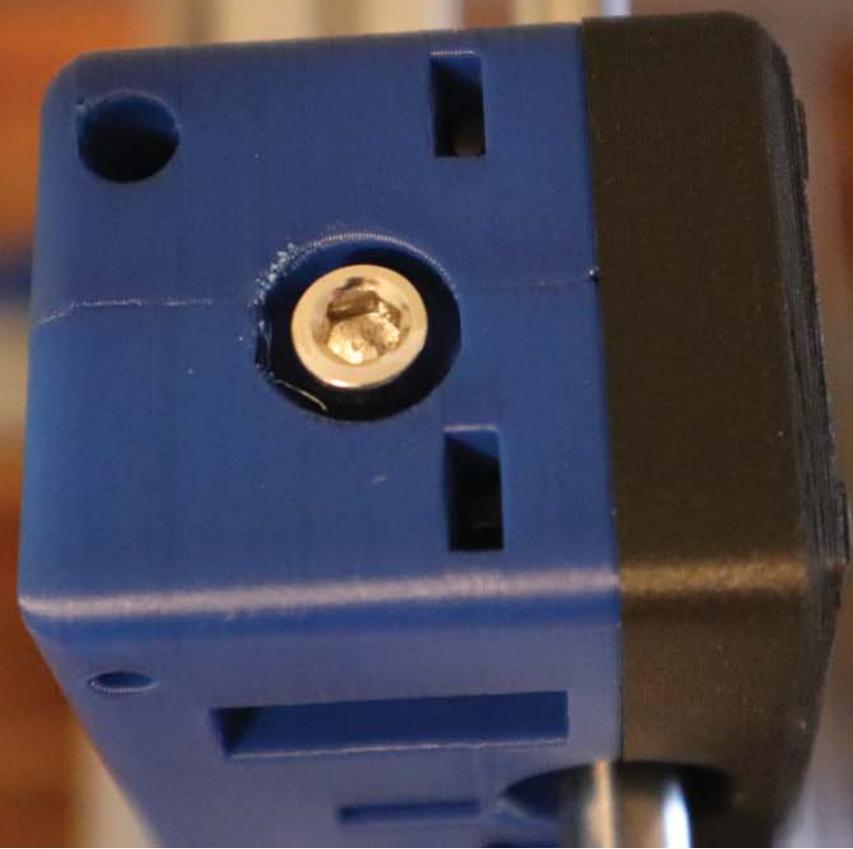
STEP 4/5



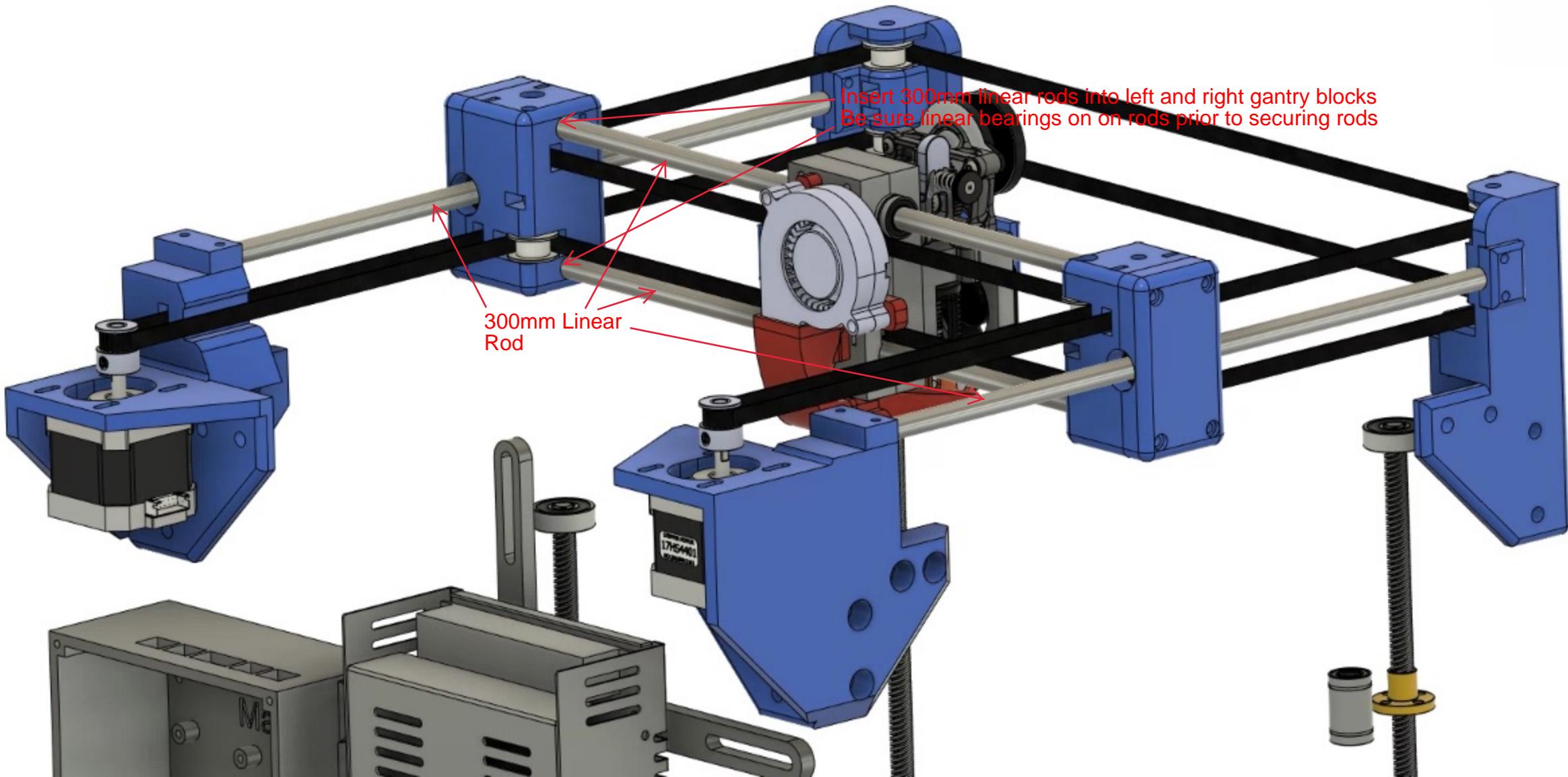
There are 6 M3 Captive Nuts on each gantry block and 2 M5







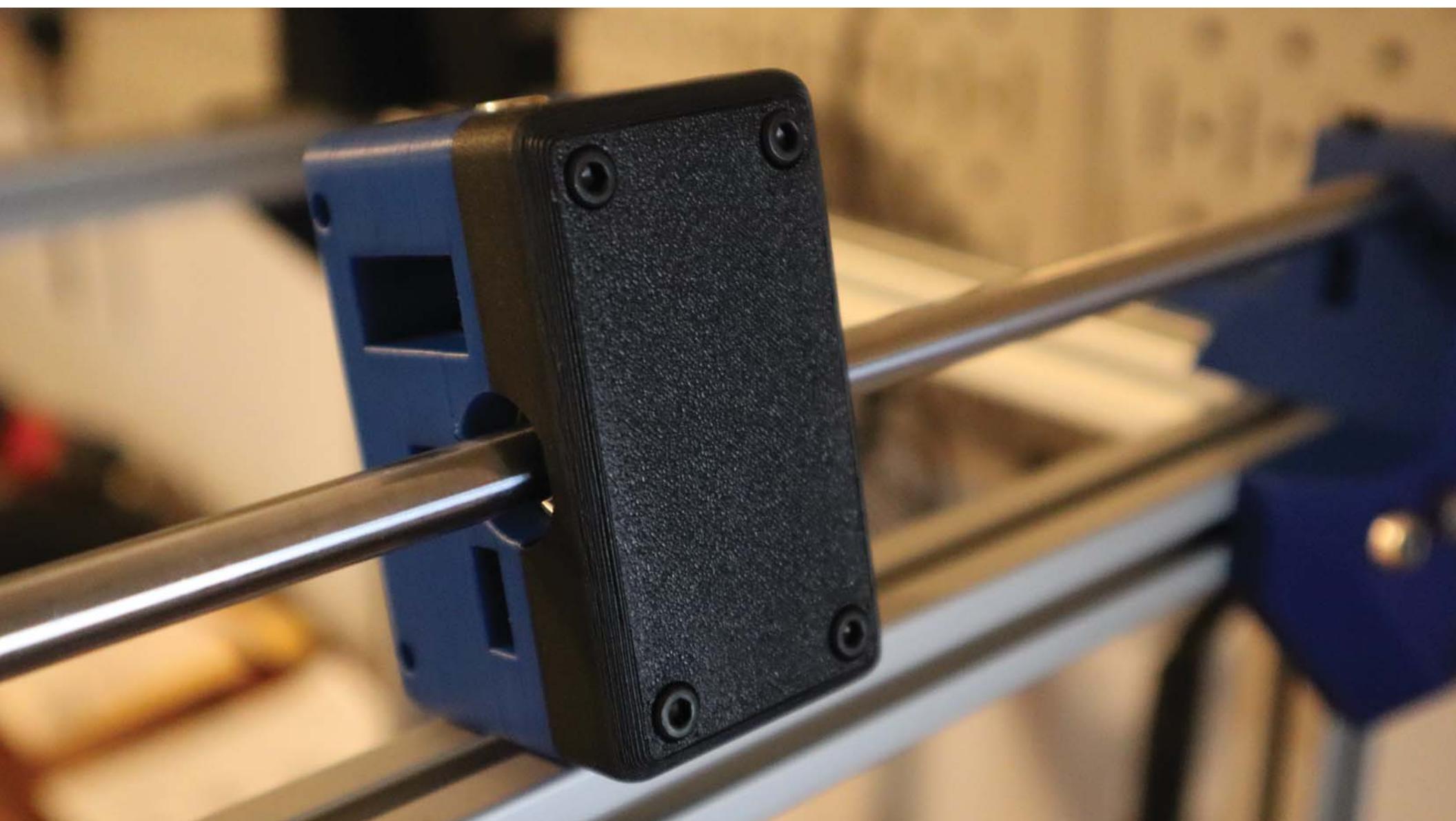
## Gantry System

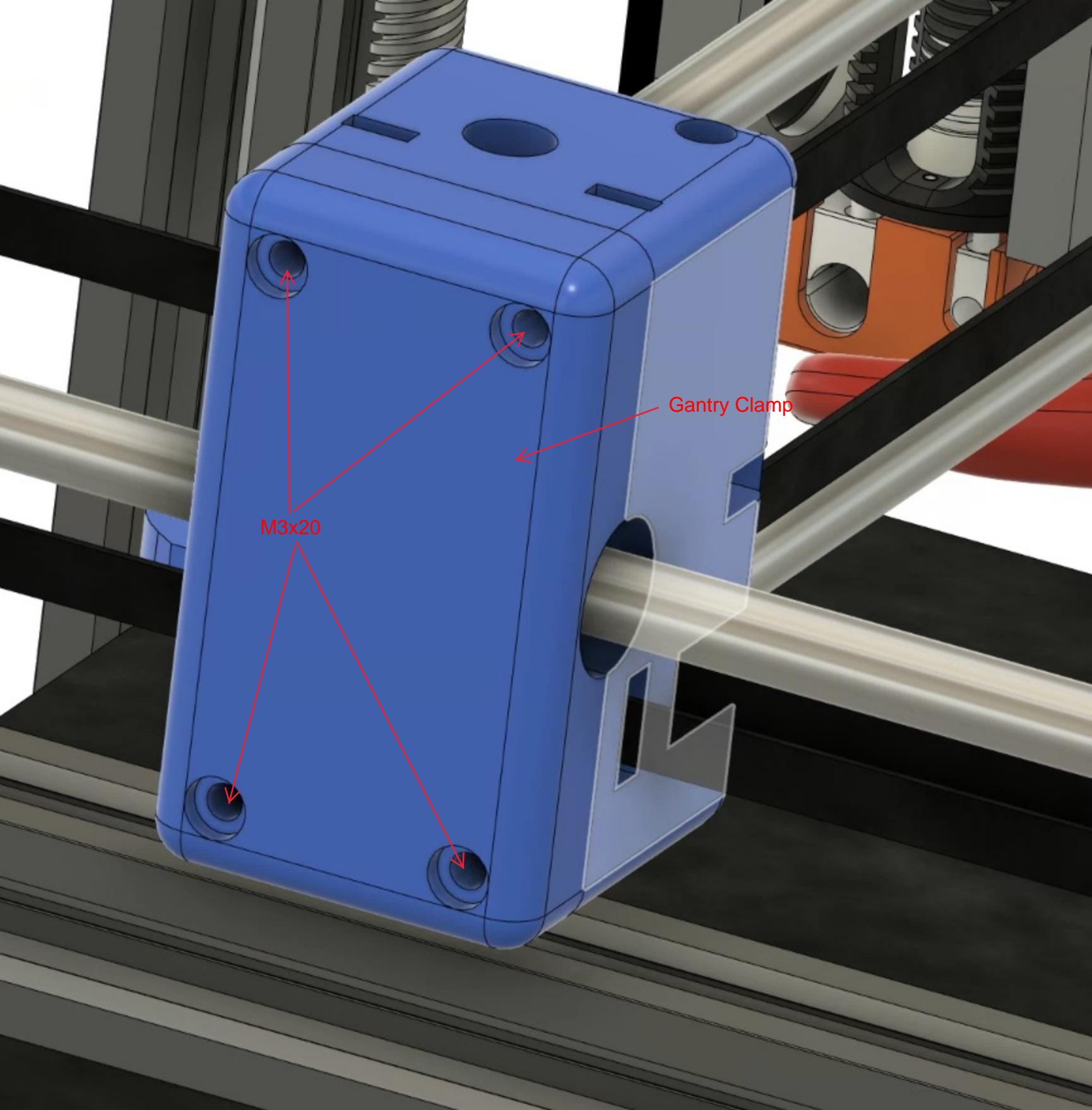


STEP 6



STEP 6/7

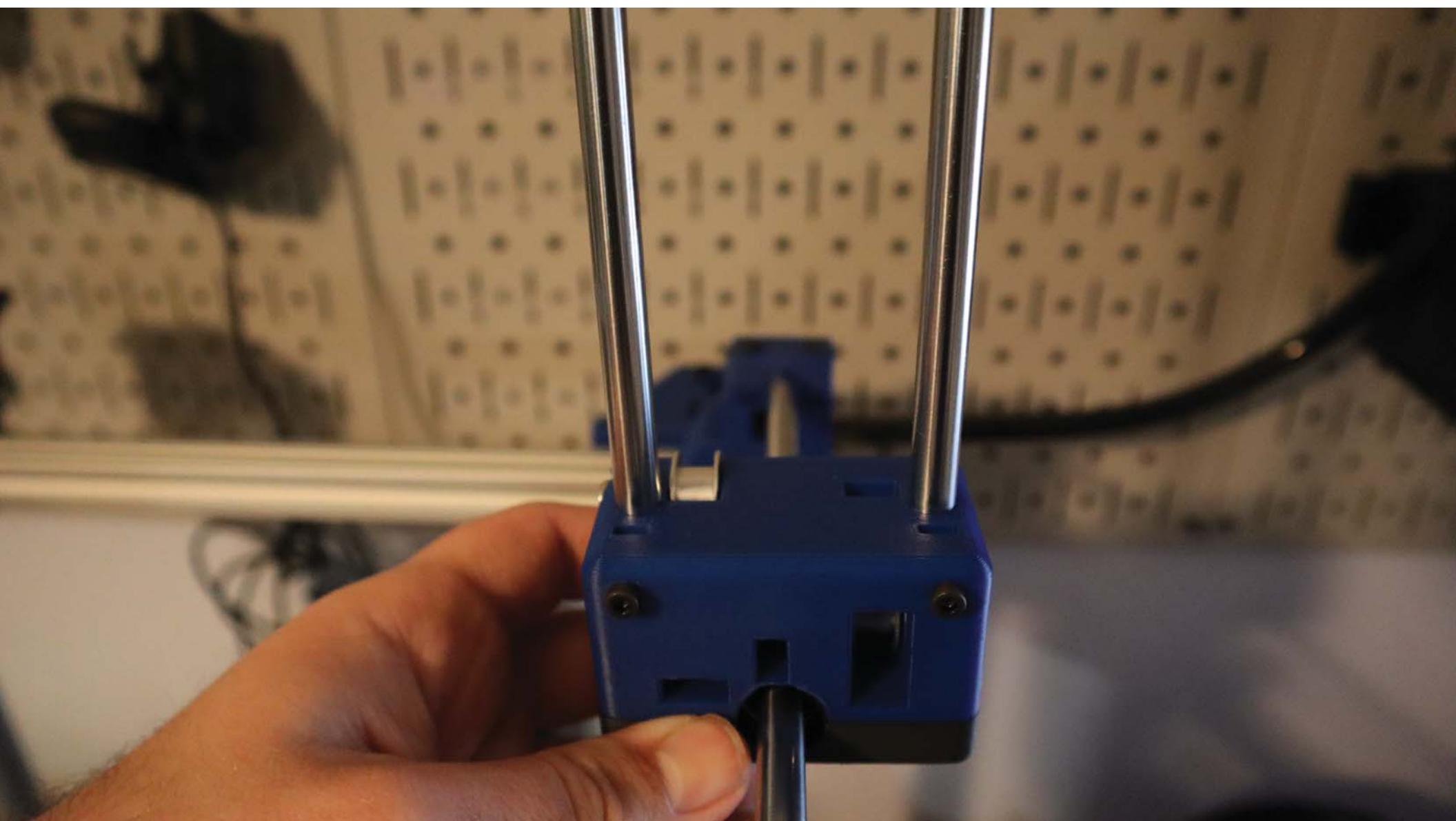




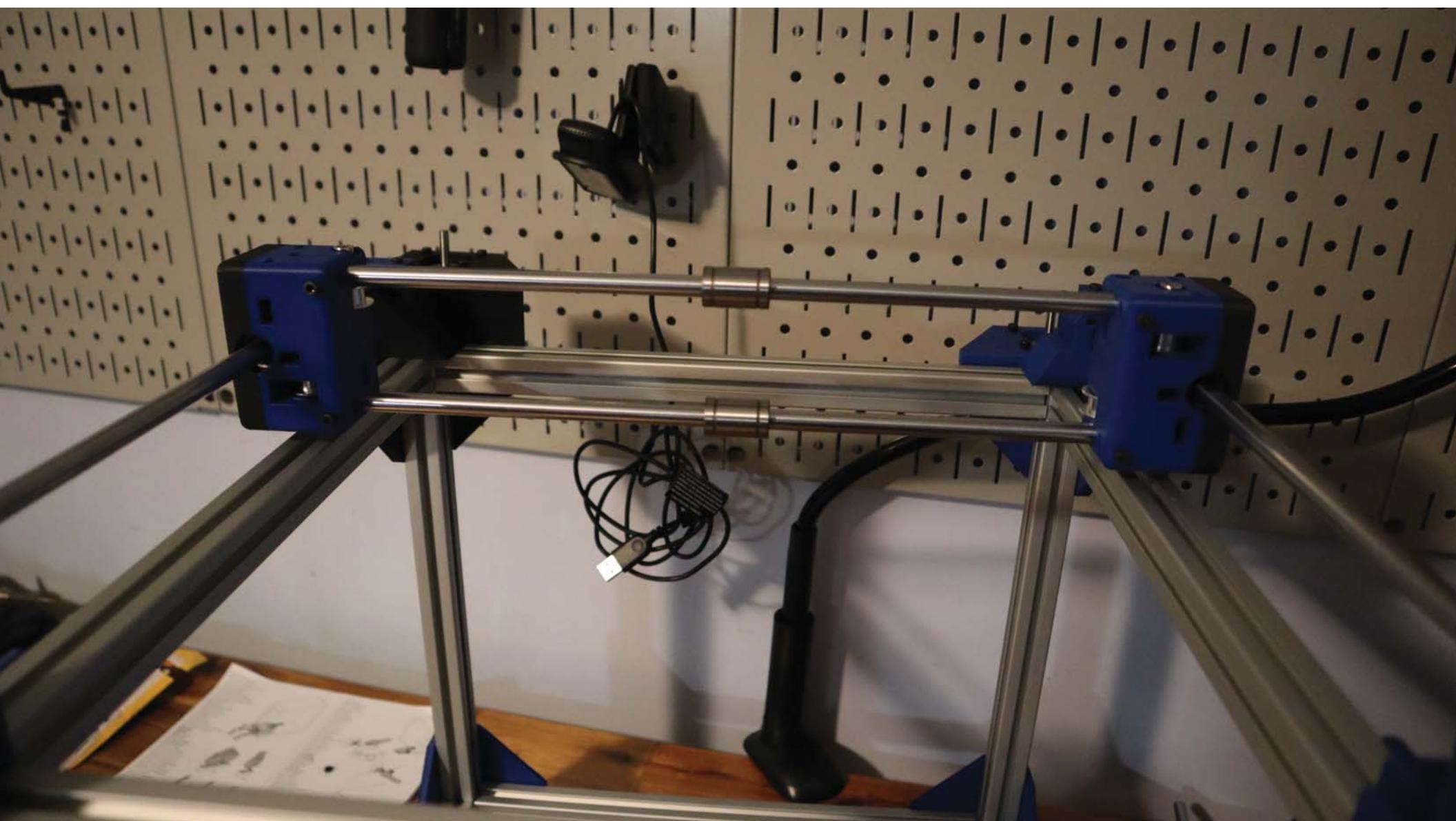
Gantry Clamp

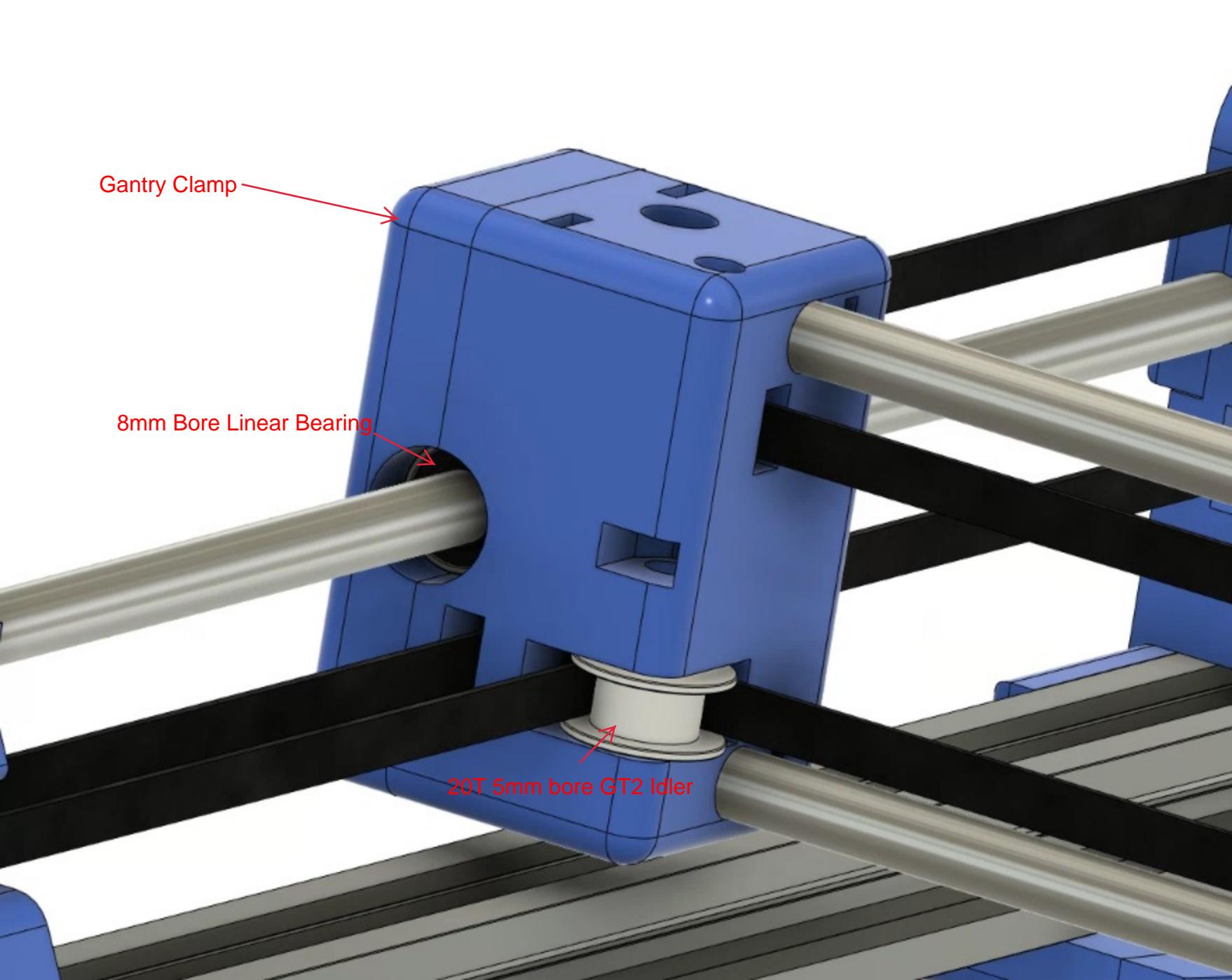
M3x20

STEP 8/9/10



STEP 8/9/10

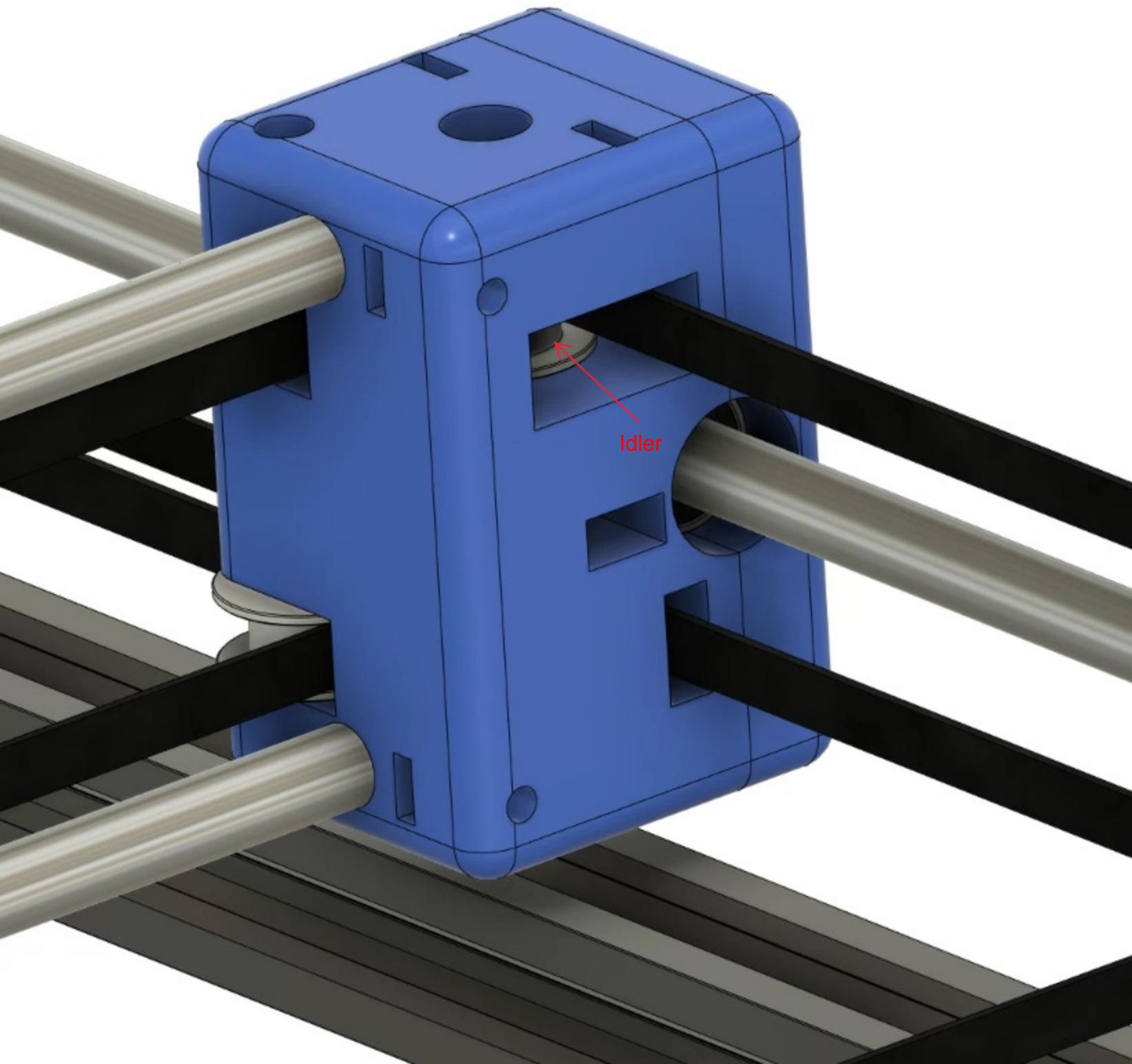




Gantry Clamp

8mm Bore Linear Bearing

20T 5mm bore GT2 Idler



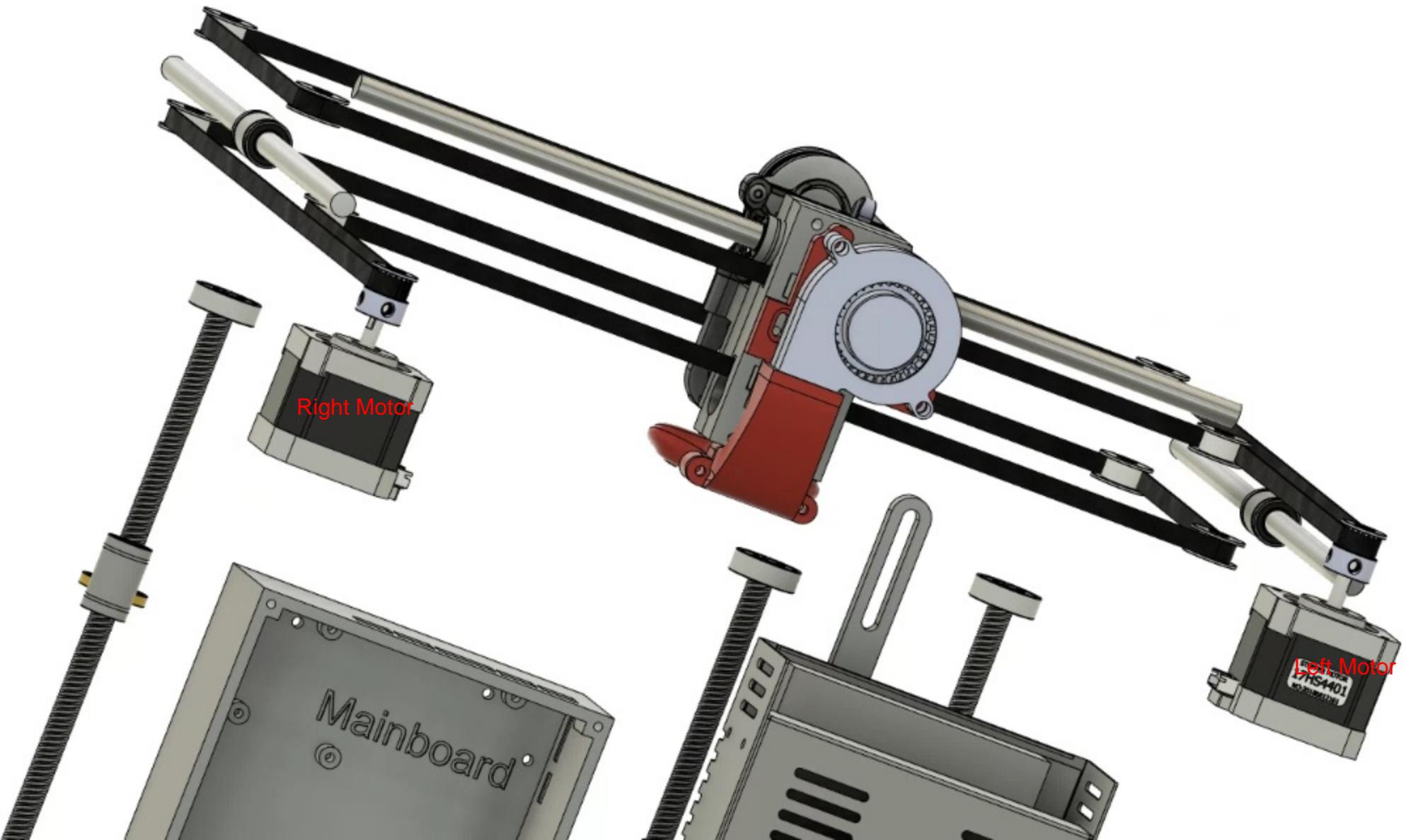
Idler

## **Section 3:**

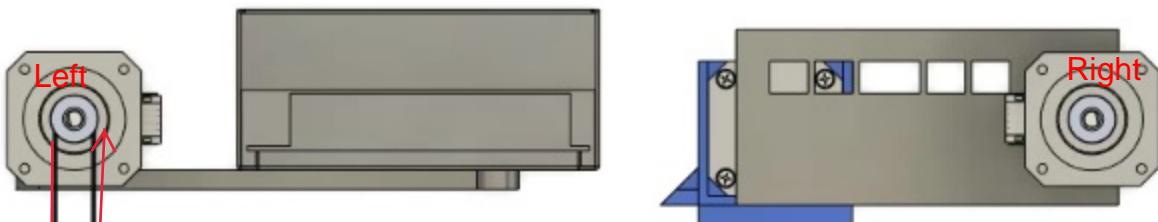
### **X/Y Belt Patch**

**Components needed for this portion:**

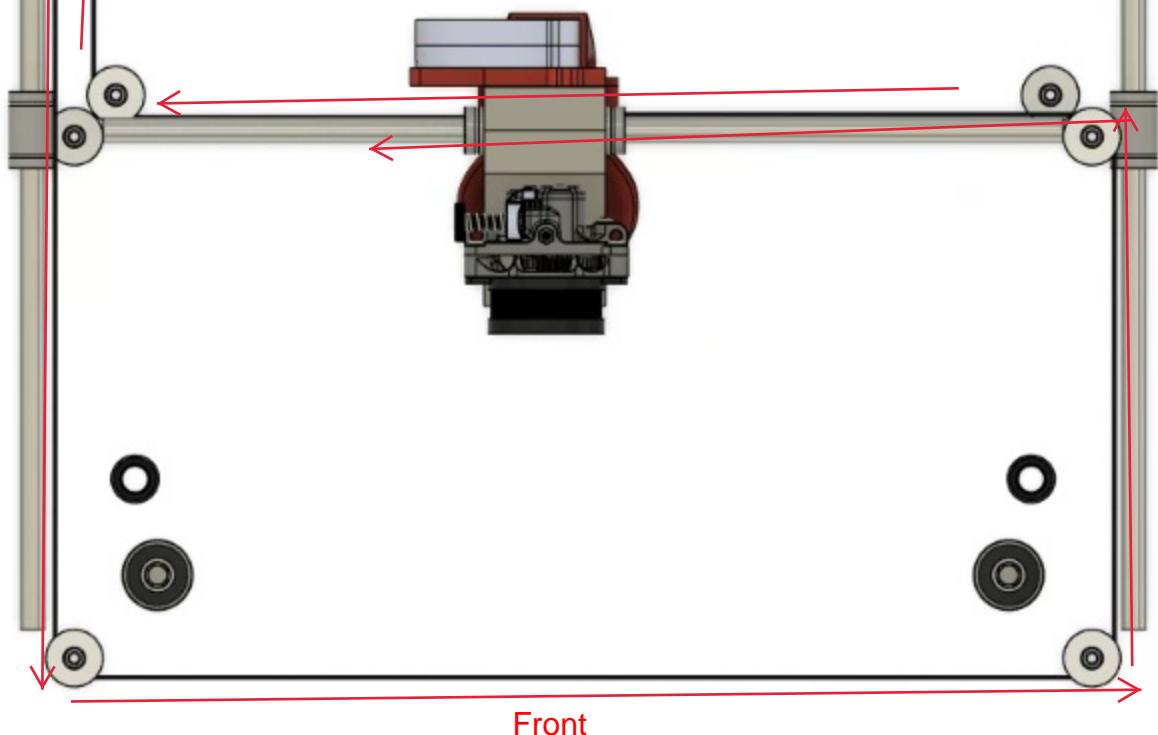
**GT2 6mm Belt, up to 5 meters in length**



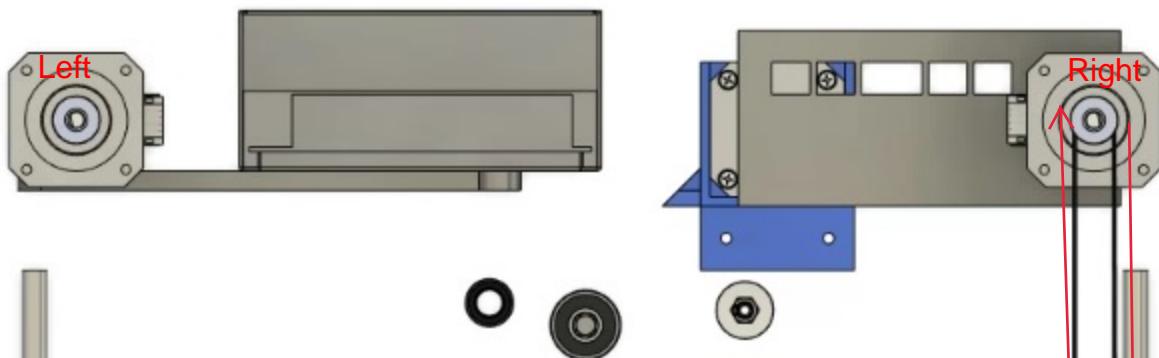
Back



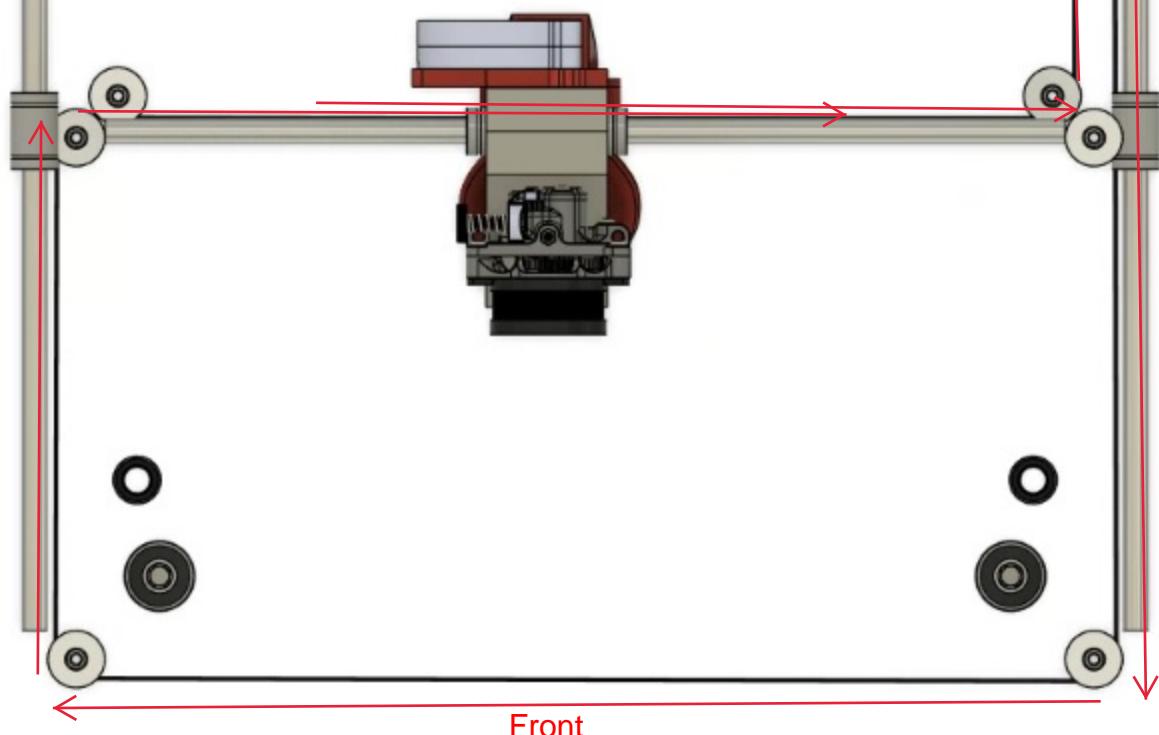
Route belt from print carriage location,  
extend past for some excess to cut later



Back



Route belt from print carriage location,  
extend past for some excess to cut later

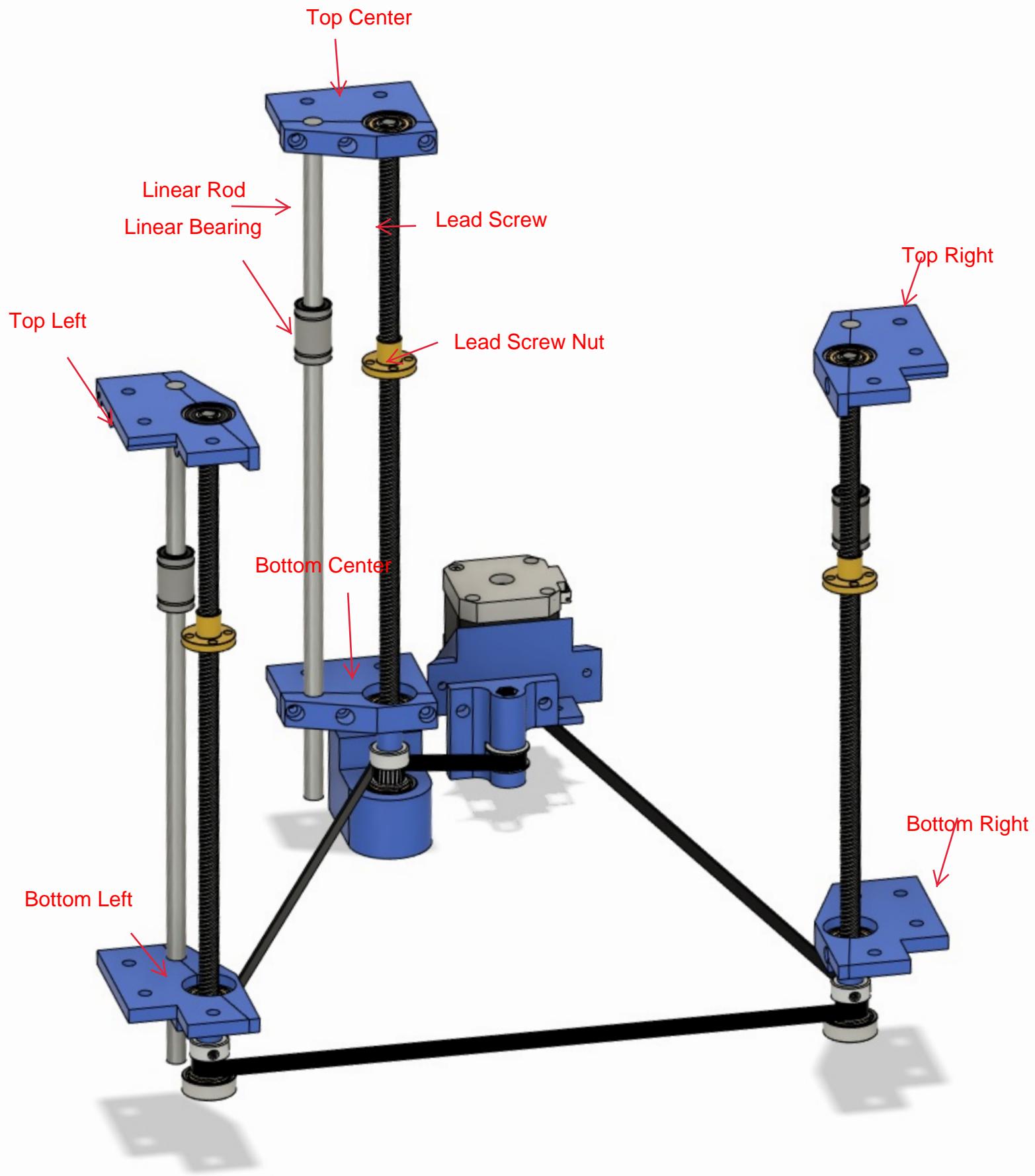


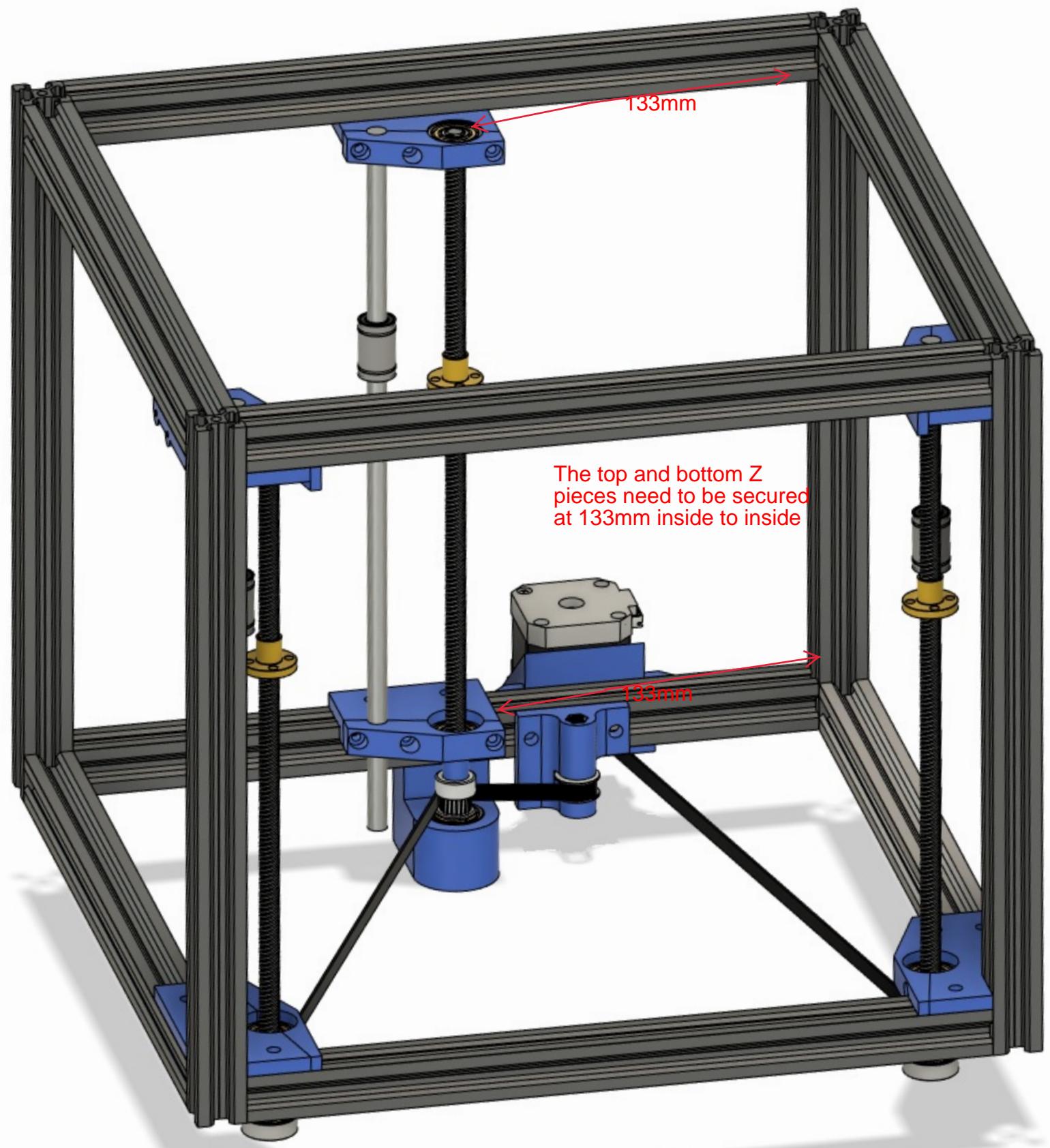
## Section 4:

# Z System

### Components needed for this portion:

GT2 6mm Belt 1100 closed loop	x1
Skateboard Bearings (608-2RS 8x22x7)	x9
300mm x 8mm Linear Rod	x3
8mm Linear Bearing	x3
300mm x 8mm 4 start 8x8 Lead Screw	x3
Lead Screw Nut	x3
M5x12 (or 10)	x20
M5 T-nut	x20
M5x40	x1
M5 Nut	x1
M3x12 (or 10)	x22
M3 T-nut	x4
20T GT2 5mm Bore Idler	x1
20T GT2 8mm Bore Pulley	x3





## The Z

1. Take 3 lead screws and slide up from the bottom 1 608 bearing, 1 spacer, and then 1 8mm g2 20T. Secure the pulley gear 7-9mm above the base of the lead screw.
2. Secure the Bottom Z mounts to each front leg using 3 m5 T nuts and 3 m5x12 screws
3. Secure the top Z mounts to each front leg using 3 m5 T nuts and 3 m5x12 screws.
4. Place one 608 bearing in the base of each front Z mount.

(...NOTE: Prior to mounting the lead screws, ensure the Bed mounts are attached to the lead screw nut and screwed on to the lead screw)

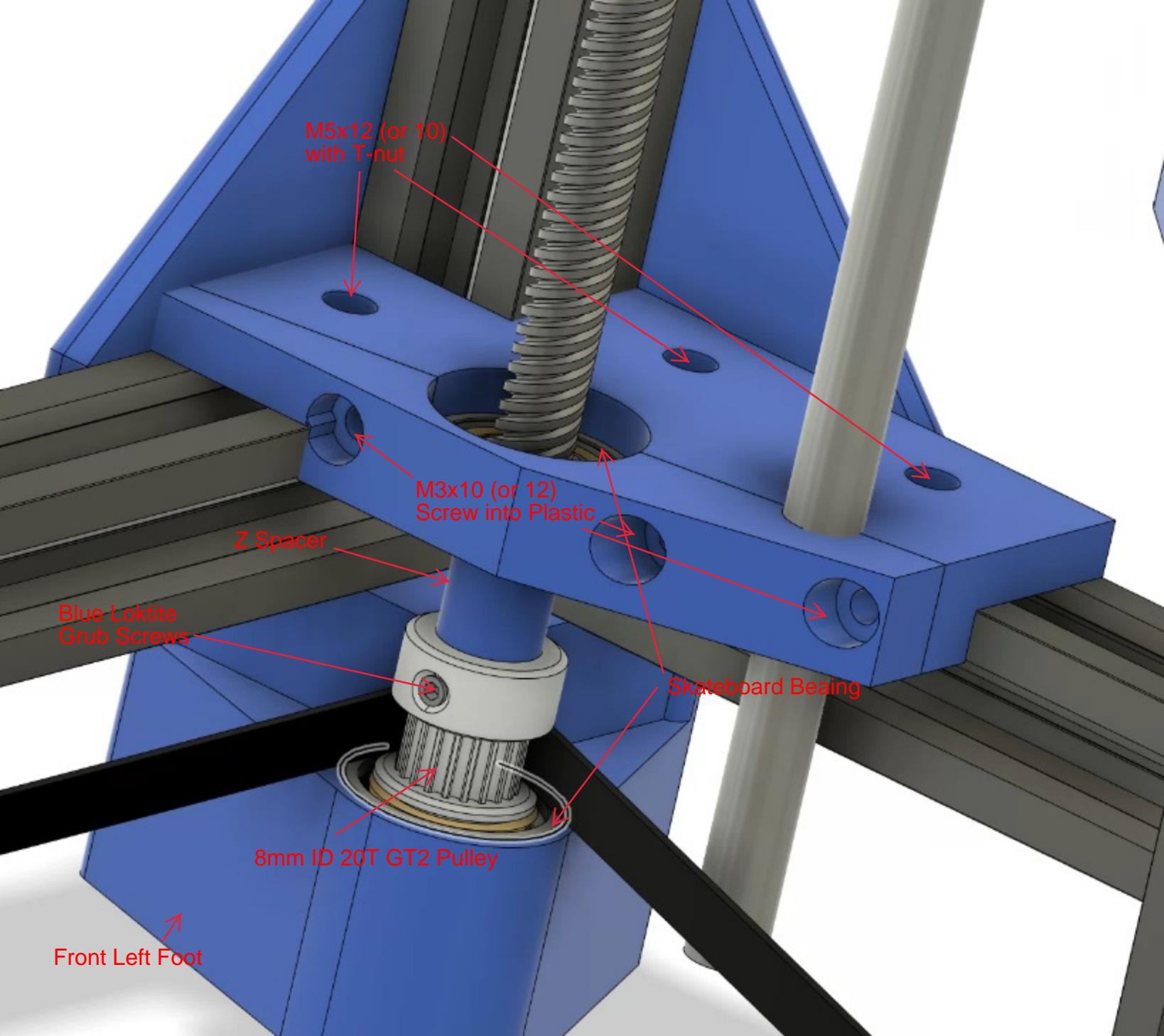
5. Insert the bottom of the lead screw (with the bearing, spacer, and pully) into the bottom Z mount.
6. Slide the Bed mount for that corner onto the lead screw.
7. Slide one linear bearing onto each linear rod.
8. Place a 608 bearing at the top of the lead screw.
9. Secure the lead screw with bearing and the linear rod to the Z axis with the top and bottom clamps. Each clamp will use 3 m3x10 (or longer) screws.

(...NOTE: Ensure linear rod and lead screw are flush at top but fully captured by clamp)

10. Secure the bottom of the rod and lead screw using the clamps and 3 m3x10 (or longer) screws each. This should clamp around the 608 bearing.
11. For the rear bottom center base, the base will be in the exact center of the extrusion. This attaches from the bottom using two m5 t nuts and 2 m5x12 screws.
12. Line up the bottom center mount with the bottom center base and mount it to the top of the extrusion using 2 m5 t nuts and 2 m5x12 screws.
13. Mount the Back Center Top mount to the center of the top extrusion in line with the Bottom and base. This will mount with 2 m5 t nuts and 2 m5x12 screws.
14. Insert 1 608 bearing into the center bottom base.
15. Complete the center bed mount assembly with z rod and lead screw the same as the front two.
16. Clamp the bed mount around the linear bearing on each of the 3 linear rods using 2 captive m3 nuts and 2 m3x16 screws

## The Z Belt

1. Remove lower lead screw and linear rod clamp from all three points, this will allow you to slide each lead screw up to place the belt around the pulley's.
2. After routing the belt, reinstall the clamps to secure lead screws and linear rods
3. Secure the Z motor mount to back right of the frame using 2 M3x8 and 2 M3x10 fasteners with t-nuts
4. Secure the z motor to the bracket using 4 M3x10, making sure the wiring faces towards center of frame
5. Assemble the tensioner using one M5 nut, one M5x40, and one 2GT 20T idler. Secure the tensioner to the frame using 2 M5x12 and t-nuts
6. Route the belt around the motor pulley and tensioner. Move the motor out as far as the bracket will allow for tension, then use tensioner for remaining slack



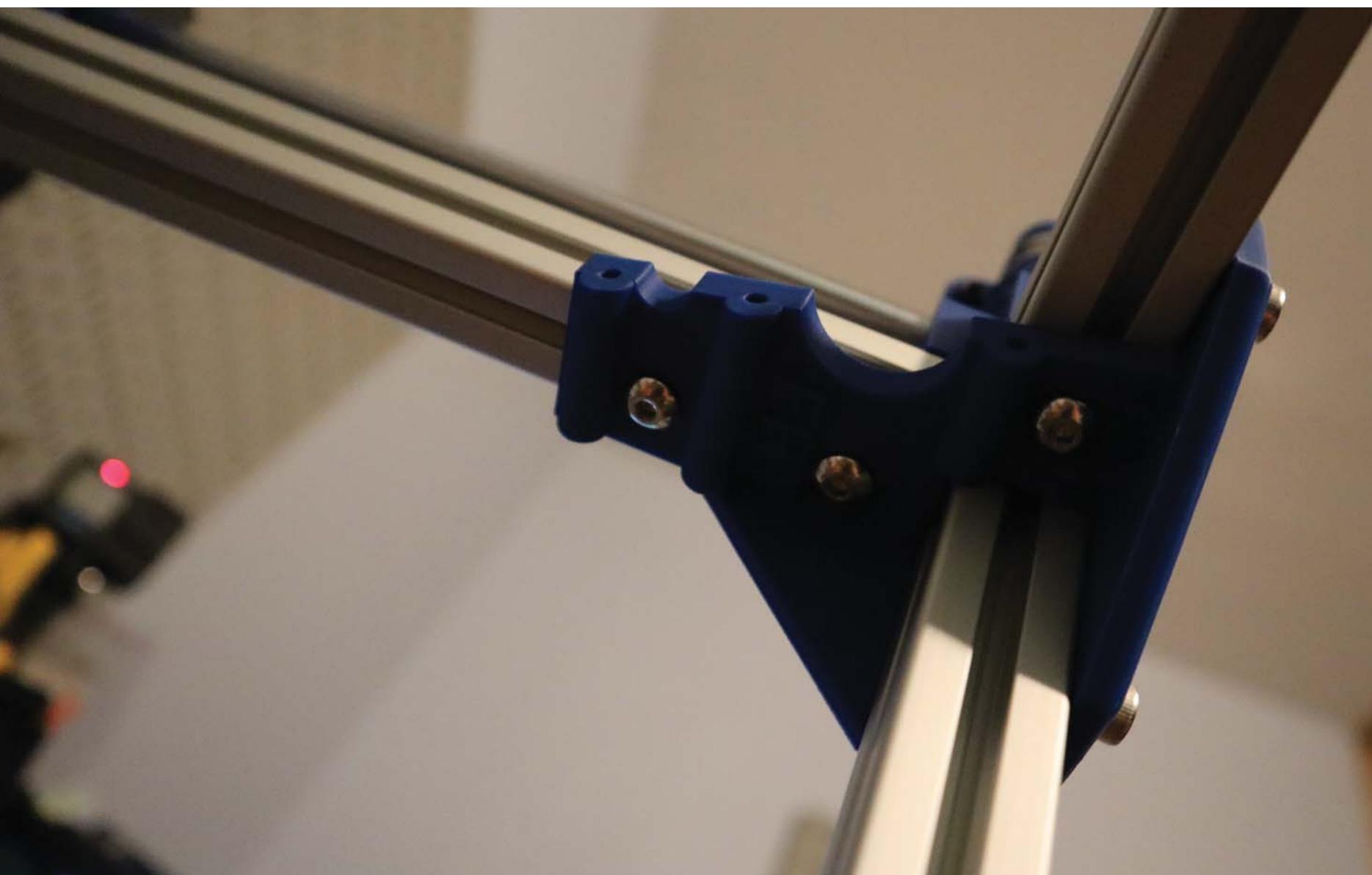
## STEP 1, PREPARING YOUR LEAD SCREWS

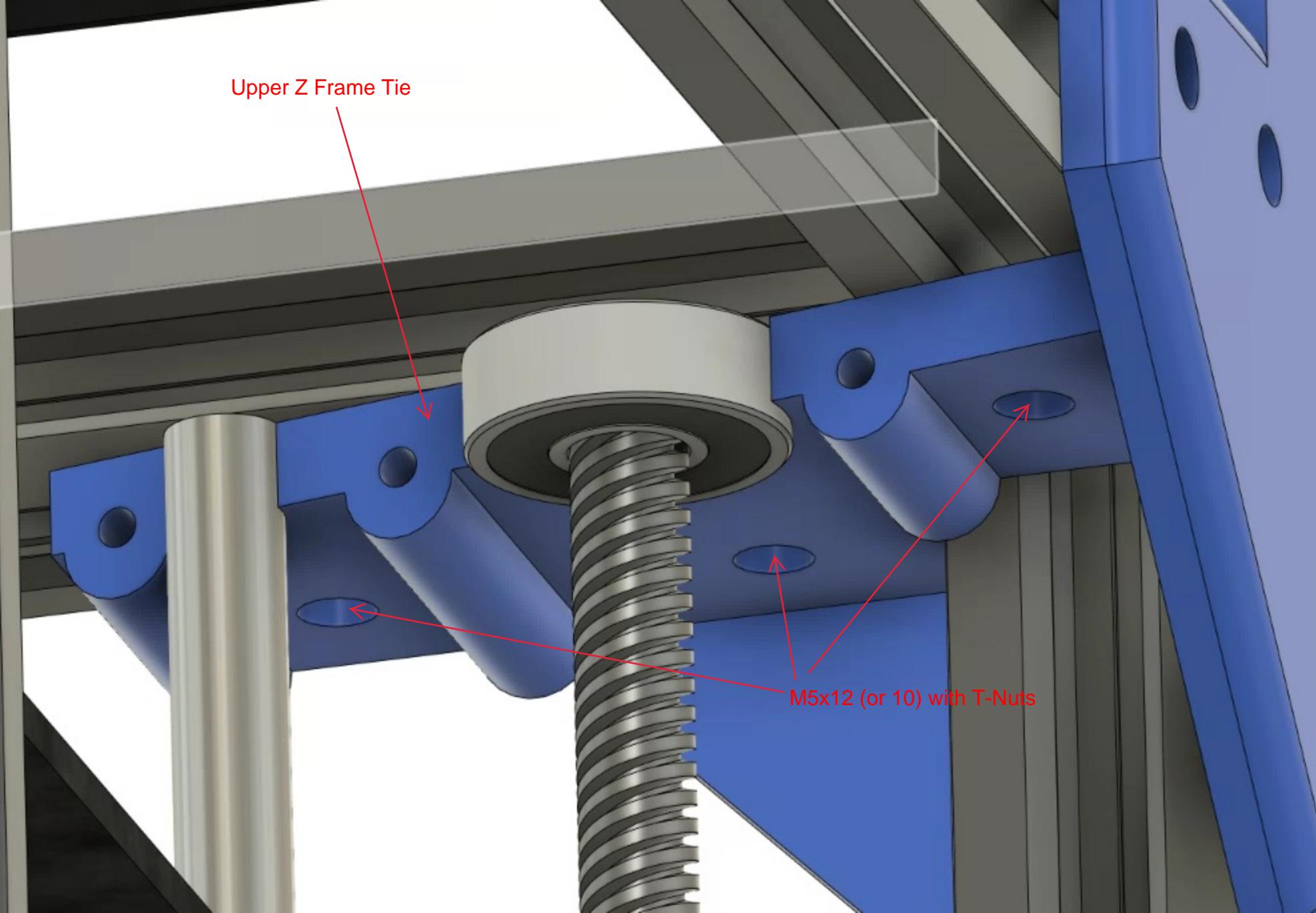


STEP 2



STEP 3







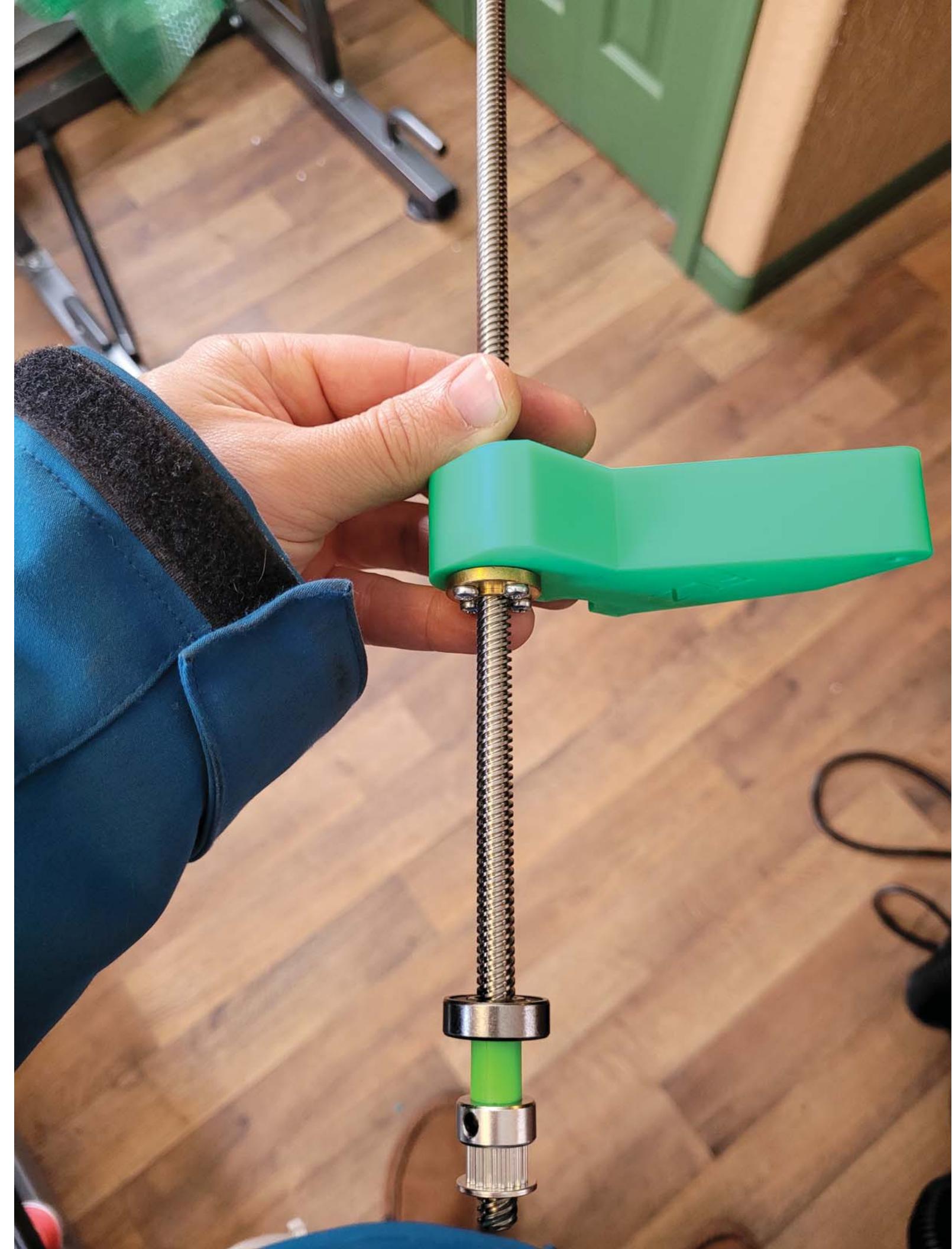
Insert captured nuts prior to putting on lead screw

FLZ

Lead Screw Nut

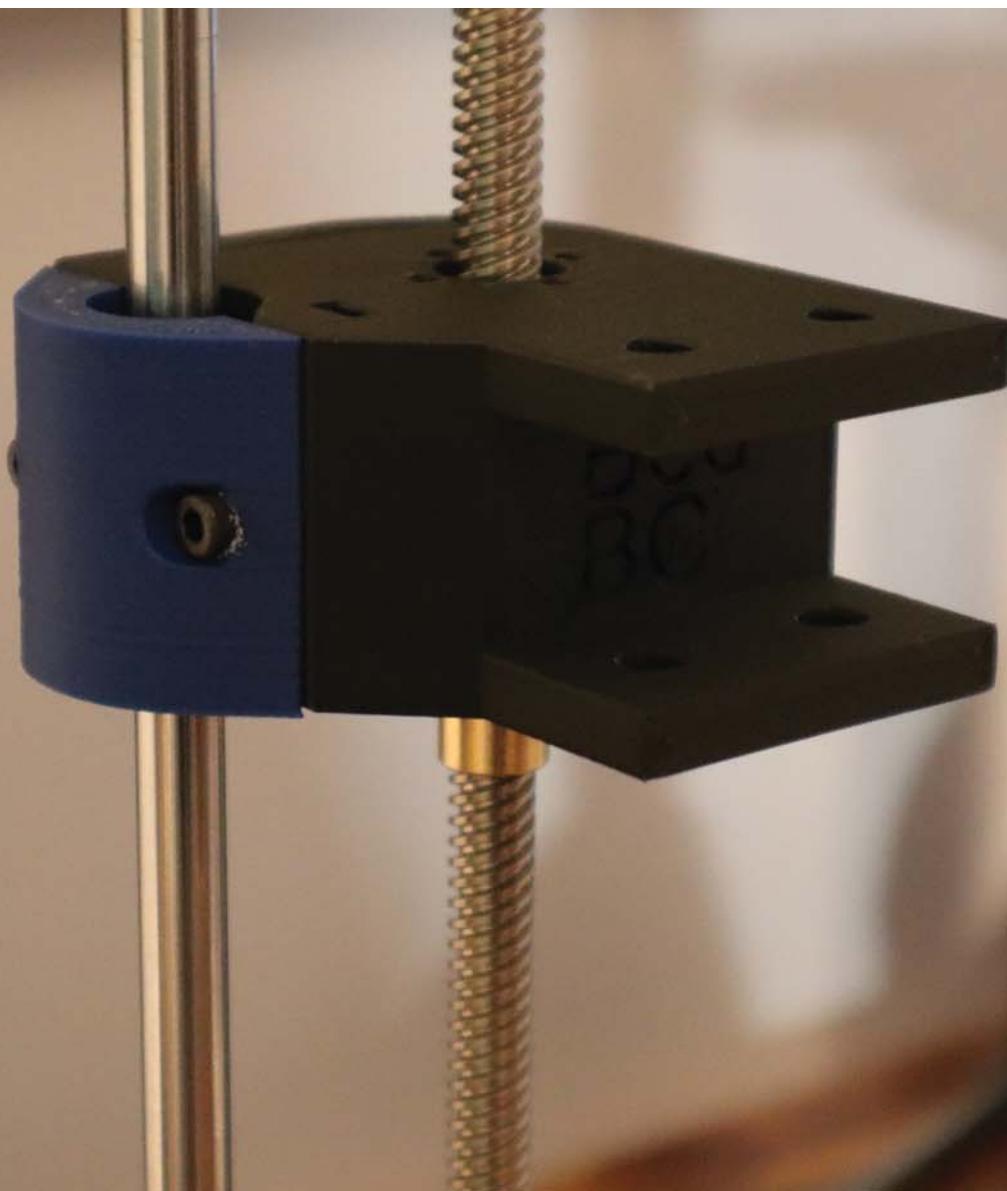
M3x8  
Screwed into  
plastic

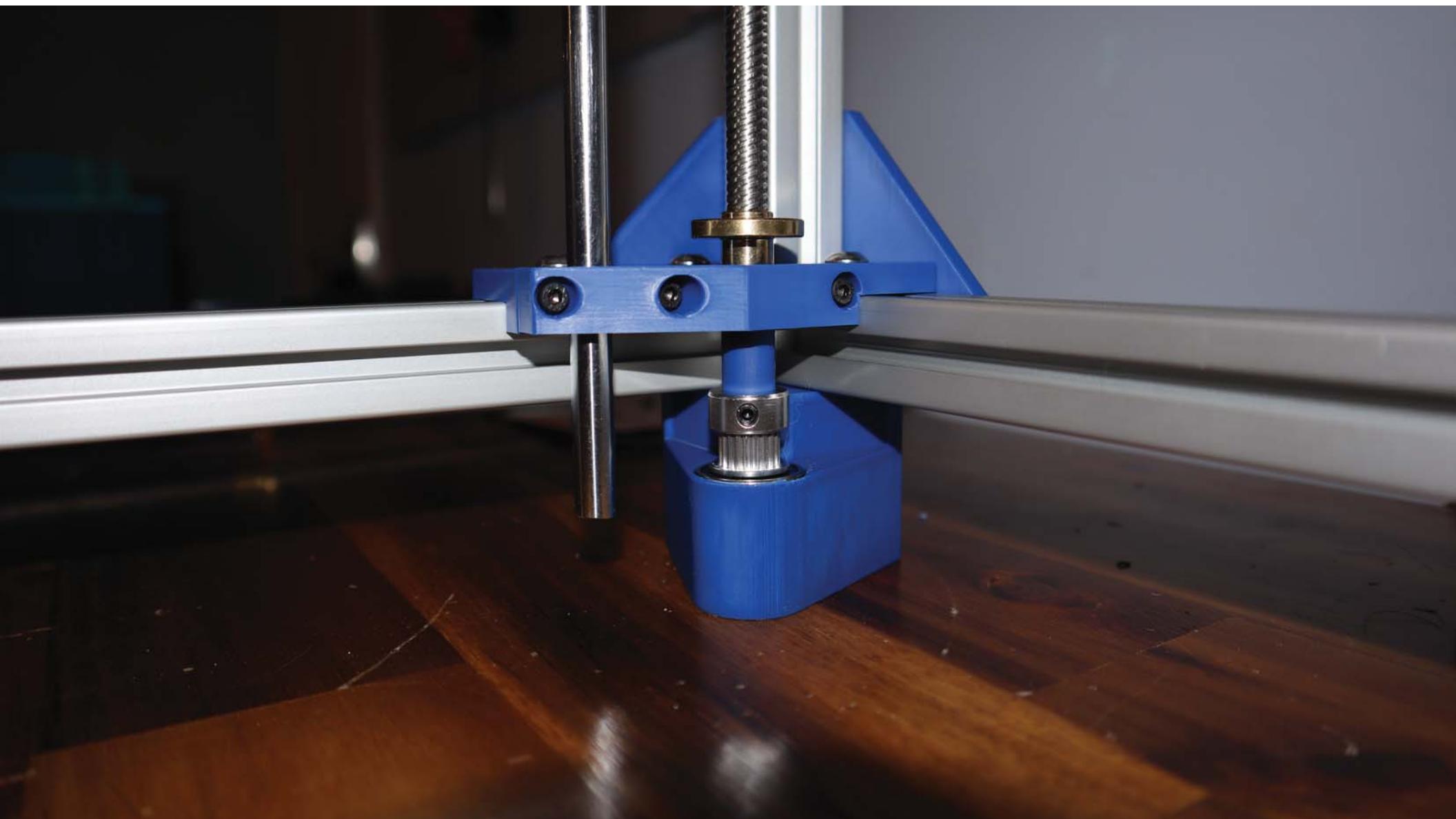


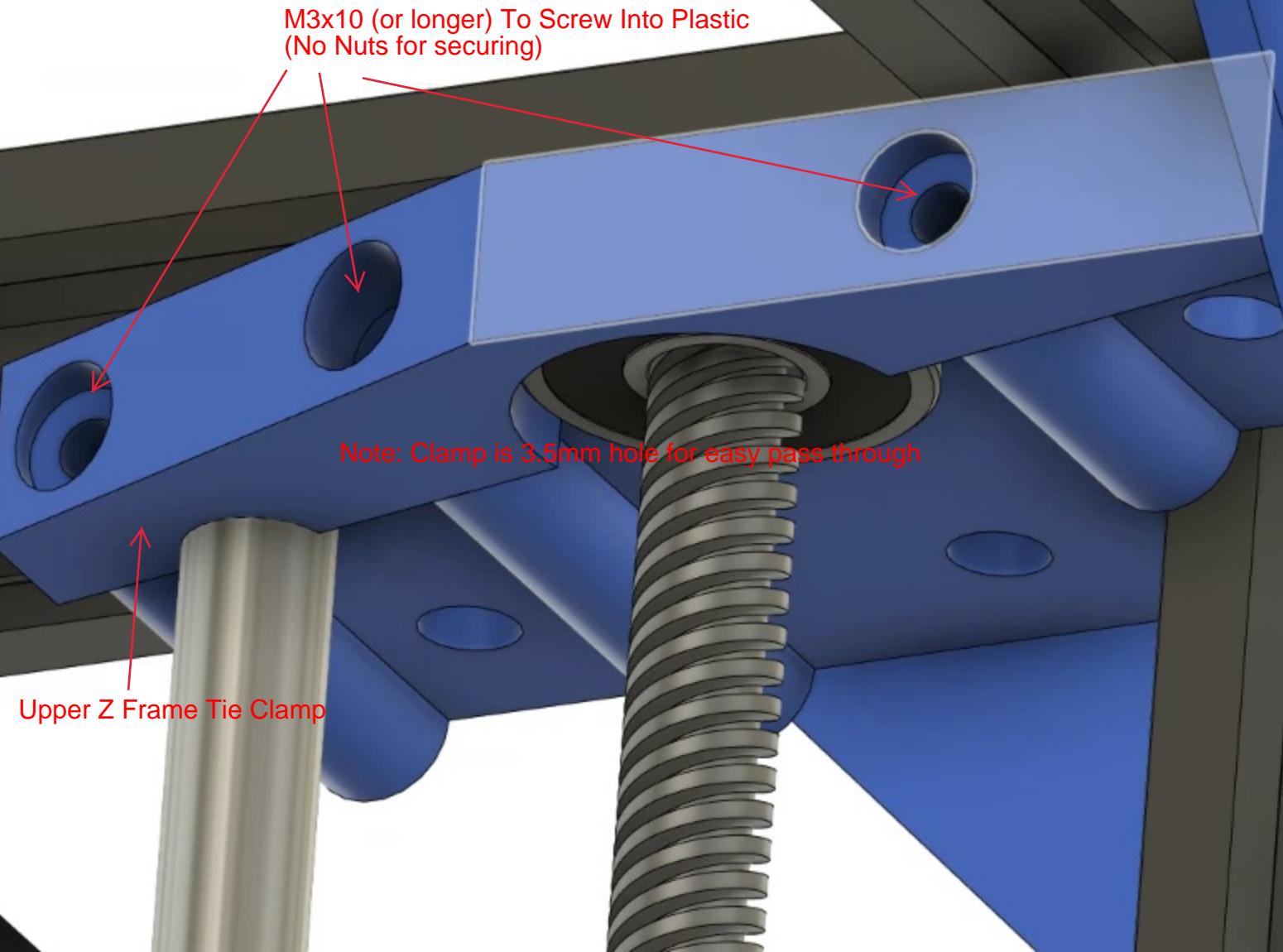


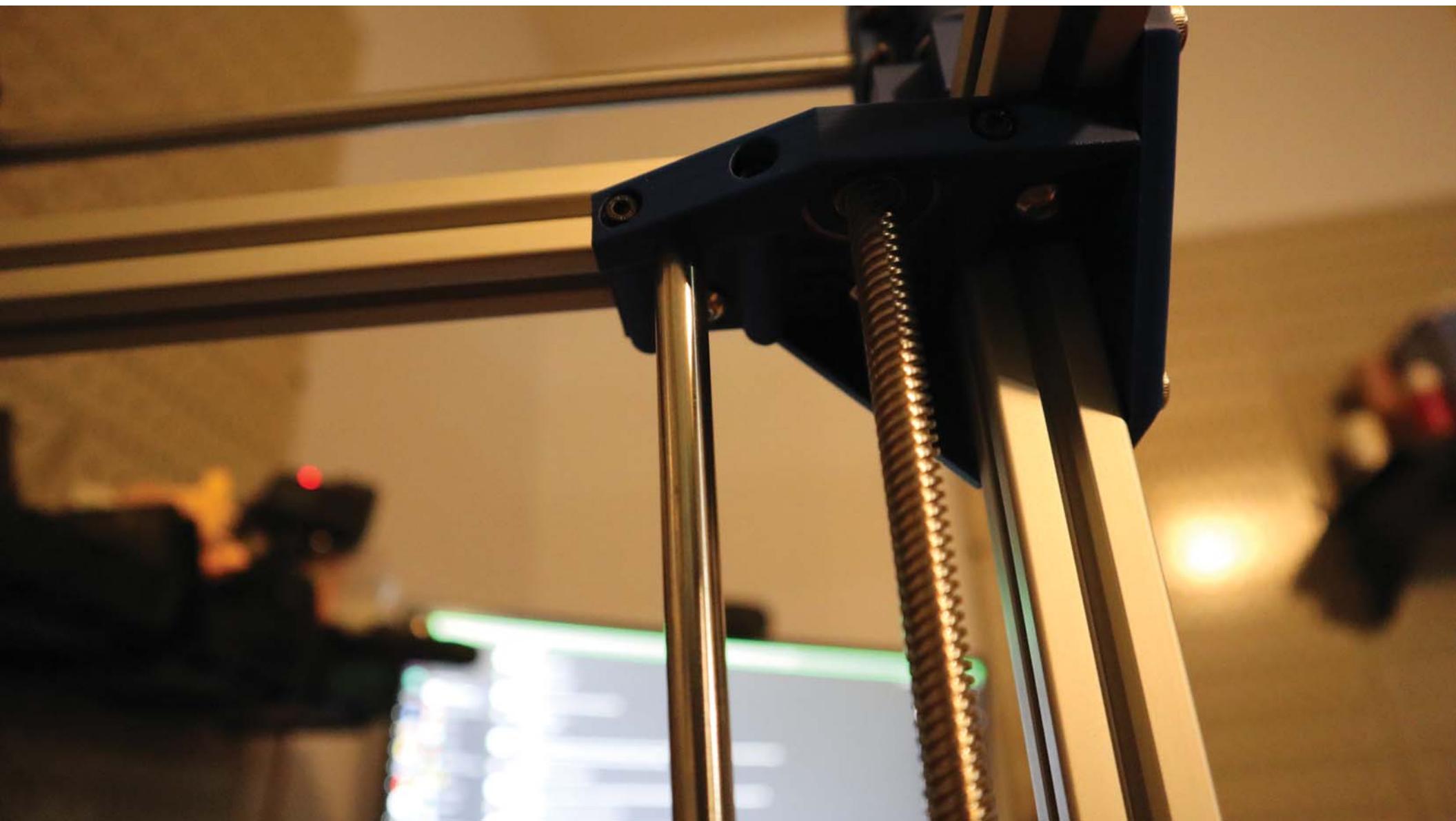


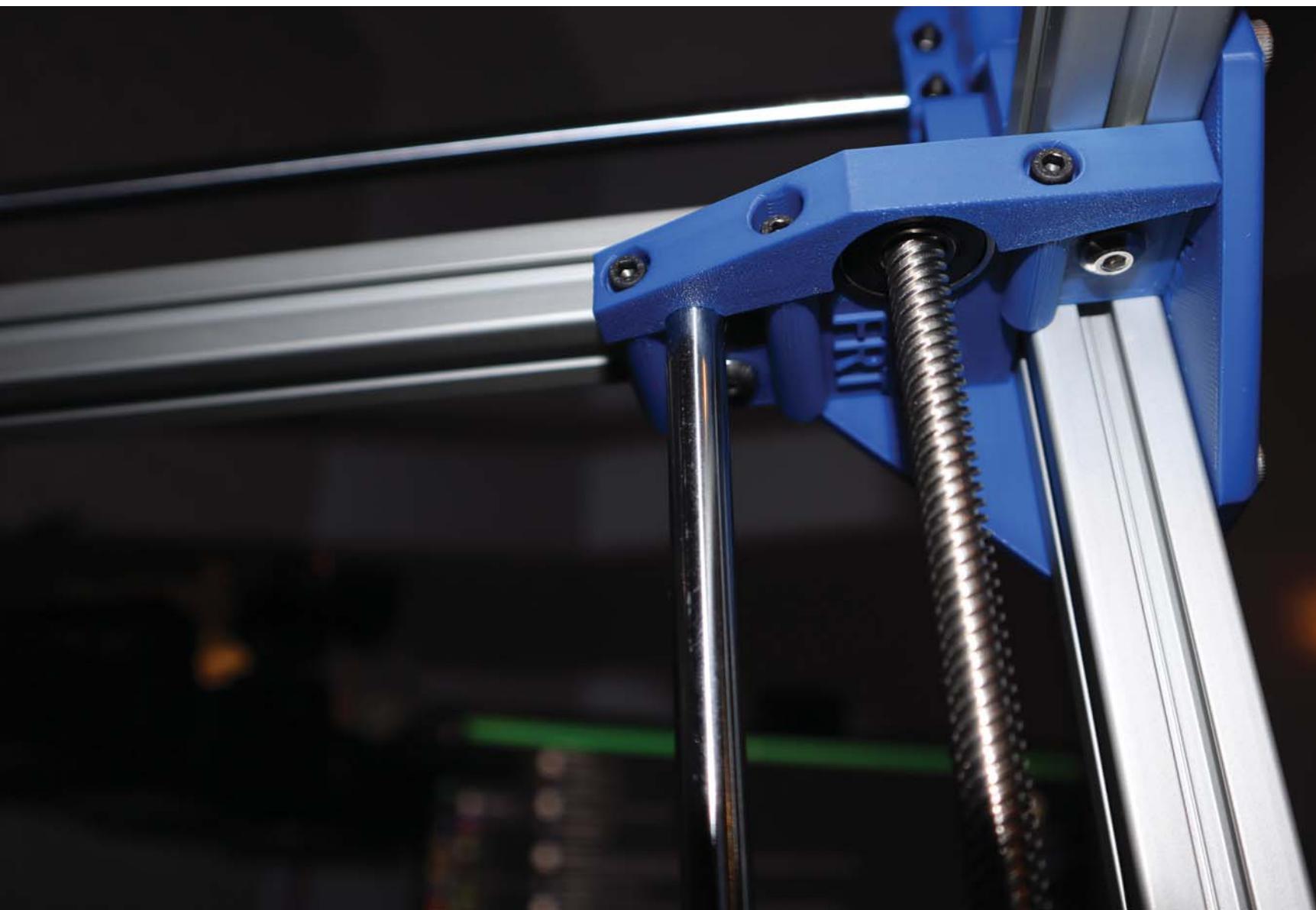


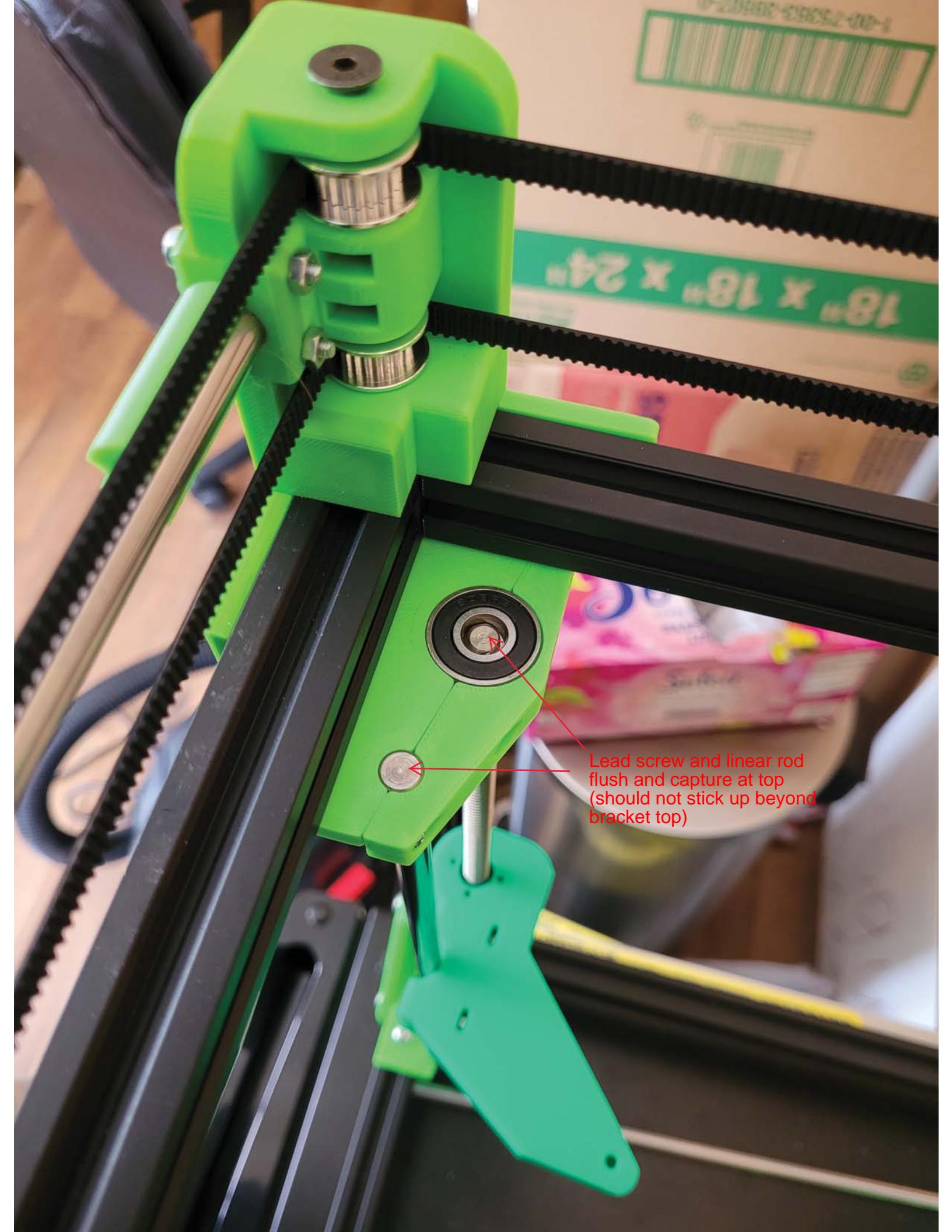








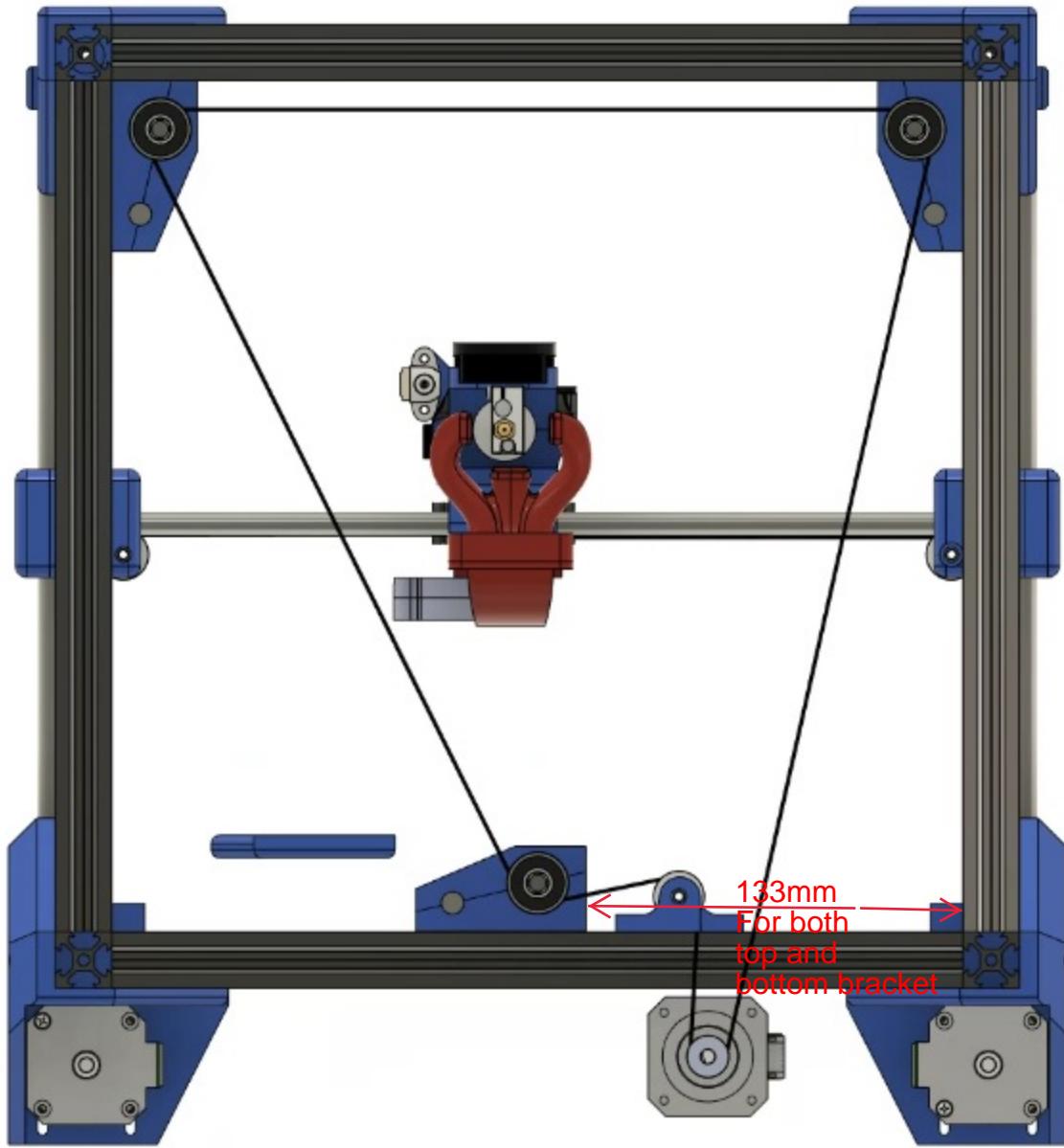




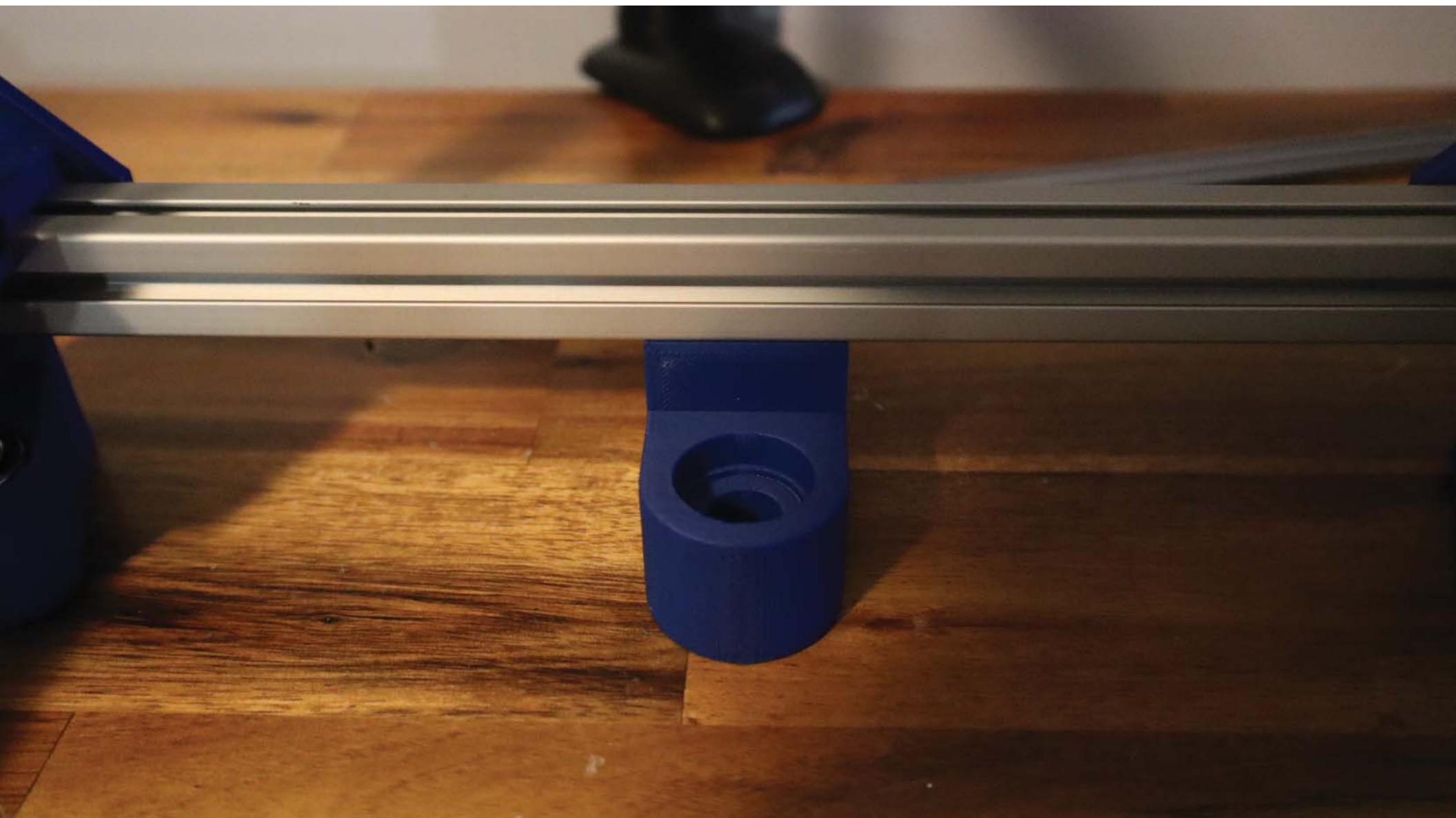
Lead screw and linear rod  
flush and capture at top  
(should not stick up beyond  
bracket top)

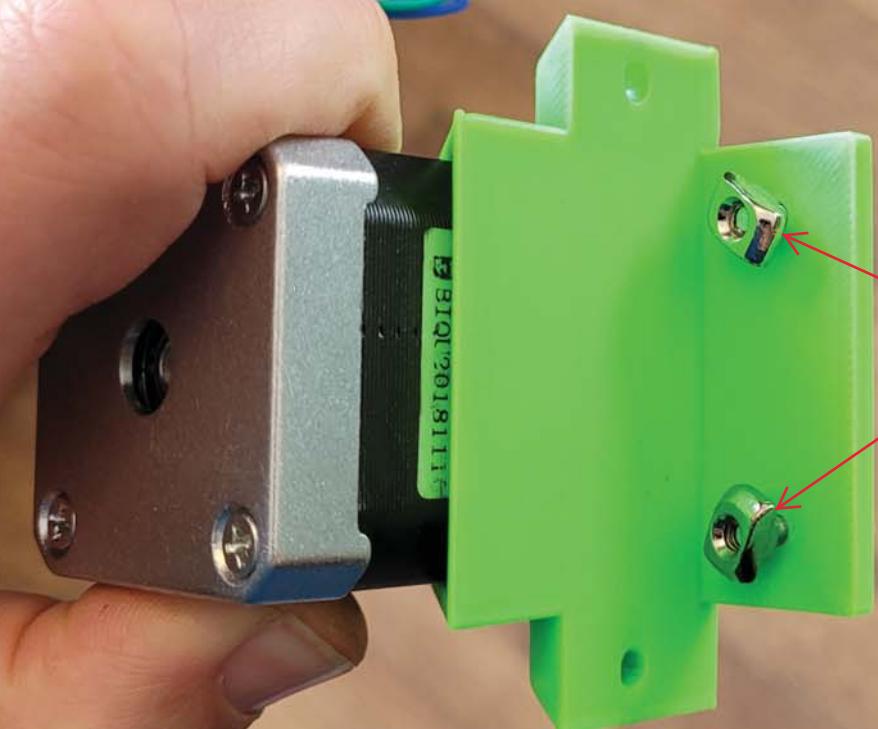
Lead screw and linear rod  
flush and capture at top  
(should not stick up beyond  
bracket top)

MEASUREMENT FOR BACK CENTER BRACKET  
133MM FROM INSIDE OF 2020 TO INSIDE OF BRACKETS

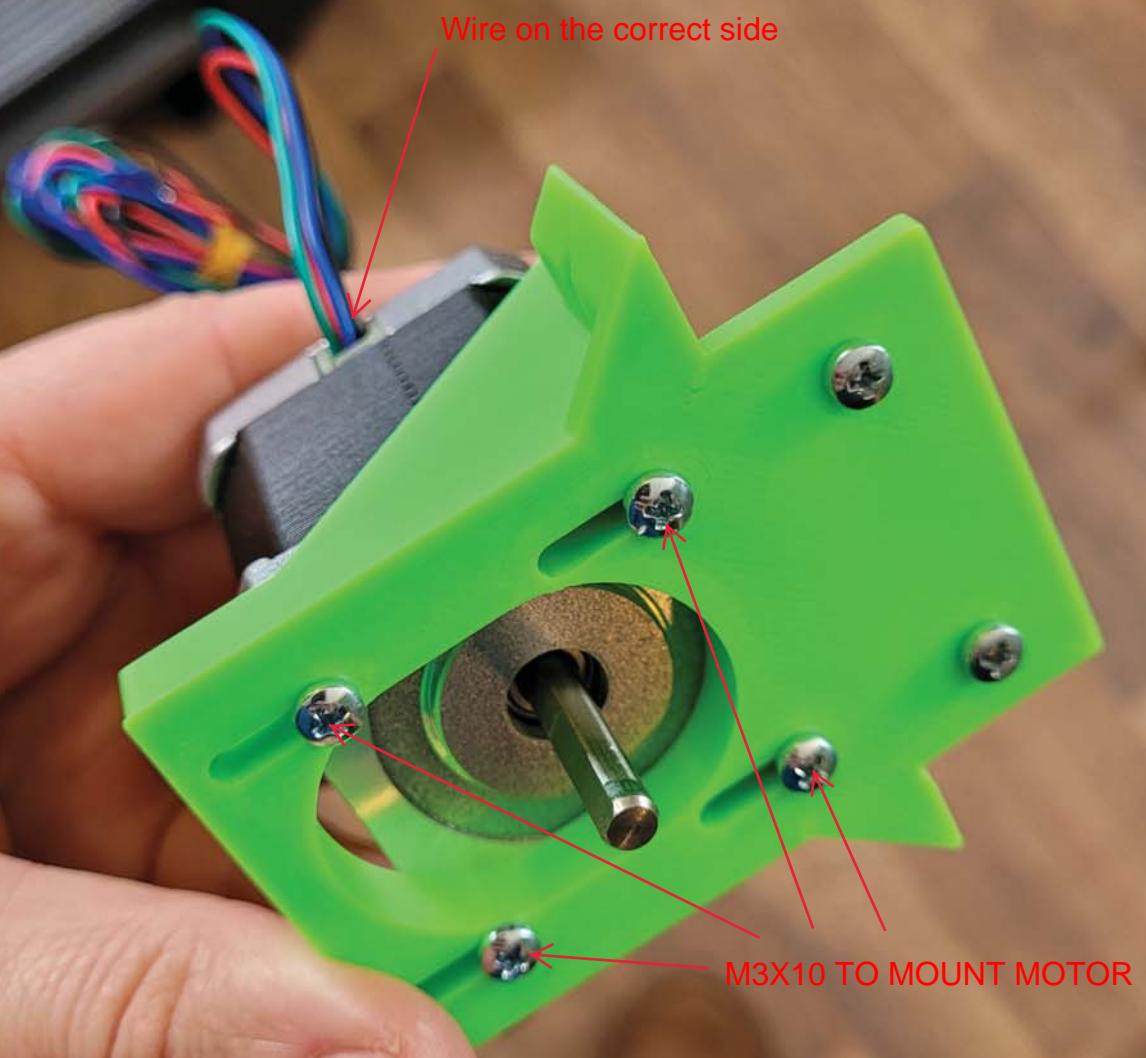


BACK CENTER SECURED





M3X8 WITH T-NUT



Idler Assembly



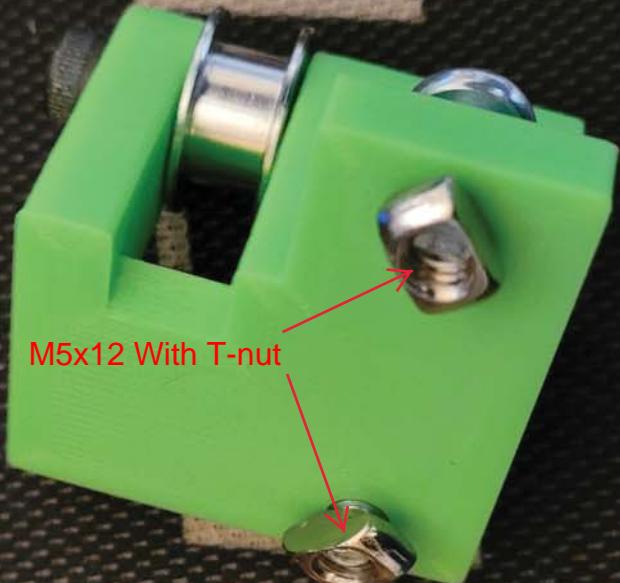


M5 Nut





T



M5x12 With T-nut

N

B

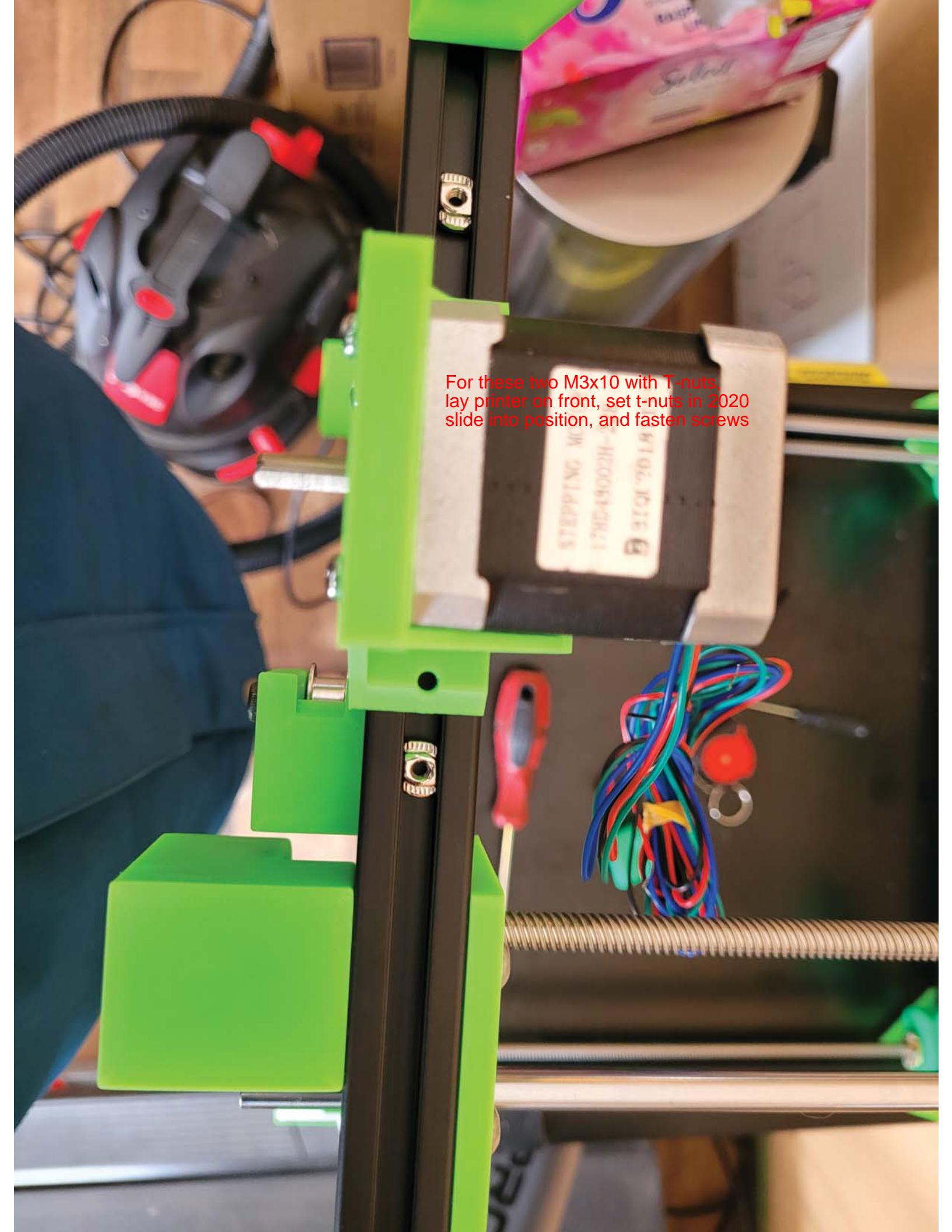
Frame Back



Frame Bottom →

M3x8 With T-nuts

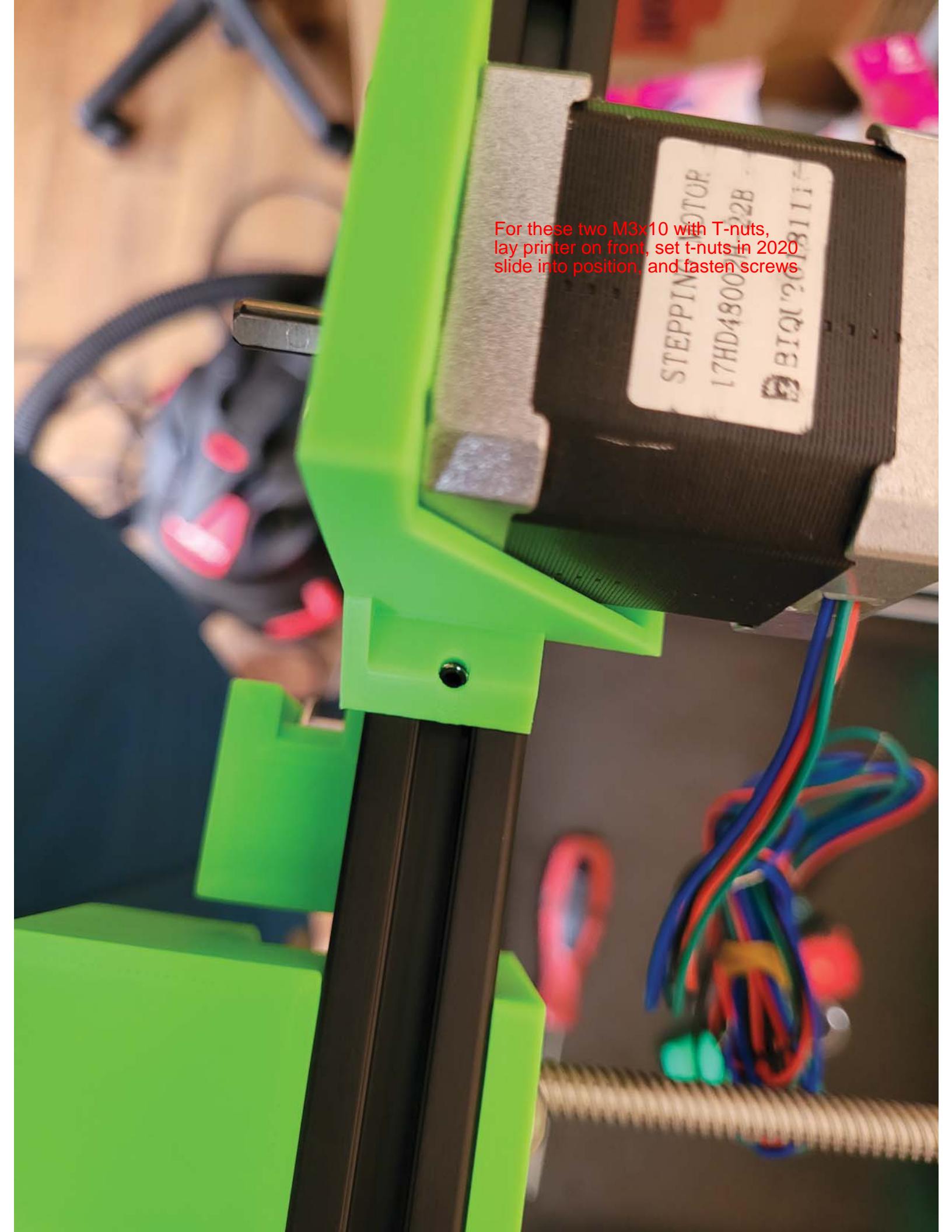
STEPPING MOTOR  
LTHD4800H-32B  
SIGNS111



For these two M3x10 with T-nuts,  
lay printer on front, set t-nuts in 2020  
slide into position, and fasten screws



For these two M3x10 with T-nuts,  
lay printer on front, set t-nuts in 2020  
slide into position, and fasten screws



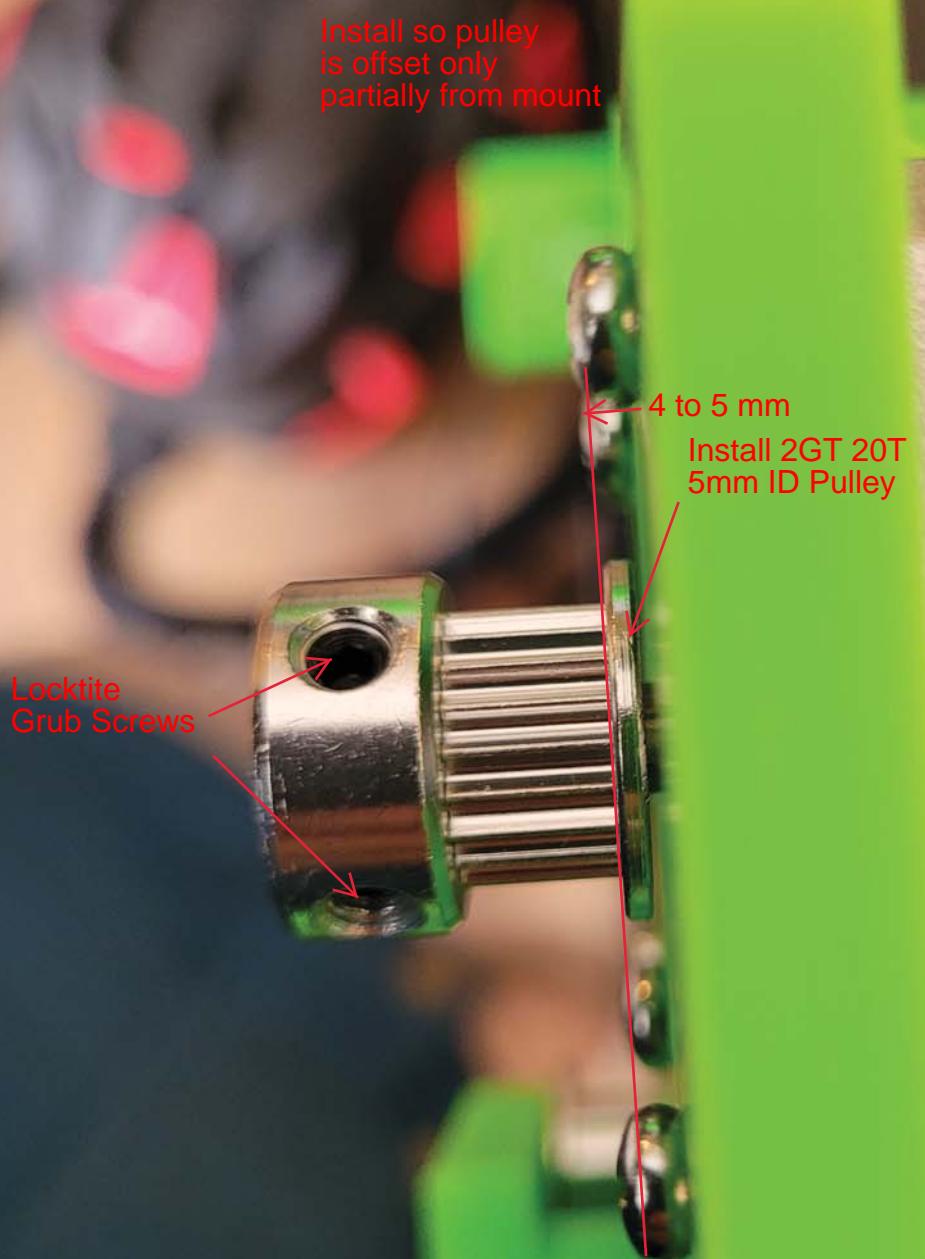
For these two M3x10 with T-nuts,  
lay printer on front, set t-nuts in 2020  
slide into position, and fasten screws

STEPPING MOTOR  
17HD4800/1722B  
BTQI 201311

Z Motor Mount Secured

STEPPING MOTOR  
17HD48002H-22B  
HITACHI 20181111

# STEPPING MOTOR



A close-up photograph of a 3D printer's Z-axis assembly. The assembly consists of a grey metal motor mount at the top, a black belt, and a green plastic tensioner. A multi-colored ribbon cable is visible on the left side. The background shows a pink spool of filament and some wooden boxes.

Z motor and mount location

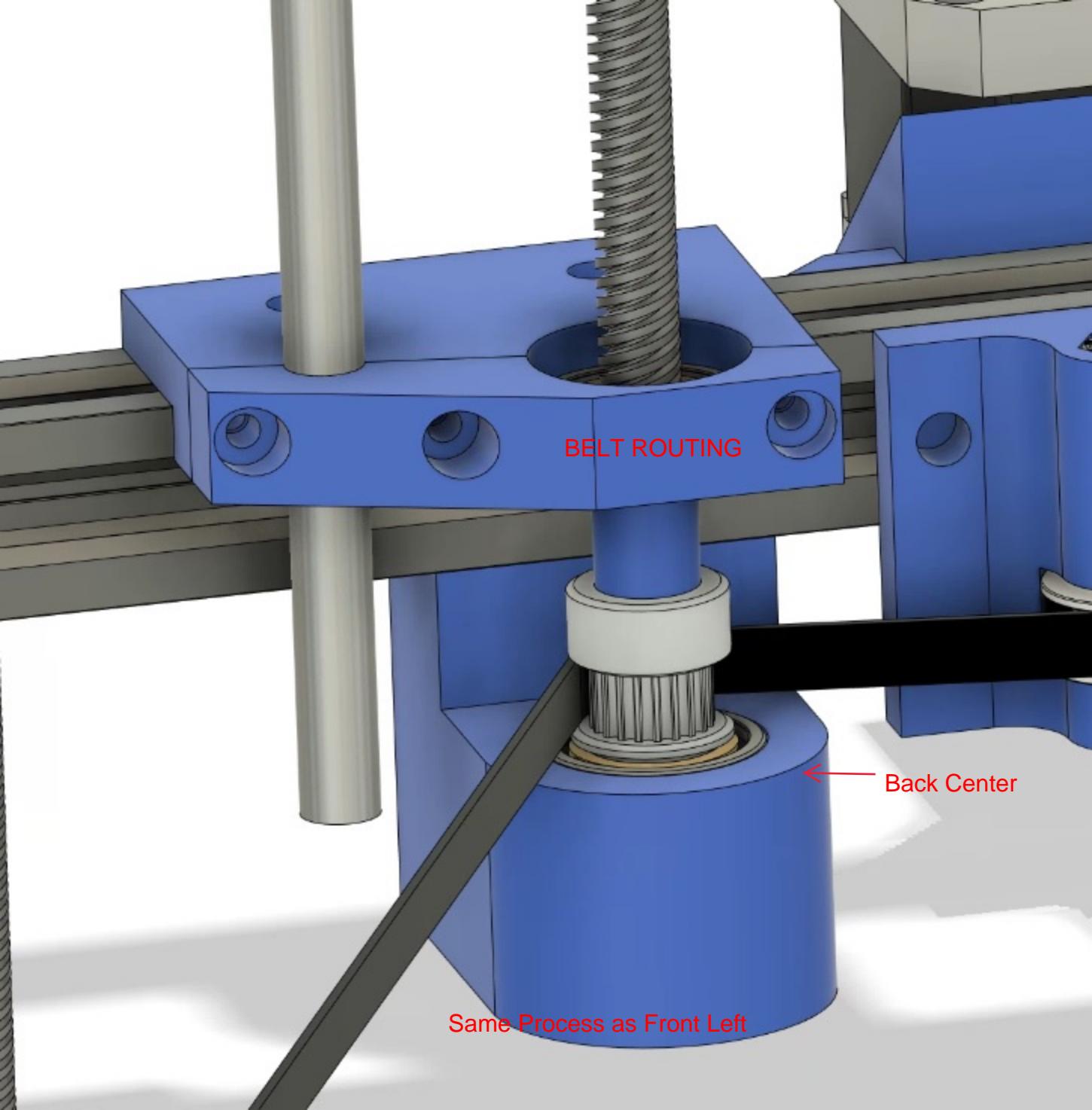
A close-up photograph of a green plastic tensioner installed on a 3D printer's Z-axis. The tensioner is secured with two silver screws. The background is dark, and the assembly is part of a larger green structural frame.

Tensioner Installed

BELT ROUTING

Same Process as Front Left

↗  
Front Right Foot



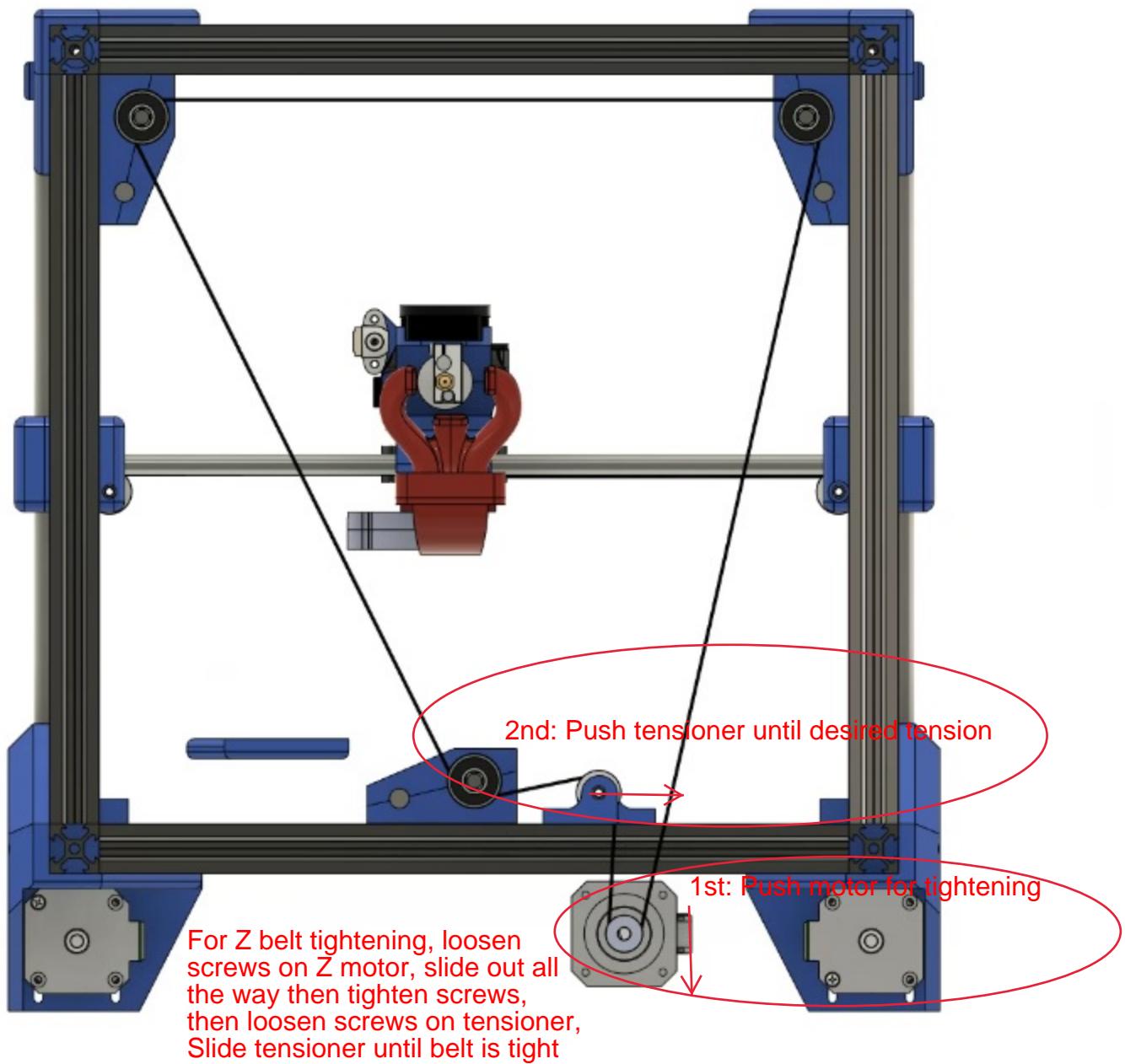
A 3D CAD rendering of a mechanical assembly. It features a blue base plate with three circular holes. A vertical silver cylindrical shaft is positioned on the left, and a vertical grey ribbed cylindrical component is on the right. A black belt is wrapped around a blue cylindrical pulley at the bottom. The text "BELT ROUTING" is displayed in red capital letters above the base plate. A red arrow points from the text "Back Center" to the center of the blue pulley. Another red arrow points from the text "Same Process as Front Left" to the left side of the blue pulley.

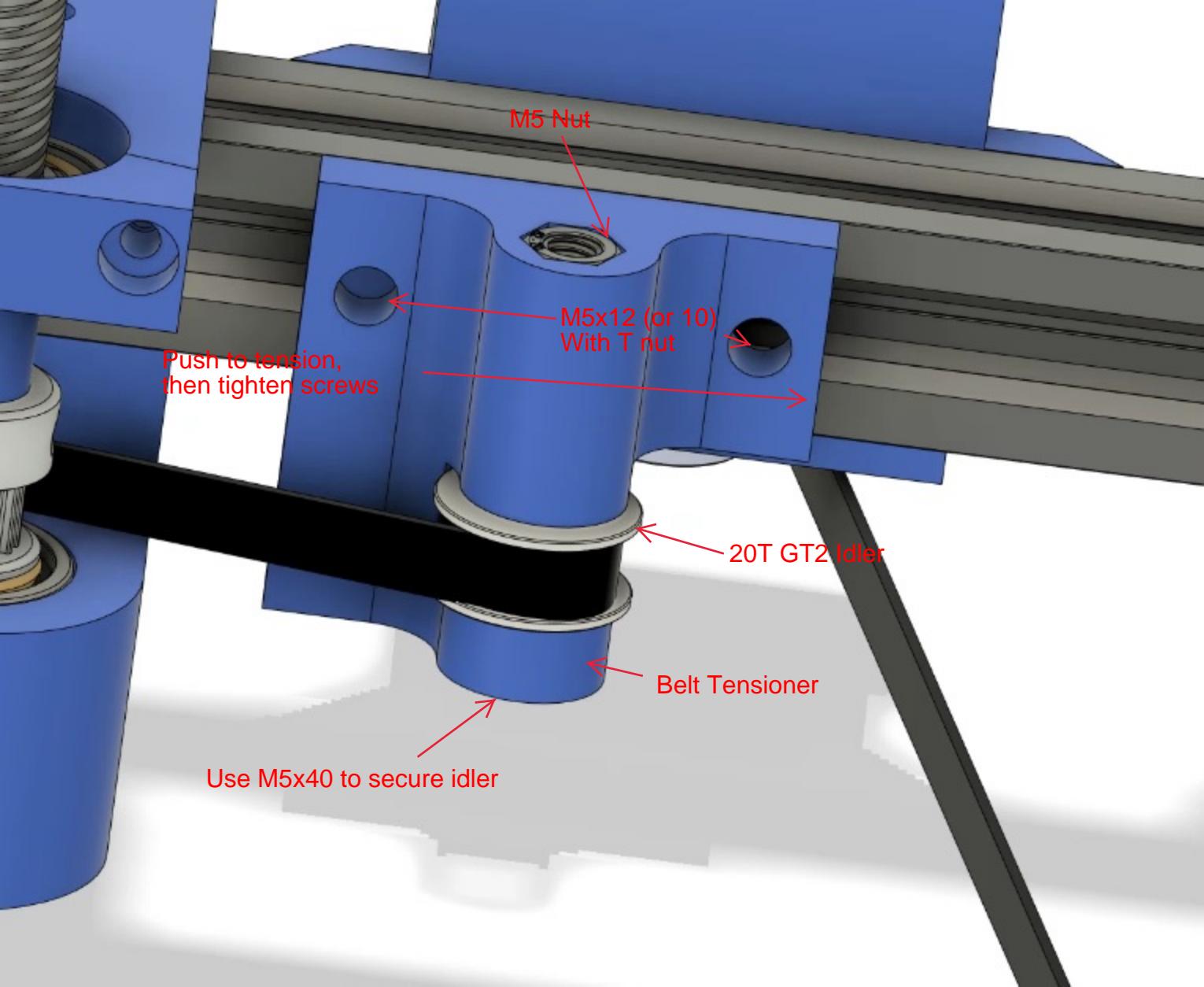
BELT ROUTING

Back Center

Same Process as Front Left

## Z Belt Routing



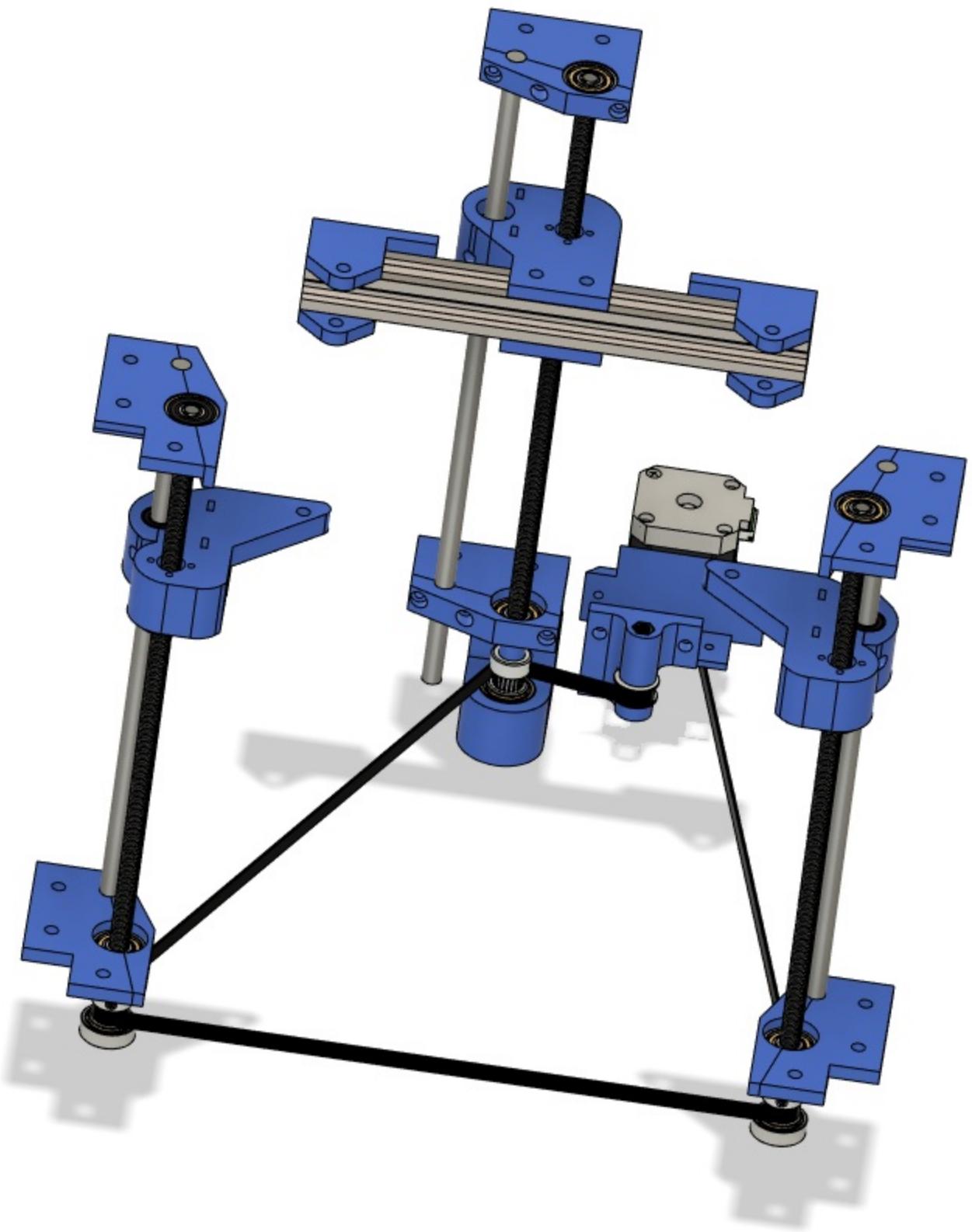


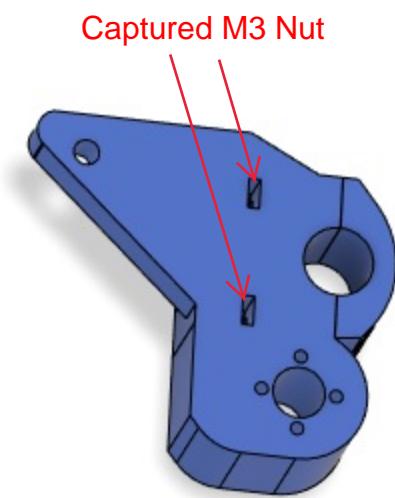
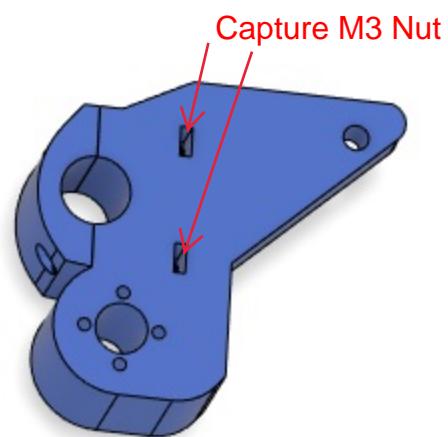
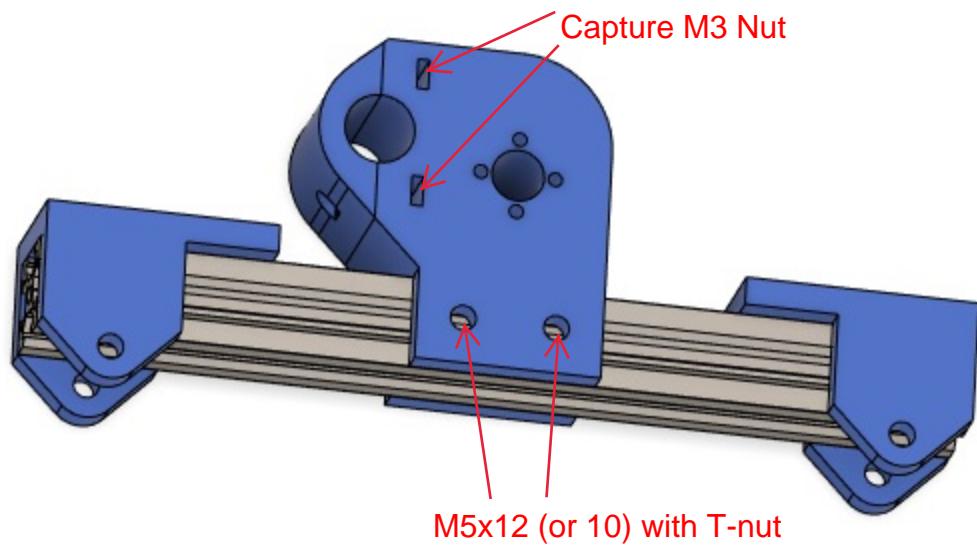
## **Section 5:**

### **Print Bed System**

#### **Components needed for this portion:**

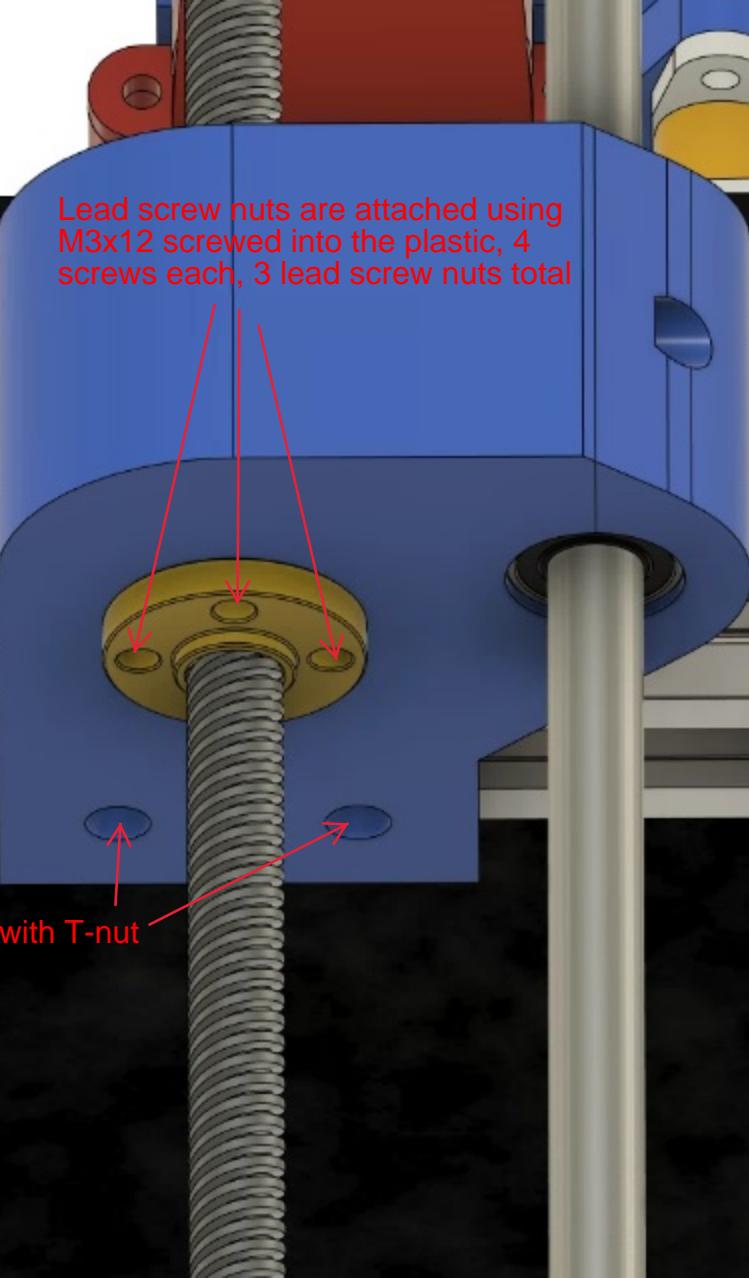
<b>235x235 Ender 3 Heated Bed</b>	<b>x1</b>
<b>M3x30</b>	<b>x6</b>
<b>M3 Nut</b>	<b>x6</b>
<b>M3x12 (or 10)</b>	<b>x12</b>
<b>M5x12 (or 10)</b>	<b>x8</b>
<b>M5 T-nut</b>	<b>x8</b>
<b>M4x40 Recessed Head</b>	<b>x4</b>
<b>M4 Nut</b>	<b>x4</b>
<b>Print Bed Spring</b>	<b>x4</b>





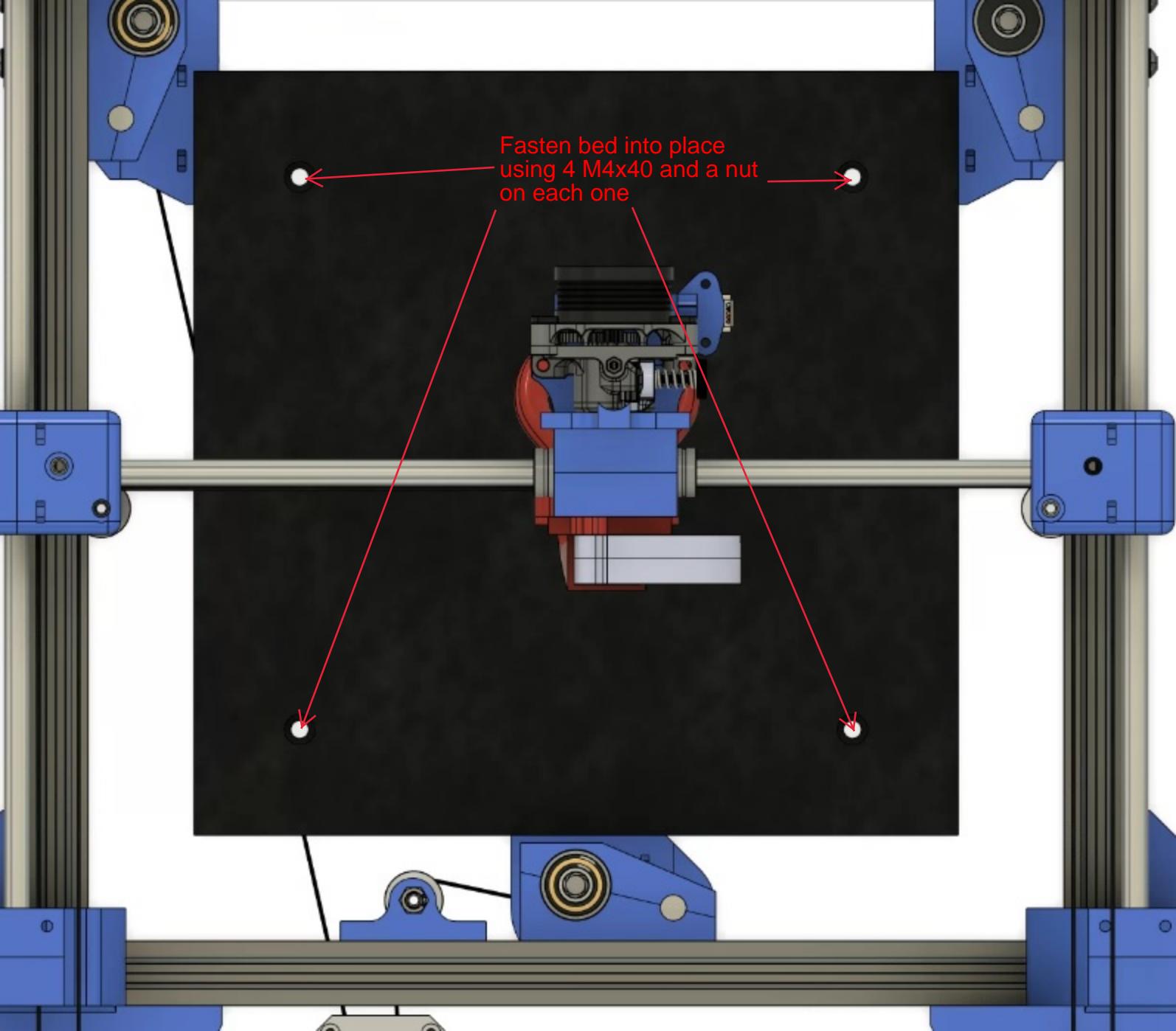


M5x12 (or 10) with T-nut



Lead screw nuts are attached using M3x12 screwed into the plastic, 4 screws each, 3 lead screw nuts total

M5x12 (or 10) with T-nut



Fasten bed into place  
using 4 M4x40 and a nut  
on each one

The diagram shows a black rectangular bed plate positioned between two vertical blue frame structures. A horizontal grey rod passes through the center of the bed plate. Four circular mounting holes are located at the corners of the bed plate. Red arrows point from the text "Fasten bed into place using 4 M4x40 and a nut on each one" to these four holes.

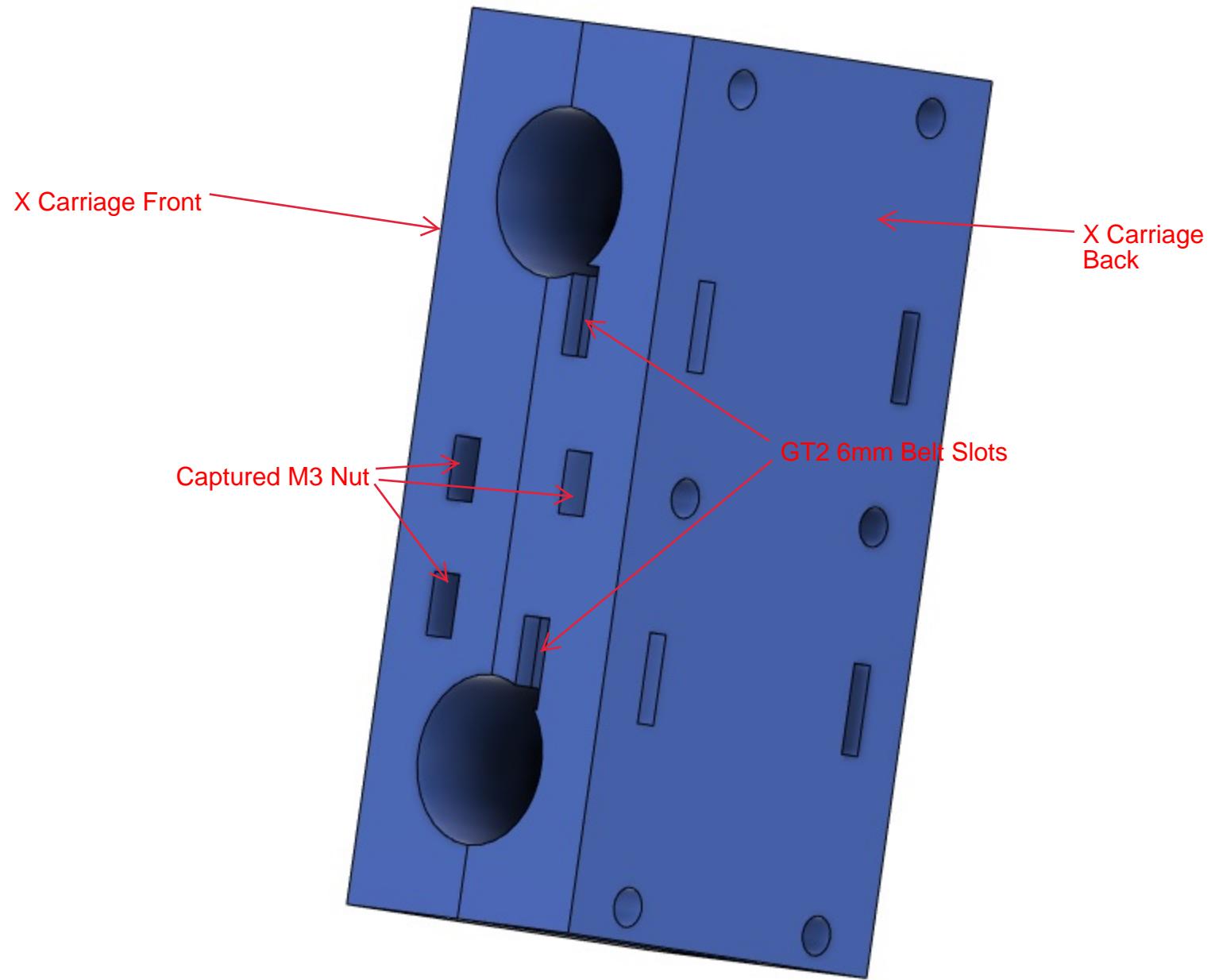
## **Section 6:**

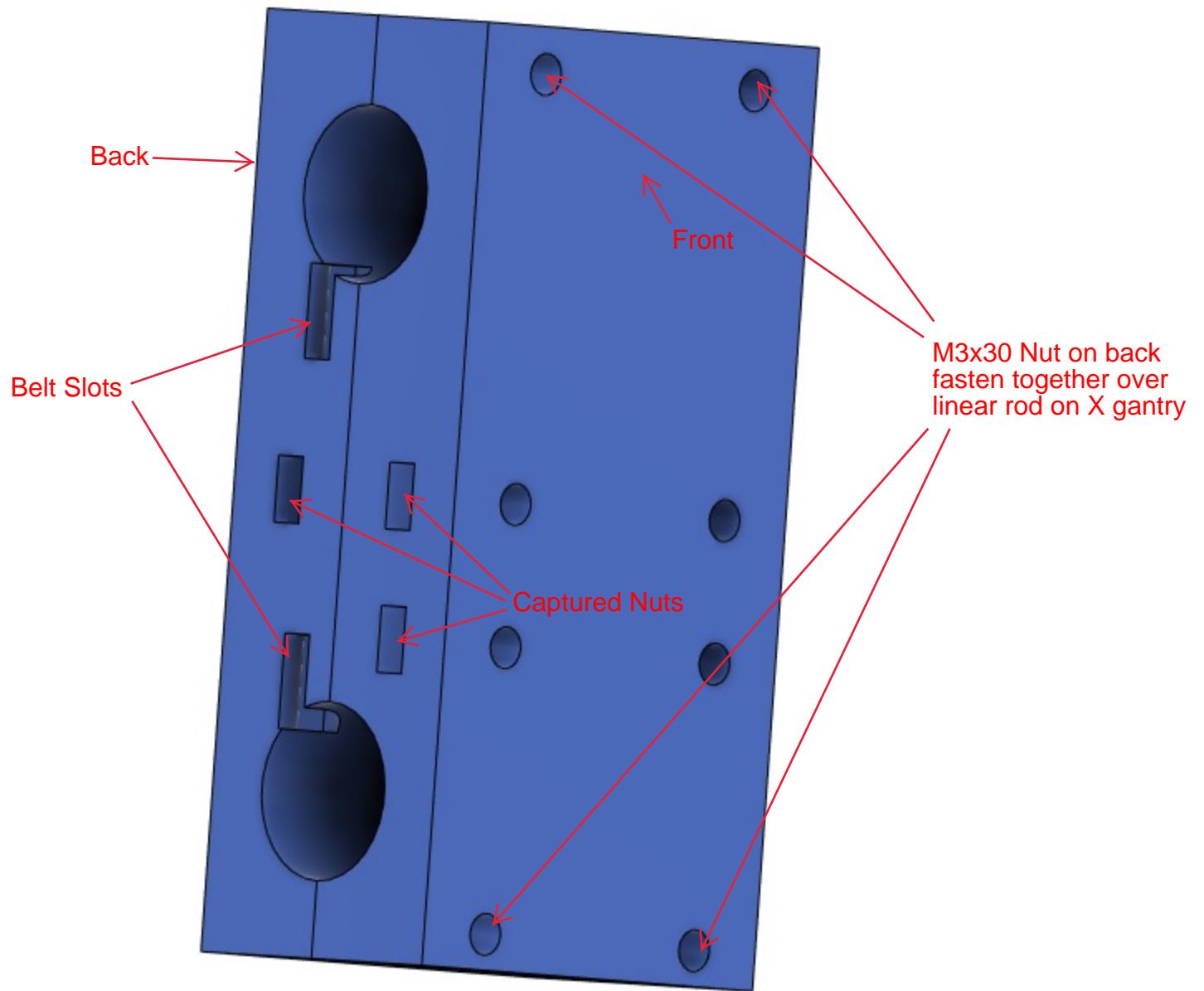
### **Print Head**

#### **Components needed for this portion:**

M3x30	x4
M3x16	x6
M3x20 (or 25)	x3
M3x25	x2
M3x12	x6
M3x10	x2
M3 Nut	x16
3010 24V Fan	x1
5015 24v Blower Fan	x1
J-head (V6) Hot End	x1
Sherpa Mini Extruder	x1
BLTouch	x1





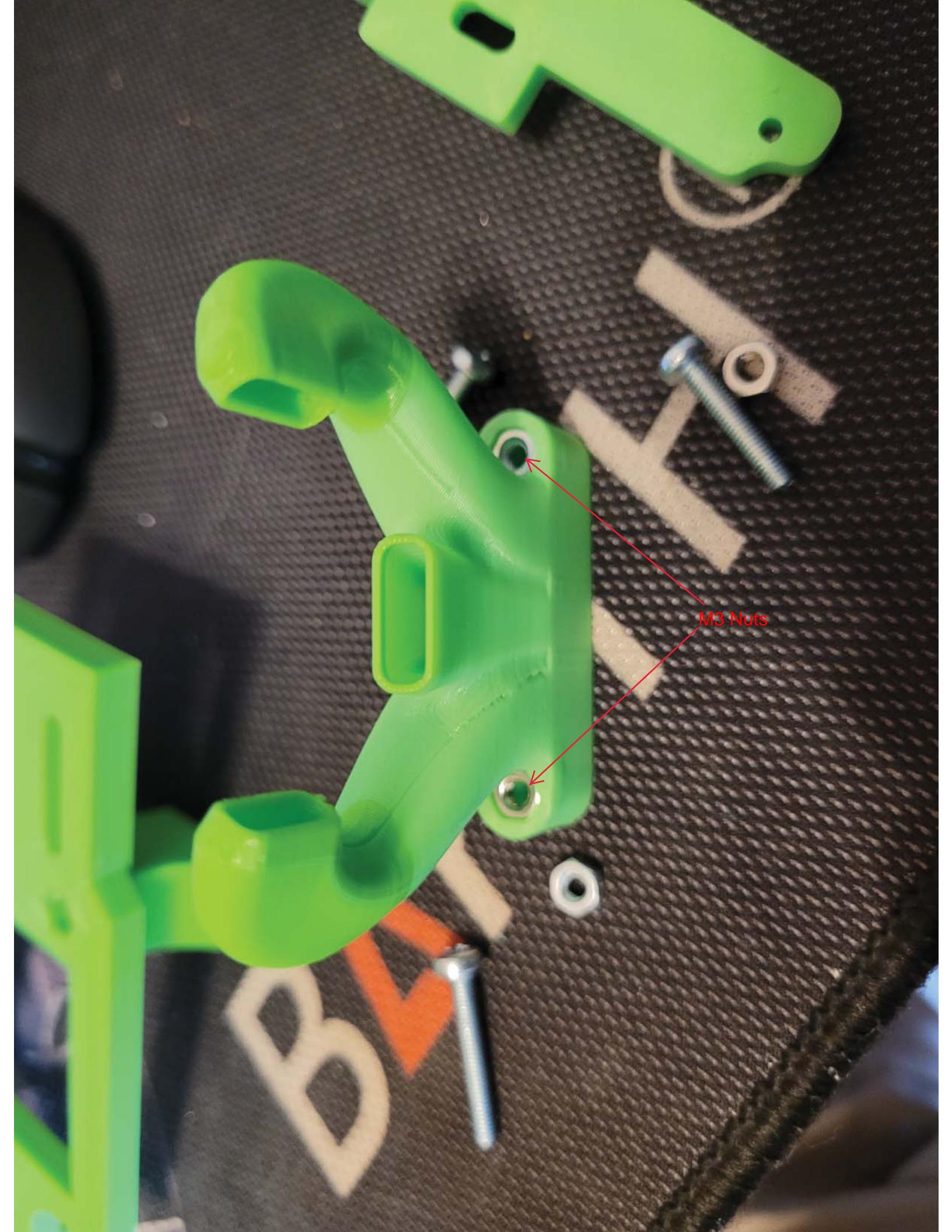


Tri Horn Duct

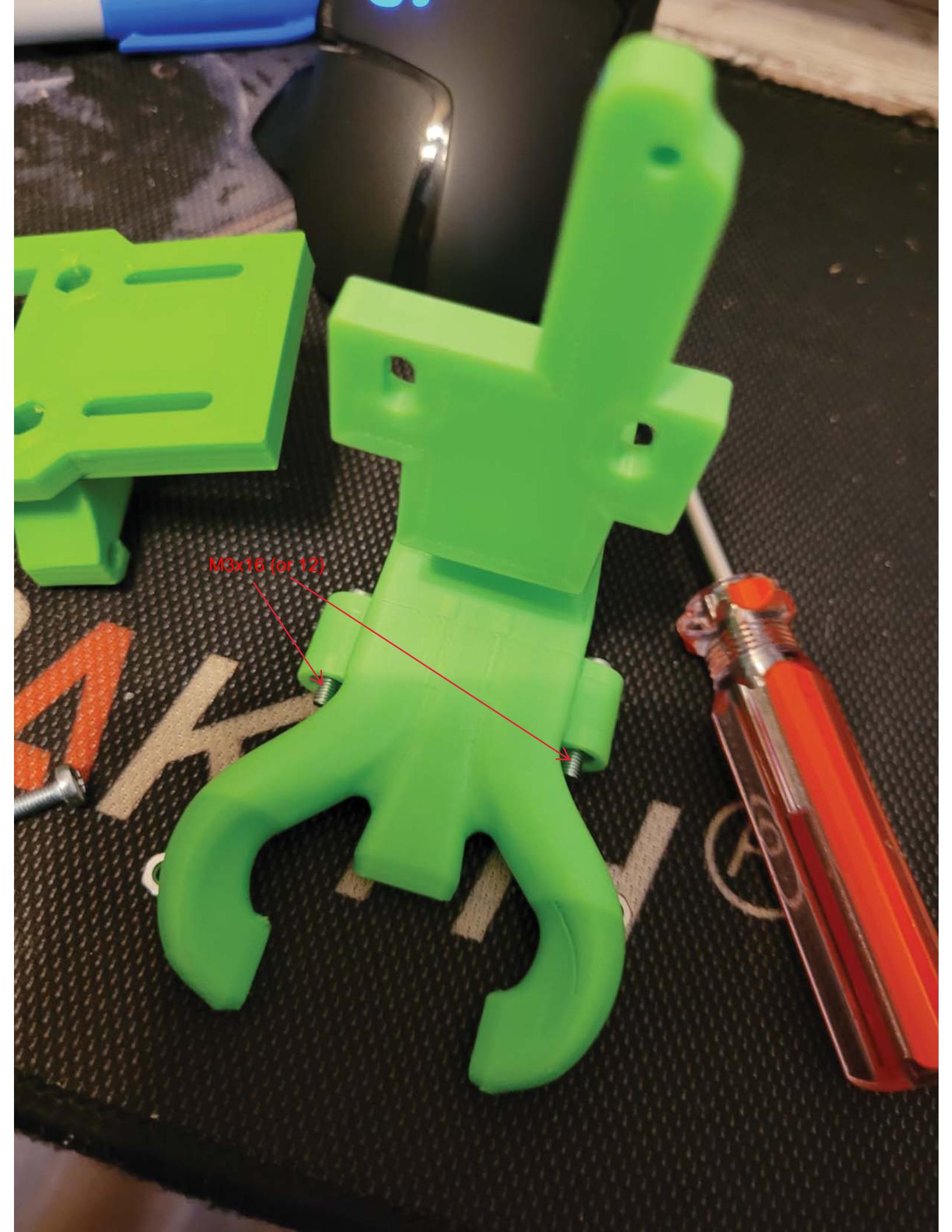
5050 part cooling adapter



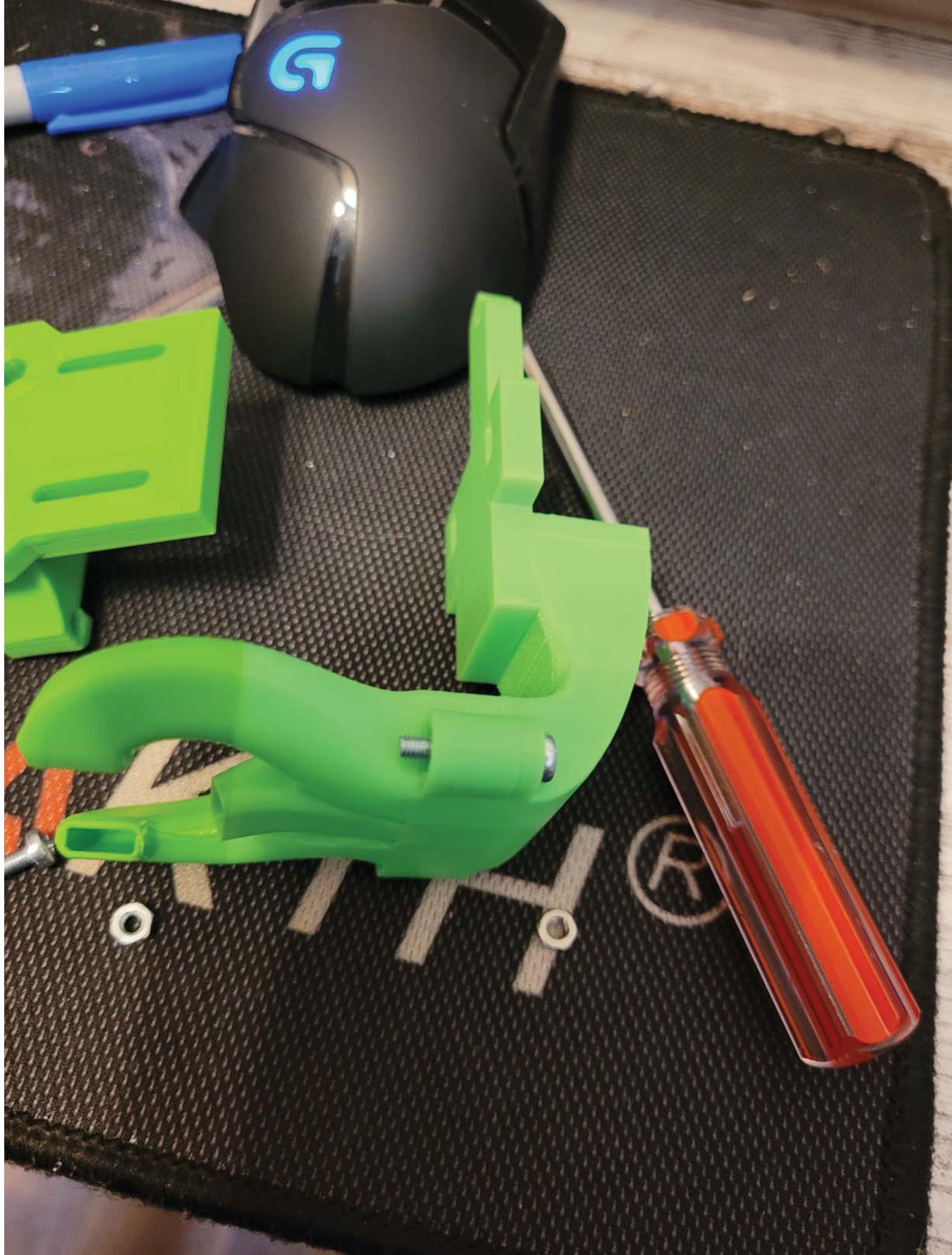
Hotend/Extruder  
Plate

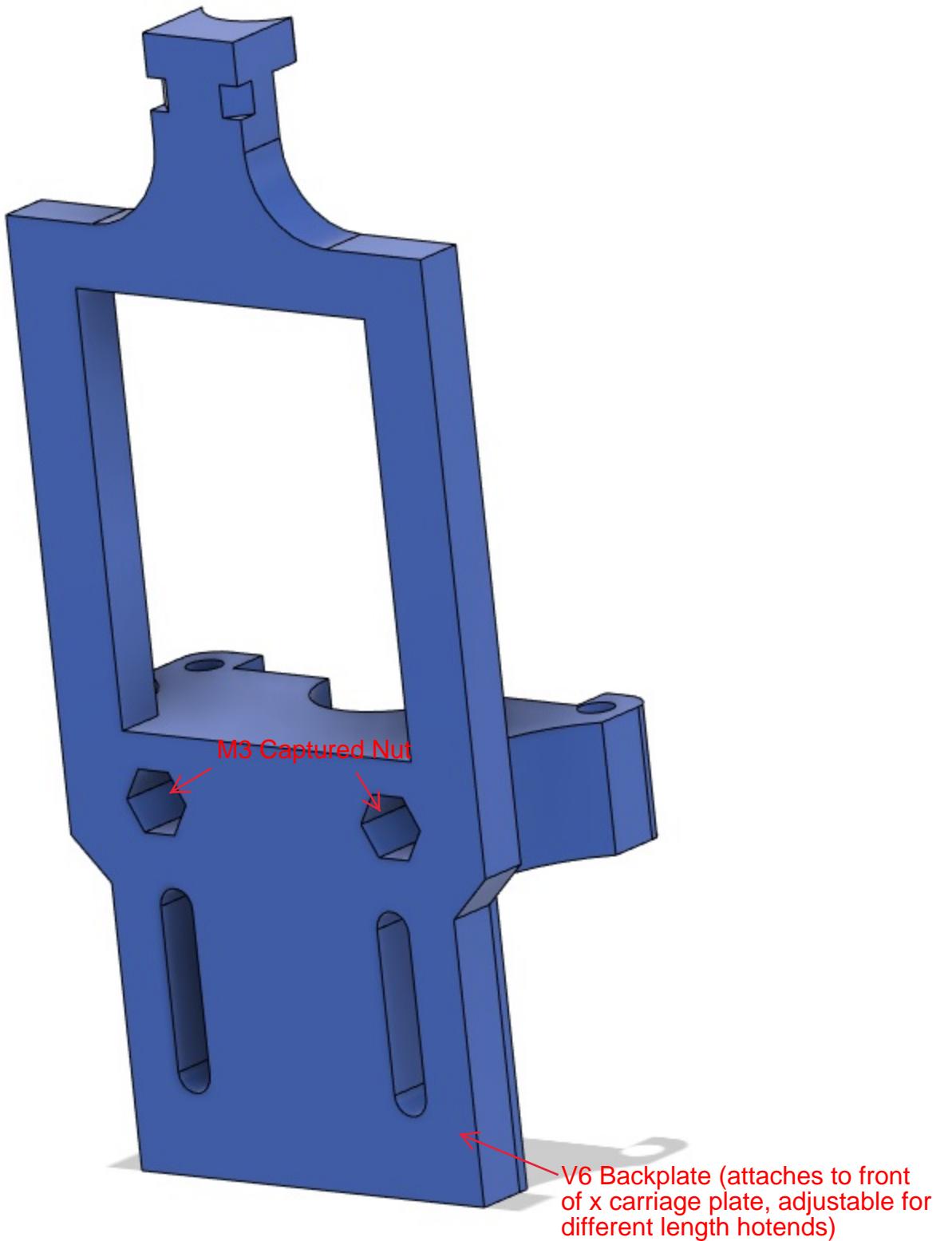


M3 Nuts



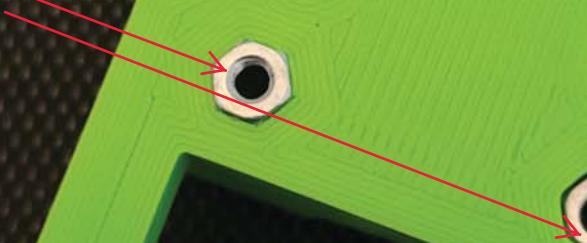
M3x16 (or 12)





M3 Nuts

Set in place,  
use m3x20 to cleanly  
pull the nuts all the  
way into the slots

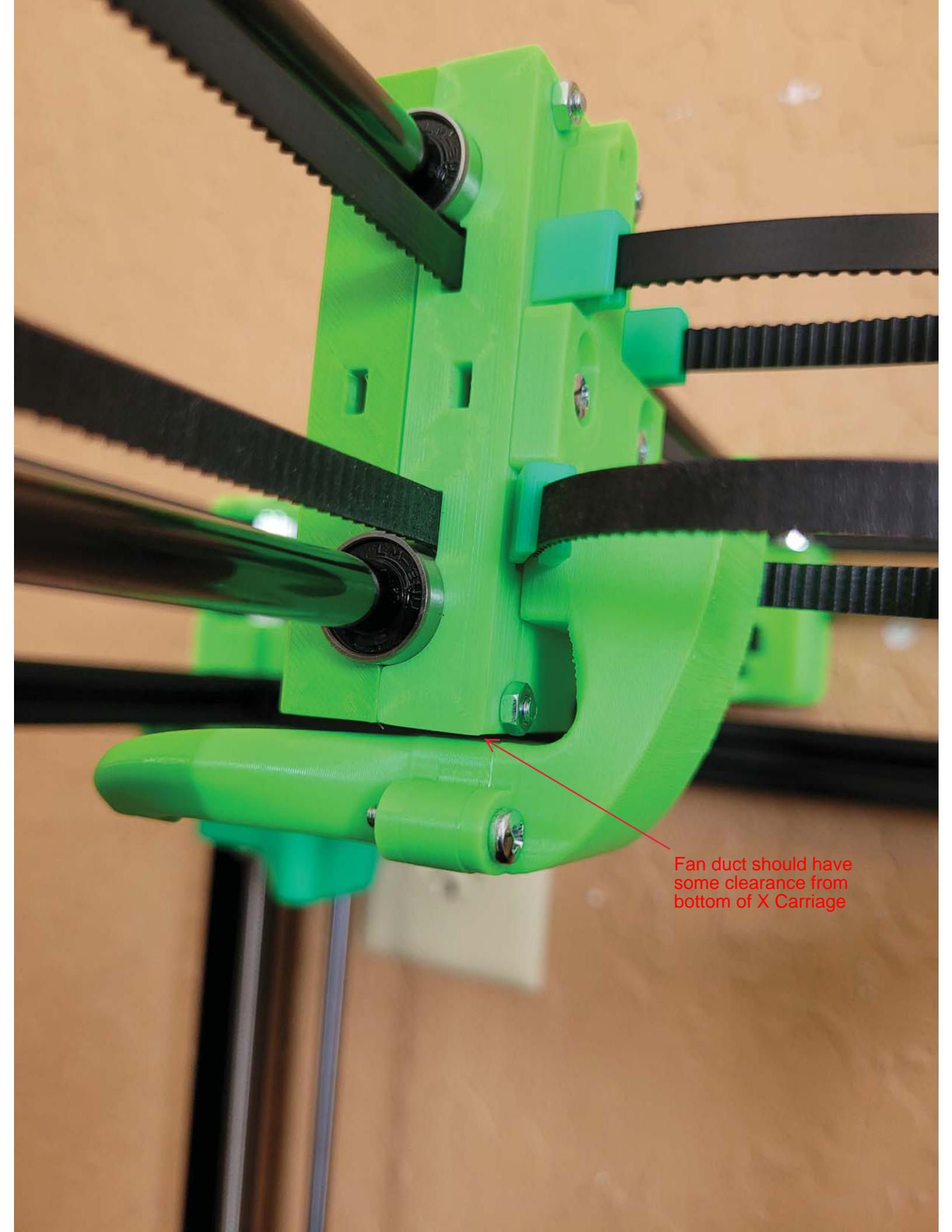


G

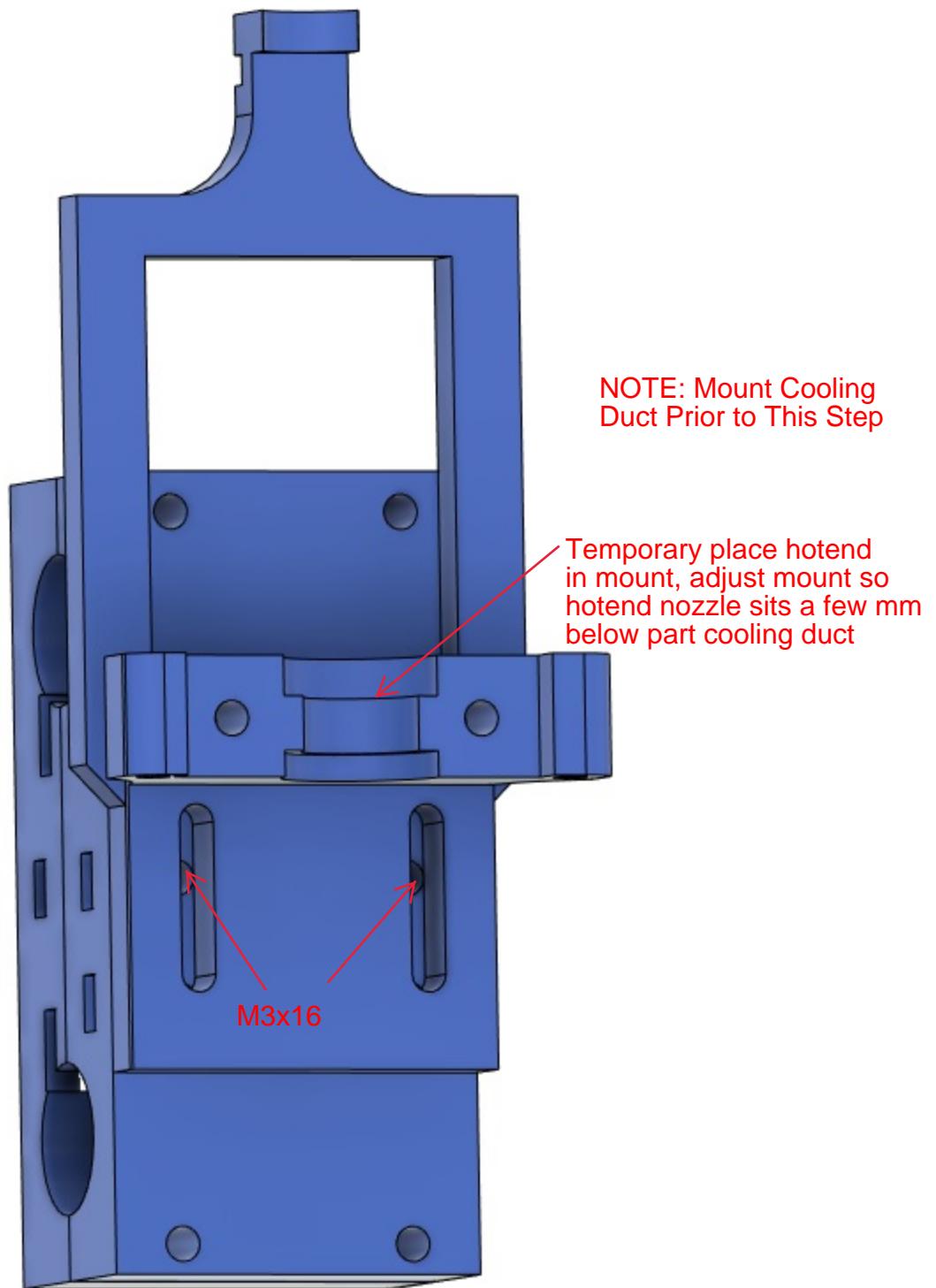
BATHT

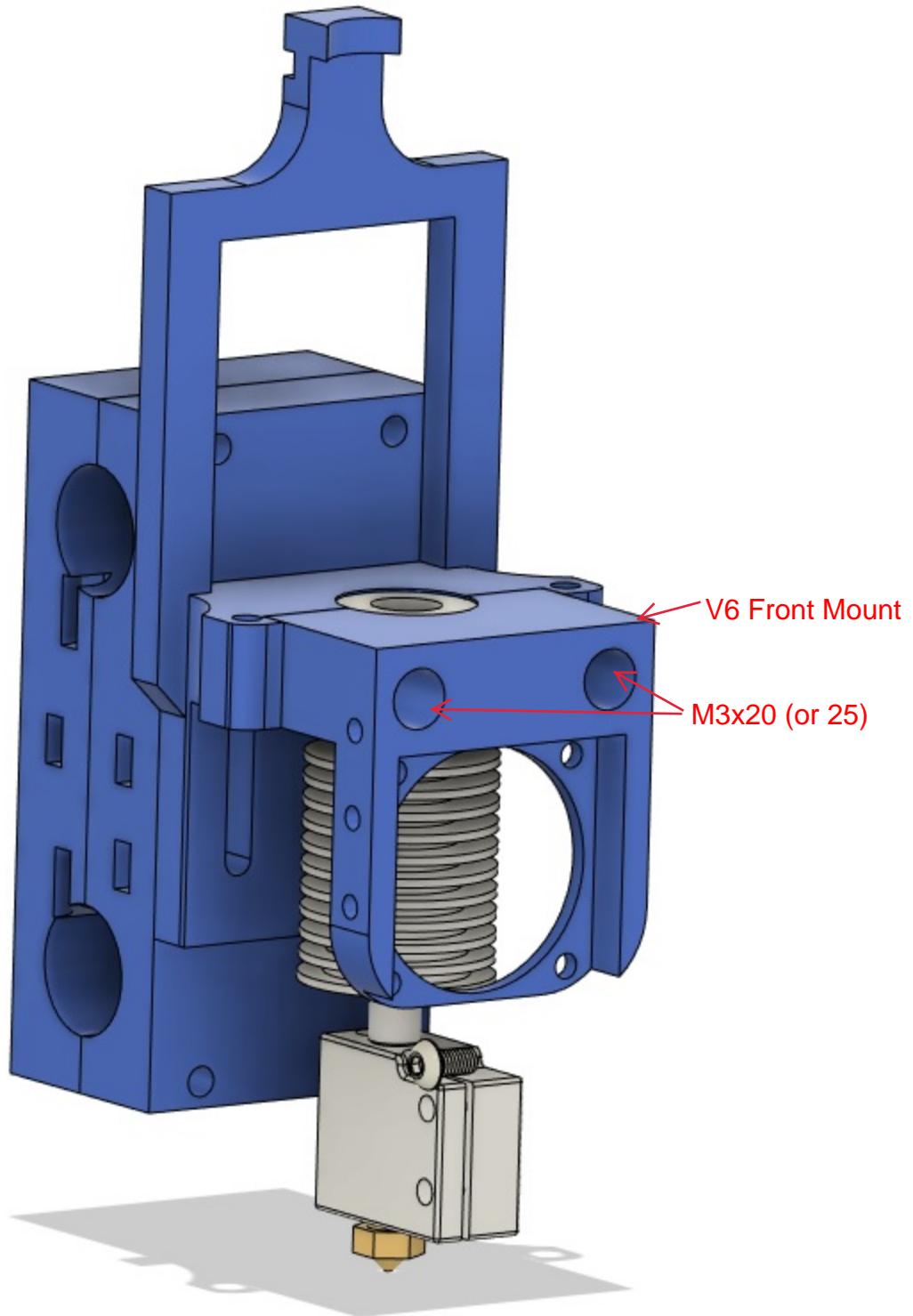
NOTE: You will need to  
bend this belt cap to install  
as show here

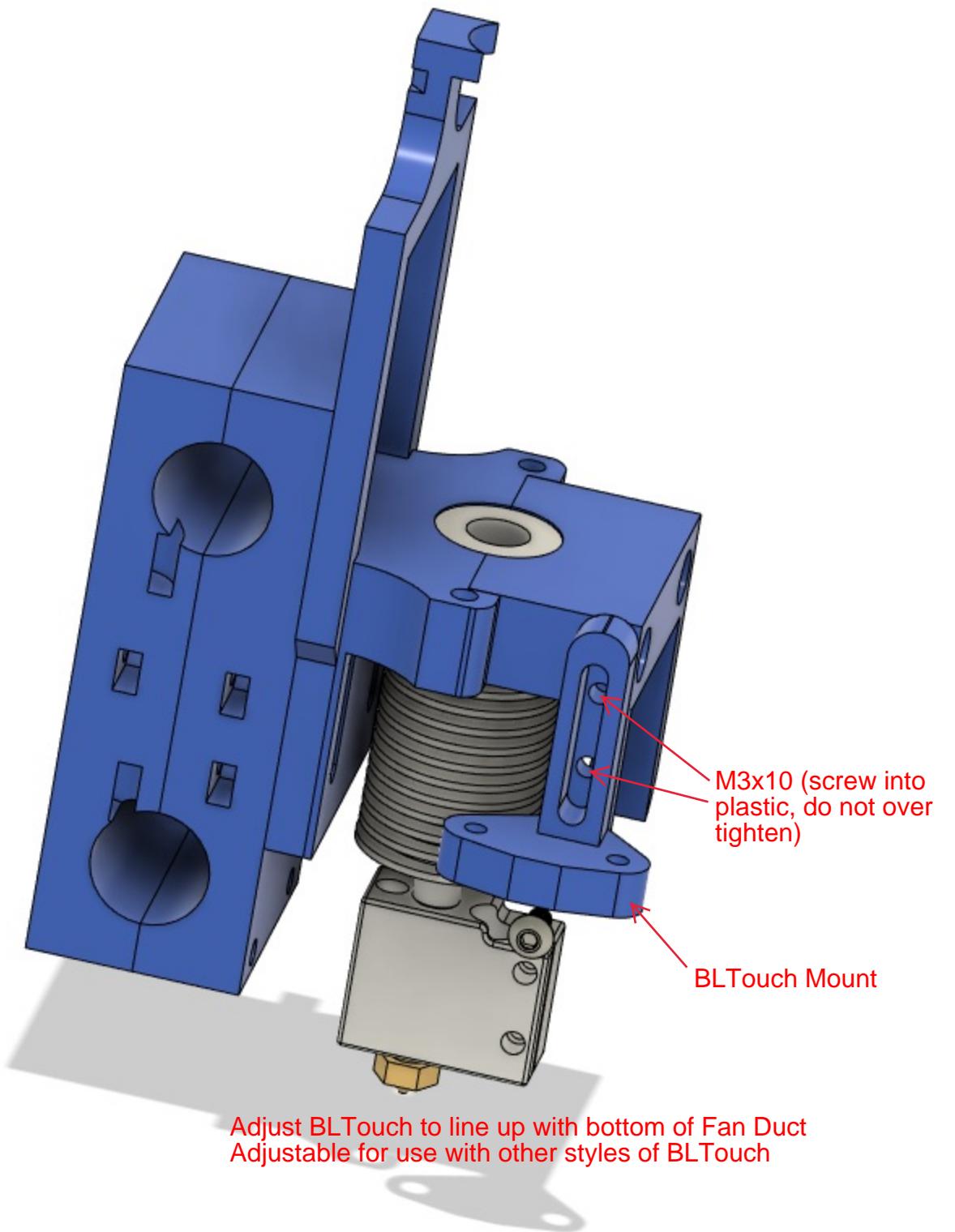
Mount 5015 Adapter with  
2 M3x16 screwed into  
captive M3 Nuts

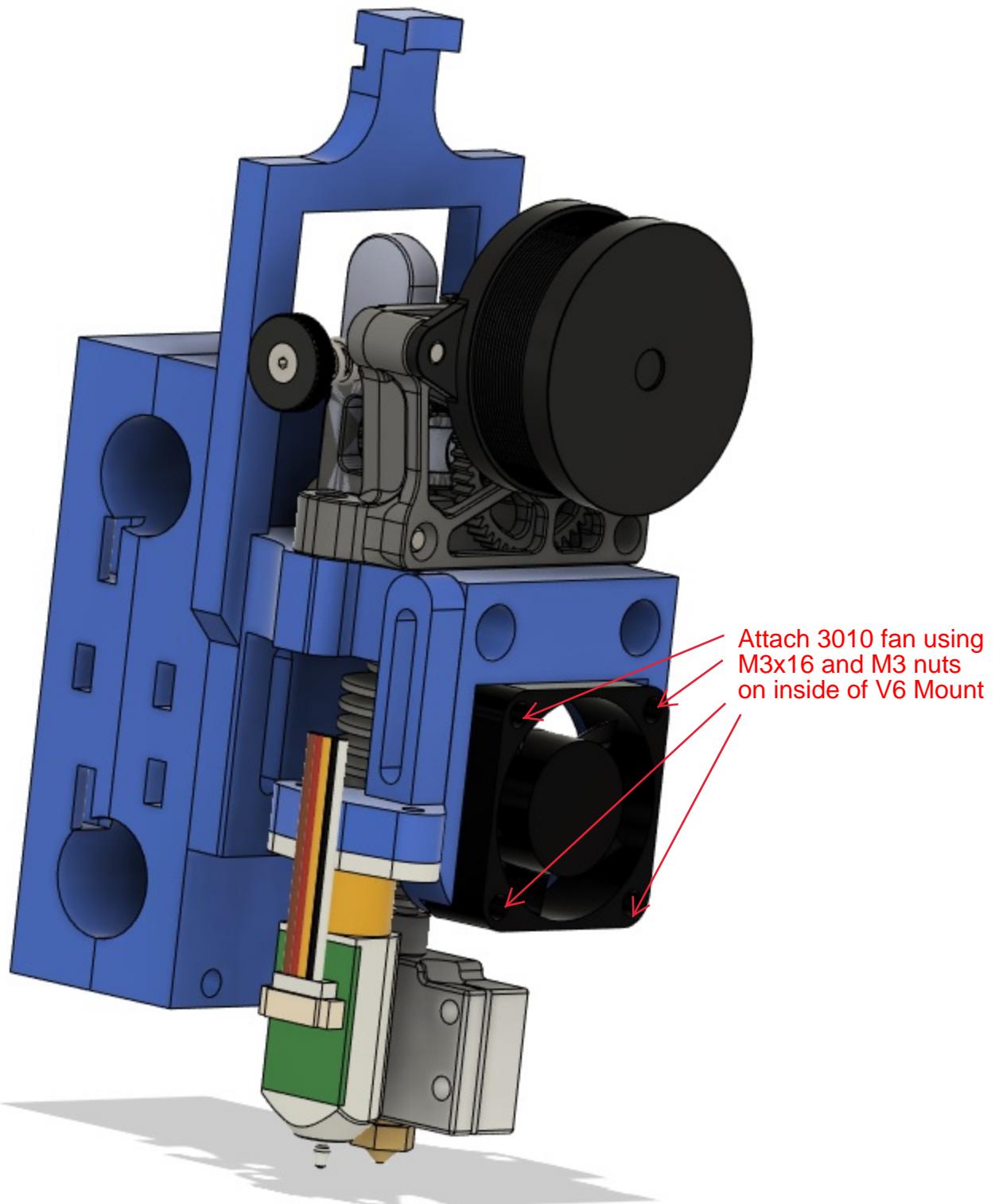


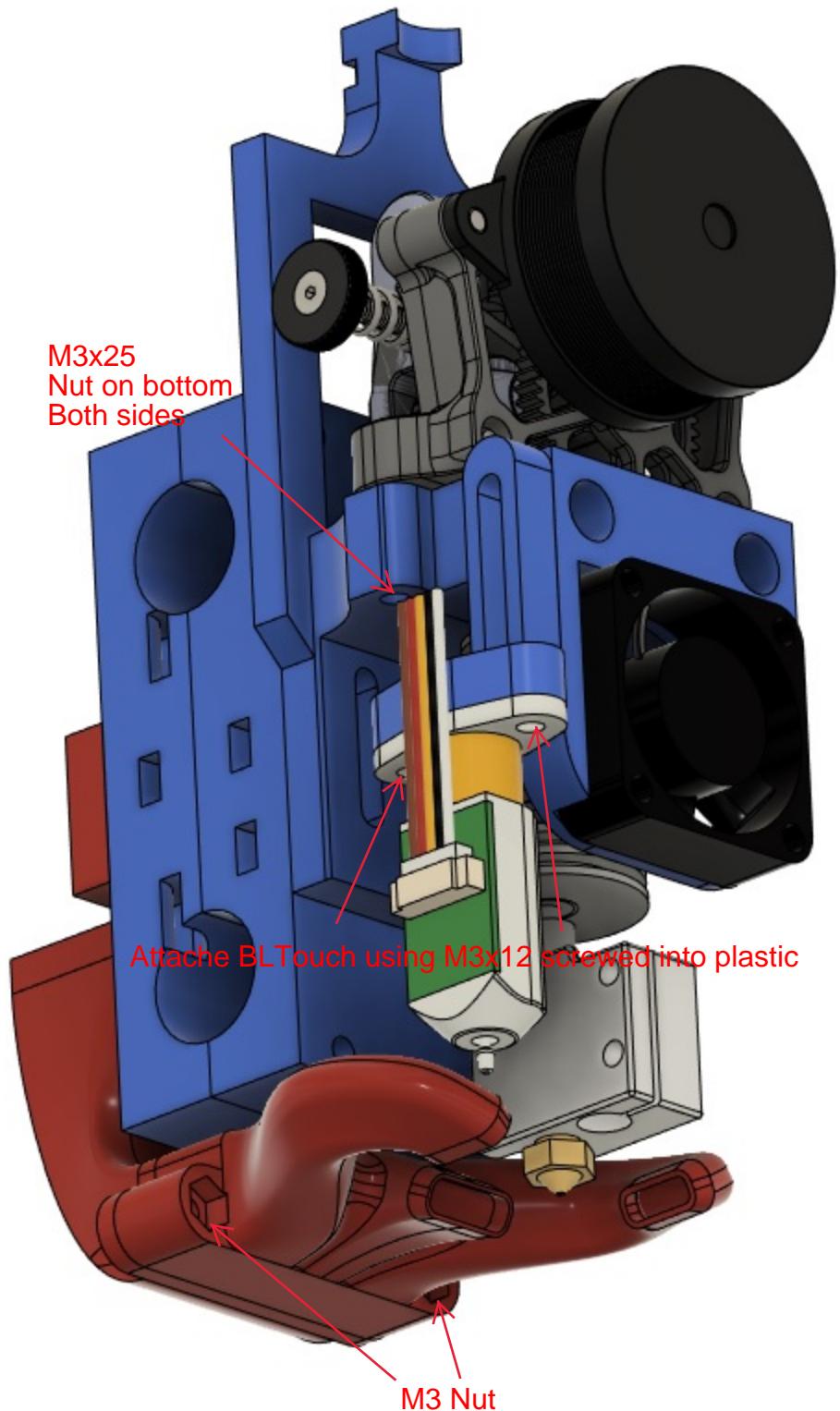
Fan duct should have some clearance from bottom of X Carriage

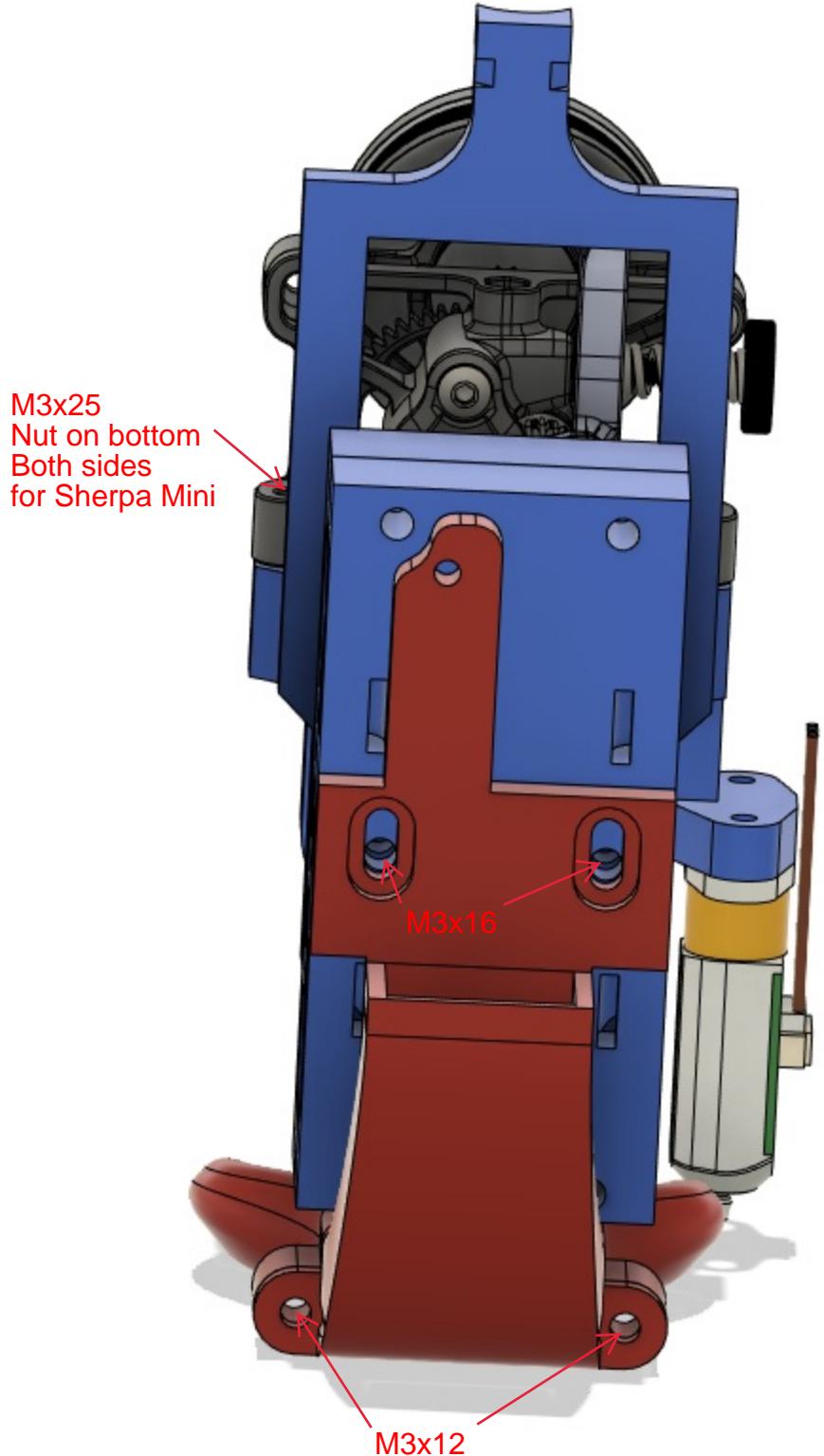


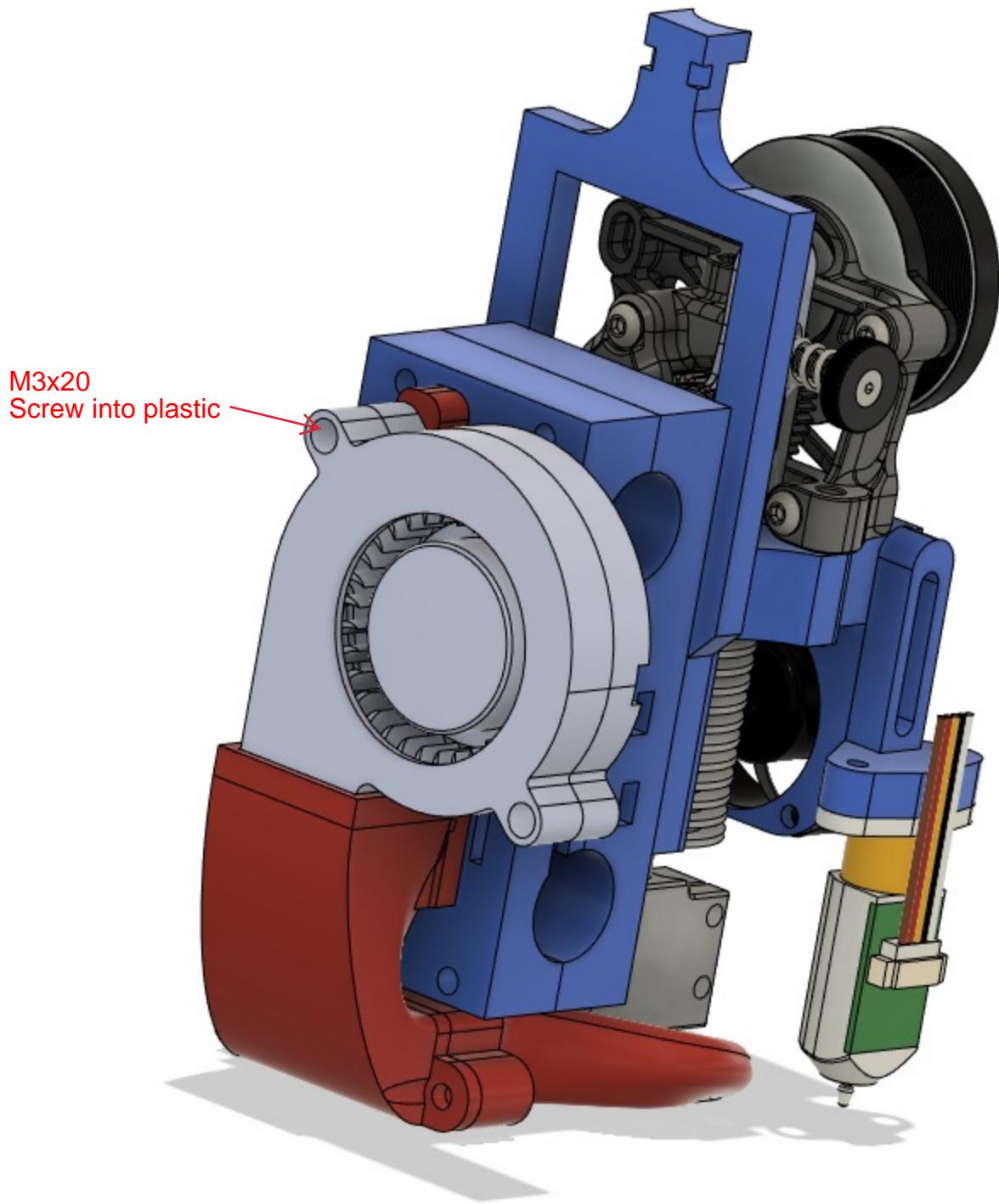












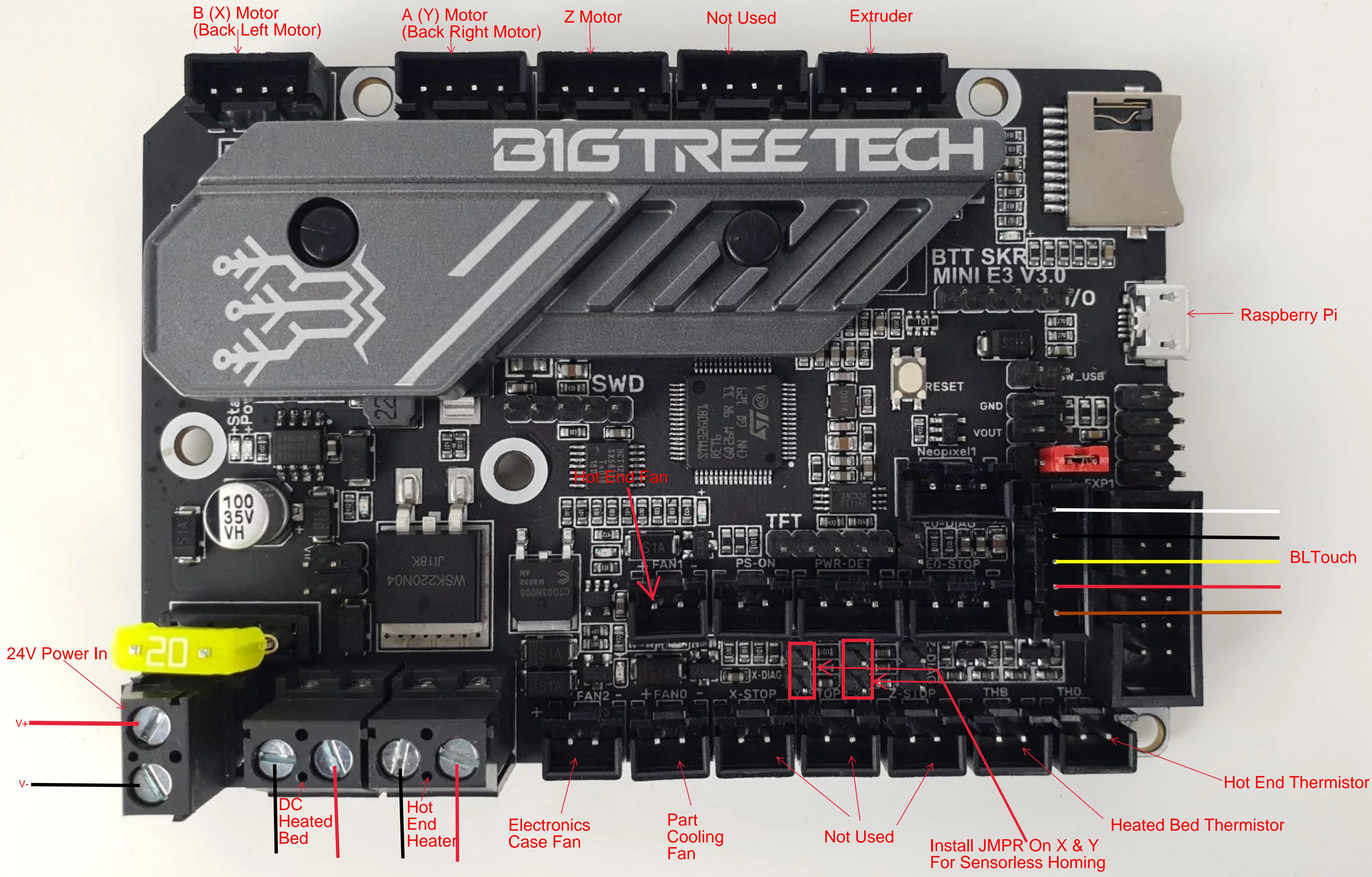
## **Section 7:**

# **Mainboard Wiring Diagram**

**Components needed for this portion:**

**Bigtreetech SKR Mini E3 V3**

**Printer Wired & Wiring to Board**



## **Section 8:**

### **Pi Setup and Firmware Install**

**Components needed for this portion:**

**Micro SD for Pi, and Micro SD for Firmware Flash**

**Computer and Micro SD Reader for Computer**

**Internet Access**

**While I'm sure everyone would love to read 100 or more pages on this, please just use the following YouTube setup guide to walk you through the process of Klipper on your Pi, and flashing your mainboard:**

**[https://www.youtube.com/watch?v=FjMZzW\\_WVQ8](https://www.youtube.com/watch?v=FjMZzW_WVQ8)**

## **Section 9:**

### **Initial Startup**

**Components needed for this portion:**

**Completed Printer, Pi setup and operational, and you PC**

**<https://gadgetangel.org/build/startup/index#initial-startup-checks>**

**Yes, another link.... Why, because Voron has done an excellent job laying out the information in a step by step fashion for easy initial startup. Once the operation is confirmed and operational, use the following link to perfectly tune your new 3d corexy printer.**

**<https://ellis3dp.com/Print-Tuning-Guide/>**

# **LAST PAGE!!!!**

**Congratulations!**

**You now have completed your BugBu, and are hopefully getting great prints, at fast speeds, and smiling ear to ear!**

If you made it this far, and you thought the information was informative and the project was fun, please consider donating.... SOME OF YOUR TIME.... Helping others get the same enjoyment.

Remember, we are a community built upon a foundation of experimentation and idea sharing, so please consider helping others on their journey, and always know, no one began as a professional, and everyone including me and you started at the beginning as the annoying new guy. So please also be respectful.

Sincerely,

**Rolls17, Chewy240, and Computermedic78**