

FT-5 R2

Assembly and Setup Manual v1.0 (WIP) 12-04-17

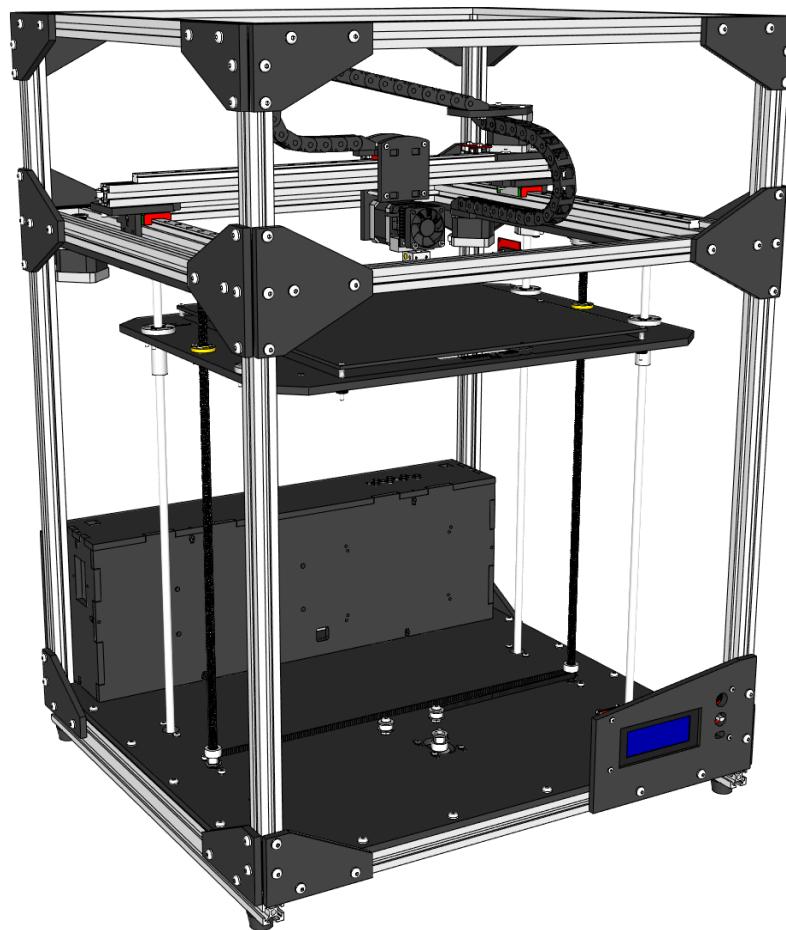


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Assembly

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Introduction

Congratulations! If you are looking over this manual it means that you are the proud owner of a Folger Tech FT-5 R2 3D printer.

Our goal as a company is to provide affordable 3D printers to consumers worldwide. On top of this, we want everyone's first printing experience to be a great one. So this User Manual was assembled to provide guidance in assembling and understanding common procedures while using this printer. It covers everything from assembly to the maintenance required to keep the printer performing like new.

The FT-5 R2 addresses a lot of the feedback from the community concerning the original FT-5's design.

Some of these changes are:

- Single Z stepper to improve bed level accuracy.
- Replaced all of the melamine parts with ACM.
- Redesigned the carriage to make attachment changes much easier.
- Updated the idler pulleys to be much more robust.
- 24v system to make the steppers run better and bed heating faster and more stable.
- Plus many other enhancements

Contacting Folger Tech

We understand that this manual only covers the basics of your Folger Tech kit. If at any time you need more assistance, visit our support page at Folger Tech Support to send us a message or give us a call at (888) 397-8160 and we will be happy to address your question or concern.

DISCLAIMER OF LIABILITY: FOLGER TECHNOLOGIES LLC specifically DISCLAIMS LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES and assumes no responsibility or liability for any loss or damage suffered by any person as a result of the use or misuse of any of the provided information or product. FOLGER TECHNOLOGIES LLC assumes or undertakes NO LIABILITY for any loss or damage suffered as a result of the use, misuse or reliance on the information and or product. **USE AT YOUR OWN RISK:** Never leave your printer unattended.

WIP (work in progress) Disclaimer

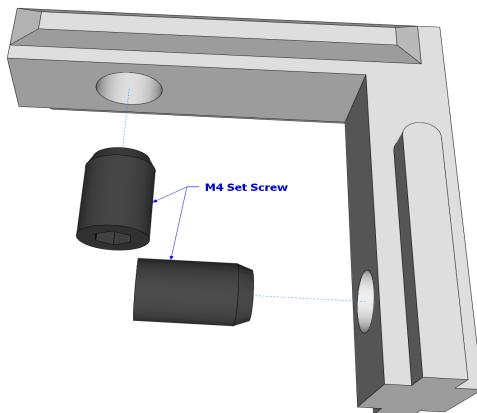
This manual has been released as a WIP document. Folger Technologies LLC shall not be held responsible for any errors in this manual and it should be taken as a rough guide to aid in the assembly of the kit.

Being a WIP document, you should not expect it to be complete, correct, or a replacement for an officially released manual. Any or all of this document can be changed or removed at any point without notice. If you choose to follow this WIP manual, we recommend you keep checking back as we release more current and complete versions on a regular basis.

If you find something that you think should be changed or is unclear, do not hesitate to contact us with your feedback so that we can improve the official release.

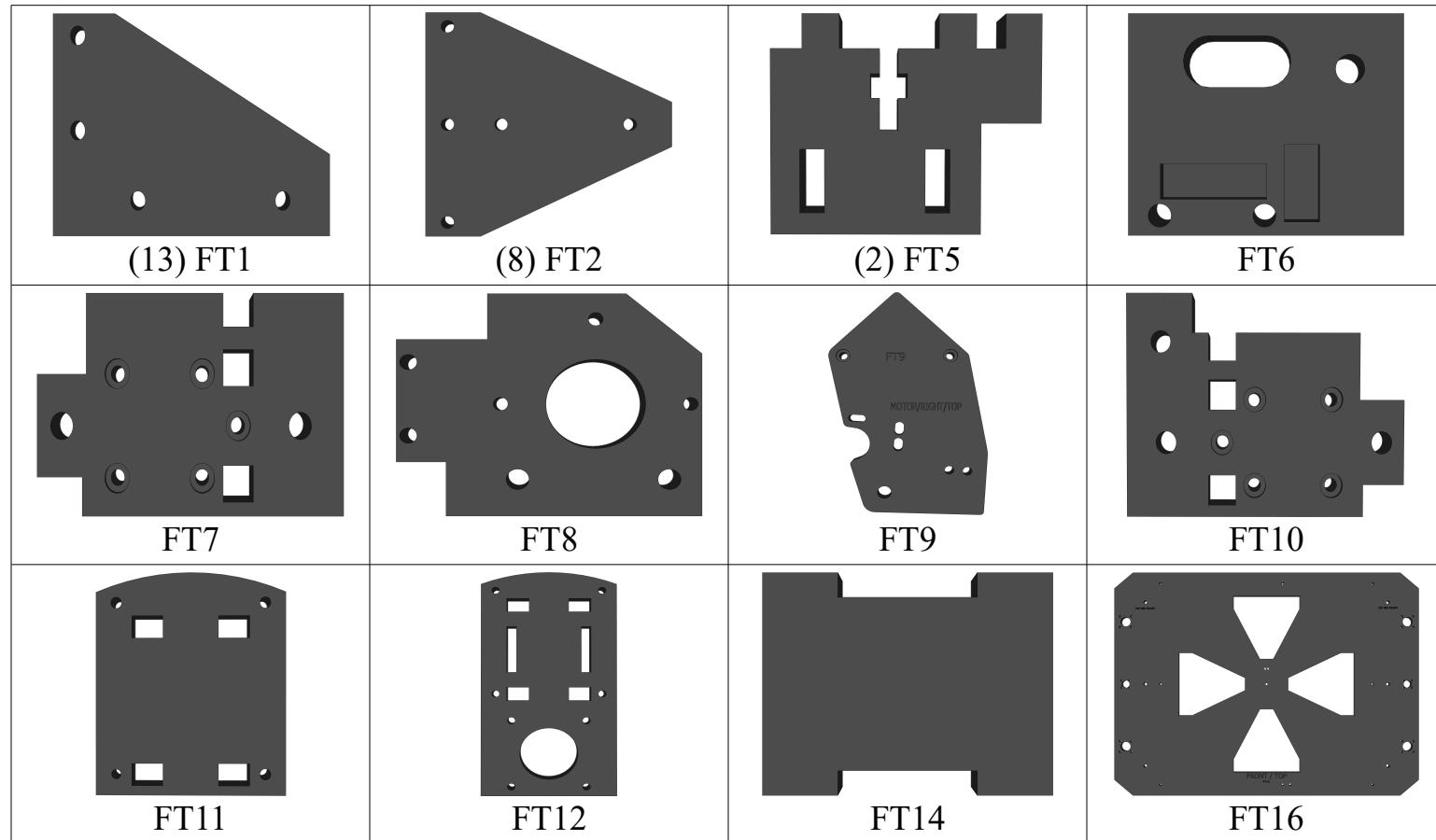
Preparation and Tips

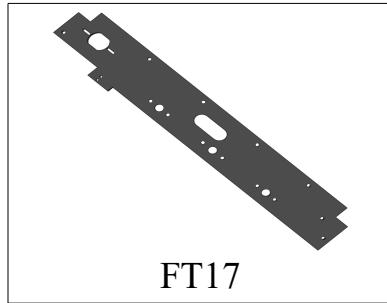
- Unwrap and lay out all of the parts in the box
- Pull off all of the protective film on the ACM parts and verify with the list on the next page
- Verify all of the hardware listed on the hardware bags are included (there will be extras)
- We recommend sorting the hardware into containers to make identification faster during the build
- Pull off the film and remove all of the cutting particles from the 2020 and 2040 beams
- Make sure you have a large, clear, and flat surface to build on
- Go slow and check your work, rushing could cause issues in print quality and operation
- Make sure there is no damage on any parts and report any issues to us right away
- Be careful when handling the ACM parts, the edges are sharp



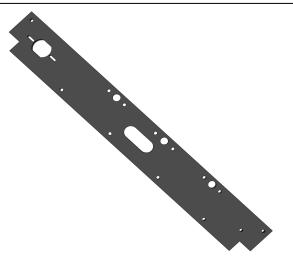
Install (2) M4 set screws into each of the (4) L brackets

ACM Parts List

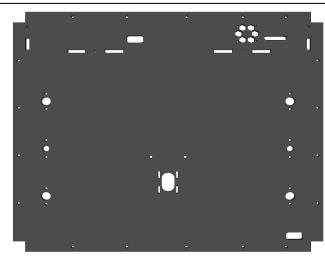




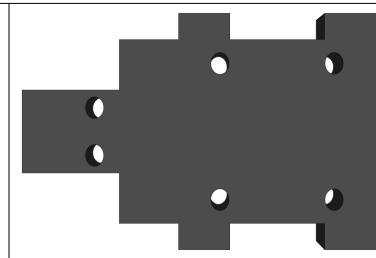
FT17



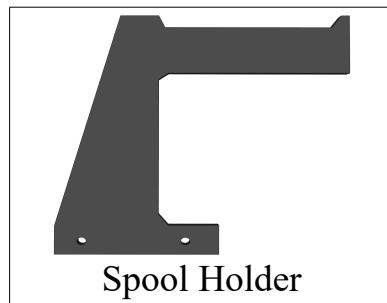
FT18



FT23



FT27



Spool Holder

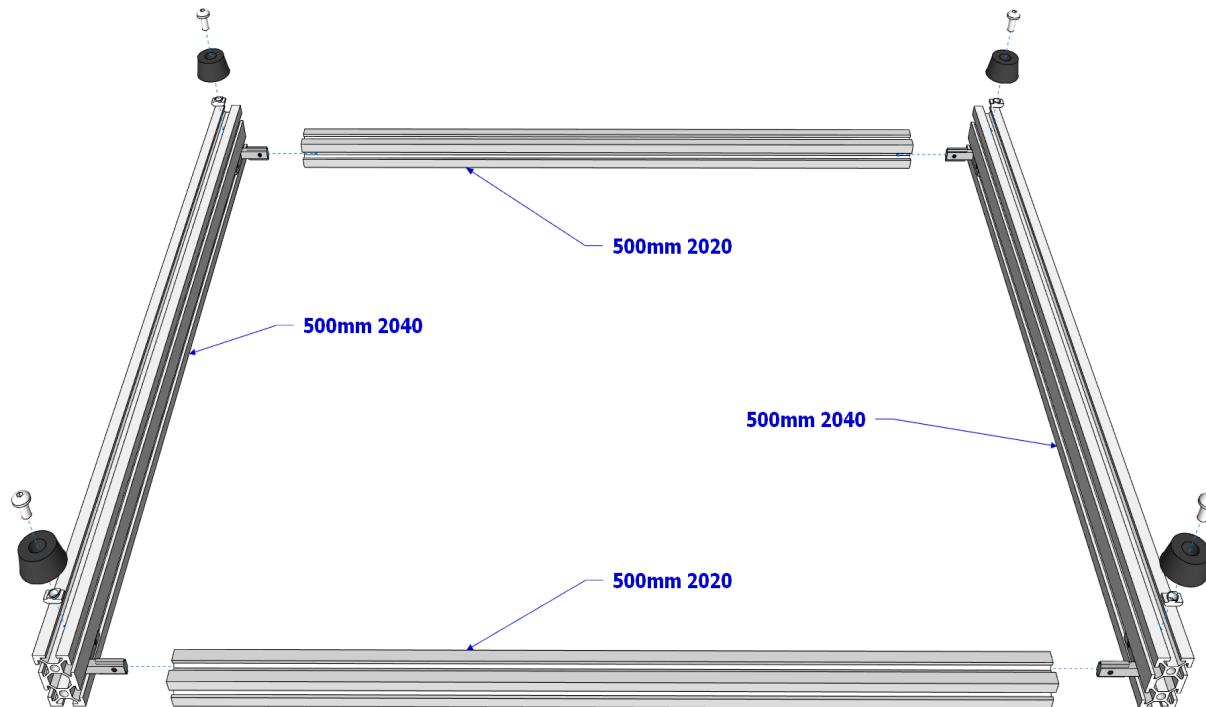
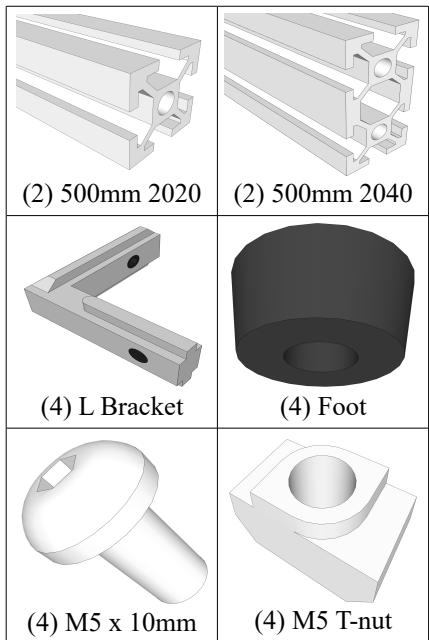
Please go through the parts above and check your kit's contents.

If anything is missing or damaged, contact [Folger Tech](#) within (14) days of delivery for replacements.

Now let's get this kit built!

Frame Assembly

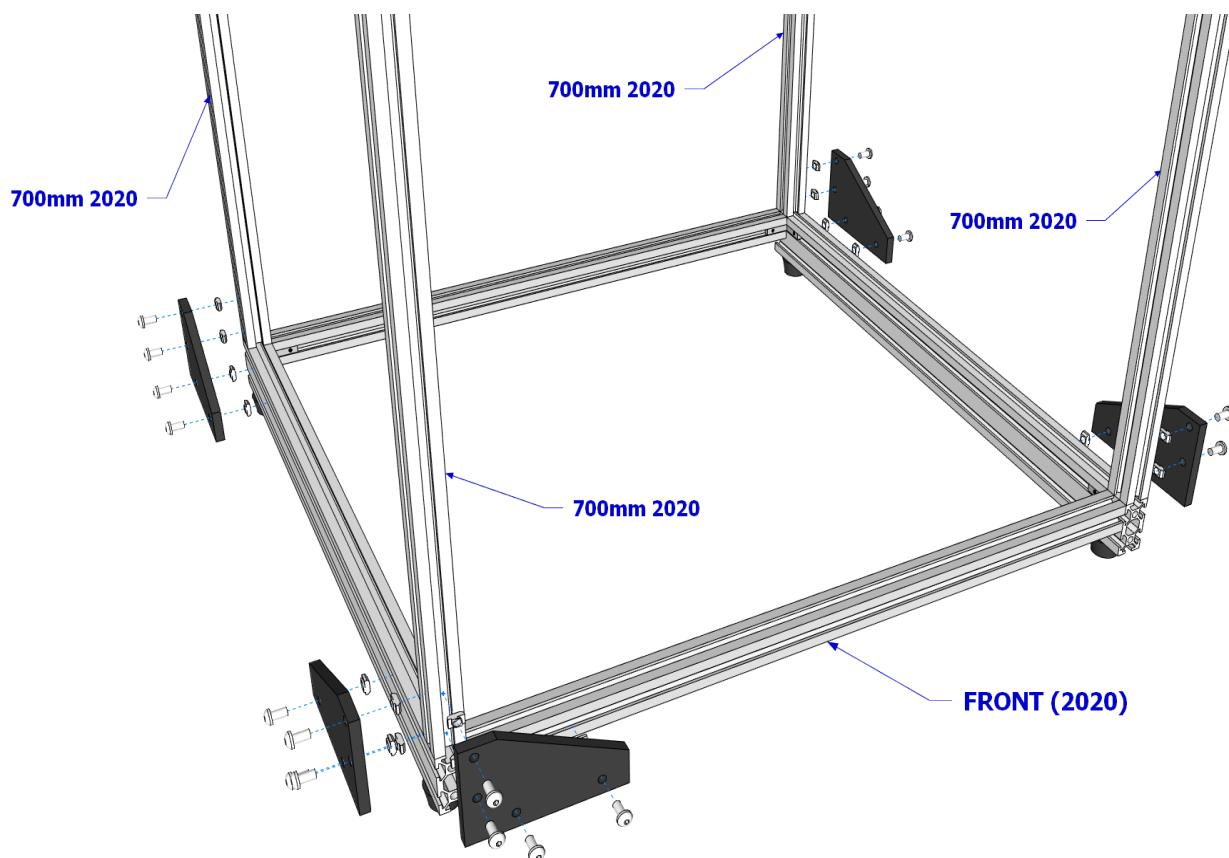
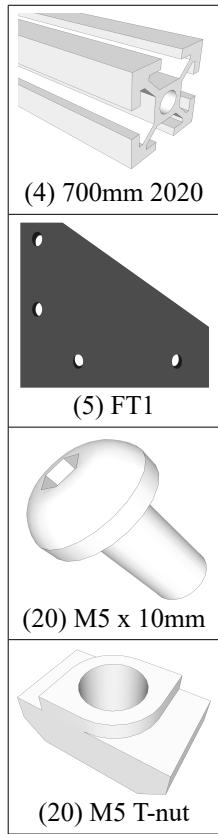
Step 1



On a flat surface, lay (2) 500mm 2040 beams to the left and right on their edge as shown. Slide a L bracket (leg first) into the lower channel on each end of both 2040 beams. Slide the other leg of the L brackets into the inner channel of each of the 500mm 2020 beams forming a rectangle. While making sure the joins are flush, tighten the grub screws. Mount a foot on each corner of the frame using a M5 x 10mm bolt and a M5 t-nut.

Frame Assembly

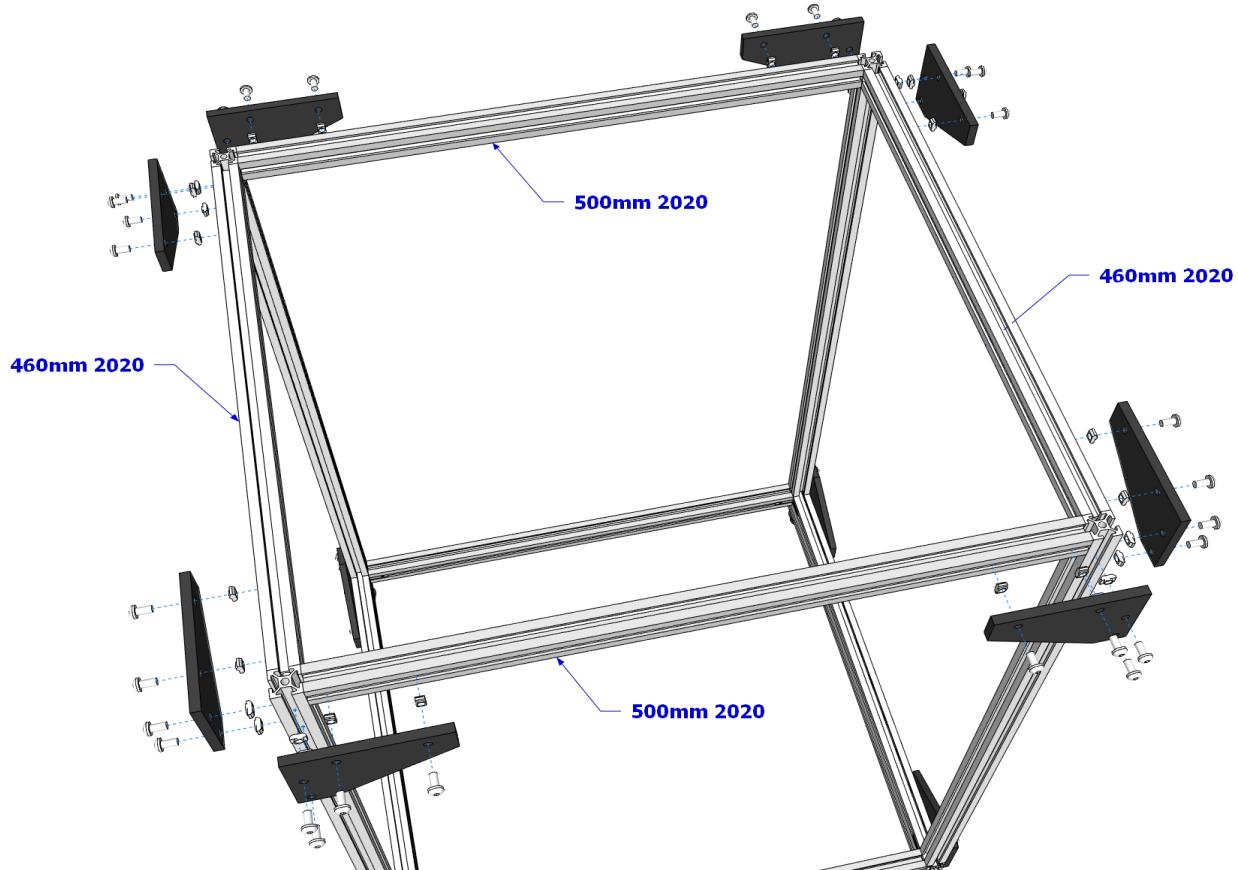
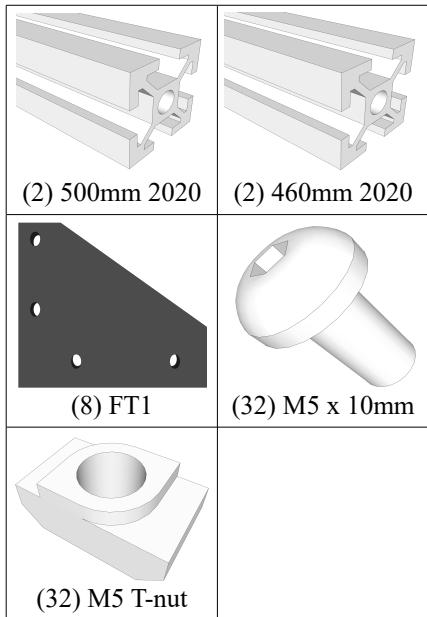
Step 2



Flip the frame over making sure one of the 2020 beams is toward you and the feet are on the bottom. This will be the front of the printer. Working on one corner at a time, place a 700mm 2020 beam at the corner and secure with (1) or (2) FT1(s) as shown using (4) M5 x 10mm bolts and (4) M5 t-nuts per F1. Please note the locations of the FT1s as they are not installed on all sides. Make sure the 700mm 2020 beams are square with the bottom frame.

Frame Assembly

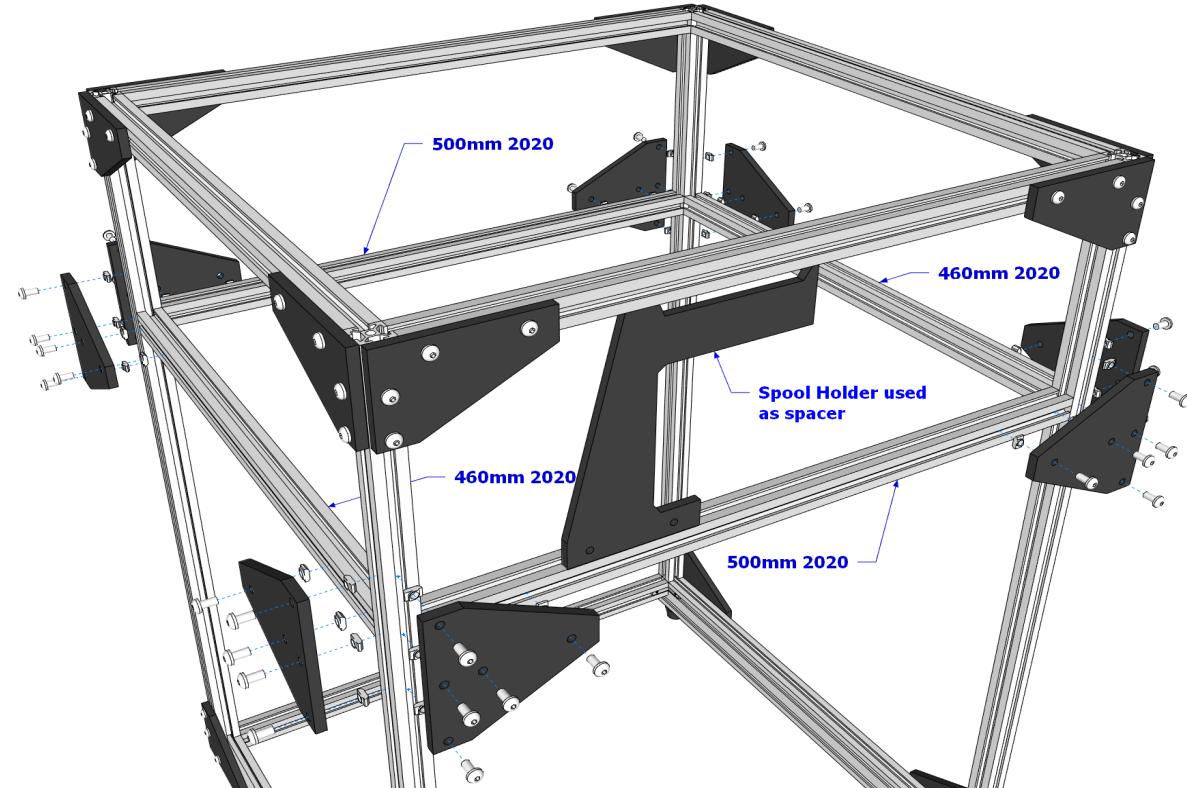
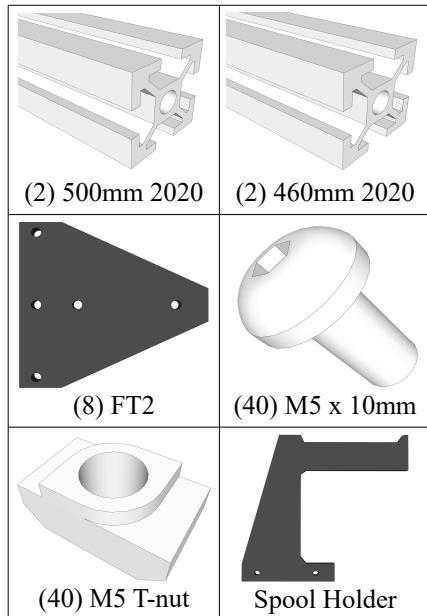
Step 3



Repeat the same process to mount 460mm 2020 beams on the left and right sides and 500mm 2020 beams on the front and rear. Make sure they are flush with the top.

Frame Assembly

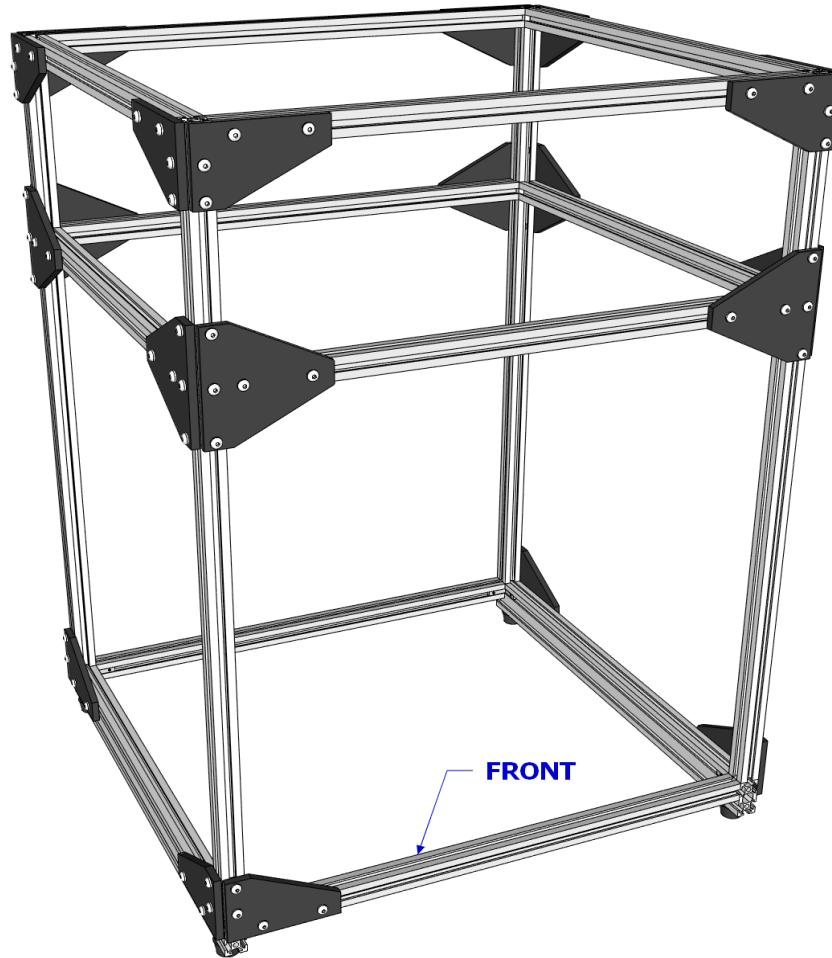
Step 4



Measure down 170mm from the underside of the top 2020 beams and mark each upright beam. Aligning the top edge of each beam with the mark, secure them with FT2s, M5 x 10mm bolts, and M5 t-nuts as before. Using the spool holder as a spacer on the beam faces, adjust each corner up against it. Do not jam the spool holder into the slots of the beam. It should be on the face of the beam as shown. **Having the same spacing all around is important.**

Frame Assembly

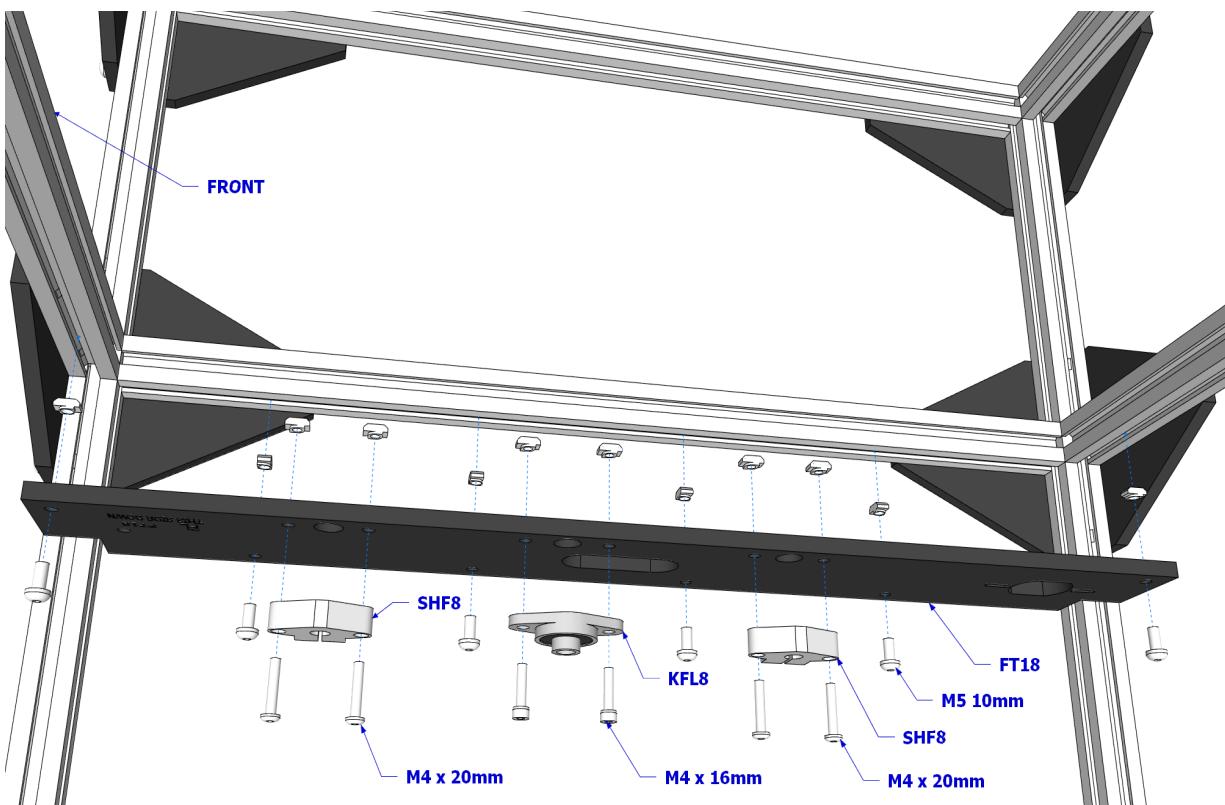
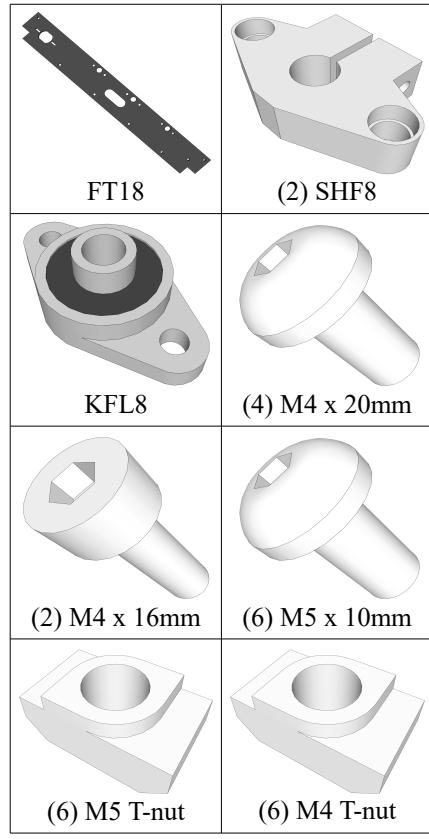
Complete



The frame is complete. Take a few minutes to make sure it looks like the image above and everything is flush and square. Adjust if necessary. It's recommended to put a piece of tape or some kind of marker on the front for orientation.

Y Assembly

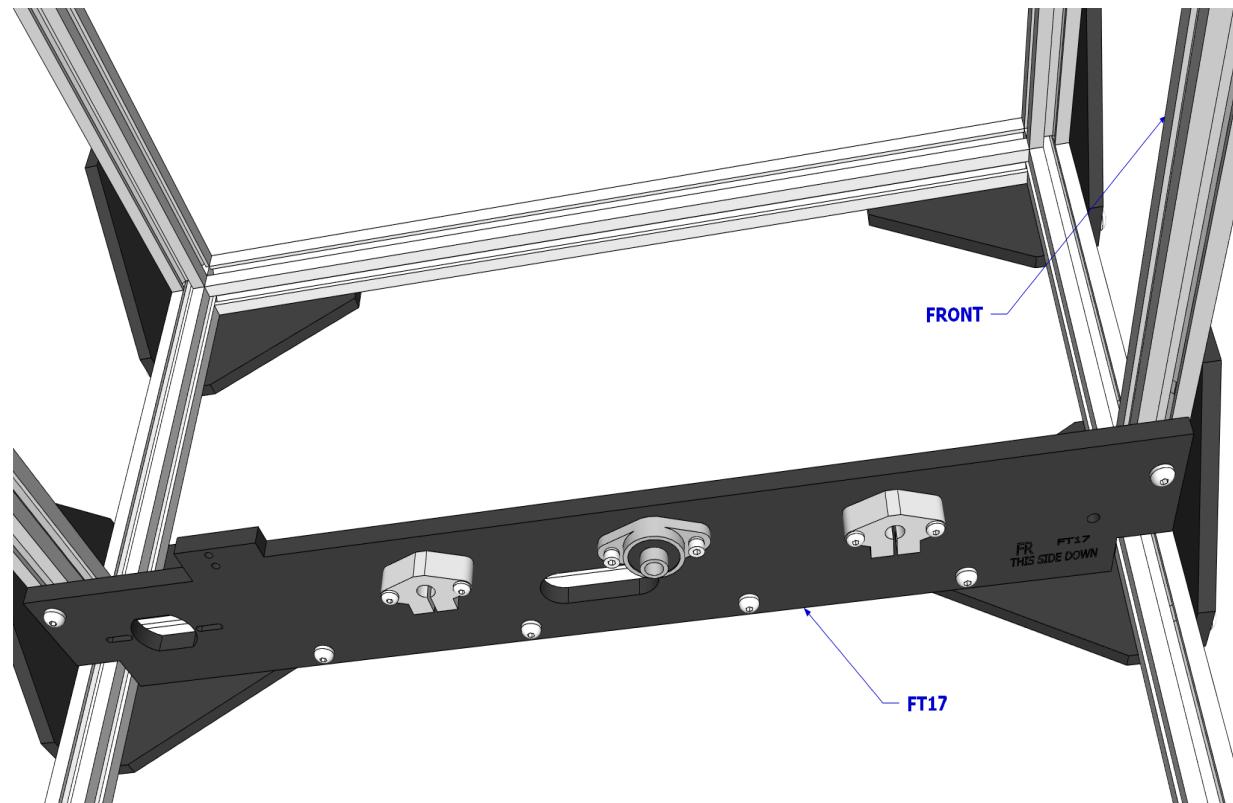
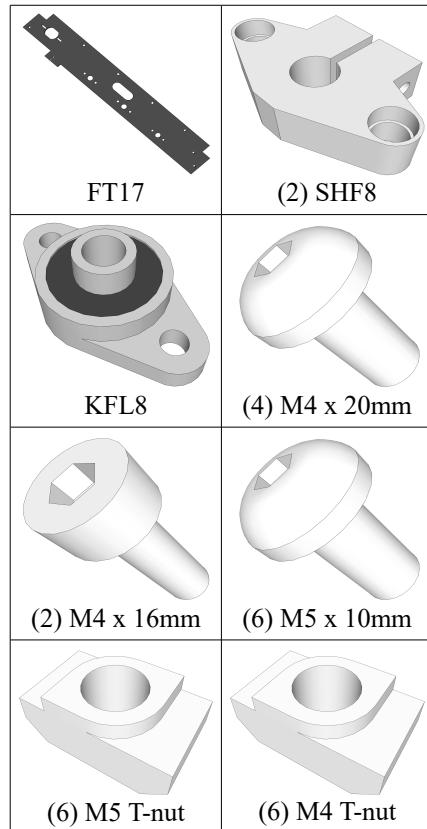
Step 1



On the left side of the frame, bolt (2) SHF8s with (4) M4 x 20mm bolts and (4) M4 t-nuts to the FT18 as shown. Bolt a KFL8 with (2) M4 x 16mm bolts and (2) M4 t-nuts to the FT18. Only spin the M4 t-nuts on a few turns. Bolt the FT18 to the underside of the middle beams using (6) M5 x 10mm bolts and (6) M5 t-nuts.

Y Assembly

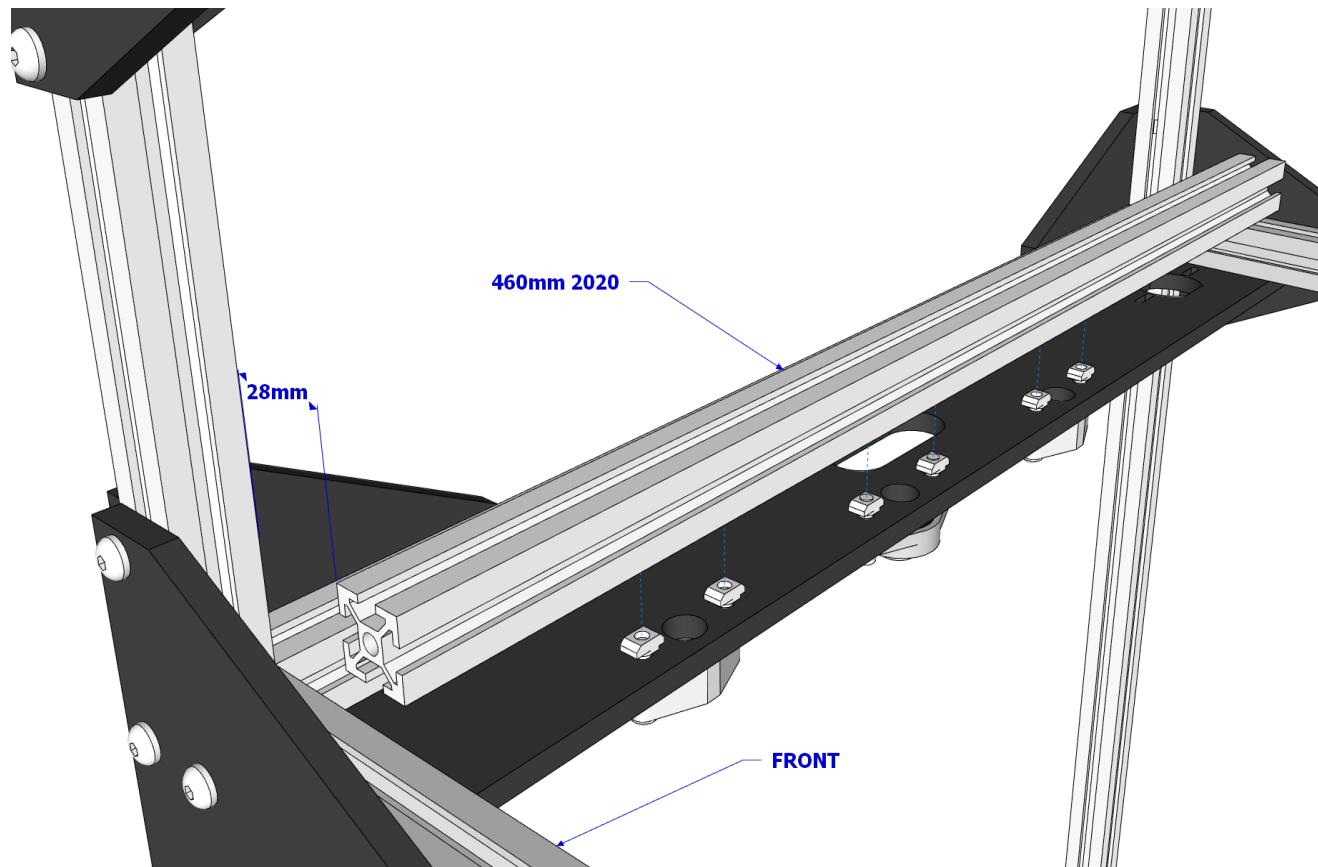
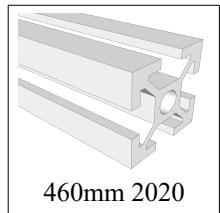
Step 2



Repeat the same process to mount the FT17 to the right side of the frame. They should both look like the image above when complete.

Y Assembly

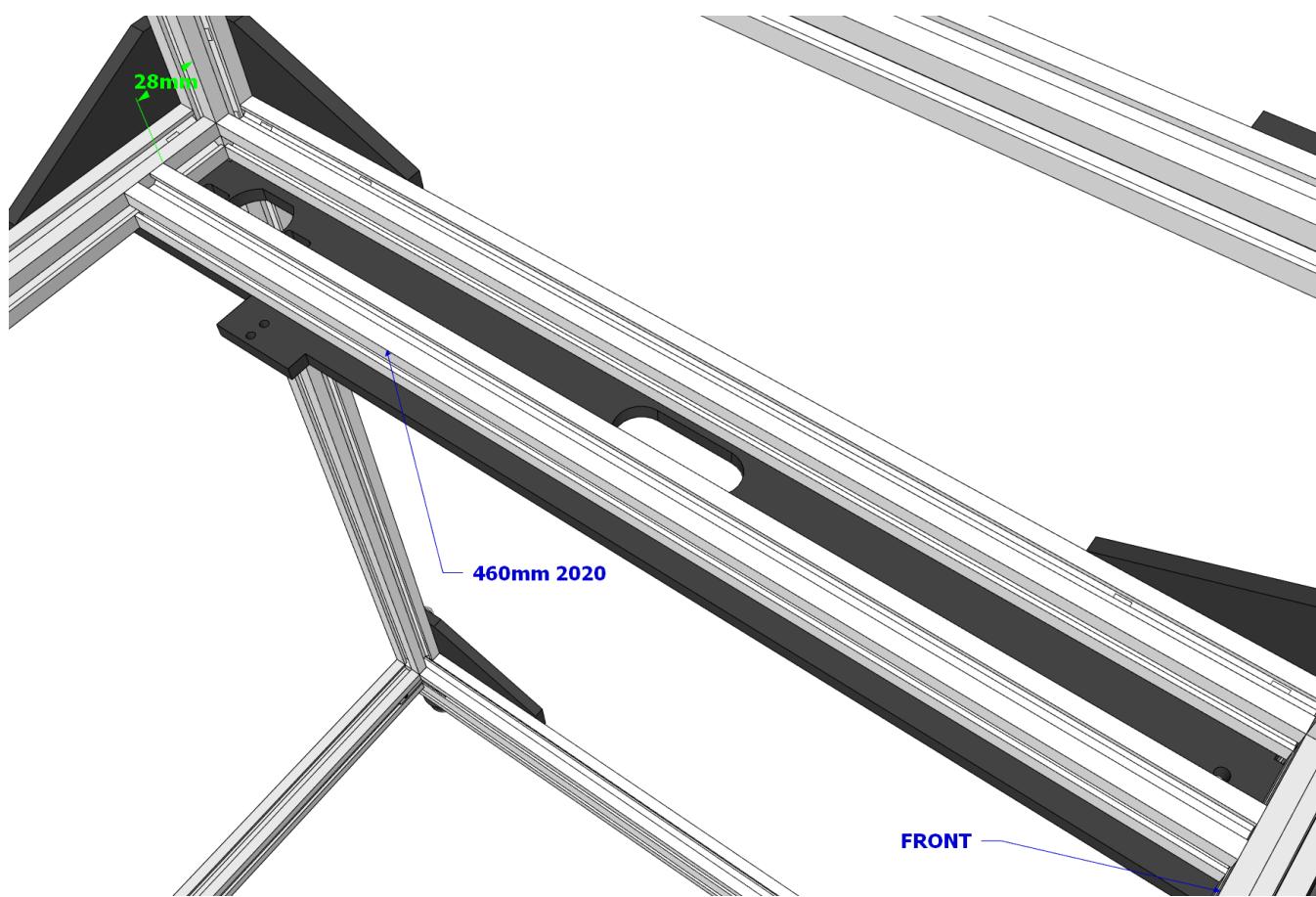
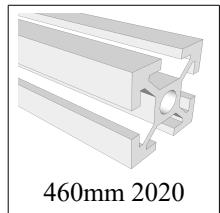
Step 3



On the left side, place the 460mm 2020 beam over the (6) t-nuts we left loose in step 1. Adjust both ends so that the gap between the beams is 28mm. This may be more clear in the illustration on the next page. Tighten to secure the beam into place. This will be a tight fit.

Y Assembly

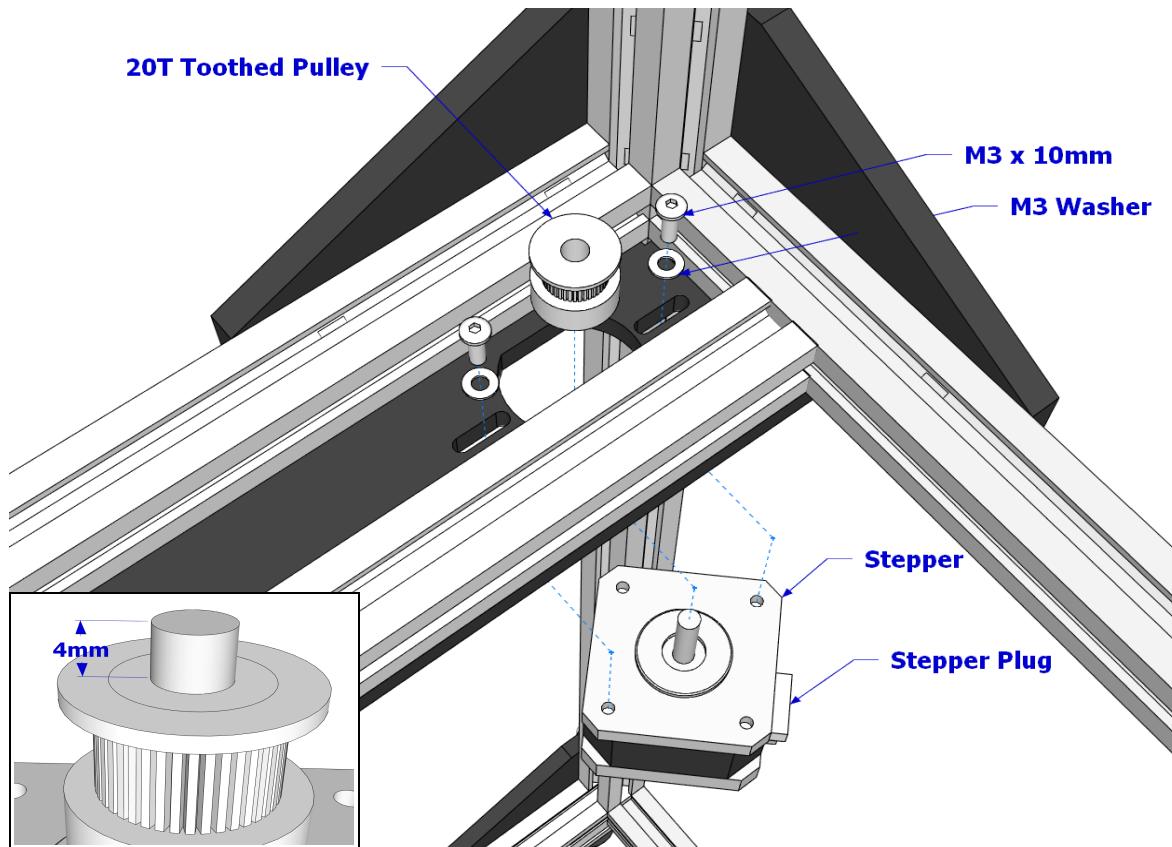
Step 4



Repeat the same process on the right side with the (6) t-nuts we left loose in step 2. They should both look like the image above when complete. Make sure the space between the beams is 28mm. This is important for squareness.

Y Assembly

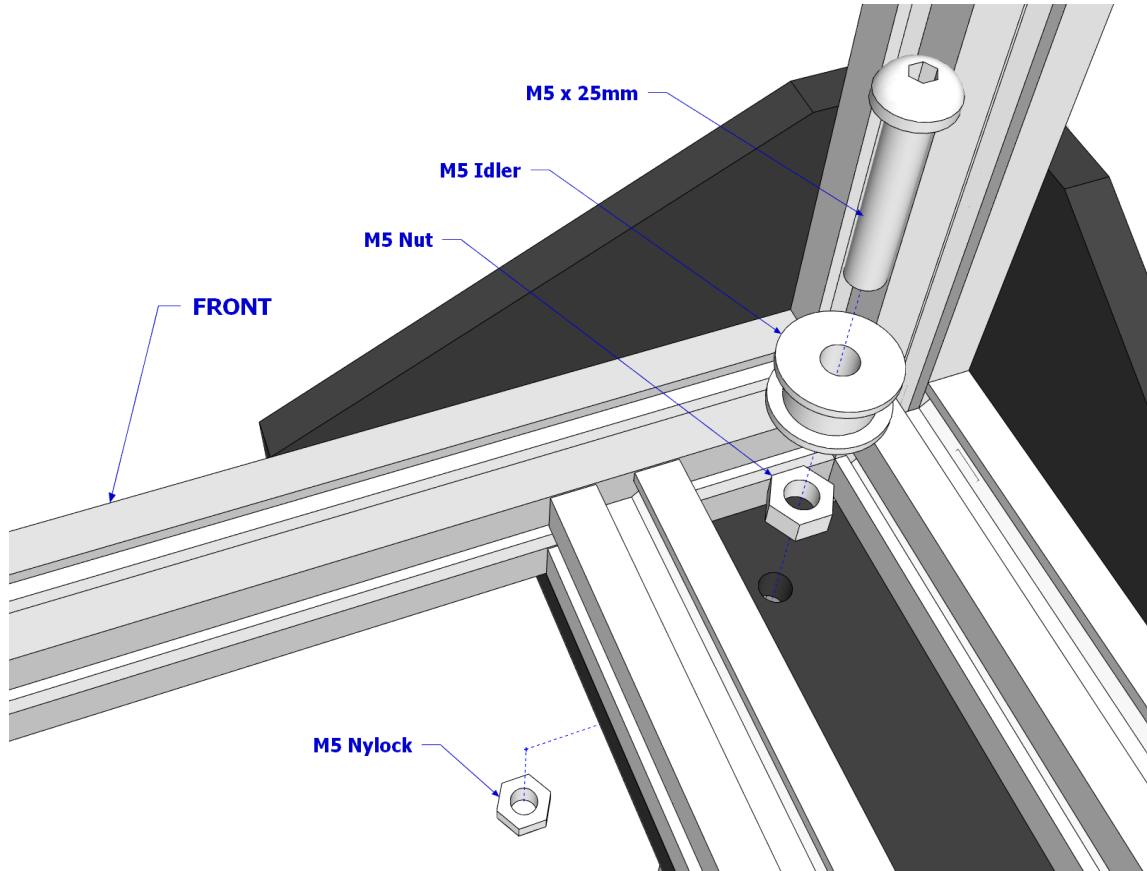
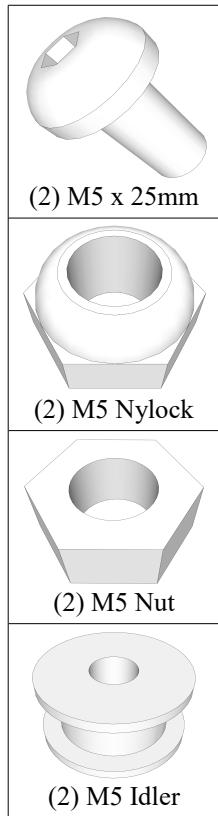
Step 5



Attach a 20T 5mm bore pulley to the stepper shaft making sure the set screw contacts the flat face. Leave 4mm of shaft sticking out as shown above. With the plug on the stepper facing toward the center rear, secure it with (2) M3 x 10mm bolts and (2) M3 washers. Make sure the M3 x 10mm bolts are in the center of the slot. Repeat on the other side.

Y Assembly

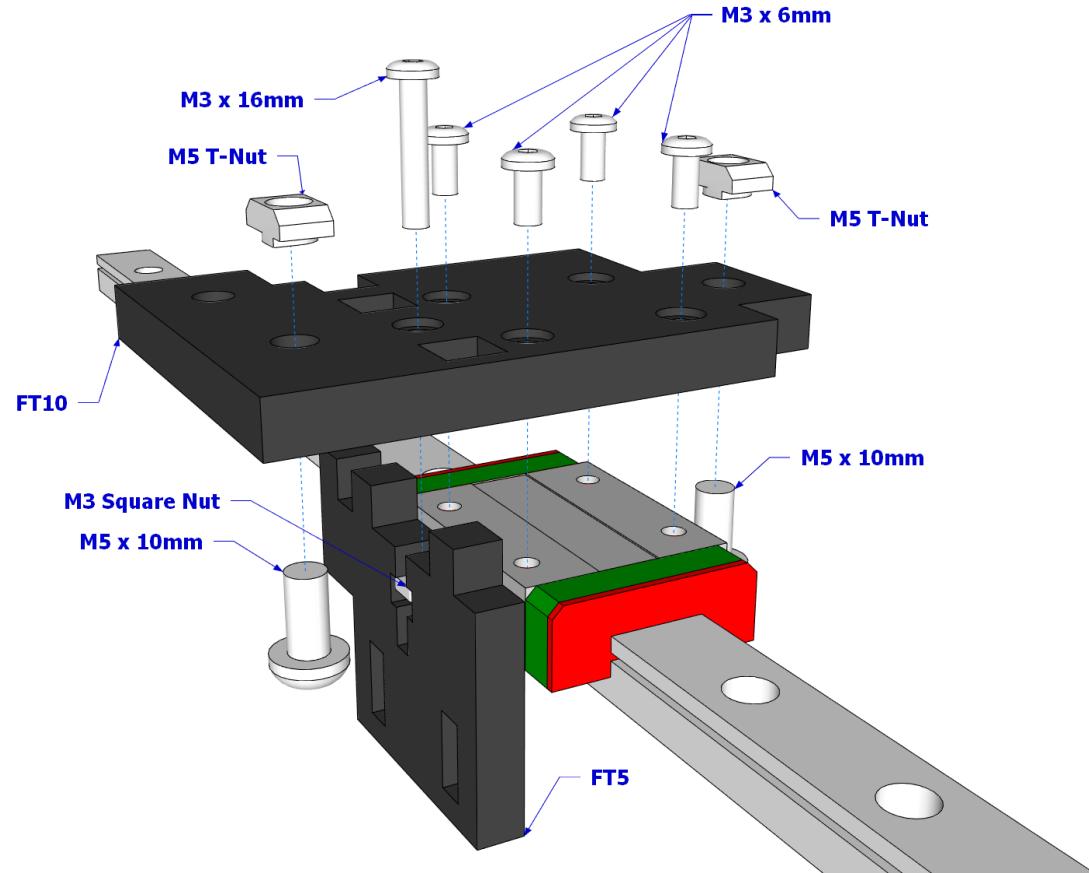
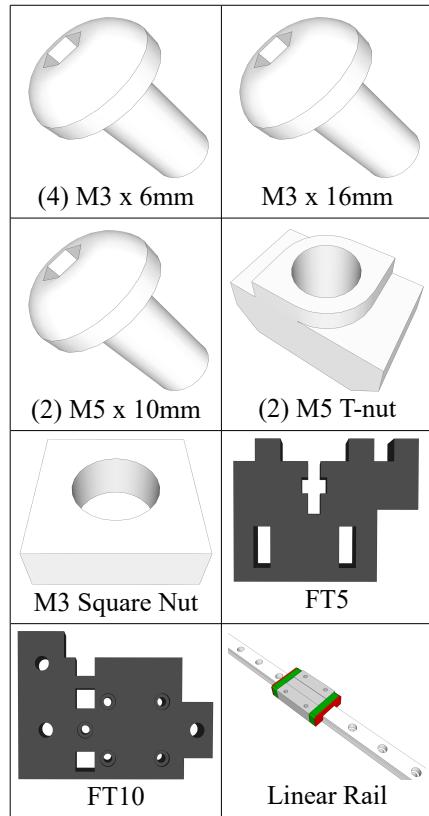
Step 6



Insert a M5 x 25mm bolt through a M5 idler. Secure it with a M5 nut. Make sure the idler can spin. Adjust as necessary. Insert the assembly through the hole and secure it with a M5 nylock. Tighten by turning the nylock, not the bolt. This will prevent tightening the nut against the pulley and causing it to lock. Repeat the process on the other side.

Y Assembly

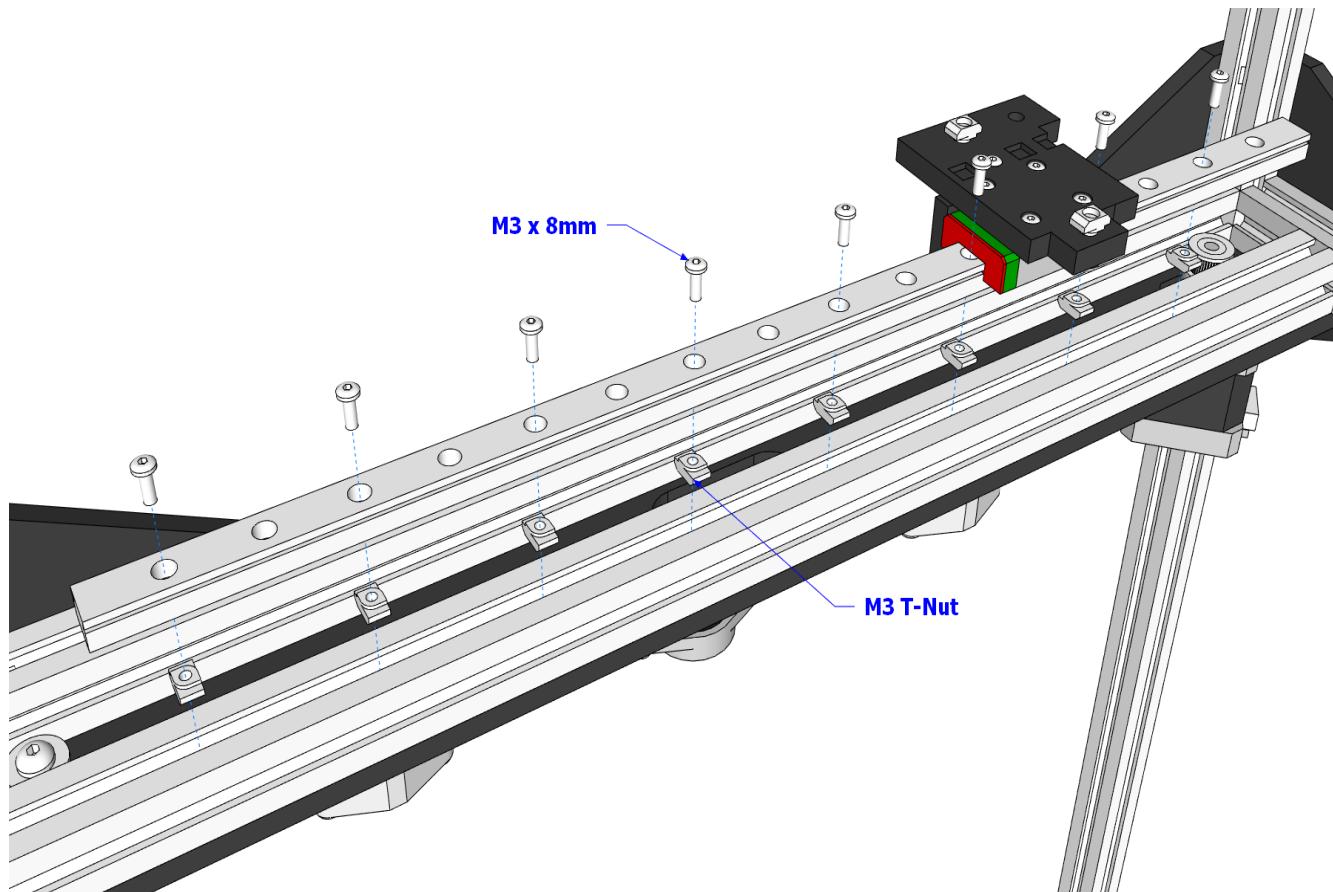
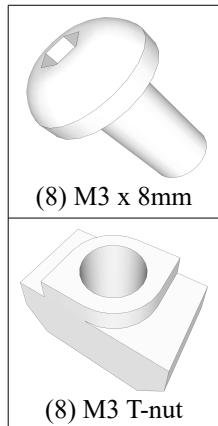
Step 7



Insert the M3 square nut into the slot in FT5. Bolt FT10 to FT5 using a M3 x 16mm bolt into the M3 square nut. Bolt FT10 to the linear rail block using (4) M3 x 6mm bolts. Insert a M5 x 10mm bolt up through the hole at each end FT10 and spin on a M5 t-nut a few turns. **Be very careful to not allow the block to slide off the end of the rail.**

Y Assembly

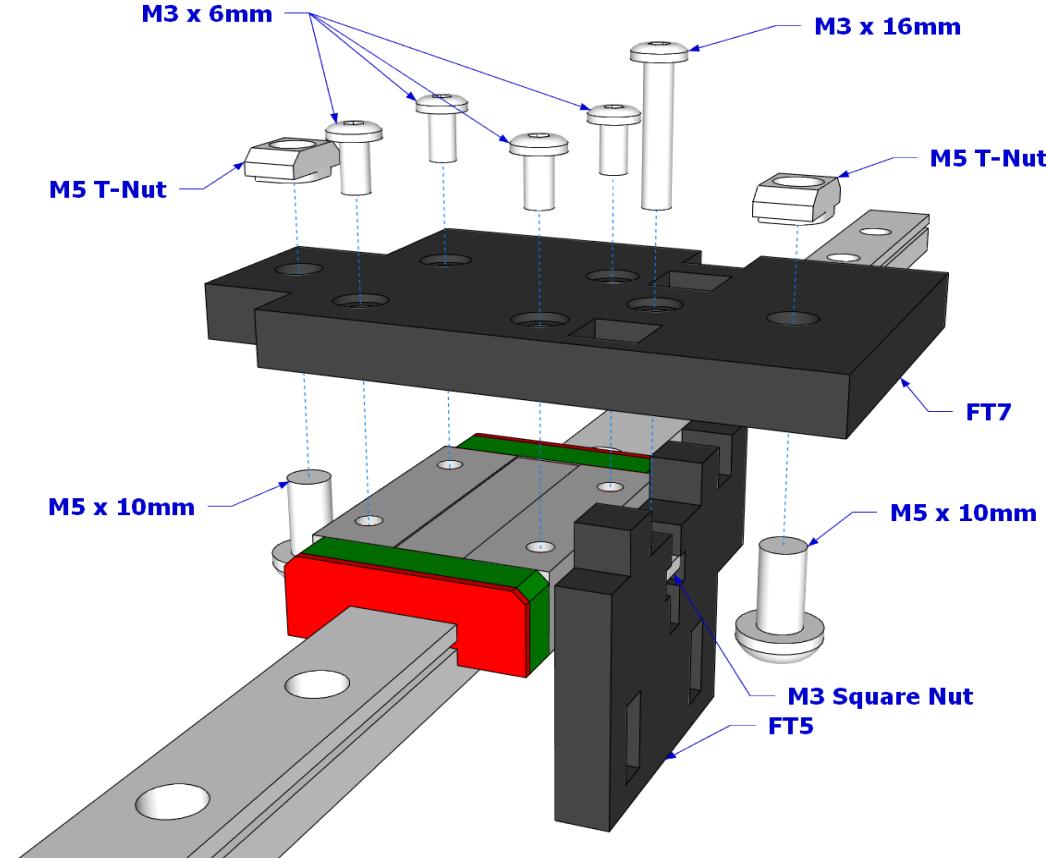
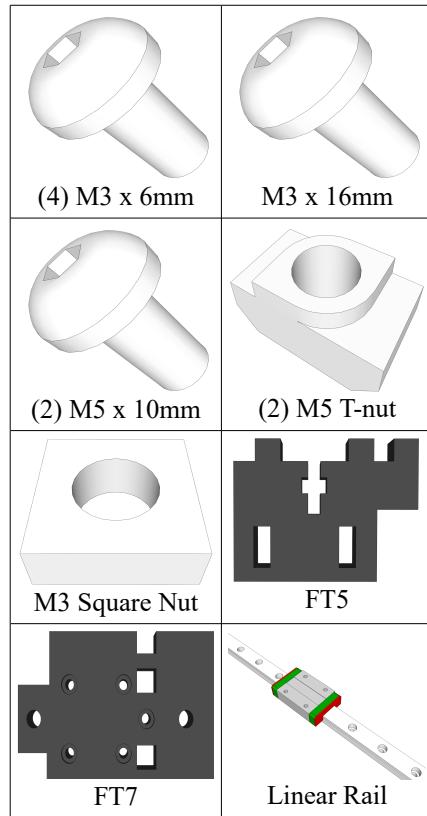
Step 8



Mount the assembly we built in the last step onto the inner 2020 beam on the left side of the printer using (8) M3 x 8mm bolts and (8) M3 t-nuts in every other hole. Center it front to back and side to side. **Tape the block in place so it won't slide off the rail.**

Y Assembly

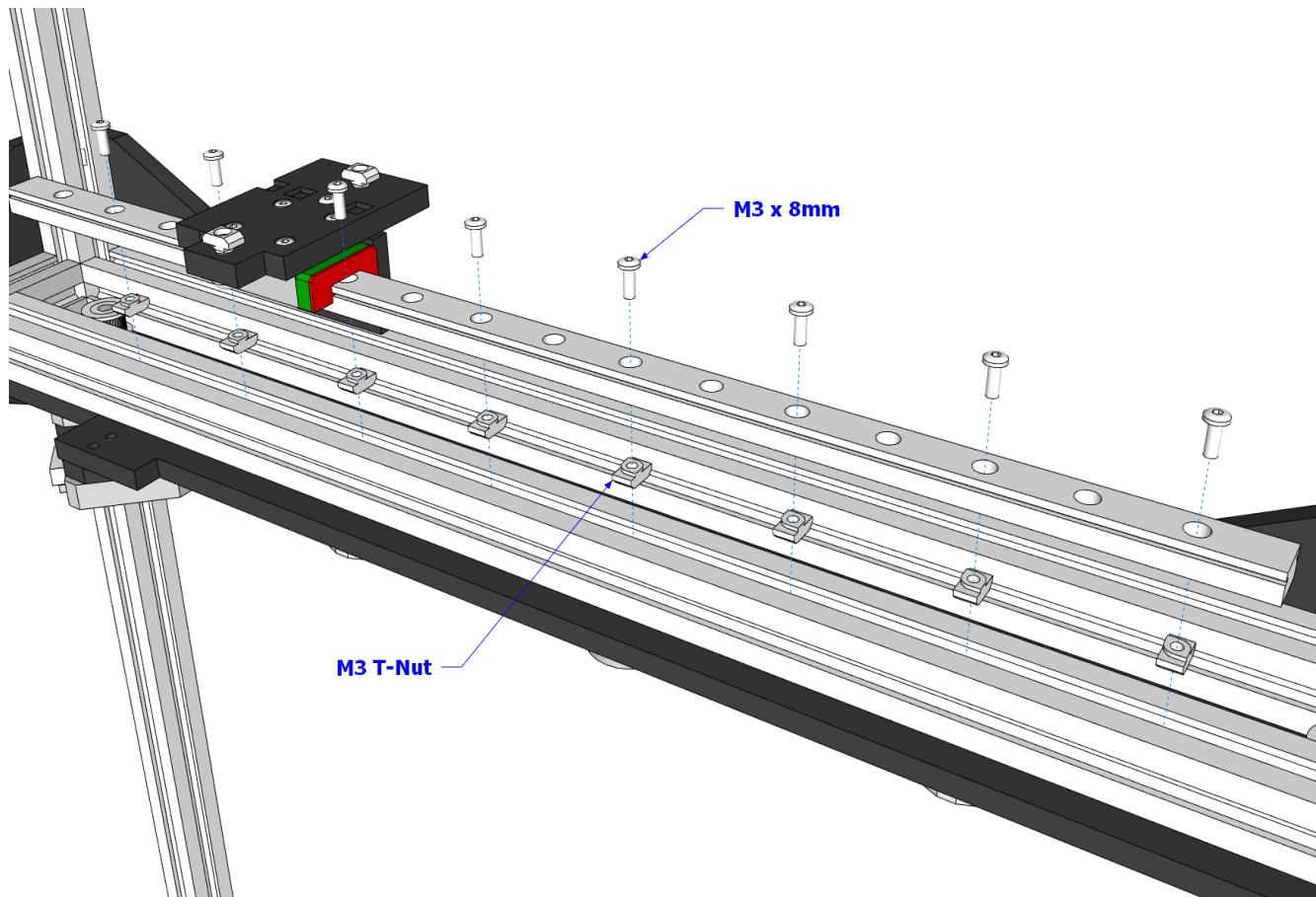
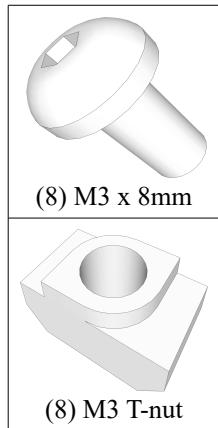
Step 9



Insert the M3 square nut into the slot in FT5. Bolt FT7 to FT5 using a M3 x 16mm bolt into the M3 square nut. Bolt FT7 to the linear rail block using (4) M3 x 6mm bolts. Insert a M5 x 10mm bolt up through the hole at each end FT7 and spin on a M5 t-nut a few turns. **Be very careful to not allow the block to slide off the end of the rail.**

Y Assembly

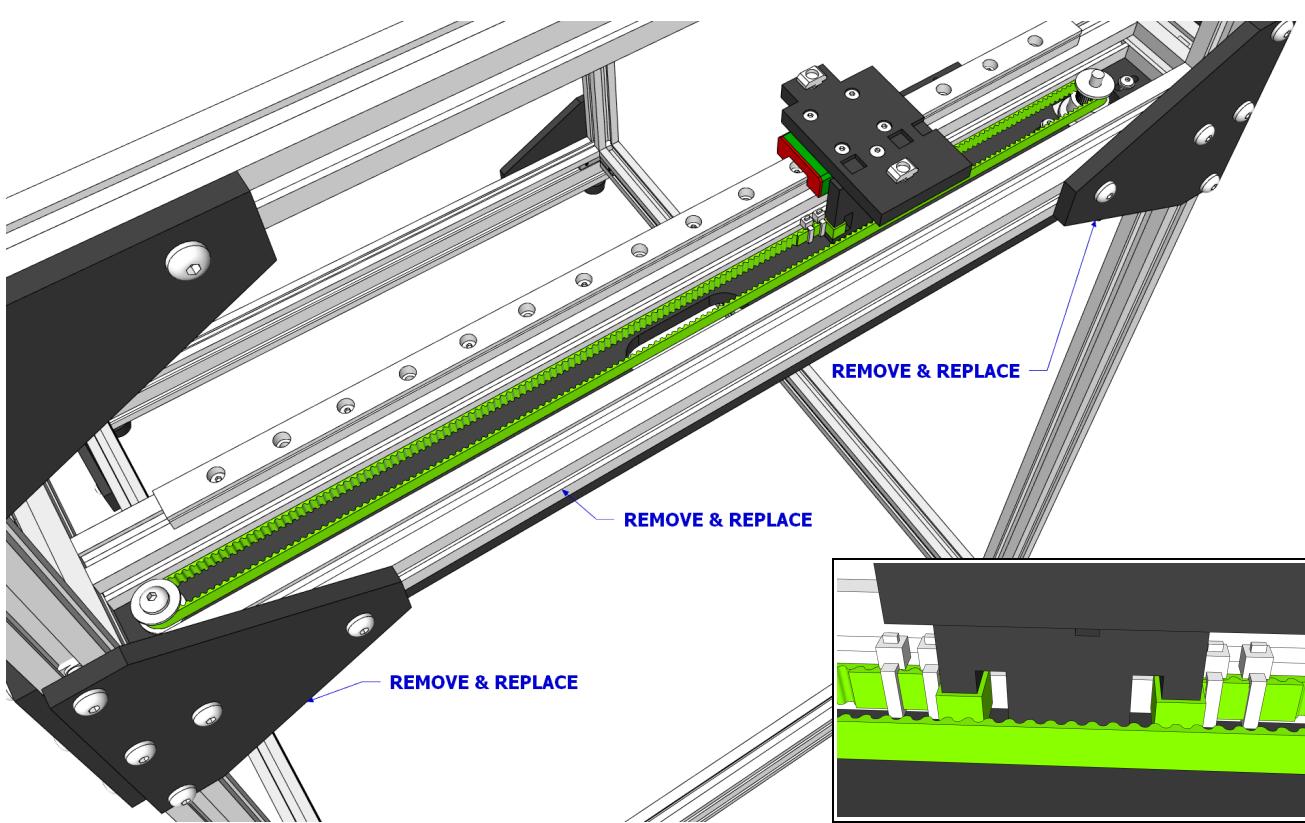
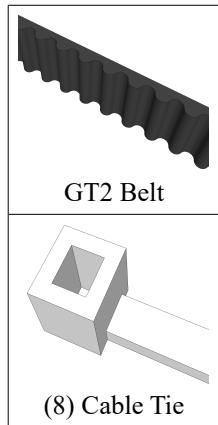
Step 10



Mount the assembly onto the inner 2020 beam on the left side of the printer using (8) M3 x 8mm bolts and (8) M3 t-nuts in every other hole. Center it front to back and side to side. **Tape the block in place so it won't slide off the rail.**

Y Assembly

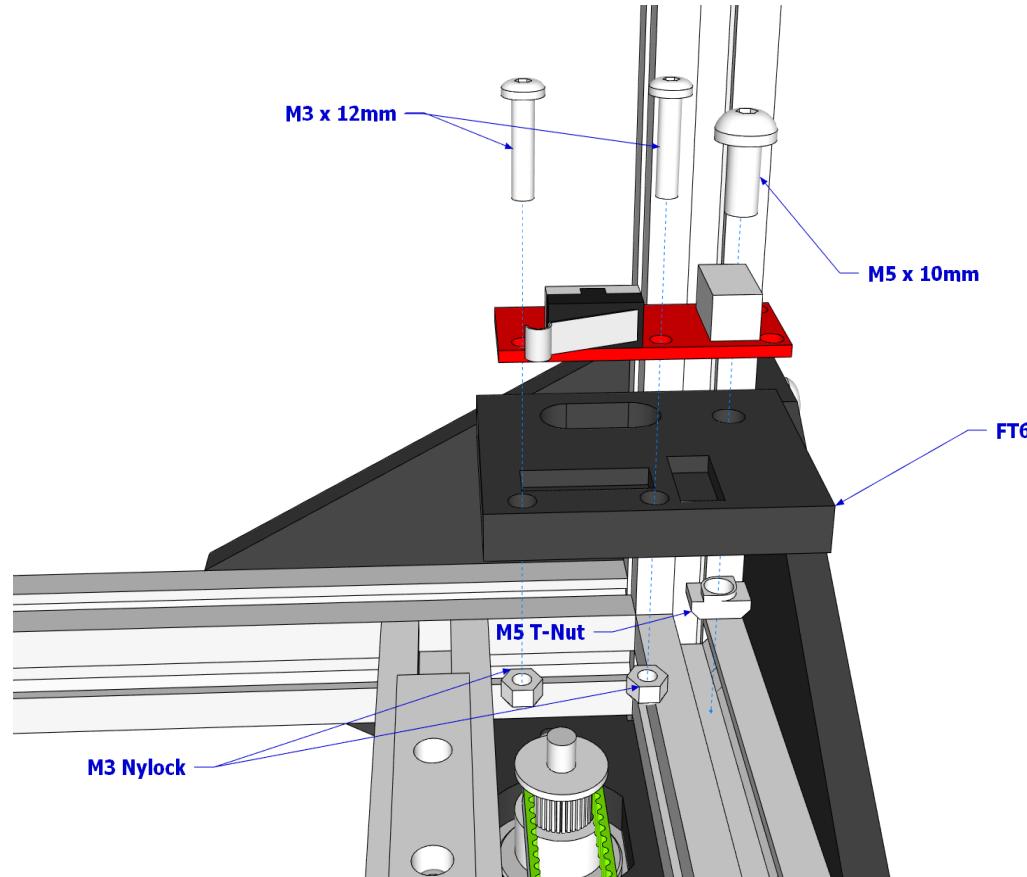
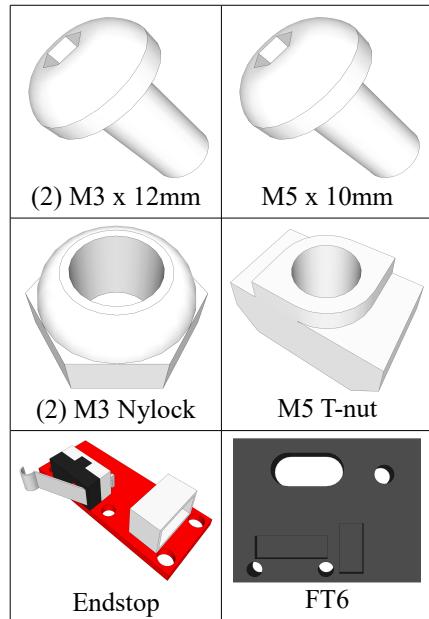
Step 11



Remove the FT2s and 460mm beam on one side. Cut off 1 meter of GT2 belt (the side of the frame is 0.5 meters long) and secure one end to the FT5 using (2) cable ties. It may be easier to use a cable tie to guide the belt. Run the belt around both pulleys and pull tight. Secure the other end of the GT2 belt to the FT5. Trim off the excess. Replace the FT2s and 460mm beam. Adjust the stepper to tighten the belt. Repeat on the other side.

Y Assembly

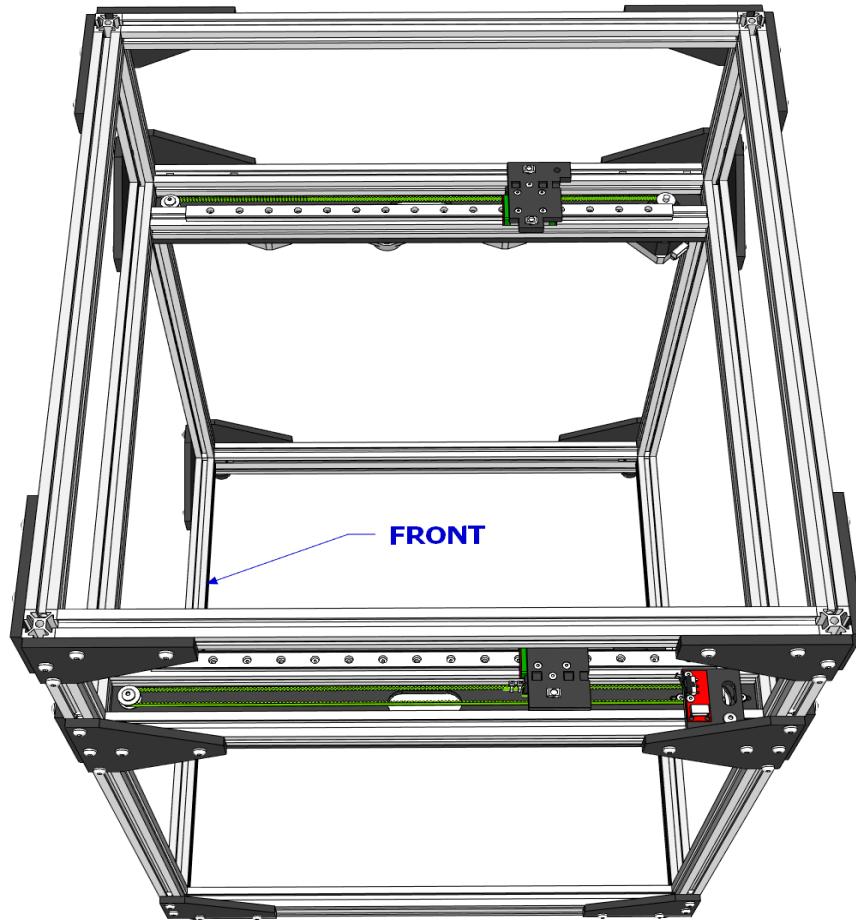
Step 12



Secure the endstop to the FT6 using (2) M3 x 12mm bolts and (2) M3 nylocks. Mount the FT6 to the right rear corner using a M5 x 10mm bolt and M5 t-nut.

Y Assembly

Complete



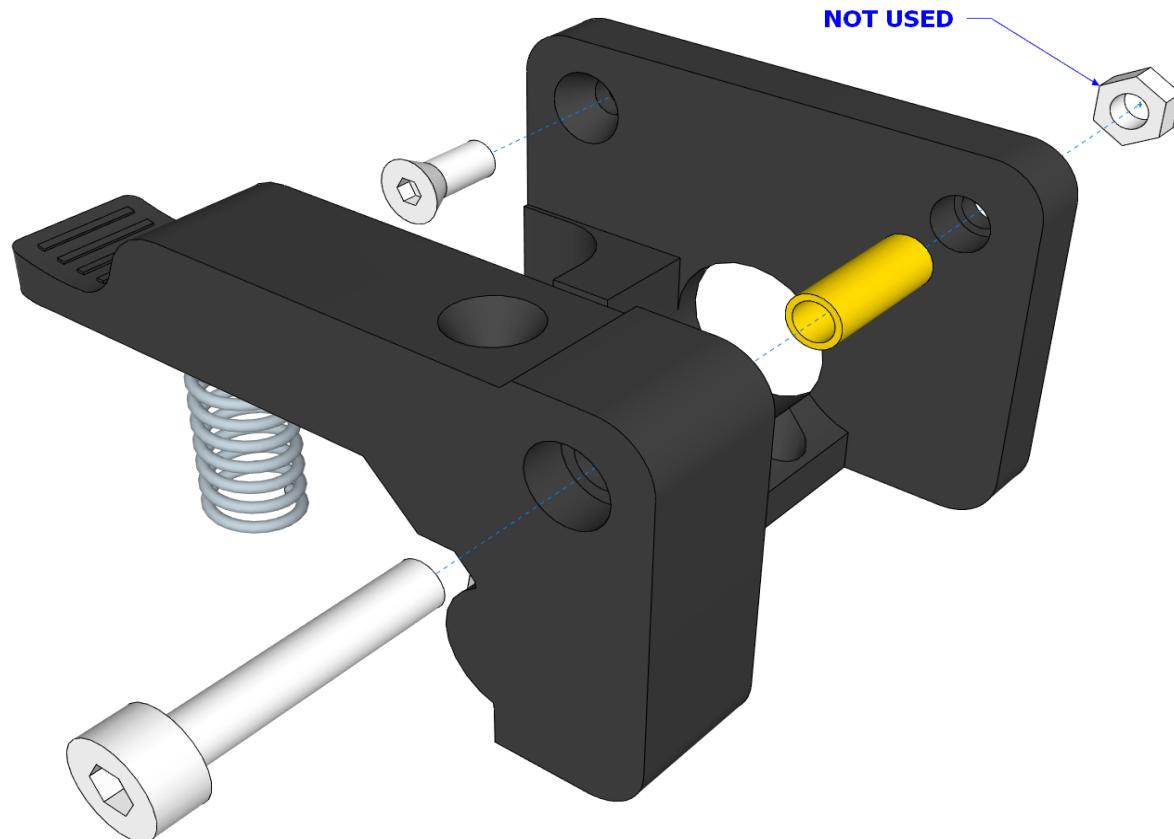
The Y assembly is complete. Take a few minutes to make sure the Y assembly moves smoothly and the belts remain tight after moving them around. You may need to hold the M5 nut under the pulley in place and unscrew the M5 bolt a little bit to allow the pulley to turn free. Make sure you tighten the M5 nylock afterward.

Extruder Assembly

Step 1



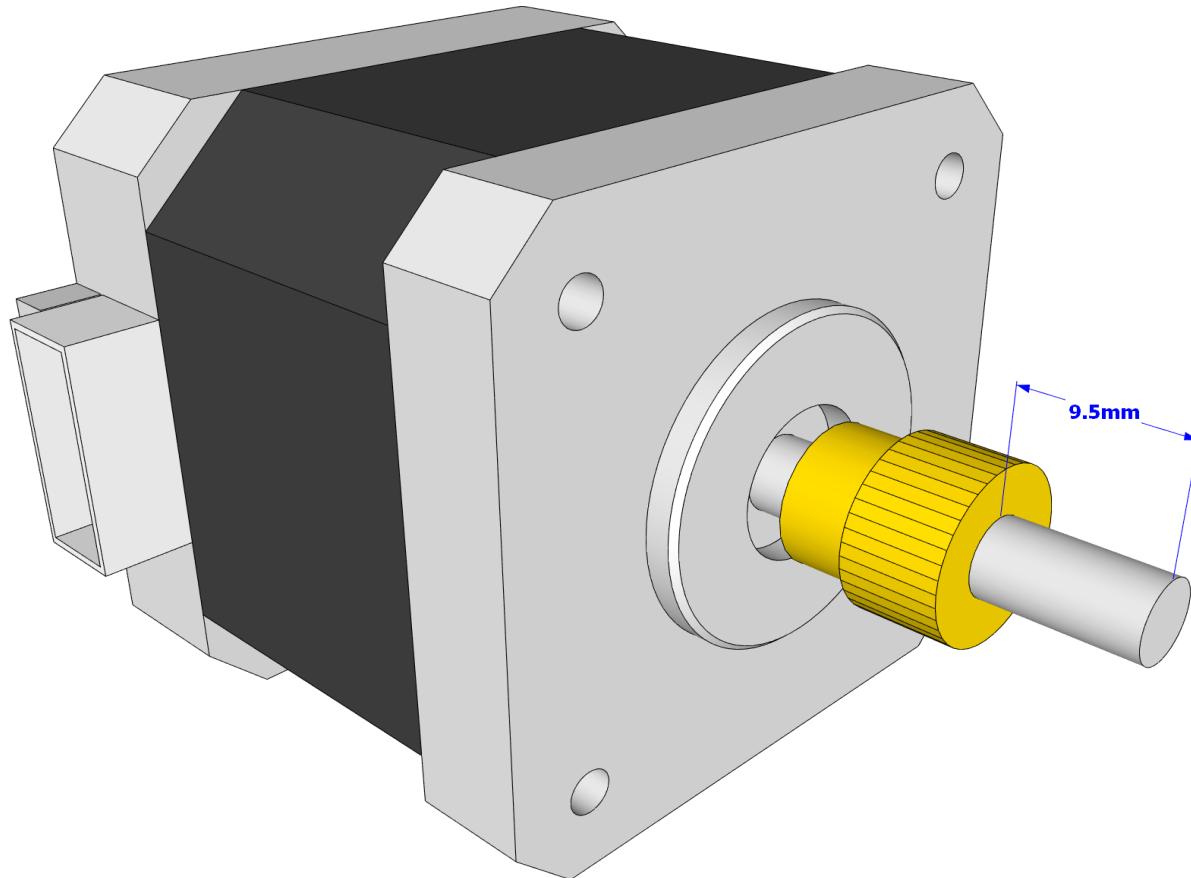
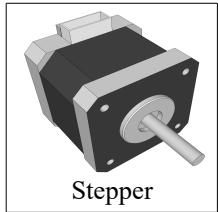
MK9 Extruder



Disassemble the MK9 extruder as shown. Set the drive gear to the side for the next step. The M3 nut on the back is for shipping and will not be used.

Extruder Assembly

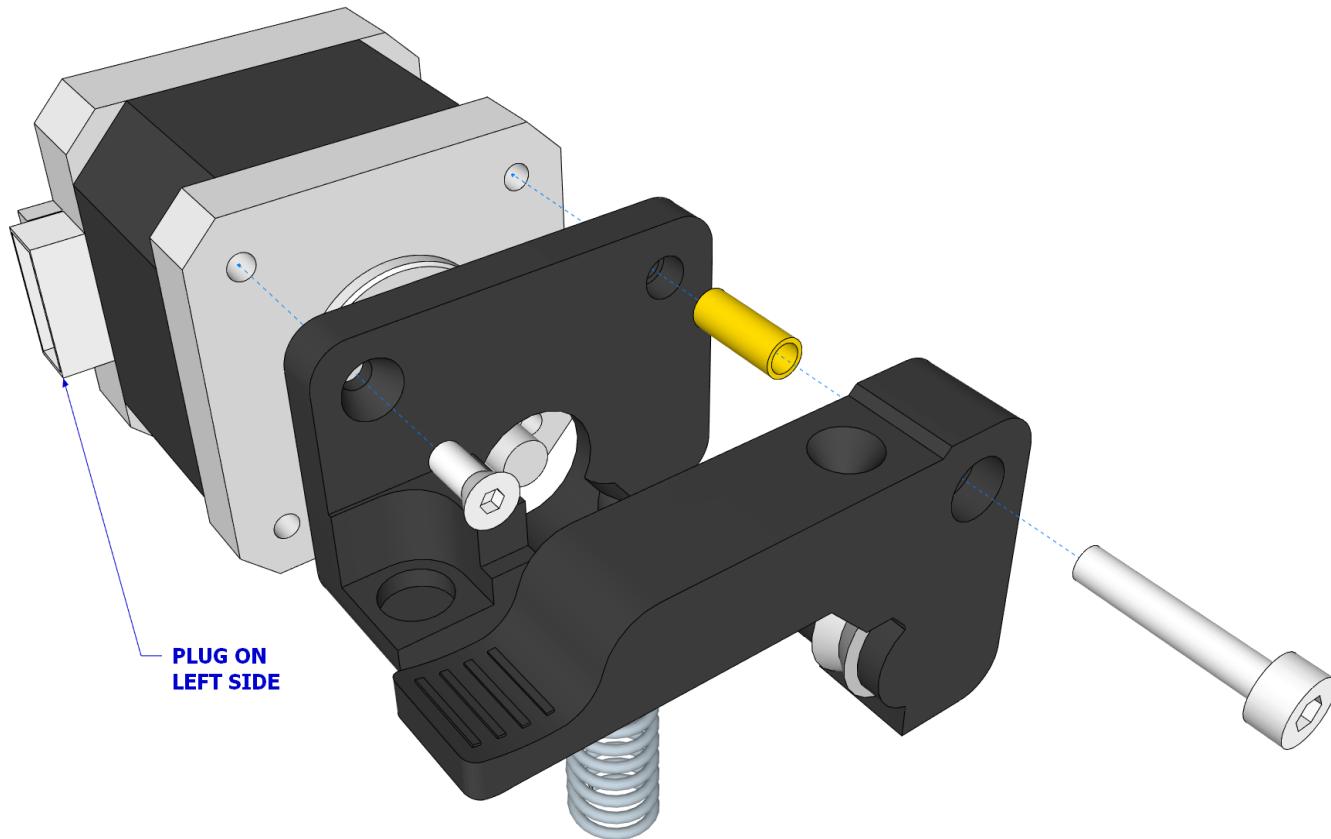
Step 2



Slide the drive gear from the last step onto the shaft of the stepper. Locate it 9.5mm from the end of the shaft and tighten the set screw against the flat face of the shaft.

Extruder Assembly

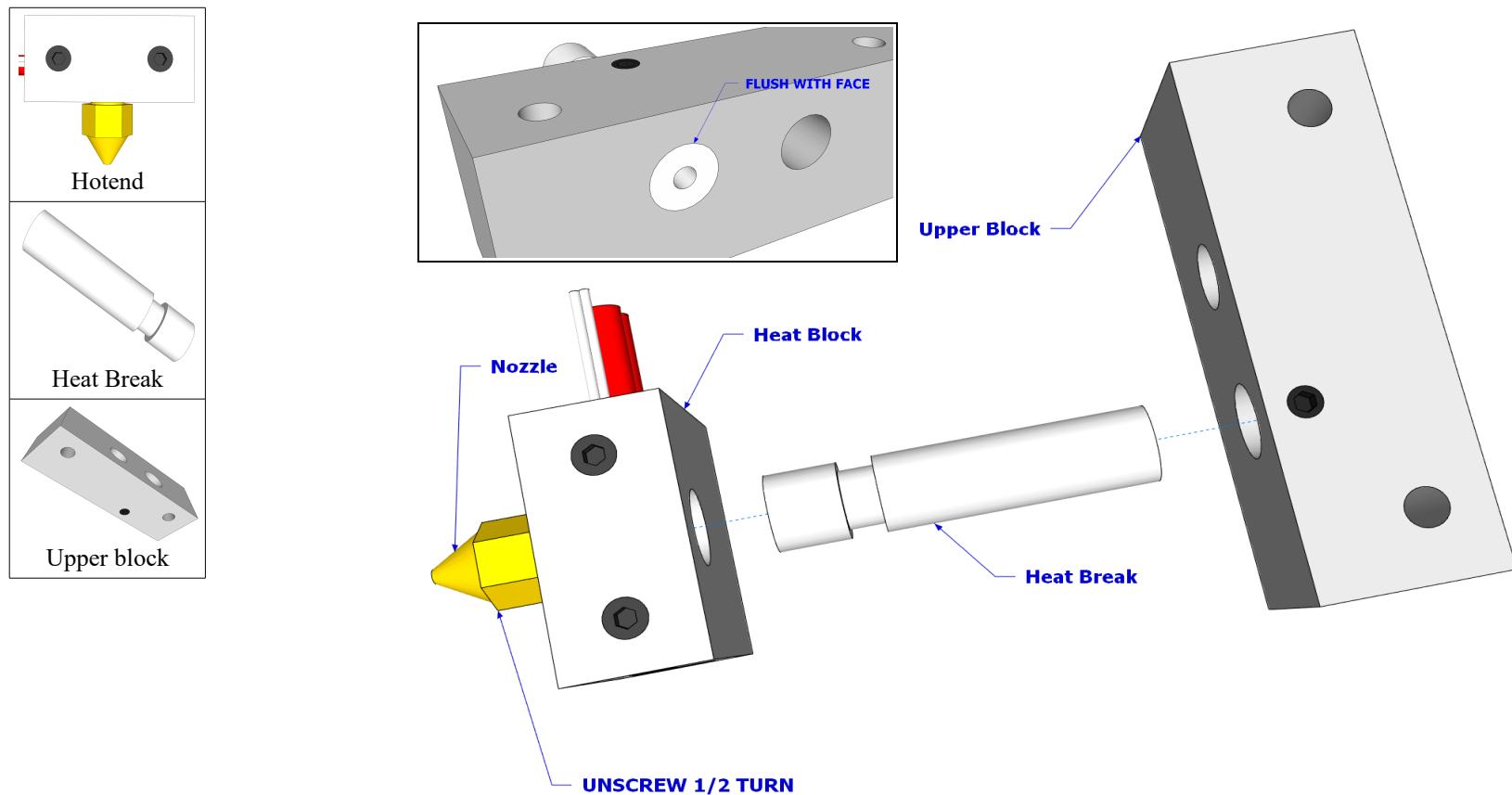
Step 3



With the plug of the stepper on the left side, re-assemble the MK9 extruder onto the stepper.

Extruder Assembly

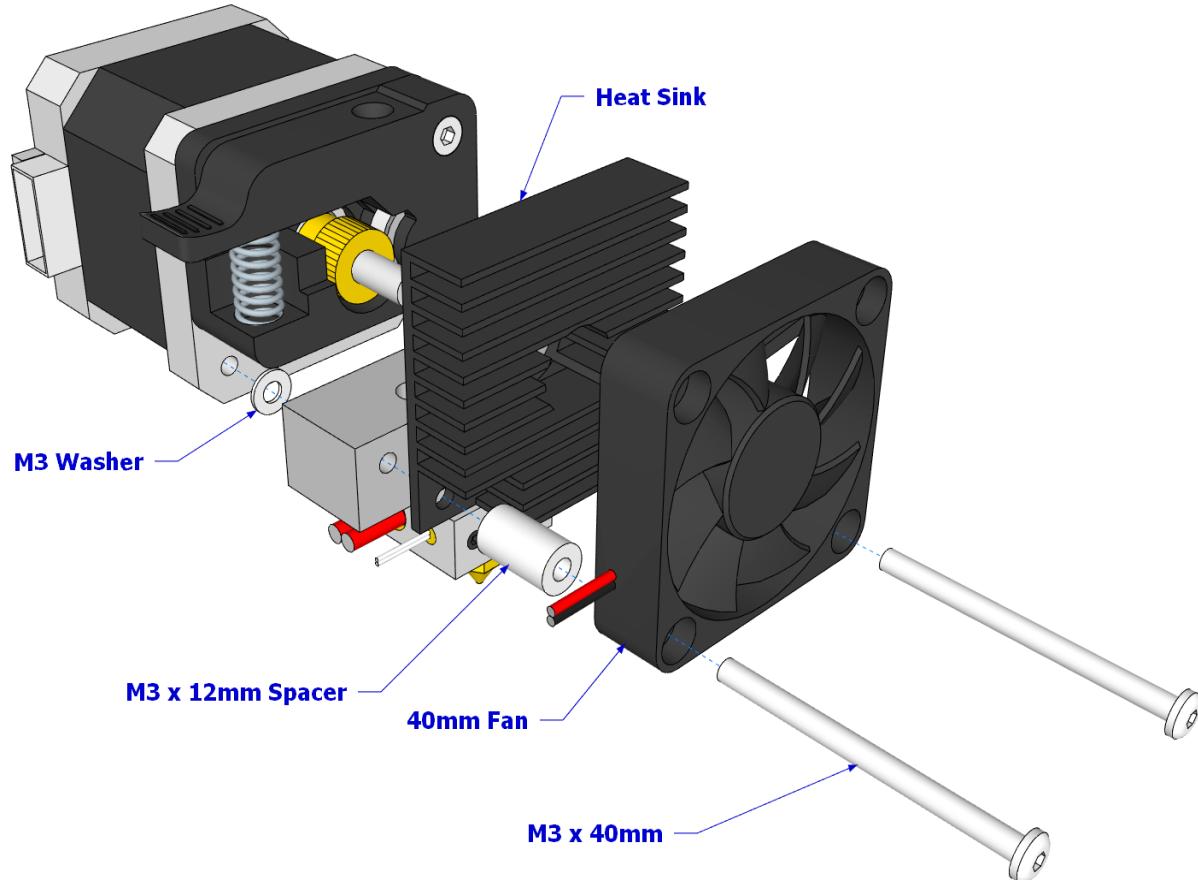
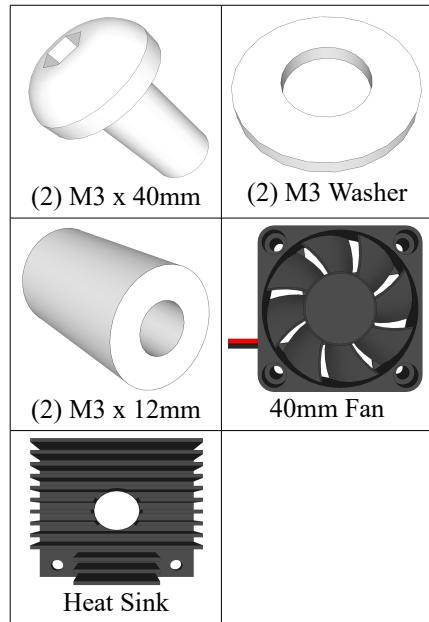
Step 4



Make sure the nozzle is screwed all the way into the heat block then unscrew $\frac{1}{2}$ a turn. Thread the heat break into the heat block until tight. Holding the heat block, tighten the nozzle. Paying attention to the orientation of the holes in the upper block and the wires on the heat block, insert the other end of the heat break until the end of the heat break is flush with the upper face of the upper block. Tighten the set screw enough to keep the hotend from shifting.

Extruder Assembly

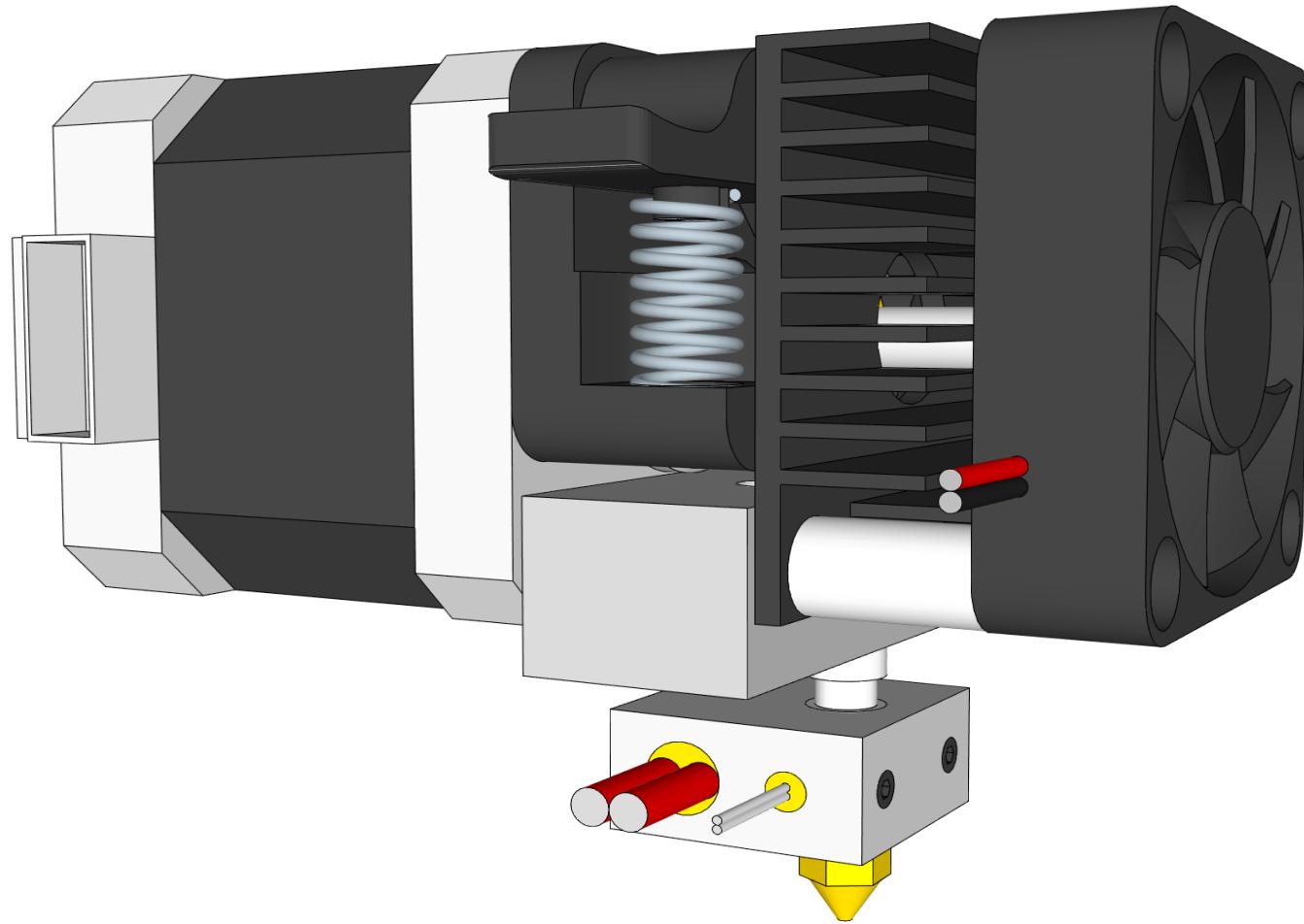
Step 5



Insert a M3 x 40mm bolt through the fan, M3 x 12mm spacer, heat sink, upper block, M3 washer, then into the stepper. Repeat on the other side. Make sure all of the wires are facing the left side.

Extruder Assembly

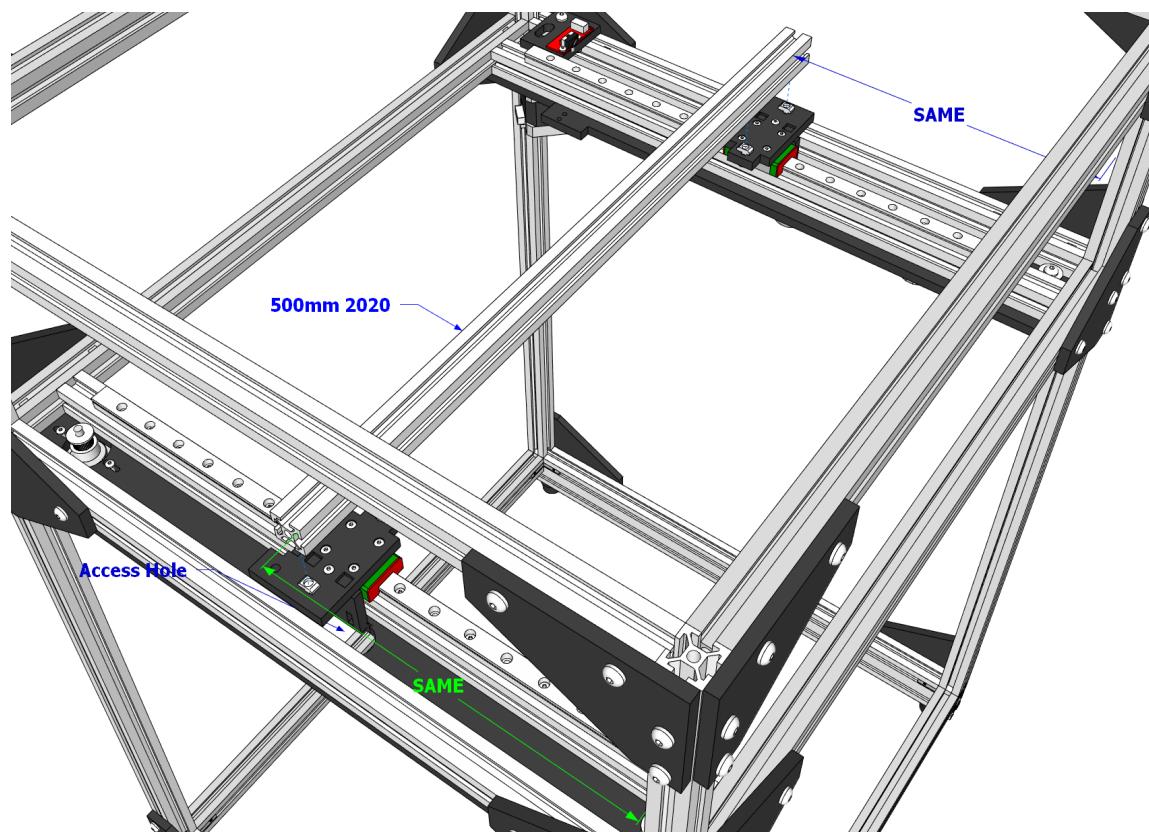
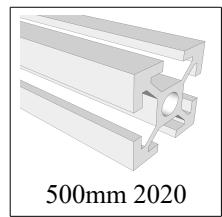
Complete



The extruder assembly is now complete. Take a few minutes to make sure it looks like the image above. Make sure all of the wires are coming out of the left hand side as shown in the image.

X Assembly

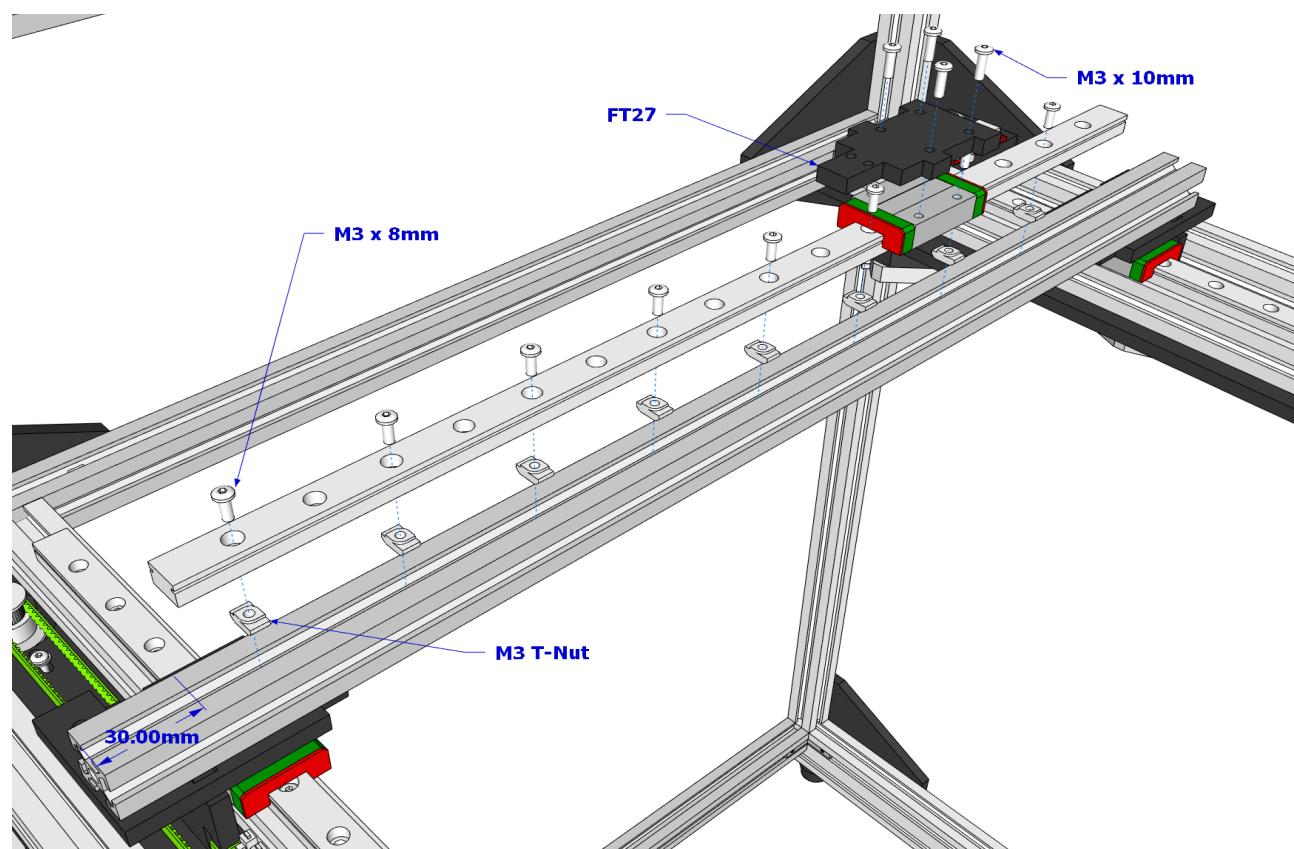
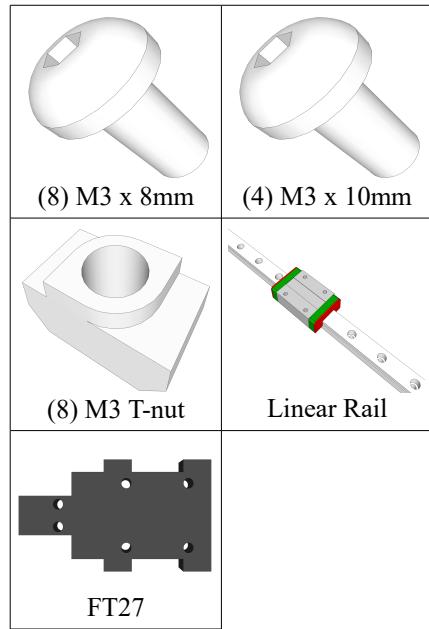
Step 1



Slide the FT10 and FT7 assemblies over the access holes in FT17 and FT18. Place the 500mm 2020 over the t-nuts we left loose earlier. Make sure both ends of the 500mm 2020 are the same distance from the front frame and it is centered. Fasten the beam down using the access hole to get to the outer bolts. Re-check to make sure the 500mm 2020 is even with the front. Adjust if needed. This will make sure it is square with the frame. **NOTE: Y belts are not shown.**

X Assembly

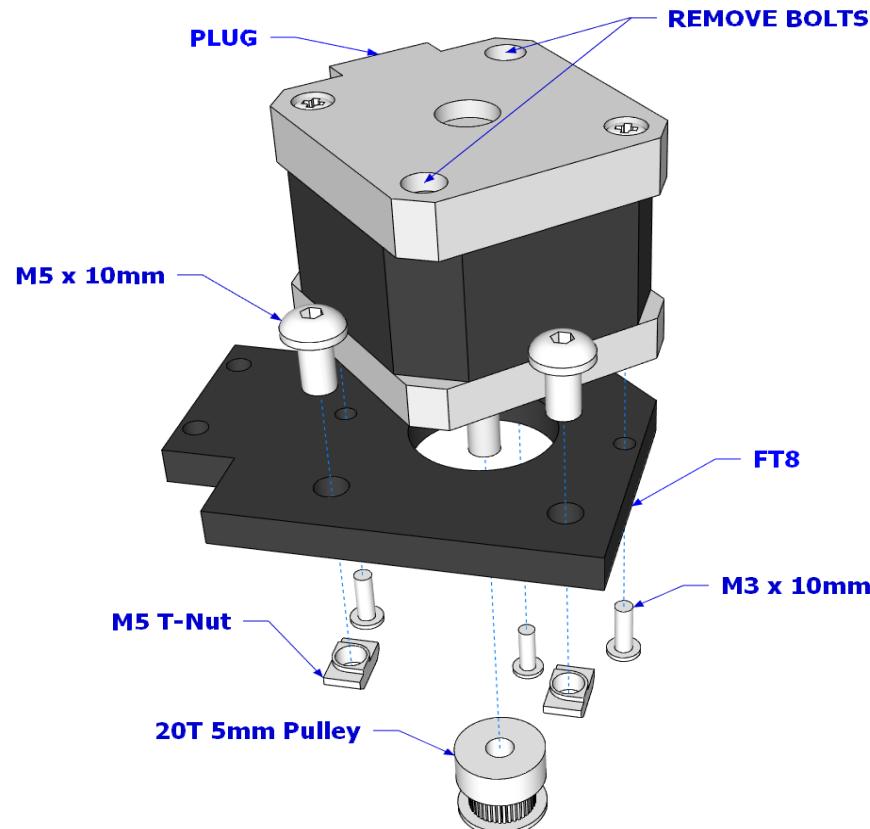
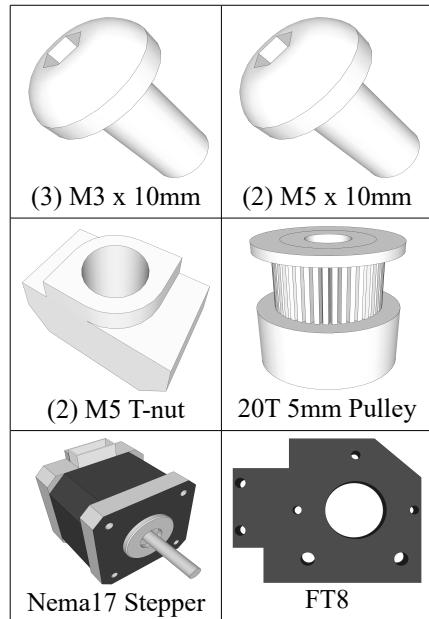
Step 2



Install (8) M3 x 8mm bolts and t-nuts into every other hole in the linear rail. Mount the linear rail to the X beam making sure you have a 30mm gap on the left end of the beam. Mount the FT27 (with the tail to the left) to the linear rail block using (4) M3 x 10mm bolts.

X Assembly

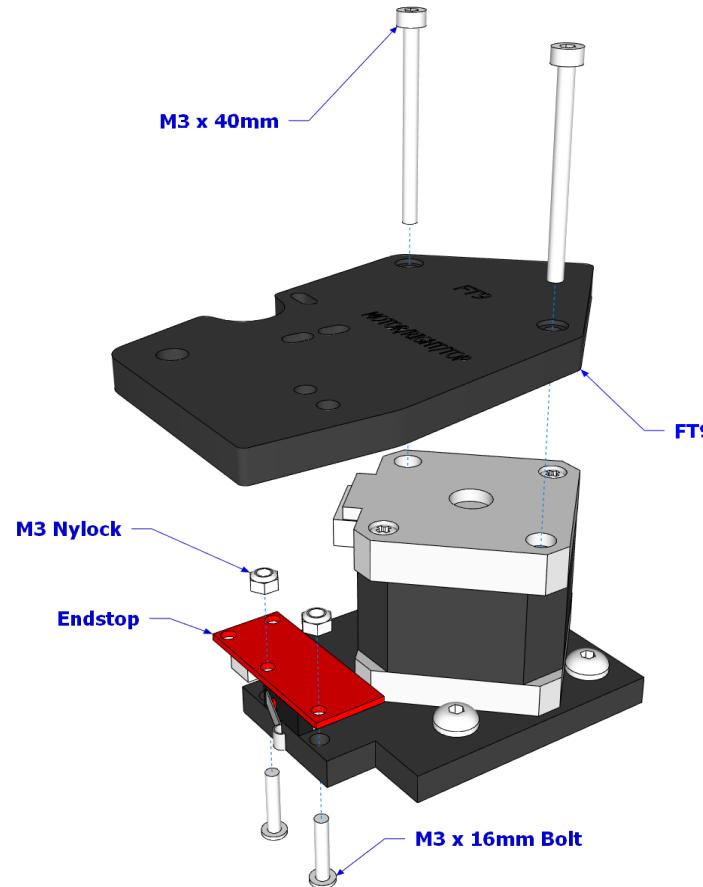
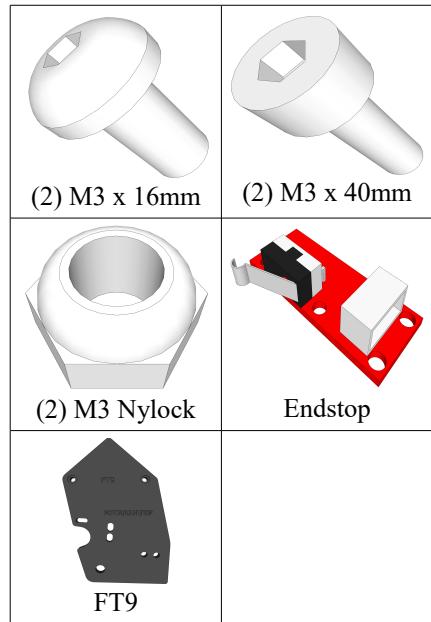
Step 3



Mount the 20T pulley to the stepper shaft leaving a 1mm gap at the end. Mount the stepper to the FT8 using (3) M3 x 10mm bolts. Make sure you have the plug on the stepper faced the correct direction. Install (2) M5 x 10mm bolts and M5 t-nuts to the FT8. Remove the (2) stepper bolts shown in the image.

X Assembly

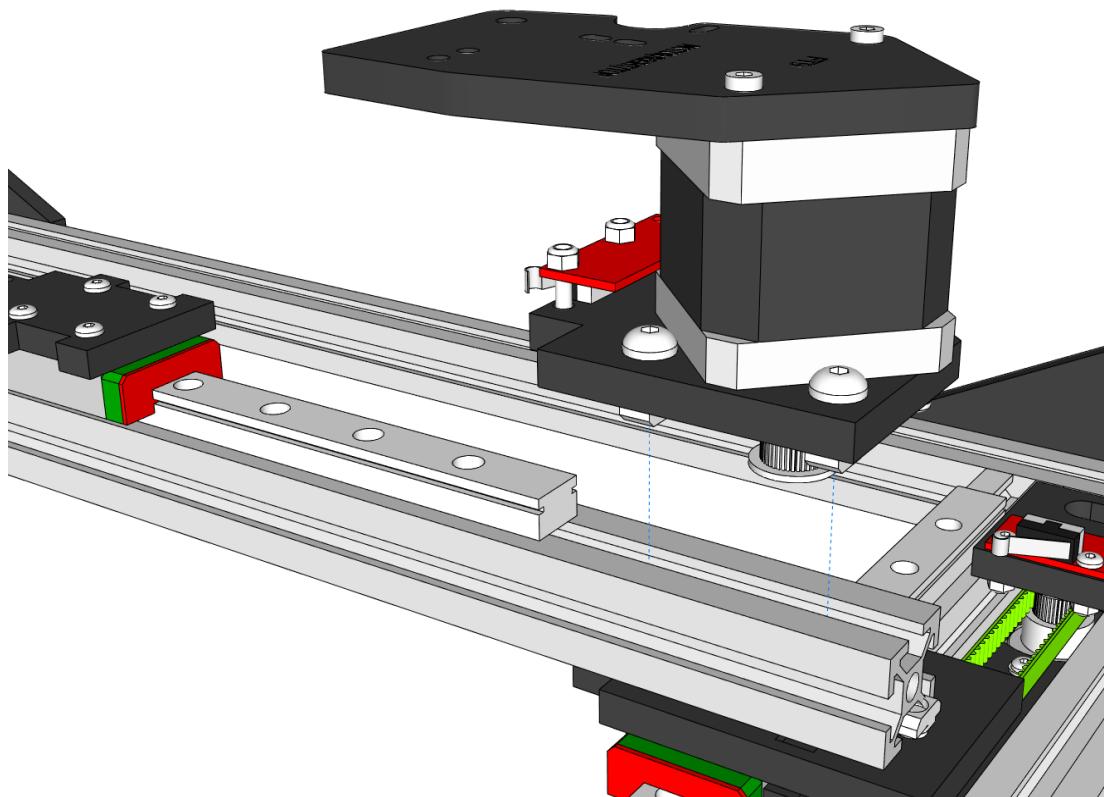
Step 4



Mount the endstop upside down to the FT8 using (2) M3 x 16mm bolts and (2) M3 nylocks. Mount the FT9 to the back of the stepper using (2) M3 x 40mm bolts.

X Assembly

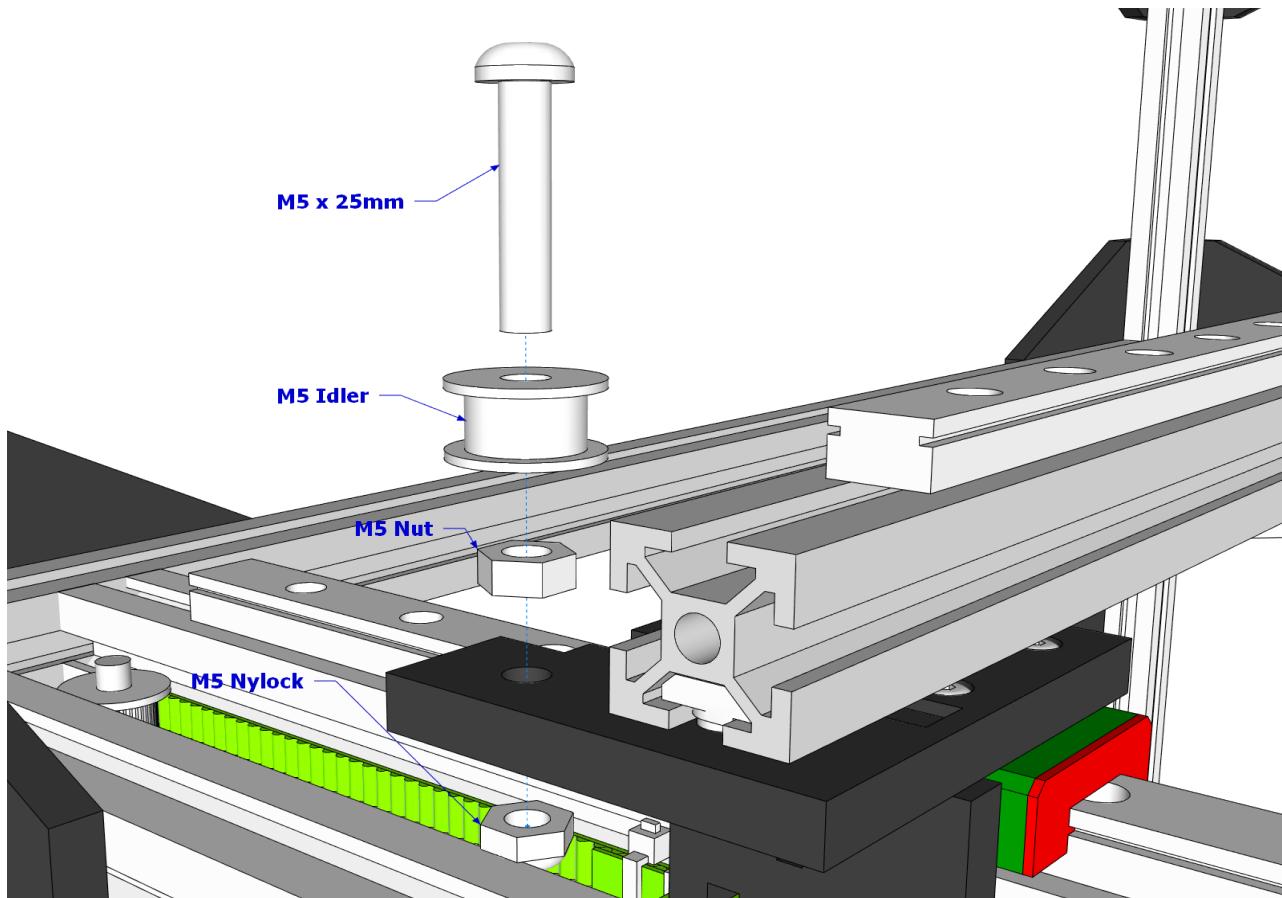
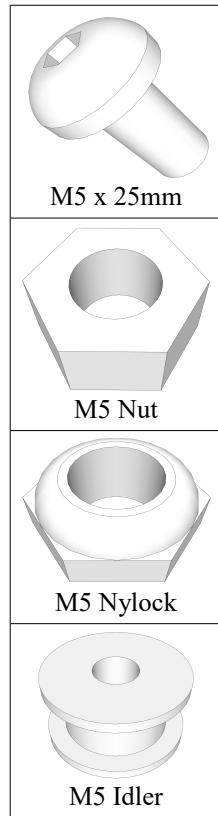
Step 5



Mount the assembly from the last step to the right end of the X beam using the (2) M5 x 10mm bolts and t-nuts we installed earlier. Slide it to the left so that it is up against the linear rail.

X Assembly

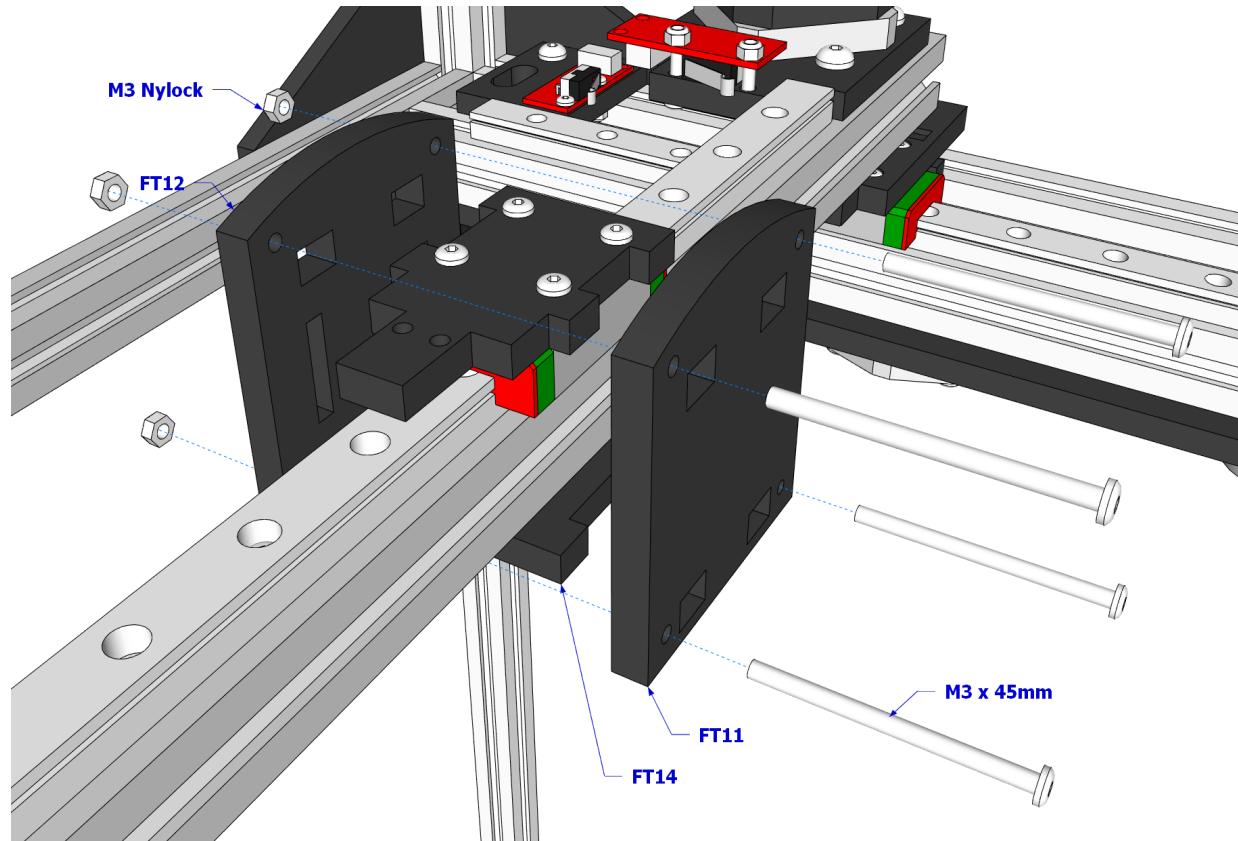
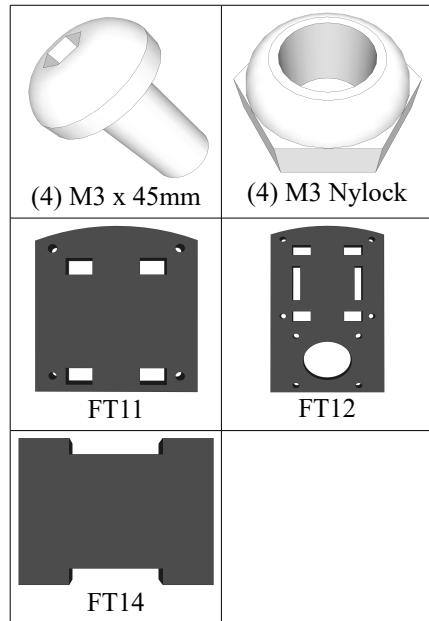
Step 6



Install the M5 idler onto the M5 x 25mm bolt using the M5 nut as we did before. Make sure it spins free. Mount it into the hole in the FT10 using the M5 nylock. Adjust to make sure it still spins free.

X Assembly

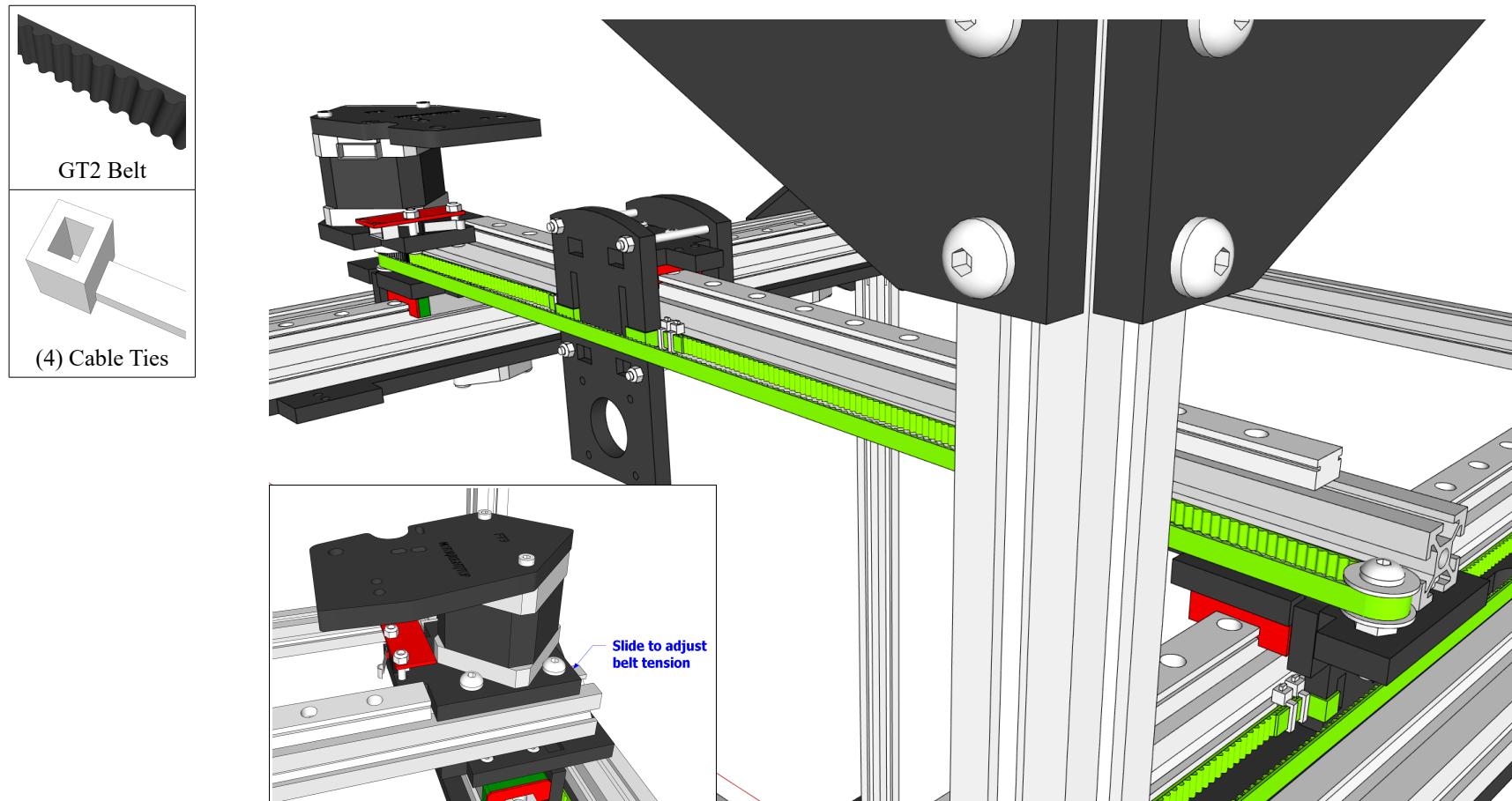
Step 7



Mount FT11 and FT12 with FT14 between them using (4) M3 x 45mm bolts and (4) M3 nylocks.

X Assembly

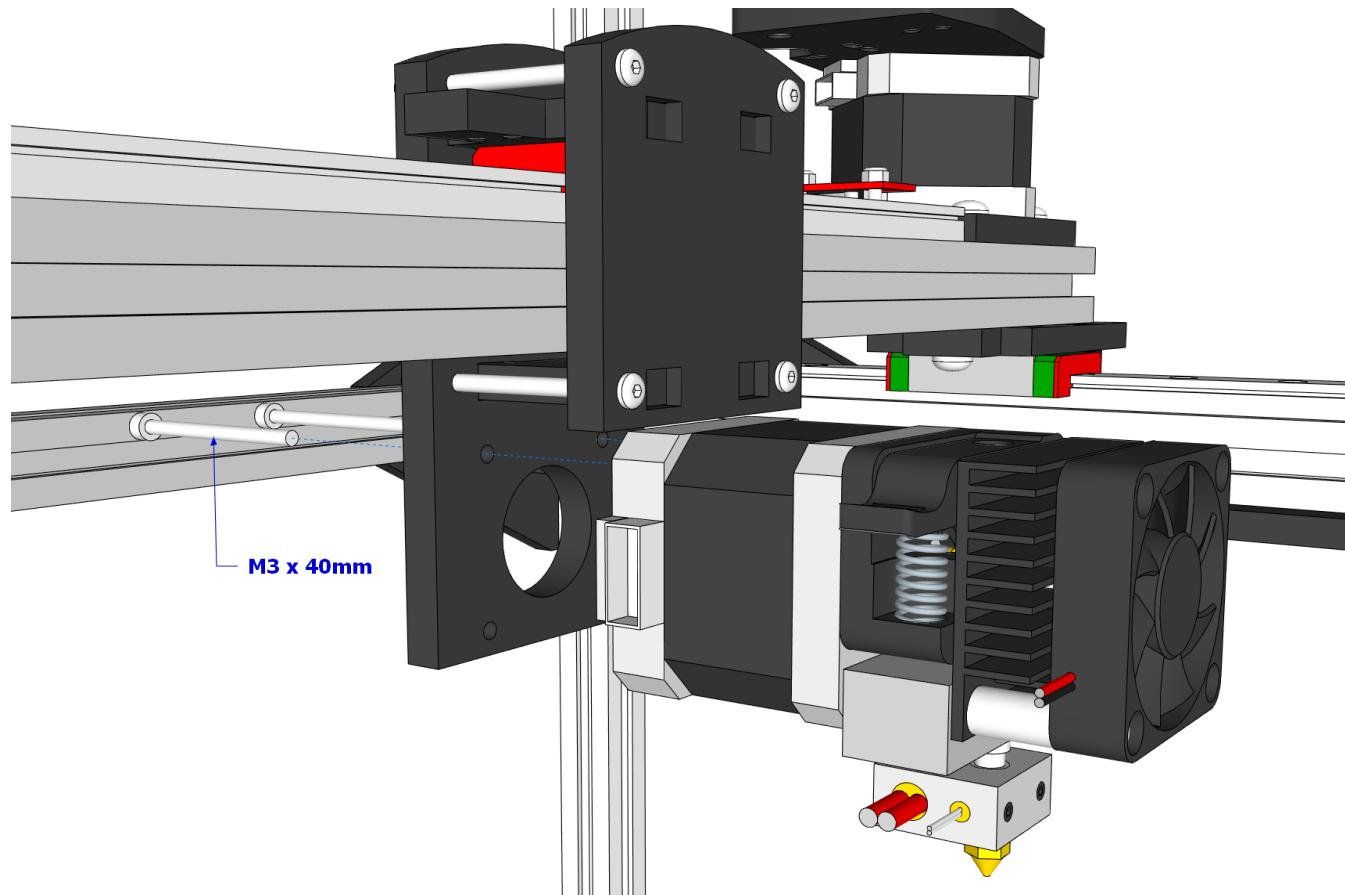
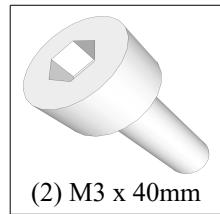
Step 8



Mount one end of the GT2 belt to one slot in the carriage assembly using (2) cable ties. Tightly run the belt around the X idler and pulley then secure to the other slot in the carriage using (2) cable ties. Trim off the excess. Adjust the X stepper to tighten the belt.

X Assembly

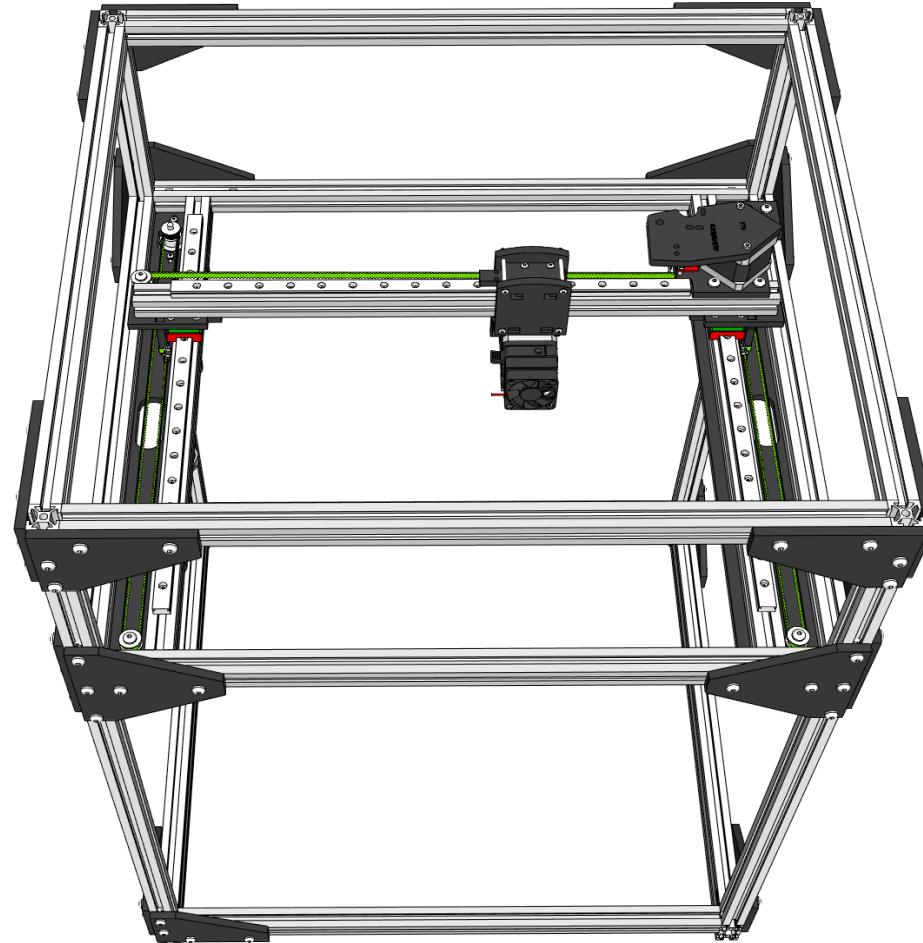
Step 9



Remove the top (2) bolts on the back of the extruder stepper. Mount the extruder assembly onto the carriage using (2) M3 x 40mm bolts.

X Assembly

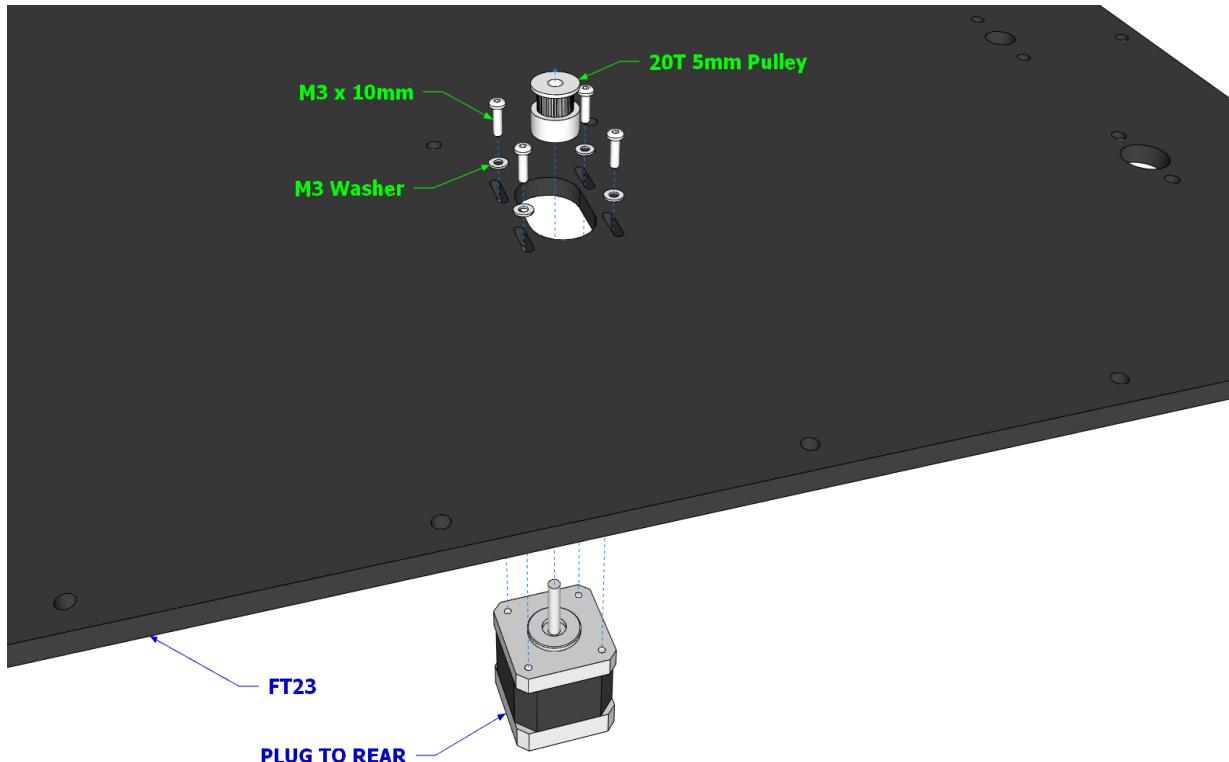
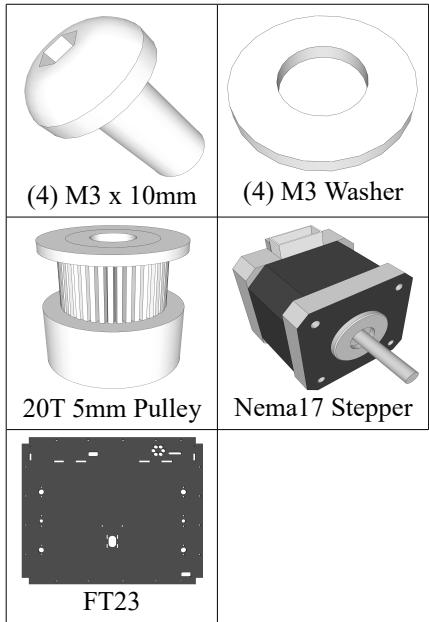
Complete



The X assembly is now complete. Make sure everything moves smoothly and that it looks like the image above.

Z Assembly

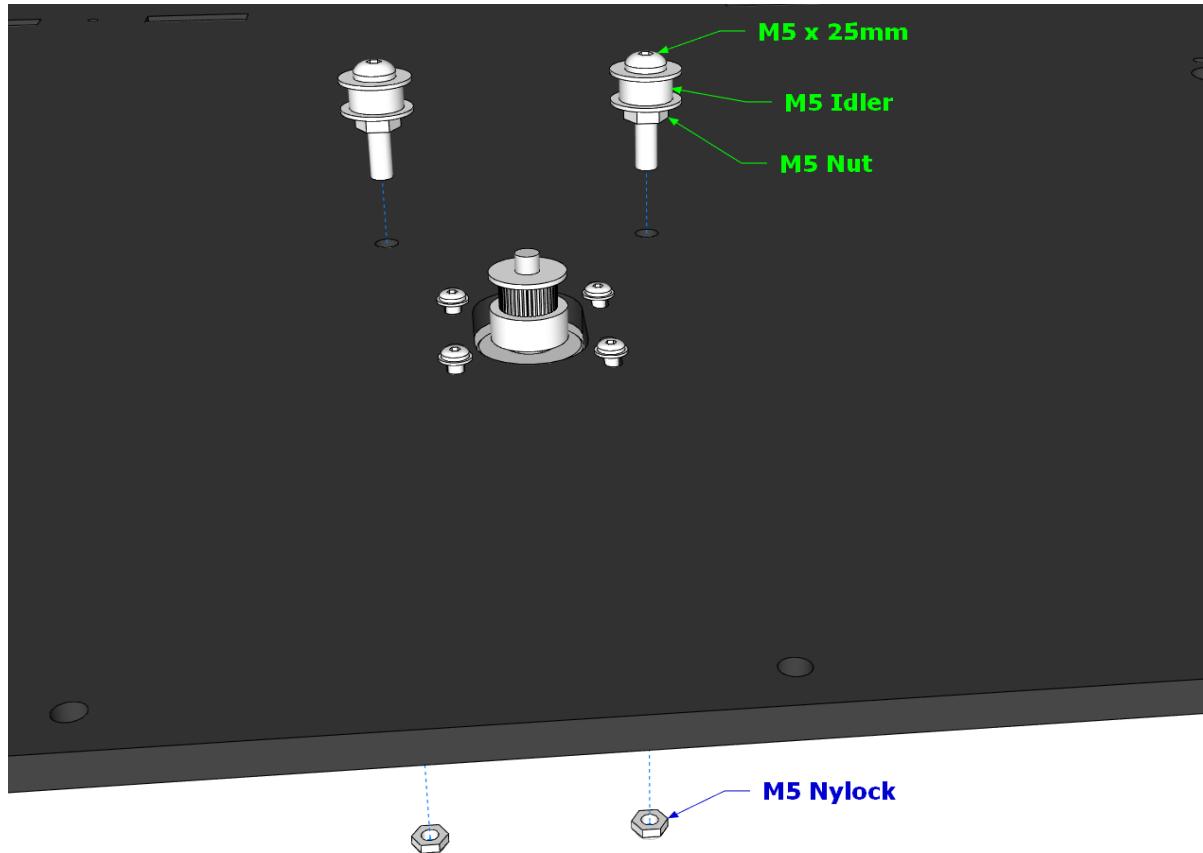
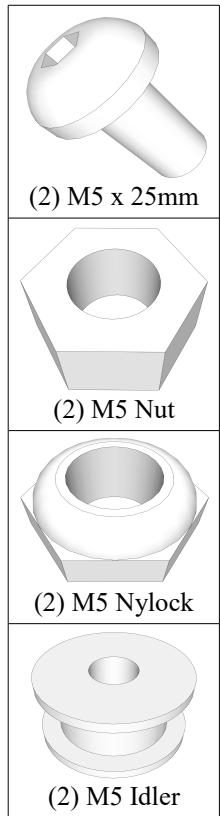
Step 1



Mount the 20T 5mm pulley to the shaft of the stepper. With the plug toward the rear, mount the stepper to the FT23 using (4) M3 x 10mm bolts and (4) M3 washers. Make sure the stepper is slid all the way toward the rear in the slots.

Z Assembly

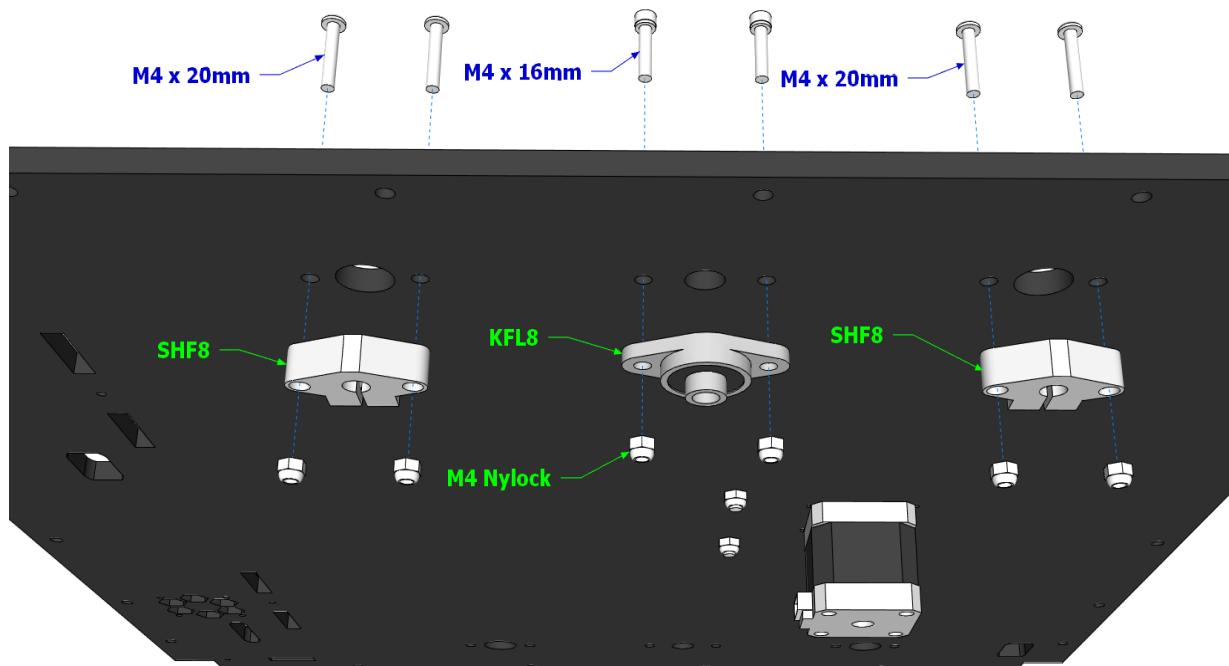
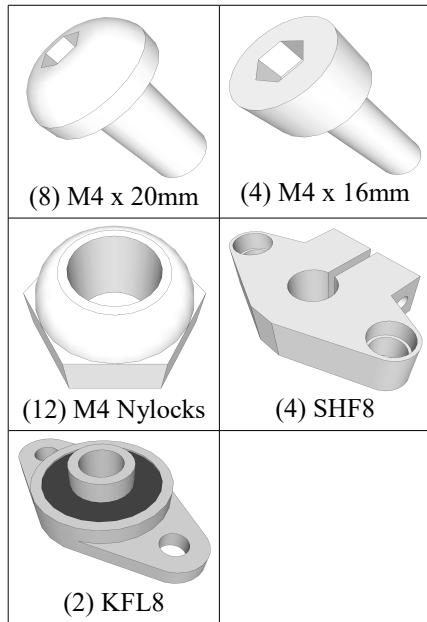
Step 2



As we did before, slide an M5 idler onto a M5 x 25mm bolt and secure with a M5 nut. Adjust the nut so that the idler spins free. Secure the assembly into one of the holes on the FT23 using a M5 nylock. Adjust to make sure the idler still spins free. Repeat for the other hole.

Z assembly

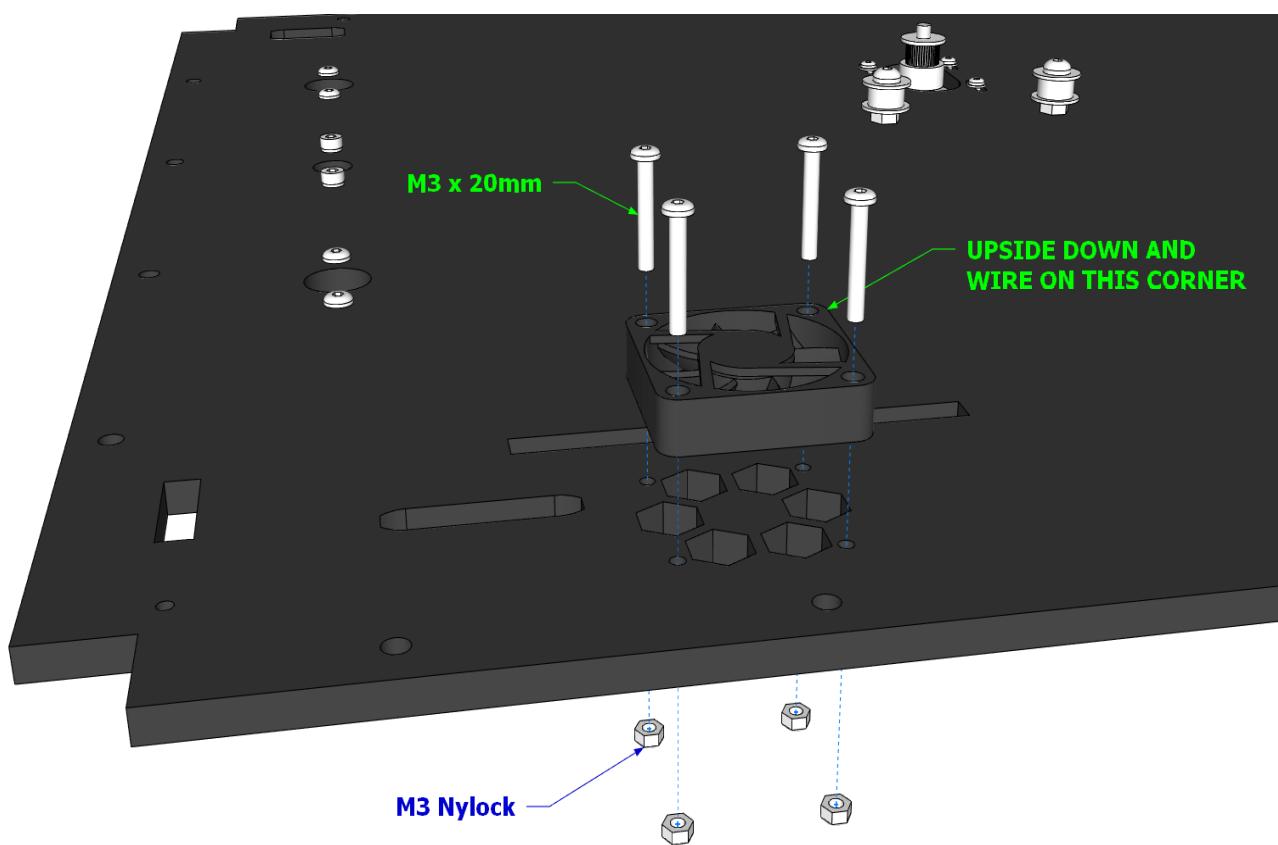
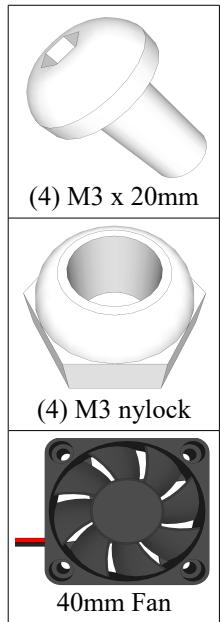
Step 3



Mount a SHF8 to each of the outer sets of holes from the bottom of FT23 using (2) M4 x 20mm bolts and (2) M4 nylocks each as shown. Mount a KFL8 to the center set of holes from the bottom of FT23 using (2) M4 x 16mm bolts and (2) M4 nylocks. From the top, make sure they are centered in the holes. Repeat for the other side.

Z Assembly

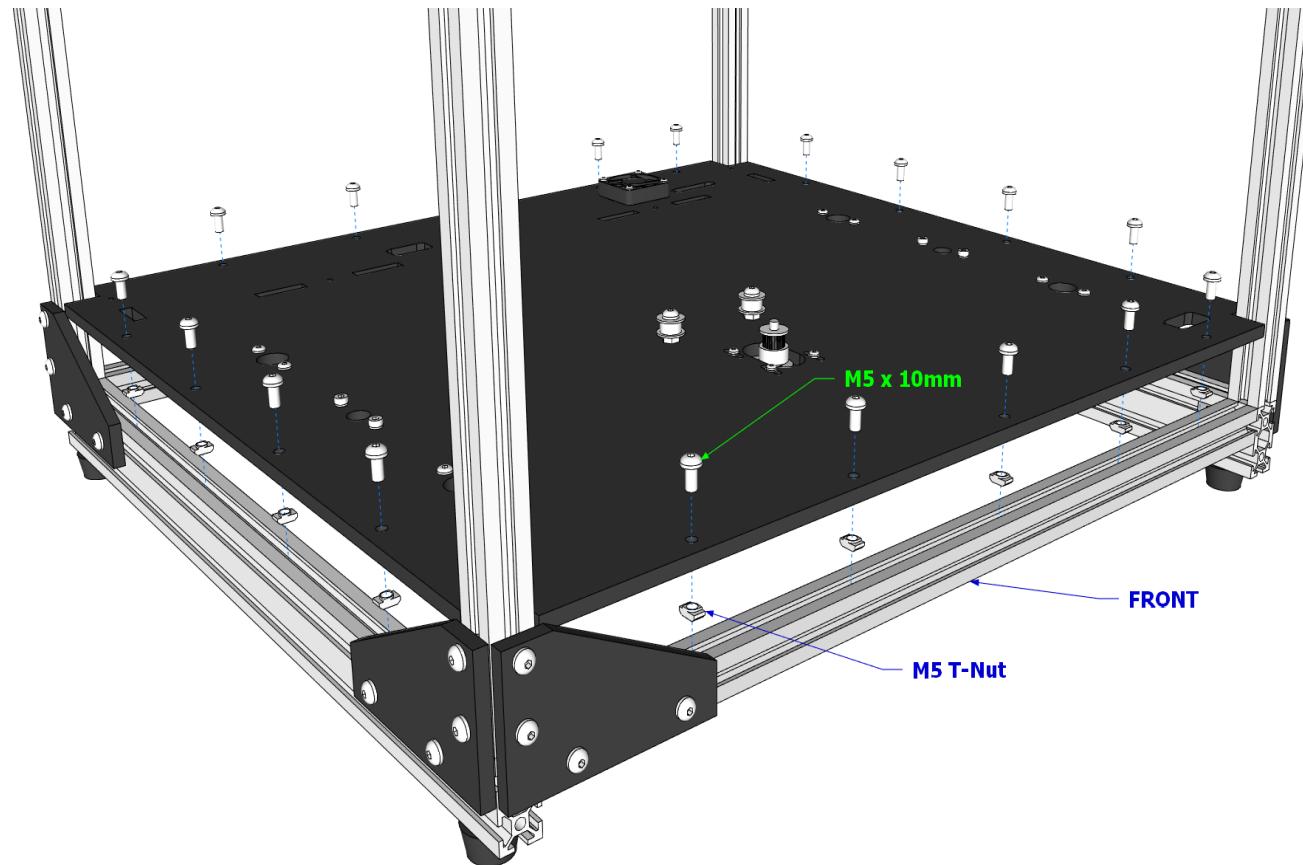
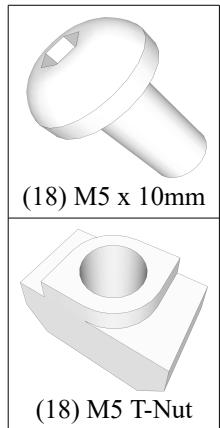
Step 4



Turn FT23 to the rear and install the 40mm fan upside down using (4) M3 x 20mm bolts and (2) M3 nylocks. Make sure the wire comes out on the rear right corner as indicated in the diagram above.

Z Assembly

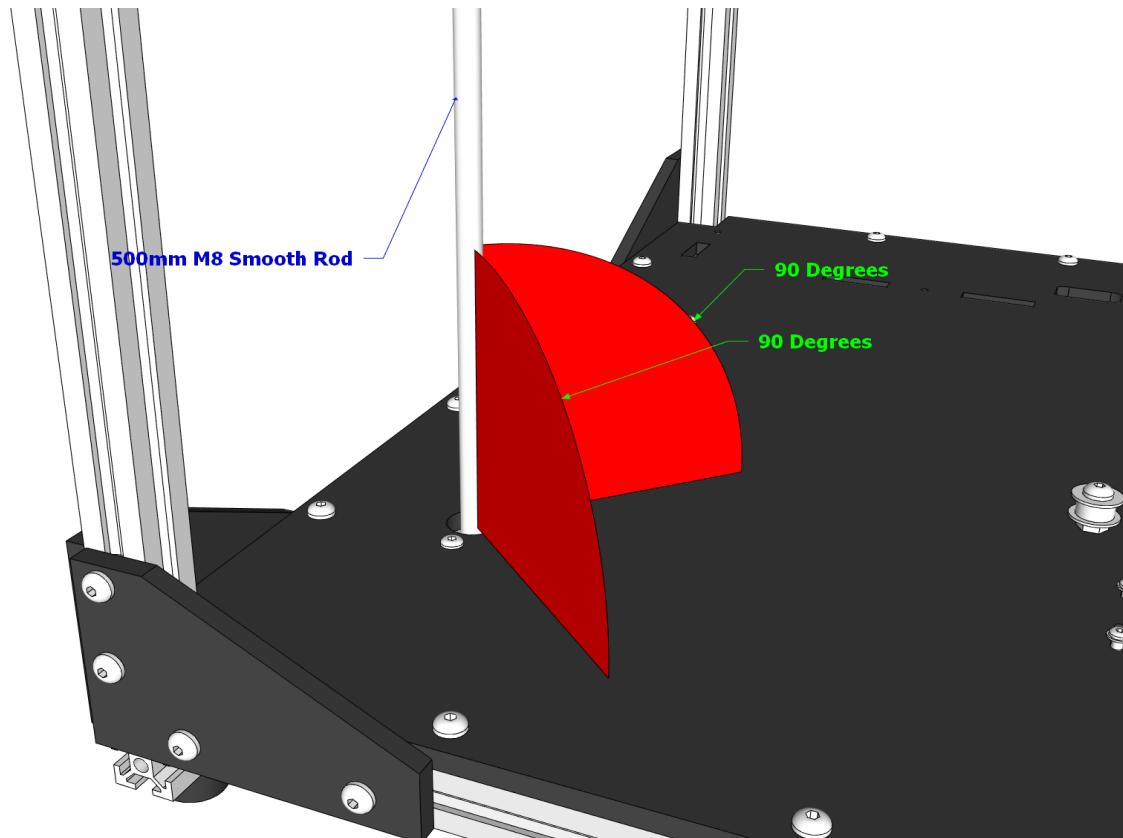
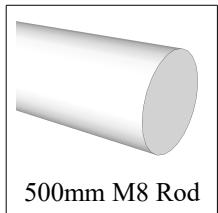
Step 5



Loosely install (18) M5 x 10mm bolts and (18) M5 t-nuts into the holes around the edge of FT23. Making sure the Z stepper is toward the front of the frame and the fan is at the rear, mount FT23 to the frame by tightening the M5 x 10mm bolts making sure the t-nuts engage into the slot in the beam.

Z Assembly

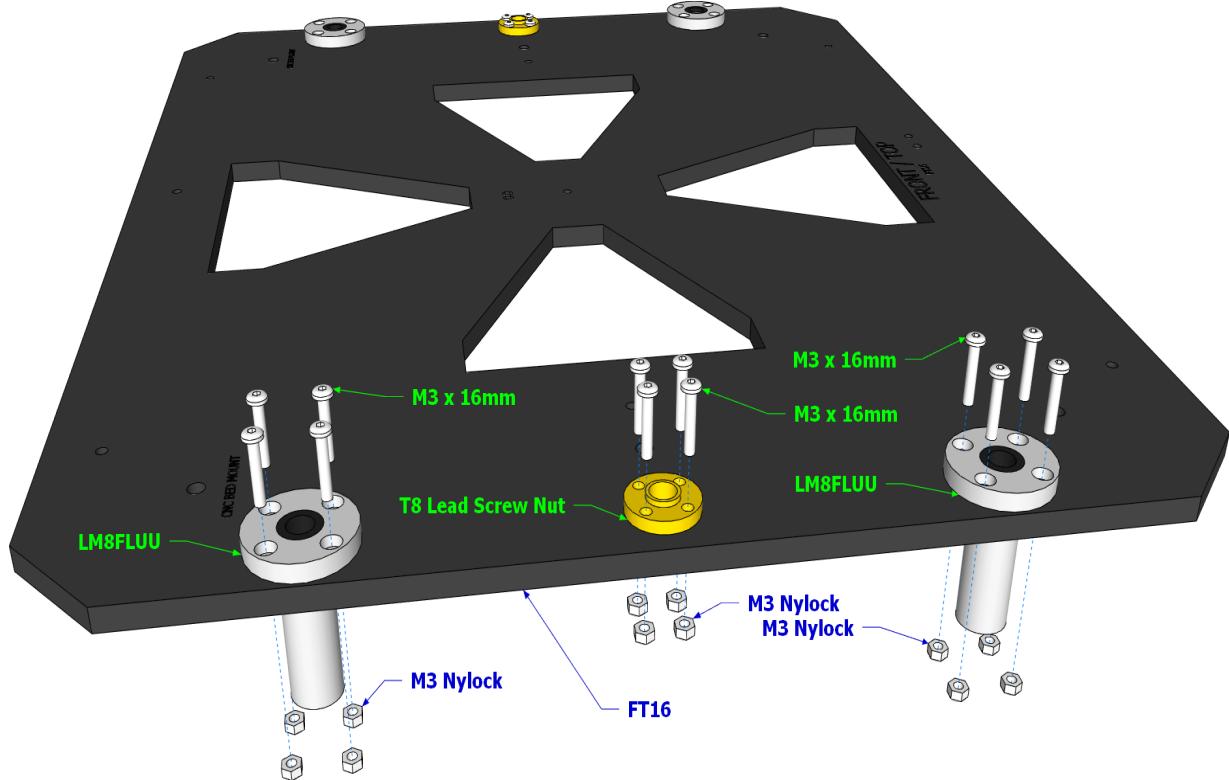
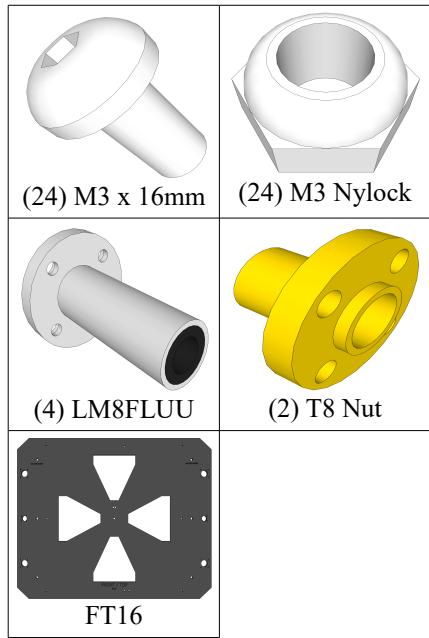
Step 6



Insert a 500mm M8 smooth rod up through the SHF8 on the bottom front left and up into the top SHF8 (not shown) then tighten both SHF8s. Using a square or anything you have that is known to be 90 degrees, adjust the top SHF8 until the M8 smooth rod is square with the base as shown above. This gives us a 90 degree reference to set the other rods to in a later step. **Remove the 8mm smooth rod.**

Z Assembly

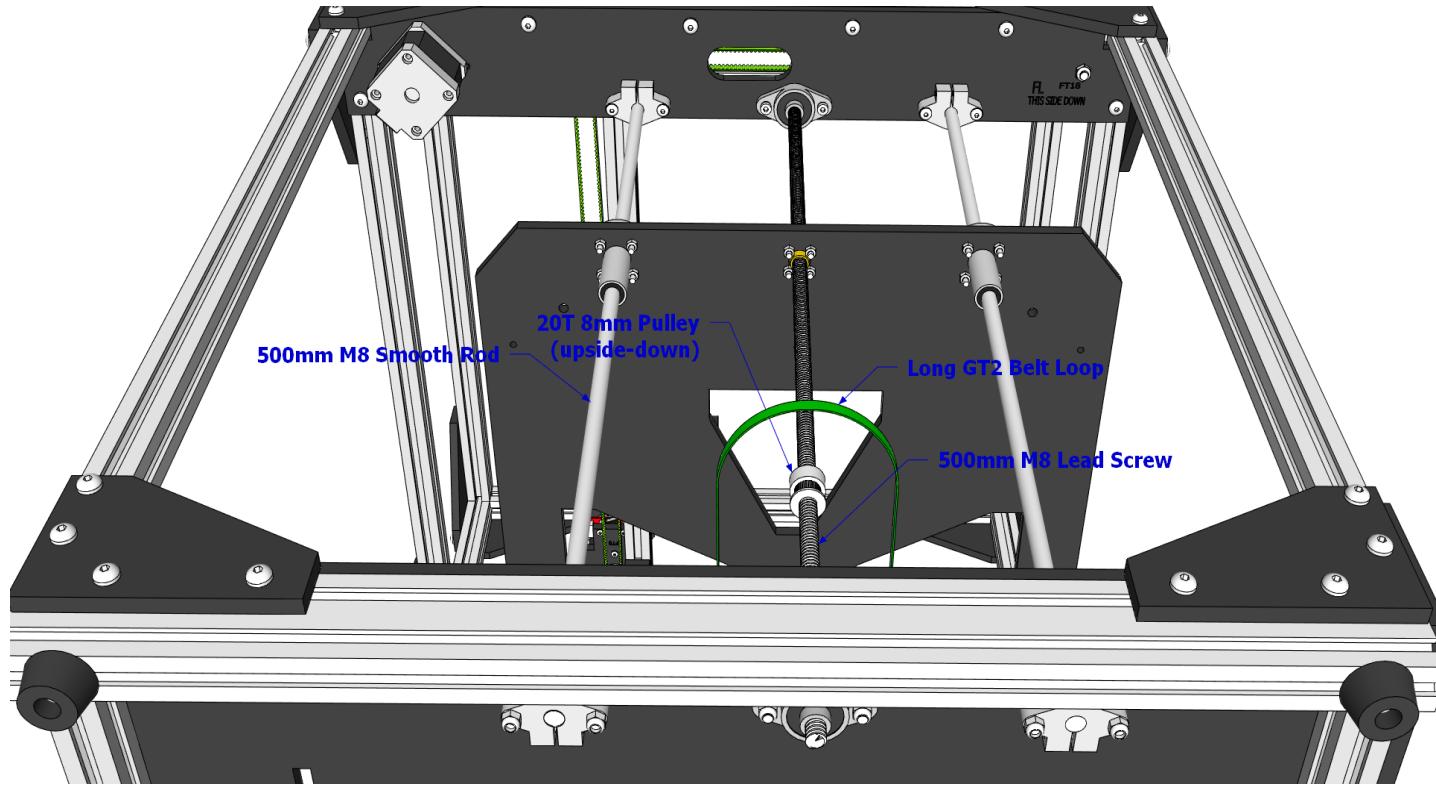
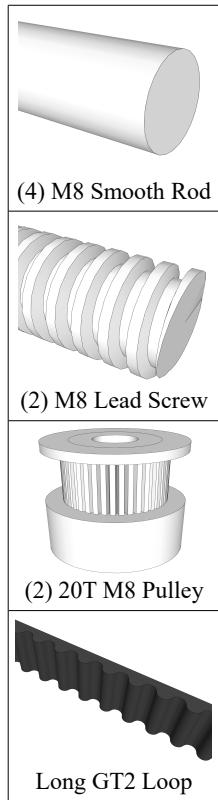
Step 7



Mount a T8 lead screw nut into the middle hole on one side of FT16 using (4) M3 x 16mm bolts and (4) M3 nylocks. Mount a LM8FLUU into each of the outer holes using (4) M3 x16mm bolts and (4) M3 nylocks each. Repeat on the other side.

Z Assembly

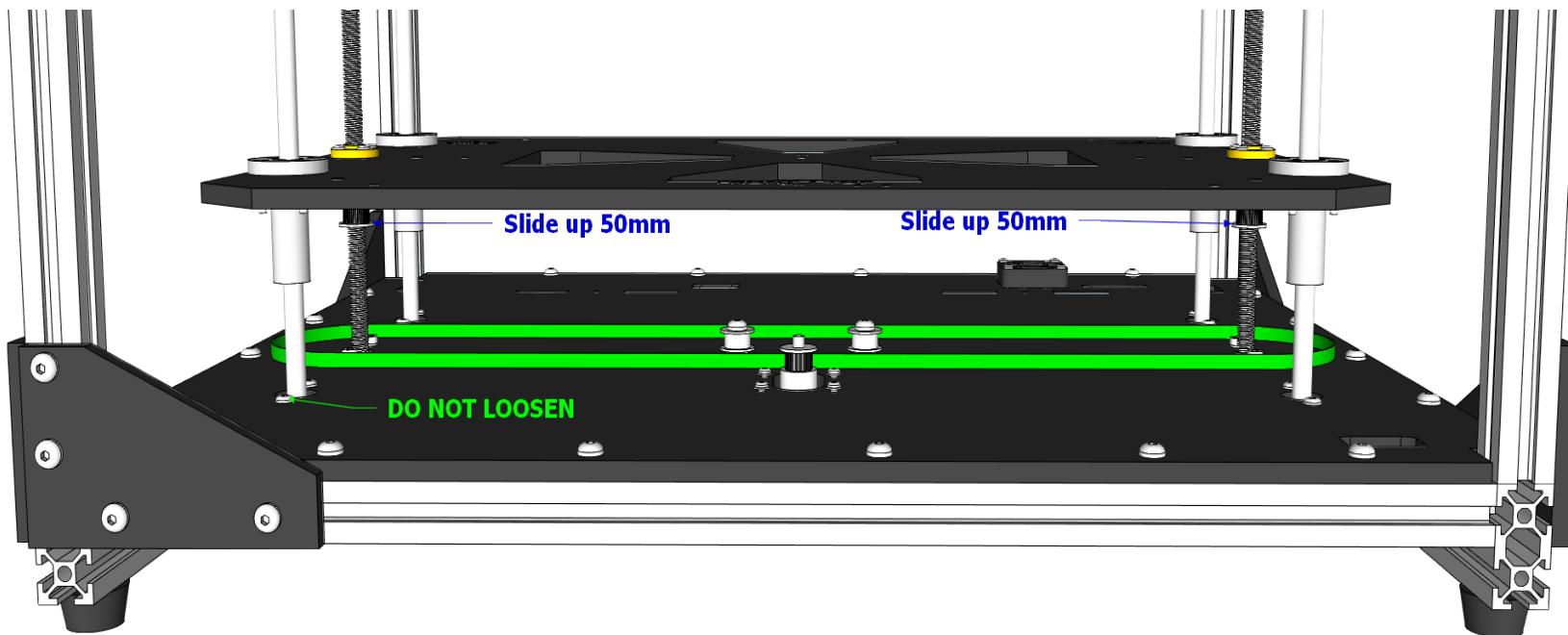
Step 8



Lay the frame on its right side. Slide a 500mm M8 smooth rod through both outer SHF8s, through the bed, and into the top SHF8s. Tighten the SHF8s. Slide a 500mm M8 lead screw through the lower KFL8. Slide on a 20T 8mm pulley (upside-down) and loop the long GT2 belt loop around it. Thread it through the T8 lead screw nut on the bed and into the top KFL8. Tighten both KFL8s. Flip the frame onto the left side and repeat on the other side. Make sure the 20T 8mm pulleys are upside-down and that the long GT2 belt loop goes around both M8 lead screws.

Z Assembly

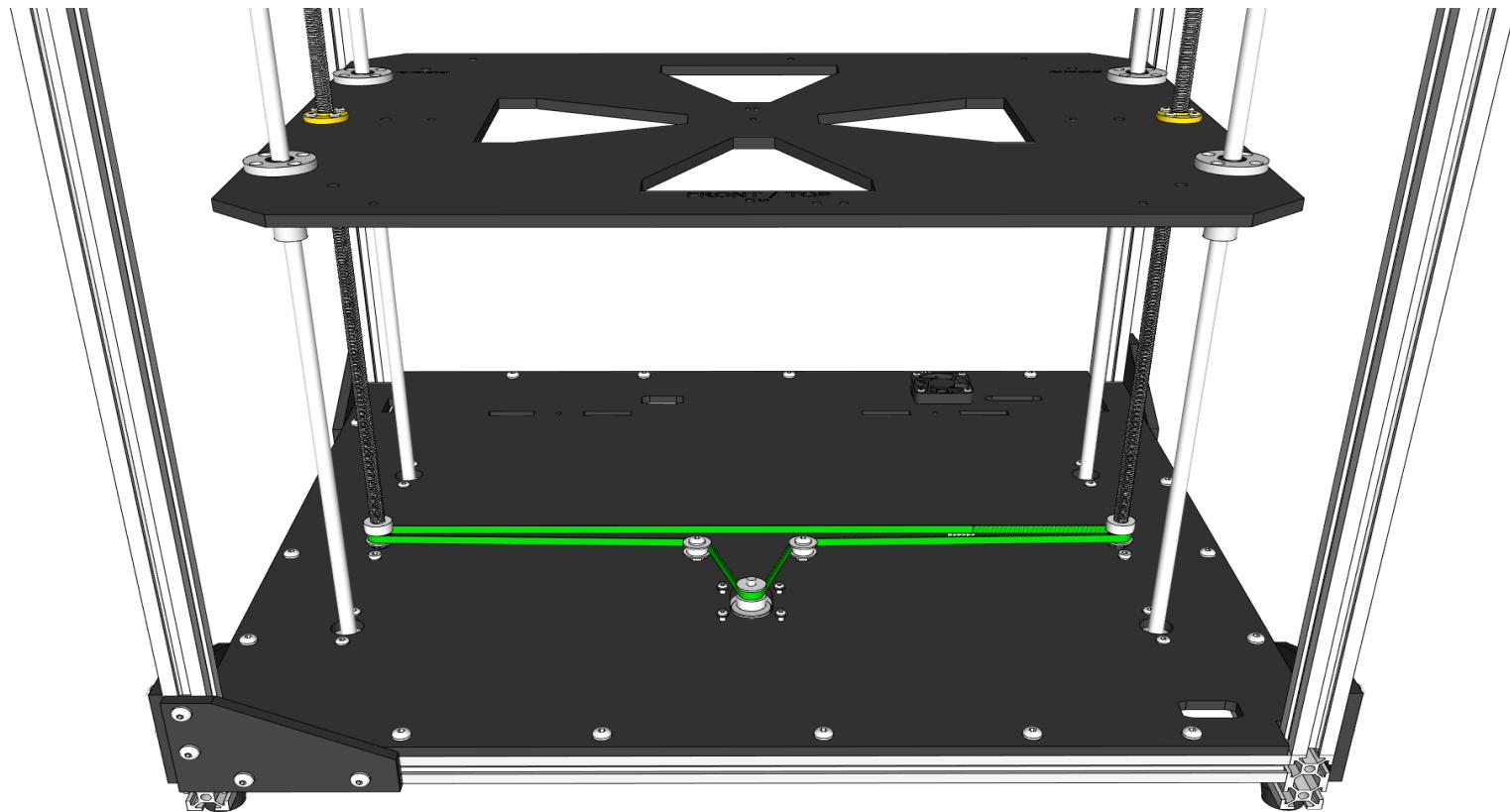
Step 9



Slide the 20T 8mm pulleys up 50mm and tighten. These will be used to keep the bed up during this step. Loosen the mounting bolts on all of the SHF8s and KFL8s on the bottom **EXCEPT THE FRONT LEFT SHF8** indicated in the image above. Move the bed up and down a bit to settle the mounts into location. Tighten all the mounting bolts. Again using the 20T 8mm pulleys, hold the bed toward the top leaving room to access the hardware. Repeat the process at the top with the upper SHF8s and KFL8s **EXCEPT THE FRONT LEFT SHF8**.

Z Assembly

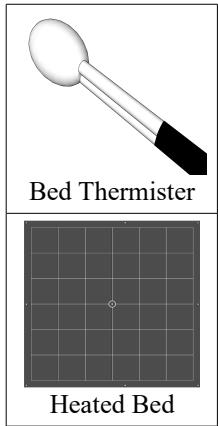
Step 10



Loosen and slide the Z stepper toward the rear. Install the Z belt as shown above. Adjust the 20T pulleys on the M8 lead screws and Z stepper so that they line up with the idler pulleys. Slide the Z stepper toward the front to tighten the belt then tighten the bolts holding the stepper. Loosen one of the 20T pulleys on one of the M8 lead screws and adjust the bed so it is the same height on both sides. This will ensure the bed is level with the frame. Tighten the 20T pulley.

Bed Assembly

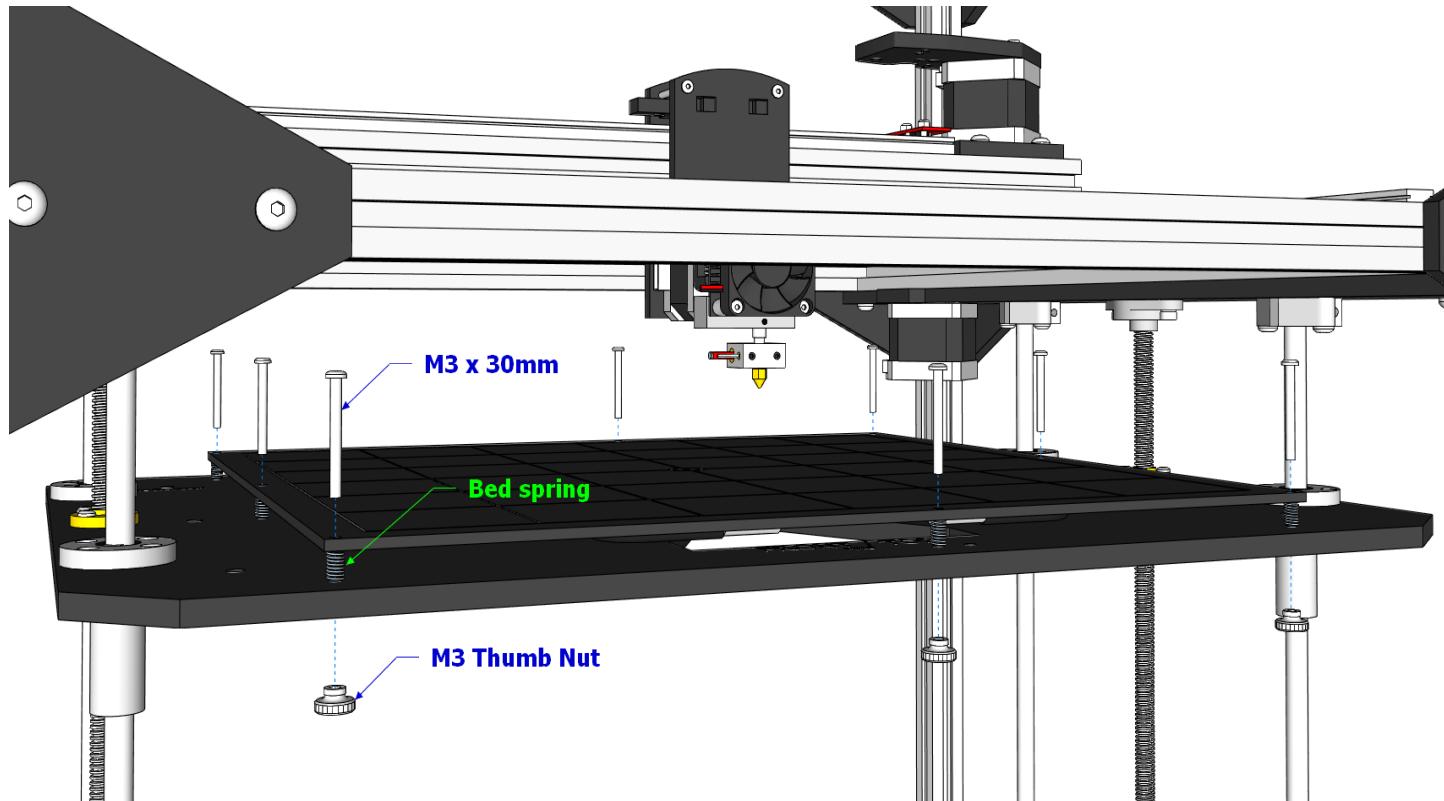
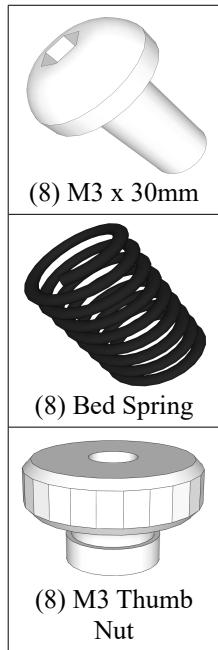
Step 1



Flip the heated bed upside-down (pre-soldered wires will be at the top) and tape the bed thermister over the contacts in the center of the heated bed using an X of kapton tape. Make sure it is secured very well. Run the heater wires over the tape and along with the thermister wires. These will be secured in a later next step.

Bed Assembly

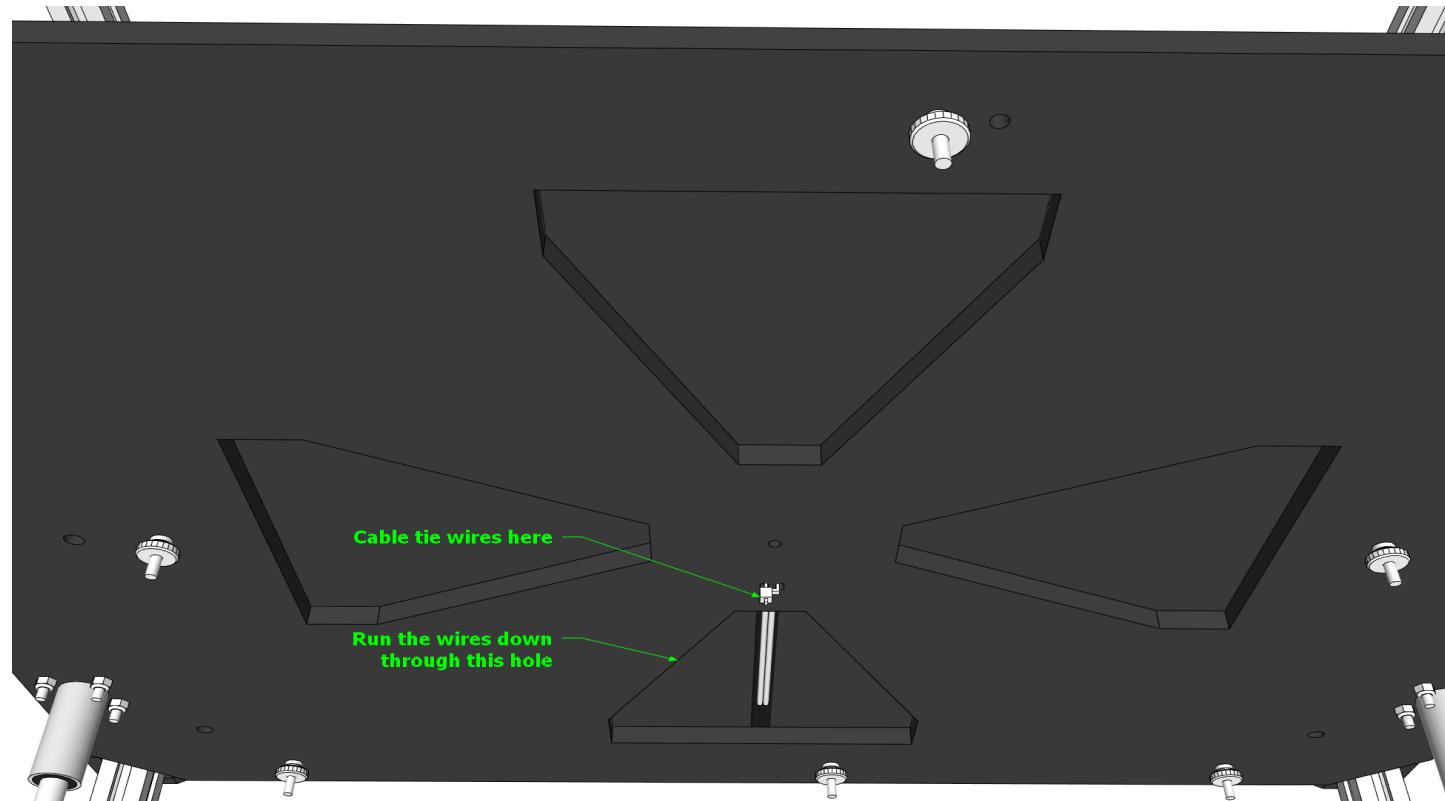
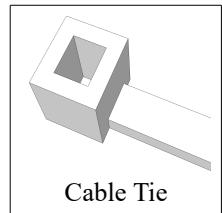
Step 2



Lay the heated bed onto F16 with the wires leading out the rear. Slide in a bed spring between the heated bed and FT16 at each of the (8) holes. Insert an M3 x 30mm bolt through each hole and secure with a M3 thumb nut. Tighten the M3 thumb nuts until the bed spring is fully compressed then back off a few turns.

Bed Assembly

Step 3



Leaving some slack, use a cable tie to secure the thermister and bed heater wires through the (2) holes as shown. Run the wires down through the rear hole as indicated in the image above.

NOTICE

The remainder of this WIP manual was copied and modified from the FT-5 R1 guide.

The images may not be representative of what your machine and parts look like but the ideas and concepts are the same.

We tried to point out every time they are different.
This was done to accelerate the release of the beta manual.

These steps will be updated to follow the layout of the rest of the manual in the full FT-5 R2 v1.0 manual release.

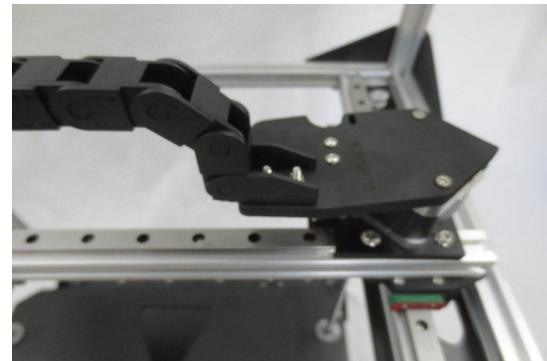
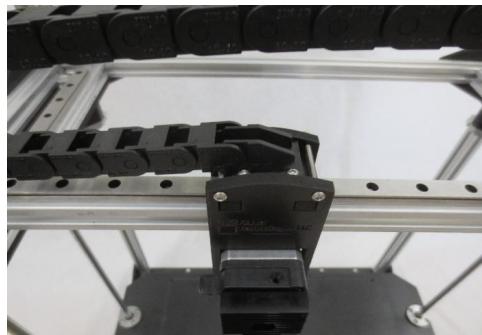
Secure a female cable chain end mount to FT9 using (2) M3 x 12mm bolts and M3 nylocks.



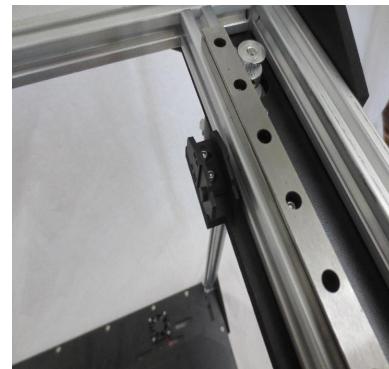
Secure a male cable chain end mount to FT27 using (2) M3 x 12mm bolts and M3 nylocks



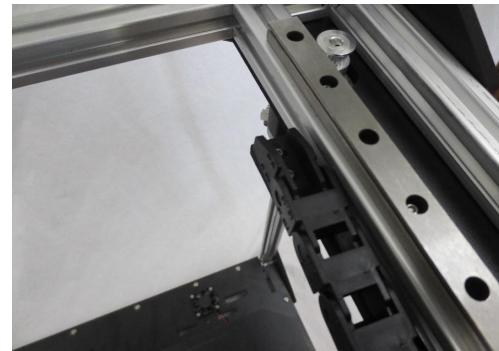
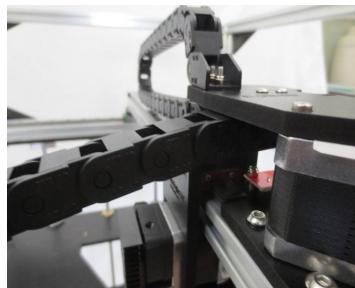
Take the cable chain and split it in half (25 links, note using more than 25 links will cause the cables to be too short). Take one end and lock it into the female cable mount on the x axis motor. Lock the other end onto the male cable mount on top of the hotend.



Take a male cable mount and secure it in place on the right upper panel using two M3x12mm screws and two M3 Nylocks.



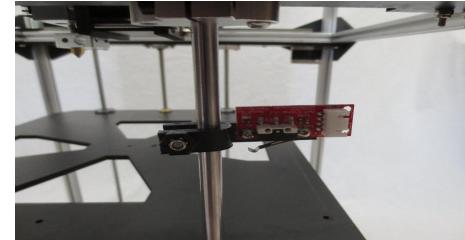
Snap one end of the other section (about 27 links, note using more than 27 links will cause the cables to be too short) of cable chain onto the male cable mount. Secure the other end of the cable chain onto the female cable mount.



Take the printed endstop mount and an endstop and secure it in place using two M3x20mm screws and two M3 Nylocks.



Position the endstop onto the back right M8 smooth rod. Insert a M3x20mm bolt through the end and secure it with a M3 nylock. This will be adjusted during calibration.



Lay the power supply face down with the terminals to the right, and FT19 on top of it. Line up the four M4 holes on the back of the power supply and secure it in place using (4) M4 x 10mm bolts.



Place the MKS board next to the power supply and secure it in place using (4) M3 x 12mm bolts, (4) 5mm nylon spacers, and (4) M3 nylocks.



Note: The power supply and the MKS board should be mounted with the power terminals facing each other.

Place FT19 onto the base plate, line up the slots with the tabs.

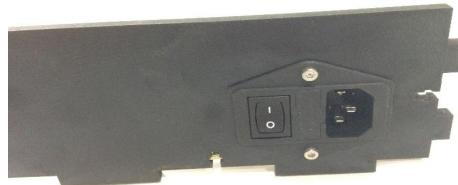
Slide a M3 square nut into the slot and screw a M3x16mm screw in. It should look like the picture to the right with the base at the bottom and electronics facing the rear of the printer.



Place FT21 onto the left side, as viewing from the rear of the machine, and secure it in place using two M3x16mm screws and two M3 square nuts.



Place the power outlet onto FT20 and secure it in place using two M3x16mm screws and two M3 Nylocks.



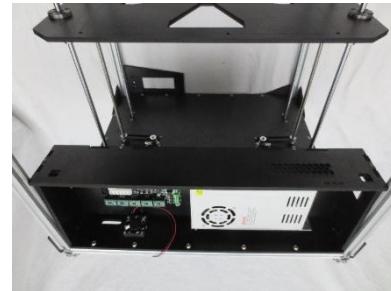
Mount FT20 on the right side as we did with FT21 above.



Take the USB cable mount plug and secure it onto FT21 using two M3x12mm screws. This is a good time to plug the other end into the MKS board before the top goes on.



Place FT22 on top and secure it in place using four M3x16mm screws and four M3 square nuts.



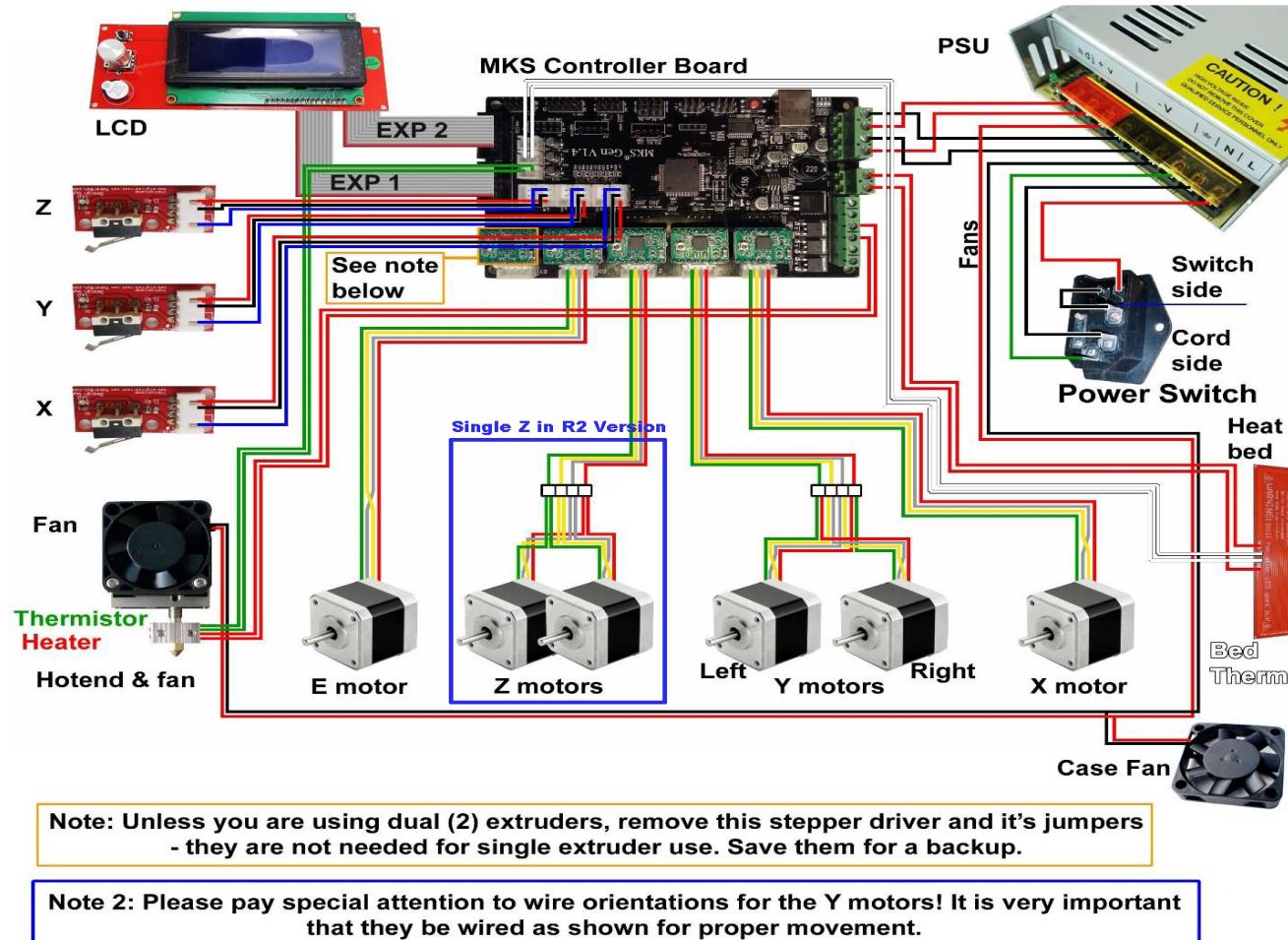
Mount FT25 to the front right corner using (4) M5 x 10mm bolts and (4) M5 t-nuts.



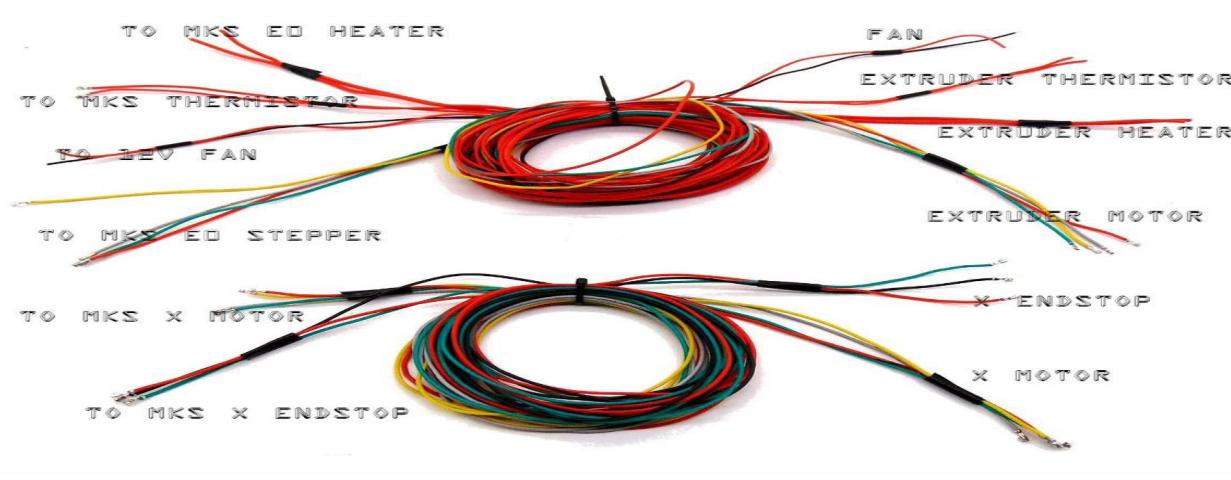
Take the LCD screen and remove the knob from the panel. Place the orange stop button through FT25 and then place the LCD screen into it. Place the knob back on and secure the panel in place using four M3x20mm screws, four nylon spacers, and four M3 Nylocks. **Place the four larger nylon spacers between the LCD screen and FT25.** Be careful not to over tighten the screws as this can damage the screen.



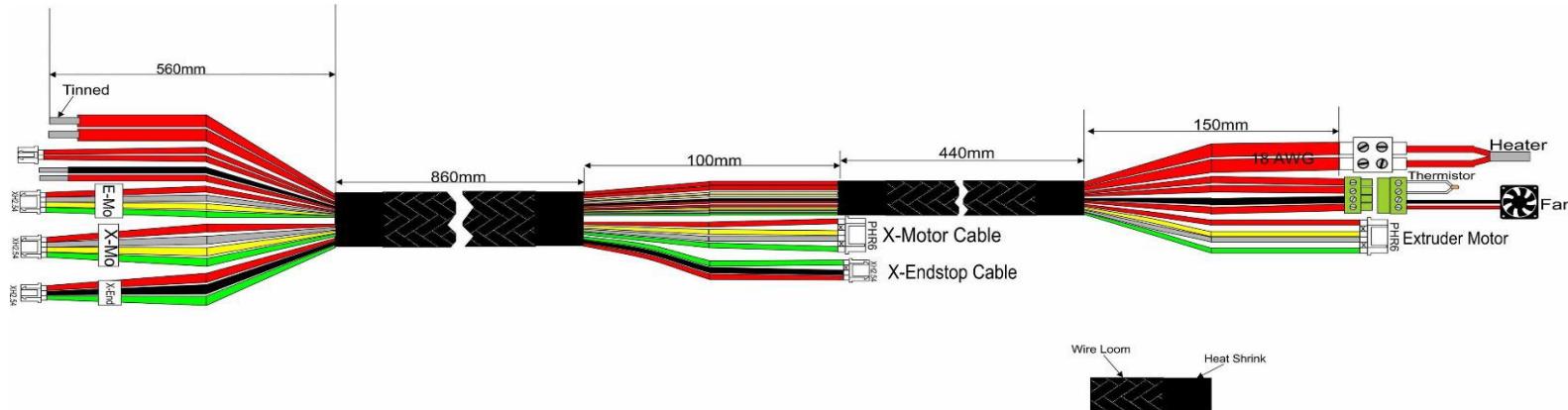
FT-5 Wiring Schematic - MKS Gen 1.4 Controller Board



Locate the wiring for the X axis and Extruder as shown below. Note: your stepper wires will have the connectors installed. **Note: your thermister wires will be white.**

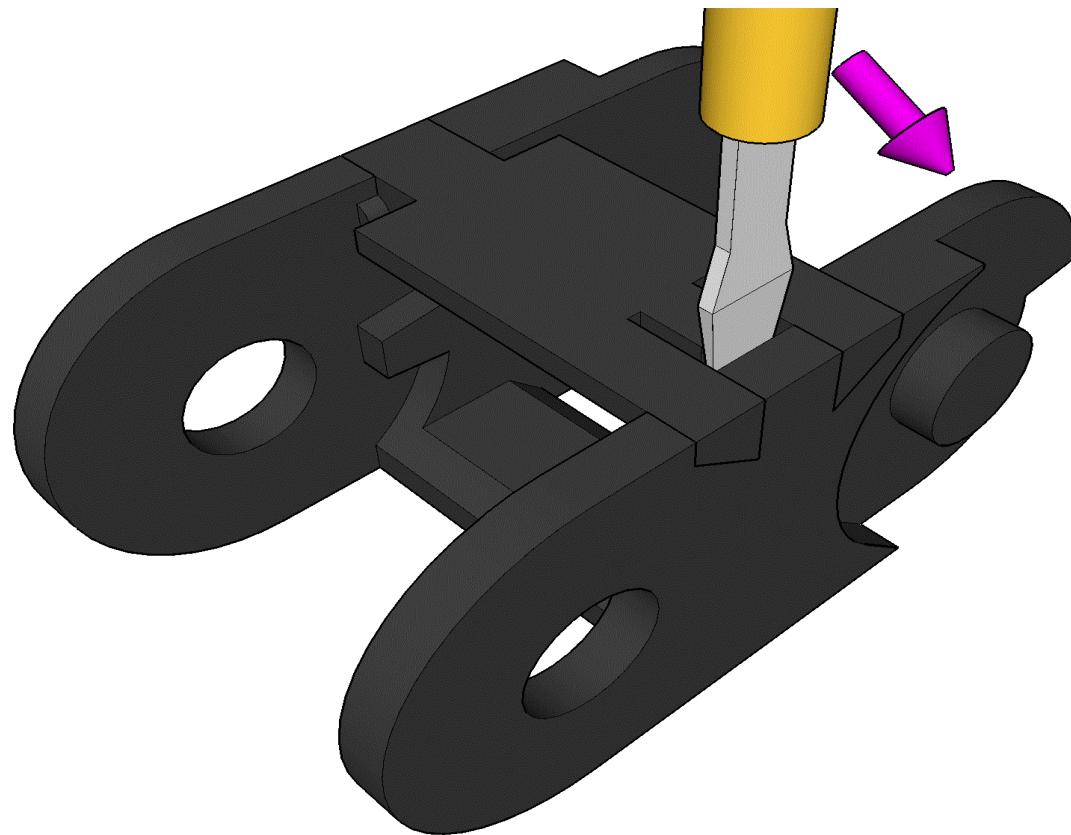


Add the braided wire loom as shown and add heat shrink to the ends. This will make it much easier to install into the cable chain. The additional connectors will be added once installed onto the printer. **Note: your thermister wires will be white.**



Install the harness through the cable chains starting from the MKS board. The X Stepper motor plug and X endstop plug should exit the end of the first section of chain. The rest exit the end of the second section of chain.

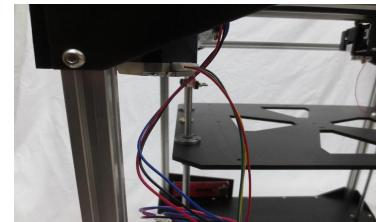
It's much easier if you open the chain with a small flat bladed tool as shown below.



Take an endstop cable and plug the 4 pin connector into the Y endstop.



Take two 1 meter motor wires and plug the motor end into the two Y axis stepper motors.



On each Y axis stepper motor, clip all four wires 300mm from the 4 pin board connector (you can use the bed heater to measure). Strip $\frac{1}{4}$ inch off each wire.

Take the wires coming from the Y steppers and insert them into the 4 pin green connector with the screws facing up in the following order:

FEMALE SIDE: (to steppers)

(left/right is looking from the front of the printer)

PIN 1: Green (Left Motor)/Red (Right Motor)

PIN 2: Yellow (Left Motor)/Gray (Right Motor)

PIN 3: Grey (Left Motor) /Yellow (Right Motor)

PIN 4: Red (Left Motor) /Green (Right Motor)

Take the 4pin pigtail, and strip 1/4 inch off the ends of each wire. Insert them into the other end of the 4 pin terminal as follows:

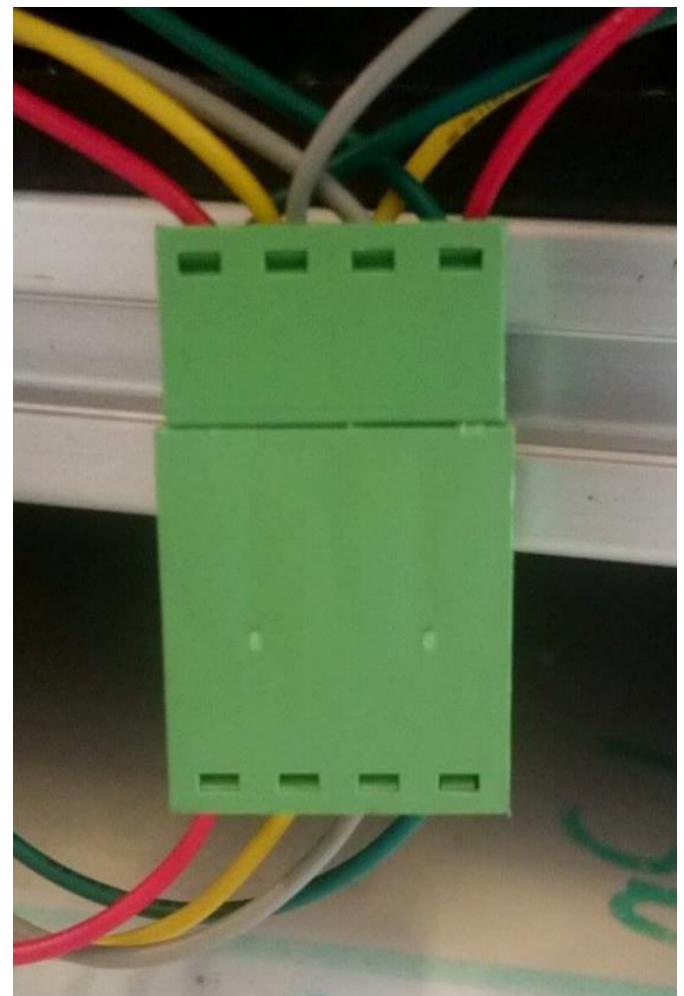
MALE SIDE: (to controller)

PIN 1: GREEN

PIN 2: YELLOW

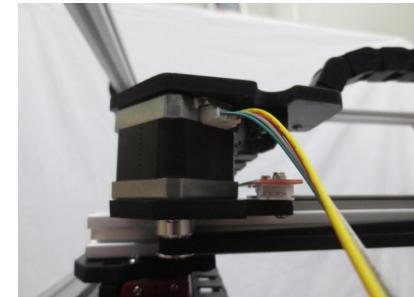
PIN 3: GREY

PIN 4: RED

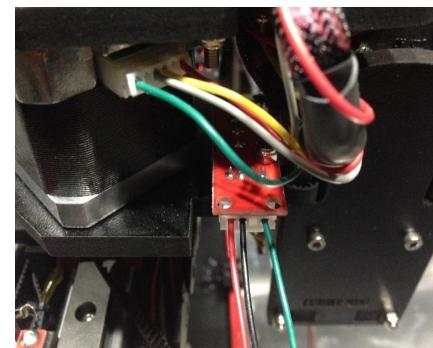


What you consider PIN 1, 2, 3, and 4 is not important as long as you are consistent on both ends.

Run the completed Y stepper wires down to the MKS board with the loom we ran earlier.

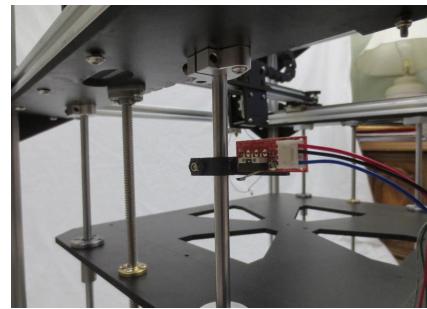


Plug the X stepper plug into the X stepper we ran earlier.

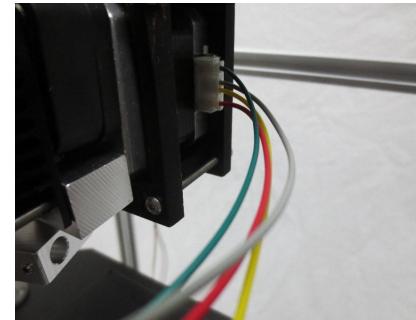


Do the same for the X endstop.

Take the last endstop cable and plug it into the Z axis endstop.

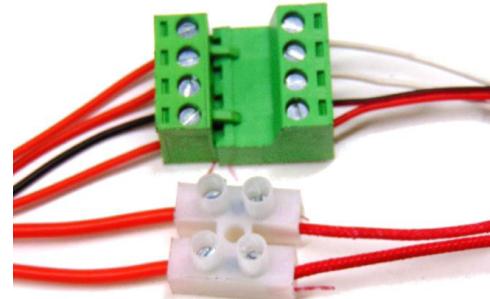


Plug the extruder stepper plug from the loom into the extruder stepper.

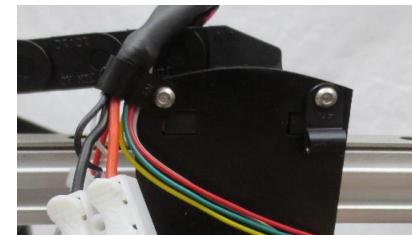


Cut the hotend fan and thermister wires to 5" long and strip off $\frac{1}{4}$ inch of insulation. Secure them into the green connector.

Repeat for the hotend heater into the white connector. Making sure you have enough slack, cut and strip the wires from the loom and secure into the other end of the connectors matching the wires up as shown.



Remove the two top screws on the hotend and insert two small cable clamps (one on each). The left one should have all the wiring in it and the right one should be empty. It is used as a filament guild later.



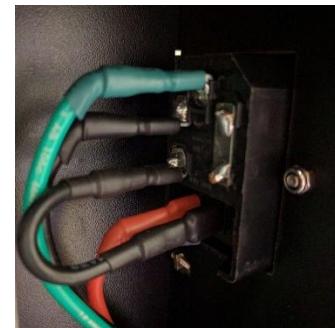
Using a small cable clip, insert the hotend wire bundle (the extruder stepper wires shown free will be inside your loom) . Secure it using a M3 x 12mm bolt and a M3 nylock.



Plug the last stepper wire into the Z stepper. Secure it to the underside with Kapton tape and run it to the MKS board.



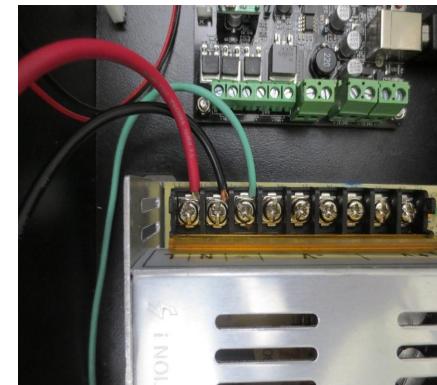
Strip $\frac{1}{4}$ inch off the red, black, and green 14 gauge wires. Solder (or use spade connectors if you have them) the green wire to the top connector (pin 1) of the power outlet. The black wire goes on pin 2. The two-inch black jumper goes from pin 3-4 and finally the red 14 gauge wire connects to pin 5.



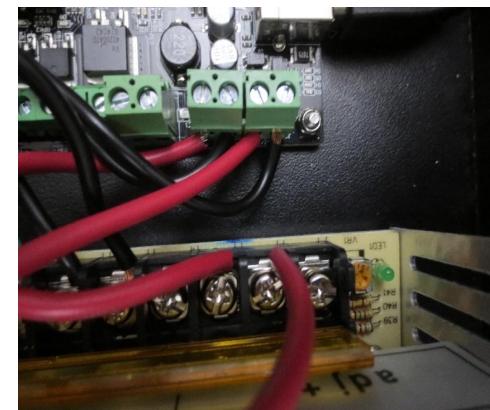
On the front of the power outlet, remove the fuse panel. Insert one of the fuses into the fuse slot and the second fuse into the spare slot.



Run the red, black, and green wires to the power supply and trim them so they run nicely to the lower three terminals. Strip $\frac{1}{4}$ inch off the ends of the wires. Loosen the terminals using a screw driver, insert the wires, then tighten.



Take the red and black 14 gauge wires and cut (2) 5" lengths of each. Strip $\frac{1}{4}$ inch off each end. Connect the red wires to the positive terminals on the power supply (there are three positive and negative terminals and each wire should have its own). Do the same for the black wires to the negative terminals.



Cut and strip the two wires from the electrical box fan. Strip the two wires from the hotend fan. Insert these wires into the remaining positive and negative terminal. If there is ever a need for access to 12v, use these terminals.



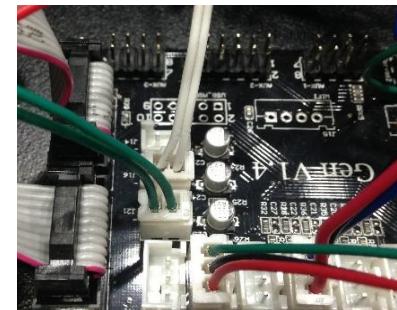
Plug the four motor cables into the MKS board. The board is labeled E0, Z, Y, and X. Plug each plug into it's corresponding location. You can remove the E1 stepper driver (far left) and keep as a spare. Adhere a heat sink to the chip on each of the 4 remaining drivers. Make the fins vertical, not horizontal as shown in the image.



Plug the three limit switches into the board. From left to right they are Z-, Y-, and X-.

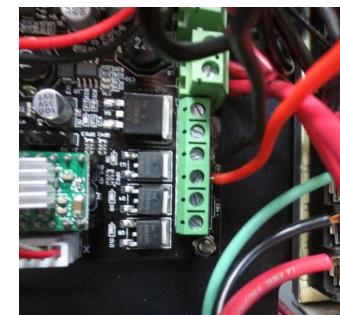


Plug the two thermistor wires into the board. The middle is the heated bed (labeled bed) and the bottom is the hotend thermistor (labeled E0).



Move the bed all the way up against the hotend. Run the bed heater and bed thermister wires down from the bed and into the hole in the front bottom (from looking at the front of the printer) of the electronics enclosure making sure you do not pull them tight. Slide a piece of heat shrink over the wires and up to the bed. Run the wires through the remaining braided wire loom and secure the end of it at the bed using the heat shrink we slid on. Cut the other end of the braided wire loom a few inches inside the electronics enclosure and secure with heat shrink.

Trim the heated bed wires long enough to reach the terminals on the MKS board. Secure the heated bed wires and the hotend heater wires into the terminals on the board. The color orientation of these two do not matter.



Run the longer ribbon cables from the LCD to the MKS board as shown below. Secure them to the underside keeping them far away from the Z stepper and wires using kapton tape.

