

Zaribo MK3 Assembly Manual

Ver 0.4, 14.1.2019

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List of required tools

Necessary:

- scalpel
- hex keys in sizes 2.5mm, 3mm, 5mm, 6mm
- ratchet with 5mm and 6mm hex bits
- pliers
- calipers (at least 162mm width)

Recommended in addition:

- ball-headed hex keys in sizes 5mm
- *etc.*

Notice:

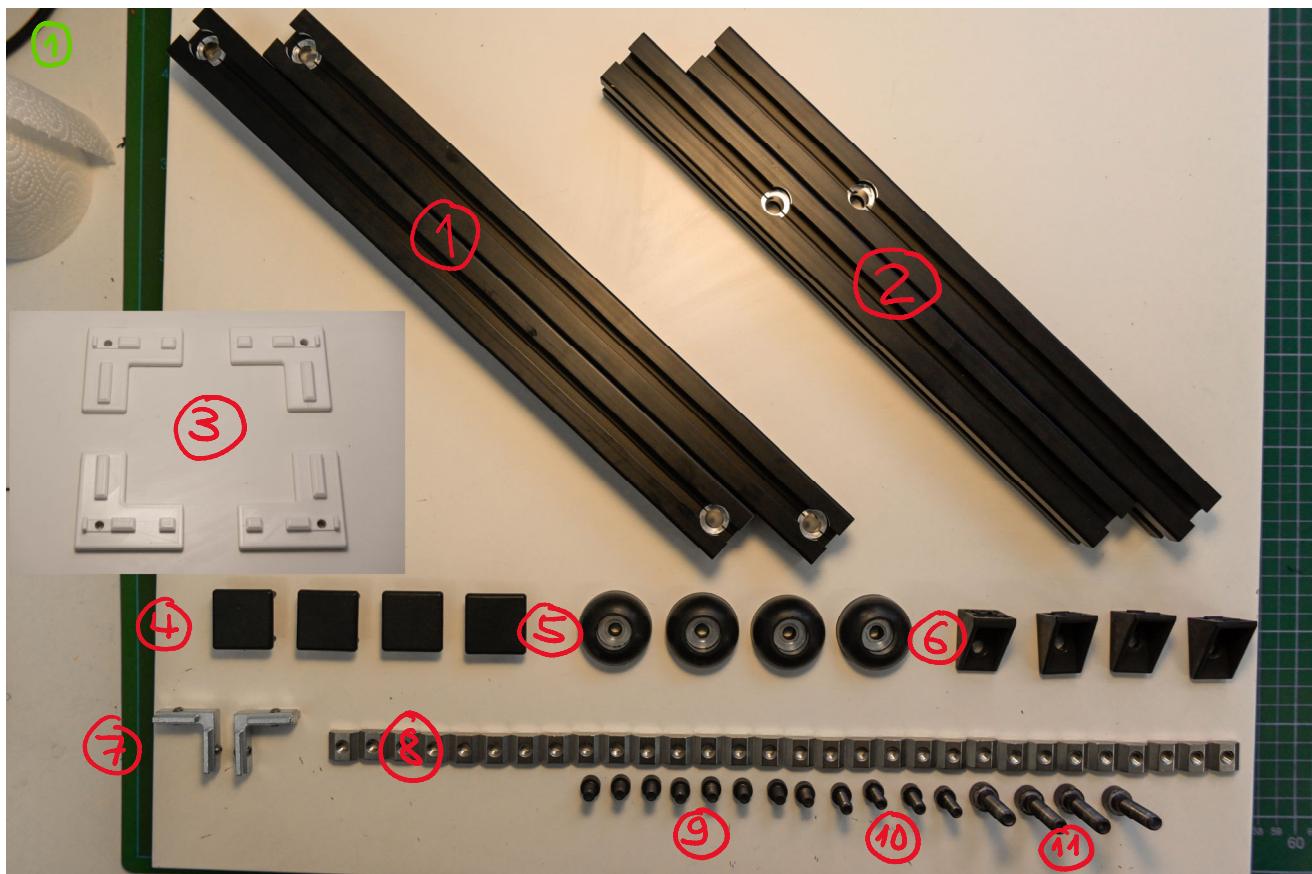
Before you proceed with any of the construction steps, please do the following:

- 1: Make sure that the required parts (which are listed at the beginning of each chapter) are all present, correct and not damaged. If that isn't the case, please contact our support and we will provide you with a replacement as quickly as possible.
- 2: Remove any support material from the included plastic parts.
- 3: Make sure to have access to all of the listed tools. Do not attempt to build without these as the use of incorrect tools may lead to breakage of parts or a faulty construction. If a tool that we use is optional, it will be noted at the corresponding step.

Assembly instructions

1: Subframe

You will need the following parts to complete the subframe:

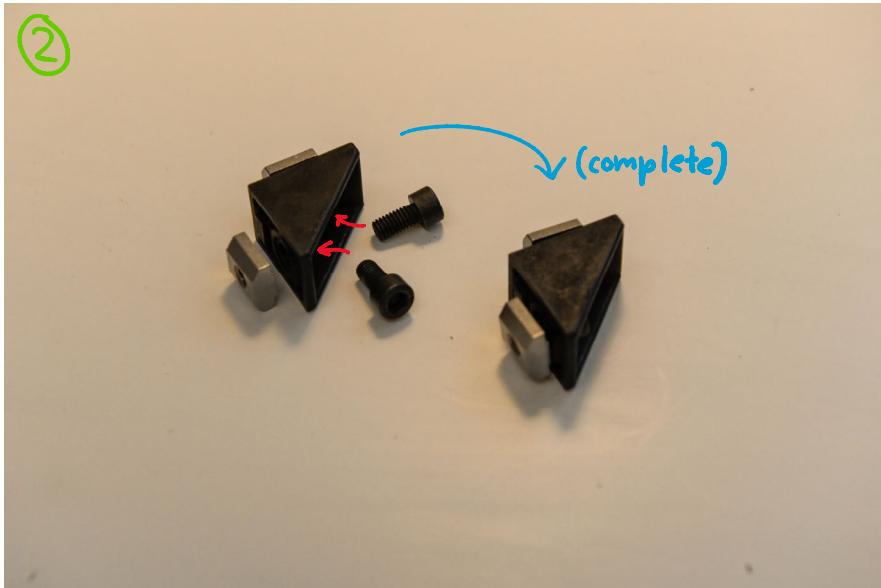


- ① 2x X-extrusion
- ② 2x Y-extrusion
- ③ 4x plastic L-brackets
- ④ 4x extrusion end caps
- ⑤ 4x rubber feet
- ⑥ 4x corner bracket

- ⑦ 2x metal L-brackets
- ⑧ 30x T-nuts
- ⑨ 8x M6x12mm hex socket screws
- ⑩ 4x M6x20mm hex socket screws
- ⑪ 4x M8x40mm hex socket screws

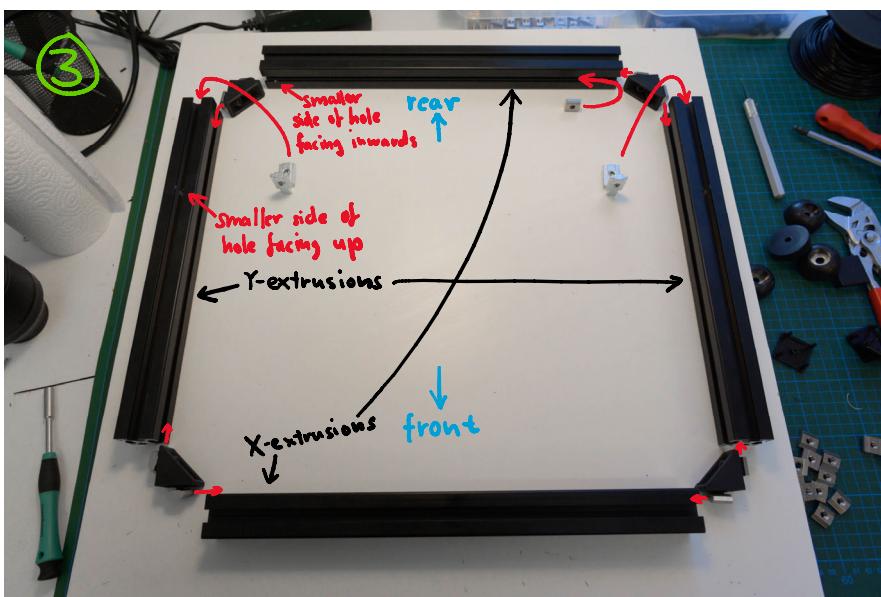
Important: Make sure that the surface that you are working on is perfectly flat. By using an uneven work surface you risk building a scewed frame, which may lead to the printer not being able to be calibrated.

②



Using M6x12mm screws and T-nuts, prepare the four corner brackets as seen in the picture. Don't tighten them fully, the T-nut should have a generous amount of play (will be useful in the next step).

③



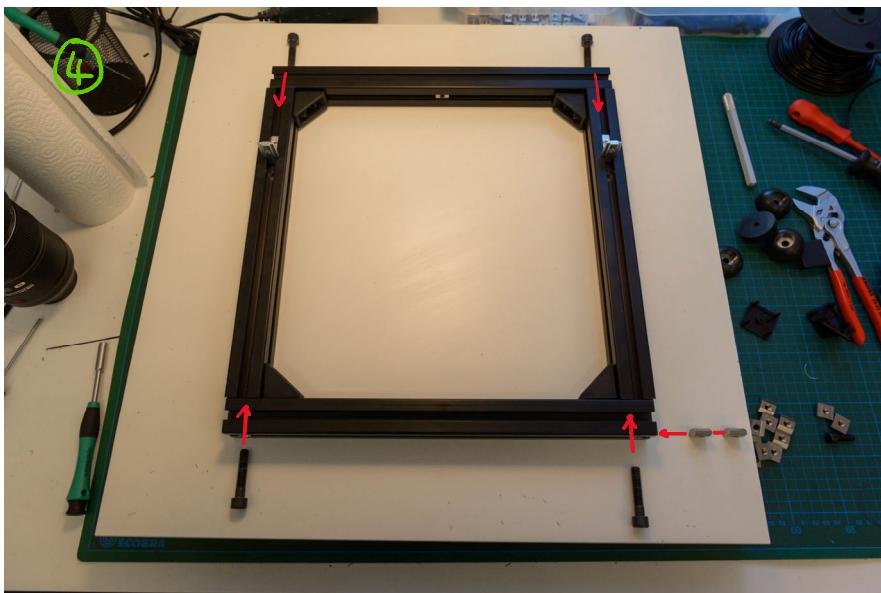
Lay out the extrusions so that the X-extrusions are (when viewed from above) horizontal and the Y-extrusions vertical. The X-extrusions should be oriented with the larger holes towards the outside. The Y-extrusions should have the larger side of the hole facing downwards.

Insert one metal L-bracket into the top slot of each Y-extrusion so that the inside of the L-bracket faces away from you.

Insert a single T-nut into the rear X-extrusion, in the slot facing the front (Use step 4 as reference).

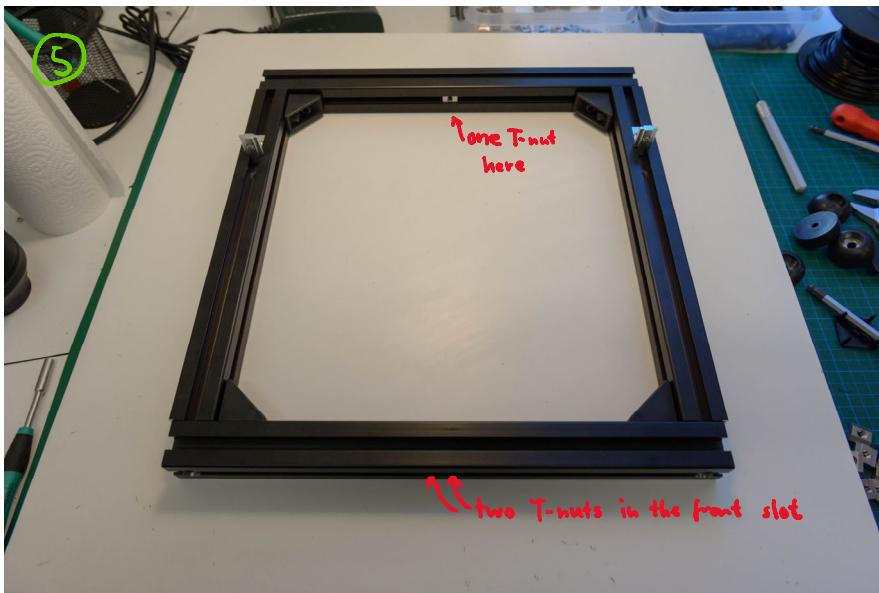
Finally, slot together the four extrusions as seen in step 4, using the corner brackets from step 2. Do not tighten the corner bracket screws yet.

④

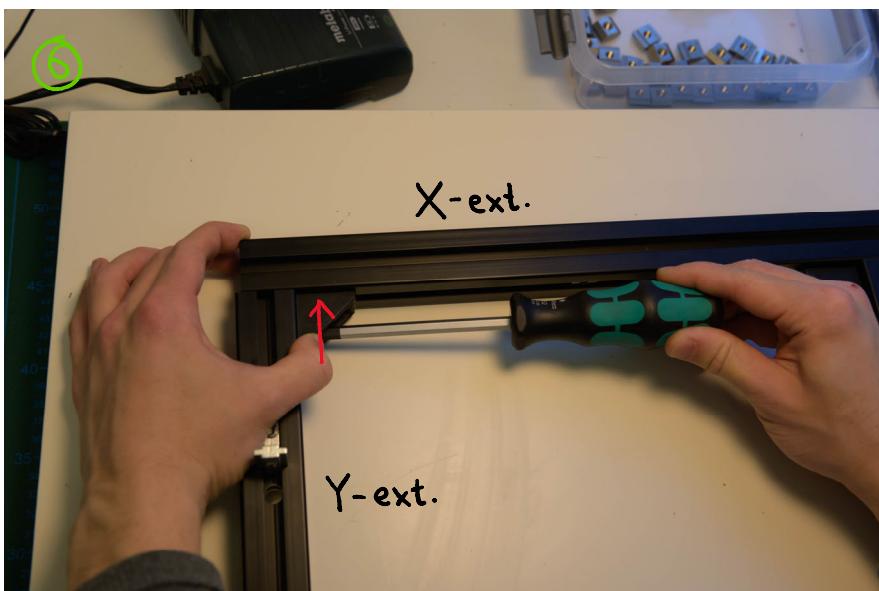


Insert two T-nuts into the forward facing slot of the front X-extrusion.

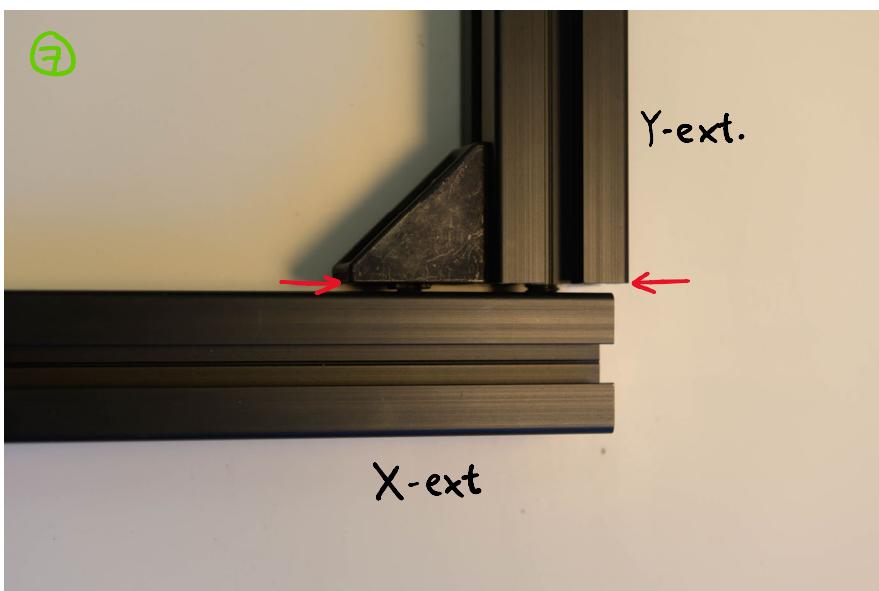
Now screw in the four M8x40mm screws, connecting the four extrusions together. Tightening with full force is not necessary just yet, but make sure there is no gap between the extrusions.



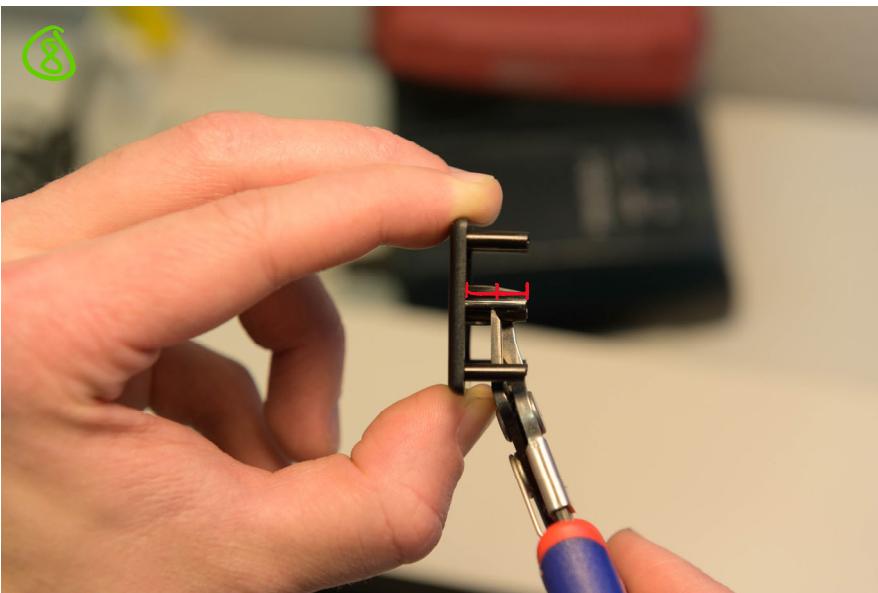
Your frame should now look like this.



While pushing the corner bracket up against the corresponding X-extrusion, tighten the screw facing the Y-extrusion. This way the corner bracket's position on the Y-extrusion will be set correctly. Repeat for the other 3 corners.



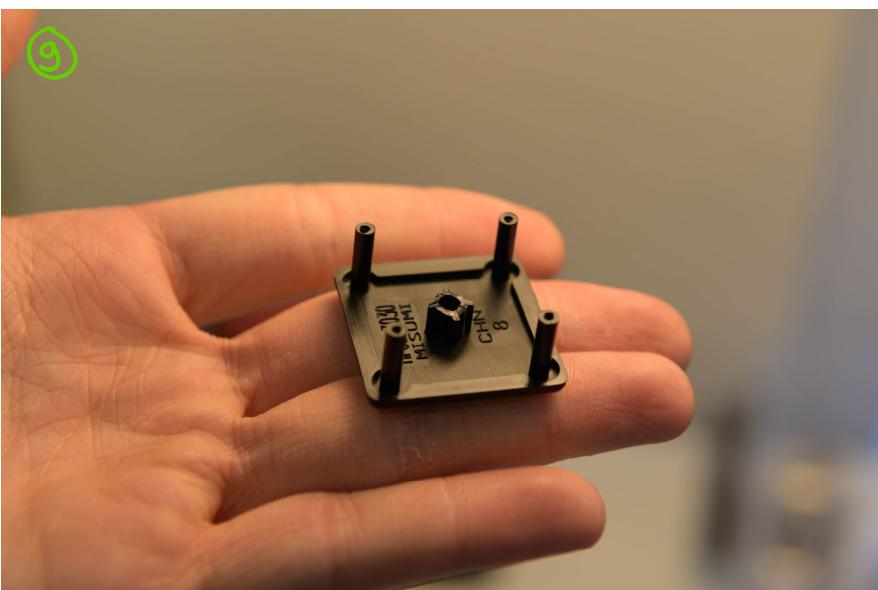
Now loosen the four M8x40mm screws by about 2-3mm.
Each corner bracket should now sit flush with the end of the corresponding Y-extrusion.



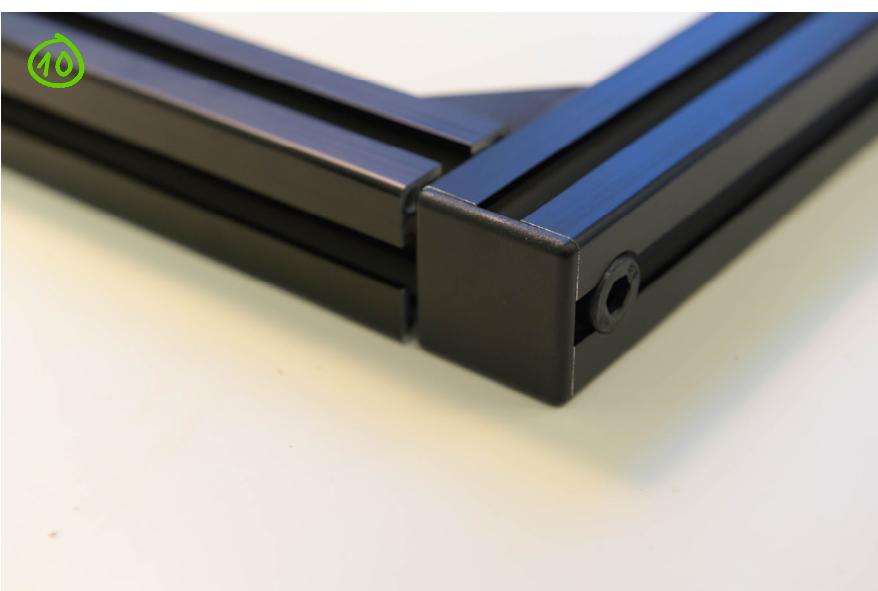
The middle part is too long to fit on the end of the extrusions due to clearance issues with the M8x40mm screws.

Trim the middle part of the extrusion end caps at about the halfway point. Be careful not to cut them too short, as they may lose their ability to hold onto the end of the extrusion.

Trim all four end caps.



After trimming, they should look like this.



Now install the caps onto the ends of the two X-extrusions. The thickness of the cap is 3mm, which we will use to align the X-extrusions with the corner brackets.



Reminder: Note that at this point in time the M8x40mm screws are loose.

Using a flat surface as a reference (such as the tool seen in the picture) make sure that the surfaces marked in blue are perfectly aligned and that the extrusions are at a 90° angle in relation to each other. Now tighten the loose M6x12mm screw in the corner bracket, fastening the bracket to the X-extrusion.

After repeating this for the other 3 corners, check thoroughly that the marked surfaces are indeed correctly aligned.

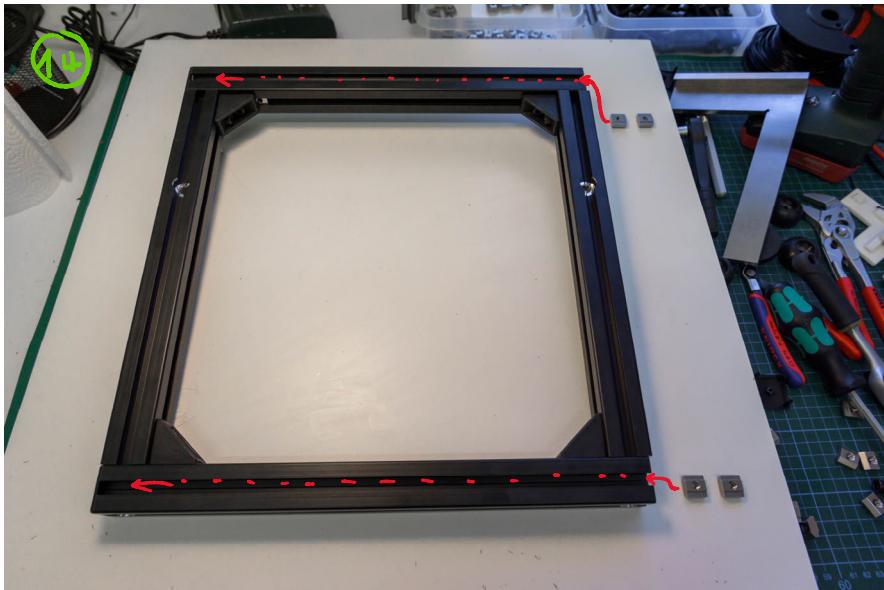


While holding the frame in place steadily, fully tighten the four M8x40mm screws with a ratchet.

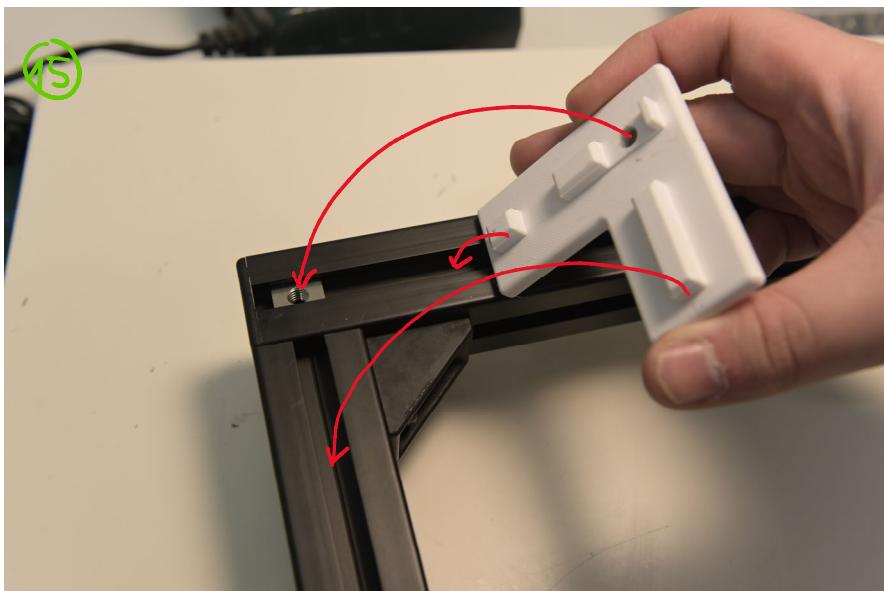


Now do the same for the eight M6x12mm screws in the corner brackets.

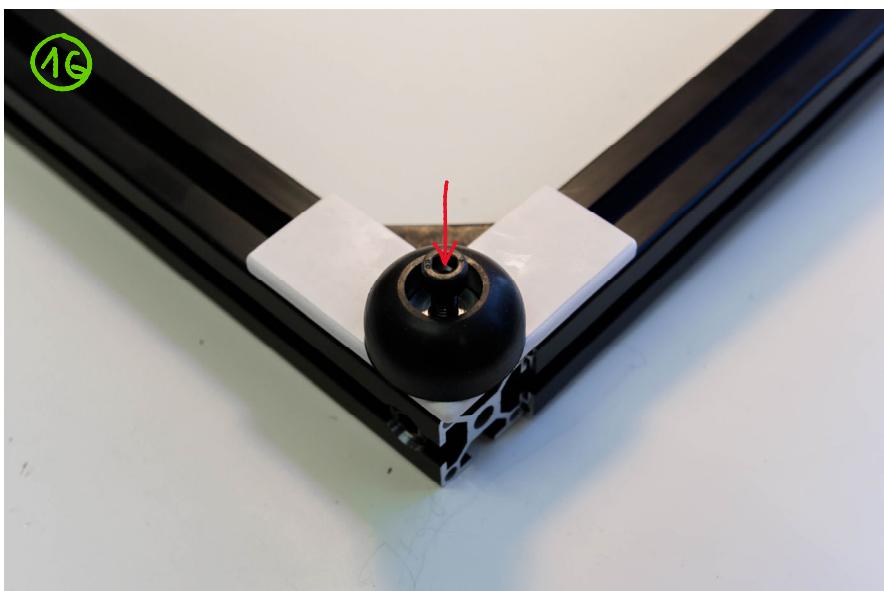
After this, the frame should be perfectly flat and not rock on a flat surface, like a badly made chair might do.



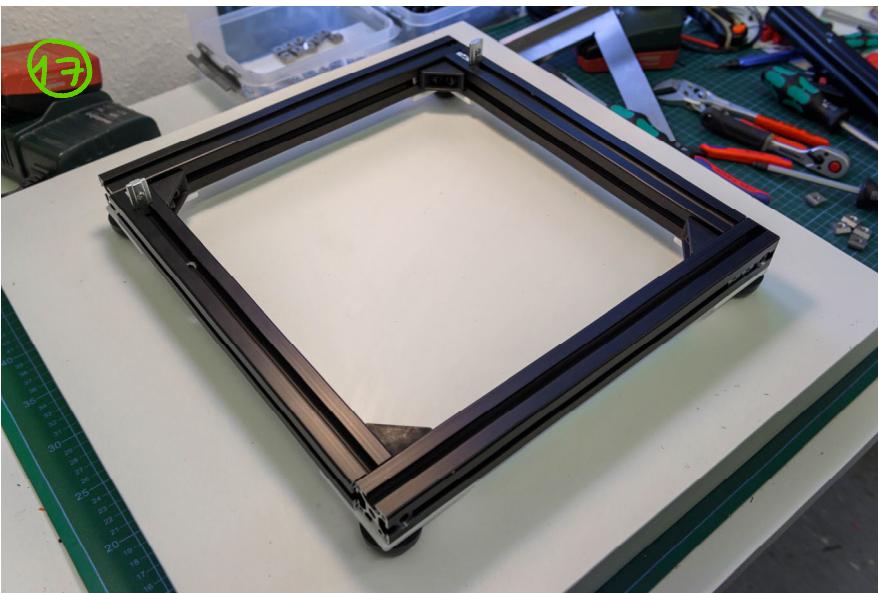
Flip the frame upside down, remove the two extrusion caps from the right side, and insert two T-nuts into the (now) upper slots of each X-extrusion.



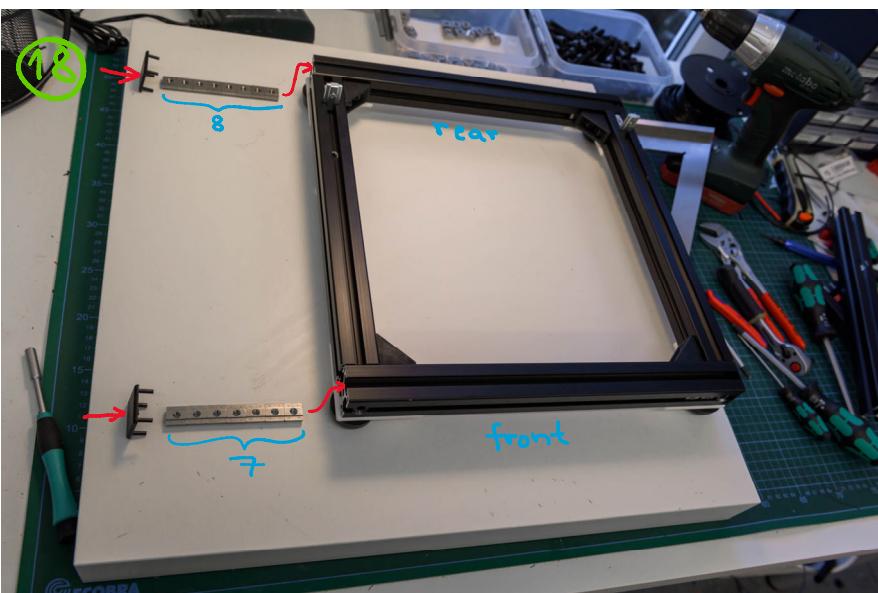
For each corner, set a T-nut in the position as seen in the picture, and place a plastic L-bracket over it. There are two "left L-brackets" and two "right L-brackets".



For each corner, place one of the rubber feet onto the bracket. Use a M6x20mm screw to secure it and the L-bracket into place.



Flip the frame back over. It should be rock steady on its feet.

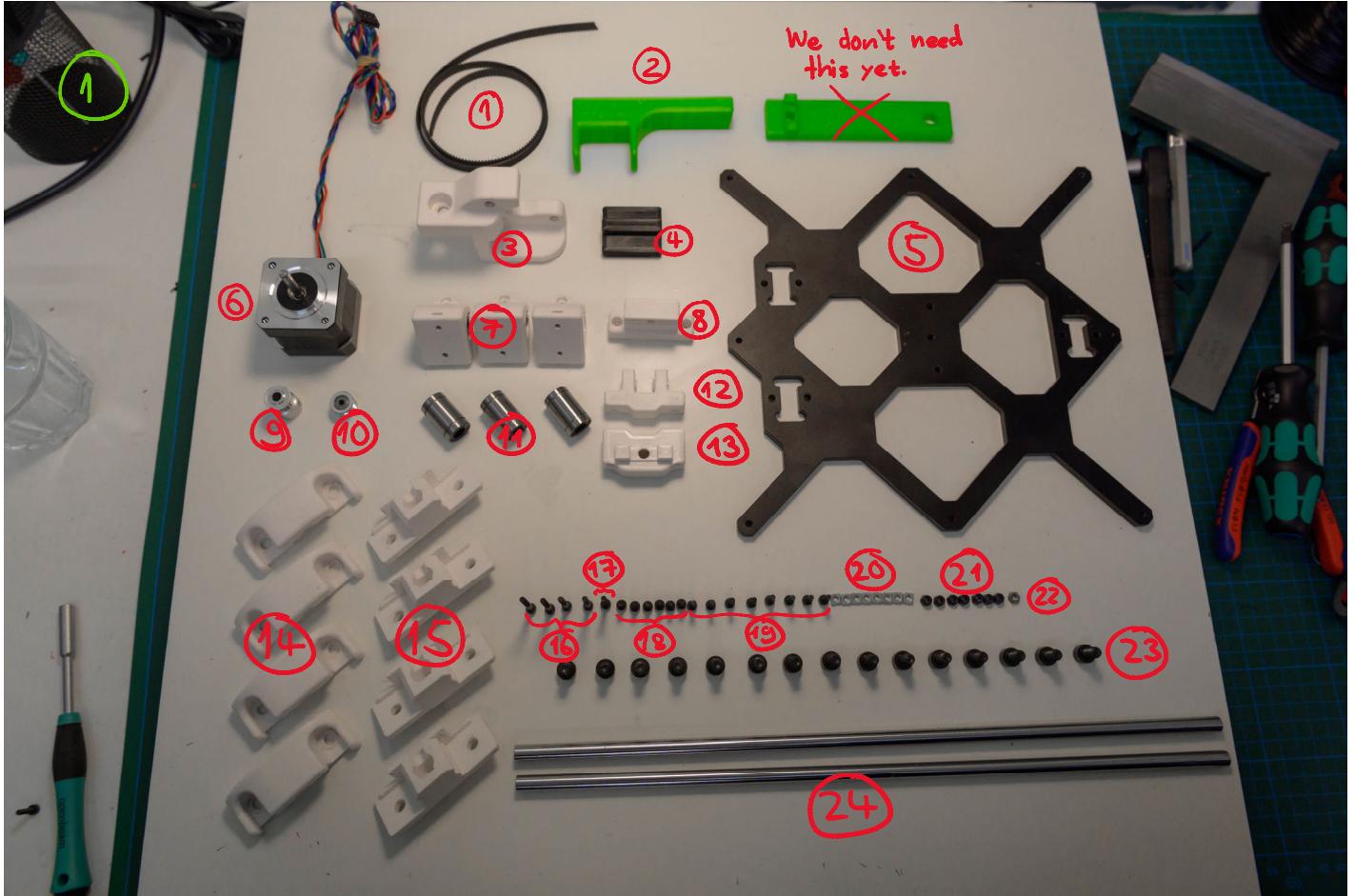


Insert 8 T-nuts into the top of the rear X-extrusion, and 7 T-nuts into the top of the front X-extrusion. Finally, reattach the two extrusion caps to the frame.

Your subframe is now complete.

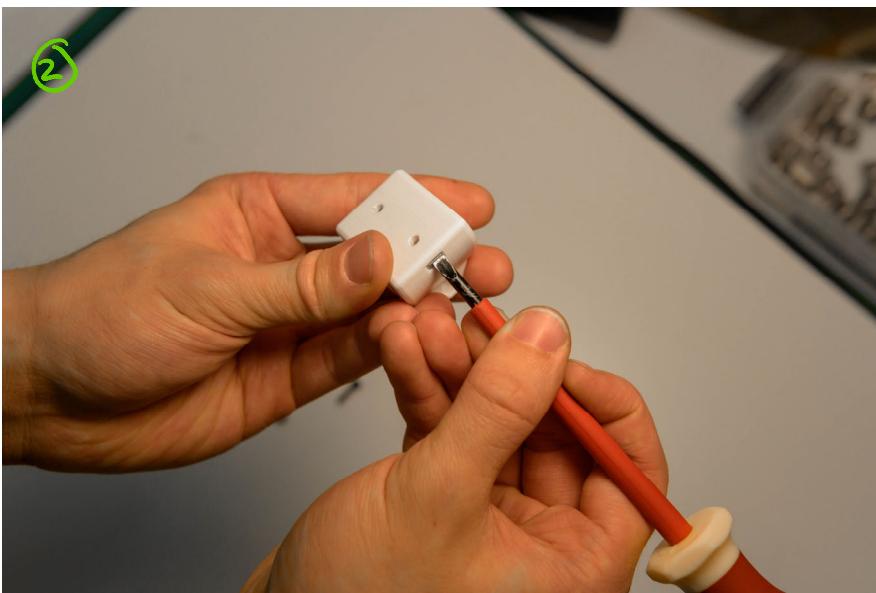
2: Y-axis (part 1/2)

You will need the following parts to complete the Y-axis:

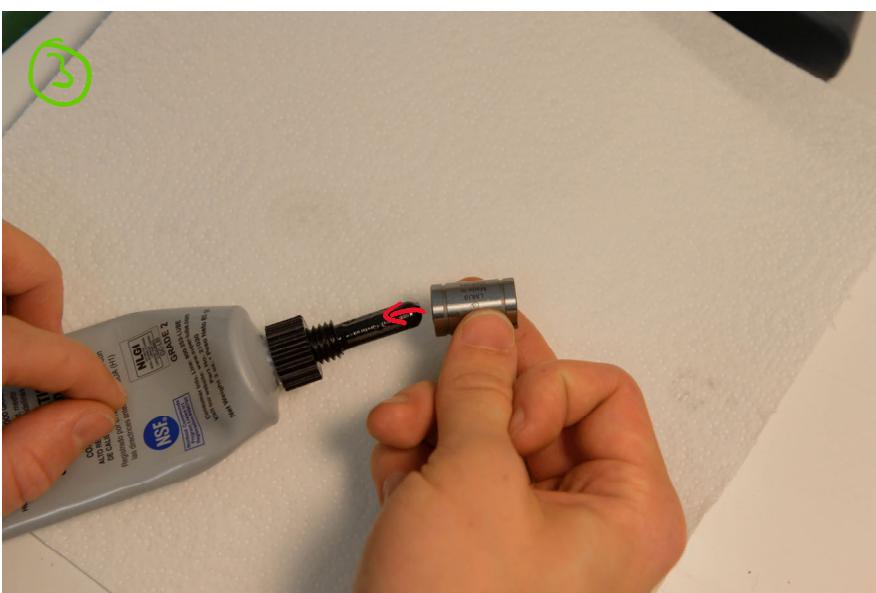


- ① 1x ~ 90cm toothed belt
- ② 1x build tool 1
- ③ 1x Y-motor mount
- ④ 1x Y-motor mount support
- ⑤ 1x heat bed carriage
- ⑥ 1x stepper motor
- ⑦ 3x bearing mount
- ⑧ 1x belt mount
- ⑨ 1x toothed pulley
- ⑩ 1x toothless pulley
- ⑪ 3x linear rod bearings
- ⑫ 1x belt tensioner part 1

- ⑬ 1x belt tensioner part 2
- ⑭ 4x Y-rod mount part 2
- ⑮ 4x Y-rod mount part 1
- ⑯ 4x M3x35mm screws
- ⑰ 1x M3x22mm screw
- ⑱ 6x M3x10mm screws
- ⑲ 8x M3x12mm screws
- ⑳ 8x M3 square nuts
- ㉑ 7x M3 self locking nuts
- ㉒ 1x M3 nut
- ㉓ 15x M6x12mm screws
- ㉔ 2x 360mm rods



Take a bearing mount, and insert a square nut into either side as seen on the left.



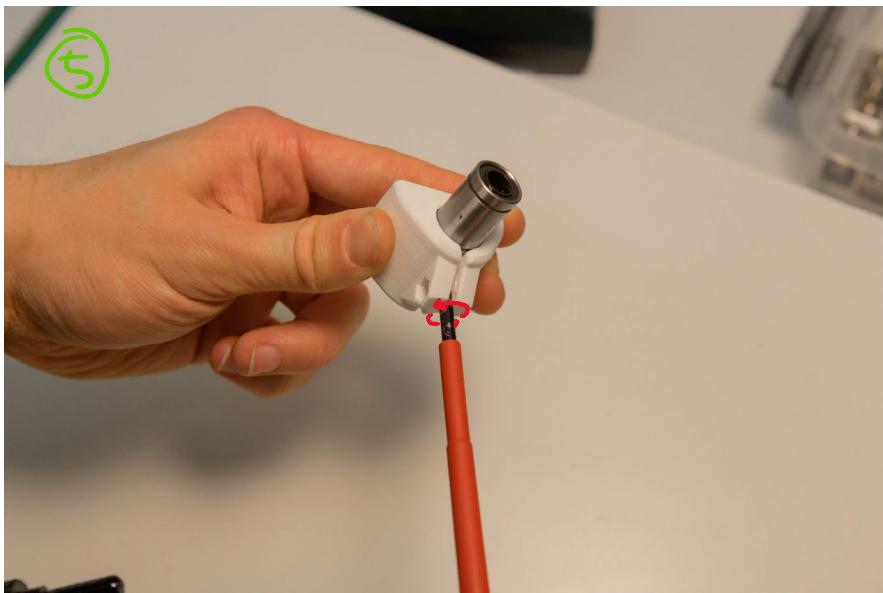
(RECOMMENDED:
Replacing the factory oil of the bearings with grease will make the printer significantly quieter, but does not otherwise affect printing performance.)

You can buy this grease off our website, which will include the special nozzle seen in the picture.)

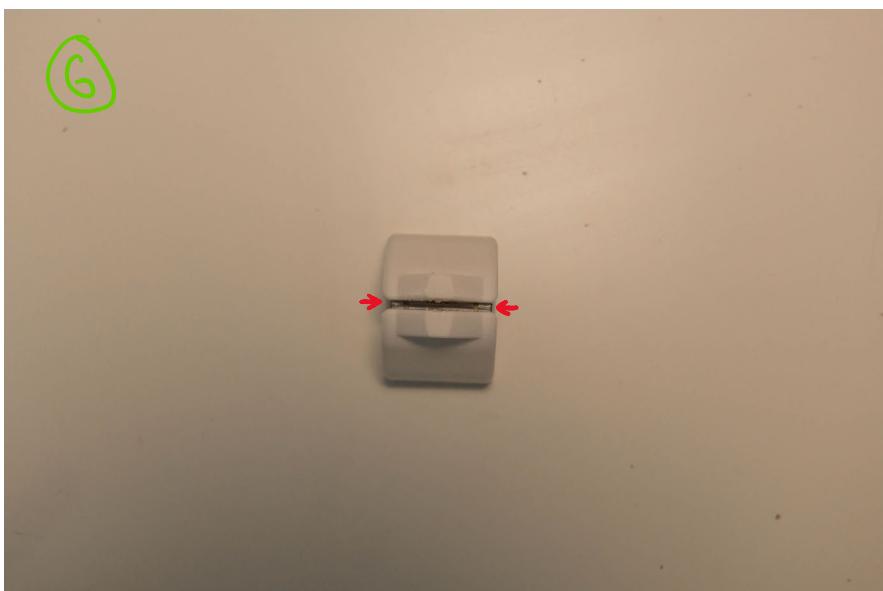
Slide the bearing onto the nozzle fully.



Force the grease into the bearing by squeezing the tube, and the factory oil should seep out the other end. You are done when you see grease come out the end of the bearing.



Insert the bearing into the bearing mount by prying the case open slightly and very carefully with something like a flathead screwdriver.



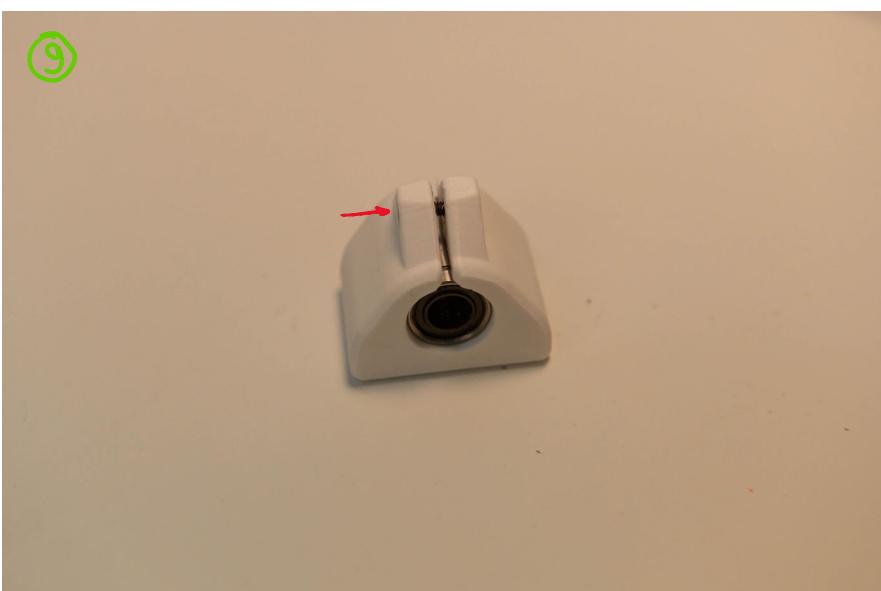
The bearing should be seated exactly in the middle.



Also, the inner rails containing the ball bearings should be aligned with the red markings in the picture. This is so that after the installation the weight of the heat bed and carriage is transferred into the rod optimally.



Insert an M3 self-locking nut into the hexagonal slot. We recommend using a similar tool as the pliers seen in the picture for this operation.



From the other side, screw in an M3x10mm screw. Do not over tighten this screw, as you will risk breaking the bearing mount. The inner surfaces of the clamp should be roughly parallel.

Now repeat this for the other two bearings.

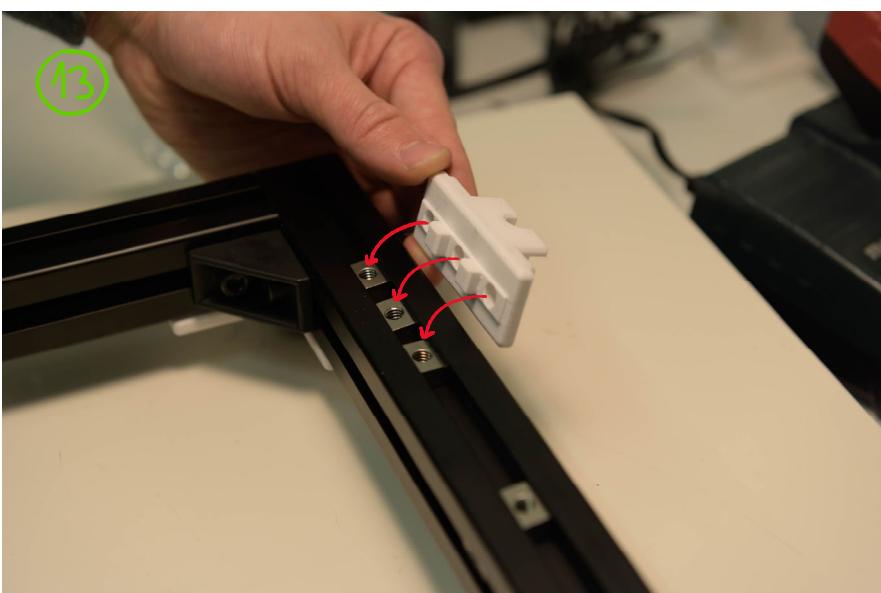
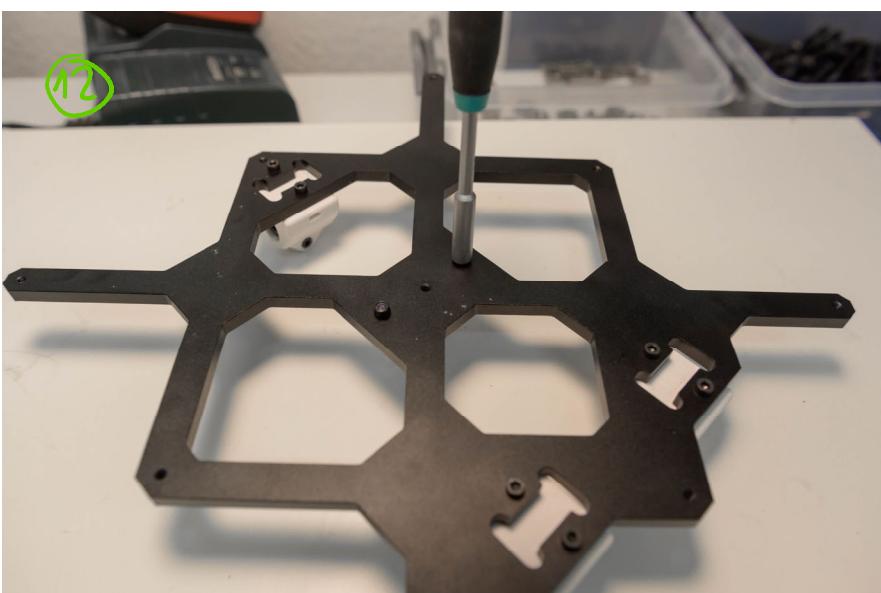


Using six M3x12mm screws, fasten the three completed bearings to the heat bed carriage. Leave these screws ever so slightly loose, as we will tighten them later in the assembly process.

Orient the bearing mounts with the head of the 10mm screws facing inwards.



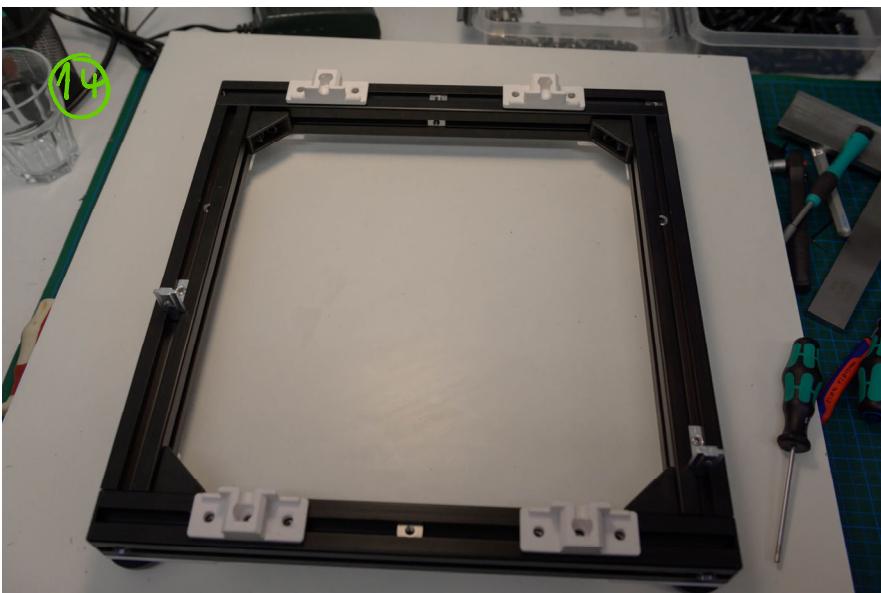
Flip the carriage over, and install the belt mount, with the belt slits facing the side with two bearings. Do this using two 12mm screws and two self-locking nuts from the other side.



Put away the carriage for now.

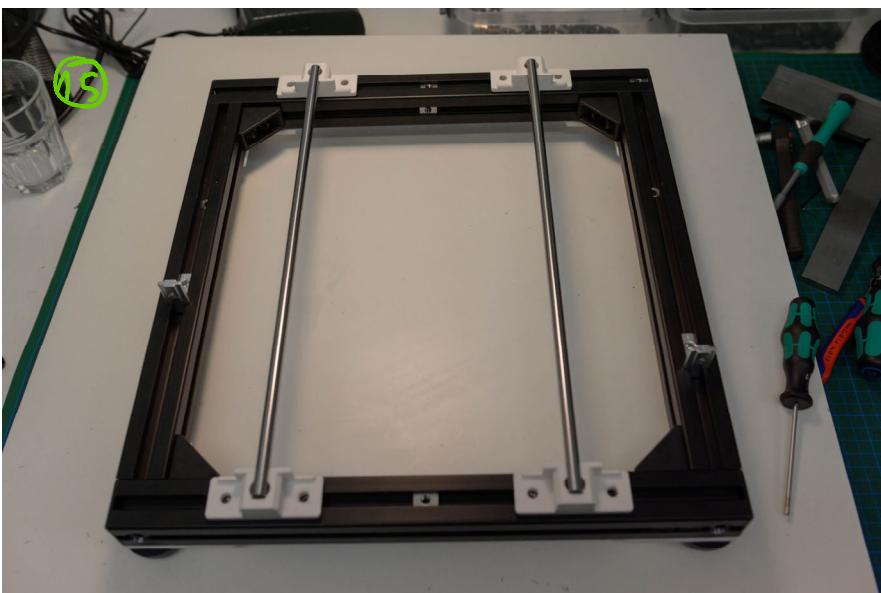
Do the following four times, for each corner.

Insert a rod mount part 1 piece onto the frame, with each of the holes dedicated to a T-nut.

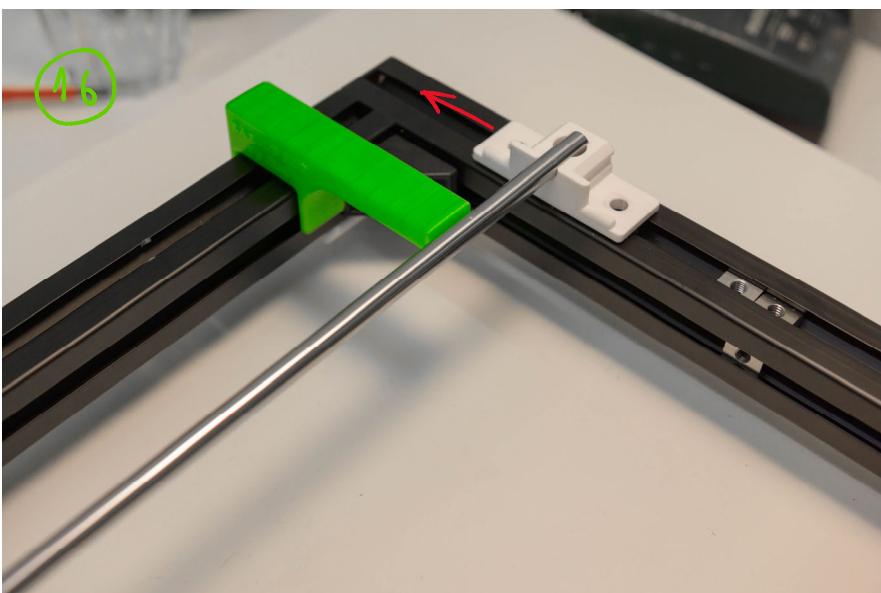


Your frame should look like this.

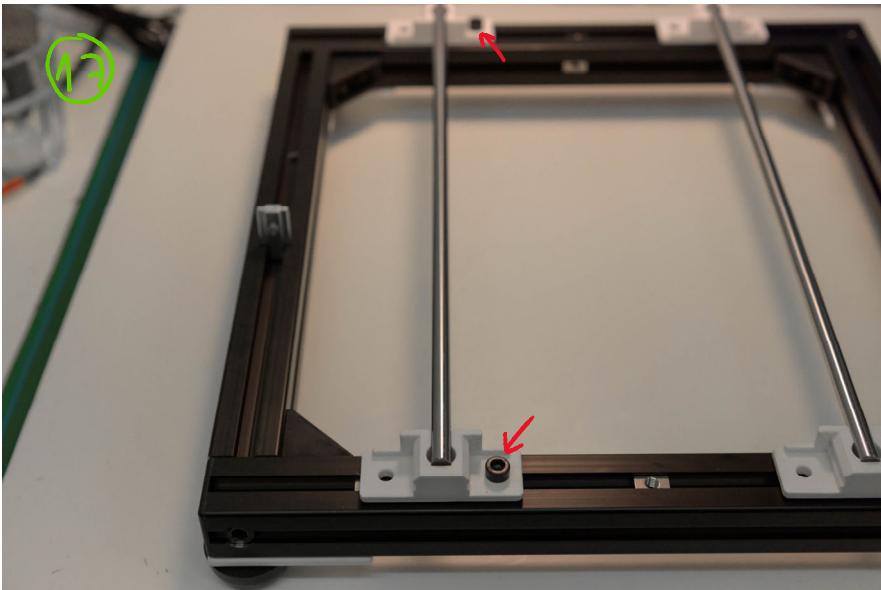
Align them so that the left two mounts are roughly directly above each other, same thing for the right two.



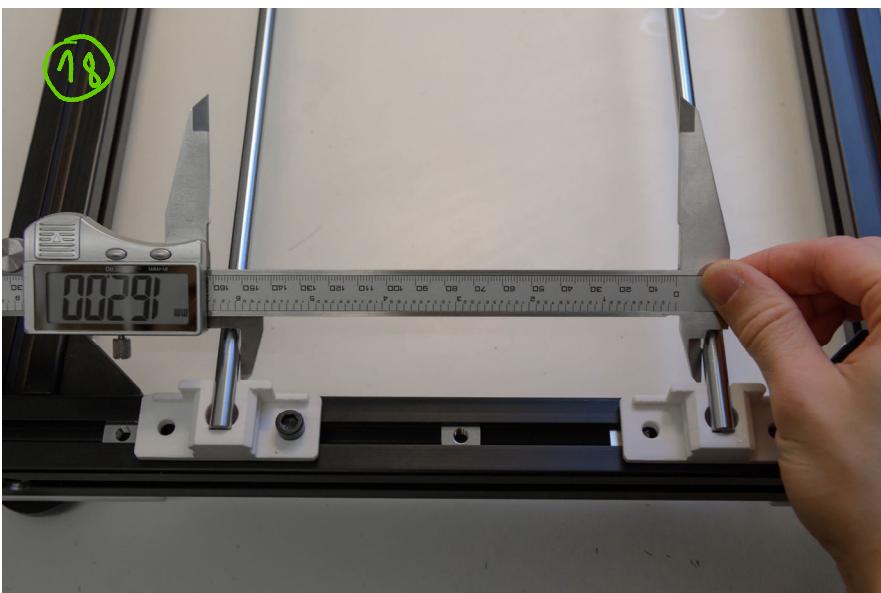
Now click in the two 360mm rods as seen in the picture.



Use the build tool 1 to align the left rod to be perfectly parallel with the left Y-extrusion. Do this by placing the tool once at the top and pushing the rod to the left, and doing this again at the bottom.



Secure the left mounts in place using the marked holes, using two M6x12mm screws. These screws are temporary and will be removed later on. Make sure to not shift the part while screwing them in. If this does happen, repeat the alignment from the previous step.



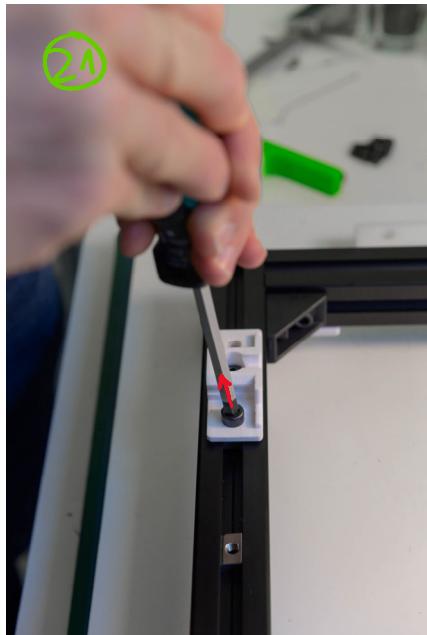
Now we will set the right mounts. Do this with a calliper (or something equally accurate) set to exactly 162mm. Using the same technique from setting the left rod, make sure the two rods are parallel.

Now fasten the right two mounts in place, again using the right holes and two M6x12mm screws.



Detach the front ends of the rods, and insert the carriage we previously assembled. The side with two bearings should face the left. Now reattach the front ends of the rods.

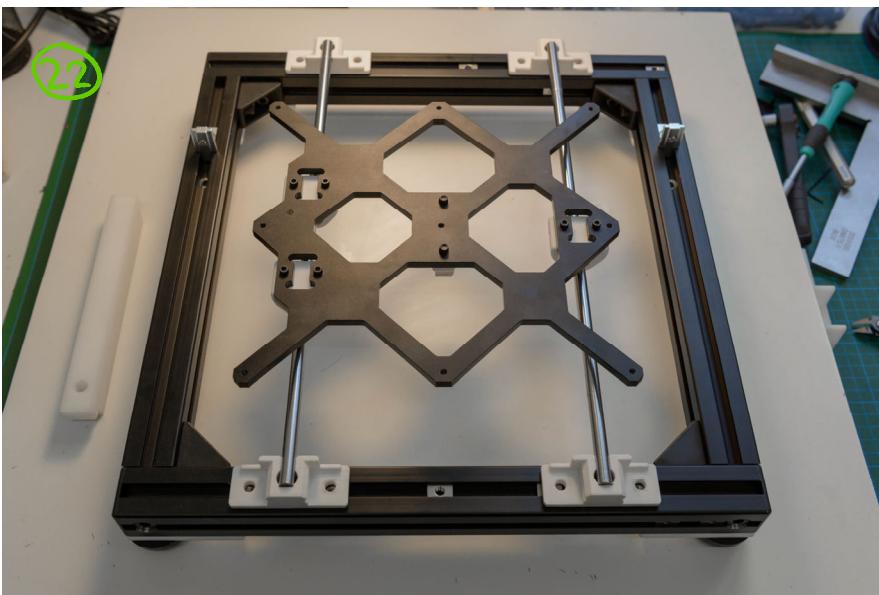
Slide the carriage back and forth. This should feel and sound completely smooth. This however doesn't yet mean that you have done a good job. While sliding the carriage back and forth lightly, slowly tighten the six 12mm screws that we left loose earlier. You will notice that the carriage's movement will no longer be as silent and smooth as before, but this is normal (up to a certain extent).



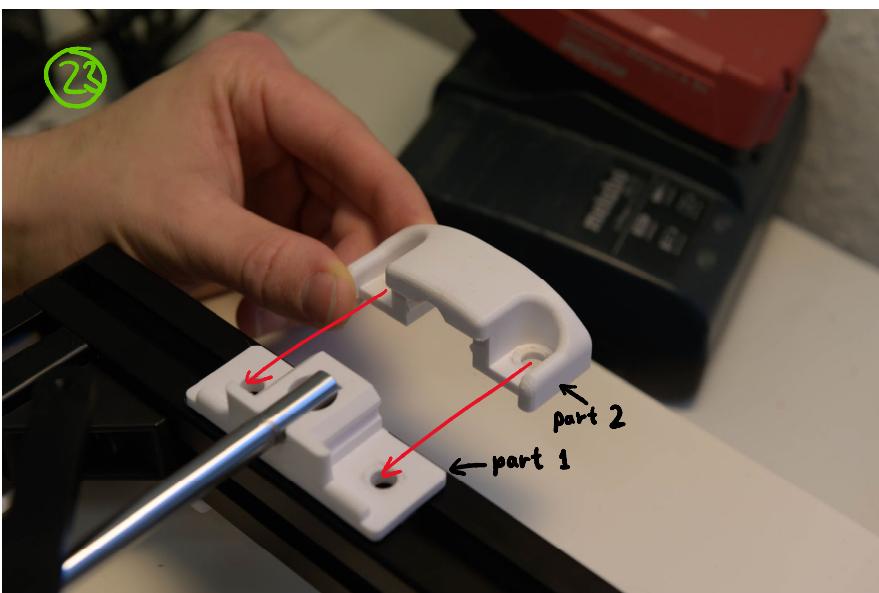
The carriage should still be able to be moved with very little force, and not stop instantly when pushed.

Indicator of bad alignment is when the movement of the carriage doesn't feel linear, but rather like an electric motor or a zip.

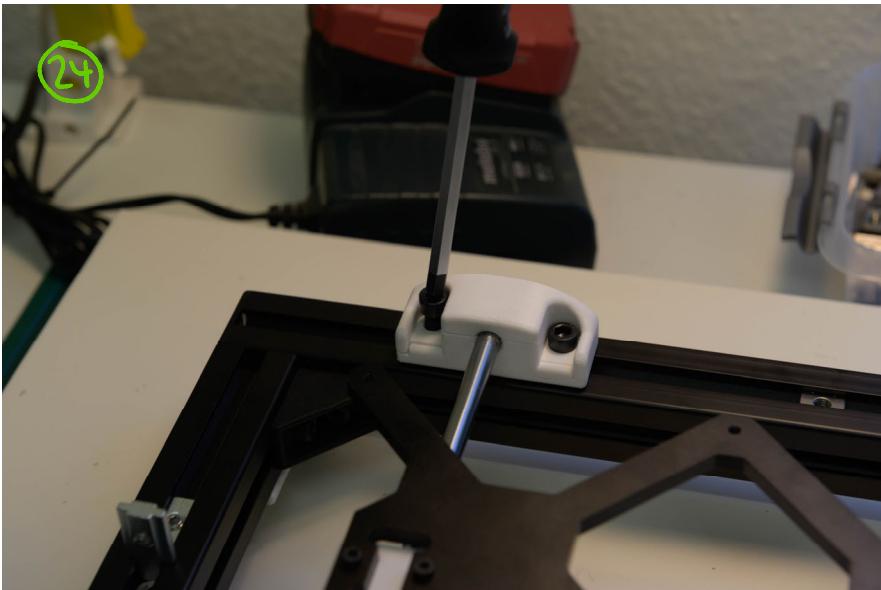
If you are happy with the alignment, remove the carriage along with the rods. Then screw in the middle screw for all four mounts. Finally, remove the temporary screws.



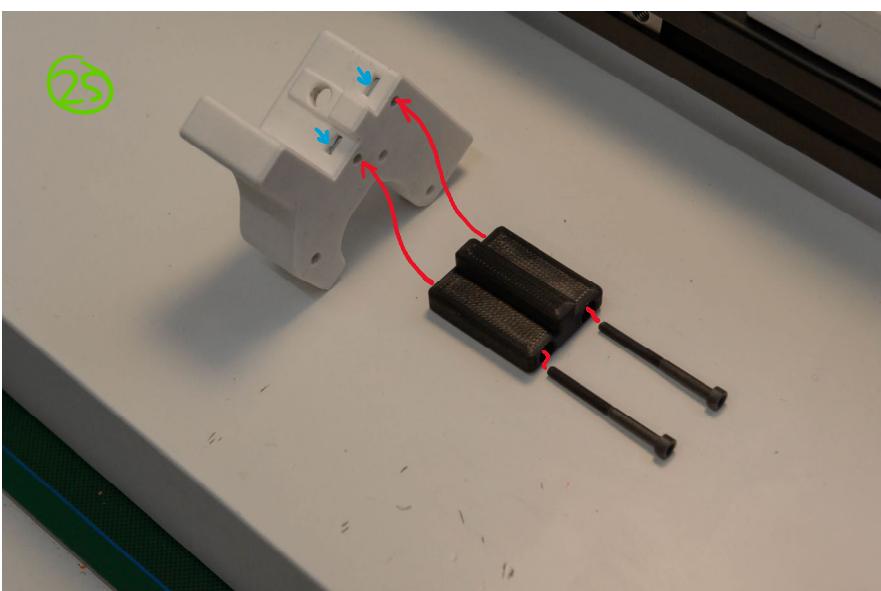
You may now reattach the carriage and the rods.



Slide part 2 of the mount onto part 1 for all 4 corners.

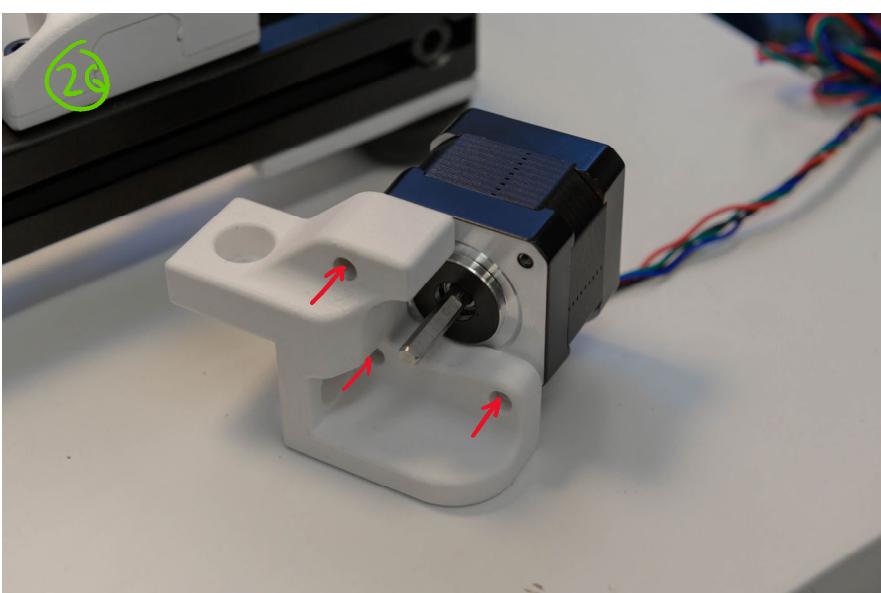


Screw them in place using two M6x12mm screws for each one.

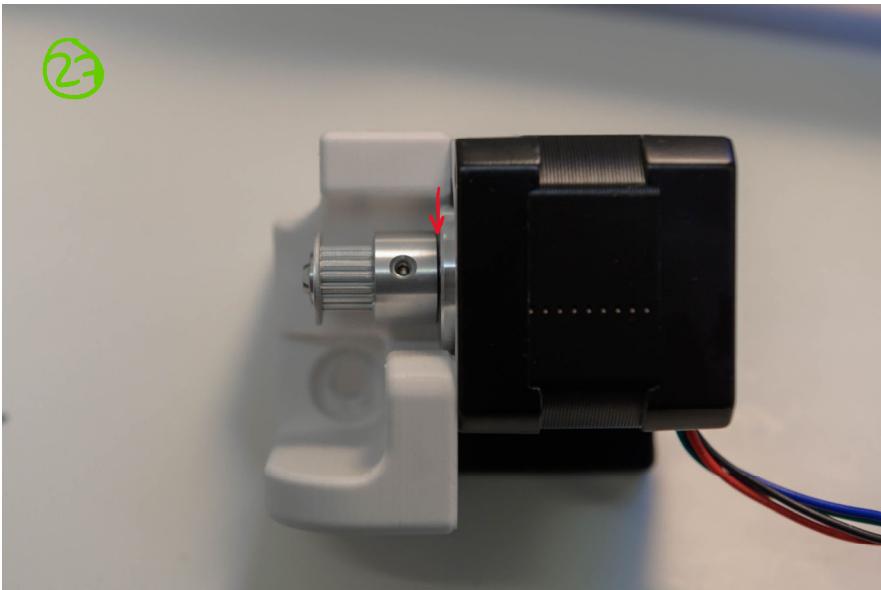


Motor mount assembly:

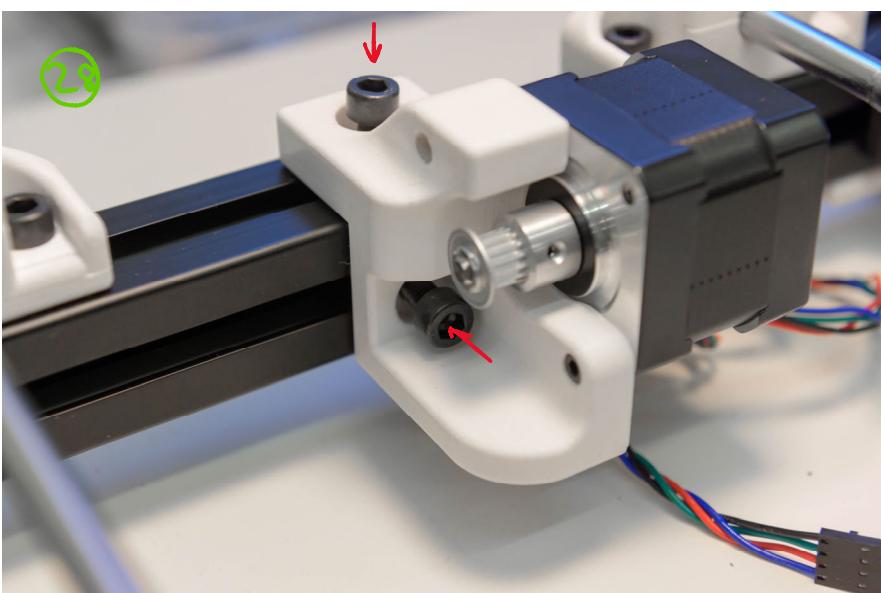
Insert two square nuts into the slots marked by the blue arrows. Then screw the black support piece onto the motor mount using two M3x35mm screws.



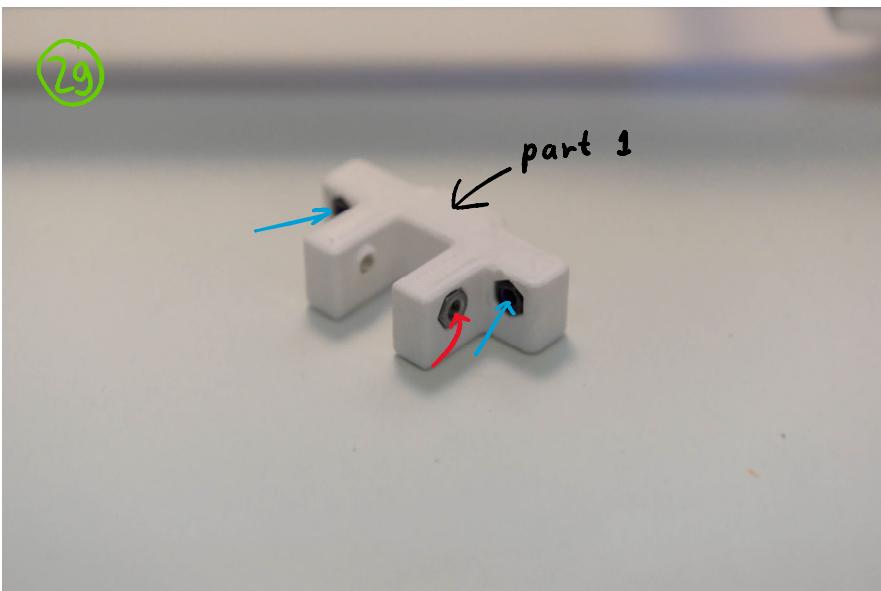
Attach the motor onto the motor mount, with the cables exiting downward. Use three M3x10mm screws as marked by the red arrows.



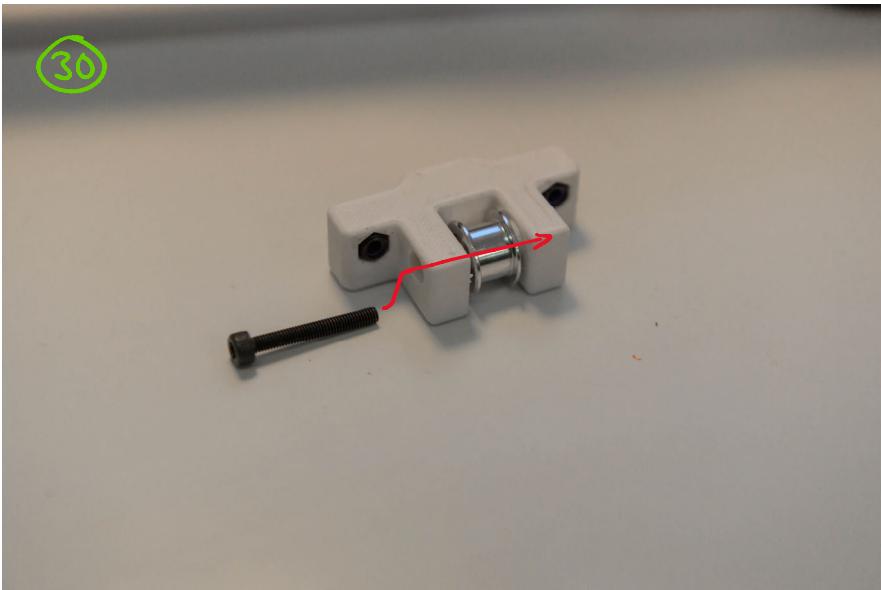
Slide the toothed pulley onto the motor shaft. The pulley has two fastening screws, make sure one of them is aligned with the flat surface of the shaft. Leave a thin gap between the pulley and the motor face, as to avoid rubbing.



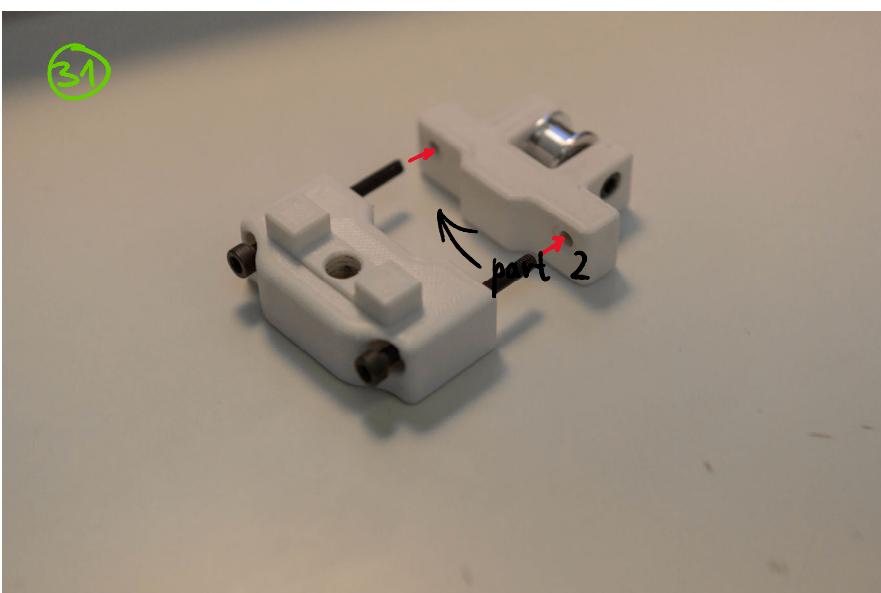
Now attach the motor assembly to the rear extrusion, with the motor on the inner side of the frame. Use two M6x12mm screws and the two T-nuts that we inserted into the extrusion in chapter 1.



Belt tensioner assembly:
Insert two self-securing nuts into the base of part 1 (blue), and a normal nut into the hexagonal slot of the tensioner fork (red).



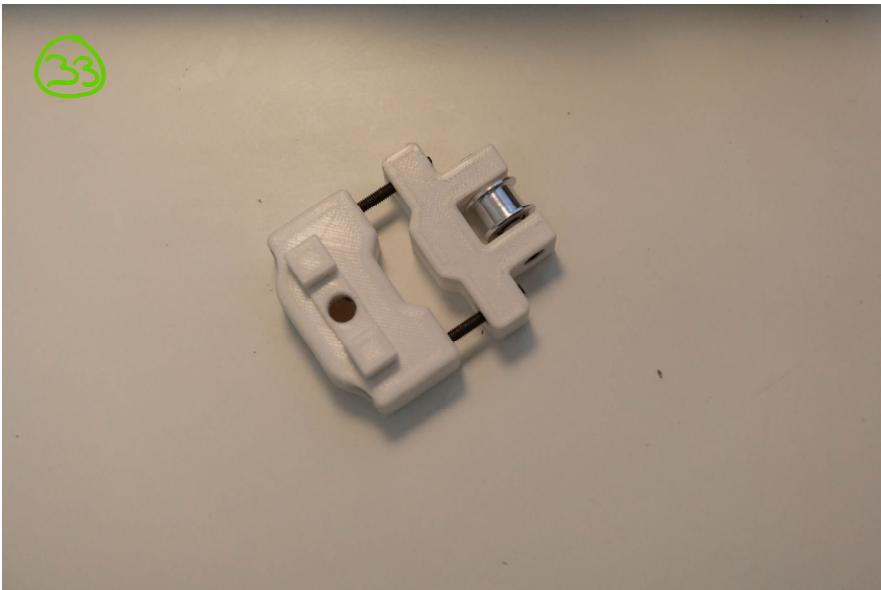
Using an M3x22mm screw as an axis, install the pulley as seen in the picture. The fork may bend inwards very, very slightly, but don't risk breaking the part and make sure that the pulley moves freely.



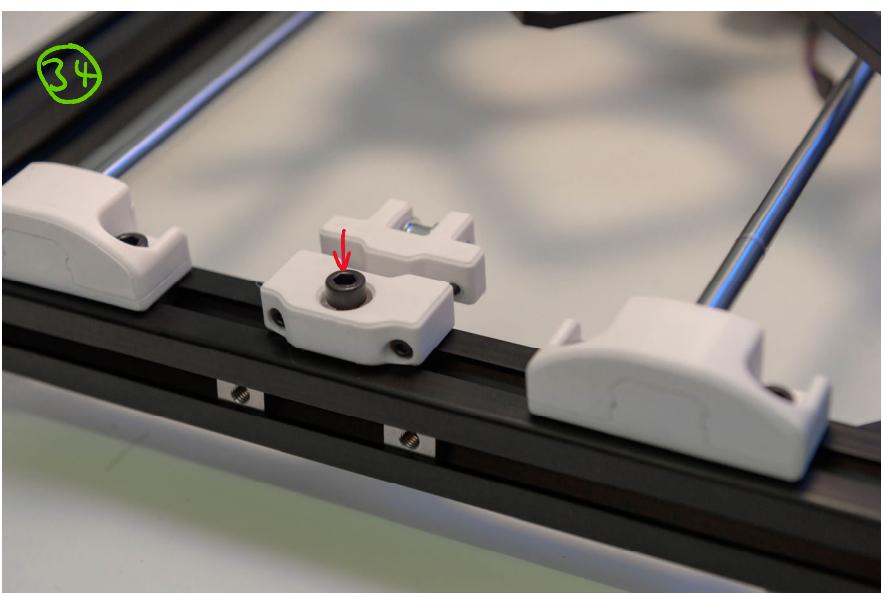
Connect the second part of the belt tensioner to the first using two 35mm screws as seen in the picture.



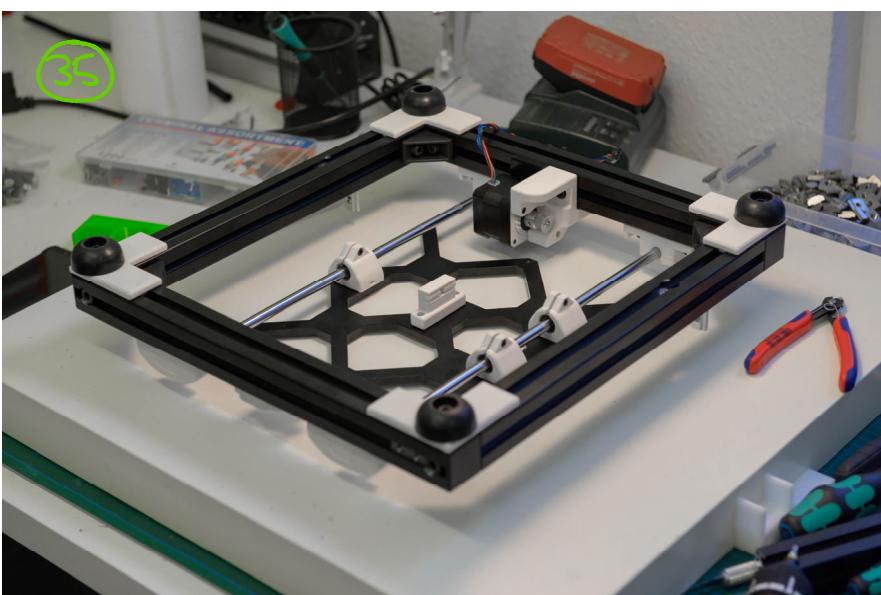
Screw them together completely, so that the self securing nuts are pulled into their slots fully.



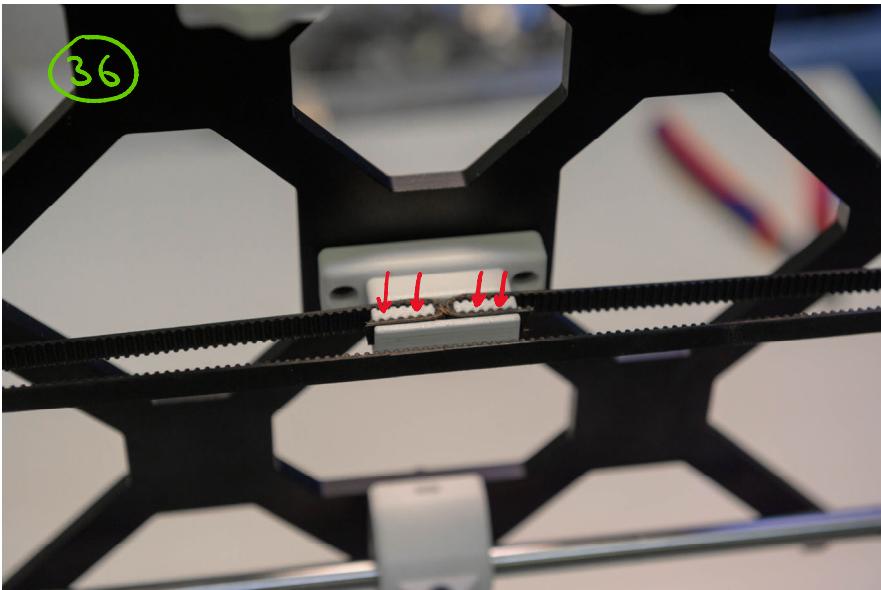
Now unscrew them again, in order to maximise tensioning range for later on.



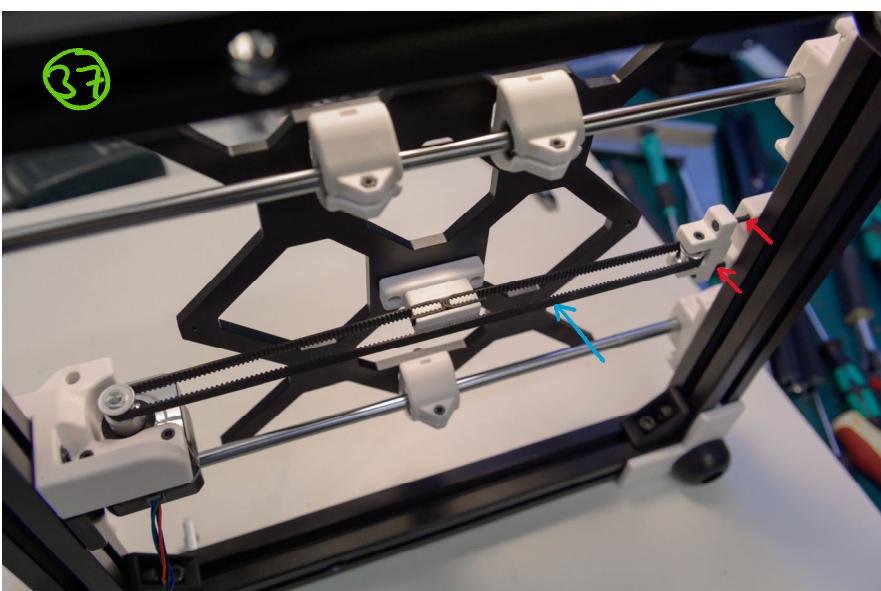
Install the part onto the front part of the frame.



Flip the frame on its back.



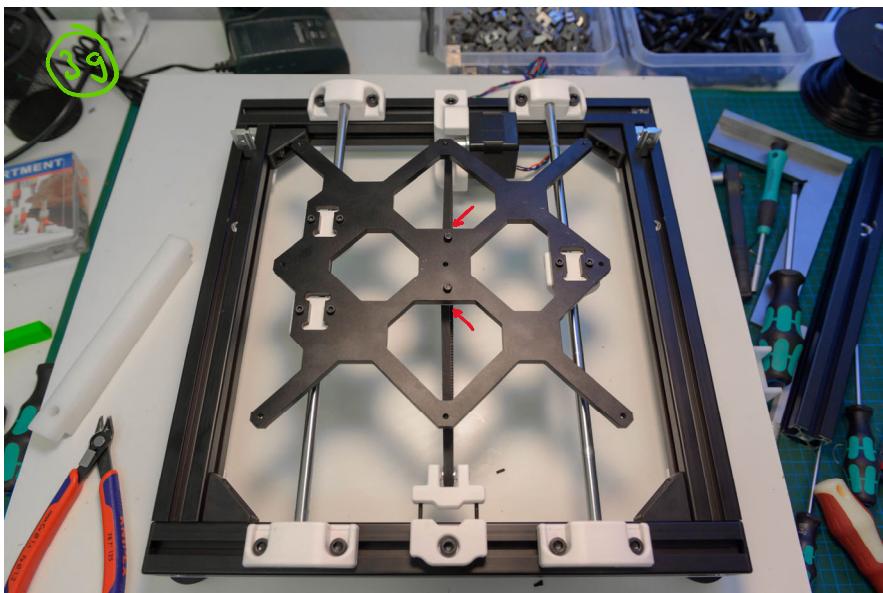
Push the belt into the belt mount as seen in the picture. You may use a flathead screwdriver for this, but proceed with caution as not to break the mount.



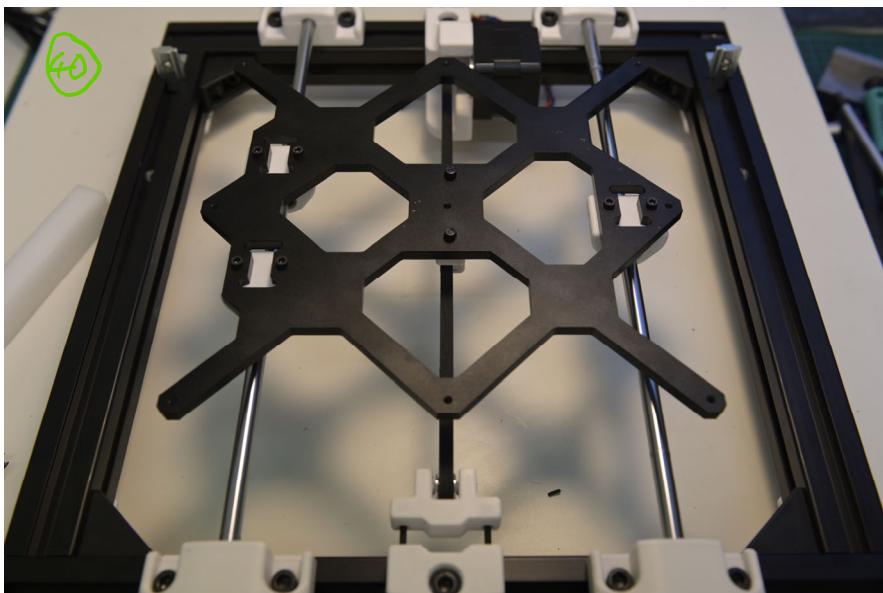
The belt should look like this. Use the two screws marked in red to adjust the tension on the belt. To give you an idea of how much tension is optimal, the belt when plucked in the area marked blue should produce a sound at roughly 110Hz. For those people with a good ear, that is two octaves below the standard 440Hz A. Alternatively, use a tuning device like a normal person.



Cut off any excess from the right and left side of the belt mount.



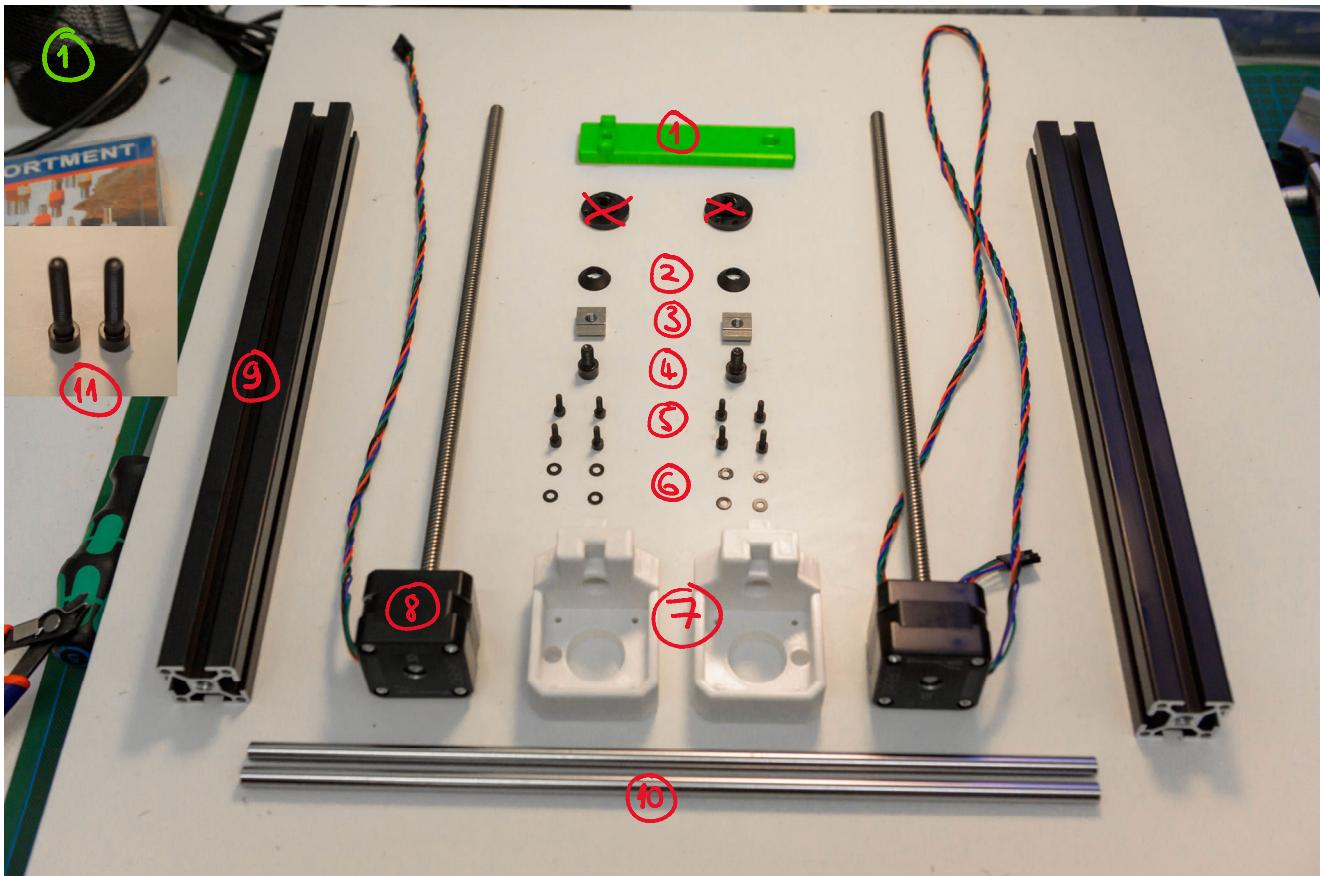
The picture on the left is an example of bad motor and tensioner alignment. Loosen the three M6x12mm screws that hold the tensioner and motor mount in place in order to adjust their position along the extrusion. Close one eye when judging the alignment, or you WILL get confused.



Once you are done with alignment and the belt tension is set correctly and your frame looks like this, you have completed part 1 of the Y-axis.

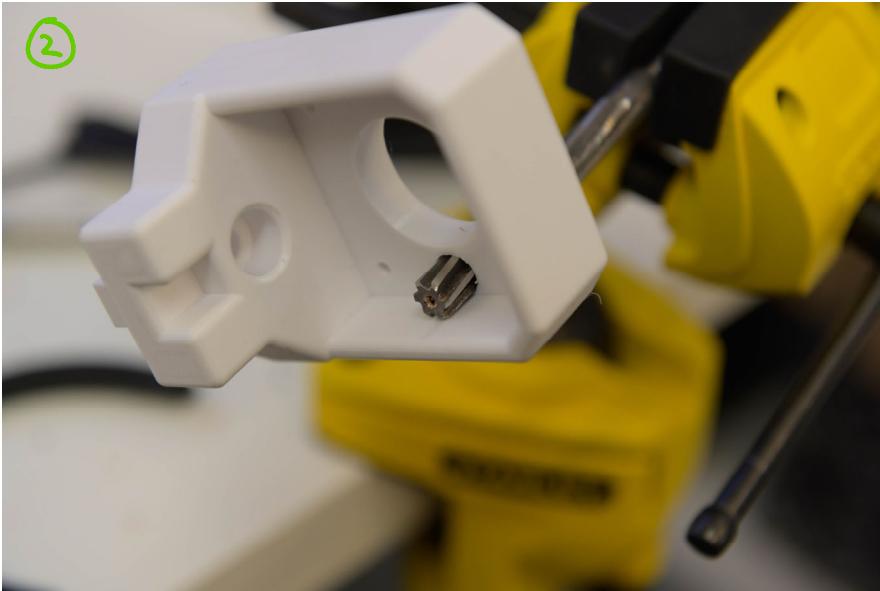
3: Z-axis (part 1/2)

You will need the following parts to complete part 1 of the Z-axis:



- ① 1x build tool
- ② 2x Z-screw covers
- ③ 2x T-nuts
- ④ 2x M6x12mm screws
- ⑤ 8x M3x10mm screws
- ⑥ 8x M3 washers

- ⑦ 2x Z-motor mounts (left and right)
- ⑧ 2x Z-motors (left and right, length depends on model)
- ⑨ 2x Z-extrusions (length depends on model)
- ⑩ 2x Z-rods (length depends on model)
- ⑪ 2x M8x40mm screws

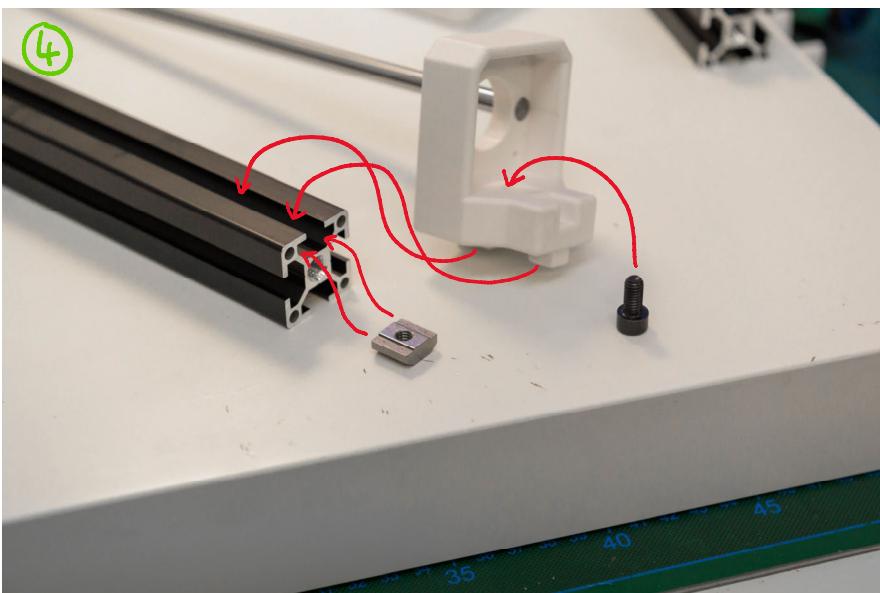


Do the following for both motors:

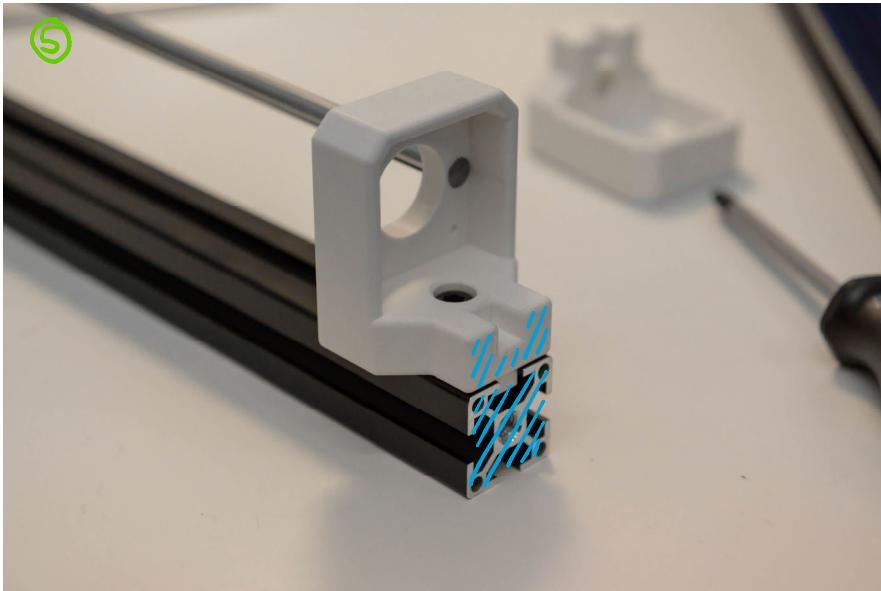
As the rods will probably not fit into the motor mount's slot from the start, you will have to widen the hole. Do this very carefully by using an 8mm reamer. Optimally, you will widen the hole just enough so that you can tap the rod in, and it will not fall out under its own weight. It is ok if the rod, when seated, isn't 100% straight, as long as there is no play.



Make sure the rod sits flush with the inside of the mount.



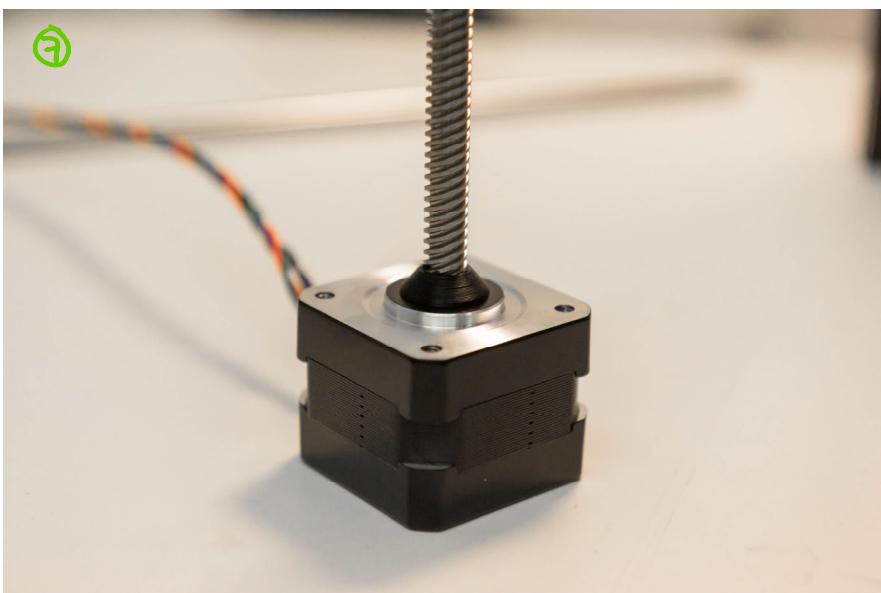
Using an M6x12mm screw and a T-nut, secure the motor mount to a Z-extrusion.

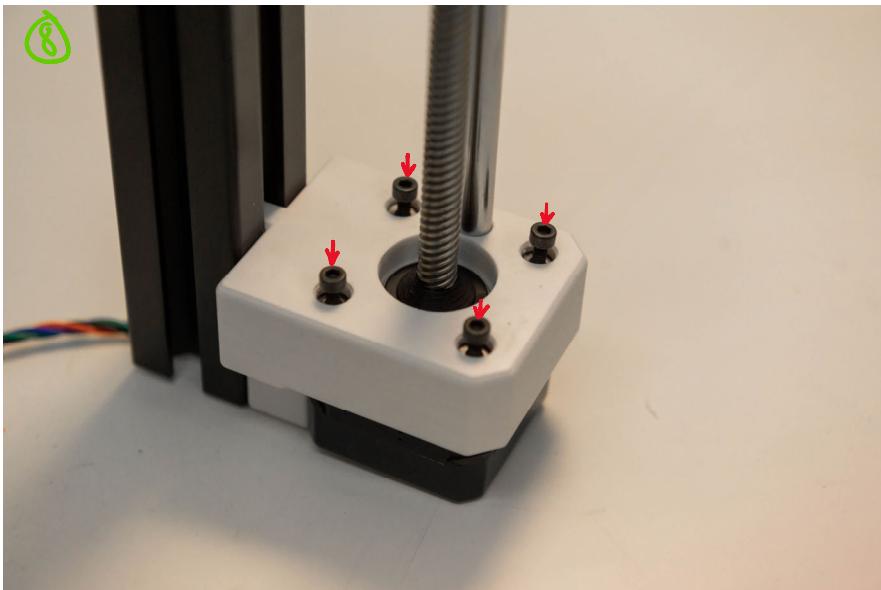


Make sure that the surfaces marked in blue are flush with one another.



Screw a Z-screw cover onto the motor and position it at the very bottom as seen in the picture below.





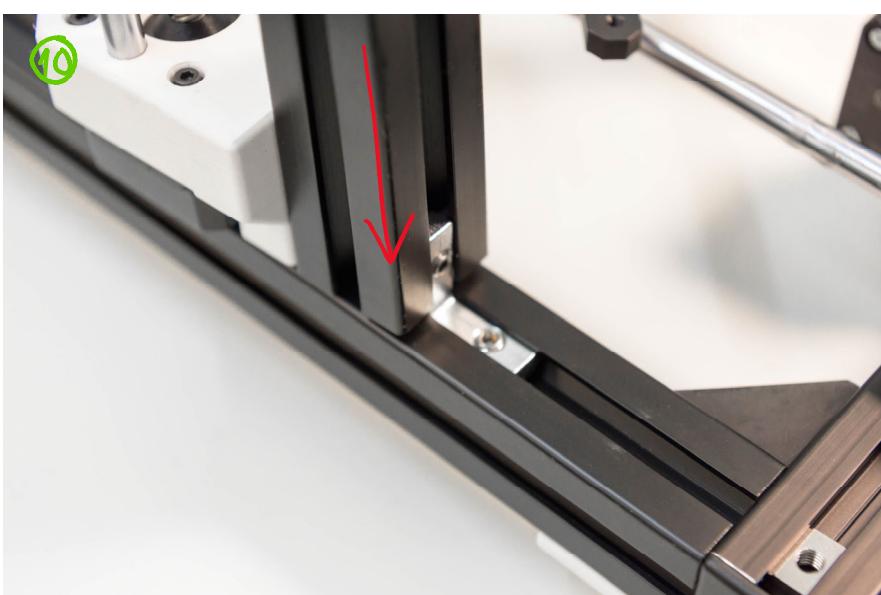
Using 4 M3x10mm screws and 4 M3 washers, screw the motor into the motor mount from below, with the cable exit facing the extrusion.

NOTE: The two motors have different cable lengths. The right motor has the longer cable and the left one the shorter cable. What you see on the left is the RIGHT motor, with the longer cable.

If any of the screws have a lot of resistance when being screwed in, reseat the motor and try again.



It should now look like this.



Insert the assembly onto the frame over the hole in the extrusion as seen in the picture.



Screw in the M8x40mm screw from the bottom, making sure that there is no gap between the Z- and Y-extrusion.



Evenly, switching back and forth, slowly tighten the two screws in the L-bracket. This is so that the L-bracket is perfectly aligned in both channels.



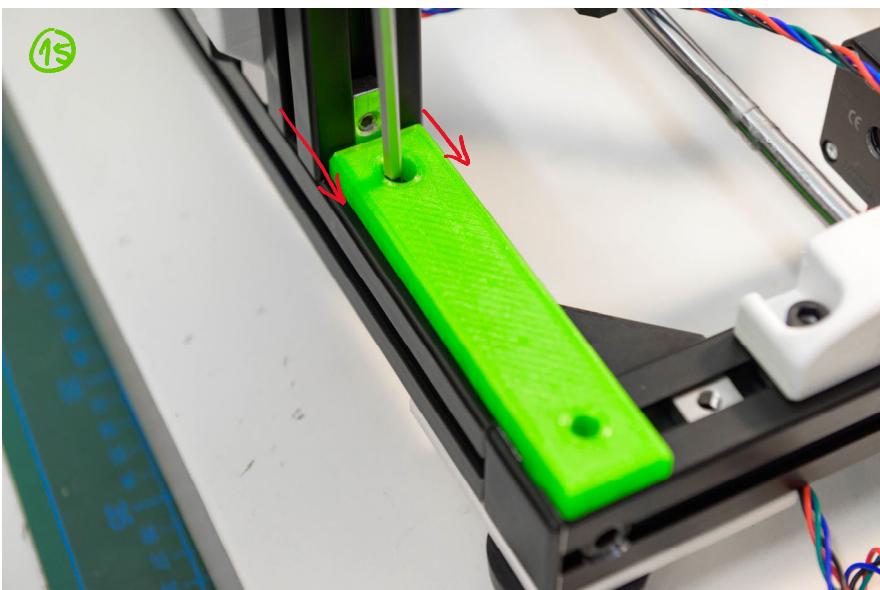
This is roughly what that should look like.

Now loosen the lower screw. If the bracket is aligned properly, it should not move after loosening.



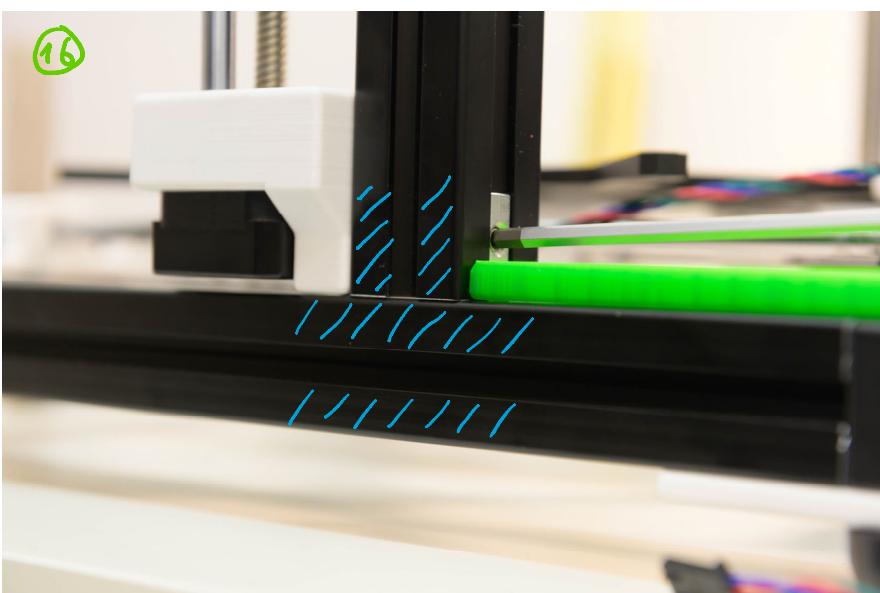
Loosen the M8x40mm screw.

You should now be able to move the entire Z-assembly forward and backward slightly.



Position the build tool 2 as seen in the picture, with the two studs in the rear X-extrusion.

Slide the Z-extrusion against the tool, and retighten the lower bracket screw.



Once the lower screw is tight, loosen and retighten the upper screw, making sure that there is no gap between the Z- and Y-extrusion.

Make sure that the surfaces marked in blue are perfectly aligned.



Using a ratchet, tighten the M8x40mm screw. Make sure that the Z-extrusion doesn't twist out of alignment under torque.

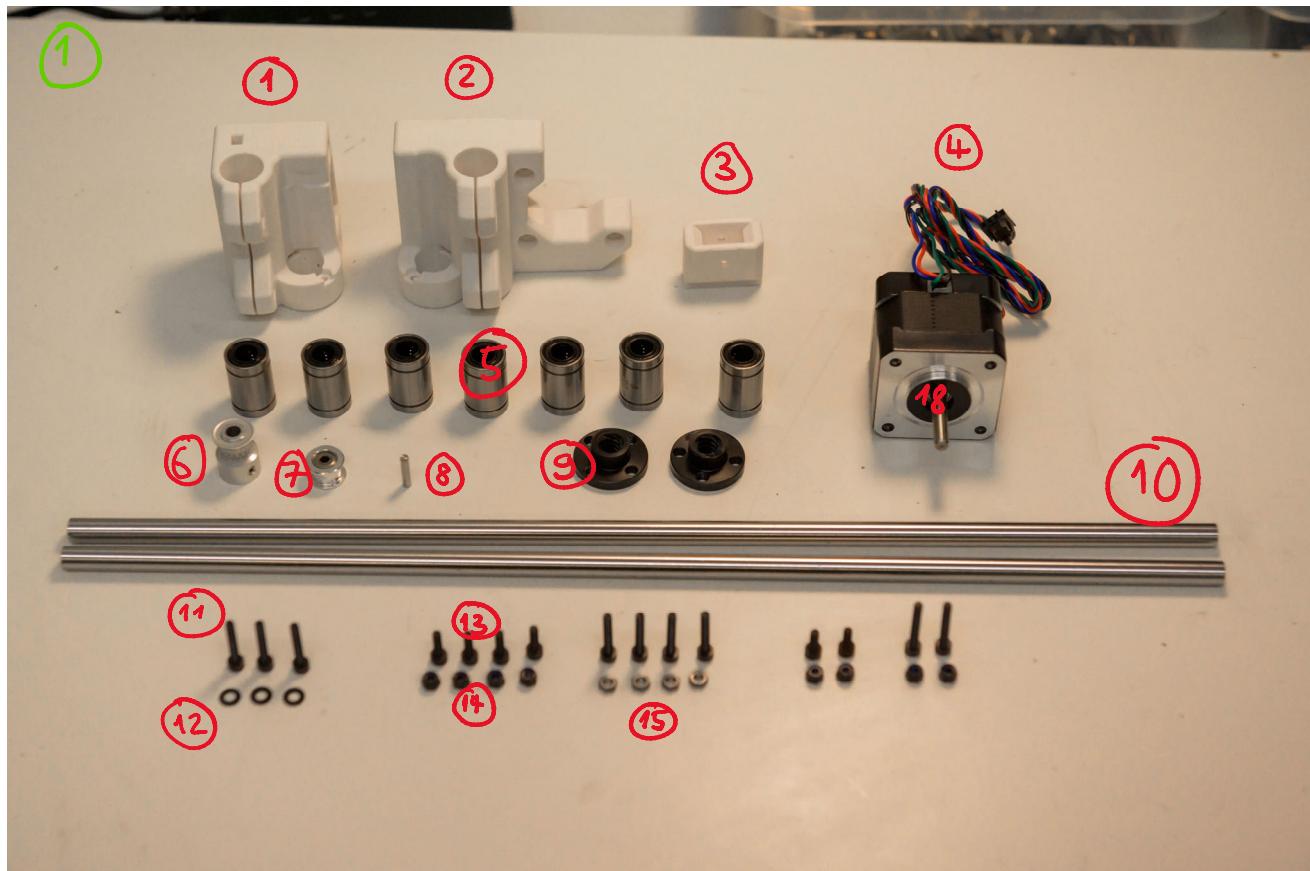


After completing both sides, your 3D printer should look like this.

Part 1 of the Z-axis is now complete.

4: X-axis

You will need the following parts to complete the X-axis:

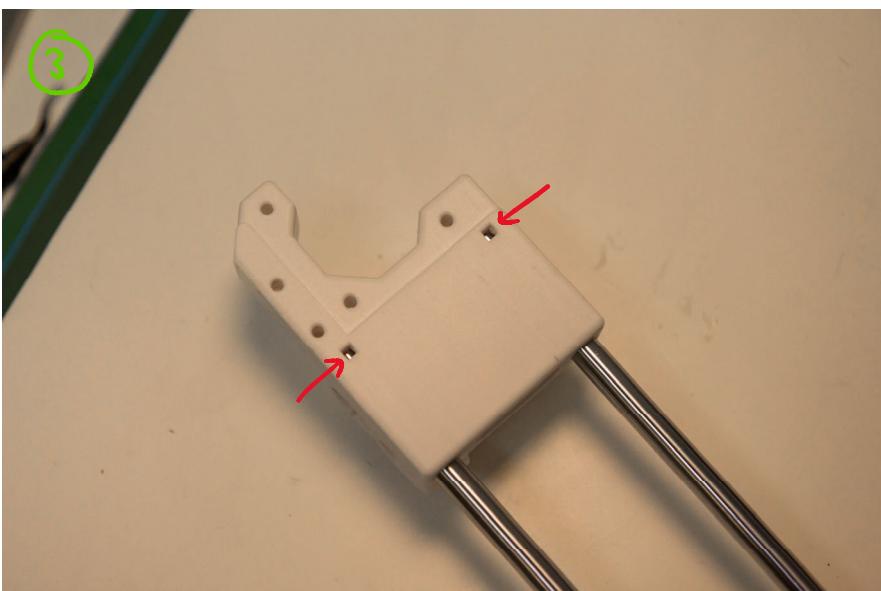


- ① 1x X-idler
- ② 1x X-motor mount
- ③ 1x X-belt tensioner
- ④ 1x stepper motor
- ⑤ 7x linear rod bearings
- ⑥ 1x toothed pulley
- ⑦ 1x toothless pulley
- ⑧ 1x dowel pin

- ⑨ 2x POM nuts
- ⑩ 2x 370mm rods
- ⑪ 9x M3x18mm screws
- ⑫ 3x M3 washers
- ⑬ 6x M3x10mm screws
- ⑭ 8x M3 self locking nuts
- ⑮ 4x M3 nuts

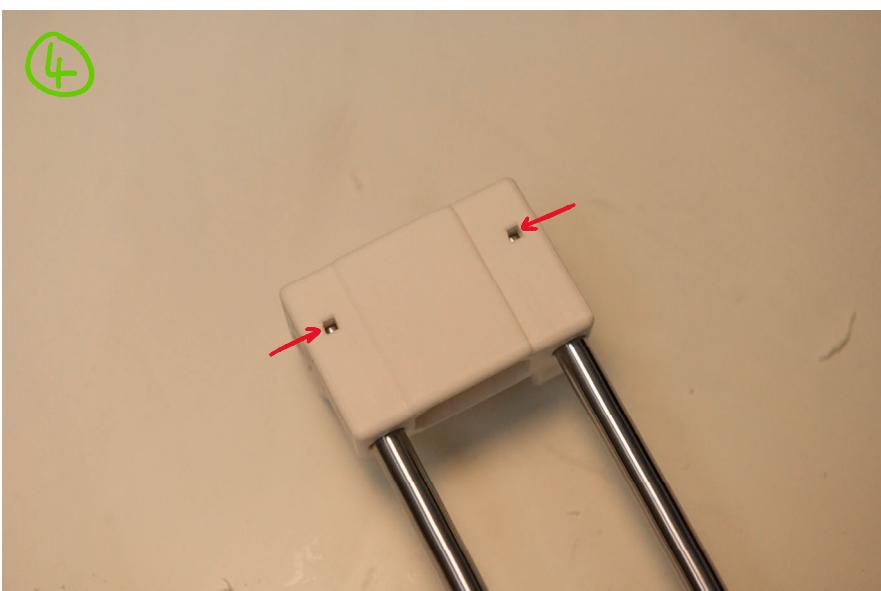


Using the 8mm reamer, drill the marked holes to fit the rods. Be careful not to skew the channel by drilling diagonally, or drilling it too much.



Test fit the rods. You should be able to slide them in all the way. You can check if they are fully inserted by seeing whether or not the ends of the rods can be seen in the little windows marked by the arrows. It is normal for them to be a pretty tight fit, it will make it a lot easier if you rotate the rods while pushing them in or out.

Remove the rods after the test fit.

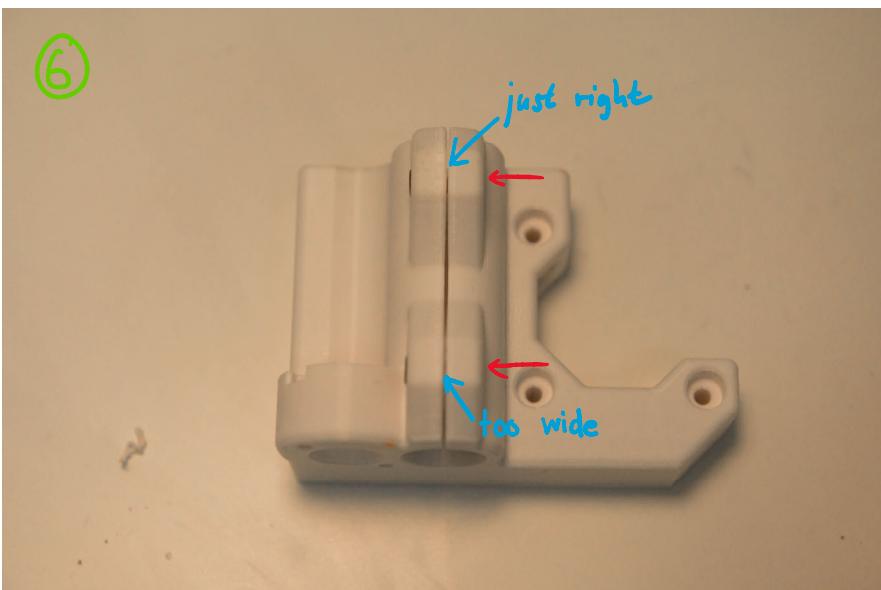


Do the same for the X-idler.



Insert two M3 self locking nuts into the marked hexagonal slots. Using the tool seen in the picture will make this a lot easier.

If you think that it is too tight to fit, do not force it in, as you will risk cracking the part. Instead, using a scalpel for example, carefully widen the hole slightly and the nut should be able to be inserted without any problems.



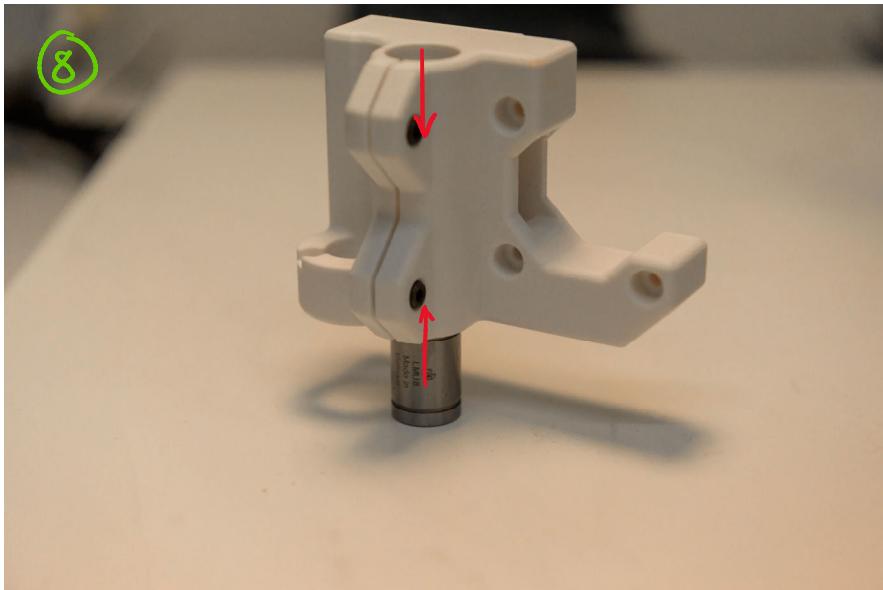
NOTE: If you are using an idler and motor mount that you received in a kit, then you can skip steps 6 and 7, as we send them out pre-drilled.

Screw in two M3x10mm screws from the other side of the M3 self locking nuts. There should be a roughly 0.2mm gap left.



Using a 15mm drill bit, drill the part as seen in the picture. Make sure to be careful not to injure yourself. A higher drill rpm is recommended as it reduces the risk of it getting stuck, which may lead to injury or breakage of the part.

About 2 seconds of drilling should suffice.



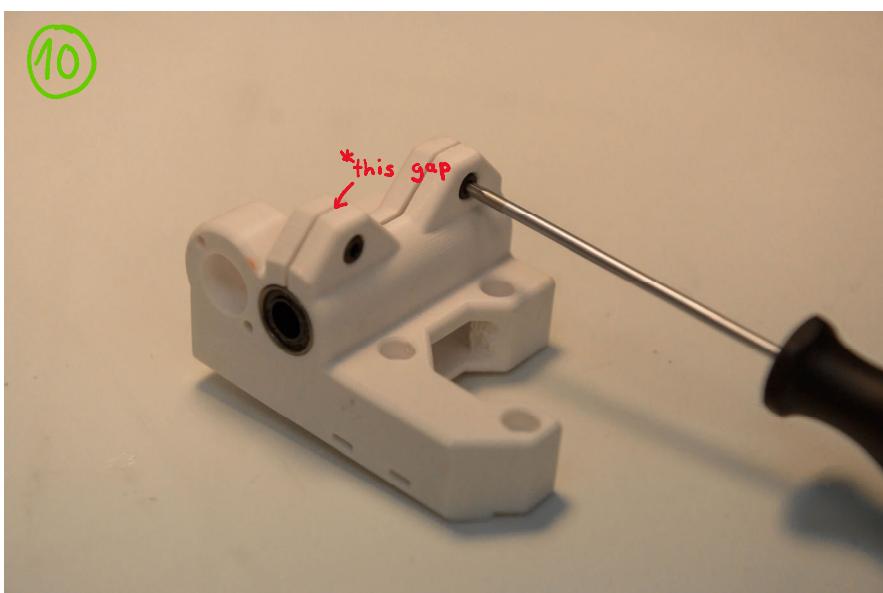
We recommend that you prepare the bearings like we did for the Y-axis.

Loosen the M3x10mm screws if you have them installed already.

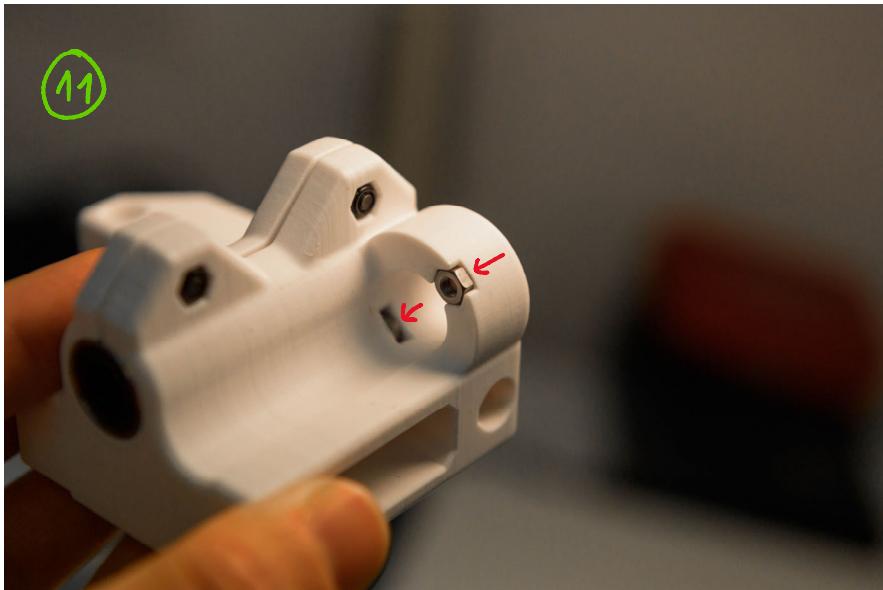
Insert two bearings into each side.



The bearing should sit at the same height as the surface of the part. It shouldn't protrude, or be recessed.

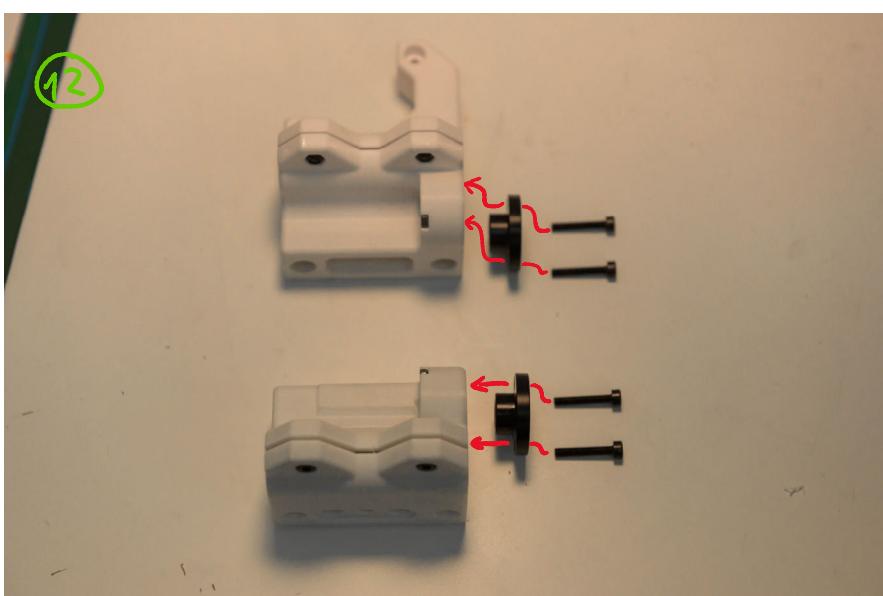


Tighten the M3x10mm screws (install them if you haven't already). Don't overtighten them, there is supposed to be a slight gap.*

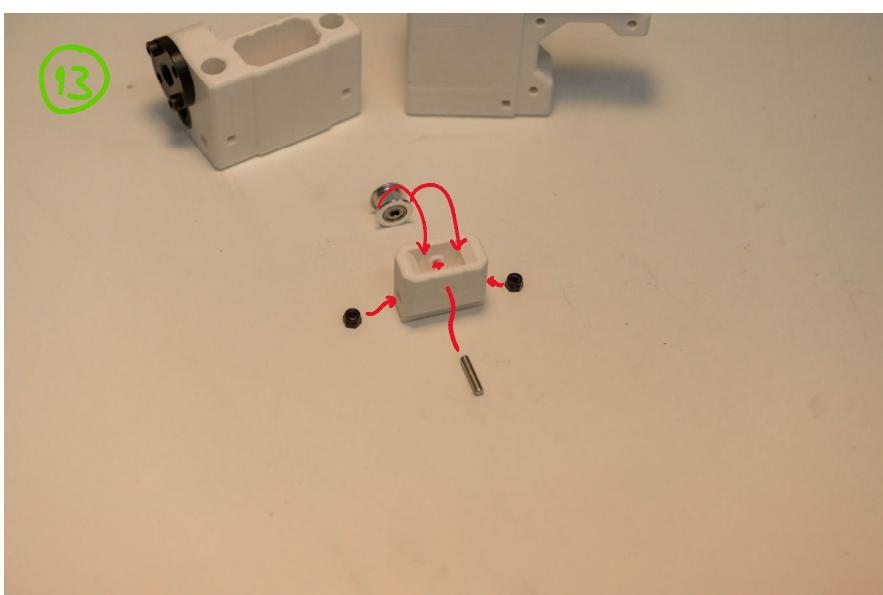


Insert two M3 nuts into the slots as seen in the picture.

Now do steps 5 to 11 for the X-idler.

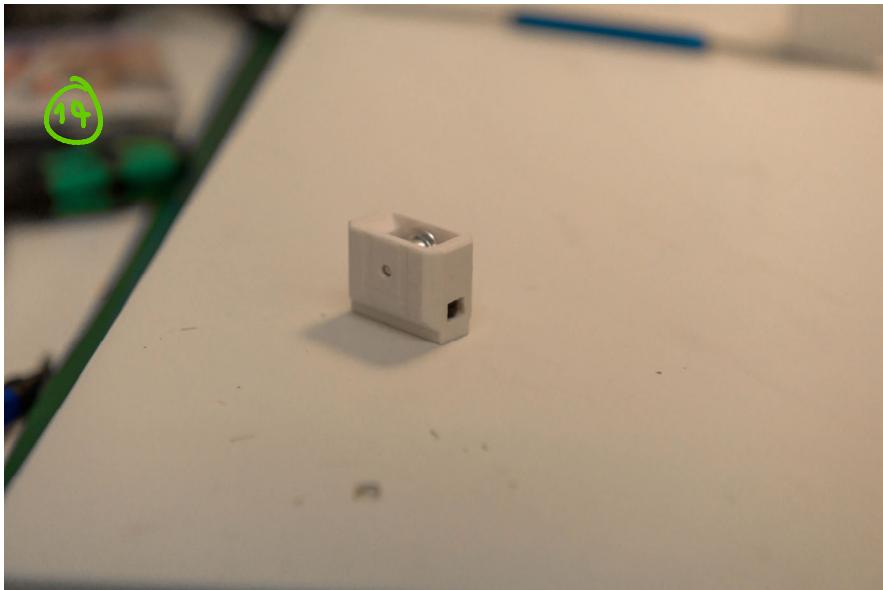


Using four M3x18mm screws, install a POM nut on each part.

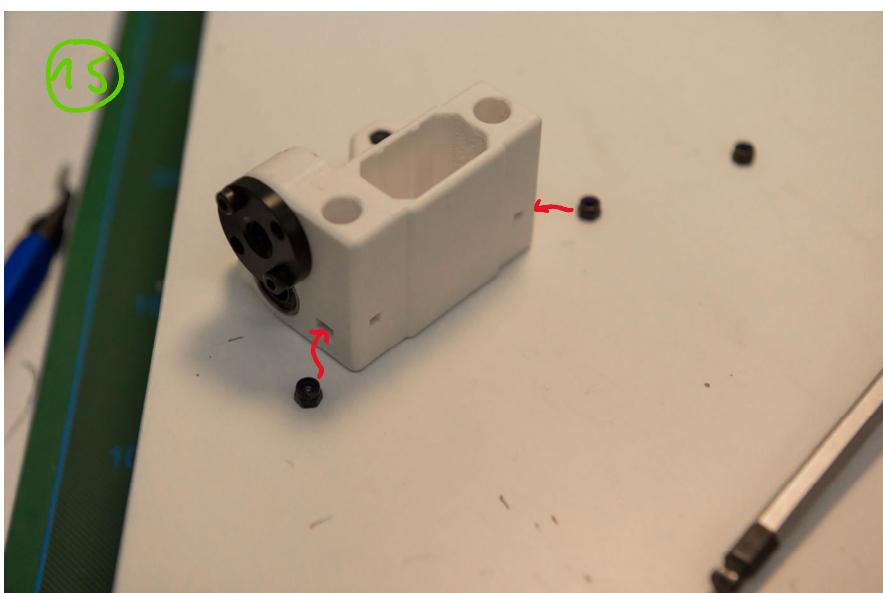


Belt tensioner:

Insert the toothless pulley and fasten it in place with the dowel pin. Make sure the dowel pin is centred. Then install two M3 self locking nuts in the marked slots.

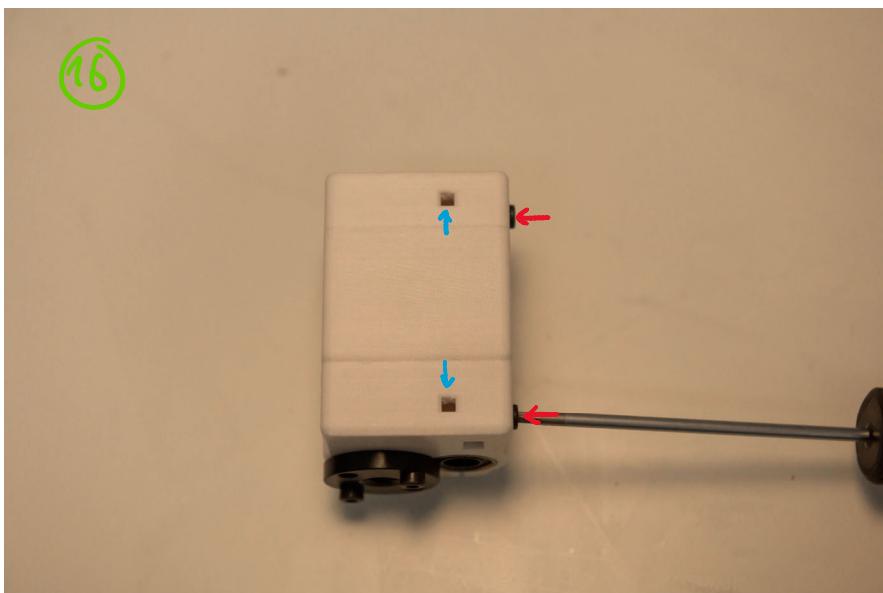


The tensioner should now look like this.

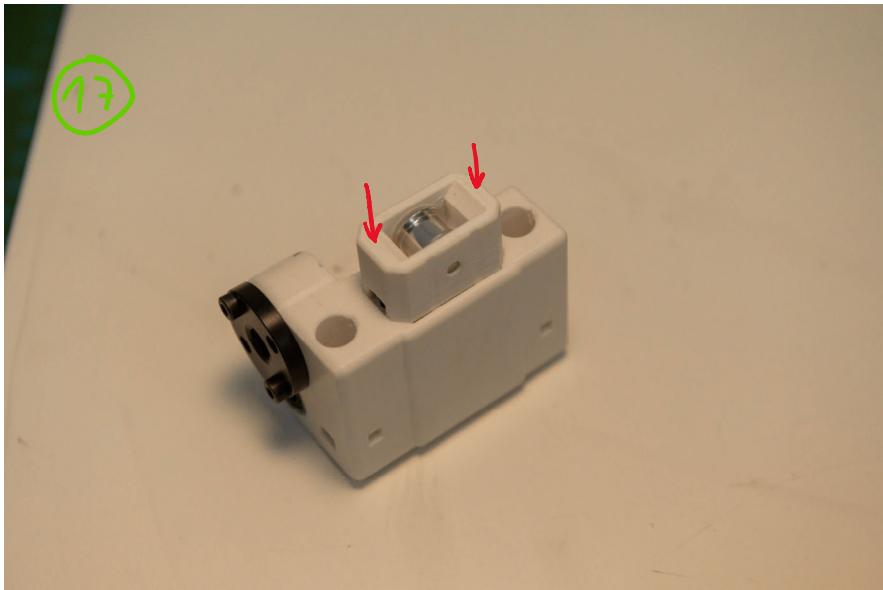


NOTE: Steps 15 and 16 are optional.

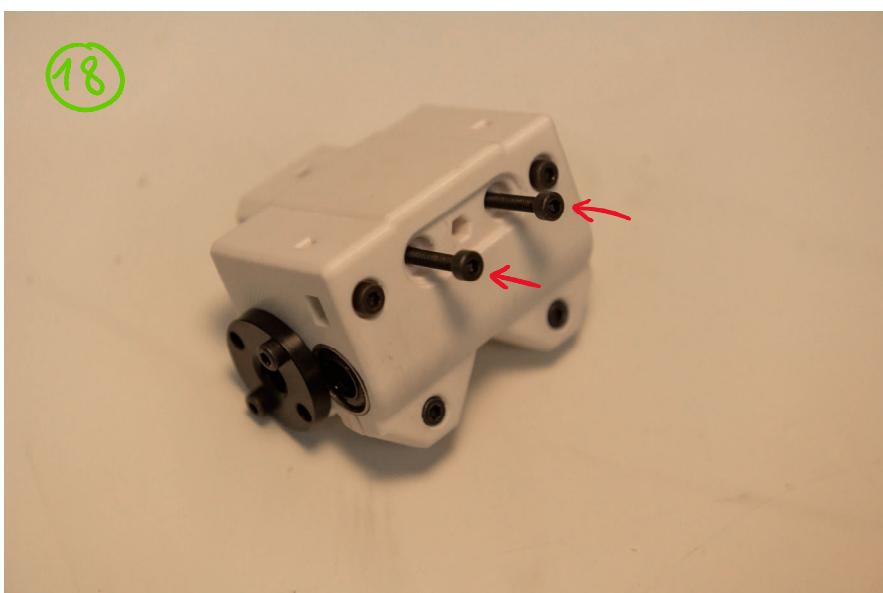
On the X-idler, insert two M3 self locking nuts into the marked slots.



Screw two M3x10mm screws into the previously installed self locking nuts, but only part way. The tip of the screw should not be able to be seen from the windows marked in blue. Screwing them in too far will interfere with the rod installation later on.



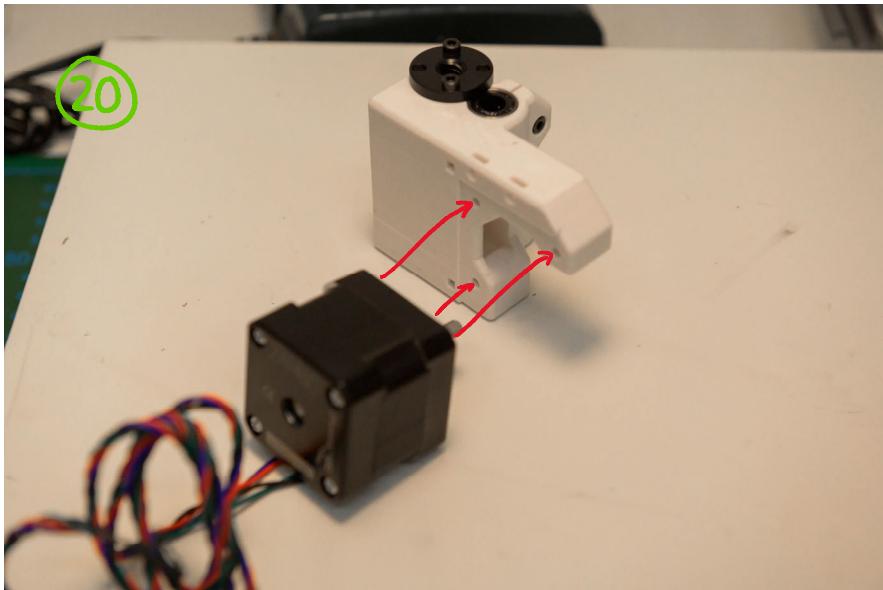
Push the completed tensioner into the X-idler.



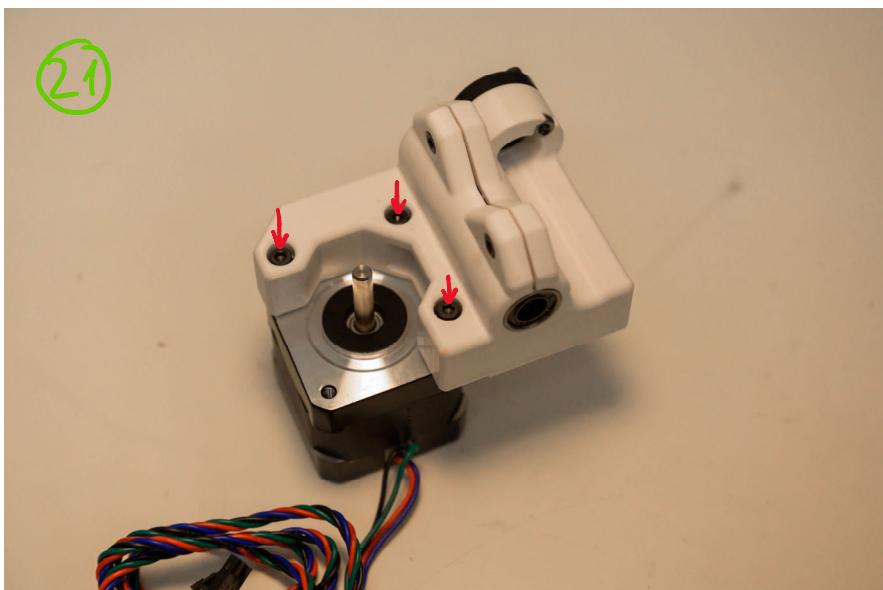
From the other side, insert two M3x18mm screws.



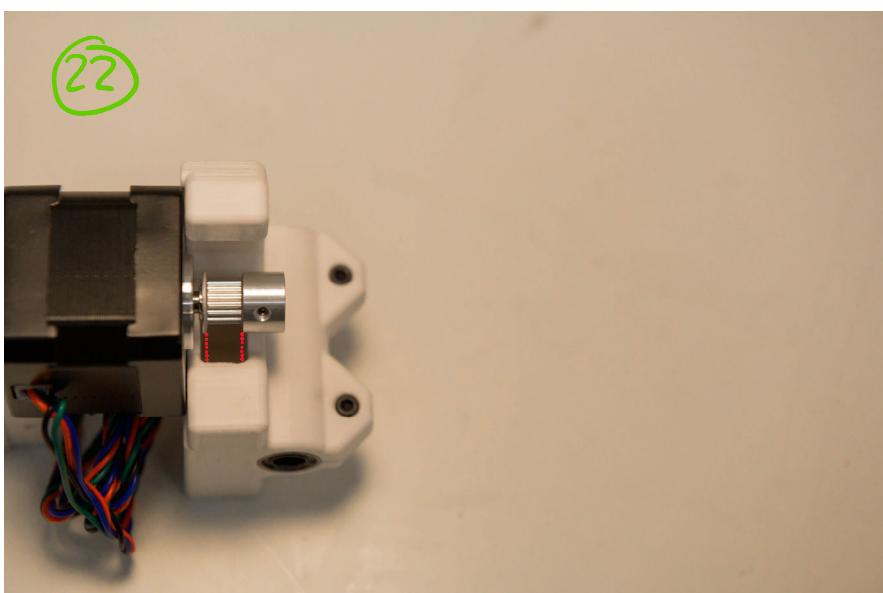
Your X-idler should look like this.
Don't pull the tensioner all the way in, or you will not have enough tensioning head room.



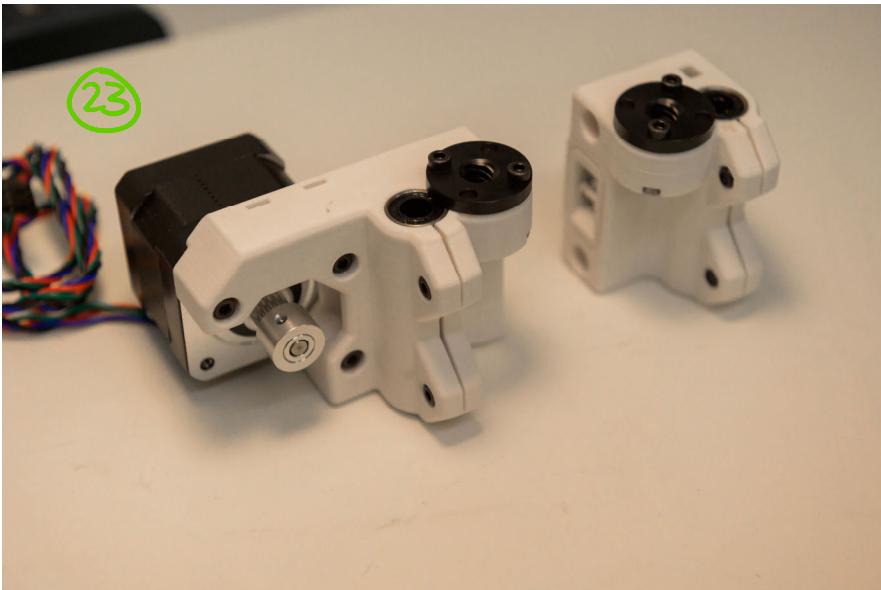
On the X motor mount, align the motor in the orientation shown on the left. With the POM nut facing up, the cable should exit the motor from the bottom.



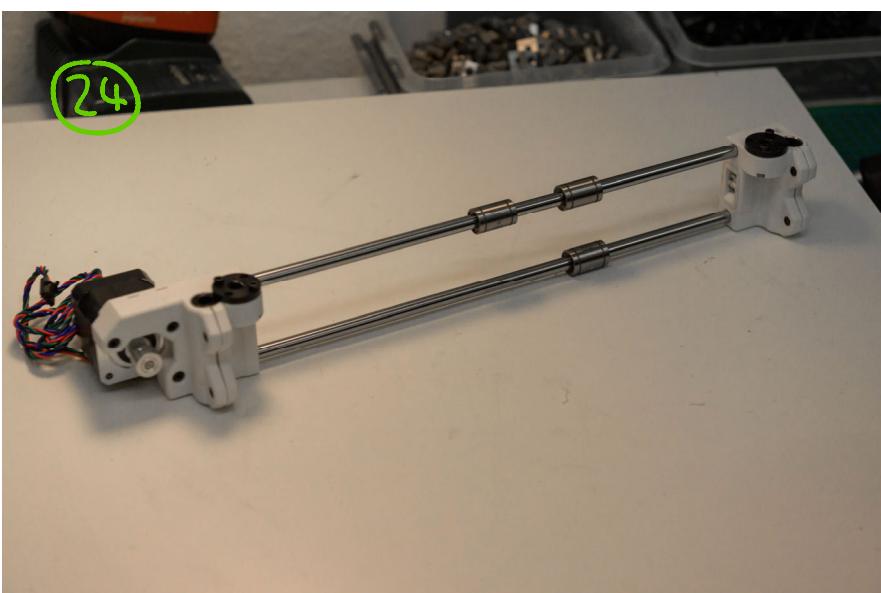
Secure the motor in place using three washers and three M3x18mm screws.



Slide the toothed pulley onto the motor shaft. Install it so that the channel for the belt is in the middle of the pass-through hole.

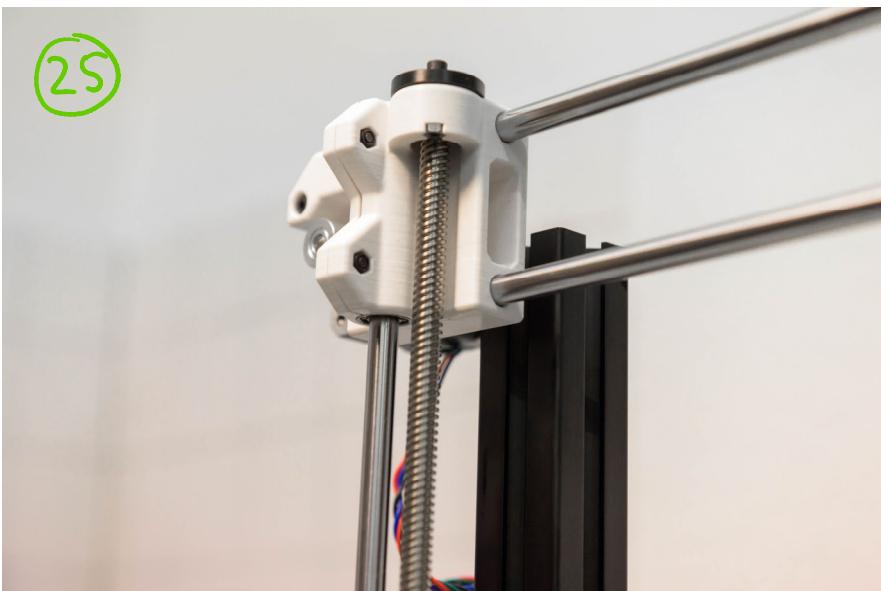


This is what your X-idler and X-motor mount should look like.



Insert the rods into the X-motor holder, then slide two bearings onto the upper rod, and one onto the lower rod. Then install the X-idler onto the other side. Make sure that the POM nuts are facing upwards.

Take your time with this step, it can be a little tedious. Due to there being two rods, you cannot twist the X-idler to install it. You can tap it gently and evenly into place, making sure not to break the part through excessive force.



Place the finished X-axis on top of the Z-rods and motor screws as seen in the picture.

Rotate the Z-motors counter-clockwise by hand to move the X-axis down about 10cm. Make sure that the axis is more or less horizontal, or you might put unnecessary strain on the idler and motor mount.

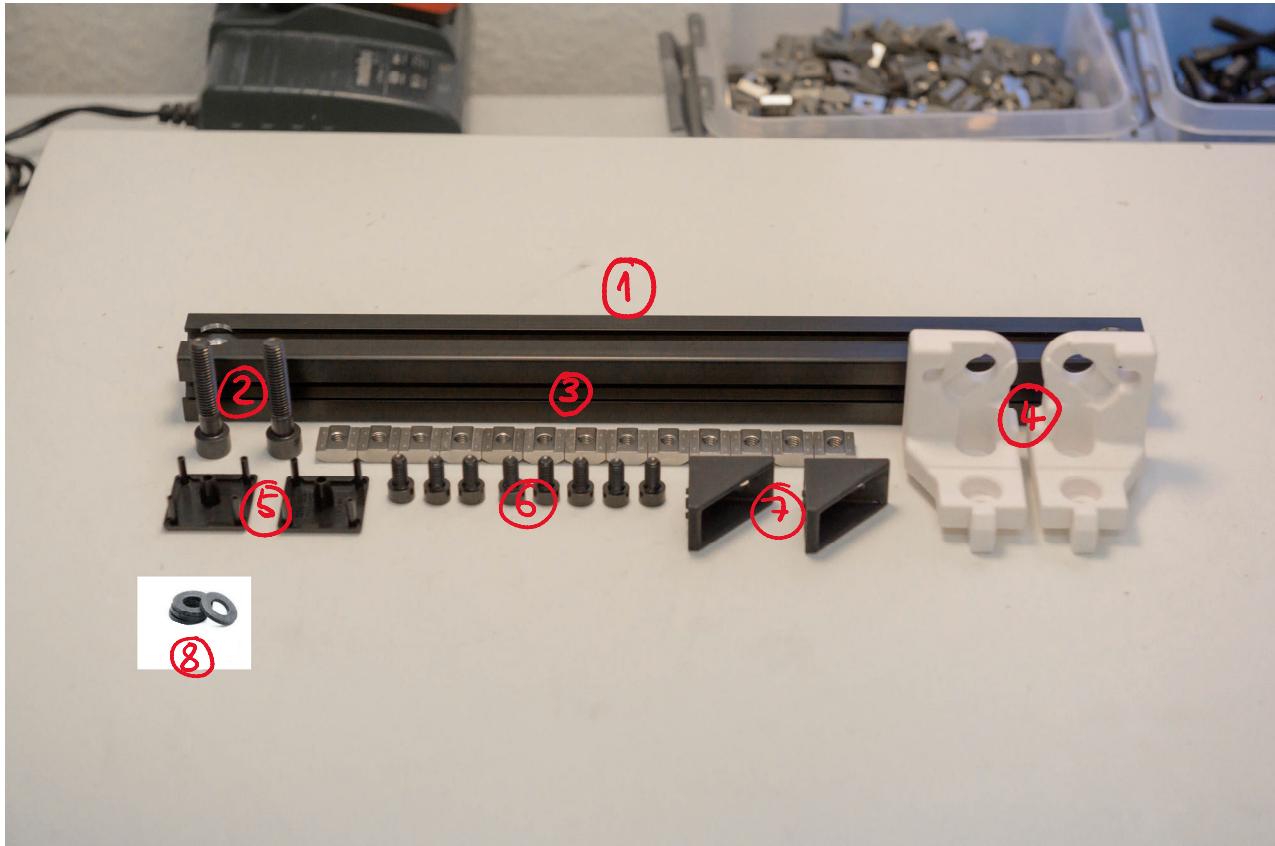


This is what your 3D printer
should look like.

The X-axis is now complete.

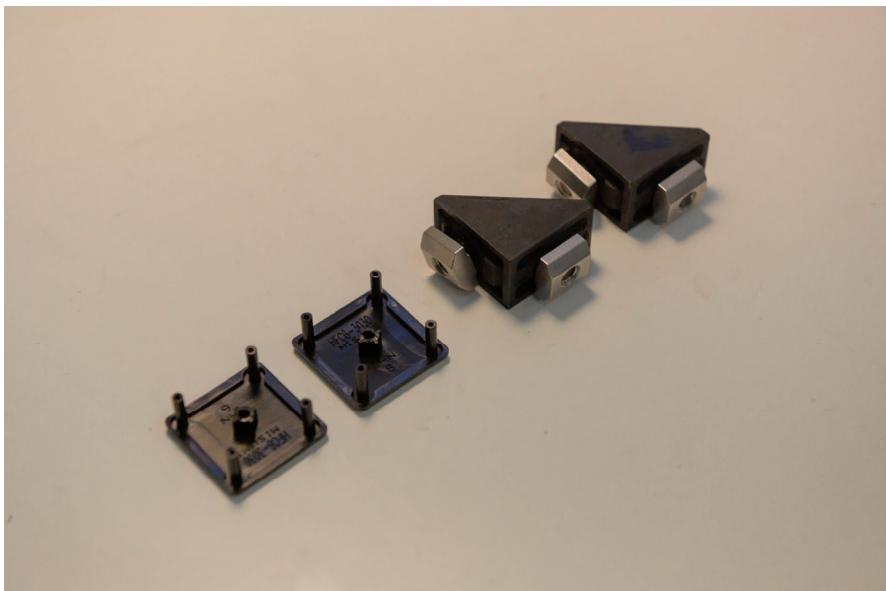
5: Z-axis (part 2/2)

You will need the following parts to complete part 2 of the Z-axis:



- ① 1x X-extrusion
- ② 2x M8x40mm screws
- ③ 13x T-nuts
- ④ 2x top brackets (left and right)

- ⑤ 2x extrusion end caps
- ⑥ 8x M6x12mm screws
- ⑦ 2x corner brackets
- ⑧ 4x M6 washers



Prepare the two end caps and the two corner brackets just as we did in chapter 1.



Put the two corner brackets onto the X-extrusion, in the slot with the two smaller screw holes.



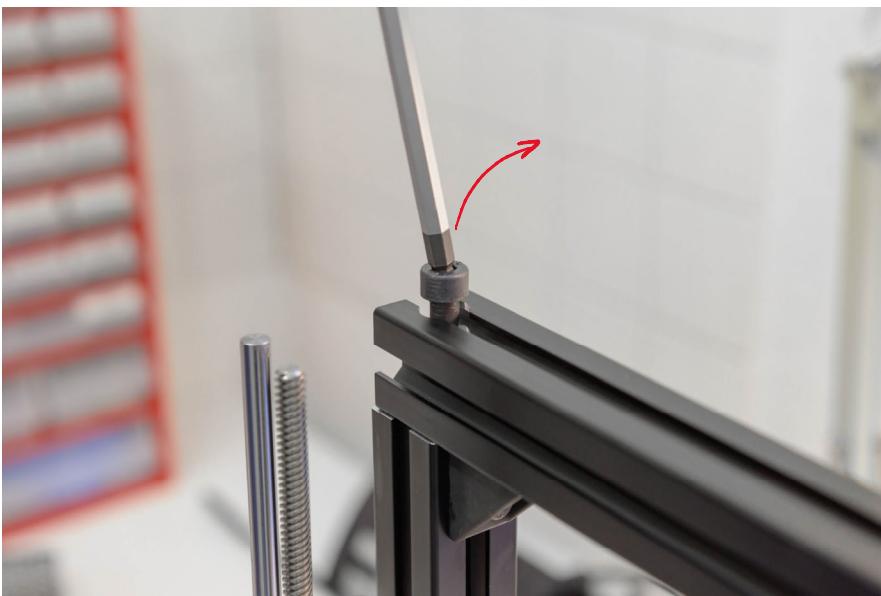
Put the X-extrusion onto the printer as seen in the picture, with the T-nuts of the corner brackets properly slotted into the inner slots of the Z-extrusions.



Screw in both M8x40mm screws into the top, and tighten them slightly.



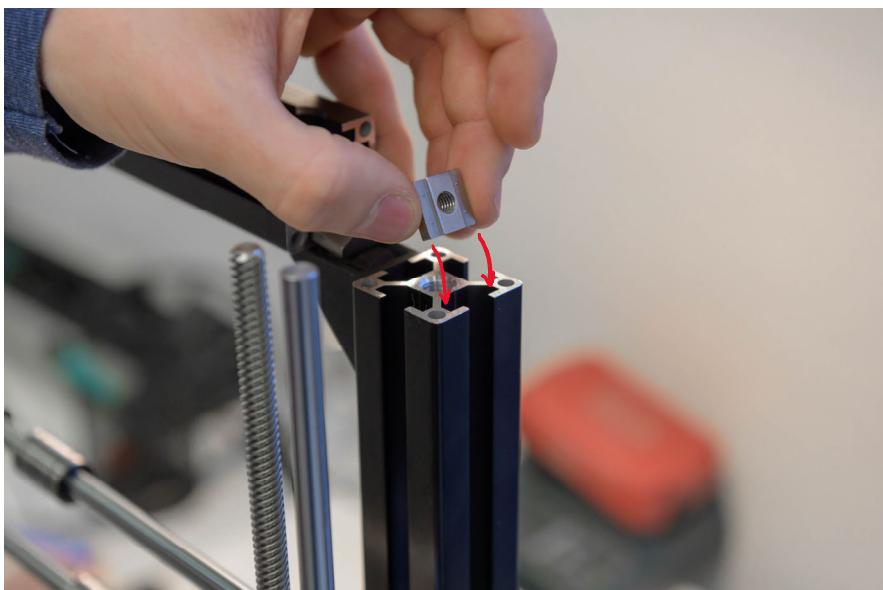
While pushing the corner brackets up against the X-extrusion, screw in the horizontal M6x12mm screws.



Remove both M8x40mm screws.



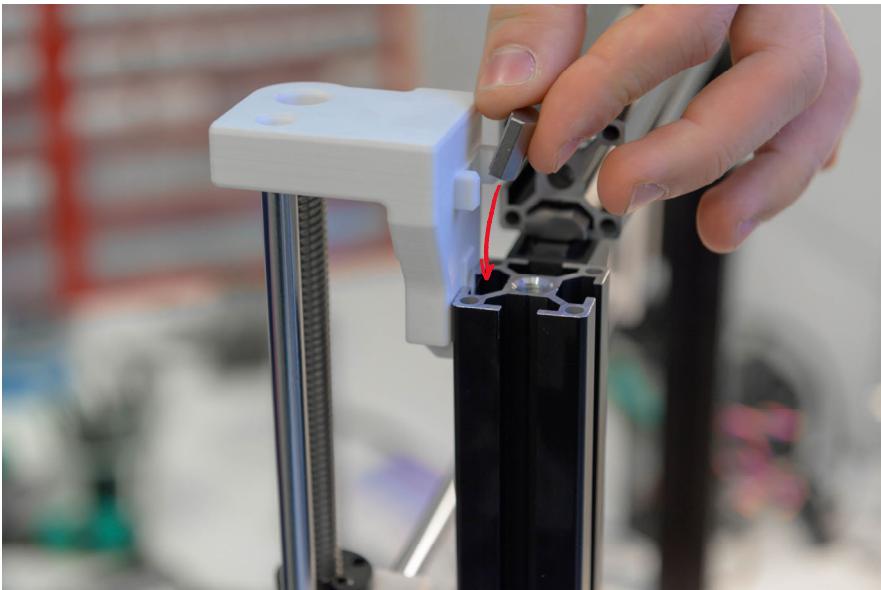
Slide the X-extrusion to the left.



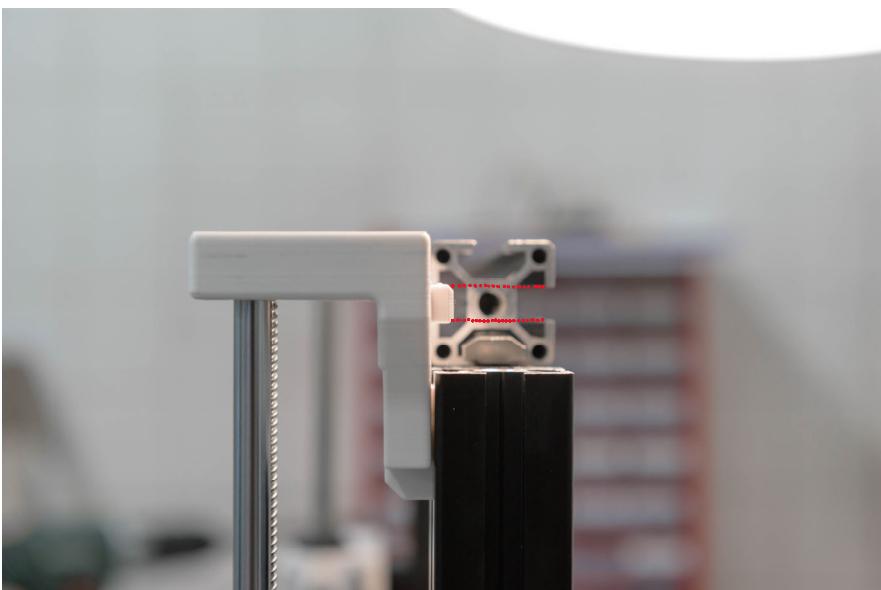
Insert one T-nut into the right slot of the right Z-extrusion.



Install the right top bracket, making sure the stud is properly inserted in the Z-extrusion.



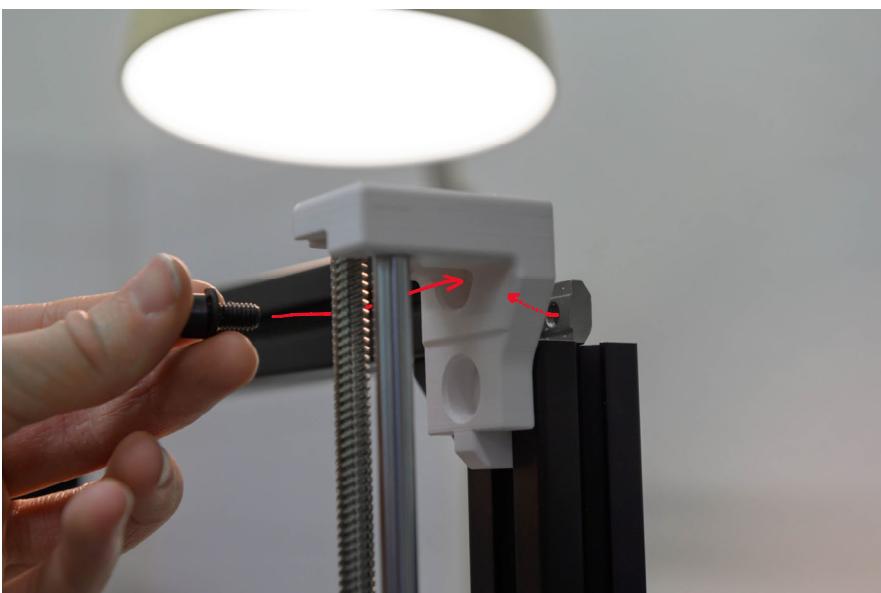
Insert a T-nut into the slot marked in red.



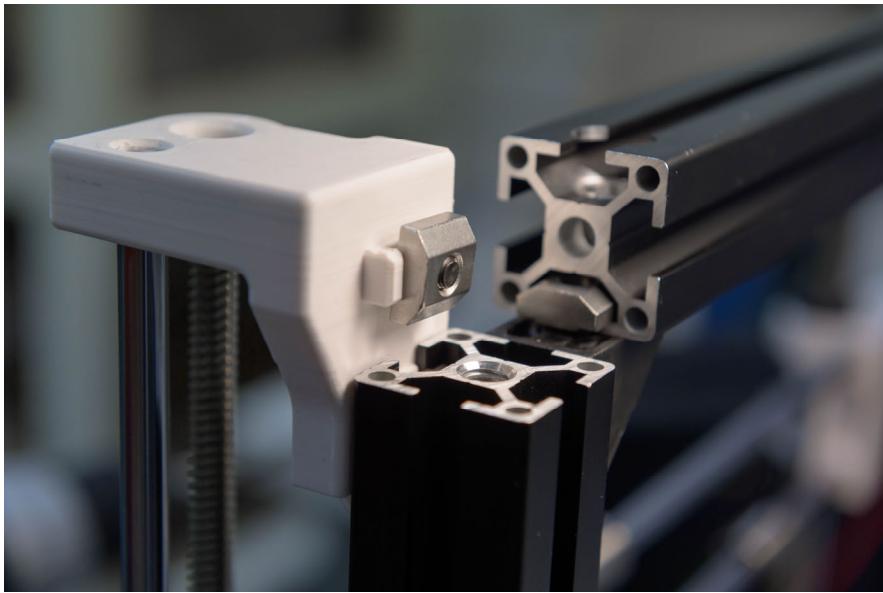
Gently adjust the height of the top bracket so that its upper stud is aligned with the extrusion slot of the X-extrusion.

If you can't get the Z-rod through the slot in the bracket, you may use the 8mm reamer to open it up a little. Be very careful to not widen the hole too much, it should not have any play.

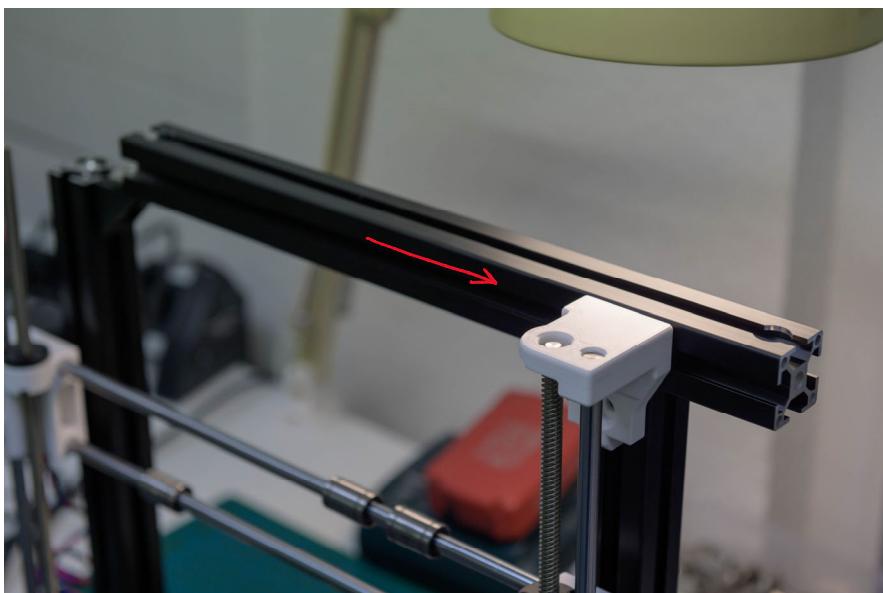
Generally it should fit right out of the box, though.



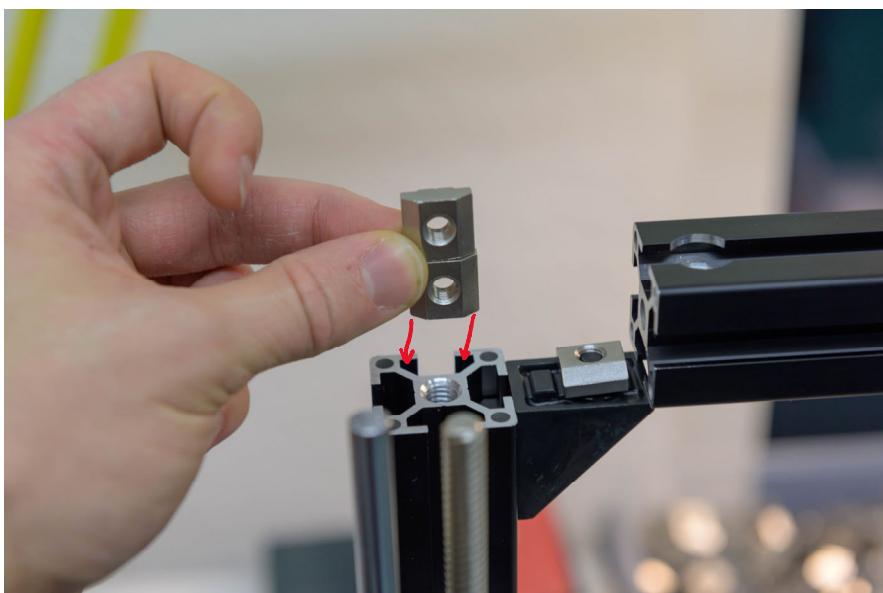
Using an M6x12mm screw and an M6 washer, fasten a T-nut to the rear of the bracket.



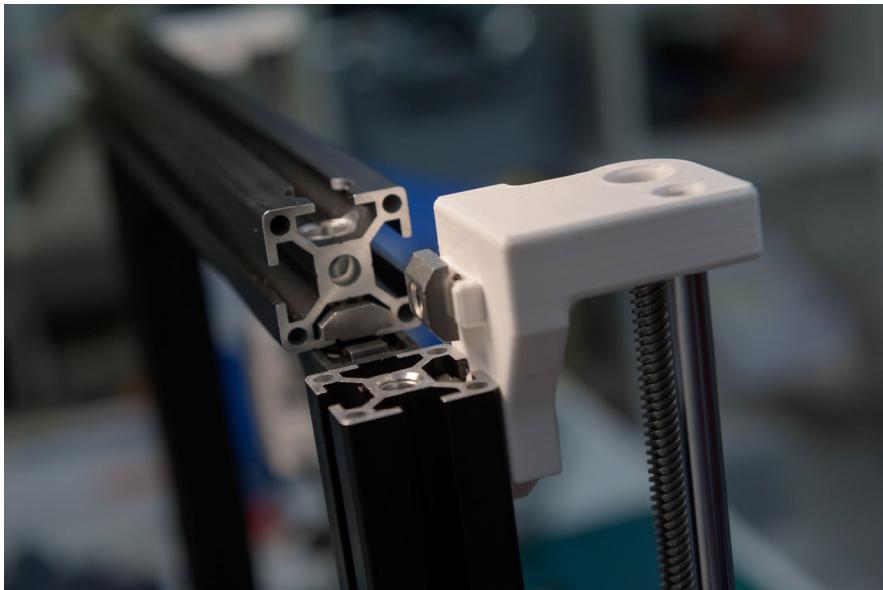
It should look like this.



Now slide the X-extrusion to the right.

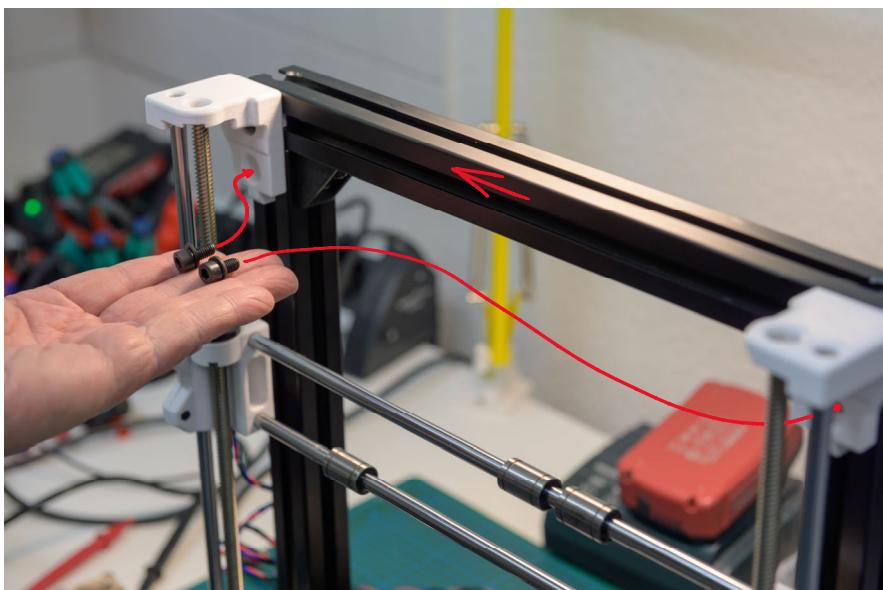


In the slot marked in red, insert two T-nuts.

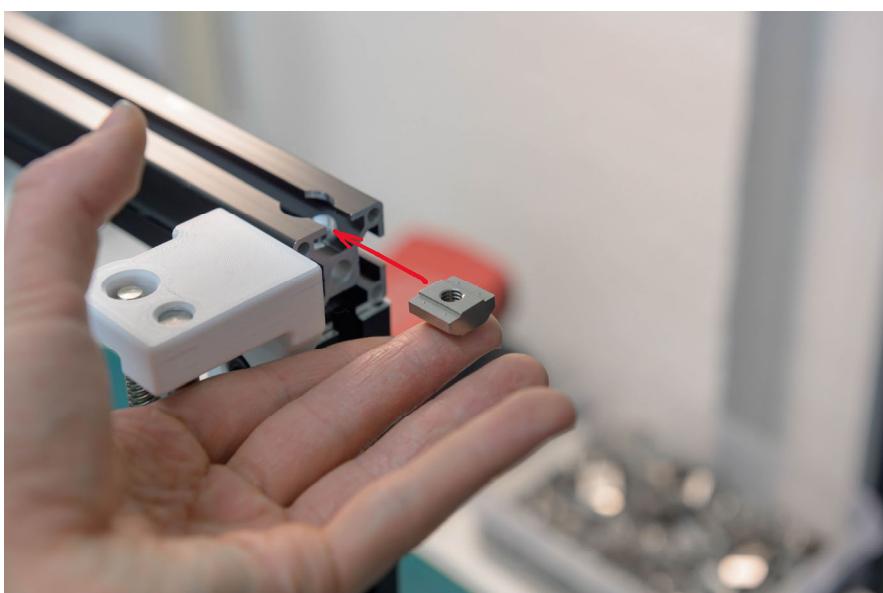


Install the left top bracket in the same fashion as on the right.

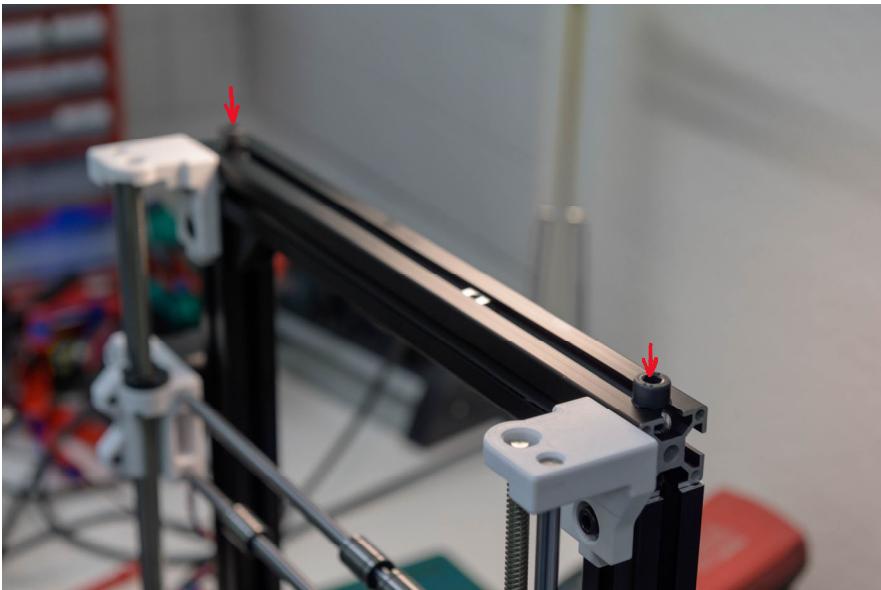
Then move the X-extrusion back into the middle.



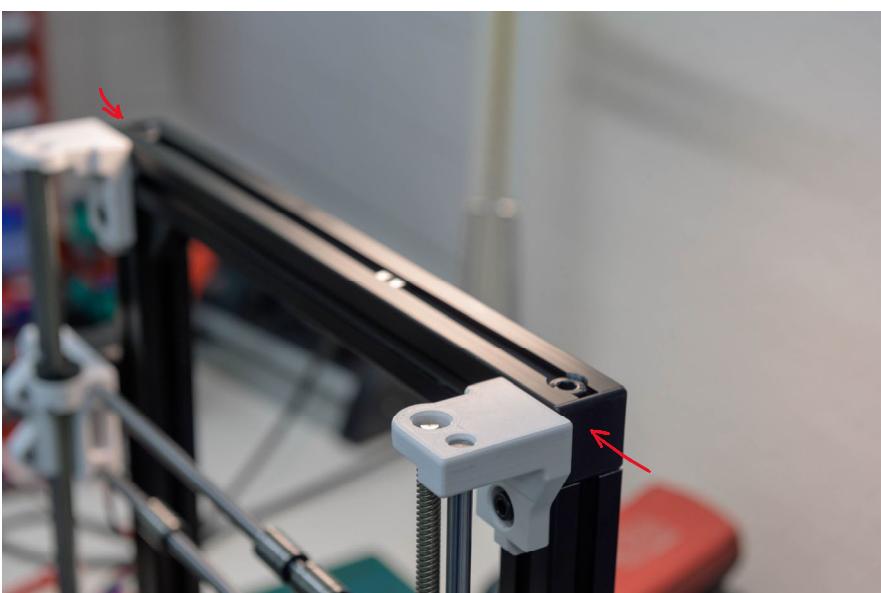
Screw two M6x12mm screws into the holes marked in red using an M6 washer each.



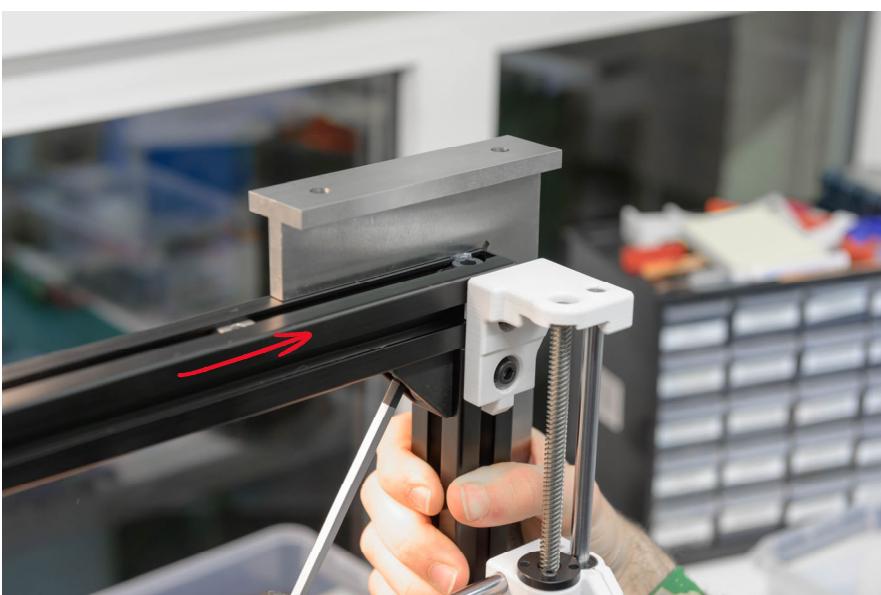
Insert one T-nut into the top extrusion slot.



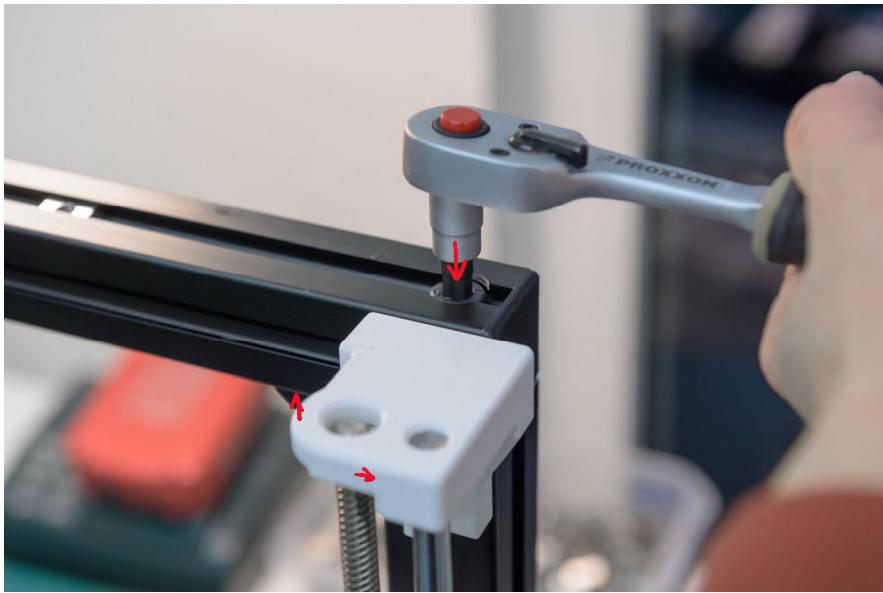
Screw in the two M8x40mm screws again, but leave them loose.



Install the two extrusion end caps.

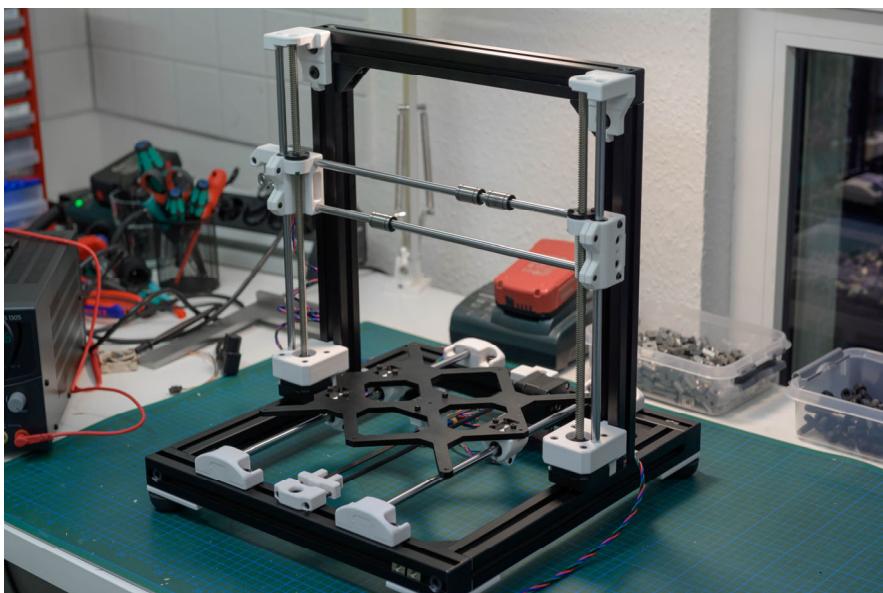


Just like when building the sub frame, we are using a flat surface to push both extrusions against in order to align them properly. When aligned, tighten the vertical M6x12mm screws in the brackets.



Now Tighten the
M8x40mm screws fully.

Then fully tighten the 4
M6x12mm screws in the
corner brackets.



Your 3D printer should
now look like this.

The second part of the Z-
axis is now complete.