Zaribo MK3 Assembly Manual

Ver 0.6, 26.1.2019

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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.

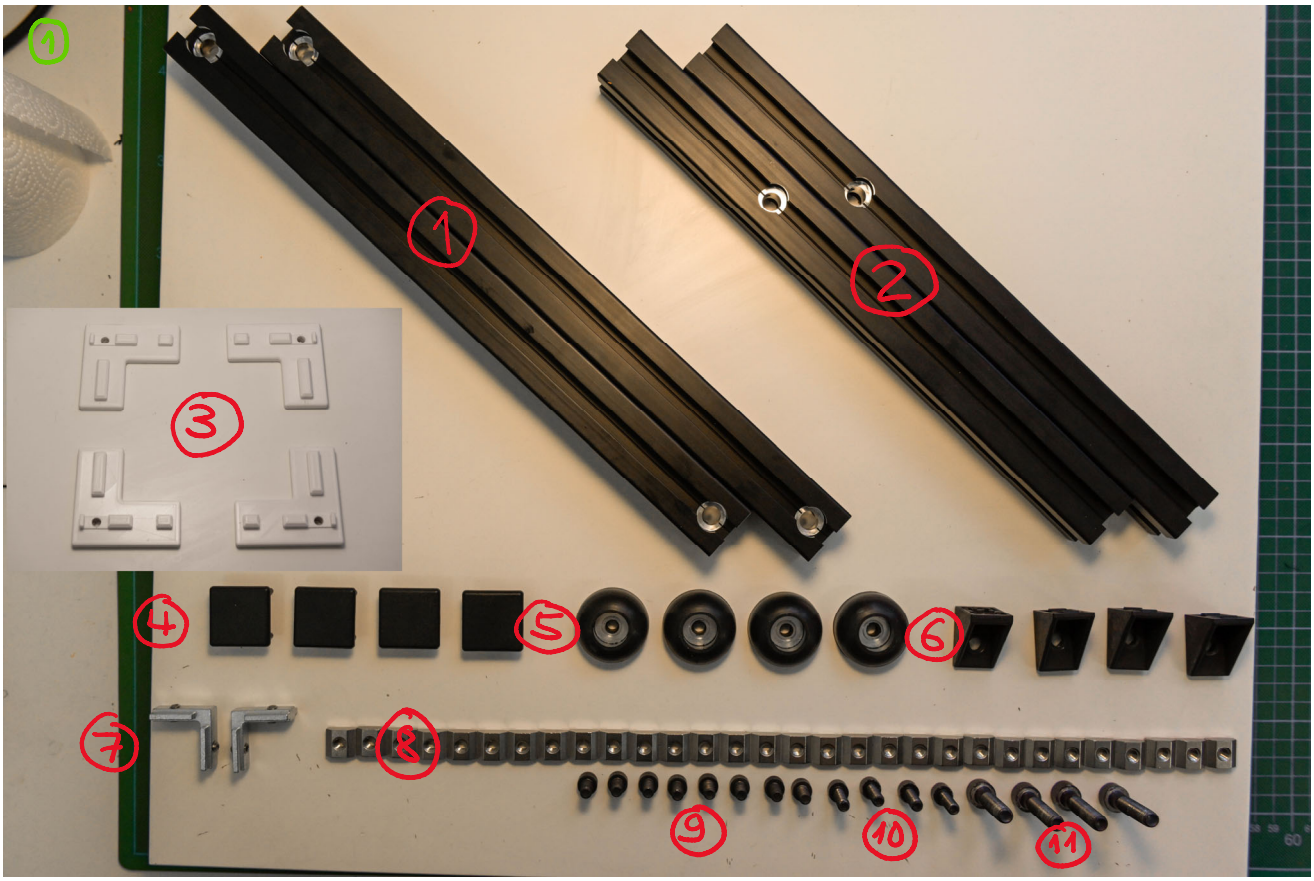
2: Remove any support material from the included plastic parts.

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

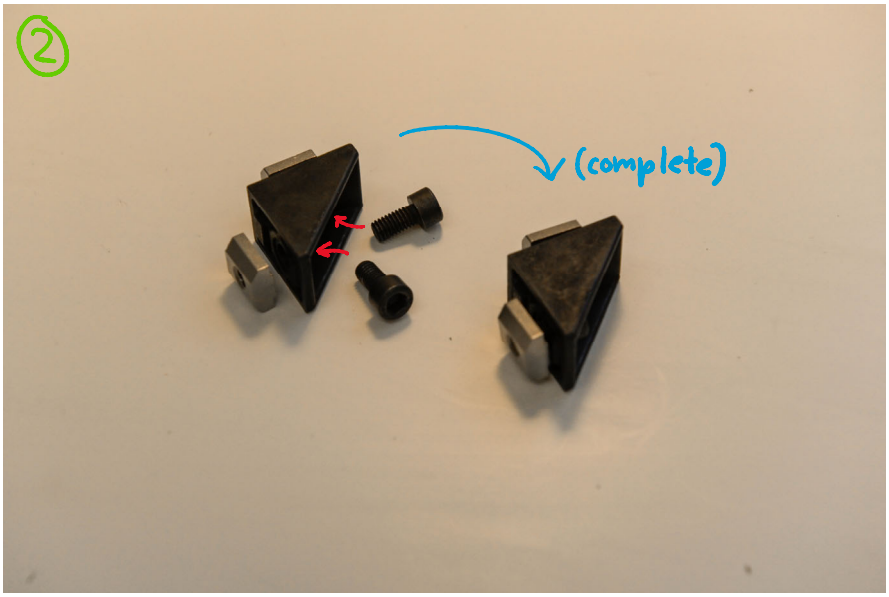
1: Subframe

You will need the following parts to complete the subframe:

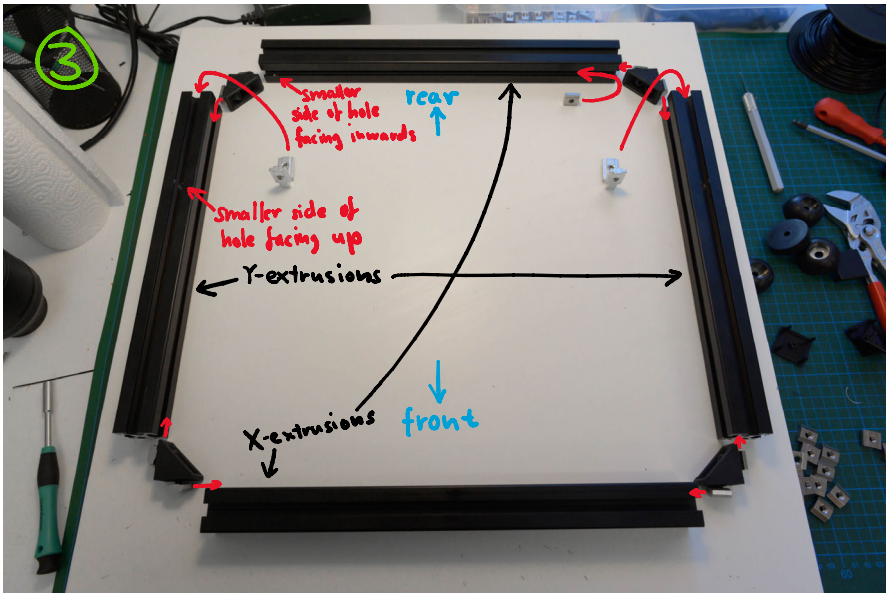


1. 2x X-extrusion
2. 2x Y-extrusion
3. 4x plastic L-brackets
4. 4x extrusion end caps
5. 4x rubber feet
6. 4x corner bracket
7. 2x metal L-brackets
8. 30x T-nuts
9. 8x M6x12mm hex socket screws
10. 4x M6x20mm hex socket screws
11. 4x M8x40mm hex socket screws

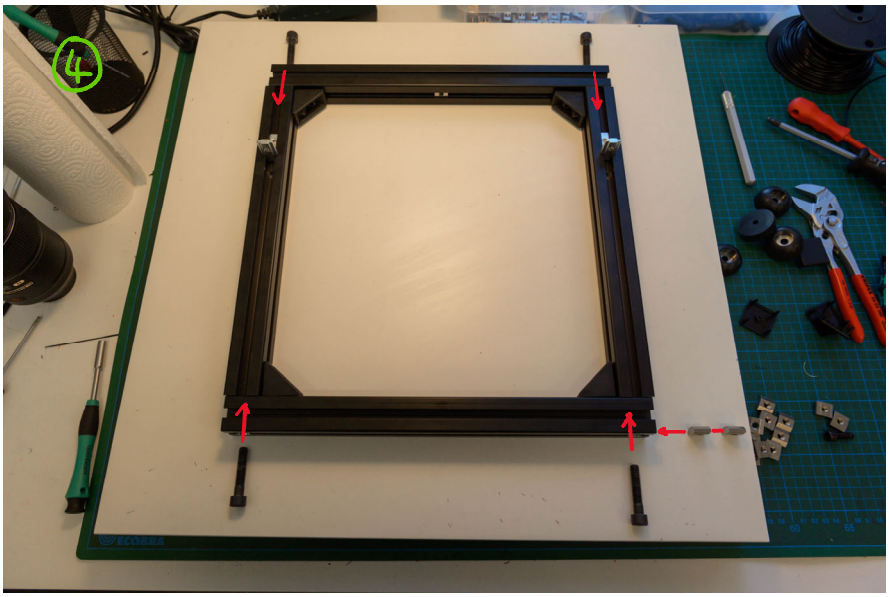
Important: Make sure that the surface that you are working on is perfectly flat. By using an uneven work surface you risk building a scewed frame, which may lead to the printer not being able to be calibrated.



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).

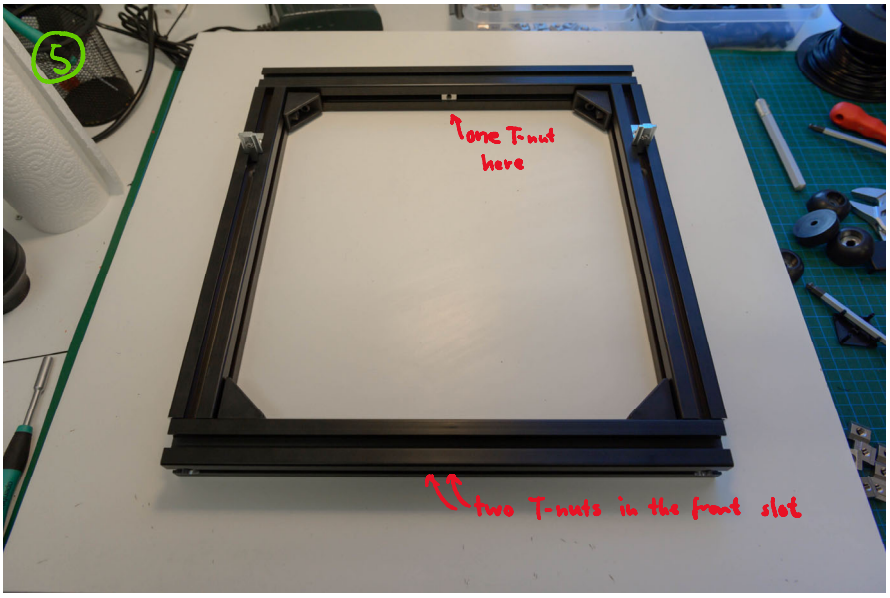


Lay out the extrusions so that the X-extrusions are (when viewed from above) horizontal and the Y-extrusions vertical. The X-extrusions should be oriented with the larger holes towards the outside. The Y-extrusions should have the larger side of the hole facing downwards.
Insert one metal L-bracket into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

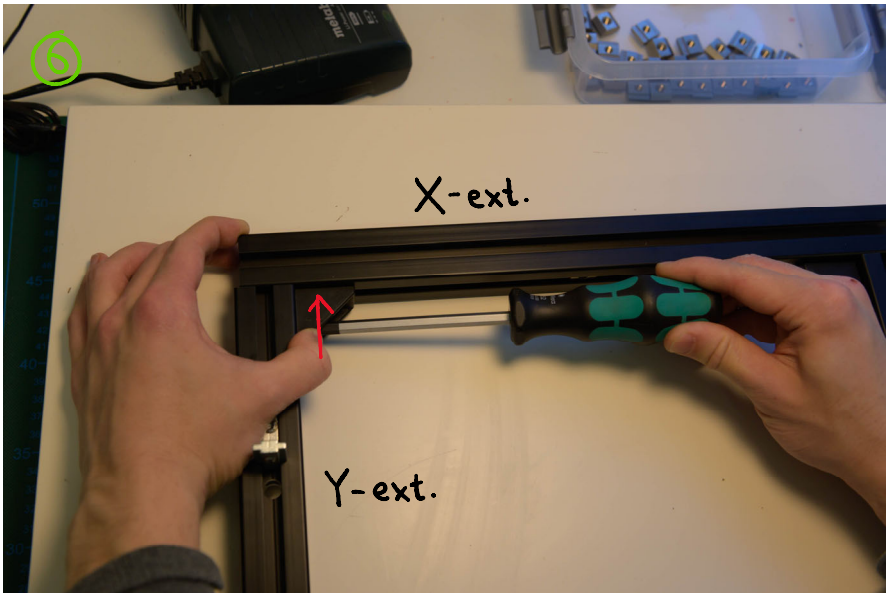


Insert two T-nuts into the forward facing slot of the front X-extrusion.

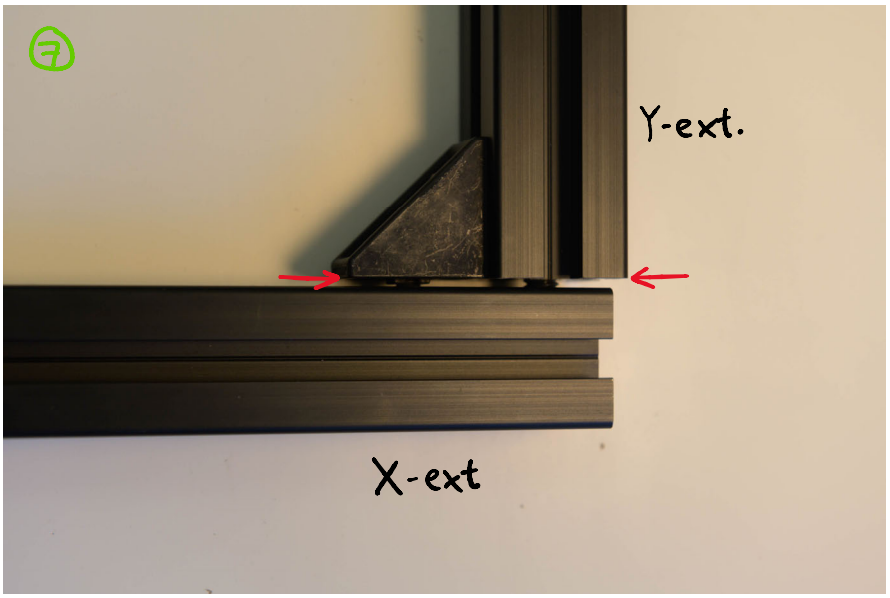
Now screw in the four M8x40mm screws, connecting the four extrusions together. Tightening with full force is not necessary just yet, but make sure there is no gap between the extrusions.



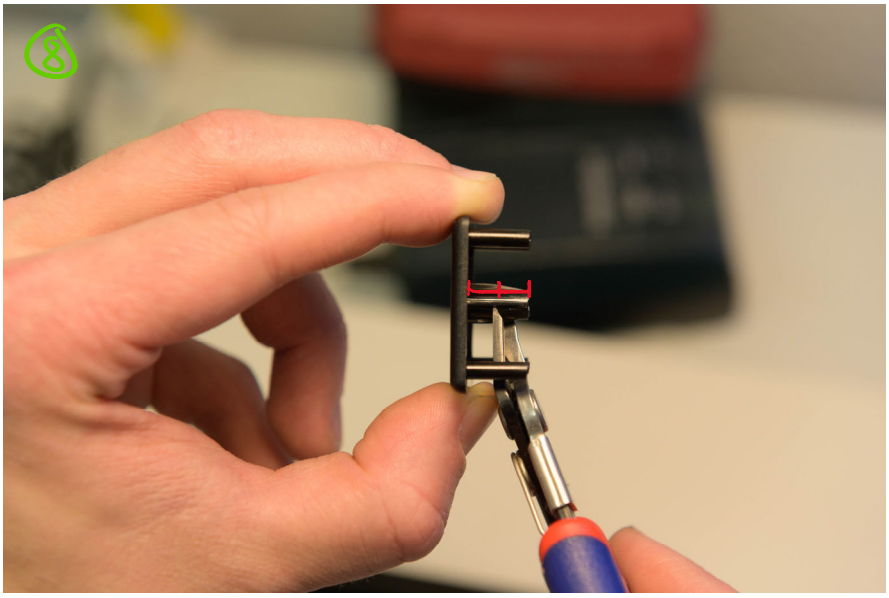
Your frame should now look like this.



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.

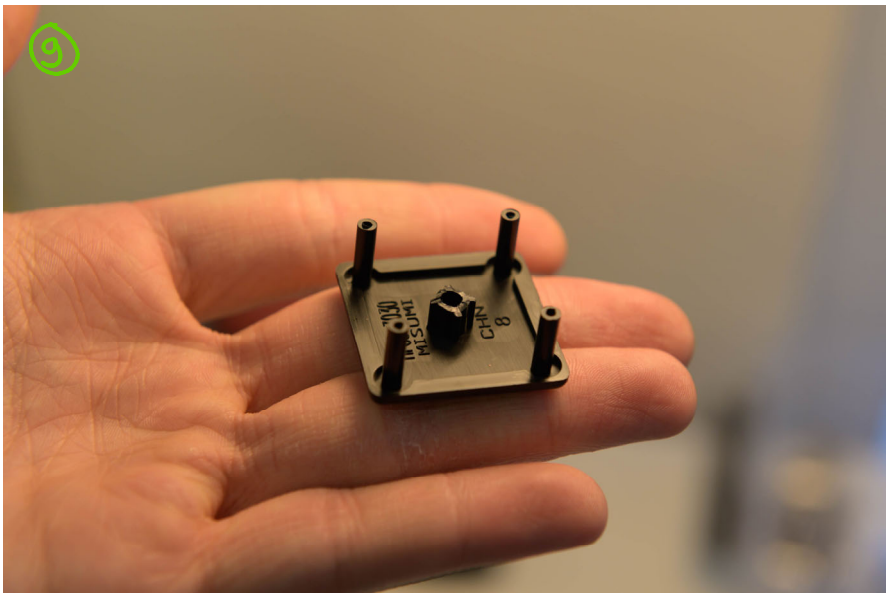


Now loosen the four M8x40mm screws by about 2-3mm.
Each corner bracket should now sit flush with the end of the corresponding Y-extrusion.

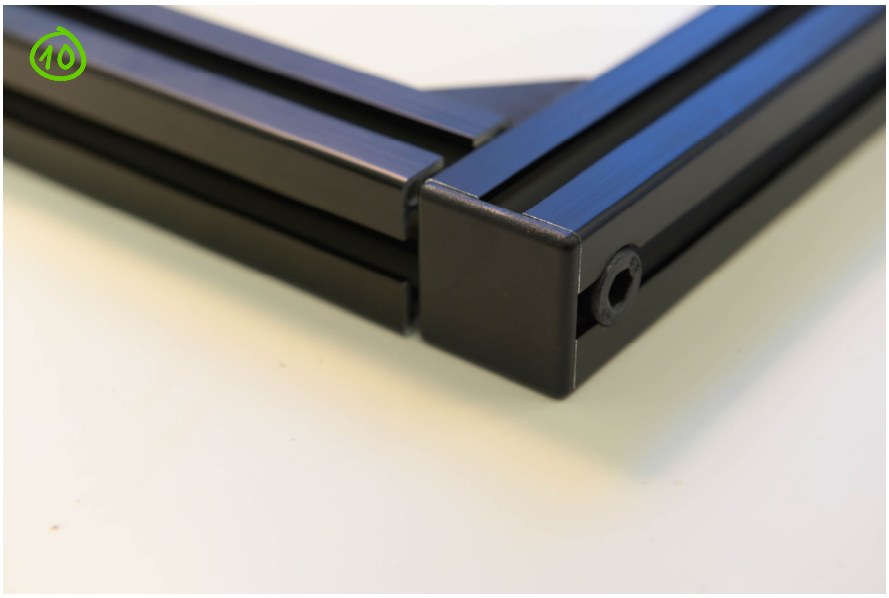


The middle part is too long to fit on the end of the extrusions due to clearance issues with the M8x40mm screws.
Trim the middle part of the extrusion end caps at about the halfway point. Be careful not to cut them too short, as they may lose their ability to hold onto the end of the extrusion.

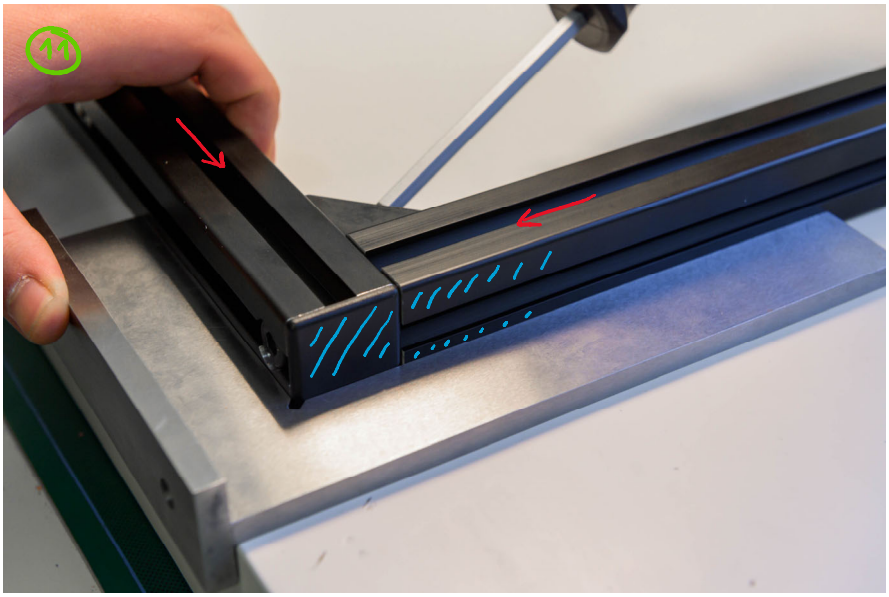
Trim all four end caps.



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.

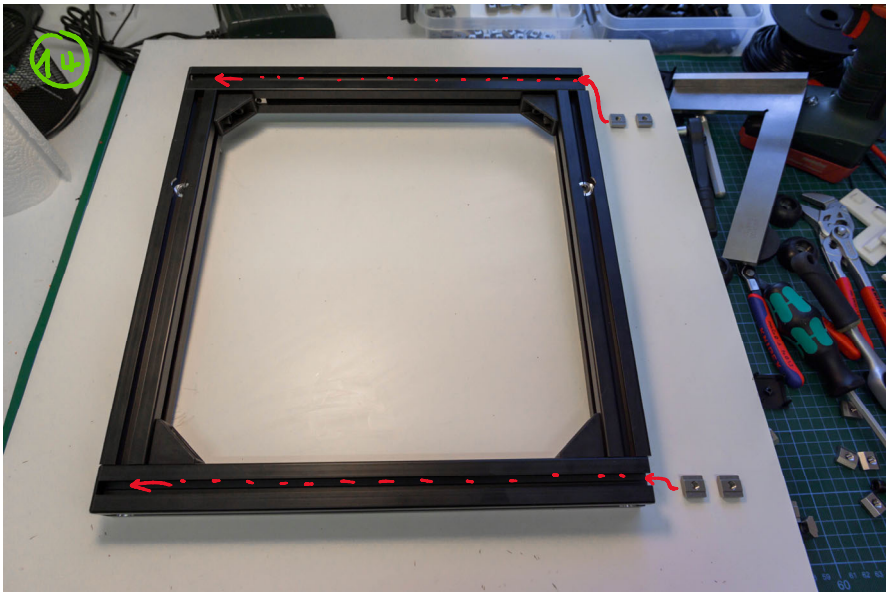
Using a flat surface as a reference (such as the tool seen in the picture) make sure that the surfaces marked in blue are perfectly aligned and that the extrusions are at a 90° angle in relation to each other. Now tighten the loose M6x12mm screw in the corner bracket, fastening the bracket to the X-extrusion.

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

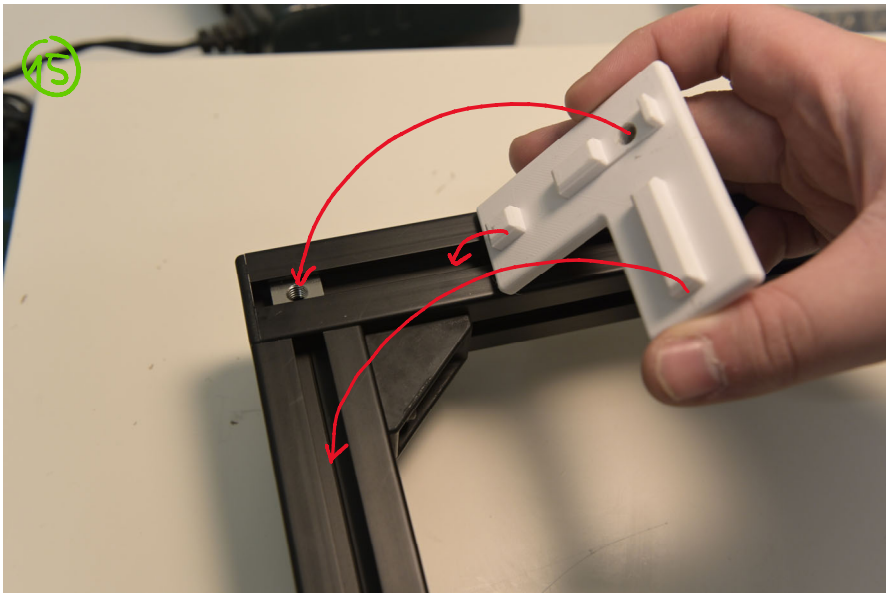
While holding the frame in place steadily, fully tighten the four M8x40mm screws with a ratchet.

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

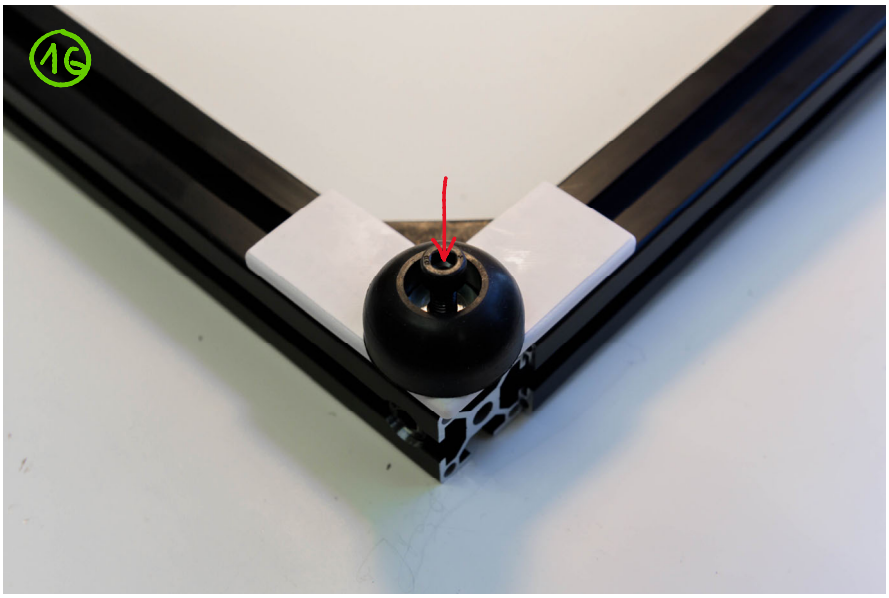
After this, the frame should be perfectly flat and not rock on a flat surface, like a badly made chair might do.



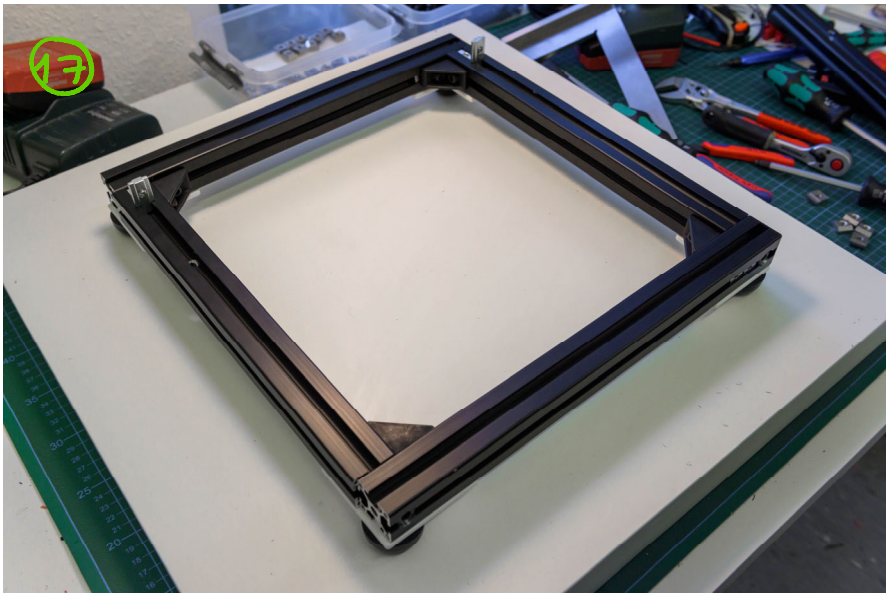
Flip the frame upside down, remove the two extrusion caps from the right side, and insert two T-nuts into the (now) upper slots of each X-extrusion.



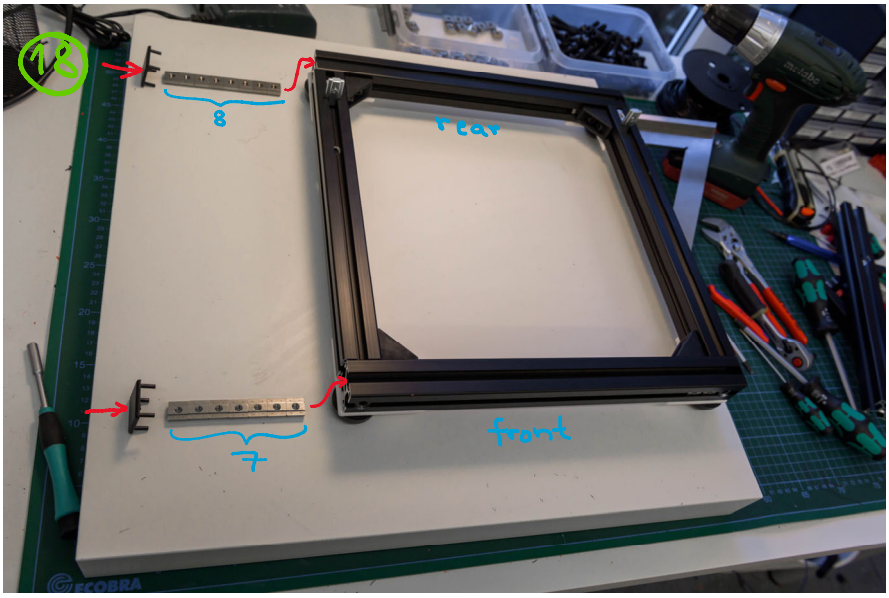
For each corner, set a T-nut in the position as seen in the picture, and place a plastic L-bracket over it. There are two "left L-brackets" and two "right L-brackets".



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.

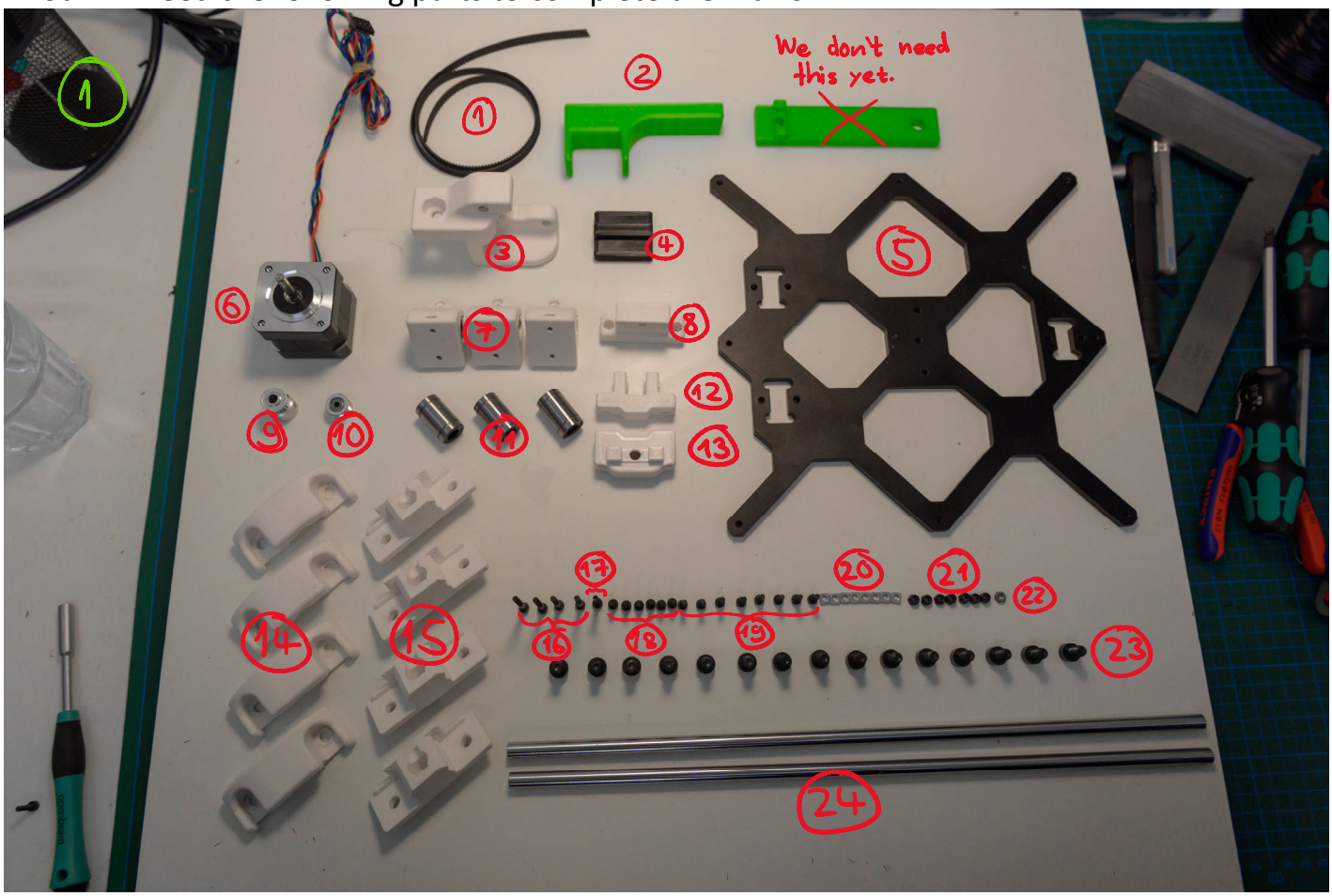


Insert 8 T-nuts into the top of the rear X-extrusion, and 7 T-nuts into the top of the front X-extrusion. Finally, reattach the two extrusion caps to the frame.

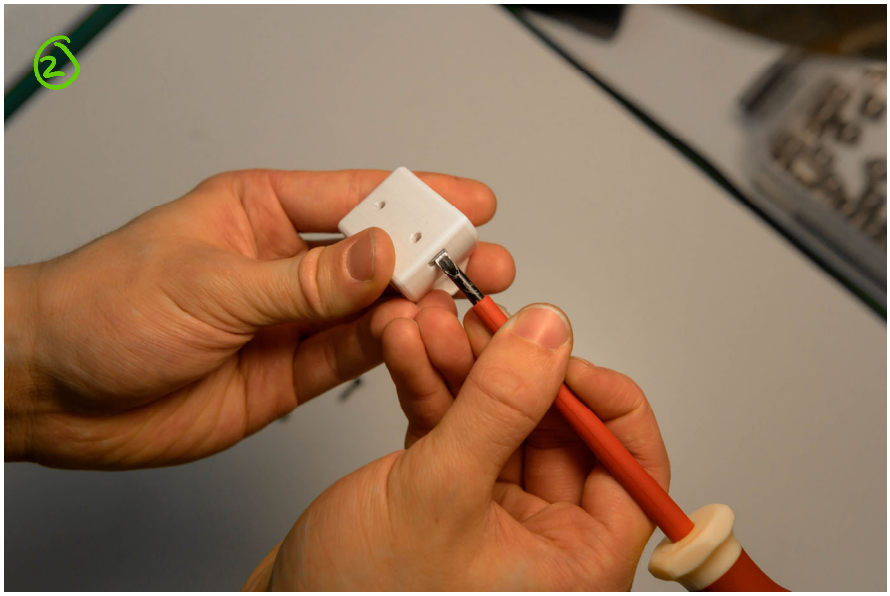
Your subframe is now complete.

2: Y-axis (part 1/2)

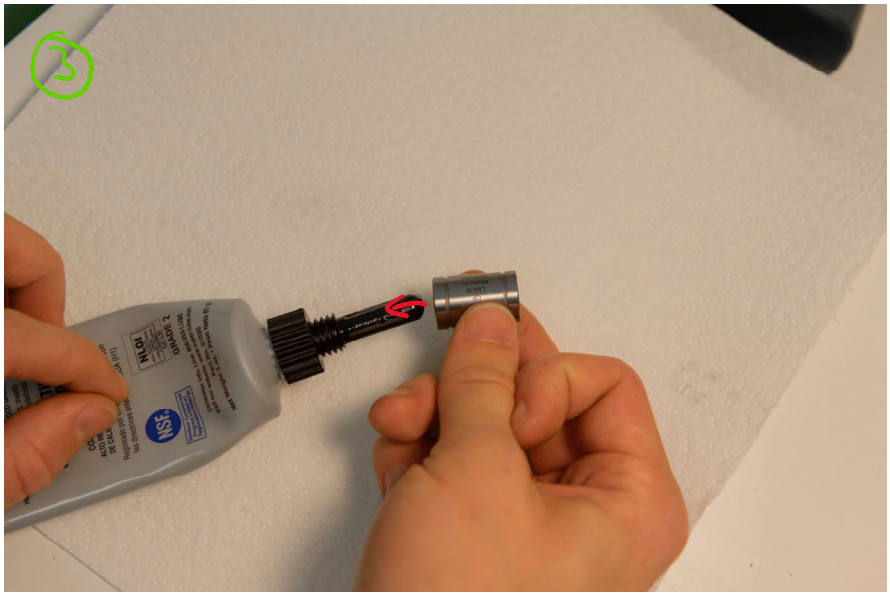
You will need the following parts to complete the Y-axis:



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.

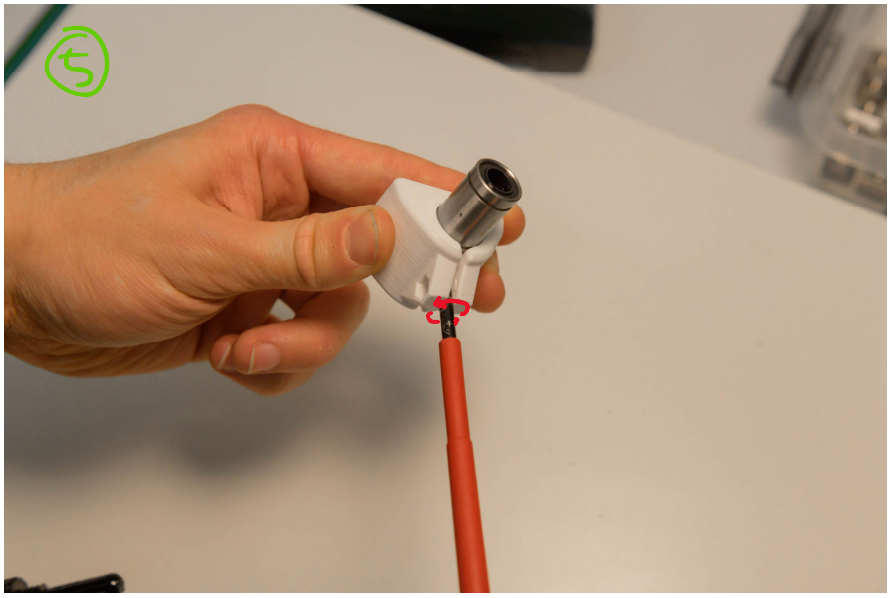


(RECOMMENDED:
Replacing the factory oil of the bearings with grease will make the printer significantly quieter, but does not otherwise affect printing performance.

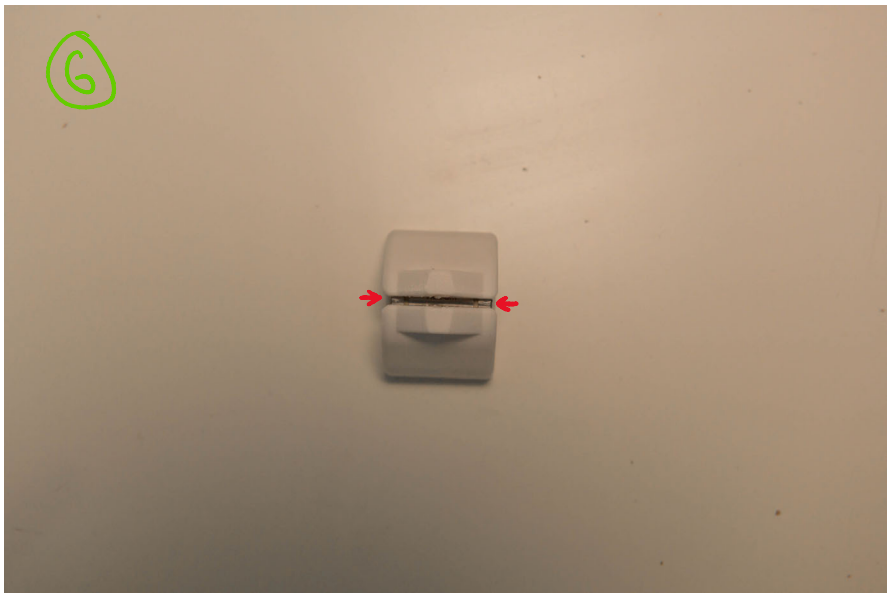
You can buy this grease off our website, which will include the special nozzle seen in the picture.)

Slide the bearing onto the nozzle fully.

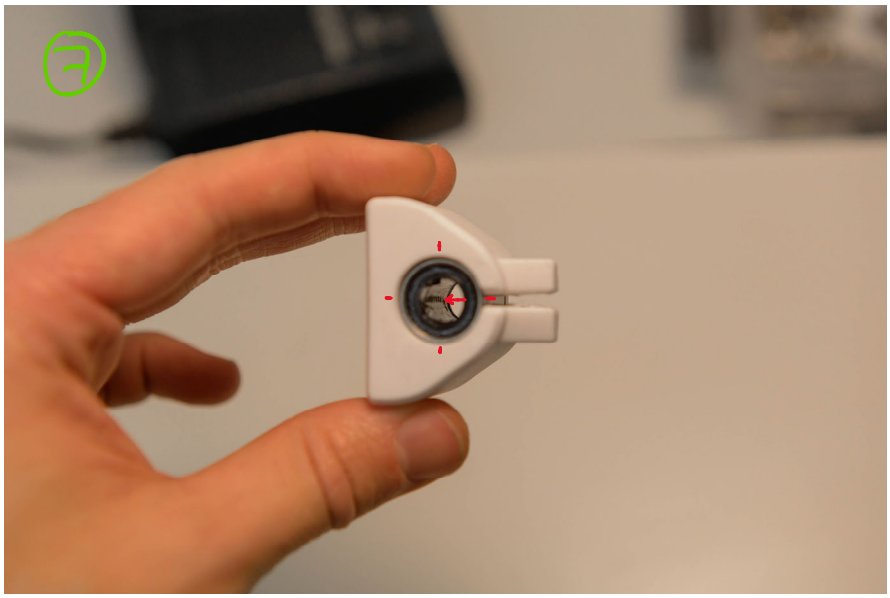
Force the grease into the bearing by squeezing the tube, and the factory oil should seep out the other end. You are done when you see grease come out the end of the bearing.



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

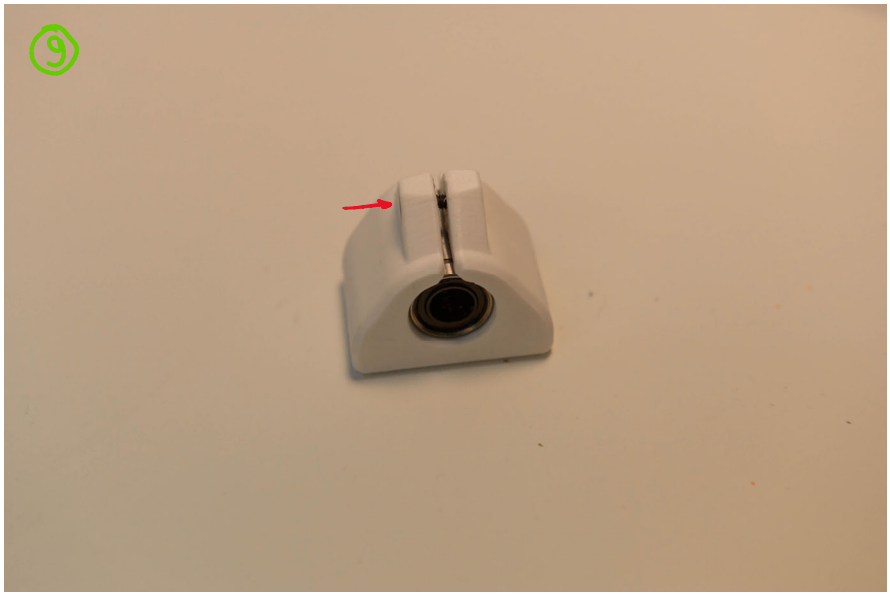


The bearing should be seated exactly in the middle.



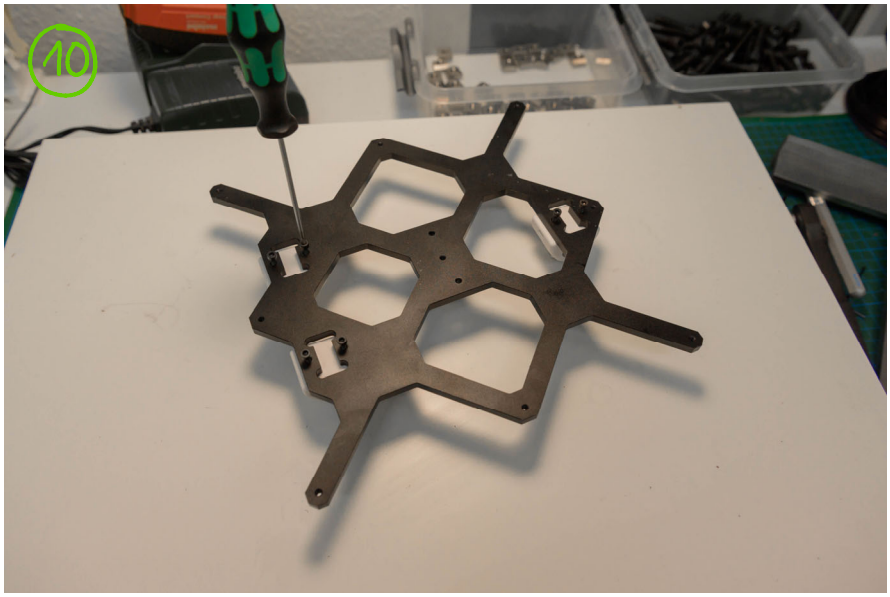
Also, the inner rails containing the ball bearings should be aligned with the red markings in the picture. This is so that after the installation the weight of the heat bed and carriage is transferred into the rod optimally.

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.

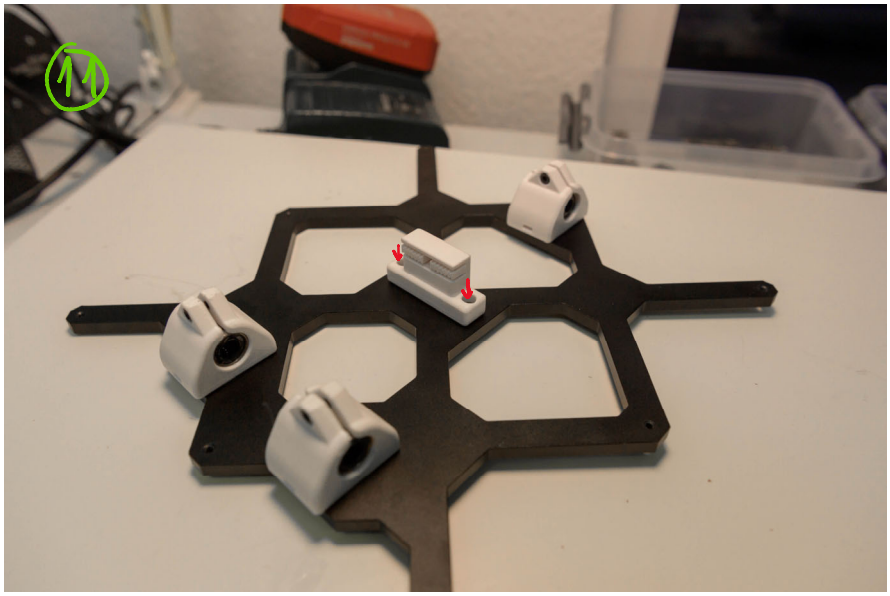


From the other side, screw in an M3x10mm screw. Do not over tighten this screw, as you will risk breaking the bearing mount. The inner surfaces of the clamp should be roughly parallel.

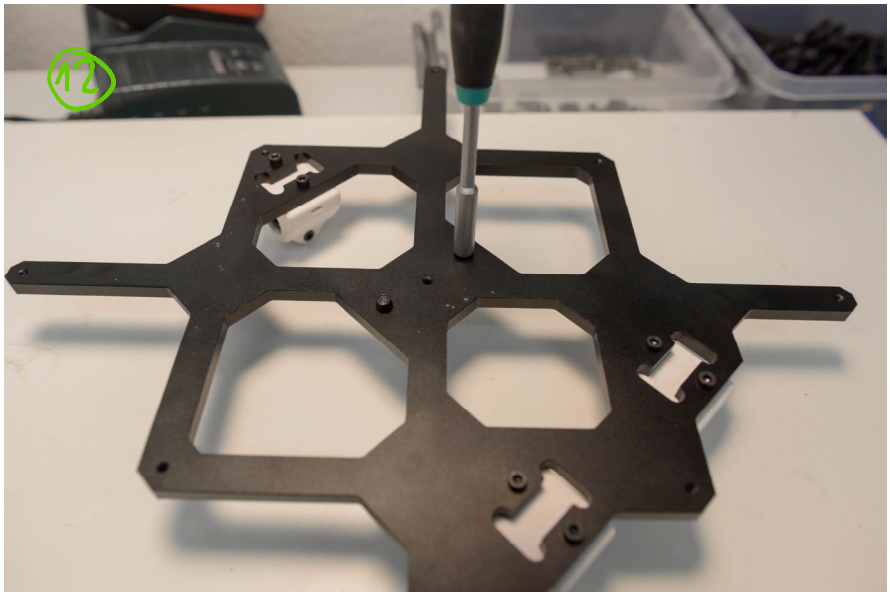
Now repeat this for the other two bearings.

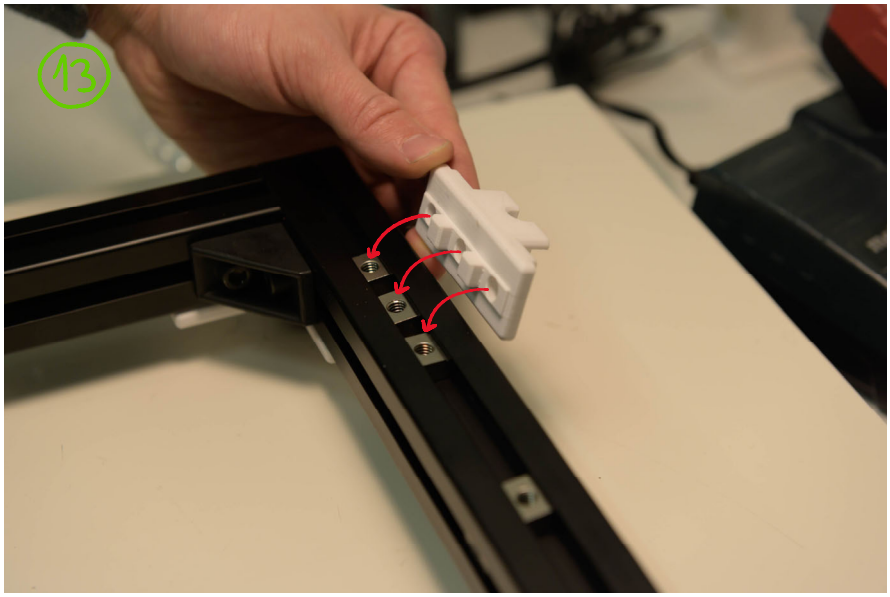


Using six M3x12mm screws, fasten the three completed bearings to the heat bed carriage. Leave these screws ever so slightly loose, as we will tighten them later in the assembly process.
Orient the bearing mounts with the head of the 10mm screws facing inwards.



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.

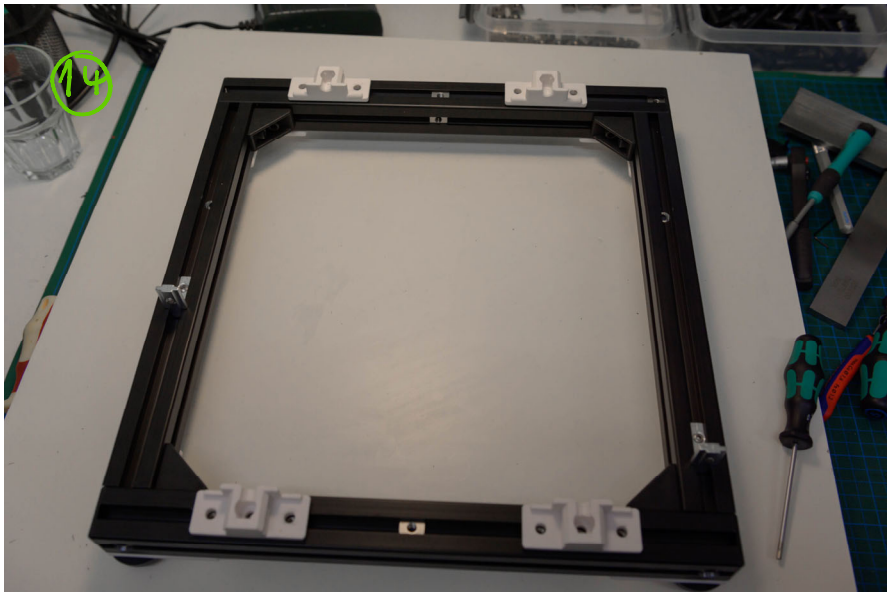




Put away the carriage for now.

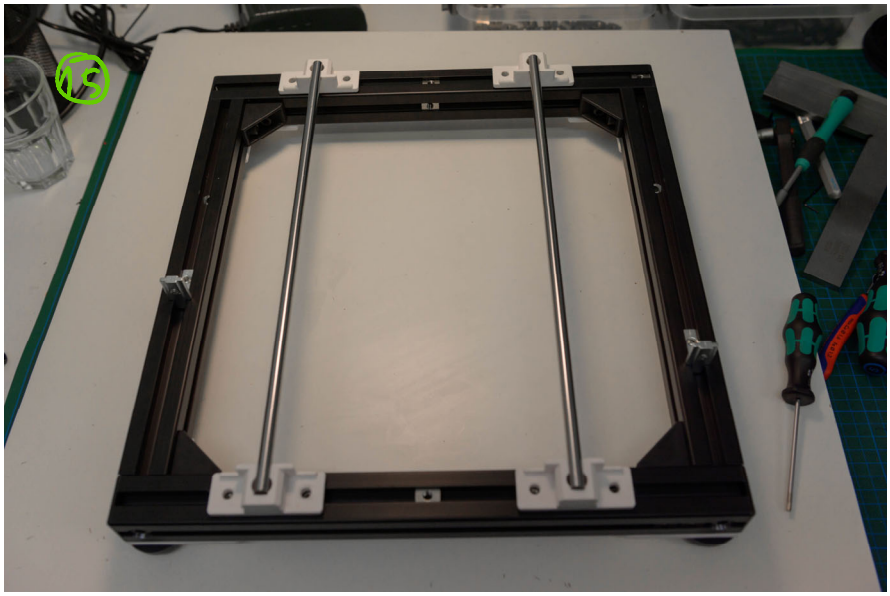
Do the following four times, for each corner.

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

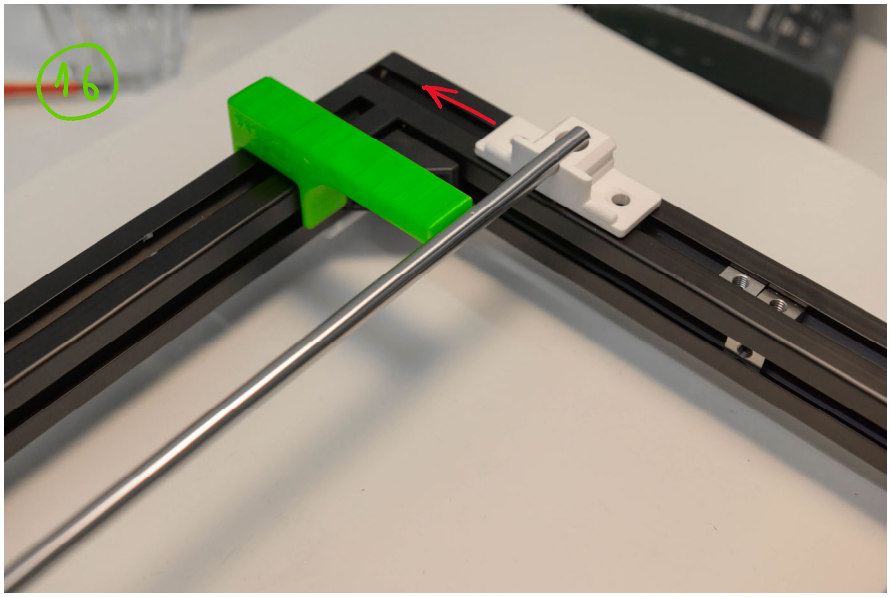


Your frame should look like this.

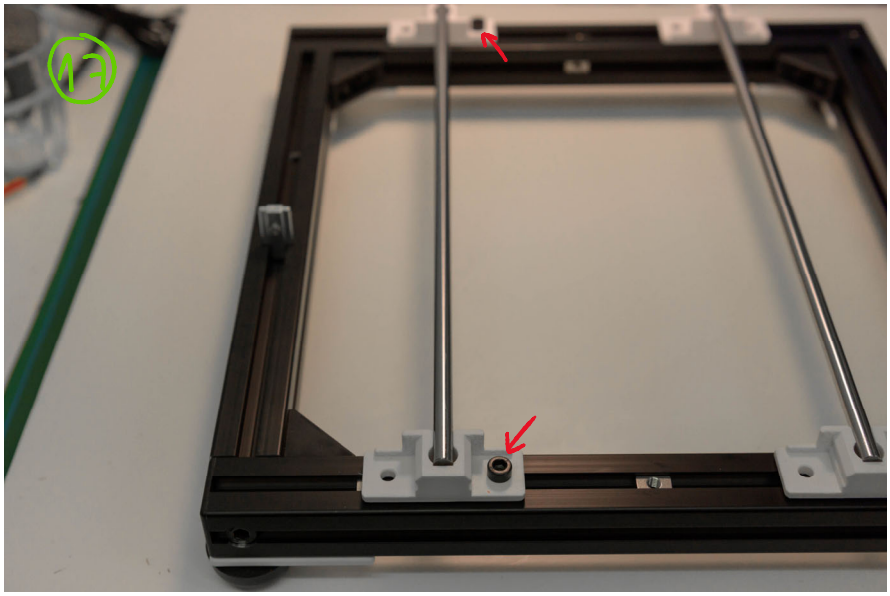
Align them so that the left two mounts are roughly directly above each other, same thing for the right two.



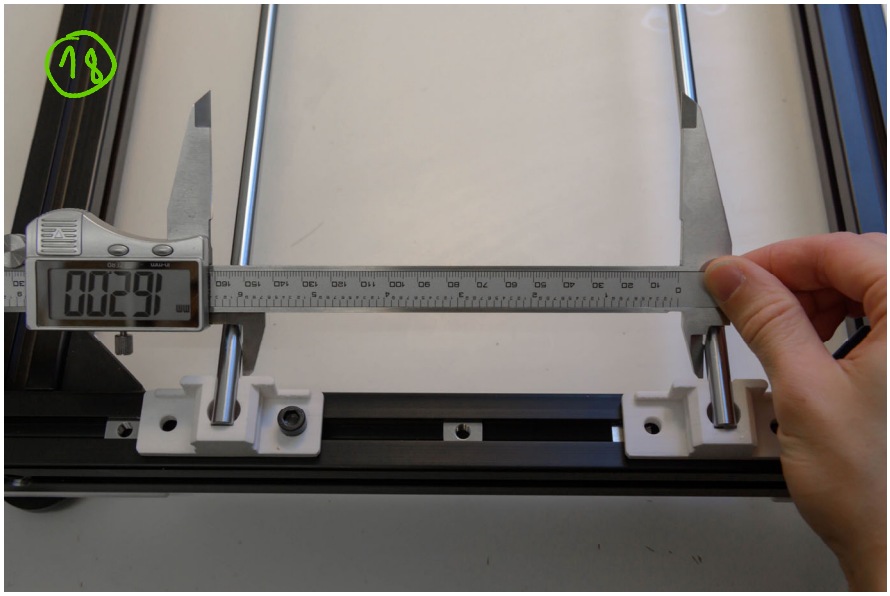
Now click in the two 360mm rods as seen in the picture.



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.

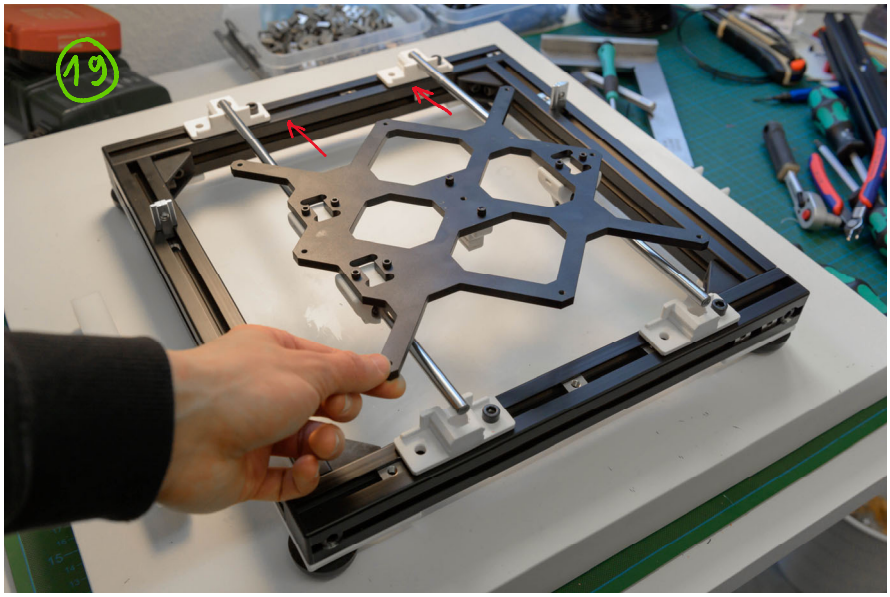


Secure the left mounts in place using the marked holes, using two M6x12mm screws. These screws are temporary and will be removed later on. Make sure to not shift the part while screwing them in. If this does happen, repeat the alignment from the previous step.



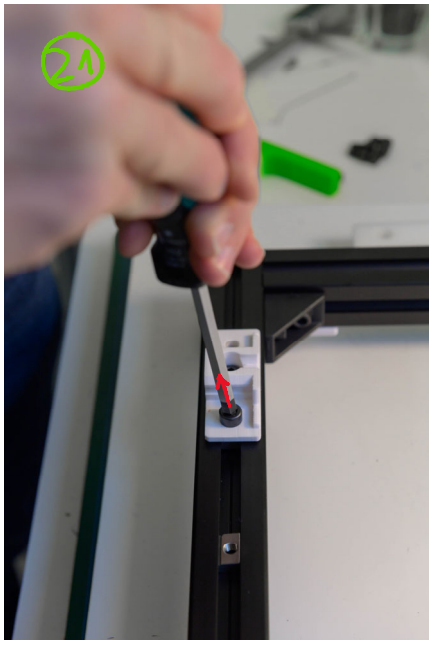
Now we will set the right mounts. Do this with a calliper (or something equally accurate) set to exactly 162mm. Using the same technique from setting the left rod, make sure the two rods are parallel.

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



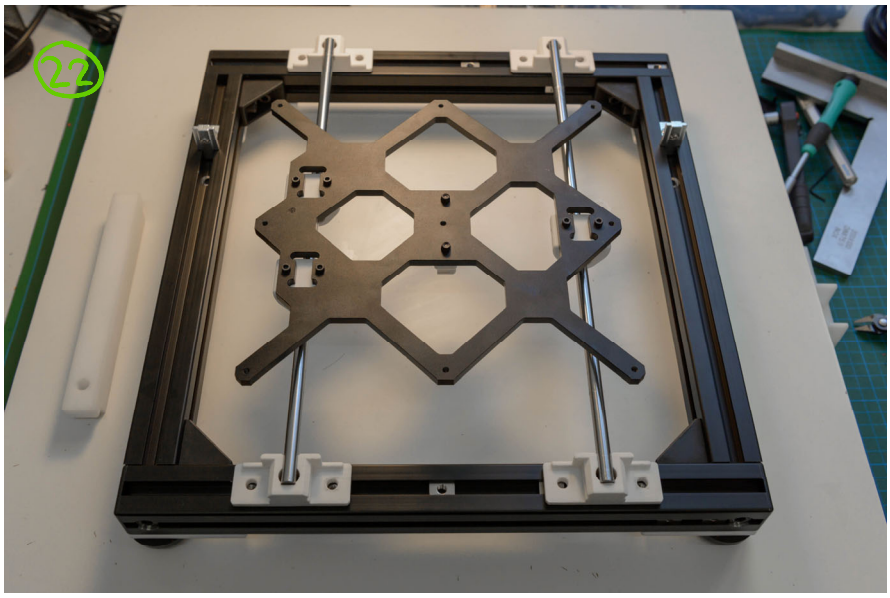
Detach the front ends of the rods, and insert the carriage we previously assembled. The side with two bearings should face the left. Now reattach the front ends of the rods.

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).

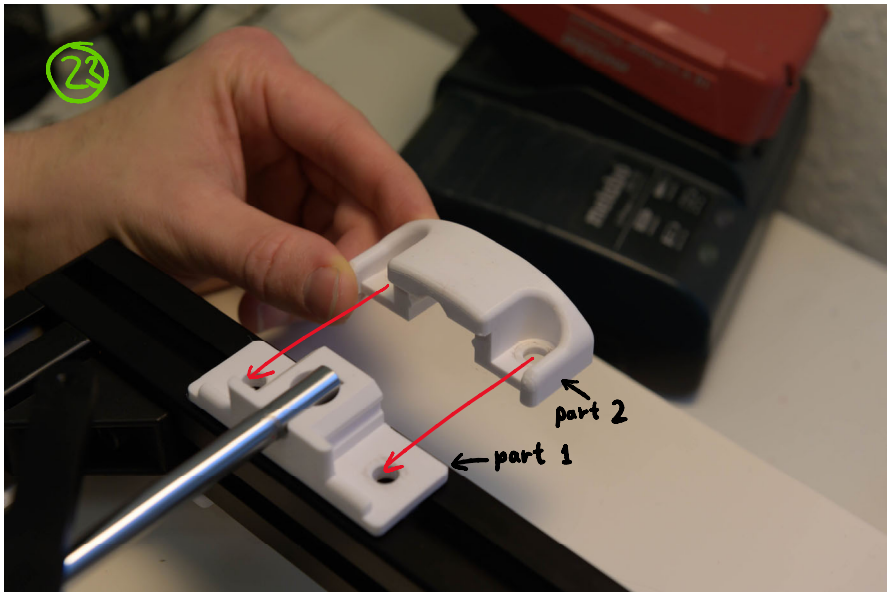


The carriage should still be able to be moved with very little force, and not stop instantly when pushed.
Indicator of bad alignment is when the movement of the carriage doesn't feel linear, but rather like an electric motor or a zip.

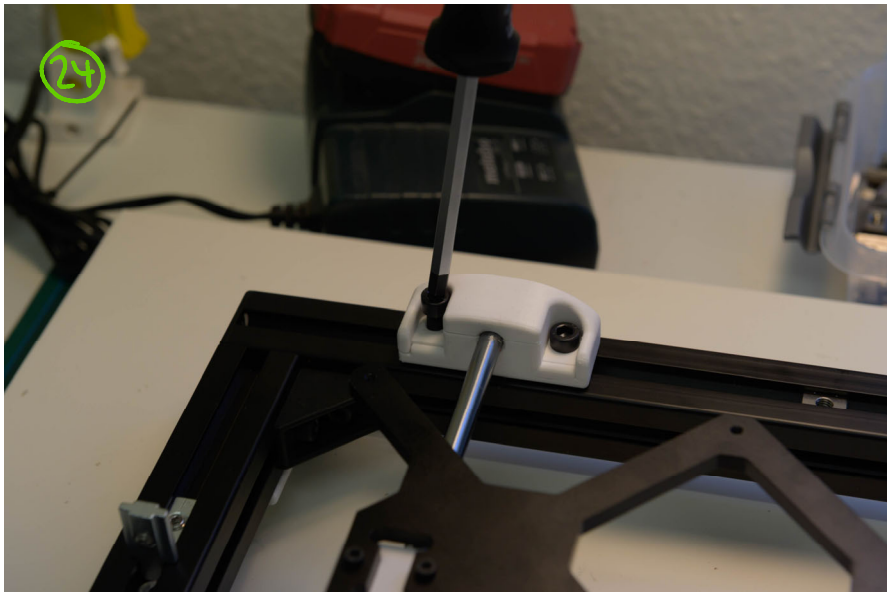
If you are happy with the alignment, remove the carriage along with the rods. Then screw in the middle screw for all four mounts. Finally, remove the temporary screws.



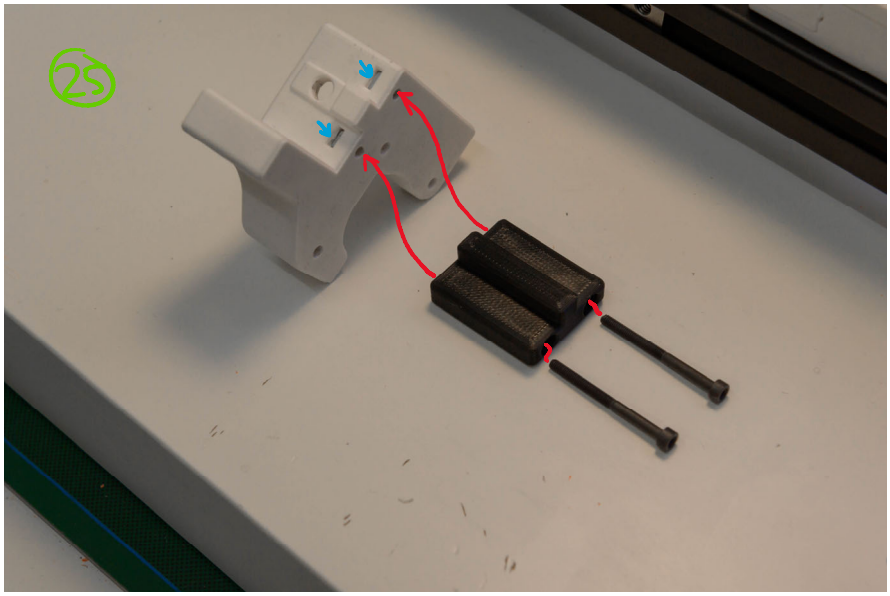
You may now reattach the carriage and the rods.



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

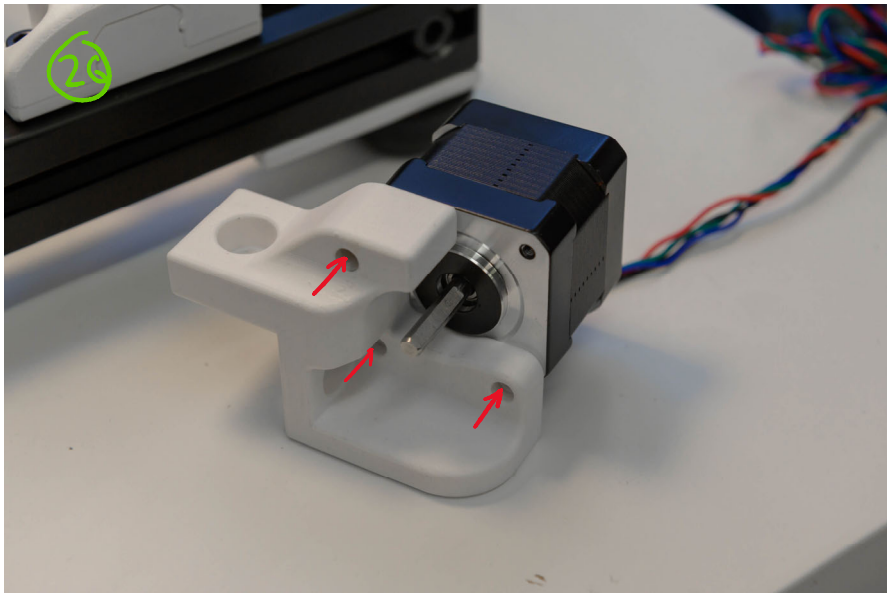


Screw them in place using two M6x12mm screws for each one.

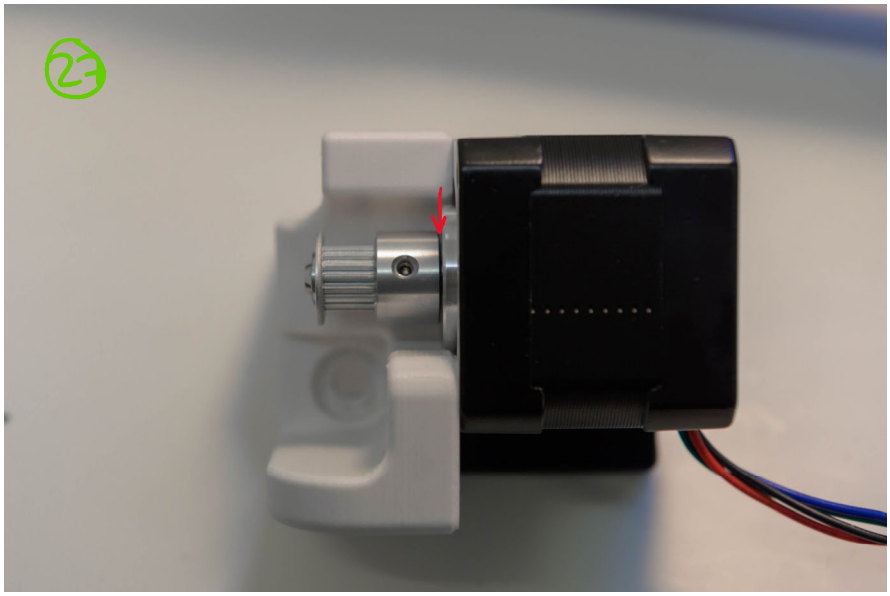


Motor mount assembly:

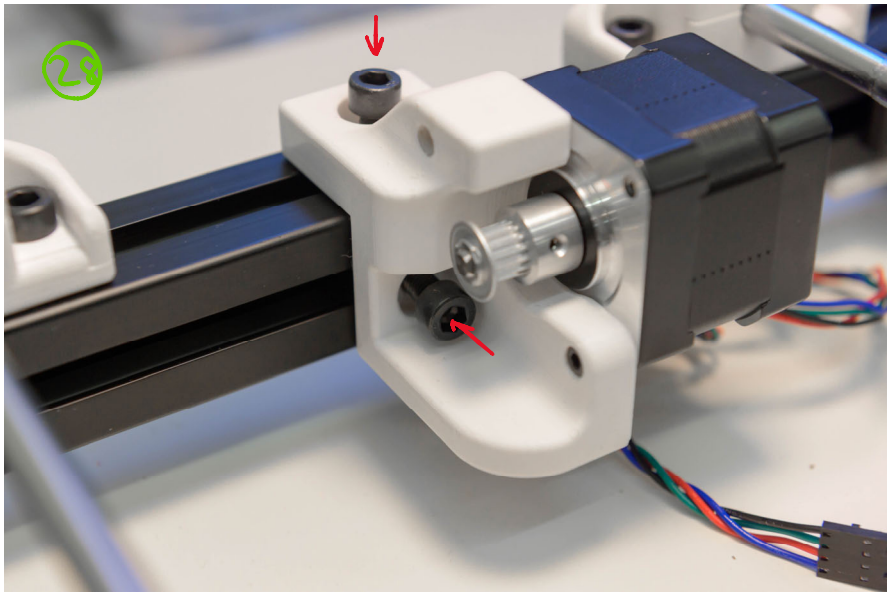
Insert two square nuts into the slots marked by the blue arrows.
Then screw the black support piece onto the motor mount using two M3x35mm screws.



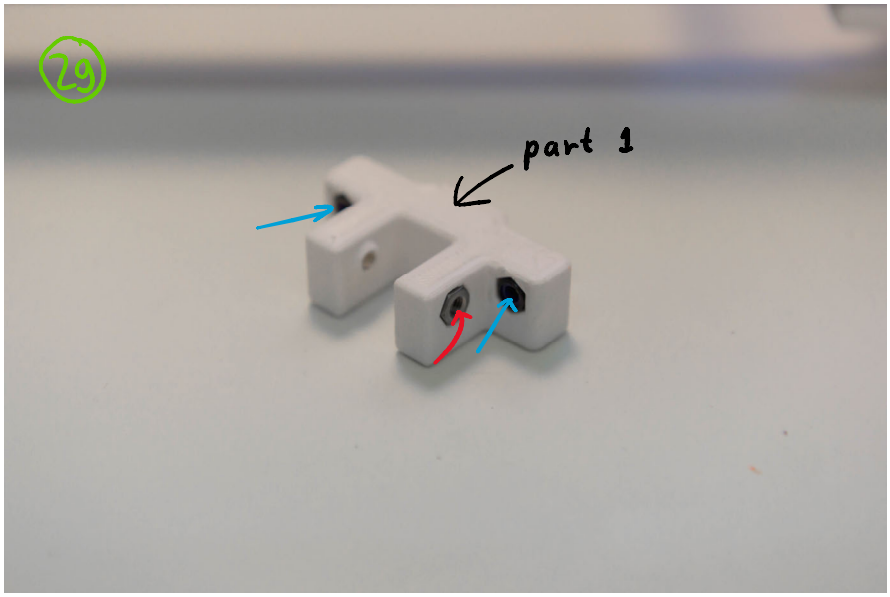
Attach the motor onto the motor mount, with the cables exiting downward. Use three M3x10mm screws as marked by the red arrows.



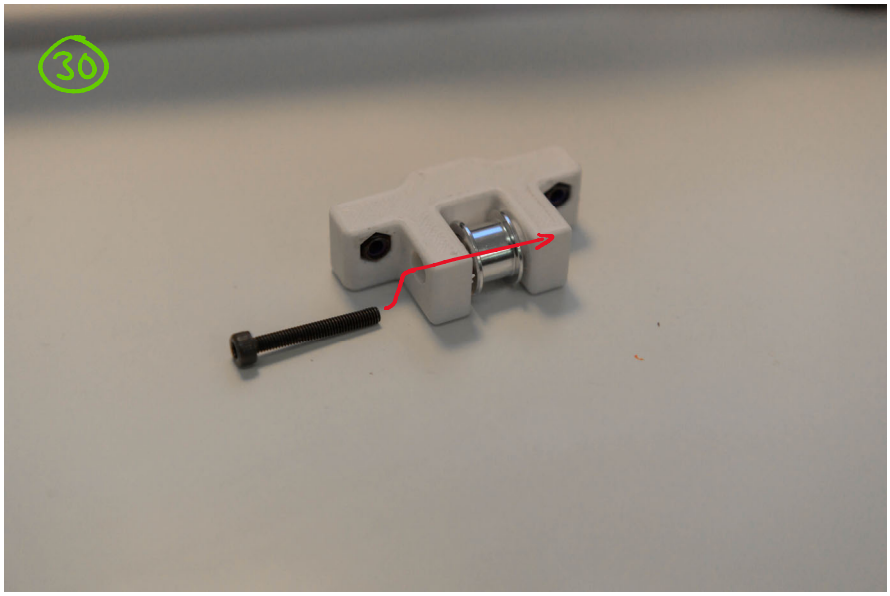
Slide the toothed pulley onto the motor shaft. The pulley has two fastening screws, make sure one of them is aligned with the flat surface of the shaft. Leave a thin gap between the pulley and the motor face, as to avoid rubbing.



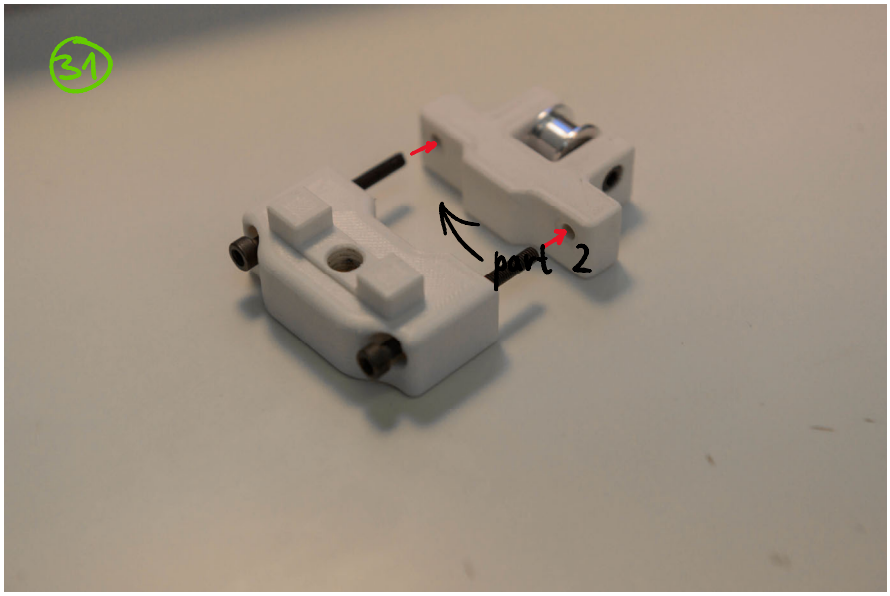
Now attach the motor assembly to the rear extrusion, with the motor on the inner side of the frame. Use two M6x12mm screws and the two T-nuts that we inserted into the extrusion in chapter 1.



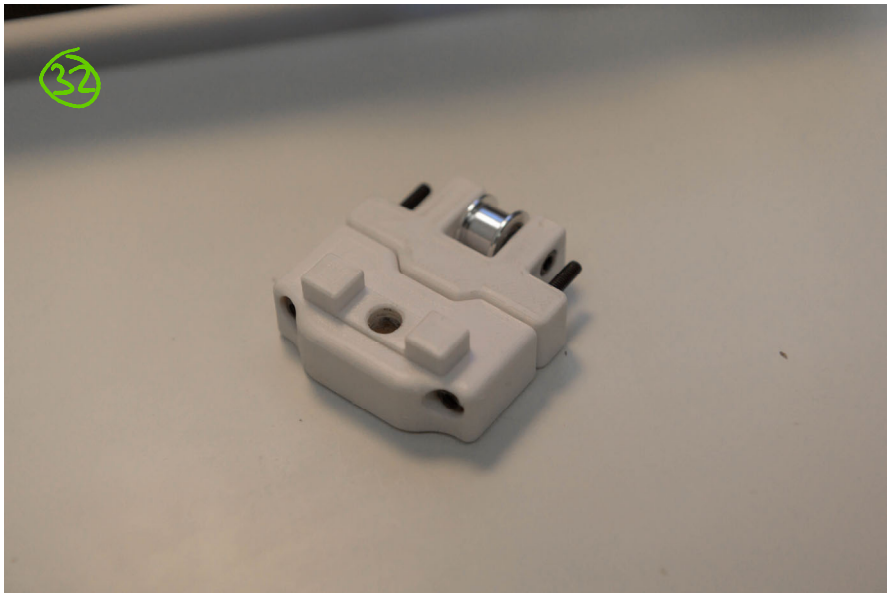
Belt tensioner assembly:
Insert two self-securing nuts into the base of part 1 (blue), and a normal nut into the hexagonal slot of the tensioner fork (red).



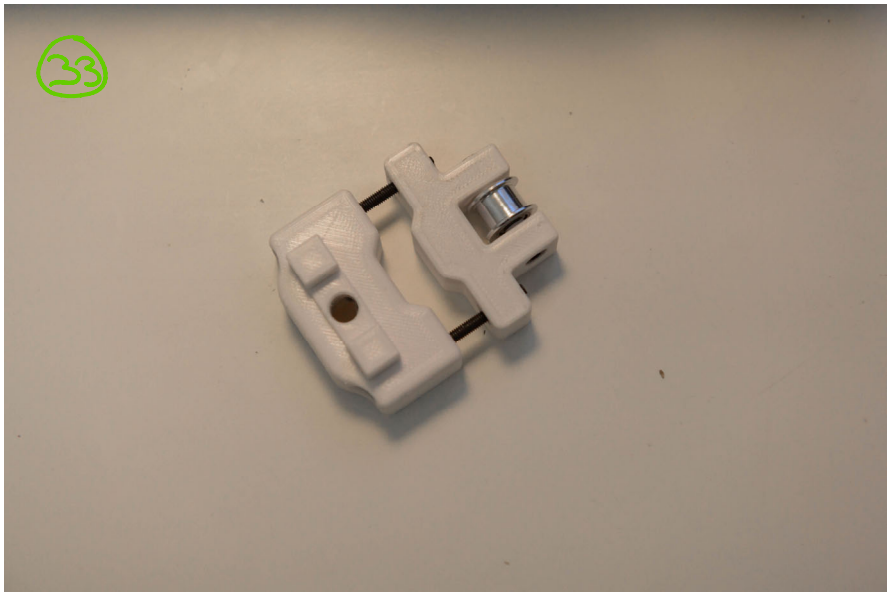
Using an M3x22mm screw as an axis, install the pulley as seen in the picture. The fork may bend inwards very, very slightly, but don't risk breaking the part and make sure that the pulley moves freely.



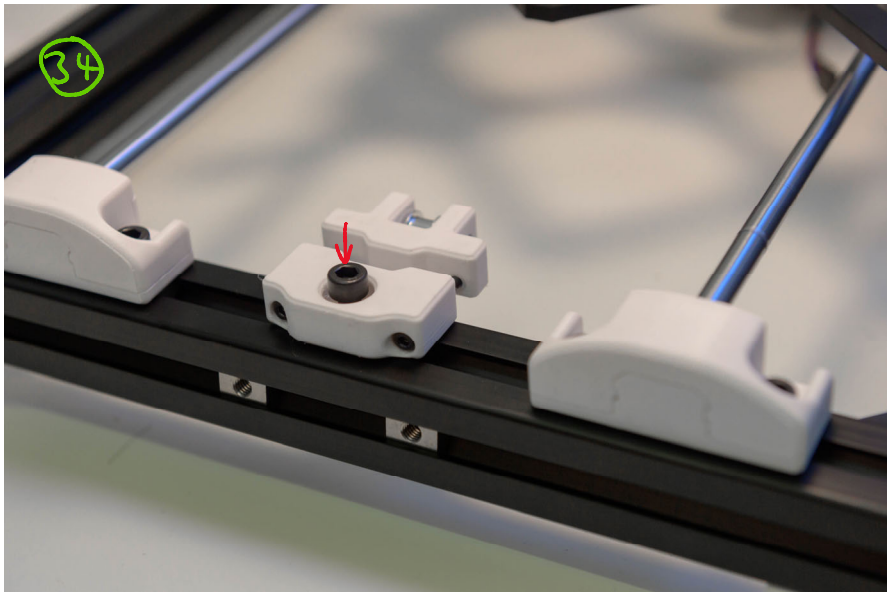
Connect the second part of the belt tensioner to the first using two 35mm screws as seen in the picture.



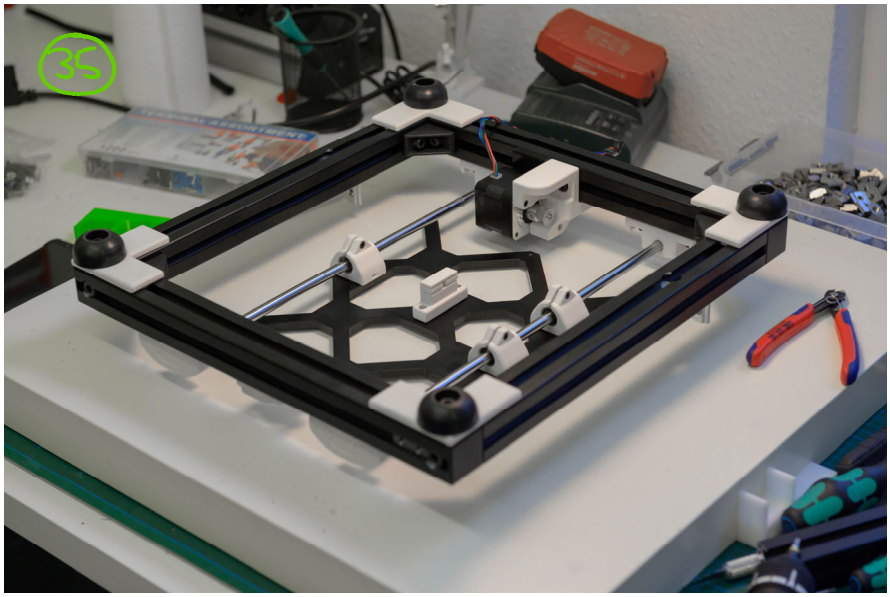
Screw them together completely, so that the self securing nuts are pulled into their slots fully.



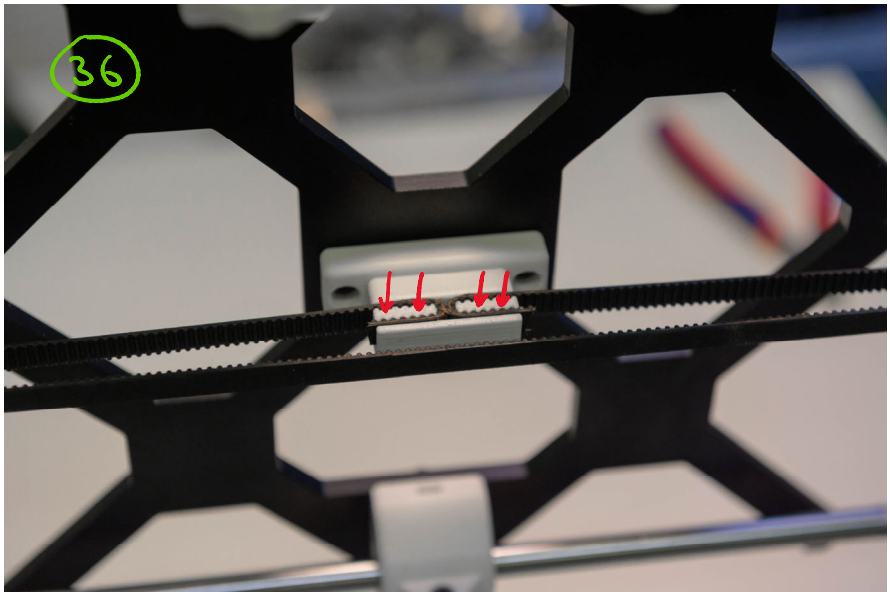
Now unscrew them again, in order to maximise tensioning range for later on.



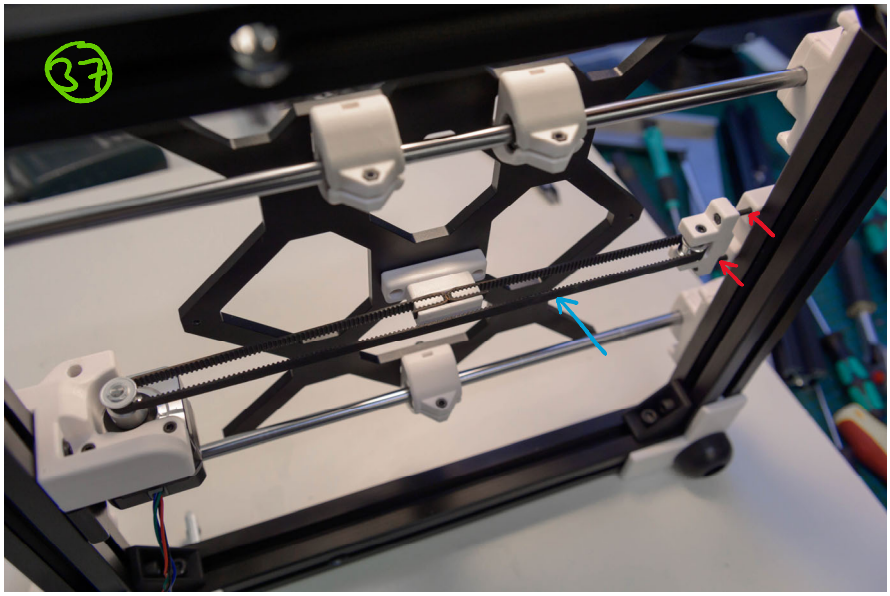
Install the part onto the front part of the frame.



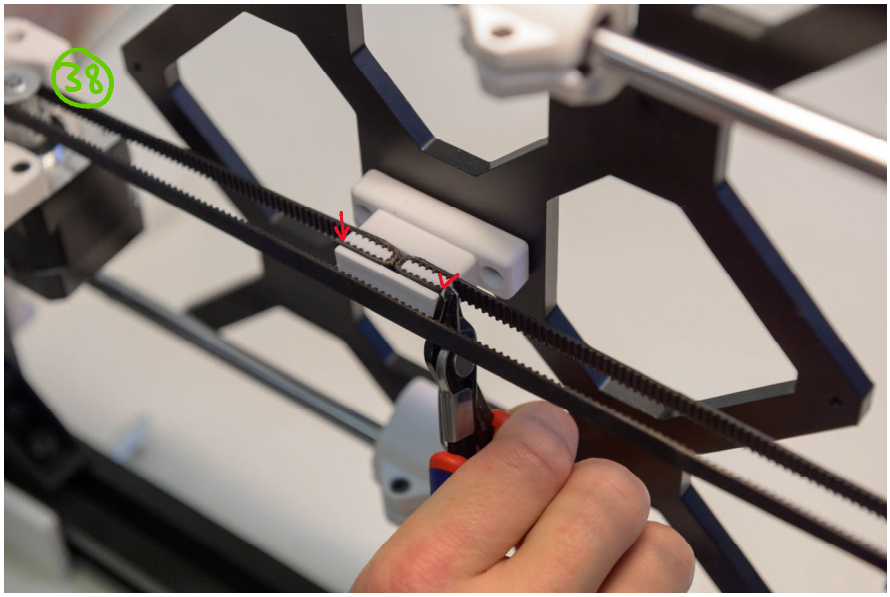
Flip the frame on its back.



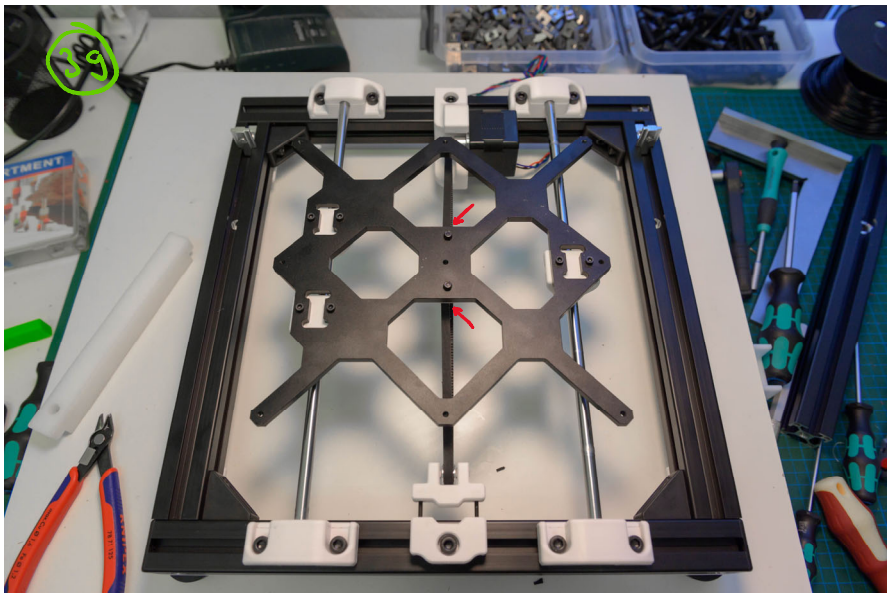
Push the belt into the belt mount as seen in the picture. You may use a flathead screwdriver for this, but proceed with caution as not to break the mount.



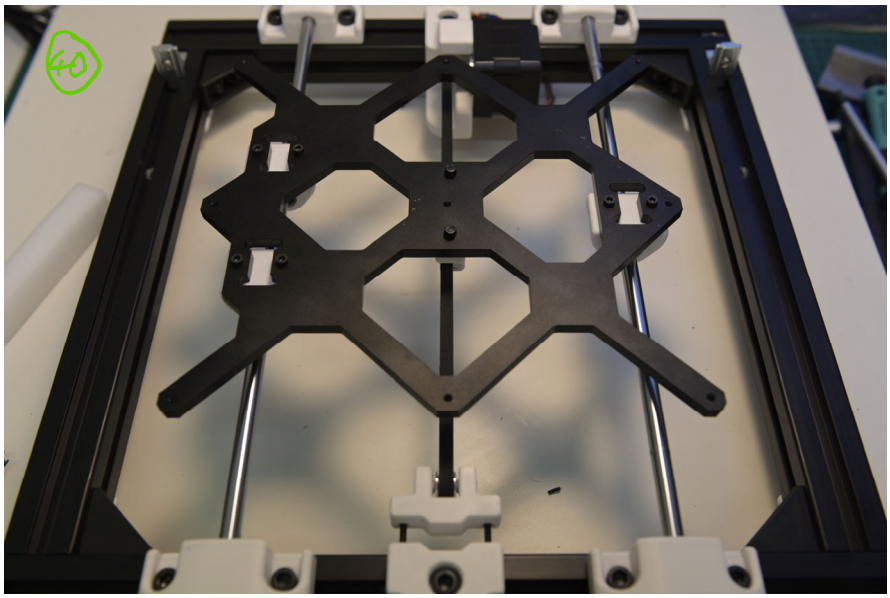
The belt should look like this.
Use the two screws marked in red to adjust the tension on the belt. Adjust the tension so that the belt is not too tight as to cause unnecessary wear, but assure that it has no chance of jumping.



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



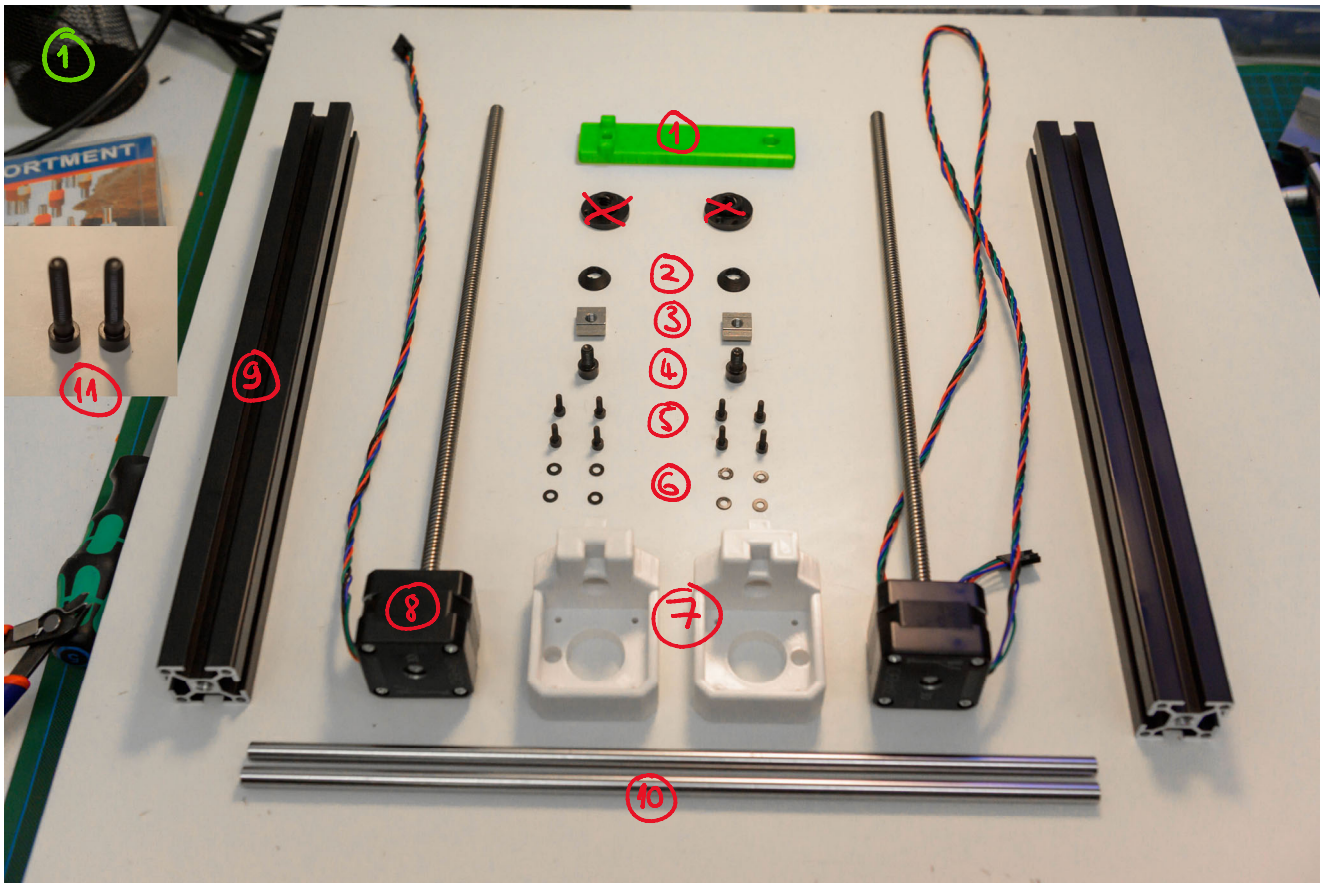
The picture on the left is an example of bad motor and tensioner alignment.
Loosen the three M6x12mm screws that hold the tensioner and motor mount in place in order to adjust their position along the extrusion. Close one eye when judging the alignment, or you WILL get confused.



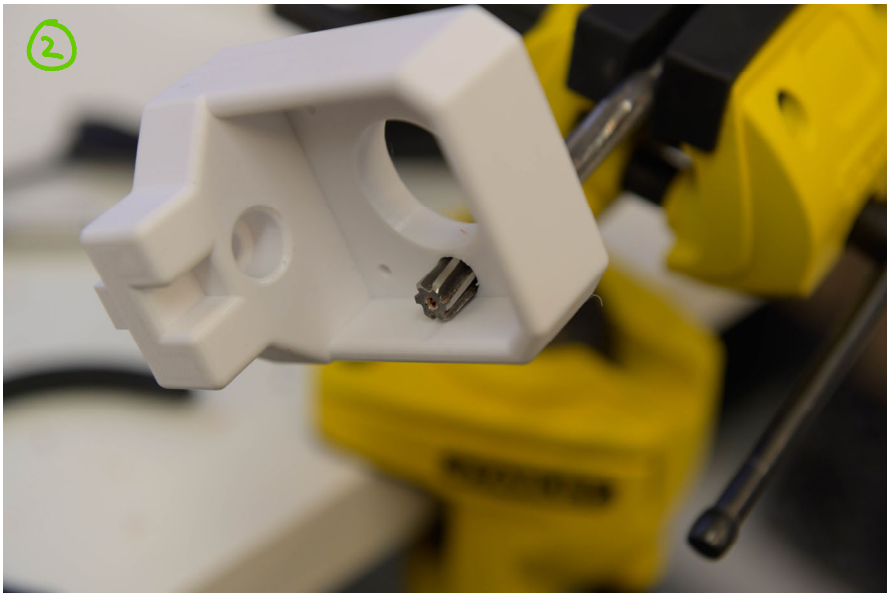
Once you are done with alignment and the belt tension is set correctly and your frame looks like this, you have completed part 1 of the Y-axis.

3: Z-axis (part 1/2)

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

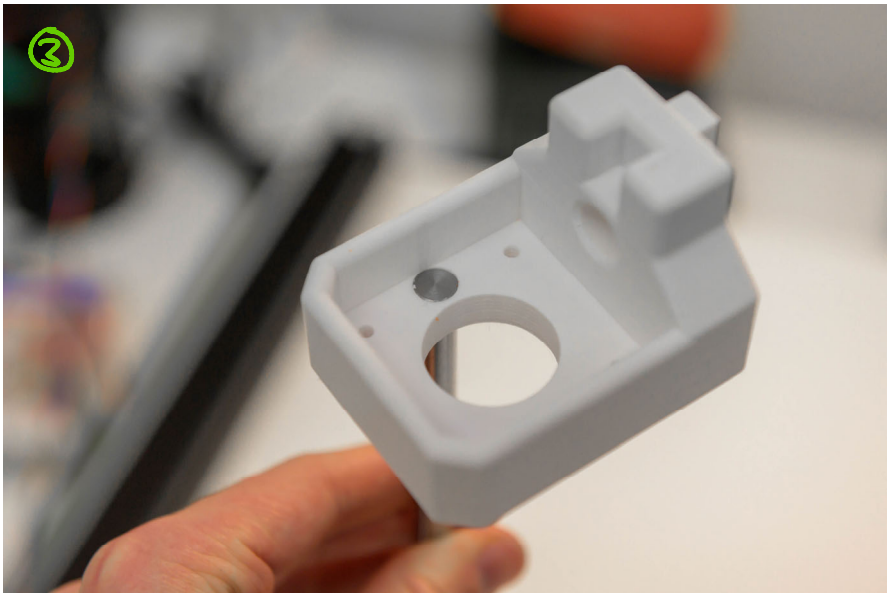


1. 1x build tool 2
2. 2x Z-screw covers
3. 2x T-nuts
4. 2x M6x12mm screws
5. 8x M3x10mm screws
6. 8x M3 washers
7. 2x Z-motor mounts (left and right)
8. 2x Z-motors (left and right, length depends on model)
9. 2x Z-extrusions (length depends on model)
10. 2x Z-rods (length depends on model)
11. 2x M8x40mm screws

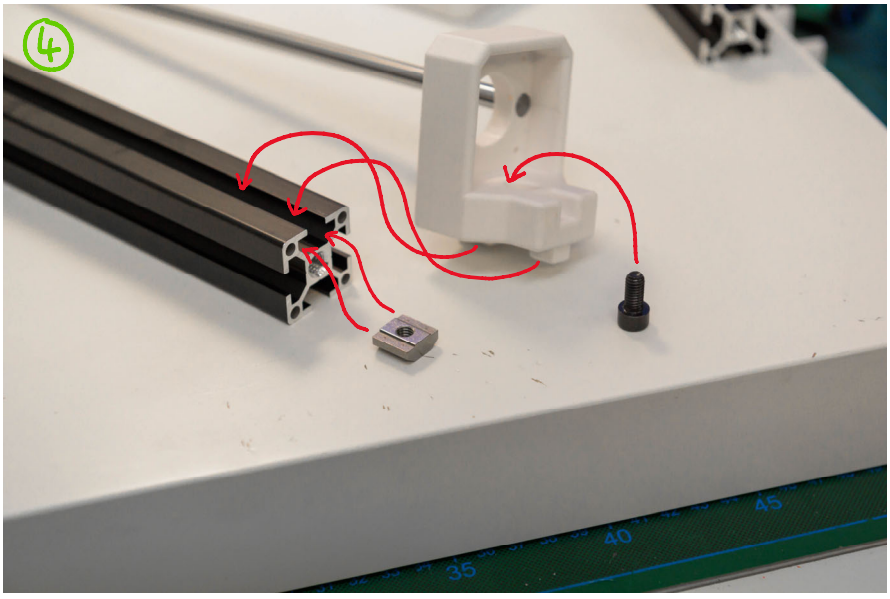


Do the following for both motors:

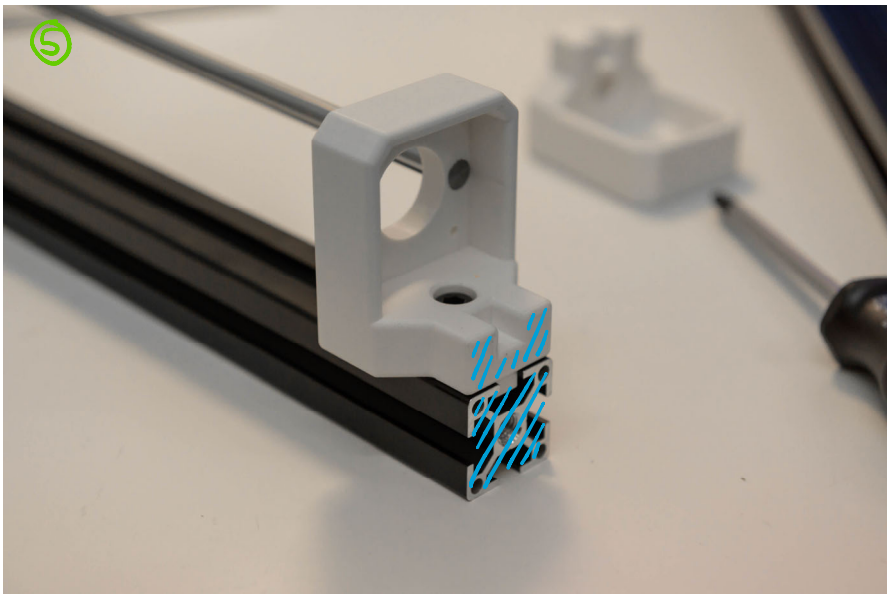
As the rods will probably not fit into the motor mount's slot from the start, you will have to widen the hole. Do this very carefully by using an 8mm reamer. Optimally, you will widen the hole just enough so that you can tap the rod in, and it will not fall out under its own weight. It is ok if the rod,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



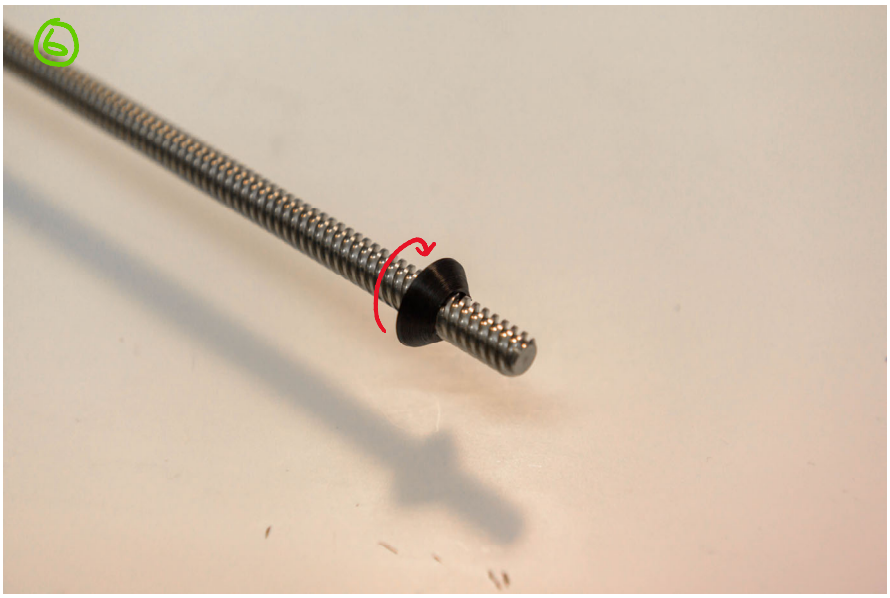
Make sure the rod sits flush with the inside of the mount.



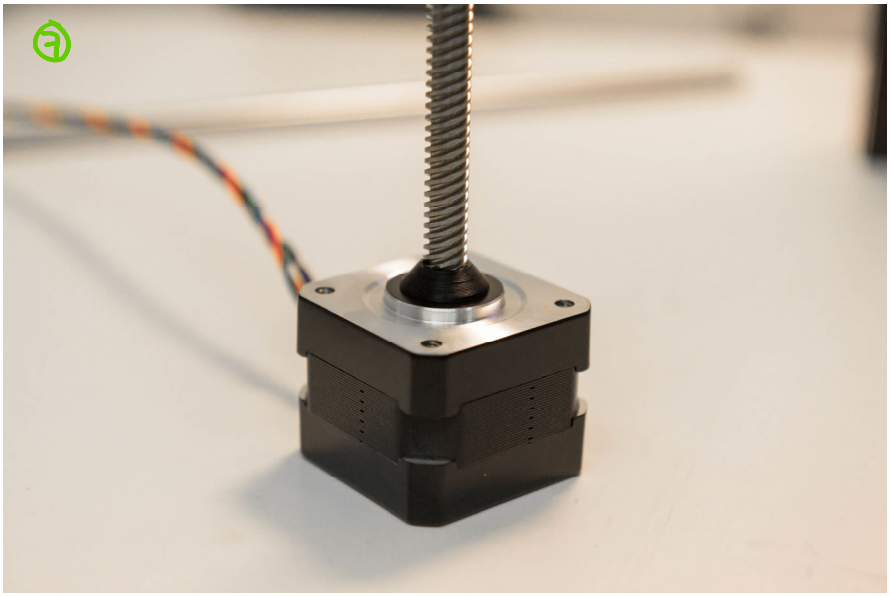
Using an M6x12mm screw and a T-nut, secure the motor mount to a Z-extrusion.

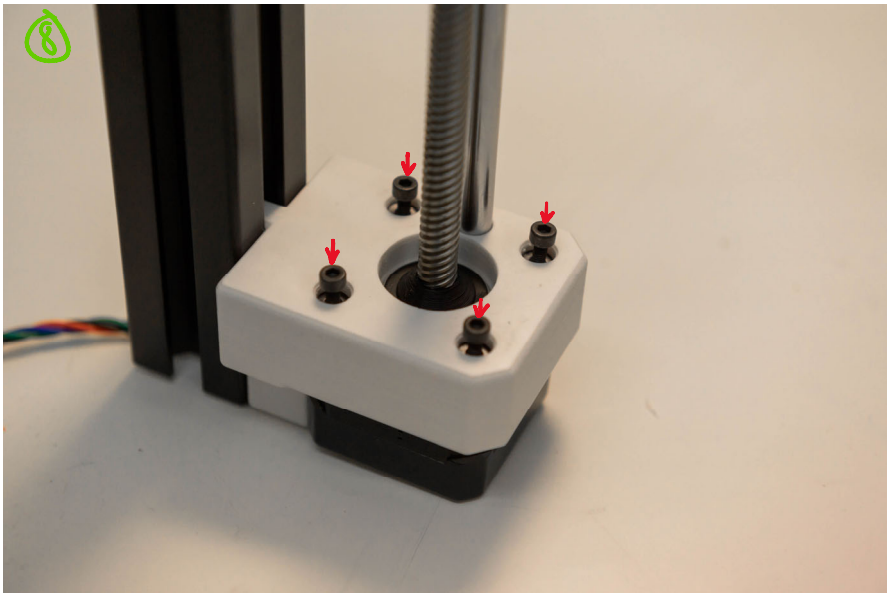


Make sure that the surfaces marked in blue are flush with one another.



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

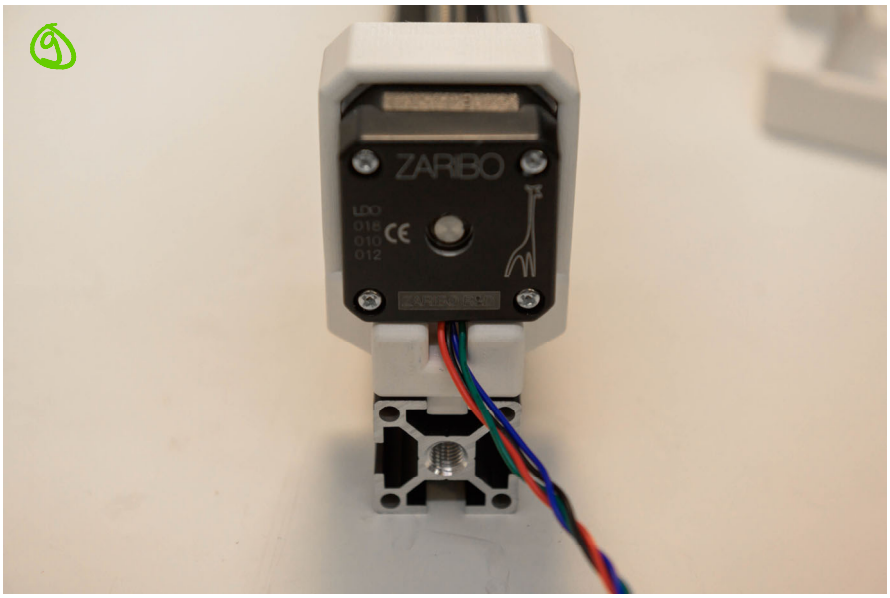




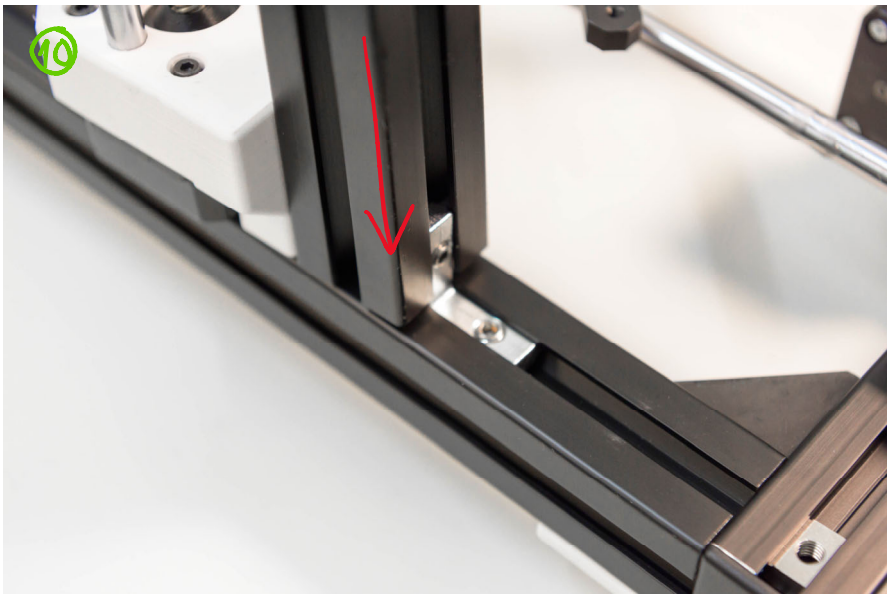
Using 4 M3x10mm screws and 4 M3 washers, screw the motor into the motor mount from below, with the cable exit facing the extrusion.

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.

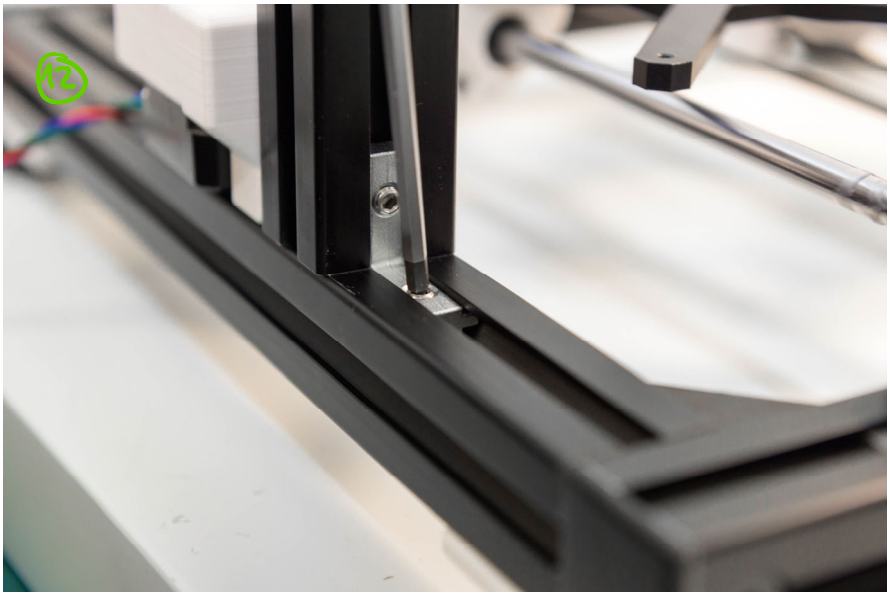


It should now look like this.



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

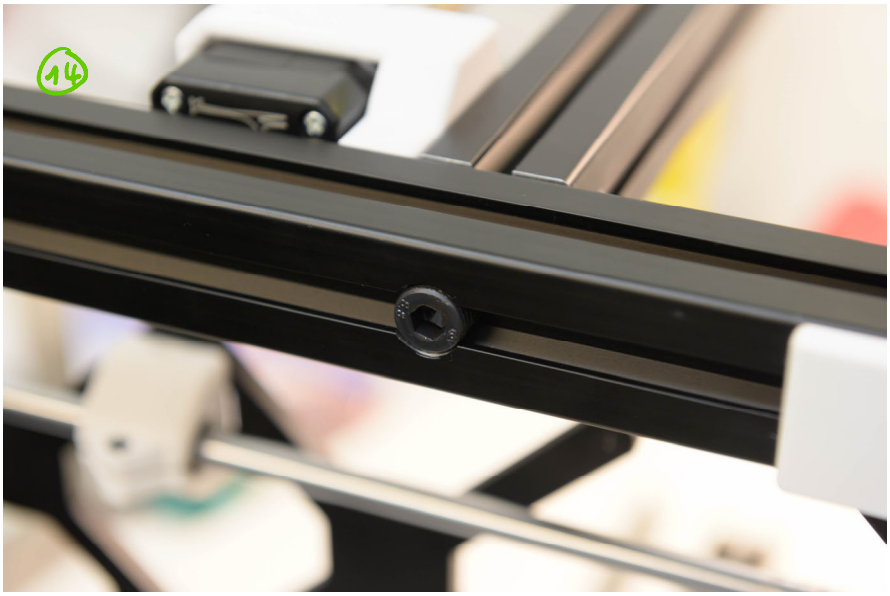
Screw in the M8x40mm screw from the bottom, making sure that there is no gap between the Z- and Y-extrusion.



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.

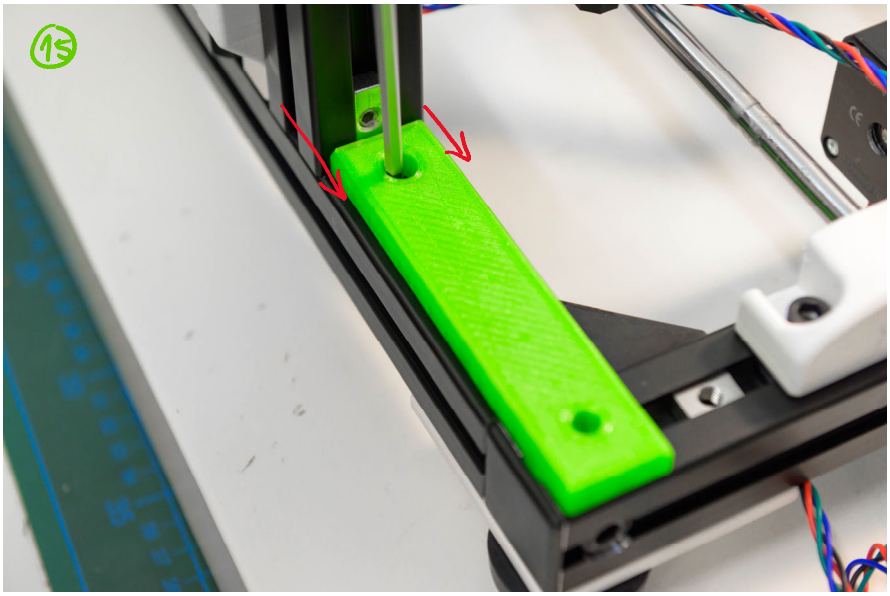
This is roughly what that should look like.

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



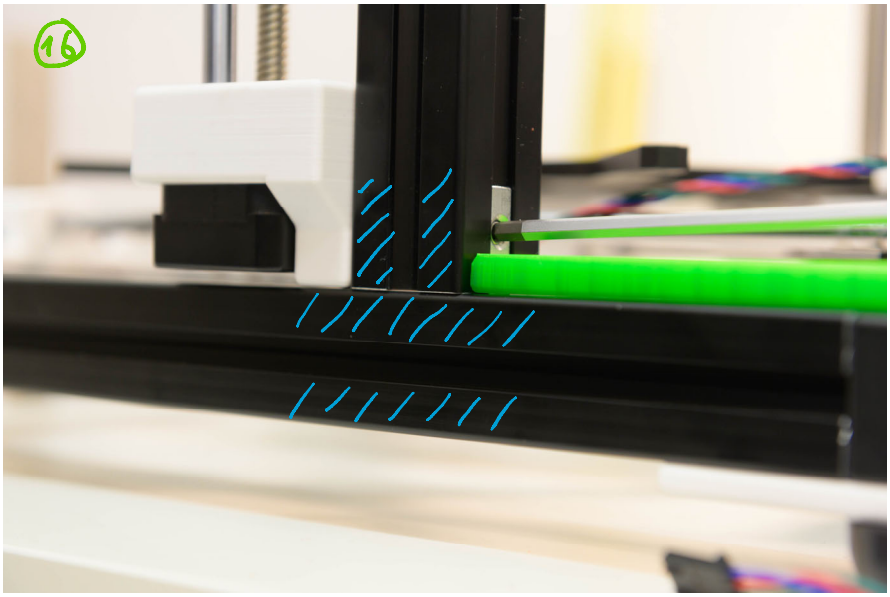
Loosen the M8x40mm screw.

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.

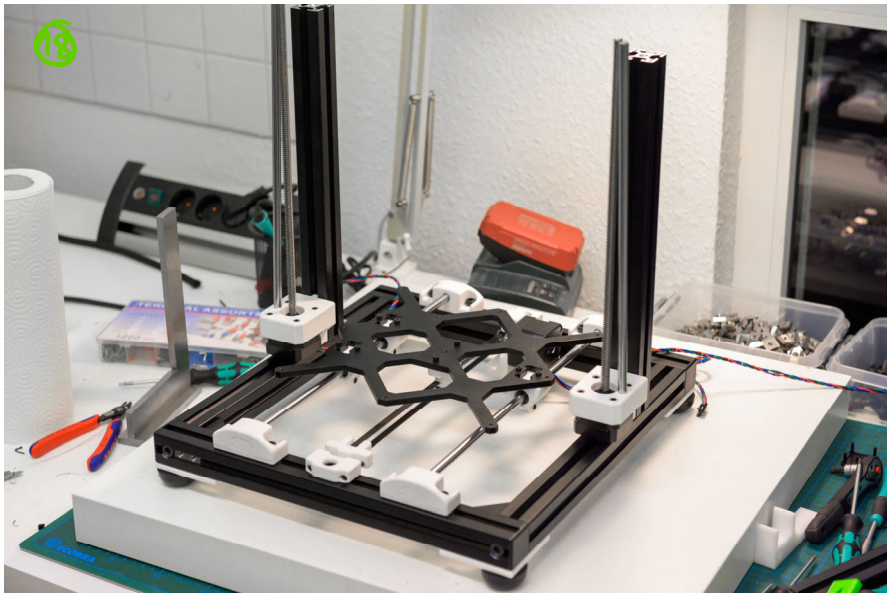
Slide the Z-extrusion against the tool, and retighten the lower bracket screw.



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.

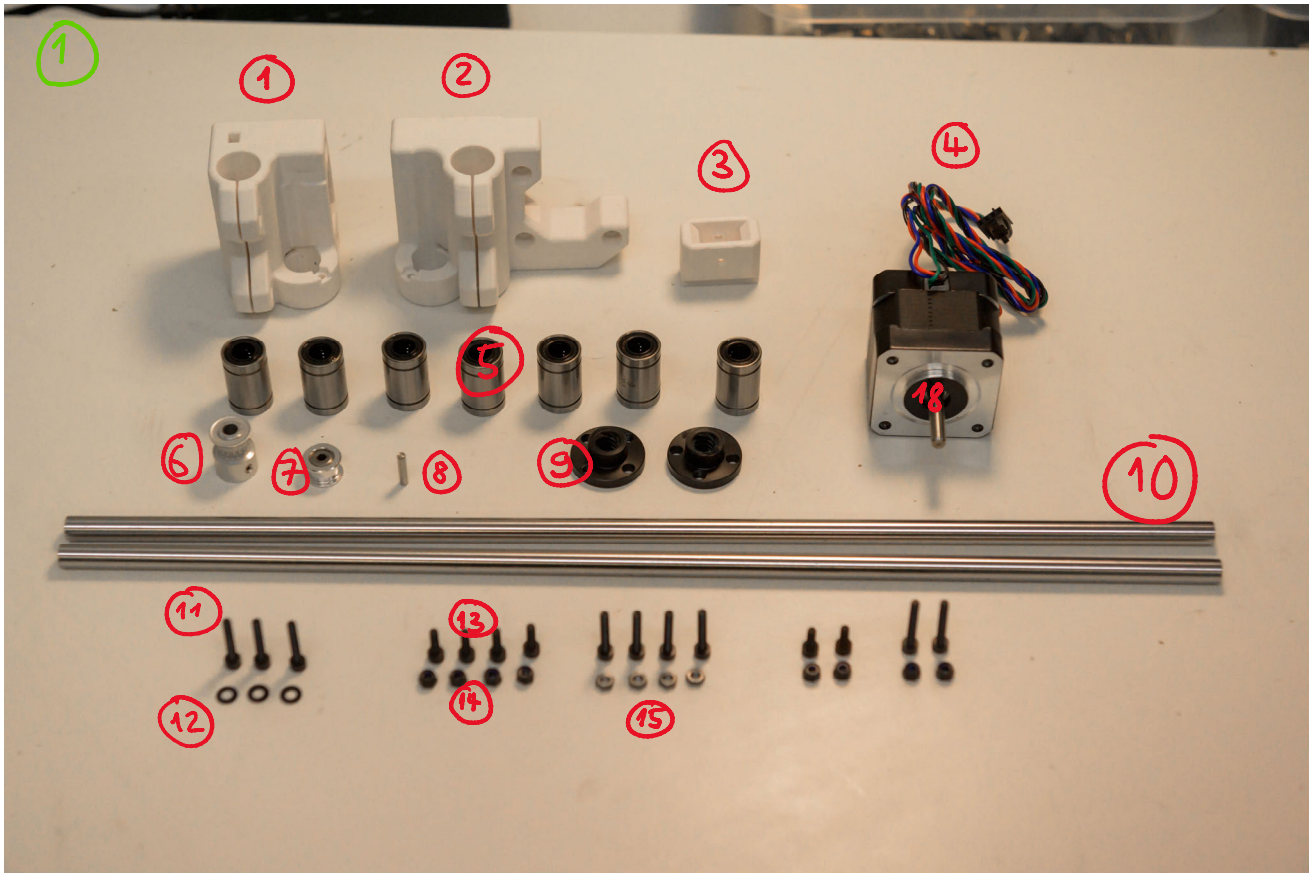


After completing both sides, your 3D printer should look like this.

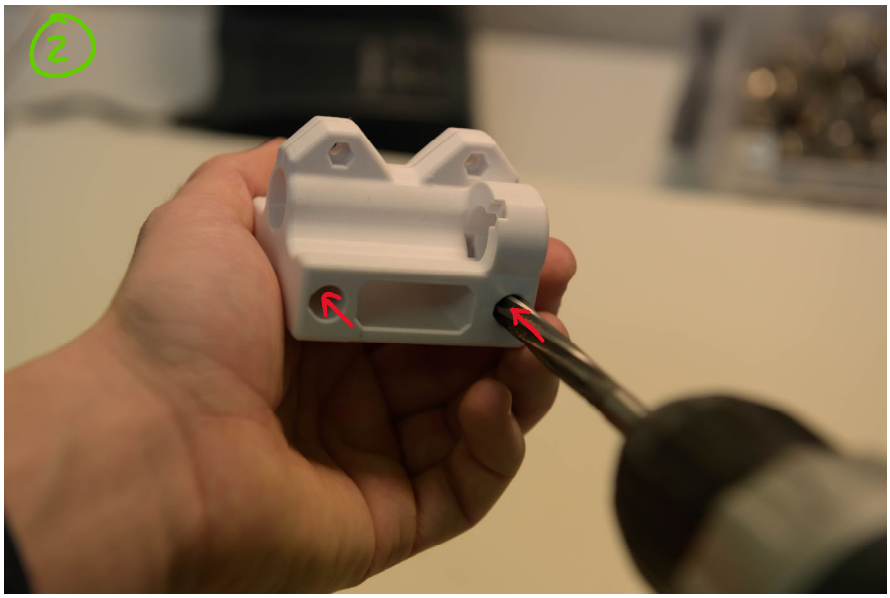
Part 1 of the Z-axis is now complete.

4: X-axis

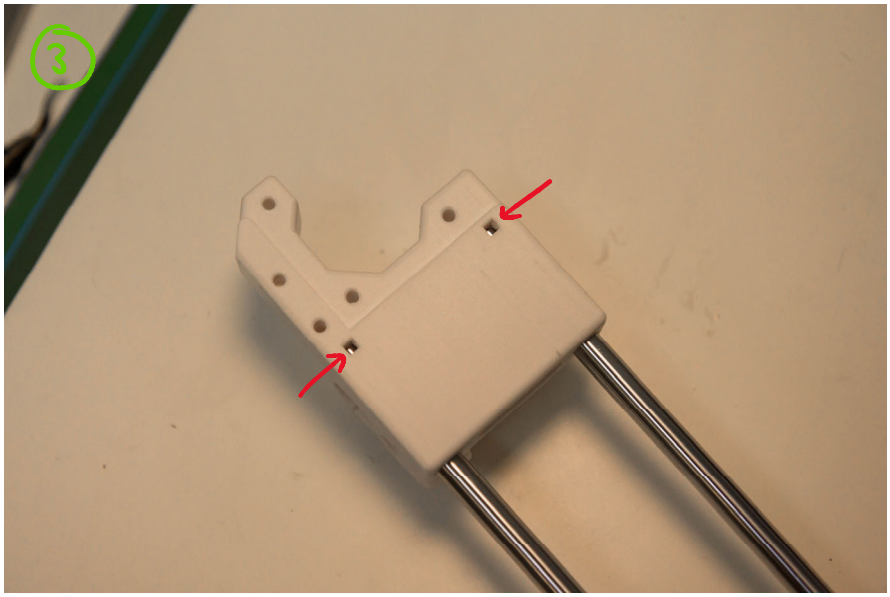
You will need the following parts to complete the X-axis:



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

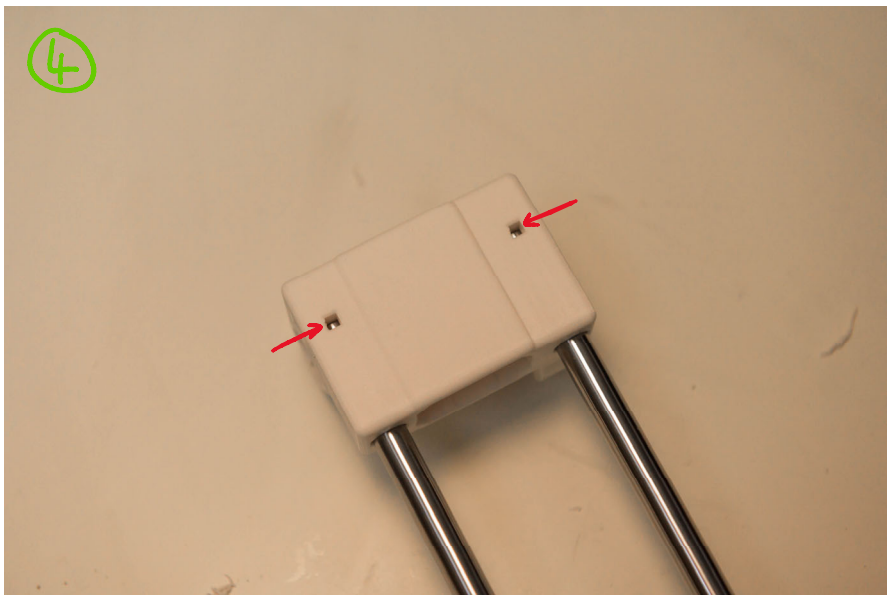


Using the 8mm reamer, drill the marked holes to fit the rods. Be careful not to skew the channel by drilling diagonally, or drilling it too much.

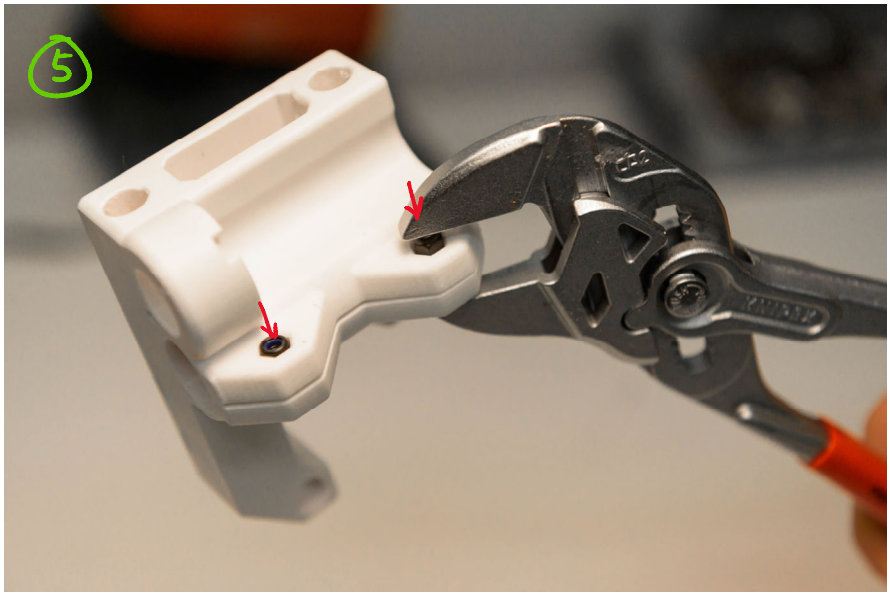


Test fit the rods. You should be able to slide them in all the way. You can check if they are fully inserted by seeing whether or not the ends of the rods can be seen in the little windows marked by the arrows.
It is normal for them to be a pretty tight fit, it will make it a lot easier if you rotate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

Remove the rods after the test fit.

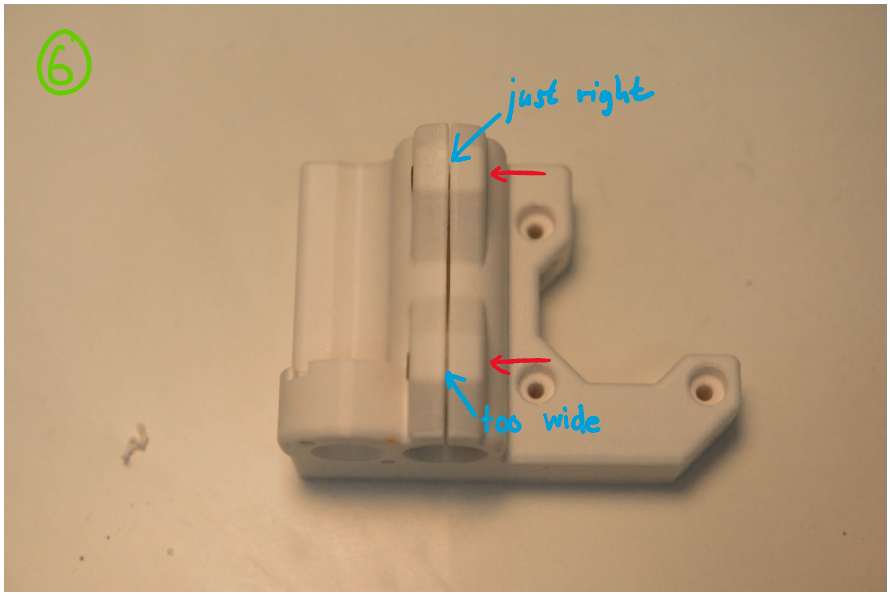


Do the same for the X-idler.



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.

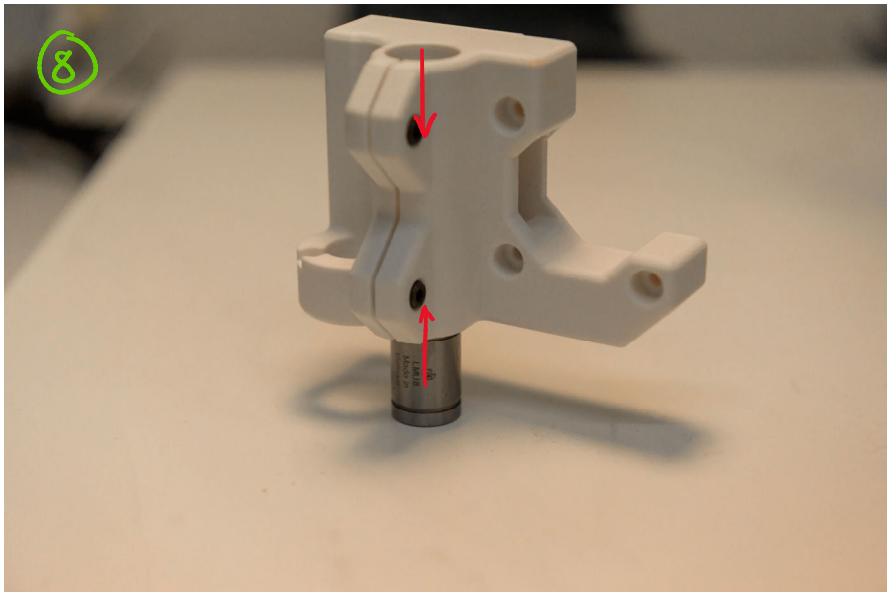


NOTE: If you are using an idler and motor mount that you received in a kit, then you can skip steps 6 and 7, as we send them out pre-drilled.

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.

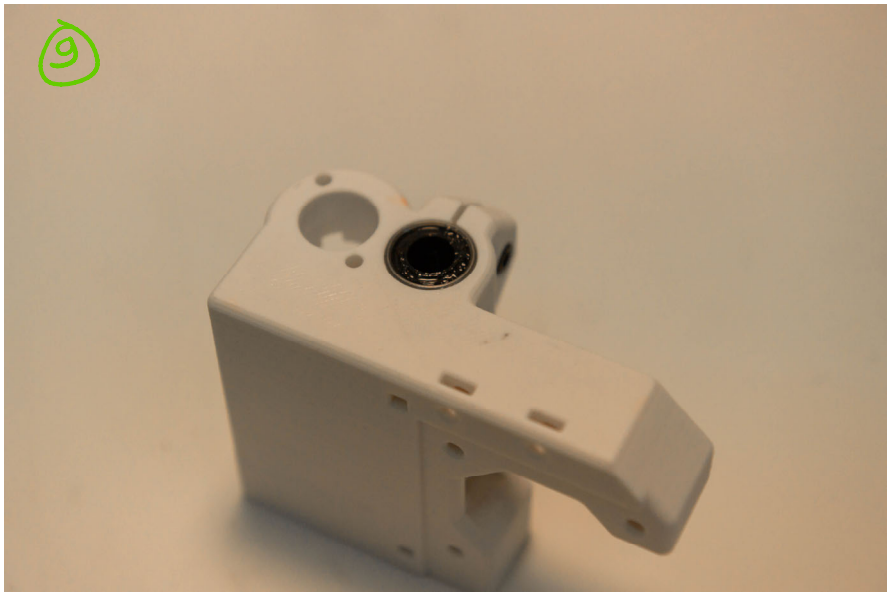
About 2 seconds of drilling should suffice.



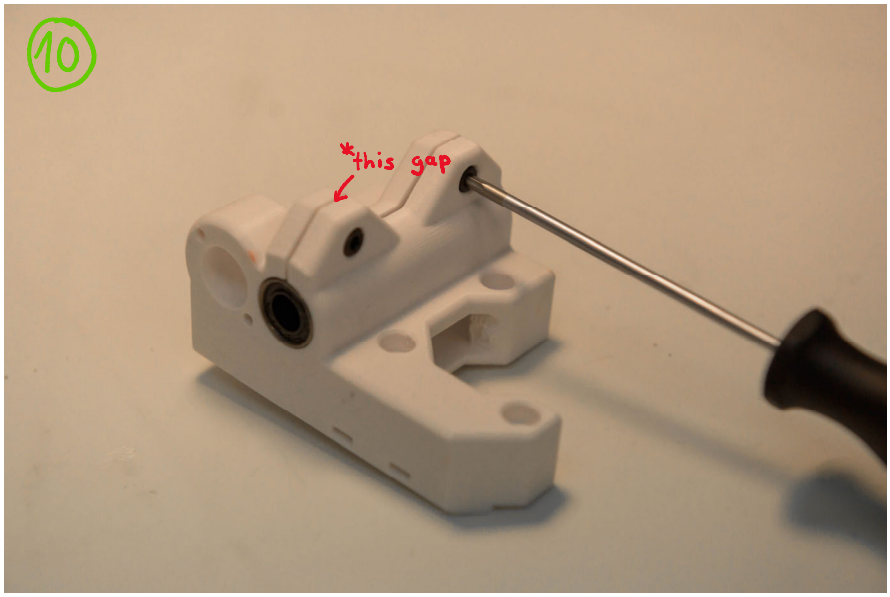
We recommend that you prepare the bearings like we did for the Y-axis.

Loosen the M3x10mm screws if you have them installed already.

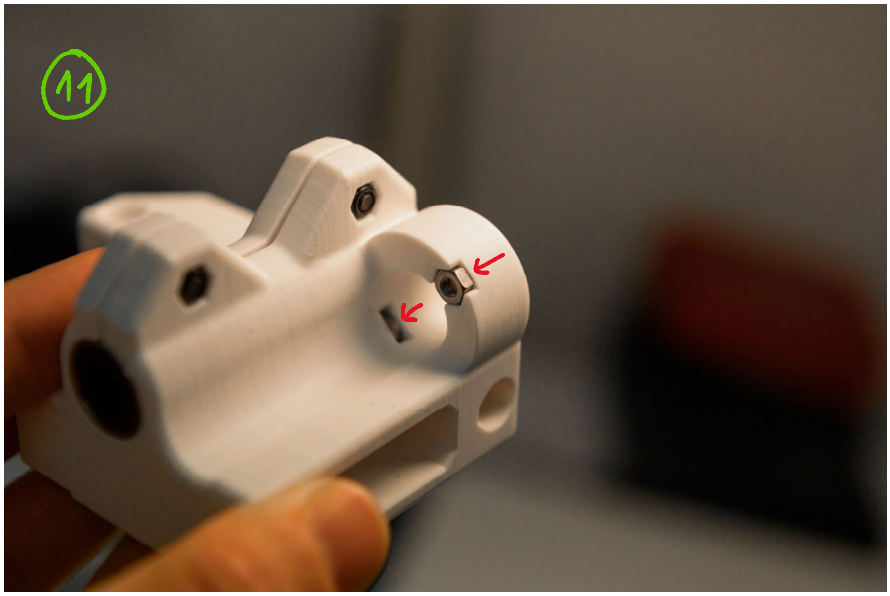
Insert two bearings into each side.



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

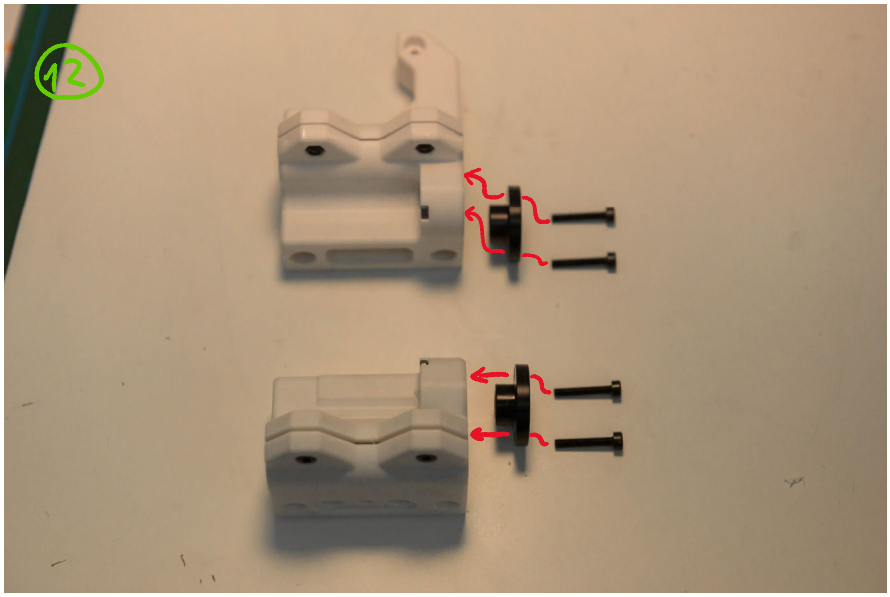


Tighten the M3x10mm screws (install them if you haven't already). Don't overtighten them, there is supposed to be a slight gap*.

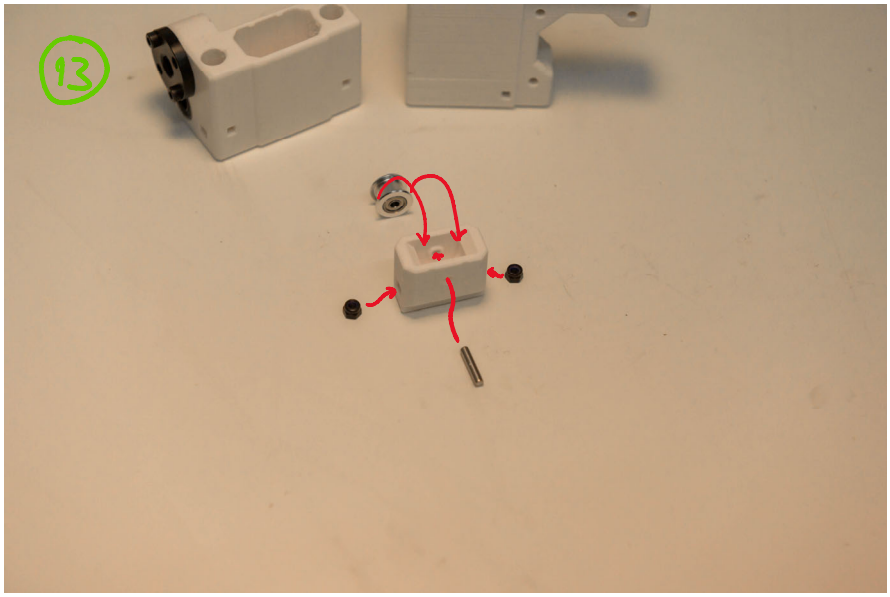


Insert two M3 nuts into the slots as seen in the picture.

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

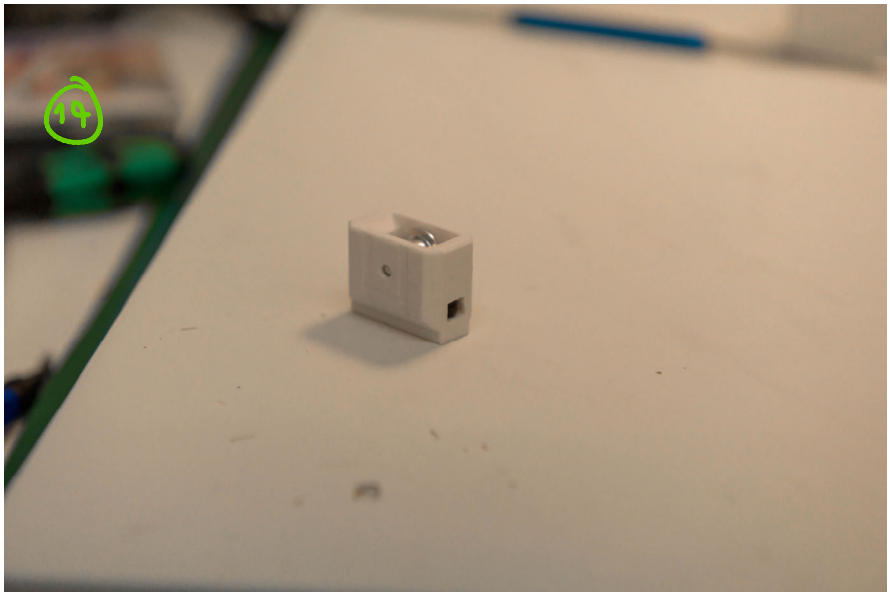


Using four M3x18mm screws, install a POM nut on each part.

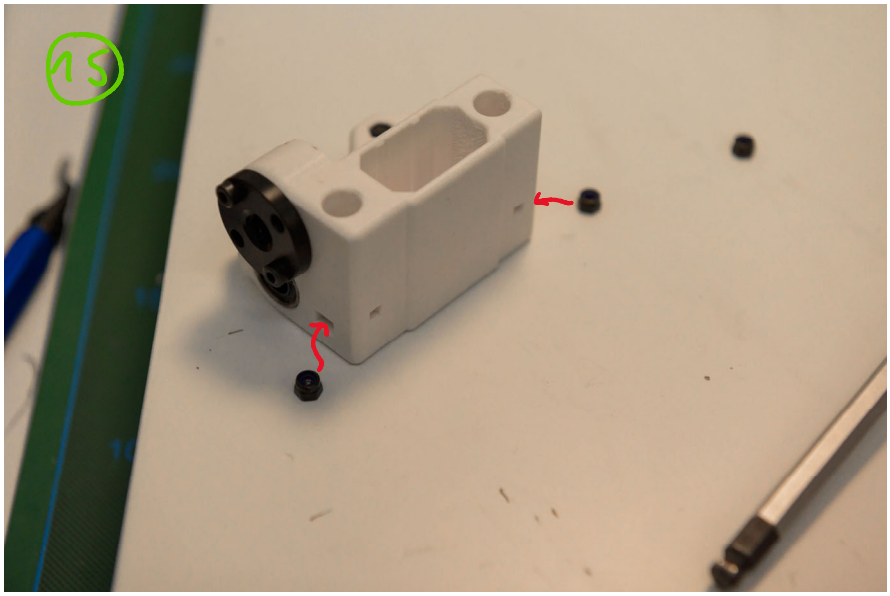


Belt tensioner:

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.

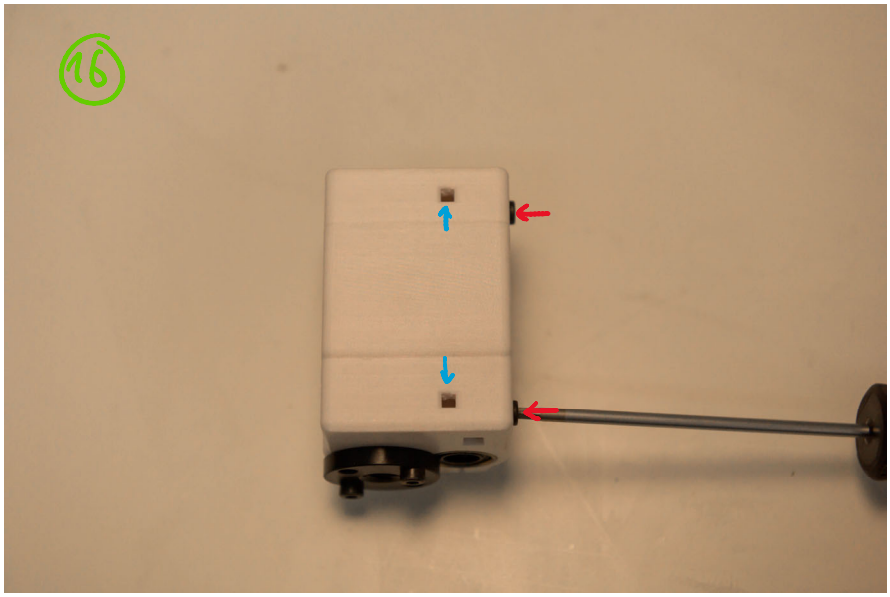


The tensioner should now look like this.

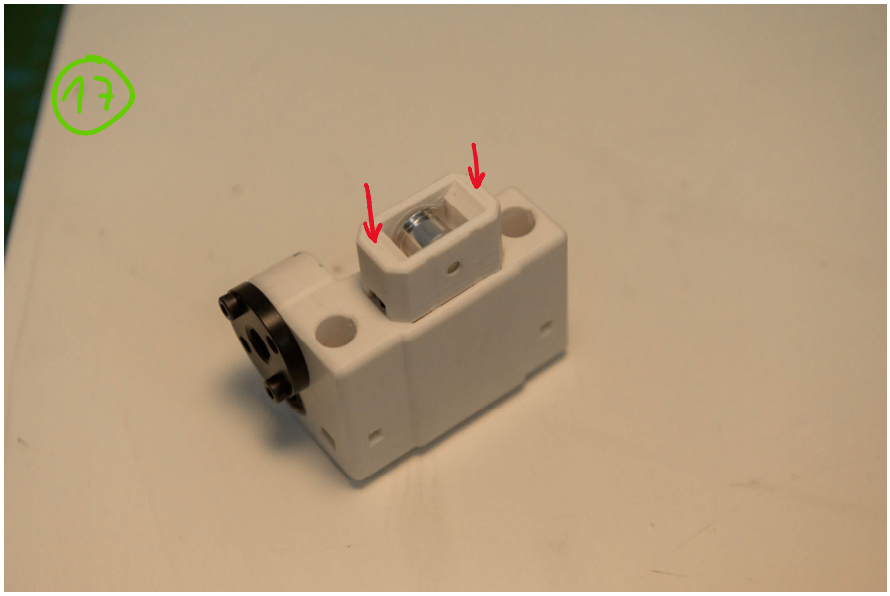


NOTE: Steps 15 and 16 are optional.

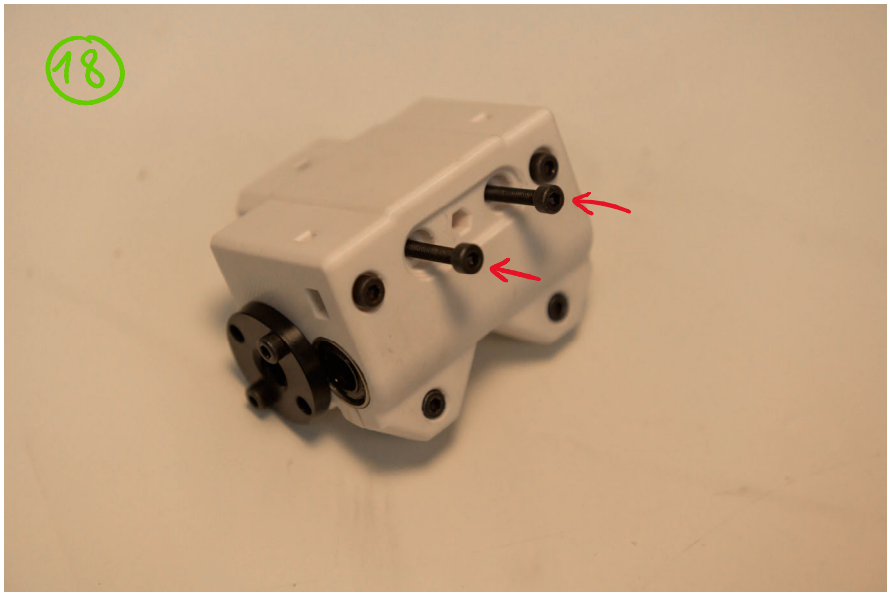
On the X-idler, insert two M3 self locking nuts into the marked slots.



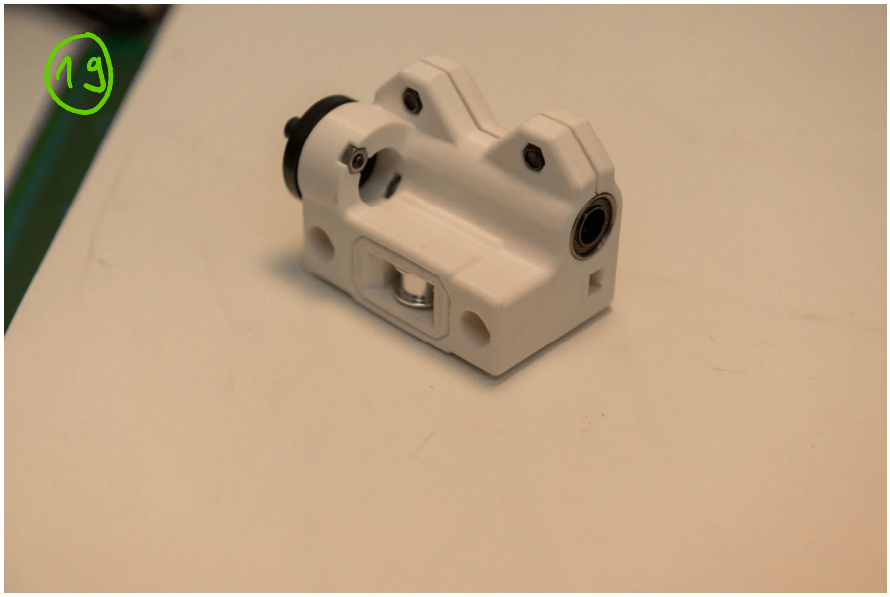
Screw two M3x10mm screws into the previously installed self locking nuts, but only part way.
The tip of the screw should not be able to be seen from the windows marked in blue. Screwing them in too far will interfere with the rod installation later on.



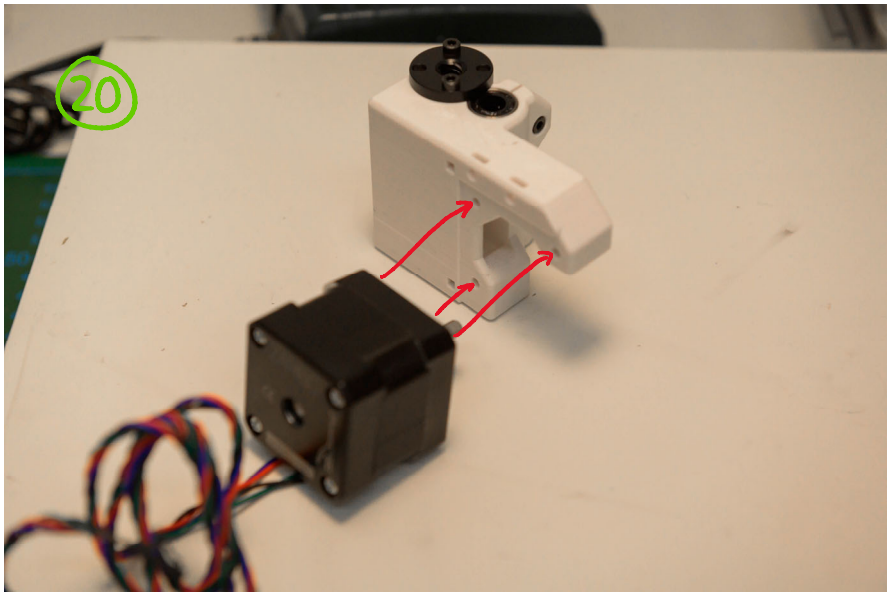
Push the completed tensioner into the X-idler.



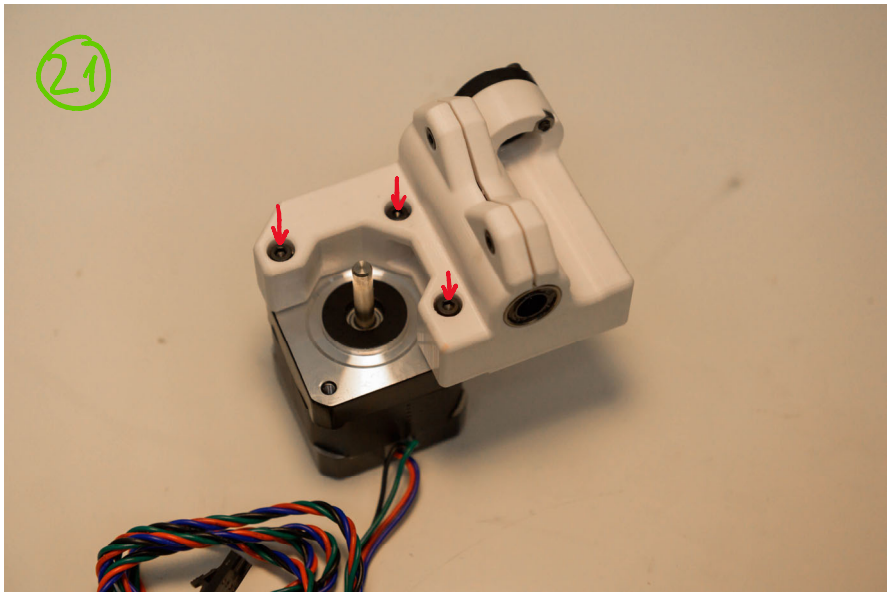
From the other side, insert two M3x18mm screws.



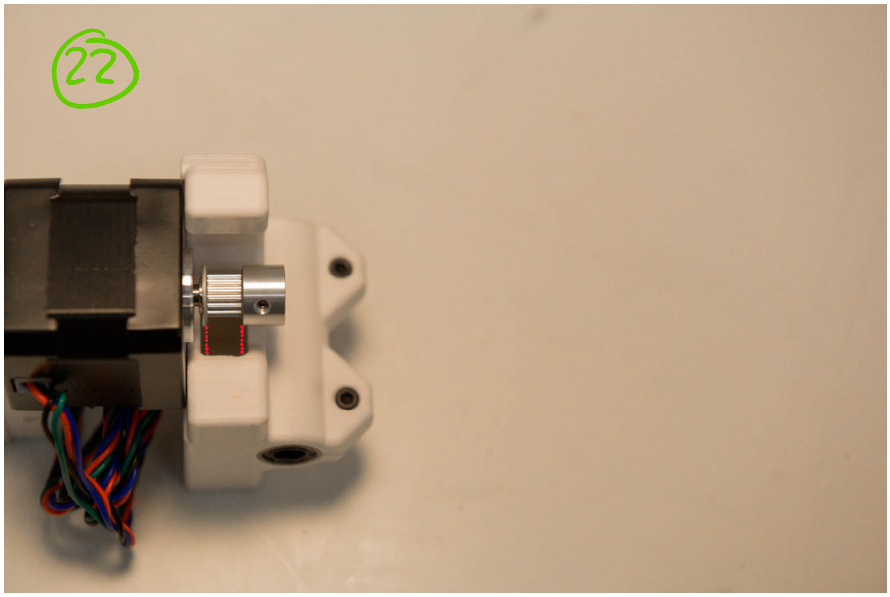
Your X-idler should look like this. Don't pull the tensioner all the way in, or you will not have enough tensioning head room.



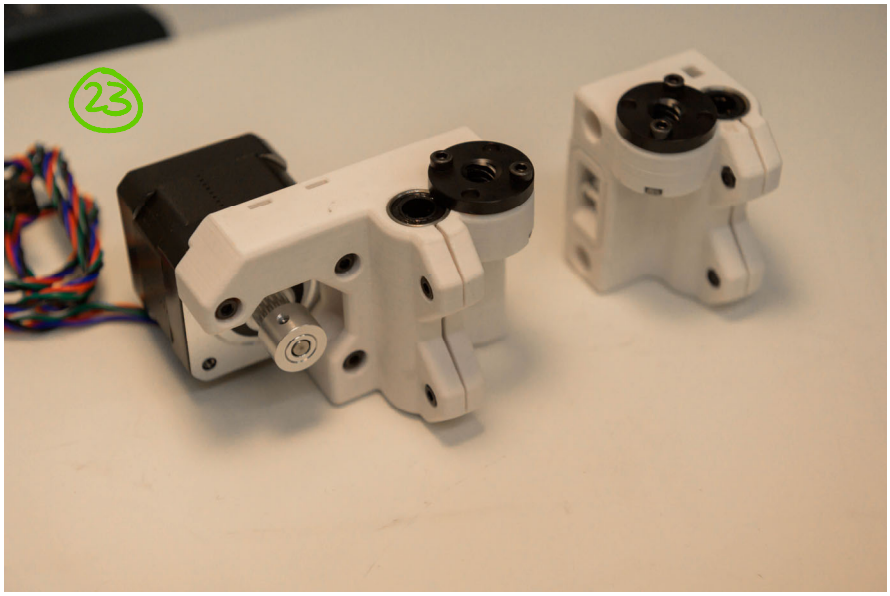
On the X motor mount, align the motor in the orientation shown on the left. With the POM nut facing up, the cable should exit the motor from the bottom.



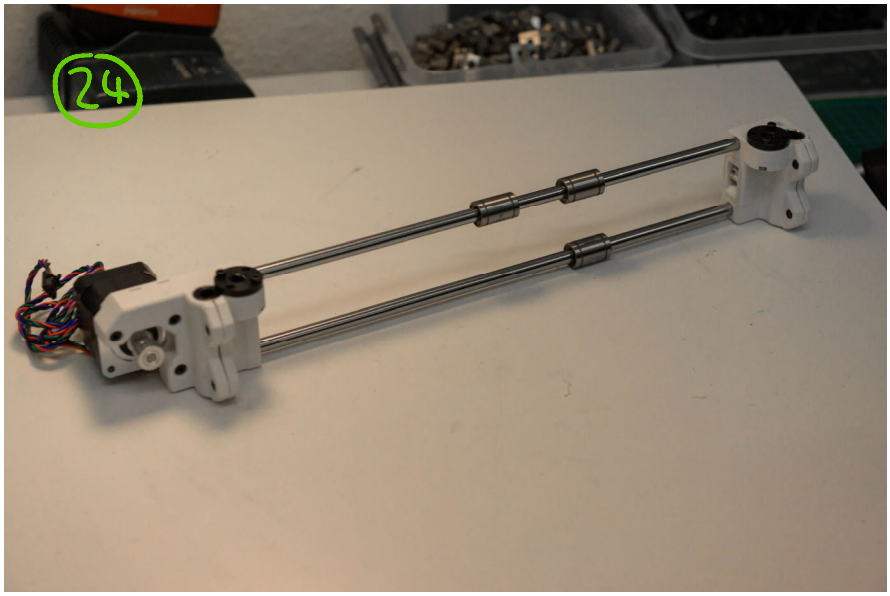
Secure the motor in place using three washers and three M3x18mm screws.



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.

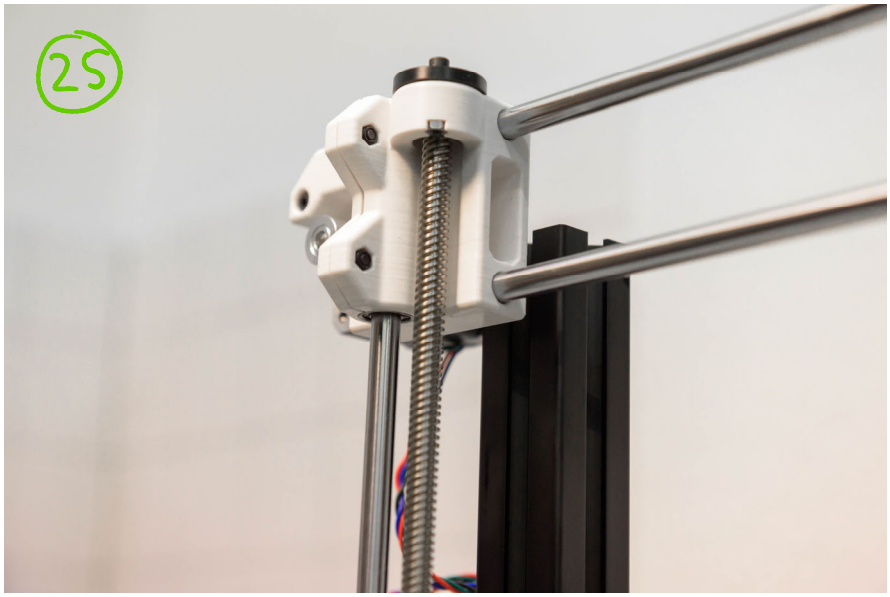


This is what your X-idler and X-motor mount should look like.



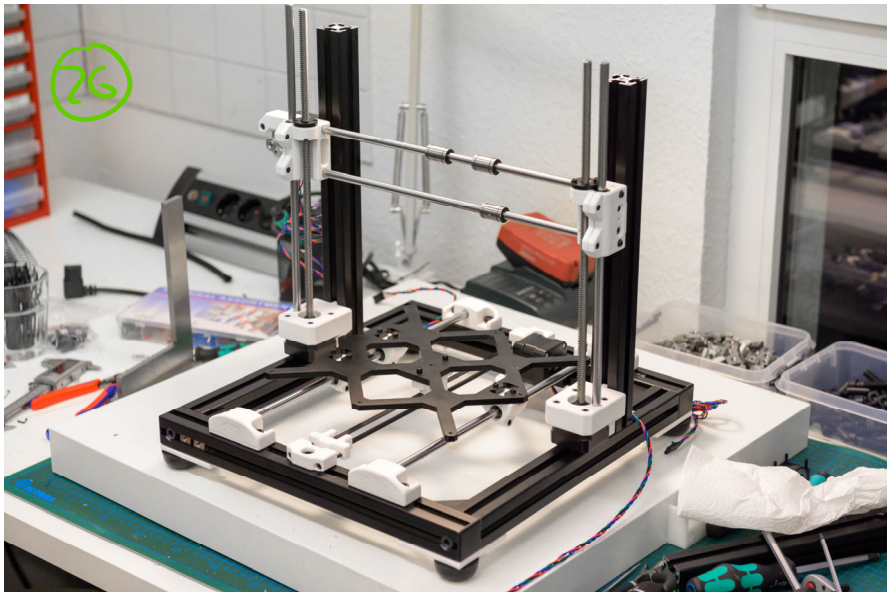
Insert the rods into the X-motor holder, then slide two bearings onto the upper rod, and one onto the lower rod. Then install the X-idler onto the other side. Make sure that the POM nuts are facing upwards.

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.

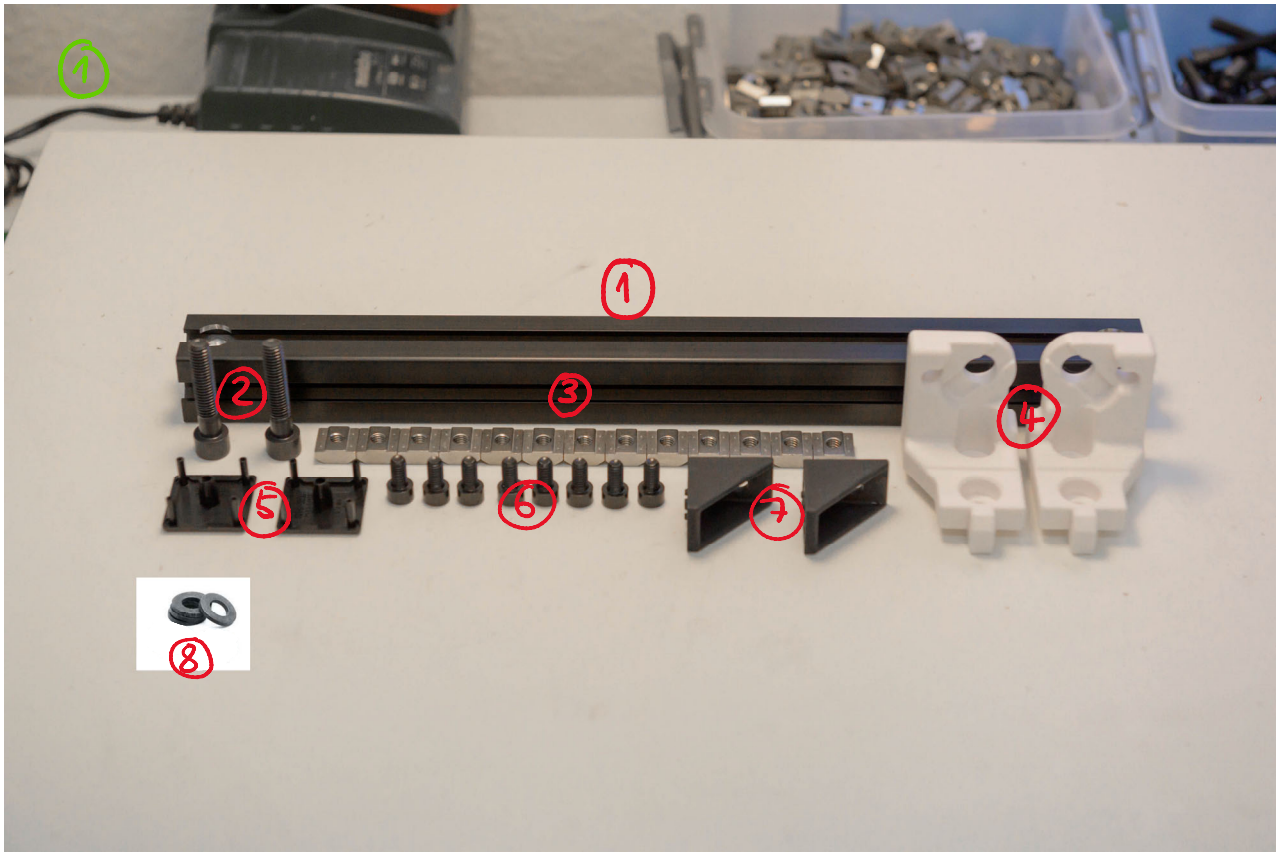


This is what your 3D printer should look like.

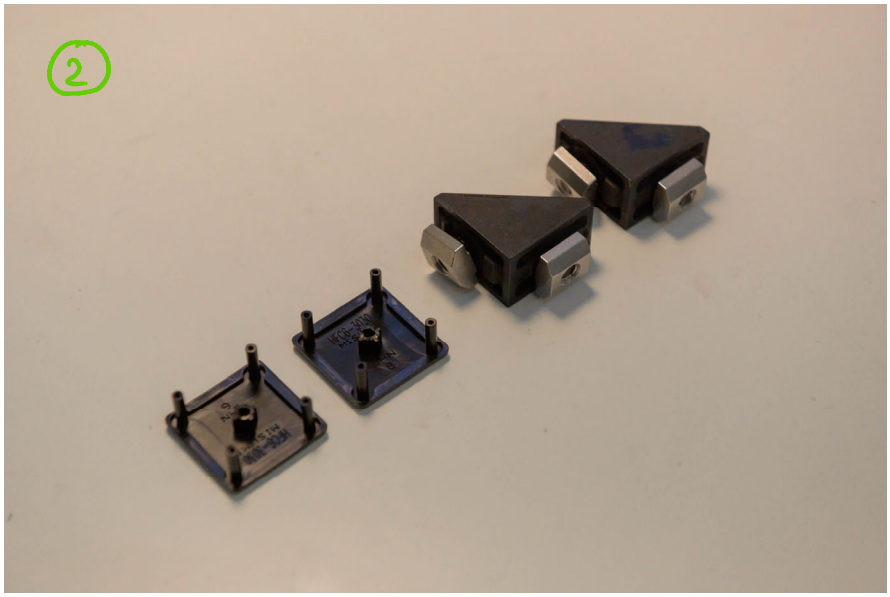
The X-axis is now complete.

5: Z-axis (part 2/2)

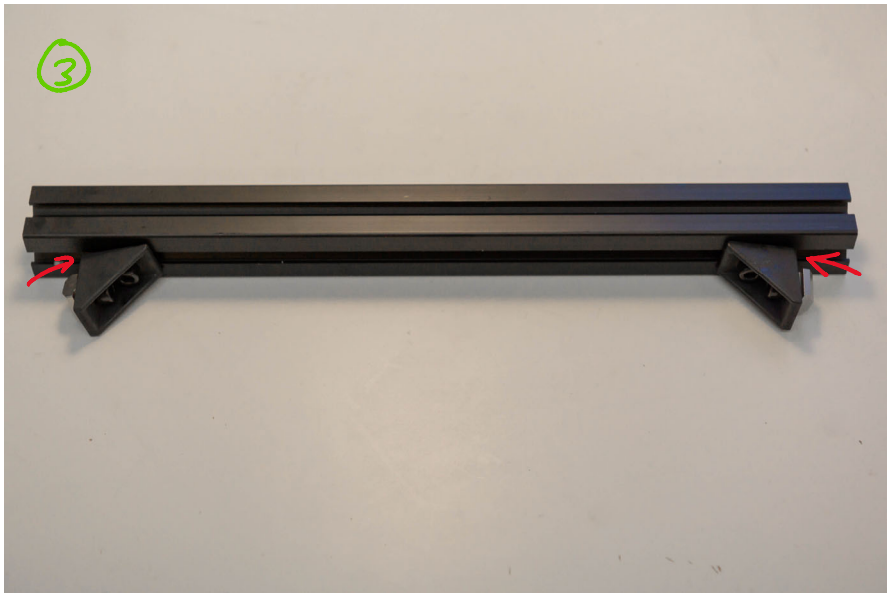
You will need the following parts to complete part 2 of the Z-axis:



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

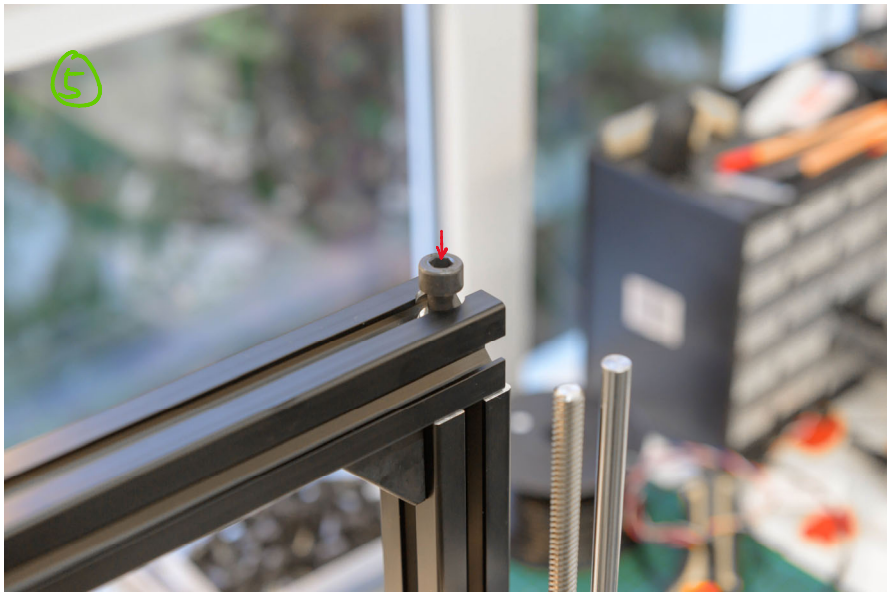


Prepare the two end caps and the two corner brackets just as we did in chapter 1.

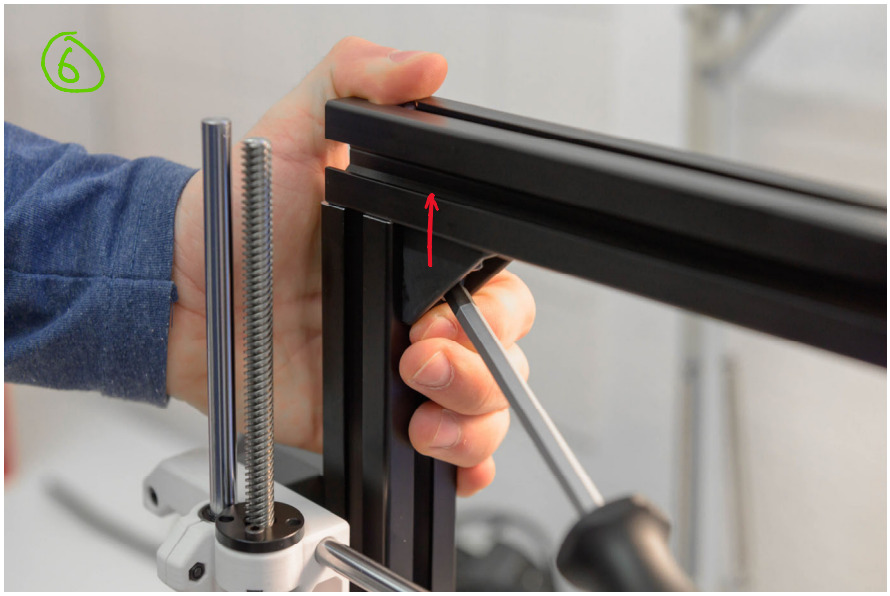


Put the two corner brackets onto the X-extrusion, in the slot with the two smaller screw holes.

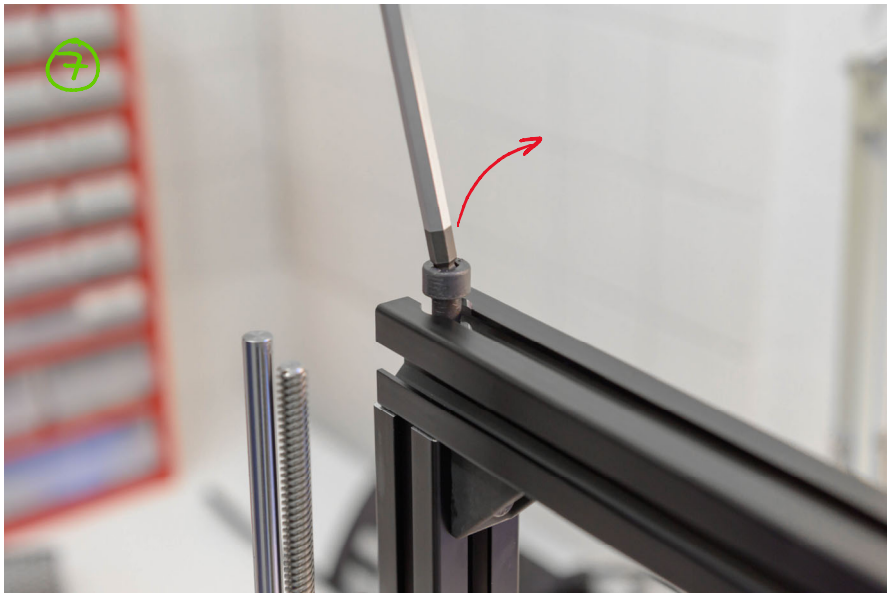
Put the X-extrusion onto the printer as seen in the picture, with the T-nuts of the corner brackets properly slotted into the inner slots of the Z-extrusions.



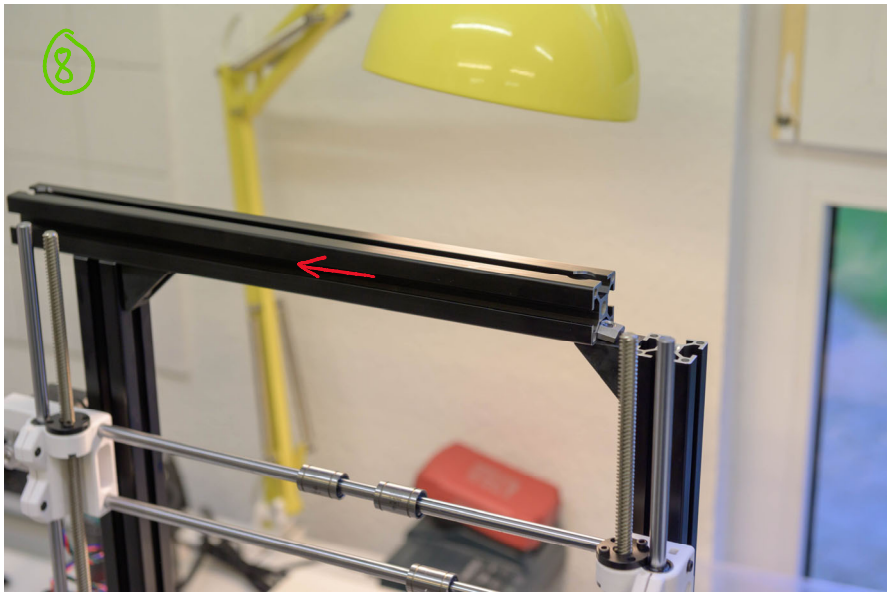
Screw in both M8x40mm screws into the top, and tightem them slightly.



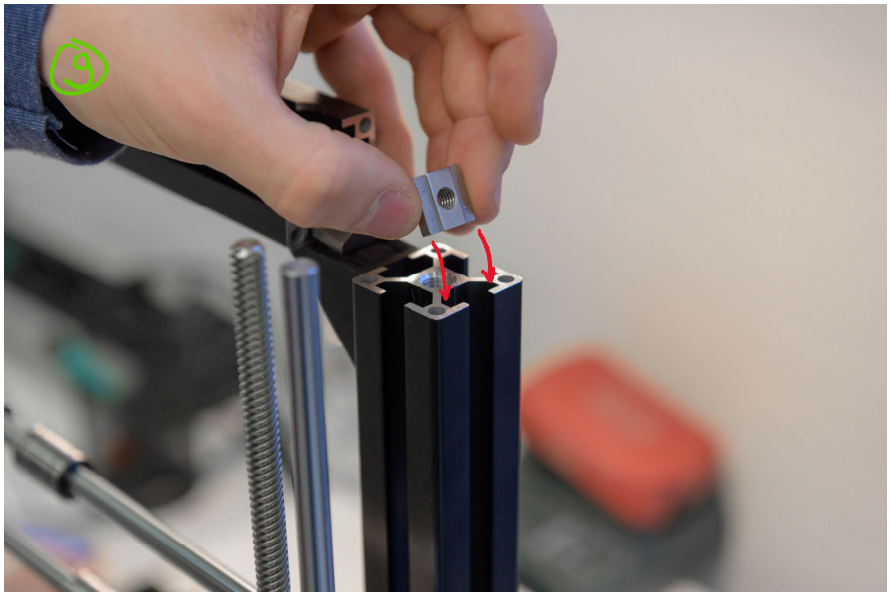
While pushing the corner brackets up against the X-extrusion, screw in the horizontal M6x12mm screws.



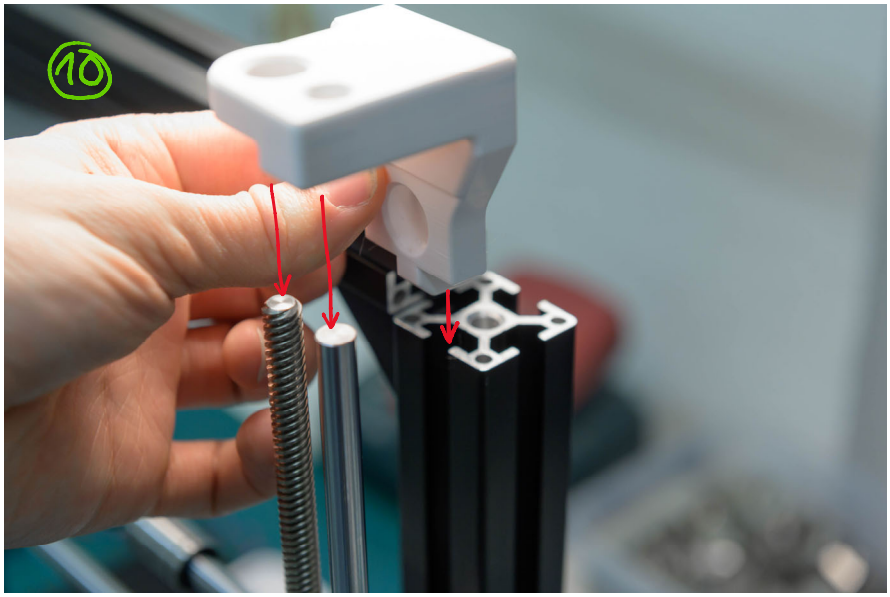
Remove both M8x40mm screws.



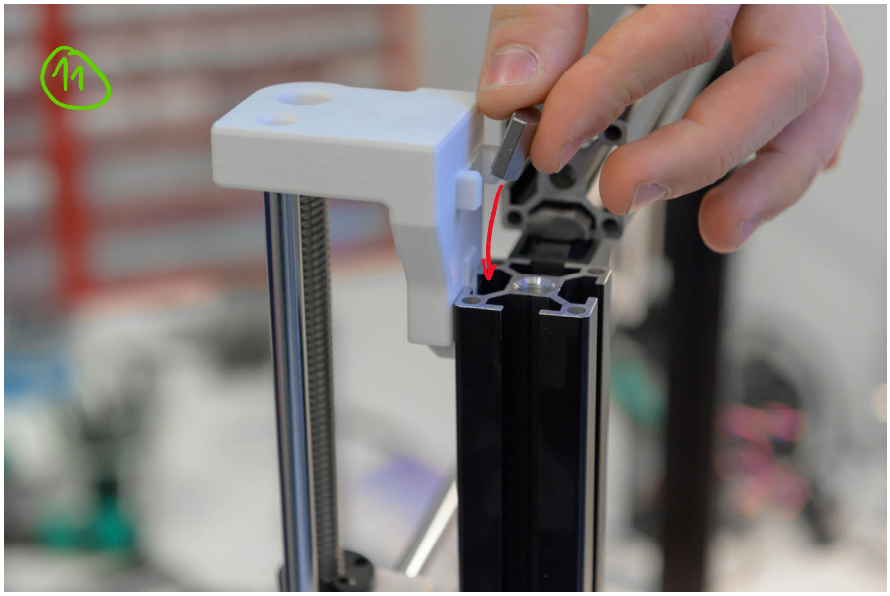
Slide the X-extrusion to the left.



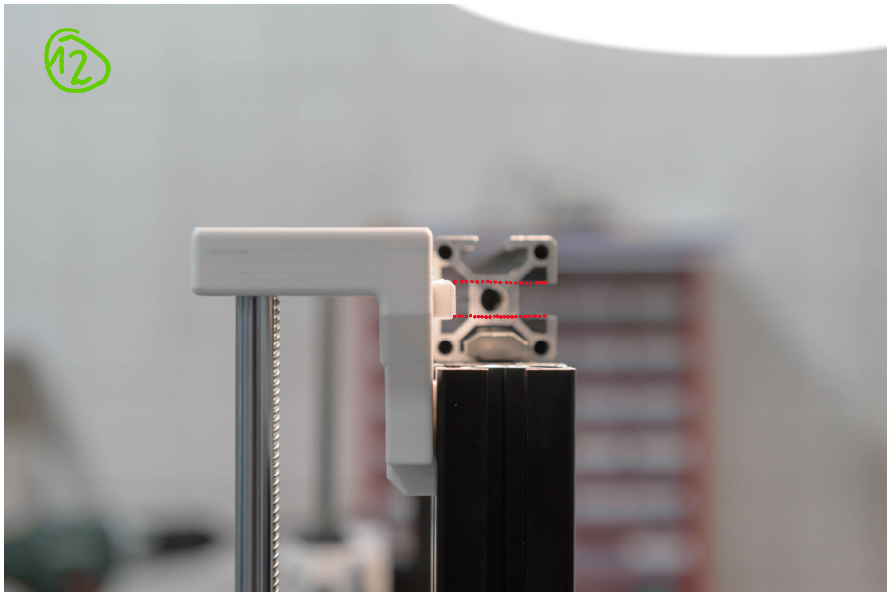
Insert one T-nut into the right slot of the right Z-extrusion.



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



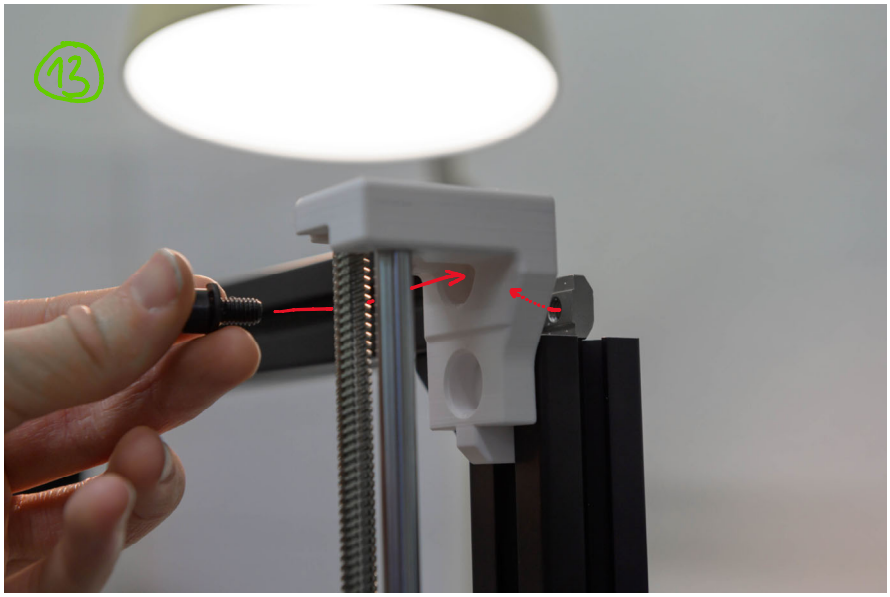
Insert a T-nut into the slot marked in red.



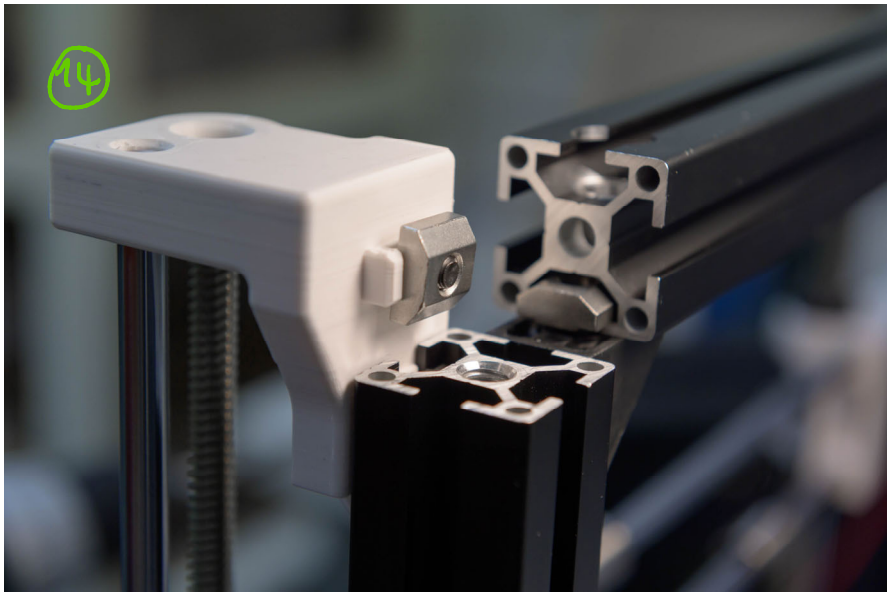
Gently adjust the height of height of the top bracket so that its upper stud is aligned with the extrusion slot of the X-extrusion.

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 vareful to not widen the hole too much, it should not have any play.

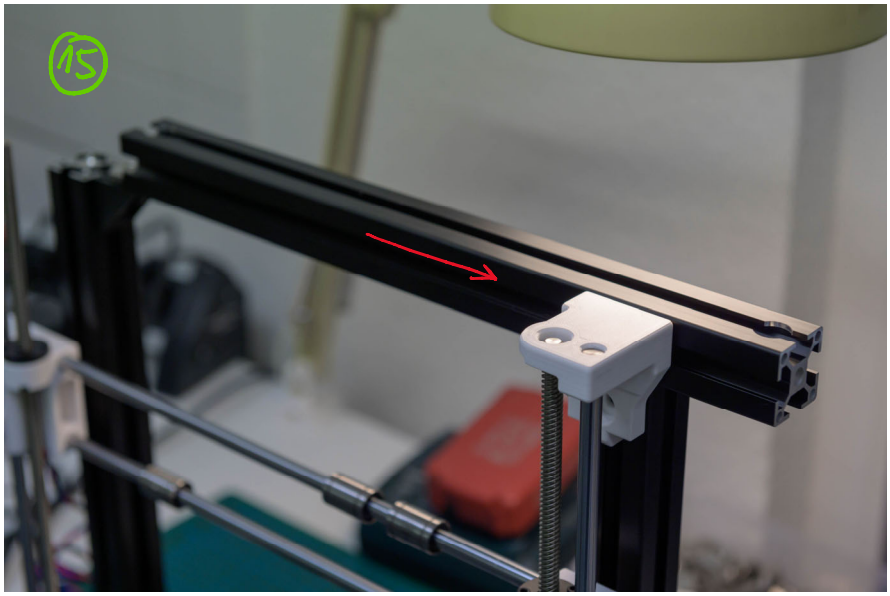
Generally it should fit right out of the box, though.



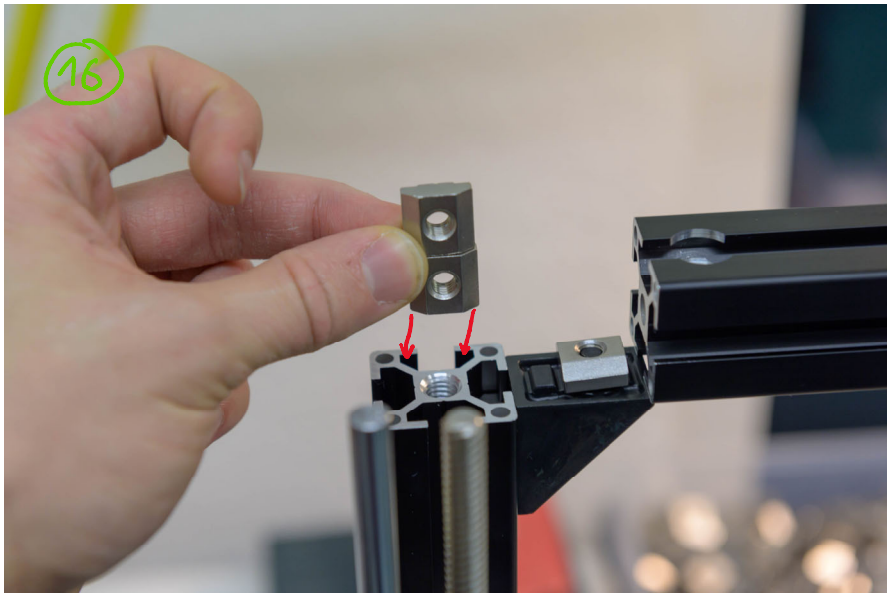
Using an M6x12mm screw and an M6 washer, fasten a T-nut to the rear of the bracket.



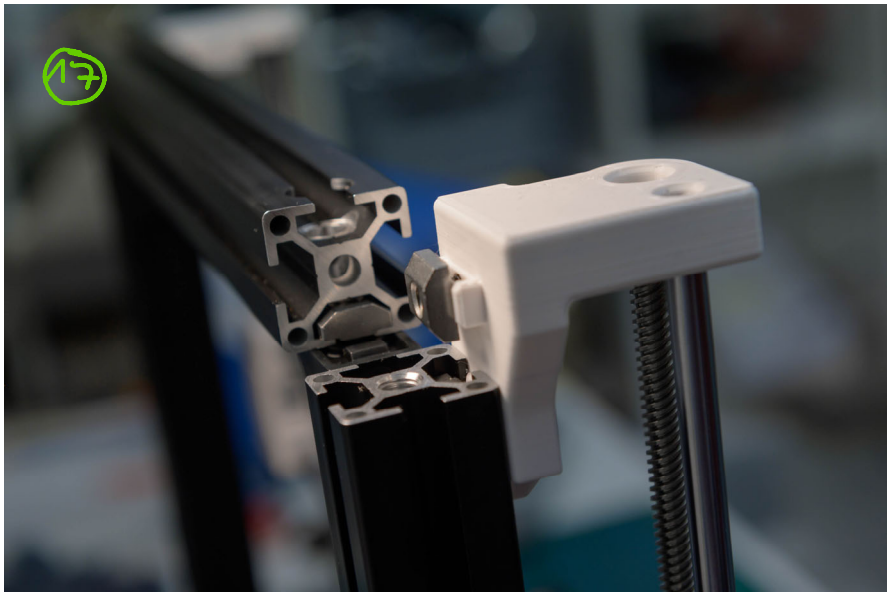
It should look like this.



Now slide the X-extrusion to the right.

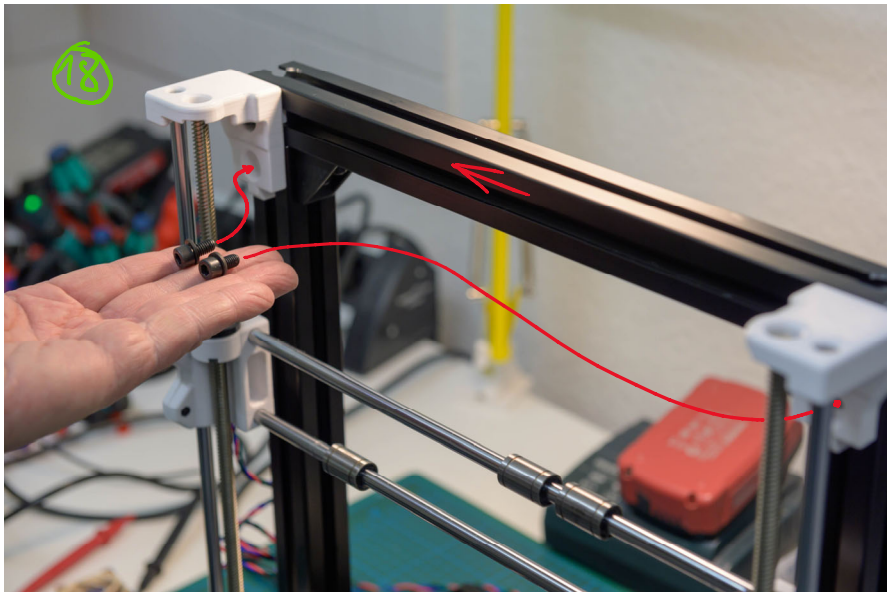


In the slot marked in red, insert two T-nuts.

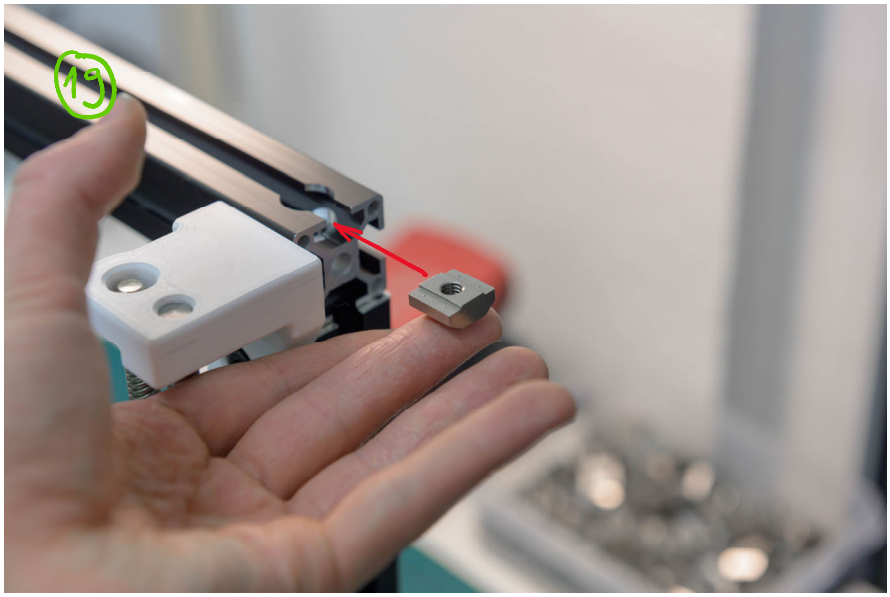


Install the left top bracket in the the same fashion as on the right.

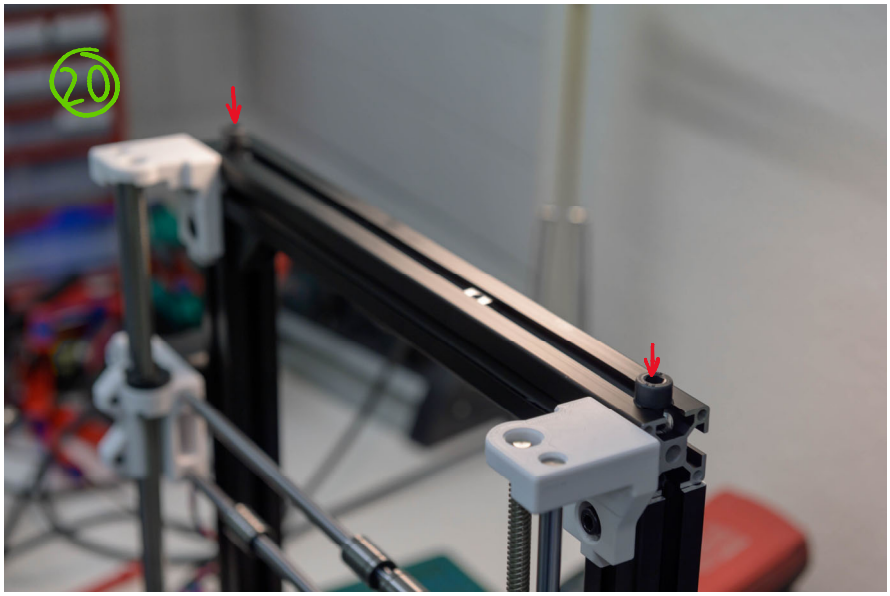
Then move the X-extrusion back into the middle.



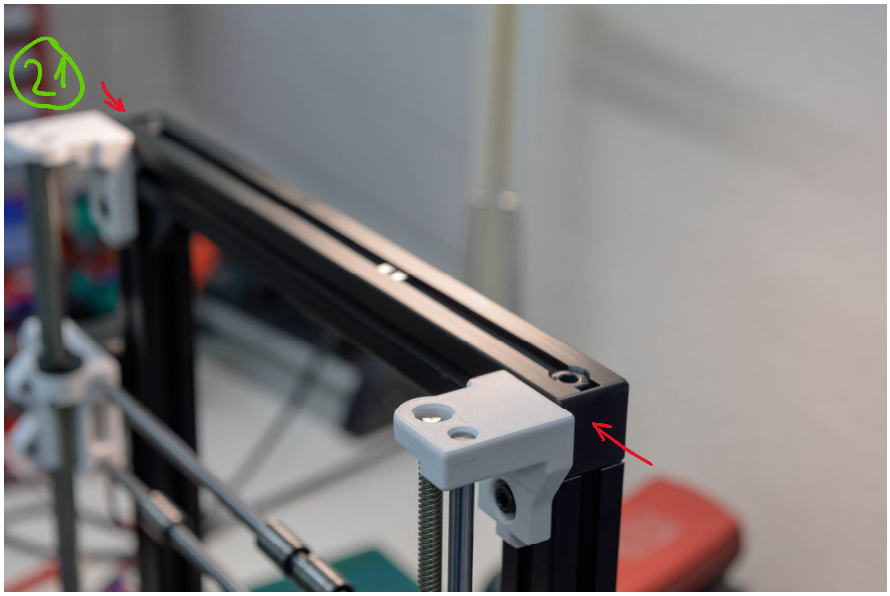
Screw two M6x12mm screws into the holes marked in red using an M6 washer each.



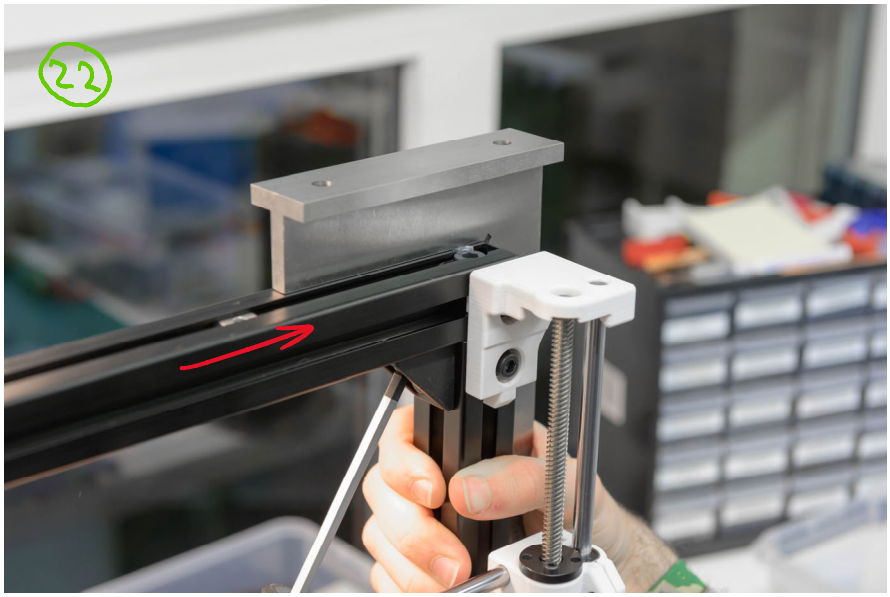
Insert one T-nut into the top extrusion slot.



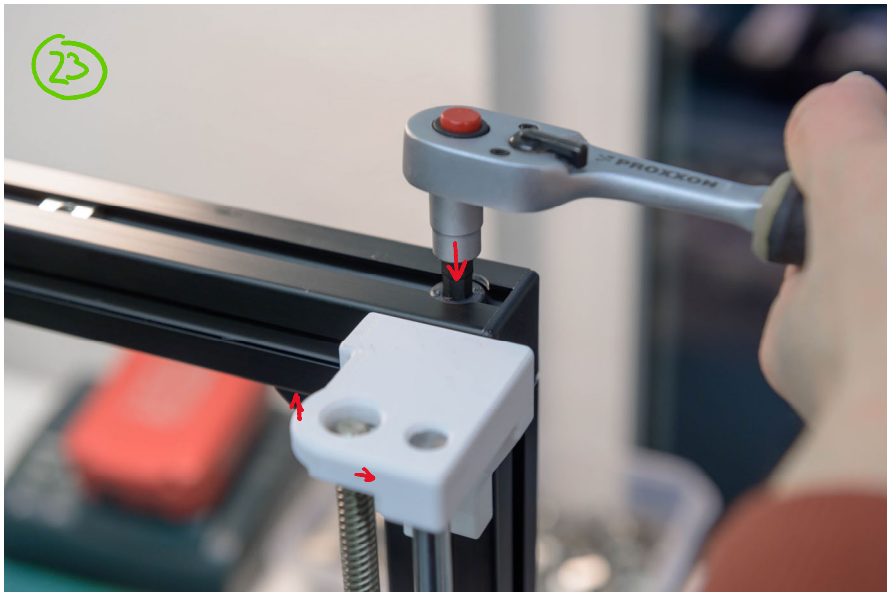
Screw in the two M8x40mm screws again, but leave them loose.



Install the two extrusion end caps.

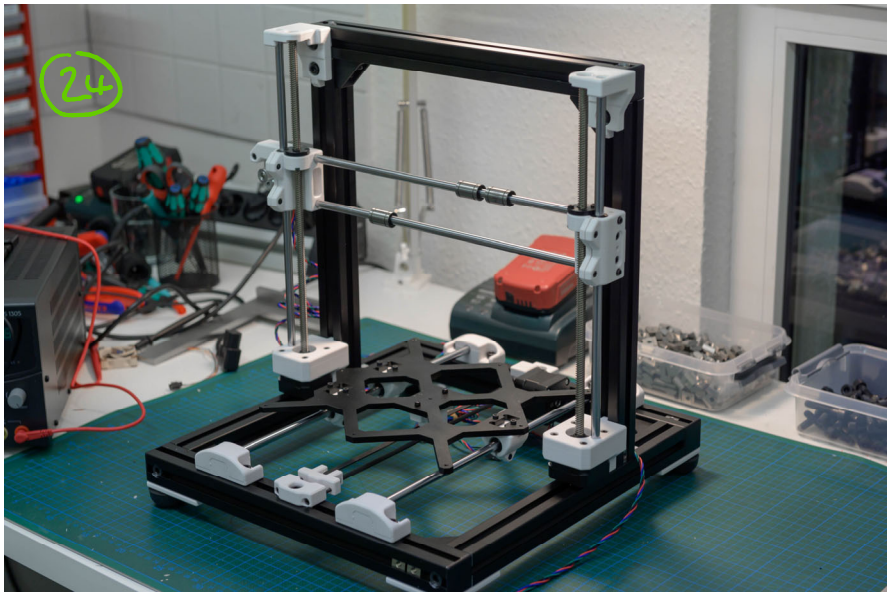


Just like when building the sub frame, we are using a flat surface to push both extrusions against in order to align them properly. When aligned, tighten the vertical M6x12mm screws in the brackets.



Now Tighten the M8x40mm screws fully.

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

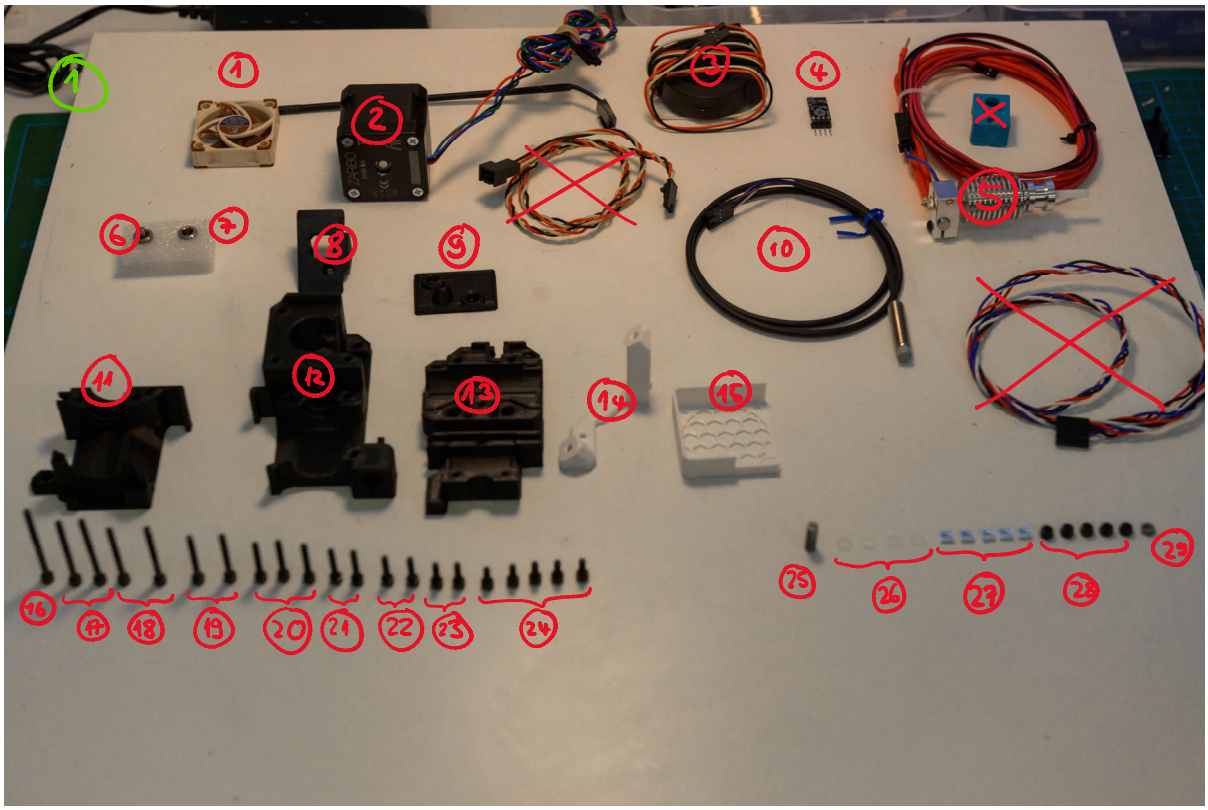


Your 3D printer should now look like this.

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

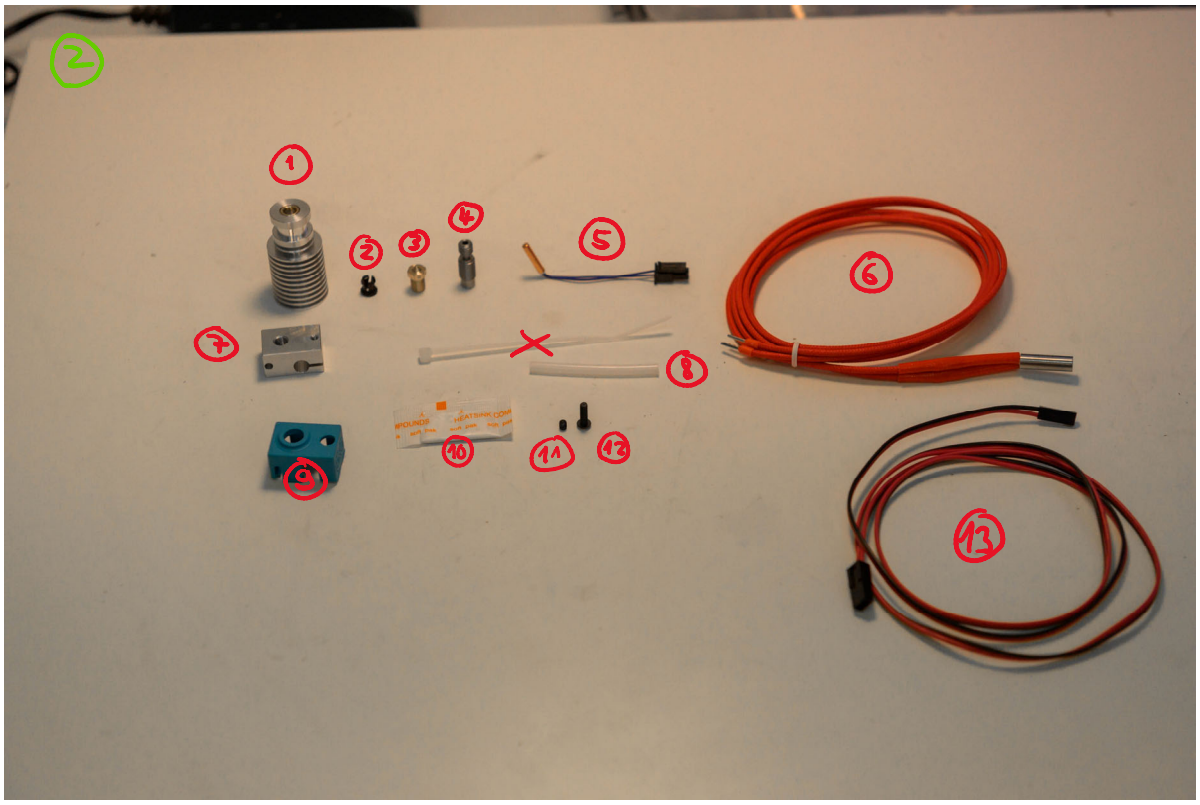
6: Extruder (part 1/2)

You will need the following parts to complete part 1 of the Extruder:

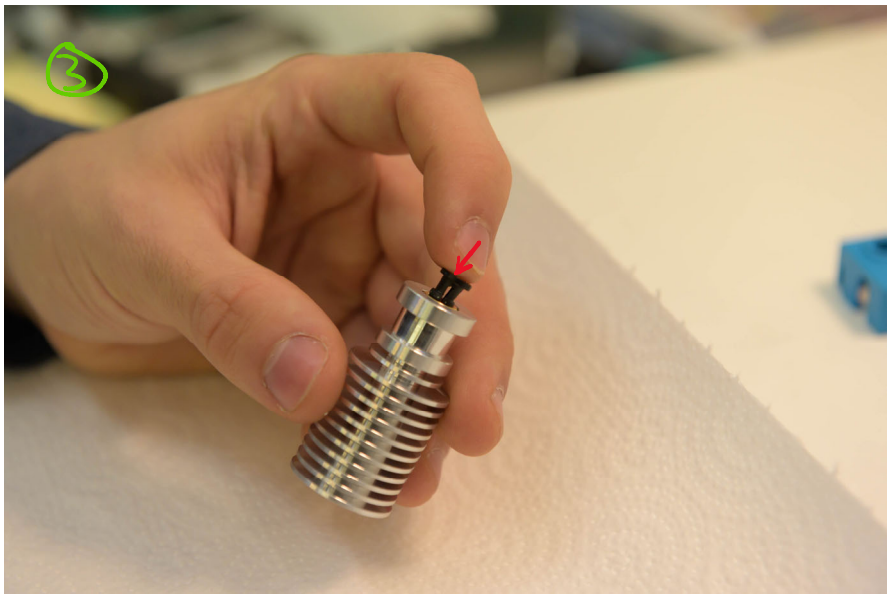


1. 1x extruder fan
2. 1x extruder motor
3. 1x radial fan
4. 1x filament sensor
5. 1x hot end
6. 1x drive gear 1
7. 1x drive gear 2
8. 1x idler
9. 1x filament sensor cover
10. 1x PINDA sensor
11. 1x extruder cover
12. 1x extruder body
13. 1x X-carriage
14. 1x radial fan mount
15. 1x extruder fan cover
16. 1x M3x40mm screw
17. 2x M3x35mm screws
18. 2x M3x30mm screws
19. 2x M3x25mm screws
20. 3x M3x20mm screws
21. 2x M3x16mm screws
22. 2x M3x12mm screws
23. 2x M3x10mm screws
24. 5x M3x8mm screws
25. 1x idler spring
26. 4x plastic washers
27. 5x M3 square nuts
28. 5x M3 self locking nuts
29. 1x M3 nut

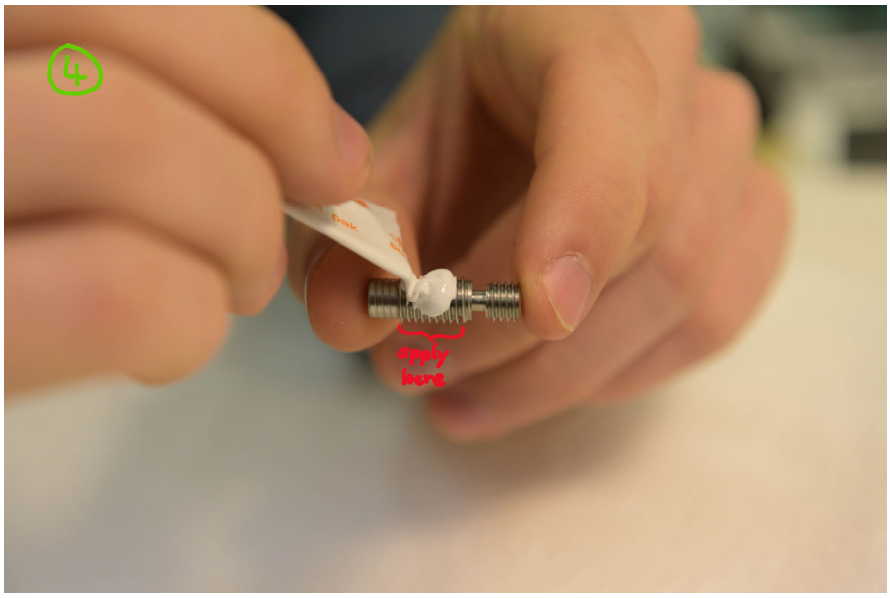
First of all, we will build the hot end that we need for the extruder.
You will need the following parts:



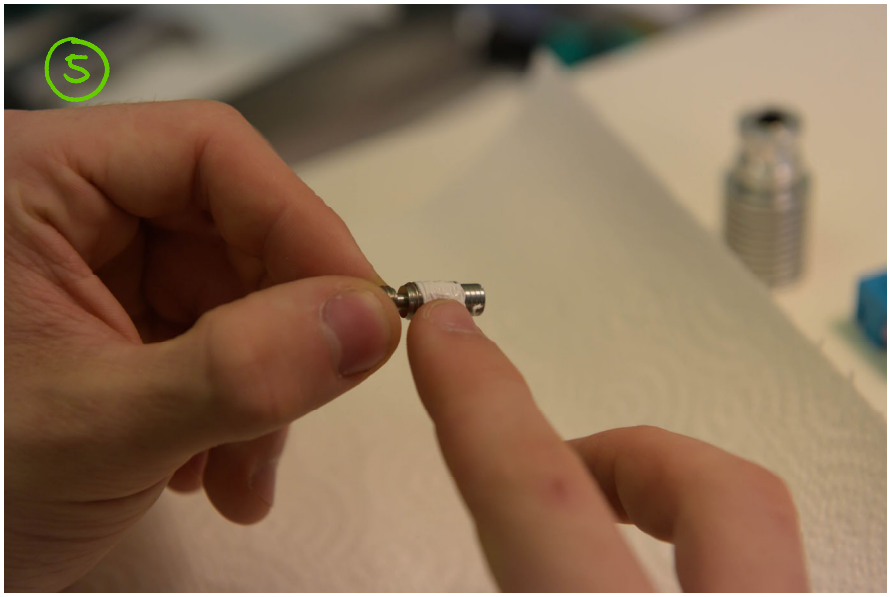
1. 1x heatsink
2. 1x tube lock
3. 1x nozzle
4. 1x heat break
5. 1x thermister
6. 1x heater cartridge
7. 1x nozzle block
8. 1x 50mm PFTE tube
9. 1x silicone sock
10. 1x thermal paste
11. 1x allen screw
12. 1x lens head screw
13. 1x thermister extension cable



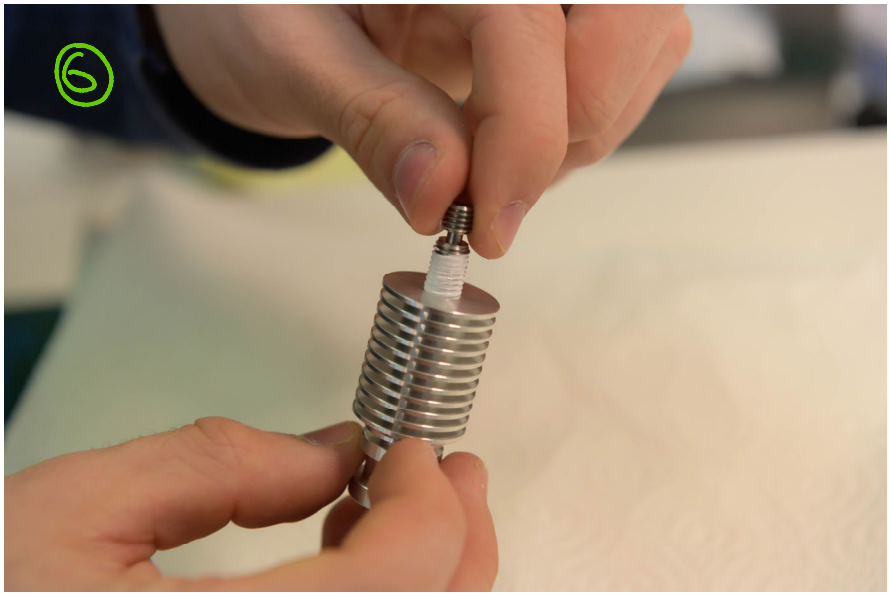
Insert the tube lock into the heatsink.



On the heat break, apply the thermal paste onto the larger thread of the two.

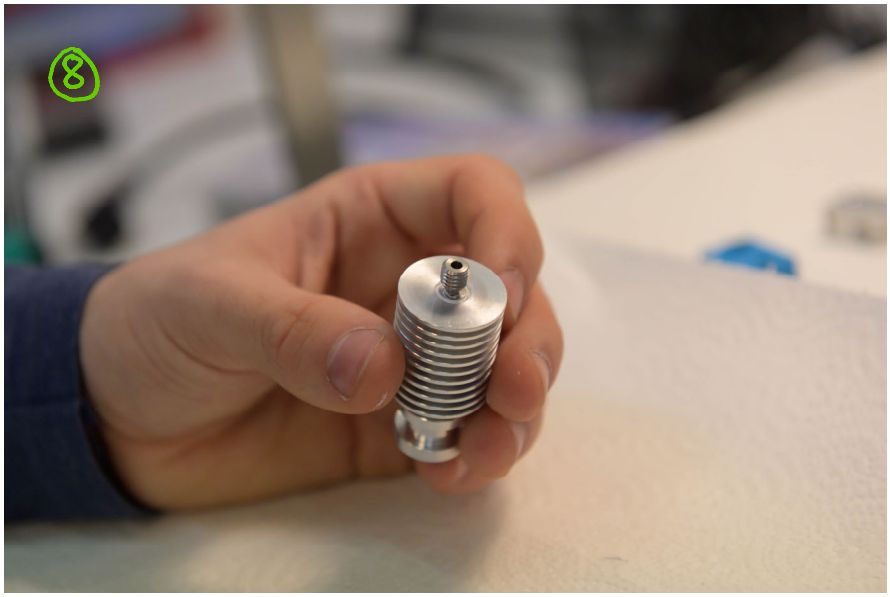


Make sure it is spread evenly.

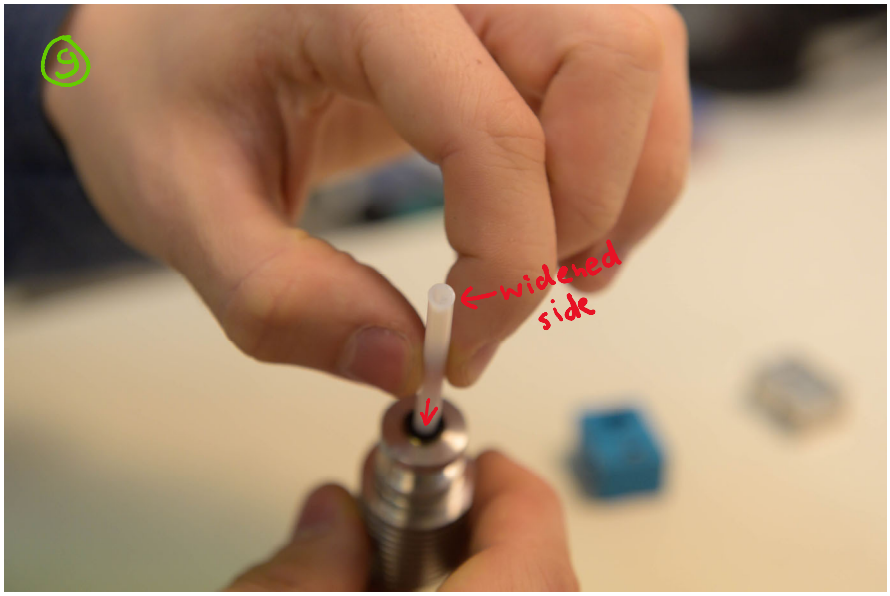


Screw the heat break into the heatsink fully.

You will notice that the excess thermal paste will be forced out of the thread. Remove it with something like a paper towel.



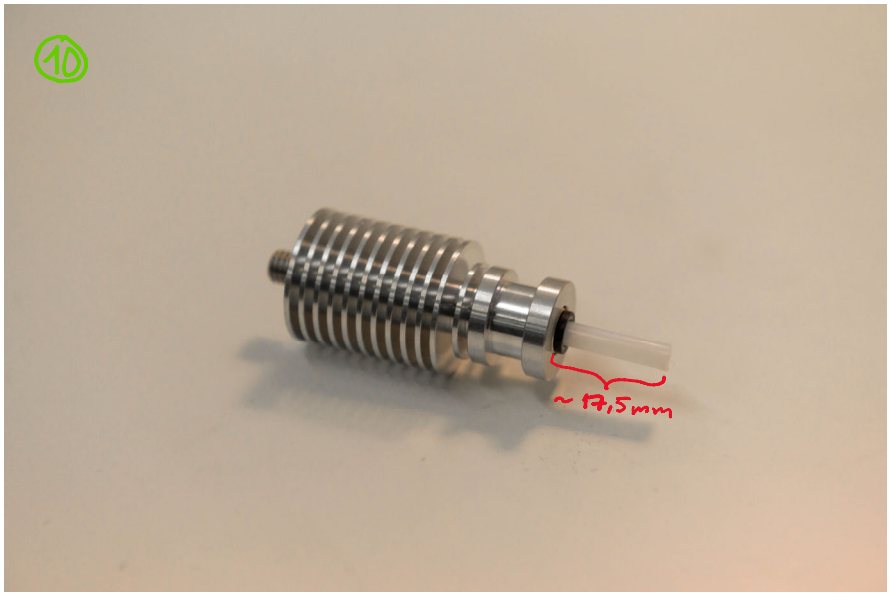
The hot end should now look like this.



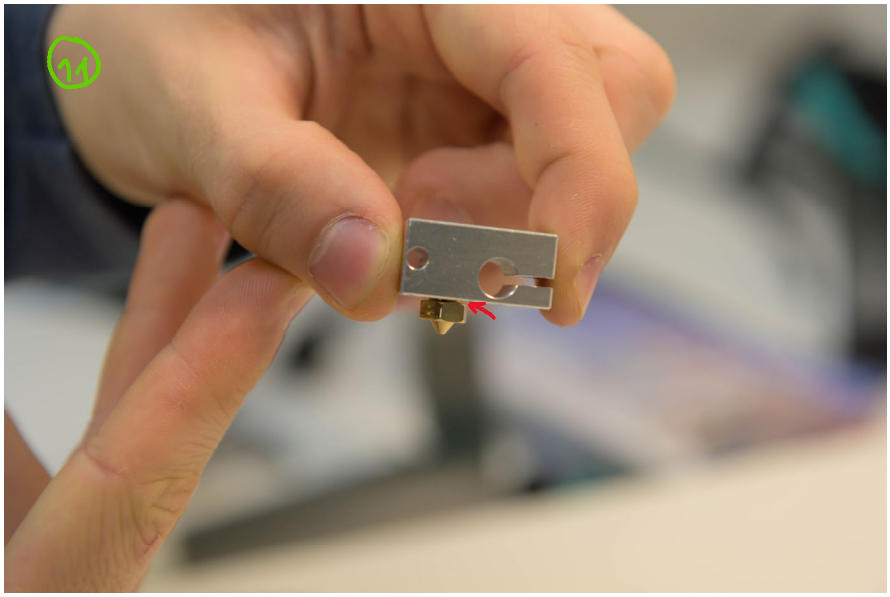
Check if the tube is indeed exactly 50mm long.

Insert the PFTE tube into the hot end, with the widened* hole outwards.

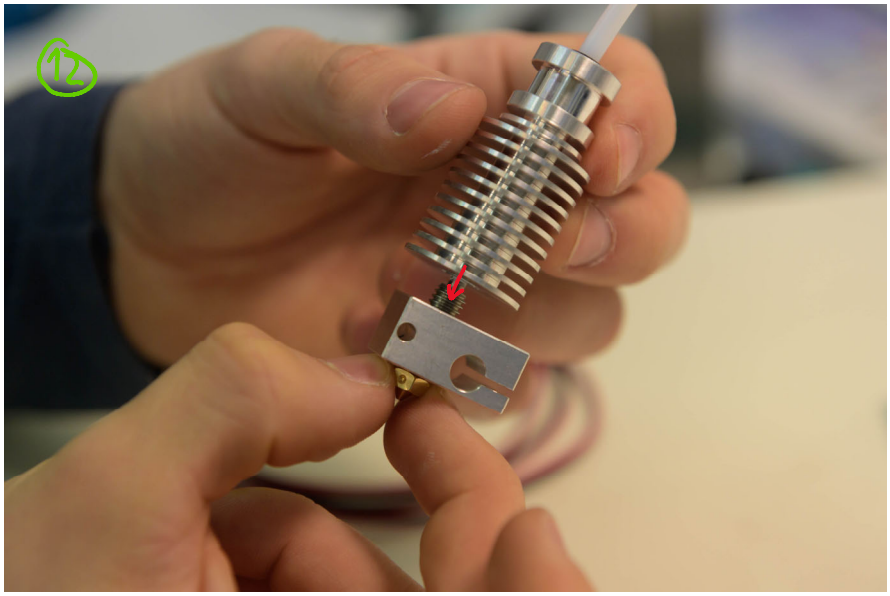
*In our kits we pre-widen the tube on one side. Should you be required to do this by your self for some reason, we recommend using a fitting central drill and turning it by hand.



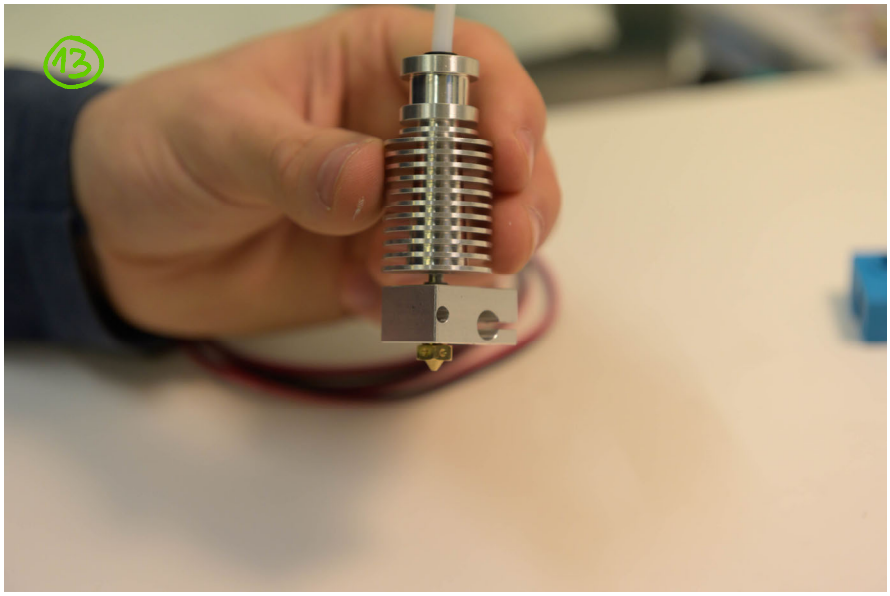
Make sure it is fully inserted. Measured from the metal to the tip of the tube it should protrude about 17.5mm.



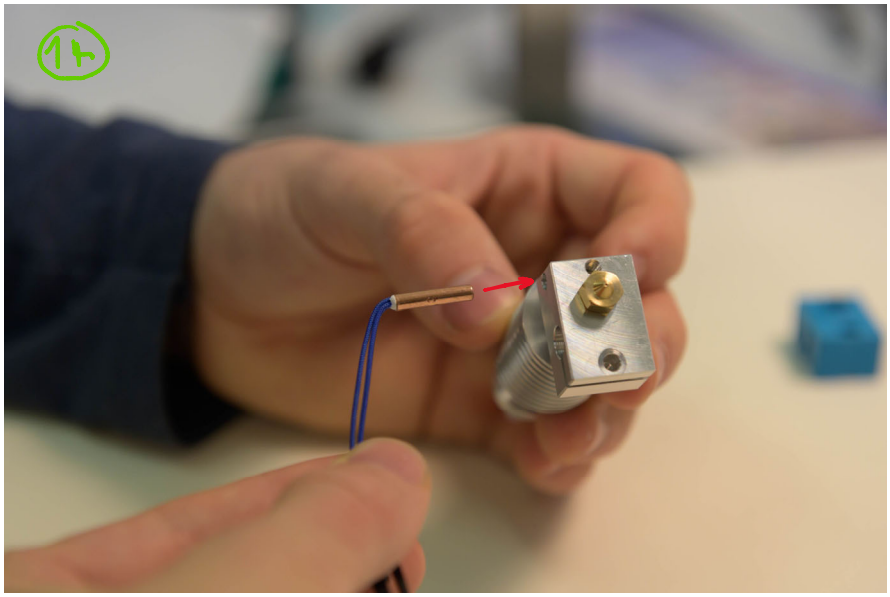
Now screw the nozzle into the nozzle block. Leave about a 0.5mm gap as marked by the red arrow. The slot for the heat cartridge should be on the side of the nozzle.



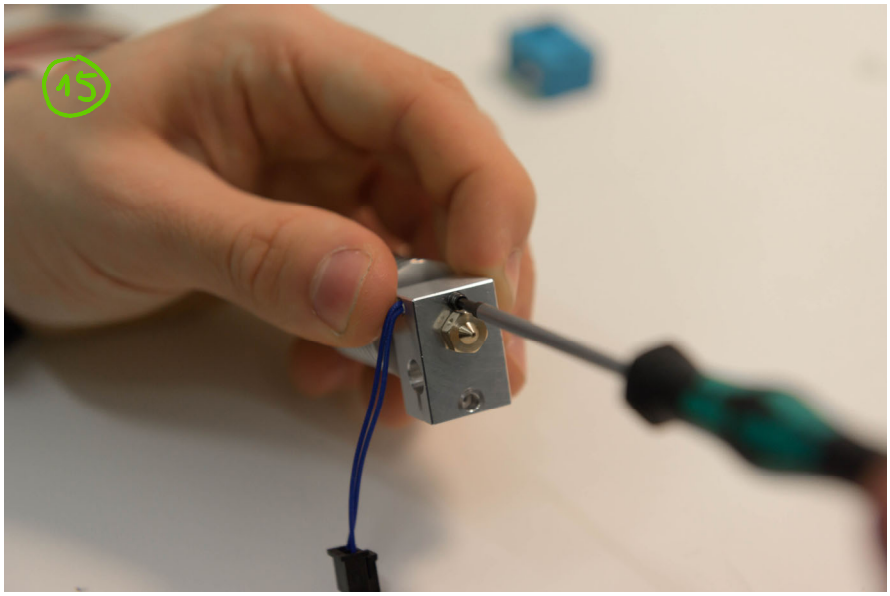
Screw the hot end into the nozzle block and tighten it. It shouldn't come loose easily.



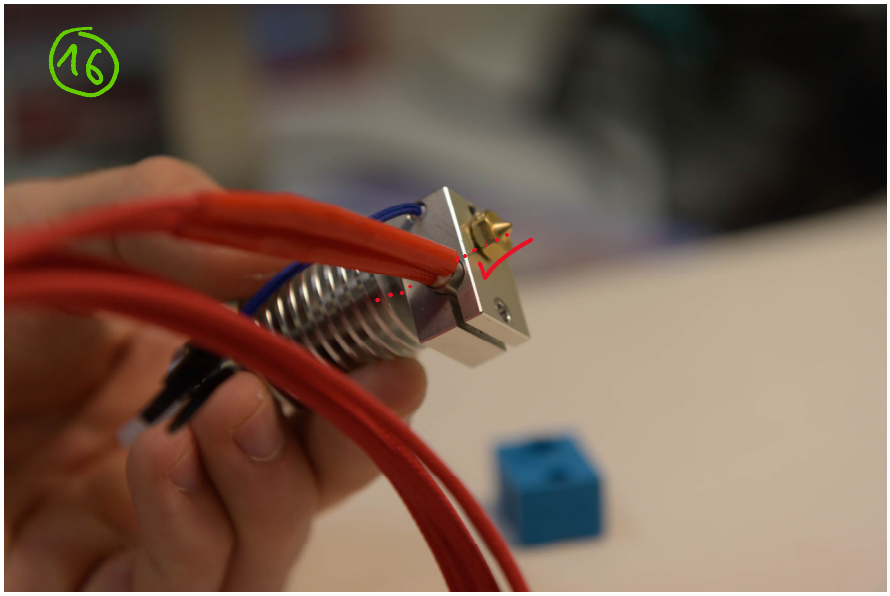
This is what the hot end should look like.



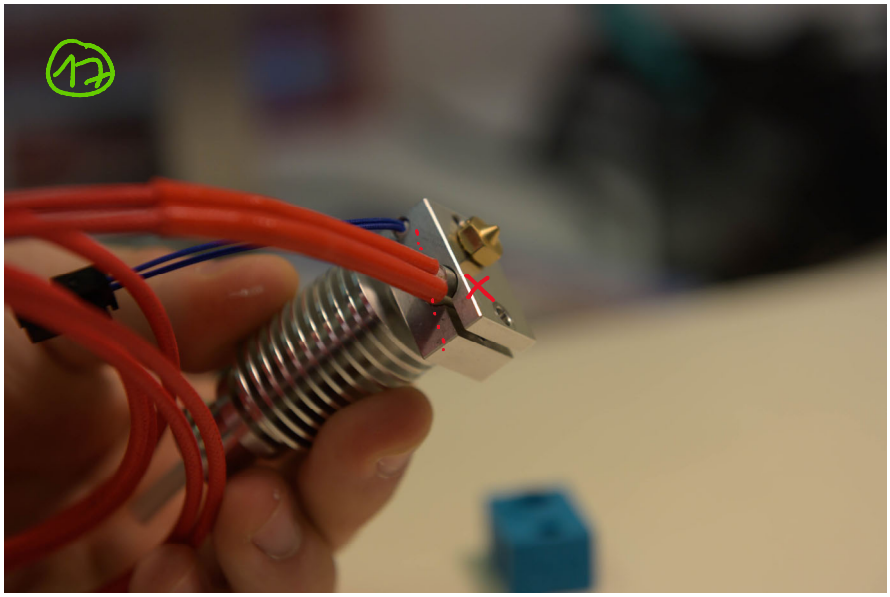
Insert the thermister into the corrisponding slot.



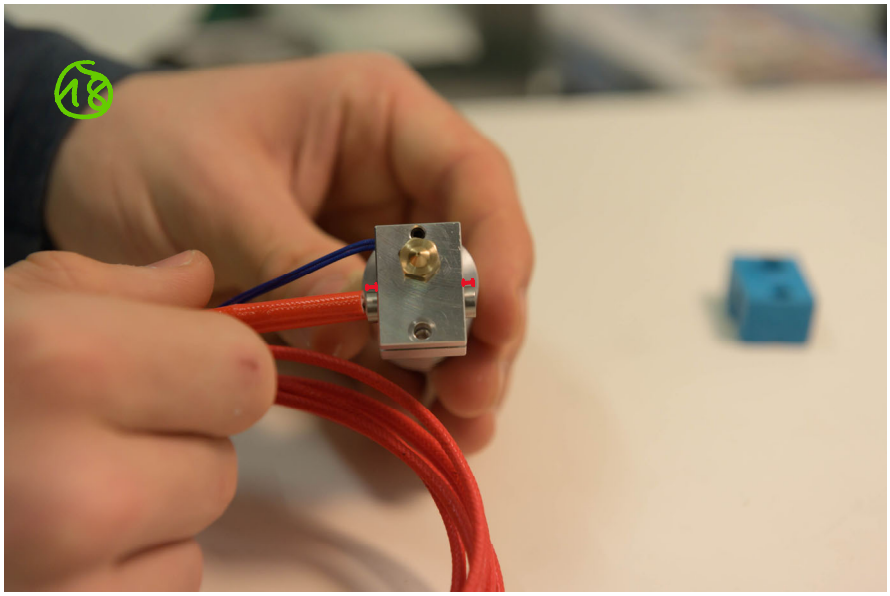
Using the allen screw, fasten the thermister in place.



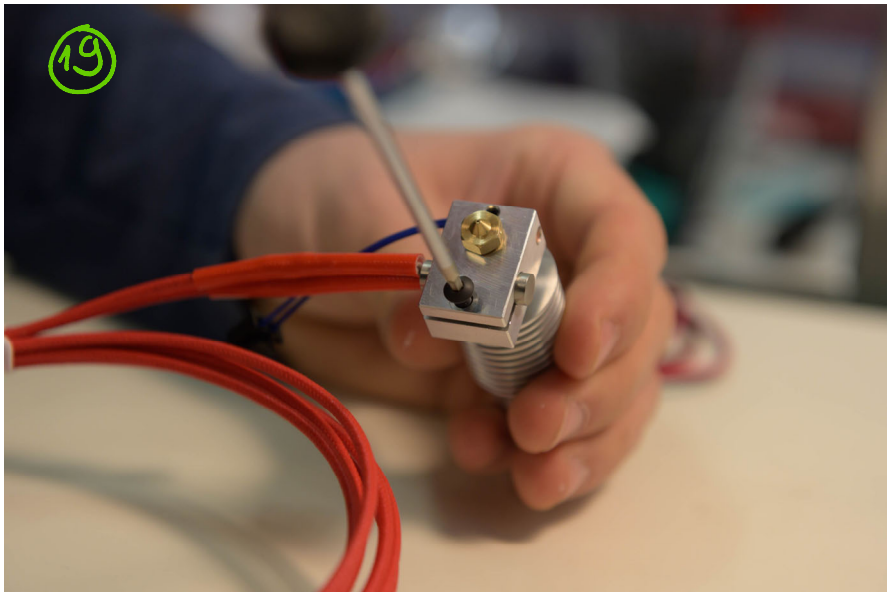
Now insert the heat cartridge. Make sure it is oriented as shown on the left.



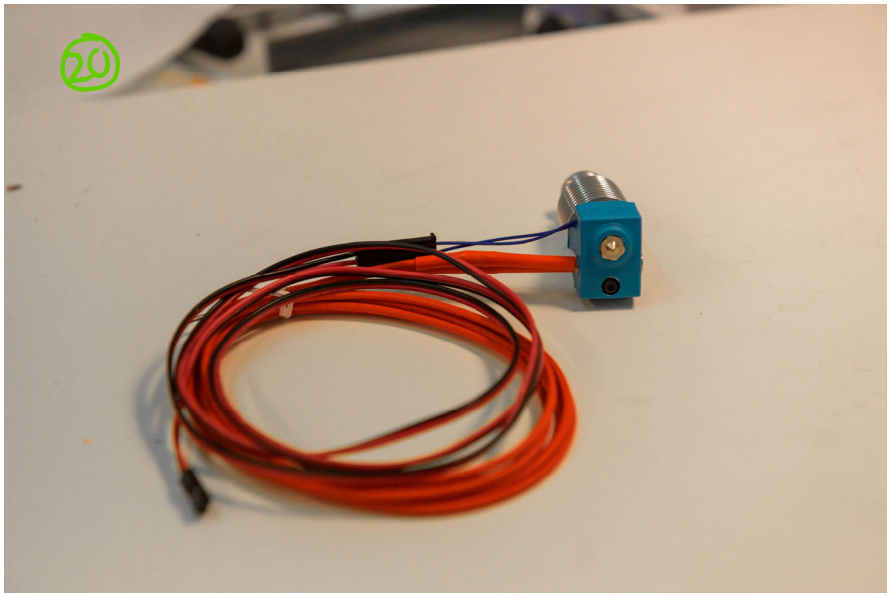
This is an example of bad alignment.



Also, make sure that the cartridge is centred.

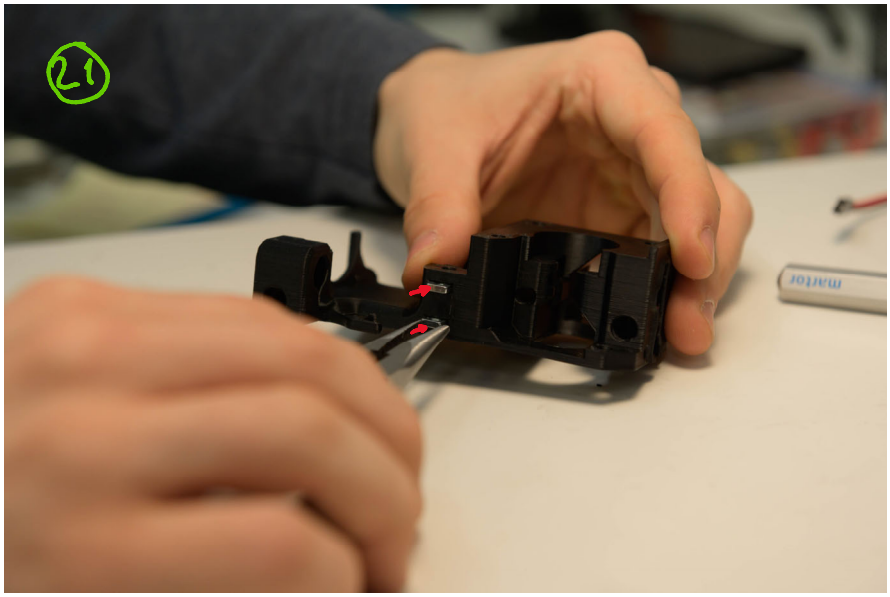


Fasten it into place with the lens head screw.

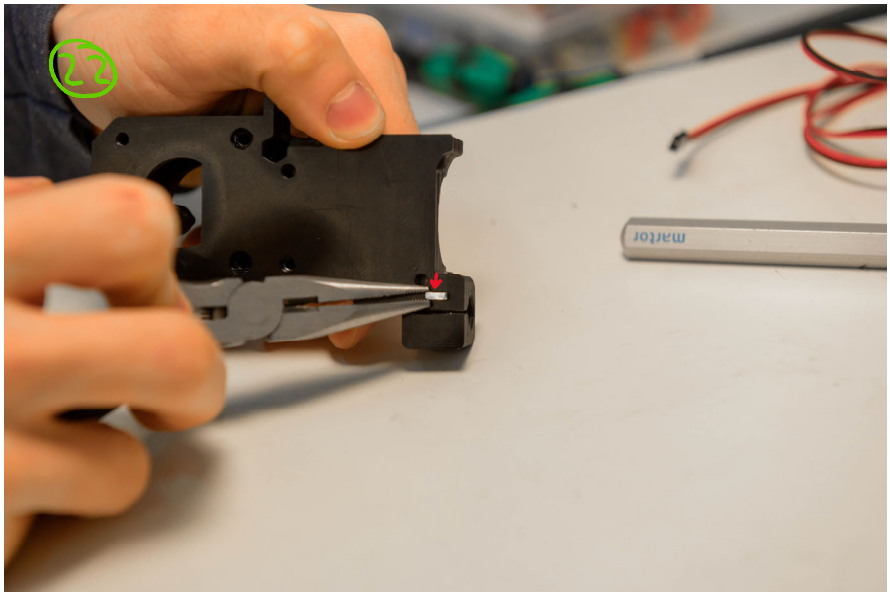


If you decide to immediatly proceed to the extruder assembly, you can leave out attaching the silicone sock and the thermister cable. We will add those parts in the last two chapters.

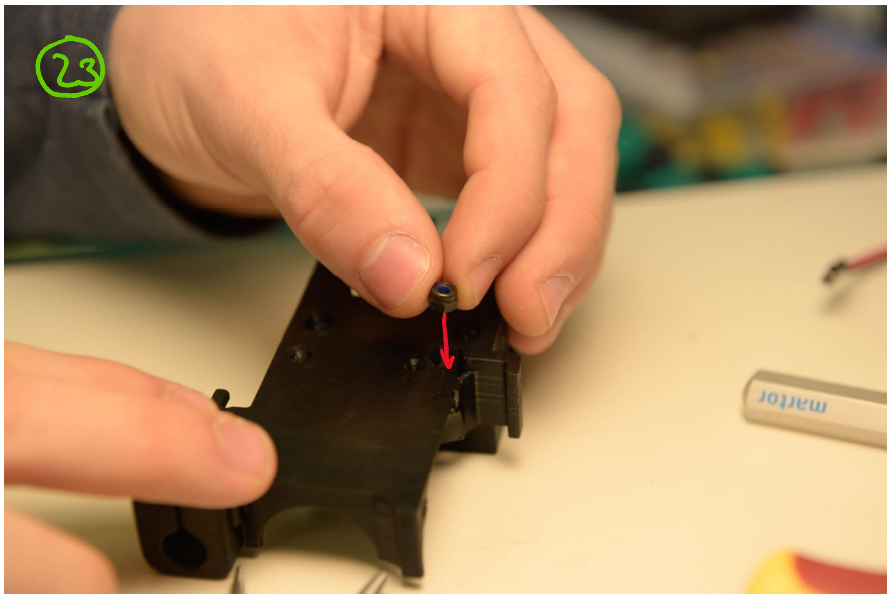
With the hot end completed, we will now proceed to building the extruder.



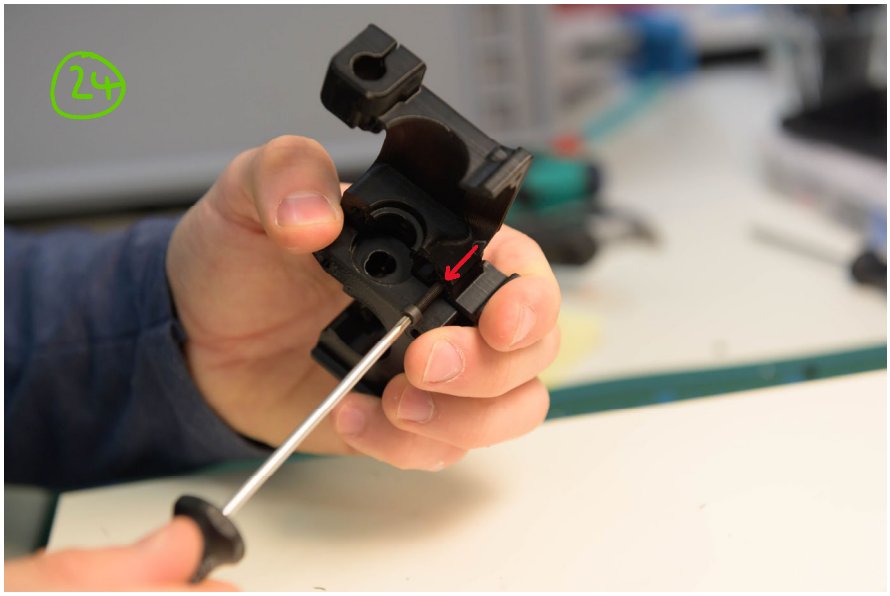
Insert two square nuts into the side of the extruder body.



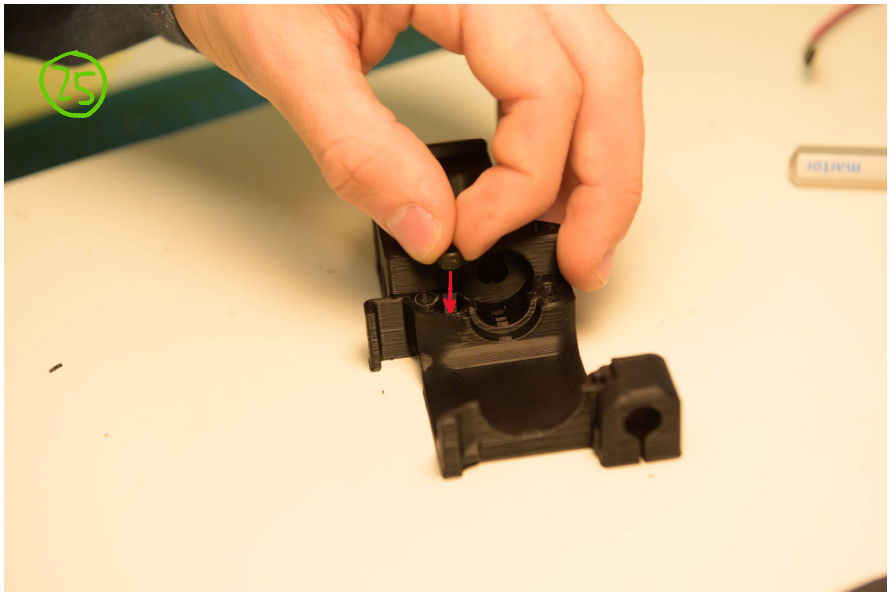
Insert another square nut in the slot marked in red.



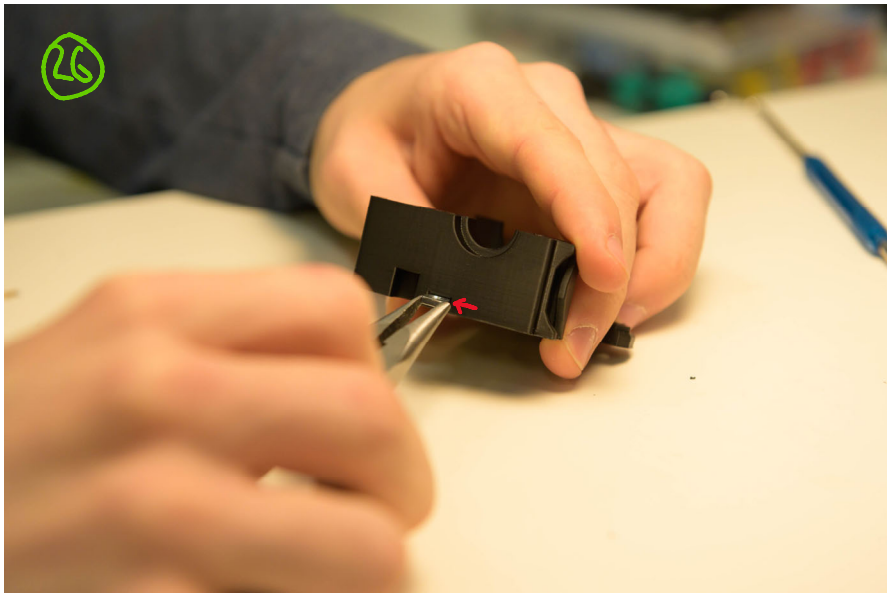
Insert a self locking nut into the indicated slot.



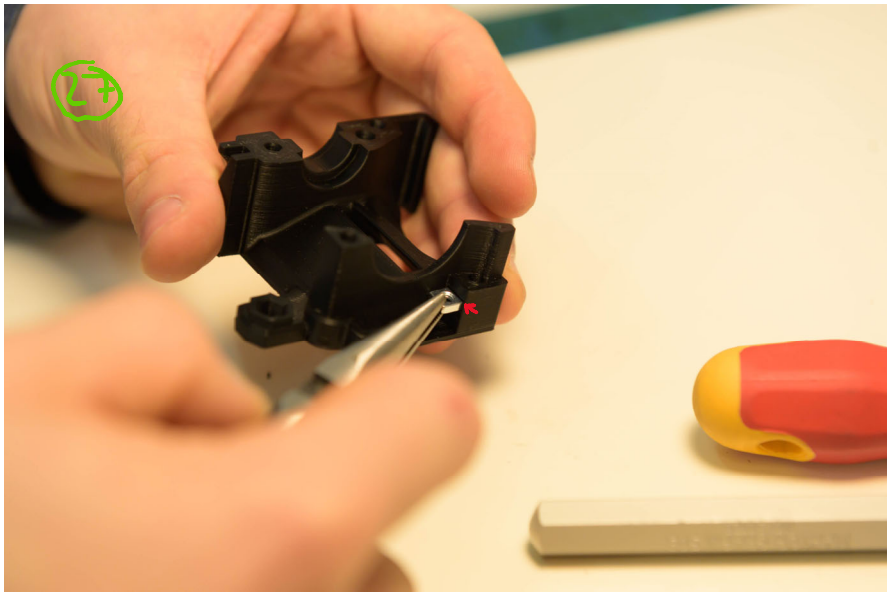
Use a screw from the other side to pull the nut in fully.



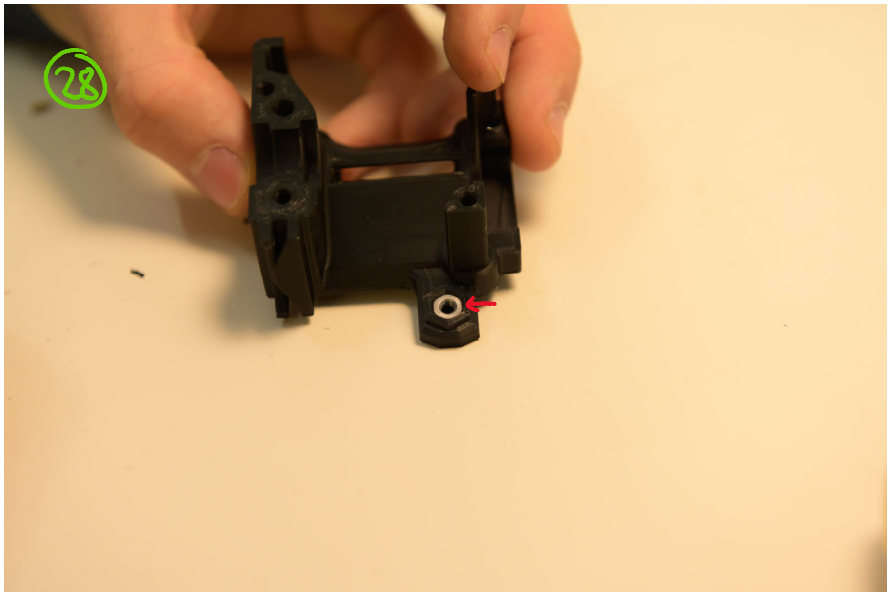
Do the same for this slot.



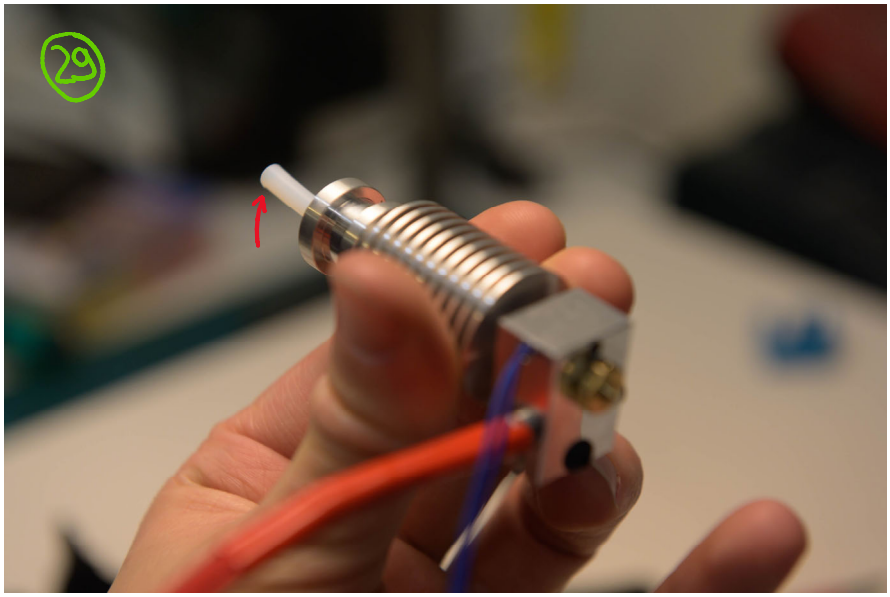
On the extruder cover, insert a square nut here....



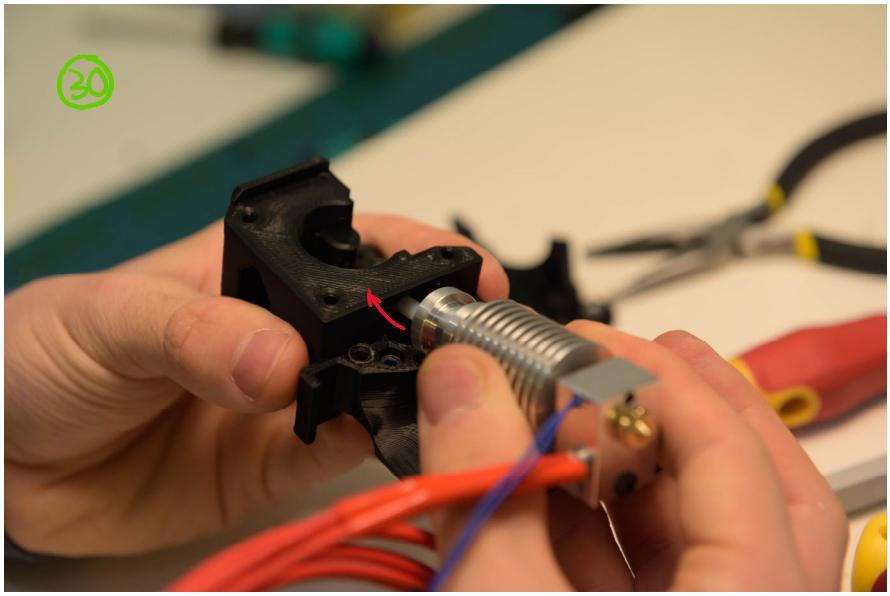
....and here.



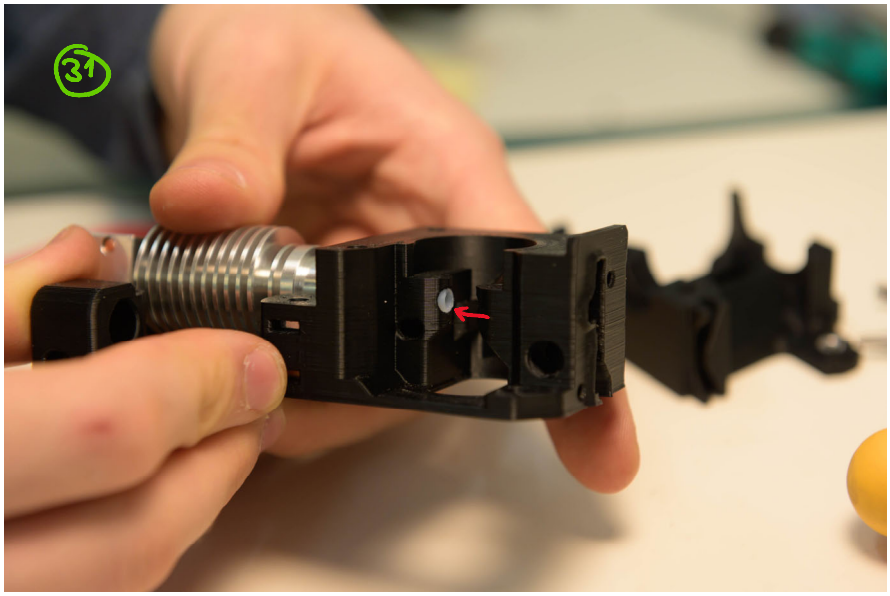
Insert a nut into the marked slot.



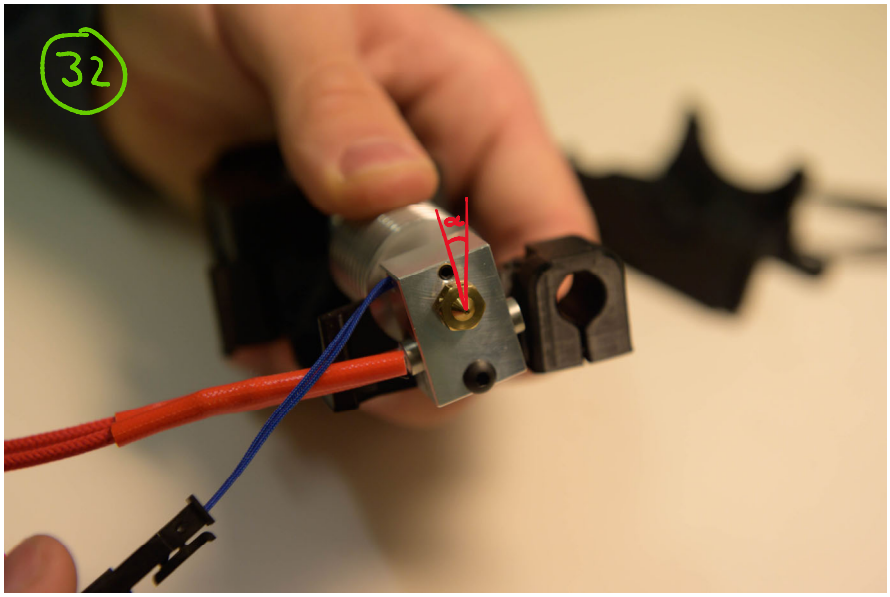
Bend the tube on the hot end up slightly to ease installation.



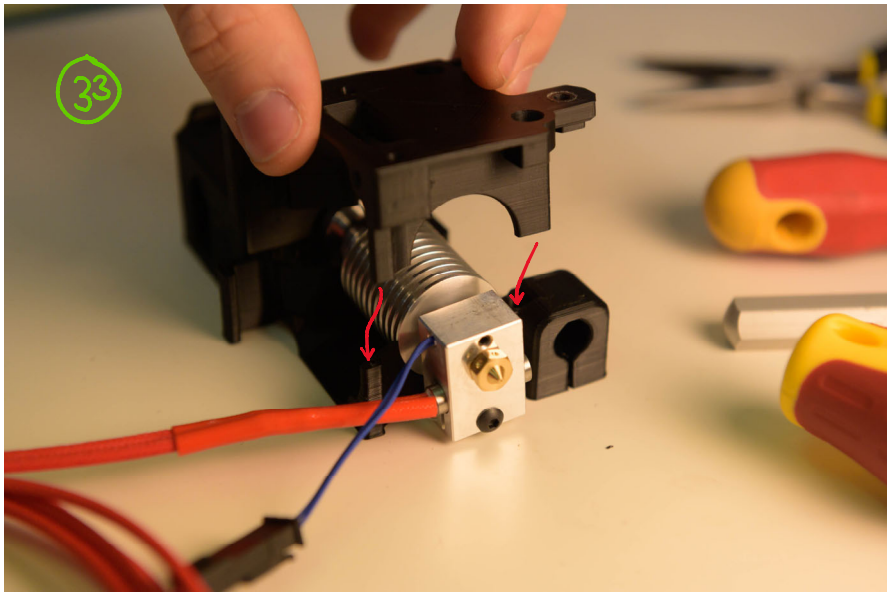
Insert the hot end into the extruder body as seen on the left.



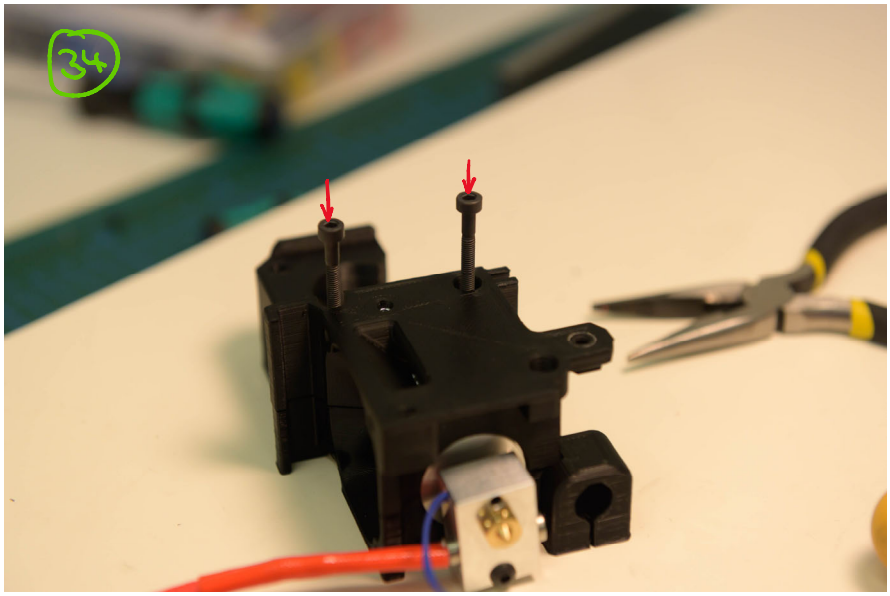
When installed, the tube should sit flush with the opening in the extruder body.



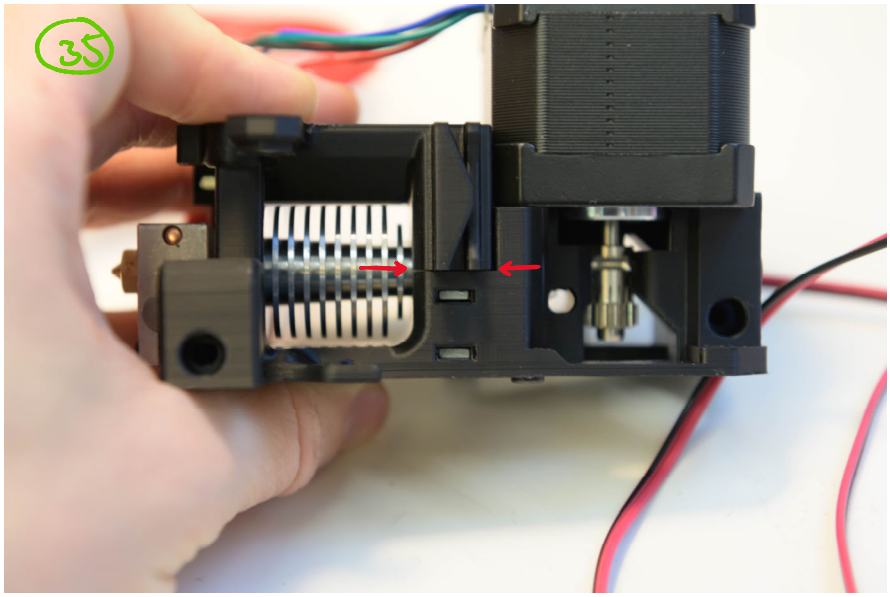
Rotate the hot end counterclockwise a bit.
$5° < \alpha < 10°$
(The picture is a little exaggerated.)



Put on the extruder cover.

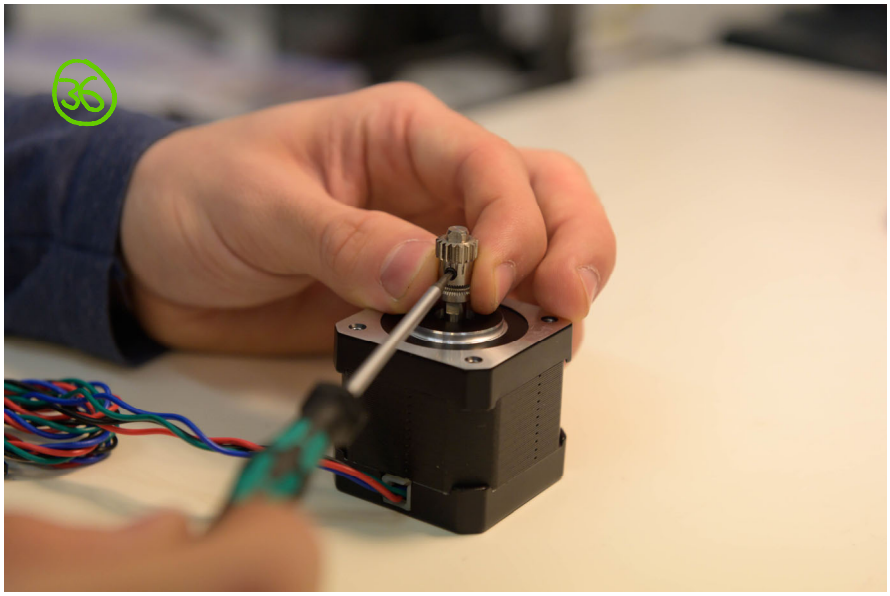


Screw it in with two M3x25mm screws.



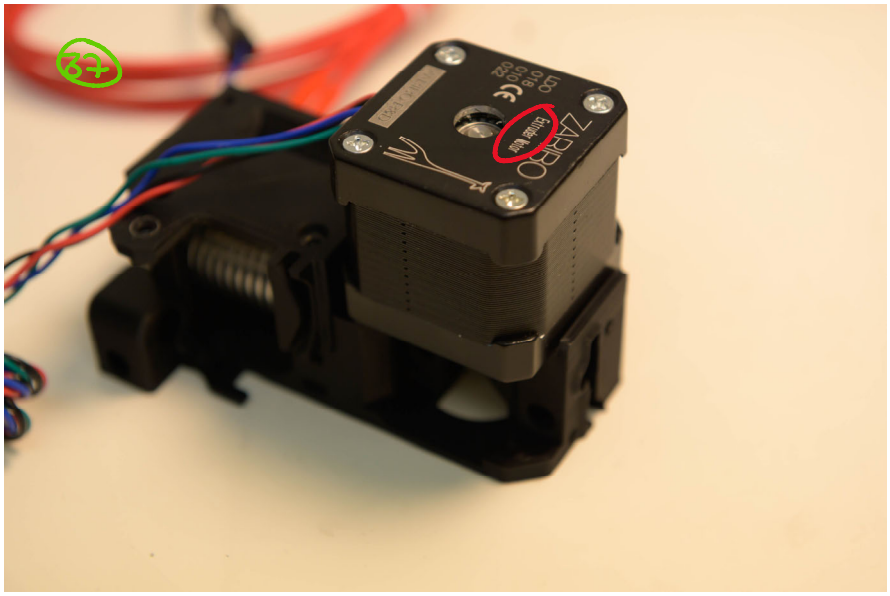
Don't overtighten these screws.
A gap between the two pieces in the marked area is ok, as long as the hot end can't move around.

(Don't worry, the motor already being installed in this picture is just a continuity error.)

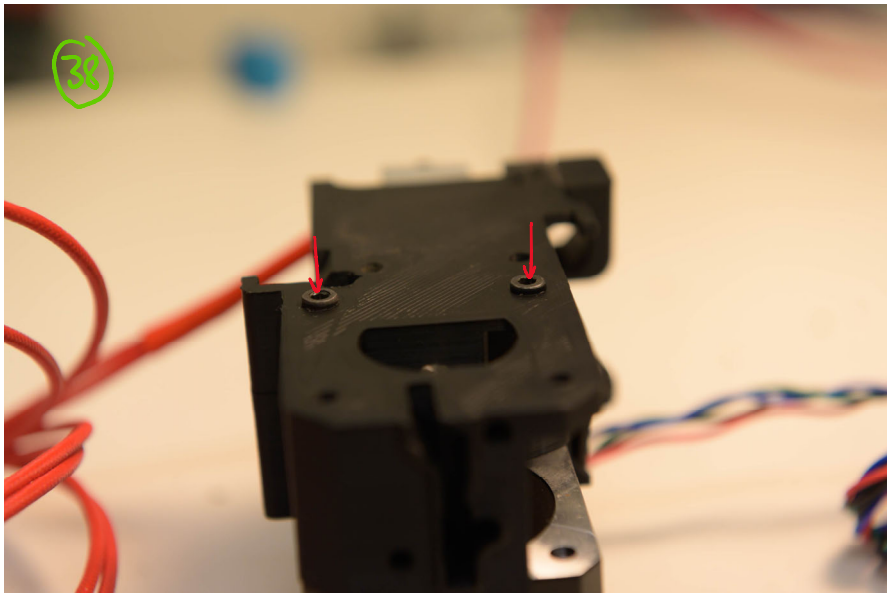


Put the drive gear 2 onto the motor shaft. Make sure that the motor is an extruder motor, which you can tell by looking at the rear of the motor (see picture 37).

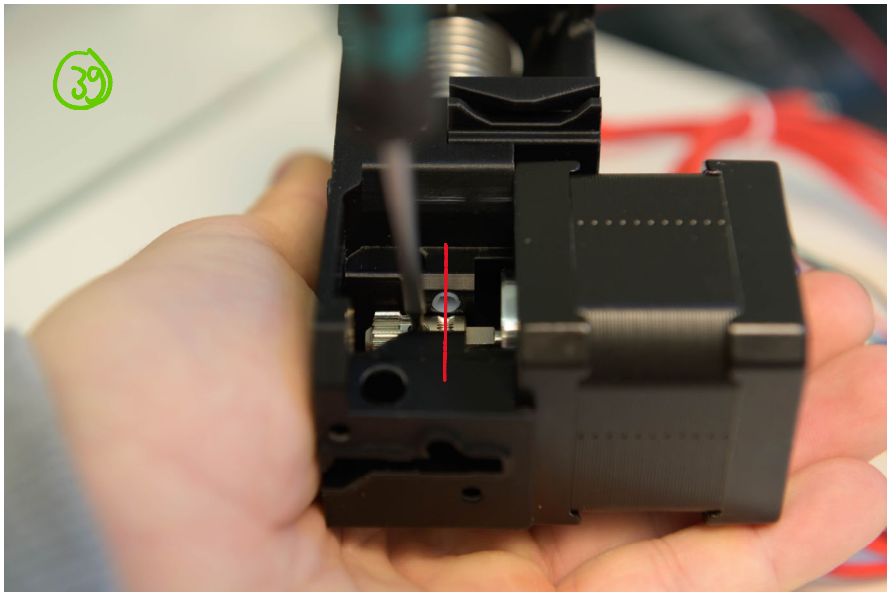
Tighten the allen screw so that it is aligned with the flattened side of the shaft.



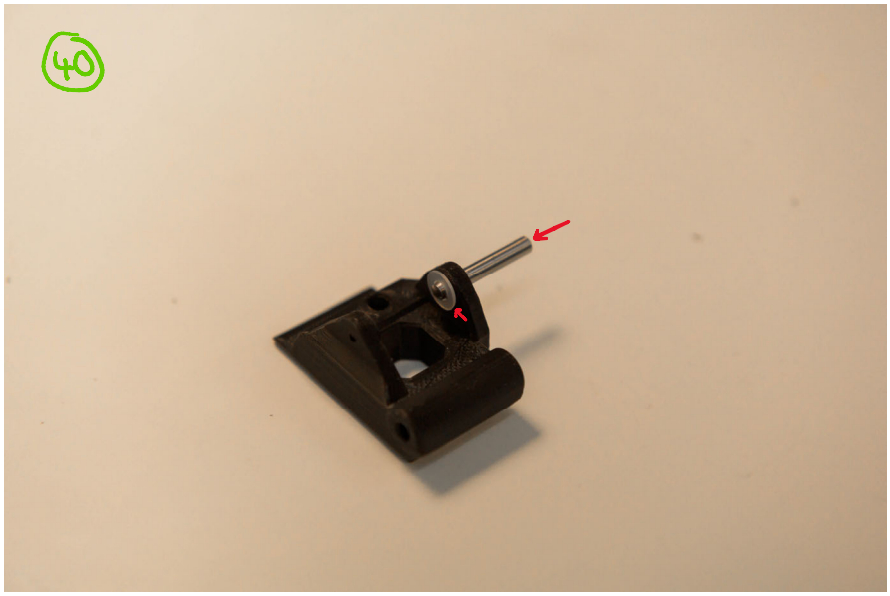
Put the motor onto the extruder body, with the cable exiting towards the hot end.



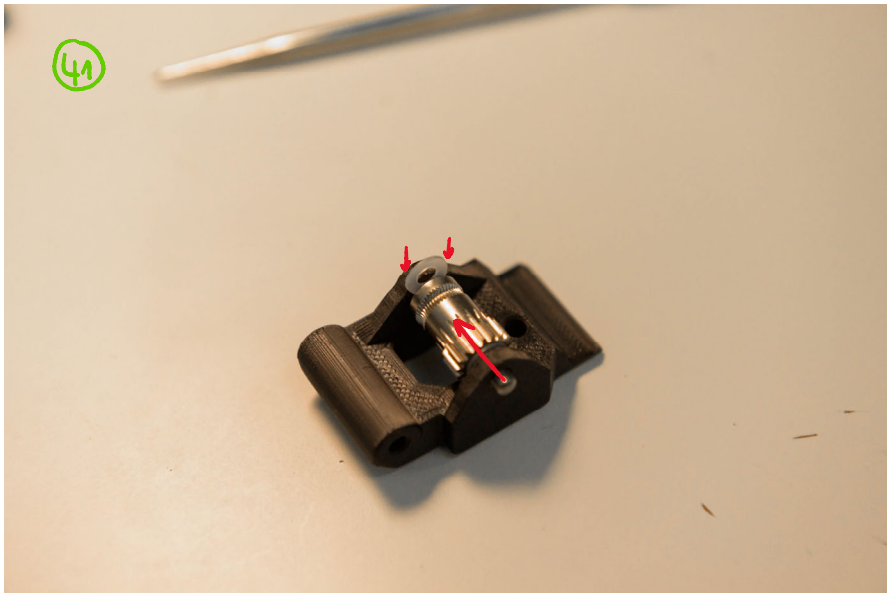
Screw two M3x30mm screws into the motor through the extruder body. The heads of the screws are supposed to protrude from the extruder body surface as seen in the picture.



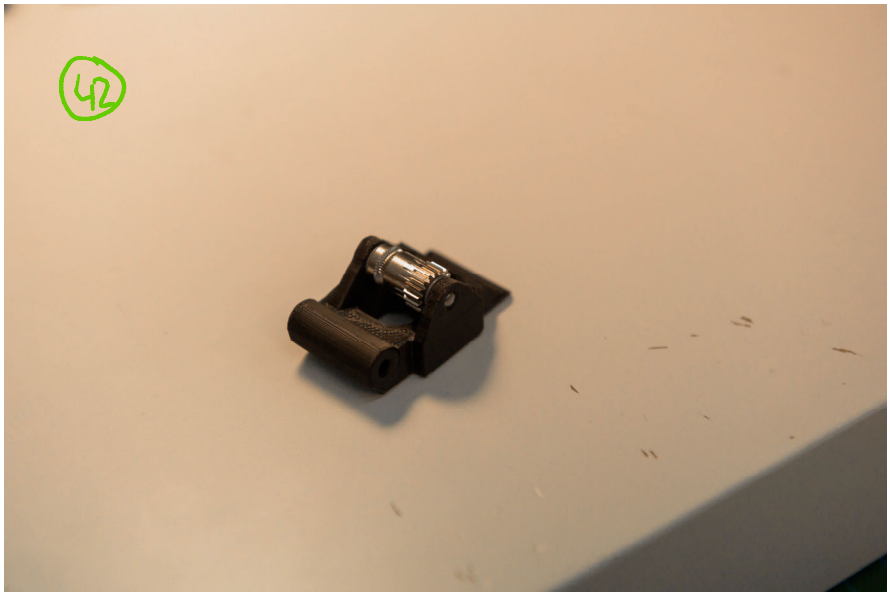
If the drive gear is not aligned already, loosen the allen screw and align the grooves with the tube.



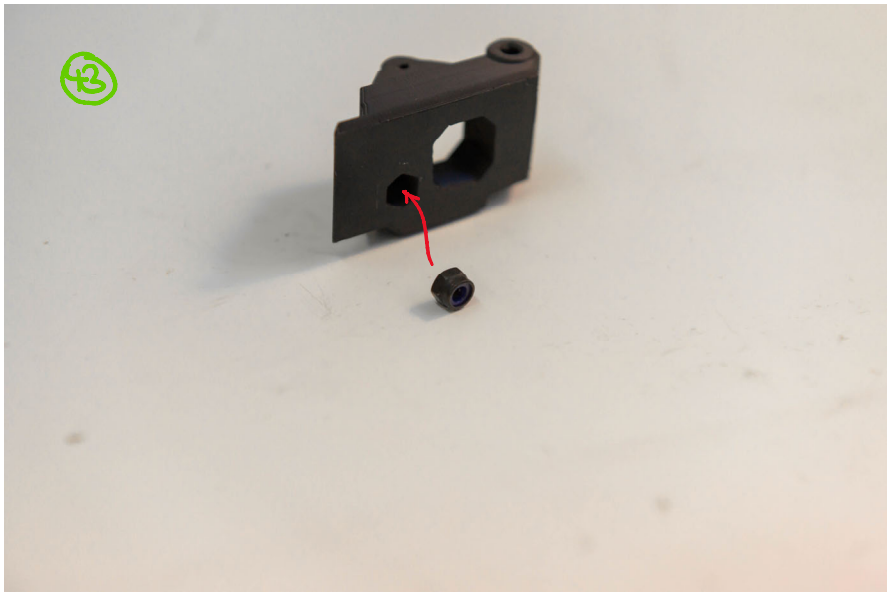
Idler:
Partly insert the drive gear pin from the drive gear 1 into the idler from one side, so that you can just about fit a plastic washer onto it.



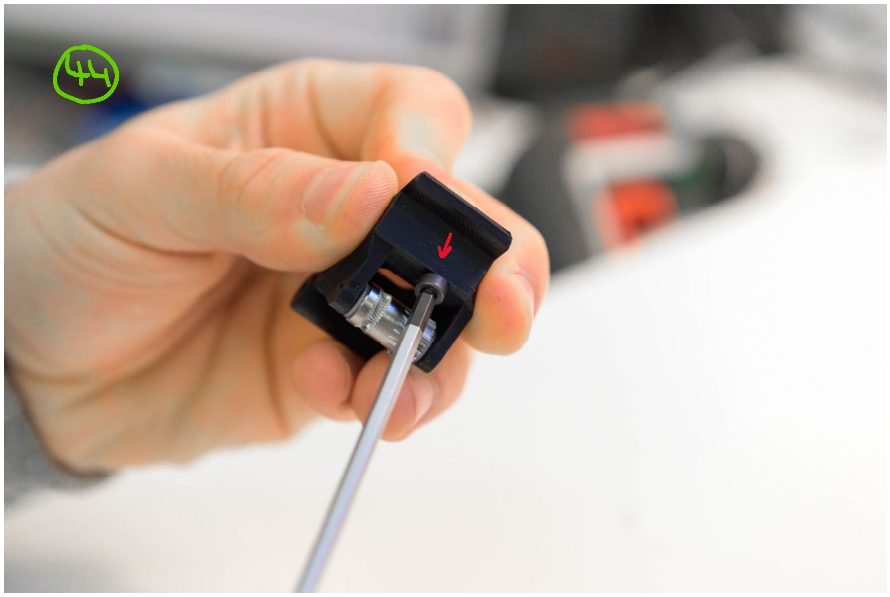
While holding the driver gear 1 in place, push the pin through, and before pushing it through completely insert a second plastic washer.



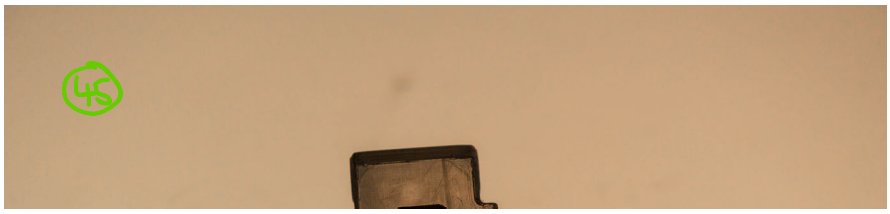
The idler should now look like this.



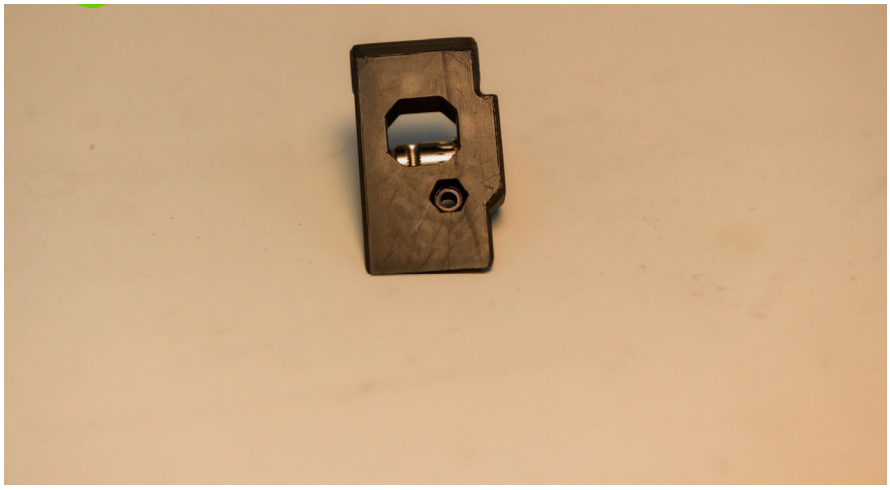
Now insert a self locking nut into the marked slot.



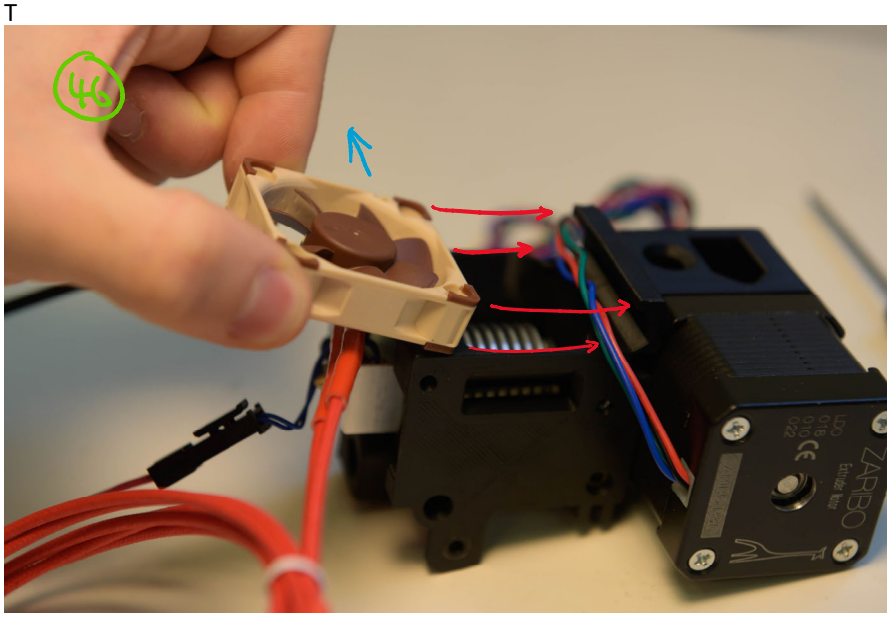
You can use the screw method to pull it in fully.



This is the finished idler.

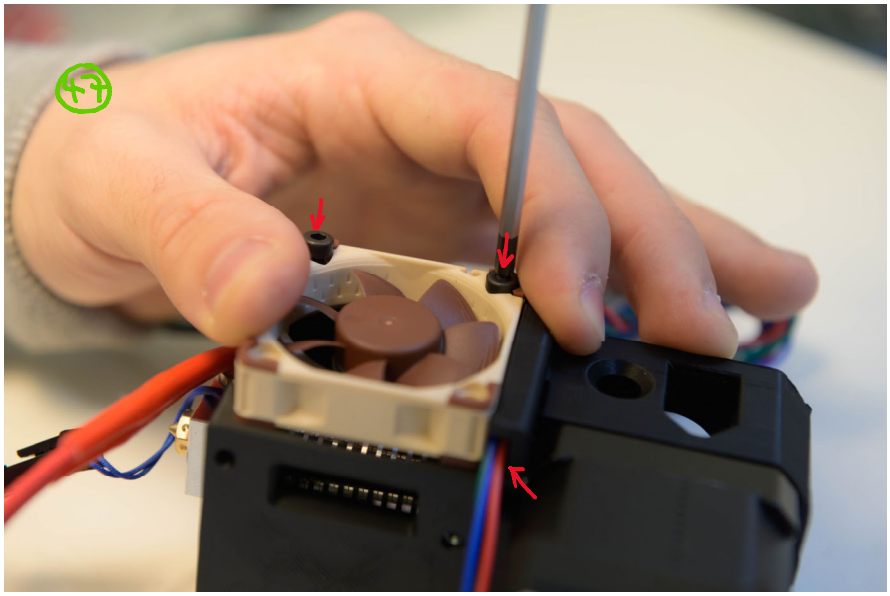


T

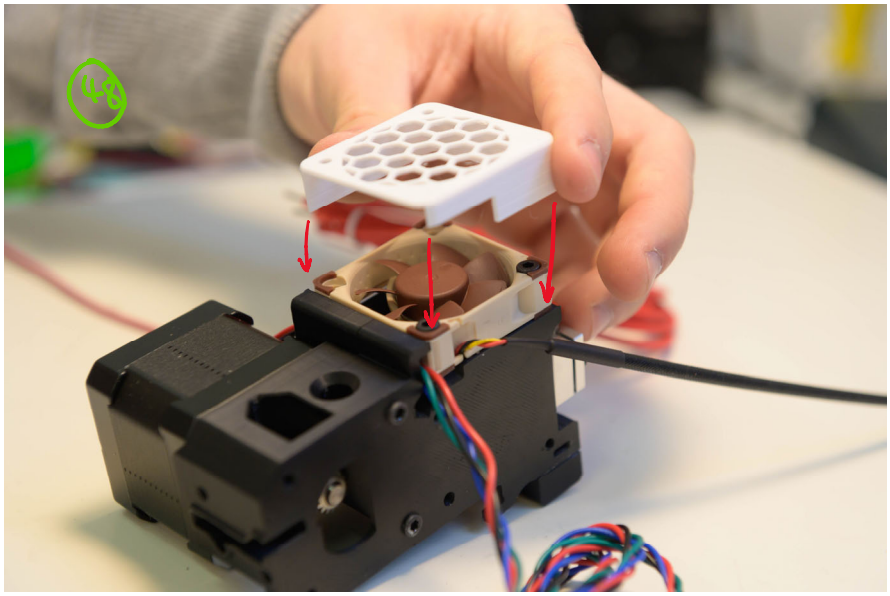


Back to the extruder:
Slide the extruder fan into place. Make sure that the extruder motor cable is seated in the channel (see picture 47).

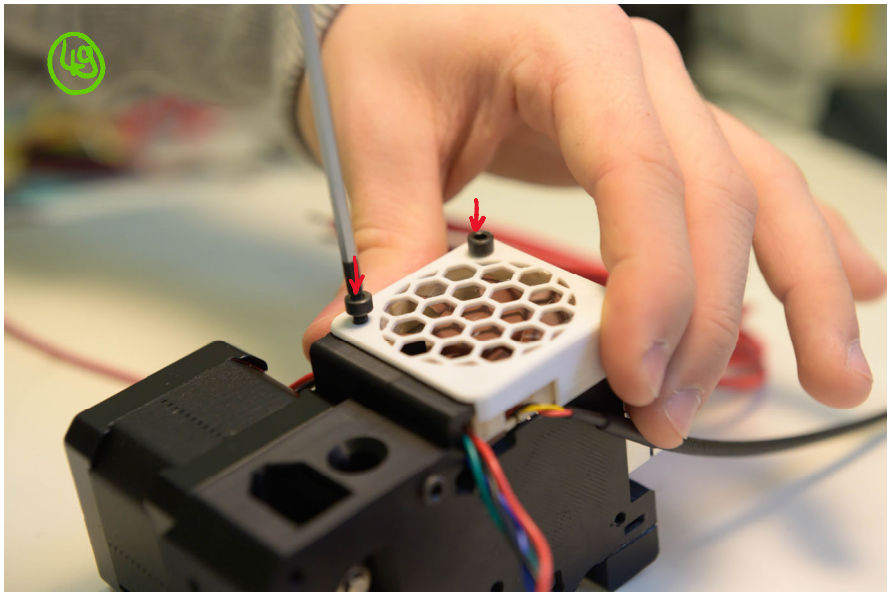
The cable exit of the fan should be on the side marked in blue.



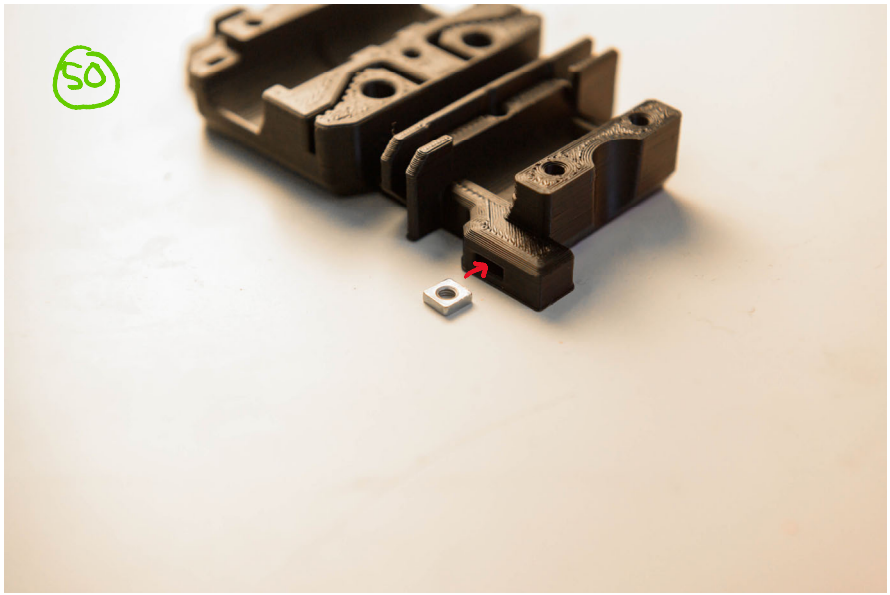
Screw two M3x12mm screws into the rear two holes of the fan.



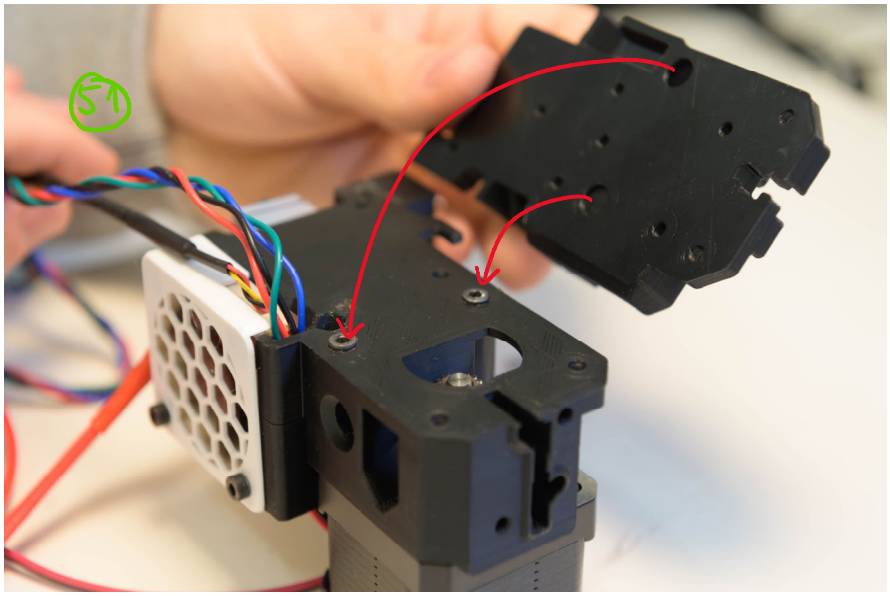
Place the fan cover onto the extruder oriented as shown.



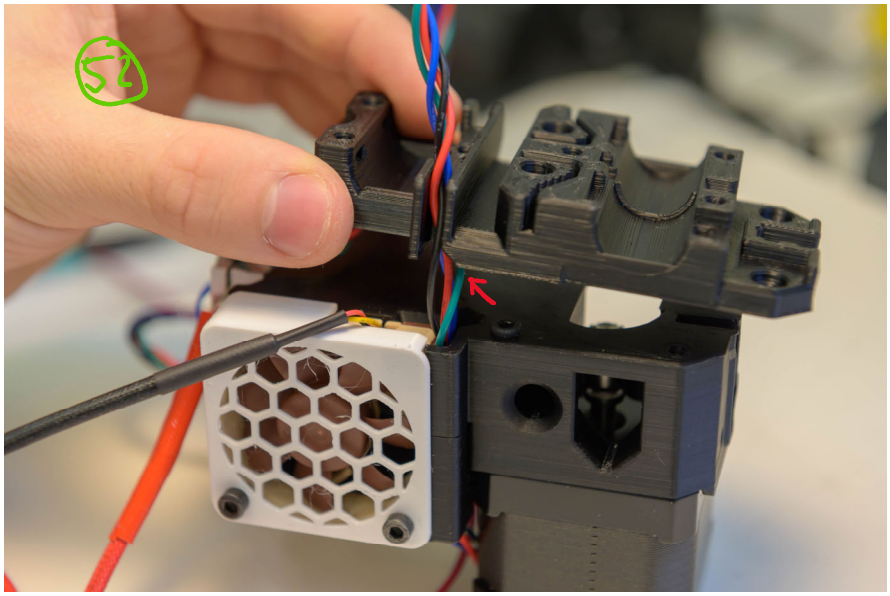
Fasten it using two M3x16mm screws, and tighten them lightly.



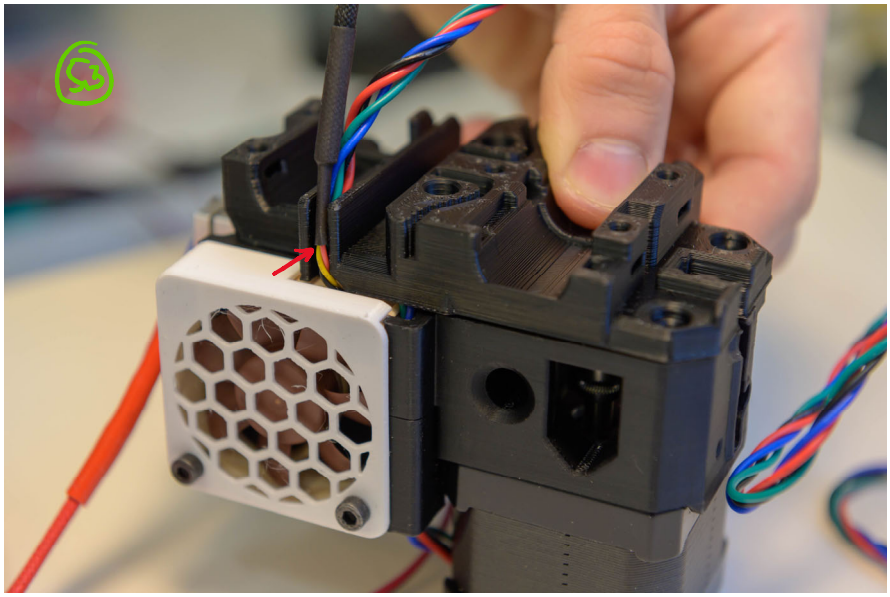
Insert a square nut into marked slot of the X-carriage.



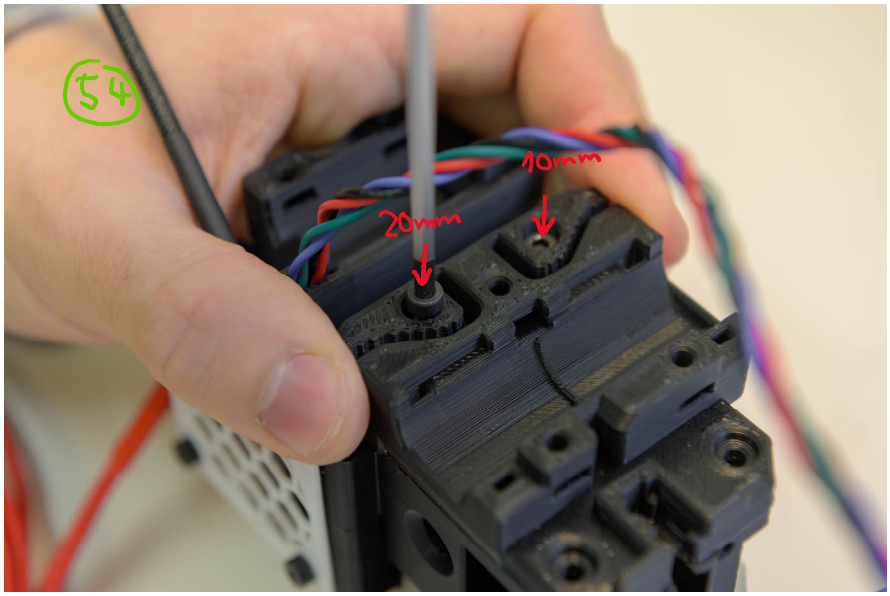
Place the X-carriage onto the back of the extruder.



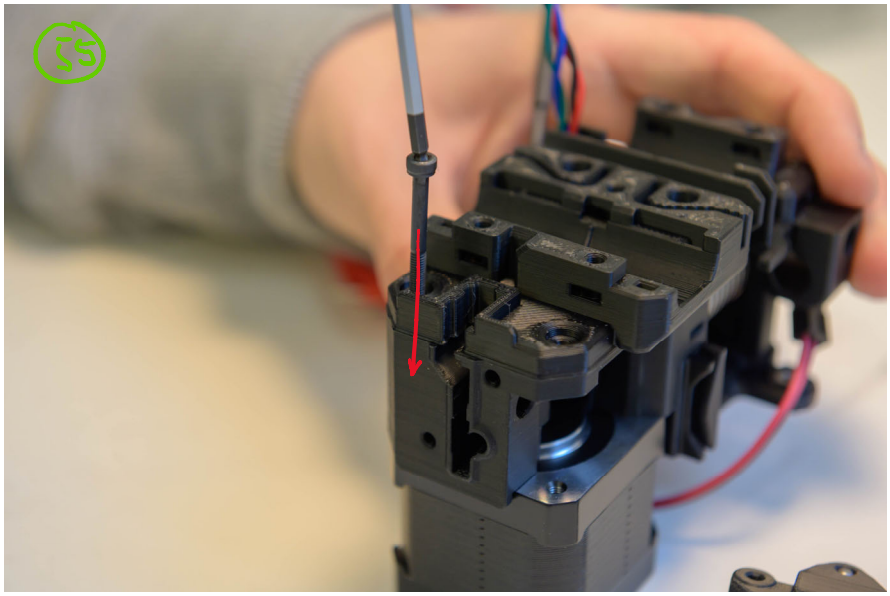
Make sure that the extruder motor cable is slotted into the guide properly.



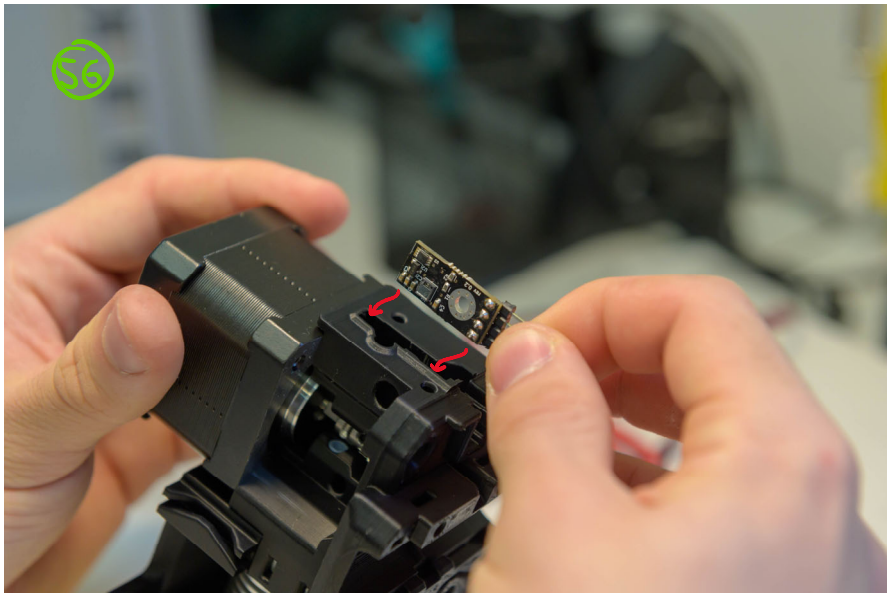
The fan cable should also be in the same guide as well, and be the outer cable.



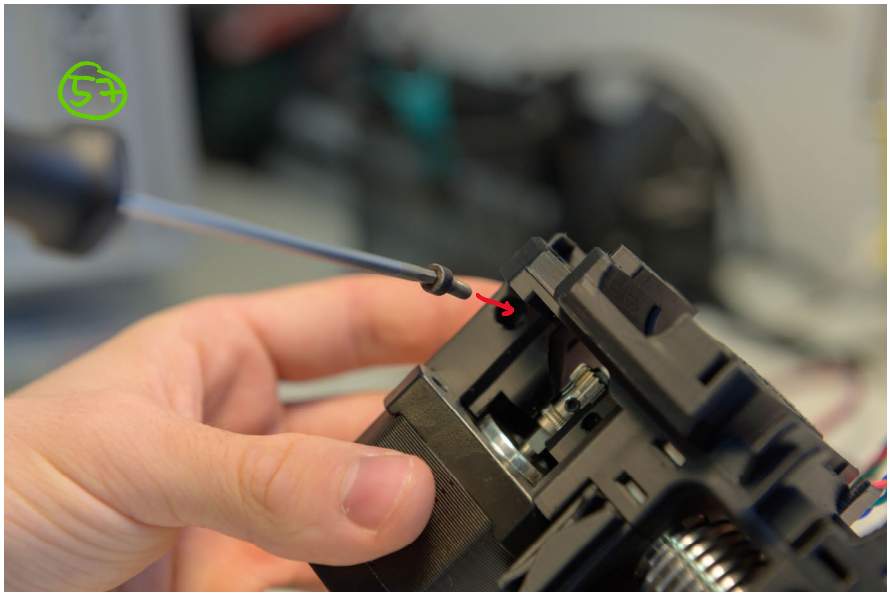
Using an M3x20mm and an M3x10mm screw respectively, secure the X-carriage into place.



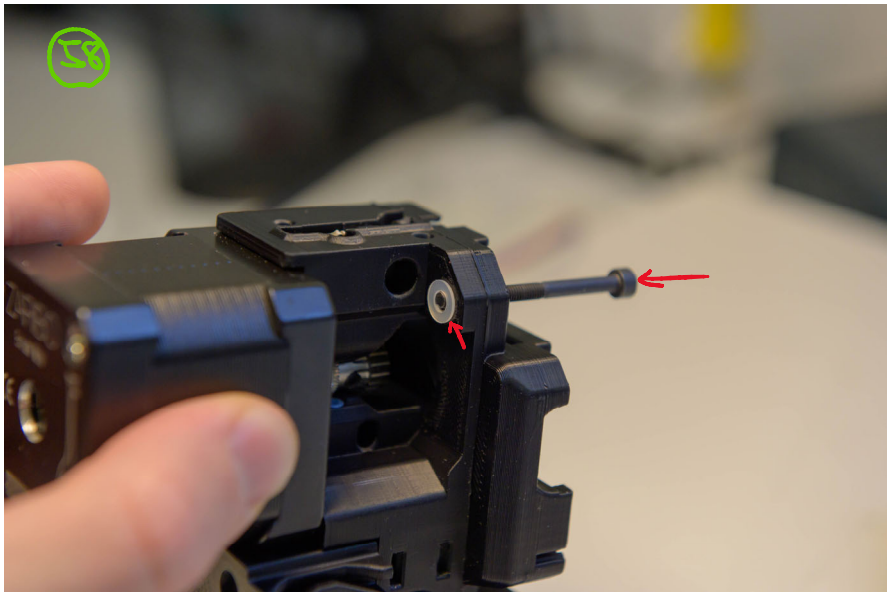
At the top, screw an M3x35mm screw into the motor through the X-carriage and the extruder body.



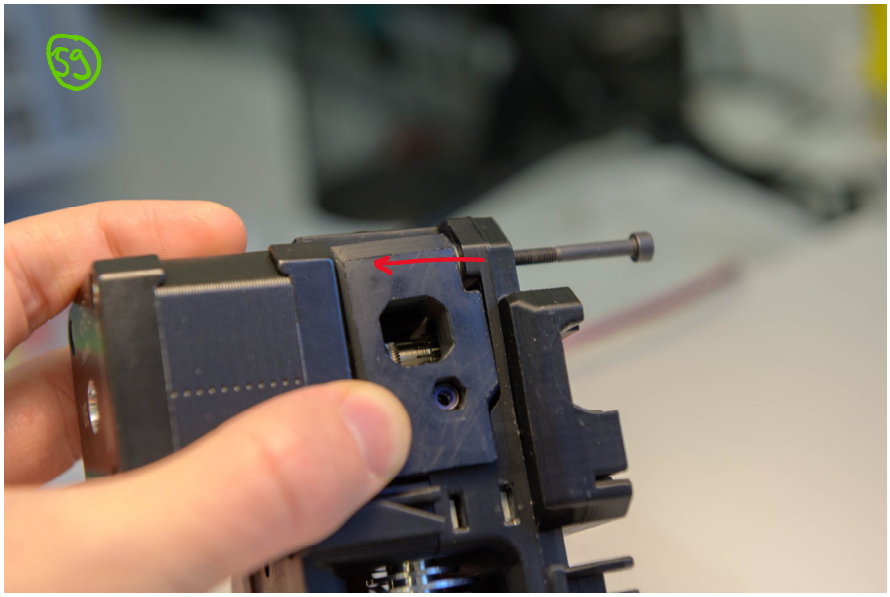
Insert the filament sensor into its slot.



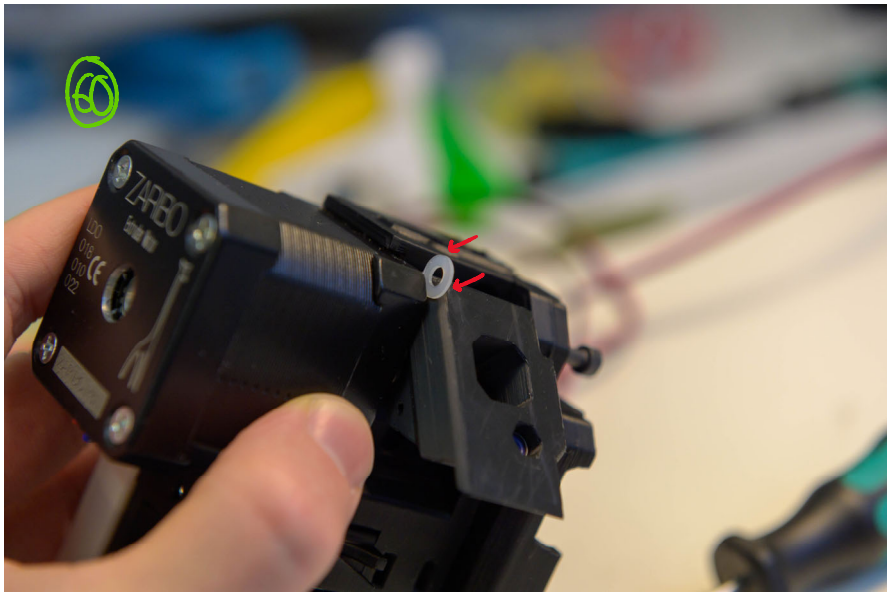
Screw it into place with an M3x8mm screw.



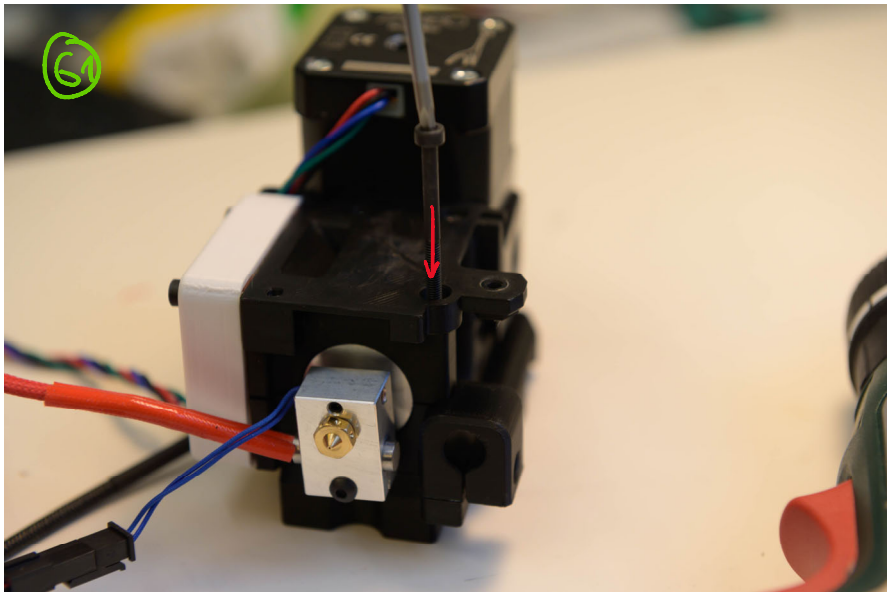
With the same method as for the idler, screw in another M3x35mm screw part way and place a plastic washer onto the thread.



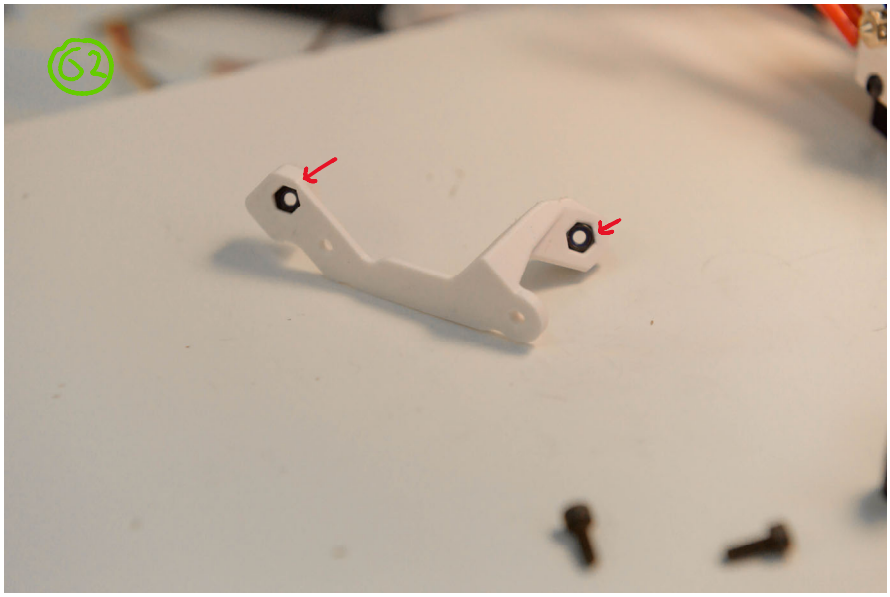
Holding the idler in place, screw the 35mm screw through.



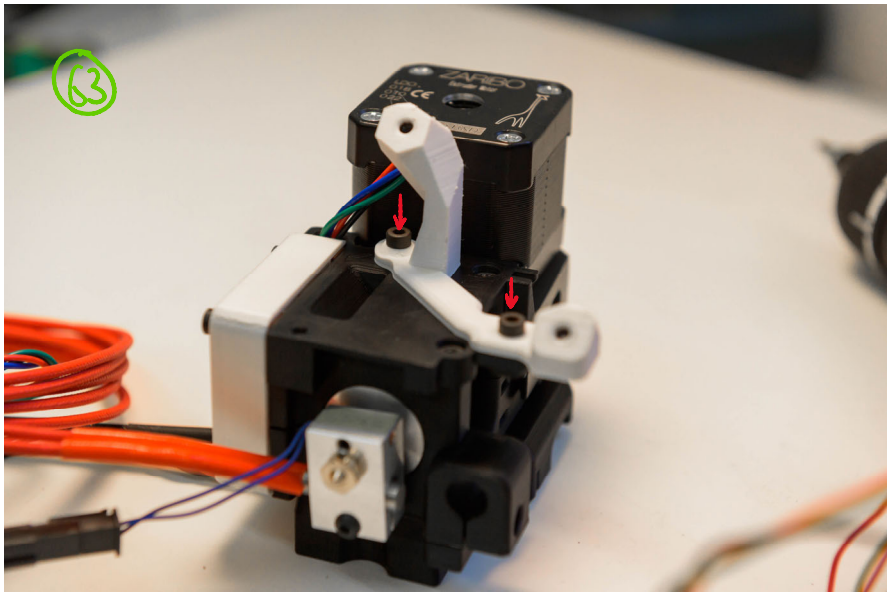
OPTIONAL:
If you think there is enough space, you can insert a second plastic washer into the left side, before screwing in the screw fully. Don't tighten the screw too much, as the idler should still be adjustable.



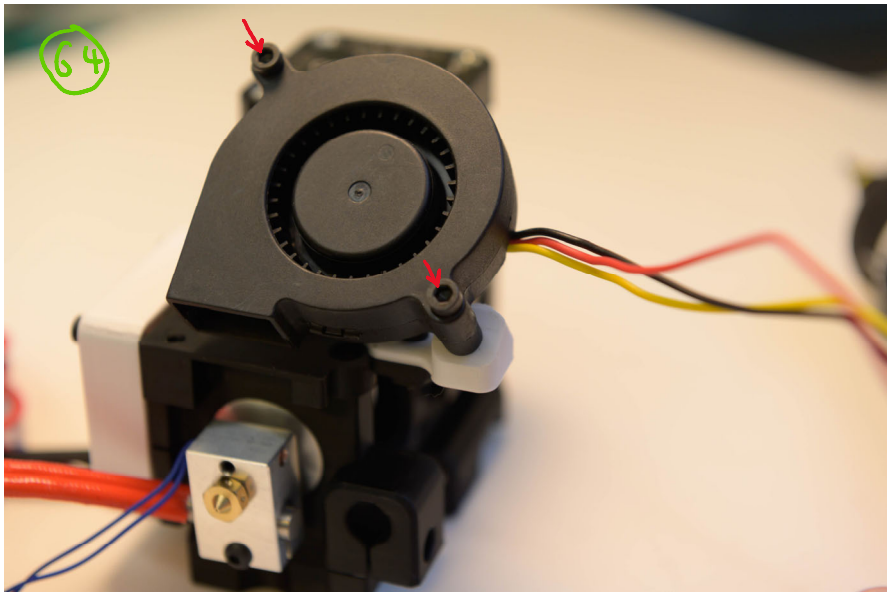
Install an M3x40mm screw in the marked hole.



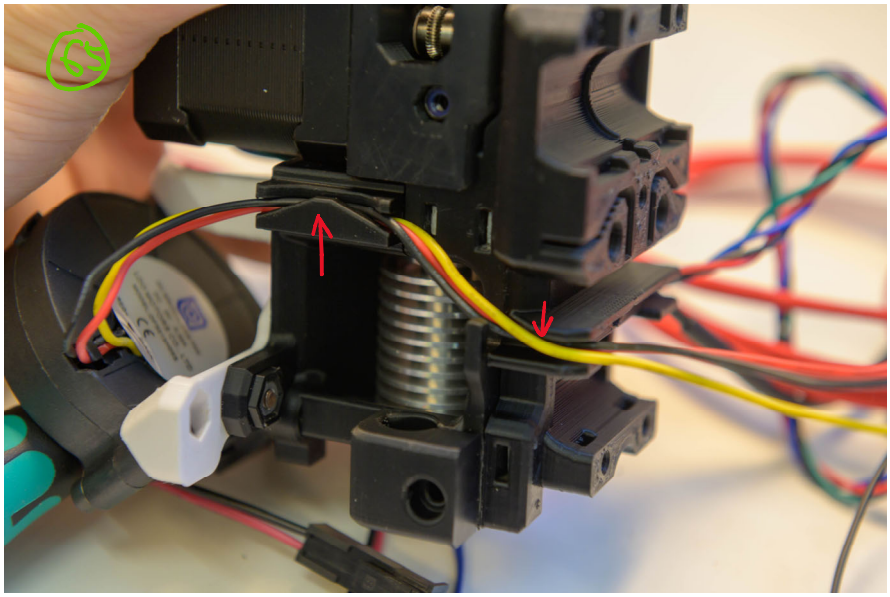
Insert two M3 self locking nuts into their slots in the radial fan mount.



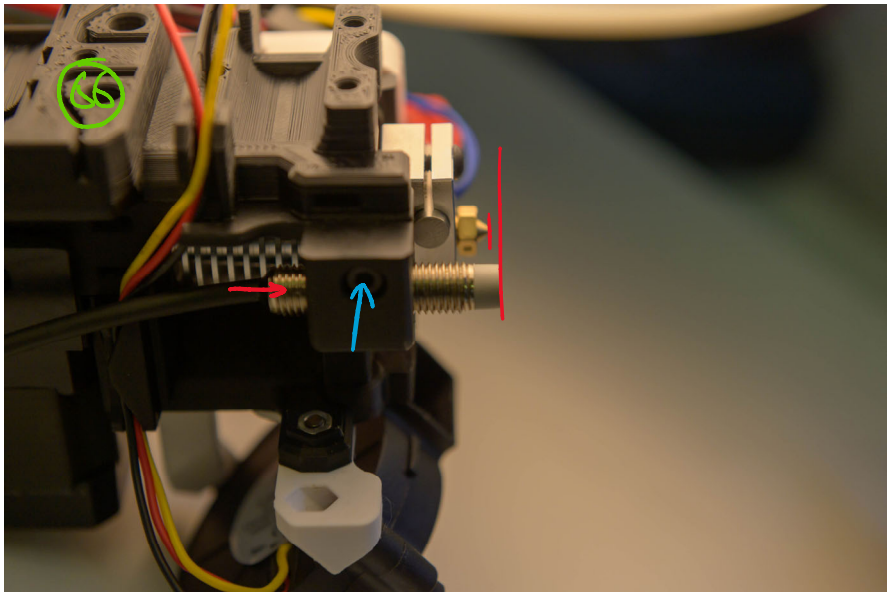
Screw the mount to the extruder using two M3x8mm screws.



Install the fan in the shown orientation using two M3x20mm screws.
Be careful not to break the fan casing by overtightening.



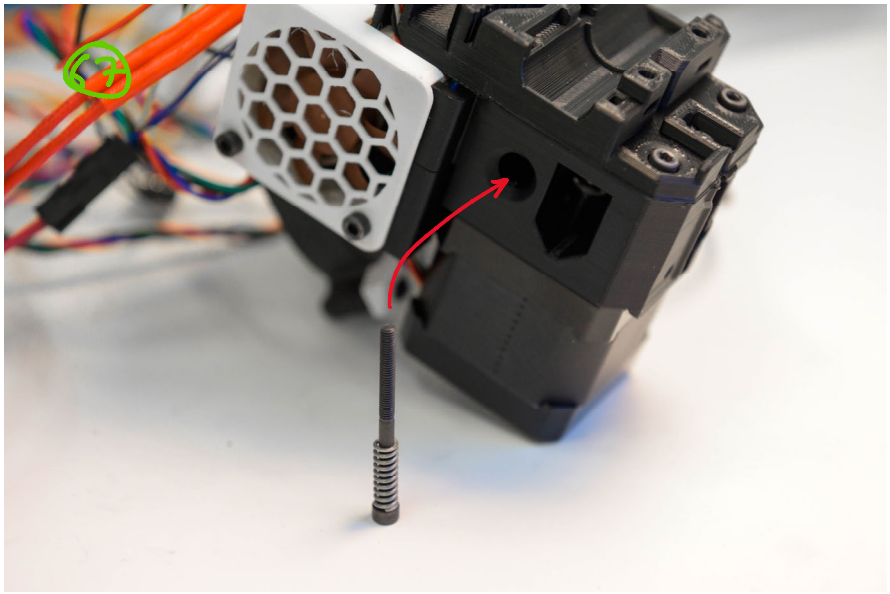
Route the fan cables through the two marked guides.



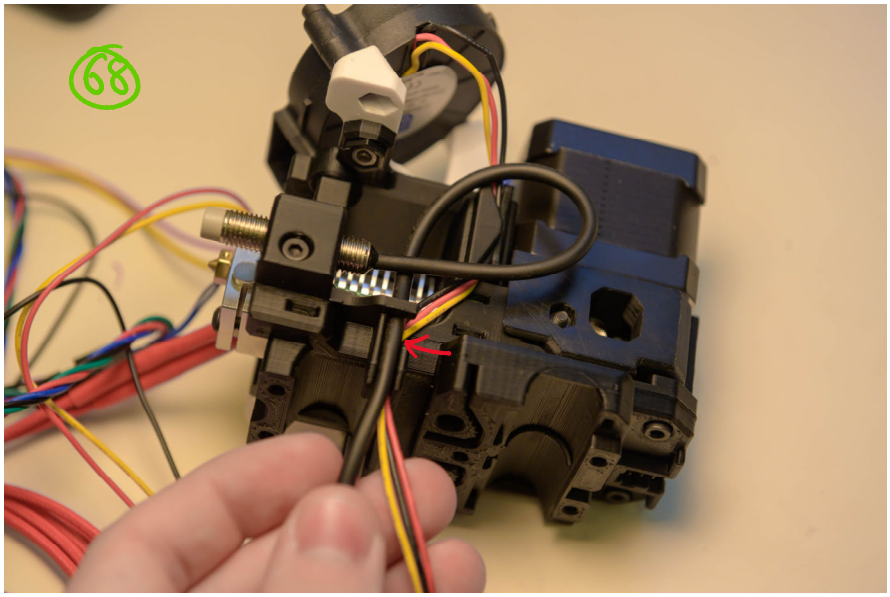
Insert the PINDA sensor into the the clamp marked in red.

Position it about 2mm lower than the nozzle.

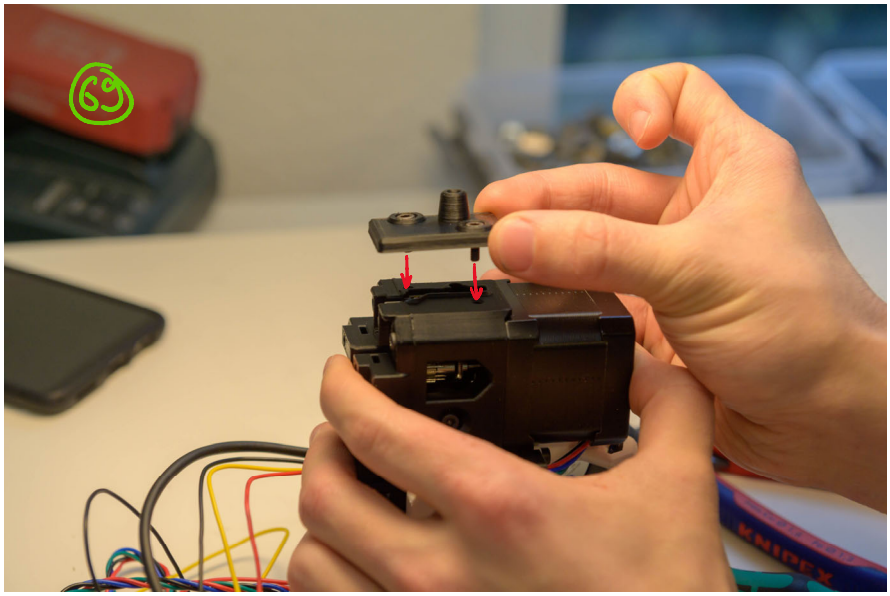
Screw it in place with an M3x10mm screw marked in blue.



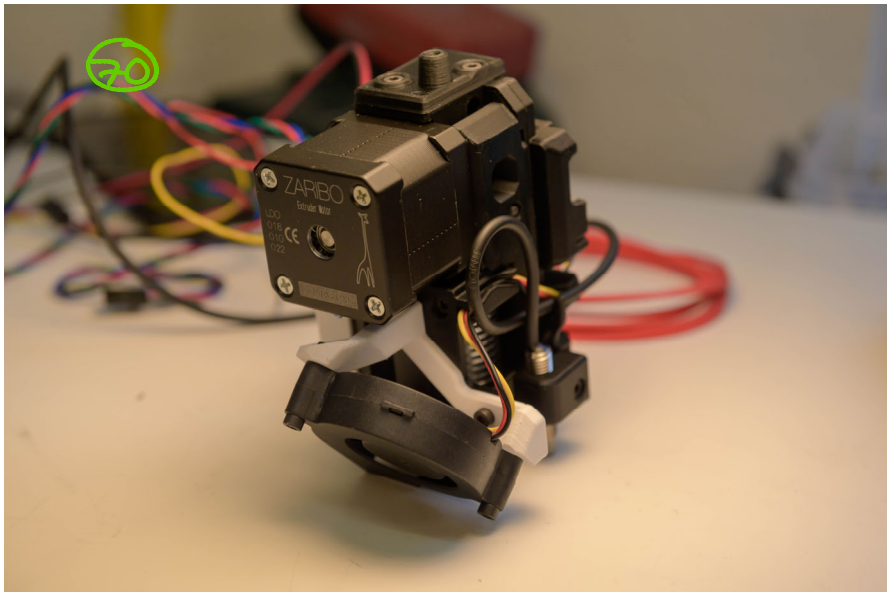
Insert the spring onto an M3x40mm screw, then screw it into the idler through the extruder.



Route the PINDA cable through the marked guide, over the fan cable.



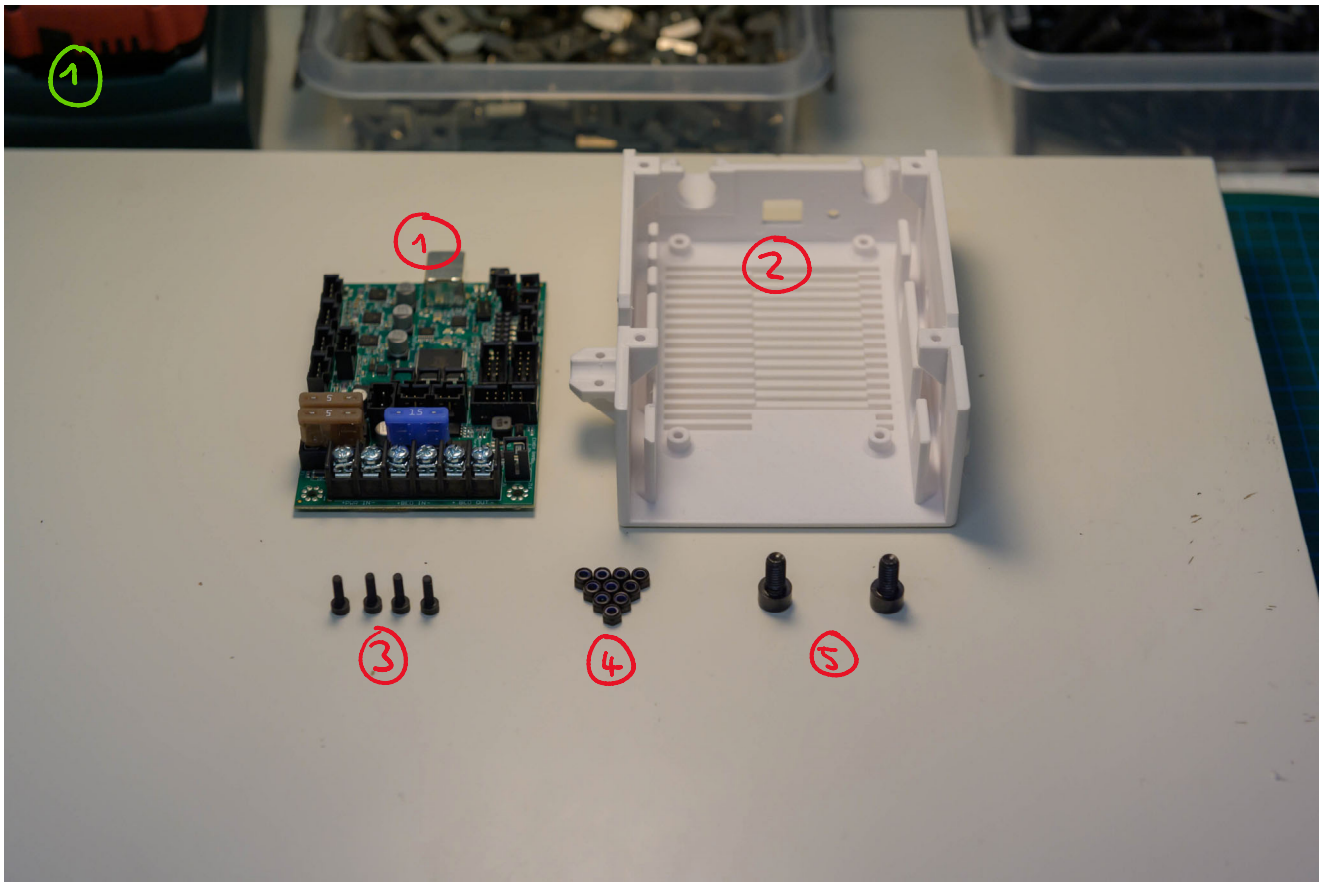
Using two M3x8mm screws, install the filament sensor cover.



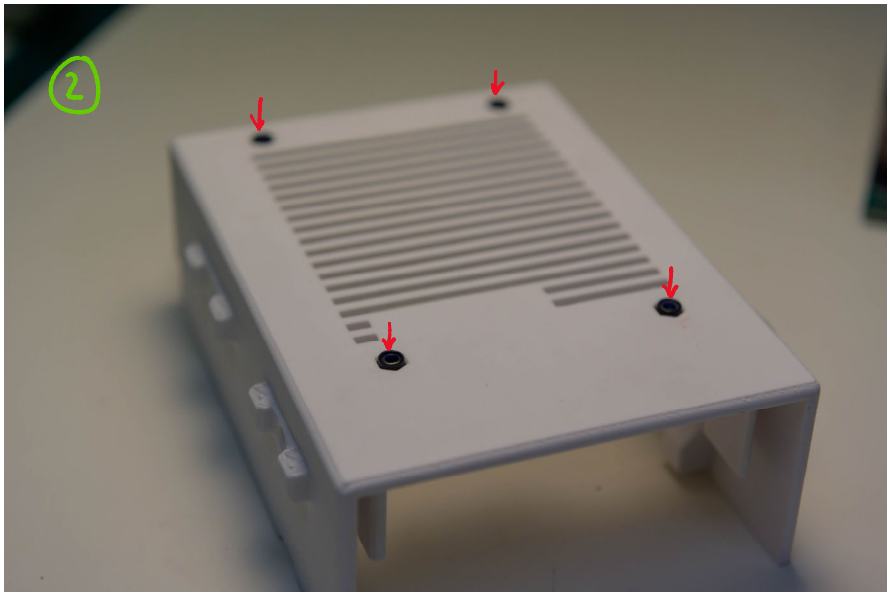
The extruder is now complete.

7: Motherboard

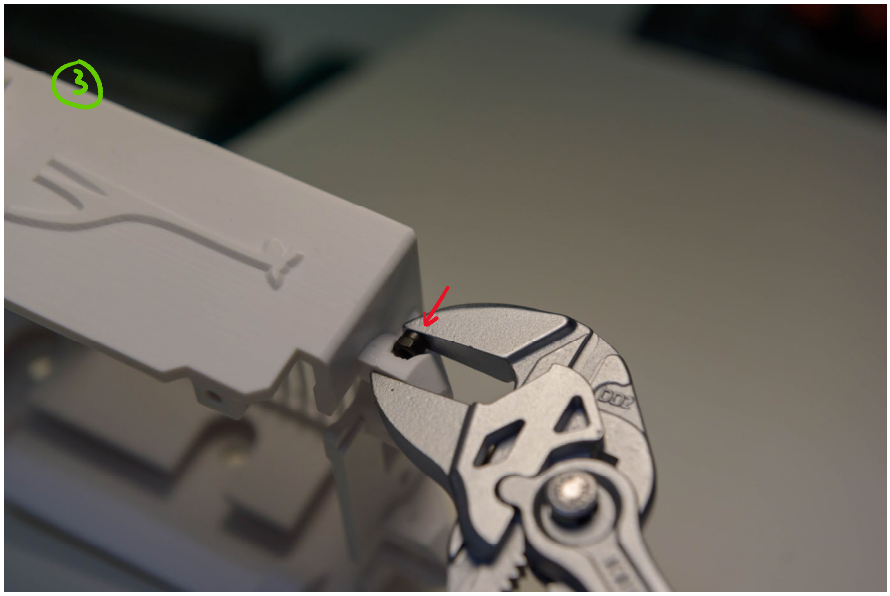
You will need the following parts to complete the motherboard:



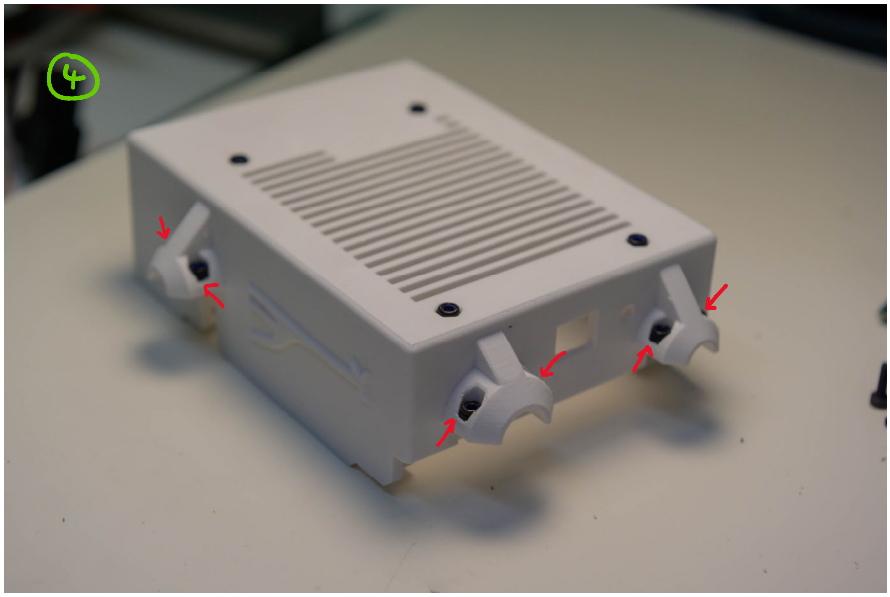
1. 1x motherboard
2. 1x motherboard box
3. 4x M3x10mm screws
4. 10x M3 self locking nuts
5. 2x M6x12mm screws



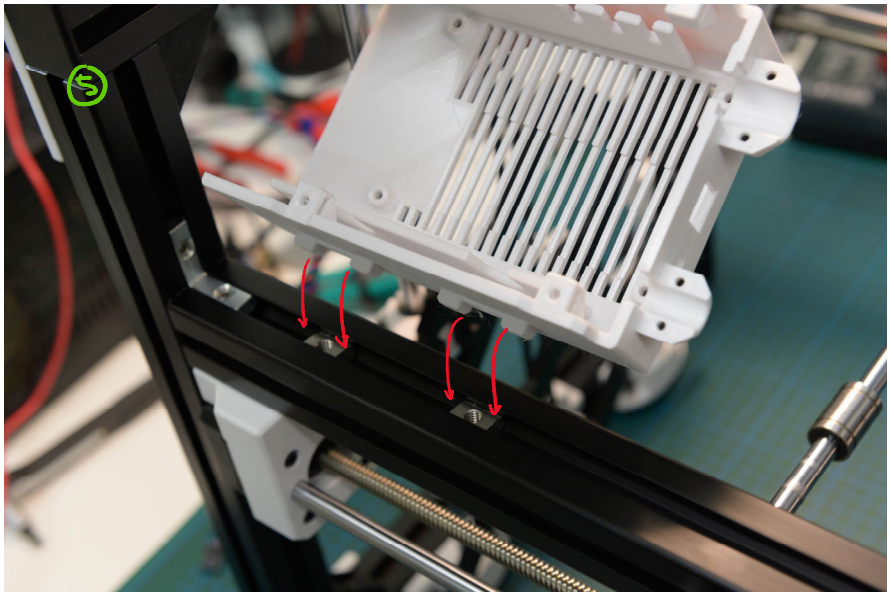
Insert four self locking nuts into the slots on the back of the box.



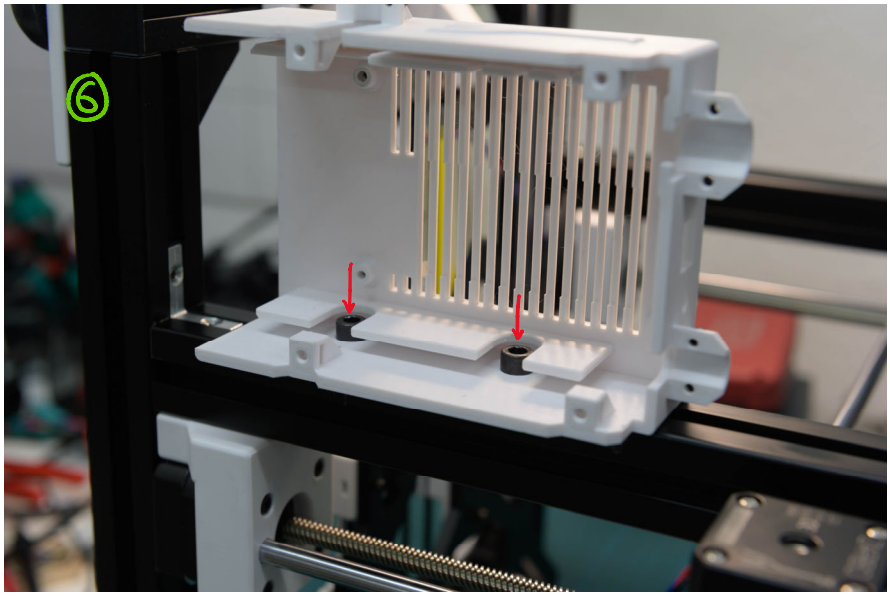
Insert the other 6 nuts into the cable clamps (2 x 3).
It is recommended you use the tool seen in the picture.



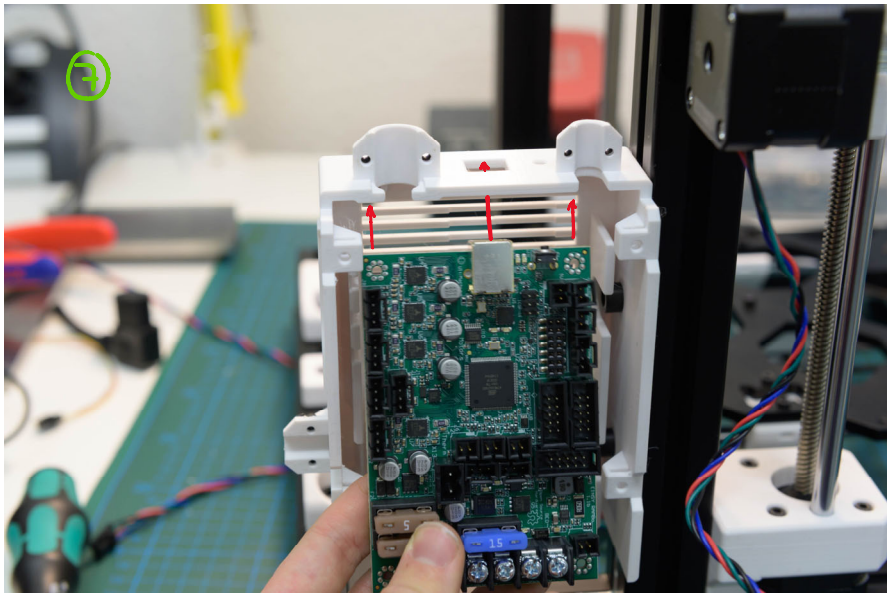
This is what the box should look like.



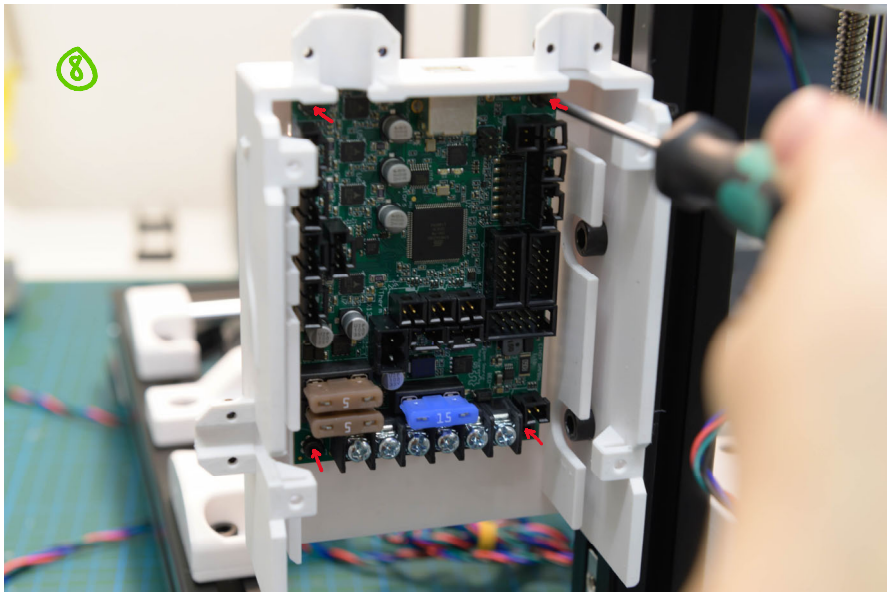
Line up the T-nuts on the rear of the left Z-extrusion and place the box onto them.



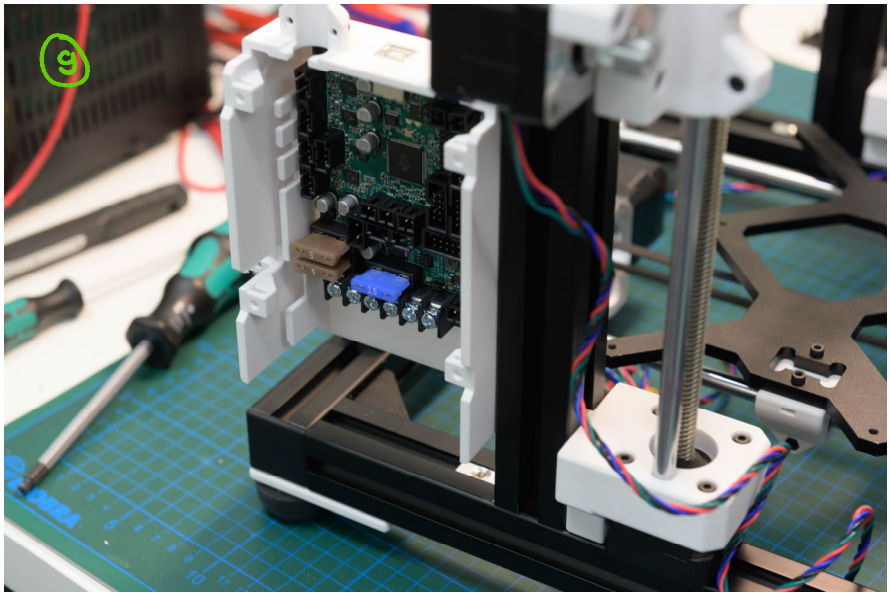
Use the two M6x12mm screws to fasten it to the frame.



Insert the motherboard in the motion indicated by the arrows.



Screw the motherboard to the box using the four M3x10mm screws.



The motherboard is now complete.