



5. Extruder Assembly

Guide for the assembly of the Extruder.

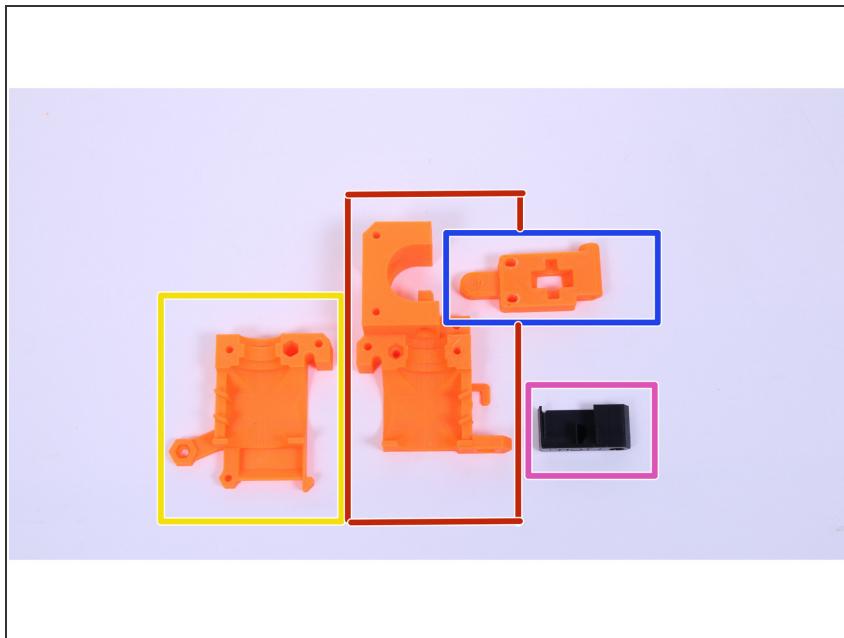
Written By: Josef Prusa

Step 1 — Get the necessary tools



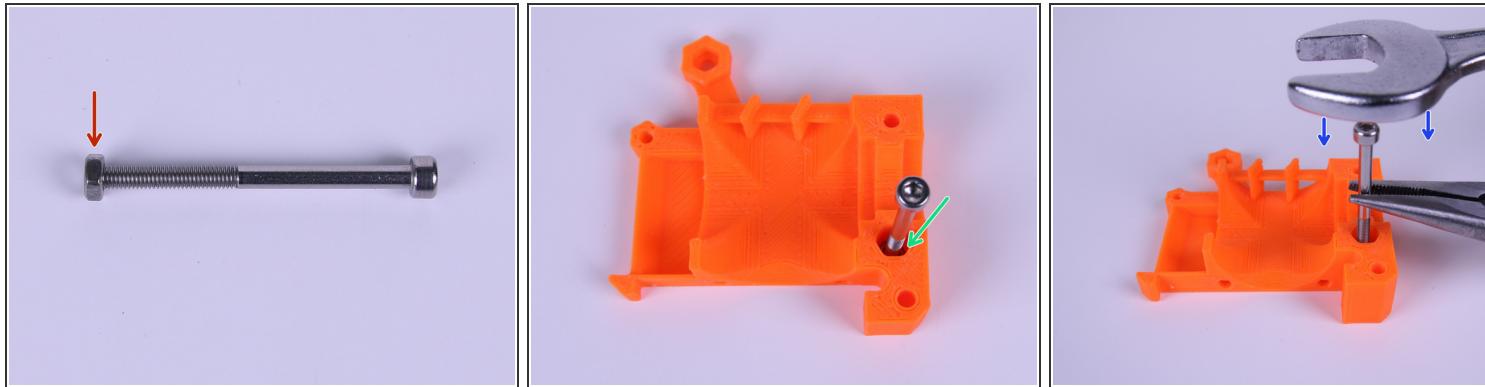
- 2.5 and 1.5 mm Allen key
- Needle-nose pliers

Step 2 — 3D printed parts



- Extruder cover
- Extruder body
- Extruder idler
- Fan nozzle (can be in orange color, dimensions are the same).

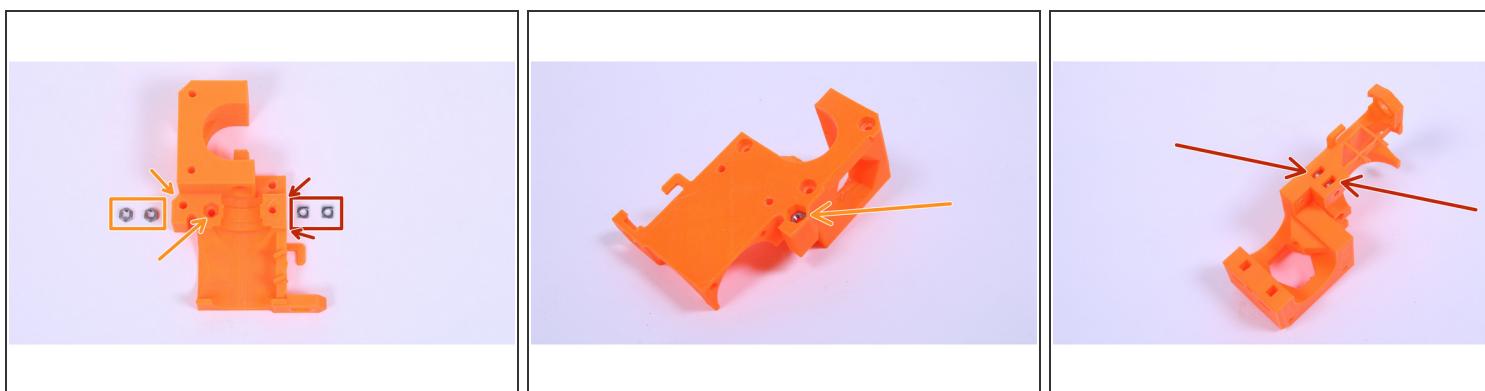
Step 3 — [TIP] Top nut insertion



(i) If you're experiencing troubles with getting nut into the top hole, just follow these simple steps.

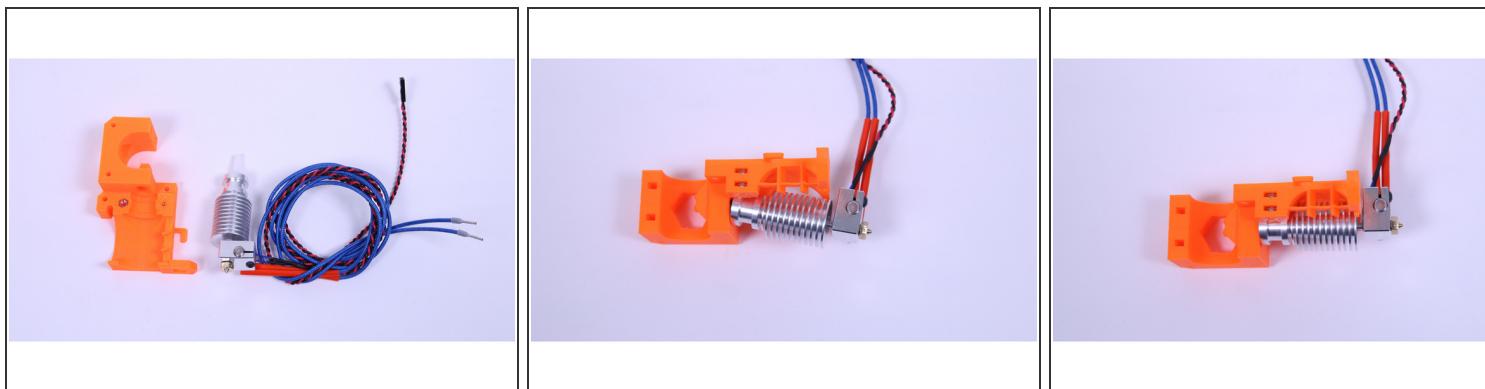
- Screw M3 nut a bit on some long screw (M3x40 works best).
- Push the screw with the nut into the hole where it is supposed to be.
- Grab the screw with pliers and gently hammer the nut in place using a wrench.

Step 4 — Placing the nuts



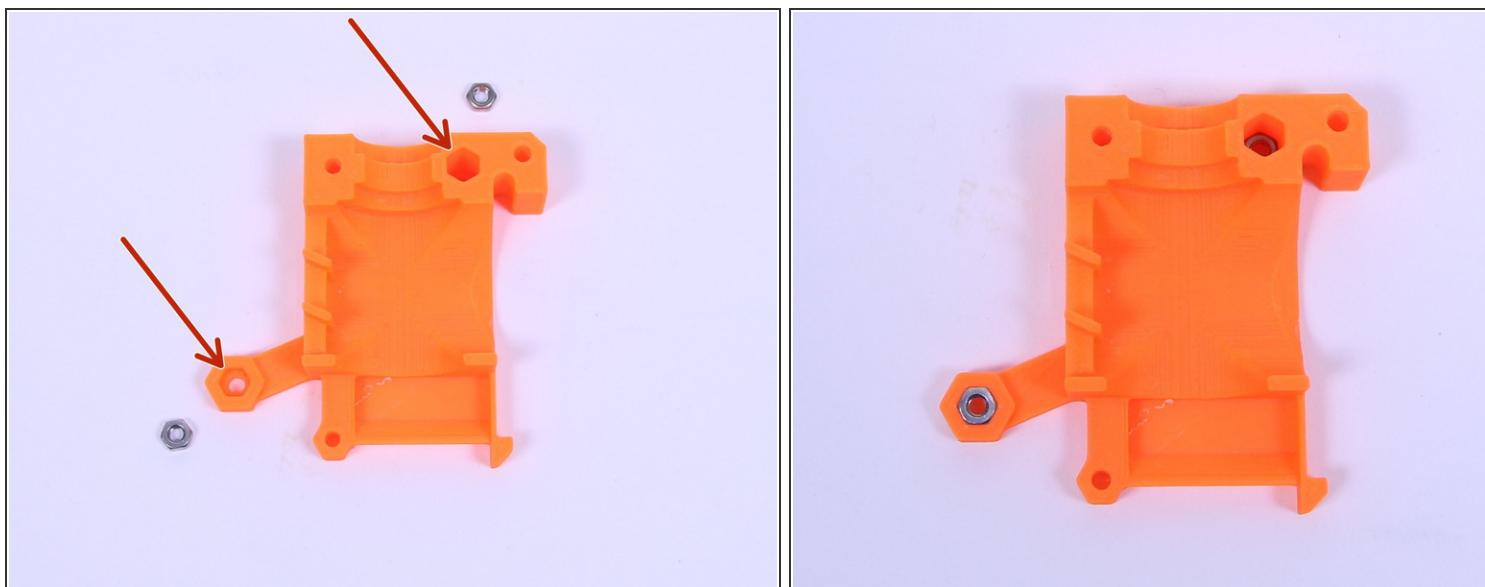
- Place the M3 nuts (2 pcs) into the traps on the left side of the extruder body.
 - Slide the M3nS square nuts (2 pcs) into the traps on the right side of the extruder body.
- ⚠** Place the nuts as deep as possible.

Step 5 — Preparing extruder body



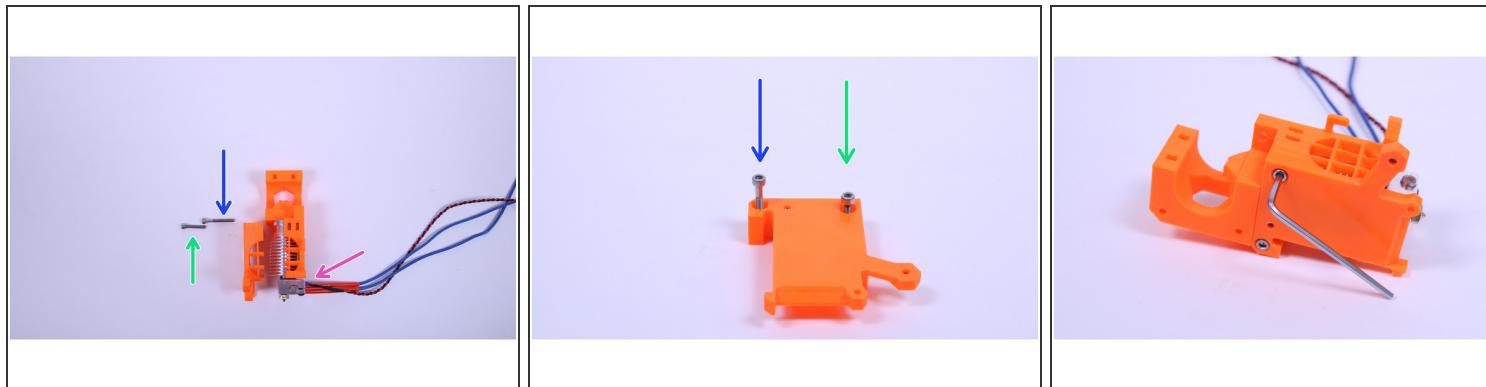
- Slide the extruder body on the nozzle as shown in the picture.
- Push the nozzle all the way down and make sure that cables are on the side as shown in the picture.

Step 6 — Preparing the extruder cover



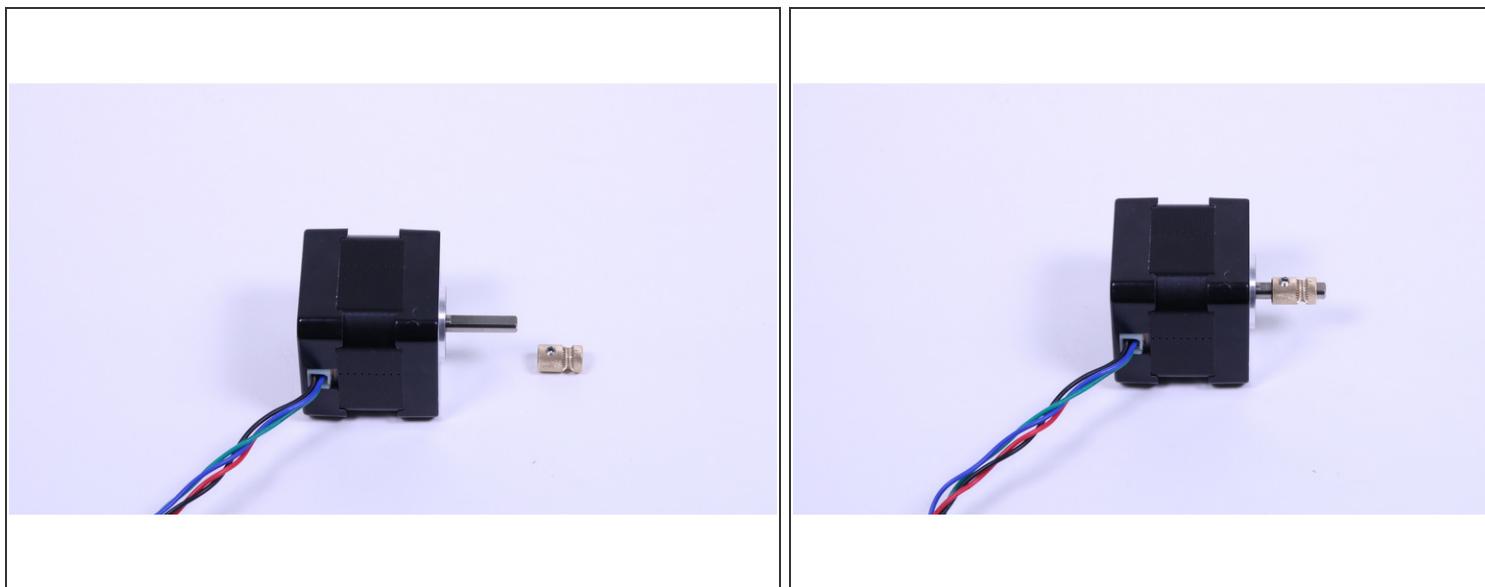
- Place the M3 nuts (2 pcs) into the traps of the extruder cover.
- ⚠️** Top nut needs to be pushed all the way down! (the nut trap has 2 diameters, only last 3 mm have correct diameter for the nut trap).

Step 7 — Placing the extruder cover



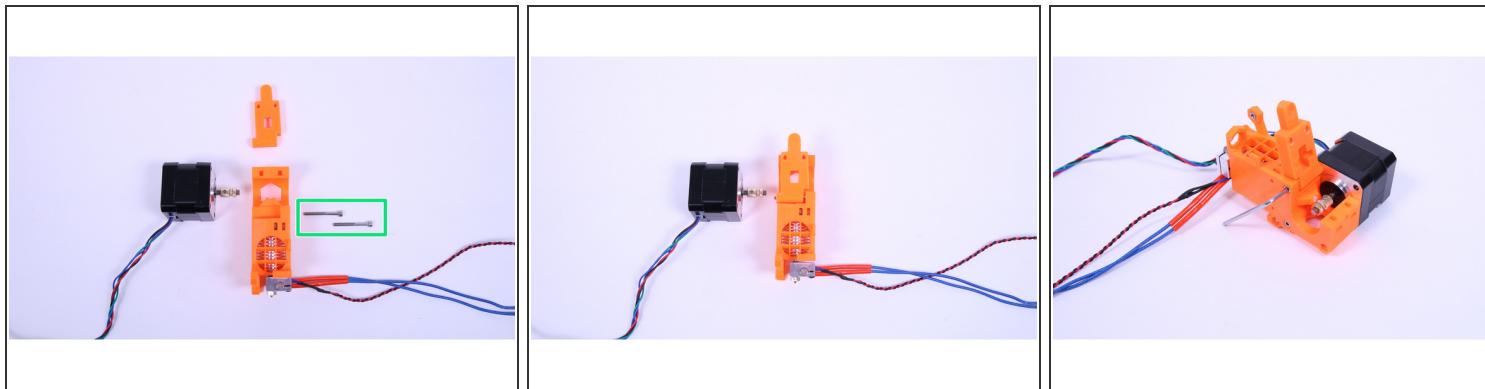
- M3x18 (1 pc)
 - M3x25 (1 pc)
 - Mind the correct orientation of cables leading from the extruder heater.
 - Using the 2.5mm Allen key tighten both screws to mount the extruder cover on the extruder body.
- ⚠** Make sure to use the proper length of screws when mounting the extruder cover.
- ⚠** Tighten until the nozzle stops moving in the extruder, if there's still a gap between the cover and the body it's alright.

Step 8 — Preparing the extruder motor



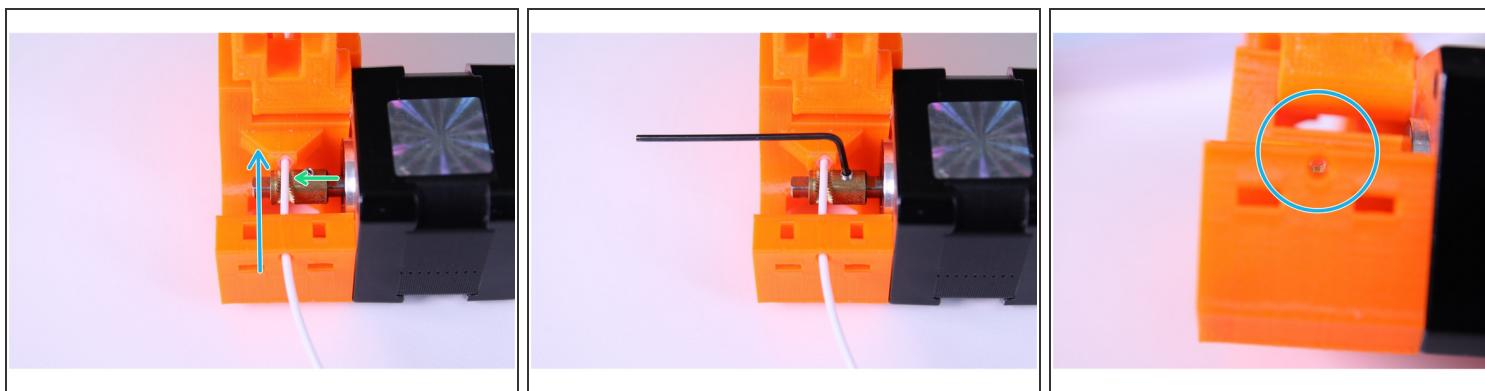
- Press the pulley on the motor.
- If you're experiencing trouble, loose the grub screw a bit.
- Note the correct orientation (the screw has to be closer to the motor).
- ⚠ Don't tighten the pulley at the moment, we have still time for that.

Step 9 — Mounting the motor and idler



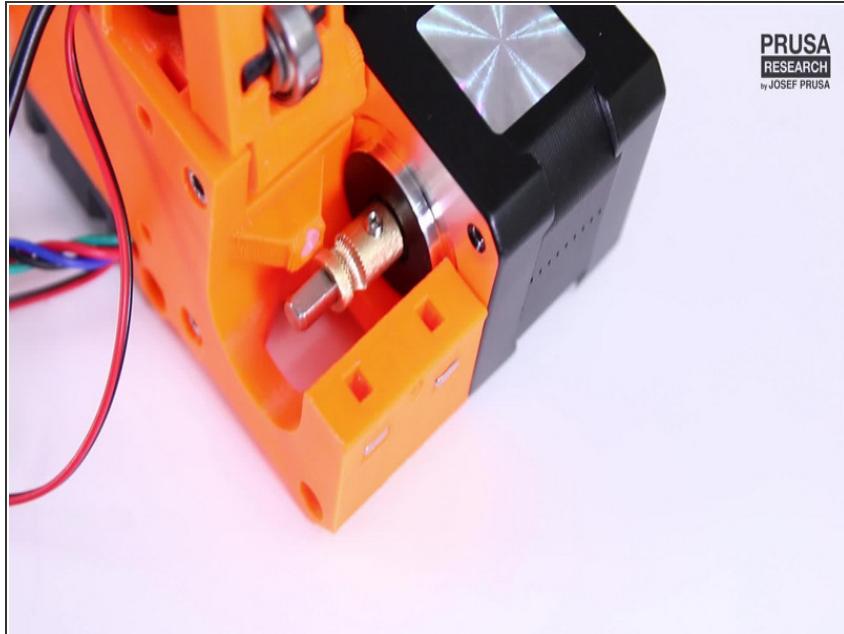
- M3x30 screws (2 pcs)
 - Mount the motor on the the extruder body as shown in the picture, double check proper orientation of the motor cables.
 - Tighten the motor screws gently.
- ⚠** Don't forget to have the idler in place (the screw has to go through it).
- ⚠** Mind the correct orientation of motor cables.

Step 10 — Tightening the pulley



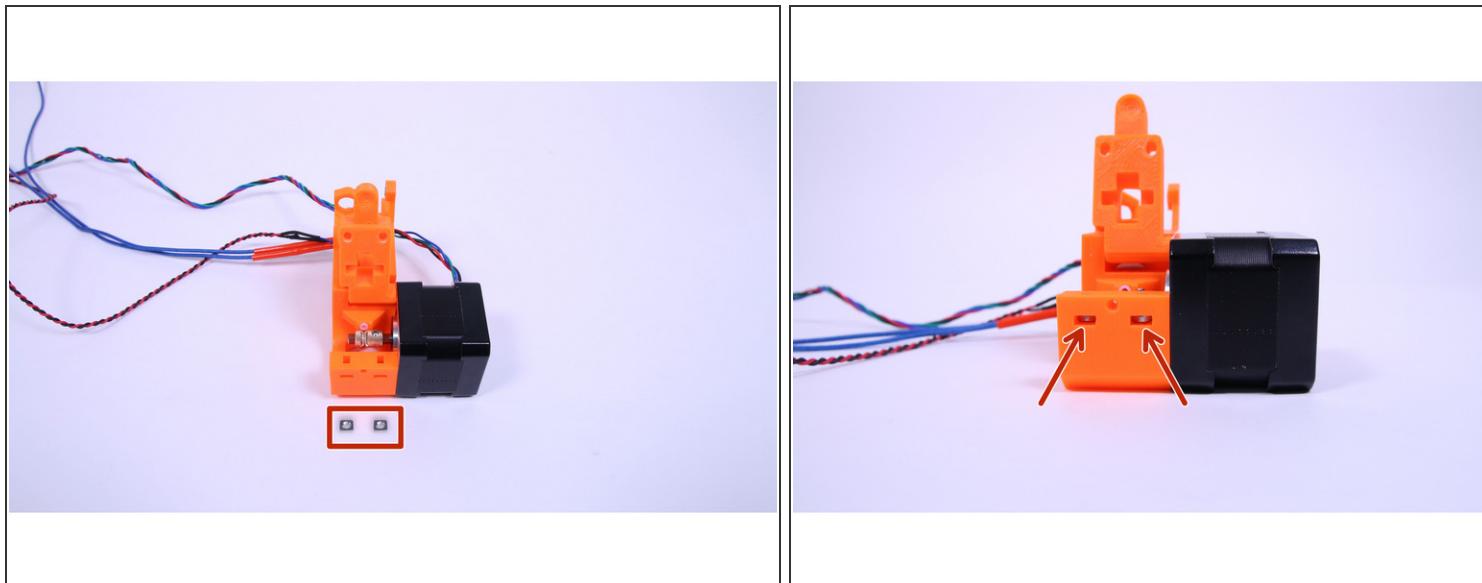
- Using the 1.5mm Allen key tighten the pulley.
- ⚠** Make sure that the part with smaller diameter is perfectly aligned with the nozzle entrance.
- i** Use a piece of filament to align the pulley with the openings for the filament (see the picture).

Step 11 — VIDEO for step 11



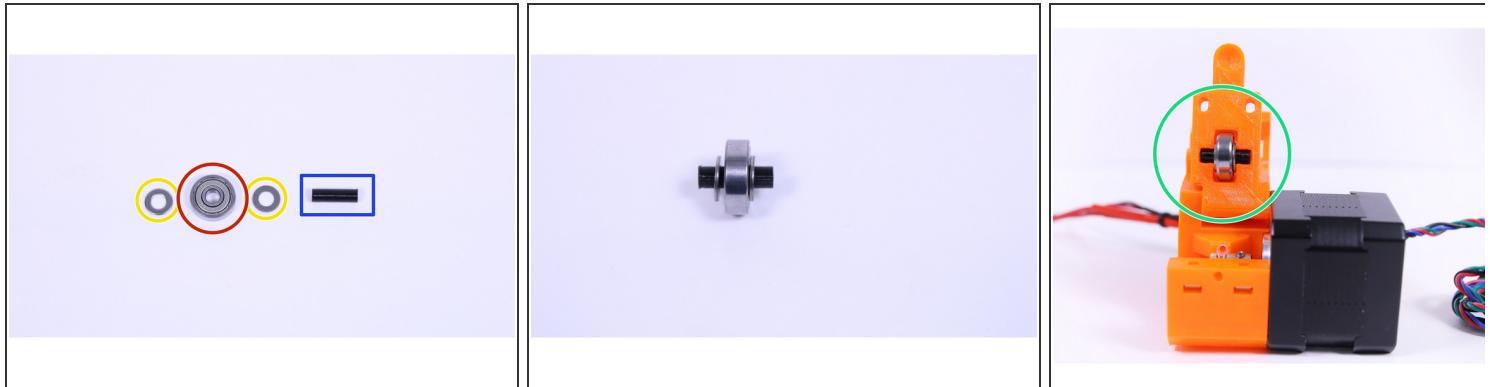
- Using the 1.5mm Allen key tighten the pulley. Make sure that the part with smaller diameter is perfectly aligned with the nozzle entrance. Use a piece of filament to align the pulley with the openings for the filament.
- (i)* Video is available in an online (digital) version only.

Step 12 — Prepare the Extruder idler



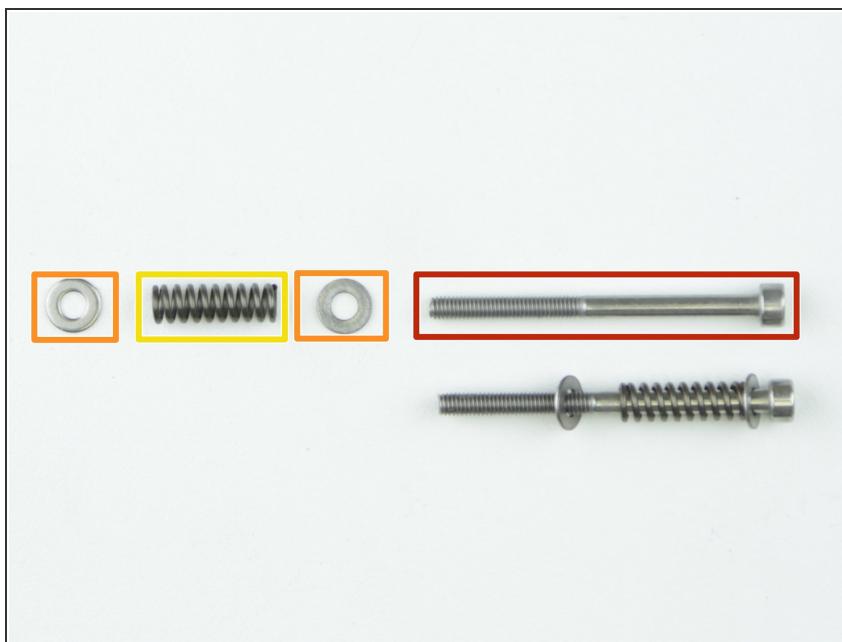
- Place the M3nS square nuts (2 pcs) into the traps of the extruder body.

Step 13 — Preparing shaft with bearing



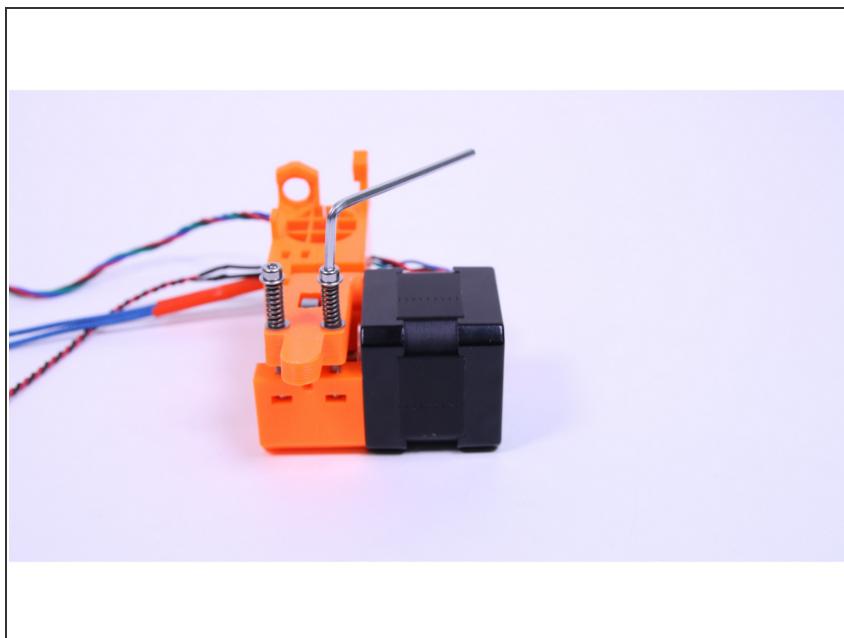
- 5x16sh shaft
 - M5w washer (2 pcs)
 - 625 bearing (1 pc)
 - Place the washers and bearing on the shaft as shown in the picture.
 - Place the shaft with bearing into the idler.
-  Check the shaft is pressed all the way in!

Step 14 — Prepare the Extruder idler screws



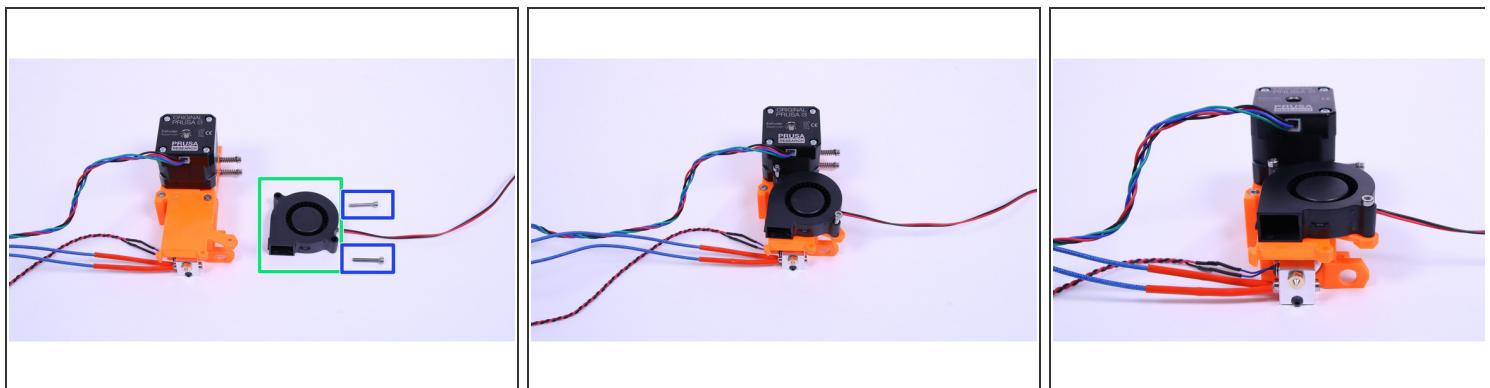
- M3x40 screw (2 pcs)
- M3w washer (4 pcs)
- Extruder spring (2 pcs)
- Assemble the screws as shown in the picture.

Step 15 — Placing the screws



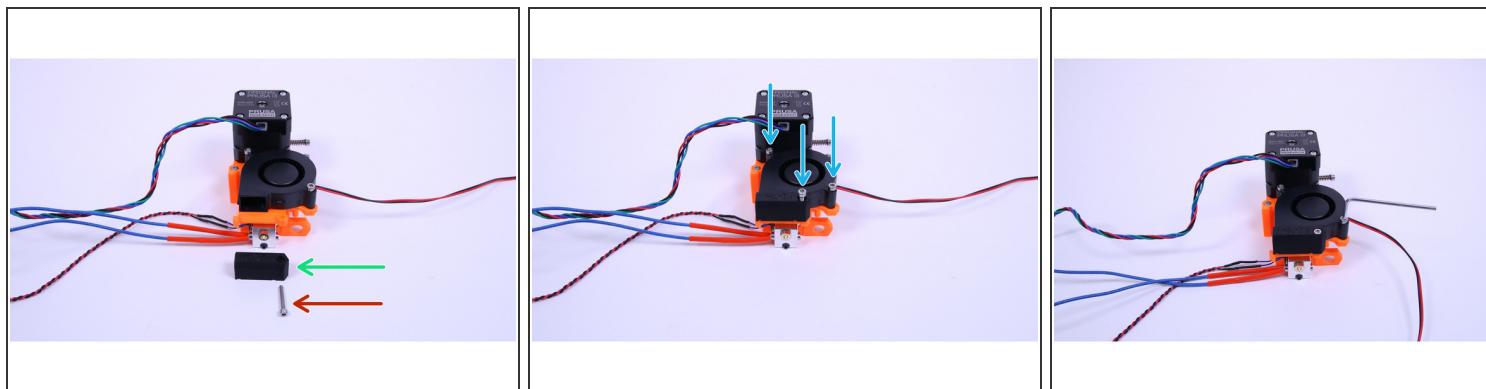
- Screw the extruder screws into the extruder body using the 2.5 mm Allen key as shown in the picture.
- *i* Length of the springs should be circa 13 mm when tightened.
- *i* It is alright to tighten the screws with higher force, we need to induce pressure on the idler.

Step 16 — Preparing the print fan



- 5015 print fan
 - M3x20 screws (2 pcs)
 - Screw the fan on to the extruder using the 2.5 mm Allen key as shown in the picture.
- ⚠** Do not tighten fully at this moment, fan should just be secured in place.
- i* Front fan is in the box 2.3.4.5.SUP

Step 17 — Preparing the fan nozzle



- Fan nozzle
 - M3x20 screw (1 pc)
 - Tighten the fan nozzle using the 2.5 mm Allen key. Gently tighten screws holding up the fan in place.
- ⚠ Double check that the fan can rotate freely.

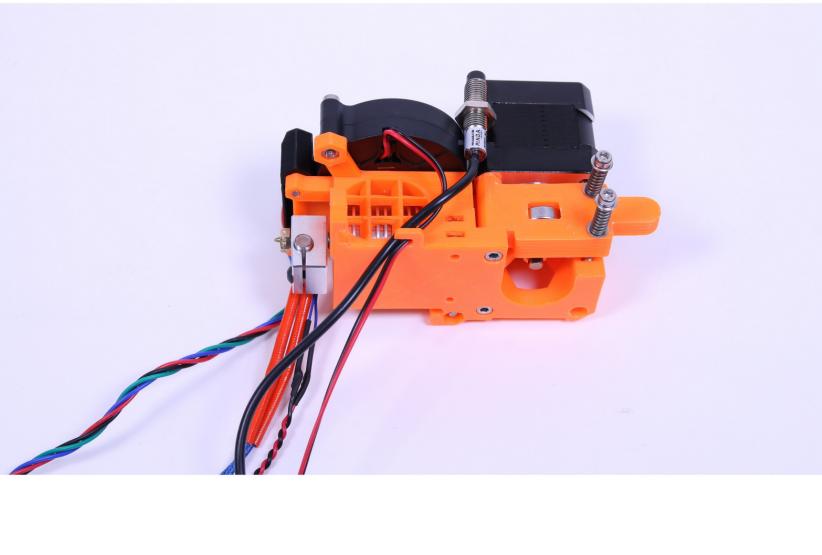
Step 18 — P.I.N.D.A. probe preparation



- Prepare P.I.N.D.A. probe (autocalibration) by removing one of the nuts.

Step 19 — P.I.N.D.A probe and print fan cables preparation

- Guide both cables through cable clip on the extruder body as shown in the picture.

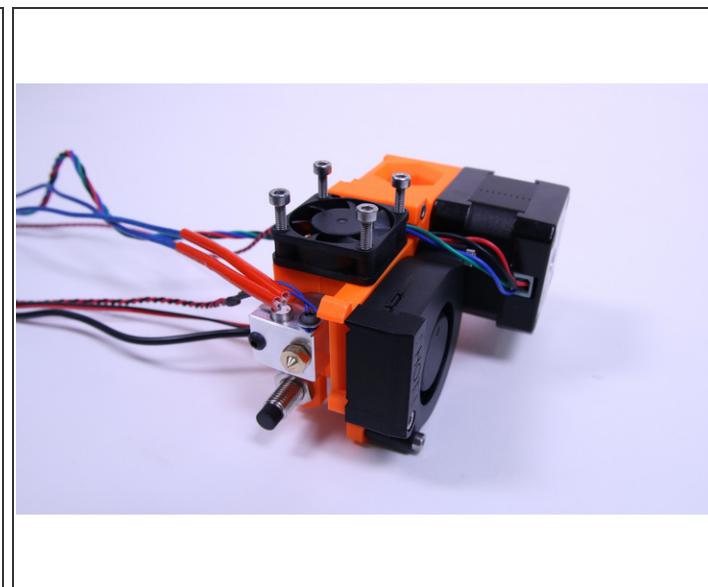
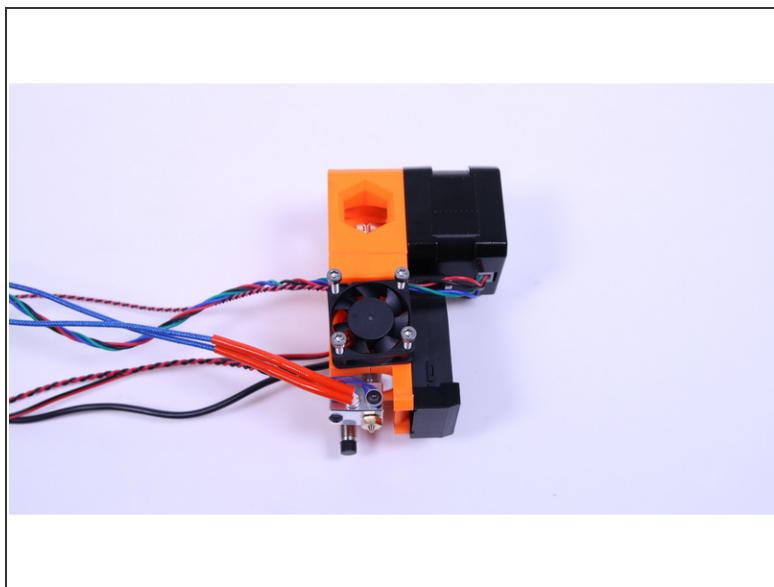


Step 20 — P.I.N.D.A. probe mounting



- Mount P.I.N.D.A. probe in place.
 - Secure P.I.N.D.A. probe with nut.
- (i) Exact position of P.I.N.D.A. probe will be adjusted later (during the printer calibration described in 3D Printing Handbook), so there is no need to adjust or tighten fully at this point.
- The best position for mounting at this point is to align the end of the probe with the end of the hook on the extruder body.
- ⚠ Note the loop on cable from probe, it's necessary to do it like that!**

Step 21 — Mounting the fan



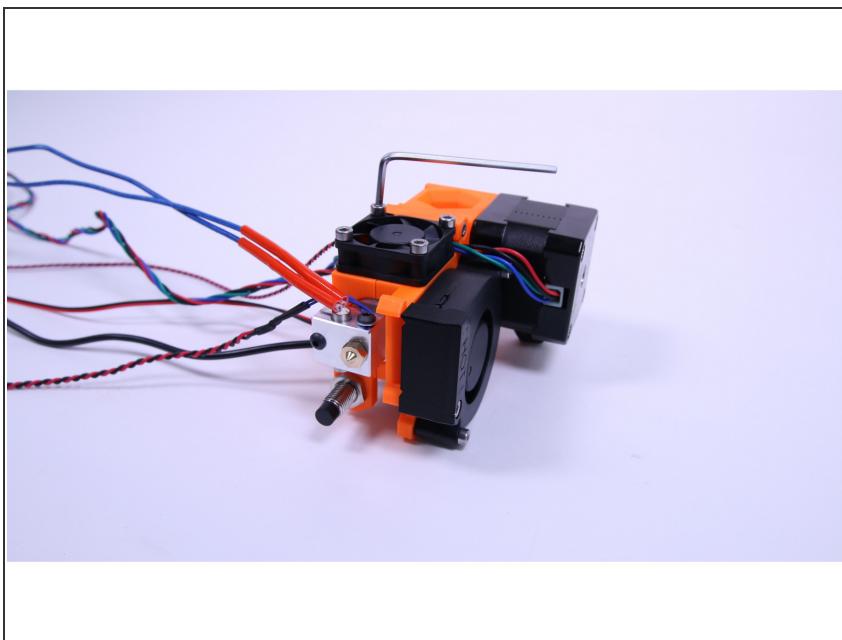
- M3x18 screws (4 pcs)

 Note the correct orientation of the fan. The sticker has to face towards the nozzle!

- Guide cables from the extruder motor via slot in the extruder body, put the fan in place.
- Using M3x18 screws mount the fan to the extruder body using the 2.5mm Allen key as shown in the picture.

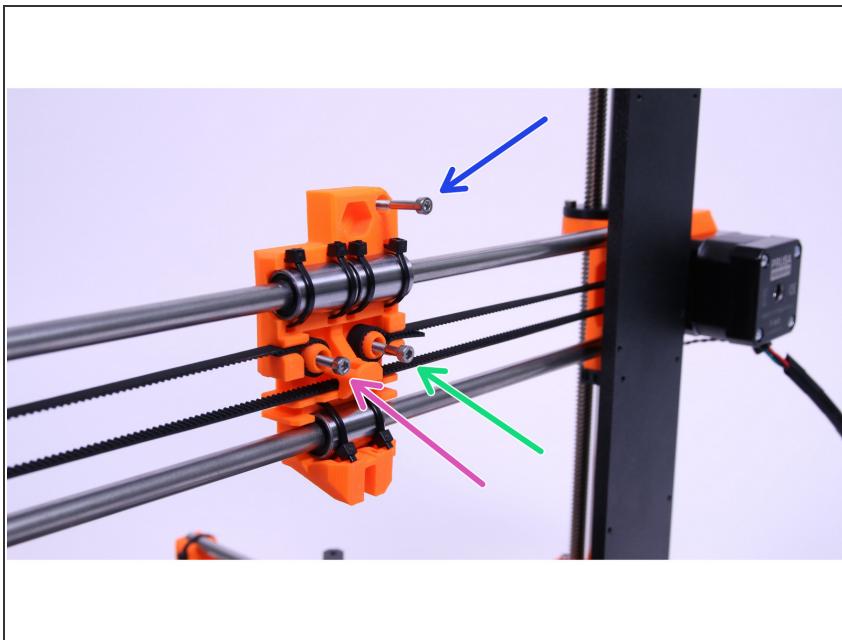
 Left fan is in the box 2.3.4.5.SUP

Step 22 — Tighten fan screws



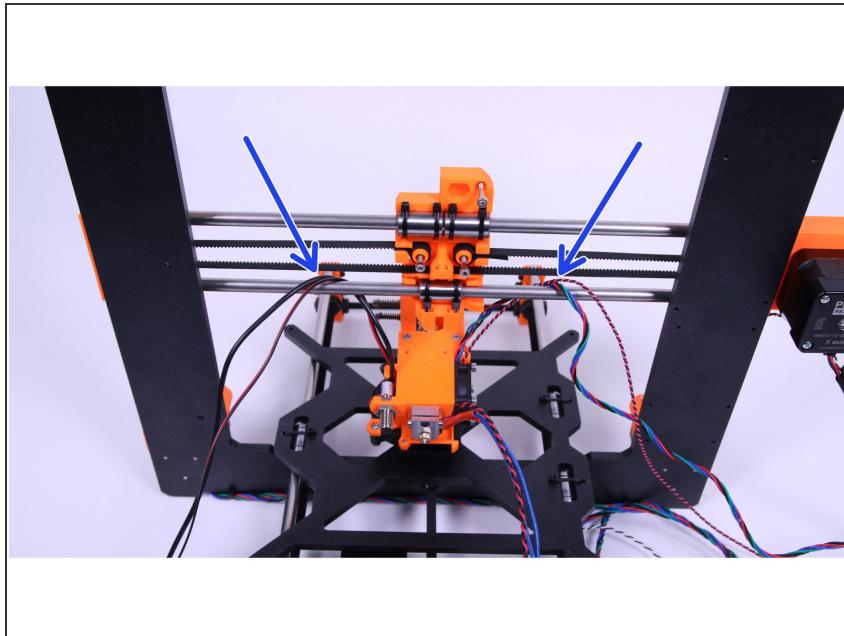
- Tighten fan screws gently using the 2.5 mm Allen key.

Step 23 — Preparing for extruder mounting on X-axis



- M3x40 screws (1 pc)
 - M3x30 screw (1 pc)
 - M3x18 screw (1 pc)
- ⚠** Pay attention to use proper screws as indicated in the picture.

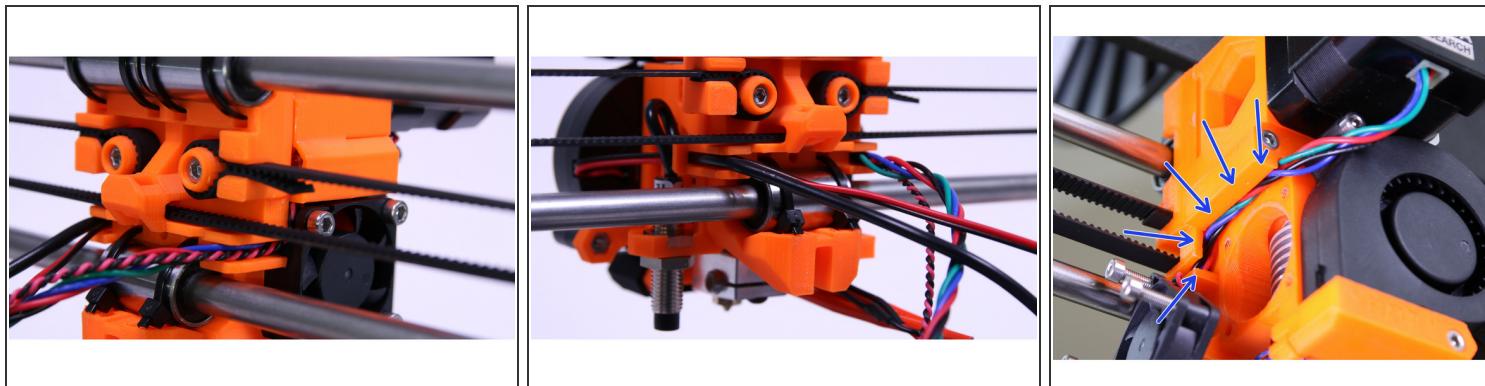
Step 24 — Extruder cables preparation



- Guide cables from the extruder as in the picture.

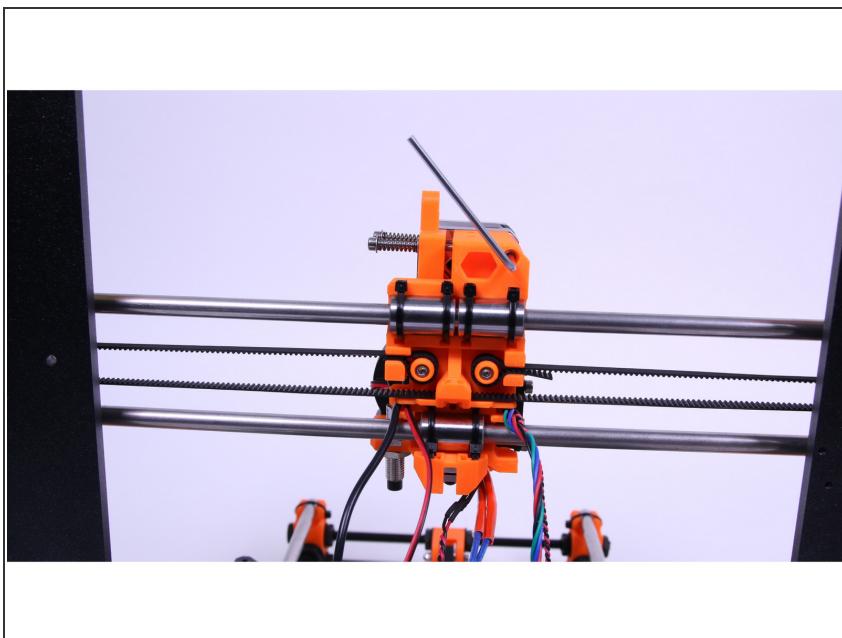
 Cables from P.I.N.D.A. probe, extruder motor and both fans must pass X-axis between lower smooth rod and X-axis belt.

Step 25 — Arranging extruder cables



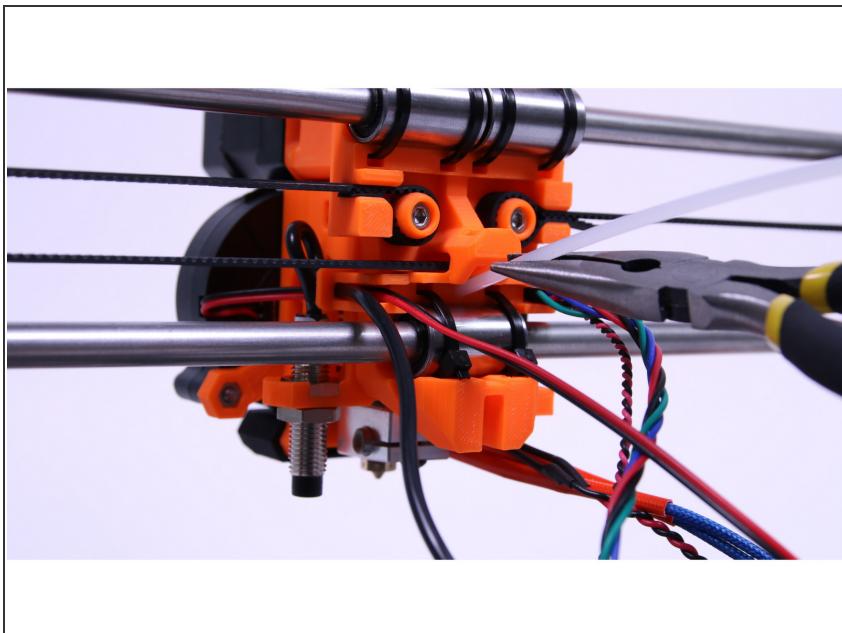
- Arrange cables from the extruder upper part neatly in extruder cable holders.
- Ensure the cables are placed in the channel behind left fan, otherwise there is a risk of breaking them (see photo with blue arrows).

Step 26 — Securing extruder in place



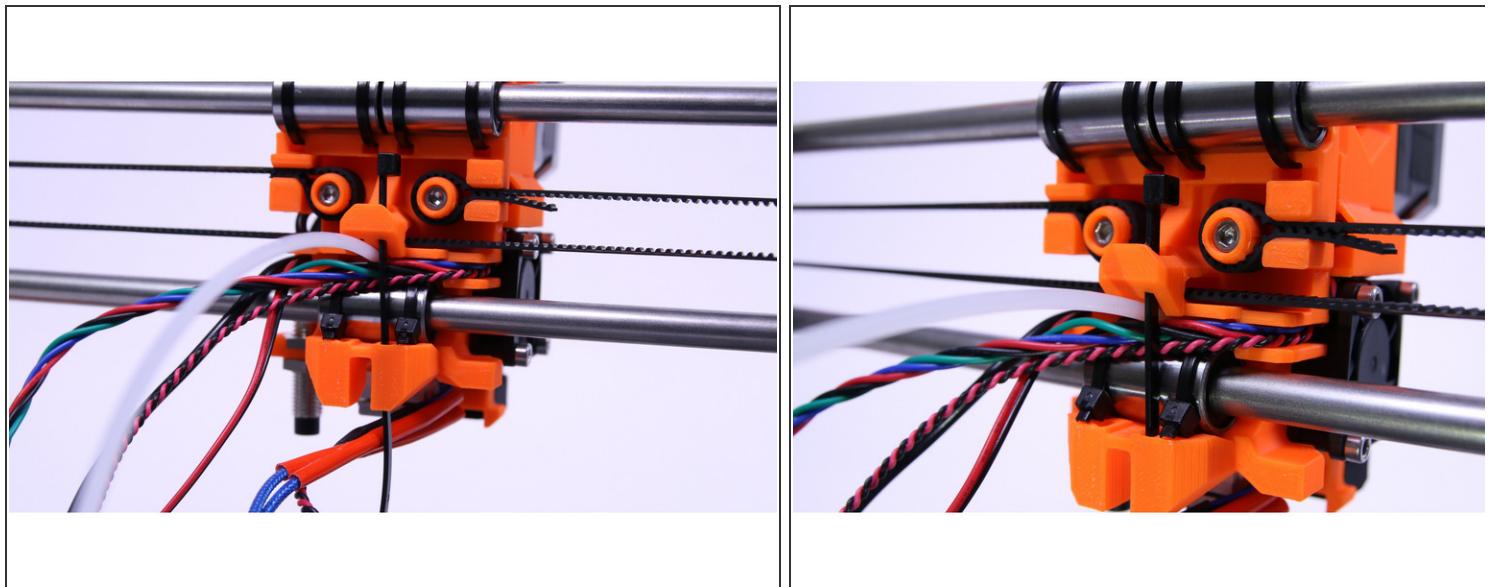
- Tighten the extruder in place using 2.5 mm Allen key.

Step 27 — Preparing the filament



- Take the piece of filament that came with the parts (NYLON Ø 3 mm, about 50 cm long).
⚠ Push it all the way down. If you experience difficulties when inserting the filament use pliers to make a sharp tip on the filament.
- **i** The filament is for the support of the whole harness. Don't cut it, it'll go all the way with the wires to the electronics.

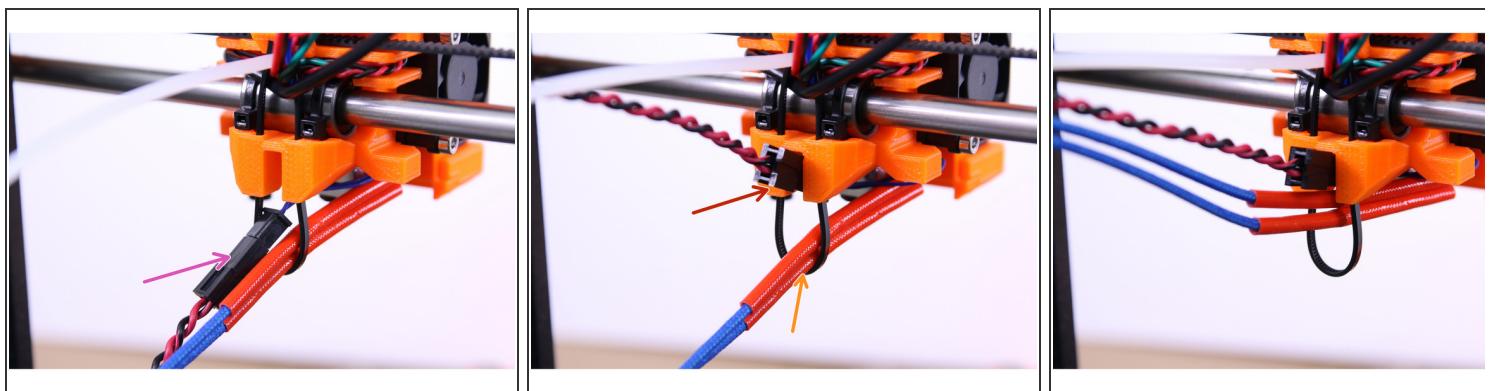
Step 28 — Cable management - right side



- Insert ziptie (longer one in package) in the right side of the X-carriage so that cables from the extruder motor and the fan are below ziptie and held in place.

 Double check the orientation of the ziptie.

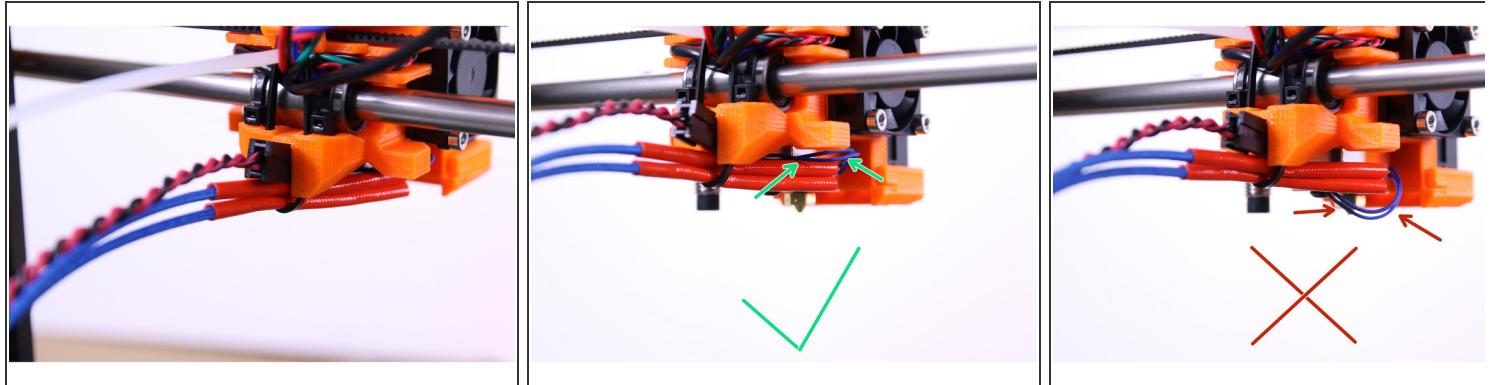
Step 29 — [OPTION1] Cable management - part one



- If you have a connector on the thermistor cable, this option is for you. If you don't, go for OPTION2.
- Guide the cables from the nozzle as shown in the picture.

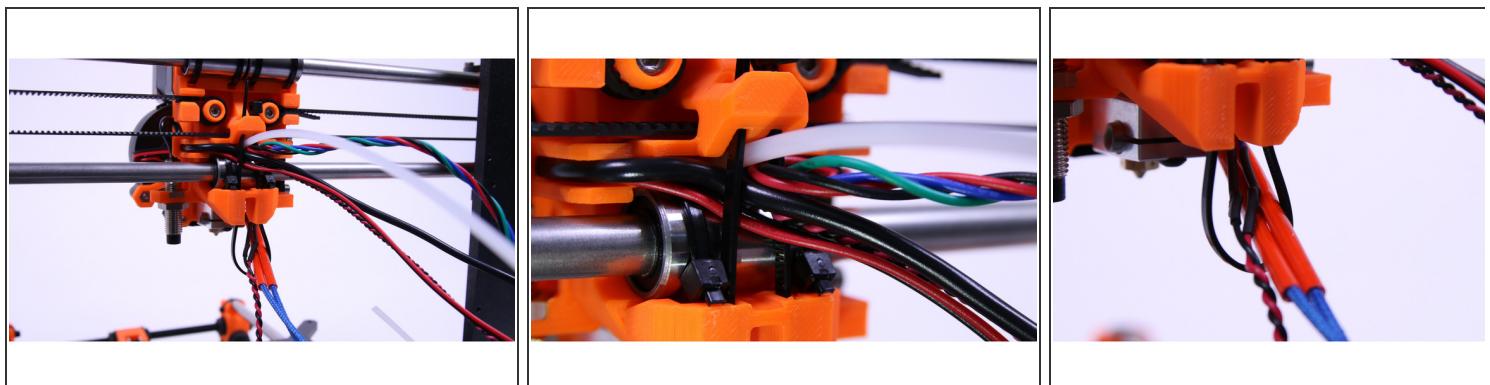
 While handling the thermistor with the connector, make sure that it's still connected!

Step 30 — [OPTION1] Cable management - part two



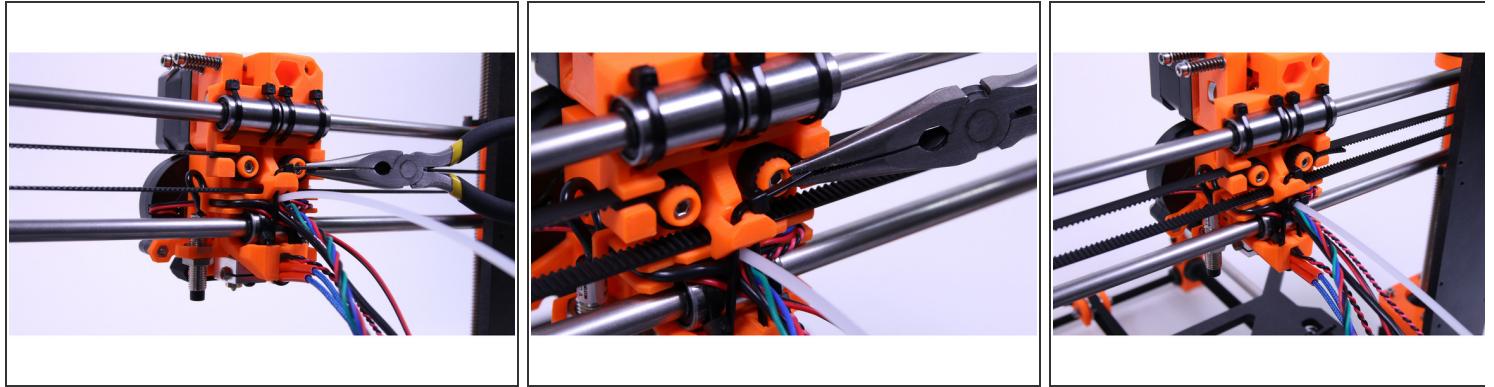
- Guide the cables as shown in the picture.
- Make sure that the wires from the thermistor are going above the heater wires.
- Running them below will cause issues later, don't do that!

Step 31 — [OPTION2] Cable management - hot end cables



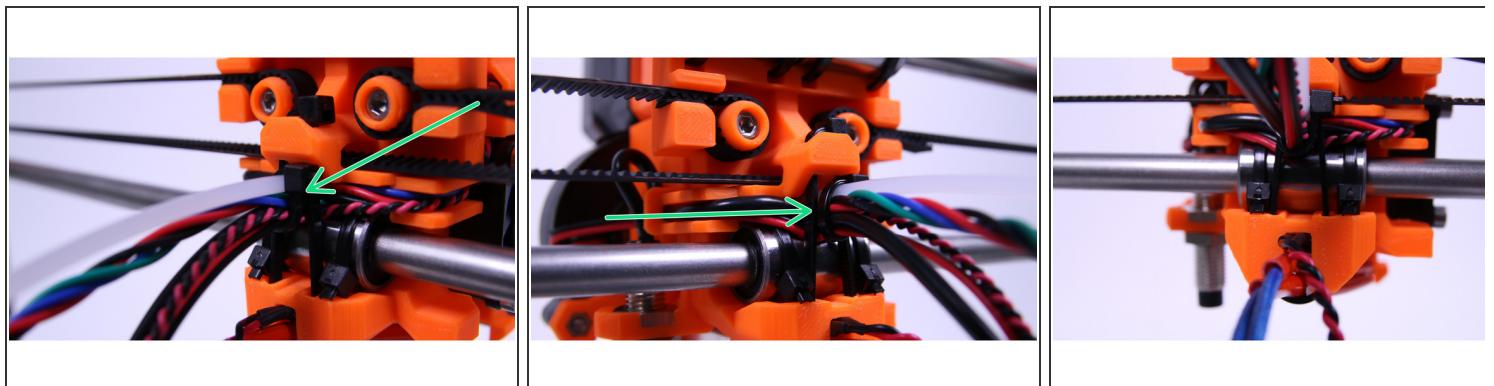
- Revert a ziptie below hot end cables and guide the ziptie up on the left side of the X-carriage.
- (i)* If you have troubles guiding the cables from hotend, you can cut out the ziptie holding them together.
- ⚠ Cables from P.I.N.D.A. probe and the print fan must be located under the ziptie to keep them in place.
- ⚠ Cables from the nozzle heater are fragile, handle them with extra care!

Step 32 — Finalizing x-carriage cable management



- Once all cables are neatly arranged finalize it by tightening the ziptie and cutting off the excessive piece.

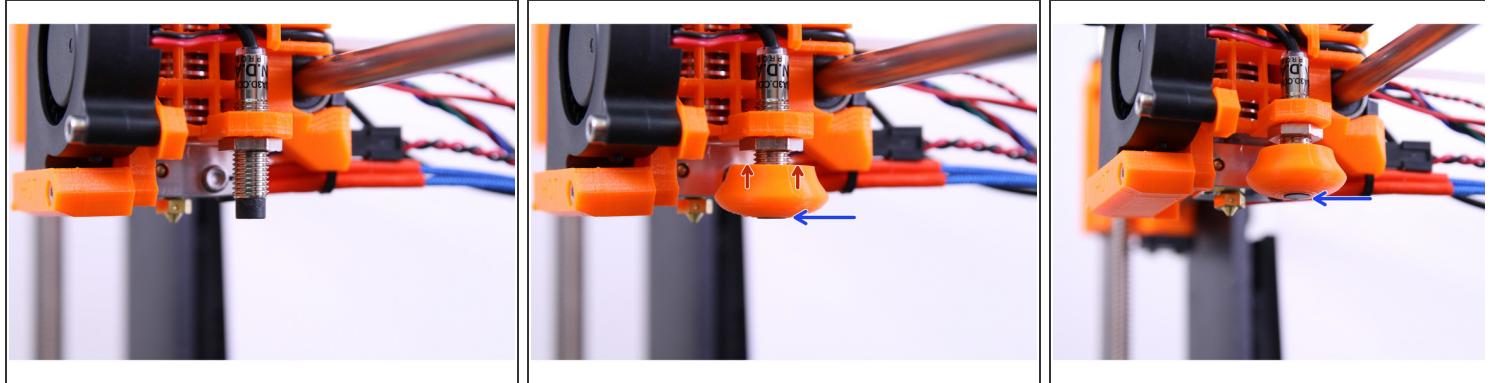
Step 33 — Finalizing cable management



- Use a ziptie to secure cables and filament together.

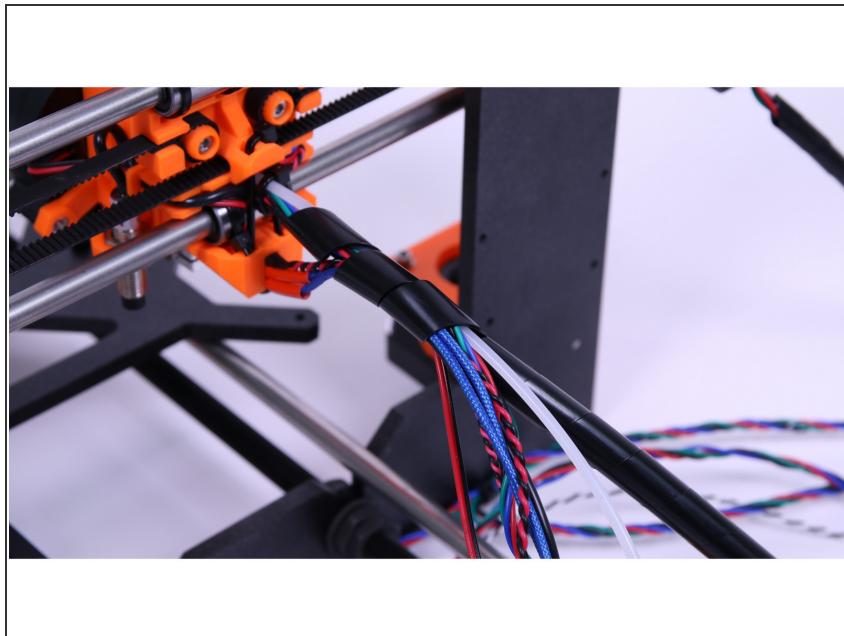
⚠ The ziptie must be as close as possible to the X-carriage in order not to interfere with the printer frame.

Step 34 — [OPTIONAL] P.I.N.D.A. protector assembly



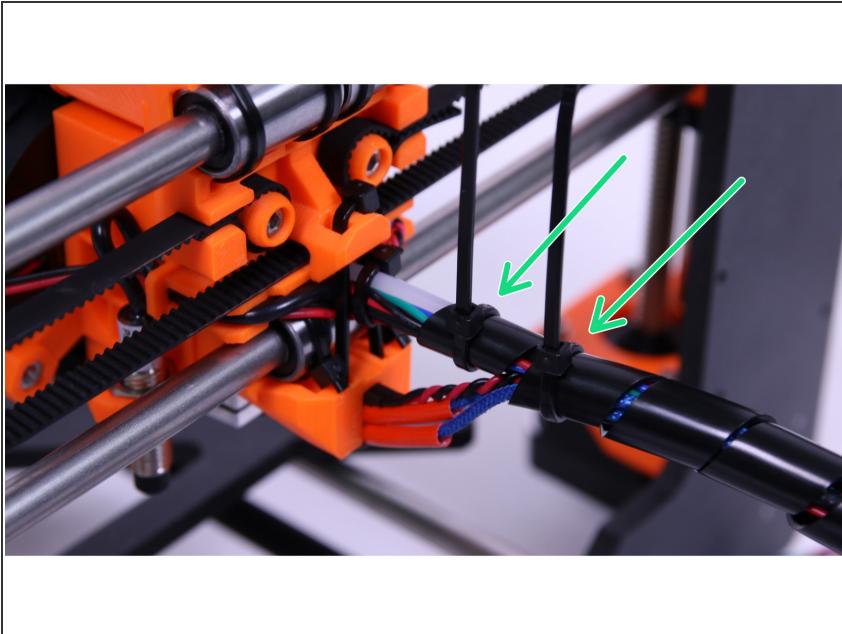
- Prevents rare damage to the probe when a print accidentally lifts up. If you do not have this part, download and print it from <http://www.prusa3d.com/printable-parts> and mount it later.
- Screw in the P.I.N.D.A. protector on the probe.
- Make sure that the end of the probe is in line with the protector as shown in the picture.

Step 35 — Preparing the spiral wrap



- Wrap the spiral wrap (the largest and the longest one) around the cables.
 - Take nylon with upper cables (both fans, motor, P.I.N.D.A.) and make 1 turn with spiral wrap around them, then add remaining cables and continue with wrapping. (see the picture)
-  Double check by moving the extruder fully to the left or right that spiral wrap does not interfere with the printer frame.

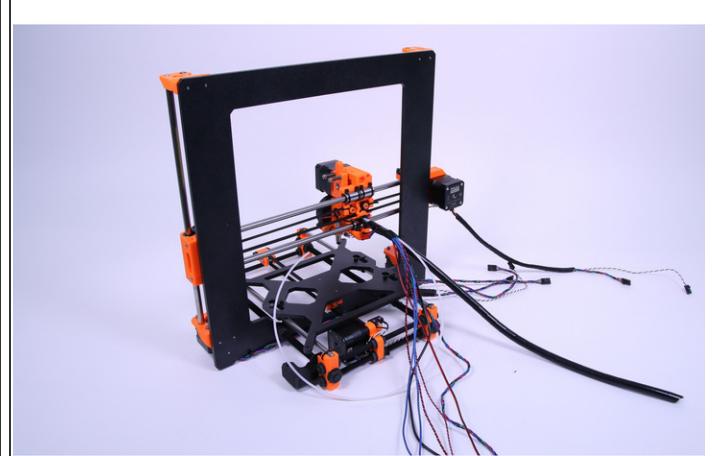
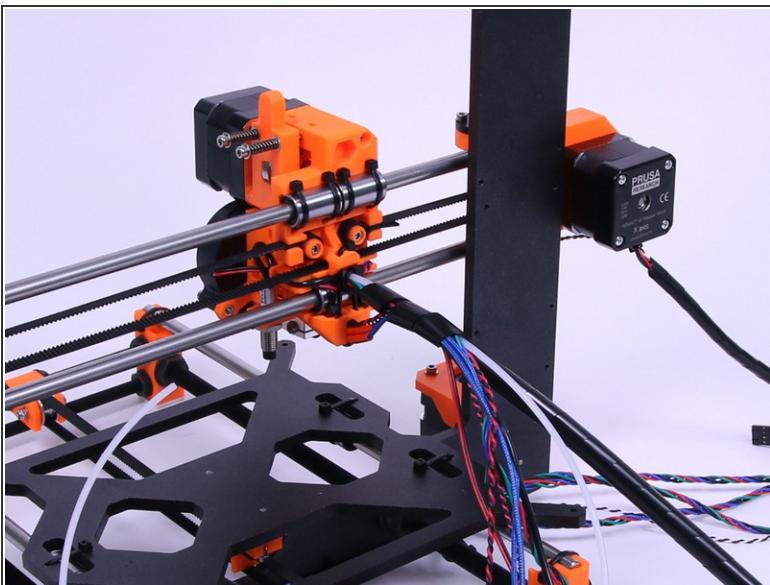
Step 36 — Spiral wrap ziptie



- Use zipties and tighten the wrapped cables and spiral wrap.
- Use one piece at the beginning of the spiral wrap, second one just after join of all cables.

 Tighten zip ties carefully, too much pressure can damage cables inside!

Step 37 — Finalizing extruder



- Check free movement of the X-carriage and inspect cables in the full left or right position.
- Once satisfied with organisation of extruder cables finalize spiral wrap to the full length.

Step 38 — All done!



- Congratulations! You've just assembled the extruder.
- You can continue by assembling the LCD in the next chapter - [6. LCD assembly](#)

This document was last generated on 2017-03-15 07:56:50 AM.