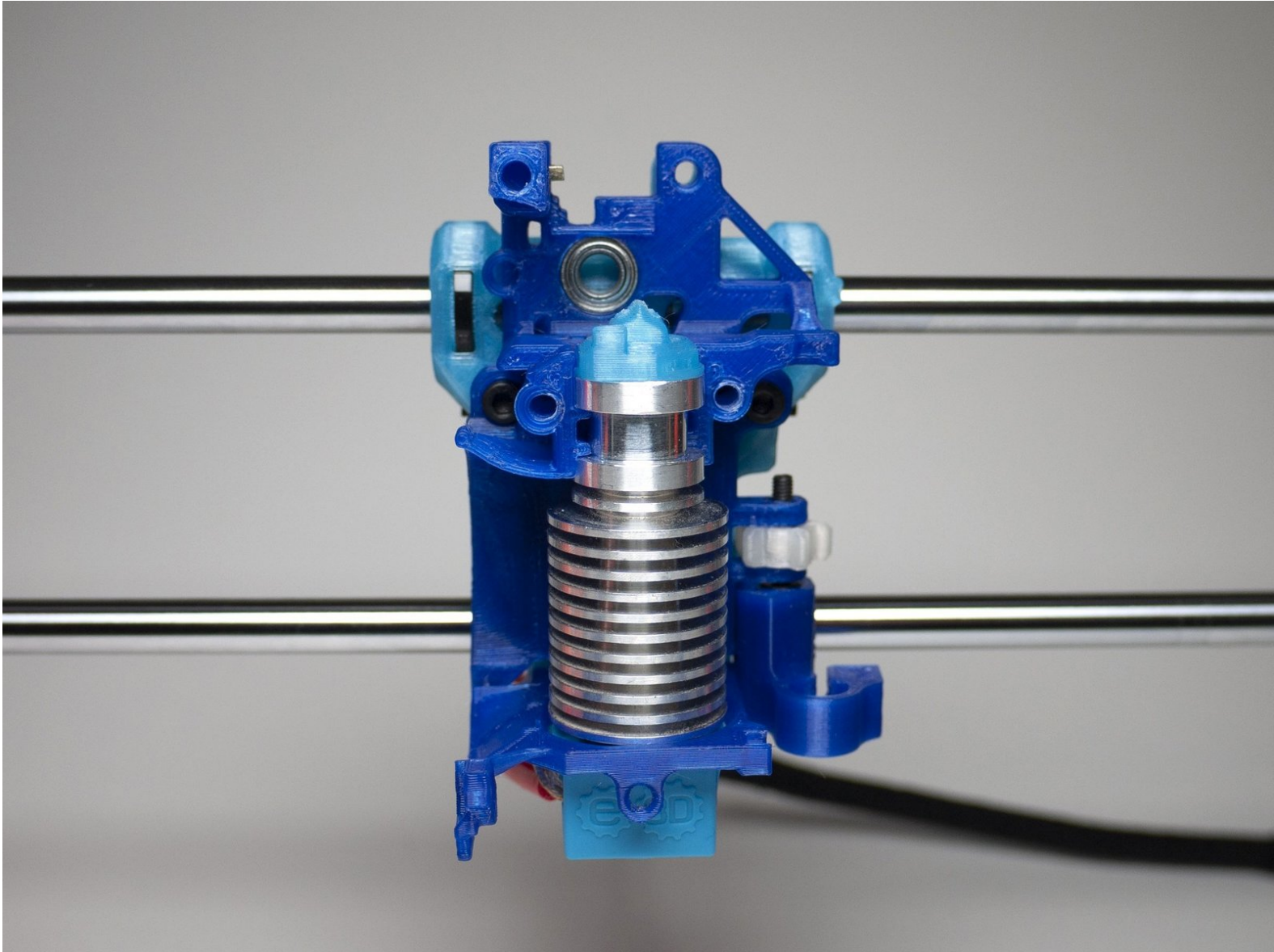


# JLTXplore

## 4. Assembly

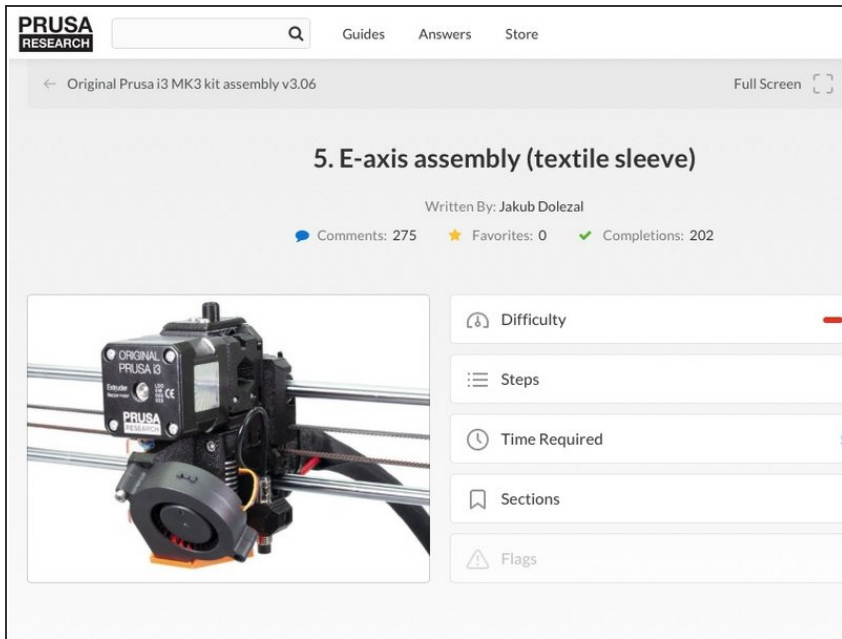
Written By: JLTX



## INTRODUCTION

Final assembly is really not that difficult. There are many steps because it is methodical. After you are done you will know it is not hard. Honestly the hardest part is removing the stock extruder.

## Step 1 — Remove stock extruder and X carriage



- If you have not already done so, you need to first remove the stock extruder and X carriage, as you will be replacing those.

**⚠ Save all parts!!**

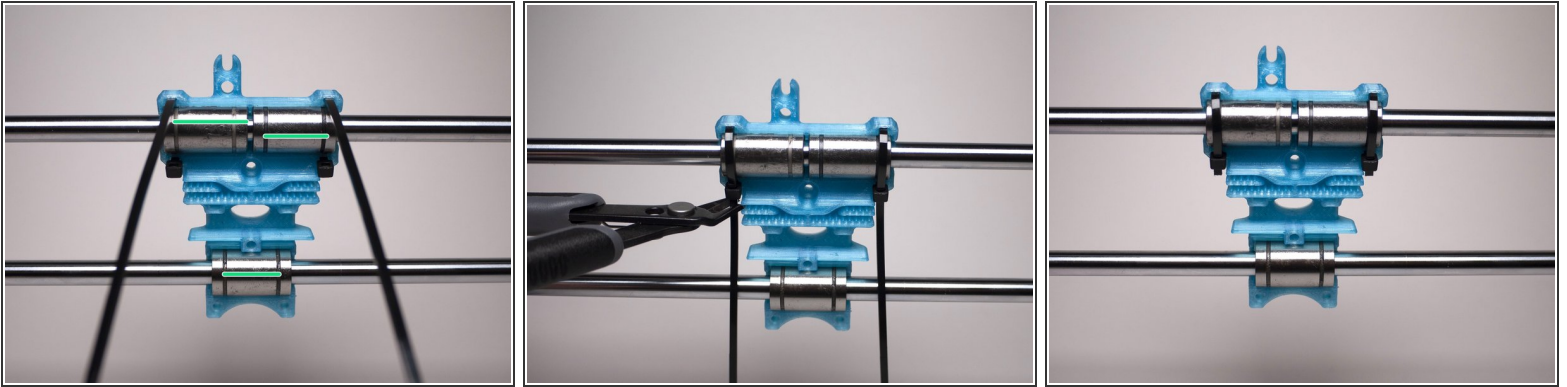
- ① Leave all wiring in umbilical in place! It is not necessary to rework any of that unless so desired.
- ① See Prusa documentation for help.
  - Do these steps in reverse: [E axis assembly](#)
  - Helpful tips on doing that in reverse are first 15 steps of MMU install: [removing extruder](#)

## Step 2



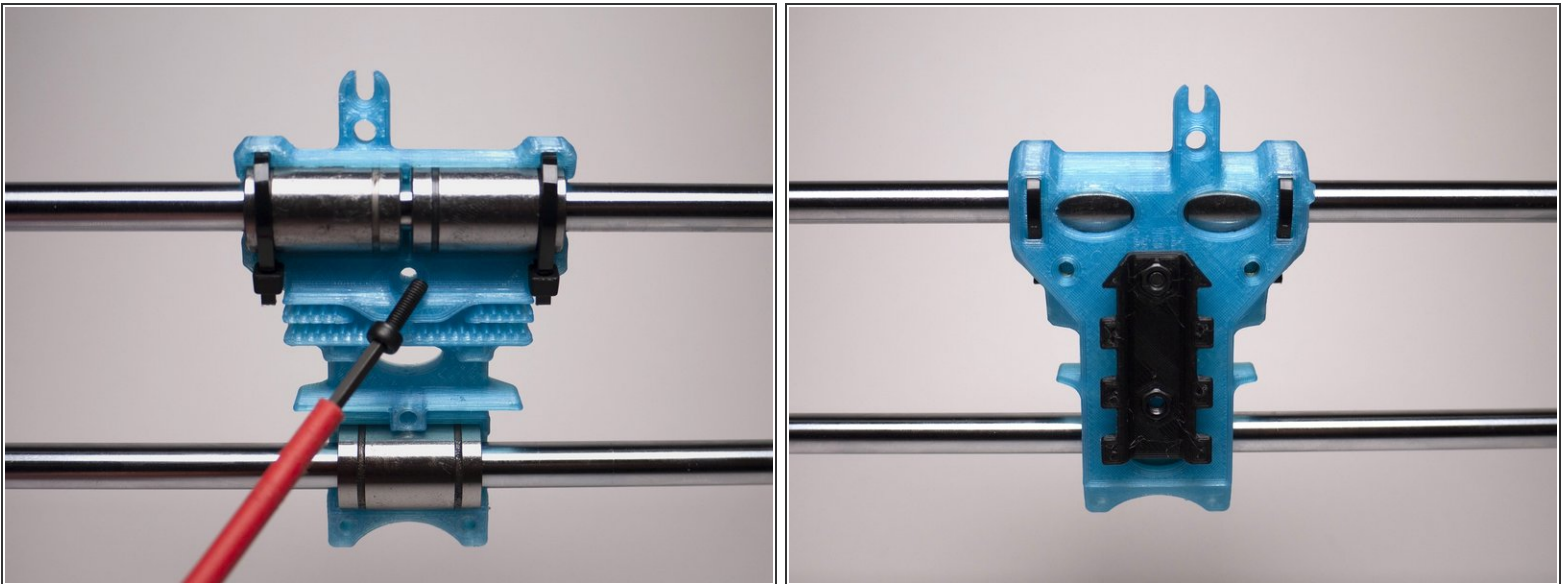
- Get Carriage, X-clamp, Key and Tail
- Hardware: M3x25 + 3X M3x10

### Step 3 — Carriage



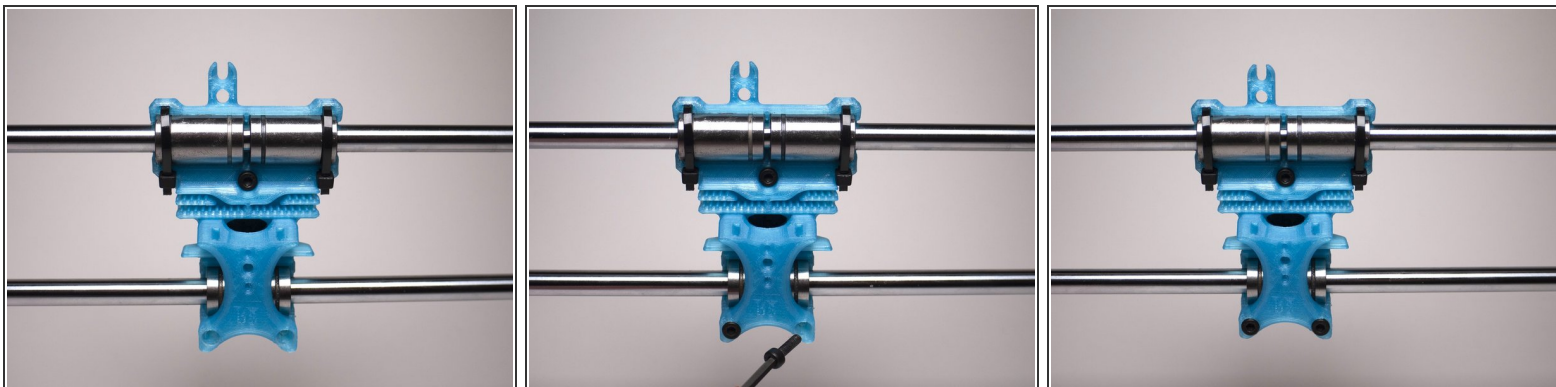
- Optional: align bearings so that ball races are offset as shown.
- Clip Carriage onto Bearings. It will hold itself in place
- Tighten Zip Ties. Cut them relatively flush to avoid them being an obstacle for wiring later.
- This is the view from the rear of the Prusa. Make sure this is oriented correctly.

### Step 4 — Key



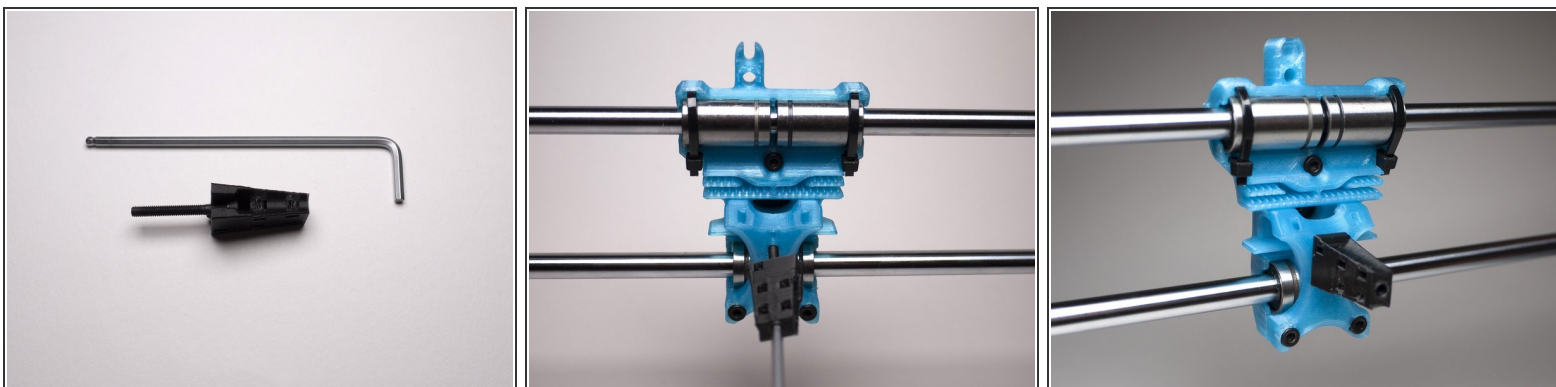
- Use M3x10 to mount Key to Carriage
- ❗ Note the orientation of the Key. The key should be facing the front of the Prusa and the hex nuts should be visible.

## Step 5



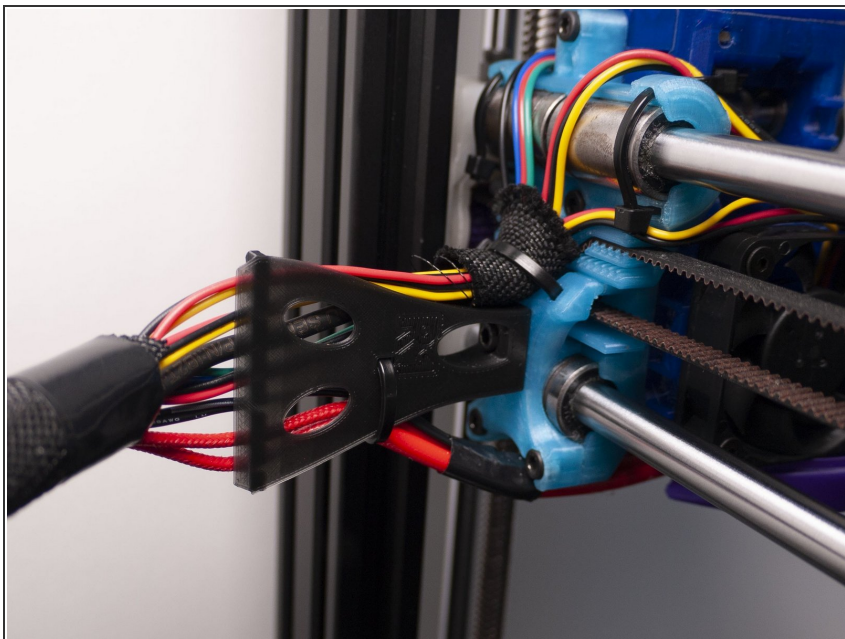
- Press X-clamp on Carriage, it should fit nicely over bottom Bearing
- Use two M3x10 screws to tighten X-clamp to Carriage
- ☑ Do not fully tighten yet. Will complete later

## Step 6



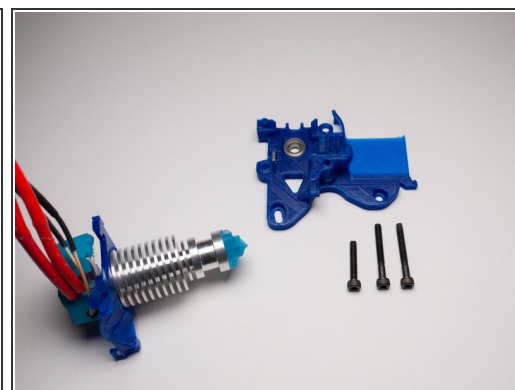
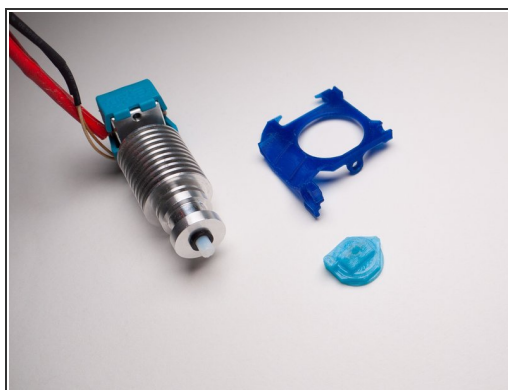
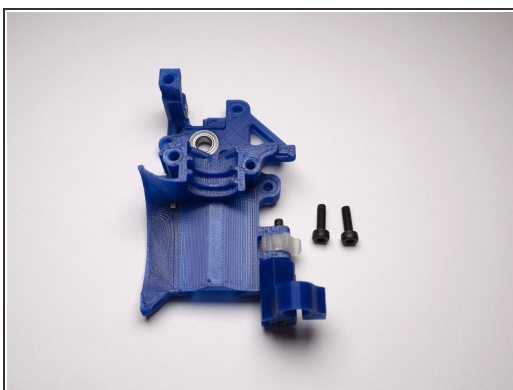
- Get Tail, Allen key and one M3x25
- ⓘ If using Fin instead, skip to [step 7](#)
- Insert M3x25 into Tail. Use Allen key to fix Tail to X-clamp
- Alternatively, start M3x25 into X-clamp first, then slide tail down over head and finish tightening.
- ☑ Now finish tightening two screws at bottom of X-clamp
- Skip to [step 8](#)

## Step 7 — Optional: Fin



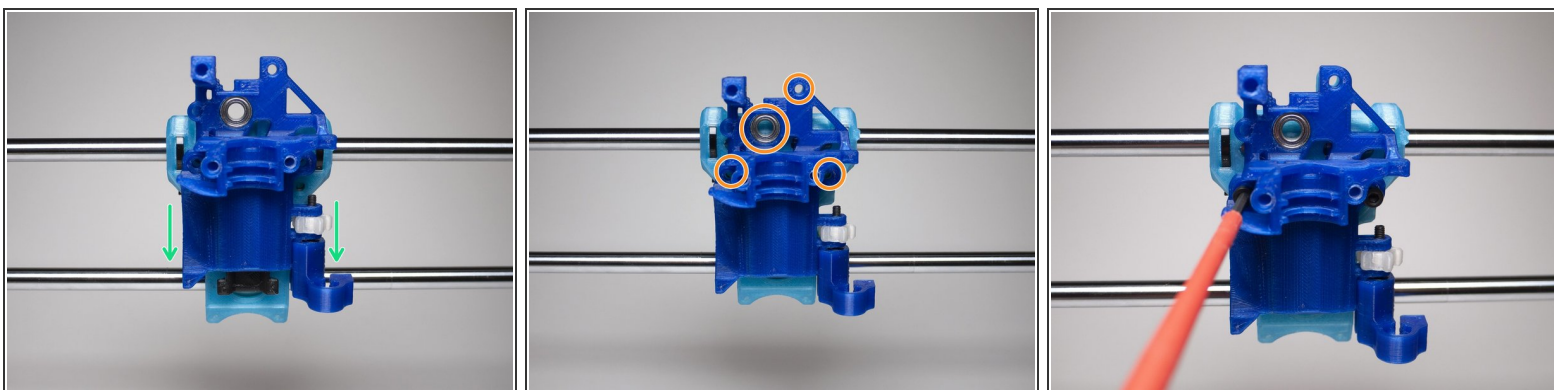
- Get Fin, Allen key and M3x25
- Slide M3 screw through screw hole in fin, then through center of Xclamp and tighten.
- ① Wire rack should point away from Einsy
- ★ Now finish tightening two screws at bottom of X-clamp
- ⚠ Need pre-wire photo

## Step 8 — E-Cage



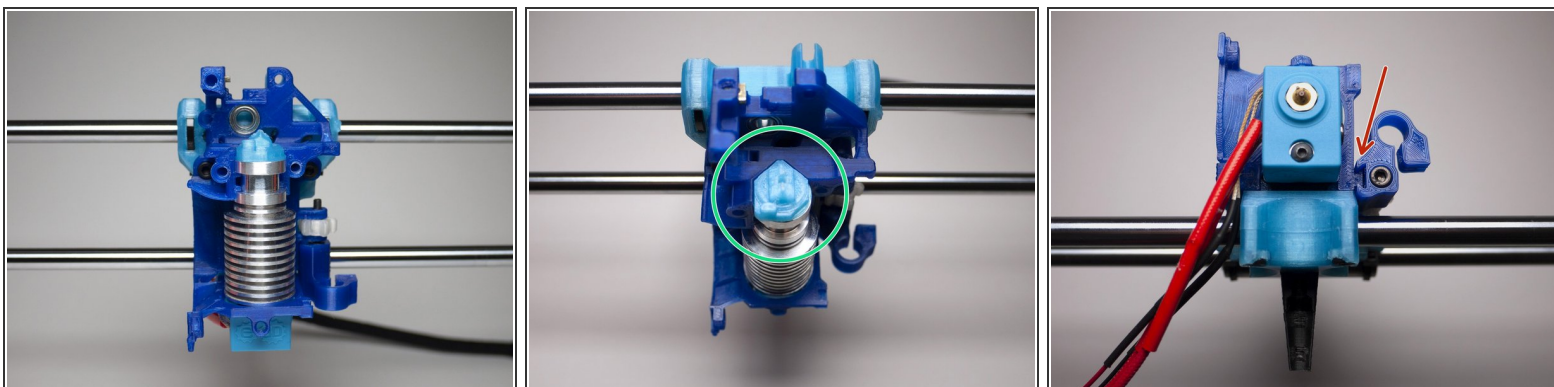
- Get E-Cage B, E-Cage F, E-Cage S, V6 and Inlet
- Hardware: 2X M3x10, 2x M3x25
- Put E-Cage S over V6 and Inlet on top of V6. Insert PTFE in the Inlet.

## Step 9 — E-Cage B Mounting



- Insert E-Cage B on Key
- Press E-Cage B down to lock it in
- Make sure Bearings and screw holes are aligned
- Use two M3x10 to secure E-Cage B to Carriage

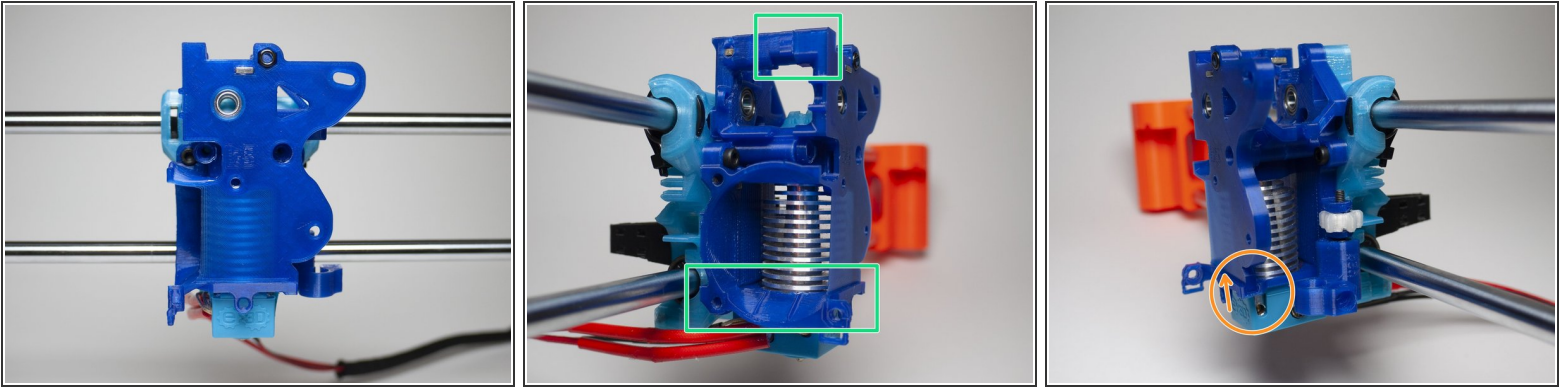
## Step 10 — V6 mounting



- Insert V6 + Inlet into E-Cage B, watching that E-Cage S stays free and not catching
- Make sure Inlet is inserted all the way

**⚠ Important: E-Cage S is inserted into P-Rack. Missing this could cause damage to parts when tightening the E-Cage. Be careful and don't use much force!**

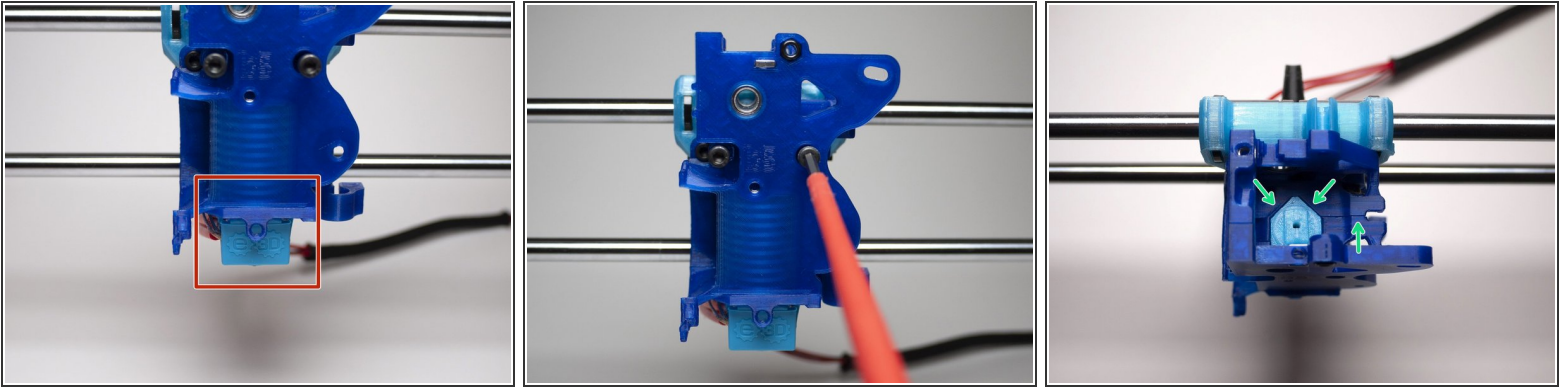
## Step 11 — E-Cage F



- Carefully Press E-Cage F onto E-Cage B, again watch E-Cage S slides underneath
- Make sure all is aligned between the three parts
- The right front corner of E-Cage S clips into E-Cage F

**⚠ Missing those steps might cause damage to the parts when tightening the E-Cage**

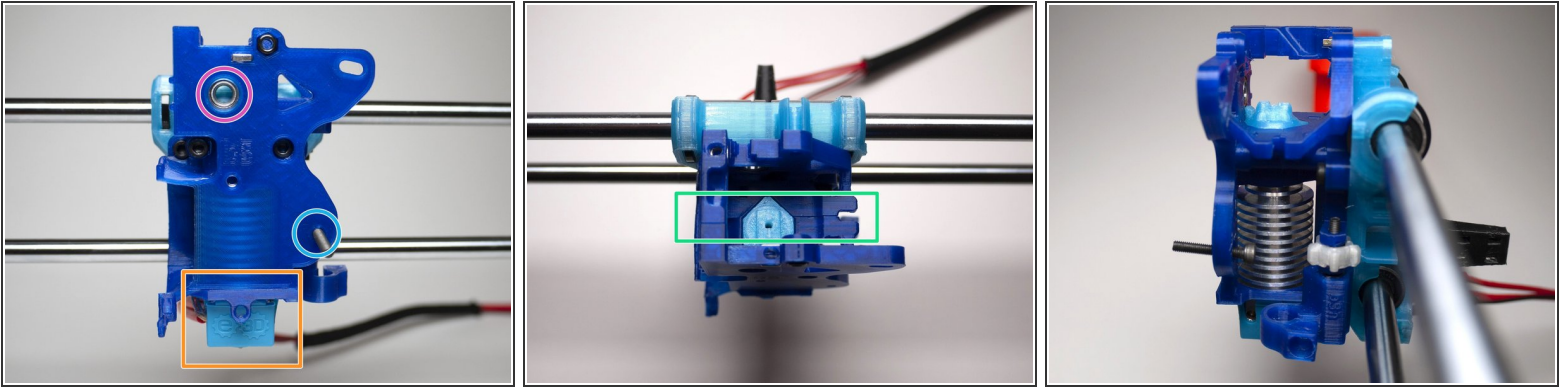
## Step 12 — E-Cage F Cont.



**⚠** Before proceeding, check that V6 is aligned correctly. You won't be able to change after tightening. Remove E-Cage F and turn heatsink without much force to correct. Do not turn the heatblock, since it might loosen heatbreak and nozzle.

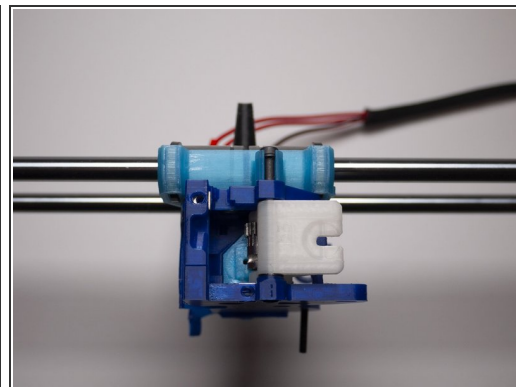
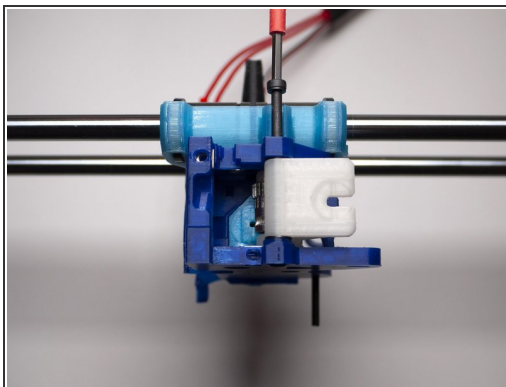
- i** You can either align square with cage (as shown) or angled slightly to align with Omega nozzles which are offset. see [Omega close-up](#)
- Use two M3x25 to screw E-Cage together. Turn both screws equally to avoid bending of any parts
- i** Tip: first time tightening cage, nuts may not be fully set, or burrs on faces, can have trouble catching both screws. Press one side and screw it snug, then release. Do the same to the other side. Then tighten both screws equally.
- Check that E-Cage has no gaps around Inlet or between halves after tightening

## Step 13 — E-Cage Check



- Before proceeding, check your progress again and make sure all is aligned. This avoids taking things apart again during the assembly.
- Insert M3x18 from the back into E-Cage F as motor anchor screw
  - ⓘ You can defer this until step 19 if preferred.
- The bearings of E-Cage B and E-Cage F are aligned
- V6 is aligned correctly
  - ⓘ You can angle heat block slightly to match Omega outlets if desired
- No gaps between E-Cage B and E-Cage F. Inlet is be secured without gaps.

## Step 14 — Idler



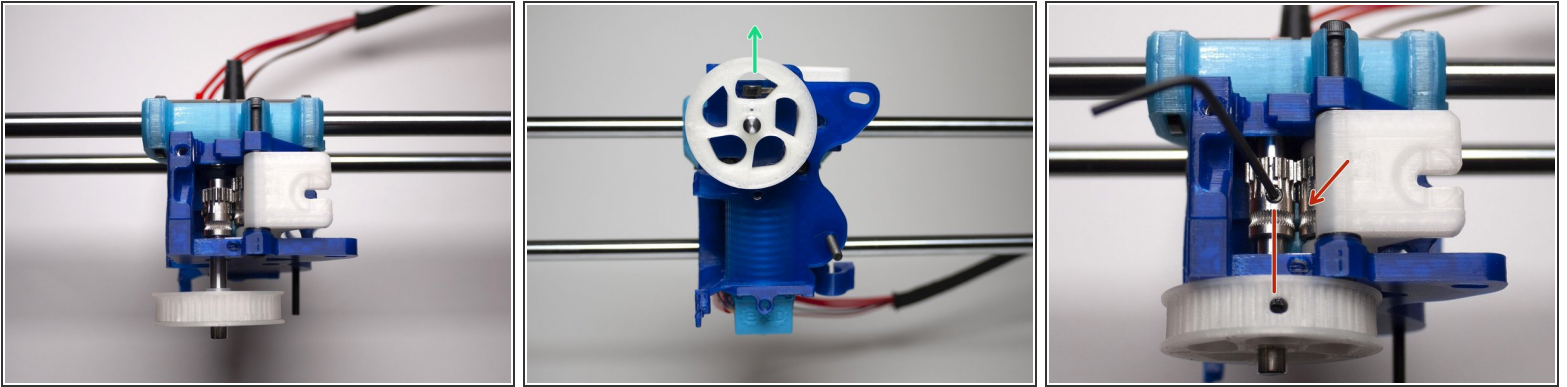
- Get Idler, two nylon washers and one M3x40mm screw.
- Insert screw through Carriage and E-cage B until tip pokes through. Hang a nylon washer on the screw tip. Place Idler as presented and push screw through most of the way. Slide second washer between Idler and E-cage F and push screw through to nut.
- Tighten screw finger tight only

## Step 15 — Wheel + Bondtech Drive + Spacer + Belt



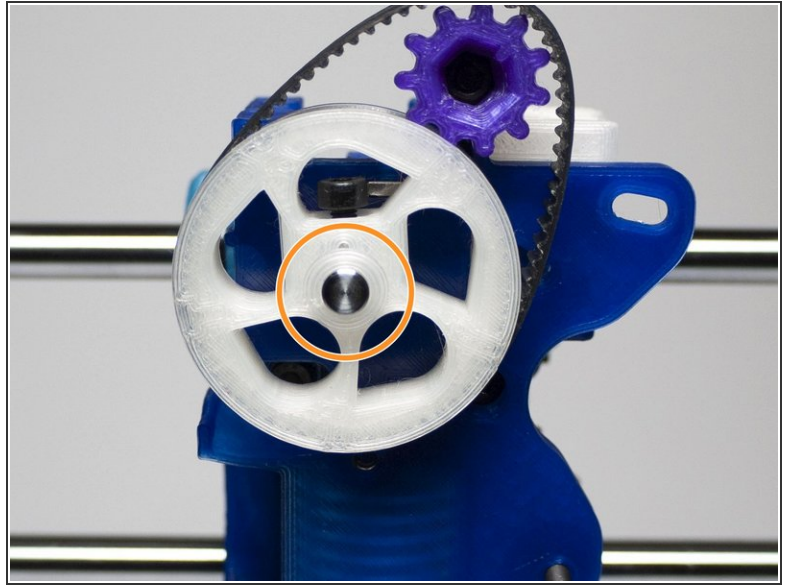
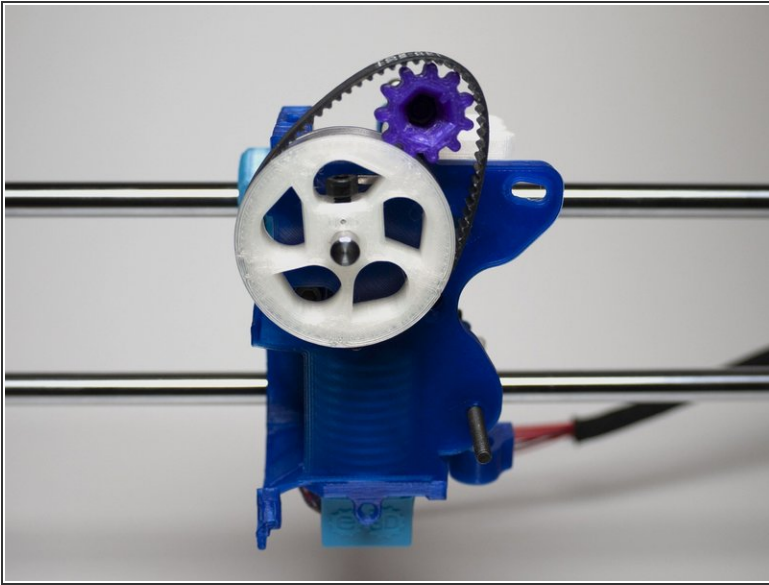
- Get Wheel, Spacer, Bondtech drive gear and Belt


## Step 16 — Wheel + Bondtech Drive



- Insert Shaft into E-Cage, through front bearing. Add Bondtech with teeth toward rear. Press shaft through rear bearing until Wheel touches E-Cage
  - Make sure to orientate the Wheel with the screw on the top
- ⚠ Bondtech scrub screw and Wheel screw need to be aligned, so Bondtech gear can be secured to the flat part of the shaft. Otherwise it might slip in use later
- ⚠ Make sure the Bondtech gears are aligned with the filament path. Use a piece of filament to check

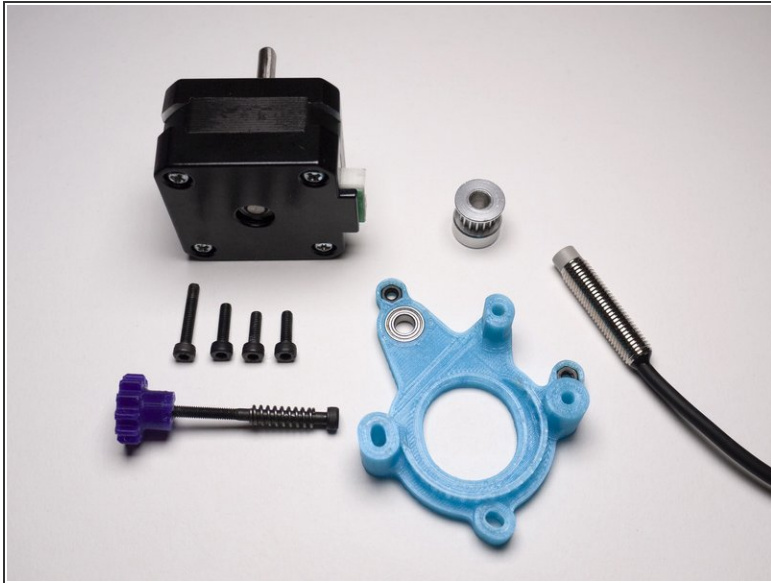
## Step 17 — Belt + Spacer



 Tip: use tensioner to prop up belt. This will make attaching the spider easier.

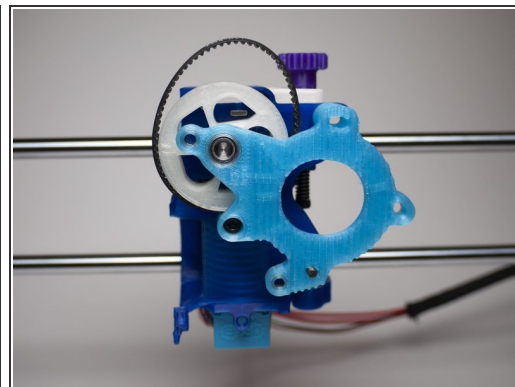
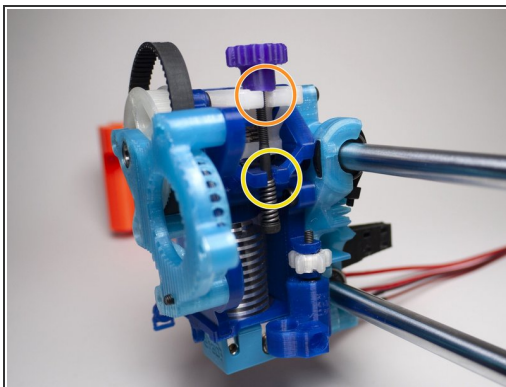
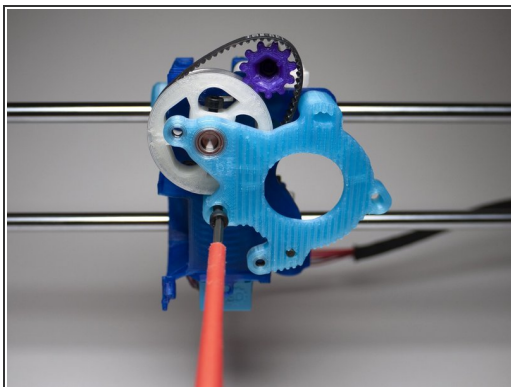
- Add Spacer to the shaft. Make sure to let its flat side face the wheel, so the bulges on the Spacer point to the front

## Step 18 — Spider + Motor + PINDA + Tensioner





- Get Motor, Tensioner, Spider, Pulley (or Pinion if you printed one) and Pinda
- Hardware: M3x18 + M3x12 + M3x10 + M3x8
- Put Pulley (or printed Pinion) on the motor shaft as shown on the second picture. Do not worry so much about the position on the shaft, you can adjust that later if necessary
- ⓘ If your Pulley has two grub screws, make sure to tighten both. Otherwise one might come loose and cause the Pulley to get jammed with the Spider when in use later
- ⓘ You can use the stock MK3 extruder stepper motor if you do not have a slim stepper at hand. But one of the main benefits of Skelestruder is the loss of weight to achieve higher printing speeds. This is limited with the bigger motor. It still will be a great working Extruder though!

## Step 19 — Spider + Tensioner

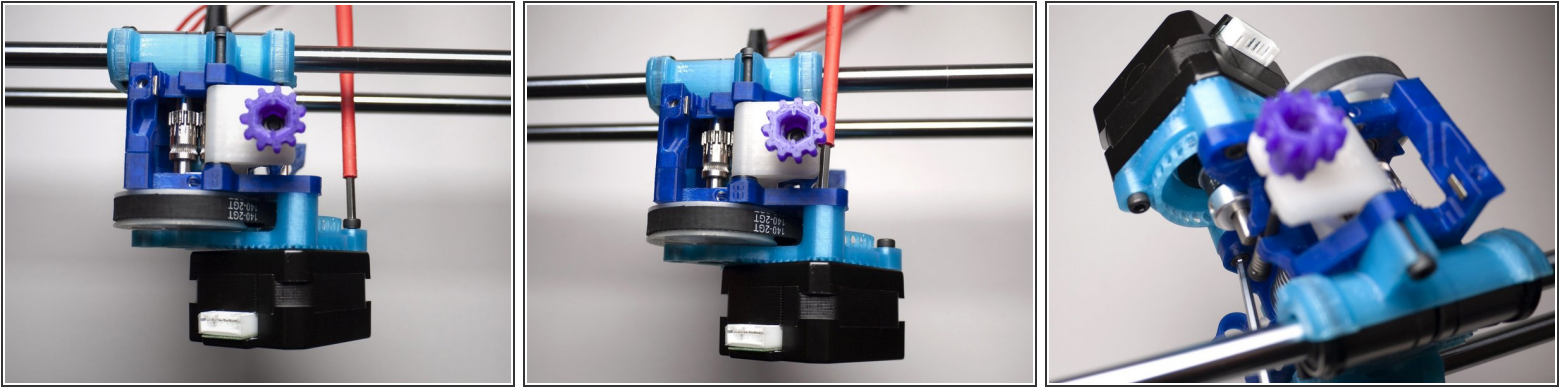


- Screw on spider with M3x12 screw. Remove tensioner for next step
- First insert screw head with spring into slot in E-Cage. Make sure spring sits underneath the slot
- Pull up Tensioner by hand and slip it into the slot prepared in the idler. If it is too hard to insert, do not use excessive force but loosen the tensioner knob a little

 Alternatively, wait until the very end to install the tensioner

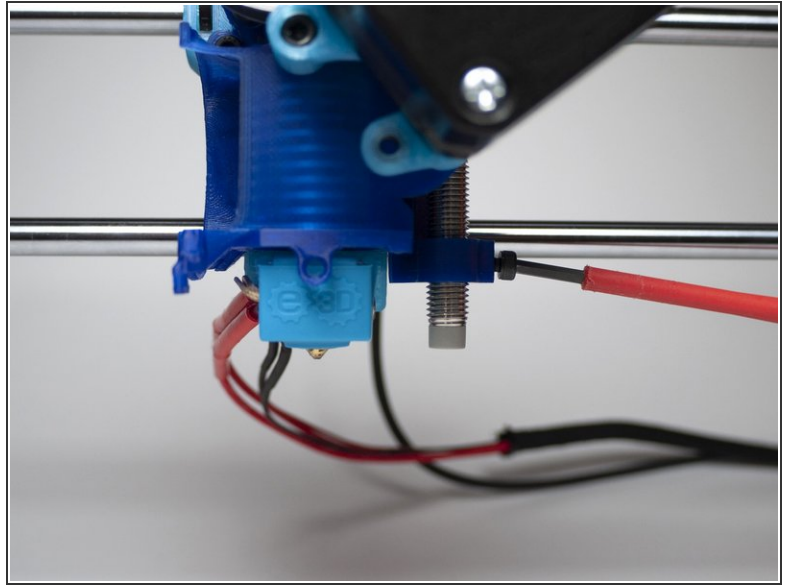
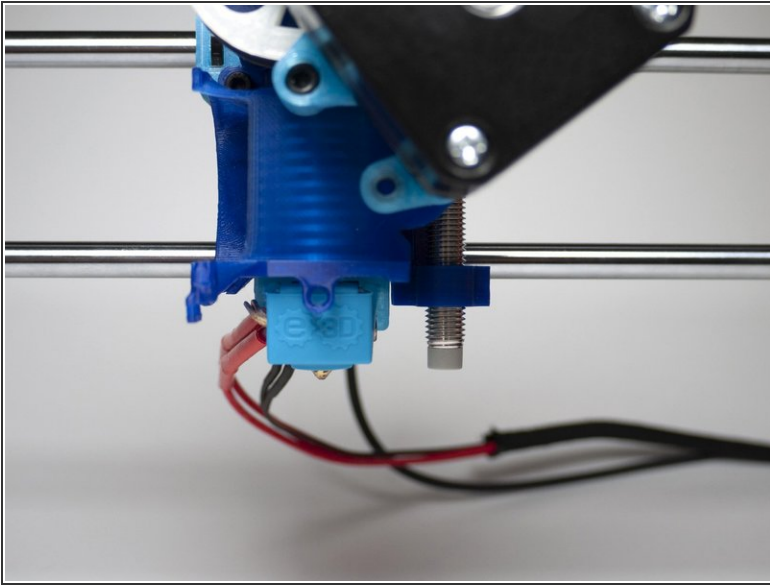
 When pulling up the tensioner, it is tempting to press down the extruder assembly to work against the force pulling up. Try to not lean too much on the extruder to assure you are not bending any rods, etc.

## Step 20 — Motor



- Insert motor through hole in Spider and make sure the belt warps around the Pulley (or Pinion). Recommend wires exit upper left.
- ❗ You can turn the motor connector in a different direction if you prefer a different route for the wire
- Tighten M3x10 as shown in picture 1
- Tighten M3x18 as shown in picture 2
- Tighten M3x18 motor anchor screw with allen key as shown in picture 3
- ❗ Be careful if PINDA already installed. Best to use Allen key with ball end since approach is angled.
- ⚠ Unscrew all screws, half a turn after tightening and turn the motor a little bit away from the wheel to tighten the belt
- ⚠ Do not over-tighten the screws or the belt. It does not need to be as tight as the other belts on X and Y

## Step 21 — PINDA



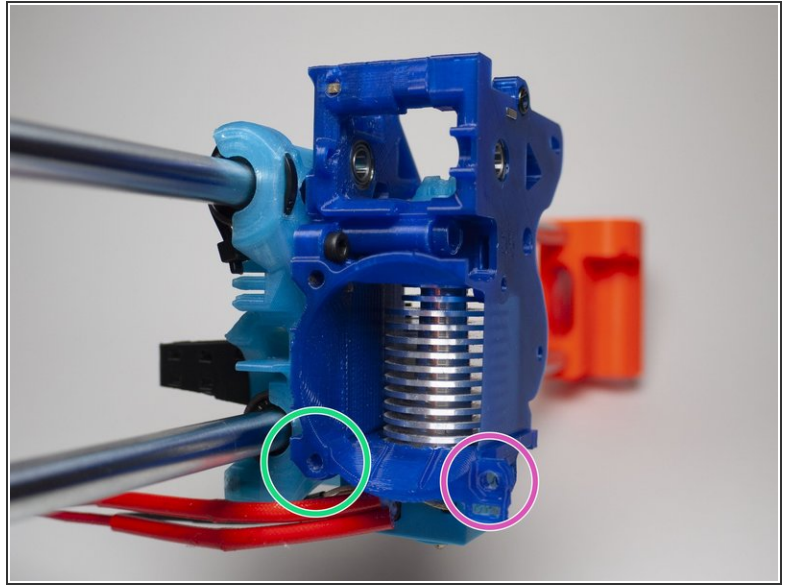
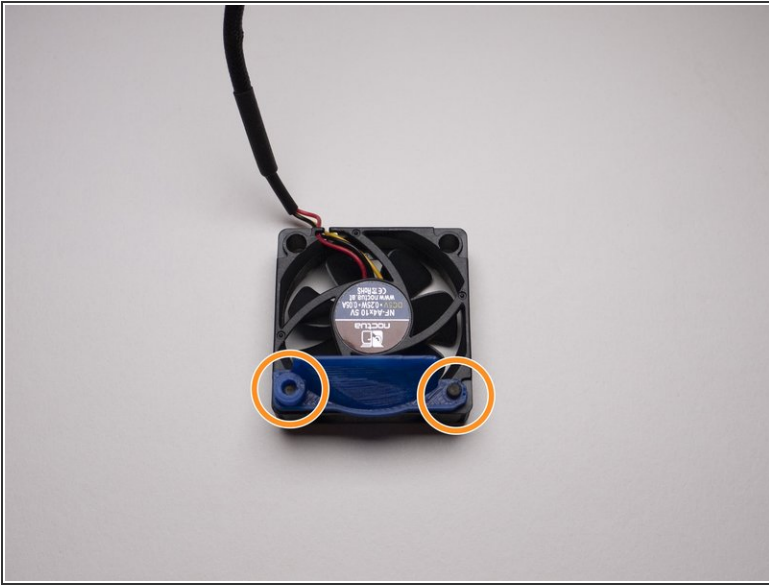
- Insert the Pinda into P-Rack as shown in picture 1, getting it close to level with the nozzle.
  - ⓘ Don't worry too much about the exact Pinda position. With the knob on you can easily adjust its height later when calibrating the printer
  - Use M3x8 to tighten the Pinda. Make sure it does not slip
- ⚠ Depending on the force needed, hold the P-Rack to support it when tightening the Pinda to avoid bending it

## Step 22 — Cooling



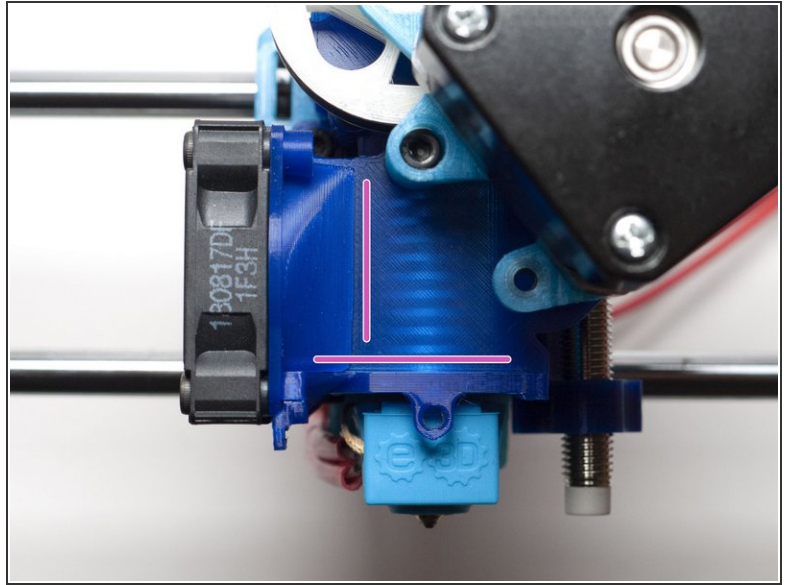
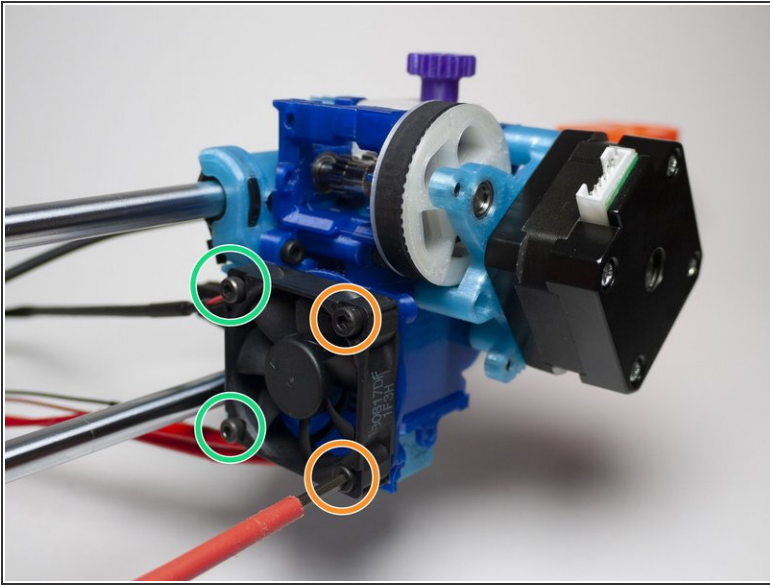
- Get Nocuta, Blower, Fan Shroud and Omega
- Hardware: 3X M3x12 + 4X M3x18

## Step 23 — Noctua Prep



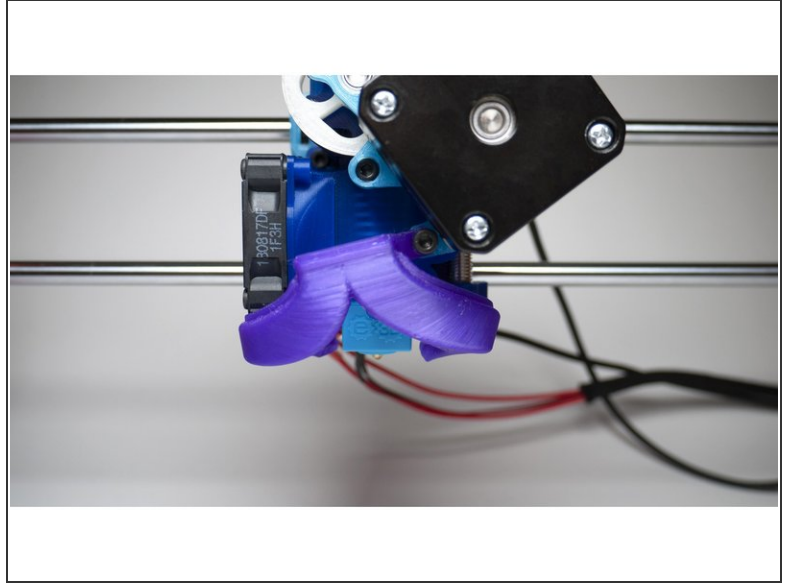
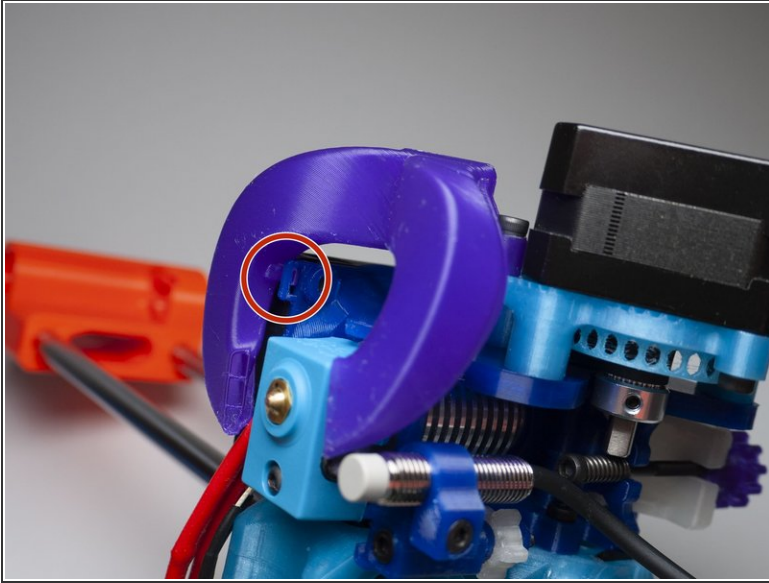
- Use 2X M3x12 to screw Fan Shroud on the Noctua's right side. The wire outlet will be located top right when mounting the fan to the assembly. The logo of the fan needs to point to the inside of the E-Cage
- Make sure the Fan Shroud's screw hole is aligned with the mount on E-Cage S
- Make sure the bottom left screw will catch the mount on E-Cage S. The E-Cage S mount is behind the screw hole shown in the circle. Make sure it is pushed all the way up.

## Step 24 — Noctua



- Use two M3x18 screws to mount the right side of the Noctua
- Use the already in the shroud inserted M3x12 screws to mount the left side
  - ⓘ Some have found M3x14 works better depending on print fit
- Make sure everything is aligned and that there are no major gaps between shroud and the E-Cage
  - ⓘ Tiny gaps won't have influence on cooling and can be ignored

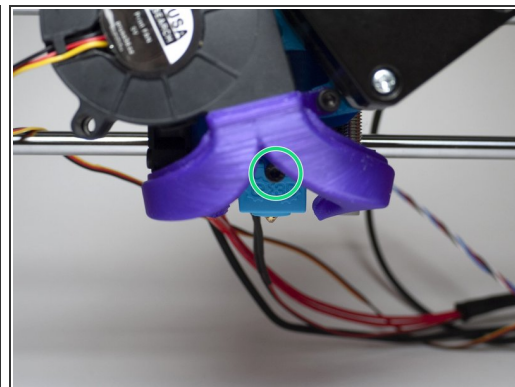
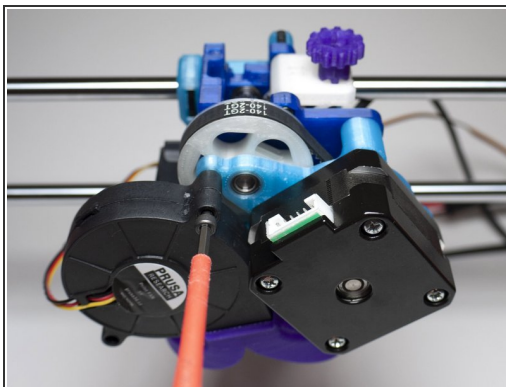
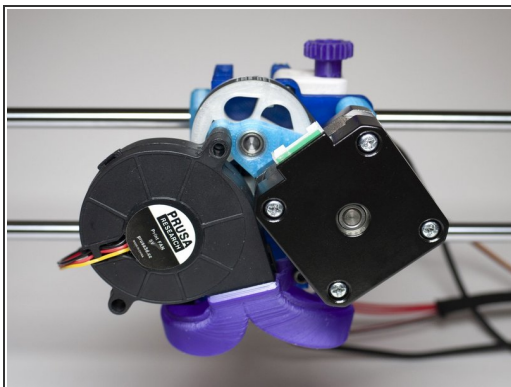
## Step 25 — Omega



### ⚠ Make sure the Omega hooks into E-Cage S

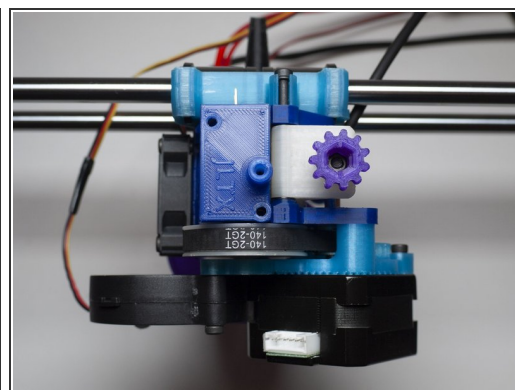
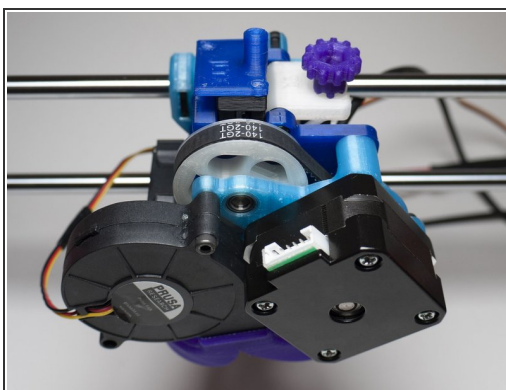
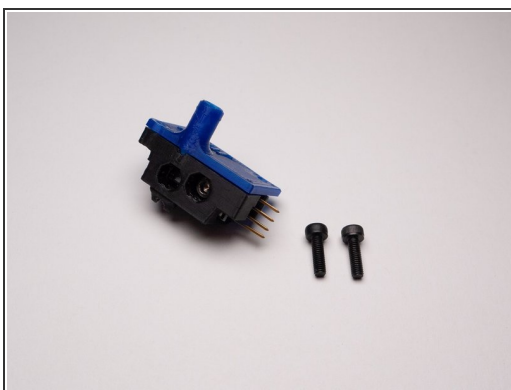
- For newer R2 version, first hang the right hook on the right edge of E-Cage S, then clip the hook into the E-Cage S on the left. The right hook has some flex so you can press in to enable the clip on the left.
- Lastly, use M3x12 to screw the Omega on the Spider

## Step 26 — Blower + Garter Screw (Optional)



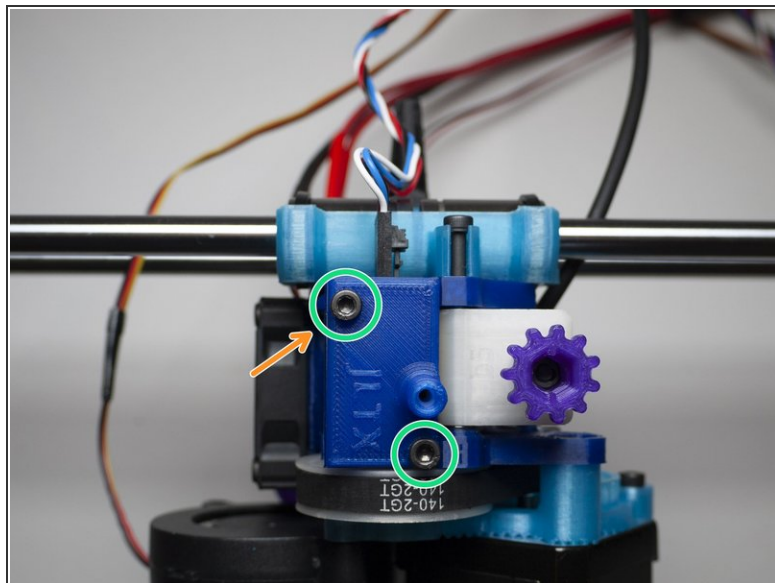
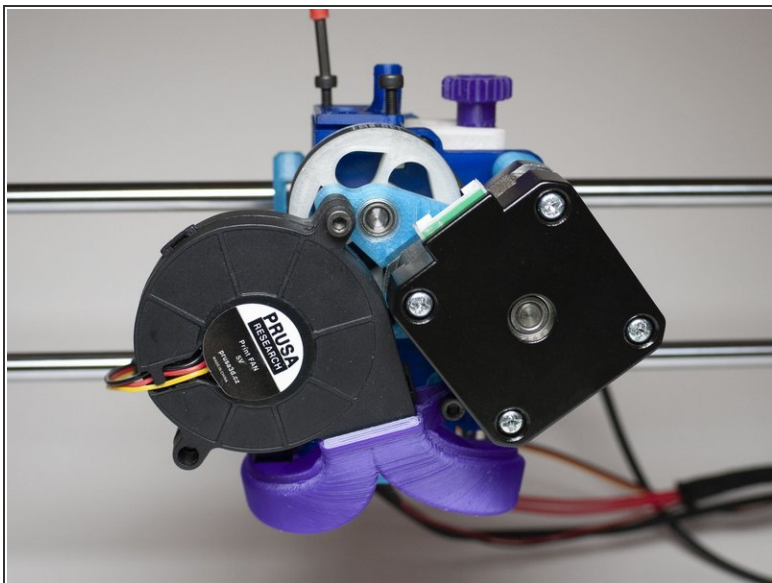
- Insert the Blower into Omega and use M3x18 to secure it with the Spider
- Optional: If you use a silicone sock, you can use M3x8 or M3x6 to secure it to the heater block. This is a great way for preventing it slipping down during a print
- ① Screw tip should just touch the sock, not dig in.

## Step 27 — MK3: Cartridge + Laser Filament Sensor + Cover



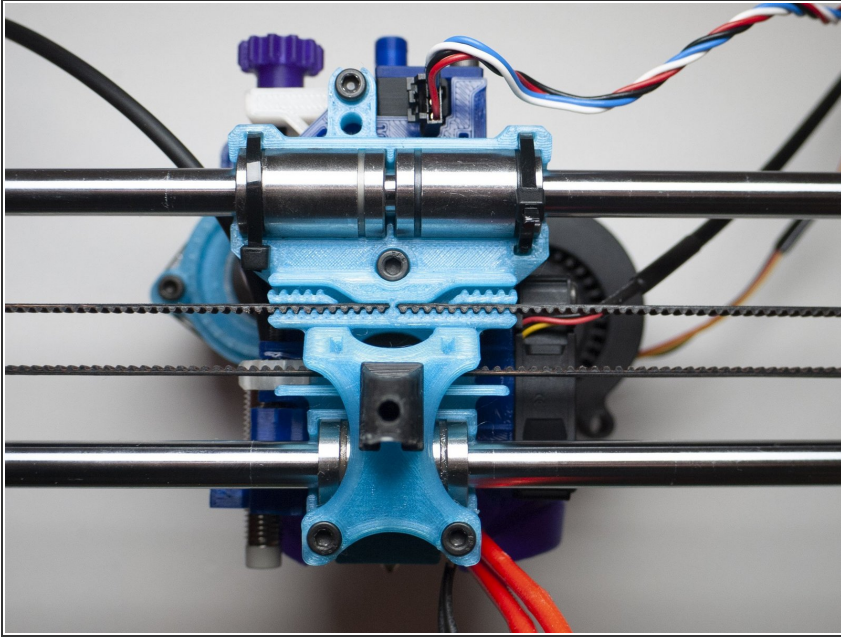
- Get the Cartridge + Cover assembly
- Hardware: 2X M3x10
- Insert the Cartridge + Cover assembly into the top of the extruder

## Step 28 — Cover + Sensor



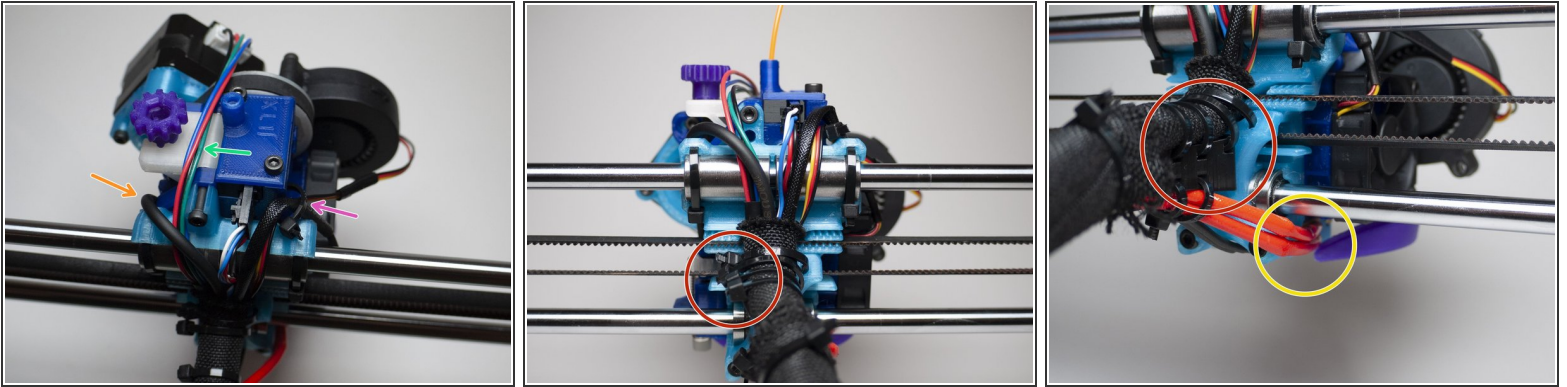
- Use the M3x10 screws to tighten down the Cartridge + Cover assembly
- Optionally use M3x8 instead of M3x10 for the rear cover screw
- Plug in filament sensor wire

## Step 29 — Belt



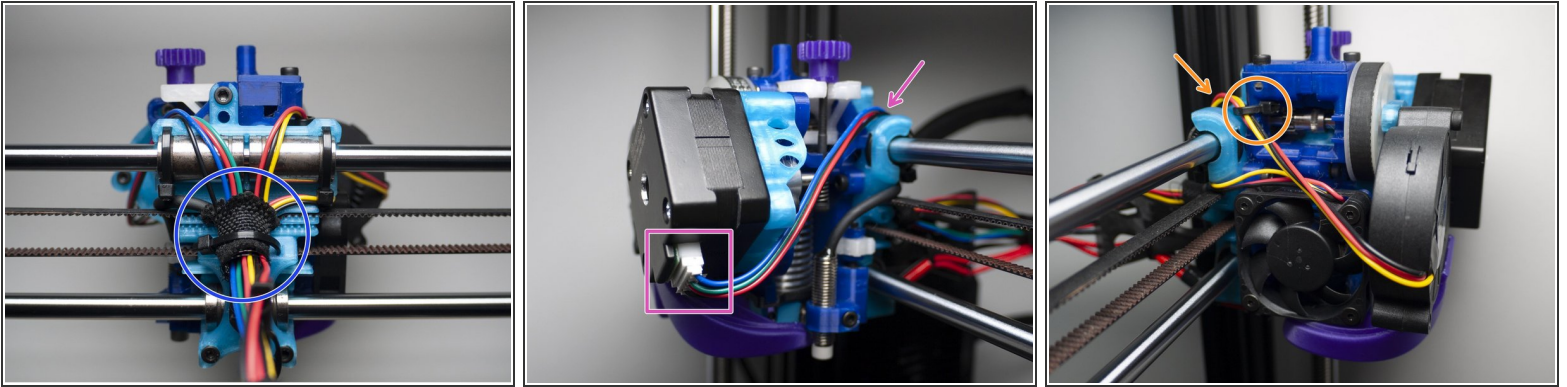
- Insert the belt into the bottom pockets if you are using a stock MK3 X-axis. Make sure the belt is fully inserted and that the belt teeth are matching the profile of the pockets
- ① Skelestruder supports the Bear X-axis. If you have a MK3 bear upgrade or just use the Bear X-axis on your stock machine, use the top pockets for the right belt path between the X-ends
- ① Optional: Insert a 10mm piece of belt in the channel not used on each side, to provide extra clamping.

## Step 30 — Wiring - Option 1



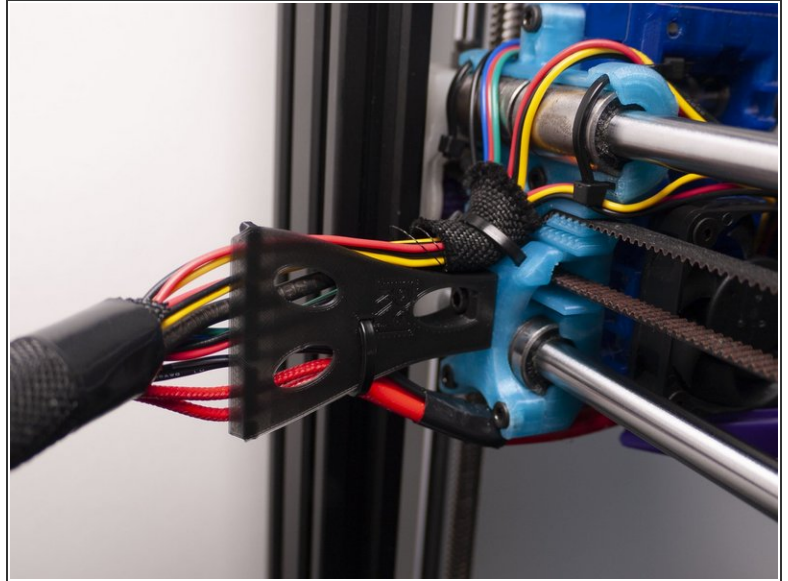
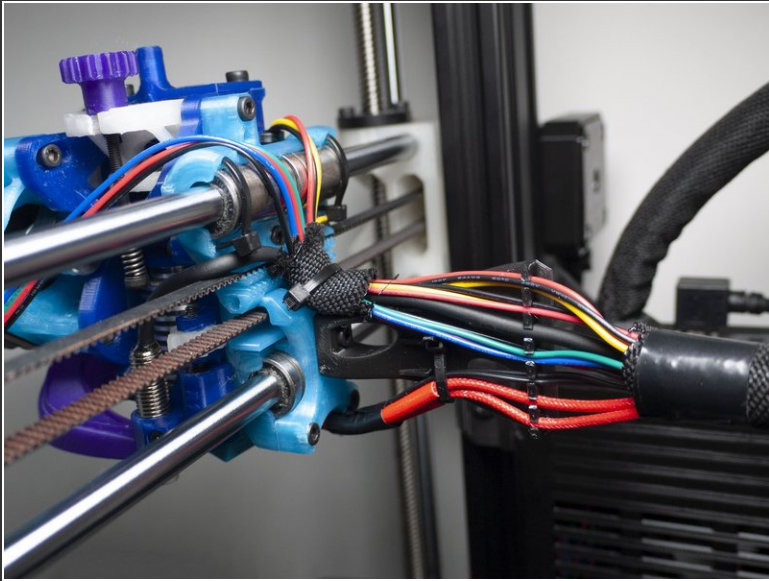
- This is one way to wire the electronics. You can adjust this to your needs/preference.
- The Pinda wire runs over the left top of the X-Carriage
- The motor wire runs over the top of the extruder. Make sure to leave some slack so you can open the idler freely
- The fan wires run over the right top of the X-Carriage. You can secure them with a zip tie
- The filament sensor wire just runs straight down the back
- Use some braided sleeve or something similar around the wires. Use zip ties to secure the bundle to the X-Clamp and Tail. Make sure to align the zip tie heads on the left, so they do not become an obstacle during homing.
- If the heater cartridge wires are too close to the bed, running underneath the X-Clamp, route them around the side as shown in picture 3

## Step 31 — Wiring - Option 2



- For protection of the wires, you can use a piece of braided sleeve. On a Full Bear Upgrade, make sure it is tight enough so your X-ends can touch the Z-tops.
- Prinda cable should go just over top belt. You can rotate the zip tie head down to help hold it in place. Make sure it not an obstacle when the extruder hits the end stop.
- Motor wire can go over the top of the carriage. Wire connector alternatively can sit in the top right corner
- Blower fan wire goes over the top of the carriage and is secured with a zip tie
- Hotend fan wire can go directly over beld. Too much wire here, can cause issues with homing. Check that the X-end can tough the carriage.

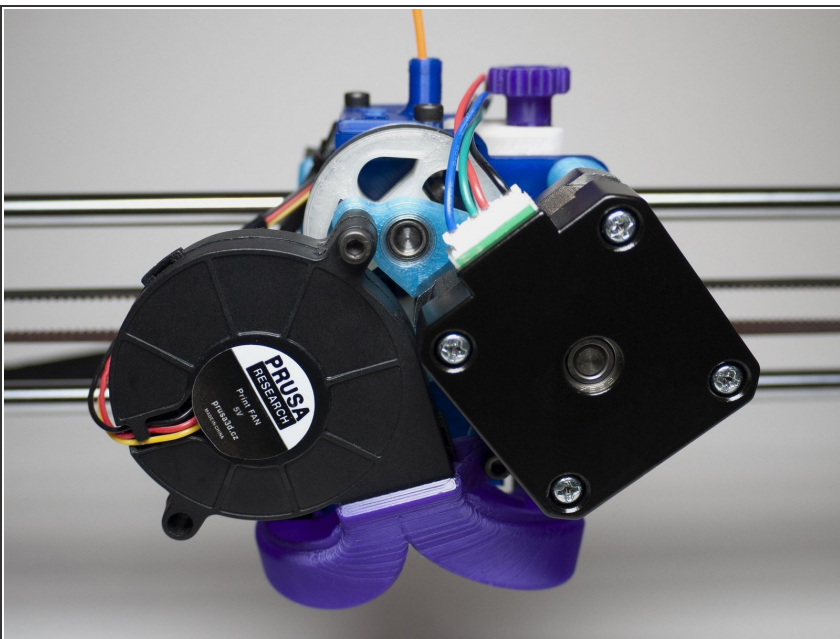
## Step 32 — Optional: Fin Wiring



- The order for the wires depends on your setup and how it works best for you.

**⚠ Make sure you have enough clearance to the Einsy case when homing**

## Step 33 — Congratulations!



- Congratulations you are done with the assembly! Only a few small tweaks to software settings are left before you can use your new extruder!

On to the last stage, [Software changes](#)