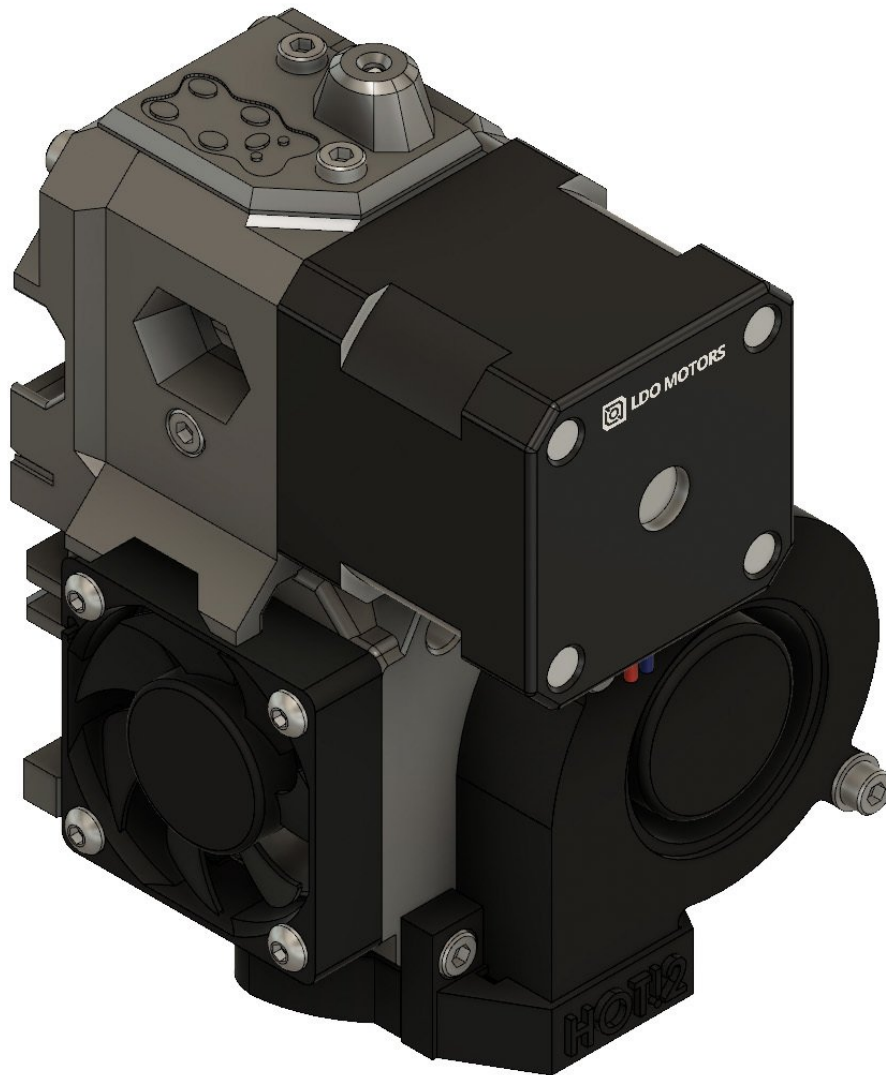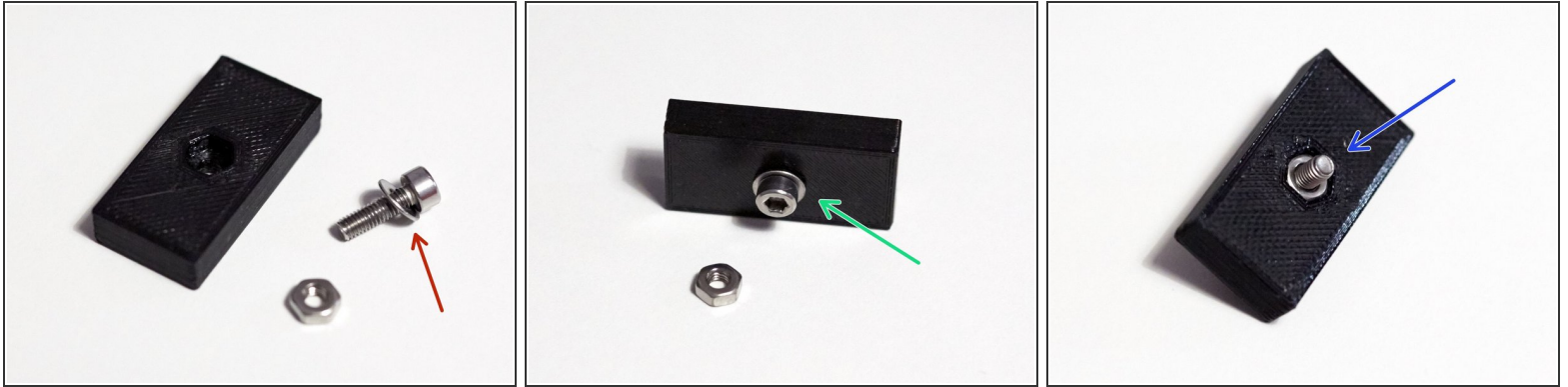# Bear Lab

3. Extruder

Written By: Grégoire Saunier

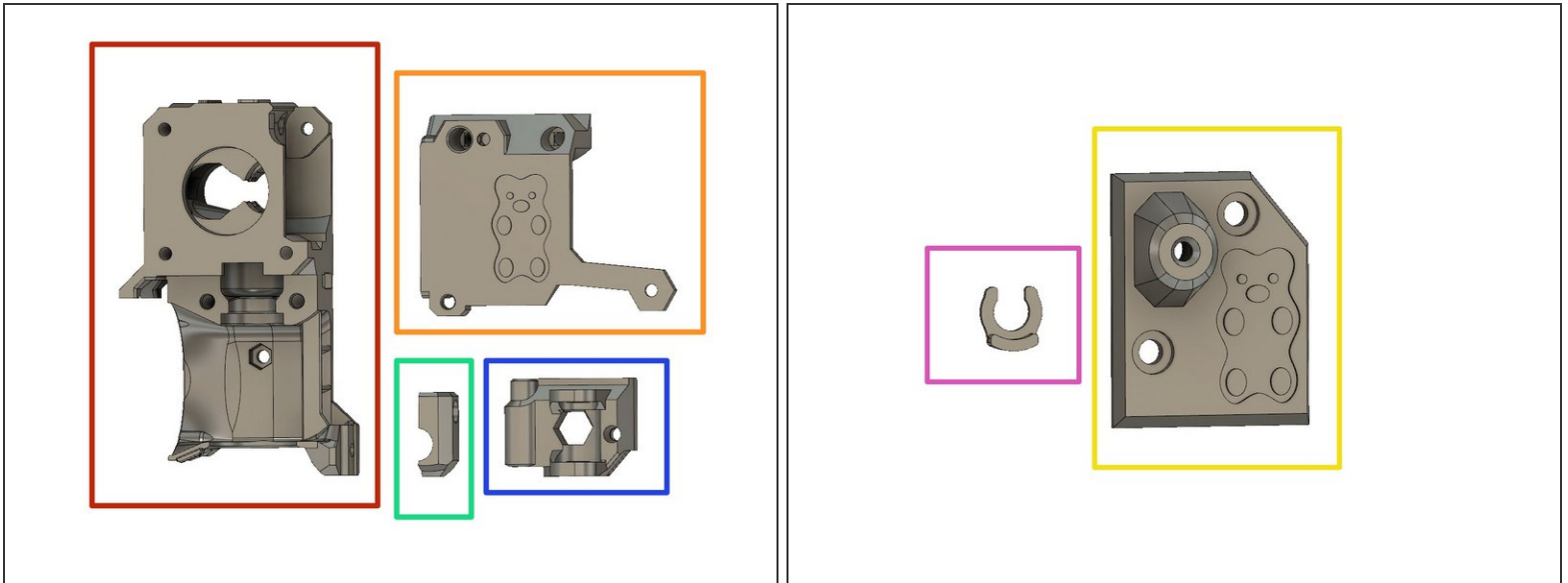## Step 1 — How to insert nuts

ⓘ **Inserting Hex Nuts:** To assure that hex nuts are properly seated, do the following:

- 🔴 Insert a screw through a washer.

- 🟢 Insert the screw through the hole on the flat side (not the hex cavity side).

- 🔵 Add the hex nut on the screw and tighten the screw.

⚠️ Ensure the hex nut is aligned with the hex cavity while tightening.

- ⚫ When the nut is fully seated, you need to remove the screw being careful not to dislodge the nut.

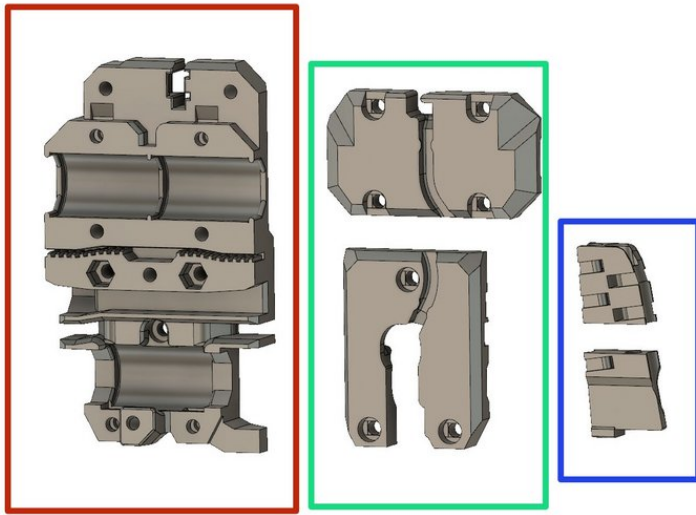ⓘ **Inserting Nyloc Nuts:** You can use the same method as hex nuts.

ⓘ **Inserting Square Nuts:** They tend to fall out if the piece holding them is inverted. After they are inserted, check that they are properly seated by inserting a screw to engage that nut.

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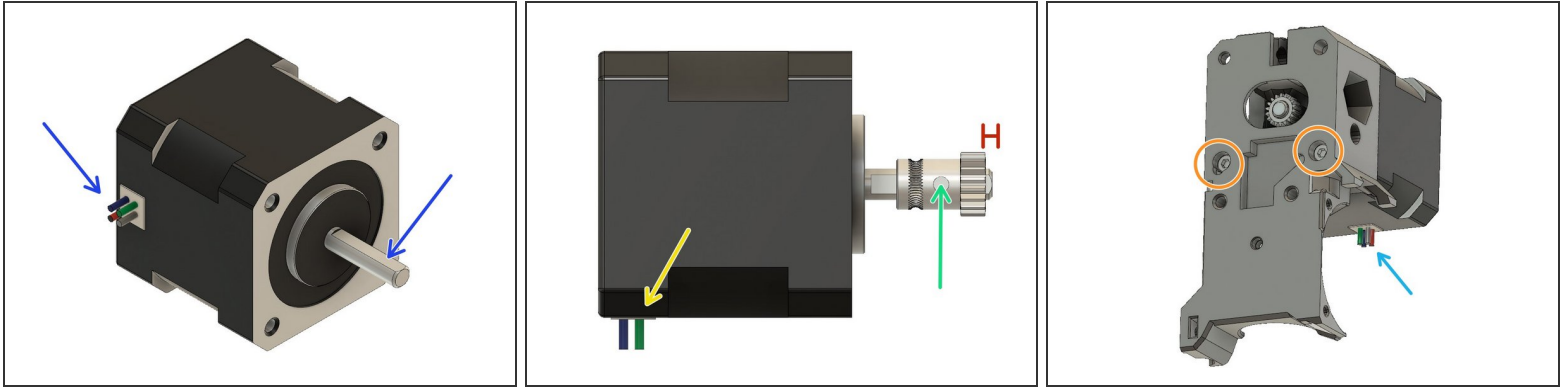© 2022   guides.bear-lab.com/   Page 2 of 20

Step 2 — Extruder parts

- extruder_body

- extruder_cover

- extruder_idler

- pinda_mount

- hotend_collet_clip

- filament_sensor_cover

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Step 3 — X carriage parts

- ● *x_carriage*

- ● *x_carriage_back*

- ● *cable_guide_back* (part A and B)

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Step 4 — Extruder motor

- Locate the extruder motor so the wires face to the left. Rotate the shaft so that the flat is facing up.

- Mount the Bondtech pulley on the extruder motor shaft with the toothed portion on top with the set screw contacting the flat portion of the shaft.

- The motor shaft should protrude by approximately 1mm.

- Secure the set screw to avoid the gear moving. We will fine tune the position later.

- Verify the motor cables orientation.

- Secure the extruder motor to the *extruder_body* using two M3x25 screws.

- Verify the motor cables orientation

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Step 5 — X carriage preparation
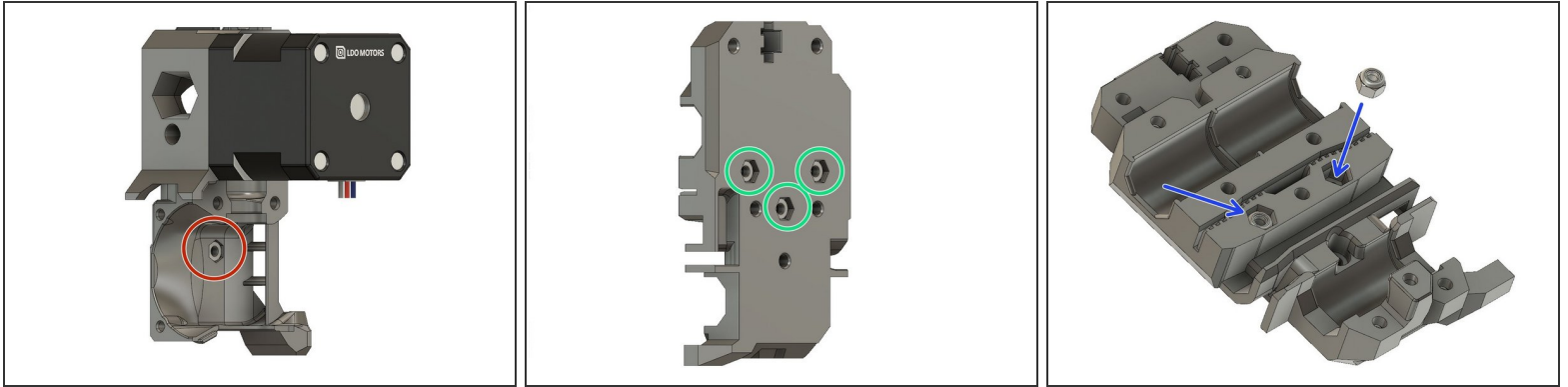
- Press an M3 hex nut into the *extruder_body*.

- Insert three M3 hex nuts

- Insert two M3 nylock hex nuts

Step 6 — X carriage assembly
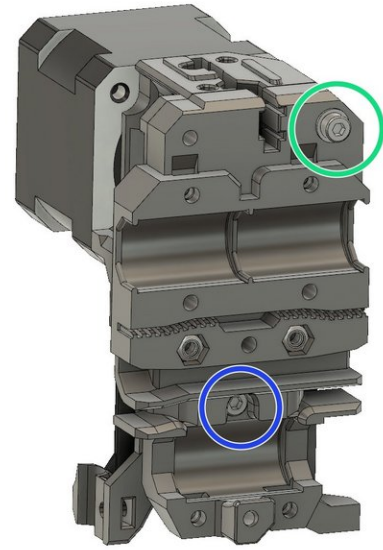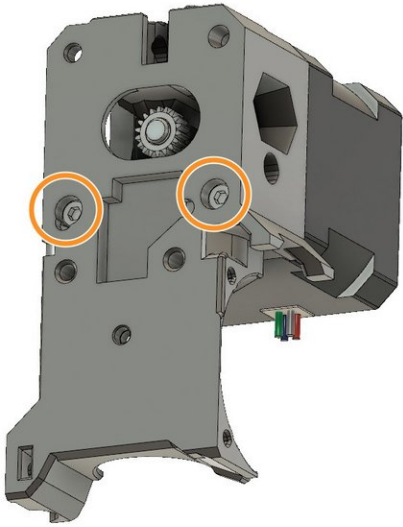
- Verify that the M3x25mm screws are snug

- Using an M3x10 screw attach the *extruder_body* to the *x_carriage*.

- Using an M3x40 screw and an M3 washer attach the *extruder_body* to the *x_carriage*.
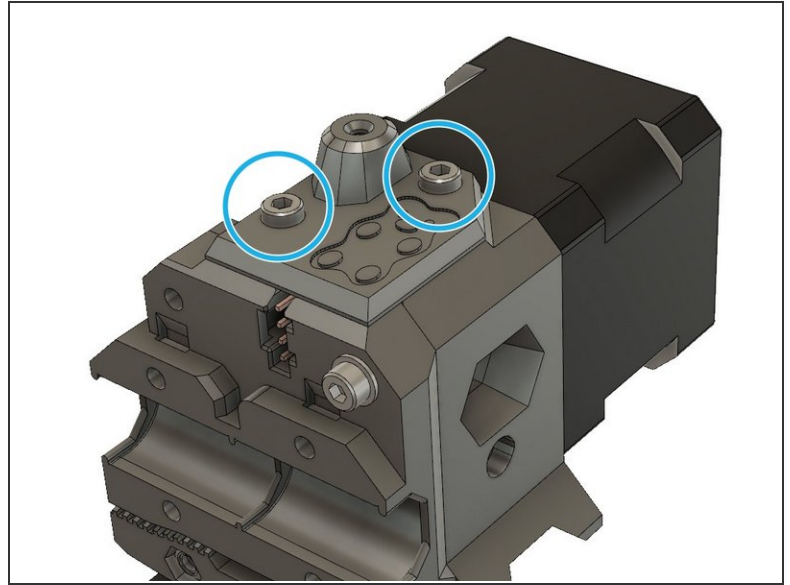
⚠ Verify that *extruder_body* and *x_carriage* are correctly aligned. Adjust if necessary with the M3x10 and M3x40 screws

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Step 7 — Filament sensor assembly
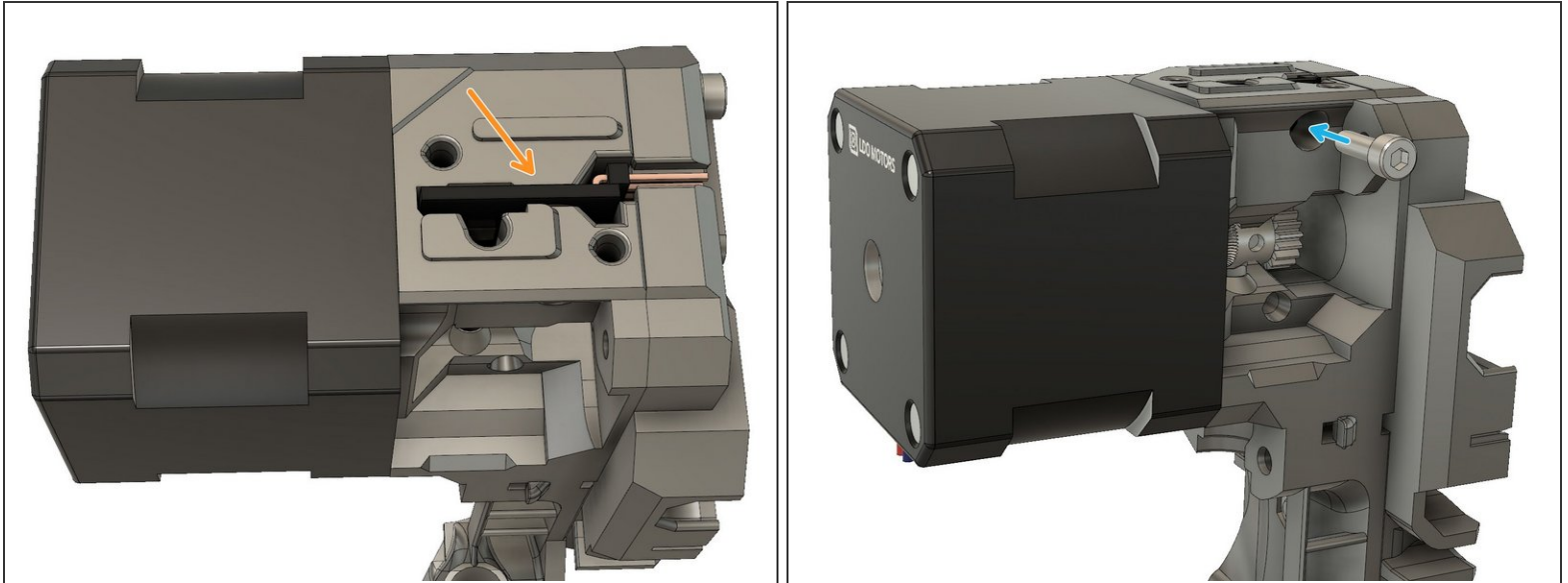
⚠️ In order to avoid electrostatic discharge to the filament sensor, touch something metallic that is linked to the ground, for example pipework or a faucet.

ⓘ Verify that the laser sensor is clean. If not, use a cotton bud (q-tip) with a dab of Isopropyl alcohol.

● Insert the filament sensor into the *extruder_body*. Avoid touching any of the components on the PCB.

● Using an M3x10 screw, secure the filament sensor.

⚠️ Don't over-tighten the filament sensor to avoid damaging the PCB.

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Step 8 — Filament sensor cover assembly
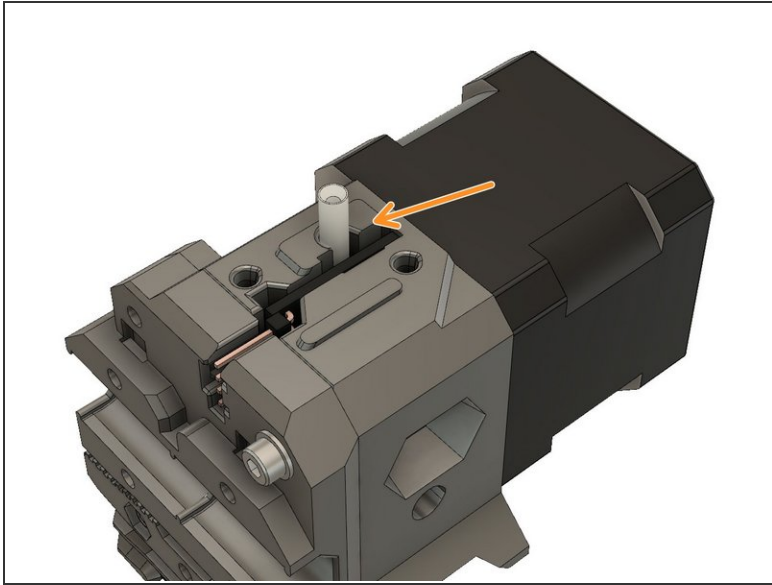
- Insert the small PTFE tube in the *extruder_body*

- Use two M3x10 screws and the *filament_sensor_cover* to close the top of the *extruder_body*

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Step 9 — Extruder idler preparation

- Locate the Bondtech drive gear. This is the one that has NO set screw.

- Lubricate the needle bearings with a dab of lithium based grease

- Slide two Bondtech needle bearings in the Bondtech drive gear.

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Step 10 — Extruder idler preparation

- Place the idler gear into the *extruder_idler*. Note the orientation of the teeth.

⚠ Make sure that both needle bearings are still present in the idler gear.

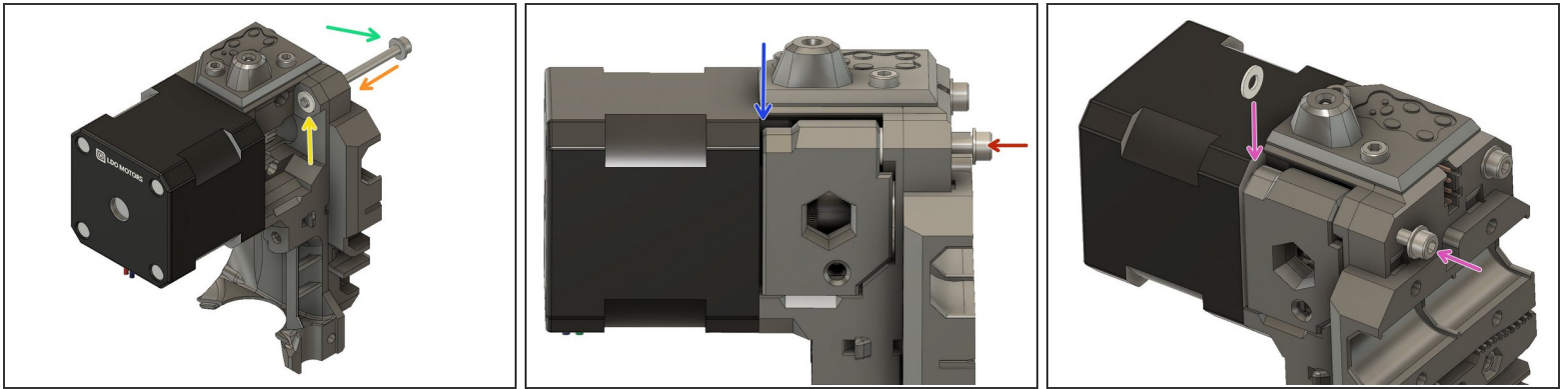- Insert the shaft from the direction as shown in the figure.

- Insert a square nut in the lateral pocket.

⚠ Double check the orientation of the gears.
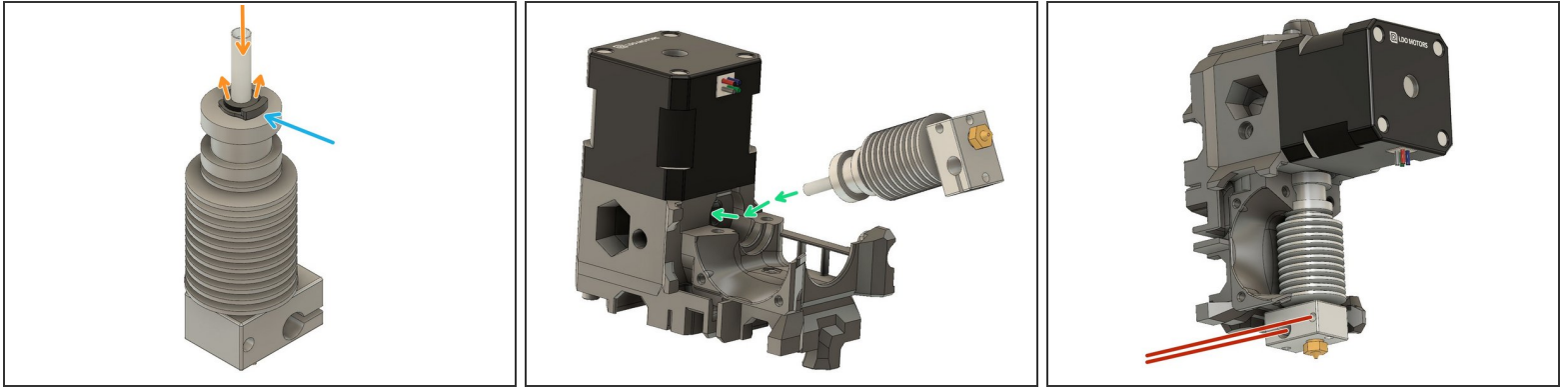
⚠ Double check that no needle bearings fell out during these steps

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Step 11 — Extruder idler assembly

- Slide a M3 washer on a M3x40 screw.

- Insert the screw in the top left hole of the *x_carriage* until it is just protruding from the other side of the *extruder_body*.

- Add a M3 nylon washer on the end of the screw.

- Add the *extruder_idler* in the opening. and push the screw.

- Leave a space to insert the second M3 nylon washer.

- Insert the second M3 nylon washer and push the screw further to secure it.

- Slightly tighten the screw, ensuring that the *extruder_idler* can still rotate freely.
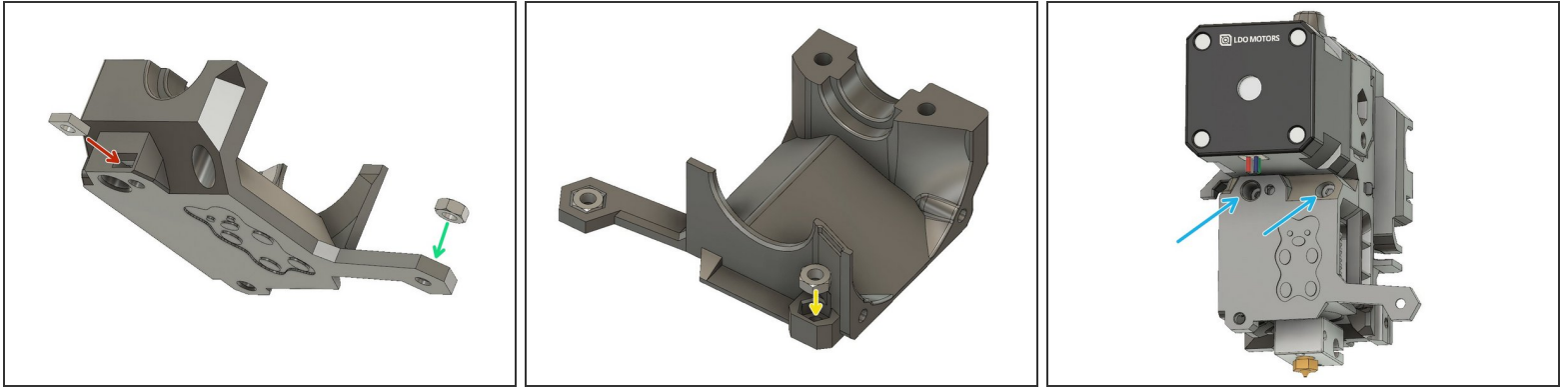
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Step 12 — Hotend assembly

ⓘ Hotend wires are not visible in these images. Use the heatblock to orientate the hotend correctly.

● Push down the PTFE tube while raising up the collet.

● Insert the *hotend_collet_clip*. This locks the PFTE tube in place.

● Insert the hot end into the *extruder_body* so that the heater and thermistor wires are properly oriented.

● Note the position of the heater and thermistor wires.

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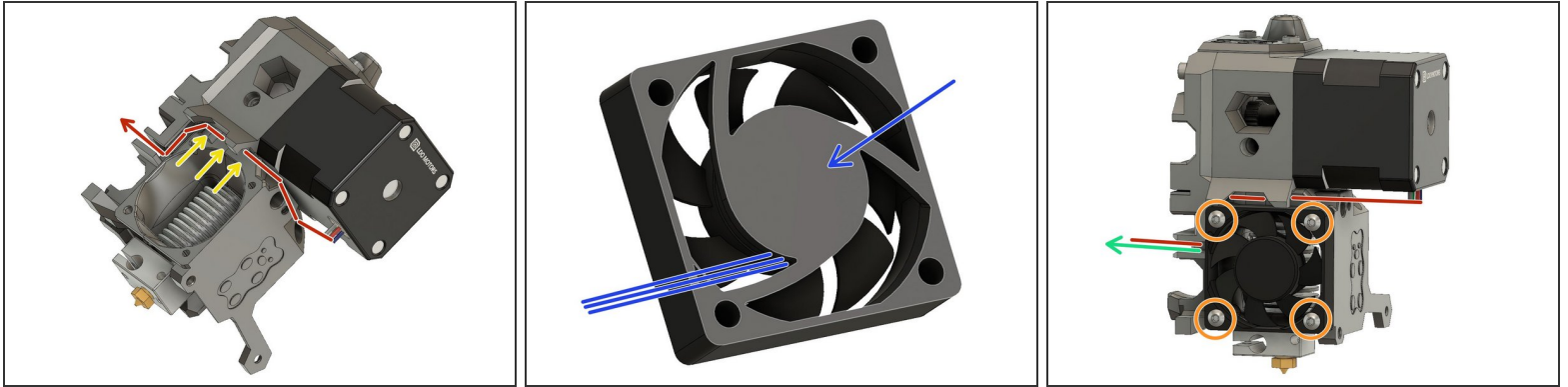
Step 13 — Extruder cover assembly

- Insert one M3 square nut

- Insert one M3 hex nut

- Insert one M3 hex nut

- Insert two M3x40 screw to lock the hotend in place

⚠ Check that the hotend has not rotated, adjust if necessary.

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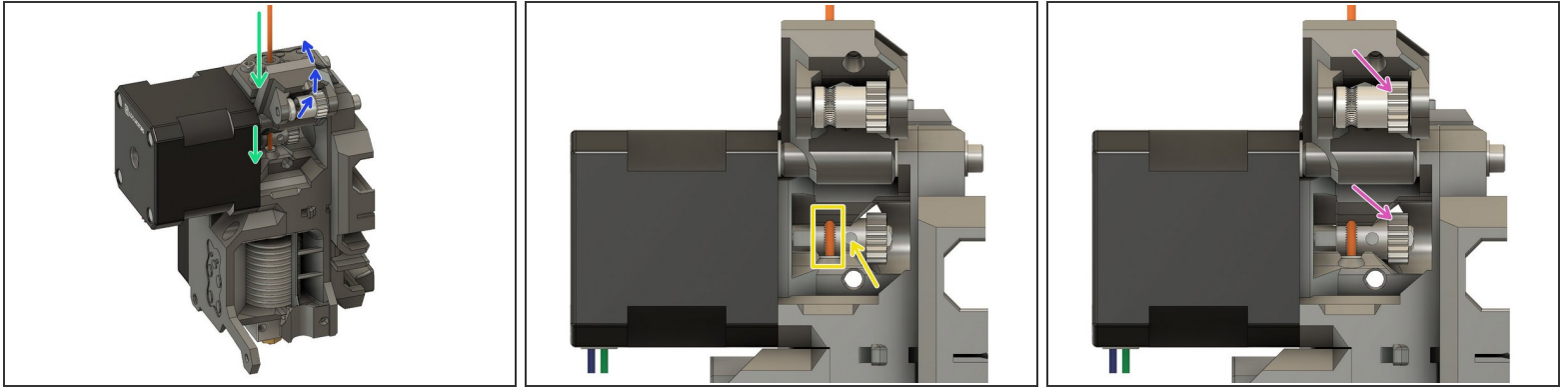Page 14 of 20

Step 14 — Hotend fan assembly

- ● Carefully route the motor wires as shown in the figure.

- ● Make sure the wires sit correctly in the channel.

- ● This surface will be touching the *extruder_body*. Wires are going out from this side.

- ● Carefully route the hotend fan wires in the *x_carriage*.

- ● Attach the hotend fan with four M3x14 rounded head screws.

⚠ Check that no wires are pinched.

⚠ Check hotend fan orientation.

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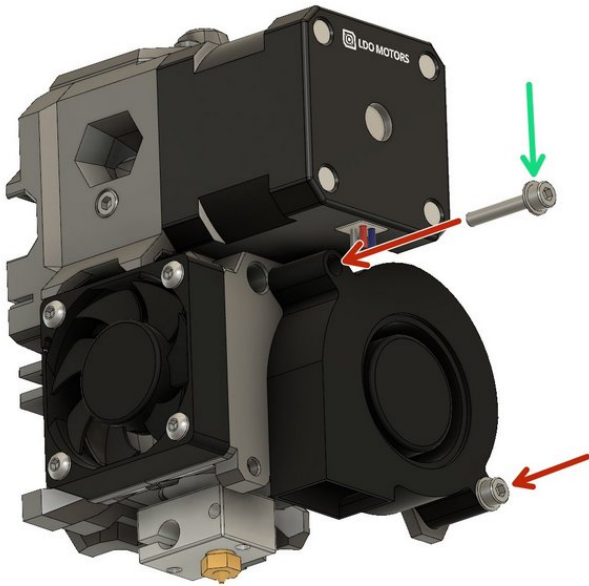
Step 15 — Bondtech gear alignment

- Open the *extruder_idler*

- Insert a piece of 1.75 mm filament through the *extruder_body* into the PFTE tube.

- Using the Bondtech set screw, carefully center the filament on the drive teeth.

- Tighten the set screw. Don't tighten too much as you will damage the thread.

- Remove the filament.

- This is a good moment to put a dab of lithium based grease on the gears. Make sure to only put grease on the gears, not the drive teeth!

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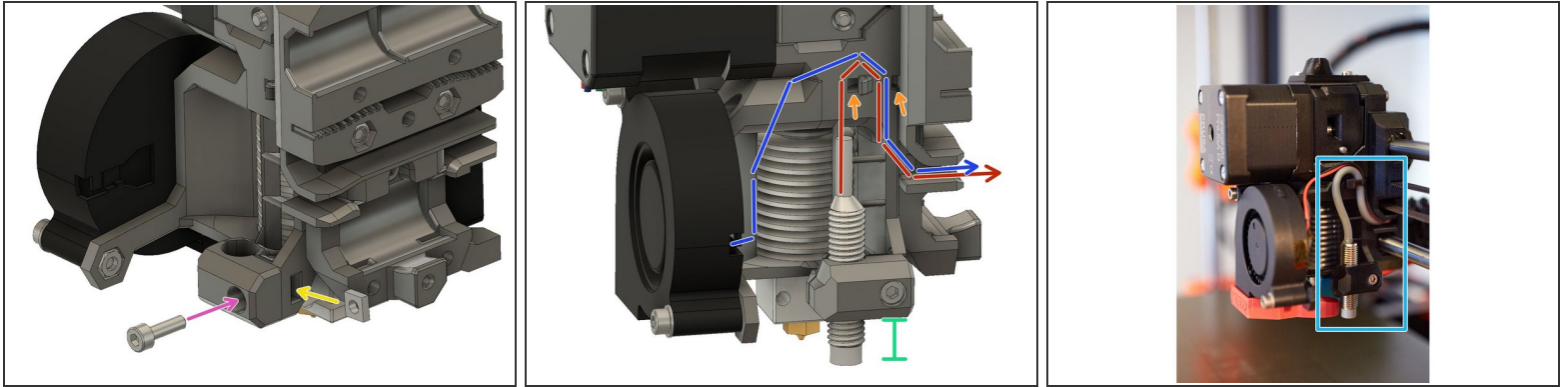Page 16 of 20

Step 16 — Extruder idler tensioner screw

- Make sure you have totally removed the filament from the *extruder_body*.

- Slide an extruder spring on a M3x40 screw.

- Close the *extruder_idler* door.

- Slide the screw with the extruder spring in the *extruder_body*.

- Tighten the screw in the *extruder_idler* until the head is flush with the surface of the body.

- (i) If you have trouble closing the *extruder_idler*, try rotating the Bondtech idler gear with your finger.

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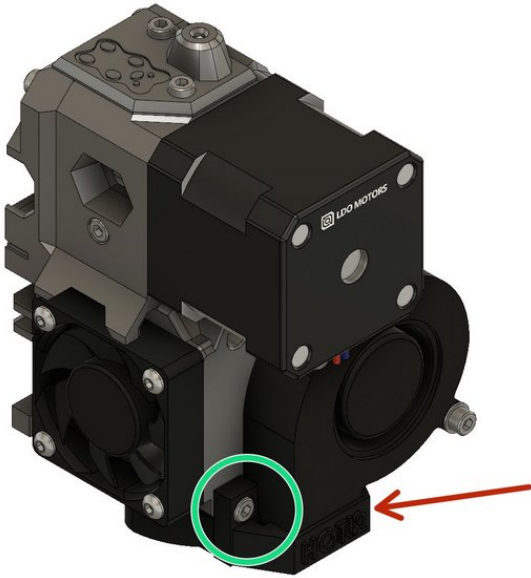
Step 17

- Slide a M3 washer on a M3x18 screw. Do the same for another M3x18 screw.

- Attach the print fan using the screws

⚠ Be careful not to over tighten in order to avoid damaging the fan.

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Step 18 — Pinda probe assembly

- Place a square nut in the *extruder_body* for the *pinda_mount*.

- Slide an M3x10 screw in the *pinda_mount* and engage the square nut, but do not tighten.

- Insert the Pinda in the mount so that the sensor end is 12mm below the bottom of the *pinda_mount*. Tighten the screw just enough to keep the Pinda from falling out. The optimum Pinda position will be adjusted later.

- Route the Pinda wires

- Route the print fan wires

- Secure the cables with a zip tie. Be sure to leave some slack since the Pinda position will need to be adjusted later.

- This is an example of how the Pinda and print fan cables should be wired.

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Step 19 — Print fan shroud assembly

ⓘ There is currently no official print fan shroud for the Bear extruder. I recommend the [original R1 shroud](#) from Prusa. Some other good alternatives are the shroud from [RH_Dreambox](#) or [Robps](#).

● Insert the print shroud. If necessary, slightly unscrew the print fan.

● Use an M3x10 screw to attach the shroud

Step 20 — Next chapter

● Congratulations you have finished this chapter :-)

● Go to the next chapter: [4. Extruder and X axis assembly](#)

To reassemble your device, follow these instructions in reverse order.