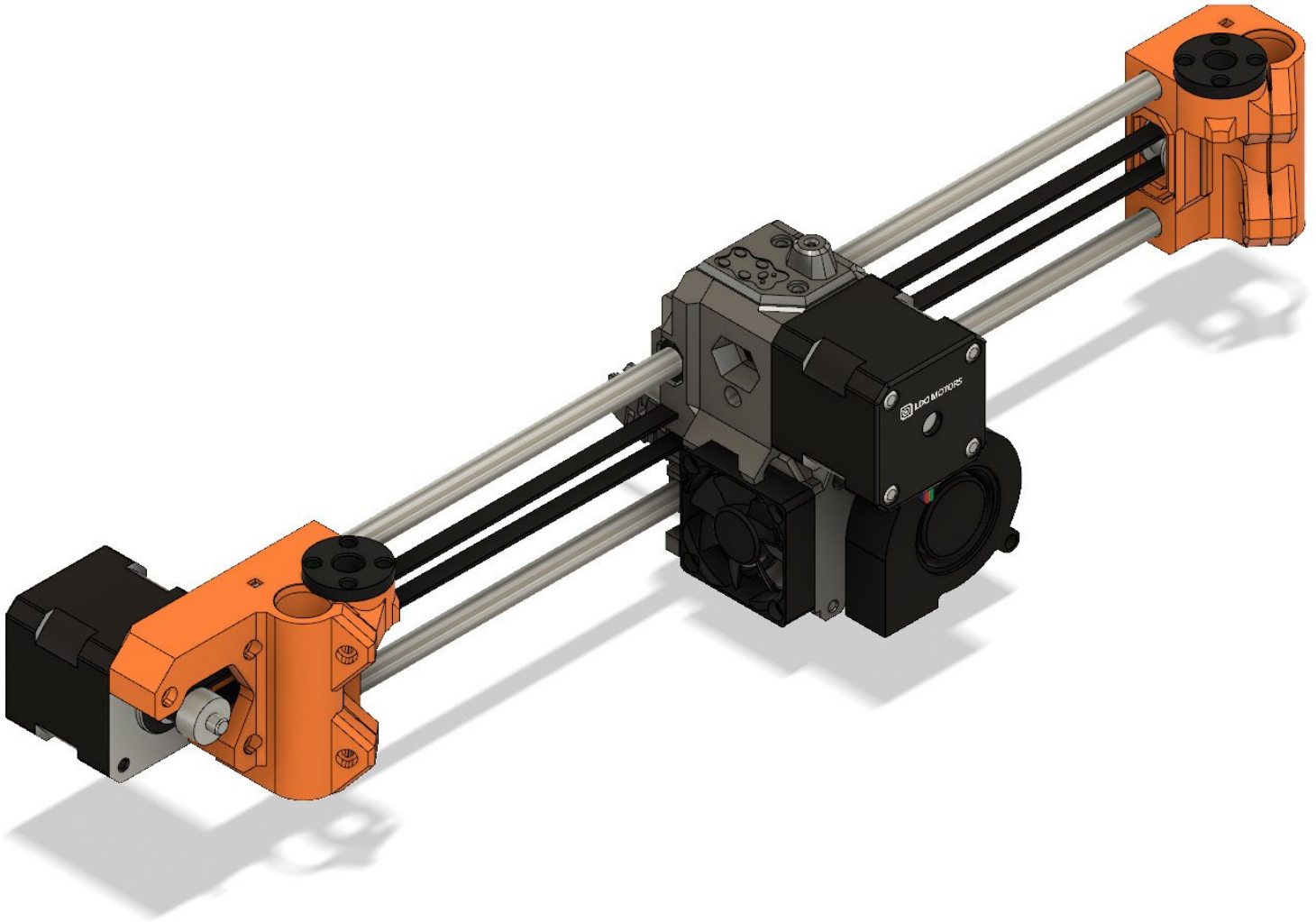


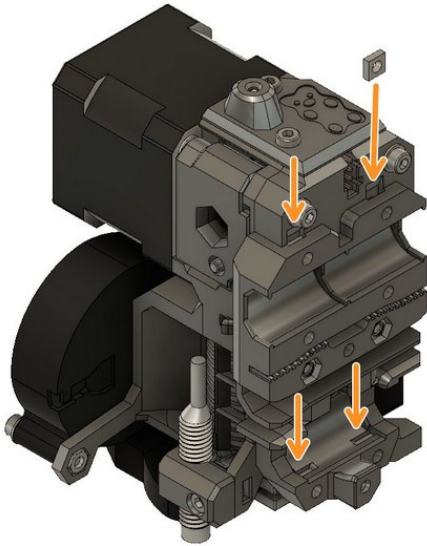
Bear Lab

4. Extruder and X axis assembly

Written By: Grégoire Saunier

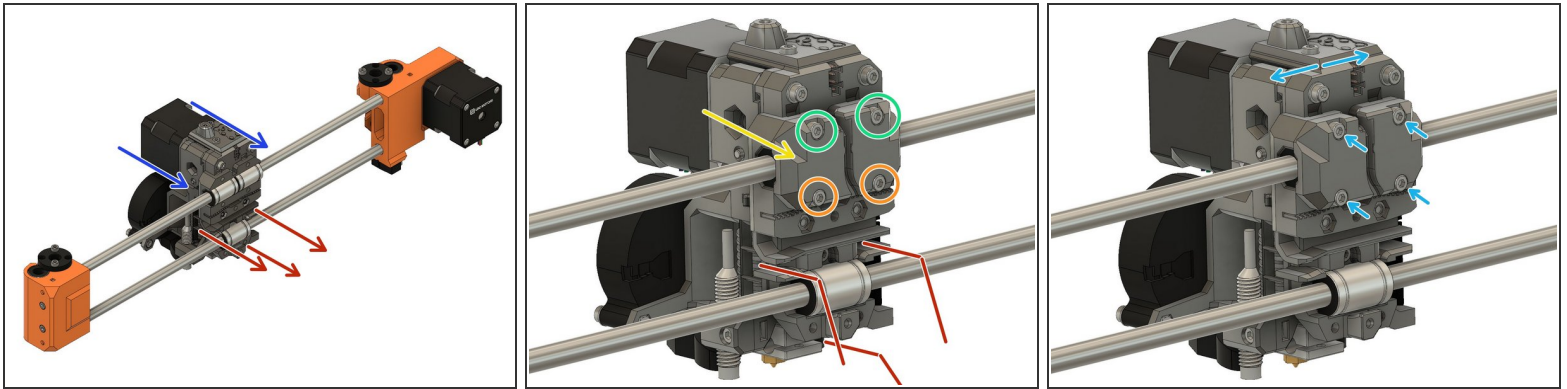


Step 1 — X carriage preparation



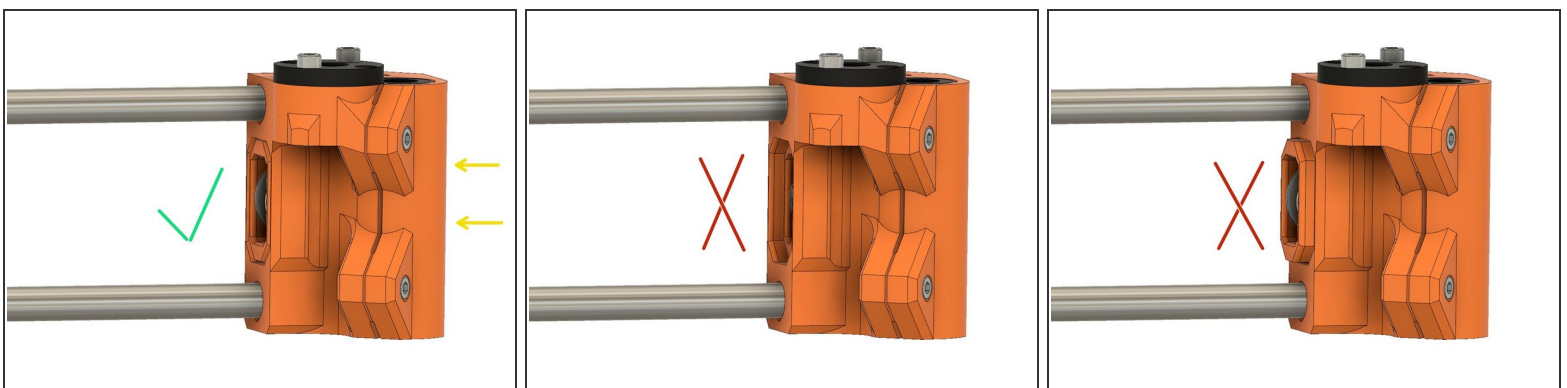
- Insert four M3 square nuts on the *x_carriage_back*
- ① Tweezers are handy to insert those square nuts.
- ① If you have trouble inserting the top left square nut, slowly unscrew the M3x40mm screw just above. Be careful not to lose the two nylon washers and don't forget to screw it back in place!

Step 2 — Extruder attachment



- Clamp the extruder on the top and bottom linear bearings of the X axis
- Make sure all cables, except hotend cables, are running on top of the bottom smooth rod (between two X smooth rods). The hotend cable should stay under the bottom smooth rod.
- Clamp the top of the *x_carriage_back*
- Secure it with two M3x10 screws in top holes. Don't tighten them right now!
- Finish securing it with two M3x18 screws in bottom holes. Don't tighten them right now
- Gradually tighten each of the four screws while moving the extruder. Don't over tighten them.

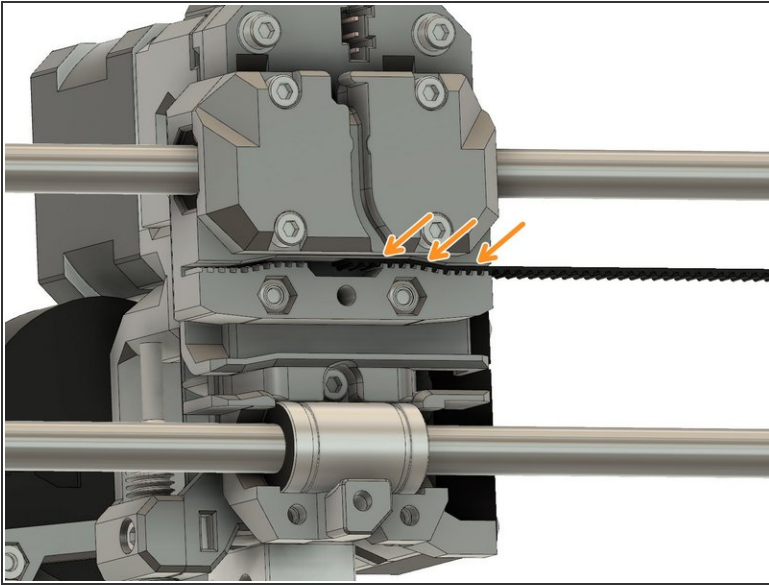
Step 3 — Prepare belt routing



- Adjust the two *x_end_idler* screws to to have the *x_end_idler_idle_mount* flush as shown in the first image

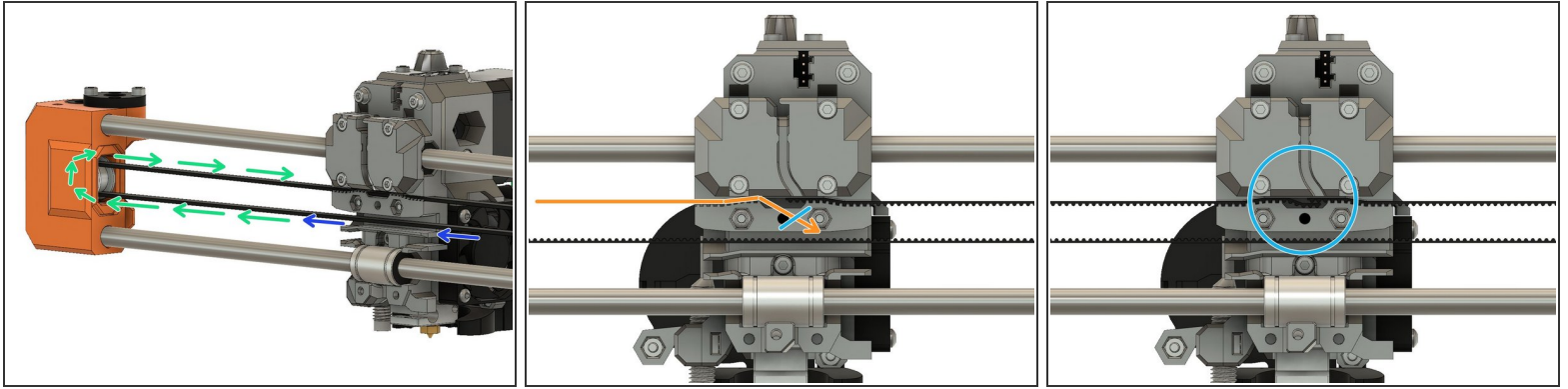
⚠ Verify the *x_end_idler_idler_mount* adjustment, should not be like on second and third image.

Step 4 — Attach the X belt



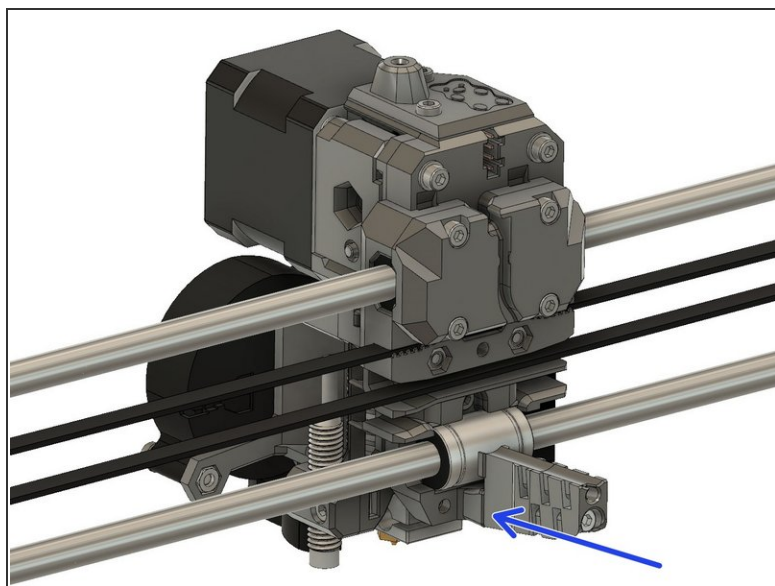
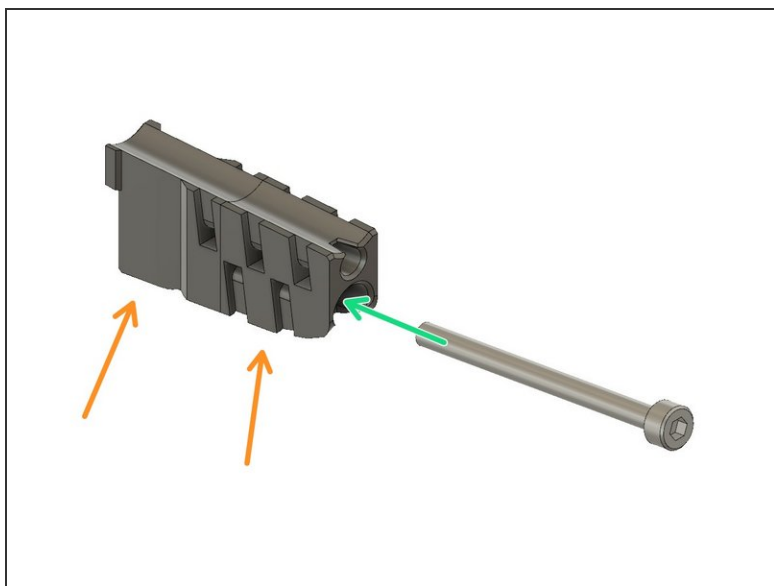
- Slide one end of the 2GT timing belt into the right side of the *x_carriage*.
- ⚠ Verify that the belt is completely pressed into the slot and that it extends to the central portion.
- Route the timing belt through the *x_end_motor*, around the pulley and back out through the *x_end_motor*.

Step 5 — Attach the X belt



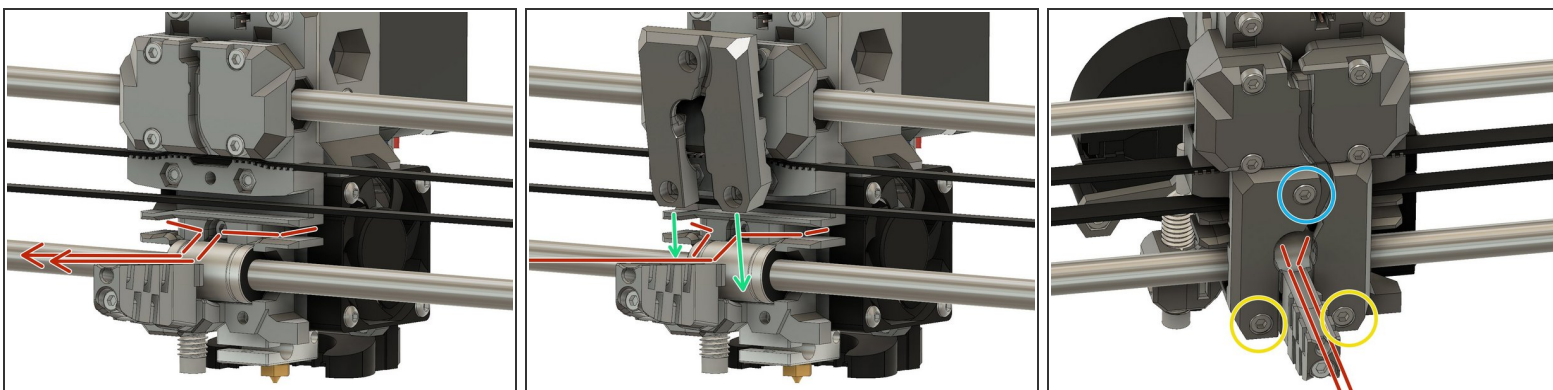
- Route the timing belt through the `x_carriage`.
- Continue to route the timing belt around the idler of the `x_end_idler_idler_mount` and go back in the direction of the `x_carriage`.
- To finish routing the timing belt, attach few belt teeth in the `x_carriage`.
- ⓘ The belt should have almost no tension, it will be adjusted later.
- Estimate the length and cut the belt. Finish to insert it in the `x_carriage`
- ⚠ Verify that the belt is completely pressed into the slot and that it extends to the central portion.
- ⚠ Verify that no cable is pinched by the belt.

Step 6 — Cable guide back



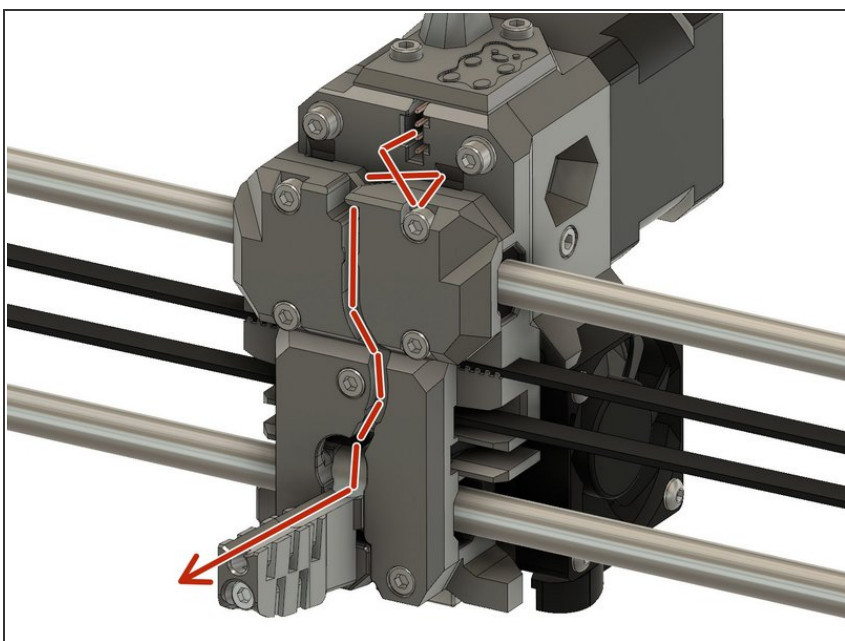
- Join *cable_guide_back_a* and *cable_guide_back_b* together
- Slide a M3x40 screw through them
- Screw the M3x40 into the *x_carriage*

Step 7 — X carriage back bottom and cables



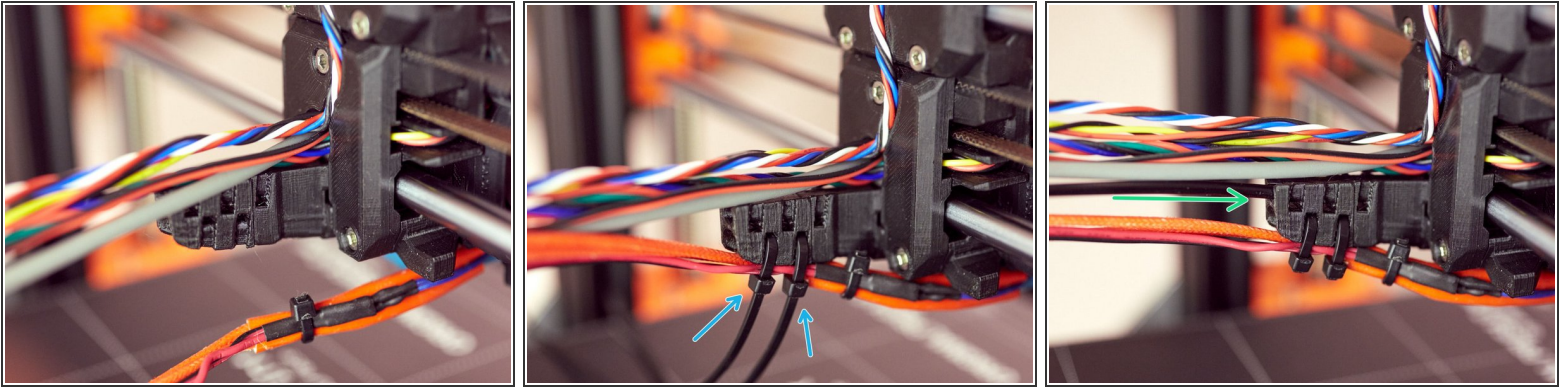
- Create a bundle with the following cables: extruder motor, hotend fan, Pinda, and nozzle fan. Route the bundle as shown in the first image
- Slide down the *x_carriage_back* with the cable bundle in the middle.
- Secure the *x_carriage_back* bottom with one M3x18 screw
- And two M3x10


Step 8 — Filament sensor cable




- Clip the filament sensor cables on the filament sensor connector. The white wire of the cable should face up when connected to the filament sensor.
- Route the filament sensor cable through the channel in the *x_carriage_back*.

Step 9 — Extruder cables

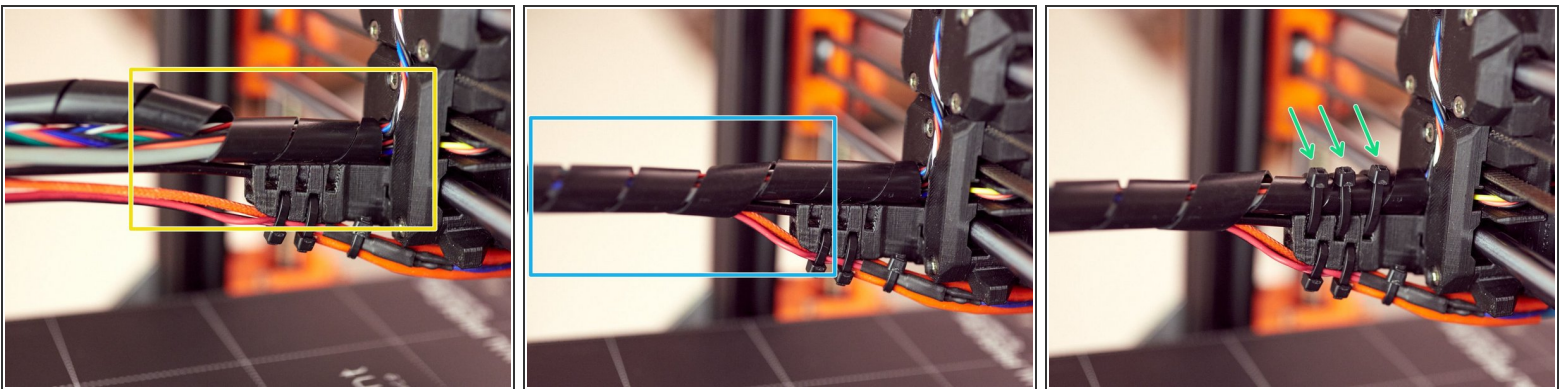


 These instructions are made for spiral wrap, but can be applied to textile sleeve without an issue.

- Using two zip ties, attach the hotend cables.
- Insert the 3 mm nylon filament into the end of the *cable_guide_back*.

 The nylon filament should slide in at least 10 mm. If you have trouble inserting it, the nylon filament end may be tapered. by a diagonal cut.

Step 10 — Extruder cables



- Wrap the wires coming out of the *x_carriage_back* using spiral wrap for 2-3 turns. The wrap should touch the *x_carriage_back*.
- Continue spiral wrapping the cable now including the nylon filament and hotend cables.
- Secure the spiral wrap to the *cable_guide_back* using three zip ties.

 Verify that no cable has been pinched.

Step 11 — Wiring extruder to Rambo



- Finish to wrap the spiral up to the Rambo Mini / Einsy.
- Follow the original Prusa manual to connect your extruder cables on the Rambo Mini / Einsy:
 - [MK3 guide](#)
 - [MK2.5 guide](#)
 - [MK2s guide](#)

Step 12 — Next chapter



- Congratulations you have finished this chapter :-)
- Go to the next chapter: [5. Final adjustments and calibration](#)