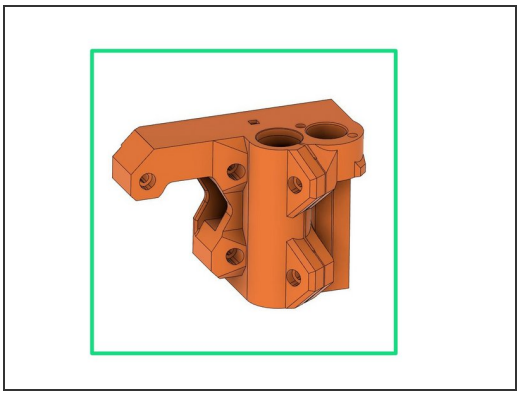
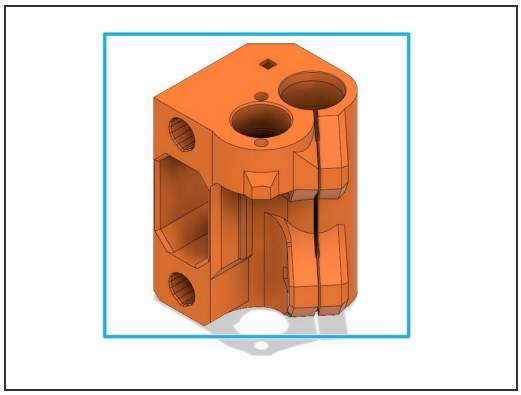
Bear Lab

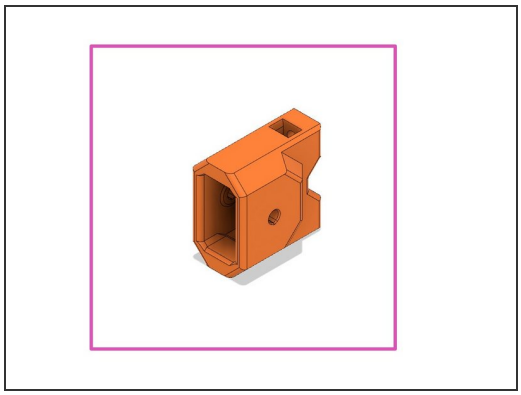
2. X axis

Written By: Grégoire Saunier

Step 1 — X Ends Parts

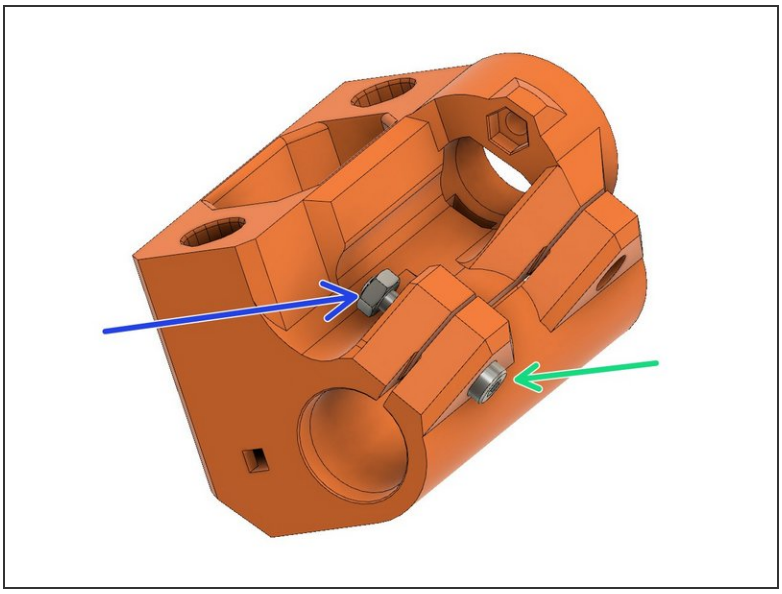


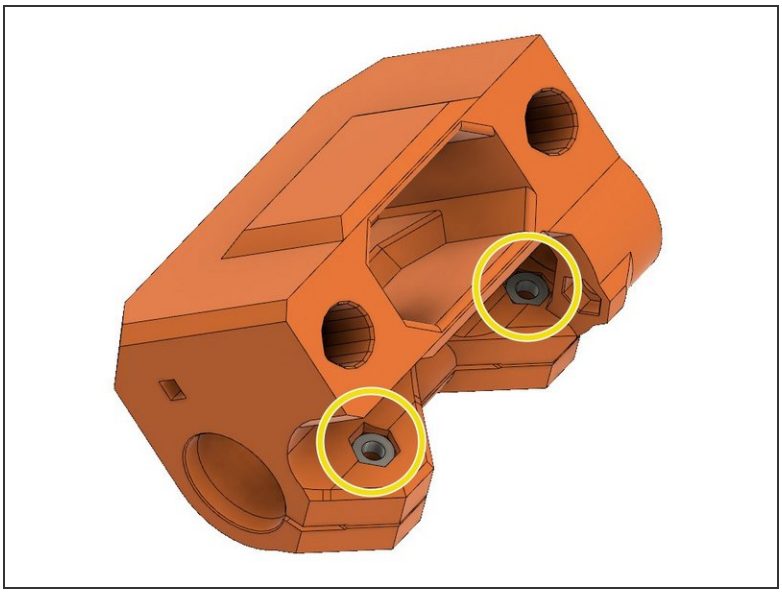




- *x_end_motor*
- *x_end_idler*
- *x_end_idler_tensioner*

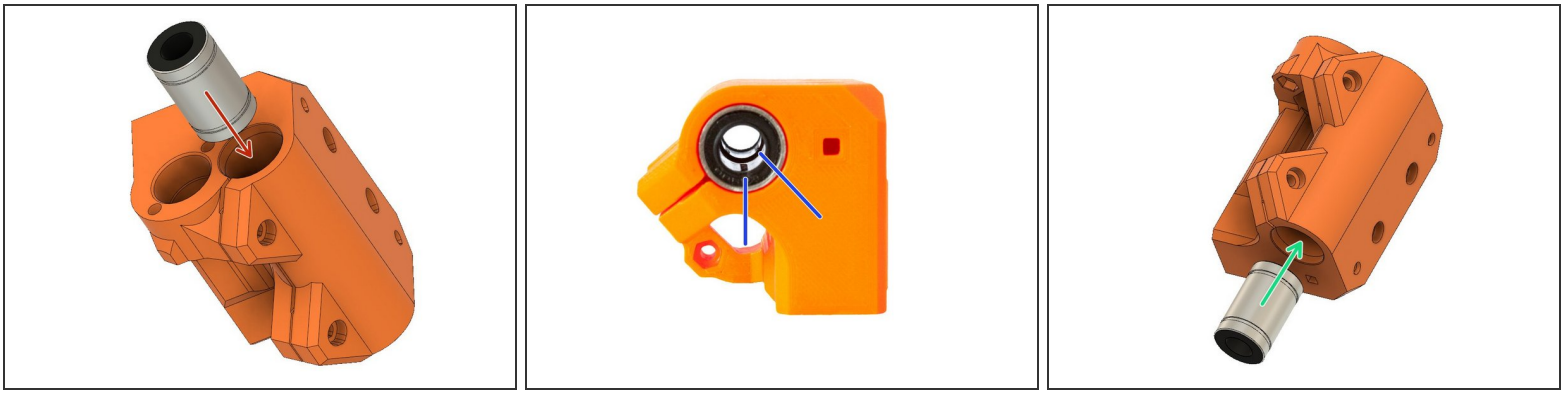
Step 2 — X End Idler





- Insert an M3x18mm socket head screw in one of the *x_end_idler* clamp holes. This screw helps insert the hex nut.
- Using tweezers, hold an M3 hex nut so that it can be threaded onto the M3x18mm socket head screw. Tighten that screw until the M3 hex nut is firmly seated.
- Remove the M3x18 socket head screw and repeat on the other clamp hole.

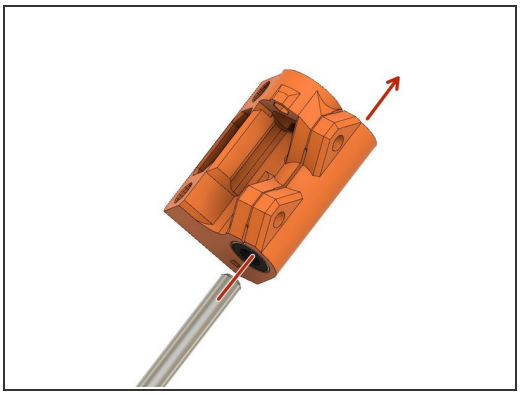
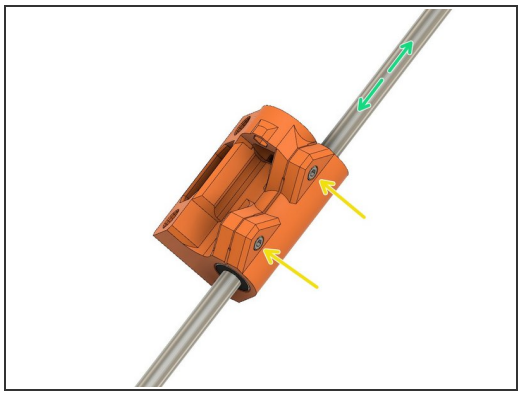
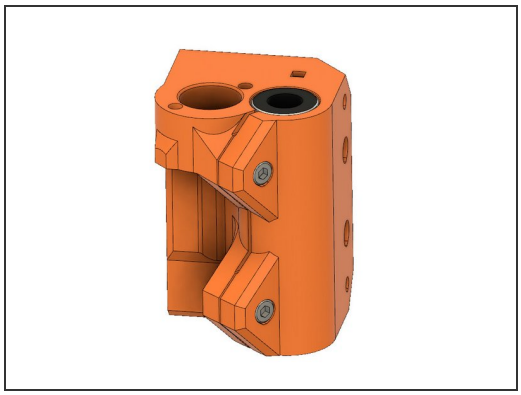
Step 3 — X End Idler



- Insert an LM8UU linear bearing into the *x_end_idler* until it hits the internal stop.
- The next LM8UU linear bearing will have to be inserted so that the rows of ball bearings are at 45° to the rows in the other bearing.
- Insert that LM8UU linear bearing into the *x_end_idler* until it hits the internal stop.

⚠ Verify that the rows of balls are rotated at an angle of 45° from each other (as shown in the photograph).

Step 4 — X End Idler

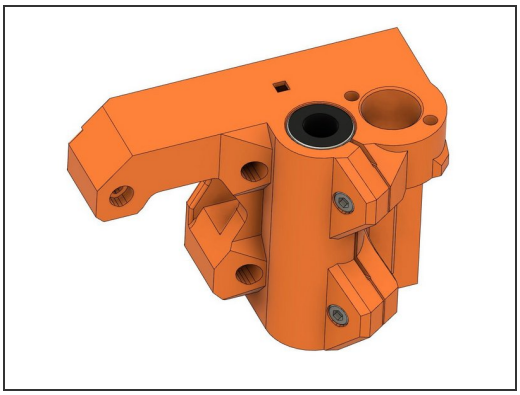
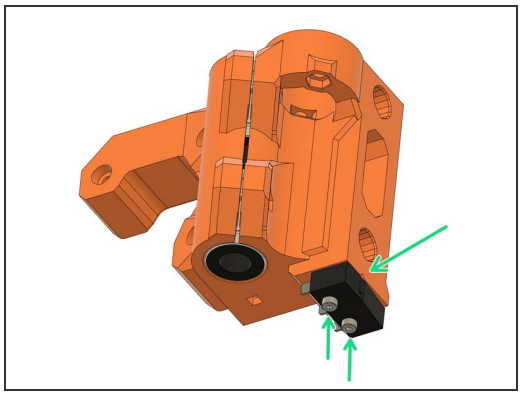
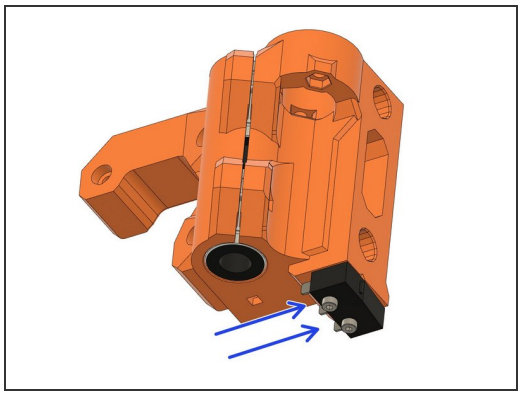




- Temporarily insert a 8mm smooth rod through both LM8UU linear bearings.
- Engage two M3x10 socket head screws in the hex nuts, but do not tighten them at this time.
- Alternatively tighten the two M3x10 clamp screws to secure the linear bearings. Slide the smooth rods back and forth while tightening.

⚠ Don't over-tighten the clamp screws; they need to be just tight enough to keep the bearings from moving.

- Remove the 8mm smooth rod.

Step 5 — X End Motor

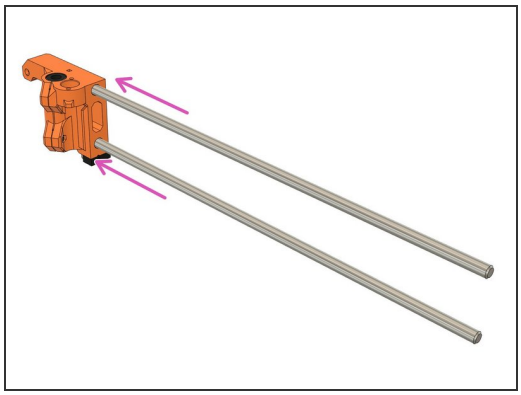
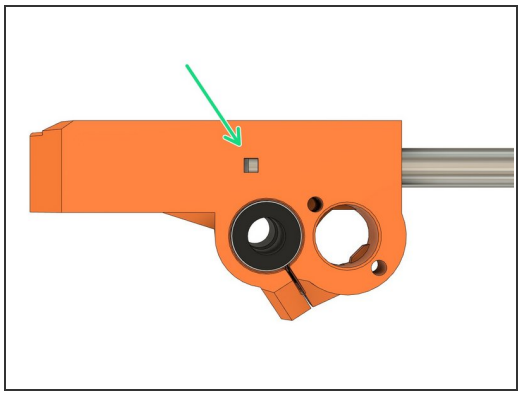
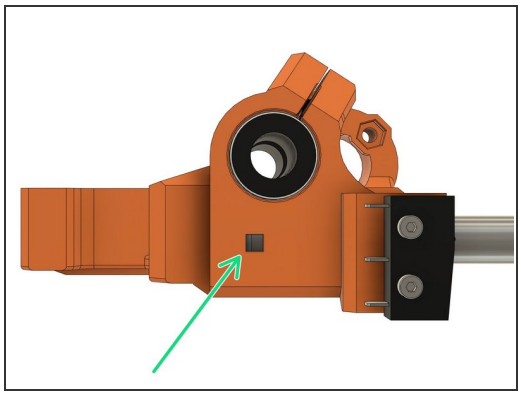




- Repeat the 3 previous steps on *x_end_motor*
- **MK2(S) or MK2.5(S) only:** Use two M2x12 screws to attach the x-endstop switch. Ensure the correct orientation of the switch. The microswitch should be oriented so that it is closest to the v-notch in the printed part.
- **MK2(S) or MK2.5(S) only:** While tightening the screws, apply gentle pressure in the direction shown.

⚠ **MK2(S) or MK2.5(S) only:** Do not over-tighten the M2x12 screws!

⚠ **MK2(S) or MK2.5(S) only:** Double check the orientation of the endstop.

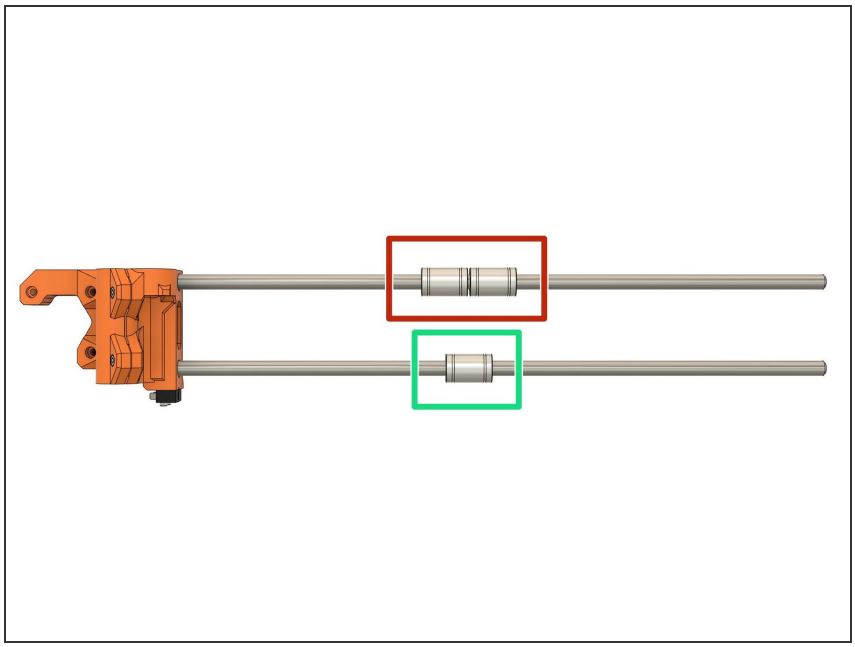
Step 6 — X Smooth Rods

- Check the holes for the smooth rods in the x_end_motor part and ensure that they are clean and free from obstructions.
- Slide the two 370mm smooth rods in the *x_end_motor*.
- Ensure that the smooth rods are fully inserted. You can see them in the little windows on top and bottom.

If it is too hard to insert the smooth rods you can use a quality metal drill of 8mm and **hand** drill the first centimeter. Warning: don't drill the hole up to the end, only first centimeter.

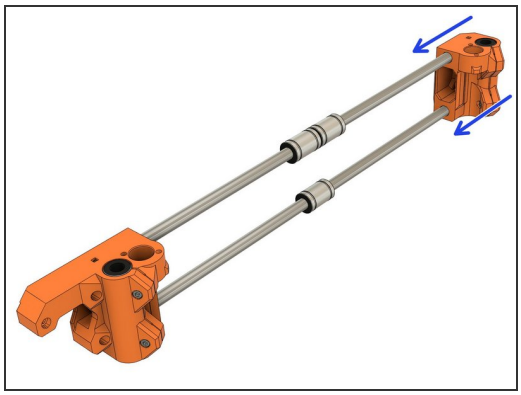
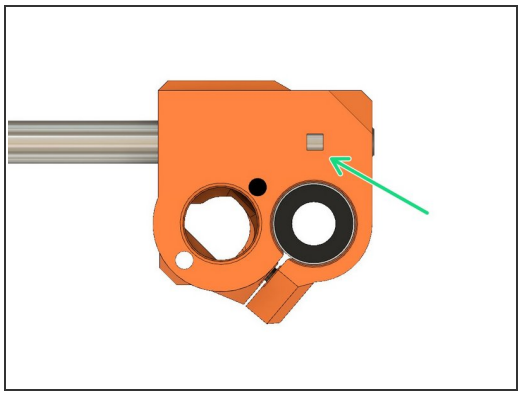
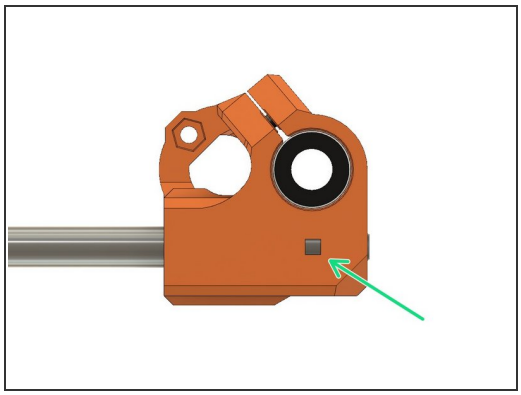
Step 7 — X Smooth Rods Assembly



- Insert two LM8UU linear bearings on the top smooth rod.
- Insert one LM8UU linear bearing on the bottom smooth rod.

Be very careful inserting the LM8UU linear bearings.

Step 8 — X Smooth Rods Assembly

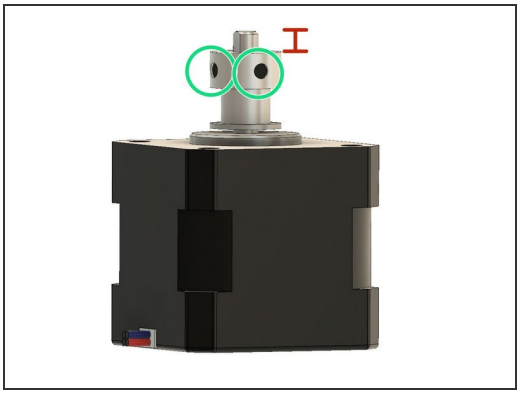




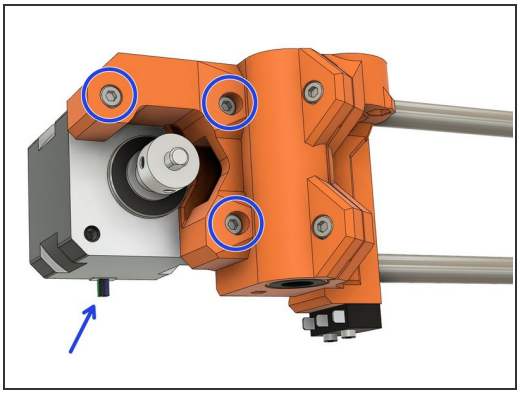
- Insert both rods simultaneously into the *x_end_idler* and provide even pressure to force the rods all the way in.
- Using the observation windows, verify that each rod is fully seated.

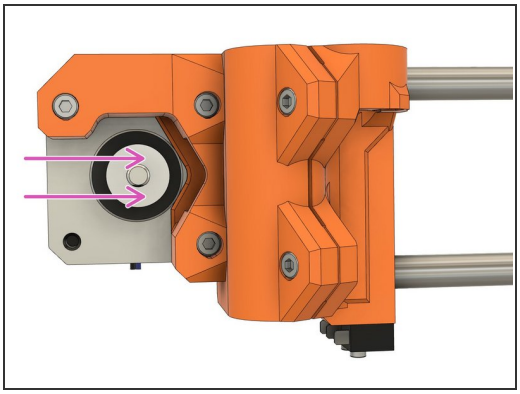
⚠ Take the time to double check observation windows on both *x_end_idler* and *x_end_motor*.

ⓘ If it is too hard to insert the smooth rods you can use a quality metal drill of 8mm and **hand** drill the first centimeter. Warning: don't drill the hole up to the end, only first centimeter.

Step 9 — X End Motor





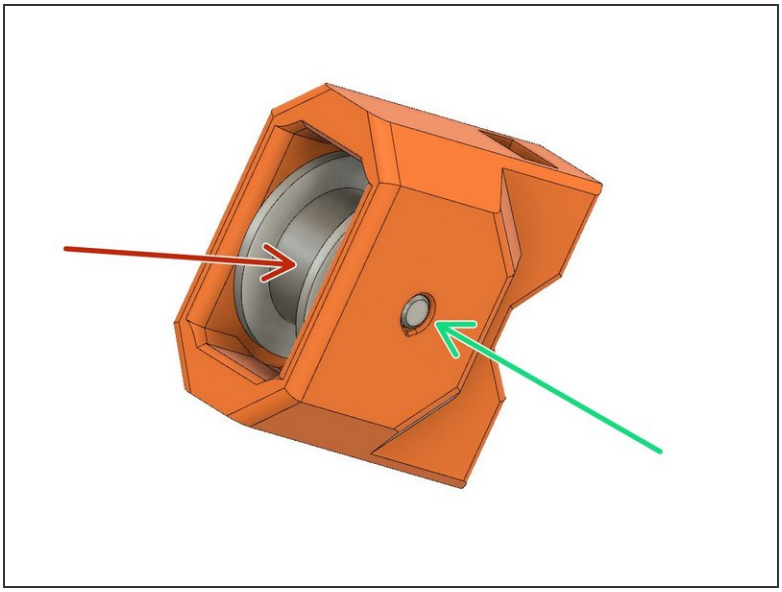


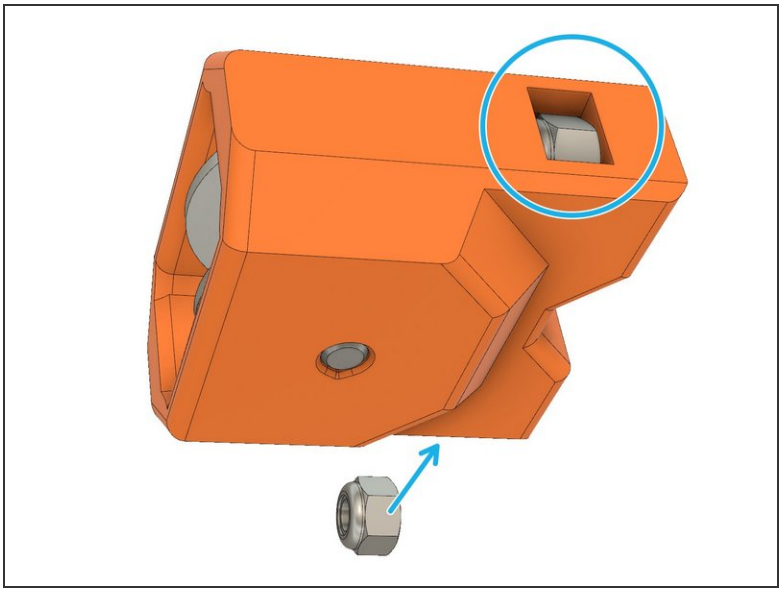
The 2GT 16T pulley's gear teeth are not visible on the images.

- Position the 2GT 16T pulley so that approximately 3.5 to 4 mm of the shaft protrudes. Ensure the pulley is not touching the motor.
- Align one of the set screws on the flat on the motor shaft and then tighten, alternately, each set screw until they are both snug.
- Using three M3x18 screws, attach the x-axis motor, don't fully tighten them now, we will do it in the next point. Note the orientation of the wires.
- Finish to tighten the M3x18 screws while applying gentle pressure in the direction shown

Double check the pulley position and ensure it does not touch the motor.

Step 10 — X End Idler Idler Mount





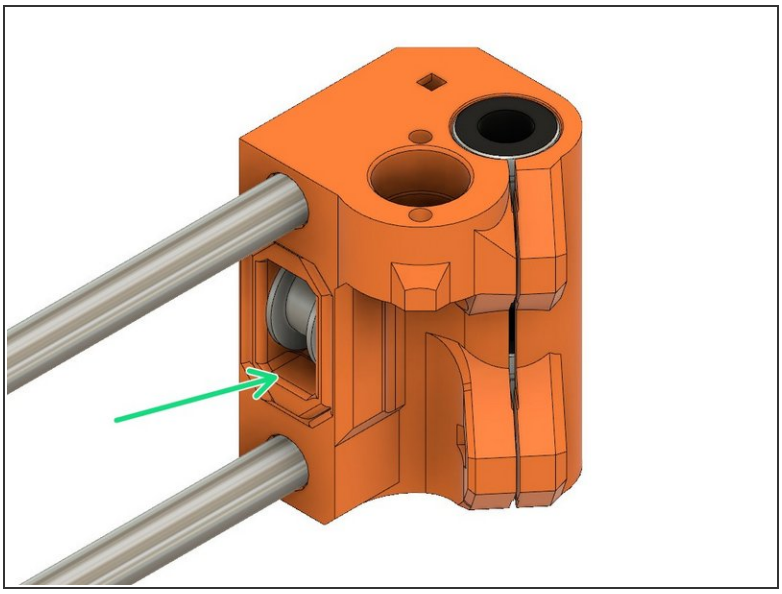
- Insert the idler in the *x_end_idler_tensioner*.
- Press the dowel pin through the *x_end_idler_tensioner* and idler bearings.

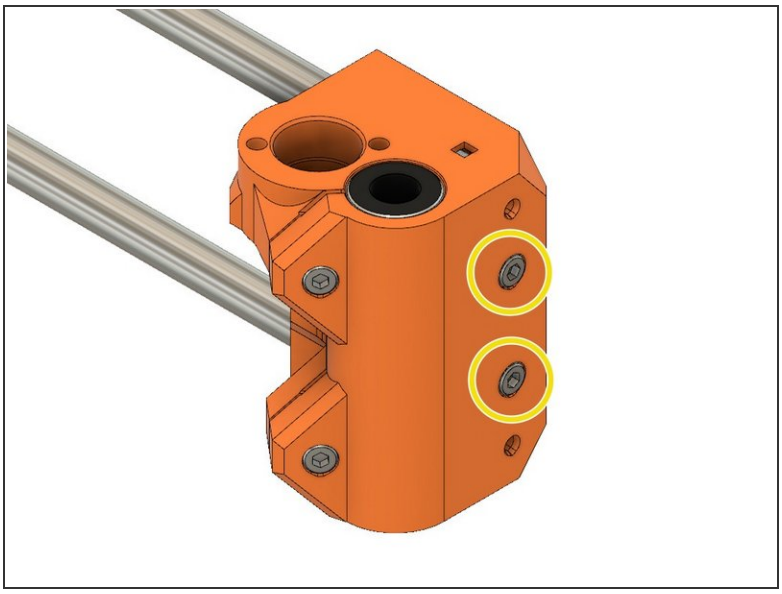
⚠ Verify that the dowel pin is not protruding from either side.

⚠ Verify that the idler spins freely.

- Insert two M3 nylock nuts in the top and bottom of *x_end_idler_tensioner*. Note the orientation of the nylock nuts.

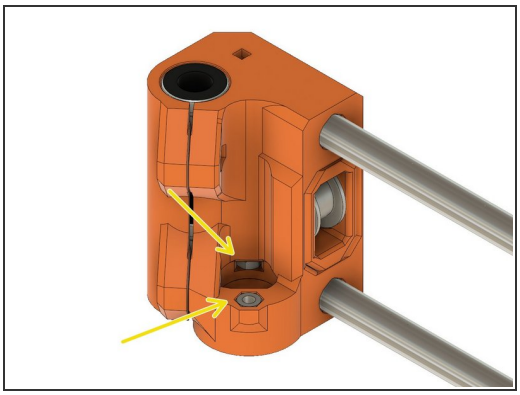
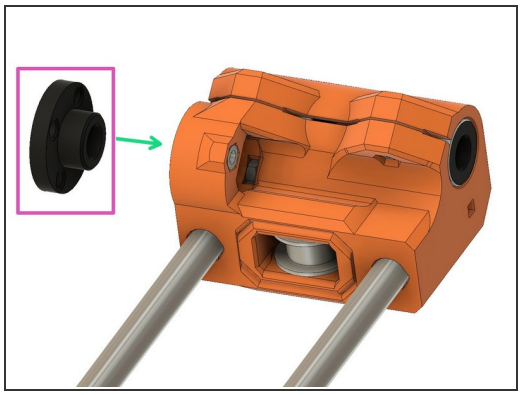
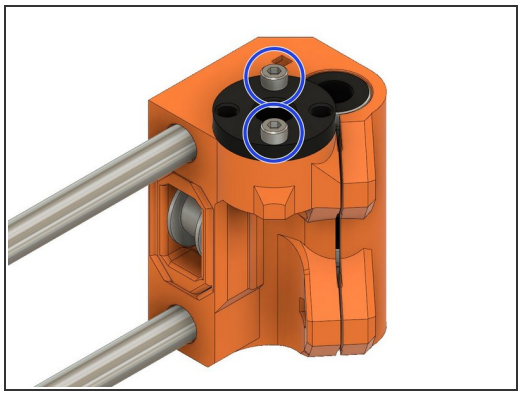
Step 11 — X End Idler Idler Mount





- Insert the *x_end_idler_tensioner* in the *x_end_idler*.
- Secure it with two M3x18 screws. Don't need to tighten the screws, only engage them.

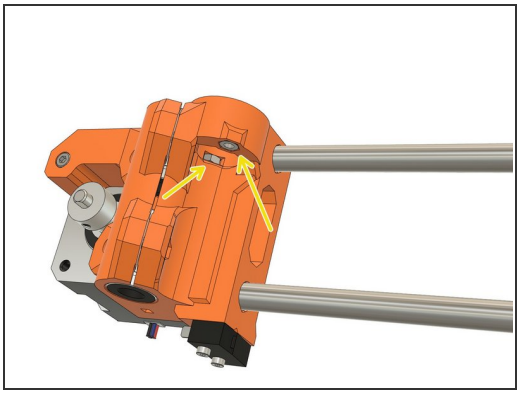
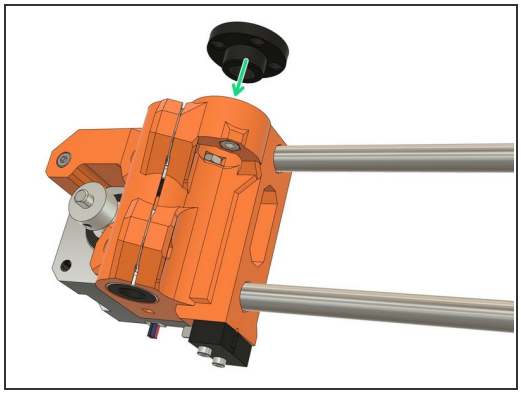
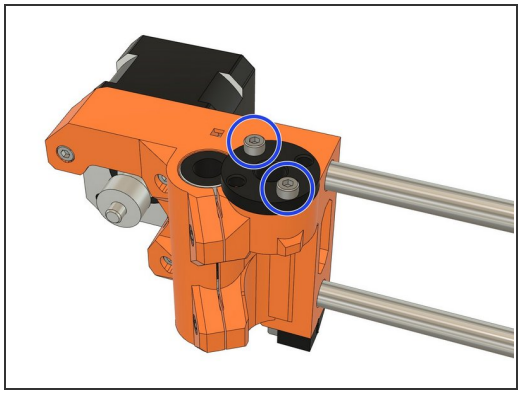
Step 12 — Trapezoidal Nuts

- Insert two M3 hex nuts in the dedicated pockets *of x_end_idler*.
- Note the orientation of the trapezoidal nut.
- Insert a trapezoidal nut on top of *x_end_idler*.
- Using two M3x18 screws, tighten the trapezoidal nut in place. Do not over-tighten the screws.

⚠ Verify that the trapezoidal nut is in the correct orientation.

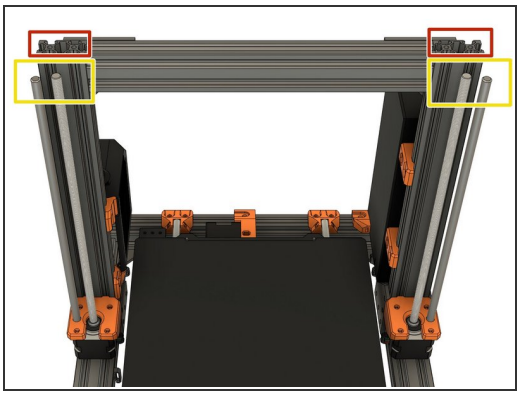
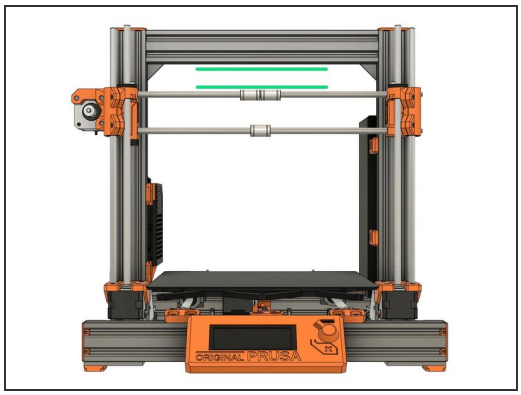
Step 13 — Trapezoidal Nuts

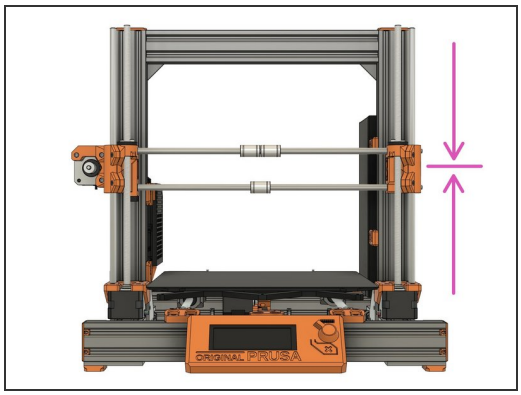




- Insert two M3 hex nuts into the dedicated pockets of *x_end_motor*.
- Insert a trapezoidal nut on top of *x_end_motor*.
- Using two M3x18 screws, tighten the trapezoidal nut in place. Do not over-tighten the screws.

⚠ Verify that the trapezoidal nut is in the correct orientation.

Step 14 — Assembling X Axis On Z Axis

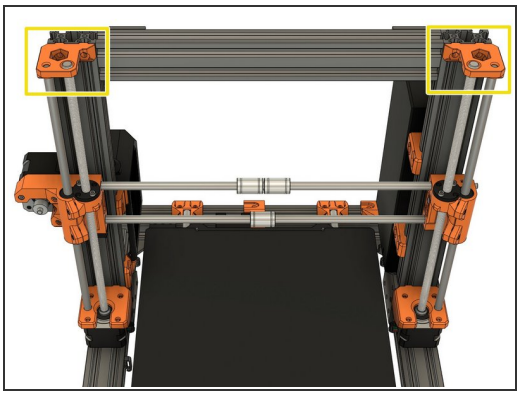
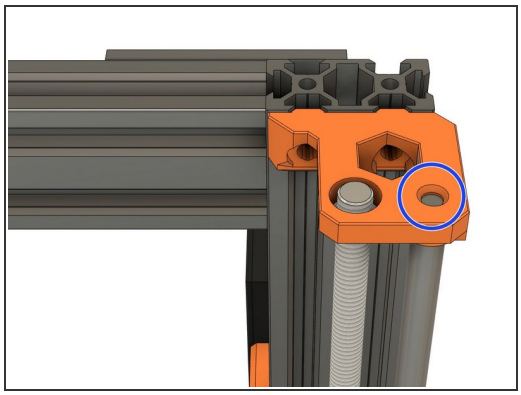
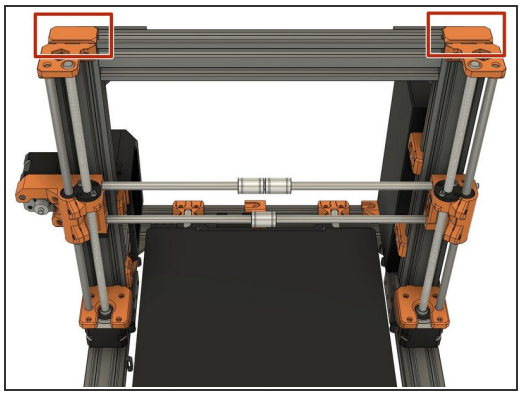





These steps are using the Bear Upgrade frame 2.1 as example but can be applied to Original Prusa frame and previous Bear Upgrade frame version.

- **Bear Upgrade frame only:** Remove *z_end_caps*.
- Remove the *z_tops* that holds the Z smooth rods.
- Carefully slide the X axis assembly onto the Z-axis. Rotate both lead screws to engage the X axis in the trapezoidal nuts.
- Continue to rotate both lead screws, by hand, to move the X axis assembly down by a few centimetres. If the X rods are not parallel with the top of the Z axis, rotate a lead screw on one side only, until the X axis assembly is parallel to the top of the Z axis.
- Continue to move the X axis assembly downwards until you reach the middle of the Z axis. Keep the X axis as level as possible.

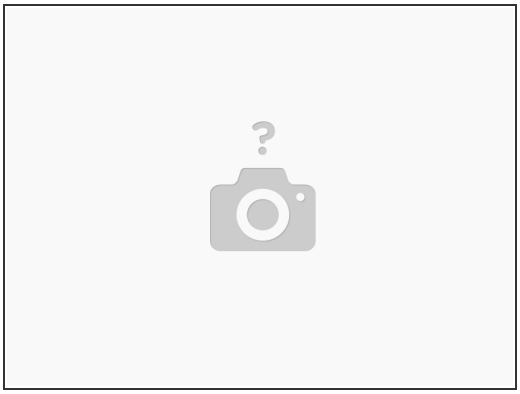
Step 15 — Assembling X Axis On Z Axis

These steps are using the Bear Upgrade frame 2.1 as example but can be applied to Original Prusa frame and previous Bear Upgrade frame version.

- Install the Z axis tops and tighten them.
- **Bear Upgrade frame only:** Make sure the *z_tops* are flush with the Z smooth rods on both sides
- **Bear Upgrade frame only:** Tighten the *z_ends_caps* back in place.

Step 16 — Next chapter



- Congratulations you have finished this chapter :-)
- Go to the next chapter: 3. BearMera extruder