Part 7

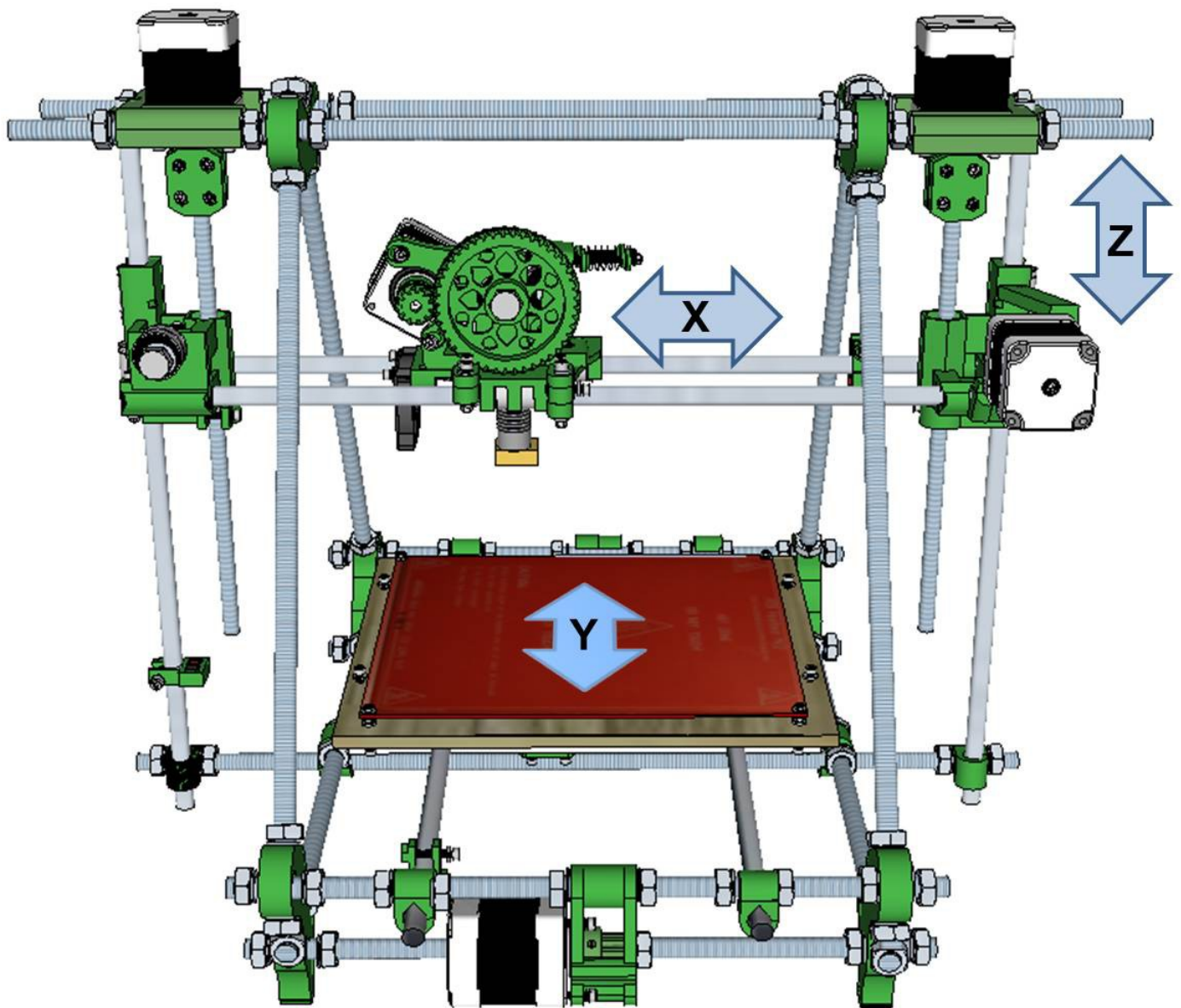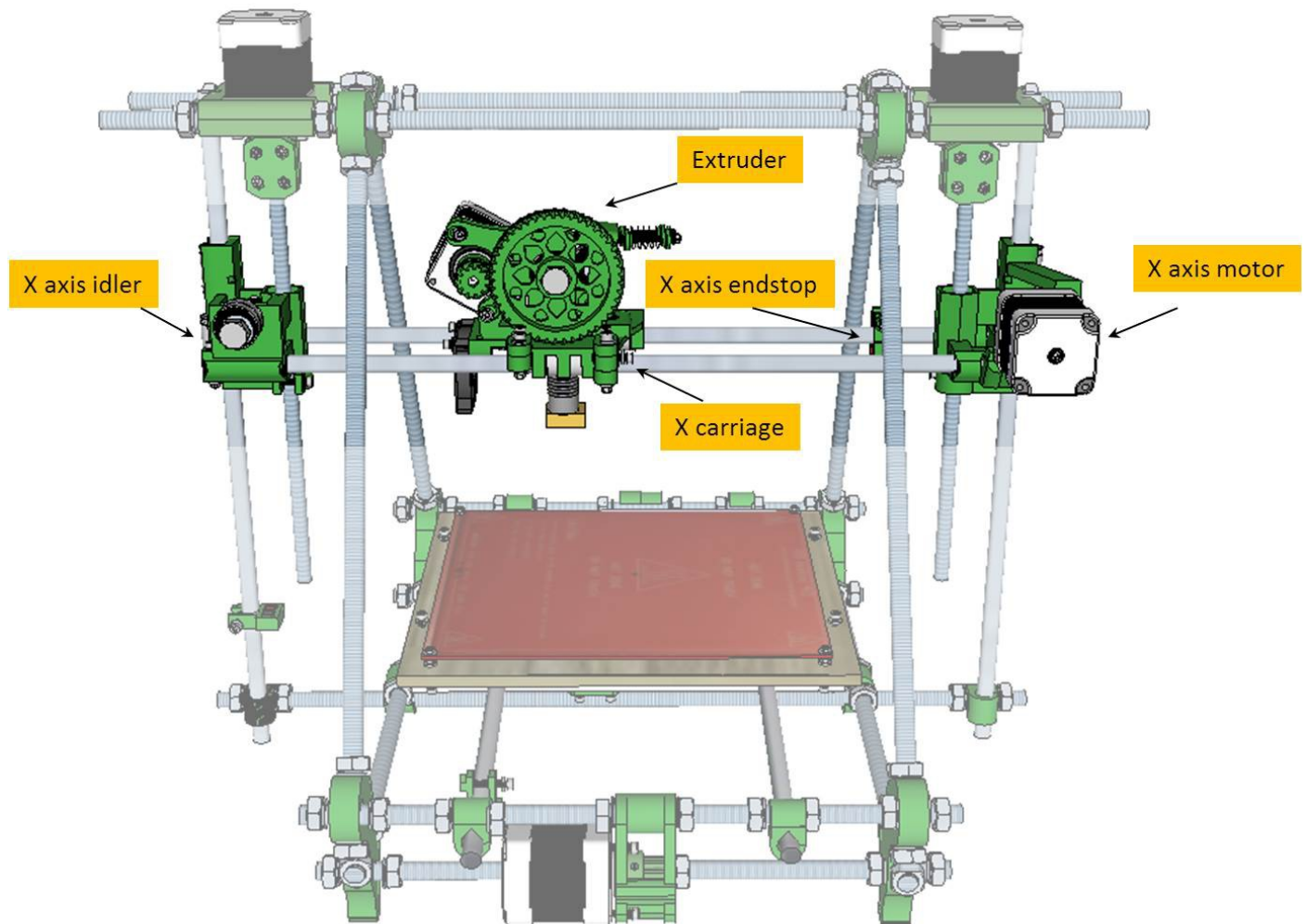
Assembling the X axis

The X axis is a key part of the printer, it carries the extruder on a carriage that moves the extruder laterally in the X axis. The x axis itself is moved vertically on the Z axis
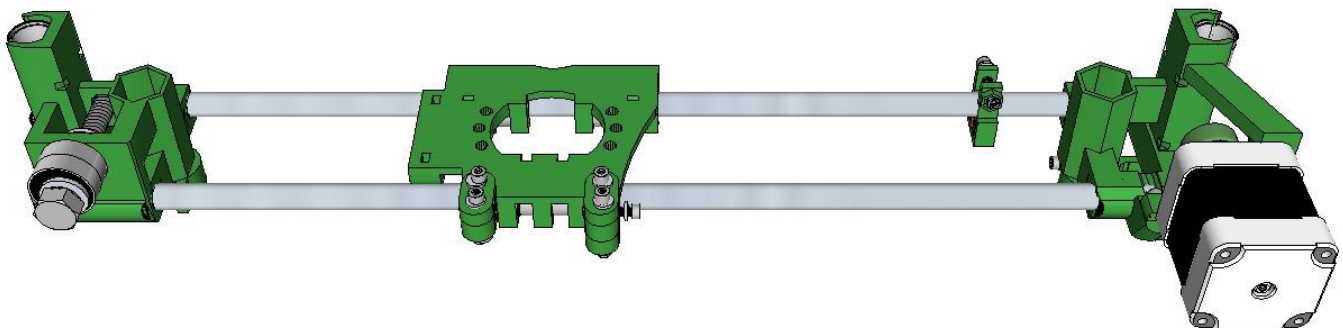
The X axis comprises three main sub-assemblies mounted on two smooth rods;

- The X carriage which carries the extruder
- The X axis Idler
- The X axis Motor

This section describes the construction of each of these in turn together with their overall assembly in to the X axis as shown below;

1 The first step is to test fit and ease various parts to make sure that they will fit properly when assembling the X axis on the machine. You need to do this now because it is easier than when the X axis is already mounted and you won't disturb the overall structure and alignment of the machine.

This means that you will assemble some parts for fit then take them apart again to enable the X axis to be assembled and mounted.

You start by assembling the X carriage including parts of the extruder plus the hot end as shown below. Note, these images show a more or less complete hot end, don't worry if you haven't built that hot end this far as the key part is the black PEEK cylinder.
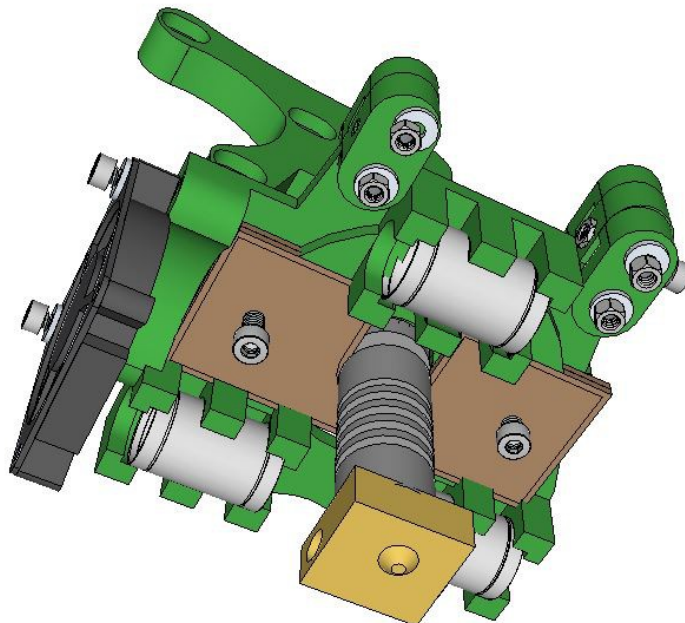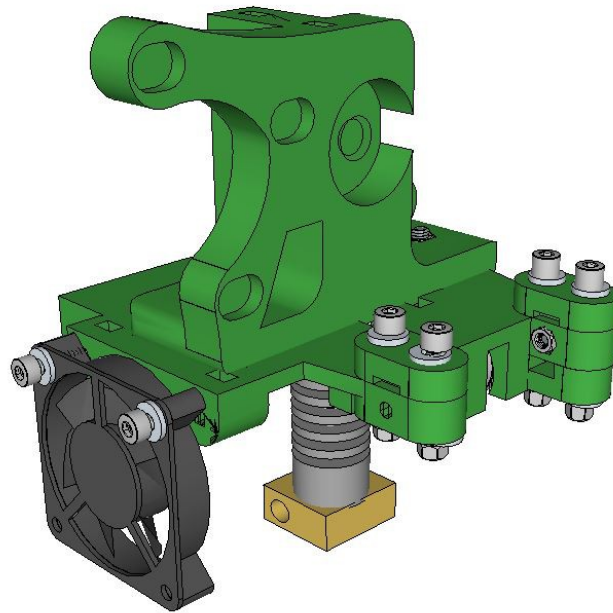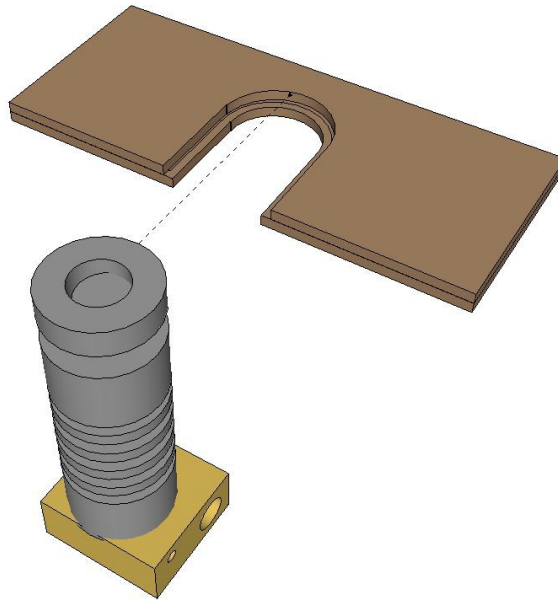
**2** First ease and fit the 40mm fan, then remove it.
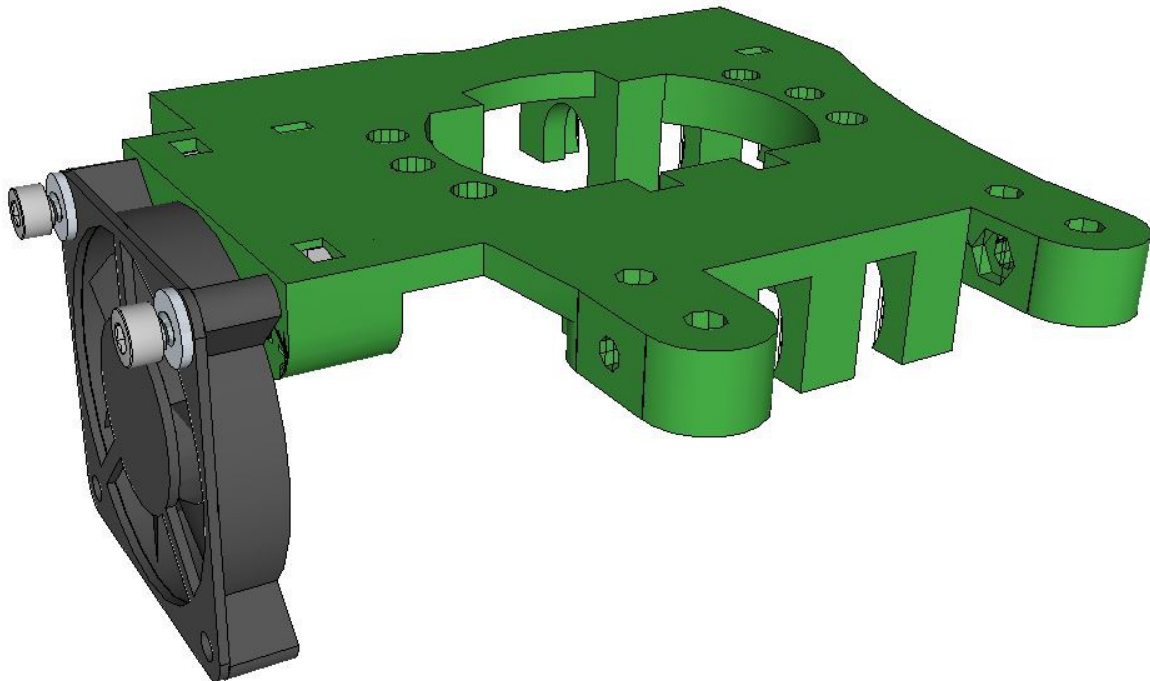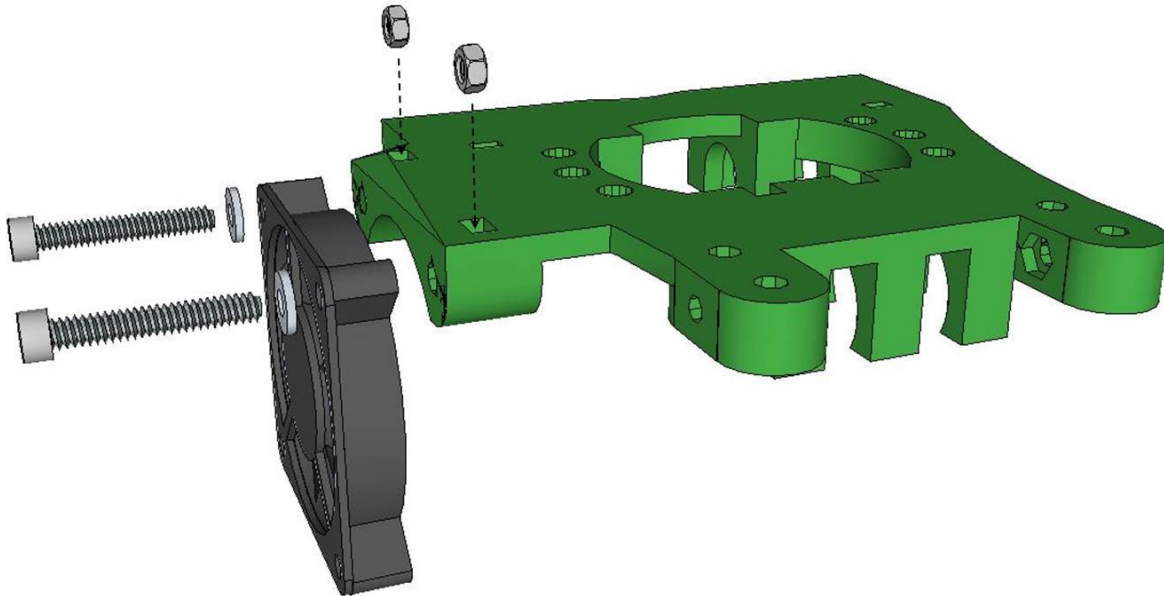
3

Next ensure the extruder block, mdf plate and peek barrel fit properly.

Start by sliding the peek barrel on to the mdf plate with the lip of the plate being at the bottom, the barrel should fit snugly into the slot, do not ease the slot to make for a loose fit as this will cause less precision when printing.

Mount these to the bottom side of the extruder block. The top part of the peek barrel should jut above the mdf plate and fit in to a circular hole in the extruder block.

Check the bolt holes align all the way through the mdf and extruder. Test fit the M4x20 bolts and nuts

X carriage: Tapered side

Bar clamps at front

MDF: long side

MDF: short side
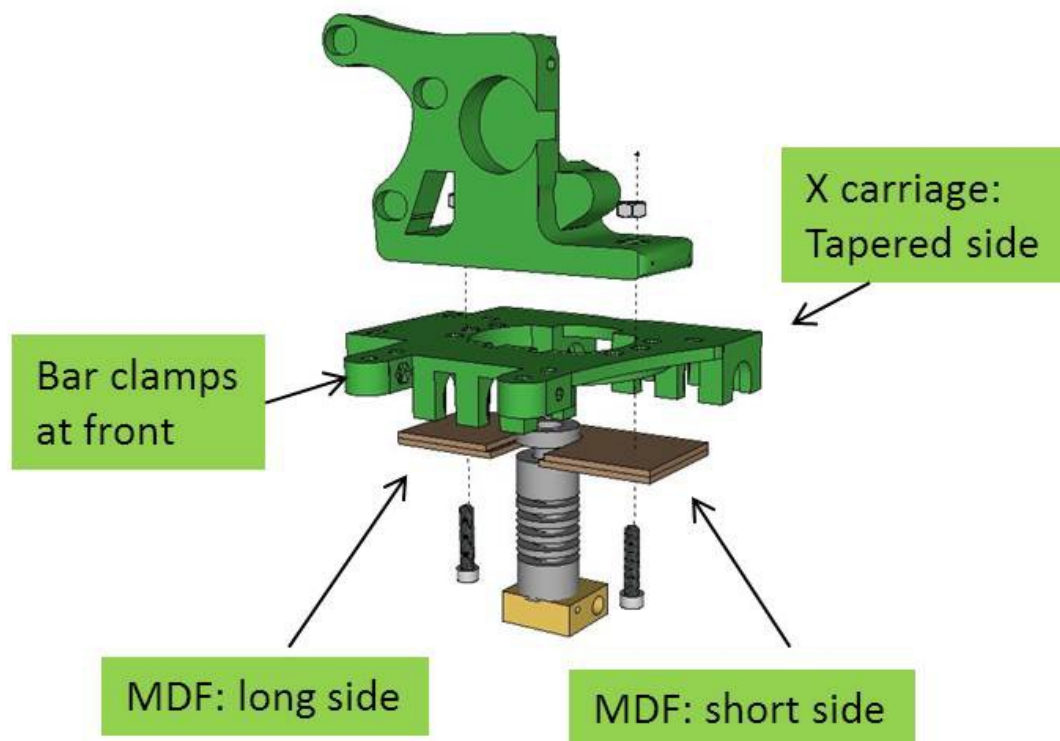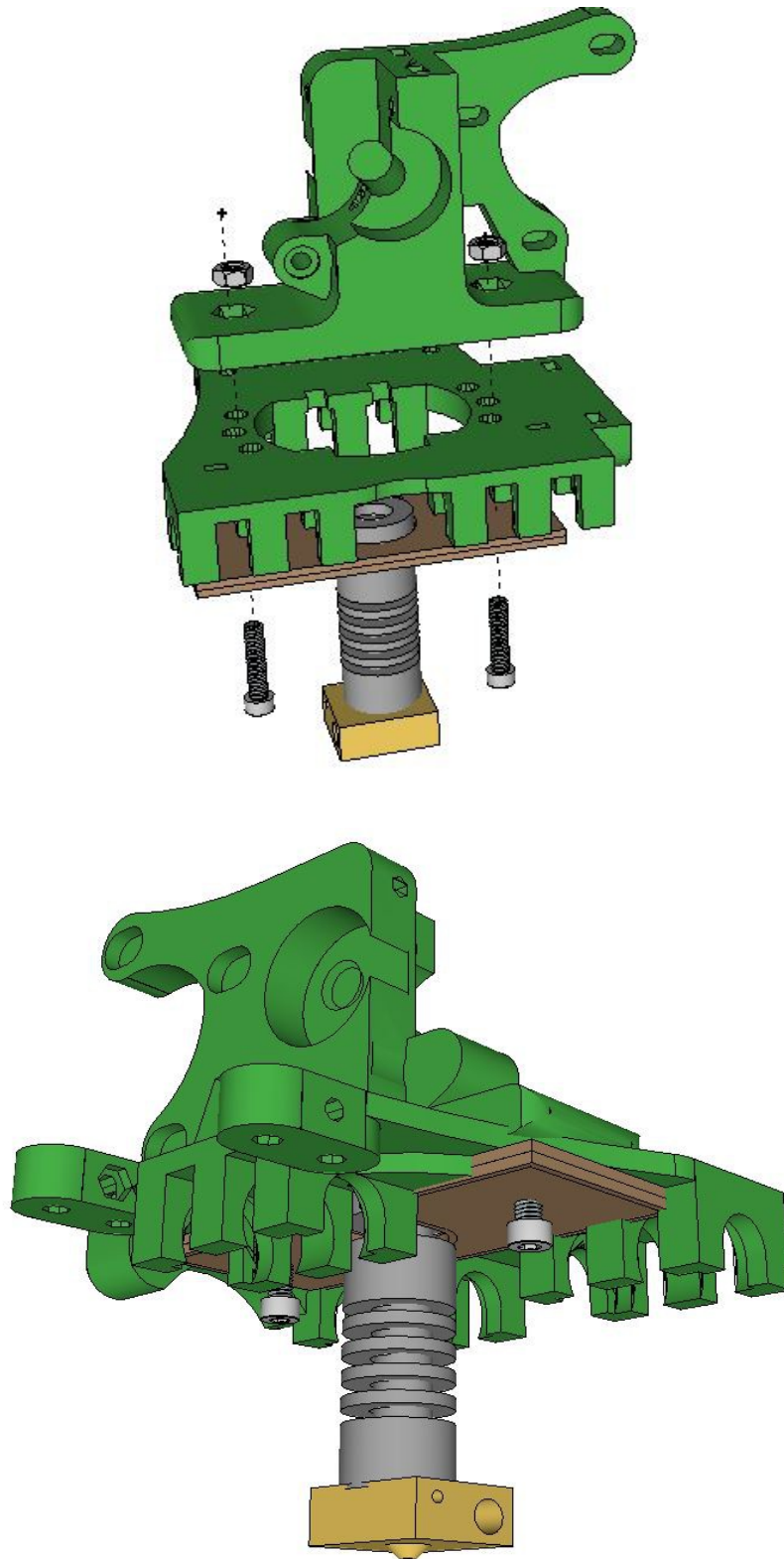
If the mdf to x-carriage mounting is a bit loose this can be addressed by placing 2 or so M8 washers in the extruder block well to close the gap with the top of the PEEK barrel

4

Remove all the bits you have test fit on to the X carriage. You will now assemble the X carriage proper.

BE VERY CAREFUL WITH THIS STAGE, the uprights of the bearing clips are quite fragile and prone to breaking. Sit an LM8UU linear bearing on top of a clips aligned as the dotted line indicate;
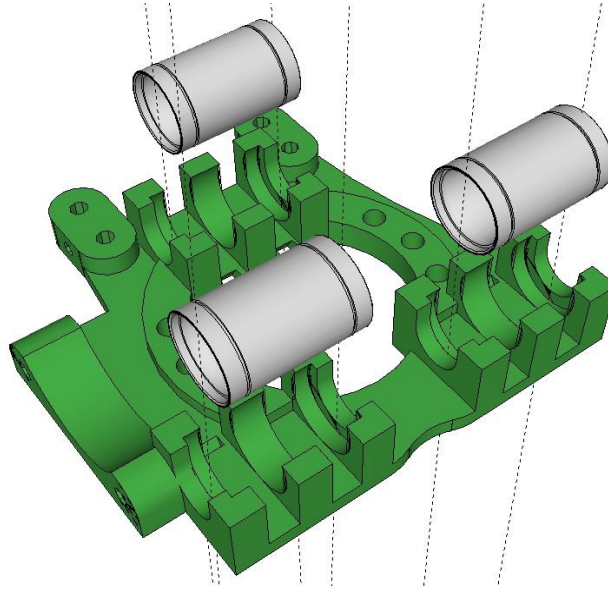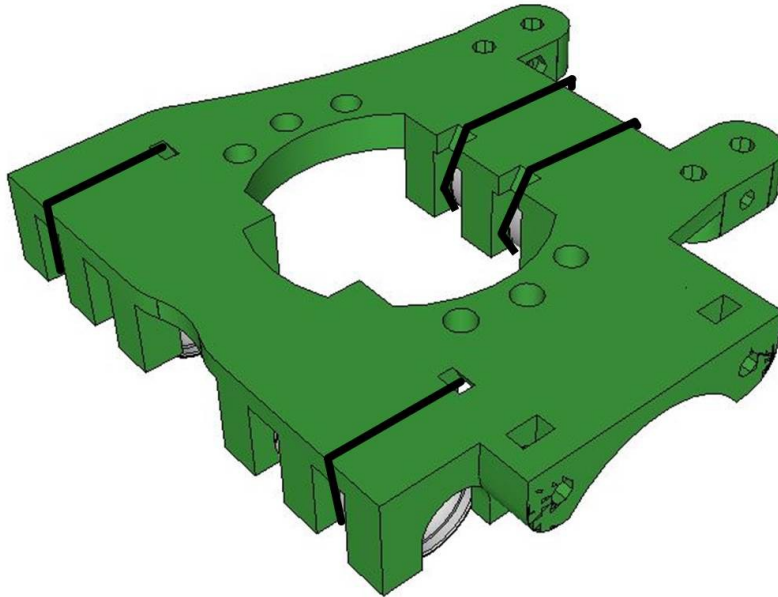

Then carefully press down gently but firmly with pressure applied evenly along the bearing length until it clips in to place. Repeat for the other two bearings making sure all bearings are fully and properly seated in the clips.
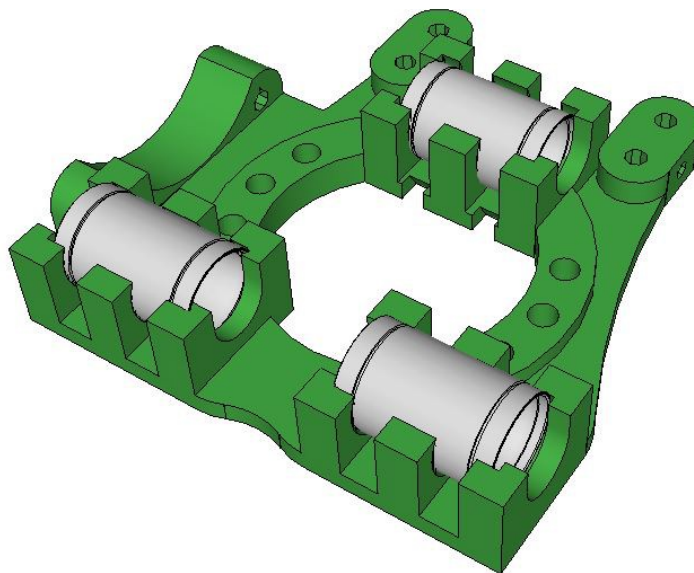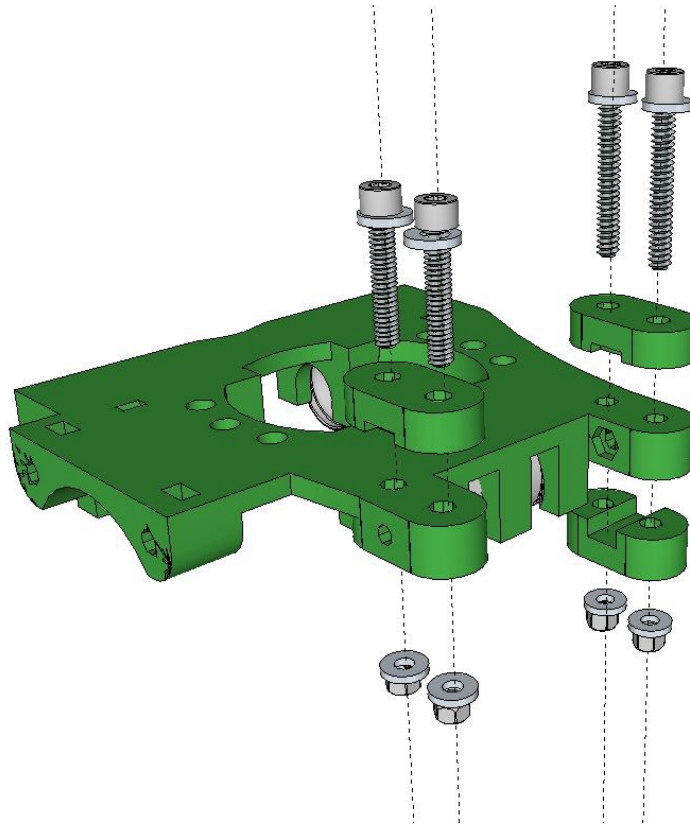
5 Once the bearings are properly seated use cable ties to secure them via the slots provided in the X carriage as shown below

6 Next, attach the belt clamps as shown using M3x20 cap screws and washers for the single clamp and M3x30 cap screws and washers for the double clamp. All four bolts are then secured using nyloc nuts.
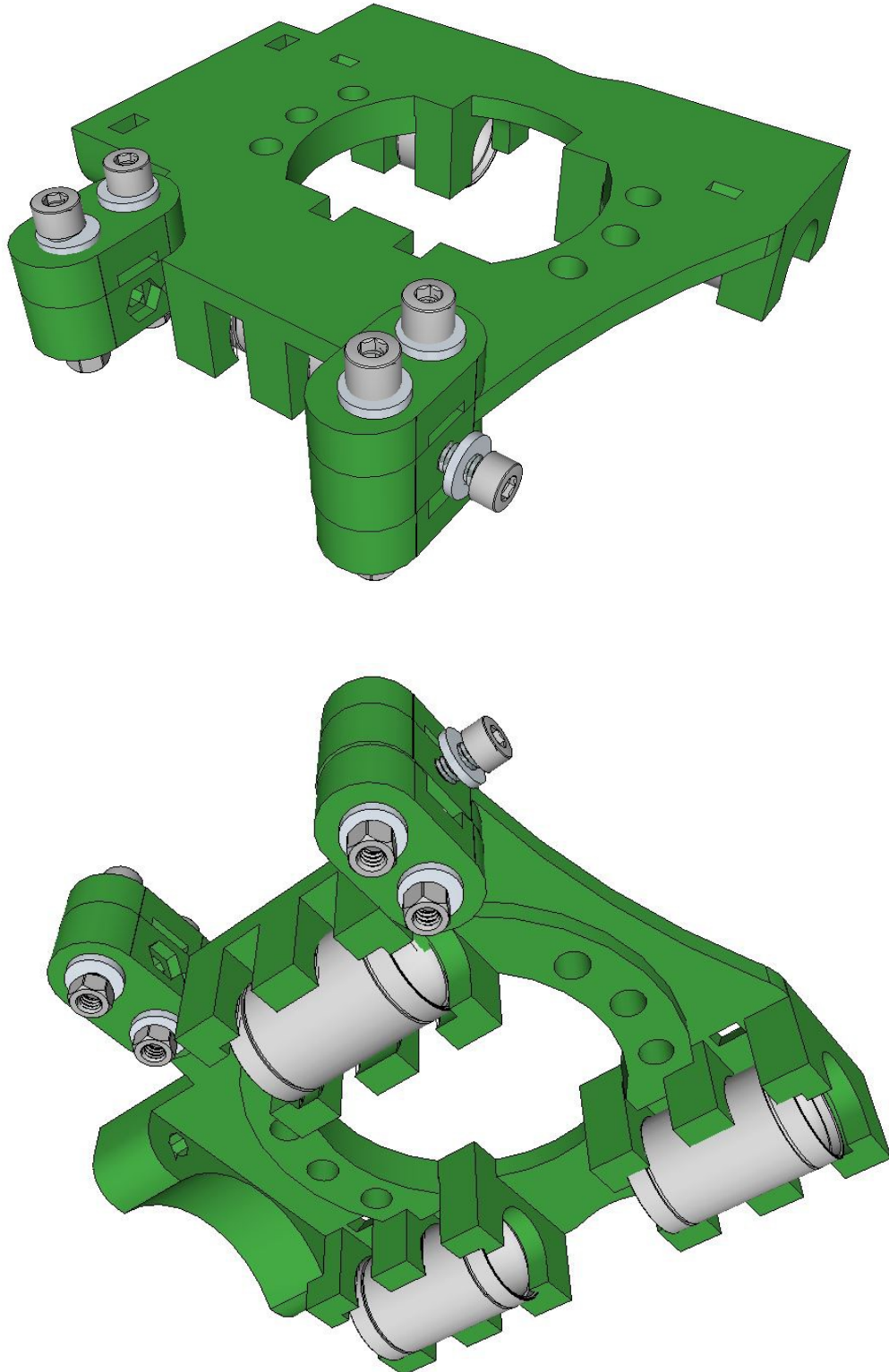

7 Insert the M3x20 cap screw with a washer and captive nut. This screw is used to tighten the belt against the clamp to maintain tension. The inset photograph shows how the double belt clamp is used together with the arrangements of cable ties on the belt clamps.
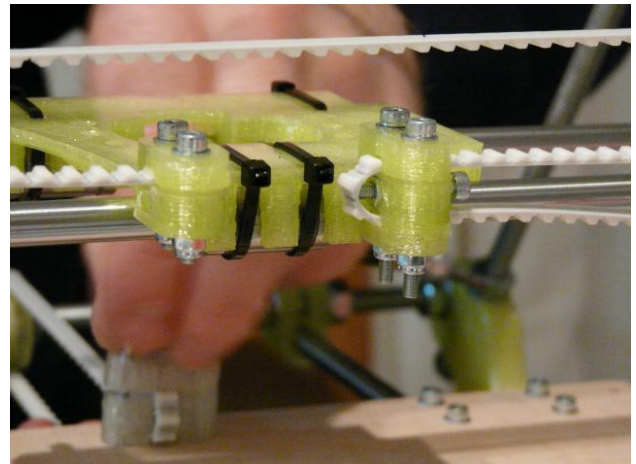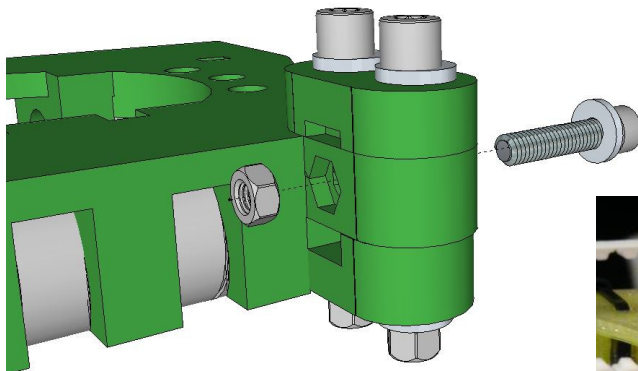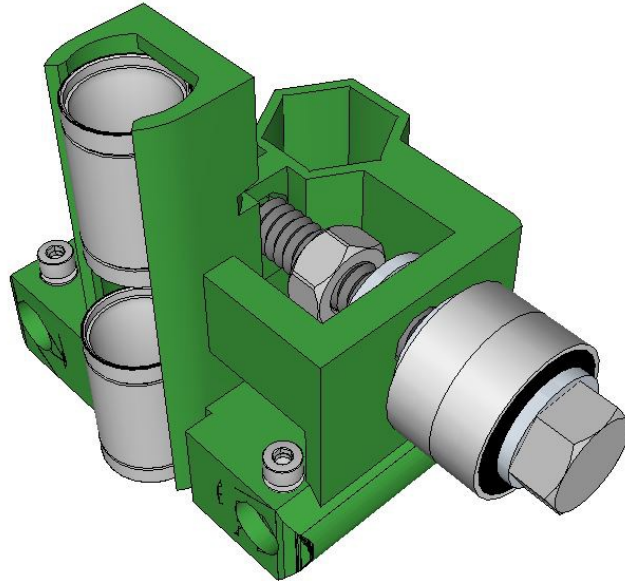
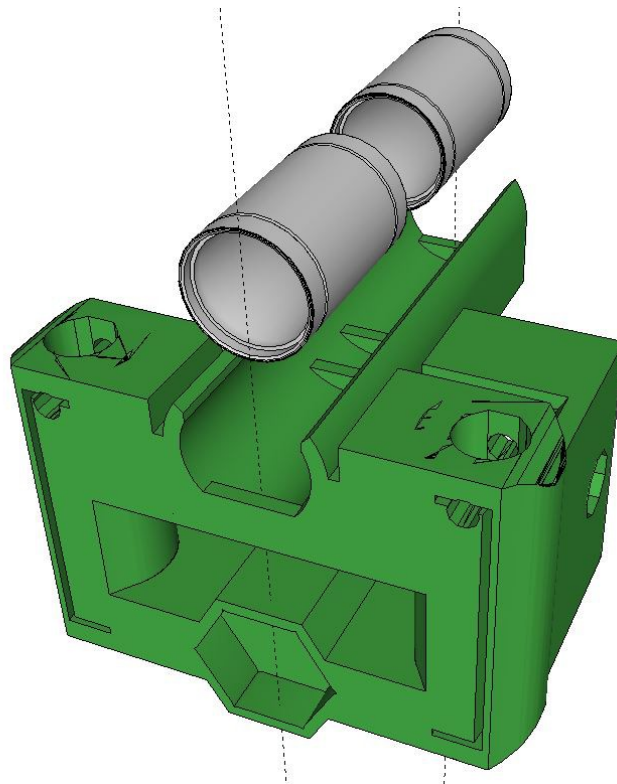**8**   Your X carriage should look like the illustration below

9

The next step is to assemble the X Idler.

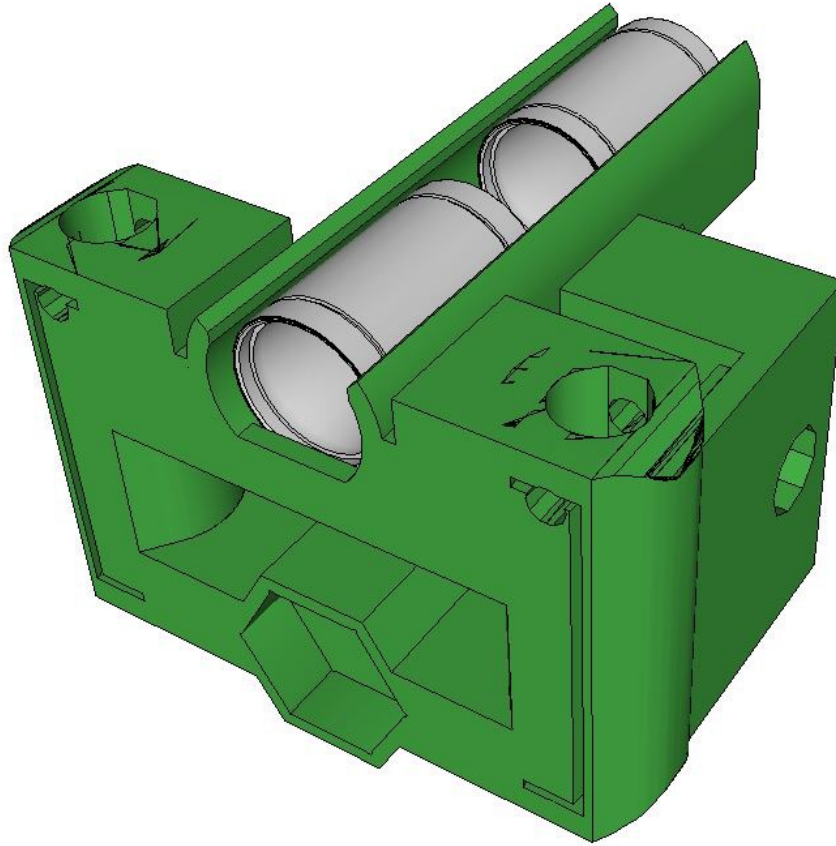Note that the M8x60 hex head bolt will go through the two holes in the idler bracket.

Start by locating and carefully pressing down with pressure applied evenly along the bearing length until it clips in to place.

10 Repeat for the other bearing making sure both bearings are fully and properly seated in the clips then secure both bearings with cable ties as shown in the photograph below.

11 Insert the two M3x20 cap screws with washers and nyloc nuts in to the holes near one end of the rod slots. These cap screws prevent the bracket moving along the smooth rods and provide a firm and even "wall" for the rods to be tensioned against.
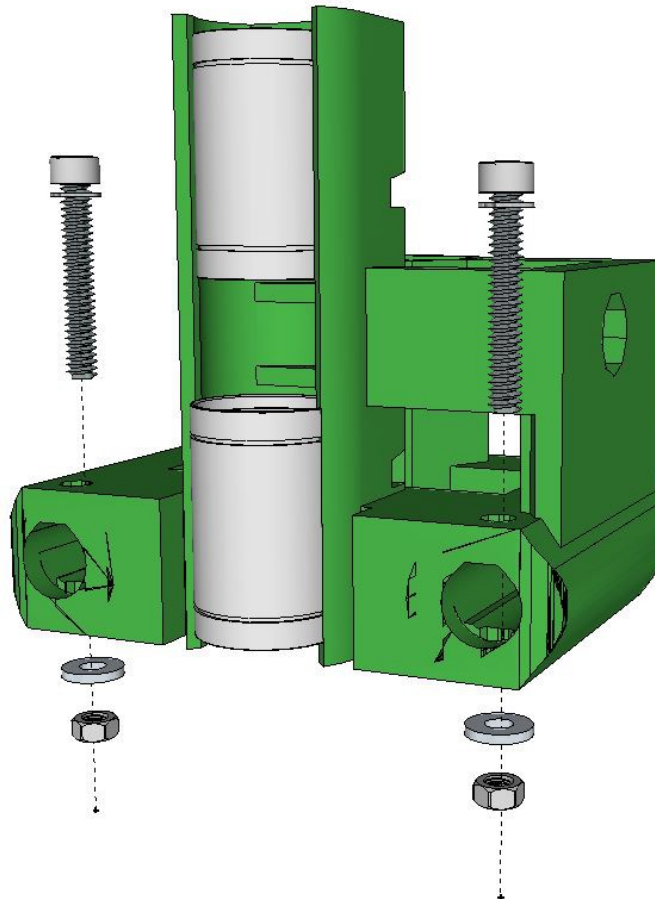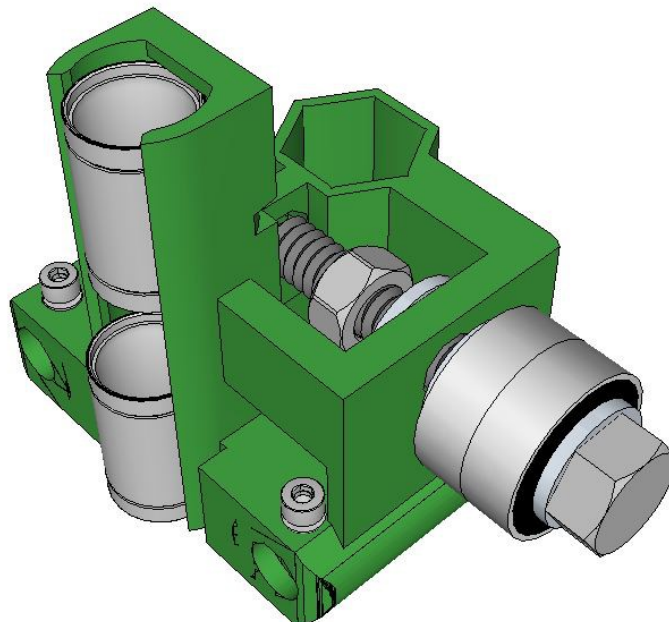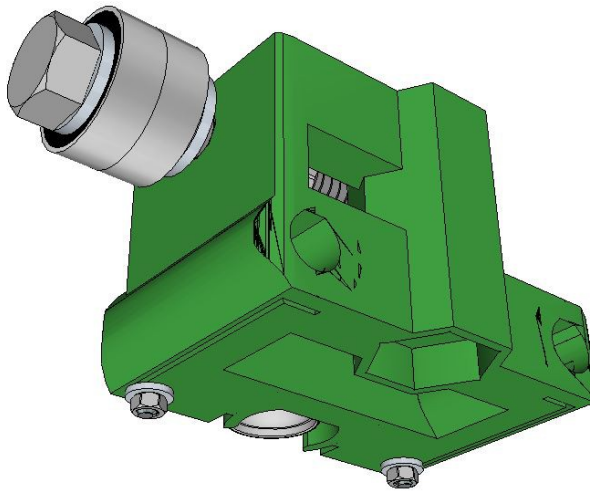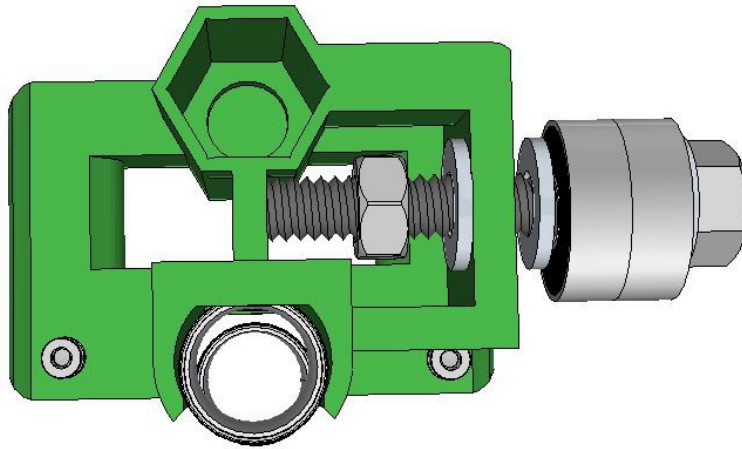

Thread the M8x60 hex head bolt into a washer, two 608 bearings and another washer. Insert this loaded bolt into the out hole of the idler bracket and secure using a washer and nut.
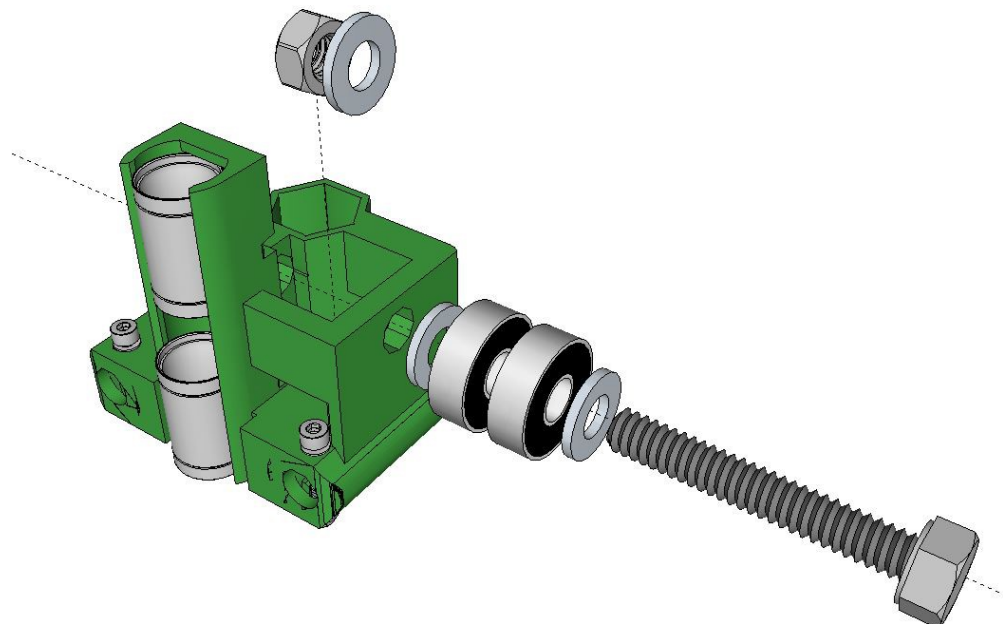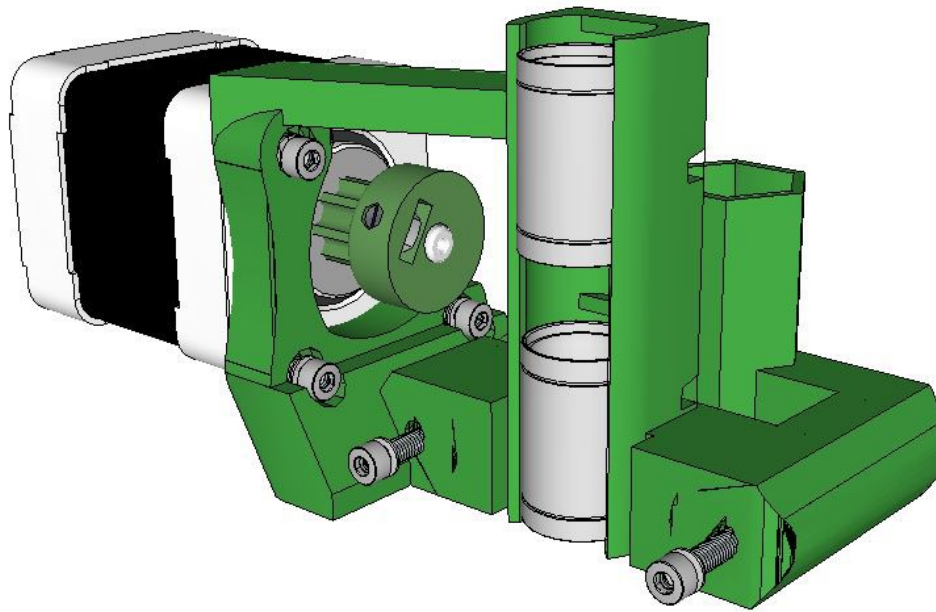
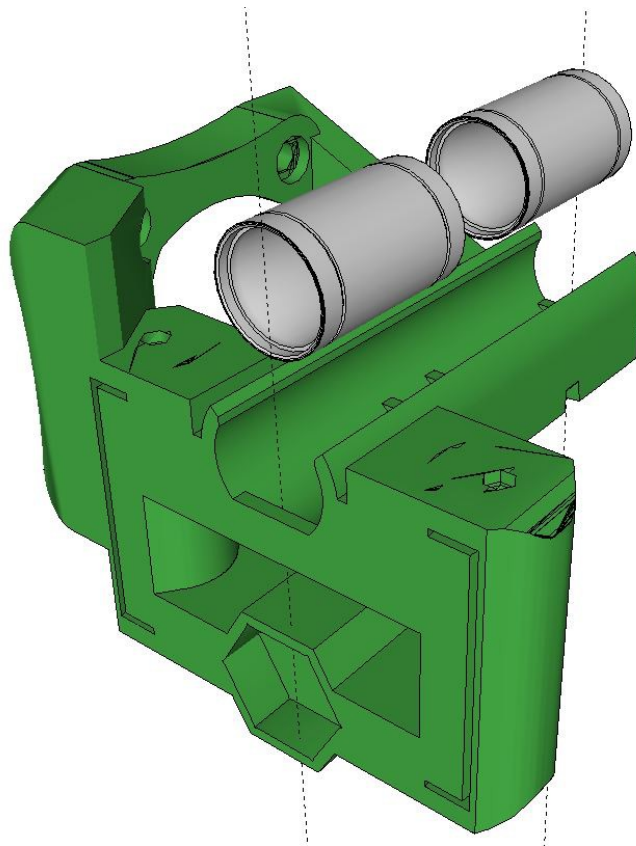**12**   Your completed X Idler should look like the one below

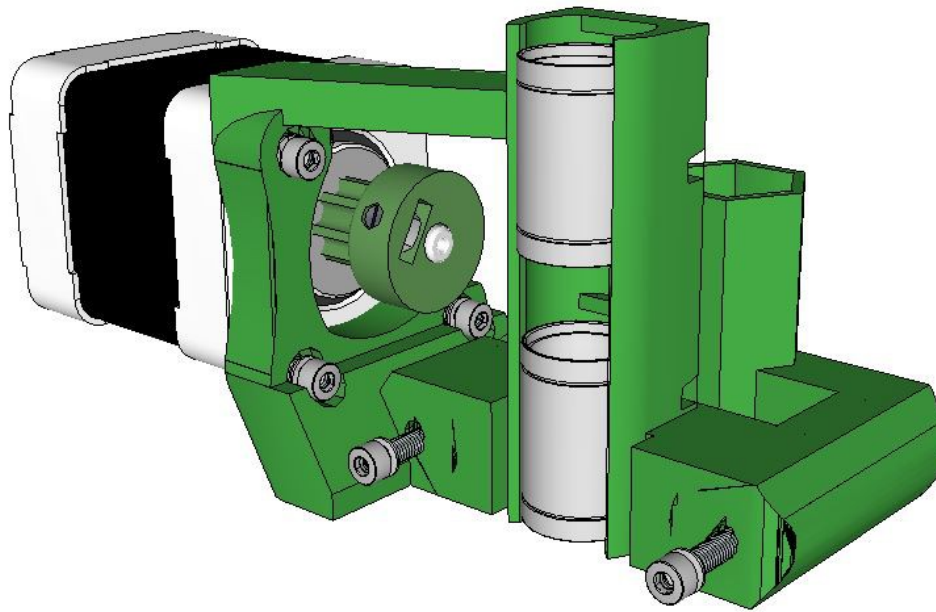**13** The next step is to assemble the X Motor bracket.

As you did with the X Idler Bracket start by locating and carefully pressing down with pressure applied evenly along the bearing length until it clips in to place.
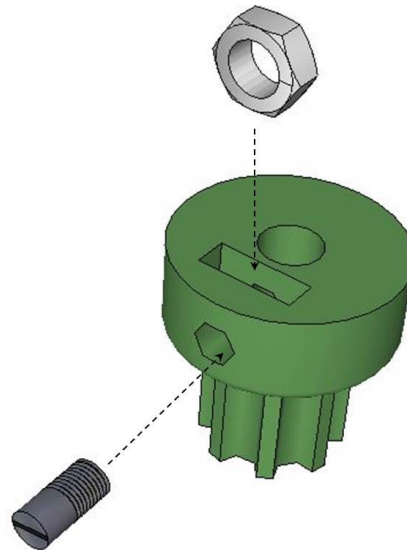
14 Repeat for the second bearing making sure all bearings are fully and properly seated in the clips then secure both with cable ties.
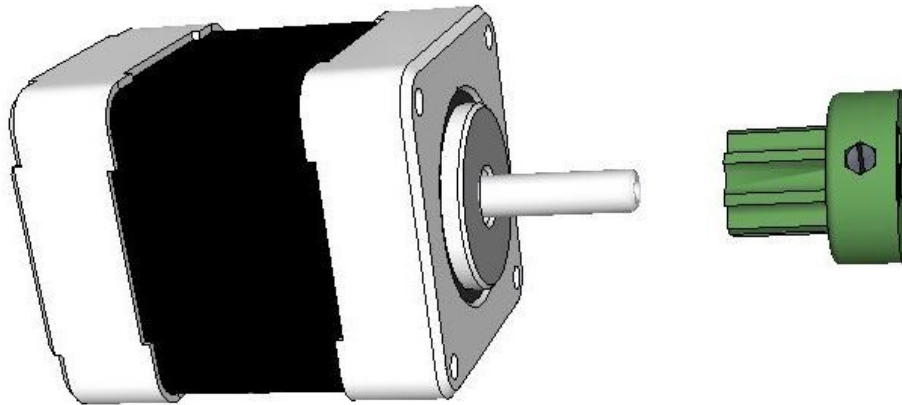
Prepare a pulley by inserting an M3 nut into the captive slot and the grub screw.
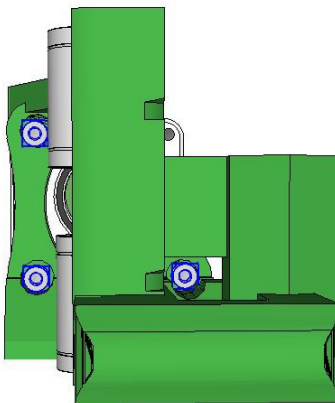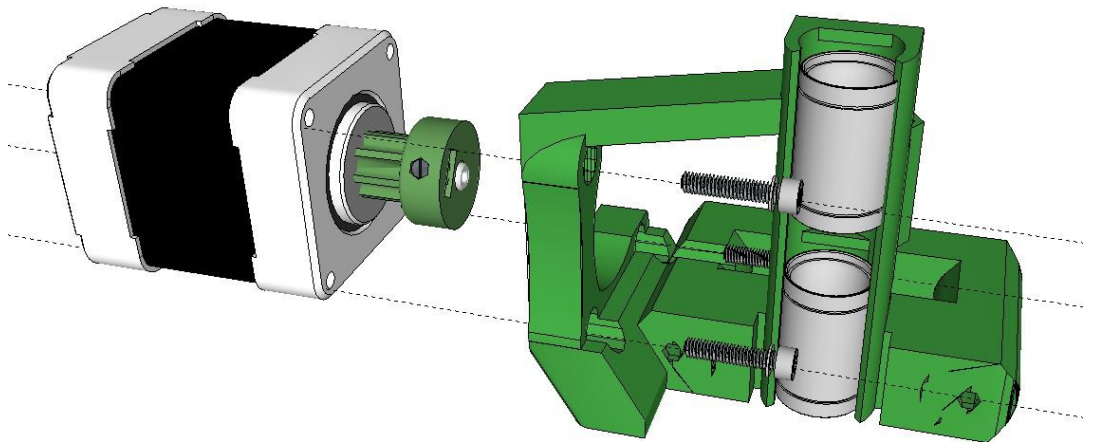
15

Attach the pulley to a stepper motor, make sure the grub screw is perpendicular to the flat part of the motor shaft and firmly tightened down.

Attach the stepper motor to the X motor bracket using three M3x10 cap screws and possibly washers (these may not fit on your bracket depending on how it was printed).

Note how the three cap screw heads are accessed, highlighted in the diagram on the left.

16

The next step needs a bit of care and can be tricky.You need to insert a nut in each smooth rod slot so that it engages in the captive slot at the end – see photograph;
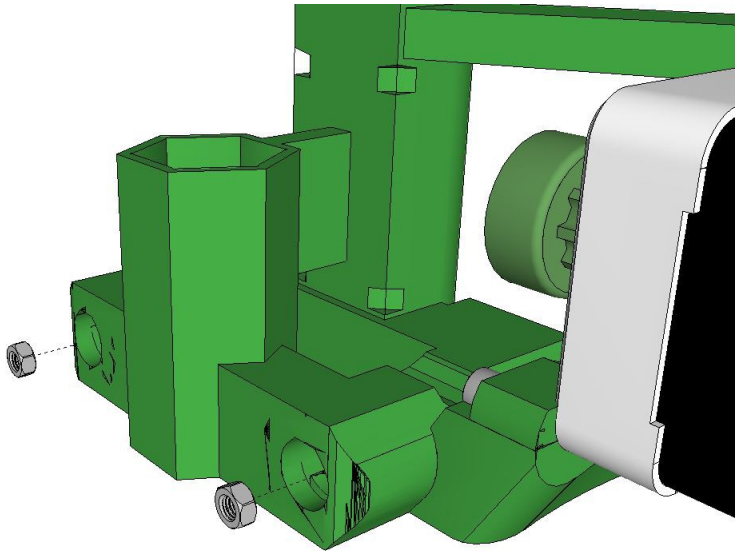
Then insert an M3x20 cap screw at the other end to engage with the nut. One way to do this is to slide a smooth rod into the slot to keep the nut in place until you can get the cap screw threading into the nut. These screws are used to tension the motor bracket against the idler bracket at the other end of the X axis and serves to both tension the belt and to load the X axis bearings against the Z axis smooth rods.
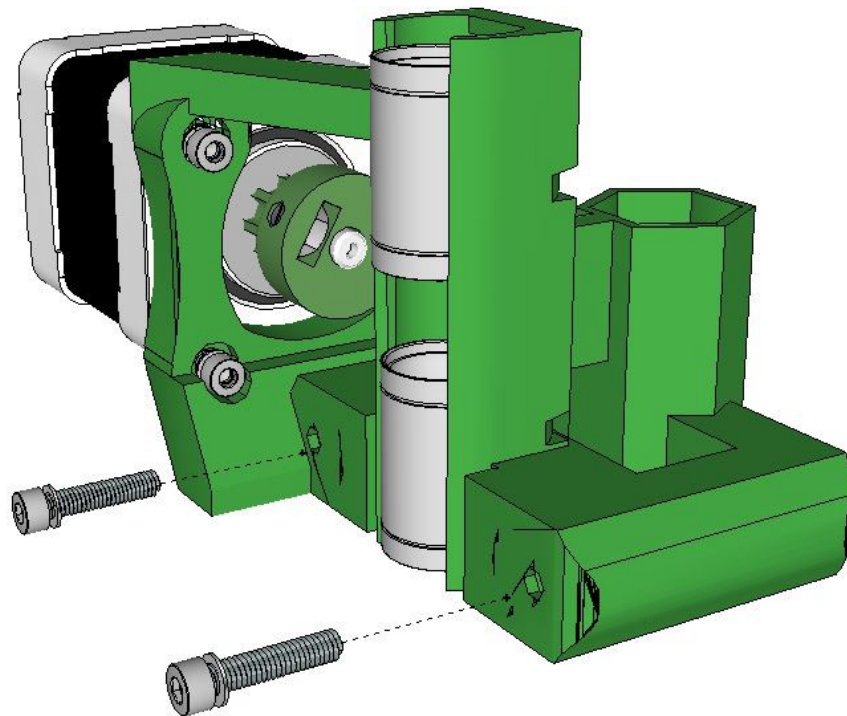
17 The final preparation is to assemble the X axis endstop. Insert a wired microswitch into the slot as shown and insert a m3x20 cap screw, washer and nut. Do not tighten the nut yet. Note, ensure the middle terminal and the one at the same end as the red switch are wired (so the switch will make rather than break contact when the red button is pressed) and have heat shrink insulation.

Connect
these two
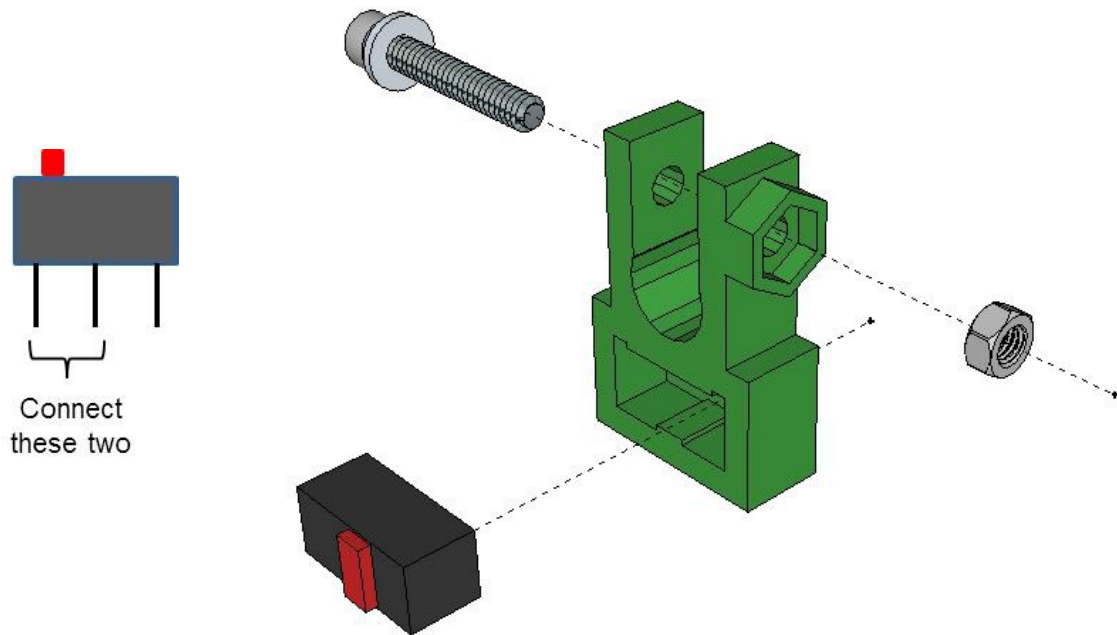
18 You now have all four elements prepared to assemble the X axis.

Insert the first smooth rod into the "front" slot, the motor side, of the bracket. Next, slide the endstop on to a second 404mm smooth rod and then slide that rod in to the second slot of the bracket.
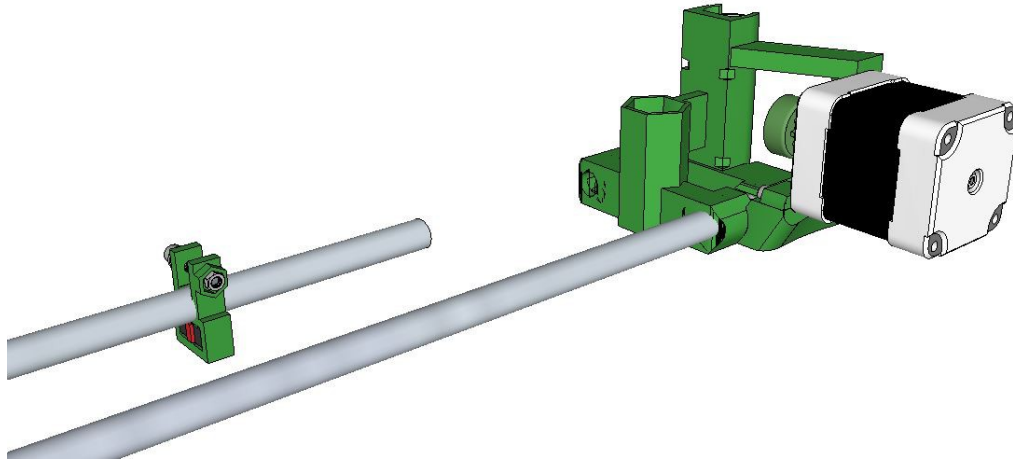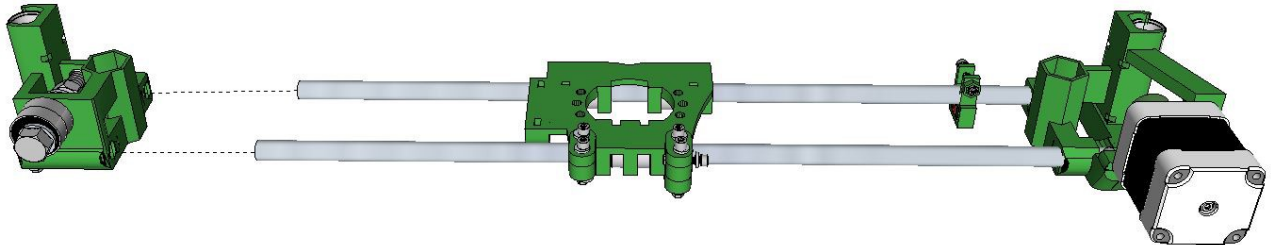
Then slide the X carriage on to the two rods carefully engaging each rod in to the linear bearings of the carriage. The belt clamp part of the carriage must be on the same side as the motor to ensure the belt will fit properly.
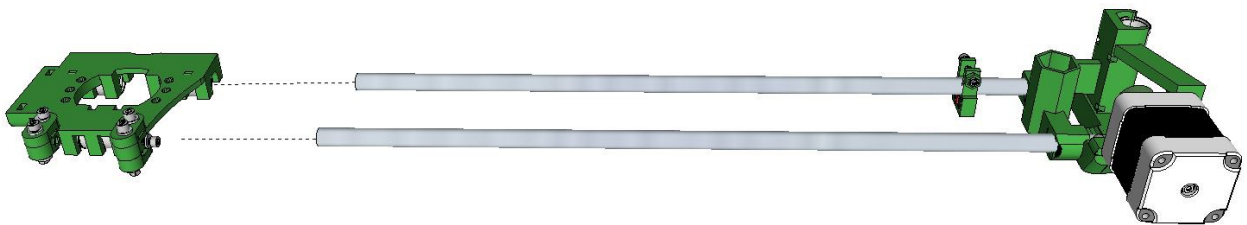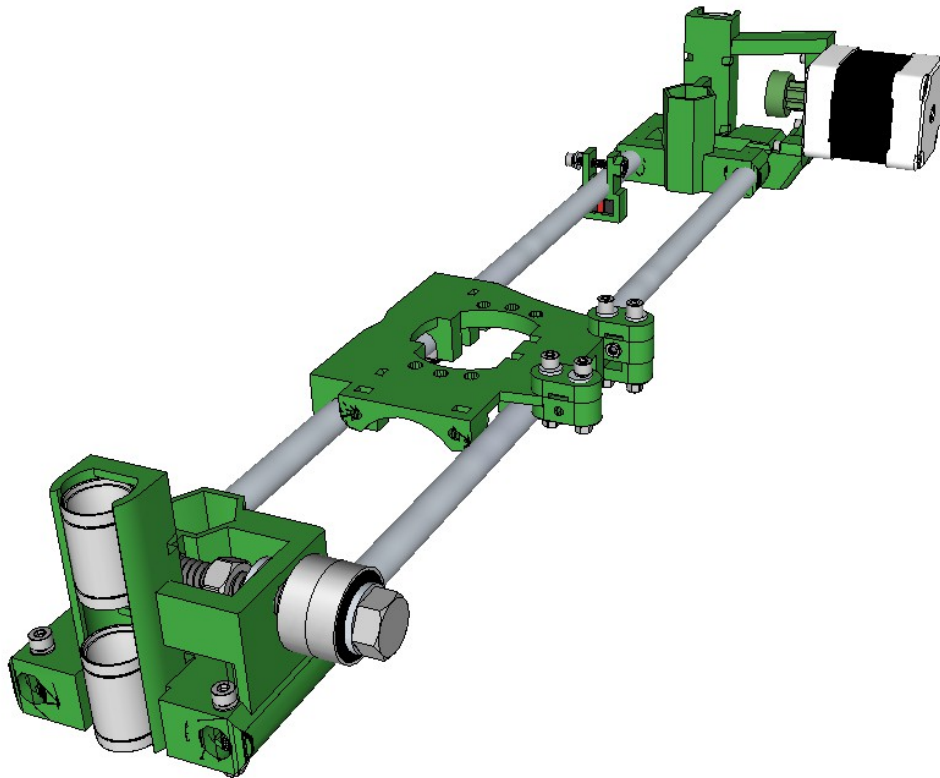
19 Finally, slide the X Idler bracket on to the ends of the smooth rods so they engage against the two vertical cap screws at the end of the slots.

You are now ready to install the belt.

20 Secure the belt in the single belt clamp on the X carriag teeth side down. Then loop the belt around the idler pulley with the smooth side of belt against the. Pass the belt across to the motor bracket twisting the belt so the teeth of the belt engage the teeth of the pulley. Loop the belt around the motor pully and back to the X carriage and secure in the double belt clamp
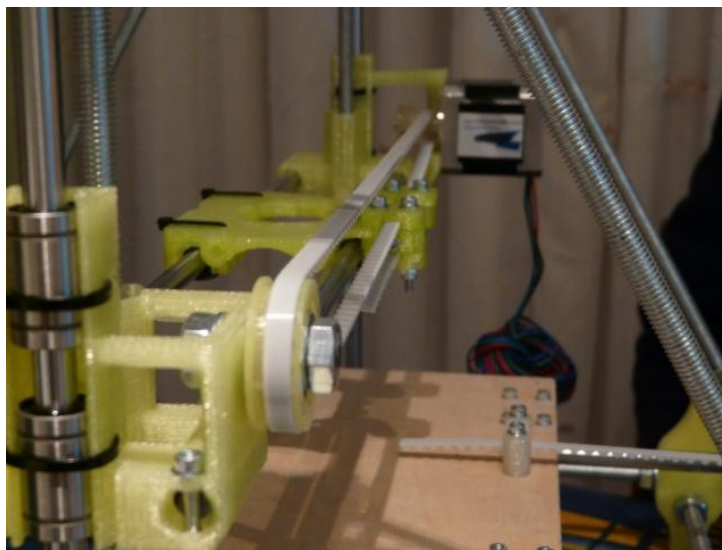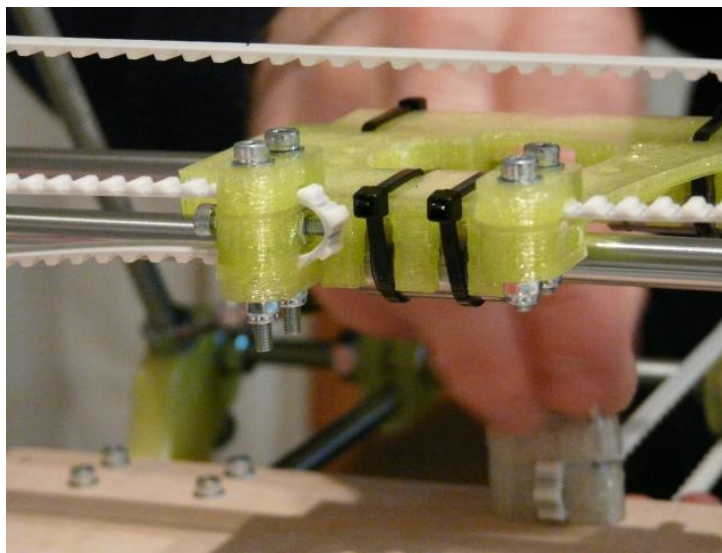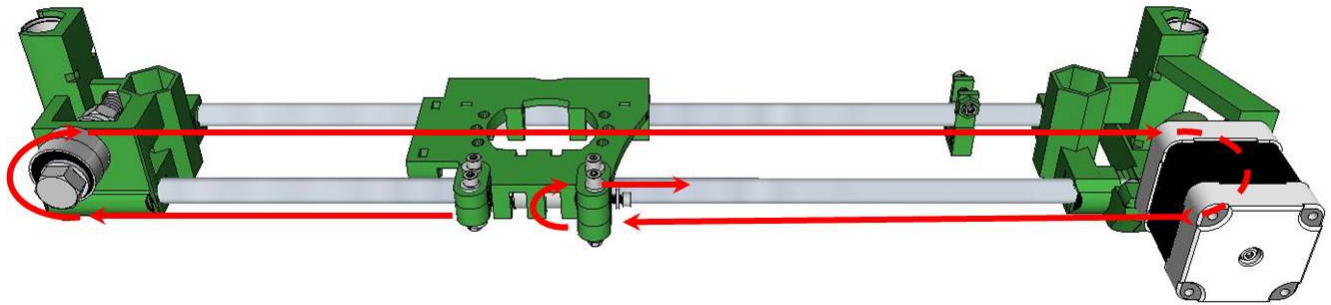
You have completed the X axis – Well done !.