05 Spool Drive assembly
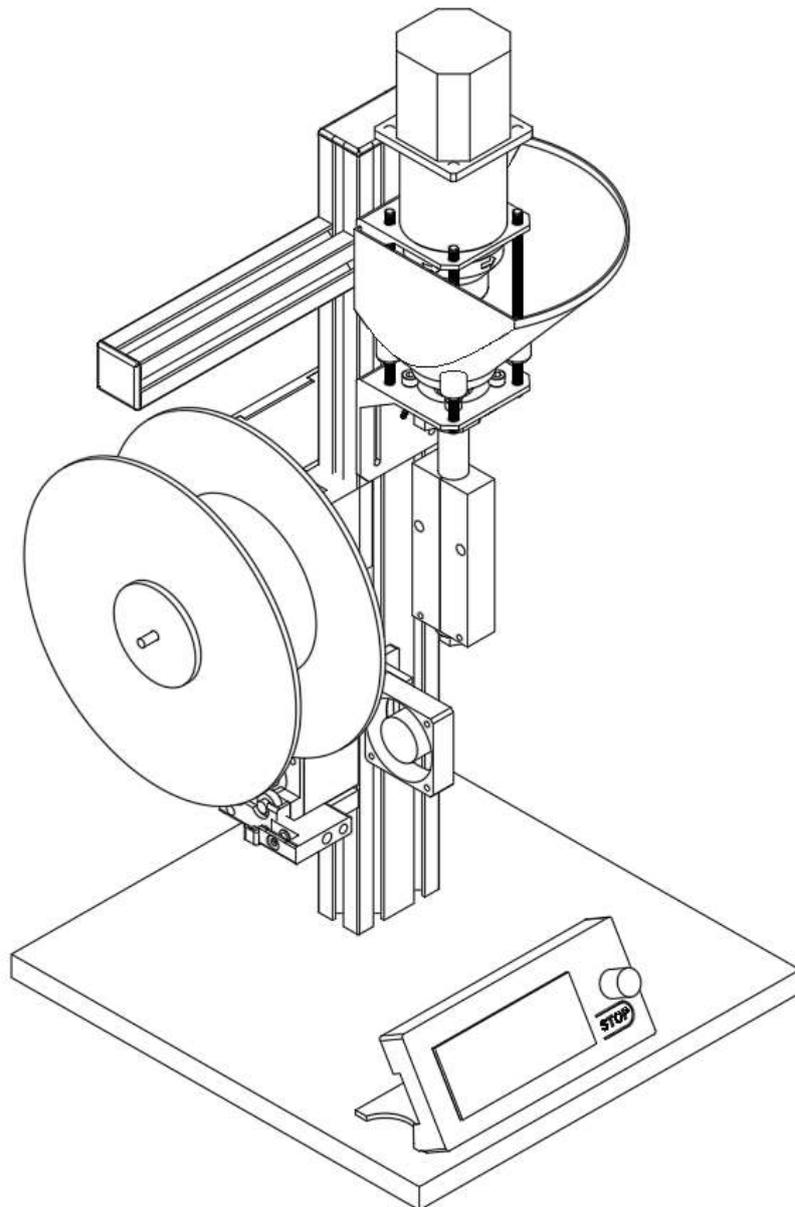
Assembly instructions
Original Desktop Filament Extruder E1.7 by ARTME 3D
Version 28.02.2022

Required tools for this assembly section:
Phillips screwdriver PH1
Superglue if necessary
if necessary sandpaper

Overview packages
Package 0: Delivered carton
Package 1: Screws (SC)
Package 2: Spare Parts (SP)
Package 3: Custom Metal Parts (CM)
Package 4: Extruder Barrel (EB)
Package 5: Electronics (EL)
Package 6: Tools (TO)

Step 1:

Remove from package 0 (delivered carton):
1x Nema 17 stepper motor (MO03)

Remove from package 1:
16x wood screw 2.5x12 (SC01)
2x wood screw 3x25 (SC02)
4x cap head screw M3x6 (SC03)
7x cap head screw M4x10 (SC04)
1x wing nut (SC09)
4x hammer nut (SC10)
1x hexagon head screw M5x70 (SC08)
1x hexagon head screw M10x50 (SC12)

Remove from package 2:
1x toothed belt (SP05)
6x ball bearing 4x13x5 (SP14)
1x Pully GT2, 6mm 20 teeth (SP17)
2x ball bearing 10x26x8 (SP18)

Step 2:

3D printing parts:
1x spool holder (SD01)
1x Spacer (SD02)
1x spool holder disk (SD03)
1x cover spool holder 1 (SD04)
1x motor holder (SD05)
1x Motor holder cover (SD06)
1x belt tensioner (SD07)
1x Spool adapter (SD08, choose the adapter for the suitable inner diameter of your used spool)
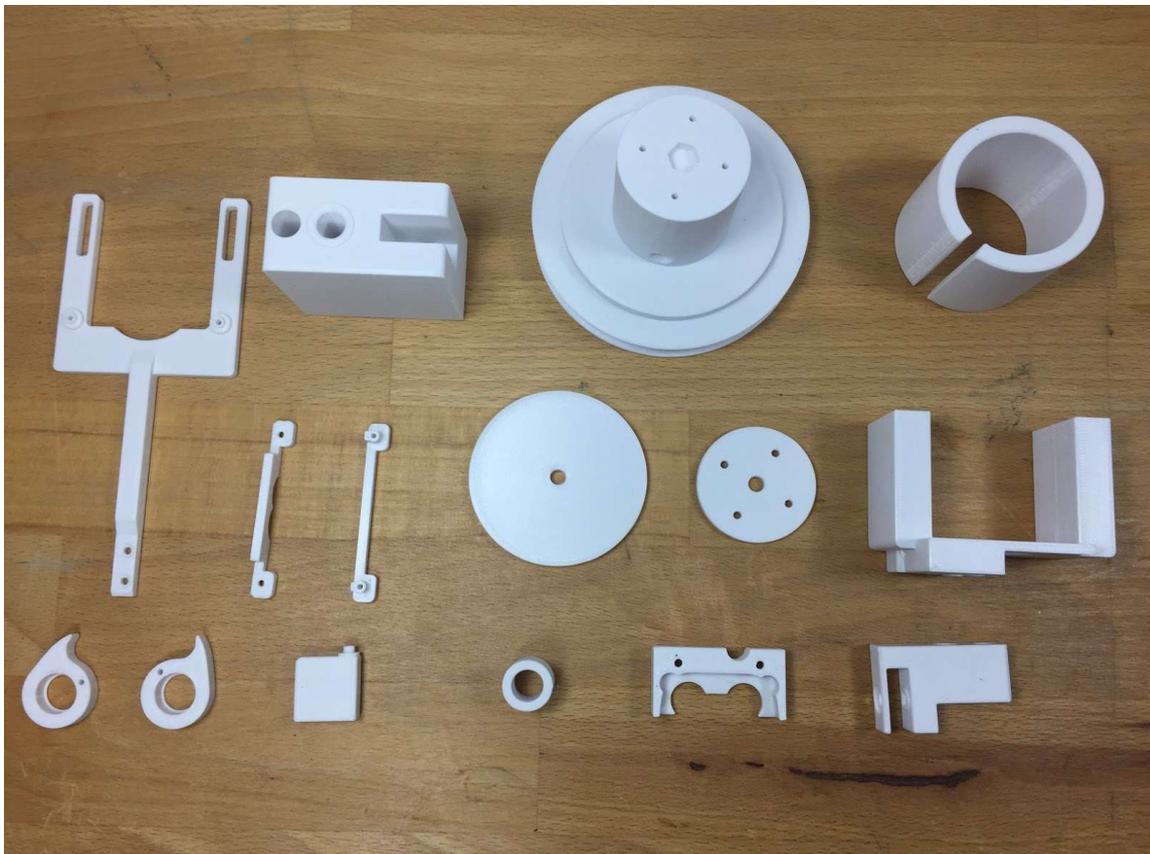1x spool holder cover 2 (SD09)
1x serrated driver (FG01)
1x serrated driver (FG02)
1x swing arm for 0.7 to 1kg bobbins (FG03.1)
1x cross strut 1 (FG04)
1x cross strut 2 (FG05)
1x lifter (FG06)

Step 3:

Tool from package 6: Allen key size 3

Insert two cap screws M4x10 (SC04) into the holes of the spool holder (SD01) and loosely screw a hammer nut (SC10) on each.

Step 4:

Tool from package 6: Allen key size 3

Mount the spool holder (SD01) on the aluminum profile of the main frame. The recess points upwards, see picture. The lower edge of the spool holder has a distance of 229mm to the mounting plate. To do this, insert the hammer nuts into the groove on the left side of the aluminum profile, hold the spool holder straight and tighten the cap screws in the holes. Again, make sure that the hammer nuts twist in the groove when tightening the screws.
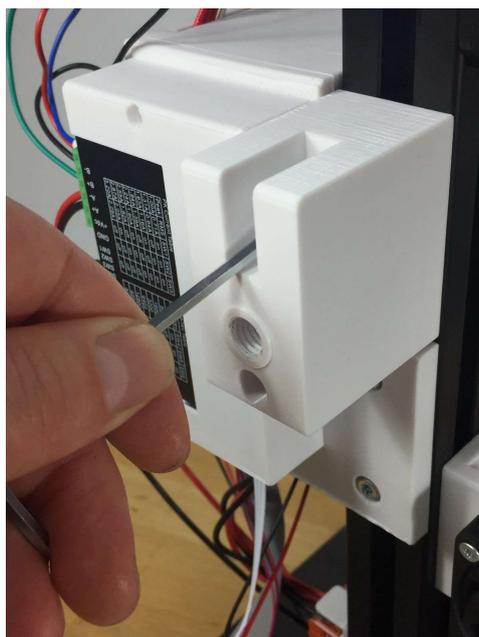
Step 5:

Place the two ball bearings 10x26x8 and the spacer on the hexagon screw M10x50. See picture for sequence.

Step 6:

Tool from package 6: socket wrench size 17 (in the photo the assembly is still shown with a wrench size 17. You can put the nail through the hole in the socket wrench to have more power when turning. Do not overtighten the thread in the pressure part).

Carefully screw the hexagon screw into the thread in the coil holder. If the screw is too difficult to turn, re-tap the thread with an M10 tap if necessary or reprint the coil holder and scale it larger by a small factor in x and y direction.

Step 7:

Tool: if necessary, sandpaper

Place the spool holder disc on the ball bearings as a test. If the print is not dimensionally accurate enough and the spool retainer disc is very difficult to fit, the bore must be reworked. Grind the inner surface of the bore evenly with sandpaper until the bobbin retaining disk can be placed on the ball bearings with slight resistance.
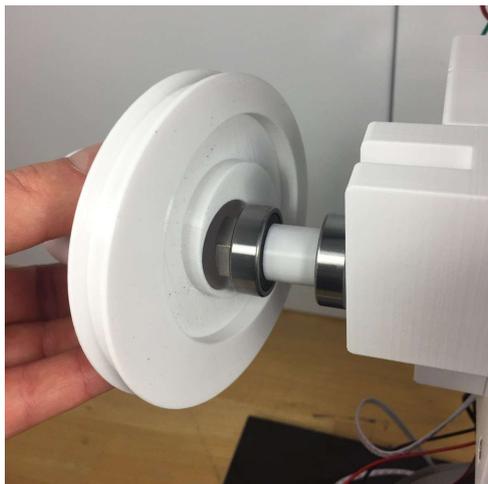
Step 8:

Tool: superglue if necessary

Place the two serrated drivers (FG01+FG02) so that the opening for the ball bearing faces upwards. Now press one ball bearing 4x13x5 (SP14) each into the opening, see picture. If it is very difficult, use light hammer blows or press the ball bearing into the opening with the help of a vice. Be careful not to damage the ball bearing. If the ball bearing fits easily into the opening, you can secure it against slipping with a few drops of superglue.

Step 9:

Remove from package 2:
1x tension spring 3mm (SP23)

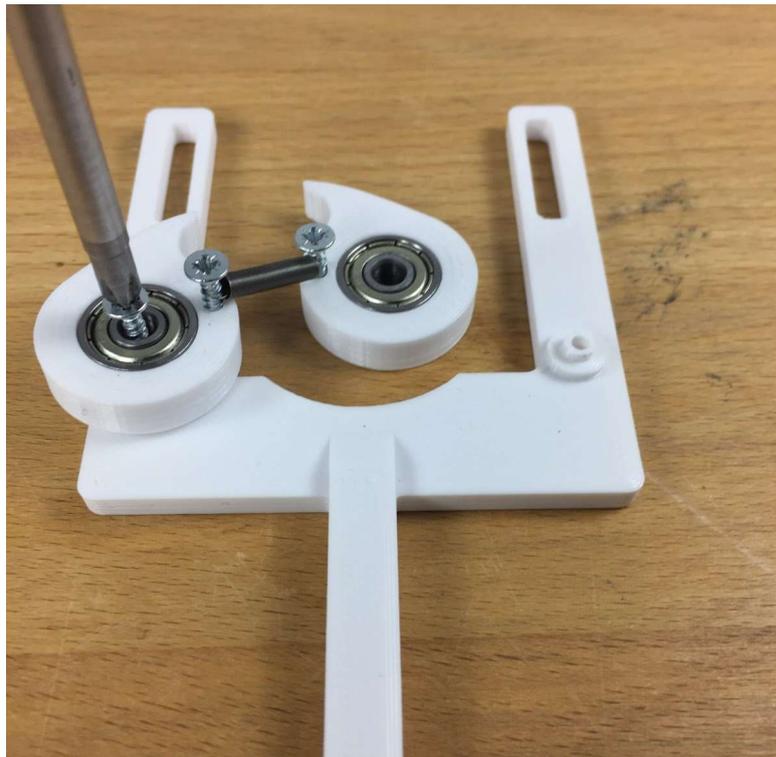# Step 10:

Tool: Phillips screwdriver PH1

Insert two 2.5x12 wood screws through both ends of the tension spring and screw them into the holes provided for this purpose in the serrated drivers. Align everything as shown in the picture.
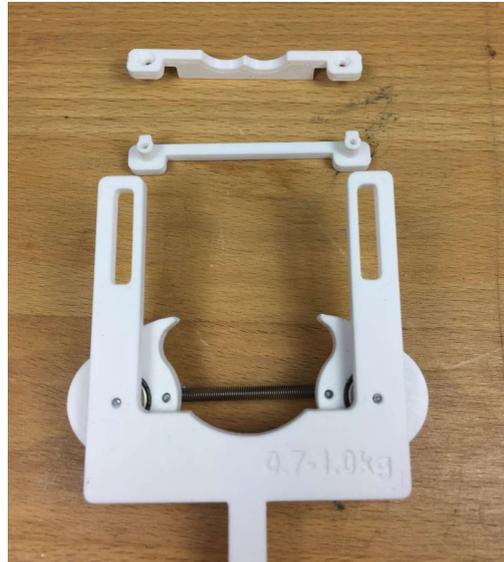
Step 11:

Tool: Phillips screwdriver PH1

Place the serrated drivers on the designated elevations on the swing arm (Use swing arm FG03.1 for bobbins up to 1kg. For spools with larger diameter up to 2.5kg use the swing arm FG03.2). Make sure that the ball bearing is properly inserted and centered on the elevation. Now screw the ball bearings tight with a wood screw 2.5x12 each. The tension spring tightens a little in the process.
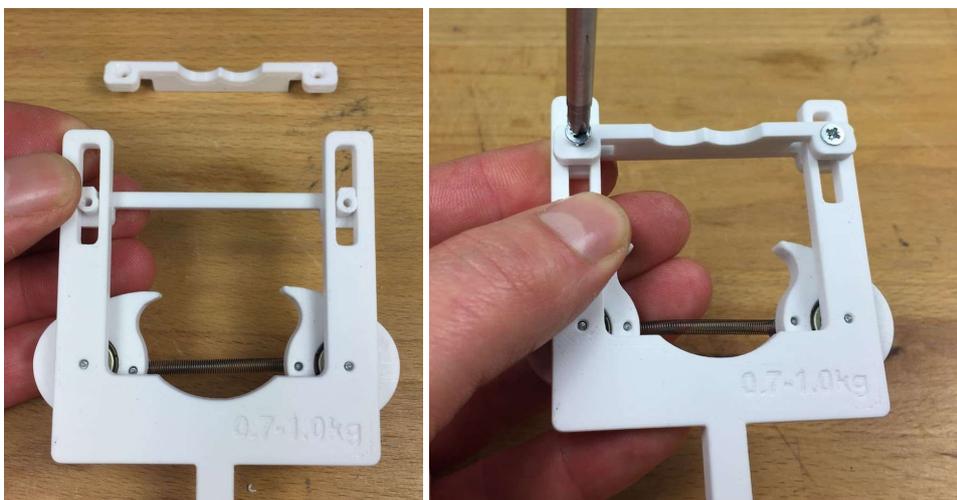
Step 12:

Place cross strut 1 and cross strut 2 over the swing arm and align exactly as shown in the picture.

Step 13:

Tool: Phillips screwdriver PH1

Take cross strut 1 and insert it into the elongated holes of the swing arm, see picture. Then place cross strut 2 on top and screw a wood screw 2.5x12 into each end, see picture. The cross strut should slide back and forth quite easily, as well as twist slightly. If resistance is felt here, remove the cross struts again and grind the contact surfaces between the swing arm and cross strut 1 slightly. Then repeat the process.

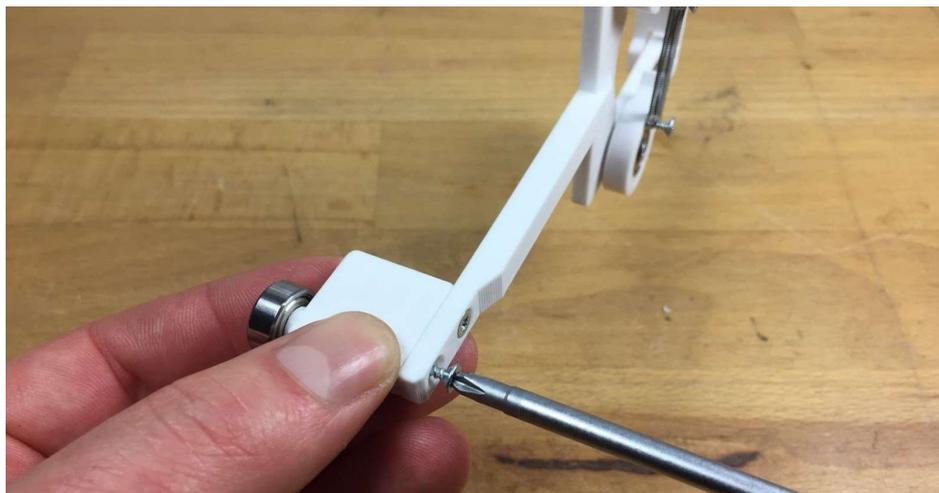# Step 14:

Tool: Phillips screwdriver PH1

The ball bearing 4x13x5 is placed on the jack and screwed tight with the wood screw 2.5x12. Make sure that the ball bearing is centered on the elevation provided.

Step 15:

Tool: Phillips screwdriver PH1

The jack is screwed to the swing arm with two wood screws 2.5x12. Pay attention to the correct alignment see picture.

Step 16:

Check again that all parts on the swingarm are correctly aligned. See picture.

Step 17:

Place the swing arm in the recess provided in the already mounted bobbin holder. See picture.

Step 18:

Tool: Phillips screwdriver PH1

The bobbin retainer washer is placed on the ball bearings. The small ball bearing of the swing arm must hit the oval guide. Slide the bobbin retainer washer up to the stop. Screw a 2.5x12 wood screw into the hole in the side of the bobbin holder disc. This secures the disk and prevents it from moving. Check whether the disk turns smoothly. If it hooks or grinds somewhere, you can rework the spring parts until everything runs well.

Step 19:

Tool: Phillips screwdriver PH1

Insert the head of the M5x70 hexagon head screw into the opening provided and place the cover spool holder 1 on top. Align the lid so that you can screw in the four wood screws 2.5x12.
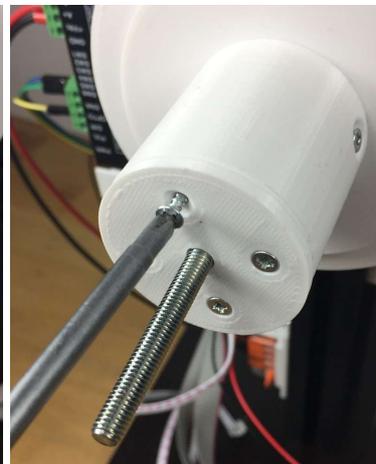
Step 20:

Tool: Allen key 3mm

The Nema 17 stepper motor is placed on the motor holder. Alignment See picture. The connection for the cable on the motor points upwards. Screw down the motor with 4x cylinder screw M3x6.
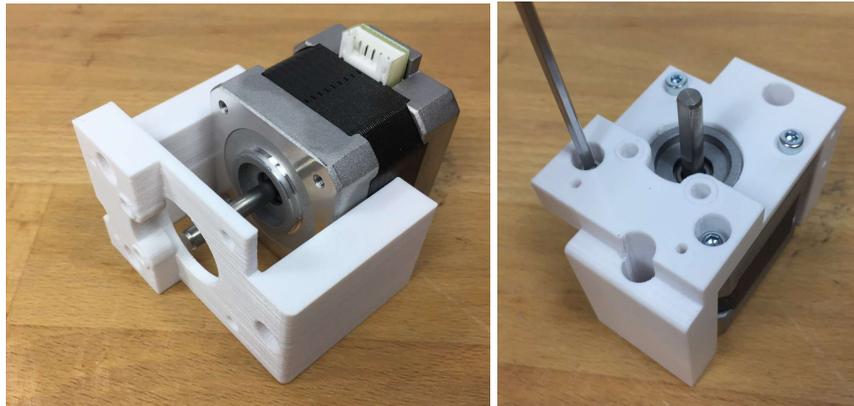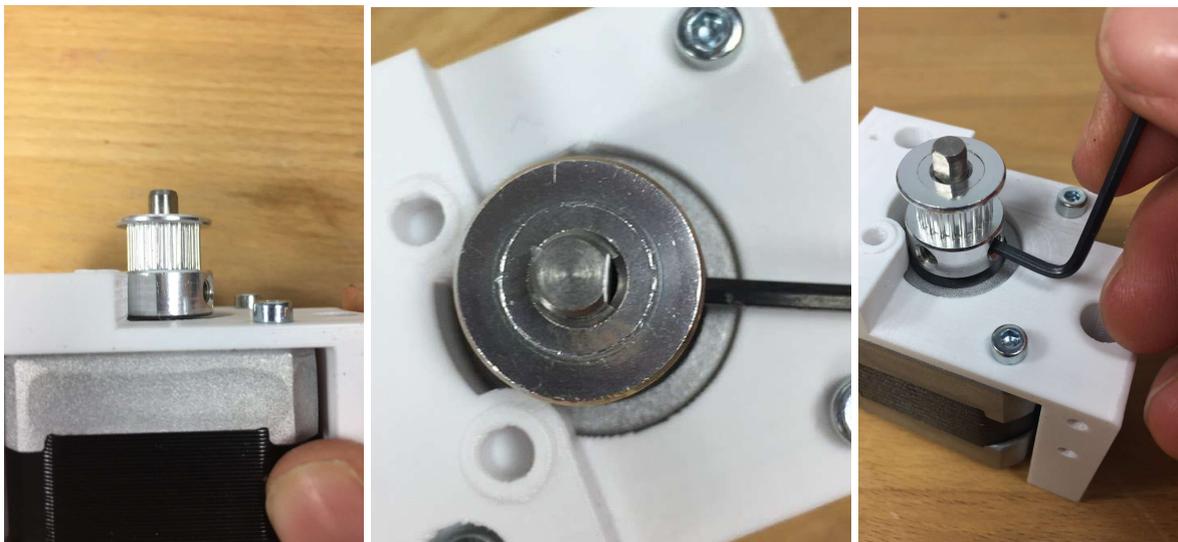

Step 21:

Tool from package 6: Allen key size 2
Tools: Phillips screwdriver PH1

The pully (GT2, 6mm 20 teeth) is put on the motor shaft. Alignment see picture. Align the grub screws in the pully so that one screw meets the flat surface on the motor shaft. Tighten both grub screws. (do not overtighten)

Step 22:

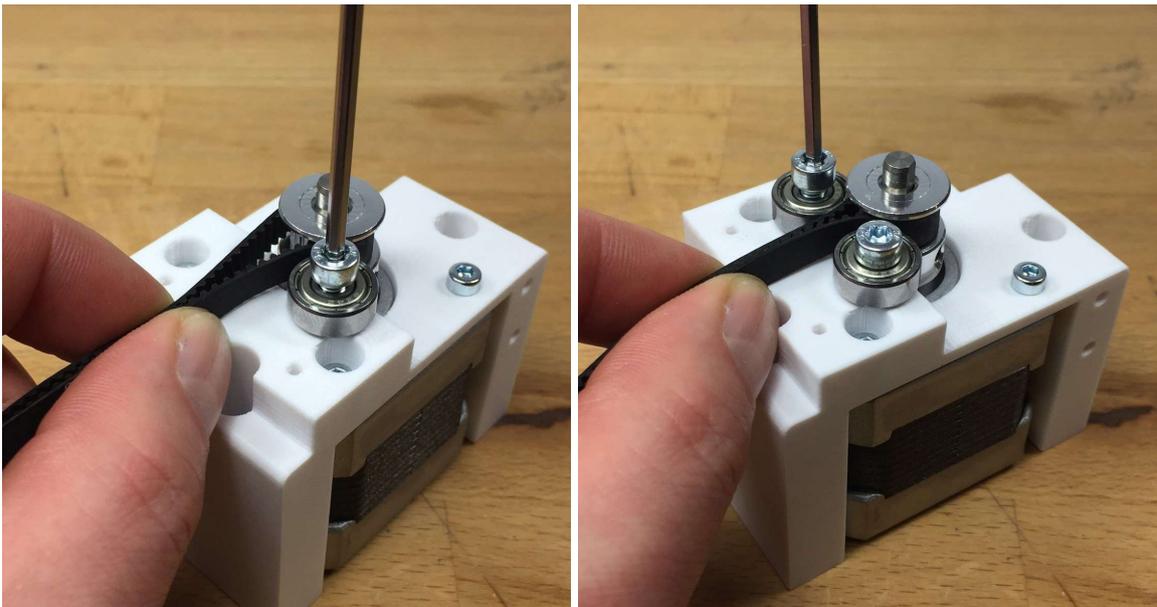Place the toothed belt around the pully. See picture.

Step 23:

Tool from package 6: Allen key size 3
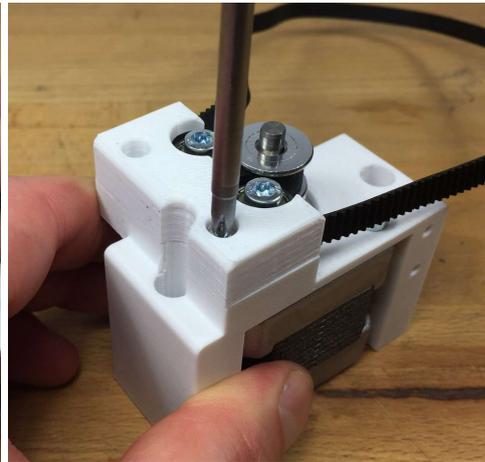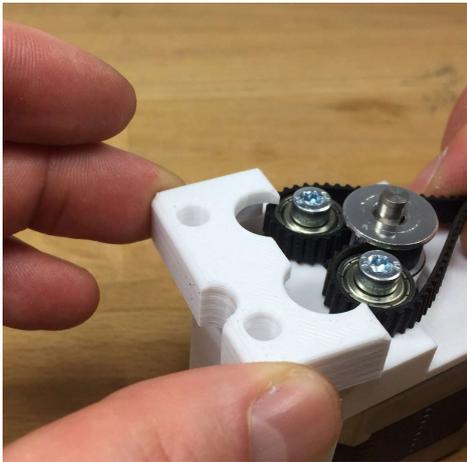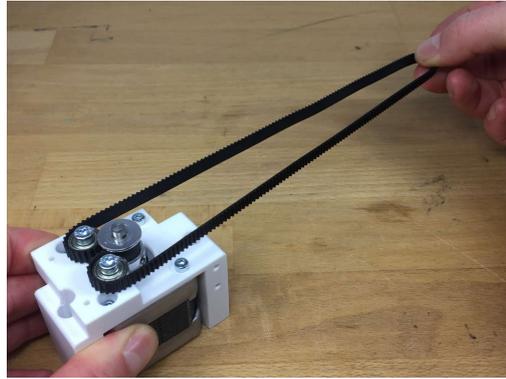Tool: Phillips screwdriver PH1

Two ball bearings 4x13x5 are screwed into the hole provided for this purpose, each with a socket head screw M4x10.

Step 24:

Tool: Phillips screwdriver PH1
Twist the toothed belt so that the teeth point outwards. Then fasten the motor holder cover with two wood screws 2.5x12.

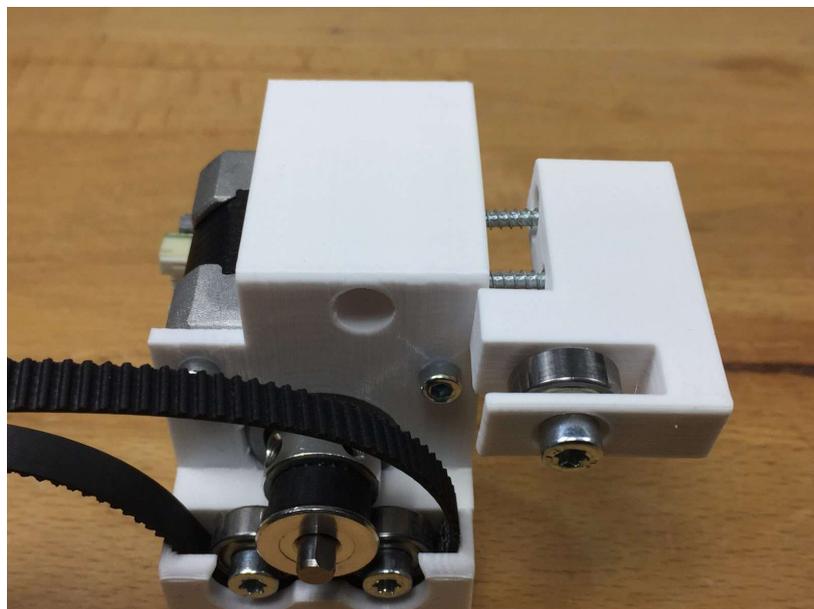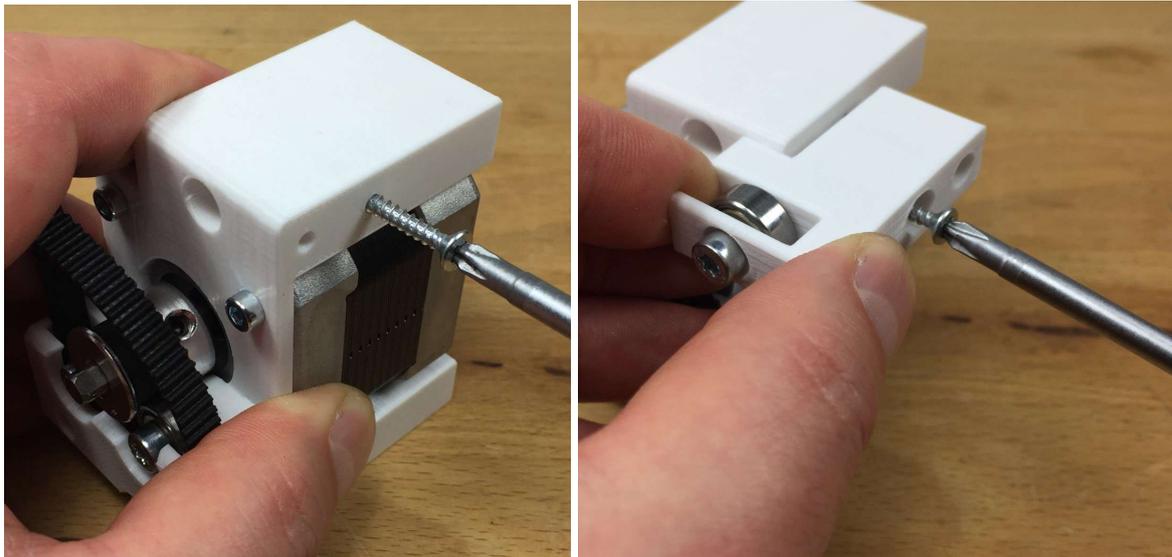# Step 25:

Tool from package 6: Allen key size 3
A ball bearing 4x13x5 is inserted into the belt tensioner and fastened with a socket head screw M4x10.
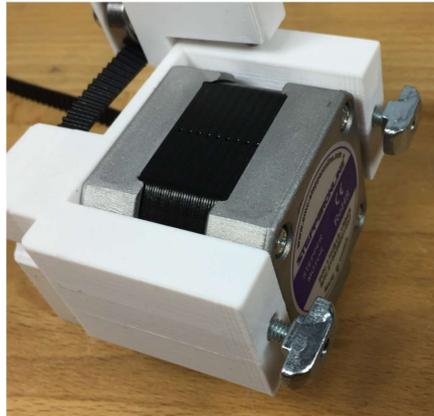
Step 26:

Tool: Phillips screwdriver PH1

A 3x25 wood screw is screwed into the right hole in the motor holder. Only a few turns, do not screw it all the way in. Then the belt tensioner is placed on the screw. A second 3x25 wood screw is screwed through the left hole. Also this only a few turns.
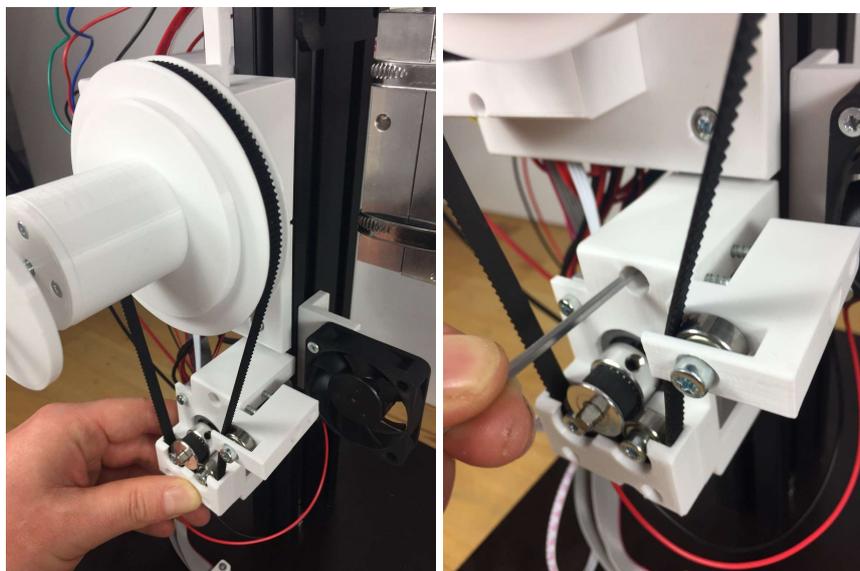
Step 27:

Tool from package 6: Allen key size 3

Two cap screws M4x10 are inserted into the hole provided for this purpose in the motor mount and two hammer nuts are screwed onto them.


Step 28:

Tool from package 6: Allen key size 3

The toothed belt is placed on the spool holder pulley and the motor holder is attached to the aluminum profile of the main frame. Alignment see picture. The cap screws are tightened. Again, make sure that the hammer nuts inside the groove are twisted when tightening. The motor mount should be fastened so that the timing belt has only very slight tension. However, the belt should not sag either. The two wood screws on the belt tensioner should be unscrewed so that the belt tensioner does not yet exert any force on the belt. The left screw adjusts the tension and the right screw straightens the belt tensioner.

Step 29:

Place the bobbin adapter (SD08) on the bobbin holder disk. Print the bobbin adapter in the size of the inner diameter of the bobbin you are using.
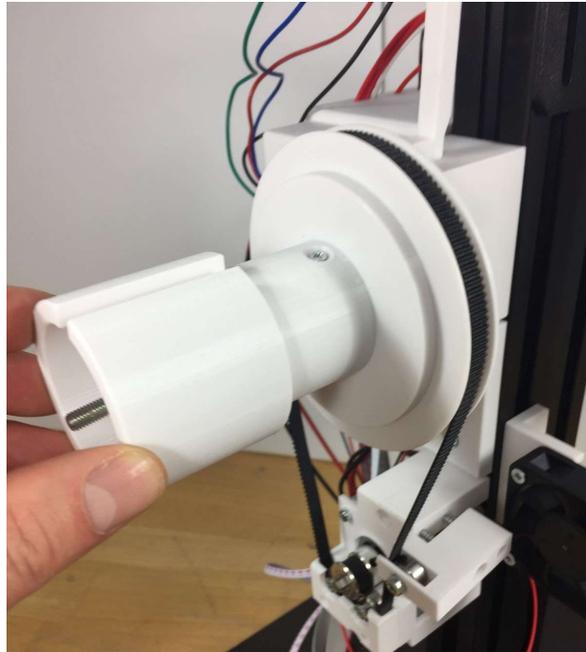

Step 30:

Tool: Phillips screwdriver PH1

The cover spool holder 2 (SD09) is put on the hexagon screw M5x70 and the wing nut is loosely screwed on it. The spool can be clamped onto the holder before commissioning. To do this, loosen the wing nut again and remove the cover. If you only use a small spool, you can also shorten the screw, then the unscrewing of the wing nut does not take so long.
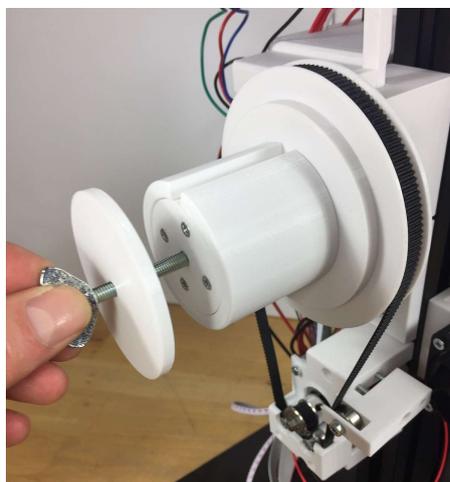
Step 31:

The stepper motor cable, which is led down out of the Arduino housing, is connected to the stepper motor. The connector is coded, pay attention to the correct orientation.
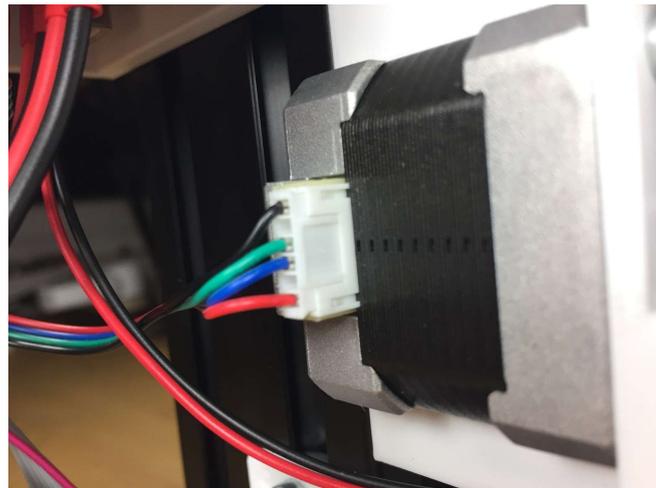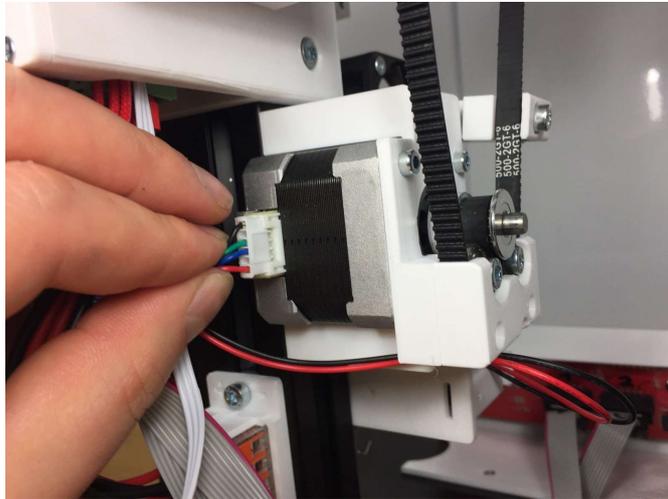
Done:

Now continue with assembly instructions "06-Filament guide assembly".