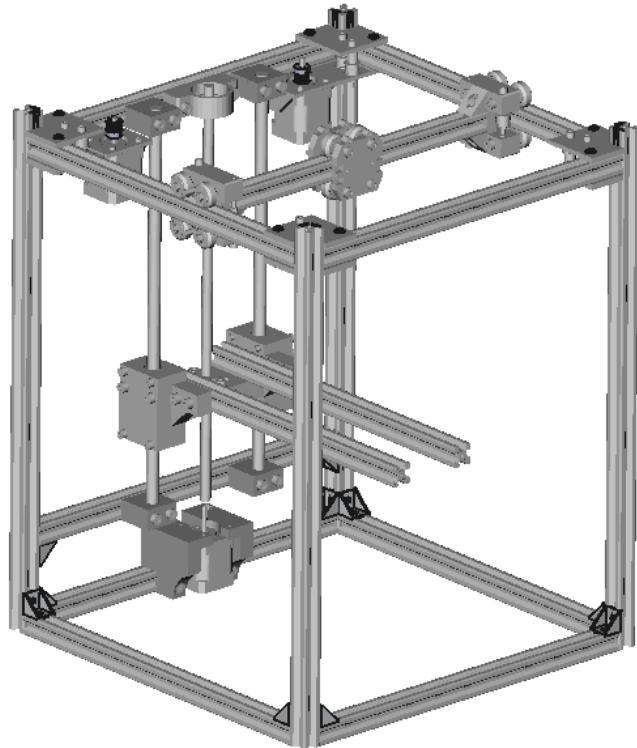

V-Slot CoreXY 3D Printer

Assembly Instructions

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1 Introduction

This project is a Work In Progress, hence this document will only provide a rough assembly guide due to various changes over time. This is a 3D printer which uses the CoreXY belt layout and uses V-Slot Wheels for the X and Y axis and linear bearings for the Z axis.

Follow this link to view a 3D model of the printer which may assist in the assembly process:

<https://github.com/sdavi/VSlot-CoreXY/blob/master/Assembly/Complete.stl>

For information on selecting stepper motors: http://reprap.org/wiki/Stepper_motor - I use 1.8Deg 48N.cm Holding Torque NEMA17 motors.

2 Frame Assembly

Note

Read through document first to determine where t-nuts need to be inserted into the extrusions before finishing frame, otherwise you will need to dismantle parts to insert t-nuts later.

Note

All t-nuts in this document have M5 Thread.

Parts Needed:

- 4x 500mm V-Slot Aluminium Extrusions
- 9x 360mm V-Slot Aluminium Extrusions
- 8x Inside hidden Bracket
- 10x 90 Degree Angle Corner Connector
- 20x M5x8mm Low Profile Screws
- 20x T-Nuts

Assemble as shown in Figure 1.

3 Z-Axis Assembly

3.1 Z_nut Holder

Parts Needed:



Figure 1: Assembled frame

- z_nut_holder.stl (Printed Part)
- 2x 360mm V-Slot Extrusions
- 1x 10X2 flanged trapezoidal bronze nut
- 4x t-nut
- 10 M5 Washers
- 16x M5 Nut
- 10x M5x25 Screw

Assemble as shown in Figure 2.

3.2 Z-Carriage Assembly

Parts Needed:

- 2x LM12LUU Linear Bearings
- 8x M4x40 Screws
- 8x M4 Nuts
- 16x M4 Washers
- 4x M5x40 Screws
- 4x M5x25 Screws
- 20 x M5 Washers
- 8x t-nuts
- 2x z_carriage_outer.stl (Printed Part)
- 1x z_carriage_inner(mirror).stl (Printed Part)

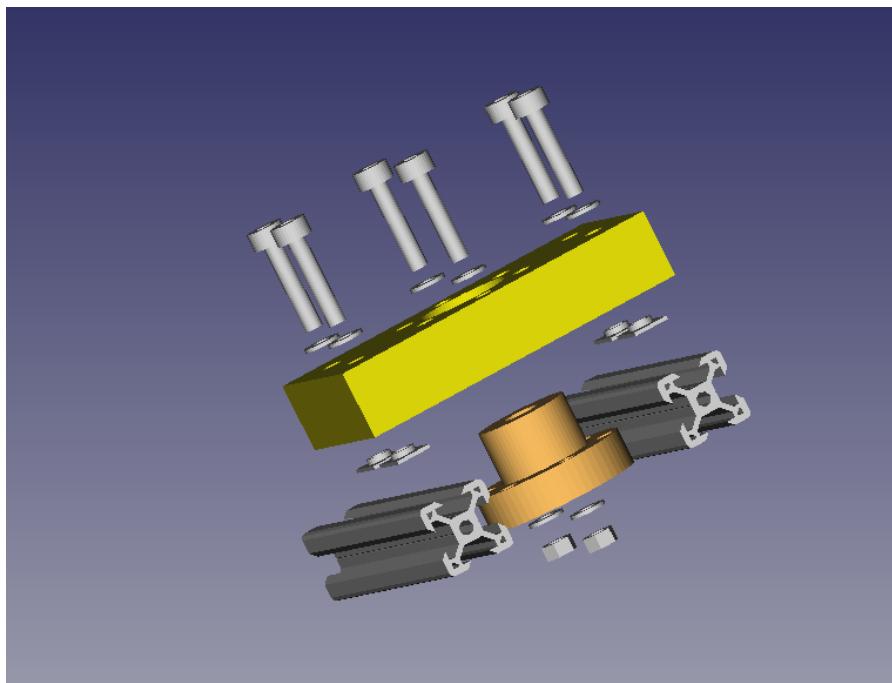


Figure 2: Exploded view of z nut

- 1x z_carriage_inner.stl (Printed Part)

Assemble as shown in Figures 3 and 4. Attach the z_carriage ends to the v_slot extrusions on the z-nut assembly. Pad out the gap on the M5x25 screws with approx. 4 washers for a tight fit.

3.3 Z Axis

Parts Needed:

- 2x 12mm 400mm Smooth Rod
- 4x Double t-nut
- 6x T-Nut
- 1x 5mmx10mm coupler
- 1x 6300Z bearing
- 8x M5x40mm (for rod mounts)
- 1x NEMA 17 Stepper Motor
- 400mm TR10x2 Trapezoidal leadscrew (10mm diameter with 2mm pitch)
- 3x M5x25 Screws (for Bearing Mount)
- 2x M5x40mm Screws (for z-motor mount)
- 2x M5x30mm Screws (for z-motor mount)

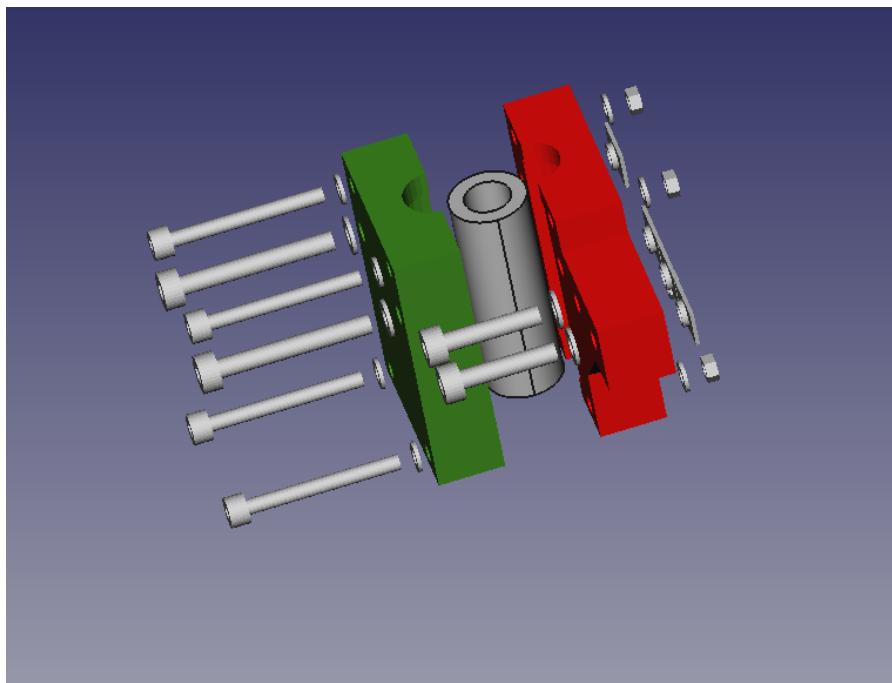


Figure 3: Exploded view of z carriage

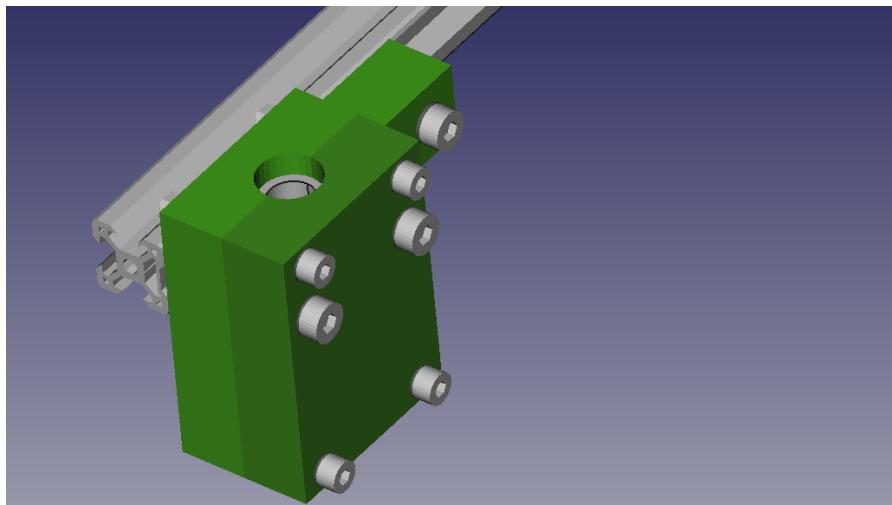


Figure 4: Assembled view of z carriage

- 4x M3x15mm Screws (to attach Nema Motor)
- 1x z_motor_mount.stl (Printed Parts)
- 1x z_rod_clamps.stl (Printed Parts)
- 1x z_bearing_mount.stl (Printed Parts)

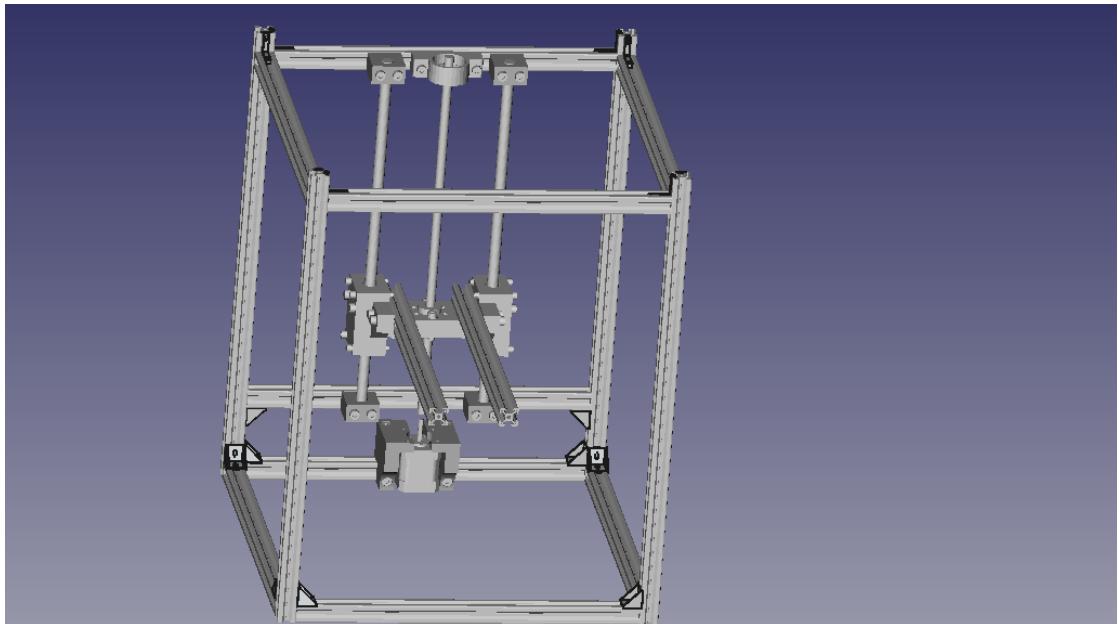


Figure 5: Assembled view of z axis

1. Assemble z_motor_mount printed parts to NEMA17 Stepper motor using M3 screws.
2. Insert the Coupler to the NEMA17 and tighten
3. Screw the z_motor_mount onto the frame
4. Insert Smooth Rods into the single piece rod_clamps (these should be a tight fit)
5. Mount the bottom rod clamps to the frame but do not tighten the screws just yet - leave them slightly loose
6. Slide the z-carriage onto the Smooth Rods and tighten the bottom z-clamps
7. Mount the 2-piece rod_clamps to the top of the frame and tighten screws
8. Ensure the z-carriage can move freely up and down without binding
9. Thread the leadscrew though the z-nut down to the coupler. Ensure the z-motor-mount is lined up with the leadscrew.
10. Insert leadscrew into coupler and tighten.

3.4 Heated Bed

Parts Needed:

- 1x PCB Heatbed 214x214mm
- 1x 3mm Aluminium sheet 225x225mm

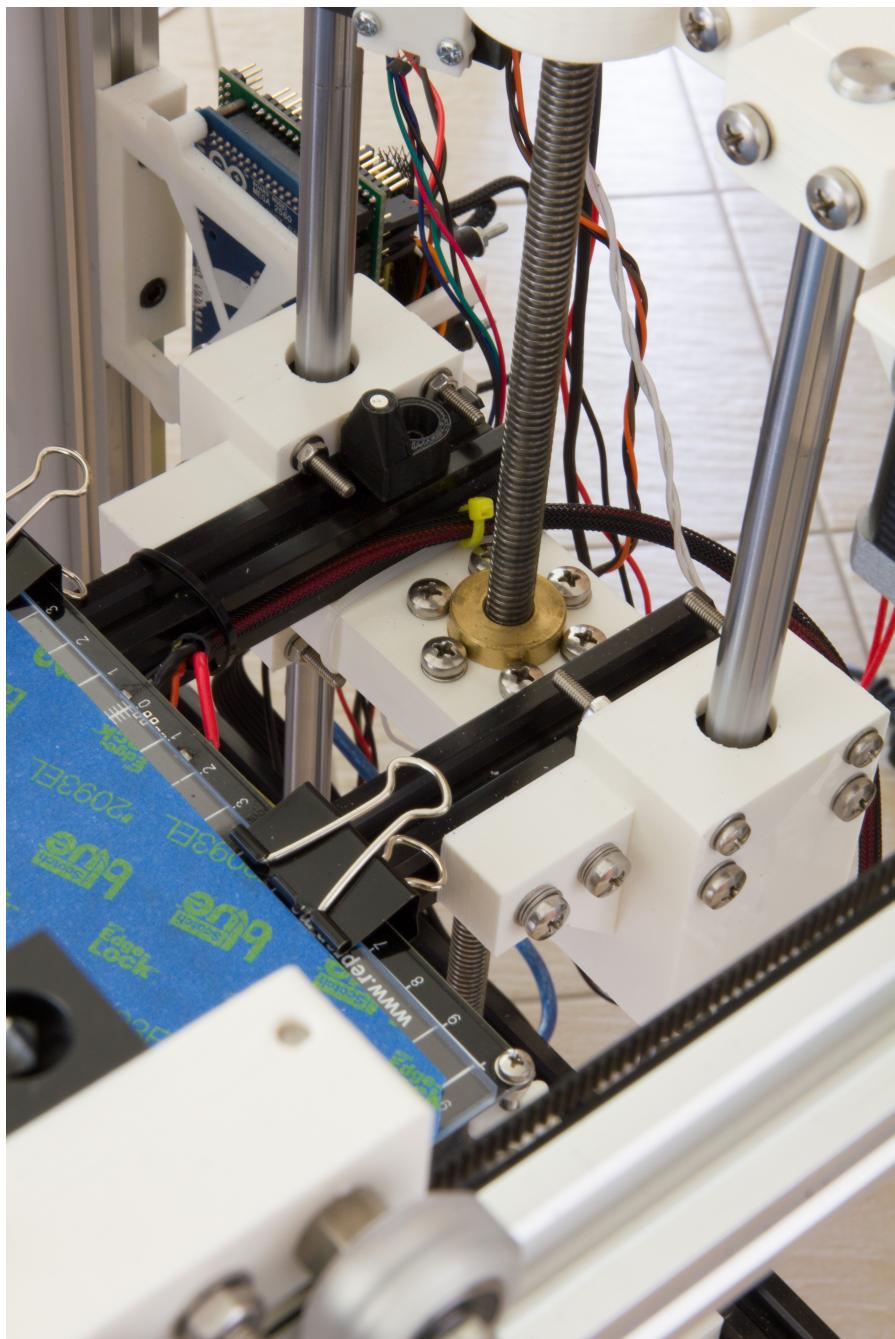


Figure 6: Assembled view of z-axis

- 8x T-Nuts
- 8x M5x8mm Low Profile Screws
- Nyloc Nuts

- M3 Screws
 - M3 Washers
 - Thumb Wheels (optional) - (many available on Thingiverse)
 - M3 Wingnut (or plain nut)
1. Drill holes using a 5mm drill bit to attach the aluminium to the v-slot arms using the M5 screws and T-nuts. 2-4 Screws per arm should be sufficient.
 2. Align the heatbed PCB on the aluminium plate and mark the holes and drill with 3mm drill bit
 3. Screw the aluminium plate to the V-slot arms using the T-nuts and the M5x8mm screws.
 4. Assemble as follows: Screw-Washer-Heatbed-Washer-Nyloc Nut-Gap-Nyloc Nut(in thumbwheel)-aluminium plate-M3 Wing nut. I prefer not to use springs and adjust the height with the thumbwheels and then tighten the wing nut. See Figure 7

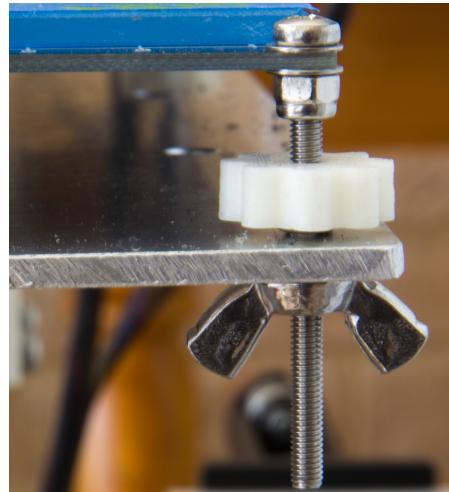


Figure 7: Heated bed leveling

4 X and Y Axis Assembly

The belt layout diagram is shown in Figure 8. H indicates bearings are on the top and spacer is at the bottom, and L indicates the bearings are at the bottom and spacer is on the top.

4.1 XY Block

Parts Needed:

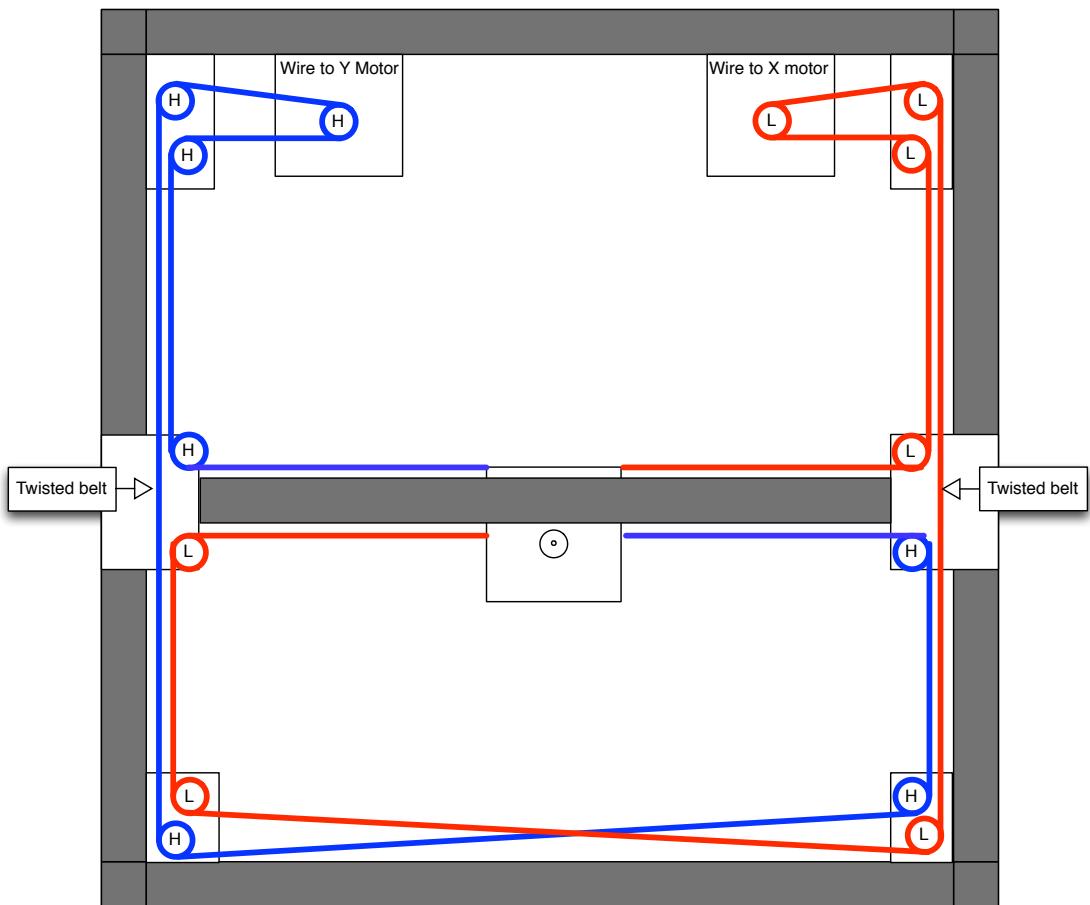


Figure 8: Belt layout configuration

- 2x xy_block.stl (Printed Parts)
- 4x Eccentric Spacer
- 1x 310mm V-Slot Extrusion
- 8x F624ZZ flanged bearings
- 12x M4 Washers
- 4x M4x60mm Screws (for XY block idler bearings)
- 4x M4 Nuts
- 4x T-nuts
- 4x M5 Nuts
- 4x M5x8 low profile screws
- 3x Corner Bracket Connectors (or cube connector)
- 1x Corner Bracket + integrated endstop holder (printed part - part of endstop_holder.stl)
- 8x Solid V-Slot Wheel Kit (each kit includes wheel, precision shim, bearings,

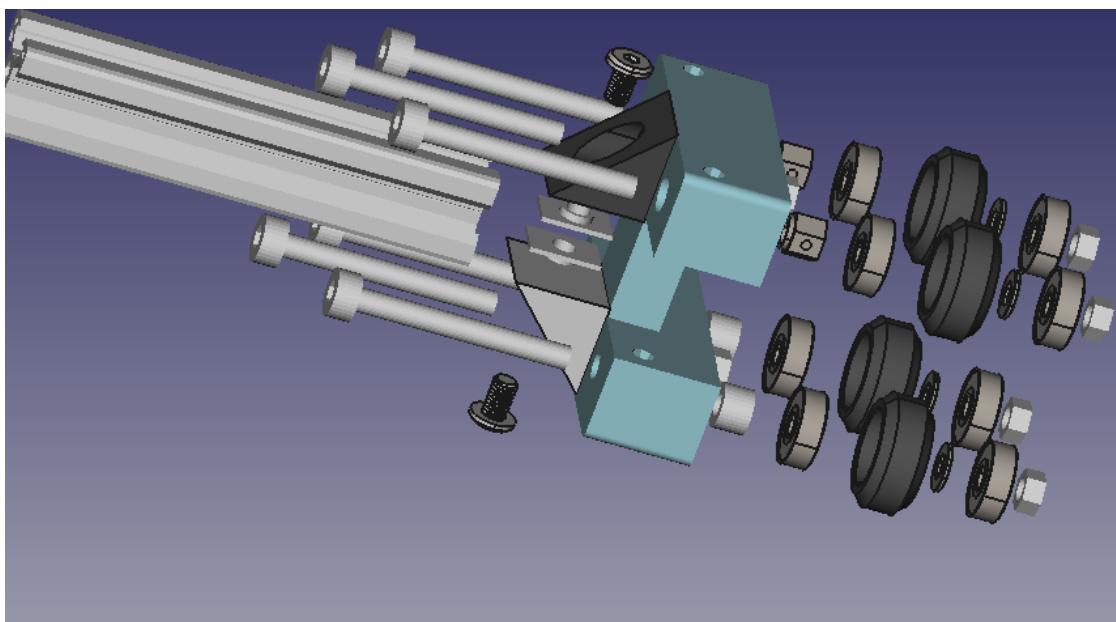


Figure 9: Exploded view of xy block

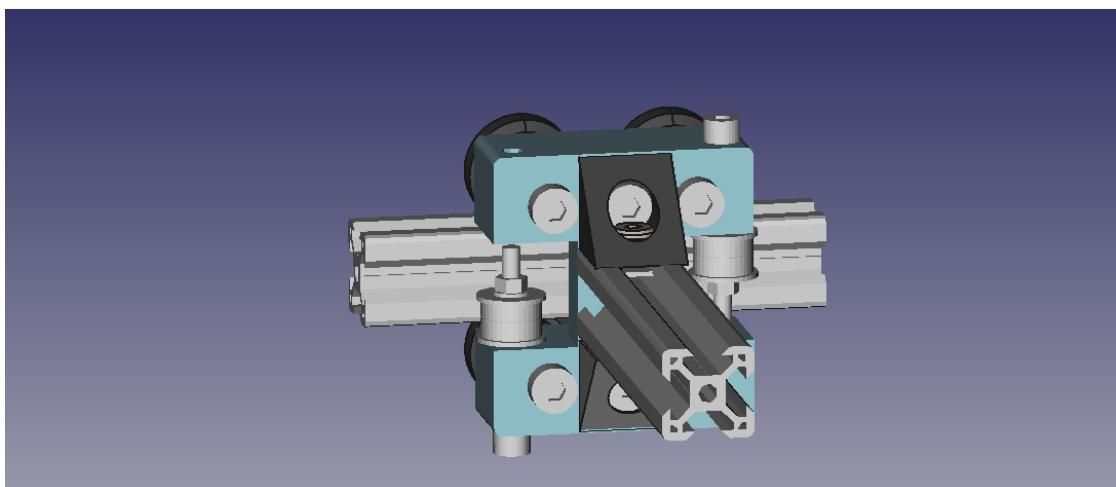


Figure 10: Assembled view of xy block

aluminium spacer,M5 nyloc nut, and M5 Screw(unused))

- 12x M5x45mm Screws
1. Assemble Wheels. Do not forget the precision shim which goes between the bearings (see <http://openlab.com.au/shop/solid-v-wheel-kit/> for a video on how to assemble if unsure)
 2. Attach the Wheels to the XY_block printed part using the 45mm M5 Screw.

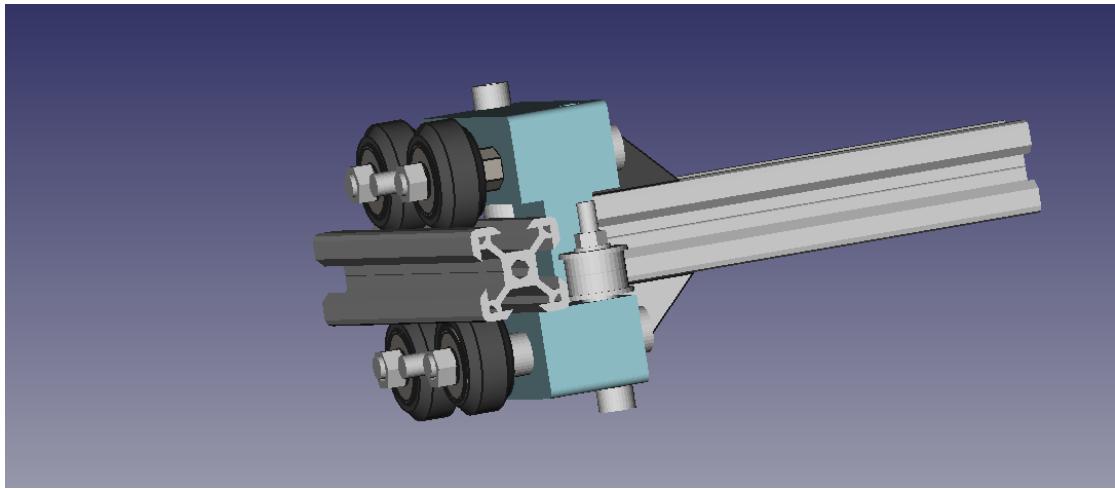


Figure 11: Assembled view of xy block

The top holes are slightly larger to hold the eccentric spacer. The bottoms ones use the aluminium spacer (which is included in the solid wheel kit). Attach the M5 nyloc nut on the end.

3. Assemble the bearings with the flanged part on the outsides and a M4 washer on the outer edges of the bearings. I.e. washer-bearing-bearing-washer. Follow the belt layout diagram to ensure bearings are positioned at top or bottom. Secure with M4 screw and nut.
4. Attach the corner connector to the top and bottom and attach to the v-slot via the t-nut
5. Starting with the Eccentric Spacers notch facing up and then adjust the wheels by turning the eccentric spacers with a spanner until the wheels are fitting properly in the V-Slots. Ensure the Y-axis moves back and forth freely.

4.2 Idler Ends and Motor Ends

Parts Needed:

- 2x NEMA17 Stepper Motors
- 2x 20 Tooth GT2 Pulleys
- 2x y_idler_ends.stl (Printed Parts)
- 2x y_idler_ends_mirror.stl (Printed Parts)
- 1x y_motor_end.stl (Printed Parts)
- 8x belt_bearing_spacer.stl (Printed Parts)
- 16x F624ZZ flanged bearings

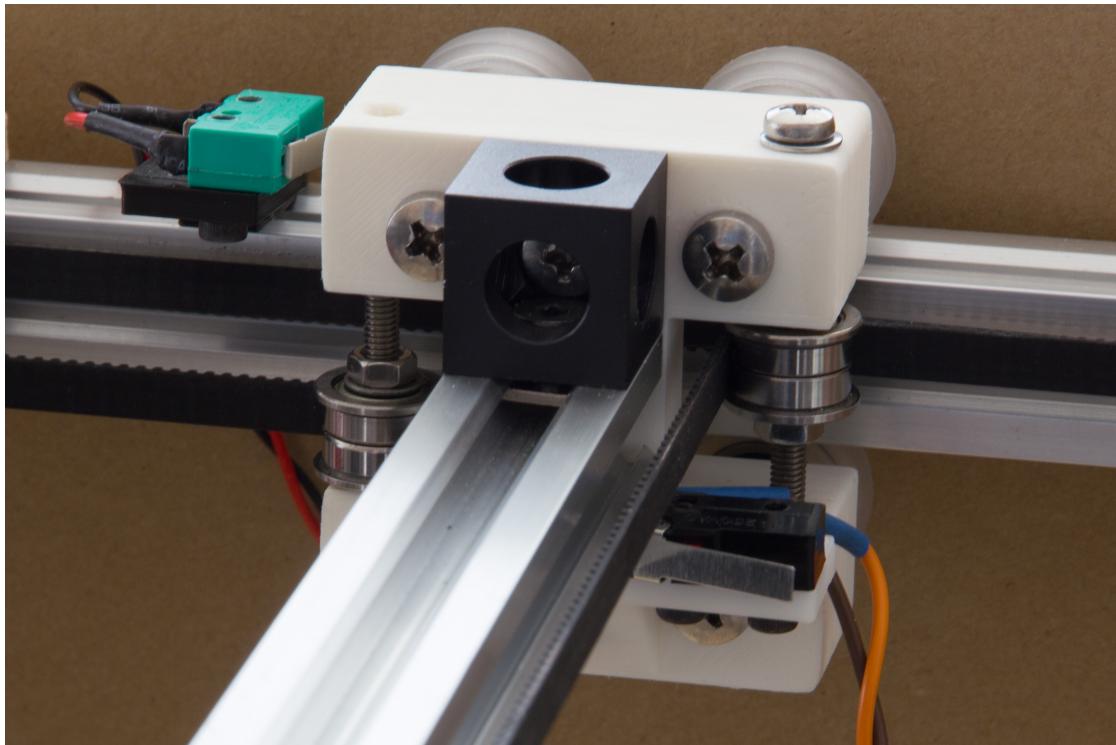


Figure 12: Assembled view of xy block

- 8x M4x40 Screws (can be longer)
- 4x M5x30mm screws
- 32x M4 Washer
- 8x M4 Nut
- 24x M5x8mm Low Profile Screw
- 24 T-Nuts
- 8x M3x10

1. Make sure the Idler Ends printed parts are in the correct corners.
2. Follow the Belt Layout Diagram to ensure the bearings are correctly positioned. There is M4 washers on outer ends of bearings, i.e. washer-bearing-bearing-washer with spacer on top or bottom as required.
3. Assemble the y_motor_ends with the NEMA17 steppers using the 4 M3 screws and attach the motor ends to the frame using the M5x30 screws
4. Align the heights of the GT2 Pulleys with the bearings and tighten the setscrew on the pulleys.

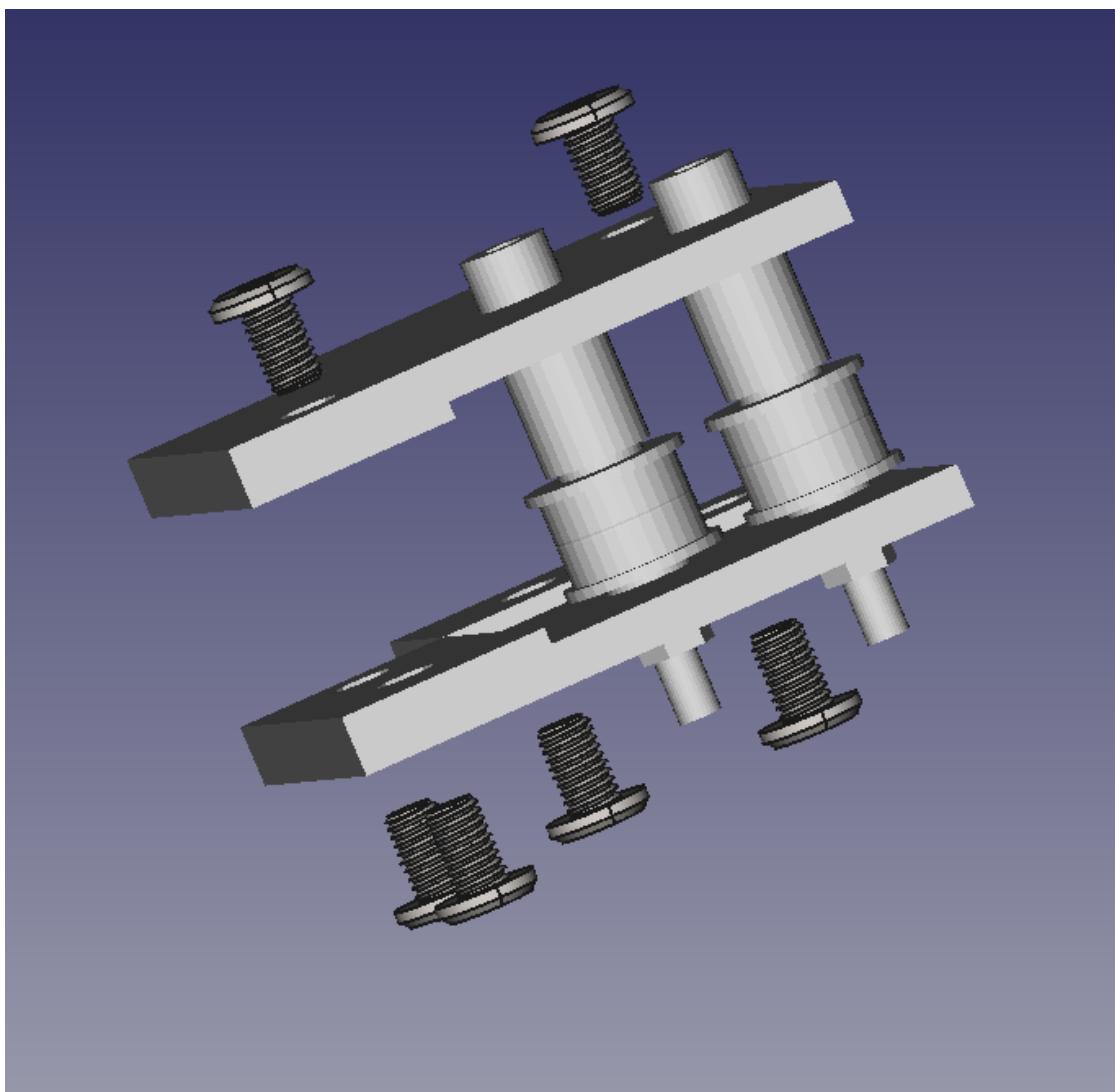


Figure 13: Partially assembled view of the rear right Idler End

4.3 X-carriage

Parts Needed:

- 4x Eccentric spacer
- 8x Solid V-Slot Wheel Kit (includes wheel, precision shim, bearings, aluminium spacer, M5 nyloc nut, and M5 screw (unused))
- 4x M5x45mm screws
- 2x M3 nut (to mount hot-end)
- 1x x-carriage.stl

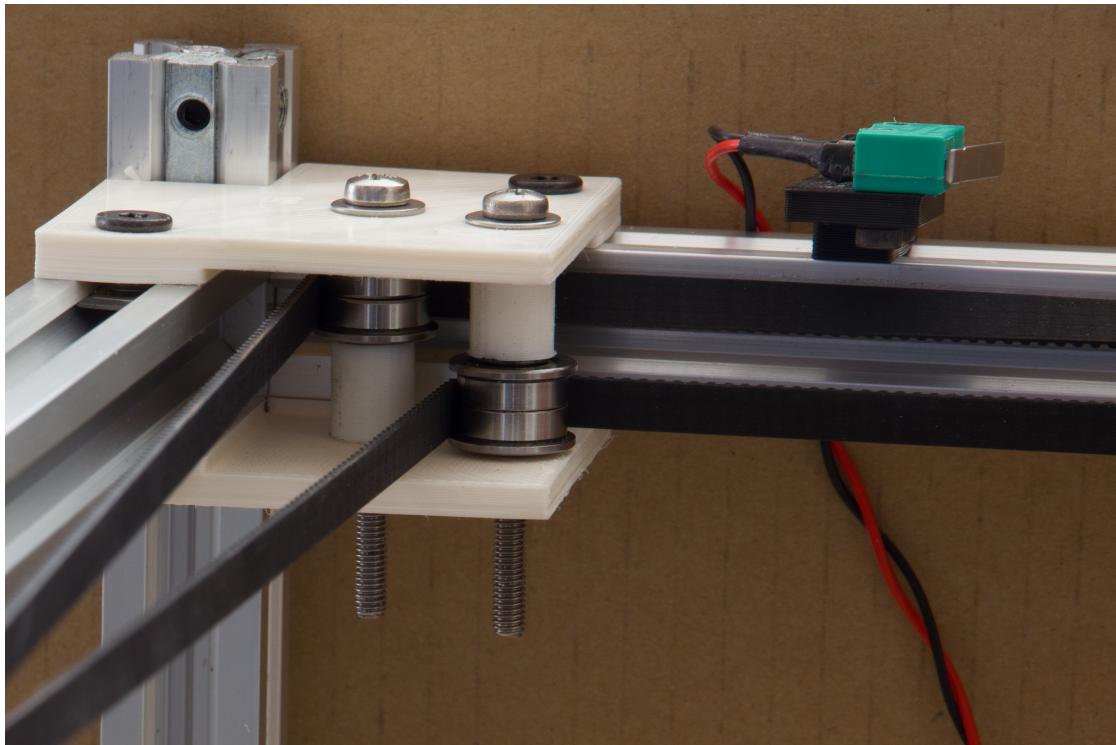


Figure 14: Assembled view of front left Idler End

Note

Default hotend mounting uses 30mm spacing, other sizes edit the source code for desired mounting spacings

1. Assemble the V-Wheels as before.
2. The top wheels will have an eccentric spacer on each side of the wheel, and the bottom wheels will have a aluminium spacer on each side of the wheel. See Figure 15.
3. Attach the wheels and spacers/eccentric spacers with the M5 screws and tighten the M5 nyloc to the back piece
4. Glue in the M3 nuts on the back of the front x-carriage part (where the hotend will attach) so the don't fall out when removing the hotend. I used JB Weld for this.
5. Use the notches on the eccentric spacers and make sure the front spacers line up with the back spacers for the v-slot wheel on the x-carriage. This will ensure the front and back are sitting correctly. See Figure 18.

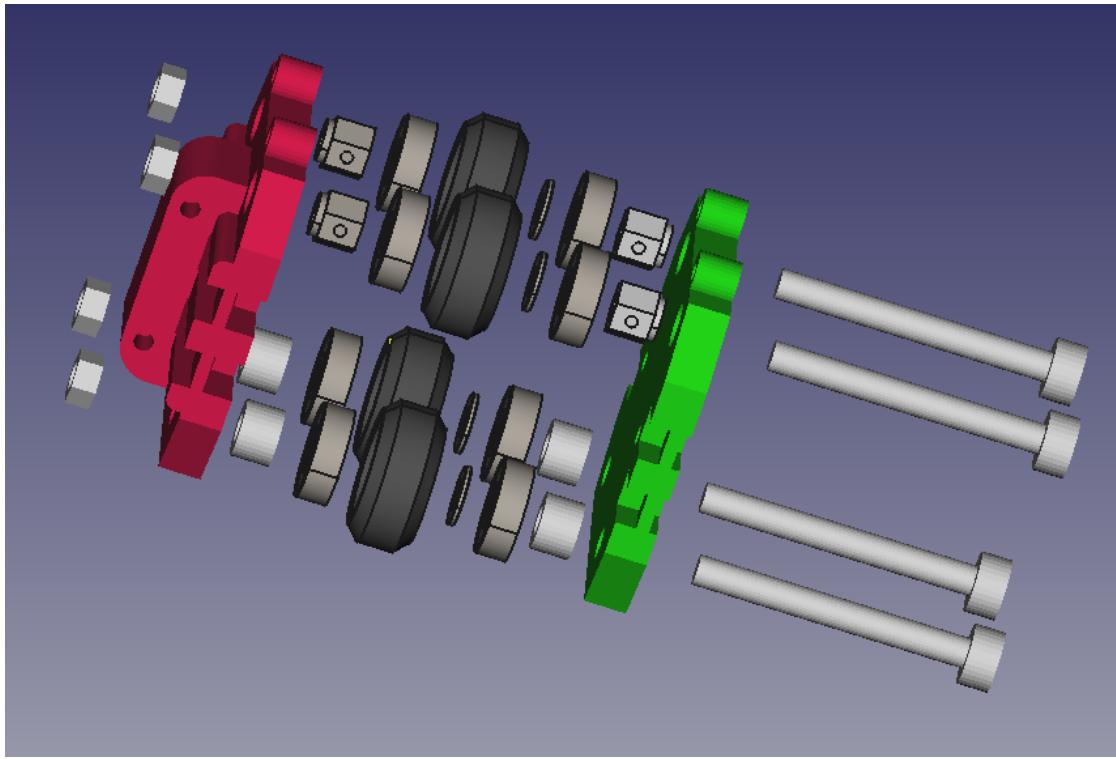


Figure 15: Exploded view of x-carriage

4.4 Belt Installation

Parts Needed:

- Approx. 3-4m GT2 Belt
- Small Zipties
- 1x x_carriage_tensioners.stl (Printed Parts)
- 4x M3x25mm Screws (for tensioner)
- 4x M3 nut (for tensioner)

1. Cut the GT2 belt into approx. 2 2m lengths.
2. Begin by attaching the belt to the front of the x-carriage. Feed belt from the front towards the x-axis v-slot and bend around and put on a zip tie to hold the belt in place. Make sure the teeth of the belt are locking with each other.
3. Feed the belt around the bearings following the Belt Layout Diagram. Run a twist in the belts on the y-axis which is closest to the v-slot so the back of the belt runs on the front idlers as indicated in Figure 8 and shown in Figure 21.

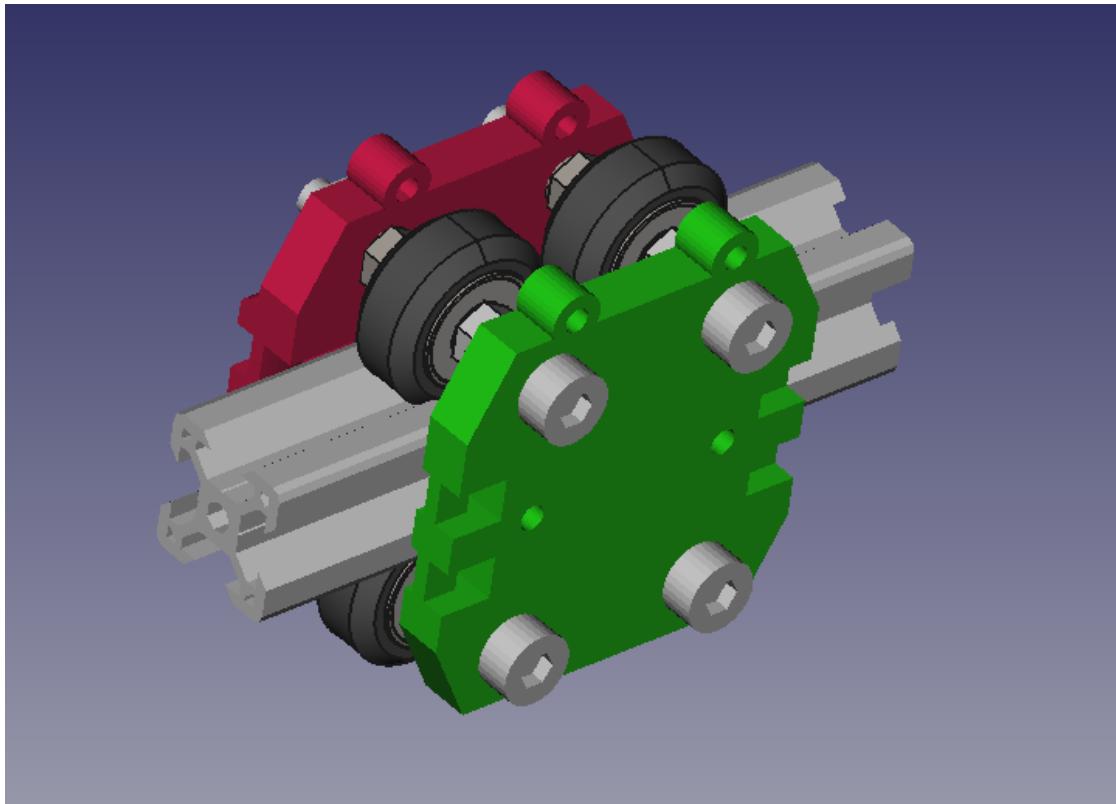


Figure 16: Assembled view of x-carriage

4. On the back of the X-Carriage, feed the belt in closest to the v-slot, push through under the middle part on the back and out the other side.
5. Attach the M3 nuts into the tensioners and screw the M3 screws through so they are just past the nut.
6. Feed the belt through the back of the tensioner, pull the belt tight so the tensioner is against the middle part of the x-carriage back, then pull the belt around and push down into the clamp.
7. Turn each of the 2 screws a few turns at a time until properly tensioned.
8. It is important that both the belts be the same tension. By plucking the belts (like a guitar string) at the front where they cross over and tension so they both sound the same and have adequate tension.

5 Hotend Installation

Parts Needed:

- 2x M3x35mm Screws

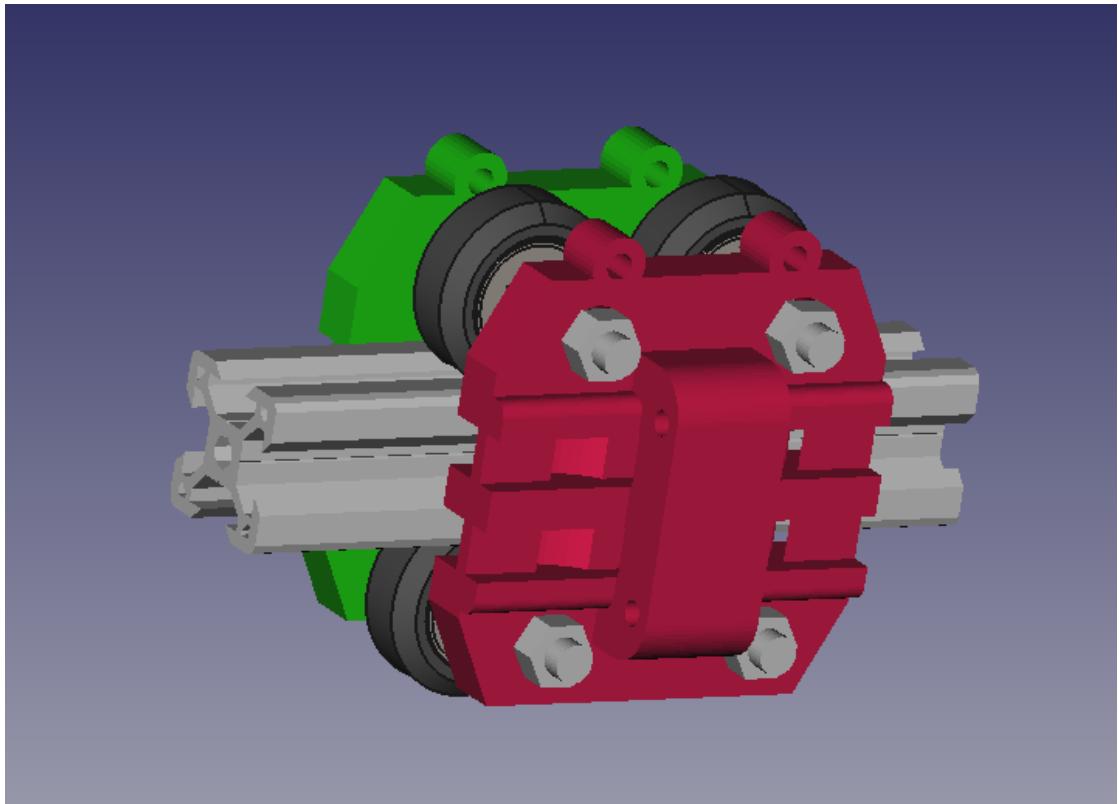


Figure 17: Assembled view of x-carriage

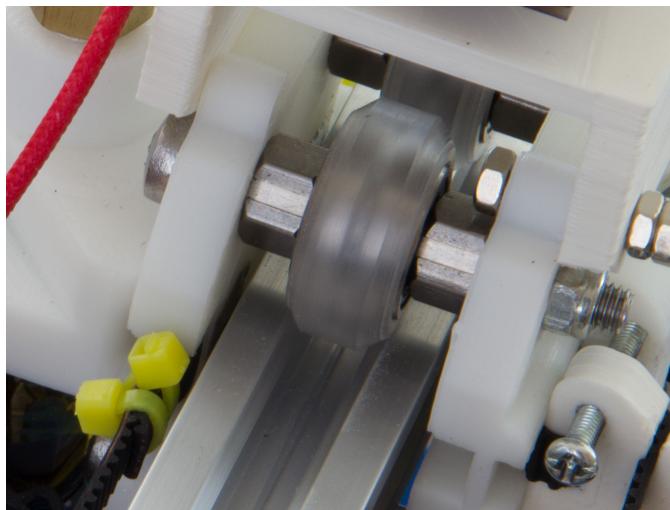


Figure 18: Adjusted v-wheels with notch the same on front and back of each wheel

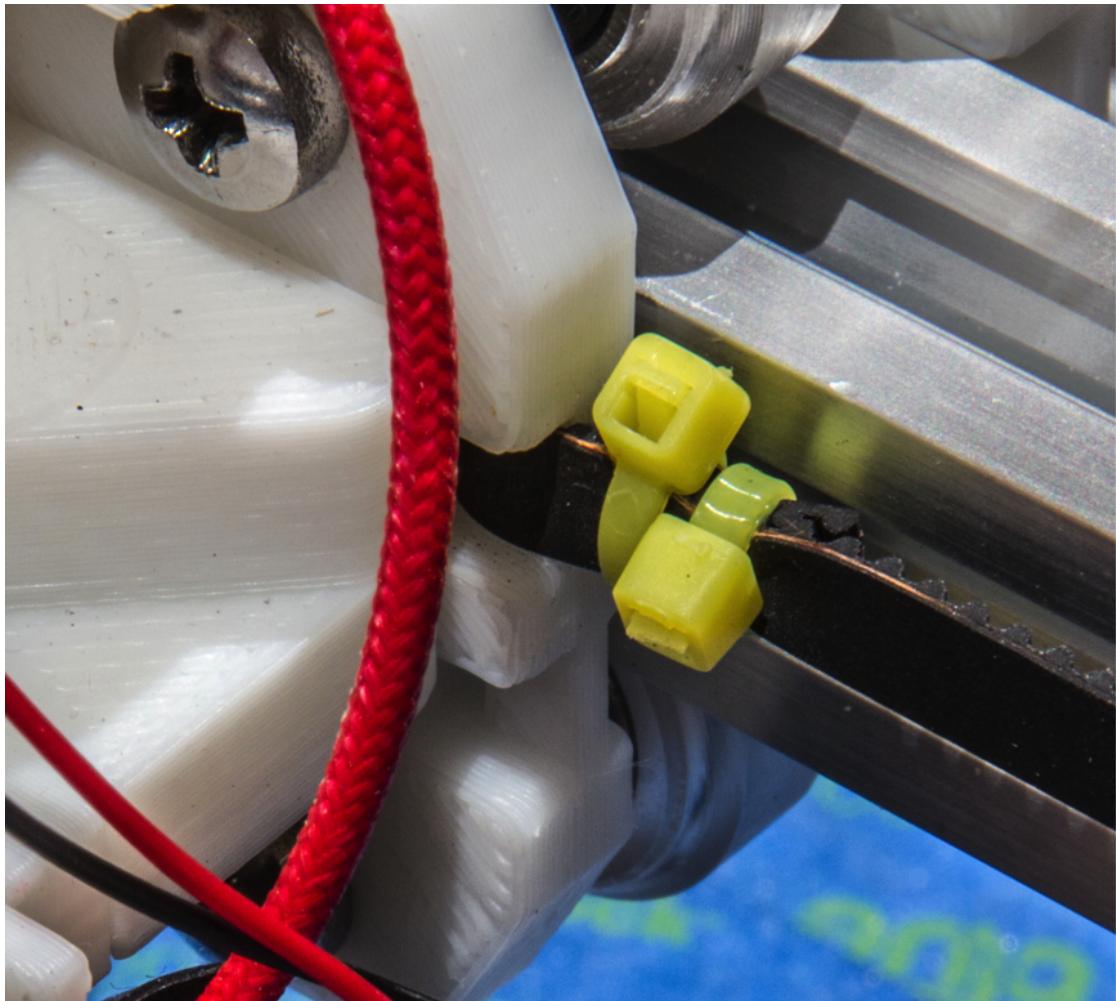


Figure 19: Belt attachment to front of x-carriage

- 1x 25mm 12V Fans (recommended when printing PLA) - Cooling for J-Head Fins
- 1x 25mm 12V Fans (optional) - part cooling
- 1x J-Head
- 1x hotend/jhead_bowden_hotend_mount_fan.stl
- 1x select the appropriate mount for your setup:
hotend/jhead_bowden_hotend_mount_<filament diameter>_<pneumatic connector thread diameter>
 - jhead_bowden_hotend_mount_3.0_6mm.stl (compatible with bulldog XL included connectors)
 - jhead_bowden_hotend_mount_1.75_6mm.stl (compatible with bulldog XL)

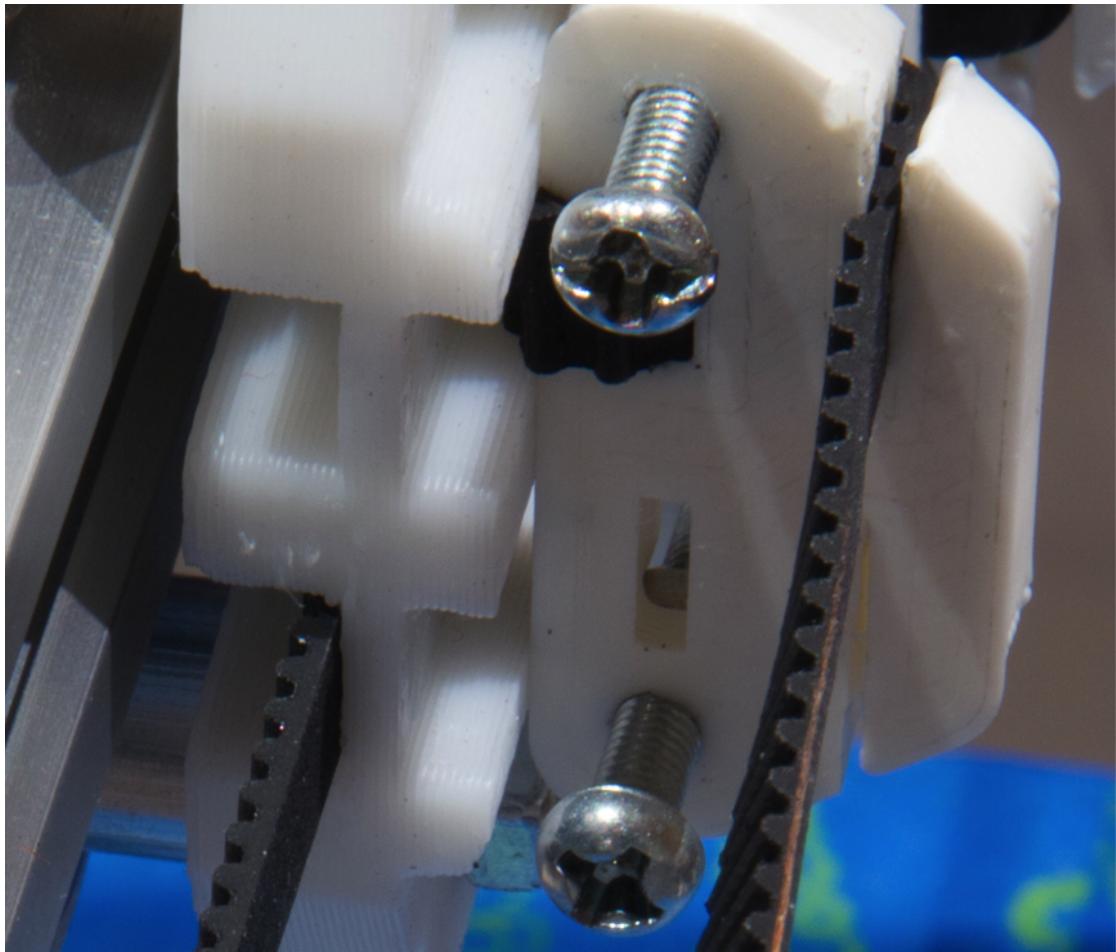


Figure 20: Belt attachment to back of x-carriage and tensioner

- included connectors)
- jhead_bowden_hotend_mount_1.75_1.8bsp.stl
 - jhead_bowden_hotend_mount_3_1.8bsp.stl



Figure 21: Example twisted belt