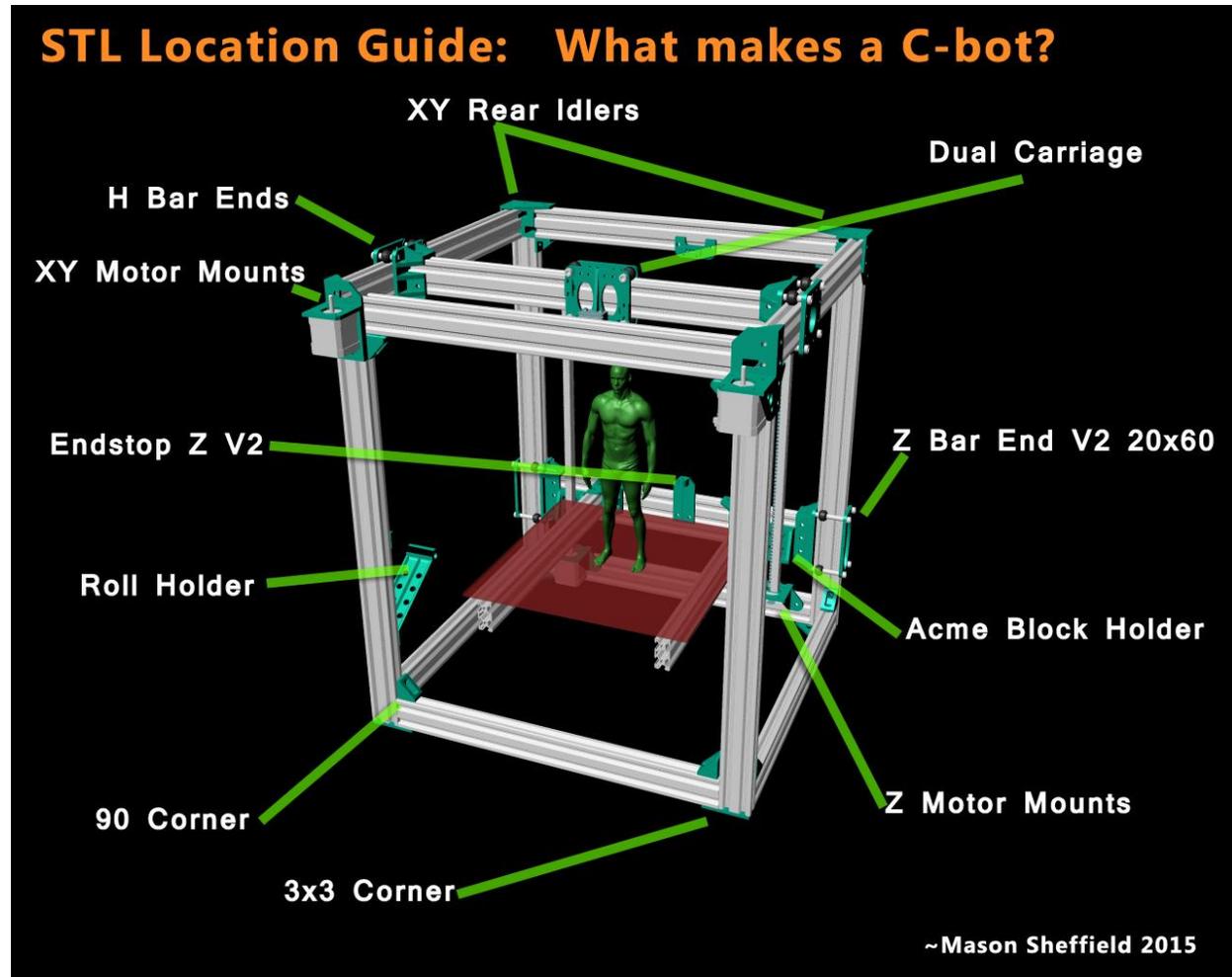


# C-Bot 3D Printer Assembly Guide

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Edited by Mason Sheffield



## Pre assembly work:

- 1) Decide on a build volume
  - For the XY plane, common sizes are 8x8", 10x10", 8x12", 12x12"
  - For the Z, a 300mm lead screw is typical, but not all this range will be usable
    - I'd say up to 500mm is reasonable, but not a hard limit
- 2) Order parts
  - Use the BOM and see sheet2 for a guide on extrusion length requirements
  - Review the optional equipment
  - Decided if you want to buy or 3D print certain components
  - Try to reduced shipping costs by ordering from fewer suppliers
  - Be aware that purchases from Ebay China may take 4-6 weeks to arrive and sometimes don't arrive at all, but often items are 10-50% cheaper and have free shipping
  - Choose a Hot End. I'd recommend all beginners to start with an official J-head. Rip-off hot ends are available on EBay <- avoid. This is **NOT** an item you want to cheap out on.
- 3) Decide on color and type of plastic for printed parts, order a 1kg spool
  - I used PLA, but ABS would work very well
  - Order multiple colors if you want to mix it up
  - I always buy plastic in 3 packs to get free shipping
- 4) Print printed parts
  - If you don't have a printer your self
    - See if there are other reprop owners in your area, check the reprop forums
    - Join a maker/proto shop or hacker space
    - Libraries in some areas are buying 3D printers
- 5) Cut extrusion
  - I used a miter saw with a normal wood blade. I can't advise this but aluminum cuts like butter.
  - Safer options include:
    - buying a metal blade for a miter saw/table saw,
    - using a band saw,
    - using a chop saw,
    - and using a *good* miter block and fine toothed hacksaw (don't use a plastic one meant for 2x4s!).

## Assembly:

### *Load Idler pieces and CoreXY Ends with Flanged bearings*

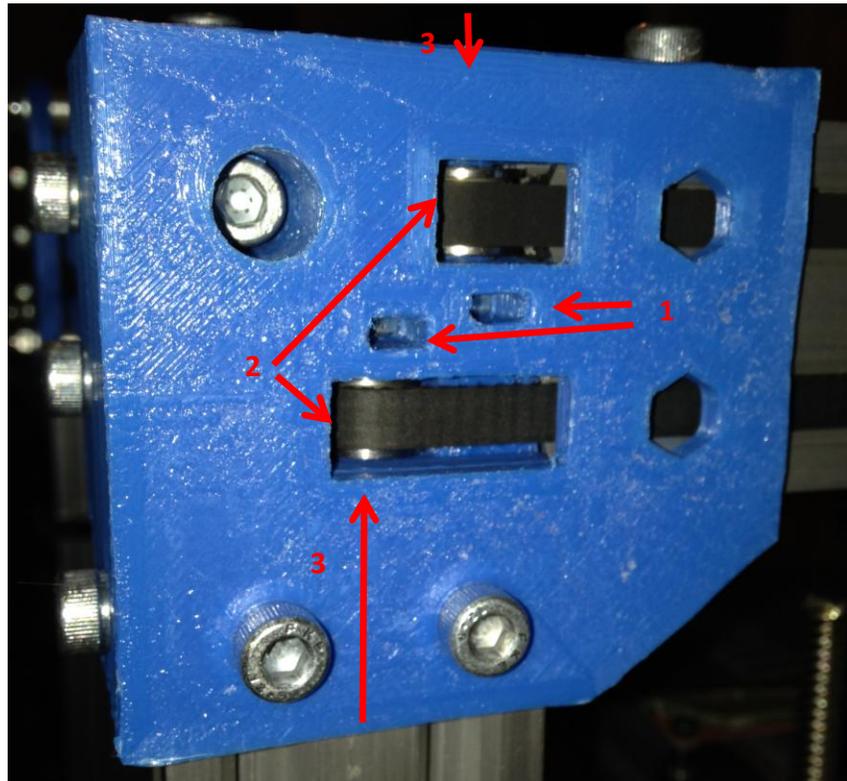
#### Idlers:

1. Trim nut slots and insert **regular M3 nuts**.
2. Stack 2 **F623ZZ flanged bearings** with a **M3 washer** *between* them and load it into the assembly .

#### NOTE:

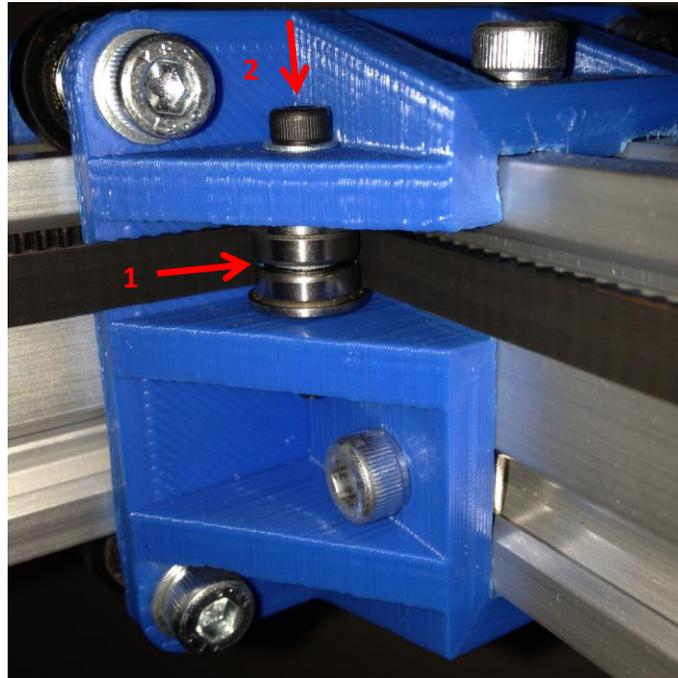
Try stacking the flanged bearings and an **M3 washer** on an M3 bolt and secure the stack with a thin strip of masking tape. Remove the m3 bolt and slide it into the corner piece. Slide a **25mm M3 bolt** through the housing and bearings then carefully remove the piece of tape with Pliers or tweezers.  
(Tip from **Miertam**)

3. Insert a **25mm M3 bolt** through the assembly and lightly tighten.



## ➤ CoreXY Moving Rail Ends

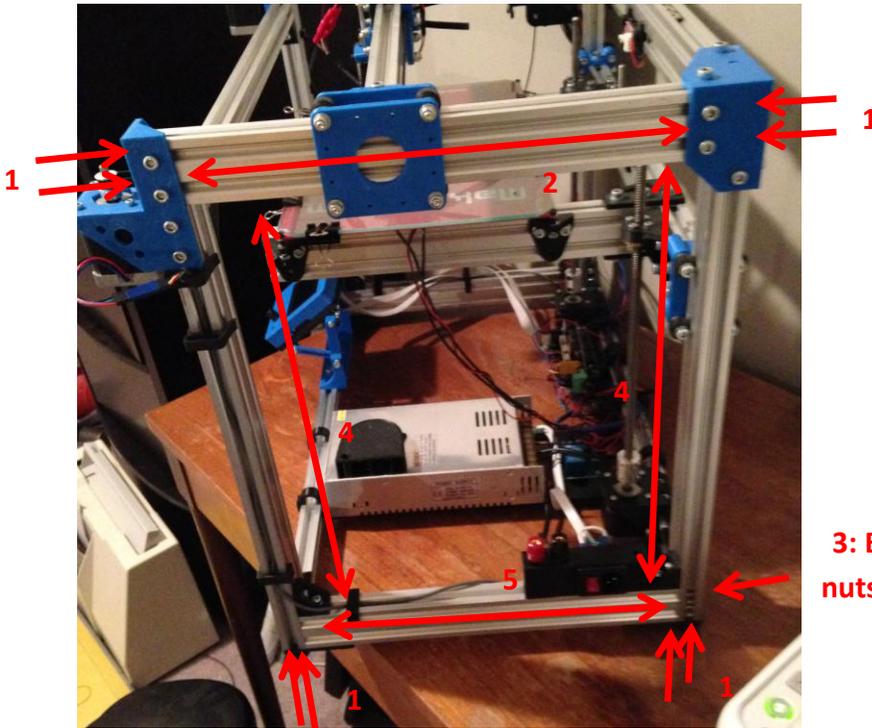
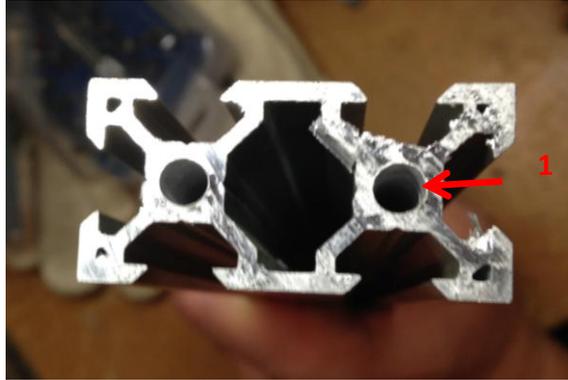
1. Stack 2 **F623ZZ flanged bearings** with a **M3 washer** *between* them and load it into the assembly
2. Step 2: insert **25mm M3 bolts** through assembly and lightly tighten. Use a **M3 nyloc nut** if available.



## ***Build Side frames***

1. Drill and tap extrusion ends, this needs to be done for the two horizontal CoreXY rails (both ends) and the four vertical legs (one end each)

**NOTE:** Use an M5 tap if available. If you do not have access to a proper tap, drill to a depth of 4.5mm or 3/16" and slowly cut threads with an M5 bolt. Reverse out the screw frequently to clear the aluminum shavings or you will destroy your newly cut threads.



**3: Ex. Preloaded T nuts for future dual extrusion**

2. Assemble the CoreXY Idler brackets and Motor Mounts to the CoreXY rails.  
Use 10mm M5 bolts and T-nuts.

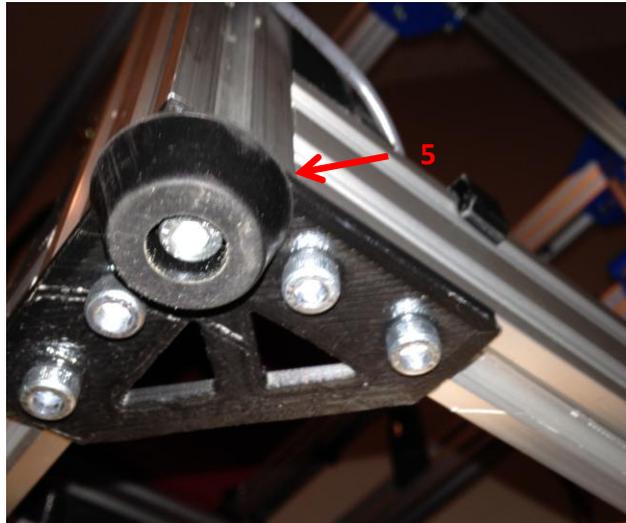
**NOTE:** Don't over tighten or you may crack the plastic printed parts.

3. Preload the leg pieces and bottom horizontals with T-nuts for accessories as well as for the structural brackets.

**NOTE:** Remember things like the filament holder, electrical plug and switch holder, Z stop (planned future modification), extruder, and 90 deg. corner brackets for the horizontal pieces in the next step.

## ❖ Attach legs to CoreXY rail

4. Attach L brackets to the bottom of the legs firmly and attach the 90 deg. corners loosely. Insert the bottom horizontal extrusion piece and tighten the corners.
5. If purchased, add a rubber foot to the bottom of the L bracket



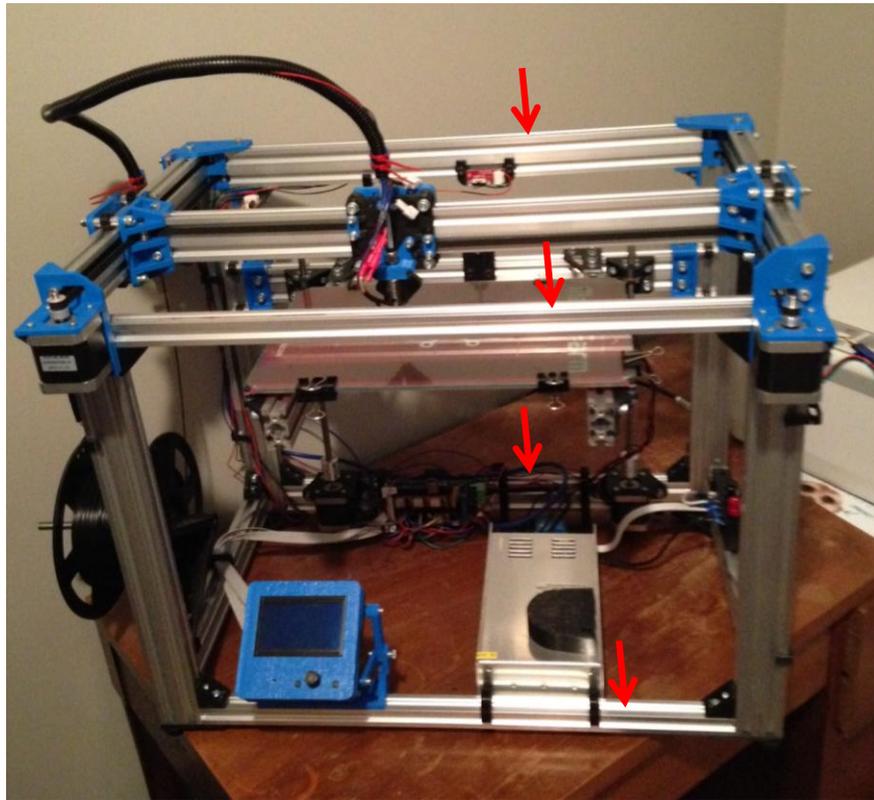
## ❖ Square the frame

1. Check that all legs are the same length **when measured within the top and bottom horizontals**. If they are not equal adjust them to match the longest measurement by creating a slight gap.
2. Repeat this process with the horizontal measurements of the extrusion between the legs. These two steps will remove any chance of the frame being skewed into a trapezoidal shape.
3. Use a carpenter's square to verify the corners are straight. If the corners are not straight either the printed pieces are not square or a bracket is binding with the extrusion. To solve the latter, slightly loosen all brackets confining the non-square joint, square them up and retighten.

## ❖ Connect Frame Ends to complete the cube

Connect the two frame ends assembled earlier with 4 horizontal extrusion pieces. You will need 4 equal pieces of extrusion and 6x 90 degree corner brackets (plus 10mm M5 bolts and T-nuts)

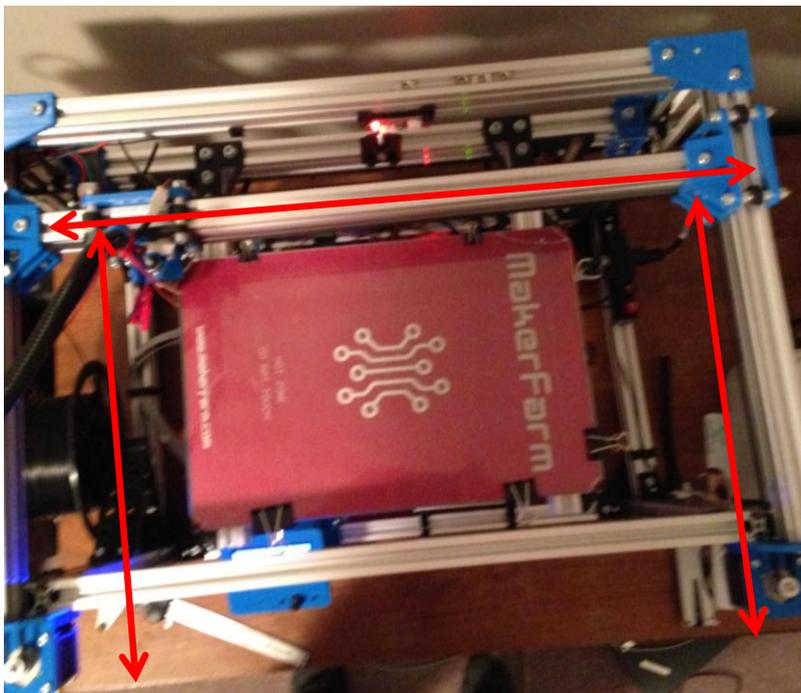
1. Preload the rear top bar and bottom rear bar with T-nuts for the brackets. Also preload T-nuts for the Z endstop, Y endstop, Z motor mounts, and other future accessories. Look at photos to ensure T-nuts are loaded in the correct slots.
2. Slide the bars onto the two assembled frame pieces and connect them. Tighten lightly.
3. Preload the front top and bottom bar with T-nuts for the brackets. Also preload T-nuts for the LCD mount if applicable.
4. Insert and tighten the two extrusion pieces.
5. Square the frame (similar to above) and firmly tighten all bolts.
6. Attach the two Z motor mounts onto the preloaded T-nuts.

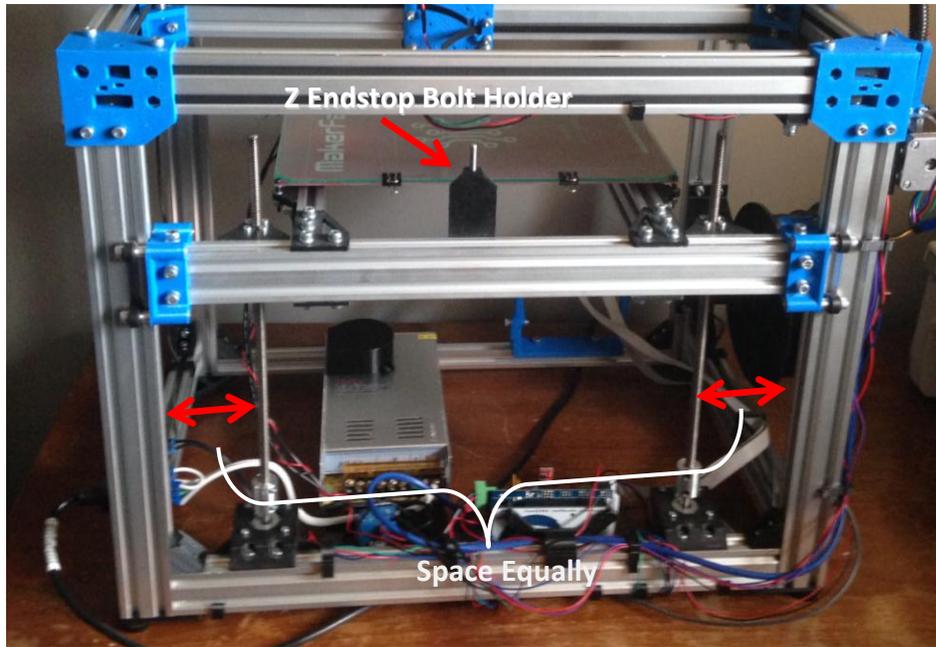
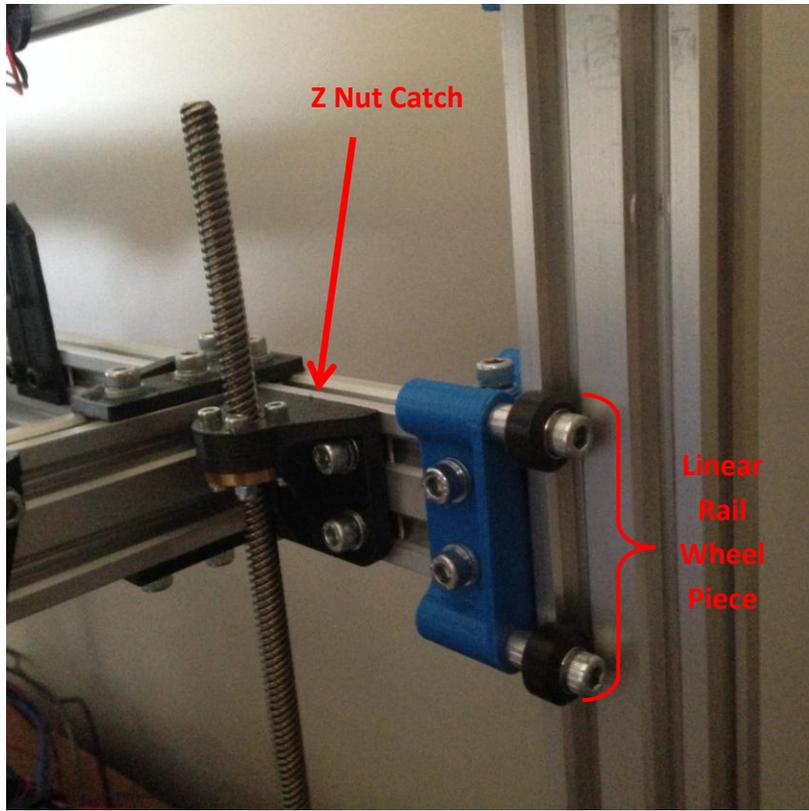


### ❖ Assemble Z Frame (moving bed platform)

1. Arrange the pieces on a perfectly flat similar to the final assembly. Space the bars to the approximate with by using the heated bed as a guide. Load the necessary T-nuts into the top layer and install the two top T (or L) brackets.

2. Flip the assembly over and install the other two brackets.
3. Install the bed support mount (this can also wait until later as the extrusion ends are exposed for loading T-nuts).
4. Install the two Lead screw nut catches and the adjustable Z endstop bolt piece.
5. Assemble Z Frame linear Wheel pieces. Bolts should cut threads into the plastic bolt holes and be very firm. Important! --> insure there is an aluminum spacer between the two bearings in the delrin wheel.
6. Install half (front or back, not a pair) of the Z frame linear guide pieces. Keep one side loose and preload T-nuts for the others.
7. Place the partial frame into the main assembly and adjust the loose side so that the v wheel align with the V-slot extrusion. Attach the other two Z Frame linear guide pieces lightly. Run the assembly up and down the extrusion and then properly tighten all bolts.
8. Install the two Z motors with 8mm M3 bolts. Balance the position of the two Z motor mounts so they are equally spaced from the vertical legs used as a linear guide. Slide the Z frame down near the Z motor mounts and adjust the Z nut catches to align.
9. Attach the 5mm to 8mm couplings to the motor shafts. Insert the lead screws, clamp in place, then recheck the alignment of the motor shaft and Z nut catch at both the minimum and maximum travel positions. Adjust as necessary.





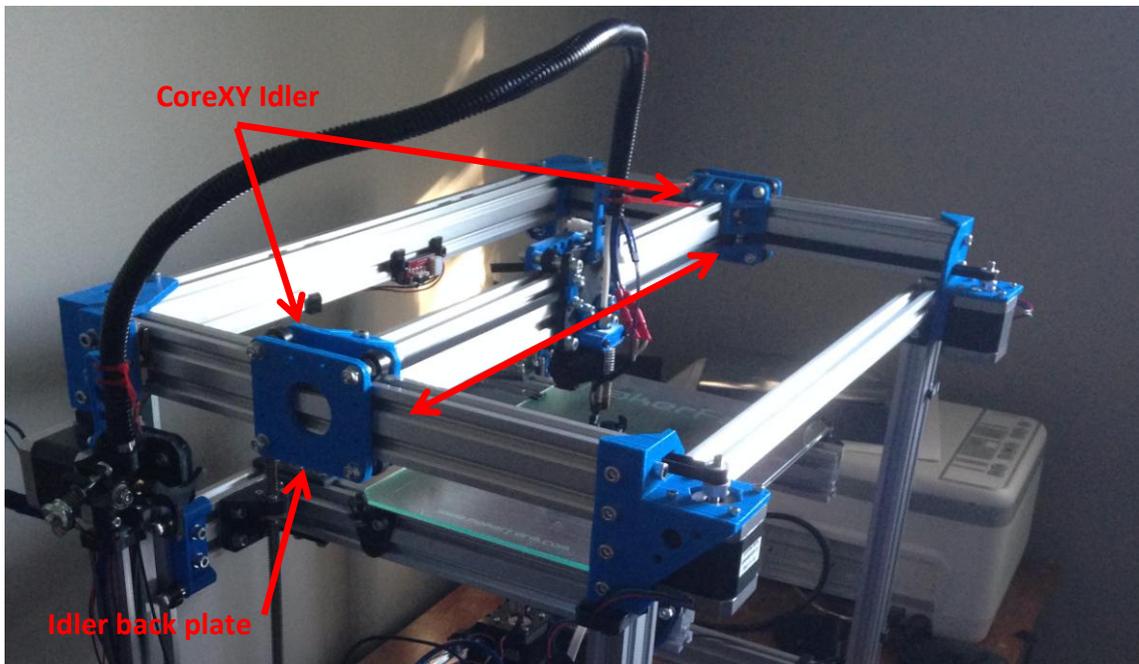
## ❖ Assemble CoreXY Bar

1. Load with T-nuts and attach end piece idlers to coreXY cross bar, leave one end loose for adjustment.
2. Connect the Idler back pieces to the idlers, but only with the top wheels.

This how the parts stack:

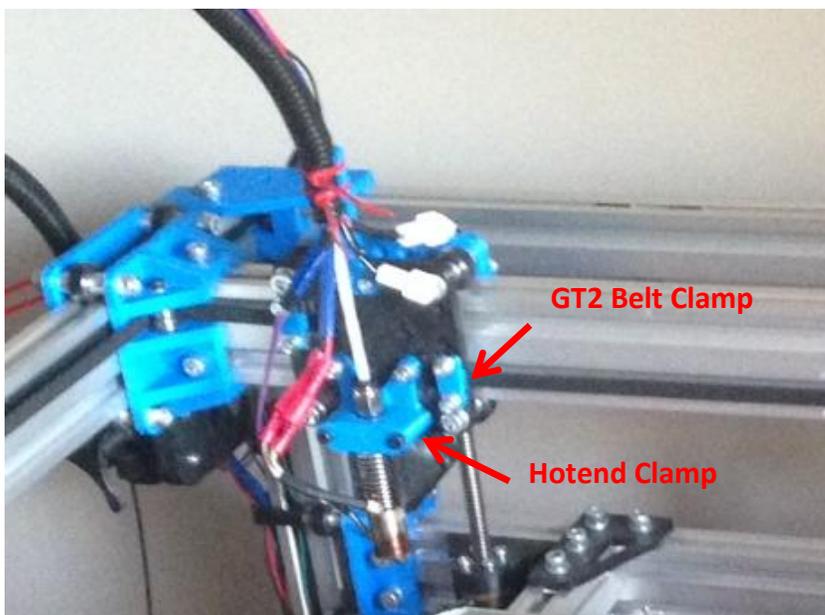
**Bolt head - washer - plastic - spacer - wheel - spacer - plastic - washer - nut**

3. Insert the assembly into the printer frame and adjust the loose idler on the extrusion piece to fit the wheels into the V-slot.
4. Insert the 4 bottom wheel bolts into the idler bottoms. Firmly clamp the top and bottom wheels together by hand and tighten the bottom bolt. Ensure all 8 bolts are tight.
5. Slide the bar to both ends to ensure it is square and then tighten the loose idler bolts.



## ❖ Assemble Hot end Carriage and install belt

1. Take the two carriage pieces and insert M3 nuts into the back of each side of the GT2 belt clamps (4 nuts in each plate), also insert 4 nuts corresponding to the hotend clamp locations in the front plate.
2. Connect the GT2 belt clamps and the hotend clamp to help retain the M3 nuts. Use 10mm M3 bolts for all except the bottom two hotend clamp bolts. Use 25mm bolts for those.
3. Connect the two plates at the bottom with two wheel assemblies, place in one the CoreXY bar and, in the same manner of the CoreXY bar idlers, insert the other two wheel assemblies and tighten.
4. Install the two CoreXY motors with 8mm M3 bolts and attach the 16tooth GT2 pulleys to their shafts.
5. Run the GT2 belt through the extrusions, around the idlers and pulleys, then to the hotend carriage. Place the belt under the clamps and tighten the two front clamps. Don't over tighten or the plastic will split on the layers or the bolt ends will touch the aluminum extrusion.
6. Push the entire bar to the front of the printer to insure that it is square, pull the belt end on the back plate firmly through the clamping spot and tighten. Do the same for the other belt. The assembly should remain square. If not, then one belt might be notably tighter than the other.



## ❖ Wiring, Programming, and Tuning

I will not provide details for these subjects since there are many resources available online to help with these steps.

A few notes and words of advice below

- I used a ramps 1.4 setup with Marlin installed
- Used pronterface as an interface before I started printing from SD cards, it also helps with calibrations.
- I am using slic3r to convert STL to G-code files that are ready to print.
- Oil the lead screws before attempting to tune your stepper drivers.
- If you have question then send me a message.
- The switch lever on the Y end-stop needs to be bent like the photo below so that it can home while in the home position.  
If you don't do this, the metal arm will snag and break. A lesson I learned the hard way.

