

SK-300 / SK-600

Assembly Manual

SecKit, All-Metal CoreXY 3DP Kit

SK300 (300mm Z), SK600 (600mm Z)

Web <https://seckit3dp.wix.com>

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Something You
Need to Know
Before Getting
Too Excited...

Something You Need to Know

Please note that SecKit tries to be helpful and provides as clear instructions as we can, but we will not be responsible for any of your loss caused during assembly process.

Linear Blocks



Every linear block comes with a **plastic rail**.

ALWAYS keep a rail under the block.

NEVER leave the block along.

Those tiny steel balls will fall out and you will cry.

How to move linear blocks onto linear rails?



Connect plastic rail and linear rail



Carefully move linear block across the rails



Remove plastic rail

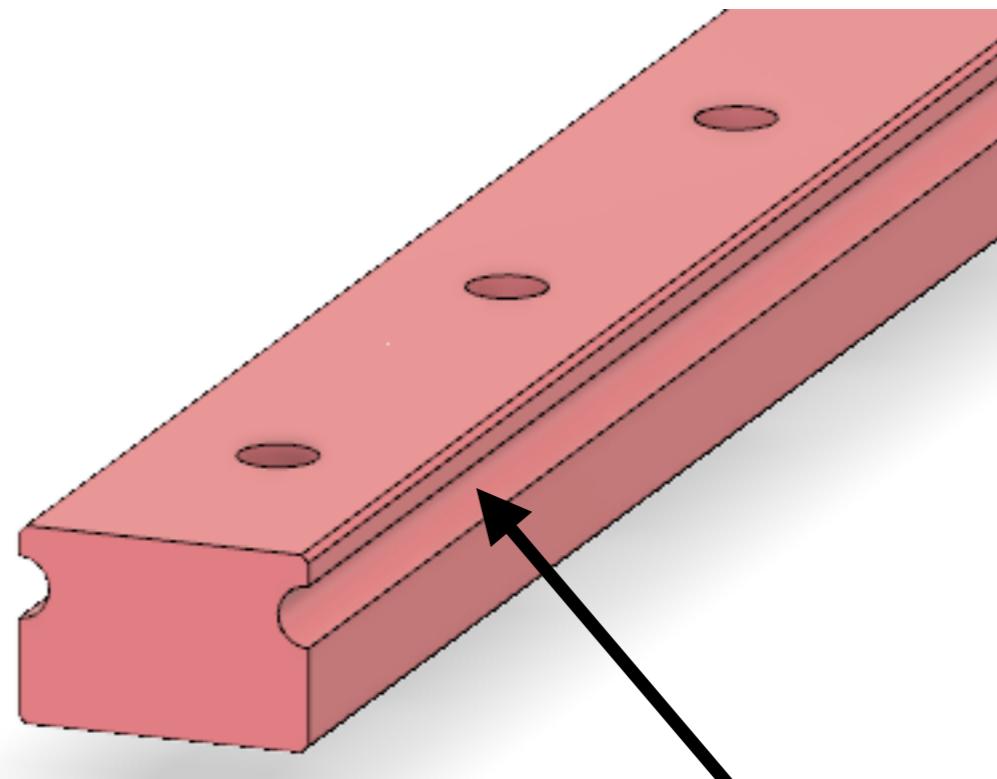
Clean linear rails

- Lubricating oil
- Tissue or cotton swabs

Action

After the rails being cut, some dirt and particles will stay on the surface, so linear block won't move smoothly.

Wipe those dirt out with lubricating oil and tissue before assembly, and always keep the rail oily to prevent from rusting.



Pay more attention to the grooves.

Make sure you build it right in each step

Errors will accumulate along with each step in your assembly progress. To get a solid machine you must build it correctly.

Each page in this manual is written in a similar structure. You can ignore if you already know how to do, but you must read the “Exam” step to ensure you do it correctly.

Parts to be prepared



Actions



Exam

MUST double check!

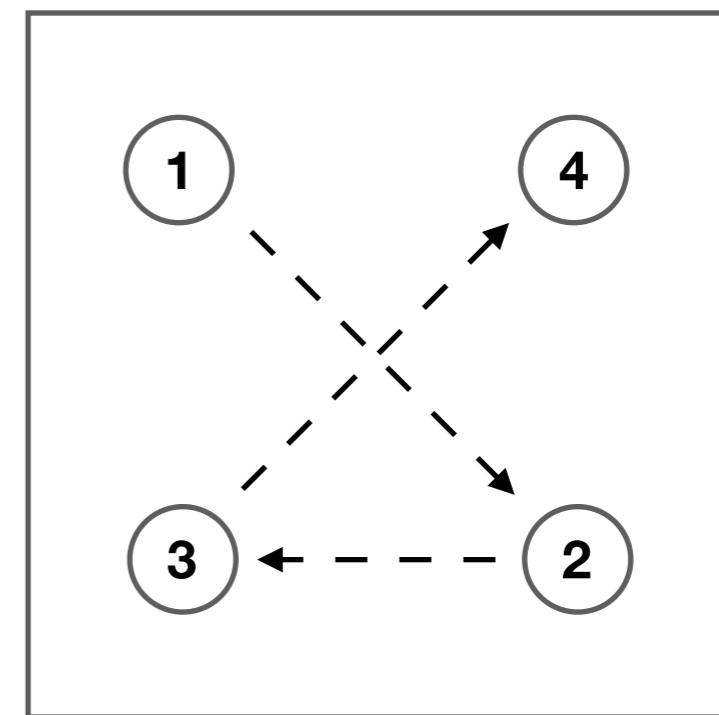
Assemble on a flat & solid surface

- (O) Stiff and heavy table, large tile, granite table, etc.
- (X) Carpet, thin and unstable desk, etc.

Fasten bolts diagonally

If there are multiple bolts, fasten them in a diagonal sequence.

Also tighten screws with proper force to prevent from damaging threads .



Always Turn ON with steppers CONNECTED!

The stepping motor driver board needs an electronic load to function normally.

It's highly possible to damage the drivers if steppers do not exist or are not connected well.

Still Not Understand?

If you still have problems or find any issue, drop us a message here:

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Something You Need to Know

Enjoy!

During assembly you'll feel the rigidity
and be confident of this machine.

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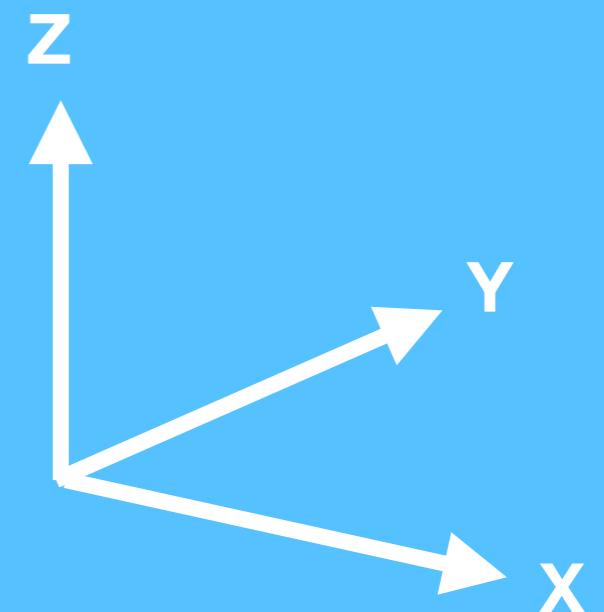
Tools

Prepare Your Tools

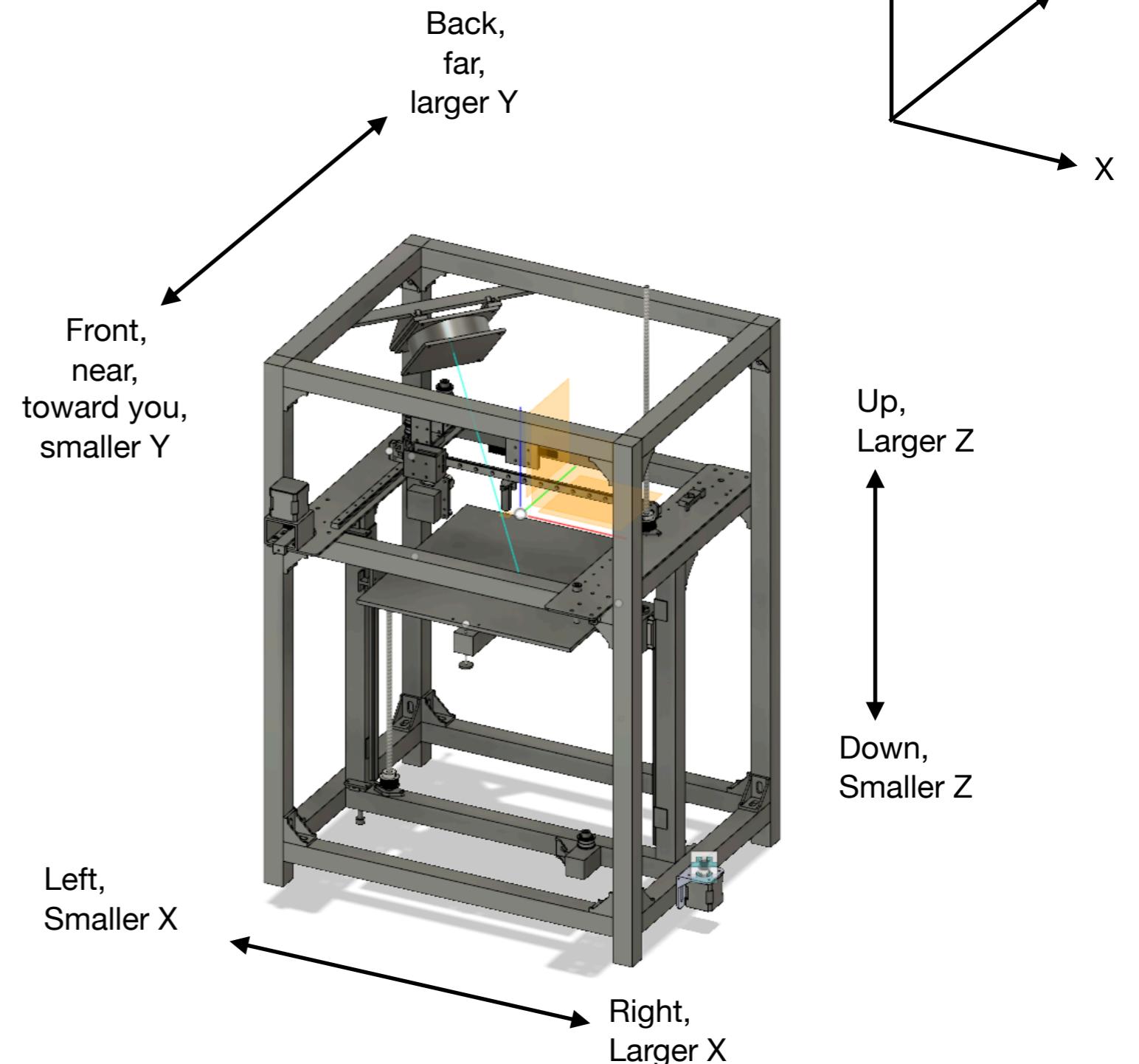
- Wrench #8, #13
- Allen wrench #1.5, #2, #2.5, #3, #4, #5
- Phillips and flat head screw driver
- Small needle nose plier
- Wire stripper
- Scissors
- Cutter knife
- Lubricating oil
- Tissue or cotton swob
- Soldering iron (optional)
- Silicone (optional, for water leakage)
- Toothpick (optional, for water leakage)

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Direction Definition



Direction Definition

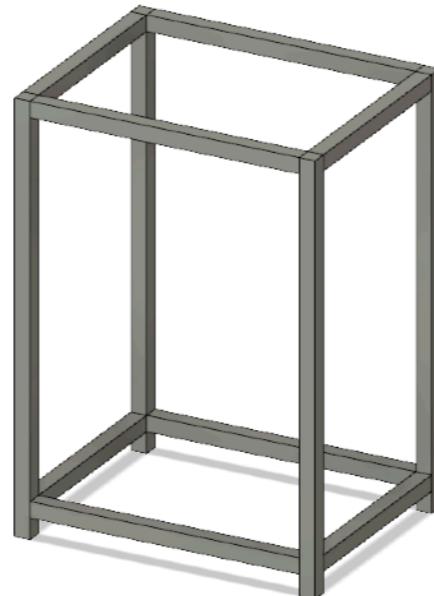


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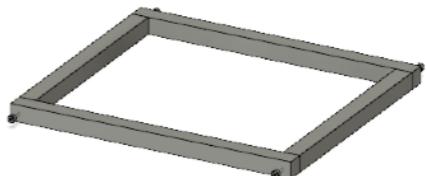
Structure Overview

Major Parts

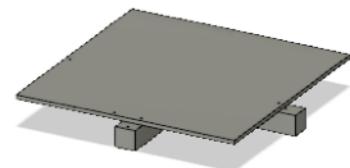
You will assemble each major part first, and then combine them together.



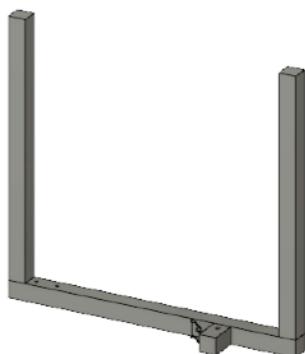
Cube Frame



XY Axes



Bed



Z Axis

5

Cube Frame



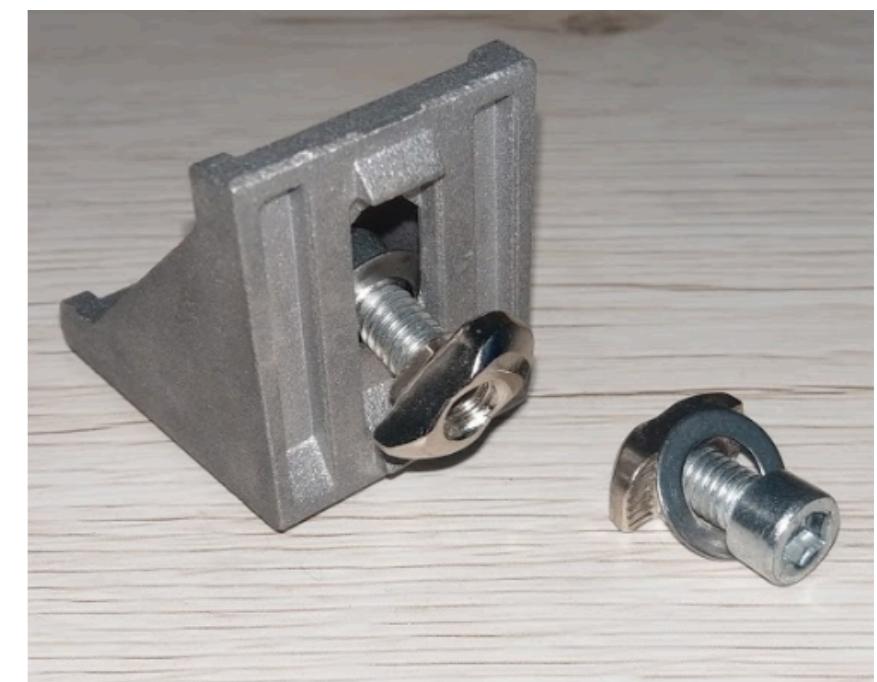
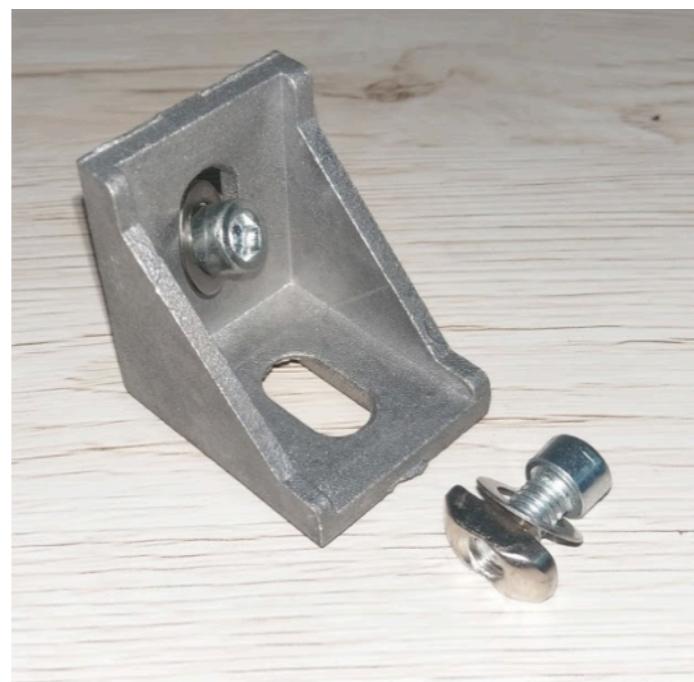
Make Bracket Sets

- Parts per set
 - 1 3030 bracket
 - 2 bolt M6 x 12
 - 2 washers M6 x 14 x 0.5

Action

Pre-assemble all 26 corner sets for later use.

Prepare 30 sets if your aluminum profiles are not drilled and thread tapped.

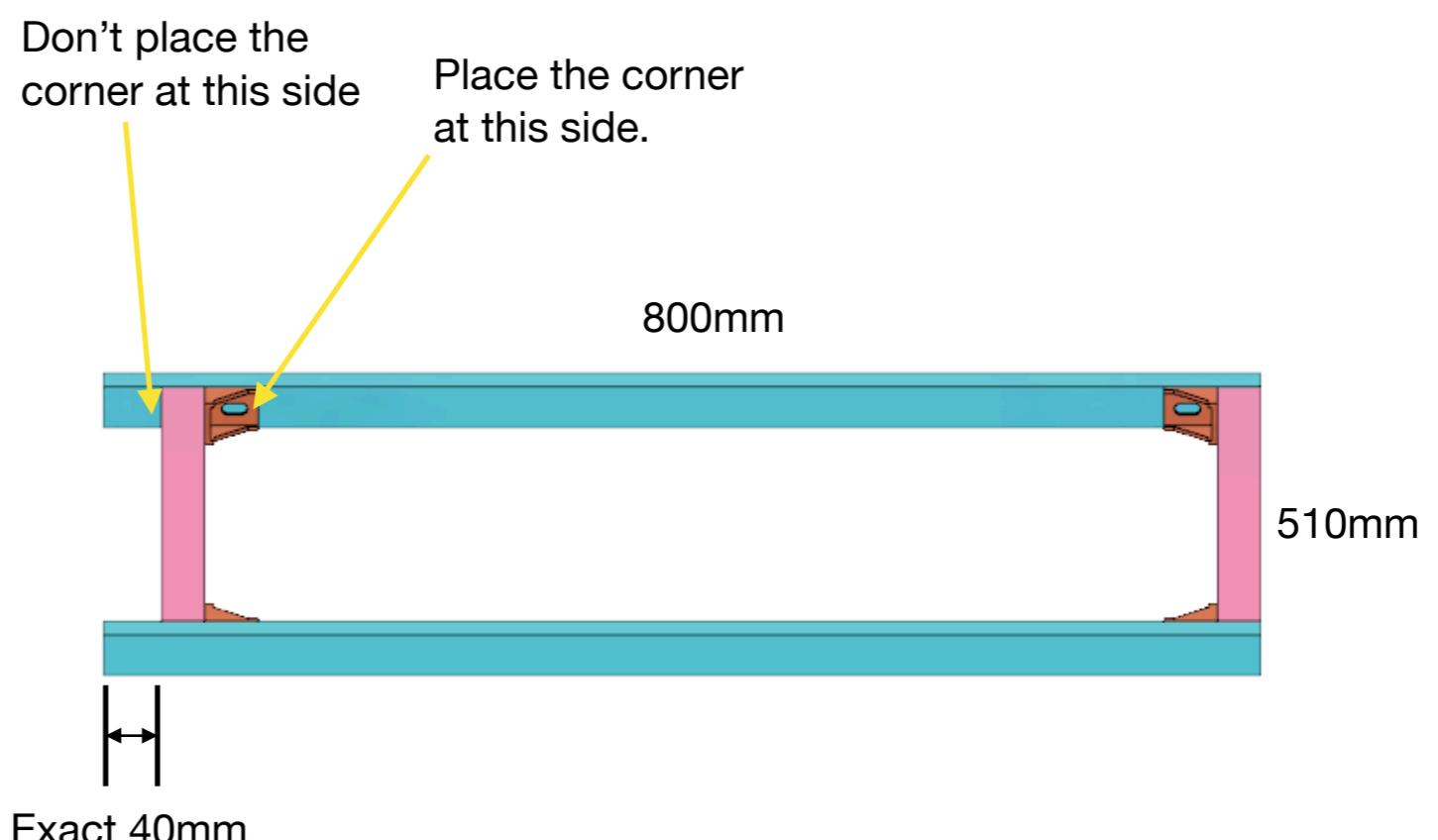


Assemble the front & back frame

- Parts per set
 - 510mm (no bolt hole) x 2
 - 800mm x 2 (SK300)
 - 1100mm x 2 (SK600)
 - 3030 brackets x 4
- You need 2 sets for the front and back frame
- Lock the bolts but not too tight. You'll have to loose and re-tighten them after, to relief internal strength.

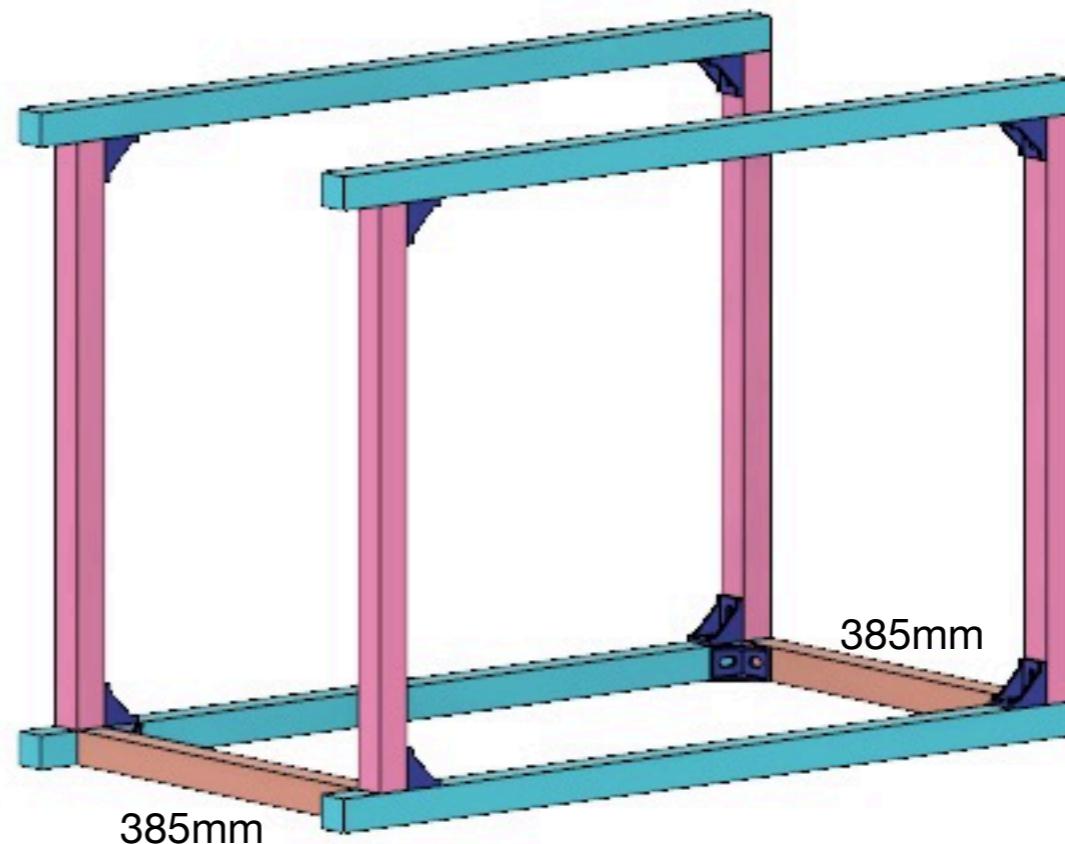
Exam

The frame won't tilt up when laying it on a flat surface.



Assemble front & back frame

- 3030 aluminum profiles per set
 - 385mm x 2
 - Brackets x 4
- You need 2 sets for the left and right frame.



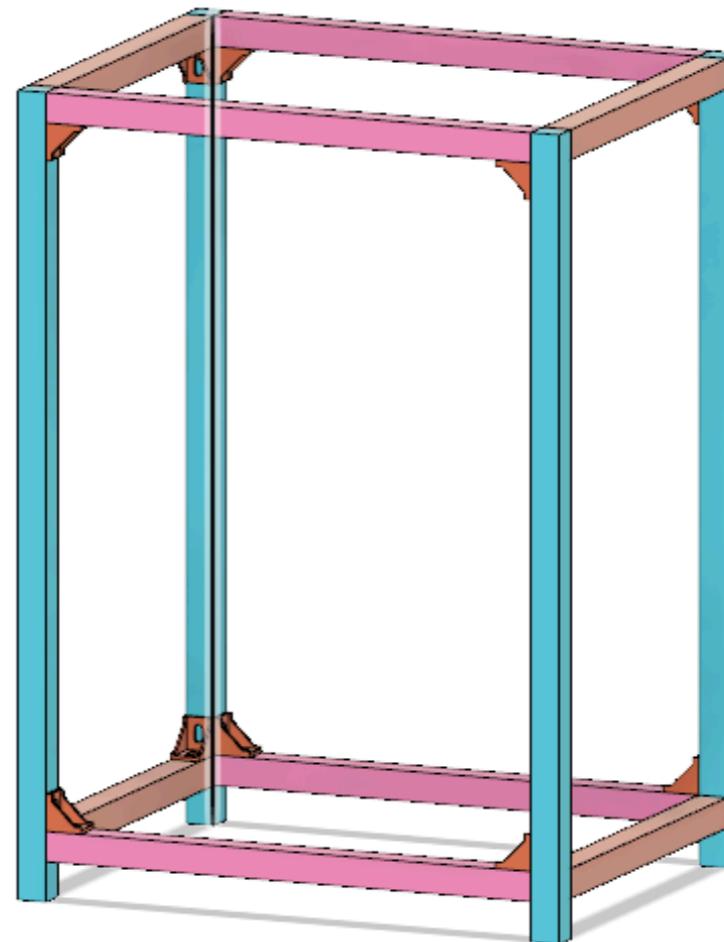
Relief Internal Stress

Now you have a cube.

Stand it up and check if there are gaps between legs and the floor, and between aluminum profiles.

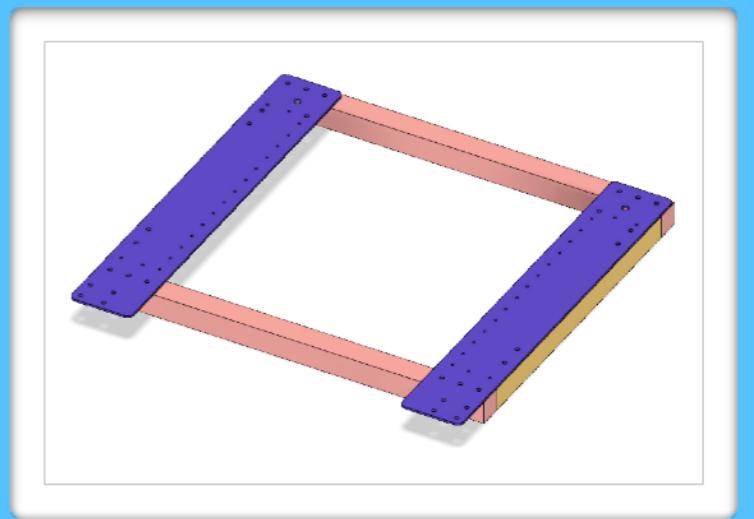
If there are gaps, loose the bolts a little and fix them, and then tighten the bolts.

If you're not sure your floor is flat, check a few more times at some different locations.



6

XY Frame



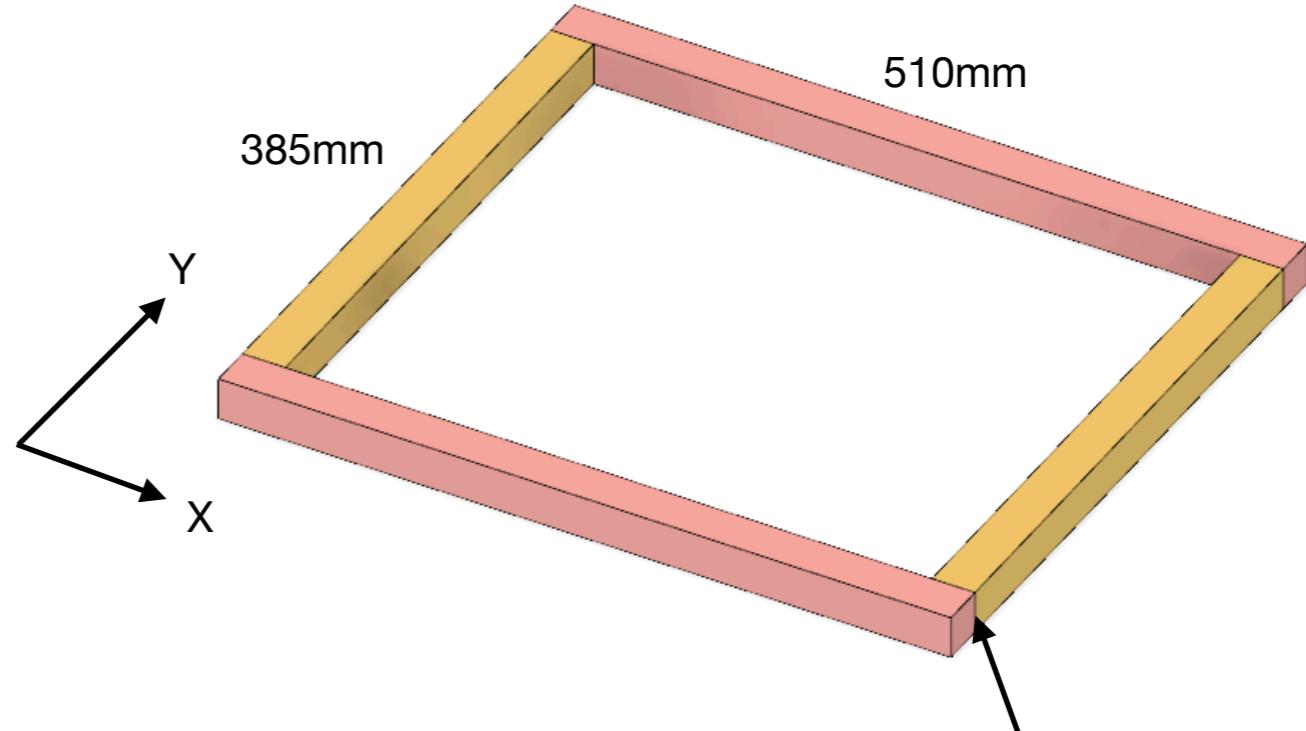
Assemble XY frame

- Two 510mm with hole drilled
- Two 385mm with thread tapped
- 4 Bolts M8 x 20
- 4 Washers m8 x 14 x 0.5

Action

Connect aluminum profiles with bolts.

If your aluminum profiles are not drilled and tapped, you can **temporarily** use four 3030 brackets instead. After Y plates (in next page) is attached as extra support, **brackets must be removed in order not to interfere with later components.**



Exam

The XY frame should be flat when being laid on a flat surface.

Blind joint with bolt and washer inside.

XY Frame

Identify Left & Right Y Plates

The two Y plates are symmetric. One side comes in hairy/glossy finish and should face up.

XY frame

XY frame

XY frame

XY frame

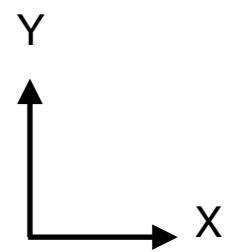
Stepper
mount



Left



Right



Assemble Y-min Endstop

- 1 optical endstop
- 1 Y endstop mount
- 1 nut M3
- 1 T-nut M3
- 2 bolts M3 x 15
- 10 washers M3 x 6 x 0.5

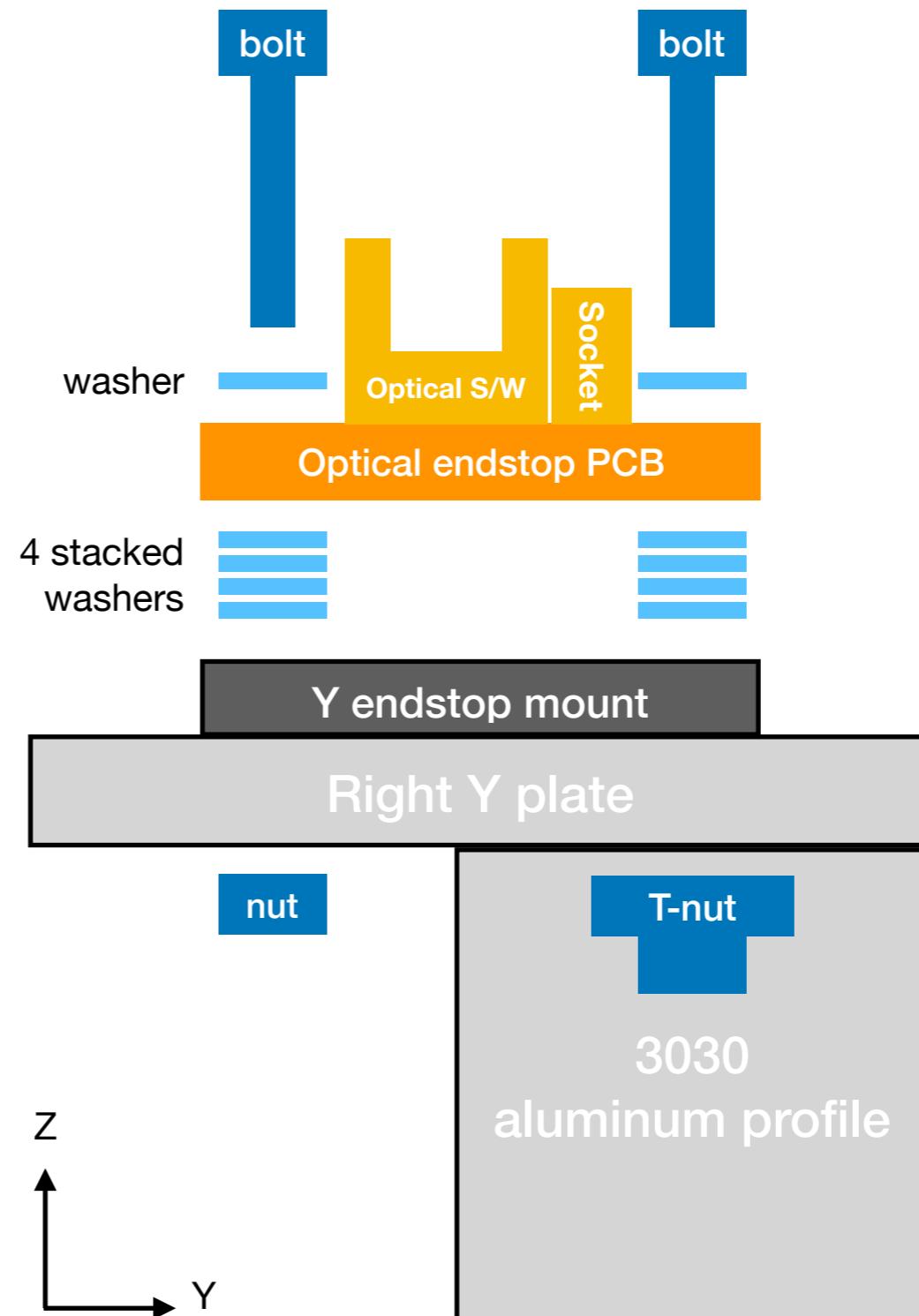
Action

4 washers are stacked up to prevent PCB bending when being locked onto Y endstop mount.

Don't fasten the T-nut since you'll lock the right Y plate onto XY frame later.

Exam

Must use the correct amount of washers. Dimensions are carefully designed.



Attach Y plates onto XY frame

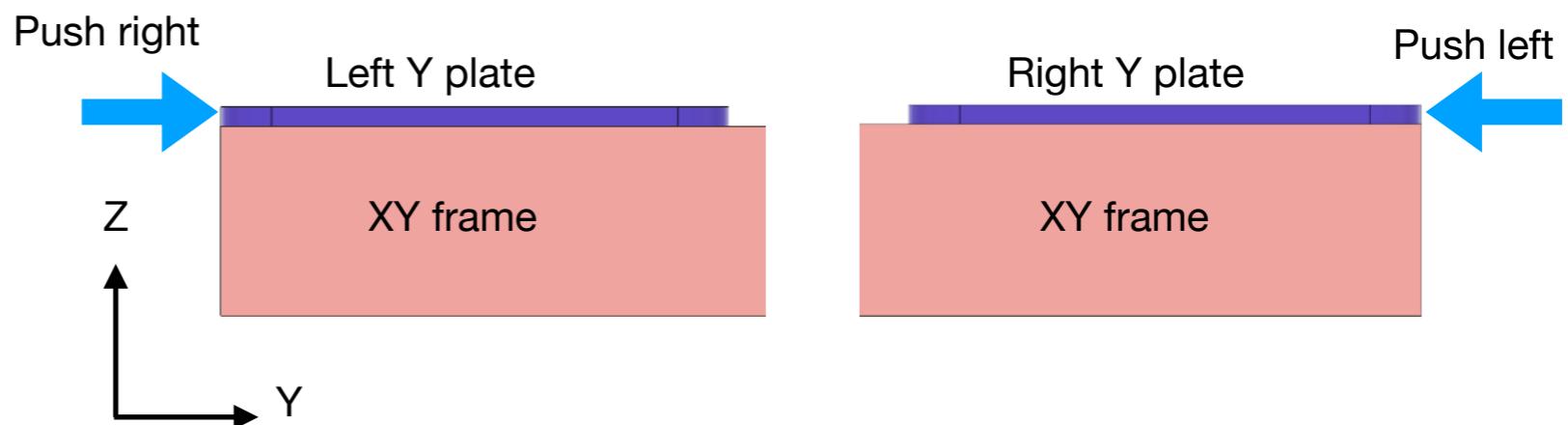
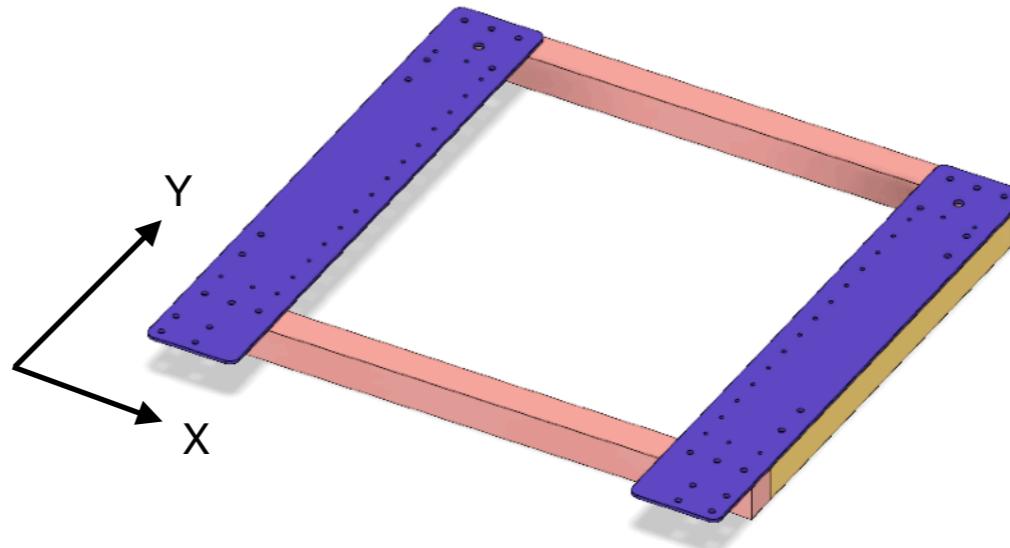
- 2 Y plates
- 20 Bolts M5x10
- 20 T-nuts 3030 M5

Action

- Lock Y plates onto XY frame.
- Push Y plates inward XY frame so Y plates won't stuck when sliding the whole XY plane into the cube frame.

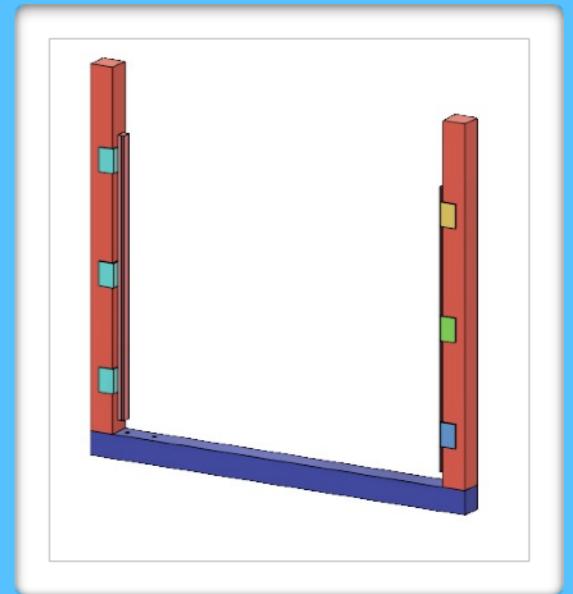
Exam

If you assembled XY frame with 4 3030 brackets in the previous step, you **must remove 2 brackets at the far side to prevent interfering with pulley pillars.**



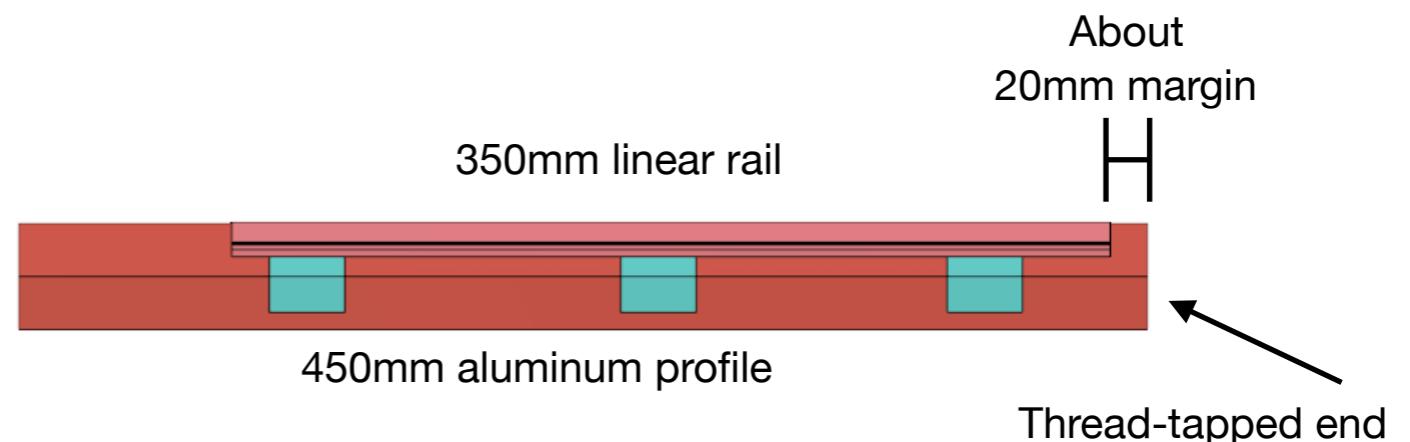
7

Z Frame



Assemble Left Z Leg

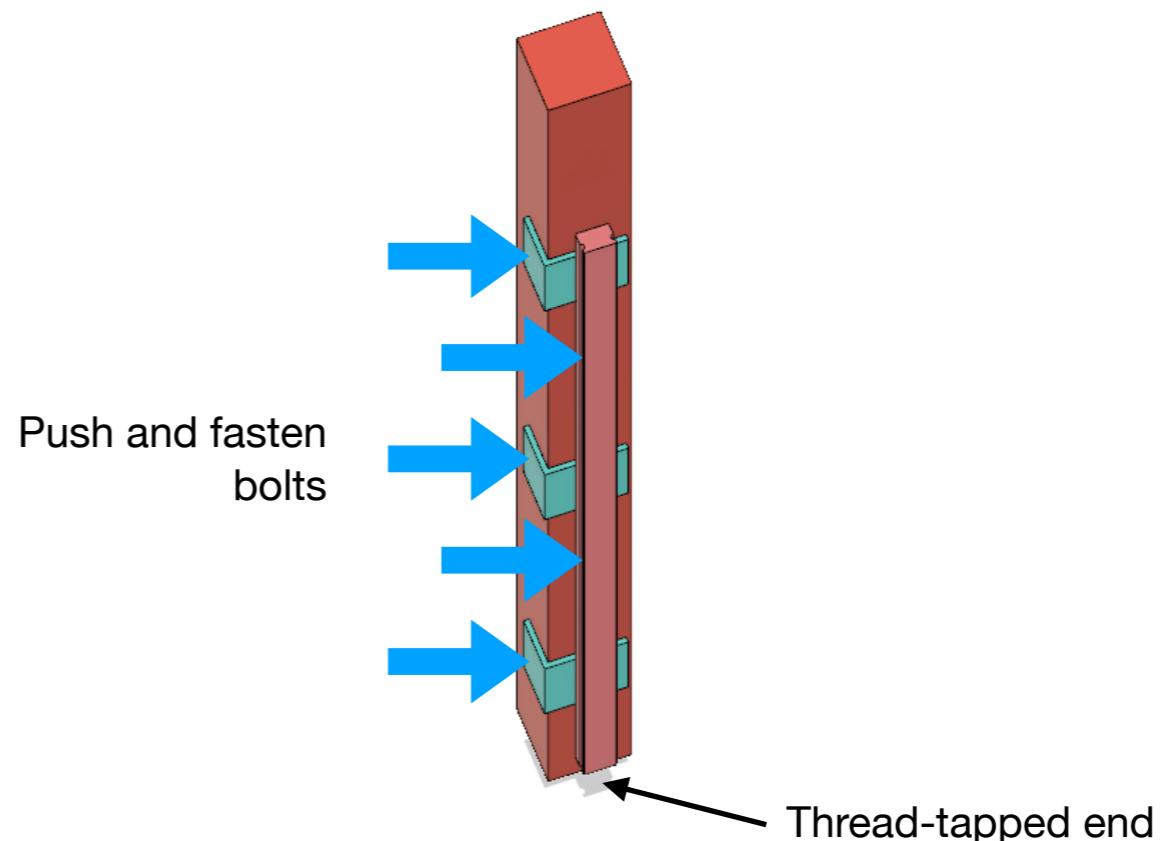
- 1 450mm (SK600: 750mm) aluminum profile with thread tapped
- 1 350mm (SK600: 650mm) linear rail
- 3 Bolts M3 x 10
- 3 T-nut M3
- 3 linear rail supports



Action

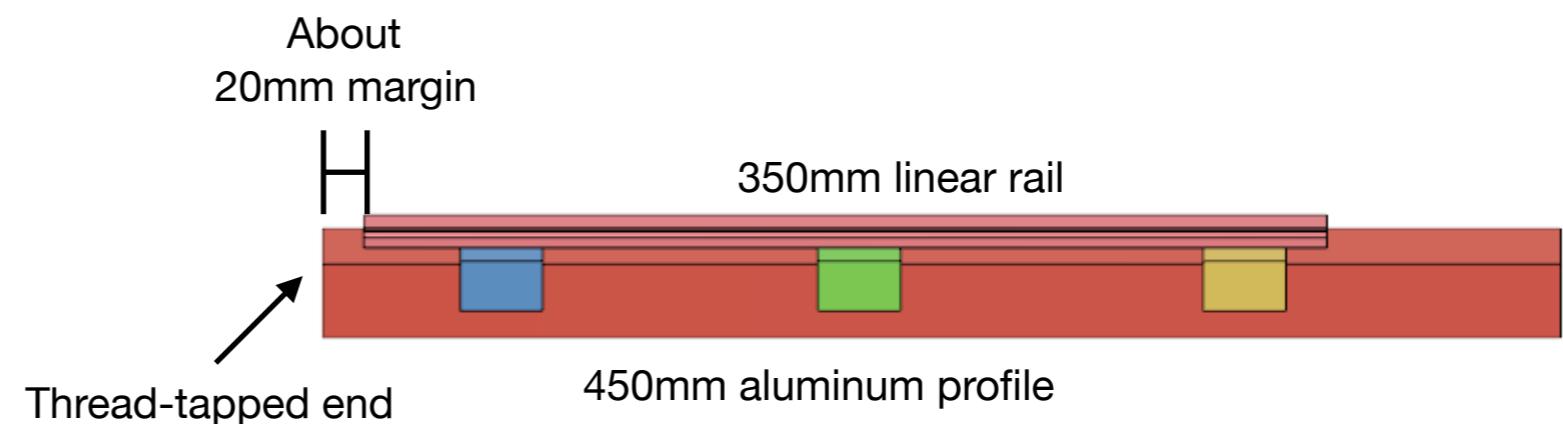
Attach linear rail onto aluminum profile, with 3 rail supports inserted.

3 bolts are enough because the main task Z linear rail here is to guide the bed movement, not to bear strong force.



Assemble Right Z Leg

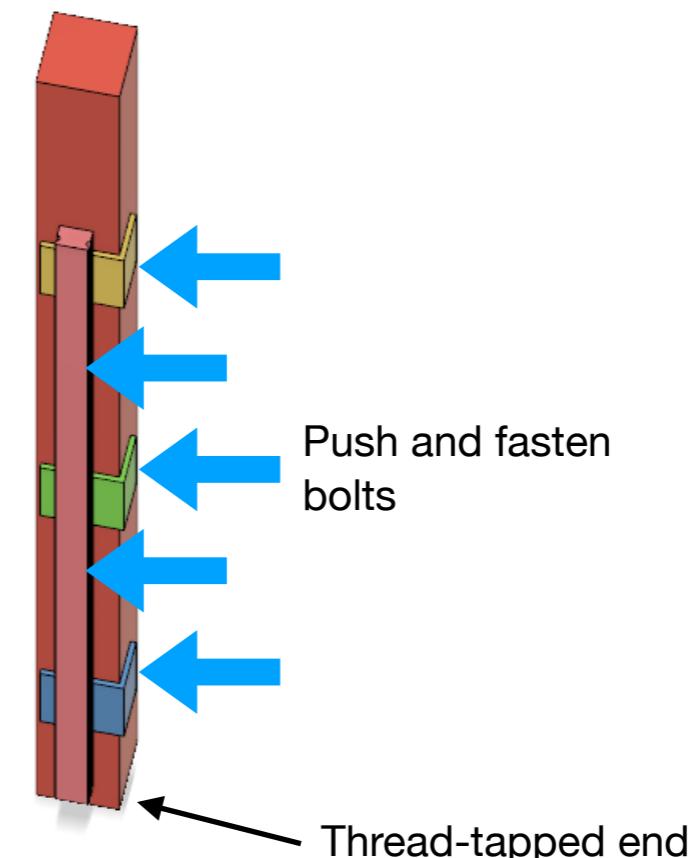
- 1 450mm (SK600: 750mm) aluminum profile with thread tapped
- 1 350mm (SK600: 650mm) linear rail
- 3 Bolts M3 x 10
- 3 T-nut M3
- 3 linear rail supports



Action

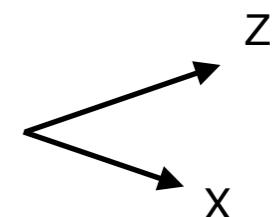
Attach linear rail onto aluminum profile, with 3 rail supports inserted.

3 bolts are enough because the main task Z linear rail here is to guide the bed movement, not to bear strong force.



Assemble Z frame

- 1 510mm with hole drilled
- Left & Right Z Leg
- 2 Bolts M8 x 20
- 2 Washers m8 x 14 x 0.5



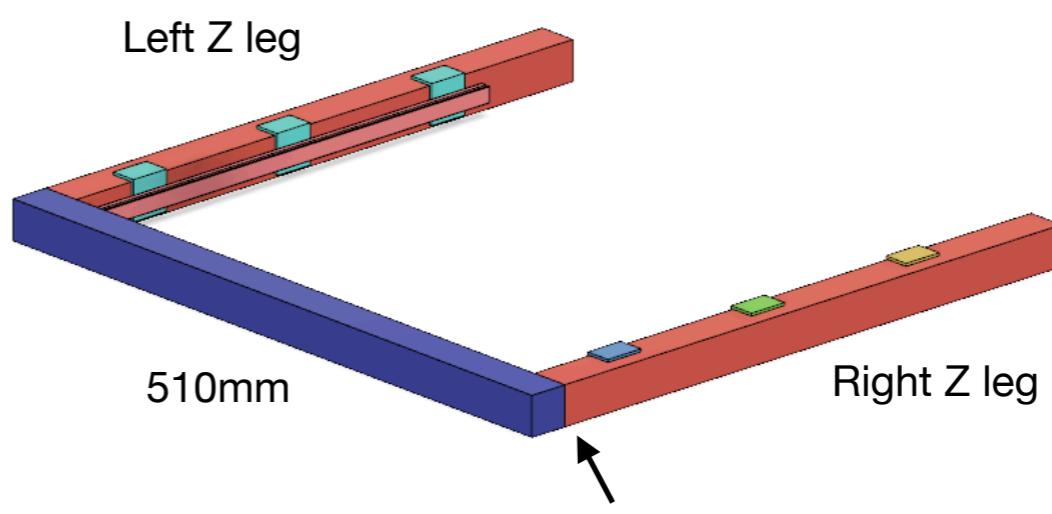
Action

Connect aluminum profiles with bolts.

If your aluminum profiles are not drilled and tapped, you can use two L-shape connectors instead. 3030 brackets won't work here due to interference with lead screw mount.

Exam

The Z frame should be flat when laid on a flat surface.



Z Frame

Assemble All Frames

- 8 corner sets

Action

Lay down the cube frame.

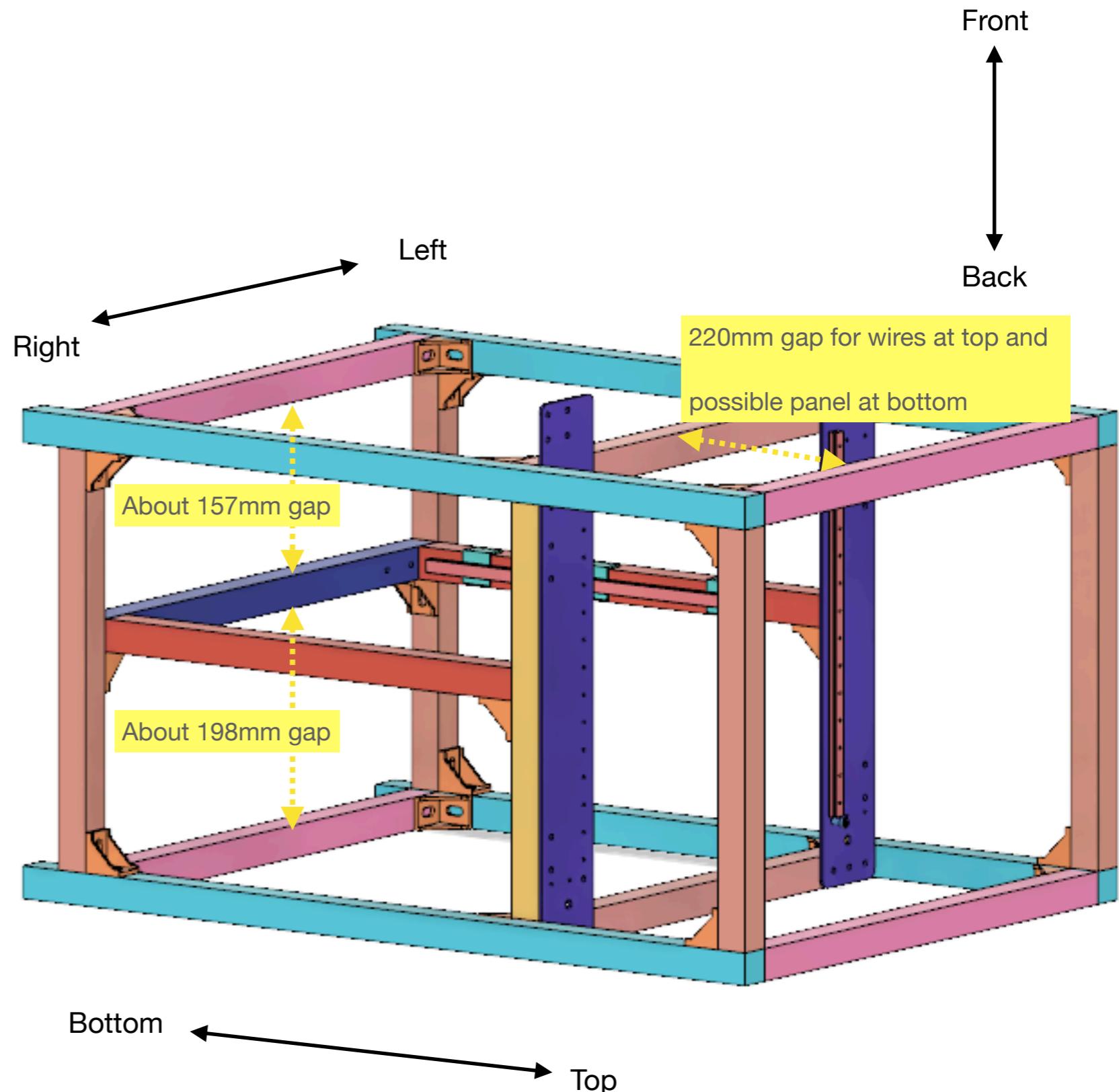
Insert and lock the XY frame with offset shown in the picture.

Insert and lock the Z frame with offset shown in the picture.

Exam

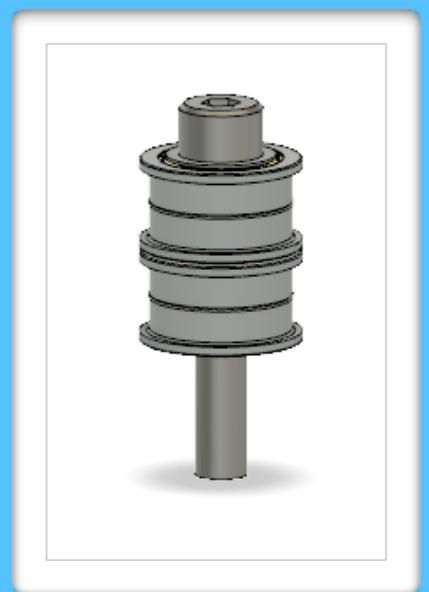
Beware of locations of the brackets.

If there are gaps between joint faces of aluminum profiles, loosen the bolts, adjust and then re-tighten.



8

XY Idler



Thicken Pulley Pillars

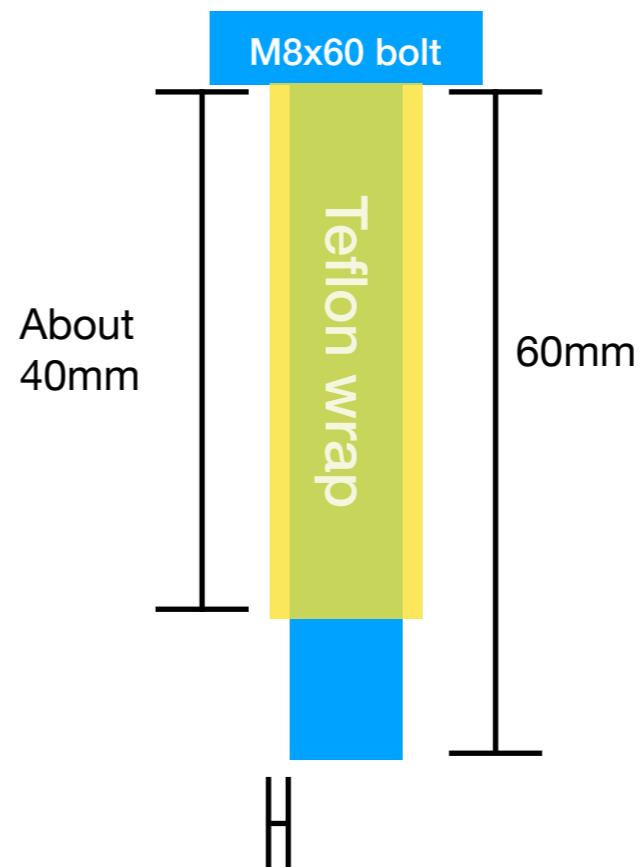
- Parts per pillar
 - 1 bolt M8 x 60
 - Teflon tape

Action

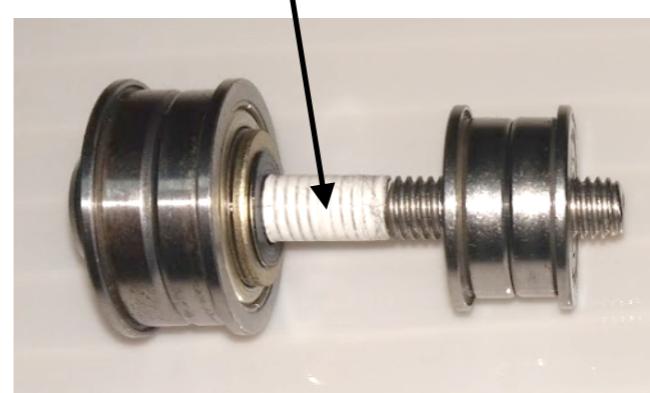
Evenly wrap the M8x60 bolt with teflon tape to make the bolt thicker.

For every millimeter 10 stacked layers will be enough.

Make 4 pillars, 2 for XY idlers, 2 for XY joiners.



About 10 layers of
teflon tape



XY Idler

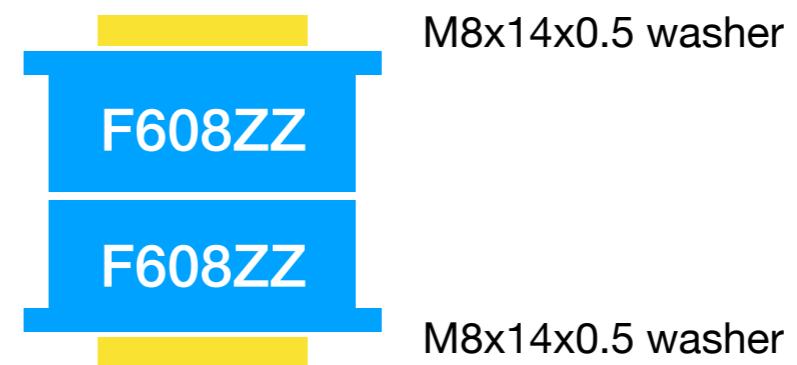
Assemble Left XY Idler

- 2 F608ZZ bearings
- 2 F6902ZZ bearings
- 1 3D-printed ABS liner
- 2 nuts M8
- 5 washers m8 x 14 x 0.5
- 8 washers m8 x 16 x 1.6



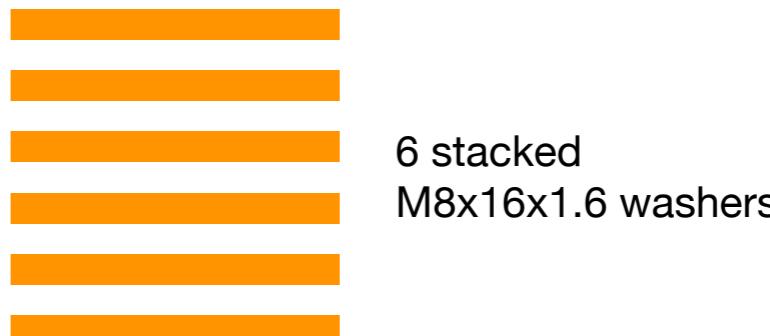
Action

- Stack washers and bearings correctly and lock nut on.



Exam

- Must use exact number of washers to create correct heights for the belts.
- Tighten the nut just enough for the bearings rotate freely and no vertical gap is left.
- Make sure Left & Right XY idler are differently stacked.



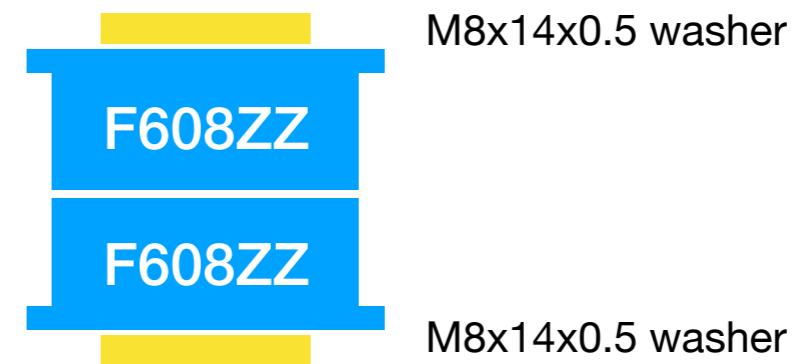
M8 nut

M8x16x1.6 washer

Left Y plate

M8 nut

XY Idler



Assemble Right XY Idler

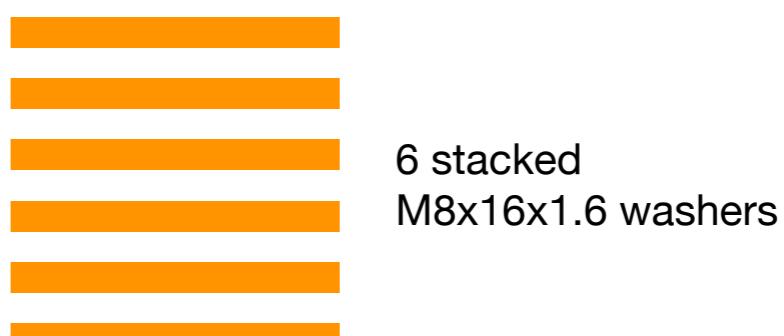
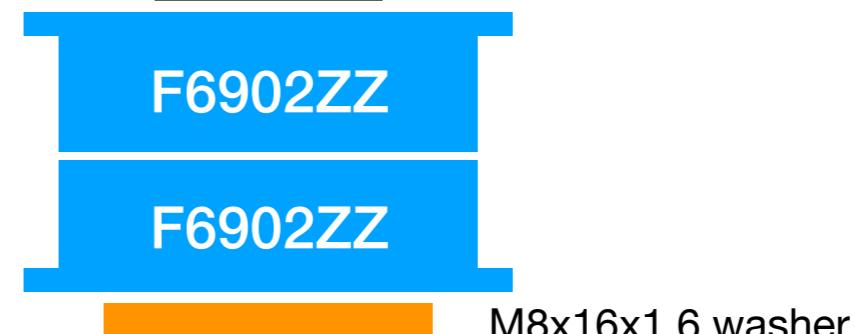
- 2 F608ZZ bearings
- 2 F6902ZZ bearings
- 1 3D-printed ABS liner
- 2 nuts M8
- 2 washers m8 x 14 x 0.5
- 9 washers m8 x 16 x 1.6

Action

- Stack washers and bearings correctly and lock nut on.

Exam

- Must use exact number of washers to create correct heights for the belts.
- Tighten the nut just enough for the bearings rotate freely and no vertical gap is left.
- Make sure Left & Right XY idler are differently stacked.



Assemble XY Idler

Exam

- Make sure Left & Right XY idler are differently stacked.

Left XY idler

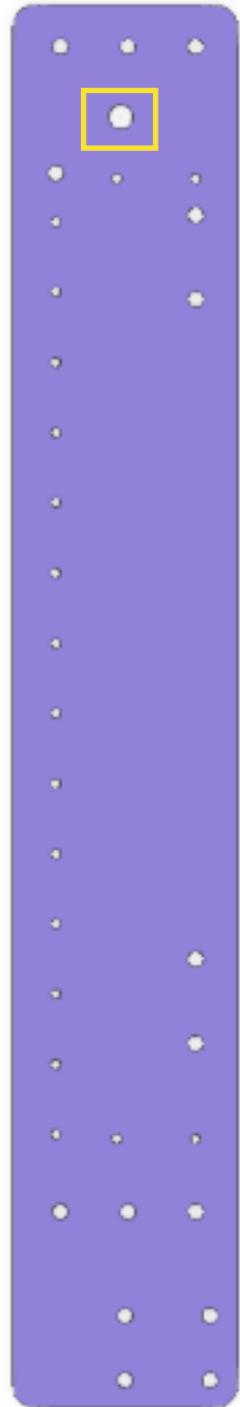


Right XY idler



This was replaced by washers for fine tuning heights more easily

Holes for XY Idlers

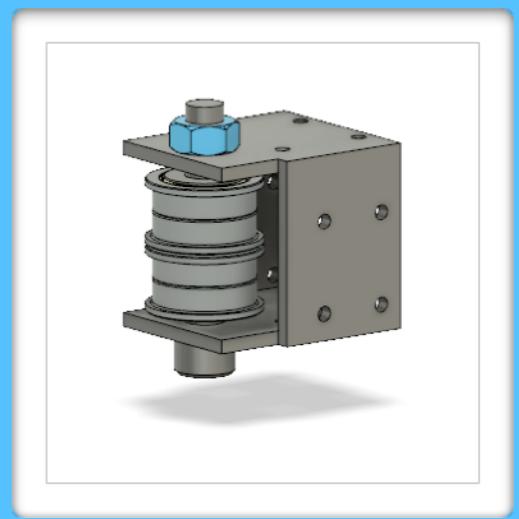


Left Y Plate

Right Y Plate

9

XY Joiner



Thicken The Pillars

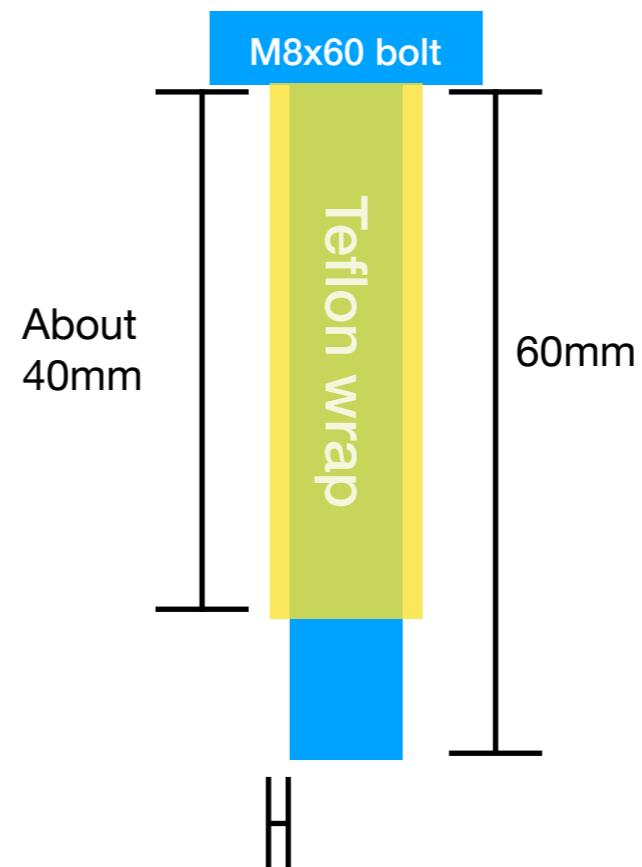
- Parts per pillar
 - 1 bolt M8 x 60
 - Teflon tape

Action

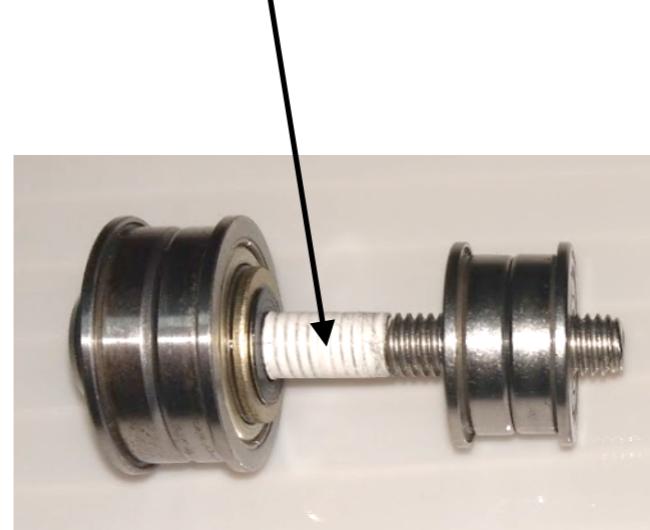
Evenly wrap 40mm of the M8x60 bolt with teflon tape to make the bolt thicker.

10 stacked layers will be enough.

Make 4 pillars, 2 for XY idlers, 2 for XY joiners.



About 10 layers thick of
teflon tape



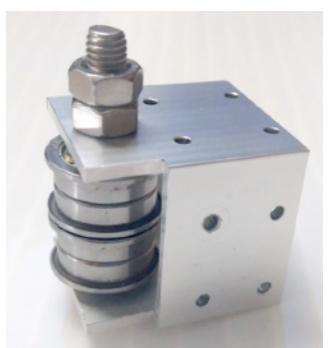
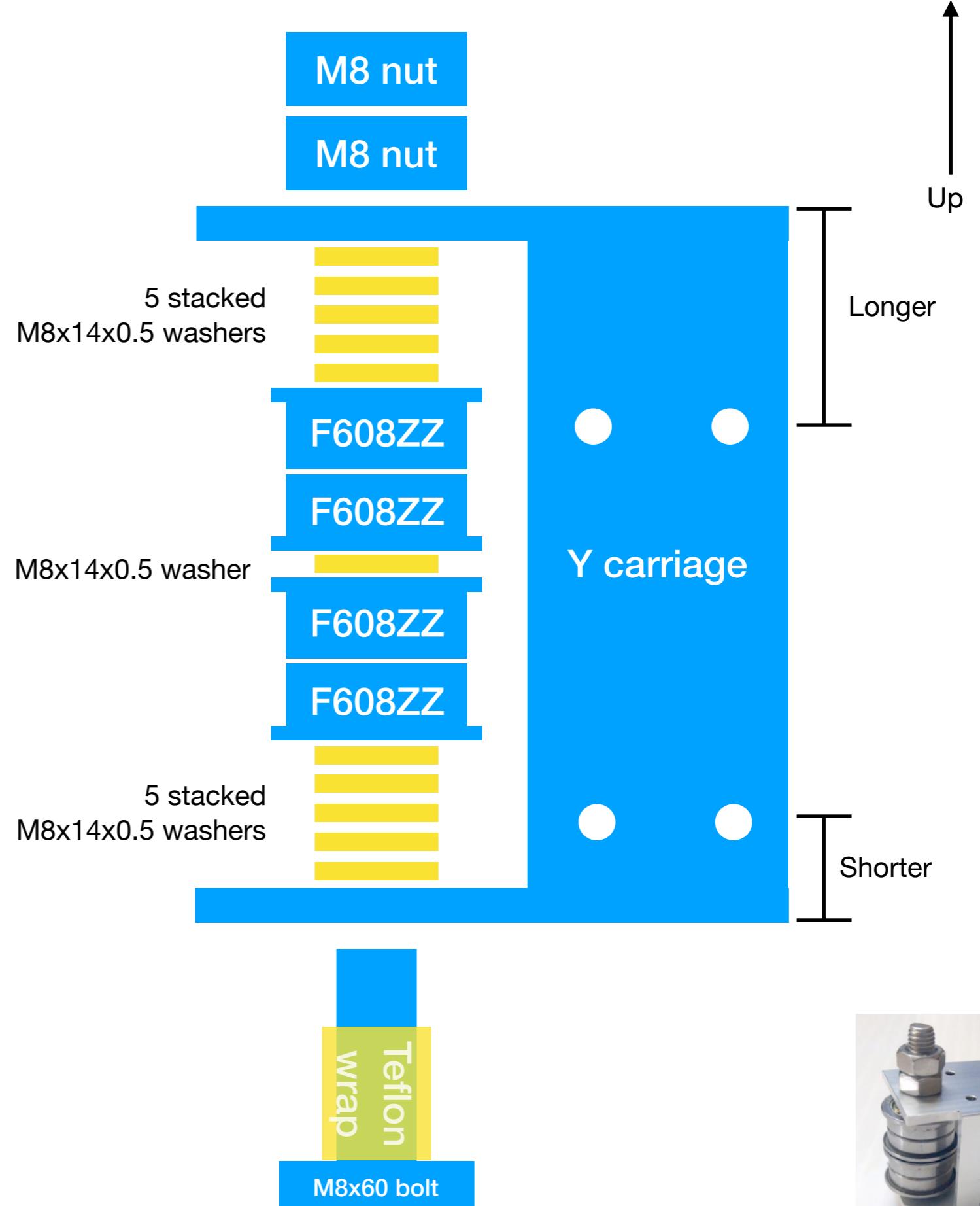
XY Joiner

Assemble XY Joiner

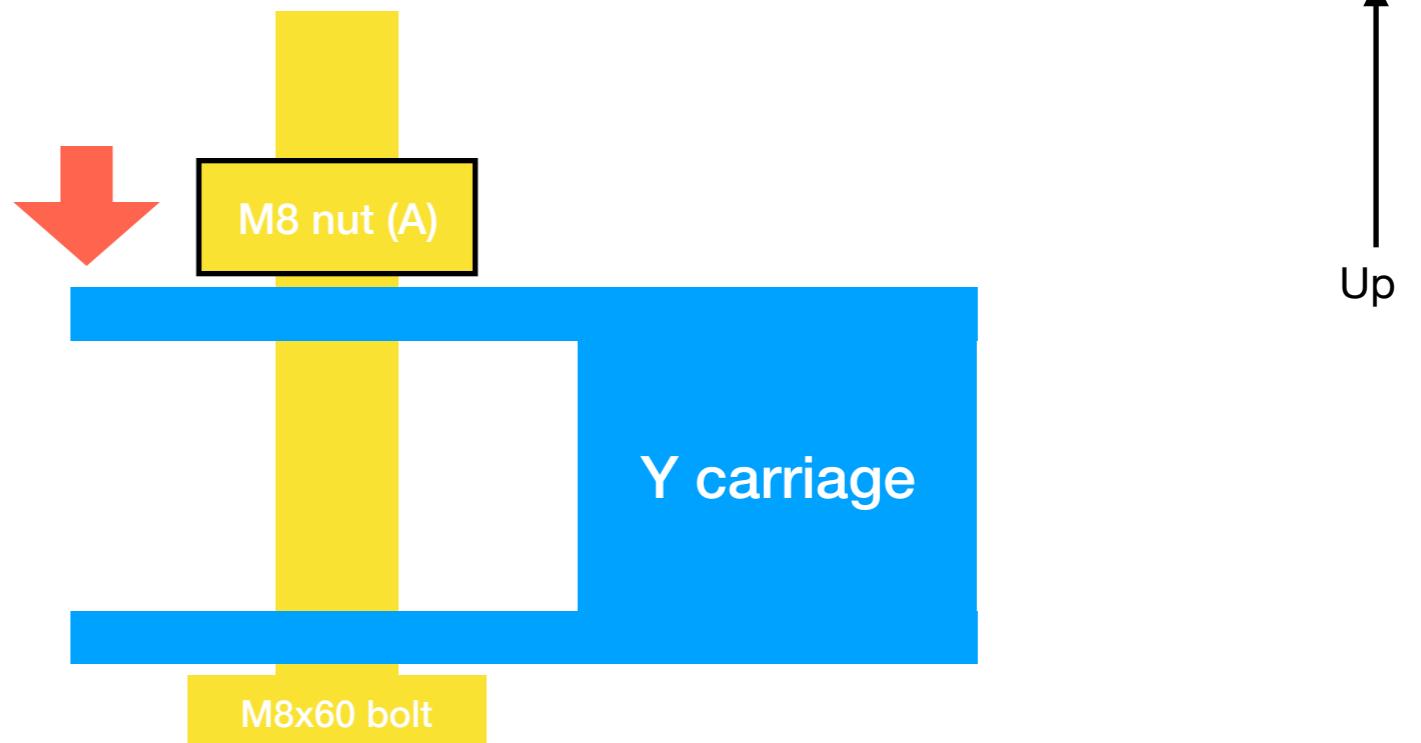
- 1 Y carriage
- 1 bolt M8 x 60
- 4 F608ZZ bearings
- 11 washers M8 x 14 x 0.5

Action

The heights were designed precisely, so you must stack washers and bearings as shown.



XY Joiner



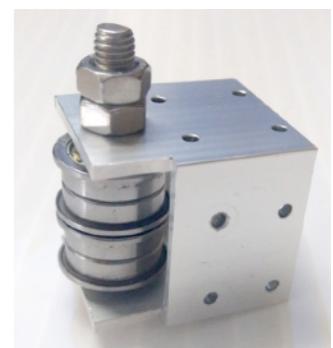
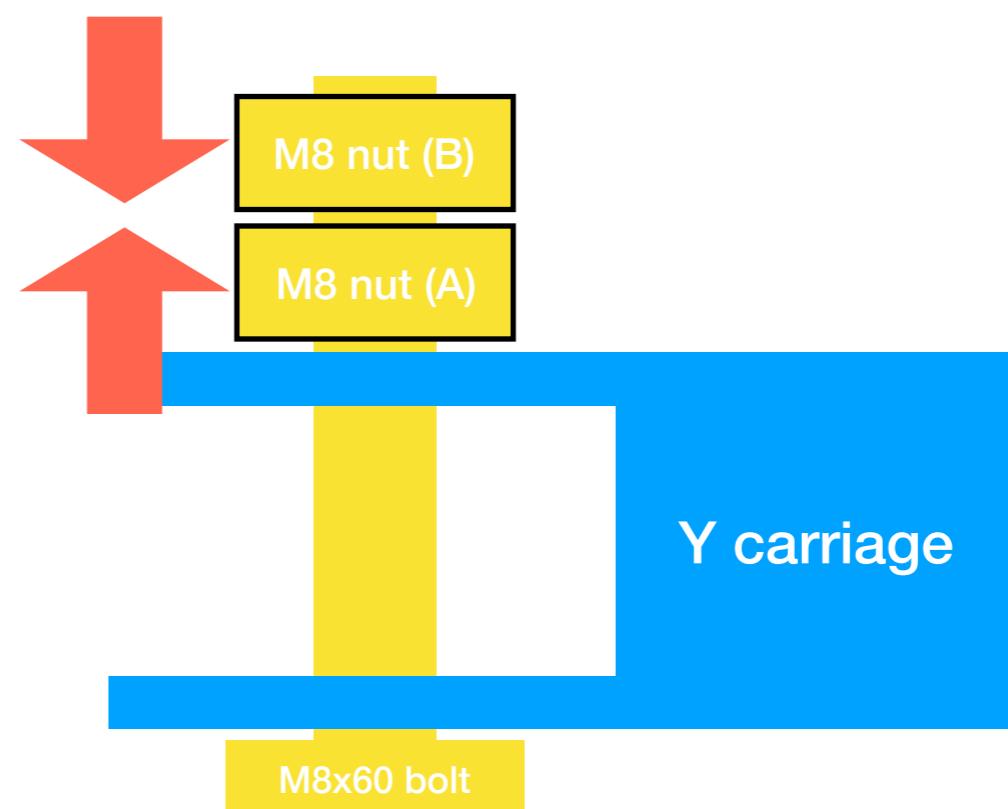
Assemble XY Joiner

Action

1. Fasten M8 nut (A) with smaller force so that bearings rotate freely and no vertical gap is left.
2. Fasten M8 nuts (A) and (B) with larger force to interlock both nuts.

Exam

Make sure the bearings rotate freely and no vertical gap is left.



Attach linear rails onto Y plates

- 350mm linear rail
- MGN12H linear block
- 5 bolts M3 x 15
- 5 nuts M3
- 5 washers M3 x 6 x 0.5

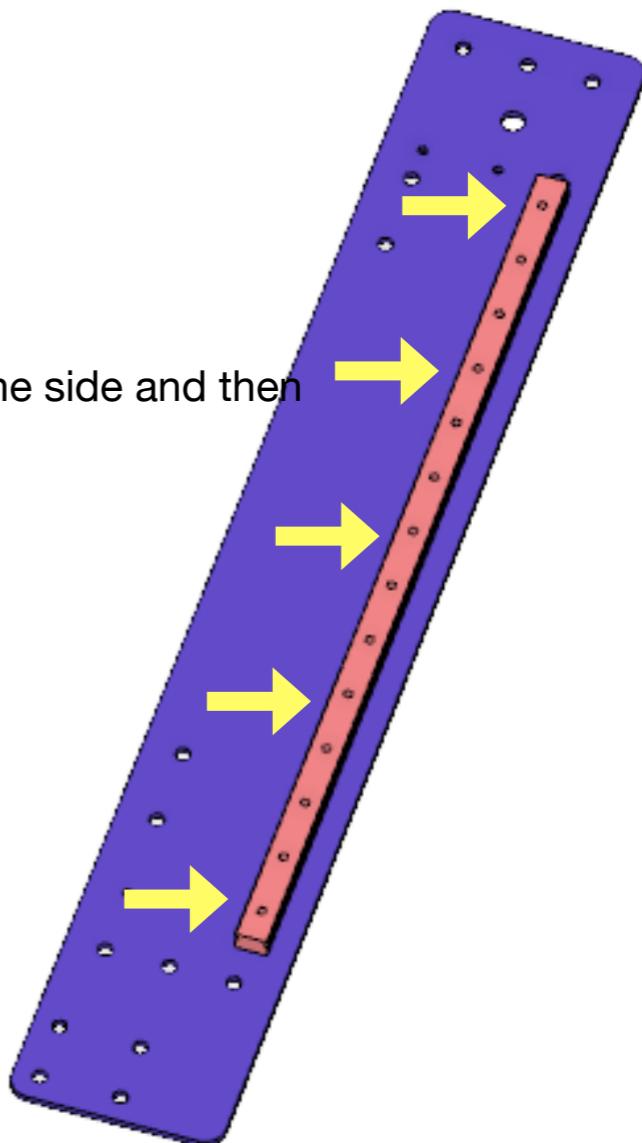
Action

Lock linear rail onto Y plate with bolts.
You don't have to fill all bolt holes
because rails don't afford that much
force as in a CNC machine. Just
spreading 5 bolts evenly and they are
more than enough.

Push linear rail against one side and
then fasten the bolts.

Carefully slide MGN12H onto Y linear
rails. Don't let it fall out!

Push the rail against one side and then
fasten the bolts



Holes for
Y metal stoppers

Make Y metal stoppers

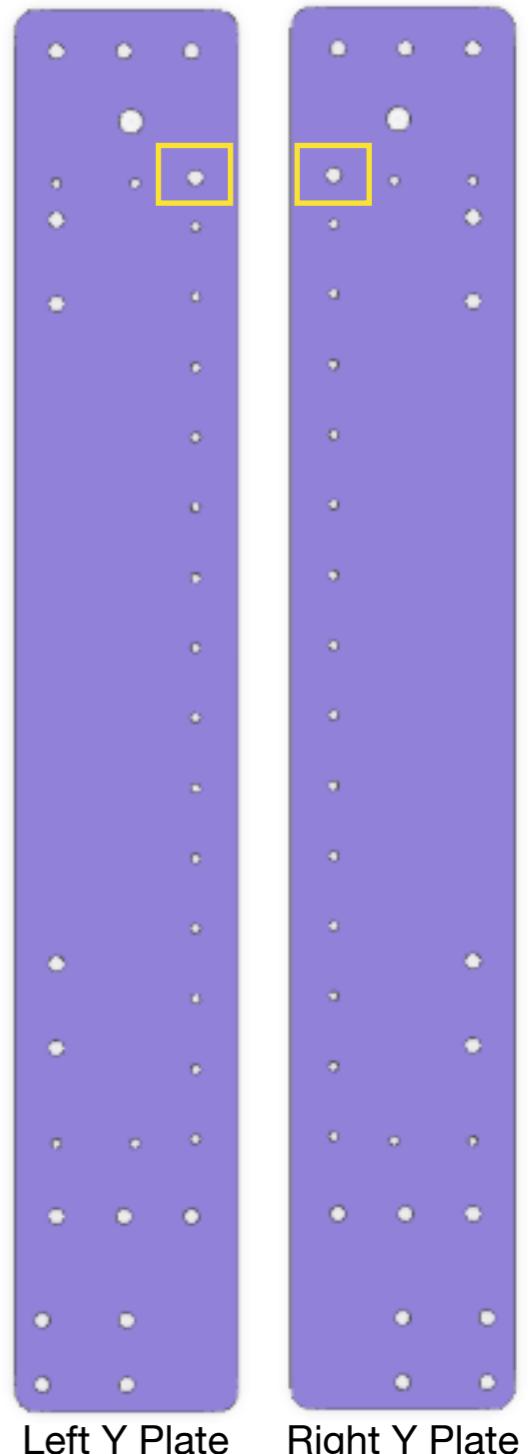
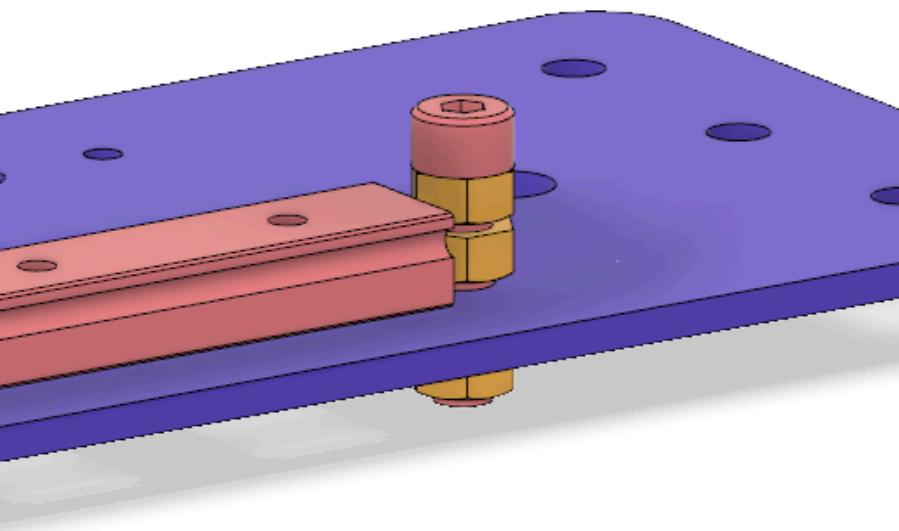
- 1 bolt M5 x 15
- 3 nuts M5
- 2 ABS printed endstop caps

Action

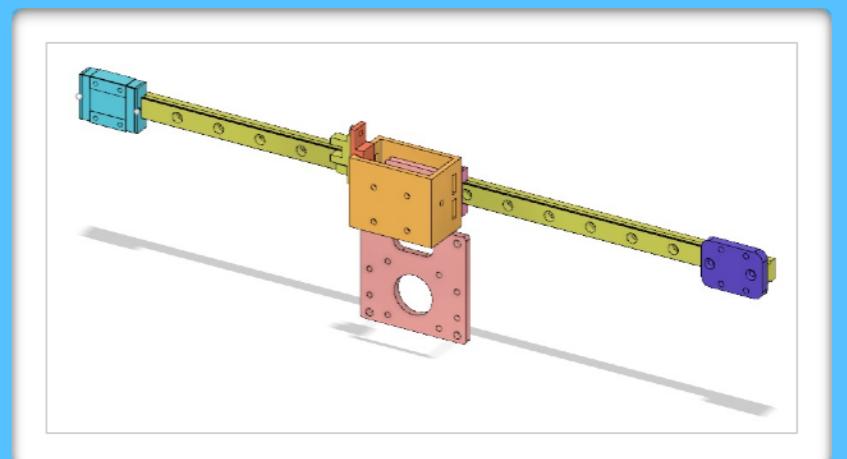
Stack and fasten nuts as shown to make a Y max physical stopper.

Make 2 stoppers for both left and right Y plates.

Put the caps onto bolts.



10 X Axis

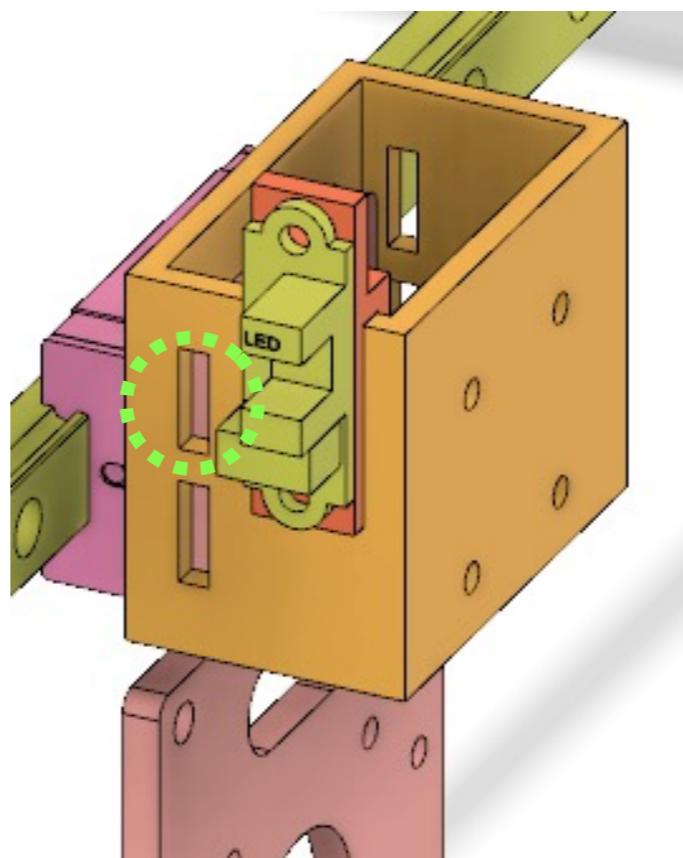


Attach one end of the XY belts

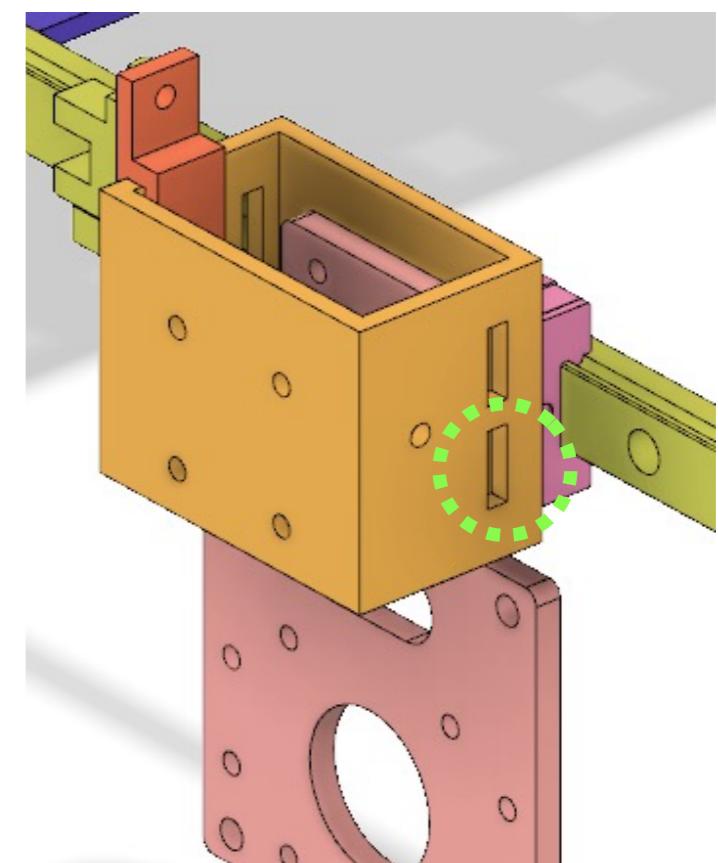
In this step we insert one end of the two XY belts into X carriage first, and will fix the other ends at later step.

Only the upper-left and lower-right holes at X carriage are used.

These gaps allow exactly 2 belts stacked tooth-by-tooth to pass through.



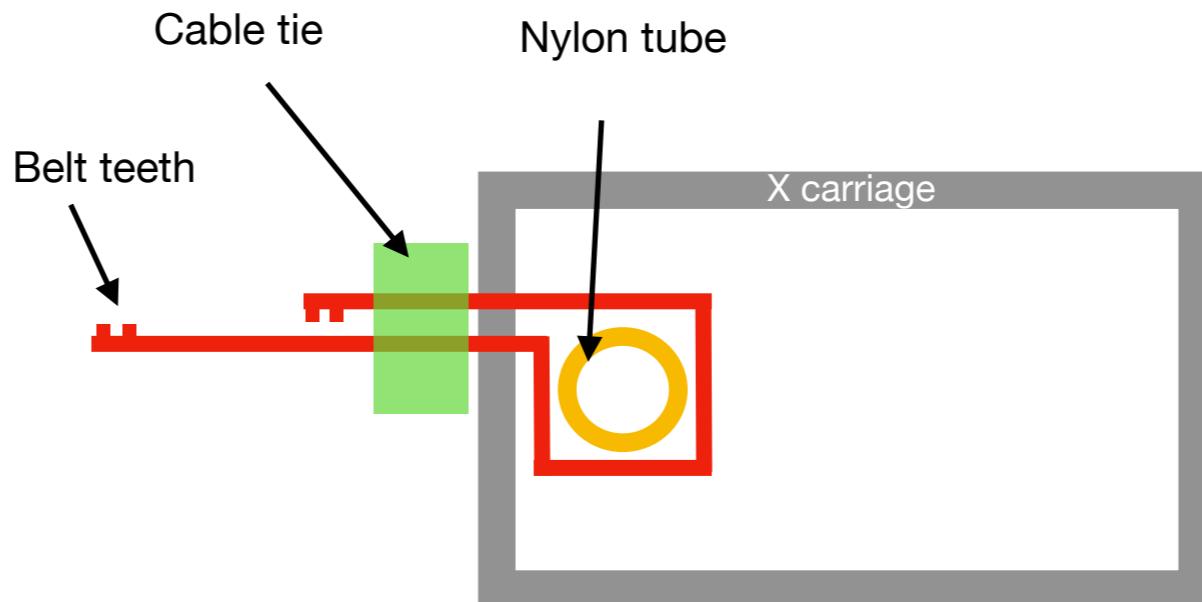
The upper-left hole



The lower-right hole

Attach Belt For Left Stepper

- X carriage
- 2GT 10mm belt
- 1 nylon tube
- Cable ties

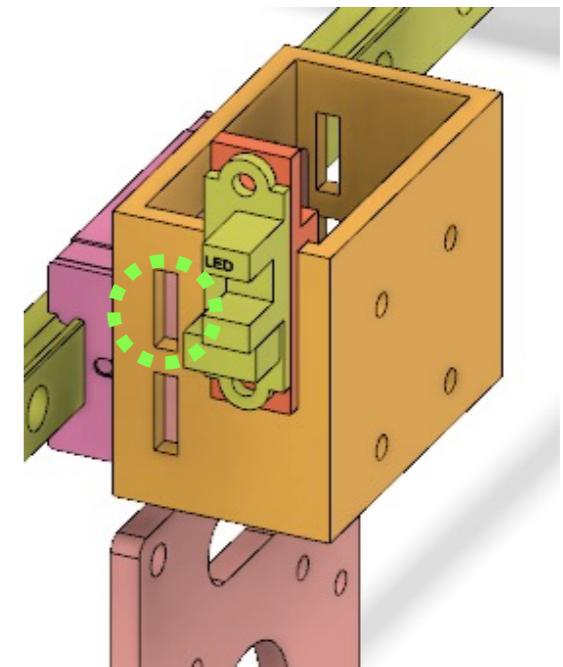


Actions

1. Don't attach X carriage onto X linear block here, so you get more space inside the X carriage.
2. Cut the 5-meter 10mm width belt into two equal length segments.
3. Insert belt into the upper-left hold at X carriage and fix the belt as shown in the picture.



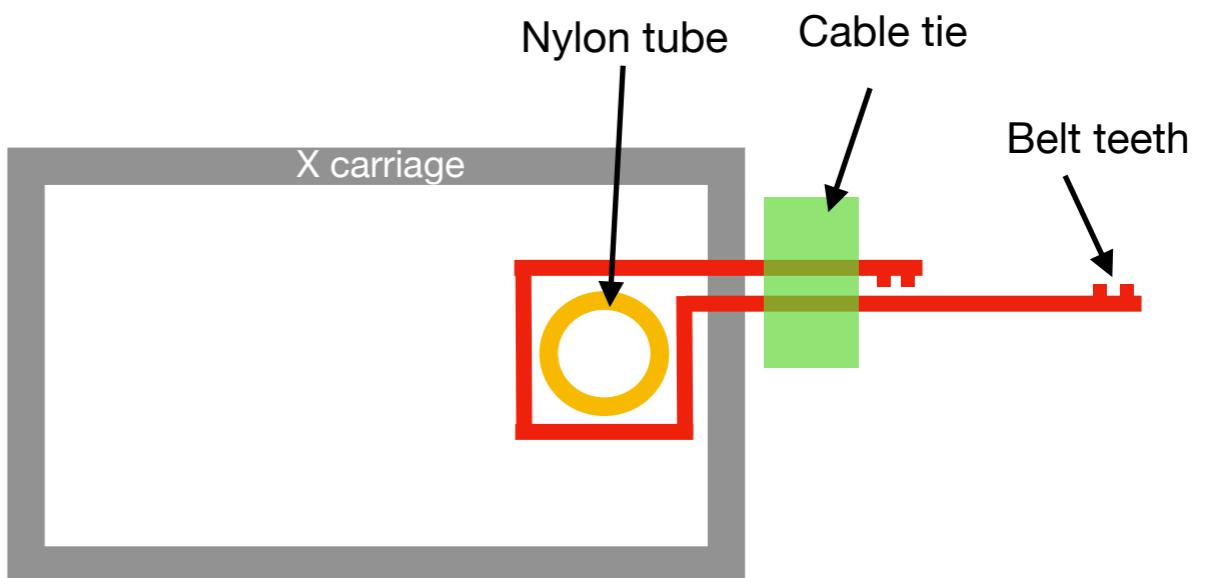
Nylon tube



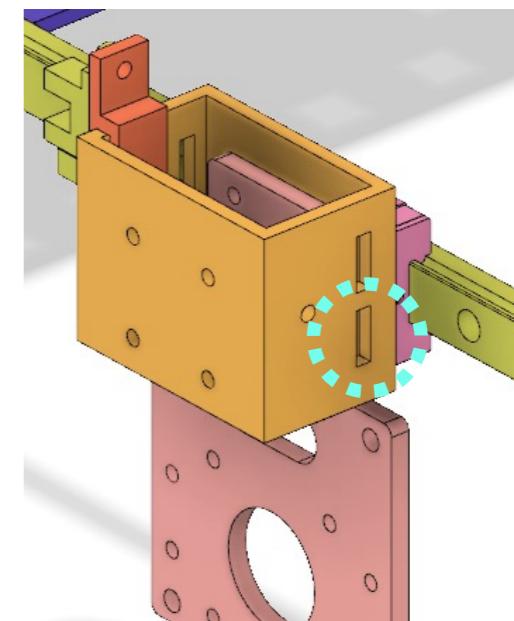
The upper-left hole

Attach Belt For Right Stepper

1. Get the other 2.5 meter belt.
2. Insert into the lower-right hole at X carriage and fix the belt as shown in the picture.



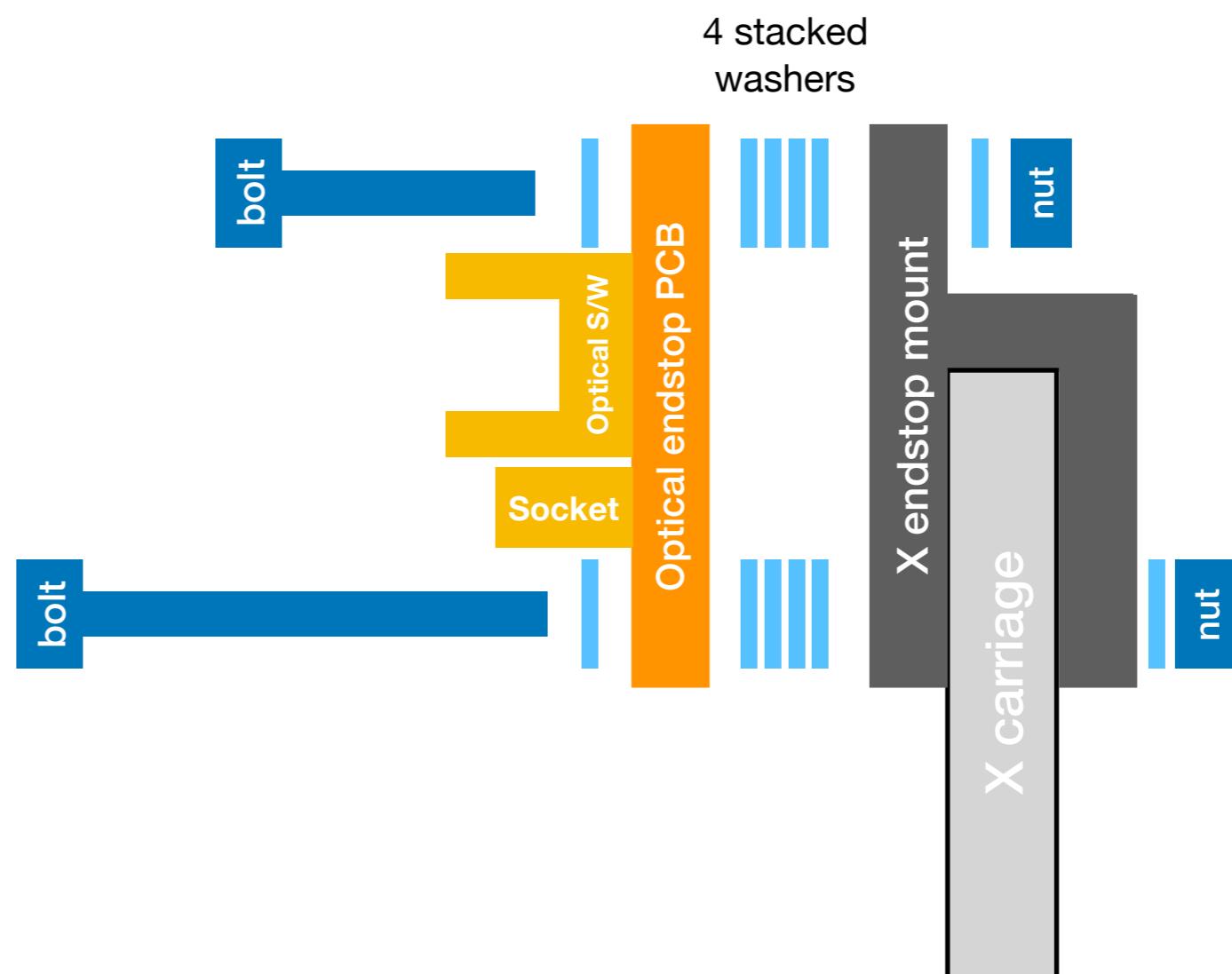
Nylon tube



Use the lower-right hole

Attach X Endstop to X Carriage

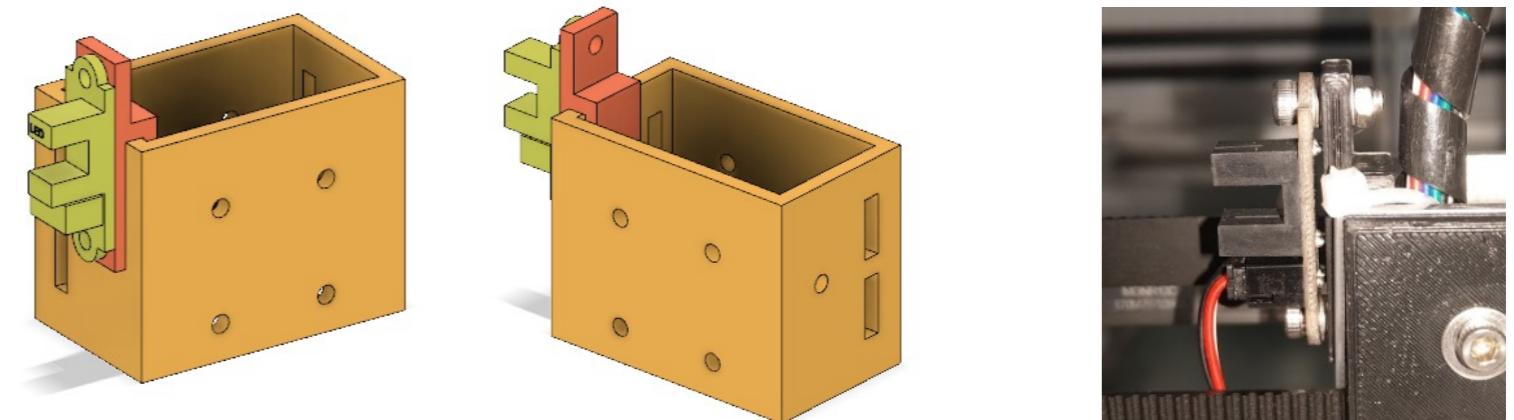
- 1 optical endstop
- 1 X endstop mount
- 1 bolt M3 x 10
- 1 bolt M3 x 15
- 2 nuts M3
- 12 washer M3 x 6 x 0.5



Action

Attach the endstop onto X carriage as shown in the picture.

Must use washers and do not fasten too hard since PCB and 3D printed ABS endstop mount are not that stiff.



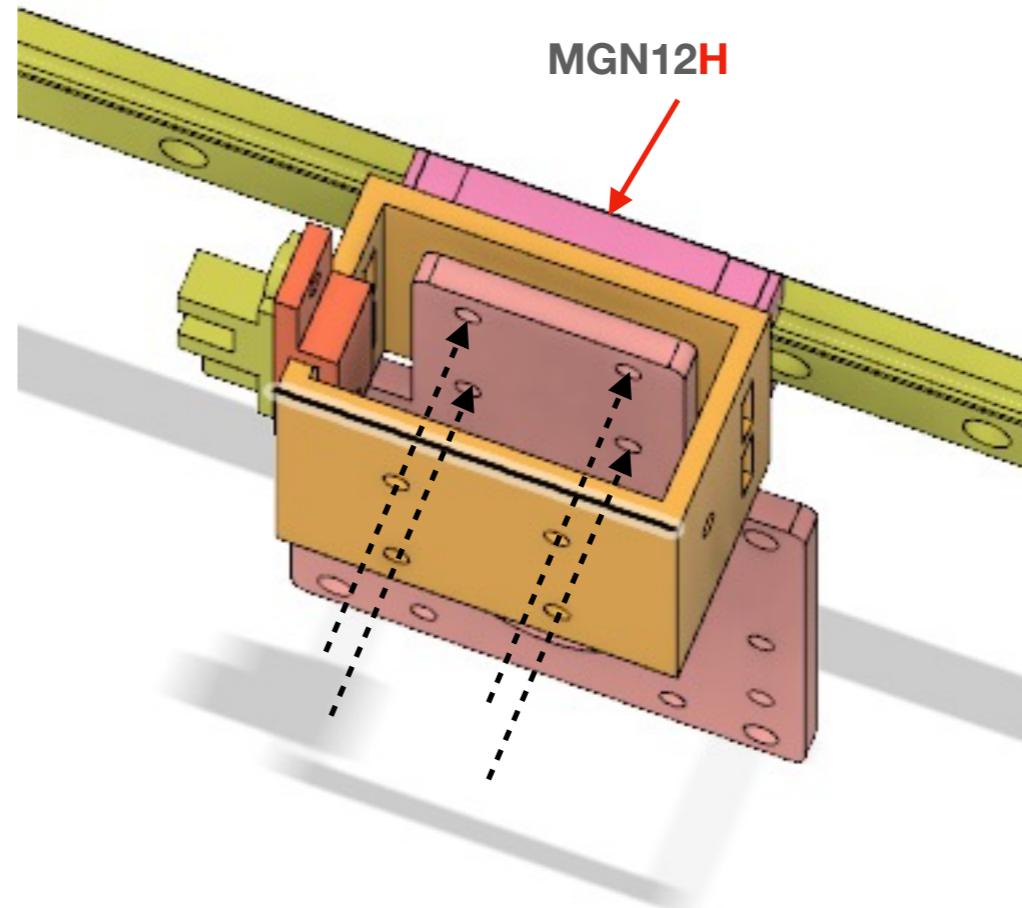
Attach X Carriage to Linear Rail

- 1 **MGN12H** linear block, not MGN12C
- X Carriage
- Extruder plate
- 4 bolts M3 x 10

Action

Carefully slide MGN12H linear block onto linear rail.

Attach extruder plate and X carriage onto linear rail with bolts.



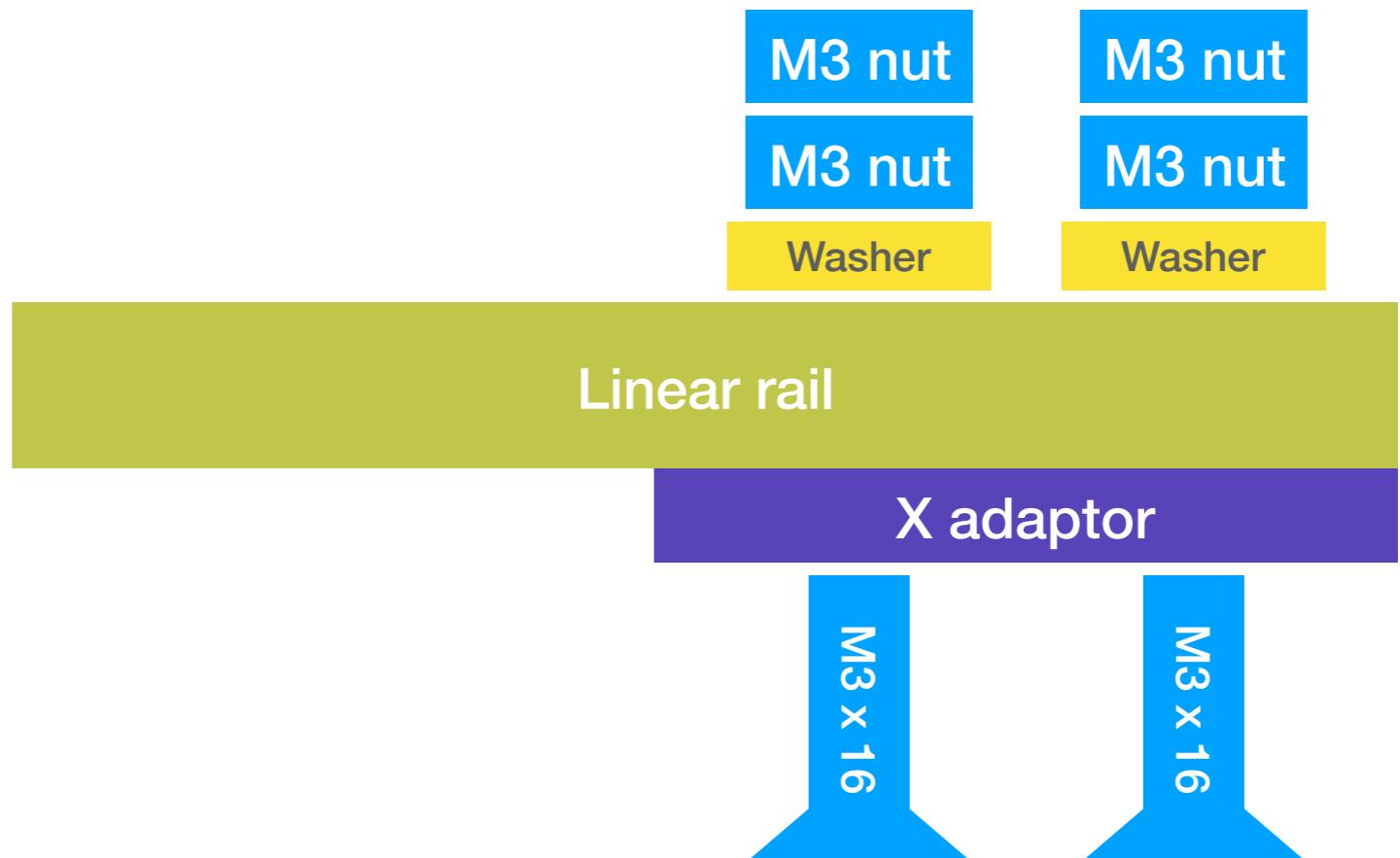
Exam

NEVER let the linear block fall out of rail.

It's **MGN12H**, not **MGN12C**.

Attach X Adaptor to Linear Rail

- 414mm linear rail
- X adaptor
- 2 countersunk bolts M3 x 16
- 2 washers M3 x 6 x 0.5
- 4 nuts M3

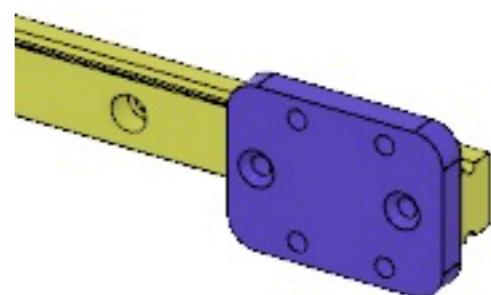


Action

Attach X adaptor onto linear rail with countersunk bolts and 2 interlocked nuts.



Countersunk bolts



Attach MGN12C to Linear Rail

- 1 **MGN12C** linear block, not MGN12H

Action

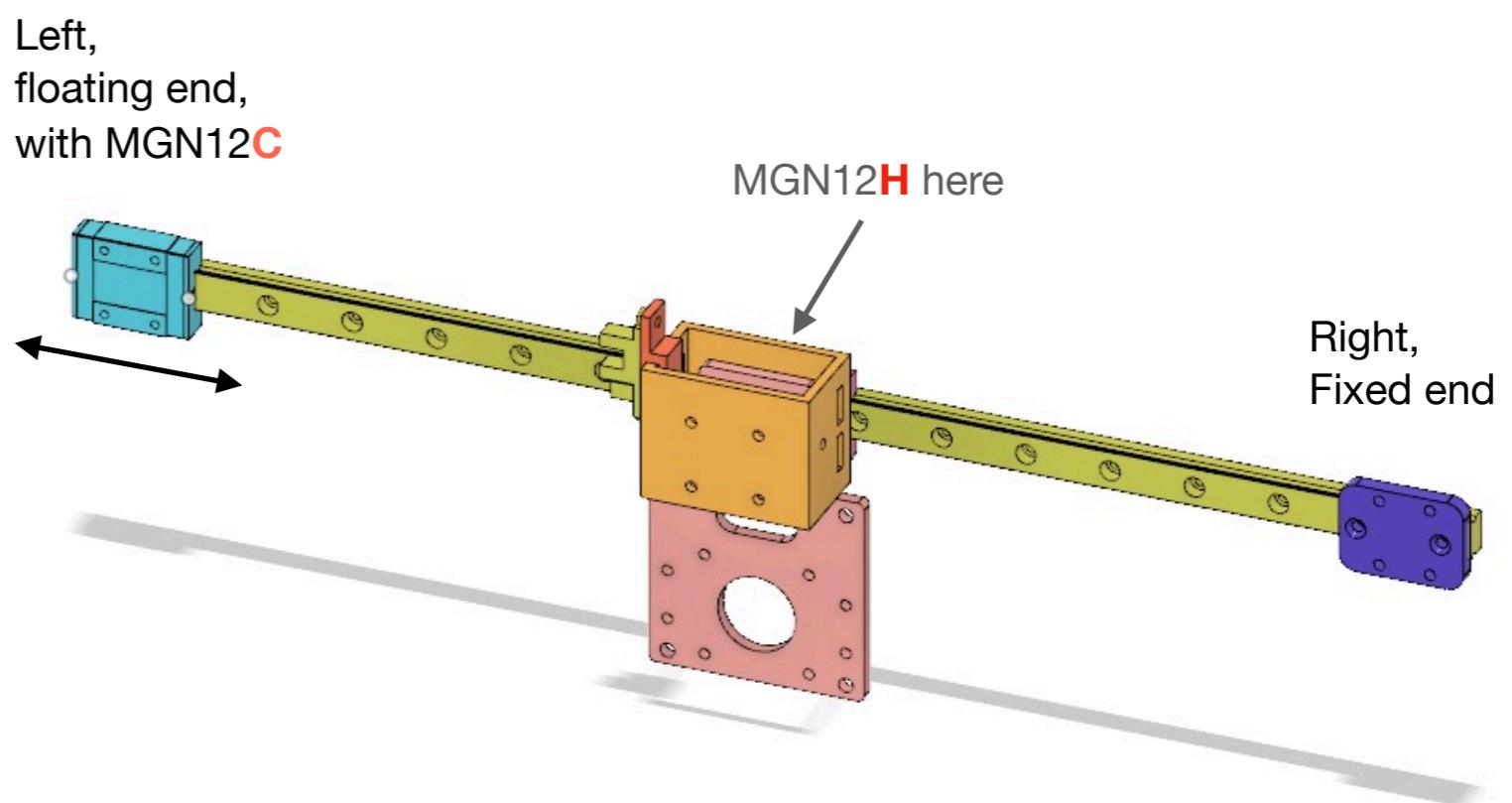
Carefully slide MGN12C linear block onto linear rail.

X axis is floating at this end to deal with thermal expansion.

Exam

NEVER let the linear block fall out of rail.

It's **MGN12C**, not **MGN12H**.



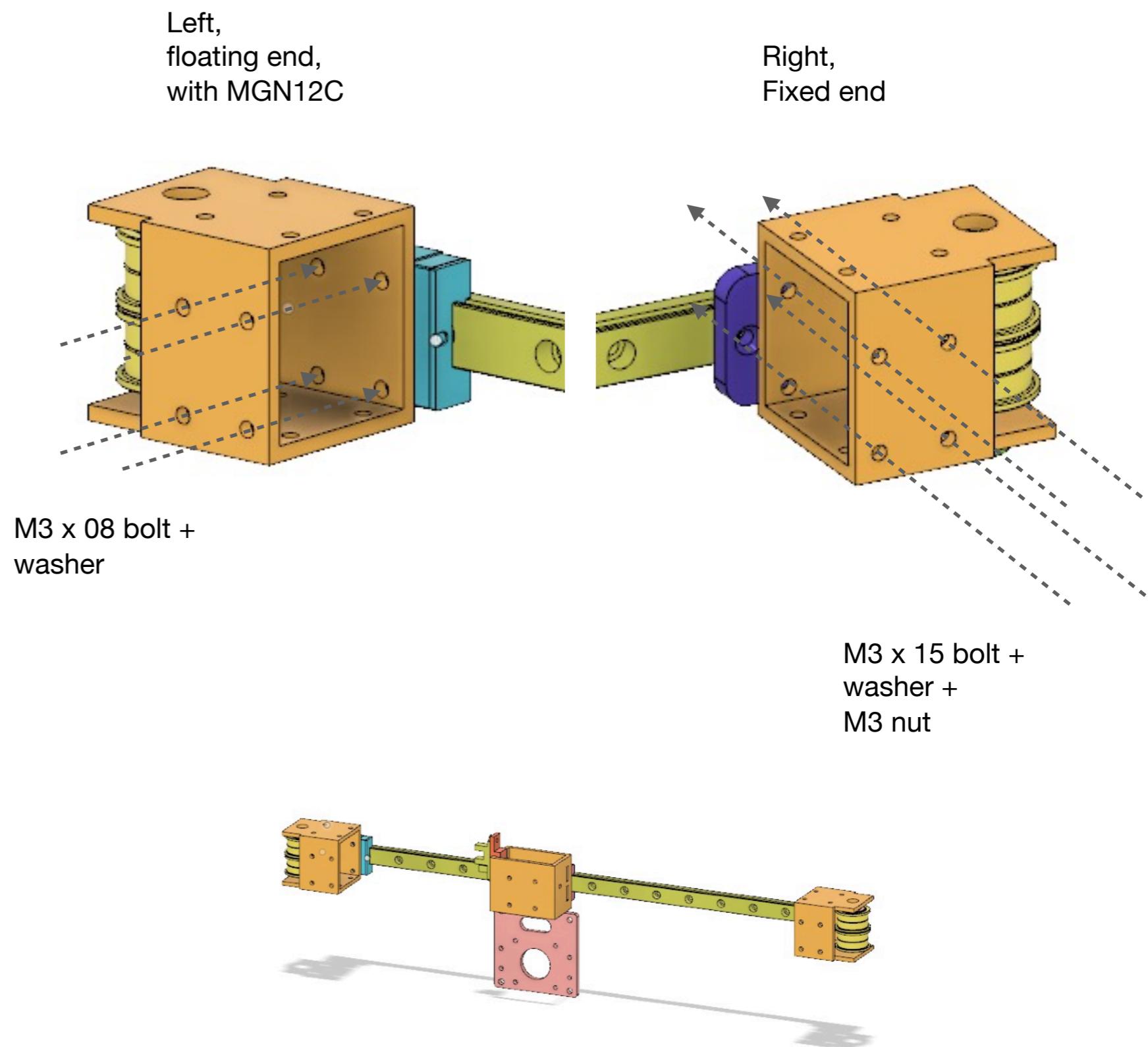
X Axis

Attach XY Joiners to X Axis

- 2 pre-assembled XY Joiners
- X Axis
- 4 bolts M3 x 08
- 4 bolts M3 x 15
- 10 washers M3 x 6 x 0.5

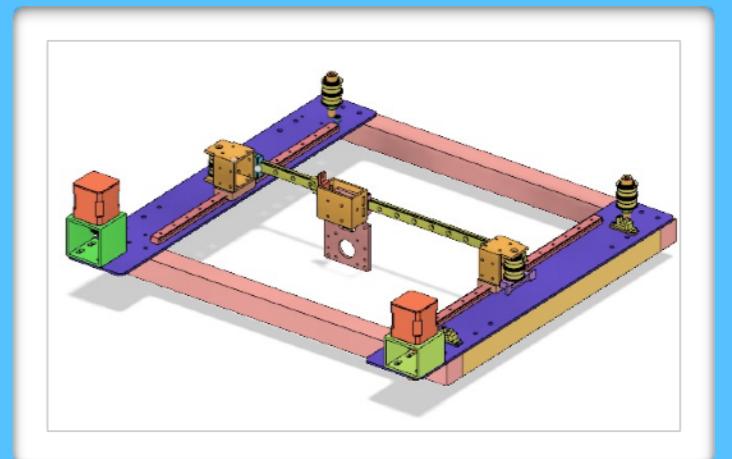
Action

Attach XY Joiners onto X Axis as shown in the picture.



11

XY Plane

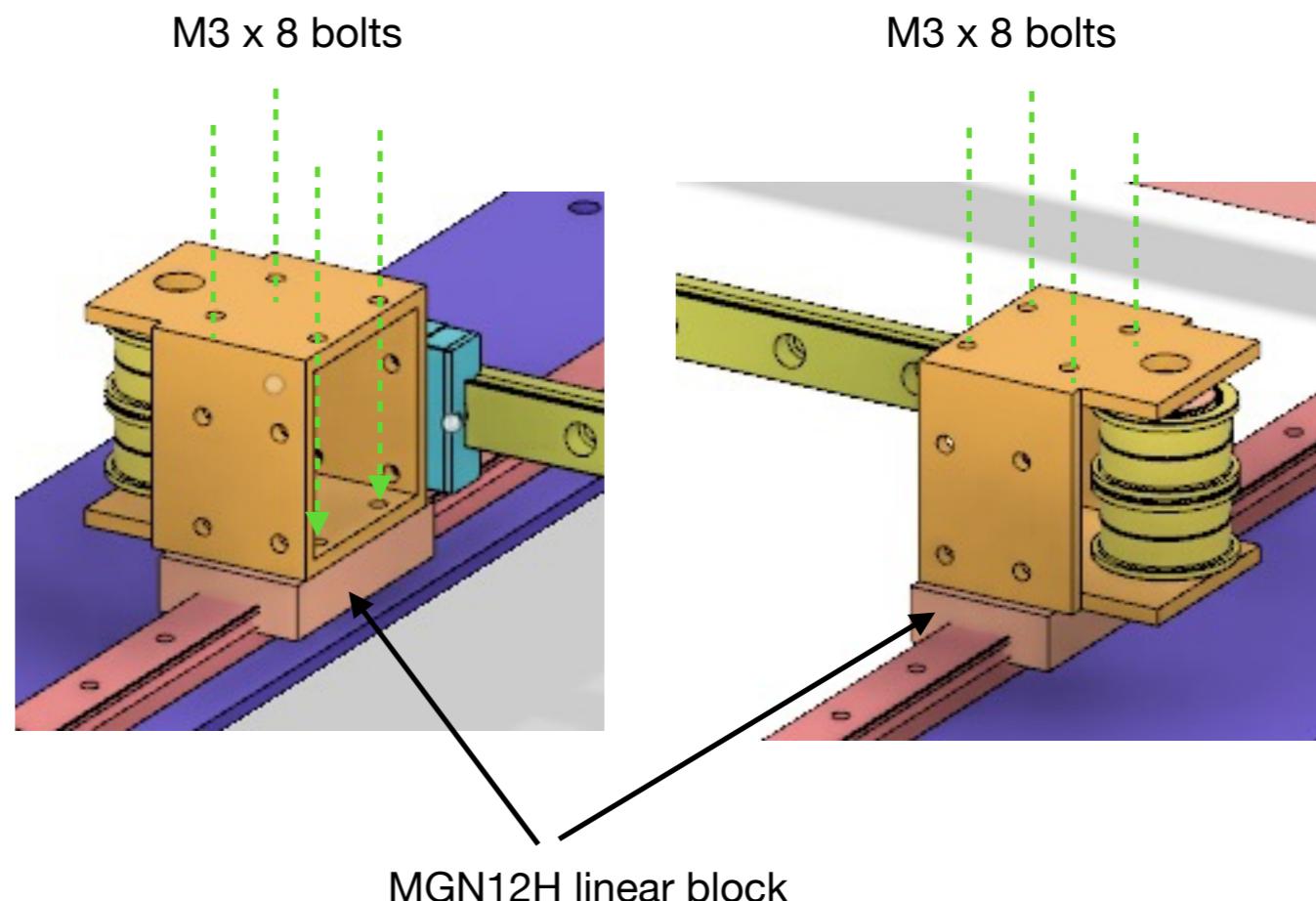


Attach X Axis onto XY Frame

- Pre-assembled X Axis
- 8 bolts M3 x 8
- 8 washers M3 x 6 x 0.5

Action

Attach XY Joiners onto X Axis with bolts as shown in the picture.



XY Plane

Right
Y carriage

Clip on Y endstop stick

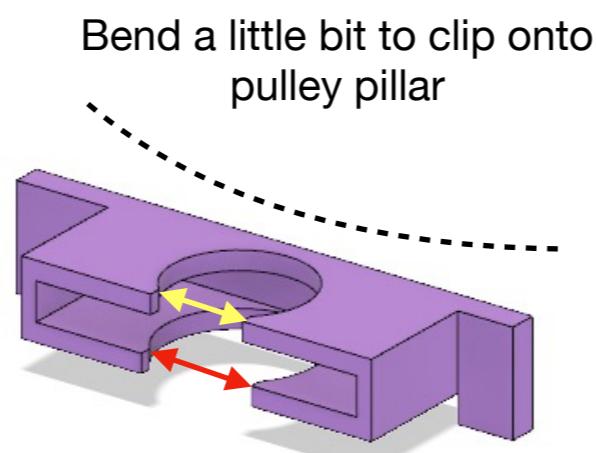
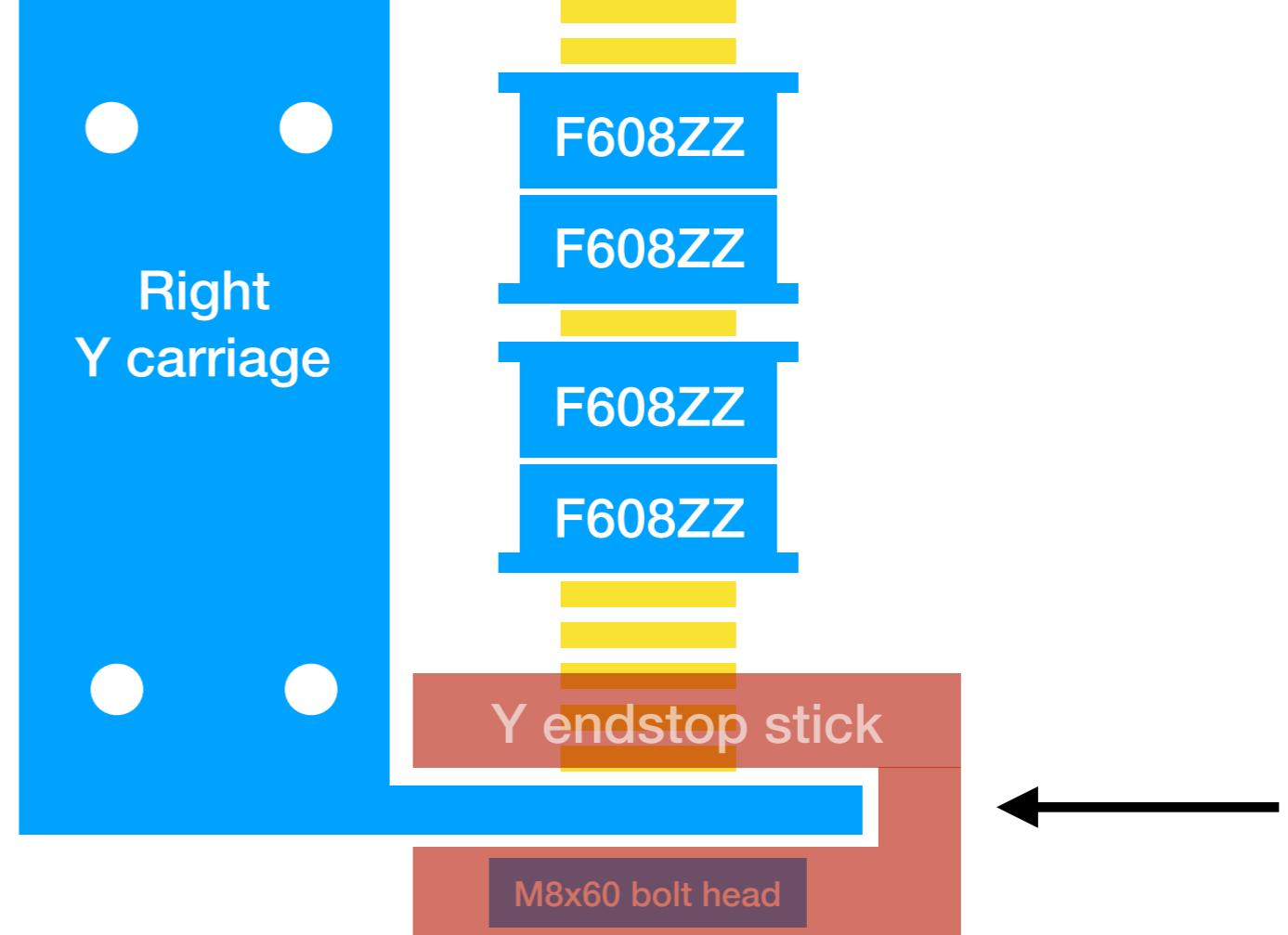
- 3D-printed ABS Y endstop stick

Action

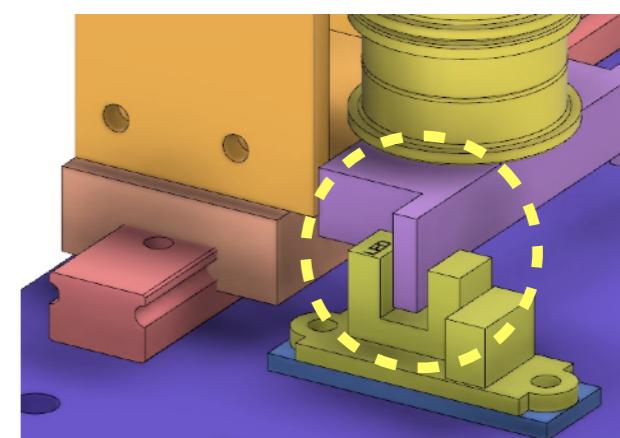
Bend the endstop stick a little bit so that it clips onto the bolt head and washers.

Exam

Make sure the stick will pass through optical endstop.



The opening is wider at bottom



Make sure the stick will pass
through optical endstop

Attach Stepper Mounts

- Left/Right stepper mounts
- 2 NEMA17 steppers
- 2 2GT 16T gears (5mm bore, 10mm belt)
- 8 bolts M3 x 8
- 8 bolts M5 x 10
- 8 nuts M3
- 8 nuts M5

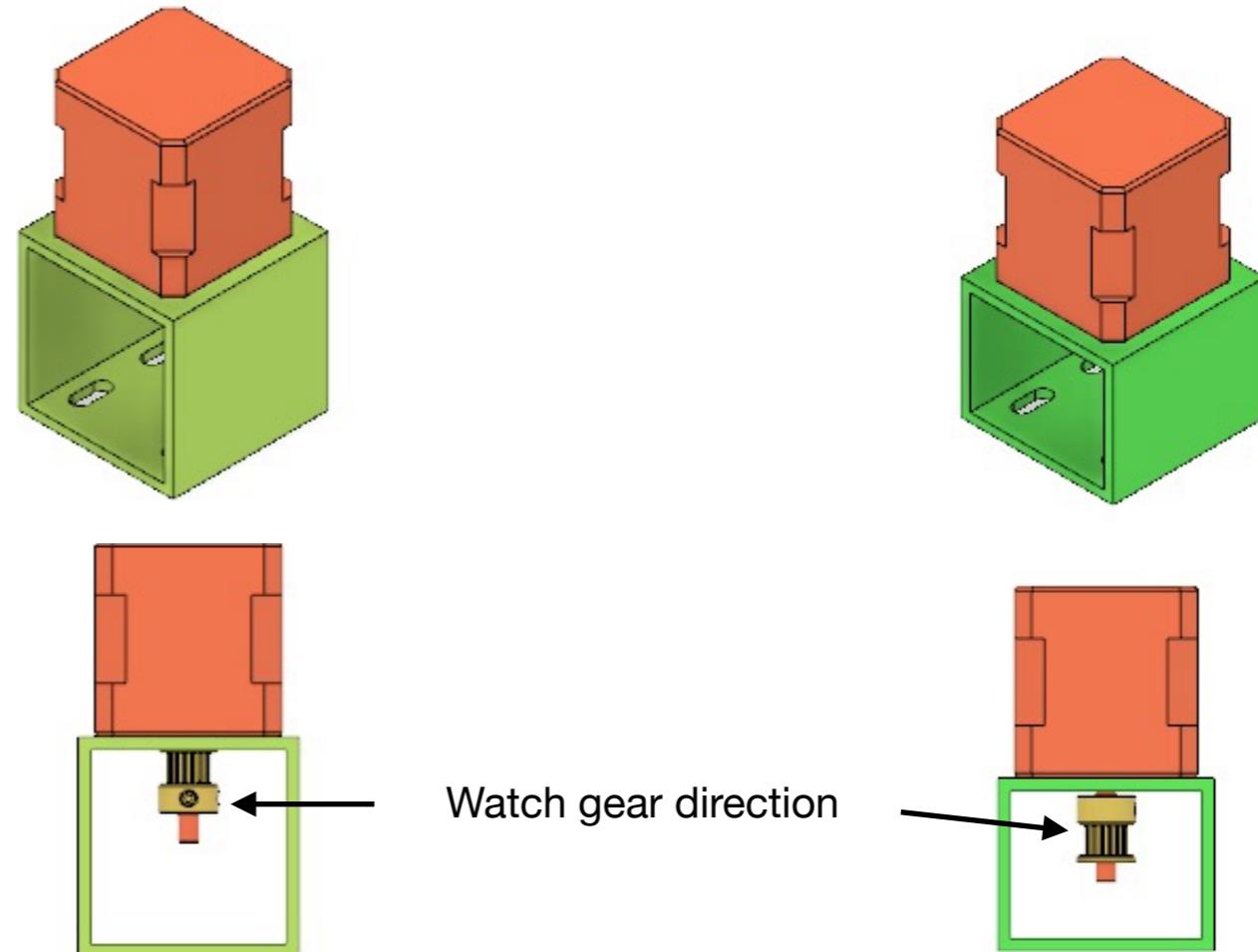
Action

Attach NEMA17s onto stepper mounts with M3 x 8 bolts. Use an M3 nut as washer to reduce thread length.

Attach stepper mounts onto Y plates.

Exam

Watch the directions of gears.



Left stepper mount is taller

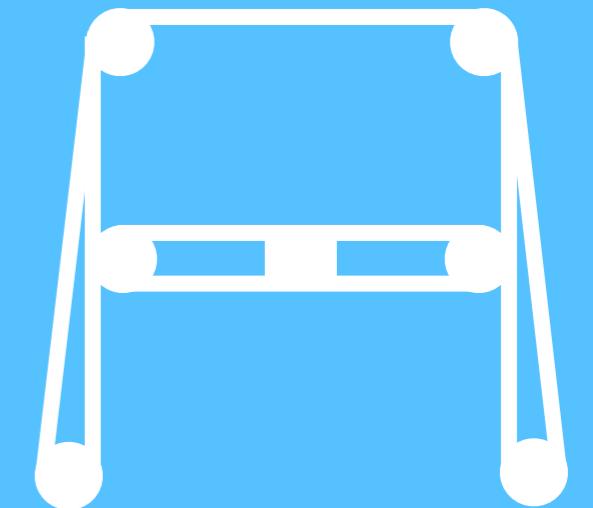
Right stepper mount is shorter



M3x8 is a little longer for NEMA17, so reduce thread length with a nut.

12

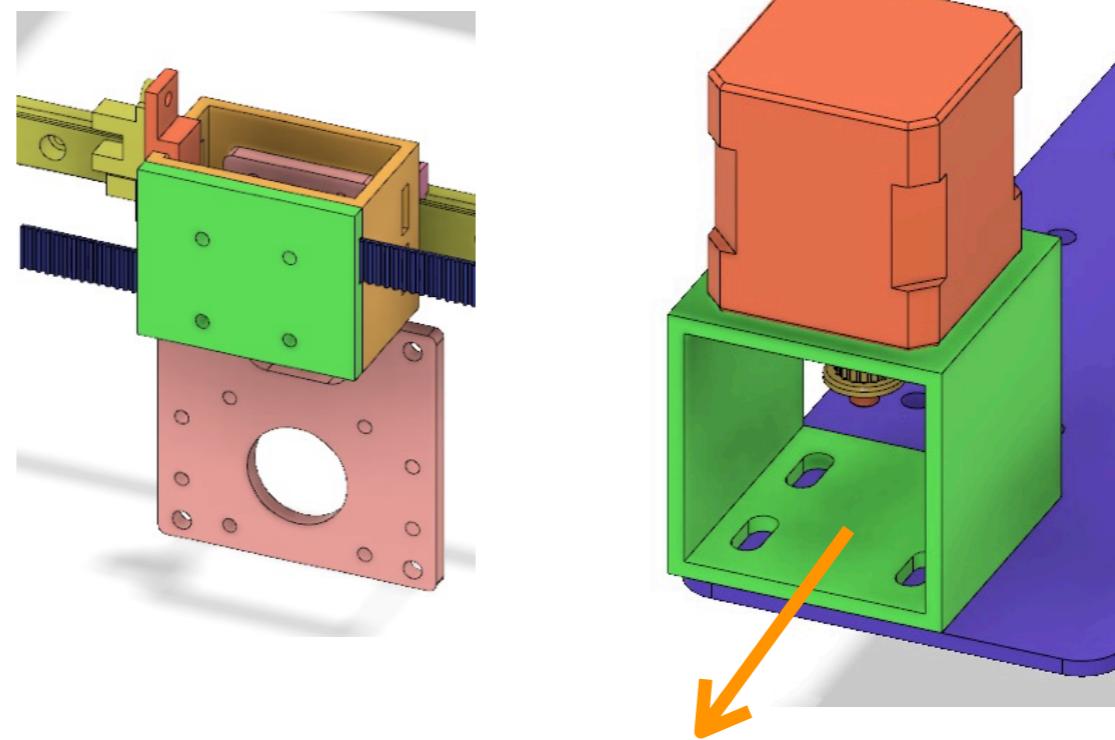
CoreXY Belts



XY Belt Tensioners

Belts are fixed with cable ties and a belt clamp at the X carriage.

You can adjust belt tension easily by pulling left/right stepper mounts.



Belts are fixed at X carriage

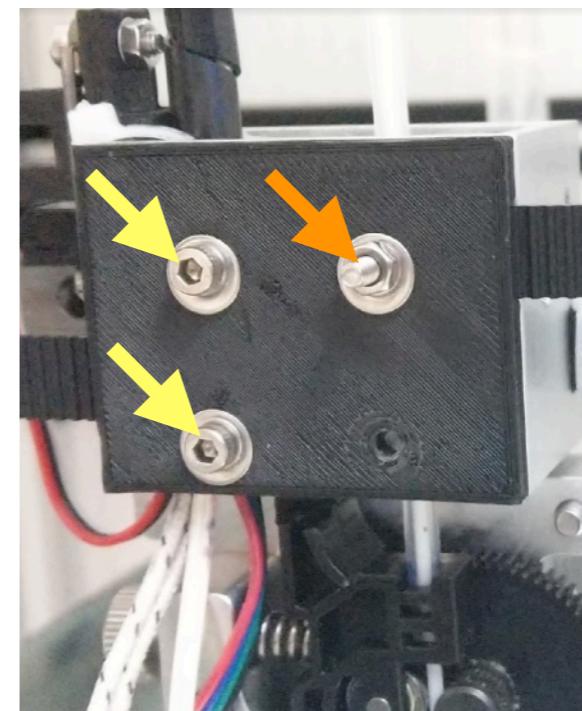
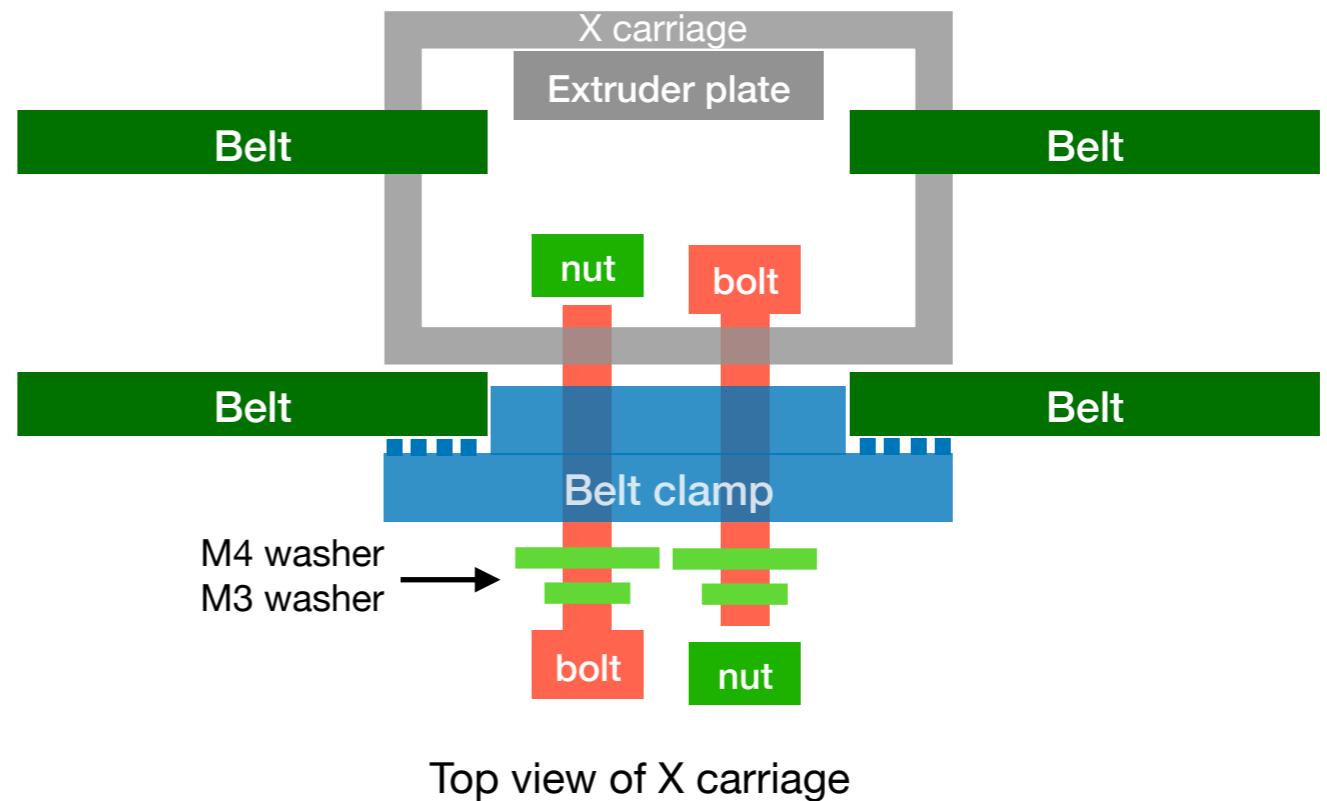
Easily pull stepper mount to
tense the belts

Belt Clamp

To prevent interfering with filament tube, use only 3 bolts to lock belt clamp onto X carriage.

The belt clamp is ABS printed. An M3 + M4 washers stack is used expand the area bearing pressure and to prevent plastic from deformation.

Also check directions of these 3 bolts.

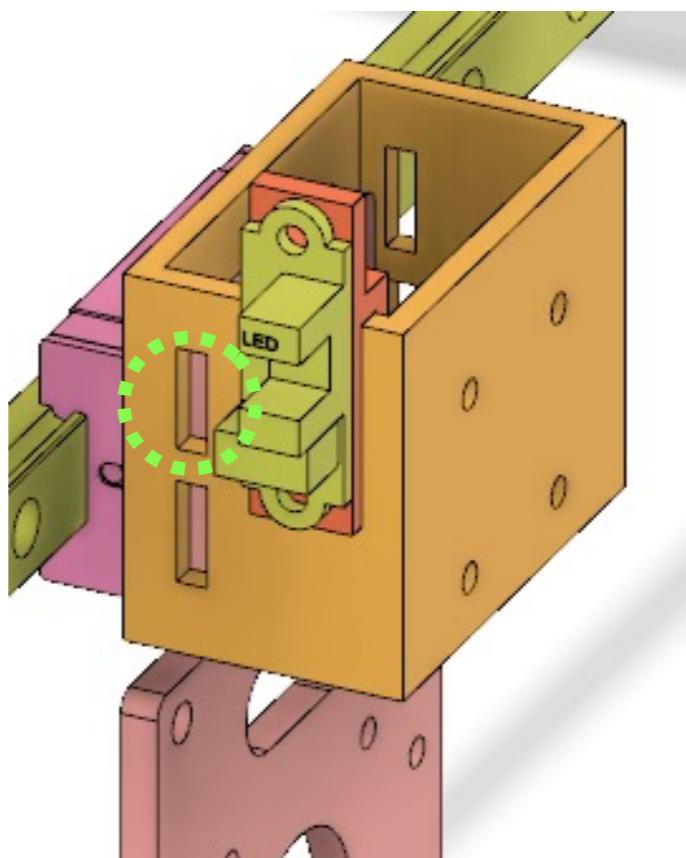


3 bolts and their directions

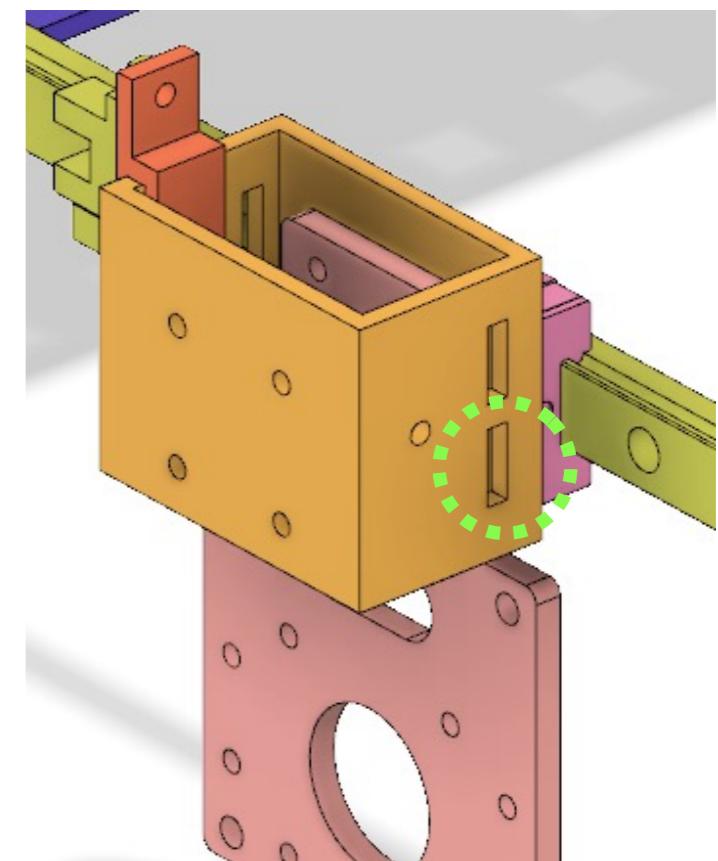
Attach Belt For Left Stepper

Use only the upper-left and lower-right gaps at X carriage.

These gaps allow exactly 2 belts stacked tooth-by-tooth to pass through.



The upper-left gap



The lower-right gap

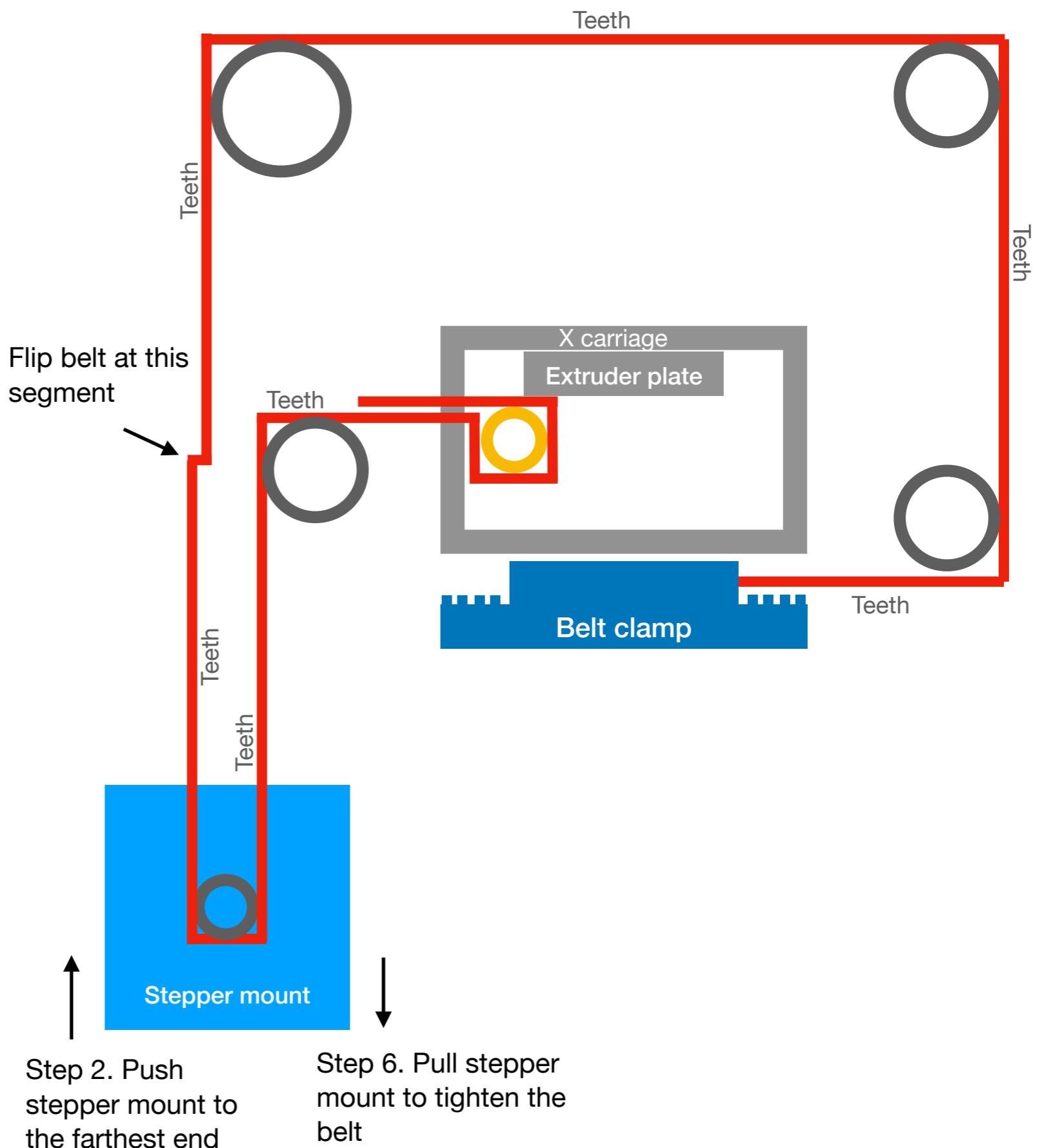
Attach Belt For Left Stepper

- 2GT 10mm belt
- 2 nylon tubes
- Cable ties

The face of belt teeth is indicated in the picture. Also note the segment for you to flip belt.

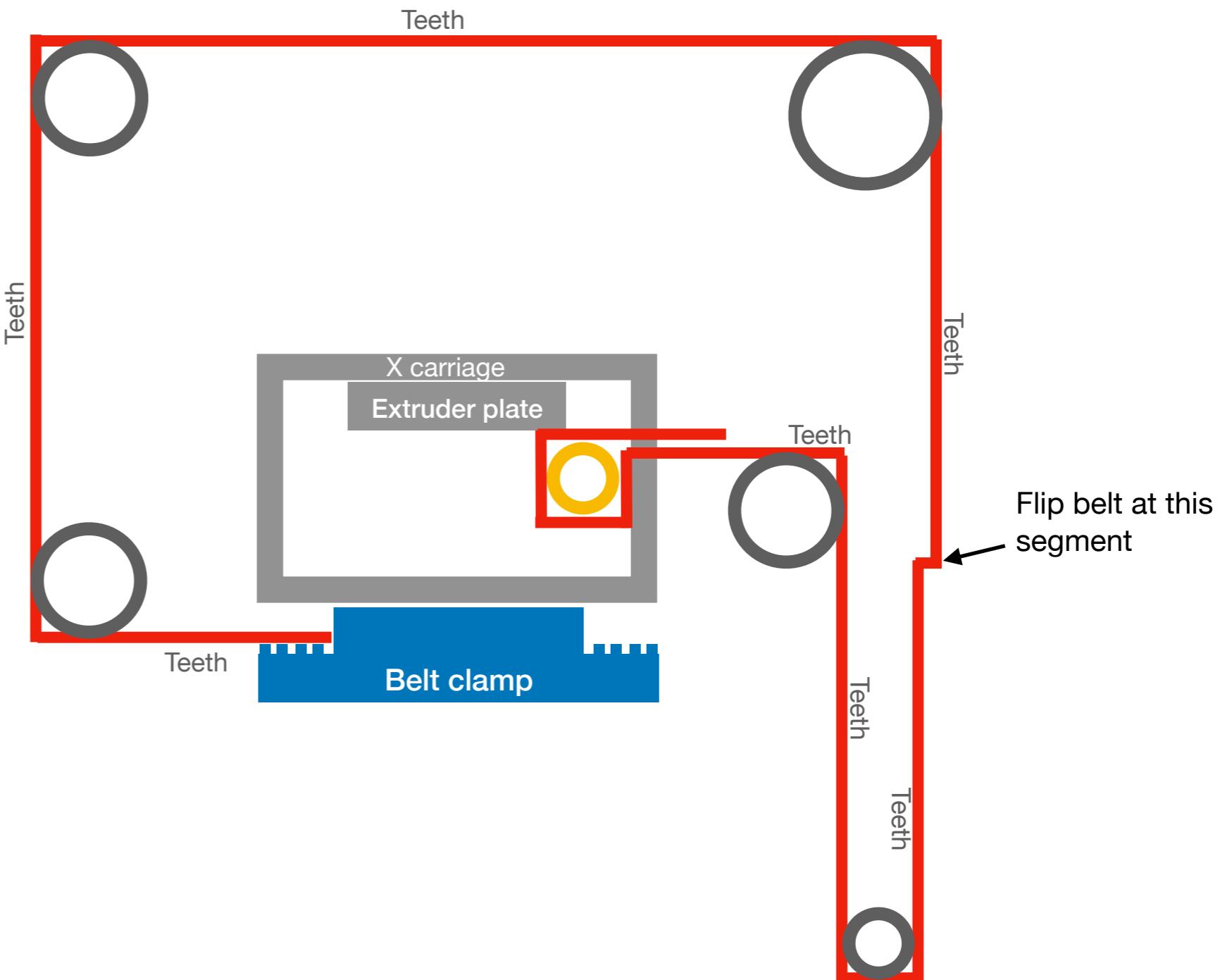
Actions

1. Fix the belt at the nylon-tube end first.
2. Push left stepper mount to the farthest end before tighten the belt
3. Push X axis to the farthest end until it reach the metal Y endstops.
4. Cut the belt longer than enough.
5. Carefully shorten the belt so it can go deepest into the clamp.
6. Pull stepper mount to the nearest end to tighten the belt.



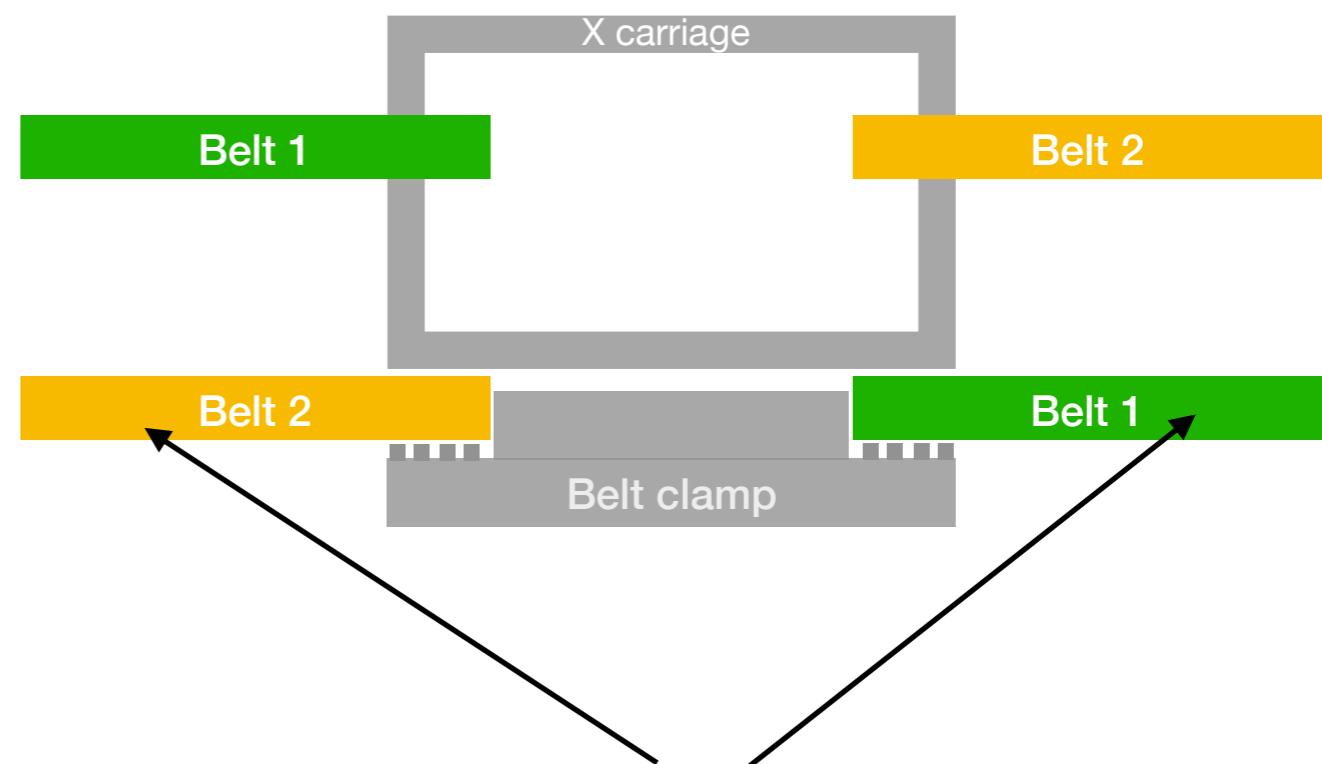
Attach Belt For Right Stepper

Belt going through the right stepper uses the **lower right gap** at X carriage.



Adjust XY Belt Tension

1. Loose screws of both stepper mounts.
2. Slowly push X axis to the farthest end until it touches Y-max metal stoppers. If you move too fast, steppers will generate current back to the PCB which might damage chips.
3. Move extruder to the middle of X axis.
4. Pull the left stepper mount toward you, while the other hand push the X axis against Y-max metal stoppers.
5. Find a proper tension and fasten the screws.
6. Do the same action to the right stepper mount.
7. Pluck the belts near the extruders and hear the sound. If the sound frequency are the same, they have the same belt tension.



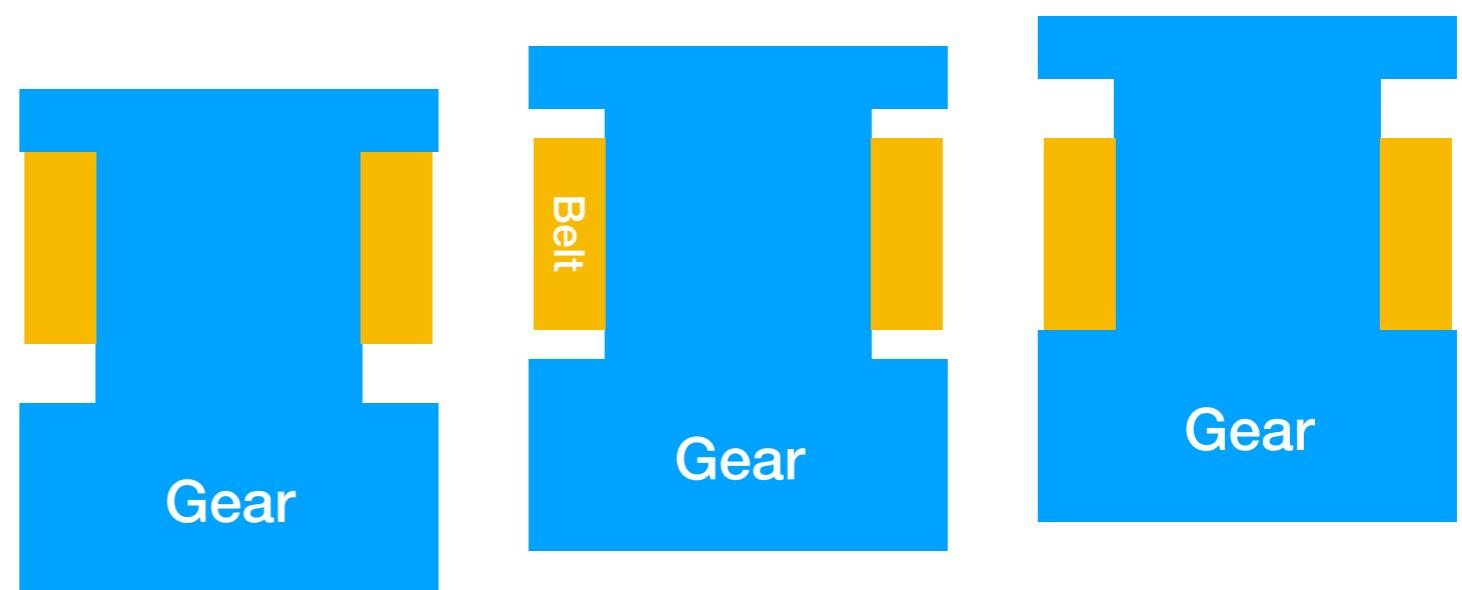
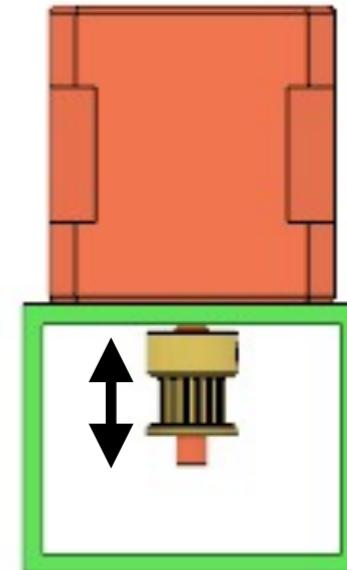
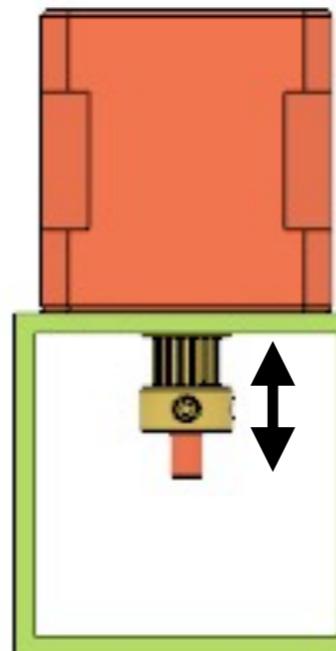
Pluck both belts and hear the sound frequency.

Check Gear Position

After the belt tensioning is done, slowly move the extruder all around the XY plane and watch how belts slide around the gears.

If the belt rubs against the top edge of gear, move the gear lower, or do vise versa, until both belts run in the middle of gears. This will extend belt life.

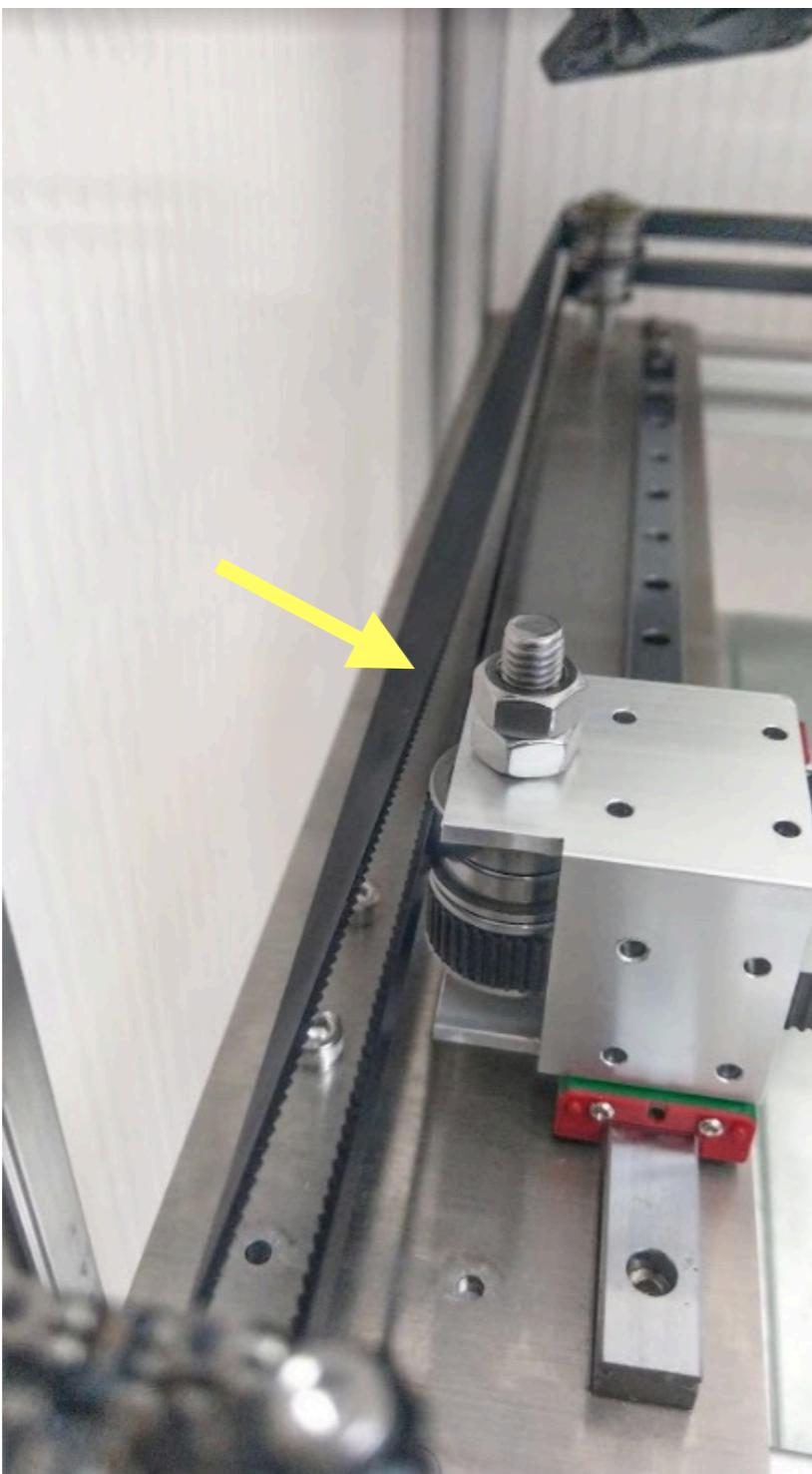
Remember to fasten screws on the gears.



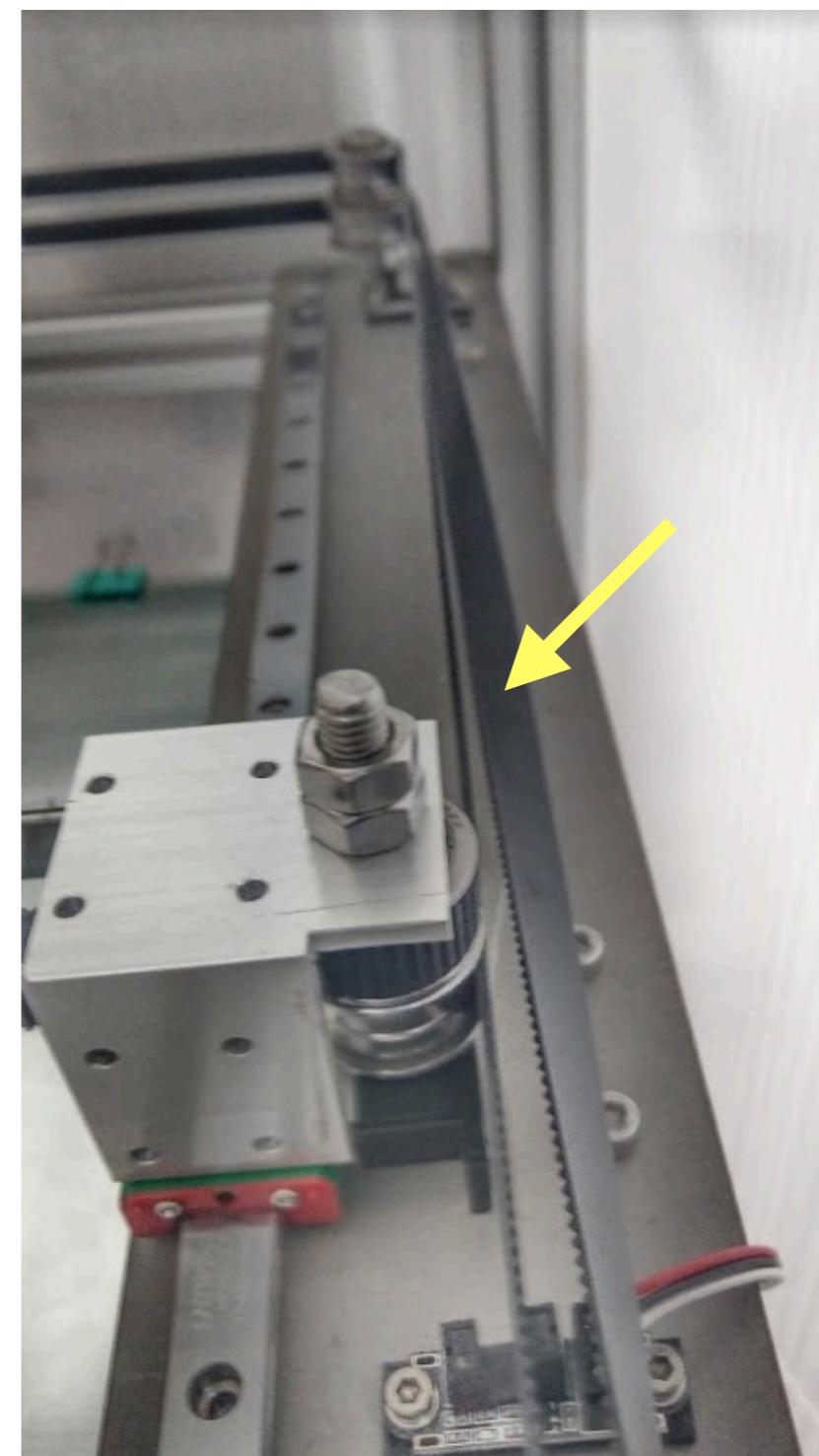
Should move the gear higher

Good

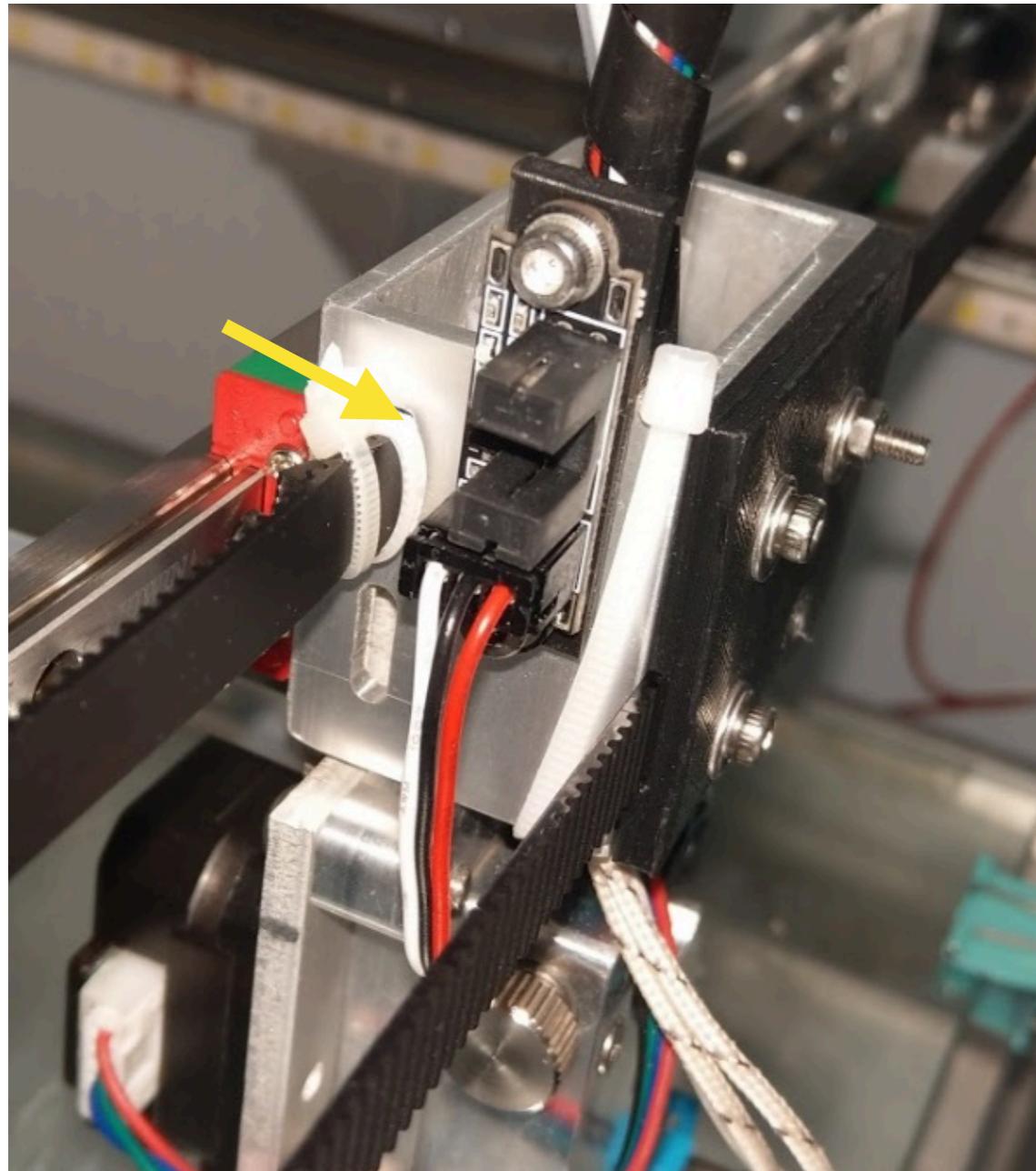
Should move the gear lower



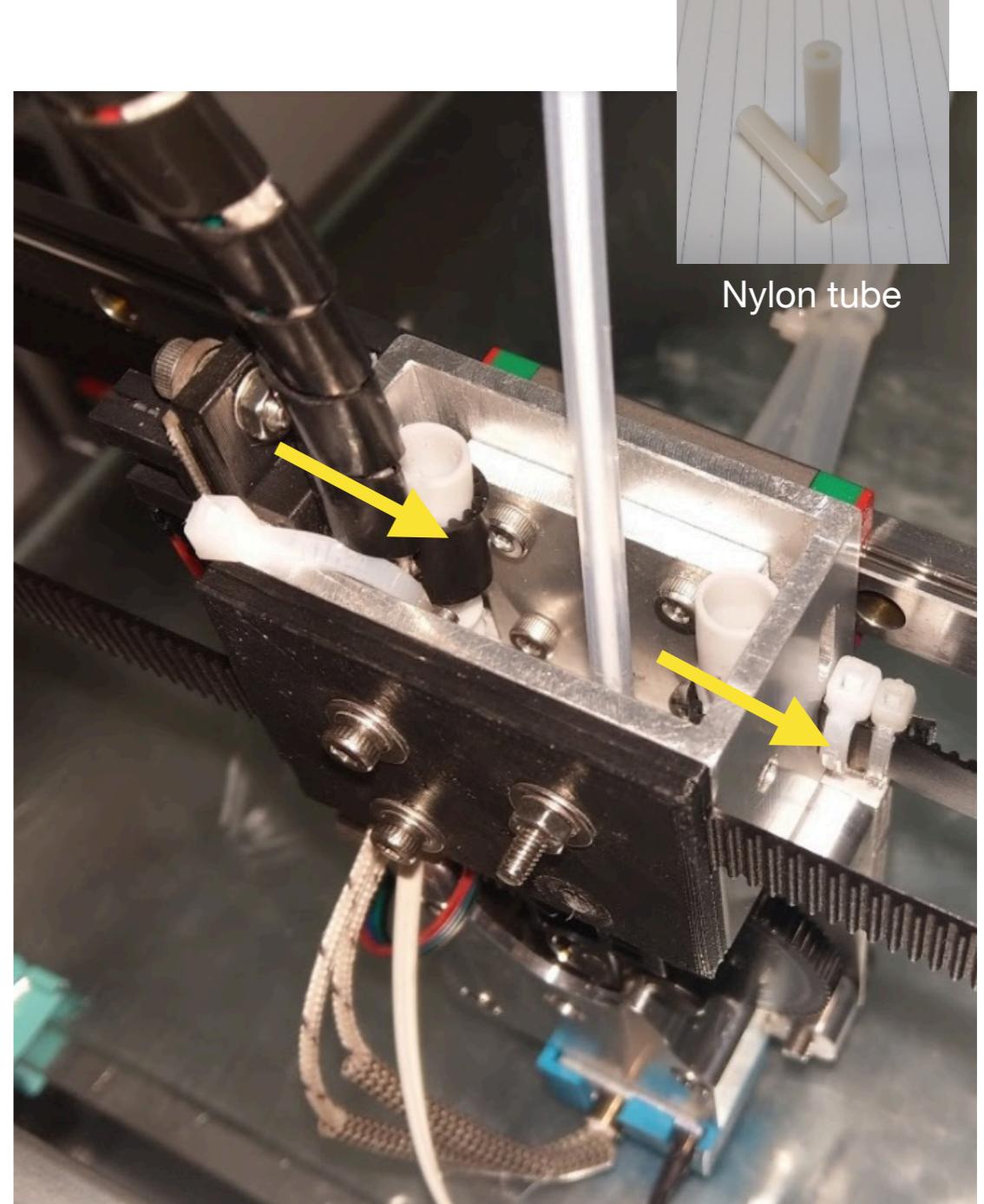
Flip the belt



Flip the belt

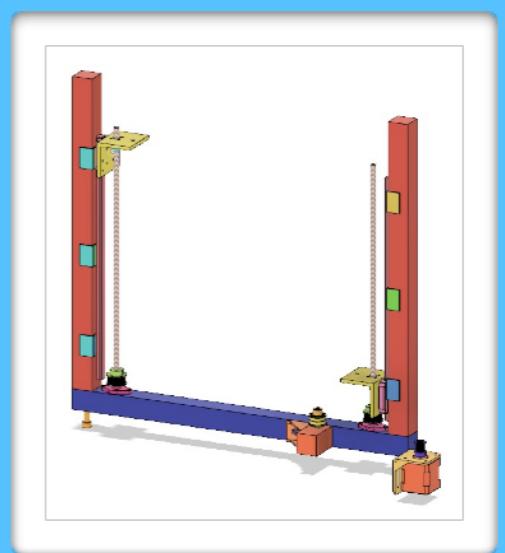


Upper-left gap



Lower-right gap &
Belt wrapping around nylon tube

13 Z Axis

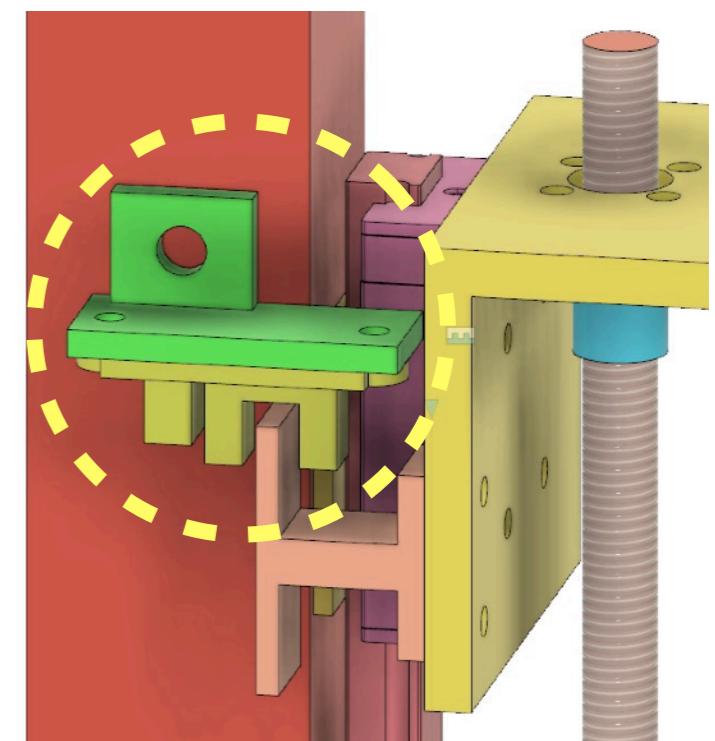
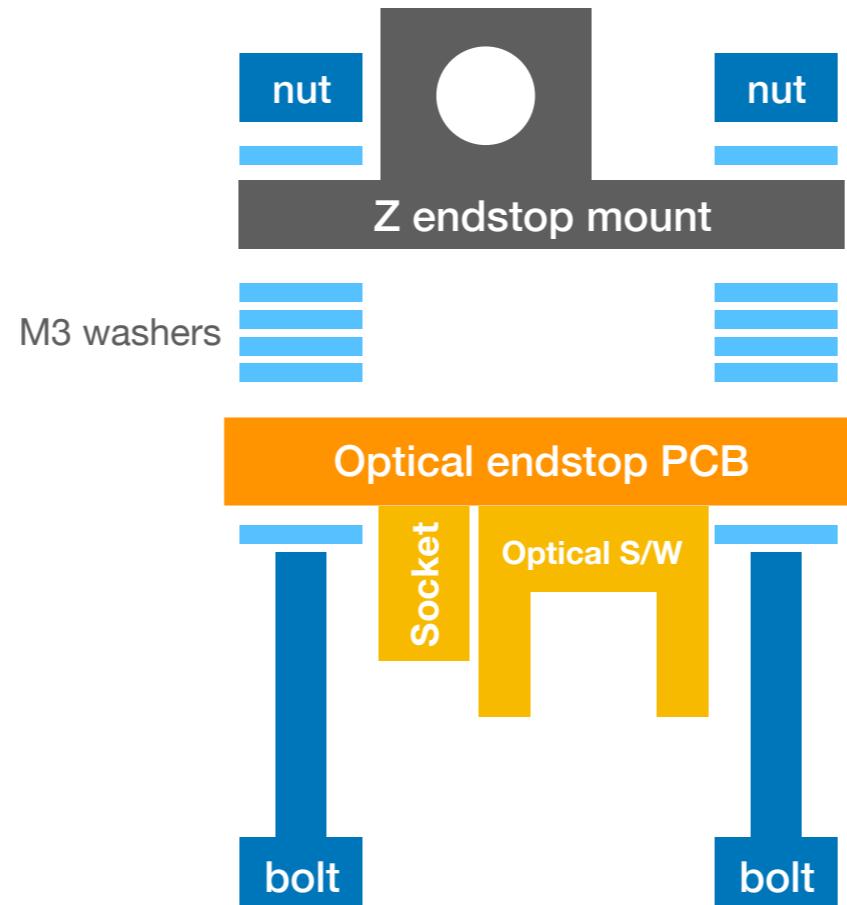


Assemble Z Optical Endstop

- 1 optical endstop
- 1 3D printed Z endstop mount
- 1 bolt M5 x 10
- 1 T-nut M5
- 2 bolts M3 x 15
- 2 nuts M3
- 12 washers M3 x 6 x 0.5

Action

- Z endstop should be located at the back side of right Z frame, for a shorter wiring path to control board.
- Assemble Z optical endstop as shown in the picture.
- The position of endstop mount doesn't have to be precise, since bed leveling will be done later.



Back side of right Z frame

Exam

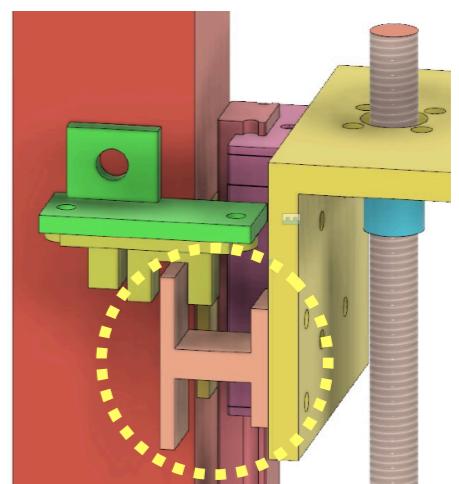
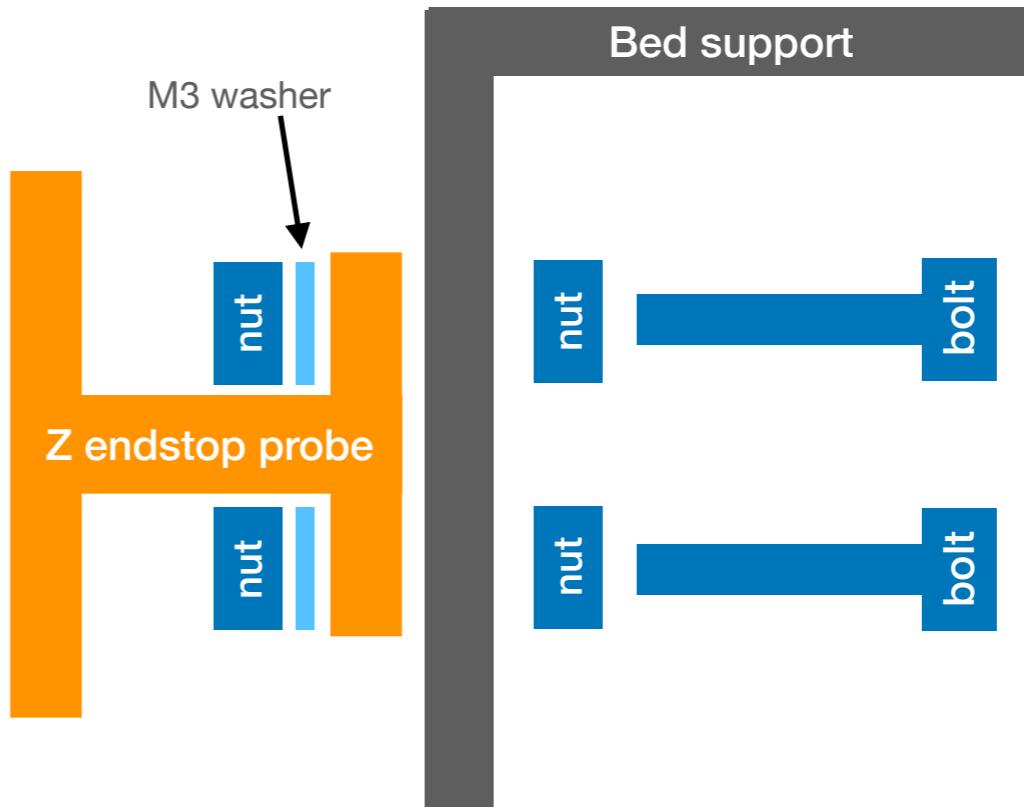
Z endstop is located at the back side of right Z frame.

Assemble Z Endstop Probe

- 1 bed support
- 1 3D printed Z endstop probe
- 2 bolts M3 x 15
- 4 nuts M3
- 2 washers M3 x 6 x 0.5

Action

- Assemble Z endstop probe as shown in the picture.

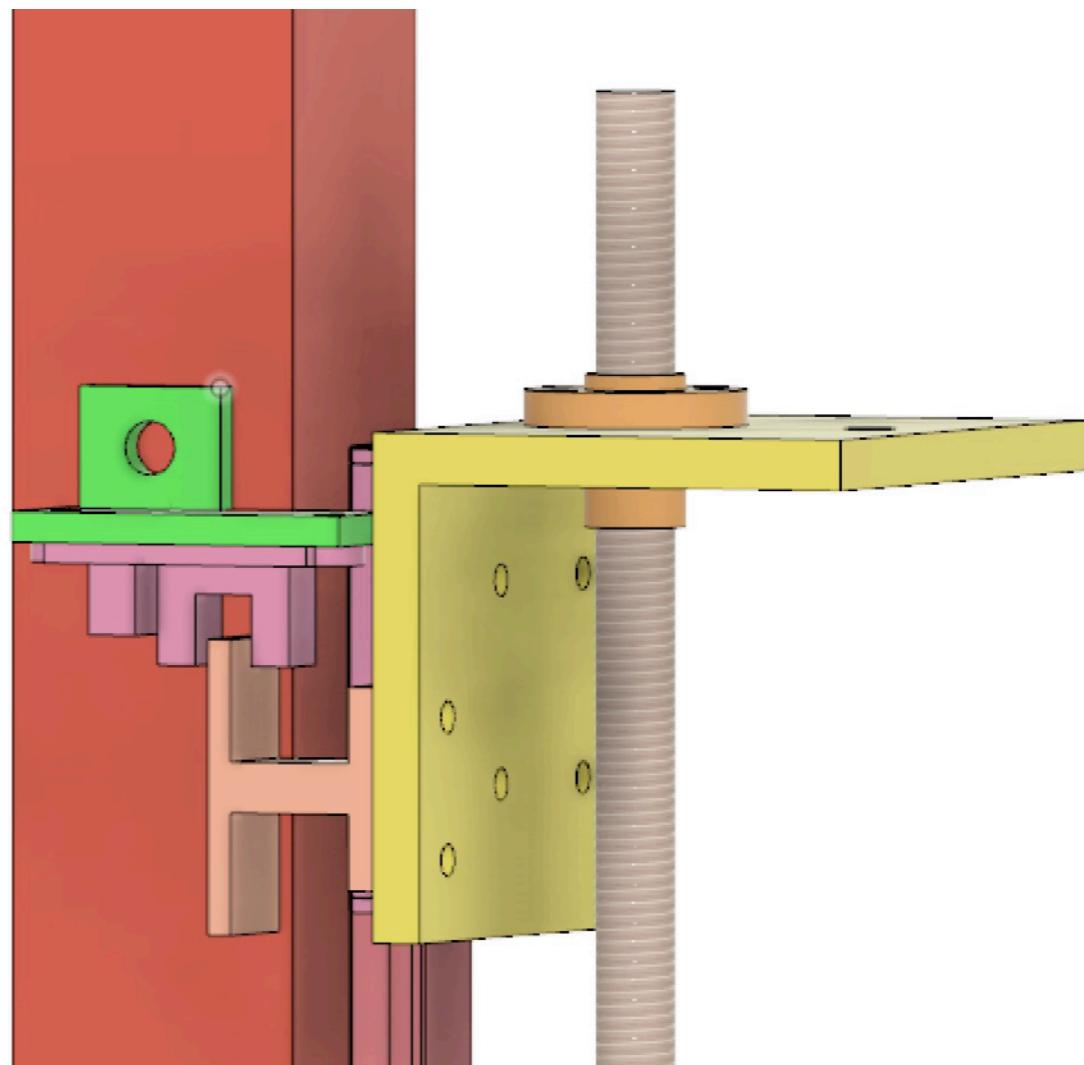


Assemble Lead Screw Set

- Parts per set
 - 1 T8 lead screw nut, or anti-backlash nut set
 - 1 T8 lead screw
 - 1 Z bed support
 - 4 bolts M3 x 15
 - 4 nuts M3
 - 4 washers M3 x 6 x 0.5
- Make 2 sets

Action

1. If you use an anti-backlash nut, assemble it onto lead screw first.
2. Attach the lead screw set with bed support, with M3 nuts at top side so there are rooms for M3 bolts of MGN12H later.



Exam

Make sure that Z endstop probe can insert into optical endstop.

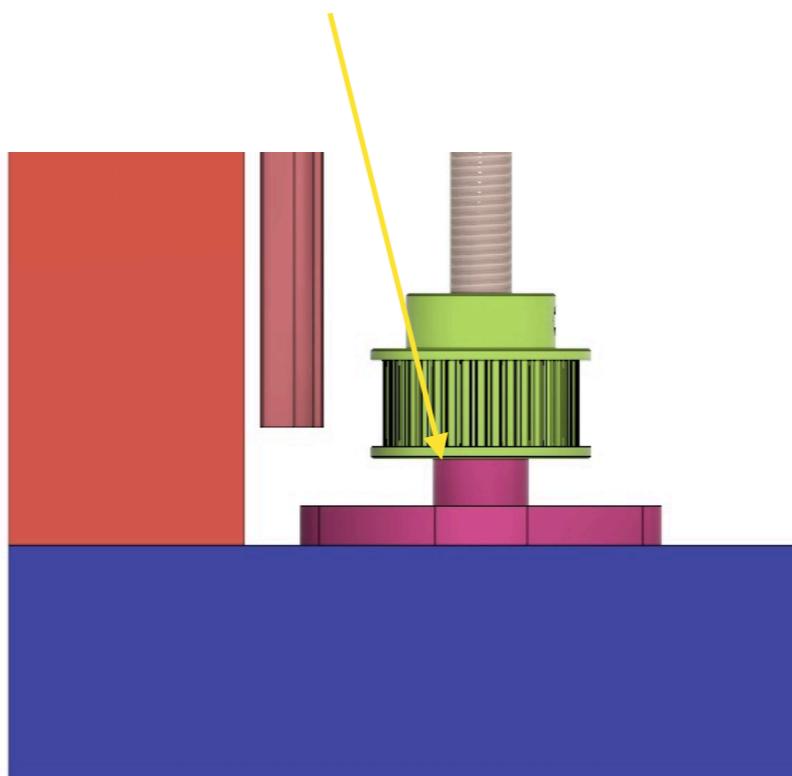
Assemble Bed Support

- Parts per set
 - 1 T8 lead screw bottom mount
 - 1 MGN12H
 - 1 2GT 40T gear (8mm bore, 10mm belt)
 - 4 bolts M3 x 10
 - 2 bolts M5 x 10
 - 2 T-nuts M5
- Make 2 sets
- 2GT close-loop belt

Action

1. Carefully slide MGN12 onto linear rail.
2. Put the close-loop belt between lead screw and linear rail.
3. Fasten screws on bottom mount and 2GT 40T gear.
5. Fasten bolts at MGN12H

No gap exists between gear and bottom mount



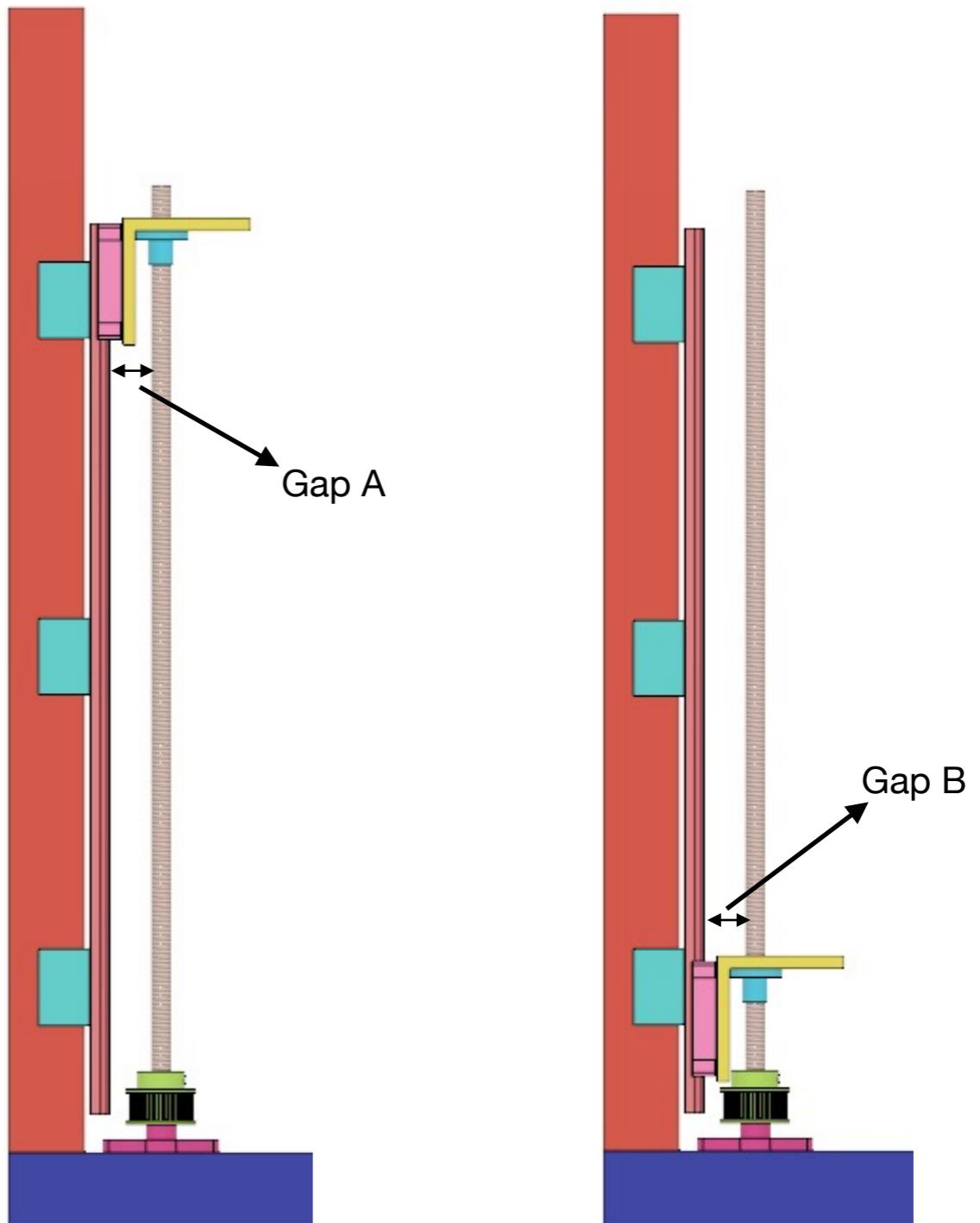
Adjust Lead Screw Position

Action

1. Loosen the M5 bolts on lead screw bottom mount
2. Move bed support to top end, measure gap A.
3. Move bed support to bottom end, measure gap B.
4. Adjust position of the lead screw bottom mount, make sure A and B are equal so the bed support can move freely.
5. Fasten the M5 bolts.

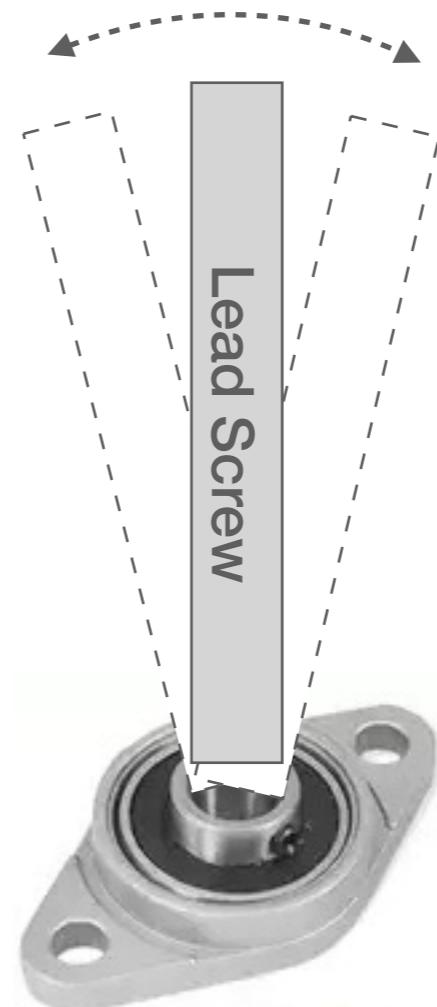
Exam

Make sure gap A and B are equal.



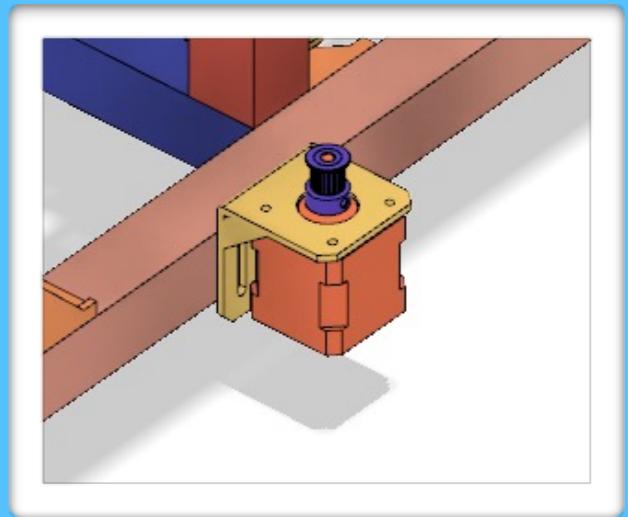
About Lead Screw Bottom Mount

Lead screw can still be tilted within a small angle range after being locked into the mount.



14

Z Stepper Mount



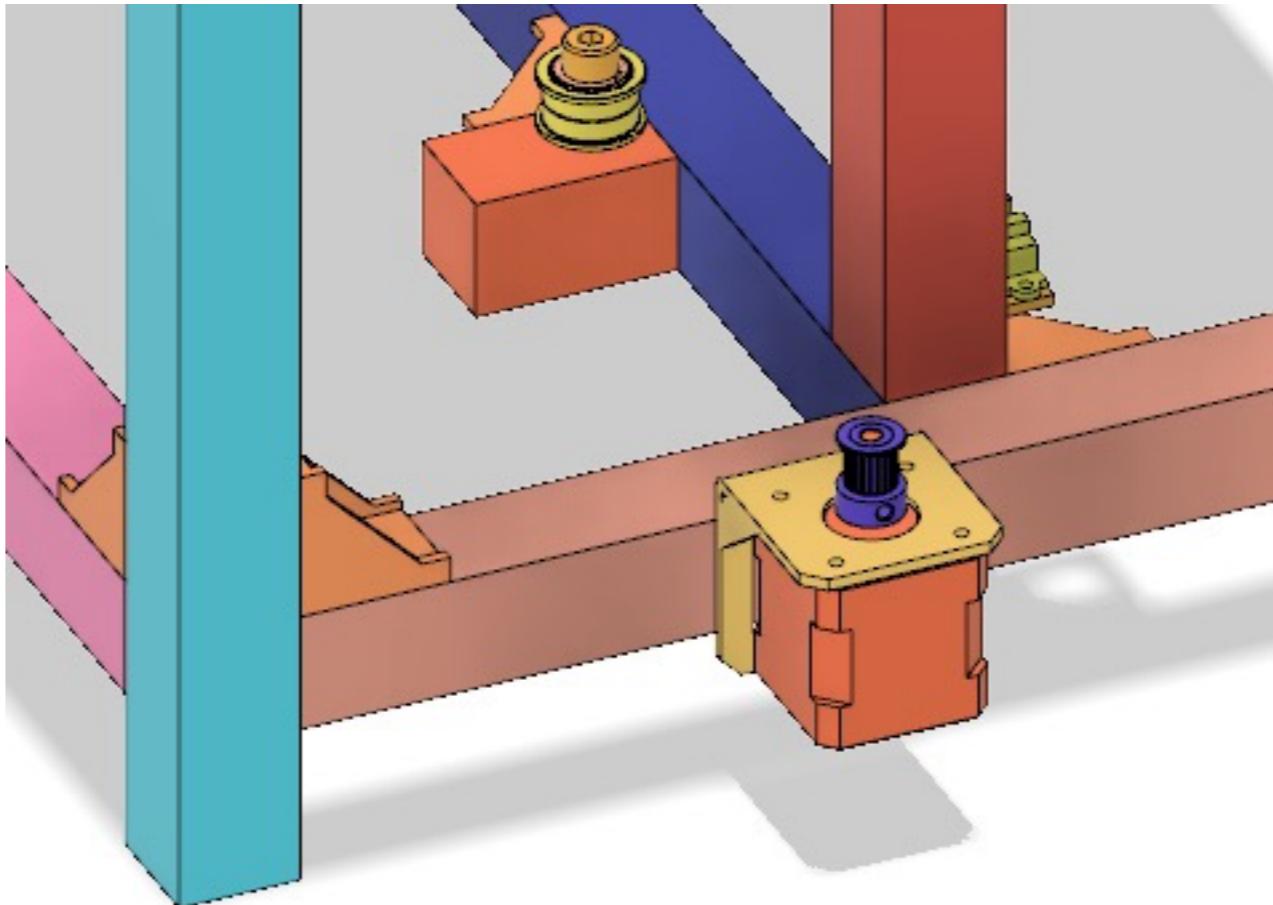
Attach Z Stepper Mount

- NEMA17 stepper
- NEMA17 stepper mount
- 1 2GT 20T gear (5mm bore, 10mm belt)
- 4 bolts M3 x 8
- 2 bolts M4 x 8
- 2 washers M4 x 9 x 0.8
- 4 nuts M3
- 2 T-nuts M4

Action

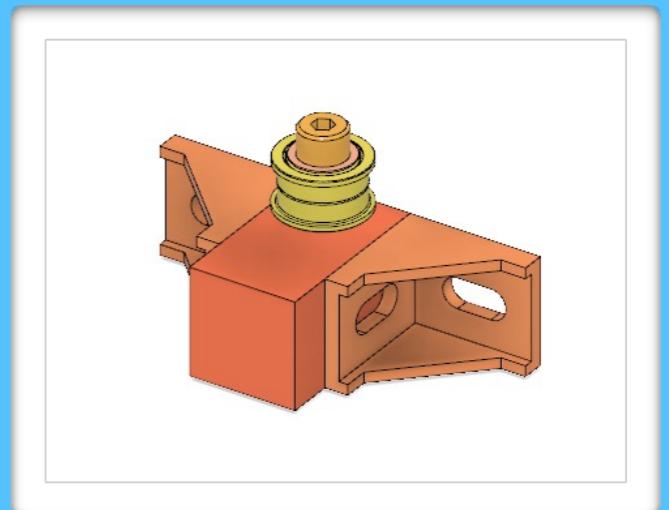
Attach 2GT 20T gear onto NEMA17 as shown.

The position of stepper mount doesn't have to be precise. Relative distance between Z stepper mount and Z belt tensioner decides belt tension.



15

Z Belt Tensioner



Assemble Z Pulley Set

- 1 bolt M8 x 60
- 1 slider nut M8
- 1 50mm aluminum profile
- 2 F608ZZ bearings
- 2 nuts M8
- 5 washers M8 x 14 x 0.5
- 4 washers M8 x 16 x 1.6
- Teflon tape

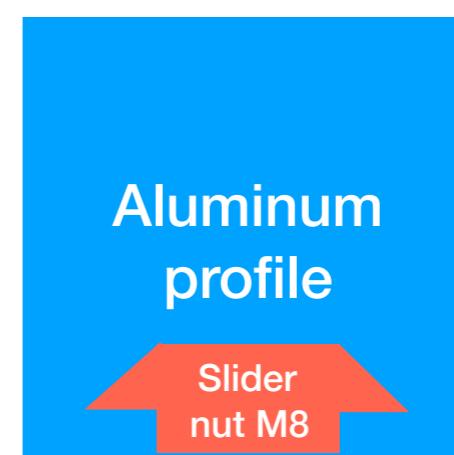
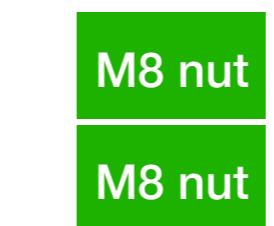
Action

Wrap M8 x 60 bolt with teflon tape as previous in making XY idler pillars.

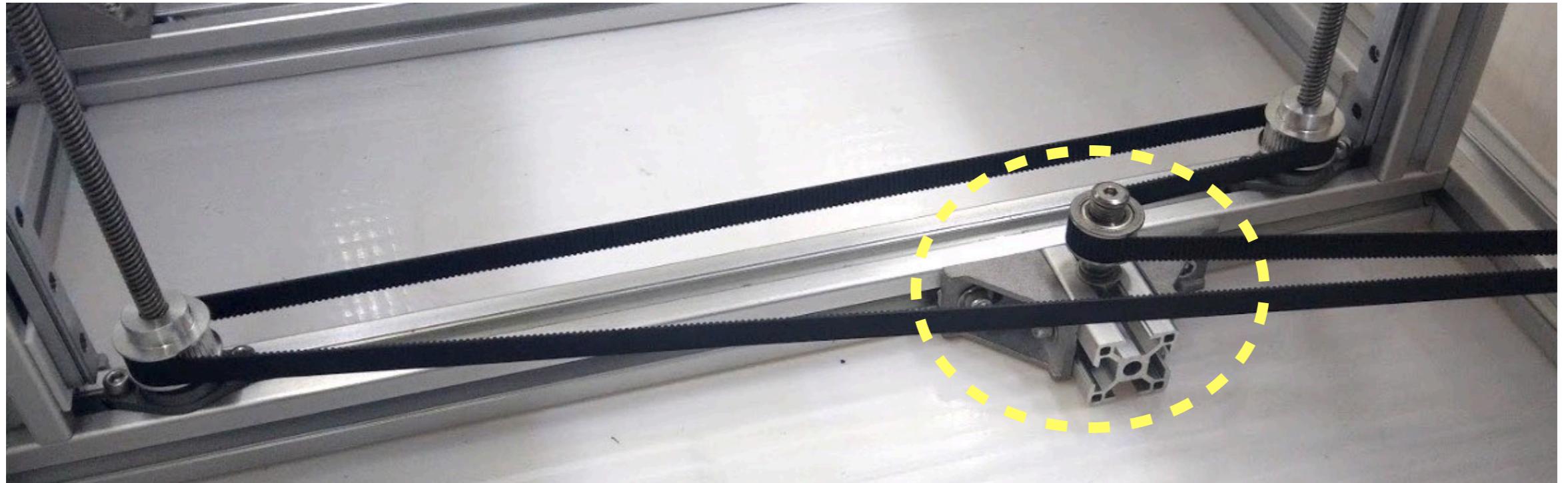
Stack exactly the number of washers to create proper pulley height.

Exam

Make sure the bearings rotate freely.



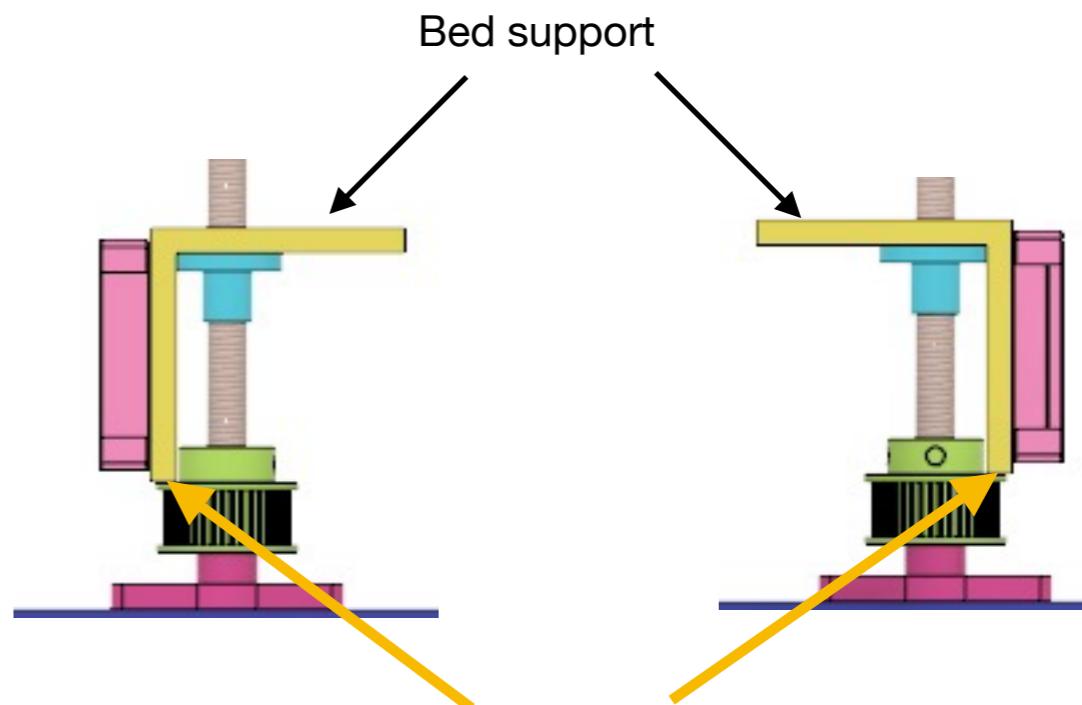
Z Belt Tensioner



Attach Z Belt Tensioner

Attach Z belt tensioner onto Z frame with 2 3030 corner sets. Wrap the belt as shown.

Z Belt Tensioner



Synchronize Z Lead Screws

Action

Move both bed supports to the bottom until they touch the gears.

Align belt teeth and 2GT 40T gear teeth carefully. Don't rotate the gears while tightening the belt.

Pull Z belt tensioner to the left and fasten its M5 bolts.

Exam

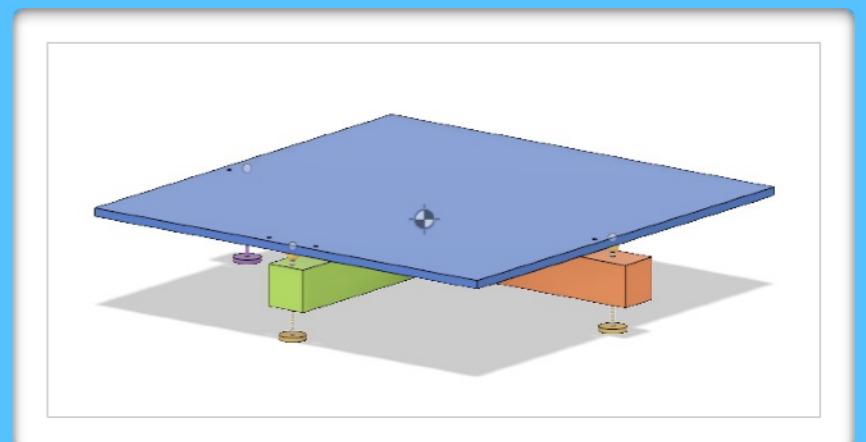
Pull the belt by hand and observe belt movement. Adjust heights of the gears if need.



Tense the belt by pulling left

16

Heated Bed



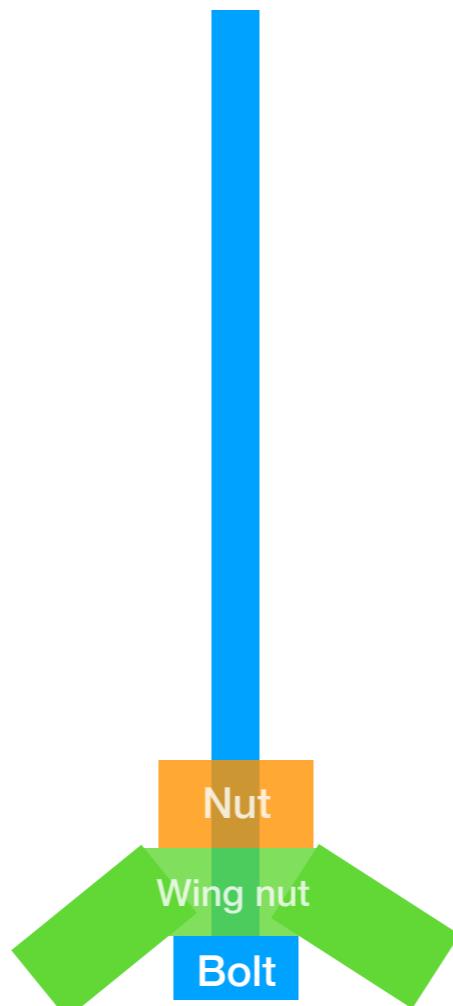
Assemble Bed Level Screw

- Parts per set
 - 1 bolt M3 x 60
 - 1 nut M3
 - 1 wing nut
- Make 3 sets

Action

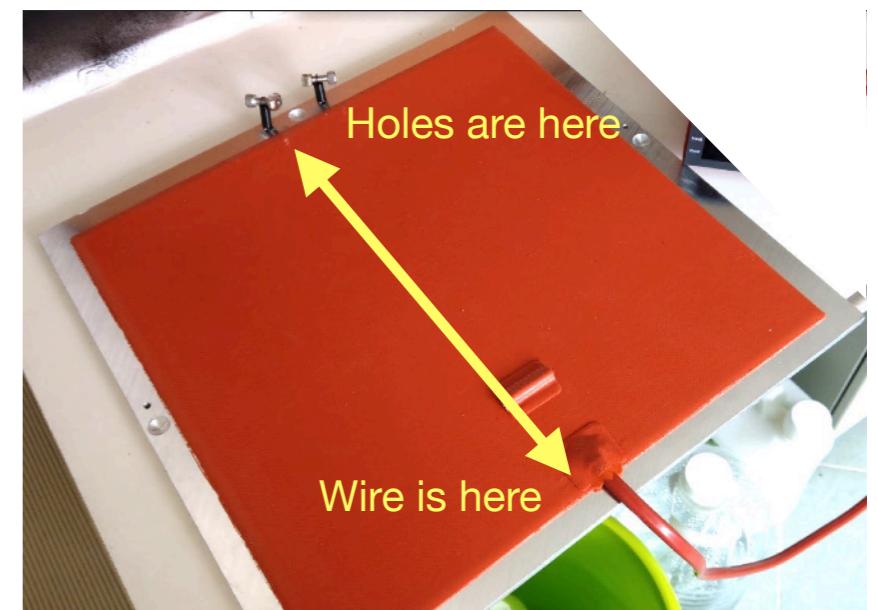
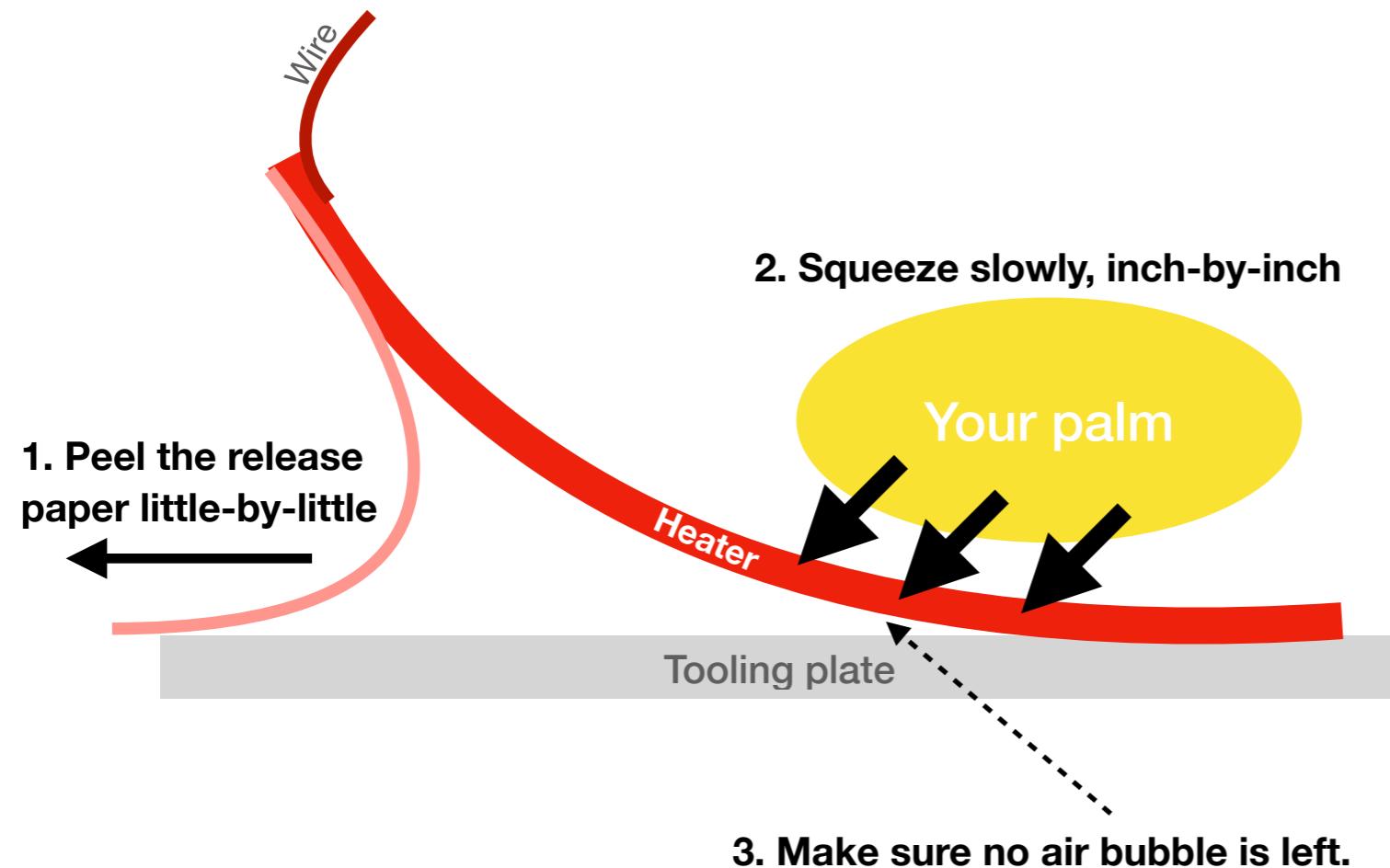
Assemble 3 sets of bed level screws.

A wing nut is used for easily know how much the screw has been turned.



M3 x 60 bolt
Thread pitch 0.5mm

Turn	Degree	Shift (mm)	Shift (μm)
1	360°	0.5	500
1/2	180°	0.25	250
1/4	90°	0.125	125
1/8	45°	0.0625	62.5
0.4	144°	0.2	200
0.2	72	0.1	100



Attach Silicone Heater

- Tooling plate
- AC powered silicon heater
- Repeat step 1 to 3 as shown in the picture

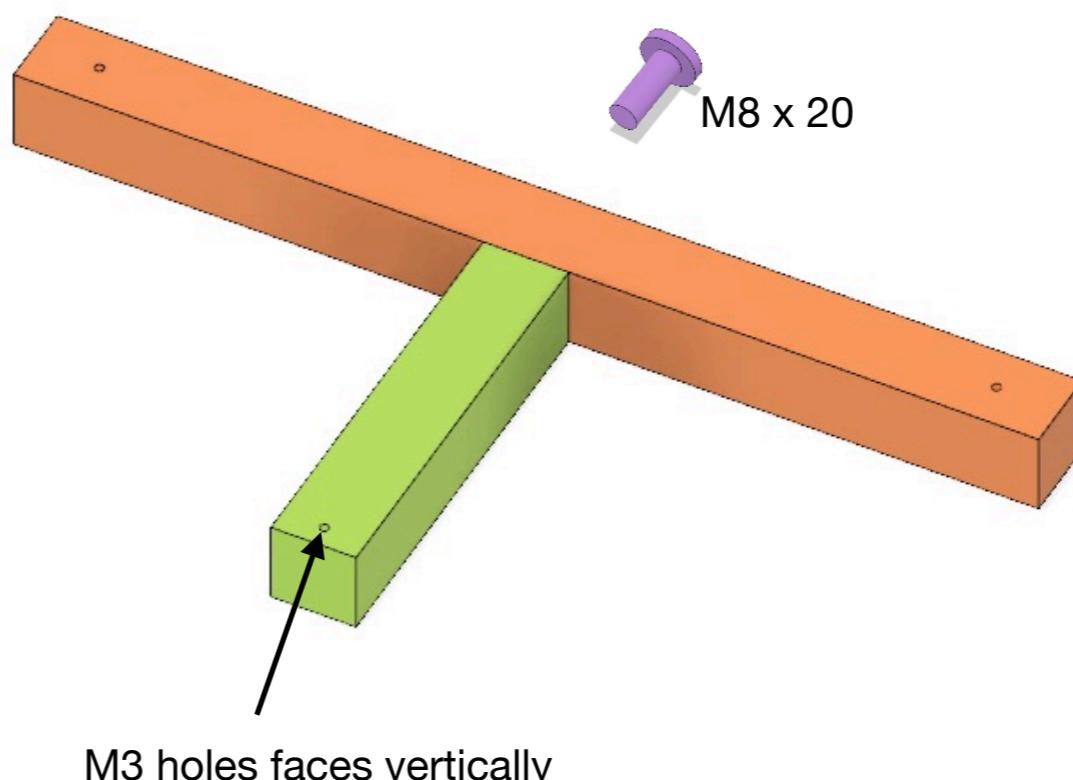
Assemble Bed Frame

- 360mm aluminum profile
- 145mm aluminum profile
- 1 bolt M8 x 20
- 1 washer m8 x 14 x 0.5

Action

Lay the 2 aluminum profiles on a flat surface and lock them up with M8 x 20 bolt.

If your aluminum profile is not M8 thread tapped, you can use 2 3030 brackets instead.

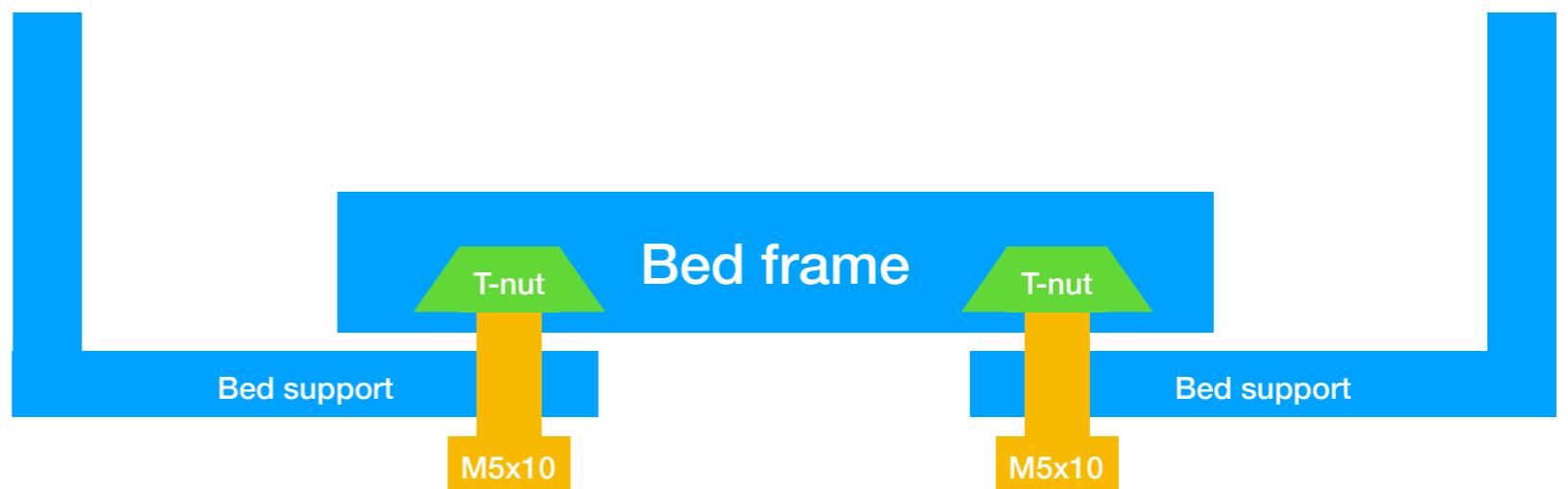


Attach Bed Frame to Bed Supports

- 2 bolt M5 x 10
- 2 T-nut M5

Action

Attach bed frame to bed supports. If you have difficult turning the T-nuts, insert a small flathead screw driver or thin stick to turn them.



Assemble Bed Frame

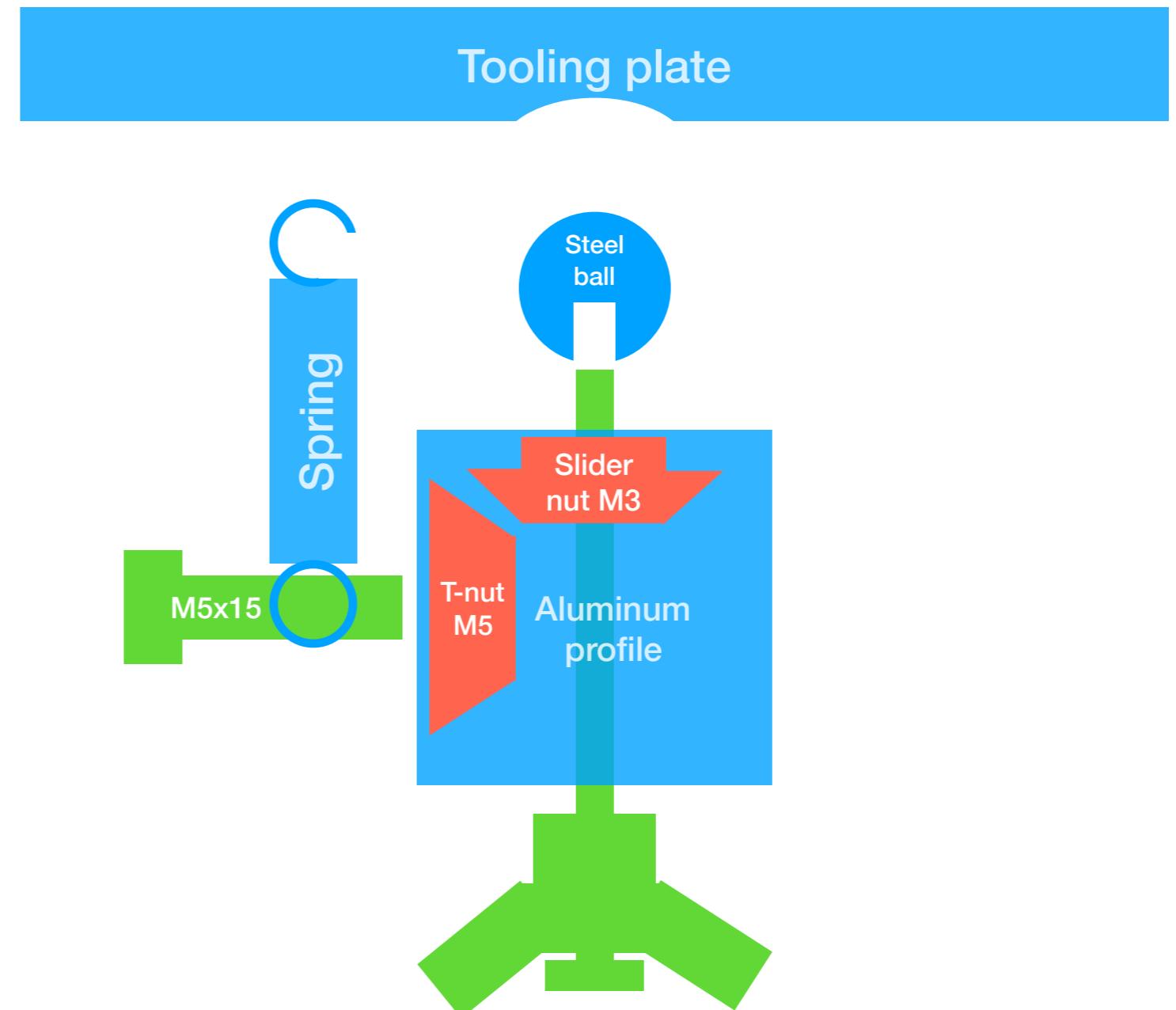
- 3 pre-assembled bed level screw
- 3 thread-tapped steel balls 10mm
- 3 slider nuts M3
- 6 bolts M5 x 15
- 6 springs 0.6 x 6 x 25
- 6 T-nuts M5

Action

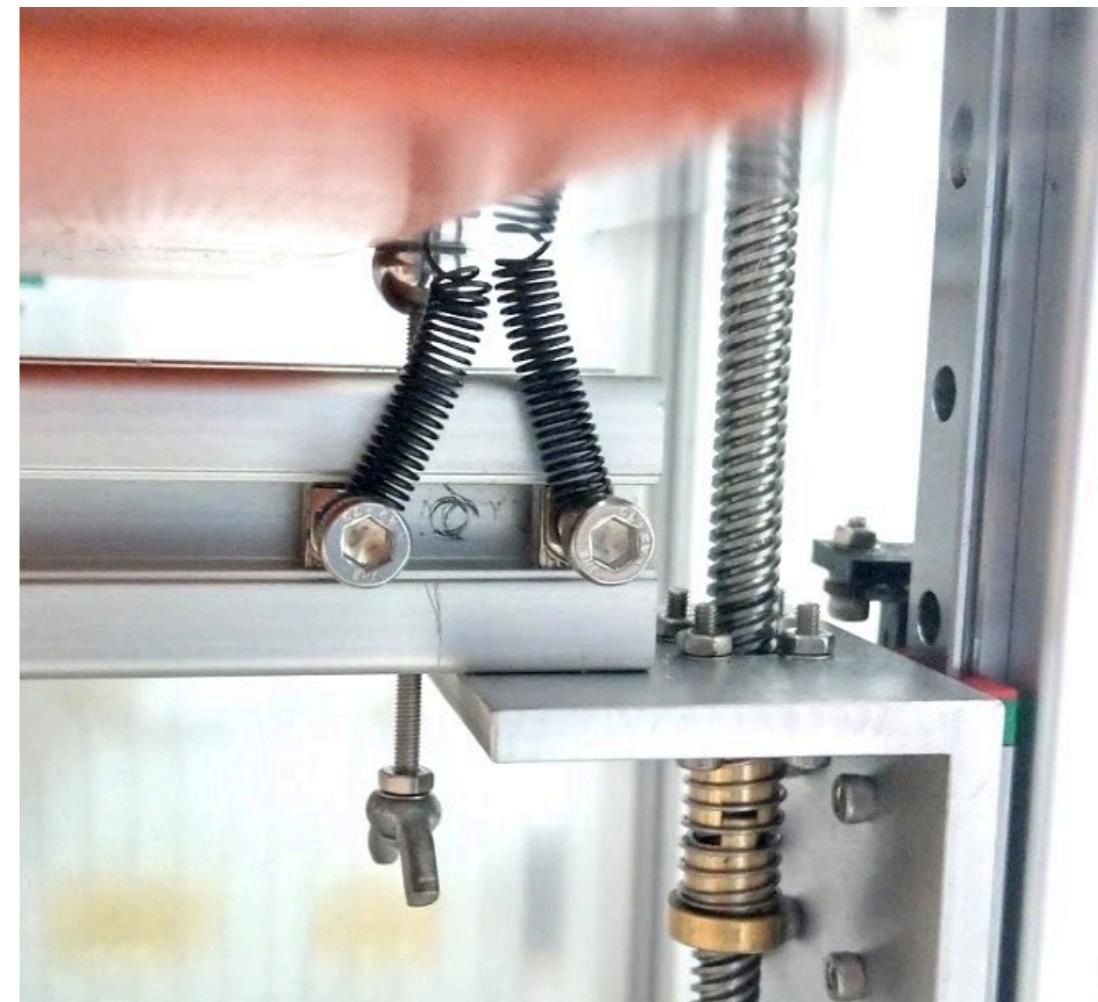
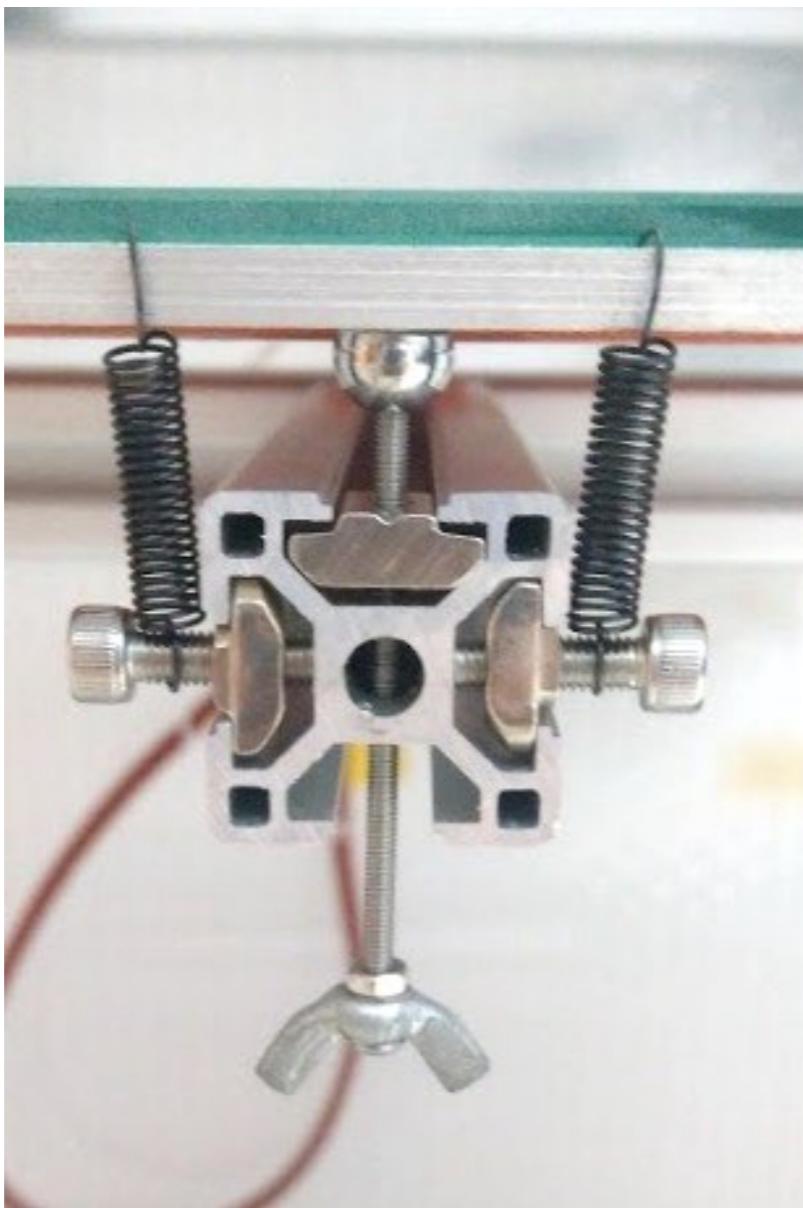
Assemble as shown in the picture.

The heated bed is kinematically designed to deal with thermal expansion. The tooling plate is supported by 3 steel balls and pulled by 6 springs.

The center of gravity has been calculated to keep Z linear blocks balanced.



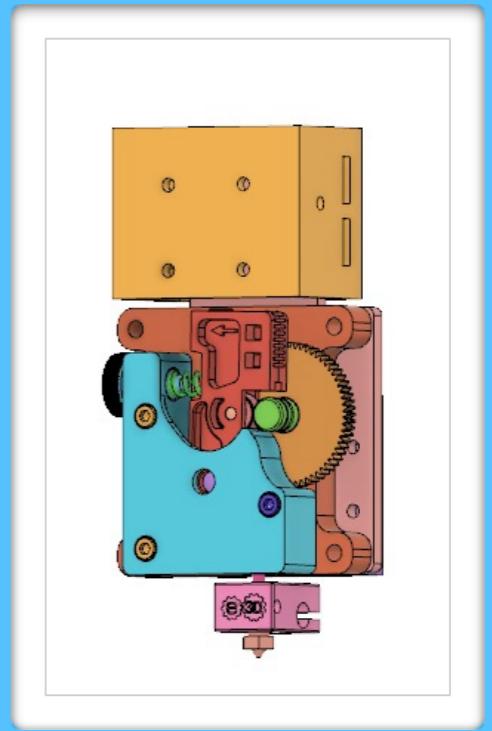
Heated Bed



Assemble Heated Bed

17

Water Cooling Extruder



Cut Titan Aqua lever

- Saw, knife or soldering iron

Action

The lever of Titan Aqua is too long to fit into the X carriage. Please cut it before mounting it onto extruder plate.

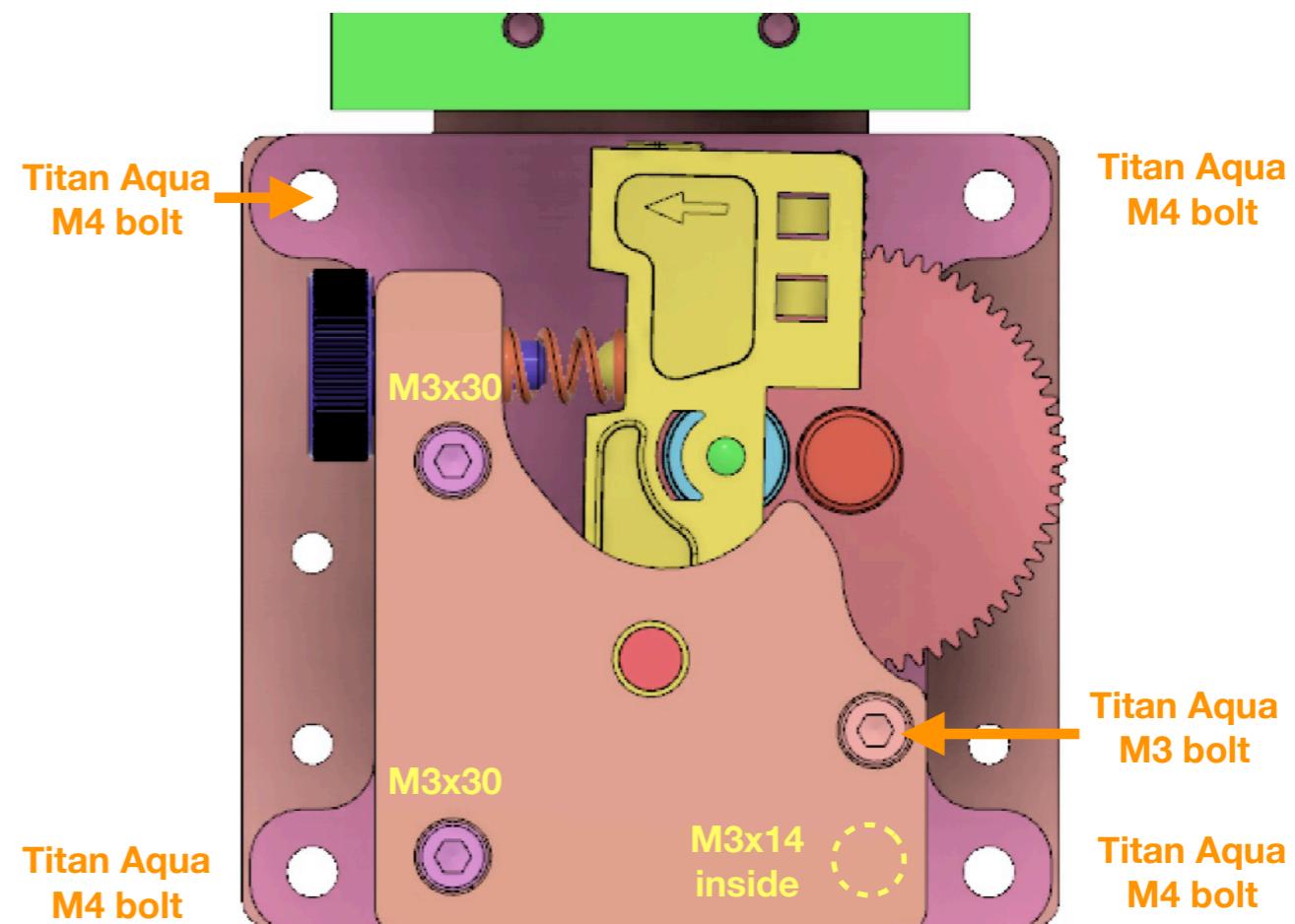


Assemble Titan Aqua

- Titan Aqua kit
- Two M3x30 bolts
- One M3x14 bolt
- 2 metal hose connectors
- Extruder plate

Action

To mount Titan Aqua, extruder plate and NEMA17 together, the original bolts sent in Titan Aqua are too short, use M3 x 30 and M3 x 14 instead.



Exam

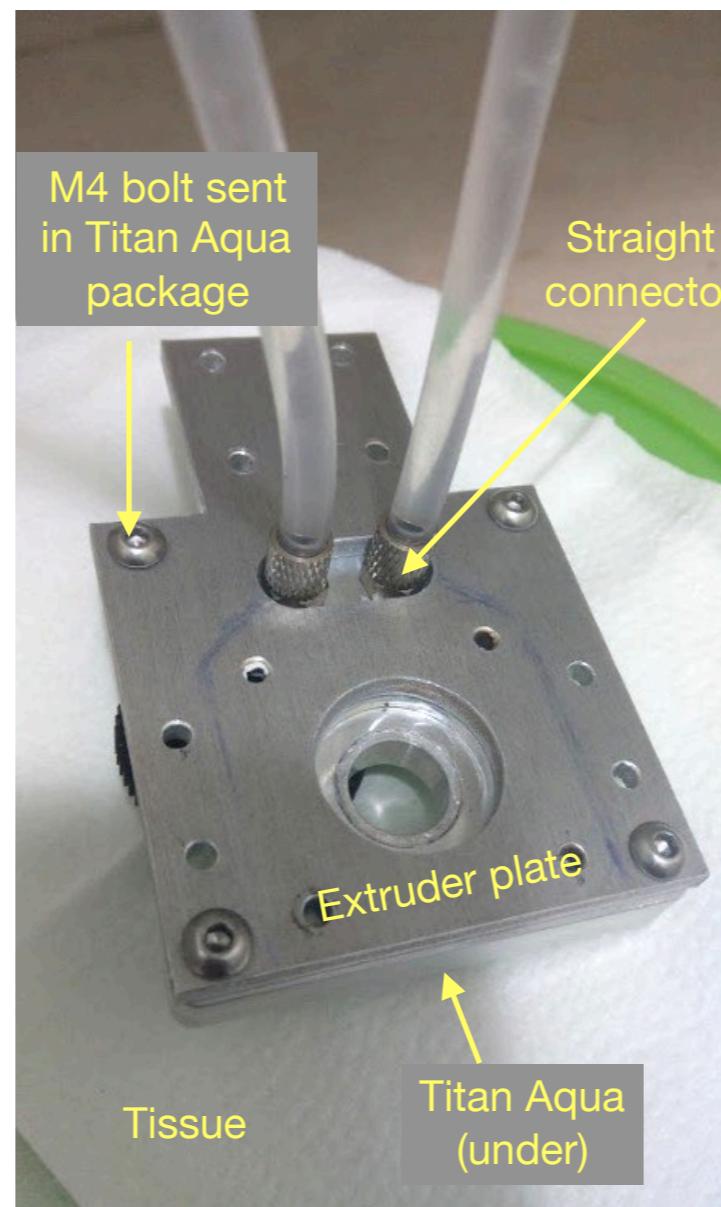
NO WATER LEAKAGE AT ALL!

Assemble Titan Aqua

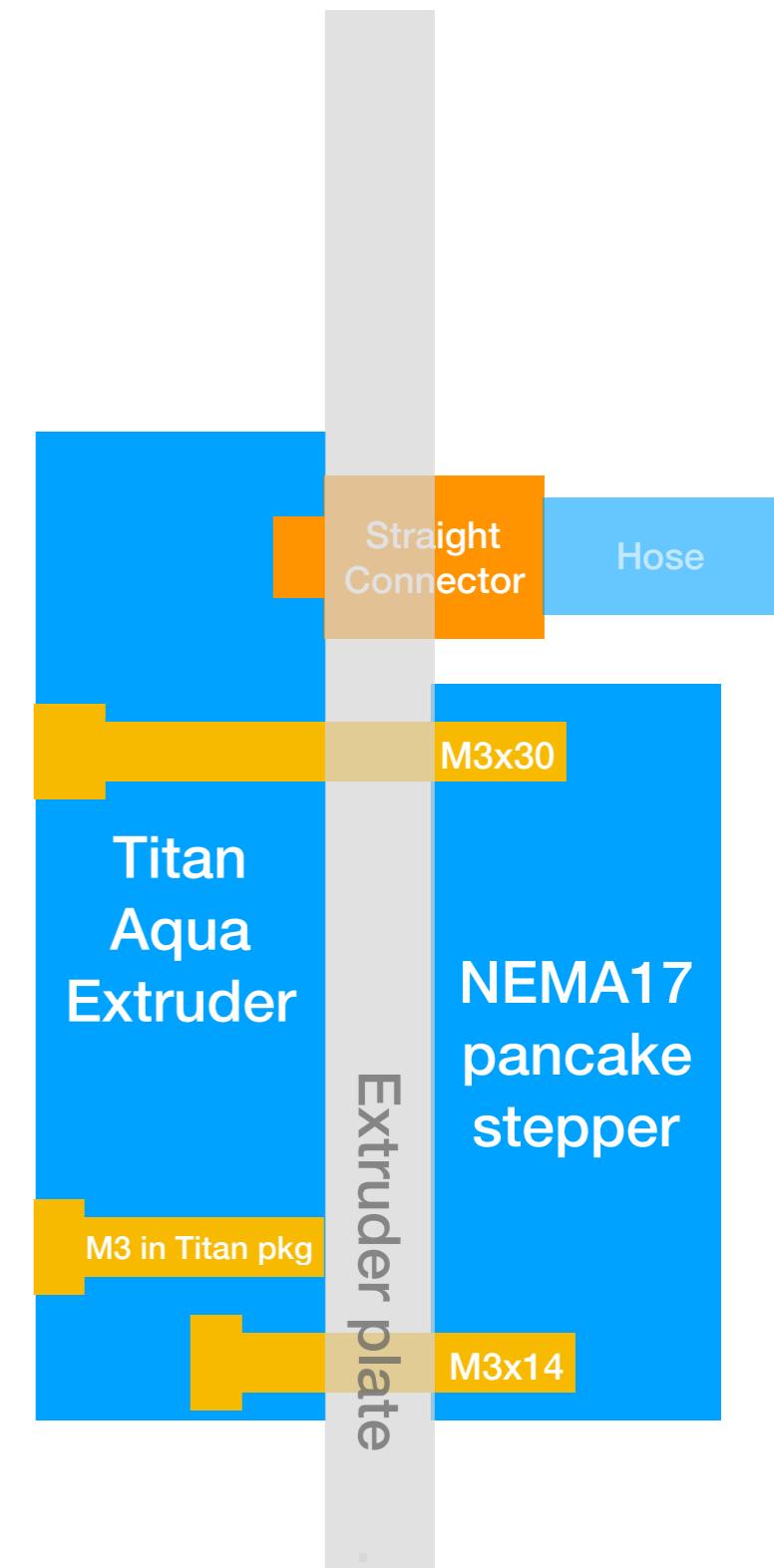
Action

Replace the L-shape hose connectors in the Titan Aqua kit with the straight ones. L-shape connectors will interfere with the extruder plate.

Pre-assemble Titan Aqua. Place a few pieces of tissues under the kit and test it independently for at least 8 hours.



Test for water leakage



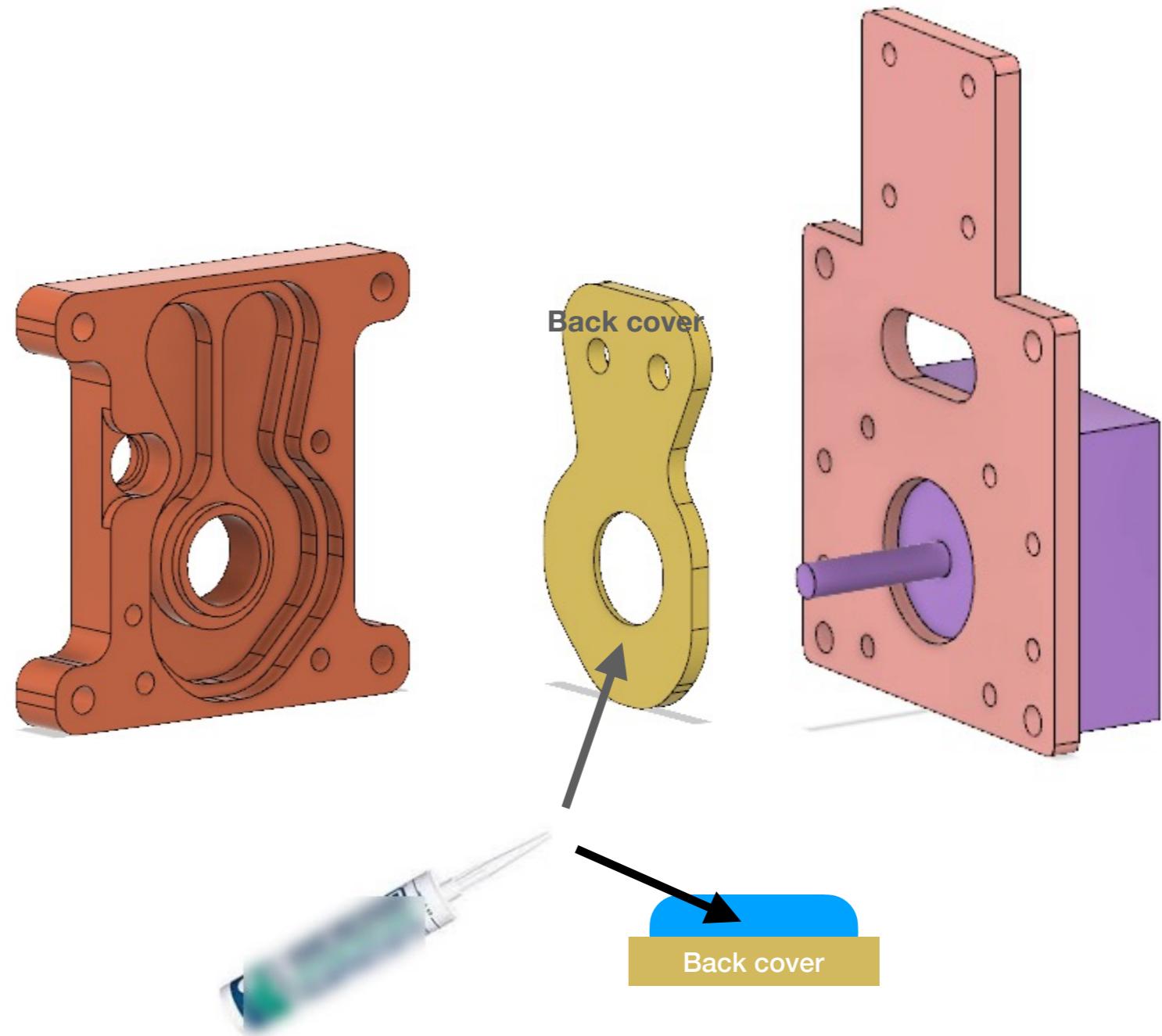
Side view of extruder

Deal with Water Leakage

- Tooth picks (not included)
- Silicone (not included)

Action

If the rubber pad came in Titan Aqua kit fails, apply about 1mm layer of silicone at the capping plate of Titan Aqua, let it dry completely, re-assemble and test for leakage.



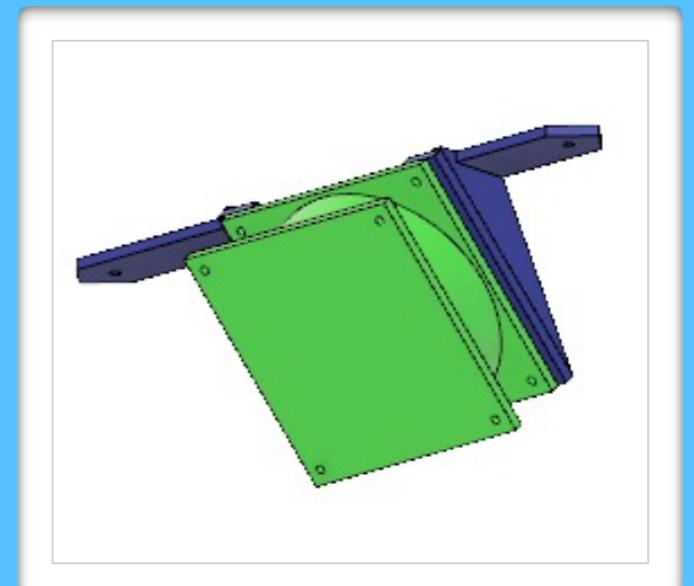
Exam

NO WATER LEAKAGE AT ALL!

Apply about 1mm layer of silicone at this face, let it dry completely, re-assemble and test for leakage.

18

Part-Cooling Fan



Part-Cooling Fan

- (Thingiverse link TBD)
- 24V 3.5W fan
- 4 bolts M3 x 15
- 4 nuts M3
- 4 washers M3 x 6 x 0.5
- 2 bolt M5 x 15
- 2 T-nut M5
- 2 washer M5 x 10 x 1

Action

Please print the fan mount by yourself.
PLA is OK but ABS will be better.

Always use a washer between plastic
and nut/bolt.

You might need soldering the wire to fan
plugs.



Exam

Check polarities of the wire.

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Wiring Diagram

DANGER!
Electric shock risk

Electricity can be fatal and you should be qualified
and confident to carry out any electric work.

Beware of polarity

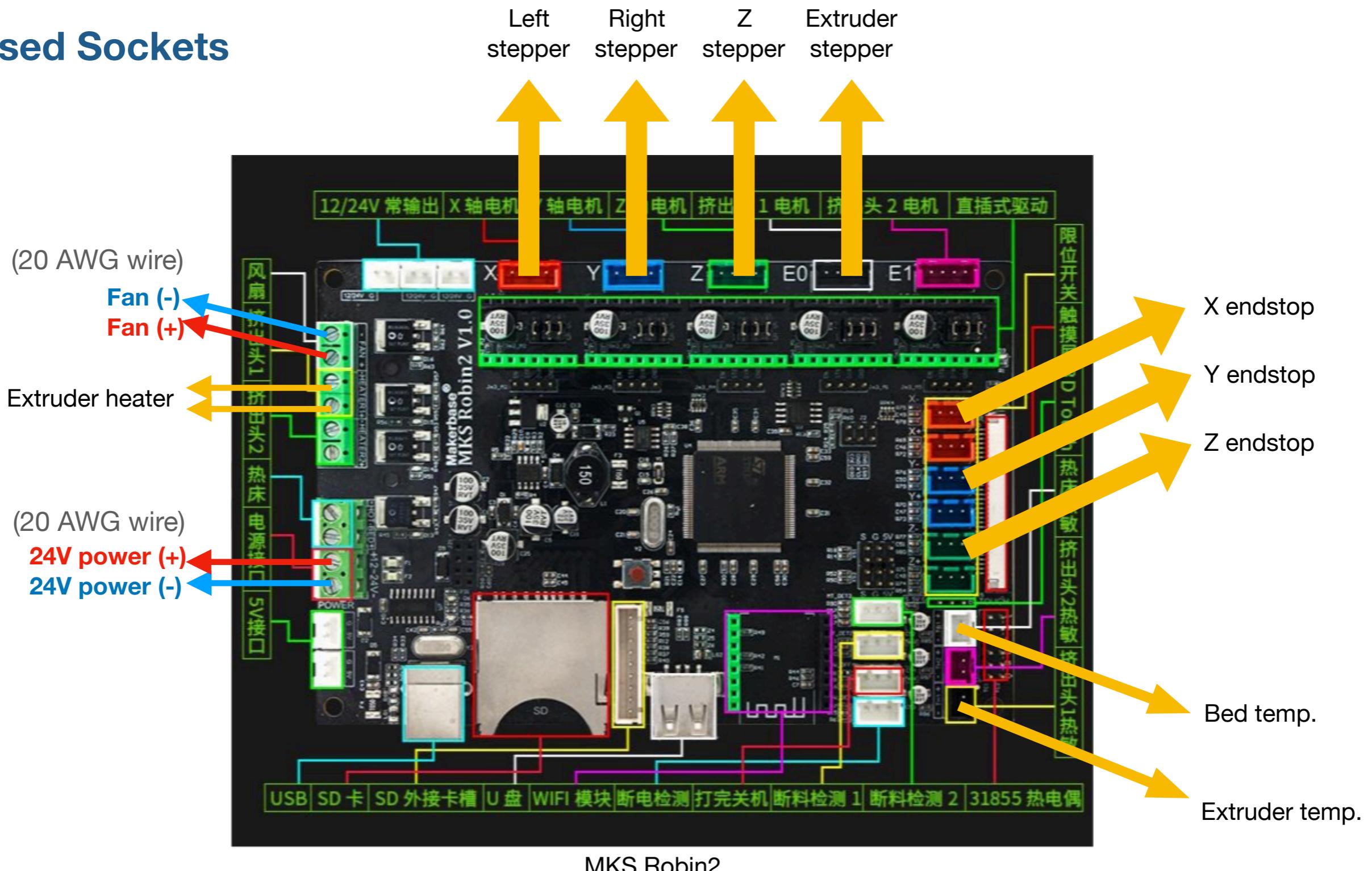
20 AWG wire  **24V power (+)**

20 AWG wire  **24V power (-)**

14 AWG wire  **AC line (polarity doesn't matter)
or fool-proof socket**

Contact us for MKS Robin2 user manual

Used Sockets



Wall plug & switch

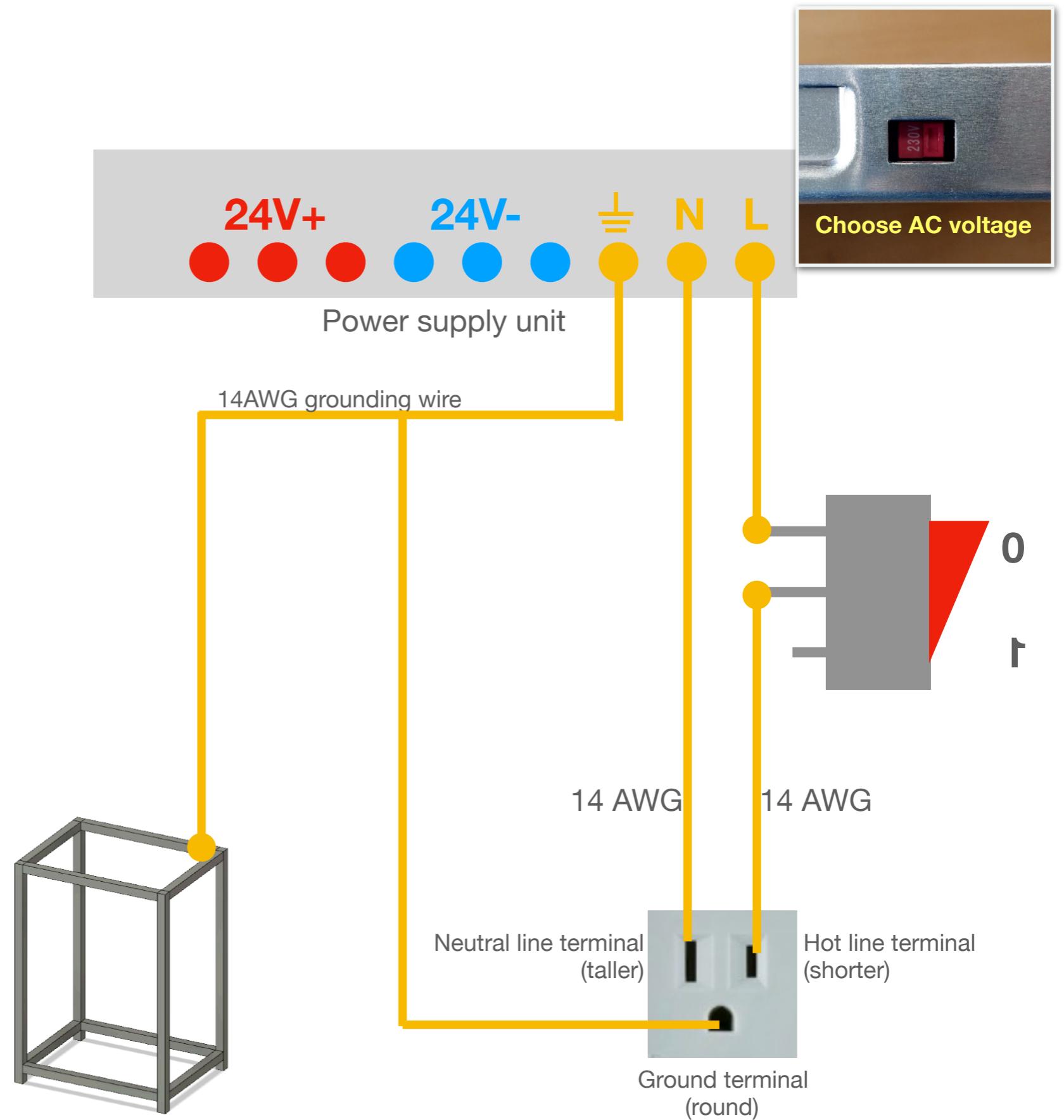
Connect hot line, neutral line, and ground line of wall plug to the L, N and \pm terminal of PSU, as shown in the picture.

Connect a grounding wire to the frame. If your frame is black painted, grind the paint off so the bare metal and ground wire are contacted.

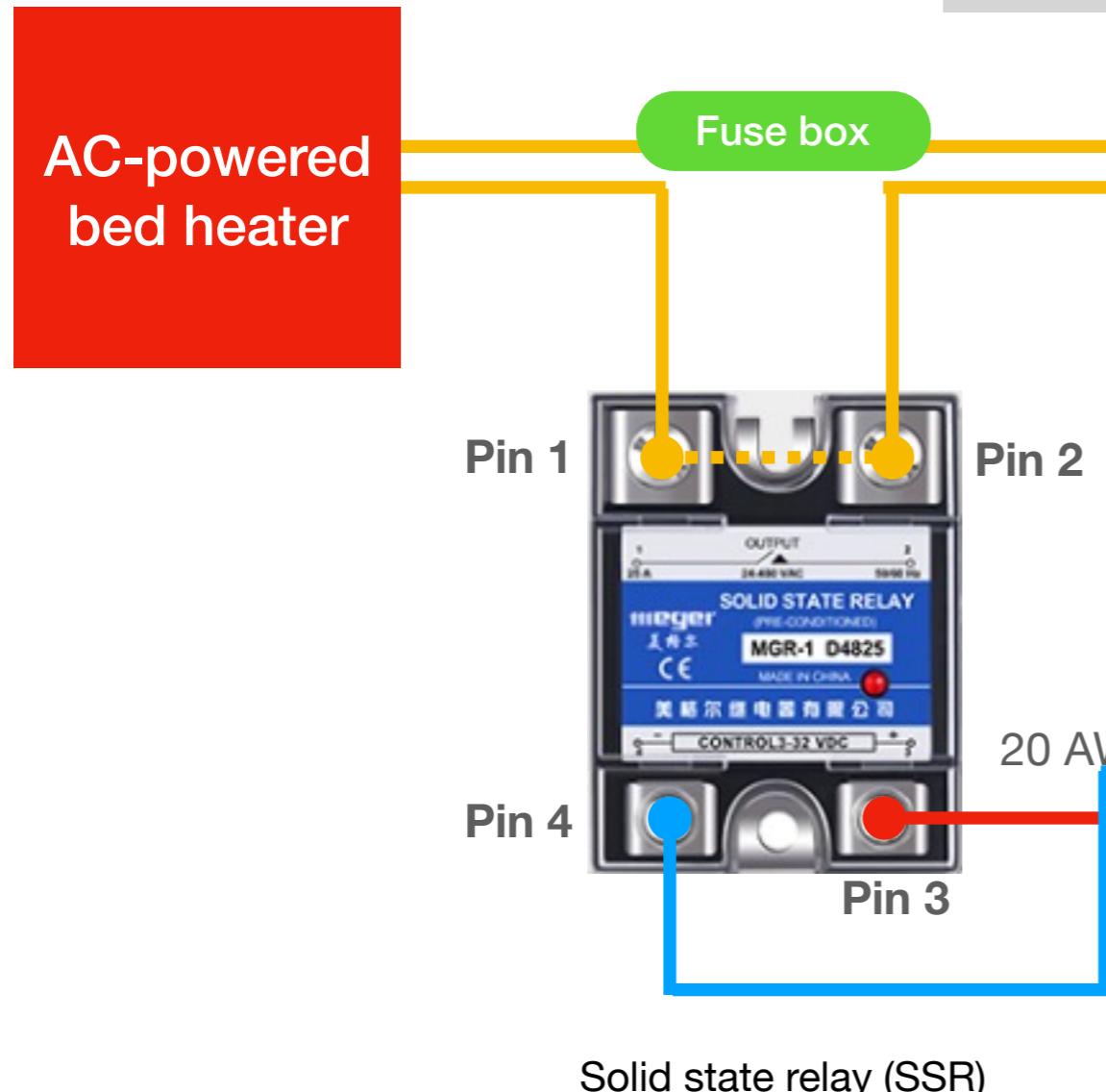
There will be no electricity flowing on the ground wire in normal condition. It acts as a bypass path when abnormal short circuit condition happens, and protect you from electric shock.

If an abnormal short circuit happens, the main circuit breaker in your house will break immediately and stop providing electricity.

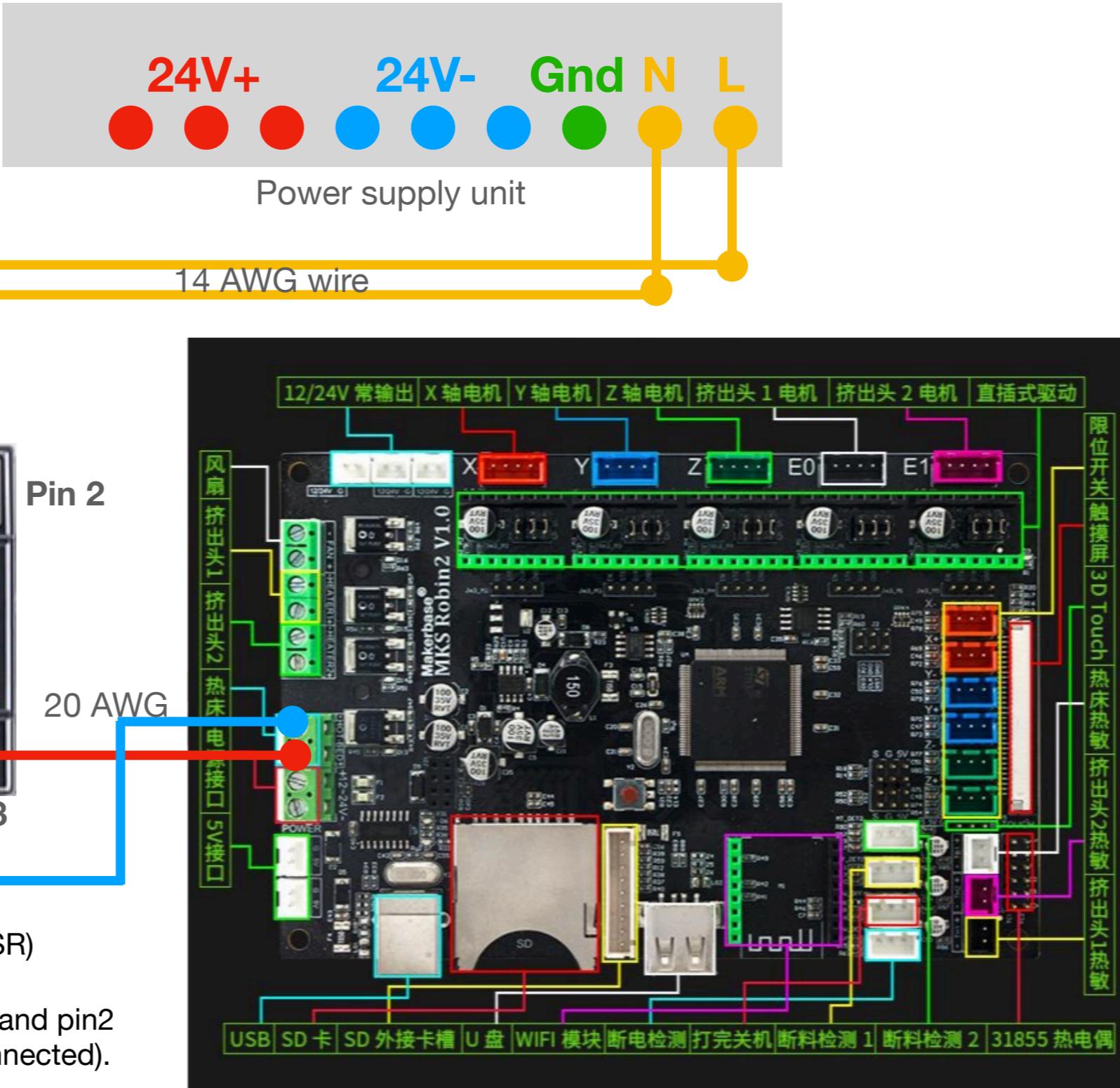
The machine will still work but with less protection if the ground line is not connected.



Bed Heater Wiring



If pin 3 is high (low), pin1 and pin2 will be connected (disconnected).



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Tuning Parameters

Configure Motion Parameters

	Steps/mm (DO NOT CHANGE)	Default Acceleration	Default Jerk
X	100	1500	10
Y	100	1500	10
Z	800	100	0.4
E	415	1000	5

Configure Max Temperatures

Extruder: 295°C

Bed: 145°C

Contact us for MKS Robin2 user manual

Auto PID tuning

Run following command in OctoPrint Terminal or similar place.
It takes minutes and will show a set of P, I, D numbers. Save
PID numbers into your configuration file or EEPROM of control
board.

Auto-tune extruder PID at 200°C.

M303 E0 S200 ; auto-tune extruder PID at 200°C.

Set part-cooling fan speed at 80% (204/255=0.8) and auto-tune
heated bed PID at 50%.

M106 P0 204 ; set fan speed at 204 of 255

M303 E-1 S50 ; auto-tune heated bed PID at 50°C.

P.S. The 24V 3.5W fan is an overkill, so 50% ~ 80% speed is
fast enough for normal printing, also not too loud.

Exam

Sometimes while auto-tuning bed PID the procedure won't stop
and the temperature just climbs up slowly and endlessly. Make
sure your fan is ON and try it again.

Must calibrate Servo42 after assembly

If you're using Servo42s, a calibration process must be done after assembly is completed. This will let the servos adapt your machine loading.

Please contact us for Servo42 user manual. You can connect to Servo42 with the attached micro USB cable and these free software tools: SerialTools (Mac) or Serial Port Utility (Windows).

Serial port parameters

Baud rate: 115200

Bits: 8

Parity: none

Stop bits: 1

CR/LF: checked

Local echo: checked

Configure Step Motor Driving Current

Lower current can be silent but more likely to loose step at high speed. According to experience, 500mA for XY steppers is a good point to begin with.

If you're using Servo42s, you'll print silently if setting max current to 300mA and hold current to 100mA. The default values are 500mA and 300mA.

You can still optimize by doing some more experiments.

SecKit, All-Metal CoreXY 3DP Kit

Web <https://seckit3dp.wix.com>

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