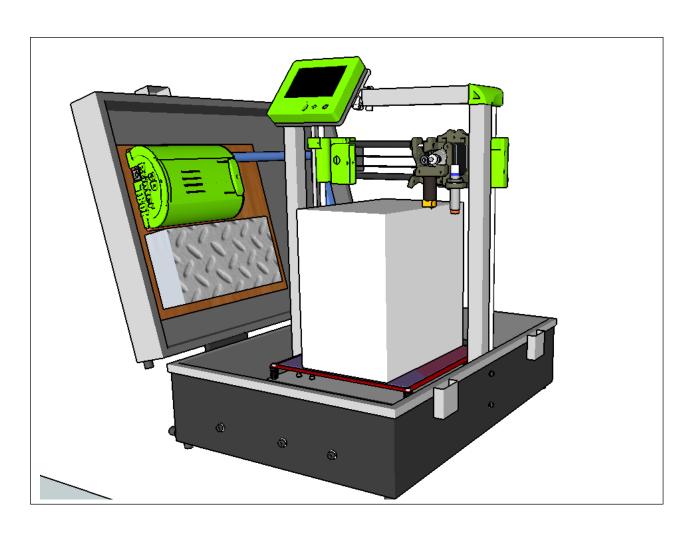


# TeeBox

The Suitcase 3D printer.



BY:



Eindhoven
The Netherlands

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# INTRODUCTION.

Thanks for supporting TeeBot!! And welcome to the world of 3D printing if this is your first printer.

The TeeBot DIY kits, contains all key parts and components required for you to put together a working 3D printer. All parts have been carefully inspected and checked to ensure that you get a smooth build. For those who have successfully assembled a similar printer, assembling the TeeBot should be easy. Otherwise take the build as easy as possible.

#### Terms and condition.

Please note you are completely responsible for the build, use, and operation of your 3D printer. Do not leave 3D printer unattended, always print in well ventilated places. Follow the safety guide for the filaments you use.

# Liability

Neither 3DstuffsNL nor its suppliers shall be liable for any indirect, incidental, consequential, special, punitive, or exemplary damages which might arise out of the USE, BUILD and OPERATION of your TeeBot printers.

#### Returns

Return is only possible on parts which have been damaged during shipping. If any part arrives broken or damaged please make a photo and send an email.

# **WARNING**

A 3D printer works by melting plastic or materials at temperature up to 200 degrees or more!! Touching the nozzle at that temperature will burn in less than a second!!

#### Do not touch a hot Nozzle or bed.

Do not leave a 3dprinter unattended!!,

Do not print in poorly ventilated rooms or space.

Printing any other material other than PLA requires extra ventilation.

You are responsible for any Item produce or the use of the 3D printer.

You cannot claim damages caused by the use of the Printer.

As with any tools, machine or equipment operating in a safe and clean environment with smoke alarms, fire extinguisher and most importantly absolute patience and care is required.

Keep children away from a working printer.

A 3D printer is fun to work with. Enjoy and have fun 3D printing.

# TRICKS AND TIP

It's better to build your printer together with someone, much better if it's built in a group where everyone can share their technical skills

All the skills required can be learnt, but it simply means prolonging the build time into weeks if not months. An easy way out is to embark on the adventure with someone who has the right tools and DIY mind.

The holes in the plastic might not match hundred percent of the time, its ok to drill out these holes with the right drill size while having the plastics in place.

Read the entire documentation to have an overview of the task ahead. Also to see where you might need help.

Again always follow all safety guidelines with using tools, machines and most importantly when working with electricity.

# THE DESIGN.



"The journey of a thousand miles begins with a single step."

# TOOLS NEEDED.

Drill Bits: 4mm, 3mm, 8mm

Screw drivers, Pliers, Allen key set

# PART 1 --- Y AXIS (PRINT BED)

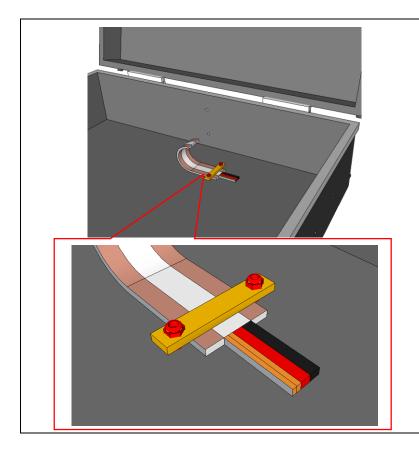


The rail on which the print platform rides is referred to as the Y axis. Upon completion of the Y axis you should have

- A free moving print platform.
- Installed stepper motor with adequate tension on belt drive
- Well secured rod/rail without play/movements.

Start by preparing the heatbed wire harness, then move on to tightening the belt and the Y axis end supports.

#### Fasten heatbed cable harness



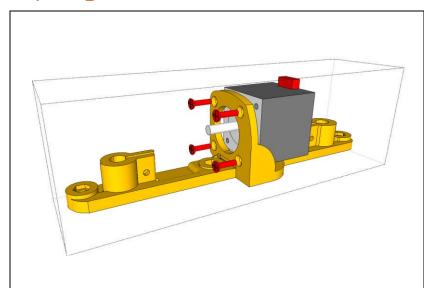
#### **Cable Harness**

Fasten tight the heatbed cable harness onto the box, using

- 2) M3 X 20
- 2) M3 Washer
- 2) M3 lock nuts.

The line on which to fasten the cable is indicated on the wire harness.

#### Prepare Y\_AXIS motor



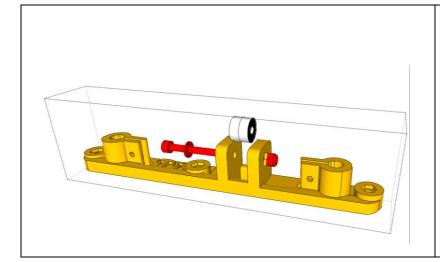
#### **Y Axis Motor**

#### Use

• 4) M3 x 10 bolts

to fasten the stepper motor into the Y\_AXIS\_MOTOR\_END.

Note: The orientation of the stepper motor wire outlet is upwards!!



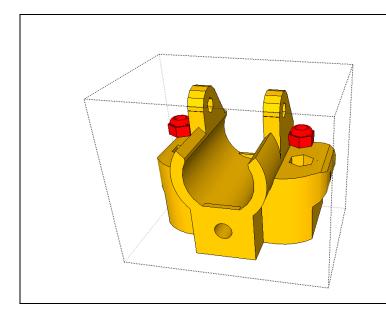
#### **Install Y Idler bearing**

#### Use

- 1) M4x 30 bolt
- 1) M4 Washer
- 1) M4 Nuts

fasten two idler bearing in place.

Note: The lock nut must sit properly in the Y\_AXIS\_IDLER. You might need to make the hole 4mm.



#### **Prep Bearing Holder (x3)**

Use

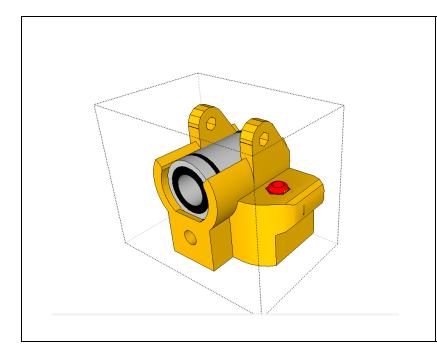
• 6) M3 Lock Nut

Insert 2 lock nuts each into the BEARING\_HOLDER.

Note: For easy assembly, it is advisable to first drill out the holes with 3mm or 3.5mm drill.

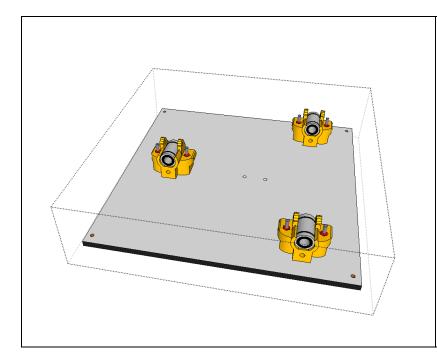
If the nuts does not fit use a bolt by fastening it in.

Do this for all 3 Bearing holder.



#### **Install bearing**

Insert/press the LM8UU bearing into the holder by using one of the 8mm rod as a guide

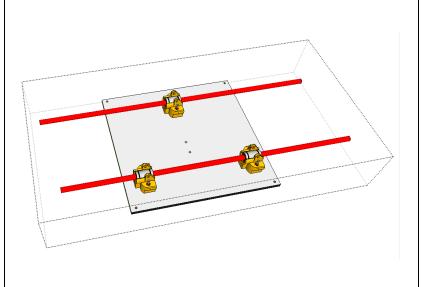


# Mount holder loosely on support board.

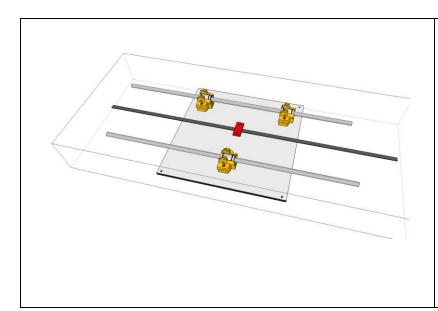
• 6) M3 X 30 Bolt

Using the M3 X 30mm mount all bearing holder on the board as shown.

Do not tighten fast yet!!



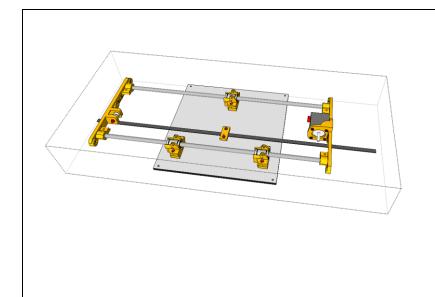
### Insert the Y\_AXIS\_RODS



#### **Tighten Belt**

- 2) M3 X 20 Bolts
- 2) M3 Washer
- 2) M3 Lock Nuts

At Equal half fasten the belt to the board using 2 M3X20. These you can fasten tight

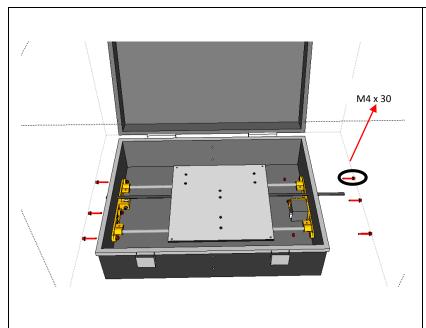


# Mount Y\_AXIS\_MOTOR\_END and Y\_AXAIS\_IDLER

If the 8 MM rod does not slide in easily, use an 8mm drill in reverse direction to pass the hole. An alternative method is to blow some warm air/ hair dryer/ heat gun to soften the plastic a bit.

Note caution should be taken in inserting the rods.

Do not fasten the rods yet.



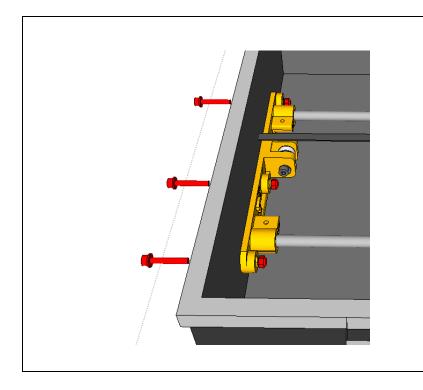
#### Mount Y\_AXIS Into the 3D case

- 5) M4 X 20 Bolts
- 1) M4 X 30 Bolts
- 6) M4 Lock Nuts
- 6) M4 Washer

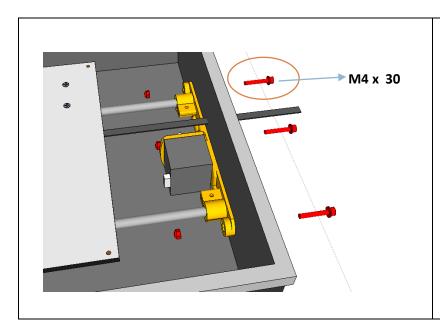
The longer M4 x 30 bolt is used on the motor side where the limit switch will sit.

Fasten tight. Washers are only on the outside of the box.

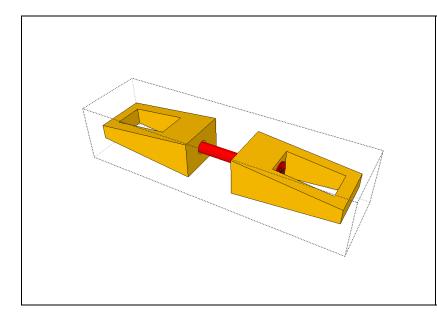
Note: The orientation of the assembly. The Y axis stepper is on the right hand side of the box



#### Mount Y\_AXIS Into the 3D case



### Mount Y\_AXIS Into the 3D case

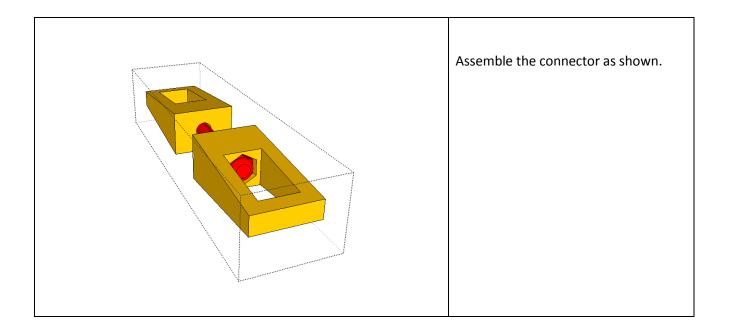


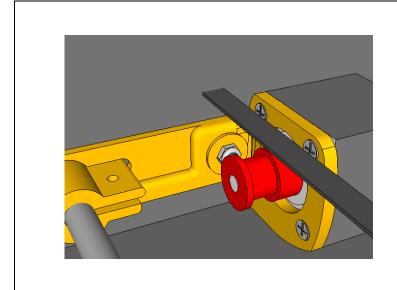
### Tensioning the Y Axis belt

- 1) M3 x 30 Bolt
- 1) M3 x Lock nut

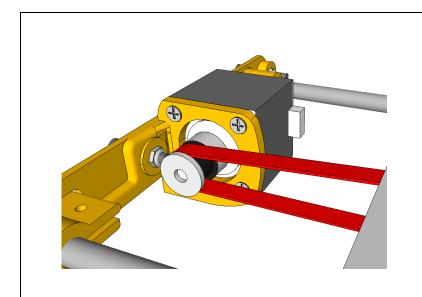
The belt is connected together and tensioned using the two belt connector.

Assemble the connector as shown.

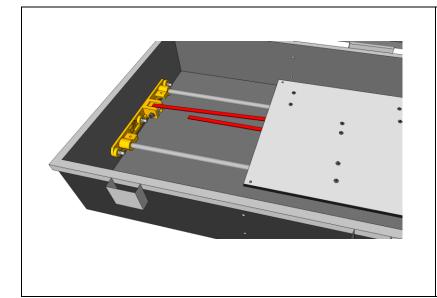




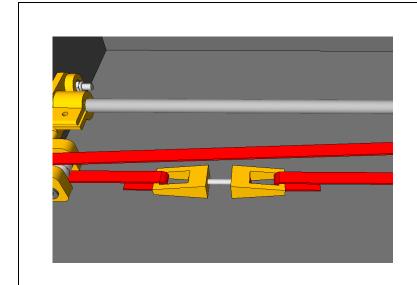
Slide one of the GT2 pulley in place. Do not fasten tight Yet.



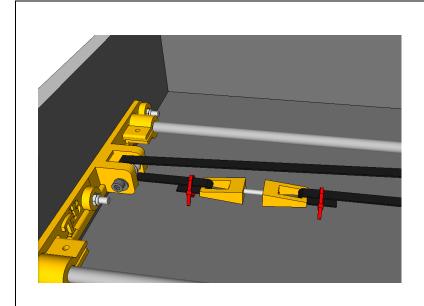
Wrap the belt around pulley and idler sliding the print platform to the stepper motor side.



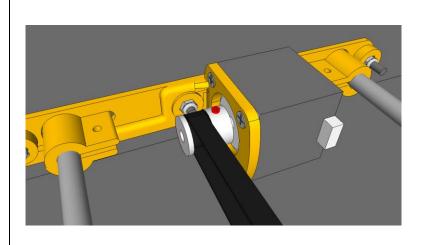
Wrap the belt around pulley and idler sliding the print platform to the stepper motor side.



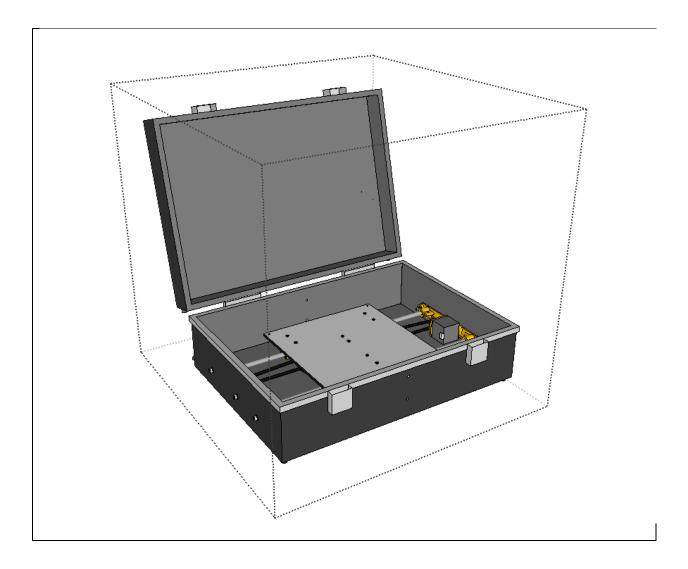
Wrap the belt around tension assembly.



Secure the belt in place as tight as possible using the zip tie use two zip tie on each side.



Slide the print bed back and front to properly align the pulley and fasten tight the pulley.



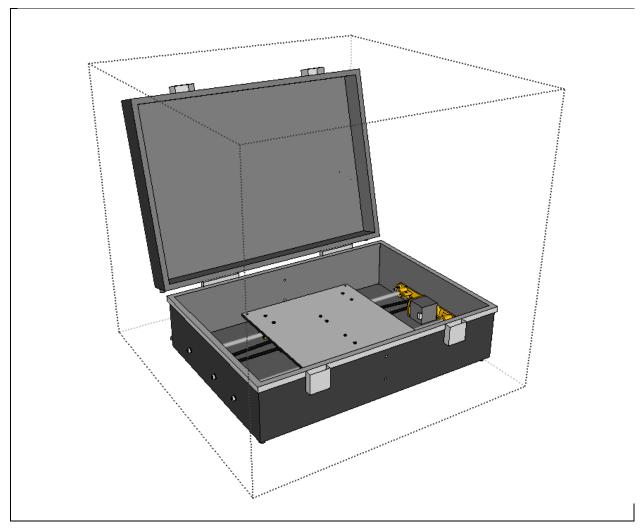
At this point fasten tight all fasteners. Check each and every one of them to ensure none is forgotten.

If all goes well you have a completed Y\_AXIS assembly. The print bed should slide easily on its rail with minimal effort.

The belt should be firm but not too much. Make sure the zip tie are well tensioned. If possible use two on each side of the belt.

# PART 2 --- Z AXIS (FRAME)

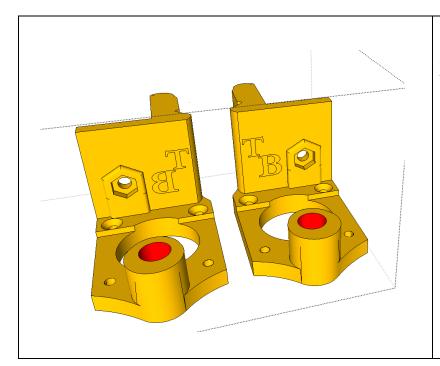
#### Assembling the Z axis.



The Z Axis lifts the print nozzle(X Axis) up and down. The Z Axis is designed to be easily demountable for packing the 3d printer. It is held in place by 4 bolts and wing nuts for easy unpacking and assembling. Before printing and after long prints, it is advisable to check these for wing nuts to make sure they are properly fasten at all time.

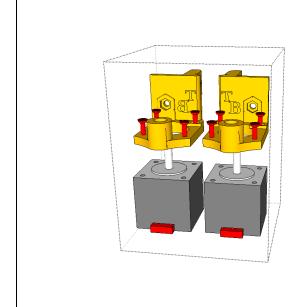
The Z Axis is assembled by first mounting the poles on each sides and then installing the Z\_threaded rods and smooth rods, the top section comes next and finally the X Axis.

### Prepare the Z\_Axis Motor.



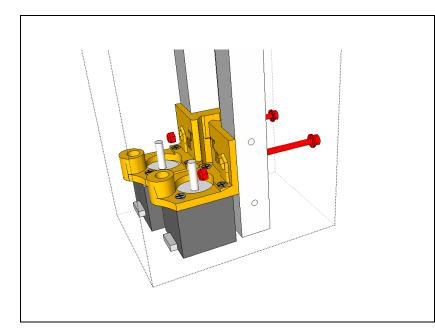
Start by making sure the 8mm hole for the rod is free enough to take the 8mm rod. If not, in reverse motion use the drill with 8mm bit to clear and make the hole through. And file or make round the tip of the 8mm rods.

Mount two of the stepper motor



Next mount the stepper motors using the M3X 10mm screw.

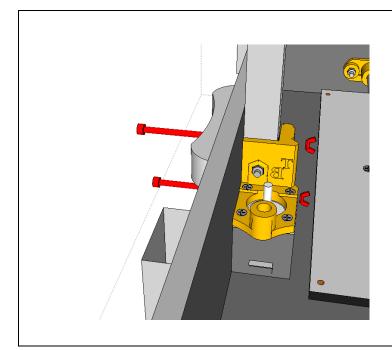
Note: The orientation of the connector/cable front for the stepper motor



Next install the assembled motor on to each of the Z\_POLE tubing.

Fasten Tight.

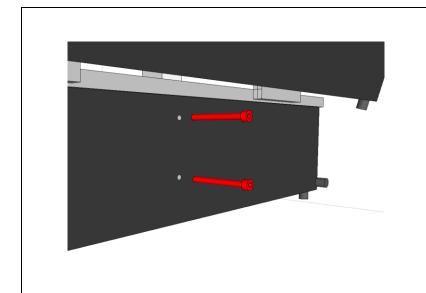
Use M4 x 30 bolts and nut with washers on the Aluminum side only.



Mount each Z-Pole into the box using

The longest mounting screw in the handle mount.

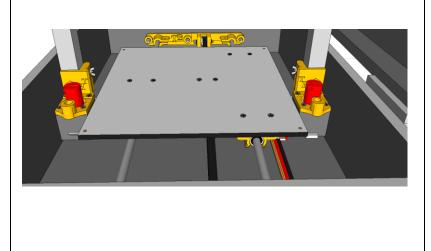
Use M4 x 50 for the top bolt and M4 x 40 for the bottom one.



Mount each Z-Pole into the box using

The longest mounting screw in the handle mount.

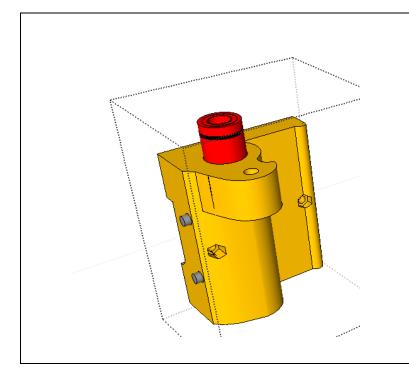
Use M4 x 50 for the top bolt and M4 x 40 for the bottom one.



Insert the two Aluminum coupling into the Stepper motor.

Note: Do not fasten the lock nuts!!

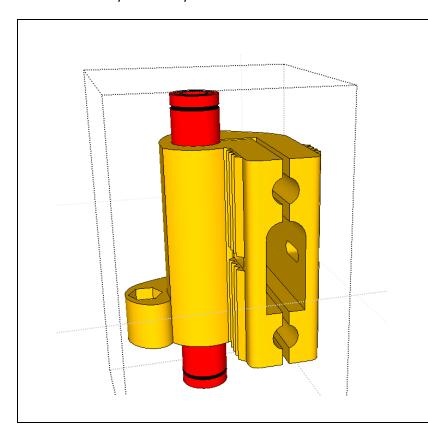
### Prepare the X\_Axis Assemblies.



Insert two LM8UU linear bearing in each of the X\_AXIS\_ENDS

A little force is required in punching the bearing into the X\_AXIS\_MOTOR end. Holding the plastic part in one hand while gently tapping it with a wood/ plastic/ rubber hammer does the trick.

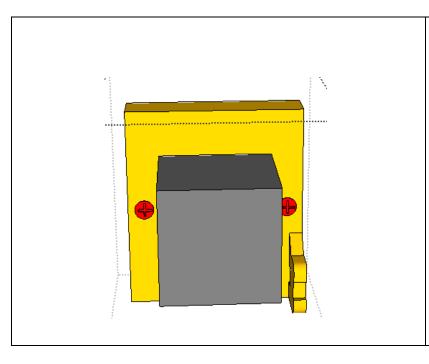
#### TeeBot Assembly Manual by 3DstuffsNL



Inserting the bearings in the X\_AXIS\_IDDLER ends is much easier.

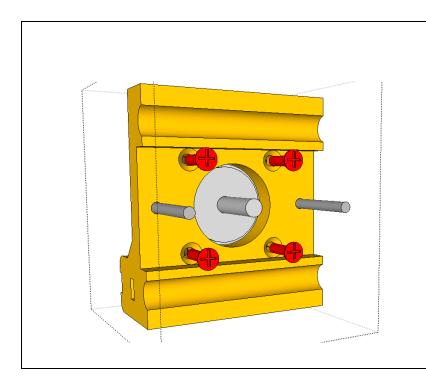
Gently open the plastic and let the bearing slid all the way in.

Lock/ fasten all grub screw tight.

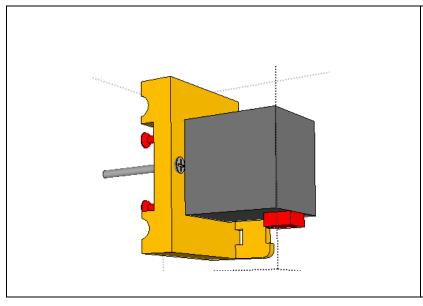


Mount the stepper motor on to the X\_AXIS\_MOTOR\_BACK.

Before mounting the motor insert the long M3 x 40 bolts into the back side.

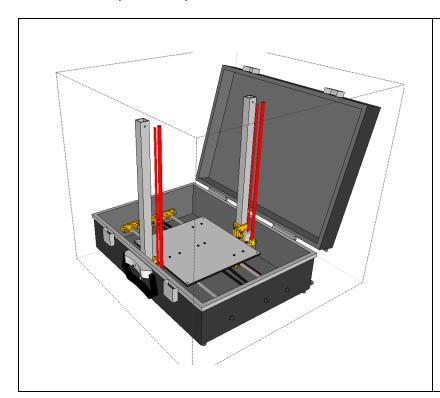


Mount the stepper motor on to the X\_AXIS\_MOTOR\_BACK. Using the M3 x 10



Note the Direction of the Motor wiring / connector is downwards

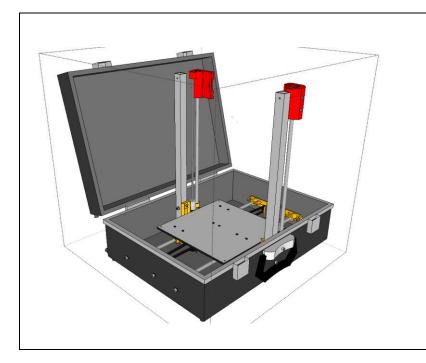
#### TeeBot Assembly Manual by 3DstuffsNL



Insert the two M5 Threaded Rods, and the two M8 Smooth rods.

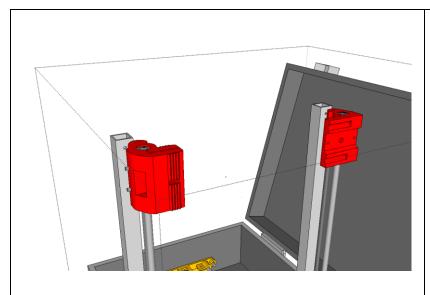
Use a plier to hold on the M8 and wiggle it left to right while gently pressing it into the hole in the plastic.

# **PART 3 --- X AXIS**



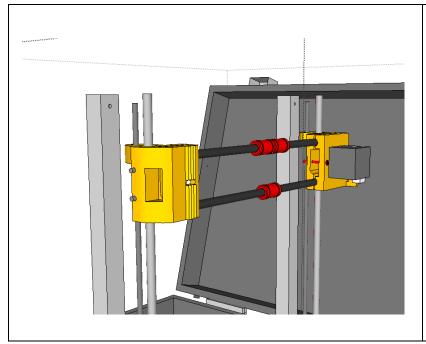
Slide in the prepared X\_AXIS\_IDLER and MOTOR end into the smooth rods, while rotating the threaded rods.

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Slide in the X\_AXIS\_IDLER and MOTOR end into the smooth rods, while twisting/screwing the threaded rods.

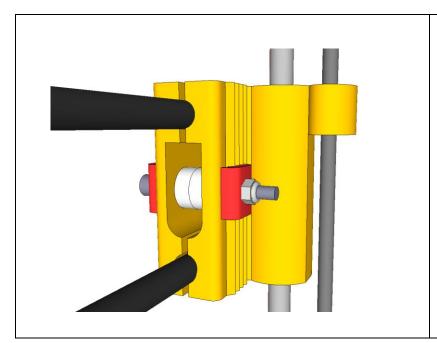
Try to thread each block down at least 4cm.



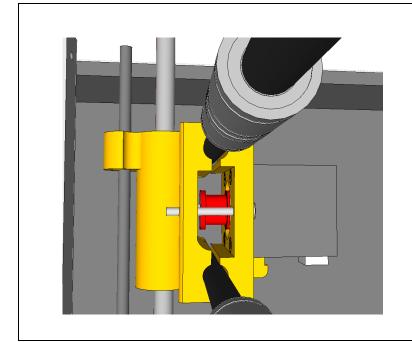
Next is to insert the X Axis rods. And screw it in place loosely

Note slide in two bearing for the top rod, and one for the lower rod.

### TeeBot Assembly Manual by 3DstuffsNL

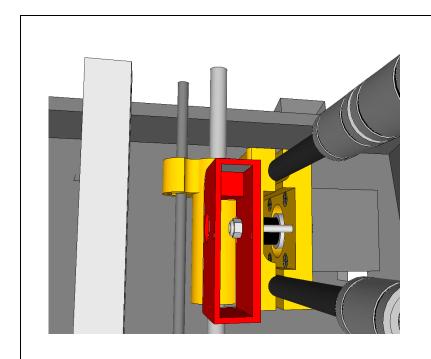


Insert the idler bearing and fasten loosely. Use M4 x 40.

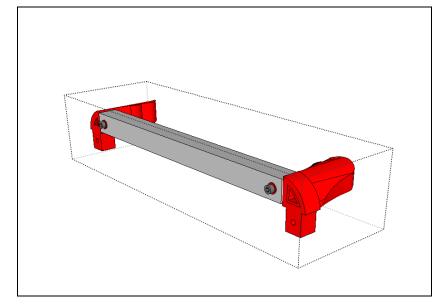


Do not fasten the stepper motor assembly yet.

Insert the pulley and make sure it is align



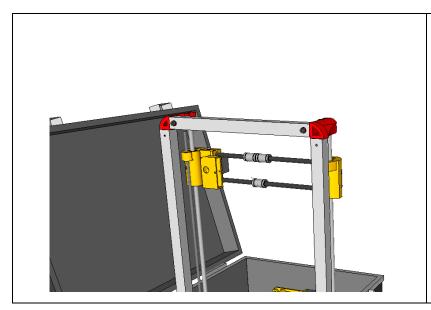
Mount the X\_AXIS\_LMIT\_HOLDER and screw loosely in place.



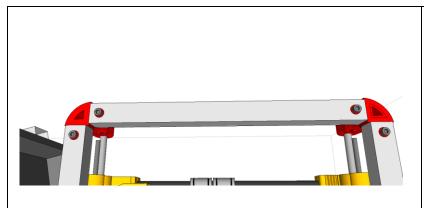
Prepare the top frame assembly

Fasten tight the two M4 x 25 Bolt with washers on both sides.

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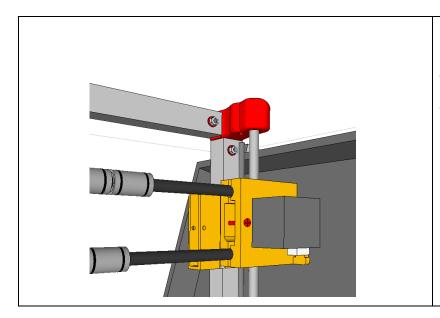


Insert the Top frame assemble into the printer. Using a plier on each side the M8 rod should be wiggled into place.



Fasten tight all 4 corners use M4 x 25.

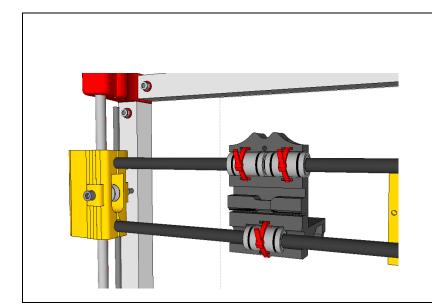
### TeeBot Assembly Manual by 3DstuffsNL



Fasten tight the X\_AXIS\_MOTOR on the 2 mounting M3 screws.

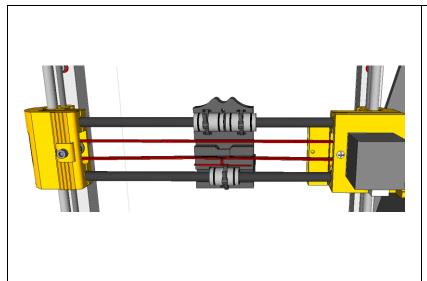
Also fasten the X\_Motor\_Iddler.

## Prepare the X\_Carriage Assembly.



Mount the X\_axis\_Carriage unto the bearing and fasten using zip ties.

#### TeeBot Assembly Manual by 3DstuffsNL

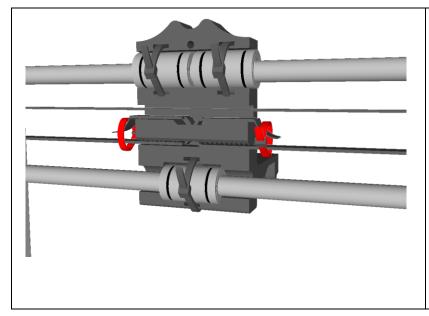


Thread the belts into the machine.

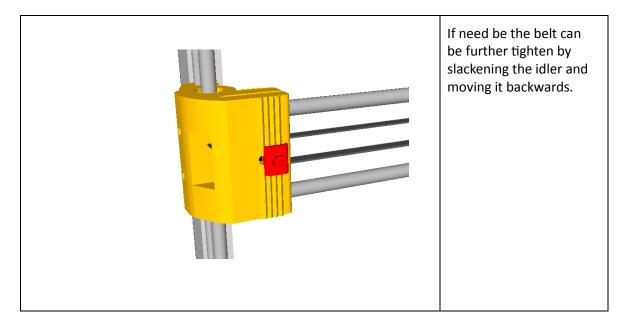
There are different method to secure the belts in place.

First is looping each belt backwards.

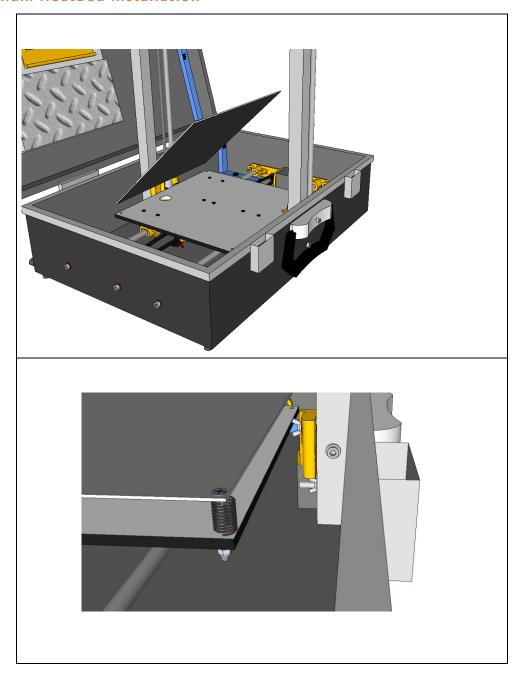
Second is pulling it to the lower zip tie and locking it in place using another zip tie see image below.



With all frames fasten, pull the belt as tight as possible and lock in pace using the ziptie.



## Aluminum HeatBed installation



While tilting the Heatbed slightly.

- Solder on the power cables for the Heat bed.
- Tape the thermistor underneath the bed anywhere around the center is fine.
- Using 4 pcs of 30mm screw and 4 springs secure the heatbed in place with m3 lock nuts
- The height of the bed from the board does not matter I recommend 15 to 20mm.

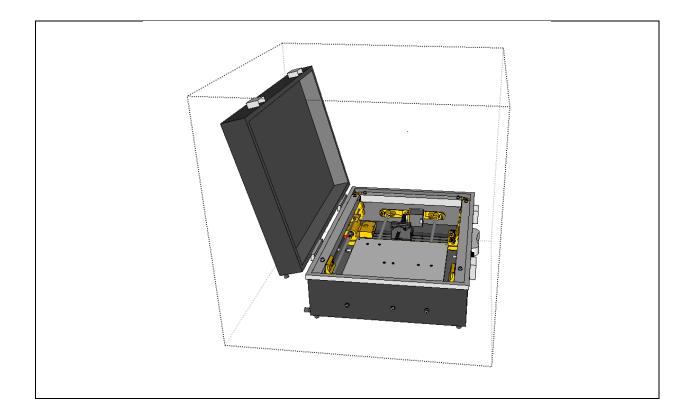


At this point the assembly of the mechanical parts is complete, fasten in place all nuts and zip tie make sure both belts are as tensioned tight as possible.

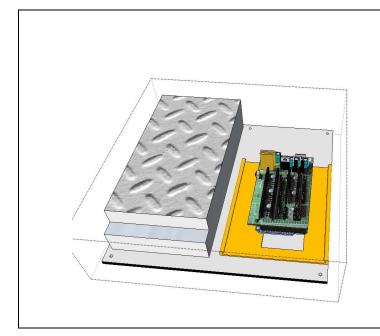
Move all axis in all direction they should move freely with a slight stepping feeling of the stepper motors.

Try folding the 3D printer by loosening the 4 mounting bolt and lay the X axis down in the box it should close neatly.

Note when loose, the X axis belt tend to lose some of its tension this is fine. When mounted back in place it gains the tension back.



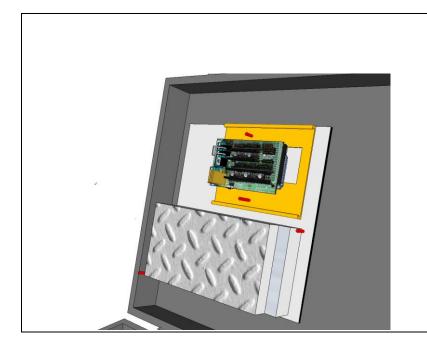
# **PART 4 ---ELECTRONICS**



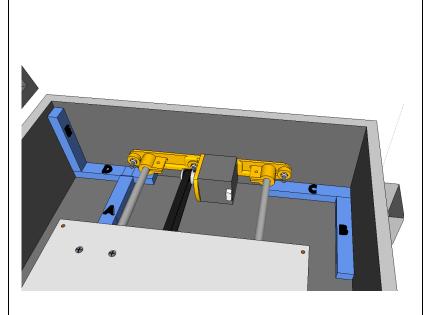
Install the RAMPS ELECTRONICS.

The Ramps board supplied with the kit has been prepared and tested for use.

Use a Zip tie to fasten the Arduino board to the plastic parts.

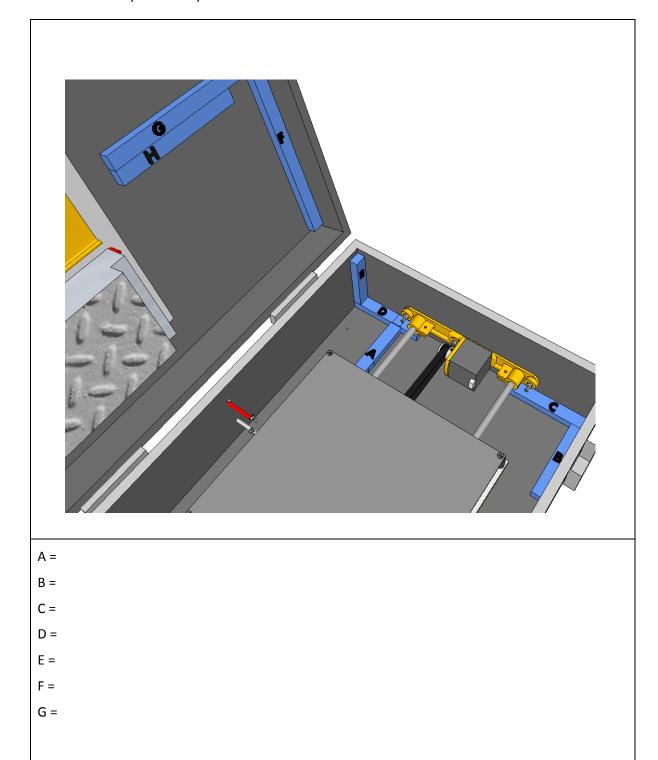


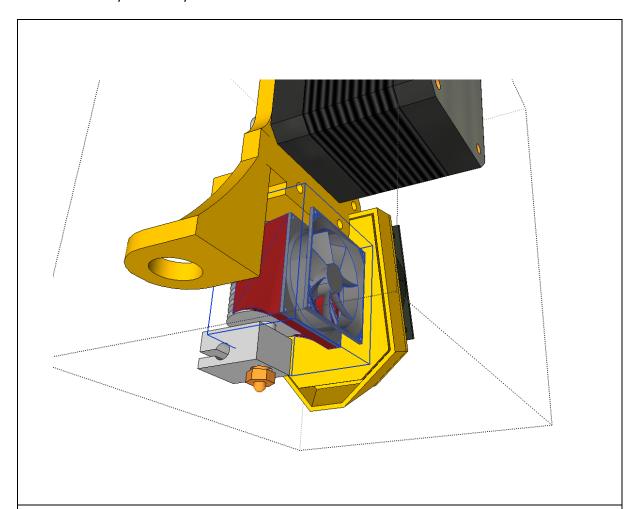
Mount the board into the box using the four mount M3/20 bolts



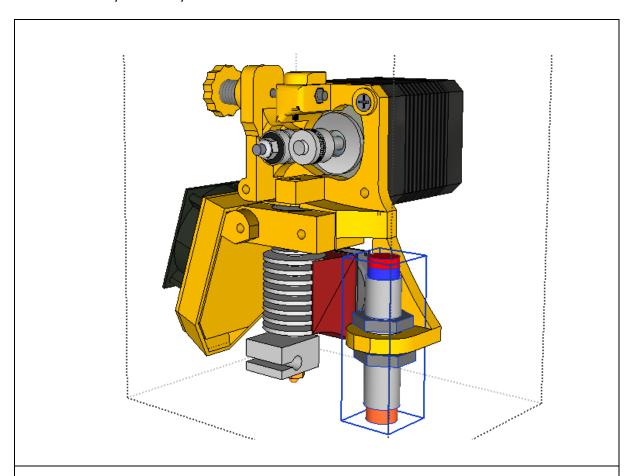
Install in place the cable pipes.

As shown in the image. The cable pipes are labelled in the kit.

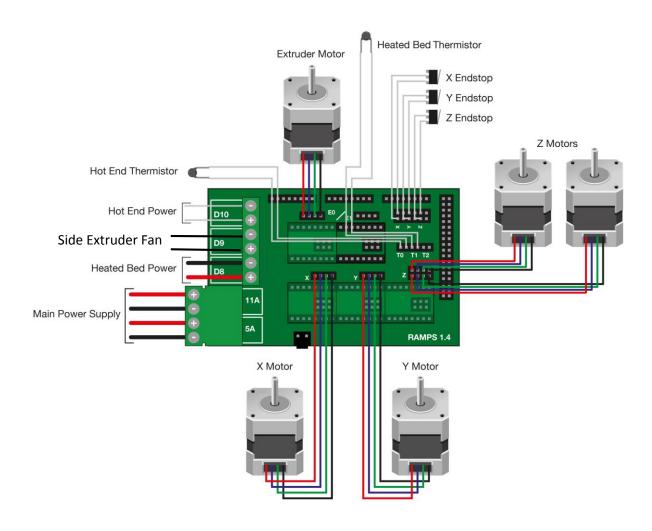




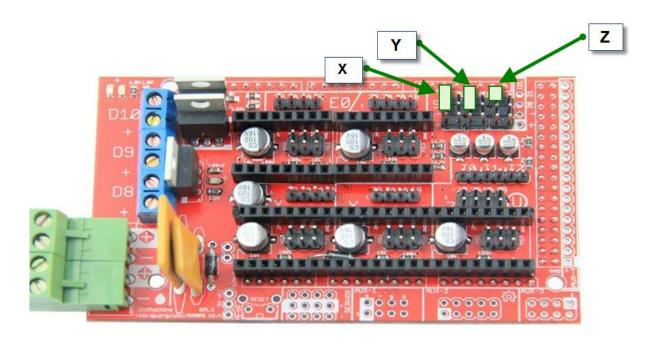
Instal/instert the cooling fan it should snap into place with little effort.



Instal/instert the proximity sensor. The Proximity sensor has already been prepared to length the black cable is the Gnd /Negative connecting to the 12V power supply. The cable with a pin goes on the Zmin in the board while the third cable is the possitive connecting to the 12V power supply.



Using the Supplied Cables Make all connections as shown in the diagram above, Please Note D9 connects to the side extruder Fan. And the fan from the hotend is connected directly to the power supply/ always on.



Connection to the limit switch is using the alternating pins in the block as shown above, 2 pins are connected to the "s" and "-ve" for x and y axis. For Z axis using the Limit sensor only one pin is required and it is connected to the "S" pin for Z axis. The reminder of the Z axis are connected to 5 volts + and ground. Note you will have to limit the voltage going to the sensor using two resistor. This has already been done in the DIY kit supply. Simply connect the S for the Z axis the other connections goes straight to the power supply.

# PART 9 (TESTING)

Before you start printing it is recommended that you test and confirm all connections are properly fitted. A wrong connection will most likely damage a part if not the whole board.

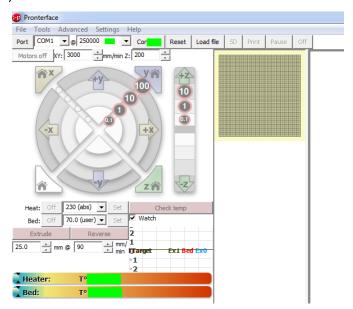
Testing and calibration is done via a PC, after all it set up you can resume to printing from the SD card.

NOTE!! When you need to make a new connection on the RAMPS board or double check existing connections, it is important to first disconnect the printer from the software then the USB cable and finally always unplug the power supply!! Any attempt to connect or disconnect from the Ramps board while still powered will ruin your board immediately!!

#### **POWER SUPPLY**

Download the latest Pronterface software from here

- 1. Make sure the power output from the power supply is 12V by measuring the voltage output with a multimeter. If you have the kit from 3DstuffsNL this is already done.
- 2. Connect only the Main power supply, Thermistor T1 ,T2, Heated Bed power and Hot end Power
- 3. Make connection to the printer via pronterface using a USB cable, and make sure the temperature reading is similar to that of the Room. (Note you ramps Board need to have been flashed/loaded with the correct version of Marlin firmware this is already don with the supplied Board)

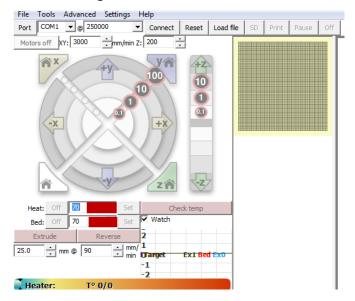


4. The Heater and Bed display should be a temperature close the room temperature. If this temperature is Zero double check all connections and try again.

#### HEAT BED AND HOTEND TESTING.

Testing the heat bed and Hotend can be done by raising their temperature.

 While connected to Pronterface set the heatbed and hotend Temperature to 70 degrees by typing it in the box and clicking set.

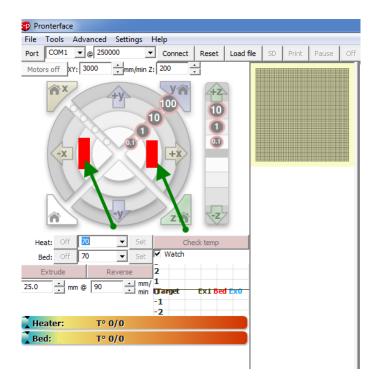


You should see the temperature rise to 70 degrees after a few minutes. For the first time it is
ok to smell some burnt plastic, oil. If the temperature fail to rise, double check the connection/
polarity of the heatbed, the hotend connection does not have polarity. You feel the
temperature by touching the heat bed, be careful touching the hotend as the temperature
might initially rise above 70 degree and then fall.

#### X AXIS AND LIMIT SWITCH TESTING

The next test is the X Axis, the aim here is to make sure that the X axis moves from left to right, and also that the limit switch is triggered when reached. Remember to always disconnect the USB cable and power supply first before making / changing any connection

- Connect the X axis motor and limit switch and connect the printer and power.
- Try to move the printer by 1 mm on the X axis. Do not attempt to move the printer by 100mm. This is done by using the move buttons on the software.



- Do this with a few clicks, +ve X is right direction, -ve X is left, if the printer move in opposite directions, fix this by flipping the X axis connector on the Ramps board. (Remember disconnect USB, and power supply first!!!).
- Place you hand on the X limit switch to activate the switch hold it down and try to move the x axis in the –ve direction it should not move. If it moves double check the connection and make sure you have the limit switch properly connected.

#### Y AXIS AND LIMIT SWITCH TESTING

The next test is the Y Axis, the aim here is to make sure that the Y axis moves from Front to Back, and also that the limit switch is triggered when reached. Remember to always disconnect the USB cable and power supply first before making / changing any connection.

Repeat the steps in X axis for the Y axis to make sure that the Y Axis limit is triggered and that the bed move in the right direction when moved +ve (forward away from the limit switch) –Ve backwards towards the limit switch.

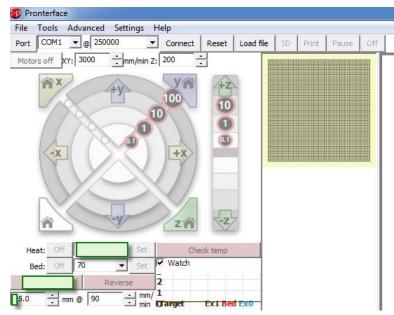
### **Z AXIS AND LIMIT SWITCH TESTING**

The Z axis is simple, bring a metal object close to the proximity sensor and the light should come on indicating that it is triggered. Check the direction of travel by ensuring –Ve goes upwards, and –Ve downwards.

#### **EXTRUDER MOTOR TESTING**

The extruder needs to rotate in the right direction while extruding. To be able to extrude, you will need to raise the temperature otherwise marlin will trigger cold extrusion and prevent the motor from moving.

- Set the heater temperature to 180
- Manually Insert a filament into the hotend going as far as possible, you should see it coming out from the nozzle
- Next extrude by 5mm, using the pronterface extrude button.



Note the rotation of the extruder, it should be anticlockwise. If it rotates clockwise ejecting the
filament from the hotend, you will have to flip the connection of the extruder motor.
 Remember to always disconnect the USB cable and power supply first before making /
changing any connection.

At this point you are safe to use the X and Y axis Home button to move the printer to the Home position by itself.

#### **AUTO LEVEL TESTING**

The DIY kit comes with preloaded marlin firmware which is enabled for Auto leveling. If you are sourcing the parts yourself a good video to watch in setting up auto leveling is <u>Tom's Guide</u> on auto leveling. If you need the Modified marlin you can always send an email.

#### **HOME ALL AXIS**

After homing all axis the height of the extrusion nozzle should be just a little bit above the bed. ~ 1mm

At this point you are ready to 3D print. Note if you are sourcing your parts or using a different control board, all axis will need calibration to ensure that 1mm moved in the software actually translate to 1mm movement on the printer. This requires some little mathematics, updating of the firmware configuration settings and then flashing/reloading of the firmware into the control board. There are many blogs, videos and topics online that covers calculating the correct steps for the stepper motor. Please follow this process for the board you are using.

#### **3D PRINTING**

Download the sample Gcode from our website if you do not have them, load it via pronterface and print.

If the printer prints too high in the air, the print will not stick to the bed, if the nozzle is in the heatbed scratching the aluminum heat bed it will not print also, you will hear a ticking sound from the extruder and notice a jerk of the filament. Please follow the step above on calibrating the auto Z level. Normally simply moving the proximity up or down by a few millimeter should do the trick.

After you are satisfy with the print, you can then move on to copy the same Gcode to an SD card and then 3d print from the SD card.

Do not try to rush your build!! When you are not sure it's better to pause and find help online or simple send an email. It is much better to wait a day or two than waiting a week or two for a replacement parts and spending more.

#### SLIC3R SETTINGS

