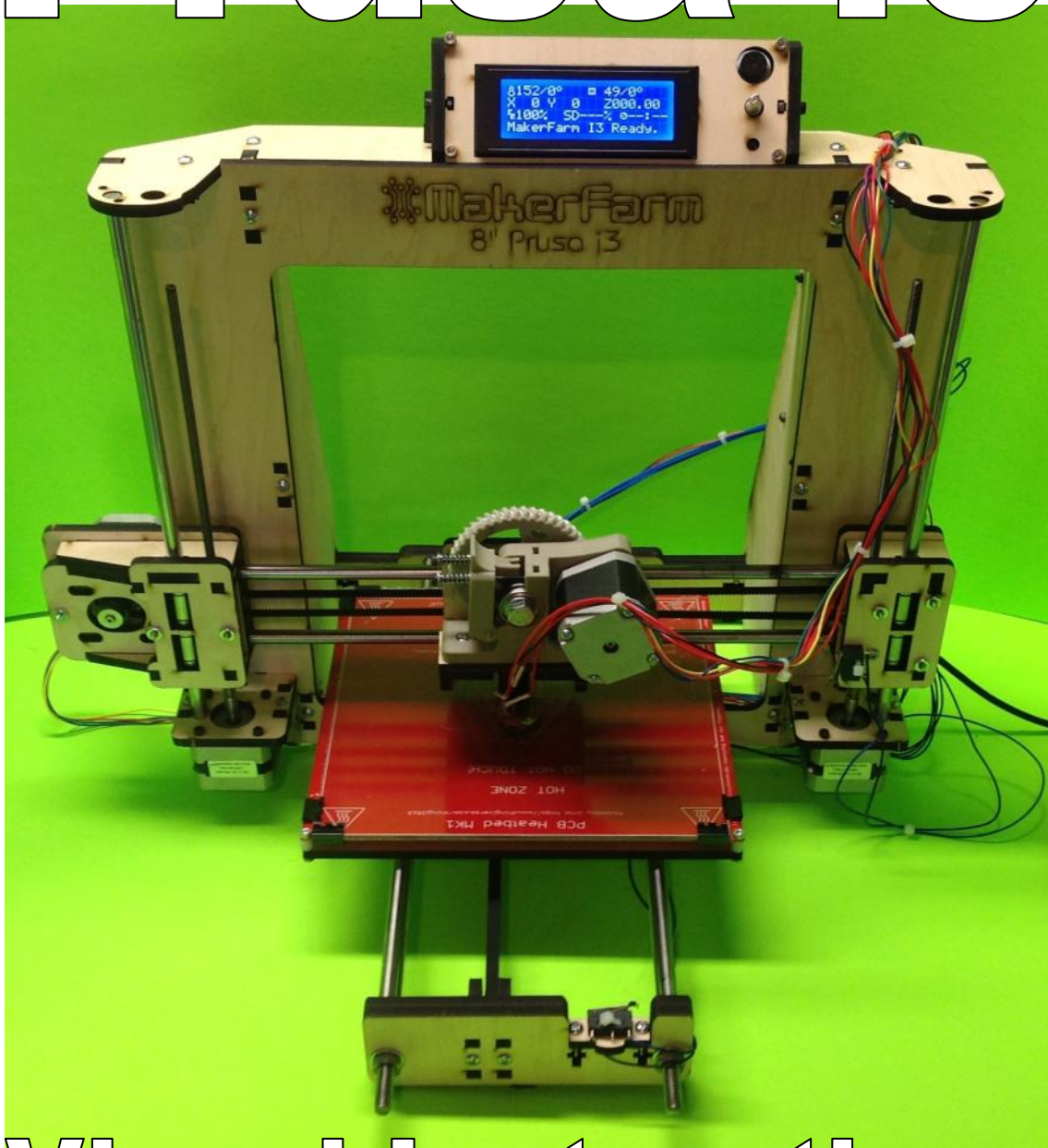


# Laser Cut 8" Prusa i3



Visual Instructions

# MAKERFARM



# Parts List

## Laser Cut 8" i3 Prusa

This Guide has Hyper links, to use them please click File then Download and open the PDF in your PDF Viewer, if you view the Guide online the Hyper links will not function

Thank you for purchasing the Laser Cut i3 Kit. To complete your build you will need a couple other items.

Piece of Glass 215mm X 204mm (2.5mm to 3.5mm Thick, most hardware stores will cut it to the size you need, Inside the USA Lowes or Home Depot)

Power Supply: [http://www.staples.com/Antec-VP-450W-Power-Supply/product\\_928656](http://www.staples.com/Antec-VP-450W-Power-Supply/product_928656) or similar power supply (Your power supply will need to be able to output minimum 16amps at 12v)

You may also want some filament to print with after you have built your printer. Makerfarm.com does sell filament and if you purchase it with your kit you will receive a discount. If you want to purchase your filament somewhere else make sure you get high quality filament, poor quality filament (Amazon and eBay) will jam and cause problems.

At any time if you have any questions feel free to e-mail or chat via google chat:  
elderfarrer@gmail.com

Thanks,  
Colin Farrer  
Sales@MakerFarm.com



# Assembly

## X Carriage

Gather the following parts before watching the X Carriage Video

5 x #6 Nuts

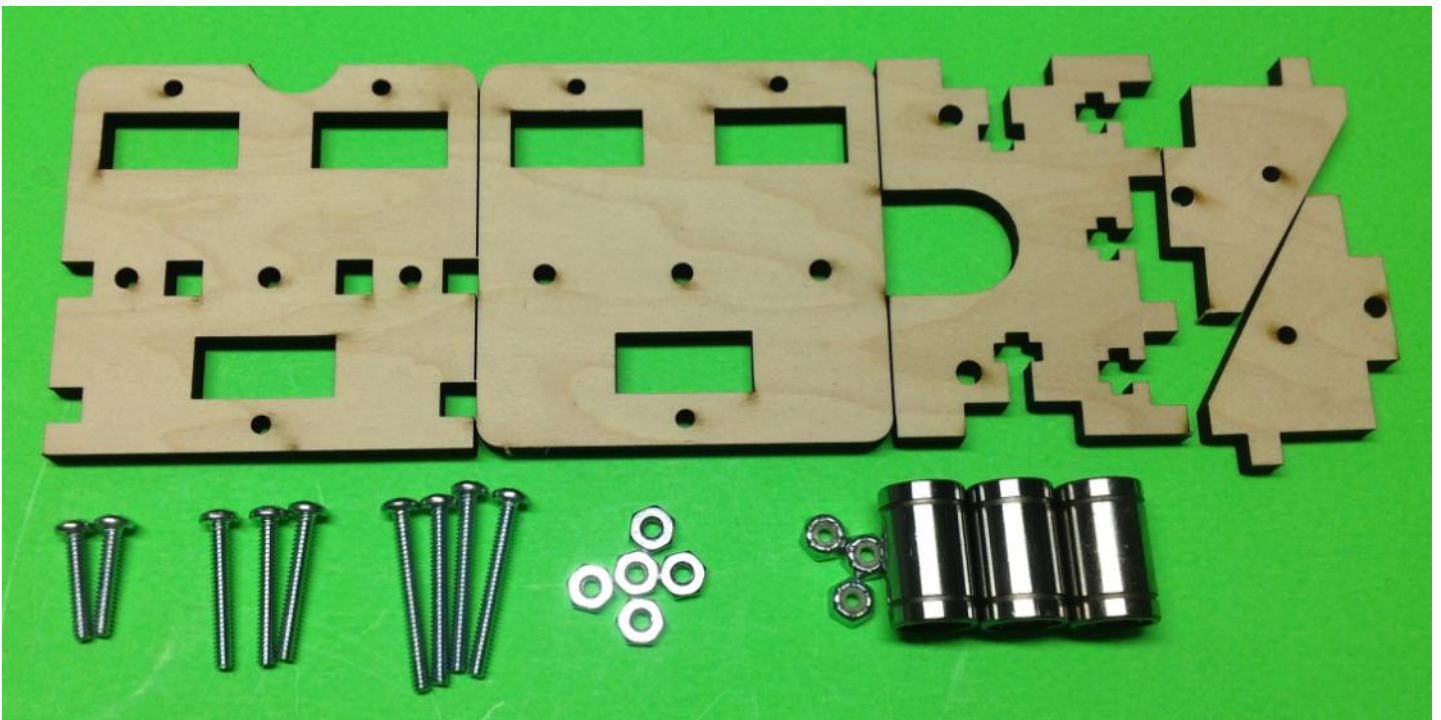
3 x #6 Lock Nuts (these will be installed on the 3 1" bolts)

2 x #6 .75" Bolts

3 x #6 1" Bolts

4 x #6 1.25" Bolts

3 x LM8UU Linear Bearings



## X Carriage Video





# X Idler

**Gather the following parts before watching the X Idler Video**

**4 x #6 Lock Nuts (these will be installed on the 4 1.5" bolts)**

**4 x #6 1.5" Bolts**

**1 x #6 1.25" Bolt**

**2 x M5 washers**

**2 x M5 Nuts**

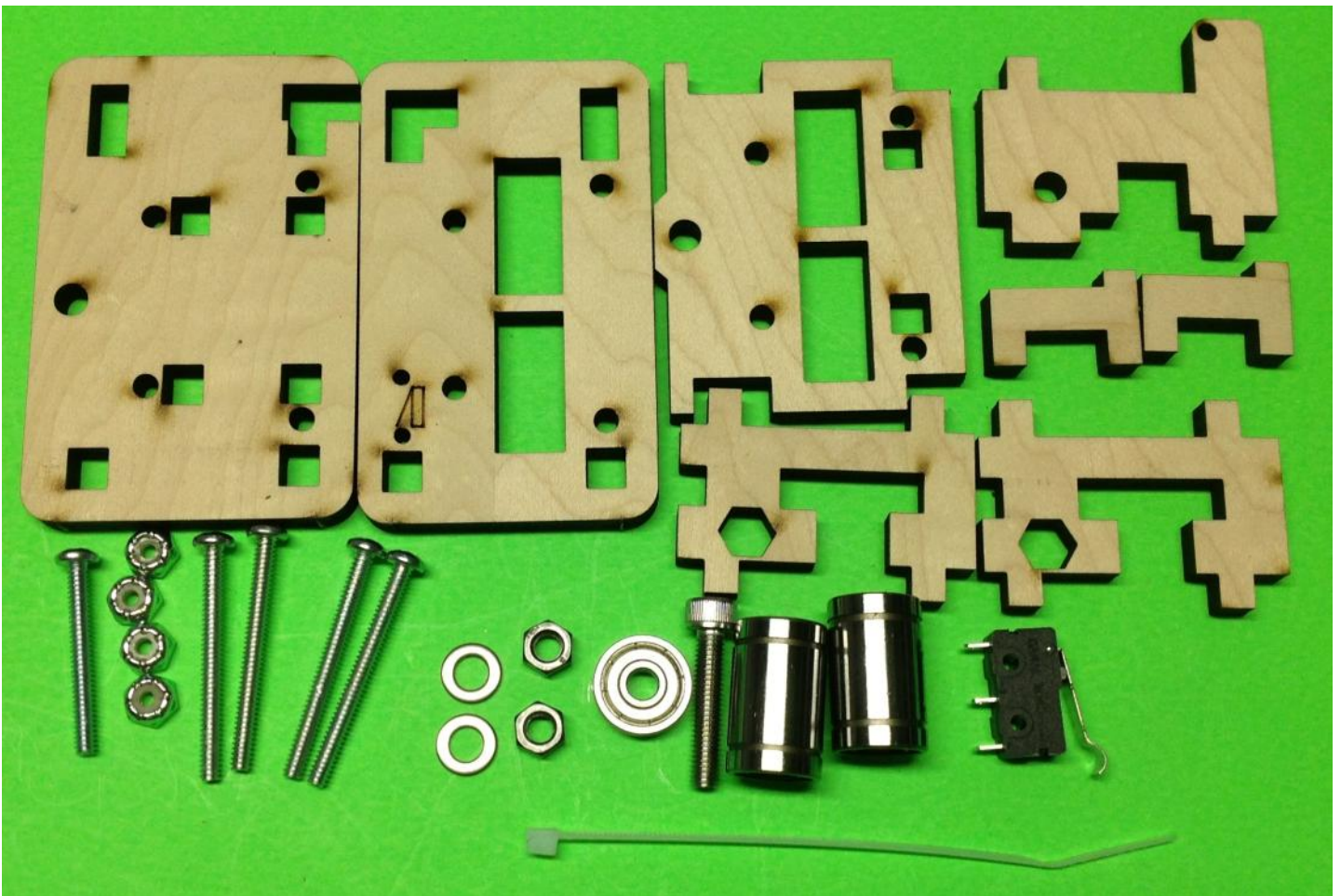
**1 x 625 Bearing**

**1 x M5x25mm Bolt**

**2 x LM8UU Linear Bearings**

**1 x Zip Tie**

**1 x Micro Switch**



## X Idler Video



# X Motor

**Gather the following parts before watching the X Motor Video**

**3 x #6 Lock Nuts**

**2 x #6 1.5" Bolts**

**1 x #6 1" Bolt**

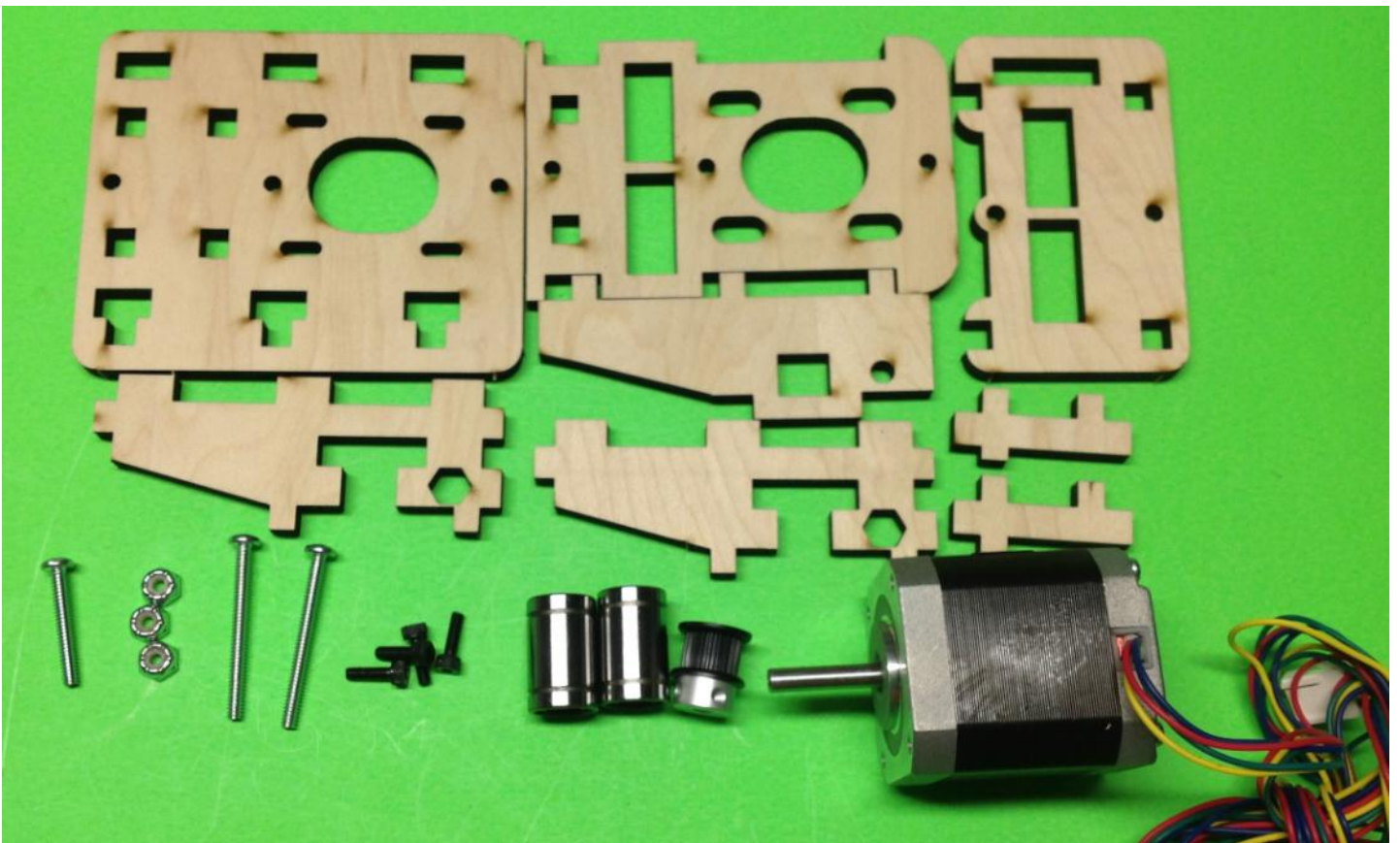
**4 x M3x10mm Bolts**

**1 x M5 Nut**

**2 x LM8UU Linear Bearings**

**1 x GT2 Pulley**

**1 x Motor**



## X Motor Video



# X Axis Assembly

Gather the following parts before watching the X Axis Video

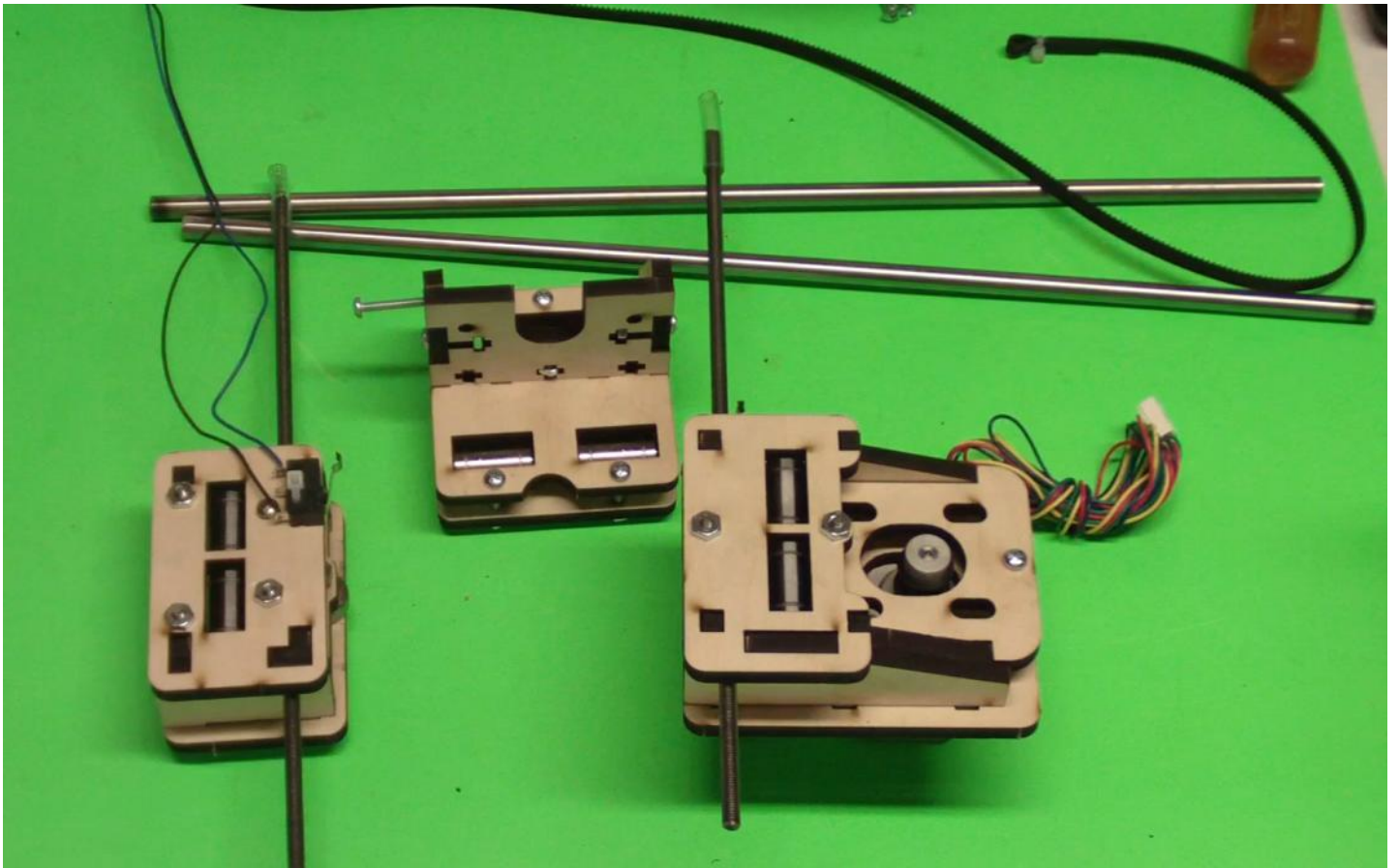
1 x Assembled X Carriage

1 x Assembled X Idler

1 x Assembled X Motor

2 x 15.5" Smooth Rods

1 x X Belt cut to 32" Long, loop the ends and secure with a zip tie, the end result should be a belt 29 7/8" long



## X Axis Assembly Video





# Y Idler

Gather the following parts before watching the Y Idler Video

1 x M5x25mm Bolt

2 x M5 Washers

1 x M5 Nut

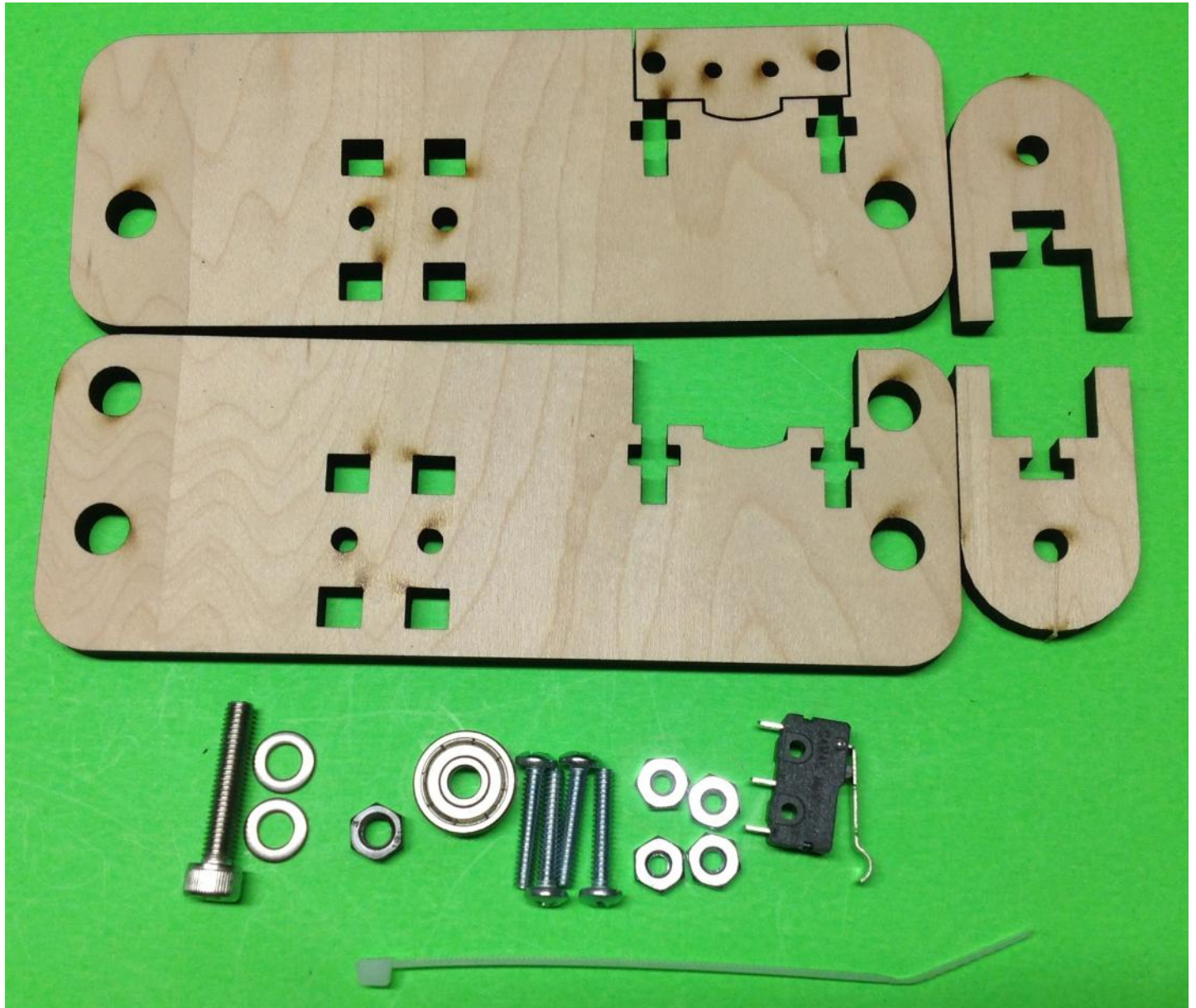
1 x 625 Bearing

4 x #6 .75" Bolt

4 x #6 Nuts

1 x Micro Switch

1 x Zip Tie



## Y Idler Video



# LCD Interface

Gather the following parts before watching the LCD Interface Video

4 x M3x16mm Bolt

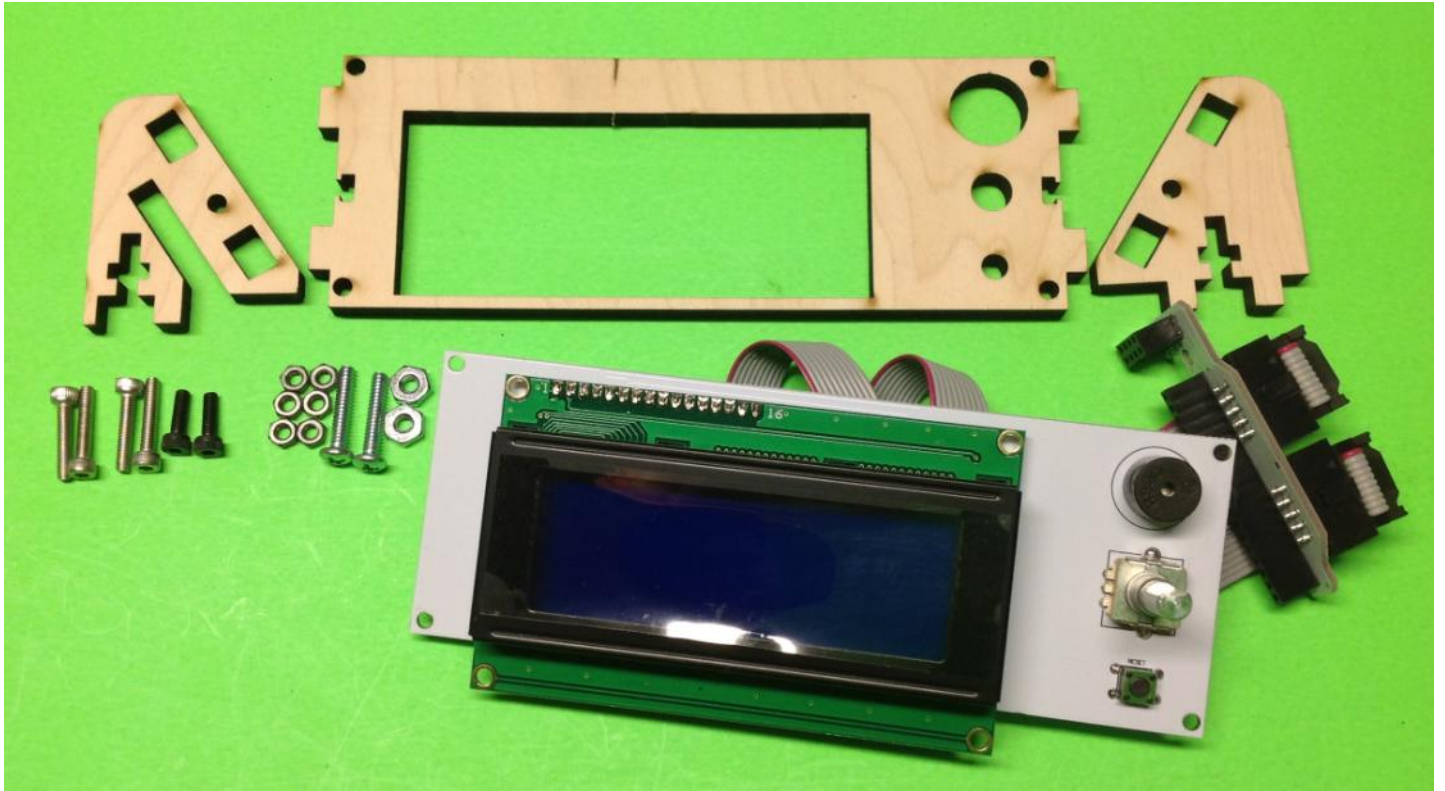
2 x M3x10mm Bolt

6 x M3 Nuts

2 x #6 .75" Bolt

2 x #6 Nuts

Ramps LCD Interface



## LCD Interface Video



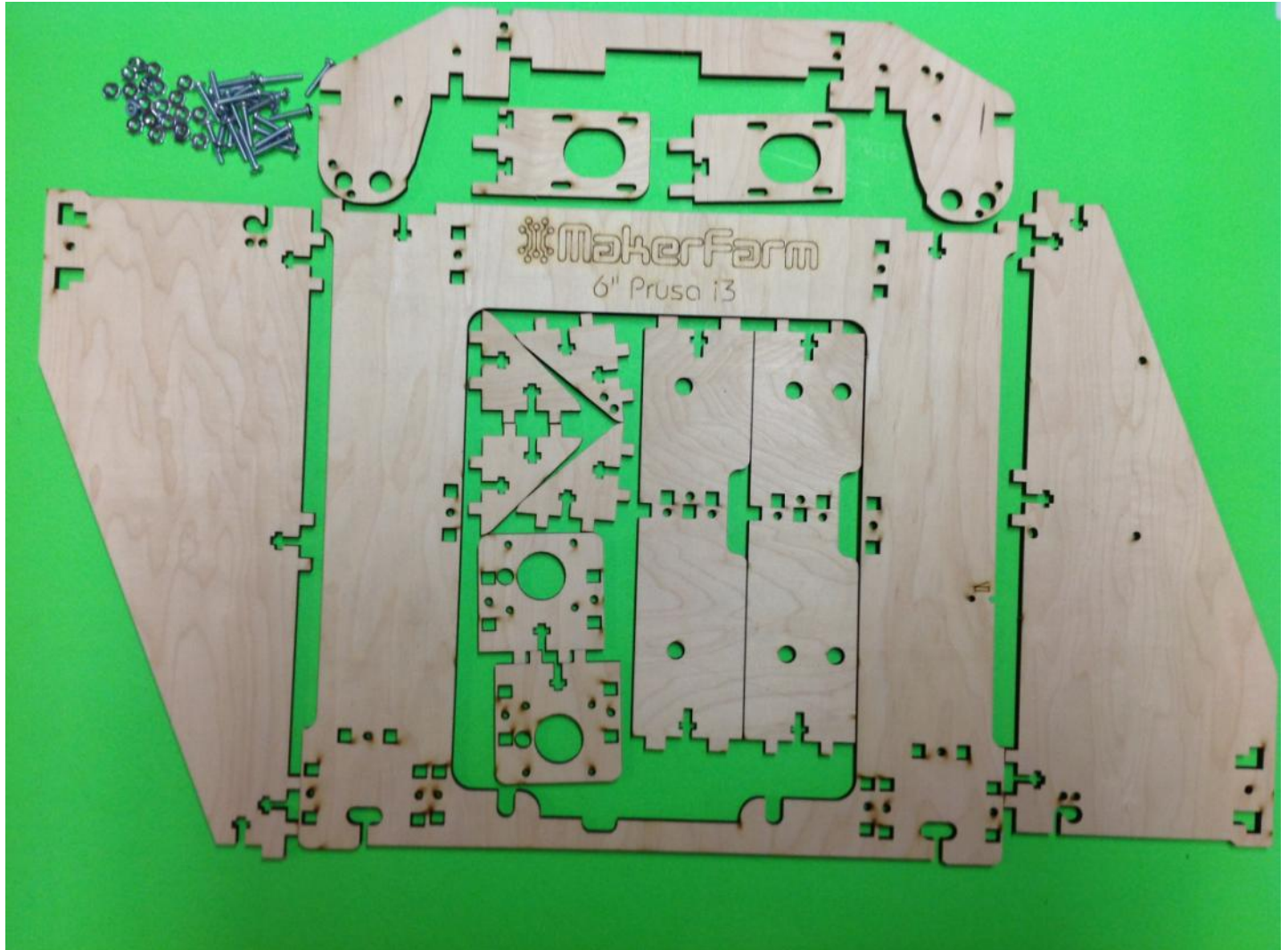


# Frame

Gather the following parts before watching the Frame Video

24 x #6 .75" Bolt

24 x #6 Nuts



## Frame Video



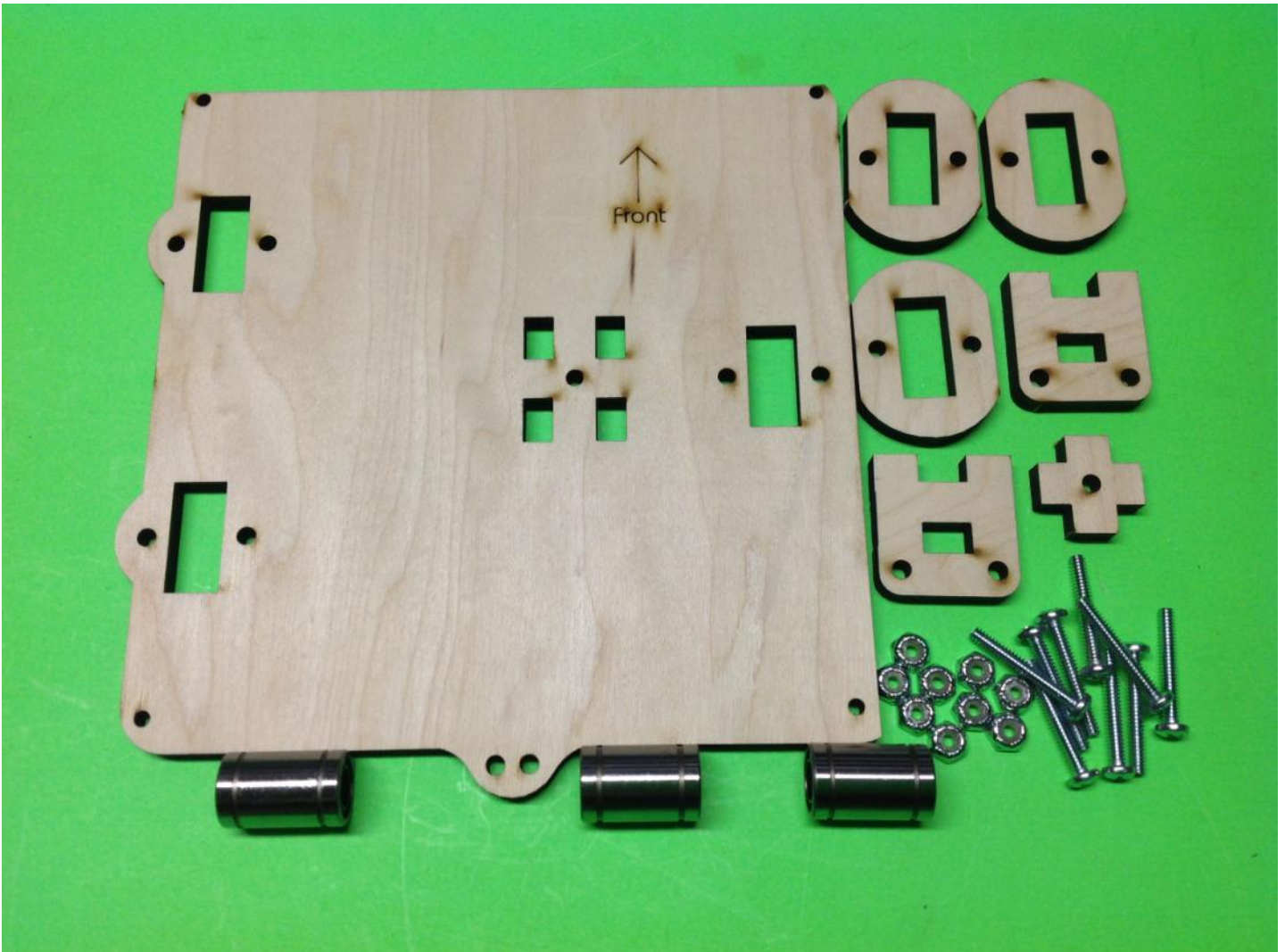
# Y Bed

Gather the following parts before watching the Y Bed Video

9 x #6 1" Bolt

9 x #6 Lock Nuts

3 x LM8UU Bearings



For newer kits your heat bed mount will look different and have narrow slots for the bearings, the lower Y bearing holders will also look different and one will be marked “Y Endstop”, this one will be mounted in the front right corner of the heat bed mount (in the picture above it will be under the top left bearing hole).

When installing the 1" bolts you will want to have the Nylon lock nuts under the heat bed, also you will first want to install one bolt getting just one thread onto the locknut, then do the same with the other bolt before tightening them both down.







If your bolt heads hit the frame you can sand away a little wood until the bolt heads clear.

**Y Bed Video**





# Y Rods

**Gather the following parts before watching the Y Rods Video**

**2 x 15.75" 5/16" Threaded Rods**

**2 x 14.75" Smooth Rods**

**3 x LM8UU Bearings**

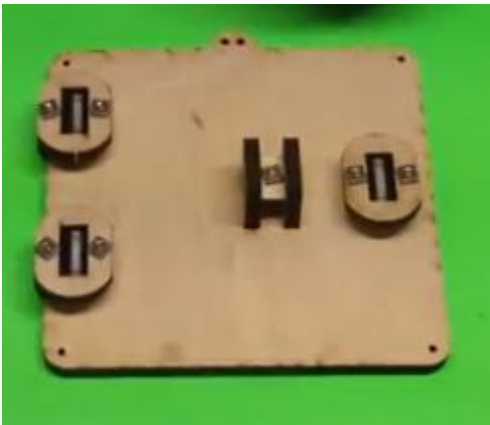
**12 x 5/16" Nuts**

**12 x 5/16" Washers**

**1 x GT2 Pulley**

**1 x Motor**

**1 x Y Belt cut to 26.5 " Long, loop the ends and secure with a zip tie, the end result should be a belt 24.75" long**



**Assembled Y Bed**



**Assembled Y Idler**

**Also get the Assembled Frame**

**Y Rods Video**



# Z Rods

**Gather the following parts before watching the Z Rods Video**

**2 x Zip Tie**

**1 x Micro Switch**

**1 x Heat Bed (See RAMPS Setup Video)**

**4 x M3 16mm Bolt**

**4 x Nylon Spacer**

**4 x M3 Nuts**

**1 x Assembled X Axis**

**2 x Z Motors**

**2 x Clear Tubing**

**8 x M3 10mm Bolts**

**2 x 12" Smooth Rods (Z Rods)**

**1 x Assembled LCD Interface**

## Z Rods Video



# .40mm Magma Hot End

Gather the following parts before watching the Hot End Video

1 x Magma Hot End Kit

1 x Magma Accessory Bag

2 x M3x10mm bolts



[Magma Hot End Video](#)



# **.35mm or .50mm J-Head Hot End**

**Gather the following parts before watching the Hot End Video**  
**1 x Hot End Kit**



Newer versions of the Jhead include a Ceramic Heater, Watch the Magma video on Page 14 to see how to install the Ceramic Heater.

## **Hot End Video**



# Extruder

Gather the following parts before watching the Extruder Video

1 x Extruder Printed Parts

1 x Extruder Hardware Bag

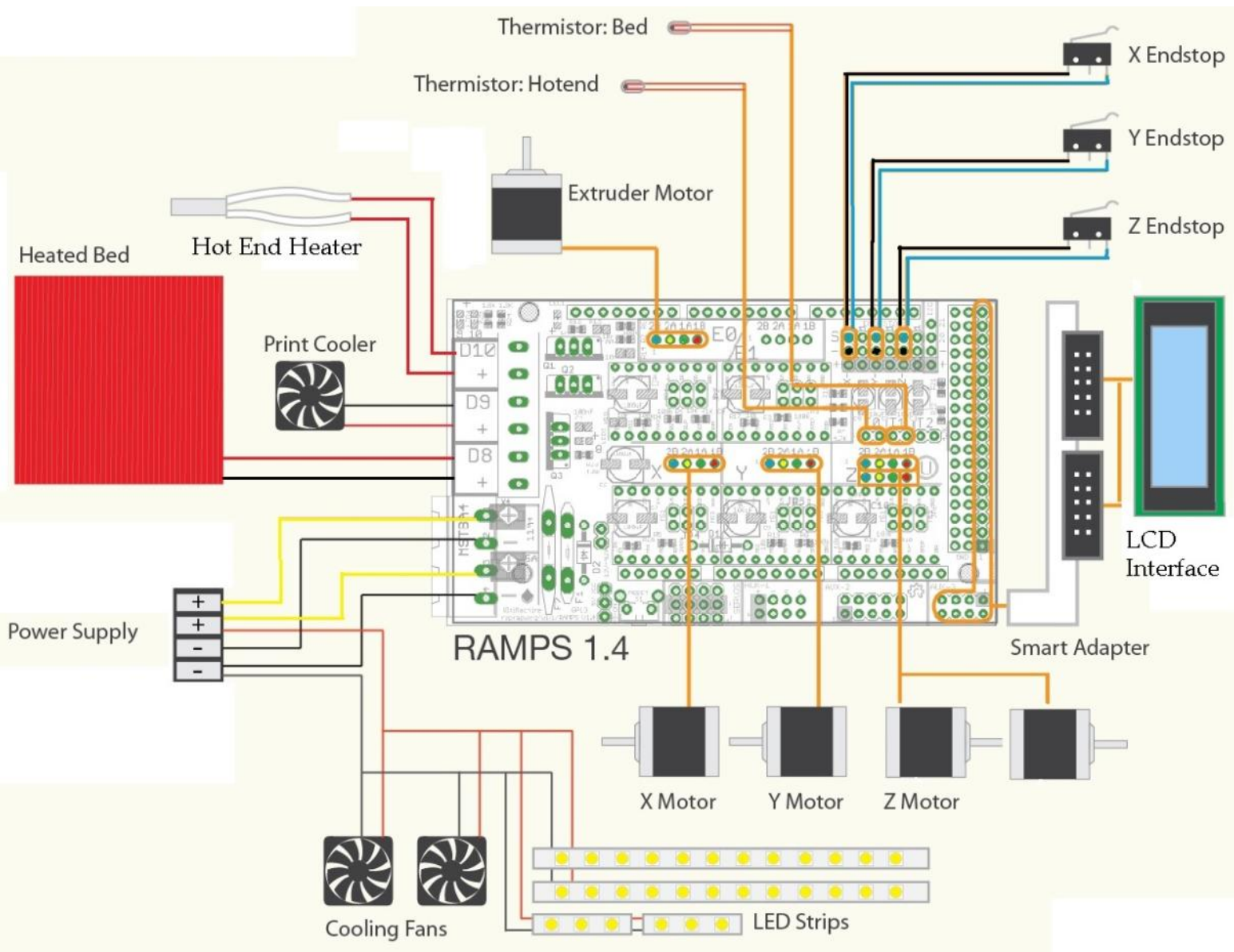


[Extruder Video](#), [Download Printed Parts](#)



# RAMPS Setup

Gather all your electronic parts before watching the RAMPS Setup Video, this diagram is a reference only, the colors of your wires may be different.



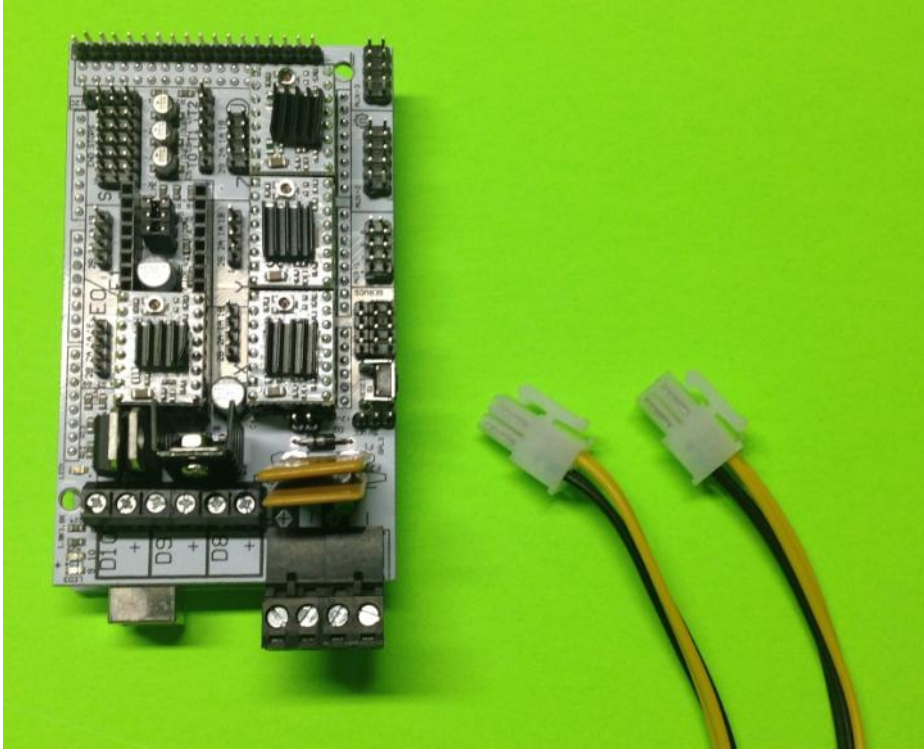
The Magma fan will be connected to the Power supply, Not D8 as the Magma requires a fan to run all the time.

## RAMPS Setup Video

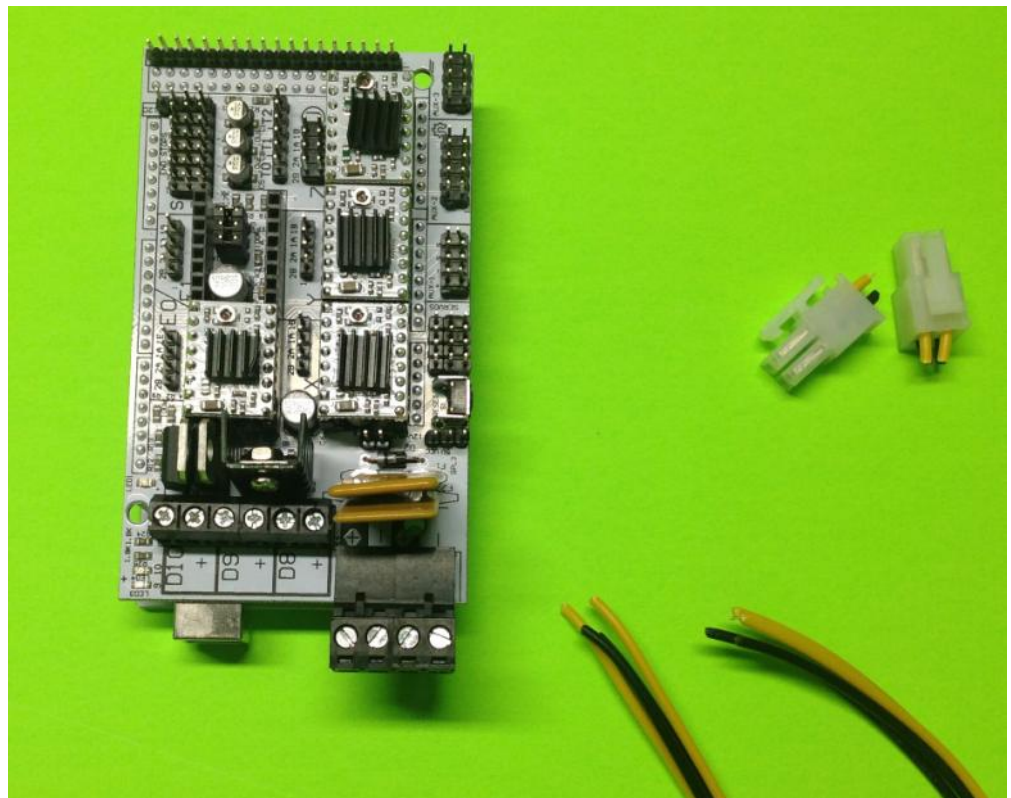


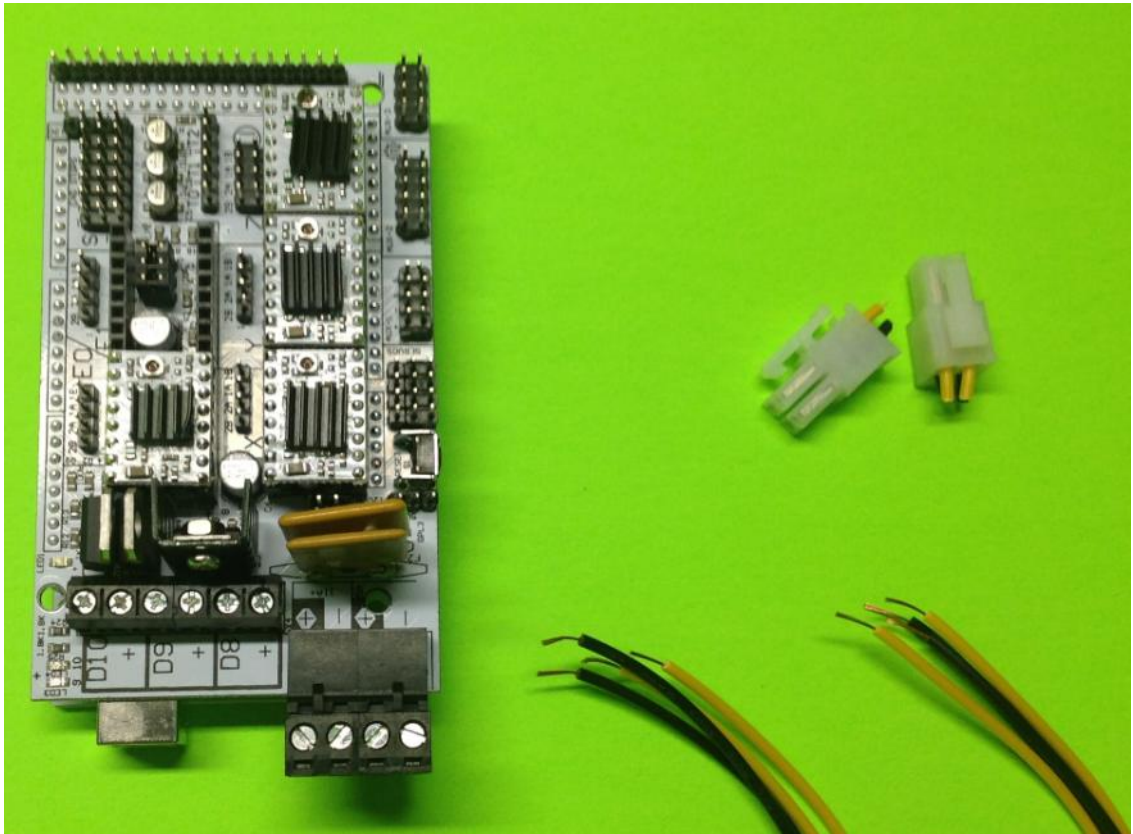


# Wiring your Power Supply to your RAMPS



**Your ATX Power supply should have one or two high current 2x2pin power connector with Black and Yellow wires. Cut the 2x2 connectors off (This will void your Power supply Warranty if you have one).**

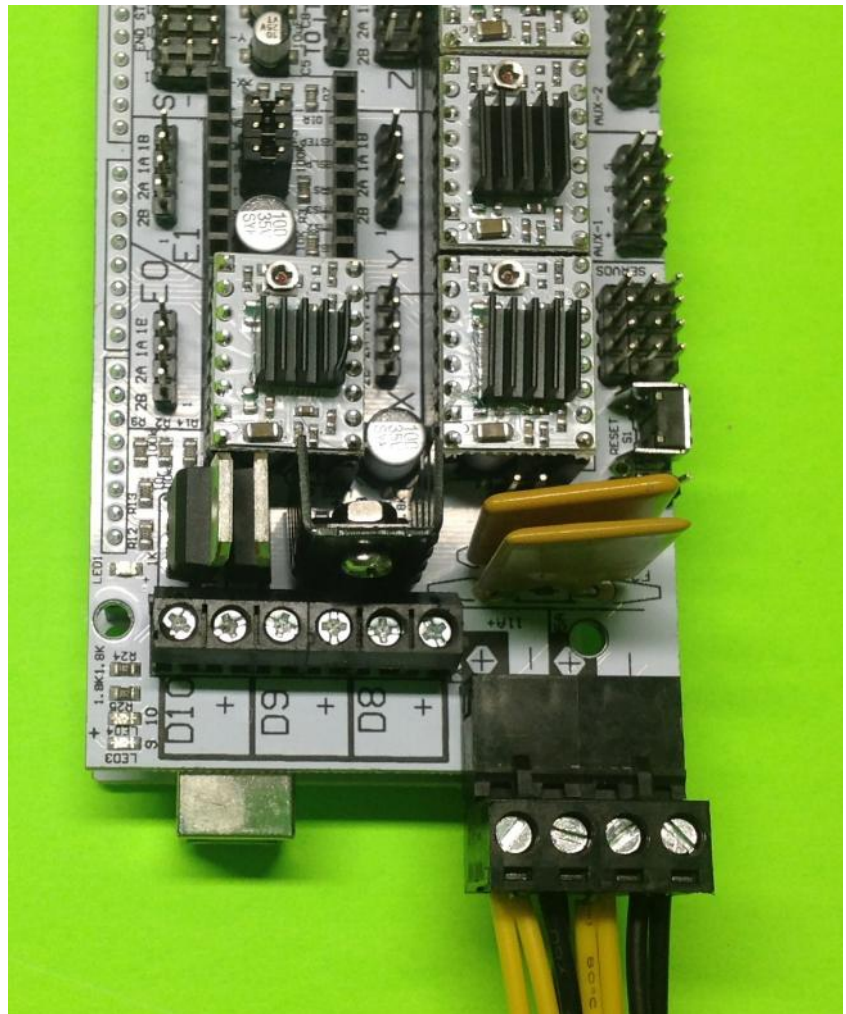




**Strip some wire off of the wires you cut and install in the power connector as shown below.**

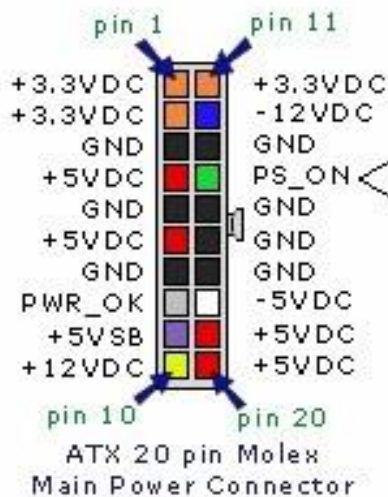
Notice that the wires are all doubled up.

The connection closest to D10, D9 and D8 is the 11amp connection that requires more current than the 5amp connector. you don't have two of these 2x2 connections use the one you do have on the 11amp connection and use any other black and yellow wires for the 5amp connection.

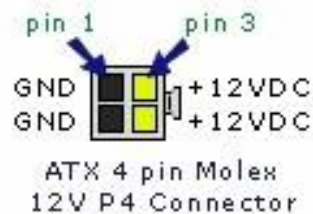


If

diagrams with pins facing forward



To turn the power supply on and keep it on connect the Green wire and a black wire, or use a piece of paperclip cut to size to connect them.



**Some Power supplies require a load on the 5v rail to keep the power supply on, if your power supply shuts off after a while try following the instructions here:**

**PUTTING A LOAD ON THE 5V RAIL: <http://brazenartifice.wordpress.com/2011/12/26/atx-power-supply-5v-load-resistor-for-better-12v-regulation/>**



# Final Hardware Setup

Your RAMPS electronics for your i3 will come pre-loaded with the correct firmware for your printer, but if you choose to change the firmware you can watch the [RAMPS Firmware Video](#)

## Windows 7 & XP Driver & Firmware for i3 Prusa

### Windows 8 Driver

### How to install an Unsigned Driver in Win 8

### MAC OS X driver (Download Arduino 1.0.5)

### Download Pronterface here.


### Download Slic3r here (Includes Slic3r Configs)


Now that you have everything installed we will open pronterface select the com port that your printer installed to and set the speed to 250000 then click connect.

Next set your Speeds:

mm/min

XY:	<input type="text" value="3000"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>	Z:	<input type="text" value="30"/>	<input type="button" value="▲"/>	<input type="button" value="▼"/>
-----	-----------------------------------	----------------------------------	----------------------------------	----	---------------------------------	----------------------------------	----------------------------------

Now we are going to test our endstops and make sure the motors are plugged in correctly. First click the  button, your heat

bed should move forward and the  bottom wood piece holding the Linear Bearing should hit the switch causing the heat bed to stop.

If your heat bed moves to the back of the printer instead you can turn the power supply off, unplug your usb cable and flip the connector around 180 degrees for the Y motor.

Once the Bed moves the correct direction you can adjust the Y endstop until the nozzle is on the back edge of the Glass. For the X and Z endstops there will be #6 bolts that will contact the switch, you can turn the bolt clockwise and counter clockwise until the correct home position has been reached.

Then repeat for the other axis using the



buttons.

For the Z axis we want the nozzle to be about the thickness of a sheet of paper away from the glass on both the right and left of the heat bed, if the side opposite the switch is higher or lower you can adjust the height by holding both the m5 threaded rods and turning one.

Next heat up your hot end to about 225c by typing in 225 and click set in the Heater Row, then to check your temperature click the Check temp occasionally:

Heater:	<input type="button" value="Off"/>	225.0 (user <input type="button" value="v"/> )	<input type="button" value="Set"/>	<input type="button" value="Check temp"/>
Bed:	<input type="button" value="Off"/>	100.0 (user <input type="button" value="v"/> )	<input type="button" value="Set"/>	

Once your hot end has reached 225c set your Extruder speed to 30 and click extrude.

<input type="button" value="Extrude"/>	5	<input type="button" value="+"/> <input type="button" value="-"/>	mm
<input type="button" value="Reverse"/>	30	<input type="button" value="+"/> <input type="button" value="-"/>	mm/min

If your filament gets pulled out of the hot end instead of pushing it in then power off the printer and rotate the motor connector for the Extruder Motor.

You should now be able to move your printer in all directions, but your endstops will only be used when you click one of the home buttons so don't keep telling your printer to go past that point.

Slic3r -

Now that we have the printer moving and calibrated we can slice some 3d objects so they can be printed. Open slic3r then click File and Load Config and browse to find the Config file you downloaded earlier that matches your nozzle size. Next click File, Quick Slice and select Hollow\_Cube.stl (Browse to the RAMPS download that contained the Firmware and Driver for your printer, there will be a Hollow\_Cube.stl in that folder).

Your Slic3r will now slice the stl into Gcode which we can copy onto an SD Card and print directly from the LCD interface or we can load the Gcode into Pronterface and print simply by Opening Pronterface, connecting to the printer clicking Load File then Print.

Your printer will then start heating up and once the hot end and heat bed have reached the correct temperatures setup in the Slic3r Config file it will start printing.

Any questions please e-mail [elderfarrer@gmail.com](mailto:elderfarrer@gmail.com) or you can chat via google chat ([elderfarrer@gmail.com](mailto:elderfarrer@gmail.com))

Thanks,

Maker Farm Inc



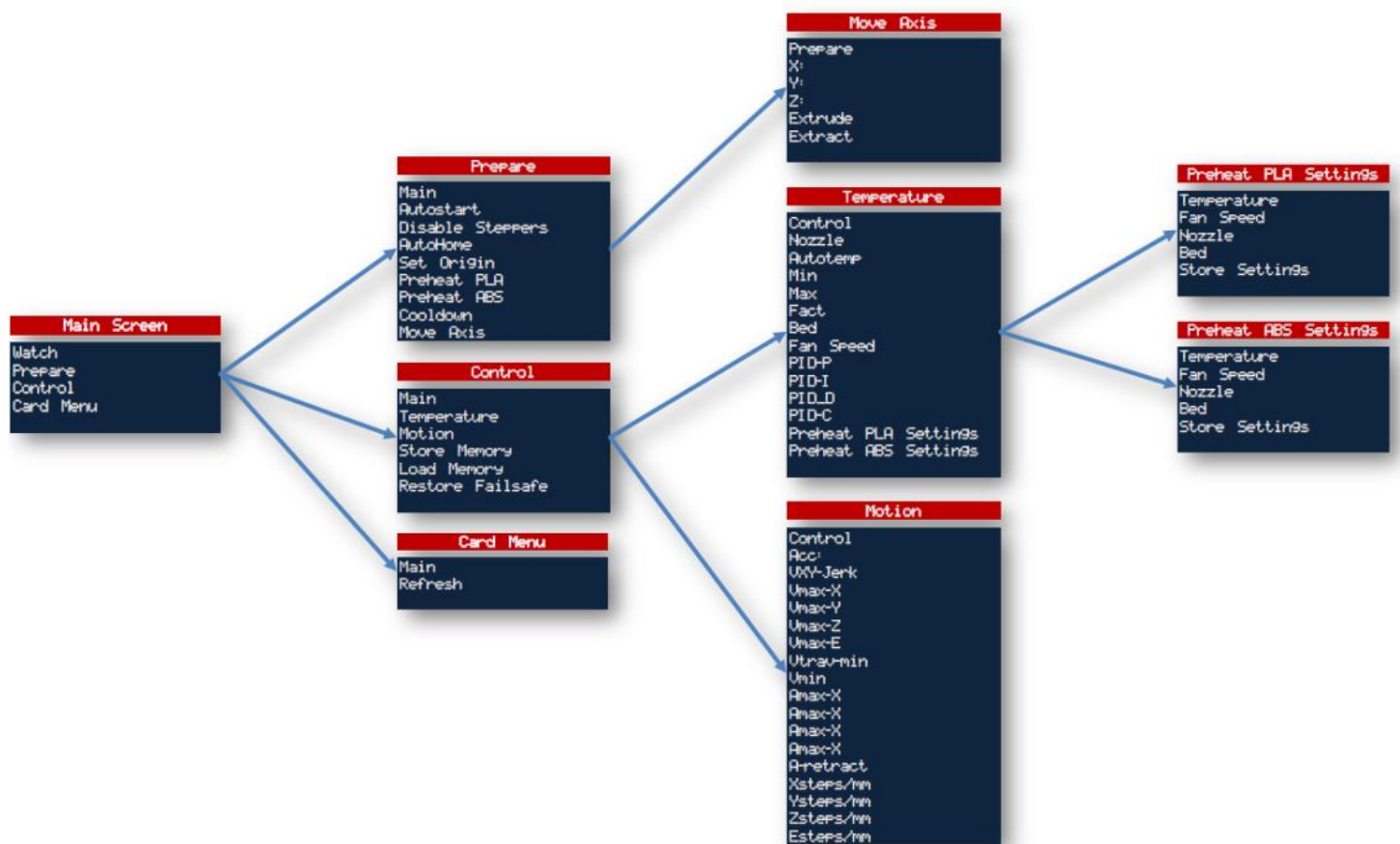


# Using the LCD interface

The LCD interface will have a Rotary Knob, if you turn the knob at the main screen you can change the feed rate or speed at which the printer prints. If you push the rotary knob you can enter menus and select options.

See Menu Structure Below:

Marlin LCD Menu Tree (V1)



# Troubleshooting:

## My Prints are shifting during the printing process.

Typically when you print shifts to one side it due to one of a few different things.

Lose belts or belts that are to tight.

Mechanical binding, if your print head hits something during a print it can shift, or if your rods need to be cleaned and oiled there may be to much friction and your print can shift (you should wipe down and re-oil your smooth rods at least once a month).

Not enough Current. Each axis has a potentiometer on the electronics, if you turn it clockwise 1/8th a turn it will give your more current and more power to prevent shifting prints.

To much current, If your motors get to much current they can get very hot which can cause the motors to skip, you can turn your potentiometer for that axis counter clockwise 1/8th a turn to test.

Make sure you have the latest firmware: to check your firmware connect your printer to pronterface, in the box on the right of the pronterface screen you will see the firmware date, currently the latest is 8-15-13 which can be downloaded from the link in the i3 guide.

	Connecting...
	Connecting...
	start
	Printer is now online.
	echo: External Reset
	Marlin 1.0.0
	echo: Last Updated: Aug 19 2013 8-15-13 2:00:34   Author:
	(Maker Farm Inc, 8 i3 Prusa Config)
	Compiled: Aug 19 2013
	echo: Free Memory: 4531 PlannerBufferBytes: 1232
	Error:0
	; Extruder switched off. MINTEMP triggered !
	Error:Printer stopped due to errors. Fix the error and use M999 to
	restart. (Temperature is reset. Set it after restarting)
	echo:SD init fail
	ok T:0.0 /0.0 B:0.0 /0.0 @:0 B@:0

Last is Speed, if your printer is going to fast or your slic3r settings have fast acceleration it can cause your print to shift, to test you can lower all your speeds in slic3r.



# Troubleshooting:

## My hobbled bolt is chewing up the filament

First is we want to check out speeds for pronterface and for Slic3r, for pronterface make sure the extruder speed is set to 30mm/min (to the right of the Reverse button) for Slic3r make sure you use the Slic3r config file from the i3 build guide for your hot end.

Next look at your extruder, we want to make sure the idler bearing turns freely when not in contact with the filament or hobbled bolt. If the idler bearing does not turn freely check to make sure it isn't rubbing on the hinge part of the extruder block, also make sure the bearing isn't hitting plastic inside the extruder idler.

Next is Temperature, for ABS use 225c, for PLA use around 205c. If you are using PLA you may also need a fan to blow on the black peek plastic part of the jhead hot end to prevent heat from building up causing jams, for the Magma PLA is not supported.

Next is the print material used, ABS is the easiest material to print with, I would recommend everyone start out with ABS to get you printing, after that you can experiment with other materials that take more effort to get printing. Also make sure you have good quality filament from a good source, there are many places that sell sub par filament that won't work and just cause problems. I would recommend using Makerfarm, Ultimachine or Makerbot filament as they are all known good sources, you can measure your filament and make sure its 3mm, if its above 3mm it can cause issues and jams, cheap filament also usually has debris in the filament which will cause jams and other issues.

Next if your X axis isn't level this can cause your nozzle to have to much back pressure. If you tell your printer to home the nozzle should end up in the back right corner of the heat bed glass. If you now move the nozzle to the left side of the printer check to see if the nozzle moves farther away from the glass or if it moves closer to the glass, if either happens then you will want to hold both of the 5mm threaded rods attached to the Z motors and turn the left one until the nozzle is the same height away from the glass on the left side as it was on the right side.

Next check your spring tension, if the springs are to loose there won't be enough grip on the filament, if the springs are to tight the filament will be squished causing it to be oval instead of cylindrical which will cause it to jam also. You should be able to pull back on the Extruder Idler with your thumb to pull out or put in new filament, if you can't pull out the filament your springs are to tight.

Last if there is something physically blocking the nozzle it can cause the same problem, if you have a .50mm nozzle you can straighten out part of a pen spring, then when the hot end is at temp for your filament you can push the spring up into the tip of the nozzle, then set your pronterface speed to 10mm/min and extrude to see if that unclogged the nozzle. If that doesnt work you will want to separate your hot end from the extruder, then when the hot end is at temp push in a alan wrench or screw driver that is 3mm into the hot end while holding onto the hot end mounting plate, this should force out any filament in the hot end clearing out any debris.



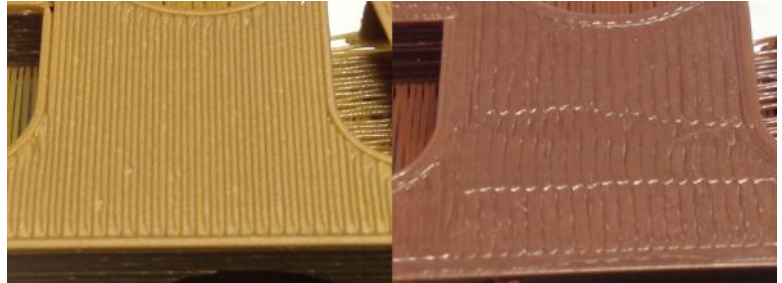


# Troubleshooting:

## My ABS prints warp or come off the glass before finished printing.

Warping is caused because the edges of your print cool faster then the center of the print which causes them to shrink. There are a few things that can be done to help minimize or prevent this warping.

1. Make sure your first layer print is squished to the glass, if you look at the bottom of your print (side in contact with the glass) you should not easily be able to see the lines of filament, if it looks like the left picture try lowering your nozzle a little till your print looks the right photo.



2. Make sure your heat bed is at the proper temperature, For RAMPS electronics and ABS you will want your heat bed as close to 110c as possible, the high temperature helps keep the ABS stuck to the bed. If you have a hard time getting your heat bed up to 110c you may want to add a [Heat Bed Relay](#)

3. Next we need to make sure we have a good printing surface, on top of your heat bed you should have a piece of glass, for ABS it is recommended to spray your glass with a extreme hold hairspray like this: [walmart.com/ip/Fructis-Style-Extreme-Hold-Extreme-Control-Anti-Humidity-Aerosol-Hairspray-8.25-oz/19200744](http://walmart.com/ip/Fructis-Style-Extreme-Hold-Extreme-Control-Anti-Humidity-Aerosol-Hairspray-8.25-oz/19200744), this is the one we use in our botfarm and not all hairspray's are created equal, if you can get the Garnier Fructice Extreme #5 the make sure you use it. When you apply the hair spray to the glass it should take you about 3 or 4 seconds to spray the whole bed. If your prints stop sticking you can spray it again on top of the last layer. After a few layers you will want to wash your glass off under some hot water before applying a fresh layer. You can also cover your glass with Kapton tape, you will want to get as wide of a roll of kapton tape as possible, if your print is on top of any seam of two pieces of kapton tape meeting the print will not stick, also you will want to clean your kapton tape with acetone to prevent oils from the kapton tape to help the print to stick. You may also want to research ABS glue.

4. Environment - if you are in a cold room or a room with moving air that can make your print warp also. Sometime people will have an enclosure to keep their printer in a hot environment though most of the time this isn't needed.

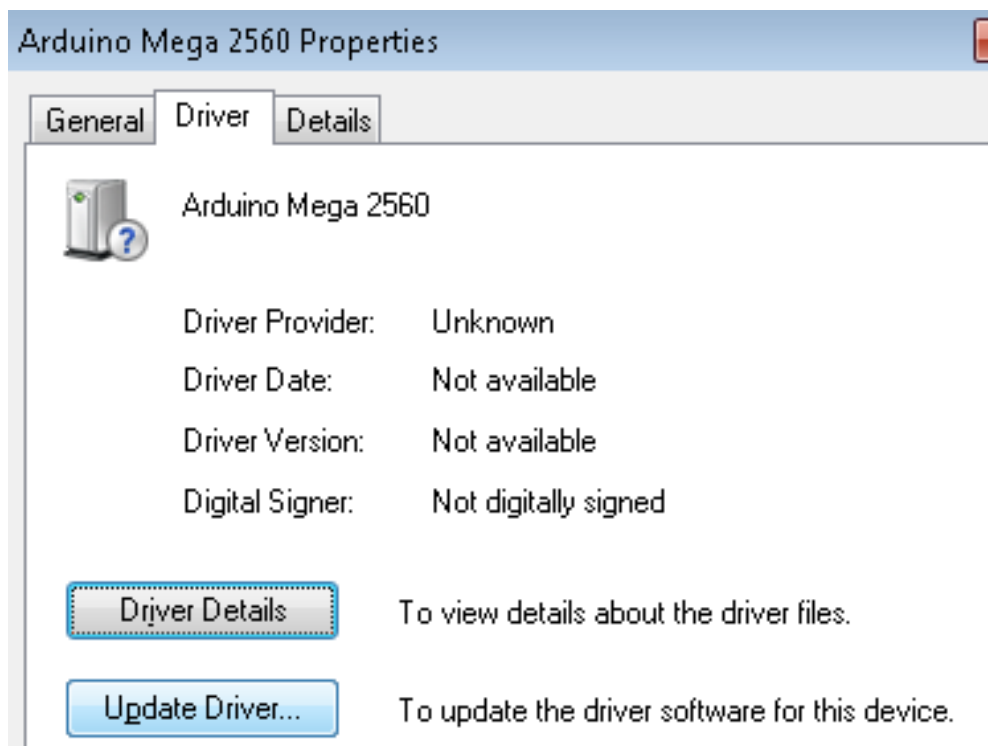
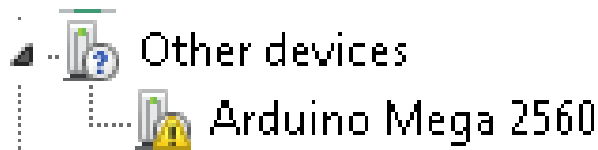
5. Adding mouse ears or a raft to your print can help with warping: <http://www.makerbot.com/blog/2011/02/25/mouse-ears-defeat-corner-curling-monster/>, raft settings are in slic3r Print settings tab under Support Material. You may also want to play with the skirt function and add multiple layers as a wall to keep the heat in.



# Troubleshooting:

## My computer didn't install the printer on a com port.

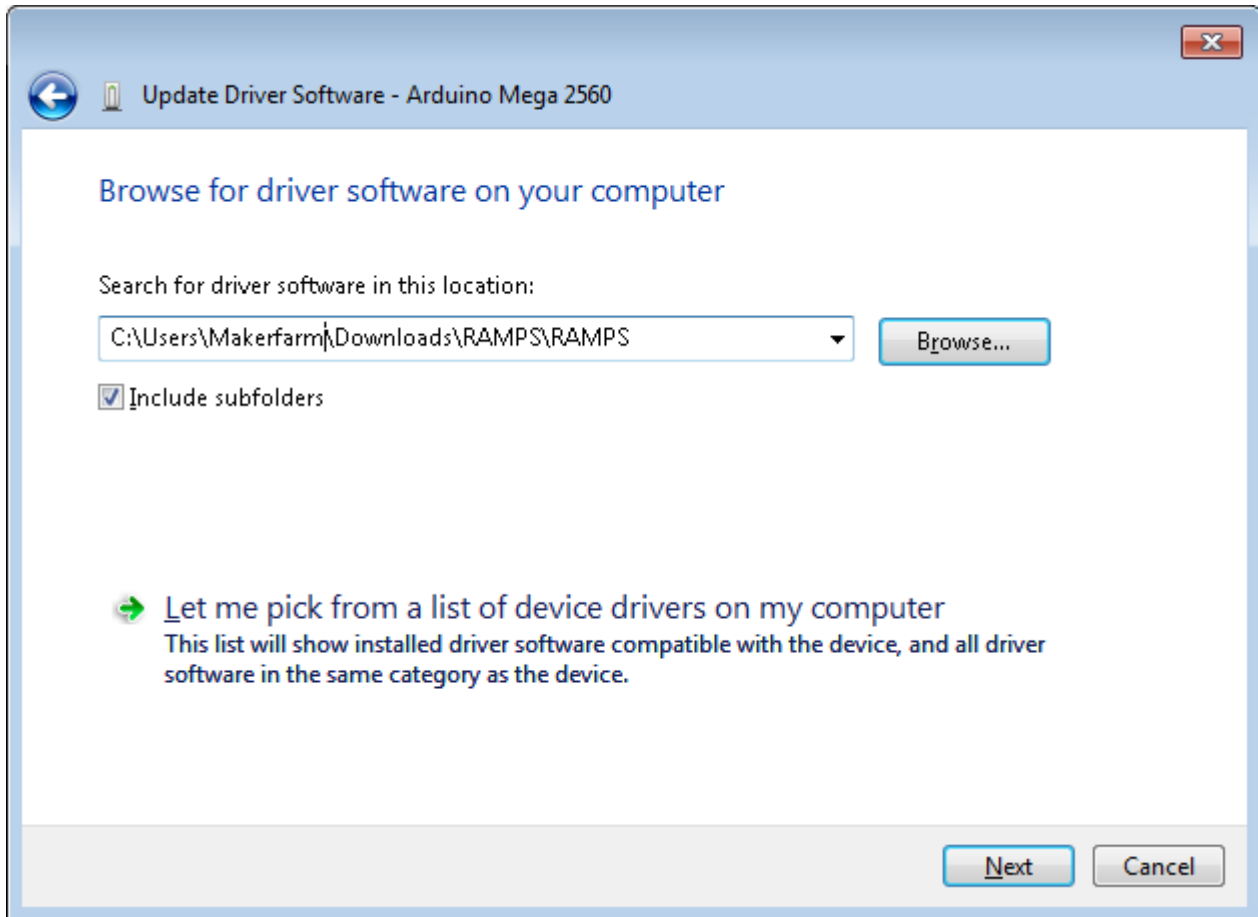
If windows doesn't setup your printer on a com port most likely the driver hasn't been installed yet. For windows xp and windows 7 you will first want to download the "[Windows 7 & XP Driver & Firmware for i3 Prusa](#)" link in the i3 guide on page 21, After you have downloaded that you will unzip the zip you downloaded and you should have a firmware called RAMPS with a few sub folders, in the ramps folder there will be a file called "Arduino MEGA 2560.inf" that will be the driver for your ramps board. To install it you will plug in your ramps, if it comes up and asks for the driver you will point it to the file called "Arduino MEGA 2560.inf", if it doesn't ask for the driver open your control panel and device manager, you should see a device with an ! by it that says something like "Taurino Mega" or "Arduino Mega 2560",



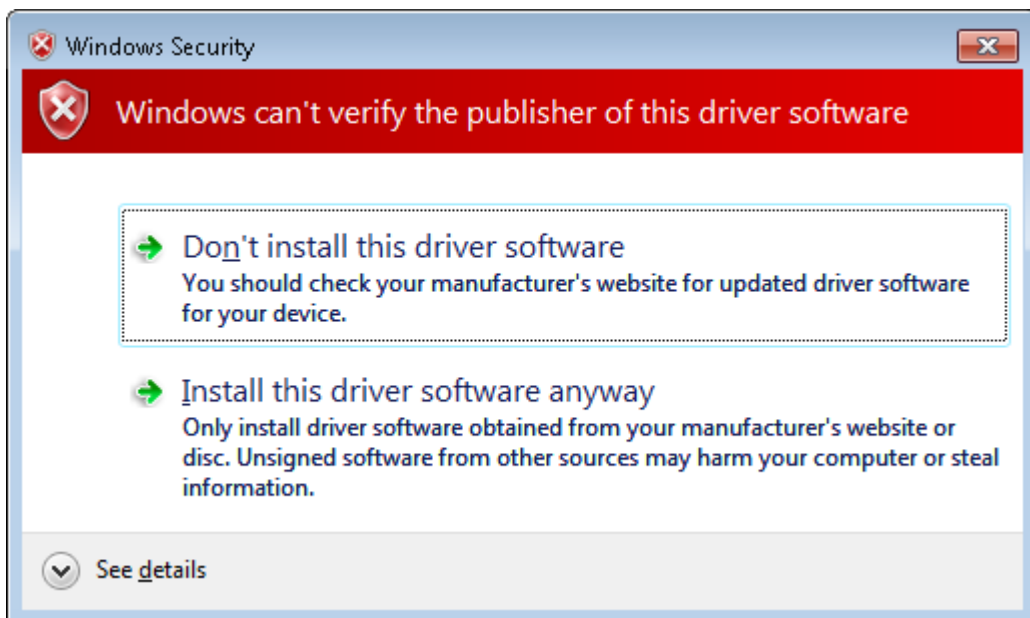
if you double click on that device and goto the driver tab, you can click on update driver,



# Troubleshooting:



at that point you will click “Browse my computer for driver software” point to the folder that contains the file called "Arduino MEGA 2560.inf, and click next.

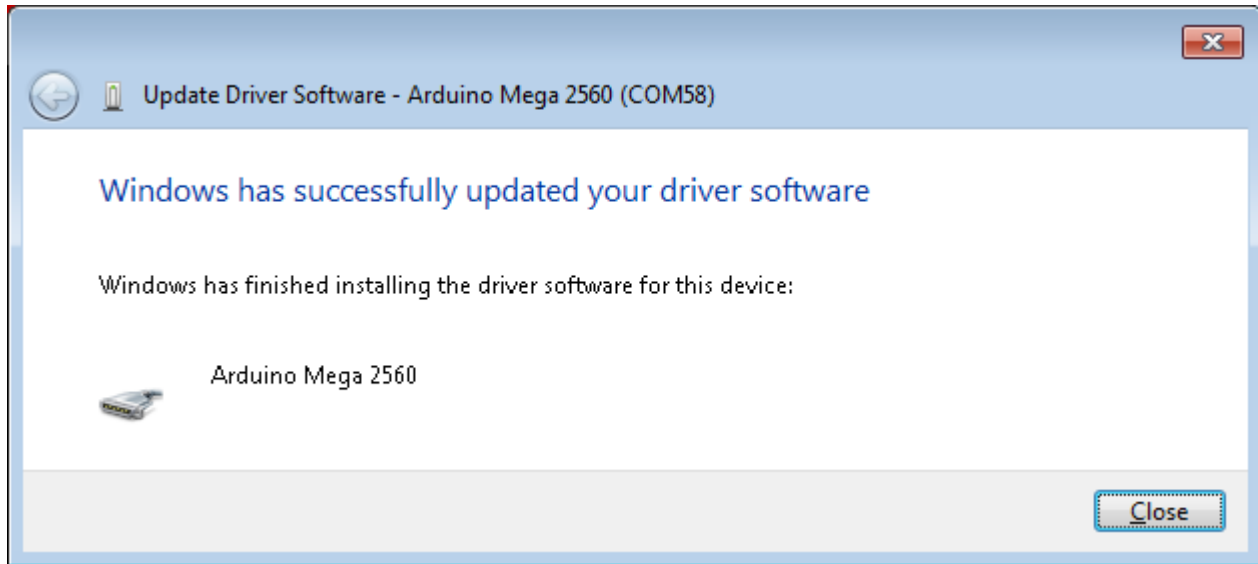


If you get this message just click “Install this driver software anyway”

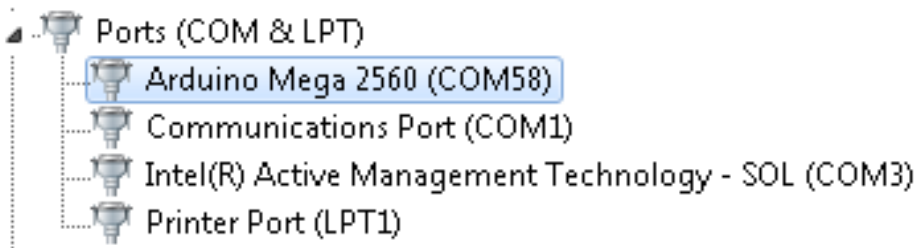




# Troubleshooting:



it should install the driver, now you can click close.



After that it will show up under your ports in the device manager.

If that doesn't work you may try to carefully remove the Arduino Mega from the RAMPS (the Arduino Mega has the USB plug and is the back board)

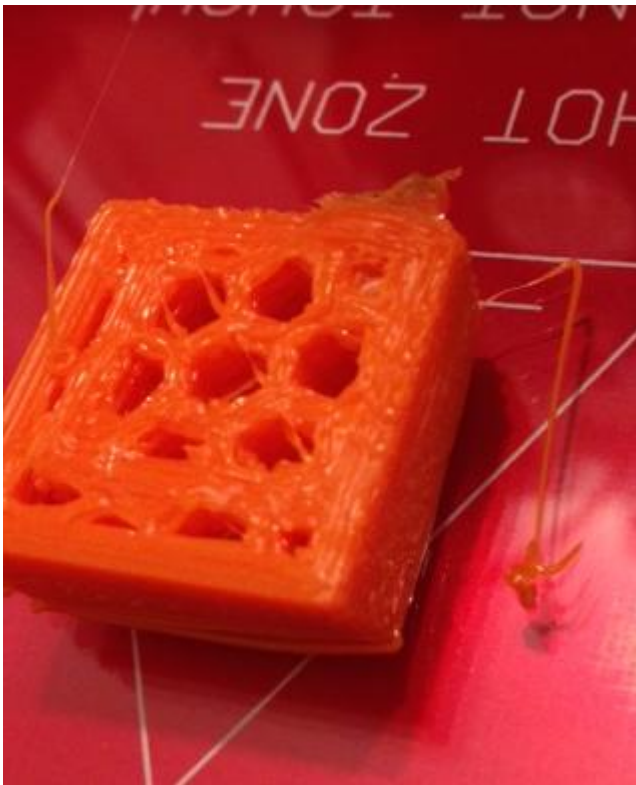
# Troubleshooting:

## **My Y rods don't match up with the frame:**

If your Y rods don't match the frame you will need to flip the two pieces shown at the back of the photo around 180 degrees.



## **My Prints look bad, like they are putting out too much plastic:**



This is a common issue with newer versions of slic3r, to fix this download Slic3r 0.9.9 and re-slice any stl files you would like to print.

# Troubleshooting:

## **My Magma is taking a long time to reach 225c to print ABS.**

The Magma requires a fan to run all the time, this can also cause problems getting your hot end up to correct temperature. Here are a few things that can help.

1. Wrap your brass nozzle with a few layers of kapton tape to insulate the thermistor.
2. Print a fan Shroud: <http://www.thingiverse.com/thing:147033>
3. Flip your fan around so it pulls air instead of blowing, you may need longer bolts to do this.

## **My Magma gets a MAXTEMP error when I go above 235c.**

By default the firmware's Max temp is set to 235c, if you have a jhead and go over that temperature the hot end will melt down. For the magma though we can increase the max temp, all you need to do is download the Magma Firmware: [MAGMA FIRMWARE DOWNLOAD](#) Then follow the firmware video on page 21.

## **My Heat Bed is taking a long time to reach 110c to print ABS.**

The Heat bed can sometime be difficult to get up to correct temperature. Here are a few things that can help.

1. Install Insulation under the heat bed, Any high temperature and flame proof insulation will work, I have heard of reports of people using a few sheets of Cardboard, if you do use Cardboard use it at your own risk and be careful as it is flammable.
2. Make sure your heat bed is getting enough current, your power supply will need to output a minimum of 11amps on the 12v rail. If you are not using an ATX power supply your power supply may not be able to output what it is actually rated at.
3. If you are in a cold room or a room with moving air that can cause your heat bed to cool faster then it can heat.
4. If you have a hard time getting your heat bed up to 110c you may want to add a [Heat Bed Relay](#)





# Troubleshooting:

## I keep needing to adjust my Z axis or Z endstop

There are a few things that can get the z motors out of sync, most of them stem from moving the z axis to fast.

First thing to check is your z speed in pronterface, make sure it's set to 30 (see page 21 of the i3 guide)

Next make sure you don't try to move the z axis using the "move axis" menu in the LCD, you can "auto home" without any problems.

Next make sure you have the current firmware, see page 25 of i3 guide

Next make sure you are using the correct slic3r config.ini file, to do this any time you want to Slice a file open slic3r, click file, load config, select the config file you downloaded from the i3 guide that matches your hot end. Then you can click file and quick slice to generate gcode from an stl file. Then open pronterface and load the gcode. If you just open pronterface and open the stl file you may not be using the correct slic3r settings which can cause the z to get out of sync.

Next make sure you are using the most recent slic3r config file, older versions tried to move the z to fast causing it to get out of sync.

Next on each of the z threaded rods there is a 5mm nut that gets trapped in the x motor and x idler, if one of the nuts is to high or to low then the other the x axis will only be supported on one nut which will lead to very inconsistent z height. One way to test is you can push down on the x motor side and x idler side, when you push down they shouldn't really move.

Next is if your clear tubing connecting the z motors to the z threaded rods slip, to prevent this you can use two zip ties on each clear tube, one on the motor shaft and one on the 5mm rod.

Last is it could be a stepper driver having a hard time putting out enough current for two motors. Usually the current setting works great just as it shipped, if you have adjusted the potentiometer on the z axis counter clockwise that will give the motors less current which can cause problems, if you did turn down the pot, try to put it back where it was. If that doesn't work let's try to swap stepper drivers as it is possible for them to sometimes have a hard time driving two motors, To do this power off the printer, unplug the USB cable then pull and swap the z stepper driver (small white circuit board about 15mm x 20mm) with one of the other axis.



# Troubleshooting:

## My endstops aren't working properly

The first thing we need to do is make sure the endstops are wired correctly and plugged into the electronics in the correct place, see page 17 for the wiring diagram. NOTE: the Blue wires should all be connected to the S Row, the Black wires connected to the - Row and the + Row will not be connected to a wire. NC on the switch should be connected to the Blue wire, C should be connected to the Black wire and NO will not be used.

Next we will check to see if they are working, to do this start pronterface and connect to your printer, in the bottom right corner of the screen you will see a text box and send button. Make sure none of your Endstops are triggered then type M119 in the Text box and Click the Send button, in your box above the send button you should see something like picture P1.

```
x_min: open
x_max: open
y_min: open
y_max: open
z_min: open
z_max: open
```

**P1**

Next move your heat bed all the way to the front so it triggers the Y endstop, type M119 in the box and click send, you should see something like P2. If it doesn't look like P2 double check the wiring of your Y endstop on page 17.

```
x_min: open
x_max: open
y_min: TRIGGERED
y_max: open
z_min: open
z_max: open
```

**P2**

Next move your Hot end all the way to the right so the X endstop is triggered, type M119 in the box and click send, you should now see something like P3. If it doesn't look like P3 double check the wiring of your X endstop on page 17.

```
x_min: TRIGGERED
x_max: open
y_min: TRIGGERED
y_max: open
z_min: open
z_max: open
```

**P3**

Next we will check to see if your Z endstop works, you can either manually press your Z endstop switch or turn your Z motors until they hit the Z endstop. Type M119 in the box and click send, you should now see something like P4. If it doesn't look like P4 double check the wiring of your Z endstop on page 17.

```
x_min: TRIGGERED
x_max: open
y_min: TRIGGERED
y_max: open
z_min: TRIGGERED
z_max: open
```

**P4**

If any of your endstops went from Open to triggered in the Z\_Max, Y\_Max or X\_Max make sure you have that endstop plugged into the correct spot on the RAMPS. If you had one endstop not do anything you can plug it into another spot then run the M119 command again to see if it works, if it still doesn't plug a known working endstop into the original port that wasn't working, if the known good endstop works we know we have a problem with the endstop or its wiring, if the known good endstop doesn't work please contact Maker Farm for more instructions.

Also the endstops will only work when you press the Home button for all Axis or for each individual axis, if you press the + or - the firmware is set to not use the endstops.

