Rostock MAX

Rostock MAX is a derivative based upon Johann's original Rostock Delta Printer Prototype. It features T-Slot extrusion for the linear motion (cheapskate) and laser cut acrylic OR melamine framework. The lower wrap piece around the bottom hides the electronics, but it's removable to show off all the acrylic/plywood and electronics if you want. The main goal of the MAX is to make a more rigid and sturdy version of the original using CNC machined, Injection molded and laser cut parts instead of printed and plywood pieces.

Also, Rostock MAX is now capable of printing directly from an SD card. Check out RamboLCD for instructions on how to wire up a reprapdiscount Smart LCD

Note that the instructions and photographs on this page pertain primarily to the original Indiegogo campaign version of the Rostock MAX. Many updates and improvements have been added since the original release.

Contents

Rostock MAX

Release status: working

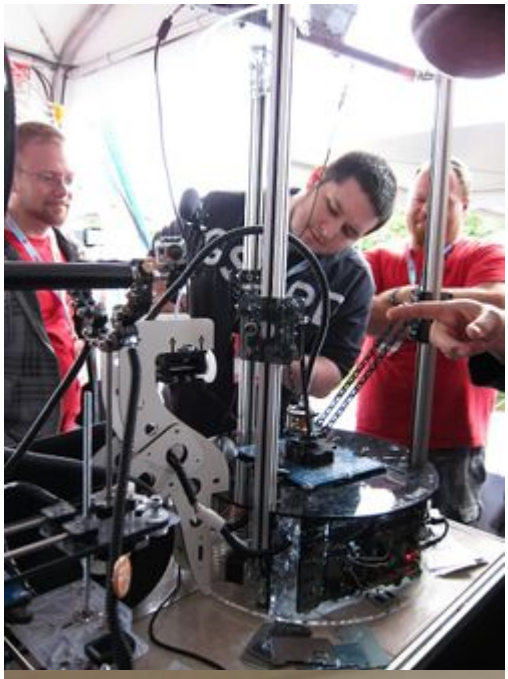
Description	Rostock MAX is a delta robot 3D printer based upon Johann's original.
License	GPL
Author	SeeMeCNC
Contributors	
Based-on	Rostock
Categories	Delta
CAD Models	See BOM for links to files
External Link	

Assembly Instructions/Manual including LCD setup

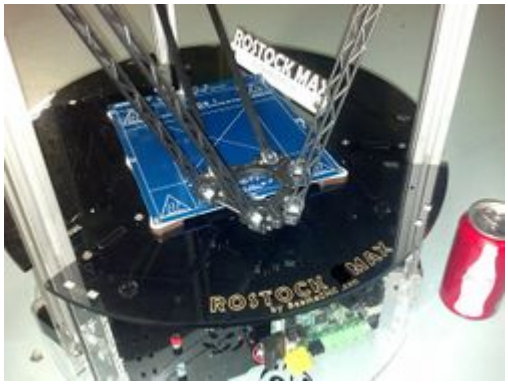
Many many thanks to user:geneb for generating an awesome, easy to use set of instructions!

[Rostock MAX Assembly Manual, 2nd Edition (http://download.seemecnc.com/rostockmax/Rostock-MAX-Assembly-Guide.pdf)] created, maintained and updated by geneb.

Photos




ROSTOCK MAX
by SeeMeCNC.com



Videos / Other Resources

http://youtube.com/seemecnc
http://www.ustream.tv/channel/seemecnc - Contains videos detailing the mechanical part of the build.

Tools Needed

The following tools will be needed to complete a build of the Rostock MAX:

- Hobby knife or utility knife: Used to clean up any burs or flashing on the plastic parts. Also used to pop out the small scored rings instead of counter sinking the holes.
- Soldering iron: Used to extend the wires of the stepper motors.
- Sand paper or flat file: Used to improve the fit of plastic parts, if needed.
- Hex wrench (5/32"): For the idler bearing screws and the screws that hold the T-Slot in place.
- Hex wrench (3/32"): For various other socket head cap screws included in the kit.
- Phillips head screwdriver: You'll need a normal sized one (P2) for most screws and a smaller one (P1) for the motor screws.
- Flat head screwdriver: Used for the nylon power supply screws.
- Needle nose pliers: Used to put the nylon locknuts into the slots in the laser cut parts. Putting them in by hand is really difficult.
- Tape measure: For roughly leveling the top plate.

BOM / CAD Files

The following BOM is for completing a Rostock MAX. You may substitute many of the hardware pieces for metric equivalents if you have easier access to them, we tried to make sure that it would accept both where possible.

The Most accurate, up to date version is this.

File:Rostock MAX Bill Of Materials.pdf

File:Rostock MAX Bill Of Materials.xlsx

1. 1. 1. 1. 1. Updated as of 1/9/2013 Lasercut Files #####

Wood/Melamine laminate files, optimized for .270" thick material

File:Rostock MAX LASER WOOD0272 JAN 13.zip

Acrylic Files optimized for .250" material

File:68399 ROSTOCK MAX ACRYLIC0250 JAN 13.zip

STL or IGES CAD Files ALL PARTS:

IGES FILES: File:ROSTOCK MAX IGES FILES JAN 15 2013.zip

older files: File:10-11-12 ROSTOCK MAX RELEASE BY PARTDADDY SEEMECNC.zip These are .stl files of all parts for reference

Hot End Files with New No22le IGES and STLs

File:RostockMAX HOTEND OF JAN 15 2013.zip

OLD Lasercut Parts files

|File:DWG 10-11-12 ROSTOCK MAX LASERFILES BY PARTDADDY SEEMECNC.zip These parts may have modifications as time goes on, but they are a good baseline.

Feel free to add any other items not listed below here, by you the users

Materials not included in the kit:

- PTFE tubing for insulating the thermistor leads (optional, you can also use some of the RTV silicone or Kapton tape)
- RTV high-temperature silicone: http://www.harborfreight.com/3-oz-rtv-silicone-red-90026.html
- Heat shrink tubing: Used to protect the stepper motor wire extensions.

Software and Setup

While the Rostock MAX will work with any of the Reprap Host softwares, Repetier-Host has proven to be the most reliable, full featured and easy to set up and use.

Repetier Host

Repetier-Host is a great software package that bundles the toolpathing program Slic3r with a great machine control as well as gcode viewer all in one install. Download the current version for your operating system (Windows, Mac and Linux are supported) from http://repetier.com

SeeMeCNC has videos for installing and setting up repetier for the Rostock MAX on Installing Youtube (http://youtube.com/seemecnc)

Installation:

1. Download and install Repetier-Host on your computer. It will automatically install the slicing program Slic3r with it, no need to go out and download it seperately.

2. Under Config/Printer settings, you will need to set up the printers COM port and set the baud rate to 250000, and it helps to give the printer a unique name now, just highlight "default" and put your own name in there, then click on apply.

3. Now, go into the printer shape tab, and change printer shape to X=250 Y=250 Z=350 for starters. You will need to change these numbers once you learn the physical max movements of your machine in X Y and Z.

3b. Starting with Repetier-Host version 0.83 the Rostock printer is now supported. From the drop down list select "Rostock" as your printer shape and enter 270mm for it's diameter if you are using the Round Onyx Heat bed. The Height will be around 400mm, again You will need to change these numbers once you learn the physical max movements of your machine.

4. Also while in the Printer Shape tab, we need to change Home X and Home Y to 0 instead of Min or Max, and Home Z to Max.

5. Make sure "Has Dump Area" is un-checked, and enter HALF of your width negative in X min, and Half in X Max, and Bed Left should be equal to X min. So, if you entered 250 for Print Area Width, you would put -125 in X Min, 125 in X max, and -125 in bed left. Repeat the logic there for the Y axis min/max/bed front and make sure to click on "Apply"

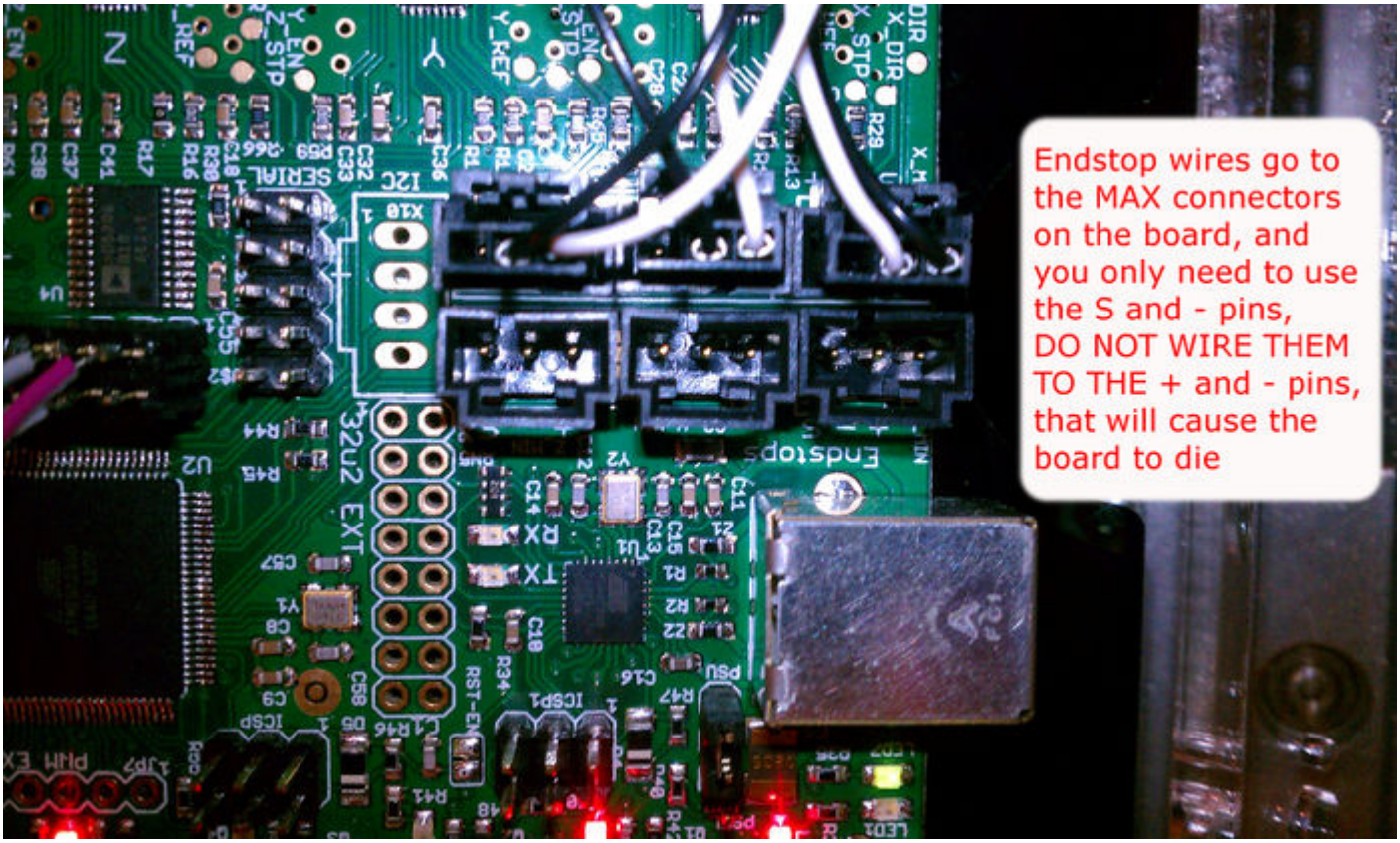
6. If you made those changes right, your screen should now be showing you a tall box shaped print area, with a dot in the center of the table area, that represents your machine's zero point.

Electronics

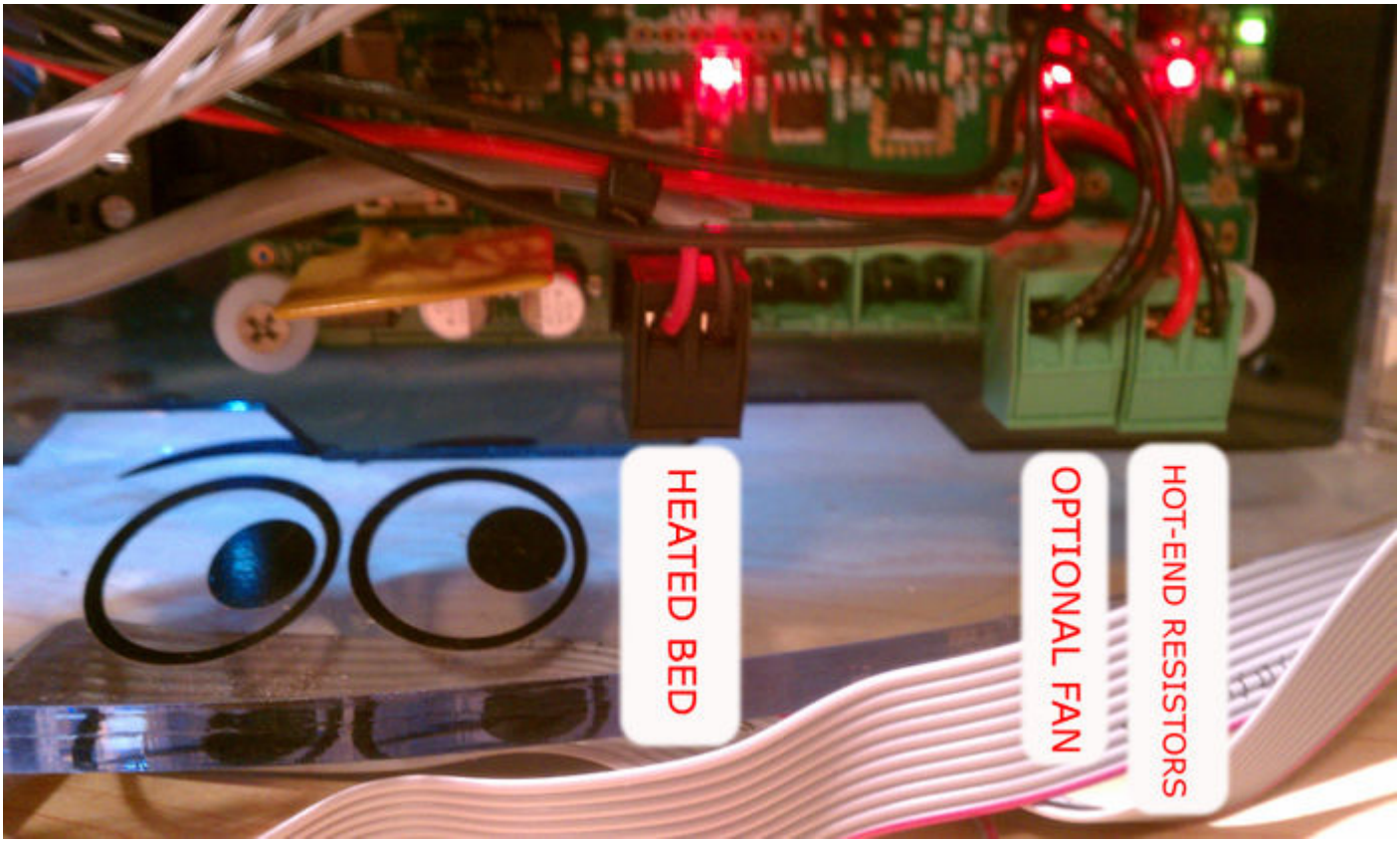
RAMBo Boards

Rambo by UltiMachine is what SeeMeCNC provides with their kits. RAMPS 1.4 was used as well, but RAMBo is the next step in UltiMachine electronics. You only need 4 stepper drivers, 3 limit switch inputs, and two heating circuits (if using a heated bed) so any board capable of those requirements should be acceptable.

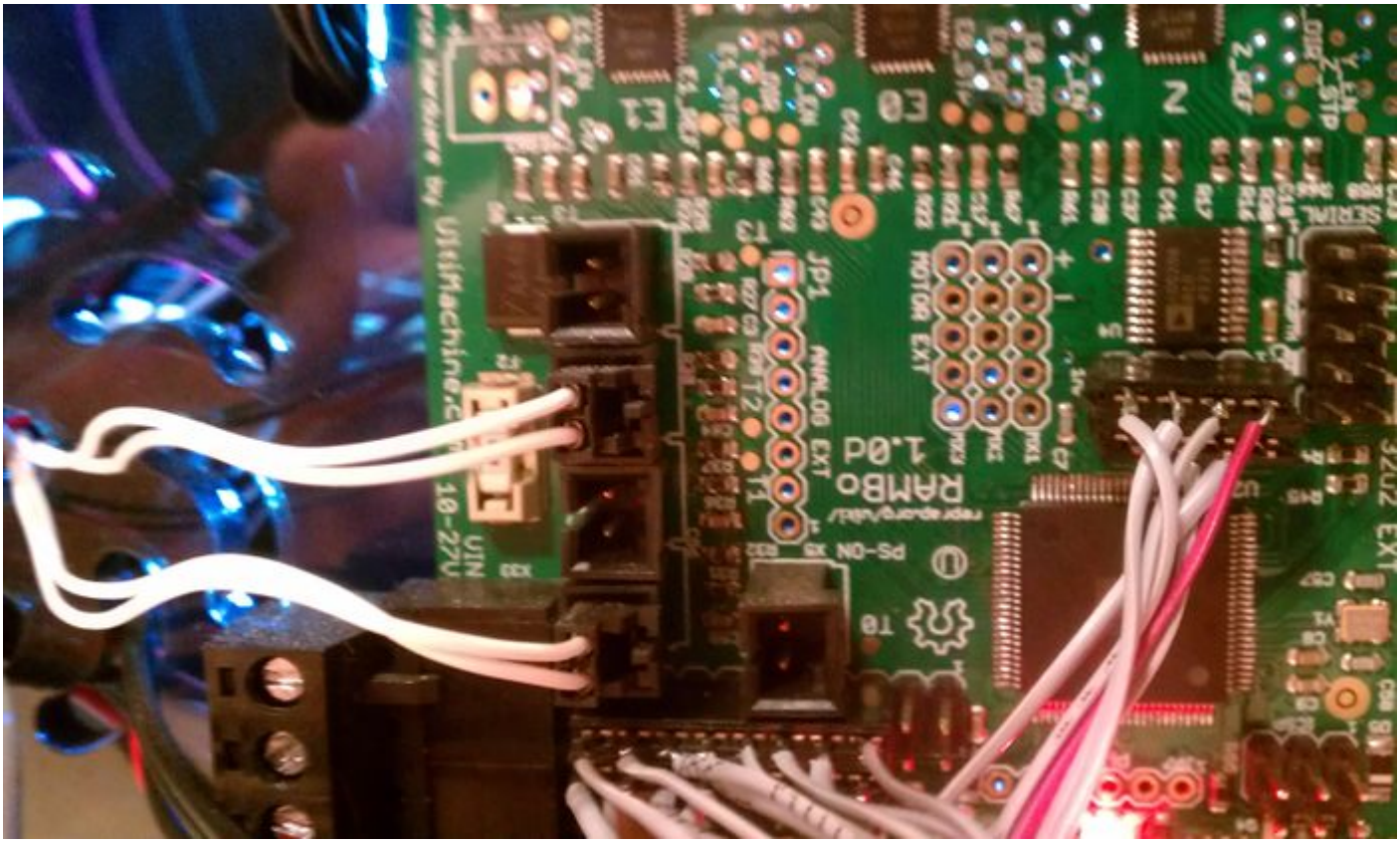
The endstops on the Rostock MAX are located at the top of the machine. The settings in the firmware are looking for them at the MAX positions, so you will need to plug the endstops into the RAMBo board in the MAX plugs. MAKE SURE to attach the wires to the C and NC connectors on the endstops. This means you should have continuity between the wires until the endstop is pressed, then the circuit is open.



The Hot-End and Heated Bed plug into the connectors on the side of the board as shown in the picture below. The fan is used with PLA. If you want to print with PLA, you will need a small fan blowing across the upper section of the Hot End to keep it from getting a PLA plug. Note that the RAMBo has an extra hot end and fan plug for a dual extruder setup too!



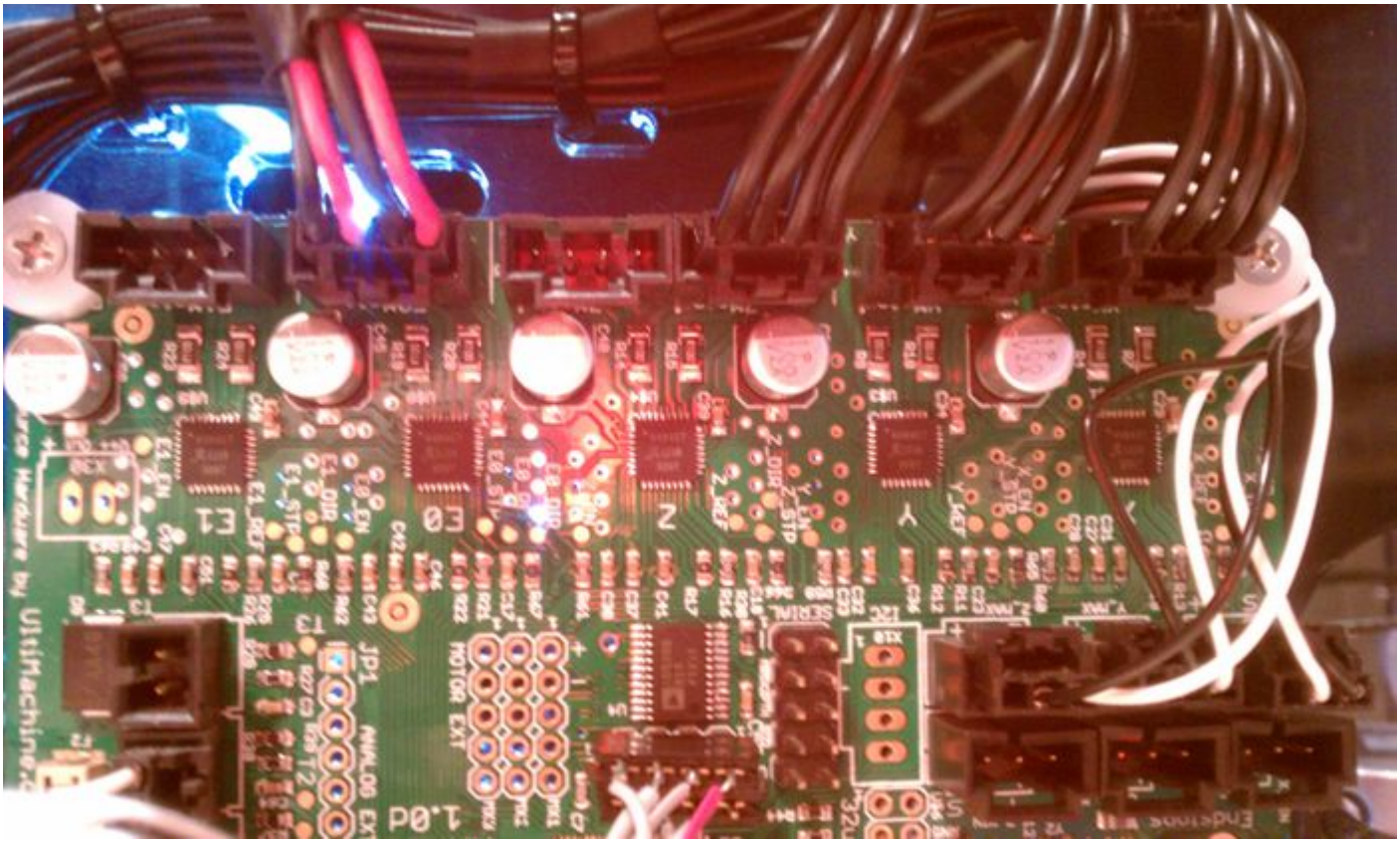
The Thermistors for the hot end and heated bed are shown in the photo below. The one lowest in the picture is for the hot end thermistor. The next connector from it is left open, but is there for a second hot end. The third connector is for the heated bed. It is the one towards the top of the row in the pictures



The Stepper motors have four wires coming out of them. RED/BLUE make one coil, and GREEN/BLACK make the other coil. Using the picture and diagram below, wire the connectors as follows.

RED - BLUE - GREEN - BLACK Note: the board is upside down in the photo, so it is from Right to Left in the below photo.

The RAMBo is labeled to identify which motor goes where. It also has two plugs for the Z axis, you can use either plug. It is there for machines that use two stepper motors to drive the z axis. On the Rostock MAX, the table has markings to identify which towers are X Y and Z, but they are front left = X, front right = Y, and rear tower = Z. Use 22 gauge wire to extend the stepper motors wires to reach the board. Most 4 conductor wire has red, black, green and white colors, so just remember which colors you use for the extensions. The photo below, all black extension wire was used, but they are wired to the stepper in the RED-BLUE-GREEN-BLACK orientation. RAMBo uses a setting in the firmware to control the motor current. By default, you should set the XYZ and E values to around 200 (the range is 0-255). This sets the motors for appx 1.2 amps.



Installing the RAMBo USB driver for Windows

Download this file File:RAMBo USBdriver.zip and unzip it into a known location on your computer. In windows 7, plug in your RAMBo board, and let windows 'quietly' fail to find the driver. Then, go to the start menu, right click on computer and click properties. On the left, click on Device Manager. Scroll down to Unknown Devices, and right click on RAMBo. Choose Update driver. CLick on "Browse my computer for driver software", then click on "Let me pick from a list of device drivers on my computer", then click the button for "Have Disk" and then click browse and point it to the file you downloaded above. Then click OK and it will tell you the driver isn't signed, it's ok, install anyways, and enjoy!

Power Supply

450W ATX PSU is used to run all electronics, the lower acrylic/wood panels have mounts for a standard ATX PSU, as well as RAMPS 1.4, RAMBo and universal mounting holes for other electronics such as the RAMBo or RAMPS (arduino Mega). There are many ways to use an ATX power supply for a 3D printer power supply. The easiest is to just cut the green wire and one black wire, and run that to the toggle switch. Also, you can cut three yellow and three black wires from their connectors and use those for each of the three RAMBo power input connectors. Use three to make sure you can draw enough current thru the wires.

Firmware

The Rostock MAX uses Delta based firmware. The firmware can be found at https://github.com/johnoly99/Marlin-for-rostockmax-rambo. That firmware can also be used on RAMPS or other electronics. It is Marlin RC2, But has Johann's delta mods, Tonokip's RAMBo mods, and johnoly99's MAX mods.

All of the settings relating to the delta geometry is located in the first marlin.pde file. The settings in the version linked above are maintained to work on the Rostock MAX, but changing the delta geometry could make it work on other 3 column parallel delta bots such as your own designs and iterations.

If you are using the RAMPS 1.4 controller, be sure to change `#define MOTHERBOARD` firmware setting in the Configuration_adv.h file. You can use either 33 or 34, but 33 is probably the most appropriate considering the Rostock MAX is only fitted with a single extruder.

```
//// The following define selects which electronics board you have. Please choose the one that matches your setup
// Gen7 custom (Alfons3 Version) = 10 "https://github.com/Alfons3/Generation_7_Electronics"
// Gen7 v1.1, v1.2 = 11
// Gen7 v1.3 = 12
// Gen7 v1.4 = 13
// MEGA/RAMPS up to 1.2 = 3
// RAMPS 1.3 = 33 (Power outputs: Extruder, Bed, Fan)
// RAMPS 1.3 = 34 (Power outputs: Extruder0, Extruder1, Bed)
// Gen6 = 5
// Gen6 deluxe = 51
// Sanguinololu 1.2 and above = 62
// Melzi = 63
// Ultimaker = 7
// Teensylu = 8
// Gen3+ =9
// Rambo = 301

#ifndef MOTHERBOARD
#define MOTHERBOARD 33
#endif
```

Assembly

Each of the following assembly steps build upon the previous step. Pay close attention to the laser cut pieces. There are some holes that have a scored circle around them. The scored line around the holes indicates that those holes need to be countersunk to put the 6-32 screws flush with the surface. If you have melamine wood laser cut parts, you can pick the melamine off the surface around the holes to where the scored line is, and the screw will bite into the MDF core without needing to use a countersink also. Another note is that it helps to leave the masking on the parts while assembling except where it would be impossible to remove once it's tightened down. That helps keep everything clean and free from scratches from tools while you're working on it.

Pre-Assembly

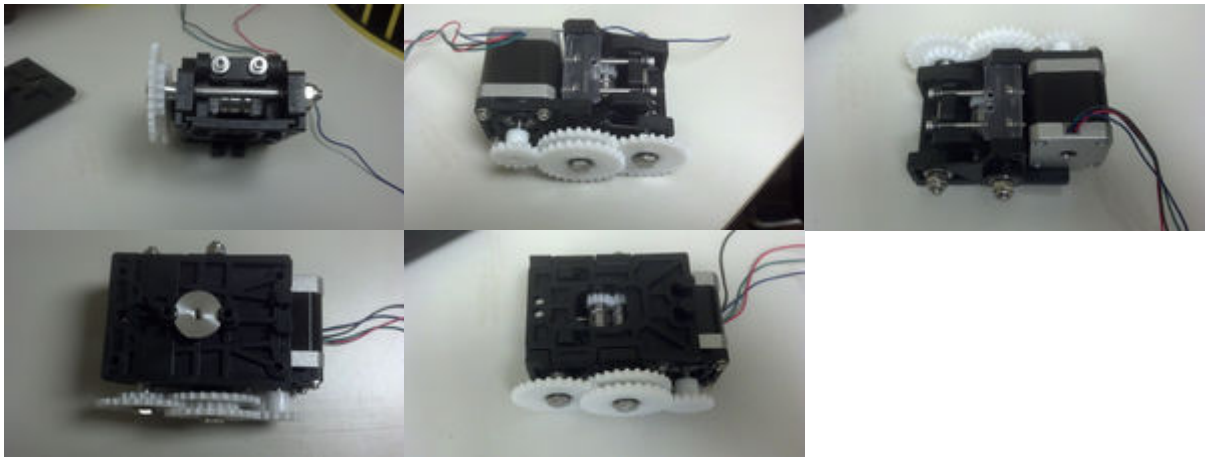
Check all Aluminum and Plastic parts for burs and flashing. Bearing covers may have heavy flashing. Use a hobby knife or Utility knife to clean the flashing from the Bearing covers. A Utility knife or small file can be used to remove any burs on the Aluminum parts.

If you wish to do any Edge painting of your wood cut Rostock such as I have in these pictured, be sure to first clean the edges by wiping them with a cloth rag to remove the loose burn powder from the wood. Then apply a good coat of sealer or paint primer and let dry before applying the color. These wood cut pieces hold moisture very well, so dry them in a controlled environment @ aprox 70 f or above for 72 hours before handling.

Steve's Extruder assembly instructions are the same as SeeMe CNC's H-1 3D Printer:

File:71590 Steves Extruder Assembly.pdf

Photos of Steves Extruder



Step 1 - Base Assembly

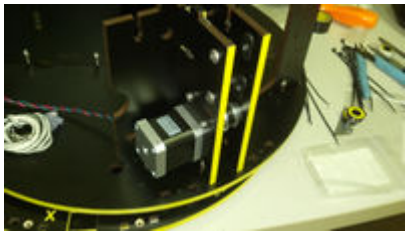
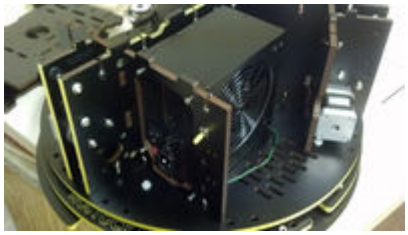
Step 1.1 - Base Sub Assembly

File:RostockMAX-Step1-1.PDF

Assemble the Base of the machine. Start by installing the 6 17505 LEG parts with the 10-32x5/8" pan head nylon screws with the nylon nut onto the 68355 BASE. The Part number on the Base part will be facing downward along with the legs. Once the legs are secured the 44010 FOOT can be installed on the LEG part.

Next the 68352 TRI SUPPORT, 68377 TSLOT SUPPORT, and the 68364 MOTOR MOUNT will assemble together first before being attached to the BASE. This step will be repeated 2 more times so you will end up with 3 identical assemblies. Next select any 1 of these 3 assemblies and add 68356 POWER SUPPLY RETAINER to it opposite of the TSLOT SUPPORT part. The screws attaching these parts together can be fully tightened at this time. Next the 3 assemblies can be assembled with the base install all the screws making sure that you countersunk all the holes so that your screws will sit flush. It is best to leave these screws lose so the it is easier to install the TABLE part.

At this point you may want to install the STEPPER MOTORS, 15T Timing Pullies, 608 idler bearings, and ATX POWER SUPPLY just for ease of assembly.

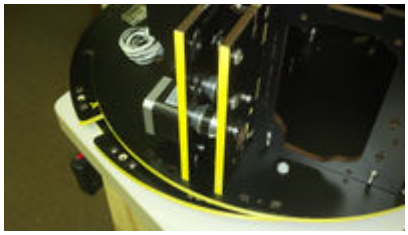



Now it is time to add the 68361 COVER BRACKETS there are 7 of these around the outer edge of the BASE. The TABLE has lettering on it indicating an X, Y and Z column location. Take note that the X is the front-left column facing you, Y is the front-right, and Z is in the rear-middle position. That will help you know which axes is which when it comes to calibration/tuning if needed. The 2 Doors need to go on before you put the TABLE on, as they are held in with the tabs on them, into holes in the top/bottom plates. The door on the front (between X and Y columns) is where the RAMBo (or your own electronics) are meant to be mounted. There are holes already for RAMBo as well as the Arduino MEGA pattern(RAMPS 1.4), and fans to cool them if you need. You can mount them on the front or the back of the board, your choice. Before the TABLE part is added to the assembly be sure to install the 4-40 tee-nuts into the bottom side of the table, these are what is used to attach the UNO HEATED BED INSULATOR and the heated bed itself. You can tighten all the screws once the TABLE is installed on top of the Base sub assembly.

Step 1.2 - Stepper mounting and idler Assembly

File:RostockMAX-Step1-2.PDF

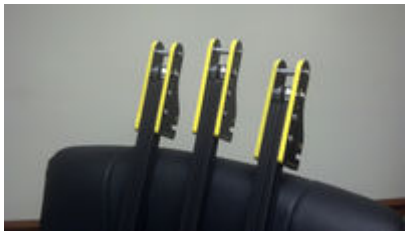
Pay close attention to the score line on the sides of the lower T slot mounting plates. The line shows you where the end of the T slot should line up with, so that the machine is square and all three arms are equal lengths.



Step 2 - T slot upper

File:RostockMAX-Step2.PDF

Assemble the top of the T Slot rails as shown, and repeat for all 3. They're all identical. The top of the rails should line up with the scored line on the upper laser cut plates. This helps in getting the machine square with all three columns identical in height. Note that the lower sections, on the base assembly, also have these lines to show you where to position the t slots before tightening.



NOTE: The uppers pictured have an additional spacer added above the pulley, this spacer was added by myself and not included in the standard kit.

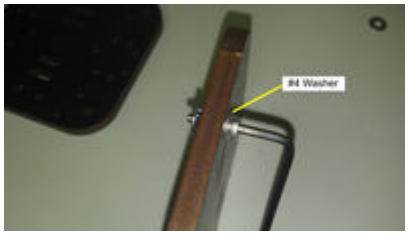
Step 3 - Cheapskate

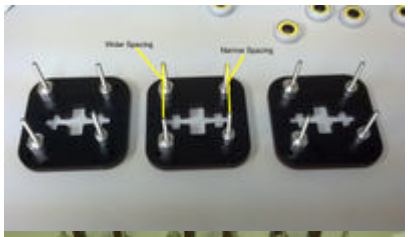
File:RostockMAX-Step3.PDF

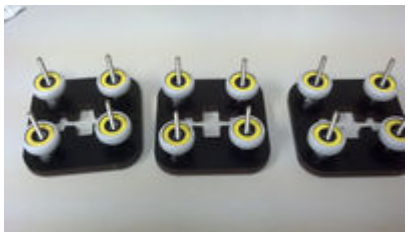
Assemble the 3 cheapskate carriages as shown, all 3 are identical. Make sure that you put the upper u joint mounts with the holes the same direction, that way your limit switch bolts will be in the same spot on all three. It's the hole that is drilled and tapped on the top/bottom of the black u joint mounts.

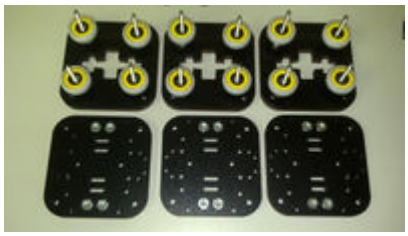
NOTE: The bearings are not mounted in a square Pattern. Two of the holes are spaced a bit further apart than the other two. Just remember to keep the lettering and Part numbers on each part right side up on all the parts and you will be fine. I chose to place the cams on the wider spaced side (left).

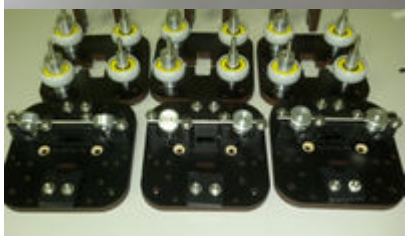
A tip on installing the T-Nuts. First screw a 4-40 bolt with a #4 washer into the nut drawing it tight, then remove the screw and repeat for all the T-Nuts.











Once you have the cheapskate assemblies assembled, adjust the cam side until the bearings are good and snug. Then, adjust the 5th bearing, the one that pulls from the inside of the plates, so it is snug too. Now, slide the carriages up and down on the tslots for a while and you will feel them free up slightly. The acetal bearing covers can get dented if snugged and left in that position for a while. Snugging them down and running the carriages 'forms' them to the alumium t slot's radius, and they tend to stay put with that radius 'squeezed' into them. If the cheapskate starts to feel like it has a flat spot on it, snug the cam side and 5th bearing side down a bit tighter, and run the carriage up/down for a bit and re-seat the acetal.

Step 4 - Hot-End Platform

File:RostockMAX-Step4.PDF

Step 4 is assembling the Platform and the u joints that carry it. The PDF shows the hot end and how it mounts, but you will want to leave the hot end off for now, until you are ready for wiring it in, it's easier to work with it off the machine. The most IMPORTANT step here is after the u joints are installed on the axles, and the platform is assembled, you will want to check the fit/tension of all 6 of the parallel arms at this point. The arms are made from a glass-filled nylon, and they are pretty strong. However, due to plastic injection molding, the tolerance of the "squeeze" on the u joints is hard to control. So, we intentionally mold them with a tight fit. All you need to do is snap them onto their u joints, and fell the friction of each joint. You want them to be tight, but not too tight. It should just take a tad more than their own weight to make them "drop" when you hold them horizontally. If they are too tight, you can lightly sand the insides of the arms where they snap over the u joints. It sands really easily, so careful not to sand too much.

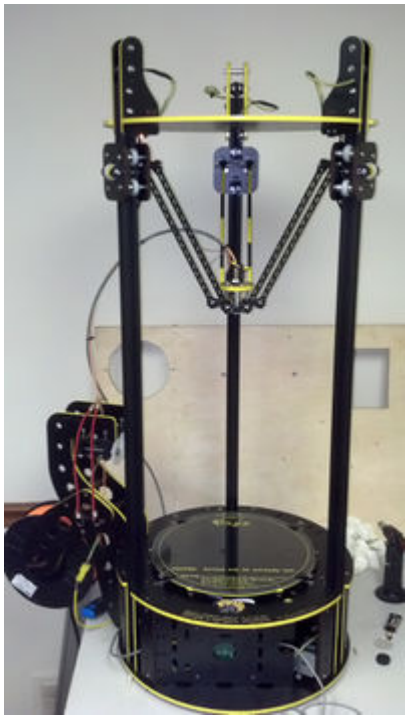
TIP: Use PTFE Tape (Teflon Tape or Pipe/Thread seal tape) to insulate the thin wires on the Thermistors. It's good for about 260c+

Step 5 - Spool and Extruder mounting bracket

File:RostockMAX-Step5.PDF

Step 6 - Final Frame Assembly

File:RostockMAX-Step6.PDF



The Rostock Yellow Jacket

File:RostockMAX-Step6-Video.AVI

Motors

4 NEMA 17 stepper motors are needed. There is one motor for each of the three delta arms, and one for the extruder. You can substitute NEMA 11 thru 17 motors on the extruder, but the arms need more torque to lift the carriage.

Motors used in SeeMeCNC kits are

42BYGHW811

Other motors that should work well are

42BYGHW804

If you use other motors, be sure to list them and their performance here please.

NEMA 17's uses M3 X.5-10mm mounting screws.

Endstops

Uses 3 mechanical endstops located at the TOP of each column. Endstops are actuated and adjusted by screws located on the cheapskate u-joint mounts. Some limit switches provided by UltiMachine have tabs that can easily be bent at a 90 degree angle to allow the use of the connectors provided in the pre-wired endstop kits. For those, just simply bend them over and use the provided connectors or solder them onto the switches. If your RAMBo kit has switches with the short stubby connections on them, it is best to simply snip off the connectors and solder the wires directly to the endstops.

Make sure you connect the endstop wires to the switches in the NC (normally closed) position. One wire goes to the C or common terminal, and the other goes to NC terminal

Belts and Pulleys

The three columns use 75" long (~1905mm long) GT2 2mm pitch x 6mm wide open ended belt. 15 tooth machined aluminum pulleys are used on the prototype to increase torque and positioning accuracy. The pulleys use M3-.5 X 6mm screws to hold them onto the stepper shafts

Commissioning/Calibration

Because the Rostock MAX (as well as other deltas) use the X Y and Z axes to drive the columns up/down, the steps per mm MUST be the same for all 3 axes as well as the acceleration values. For the Rostock MAX, the default steps per mm using the 15 tooth timing pulleys and the Rambo electronics set to 1/8 microstepping, are 53.333 for the X Y and Z, and 292.000 for the extruder (E axis). All these values are based on 1/8 stepping, so you can modify these values if you are using other electronics.

First thing to do once all the wiring is completed and hooked up is to connect to the printer in Repetier, and make sure you are not getting any errors in the lower status window. The most common error says "Printer stopped due to errors Send M999 to reset" If you are seeing this error, it is most likely because you do not have the hotend thermistor plugged in, or it is shorted to the hotend body somewhere. If you are not seeing any errors, or have fixed the error mentioned, next up is time to home the machine! Be ready to turn off the PSU just in case the motors are moving in the wrong direction.

Make sure that the screws on the carriages are not against any endstops. In the manual control window, type M119 and press send. You should get X_MAX:L Y_MAX:L Z_MAX:L indicating that all the endstops are wired correctly.

Now, take a look at the temperature of the hotend. It should be reading somewhere around 20c, or room temperature. If it's reading 0 or an abnormally high temp, stop and check your thermistor wiring. A high thermistor reading may indicate that the thermistor wires are shorted against one another or the hot-end.

Ok, ready for action now! To home the machine out, type G28 and be ready to power off if the arms move down towards the table. Enter G28 and press send. If all goes well, your carriages will move UP until the first carriage hits an endstop, then they will home each carriage seperately one at a time until all three carriages are homed out. IF your carriages move down towards the table, turn off the PS and unplug the USB cable. You need to take the RED and BLUE wires on the motor connectors and reverse them. Swap the wires around, power up, reconnect and send G28 again, and you should have success! NOTE: On my Rostock, the extruder ran backwards even though it was wired identical to the motor wires (motors ran correct) So you may need to reverse the extruder wires as suggested here, or change the firmware at this line. **#define INVERT_E0_DIR true**and change true to false.

Now, we need to 'set' our Z height. For this step, we will need to have the Arduino 0023 IDE software downloaded and the firmware from johnoly99's github. After homing the machine, jog the hotend down to the table. Using a piece of notebook paper, bring the nozzle down until you can 'feel' the paper dragging between the nozzle and the table. Take a look at the Z position in Repetier. If it is above zero, it will show in black. Write this number down. IF IT IS a 0 in repetier, it is because repetier doesn't display negative coordinates. Just jog the machine up 10mm by pressing the 10+ button, and it will show you the number, such as 9.3, indicating you WERE at -.7mm You need to take the number that you found just now, and compare it to what is in the Z_HOME_POS in configuration.h in the firmware. If you had a measurement of positive 2mm with the paper test method, then take 2mm off of the firmware's number (default is 345.0), then save and upload with the new value. Use the same logic if you had a negative number. If you were at a negative 2mm, add it to the firmware's value.

The next step is to make sure each tower/arm is moving parallel to the table. To do this, home the machine by sending G28. Then, jog the platform down to about 5mm above the print surface, at the center. Take a measurement using calipers or something as precise as you can between the top of the platform and the print surface. Now jog the platform towards the Z column, the one in the very back. Get it close to the column, but not all the way to the arms being straight up and down. Now, take a measurement again with the calipers or such. If the platform is HIGHER at the column, then move the endstop screw up by that amount, and if the platform is lower, then move the endstop screw down by that amount. Repeat this process for the other two columns, and then go once more around the three columns. This should be good enough at this point.

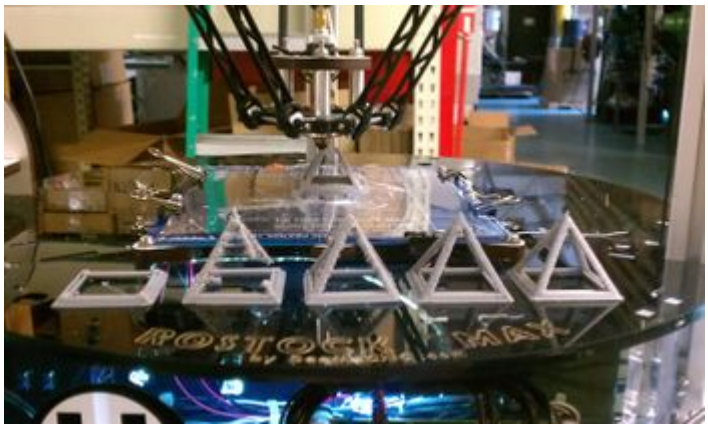
You are now done with the mechanical calibration steps. From now on, unless you change the thickness of your build plate, you can fine-tune your Z zero by adjusting all three endstop screws equally. Turning them all up (out) will set the nozzle closer to the table, and turning them all down (in) will make the nozzle higher off the table.

Tuning the hotend

This step will help you calibrate your hotend thermistor so you have really accurate PID control of your temps. Each machine will require slightly different values to be ideal. Different lengths of wire, the routing of the wires and other factors can contribute to slight differences. Learning to use these features will help you build a better understanding about how everything works too!

You will want to start with your hotend at room temperature, not from a warm state already. In the manual control tab in Repetier, type M303 S200 and press send. The screen should say something like "PID Autotune start" You will see every few seconds/minutes some numbers reported back. This is the firmware calculating the required data to come up with the best PID control values. After 5-10 minutes, you will see PID autotune complete, and above there will be a few sets of Kp, Ki and Kd values. You need to take all the Kp values and add them together, then average them out, so if there were 3 Kp values sent back, add the three togehter and divide by 3 to come up with the average. Same thing for the Ki and Kd values. Now, in the configuration.h file of the firmware, scroll down about a page or so, and look for the PID section, and enter the new values. Save and upload the new firmware, and you now have really good PID tuning for your hotend.

Slicing Settings



The following settings were used to calibrate retraction on the hollower pyramid thing at http://www.thingiverse.com/thing:29429. Filament used was Makerbot 1.75mm Silver ABS. Use these settings for a good general baseline for printing. You can increase the print speed, but you may need to increase hotend temps as you increase speed above 40mm/sec. 235C+ is looking to print well at 35mm/sec speeds

.3 layer height

2 perimeters

0% infill (hollow)

30mm/sec speeds for everything except for external perimeters at 80%

200mm/sec travel speed

228C extruder temp

slow down if print time is below 25 seconds

minimum print speed set to 6mm/sec

10mm retraction @ 55mm/sec retraction speed

0 Z lift

0 extra length on restart

3mm minimum travel after retraction

Starting Settings

SeeMeCNC publishes Slic3r settings for their Orion printer which is similar to the Rostock Max except for build area. Those settings provide a good baseline for configuring your machine.

General slicing settings

Here are some general slicing settings that have proven to give really good results.

Slic3r (as of v0.96) still has trouble sometimes with generating clean thin walled prints, and struggles to minimize retraction, but is very user friendly and FAST at slicing. CURA generates much cleaner gcode for printing, but takes longer to slice files, and is not as user-friendly as slic3r which is built into Repetier. For the ultimate in gcode manipulation, you can always try skeinforge, but be ready to spend a long time calibrating your settings and learning a new language.

.2mm layer height is a good general thickness for all around printing. If you slice at thicker layer heights, you may need to slow down, to around 30-35mm/s for .3 and slower for thicker than .3 layer heights. This is mainly due to there being a lot more filament being extruded at that layer height.

Another good layer height is .1875mm I normally print at this, or .2, and set my speeds to 60-100mm/sec for all except the top/bottom fill, which i set to 30.

Temperatures on the hotend have to be proven with each different color/suppliers filament. Generally, 225c is a good starting point. The hotend is capable of extruding at 260c+ as long as the hotend doesn't just sit there at that temp, not extruding or not moving

Travel moves/speeds (non-printing moves) set the speed to 200mm/s.

Z lift is usually set to 1mm if printing multiple parts or lots of different towered parts, meaning parts that aren't one continuous outer profile, but rather small sections that are seperated.

Generally, if the part has lots of towers, then use retraction amounts of around 8-8.5mm at 55mm/s Don't go slower on retracts, or it will cause blobbing

Using zero Z lift and zero retraction speeds up the print, but will have some hairs on the outside surface of parts where it crosses gaps. It's up to you to determine if the post-printing cleanup is worth the extra time to dial it out of your print.

Configuring the Rostock MAX for 3mm filament

This was taken from a question on the Indiegogo campaign's comments section:
The extruder used in the Rostock MAX is capable of using 3mm filament, but isn't setup to do it right out of the kit. If you're a DIY guy, just go to seemecnc.com and grab two 6mm PTC fittings and a few feet of the teflon tubing that is 4mm ID X 6mm OD. You will need to modify/make a bushing for the hot-end and extruder parts to hold the larger PTC fitting, but that's it, the extruder will drive either size.

Further reading

"Rostock MAX on Indiegogo" (http://indiegogo.com/rostockmax) The SeeMeCNC Campaign that kicked off the Rostock MAX kits

"Rostock Derivative" (http://forums.reprap.org/read.php?178,145039), another RepRap built from extruded Aluminum in the Rostock arrangement.

"The SeeMeCNC forums" (http://forum.seemecnc.com) This thread (http://forum.seemecnc.com/viewtopic.php?f=42&t=948) has some useful assembly information.

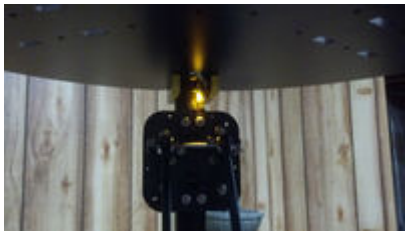
"SeeMeCNC RostockMAX Assembly" (http://seemecnc.org/download/RostockMAX/Assembly/) This contains a bunch of files that provide CAD drawings and other files useful when assembling your Rostock MAX.

MAX Mods

LED Endstops

We can utilize the third wire from the End stop connectors and use an LED to light the end stop when the switch is pressed, or the "end" is reached. The Switch is wired Normally closed with the ground as common. Normally closed means that when the switch is in it's "normal" position (i.e. not pressed or relaxed state) the NC terminal is connected or "closed" with the Common terminal and the Normally Open contact is open with respect to the common. When the switch is pressed, the NO contact is connected to the common and the NC is now open. To light the end stop run the positive wire to a 150 ohm resistor connected to the Anode of the LED. Connect the Cathode to the NO switch contact. When the limit is reached and the switch closes, ground will be connected to the LED thus turning on the light. Note that ground must be connected to the com terminal.

File:LED endstops.pdf




Endstop Wiring

It is possible to wire the endstops with only 4 wires by utilizing a common ground. This eliminates the need to feed two additional wires through the extrusions since there is limited room to run wires inside of the extrusions.

Heated Chamber

Due to the Rostock Max not having any motors or electronics within the build area it is possible to create a heated chamber by attaching insulation (such as radiant barrier insulation) around the machine or by creating an enclosure using plexiglass.

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