

STACKER®

INDUSTRIAL GRADE 3D PRINTERS

S-Series User Guide

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Minneapolis, MN 55427

<http://stacker3d.com>

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1. Warnings

Stacker 3D printers are industrial machines that should never be operated around children or left unattended. Careful setup and training is required for optimal results. Read through this entire User Guide and view online resources before attempting to operate your printer. Please note, this printed copy of the User Guide may not be the most up to date version. We recommend downloading User Guides from our website to confirm you have the most up to date version denoted by the last revision date on the front cover of the User Guide.

Please read and take seriously all Warnings. Unsafe operation of a 3D printer can result in damage to your printer and serious injury to yourself.



Burn Hazard! Do NOT touch hot surfaces!

Both the hot ends and heated bed can get HOT! To prevent burns, avoid touching the hot surfaces of the 3D printer.



Fire Hazard!

Never place flammable materials or liquids on or near the printer. It is your responsibility to operate your printer in a safe manner. To ensure that it is safe, you must incorporate the use of fire and smoke alarms and proper fire suppression technologies like fire extinguishers. Never operate the printer unattended.



Maintain Clean Environment!

Operate printer in a clean environment. Avoid exposing printer to dirt, dust, oil, smoke, or other environmental pollutants. The printer may not function properly, and operational life will decrease, in an unclean environment.



Electric Shock Hazard!

The printer must be kept dry. Attempting to operate the printer in a wet environment will damage your printer and could lead to injury. Always power down and disconnect the power cable from your printer before servicing.



Static Charge Hazard!

Ground yourself before touching the printer. Static charge can damage your printer's electronic components. Discharge your static before touching your printer!



Pinch Hazard! Keep Hands and Fingers Clear.

During operation, the printer will perform quick and unpredictable movements. To avoid injury, never place your hands, fingers or body near any moving parts of the printer including belts, pulleys, print bed, and hot ends. Be sure to tie back long hair and remove any clothing or jewelry which could become caught in the moving parts of the printer.



Age Warning.

For users under the age of 18, adult supervision is recommended. Printed parts can be a choking hazard for small children. Never operate the printer unattended!

2. Introduction

Welcome to STACKER! Our high performance industrial grade 3D printers are capable of producing everything from one-off prototypes to multiple part production runs. To get the most out of your Stacker 3D printer, please read the entire User Guide before attempting to operate your printer. This User Guide should provide all the information necessary to set up and operate your printer.

2.1 Product Registration

It is important to register your printer. In order to receive customer service support, warranty service, or join our community forums, you must register your printer. Complete the registration form on our website.

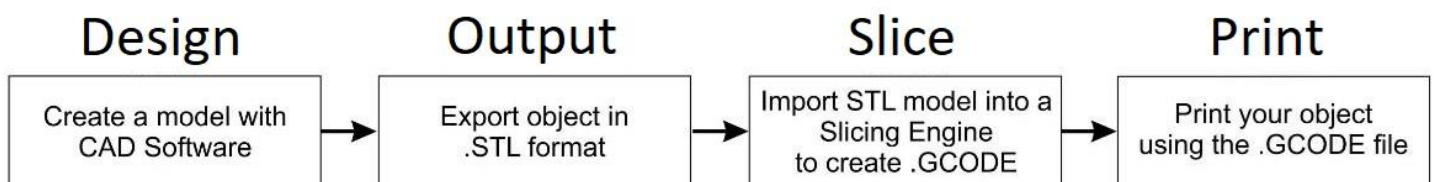
<http://stacker3d.com/product-registration/>

During registration, you must enter your printer's serial number. Your Stacker 3D printer has two serial labels: one serial label is located inside the controller housing, and the second serial label is attached to the inside of the front right leg.

2.2 Software

The 3D objects you will be printing are created using two types of software, (1) computer-aided design (CAD) software and (2) slicing software.

QUICK OVERVIEW OF SOFTWARE USE IN THE 3D PRINTING PROCESS



Design and Output: It is helpful to be familiar with solid modeling CAD applications in order to create and manipulate the parts you want to 3D print. Often a simple design modification or splitting of a model into multiple sections will allow you to print it faster, better, and without the need for support materials. The following list of CAD software is by no means exhaustive, but these programs offer a good balance of power and value, some of which are free and have robust online training and user communities. Nearly all of these apps will export your models to the preferred STL file format.

- SketchUp, Autodesk Meshmixer, Tinkercad
- FreeCAD, openSCAD, Blender, 3D Builder
- Autodesk Netfabb, Autodesk Fusion 360, C3D Toolkit, Geomagic Design, Alibre, Autodesk AutoCAD
- SolidWorks, Autodesk Inventor, Solid Edge

Slice: In operating a 3D printer, it is most critical that you have a good understanding of your preferred slicing engine before attempting your own prints. Slicing engines are used to convert an STL file into the GCODE file, which operates the printer. A GCODE file provides the commands that enable the printer to print a 3D object. We highly recommend Simplify3D. We have found Simplify3D to be one of the best slicing engines available, we provide a license for a downloadable copy with your Stacker Printer and have profiles for each Stacker model available on our website. To receive your copy of Simplify3D, please be sure to register your printer and contact sales@stacker3d.com for your coupon code to purchase your free copy of Simplify3D from our website. Slic3r and Cura do a good job and are free to use.

The links below can help familiarize you with the operation of a slicing engine:



simplify3d.com/support/



manual.slic3r.org



support.ultimaker.com/hc/en-us/sections/360003548579-Getting-started

simplify3d.com/support/

Stacker RUN software is an enhanced version of *Repetier Host* customized for using Stacker printers. Additional information and Stacker RUN software download is available on our website. You can find additional documentation on the Repetier website.



Stacker RUN

stacker3d.com/stacker-3d-printer-support/



Repetier

<http://www.repetier.com/#documentation>

If you are interested in controlling your Stacker printer remotely, we recommend Repetier Server. Through the combination of a Raspberry Pi and Repetier Server, you can operate your printer from any web enabled device.



Repetier Server

Control your 3d printer from everywhere

<http://www.repetier-server.com>

2.3 Printer Specifications

Products	S2	S4	S4XL
Number of Extruders	2	4	4
Build Volume	490mm (X), 390mm (Y), 650mm (Z)	520mm (X), 365mm (Y), 650mm (Z)	610mm (X), 610mm (Y), 610mm (Z)
Weight	140 kg (310 lbs)	140 kg (310 lbs)	163 kg (360 lbs)
Physical Dimensions	28.3" x 35.4" x 43.3"	28.3" x 35.4" x 43.3"	40.2" x 49.9" x 52.6"
Machine Type	Cartesian		
Firmware	Repetier		
Motor	Stepper		Servo
Print Speed	1 – 250 mm/sec		
X/Y Movement Speed	1 – 250 mm/sec		
Positional Accuracy X/Y	6 Microns		
Positional Accuracy Z	4 Microns		
Layer Height	0.1 to 1mm		
Extruder Temperature	Up to 300°C		
Heated Bed Temperature	Up to 110°C		
Standard Nozzle Size	0.4mm		
Optional Nozzle Size	0.25mm, 0.4mm, 0.6mm, 0.8mm, 1.0mm		
Filament Diameter	1.75mm		
Printed Material	Filaments that melt bellow 300°C		
Power Inlets	C19		2 x C19
Power Requirements	100-240VAC 8.5AMPS		100-240 VAC 8.5 AMPS 240 VAC 15 AMPS
Internal Voltage	24VDC		24VDC 240 VAC
Recommended UPS Size	1500VA/1000w or greater		
Connectivity	USB and SD Card		
Default BAUD Rate	115200		
Software Included	Simplify3D, Stacker RUN		

3. Unboxing and Assembly

Your Stacker printer has been shipped in a wooden crate to protect the printer during transit. Should you ever need to transport the printer or return it to Stacker for warranty service, we recommend keeping both the crate and packaging materials.

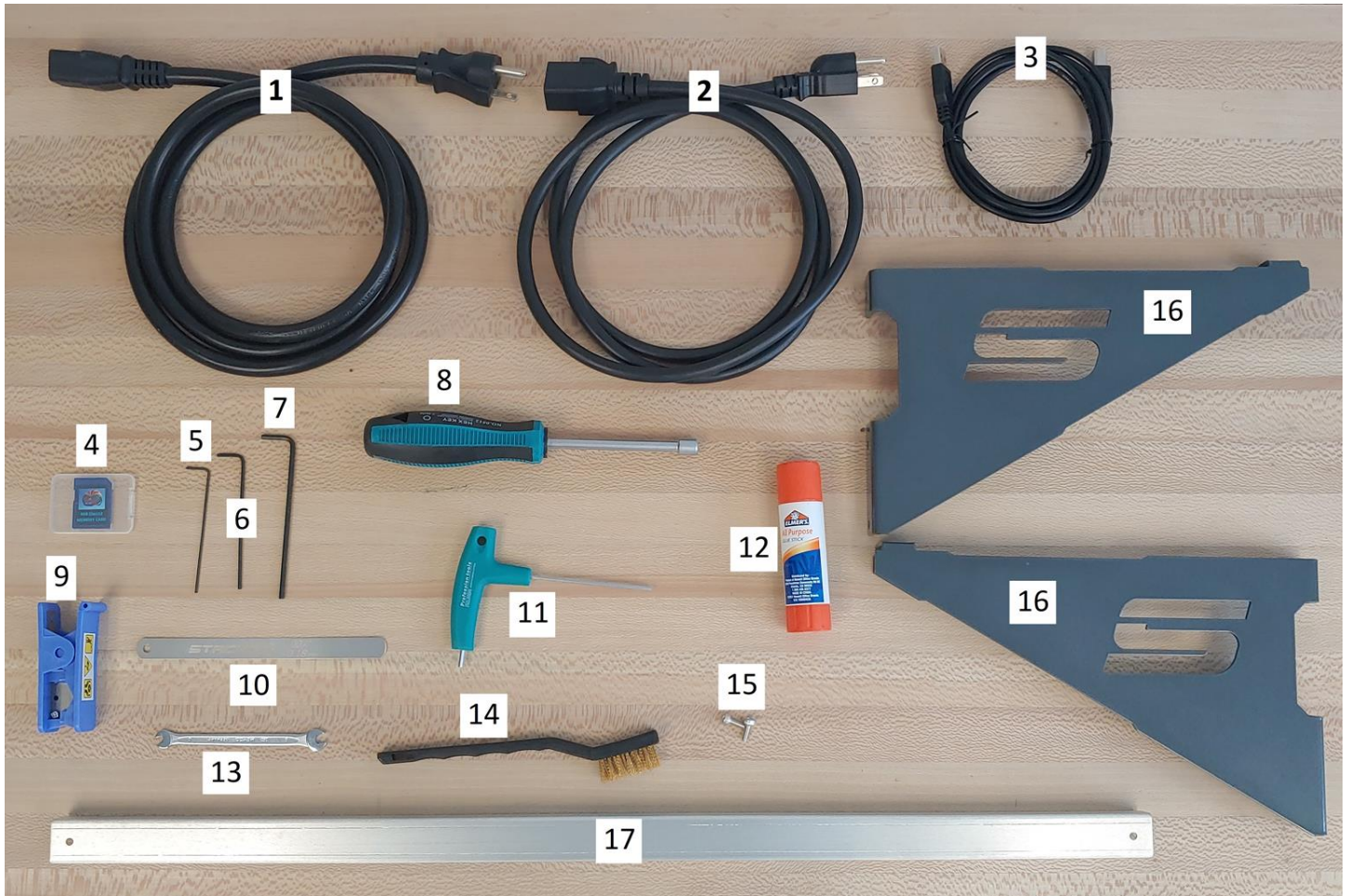
Be very careful when removing printer from the crate – the printer is HEAVY! Begin by removing the square head screws to fully detach the top and one side of the crate. Next, remove the box and foam from underneath the printer so that the printer's wheels rest on the floor of the wooden crate. You may need two other people to assist in lifting the printer when removing the foam from beneath the printer. Finally, use the side of the crate as a ramp to roll the printer out from the crate.



Remove box and foam pads from beneath the printer, then roll the printer down the ramp.

Note: The crate is completely knock-down for easier storage

3.1 Hardware List



1. 6-15P/C19 Power Cord (S4XL Only)
2. 5-15P/C19 Power Cord
3. USB Cable
4. SD Card
5. 1.5mm Hex Key
6. 2mm Hex Key
7. 3mm Hex Key
8. 7mm Nut Driver
9. Tube Cutter
10. 0.007"/0.18mm Feeler Gauge
11. 2.5mm Hex Driver
12. Glue Stick
13. 6mm Wrench
14. Filament Drive Cleaning Brush
15. (2) M4 x 10mm screws
16. Filament Rail Brackets – Right and Left
17. Filament Rail

3.2 Final Printer Assembly

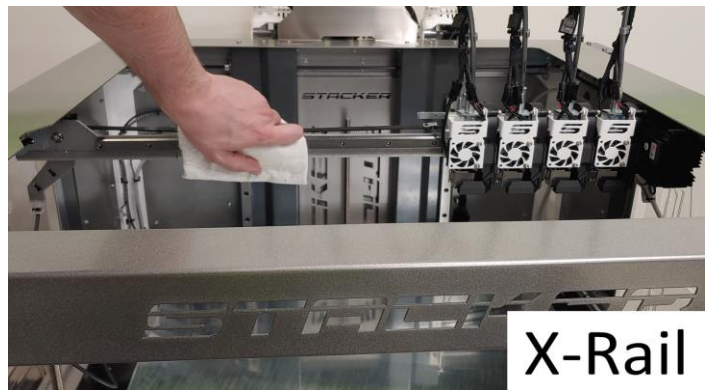
A. Remove Packaging

To protect your printer during shipping, low tack tape and protective film was attached to the printer. **You MUST remove all of this packing material before attempting to operate the printer.** You will find tape attached to the X-gantry and frame. After removing the tape, be sure to use a clean dry cloth or rubbing alcohol to remove any tape residue.

B. Rub an oiled cloth along the linear rails.

Linear rails and acme screws require a thin protective coating of oil to prevent rust and allow optimal performance of the printer. All lubricants eventually break down, and because of shipping, the oil applied at the factory to your printer's linear rails may no longer provide adequate protection and lubrication. Therefore, before attempting to operate the printer for the first time, we recommend rubbing an oily rag along the linear rails and acme screw.

A coating of synthetic SAE 75W -90 gear oil was applied at the factory. You may continue to use SAE 75W -90 gear oil, but if you wish to apply your preferred lubricant, please use a solvent to remove our lubrication before applying your preferred lubricant.¹



There are two Z-rails, two Y-rails, one X-Rail, and on the printer. Rub an oiled cloth along all five linear rails to assure they are clean and free of debris. For most users, you will likely need to wipe down and apply some oil or grease on a monthly basis. For more information about this routine maintenance, please refer to section 9.

Note: DO NOT use WD-40 or dry type lubricants for linear rails!

C. Attach Universal Filament Rail to Rear of the Printer

Step 1. Locate the Filament Rail, the two Filament Rail Brackets, and the two M4 x 10mm bolts.

Step 2. Use the 3mm hex key to carefully remove four M5 x 12mm Socket Head Cap Screws from the rear of the printer frame just below the controller housing. **Remove these screws slowly by hand!**

The screws are attached to swage nuts, so to avoid damaging the swage nuts, only remove the screws slowly by hand – **do not use power tools.**



Step 3. Use the same screws you removed in Step 2 to attach the Left and Right Filament Rail Brackets.



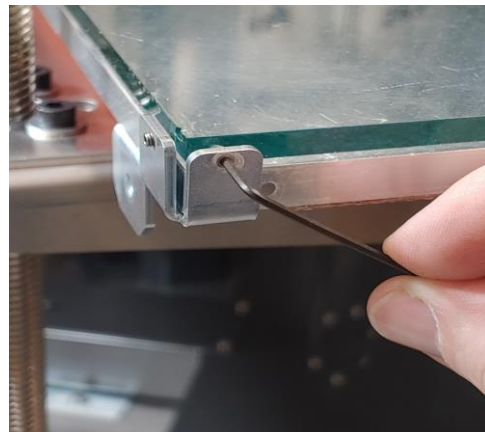
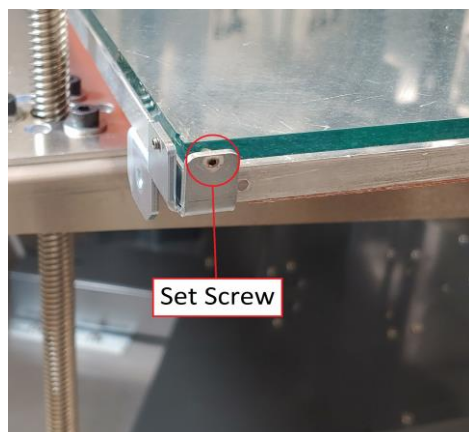
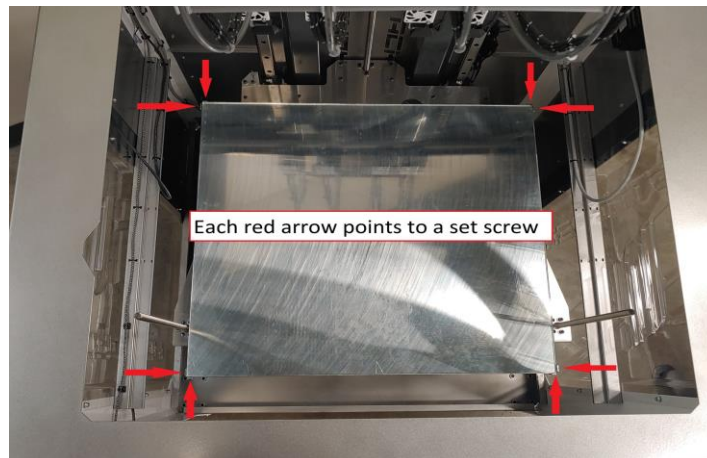
Step 4. (Optional) Place the Universal Filament Rail on the brackets and secure with the M4 x 10mm screws.



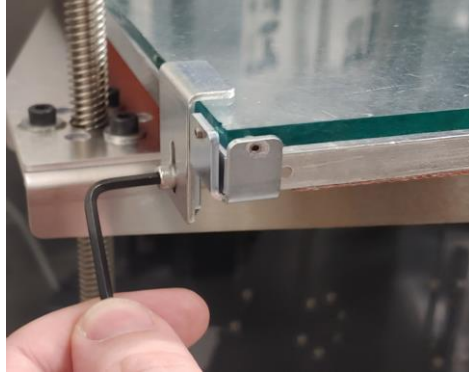
D. Install Glass Bed

The Stacker S series printers include a glass bed. To install the glass bed on the S series, you must first remove all of the packaging material from the glass plate, and then place the glass plate on the aluminum print bed. **Handle the glass bed with care. Glass is fragile and can break if not handled gently.**

To secure the bed and prevent it from sliding on the aluminum surface of your printer, you will snug the eight nylon tipped set screws with a 1.5mm hex key. **DO NOT** over tighten the setscrews, they strip easily.



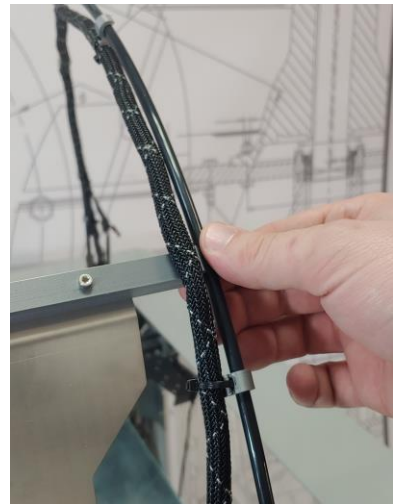
Once all the set screws are snug to the glass bed, use the glass clips along the edges of the bed to secure the glass into position. For the S4 and S4XL these clips are on the left and right sides, and for the S2 the clips are on the front and back of the bed.



Note: Glass clips are optional.

E. Secure Filament Guide Tubes

Check the top of the extruder motor and make sure the filament guide tube is still installed, if it popped out during shipping slide the tube back in the top of the drive. Next snap the other end of the guide tube into the printed bracket, the tube should be past the bracket about 3mm (1/8 inch). Finally push the tube into the silver tube support bracket. The tubes should make a gentle arch when the gantry is homed in the Y axis.



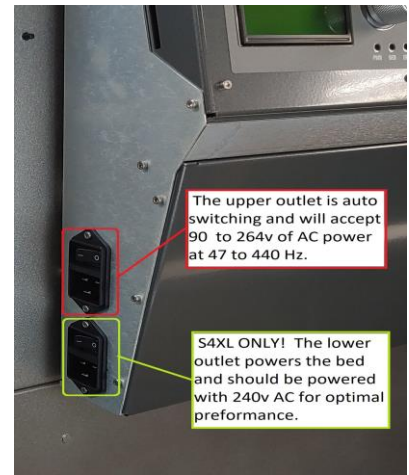
F. Connect Power Cords

The Stacker S2 and S4 uses one C19 inlet and the Stacker S4-XL uses two C19 inlets.

The upper C19 inlet is for the auto switching power supply and will accept 120 to 240 volts of AC power at 47 to 440 Hz. Use a dedicated 15 AMP circuit.

The lower C19 inlet is only present on the S4-XL and powers the heat bed. We recommend powering the bed with 240v AC. If you power the lower C19 inlet with less than 240v (e.g., 208v or 120v), the bed will still function, but it will not heat as quickly or get as hot. Use a dedicated 15 AMP circuit.

When installing the power cords on the S4-XL, use the cord keeper bracket to prevent your cords from touching spools on the filament rail. Slide the power cords into the bracket by loosening (but not removing) the two screws indicated by the arrows. Loosening these two screws will provide enough room to insert cords. After you slide the cords into place, then re-tighten the two screws.



3.3 Uninterruptible Power Supply (UPS)

We **strongly advise** the use of an uninterruptible power supply (UPS) with your printer. Any sudden loss of power, no matter how brief, will likely cause the electronics in your printer to reset, and this will ruin your print. If you want to avoid the pain and suffering associated with losing a multi-hour print, then we recommend using a UPS. Furthermore, power spikes and brownouts can damage the printer's electronics. Any good quality UPS will save you from momentary power loss or brownouts and will protect your printer from potential damage. We cannot stress enough the importance of this relatively inexpensive insurance. Uninterruptible power supplies (UPS) are widely available from computer and electronics retailers.

Always be sure to confirm that you have plugged your power cord into the correct outlet on the UPS. Typically, some of the outlets provide only surge protection rather than both surge protection and battery backup. To confirm your UPS is working, simply unplug the UPS power cord from the wall to verify that the battery is providing power to your printer.

Your printer uses a 1000-watt power supply, so you will need a UPS that is also rated for 1000 watts or more. Use a UPS rated for 1500VA or more.

DO NOT use a UPS for the heated bed on the S4XL.

4. Your First Test Print

After you have completed all of the assembly steps in Section 3, you are ready to run a test print. Running a test print is the best method of familiarizing yourself with the printer and to confirm it is properly calibrated. The following steps will also help teach you the basic steps used to produce a print.

A. Download a Copy GCODE to an SD Card. In most cases, you will be creating your own GCODE by using a slicing engine such as Simplify3D, but for this test print, we recommend using our GCODE because it should provide proven results. To download the test print GCODE, go to <http://stacker3d.com/stacker-3d-printer-support/> and select a test print GCODE file that matches the filament you will be using. Please note, if you click on the link to download the GCODE file, your web browser may attempt to open the GCODE file as text within the browser. To save the GCODE file to your computer, right click on the file link and select “save link as...” to download the file to your computer.

Next, transfer the downloaded GCODE file from your computer to the provided SD card. If using your own SD card, we recommend using a slower, smaller card like a 4GB Class 4 cards. If your computer does not have an SD card slot, you can purchase an inexpensive pocket-sized SD card reader that will work with an available USB port on your computer.

B. Power Up Printer. The Stacker S4 and S2 have one power switch, and the Stacker S4-XL has two power switches. On the S4-XL, be sure to turn on both power switches. The printer will not operate properly if only one of the power switches is turned on.

PLEASE BEAWARE! If the printer ever behaves in a manner which could cause damage to itself or others, immediately press the Reset/Emergency Stop button. This button will disable the printer’s motors, hot ends, and heat bed.



C. Load Filament

Step 1. Load Filament Spool. Loosen and remove the M4 screws on the Universal Filament Rail then carefully lift one side of the rail to slide the spool of filament onto the rail. Reattach the Filament Rail thumbscrews to secure the rail in place. Always place the filament rolls so the filament will dispense over the top of the roll as shown in the image.

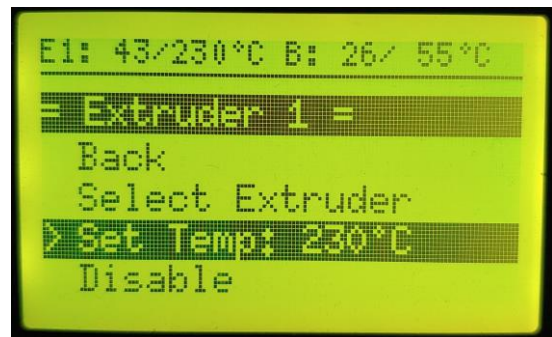


Step 2. Preheat the print bed and hot end. Every filament has an optimal extruding temperature. Most filament manufactures provide a recommended extrusion temperature range, check the label on the filament spool or the manufacture's website for the suggested range. In this example, we have selected to use I-BEAM IMPACT PLA filament for our test print.

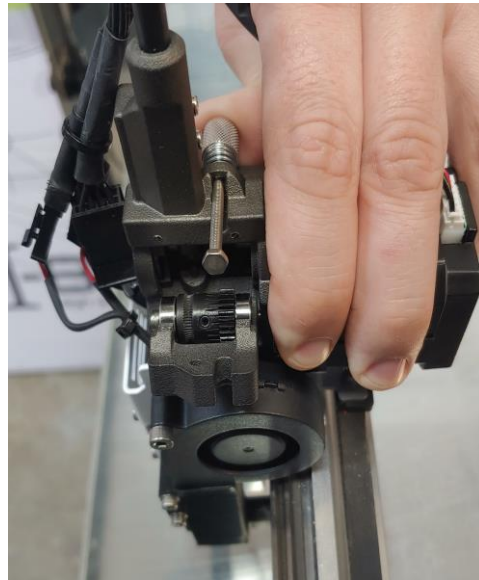
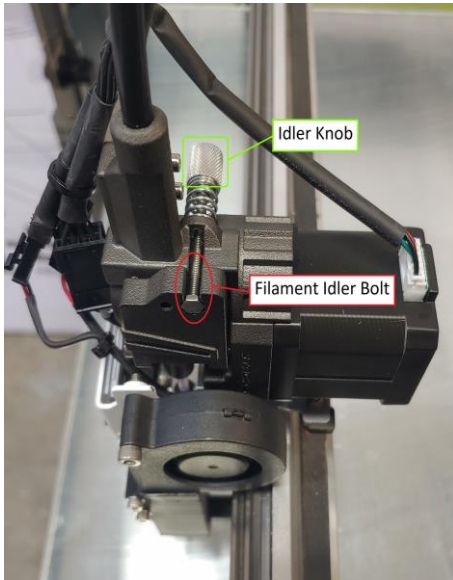
Begin by depressing the knob next to the LCD panel to open the LCD menu. Next, turn the knob to highlight Controls, then push the knob to enter the Extruder sub-menu.

Now scroll down to the bottom of the menu to highlight Bed, then push the knob to enter the Bed sub-menu. Use the knob to select Set Temp. Once selected, you can dial the desired temperature, then push the knob to set the temperature and the printer will immediately begin to warm the bed to the temperature you requested. In our example we have called for a bed temperature on 55°C.

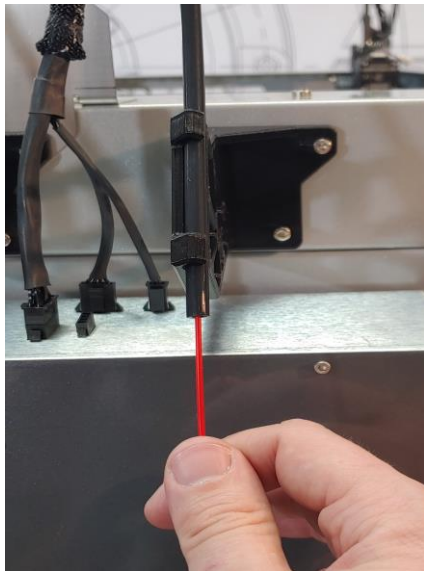
Once the bed temperature is set, highlight Back, then push the knob to return to the Controls sub-menu. Next, in the same way you adjusted the bed temperature, use the knob to set the temperature for Extruder 1. In our example we will set the temperature to 230°C.



Step 3. Insert the Filament. Before you will be able to insert the filament into the filament drive, you will need to open the idler assembly. The Filament Idler Bolt keeps the idler assembly closed. To open the assembly, loosen the idler bolt by turning the knob located above the extruder. Once the knob is loose, you will be able to push the Filament Idler Bolt to the right and compress the spring. Use your finger to flip open the idler assembly.



At the back of the printer, insert and push the filament upward into the filament guide tube and toward the idler assembly. Next feed the filament into the idler assembly, over the gear, and through the filament guide just below the gear.



Step 4. Extrude filament by hand. When extruder 1 has reached the temperature to extrude your filament, you will be able to prime the nozzle by gently pushing the filament by hand through the filament guide tube. Note, if extruder 1 has not reached the temperature required to melt the filament, it will be difficult (if not impossible) to push the filament through the nozzle.

Pushing a small amount of filament by hand through the nozzle enables you to visually verify that the nozzle is primed and ready to print.

Please note, when you initially extrude by hand, you may see a color of filament extruded from the nozzle which does not match the filament you are using. Do not be alarmed. You are seeing the remnants of the filament used during your printer's initial calibration and testing at Stacker. If you continue pushing by hand, you will eventually see your filament extrude from the nozzle.

Step 5. Secure the Filament Idler Assembly. Close the assembly by hand while securing the Filament Idler Bolt in a position to prevent the assembly from opening. Finally, turn the knob used to open the idler assembly until the Filament Idler Bolt is secure. Turn the knob so the spring is compressed to prevent the filament idler bolt from coming loose during printer operation. Generally, if the end of the bolt is flush or slightly protruding from the knob, the assembly should remain secure.



Step 6. Secure Additional Heads for Copy Mode Print (Optional). If you are printing with multiple heads using copy mode attach the extra heads to the X axis belt. Position the additional heads so they don't print on top of each other, additionally make sure last head doesn't run into the frame of the printer.

Once in position use the 2.5mm hex wrench to loosen the two bolts on the extruder clamp, then slide the clamp up so it engages with the X axis belt, then tighten the two clamp screws. You will know the head is properly secure if you slid the extruder left and right and the other heads move with it. If there is slop when moving the head, then adjust the clamp so it is more secure to the belt.

Step 7. Prepare the print surface. If you are printing on a glass build plate, then you should apply a thin layer of glue to the glass, so the filament sticks to the glass. Never apply glue to BuildTak! Make sure the print surface is clear of any tools or other items before you start the print.

You should always double check your print bed to confirm that it is clear of tools and printed objects before starting a print.

Step 8. Insert the SD Card and Select the File. To start your print, carefully insert the SD card into the controller. When inserting the SD card into the slot, make sure the orientation of the SD card is correct. If the orientation is correct, the card should insert easily. NEVER FORCE THE CARD INTO THE SLOT OR INSERT THE CARD CROOKED OR **BACKWARDS!!** If you damage your SD card reader, it is not covered by the warranty.



When the SD card is inserted, the LCD screen will say SD Card Inserted. Push on the knob to enter the LCD menu. Scroll down to highlight SD Print, then push on the knob to enter the SD Card menu. A list of GCODE files on the SD will appear on the LCD screen, turn the knob to highlight the GCODE file you wish to print and press the knob. Once the knob pressed, the selected GCODE file will begin to print as soon as the bed and nozzle have reached the temperature specified by the GCODE file.

Step 9. Watch Your Test Print. While your print is running, watch for any problems with the printer. Although the printer was calibrated prior to shipping, calibration can sometimes be thrown off during shipping. If the printer is not performing adequately, calibration may be necessary to improve print quality. For calibration instructions turn Section 6. Please contact info@stacker3d.com if you have any questions.

If something seems seriously wrong with the printer, such as the nozzles crashing or scraping on the bed, you should immediately press Reset/Emergency Stop button.



Step 10. Removing Your Test Print from the Print Bed. It is sometimes difficult to remove a printed object from the glass or BuildTak build plate. If you allow the bed to fully cool, it can sometimes make print removal easier. Also, the F-Flex (sold separately) is a very useful tool which allows you to pry your parts from the build plate.

Another option for easy part removal is the BuildTak FlexPlate. The FlexPlate is a removable build plate which enables you to literally “pop” your parts off the BuildTak. Please check our website for availability of our FlexPlate systems for your printer.

Step 11. Unloading Filament. If you have allowed the hot end to cool, the filament will become stuck in the nozzle, and you may be unable to pull the filament from the extruder by hand. By heating the hot end to an appropriate temperature to melt the filament inside the nozzle, you will be able to pull the filament out from the nozzle, filament guide tube, and extruder. To heat the extruder, follow the instructions in Step C, sub-step 2.

Filament inside the nozzle will typically form a small plug, and this plug may prevent you from removing the filament from the extruder. To get rid of the plug simply push some filament through the nozzle by hand, this will melt the plug and you will be able to remove the filament.

Step 12. Turning Off the Printer. Wait for the cooling fans to fully cool your hot ends before turning off the printer. You can observe the temperatures on the LCD. Turning off the printer with hot extruders can damage your printer and reduce the life of nozzles and filament guide tubes. We recommend allowing hot ends to cool below 50°C before powering off the printer.

5. Changing Nozzles

Your Stacker print comes with 0.4mm nozzle preinstalled, the S4 and S4XL have four nozzles and the S2 has two nozzles. We recommend experimenting with different nozzle sizes after you become familiar with the operation of your printer. Changing your nozzle size can increase print speeds (with larger nozzle sizes) or improve the fine detail of your prints (with smaller nozzle sizes). A variety of nozzles are available from our website <http://stacker3d.com/product/3d-printer-nozzles/>.

Although nozzles tubes can last for hundreds of hours of operation, they are wear parts which will eventually need to be replaced to maintain optimal printing performance. The following steps will instruct you on how to properly remove and install new nozzles. Please follow these steps VERY CAREFULLY. Improper installation of nozzles will result in poor quality prints and filament jams.

Step1. Remove filament and Wipe Nozzle Clean. Begin by depressing the knob next to the LCD panel to open the LCD menu. Next, turn the knob to highlight Controls, then push the knob to enter the Extruder sub-menu. Next click on the extruder you intend to change the nozzle on and set the temperature. The temperature should be set for the filament currently in extruder. In our example, we are removing PLA filament from extruder 1, so we have set the Temp. 1 to 230°C. Repeat this step for any extra extruders you intend to replace the nozzle on.

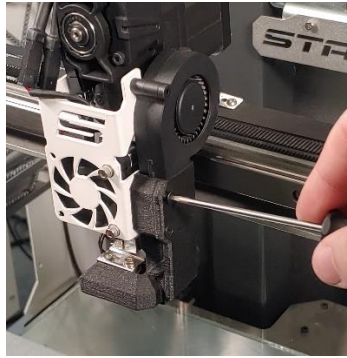
Once the extruder reaches the target temperature, loosen the idler bolt by turning the knob located above the extruder. Once the knob is loose, you will be able to push the Filament Idler Bolt to the right and compress the spring. User your finger to flip open the idler assembly, then gently push some filament out of the nozzle to melt the plug on the end of the filament, next pull the filament out of the extruder.

Note: Whenever you return filament to a spool, avoid filament crossover by pushing the end of the filament through one of the side holes on the filament spool. Filament crossover will prevent the filament from feeding and cause the printer to jam.

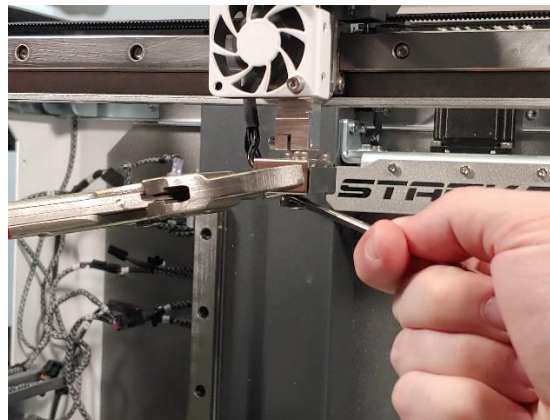


Lastly, use the wire brush included with the accessories kit or a dry cloth to wipe any melted filament from the nozzle and underside of the heater block. NOTE, THE NOZZLE IS HOT! PROTECT YOURSELF FROM GETTING BURNED! You will want to thoroughly remove all the filament from underneath the hot end.

Step 2. Remove the Part Cooling Fan Duct. Using a 2mm hex key, loosen the two screws on the side of the duct. Once loose the duct should slide off the fan and can be set to the side for now.



Step 3. Unscrew the old nozzle. Use some pliers to prevent the heater block from spinning, then use a 6mm wrench to unscrew the old nozzle. **BE CAREFUL, THE NOZZLE AND HEATER BLOCK WILL STILL BE HOT.** Let the old nozzle drop onto the print bed and let it cool before trying to pick it up.



Step 4. Install the new nozzle. Carefully thread the new nozzle into the heater block. Once started, hold the heater block with some pliers again and use a 6mm wrench screw in the nozzle until its snug-tight.

You can let the heater block cool before installing the new nozzle if that makes you more comfortable, but you will need to re-heat the heater block to finish tightening the nozzle. Having the heater block at temperature helps ensure there is no gap between the nozzle and heat break for liquid filament to leak through.

Step 5. Re-attach the Part Cooling Fan Duct. Slide the top of the duct over the opening of the 50mm fan then tighten the black screws with the 2mm hex key.

6. Printer Calibration

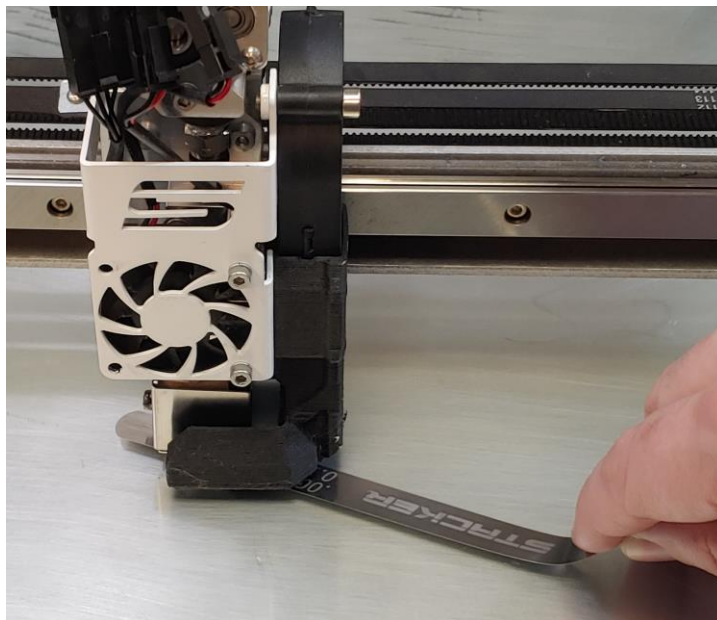
Your printer was calibrated before leaving the factory, but over time you may want to/need to re-calibrate your printer. In this section you will find instructions for calibrating different parts of your printer.

6.1 Adjusting First Layer Height

First layer height is critically important to 3D printing. When the printer is calibrated correctly, the first layer has a perfect amount of “squish”. If your nozzle is too far away from the print bed, the filament will not adhere properly to the print bed, and if the nozzle is too close to the print bed, the filament will be unable to come out of the nozzle and this will inevitably result in the filament stripping out on the drive gear. Therefore, you want to set all the nozzles at the perfect height.

Although you can alter the layer height in your slicing software, it is always best practice to have your printer’s actual (mechanical) layer height set perfectly.

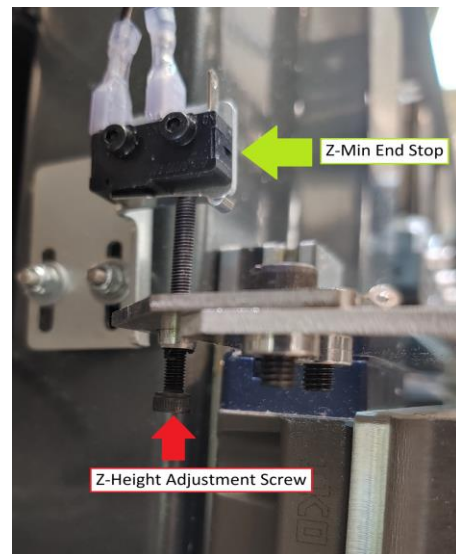
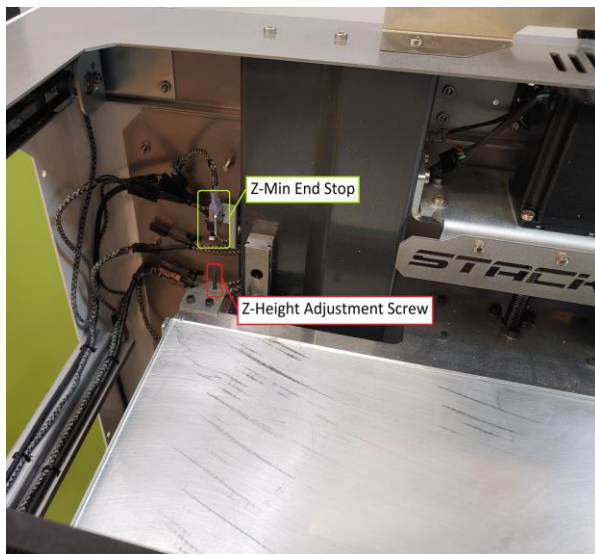
The feeler gauge in the accessories kit is a good starting point. Use the gauge to adjust the gap between the nozzle and the bed. When sliding the feeler gauge between the nozzle tip and the bed, you should feel a small amount of friction from the nozzle tip. If there is no friction, then the nozzle is too high, and if you are unable to slip the gauge between the nozzle and the bed, then the nozzle is too close to the bed. Be aware that heating the bed will make a difference in the gap between the nozzle and the bed, so for a more precise test, you should heat the bed to the temperature you will be using for your print.



After setting the height with the feeler gauge run a test print and watch the first layer. A good first layer squish should have the lines touching each other. If you see gaps between the lines that means the bed is too far away from the nozzle(s). If there are ridges between them that indicates there is too much squish, the bed is too close to the nozzle(s).



The nozzle gap is easily changed by turning the Z-height adjustment screw with a 2.5mm hex wrench. Turning the screw clockwise (making the screw go upward) will LOWER the bed away from the nozzles upon re-homing the Z- axis (increase first layer height). Turning the knob counterclockwise will RAISE the bed towards the nozzles upon re-homing the Z-axis (decreasing first layer height). Each full rotation of the Z-height adjustment screw will change the layer height by $\pm 0.2756"/0.7\text{mm}$, so making quarter-turn adjustments is often sufficient to make noticeable changes in the first layer height.



After making any change to the Z-height adjustment screw, you will need to re-home the Z-Axis with the LCD controller (**Main Menu > Controls > Home > Home Z**) and then test the nozzle gap again. **It is good practice to move the X-gantry all the way forward on the printer, so the nozzles cannot crash into the bed if you have adjusted the Z-height incorrectly.** Keep in mind, it may take multiple attempts at turning the Z-height adjustment screw before you determine the perfect position.

6.2 Stacker RUN

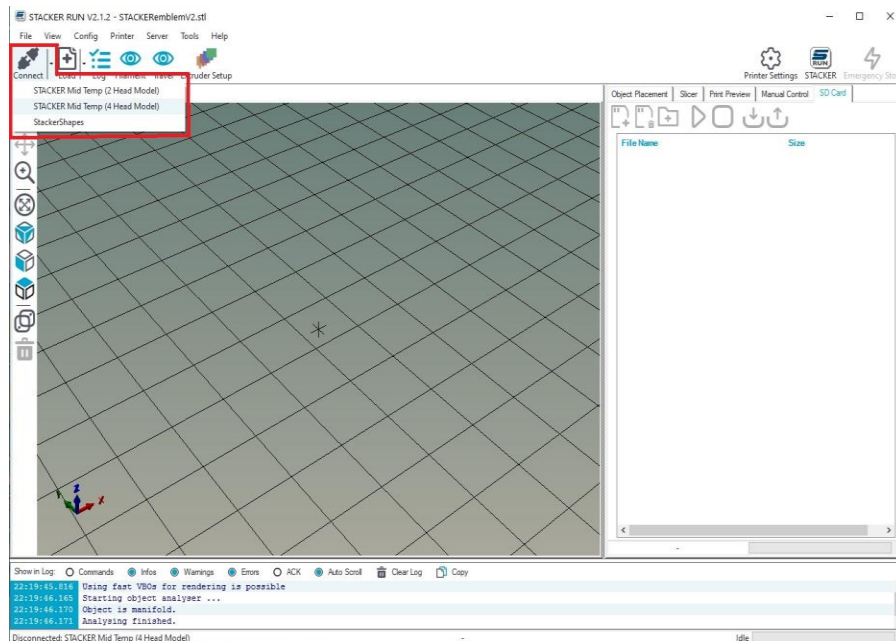
To assist with printer calibration, it is necessary to download and install **Stacker RUN** software which is available for free on our website.

Stacker RUN software is an enhanced version of *Repetier Host* customized for using Stacker printers. Most of the installation and documentation available from the Repetier website is applicable. To familiarize yourself with *Repetier Host*, please visit their website. Your printer connects and communicates with Stacker RUN using the provided USB cable.



Before attempting to use Stacker RUN, **make sure you do not have any other software running on your computer. If Simplify3D is open, you may be unable to connect to your printer with Stacker RUN.**

When all other software has been closed on your computer, click the Connect button located in the upper left corner of Stacker RUN. A drop-down menu will allow you to select the four or two head model.



With some computers, you may need to go into the Printer Settings menu of Stacker RUN and change the Port setting from Auto to an available COM port. Also note, the Baud Rate should read 115000. In rare cases, some computers seem to have lackluster USB to Serial Bridge communication. If you are having trouble connecting, even after (1) making sure the printer's power is on, (2) making sure the USB cables are connected properly, (3) restarting the computer, and (4) specifying a specific COM port number within Stacker RUN, then we recommend trying Stacker RUN with a different computer.

When your printer is connected to Stacker RUN, you are ready to calibrate.

6.3 Volumetric Calibration

One secret to accurate prints and beautiful surface finish is proper volumetric flow control. Stacker printers use four variables to control volume: (A) filament diameter, (B) filament drive E-STEPS, (C) nozzle size, and (D) extrusion multiplier. Slicing engines use these variables to determine exactly how much filament to extrude. Therefore, it is essential to set these variables carefully and accurately for the best quality prints.

A. Filament Diameter

Stacker printers use 1.75mm diameter filament. It is very important to use filament with a highly consistent diameter. A reason why Stacker sells and recommends I-BEAM filaments is because these filament manufacturers use highly advanced laser tools for precise diametric measurements, as well as a host of other controls to ensure consistent filament diameters.

Regardless of what filament brand you use, always confirm consistent filament diameter with a digital caliper. Measure the diameter of your filament in a few different places to see if it is consistent. If the diameter is not consistent, return the filament from where you purchased it. Filament with an inconsistent diameter will inevitably provide inconsistent results and filament jams.

B. Test Filament Drive E-STEPS

Calibrating your filament drive E-STEPS (*extruder steps*) is essential to achieving the best quality prints, and it should be done every time you change filament types or brands.

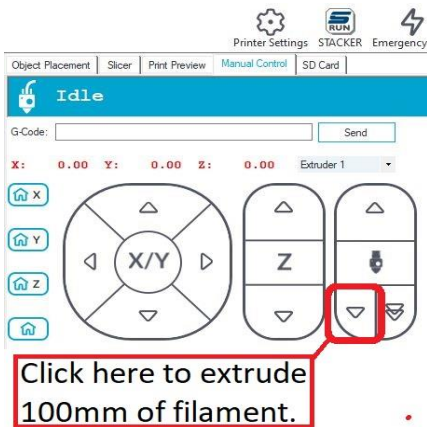
The calibration process only takes a few minutes and only a little bit of filament. The only tools you will need is the filament guide cleaning brush, a metric ruler, a calculator, and an ink pen for marking the filament.

Step 1. Connect to Stacker RUN and Preheat the Extruder. Open Stacker RUN and connect to your printer. Once connected, preheat your extruder to the filament's required temperature.

Step 2. Clean the Drive Gear. Open the idler assembly and remove any filament from the filament drive. Look closely at the drive gear with a bright flashlight. Turn the gear manually with your finger and inspect it for filament debris. If the drive gear is dirty, you will not get an accurate measurement during calibration. Use the filament drive cleaning brush to be sure the gear is clear of any filament debris. When the gear is completely clean, you are ready for the next step.

Step 3. Insert the Filament. Insert the filament into idler assembly, over the gear, and through the tube just below the gear. Gently push the filament by hand until it comes out the nozzle.

Step 4. Mark 120mm of filament. With a permanent marker and a ruler, mark the filament at 120mm.

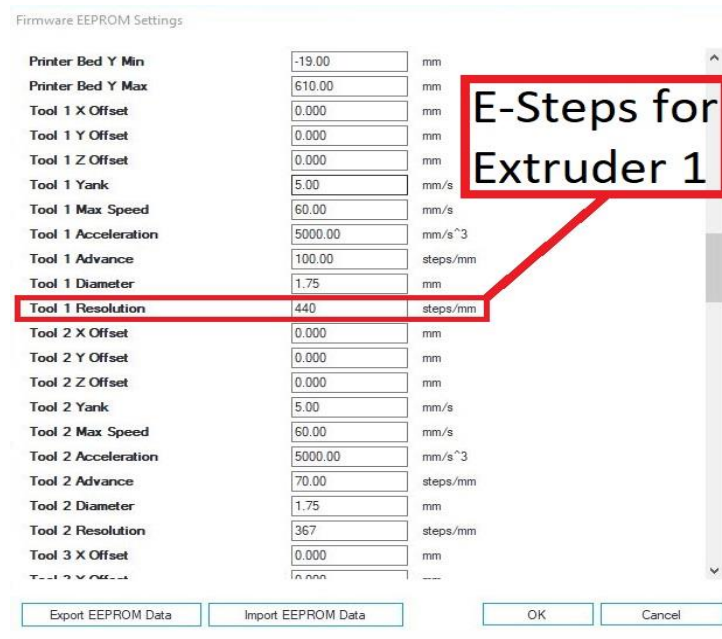


Step 5. Slow Extrude 100mm of Filament: On Stacker RUN use the Manual Control tab to **slow extrude** exactly 100mm of filament.

After attempting to slow extrude 100mm, measure to see what was actually extruded. Because you marked 120mm and attempted to extrude 100mm, your mark should show 20mm of filament. In other words, you extruded 100mm of filament, so you should have 20mm of filament remaining. In the image to the right, our measurement shows we extruded 115mm of filament because we only measure 6mm of filament remaining.



Step 6. Change the EEPROM Steps Per mm: Open your EEPROM window in Stacker RUN by pressing Alt+E or select “Firmware EEPROM Configuration” under the Config menu to see your current E-STEPS for each extruder.



To calculate the new E-STEPS number, use this formula:

$$(100\text{mm} \div \text{Your Measurement}) \times (\text{Your current E-Steps}) = \text{Your New E-Steps}$$

For Example, in attempting to extrude 100mm of filament we actually extruder 115mm of filament, so we would get the following result:

$$100 \div 115 = 0.869565$$

Because the current “steps per mm” in the EEPROM is set to 440, we would do the following calculation:

$$0.869565 \times 440 = 383$$

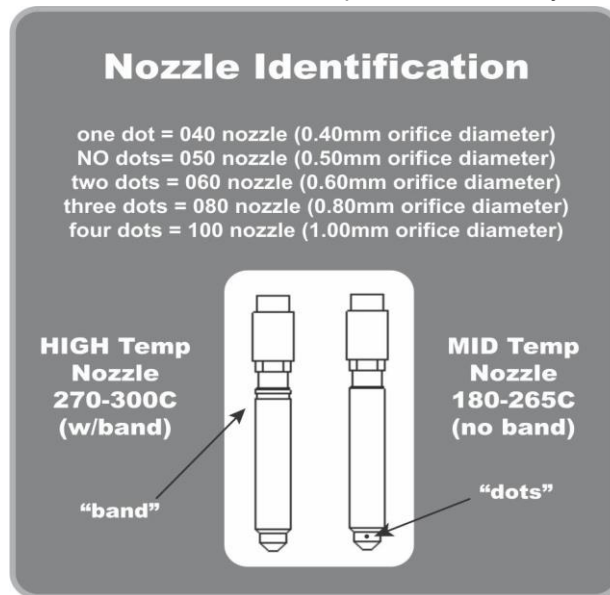
(Steps per mm doesn't accept decimals so round to the nearest whole number)

Thus, in this example, we should change the “Tool 1 Resolution” from 440 to 383 before printing.

Step 7. Save the New E-Steps Number. Enter your new E-Steps for your extruder, then click the OK button at the bottom of the window. Before you start printing, be sure to confirm these results. Go back and repeat steps 4 through 6 again to confirm your E-Steps setting.

C. Verify Nozzle Size

Stacker nozzles use a system of small, machined dots around the tip for identification purposes. Be sure to enter the correct nozzle size in your slicing software. Stacker's standard nozzle size is 0.40mm, also called a 040 nozzle, and these were pre-installed on your printer.



A Note about Stacker's MID and HIGH temp nozzles: For most filaments and applications, it is best to use our MID temp nozzles. Our HIGH temp nozzles are optional and only necessary when using filaments which require temperatures between 275°C and 300°C. HIGH temp nozzles are identified by a special machined "band" to distinguish them from our MID temp nozzles.

D. Extrusion Multiplier.

For even finer volumetric calibration you can adjust the extrusion multiplier in your slicing engine. Most filaments will print very accurately with a 100% extrusion multiplier setting in your slicing engine. Nevertheless, some filaments like colorFabb's XT-CF20 Carbon Fiber filament will over extrude due to die swell, and will therefore require a lower extrusion multiplier, often a multiplier of 0.95 is sufficient to compensate for die swell, but sometimes a multiplier as low as 0.88 is necessary. Printing a simple single wall test cube will allow you to verify the accuracy of your print widths.

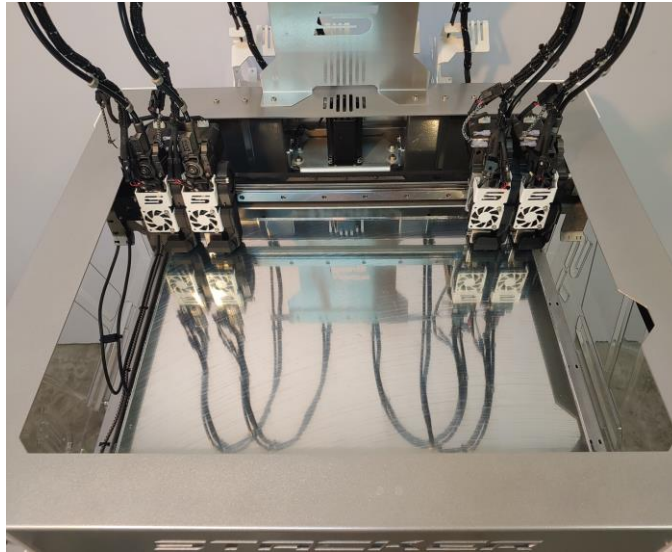
Your print bed was leveled (adjusted to be co-planar to the nozzles) at the factory, and for most users, the bed will remain level during shipping. Nevertheless, if you notice inconsistent layer heights across the bed, or nozzles are scrapping on your build surface in some areas, you may need to re-level the bed. Test the gap between the nozzles and the bed using the 0.007"/0.18mm feeler gauge in several areas across your bed with the same print head. If you discover inconsistent gaps across the bed, then you should probably re-level your bed.

6.4 S2 and S4 Bed Leveling

Step 1. Heat the bed. Heat your bed to 55°C, wait until this temp is reached.

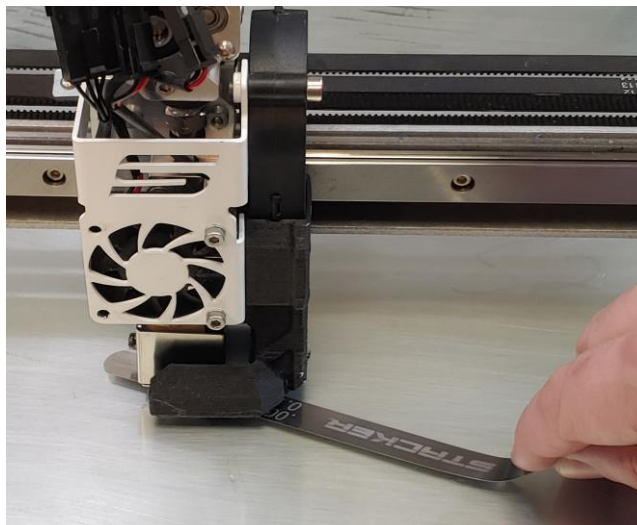
Step 2. Home the Z Axis. Use the LCD controller to home the Z-axis.

Step 3. Position the print heads. Use both hands to push the X/Y gantry to the rear of the print bed as shown below. For the S4, slide two heads to the far right and two heads to the far left of the X gantry. For the S2 or X2, start with both head on the left side of the gantry.

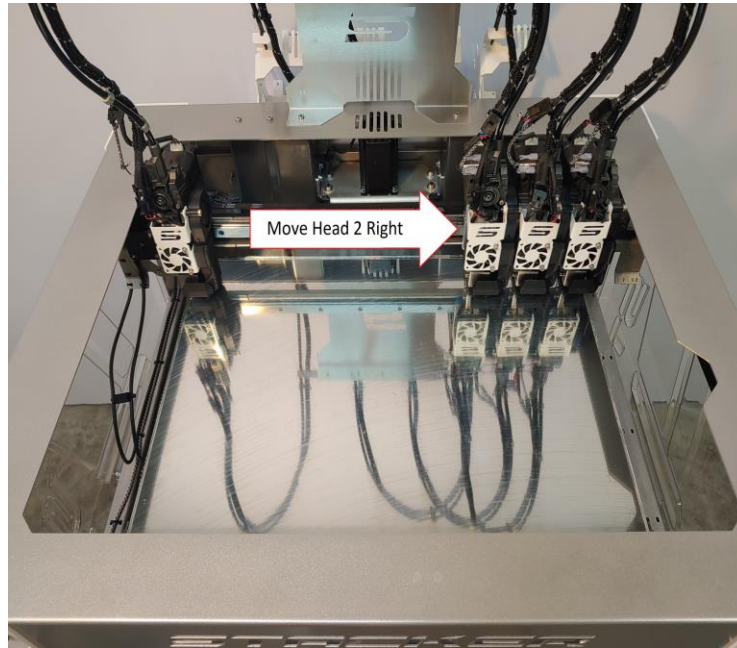


Step 4. Using only hotend 2, level the rear of the bed. Underneath the bed are three special bed leveling screws. You will be adjusting the two rear bed leveling screws with a 7mm nut driver to make the X/Y gantry co-planar to the print bed. To begin, slide the 0.007"/0.18mm feeler gauge between the nozzle tip of head 2 and the print bed. You should feel *slight friction* from the nozzle tip as you move the feeler gauge. If the gap is too large or too small, you will need to adjust the bed leveling screw underneath the bed.

Start by adjusting the left rear leveling screw. Turn the nut driver clockwise or counterclockwise until the feeler gauge slides beneath the nozzle with a small amount of friction from the nozzle.



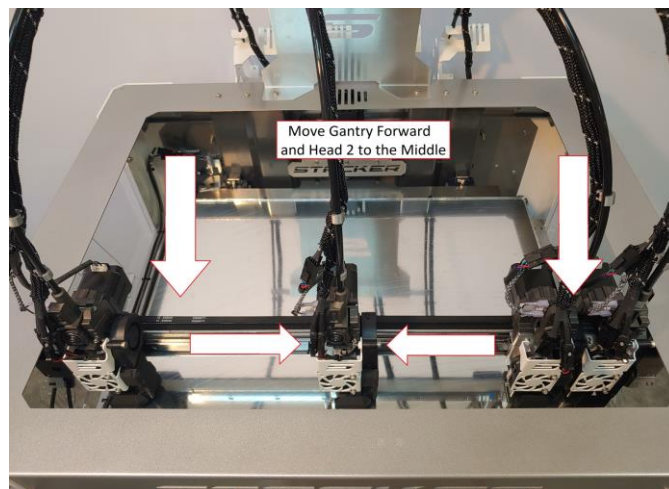
When you have a small amount of friction on the left side, slide print head number 2 by hand to the far-right side of the gantry. Again, use the 0.007"/0.18mm feeler gauge to determine the gap between the nozzle tip and the bed. You should feel slight friction from the nozzle tip as you move the feeler gauge. If the gap is too large or too small, you will need to make an adjustment to the right rear bed leveling screw found underneath the bed.



Turn the nut driver clockwise or counterclockwise until the feeler gauge slides with a small amount of friction from the nozzle. You want to achieve the same feeler gauge height at all leveling locations.

Adjusting a leveling jack can affect the other jack so you will need to repeat the same process again by sliding head 2 back to the far-left side of the bed. Slide head 2 back and forth making the necessary adjustments to the two rear bed leveling screws until the nozzle on head 2 provides a small and equal amount of friction in both locations at the rear of the bed.

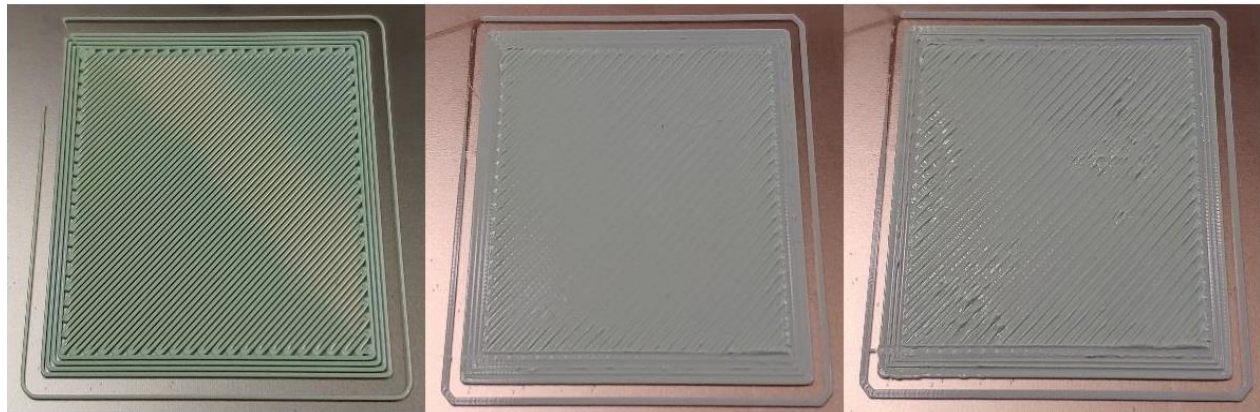
Step 5. Slide the X/Y gantry forward and level the front of the bed. Move the gantry forward to the front of the bed, place the nozzle for head 2 directly over the front middle leveler screw, and test the gap with the feeler gauge. Turn the 7mm hex driver clockwise or counterclockwise until the feeler gauge slides with a small amount of friction.



Now that the front of the bed is set, slide the gantry to the rear of the bed and repeat step 4. Repeat steps 4 and 5 until the nozzle gap is consistent in all these areas of the bed.

Step 6. Run a test print. Run a short print to verify the bed is level. You can print one big print that covers most of the bed or several small models spread out around the bed. You only need to print the first layer, make sure the squish is consistent across the bed.

Take this time to check the first layer squish. For the ideal first layer squish should have all the lines touching and still flat on top. If you see gaps between the lines you bed is too far from the nozzles, and if you see the filament forming “peaks” between the lines that means the bed is too close to the nozzles.

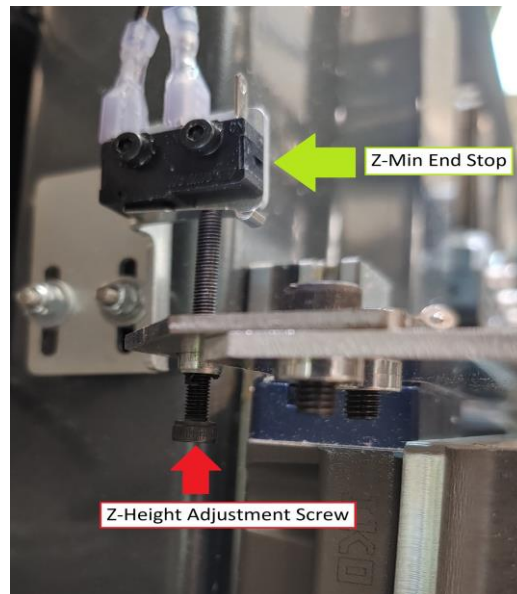


Not Enough Squish

Good Squish

Too Much Squish

To fix the first layer squish you can adjust the Z min end stop screw. If you don't have enough first layer squish, turn the screw clockwise. If you have too much first layer squish, turn the screw counterclockwise. After adjusting the screw, restart the print and check the first layer squish again.



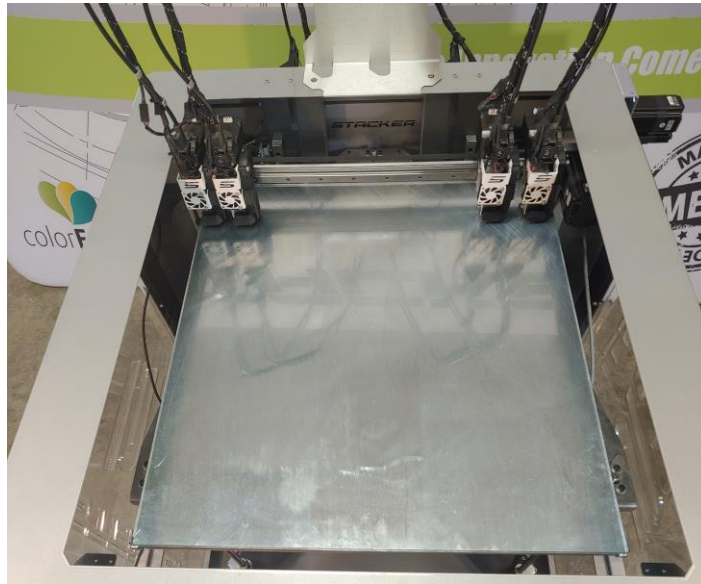
6.5 S4XL Bed Leveling

Due to the size of the S4XL bed there are a few more leveling points, and this requires a slightly different leveling sequence.

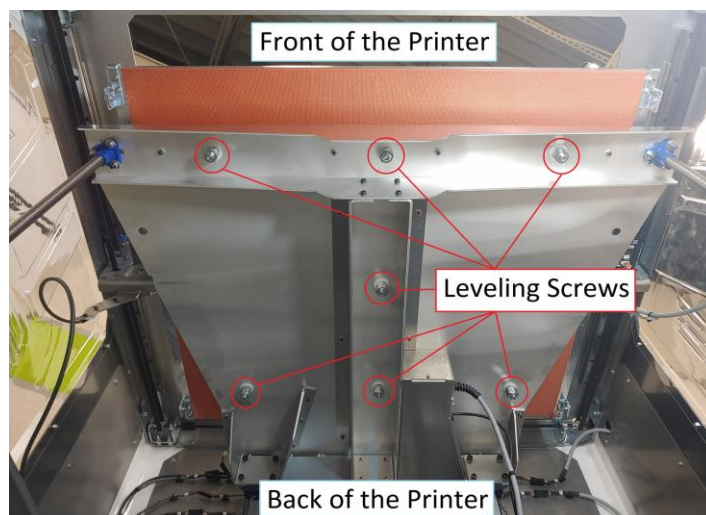
Step 1. Heat the bed. Use the LCD screen to heat the bed to 55°C, wait until this temp is reached.

Step 2. Home the Z axis. Use the LCD screen to home the Z axis.

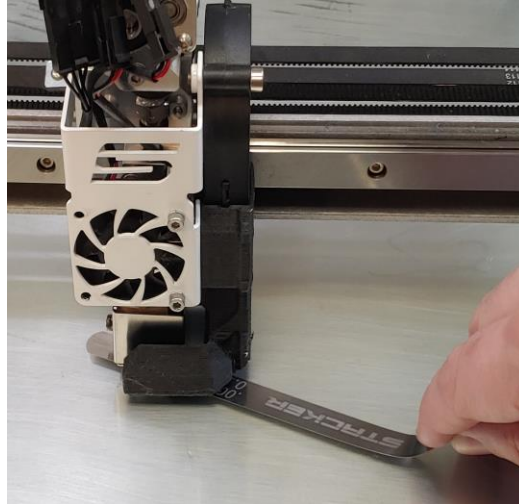
Step 3. Position the print heads. Use both hands to push the X/Y gantry to the rear of the print bed as shown below. Slide two heads to the far right and two heads to the far left of the X gantry.



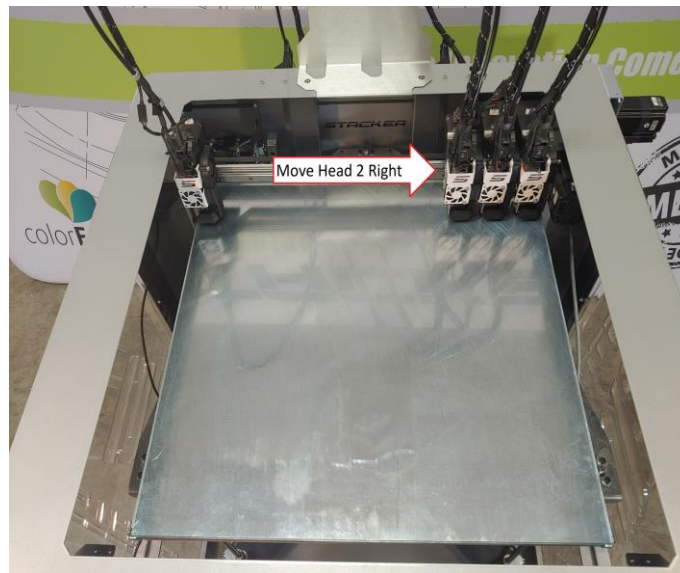
Step 4. Using only head 2, adjust the back leveling screws. Underneath the bed there are seven special bed leveling screws, three on the back of the bed, three on the front of the bed, and one in the center. Start by sliding the 0.007"/0.18mm feeler gauge between the nozzle tip of head 2 and the print bed. You should feel slight friction from the nozzle tip as you move the feeler gauge. If the gap is too large or too small, use the 7mm nut driver to adjust bed leveling screw underneath the bed.



Start by adjusting the left rear leveling screw. Turn the nut driver clockwise or counterclockwise until the feeler gauge slides beneath the nozzle with a small amount of friction from the nozzle.



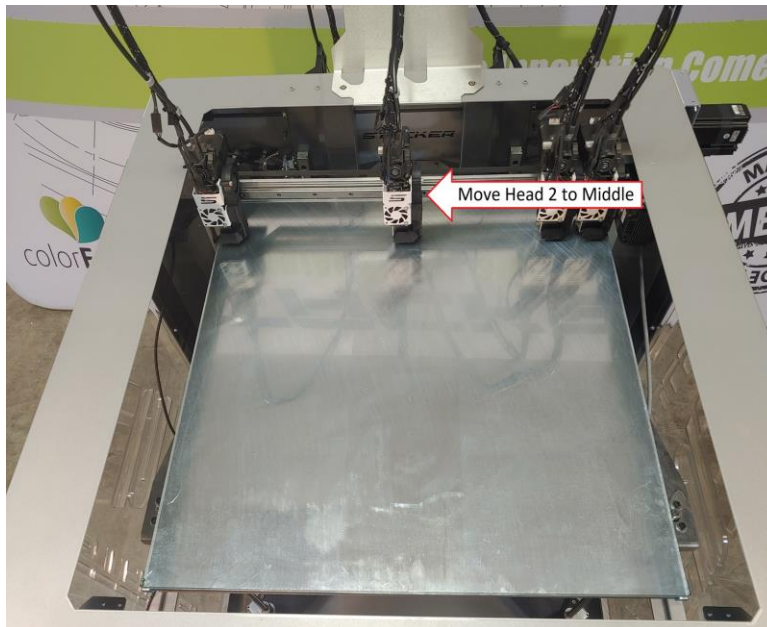
When you have a small amount of friction on the left side, slide print head number 2 by hand to the far-right side of the gantry. Again, use the 0.007"/0.18mm feeler gauge to determine the gap between the nozzle tip and the bed. You should feel slight friction from the nozzle tip as you move the feeler gauge. If the gap is too large or too small, you will need to make an adjustment to the right rear bed leveling screw found underneath the bed.



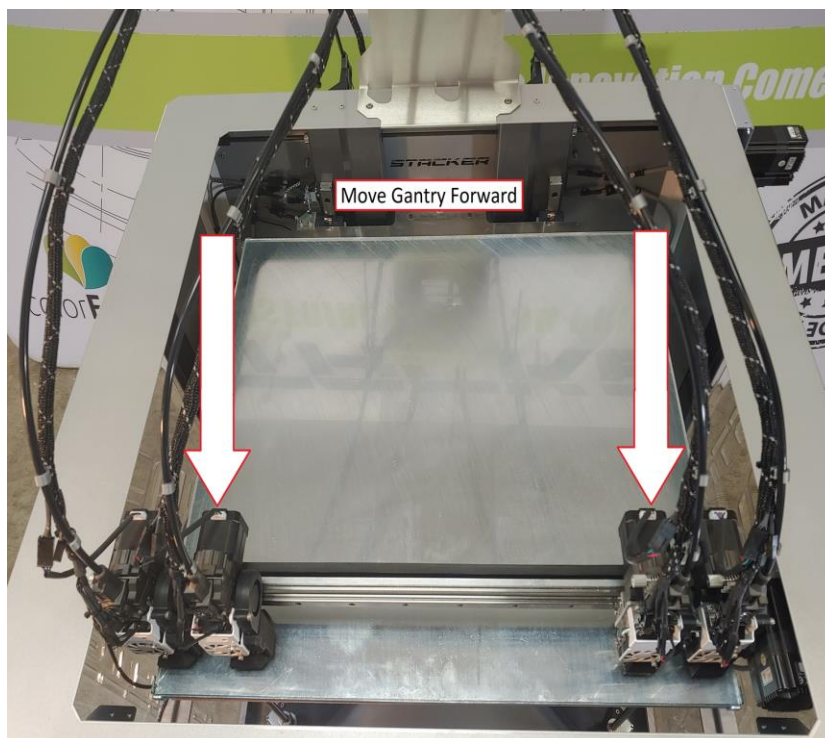
Turn the nut driver clockwise or counterclockwise until the feeler gauge slides with a small amount of friction from the nozzle. You want to achieve the same feeler gauge height at all leveling locations.

Now, repeat the same process again by sliding head 2 back to the far-left side of the bed. Slide head 2 back and forth making the necessary adjustments to the two rear bed leveling screws until the nozzle on head 2 provides a small and equal amount of friction in both locations at the rear of the bed.

Next, repeat the same process for the middle rear screw. Move head 2 to the middle rear and adjust the screw until you feel the same small friction on the feeler gauge. Move between all three points until the friction feels the same.



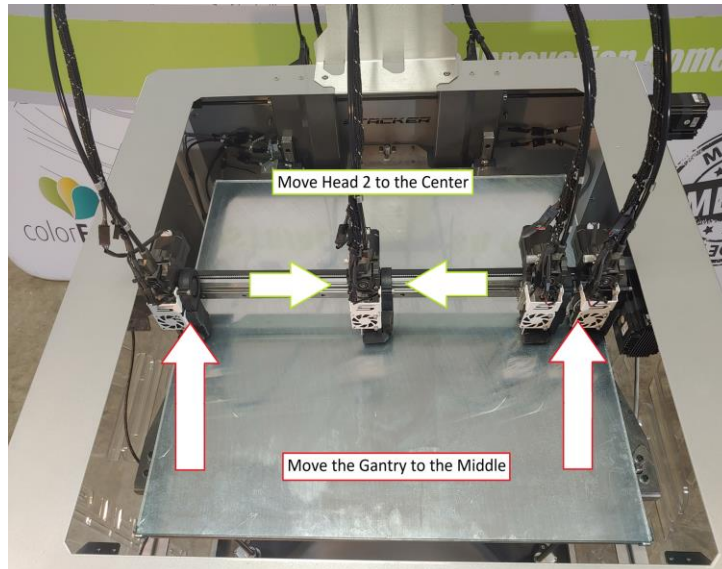
Step 5. Move the gantry forward and adjust the front screws. Slide the gantry forward by hand and repeat the same process with the front screws. Start on the left side of the bed and adjust the screw until you feel a slight friction on the feeler gauge. Next move to the right side and adjust that screw until you feel the same level of friction. Move back and forth until both sides feel the same. Then move go to the middle and adjust the screw until the friction feels the same as the sides. Move between all three points to make sure they all have the same level of friction.



Step 6. Readjust the screws. Move the gantry to the back of the printer and use the feeler gauge to verify the gap. Go between all points and make any adjustments needed to get the same level of friction.

Next move the gantry to the front and verify those gaps as well. Move front and back between all the leveling points as much as needed to get a consistent friction on the feeler gauge.

Step 7. Adjust the center screw. Move the gantry to the middle of the printer and slide head 2 over to the center of the print bed. Just like the other leveling points, slide the feeler gauge under the nozzle and adjust the screw in the center until you feel a slight friction on the feeler gauge.



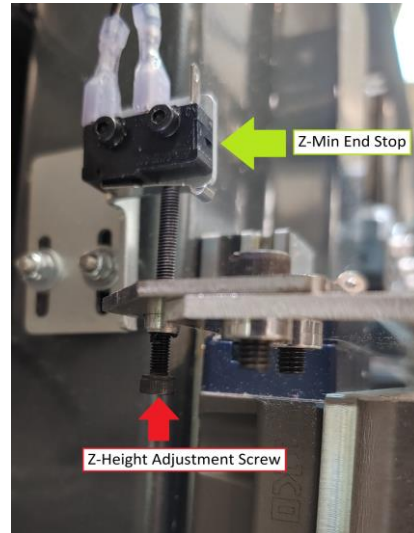
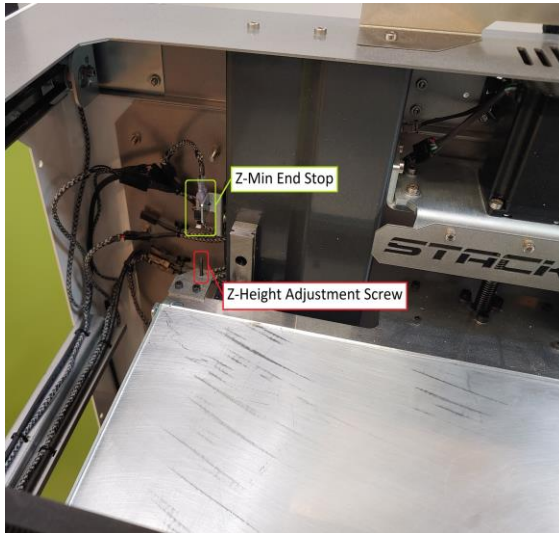
Step 8. Verify all leveling points. Just like in Step 6, go back to all the previous points and make sure you feel the same amount of friction at each point. You may need to go back to each point several times to get a consistent friction on the feeler gauge.

Step 9. Run a test print. Run a short print to verify the bed is level. You can print one big print that covers most of the bed or several small models spread out around the bed. You only need to print the first layer, make sure the squish is consistent across the bed.

Take this time to check the first layer squish. The ideal first layer squish should have all the lines touching and still flat on top. If you see gaps between the lines, your bed is too far from the nozzles, and if you see the filament forming “peaks” between the lines that means the bed is too close to the nozzles.



To fix the first layer squish you can adjust the Z min end stop screw. If you don't have enough first layer squish, turn the screw clockwise. If you have too much first layer squish, turn the screw counter-clockwise. After adjusting the screw, restart the print and check the first layer squish again.

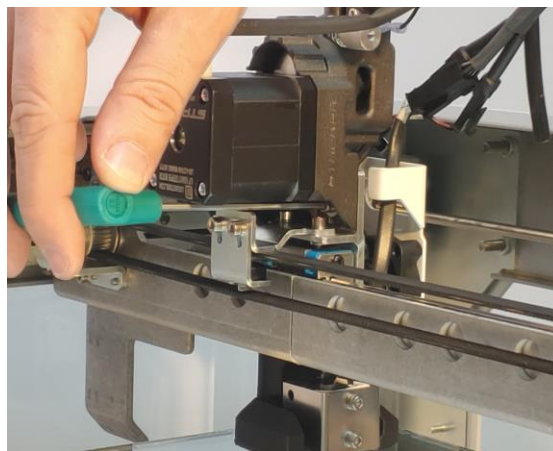


6.6 Leveling Nozzles

If you are going to print with multiple nozzles at the same time it's important that those nozzles are the same distance from the bed. During assembly the nozzles were all leveled with each other, however if you notice differences in first layer squish you may need to adjust the nozzle heights.

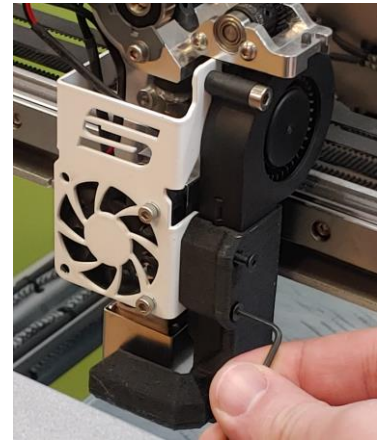
Step 1. Remove Filament from the extruder. For each head you want to level, set the target temperature for the filament in the extruder. Once the heater block(s) reach the target temperature open the extruder idler door and pull the filament out. Turn the extruders off and let them cool to room temperature before continuing.

Step 2. Remove the filament drive. Unplug the motor cable and the filament out sensor from the hot end feed cable. Slide the filament guide tube out of the top of the filament drive. Loosen the two screws that clamp the filament drive to the hot end bracket then lift the drive off the rest of the hot end and set it aside.

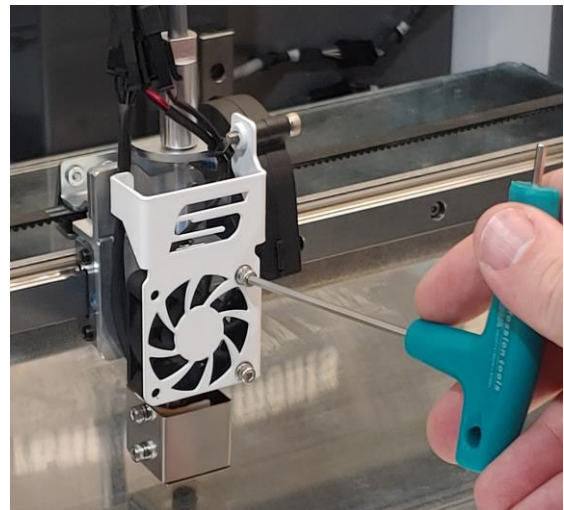


Step 3. Heat and home the bed. Use the LCD screen to set the bed temperature to 55°C. Also use the LCD screen to home the Z axis.

Step 4. Remove the part cooling fan ducts. For each head you want to level remove the fan duct on the side of the print head. Use a 2mm hex key to loosen the two screws holding the duct in place. Set the ducts to the side for now.

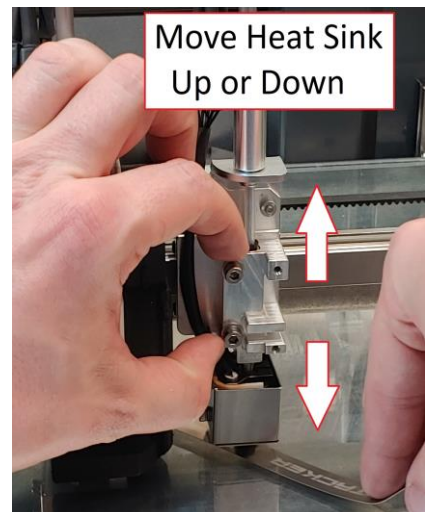
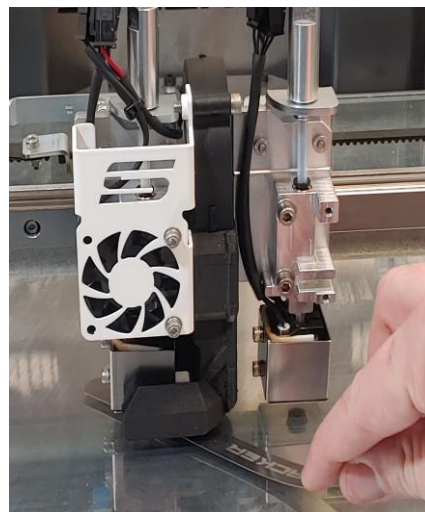


Step 5. Remove the white bracket and heat sink fan. Use a 2.5mm hex key to remove the screws holding the white bracket to the heat sink. The 40mm heat sink fan will come off with the bracket. Disconnect the fan connectors from the extruder cable and set all the parts to the side.



Step 6. Position the printer heads. Move the X gantry to the middle of the printer, then slide the print heads to the middle of the printer, keep them as close to each other as you can.

Step 7. Test the height of head 1. Use the 0.007"/0.18mm feeler gauge under the nozzle of head 1. You should feel light friction from the nozzle. If you don't, use a 3mm hex key to loosen the two bolts that secure the heat sink. DO NOT REMOVE THE SCREWS. You should be able to slide the heat sink up and down a few millimeters. Adjust the heat sink until you feel a slight friction on the feeler gauge. Once the heat sink is at the correct height tighten the bolts to secure the heat sink.



Step 8. Adjust the height of the next head. Use the same procedure from Step 5 on the other 3 heads. Use the feeler gauge and adjust the heat sink up or down until you feel slight friction from the nozzle. Make sure the friction is the same level as head 1.

Step 9. Re-install the heat sink fan and white bracket. Once all the nozzles are the same height, re attach the heat sink fan and white bracket. Make sure the flat side of the fan (the side with the manufacture's sticker) is against the heat sink. Reconnect the fan cables to the hot end feed cable, the heat sink fan should be plugged into the connector with the silver dot.

Step 10. Re-attach the part cooling fan ducts. The fan duct should slide onto the 50mm part cooling fan. Use the 2mm screw to secure the duct.

Step 11. Re-install the filament drive. Slide to filament drive over the white tube and onto the screws attached to the hot end bracket. Make sure the drive sits all the way down on the tube. Tighten the two screw to clamp the drive to the hot end bracket. Slide the filament guide tube back into the top of the filament drive and plug in the motor wire and filament out sensor wire into the hot end feed cable.

7. Filament Out Switch

Located above the idler housing on each extruder is a filament out switch. If you run out of filament during a print the switch will trigger and automatically pause the print. This will give you the opportunity to load new filament and continue the print instead of starting over again.

When the switch is triggered the Z axis will move down 10mm, the X and Y axis will home, and the heater blocks will cool to room temperature. The heated bed will remain at temperature. When you return to the printer press the knob next to the LCD screen and the heater blocks will begin to heat up. Once they reach the target temperature you can remove the remaining filament and load a new spool (see section 4.C.). When the new filament is loaded push the knob again, the X and Y axis will move to the position they were in when the print paused, the Z motor will raise 10mm and the printer will resume the print.

Note: *The filament out switches only work if the printer is being run by Repetier Server.*

8. Basic Printer Maintenance

Other than periodically replacing nozzles, filament guide tubes, and cleaning the glass bed as needed, the basic maintenance required on a Stacker 3D printer is minimal.

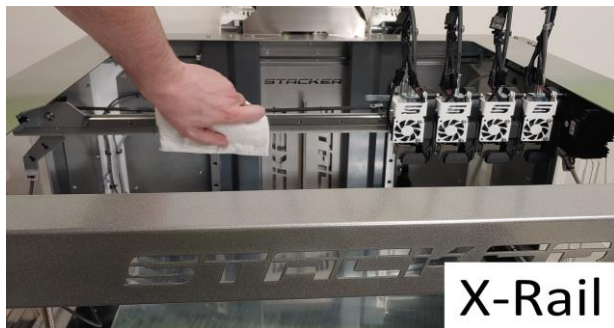
8.1 Keep Your Printer Clean

Inevitably, from regular use, small bits of filament debris will land on your printer. You must periodically remove this filament debris to protect your printer from damage. The combination of blower fans and small bits of filament can result in debris landing upon the moving parts of your printer. Clean the filament debris to prevent damage to your printer's moving parts. Damage to your printer caused by debris is not covered by the warranty.

8.2 Linear Guides

The linear rail system on Stacker 3D Printers uses recirculating linear bearings and profile rail guides. For optimal performance, lubrication of these parts is essential. Lubrication promotes smooth operation, minimizes friction and wear along the raceways, dissipates heat, and prevents corrosion. The absence of proper lubrication will eventually lead to machine failure.

The frequency with which you will need to re-apply lubricant to your linear rail system will largely depend upon use and environmental conditions. More humid environments will typically require more frequent re-application of lubricant to protect the printer's raceways from rust.

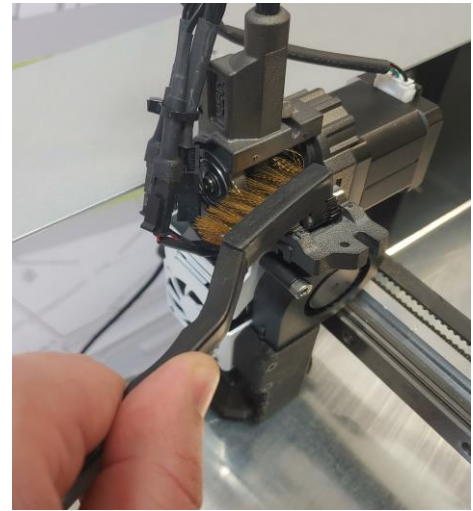


X/Y/Z Rails: To lubricate the horizontal X and Y rails and the vertical Z rails, apply a 40 to 90 weight 100% synthetic oil to a cloth and apply liberally to the raceways. For the X and Y rails, you can then manually slide the blocks by hand to work the oil into the blocks. For the Z rail, you will need to run the bed up and down a few times. Finally, use a clean dry cloth to remove any excess oil by wiping down the raceways.

8.3 Filament Drive Gears

Dirty gears can lead to stripped out filament and jams. The filament drive gears should be cleaned periodically to remove any debris which can prevent the smooth flow of filament.

Always inspect the gears with a bright flashlight and turn them manually with your fingers to inspect both gears for any filament debris. Sometimes a dental pick, sewing needle, or an X-ACTO knife is required to remove small bits of filament from the valleys of the gears.



8.4 Filament Guide Tubes

The filament guide tubes on your printer should be inspected after 250 hours of use, and they typically need to be refreshed at a minimum of every 500 hours of use. When operating the print heads at temperatures greater than 250°C, you can expect the portion of the filament guide tube inside the nozzle to degrade more rapidly.

When inspecting, remove the filament guide tube from the nozzles and confirm the tube is in good condition. Tube ends will yellow and deform over time, so if the tube is not in perfect condition, trim the damaged portion of the tube with the hose cutter (shown to the right) to insure a clean 90° cut.



9. Removing Extra Heads

Your Stacker S4 and S4XL come with four heads installed on the gantry, but they can be removed if you need more room for your print. If you intend to use a couple heads for printing or want to use the full print bed for one head, you can remove the additional extruders from the gantry.

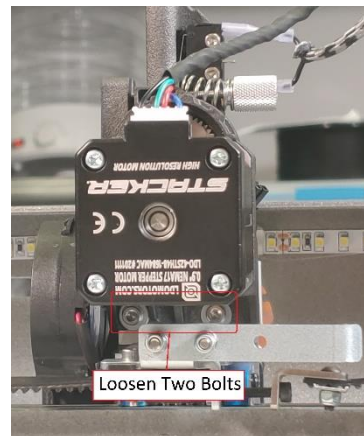
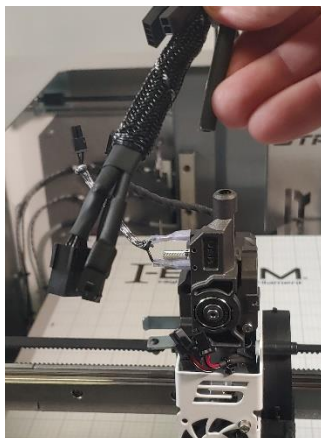
Before removing extra heads, we recommend printing the head storage bracket for your printer. This gives you a place to put the extra heads when you remove them while keeping them close to your printer so your hot end feed cables can stay plugged in. You can find the STL file for the head storage brackets on our website in the support section for your model printer.

9.1 S4

Step 1. Remove filament. Begin by depressing the knob next to the LCD panel to open the LCD menu. Next, turn the knob to highlight Controls, then push the knob to enter the Extruder sub-menu. Next click on the extruder you intend to change the nozzle on and set the temperature. The temperature should be set for the filament currently in extruder. In our example, we are removing PLA filament from extruder 1, so we have set the Temp. 4 to 230°C. Repeat this step for any head you intend to remove.

Once the extruder reaches the target temperature, loosen the idler bolt by turning the knob located above the extruder. Once the knob is loose, you will be able to push the Filament Idler Bolt to the right and compress the spring. Use your finger to flip open the idler assembly, then gently push some filament out of the nozzle to melt the plug on the end of the filament, next pull the filament out of the extruder. When the filament is removed, TURN OFF THE HEATER BLOCK and wait for it to cool. Pressing the Reset/Emergency Stop button will turn off all the extruders.

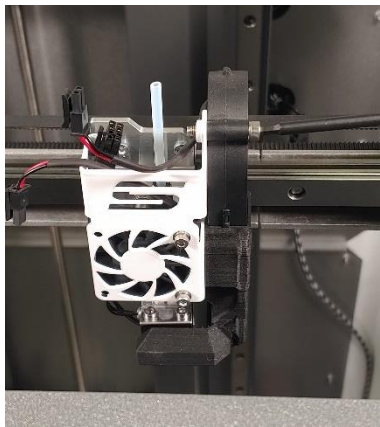
Step 2. Remove the extruder drive. Start by unplugging the extruder drive cable from the hot end feed cable. Next use a 2.5mm hex driver to loosen the two bolts that attached the extruder drive to the rest of the head. You should be able to lift the extruder drive off the head and set it aside.



Step 3. Remove X belt bracket. Use the 2.5mm hex driver to remove the two screws that hold the X belt bracket to the head. Set the screws and the bracket aside.



Step 4. Remove the part cooling fan. Use a 3mm hex key to unscrew the bolt holding the 50mm part cooling fan to the white bracket. Next slide the fan out of the fan duct, set the fan to the side.



Step 5. Slide the head off the gantry. Align the gantry with the notch on the right side of the printer frame then carefully slide the head off the rail. Now carefully slide the head on the head storage bracket. DO NOT force the head on the bracket, if the head isn't aligned properly, and the head is forced on, bearings can fall out of the head's bearing block.



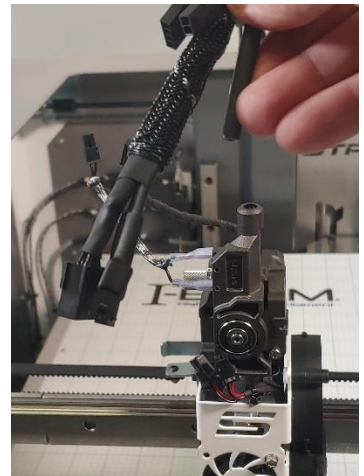
9.2 S4XL

Step 1. Remove filament from all heads. Begin by depressing the knob next to the LCD panel to open the LCD menu. Next, turn the knob to highlight Controls, then push the knob to enter the Extruder sub-menu. Next click on the extruder you intend to change the nozzle on and set the temperature. The temperature should be set for the filament currently in extruder. In our example, we are removing PLA filament from extruder 1, so we have set the Temp. 1 to 230°C. Repeat this step for all 4 heads.

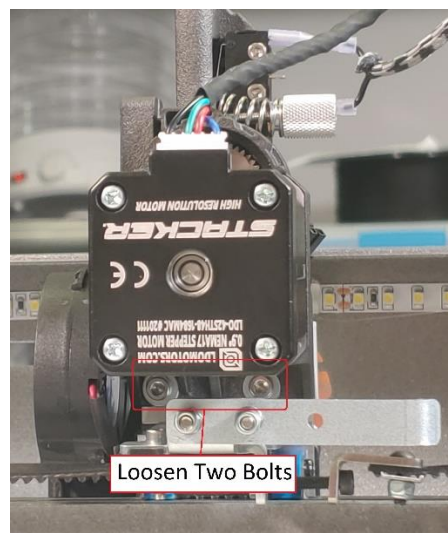
Once the extruder reaches the target temperature, loosen the idler bolt by turning the knob located above the extruder. Once the knob is loose, you will be able to push the Filament Idler Bolt to the right and compress the spring. Use your finger to flip open the idler assembly, then gently push some filament out of the nozzle to melt the plug on the end of the filament, next pull the filament out of the extruder. When the filament is removed, TURN OFF THE HEATER BLOCK and wait for it to cool. Pressing the Reset/Emergency Stop button will turn off all the extruders.

When the heater blocks cool down, turn off the printer.

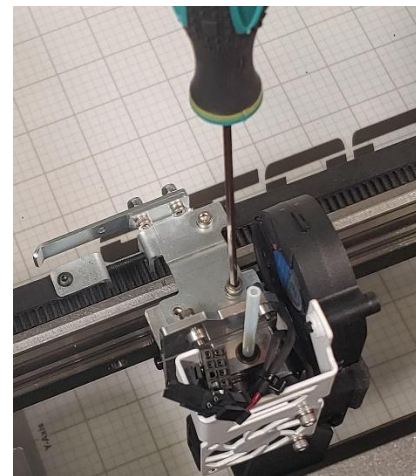
Step 2. Disconnect the hot end feed cables and guide tube. Unplug the heater block, fans, motor, and filament out switch from the hot end feed cable for all 4 heads. Slide the filament guide tube out of the top of the extruder drives.



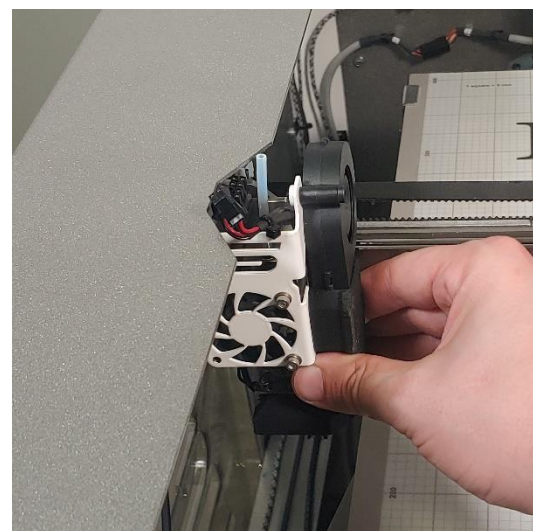
Step 3. Remove the extruder drives. Use a 2.5mm hex driver to loosen the two bolts that hold the extruder drive to the rest of the head. Lift the drive off the head and set it aside. Repeat this for all 4 heads.



Step 4. Disconnect the X belt brackets. Use the 2.5mm hex driver to remove the two screws that attached X belt brackets. The bracket for head 1 is always attached to the X belt, but you can flip it out of the way for now. For head 2 – 4, remove the X belt bracket and set them aside.



Step 5. Slide heads off the gantry. Line the gantry up with the notch on the left side of the frame. Slide off the number of heads you'd like to remove, then slide them on the head storage bracket. DO NOT force the head on the bracket, if the head isn't aligned properly and the head is forced on bearings can fall out of the head.



Step 6. Re-attach remaining heads. Slide the remaining heads (there will be at least 1 left) to the left side of the gantry. Attache the left most head to the X belt bracket that was flipped over in step 4. For any other heads attach the X belt brackets that were set aside.

Step 7. Install extruder drives. Slide an extruder drive on each head still on the gantry. Make sure the drives are straight up and down then use the 2.5mm hex driver to tighten the two bolts to secure the drive.

Step 8. Re-connect the hot end feed cables and guide tube. Plug in the heater block, fans, motor, and filament out sensors for each of the heads. The heat sink fan (square fan) should be plugged into the connector with the silver dot, the part cooling fan (round fan) is plugged into the other 2 pin connector. Slide the filament guide tube into the top of the drives.

Heads that were removed from the gantry still need to be plugged into a hot end feed cable. The printer has a safety feature that will prevent the printer from functioning if it does not read a temperature from each heater block.

10. Multi Head Printing.

Stacker S series printers have more than one extruder and these extra extruders can be used in a couple ways.

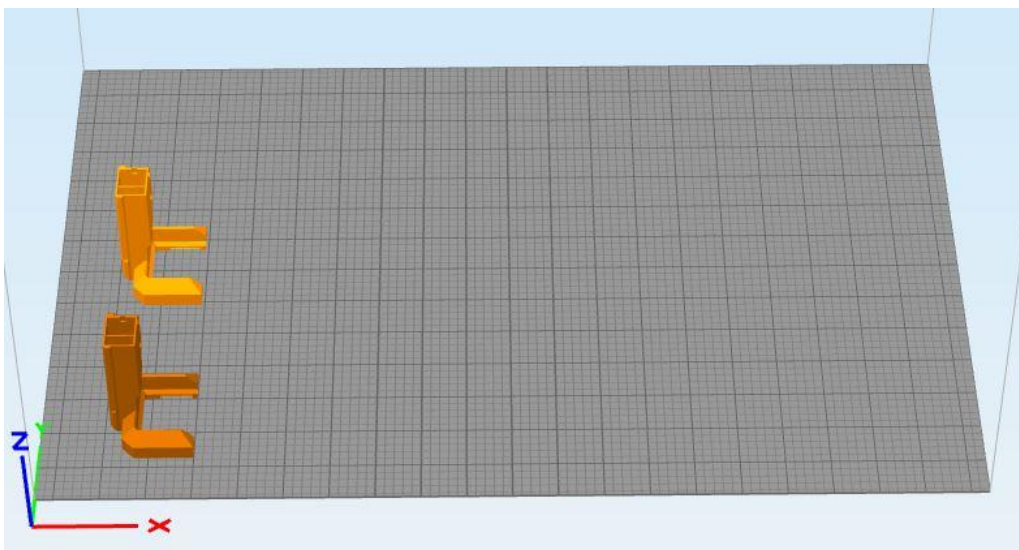
Ditto mode allows you to make multiple copies of the same part during the same print. This reduces the number of prints needed to make a batch of the same part.

Dual material printing uses two heads to print one model. You can use this to make a part with different colors, use hard plastic for part of your model and a flexible filament for another part, or use material made specifically for supporting parts.

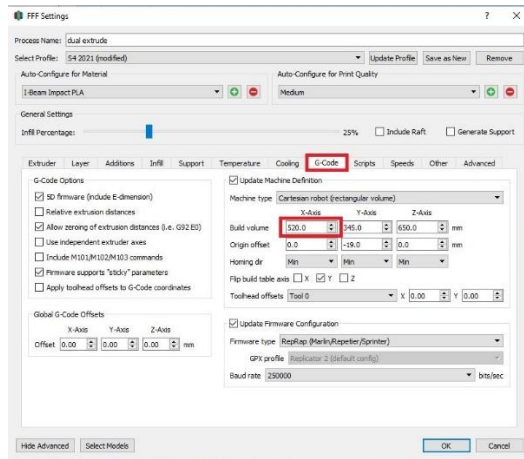
Mirror mode is only available on the S2. This mode works like copy mode, you will get two models, the difference is the model printed by the right head will mirrored in the X axis. So, if the left head prints a “b” the right head will print a “d”.

10.1 Ditto Mode.

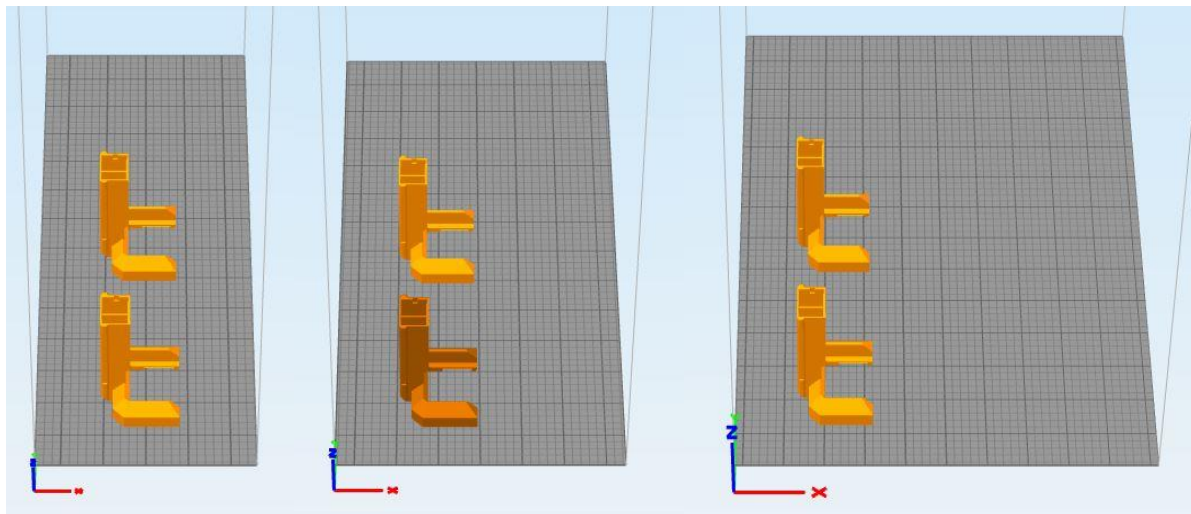
Step 1. Slicing your model. The key here is you only position your model(s) on the slicer’s build table for HEAD ONE. Do NOT place models where heads 2, 3, and 4 are. The firmware will ditto the gcode to the other heads as you specify! You can have multiple models on the build table but position the model(s) as if ONLY HEAD ONE is printing them. You must obviously position the models all the way over to the left side of the slicer’s build table, otherwise you will not leave enough room, physically, for the other heads to print the same models. If your models are large you may only be able to print one model at a time! Make sure the number of models you want to print in ditto mode fit on the printer’s build plate.



If you like, you can modify the printer area in Simplify3D so the X axis is smaller, this can make it easier to tell if you have enough room on print bed to fit the number of parts you'd like to print.



S2	S4	S4XL
1 Head X Max = 490 mm	1 Head X Max = 520 mm	1 Head X Max = 610 mm
2Head X Max = 245 mm	2 Head X Max = 260 mm	2 Head X Max = 305 mm
	3 Head X Max = 173 mm	3 Head X Max = 203 mm
	4 Head X Max = 130 mm	4 Head X Max = 152 mm



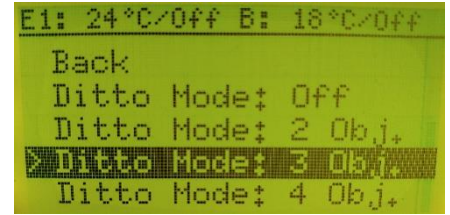
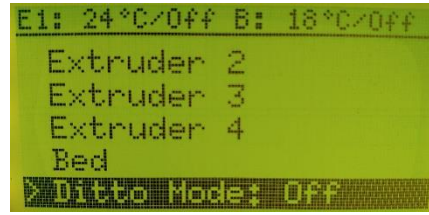
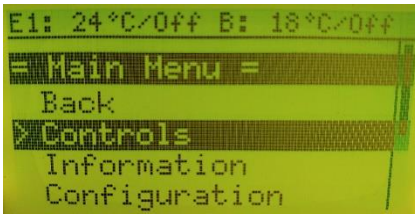
X set to 130mm

X set to 173mm

X set to 260mm

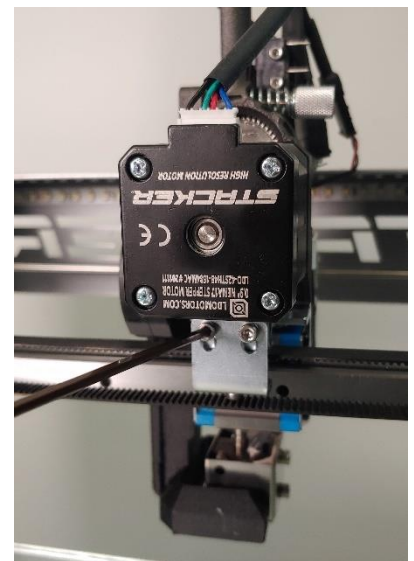
Once you're happy with your settings, you can save the gcode file to an SD card like normal.

Step 2. Enable Ditto Mode. Go to the LCD screen on the printer and navigate to the Ditto Mode settings. Start by clicking the knob, the scroll down and click on “Controls”, then scroll all the way to the bottom of the menu and click on “Ditto Mode”, now scroll down, and select the number of heads you’d like to use. The printer is now in ditto mode and when you start a print the printer will automatically set temperatures and send commands for the additional extruders.



Step 3. Attach additional heads to X belt. This step only applies to the S4 and S4XL, the S2 will automatically space to two heads when a print is started in ditto mode.

Slide to additional heads so they are spaced far enough apart so the heads won't print on top of each other when the print starts. Now use a 2.5 mm hex driver to loosen the two bolts on the X belt clamp, use the clamp to pinch the X belt, then tighten the two bolts. Gently try to move the head back and forth, the belt and other attached heads should move with it, if the head moves independently of the X belt, then try clamping the X belt again.

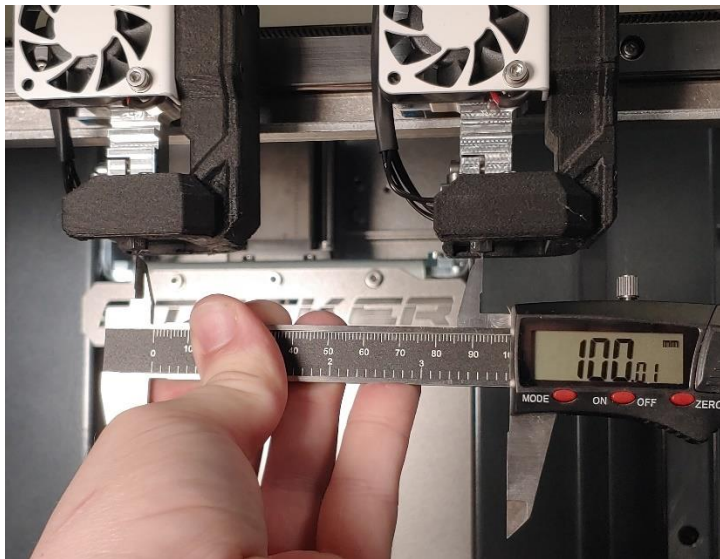


Step 4. Load filament and start the print. Now that the printer is in ditto mode and the additional heads are attached to the X belt all you need to do is load filament into each head. Once the filament is loaded, insert the SD card with the gcode file made in step 1, then start the print. We recommend watching the beginning of the print to make sure the heads are properly spaced. If the filament starts to print on top of each other or the heads collide with the frame of the printer, stop the print, and adjust the spacing of the heads. You may need to reduce the number of copies if your models are too large.

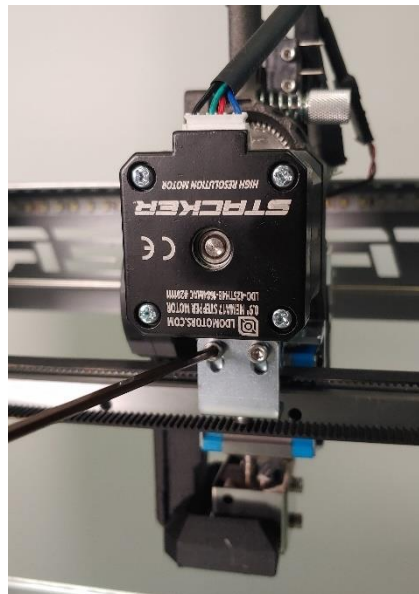
10.2 Dual Material Printing.

S4 and S4XL

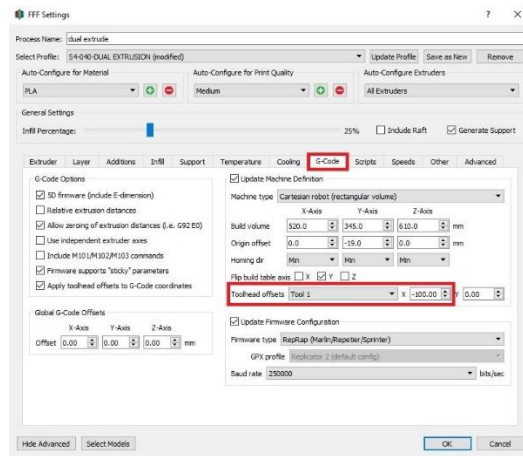
Step 1. Attach the second extruder to the X belt. Slide the second head so it's the desired distance from the first head (in our example we will space the heads apart 100 mm). Use a ruler or some calipers to verify the distance.



Once the second head is in place, use a 2.5mm hex key to loosen the two bolts on the second head X clamp, then pinch the clamp to the X belt and tighten the two bolts to keep it in place.



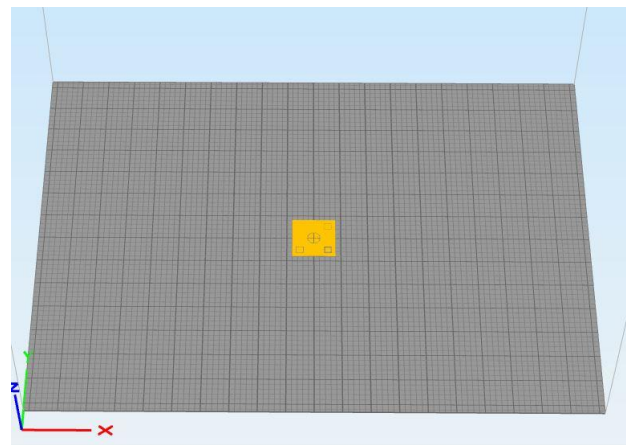
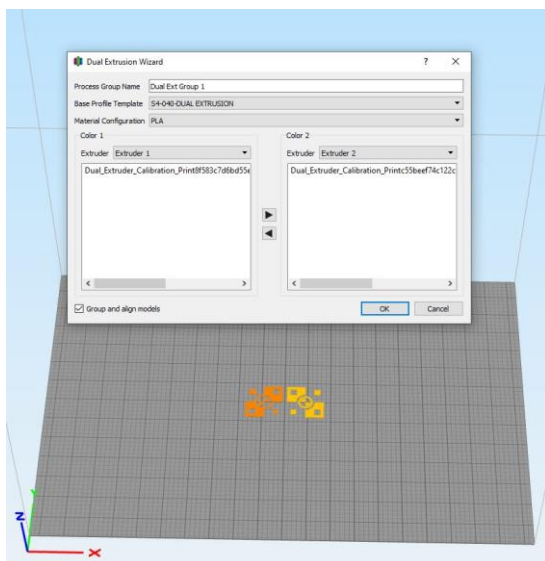
Step 2. Set the Tool 1 offset. Open Simplify3D and select the dual extrusion profile for your printer. Now open the process settings and go to the “G-Code” tab. In this tab you will find the Toolhead offsets setting, change the tool to Tool 1, then change the X value to negative the distance measured in step 1. In our example we set the heads 100 mm apart so for Tool 1 we will set to the X value to -100.



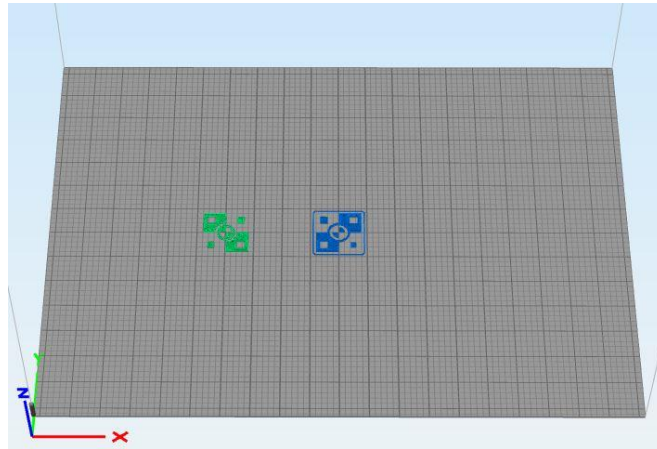
Make sure to push the Update Profile button before closing the window.

Step 3. Slice a test print. We now need to verify the X offset set in the previous step with a test print. Import the STL files for your test print into Simplify3D, then click Tools on the top of the screen, then in the dropdown menu select Dual Extrusion Wizard.

In the new window, make sure the Base Profile Template is set to your dual extrusion profile and make sure each color has one of the models for your sample part. When you're ready click the Ok button, the window should disappear and the models for your test print should now be aligned in the center of the print area.



Once you're happy with the settings click the Prepare to Print button, a new window will pop up, make sure both colors are highlighted then click the OK button. The print preview screen will now show the two models separated in the X axis by the offset from step 1. The preview shows where head 1 is during the whole print and when head 2 is printing its section of the part head 1 will be shifted over to the left, that's why the print preview shows the models misaligned.



Step 4. Print the test part. Now that the test print is sliced, save the gcode file to an SD card and put it in the printer and start the print. You don't need to let the whole print finish; you just need to see how close the two colors are to lining up. Usually, one or two layers is enough to see this.

Step 5. Inspect the test print. Once the test print is done, look at where the two colors meet in the X axis. If the two colors overlap or there is a gap between them use some calipers to measure the gap or overlap. Now go back to the G-Code tab in Simplify3D and adjust the Tool 1 X offset by the number you just measured. If the colors are overlapping, you should increase the offset by the number you just measured. If there is a gap between the colors, you should decrease the offset by the number you just measured. Once you adjust the offset, click the Update Profile button.

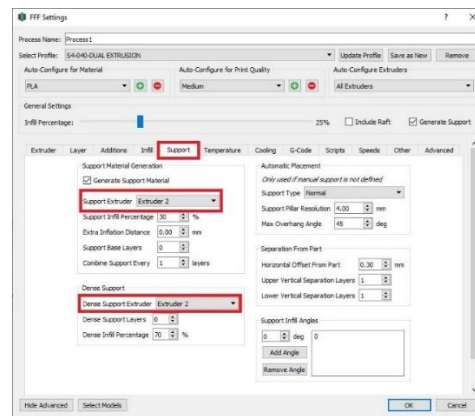


In this example you can see the gray color (the color in head 2) is too far to the left by 1mm. This means we will need to adjust the Tool 1 X offset to -99mm.

Now that the offset has been adjusted, re-slice the model, export the gcode file again and run another test print. Repeat this step until the colors line correctly.

Step 6. Slice your model. Now that the offset is properly calibrated you can slice your model. If you are doing a dual color print (like the test print) you can import the STL files and use the Dual Extrusion Wizard just like before to produce your gcode.

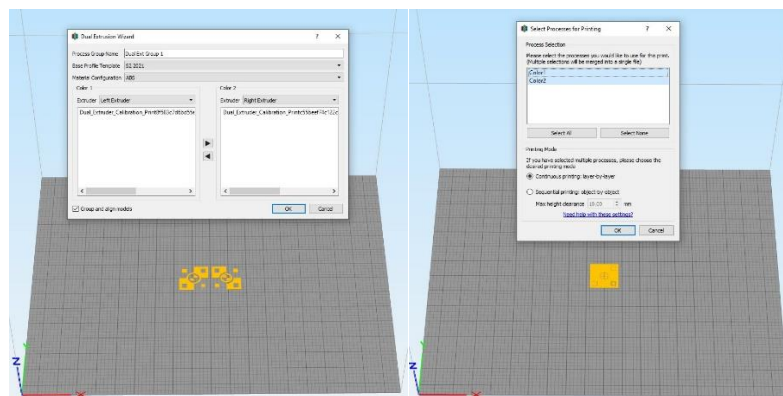
If you want to use the second head for support material, you start by importing your STL file. Next open the process settings and make sure the Dual Extrusion profile is selected. Next change the Auto-Configure Extruders to All Extruders. Next go to the Support tab and change the Support Extruder and Dense Support Extruder to Extruder 2. Now slice your model, just like with the test print, in the print preview the support material will look like its shifted to the left.



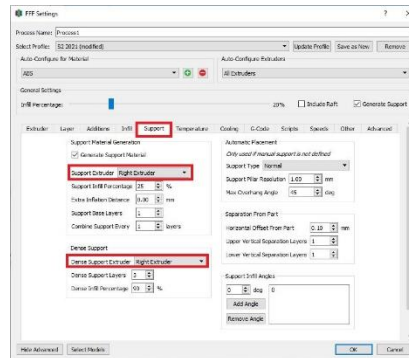
S2

The S2 uses independently controlled X motors, so you do not need to attach the right head to the X belt. The S2's X offset is calibrated at the factory before your printer is shipped. This means you don't need to calibrate an offset; you just need to slice your model and the firmware will take care of the offset for you.

To slice a dual material print, open Simplify3D and import the STL files you'd like to print. Next click Tools at the top of the screen and from the drop-down menu select Dual Extrusion Wizard. In the new window, make sure the Base Profile Template is set to your dual extrusion profile and make sure each color has one of the models for your sample part. When you're ready click the Ok button, the window should disappear and the models for your test print should now be aligned in the center of the print area. Once you're happy with the settings click the Prepare to Print button, a new window will pop up, make sure both colors are highlighted then click the OK button. Now save the gcode file to an SD card, insert the SD card into your printer and start your print.

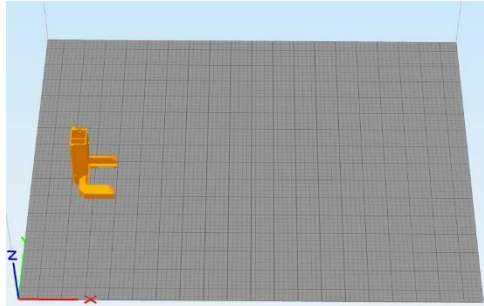


If you want to use the second head for support material, you start by importing your STL file. Next open the process settings and make sure the Dual Extrusion profile is selected. Next change the Auto-Configure Extruders to All Extruders. Next go to the Support tab and change the Support Extruder and Dense Support Extruder to Right Extruder. Now slice your model, just like with the test print, in the print preview the support material will look like its shifted to the left.



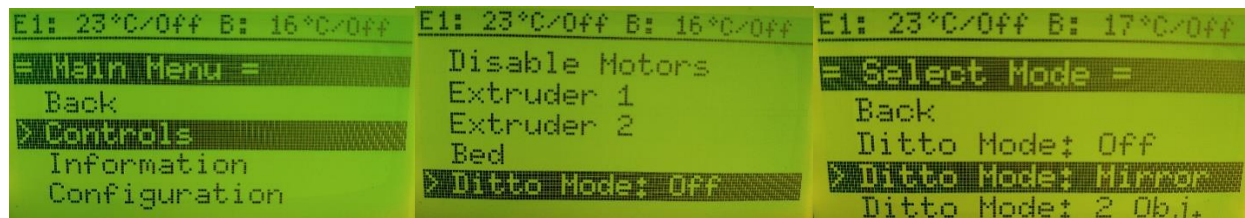
10.3 Mirror Mode (S2 Only)

Step 1. Slicing your model. The same rules apply here as they do with ditto mode. Again, the key here is that you only position your model(s) on the slicer's build table for HEAD ONE (the left head). Do NOT place models where head two is (the right head). The firmware will ditto the gcode to head two. You can have multiple models on the build table but position the models as if ONLY HEAD ONE is printing them. You must obviously position the models all the way over to the left side of the slicer's build table, otherwise you will not leave enough room, physically, for head two to print the same model(s). If your model(s) are large you may only be able to print one model at a time! Make sure the models you want to print in mirror mode actually fit on the printer's build plate.



Once you're happy with your settings, you can save the gcode file to an SD card like normal.

Step 2. Enable Mirror Mode. Go to the LCD screen on the printer and navigate to the Ditto Mode settings. Start by clicking the knob, the scroll down and click on "Controls", then scroll all the way to the bottom of the menu and click on "Ditto Mode", now scroll down and select Ditto Mode: Mirror.



Step 4. Load filament and start the print. Now that the printer is in ditto mode all you need to do is load filament into each head. Once the filament is loaded, insert the SD card with the gcode file made in step 1, then start the print. We recommend watching the beginning of the print to make sure the parts don't print on top of each other. If the filament starts to print on top of each other that means you need to be repositioned or is too big to print in mirror mode.

11. Terms and Conditions

STACKER, LLC

TERMS AND CONDITIONS OF SALE & LICENSE

As used herein, "Seller" shall mean Stacker, LLC, a Minnesota limited liability company, or any wholly-owned subsidiary of Stacker, LLC.

These terms and conditions, and any applicable Seller quotation, sales order acknowledgment and Separate Software License, along with any other documents incorporated by reference in any of the foregoing (hereinafter collectively the "Agreement"), bind the buyer ("Buyer") and Seller as to any hardware products sold by Seller to Buyer ("Hardware"), any services sold by Seller to Buyer ("Services"), and any software (including without limitation, any embedded software) licensed or sub-licensed by Seller to Buyer ("Software"), and constitute the entire agreement between Buyer and Seller regarding such sale and/or license.

Also as used herein and as applicable: (1) Hardware, Software and Services are collectively, and as applicable, referred to as "Goods" and (2) the term "Separate Software License" shall mean a set of terms and conditions that govern the licensing of specific Software and which is communicated to the Buyer by Seller or by a third party software owner.

This Agreement is subject and expressly limited to the terms and conditions contained in this Agreement. Any terms or conditions stated by the Buyer in any prior, concurrent and/or subsequent request for proposal, offer, purchase order and/or other documents are deemed by Seller to be a material alteration of this Agreement and are hereby rejected and inapplicable unless specifically agreed to in writing by an authorized representative of Seller. **Buyer shall be deemed to have accepted the Agreement and all of its terms and conditions, without exception, if any of the following events occur: (1) Buyer communicates to Seller its acceptance of the applicable Seller's quotation and/or sales documents; (2) Buyer issues Seller a purchase order which includes the same Goods and prices as set forth on the corresponding Seller's quotation and/or sales documents; and/or (3) Seller delivers any of the Goods covered by the applicable Seller's quotation and/or sales documents.**

1. **PRICES:** Except as otherwise set forth in writing by Seller, the price for Goods shall be as set forth in the applicable Seller's quotation and/or sales documents, or if the price is not set forth in any such quotation or documents, in accordance with Seller then-current list price. Prices set forth in a Seller's quotation shall be valid for thirty (30) days from the date of such quotation.
2. **SHIPPING, RISK AND TITLE:** All shipping dates are approximate and are based on Seller's prompt receipt of all necessary information from Buyer to properly process the order. Goods are shipped Ex Works Seller's facility (pursuant to Incoterms 2010). Subject to Section 8(a) below, title to the Goods and risk of loss thereto shall transfer to Buyer upon tender of the Goods to a carrier at Seller's factory. Buyer shall be responsible for all of the following related to the Goods: freight, duty and tax costs, risk, securing insurance, customs clearance and related costs, and arranging for a carrier and determining the method of shipment.
3. **TAXES AND DUTIES:** Prices do not include applicable taxes, duties or fees, including without limitation, any sales, excise, value added or goods sold taxes, or any customs duties or fees. Except for taxes due on Seller's net income, any taxes, duties or fees payable on any transactions hereunder shall be the responsibility of Buyer, and Seller may invoice Buyer for any such taxes, duties or fees that are or may be payable by Seller.
4. **PAYMENT:** (a) Except as otherwise required by Seller in its sole discretion (e.g., payment in advance, payment by letter of credit), Buyer agrees to pay Seller's invoice, in U.S. currency. (b) If any payment owed to Seller hereunder is not paid when due, Seller may charge Buyer a late payment charge of one and one-half percent (1½%) per month or, if less, the maximum rate allowed by law, on all past outstanding balances. In the event Buyer fails to make any payment when due, Seller shall have the right, among other remedies, to terminate this Agreement or to suspend further delivery of Goods under this and/or other agreements with Buyer. Buyer shall be liable to Seller for all expenses attendant to collection of any past due amounts, including without limitation, reasonable attorneys' fees. (c) Seller reserves a purchase money security interest in the Goods sold only to the extent of the invoiced amount and solely for the purpose of securing Buyer's payment obligation hereunder. This Agreement is a security agreement. At Seller's request, Buyer agrees to promptly execute any instrument or statement, and otherwise cooperate with Seller, in order to perfect the aforesaid security interest; provided, however, that in the event Buyer fails to comply with any such request, Buyer authorizes Seller, or a representative on behalf of Seller, to sign and file the necessary instruments or statements for the Buyer. **DOCUMENTATION:** Seller shall provide Buyer with that data/documentation that: (1) is specifically identified in the applicable Seller's quotation and/or order documents; and (2) is made commercially available and provided by Seller with the applicable Goods in Seller's normal course of business.
5. **RECEIVING:** Except as set forth in the applicable Seller quotation and/or other applicable Seller documentation provided with the Goods, Buyer shall be responsible for receiving, storing, installing, starting up and maintaining all Goods.

6. **CANCELLATION:** Buyer may cancel its order at any time prior to shipment by providing written notice thereof to Seller and paying Seller liquidated damages in the following amounts: (a) if the order is cancelled within 48 hours of the Buyer's purchase order date, then an amount equal to five percent (5%) of the total order price; (b) if the order is cancelled within 10 calendar days of the Buyer's purchase order date, then an amount equal to twenty-five percent (25%) of the total order price; (c) if the order is cancelled within 11 to 30 calendar days of the Buyer's purchase order date, then an amount equal to fifty percent (50%) of the total order price; and (c) if the Buyer's order is cancelled between 31 and 60 days of the Buyer's purchase order date, then an amount equal to seventy-five percent (75%) of the total order price. The parties agree that actual damages stemming from any order cancellation will be difficult to calculate and as such the parties agree that the aforesaid amounts do not represent a cancellation penalty, but rather a reasonable and good faith estimate of the actual damages incurred as a result of the cancellation. To the extent Buyer has made any payments prior to cancellation, Seller may apply any payments against any liquidated damages or other amounts due Seller under this Agreement.
7. **RETURNS:** (a) **Allowable Period:** For all electronic items, the Seller will accept returns only within ten (10) calendar days from the date of the Buyer's receipt of merchandise, subject to a 25% restocking fee. For non-electronic items, excluding filament, the Seller accepts returns only on unopened items within thirty (30) calendar days from the date of Buyer's receipt of merchandise. Filament may not be returned. (b) **Return Process:** The Buyer shall arrange and pay all shipping, freight, and customs, taxes, and duties related to returning merchandise to the Seller. For credit, all merchandise must be returned in its original packaging. The customer must contact the Seller to be issued a return authorization account (RMA) number. Any returns made by a Buyer without a return authorization account number will be considered an "Unauthorized Return" and will not be subject to a refund or credit by the Seller. If the returned product is not received by the Seller in "Resalable Condition", the Buyer may not receive credit. "Resalable condition" means the Product has no sign of: use, wear and tear, cosmetic damage, or any other damage; furthermore, the Buyer is responsible for any damage to the returned product incurred during the shipping.
8. **SOFTWARE:** (a) Seller and/or any applicable third party owner shall retain exclusive right, title and ownership in and to their respective Software, and the license provided herein does not convey to Buyer any interest in the Software or any part thereof. Buyer acknowledges and agrees that the Software consists of proprietary material and information of Seller and/or any applicable third party owner, and is protected under U.S. and foreign copyright and other intellectual property laws, as well as international treaty provisions. (b) If a Separate Software License is provided with the Software, referenced on Seller order documents and/or otherwise communicated to Buyer, then such Software shall be governed, in order of precedence, by the terms of the Separate Software License and then by any non-conflicting terms hereof. If no Separate Software License applies, then Seller hereby grants to Buyer, and Buyer accepts, a limited, personal, non-exclusive license, without the right to sublicense, to use the Software only: (1) with the specific Seller's manufactured Hardware that such Software is intended to operate with; or (2) if the Software is not intended to operate with Seller's manufactured Hardware, on a single computer owned, leased or otherwise controlled by the Buyer. Any concurrent use of the Software and any use on any local area network or other type of network are not authorized. Notwithstanding any term in this Section 8(b) to the contrary, Buyer's license rights in the Software shall include the right to use the Software in any manner expressly described in any Seller supplied documentation as described in Section 5 above. (c) Except as required to be permitted by applicable law, Buyer may not copy, reverse engineer, decompile, disassemble or modify the Software in any way. The aforesaid Software license does not entitle Buyer to any Software source code. (d) Repair of Software may be in the form of available corrections, fixes and/or patches to address Software bugs or inconsistencies, and/or to address non-conformance with the applicable Software specifications (collectively "Updates"). Following expiration of the Software warranty, Updates available from Seller shall be provided to Buyer either: (1) in accordance with Seller's quoted price therefore; or (2) at no charge if Seller provides such specific Updates at no-charge on a commercial basis to all of its customers. Seller shall not be required to make available any new versions and/or releases of any Software that provide new and/or enhanced features, performance and/or capabilities for the Software ("Upgrades"). In the event Seller does, in its sole discretion, make any Upgrades available, such Upgrades shall be subject to Seller's quoted price therefore. As used in this Agreement, Software shall include any Updates and Upgrades made thereto. (e) Notwithstanding any term or provision in this Agreement to the contrary, and with respect to any Software and/or any part thereof for which the intellectual property rights are not owned by Seller, including any third party commercial software and any software commonly referred to as open source code or open source software (collectively "Third Party Software"): (1) any such Third Party Software shall be governed exclusively by the Third Party Software owner's applicable license terms if such terms are provided with or as part of the Third Party Software; (2) nothing in this Agreement, a Separate Software License or any other agreement shall restrict or otherwise affect any rights and/or obligations Buyer may have, or conditions to which Buyer may be subject to, under any open source licenses to any open source code or software provided in or with the Software; and (3) Seller provides no warranty of any kind, express or implied, with respect to any such Third Party Software, which is provided "AS IS"; provided, however that Buyer may avail itself to any warranty provided by the supplier of any such Third Party Software. (f) The aforesaid Software license(s) shall be nontransferable except as follows: (1) any embedded Software that is included in and intended to operate with any Hardware shall be transferable with the transfer of the Hardware to another party provided that such transfer is on terms that do not materially conflict with the Software license terms in this Agreement; and (2) for Software that is not embedded Software, Buyer shall have a permanent right to transfer all its Software rights under this Agreement to another party, provided Buyer passes all the copies of the Software

9. licensed to the other party along with the accompanying documentation and a copy of this Agreement, and provided that the other party accepts the terms of this Agreement. If you transfer the Software as permitted herein, you may not retain any copies of the Software for your own use and your license rights under this Agreement are terminated.
- (g) The aforesaid Software license(s) shall continue until and automatically terminate upon Buyer's breach of any of the terms hereof.
10. **LIMITED WARRANTY:** With respect to all Goods, the following warranty terms ("General Warranty Terms") shall apply solely during the applicable warranty period set forth in Sections 10(a) through 10(f) below. If Buyer has used the Goods under normal use and care and discovers any defects in material or workmanship, or any material deviation from the Goods' applicable published specifications, and notifies Seller in writing thereof during the applicable warranty period, Seller shall, at its option, use reasonably commercial efforts to repair or replace that portion of the Goods found by Seller to be defective in material or workmanship, or in material deviation from the applicable specifications, or refund the purchase price of such Goods. Any Goods to be returned to Seller for repair or replacement under this warranty must be returned to Seller's designated facility and in accordance with Seller's then-current return material authorization (RMA) procedures and Buyer must contact Seller and obtain a RMA number and such procedures prior to any such return. This limited warranty shall not apply in the event any such defects and/or deviations are based in whole or part by improper or inadequate maintenance, unsuitable power sources or environmental conditions, improper maintenance, alteration or modification by any party other than Seller or its authorized representative, storage or handling, accident, repair by a party other than Seller or its authorized representative, or any other cause not the fault of Seller. Except as expressly set forth in this limited warranty, all costs incurred by Buyer relating to or arising out of this warranty, including without limitation, those related to dismantling and reinstallation of the Goods, shall be borne by Buyer. Except as expressly agreed to in writing by Seller prior to shipment, Seller makes no warranty or representation that the Goods supplied hereunder comply with any local laws, rules, regulations or ordinances, and Buyer shall be responsible for obtaining all permits, licenses, authorizations and/or certificates required by any regulatory body for installation or use of the Goods. This limited warranty is the only warranty made by Seller, and SELLER DOES NOT WARRANT THAT THE USE OF THE GOODS OR ANY PARTS THEREOF WILL BE UNINTERRUPTED OR ERROR FREE, AND THERE ARE NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO THE GOODS OR ANY PARTS THEREOF, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT.
- (a) Hardware (including embedded Software therein) is warranted for a period of twenty-four (24) months from the date of shipment by Seller.
- (b) Notwithstanding the foregoing, the following parts ("Wear Parts") are warranted for a period of forty five (45) days: 1) filament drive gears, 2) belts, 3) bearings, 4) pulleys, 5) hot ends. Hot ends include the following components: (i) heater cartridges, (ii) heater blocks, and (iii) thermistors; thermal fuses do not carry a warranty. Adhesive print bed coatings or sheets and glass print beds carry no warranty. Secure Digital Cards (SD Card) and SD Card reader slot on the printer, does not carry a warranty.
- (c) Services are warranted for a period of ninety (90) days from the date the Services are provided by Seller.
- (d) Notwithstanding any of the foregoing, Goods repaired or replaced during the warranty period, or Goods identified as rebuilt regardless of when purchased, are warranted for the longer of the remainder of the original warranty period or ninety (90) days from the date of shipment by Seller.
- (e) Software is warranted for a period of ninety (90) days from the date of "shipment". As used herein, "shipment" shall mean either: (1) the date the Software is physically shipped by Seller to Buyer (with or without Hardware); or (2) the date the Software is electronically transmitted to Buyer by Seller.
- (f) No warranty is extended with respect to third party owned software. Notwithstanding any language in this limited warranty to the contrary, Seller shall have the right to discontinue the availability of any Goods or components or replacement parts therefore, or to make design changes or improvements in the Goods at any time and such discontinuance or change shall not constitute a breach of warranty, or result in any liability or obligation to Seller whatsoever, including, without limitation, any obligation to retrofit, change or improve Goods purchased by Buyer prior to the discontinuance or change.
11. **LIMITATION OF REMEDY AND LIABILITY:** THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY HEREUNDER SHALL BE LIMITED TO REPAIR, REPLACEMENT OR REFUND UNDER THE LIMITED WARRANTY SET FORTH IN SECTION 9 ABOVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR BUYER'S CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT, SHALL SELLER'S LIABILITY TO BUYER AND/OR BUYER'S CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, WITHOUT LIMITATION, LOSS OF ANTICIPATED REVENUE OR PROFITS, LOSS OF USE OR DATA, DAMAGES BASED ON ANY DELAY IN PERFORMANCE, AND CLAIMS OF BUYER'S CUSTOMERS. SELLER AND BUYER AGREE THAT THE LIMITATIONS SET FORTH IN THIS PROVISION SHALL BE ENFORCED TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW. TO THE EXTENT PERMITTED BY APPLICABLE LAW,

THE LIMITATIONS SET FORTH HEREIN SHALL EXTEND TO THE BENEFIT OF SELLER'S SUPPLIERS.

12. **CONFIDENTIAL INFORMATION.** Any information disclosed by Seller to Buyer related to this Agreement, including quotations, pricing, technical information or otherwise, shall be deemed "Confidential Information". Buyer shall not disclose any Confidential Information to any third parties without Seller's prior written consent and shall use such Confidential Information only for the purposes reasonably related to the purchase and use of Seller's Goods. Seller shall, at all times, retain all right, title and interest in the Confidential Information and all copies thereof. Notwithstanding the foregoing, Confidential Information shall not include information which is or becomes publicly known through no wrongful act of Buyer.
13. **GOVERNING LAW / DISPUTES:** (a) This Agreement shall be construed, performed and enforced under the laws of the State of Minnesota, U.S.A. (b) If Buyer's address is in the United States, the sole and exclusive venue for any claims or actions under or related to this Agreement shall be in the applicable court(s) in the city of Minneapolis, Minnesota, U.S.A. If Buyer's address is not located in the United States, then Seller and Buyer agree that any controversy or claim arising out of or relating to this Agreement shall be determined by arbitration in accordance the then-current rules of the American Arbitration Association by one or more arbitrators appointed in accordance with said rules, and such arbitration shall be conducted in the city of Minneapolis, Minnesota, U.S.A. Notwithstanding the foregoing, either party may, at anytime, apply to a court having jurisdiction for a preliminary injunction and/or other equitable relief where such relief is necessary to protect the party's interests pending completion or anticipated beginning of any arbitration. (c) This Agreement shall be interpreted and construed in the English language and any proceedings and/or arbitration conducted hereunder shall be in English. (d) Notwithstanding the foregoing, if applicable law requires that any of the terms and conditions set forth in the Agreement be different than those set forth in the Agreement, including without limitation, the governing law, arbitration and/or other dispute resolution terms set forth in this Section 14, then the Agreement shall be deemed modified and amended to the minimal extent necessary to comply with and incorporate such applicable law, and the rest of the terms and conditions of the Agreement, as so amended, shall continue in full force and effect.
14. **GENERAL PROVISIONS:** (a) **Except as expressly set forth in this Agreement, Buyer may not assign this Agreement, or any rights or obligations hereunder, without Seller's prior written consent.** (b) **No action, regardless of form, arising out of or related to this Agreement, may be brought by Buyer more than two (2) years after the cause of action has accrued.** (c) **Seller shall not be liable for delays in performance or for non-performance due to acts of God, war, terrorism, riot, fire, labor trouble, unavailability of materials or components, accident, compliance with governmental laws, rules, regulations, orders or requests, or any other circumstances or causes beyond Seller's reasonable control.** (d) **In the event any of the terms of this Agreement are in conflict with any rule of law or statutory provision, or are otherwise unenforceable under any applicable laws or regulations, such terms shall be enforced to maximum extent permitted by the applicable laws or regulations, and to the extent unenforceable, such terms shall deemed stricken from this Agreement, but such invalidity or unenforceability shall not invalidate any of the other terms of this Agreement.** (e) **No failure by Seller to take any action or assert any right hereunder shall be deemed to be a waiver of such right in the event of the continuation or repetition of the circumstances giving rise to such right.** (f) **Any modification of these terms and conditions must be set forth in a written instrument signed or issued by duly authorized representative of Seller.** (g) **This Agreement is the entire agreement between the parties with respect to the subject matter herein and supersedes all oral and written communications regarding the subject matter hereof. There are no understandings, agreements or representations, express or implied, not specified in the Agreement.**