

# FABRICATOR

## MX SERIES

### User Manual



Need to ask a question?

Contact [technicalsupport@fablicator.com](mailto:technicalsupport@fablicator.com)

10/3/2017

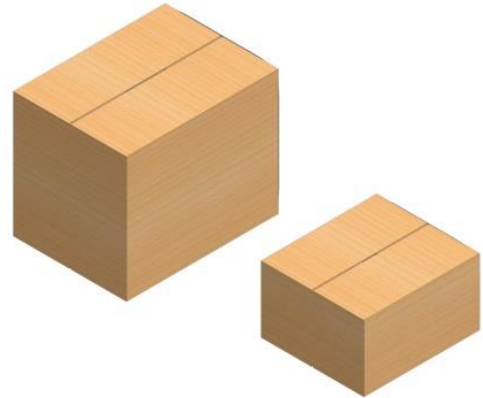
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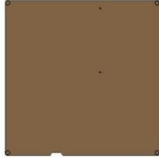
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## Unpacking the Startup Kit

1. Verify the following are contained within the small startup kit box.



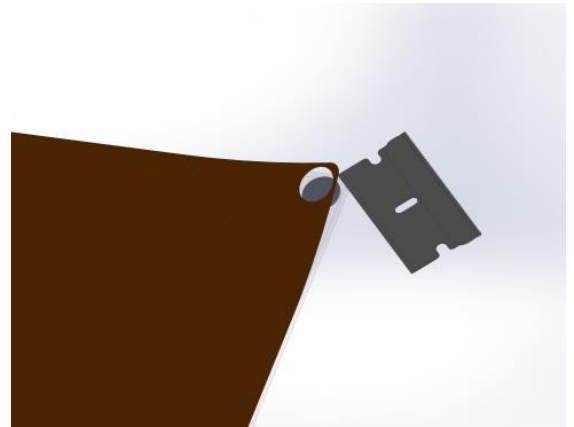
<b>Part Scraper Tool</b> 	<b>Calipers</b> 	<b>Primer Bottles</b> 	<b>Allen Wrenches and music wire</b> 
<b>Front Panel Handle</b> 	<b>3 Spools Filament</b> 	<b>Power Cord</b> 	<b>Windows Backup CD</b> 
<b>Flex Idler</b> 	<b>76mm Spool Holder</b> 	<b>54mm Spool Holder</b> 	<b>User Manual</b> 
<b>Front and Back panels</b> 	<b>Left Side Panel</b> 	<b>Right Side Panel</b> 	<b>Top Panel</b> 

2. Add acetone to the dropper bottles to begin dissolving the primer pellets.

The bottles should be filled to the line shown.



3. Peel the protective covers from the plastic panels. Use your fingernail or a razor blade to lift up the edge to get them started.



4. Assemble the front panel and front panel handle.

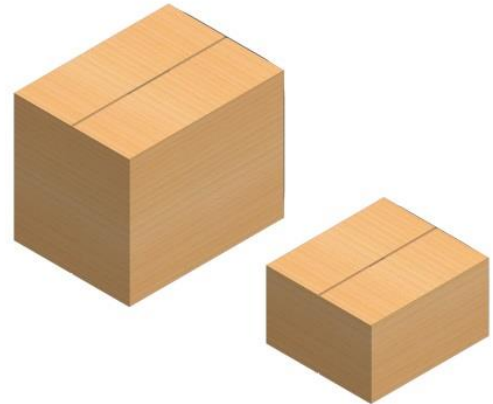


## Unpacking the MX

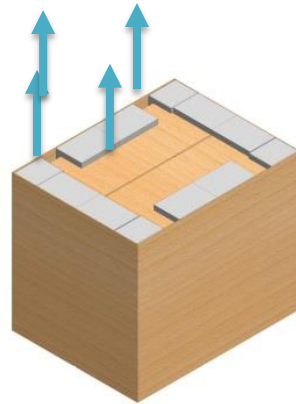
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- The MX is shipped in two Packages. One large package containing the printer and one smaller package containing the required accessories.
- 1.

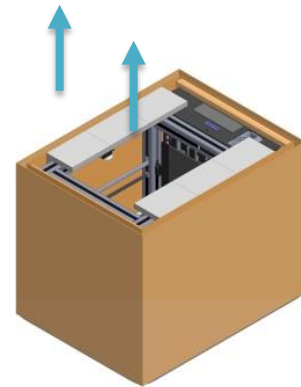
Unpacking the unit and accessories in an uncluttered area is recommended.



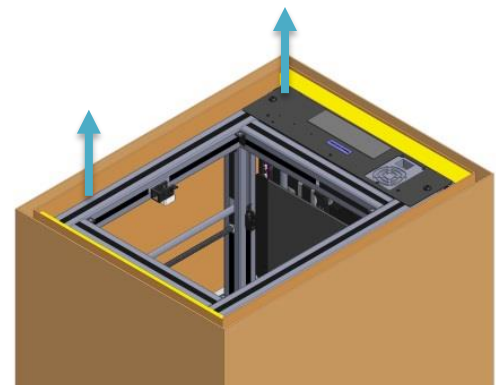
2. Start by opening the large box and removing the protective foam inserts.



3. Open the inner box and remove the foam inserts



4. Remove the protective wood and cardboard panels above and below the machine. (Highlighted in yellow)



A second person is very helpful for this step.

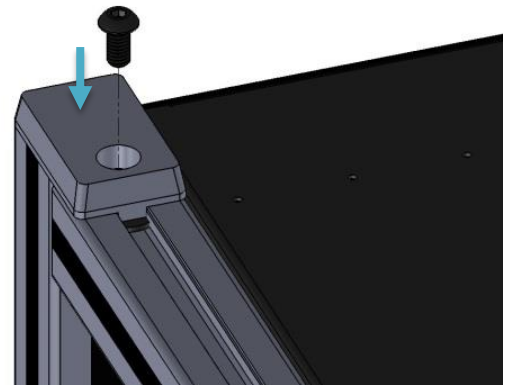
5. Lift the printer by the green highlighted areas, and set upside-down onto a flat, clean, non-abrasive surface.



Cut the feet free of the zip ties on the side of the printer.

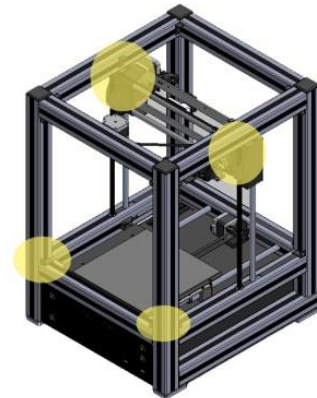
6. Screw the feet to the bottom four corners of the machine as shown using the existing hardware.

**Failure to attach the feet will cause the printer to badly scratch most surfaces!**

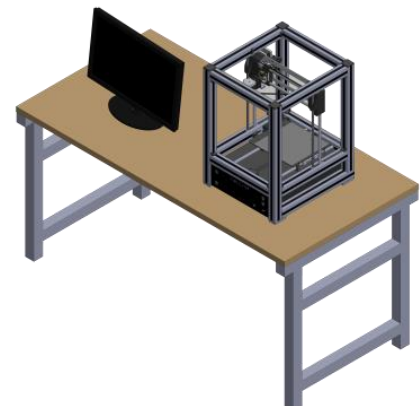


Place the Fablicator on a sturdy table or desk

7. Remove the yellow Z axis spacers and all remaining yellow zip ties.



8. Connect your monitor, keyboard, mouse, and power cord to the printer. The connections are on the back of the machine and are the same as a standard PC.

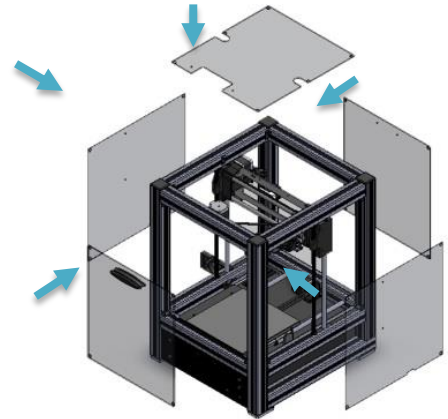


9. Insert the spool holder into the frame on either side of the machine.



Attach the clear magnetic panels to the machine.

10. The Fablicator MX is now completely assembled and ready to start printing.





## Loading Filament

1. Turn on the printer using the blue power button



2. Turn off the XYZ and EXT disable switches on the front of the machine. These switches disable the motors controlling the extruder and XYZ axis when illuminated.



The built in yellow LEDs should be OFF

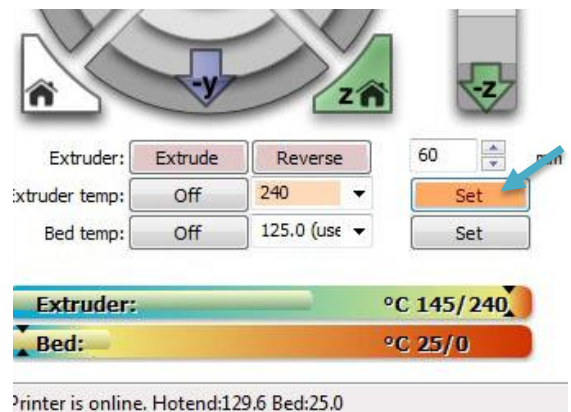
3. Open the **Fablicator shortcut** on the desktop
- This will open the interface to control the Fablicator MX.



First, the filament needs to be loaded into the machine.

4. Press the **Set** button to the right of the **Extruder Temp** text to set the extruder to 240C. . This will heat up the extruder so filament can be loaded and unloaded.

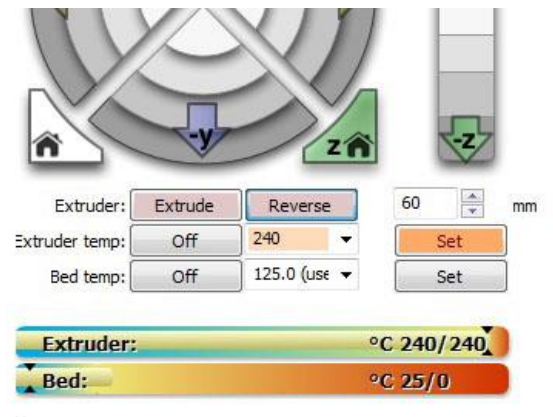
Caution: **After this step, the tip of the extruder will be extremely hot. Do not touch it.**



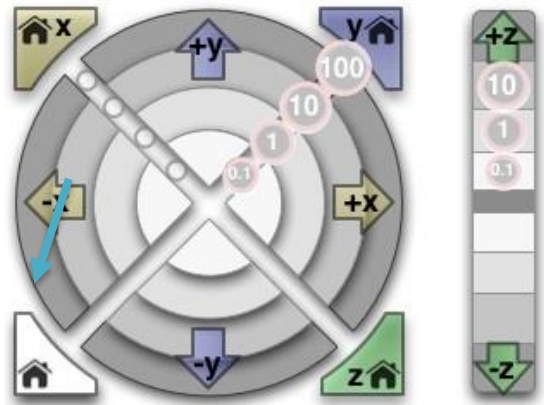


Wait for the Extruder temp to exceed 200 C

5. The extruder temp bar shows the current extrude temperature vs. the set temperature



6. Home all axis to make sure the print head is in a convenient position.



Attach a spool to the spool holder.

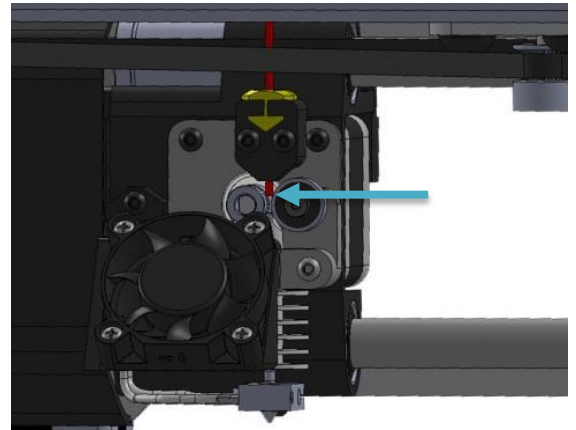
7. There are different sized spools and holders, so you may need to change the spool holder if it does not fit the spool you want to use.



8. Loop the filament over the extrusion, and into the entrance of the extruder (marked with a yellow arrow)



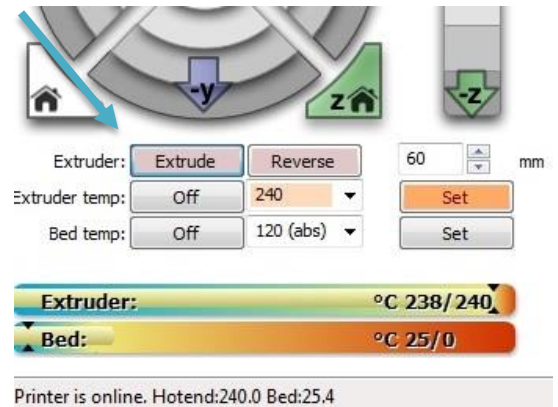
9. The filament should be inserted so it just touches the drive wheel and idler.



Hold the filament against the drive wheel and idler while pressing the **Extrude** button in the Fablicator interface.

10. The extruder motor will start to turn and grip the filament. One press moves the filament 60mm and stops automatically.

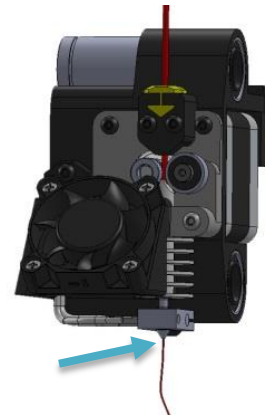
Once the filament starts to move you can let go of the material.



Press the **Extrude** button again if filament has not been extruded at the nozzle tip by the time the extruder stops.

11. Once melted filament has come out the tip of the extruder, the filament is fully loaded.

Remove the excess material from the nozzle tip.



12. Turn off the extruder by pressing the **Off** button next to the **Extruder temp** text. This is only necessary if you do not plan to print an object in the next few minutes.



## Removing Filament

Open the **Fablicator shortcut** on the desktop

1. This will open the interface to control the Fablicator MX.

The nozzle needs to be heated up to remove the filament.

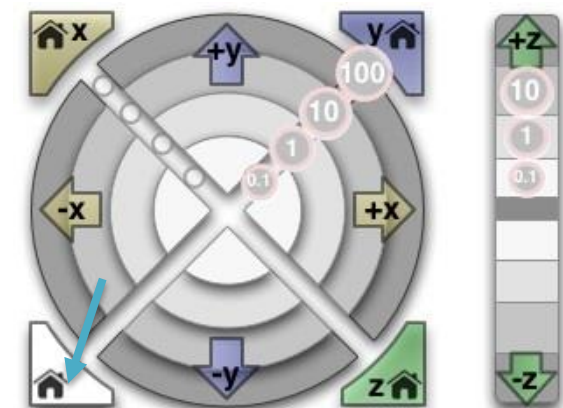
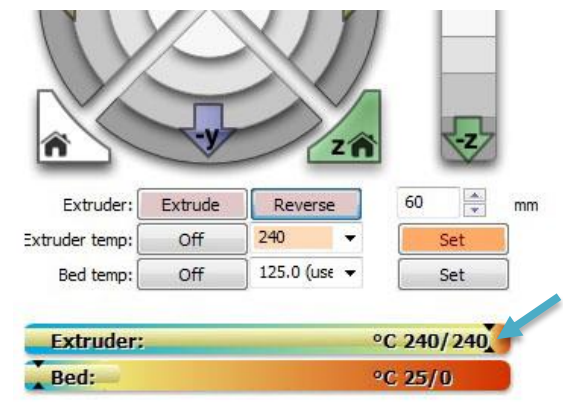
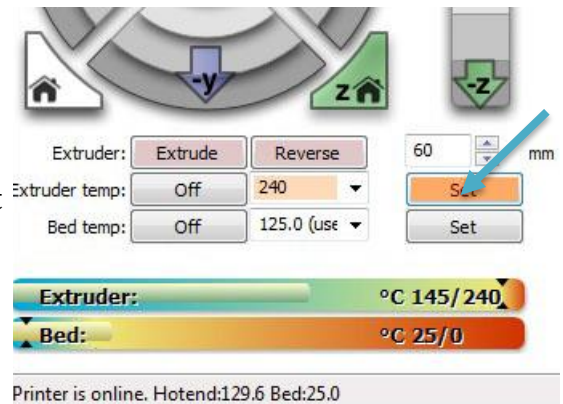
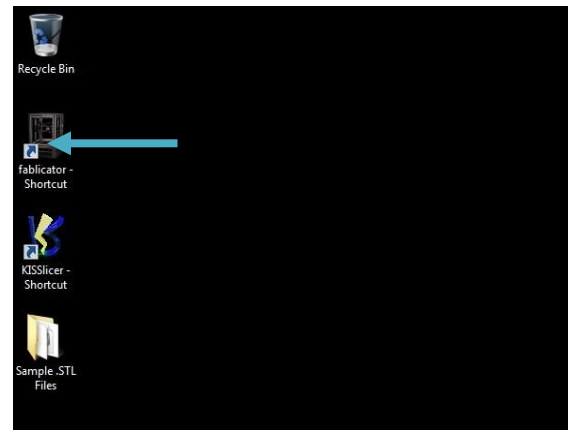
2. Press the **Set** button to the right of the **Extruder Temp** text to set the extruder to 240C. . This will heat up the extruder so filament can be loaded and unloaded.

Caution: **After this step, the tip of the extruder will be extremely hot. Do not touch it.**

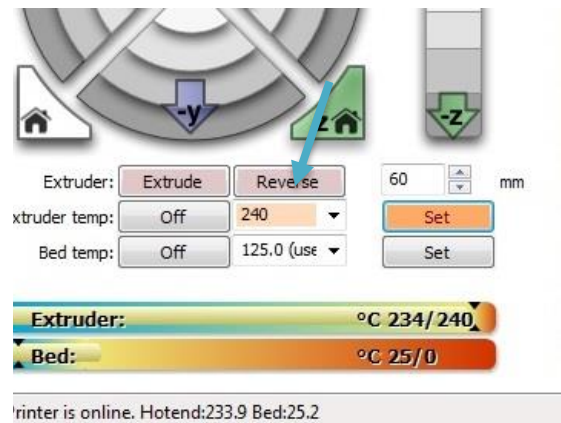
Wait for the Extruder temp to exceed 200 C

3. The extruder temp bar shows the current extrude temperature vs. the set temperature

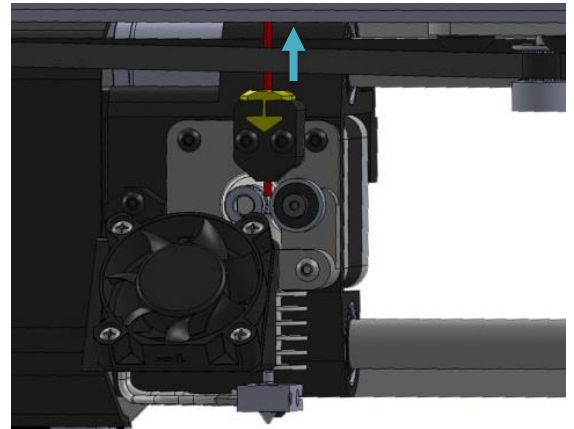
4. Home all axis to make sure the print head is in a convenient position.



5. Press the **Reverse** button which will back out 60mm of filament from the extruder.



6. After the extruder motor stops, lightly pull on the filament and it should come out of the extruder assembly.

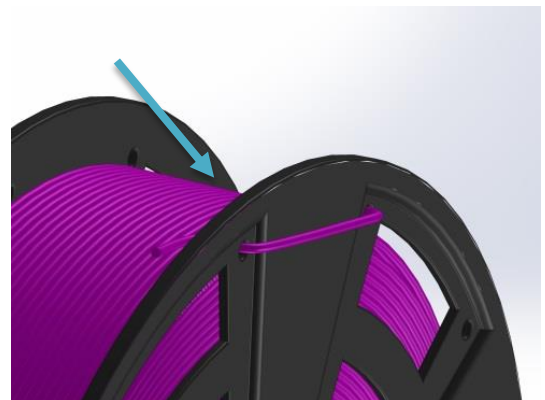


7. Trim the last 4 inches off of the filament so only unmarred plastic is visible.



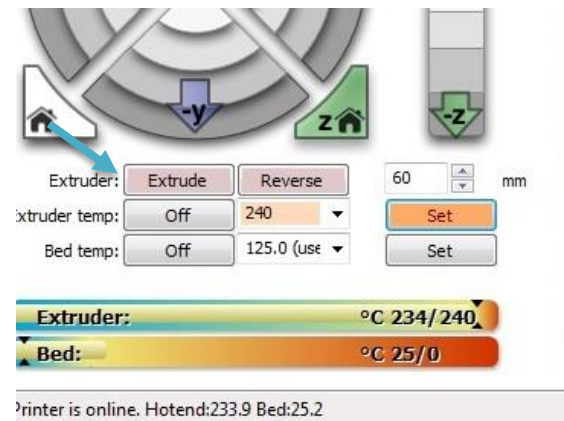
8. Wrap the loose filament back onto the spool and lock the strand through the holes on the side of the spool

**If the end of the filament is loose, it will get tangled on the spool and eventually cause knots.**



9. If you wish to add another spool of filament, now is a good time.

Otherwise, turn off the extruder by pressing the **Off** button next to the **Extruder temp** text.



## Slicing your first part

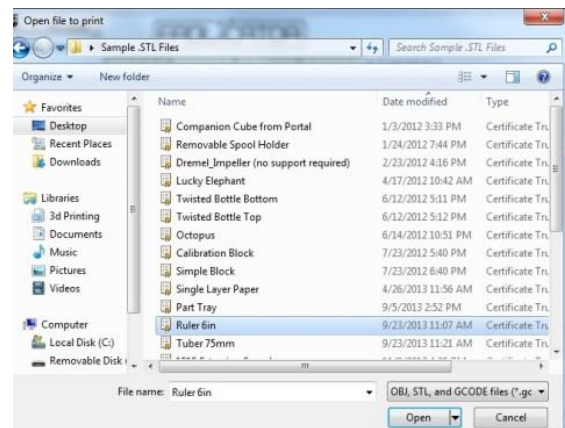
1. Open the **Fablicator shortcut** on the desktop  
This will open the interface to control the Fablicator MX.



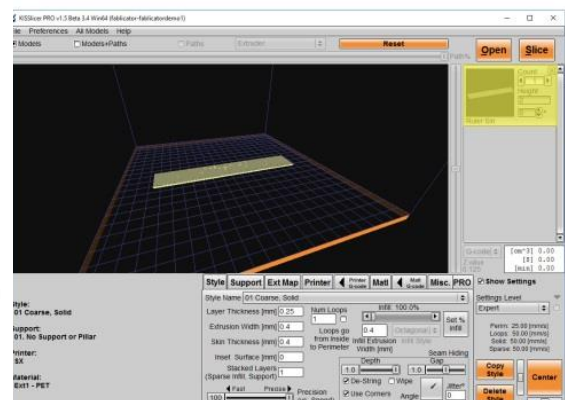
2. Click the **Load file** button in the top left corner  
This will allow you to select a .STL file to prepare it for printing.



3. Select a .stl file (The example we are using is located in **Desktop > Sample .STL Files > Engineering Samples > Ruler 6in .STL**) and click the "Open" button  
This will open the file with KISSlicer.

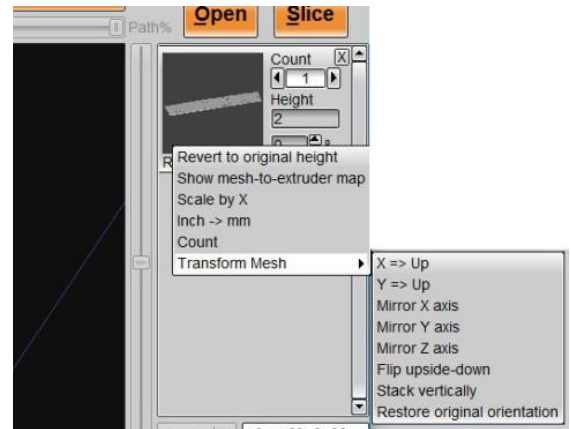


4. Once KISSlicer has loaded, a 3D representation of the part will be visible in the main window. The sample part is a short ruler in this case.  
A Small thumbnail of the part will also be visible in the "part box" on the top right of the screen (highlighted in yellow)



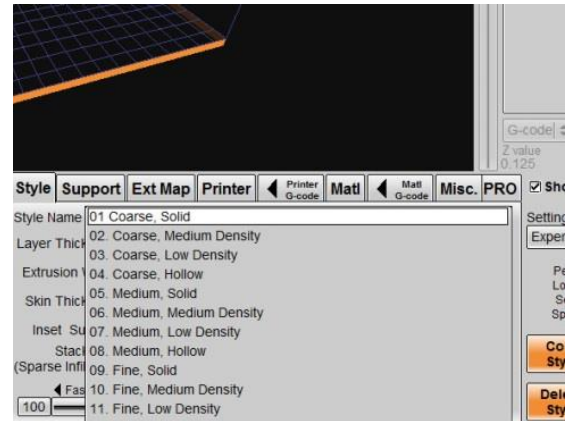


5. A **right click** on the **part box** allows a part to be scaled, multiplied, or transformed (rotated, flipped) if desired.
- Additional parts can be added to the print using the **Open** button.

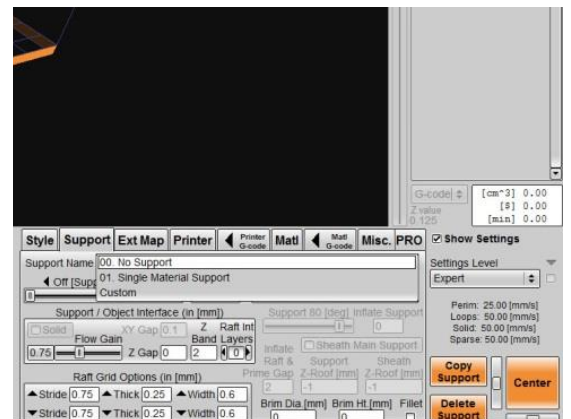


Select the **Style** tab, and set this part to **01 Coarse, Solid** using the drop down menu.

6. The Style primarily changes the layer thickness and infill density of the part.
- Thinner layers and more solid parts take longer to print.

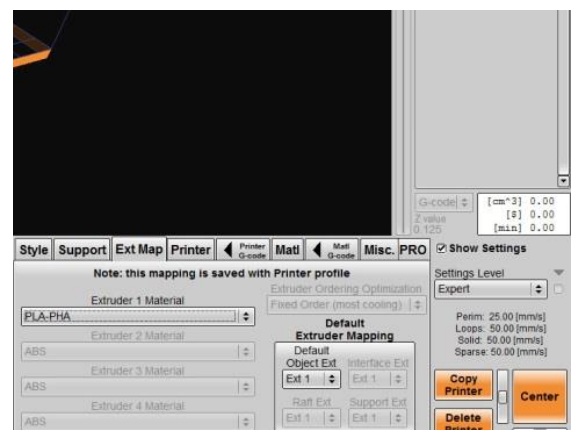


7. Select the **Support** tab, and set this part to 00. No Support



Select the **Ext Map** tab, and select the printing material from the drop down box. We will be printing the sample part in **PLA-PHA**

8. The material set in this window must match the material loaded into the printer. Incorrect material setting will lead to failed prints and potential damage to the printer.





Once all the settings are selected, Click the **Slice** button in the top right corner.

9. Choose a filename and save the file to the desktop to create G-Code for the part. *It is good practice to include the type of material used in the file name for future reference.*

After the file is sliced, you can preview the layers using the paths radio button.

10. You can use the vertical slider on the right side of the preview window to scroll through the layers and see exactly what the printer will do line by line.

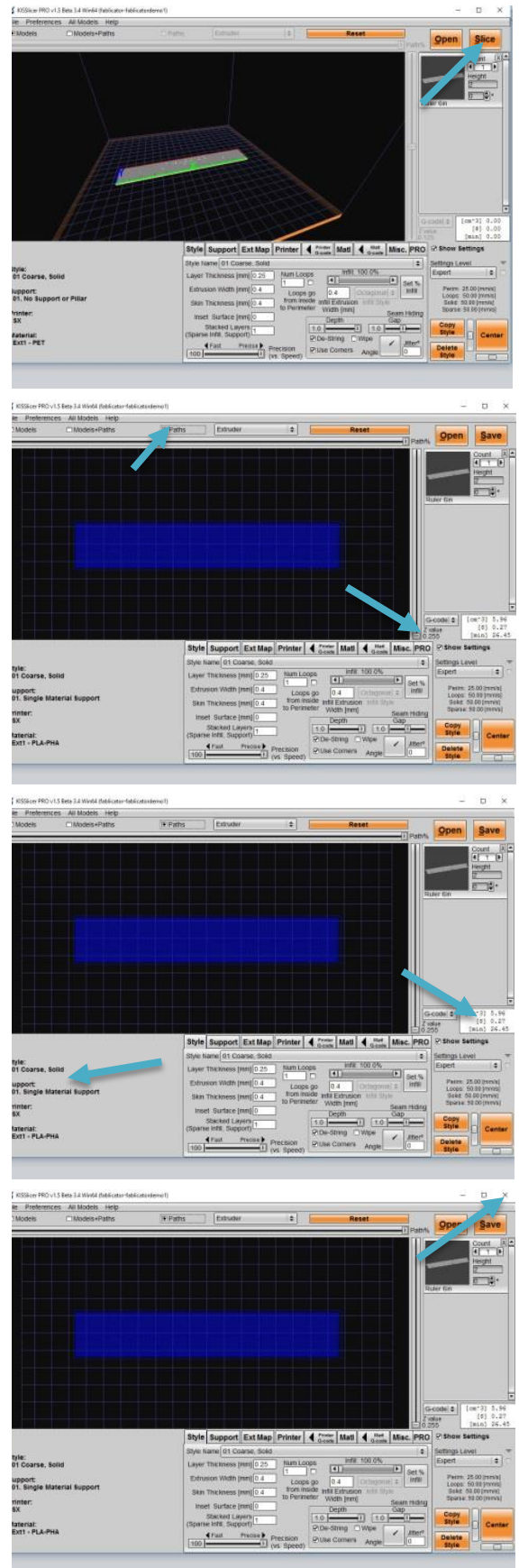
It is recommended to always preview these paths.

There is also a Time, Material Volume, and Cost estimate visible on the right side of the screen

11. Lastly, the settings used to slice your part are visible on the bottom right of the screen.

When done previewing your print, close KISSlicer.

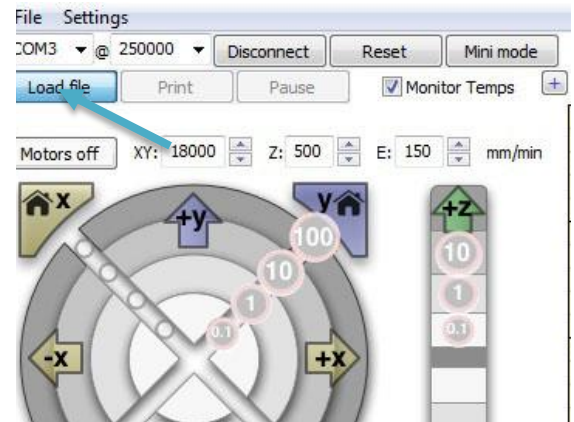
12. You **MUST** close KISSlicer before loading the g-code file into the Fablicator interface



## Printing Your First Part

Open the Fablicator interface, and Click the “Load File” button.

1. Select the G-Code file that was just created, and click Open. In this example it is **Ruler 6in.gcode** unless you renamed the file something else.



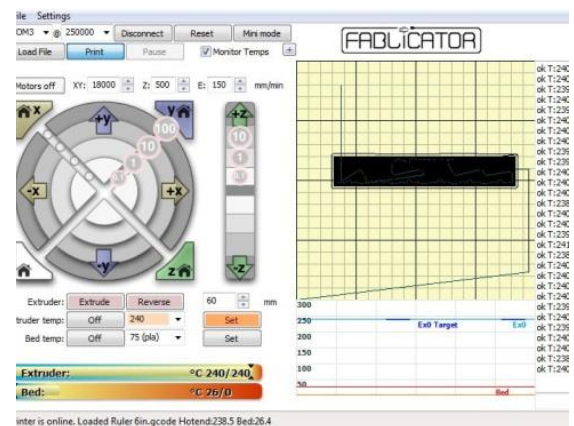
Before starting the print, always apply a thin coat of the primer solution to the print surface. Using a paper towel, apply 1-3 squirts and wipe the bed in a circular motion to achieve an even coat.

2. The bed should still be damp when you finish wiping, and it will air dry within a few seconds. Video of this process can be found at [LINK](#)



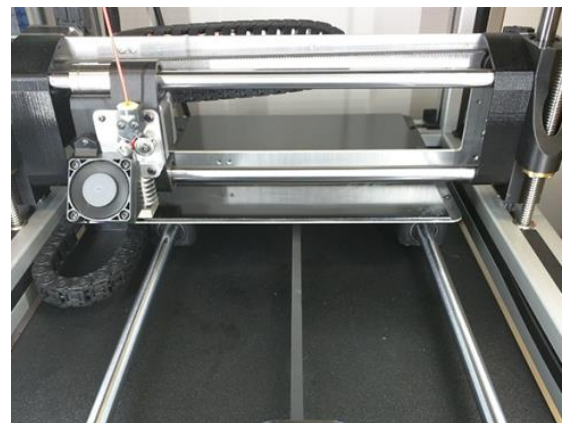
Once the bed is primed and G-Code file loaded, press the **Print** button

3. The Fablicator will automatically home all axis, and move the extruder to a corner of the bed. The printer will also automatically heat up the bed and extruder to the material settings from KISSlicer.



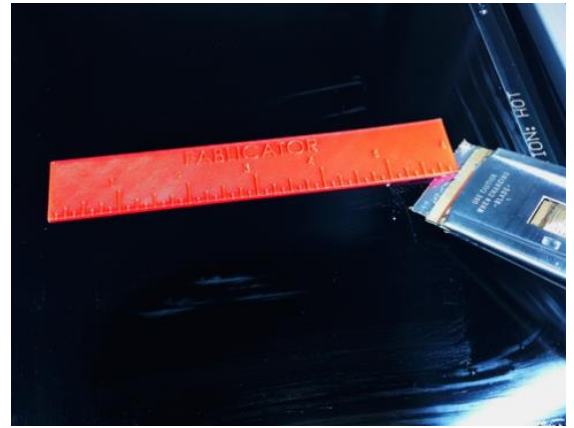
When the bed reaches the target temperature, the print will begin.

4. Once the print has finished, the extruder and bed will turn off automatically.



When the print is complete, wait for the bed to cool down before removing the part with the safety razor, generally the bed should be below 40C. Cooler is better.

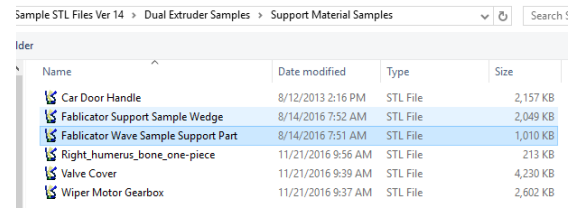
5. If you do not wait for the part to cool down, it may deform when you try and remove it, or be extremely difficult to remove.



## Slice a part for Dual Material Support

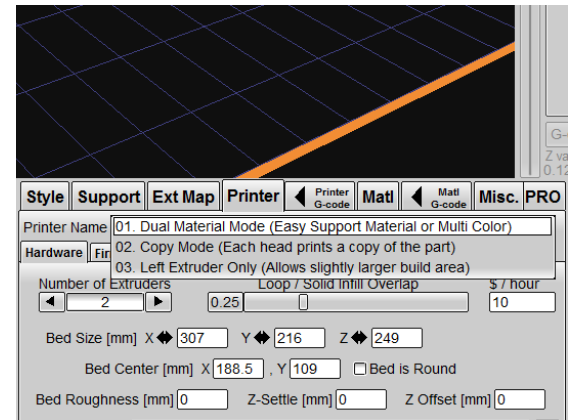
Load the .stl file into KISSlicer.

1. We are loading the sample file on the desktop:  
**Sample STL files> Dual Extruder Samples> Support Material Samples> Fablicator Wave Sample Support part.stl**



Select **01.Dual Material Mode** from the dropdown menu in the printer tab

2. This sets the printer to use both heads for support
- This defaults to build material in extruder 1 (left) and support in extruder 2 (right)

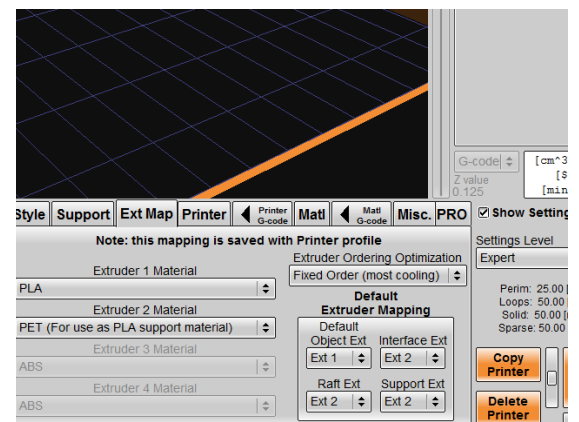


Set your materials under the EXT MAP tab.

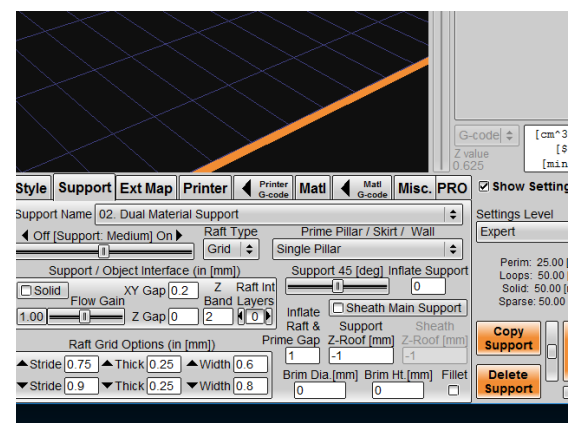
**Extruder 1 as PLA**

3. **Extruder 2 as PET (For use as support Material)**

The best combination for support is using PLA or PLA-PHA as the primary material, and PET as the peel away support

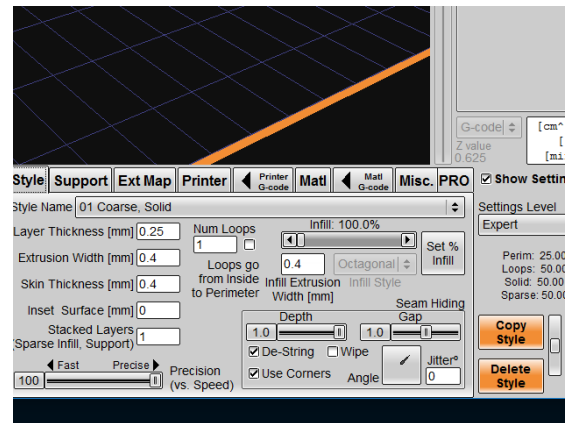


4. Select **02. Dual Material Support** under the support tab drop down menu



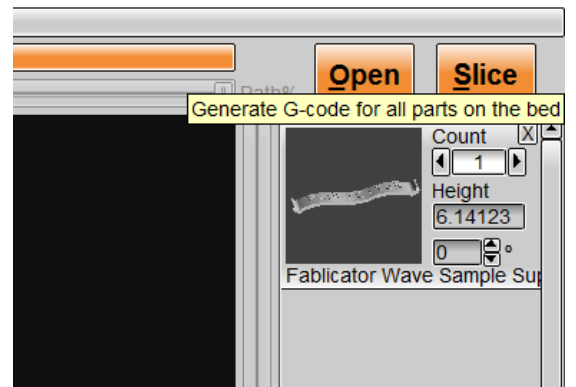
5. Select your desired style setting from the drop down menu under the Style tab.

*The example part will be using 01 Coarse, Solid*

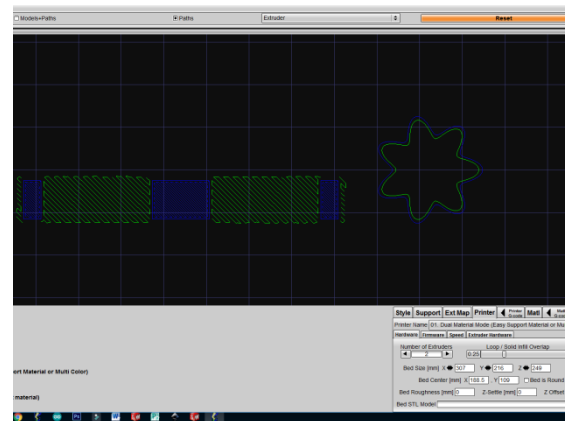


6. Slice and save your part as a .gcode file
- Adding the left and right extruder materials to the file name is a good habit.

Example:  
*Fablicator Wave (Left PLA, Right PET) .gcode*



7. Select the paths radio button to preview the tool paths. Blue is build material, green is support.



8. To print your gcode, make sure the correct materials are loaded into the extruders, and press print as usual.

## Slice a Multi-Color Part

To create a multi-color part, you need two or more .stl files, each representing a different material. They **MUST** share the same coordinate system.

1. Open the location of the files, and select all the files at once by *holding the shift key* and selecting the files with the mouse. Click **Open** when selected.

We are loading the sample file in the desktop folder:  
**Sample STL files> Dual Extruder Samples> Dual Color Samples> Lotus**

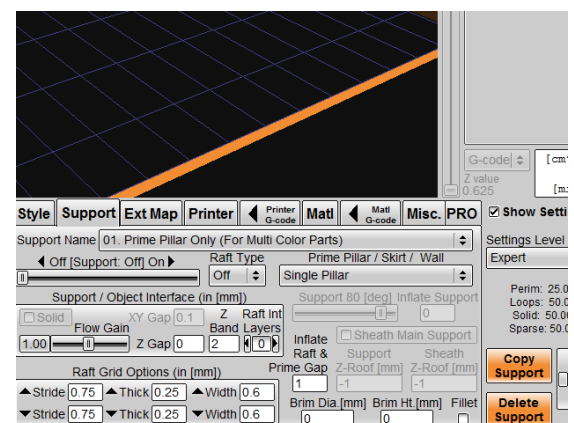
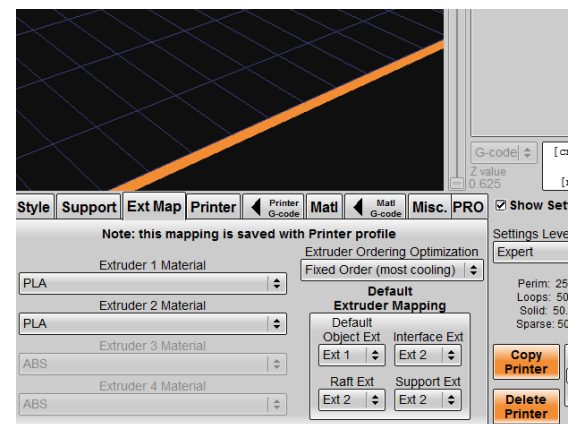
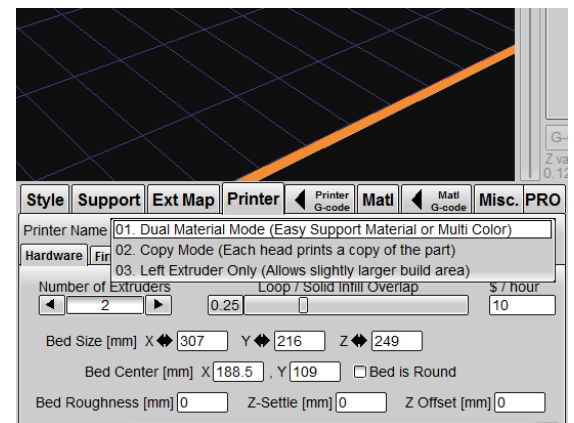
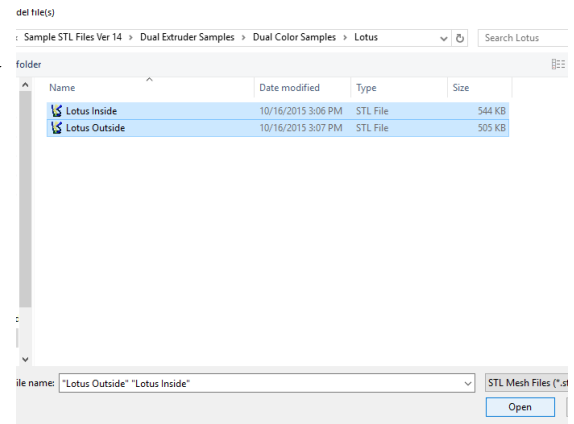
2. Select **01.Dual Material Mode** from the dropdown menu in the printer tab

This sets the printer up to use both heads

3. Set the materials in the Ext Map to their appropriate values.  
It is recommended both material are the same for multi-color parts.

**We are using PLA in both extruders for our example.**

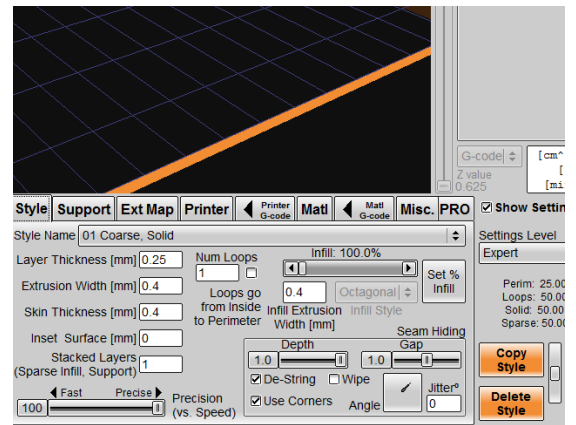
4. Select **01. Prime Pillar Only** from the drop down menu under the support tab.  
This enables the prime pillar needed to purge the heads, but does not generate support material nor a raft.



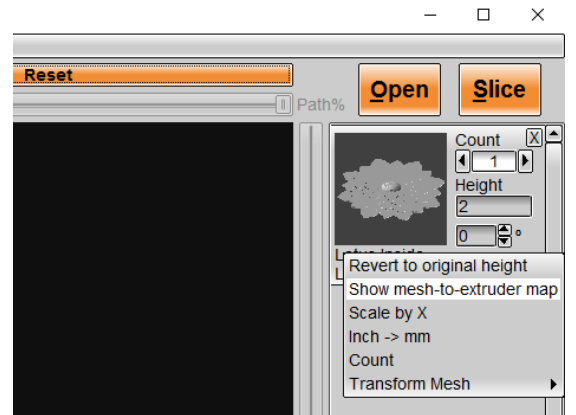


5. Set the style for the part under the style tab dropdown menu.

The example will use **01 Coarse, Solid**



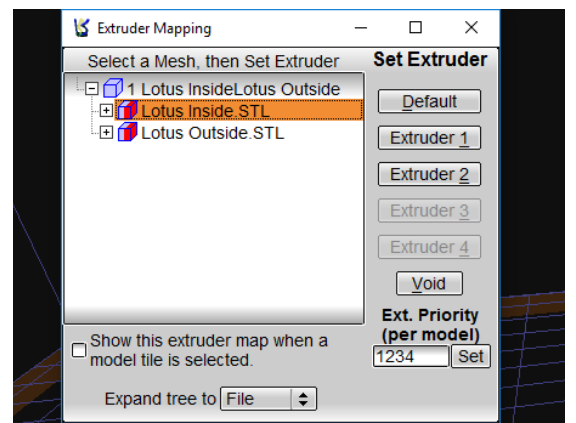
6. To assign the materials to the files, right click the part box, and select **show mesh to extruder map**



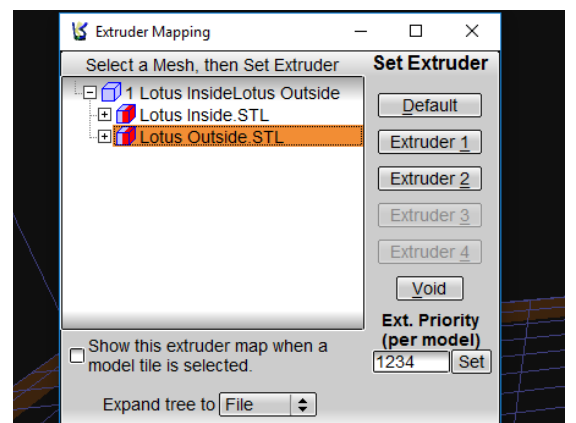
The extruder mapping window links each .stl file to a material.

7. Select the file you want to assign, and click on the appropriate extruder.

Our example is going to assign **Lotus Inside .stl** to **Extruder 1**.



8. Next, assign the second file to the other extruder
- Our example is going to assign **Lotus Outside .stl** to **Extruder 2**.





- Pieces to be printed with extruder 2 (right) are green

- 

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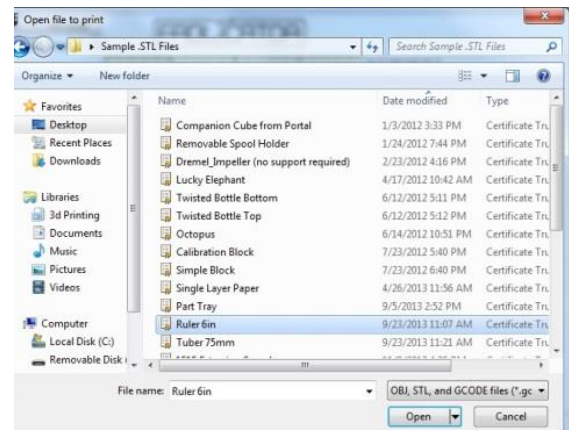
- 12.** To print your gcode, make sure the correct materials are loaded into the extruders, and press print as usual.

## Slicing a part for Copy Mode

1. Copy mode links both extruders together, and creates two single material copies of a part using the same materials.

Copy mode can only make parts up to 7in wide.

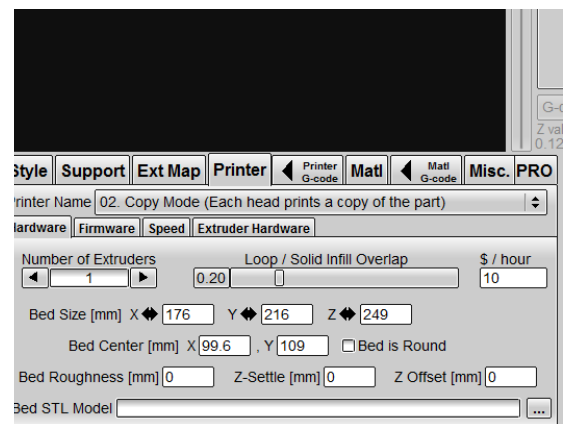
2. Select a .stl file (The example we are using is located in **Desktop > Sample .STL Files > Engineering Samples > Ruler 6in .STL**) and click the “Open” button. This will open the file with KISSlicer.



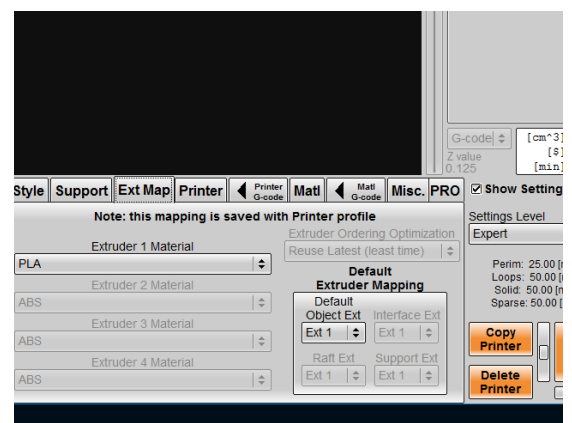
Select the Printer tab, and choose 02. Copy Mode from the drop down menu

3. The print bed will change in size to  $\frac{1}{2}$  of the full bed size.

Whatever is on the half size bed will be doubled on the second extruder automatically.

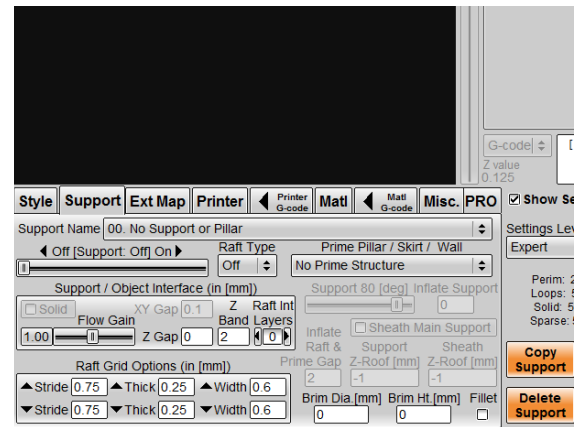


4. Select the **Ext Map** tab, and select the printing material from the drop down box. We will be printing the sample part in **PLA**



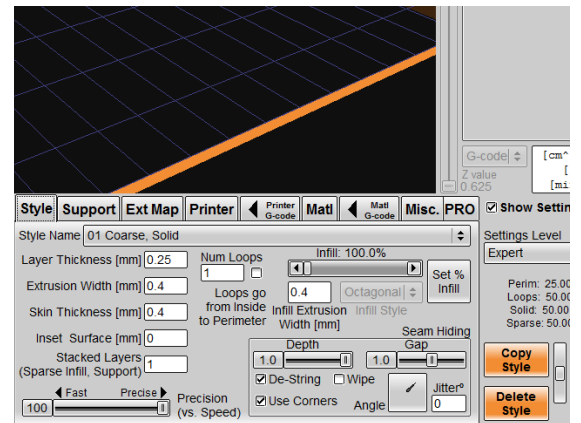
Select either **00 No Support** or **03 Single Material Support** from the support tab.

5. Our example uses **00 No Support**.

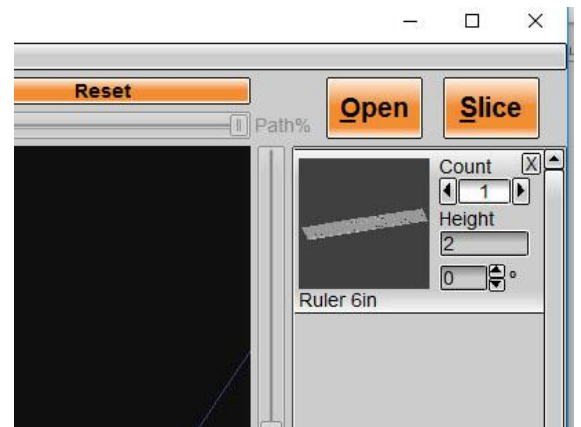


6. Set the style for the part under the style tab dropdown menu.

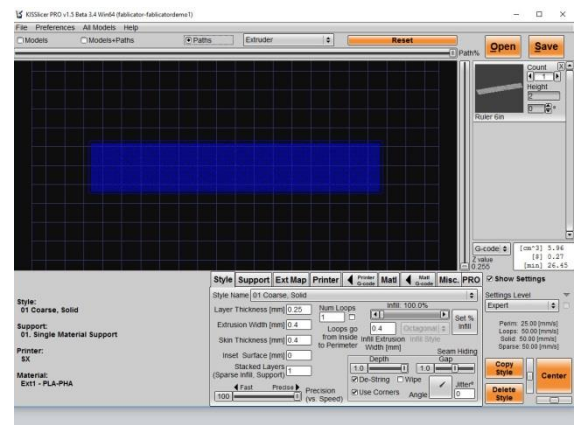
The example will use **01 Coarse, Solid**



7. Slice and save the g-code file when ready.



8. Use the paths radio button to preview the tool-paths.



9. To print your gcode, make sure the correct materials are loaded into the extruders, and press print as usual.

## Extruder Problems

If filament is not exiting the extruder while printing or manually extruding, you likely have a problem with the extruder.

1.

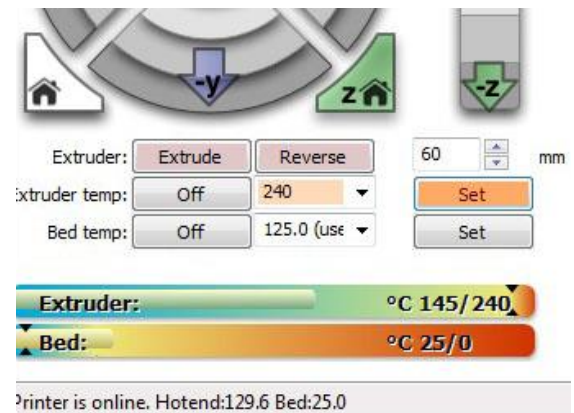
If the filament extrudes fine in air, but makes a clicking sound when printing the first layer of a part, it is most likely a bed leveling issue instead. *See the section on bed leveling and calibration*



First, check that the nozzle is heating up. Set the temperature within the Fablicator interface to 240 and see if it rises from room temperature.

2.

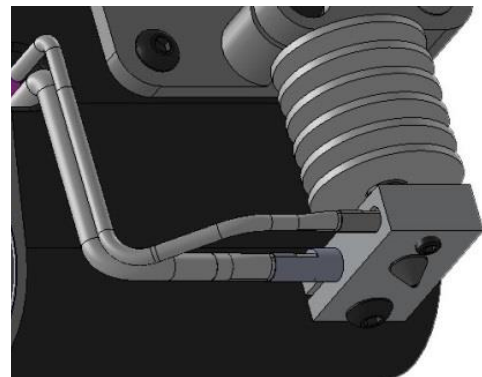
If no change is seen on-screen, physically check to see if the heater block is getting hot. Pressing a piece of filament onto the side of the block is a good way to tell.



If the heater block is hot, but the software says it's cold, the PT100 temperature sensor is likely to blame.

3.

Check the PT100 connections at the extruder and computer case. If the connections seem OK, replace the PT100 sensor.

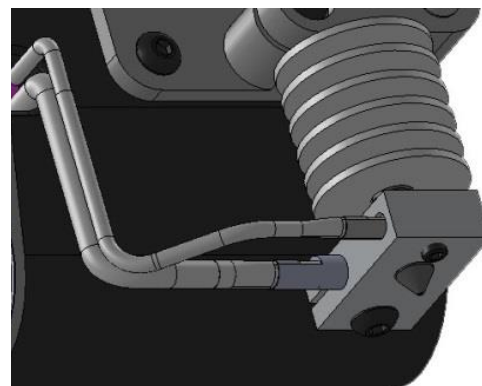


If the heater block is still cold, the problem is likely the heater cartridge or controller board.

4.

Check the heater cartridge connections in the extruder and at the case. If the connections look OK, test the resistance of the heater cartridge and wires leading to it.

A functioning cartridge should have a resistance of ~3.5 ohms.



If the heater cartridge is very high or low resistance, replace it.

5.

If the heater cartridge resistance is OK, replace the controller board.

The second thing to check is that the cooling fan is spinning and not obstructed by dirt or other debris.

6.

Clean excessive debris and/or check the fan's connection. A stopped fan will likely need to be replaced.

Third, check the entrance to the nozzle between the idler and drive wheel. If a small piece of filament or other foreign object is bent over the nozzle entrance new material will not be able to get past it.

7.

Remove the obstruction as necessary. The idler, fan shroud and drive wheel may need to be removed for easy access to this area.

8.

If all of the above are OK, you most likely have an extruder clog.

## Clearing an Extruder Clog

There are two main types of extruder clogs

1. Debris or charred filament can be blocking the tip of the nozzle (most common)
2. A piece of filament has gotten wedged in along the feed path

First, remove the filament from the extruder by heating the nozzle up and pressing reverse within the Fablicator interface.

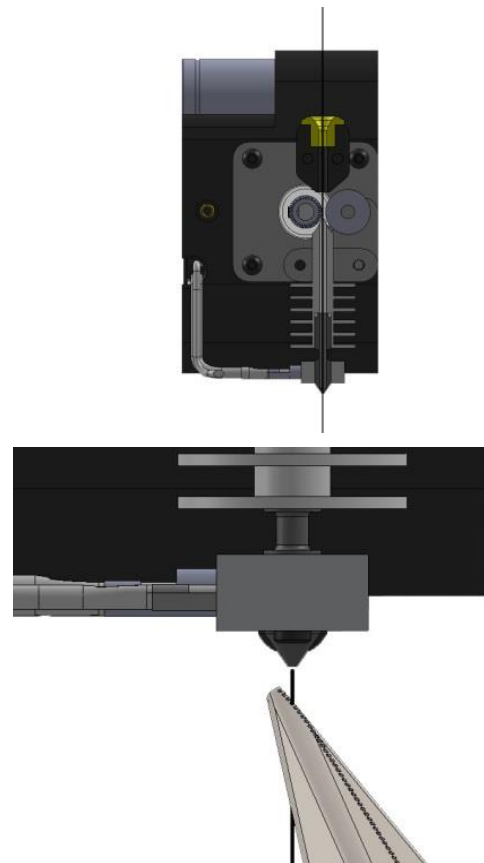
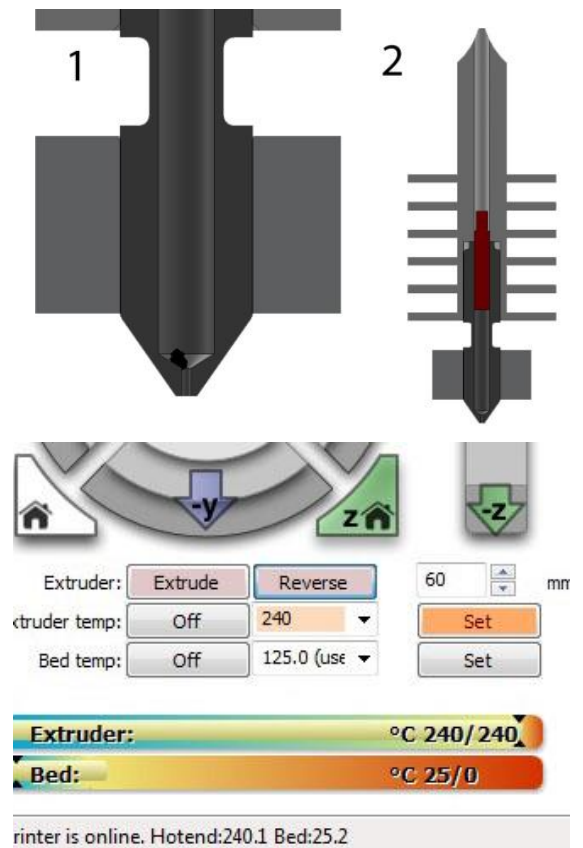
If the filament breaks off rather than pulls out normally you likely have a piece of wedged filament.

3. Try feeding a piece of the .012" music wire from the tip of the nozzle to the top of the extruder.

Use small pliers to hold the wire a short distance from its end.

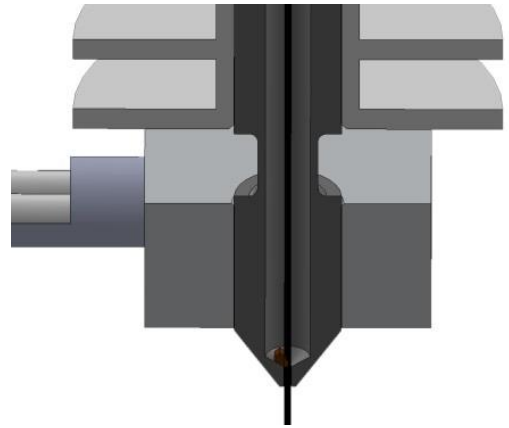
4. A small bit of force may be needed to get the wire past the first 1/16" of the nozzle

Be very careful to prevent the wire from bending.

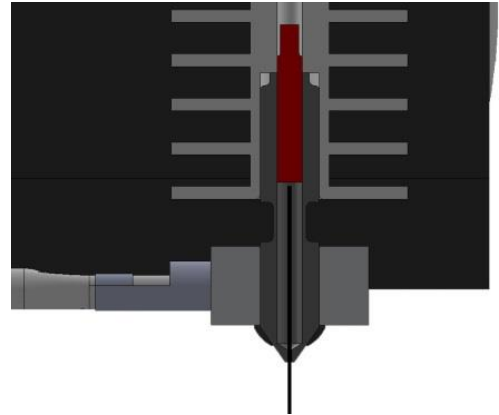




5. If the wire easily passes through the entire metal body of the nozzle assembly, there is probably a small piece of debris blocking the nozzle.



6. If the wire stops partway up the metal extruder body, there is probably a piece of wedged filament blocking its path.



7. If you can't get the wire into the nozzle tip at all, let someone else have a try. It can be a little tricky, but is a critical step.

*If the wire cannot be fed into the nozzle, the tip of the nozzle may be damaged and need replacement.*

## Wedged Filament removal

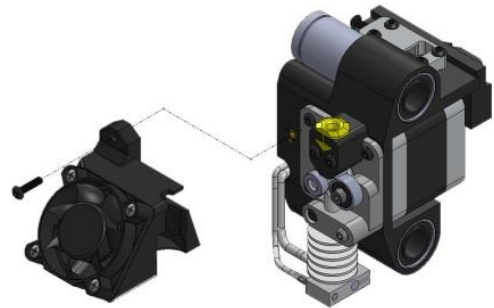
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1. Once determined you are dealing with a piece of wedged filament, there are two methods to get it unstuck.

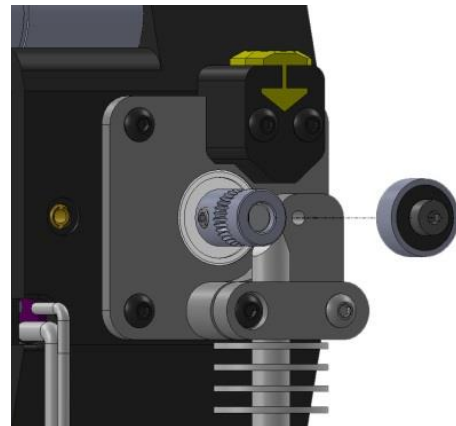
First, remove the fan shroud

2. Remove the screw, and tilt the shroud out of the way.

Be careful, as the fan wire will remain attached.

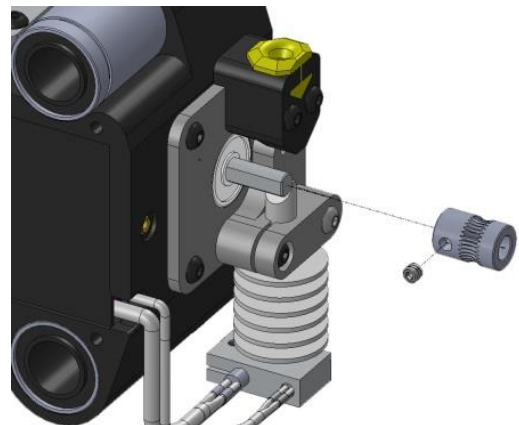


3. Second, remove the idler wheel using the 2mm hex key



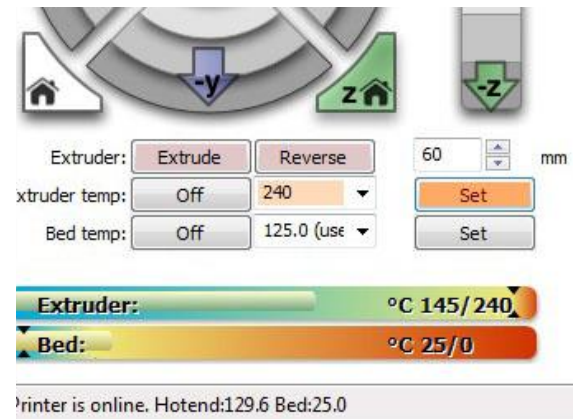
Third, Remove the filament driver (attached with a grub screw using a 1/16" allen key included in the startup kit)

4. You may need to use the front EXT disable switch to allow manually moving the drive wheel, and then rotate the driver so the set screw is at an easy to access position



5. Make sure the fan shroud is not in contact with the nozzle heater block. A piece of tape is suggested to hold it out of the way.

Then heat up the extruder in the Fablicator interface



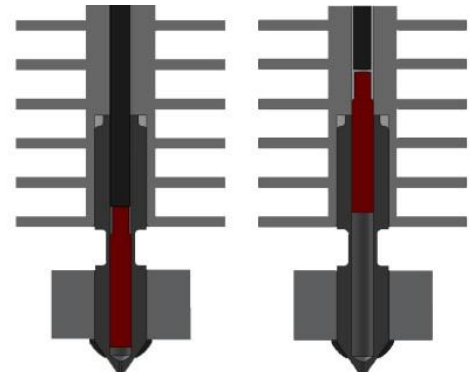
6. Using the long arm of the 1/16" Allen key, push down hard on the key to attempt to dislodge the filament. The Allen key is highlighted in red for clarity

Lightly tapping the Allen key with a hammer may be of assistance.



7. If the filament starts to push down into the nozzle continue until the clog has passed and is re-melted in the nozzle tip.

Some plastic should exit the tip.

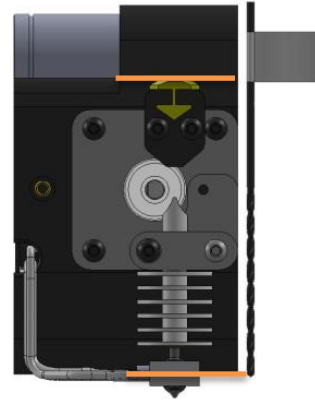


8. If the clog will not budge, using an extra-long 5/64" drill bit may be necessary.



9. Mark the drill bit with tape to below its maximum insertion depth as shown.

Going too far risks cutting into the tip of the nozzle.



Carefully drill down into the filament, removing 1/8 to 1/16 inch of plastic before removing and cleaning the bit.

10. Pulling the bit out of the nozzle and cleaning off the built up plastic is crucial.

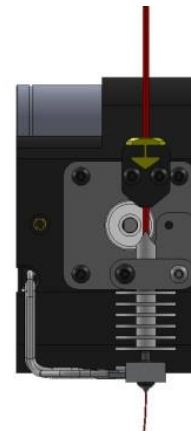
**DO NOT EXCEED THE DEPTH MARKED WITH TAPE**



Once the filament path is all clear, heat up the nozzle in the Fablicator interface and manually push filament down into the nozzle before doing any

11. reassembly.

The filament should flow easily.

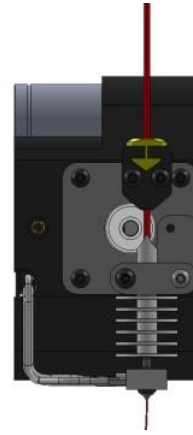


If not, you may have additional debris blocking the nozzle tip.

12. *Continue with cleaning a blocked nozzle tip.*

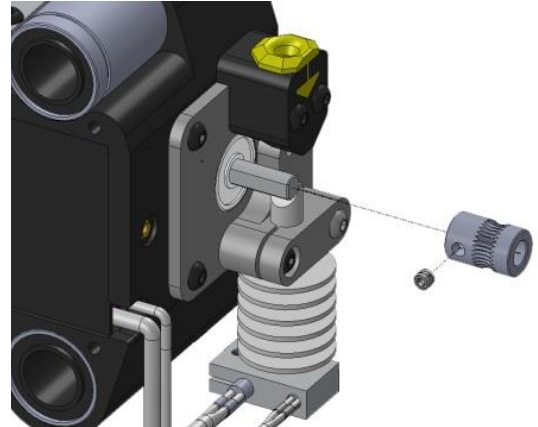
If everything appears to be flowing nicely, reassemble the extruder.

13. To reassemble the extruder, pull the filament out of the nozzle while the extruder is hot.

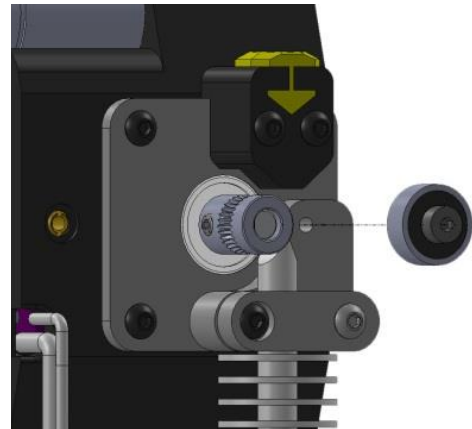


Reattach the filament driver. (the side with the set screw should be closest to the motor)

14. **Align the flat on the extruder motor with the set screw on the filament driver.** *You may need to use the front EXT disable switch to allow manually moving the drive wheel, and then rotate the driver so the set screw is at an easy to access position*

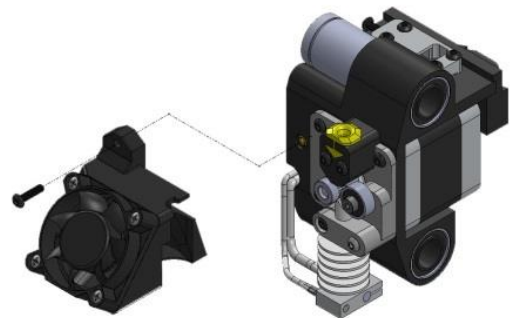


15. Now reattach the idler wheel.



Reattach the cooling fan and shroud.

16. The fan tilts in around the extruder heat sink.  
Do not allow the wires to be pinched on the side of the shroud when reassembling.

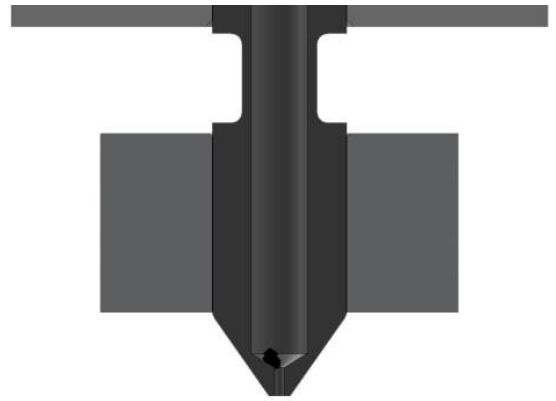


17. After double checking the Driver set screw, idler screw, and fan shroud screws are all snug, the extruder is ready to be used again.

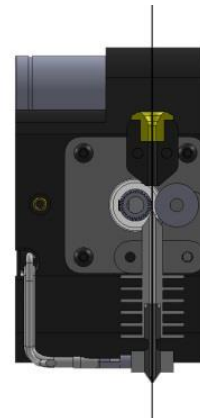


## Cleaning a blocked nozzle tip (simple method)

1. With some luck, there is a quick way to remove the debris from the Fablicator nozzle tip.

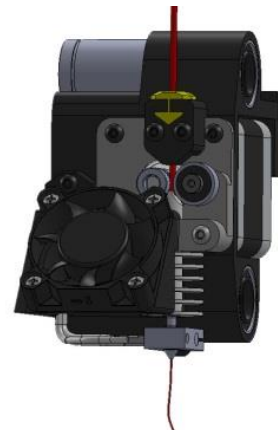


2. First, heat the nozzle to 240C and pass the music wire completely through the nozzle from the tip through the inlet.



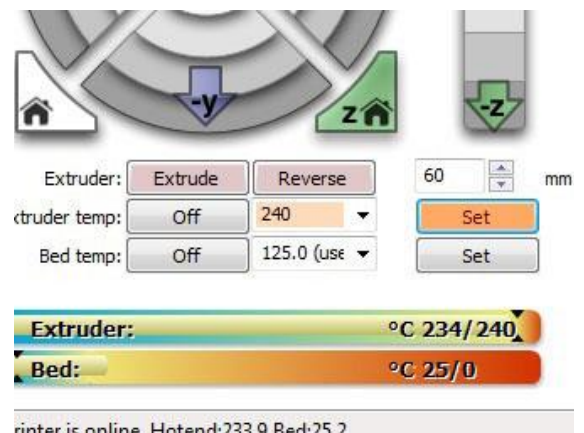
Next, load PLA or PLA/PHA filament into the extruder as normal.

3. Extrude the material until it exits the tip and/or you hear a clicking sound from the extruder typical of a clog.



Even if the extruder seems to be working fine at this point, please continue.

4. Turn the extruder heater off.





5. Press the disable motor switch on the front of the machine marked EXT.

The yellow LED should be illuminated.



Wait for the extruder temperature to reach 90C.

6. AS SOON AS the temperature reaches 90C, pull up on the filament and manually remove it from the extruder in a firm, but not violent, manner.

7. Ideally, the filament should have a bit of a cone shaped tip to it, and may have a black or discolored tip which indicates you have removed some of the material blocking the nozzle.

8. If the nozzle does not have a cone shaped tip, reheat the extruder, turn off the extruder disable switch, and re-load fresh filament.

9. Repeat steps 3-8, slightly varying the temperature when you pull the filament out (maybe 80c or 85c)

Once an approximately cone shaped tip is visible, re-heat the extruder

10. *If you are unable to get the cone shaped tip after a few tries, skip to step 12.*

*If a clog persists, try the involved method in the next section*

11. Feed the music wire from tip to entrance one last time.

12. Make sure the disable switch is no longer activated (no yellow LEDs) and load fresh filament as usual

Press the extrude button a few times to ensure filament is extruding freely.

13. You may need to repeat this method a few times to completely remove a tough clog.

*If a clog persists, you can continue to the involved method in the next section*

## Cleaning a blocked nozzle tip (involved method)

---

1. First, remove the fan shroud
2. Second, remove the idler wheel
3. Third, Remove the filament driver (attached with a grub screw using a 1/16" allen key included in the startup kit)

- Make sure the fan shroud is not in contact with the nozzle heater block. A piece of tape is suggested to hold it out of the way.
- 4.

Then heat up the extruder in the Fablicator interface

1. Try and feed a piece of the .012" music wire from the tip of the nozzle to the top of the extruder.

If you encounter resistance, use small pliers to hold the wire a short distance from its end.

2. A small bit of force may be needed to get the wire past the first 1/16" of the nozzle

Be very careful to prevent the wire from bending.

If you can't get the wire into the nozzle tip at all, let someone else have a try. It can be a little tricky, but is a critical step.

- 3.

*If the wire cannot be fed into the nozzle, the tip of the nozzle may be damaged and need replacement.*

Once the wire has been fed through the extruder, guide the long 5/64" drill bit into the extruder nozzle and gently spin it between your fingers. Until you meet resistance.

- 4.

Do not apply a large amount of force to the bit. We only want to remove the excess filament and contaminants, not drill into the metal of the extruder.

- Remove the drill from the extruder, and clean off the removed filament.
- 5.

Be careful, the drill tip and filament will be hot.

- Insert the music wire again, and repeat steps 4-6 a few times until it appears all the molten filament has been removed from the nozzle tip.
- 6.

- Manually add new filament into the nozzle and try pushing it through with your fingers. If it still feels blocked, remove the filament and repeat steps 1-6 again.
- 7.

*If both the simple and involved methods fail to fix a clog, please contact Fablicator technical support.*