ZONESTAR

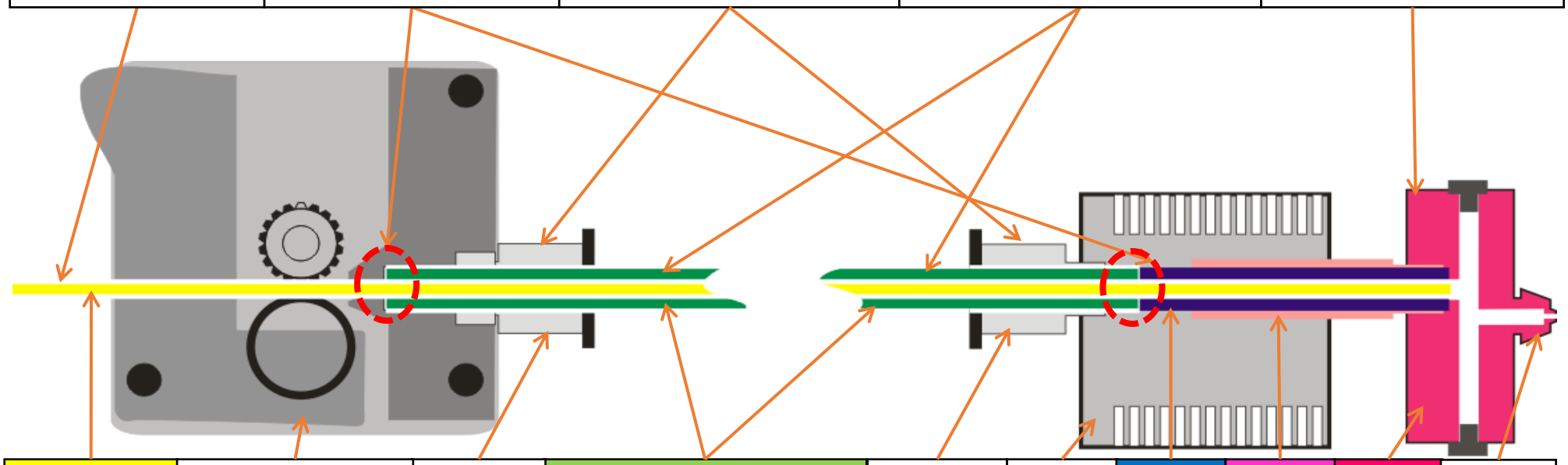
Mix Color HOTEND
User Guide

Ver: 1.0

About Extrusion System

Structure Of Extrusion System

NOTICE				
Cut the end of filament as a bevel before feed-in.	Insert the PTFE tube to the bottom as far as possible	Remove the fitting first if the filament can't be inserted.	Minimize the length of the guide and prevent deformation to reduce feed resistance	Before loding or unloding filament, preheat the nozzle to over 180 degrees.



Fialment	Extrusion feeder	Fitting	Filament Guide (PTFE tube)	Fitting	Heat sink	Inner PTFE	Throat	Heat Block	Nozzle

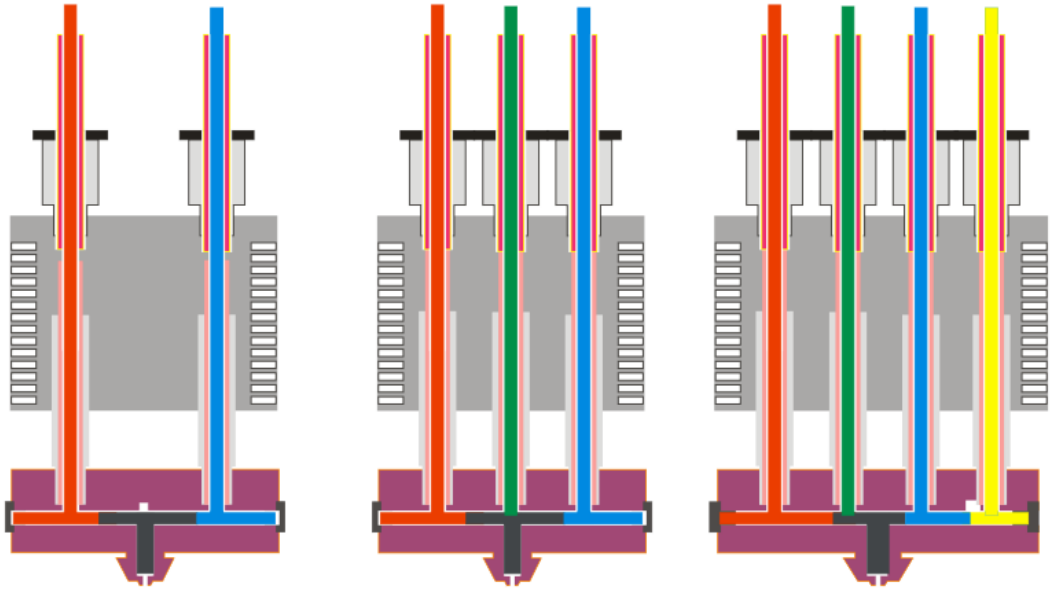
Extrusion feeder → Filament guide → HOTEND

About The Mix Color HOTEND

Color mixing principle and several important matters

- 2~4 filaments are fed into the HOEND by extrusion feeder, they are melted in the heat block and mix together and then flow out from nozzle. By adjusting the ratio of incoming filaments, we can get different color filament from the nozzle.
- Since the individual channels are ultimately connected, the filament may flow backwards into the empty channel, which can cause clogged the empty channel. Therefore, we must insert filament or use "HOTEND cleaning tool" to close the empty channel to prevent the melted filament to reflux.
- There is a color mixing space inside HOTEND, when switching extruder, it does not immediately switch to the desired color, we must consider how to solve this issue. In addition, it will cause “Retraction” to become less effective.
- PC04-M6 fitting is easy to break,do not use a wrench to tighten it.

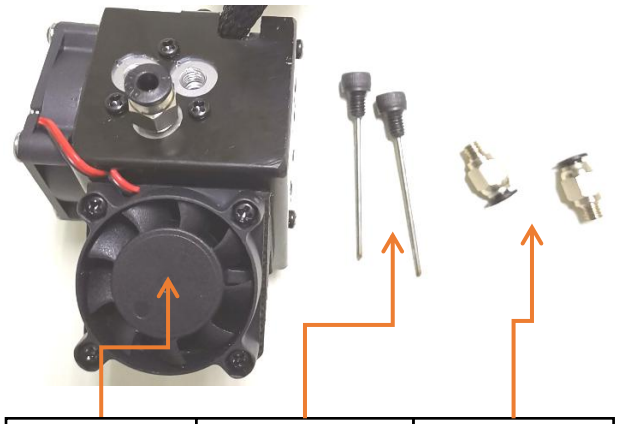
Note: Since the operation and principle of M2, M3 and M4 are basically the same, the following guide are all based on M3.



M2 M3 M4

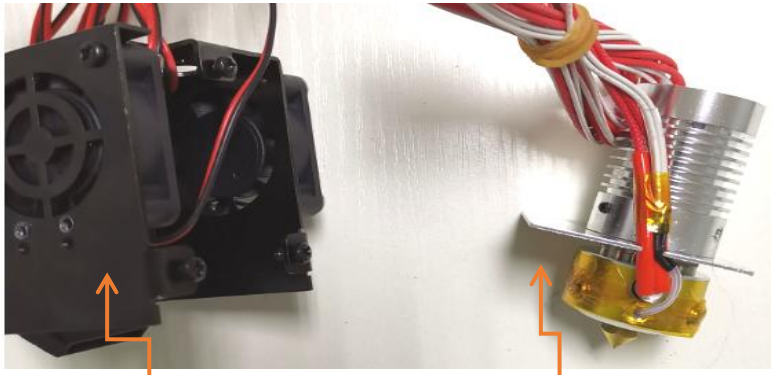
About the HOTEND Parts

The image below is the latest version, the old version may be different.



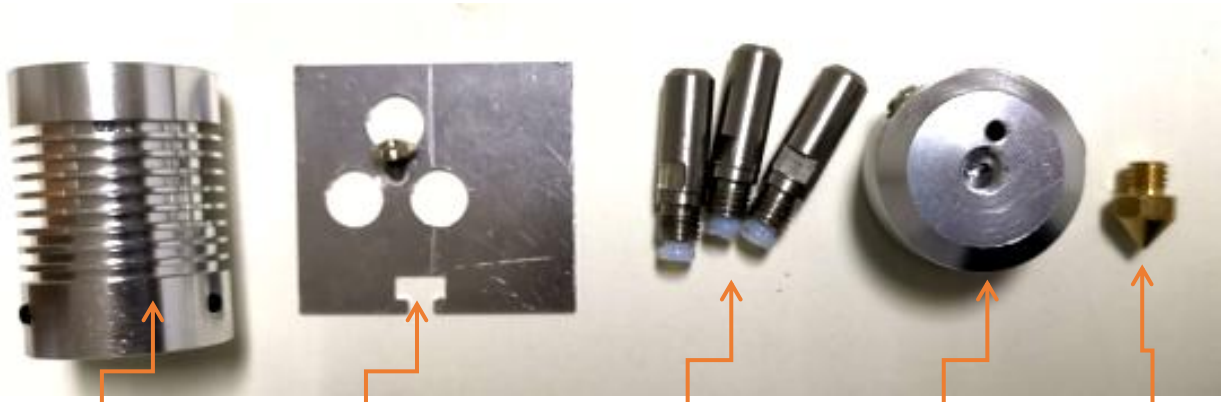
HOTEND | HOTEND CLEAN TOOL | Fittings

Nozzle | HOTEND Cool FAN | Fialment Cool FAN



Housing of HOTEND | HOTEND

HOTEND



Heatsink | Fan Shield | Throat (MK10) | Heat Block | Nozzle

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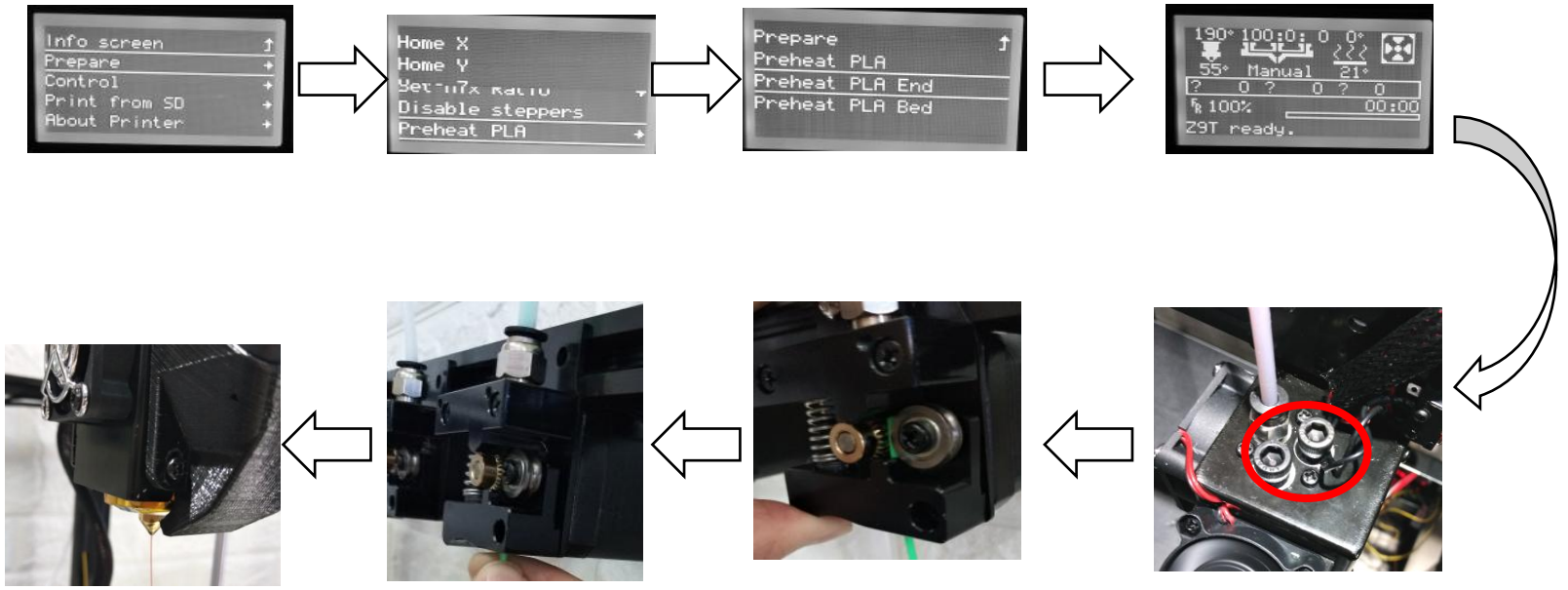
How to Load filament

Step1: Preheat Nozzle, ***Prepare>>Preheat PLA>>Preheat PLA End***

Step2: Waiting for nozzle to reach setting temperature, install“**HOTEND CLEAN TOOL**" to close unused channels.

Step3: Insert filament to extrusion feeder (press the handle when insert filament).

Step4: Feed filament to hotend, until you can see the filament is flowed out from nozzle.



How to Unload filament

Steps to unload filament

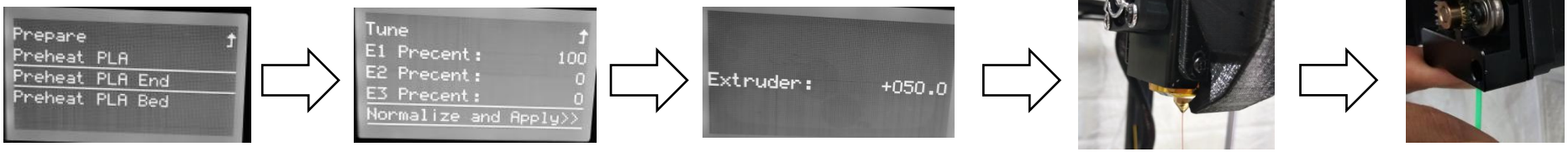
Step1: Preheat Nozzle, ***Prepare>>Preheat PLA>>Preheat PLA End***

Step2: Set the mix ratio, which channel you need to unload, set it to 100, and set others to 0%, for example you want to uload filament from #2 extruder.

Prepare>>Set Mix Ratio>>
E1 Percent: 0
E2 Percent: 100
E3 Percent: 0
Normalize and Apply>>***Do it to apply the setting***。

Step3: Extrude 50mm filament first, ***Prepare>>Move axis>>Extruder>>Move 1mm>>Extruder:50mm***

Step4: Press the handle of the exxtrusion feeder, and then pull out the filament。



Steps to unload broken filament

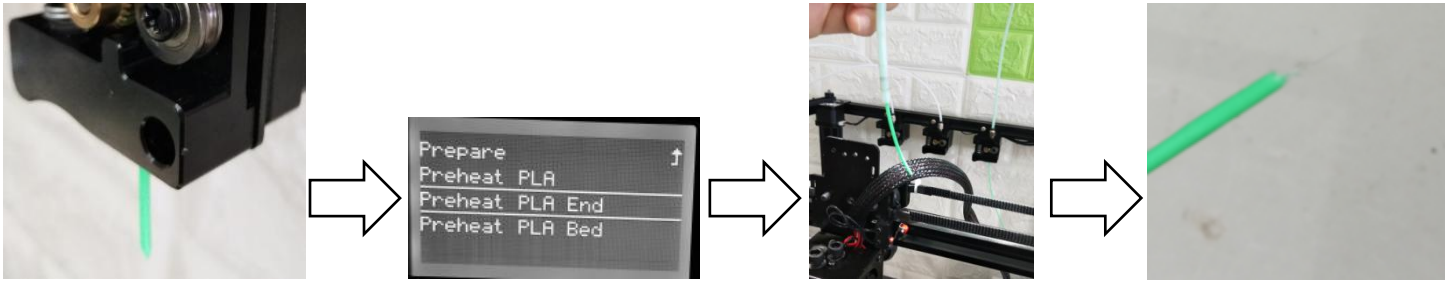
If there are broken filament in the filament guide, you need to remove these filament before load new filament, steps as following:

Step1: Preheat Nozzle

Step2: Srew down the fitting.

Step3: Pull out the filament.

Step4: Install the fitting again.



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How to load filament to one of the channels

Step1: Connect one extrusion feeder and HOTEND with one filament guide tube, load filament, confirm that the filament have been fed into the HOTEND , and close the other unused channels with **HOTEND CLEAN TOOLs.**

Step2: Turn on power and click the knob to open LCD menu.

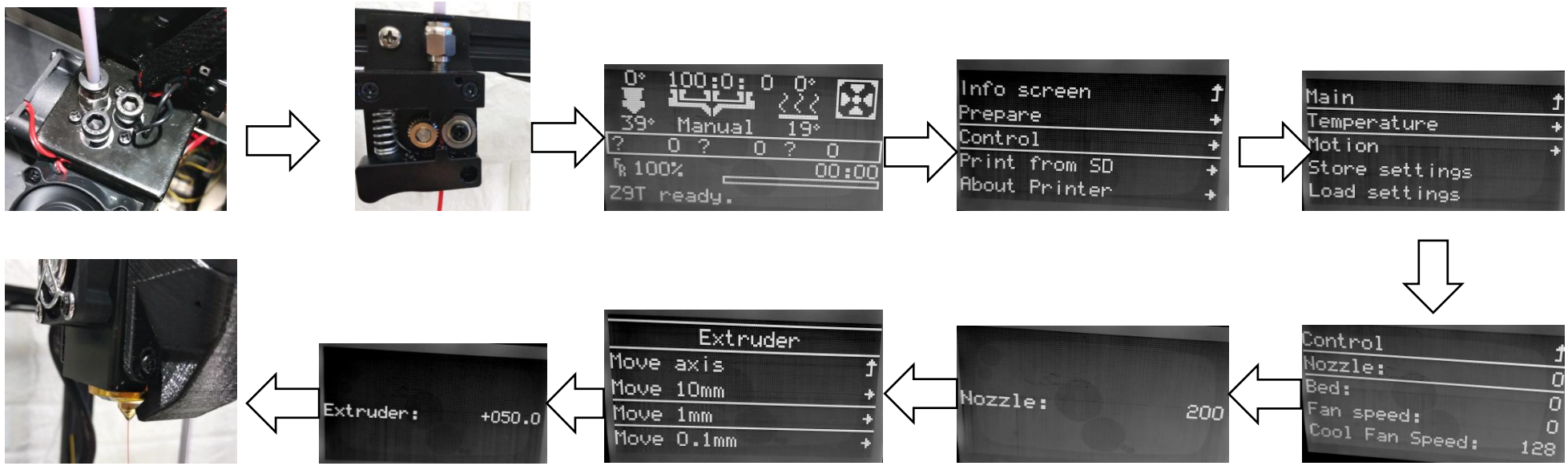
Control>>temperature>>Nozzle, set the nozzle temperature to 200 degrees.

Step3: Waiting for nozzle temperature to reach 200 degrees, start testing whether the extrusion work well.

Prepare>>Move axis>>Extruder>>Move 1mm>>Extruder: +XXX.0mm (10mm each time)

Observe whether the nozzle has a filament flow out, and continue to extrude 50mm after it flow out.

Step4: Test other channels in the same way.



Note: Unused channels must be closed with HOTEND CLEAN TOOL, otherwise HOTEND is easy to be clogged.

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How to load filament to two channels at the same time

Step1: Connect two extrusion feeders and HOTEND with two filament guide tube, load filament, confirm that the filament have been fed into the HOTEND , and close the unused channels with **HOTEND CLEAN TOOLs.**

Step2: Turn on power and click the knob to open LCD menu.

Control>>temperature>>Nozzle, set the nozzle temperature to 200 degrees.

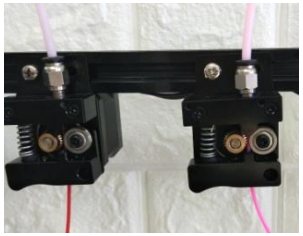
Step3: Set Mix Ratio

Prepare>>Set Mix Ratio>>
E1 Percent: 50
E2 Percent: 50
E3 Percent: 0
Normalize and Apply>>***Do it to apply the settings***。

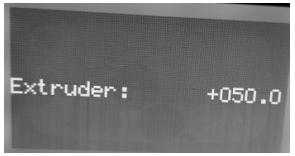
Step4: Waiting for nozzle temperature to reach 200 degrees, start testing whether the extrusion work well.

Prepare>>Move axis>>Extruder>>Move 1mm>>Extruder: +XXX.0mm (10mm each time)

Observe whether the nozzle has a filament flow out, and continue to extrude 50mm after it flow out.





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How to load filament to three channels at the same time

Step1: Connect three extrusion feeders and HOTEND with three filament guide tube, load filament, confirm that the filament have been fed into the HOTEND, (and close the unused channels with **HOTEND CLEAN TOOL).**

Step2: Turn on power and click the knob to open LCD menu.

Control>>temperature>>Nozzle, set the nozzle temperature to 200 degrees.

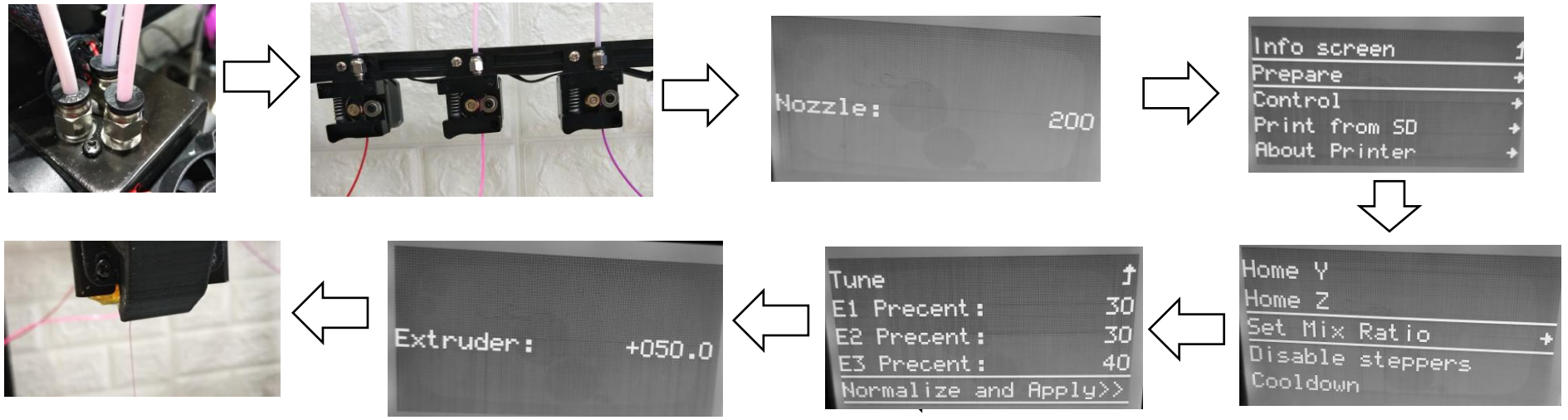
Step3: Set Mix Ratio

Prepare>>Set Mix Ratio>>
E1 Percent: 30
E2 Percent: 30
E3 Percent: 40
Normalize and Apply>>***Do it to apply the settings***。

Step4: Waiting for nozzle temperature to reach 200 degrees, start testing whether the extrusion work well.

Prepare>>Move axis>>Extruder>>Move 1mm>>Extruder: +XXX.0mm (10mm each time)

Observe whether the nozzle has a filament flow out, and continue to extrude 50mm after it flow out.



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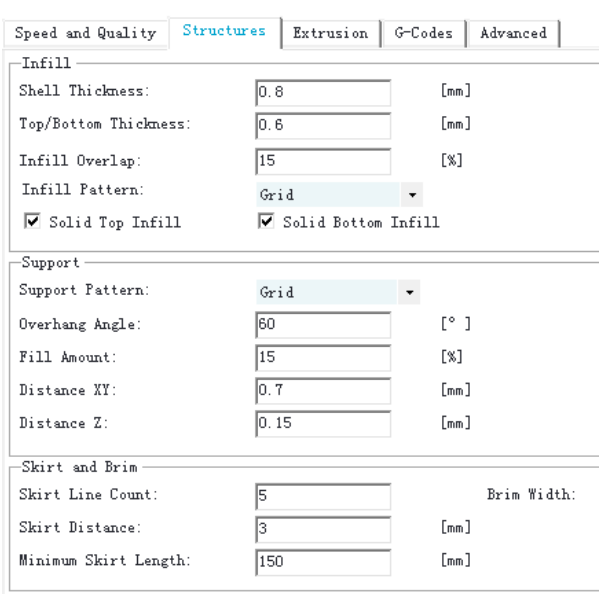
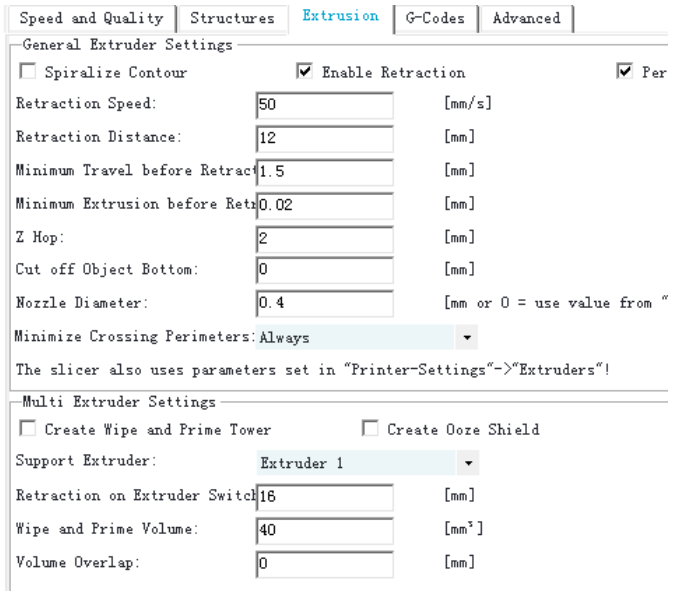
Single color printing test and slicing settings

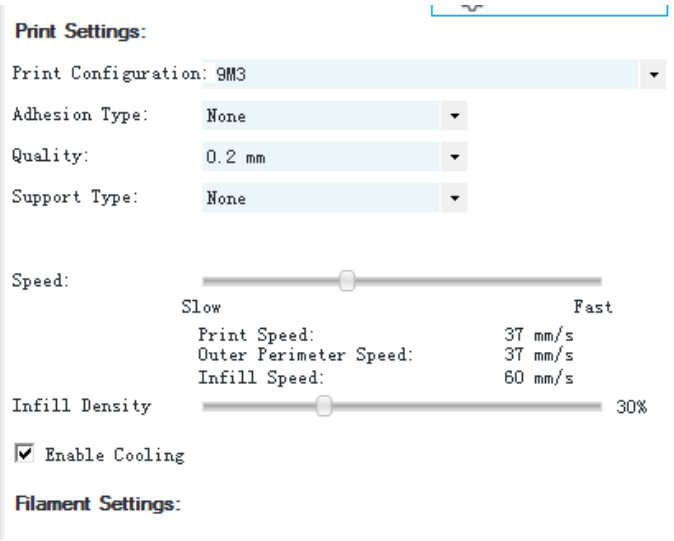
Single Color Printing test

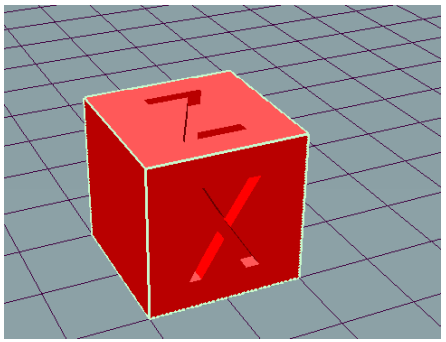
1. **Refer to “How to Load filament to one Channel “ to load filaments。**
2. Copy xyz_cube.gcode to SD card and insert the SD card to printer
3. Menu>>Print from SD>> xyz_cube.gcode

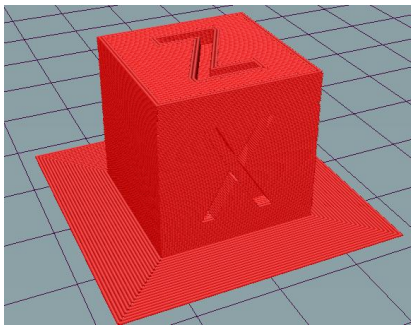
Slicing Settings











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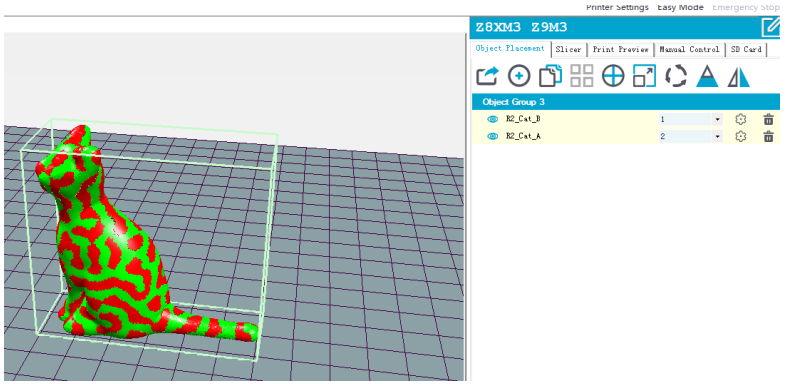
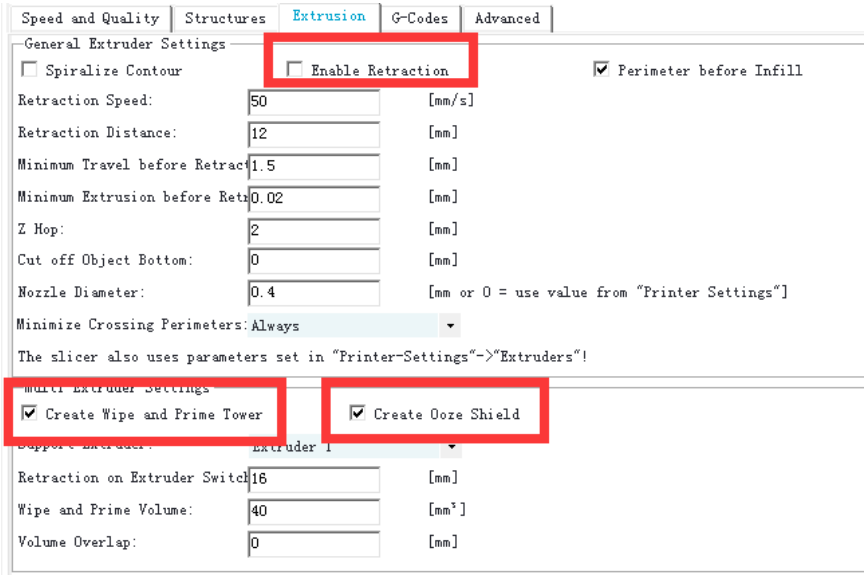
Two Color Printing Test and Slicing Settings

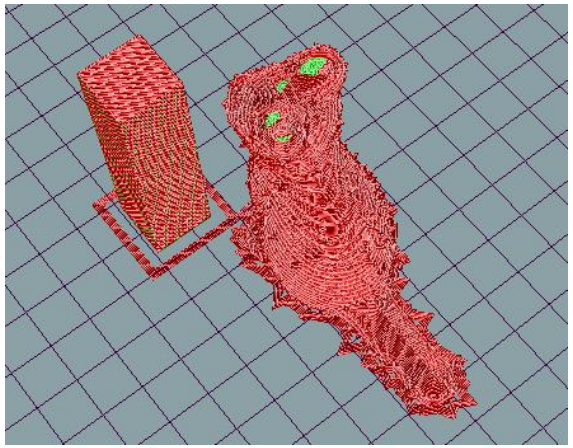
Two Color Printing test

1. **Refer to “How to Load filament to two Channel “ to load filament.**
2. Copy R2_cat.gcode to SD card and insert the SD card to printer
3. Menu>>Print from SD>> R2_cat.gcode



Slicing Settings





NOTE:Other settings is the same with single color printing.

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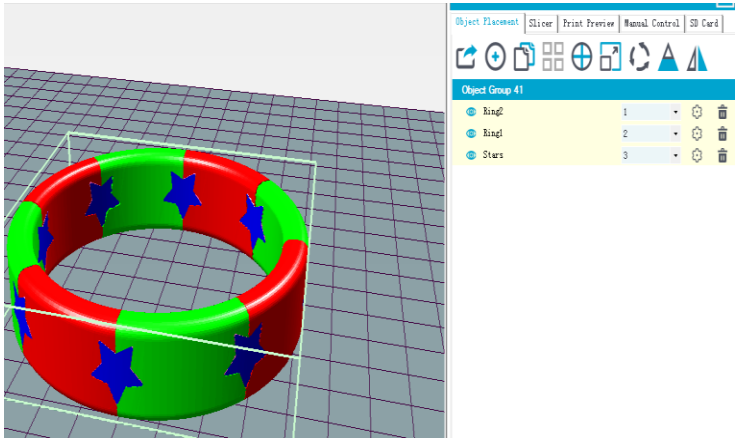
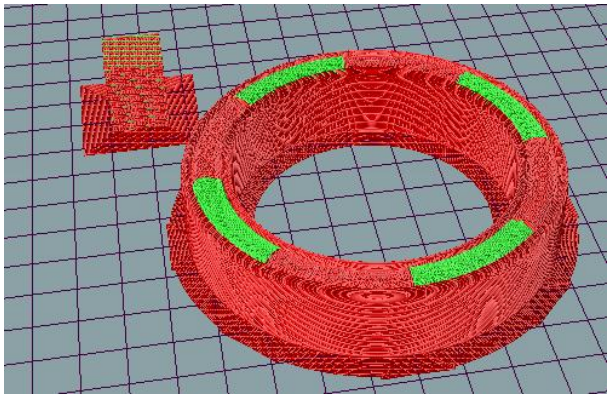
Three Color Printing Test and Slicing Settings

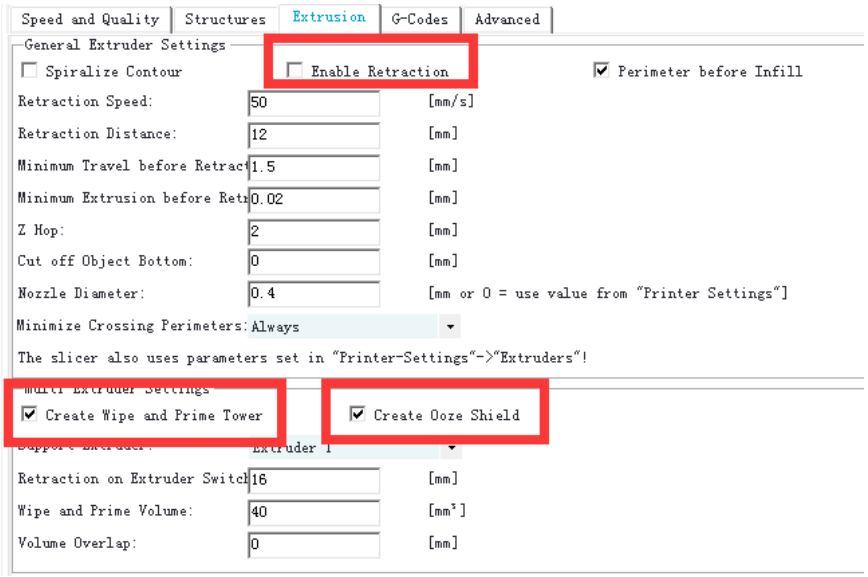
Three Color Printing test

1. **Refer to “How to Load filament to three Channel “ to load filament.。**
2. Copy 3_colro_Ring.gcode to SD card and insert the SD card to printer
3. Menu>>Print from SD>> 3_colro_Ring.gcode





Slicing Settings



How to use Virtual Extruder to print 16 color 3d object

The printer allows you to set up to 16 virtual extruders using the gcode command, you only need to add specific gcode code to the "start code" of the slicing software.

Gcode command and its syntax for virtual extruder settings:
M163 S[index] P[weight]
; Set the mixing ratio [Weight] of the real extruder [index]
M164 S[index]
;Save the above mix ratio to the virtual extruder [index]

For example, the below setting for a Z9M2 printer:

; virtual Extruder 8	***→Comment***
M163 S0 P50	*→Set the rate of extruder 1 is 50%*
M163 S1 P50	*→ Set the rate of extruder 2 is 50%*
M163 S2 P0	*→ Set the rate of extruder 3 is 0%*
M164 S7	***→Store the mix rate setting to virtuder extruder 8***

After executing these codes, the printer will produce a virtual extruder 8, the color of which is produced by mixing the extruder 1 and the extruder 2 at a ratio of 50% each.

For example, the below setting for a Z9M3 printer:

; virtual Extruder 8	***→Comment***
M163 S0 P50	*→Set the rate of extruder 1 is 50%*
M163 S1 P25	*→ Set the rate of extruder 2 is 25%*
M163 S2 P25	*→ Set the rate of extruder 3 is 25%*
M164 S7	***→Store the mix rate setting to virtuder extruder 8***

After executing these codes, the printer will produce a virtual extruder 8, the color of which is produced by mixing the extruder 1 at a rato of 50% , the extruder 2 and extruder 3 at a ratio of 25% each.

How to use Virtual Extruder to print 16 color 3d object

Let's take Z9M3 as an example to illustrate a list of 16 virtual extruder configurations. The left side is the gcode code, and the right side is the extruder mix ratio.

Gcode command:

; virtual Extruder 1 M163 S0 P100 M163 S1 P0 M163 S2 P0 M164 S0	; virtual Extruder 5 M163 S0 P50 M163 S1 P0 M163 S2 P50 M164 S4	; virtual Extruder 9 M163 S0 P25 M163 S1 P0 M163 S2 P75 M164 S8	*; virtual Extruder 13* M163 S0 P0 M163 S1 P75 M163 S2 P25 M164 S12
; virtual Extruder 2 M163 S0 P0 M163 S1 P100 M163 S2 P0 M164 S1	; virtual Extruder 6 M163 S0 P0 M163 S1 P50 M163 S2 P50 M164 S5	; virtual Extruder 10 M163 S0 P0 M163 S1 P25 M163 S2 P75 M164 S9	*; virtual Extruder 14* M163 S0 P50 M163 S1 P25 M163 S2 P25 M164 S13
; virtual Extruder 3 M163 S0 P0 M163 S1 P0 M163 S2 P100 M164 S2	; virtual Extruder 7 M163 S0 P34 M163 S1 P33 M163 S2 P33 M164 S6	; virtual Extruder 11 M163 S0 P75 M163 S1 P25 M163 S2 P0 M164 S10	*; virtual Extruder 15* M163 S0 P25 M163 S1 P50 M163 S2 P25 M164 S14
; virtual Extruder 4 M163 S0 P50 M163 S1 P50 M163 S2 P0 M164 S3	; virtual Extruder 8 M163 S0 P25 M163 S1 P75 M163 S2 P0 M164 S7	; virtual Extruder 12 M163 S0 P75 M163 S1 P0 M163 S2 P25 M164 S11	*; virtual Extruder 16* M163 S0 P25 M163 S1 P25 M163 S2 P50 M164 S15

Virtual extruder/ the actual extruder mixing ratio:

Virtual extruder NO.	Ratio of Extruder 1	Ratio of Extruder 2	Ratio of Extruder 3
1	100	0	0
2	0	100	0
3	0	0	100
4	50	50	0
5	50	0	50
6	0	50	50
7	34	33	34
8	25	75	0
9	25	0	75
10	0	25	75
11	75	25	0
12	75	0	25
13	0	75	25
14	50	25	25
15	25	50	25
16	25	25	50

Note:

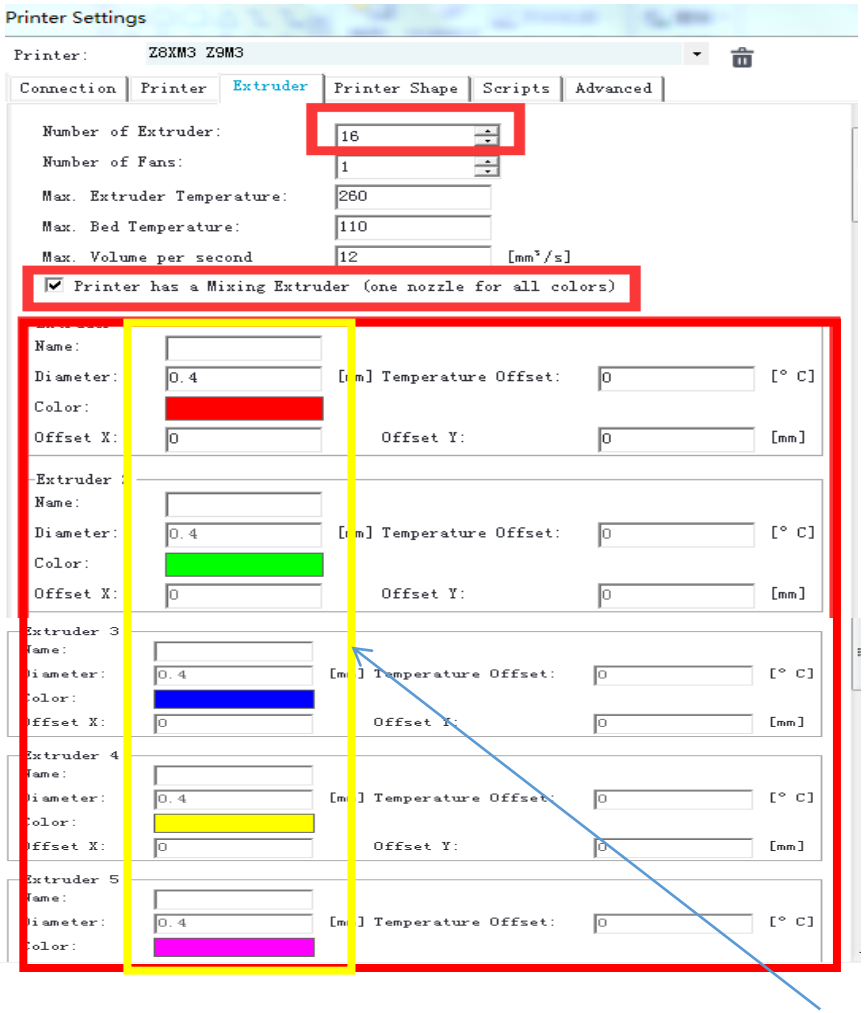
1. The above is just an example, you can set any parameters you want.
2. The ratio of the mixture ratio of any actual extrusion is not recommended to be less than 10.
3. There is a delay in color switching due to the residual material inside the print head when the color is switched. You can add extra code to the extruder switch to achieve additional extrusion to clear.

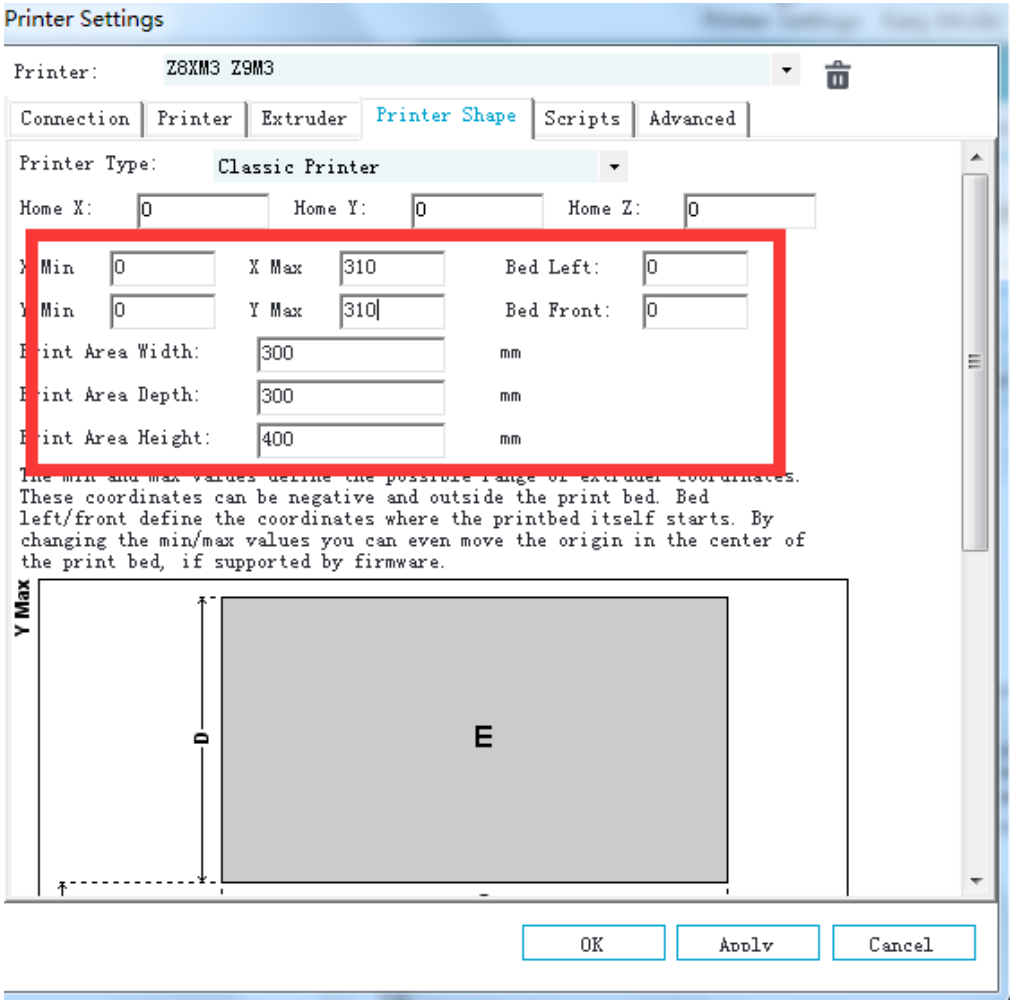
How to use Virtual Extruder to print 16 color 3d object

Below, we will show how to slicing a 16-color 3D model by using Z9M3.

Software: Repetier-Host, Slicing tool: Cura Engine of repetier-host.

Step 1. Printer setting

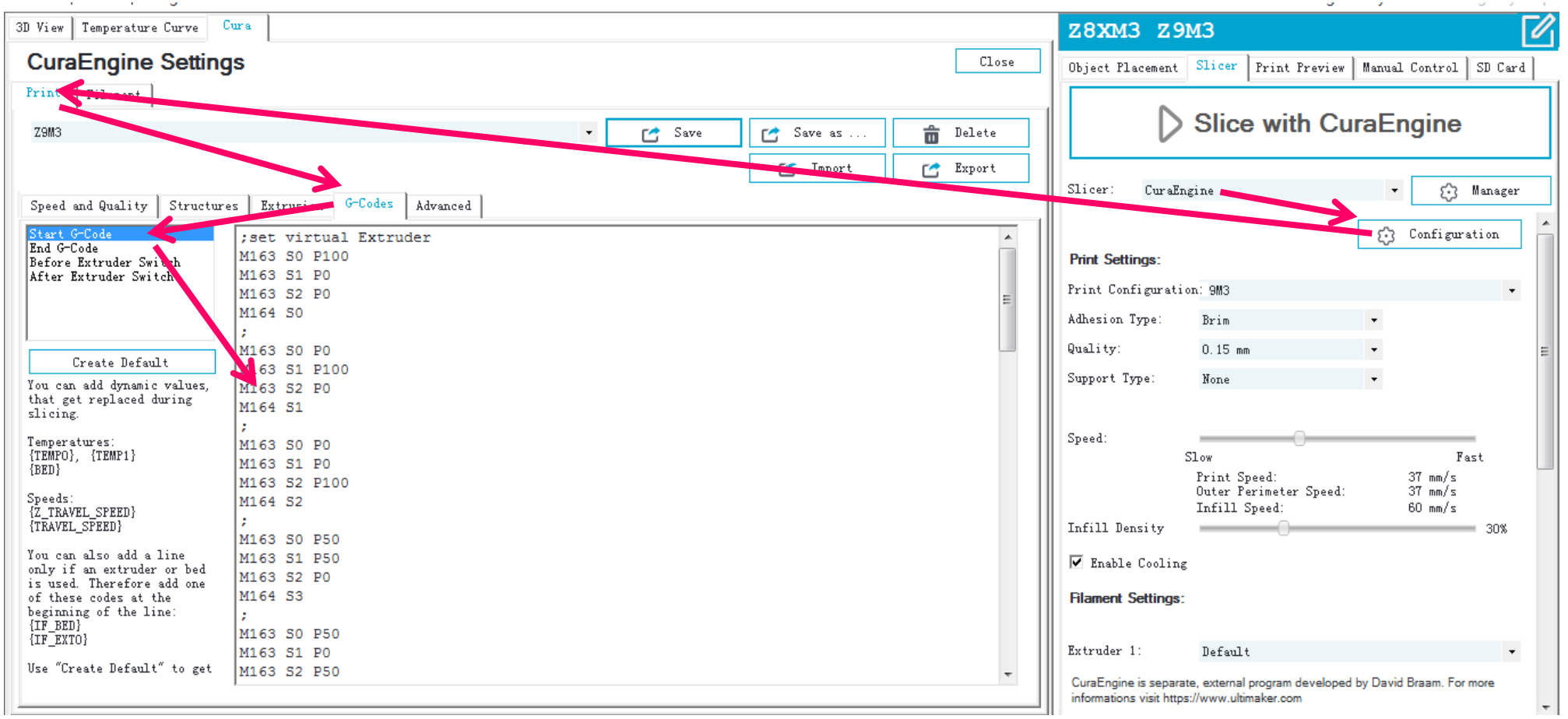




NOTE, Set the color of the extruder to better identify the extruder

How to use Virtual Extruder to print 16 color 3d object

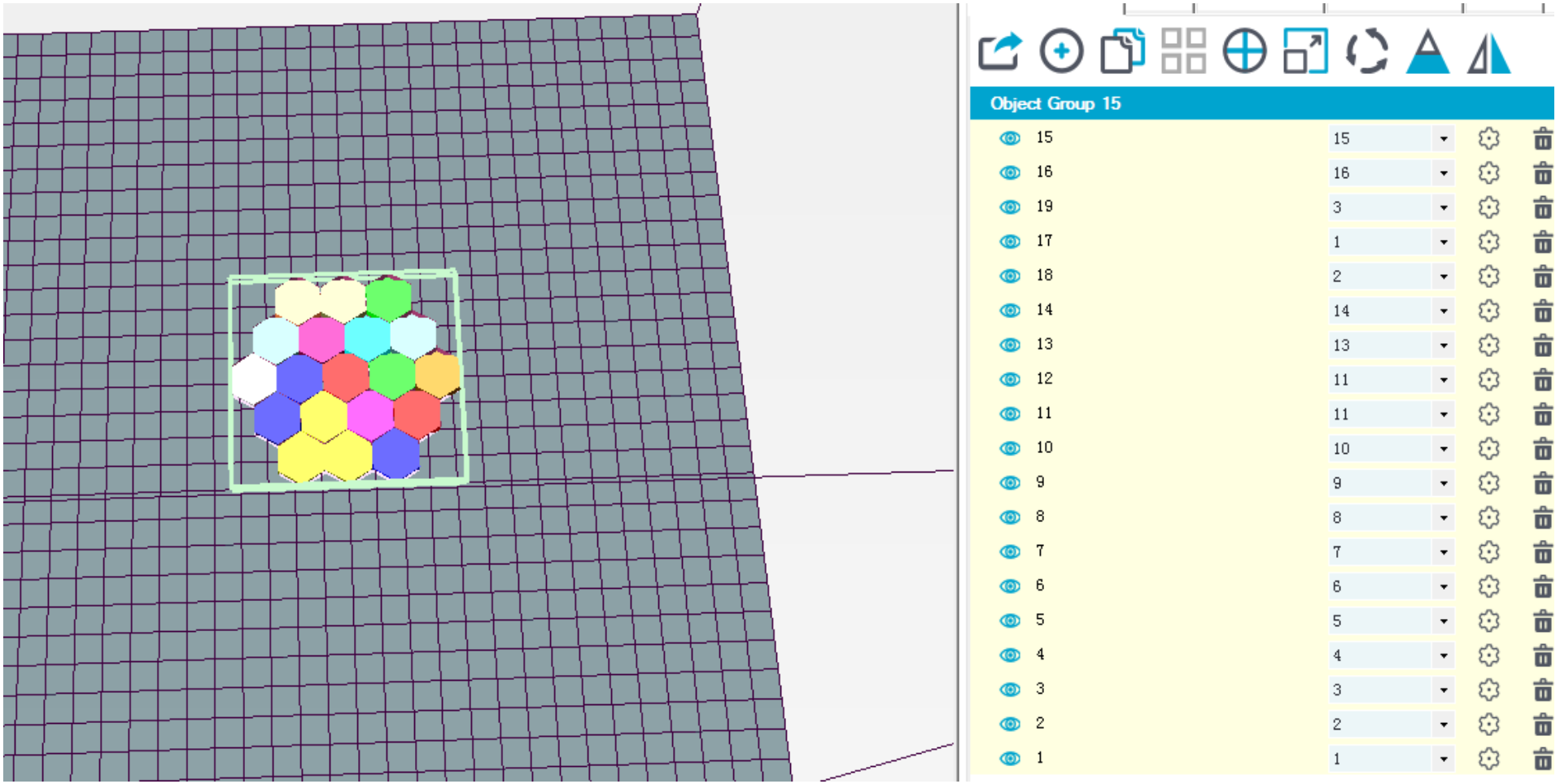
Step 2. Set the start gcode in configuration of CuraEngine.



NOTE: Put these settings to the front of the start gcode.

How to use Virtual Extruder to print 16 color 3d object

Step 3. Load stl files and assign extruders to each of them, and then group them.

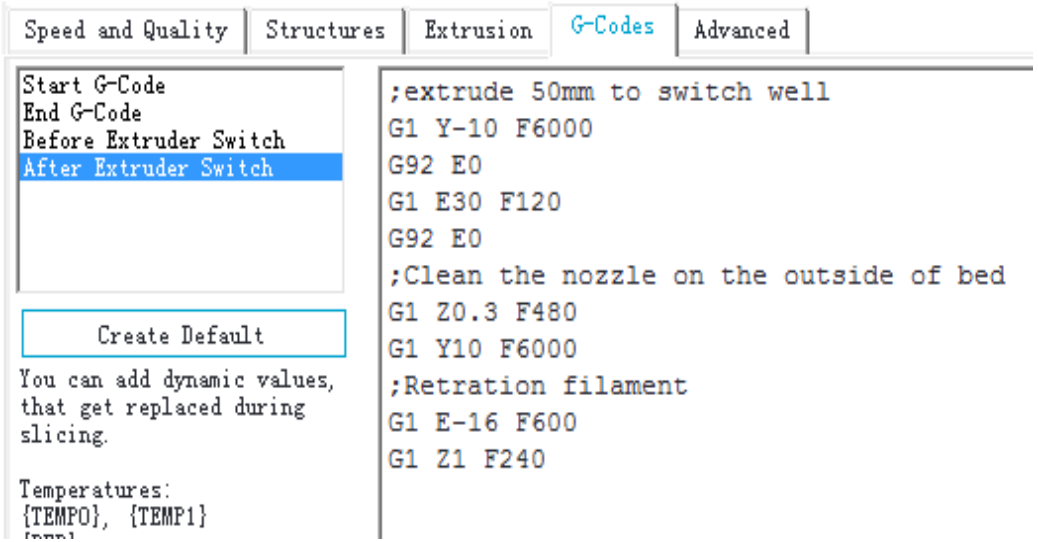


NOTE:

1. Stl file dirrectory: honeycomb
2. There are 19 stl file, so we assign extruder 1~3 for 1.stl to 3.stl.

How to use Virtual Extruder to print 16 color 3d object

Step 4. In order to solve the problem of emptying the residual filament in the print head to obtain better print discrimination when switching colors, a piece of gcode code is added after the extruder is switched.

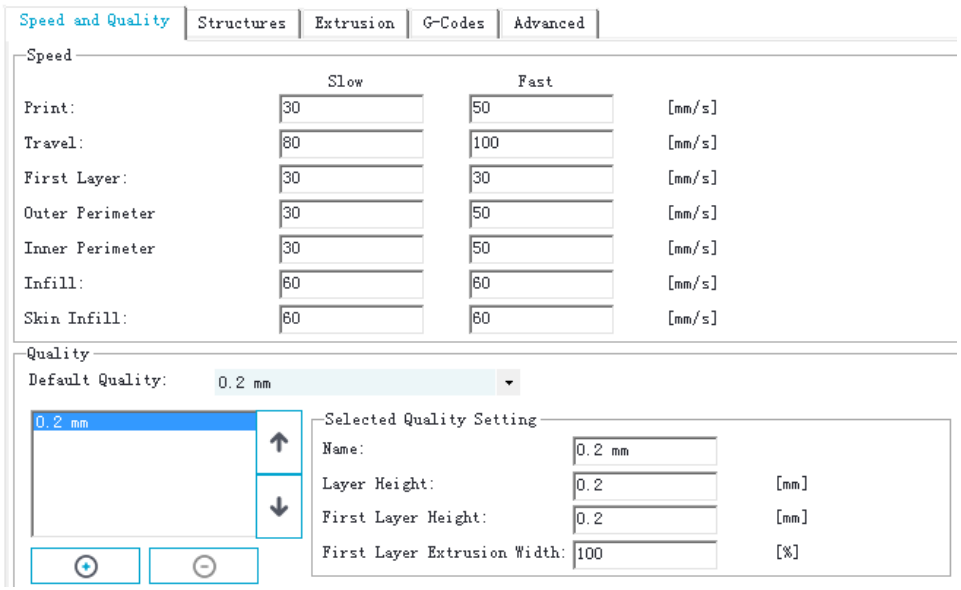


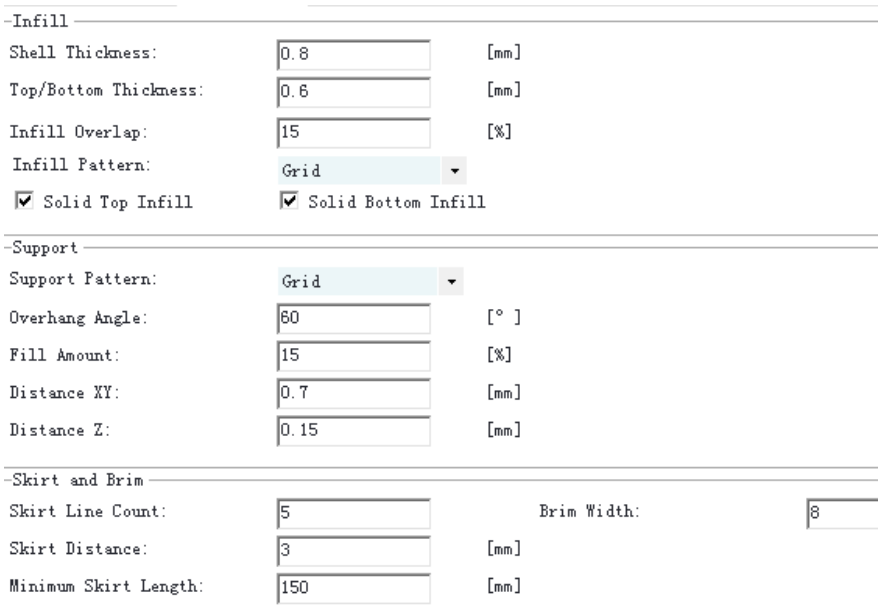
Move nozzle to outside of hot bed
Extrude 50mm filament
Wipe the nozzle at the edge of hot bed
Retrate, raise the Z axis and prepare to return to the print break point

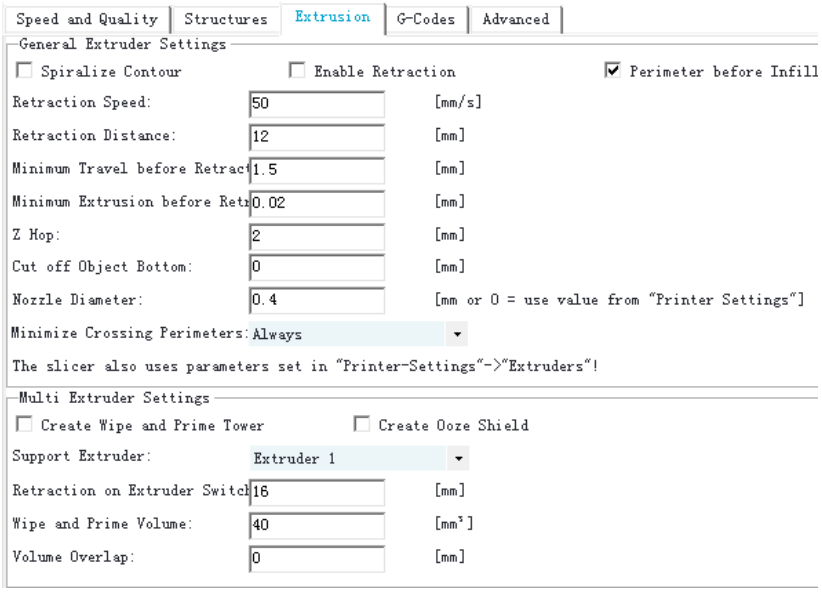
```
;Extrude 50mm to switch extruder
G1 Y-10 F6000
G92 E0
G1 E30 F120
G92 E0
;Clean the nozzle on the outside of bed
G1 Z0.3 F480
G1 Y10 F6000
;Retration filament
G1 E-16 F600
G1 Z1 F240
```

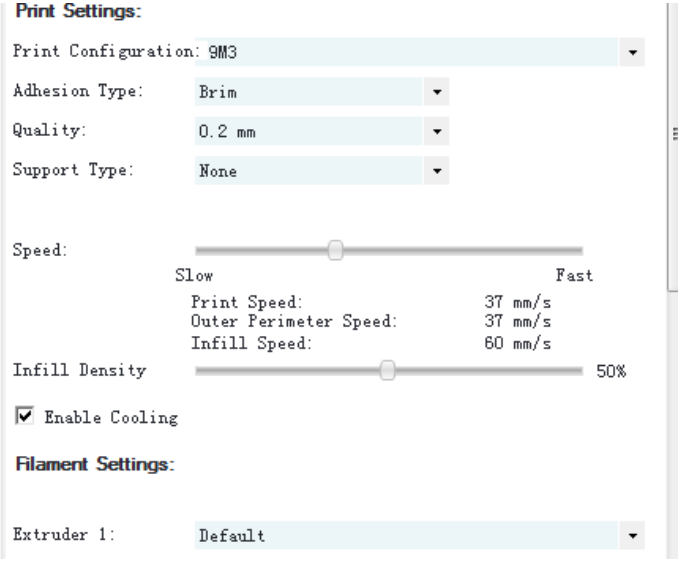
How to use Virtual Extruder to print 16 color 3d object

Step 5. Other settings are basically the same, note disable Retraction and set Z Hop to 2mm 。



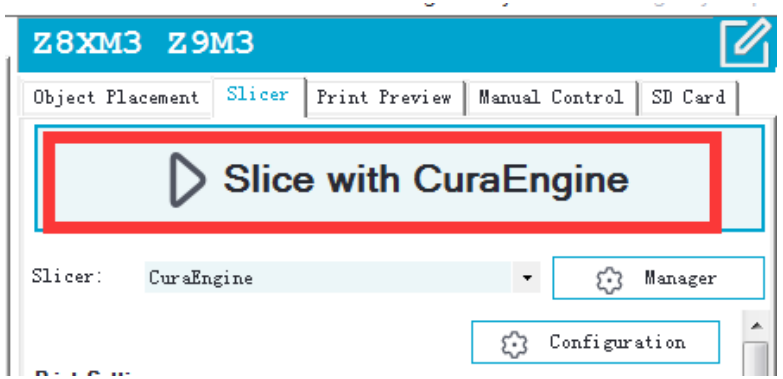


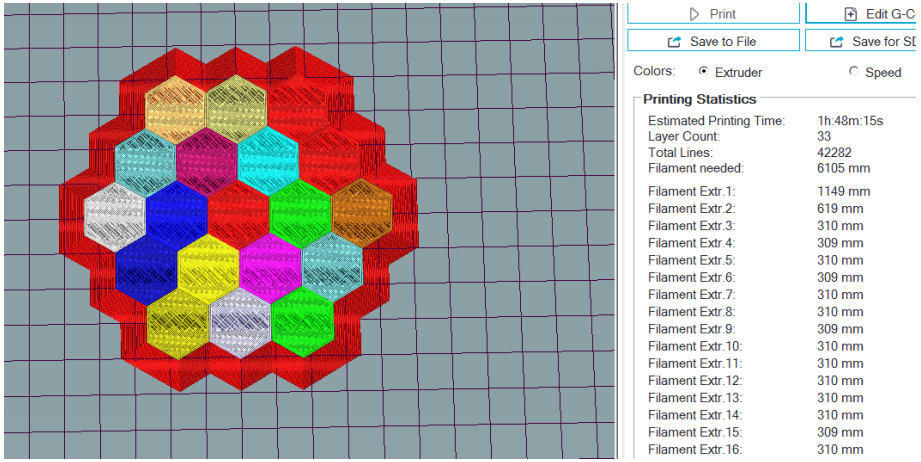


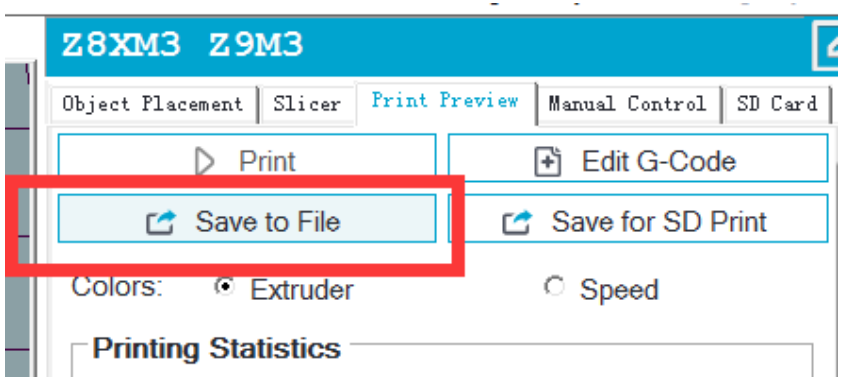


How to use Virtual Extruder to print 16 color 3d object

Step 6. Slicing and save to SD card and print it.







Gcode file name: honeycomb.gcode

NOTE:

1. I set the height to 1mm when slicing.

2. Wipe the nozzle outside hot bed is not a perfect idea. If you have a better idea, welcome to share it with us.

How to print a discolored 3D print model by using the built-in automatic color mixing engine

Using the built-in “automatic color mixing engine”, you can print a single color 3d model as a color-changing 3d model.

There are three ways to do this:

- **Manual Change Color Mode (Manual Mode):**

1. Start to print a single color 3D model from SD card.
2. Set the auto mode to 0, **menu >>Tune>>Auto Mix mode: 0.** (Note: the default is 0 after booting).
3. After starting to print the first layer, **menu >>Tune>>Set Mix Rate,** manually modify the mix ratio for each channel.

- **Linear Gradient Mode (Linear Mode):**

1. Start to print a single color 3D model from SD card.
2. After starting to print the first layer, set the auto mode to 1, **menu >>Tune>>Auto Mix mode: 1.**

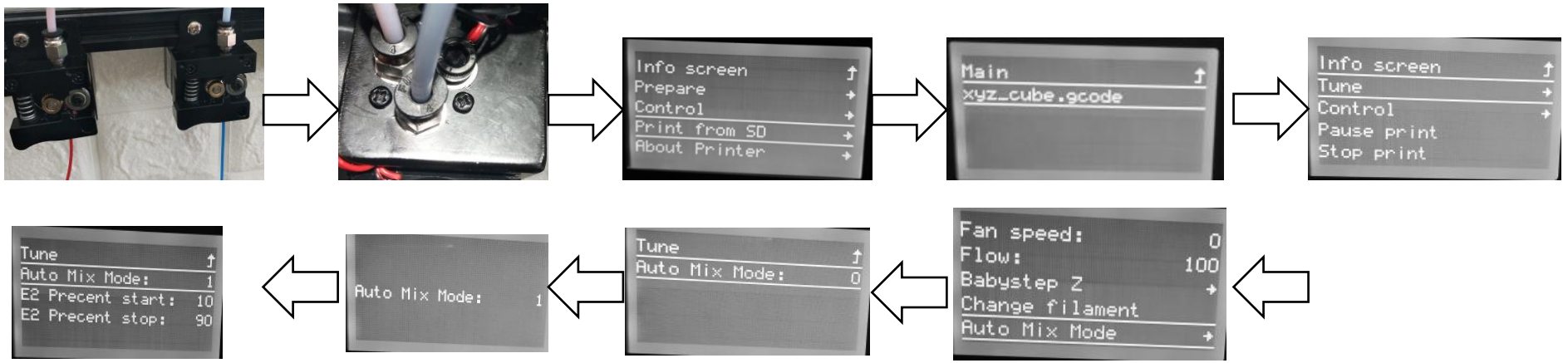
- **Automatic Random Mode:** This is similar to Mode 1, but the mix ratio is random.

1. Start to print a single color 3D model from SD card.
2. After starting to print the first layer, set the auto mode to 2, **menu >>Tune>>Auto Mix mode: 2.**

Note:

1. Automatic color change printing can be set only when printing from SD card.

2. Switch extruder command (Tx) will automatically reset Automatic Mix Mode to 0. Usually this command will be at the beginning of the gcode file, so you should set the auto mix mode manually after starting to print the first layer.



ZONESTAR