Zonestar

Slicing Guide
for mixing Color print

(Base on Cura 4.7 or later)

V1.0

Contents

Zonestar

Download and install Cura

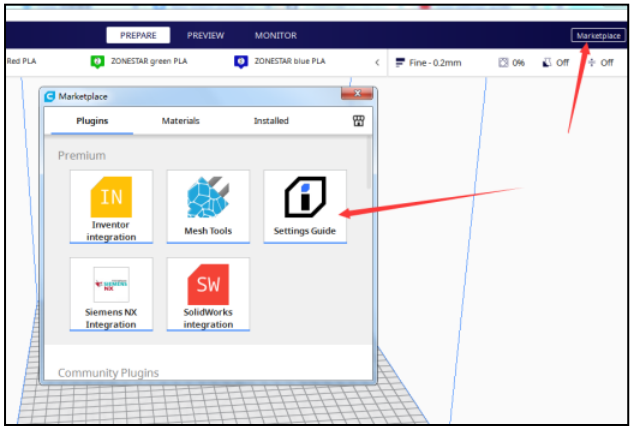
Download cura from the below link and install it to your PC:

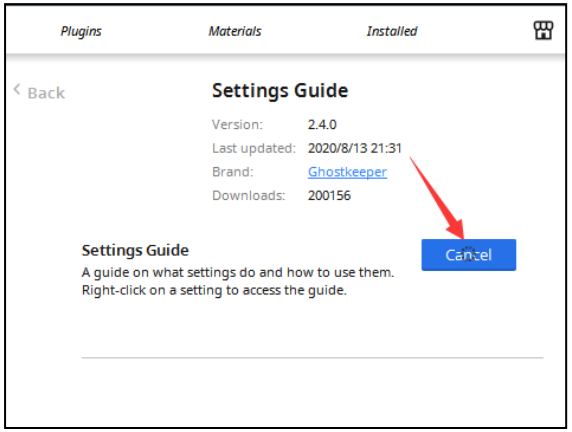
https://ultimaker.com/software/ultimaker-cura

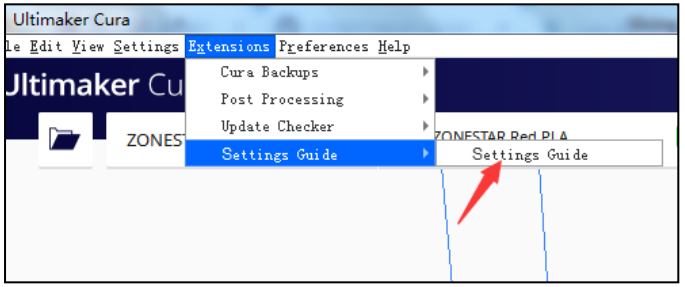
About how to install and use Cura, please refer to this link:

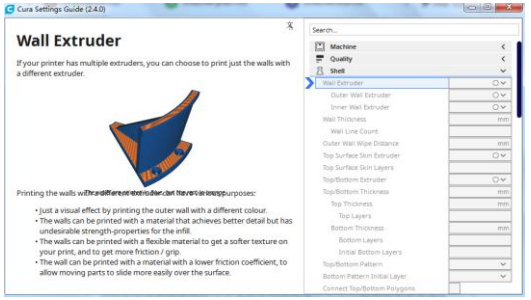
https://support.ultimaker.com/hc/en-us/categories/360002327600

If you want to know more about the settings of cura, please install a “settings guide” plugin in cura, and then open it to study:



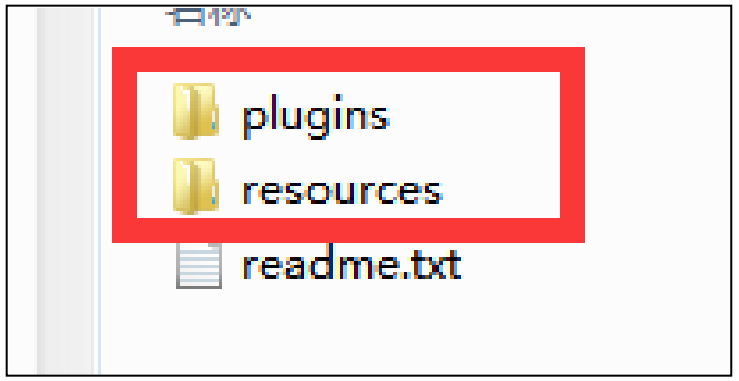


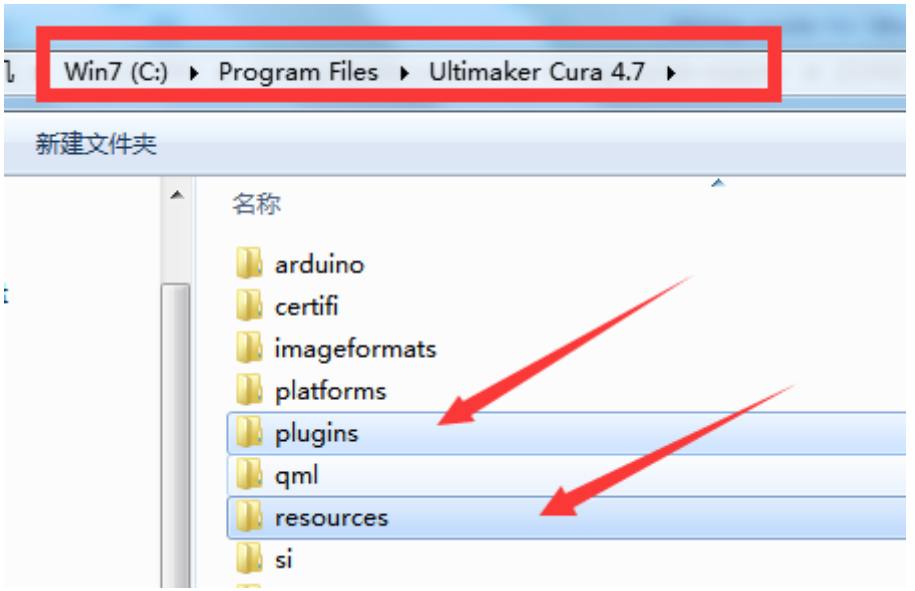




Import ZONESTAR printer settings

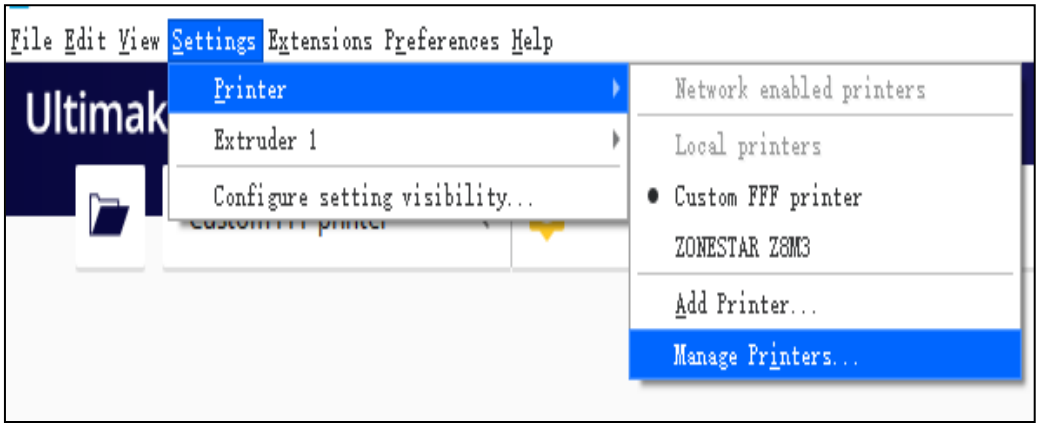
1. Download "zonestar Cura Resources “ from the below link:
   Download link: https://github.com/ZONESTAR3D/Slicing-Guide
2. Exit Cura
3. Copy the contents of this sirctory to the installation directory of Cura
4. Restart Cura



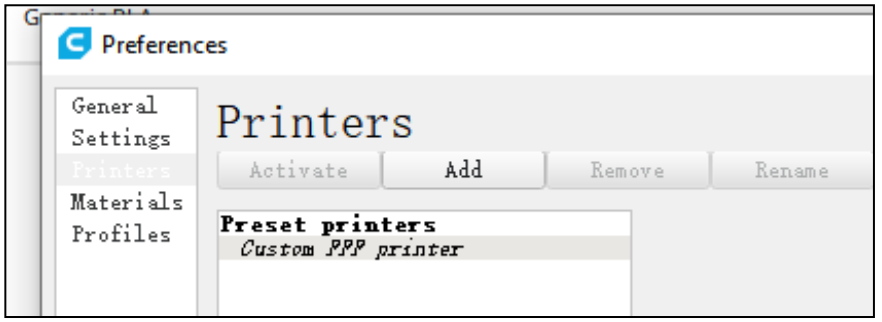


Setting up printer

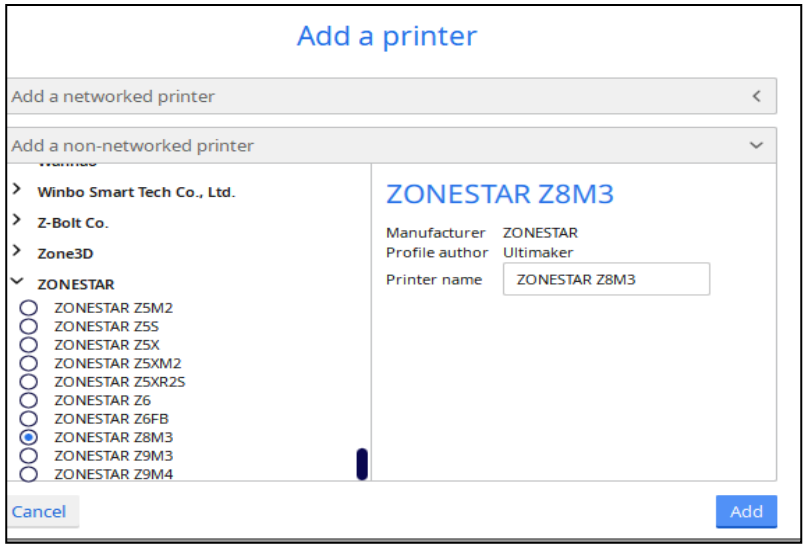
1: Open “Manage printers”



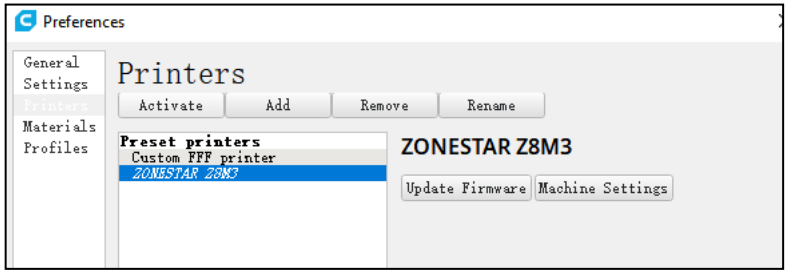
2: Click “Add”



3: Select your printer model,then click “Add”

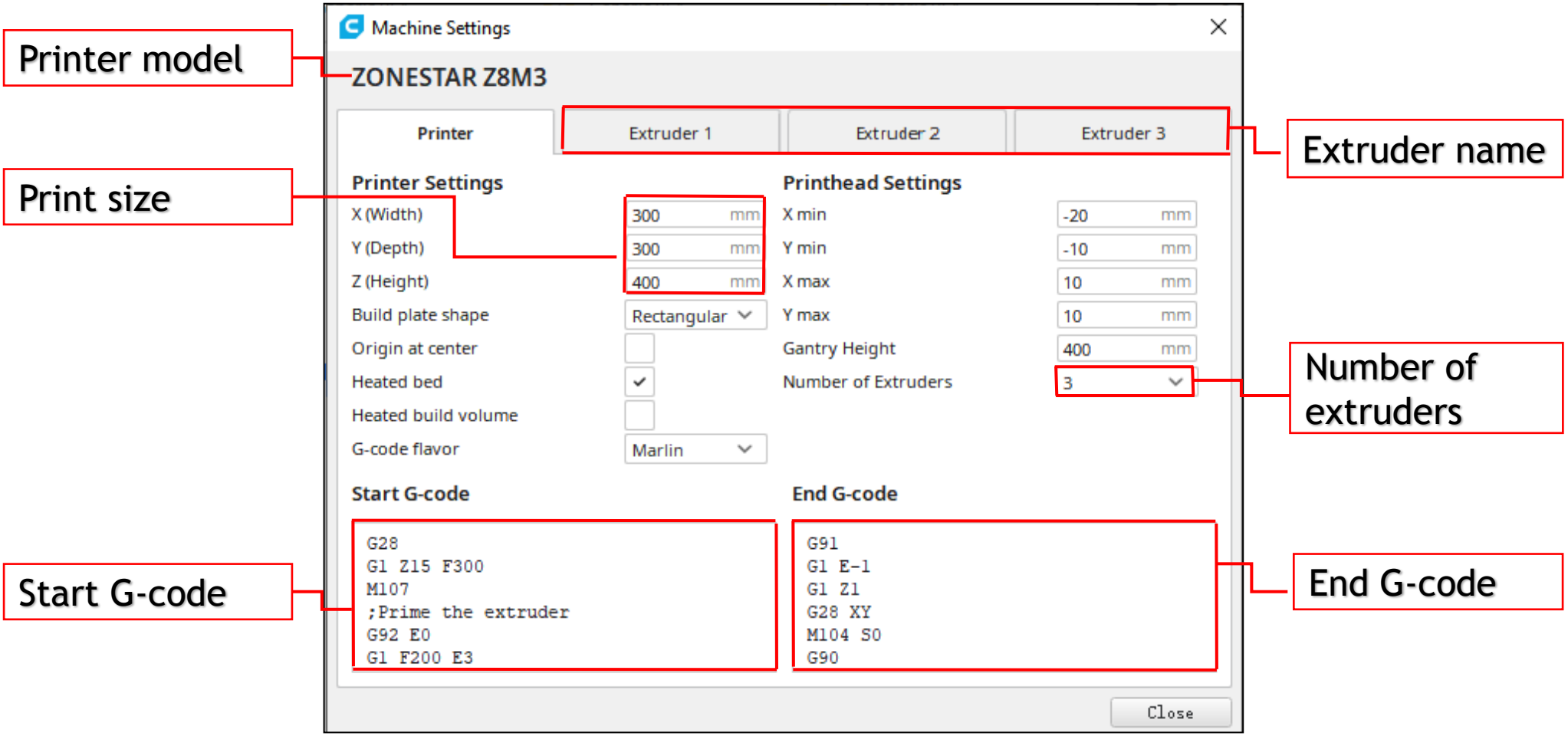


4: Click “Activate”



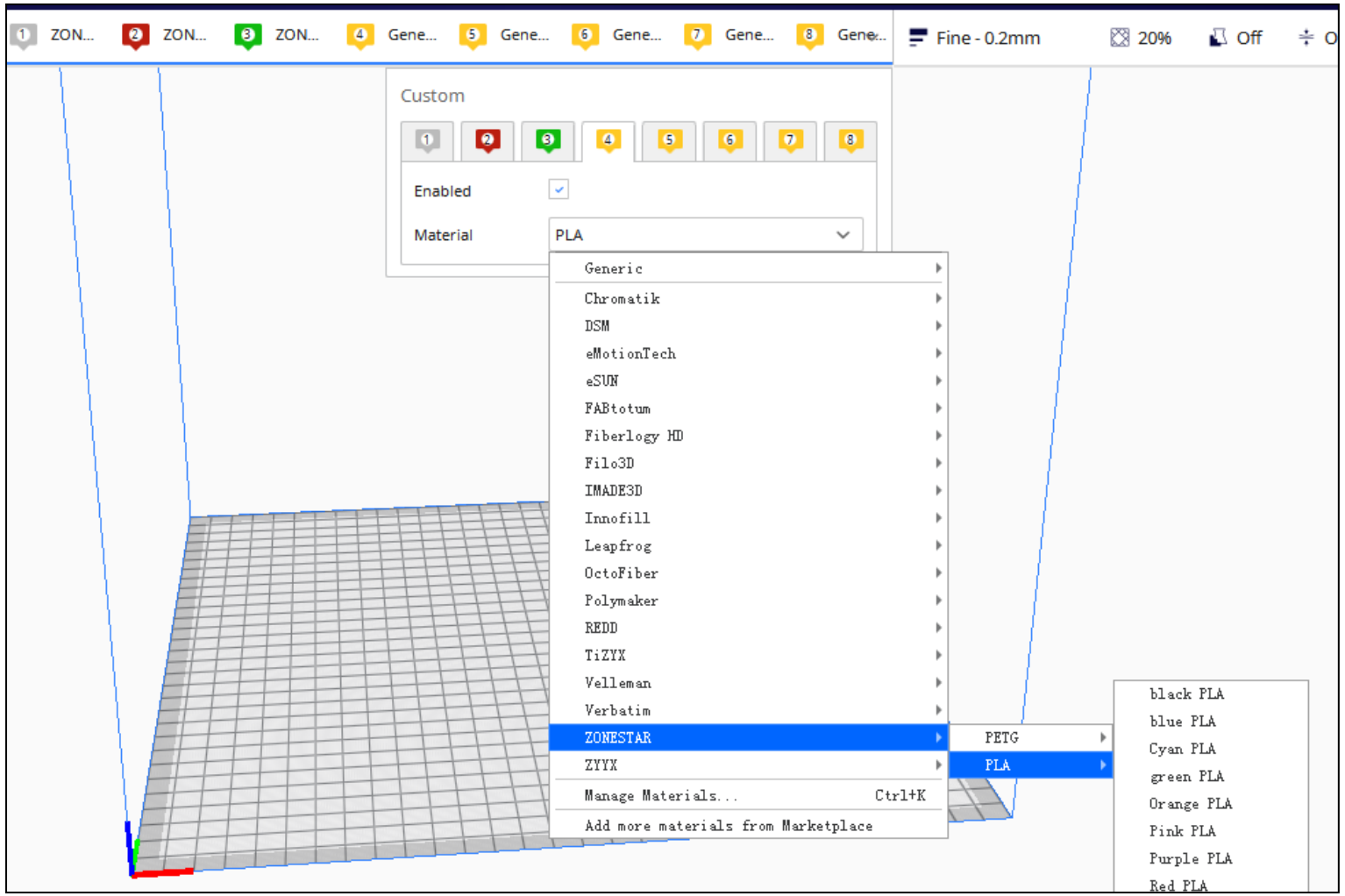
Setting up printer

Click “Machine settings”. Check the printer parameters.



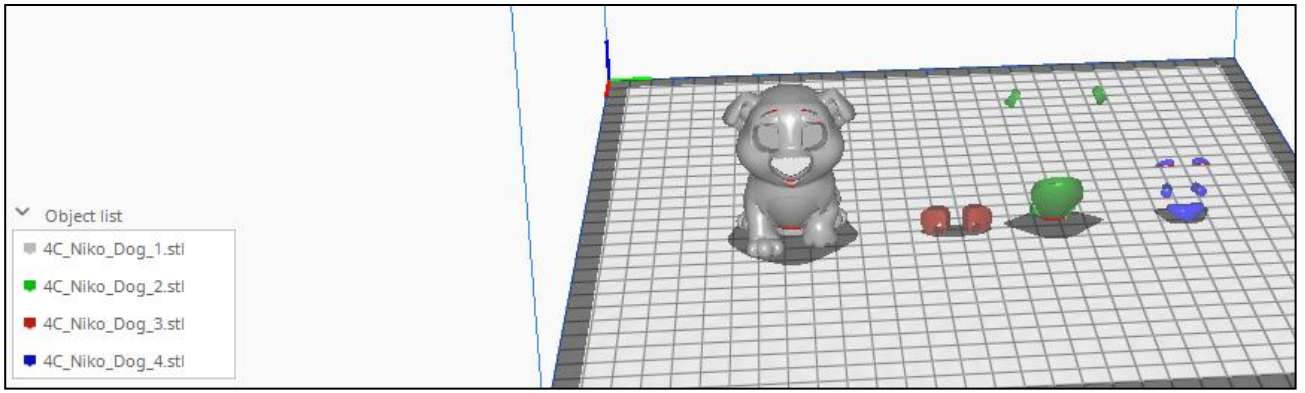
Setting up filament

In order to easy to view when slicing, you can define the filament color



Slicing

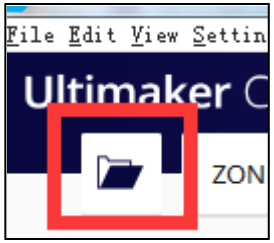
For the sake of illustration, we will use only one 3d object in the following pages. This 3d object is a 4-color model, which has divided the object into four parts

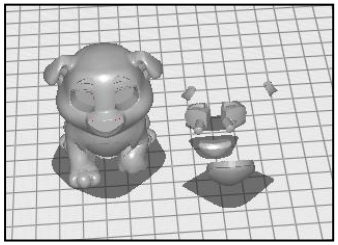


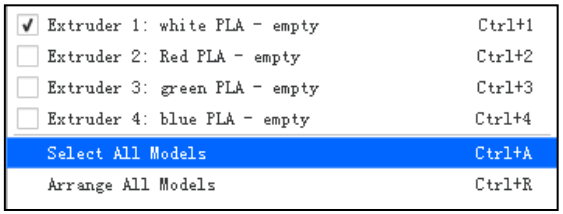
If you need to print multicolor, you need a 3d object that has been divided (the number of divided parts is according to the number of colors), and their origin position must be consistent in order to be merged.

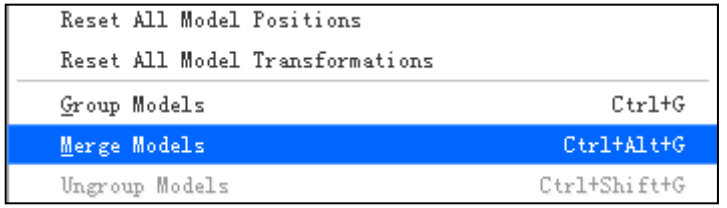
Of course, you can also merge several objects into one color (multiple parts are assigned to the same extruder), as you will see in the next pages

Slicing for singel color 3d object printing





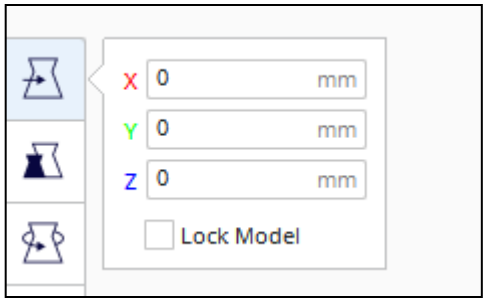


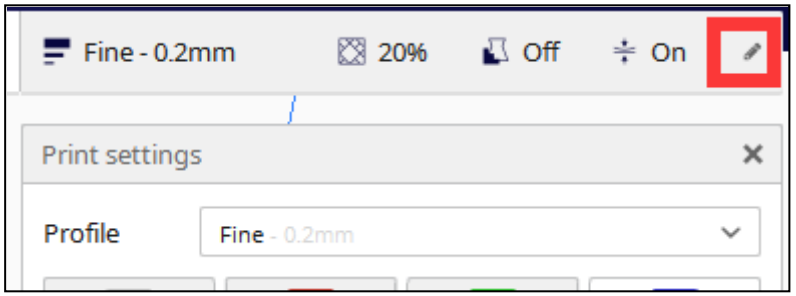


Load files

Right click the mouse
Setlect all models

Merge



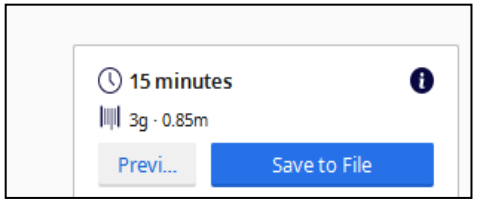


Move/Scale/Rotat
e the model

Set slicing parameter

NOTE: load “1C_Niko_dog.3mf” to see reference settings

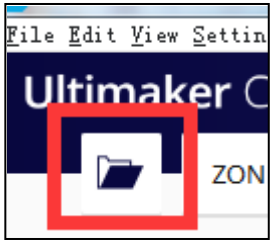
Slicing it

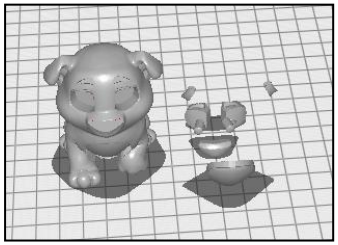


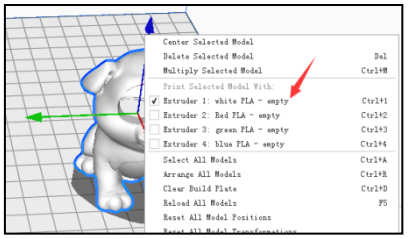
save it

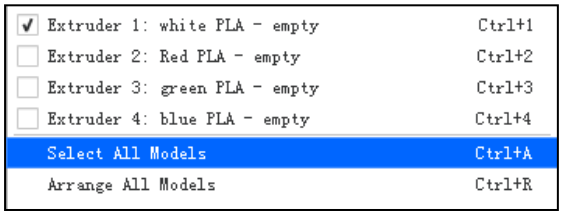
Copy the gcode file to SD card and print it

Slicing 2 Color 3d object





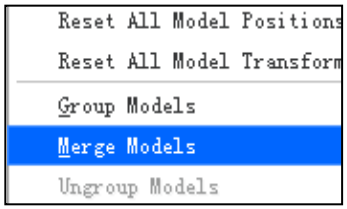


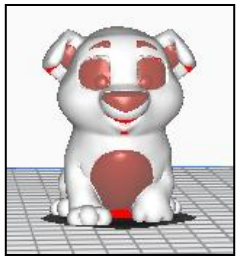


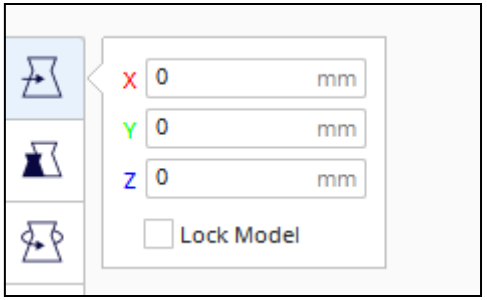
Load files

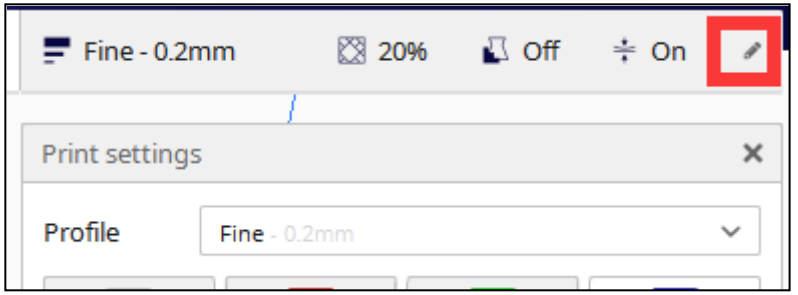
Right click the part and assign extruder for it

Right click the mouse Setlect all models





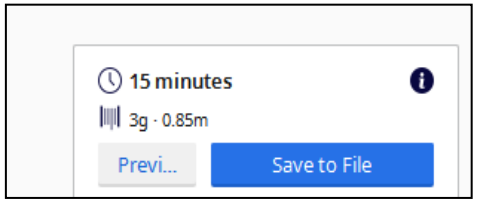




Merge

Move/Scale/Rotat e the model

Set slicing parameter



Slicing it

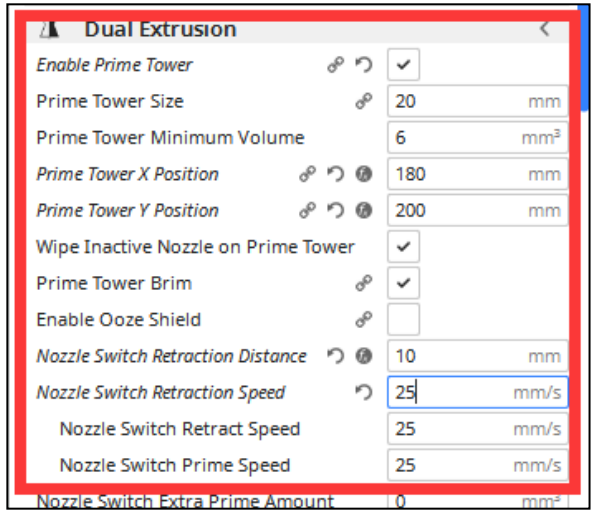
save it

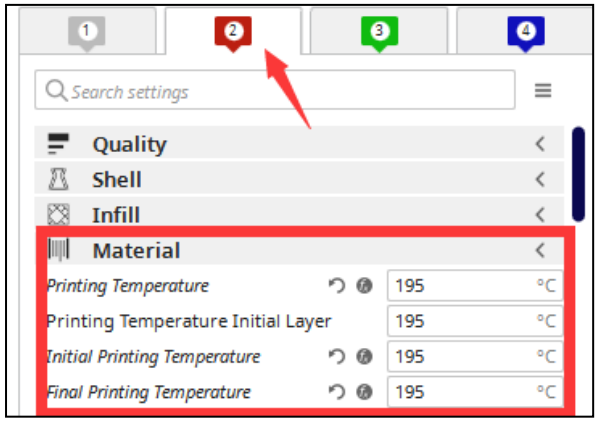
Copy the gcode file to SD card, then print it

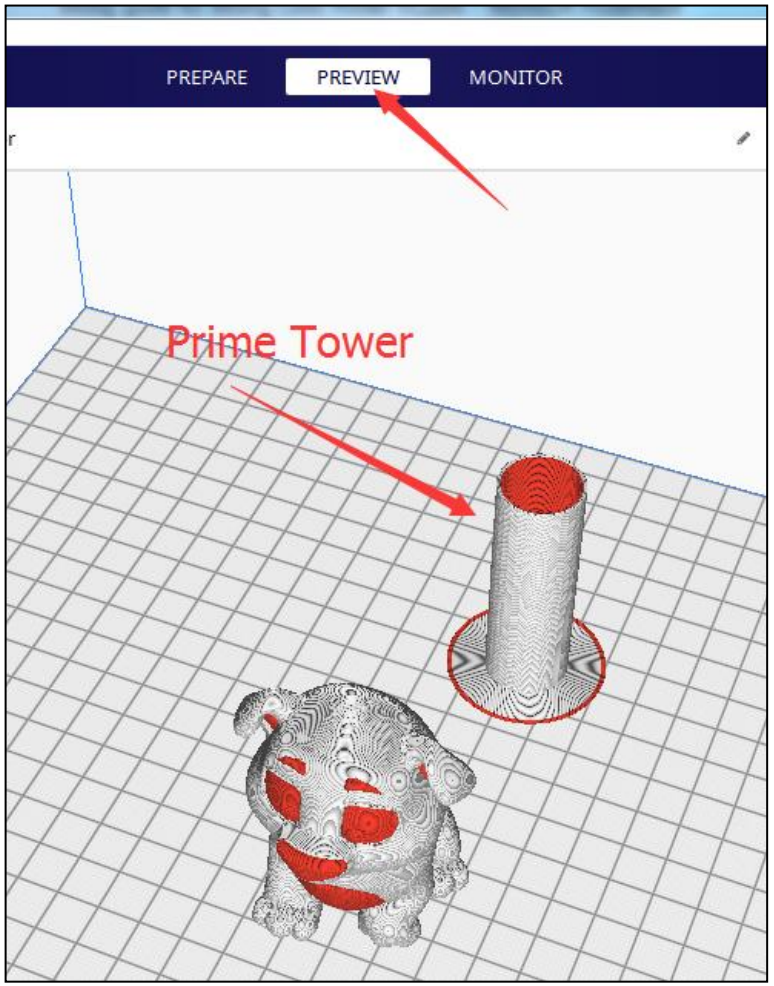
Slicing setting for 2 color printing

We need to set the below settings for 2 color printing:

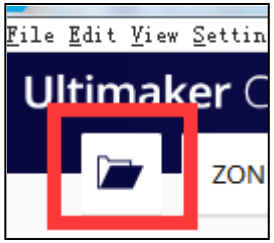
1. Enable a prime tower and set its position
2. Endable nozzle swicht retraction parameters (need to set in both of extruders)
3. Set the filament temperature for the 2nd extruder (set to the same with 1st extruder)

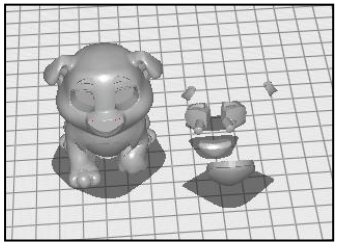


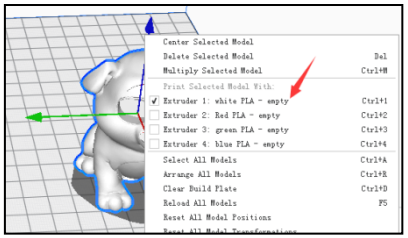


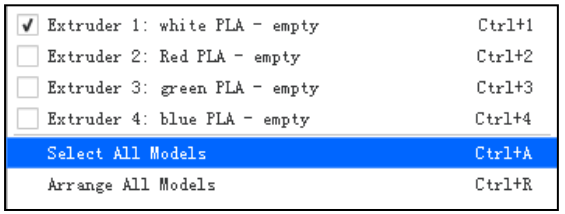


Slicing multi colors 3d object - Process





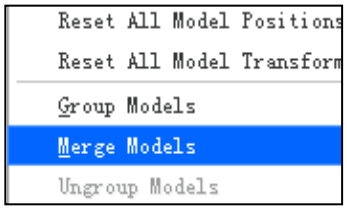


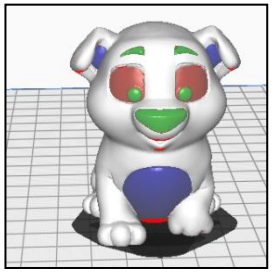


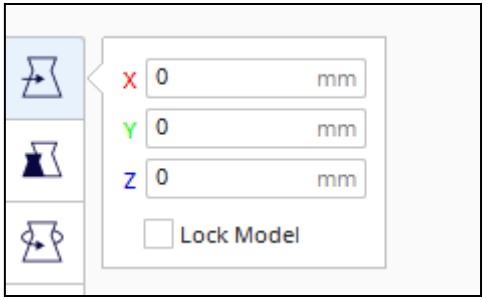
Load files

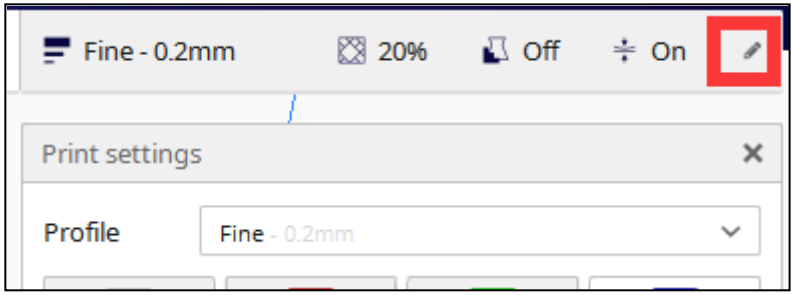
Right click the part and assign extruder for each

Right click the mouse setlect all models





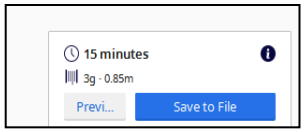


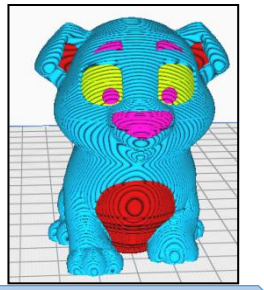


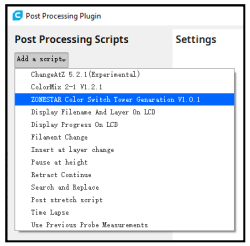
Merge

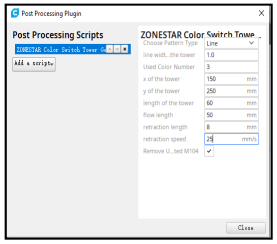
Move/Scale/Rotat e the model

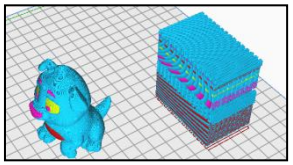
Set slicing parameter











slicing and save it to PC

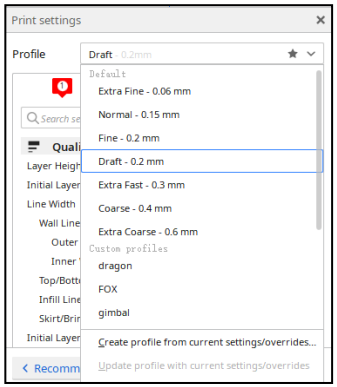
Add Color Swith Tower

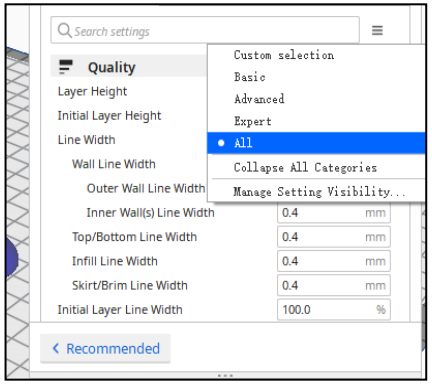
Copy to SD card and print it

Slicing multi colors 3d object - slicing

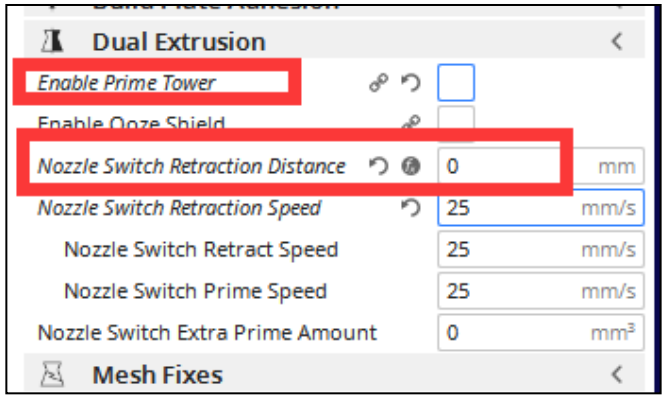
NOTE: When printing settings, please note that it needs to be set for each extruder.

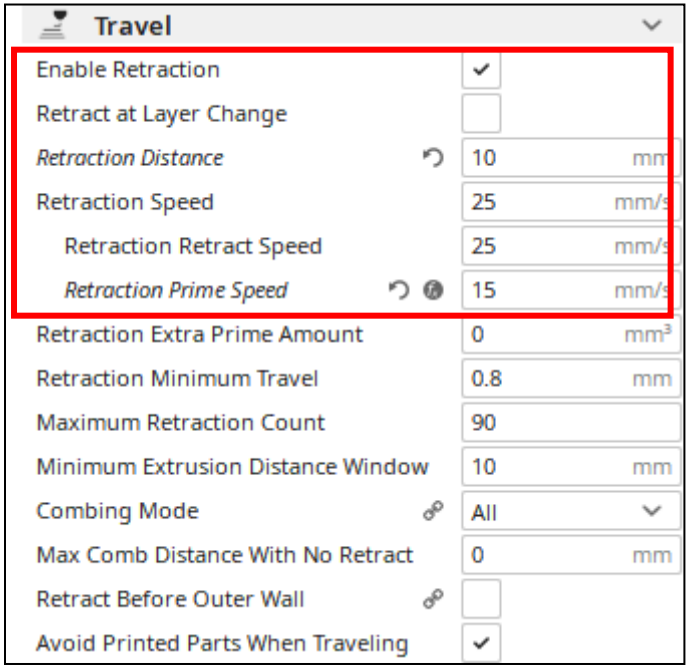
NOTE: The below settings are for PLA filament, if you want to choose other type of filament, please modify the nozzle temperature hotbed temperature to correct value

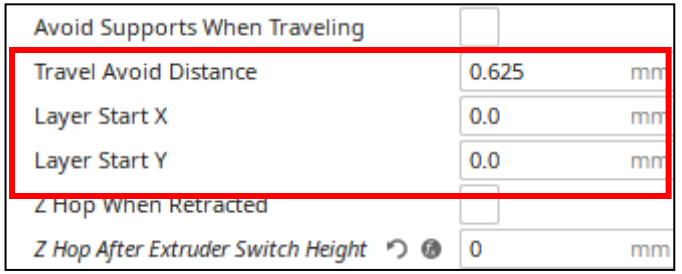




NOTE: Pay attention to the retraction parameters in "travel" and "dual Extrusion", as below:

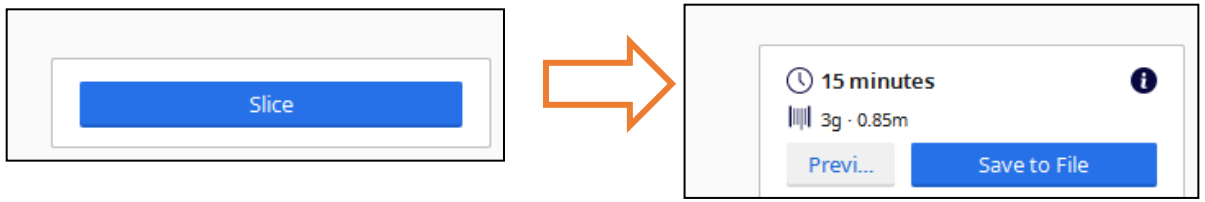




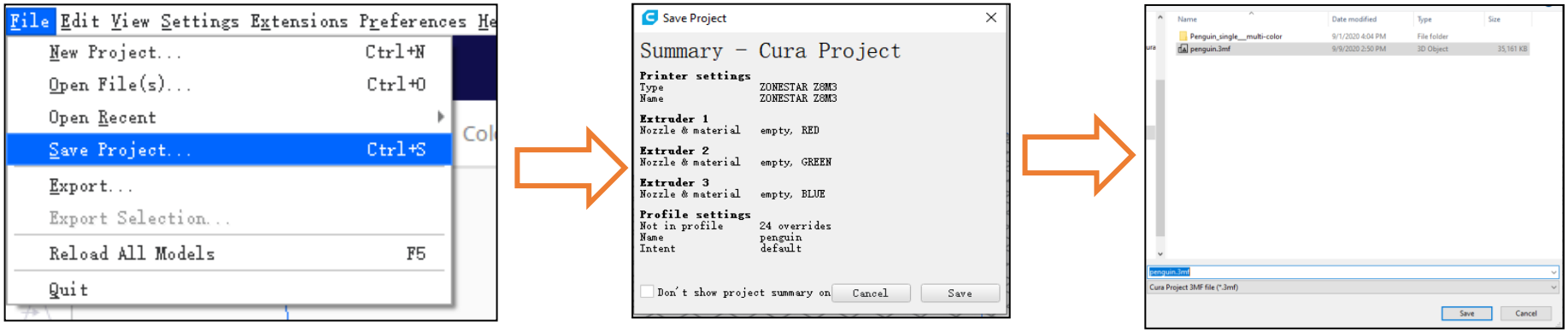


Slicing multi colors 3d object - Slice and Save

When all settings are completed, slicing and store the gcode file to your PC.



We suggest you save the project file for the next call. All configurations will follow the previous settings.

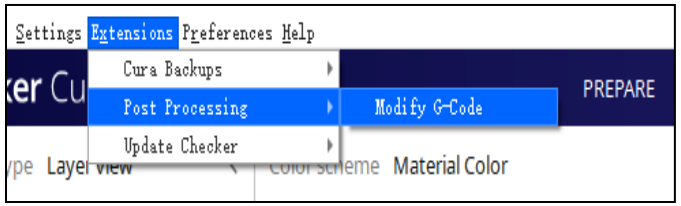


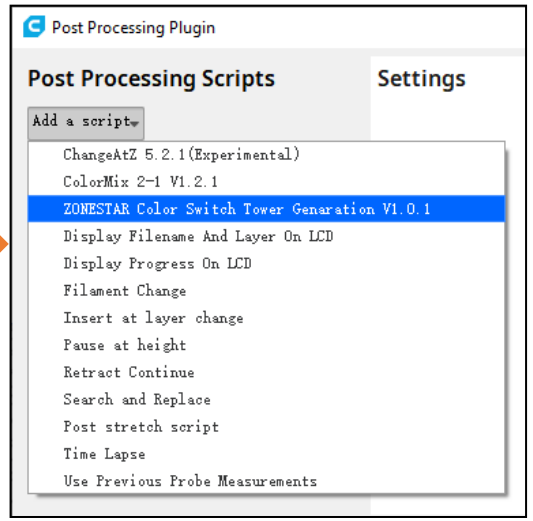
!NOT FINISHED!

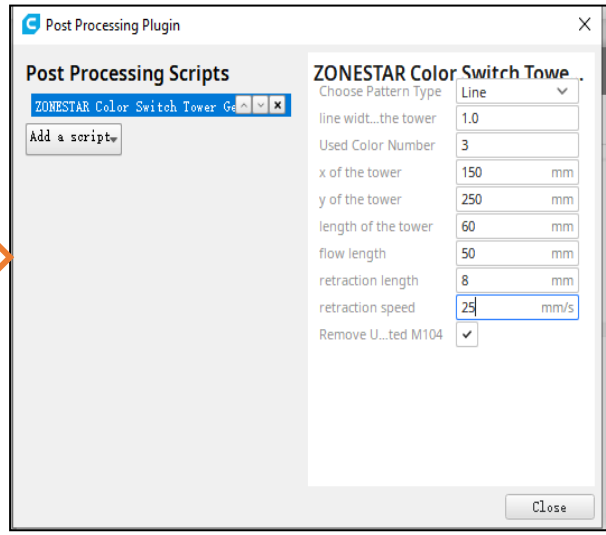
Cura can't support more than 2 color by mixing color extruder, we need to *use ZONESTAR ColorSwitchTower plugin* to process the sliced gcode files.

Slicing multi colors 3d object - Genarate color switching tower

1.Open plug-in.



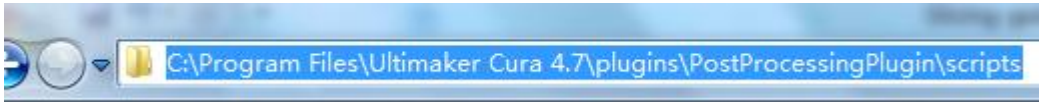


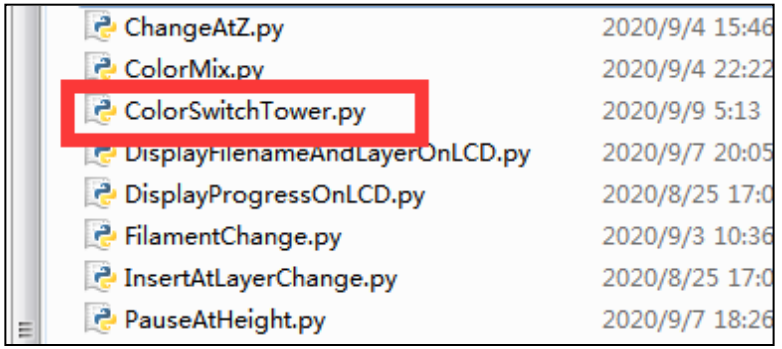


NOTE: If you can't find the "ZONESTAR Color Switch Tower Generation" plug-in in the list, please check if there is a "ColorSwitchTower_Vxxx.py" in the below directory of your PC:

%install directory of Cura%\plugins\PostProcessingPlugin\scripts

If there isn't, please refer to "page 4" to download it and copy to the above directory.



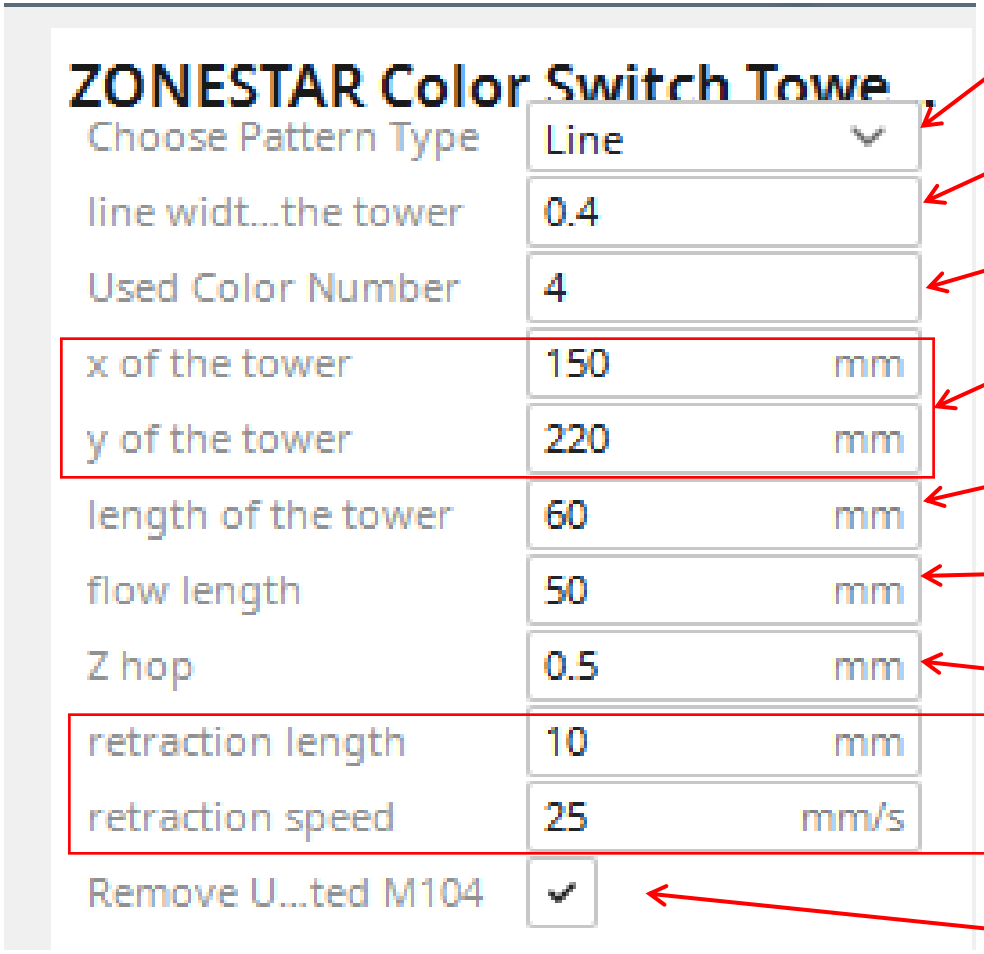


NOTE: We will continue to improve this plug-in. For instructions on the new version of the plug-in, please refer to the information in the plug-in download link

Slicing multi colors 3d object - Genarate color switching tower

2.Modify tower parameters.

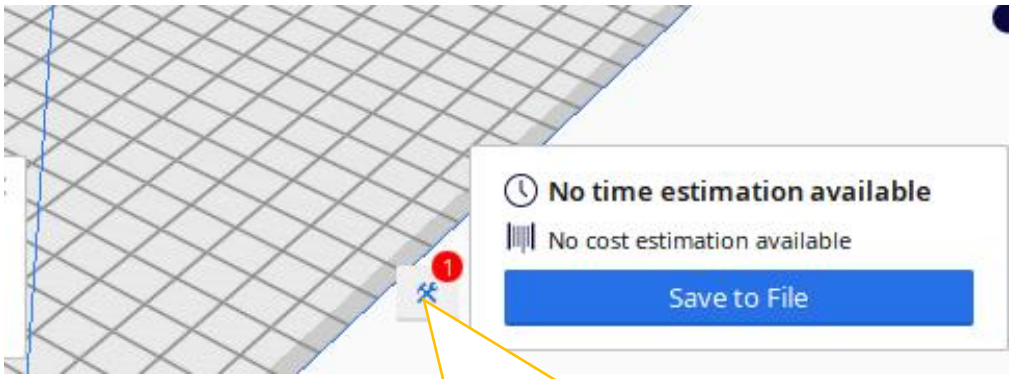
NOTE:The relevant parameters must be consistent according to the printing model and slicing software settings.



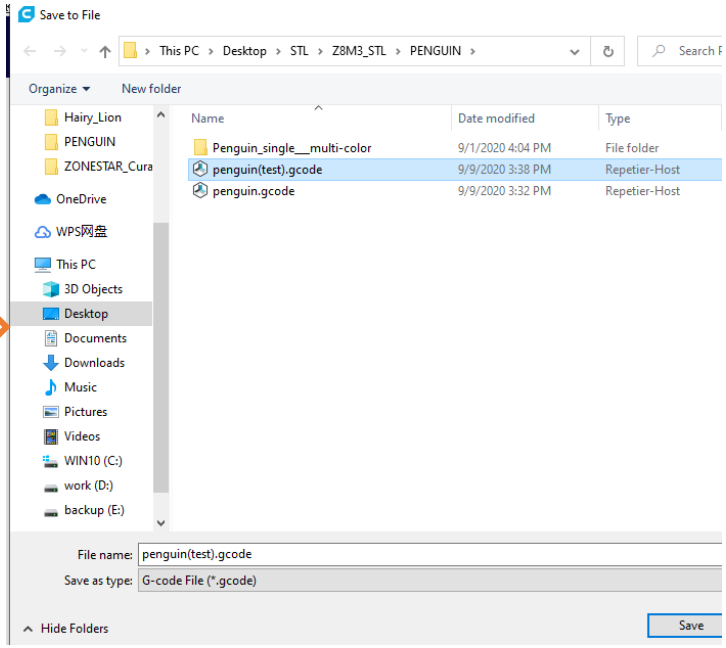
Pattern type of tower, you can choose line or square in current version
Pattern line width Recommended value is between 1 and 1.3 times of the nozzle size
How many colors (extruders) used in your gcode file.
the tower position (X and Y), choose the space of the printing platform and try to be close to the print
The length (X axis direction) of tower, recommend value is 60mm for line pattern and 40mm for square pattern
it will automatically exit the tower when feed filament over this length
Z axis hop how many distance when go to the tower and left the tower
Retraction length and speed, must set to the same with the settings in slicing(refer to page 13)
Cura will set the nozzle temperature when swith exturder, because mixing color hotend share one heater and temeprature sensor, It will cause issue on nozzle heating, so we need to remove it

Slicing multi colors 3d object - Genarate color switching tower

3.Open the sliced gcode file(e.g.: penguin.gcode) and then save it to a new gcode file (e.g.: penguin(test).gcode).



The plug-in tool is shown here.

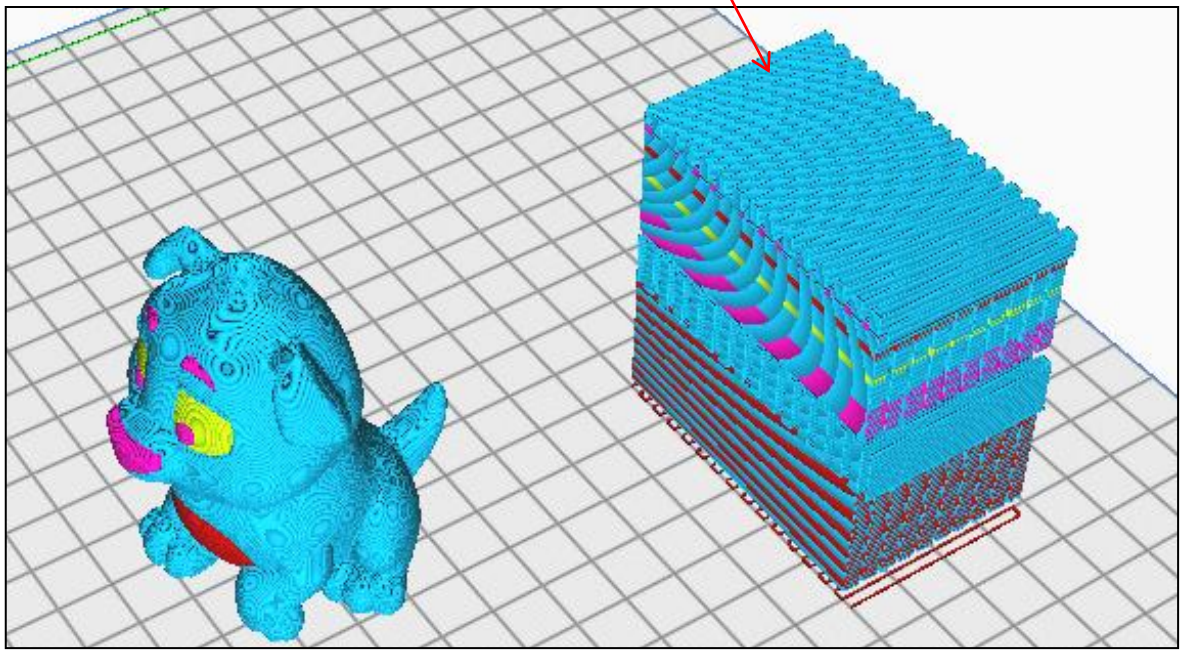


When save the new gcode file, the plug-in will work automatically and add the color swithing tower to the new gcode file.

Slicing multi colors 3d object - Genarate color switching tower

Open the new gcode file (penguin(test).gcode) you saved, preview it and check if the color switch tower has been generated and it is on the right position.

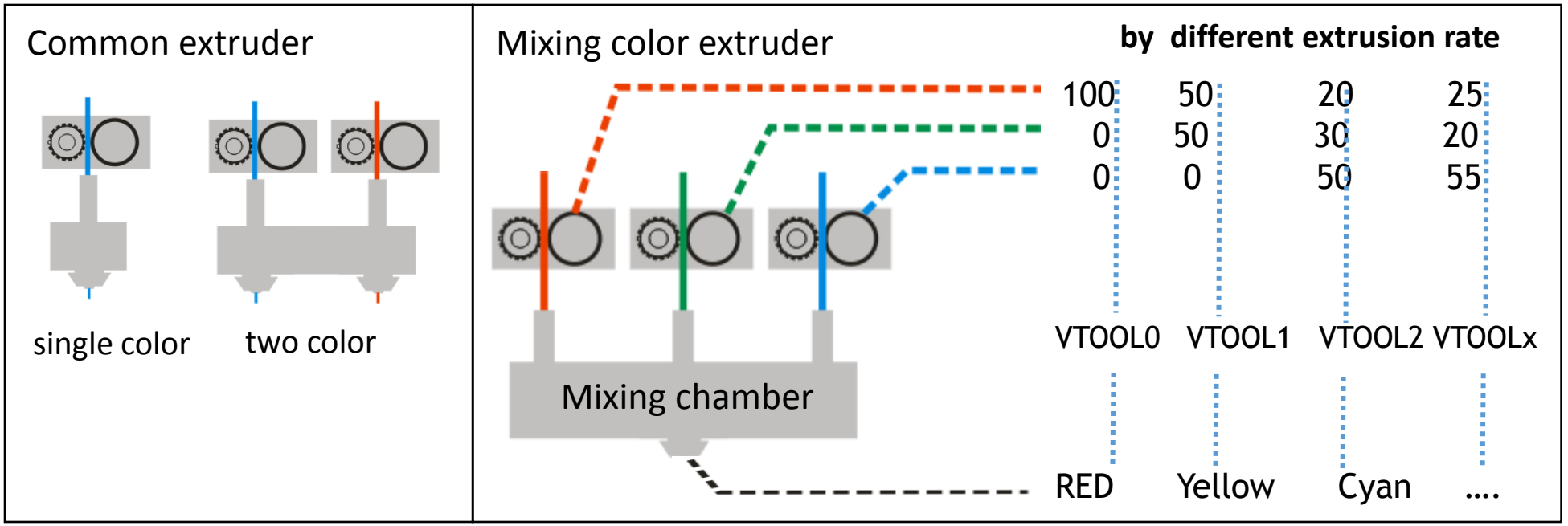
there is a color swithing tower has been added to the new gcode



Slicing more colors 3d object by using virual extruder

what is Virual extruder (V-TOOL)

•**Tool Chain (Tool head):**
For common singel color or general multicolor printer, each extrusion feeder corresponds to one nozzle, so the number of tool chain is equal to the extrusion feeders and nozzles.
For mixing color printer, because it has a mixing chamber to mix 2 or more filament together, so we can set more tool chain than real extruders
•**Virual Extruder / Virsual Tool Chain:**
In mixing color printer, **one combination of extrusion rates can correspond to a new color filament,** in order to distinguish them from the real extruder, they are called **Virsual Tool Chain**.



Slicing more colors 3d object by using virual extruder

How to use Virual extruder (V-TOOL)

- **Step 1:** Set mix rate by using **M163** command
- **Step 2:** Assign this ratio to a visual extruder by using **M164** command
- **Step 3:** Apply a virual extruder by using **Tx** command

for example (M3):

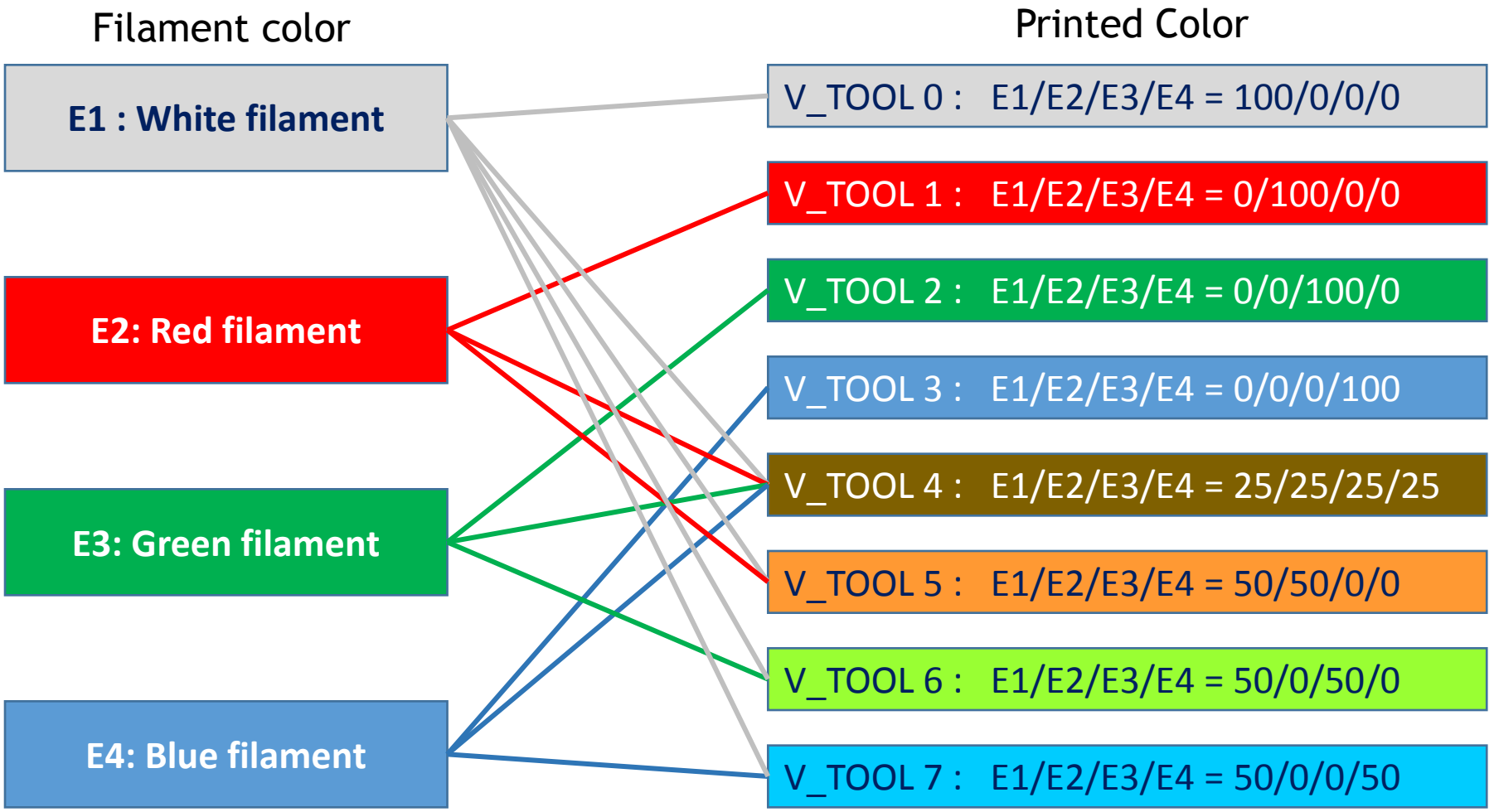
M163 S0 P30 ; **1#**Extruder rate is 30%
M163 S1 P30 ; **2#**Extruder rate is 30%
M163 S2 P40 ; **3#**Extruder rate is 40%
M164 S7 ; **8#**Virual Extruder, its color will be 30% 1# filament + 30% 2# filament + 40% 3#filament
…… ;(usually there are some other commands)
T7 ; form now, the extruder will feed the mixed color filament
…… ;(usually there are some other commands)

NOTE: In firmware or circuit, we use 0,1,2,3 to number extruder (or virtual extruder), but when we talk about actual extruder, we usually use 1#, 2# extruder (or virtual extruder) to number. This is to conform to the actual gcode. Please pay attention to distinguish it.

Slicing more colors 3d object by using virual extruder

The following example will show the slice process for using Z9M4 to print 8-color object

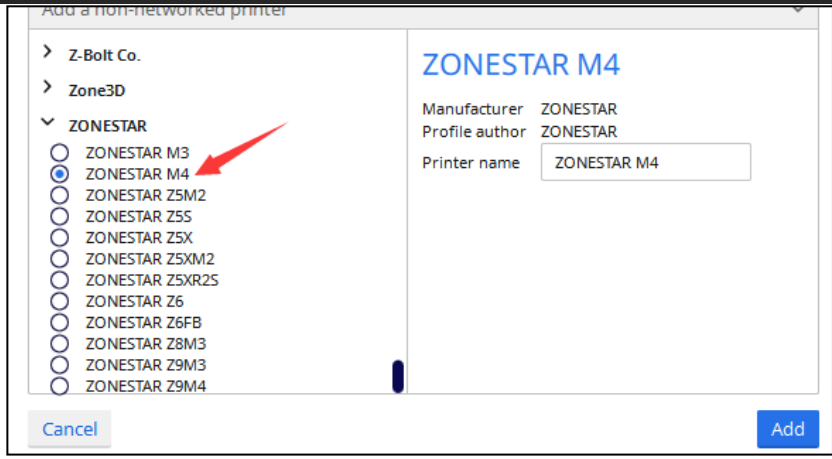
1. Colors

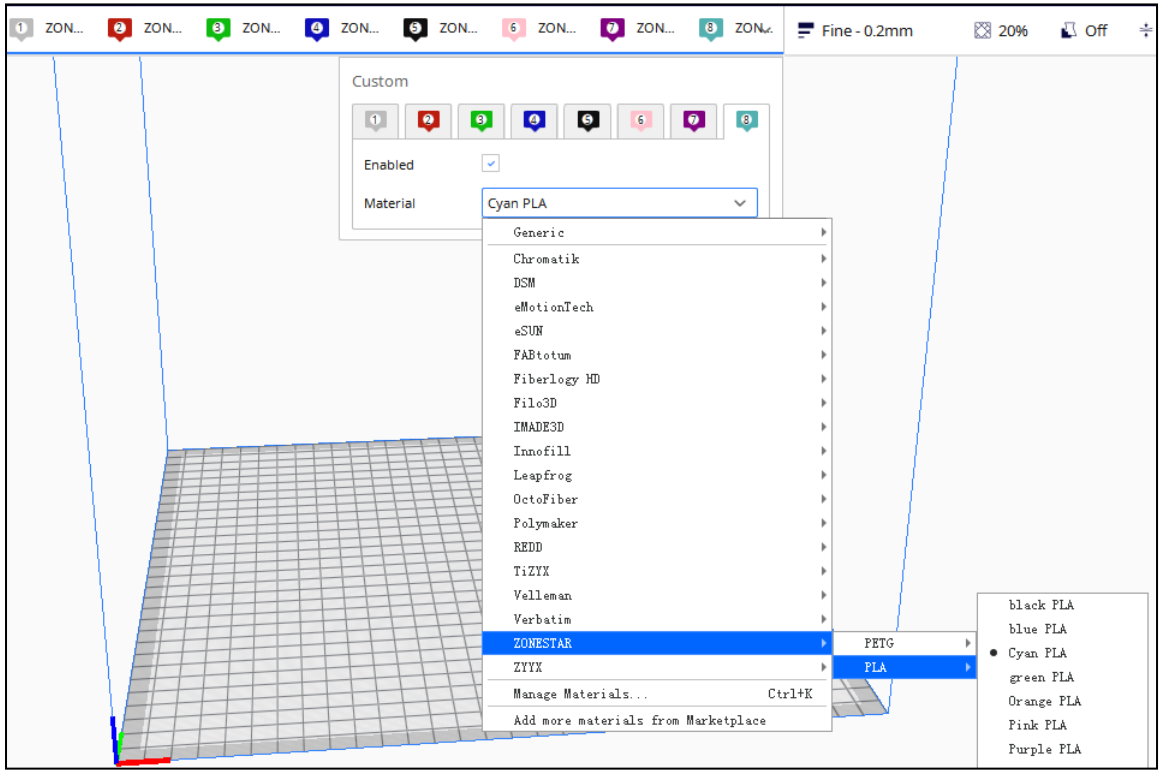


Slicing more colors 3d object by using virual extruder

Step 1: Add a new printer name “ZONESTAR M4” or “ZONESTAR M3”, depends on your printer model

Step 2: set the extruder color for every extruder.





Slicing more colors 3d object by using virual extruder

Step 3: set the mixrate in the start gcode as below:

NOTE: Insert these command to the above, before G28 command

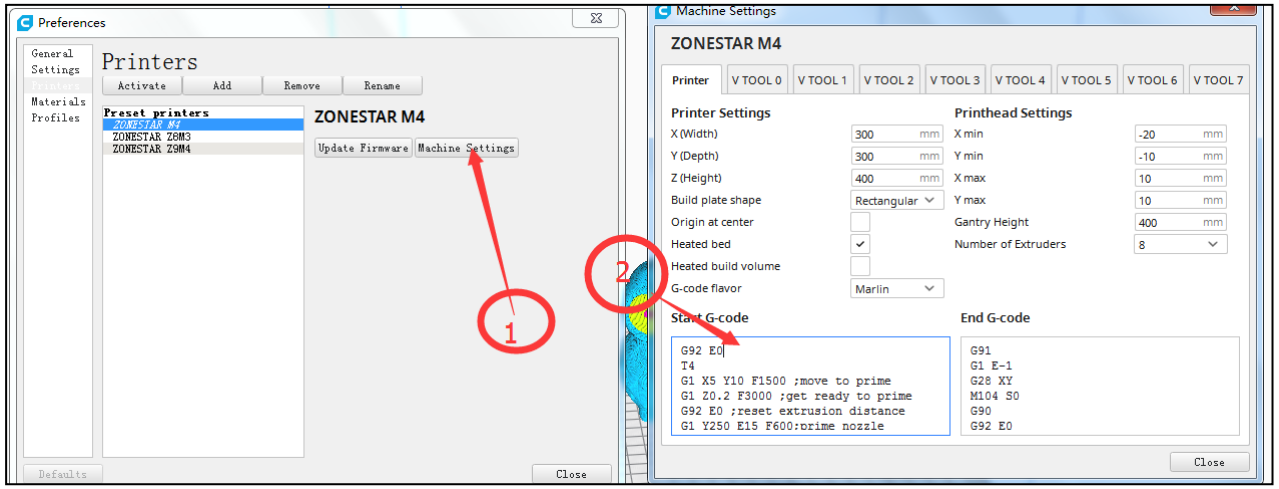
NOTE: Since we used the default mix rate of virsual extruder in this example, , this step can be ignored

```
; virtual Extruder 0
M163 S0 P100
M163 S1 P0
M163 S2 P0
M163 S3 P0
M164 S0
; virtual Extruder 1
M163 S0 P0
M163 S1 P100
M163 S2 P0
M163 S3 P0
M164 S1
```

```
; virtual Extruder 2
M163 S0 P0
M163 S1 P0
M163 S2 P100
M163 S3 P0
M164 S2
; virtual Extruder 3
M163 S0 P0
M163 S1 P0
M163 S2 P0
M163 S3 P100
M164 S3
```

```
; virtual Extruder 4
M163 S0 P25
M163 S1 P25
M163 S2 P25
M163 S3 P25
M164 S4
; virtual Extruder 5
M163 S0 P50
M163 S1 P50
M163 S2 P0
M163 S3 P0
M164 S5
```

```
; virtual Extruder 6
M163 S0 P50
M163 S1 P0
M163 S2 P50
M163 S33P0
M164 S6
; virtual Extruder 7
M163 S0 P50
M163 S1 P0
M163 S2 P0
M163 S3 P50
M164 S7
```

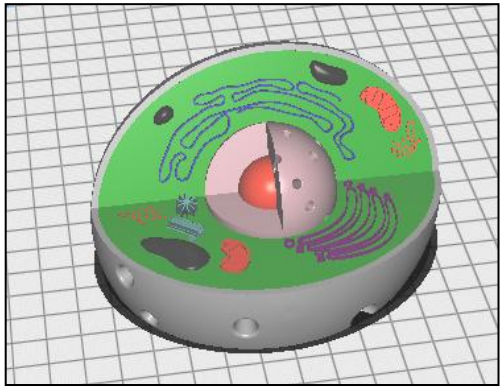


Slicing more colors 3d object by using virual extruder

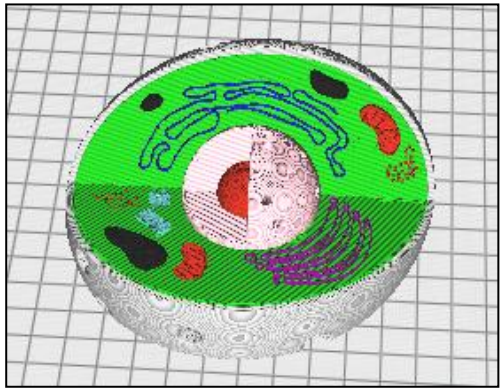
Step 4: Load stl files, assign V-TOOL, merge parts, and slicing and save the gcode file (refer to the provious pages).

NOTE: About the slicing setting, please open the “8color_Cell.3mf” by Cura and check it

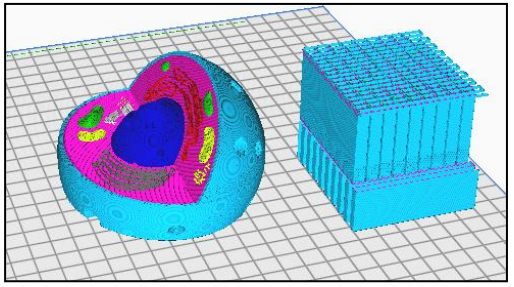
Step 5: Genarate color switching tower, refer to the provious pages



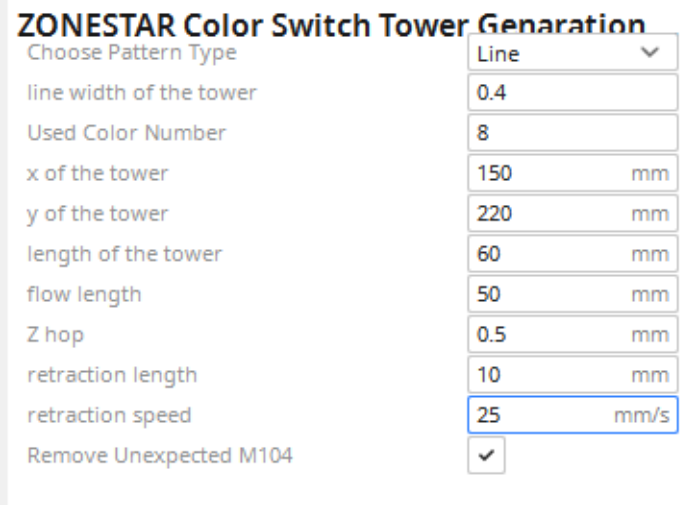
slicing



Generate tower



Stl files → Orig gcode file → gcode file with tower



Picture of actual printed object

Reference: Set the mix rate value of V-TOOL(M3)

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 Z9M3 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.

Reference: Set the mix rate value of V-TOOL (M3)

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 0 M163 S0 P100 M163 S1 P0 M163 S2 P0 M164 S0	; virtual Extruder 4 M163 S0 P50 M163 S1 P50 M163 S2 P0 M164 S3	; virtual Extruder 8 M163 S0 P25 M163 S1 P50 M163 S2 P25 M164 S8	*; virtual Extruder 12* M163 S0 P14 M163 S1 P14 M163 S2 P72 M164 S12
; virtual Extruder 1 M163 S0 P0 M163 S1 P100 M163 S2 P0 M164 S1	; virtual Extruder 5 M163 S0 P50 M163 S1 P0 M163 S2 P50 M164 S4	; virtual Extruder 9 M163 S0 P25 M163 S1 P25 M163 S2 P50 M164 S9	*; virtual Extruder 13* M163 S0 P50 M163 S1 P14 M163 S2 P31 M164 S13
; virtual Extruder 2 M163 S0 P0 M163 S1 P0 M163 S2 P100 M164 S2	; virtual Extruder 6 M163 S0 P0 M163 S1 P50 M163 S2 P50 M164 S5	; virtual Extruder 10 M163 S0 P70 M163 S1 P14 M163 S2 P16 M164 S10	*; virtual Extruder 14* M163 S0 P55 M163 S1 P29 M163 S2 P16 M164 S14
; virtual Extruder 3 M163 S0 P34 M163 S1 P33 M163 S2 P33 M164 S3	; virtual Extruder 7 M163 S0 P50 M163 S1 P25 M163 S2 P25 M164 S7	; virtual Extruder 11 M163 S0 P14 M163 S1 P70 M163 S2 P16 M164 S11	*; virtual Extruder 15* M163 S0 P14 M163 S1 P29 M163 S2 P57 M164 S15

Virtual extruder/ the actual extruder mixing ratio:

Virtual extruder NO.	Ratio of Extruder 1	Ratio of Extruder 2	Ratio of Extruder 3
0	100	0	0
1	0	100	0
2	0	0	100
3	33	33	34
4	50	50	0
5	50	0	50
6	0	50	50
7	50	25	25
8	25	50	25
9	25	25	50
10	70	14	16
11	14	70	16
12	14	14	72
13	50	14	31
14	55	29	16
15	14	29	57

Note:

1. The above value is default value when power on, you can set any parameters by add this setting in the start code of slicing software.
2. The ratio of the mixture ratio of any actual extrusion is not recommended to be less than 5.
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.

Reference: Set the mix rate value of V-TOOL(M4)

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]

; 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%*
M163 S3 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.

; 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%*
M163 S3 P0 → *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, the extruder 4 is 0%

How to set the mix rate value of V-TOOL (M4)

Let's take Z9M4 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 0 M163 S0 P100 M163 S1 P0 M163 S2 P0 M163 S3 P0 M164 S0	; virtual Extruder 4 M163 S0 P25 M163 S1 P25 M163 S2 P25 M163 S3 P25 M164 S4	; virtual Extruder 8 M163 S0 P0 M163 S1 P50 M163 S2 P50 M163 S3 P0 M164 S8	*; virtual Extruder 12* M163 S0 P20 M163 S1 P0 M163 S2 P0 M163 S3 P80 M164 S12
; virtual Extruder 1 M163 S0 P0 M163 S1 P100 M163 S2 P0 M163 S3 P0 M164 S1	; virtual Extruder 5 M163 S0 P50 M163 S1 P50 M163 S2 P0 M163 S3 P0 M164 S5	; virtual Extruder 9 M163 S0 P0 M163 S1 P50 M163 S2 P0 M163 S1 P50 M164 S9	*; virtual Extruder 13* M163 S0 P80 M163 S1 P20 M163 S2 P0 M163 S3 P0 M164 S13
; virtual Extruder 2 M163 S0 P0 M163 S1 P0 M163 S2 P100 M163 S3 P0 M164 S2	; virtual Extruder 6 M163 S0 P50 M163 S1 P0 M163 S2 P50 M163 S33P0 M164 S6	; virtual Extruder 10 M163 S0 P20 M163 S1 P80 M163 S2 P0 M163 S3 P0 M164 S10	*; virtual Extruder 14* M163 S0 P80 M163 S1 P0 M163 S2 P20 M163 S3 P0 M164 S14
; virtual Extruder 3 M163 S0 P0 M163 S1 P0 M163 S2 P0 M163 S3 P100 M164 S3	; virtual Extruder 7 M163 S0 P50 M163 S1 P0 M163 S2 P0 M163 S3 P50 M164 S7	; virtual Extruder 11 M163 S0 P20 M163 S1 P0 M163 S2 P80 M163 S3 P0 M164 S11	*; virtual Extruder 15* M163 S0 P80 M163 S1 P0 M163 S2 P0 M163 S3 P20 M164 S15

Virtual extruder/ the actual extruder mixing ratio:

Virtual extruder NO.	Ratio of Extr 1	Ratio of Extr 2	Ratio of Extr 3	Ratio of Extr 4
0	100	0	0	0
1	0	100	0	0
2	0	0	100	0
3	0	0	0	100
4	25	25	25	25
5	50	50	0	0
6	50	0	50	0
7	50	0	0	50
8	0	50	50	0
9	0	50	0	50
10	20	80	0	0
11	20	0	80	0
12	20	0	0	80
13	80	20	0	0
14	80	0	20	0
15	80	0	0	20

Note:

1. The above value is default value when power on, you can set any parameters by add this setting in the start code of slicing software.
2. The ratio of the mixture ratio of any actual extrusion is not recommended to be less than 5.
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.