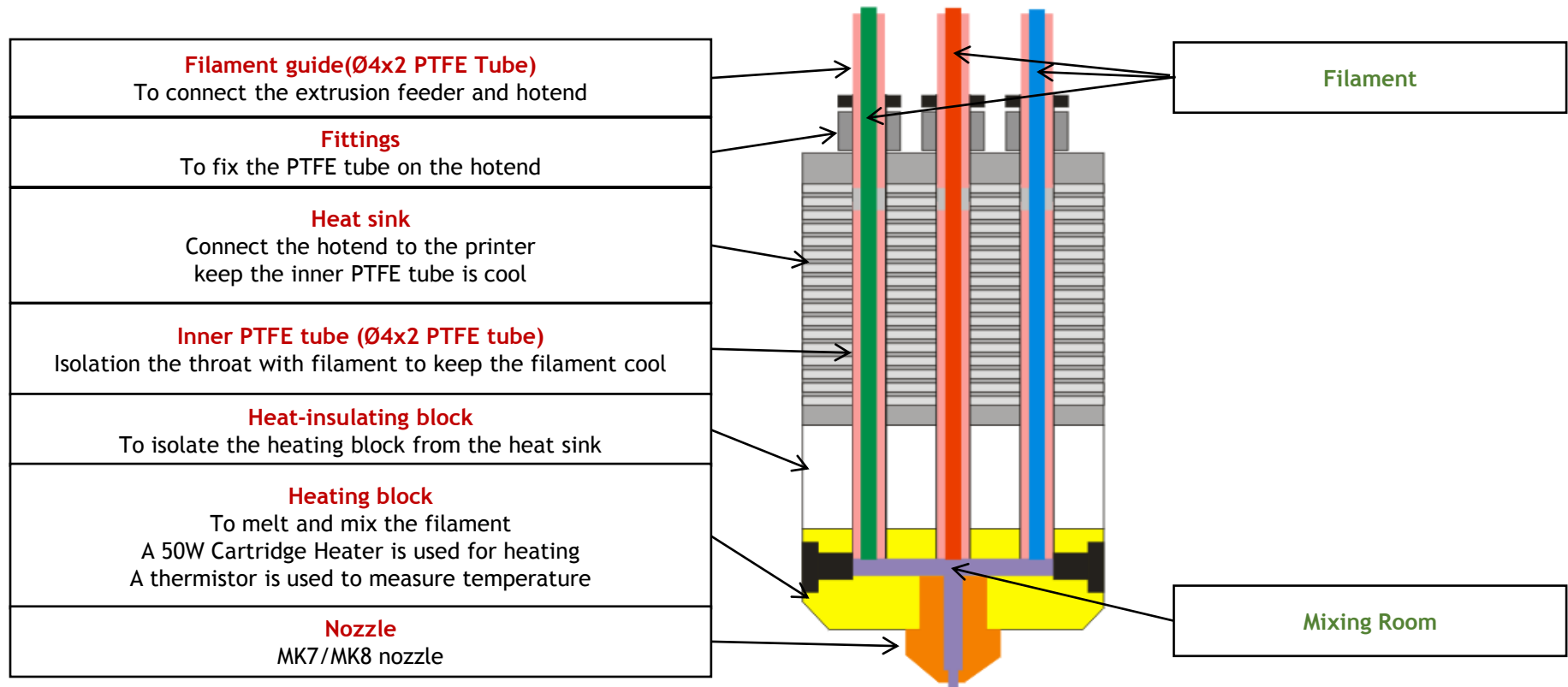# Zonestar

Operation Guide for Mixing Color Extruder

V1.3

For the 4ᵗʰ version M3 and M4 hotend

Structure and Working principle

• Structure of mixing color hot end

Filament guide(Ø4x2 PTFE Tube) To connect the extrusion feeder and hotend	
Fittings To fix the PTFE tube on the hotend	
Heat sink Connect the hotend to the printer keep the inner PTFE tube is cool	
Inner PTFE tube (Ø4x2 PTFE tube) Isolation the throat with filament to keep the filament cool	
Heat-insulating block To isolate the heating block from the heat sink	
Heating block To melt and mix the filament A 50W Cartridge Heater is used for heating A thermistor is used to measure temperature	
Nozzle MK7/MK8 nozzle	

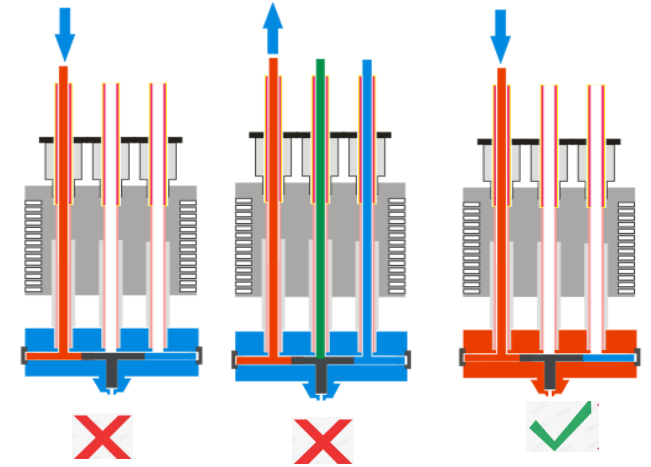**Filament**

Mixing Room

• Color mixing principle:

1. Filaments melt and mix in the mixing room, and then flow out from the nozzle.
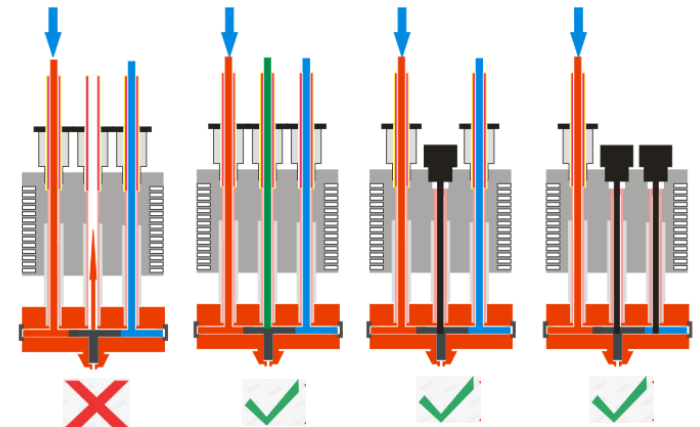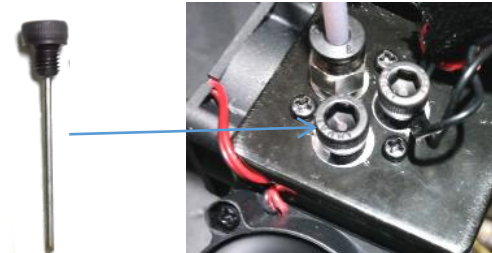2. To change the feed ratio, it can get different color filament.

!!ATTETION!!

DO NOT load / unload filament when the nozzle temperature is less than 150℃

DONOT feed-in filament over 10mm if any of the channels is empty, otherwise may cause it be clogged. You can:
1. Load filament to all channels.
2. Use a *hotend clean tool* to close empty channels.

How to print single color 3d object

Step 1: Refer to the **silcing guide for mixing color printer** to covert the 3d mode file to gcode file.

Step 2: Preheat the nozzle to about 170 degree

Step 3: Use hotend clean tool to close the unused channle of hotend

Step 4: load filament to the hotend. **NOTE: For M4 printer, recommend to load the filament to the center Channel, and use "hotend clean tool" to close the others channels.**

Step 5: print gcode file from SD card
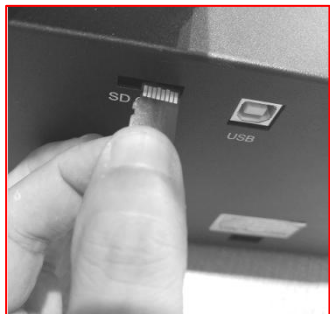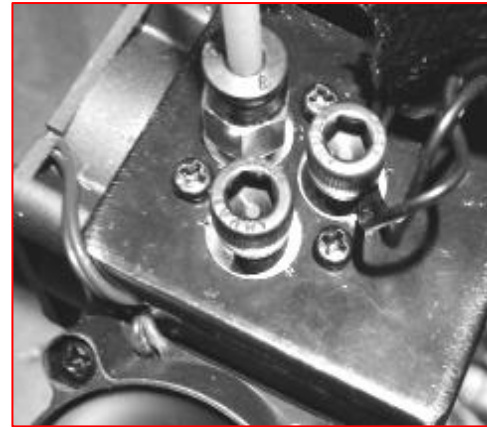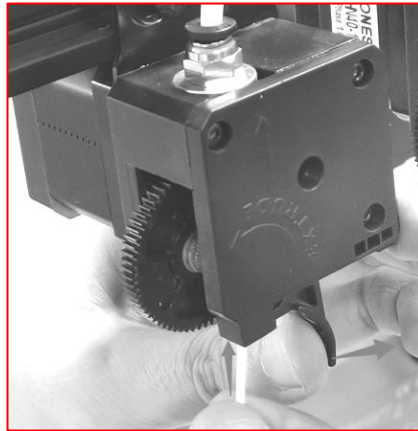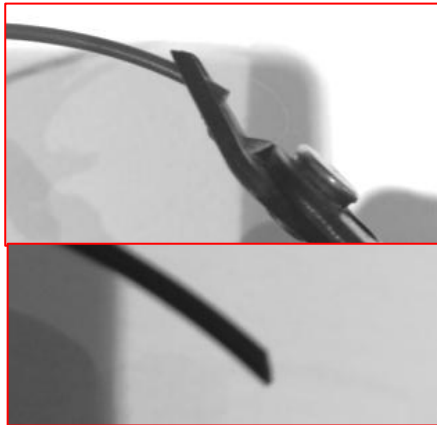
Change print color by adjust mixing rate (LCD12864)

Step 1. Start to print a singel color gcode file(Vase.gcode) from SD card.

Step 2. For LCD12864 screen, set on the menu>>

●Mixer>>Active V-tool: Select the vtool currently printed, or use the default value,

the range is **0 ~ 15.**

●Mixer>>Mix>>Component1~3(4 for M4): Arbitrarily adjust the percentage of extruder 1~3**(4 for 4),** range is **0 ~ 100.**

●Mixer>>Mix>>Comit V-tool Mix: Redistribute the percentage of all extruders in proportion and send it to the current vtool.

After setting up, on the ideal menu shows VTOOL:0

How to realize gradient mix print (LCD12864)

Step 1. **Start to print a singel color gcode file(*Vase.gcode*) from SD card.**

Step 2. **For LCD12864 screen, set on the menu>>**

Mixer>>Gradient: disable >>

>> Start Z: set the start Z heigth **(such as:0mm)**

>> End Z: set the END Z heigth **(such as:200mm)**

>> Start V-tool: set the start V-tool **(such as:0)**

>> End V-tool: set the end V-tool **(such as:1)**

After set Start Z isn't equal to the End Z, and Start V-tool isn't equal to End V-tool,

the LCD will shows "Gradient : enable" and on the ideal menu shows *gradient*


```
Start V-tool:        0
  End V-tool:        1
Reverse Gradient
Start Z:       0.0 mm →
  End Z:     200.0 mm →
```

```
Active V-tool:        0
Mix                   →
Reset V-tools         →
GradientMix : enable→
Random Mix  :disable→
```

```
100 0   0   0   0°   0°

gradient     20° 20°
               18 Z    0
»100%              00:00
Z9V5 Ready.
```

How to realize random mix print (LCD12864)

Step 1. Start to print a singel color gcode file(*Vase.gcode*) from SD card.

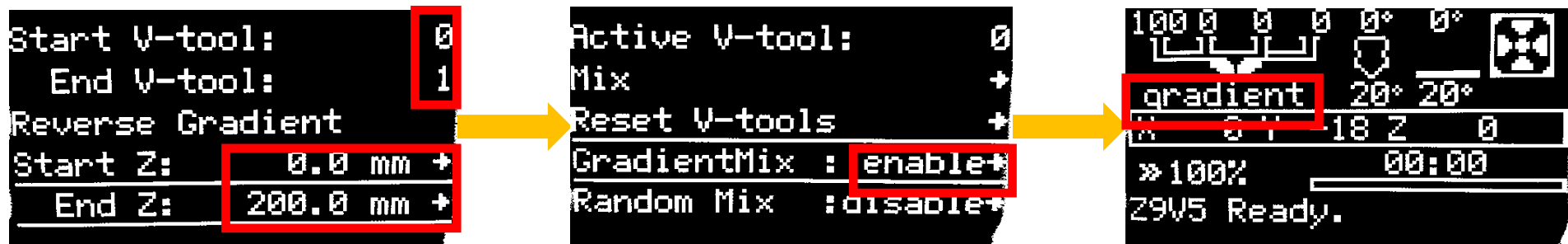Step 2. For LCD12864 screen, set on the LCD menu>>

Mixer>>Random Mix: disable >>

Start Z: set the start Z heigth(such as:0mm)   End Z: set the END Z heigth(such as:200mm)

Height: set interval distance(such as:10mm), When the z-axis distance changes beyond this value, the mixing ratio changes randomly once.

Extruders: set the number of extruders with random variation(such as:4)

After set Start Z isn't equal to the End Z, the LCD will shows "Gradient : enable"
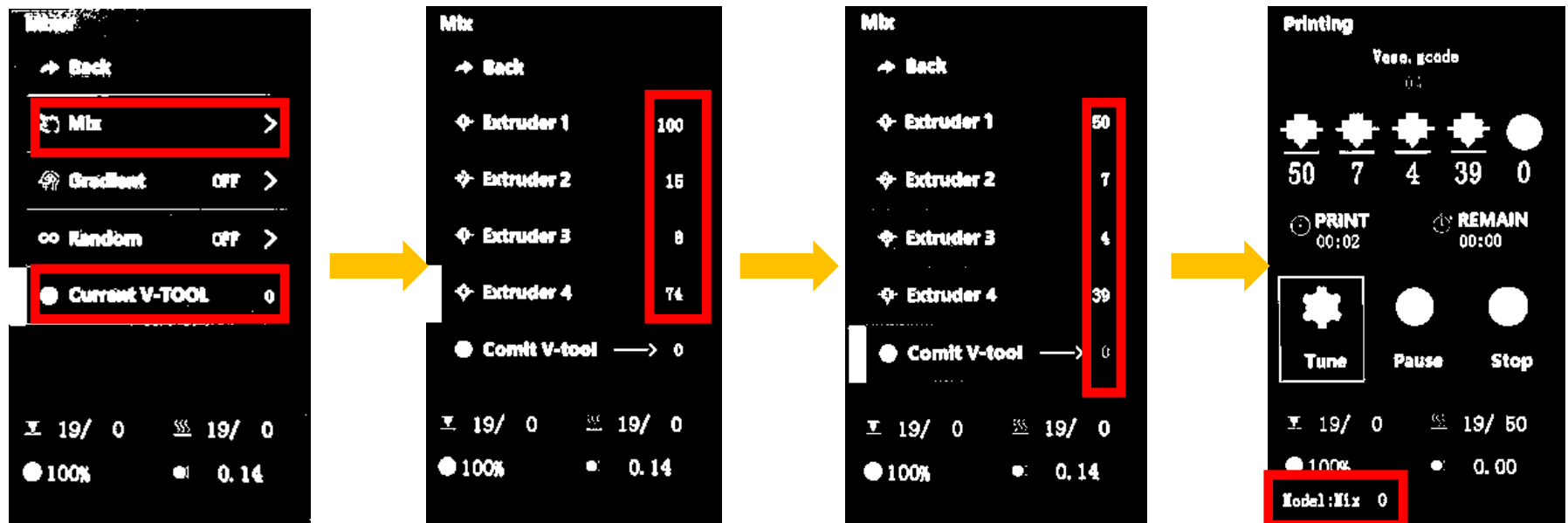
and on the ideal menu shows *random*

Change print color by adjust mixing rate (LCD-DWIN)

Step 1. Start to print a singel color gcode file(Vase.gcode) from SD card.

Step 2. For TFT screen, set on the menu>>

●Mixer>>Current V-TOOL: Select the vtool currently printed, or use the default value, range is 0 ~ 15.

●Mixer>>Mix>>Extruder1~3(4 for M4): Arbitrarily adjust the percentage of extruder 1~4, range is 0 ~ 100.

●Mixer>>Mix>>Comit V-tool: Redistribute the percentage of all extruders in proportion and send it to the current vtool. The current vtool value changes color.

After setting up, enter printing, on the printing menu shows: *Mix 0*

How to realize gradient mixing print (LCD-DWIN)

Step 1. Start to print a singel color gcode file(*Vase.gcode*) from SD card.

Step 2. For LCD-DWIN screen, set on the menu>>

Mixer>>Gradient: **OFF** >>

>> Start Z: set the start Z height **(such as:0mm)**

>> End Z: set the END Z height **(such as:200mm)**

>> Start V-tool: set the start V-tool **(such as:0)**

>> End V-tool: set the end V-tool **(such as:1)**

After set Start Z isn't equal to the End Z, and Start V-tool isn't equal to End V-tool, the LCD will shows

"Gradient : **ON**" and on the printing menu shows: *Gradient 0--->1*

How to realize random mixing print (LCD-DWIN)

Step 1 Start to print a singel color gcode file(*Vase.gcode*) from SD card.

Step 2. For LCD-DWIN screen, set on the menu>>

Mixer>>Random: OFF >>

>> Start Z: set the start Z height **(such as:0mm)**

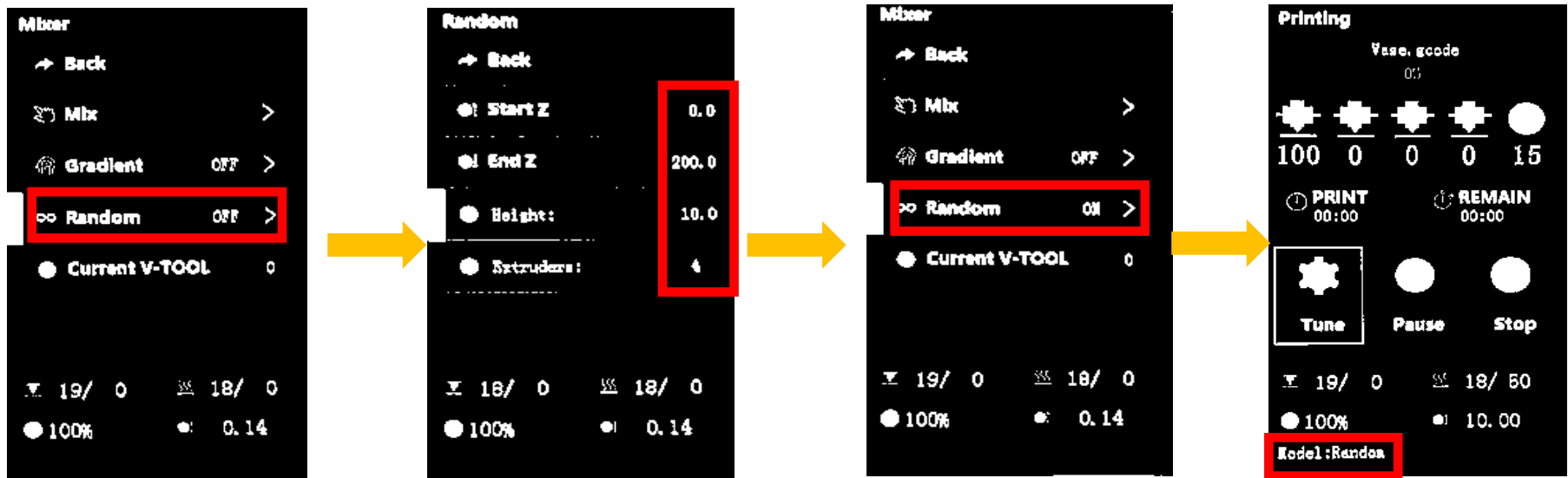**>> End Z:** set the end Z height **(such as:200mm)**

>>Height: set interval distance **(such as:10mm),** When the z-axis distance changes beyond this value, the mixing

ratio changes randomly once.

Extruders: set the number of extruders with random variation **(such as:4)**

After set Start Z isn't equal to the End Z, the LCD will shows "Random : ON" and on the printing menu shows:

Random

How to realize gradient Random mixing by modifing Add gcode)

You can also add a **M166/M167** command into the *gcode* file to apply gradient / random mixing printing, so it can automatically work when print from SD card.

Gradient Mixing:
For example: **M166 S1 A0 Z200 I0 J1**
S1➜Enable gradient mix **A0** ➜ startZ is 0mm **Z200** ➜ EndZ is 200mm **I0** ➜ Start V-tool is 0 **J1** ➜ End Vtool is 1

Random Mixing:
For example: **M167 S1 A0 Z100 H0.2 E3**
S1➜Enable Random mix **A0** ➜ startZ is 0mm **Z100** ➜ EndZ is 100mm **H0.2** ➜ change color every 0.2mm height
E3 ➜ 3 extruders (E0~E2) will be used to mix

Please note that there is no Tn(T0 ~ T16) command after M166/M167 command in the gcode code, because it will stop automatic gradient/Random mixing function

```
/**
 * M166: Start a gradient mix
 *
 * S[bool] - Enable / disable gradients
 * A[float] - Starting Z for the gradient
 * Z[float] - Ending Z for the gradient.
 * I[index] - V-Tool to use as the starting mix.
 * J[index] - V-Tool to use as the ending mix.
 **/
```

```
/**
 * M167: Start a random mixing
 *  S[bool]  - Enable / disable random mixing
 *  A[float] - Starting Z for the random mixing
 *  Z[float] - Ending Z for the random mixing
 *  H[float] - Minimum height of changing mixing rate
 *  E[int] - how many extruders used on random mixing
 **/
```

How to print multi-color 3d object

Step 1: Refer to the **silcing guide for mixing color printer** to covert the 3d mode file to gcode file.

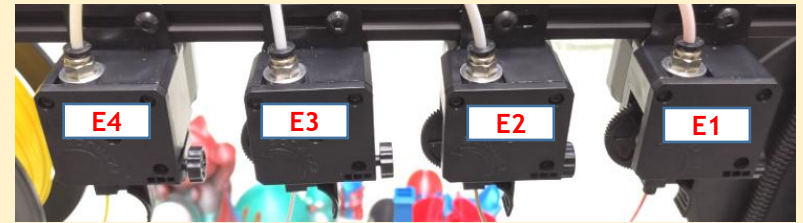Step 2: Preheat the nozzle to about 170 degree

Step 3: Load filament to the hotend, and use hotend clean tool to close the unused channles

Step 4: print gcode file from SD card**(4C_Niko_Dog.gcode)**
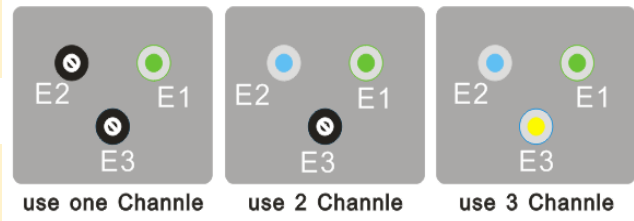

TIPS 1:
Make a mark on the extrusion feeder in order to quickly distinguish the extruder
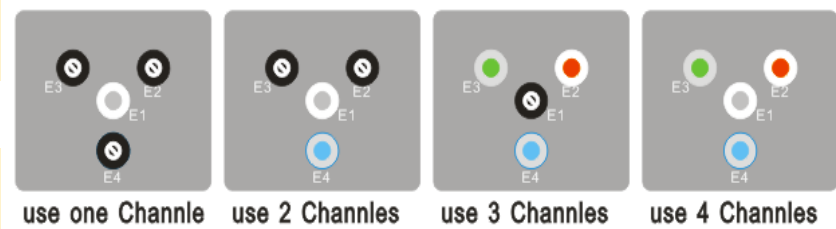**PS: Their sequence depends on wiring**

E4   E3   E2   E1

TIPS 2: Recommended channels for different quantities of filaments

M3

| E2 | E1 |
| E3 | |
use one Channle

| E2 | E1 |
| E3 | |
use 2 Channle

| E2 | E1 |
| E3 | |
use 3 Channle

M4

E3 E2
E1
use one Channle

E3 E2
E1
E4
use 2 Channles

E3 E2
E1
E4
use 3 Channles

E3 E2
E1
E4
use 4 Channles

TIPS 3:
The steps to load filaments:
1. Heat nozzle, and then use *hotend clean tool* to close unused channel (remove the fittings first)!
2. load all of the filaments into the hotend, stop when it enter the hotend about 30~40mm.
3. **MENU>>Motion>>Move axis>>Set V-TOOL to 3**(for M3) or 4(for M4).
4. **MENU>>Motion>>Move axis>Extruder>>** feed until the filament flow from the nozzle
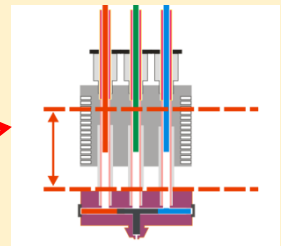
How to slicing multi-color 3d object

About how wo slicing, please refer to the guide in this link:
https://github.com/ZONESTAR3D/Slicing-Guide