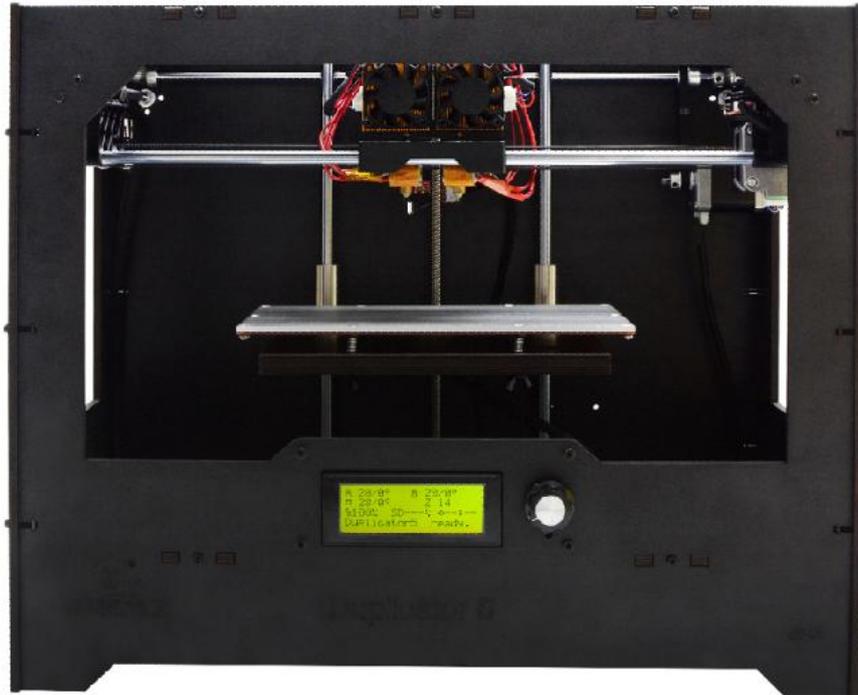


# Geeetech Duplicator 5 3D printer

## User Manual



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## **Safety Instructions**

Building the printer will require a certain amount of physical dexterity, common sense and a thorough understanding of what you are doing. We have provided this detailed instruction to help you assemble it easily.

However, ultimately we cannot be responsible for your health and safety while you are building or operating the printer. Therefore, be sure you are confident in what you are doing prior to commencing with building or buying. Read the entire manual to enable you to make an informed decision.

Building and operating involves electricity and all necessary precautions should be taken and adhered to. The printer runs on 24V supplied by a certified power supply, so you shouldn't ever have to get involved with anything over 24V. Please bear in mind that there can still be high currents involved and even at 24V they shouldn't be taken lightly.

Check the power input of the power supply unit. You can choose either 110V or 220V according to the power regulation in your country.

High temperatures are involved in 3D Printing. The extrusion nozzle of the hot end can run at about 230 °C, the heated bed runs at 110 °C and the molten plastic extruded will initially be at around 200 °C. Therefore, special care and attention should be taken when you are handling these parts of the printer during operation.

We wouldn't suggest you to leave your printer running unattended, or at least until you are confident to do so. We are not responsible for any loss, damage, threat, hurt or other negligent result caused by either building or using the printer.

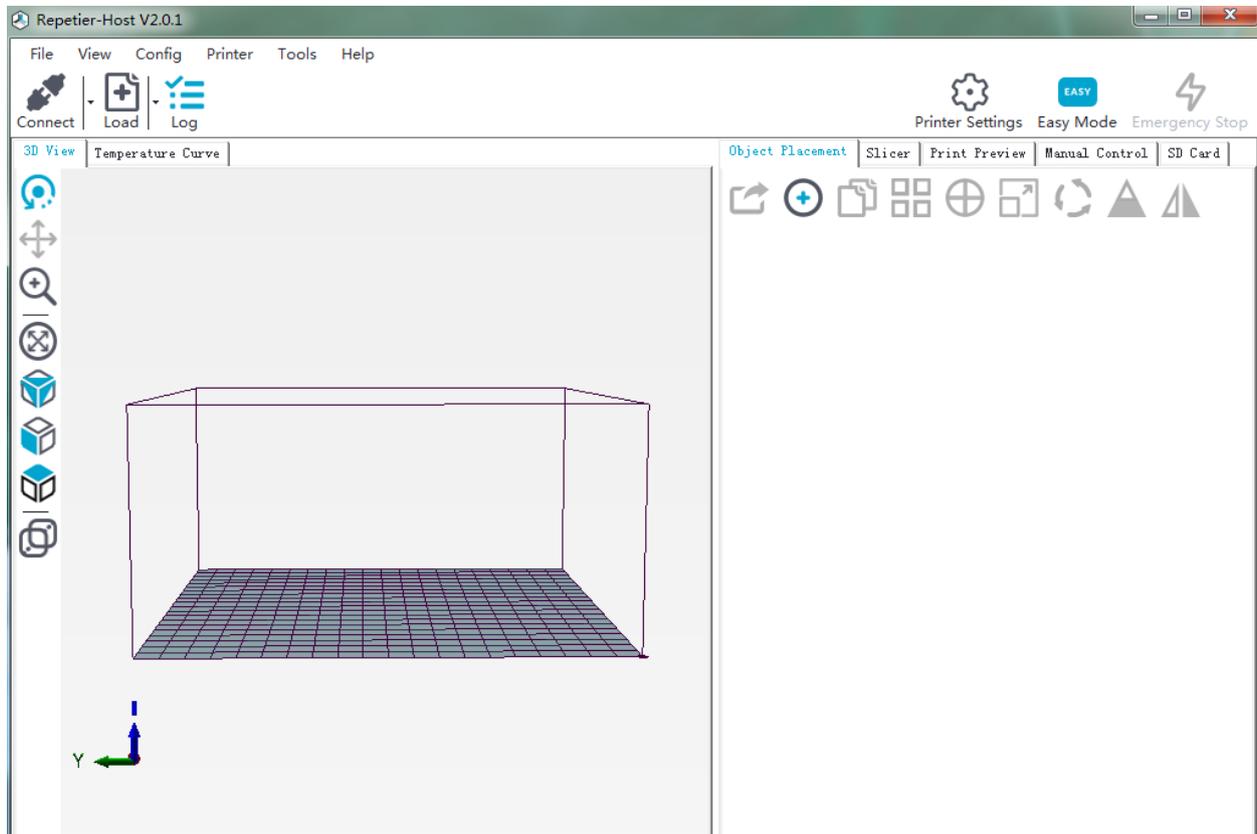
## 1. Software Resources

### 1.1 Repetier-Host

We use the latest Repetier-Host 2.0.1 as the control software for Duplicator 5. Here is the link for downloading it:

<https://www.repetier.com/download-now/>

After downloading and installation, it can be used.



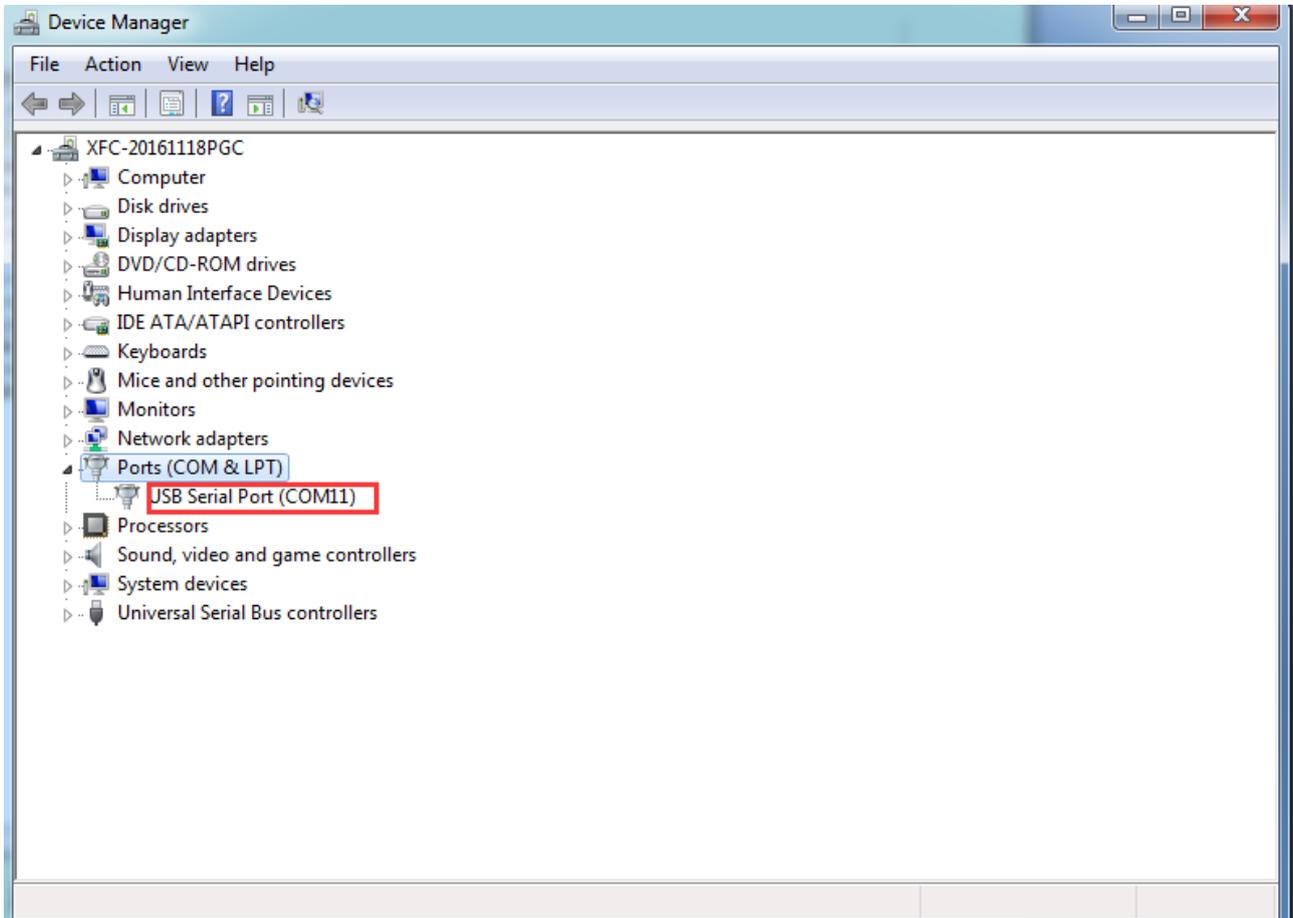
### 1.2 Driver

Connect the printer to computer with USB cable; the USB driver installer will automatically appear.

If not, you can download FT232RQ here, the driver of GT2560:

<http://www.ftdichip.com/Drivers/VCP.htm>

Upon downloading and installing, you can find the corresponding serial port in the Windows "Device Manager":



### 1.3 Arduino IDE

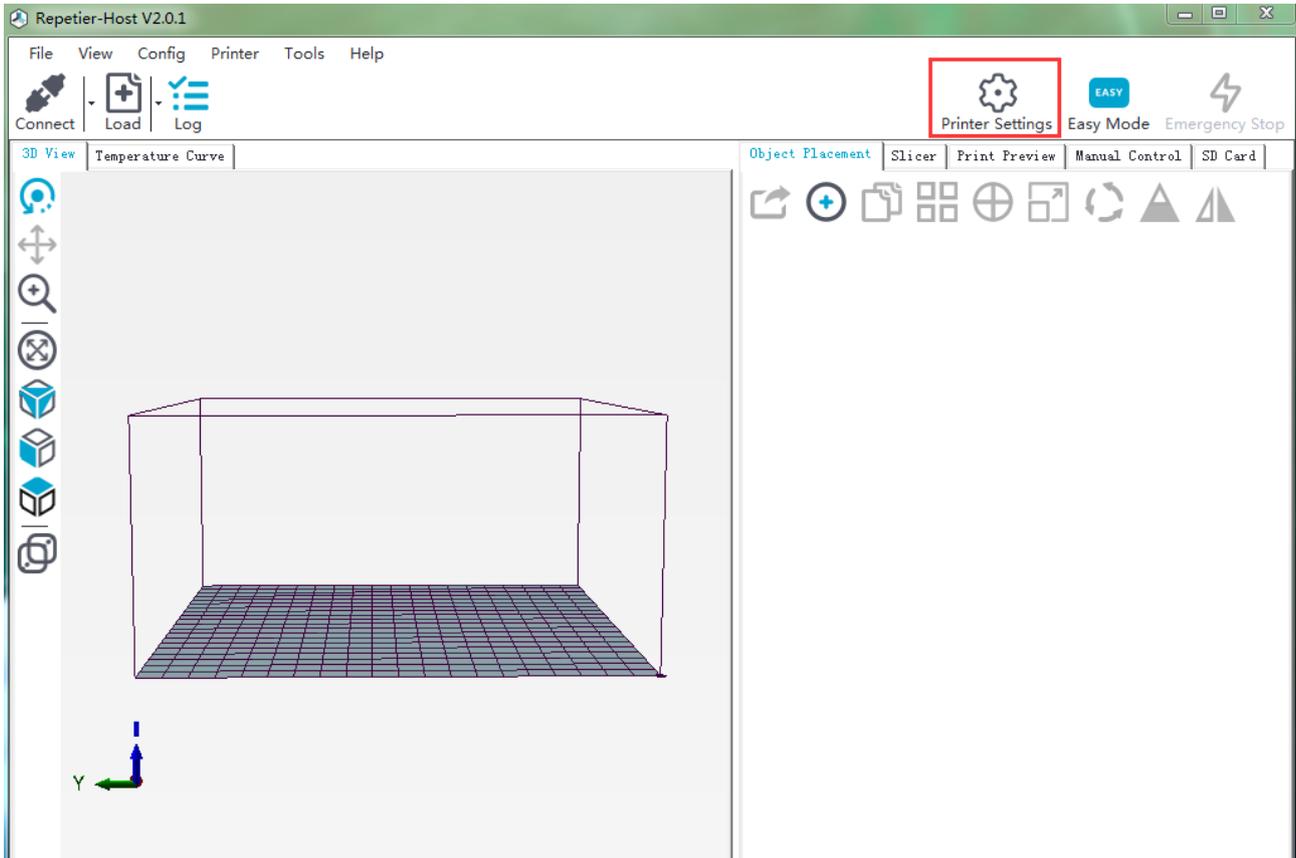
In the process of using the printer you may need to re-upload the firmware, and the software you need to use is Arduino IDE. About how to upload firmware [please refer to FAQ](#).

## 2. Connect the Printer

After the above software is installed, we can connect the printer to the computer. Plug the USB into



the computer, start Repetier-Host, click the  icon in the top right corner, and the dialog box of [printer settings] will appear.

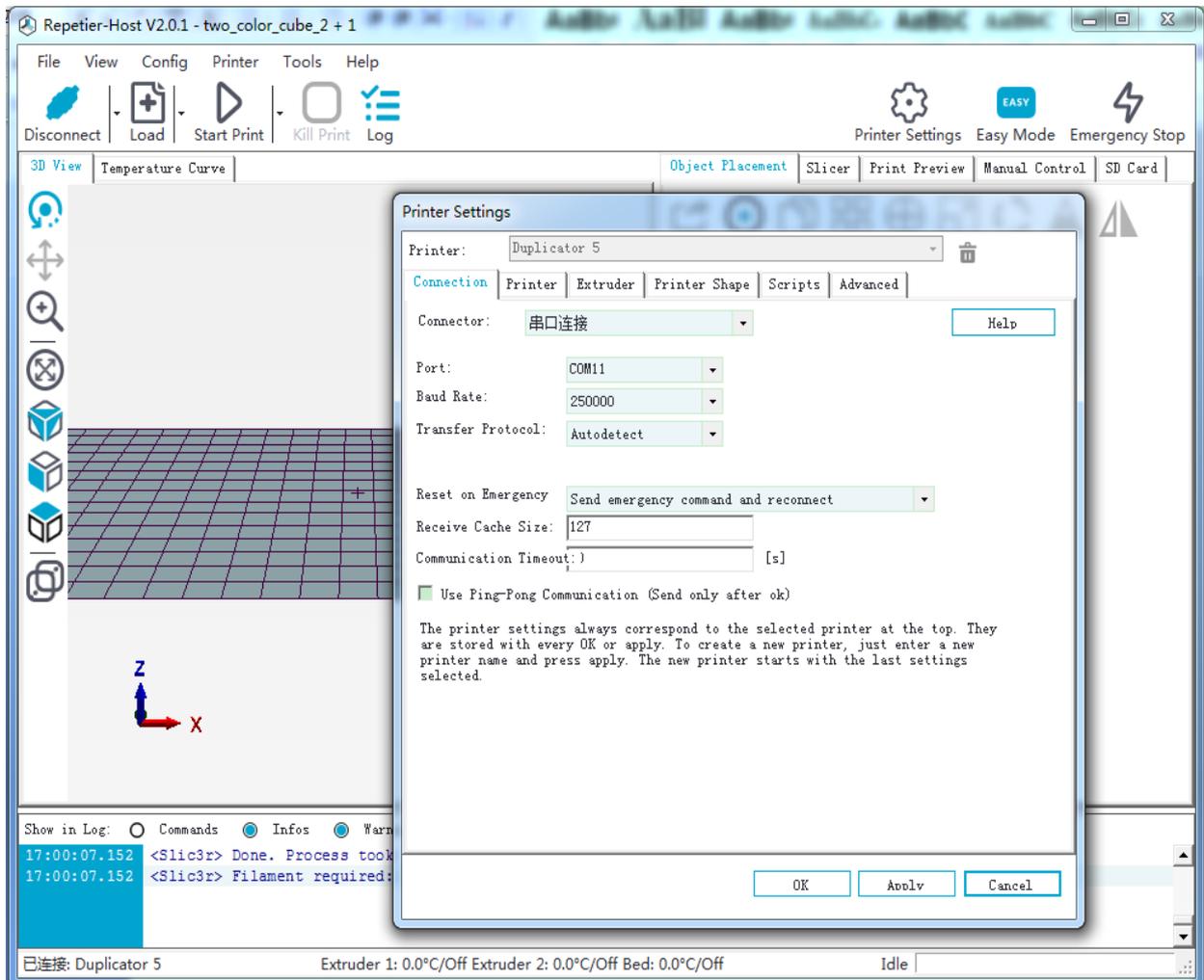


First, enter “Duplicator 5” into the text box to name the printer.

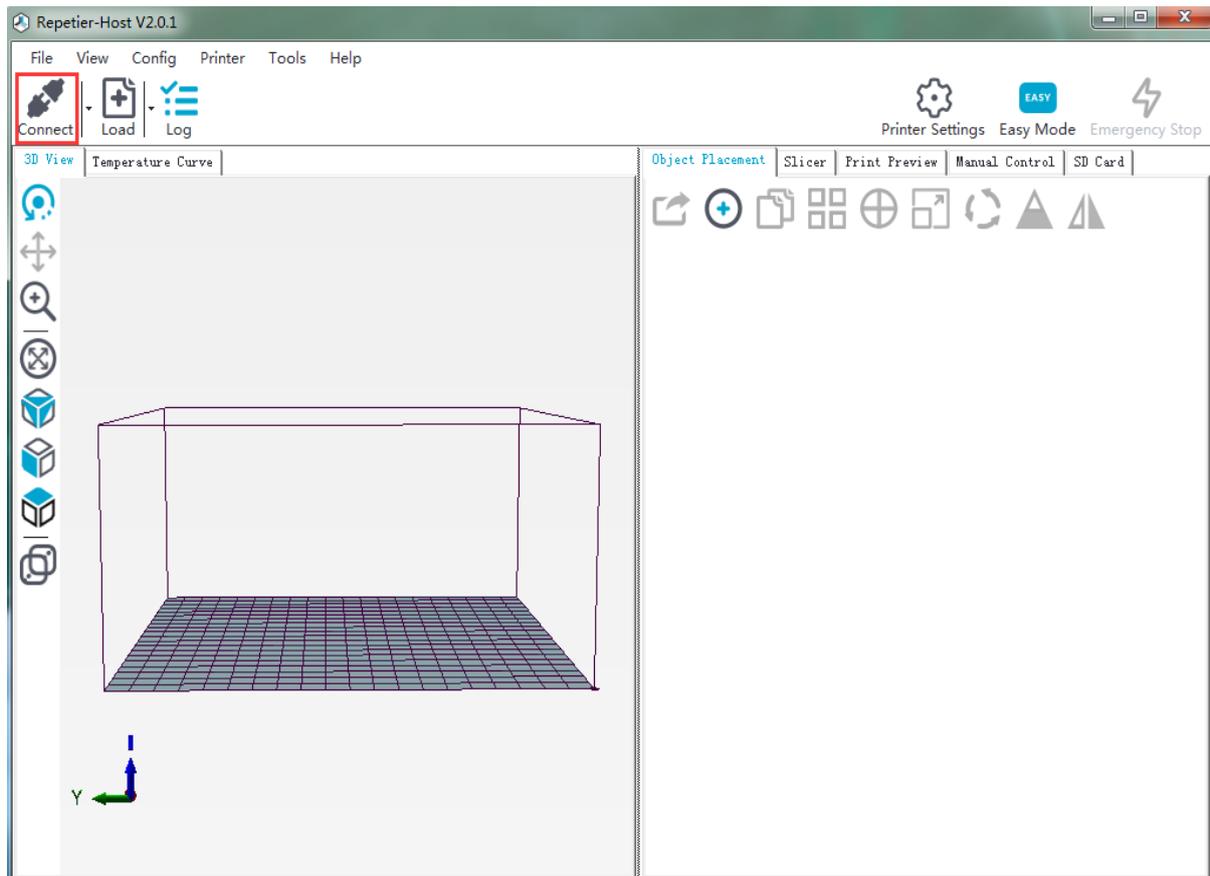
Then, select the corresponding COM port for the printer and set the baud rate as 250,000 in the drop-down menu.

Click [Apply] after the setting.

The following pictures show the whole setting details.



After setting, click the  button in the top left corner of Home Page. When the button turns green and changes into , the printer connection is successful.



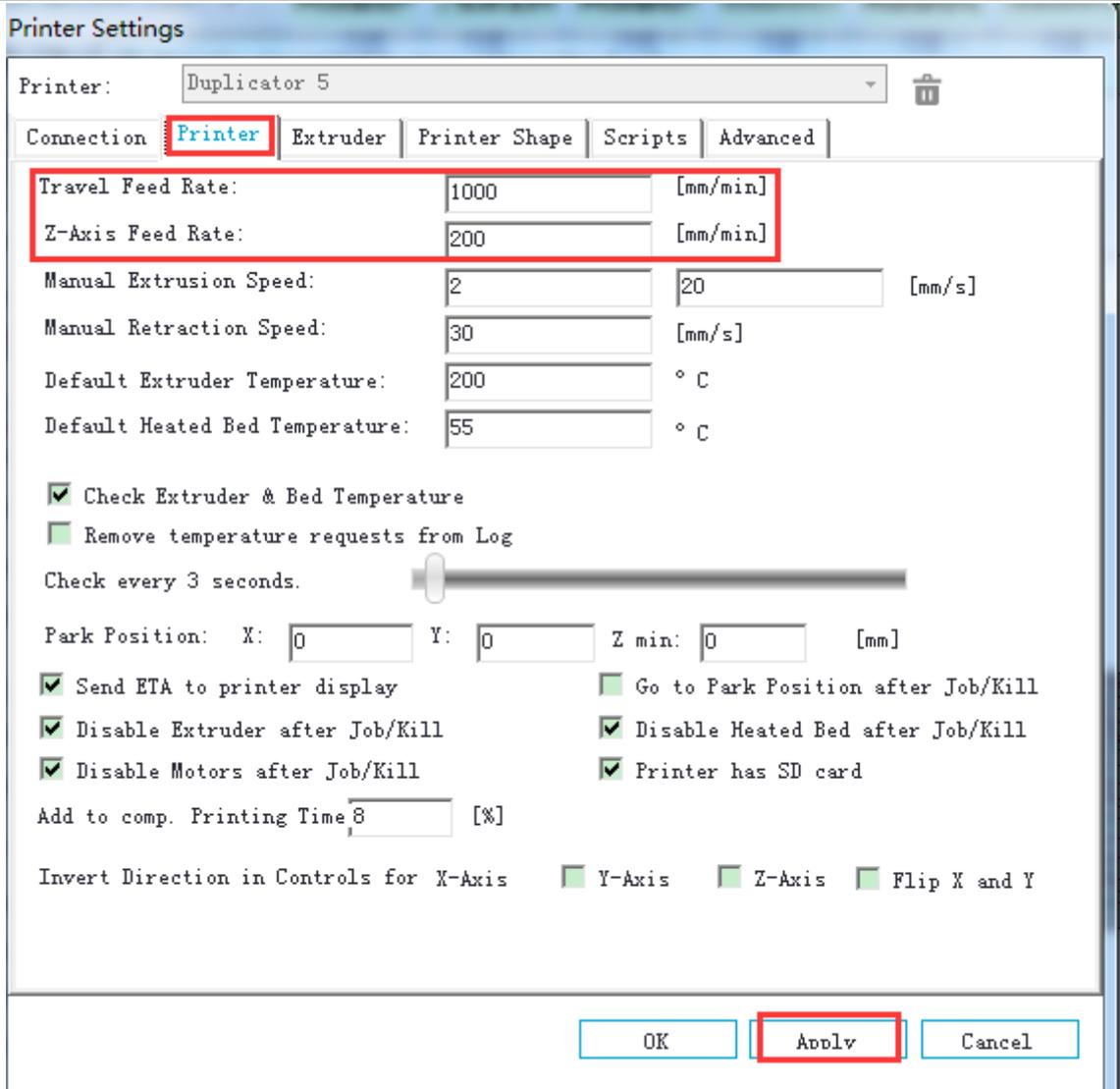
### 3. Printer Setting

#### 3.1 Printer Speed

Set the running speed of printer as 1000 in the [printer settings] in order to avoid the collision caused by high speed during the test. After the follow-up tests are completed, it can be changed back to the original value. (Note: The speed of Z-axis should not be too high. 200 is OK.)

**Travel feed rate:** 1000mm/min

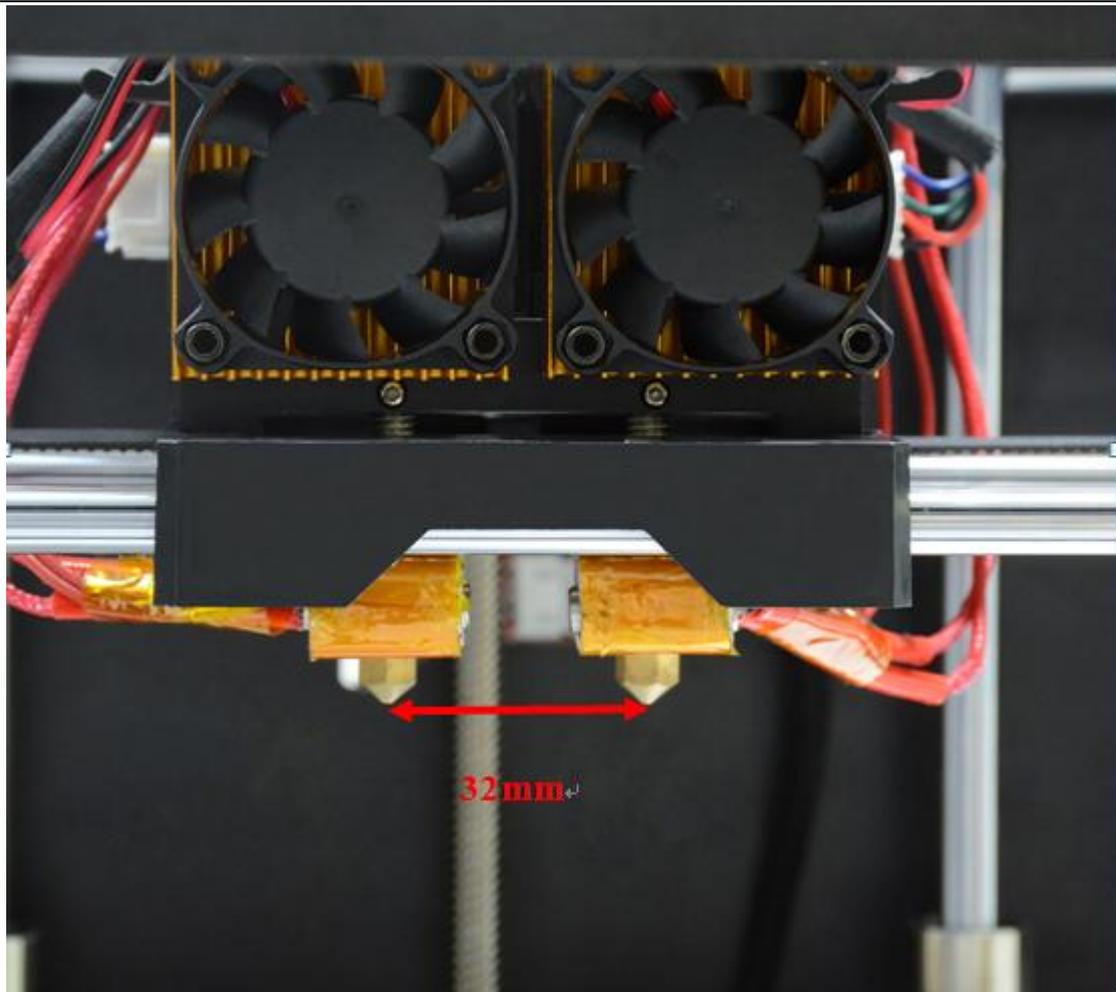
**Z-Axis feed rate:** 200mm/min

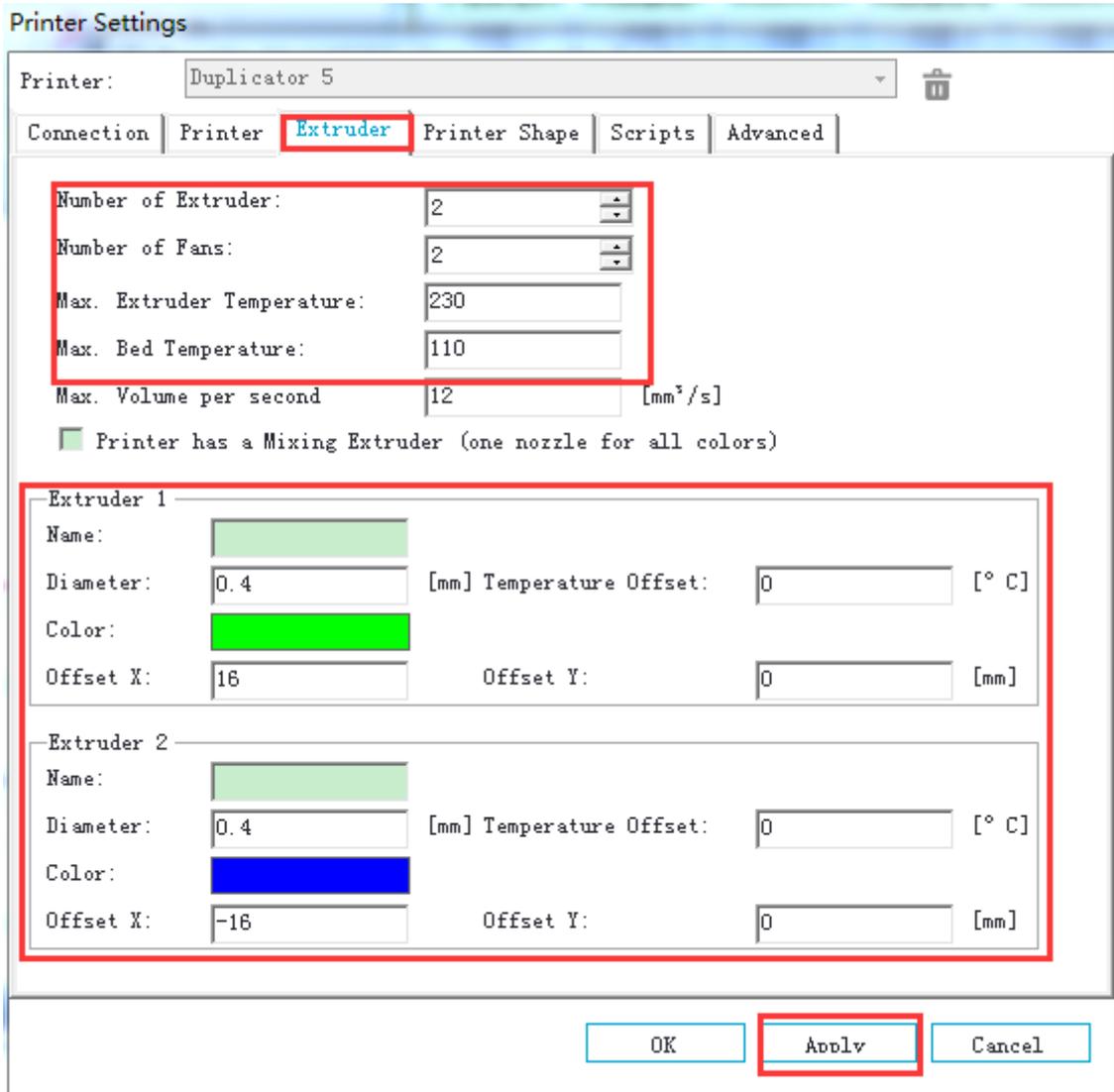


### 3.2 Number of Extruder and Nozzle Diameter

The number of extruder is set as 2. The diameter of print head is set according to the actual size, here is 0.4mm.

The distance between two extruders on X direction is 32mm, then set offset X -16 and 16mm. (You can also set it, depending on actual measurement)





### 3.3 Printer Shape

Here the printer shape of Duplicator 5 is Classic Printer;

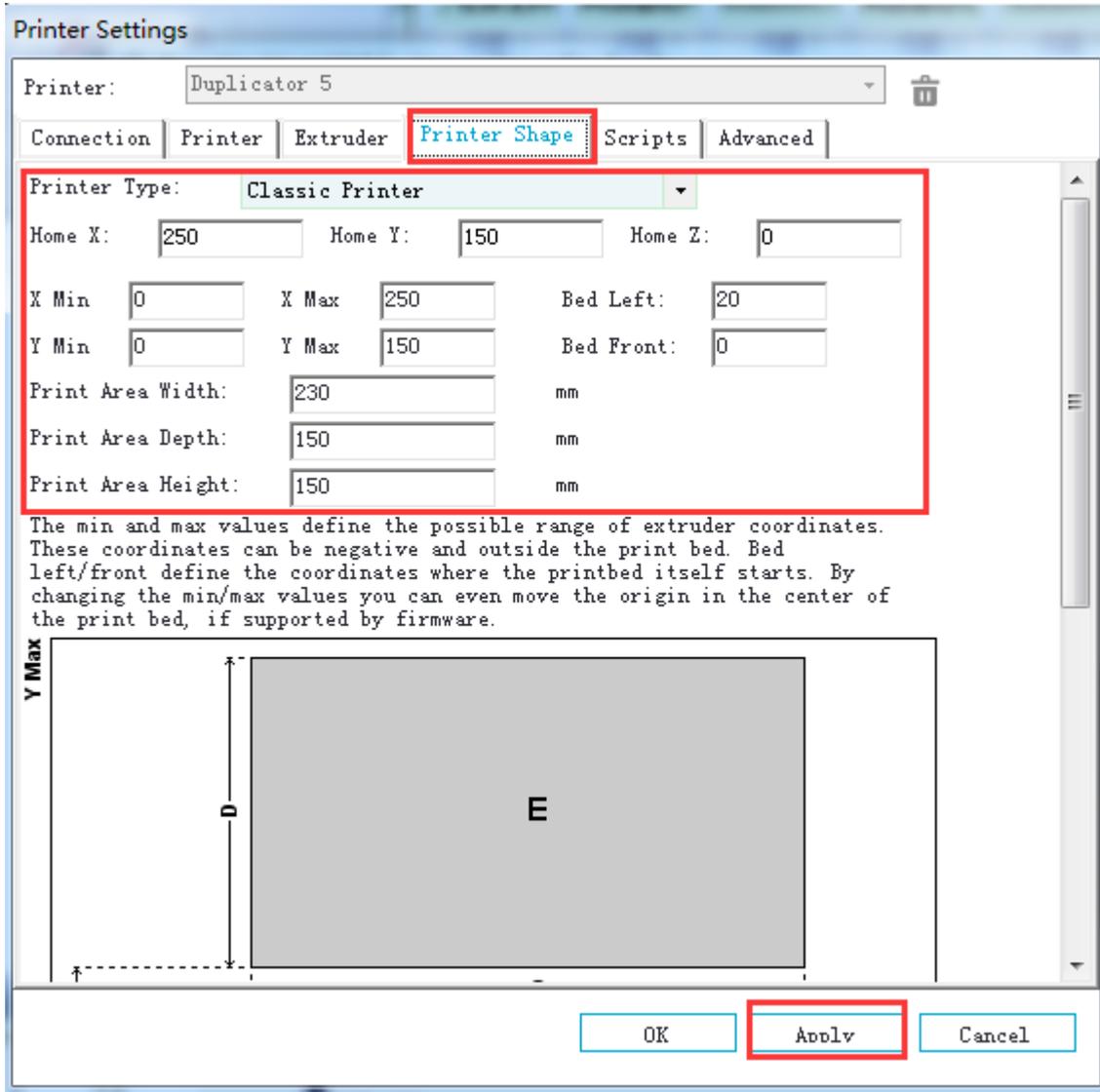
For home position, choose Min;

The printer's maximum printing volume 230 \* 150 \* 150 (length / width / height).

If the object which is being printed is not in the center of the hot bed, you can adjust the following two values to compensate for the distance deviation of X / Y direction:

#### Bed Left

### Bed Right



After setting, click Apply>OK.

Now we have finished the relevant settings for Duplicator 5.

### 4. Printer Function Test

When we are testing Duplicator 5, we can test through LCD control panel or on the control software --- Repetier-Host. The following parts display detailed testing procedures.

## 4.1 Use Repetier-Host to Test

### 4.1.1 Motor Direction Test

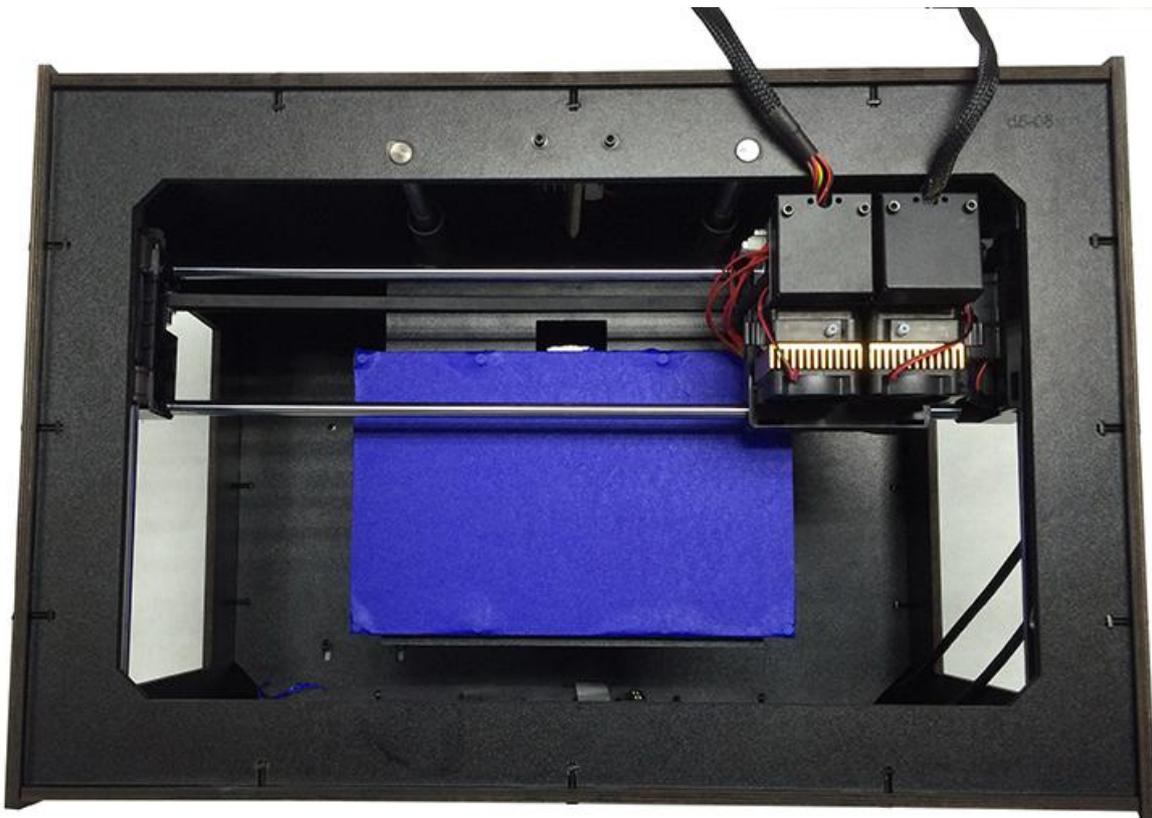
Manually set the motors of X / Y / Z axis in the middle of each direction to avoid accidental collision during the test. Always be prepared for emergency stop. There is emergency stop button at

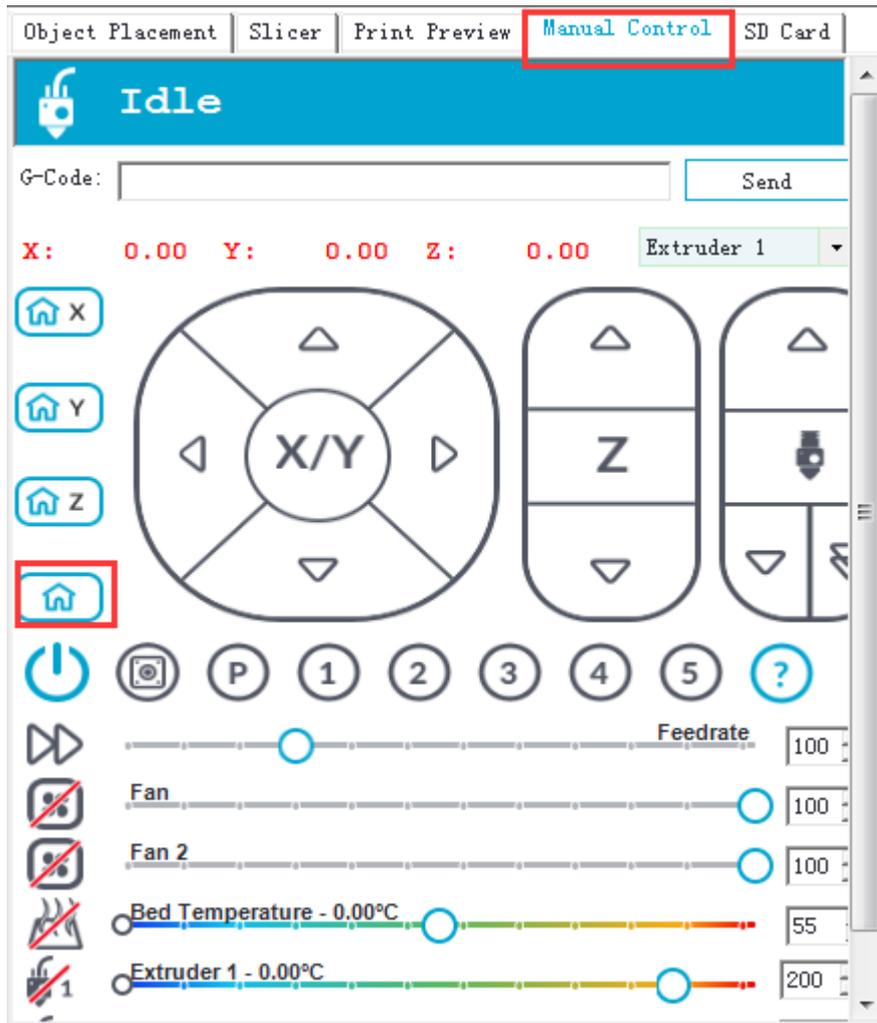


the top right corner **Emergency Stop**, or you can cut off the power.



Start Repetier-Host and connect the printer. Click Home button , then all three axes will move towards the endstop. After hitting the endstop, they will move back for a short distance and then stop the movement. The origin location should be in the right front corner of the printer platform.



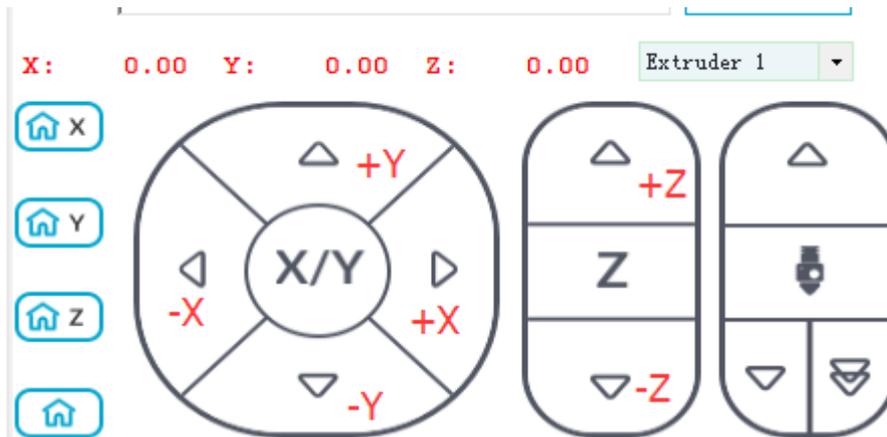


Note: The origin of the coordinates is at the front left corner of the building platform. Therefore, when X/Y/Z axis is homed, there coordinates are X=230mm, Y=150mm, Z=0mm.

In this way, the positive direction of X axis is from left to right, i.e. +1mm means the motor moves toward the X axis endstop at 1mm.

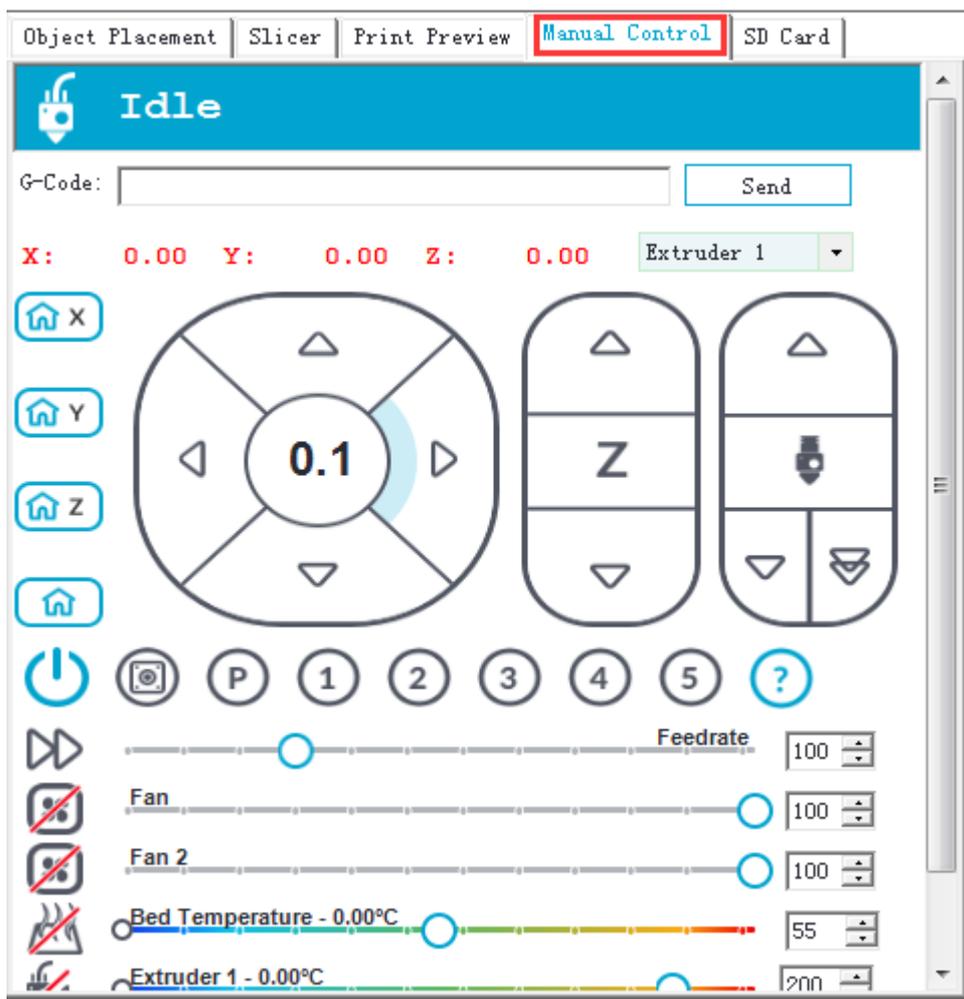
The positive direction of Y axis is from outside to inside, i.e. +1mm means the motor moves toward the Y axis endstop at 1mm.

The positive direction of Z axis is from up to down, i.e. +1mm means the motor moves away from the Z axis endstop at 1mm (move down).



If the moving direction is reversed, you can change the motor direction in the firmware. ([please refer to FAQ](#)).

In them manual control mode, the number in the middle of the panel represents the moving distance and direction every time. Click the button every one time, the motor moves at 0.1mm, 1mm, 10mm or 50mm.



Object Placement | Slicer | Print Preview | **Manual Control** | SD Card

Idle

G-Code:  Send

X: 0.00 Y: 0.00 Z: 0.00 Extruder 1

0.1

Z

Feedrate 100

Fan 100

Fan 2 100

Bed Temperature - 0.00°C 55

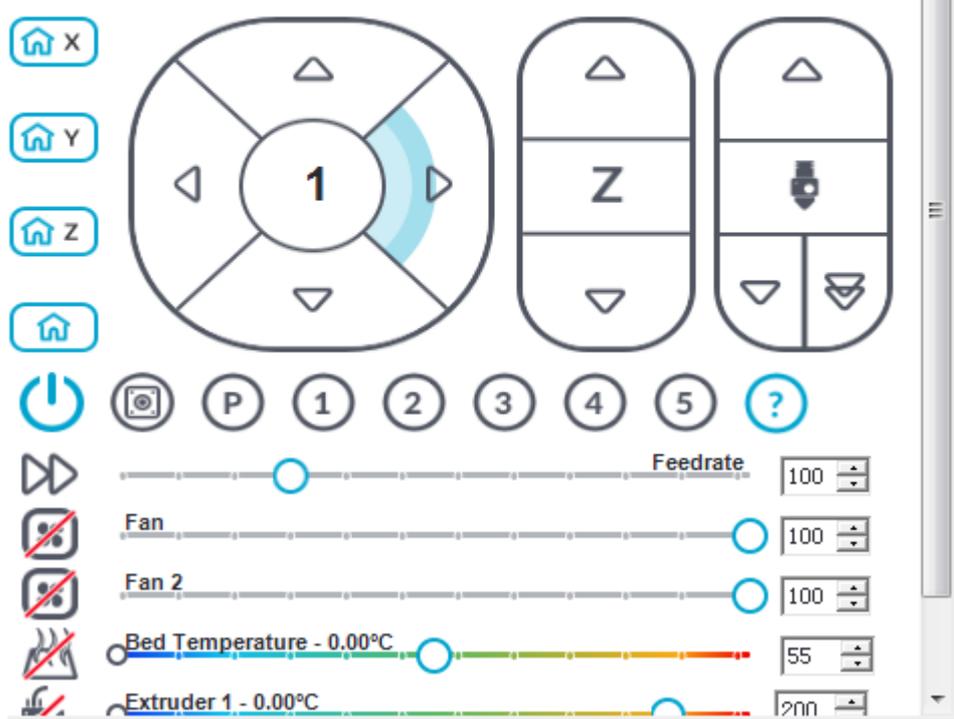
Extruder 1 - 0.00°C 200

Object Placement | Slicer | Print Preview | **Manual Control** | SD Card

**Idle**

G-Code:

X: 0.00 Y: 0.00 Z: 0.00 Extruder 1



Home X, Home Y, Home Z, Home

Power, Home, P, 1, 2, 3, 4, 5, ?

Feedrate: 100

Fan: 100

Fan 2: 100

Bed Temperature - 0.00°C: 55

Extruder 1 - 0.00°C: 200

Object Placement | Slicer | Print Preview | **Manual Control** | SD Card

**Idle**

G-Code:

X: 0.00 Y: 0.00 Z: 0.00 Extruder 1

Home X, Home Y, Home Z, Home

10

Z

Power, P, 1, 2, 3, 4, 5, ?

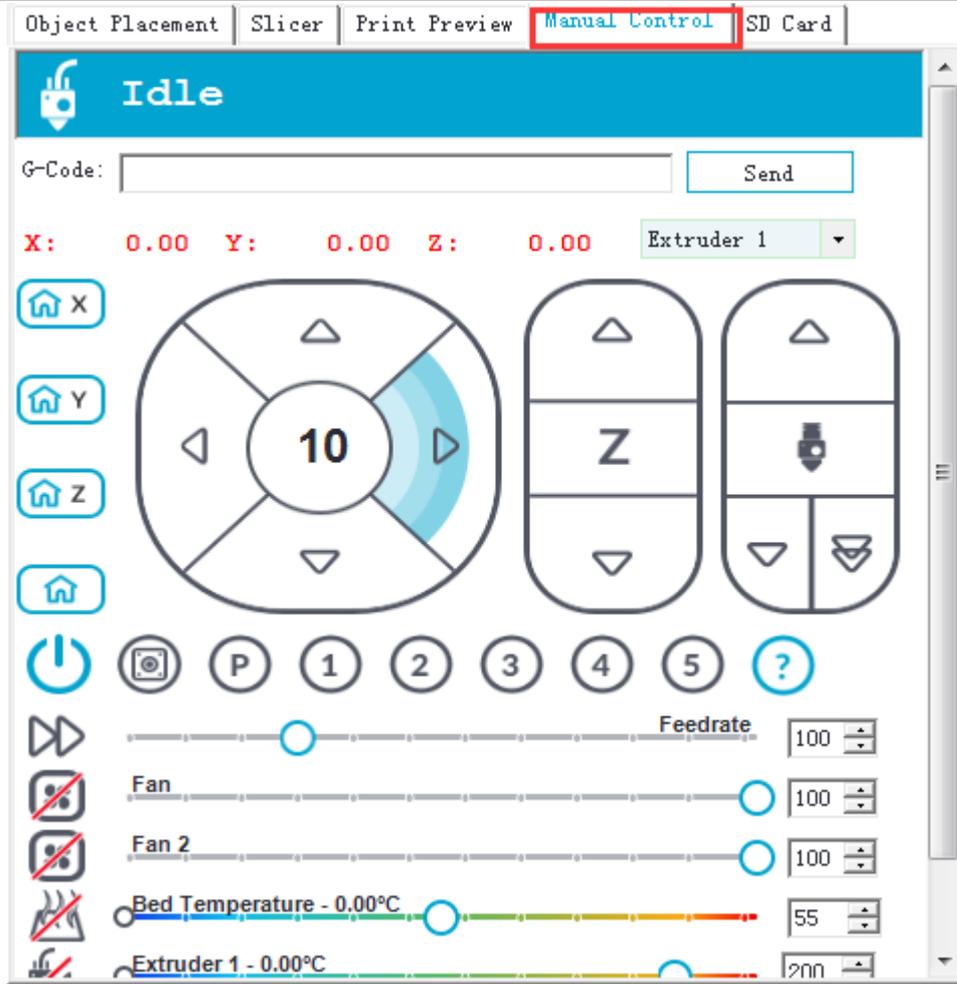
Feedrate: 100

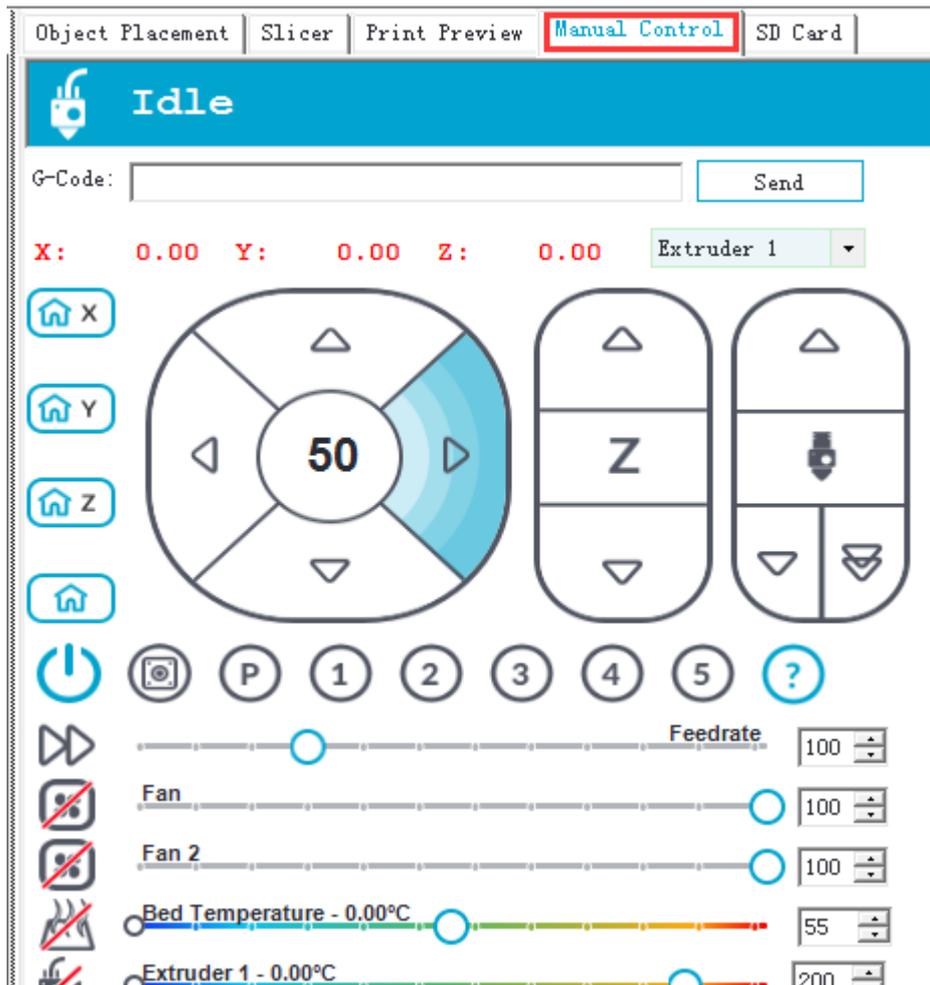
Fan: 100

Fan 2: 100

Bed Temperature - 0.00°C: 55

Extruder 1 - 0.00°C: 200





In the printing, we recommend 1mm to avoid errors.

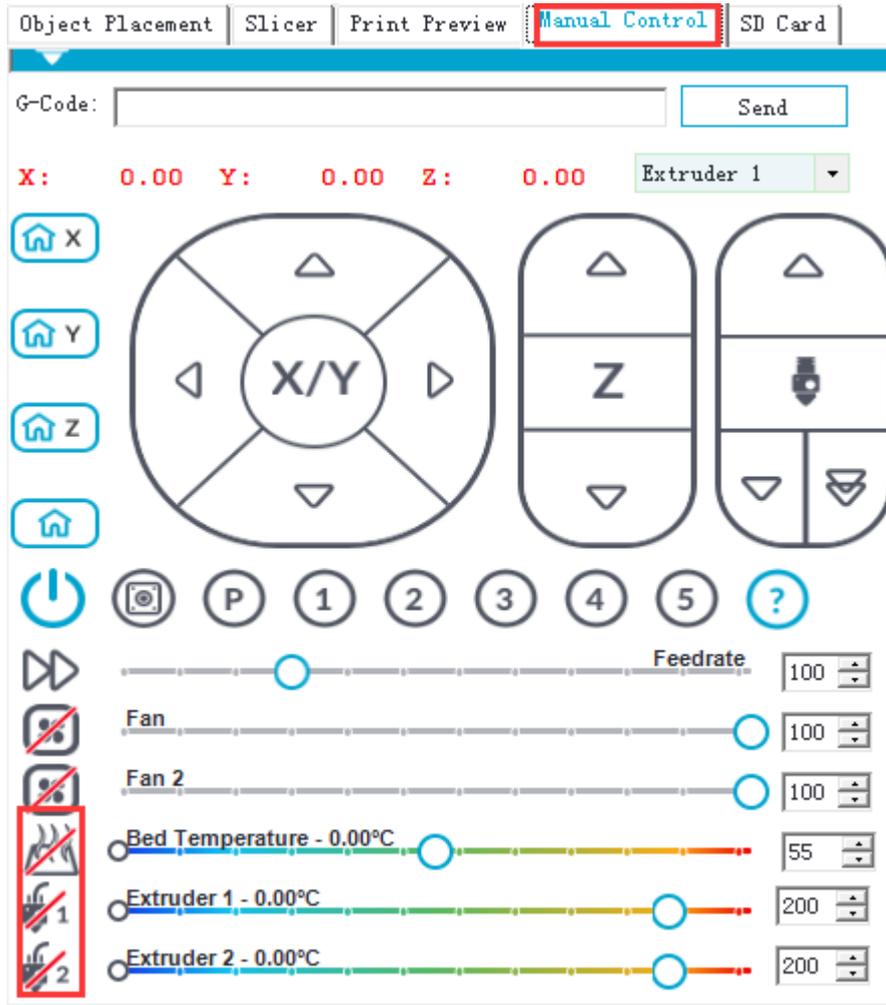
#### 4.1.2 Heating Test

Click the heating button of the hot bed  and the extruder . The slash will disappear and you will see the temperature rising up.

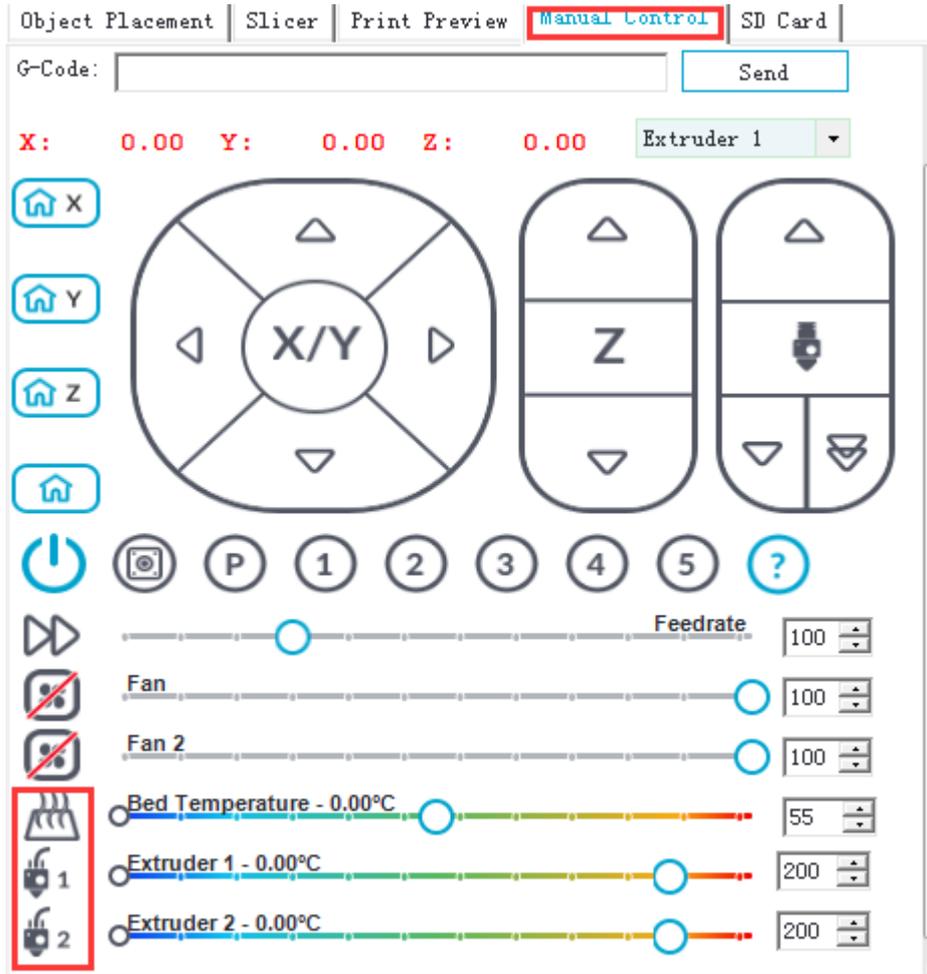
Object Placement | Slicer | Print Preview | **Manual Control** | SD Card

G-Code:

X: 0.00 Y: 0.00 Z: 0.00 Extruder 1

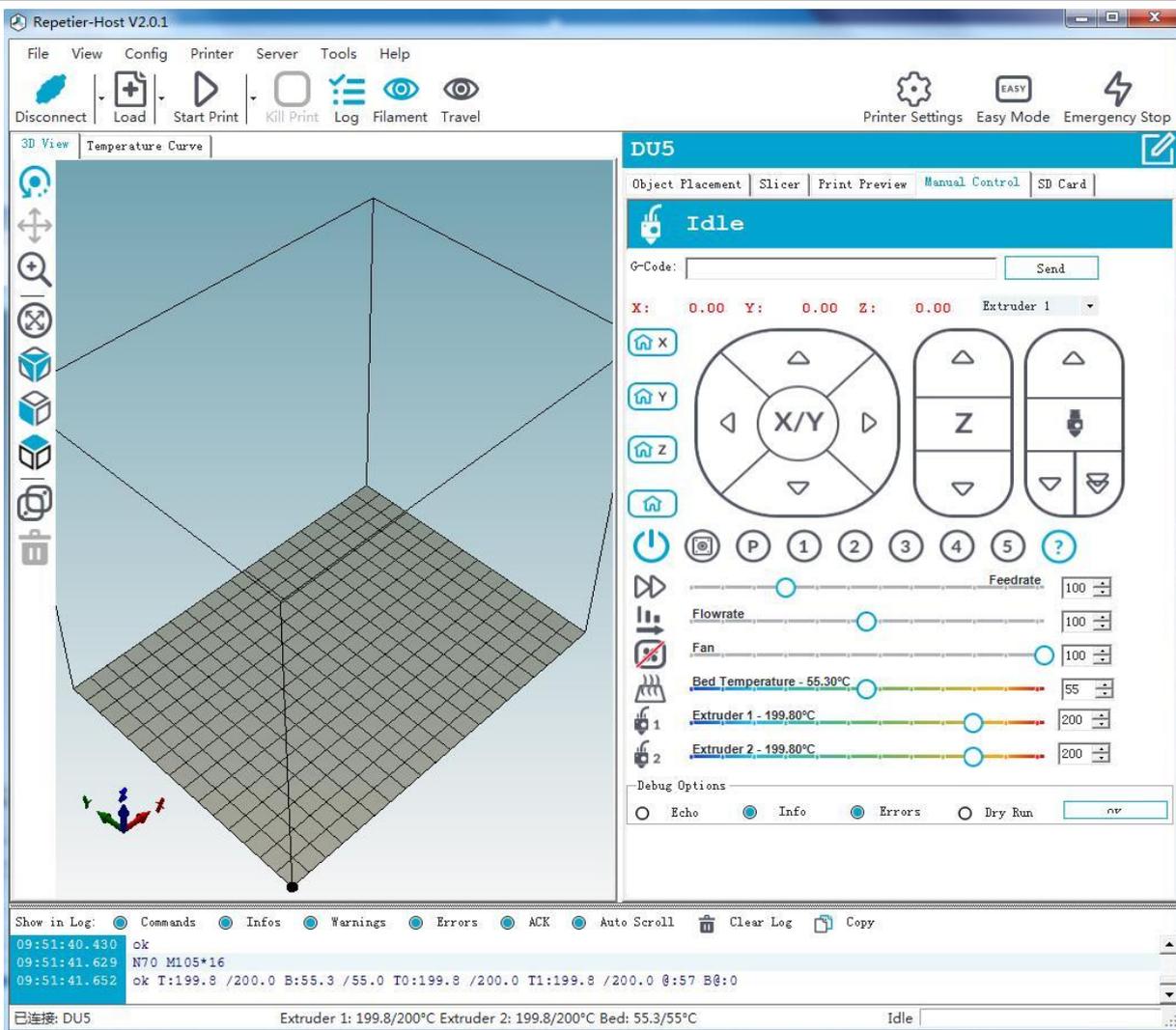


The interface includes a central X/Y movement pad, a Z-axis control, and extruder controls. Temperature sliders are shown for Bed (55°C), Extruder 1 (200°C), and Extruder 2 (200°C). A red box highlights the temperature control icons for the extruders.



Meanwhile, you can see the real-time temperature at the bottom of Repetier-Host.

If the hot bed or extruder can not be heated, please refer to [FAQ](#).



### 4.1.3 Extruder Test

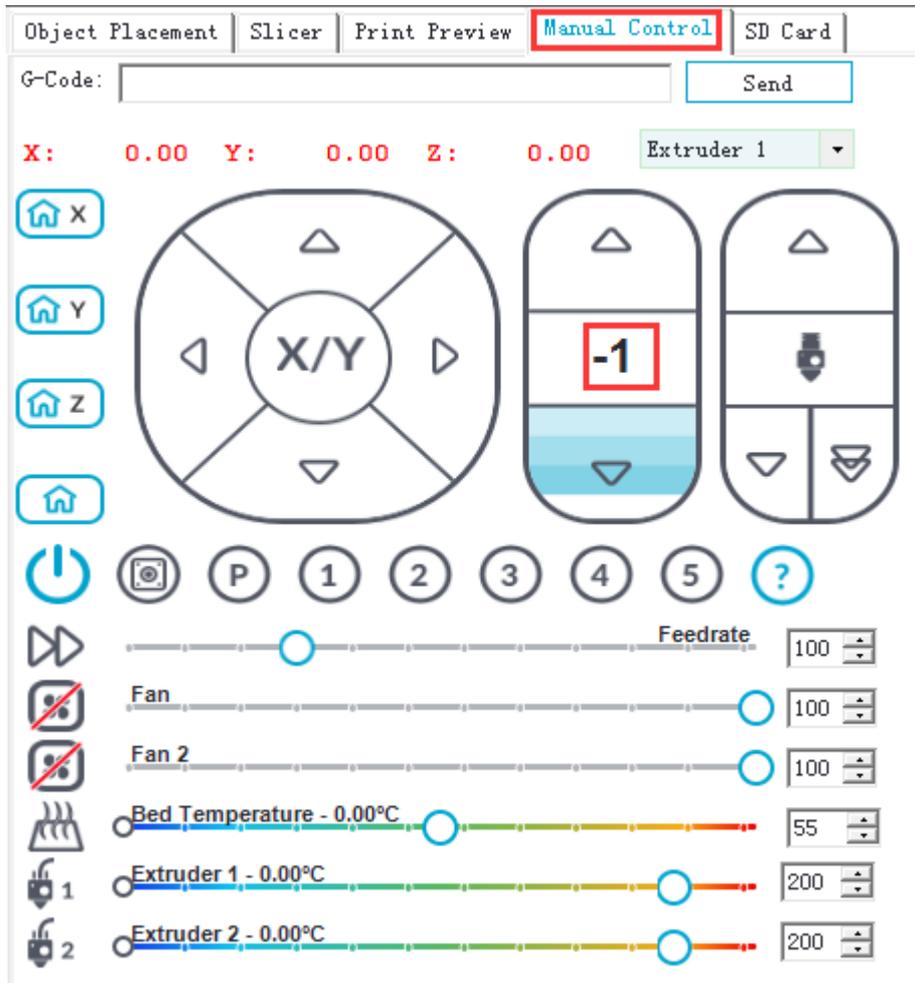
Please note: The extruder will not begin to work until the temperature reaches above 170 °C.

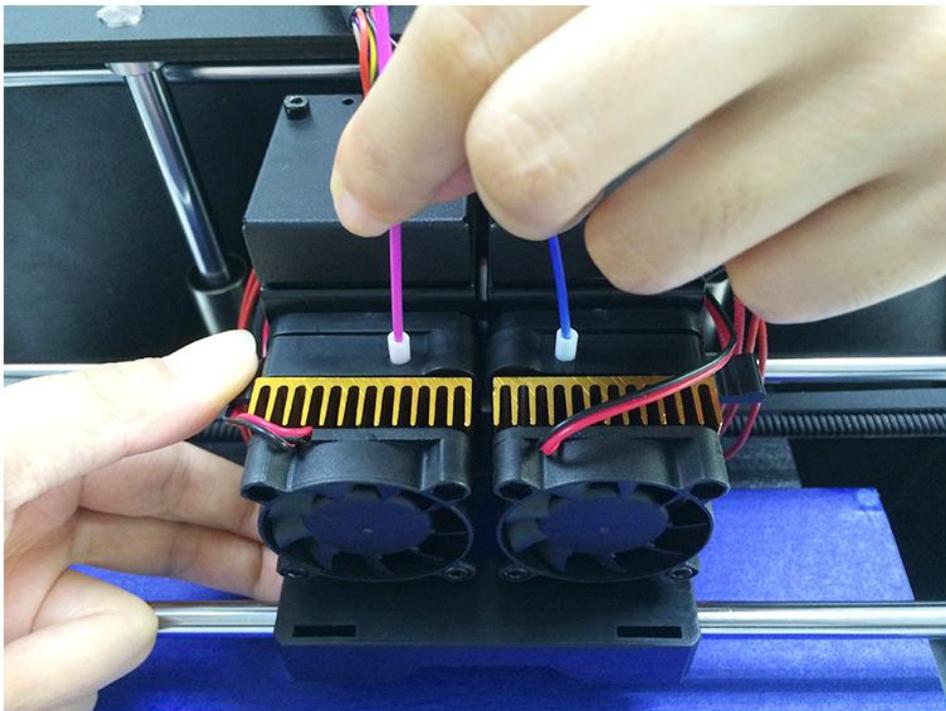
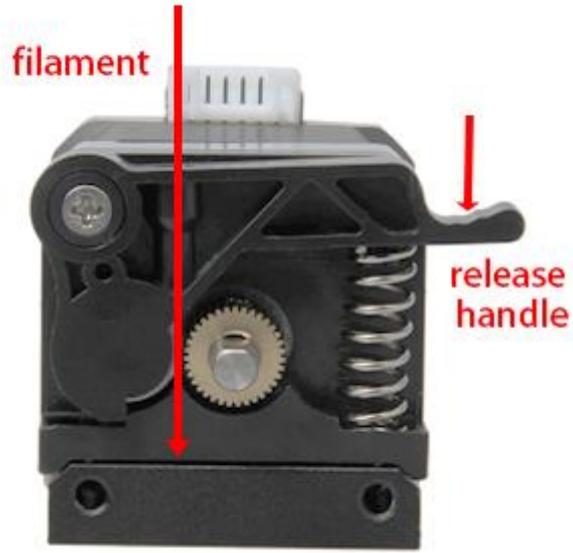
Heat the extruder to 200 °C, and then insert the filament into the hotend via push-in fitting. When you are pushing the filament, press the handle with one hand and push the filament with the other hand.

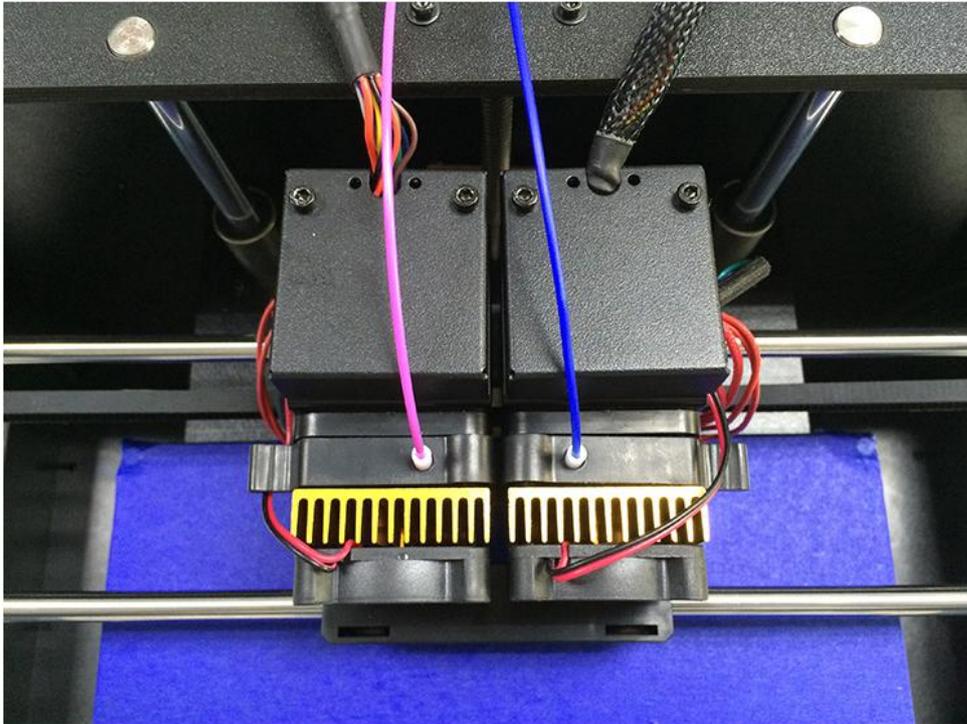
Please note that the filament must be in the slot of the idler wheel, otherwise feeding will not be fluent.

After the homing operation, it is suggested to move the building platform down. Please click the

button to modify the coordinate of Z axis.







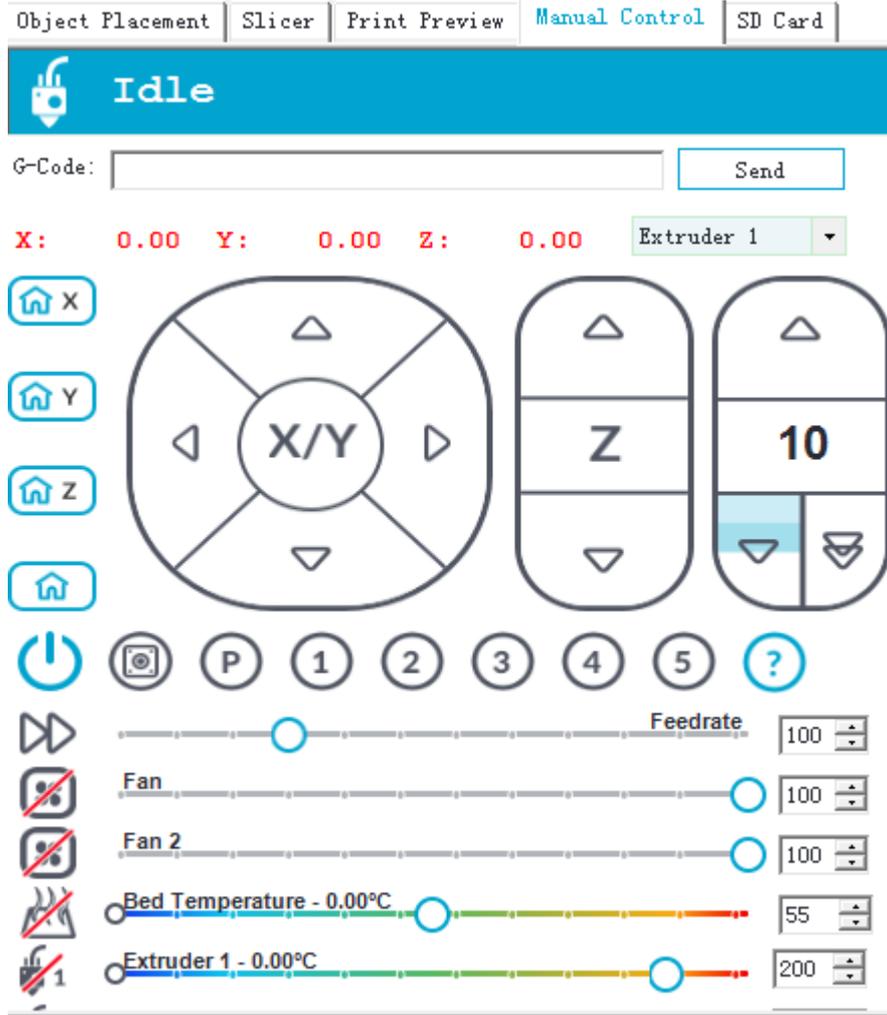
After pushing the filament into the bottom of hotend, you can use the feeding button on Repetier-Host (as shown in following picture) to do manual feeding. To avoid clogging, please

choose the feeding rate button  at 1mm or 10mm (as shown in the following picture). The

right side button  is used for rapid feeding, seldom used.

If the nozzle can extrude filament smoothly, the extruder is working well. If not, please refer to

[FAQ](#).



Note: If the moving direction of the motor is reversed, which means you find the filament going backwards when you click to feed downwards, please change the motor direction of the extruder in the firmware to solve the problem. This method also applies to the abnormal cases for X/Y/Z axis motor.

## 4.2 Use LCD Control Panel to Test

### 4.2.1 LCD Menu Introduction

#### Functions of LCD rotary knob:

1. Press the knob: confirm or enter sub-menu
2. Rotate the knob: roll to choose options or change parameters

#### LCD homepage:

1. Extruder temperature: current temperature/target temperature
2. Hotbed temperature: current temperature/target temperature
3. Current coordinates of X/Y/Z
4. Feed rate: current printing rate
5. Current rate of printing process

Note: Rotate the knob during printing will change the feedrate in real time.



**Press the knob to enter the next level menu:**

1. Prepare: Preparing work before printing
2. Control: Setting of temperature and motion parameters of the printer
3. Status display of SD card



**Main functions of Prepare menu:**

1. Disable steppers: unlock the motor so that you can move them freely.
2. Auto home: automatically homing of each axis
3. Preheat PLA: manually preheat the hotbed and the extruder before printing PLA
4. Preheat ABS: manually preheat the hotbed and the extruder before printing ABS
5. Move axis: manually move each axis and each extruder





**Main functions of Control menu:**

1. Temperature: You can change the temperature of the hotbed and the extruder in real time in printing process. Meanwhile you can set the temperature of Preheat PLA and Preheat ABS.
2. Motion: setting of the motion parameters in the firmware. You need choose store memory to save after altering the setting.
3. Store memory: to save the altered parameters.



For other detailed functions, please read the following introduction of function tests.

#### 4.2.2 Motor Direction Test

After learning about the functions of the LCD control panel, press the knob to enter sub-menu and choose [**Prepare**]:



Choose **Auto home** in menu to do home operation:

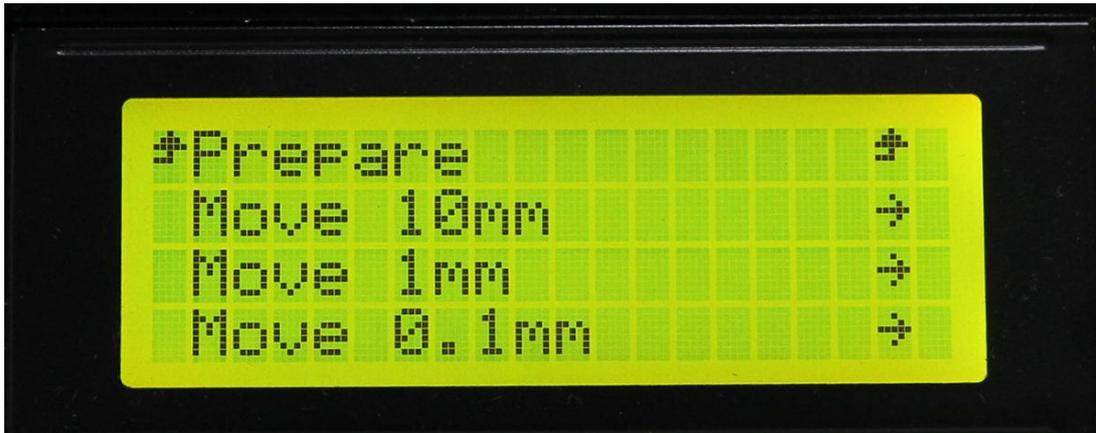


If you want to move the motor, choose **Move axis**:

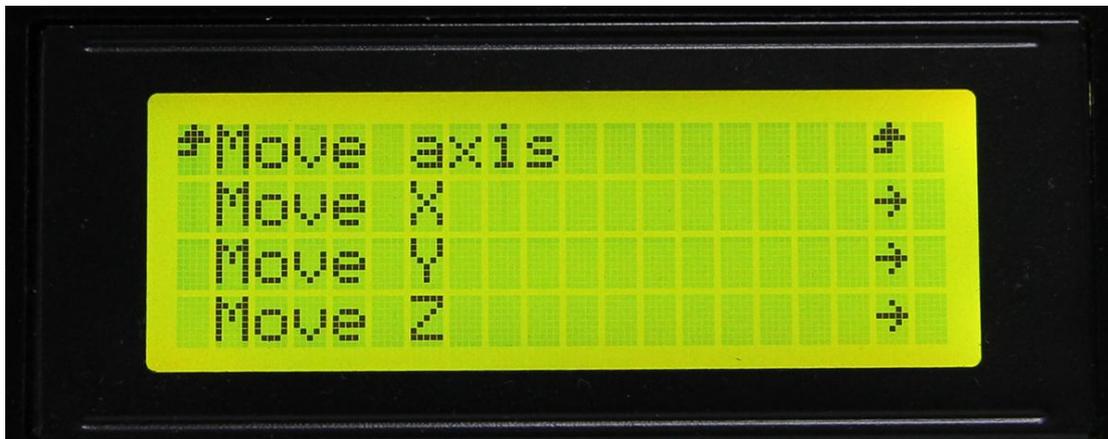


Choose **Move 1mm**:

(Note: the extruder can support three options: Move 10mm, Move 1mm and Move 0.1mm. We recommend you to choose “Move 1mm”.)



Choose the axis that you want to move by using Move X/Y/Z options. Turning the knob can make each axis move left and right or back and forth.



After testing each axis, you can choose Prepare>Auto home in the menu to make it back to home position.



If you want to manually move the motor, you can unlock the motor. Unlocking method:

Prepare>Disable steppers:



After unlocking the motor, you could move the extruders manually.

#### 4.2.3 Heating Test

In the Control menu, you can select temperature setting of hotbed and extruder.

Choose **control**:



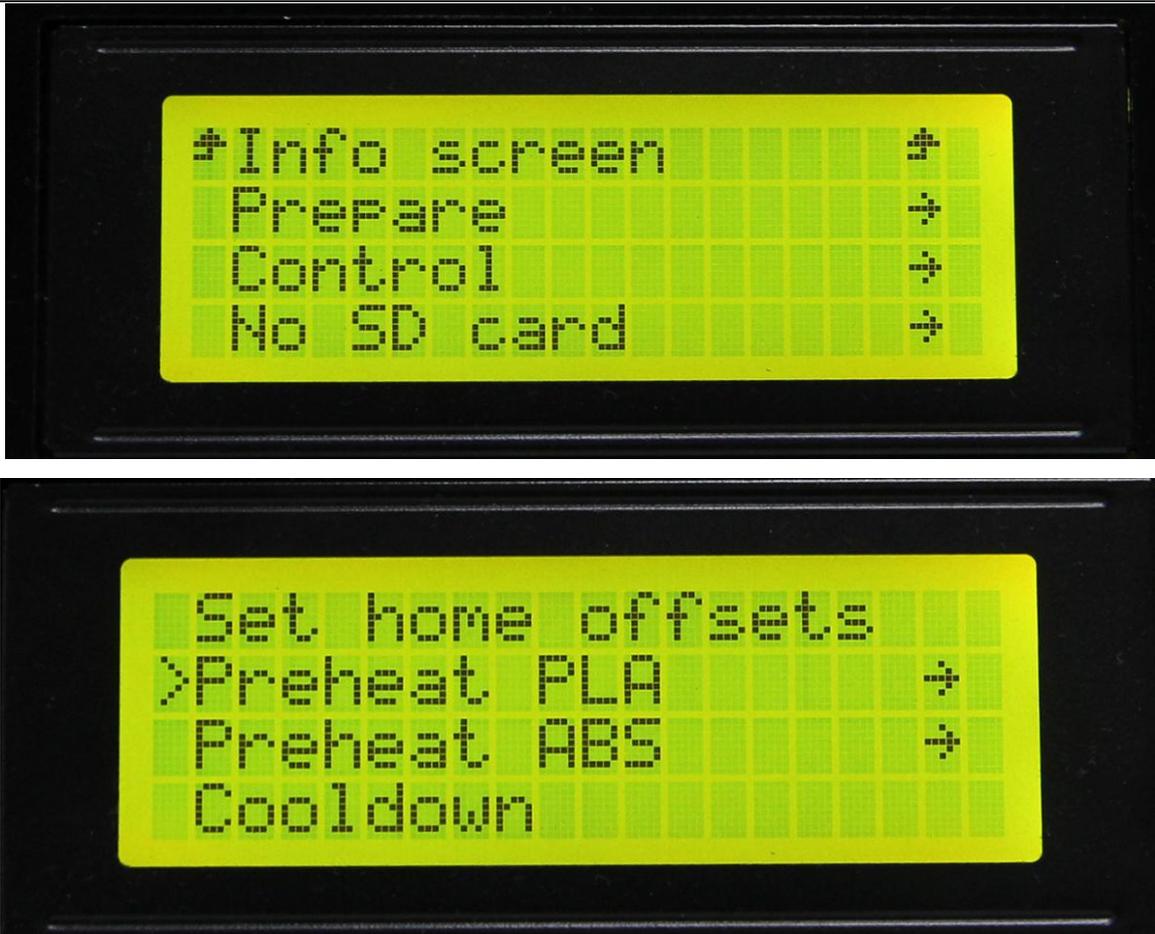
Choose temperature:



Select the temperature you want to set:



After setting, you can choose **Prepare> Preheat PLA** to preheat the hot bed and extruder.

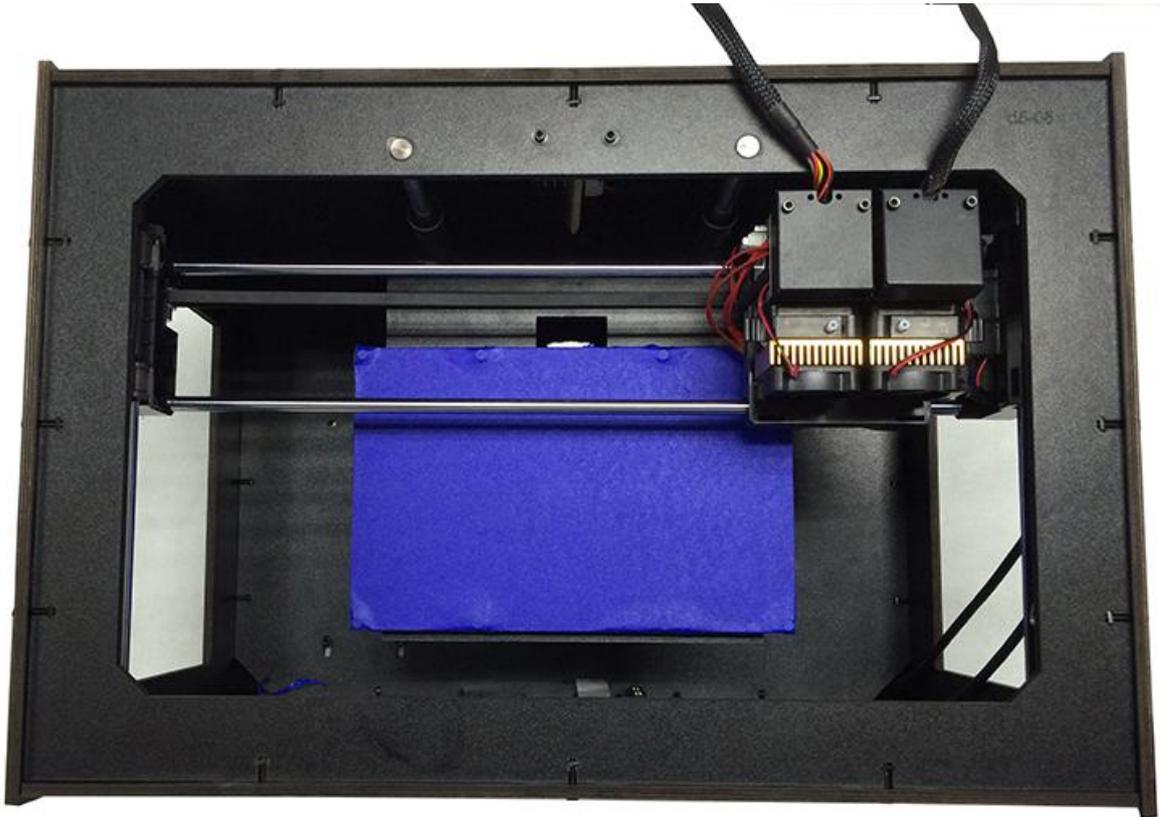


So far, functional tests of the printer are done.

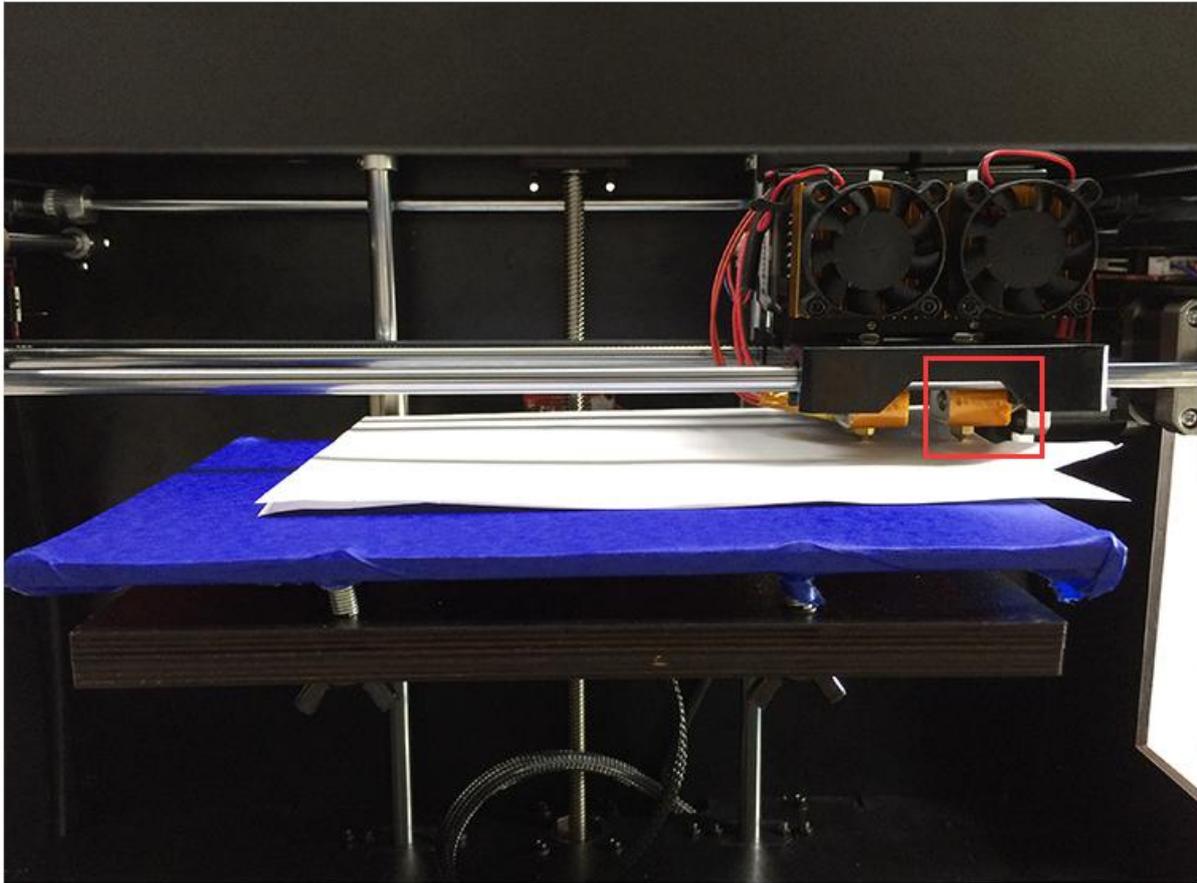
## 5. Hotbed Leveling

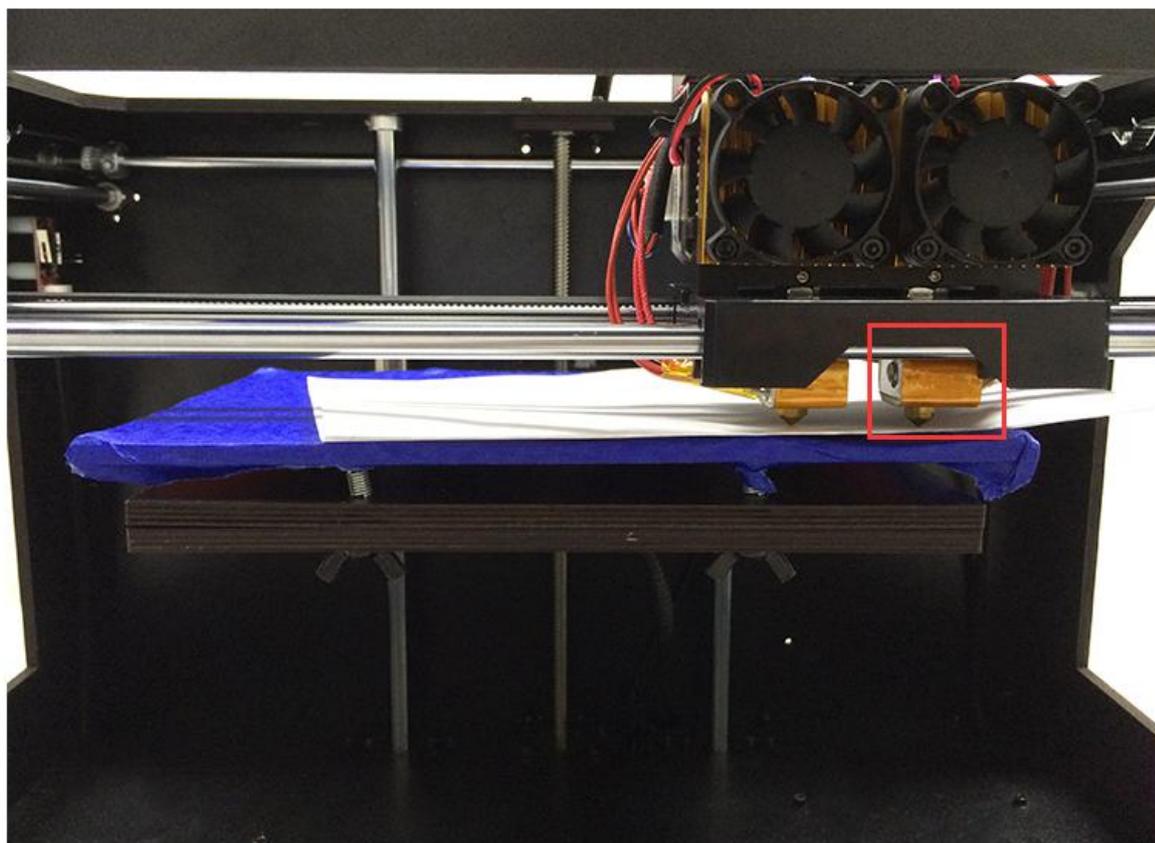
Before printing, we need to do hotbed leveling. Only after this step can quality of printed parts get improved. Otherwise the un-leveling gap between the hotbed and extrusion head will affect the filament adhering to the hotbed thus cause poor print quality or even not printing.

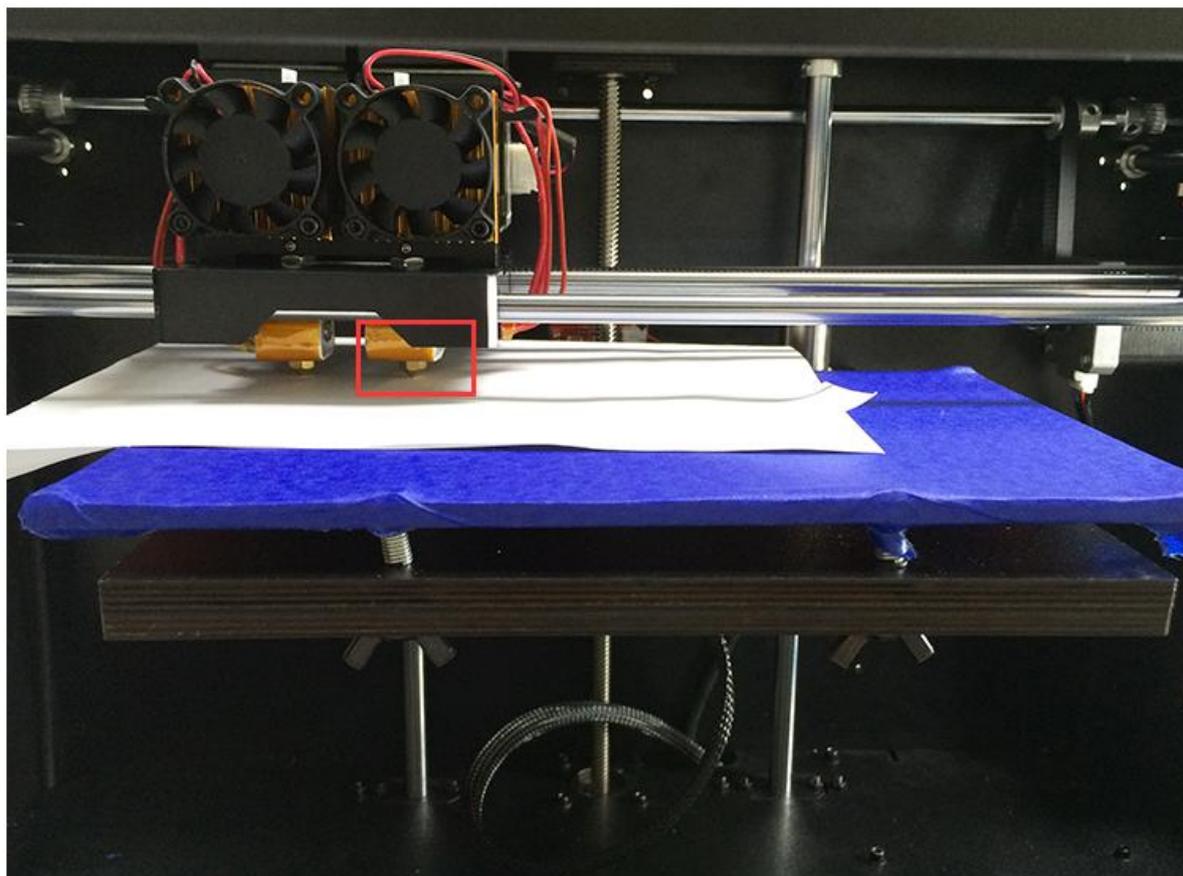
(1) Initially, home the printer.

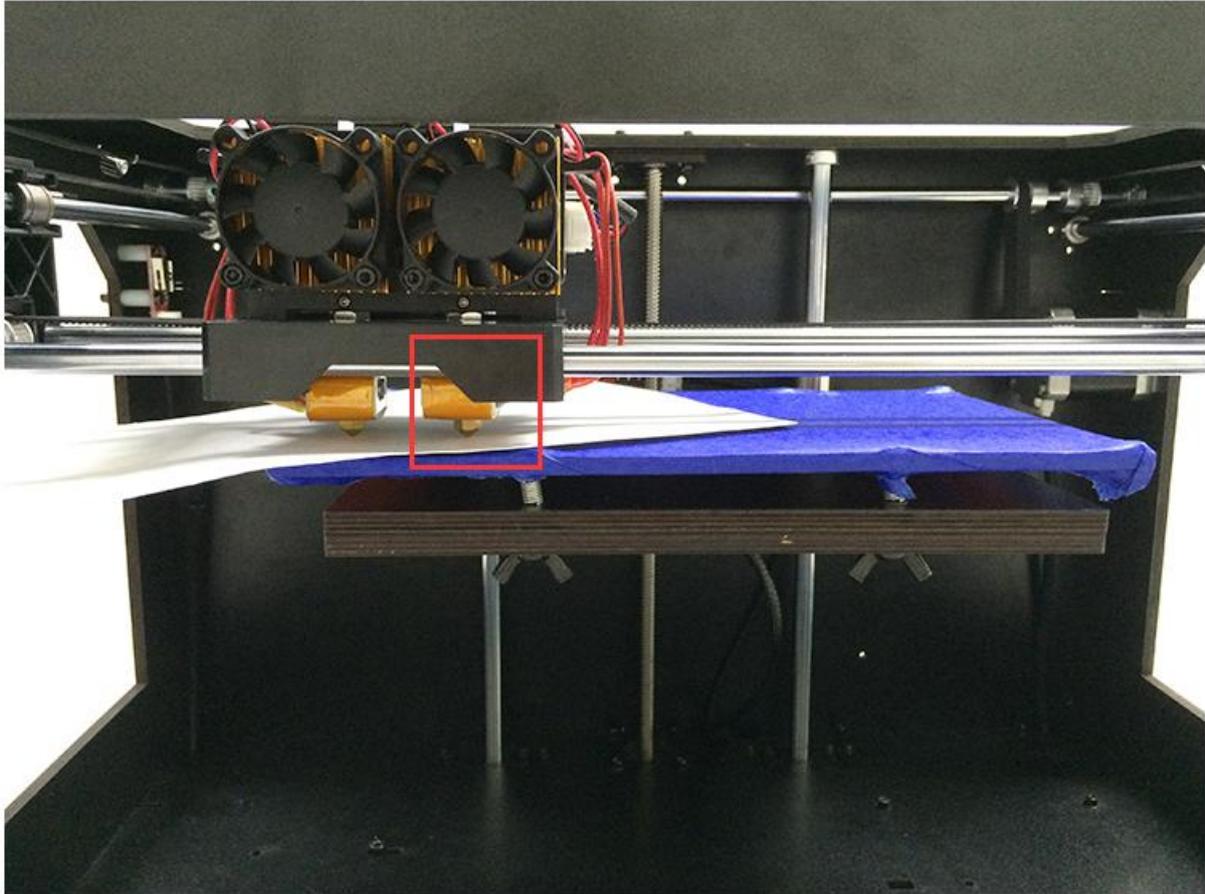


- (2) Disable the stepper motors  , manually move the extruder to the four corners of the hot bed and fine-tune the wing nut at each corner to level the distances between the extrusion head and four corners. During adjustment, you can put a piece of A4 paper (half fold it) between the nozzle and hotbed. If you can feel a bit friction when you pull the paper back and forth, the distance is proper.





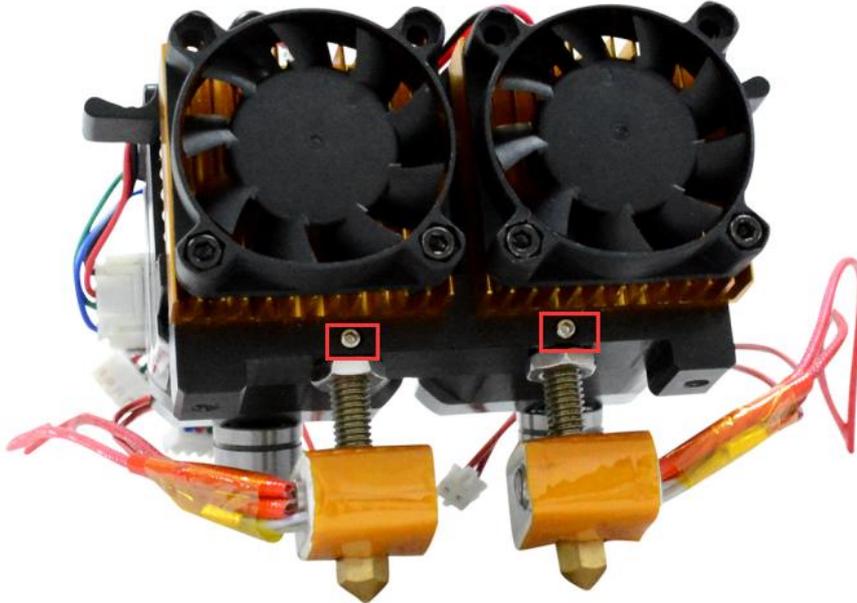




- If the friction is moderate, it means that the distance between the nozzle and building platform is adequate.
- If there is an obvious gap, it means the distance between the nozzle and the build platform is too far. Under this condition, the extruded filament will not be closely attached to the building platform. You need to rotate the wing nut at the leveling point anti-clockwise to reduce the distance.
- If you can't see any gap, it means the distance between the nozzle and building platform is too close. Under this condition, the filament can't be extruded out or can even be jammed. You need to rotate the wing nut at the leveling point clockwise to increase the distance.

(3) Dual-extruder leveling. Duplicator 5 uses MK8 dual-extruder, so you only need to adjust the two set screws when leveling the extruder, as marked in following picture. You can take one hotend as a reference when you are doing the adjustment. Loosen the corresponding set screw

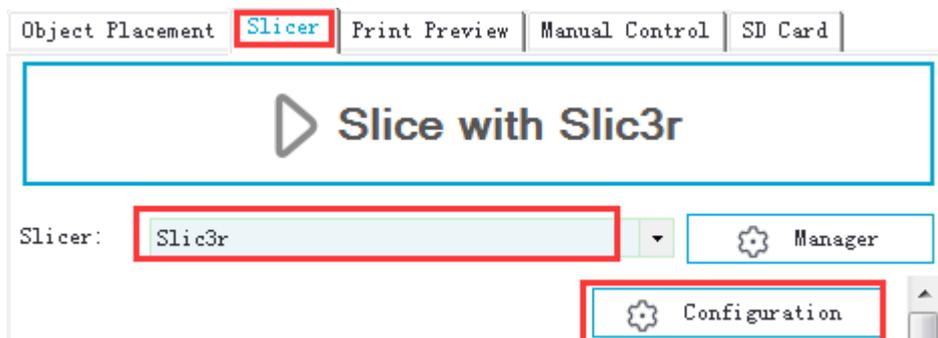
clockwise to increase or decrease the height of the other hotend.



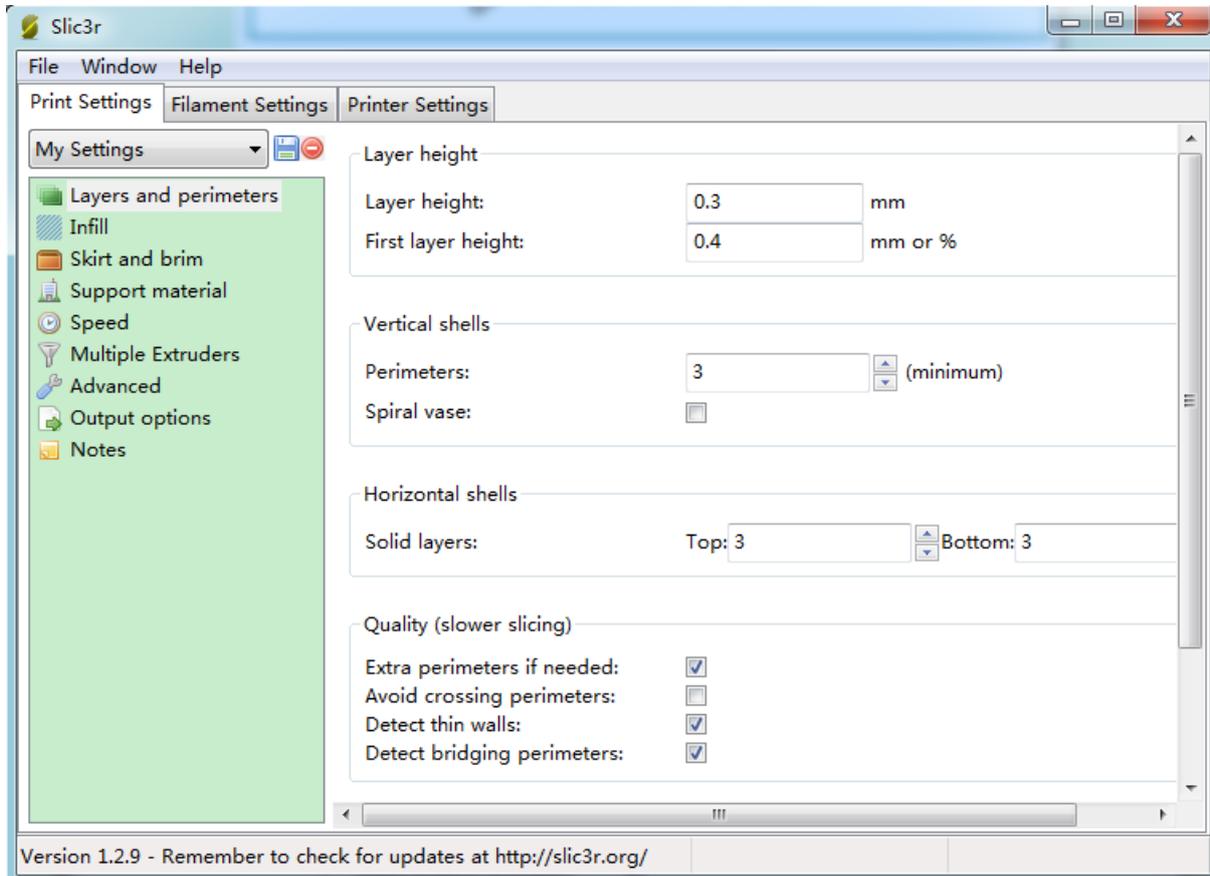
With the above three steps, we have finished the leveling job. It is suggested to move the nozzle to the center of the building platform to test whether the building platform is level.

## 6. Slice Settings

With one more step, we can start printing. Set the slicing parameters such as filament diameter, printing speed, layer height, etc. to achieve better print quality. Open slic3r, a piece of slicing software built in Repetier-Host. The following picture shows the operation flow.

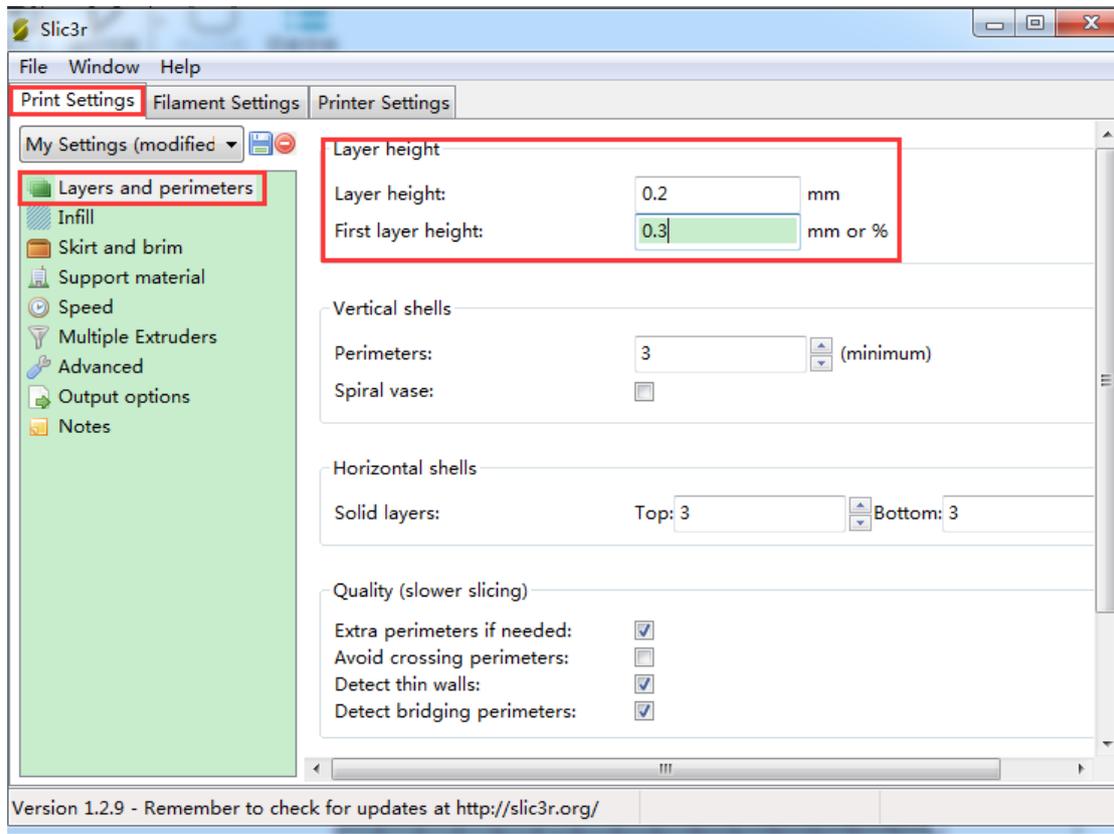


Click [configuration] and you will see the following interface:

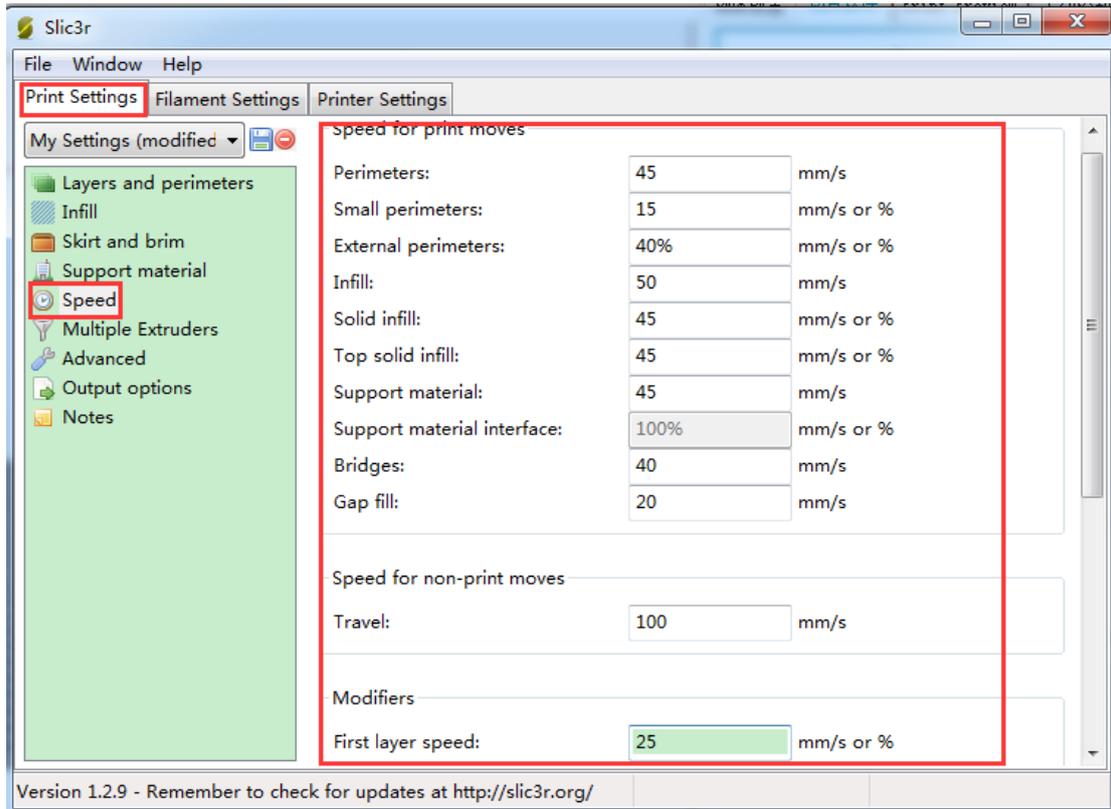


## 6.1 Printing Setting

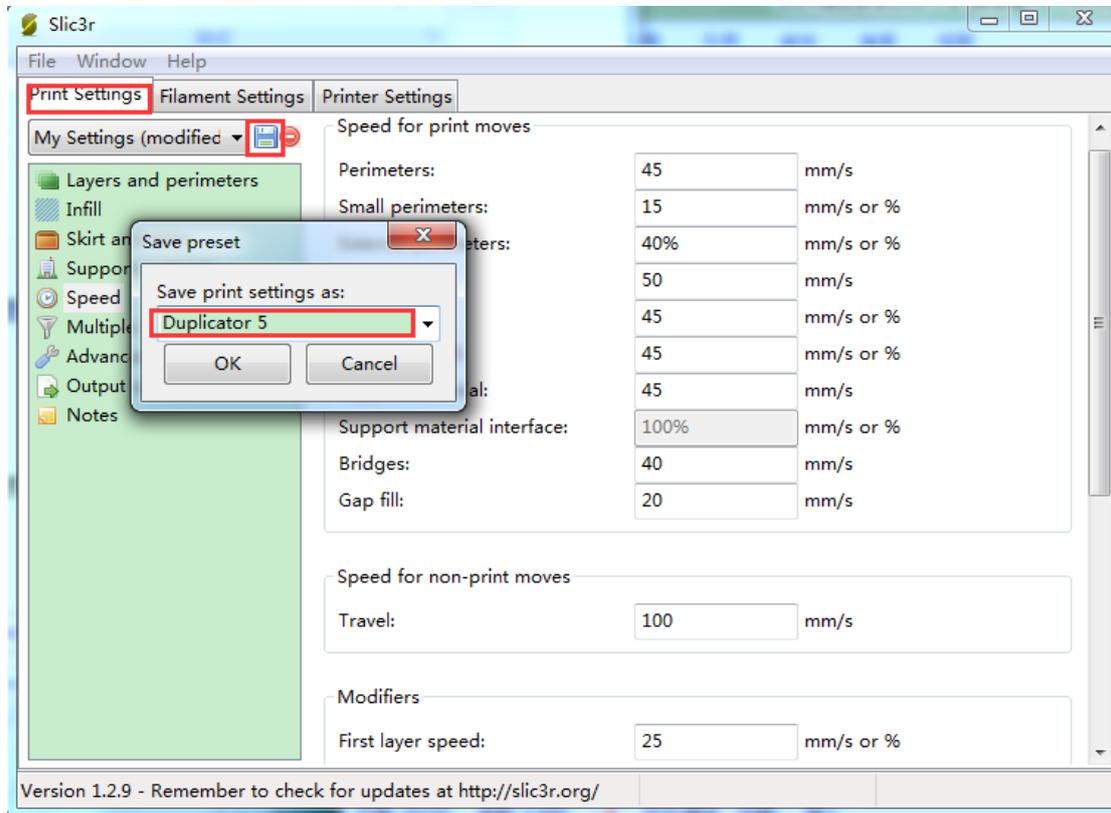
Set layer height and the first layer height in the Print setting tab. Generally speaking, layer height can be set as 0.05 -0.3mm. Considering the printing accuracy and speed, 0.2mm is the most appropriate layer height. The first layer height is set as 0.3mm.



It is convenient to set the printing speed according your need.



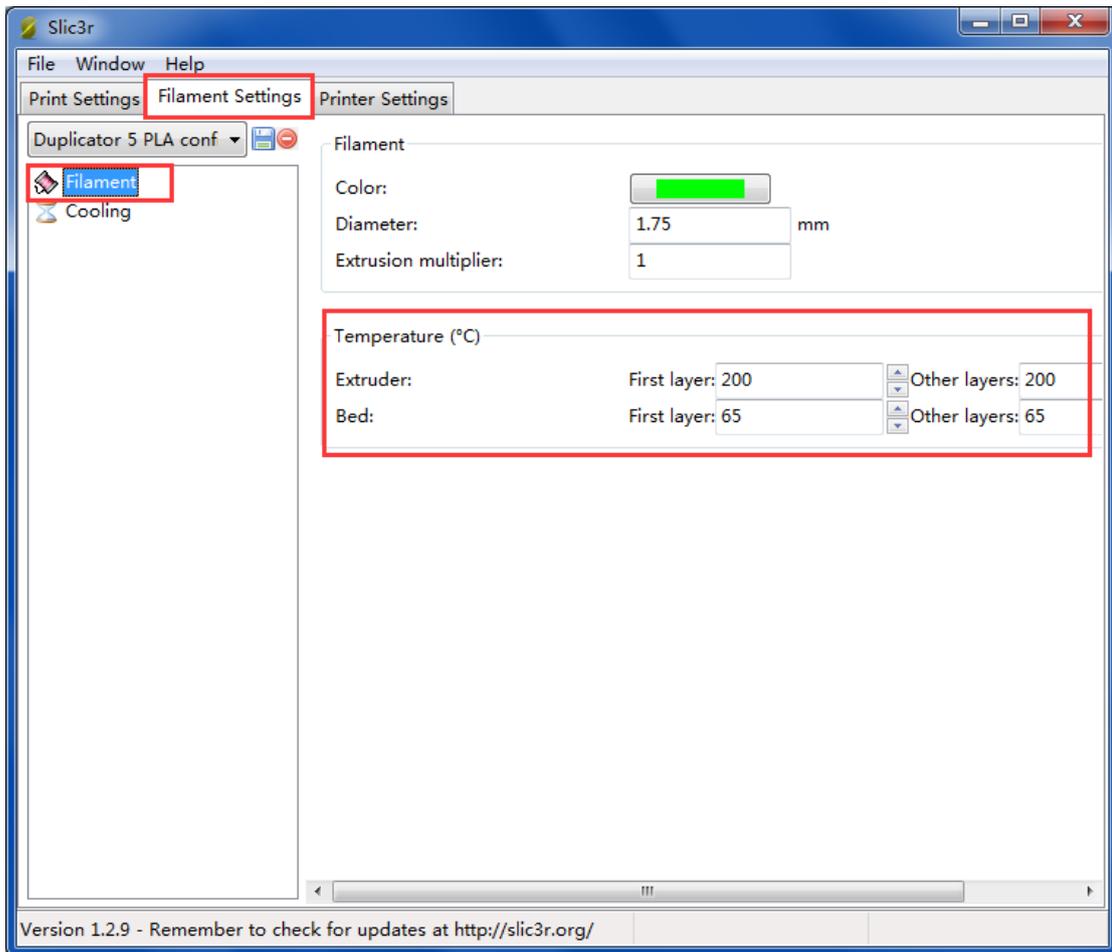
After modifying these parameters in [Print Settings], click the save button to name your setting.



Click [OK] to finish the setting.

## 6.2 Filament Setting

Set filament diameter and print temperature in the [Filament settings] tab. Filament we use here is 1.75mm PLA. Usually the temperature of the extrusion head is 195-210°C, and the temperature of hotbed is 60-70°C. Here we set them as 200°C and 65°C respectively.

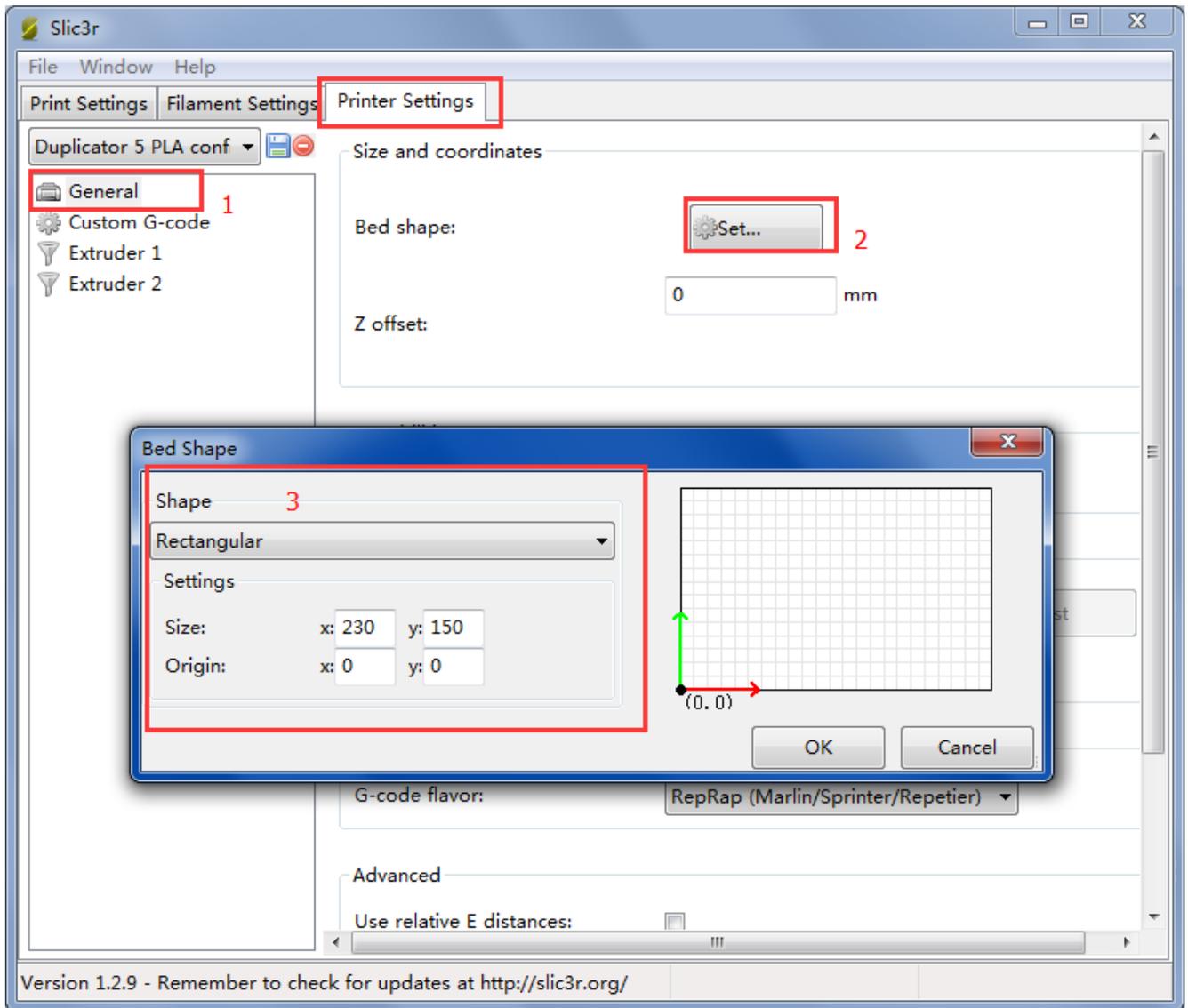


## 6.3 Printer Setting

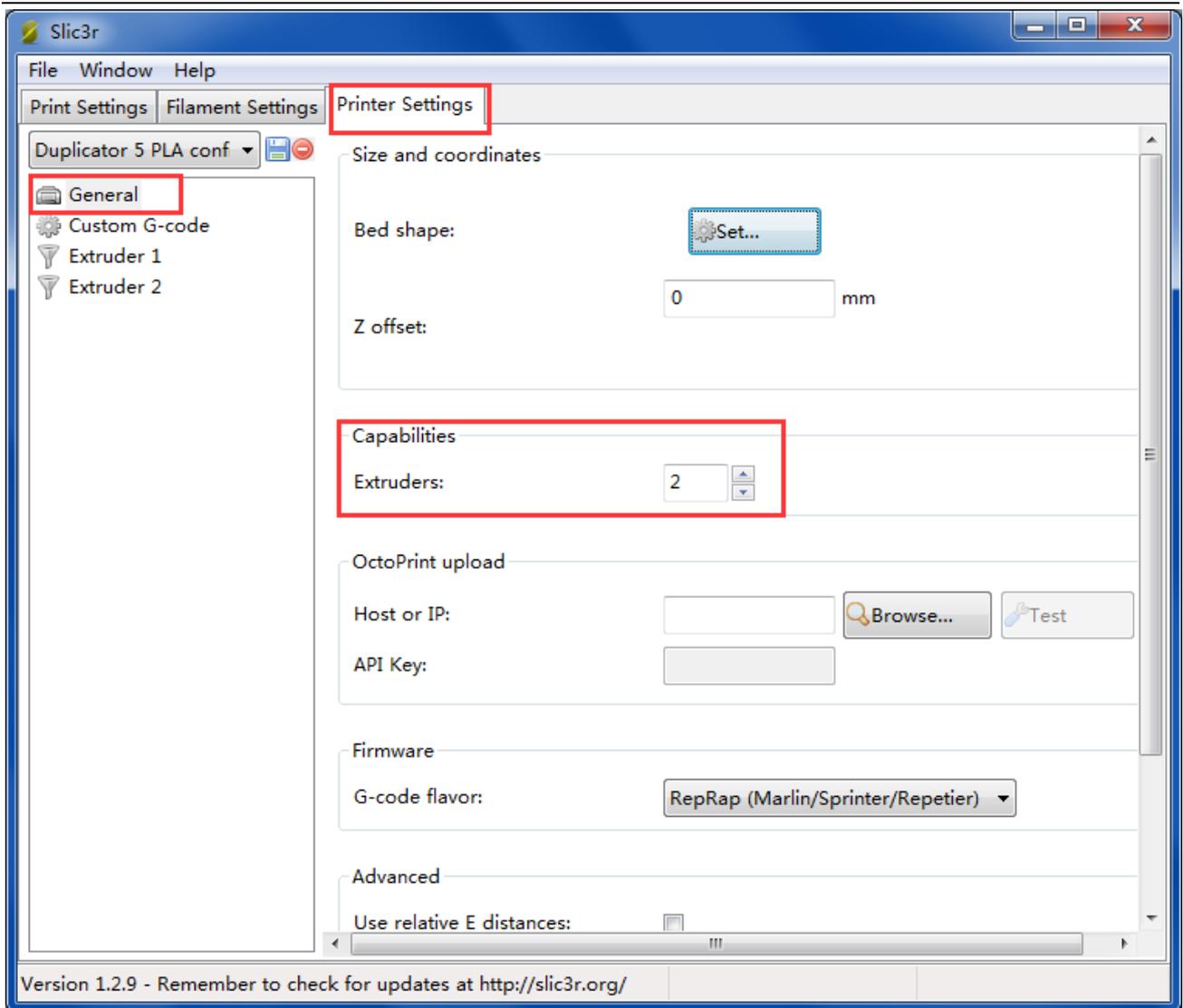
Set printer's hardware parameters in the Printer setting> General tab.

**Bed shape:** Rectangular

**Size:** 230\*150

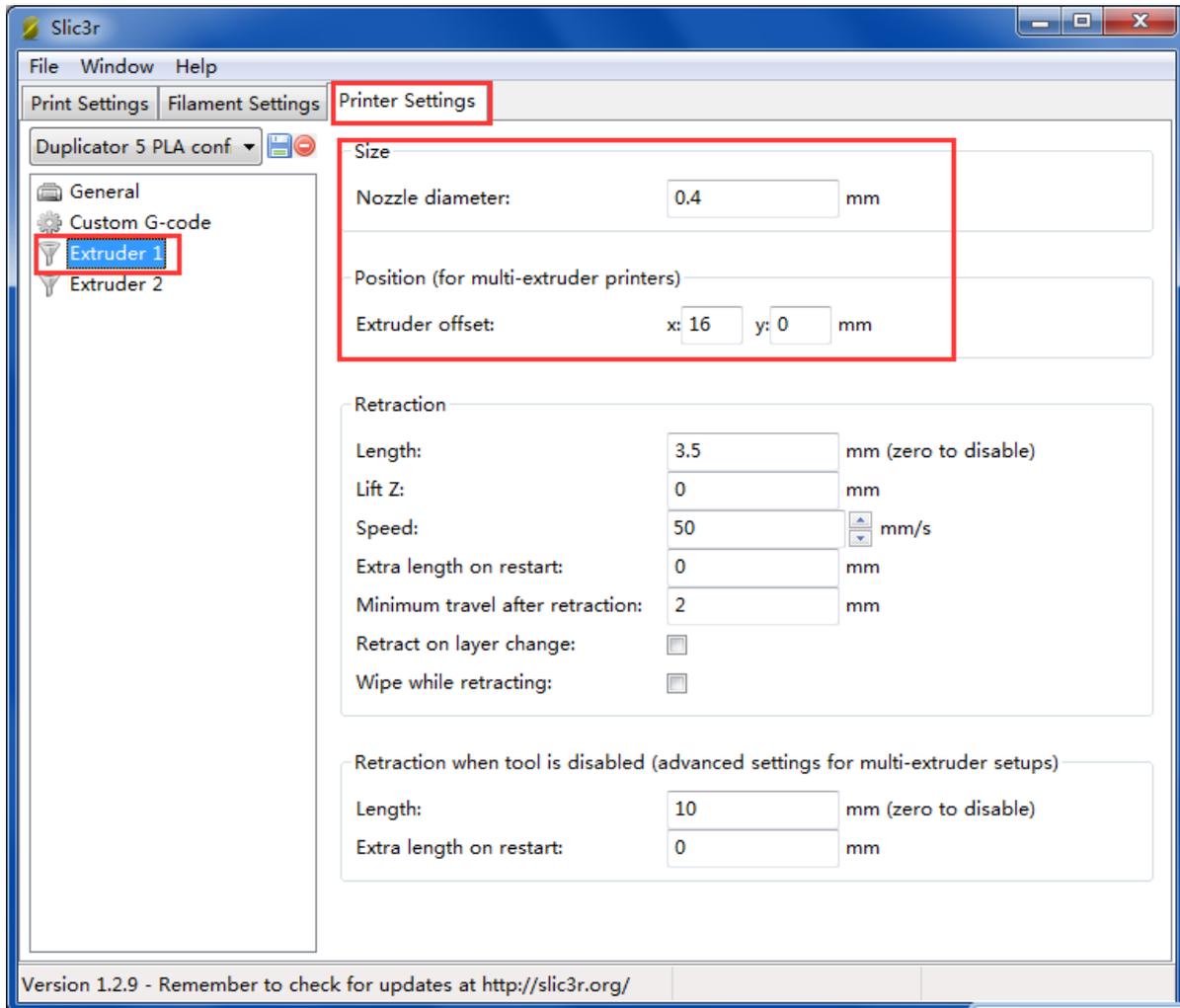


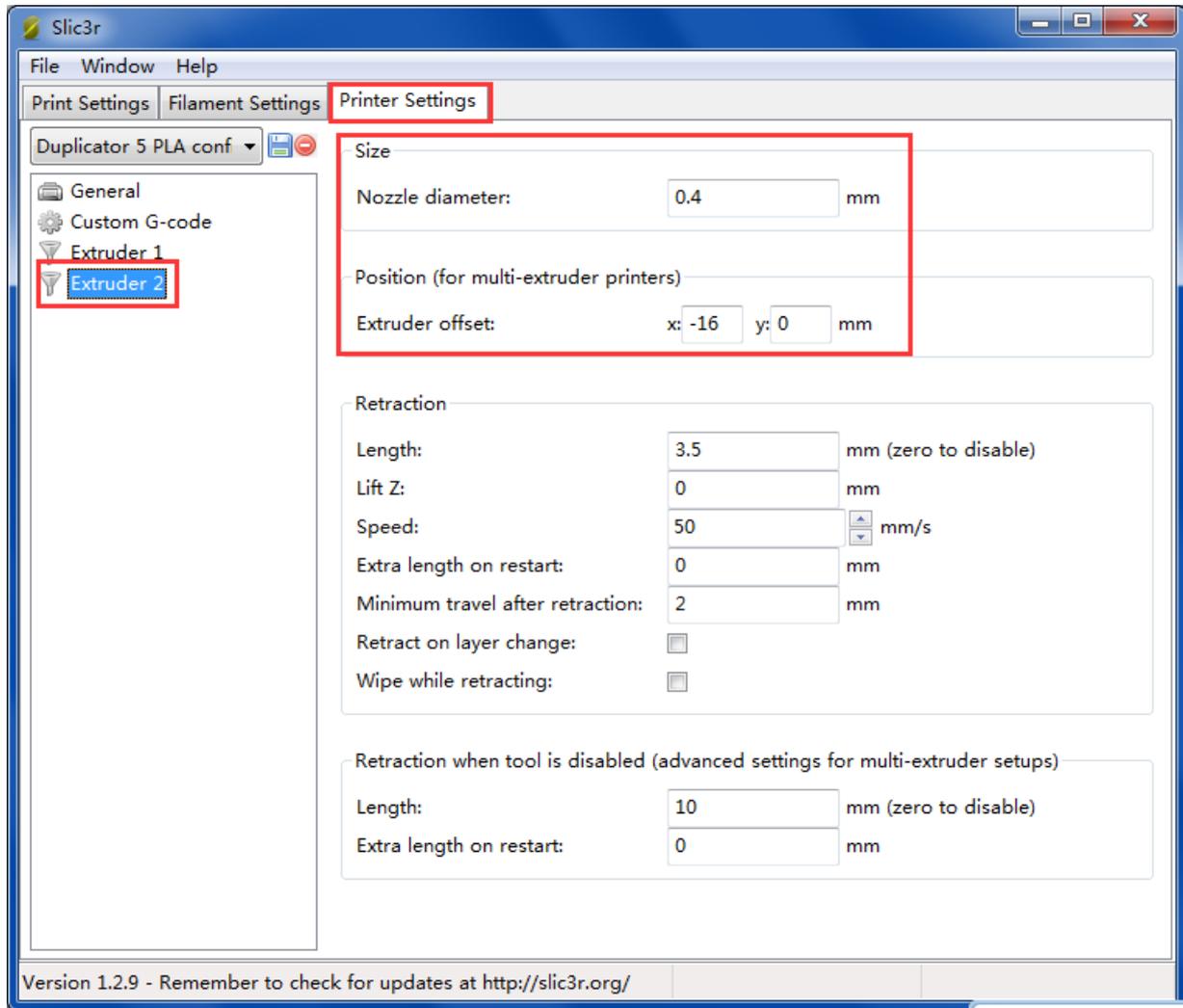
Number of extruders: 2



Set the diameter of the nozzles as 0.4mm (you can set this value according your actual need).

Offset on X direction: Extruder 1: -16mm, Extruder 2: 16mm





Do remember to save your settings and rename them.

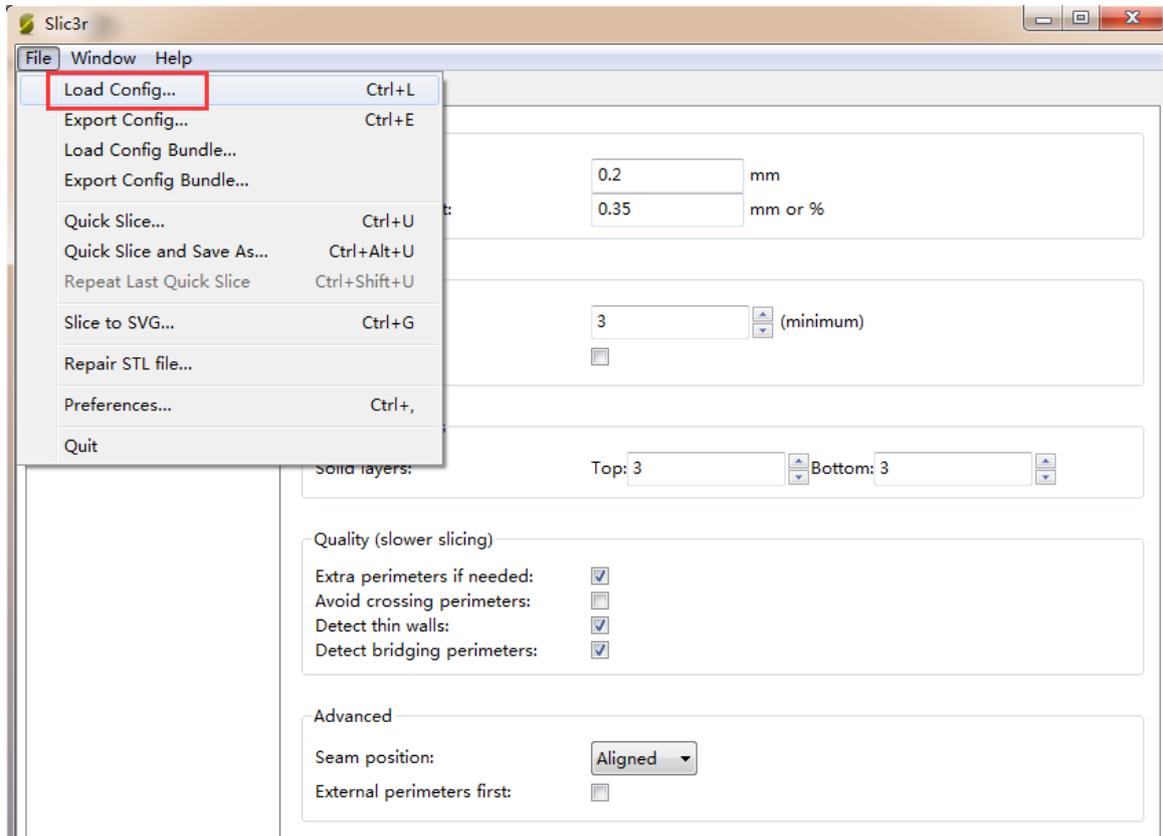
Click the save button and name your setting.

## 6.4 Other Settings

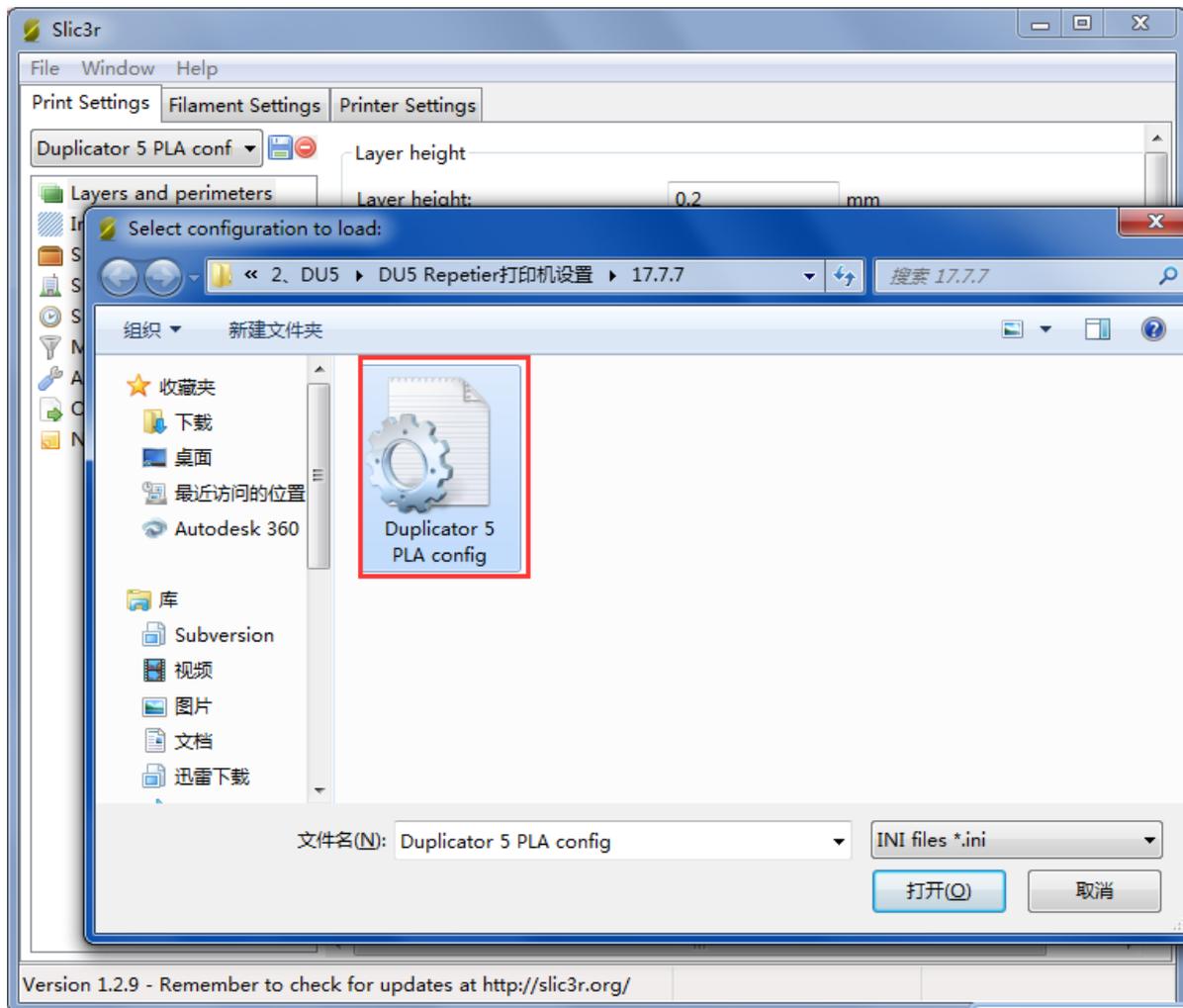
In addition to the above parameter settings, parameters like the speed of the printer are also very important to print quality. It requires user's long-term using experience and exploration. Here we'd like to give you a setting for reference, click to download the config. Link [https://www.geeetech.com/wiki/images/0/02/Duplicator\\_5\\_PLA\\_config.zip](https://www.geeetech.com/wiki/images/0/02/Duplicator_5_PLA_config.zip).

You can import it into slic3r to view it through the following steps.

Open slic3r>File>Load Config:

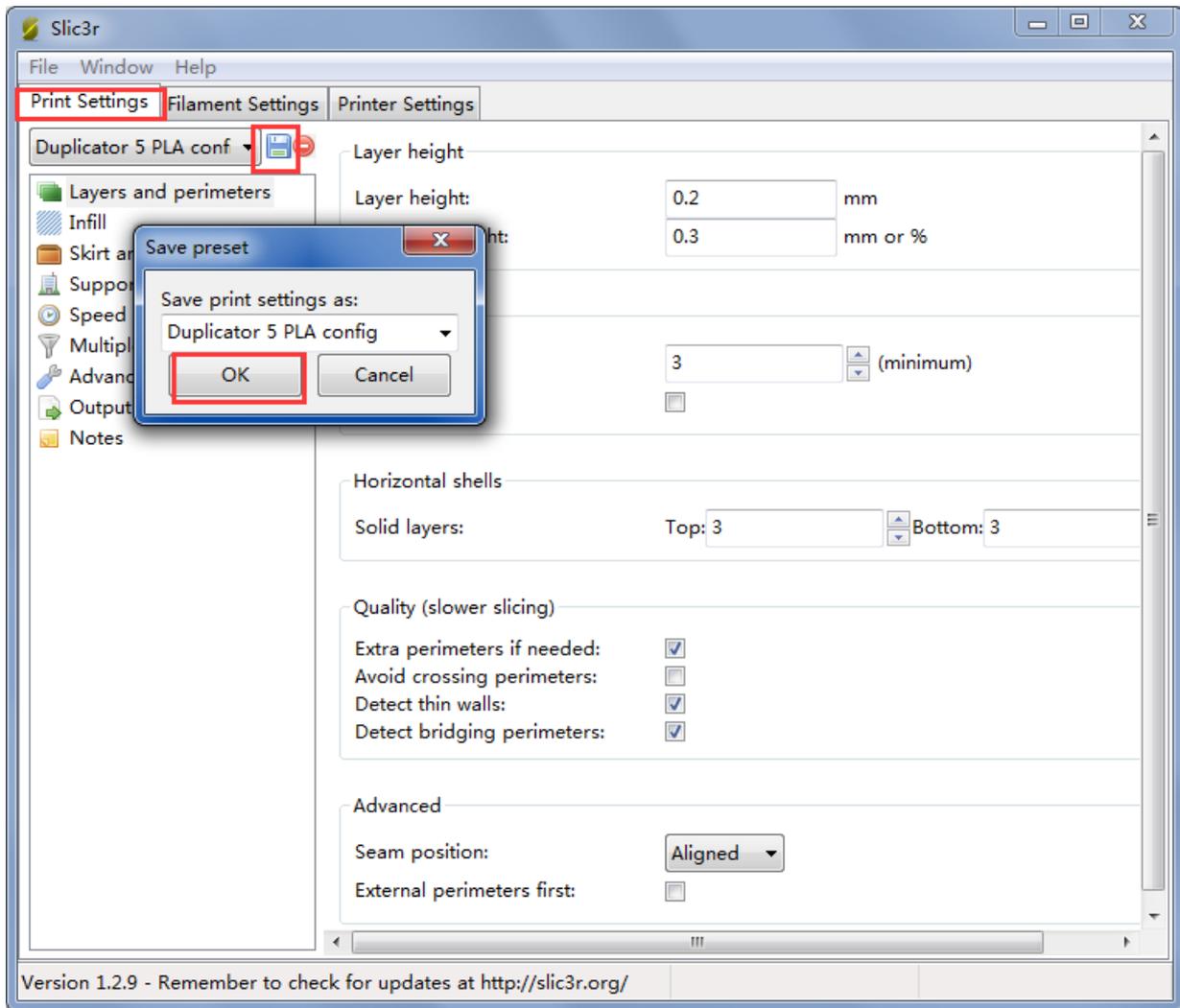


Find “Duplicator 5 PLA config.ini” file in the dialog box and open it.

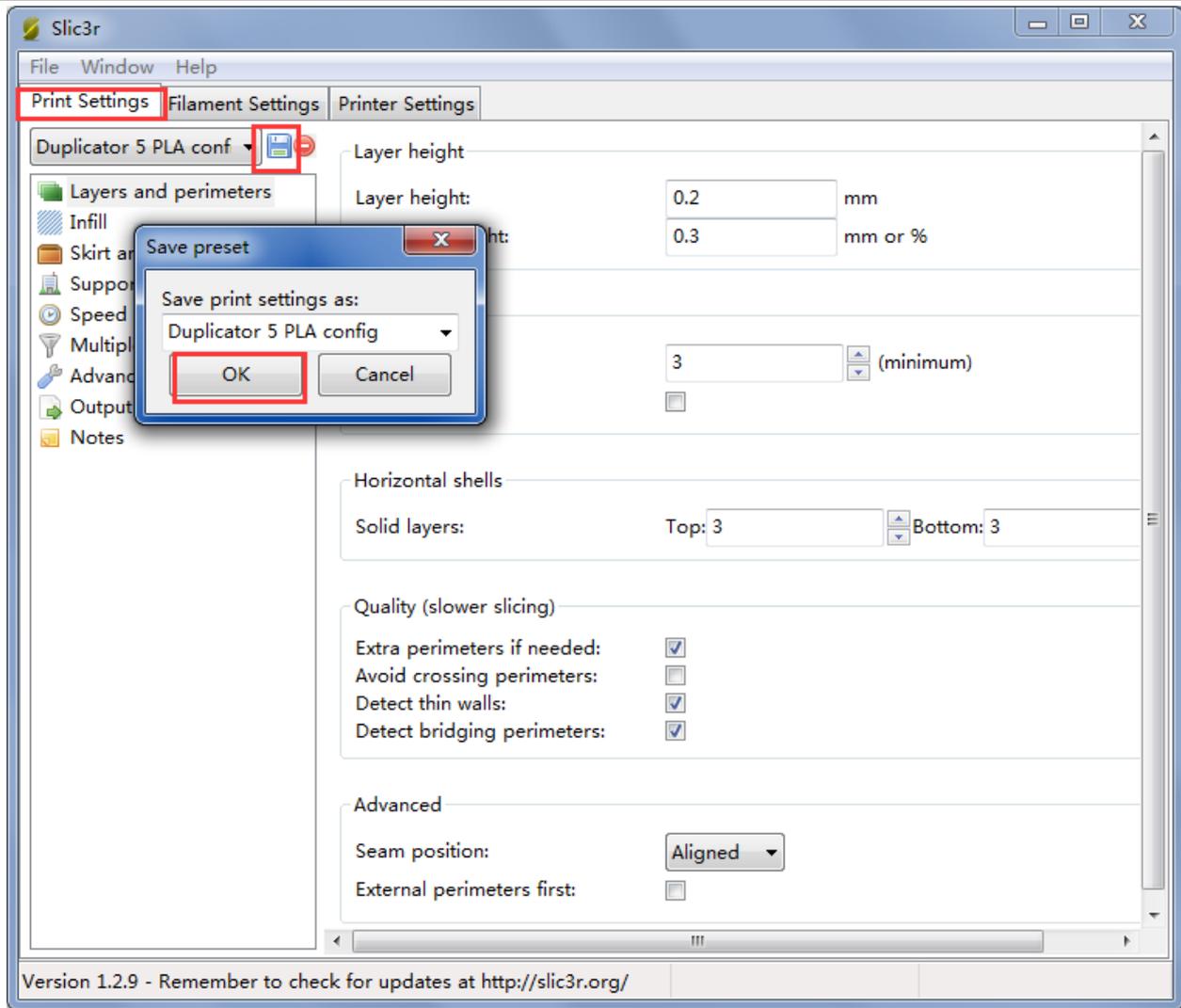


Then you can successfully import the config.ini file. Click the Save button to rename it as [Duplicator 5 PLA config] and save it.

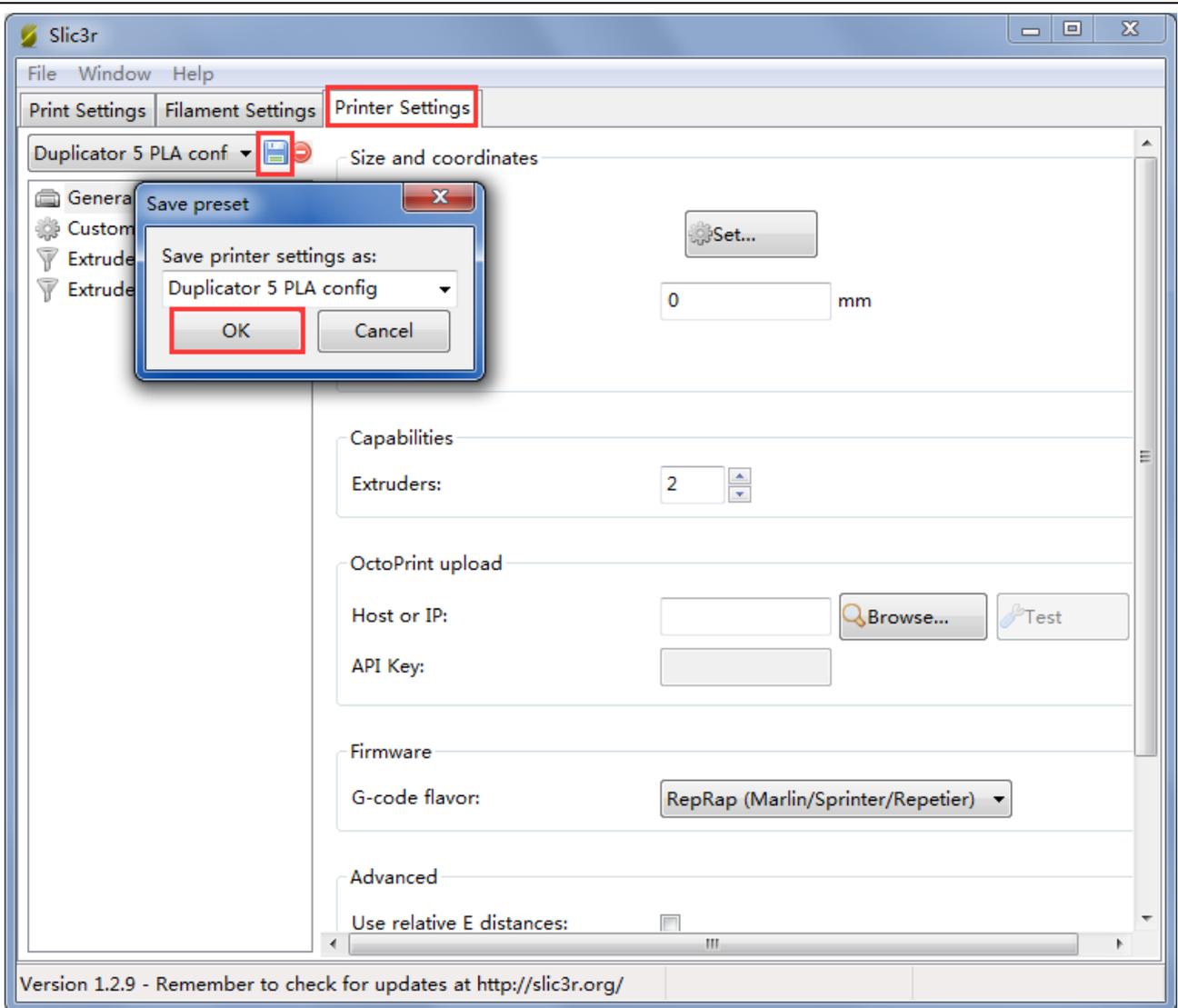
Click the save button in [**Print Settings**].



Click the save button in [Filament Settings].



Click the save button in [**Printer Settings**].



## 7. Begin Printing

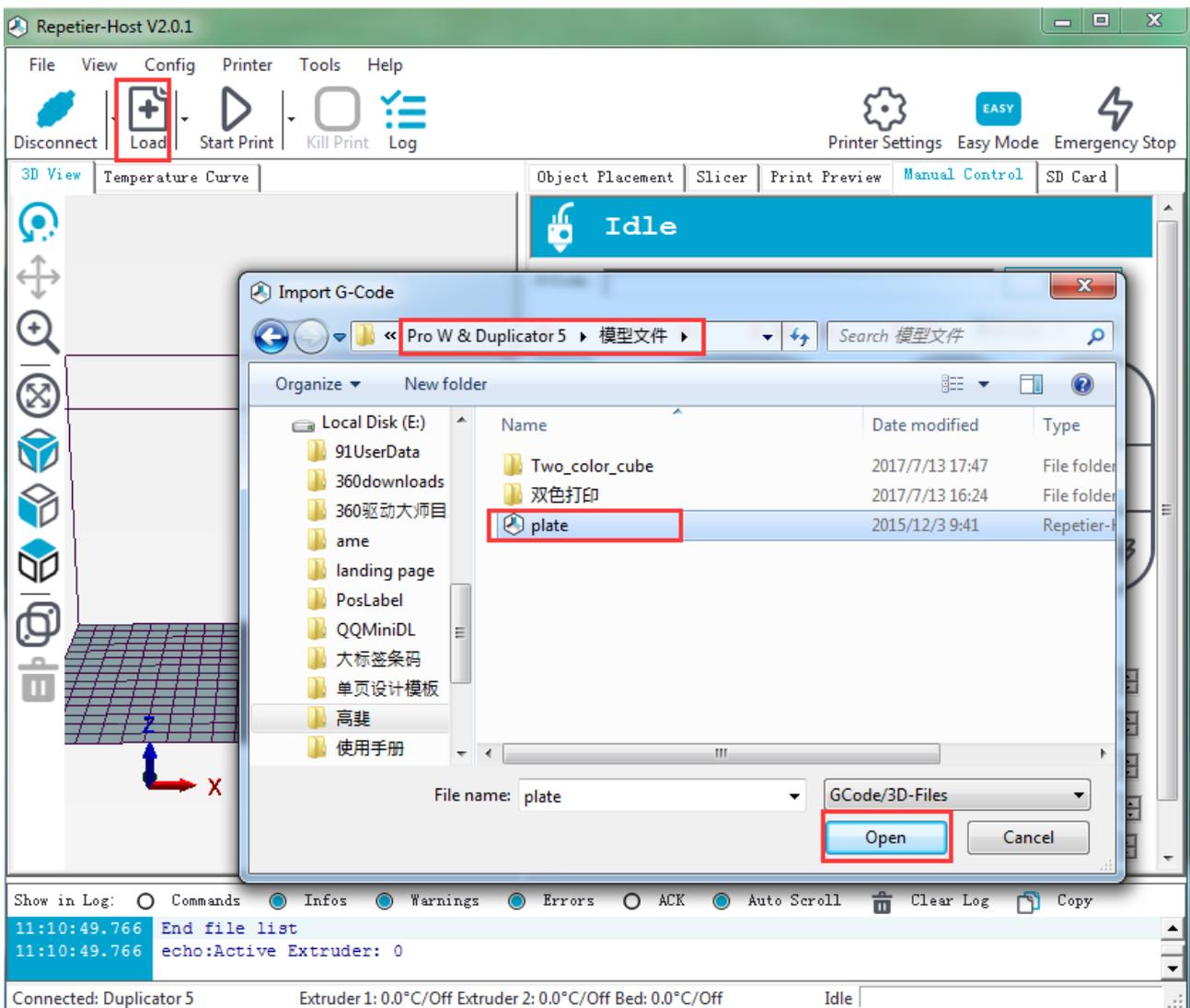
So far, all the preparatory work is completed. The next step is to import the model file for slicing and printing. For 3D printer, the file format of the model is generally .stl file. You can download 3D models for free and print those models which are shared online. Certainly you can also design your own creative objects for printing.

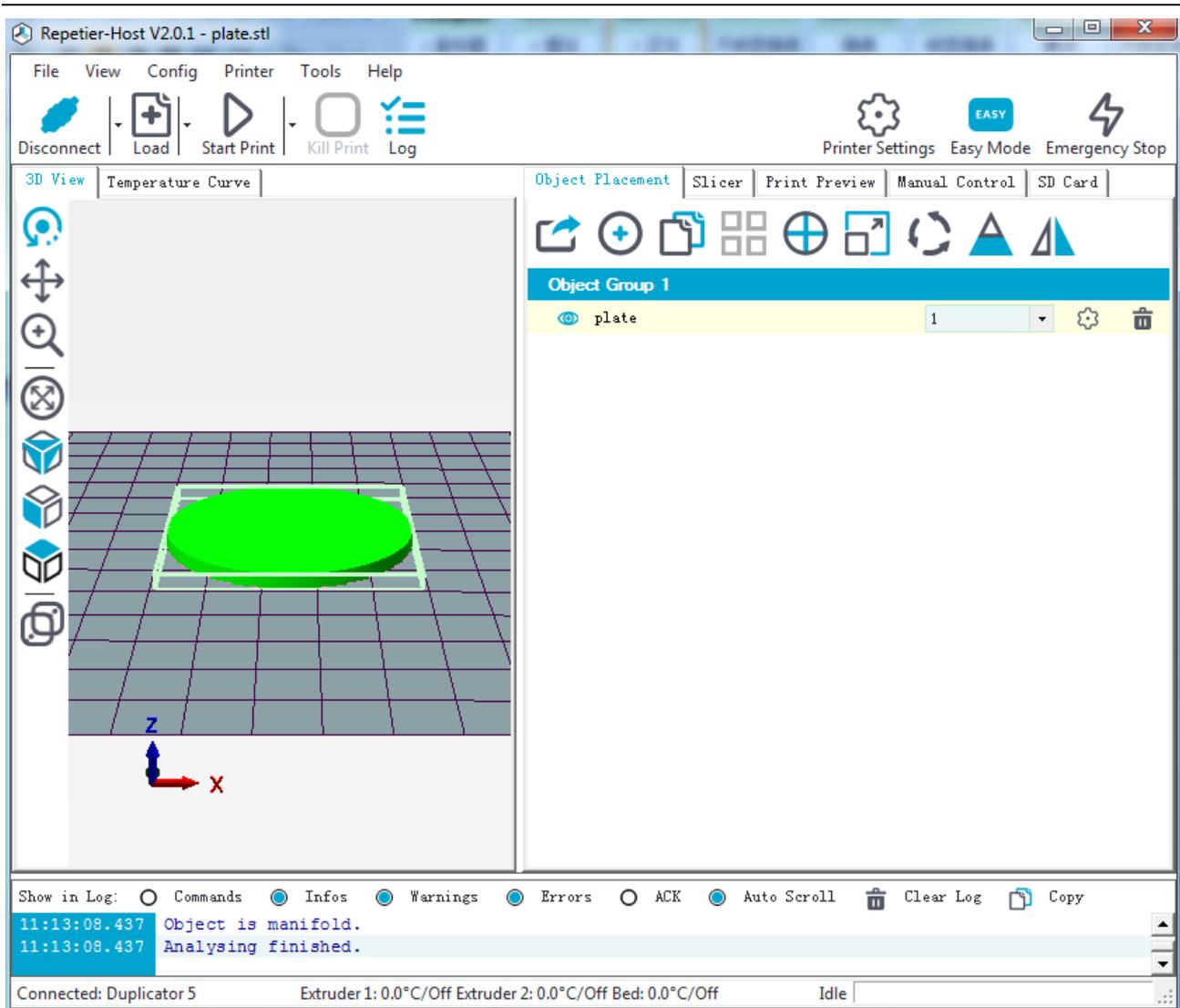
## 7.1 Print with one extruder

If you are new to 3D printing, you can try to print with only one extruder first. After getting familiar with the whole process, you can try to use dual-extruder. Here we print a simple plate. You can download the model file here: [plate.stl](#).

### 7.1.1 Load Print Model

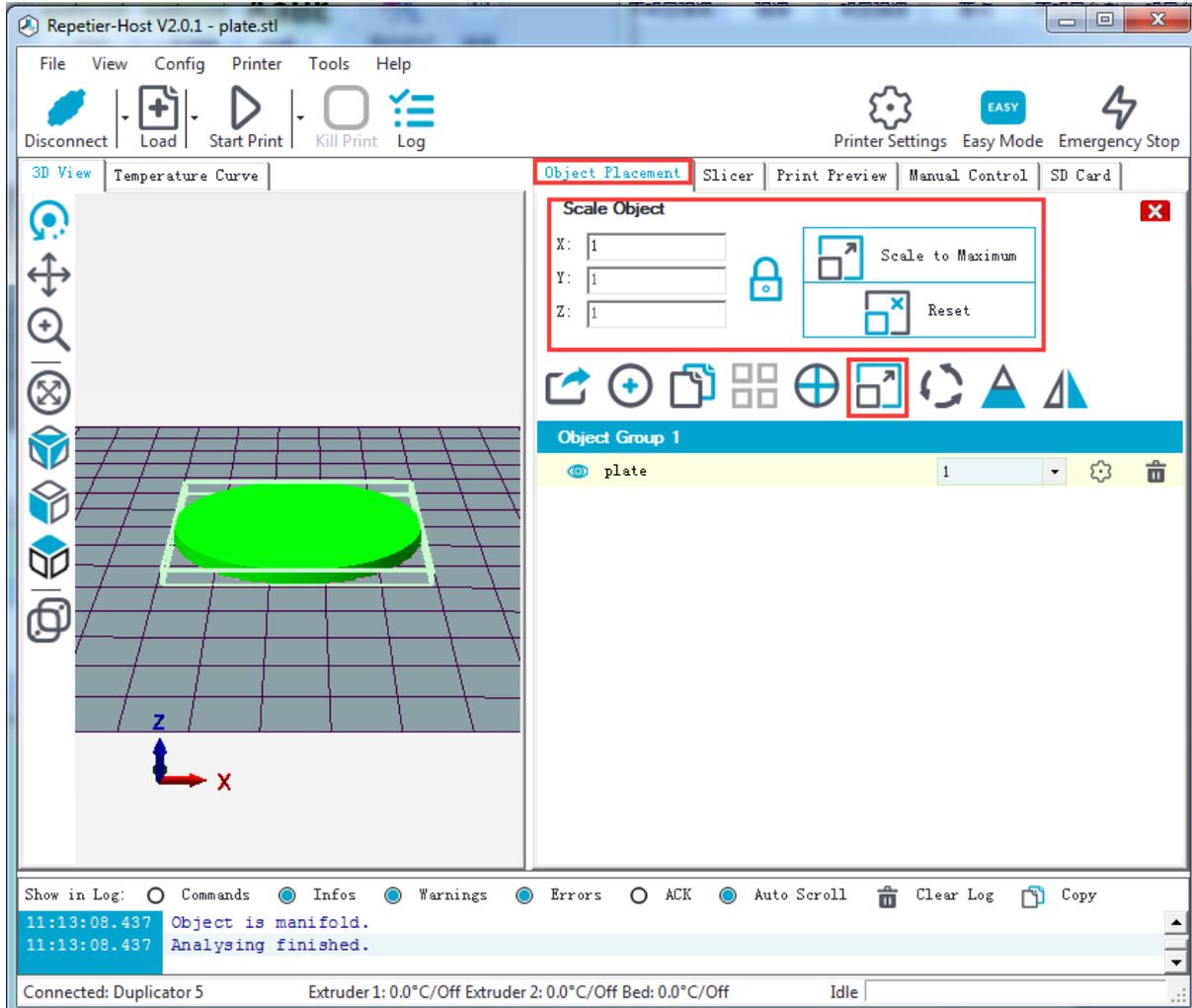
In the main interface of Repetier-Host, click the Load button . Choose the file you download and open it.

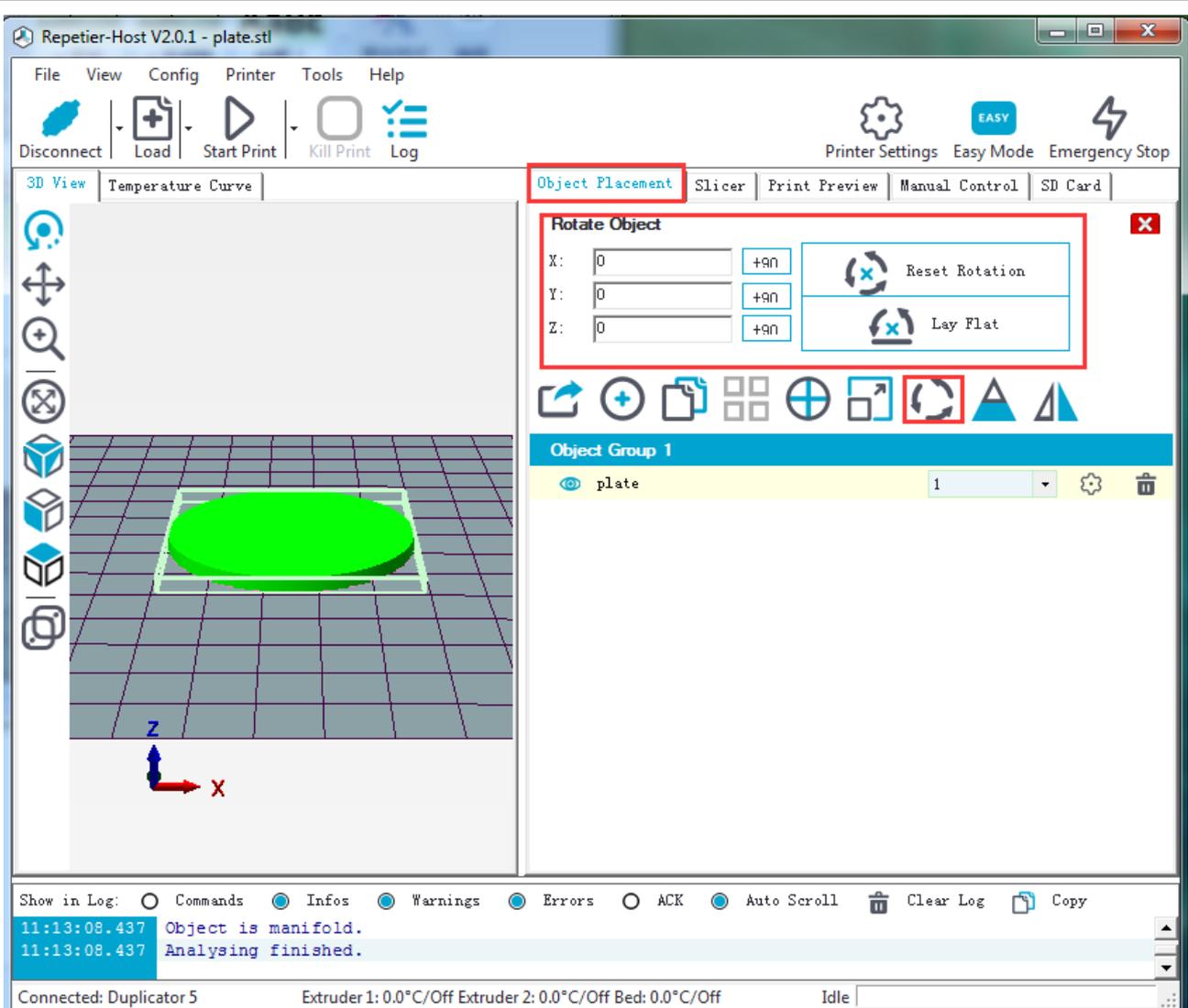




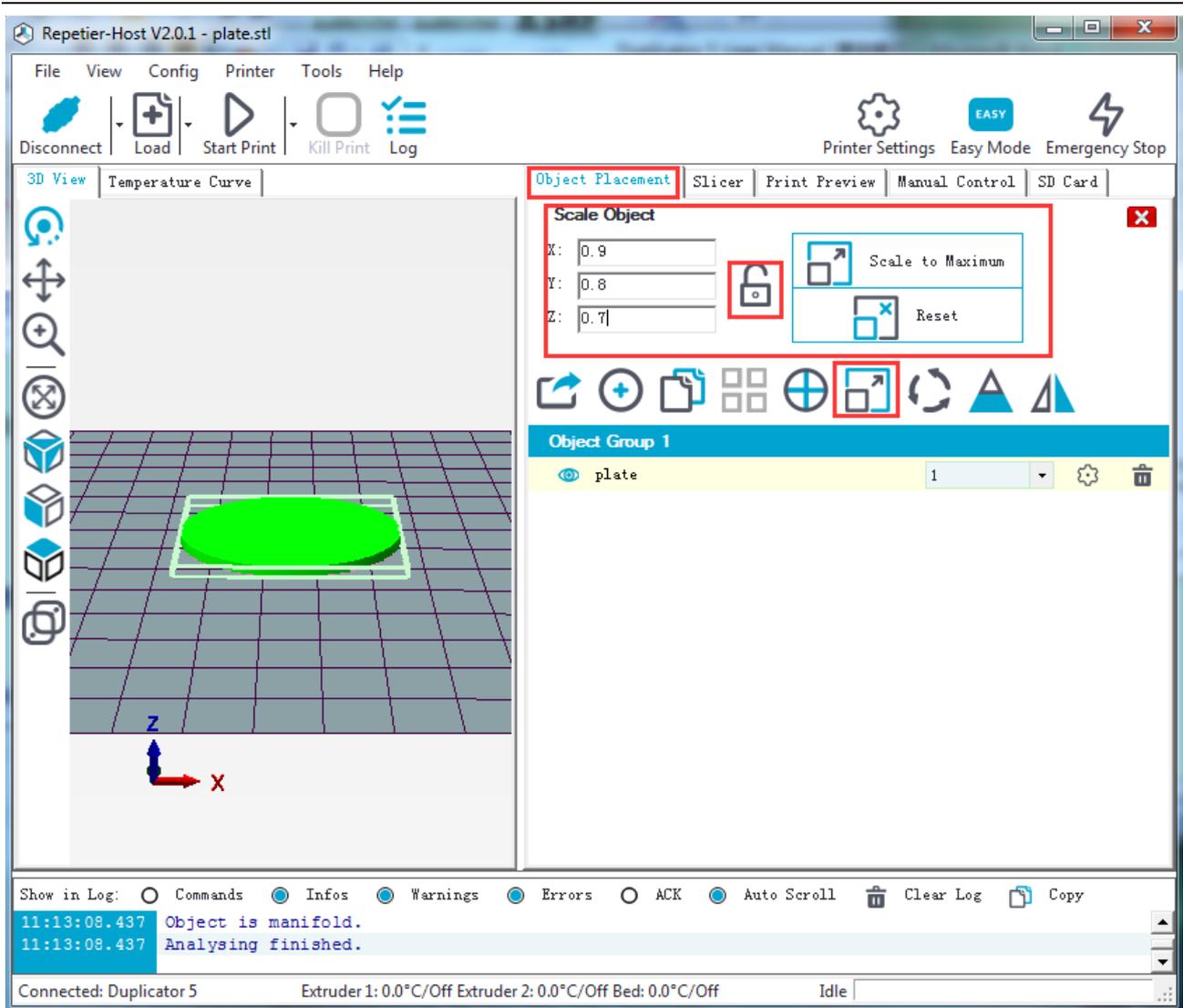
### 7.1.2 Slicing

After the file is loaded, you can use the following buttons to zoom in or zoom out the model, or rotate it.

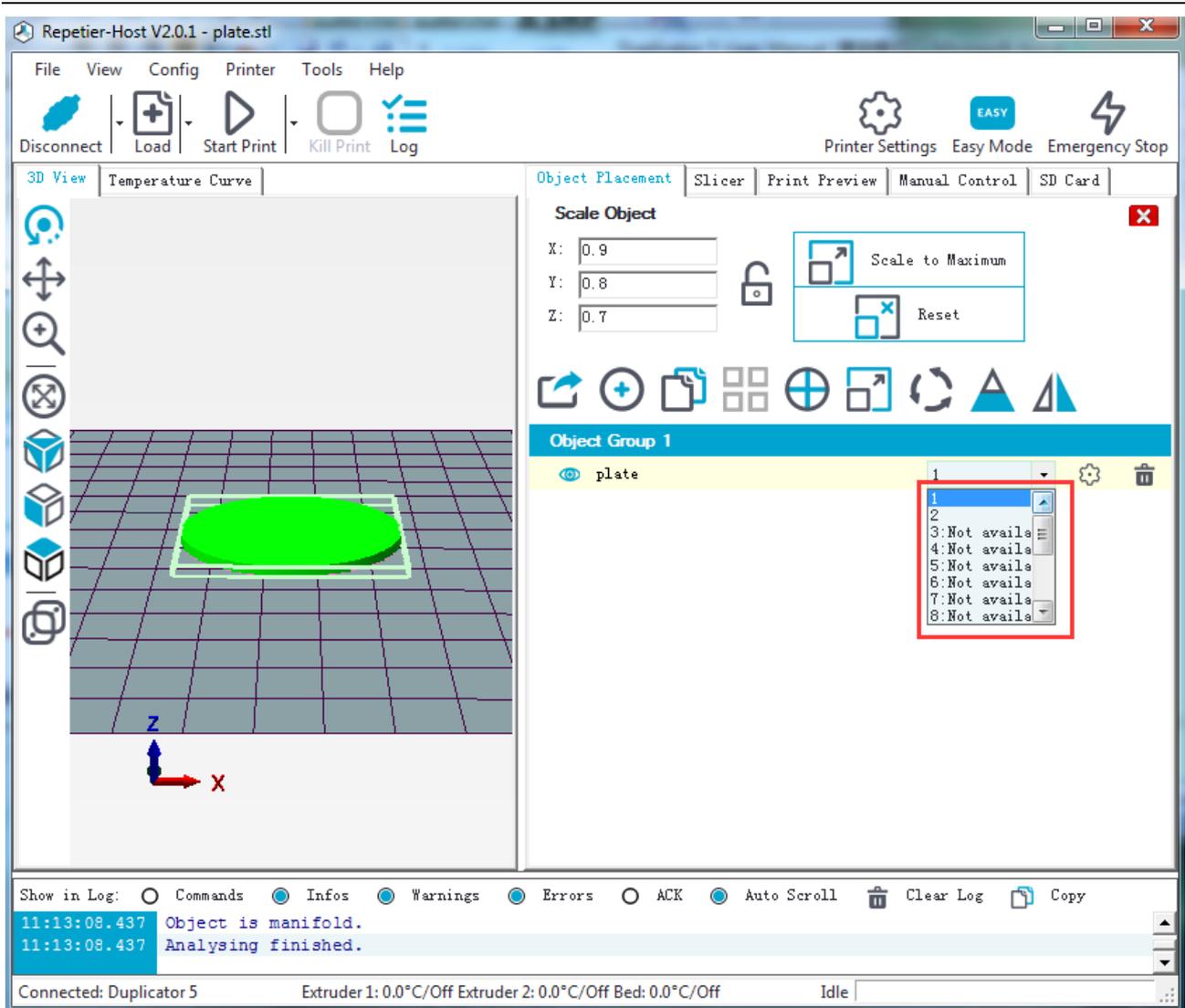




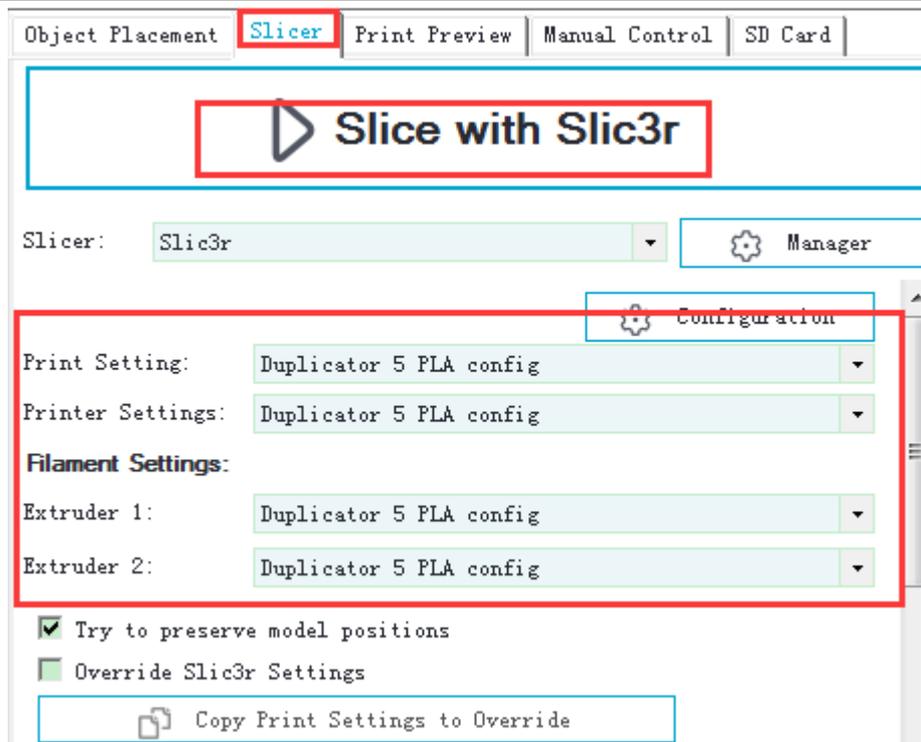
You can also use the [unlock] button to scale the object in different proportion.



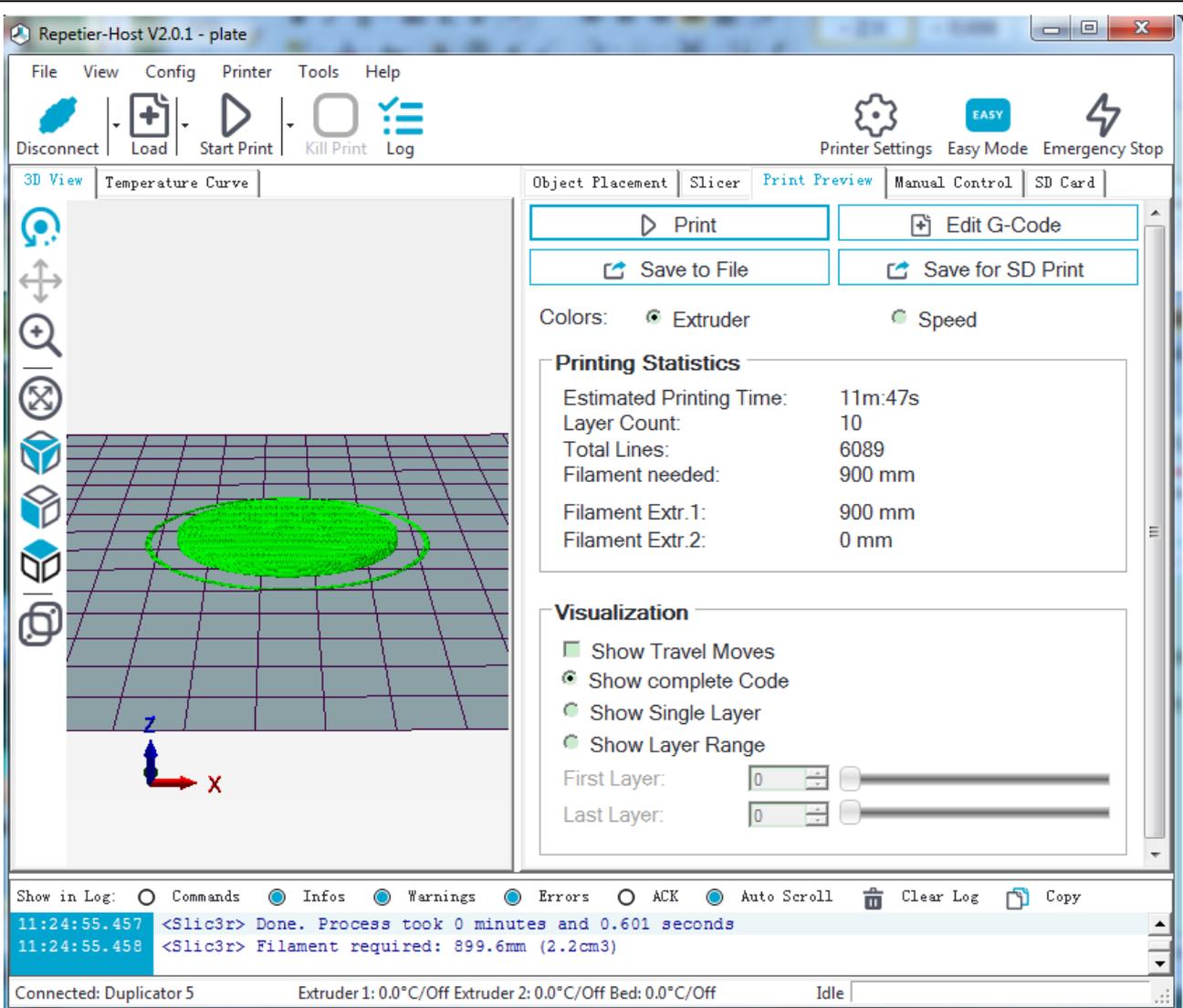
Choose the extruder.



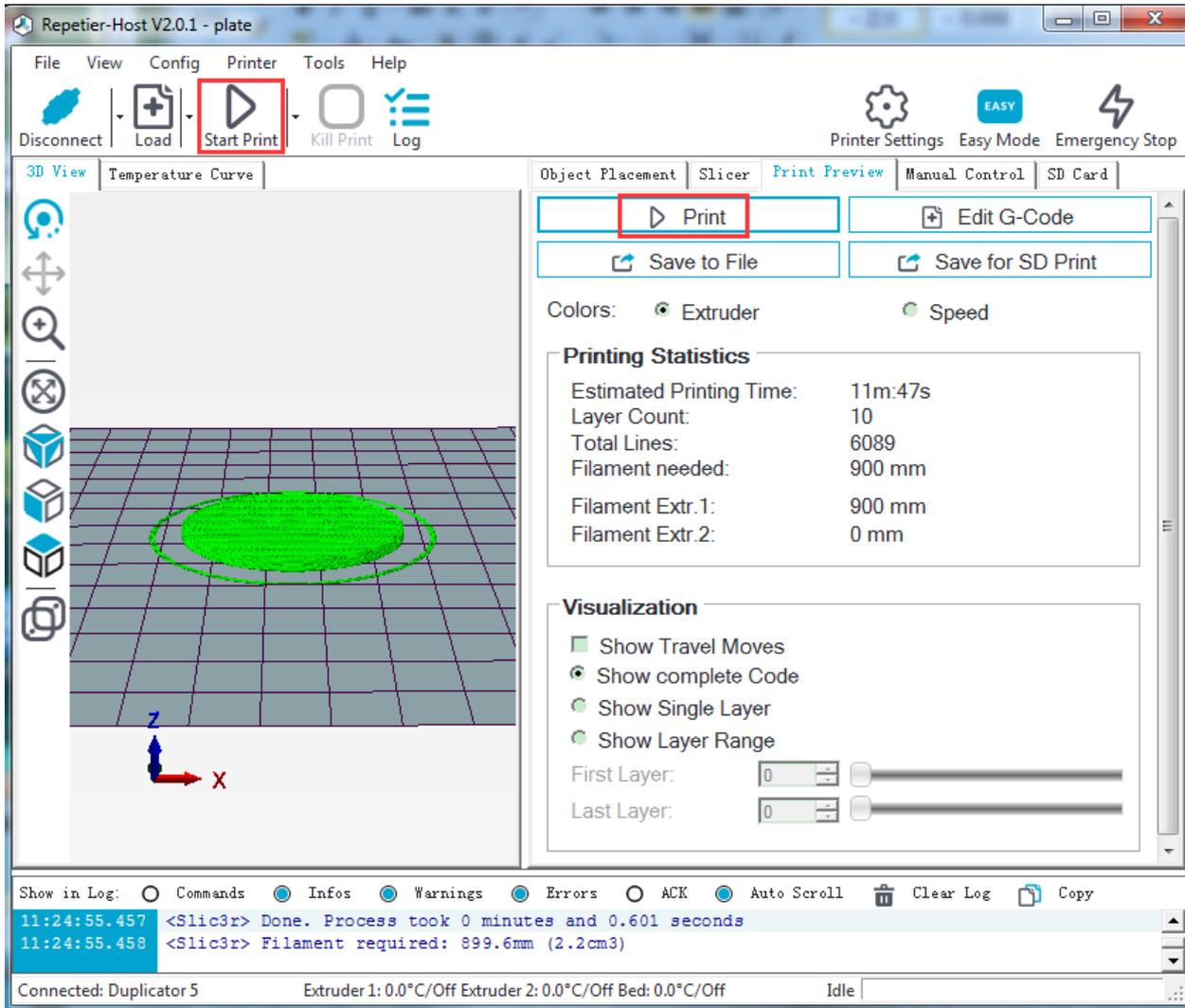
After scaling the model, you can choose the slicing parameters which have been imported previously in the drop- down menu, and click **Slice with slic3r**.



In this way, .gcode file which can be recognized by the printer is generated. Besides, the estimated printing time and filament needed are available.



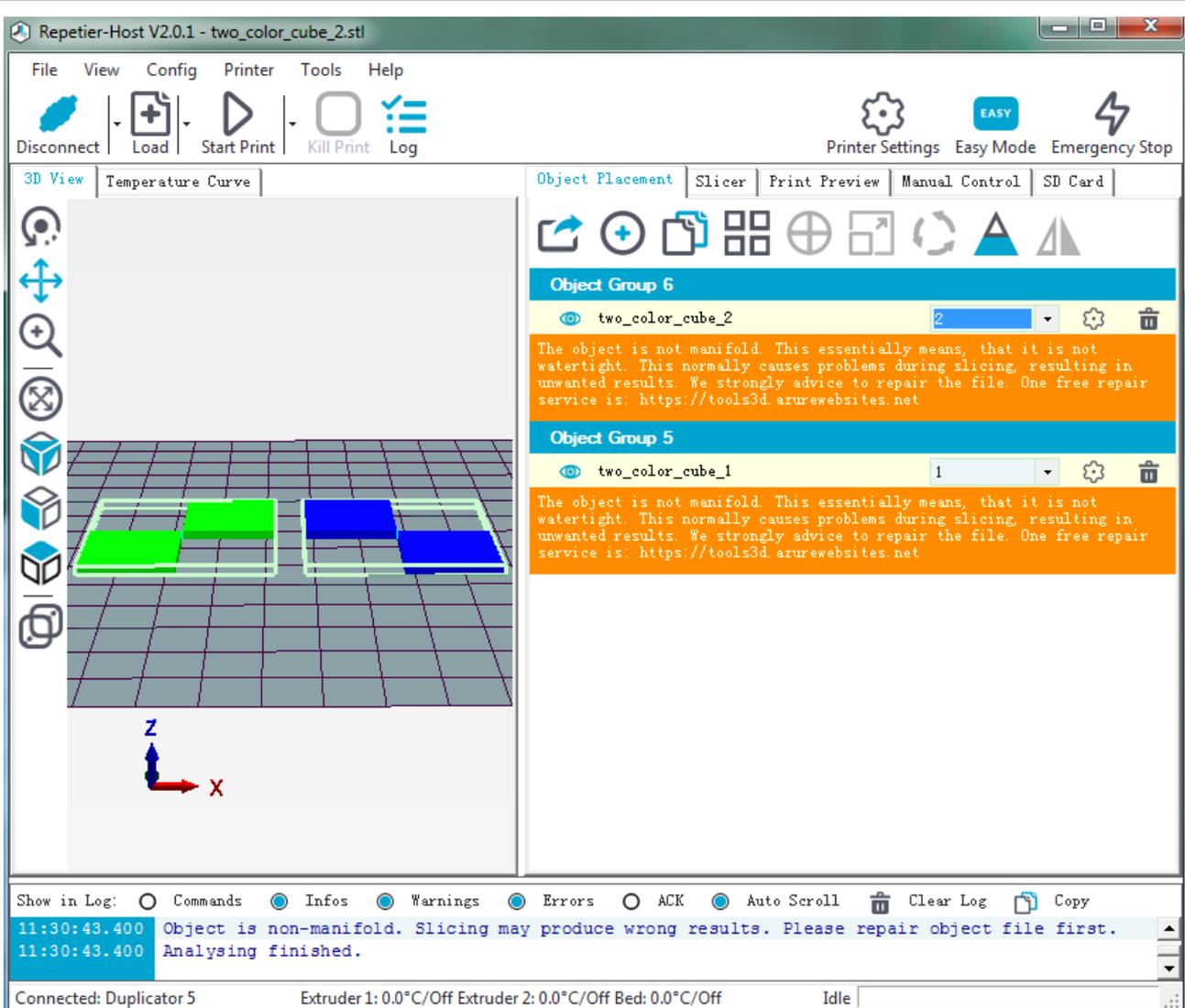
Last step, click  button or  **Print** button to print.



## 7.2 Print with Dual-extruder

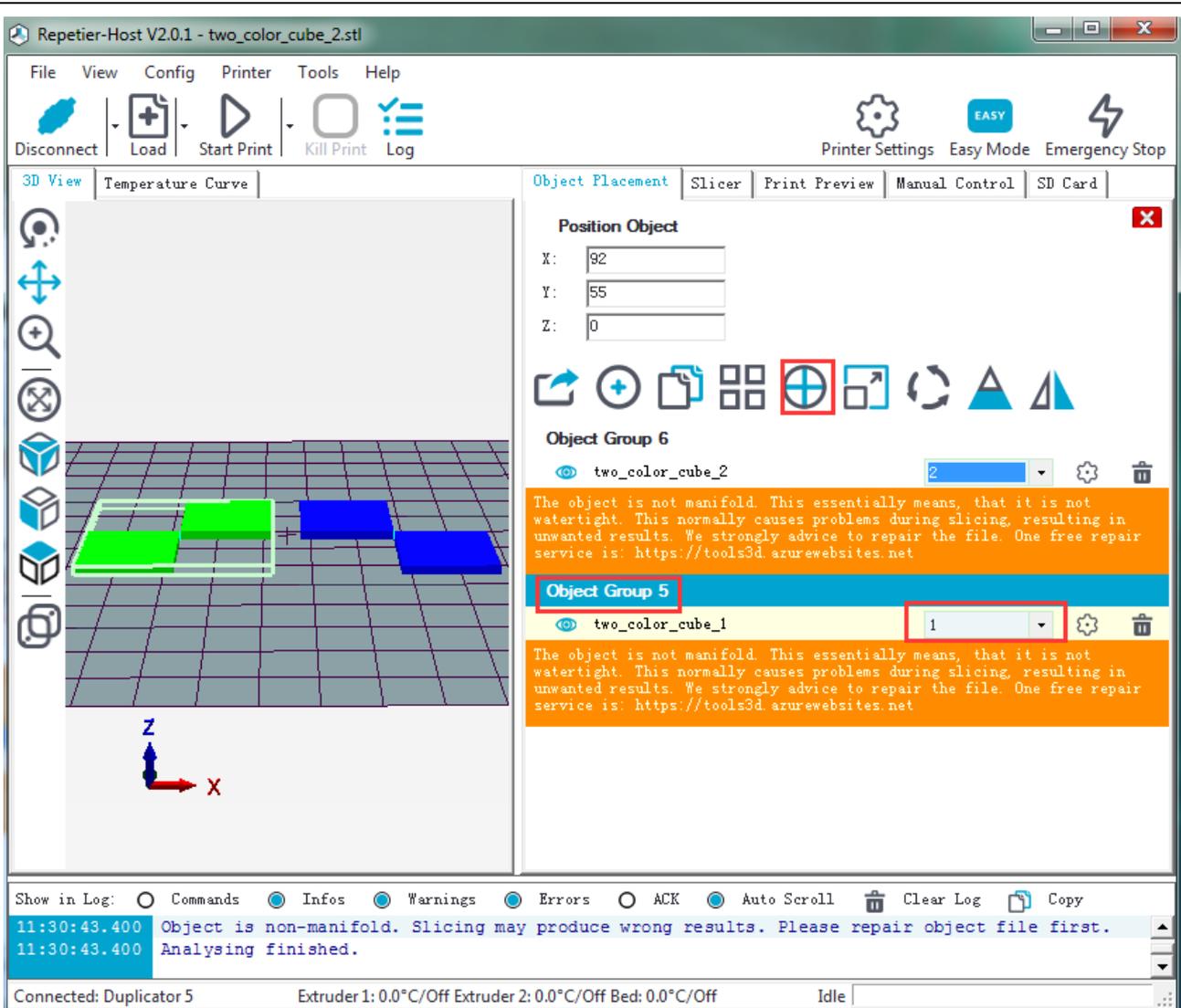
Actually, dual-extruder printing is to load two separate objects, and then separately print them with the assigned extruder. Thus you can print objects with two colors. Click [here](#) to download .stl files which can be used for dual-extruder printing: [two colour cube.stl](#).

After you download the model, load it to Repetier-Host, as shown in the following picture:

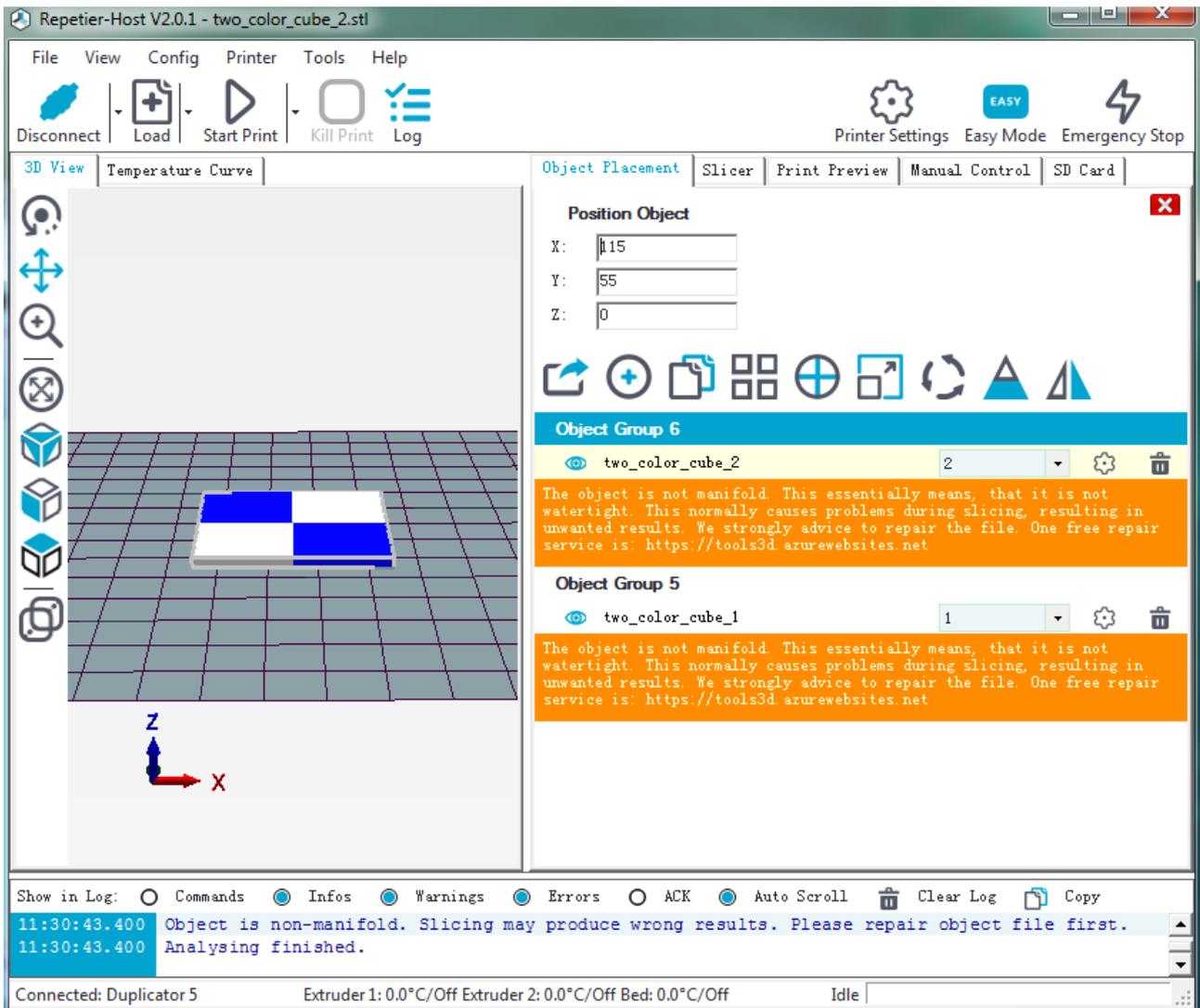


The two models loaded are separate. At first, we adjust their locations to combine them together.

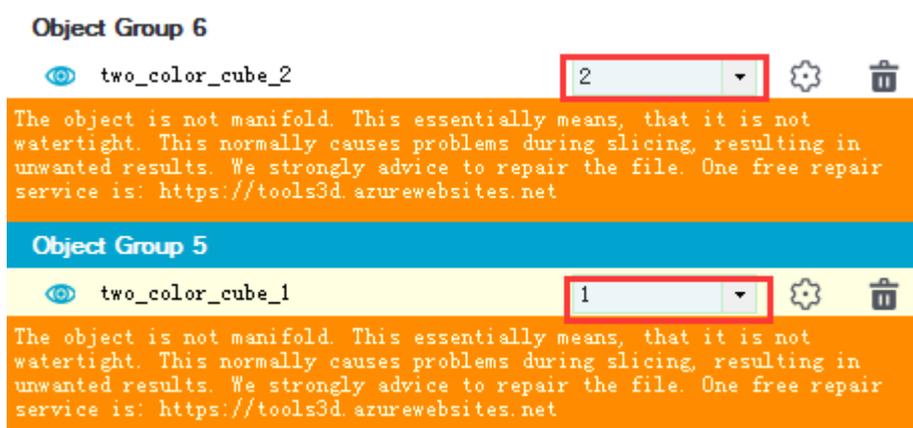
Click Object Group 5, choose object 5, and then click centering button  .



The object is now in the middle of the hotbed. Put object 6 in the middle of hotbed in the same way. See the final model in the following picture.

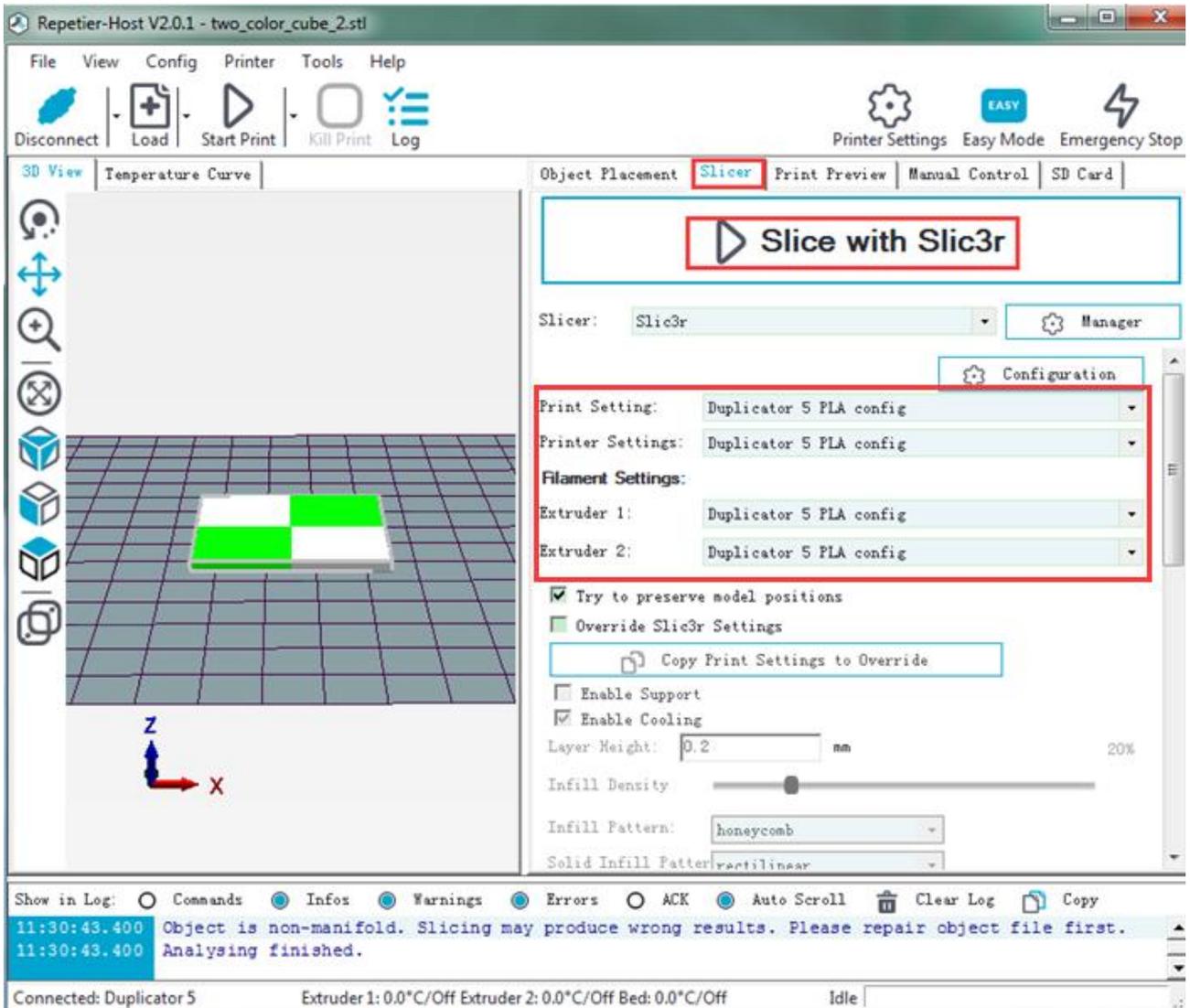


Remember to assign an extruder for each object:

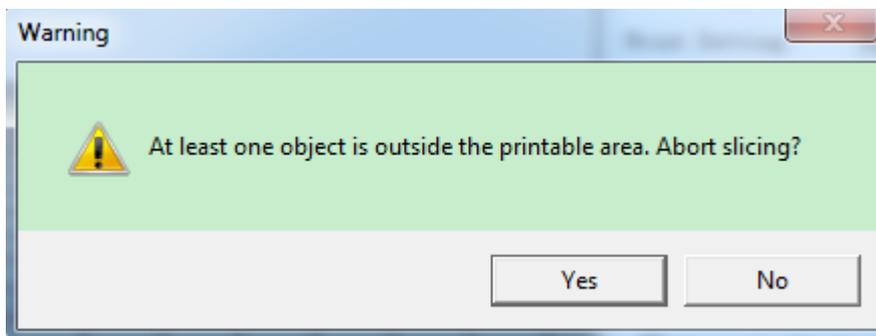


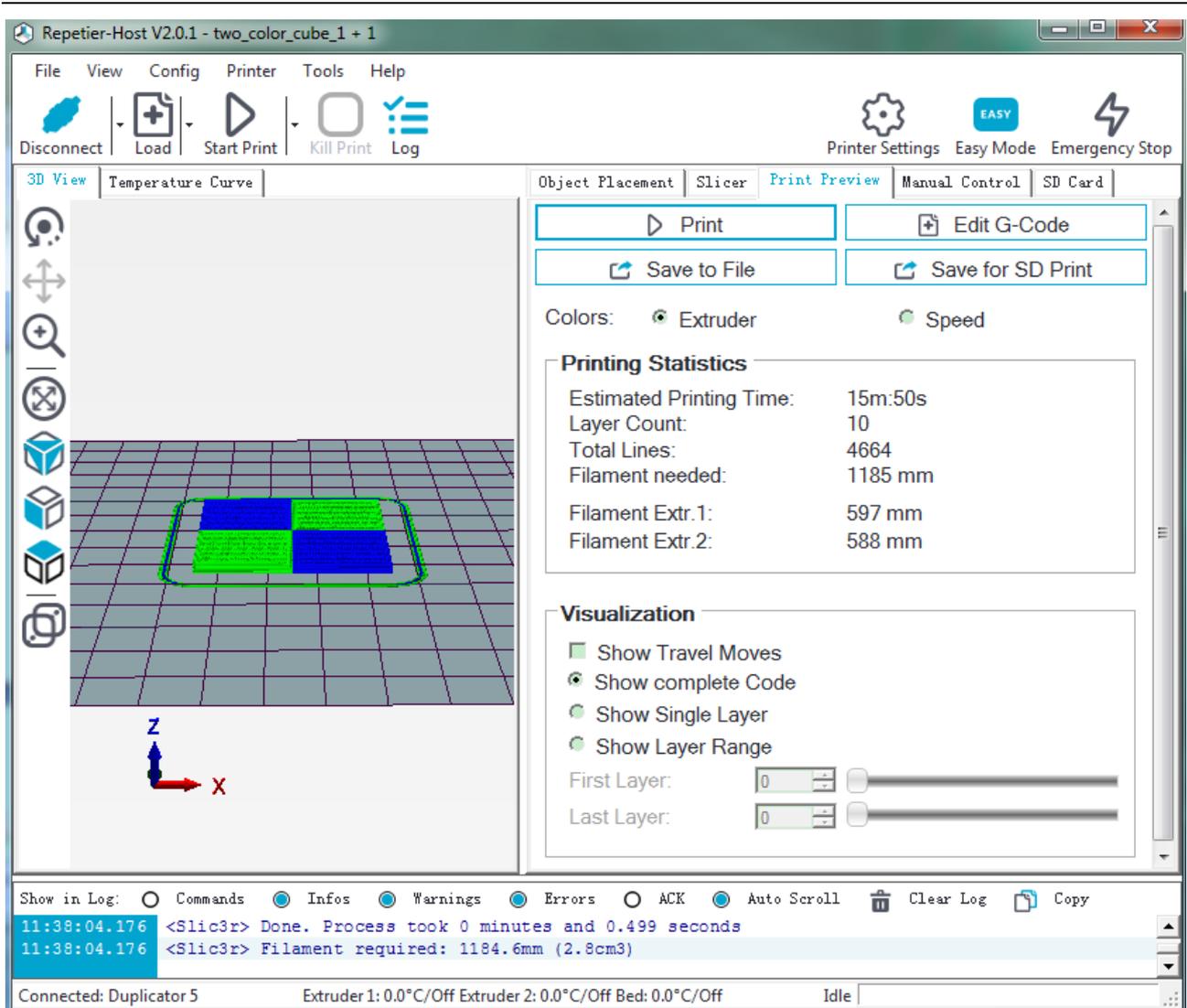
You can choose the slicing parameters which have been imported previously in the drop- down

menu, and click **Slice with slic3r**.

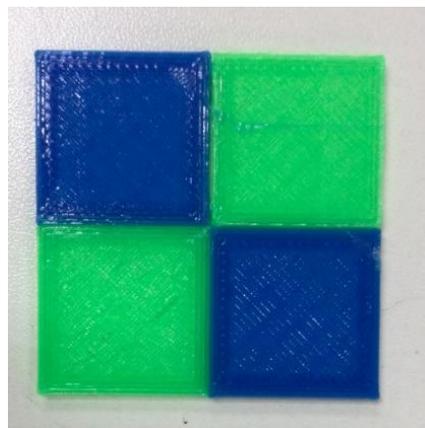


If there is a warning, you can neglect it and choose [No].





Click **Start Print** to begin printing. The finished printout is shown as bellow:



### 7.3 Stand-alone printing with SD Card

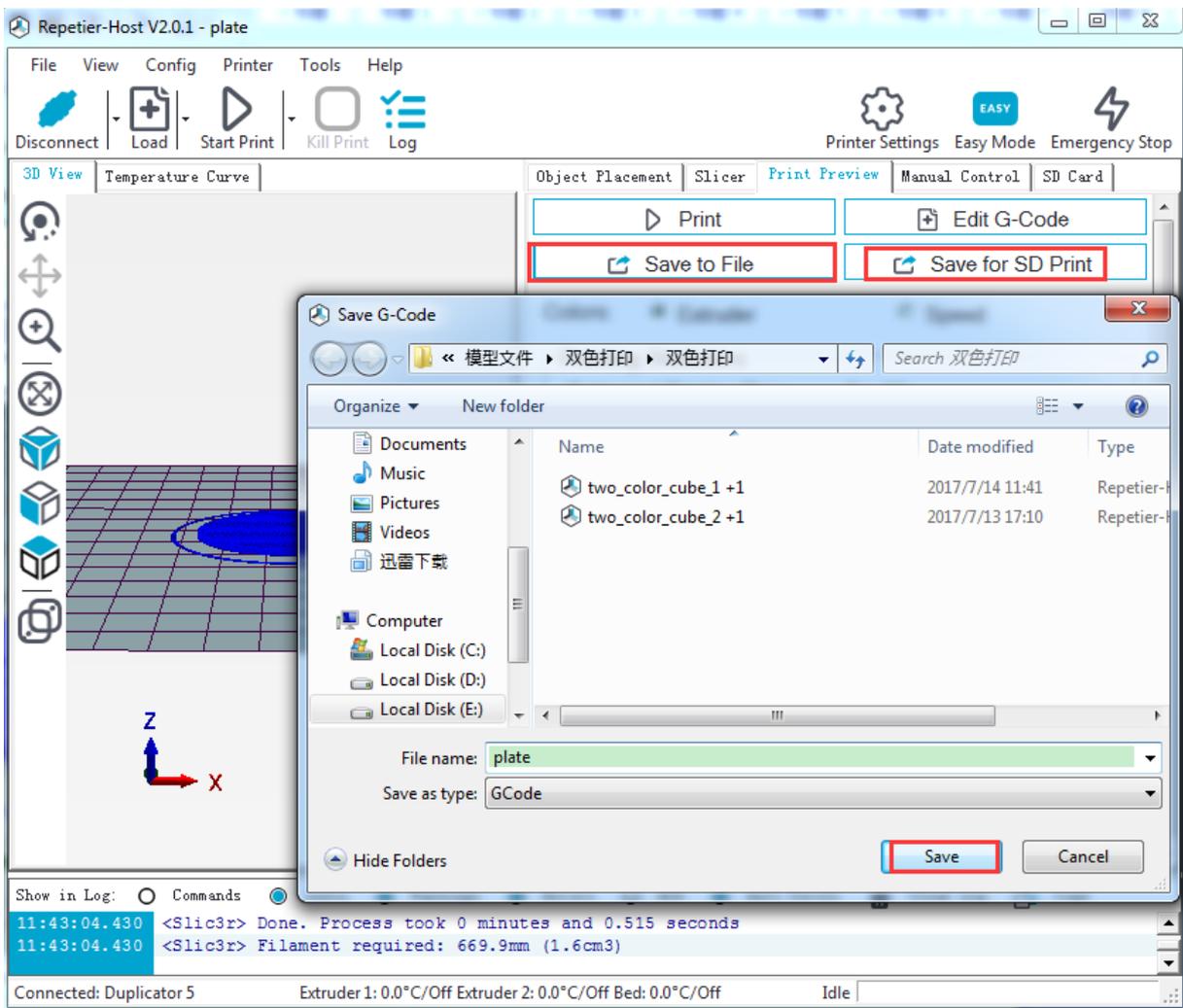
If you want to print stand-alone, please save the .gcode file in the SD card.

**Note:** The printer only recognizes .gcode file in the SD card, and the file can not be placed in any folder!

The operation flows are as follows.

#### 7.3.1 Save

Click [Save to File] or [Save for SD Print], and select the [save] button in the dialog box for SD card printing.



### 7.3.2 Print

Insert the SD card into the SD card slot on the back of the LCD control panel. Choose the corresponding .gcode file to print.

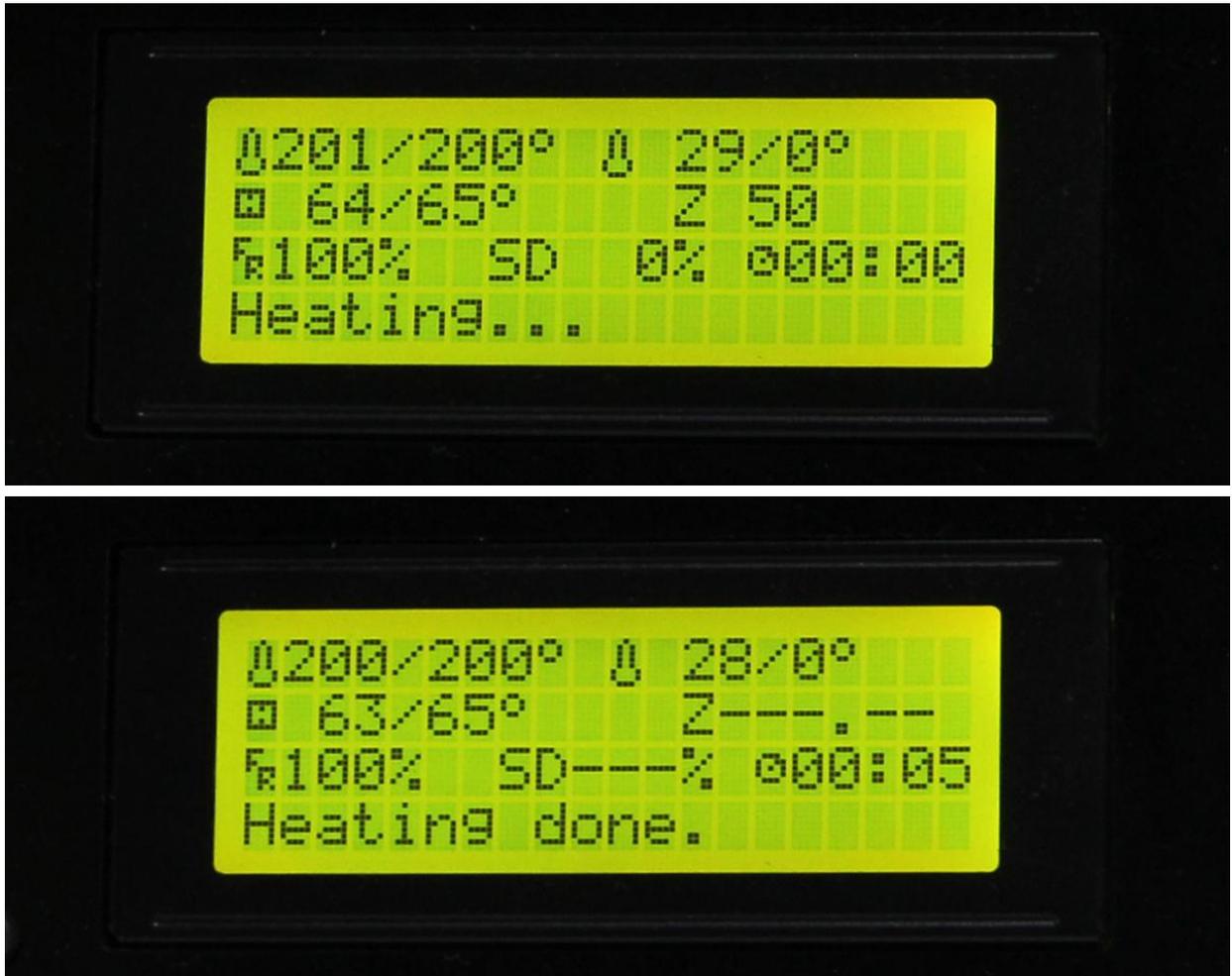
Press the knob on LCD control panel, rotate the knob to enter the main menu and choose [Print from SD] option.



Choose the corresponding .gcode file for printing.



Heating.



When heating is completed, the printer starts to print automatically.

## 8. FAQ

If you encounter any problems during printing, you can visit our forum:

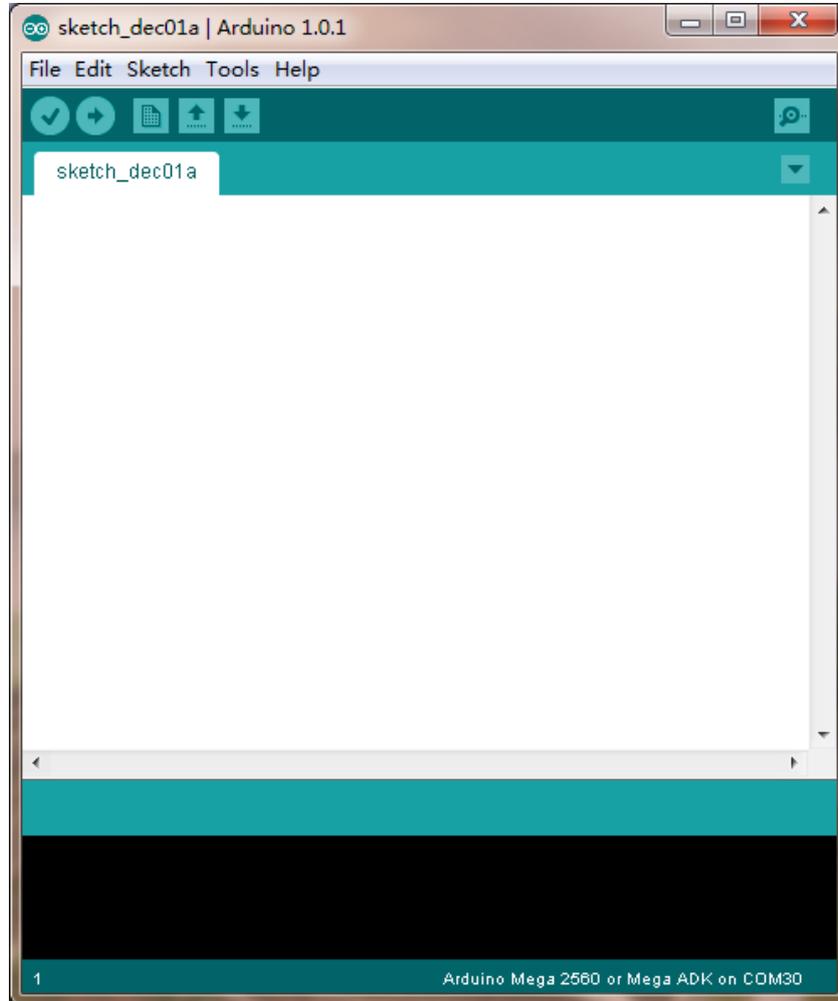
<http://www.geeetech.com/forum/>, and there are detailed solutions in the forum. Common problems are as follows:

### 8.1 How to upload firmware?

The motherboard of the printer is already burned with firmware when it leaves the factory. If you have firmware problem when using the product and need to upload firmware, please use the

Arduino IDE to burn a new firmware. Arduino1.0.1 is recommended. Here is the download link:

<https://www.arduino.cc/en/Main/OldSoftwareReleases#1.0.x>



The way of uploading firmware, please refer to:

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17181>

Firmware download, please refer to:

<http://www.geeetech.com/forum/viewtopic.php?f=10&t=17046>

Common parameters settings of firmware, please refer to:

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17194>

## 8.2 How to change the motor direction in firmware?

In the configuration.h tab of firmware, find the following codes. Change the true of corresponding

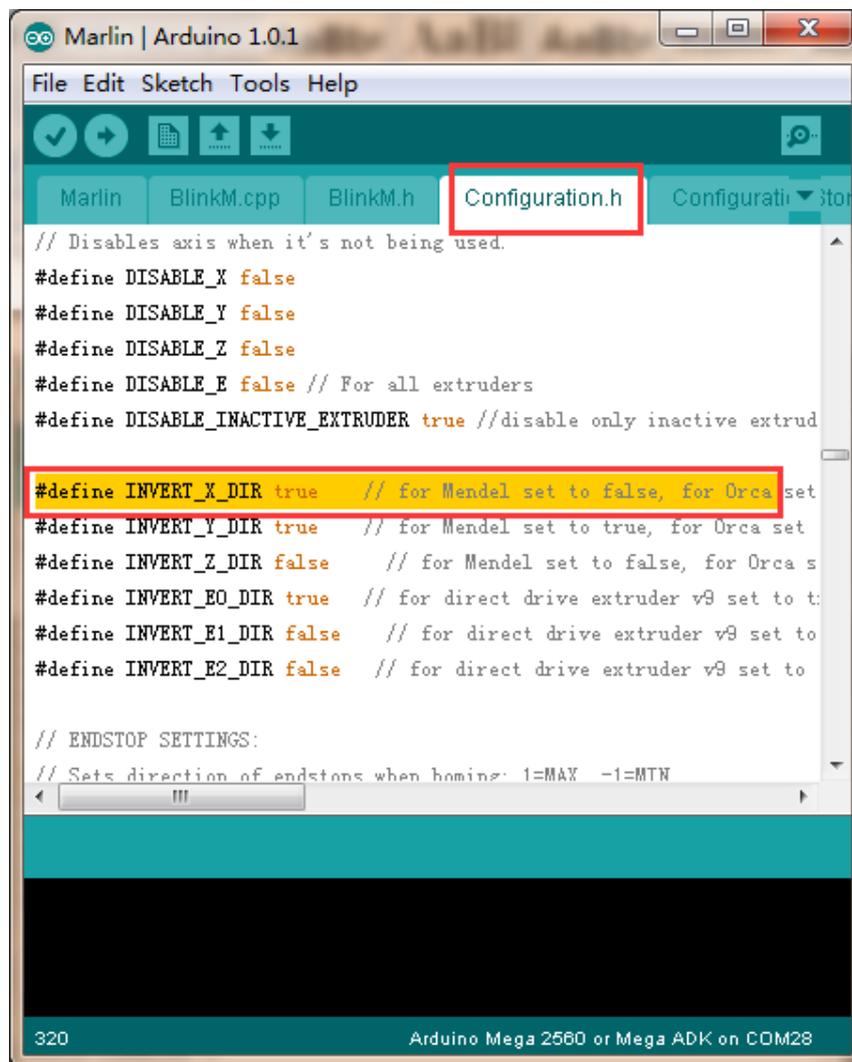
axis into false or false into true, and save the firmware and burn into the printer. (Since you don't know the firmware which has been burned by mother board is true or false, it may be necessary to burn both of the two parameters.)

```
#define INVERT_X_DIR true
```

```
#define INVERT_Y_DIR false
```

```
#define INVERT_Z_DIR true
```

```
#define INVERT_E0_DIR false
```



### 8.3 User manual of Repetier-Host

For detailed user manual of Repetier-Host, please refer to Wiki:

<http://www.geeetech.com/wiki/index.php/Repetier-Host>

#### **8.4 Possible causes for motor's non-action**

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17038>

#### **8.5 Extruder does not work normally**

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17097>

#### **8.6 The hotbed or extruder can not be heated**

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17039>

#### **8.7 LCD error: MAX/MIN TEMP error**

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17030>

#### **8.8 No information or displaying black square on LCD**

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17040>

#### **8.9 Time.h/endstop hit or other abnormalities**

<http://www.geeetech.com/forum/viewtopic.php?f=13&t=17037>