Dobot Magician

User Manual

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Revised History

Version	Date	Reason
V1.00	2016/09/27	Create a document
V1.01	2016/11/10	Add iOS APP and Bluetooth module tutorial
V1.1.0	2016/12/12	Add system adaptation description in the home page
V1.1.0	2016/12/12	Add shade laser engraving tutorial
V1.2.0	2017/2/28	Revised several function instrutions

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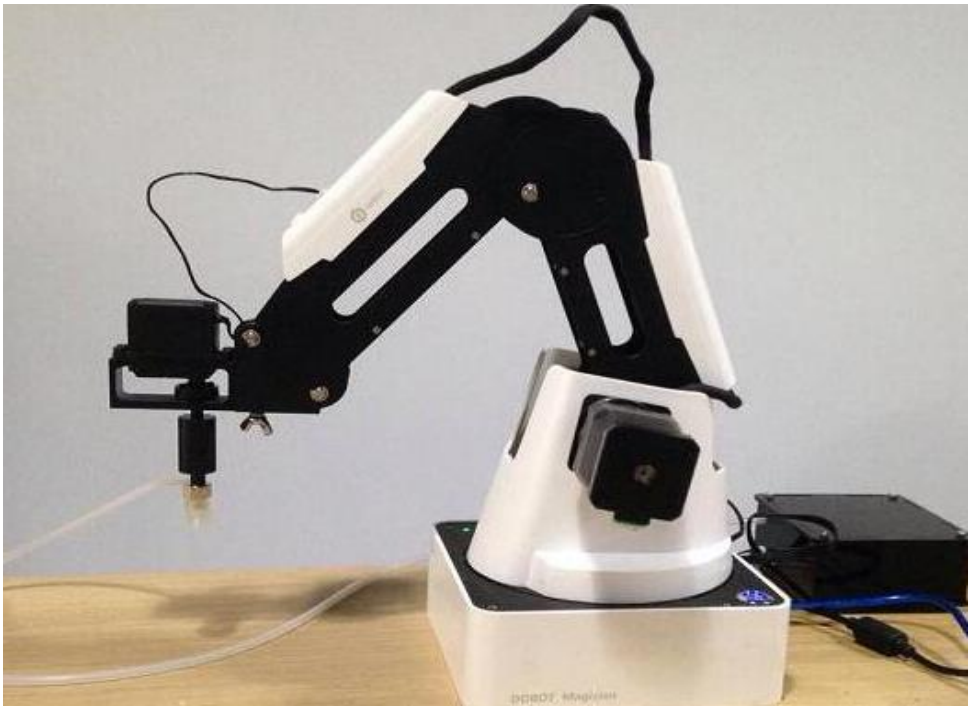
Dobot Magician User Manual Instruction and Precautions

1. Please refer to Dobot Magician User Manual along with the box before using.
2. Power On/Off:

   1） Power On: Handhold Dobot to make the angles between the forearm and rear arm about 45 °, power on, and then all the steppers will be locked. After about 10 seconds, there will be a short sound. It will work properly if the light at the bottom right on Dobot controller from yellow to green. Note that if the light is changed into red, it shows Dobot is at a limited position, so please make sure the forearm and rear arm are kept in normal range of movements.



   2） Power Off: if the light at the bottom right on Dobot controller is changed into green, press on the power button to turn off Dobot. In this process, Dobot will move slowly to the specific position. **Note safety and beware of pinch!**

   3） If the point reading is abnormal, press Reset button behind the controller. Dobot will disconnect with upper computer and reset. Then you can reconnect it.

3. **Important Safety Notice：**

   - Small spare parts are included, so keep it away from children, in case mistakenly swallowed.
   - DO NOT let children play with it alone. The process needs to be monitored when it is running. After the process please turn off the equipment promptly.
   - In the usage of laser, please wear protective glasses. Avoid eye or skin exposure to direct radiation. It is forbidden to against the laser to any part of human body to avoid accidental injury.
   - In the usage of 3D printing, the heating rod will produce high temperature up to 250℃, please be careful!
   - DON’T put hands into operating zone during Robot arm runtime, beware of bruising and pinch.

4. More Material

Follow us and get first-hand material about Dobot Magician:

The Tutorial: http://dobot.cc/tutorial/

Download Center: http://dobot.cc/download-center/

5. The adaptation system of DobotStudio: win7 SP1 x32/x64、win8/win10、mac osx10.10 and mac osx10.11、mac osx10.12.
6. Should you have any further questions, feel free to email us at support@dobot.cc

1. Dobot Magician Driver Installation Instruction

Normally, at the first time, connect Dobot with PC through USB, plug in and power on, and then the system will recognize corressponding hardware automatically, search the driver and install it. However, if failed to install, you can install again manually. The installation flow chart as follows:

1.1 Download CH340 driver package and install it

There are two versions of Dobot Magicianbased on Windows/Linux, so please choose corressponding version to download, the driver has been integarted into upper computer DobotStudio, and the download address：
http://www.dobot.cc/download-center/dobot-magician.html
After downloading, unzip and install the driver, the driver file is in the file **attachment** of root directory:

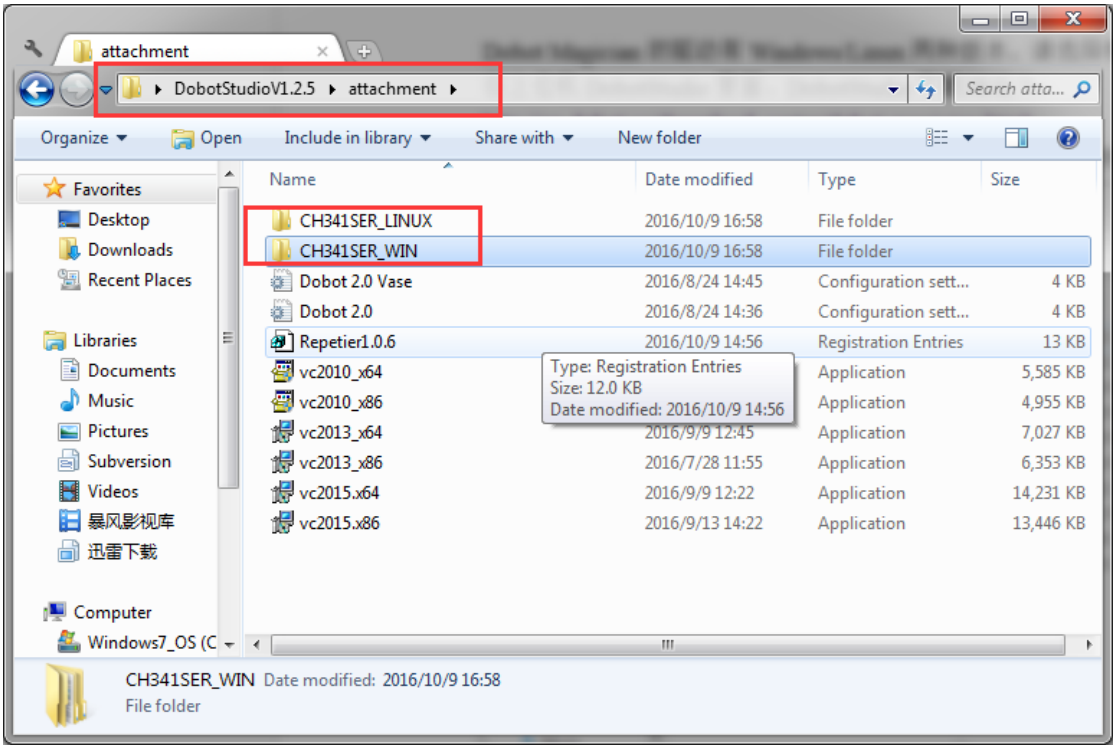


Figure 1.1 Driver file

Take Windows as an example, enter into subfoloder **CH341SER_WIN->CH341SERCH341SER**, double click **SETUP.exe** and install it, as follows:

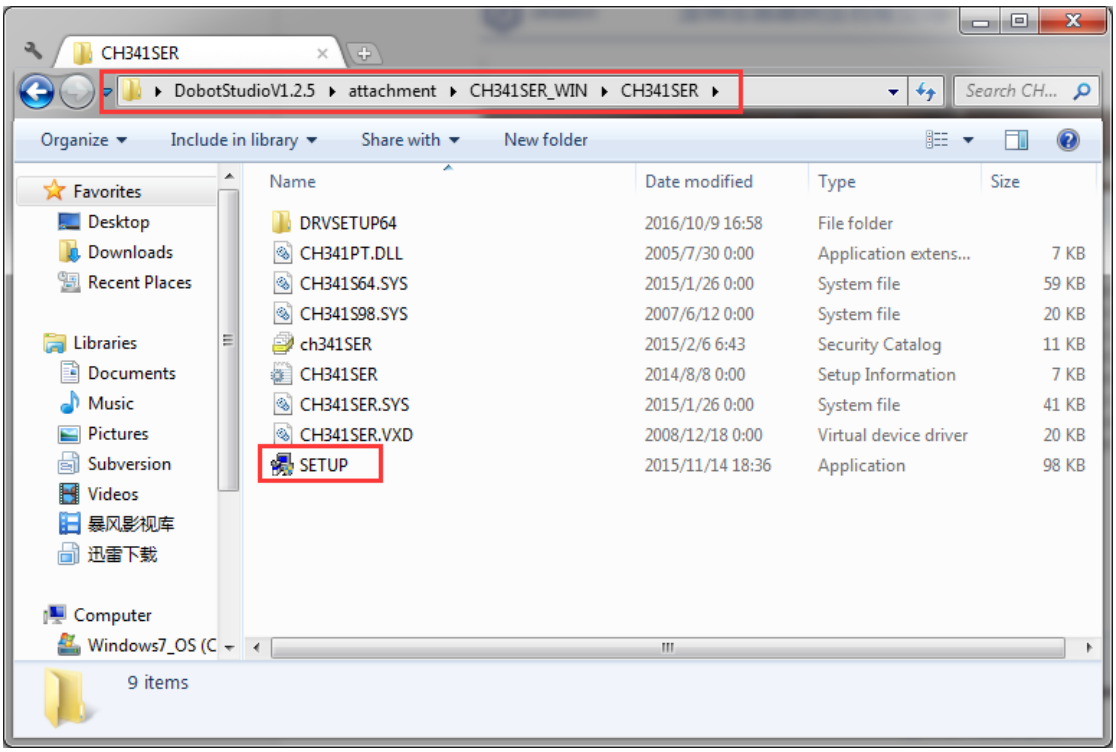


Figure 1.2 Install driver

Click **Install**:

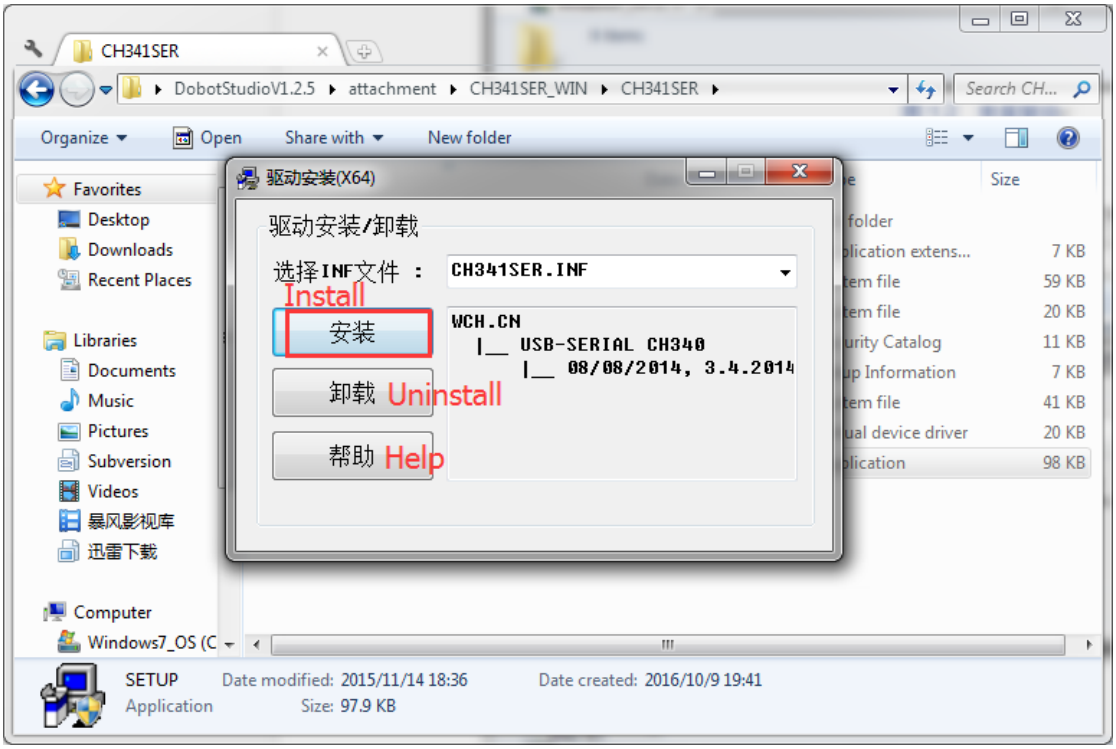


Figure 1.3 Click Install

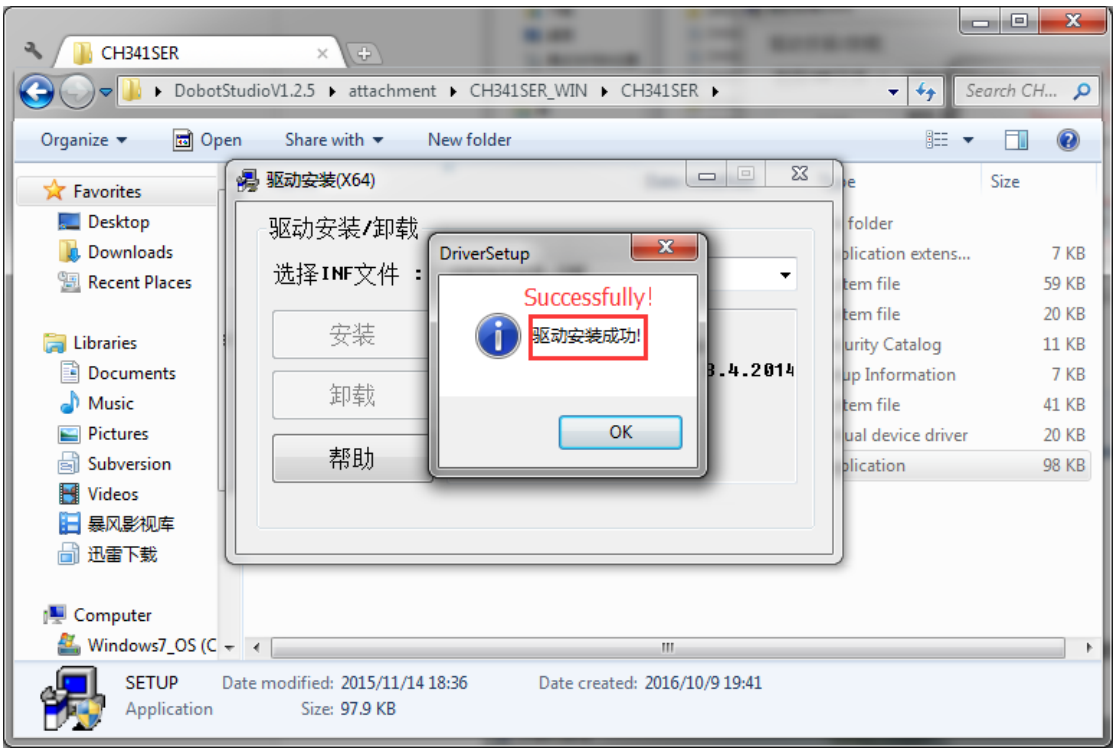


Figure 1.4 the driver installed successfully

1.2 Check if the equipment can work properly in the device management

1.2.1 Open the device management, if you can find the corresponding COM port of "**USB-SERIAL CH340**"，then it shows the driver is installed successfully. The figure as follows:

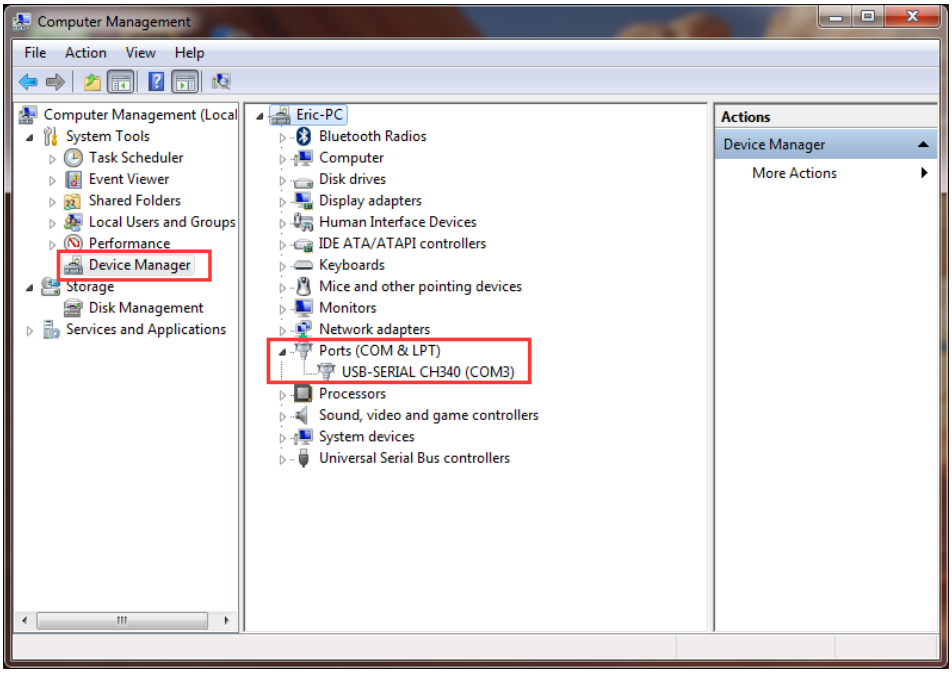


Figure 1.5 The COM port in the device management

2. DobotStudio Operating Instruction

The software used by Dobot Magician is **DobotStudio**, and you can download the latest version from our official website:

http://www.dobot.cc/download-center/dobot-magician.html

After download successfully, unzip and double click DobotStudio.exe, then open the software, the result as follows:

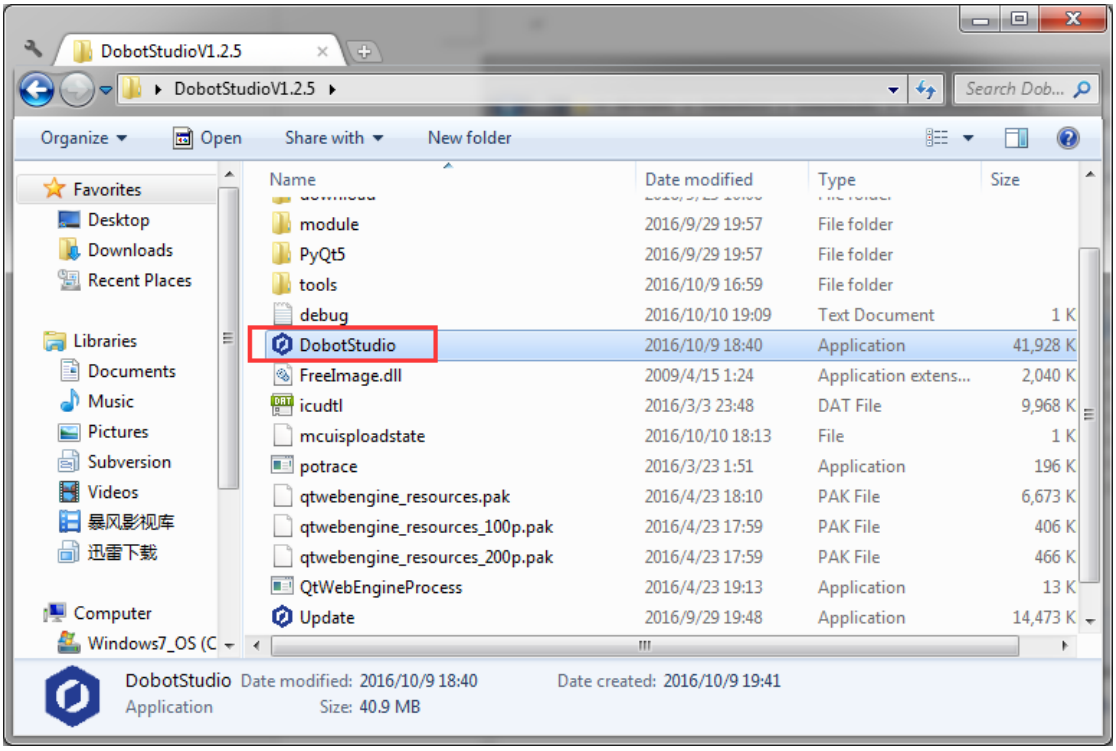
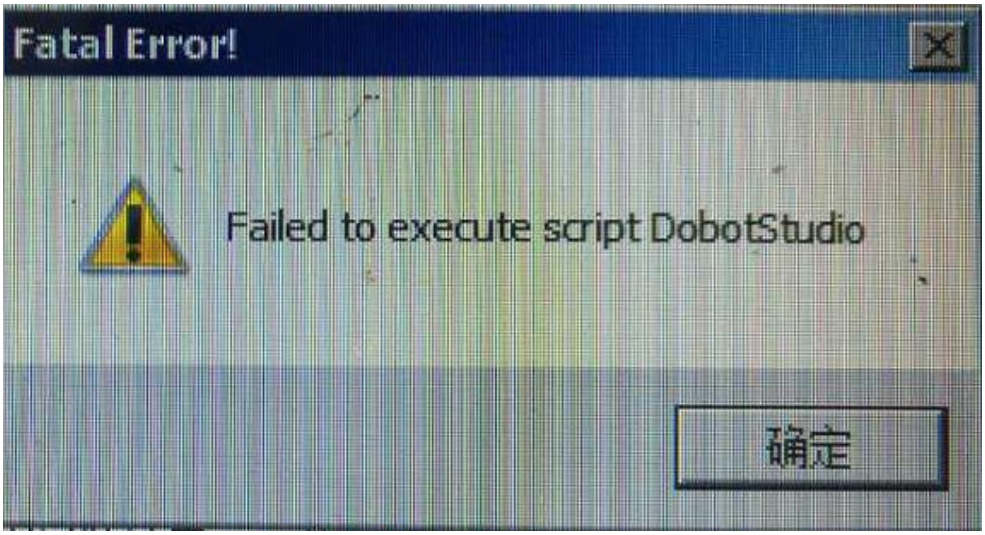


Figure 2.1 DobotStudio file

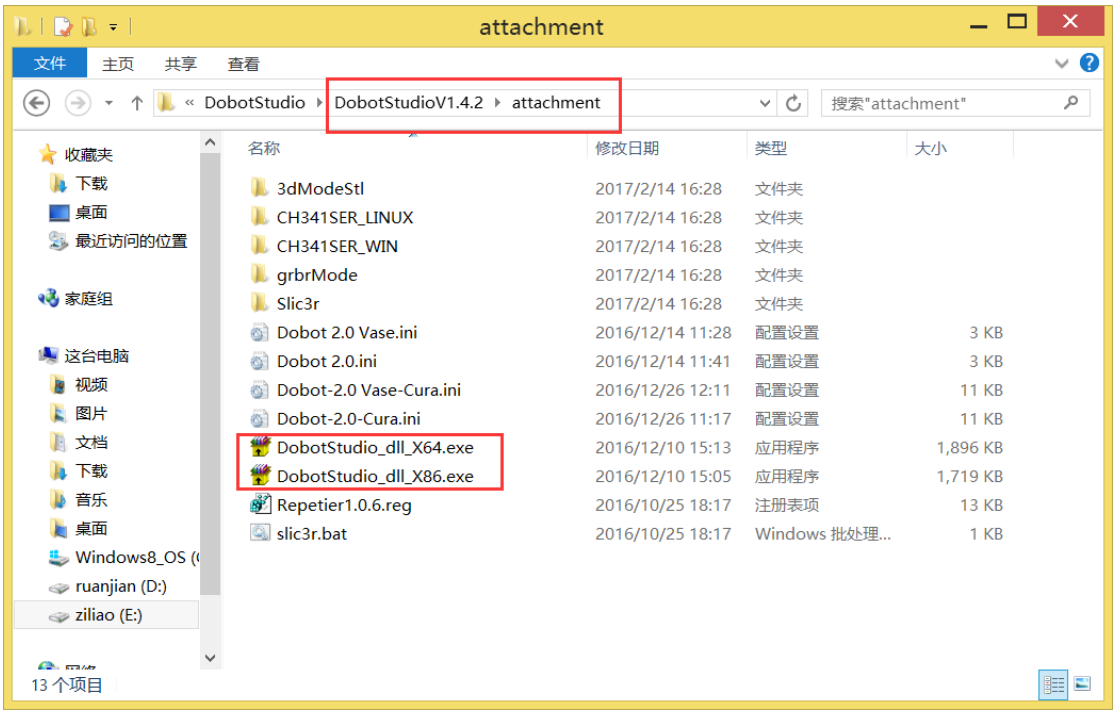
Figure 2.2 DobotStudio

Note: An error or other related errors maybe come out when opening DobotStudio, some of them shown as follows:



Please **execute the corresponding .exe file** in the folder **attachment**, then open **Dobotstudio** again and that is OK.

Install X64 for 64-bit windows system and X86 for 32-bit system. Just double click the responding one to install it, and note when you install them there is no window or other info shown on the screen, just double click it and it will be done.



If you have the following error, pls make sure that you have got the original edition, while starter edition may cause such errors. **Possible solution: Install required netframework4.6.1 required by vc2015.**

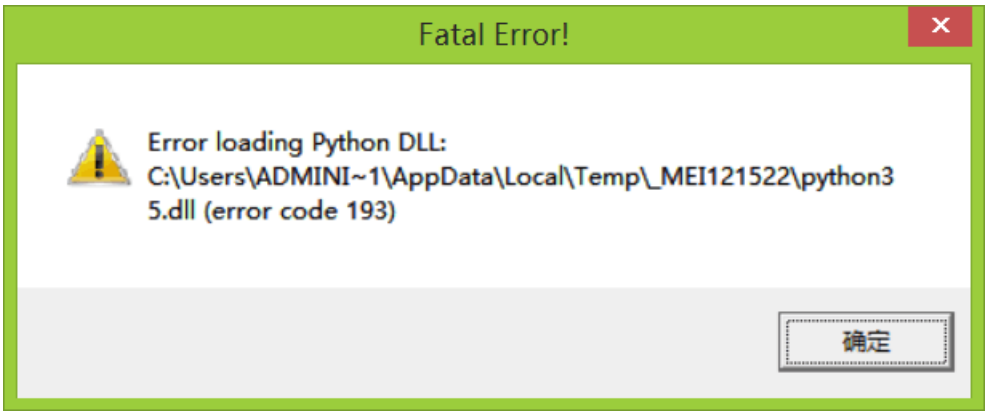


Figure 2.3 The starter edition may cause such errors

1. Select Dobot corresponding serial port, the top left corner of DobotStudio, and click **Connect,** after successful connection, Disconnect will be shown, at the same time, the coordinate parameters will be updated on the right side of the interface.

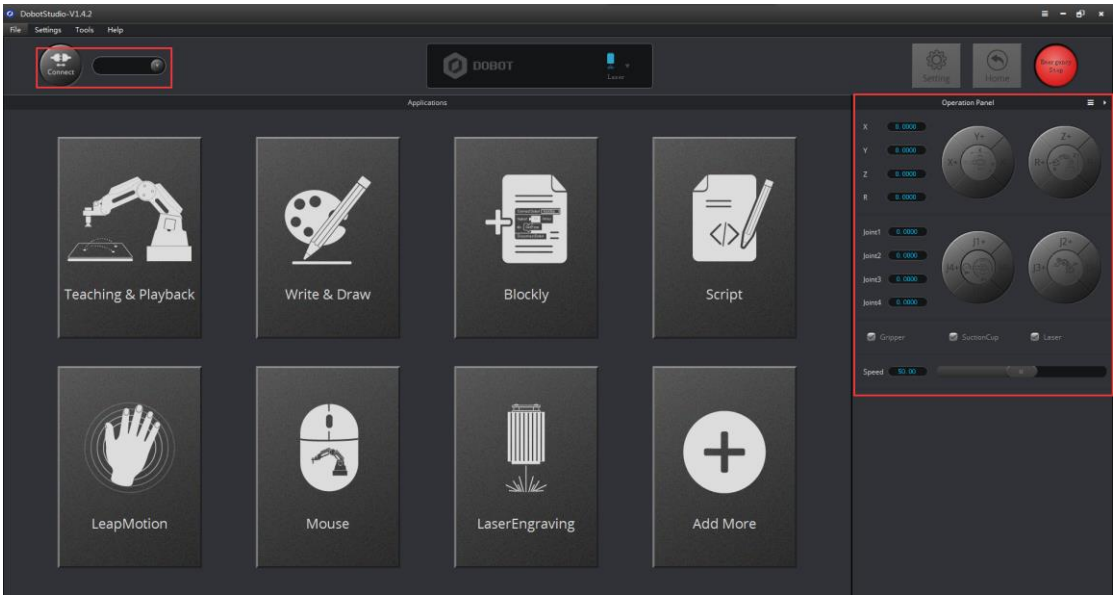


Figure 2.4 Connected successfully

There are eight modules on the main software interface:

（1）**Teaching & Playback:** A system to teach a robot a required trajectory. It enables Dobot to accomplish recorded movement repeatedly replacing human.

（2）**Write & Draw:** Control Dobot to write, draw or laser engrave.

（3）**DobotBlockly**： You can programe by puzzle, intuitive and easy tounstand.

（4）**Script:** Edit scripting language to control Dobot.

（5）**LeapMotion:** Control Dobot by gesture.

（6）**Mouse:** Control Dobot by mouse.

（7）**LaserEngraving:** To engrave bitmap with dobot.

（8）**Add More:** To do a second development with dobot.

Here we will introduce teach&playback at first.

Click **Teaching & Playback**, the brief introduction of each area as follows:

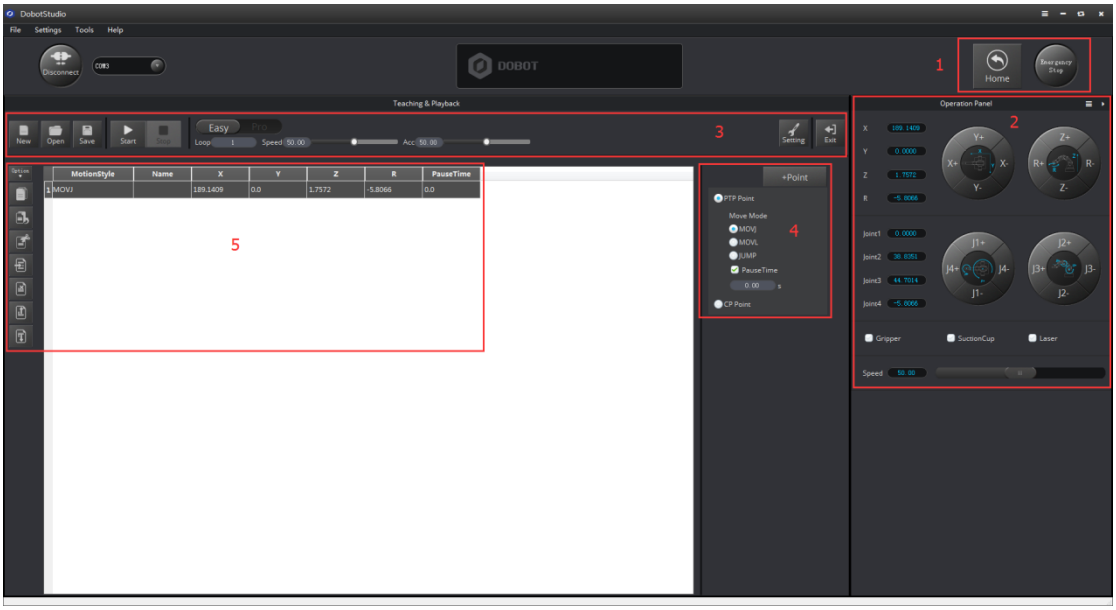


Figure 2.5 The main interface of teaching & playbac

Area 2：

Here comes with Dobot movement area, liner mode and jog mode.

Linear mode： Based on the body axes coordinate system X, Y, Z with the origin at the center of three motors. X, Y, Z is the coordinate of the center of the end platform , and the direction of X is perpendicular to the base forward, Y is perpendicular to the base towards the left, and z is vertical upward. R indicates the rotation of the servo joint relative to the coordinate frame (counter-clockwise is the positive direction).

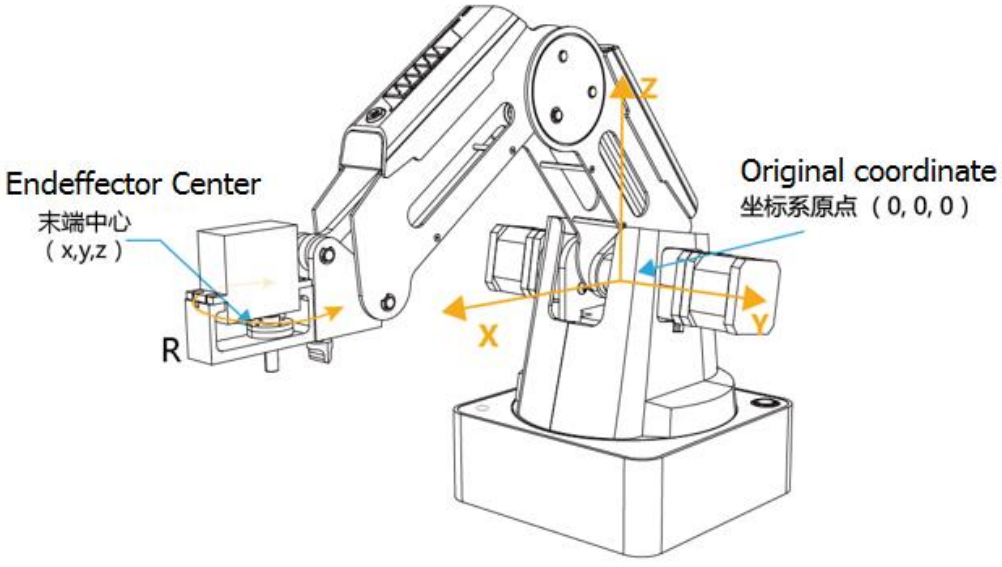


Figure 2.6 Coordinate system

（1） Click X+,X- and Dobot will move along X in the negative or positive direction;

（2） Click Y+,Y- and Dobot will move along Y in the negative or positive direction;

（3） Click Z+,Z- and Dobot will move along Z in the negative or positive direction;

（4） Click R+,R- and Dobot will move along R in the negative or positive direction.

Notice:

R-axis will move together with Y-axis during the movements, and make sure the terminal posture relative to the origin of coordinates keeps constant.

Jog mode：This movement is aimed at single axis.Long press the button, and the corresponding axis will move indepently.Once loosen, it will stop moving. Each axis is defined at counterclockwise as positive direction. Joint1、2、3、4 refer to base, rear arm, forearm and servo respectively;

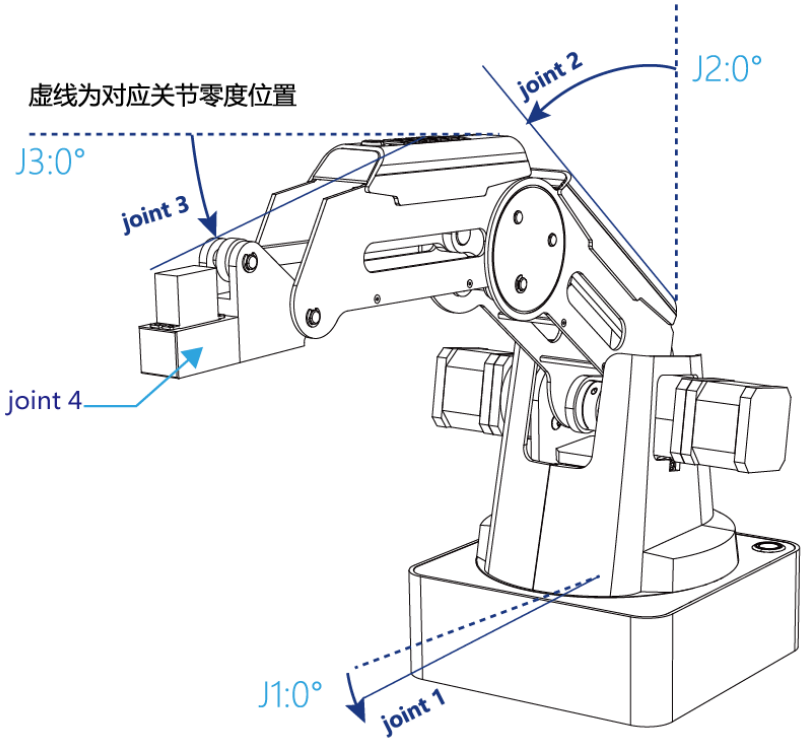


Figure 2.7 Single axis coordinate system

（1） Click Joint1+、Joint1- and control Dobot base motor to rotate in the negative or positive direction;

（2） Click Joint2+、Joint2- and control rear arm motor to rotate in the negative or positive direction;

（3） Click Joint3+、Joint3- and control forearm motor to rotate in the negative or positive direction;

（4） Click Joint4+、Joint4- and control servor to rotate in the negative or positive direction; Among this, the rotation range of Joint4 is ±150 °.

Gripper/SuctionCup/Laser：

Through ticking the corresponding buttons, open gripper/suction cup/laser, and just click again, you can close gripper/suction cup/laser. The terminal can be selected from **Setting**-> **End Effector Settings**:

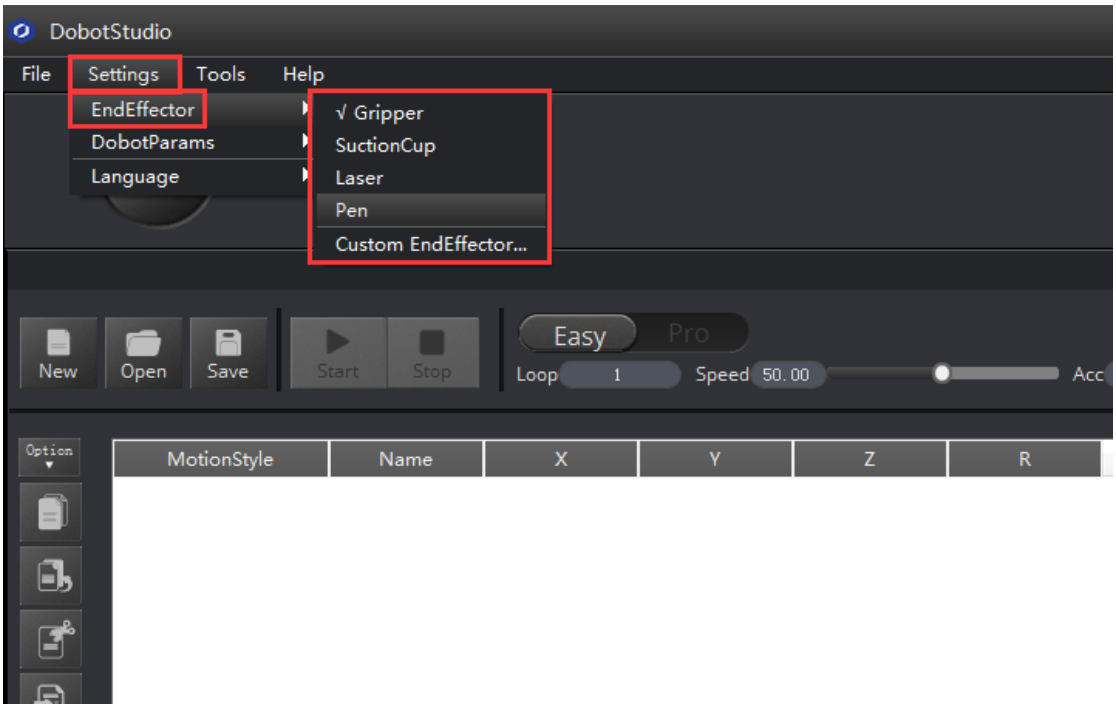


Figure 2.8 Select End Effector

You can also custom **EndEffector Configure** according to relative to coordinate offset of terminal center.

The central terminal is shown as follows:

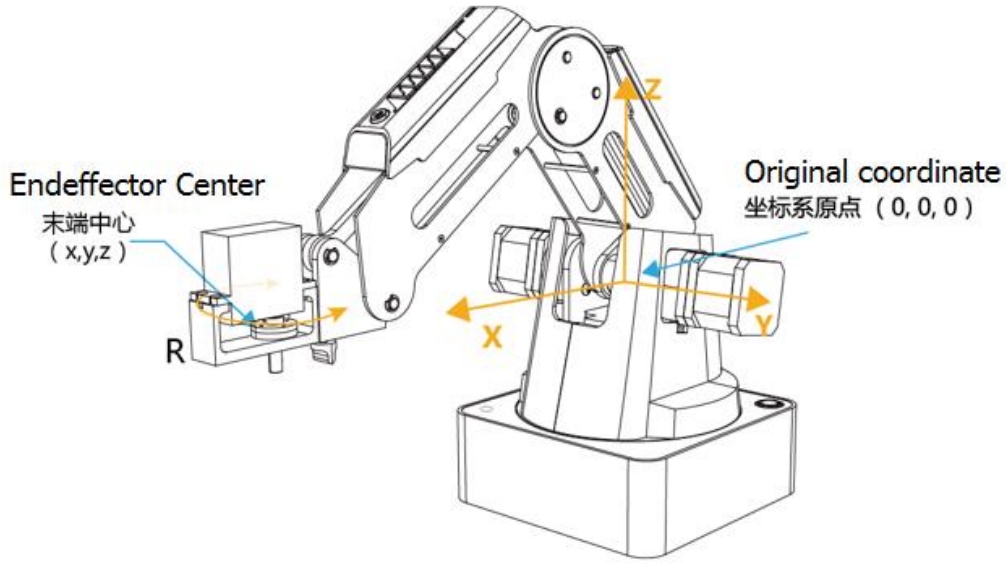


Figure 2.9 The central terminal

Speed：Adjust ratio bar to change the velocity ratio of jog control movement. The movement velocity is multiplying the corresponding percentage. Click **Settings** in area 3 to get a fast adjustment of parameters.

Area 2：

Home：Dobot auto reset. Click this button, Dobot can rotate left to the end and return to preset Home automatically. In this process, the point of **Home** can be self-defined, which will be explained in area 5.

Emergency Stop：Button of emergency stop.

Area 3：

New/ Open/Save：Create /Open/Save point list.

Start/stop/pause

Loop: Set loop numbers of playback.

Easy/Pro：Mode switch, including offline mode and I/O settings, and refer to the detailed tutorial: The tutorial of advanced functions.

Speed/Acc: Detailed Parameter Configuration of Playback Speed and acceleration.

Settings：**Set movement parameters.**

You can also set velocity and acceleration of single joint.

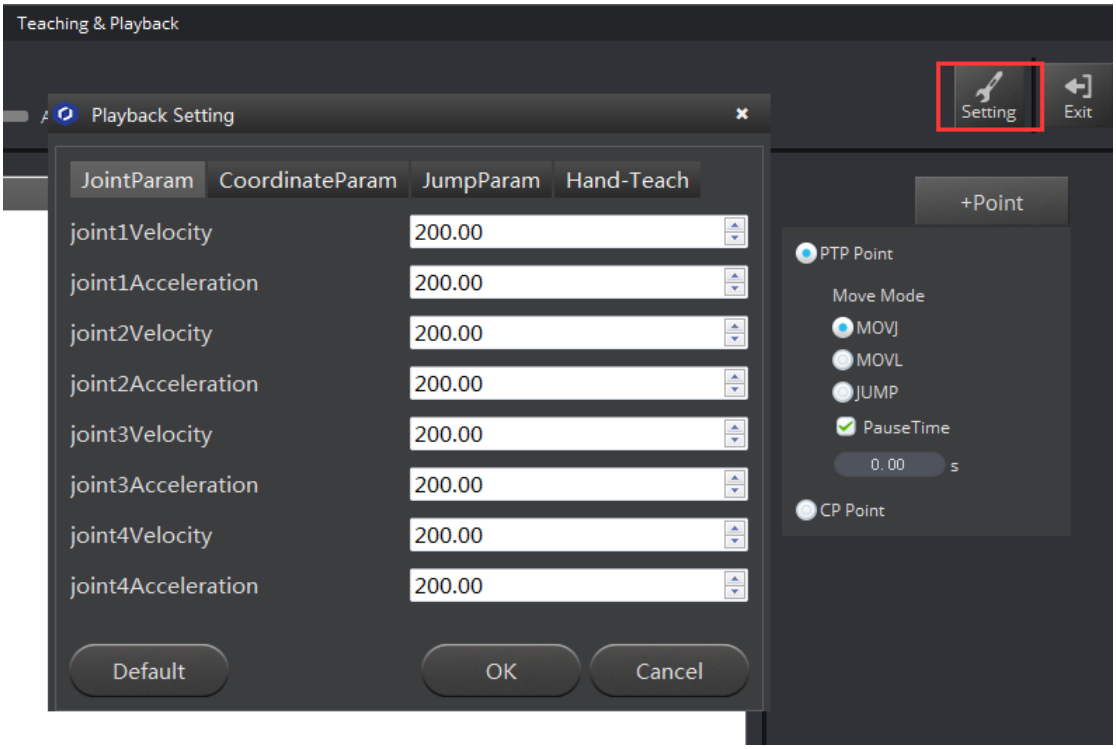


Figure 2.10 Parameters of single joint movement

Set velocity and acceleration of coordinates:

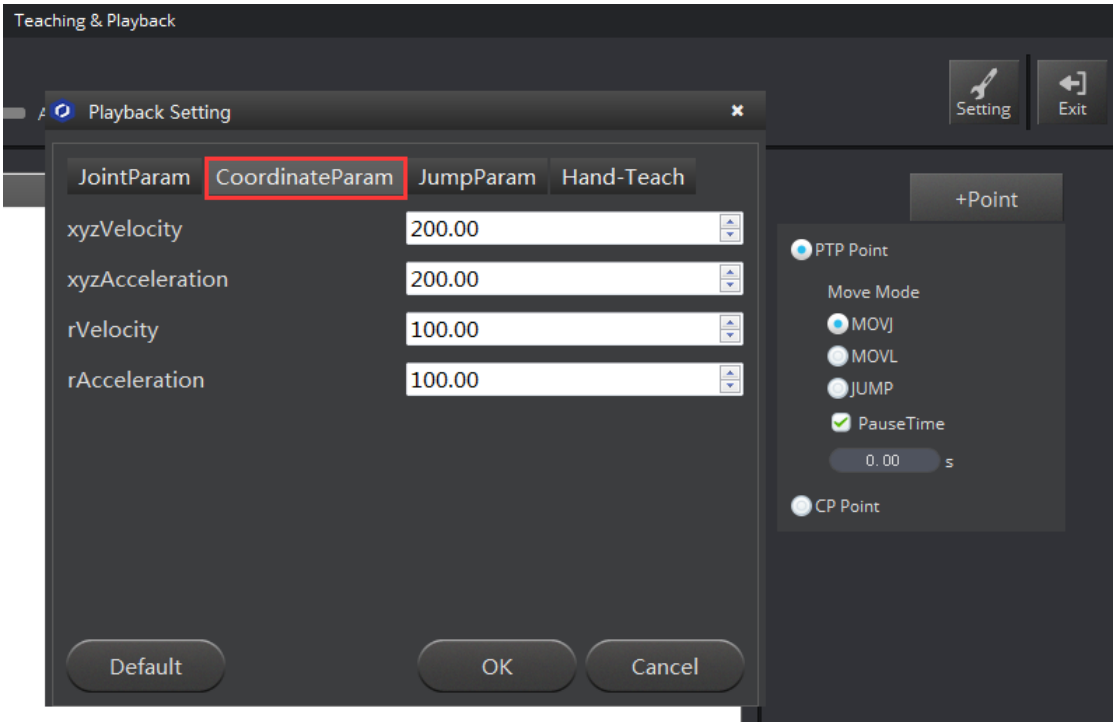


Figure 2.11 Parameter settings of coordinates

The height and Z limit of Jump mode:

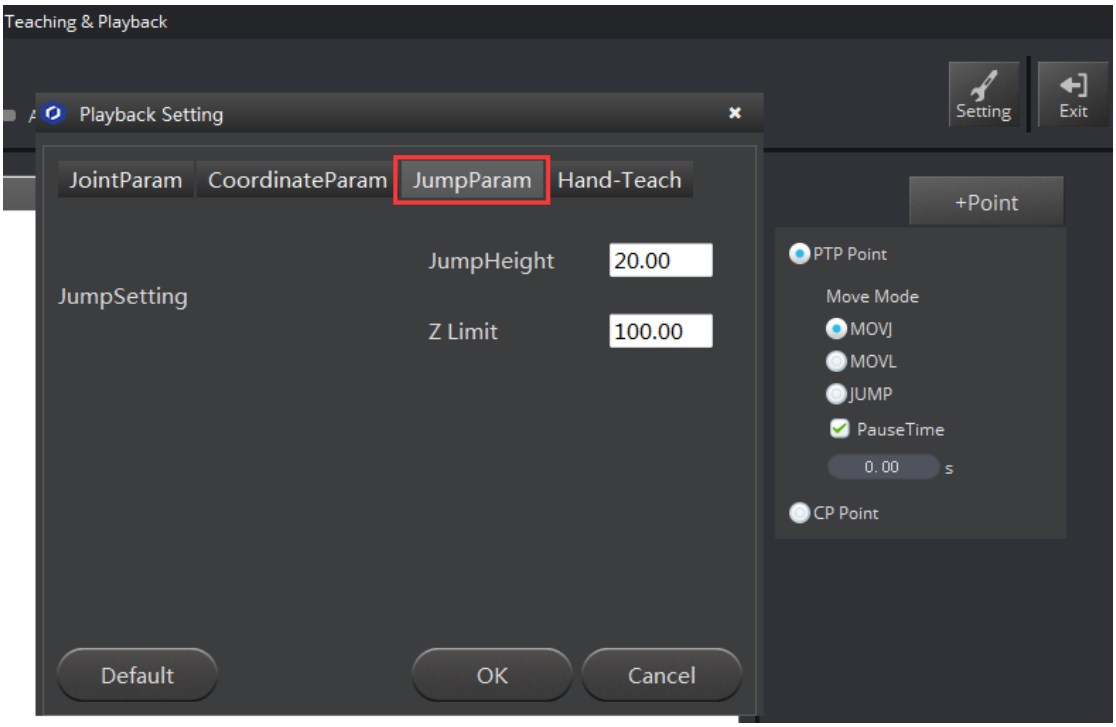


图 2.12 Jump mode settings

Handhold teaching: Tick the function, press and hold down Unlock on the forearm, and drag Dobot to any other position, then you can save a point after loosening. Of course, you can save points

continuously. After all the points are recorded, Dobot can not only playback the programmed trajectory repeatedly.

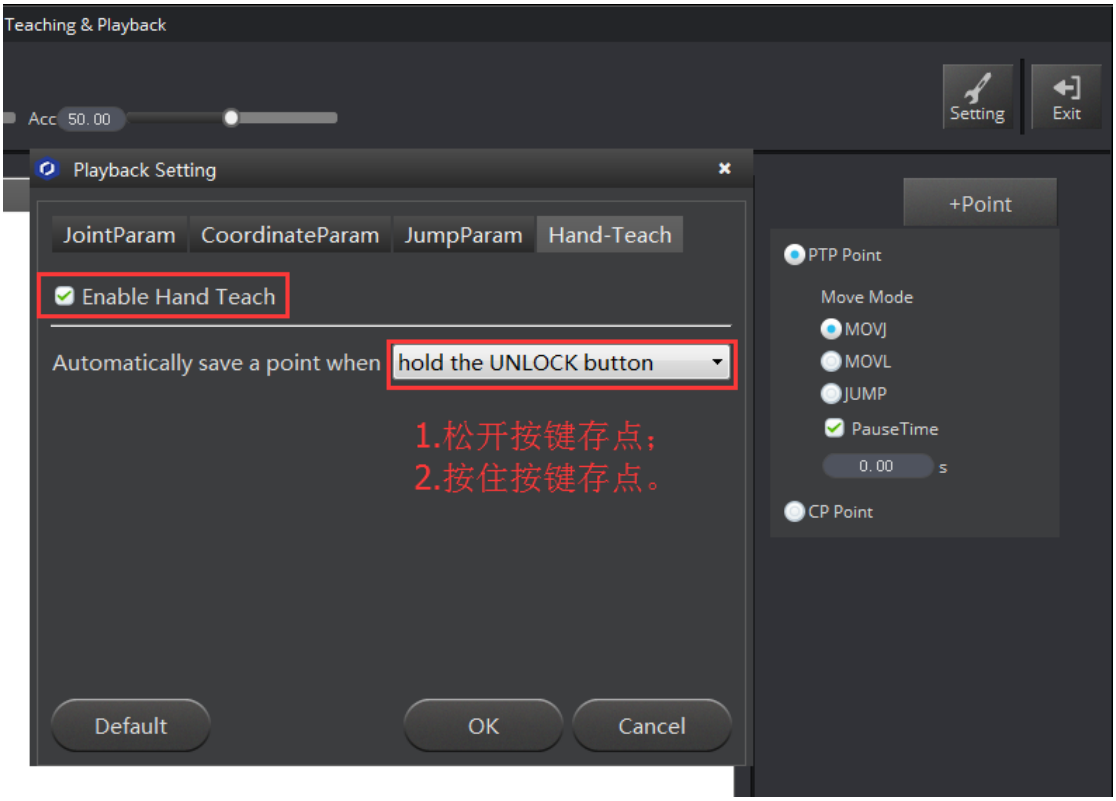


图 2.13 Playback settings

Area 4：Select save mode.

1. Click **+Point,** you can save the current point information in area 5.
2. **PTP Point**：Point mode, and three modes between saved points, **JUMP**、**MOVJ**、**MOVL** respectively.

JUMP： From point A to point B, the trajectory is shown below, the end effector will lift upwards by amount of Height (in mm) and move horizontally to a point that is above B by Height and then move down to Point B.

Figure 2.14 JUMP Mode

MOVJ：Joint movements. From point A to point B, each joint will run from initial angle to its target angle, regardless of the trajectory. The motion time for all joints are the same which means all joints will start and finish at the same time.

MOVL：The joints will cooperate in order to perform a line trajectory from point A to point B.

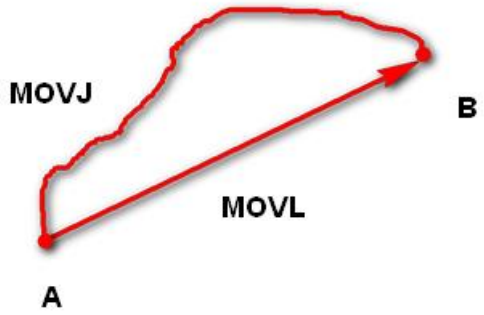


Figure 2.15 MOVL/MOVJ Mode

3. **Pause Time**：The pause unit of time is 1 second.
4. **CP Point**：Track points, saved points between velocity and acc transmit smoothly.

Area 5：Playback list that can be edited.

To show the current endeffector coordinates, move mode, pause time and any other parameters. You can double click to edit every single saved point coordinate, also, you can edit from sidebar on the left side or press right –hand button.:

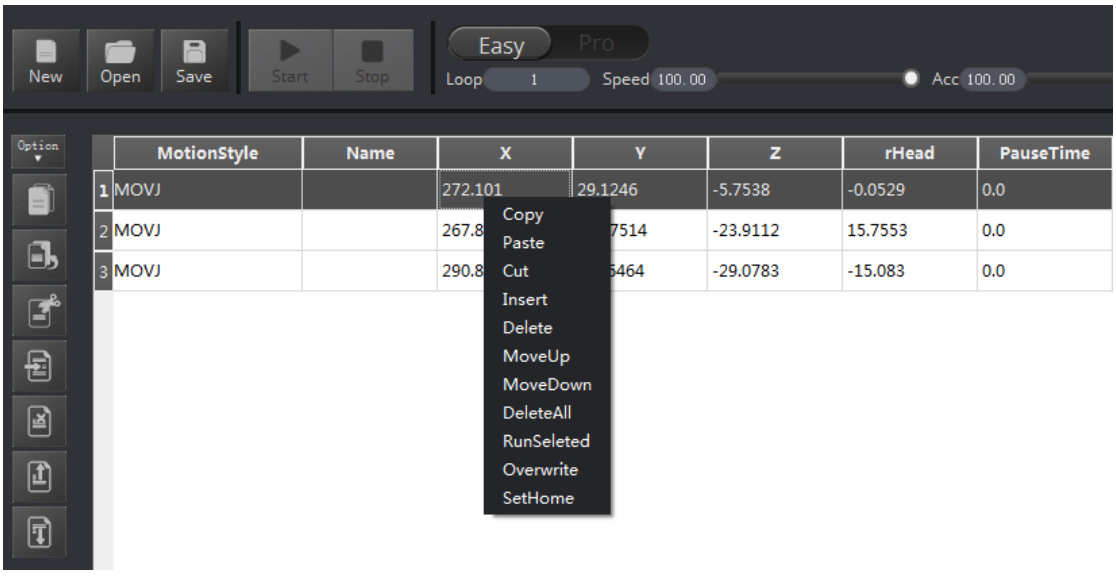


Figure 2.16 Right click options of the saved point list

1. **MotionStyle**：**JUMP**、**MOVJ**、**MOVL.**
2. **X**，**Y, Z** is the coordinate of the center of the end platform.
3. **RHead** indicates the rotation of the servo joint relative to the coordinate frame (counter-clockwise is the positive direction).
4. **PauseTime**.

5. **Insert**：Insert a line of saved points.
6. **MoveUp/MoveDown**: Move up/Move down the line of saved point.
7. **Delete**：Delete selected saved points。
8. **DeleteAll**: Delete all the saved points.
9. **RunSeleted**: Execute selected points.
10. **Overwrite**：Overwrite current saved points.
11. **SetHome**:Set as Home point location

3. Teaching & Playback

Here we are mainly to learn that how to suck up or grab simple objects using the function of teach&playback. Because we need to use air pump kit or gripper kit, we can introduce these two kits.

3.1 Air pump kit

The terminal default installation of Dobot Magician is suction cup. And the pump box and suction cup kit, shown as follows:

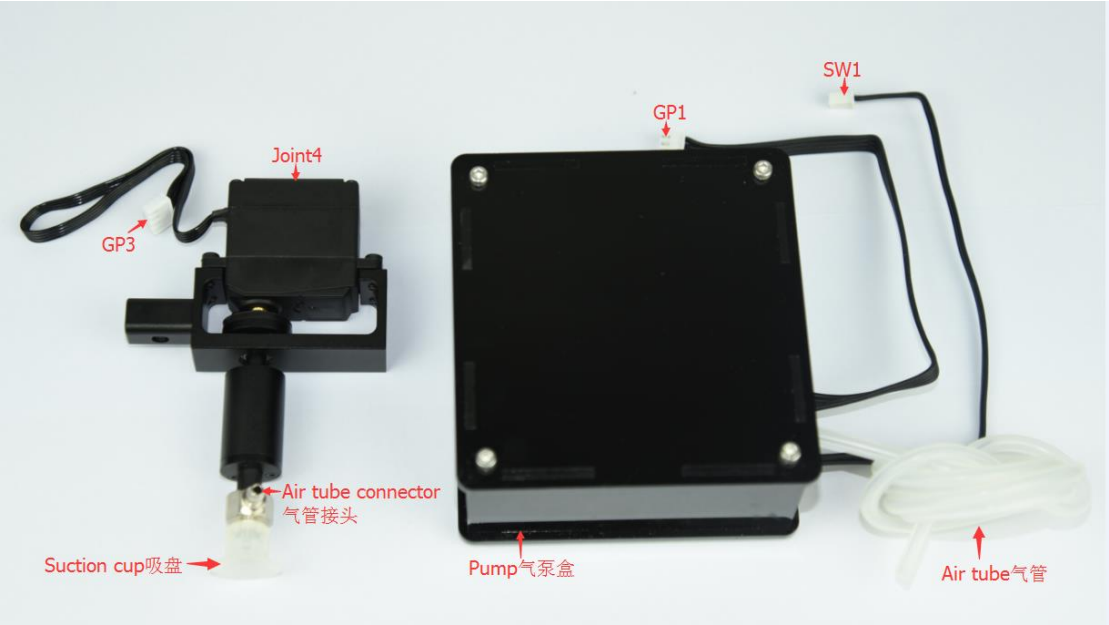


Figure 3.1 Air pump kit

The step of installation:

1. Connect power line SW1 on the pump box with interface SW1 on the controller box, connect signal line with interface GP1;
2. Tighten air pump kit into the end of the socket with butterfly nut;
3. Connect windpipe on the controller box with pipe connector on the pump box;
4. Connect GP3 of Joint4 servo line with forearm connector①GP3.

The installation effect as follows:

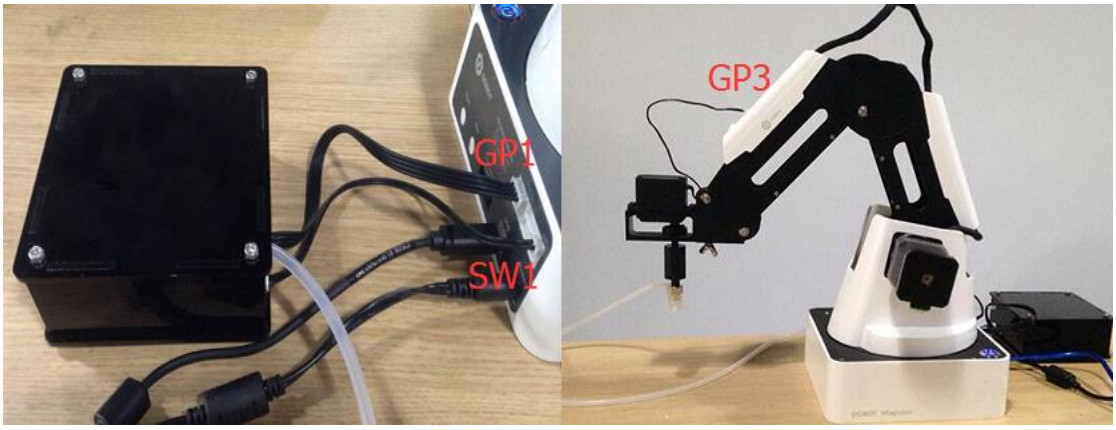


Figure 3.2 The installation effect of air pump kit

3.2 Pneumatic Gripper Kit

1. Pneumatic accessories shown in following picture:

Figure 3.3 Pneumatic Gripper Kit

2. Gripper kit needs to share together with air pump kit of suction cup. You can remove suction cup from Joint4: Unscrew the fixed on the suction cup with hex wrench, shown in Figure 2.4:

Figure 3.4 Remove suction cup

3. Install the gripper kit on Joint4 with coupler, that is done! Shown in Figure 2.5:

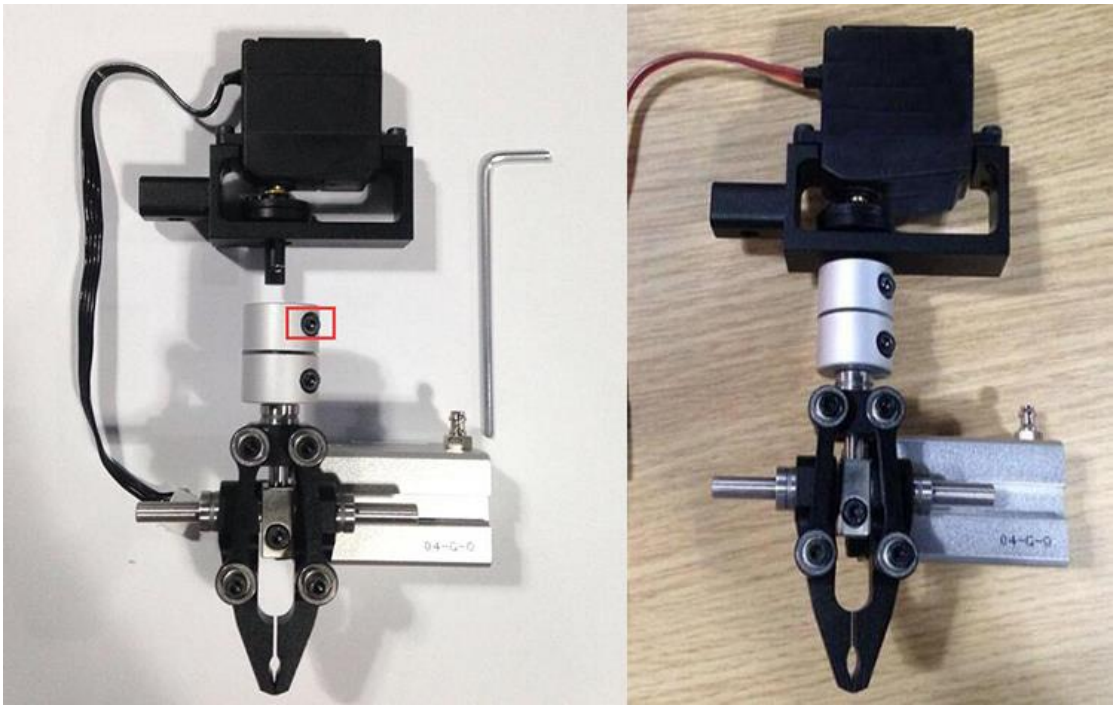


Figure 3.5 Gripper Installation

4. The connection method of gripper is the same with air pump kit, here you can refer to air pump kit method above.
5. The installation effect of gripper kit as follows:

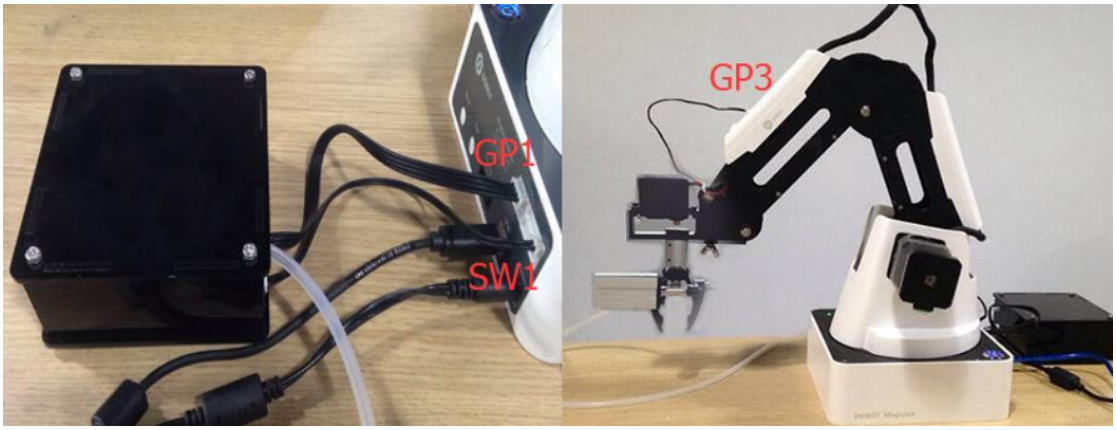


Figure 3.6 Gripper Installation

2.4 Demo of Teach & Playback

After learning about the software, now we can try to make Dobot Magician move.Throughthe function of teach & playback, make it mve a small object.

1. Select the terminal tool as **SuctionCup** on the software interface， select as **JUMP** mode.
2. Place a small object nearby Dobot, move Dobot above the small object through click **Area 2**, tick **SuctionCup** and open the pump, and then the small object will be sucked up;
3. Click **+Point** and save a point;
4. Click **Z+** to rise Dobot, move Dobot to another position, place the small object on the table, just uncheck **SuctionCup** and close the pump;
5. Click **+Point** and save one more point;

Put back the small object, click **Start**， task for moving the object from current location to another location is completed successfully.

4. Advanced function of teaching&playback

You can switch Easy into Pro when pressing the button of **Easy/Pro**, shown as follows:

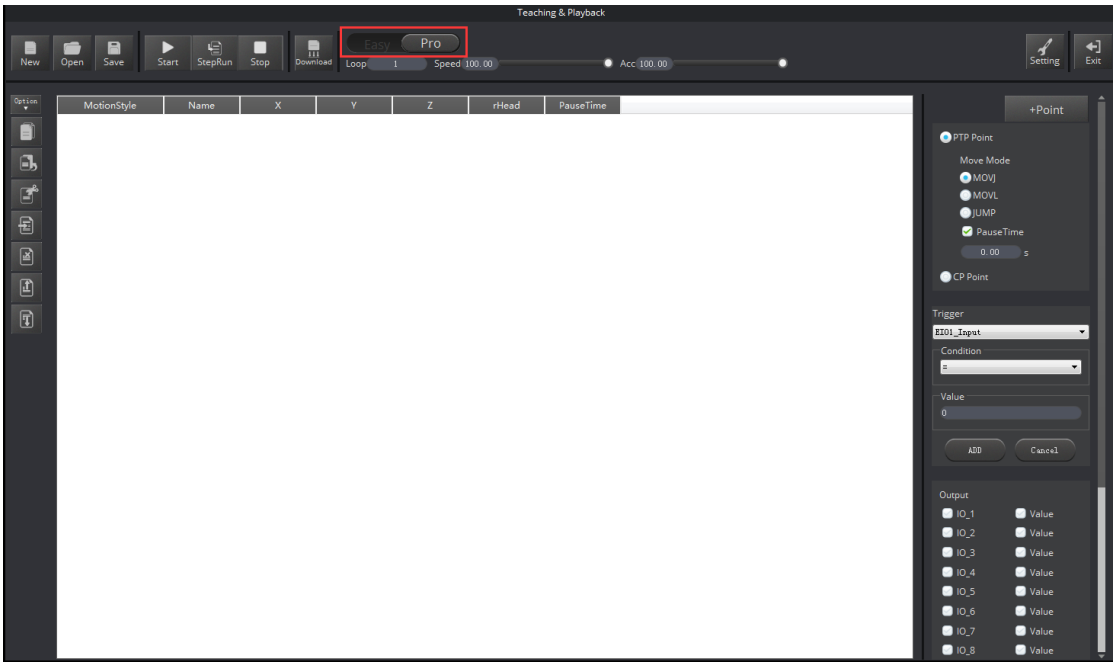


Figure 4.1 Advanced function of teaching&playback

4.1 StepRun

1. StepRun: You can execute the first saved point when you press the button at the first time, and you will turn next point when press the button again.

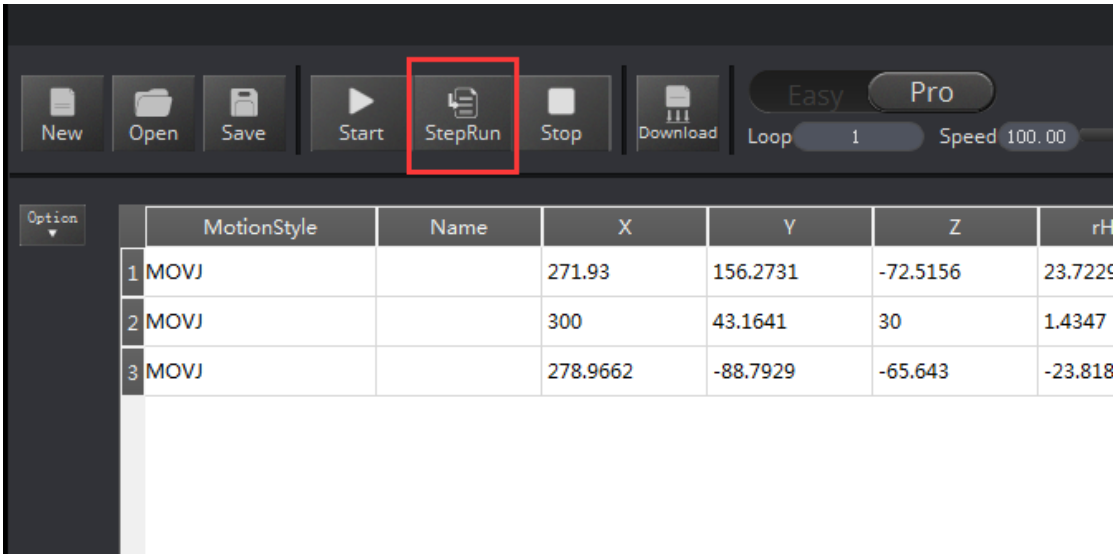


Figure 4.2 StepRun

2. Click **Stop** and then you can exit the mode of StepRun.

4.2 Offline mode

1. Click **Download** and you can download the current saved point list into Dobot, thus, you achieve the function of offline mode, do not need USB cable.

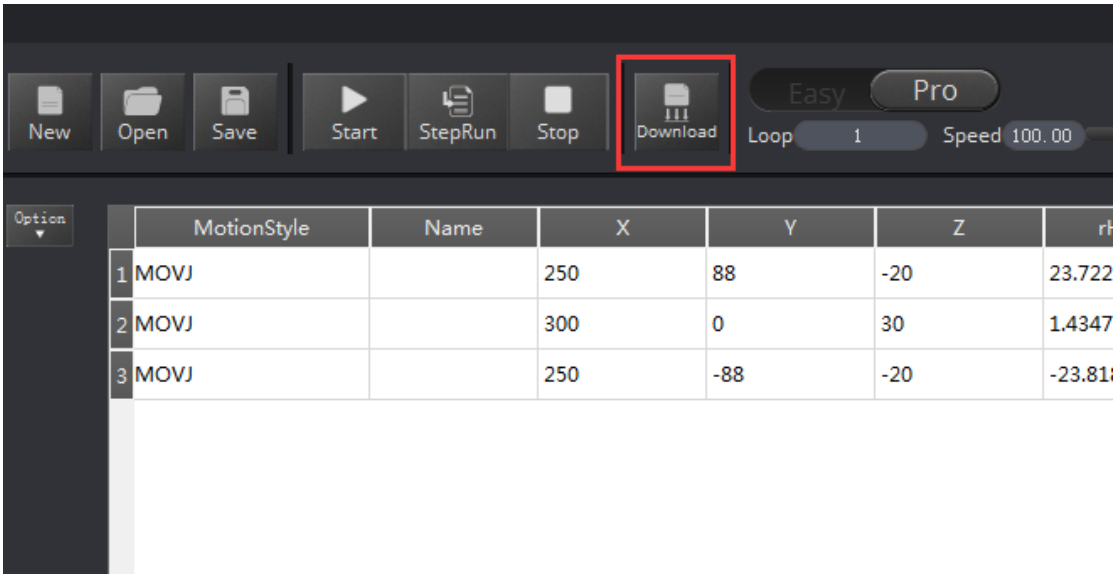


Figure 4.3 Download saved point list

2. After downloading, pull out USB cable, press **Key** behind the controller box, and execute the downloaded programe, stop executing when press again.

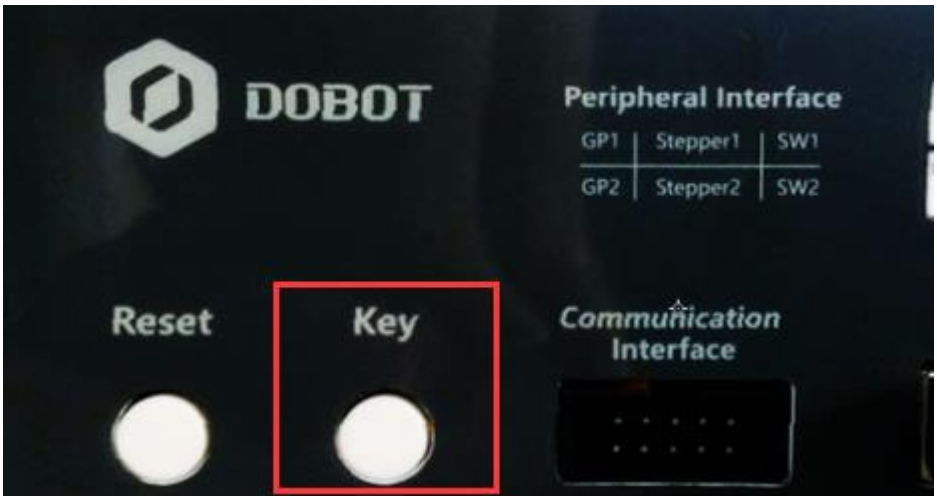


Figure 4.4 Offline mode button

Notice: Before save points and offline move, Dobot need to reset pressing Home key, and then it can keep consistent of coordinates when teach&playback and playback the trajectory clearly.

4.3 EIO multiplex

EIO, Extended I/O， most EIO included in Dobot have the functions of multiplex. This chapter is aiming at addressing and multiplex definition for DobotV2.0 EIO.

EIO interface of advanced functions shown as follows:

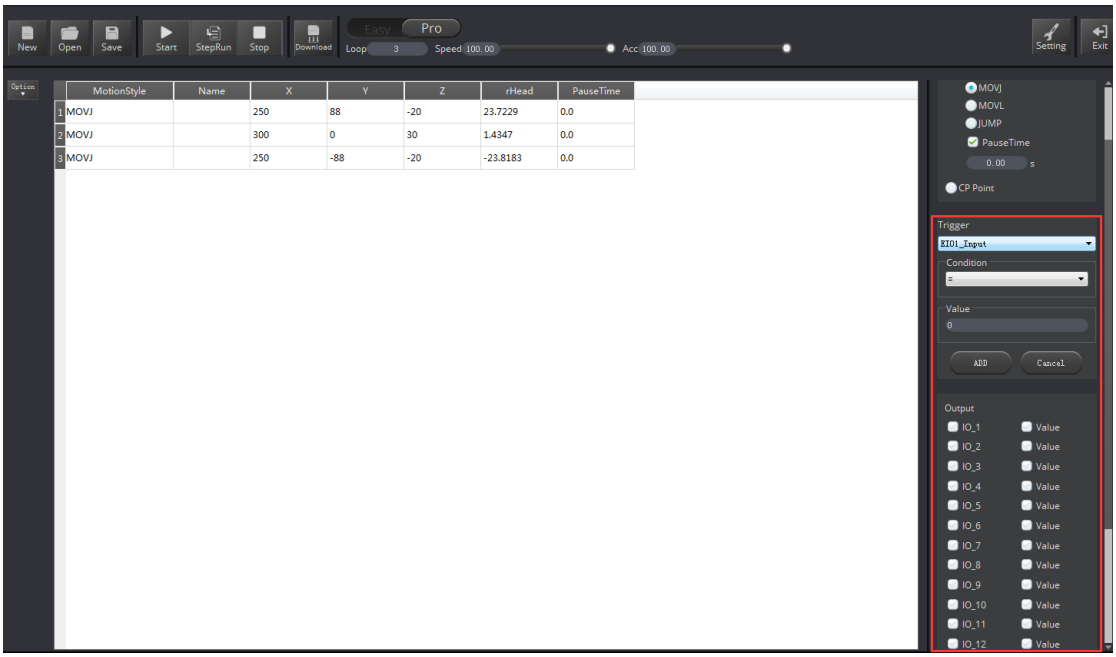


Figure 4.5 EIO Interface

4.3.1 EIO addressing

In order to use more conveniently, we address them all together. EIO exists in base, forearm separately in DobotV2.0.

1）EIO addressing in forearm shown as follows:

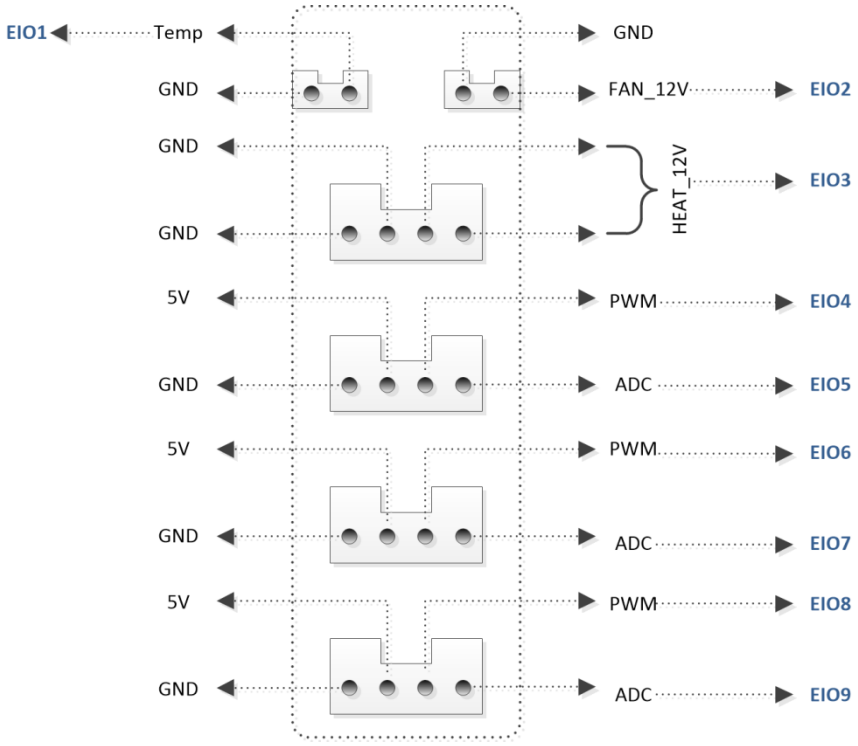


Figure 4.6 EIO addressing in forearm

2）EIO addressing in base 18PIN interface board, shown as follows:

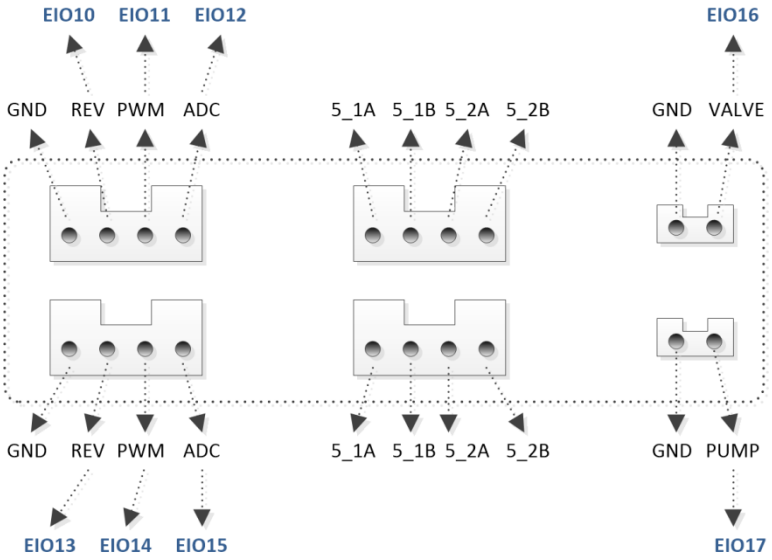


Figure 4.7 EIO addressing in base 18PIN

3）EIO addressing in base 10PIN interface board, shown as follows:

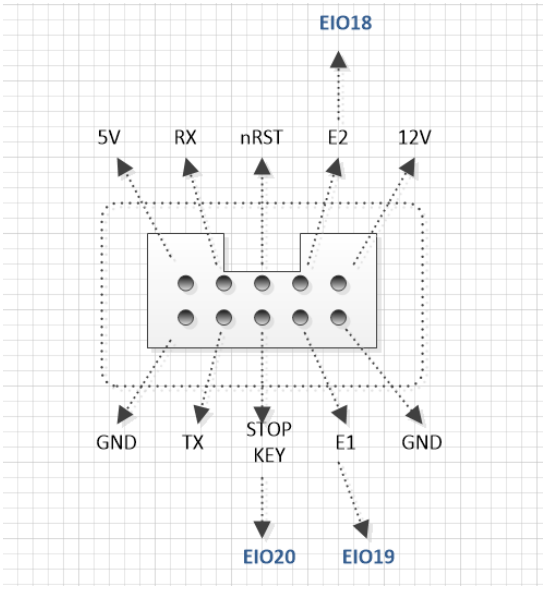


Figure 4.8 EIO addressing in base 10PIN

4.3.2 EIO multiplex function

Now let's describe EIO multiplex function. (Depends on hardware)

1）EIO multiplex instruction of forearm interface board, shown as follows:

Figure 4.1 EIO multiplex instruction of forearm interface board

EIO addressing	Level Range	Level Output	PWM	Level Input	ADC
O1	3.3V	√		√	√
O2	12V	√			
O3	12V	√			
O4	3.3V	√	√	√	
O5	3.3V	√		√	√

O6	3.3V	√	√	√	
O7	3.3V	√		√	√
O8	3.3V	√	√	√	
O9	3.3V	√		√	√

2）EIO multiplex instruction of 18PIN interface board on the base, shown as follows:

Figure 4.2 EIO multiplex instruction of 18PIN interface board on the base

EIO Addressing	Level Range	Level Output	PWM	Level Input	ADC
10	5V	√			
11	3.3V	√	√	√	
12	3.3V	√		√	√
13	5V	√			
14	3.3V	√	√	√	
15	3.3V	√		√	√
16	12V	√			
17	12V	√			

3） EIO multiplex instruction of 10PIN interface board on the base, shown as follows:

Figure 4.3 EIO multiplex instruction of 18PIN interface board on the base

EIO Addressing	Level Range	Level Output	PWM	Level Input	ADC
18	3.3V	√		√	
19	3.3V	√		√	
20	3.3V	√		√	

4.3.3 EIO multiplex Demo

Selected corressponding EIO, set input/output condition, and then you can multiplex each EIO specially. Here we have detailed explanation of level output, level input, ADC input and PWM output.

1） Level Output

Take EIO01 on the forearm connector for an example, it can configure level output into 3.3V. Shown as follows:

EIO Addressing	Level Range	Level Output	PWM	Level Input	ADC
O1	3.3V	√		√	√

Tick **IO_1**(in the output option) **-> tick Value**, -> **+Point**, and then it can be configured into high-level output of 3.3V(If you don't tick it, please choose low-level output).

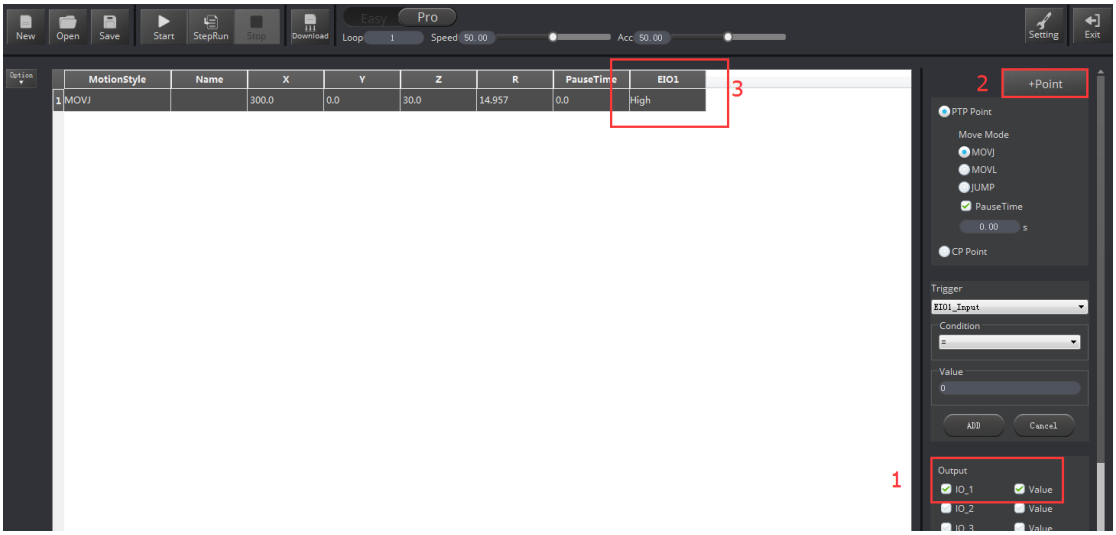


Figure 4.9 High level output of EIO1 demo

2） Level input

Also, take EIO01 on the forearm connector for an example, if you get an external photoelectric sensor, it will trigger Dobot move and can be configured into low/high level input trigger mode when access to an inductive object. Select trigger point->**EIO1_Input** (Trigger area on the bottom right)-> **Condition=1->add ADD key.** Cancel key can delete trigger settings of the current point. Trigger Value=0 indicates low level, and Value=1 denotes high level.

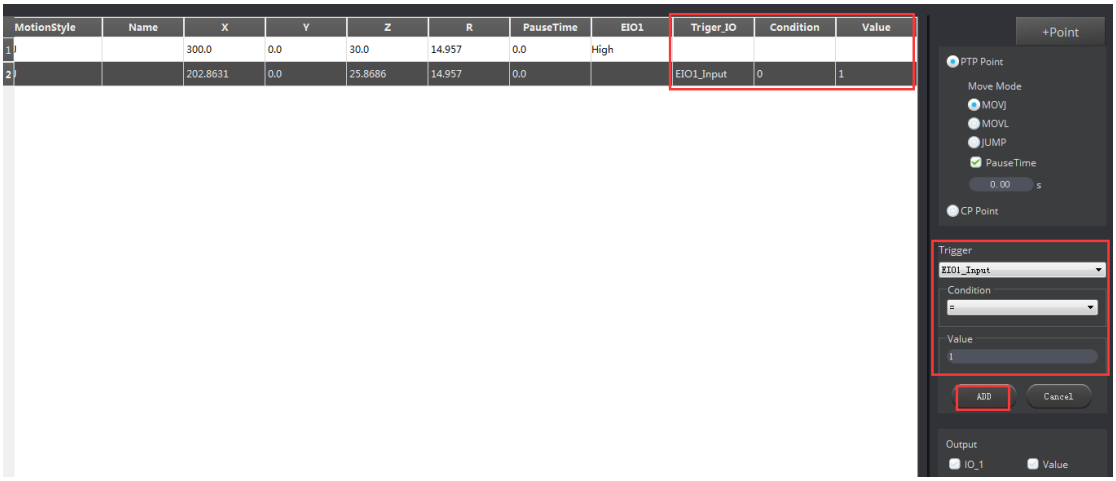


Figure 4.10 High level output of EIO1 demo

3） ADC input

ADC input operational method is the same with level input, select configured saved point and pins of ADC, such as EIO1, set ADC value less than 200, click ADD key, that is OK. The trigger value settings range is from 0 to 4095.

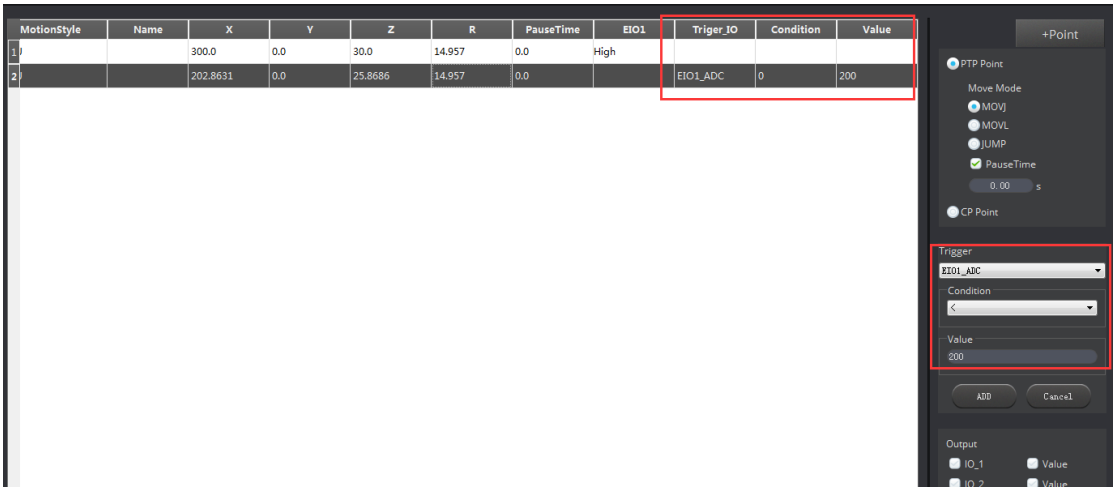


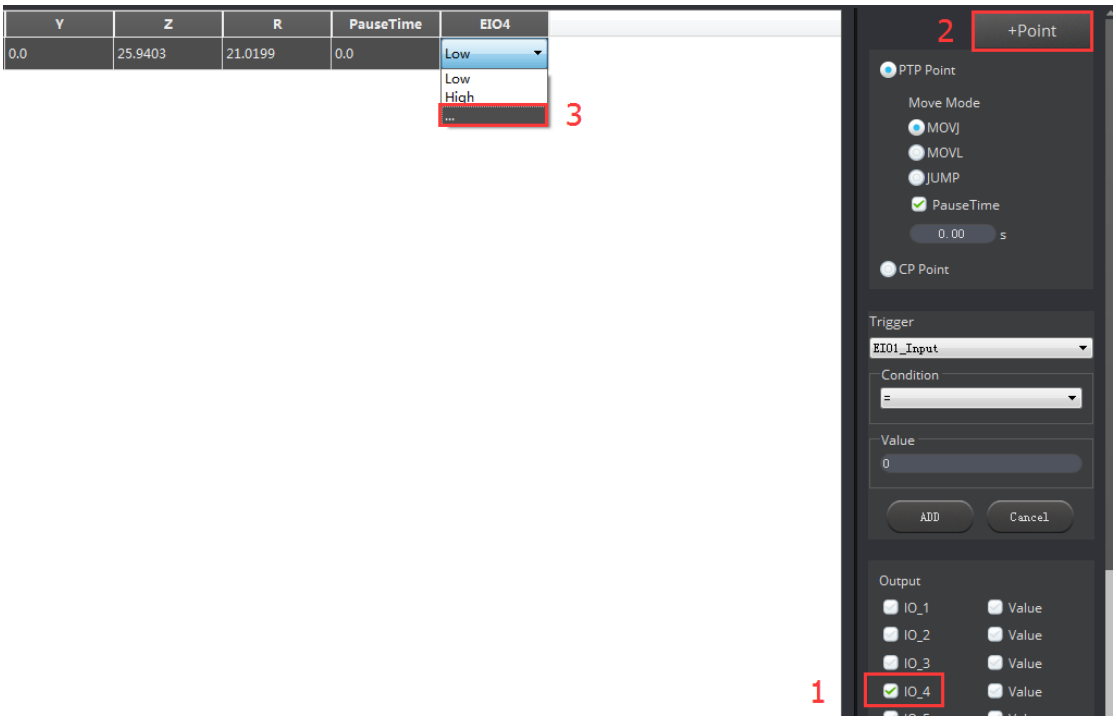
Figure 4.11 EIO1 ADC input demo

4） PWM Output

PWM: Take EIO4 for a demo

EIO Addressing	Level Range	Level Output	PWM	Level Input	ADC
O4	3.3V	√	√	√	

Tick **IO_4** pin in the Output area, click **+Point** to save new points, double click **EIO4** table cell, select "…" in the drop-down box, and set **Frequency, unit of KHZ， 10HZ-1MHZ** and **DutyRatio**（0-100%） in the pop-up dialog, shown as follows:



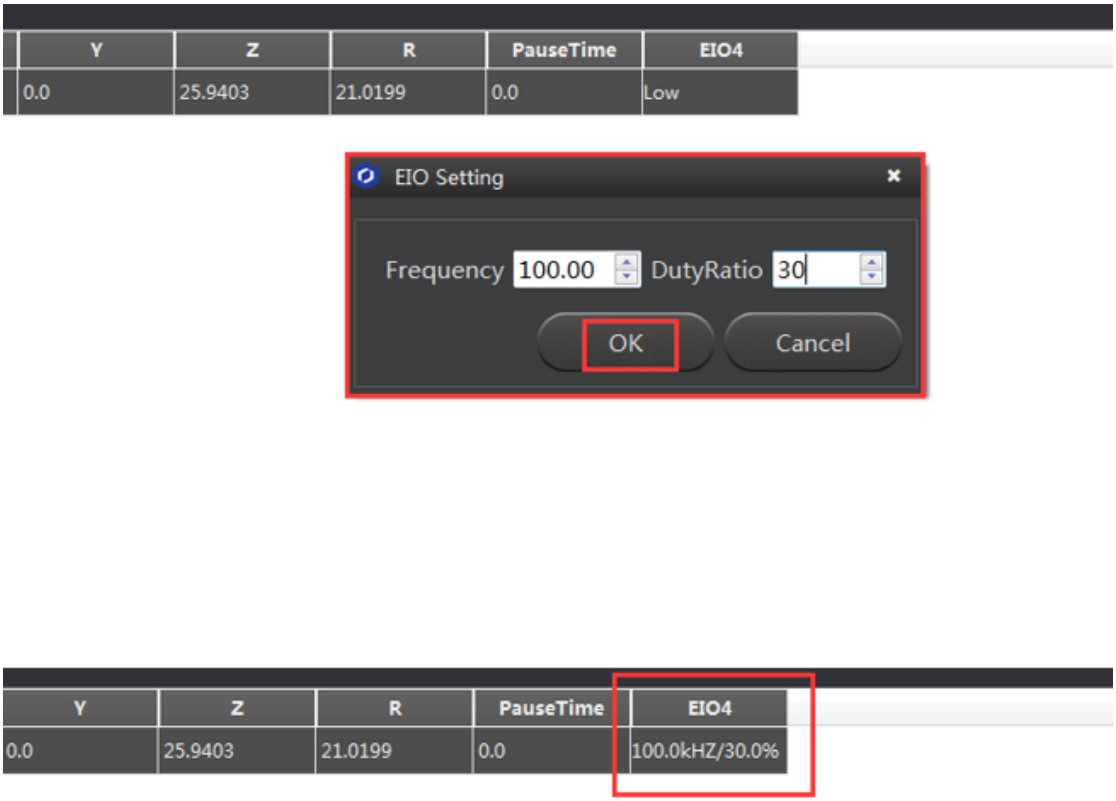


Figure 4.12 EIO4 PWM output demo

Above is four multiplx demo.

5. Writing & Drawing Manual

The whole flow chart as follows:

5.1 Installation of writing accessories

Pen and pen holder included in the draw kit, the installation steps as follows:

1. Install the pen into the fixture;
2. Lock the fixture into the endeffector with butterfly nut.

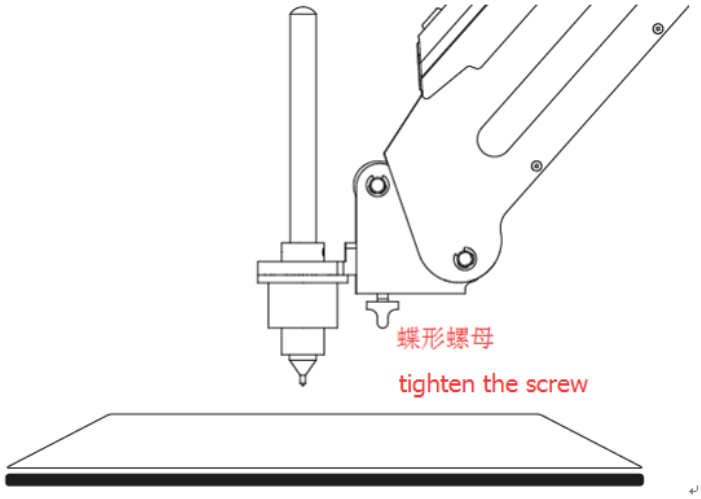


Figure 5.1 Installation of pen

If you want to switch the pen, just loosen four screws on the pen holder, that is done!

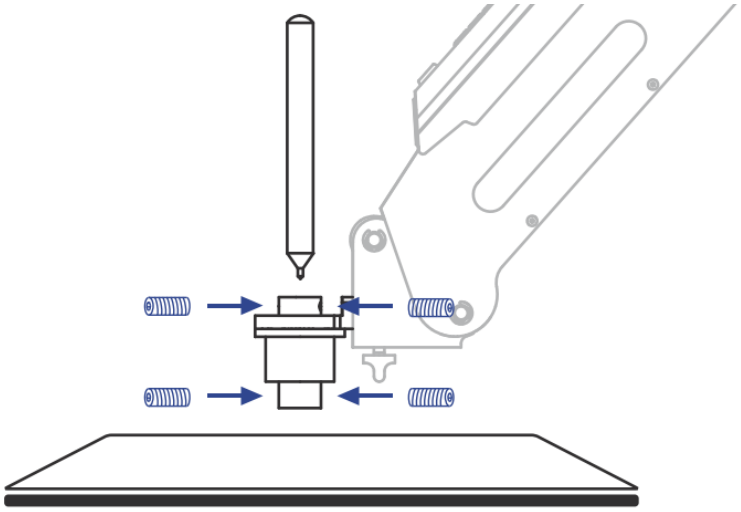


Figure 5.2 Pen installation

5.2 Connect DobotStudio

1. The software used by writing & drawing is DobotStudio, and the hardware itself is applicable for DobotStudio, so here you can connect directly. Open the software, click writing & drawing module, here comes the interface of writing & drawing as follows:

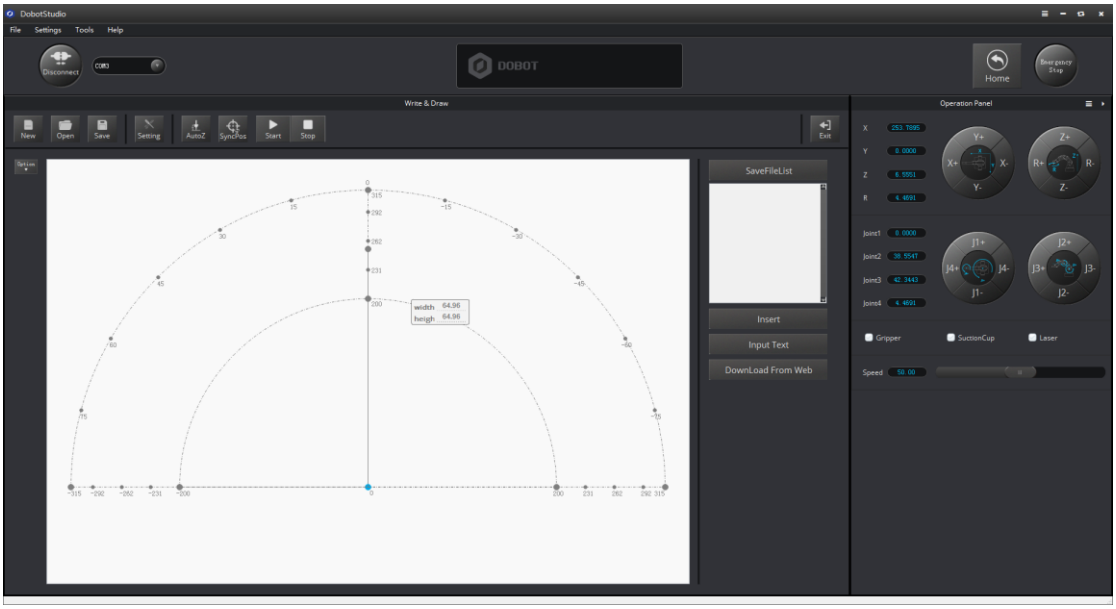


Figure 5.3 Writing & drawing interface

2. If the current hardware is not the hardware of writing & drawing itself, for example, the current firmware is for 3D printing, there will pop up a selected window, here we can choose DobotStudio in the drop-down box :

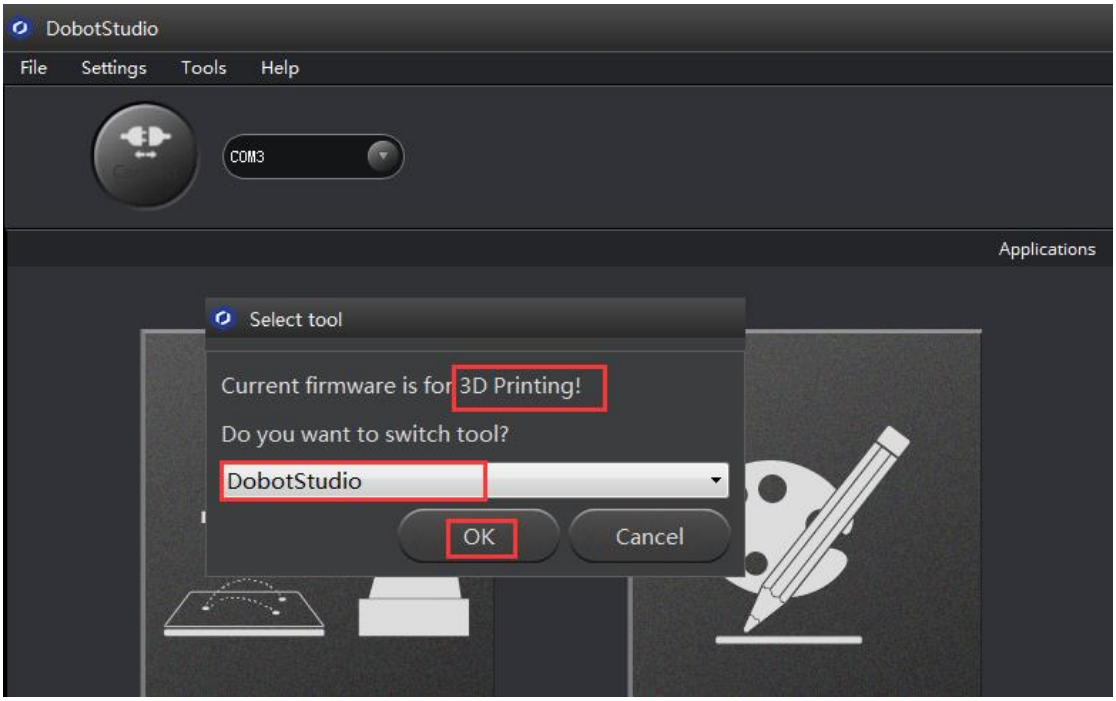
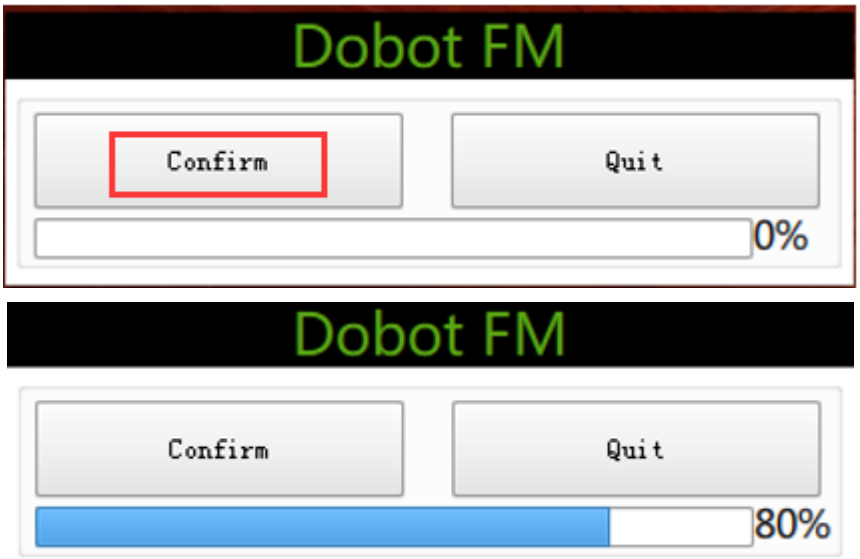


Figure 5.4 Select DobotStudio

Then click **OK**, and here will pop up burning hex window, and click **Confirm** to burn hex:



After burning, **DobotStudio** will be opened automatically, also, after about ten seconds, then you can hear a short sound from built-in buzzer, which shows a successful burning. At the same time, the light on the bottom right will turn into green. Thus, we can connect Dobot according to above operation.

5.3 Import pictures and set parameters

1. The imported picture should be put into the sector area of main interface, as Dobot will be at a limited position if beyond the standard range as a result of writing unnormally. Actually, there will be a warning of a red highlighting if beyond range.

1） Click **Open**, and import the ready PLT or SVG file:

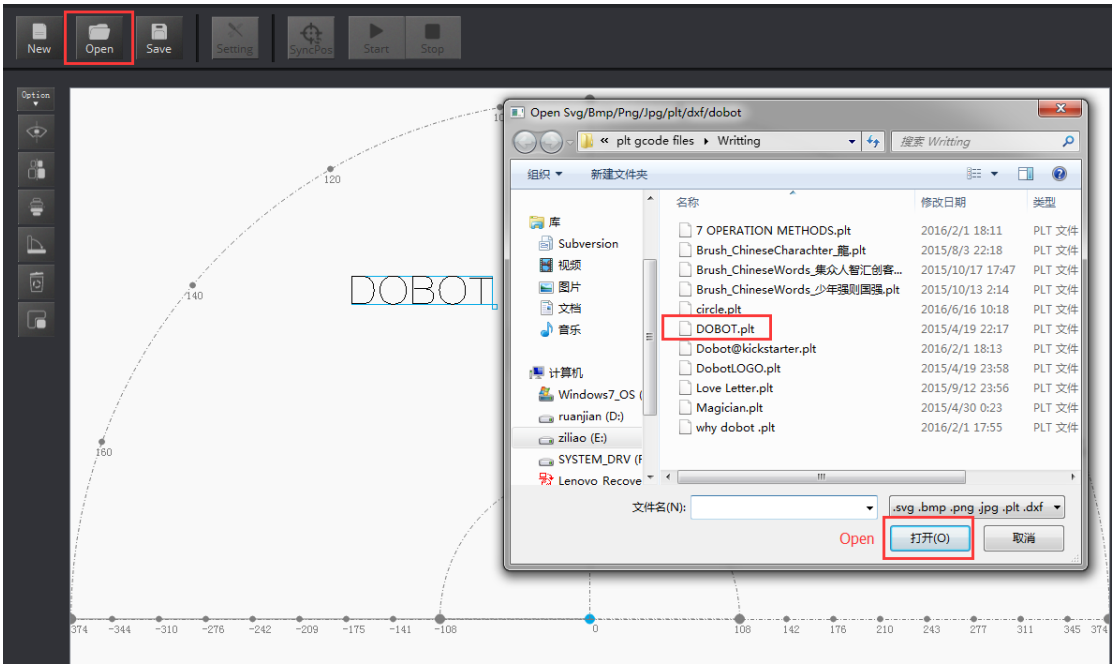


Figure 5.5 Open the file

2） Insert the included pictures of DobotStudio;

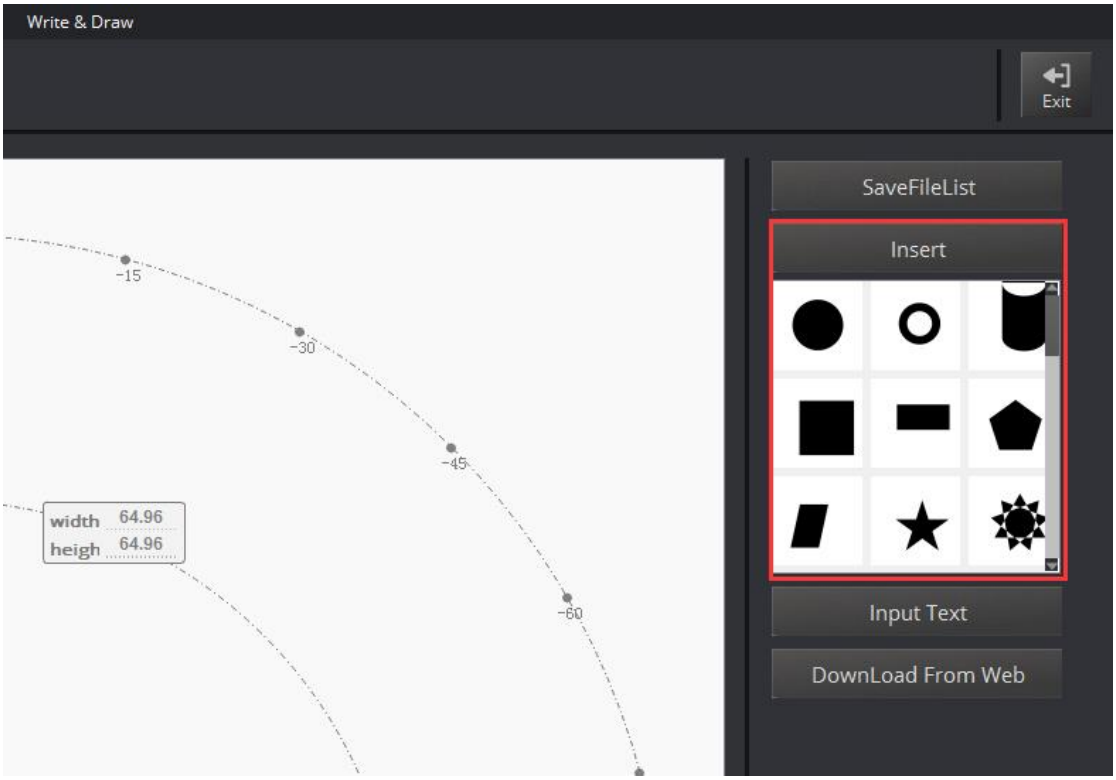


Figure 5.6 Insert the included file

3） Input text manually;

Figure 5.7 Input text manually

4） Also you can import pictures , convert these formats（BMP/JPEG/JPG/PNG and so on） into SVG recognized by Dobot, once took and once draw;

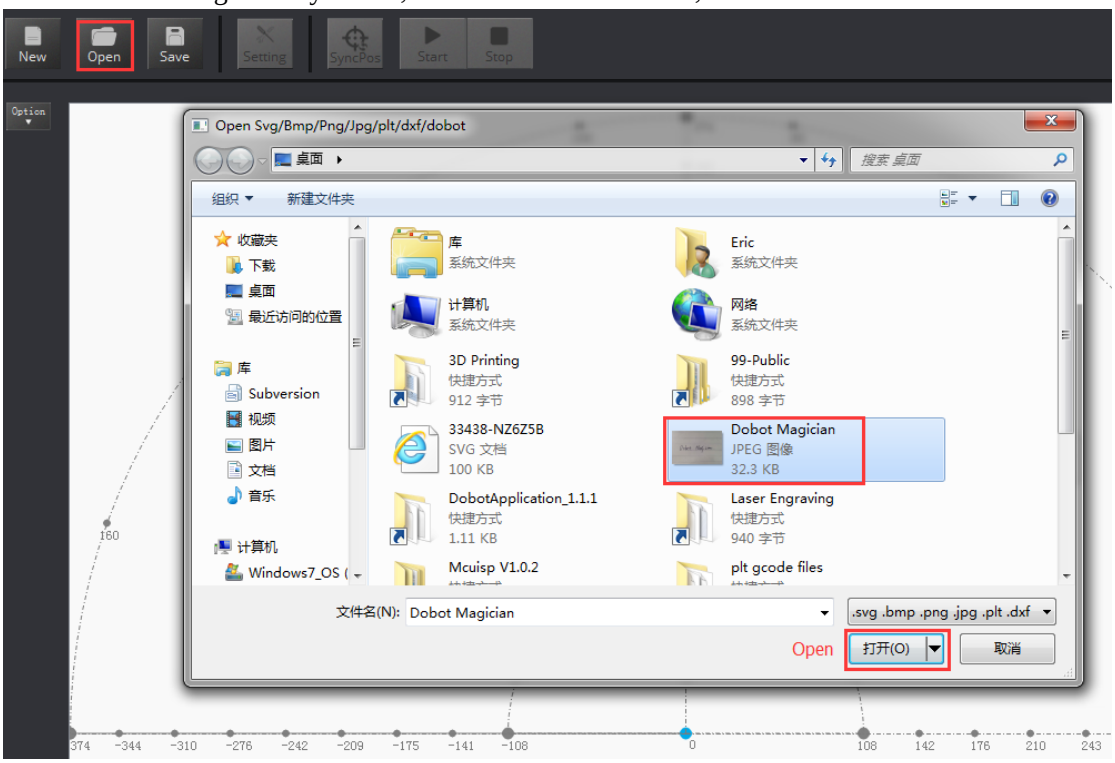


Figure 5.8 Import pictures

After opening the picture, set proper, click **Convert Bitmap**, then SVG path file will come out automatically, then click **Plot to Main Scene,** the ready trajectory can be loaded in writing main

interface, show as follows:

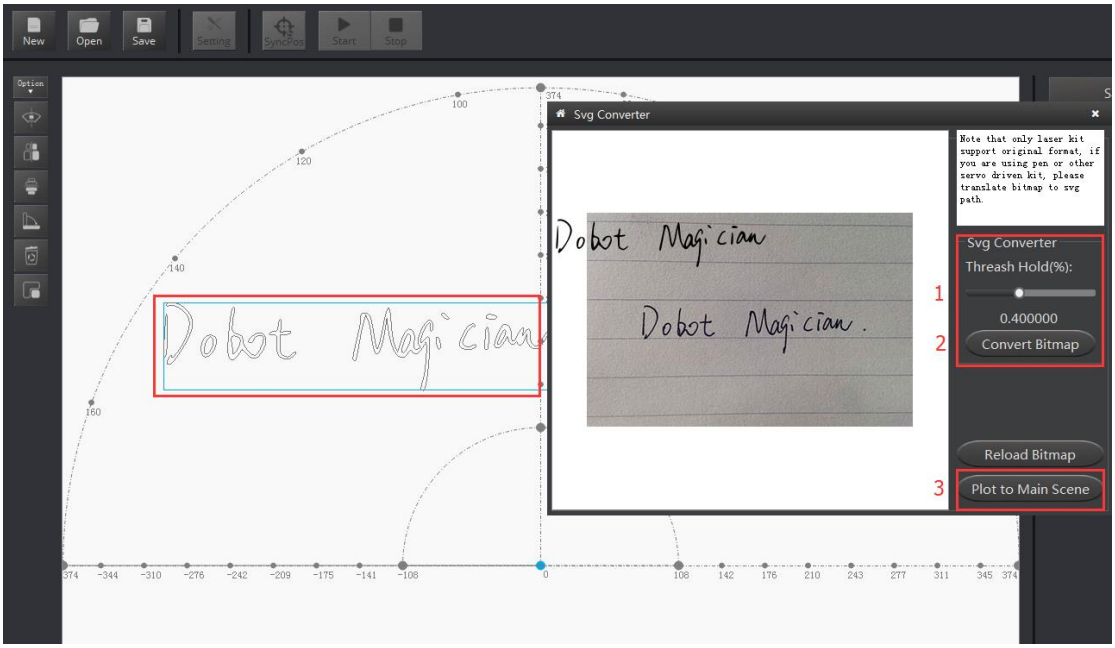


Figure 5.9 Import pictures into SVG files

2. Set writing parameters: set velocity and acceleration(0~300mm/s) and PenUpOffset;

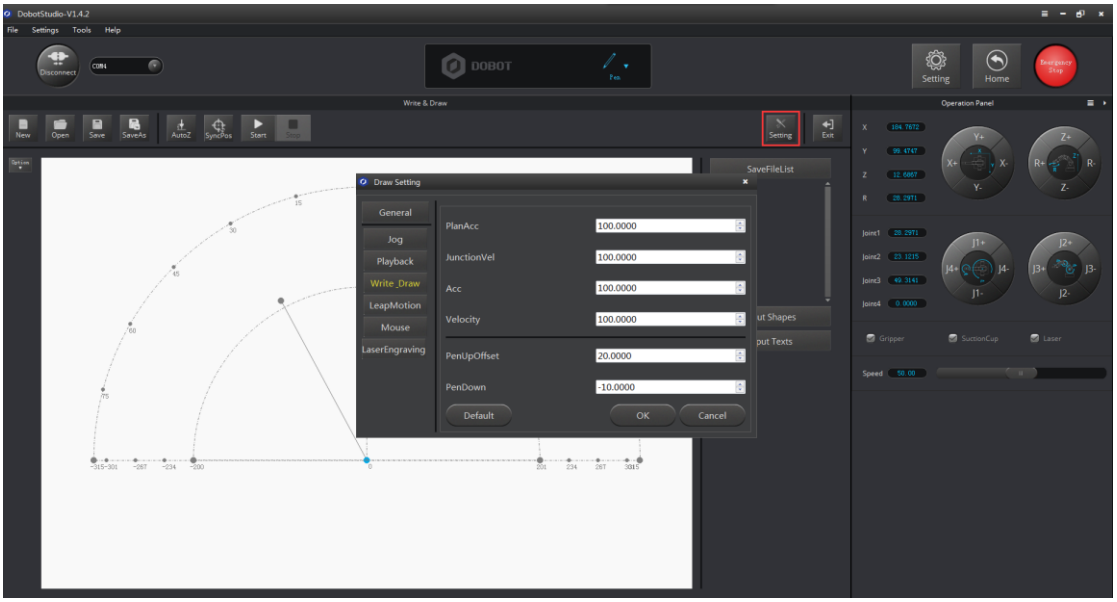


Figure 5.10 Set velocity and acceleration

4.4 Adjust the position and start writing

1. Set endeffector as Pen, here you can choose from **Settings**->EndEffector, shown as follows:

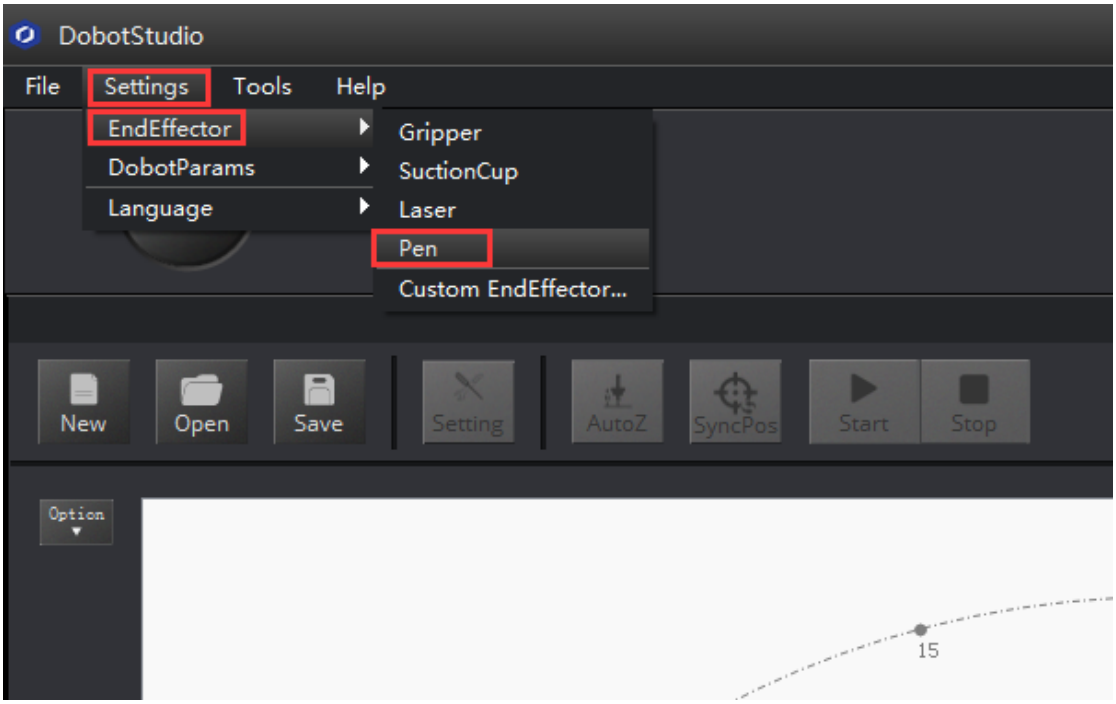


Figure 5.11 Set EndEffector

2. Adjust the nib position: press and hold down **Unlock key on the forearm** and drag the forearm to make the nib contact to paper, also, you can control Z axis moving down to paper gradually, shown as follows:

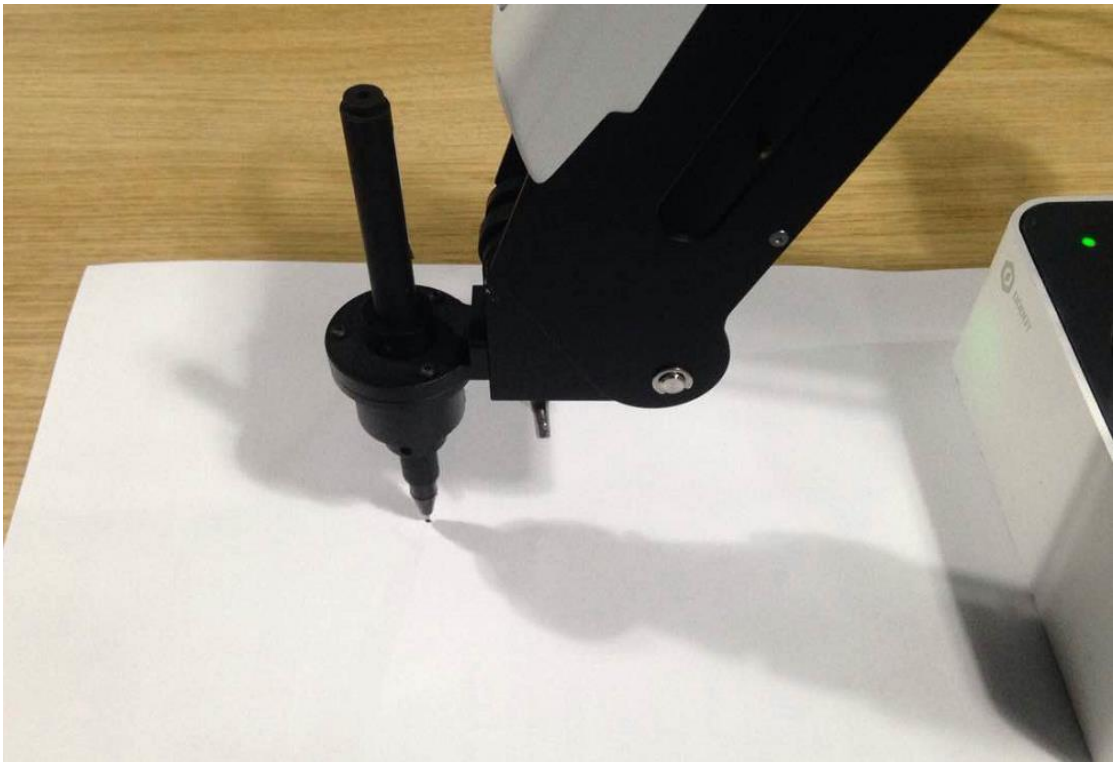


Figure 5.12 Adjust the nib position

3. Click **AutoZ** and get the current Z value, thus, you need not adjust the nib position when you write next time, here just comes with the steps: **import pictures-> SyncPos->Start** , then you enjoy

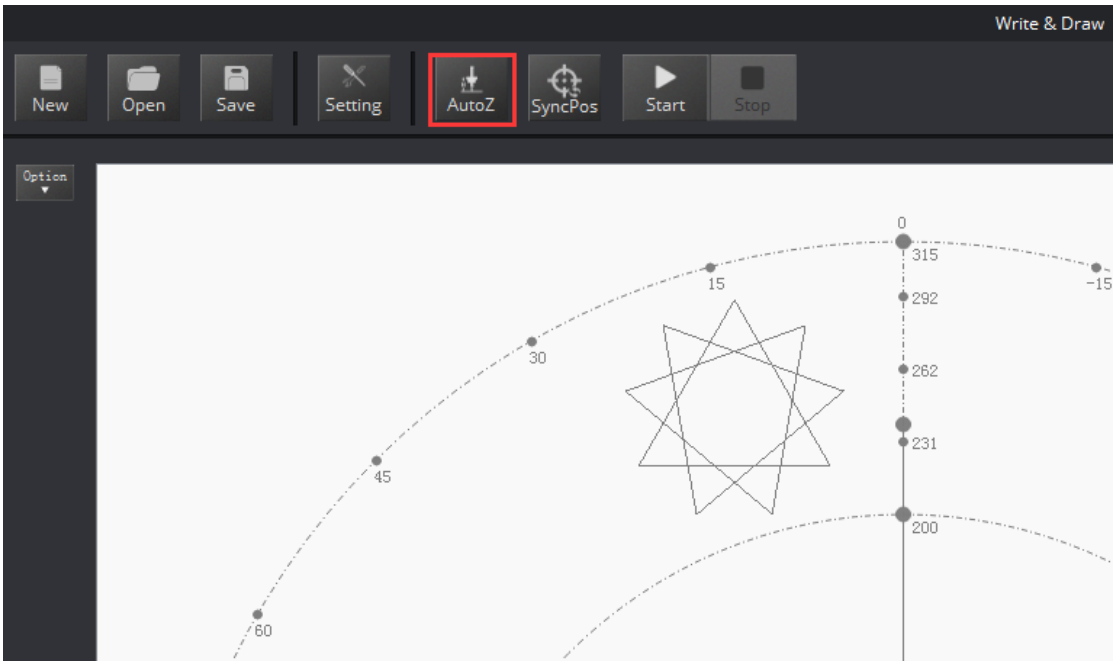


Figure 5.13 Lock writing height

You can check the **Pendown parameter** from here:

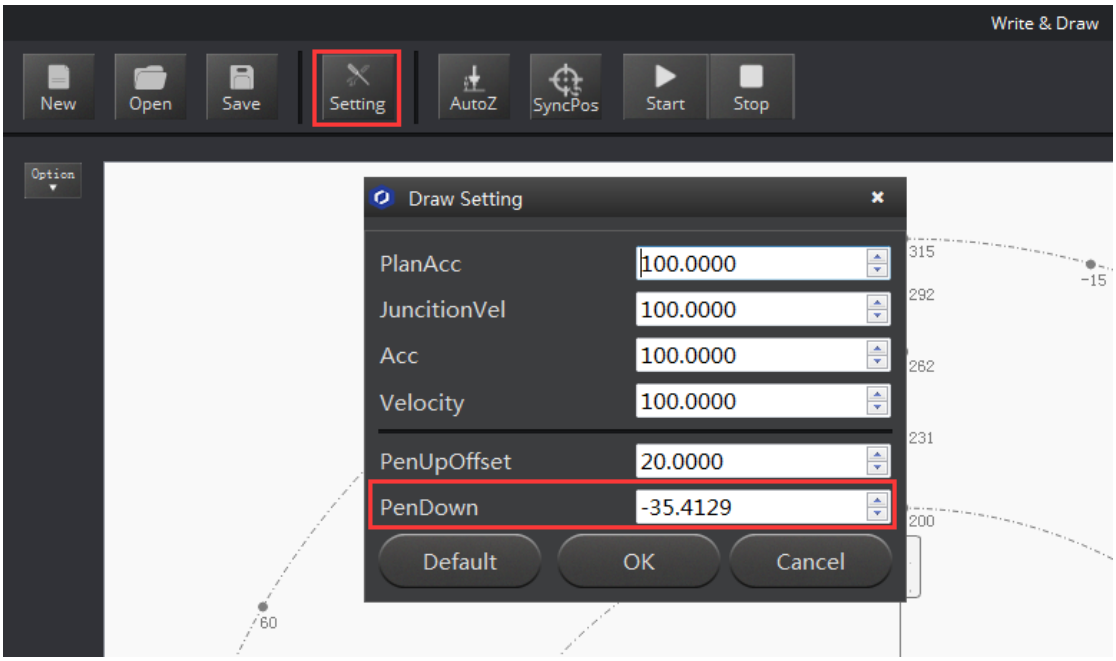


Figure 5.14 Pendown parameters

If the writing is not very well, the nib height need to be adjusted slightly, also you can revise the value of Pendown.

4. Click **SyncPos**, Dobot will move into the top position of writing starting point automatically.
5. Click **Start, Pause and Stop** to control Dobot.

6. The result as follows:

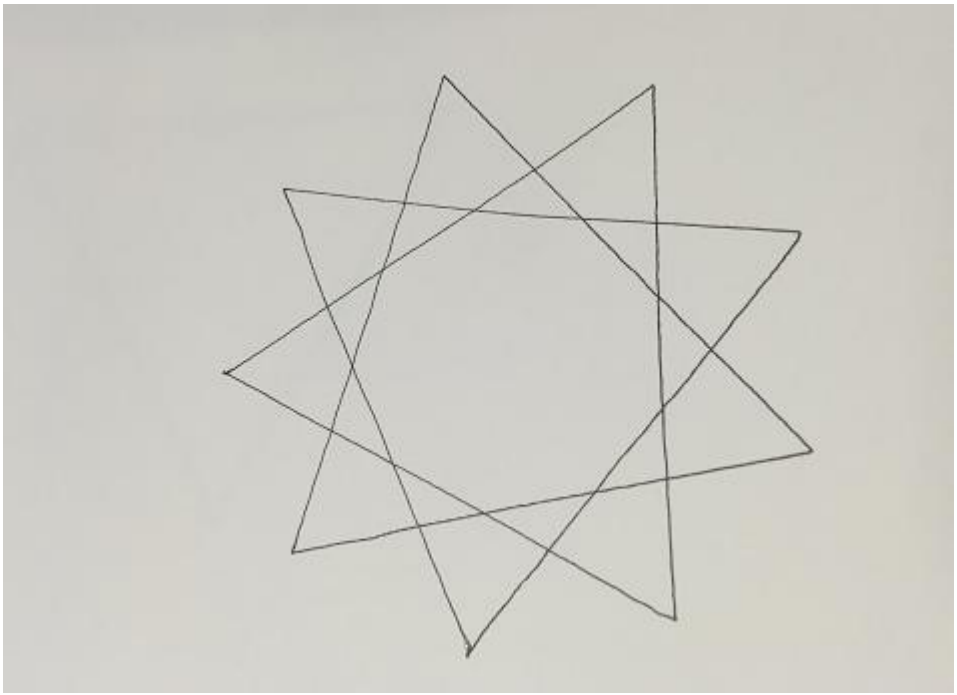


Figure 4.15 The effect of writing

6. Laser Engraving

The whole process of laser engraving as follows:

Notice:

Laser engraving and shade laser engraving are different functions. The firmware and upper computer used by laser engraving are the same with writing&drawing, which can only engrave pictures of single line. While the latter can achieve the function of bitmap engraving, for example, it can engrave figures and head portraits. If you want to use the function of shade laser engraving, please refer to Dobot2.0 Shade Laser Engraving.

6.1 Laser Installation

1. Fasten the laser by butterfly nut;
2. Connect 12V power line with interface ⑤**SW4** and connect TTL control line with interface ③**GP5**.

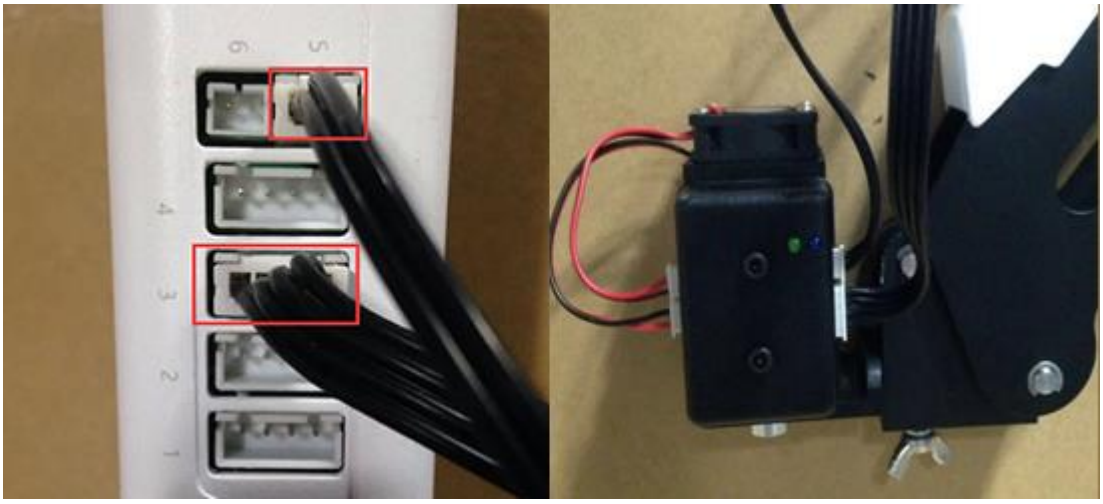


Figure 6.1 Install Laser

6.2 Connect DobotStudio

1. The software used by laser engraving is **DobotStudio**, so please open the software , click writing&drawing and enter into laser engraving interface, shown as follows:

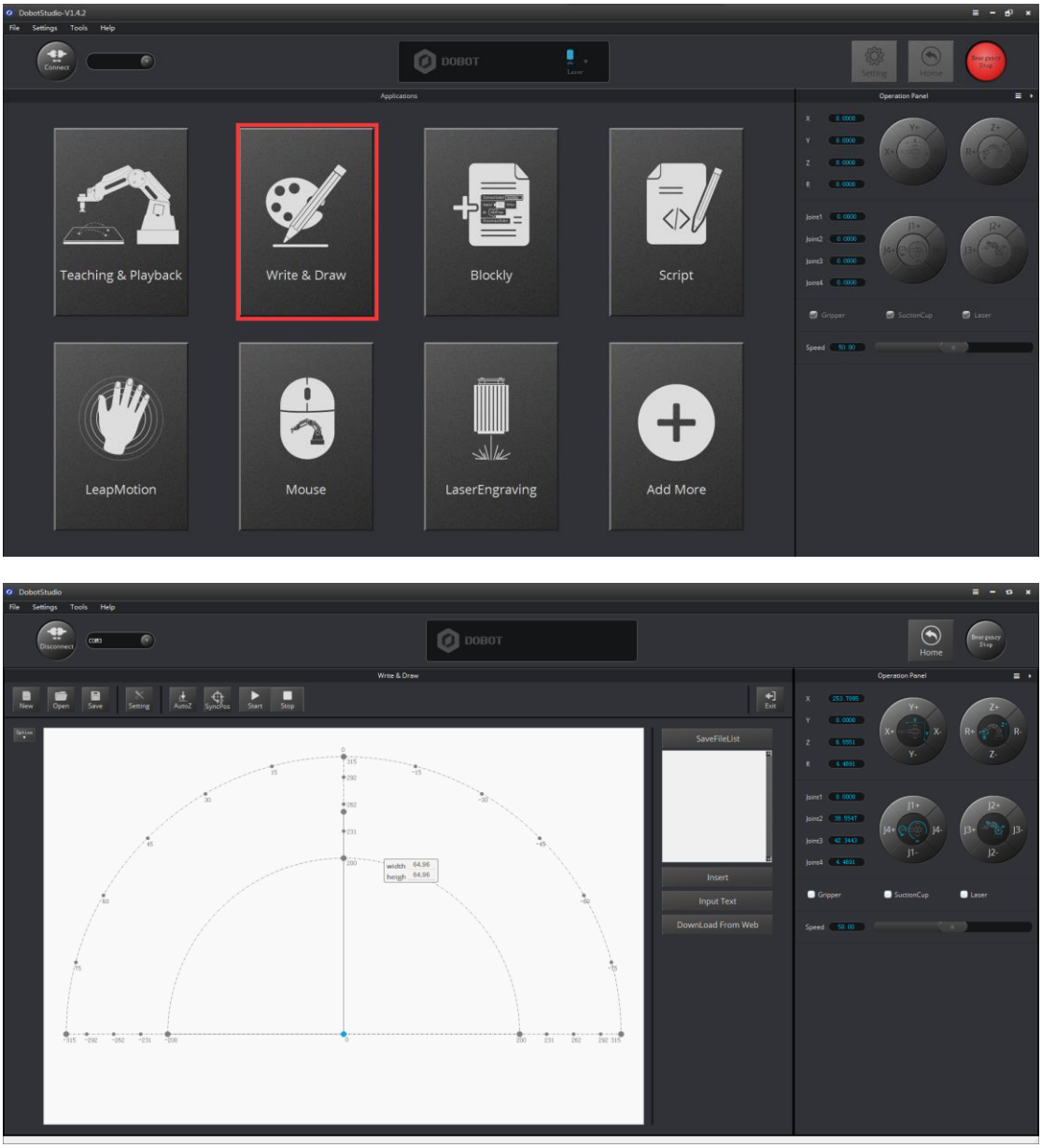


Figure 6.2 Laser engraving interface

2. If the current firmware is not for laser engraving, for example, if it is for firmware 3D printing, then will pop up select dialog when connecting, we can choose **DobotStudio** in the drop-down box:

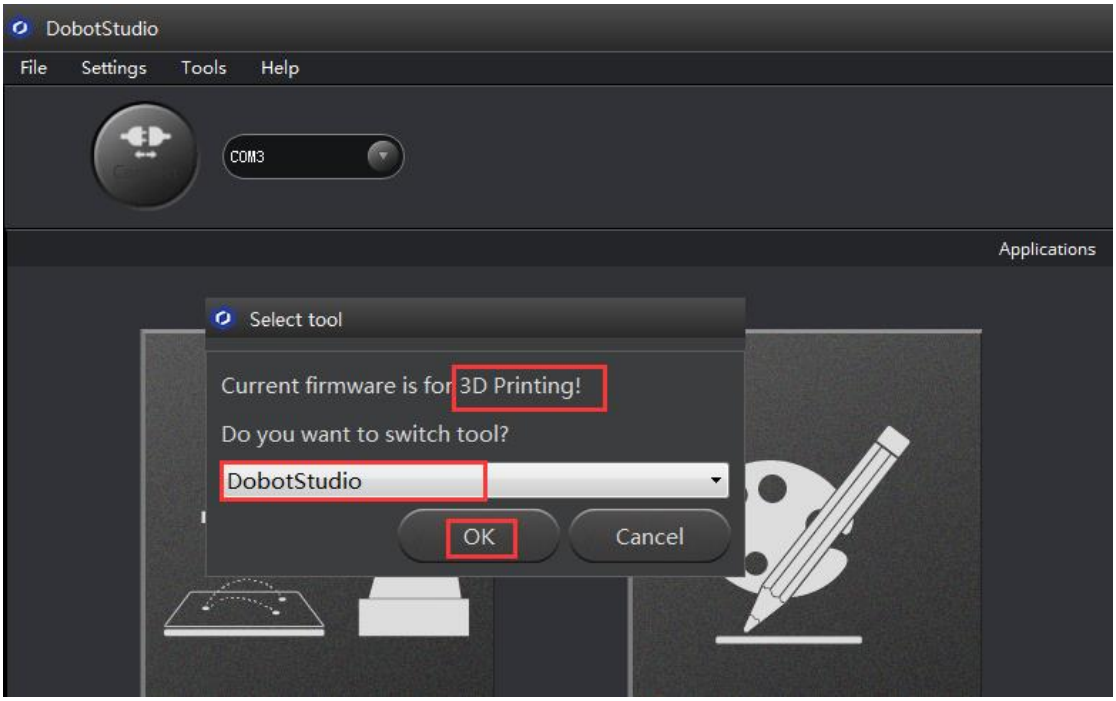
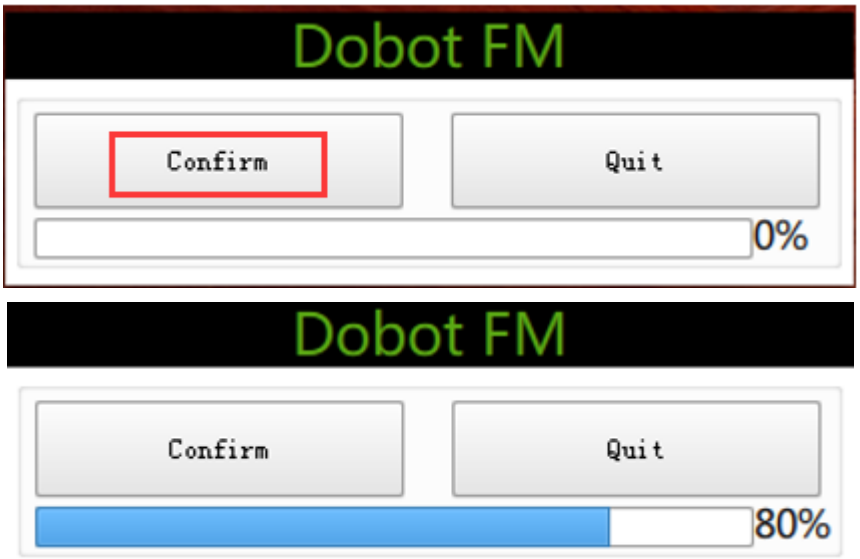


Figure 6.3 Connect DobotStudio

Then click **OK**, and here will pop up burning hex window, and click **Confirm** to burn hex:



After burning, **DobotStudio** will be opened automatically, also, after about ten seconds, then you can hear a short sound from built-in buzzer, which shows a successful burning. At the same time, the light on the bottom right will turn into green. Thus, we can connect Dobot according to above operation.

6.3 Import pictures and set parameters

1. The imported laser engraving file should be put into the sector area of main interface, as Dobot will be at a limited position if beyond the standard range as a result of writing unnormally. Actually, there will be a warning of a red highlighting if beyond range.

1） Click **Open**, and import the ready PLT or SVG file:

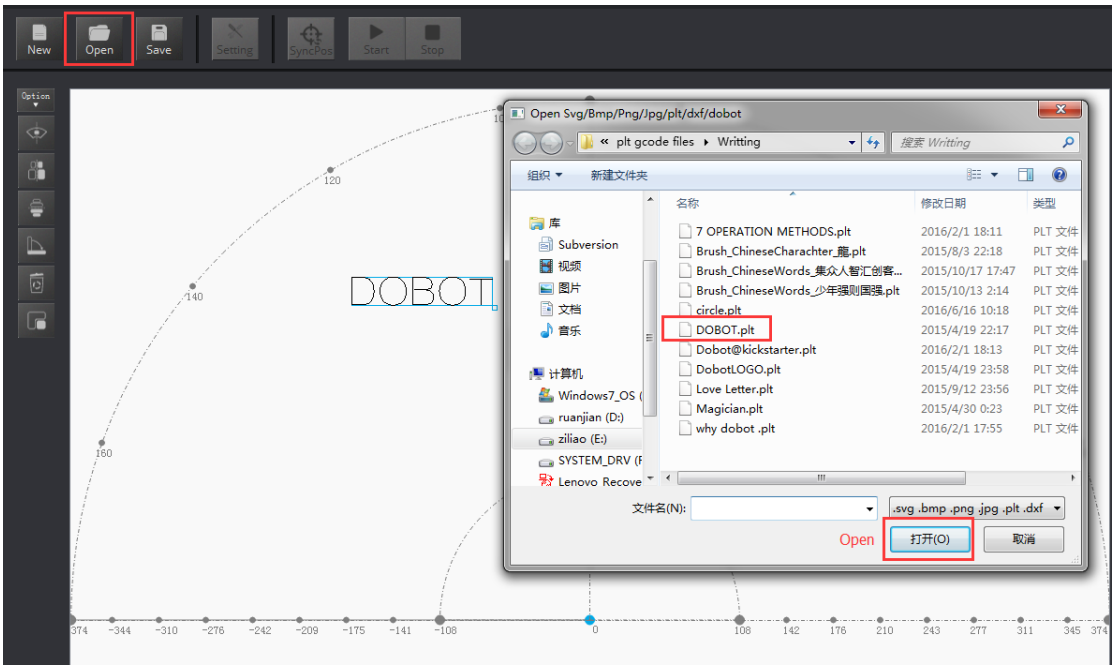


Figure 6.4 Open PLT File

2） Insert the included pictures of DobotStudio;

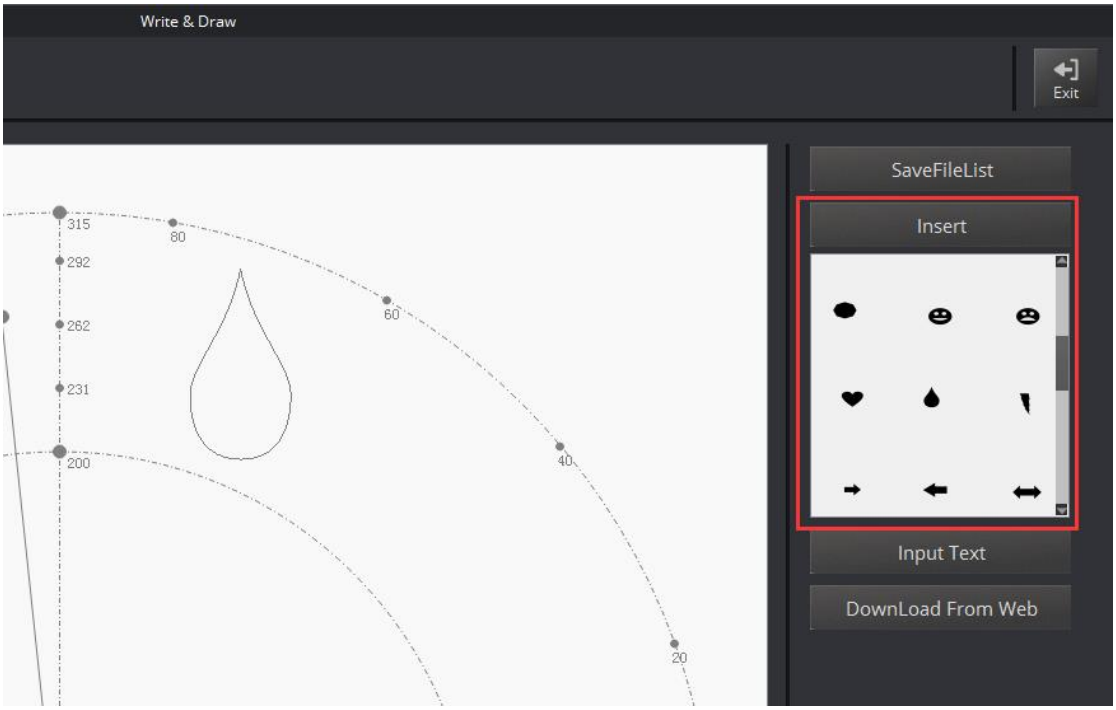


Figure 6.5 Insert included pictures

3） Input text manually;

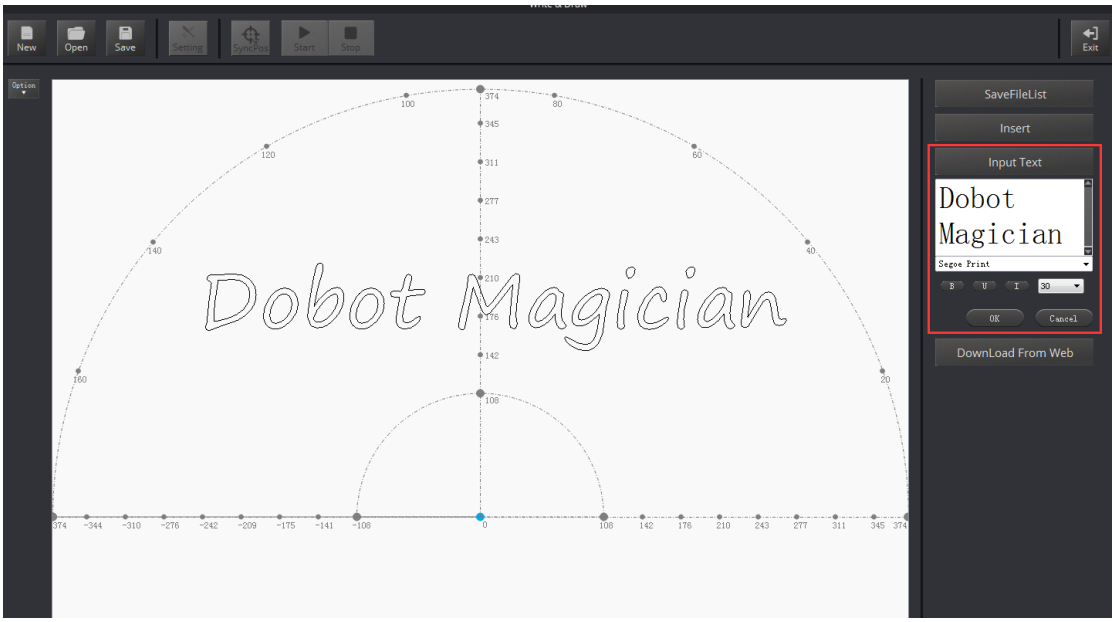


Figure 6.6 Input text manually

4） Also you can import pictures , convert these formats（BMP/JPEG/JPG/PNG and so on）into SVG recognized by Dobot, once took and once draw;

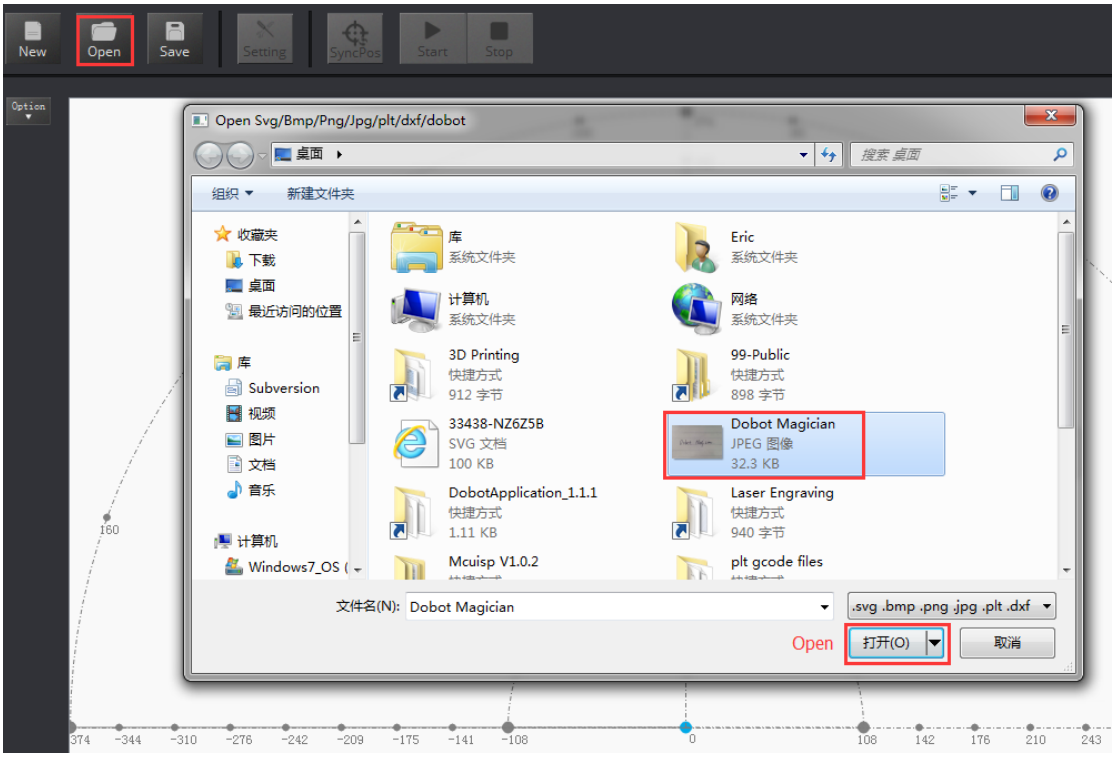


Figure 6.7 Import pictures

After opening the picture, set proper switching threshold, click **Convert Bitmap**, then SVG path file will come out automatically, then click **Plot to Main Scene,** the ready trajectory can be loaded in writing main interface, show as follows:

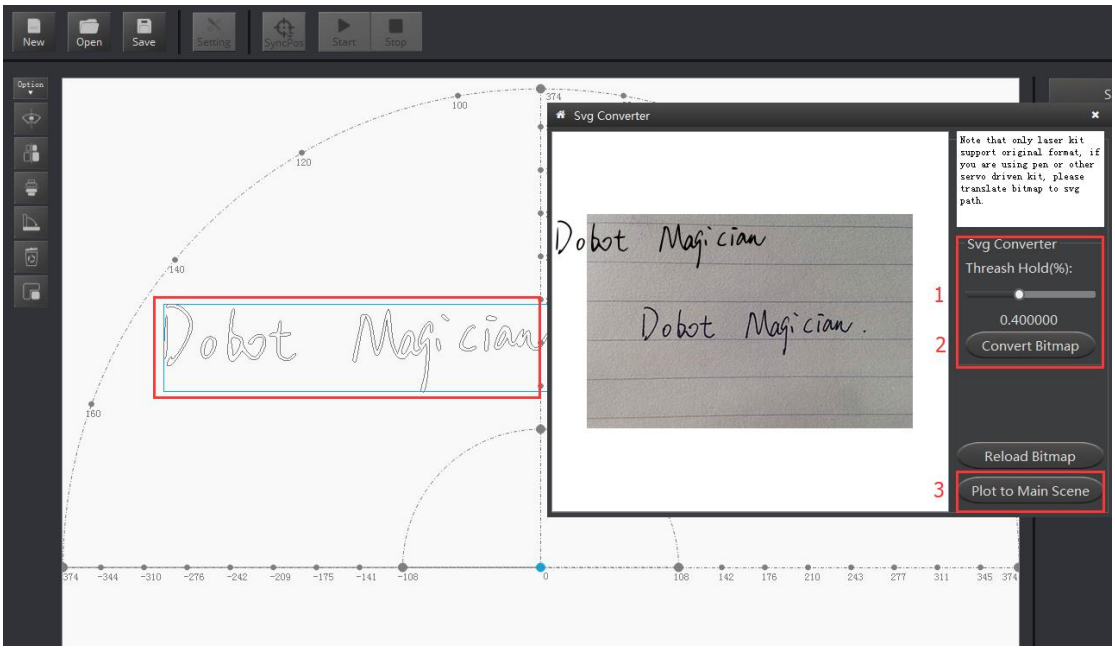


Figure 6.8 Import pictures and SVG path file will come out automatically

2. Set laser engraving parameters: set velocity and acceleration(suggested value is 3) and PenUpOffset, here just keep the default 20;

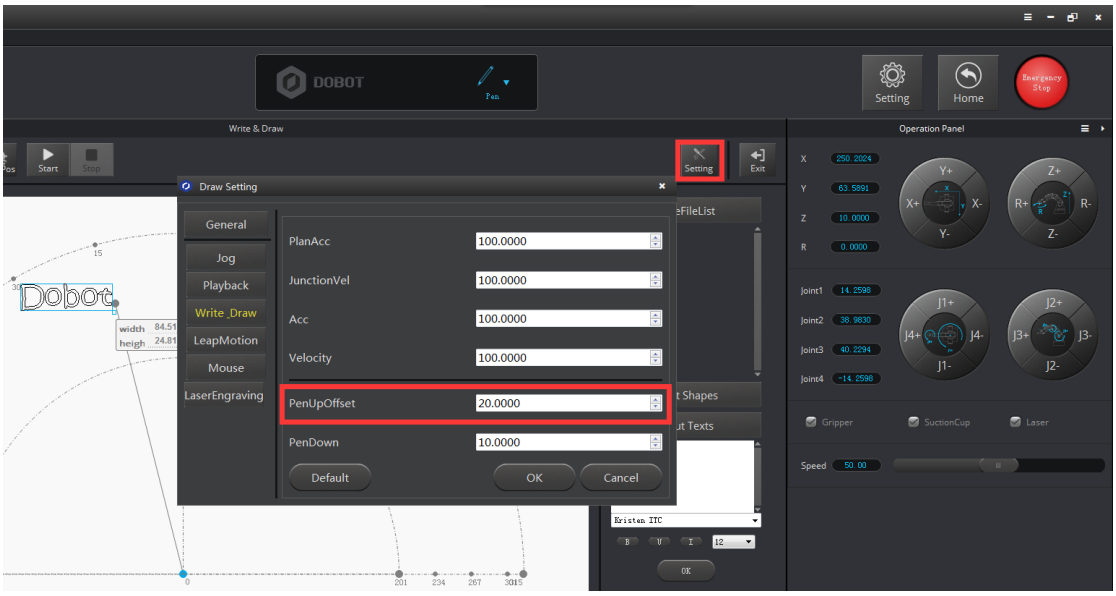


Figure 6.9 Set parameters of laser engraving

6.4 Adjust the focus and start writing

1. Select the EndEffector as **Laser: Settings->EndType Settings->Laser**, shown as follows:

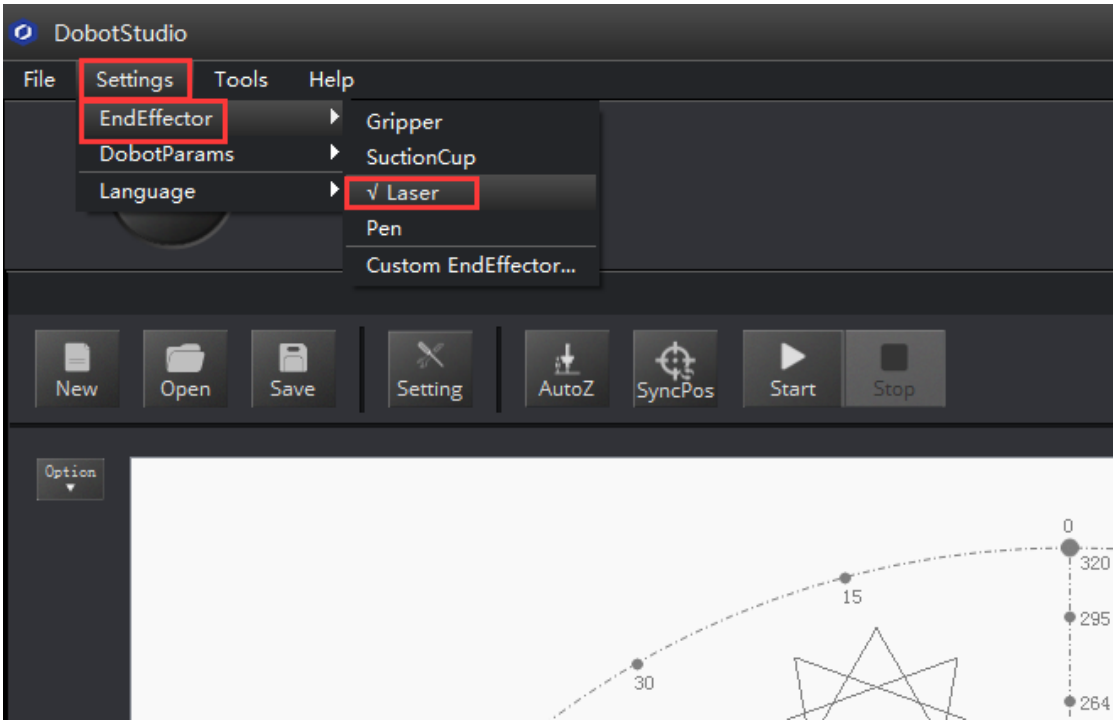


Figure 6.10 Set EndEffector

2. Tick ON to open the software;

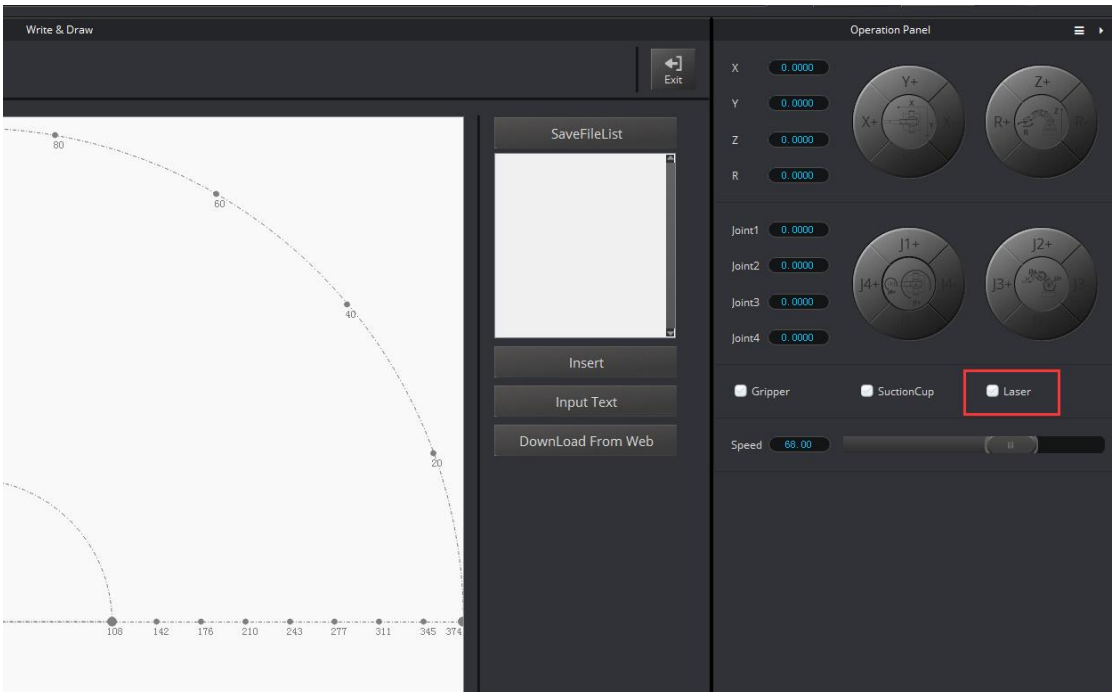


Figure 6.11 Open the laser

3. Focus Adjustment. Hold down **Unlock Key** to adjust the distance between laser and the surface of the material, and then adjust knob to proper focus, if it shown as the brightest dot of Facularpoint, this will be the most proper height. There will be signs of burn on the material when get sufficient laser power. One can cancel ticking to close laser after adjusting.

If it still cannot focus, then maybe the focus of laser is too long. We can rotate metal knob of laser to adjust(as the picture on the right button), refocus again after adjusting.

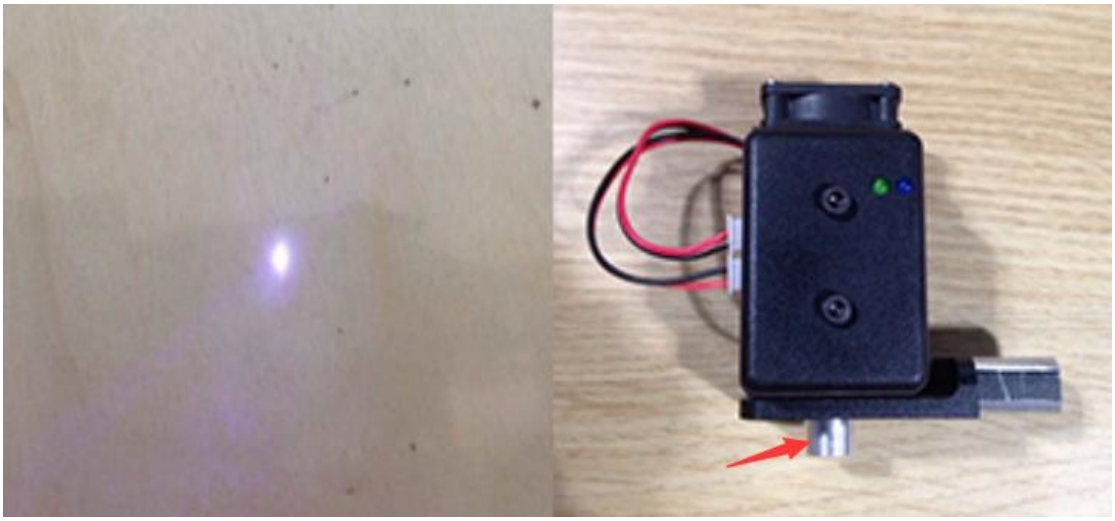


Figure 6.12 Focus Adjustment

⚠ Notice：

The laser can heat object when it is in focused state, objects like paper board or wood can be engraved or burned.

! DO NOT focus the laser on people or animals

! DO NOT let children play with it alone.

! The process needs to be monitored when it is running.

! After the process please turn off the laser promptly.

4. Click **AutoZ** and get the current Z value, thus, you need not adjust the focus manually when you engrave next time, here just comes with the steps: **import pictures-> SyncPos->Start**.

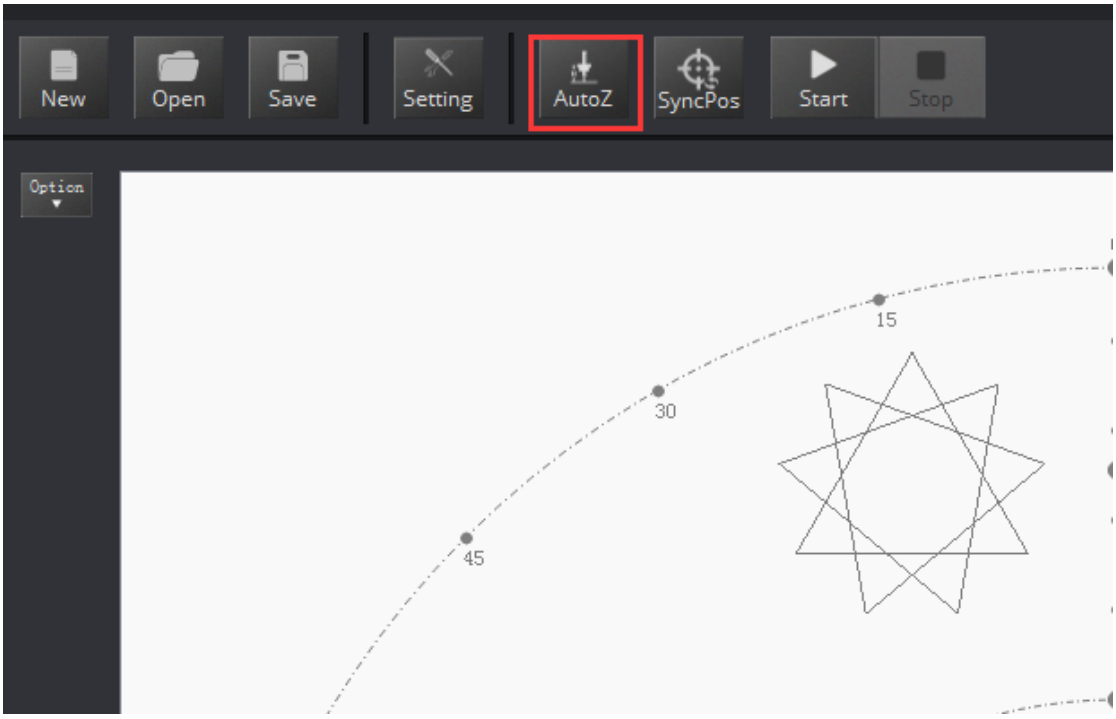


Figure 6.13 Lock writing height

You can check the **Pendown parameter** from here:

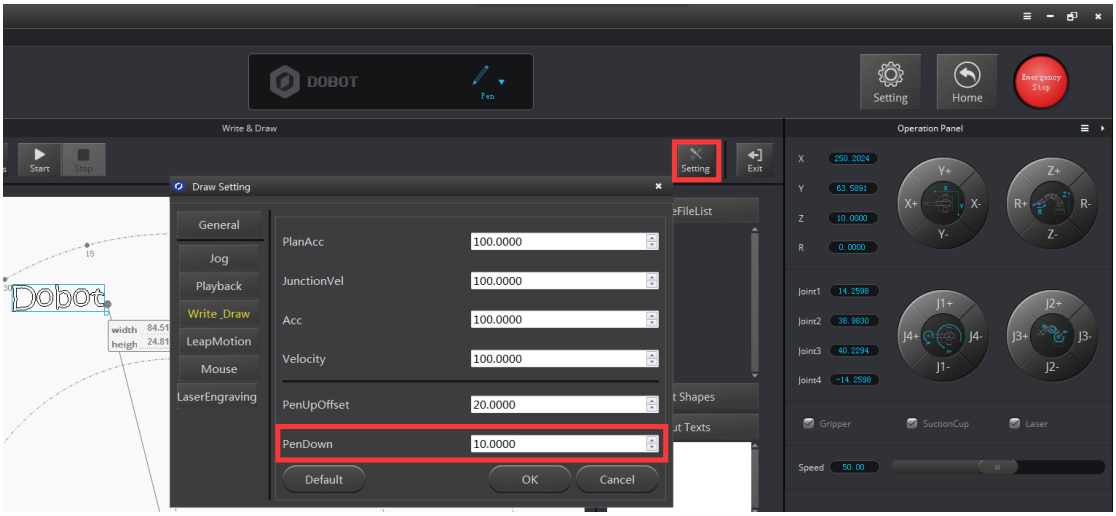


Figure 6.14 Pendown parameters

If the writing is not very well, the nib height need to be adjusted slightly, also you can revise the value of **Pendown**.

7. Click **SyncPos**, Dobot will move into the top position of writing starting point automatically.
8. Click **Start, Pause and Stop** to control Dobot.

The result as follows:

5. The effect shown as follows:

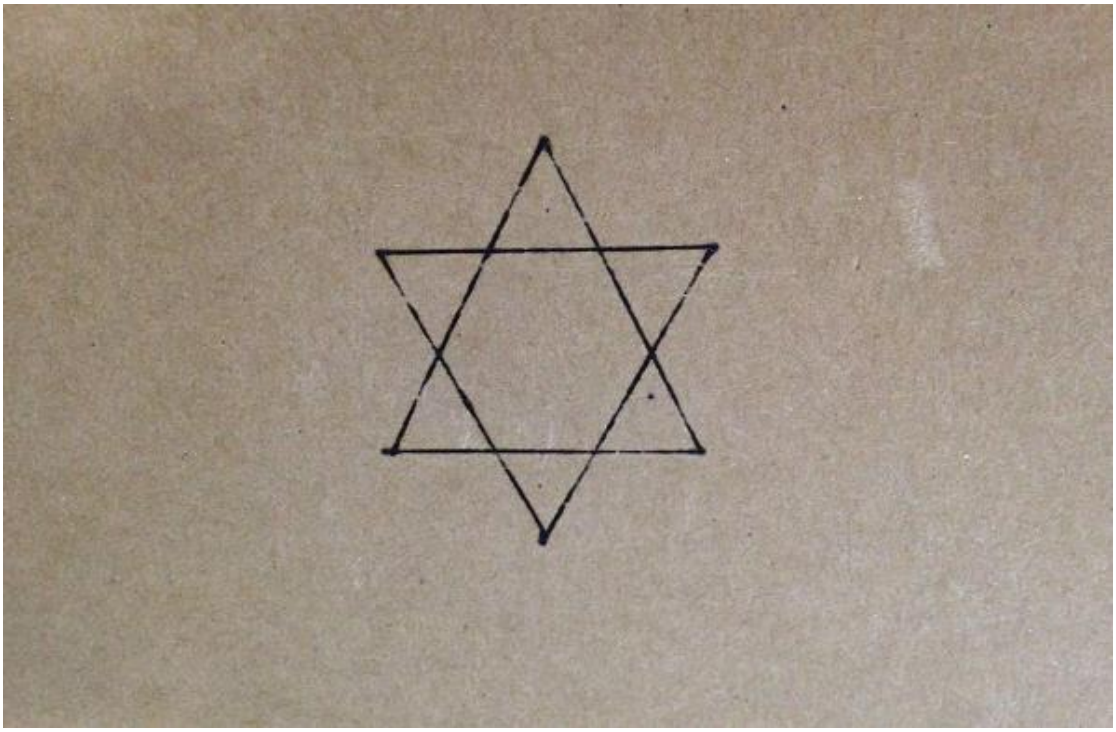


Figure 6.15 The effect of laser engraving

7. The Tutorial of Shade Laser Engraving

The whole flow chart of shade laser engraving as below:

Notice: Shade laser engraving is also a kind of laser engraving.

7.1 Installation of Laser Accessories

Shade laser engraving and laser engraving share the same kit, and pls refer to the chapter of laser engraving installation.

7.2 Connect DobotStudio

1. The software of gray engraving is DobotStudio that has been included in DobotStudio. Open DobotStudio, click **Tools-->Open Shade Laser Engraving;**

Figure 7.1 Open laser engraving interface

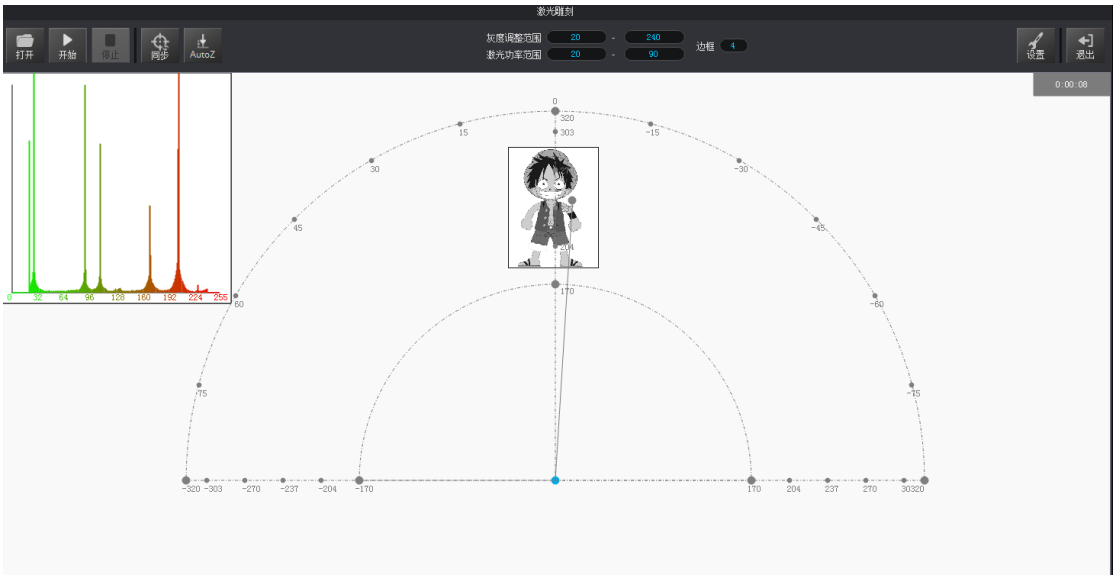
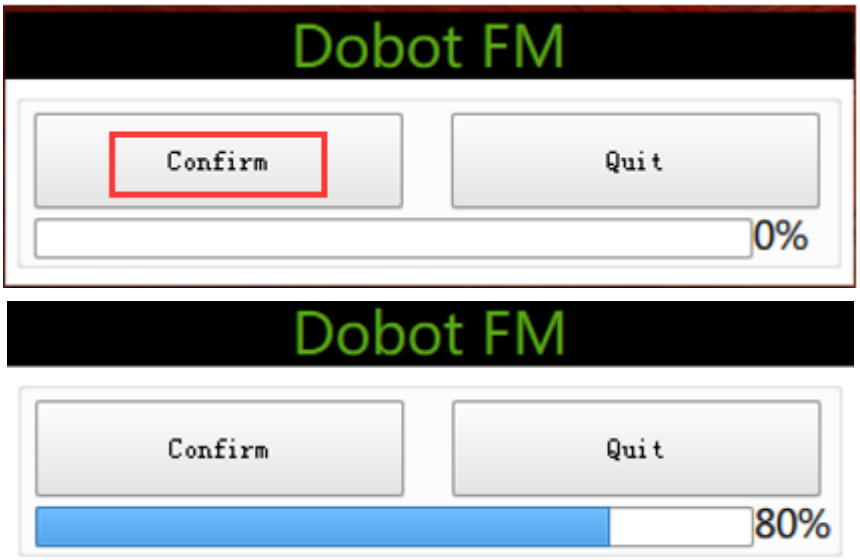


Figure 7.2 Enter into shade laser engraving interface

2. If the current firmware is not for **DobotStudio**, for example, for 3D printing, here will pop up the Checkbox, and then we can select **DobotStudio** in the drop-down box:

Figure 7.3 Select DobotStudio

Click **OK**, pop up the firmware burning window, and click **Confirm** to burn the firmware:



After burning, DobotStudio will be opened automatically, wait for about 5 seconds, you can hear a short sound, which shows a successful burning and the light turns into green at the bottom-right. Then you can connect Dobot to control according to the last step.

7.3 Import Pattern and Set Parameters

1. The imported picture should be put into the sector area of main interface, as Dobot will be at a limited position if beyond the standard range as a result of writing unnormally. Actually, there will be a warning of a red highlighting if beyond range.
   Also you can import pictures, convert these format (BMP/JPEG/JPG/PNG and so on) into SVG recognized by Dobot, once took and once draw;

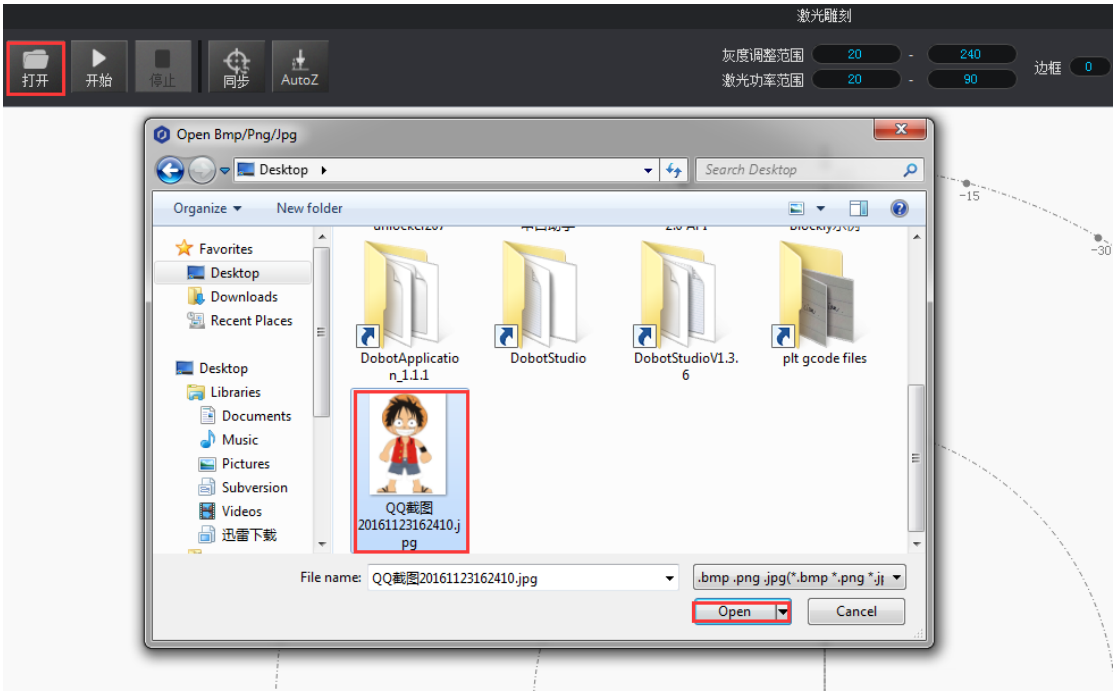


Figure 7.4 Import engraving pictures

Open the picture, adjust the gray scale(0-255), laser power(0-100%) and the border for the customized engrave effect.

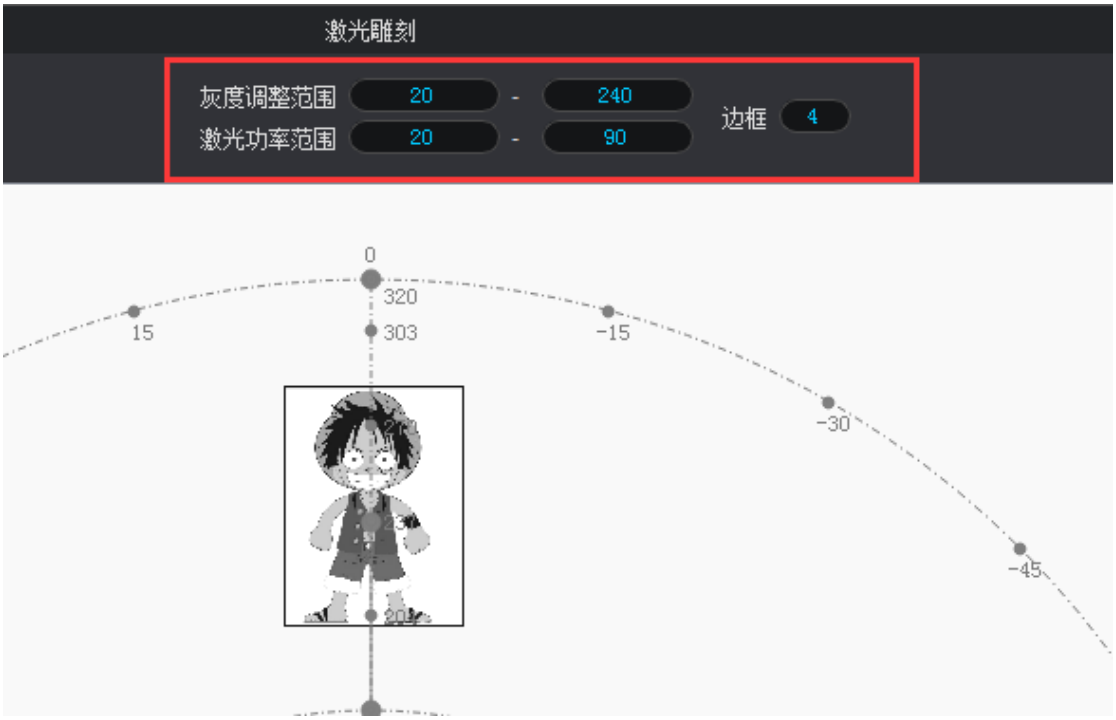


Figure 7.5 Import the pictures into SVG file

2. Set shade laser engraving velocity and acceleration, here we suggest 5, shown as folllows:

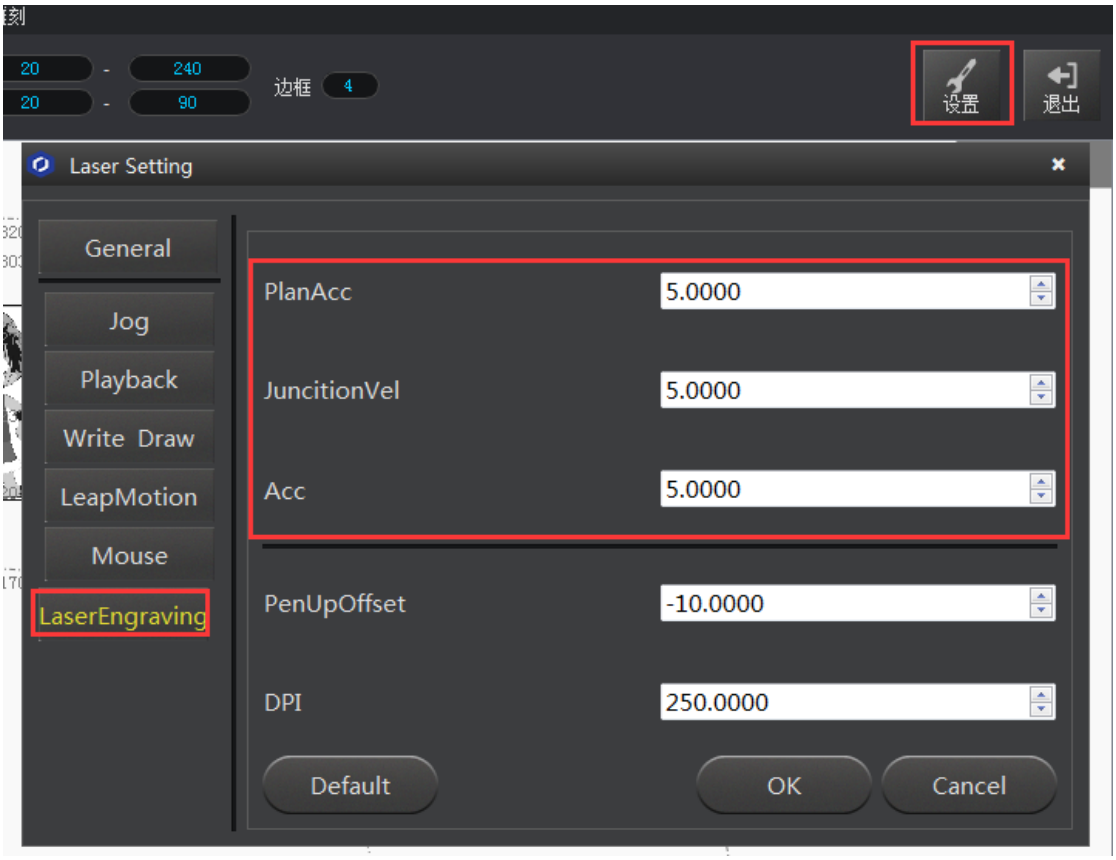


Figure 7.6 Set the parameter

7.4 Adjust Focus and Start to Engrave

1. Set the endeffector as **Laser**. **Settings-> EndEffector->Laser**, shown in follows:

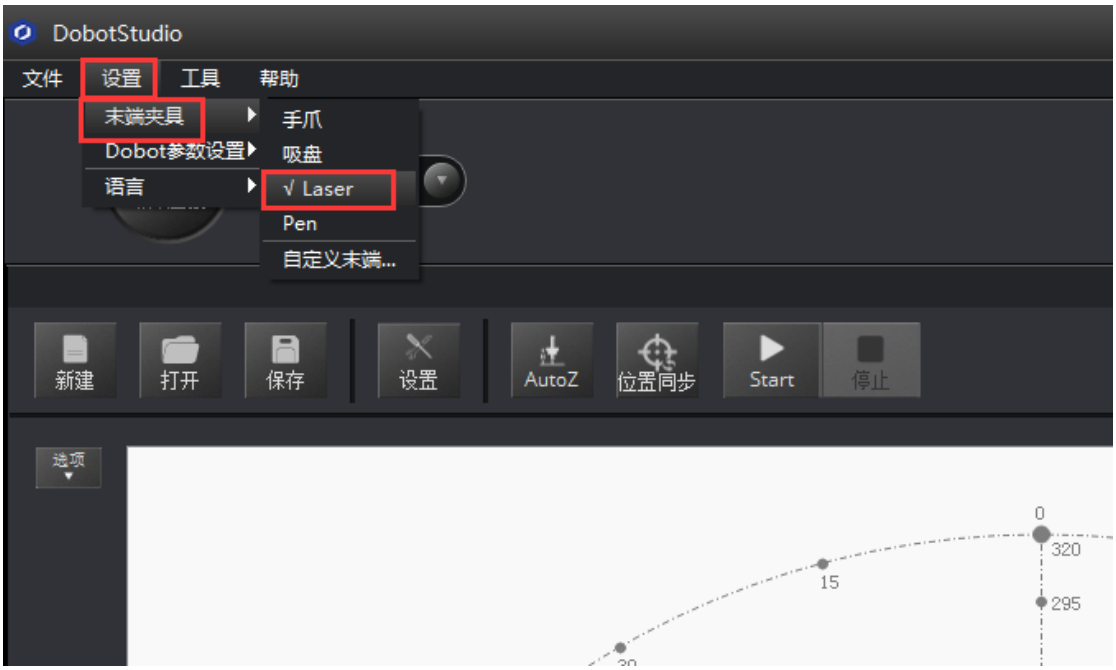


Figure 7.7 Set EndEffector

2. Focus adjustment. Adjust the distance between the laser and engraving material, check **ON** to open the laser.

Figure 7.8 Check the laser

Press and hold down the Unlock (the white button on the forearm) adjust knob to proper focus, if it shown as the brightest dot of Facularpoint, this will be the most proper height. There will

be signs of burn on the material when get sufficient laser power.
If still cannot focus, just rotate the metal knob at the bottom of laser to adjust.

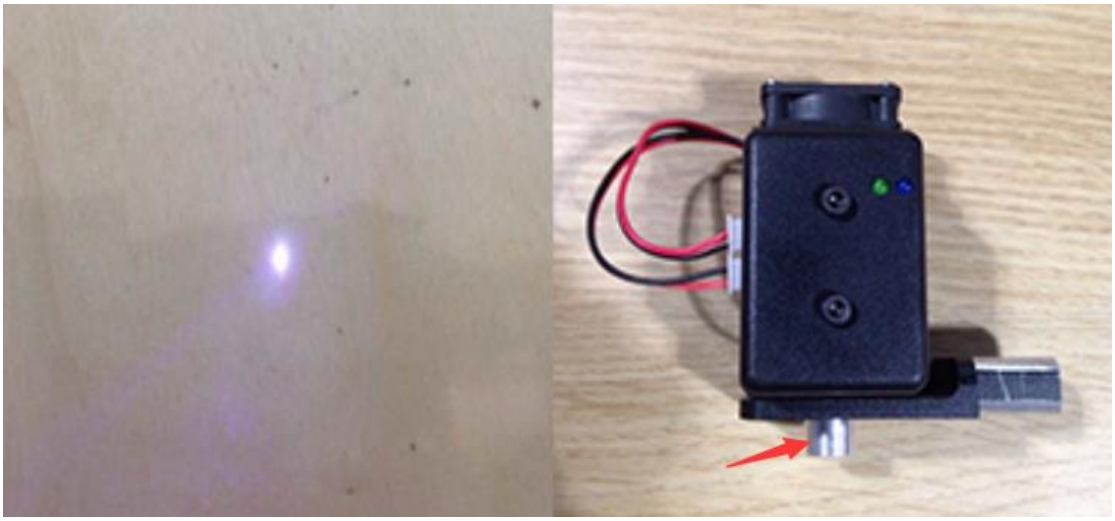


Figure 7.9 Focus adjustment

⚠ Notice：

The laser can heat object when it is in focused state, objects like paper board or wood can be engraved or burned.

! DO NOT focus the laser on people or animals

! DO NOT let children play with it alone.

! The process needs to be monitored when it is running

! After the process please turn off the laser promptly

3. Click AutoZ and get the current Z value(You needn't adjust the distance manually next time , **import pictures->Synchronous->Start**)

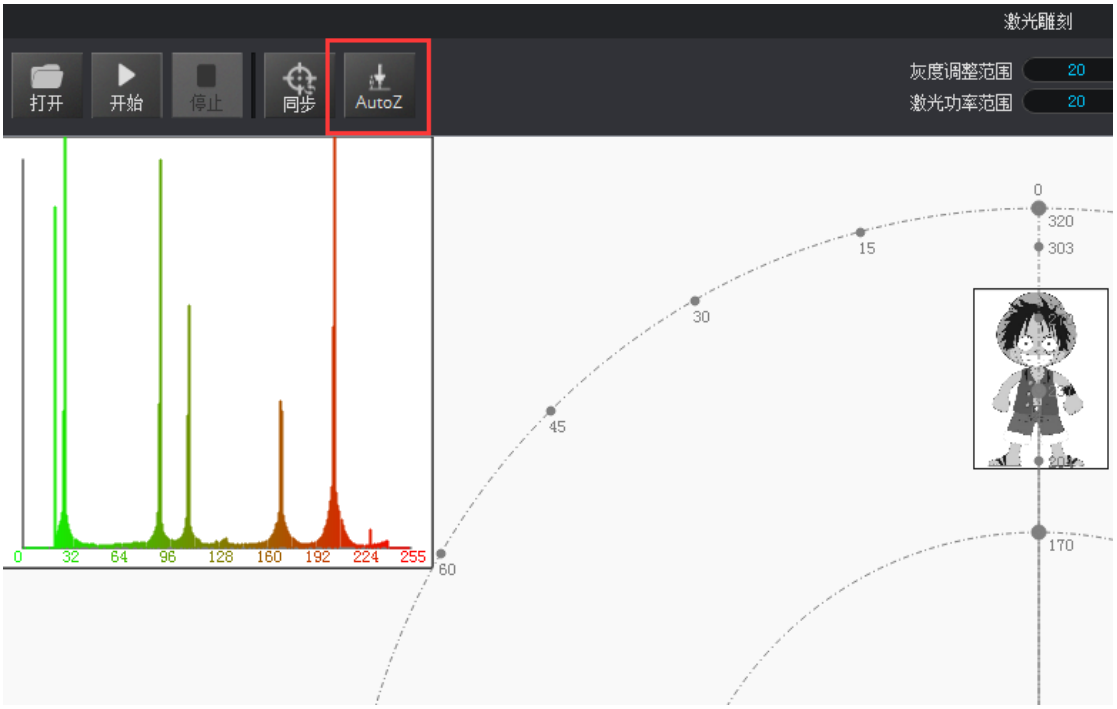


Figure 7.10 Lock the height

Saved value of Z, check from here:

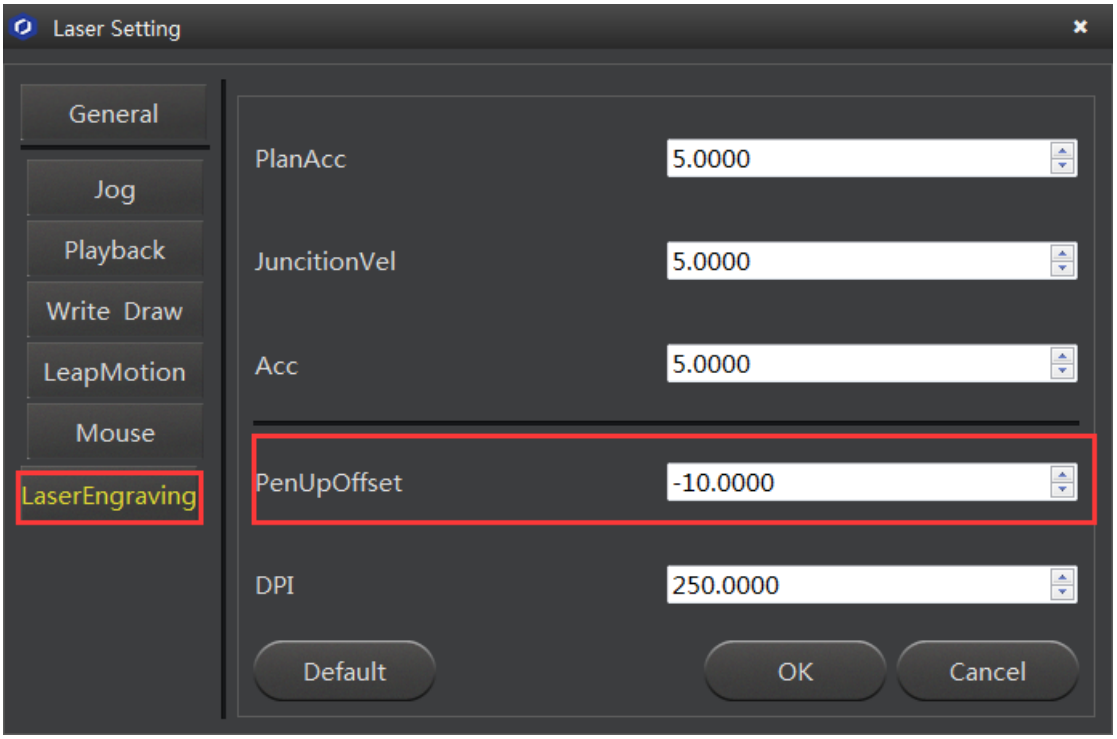
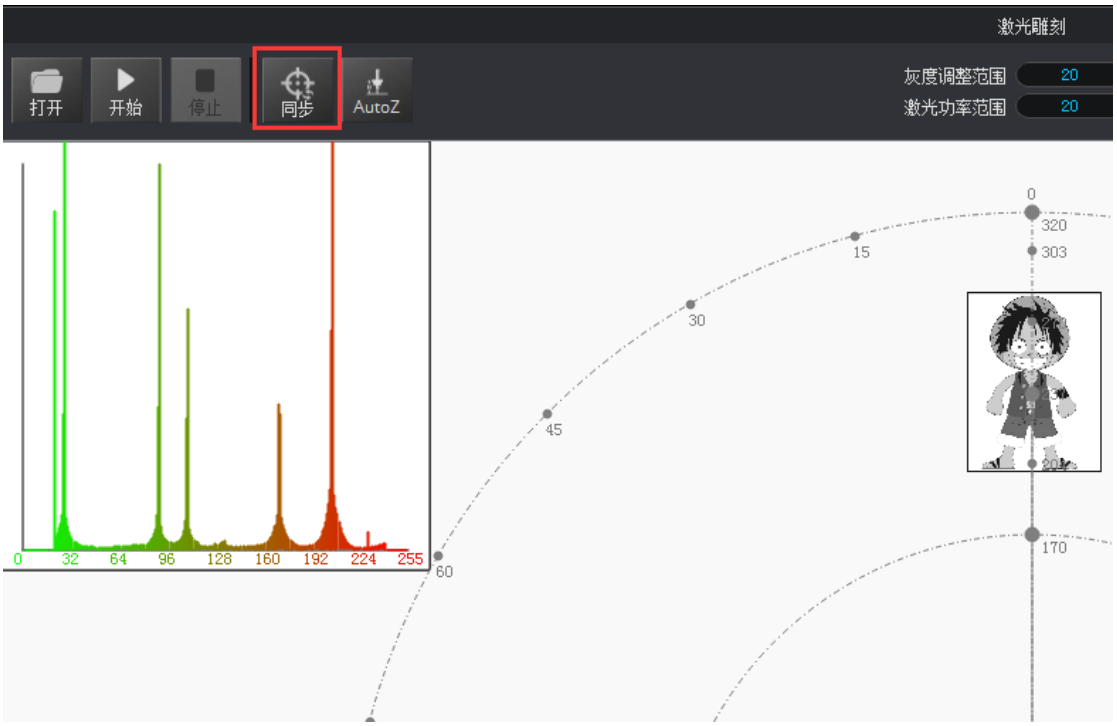


Figure 7.11 Check the height

If the effect is not very well, finetune the laser height, also can modify the pendown value.

4. After focus adjustment, click SyncPos, Dobot will move to the start position.



5. Click Start, pause and stop to control Dobot.
6. The effect is shown as follows:

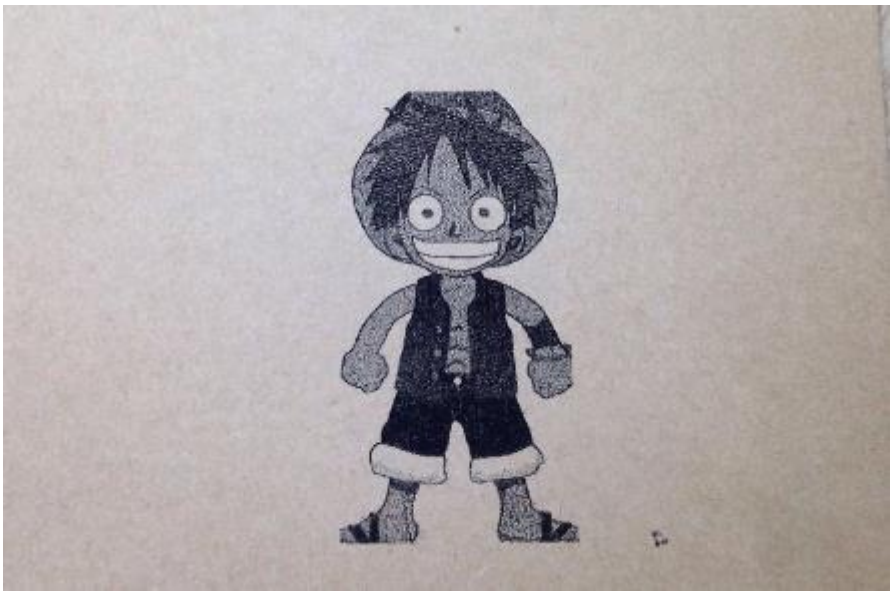
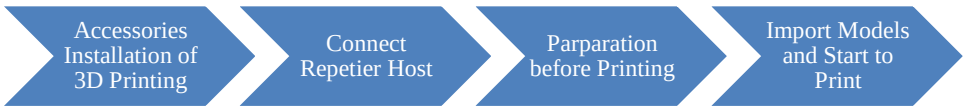


Figure 7.12 The Engraving Effect

8. The Tutorial of 3D Printing

The whole flow chart of 3D printing as shown below:



3D printing can use Repetier Host and Cura of main stream:

- Cura: Slice up is fast and stable, strong inclusiveness to 3D model structure, less parameter settings and so many other strengths, which has more and more users.
- Repetier-Host: It can slice up, check and modify G-Code, control 3D printing manually. While it doesn't offer slice up searching but call other slice up software, such as CuraEngine, Slic3r and so on. More parameter settings, more flexible.

Here will introduce the details separately from the second step.

Note: In Mac system, Dobot can only be avaliable for Cura, refer to the tutorial of Cura.

8.1 Installation of Accessories of 3D Printing

3D printing accessories: extruder, hotend, motor cable and filament, shown as follows：:

Figure 7.1 **Accessories of 3D Printing**

The steps as follows:

1. Press down the lever on the extruder by hand, and push down the filament to the bottom of the hole via the pulley;

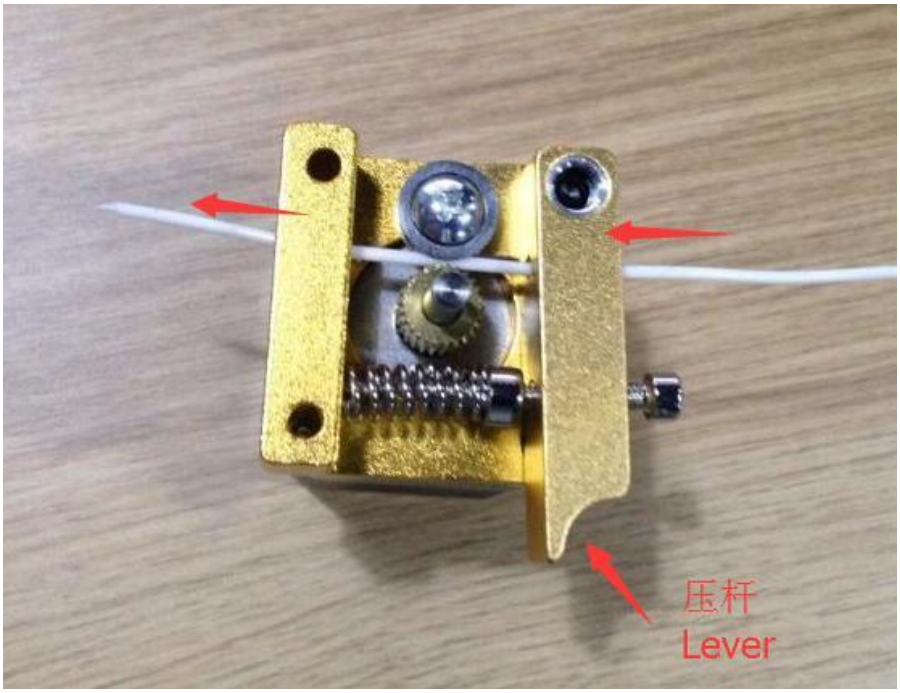


Figure 7.2 Insert filament

2. Insert the filament to PTFE Tube and push it down the bottom of the hotend, then tighten the Push-in fitting on the extruder. Notice: Make sure the PTFE Tube itself is push down to the hotend bottom, otherwise, it will cause abnormal discharge.

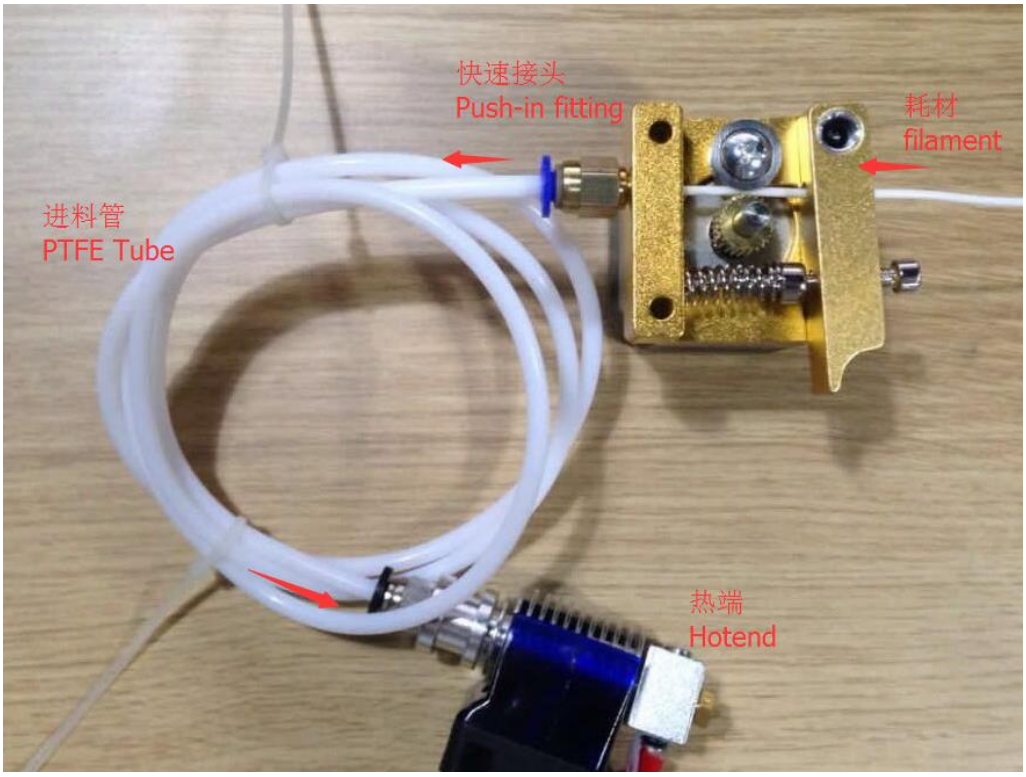


Figure 7.3 Connect extruder and hotend

3. Fasten hot end with butterfly nut;

4. Connect power line of heating cable with interface 4 of forearm, link power line of fan with interface 5, connect thermistor line with interface 6;

Figure 7.4 Connection of forearm

5. Connect extruder motor line with Stepper1 on the controller.

Figure 7.5 Connection of extruder

6. The whole kit shown as follows:

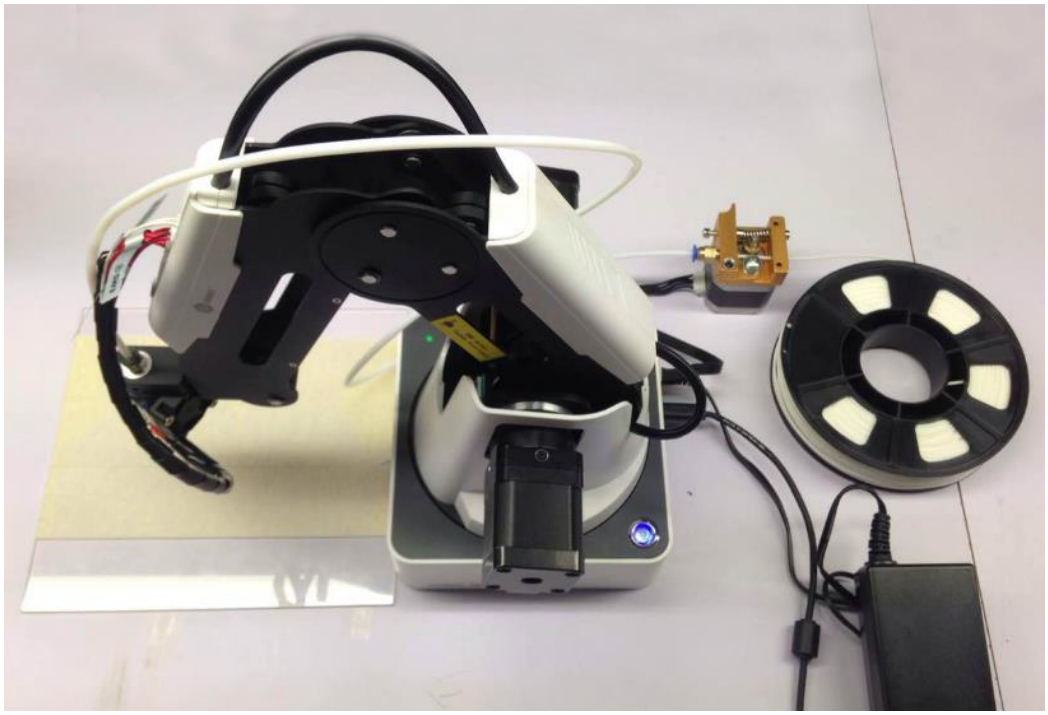
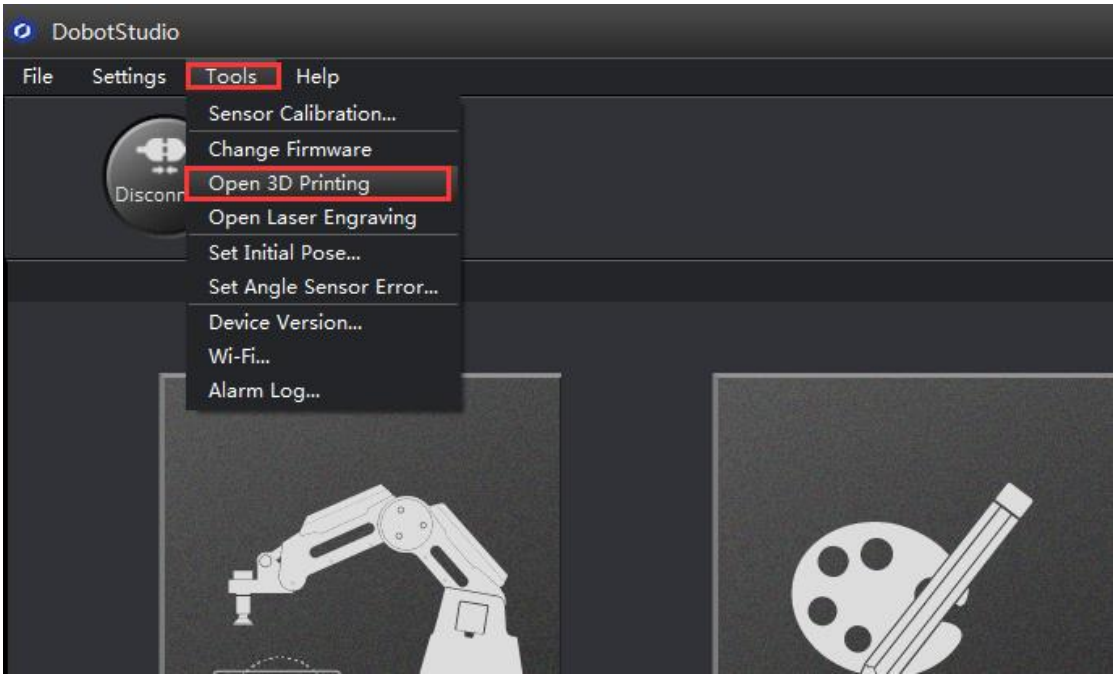


Figure 7.6 3D printing installation

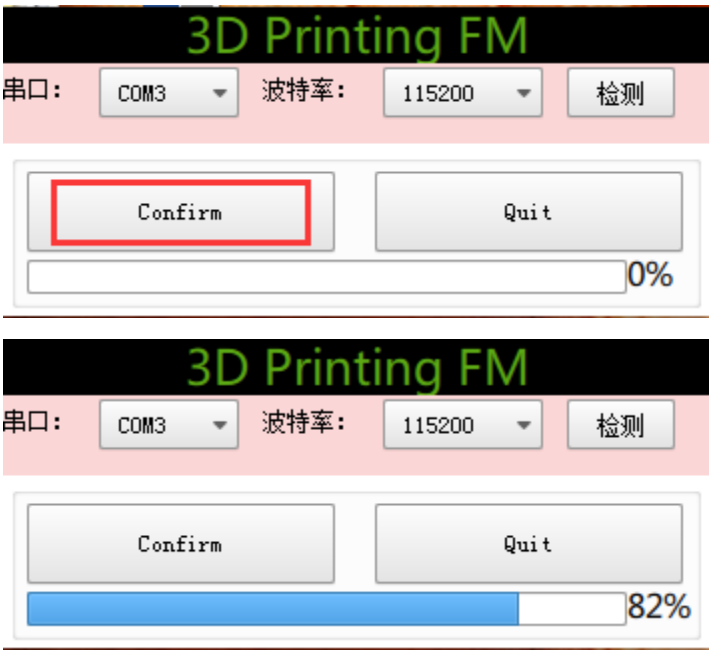
8.2 Repetier Host

8.2.1 Switch into 3D printing

Repetier host has been built in DobotStudio. Open DobotStudio, click **Tools-> Open 3D Printing**:



Here will pop up a dialog of 3D printing burning firmware, click **Confirm**, and then will pop up software interface Repetier Host automatically, as follows::



The interface of Repetier Host:

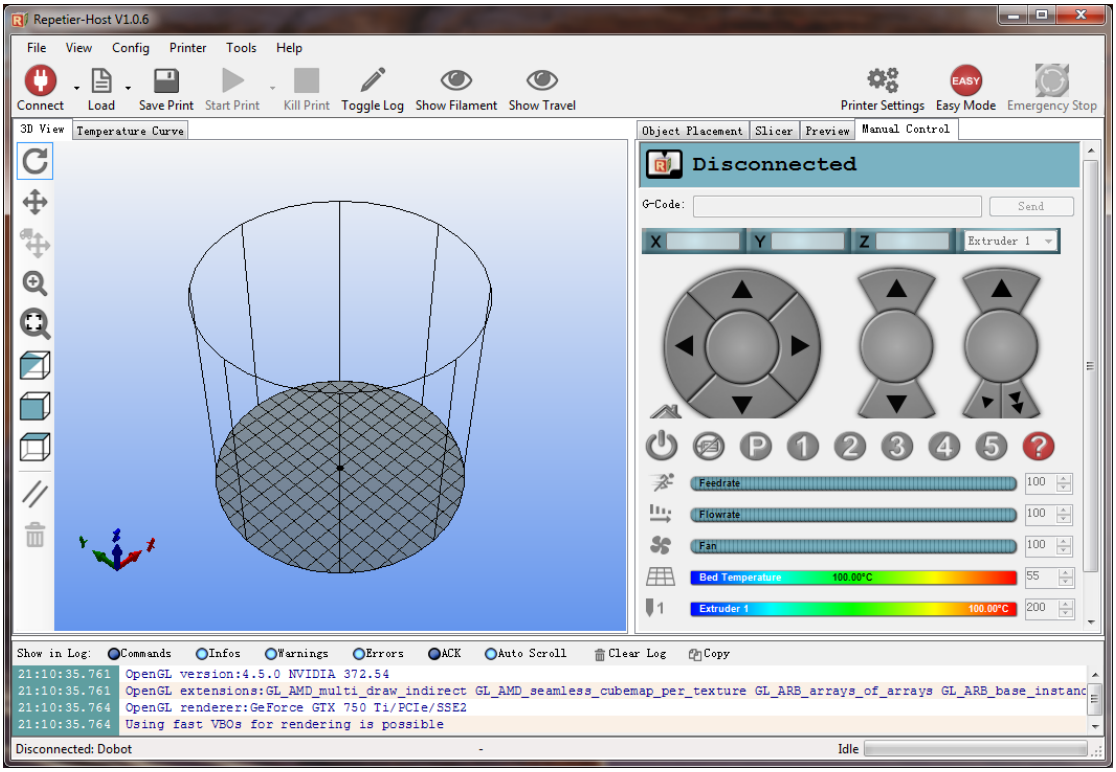


Figure 7.7 Repetier host

Note: If the current software has been 3D printing, you can open DobotStudio directly when you want to use next time. Click **Connect**, select **Ok**, and then you can switch to Repetier Host, as follows:

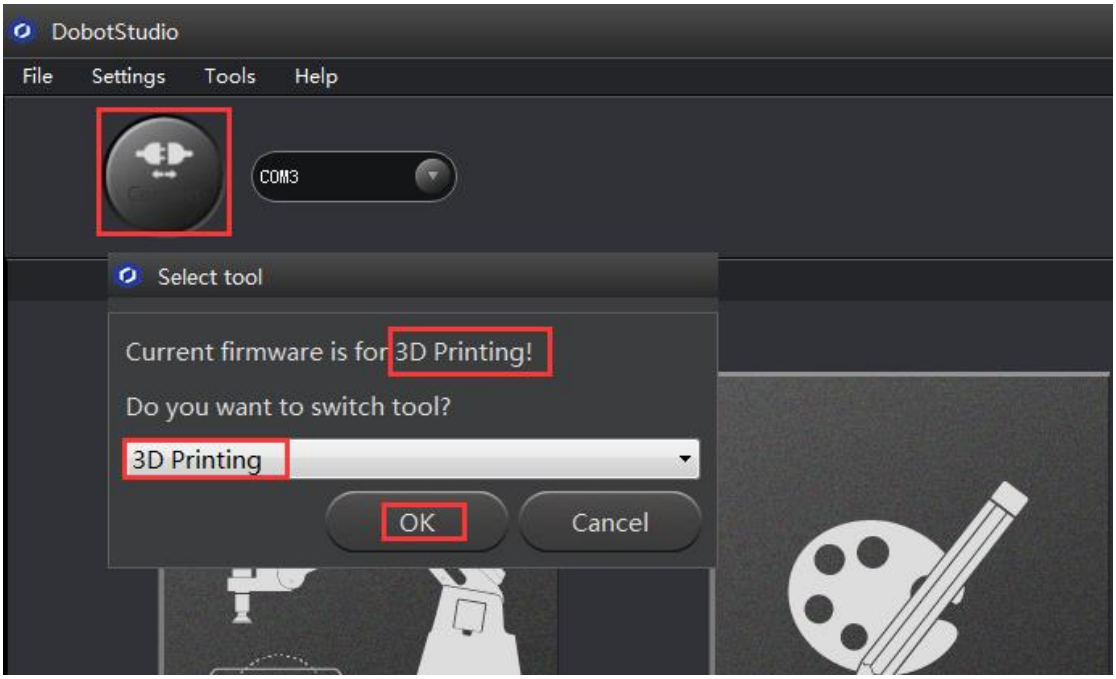


Figure 7.8 Switch into 3D printing automatically

8.2.2 Parameter Settings of 3D printing for the first time

when you use it for the first time, and later you need not to set again.

Click '**Printer settings**' in the top right corner of the interface, and set related parameters in the pop up diaglogue box:

(1)Connection lable settings

Printer Name: Dobot (can be named by oneself)

Select Dobot Serial Port: Dobot serial port

Baud Rate: 115200

Reset on connect:DTR low->high->low

Reset on Emergency： Send emergency command+DTR high->low(If failed to connect, please try other options)

Receive cache size: 63

The rest keep the default settings, click **Apply** after setting.

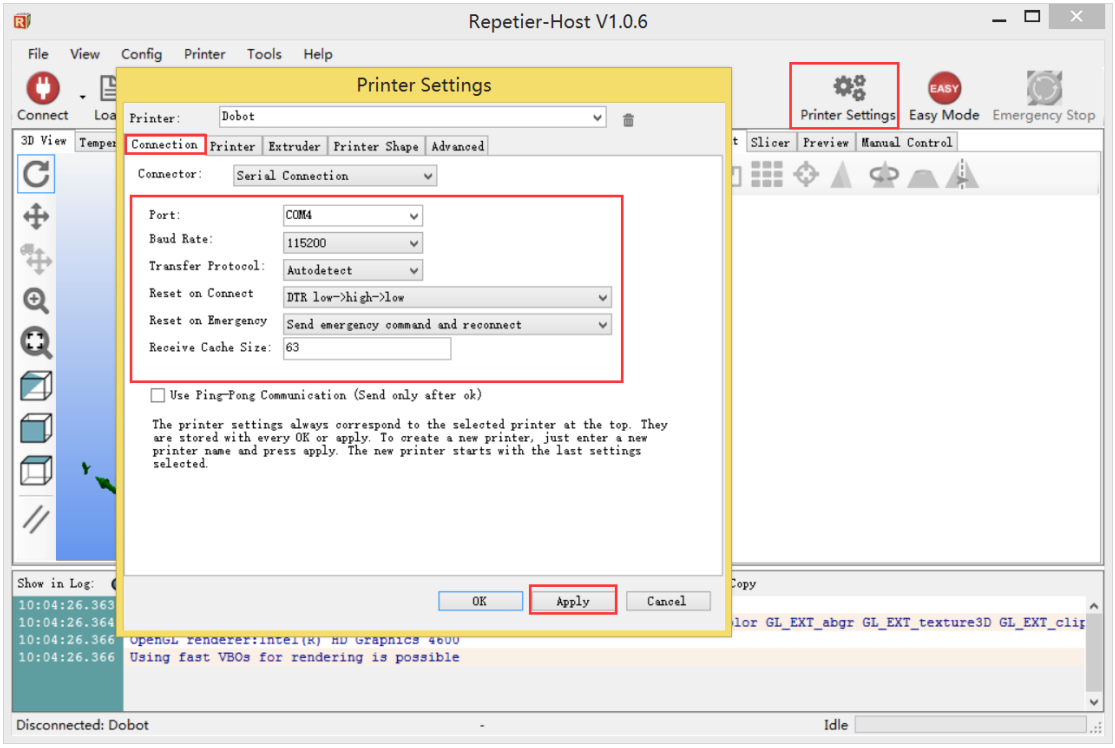


Figure 7.9 Connection Settings

（2）Connection Lable Settings

uncheck the following three settings and keep the rest default:

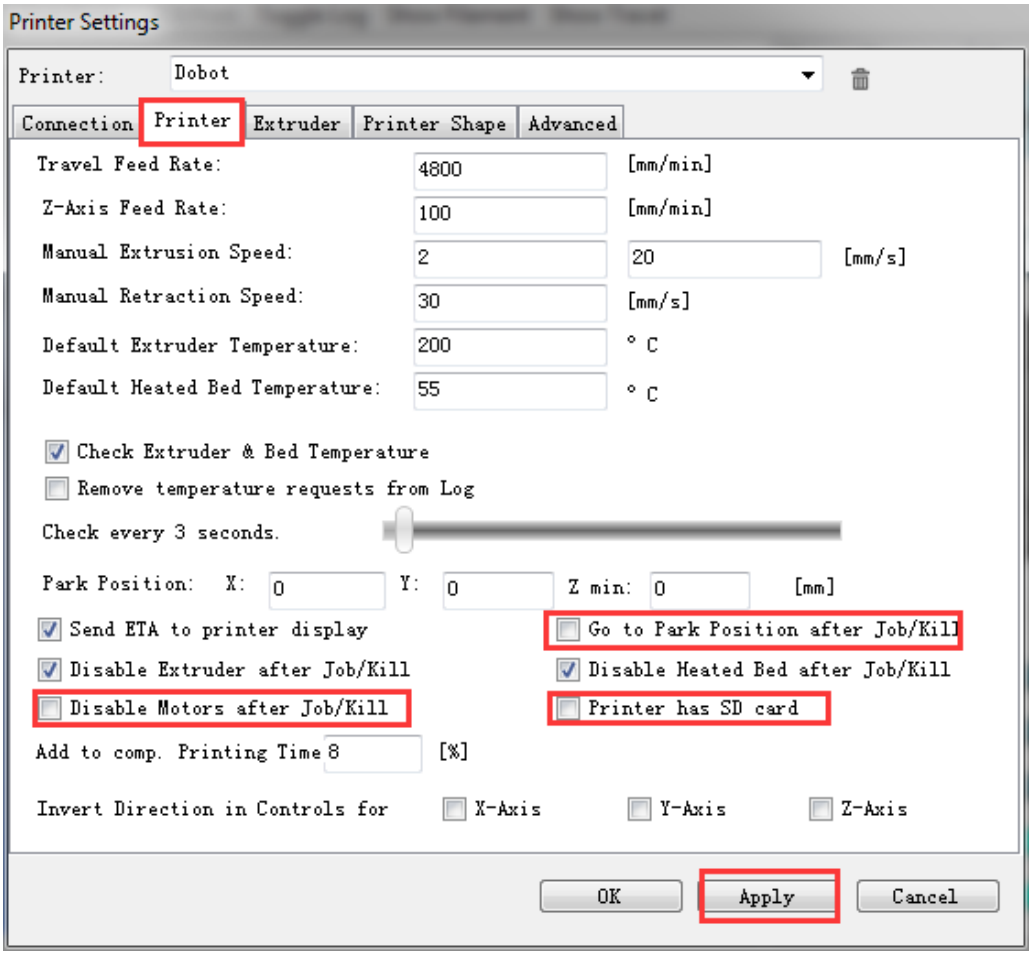


Figure 7.10 Printer settings

（3）Extruder Settings

The number of extruder setting: 1

The nozzle diameter: 0.4mm

Keep the rest default.

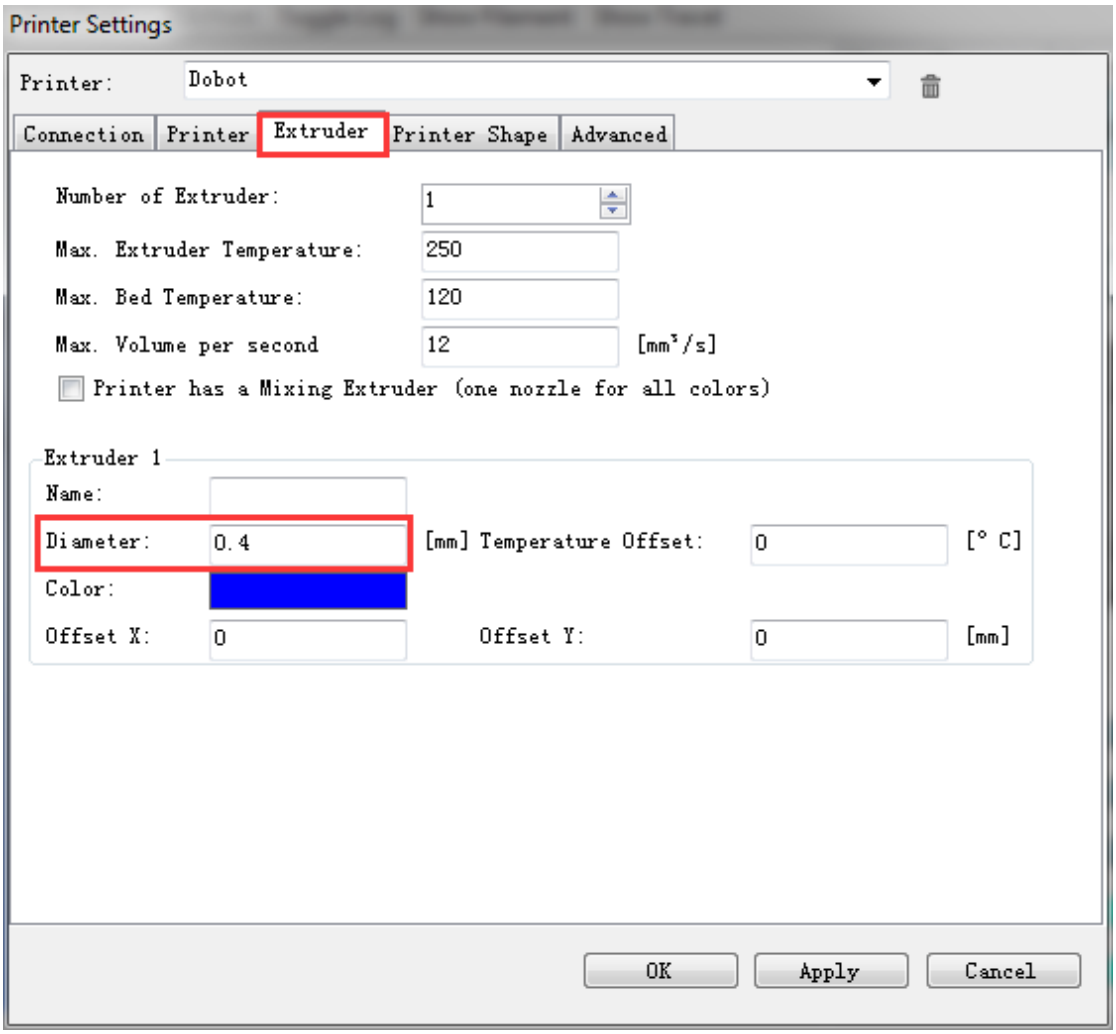


Figure 7.11 Extruder Settings

（4）Printer Shape Settings

Select **circle printer** and the detailed parameters as follows:

Home X： Min

Home Y： Min

Home Z： 0

Print area radius: 80mm

Print area height: 150mm

Click **Apply** after setting.

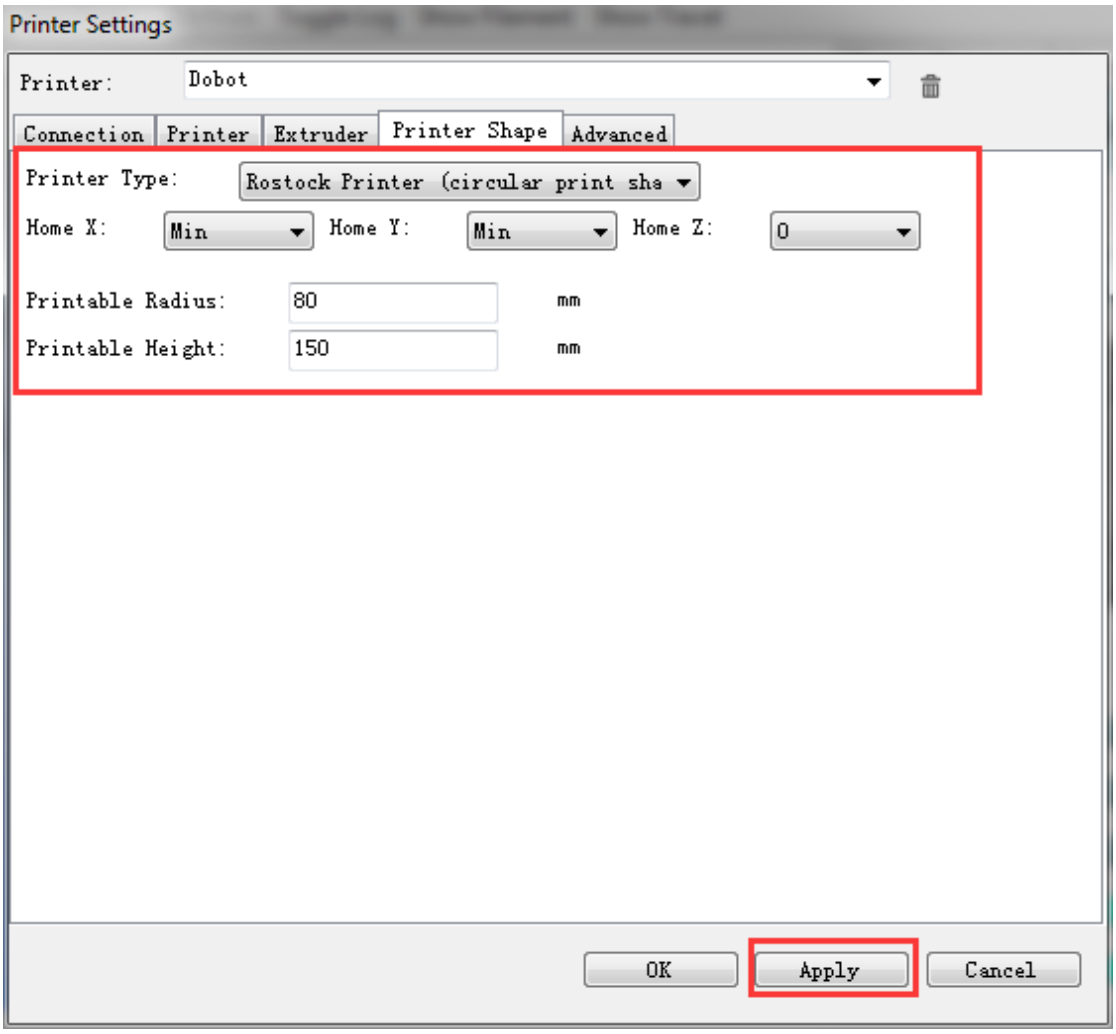


Figure 7.12 Printer Shape Settings

After setting parameters, return to main interface, open Dobot main power supply, insert USB, and click **Connect** at the top left corner of main interface, then we can connect Dobot. The led will turn out green and the tempreture will be shown below the interface:

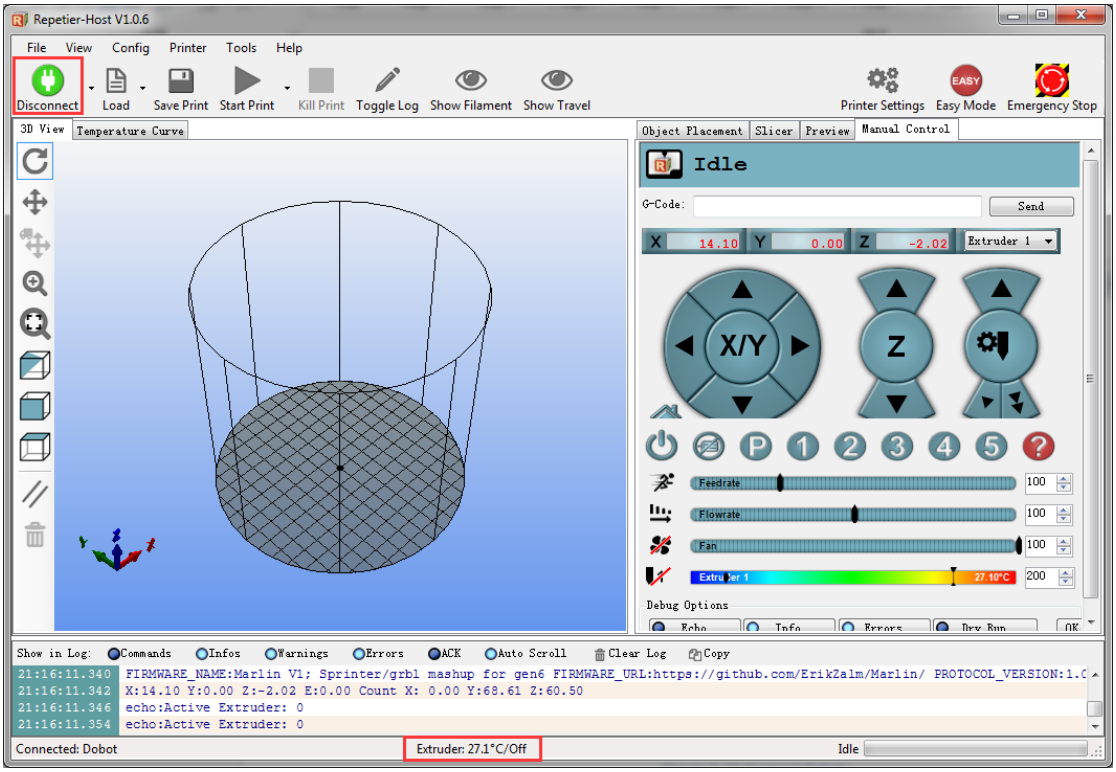


Figure 7.13 Connect Dobot

8.2.3 Preparation before Printing

It will work when the temperature of extruder reaches above 170℃ and consumables are at melt state, so we should heat up extrusion head. Here set heating temperature to 200℃ and then click the **heating button**  on control panel to heat it.

⚠ Notice：

The heating rod will produce high temperature up to 250℃, please be careful!

DO NOT let children play with it alone.

The process needs to be monitored when it is running.

After the process please turn off the equipment promptly.

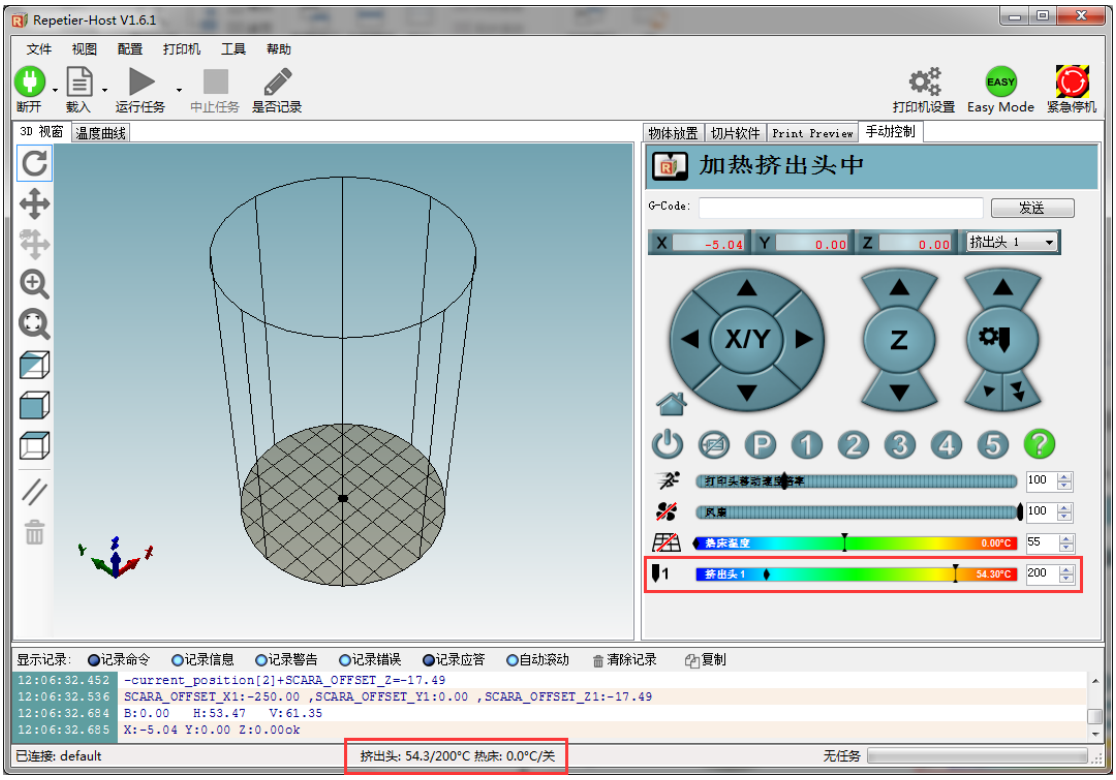


Figure 7.14 Heat the Extrusion Head

When the heating temperature is up to 200℃, click feedstock of extruder up to 10-30mm, as shown below:

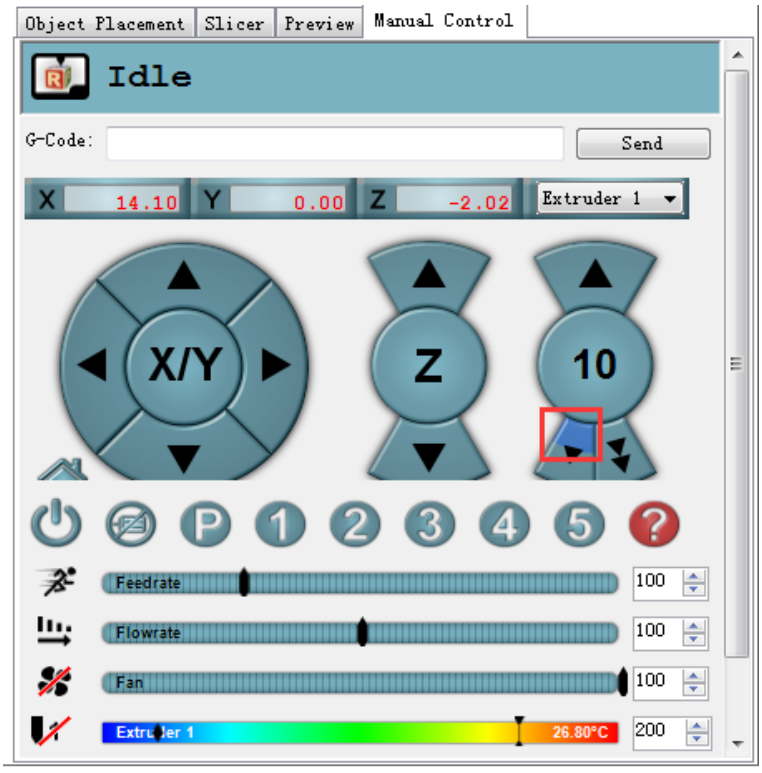


Figure 7.16 Extrude filaments

If melted materials flowed from nozzle of the extruder, then it means the extruder works properly:

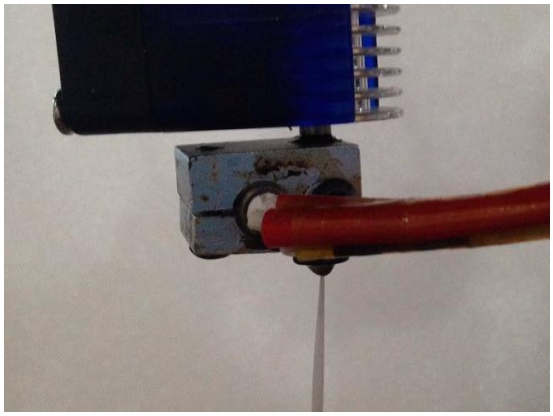


Figure 7.17 Filament Extrusion

Note: If the filament extrusion is in the opposite direction, for example, you can click feedstock, but it is discharging. Then you need pull out the filament totally from the extruder, turn the extruder to 180 °, and insert the filament, now you can get the right direction. Shown as below:

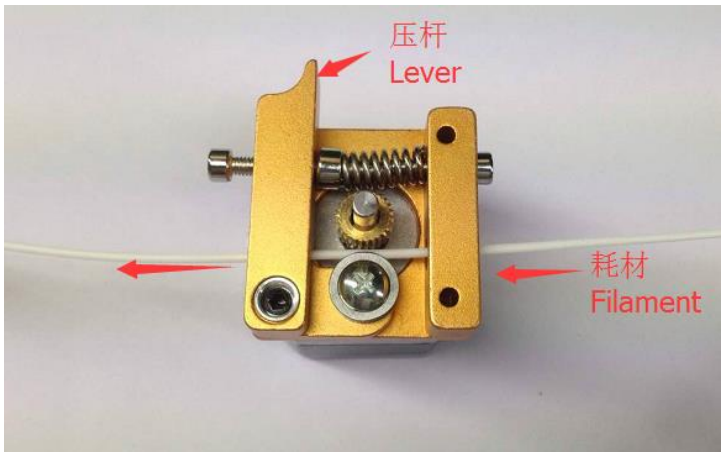


Figure 7.17 Reverse installation diagram of the extruder

8.2.4 Adjust the printing space and get printing coordinates

During the printing, if the distance between the nozzle and print is too large to paste the print bed of the first layer; If the distance is too small, which will cause consumables block. So we need to adjust the proper distance for smooth printing. Generally, the thickness of a sheet of paper is OK, paste a layer of masking tape on the glass print bed in order to add its adhesive property of the first layer.

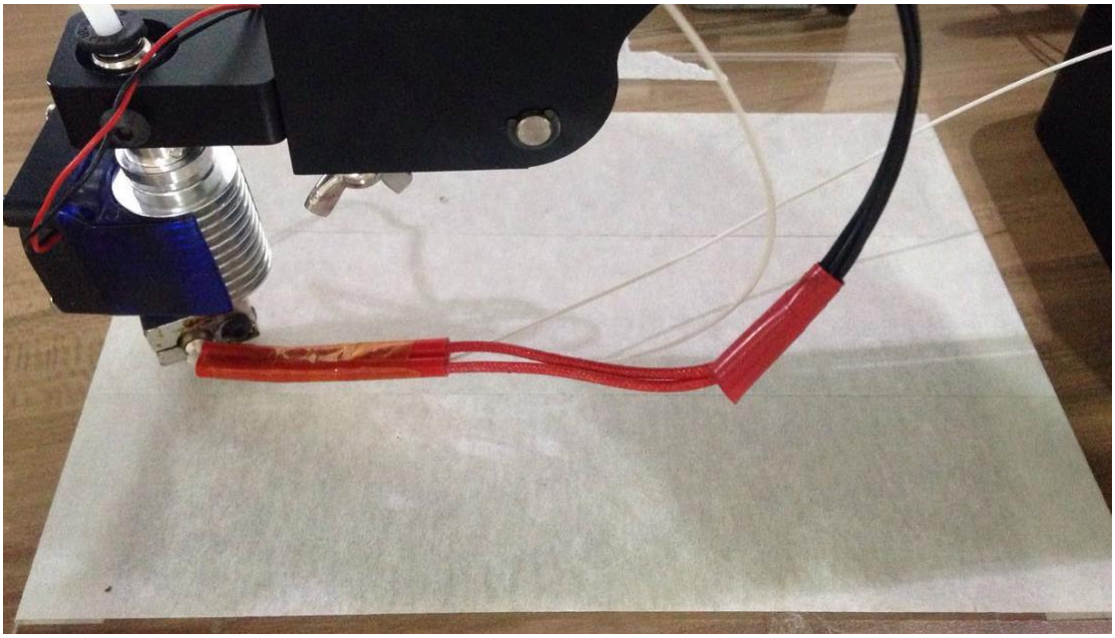


Figure 7.18 Masking tape

Adjustment process: Press **Unlock** key on the forearm, drag printing head to contact the surface of mask tape, and then press “key” at the base of dobot to save current Z value (or insert **M415** in the command line, enter and get the current Z value), now the adjustment is finished.

Notice:

After sending M415 or press “KEY”, Dobot will get the current coordinates, if successed, you will hear a beep; Also, you don’t need insert the command next time when printing next time, and just run the task is OK.

The window of command sending show as follows：

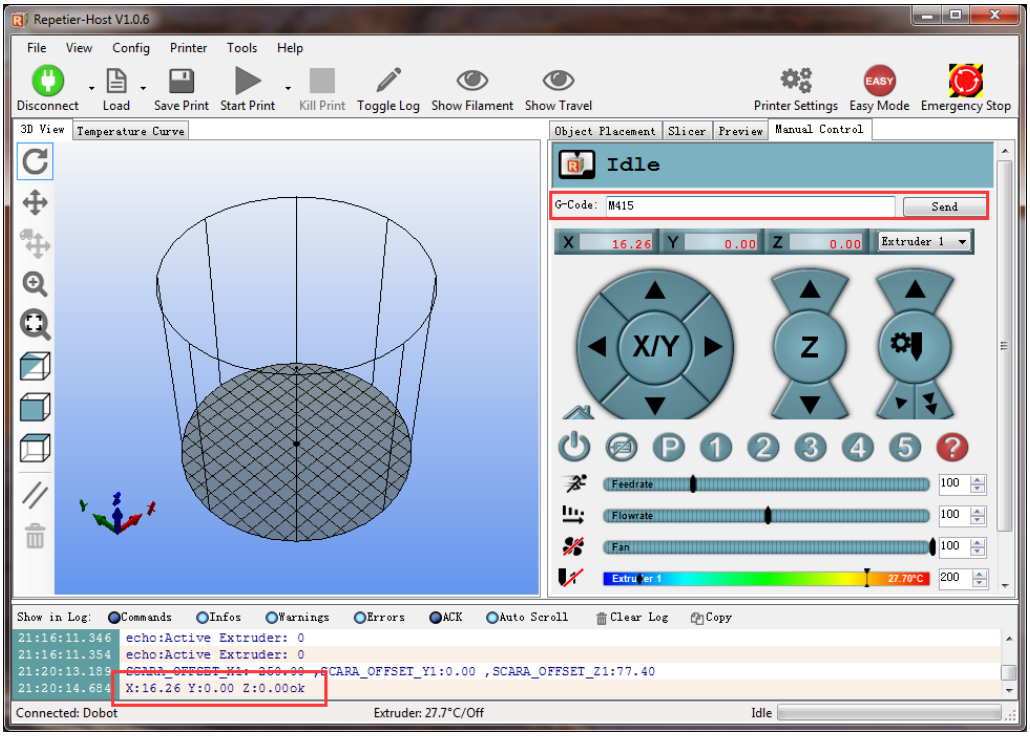
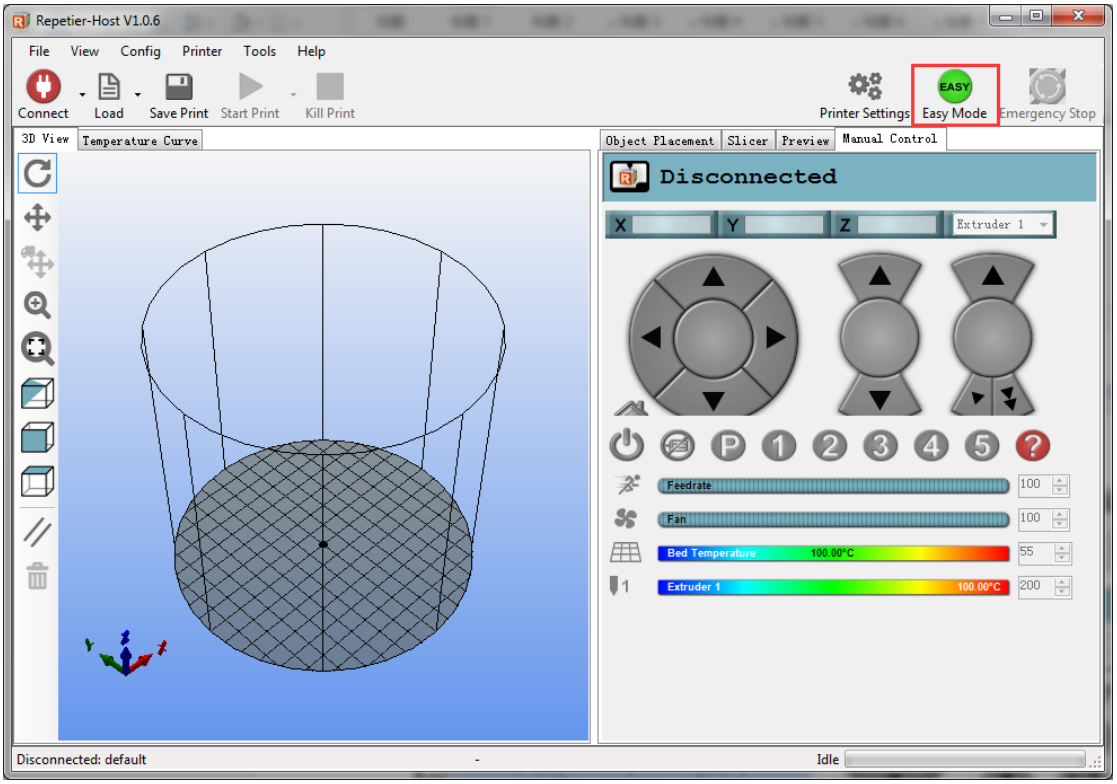
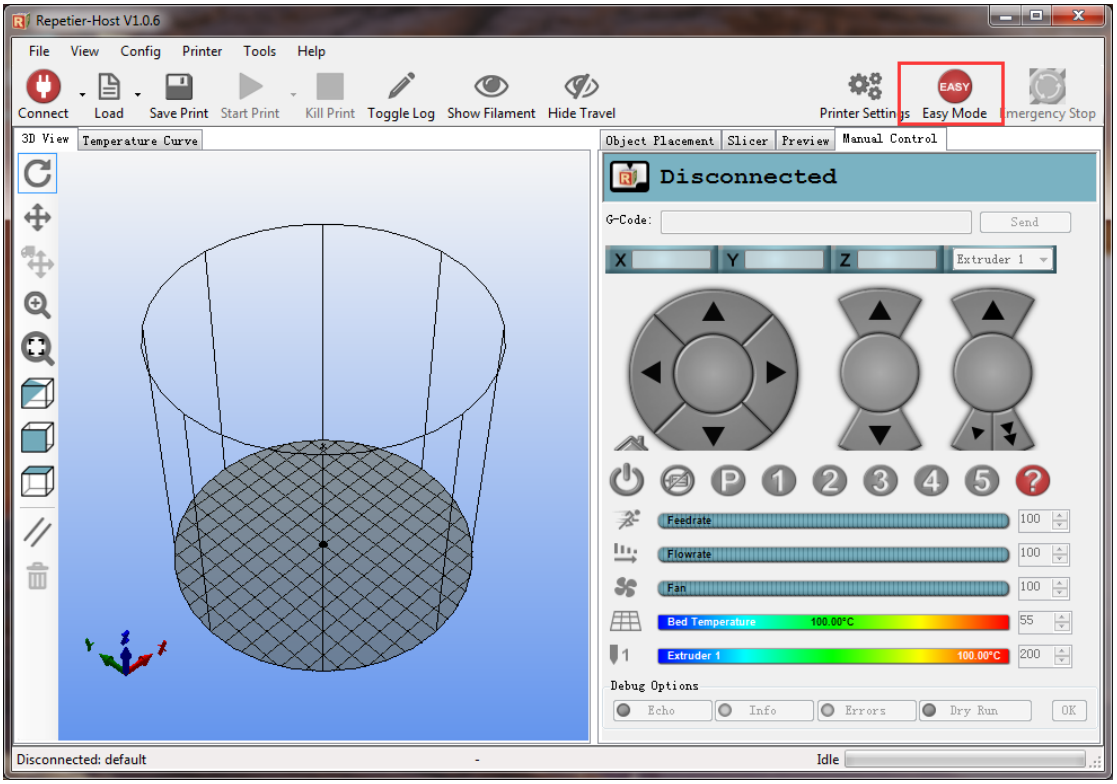


Figure 7.19 Sending out M415 command

3. If you cannot find the command line window, pls close **Easy** mode, shown as follows:





8.2.5 Import Model

The file format of 3D printing is STL employed universally.

Users can build one's own 3D model and transfer it into stl file, also, one can search free models to import them directly. Click open, import 3D model file of stl format, the details as follows:

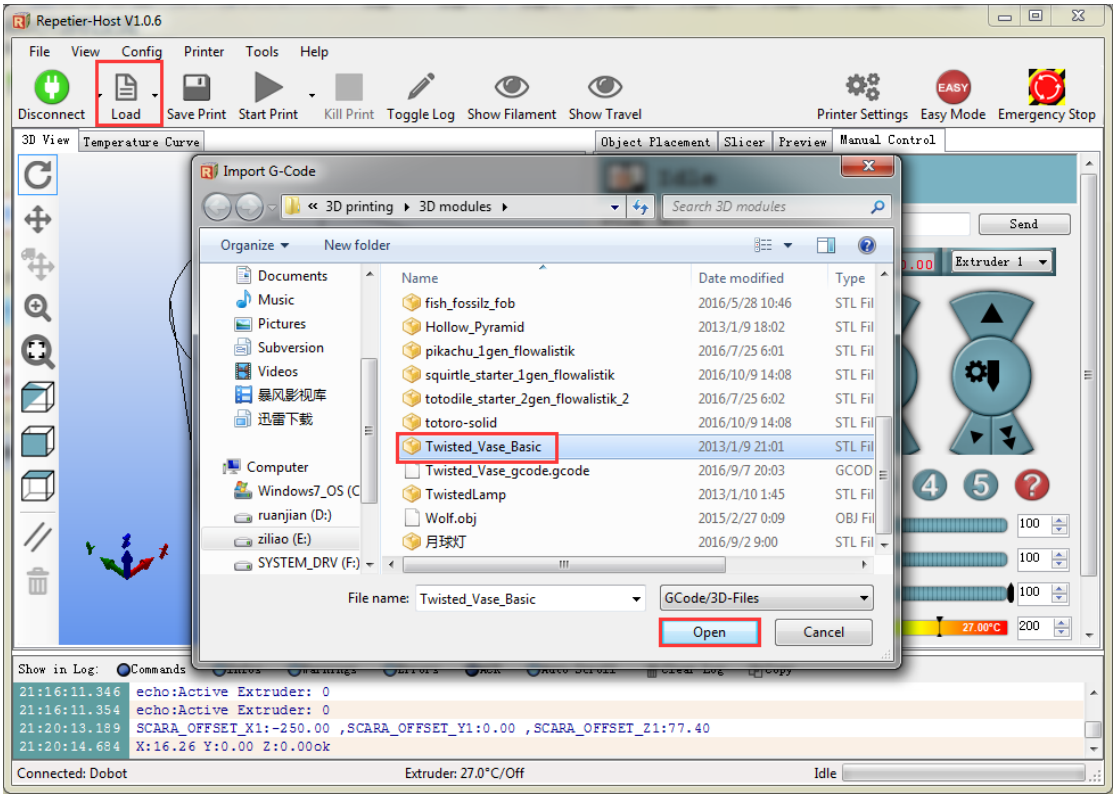


Figure 7.20 Import Models

Model Center/Scale: Users can operate the model to place in the middle, zoom or rotate and any other functions.

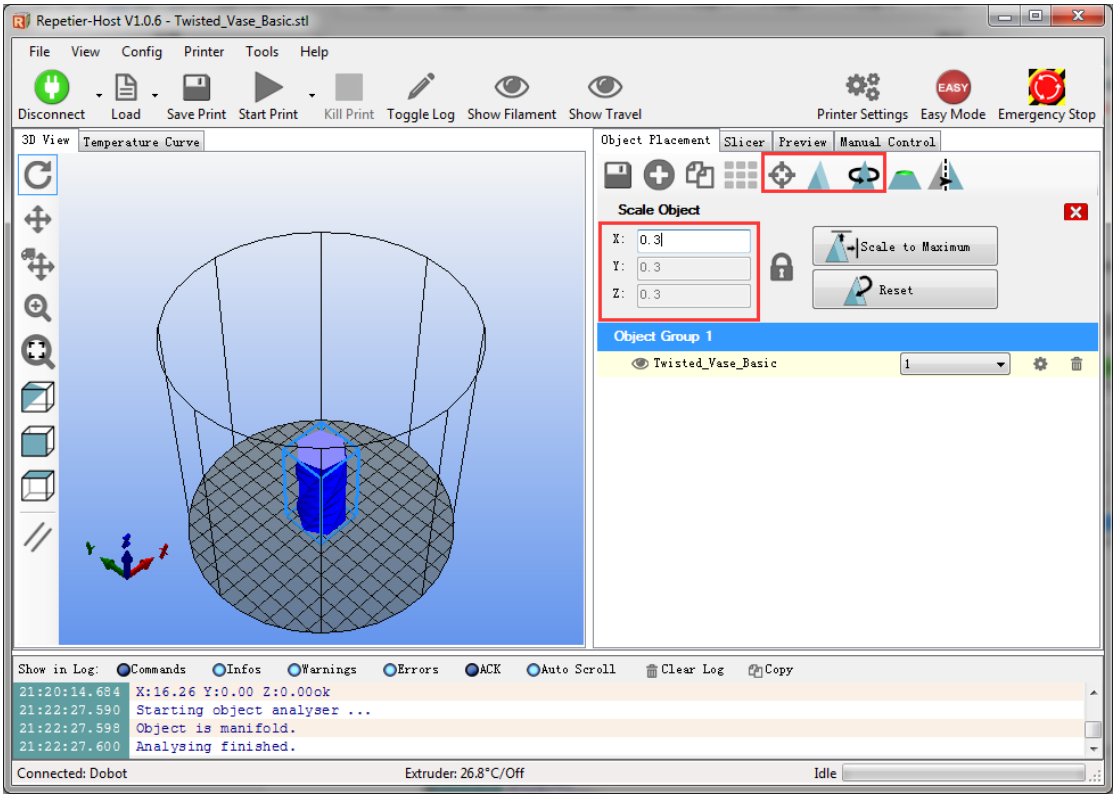


Figure 7.21 Model Center/Scale

8.2.6 Set slice parameters and slice up

Select slice engine Slic3r and click Configuration to set slice parameters.

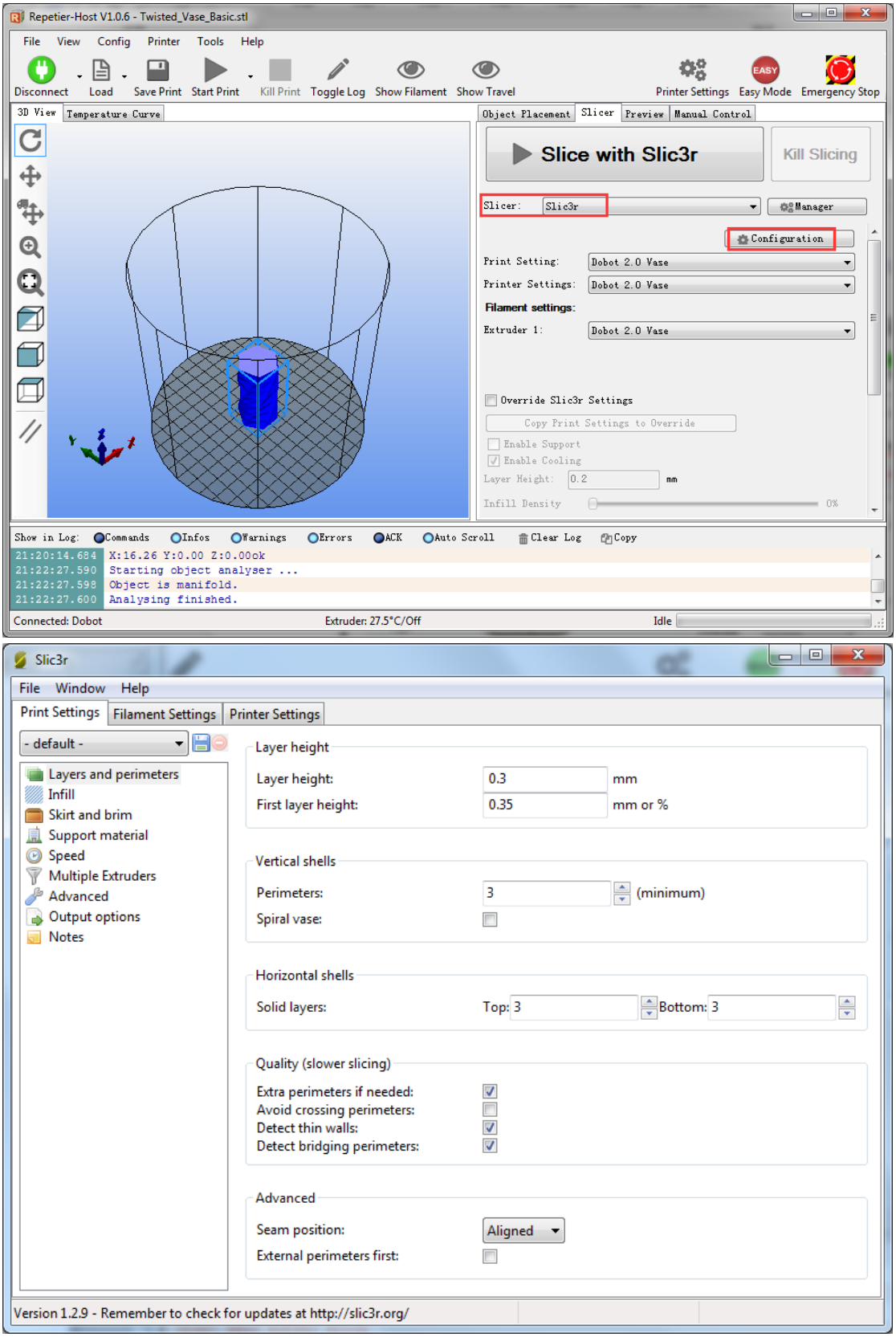


Figure 7.22 Main interface of parameter settings

It is vital to set slice parameters, in which users should get the best slice parameters according to printed models and tested performance of equipment. Here we suggest a configuration file that can be impoted from **attachement** of DobotStudio:

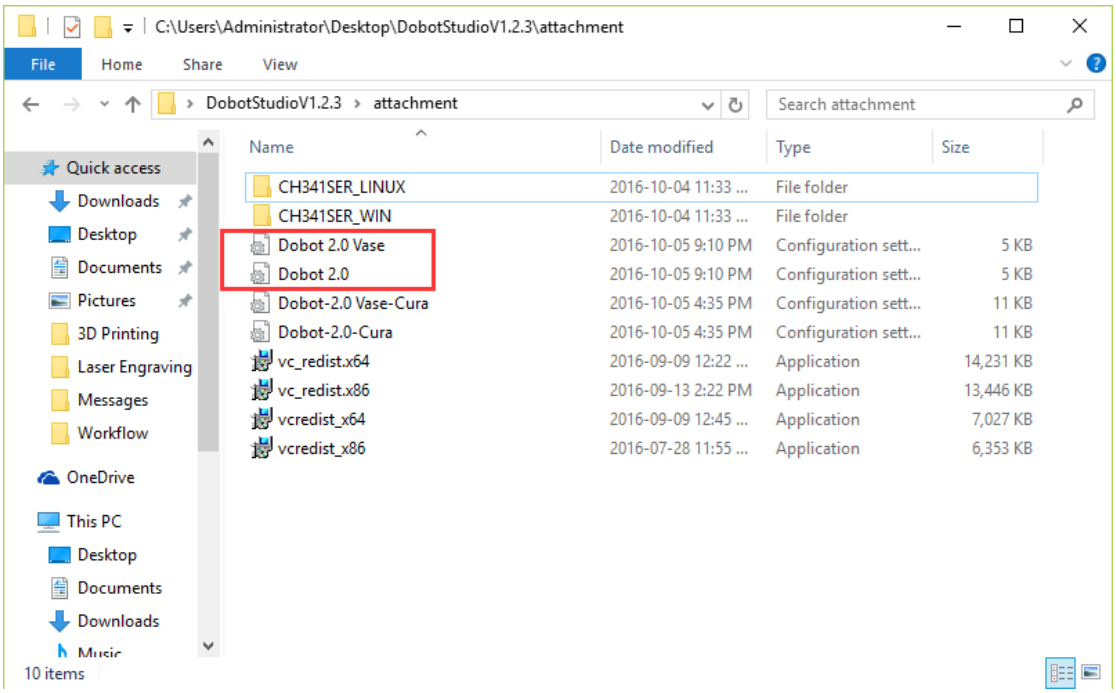
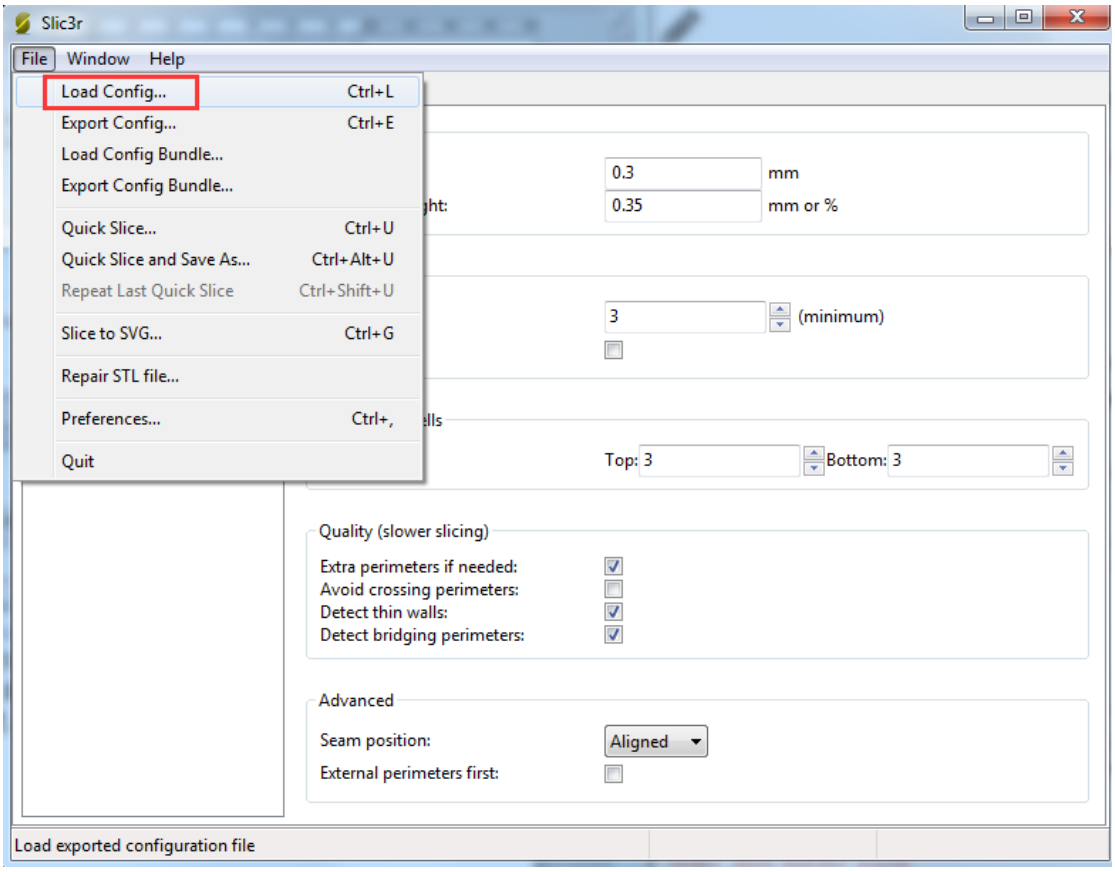


图 7.23 Config files

Dobot-2.0-Vase.ini is used for printing of thin-valled vase, while Dobot-2.0.ini is used for the filling of entity, the filling rate is 15%.

Import the file after downloading: Click **File->Load configto load**.ini file.



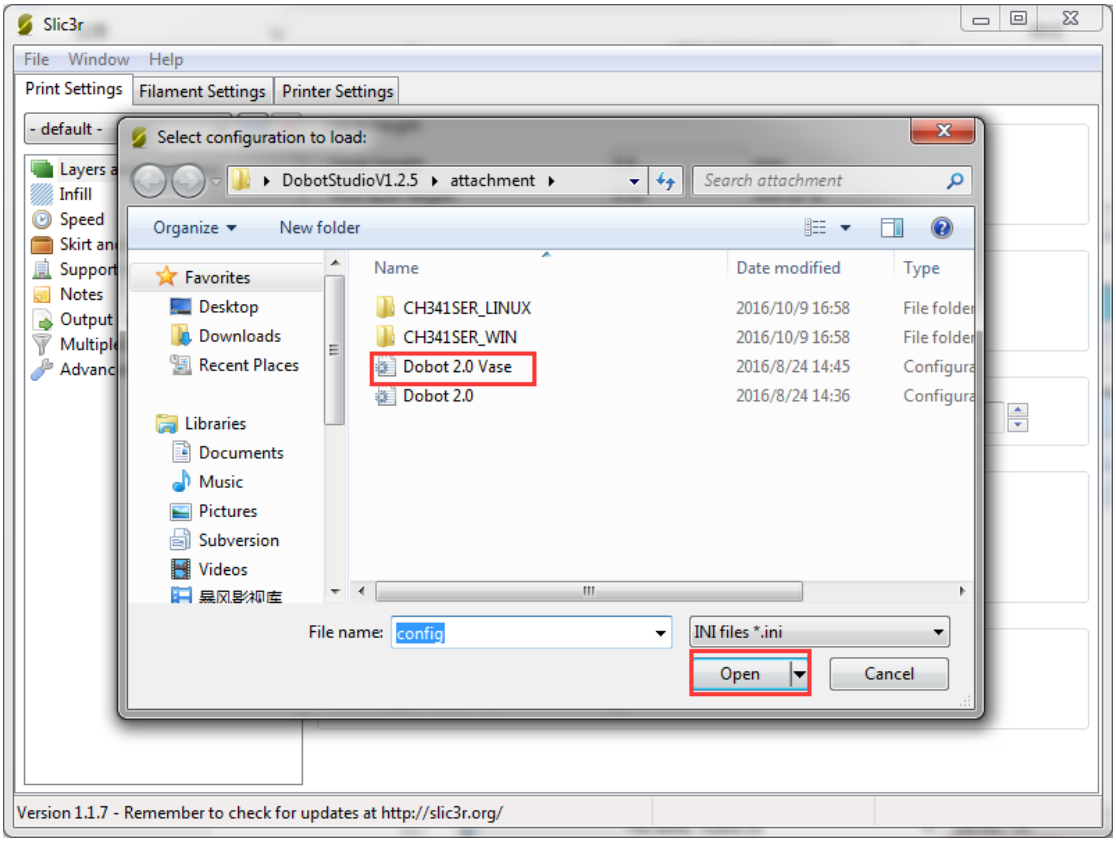


Figure 7.24 Import configuration file

After importing the file, users need to save the three lables: Print settings, Filament settings and Printer settings respectively, also, users can rename them, here we keep the default:

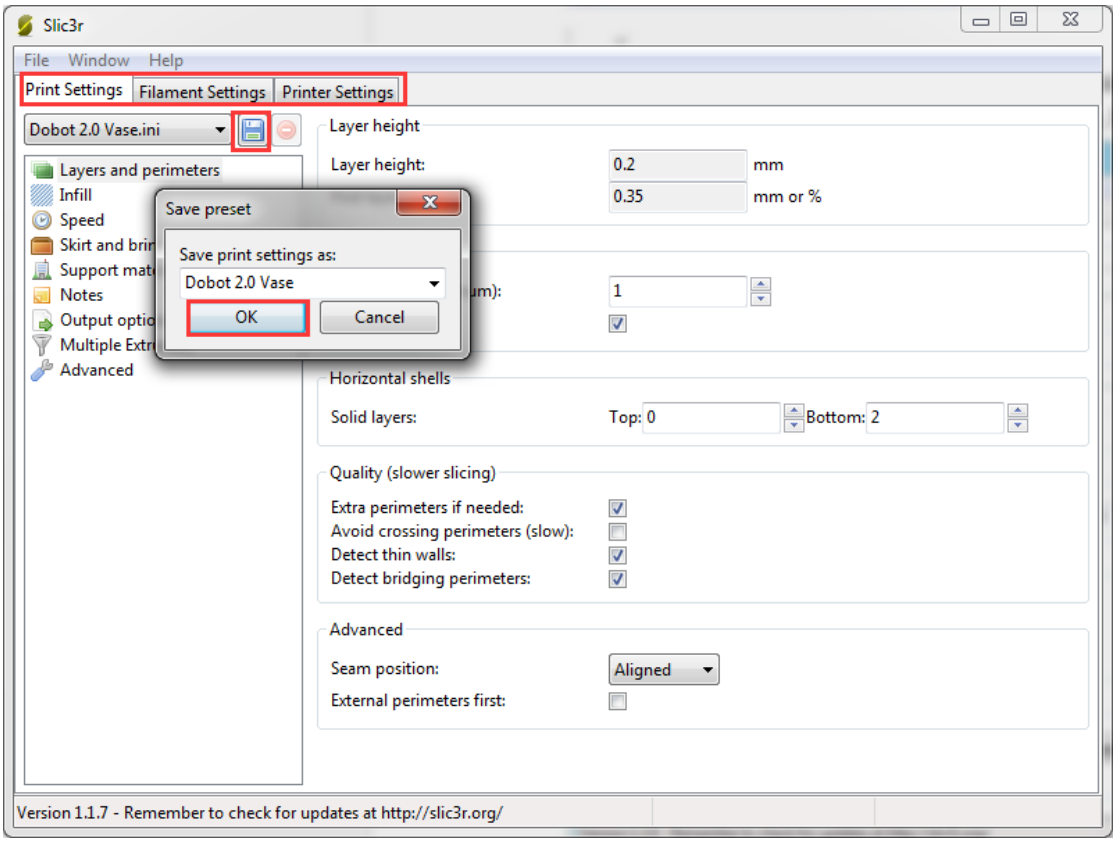


Figure 7.25 Save configuration file

Slice: After finishing above settings, save the settings of each label, and return to main interface. Select **slic3r** of slice engine, import slice settings and **click Slice with Slic3r**.

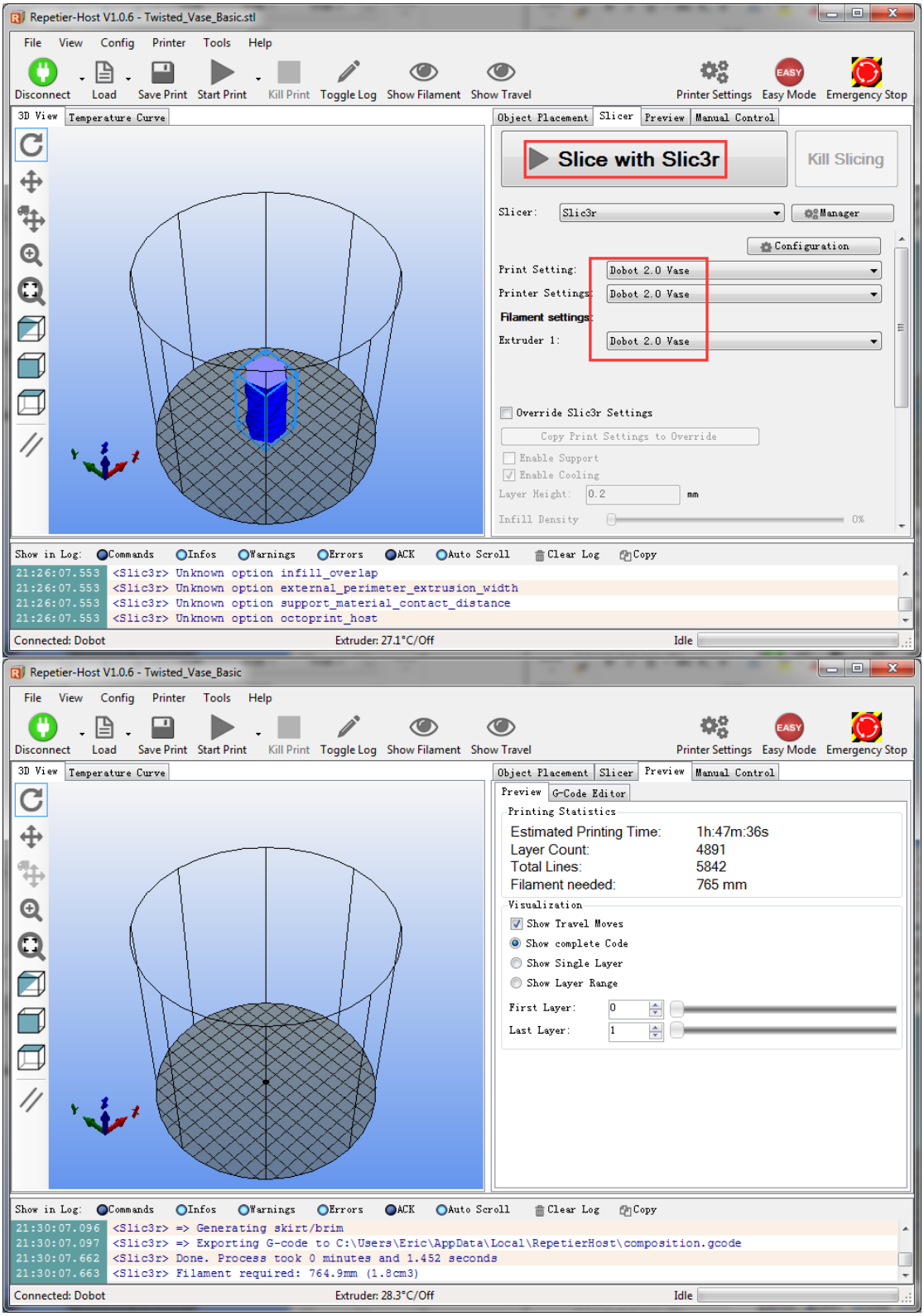
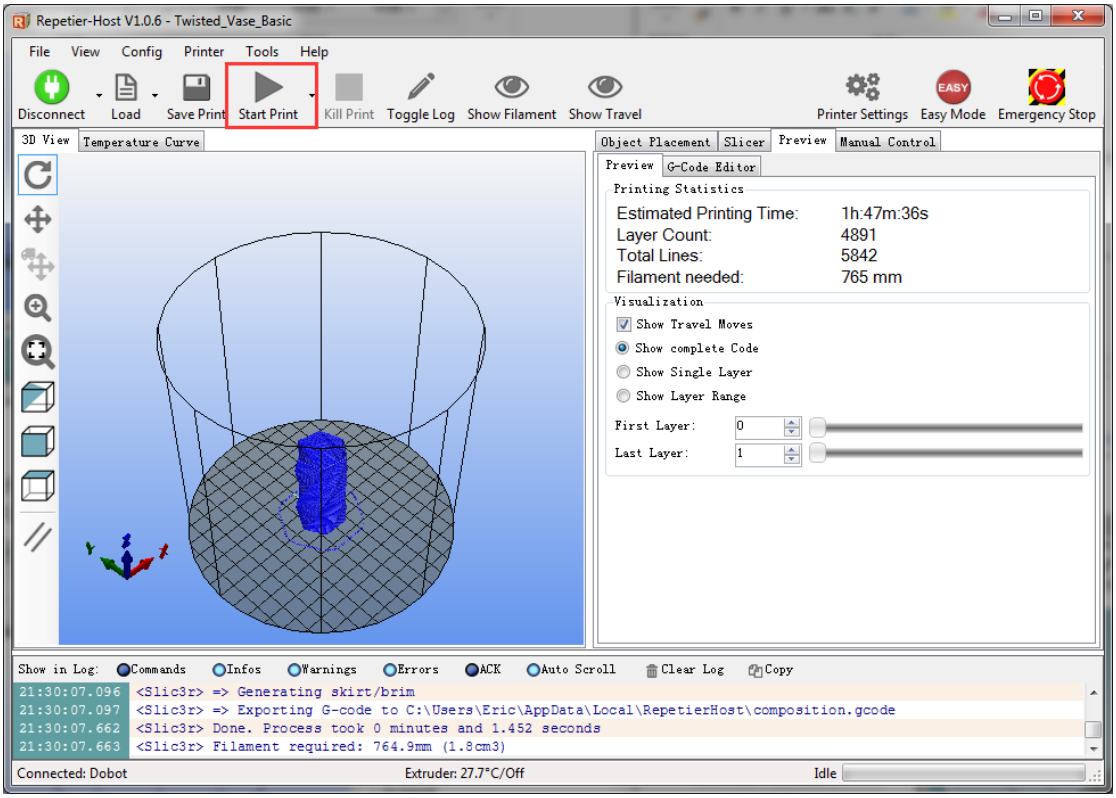
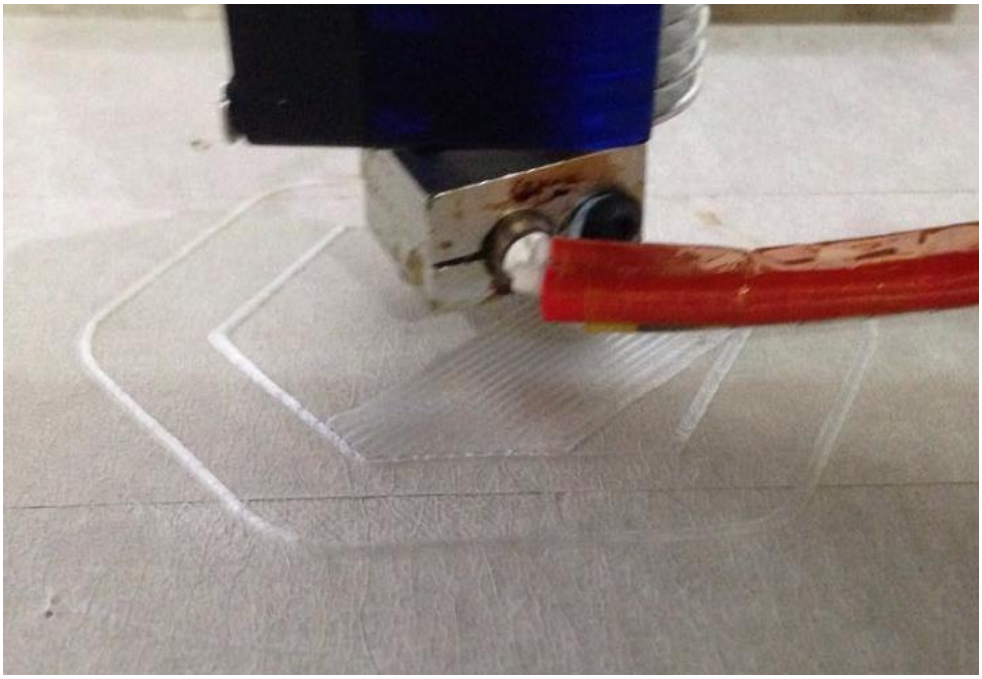


Figure 7.25 Finish slice

8.2.7 Start to Print

Now, click **Start print** at the top left corner of main interface to print：





Here we choose **vase mode**, and the effect after printing as follows:

Figure 7.26 The Effect of Printing

8.3 Cura Introduction for 3D printing

If you want to use Cura for 3D printing, the details seen as follows:
Notice: Installation of accessories and firmware burning shown as Repetier Host 3D printing.

8.3.1 Cura parameter settings

Cura is a free software that can be downloaded on its official website, here we recommand you to use Version **V14.07**, the downloading address:
https://ultimaker.com/en/products/cura-software/list
Software interface as follows:

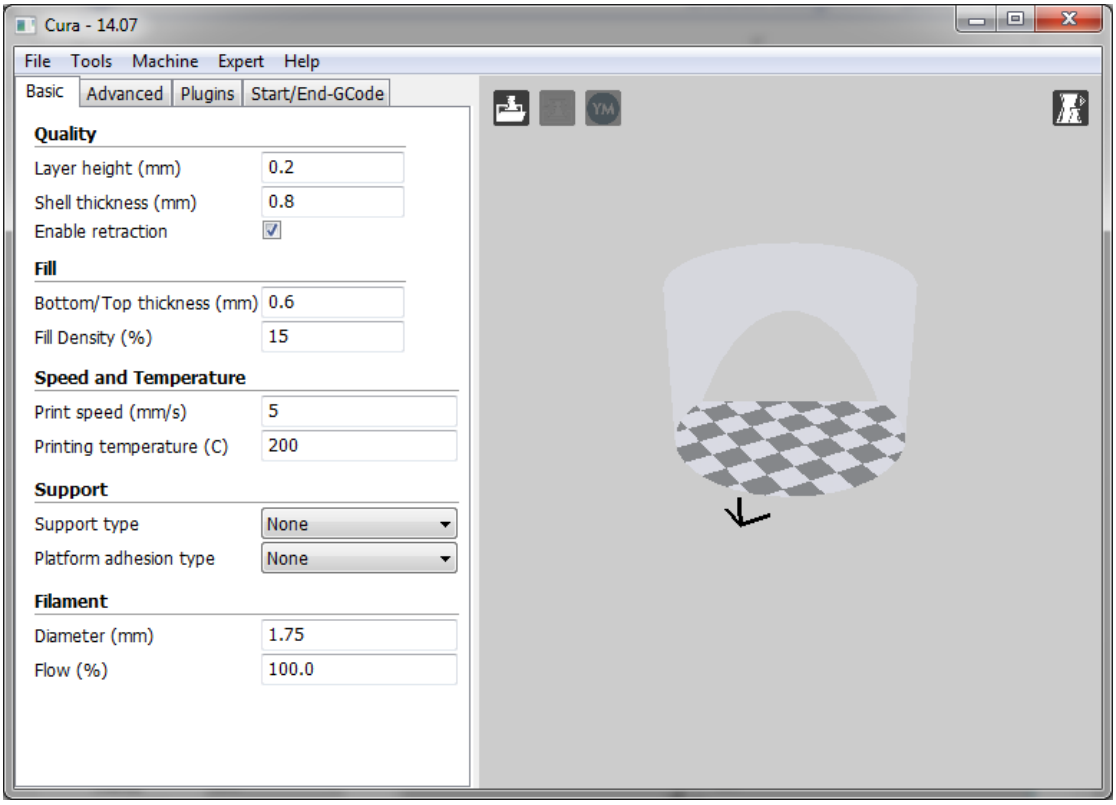


Figure 7.30 Cura interface

Machine->machine settings, set related parameters in the pop-up dialog:

（1）Connection label settings

maximum width：80mm **maximum depth**：80mm **maximum height**：150mm；

Machine center 0,0：Need tick

Build Platform shape: Circular

COM port setting: The corressponding COM port in the device management

Baud rate：115200

Also can click Rename Machine, The rest keep the default settings, click OK after setting

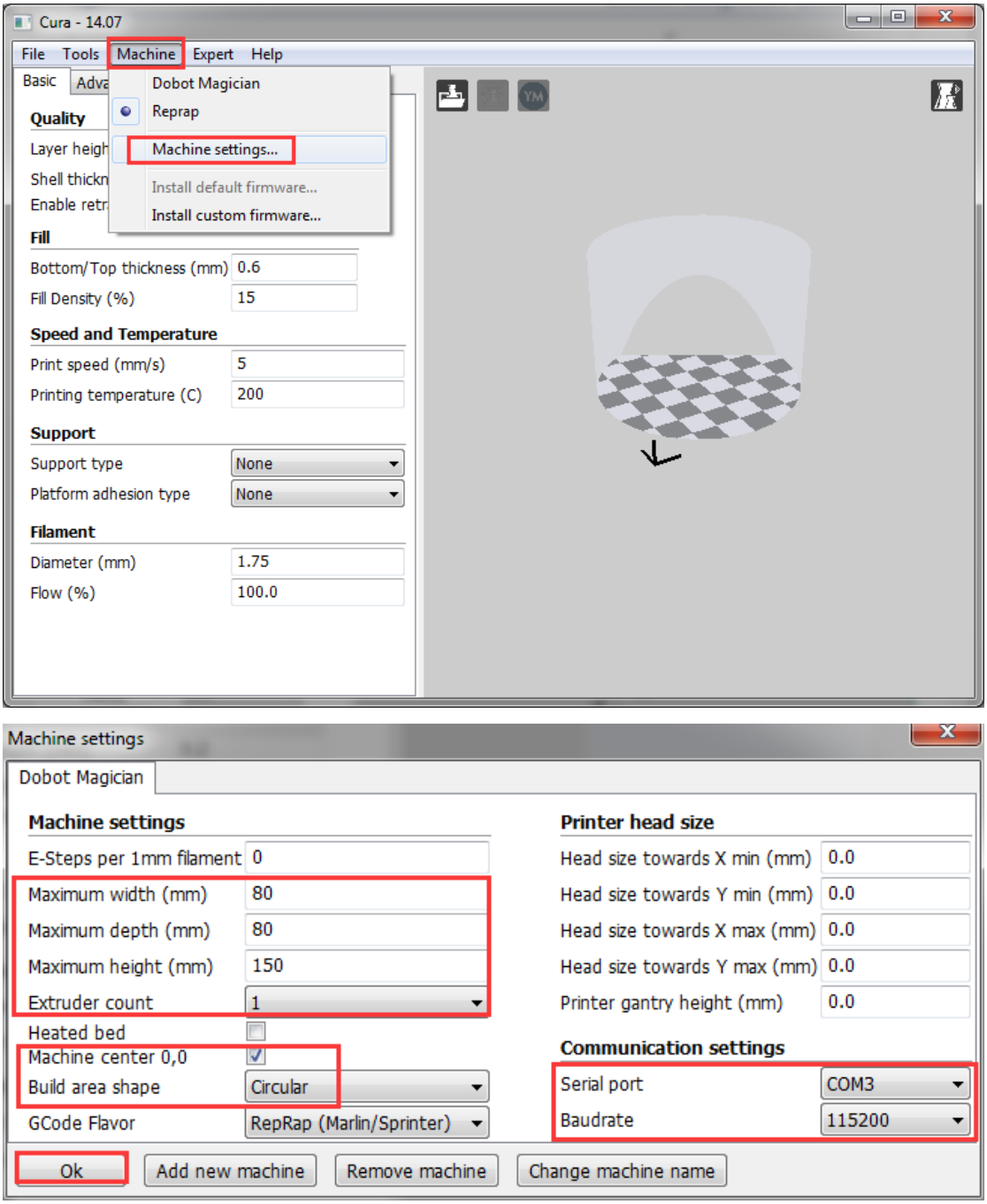


Figure 7.31 Machine settings

（2）Import configuration file

It is vital to set slice parameters, in which users should get the best slice parameters according to printed models and tested performance of equipment. Here we suggest a configuration file that can be impoted from **attachement** of DobotStudio:

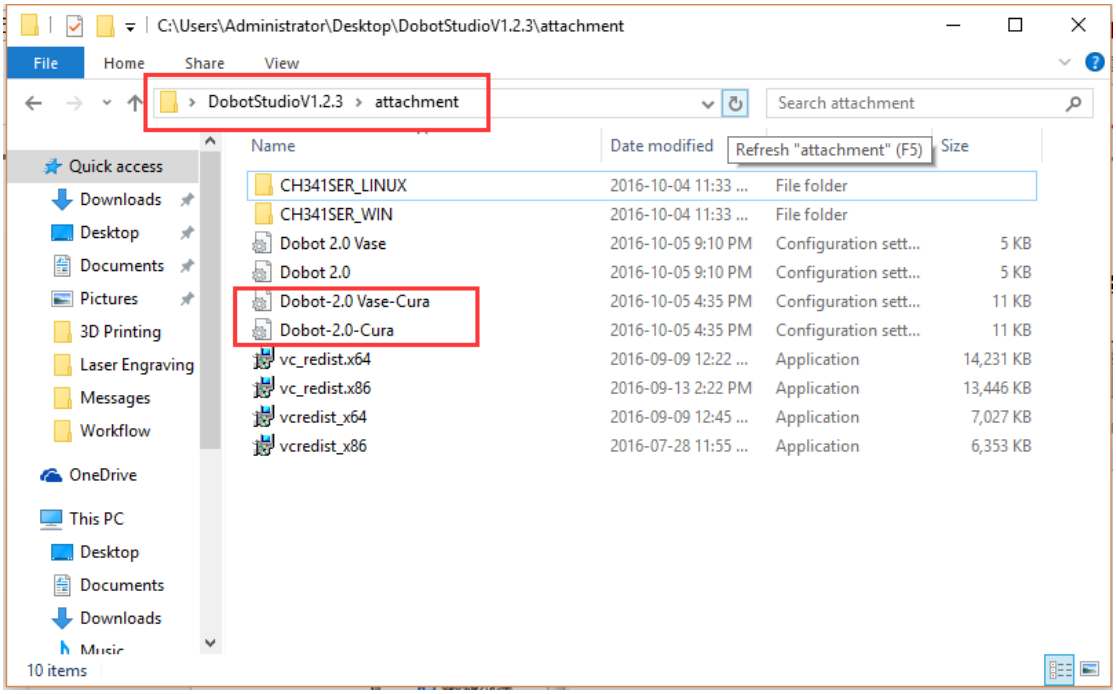
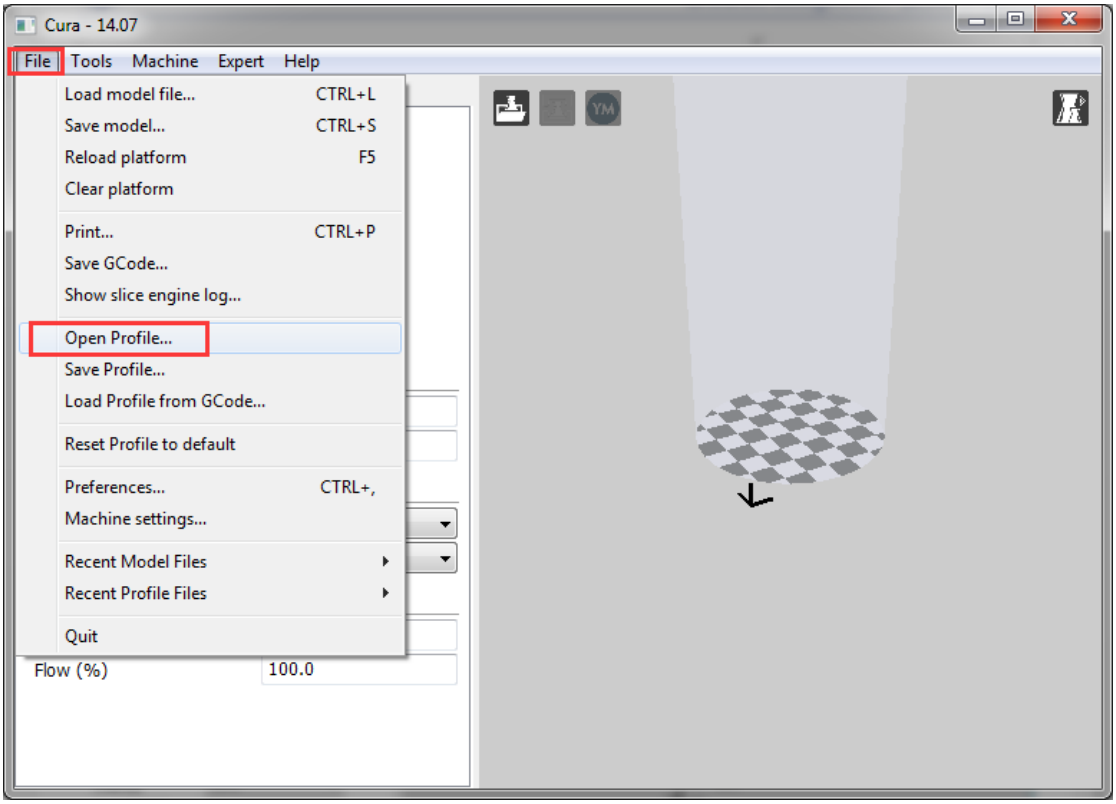


Figure 7.32 Configure files

Dobot-2.0-Vase.ini is used for printing of thin-valled vase, while Dobot-2.0.ini is used for the filling of entity, the filling rate is 15%.

Import the file after downloading: Click **File->Load Profile**.



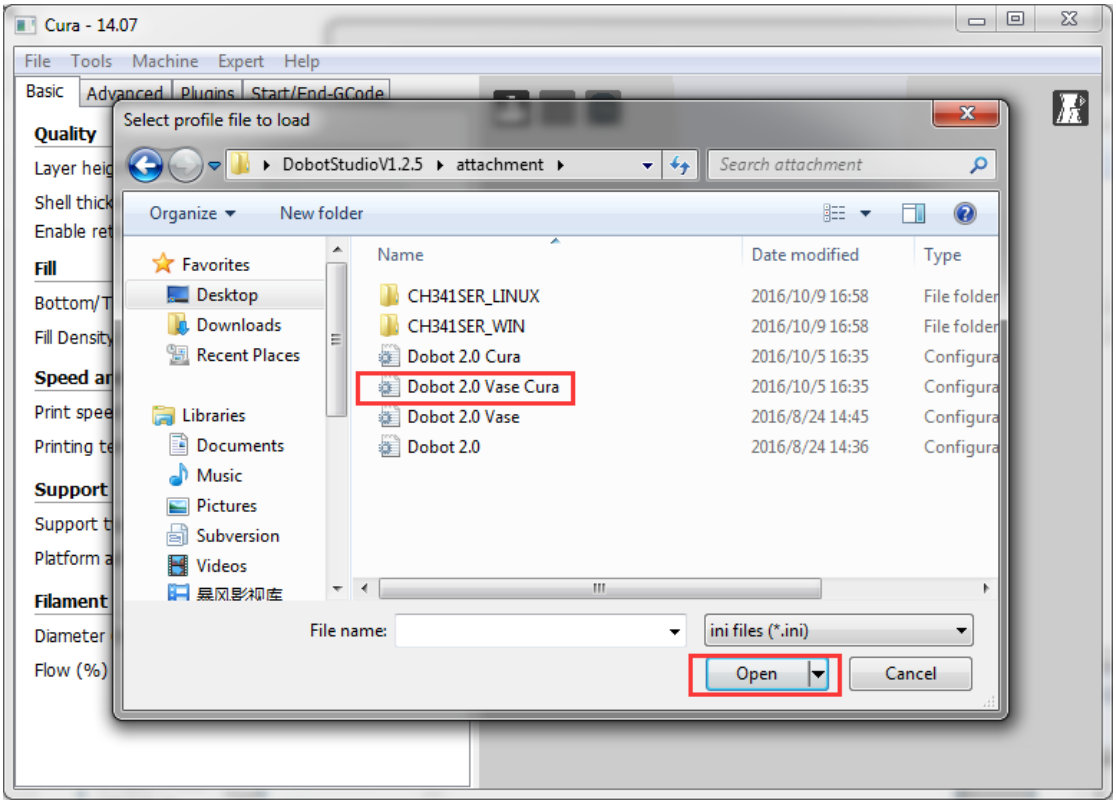


Figure 7.33 Import configuration settings

More detailed printing parameters, go to Cura website, not be repeated here.。

（3）Open the model and connect Dobot

Click **Load**, import a 3D model, Cura will slice up automatically, also, you can select different modes in the drop-down list of right hand to check its trajectory is correct or not:：

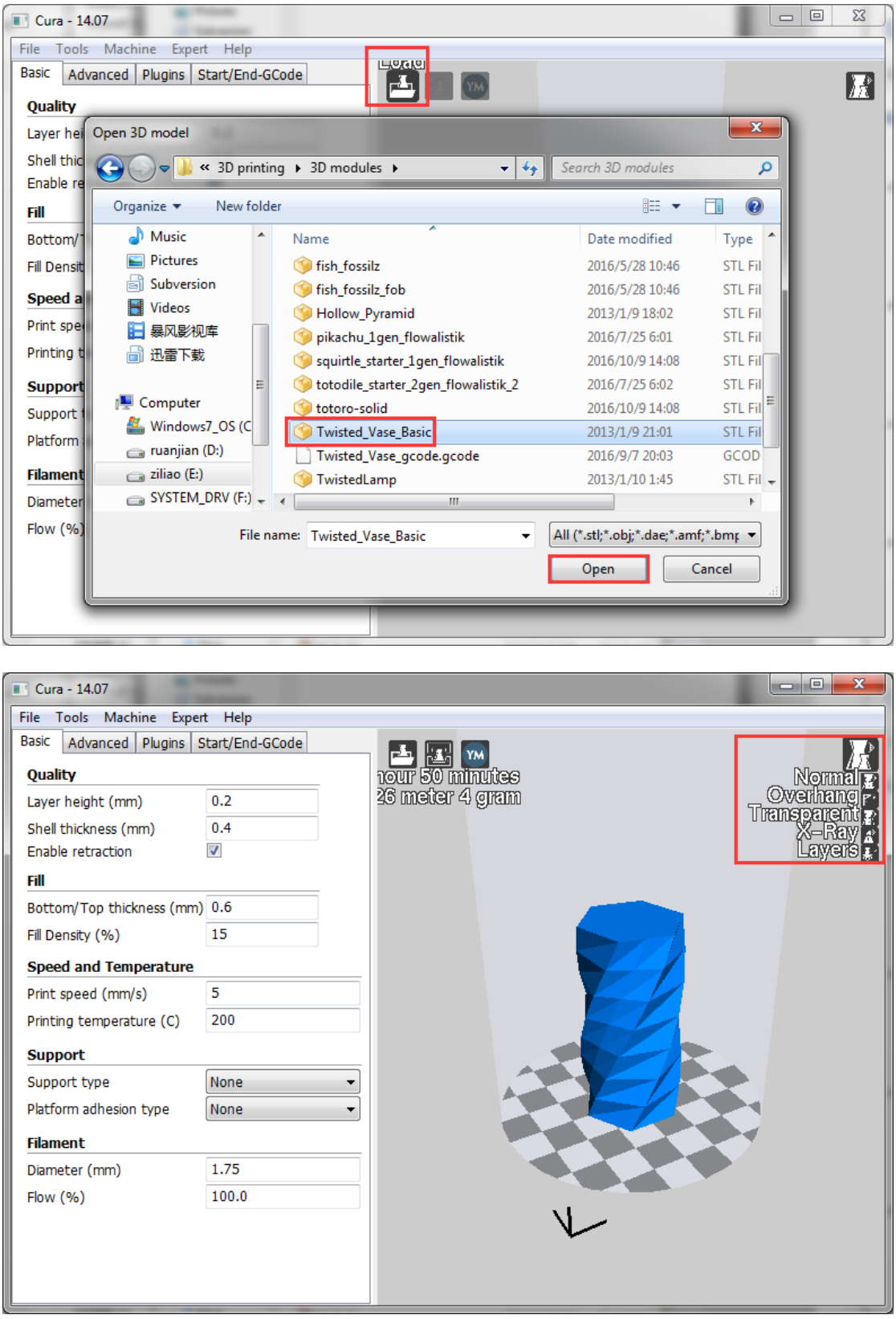
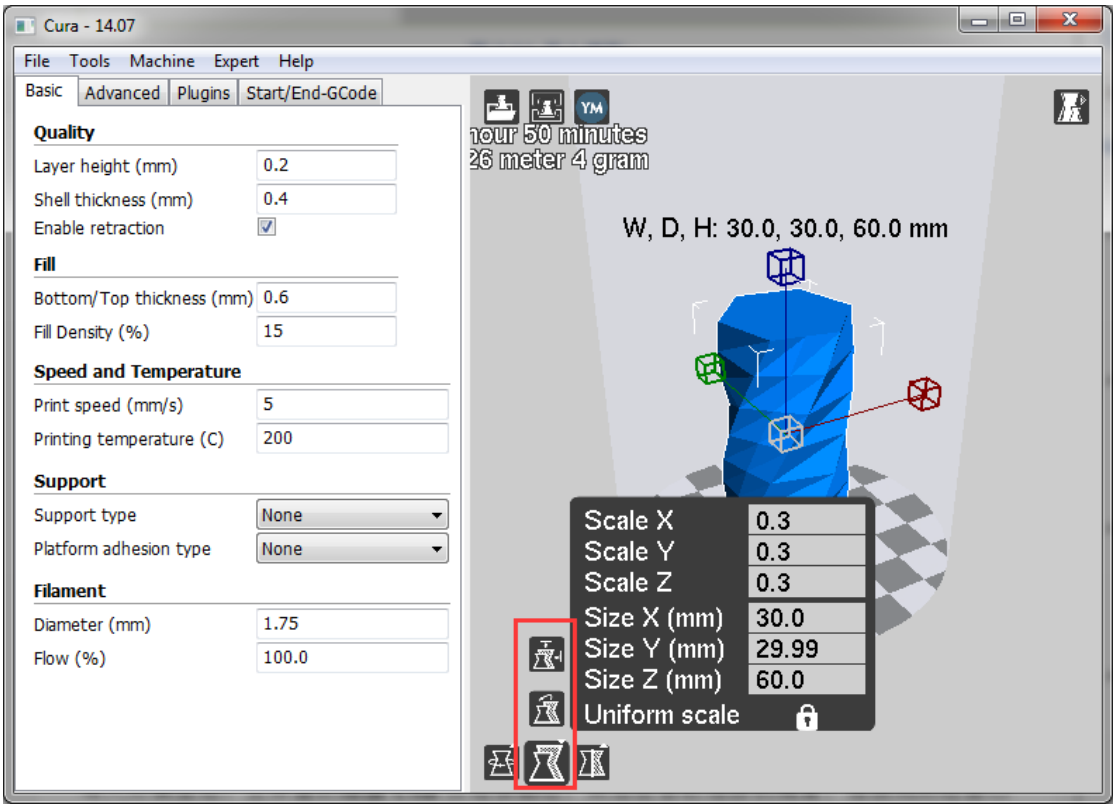


Figure 7.34 Import a model

Click the model itself, and users can operate the model to place in the middle, zoom or rotate and any other functions.



After importing model, **Print with USB** on the main interface will be activated, click it to connect Dobot automatically, and there will show the current printing temperature on the top corner of the window, at the same time, the Printing key will be activated, shown as follows:

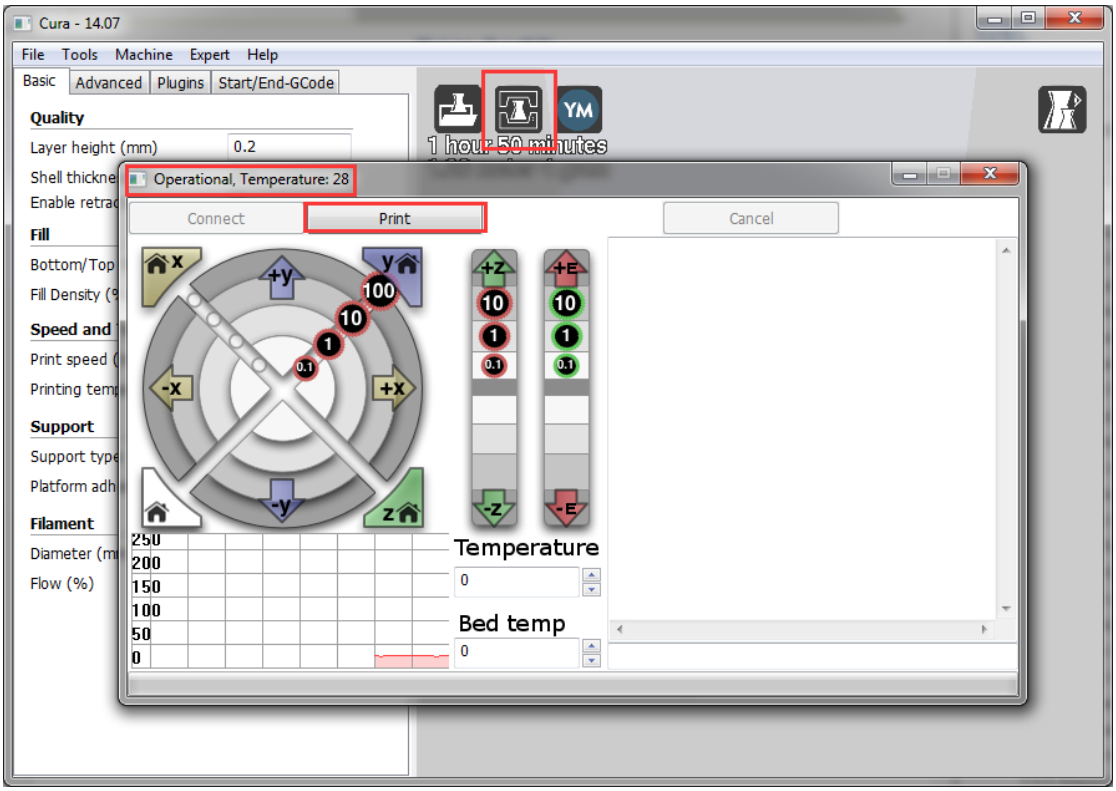


Figure 7.35 Connect Dobot

8.3.2 Preparation before Printing

Please have a test to the function of extruder before printing, such as whether in and out of the material is smooth, or the direction in and out of material is reverse. .Here set heating temperature to 200℃ and then enter to heat the nozzle.

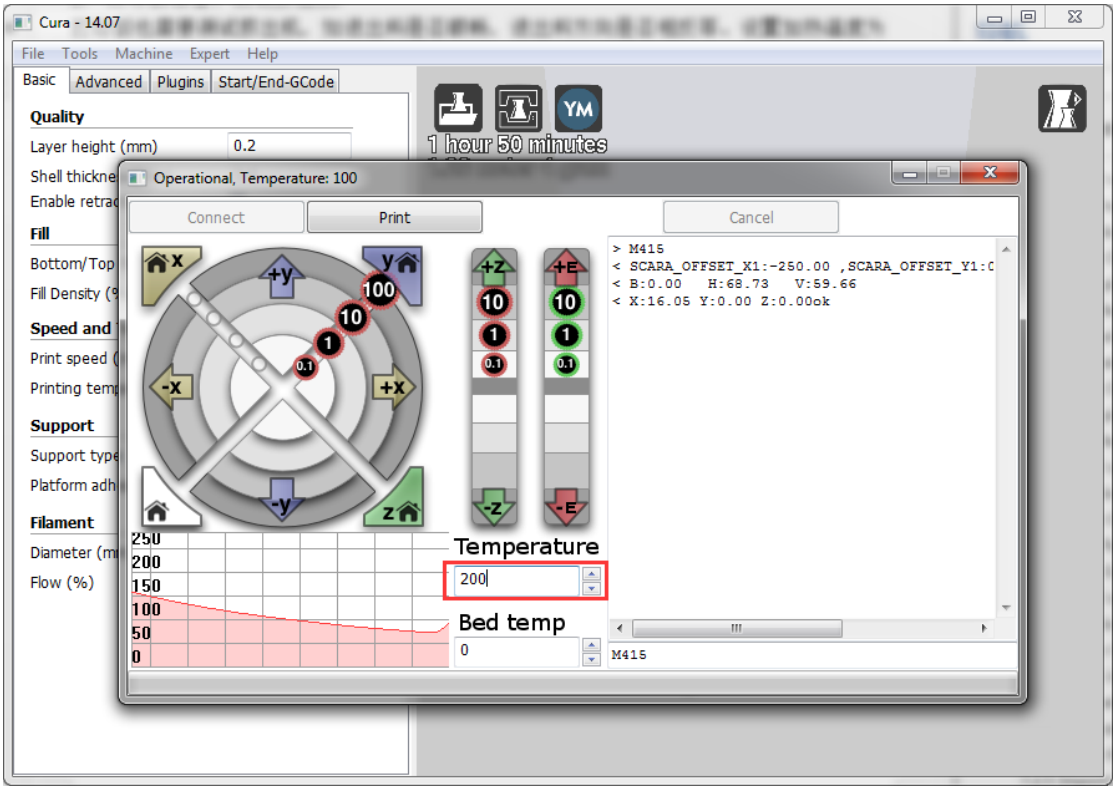
⚠ Notice：

The heating rod will produce high temperature up to 250℃, please be careful!

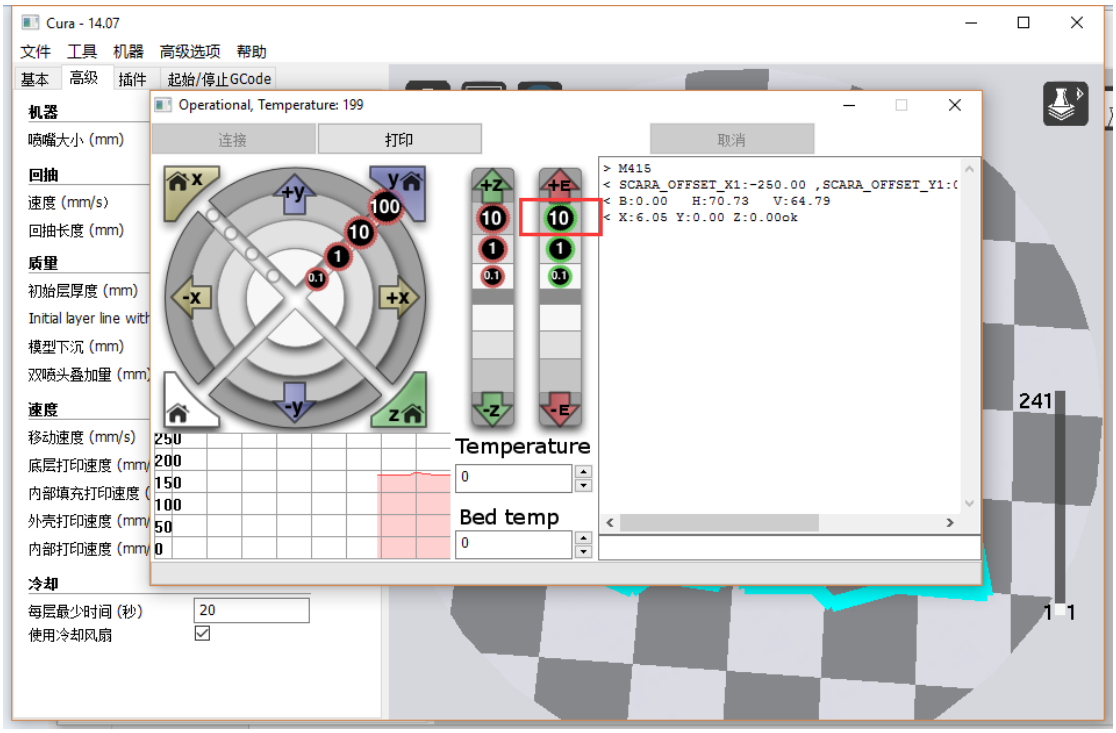
DO NOT let children play with it alone.

The process needs to be monitored when it is running.

After the process please turn off the equipment promptly.



In the heating process, the fan will be opened automatically. When the heating temperature is up to 200℃, click feedstock of extruder up to 10-30mm, as shown below:



If melted materials flowed from nozzle of the extruder, then it means the extruder works properly:

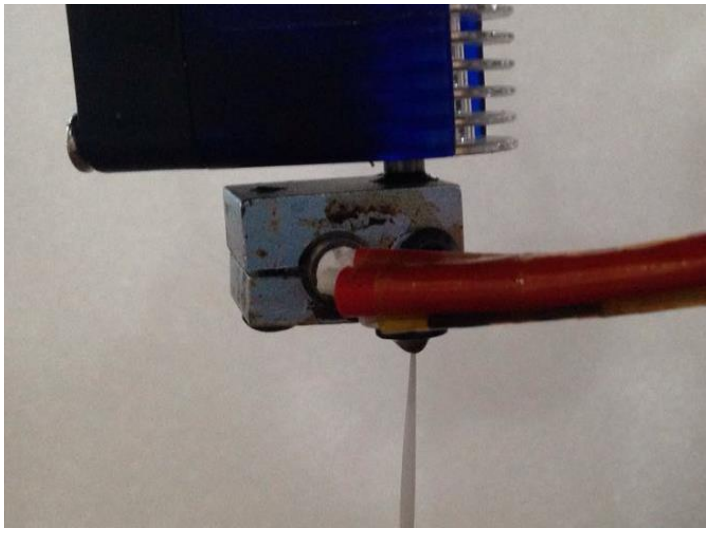


Figure 7.37 Filament Extrusion

Note: If the filament extrusion is in the opposite direction, for example, you can click feedstock, but it is discharging. Then you need pull out the filament totally from the extruder, turn the extruder to 180 °, and insert the filament, now you can get the right direction. Shown as below:

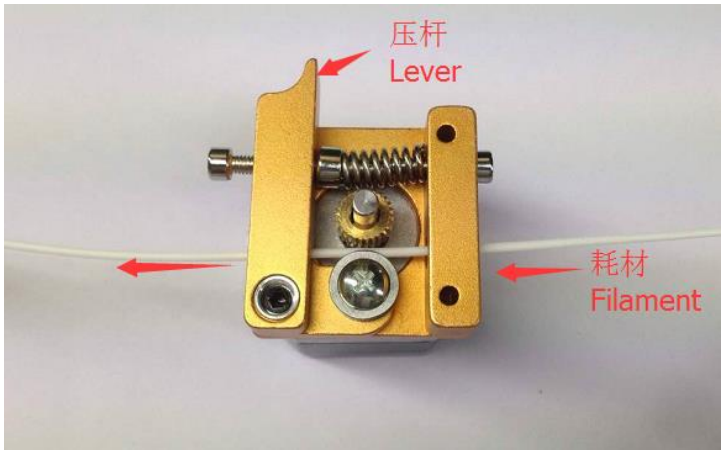


Figure 7.37 Reverse installation diagram of the extruder

8.3.3 Adjust the printing space and get printing coordinates

Note: These detailed steps, please refer to above chapter Repetier Host.

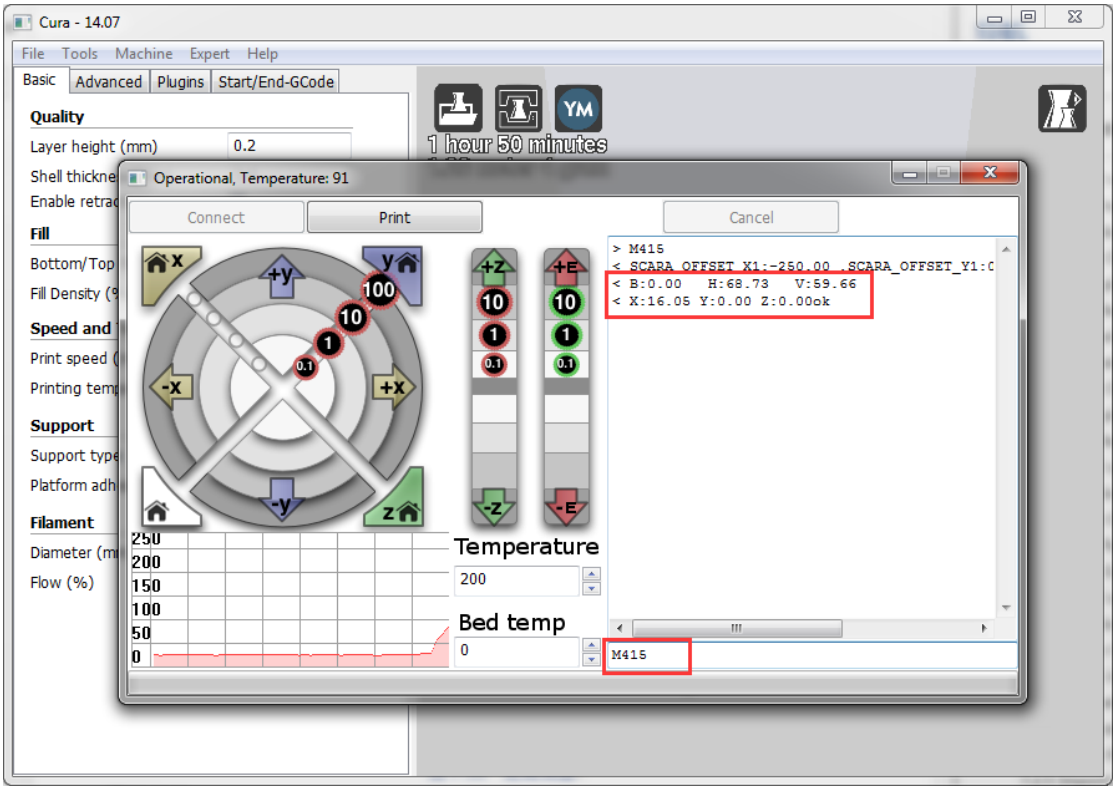
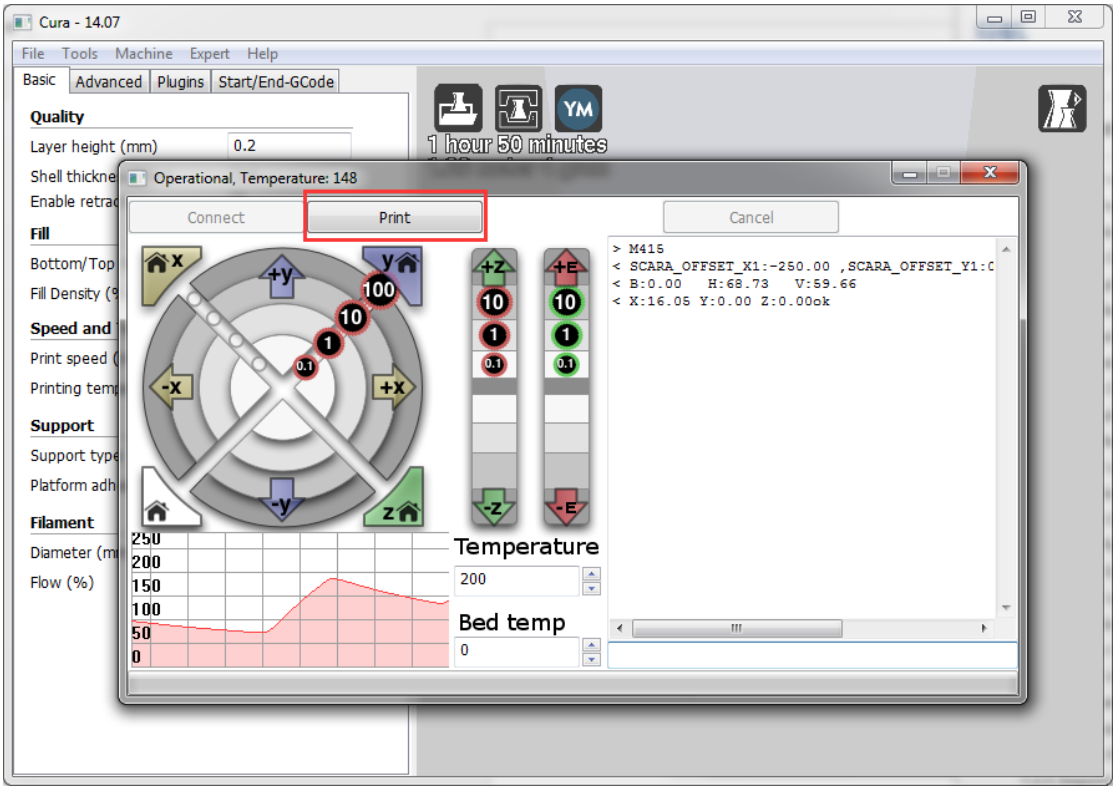


Figure 7.38 Distance adjustment

8.3.4 Start printing

Just click **Print,** and then start printing.



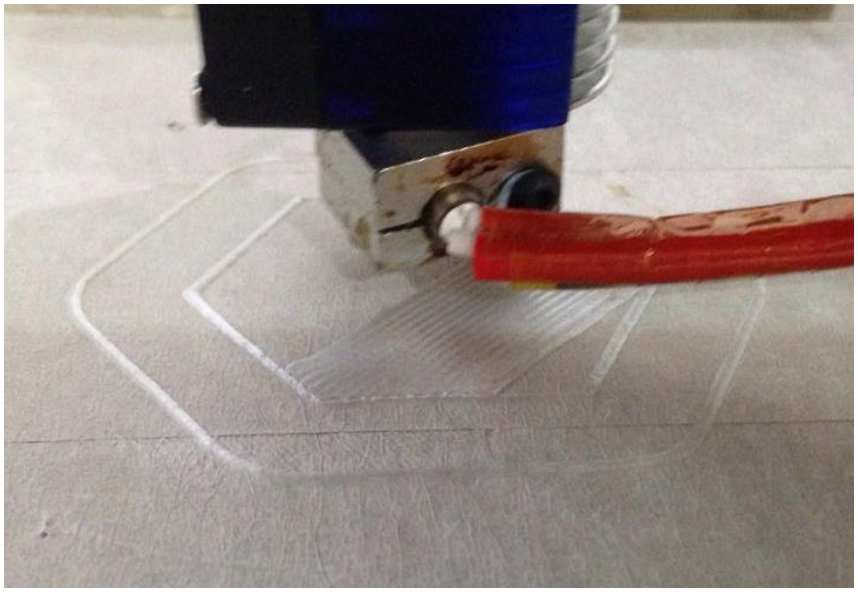


Figure 7.39 Start printing

Note: During the printing, if the distance between the nozzle and print is too large to paste the print bed of the first layer; If the distance is too small, which will cause consumables block. So we need to adjust the proper distance for smooth printing. If it is not proper height when printing the first layer, we can amend the parameters in the **initial-layer thickness**, for example, -0.1mm or +0.1mm. After amending it,Cura will slice up automatically, then you can test the printing effect. After testing, the default heught of first layer is 0.87mm.

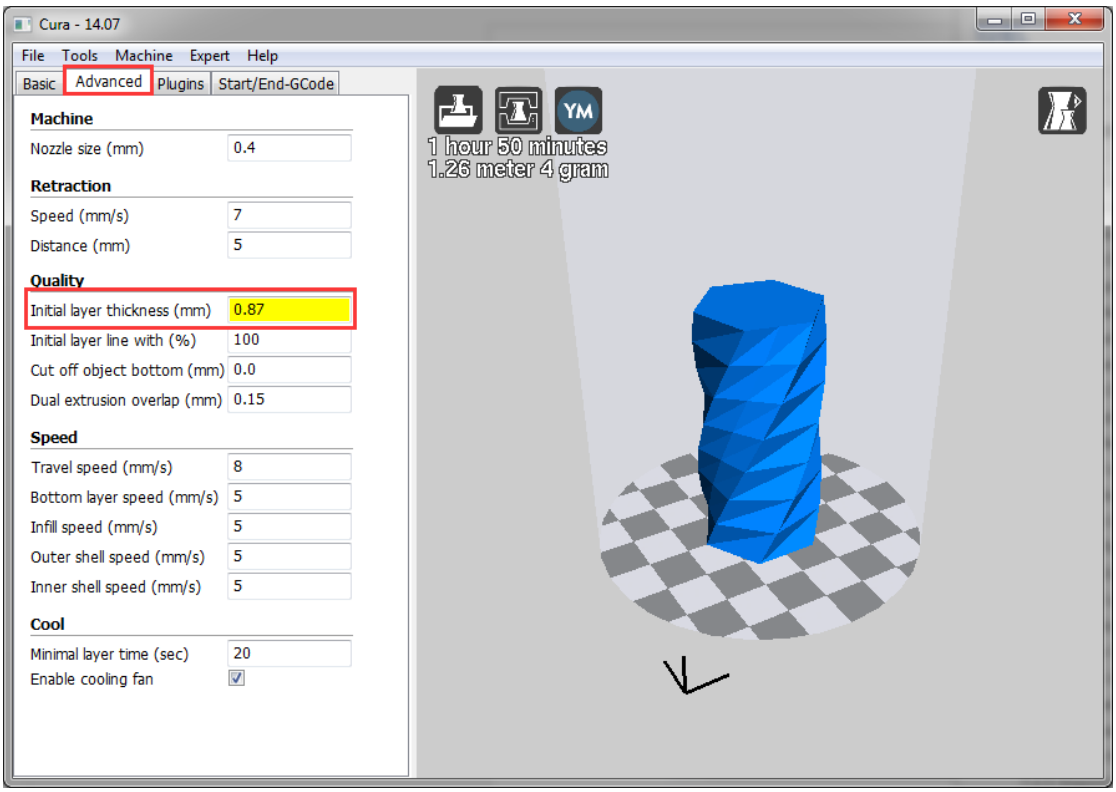


Figure 7.40 Amend the height of first layer

Here we choose **vase mode**, and the effect after printing as follows:

Figure 7.41 The Effect of Printing

8.3.5 Text note

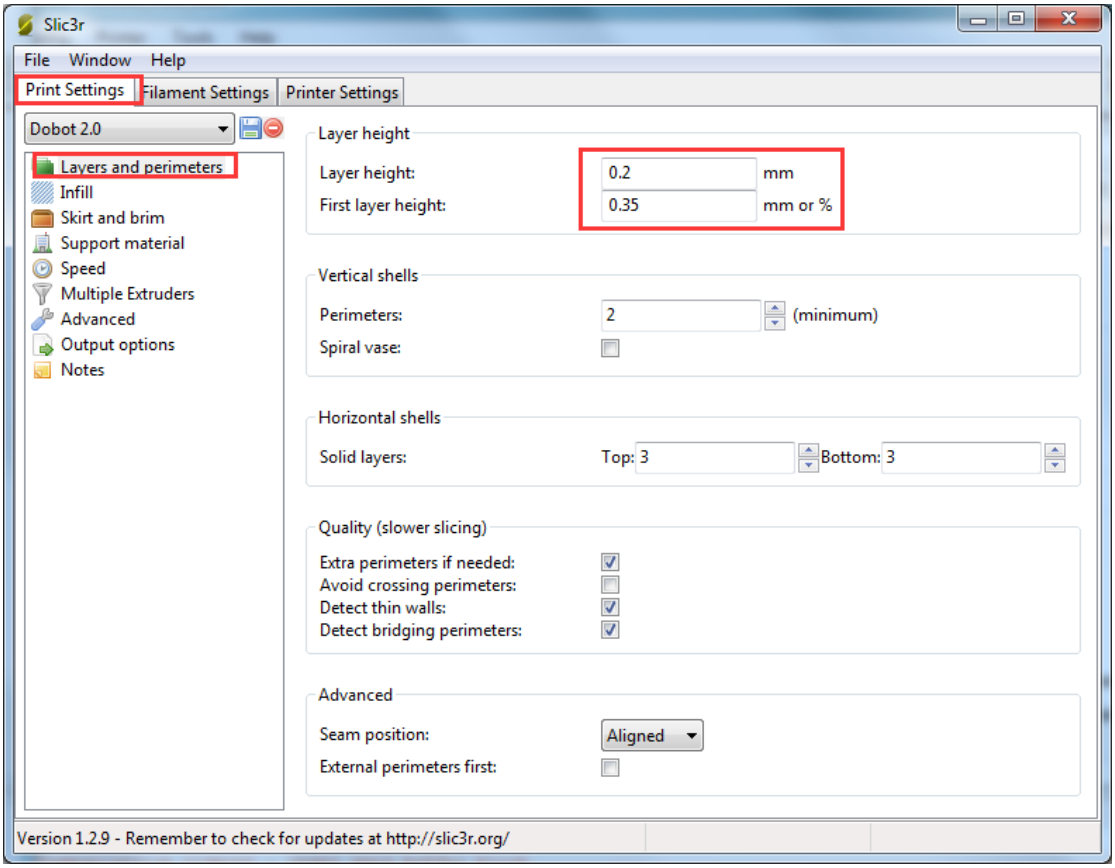
Parameters Introduction of 3D printing

Here we only introduce necessary parameter settings, and one can review the related links about the rest parameters: http://manual.slic3r.org/

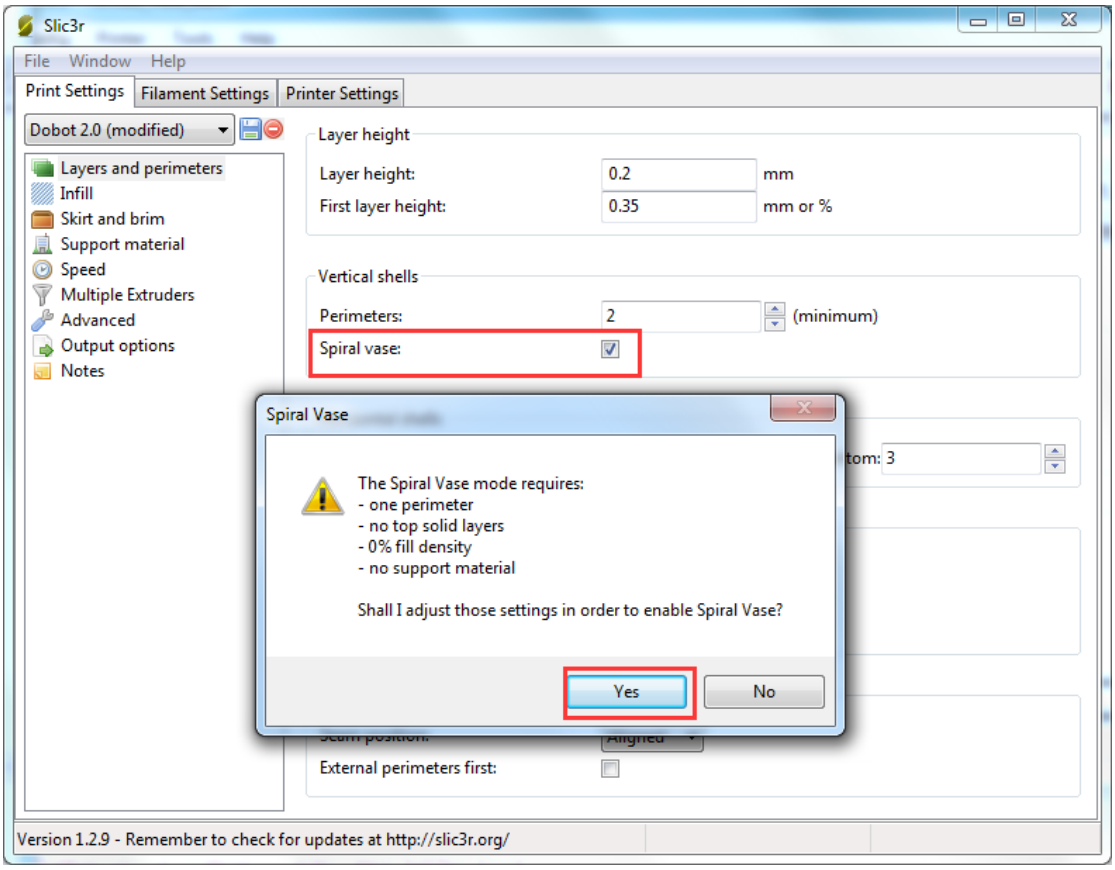
（1） Printer settings

Set the height of print layer: 0.2mm；

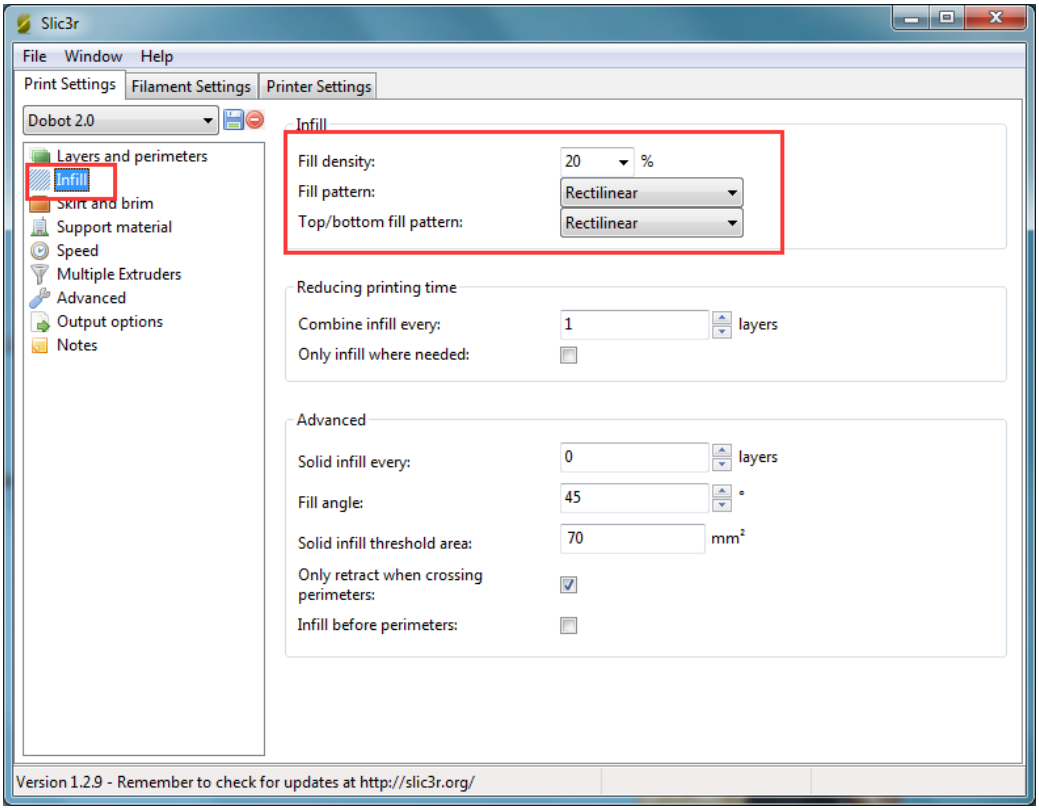
The height of first layer: 0.35mm；



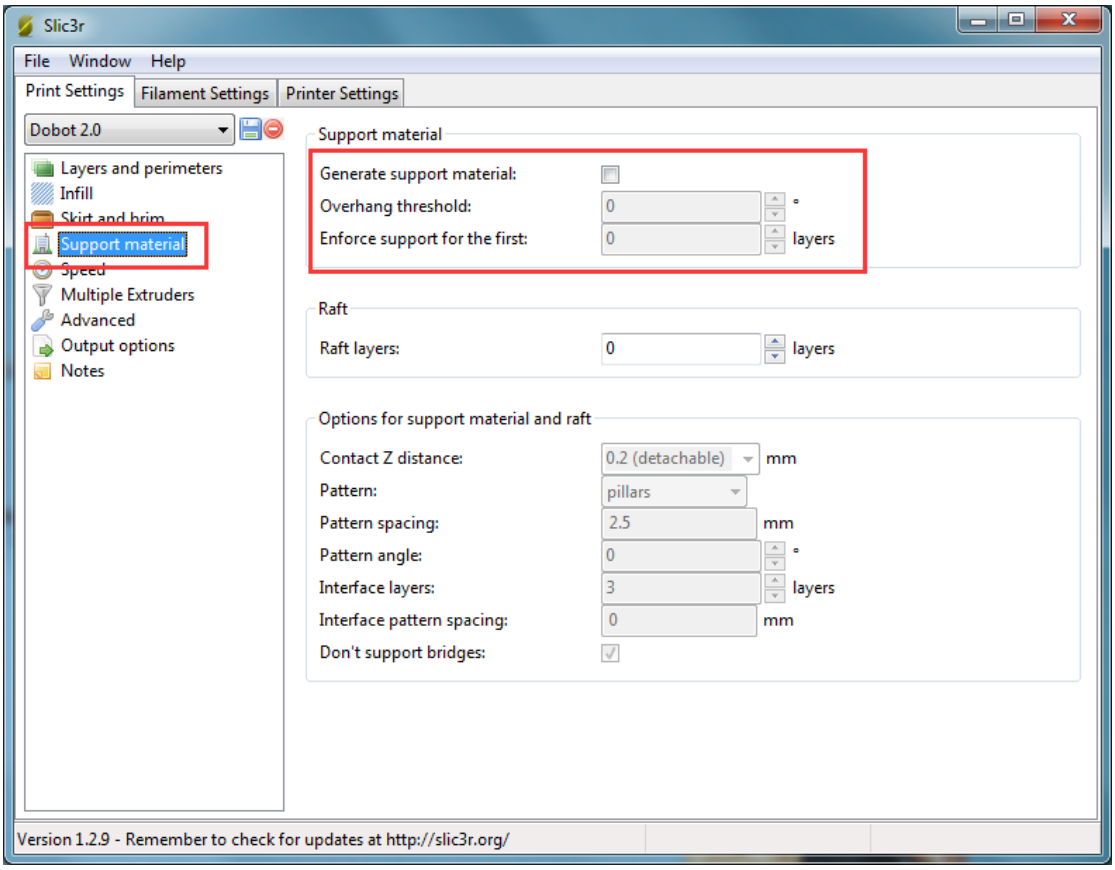
Spiral vase: Check this one and click **Yes**, then we can print unfilled vase.



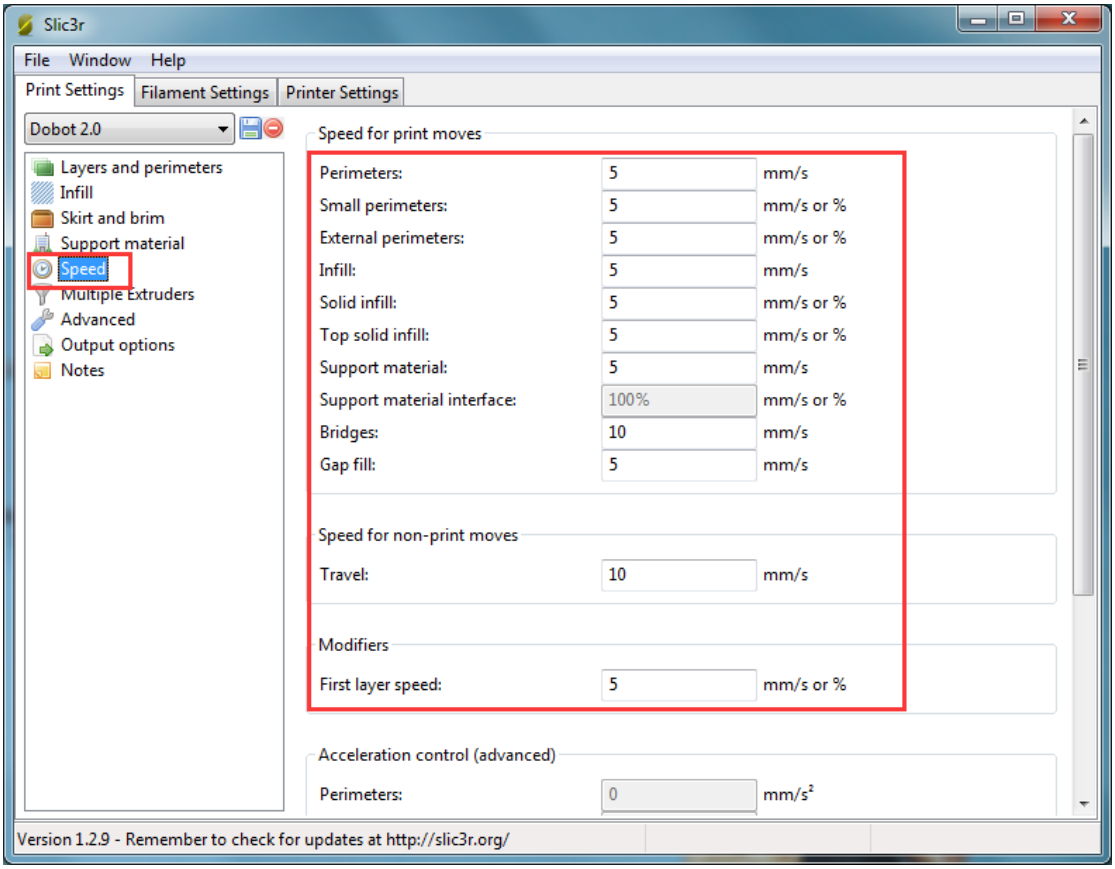
The fill rate settings:



If users need print support, please tick Support material:



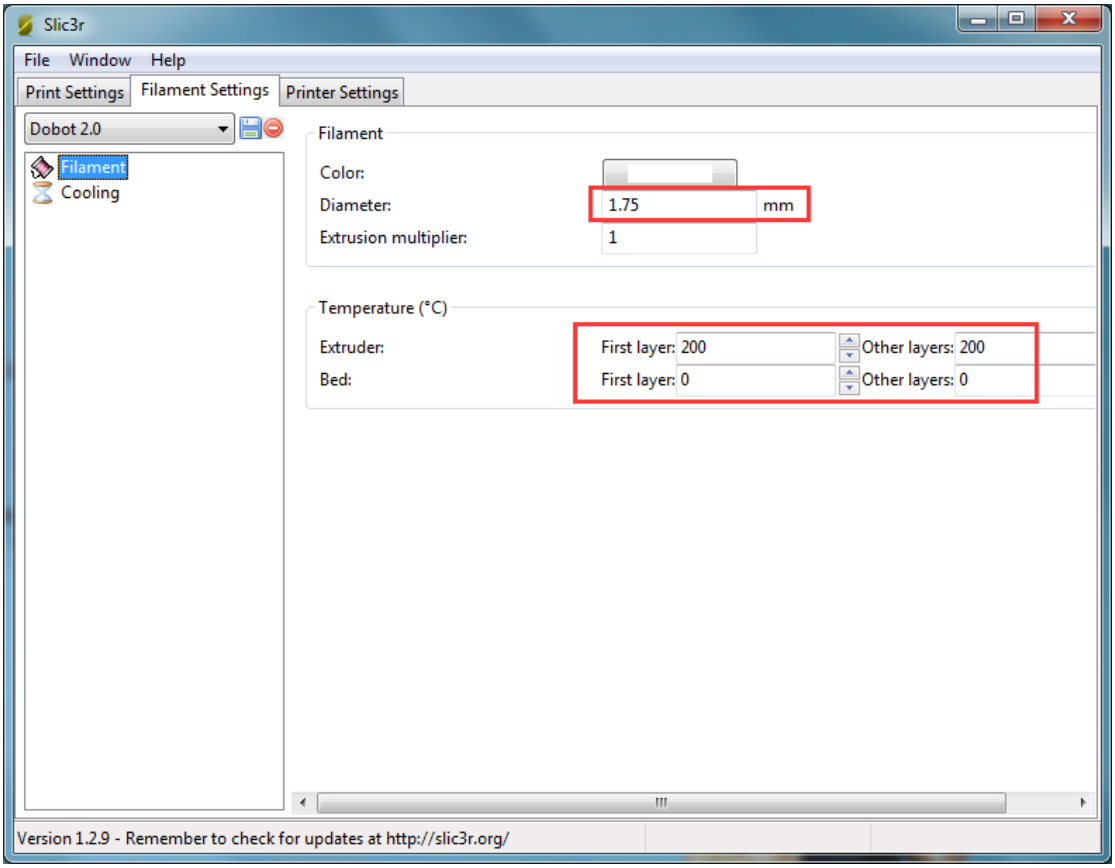
The speed settings:



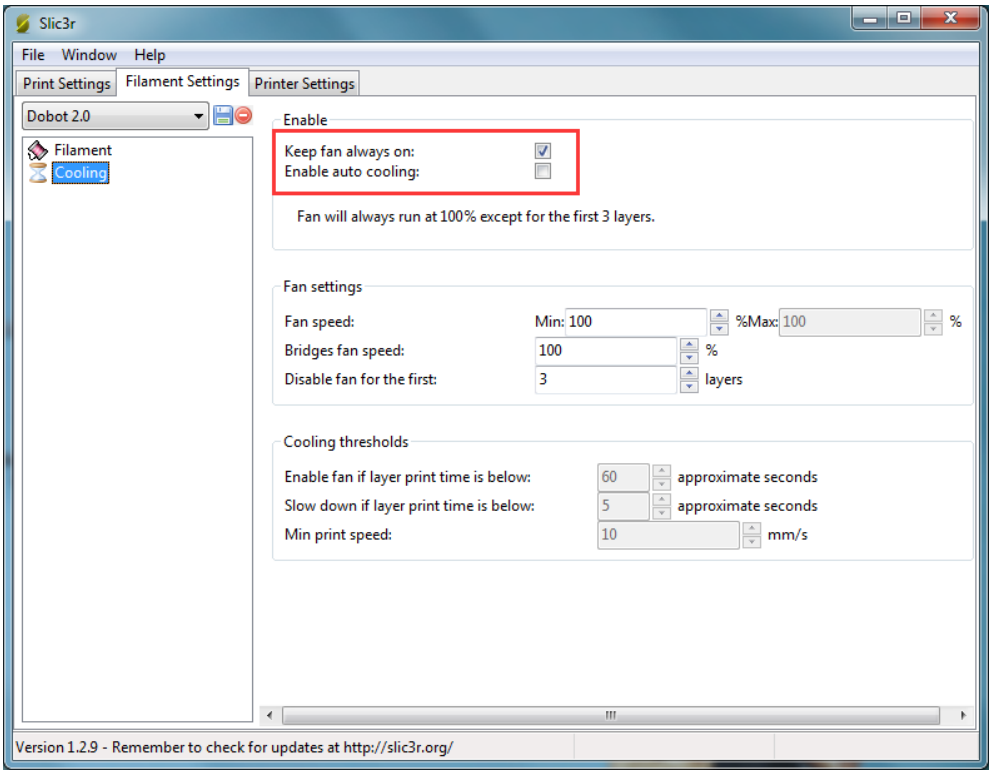
（2） Filament settings

Consumable diameter: 1.75mm

The temperature : 200℃



Open the fan:

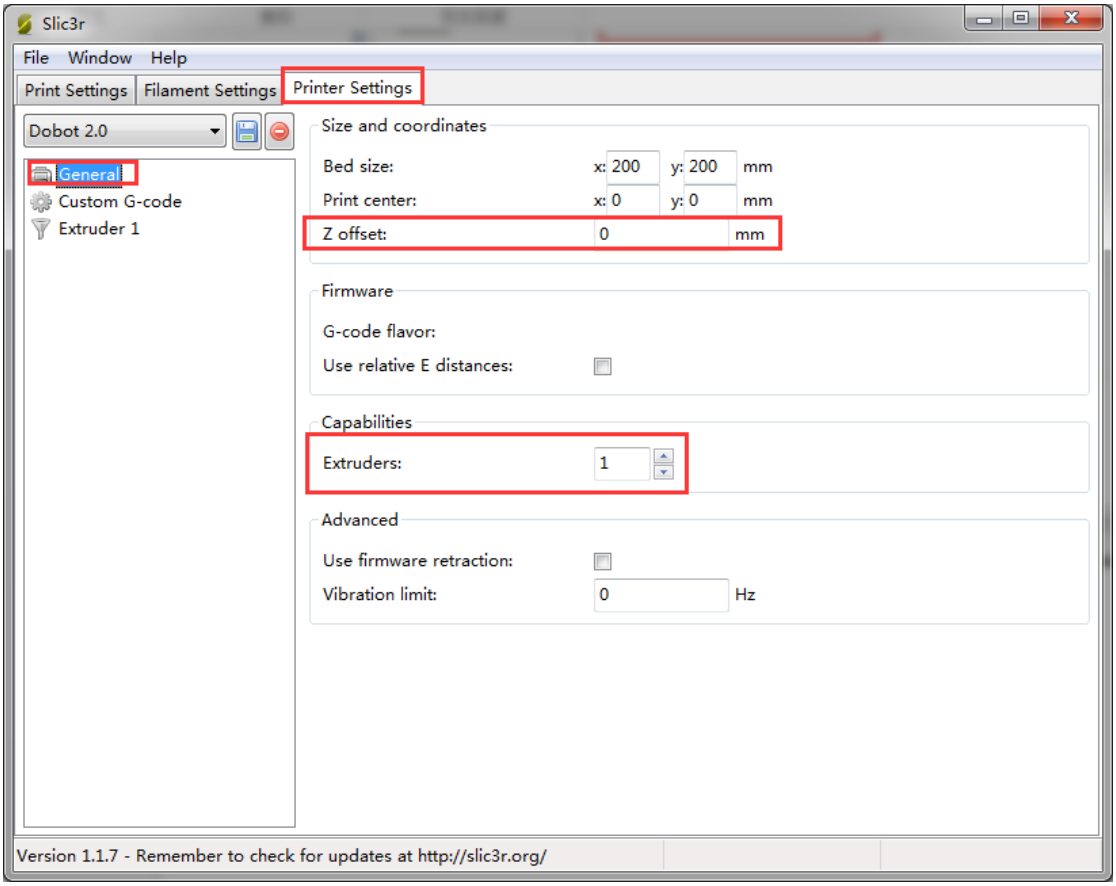


（3） Printer settings

The number of Extruder: 1

The nozzle Z offset of extruder: 0mm

Notice: If the height of nozzle is so large that consumables cannot paste print bed or so small that it cannot discharge when printing the first layer, users can amend the height from this interface, such as -0.01mm or +0.01mm, thus, one need not adjust the height again.



G-code Settings:

Start G-code: **M106**

End G-code:

M104 S0 ; turn off extruder

G91 ;relative positioning

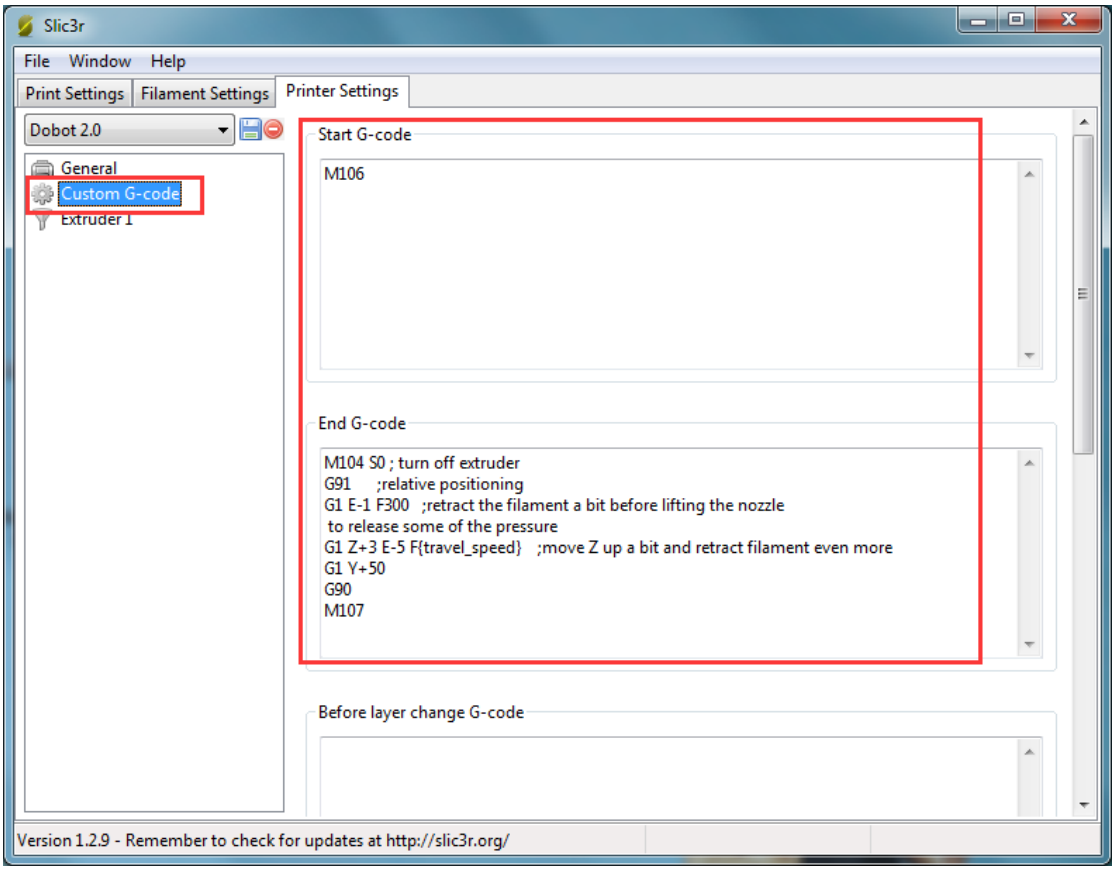
G1 E-1 F300 ;retract the filament a bit before lifting the nozzle to release some of the pressure

G1 Z+3 E-5 F{travel_speed} ;move Z up a bit and retract filament even more

G1 Y+50

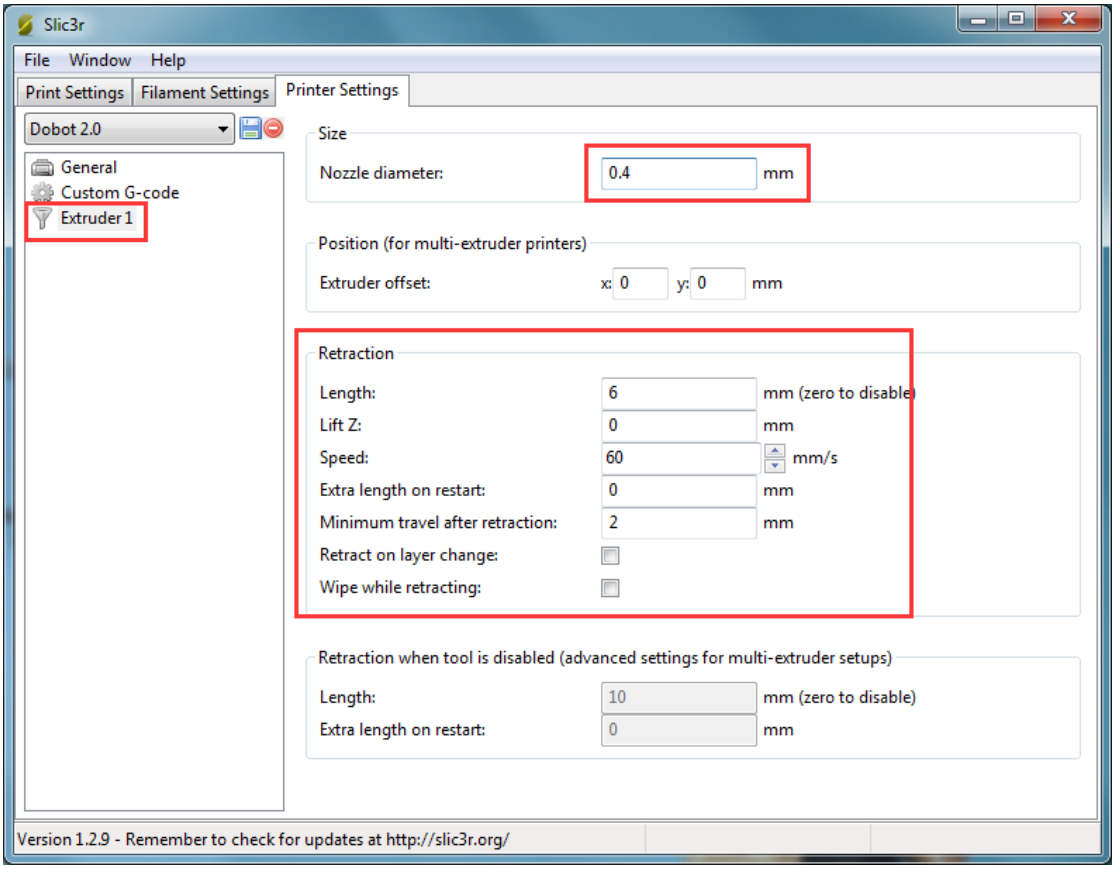
G90

M107



The nozzle diameter settings: 0.4mm；

The pump back speed settings: length=6 mm，speed=60 mm/s.



9. Bluetooth Kit

9.1 Bluetooth module is included in this kit, and the installation shown as follows:

Figure 8.1 Bluetooth module installation

9.2 After installation, power on Dobot Magician and you should be able to hear three short beep sounds, then you can find device **BLE-100** and connect Dobot Magician through mobile APP.

10.WIFI Kit

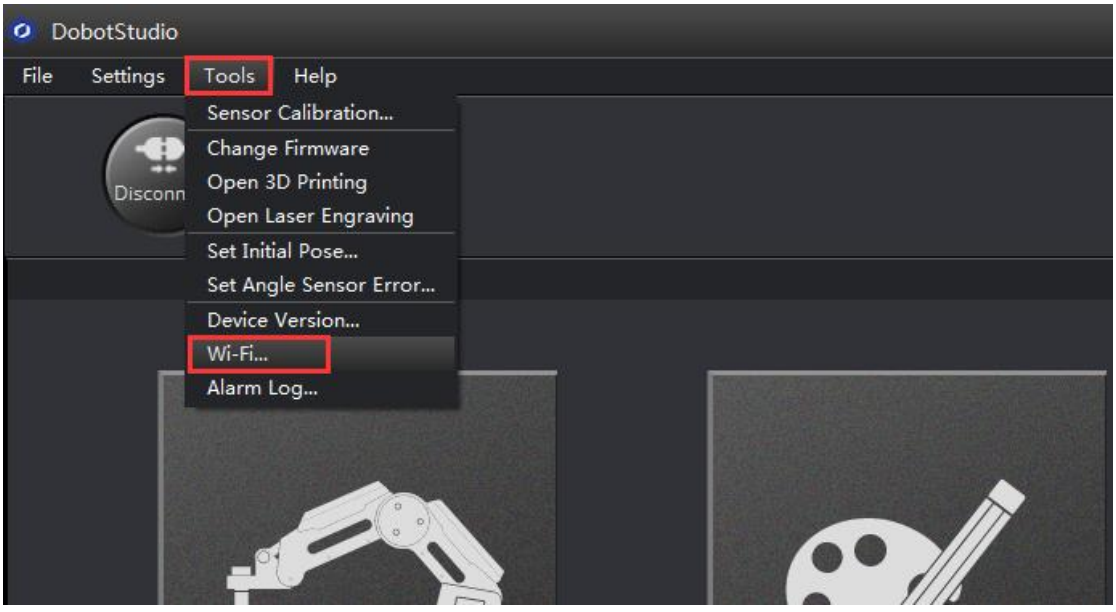
WIFI kit contains WiFi module, connect it into Dobot extensible port, and use USB cable to connect Dobot and PC, shown as follows:

Figure 9.1 WiFi module

10.1 Set Dobot Wi-Fi module

If first use, you need connect USB to configure WiFi module, creating virtual serial port. After setting up, you can use WiFi module alone and do not need USB cable.

1. Open DobotStudio, Click **Connect**->**Tools**->**Wi-Fi**, and enter into parameter setting interface.



2. Input related parameters of WLAN.

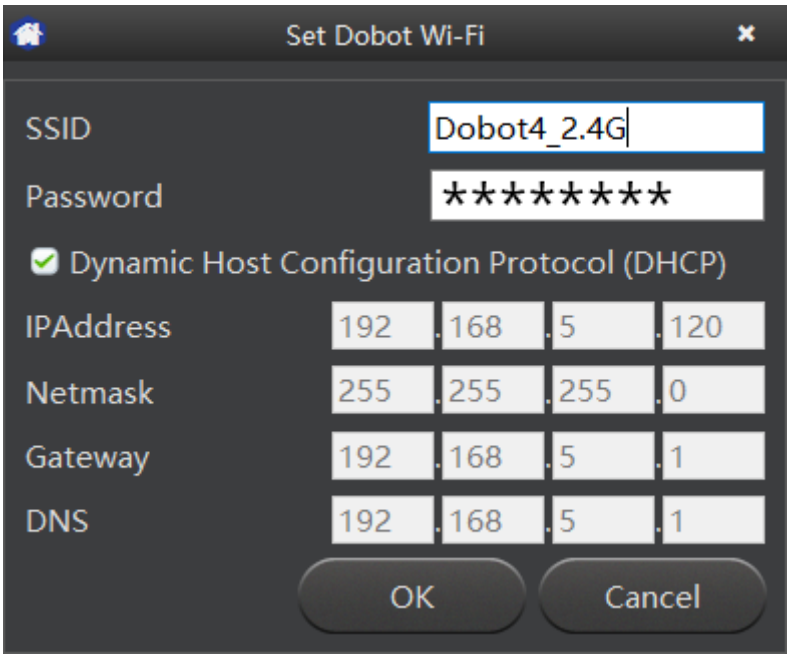


Figure 9.2 Wi-Fi interface

- Fill in Wifi name at “SSID” input box;
- Fill in Wifi password at “Password” input box;
- If you want to use function of DHCP, please tick checkbox;
- Otherwise, fill in“IPAddress”、“Netmask”、“Gateway”、“DNS” and any other parameters.

Generally, use the function of DHCP, click **OK**, and then will finish the settings. Wait for several seconds, the green indicator of Dobot WiFi wireless module will be kept on, which means Dobot has been connected with WLAN.

Figure 9.3 Connected with WLAN

Then you will find out the equipment address searched automatically on the main interface of DobotStudio, the details shown as follows:

Figure 9.4 Dobot IP address

Select the address, click Connect, then you can control Dobot through WiFi successfully. In the subsequent usage, just insert WiFi module and connect Dobot through the address without the use of USB cable.

11. Stick controller kit

11.1 Stick controller kit includes stick and USB Host module, connect wireless module into 10pin communication port behind the controller.There are two ways to connect, wired and wireless, shown as follows:

Figure 11.1 Installation of stick module

11.2 Take wireless mode for example, after installation, power on, the green led of stick module will be on, and you will hear 4 short sounds that means finishing initialization. At the same time, press the button **Home** and **A**, start up the stick controller.

Figure 11.2 Start up the stick

At this moment, the front button led will be on, and the beneth led will flash:

Figure 11.3 Stick at work

11.3There are two ways of control ways, **Linear mode and Jog mode,** which can be swithed by button **L1/R1(L1 refers to jog mode and R1 refers to liner mode)**, the detailed control mode shown as follows:

（1） Linear mode

Function	Corressponding buttons
Start up stick	Hold down **Home** and **A** for 2 seconds
Close the stick	Hold down **Home** for 2 seconds
Dobot X+/X-	Pad.LeftStick. front/back
Dobot Y+/Y-	Pad.LeftStick. left/right
Dobot Z+/Z-	Pad.LeftStick. front/back
Joint4 servo rotation R+/R-	Pad.LeftStick. left/right
Suction cup ON	**Y key**
Gripper ON	**Y** key
Release suction cup/gripper	**X** key

Figure 10.1 Linear mode

（2）Jog Mode

Function	Corressponding buttons
Start up stick	Hold down **Home** and **A** for 3 seconds
Close the stick	Hold down **Home** for 3 seconds
Dobot Joint1+/ Joint1-	Pad.LeftStick. front/back
Dobot Joint2+/ Joint2-	Pad.LeftStick. left/right
Dobot Joint3+/ Joint3-	Pad.LeftStick. front/back
Joint4 servo rotation R+/R-	Pad.LeftStick. left/right
Suction cup ON	**Y** key
Gripper ON	**Y** key
Release suction cup/gripper	**X** key

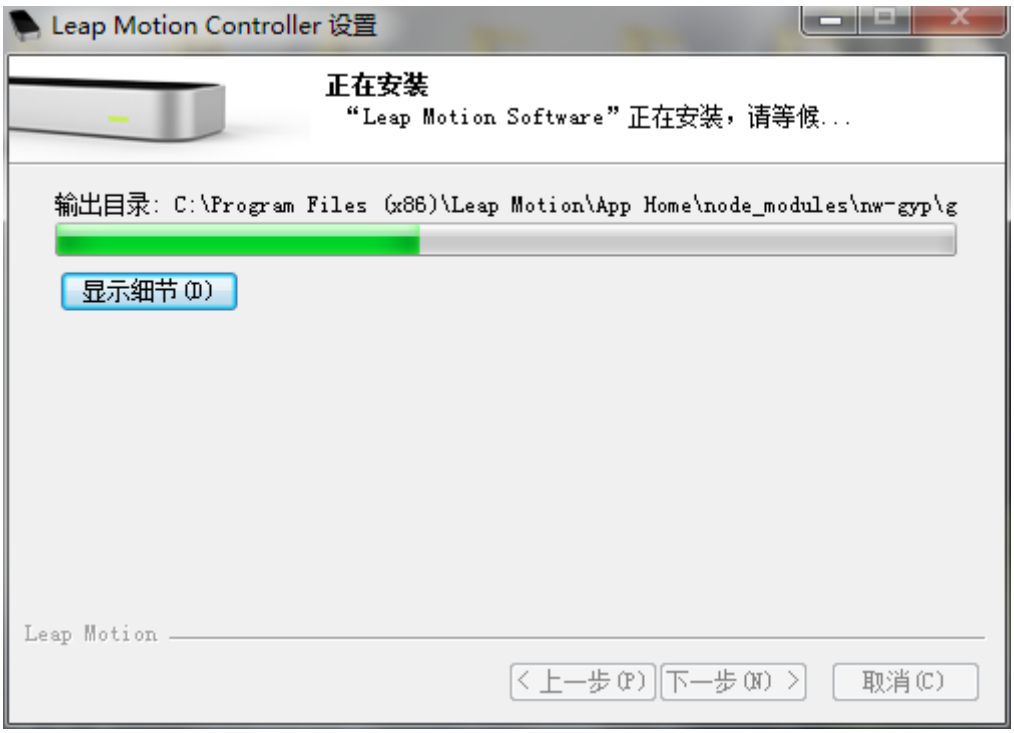
Figure 10.2 Jog mode

12 Leap Motion Kit

12.1 Connect Leap Motion module with PC through USB cable.

Figure 12.1 Leap motion module

12.2 Here are the link: https://www.leapmotion.com/setup to download Leap Motion Windows driver and install it.



If there is a warning when installing, please keep on installing until it’s done.

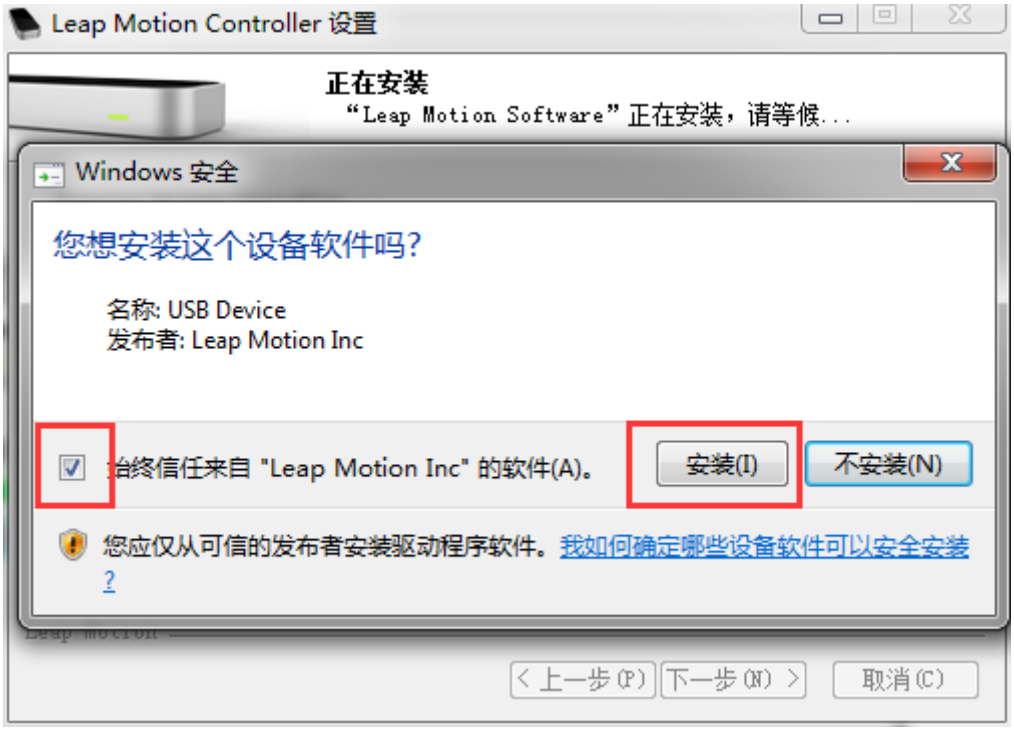


Figure 12.2 Successful installation

12. 3 After preparation, start up the equipment, open DobotStudio, click Leap Motion and enter into the interface:

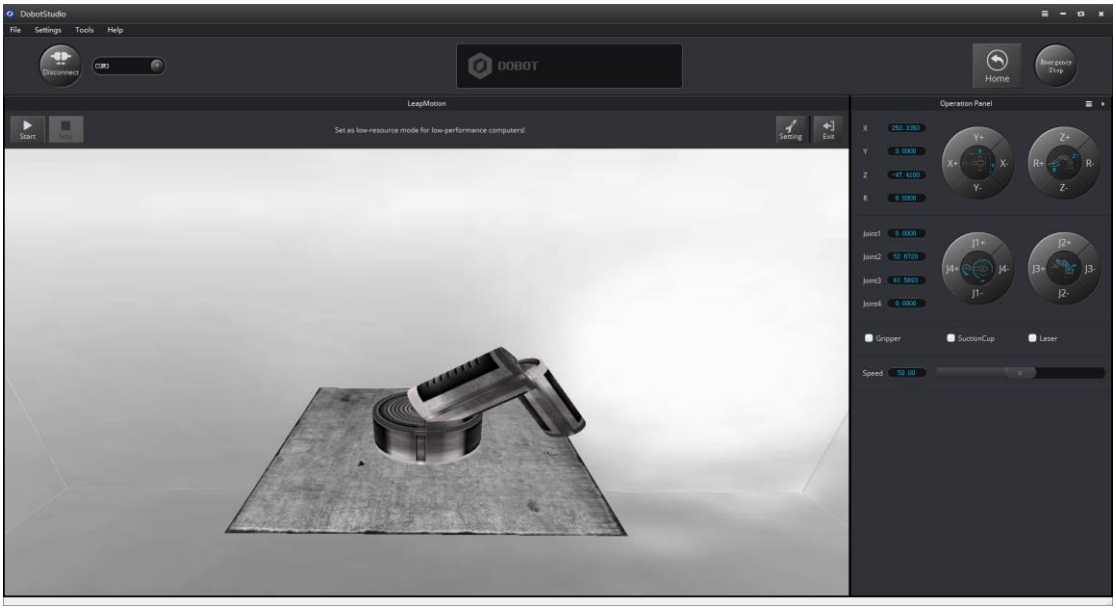


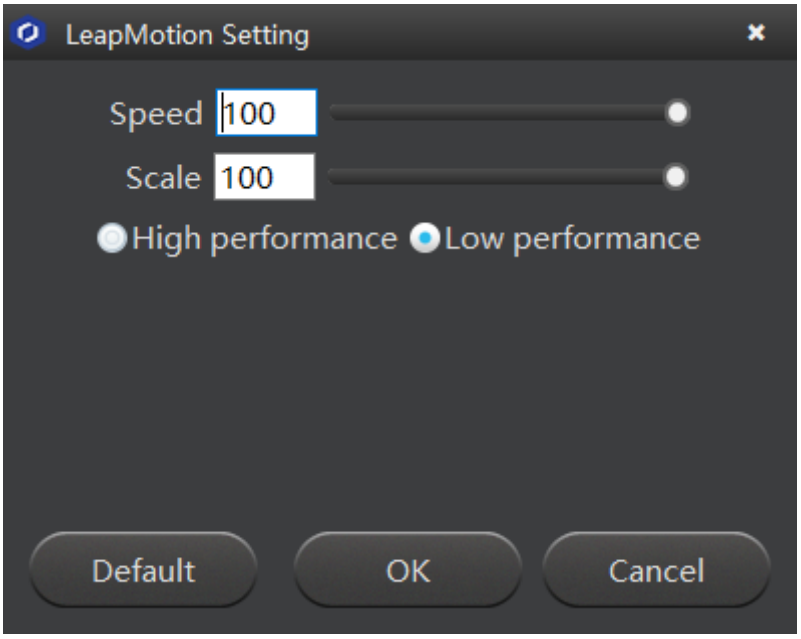
Figure 12.3 Leap motion interface

12.4 **Start**: In order to keep Dobot more stable, turn palm up to move into controlled area of Leap Motion. Dobot will move accordingly, hold hands to trigger suction cup or gripper.

12.5 Turn palm up, remove surveyed area of Leap Motion, and then exit the movement.

12.6 **Stop**: Exit **Leap Motion** mode.

12. 4 **Settings:** Set up speed and scale ratio;



Speed：Speed adjustment;

Scale：Coordinates ratio between leap motion and Dobot;

Low resource/high resource: Set as low-resource mode for low-performance computers.

13.Mouse control

13.1The software used by mouse controlling is **DobotStudio**, please open the software, and enter into mouse module interface, shown as follows:

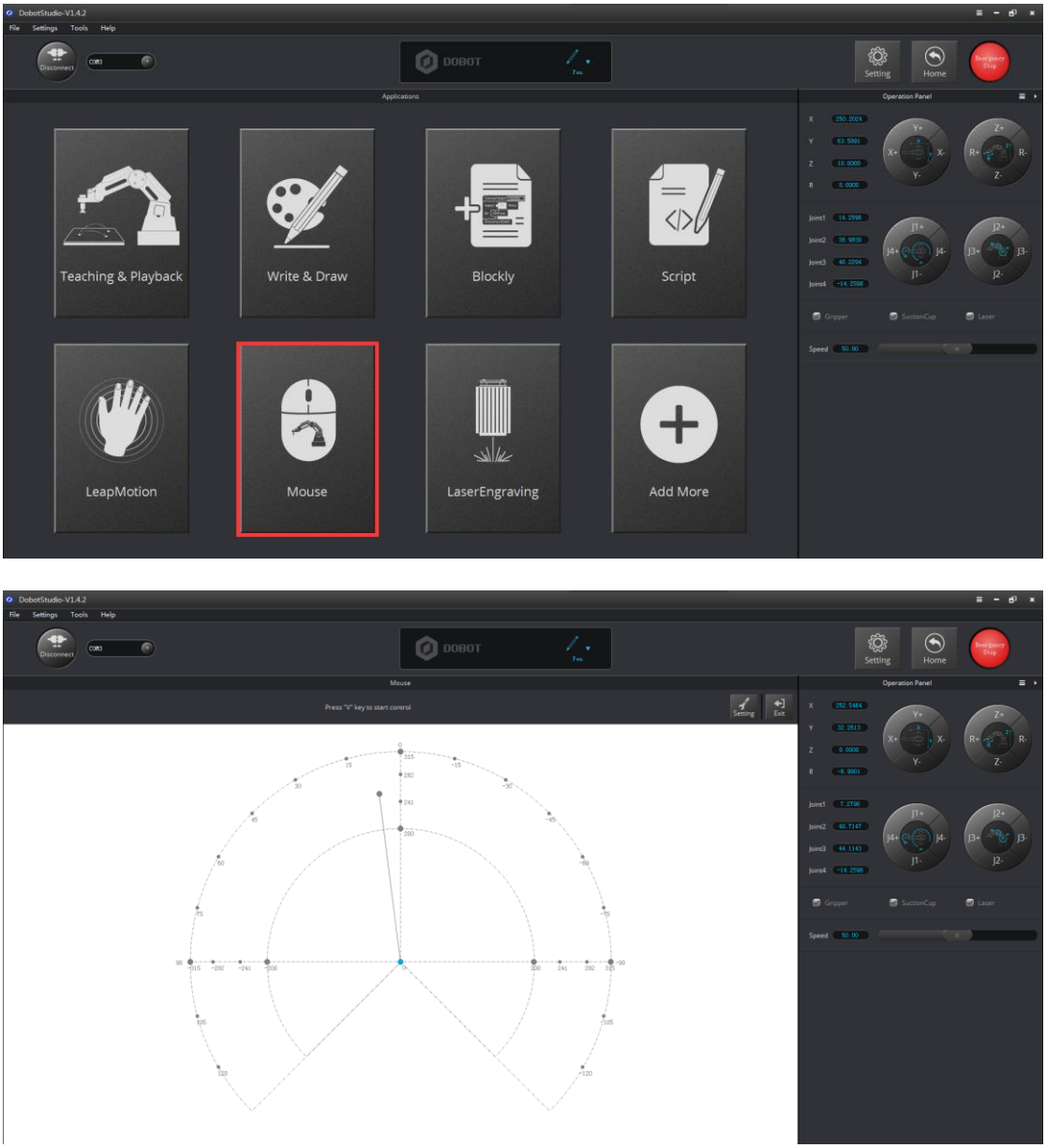


Figure 12.1 Enter into mouse controlling interface

13.2V key: Start and Stop;

13.3 **Settings:** Set up related velocity and acc;

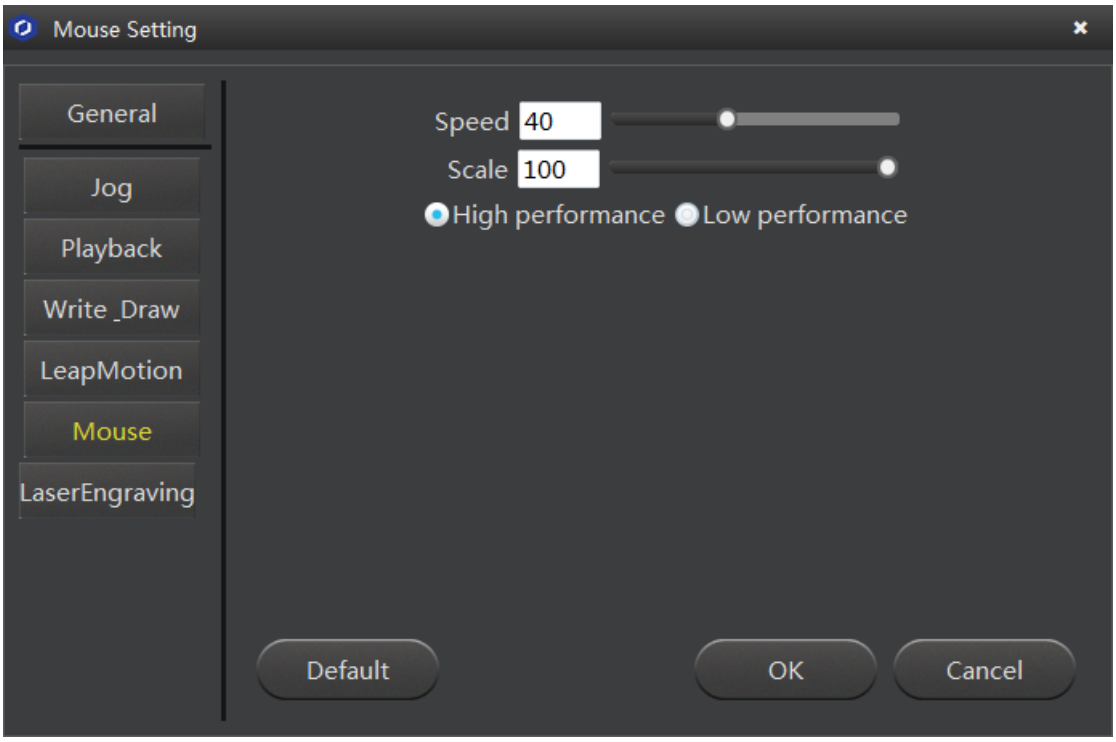


Figure 12.2 Parameter settings

Speed (percentage)：0-100，suggest 50；
Scale (percentage): 0-100, suggest 100;

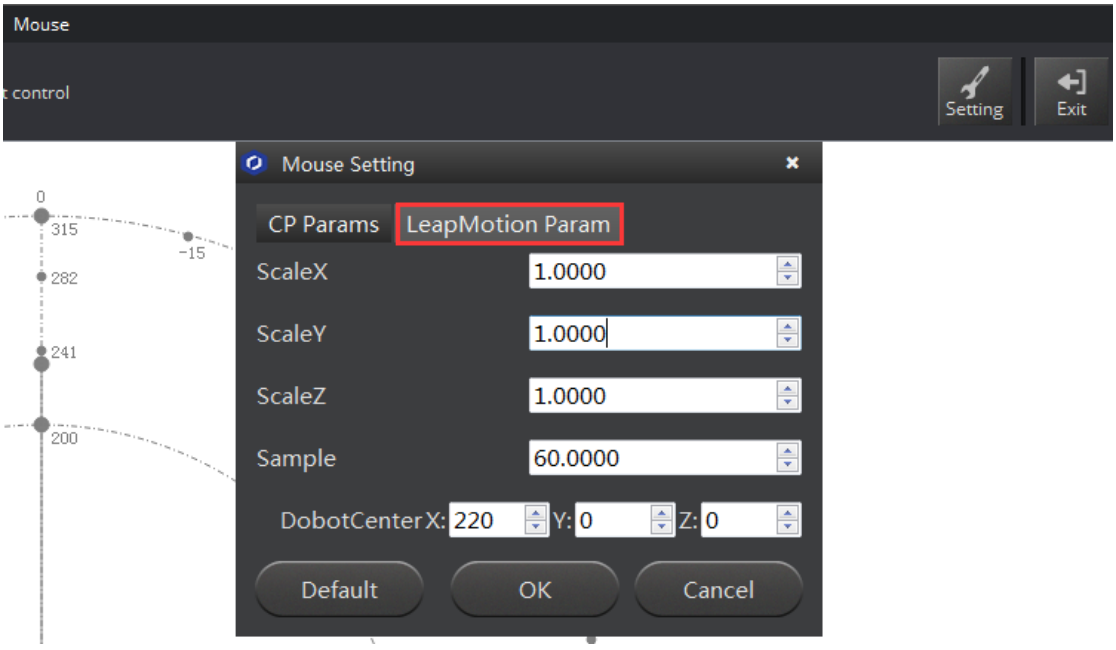


Figure 12.3 Parameter settings

Scale X/Y/Z：Scale ratio between mouse coordinates and Dobot coordinates;
Sample：20-60，depends on PC performance;
DobotCenter：Keep the default;

14 Blockly

Dobot Blockly is a platform of programming based on Google Blockly. In this process, users canprogram through puzzle, stright and easy to understand. Also, users can use the integrated API of Dobot anytime.

14.1 Blockly Interface

1. Open the software **DobotStudio,** click **DobotBlockly**:

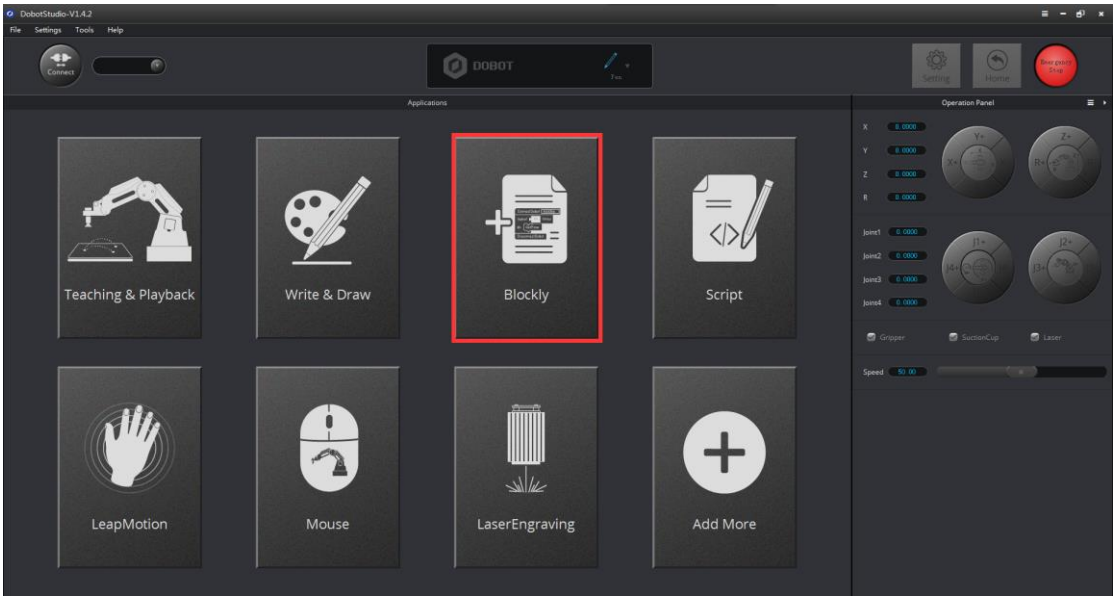


Figure 14.1 Enter into DobotBlockly

2. 5 areas are included in this window:

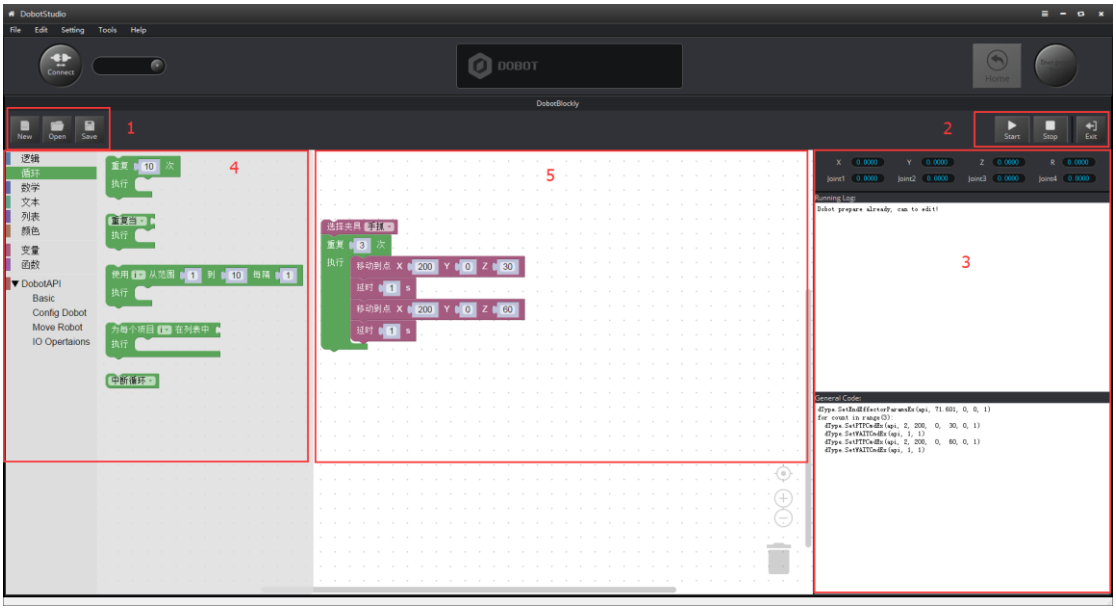


Figure 14.2 DobotBlockly Interface

Area 1：

New/Open/Save：New/Open/Save the current files

Area 2：

Start/Stop

Area 3：

This part includes the current point location info of Dobot, and log information is in the middle, programming code is on the left:

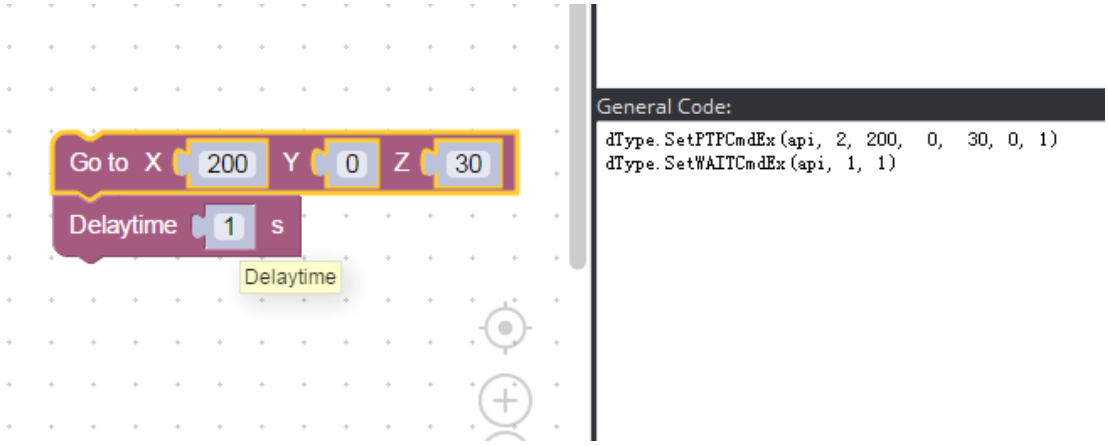


Figure 14.3 Code information

Area 4：

Selected area of blockly module, including logistic, loop, math, Dobot API and so on, just drag them to the window that is OK.

Dobot API has strong functions, such as velocity/acc, end effector settings, move mode, liner or jog mode and each interface of I/O configuration, it is very convenient for second development.

Area 5：

Main window of blockly programing

14.2 Blockly Demo

Here is one basic demo, shown as follows:

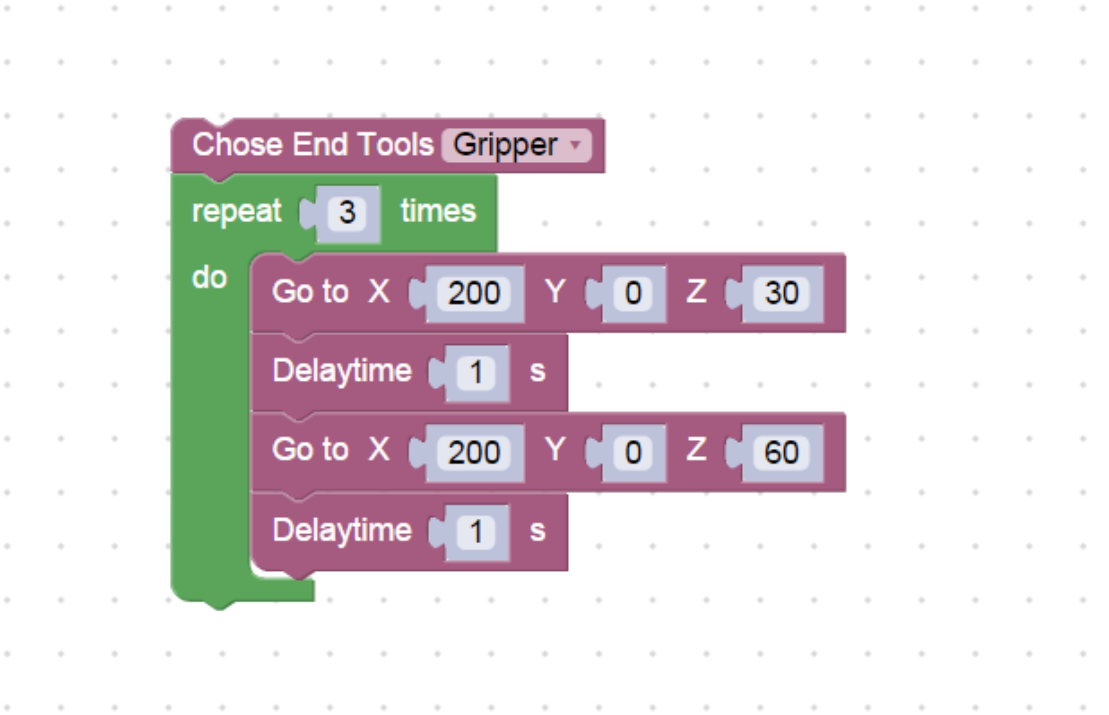


Figure 14.4 Programing demo

Explanation of Demo: Set endeffector as gripper, set the loop number as 3, and make the Z axis move back and forth 3 times. After this, click **Start**, Dobot will move accordingly.

15. More support

- For more information,visit http://cn.dobot.cc/
- For more detailed material about software, second development and any others,visit http://cn.dobot.cc/download-center/dobot-magician.html
- Share your idea on Dobot forum http://forum.dobot.cc/
- Further question, welcome to send email at support@dobot.cc

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