UP Plus 2
user manual

version : 4.6.5

Table of Contents

Precautions

1. UP Plus 2 3D printer requires power adapter provided by original manufacturer. Otherwise machine could be damaged or even cause fire hardzard. Please also keep the power adapter away from water and high temperature.

2. During printing, the nozzle of the printer will reach 260°C and the print platform could reach 100°C. Please do not touch these parts with bare hand while they are hot, not even with the heat resistant gloves included with machine as the temperature could damage the gloves and your hand.

Warning label on printer:
High Temperature, do not touch!

4. During Printing, the nozzle and print platform will move at high speed, do not touch these parts while they are moving.
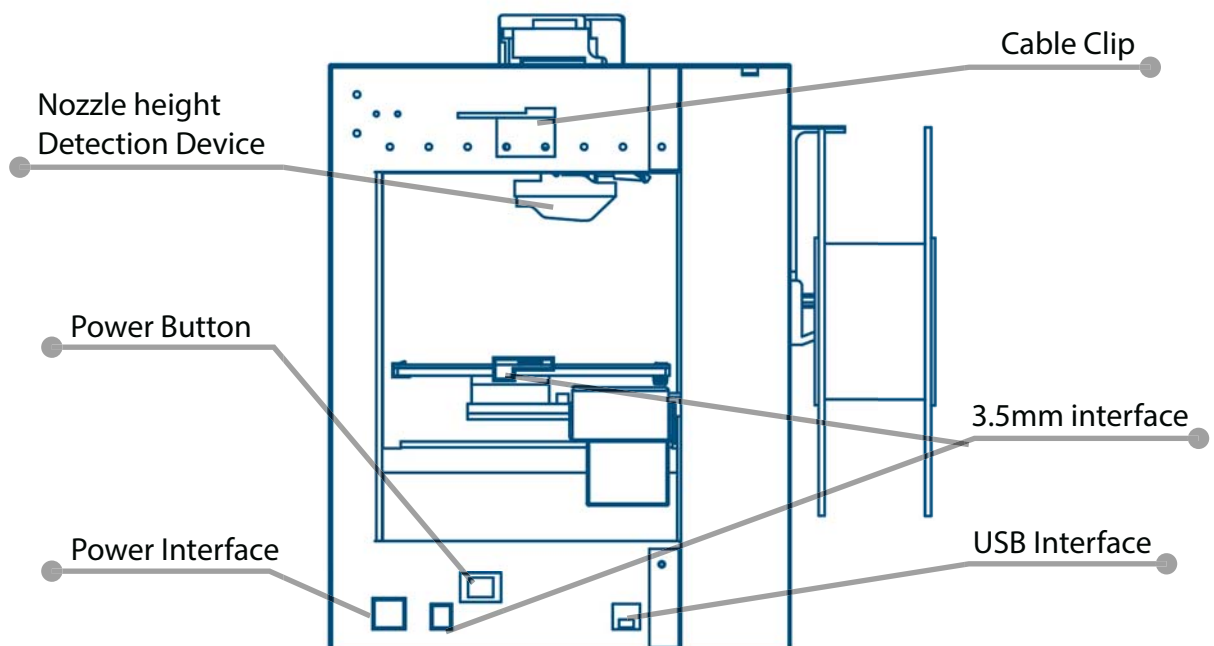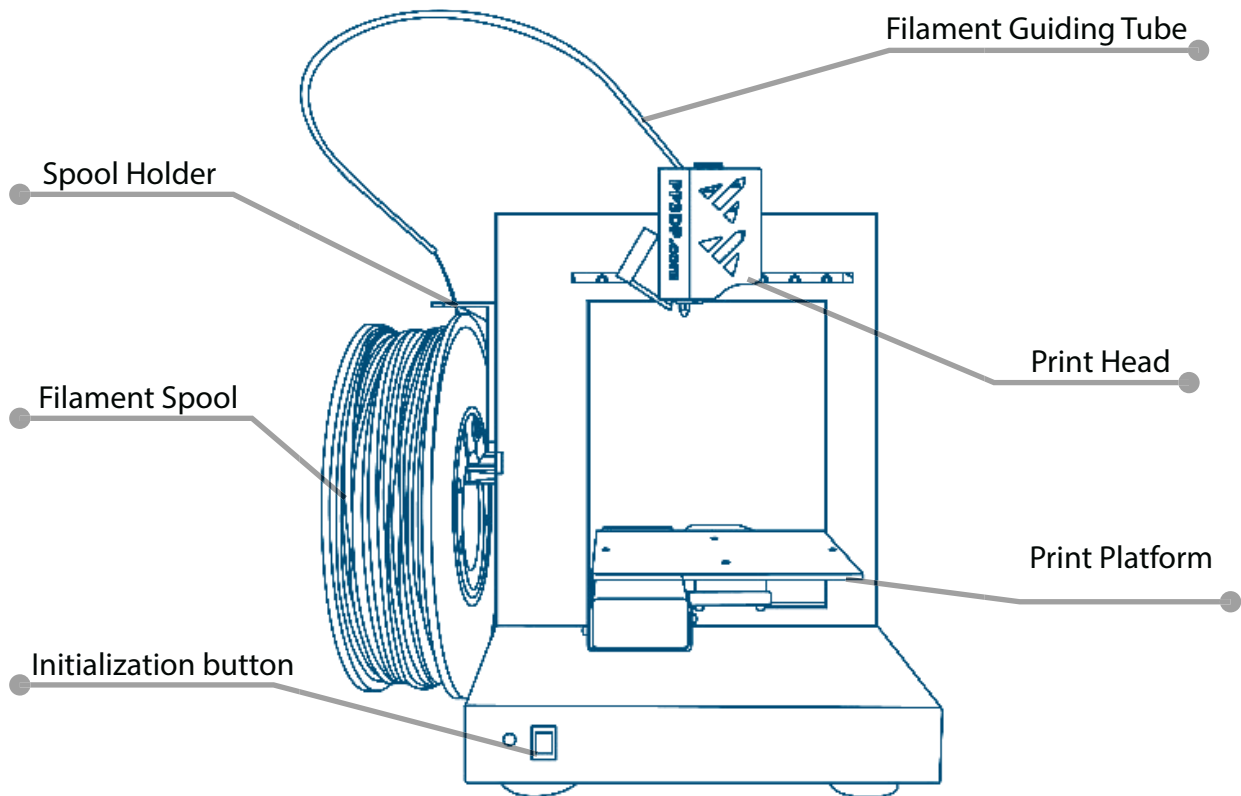

Warning label on printer:
Moving parts, do not touch!

5. Please wear goggles when removing the supporting material from models and detaching models from perf board.

6. When printing ABS and PLA, slight smell will be produced, please run the printer in a well ventilated environment. We also suggest you put the printer in an enviroment with stable temperature, as unwanted cooling could cause adverse effects on print quality.

7. When UP softwre is sending data to the printer, where the status bar on the left bottom corner is showing "sending layers", do not unplug USB cable as this will disrupt data transfer and resulted in printing failure. USB cable can be unpluged after data transfer was finished.

8. UP Plus 2's working temperature is between15^{o}C and 30°C relative humidity 20%-50%. It is recommended to discharge static charge from user's body before touching the machine to prevent interruption of printing and potential damage to the printer.

UP Plus 2 Specification

Printing

Printing Technology	MEM (Melted Extrusion Manufacturing)
Build Volume	140 x 140 x 135mm (W x H x D)
	5.5" x 5.5" x 5.3"
Print Head	Single, Modular for easy replacement.
Z-Resloution	0.15/0.20 /0.25 /0.30 /0.35 /0.40 mm
Supporting Structure	Smart Support Technology: automactically generated, easy to remove, fine-tunable.
Platform Leveling	Automatic leveling and automatic detection of nozzle height.
Print Surface	Heated bed with perf board
Unterthered Printing	Yes
Average Operational Noise	55dB

Software

Bundled Software	UP Software
Compatible File Formats	STL, UP3, UPP
Connectivity	USB
Operating System	WinXP/Vista/7/8, Mac OS

Power Supply

Power adapter	110-240VAC, 50-60Hz, 220W

Mechanical

Chassis	Metal, Open form
Printer Weight	5KG / 11 LB
Printer Dimiension	245(W) x 350(H) x 260mm(D)
	9.5" x 10.5" x 14"
Weight with Packaging	9.2KG / 21LB
Packaging Dimension	370 x 420 x 310 mm (W x H x D)
	14.5" x 16.5" x 12.2"

Printer Body illustration

Filament Guiding Tube

Spool Holder

Print Head

Filament Spool

Print Platform

Initialization button

Cable Clip

Nozzle height
Detection Device

Power Button

3.5mm interface

Power Interface

USB Interface

Accessories

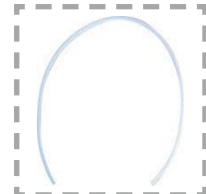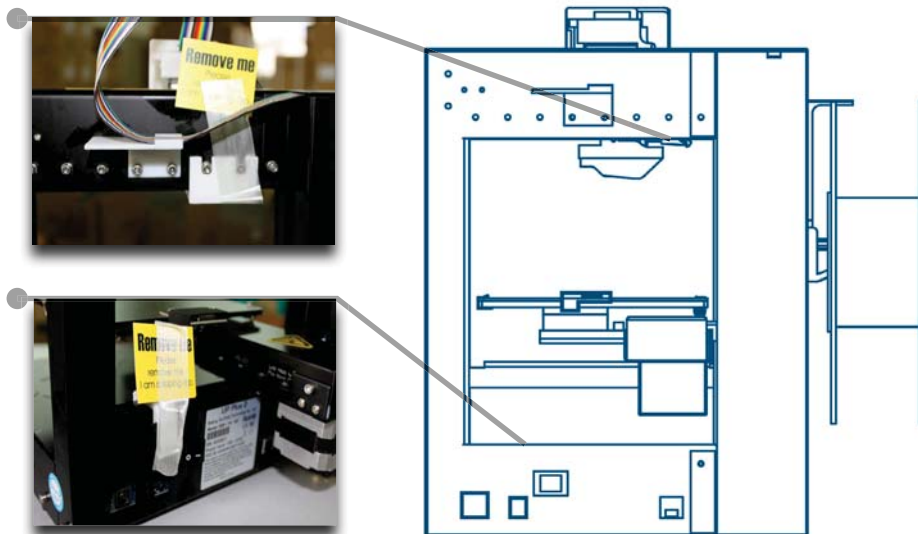|			
Perf Board	USB Cable	Power Adapter	Spool Holder
Gloves	Plier	ABS Filament	Filament Guiding Tube
Shovel	Nozzle height Detector	Hex Keys	Blots and Nuts
Nozzle Wrench	3.5mm Cable		

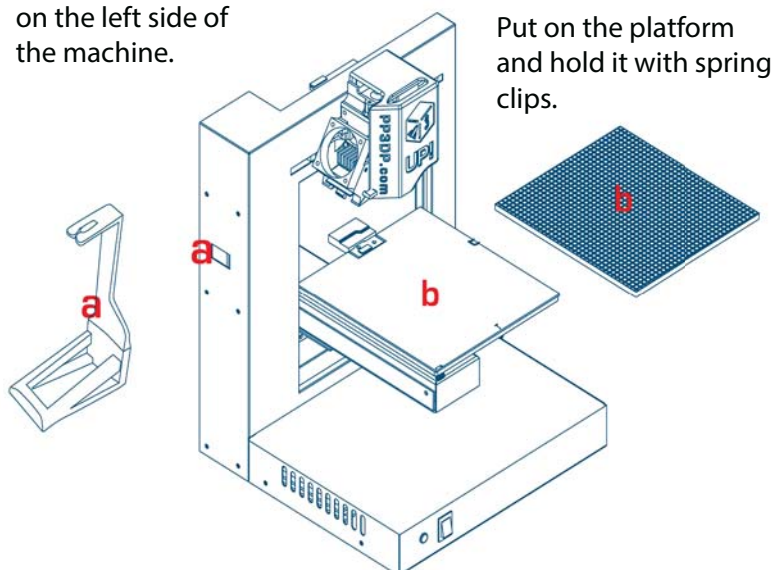*If anything is missing please contact your local distributor or *support@pp3dp.com.*

Remove Shipping Clips

User may keep the shipping clips in case the printer need to be shipped in the future.

Install Perf Board and Spool Holder
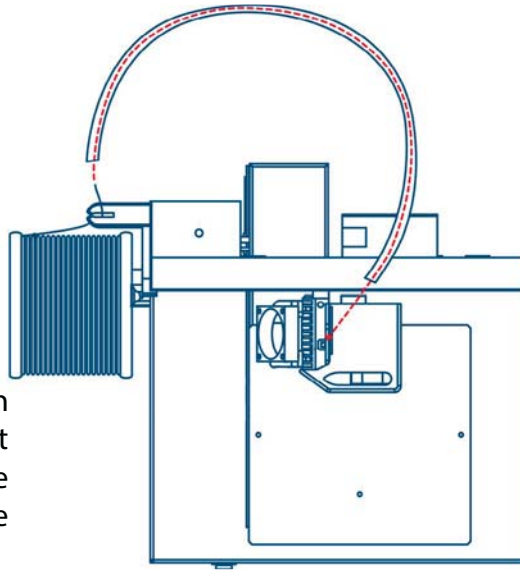
Spool holder hook on the left side of the machine.

Put on the platform and hold it with spring clips.

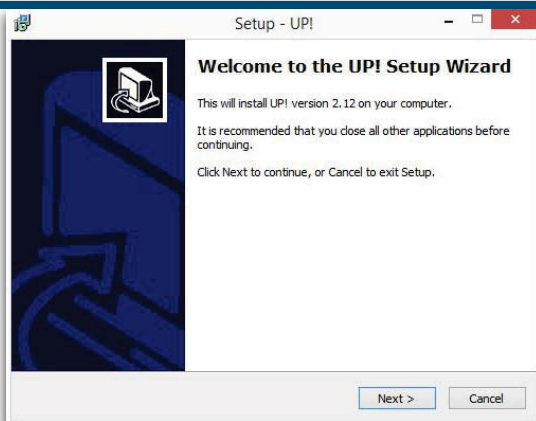Hold the Perf Board with spring clips.

Install the Filament Guiding Tube

Top View

Put the filament spool on the spool holder and insert the filament through the guiding tube and into the print head.

Install UP software

1.Go to support section of www.pp3dp.com to download the latest version of UP Software.
2.Double click UP! Setup.exe to install the software (default installation path _C:\ Program files\UP_) a pop up window will appear, select"install" and following the instruction to finish. The printer's driver is now installed into the system.
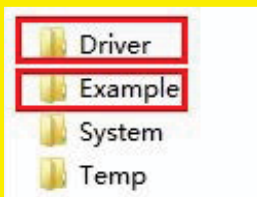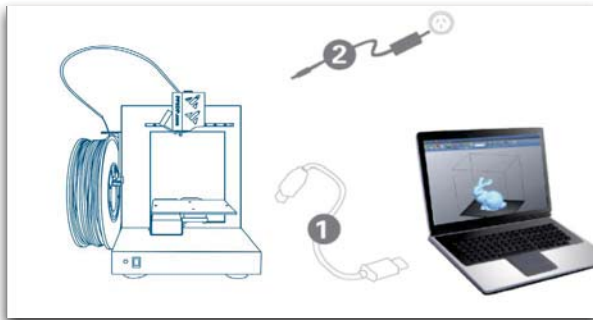
After installation,in the UP folder:
Driver folder contains the printer drivers.
Example the example folder contains STL files for the printed parts of UP printers and example files.

Testing of Printer Driver Installation

First make sure computer and printer is connected to computer via USB cable and the printer is switched on. The LED indicator next to the initialization button should be light up in red color.

In Software main menu, Click "3D Print".

"Initialize" and "Maintenance" options will light up and avaliable for selection. This indicate the successful installation of printer driver.
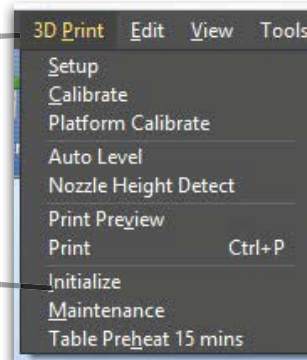
Initialization of printer

Initialization is required for everytime the machine is switched on. During initialization the print head and print platform move slowly and hit the endstops of XYZ axes. This is essential as the printer need to find the endpoints of each axis. Only after initialization, the other software options will light up and become available for use.

Two ways of initialization:
1. UP Plus 2 can be initialized by clicking initialization option in the menu which is shown above.
2. The printer has an Initialization Button in front of the machine shown in the picture below. When the printer is idle, long press this button will trigger initialization

Initialization Button

The other functions of Initialization Button:

1. Stop current print job: During printing press and hold the button.

2. Reprint last job: Quick double hit of the button.

Software Interface

Main Menu

Quick functional Buttons

Status Bar
Display the statsu of printer and software.

Print Plate
-left mouse click and hold, moving mouse to adjust camera angle.
-Right mouse click and hold, moving mouse to move print plate.
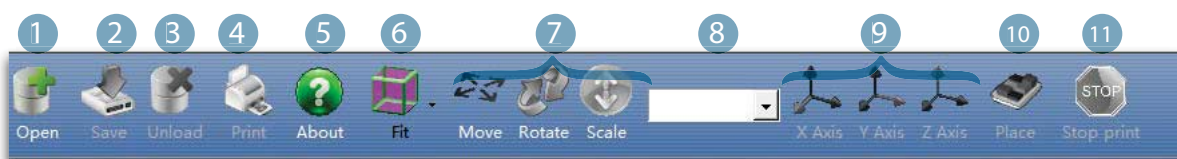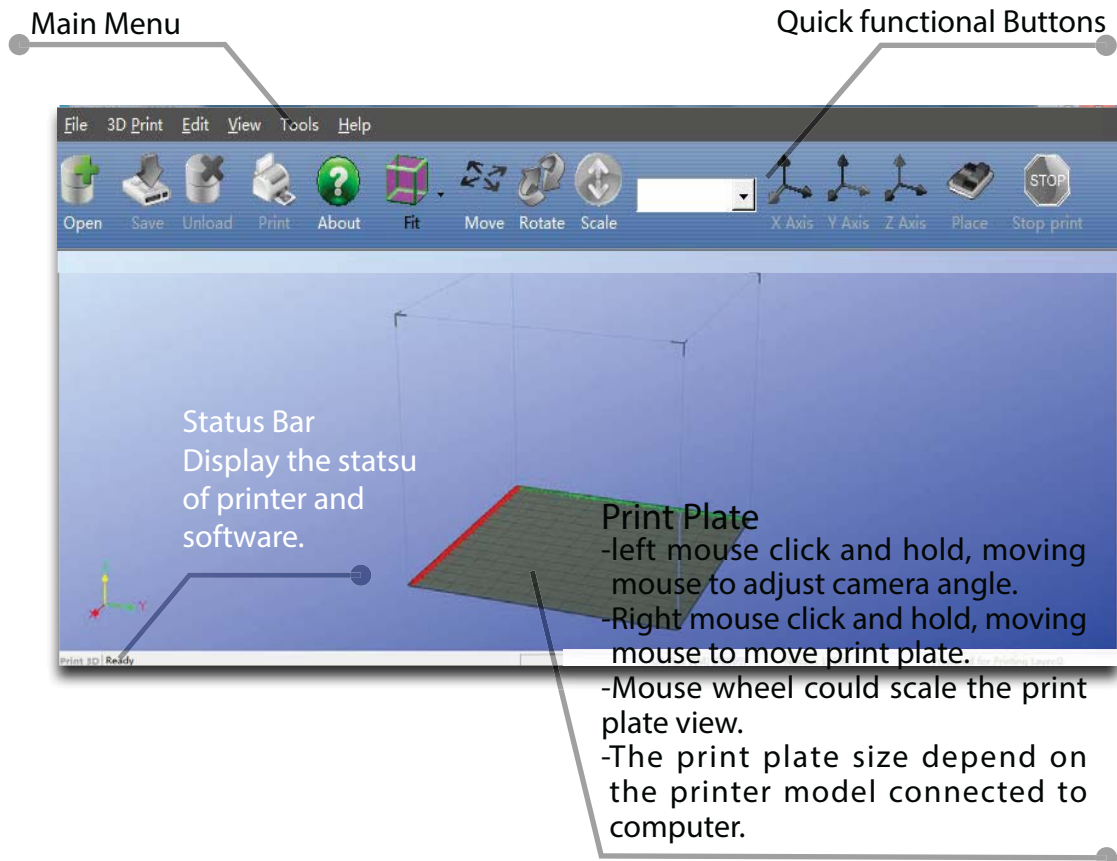-Mouse wheel could scale the print plate view.
-The print plate size depend on the printer model connected to computer.
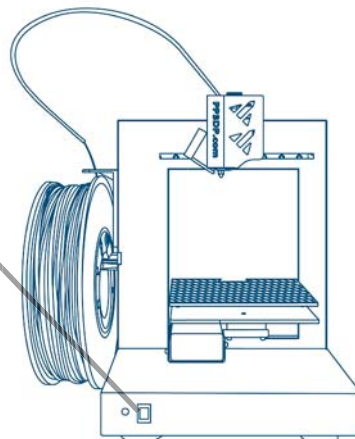
1. Open: Load a model.
2. Save : Save the model into .UP3, a propritory 3D file format for UP printers.
3. Unload: Unload the selected model.
4. Print : Print the current print plate.
5. About : Display software version, printer model, firmware version and etc.
6. View Perspective: A variety of pre-set of perspective.
7. Adjustments : Move, Rotate, Scale.
8. Set the value of adjustments.
9. Set the orientation of adjustments.
10. Place : Place the model to the center of the print plate. If more than one model exist software will optimize their positions and distances to each other.
11. Stop: If connected to printer, click this will stop the printing process. (cannot be resumed)

Automatic Platform Calibration

Platform calibration is the most important step for successfull printing, as it ensures the first layer adhesion. Ideally, the distance between nozzle and platform is constant, but in reality the distance varies at different positions due to many reasons (eg. slightly tilted platform) and this could cause warping of prints or even complete failure. Fortunately UP Plus 2 has automatic platform calibration and automatic nozzle height detection functions. By using these 2 functions, the calibration process could be finished quickly and easily.

1 Put the Platform Calibration Device onto the print head. There is a magnet on the device so that it can attach itself on the print head. There is a grove on the device that will fit the nozzle.
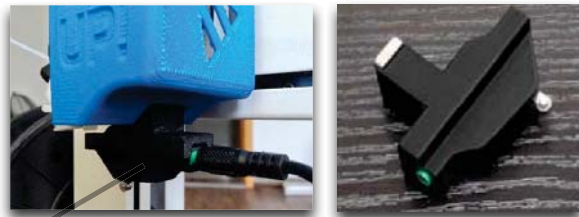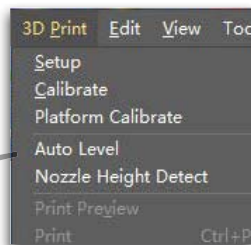
2 Connect the Platform Calibration Device to the machine's 3.5mm interface with the 3.5mm cable included.

3 Make sure the 3.5mm cable is detouring from the printer body so that the cable is not touching the platform.
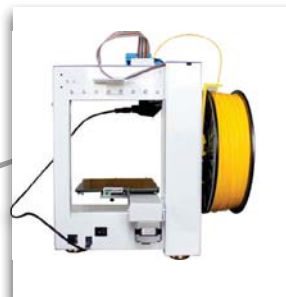
4 In the main menu, go to "3D Print" and hit "Auto level" to trigger the auto leveling process of the printer.

3D Print	Edit	View	Too
Setup			
Calibrate			
Platform Calibrate			
Auto Level			
Nozzle Height Detect			
Print Preview			
Print			Ctrl+P

Calibation Tips:
1. Do the calibrations when nozzle is not heated.
2. Remove residual plastic from the nozzle before calibration
3..A perf board should be fitted on platform during calibration.

Coarse Manual Platform Leveling
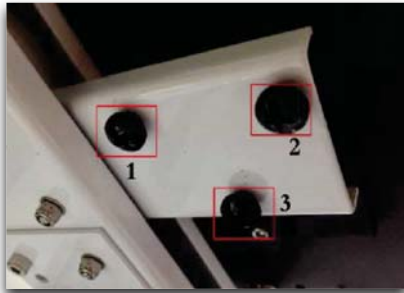
Usually you do not need to adjust the platform manually. This is only necessary if automatic leveling function unable to effectively level the platform.
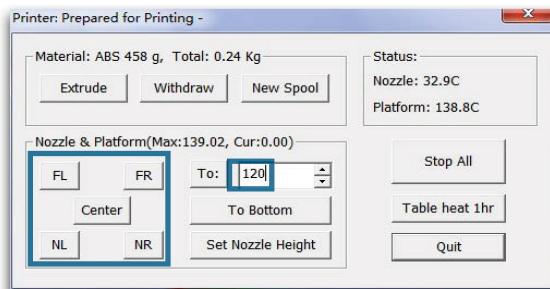There are 3 screws under the platform of UP Plus 2. These screws can be fastened or loosened to adjust the leveling of the platform.

1

In "3D Print" - "Maintainance" window, user can move the print head to 5 difference postions on the platform. User can also use "To" button to move the print platform to a particular height .

2

A piece of paper could be used to help measure the distance between nozzle and platform. Raise the platform to nearly touching the nozzle (eg. nozzle height).

3

Try to move the paper and feel the drag. When one can feel the resistance from the nozzle, that means the distance between nozzle and platform is about the thickness of the paper. Make sure you can feel similar drags at all 5 positions by adjusting the screws.

4

Other Options of the Maintenance Menu:
Withdraw: the printer heat up and withdraw filament from the print head.
New Spool: to tell the software what is the current filament type, the filament that used must match here.
Heat Table 1 hr: preheat table for 1 hour.
To Bottom: move the platform to the bottom.
Set Nozzle Height: set the current platform height as nozzle height.

Automatic Nozzle Height Detection

1. After autoleveling, *remove the platform leveling device* and unplug the 3.5mm cable from it. Plug the cable into the 3.5mm interface of the Nozzle Height Detection Device.

2. Hit "Nozzle Height Detection" in the "3D Print" Menu. The platform will rise slowly until the nozzle height detection device hit the nozzle.

3. The nozzle height measured will be shown in a pop up window. This value will be stored in printer until further modification.

4. After platform leveling and nozzle height detection the printer should be ready to print.

If consistent warping still occurs after auto-leveling, this may due to severe unleveling of the platform which exceed the capability of auto-leveling fucntion. In this case user should do a coarse manual leveling before auto-leveling (see next page).

User may also level the platform without using the auto-leveling device and nozzle detection device. Please refer Appendix A for details.
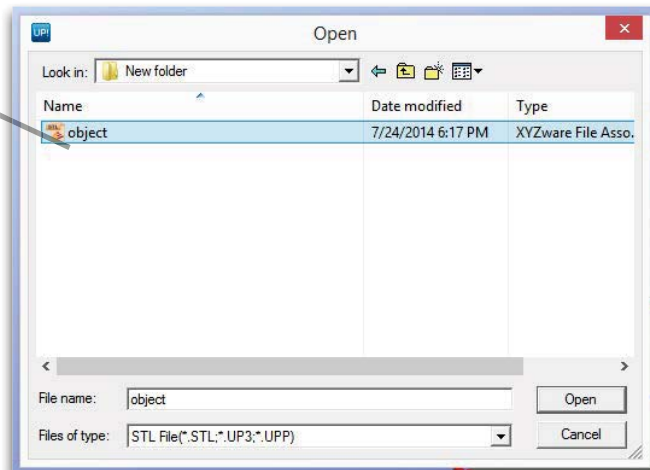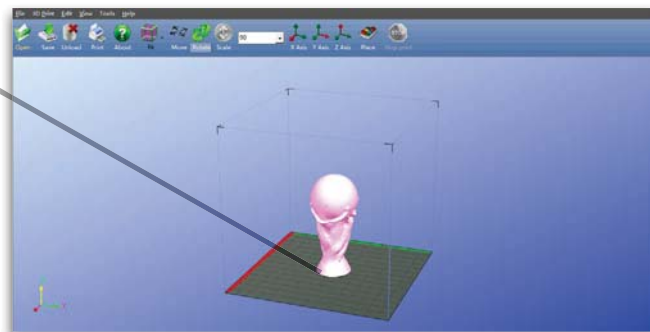
Loading a Model

1 Click "Open"
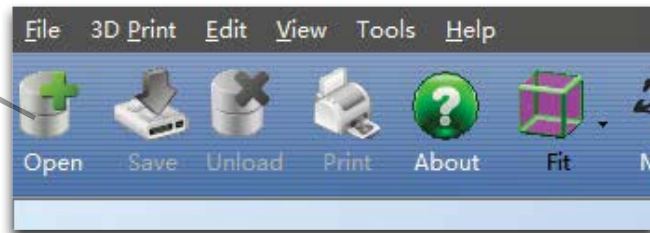
2 Choose your model.
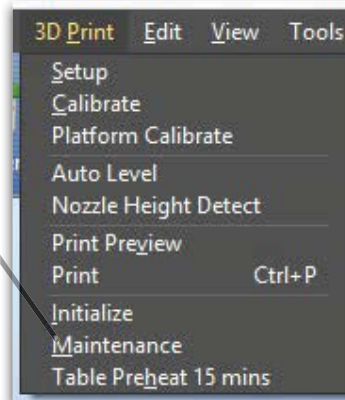

3 Loaded model on the print plate.

4 Click "Print" to open the print preview window.

Prepare for Printing

Make sure printer switched on and connected to computer. Select Main Menu - 3D Print - Maintainance.
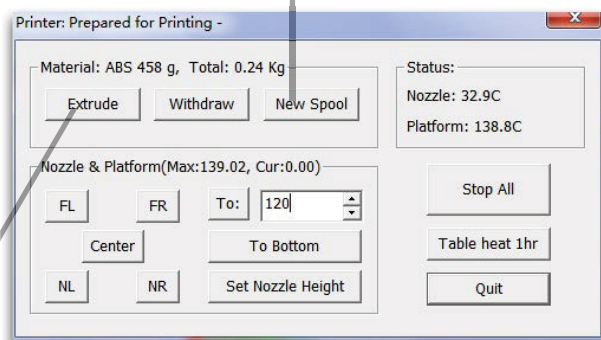
1

```
3D Print   Edit   View   Tools
Setup
Calibrate
Platform Calibrate
Auto Level
Nozzle Height Detect
Print Preview
Print                    Ctrl+P
Initialize
Maintenance
Table Preheat 15 mins
```

Click New Spool and choose ABS and input filament weight.

2

Click "Extrude" button, the print head will start to heat up, within 5 minutes its temperature will reach 260°C, then printer will buzz and the print head start to extrude.

3

```
Printer: Prepared for Printing -                                    x

Material: ABS 458 g,  Total: 0.24 Kg          Status:
  Extrude      Withdraw      New Spool         Nozzle: 32.9C
                                               Platform: 138.8C
Nozzle & Platform(Max:139.02, Cur:0.00)
  FL          FR        To:   120                  Stop All
        Center              To Bottom              Table heat 1hr
  NL          NR        Set Nozzle Height          Quit
```
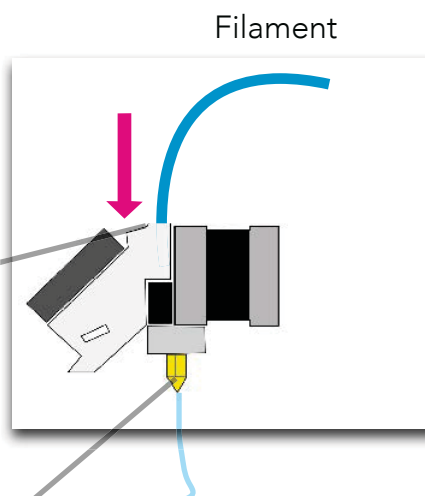
Filament

Gently insert the fliament into the small hole on the print head. The filament will be feed into the print head automatically when it reach the extruder gear inside the print head.
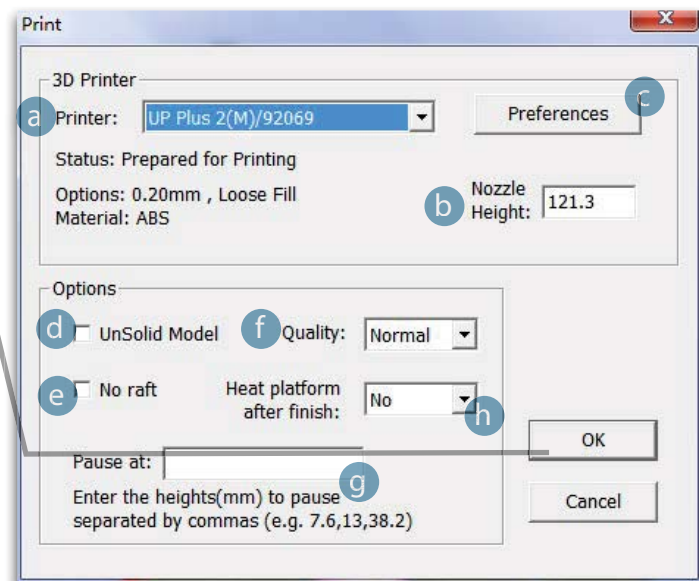
4

Check the nozzle for plastic extrusion. If plastic is coming out from the nozzle that means the print head is ready. The extrusion will stop automatically.

5

Click "OK" to start printing.
The program will first slice the model into Gcode and then transfer the data to the printer.

5

Print

3D Printer

a — Printer: UP Plus 2(M)/92069 ▾   Preferences — c

Status: Prepared for Printing

Options: 0.20mm , Loose Fill
Material: ABS

b — Nozzle Height: 121.3

Options

d — ☐ UnSolid Model   f — Quality: Normal ▾

e — ☐ No raft   Heat platform after finish: No ▾ — h

OK

Pause at:

Enter the heights(mm) to pause — g
separated by commas (e.g. 7.6,13,38.2)

Cancel

After sending the data, the program will suggest the amount of material and time needed for the model in a pop up window.
At the same time, the nozzle will start to heat up. The print job will start automatically after clicking "OK"

6

UP!   ✕

⚠ Materials: 13.8 g
Print: 01Hour:13Minute
Finish: 06(Wednesday) 15:28

OK
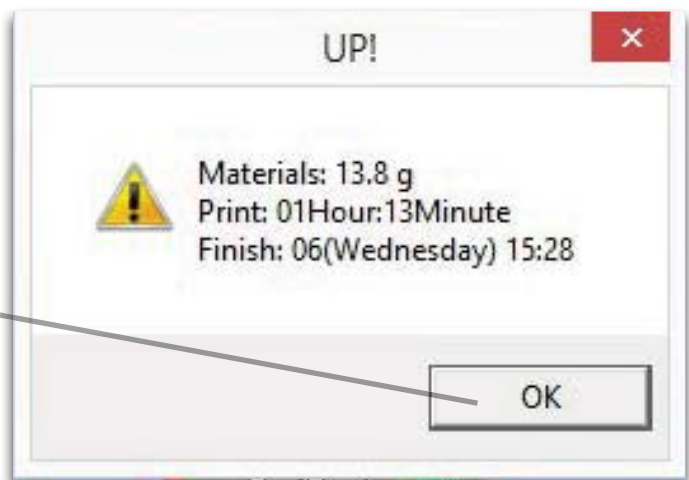
Annotation of Print Preview Interface:
a. Display the printer model.
b. Dispaly the noozle height.
c. Click to enter printer preference to set printing parameters.
d. If your model is not solid (defective), turn on this option.
e. No raft will be printed if this is turned on, print bed leveling will be disabled as well.
f. Print Quality: the better the print quality the slower the print speed.
g. Set the pause height, the printer will pause at indicated heightness for changing filaments.
h. Continuous heating of platform after printing, save heating time for consective printing and preventing breakage due to rapid cooling in cold weather.

When printer finished receiving the data, user could disconnect it from computer for untethered printing.
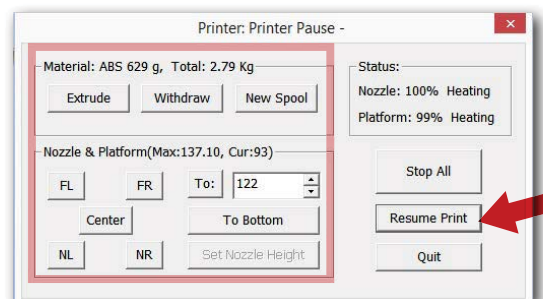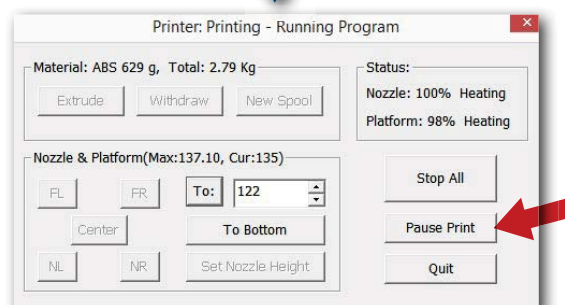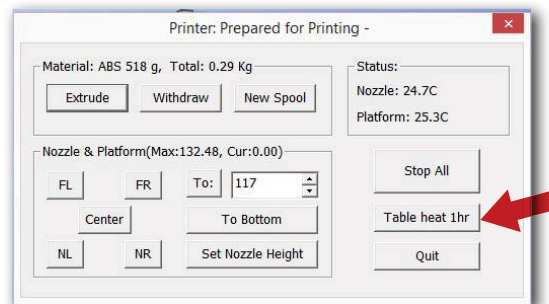
Pause of Print Job

During printing, the machine could be paused through maintainence interface.

When the printer is idle, there is a **"Table heat 1 hr"** button under "Stop All" button. Press this button will keep platform heated for one hour.
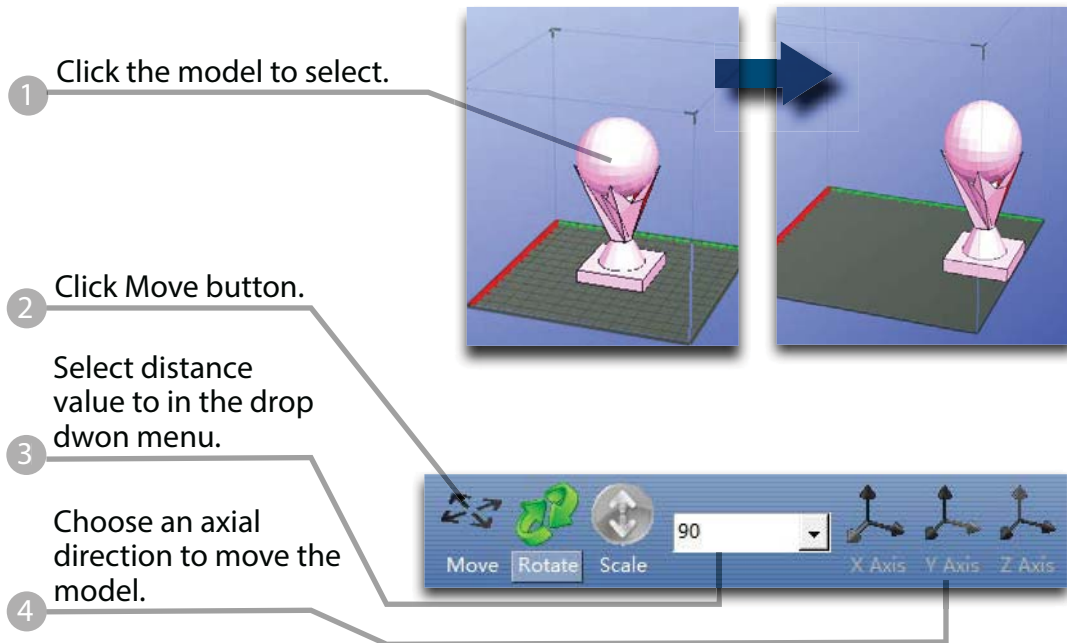
When the printer starts to print, "Table heat 1 hr" button will disappear. The button will reappear after the printing of **raft is finished** but the button becomes **"Pause Print"** which indicates pause function is now available. Press this button the printer will pause the print job and the button will become **"Resume Print".**

When the print job is paused, the other buttons on the maintence interface will become available. User could change filaments using "Withdraw" and "Extrude" buttons or move the print head and print platform with the location buttons and the "To" button. User should be aware not to crash the print into the print head.

During pause, the print head and platform will be kept at printing temperatures. When "Resume Print" button is pressed, the print head and platform will go back to the pausing point and contune the print job.
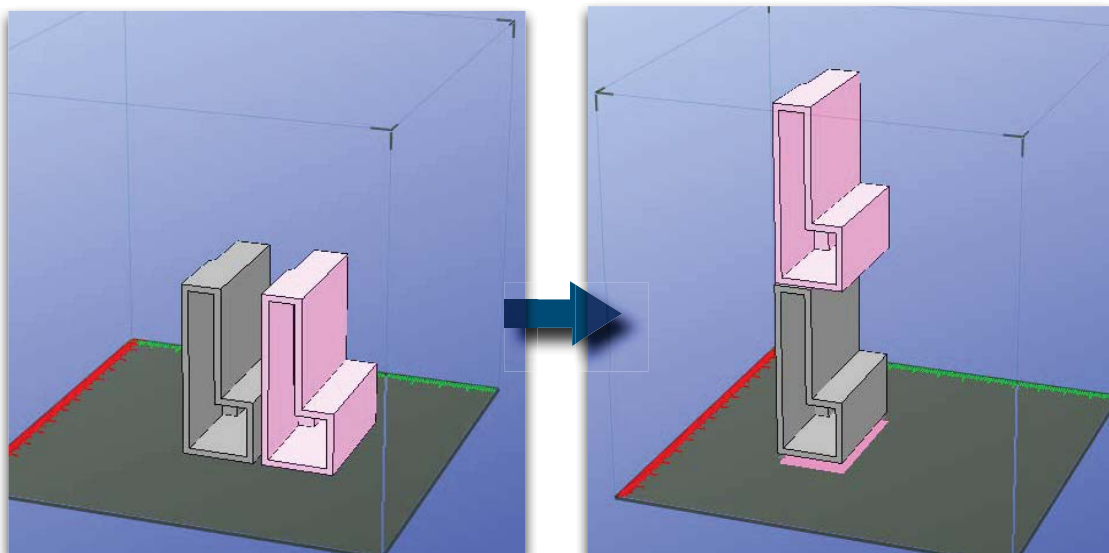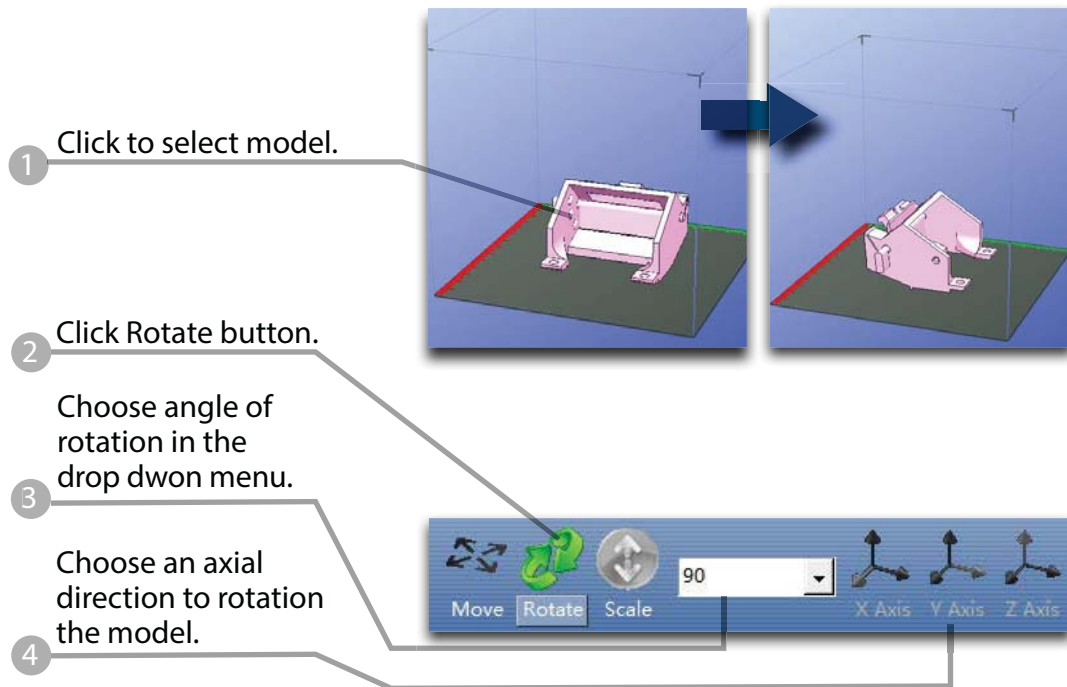
Moving Model

1 Click the model to select.

2 Click Move button.

3 Select distance value to in the drop dwon menu.

4 Choose an axial direction to move the model.

 Drag model with mouse on XY-plane: **Press and hold Ctrl key**, mouse **left click and hold** the target model, now the model could be dragged around on XY-plane.

 Drag model with mouse on Z-axis: **Press and hold Shift key, mouse left click and hold the target model**, now the model could be dragged along the Z-axis.
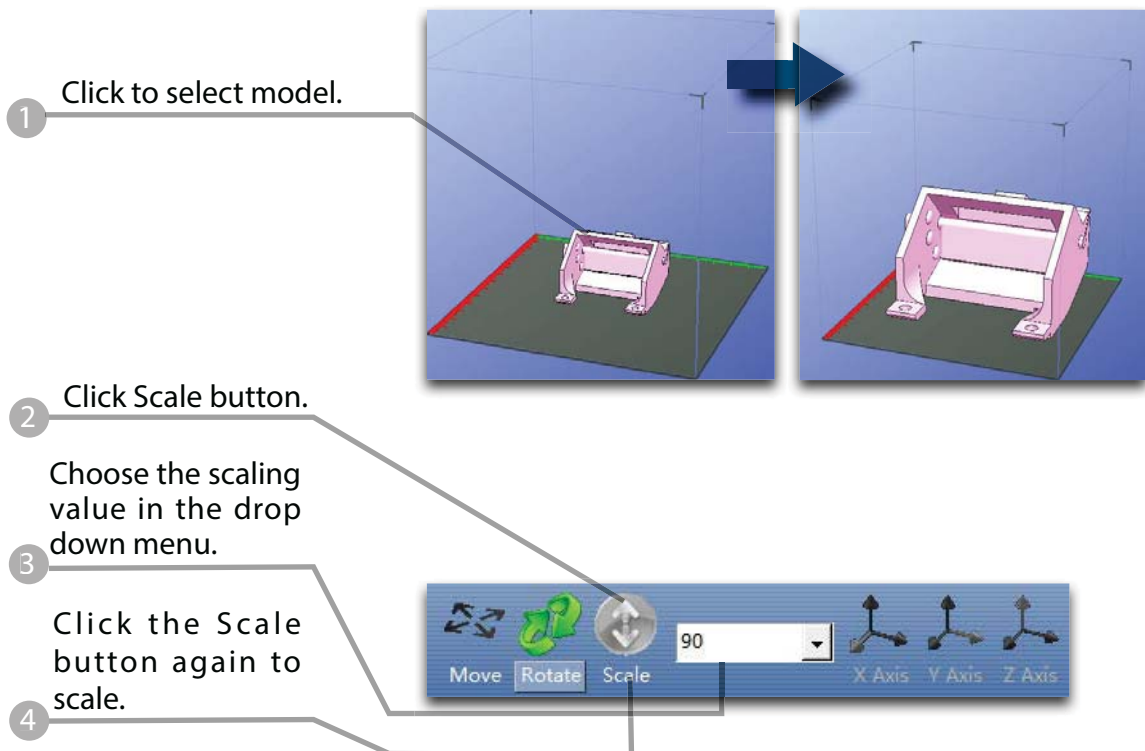
 Multiple models could be **stacked**. They can also be fused into single model by "Merge" function in the "Edit" Menu.

Rotate Model

1 Click to select model.

2 Click Rotate button.

3 Choose angle of rotation in the drop dwon menu.

4 Choose an axial direction to rotation the model.

Scale Model

1 Click to select model.

2 Click Scale button.

3 Choose the scaling value in the drop down menu.
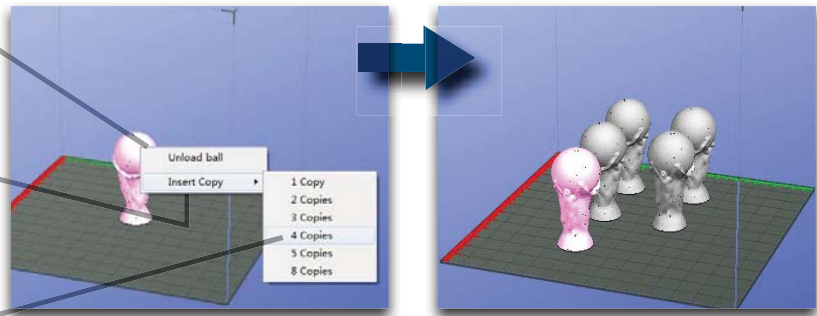
4 Click the Scale button again to scale.
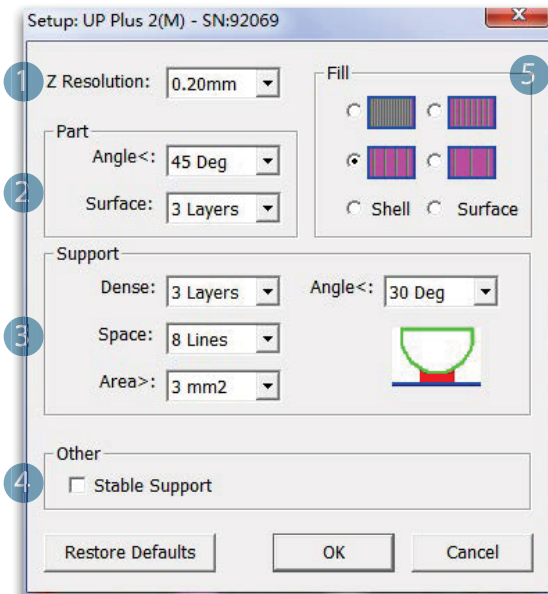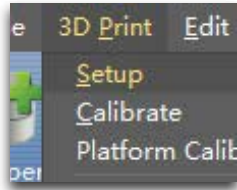
Duplicate Model

1 Click to select model.

2 After selection, right click to open menu

3 In the insert copy menu, select the number of copy for duplication.

Right click menu also contain unload function. Either choose a specific model to unload or unload all.

Printing Parameters

1. Z-resolution: Thickness of each printed layer, the lower the value, the more details will be generated.

2. Part:
   Angle: Determine the range of dense support generation.
   Surface: Choose the how many layers will be made for bottom of the model.

3. Supprot:
   Dense: How many layers for dense support generations.
   Space: Set the density of of support structure, the larger the value the less dense of the supporting structure.
   Area: If the supporting area is less than this value, no support will be generated.(it is possible to turn off support by choosing Only Base.)

4. Stable Support: Generate more stable support but more difficult to remove.

5. Infill: The photo shows the effects of 4 different infill options.
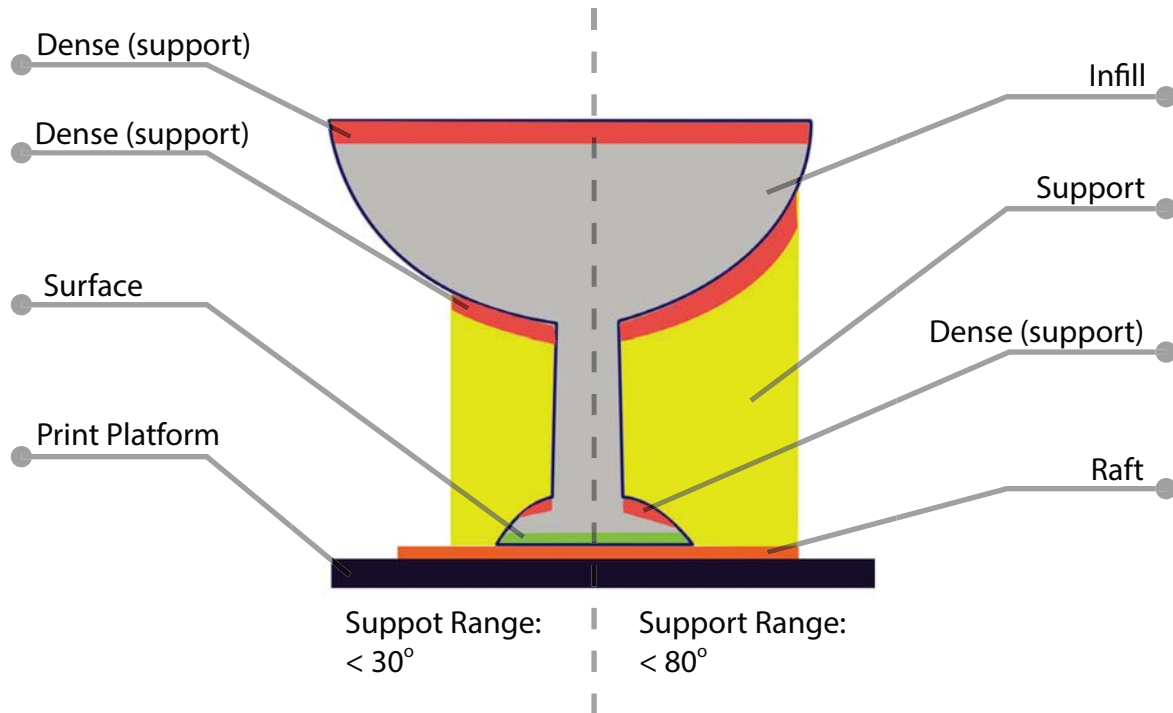
Shell

No infill in shell mode.

Surface

The object will be printed without bottom layes and top layes. Only a surface with single layer thickness will be made.

Annotation for printing parameters

Dense (support)

Dense (support)

Surface

Print Platform

Infill

Support

Dense (support)

Raft

Suppot Range:
< 30°

Support Range:
< 80°

Dense: Solid support structure ensure the surface being supported retain its
shape and surface finish.

Infill: The inner structure of the printed object, the density of infill could be
adjusted.

Raft: The thick structure that asist the adhesion of object to the platform.
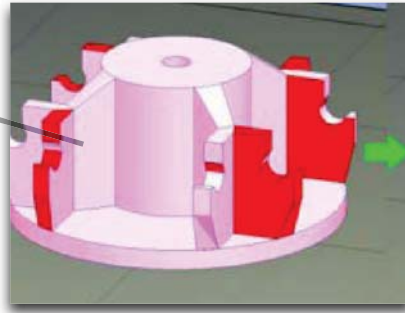
Surface: The buttom layers of the printed object.

Repair Model

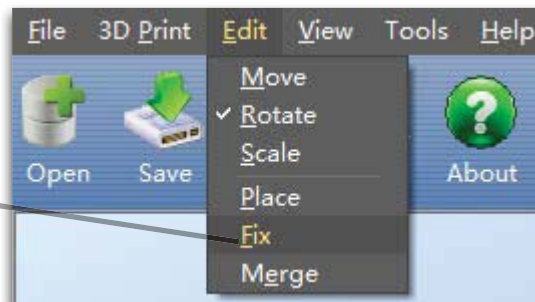UP software contains model repair function, can be used to fix simple defects.

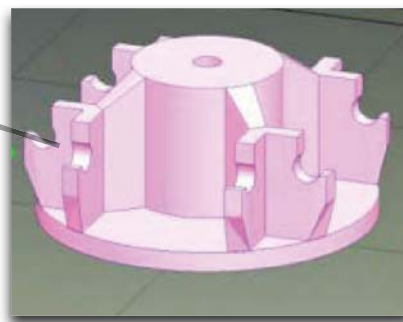If the model contains defects, eg.holes. The sofware will highlight the part with red.

1

After selecting the model, choose Edit - Fix to repair the model.

2

Repaired

3

*If the model cannot be repaired, please use other 3D modeling or mesh modifying tools.*

Calibration for the Correct Dimension

If prints are too big or too small or skewed, user could re-calibrate the printer to print in correct dimension. The method is to print a calibration model, measure its dimension and feedback to the software.

Load and print the calibration model:
C:\ProgramFiles\UP\ Example\Calibrate96.UP3
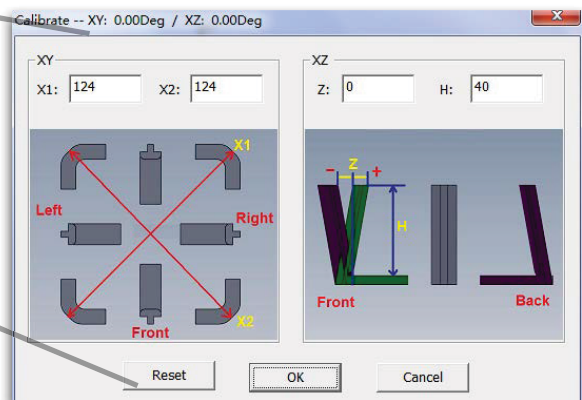
1
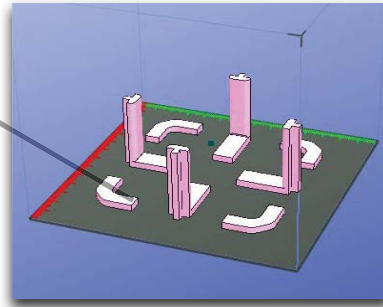
Open: 3D Print - Calibrate
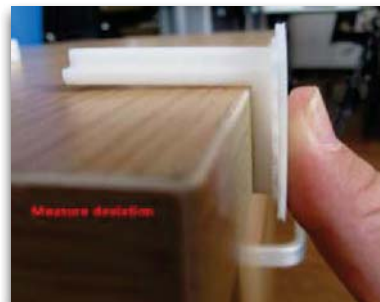This will open the calibration panel.

2

Hit "Reset" button to revert the value back to default,make sure the upper panel dispaly:
XY:0.00 Deg/XZ:0.00 Deg

3

Measure the printed model accroding the calibration panel.
Input the measured values into the software and finish the calibration.

4

Printing Techniques

1. **Ensure accurate nozzle height.** Nozzle height value too low will cause warping, too high will crash nozzle to platform causing damage and clogging. It is possible to manually fine tune nozzle height value at "maintenance" and "print preview" panels. User could try to adjust the nozzle height value plus or minus 0.1 - 0.2mm base on previous results.
2. **Well calibrate the print platform.** unleveled platform usually cause warping.
3. **Give enough time for sufficient pre-heating.** Please use the "3D Print" - "Preheat". A well preheated platform is essential for printing large objects without warping.
4. **The air flow direction of the fan on the print head is adjustable.** There is a small lever on the fan duct, when printing PLA turn the lever anti-clockwisely to direct air flow to nozzle, this will cool the PLA as soon as it is extruded and improve print quality. When printing large object using ABS, to minimize warping, turn the lever clockwisely to direct the air away from nozzle to slow down the cooling. For smaller ABS prints that warping is less likely to happen, user could direct the air to nozzle for better print quality.

5. **No raft printing.** It is highly recommended to use raft for normal printing as it improves adhesion and is required for leveling compensation, therefore it is turned on by default. User could turn it off in the "Print Preview" panel.
6. **No support printing.** It is possible to print without supporting structures, user can turn off support by choosing "Base Only" in Area drop down menu of printing preference panel.

Remove the nozzle

After a long time of printing, the nozzle could become very dirty or even clogged. We can replace it with a new one while the old one could be cleaned and reused.

1. Use extrude function in the maintenance panel, nozzle will heat up to printing temperature.
2. Wear heat resistance gloves provided.
3. Wipe the nozzle with tissue or cotton.
4. Unscrew the nozzle using the wrench provided.
5. Remove the clog: there are many method such as drill through the clog using a 0.4mm drill bit, try submerge in acetone or using a heat gun to melt and blow away the clog.

Troubleshooting

Problems	Solution
Printing or platform cannot reach target temp or over heat.	1.Initialize the printer.
	2.Heater catridge is broken, seek replacement.
	3. Cable is broken, replace the cable.
Cannot extrude plastic	1. Withdraw filament from print head, cut off the melted tip and reload it to the print head.
	2. Plastic clog the nozzle, replace new nozzle or remove the clog.
	3. The filament is too thick. Usually happens when using filament with poor quality. Please use UP filament.
	4. For some model, if PLA consistently cause problem, switch to ABS.
Cannot detect the printer	1. Install the printer driver correctly.
	2. Check for defective USB cable.
	3. Restart printer and Computer
Others	Contact technical support: support@tiertime.net

Appendix A - Fine Manual Calibration

1. Setting nozzle height.
2. Setting compensation values.

Open: Menu - 3D Print - Platform Calibrate
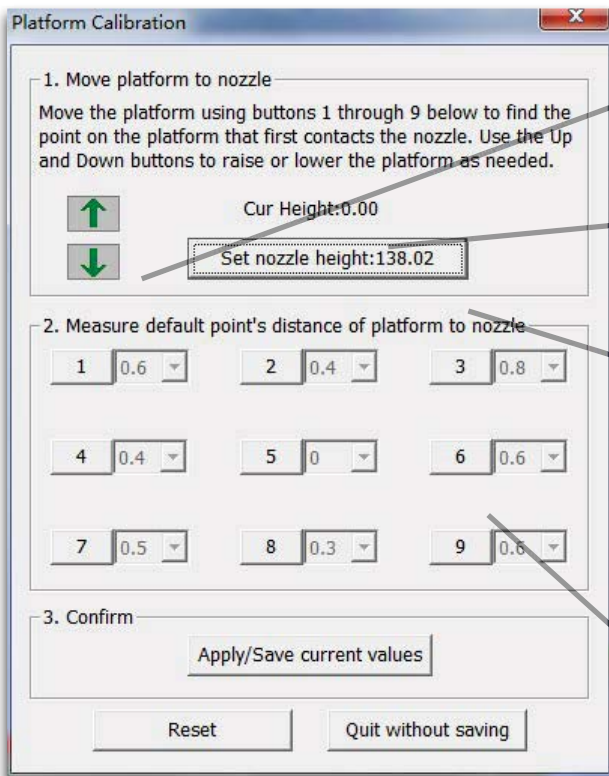
A. Moving Platform UP/DOWN: click/hold the button, platform will move accordingly.

B. Display the current platform height.

C. Setting nozzle height: click this will set the current platform height as the nozzle height.

D. 9 calibration point buttons, represent 9 positions on platform, after clicking them the nozzle will move to the corresponding positions. The drop down menu beside the button is for setting leveling compensation values.

1.Setting Nozzle Height

Setting nozzle height, actually, is not setting the nozzle itself as UP Plus 2's print head does not move in the Z-axis. Here the nozzle height we are refering to is a platform height value, at this height, the platform will be just touching the nozzle (thus "nozzle height"). After setting the value, the platform will be restricted to move over "nozzle height" as it will start crashing onto the nozzle if going beyond nozzle height. The nozzle height value is important for protecting the printer from damages as well as being the basis for calculating leveling compensations.

During the calibration we are measuring distance shorter than 1mm, so we recommend using a print paper as a guide for measurement.

Protocol for setting nozzle height:

Open the calibration interface and press the UP key, note the current height value, stop the platform at about 115.
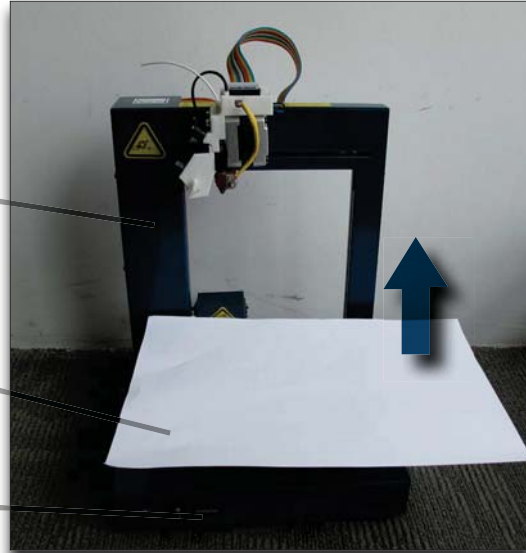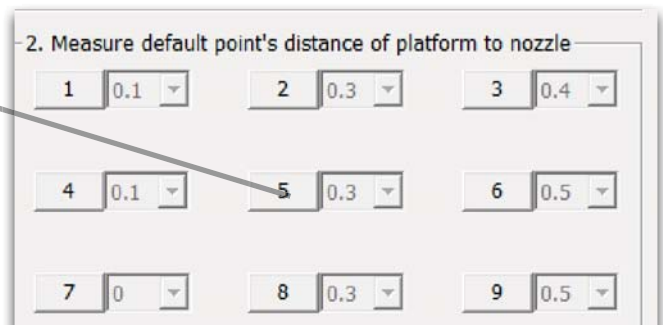
3

Put print paper on platform.

2

Initialize printer

1

Hit the "5" button. Nozzle will go to the center of the platform.

4

2. Measure default point's distance of platform to nozzle

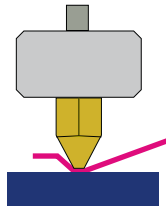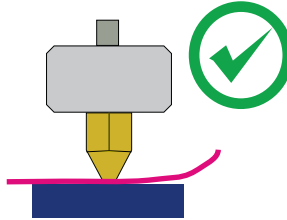| 1 | 0.1 | 2 | 0.3 | 3 | 0.4 |
| 4 | 0.1 | 5 | 0.3 | 6 | 0.5 |
| 7 | 0 | 8 | 0.3 | 9 | 0.5 |

Raise the platform until it is just touching the nozzle. We can move the paper between the nozzle and platform and see if there is any resistance. Like the diagram in next page.
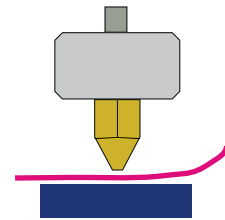
5
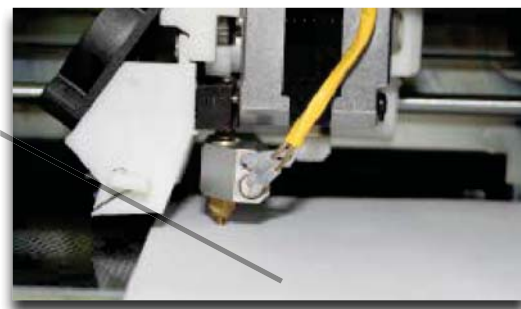
Platform too high, nozzle is pinning paper onto the platform, Lower the platfrom slightly.

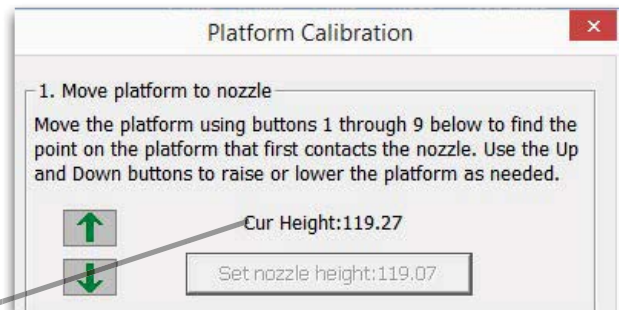Just right,could feel some resistance when moving the paper.

Platform too low, no resistance at all when moving paper, raise the platform slightly.

⑥ When obtained the right platform height, write down the value of "current height".

We will refer this as the "platform height value".

Repeat step 1- 6 for all other 8 positions and obtain their platform height values.

Platform Calibration ✕

1. Move platform to nozzle

Move the platform using buttons 1 through 9 below to find the point on the platform that first contacts the nozzle. Use the Up and Down buttons to raise or lower the platform as needed.

↑
↓
Cur Height:119.27
Set nozzle height:119.07

⑦ When obtained the platform height value of all 9 positions. Find out the smallest value among the 9 calibration points.

As you can see in this case, the calibration point 1 has the smallest platform height value, it is actully the highest point on the platform. Therefore the platform does not need to rise as high as the other points to reach the nozzle
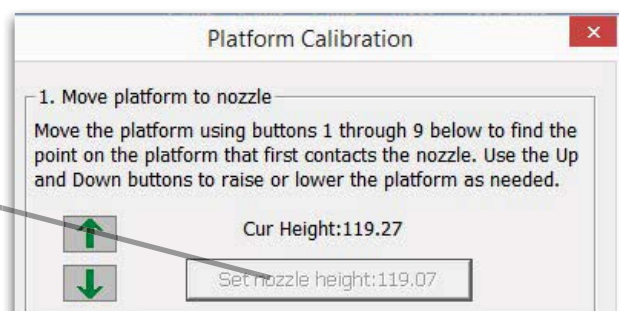
Platform Values at 9 calibration points
(hypothetical):

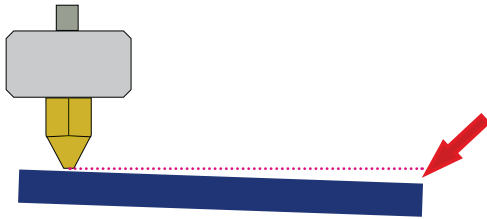| 1: 119 | 2: 119.5 | 3: 120 |
| 4: 119.5 | 5: 119.9 | 6: 119.1 |
| 7: 119.2 | 8: 119.4 | 9: 119.8 |

⑧ We set this mimimum platform height as "Nozzle Height" since it is where the nozzle first start to touch the platform. Now go to calibration point 1 and rise platform to 119.

Click the button" Set Nozzle Height" to finish.

Platform Calibration ✕

1. Move platform to nozzle

Move the platform using buttons 1 through 9 below to find the point on the platform that first contacts the nozzle. Use the Up and Down buttons to raise or lower the platform as needed.

↑
↓
Cur Height:119.27
Set nozzle height:119.07
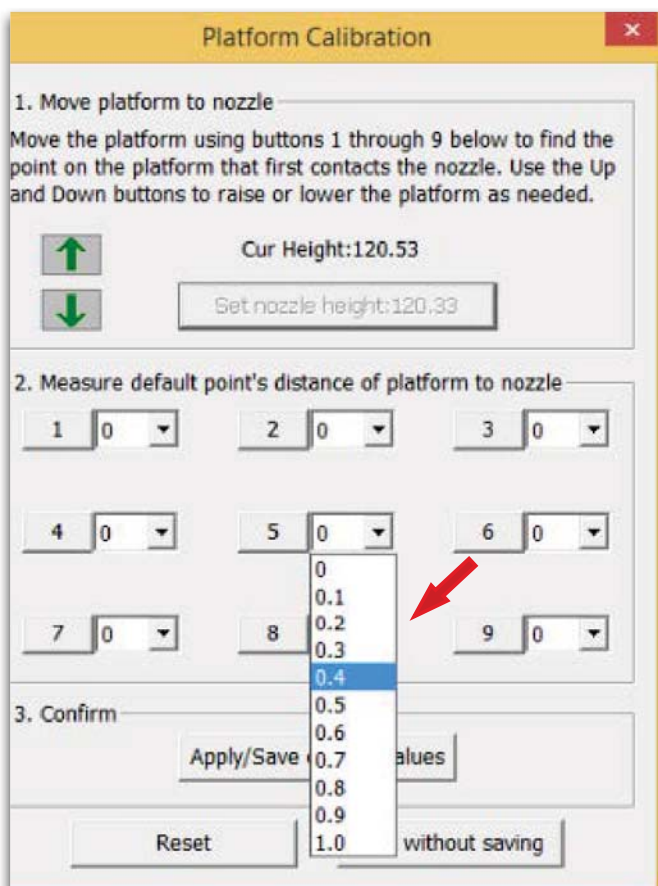
2. Setting Compensation Values

As shown in the left, when platform is at the "nozzle height", only part of the platform is touching the nozzle. Therefore we need to set compensation values for all other calibration points to inform the printer about the distance between nozzle and print surface throughout the XY plane.

Afte setting the nozzle height, the drop down menu next to the buttons will be available. A compensation value between 0.1 - 1.0 mm will be available for selection.

To calculate compensation value:

Platform height - nozzle height = compensation value

For example, setting the compensation value for calibration point No.3. Assume the "platform height" is 120 and the "nozzle height" is 119, the compensation value should be set to 1.0.

After setting 1.0 in the drop down menu, the nozzle will move to point No.3 and the platform will rise 1 mm. Now we can use the paper again to verify the compensation value.

After setting all calibration points click "Appy/Save Current Values" to finish the calibration.