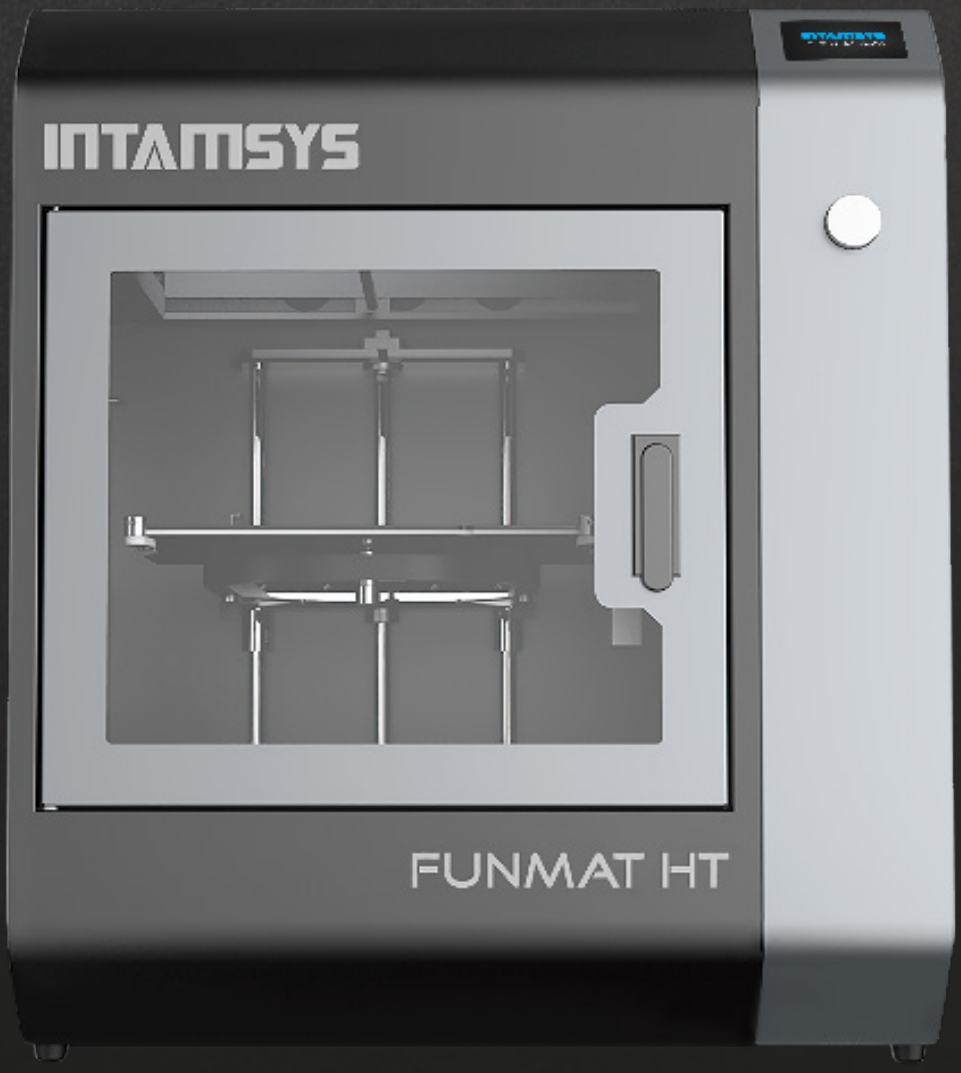
INTAMSYS

FUNMAT HT 3D PRINTER

User manual



High Performance Functional Material 3D Printer

DISCLAIMER

Please read and understand the contents of this installation and user manual. Failure to read the manual may lead to personal injury, inferior results or damage to the machine. Always make sure that anyone who uses the 3D Printer knows and understands the contents of the manual to make the most out of the 3D Printer.

The conditions or methods used for assembling, handling, storage, use or disposal of the device are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, injuries, damage, or expense arising out of or in any way connected with the assembly, handling, storage, use or disposal of the product.

The information in this document was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness.

INTENDED USE

INTAMSYS 3D printers are designed and built for fused deposition modeling for various high quality plastics like PLA, ABS, CPE within a commercial/business environment. The mixture of precision and speed makes the INTAMSYS 3D printers the perfect machines for concept models, functional prototypes and also the production of small series. Although we achieved a very high standard in the reproduction of 3D models with the usage of Cura, the user remains responsible to qualify and validate the application of the printed object for its intended use. INTAMSYS 3D Printers are open filament machines meaning you can use any third party filaments but to get the best results it is recommended to use INTAMSYS certified filaments as those are custom made for INTAMSYS 3D Printers.

CONTENTS

01

SAFETY AND COMPLIANCE

It is very important to work safely with your FUNMAT HT 3D Printer. This chapter details about safety, certifications, and hazards. Please read all information carefully to prevent possible accidents and injuries.

SAFETY MESSAGES

Movement Safety

The machine is very heavy to carry; so when unpacking the machine or whenever you wish to move the machine from one location to another location, take another person's assistance always. Also, keep the machine on a flat ground with enough margin on all sides to operate the machine without any difficulty.

Electrical Safety

FUNMAT HT operates on 24 volts and is therefore outside the scope of the low voltage directive. The power supply meets all CE mark regulations and is protected against short-circuit, overload, over voltage, and over temperature. Please make sure you always use power supply cable you receive from INTAMSYS.

Mechanical Safety

The machine has many moving parts, but the stepper motors do not have enough power to cause serious injuries. Still, it is advised to only reach in the machine when it is turned off.

High Temperature Safety

FUNMAT HT comes with an all-metal nozzle, high-temperature build plate, and heated chamber. When printing functional materials with the chamber temperature of 90°C, the heat transmits to the outer frame, so it is advisable not to touch the machine for a long time during the printing process. The nozzle will go up to a temperature of around 450°C and heat-bed can reach a temperature of 160°C when printing is in the process. So, it is strongly advised to not touch the nozzle & heat bed when the printer is working. Also, let the printer cool down before opening the front door or the top door of the machine.

HAZARDS

Safety alert symbols precede each safety message in this manual. These symbols indicate potential safety hazards that could harm you or others or cause product or property damage.

- **Warning:** Do not leave the machine unattended during operation.
- **Warning:** Always power off the printer before doing any maintenance.
- **Warning:** Don't touch the nozzle and heat bed when the printer is in operation.
- **Warning:** After the print is done, wait for 20 minutes before taking out the objects.
- **Warning:** The machine includes moving parts that can cause injury. Never reach inside the machine while it is in operation.
- **Warning:** There is a risk of shock. This product is not user serviceable.
- **Caution:** In case of emergency disconnect the machine from the wall socket.
- **Caution:** The machine melts plastic during printing. Plastic odors are emitted during this operation. Make sure to set up the machine in a well-ventilated area.

Please visit our website www.intamsys.com to know more about support.

02

INTRODUCTION TO INTAMSYS

INTAMSYS is an industrial 3D Printer manufacturer renowned for it's “world's most affordable PEEK 3D Printer” FUNMAT HT. It has offices in Shanghai, Dongguan, Nanjing with resellers present across the world.

ABOUT INTAMSYS

INTAMSYS Technology Co. Ltd. was founded in 2012 by a group of technology elites with great experience in world-class high-precision electromechanical equipment companies both at home and abroad. The company works on 3D Printer research, development, manufacture, sale and services and is committed to become the leading 3D Printing enterprise in the world. The company is renowned for its industrial 3D Printers capable of printing various functional materials like PEEK, PC, ULTEM (PEI).

INTAMSYS 3D printers are authorized by international standard systems CE, FCC, and ROHS. INTAMSYS 3D printers are high-tech products with the reputation and are widely used in education, medical treatment, industry, enterprise, culture creativity, model making, scientific research, construction and other industries. Furthermore, the company also provides 3D Printing and other allied services in areas such as medical treatment, industry, and others. The company has a complete solution of "3D Print Creative Laboratory" aiming especially at "STEAM Education".

Please visit www.intamsys.com for more information.

CONTACT

There are multiple ways to reach out to INTAMSYS as we have a strong online presence.

E-mail: Send e-mail to info@intamsys.com and we will respond within 24 hours

Phone: +86-21-5846 5932

Facebook: http://www.facebook.com/intamsys

Website: https://www.intamsys.com

Skype: intamsys

Twitter: https://twitter.com/intamsys_3d

LinkedIn: https://www.linkedin.com/organization/16240248/

ABOUT FUNMAT HT

Printer Overview

01. Display Screen

02. Rotate Button

03. SD Card Slot

04. Filament And Tool Box

05. Door Lock

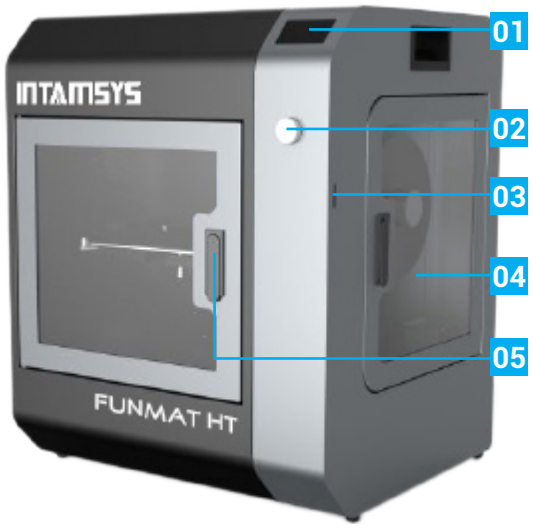


Figure 2.1

06. Power Switch

07. Power Socket

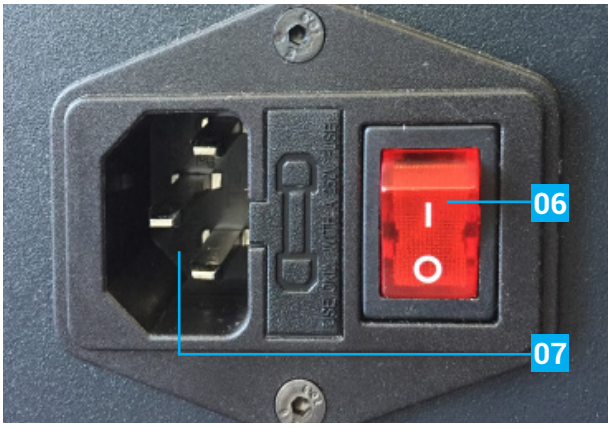


Figure 2.2

08. Cool Fan

09. Nozzle

10. Extruder Fan

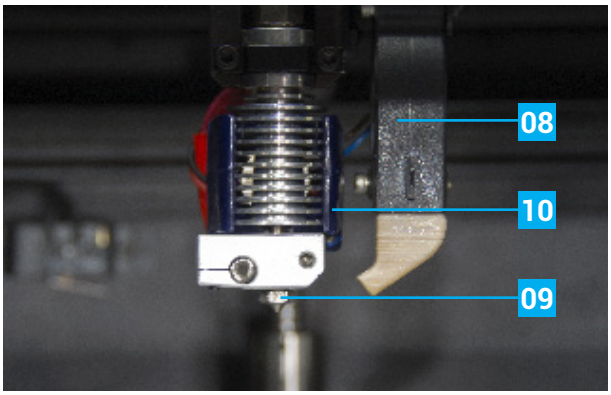


Figure 2.3

11. Filament Tube

12. Push Button--Control The Drive Gear

13. Heating Bed

14. Glass plate

15. Glass fixer

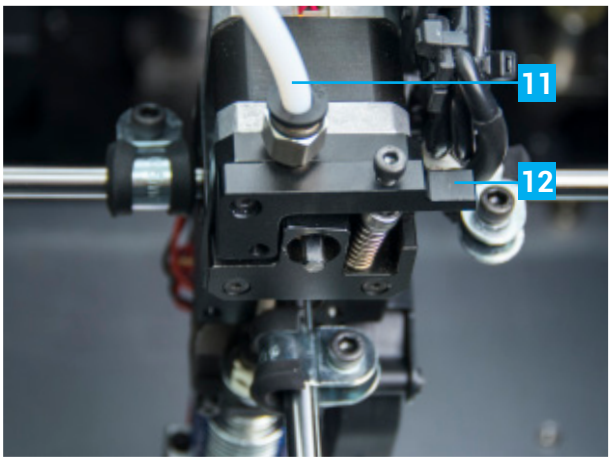


Figure 2.4

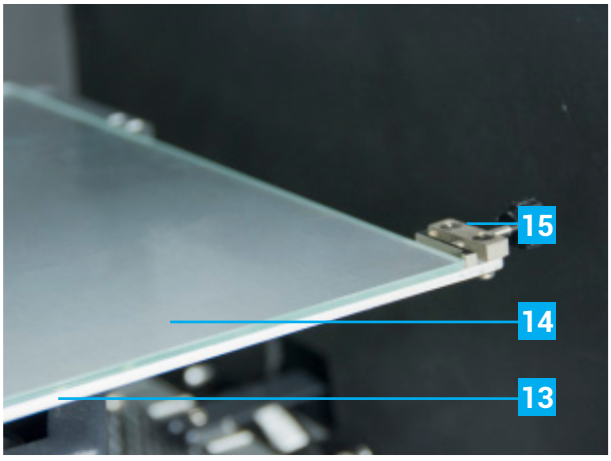


Figure 2.5

PRINTER SPECIFICATIONS

PRODUCTS	FUNMAT HT
Printing Technology	FFF
Extruder	Single
Extruder Diameter	Swappable 0.2, 0.4, 0.6 and 0.8 mm nozzles
Layer Resolution	50-200μ/0.05-0.2mm
Position Accuracy	XY:0.025mm, Z:0.0025mm
Print Speed	30-200mm/s
Filament Diameter	1.75mm
Build Platform	Glass
Supported Filament	PLA,PLA+,ABS, PC,Nylon,Carbon Fiber,Flex,Woodfill, Metalfill,HIPS,PETG,PVA,PEEK
Language	Chinese & English
User Interface Features	Full-color Touch Screen
Connectivity	SD card, USB
Camera	Yes
Power Failure Recovery	Yes
Filament Absent Warning	Yes
Build Plate Leveling	Assisted Leveling
Build Volume	10.3"x10.3"x10.3"(260*260*260mm)
Dimensions	530*490*645mm
Weight	46kg
Heated-Plate Temperature(MAX)	160°C/320°F
Extruder Temperature(MAX)	450°C/842°F
Heated Chamber(MAX)	90°C/194°F
Software	INTAM-Suite(our free 3D printing slicing software); Compatible Software: Simplyfy3D & Cura
Input Supported File Type	.Stl, .Obj
Output Supported File Type	Gcode
Operating Environment	Temperature: 15°C To 32°C (60°F To 90°F) Humidity: 30% To 70%
Storage Environment	Temperature: 0°C To 54°C (32°F To 129.2°F) Humidity: 10% To 85%
Material Storage Environment	Temperature: 13°C to 24°C (55°F To 75°F) Humidity: 20% To 50%
Voltage Input	200~240VAC 47~63Hz
Power	1200W

03

GETTING STARTED

In this chapter, you will find information on accessories, components of 3D Printers and setting up the machine.

ACCESSORY CHECKLIST

The accessory tray includes everything you need to use your FUNMAT HT 3D Printer including Polymaker filament and blue tape to get you started. Below is the list of accessories included with the machine.

Installation Manual	SD Card	Removal Tool
Filament	Glue	Tweezers
Scissors	Power Cable	Clip
Glass Plate	High Temperature Nozzle	

UNPACKING THE PRINTER

Please put the printer on flat ground before you unpack the printer.

Step 1: Open the box

Figure 3.1

Step 2: Take machine out of the box

Figure 3.2

SETTING UP THE PRINTER

Step 3: Open the front door

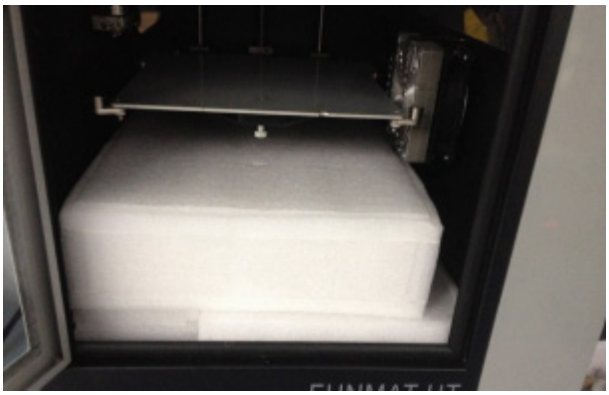


Figure 3.3

Step 4: Remove the accessories tray

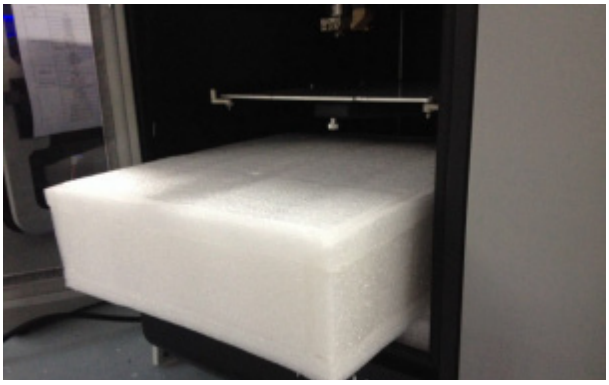


Figure 3.4

Step 5: Setting Up The Printer

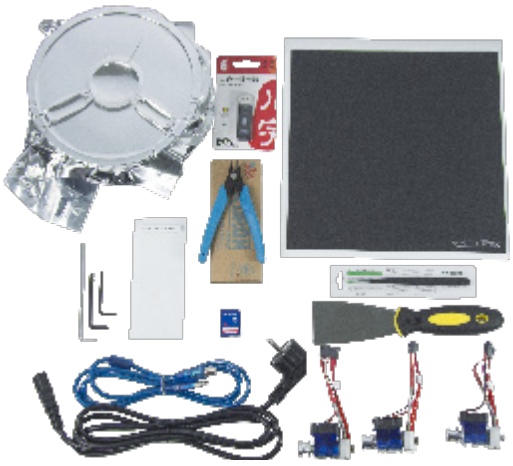


Figure 3.5

SETTING UP THE PRINTER

Release The Printing Head

When the printer is token out from the foam box firstly, the printing head is locked. So you should release the work platform before you using the printer.

1. When you open the top door, you will find that nozzle is locked in position by four screws. Unscrew the outside two locks as shown in the picture.

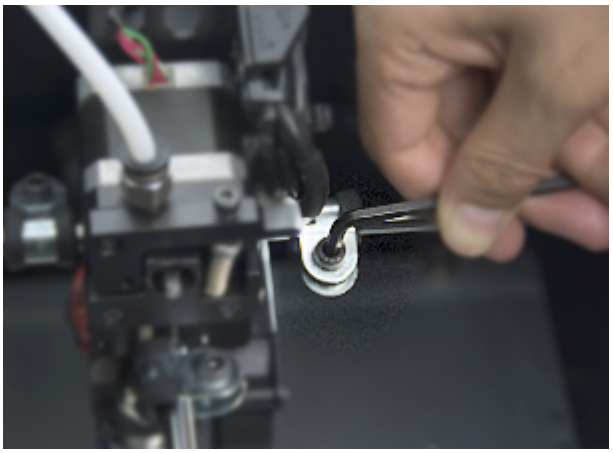


Figure 3.6

2. After the four lock blocks removed, please install the motor on top of the extruder and you can use the printer.

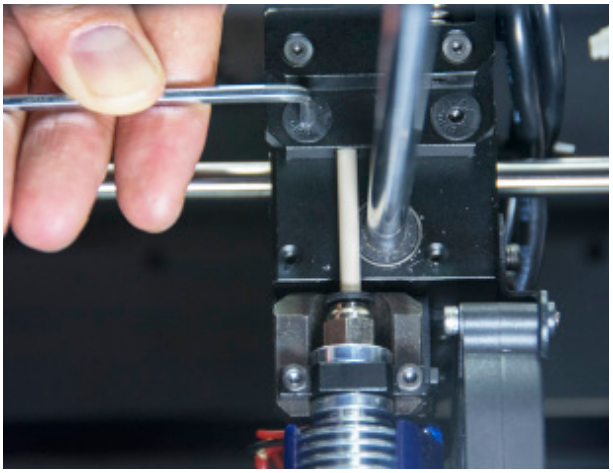


Figure 3.7

POWER ON THE PRINTER

Set Up The Build Plate

1. Glass plate is present in the accessories box. Take the glass plate out and insert it on the build plate as shown in the picture to the right. Once inserted completely, fix it to the position by adjusting the clamps on left.

Figure 3.8

Insert The Filament

1. Open the door on right side and put the filament spool inside.

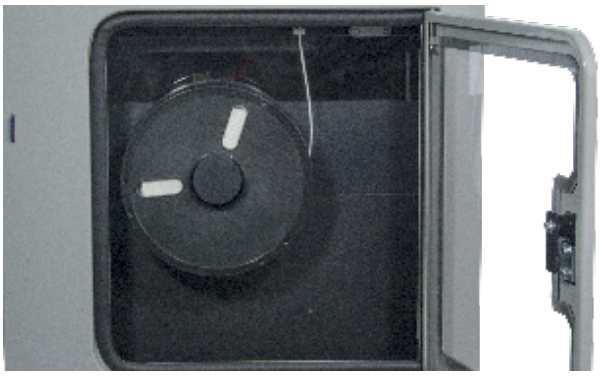


Figure 3.9

2. Take the filament from the spool holder and guide it into the printer as showin the picture below. Make sure it is inserted the exact way as depicted in the picture.

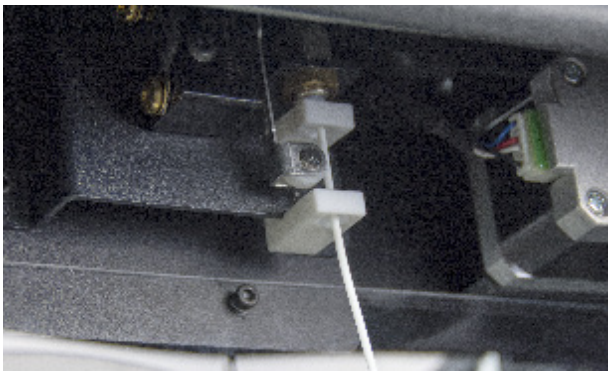


Figure 3.10

3. Push filament through the teflon tube till it reaches the nozzle. Thereafter, open the teflon tube from nozzle and guide the filament into the extruder. Don't push the filament into the nozzle without pre-heating the nozzle.

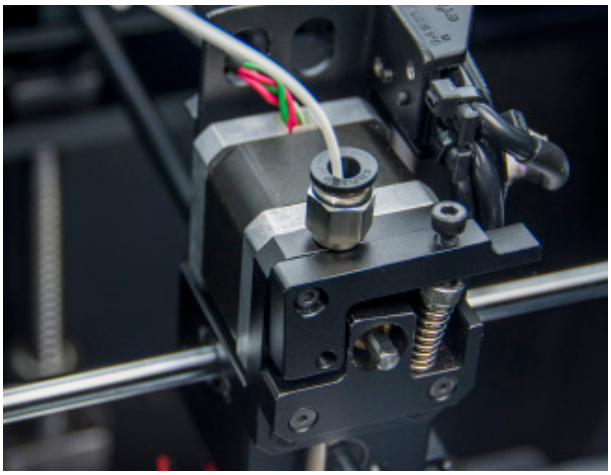


Figure 3.11

Power On The Printer

1. Connecting the Power Cable.

Figure 3.12

2. Then flip the power switch to the ON (I) position. The printer will begin to boot. The touch-screen will turn on and the INTAMSYS logo followed by start-up code will be displayed for a brief period.

Figure 3.13

04

FIRST RUN

After installing the accessories, you have to set up the printer for the first use. In this chapter, you find detailed steps about the first run.

LCD DISPLAY OVERVIEW

LCD Display can be broadly divided into seven sections. In this chapter, we shall provide a brief overview of the LCD Display.

1.INTRODUCTION

This is the screen that gets displayed when we switch on the machine.

Figure 4.1

2.MAIN SCREEN

The welcome screen is immediately followed by the main screen as shown in the right. In the main screen, we have six section – (a) Print (b) Material (c) Bed Leveling (d) Axis Movement (e) Settings (f) Help.

Figure 4.2

3.PRINT SCREEN

When you select the print option above, it will ask you to choose the file you wish to print. Once you choose the file, this screen appears. In this screen, you can find the temperature of the nozzle, the build plate, the chamber, the material type being used, the total time and the print progress.

Figure 4.3

LCD DISPLAY OVERVIEW

4.MATERIAL SCREEN

In this screen, you can select the material you wish to print from a pre-determined list of filaments. If you have a filament not present in the list, you can also enter the same in this section.

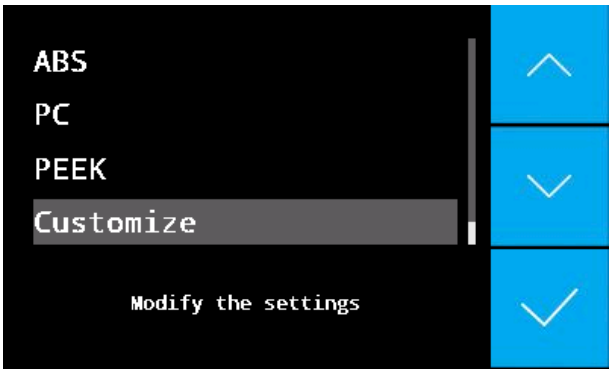


Figure 4.4

5.BED LEVELING

In this section, you can perform the bed leveling process. Follow the Instructions as shown on the LCD screen to level the build plate.

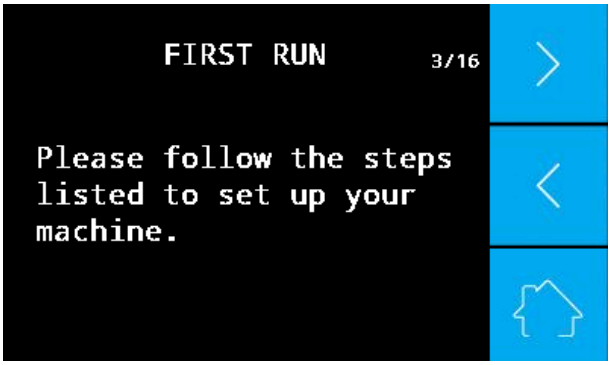


Figure 4.5

6.AXIS MOVEMENT

In this section, you can perform axis movement activities like homing the axis, moving axis and build plate in X, Y & Z direction, modify retraction settings.

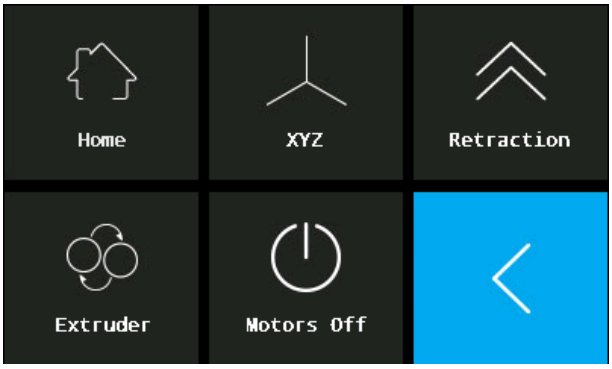


Figure 4.6

7.SETTINGS

In this section, you can modify nozzle temperature, build plateTemperature, chamber temperature, change language and other modify Some other parameters.

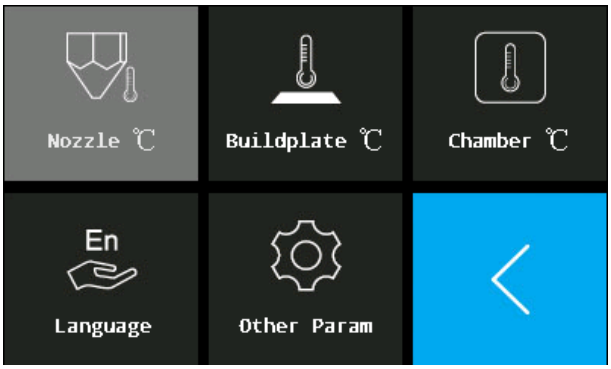


Figure 4.7

8.HELP

In this section, you can find brief reading material on various icons in the LCD screen and their functionality.

Figure 4.8

FIRST STEPS

When the printer is switched on for the first time, we shall see the first run wizard. This first run wizard is used to set-up the printer for regular day-to-day operation. Most of the images listed below are self-explanatory. Where ever required, we have put the explanation on the left.

Step 1: Choose your preferred language from the list of available languages. If you wish to change language later, you can always change it by going to Settings
-> Language.

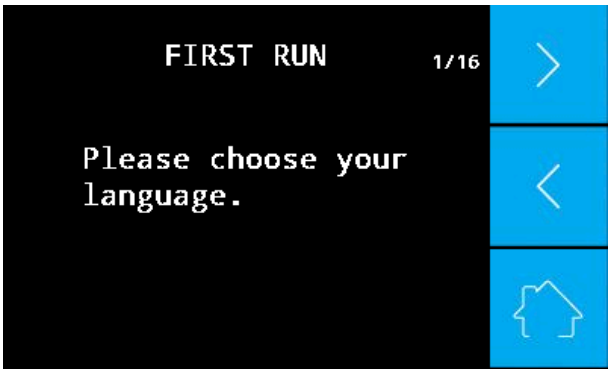


Figure 4.9

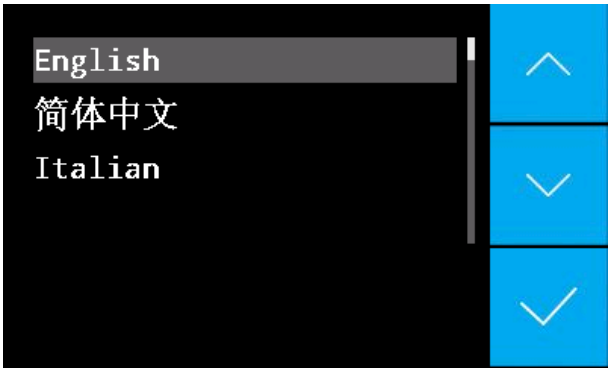


Figure 4.10

Figure 4.11

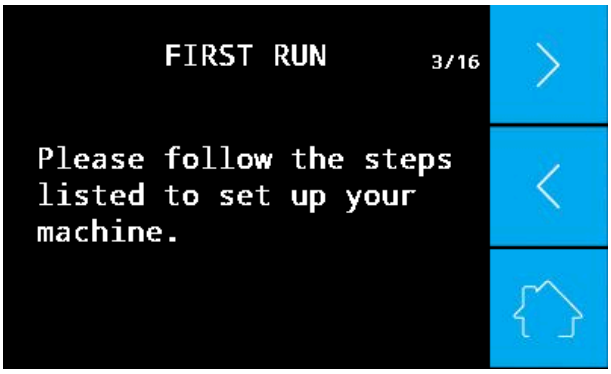


Figure 4.12

Step 2: This is the most important step in setting up the printer. In this step, we shall level the build plate. Please refer to Quick-Start guide when leveling the build plate. The objective of this exercise is to make sure build plate is flat and is at an exact distance from the nozzle.

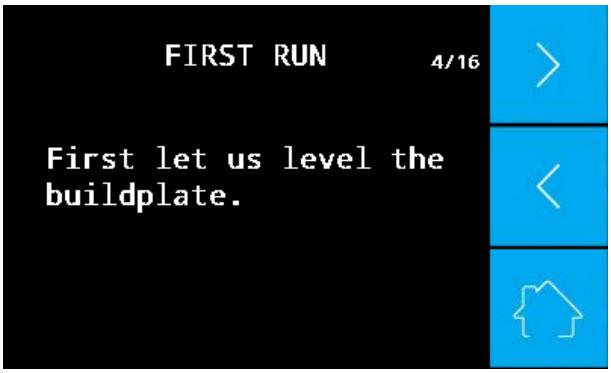


Figure 4.13

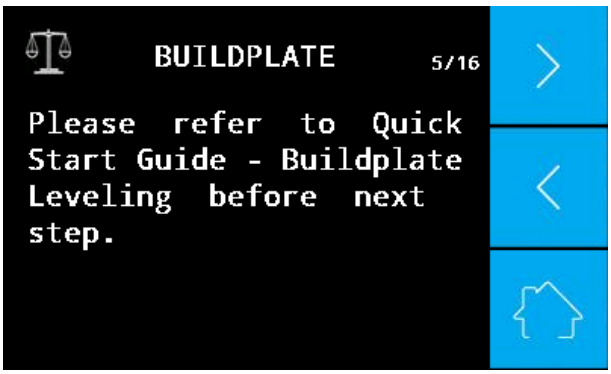


Figure 4.14

Step 3: Build Plate has rotating screws at the bottom – one at the bottom center, one at the bottom left and other at the bottom right. First turn the bottom center one to adjust the build plate distance from the nozzle. Turn it anti-clockwise to reduce the distance and turn it clockwise to increase the distance between the nozzle and the build plate. The gap between the nozzle and the build plate should be such that we can push a calibration card (shipped along with the machine) between these nozzle and the build plate & feel a little bit of friction when moving the calibration card between the nozzle and the build plate.

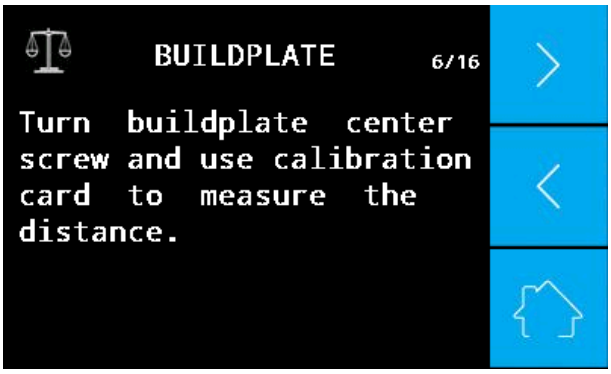


Figure 4.15

Step 4: Now repeat the same step for the left screw and the right screw present below the build plate.

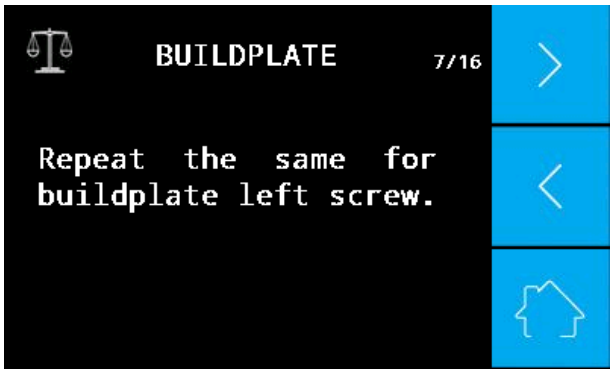


Figure 4.16

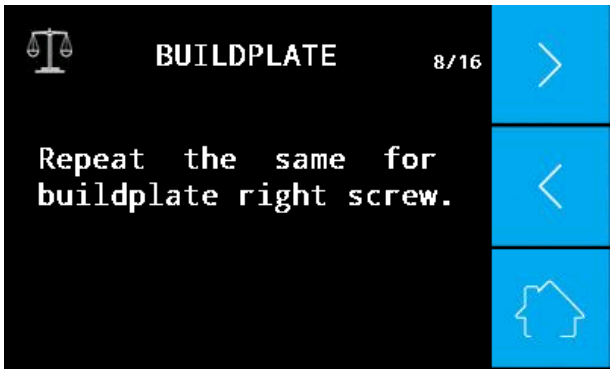


Figure 4.17

Step 5: Now that the build plate leveling is complete, we shall look at inserting the filament into the nozzle. Please refer to quick-start guide while inserting the filament.

Figure 4.18

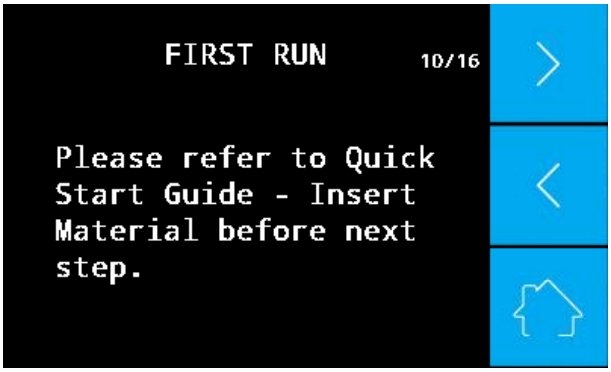


Figure 4.19

Figure 4.20

Step 6: Make sure you select the exact material you have chosen to Insert. The nozzle gets heated as per the material and if you choose the wrong material, nozzle gets heated to a different temperature than what is required for the material.

Figure 4.21

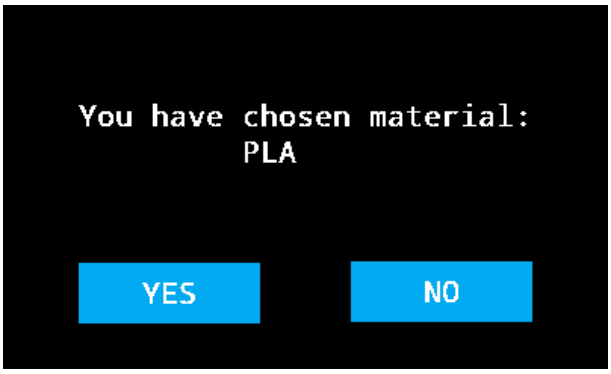


Figure 4.22

Figure 4.23

Step 7: Once the print head reaches the desired temperature, we now have to insert the filament into the nozzle. You may have to exert a bit of force initially but later the extruder shall pull the filament more inside. Please refer to quick start guide on how to insert the filament into the nozzle.

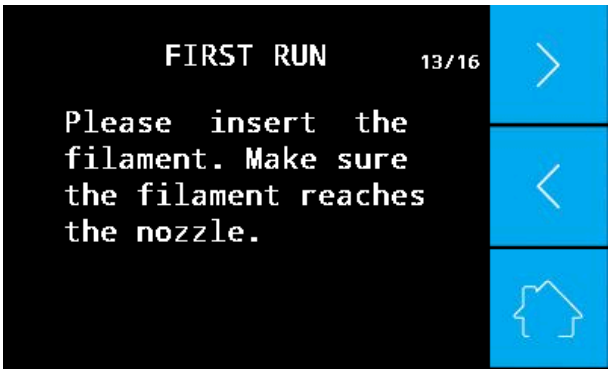


Figure 4.24

Step 8: Once you insert the filament, please wait for some time till you see the material being extruded from-hot end to build plate. There is a timer for the same.

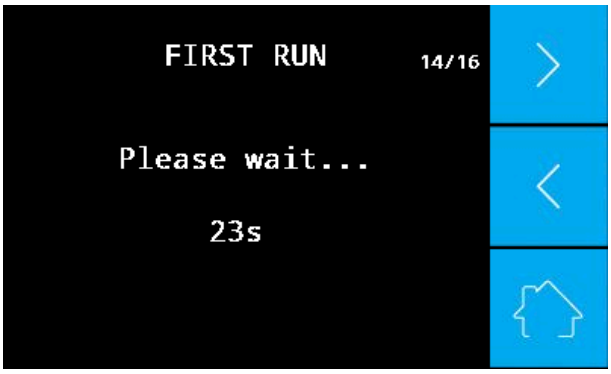


Figure 4.25

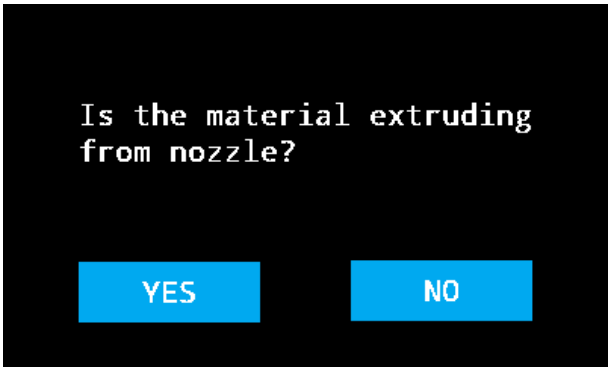


Figure 4.26

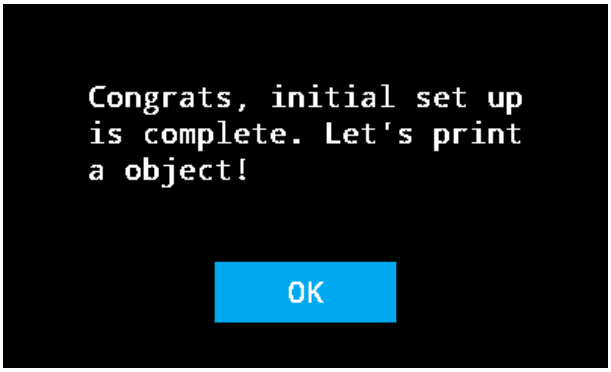


Figure 4.27

05

REGULAR OPERATION

After completion of the first run, it is time to start printing with your FUNMAT HT 3D Printer. This chapter provides information about regular day to day usage of the printer.

LEVELING BUILD PLATE

Step 1: This is the most important step in setting up the printer. In this Step, we shall level the build plate. Please refer to Quick-Start guide When leveling the build plate. The objective of this exercise is to make sure build plate is flat and is at an exact distance from nozzle.

Figure 5.1

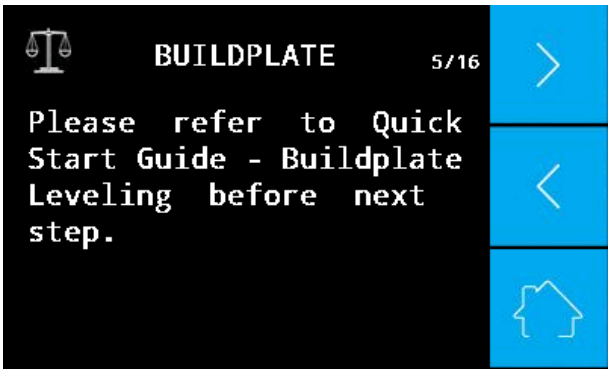


Figure 5.2

Step 2: Build Plate has rotating screws at the bottom – one at the bottom center, one at the bottom left and other at the bottom right. First turn the bottom center one to adjust the build plate distance from the nozzle. Turn anti-clockwise to reduce the distance and turn clockwise to increase the distance between nozzle and build plate. The gap between.

Nozzle and build plate should be such that we can put a calibration card (shipped along with the machine) between these two. We should be able to insert the calibration card and feel a little bit of friction while doing so.

Figure 5.3

LEVELING BUILD PLATE

Step 3: Now repeat the same step for left screw and the right screw present below the build plate.

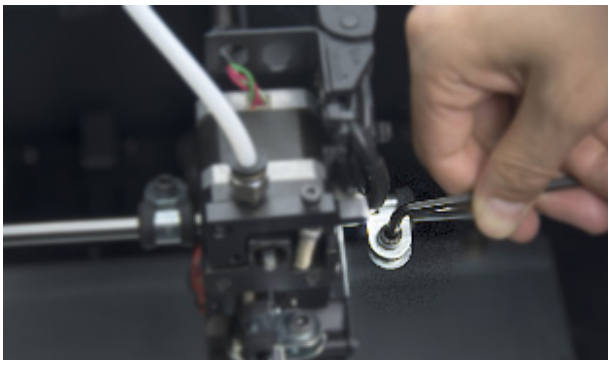


Figure 5.4

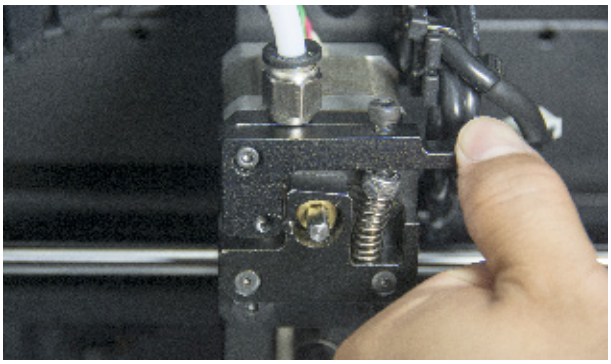


Figure 5.5

Step 4: Now that the build plate leveling is complete, we shall look at inserting the filament into the nozzle. Please refer to quick-start guide while inserting the filament.

Figure 5.6

LOADING FILAMENT

Step 1: Open the right door and arrange the material on the material tray bracket.

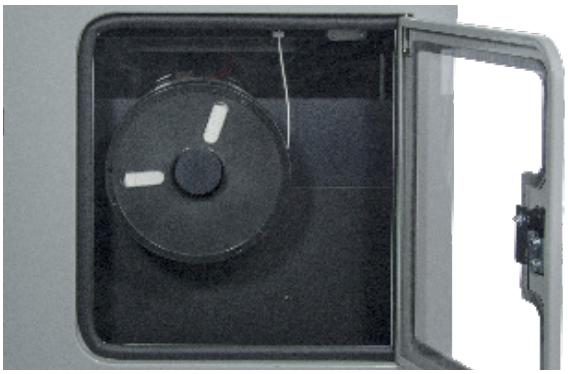


Figure 5.7

Step 2: Pass material through the limit switch into material guide tube to reach the nozzle.

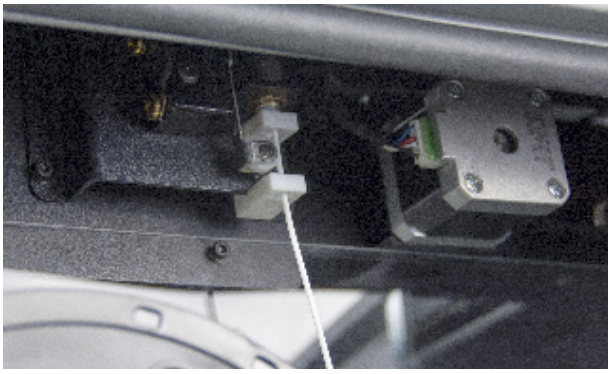


Figure 5.8

Step 3: Click on the Material icon and choose the material you wish to load.

Figure 5.9

LOADING FILAMENT

Step 4: Pull out the guide tube at the nozzle and then press the black button on the right side of the nozzle with the thumb, insert the material into the feed gear and when the material goes into the feeder gear, place the guide tube back into position.

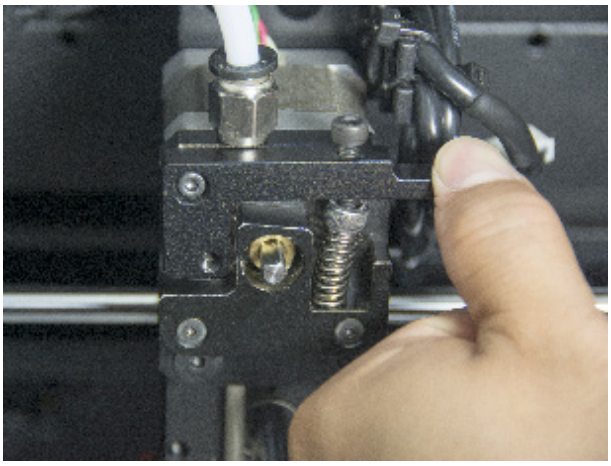


Figure 5.10

Step 5: When the nozzle temperature rises to the required temperature, turn the knob clockwise to move the material downward until the material is extruded smoothly from the nozzle.

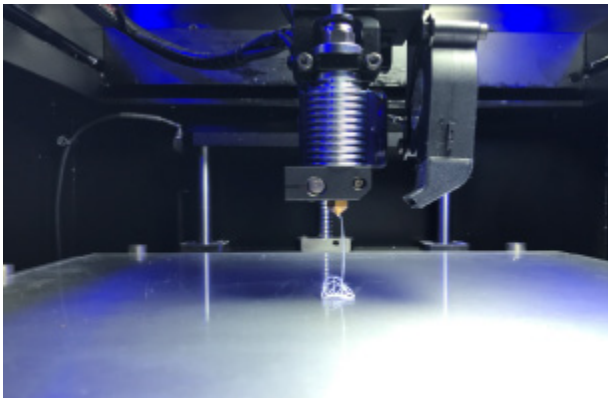


Figure 5.11

Figure 5.12

Caution:

The nozzle temperature is very high when the material is being extruded. So, please don't touch the nozzle.

PRINT FILE

Step 1: Select “PRINT” button from the LCD screen.

Figure 5.12

Step 2: Paste some glue on the build plate and wait for the machine to heat up to the required temperature.

Figure 5.13

Step 3: Input your SD card, click “PRINT” button and select the file you wish to print.

Figure 5.14

PRINT FILE

The screen will be as shown during the printing process. The time it takes to print the file, material, nozzle temperature, build plate temperature, chamber temperature are all displayed on the screen. You can abort the print, pause the print and also modify the settings using Settings tab.

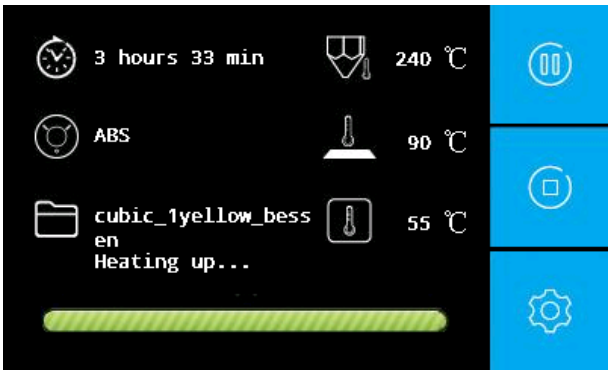


Figure 5.15

Step 4: When you click the settings tab during the printing process, the following screen will be displayed where you can change Temperature, Print Speed, Fan Speed, Material Flow, Retraction.

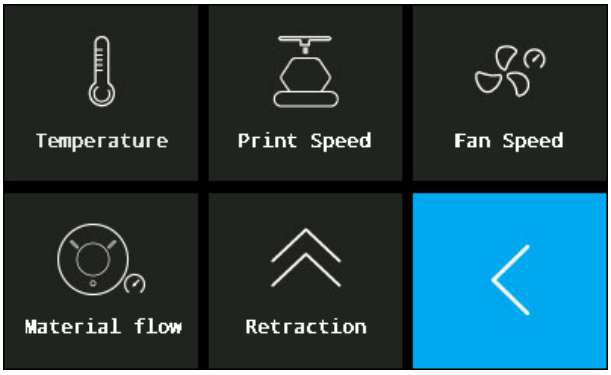


Figure 5.16

CHANGE MATERIAL

Change Material During Printing

Step 1: Please select " Pause" button from the menu.

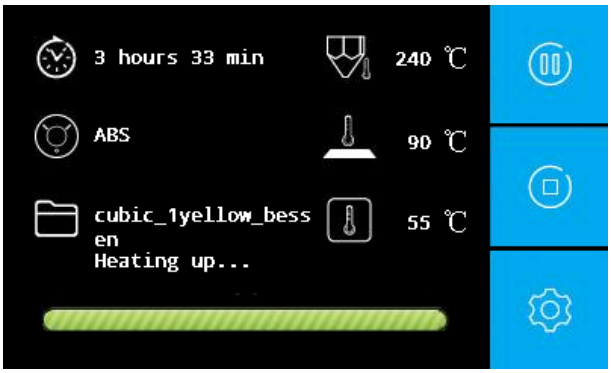


Figure 5.17

Step 2: When nozzle stopped, pull out the guide tube at the nozzle, press the spring indenter and pull out material at the same time.

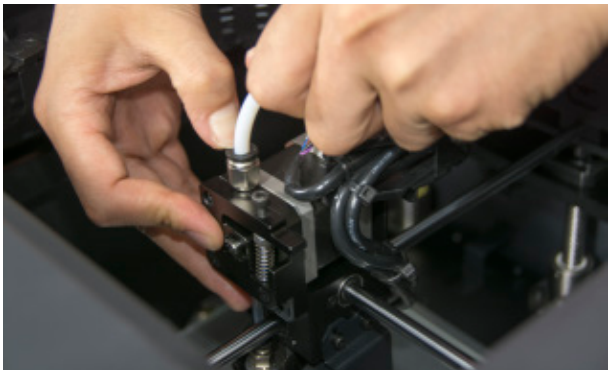


Figure 5.18

Step 3: When loading new material, insert the material directly between the feed gears and grooves and squeeze a small amount of material from the nozzle by hand.

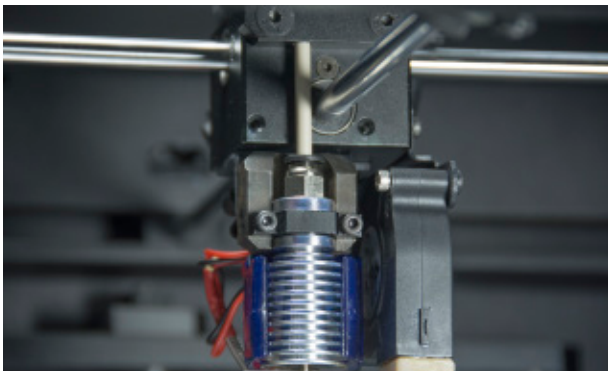


Figure 5.19

Step 4: Then you could continue printing by pressing the "Continue" button.

CHANGE MATERIAL

Change material after print

Step 1: If you want to change new material, go to Material -> Unload Material.

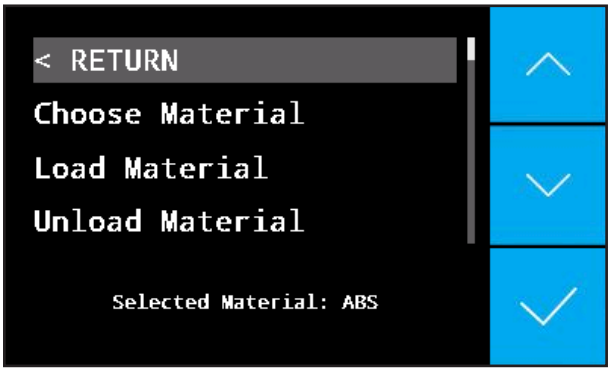


Figure 5.20

Step 2: Turn the knob counterclockwise until the material from the feed gear, then pull out the guide tube at the nozzle, press the spring indenter and pull out old material at the same time.

Figure 5.21

Step 3: Then load new material, select "Material -> Load Filament". If you wish to change the filament, you first select Change Filament option and then go for load filament. Please check the Load Filament to learn more about loading the filament.

CHANGE MATERIAL

Step 4: Press the "Black Quick Plug" button, pull out the guide tube at the nozzle, and then press the black button on the right side of the nozzle with the thumb, insert the material into the feed gear, when the material through the feed gear, make guide tube recovery.

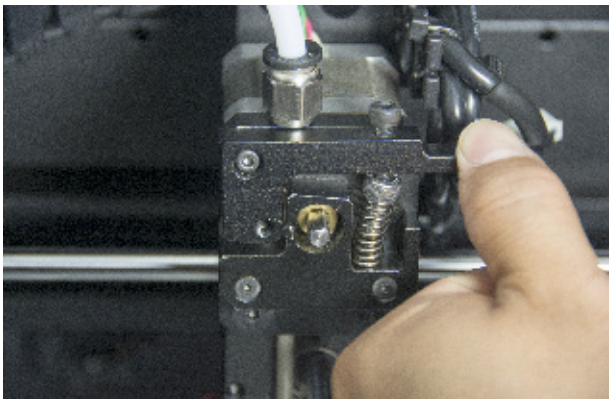


Figure 5.23

Step 5: Turn the knob clockwise to move the material downward until the material is extruded smoothly from the nozzle.

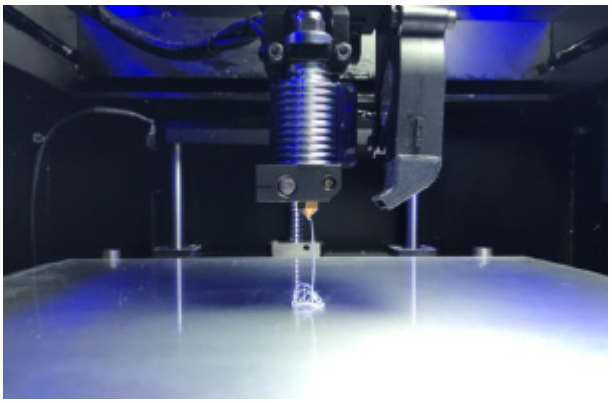


Figure 5.24

OTHER FUNCTIONS INTRODUCTION

Axis Movement

Axis Movement Section is to mainly move the motors to keep the X, Y, Z&E at desired location.

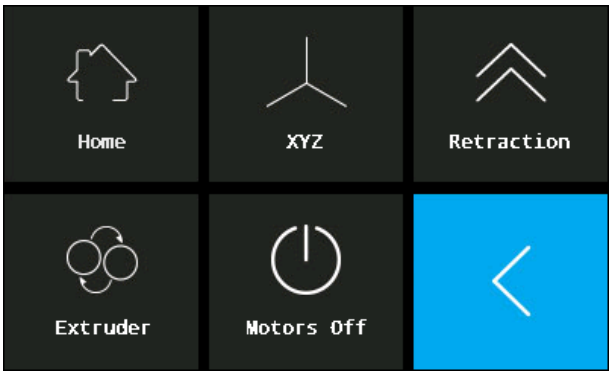


Figure 5.25

Home

This section is used to put X, Y, Z&E in the home position.

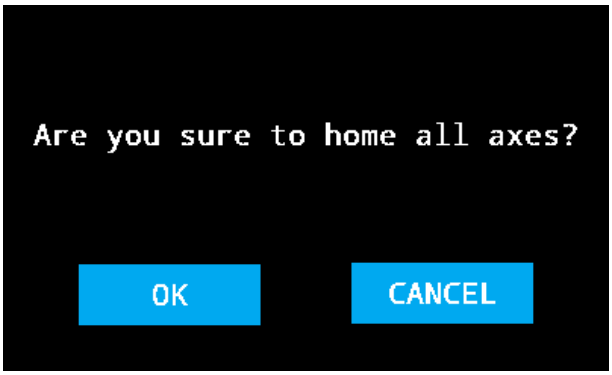


Figure 5.26

XYZ

This section is to move X, Y, Z manually. You can press the buttons to move the nozzle, build plate to the desired location manually.

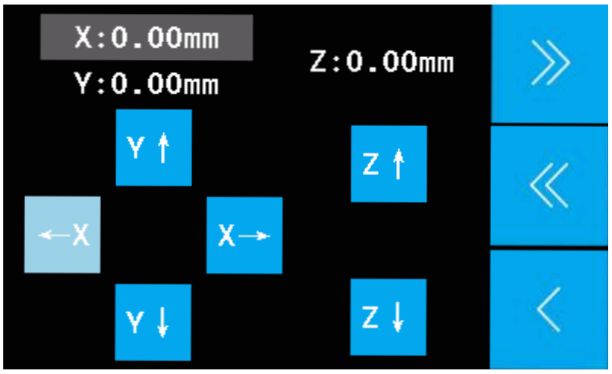


Figure 5.27

OTHER FUNCTIONS INTRODUCTION

Retraction

This section is used to set retraction distance. Retraction is mainly used to pull the filament back when the hotend is traveling.

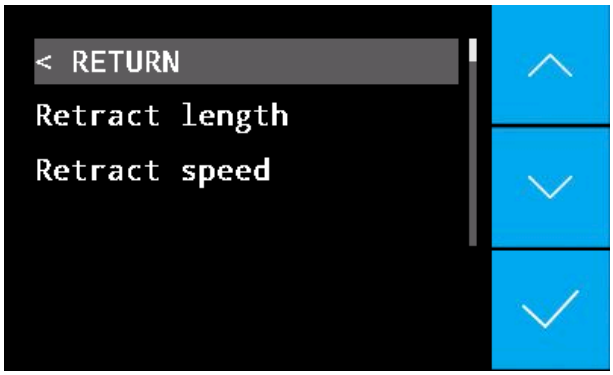


Figure 5.28

Extruder

This section is used to move the filament up or down.

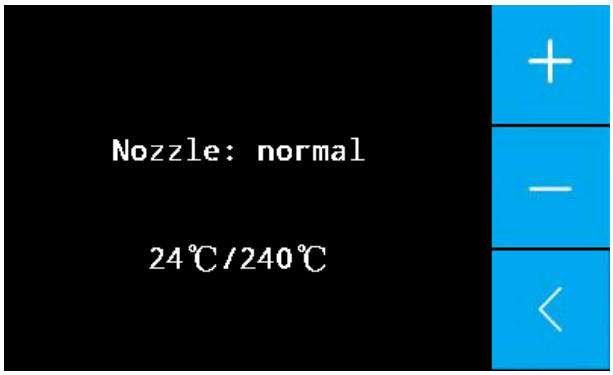


Figure 5.29

Motors Off

Motors Off to power off the stepper motors.

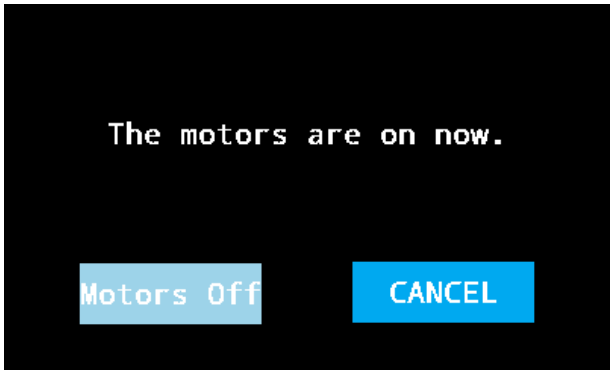


Figure 5.30

OTHER FUNCTIONS INTRODUCTION

Settings

In the settings section we have the option to modify the temperature of the nozzle, the build plate, the chamber, to change language & some additional (not so important) parameters.

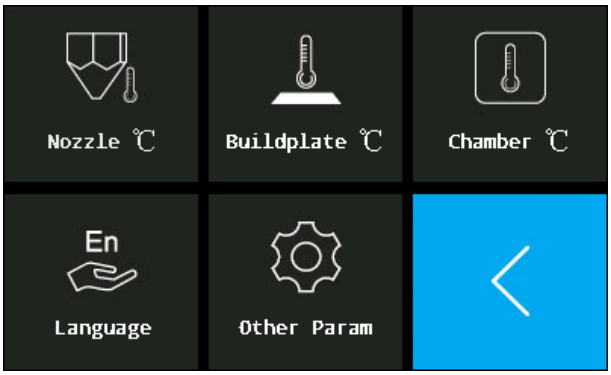


Figure 5.31

Nozzle Temperature

To increase or decrease the nozzle temperature. In the screen, we have desired temperature and actual temperature. We can modify the actual temperature to reach desired temperature. We can long press the (+) or (up arrow) to / (-) or (down arrow) to modify the temperature.

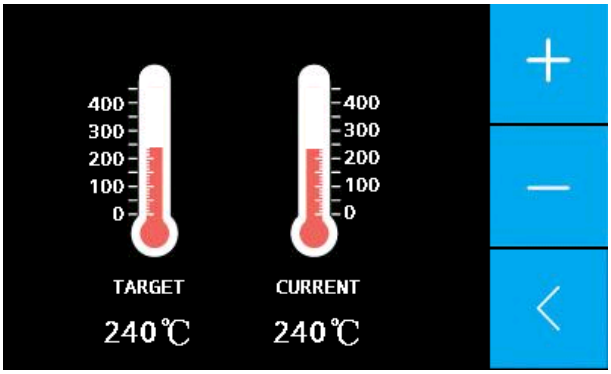


Figure 5.32

Build Plate Temperature

To increase or decrease build plate temperature. In the screen, we have desired temperature and actual temperature. We can modify the actual temperature to reach the desired temperature. We can long press the (+) or (up arrow) to / (-) or (down arrow) to modify the temperature.

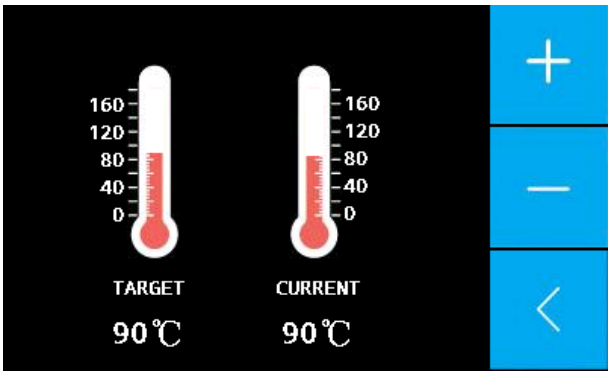


Figure 5.33

OTHER FUNCTIONS INTRODUCTION

Chamber Temperature

To increase or decrease build plate temperature. In the screen, we have desired temperature and actual temperature. We can modify the actual temperature to reach the desired temperature. We can long press the (+) or (up arrow) to / (-) or (down arrow) to modify the temperature.

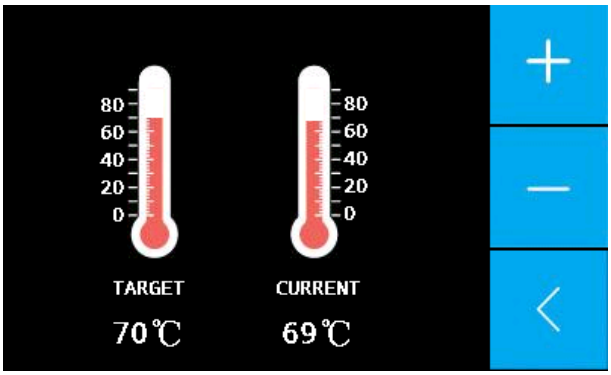


Figure 5.34

Language

To modify the language.

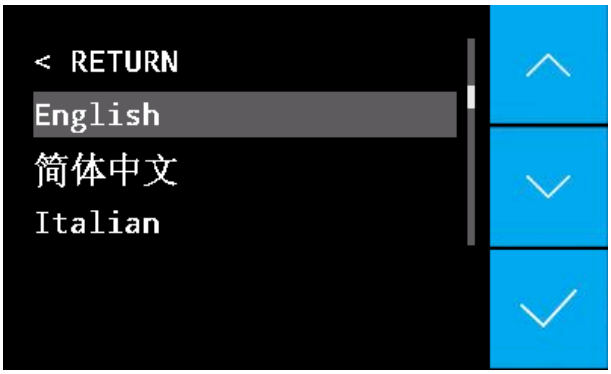


Figure 5.35

Other Parameters

To change few other, not so important parameters.

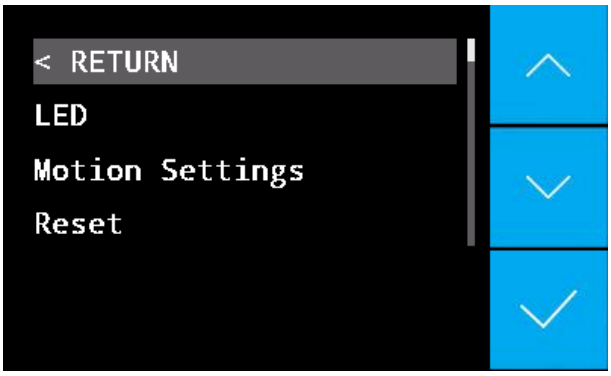


Figure 5.36

OTHER FUNCTIONS INTRODUCTION

HELP SECTION

This section is to provide some information on the HELP.

Figure 5.37

CHANGE NOZZLE

You will find two sets of nozzles in the package. The one which is assembled in the printer is the normal nozzle. It is designed for printing PLA, ABS, PC and those materials whose melt temperature is lower than 280 Celsius degrees. Another one is designed for printing high-temperature materials such as PEEK (with black cable in the adapter).

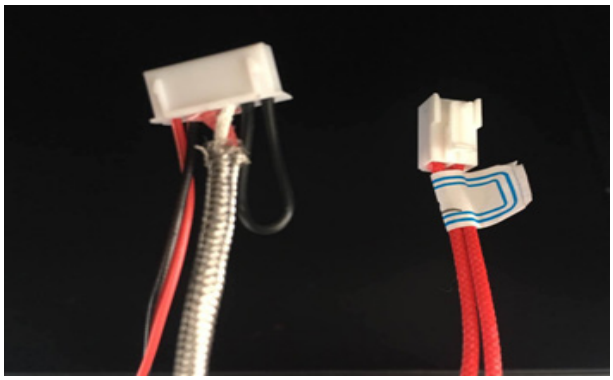


Figure 5.38

Step 1: To exchange the nozzle, first, you need to move the current material out of the nozzle. Notice that the nozzle type shows normal here, which means it is detected as a normal nozzle by the system, and it can only be used to print materials whose melt temperature lower than 280 Celsius degrees.

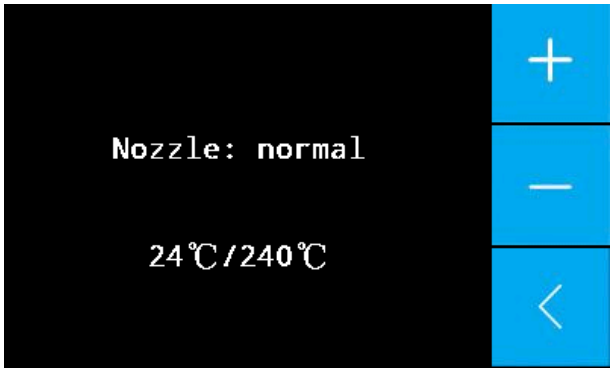


Figure 5.39

Step 2: Power off the machine and let the nozzle cool down to the room temperature. Be caution with the HOT NOZZLE!

Step 3: Use the screwdriver to take out the screws.

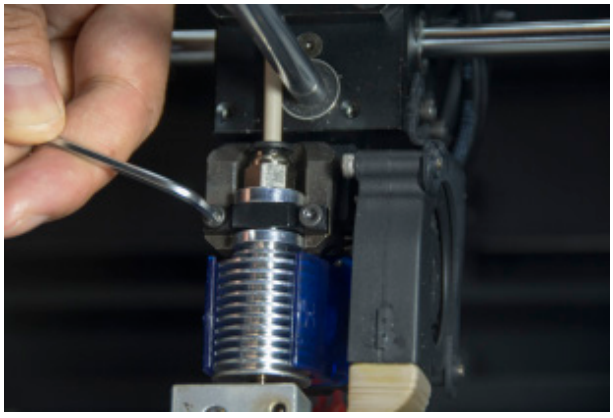


Figure 5.40

CHANGE NOZZLE

Step 4: Unplug the adapters which are behind the nozzle.

Figure 5.41

Step 5: Replace the new nozzle and plug the adapters in the right place.

Step 6: Reassemble the screws you take out in the third step.

REMOVE PRINT & CLEAN SUPPORT

After the object has been printed, wait for a few minutes to let the whole chamber and platform cool down. Be careful about the hot items such as the chamber, platform, and nozzle. They are still very hot. Use the putty knife in the package to take the model out. According to your settings, you may need to take the raft, or brim, or support out of the model. The cutting plier and the tweezer in the package will be helpful in this step. Moreover, if you have special requirements on the surface quality or the appearance of the printed objects, you can use a metal file or sand paper to smooth it.

06

MAINTENANCE

It is extremely important that FUNMAT HT is always maintained properly. In this chapter, you will find various steps for the same.

UPDATING FIRMWARE

Periodically, a new version of the INTAMSYS firmware is released. To keep your INTAMSYS FUNMAT HT up to date it is therefore recommended to update the firmware regularly. This can be done on the FUNMAT HT machine itself (when connected to the network) or via USB.

Updating On The Printer

1. Connect the printer to the network via Ethernet.
2. Go to System -> Maintenance -> Update Firmware.

FUNMAT HT will now get the latest firmware from the network and install it. This will take several minutes.

Updating Via SD Card

1. Download the new firmware file from https://www.intamsys.com/downloads/.
2. Put the firmware files on the SD Card.
3. Place the SD Card in the FUNMAT HT.
4. Go to System -> Maintenance -> Update firmware.
5. The FUNMAT HT will detect it if there is a firmware file on the SD Card. Select the file to start the firmware update.

Cleaning Glass Plate

After printing continuously, the excess glue used to stick the print on build plate gets deposited on the build plate. This causes uneven print surface due to which 3D Prints won't come properly. So, the glass plate has to be cleaned regularly.

Figure 6.1

CLEANING GLASS PLATE

Below are few steps to clean the glass plate.

Step 1: Low down the build plate by clicking on “Settings” and selecting “Printer” and “Move Z-Axis”. Rotate it slowly and build plate comes down.

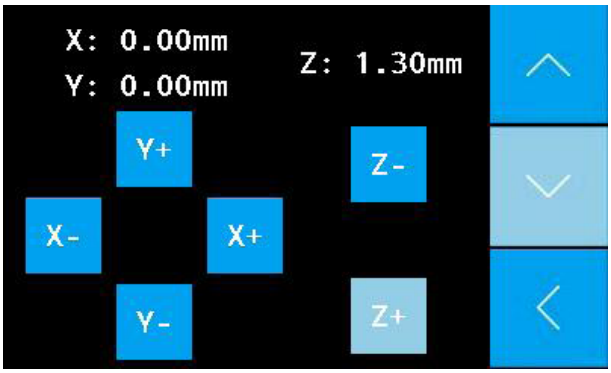


Figure 6.2

Step 2: Get the clips off and take your glass plate out.

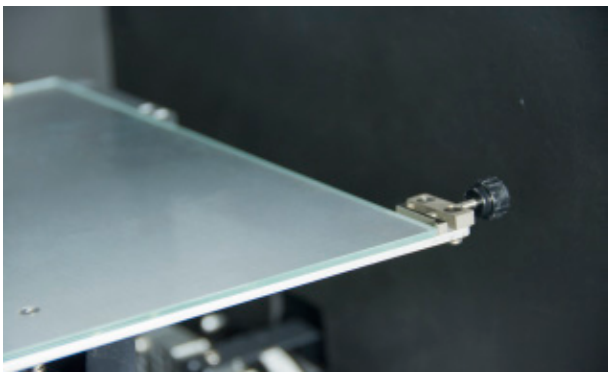


Figure 6.3

Step 3: Remove the glass plate from the build plate by sliding it to the front and taking it out.

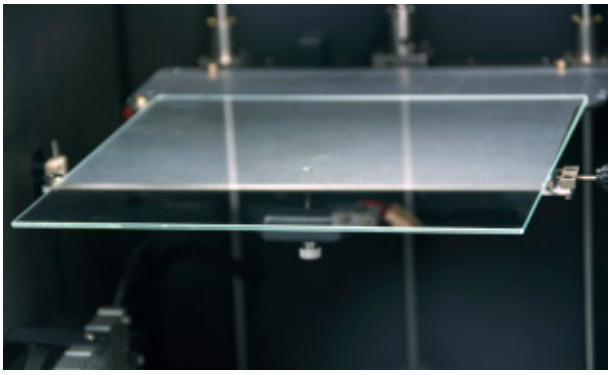


Figure 6.4

LUBRICATING AXIS

Step 4: Clean the glass plate with lukewarm water and dry it with a cloth. If necessary, you can also use some soap to clean it.

Figure 6.5

Step 5: Place the glass plate back onto the build plate and close the build plate clamps at the front side to secure it.

Figure 6.6

LUBRICATING AXIS

Cleaning Feeder

After continuous printing, knurled wheel in the material feeder can accumulate small plastic particles. These can be cleaned by blowing air on the knurled wheel or by using a simple brush. It is also recommended to clean feeder when you notice grinding of the filament.

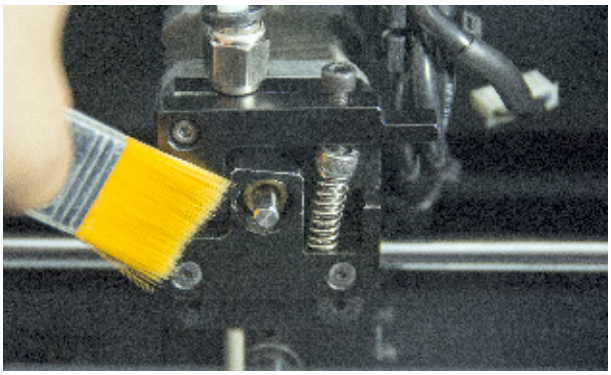


Figure 6.7

Cleaning Nozzle

While using the FUNMAT HT 3D printer it can happen that the nozzle of the print core gets dirty by material that sticks to the nozzle. This material doesn't damage the printer but it is recommended to keep the nozzle clean, in order to achieve the best print results.

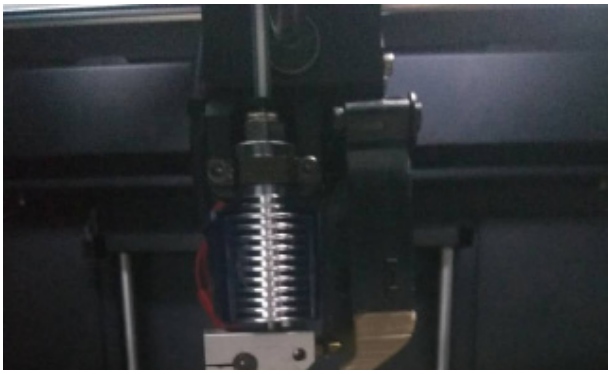


Figure 6.8

To remove the plastic from outside the nozzle, it is advised to take the following steps.

1. Heat the nozzle up to 150 degrees C so that the plastic on the outside gets soft. You can do this by navigating to Settings -> Nozzle Temperature and using the (+) / (-) icon to change the temperature.

2. When the nozzle is hot, carefully remove the material with tweezers.

Warning: Do not touch the nozzle and be careful while cleaning it as it will become hot.

Lubricating Axis

XY Axis: When you notice small ridges on the surfaces of your 3D printed objects or feel that the X and Y axis are dry, it is advised to put a single drop of sewing machine oil onto the X and Y axis. This will help in smooth running of the printer. We can't ship this liquid as logistics provider won't allow this. So, we suggest you buy the machine oil by yourself. We highly recommend you to use this oil for lubricating X & Y axis.

Z Axis: In general, we suggest you lubricate Z axis after 100-300 hours printing time and we suggest you use PTFE-based grease onto the Z axis thread rod.

Figure 6.10

FILAMENT CARE

Filament care

Keep your filament in a sealed bag if you do not use it. Exposing filament to the air will lead to filament absorbing moisture and swelling. When printing, keep filament in an air-tight box. The loose filament will lead to tangled, broken or jamming of the filament.

Figure 6.11

07

TROUBLESHOOTING

In this chapter, you will find various frequently occurring problems with 3D Prints and their solutions.

TROUBLESHOOTING

Note: We referred to www.3dverstan.de for this content as the problems while printing are the same across various FDM 3D Printers.

Warping

Warping mainly happens for ABS filament. Warping happens when the plastic cools and contracts. As the print cools down and shrinks slightly it starts to pull in on itself. Eventually the forces become so great that the print bends up from the platform. The best solution to warping problem is heated build platform. Other solution is to add glue to the platform to promote adhesion. Another option is to use BRIM / RAFT / SKIRT while printing the object. This option is available in CURA software.

Figure 7.1

Leaning

Leaning print is generally caused by friction causing the print head to move the shorter distance than expected. Make sure the moving parts of the printer don't rub against the main body of the printer.

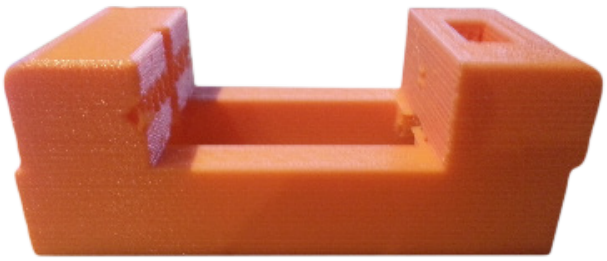


Figure 7.2

TROUBLESHOOTING

Shifted Layers

If a printer suddenly shifts the layers it is most likely that one or more pulleys aren't secured properly to the axis/axes. Tighten the set screws that hold the pulleys in place very tightly. The other issue might be head being very stiff. Add some sewing machine oil to solve this issue. Also, check if the axis is perfectly aligned. If not, do align the axis to be perfectly square.

Figure 7.3

Pillowing

Pillowing shows up as bumps in the top surface of the print and can either be open or closed. When such an issue occurs, the most important thing to do is to make sure the cooling fans are going top speed when the printer is laying down the top layer. Without proper cooling, thin strands of plastic tend to curl up and stick up above the surface of the print and make it harder for the subsequent layers to properly span over the gap. The other solution is to print more layers for top and bottom parts esp. when layer height is very thin.

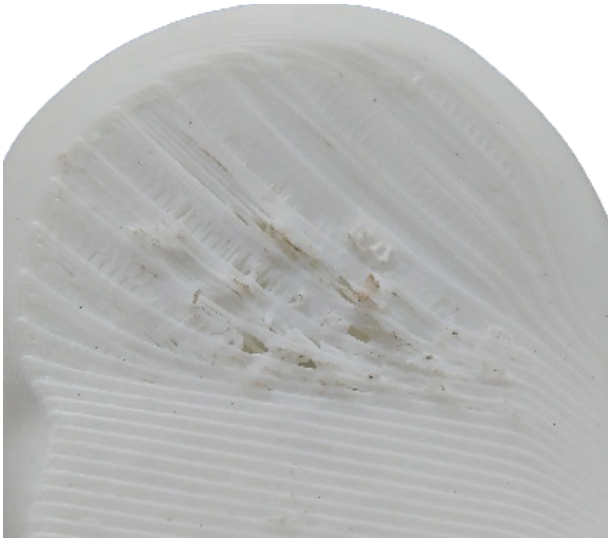


Figure 7.4

TROUBLESHOOTING

Circles Not Round / Lines Not Touching

It may happen then when you are trying to print circles, those circles don't come out perfectly circular. This problem stems from backlash caused by slack belts. To solve this issue the belts should be tightened. To tighten the belts, loosen the stepper motor, pull it downward or upward to tighten the belt and then tighten the stepper motor screws.

Figure 7.5

Stringing

Stringing is the 'unwanted' thin strands of filament that connects parts of the printed object. The major countermeasure to solve stringing is 'retraction'. Enable retraction and also increase the retraction length to prevent plastic from dipping from the nozzle during the travel. Other option is to increase the speed and this gives the head less time to ooze plastic. Another solution can be reducing the temperature. But when reducing the temperature, make sure the printer is printing slowly to prevent under extrusion.

Figure 7.6

TROUBLESHOOTING

First layer not sticking / Parts coming loose

The most common issue for this problem is improper leveling of the build plate. It is very important that the build plate is perfectly leveled in relation to the movement of the print head and that the starting distance from the nozzle is as close to perfect as possible.

Figure 7.7

Grinding

Grinding happens when the motor tries to push filament through the nozzle but for various reasons, it starts to slip onto the filament and instead grinds the plastic down. The more it grinds the filament, the less grip it is able to get and very soon it isn't able to move the filament neither in nor out.

Figure 7.8

Tangled Filament

Tangled filament is the most obvious issue. Make sure the filament can unspool unhindered.

Feeder Pressure

The amount of pressure feeder puts on filament is adjustable. This pressure has to be adjusted to the optimal level to prevent filament grinding.

TROUBLESHOOTING

Under Extrusion

Under extrusion is simply that the printer can't supply the amount of plastic that is asked for. Symptoms of this are missing layers, very thin layers or layers that have random dots and holes in them.

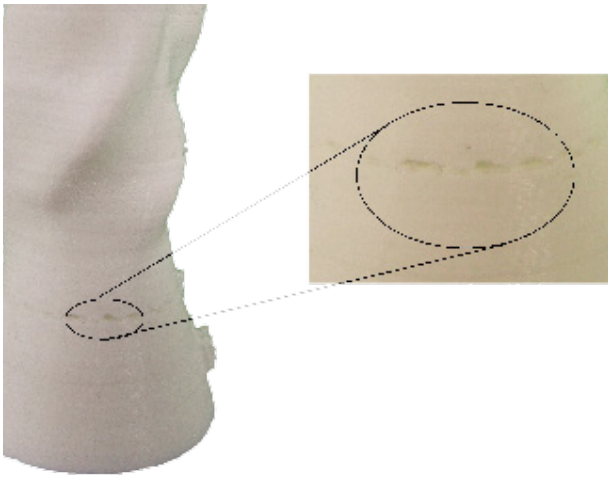


Figure 7.9

Layer separation and splitting

One major reason for this layer separation and splitting is layer height being too large. As a rule of thumb, layer height should be 80% of the nozzle diameter i.e. if you are using 0.40 mm nozzle, layer height shouldn't be higher than 0.32 mm. One other reason for the layer separation and splitting is print temperature being too low. Warm plastic always bond together much better than cold plastic. So, increase the nozzle temperature.

Figure 7.10

Nozzle Clogged

If material can't come out from the nozzle, one major reason might be nozzle being clogged. It happens when nozzle temperature is much higher than the material melting point or when nozzle temperature is much lower than the material melting point. If the nozzle temperature is much higher, filament gets carbonized leading to nozzle clogging and if the nozzle temperature is lower, the filament doesn't melt enough to be extruded out of the nozzle. The other issue can be the distance between the nozzle and the build plate. If the nozzle is too close, it will obstruct the filament from coming out of the nozzle. In such case, you should repeat the bed leveling.

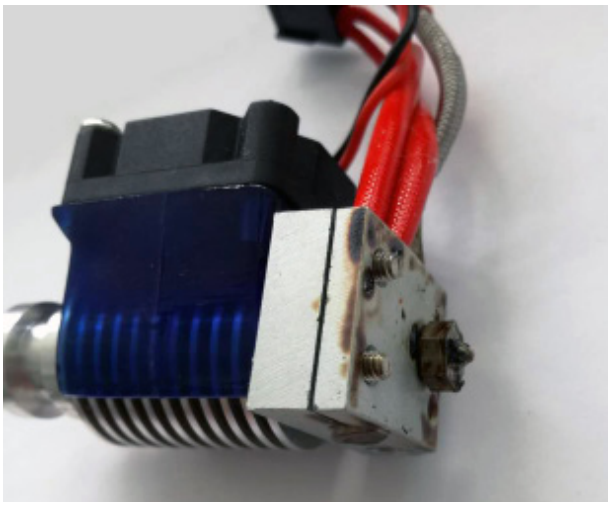


Figure 7.11

08

SOFTWARE OVERVIEW

This section details about the INTAMSUITE slicing engine developed in-house by INTAMSYS based on open source slicing software, CURA.

ABOUT SOFTWARE

INTAMSUITE is a slicer software based on Cura. In order to print your objects by using 3D Printers, firstly, you will need to use slicer software to convert your STL file into GCode. Once you convert the GCode, you can load the same into the printer and start printing the objects.

Download and install software

Step 1: You can find the software from the SD card in the carton. It is also available on our website.

Website: www.INTAMSYS.com Follow the instruction to accomplish the installation.

Step 2: Double click the software in the SD card we provided.

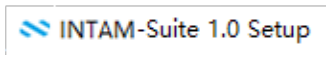


Figure 8.1

Step 3: Choose the destination folder where you want to install INTAMSUITE and click NEXT button.

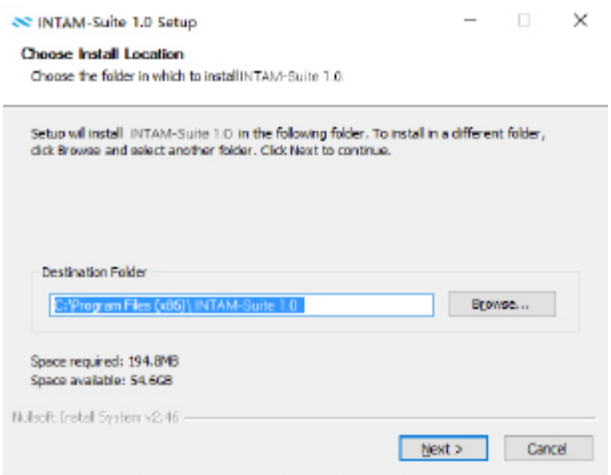


Figure 8.2

Step 4: Choose all the components you wish to install with INTAMSUITE and click "INSTALL".

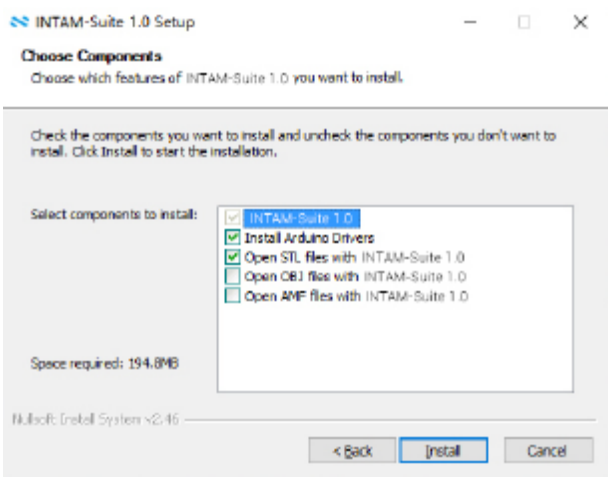


Figure 8.3

Step 5: Wait for a moment to let the program install the software.

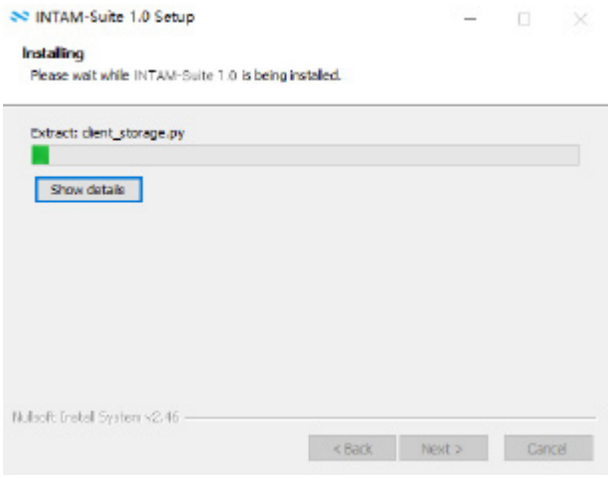


Figure 8.4

Step 6: Click 'Next'.

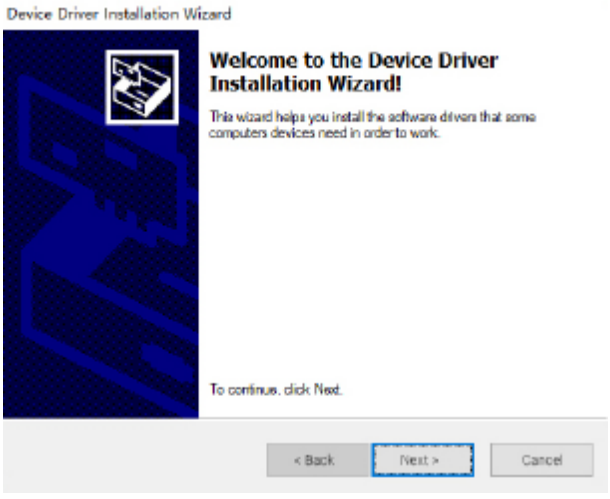


Figure 8.5

Step 7: Click 'Finish'.

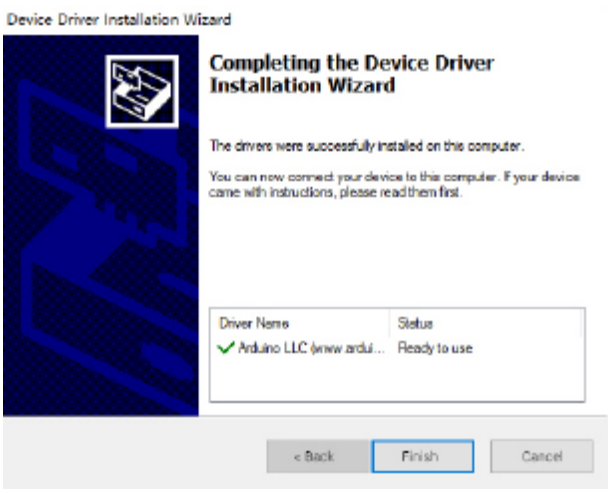


Figure 8.6

Step 8: Installation is complete, and click 'Next'.

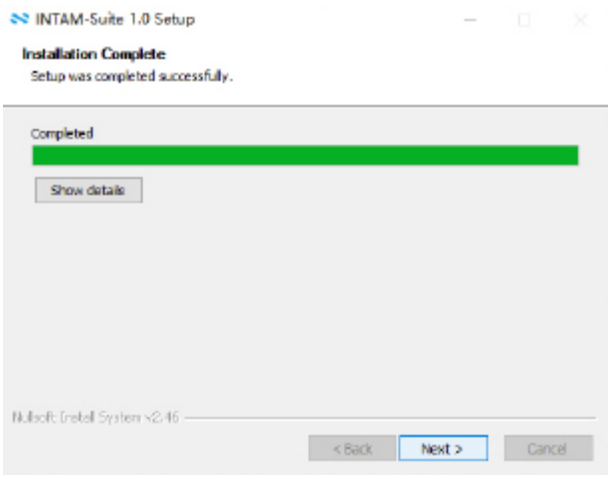


Figure 8.7

Step 9: INTAMSuite is ready to use!

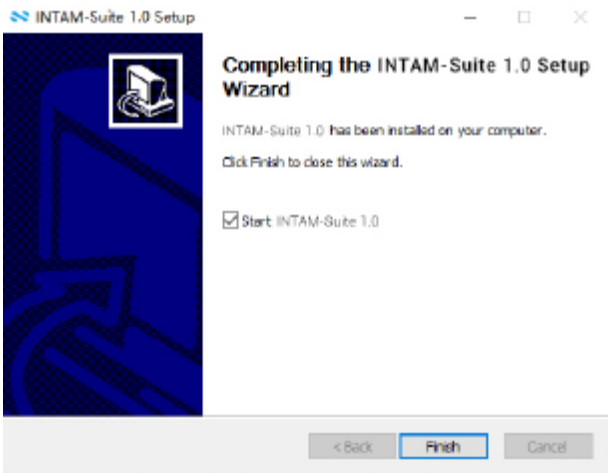


Figure 8.8

DOWNLOAD AND INSTALL SOFTWARE

Step 1: If it is the first time for you to use INTAMSUITE, the configuration wizard will ask for your preferred language. Choose your preferred language, and click 'Next'.

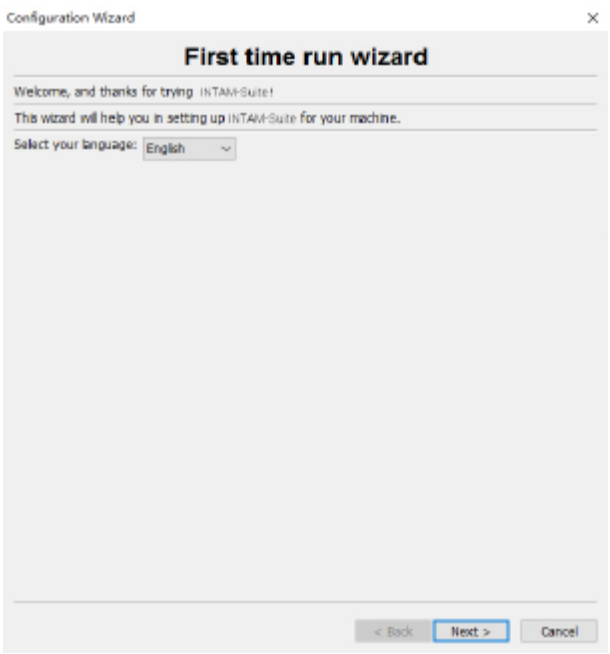


Figure 8.9

Step 2: Please select the correct model of your printer and click 'Finish'.

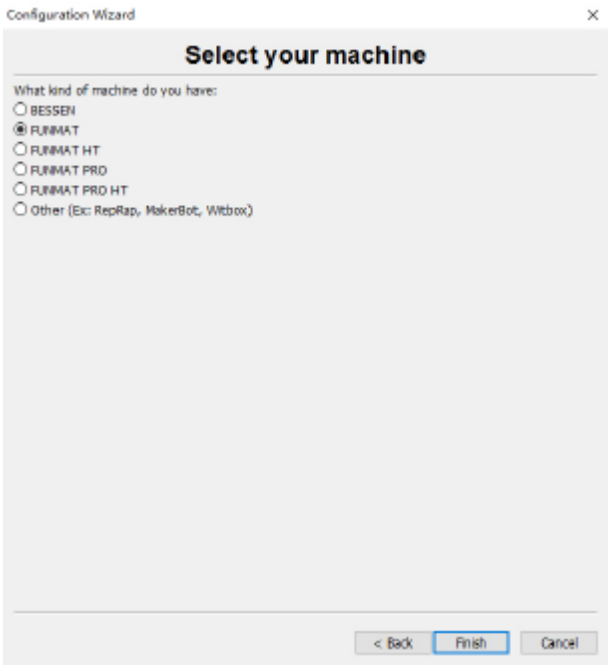


Figure 8.10

Step 3: You are ready to use the I-Suite with the correct machine type now! Click 'Finish'.

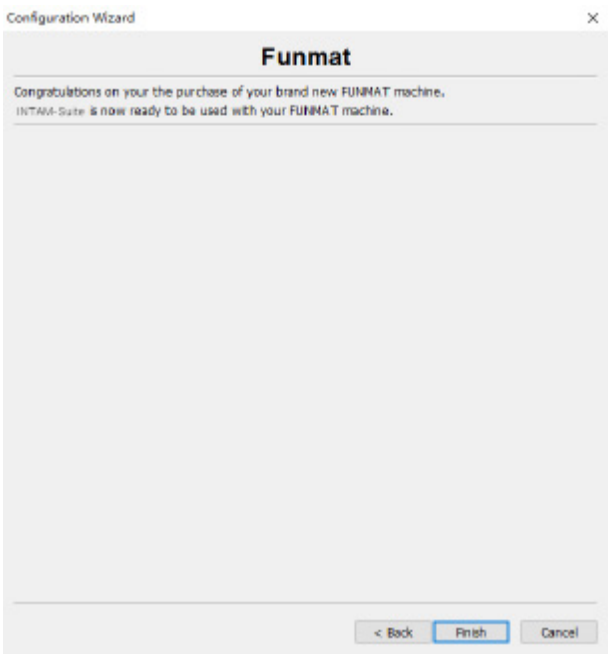


Figure 8.11

OVERVIEW OF VARIOUS SCREENS

File Screen

In this screen you can perform regular operations like

OPEN file, Save G-Code, P.

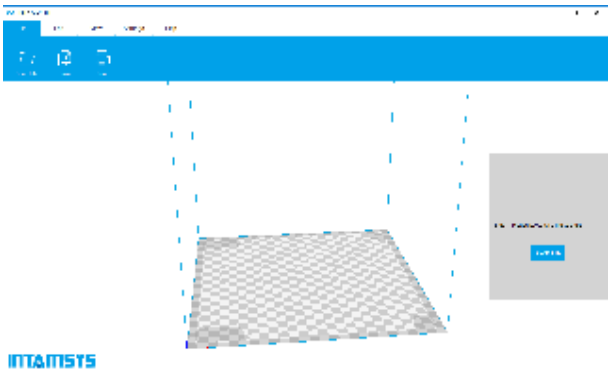


Figure 8.12

Edit Screen

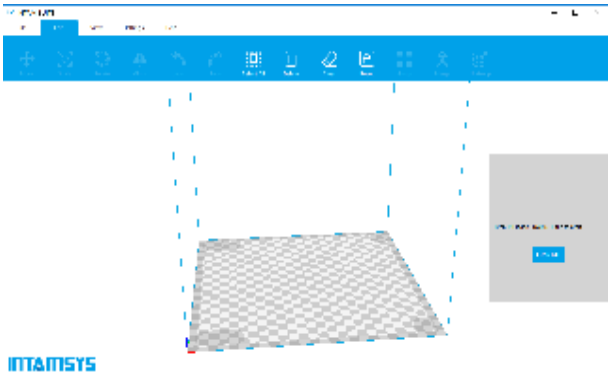


Figure 8.13

View Screen

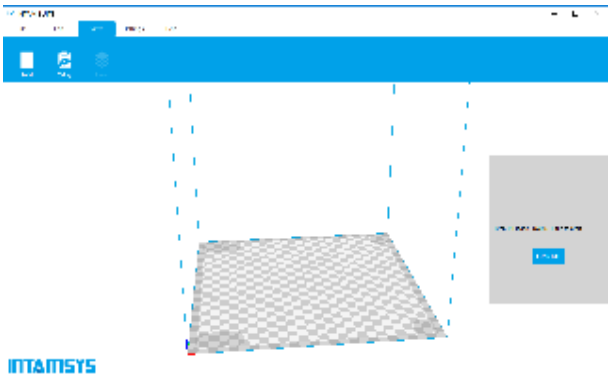


Figure 8.14

OVERVIEW OF VARIOUS SCREENS

Settings Screen

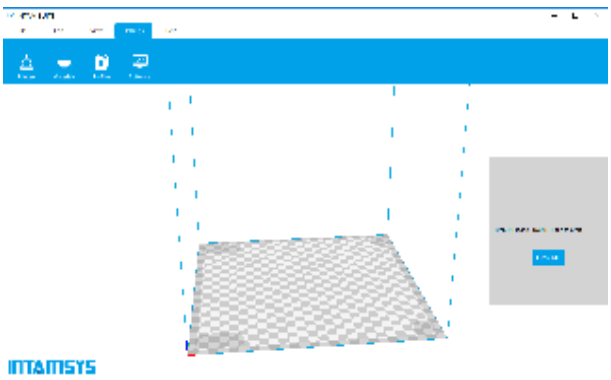


Figure 8.15

Help Screen

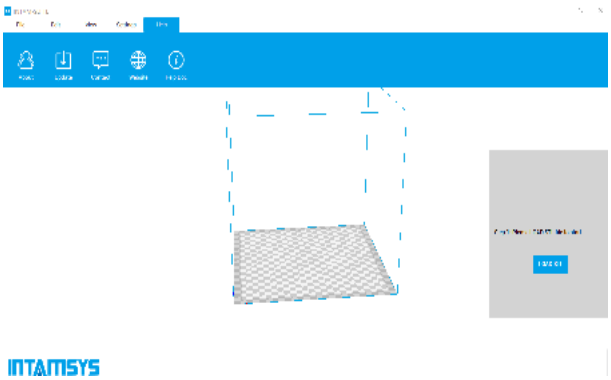


Figure 8.16

Load Section

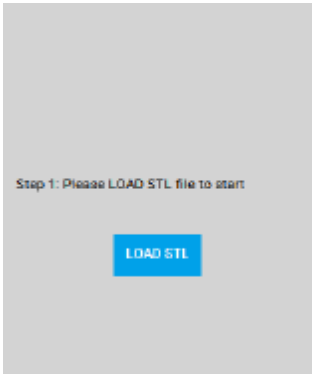


Figure 8.17

Step 1: Load STL.

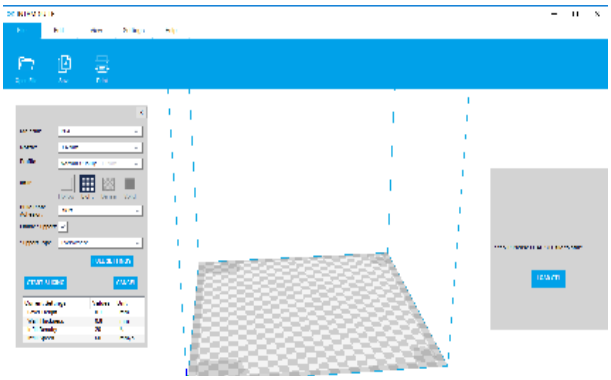


Figure 8.18

Step 2: Edit STL

All process is automatic, and please make sure your object is laid flat on the platform. You can use Rotate, Scale and Mirror button in the left bottom corner to modify your objects. Viewing button is located in the right top corner. You can change the viewing mode to get the better view of the objects.

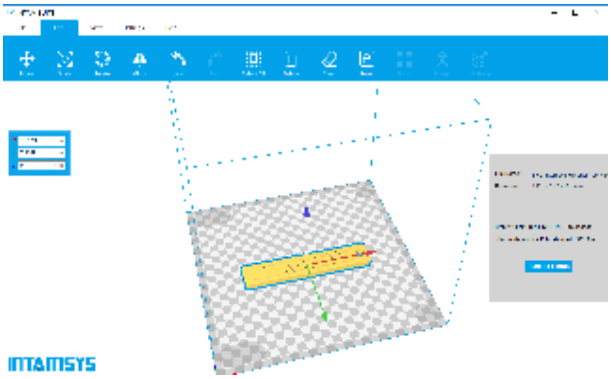


Figure 8.19

Step 3: Print STL

After you finish modifying your file, the next step is to pick the profile setting based on your requirements. Fast print provides a relative rough quality but less printing time. Normal, high, Ulti will provide higher and higher quality but slower and slower printing speed. Furthermore, you can choose the specific type of material you want to print, the nozzle size, support type and platform adhesion type as well.

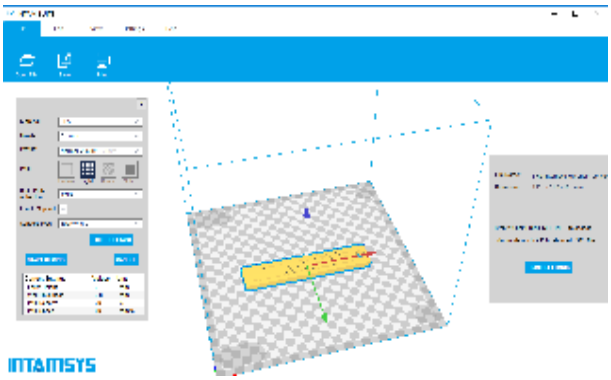


Figure 8.20

If you would like to modify the print settings or you may have a special requirement on the printing, you can go to "full settings" by clicking the "switch to full settings" option in the Expert menu. In this page, you can modify each print settings by yourself. If you are a professional 3d printer user, there are more setting options in the expert settings. You can go to expert settings by clicking the "open expert settings" option in the Expert menu.

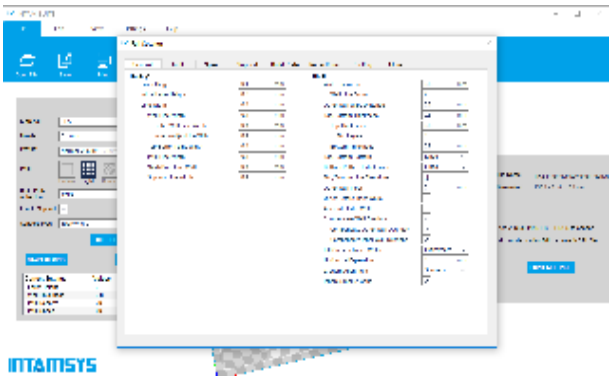


Figure 8.21

Step 4: Save to GCode.

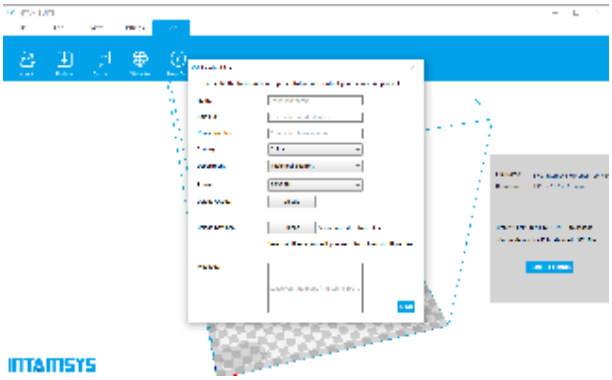


Figure 8.22

09

GLOSSARY

In this section, you can find glossary on various regularly used 3D Printing related terms.

GLOSSARY

Terminology	Meaning
Numerical	
3D Bio-Printing	3D bioprinting is the process of creating cell patterns in a confined space using 3D printing technologies, where cell function and viability are preserved within the printed construct.
3D Model	A three-dimensional design usually produced using various 3D modeling softwares like CATIA, CREO, SOLIDWORKS
3D Printing	Process of creating three-dimensional object by depositing material layer by layer
3D Scan	A process by which the shape and texture of real world object is captured and displayed as 3D Model
3D Systems	Well known 3D Printing company founded by the inventor of 3D Printing technology
3D Bioplotter	Well reputed 3D BioPrinting machine from Envisiontec.
3Doodler	Is a kind of 3D Pen that can be used to draw three-dimensional objects
3D Sand Casting	Sand casting is a metal casting process characterized by using sand as the mold material
A	
Additive Manufacturing	Process of creating three-dimensional object by depositing material layer by layer
ABS	A popular thermoplastic material heavily used in 3D Printing
Acetone	An organic solvent used to dissolve left over filament in nozzle for unclogging the nozzle and also for smoothing the ABS printed object surface
AMF	Additive Manufacturing File Format (AMF) is an open standard for describing objects for additive manufacturing processes such as 3D printing.
Alumide	Alumide is a material used in 3D printing consisting of nylon filled with aluminum dust, its name is being a combination of the words aluminum and polyamide. The printed objects have a metallic look
ABS Glue	ABS Glue is made by adding a bit of acetone to the ABS filament. This is used to stick the 3D Print to the build plate
All Metal Hot End	A nozzle design that can go upto very high temperature of 400 degrees C

GLOSSARY

Terminology	Meaning
Anisotropic	Object having physical property that is different in different directions
Amorphous	Without a clearly defined shape or form
B	
Build plate	Build plate is the platform on which material is deposited layer by layer
Build platform	Same as build plate
Build Volume	Build volume = Printer Length x Printer Width x Printer Height
Bridges	Printing horizontal layers in the air without support.To achieve good quality for bridges, it is recommend ed to reduce printing speed and printing temperature
Binder Jetting	Is a 3D Printing process where binder is jetted after each layer to glue it to the next layer
Blender	An open source 3D modeling software
Bed	Platform on which material gets extruded
Biopolymer	Biopolymers are polymers produced by living organisms. Since they are polymers, biopolymers contain monomeric units that are covalently bonded to form larger structures.
BuildTAK	Is a sheet that is placed on build plate before extruding the material to avoid warping of printed objects
Brim	A brim is attached to a model and extends outward. Brims typically have several outlines and may be a few layers tall. Brims are often used to stabilize small parts of a model, such as legs of a table, because brims help these areas stay connected to the print bed.
Build Time	Time it takes to print the object as per the parameters defined in slicing software
C	
CAD / CAM	Computer Aided Design / Computer Aided Machining
Catia	Popular 3D Modeling software
CLIP	Continuous Liquid Interface Production
CNC Machining	CNC Machining is a process used in the manufacturing sector that involves the use of computers to control machine tools.

GLOSSARY

Terminology	Meaning
CAE	Computer-aided engineering (CAE) is the broad usage of computer software to aid in engineering analysis tasks like Finite Element Analysis
Curing	Curing is a process of hardening photopolymers through UV light
Crystalline	A crystal or crystalline solid is a solid material whose constituents are arranged in a highly ordered macroscopic structure, forming a crystal lattice that extends in all directions.
CJP: ColorJetPrinting	A type of 3D Printing technology from 3D Systems, primarily for printing multi-color objects
D	
DLP: Digital Light Processing	A type of 3D Printing technology where photopolymers are cured using UV light
DMLS: Direct Metal Laser Sintering	A type of 3D Printing technology
E	
Extruder	It is a device that sends correct amount of filament to hot end
EBM: Electron Beam Melting	A type of 3D Printing technology which uses an electron beam instead of a laser or thermal printhead. EBM is often used for the production of incredibly dense metal parts
EOS	Industrial 3D Printing company well known for its metal 3D Printing
End Stop	3D Printer axes all need a datum (also known as home position or end-stop) to reference their movements.
F	
Fused Deposition Modeling (FDM)	A type of 3D Printing technology that uses heat to melt and extrude plastic filament onto the build plate
Filament	Is kind of plastic wires used in FDM 3D Printing
FabLab	It is a small-scale workshop for digital fabrication
Flowrate	It is the volume of fluid which passes per unit time
Fixture	Used to hold a workpiece during either a machining operation or some other industrial process.

GLOSSARY

Terminology	Meaning
G	
G-Code	G-code is the common name for the most widely used numerical control (NC) programming language. It is used mainly in computer-aided manufacturing to control automated machine tools.
Glass Transition Temperature	Glass Transition Temperature (Tg) is the temperature region where the polymer transitions from a hard, glassy material to a soft, rubbery material.
H	
Hardening	Harden (make an object toughen) generally by using heat treatment
Heated Bed	Heated build platform (also called heated bed) improves printing quality by helping to prevent warping. As extruded plastic cools, it shrinks slightly. Heated beds usually yield higher quality finished builds with materials such as ABS and PLA.
Heated Build Chamber	Heated build chamber also improves the printing quality by maintaining the constant temperature in the chamber thereby avoiding cracks
HIPS	High Impact Polystyrene is a type of 3D Printing filament
Hot End	Hot End is the device that melts the filament and extrudes the molten filament on build plate
Hydrogel	A hydrogel is a network of polymer chains that are hydrophilic. Hydrogels are highly absorbent natural or synthetic polymeric networks.
I	
Infill	Material that is used to fill in the gaps/holes
Injection Molding	The plastic injection molding process produces large numbers of parts of high quality with great accuracy, very quickly.
Inkjet Bioprinting	Is a process of printing tissues through a jetting process similar to 2D Printing where a combination of hydrogel and cells are jetted into a scaffold as per predetermined model
Isotropic	An object having a physical property which has the same value when measured in different directions.
J	

GLOSSARY

Terminology	Meaning
Jig	Used to hold and guide a workpiece during either a machining operation or some other industrial process.
K	
Kapton Tape	A kind of tape used to avoid product warping during the printing process. esp. for ABS material
L	
Layout	The way in which the parts of something are arranged or laid out.
Layer Height/Slice Thickness	Height of each layer that gets deposited on the build plate
Layer Thickness	Same as layer height/slice thickness
LOM: Laminated Object Machining	Laminated object manufacturing (LOM) is an RP system where layers of adhesive-coated paper is used to build a 3D model
Linear Guide	Used for movement across an axis (X, Y, and Z). Meant for higher accuracy
Linear Rail	Used for movement across an axis (X, Y, and Z)
LENS: Laser Engineered Net Shaping	Laser Engineered Net Shaping is an additive manufacturing technology developed for fabricating metal parts directly from CAD model using metal powder injected into a molten pool created by a focused, high-powered laser beam
LCF: Laser Cladding Forming	It is a type of additive manufacturing technology. During the process of laser cladding forming, a high power laser beam is focused onto the substrate to create a molten pool, metal powders are simultaneously injected into the focal zone by the powder delivering nozzles and then melted and rapidly solidified.
Hardening	Harden (make an object toughen) generally by using heat treatment
Heated Bed	Heated build platform (also called heated bed) improves printing quality by helping to prevent warping. As extruded plastic cools, it shrinks slightly. Heated beds usually, yield higher quality finished builds with materials such as ABS and PLA.
Heated Build Chamber	Heated build chamber also improves the printing quality by maintaining the constant temperature in the chamber thereby avoiding cracks
HIPS	High Impact Polystyrene is a type of 3D Printing filament

GLOSSARY

Terminology	Meaning
Hot End	Hot End is the device that melts the filament and extrudes the molten filament on build plate
Hydrogel	A hydrogel is a network of polymer chains that are hydrophilic. Hydrogels are highly absorbent natural or synthetic polymeric networks.
M	
Monomer	A molecule that can be bonded to other identical molecules to form a polymer.
Melting Point	The temperature at which a given solid will melt.
Metal Powder	Generally used Metal Laser Sintering
Micron	A unit of measurement. Usually 0.001 mm
MJP: Multi-Jet Printing	Another term of Poly Jet Printing
MJF: MultiJetFusion	Proprietary 3D Printing technology developed by HP
N	
NEMA	National Electrical Manufacturers Association offers standards for various products like Stepper Motors
Nylon	Kind of synthetic polymers that can be melt-processed into fibers, films or shapes.
Nozzle	The metal tip where plastic material gets melted and extruded
Nozzle Diameter	Diameter of the nozzle from where material gets extruded
NPJ: Nano Particle Jetting	It is a metal inkjet 3D Printing process where nanoparticles suspend in liquid are jetted and later sintered
O	
OBJ	A kind of 3D Printing file format
Overhang	A part of something that extends or hangs over something else. Supports are used to print overhangs
OpenSCAD	Software for creating solid 3D CAD objects
Organovo	Calls itself a regenerative medicine company

GLOSSARY

Terminology	Meaning
P	
Photopolymerization	Process of changing the properties of photopolymer by exposing it to light
PLA	PolyLacticAcid is a type of 3D Printing filament made out of corn starch
Polyamide	A synthetic polymer of a type made by the linkage of an amino group of one molecule and a carboxylic acid group of another, including many synthetic fibers such as nylon.
PJP: Polyjet Printing	PolyJet 3D Printing works similarly to inkjet printing, but instead of jetting drops of ink onto paper, PolyJet 3D Printers jet layers of curable liquid photopolymer
Printing Resolution	Layer height in micrometers at which 3D Printing happens
Printing Speed	The speed at which hotend moves while extruding the filament.
PC	Polycarbonates (PC) are a group of thermoplastic polymers containing carbonate groups in their chemical structures. Polycarbonates are used in engineering applications
PEEK	Polyether ether ketone (PEEK) is a colorless organic thermoplastic polymer in the polyaryletherketone (PAEK) family, used in engineering applications.
PET	Polyethylene terephthalate, commonly abbreviated PET is the most common thermoplastic polymer resin of the polyester family
PVA	Polyvinyl alcohol is a water-soluble synthetic polymer.
PTFE	Polytetrafluoroethylene (PTFE) is a synthetic fluoropolymer of tetrafluoroethylene used for multiple applications
Plastic Jet Printing	Similar to FDM/FFF
Polyphenylsulfone (PPSF)	Polyphenylsulfone (PPSF or PPSU) is a type of high-performance polymer usually consisting of aromatic rings linked by sulfone (SO2) groups.
Post Processing	Is a set of processes used to smooth out the 3D Printed object
PP: Plaster-based 3D printing	3D Printing using sandstone or plaster as the input material. This is popular for creation of miniatures.
PP: Polypropylene	Polypropylene (PP), also known as polypropene, is a thermoplastic polymer used in a wide variety of applications including packaging and labeling

GLOSSARY

Terminology	Meaning
Q	
R	
Resolution	Layer thickness usually defined in micrometers
Raft	A Raft is a horizontal latticework of filament that is located underneath your part. Rafts are primarily used with ABS to help with bed adhesion. Rafts are also used to help stabilize models with small footprints, or to create a strong foundation on which to build the upper layers of your part.
Rapid Prototyping	Rapid Prototyping is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD) data
RepRap	Open source rapid prototyping system that is capable of producing its own parts and can be replicated easily.
Rhinoceros	Rhinoceros is a commercial 3D computer graphics and computer-aided design application software
RAMPS	RepRap Arduino Mega Pololu Shield
Resin	A solid or liquid synthetic organic polymer used as the basis of plastics, adhesives, varnishes, or other products.
S	
Slicing	Process of driving a 3D model into multiple layers for printing
STL	STL (Stereolithography) is a file format native to the stereolithography CAD software created by 3D Systems. It is well-known file format for 3D Printing
Supports	Supports are used when models have steep overhangs or unsupported areas.
Shells	Shell represents an outer wall of a 3D Print
Sculptris	Well known 3D modeling software used for sculpting
SDL: Selective Deposition Lamination	Selective Deposition Lamination is a 3D printing process using paper.
Sketchup	Well known 3D modeling software

GLOSSARY

Terminology	Meaning
SLS: Selective Laser Sintering	A type of 3D Printing process where laser is used sinter powder particles
SolidWorks	Well known 3D modeling software
Steel 3D printing	3D Printing of Steel powder
SLA: Stereolithography	A type of 3D Printing process where laser is used to cure a tank of liquid resin
SVG (Scalable Vector Graphics)	Scalable Vector Graphics (SVG) is an XML-based vector image format for two-dimensional graphics with support for interactivity and animation.
Stepper Motor	A stepper motor (or step motor) is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any feedback sensor (an open-loop controller), as long as the motor is carefully sized to the application.
Support Material	Support material is used to hold the suspend parts of a 3D Printed object
SLM: Selective Laser Melting	Selective laser melting (SLM) is a rapid prototyping technique designed to use a high power laser to melt and fuse metallic powders together.
Sintering	Join powder into a solid porous mass by heating
Skirt	A skirt is an outline that surrounds your part but does not touch the part. The skirt is extruded on the print bed before starting to print the model. Skirts serve a useful purpose because they help prime the extruder and establish a smooth flow of filament.
Surface Finish	Surface finish, also known as surface texture, is the characteristics of a surface. It has three components: lay, surface roughness, and waviness.
T	
Thermoplastic	Having the property of softening or fusing when heated and of hardening and becoming rigid again when cooled
Titanium 3D Printing	3D Printing using Titanium powder
Triple Jetting	Is a Stratasys process where 3D Printers also jet a gel-like support material specially formulated to uphold overhangs and complex geometries during the printing process.

GLOSSARY

Terminology	Meaning
Tissue Engineering	Tissue engineering is the use of a combination of cells, engineering and materials methods, and suitable biochemical and physiochemical factors to improve or replace biological tissues.
Tank (Resin)	Is a holder of resin in SLA / DLP 3D Printing
Tensile Strength	The strength of material expressed as the greatest longitudinal stress it can bear without tearing apart
TPP.Two-photonp-olymerization	A new approach to micromachining and can be considered the next level to SLA. Very precise 3D models can be created within a very short span of time
U	
Ultem	Polyetherimide is an amorphous, amber-to-transparent thermoplastic with characteristics similar to PEEK
UV Light	Ultraviolet (UV) is an electromagnetic radiation with a wavelength from 10 nm (30 PHz) to 400 nm (750 THz) generally used for curing in DLP process
V	
VAT	A large open vessel for holding or storing liquids. In 3D Printing, generally for holding resin in DLP or SLA process
W	
Warping	Is bending of an object on the edges due to material shrinkage while 3D Printing
Wall Thickness	Thickness of the wall or the outer part of the 3D object
X	
X-Axis	X-Axis of a 3D Printer
Y	
Young's Modulus	Young's Modulus is stress/strain. It is measure of stiffness of a solid material
Yield	Stress at which material starts deforming plastically
Y-Axis	Y-Axis of a 3D Printer
Z	
Z-Axis	Z-Axis of a 3D Printer

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