USER MANUAL

Disclaimer

Please read the user manual and contents of the instructions carefully. Failing to read the user guide may lead to injuries and damage to Volterra, Industrial 3D Printer. Users of the printer should understand the contents of the manual completely before starting up the Volterra printer**.The methods or conditions used for assembling, handling, storage, use or disposal of the machine are beyond our control or beyond our knowledge. For this reason and other reasons, we do not assume responsibility and explicitly disclaim liability for the loss, injuries, expenses or damage arising out of or in any way connected with the assembly, handling, storage, use or disposal of the product.

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

Intended use of Volterra

Volterra 3D Printers are designed and crafted for fused deposition modeling process intended with engineering thermoplastics within a commercial/ business/ research environment. The blend of the precision and speed makes the Volterra 3D printers the perfect machines to conceptualize models, prototypes and small series of production. The printer is coupled with Fracktory Desktop to provide the best experience in slicing with easy interface for the user to change the material properties such that it matches with the machine settings. Fracktory is specifically designed for Volterra printers and gives enhanced experience to the user.

** Volterra printer refers to Volterra family of printers

Preface

This is the installation and user manual for your Volterra 3D printer. This manual contains chapters about the installation and use of the Volterra 3D printer. Important information and instructions on safety, installation and use have been emphasized in this manual. Please read all information and follow the instructions and guidelines in this manual carefully. This ensures that you will obtain great quality prints and that possible accidents and injuries will be prevented. Make sure the user of the Volterra has access to this manual.

Every effort has been made to make this manual complete and accurate as possible. The information is believed to be true but does not aim to be all inclusive and shall be used only as a guide. Kindly bring us the attention on any errors or omissions, so that we can make amendments. Revision and improvement of the documentation could help you serve better.

Contents

WELCOME
LET'S START

1 Product Details

Title: Volterra machine series
Filament diameter: 1.75 mm
Manufacturer: Fracktal Works Pvt Ltd
Manufacturer address: No. 3, 50ft Laggere Main Road Chowdeshwari Nagara, Near Old Police Chowky, Bengaluru, Karnataka, 560 058
Power supply voltage: 200V, 50Hz
Power consumption: 1900W
Working temperature range: 18 °C - 38 °C, indoor use only
Working humidity: 85 % or less

2 Introduction

Thank you for purchasing our Volterra from Fracktal Works. For correct service of the printer, please read the handbook carefully. All the chapters contain valuable information for the proper service usage.
The user manual is designed specially to make your journey with Volterra printers smooth and hassle free. Fracktal Works welcomes you to the exciting era of 3D printing using Volterra. Read and follow this guide to get the best out of your machine and for an amazing 3D printing experience.

GETTING STARTED

3 Getting Started

Volterra can print solid 3D models which are simple or complicated ranging from toys to bearings, machine parts, replacements of broken article, casing and variety of other things. Volterra helps turn concepts and ideas into physical prototypes saving time, reducing costs and shortening product development life cycles.

Printing solid 3D objects is an additive manufacturing process which involves a few simple steps. Initially a digital file or a solid model is prepared. This model is then imported into a software commonly known as a 'Slicer' and is sliced into layers and fed into the printer to get the model printed. The printer prints by depositing molten material layer by layer with the help of a 3-axis manipulator.

SAFETY

4 Safety

4.1 Electric Shock Hazards

Never open the access panel when there is power supply to the printer. Before removing the electronics casing always power down the printer completely, Also unplug the power cord connected to the printer. Allow the power supply to discharge for at least one minute.

4.2 Burn Hazard

Never touch the extruder nozzle or heater block without turning off the hot end and allowing it to completely cool down naturally. The hot end could take up to twenty minutes to completely cool. Also never touch the plastic which was just extruded. Wait for at least 3 minutes for it to cool down naturally. The plastic can stick to your skin and cause burns. Beware of the heated bed which can reach high temperatures and is capable of causing burns.

4.3 Fire Hazard

Never place flammable materials or liquids on or near the printer when powered or in operation.

4.4 Pinch Hazard

When the printer is in operation, if placed near the moving parts including the belts, pulleys, or gears, take care of your fingers. Also, tie back long hair or clothing that could get caught in the moving parts of the printer.

4.5 Static Charge

Make sure to ground yourself before touching the printer, especially with the electronics. Electrostatic charge can damage electronic components and may affect its functionality. To ground yourself, touch any grounded source.

4.6 Age Warning

For users under the age of 18, adult supervision is recommended. Beware of choking hazards.

4.7 Fumes and smell Warning

While printing filaments such as ABS, fumes are produced. Do not inhale the fumes because they are toxic in nature. Fumes released could contain toxic substances known as VOC's (Volatile Organic compound). Not all VOC's are actually toxic, but some may be, especially for younger users.
Machine is to be placed in a well ventilated area.

ANCILLARY FEATURES

5 Ancillary Features

5. 1 HEPA Filter

HEPA filter is mounted on the central rear panel of the machine which is mechanically convicting the air through a fine mesh that traps harmful particulate air.

5.2 IDEX technology

IDEX is the extrusion system capable of printing with two heads independently. This allows enabling Duplication and Mirror printing modes capable of printing two pieces at a time. Double printing capacity means double productivity, all with the same investment.

5.3 Chamber heaters

Chamber heaters enables users to print in high temperature filaments, such as PEEK and ULTEM which need a stable chamber temperatures.

5.4 Filament heaters

Filament materials such as PVA absorbs moisture when stored in open atmosphere. It is essential for PVA to be preheated before giving print. Instead of preheating externally, filament heater eliminates the use of external heating.

5.5 Light Tower

Stack lights are used in a variety of machines and process environments. Color codes for our machine is as follows:

- Green indicates “Printing"
- Amber indicates “Operational/ Idle"
- Red indicates “Error/ Offline / any other issue"

Specification & what's in the box!

6 Specifications

Parameters	Speed	IDEX	HT
Technology	FDM/FFF	FDM/FFF	FDM/FFF
Model Materials	PLA, ABS, Nylon Flexible**	PLA, PVA, ABS, HIPS, Flexible**	PLA, ABS, Nylon, ULTEM, PEEK, Flexible**
Layer Resolution	100 – 450 um	100 – 450 um	100 – 450 um
Positioning Accuracy Z	5 um	5 um	5 um
Positioning Accuracy X-Y	10 um	10 um	10 um
Max. Print Size Heated With “Magnalock Build Substrate”	380x400x400 mm	380x400x400 mm	380x400x400 mm
Chamber Heater	Yes (120C)	Yes (120C)	Yes (150C)
Filament Heater	Yes (60C)	Yes (60C)	Yes (60C)
Camera	Live Camera for 5MP	Live Camera for 5MP	Live Camera for 5MP
Heated Bed	Yes (120C)	Yes (120C)	Yes (150C)*
Max. Nozzle temperature	250C	250C	450C
Door Sensor	Yes (Active Detection)	Yes (Active Detection)	Yes (Active Detection)
Nozzles***	1 (0.6mm Default)	2 (0.6mm Default)	2 (0.6mm Default)
File Type	STL, OBJ, G-Code	STL, OBJ, G-Code	STL, OBJ, G-Code
HEPA Filter	Yes	Yes	Yes
Power	240V, 60Hz, 1900W*	240V, 60Hz, 1900W*	240V, 60Hz, 1900W*
7” “Mission Control: Touch” Panel	Touch HMI	Touch HMI	Touch HMI
Tower Light Indication and Emergency Stop Switch	Yes	Yes	Yes
Interface Connectivity	USB, Wi-Fi, Ethernet	USB, Wi-Fi, Ethernet	USB, Wi-Fi, Ethernet

*Specification tend to change as per design
** Machine ships with Brass-0.6mm nozzles Extra nozzles(0.25, 0.4, 0.6, 0.8) are charged additionally. Nozzle material with Hardened Steel and Stainless Steel variants are also available
*** Compatible with Fracktal Works Flex series of Filaments
**** Comprehensive warranty covers all parts except nozzle assembly, accessory box tools and consumables

7 What's in the box

(a) Light tower
(b) Hotend and Nozzle kits*
(c) Filament*
(d) Camera*

Accessories Checklist

1. Flex Build Plate attached to the bed
2. Allen Keys (2, 2.5, 3 mm size)
3. Print Adhesive
4. WD 40 Spray
5. USB drive
6. Nozzle cleaning tool or stove pin
7. Power cord
8. Sharp Tweezers
9. Filament cutter

*Few accessories are subjected to purchase order

SETTING UP

8 Setting up

Figure 8.1: RCBO contactor with socket

The power cord has to be connected to the IEC socket located at the backside in the bottom left of the printer near the power socket. Connect the power cable to the 220V wall socket and flip the contactor (RCBO) to turn the printer ON.
After turning the printer ON, turn the button switch ON which is located on front panel of the printer. An LED should light up after pressing the switch. LED lighting can signify the power state of the printer. When the button switch is in pressed condition, it signifies the printer is in ON condition also showing with ON state of the LED on the button switch. On the other way, when the button switch is in released position, the LED light should go OFF and state the turned off condition.
By turning the two switches, the printer should boot up and the display should show the booting. Make sure the emergency stop button is in release position.
The E-stop or the Kill switch turns off the whole machine. This switch is a handy add-on in case of emergency.
In case, you want the printer to be connected to a wired LAN connection, the LAN cable can be connected to the LAN port present just beside the power socket.

Figure 8.2: Fracktal Works Loading Screen

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STARTUP PROCESS

9 Startup process

After turning on the power supply for Volterra, the LCD screen will get activated. The following section of the manual will guide you through the process of loading the filament, leveling the print plate and testing your first build.
First you mount the magnetic print plate on the bed and it will automatically stick to it. Note that the slits on the build plate (highlighted) pass through the mounts on the bed.

Figure 9.1: Build surface aligning with the slits/notches on bed

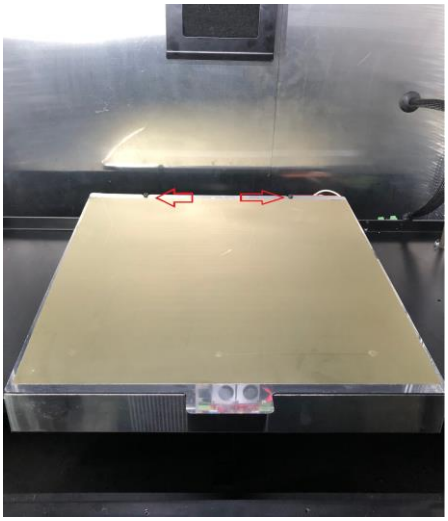


Figure 9.2: Build surface placed on the bed

Your bed should ultimately look something like this.

9. 1 Loading Filament

To load a new filament, select the control option from the main menu and click on the following icon.

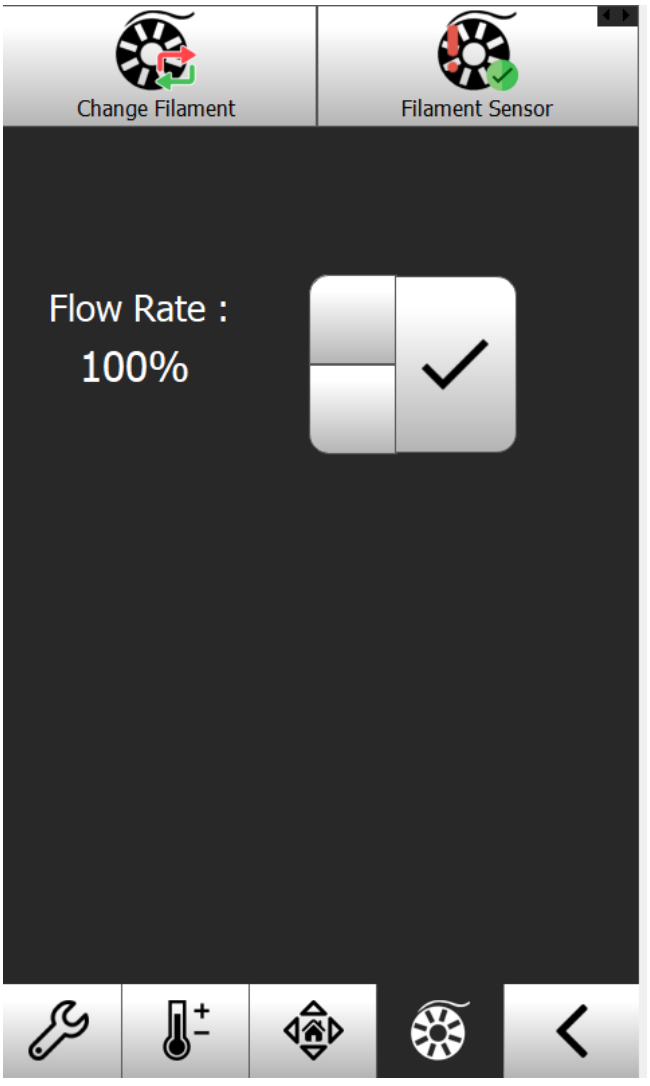


Figure 9.3: Change filament control

Figure 9.4: change filament button

Press on the 'change filament' button on corner as shown in fig. 9.4.
If you have VolterraIDEX, the filament change wizard screen should look something like the image shown in fig 9.5.

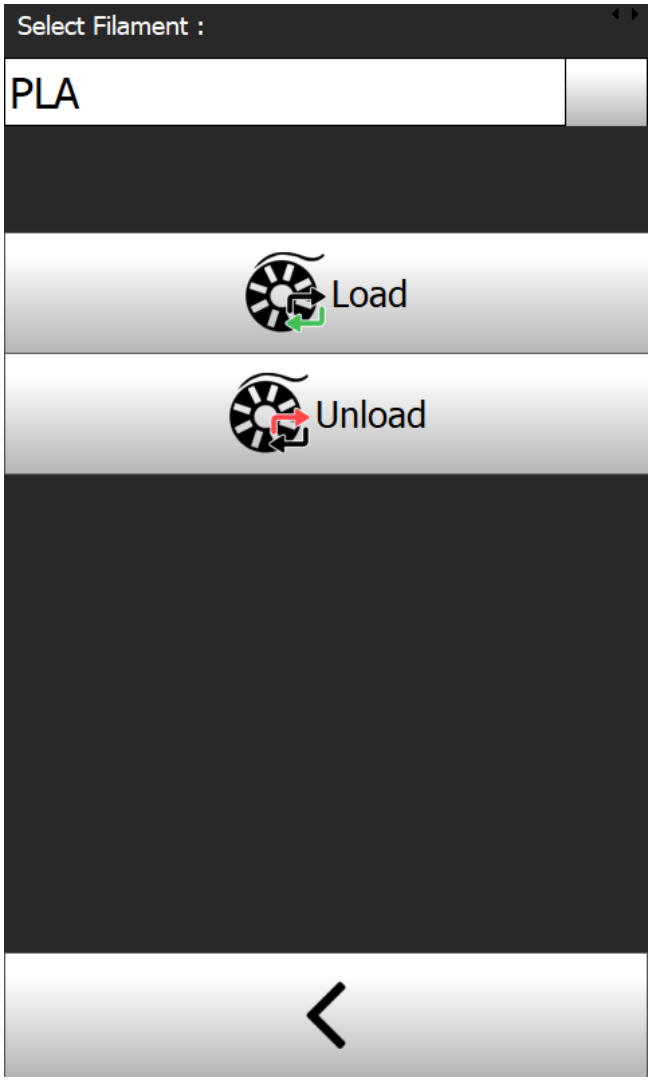


Figure 9.5: Change filament menu for VolterraIDEX

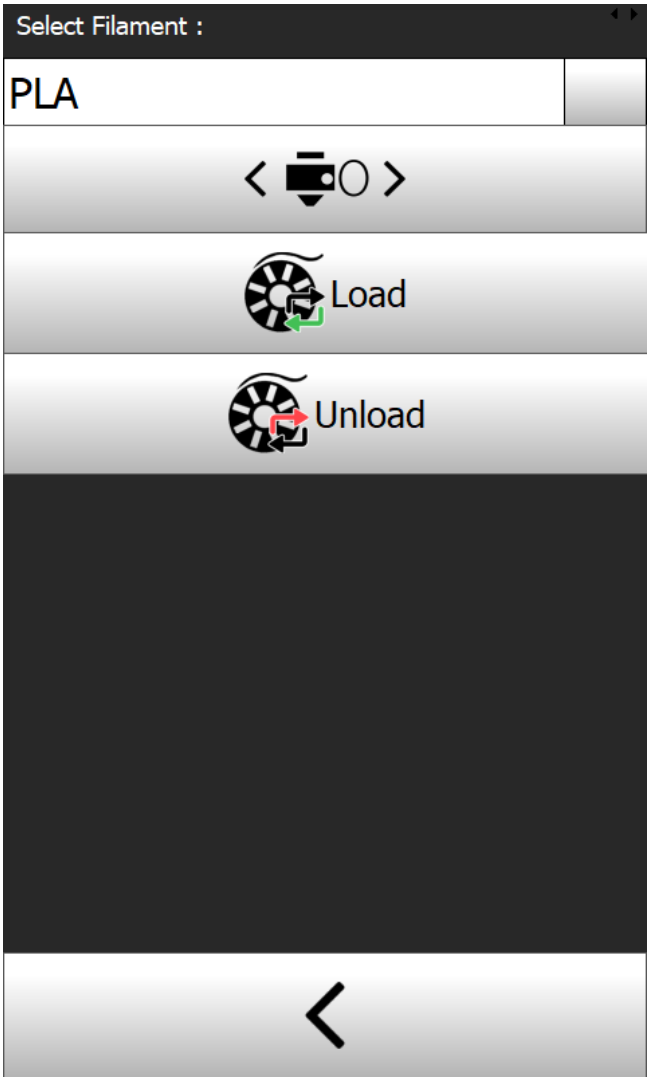


Figure 9.6: Change filament menu for VolterraIDEX

From the drop down menu under "Select Filament", select the filament which you want to load and tap on Load button.
If you have VolterraIDEX (Fig 9.6), the filament change wizard screenshould look something like the image above.

From the drop down menu under "Select Filament", select the filament which you want to load. Also select the nozzle into which you want to insert the filament and tap on Load button. For example, if you want to print PLA. Select PLA from the select drop down menu.
If the old filament is already loaded, then press the unload icon and when the filament is out press the load filament icon to insert the new filament. You can tap on unload again for unloading the filament in case the filament is not unloaded in one tap.

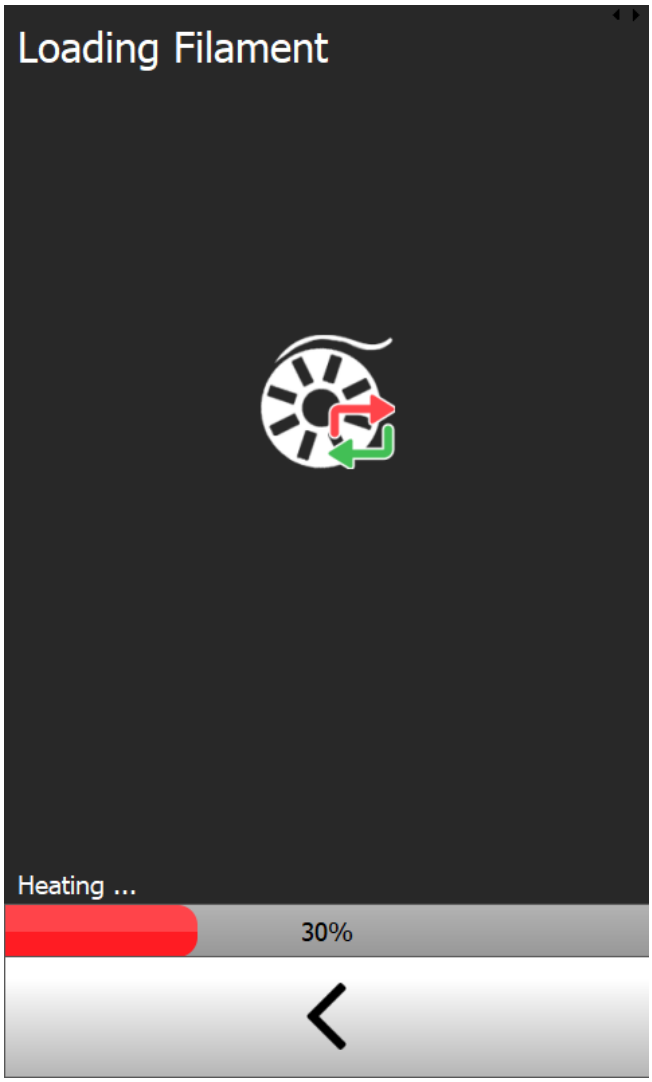


Figure 9.8: Change filament Heating process

When you press the load icon the printer should start heating the extruder to facilitate the loading of the filament and the window should look like the image shown above as per fig 9.8.
Once the extruder is heated according to the type of filament required, another window should appear which looks like the image shown in fig 9.9.

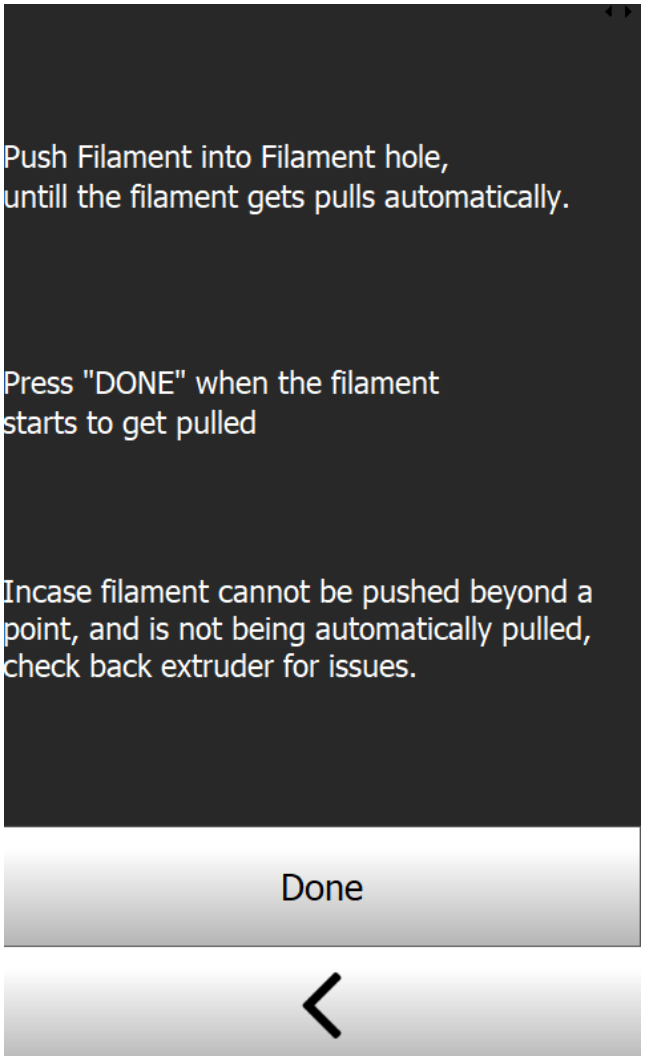


Figure 9.9: Change Filament Heating Process

In this window, Insert the filament into the channel present in the filament chamber. The left side channel is for EXT0 and the right side channel is for EXT1. Keep pushing into the channel and the PTFE till it reaches the back side extruder motor and gets pulled by it automatically, since the motor keeps rotating continuously. If the filament does not get pulled despite pushing to its limit, do check the back extruder to check if any issues persists such as, getting stuck in the PTFE or getting stuck in the motor arm.
After the Filament gets pulled successfully, press “DONE” on the screen. The filament gets pulled with a faster federate.

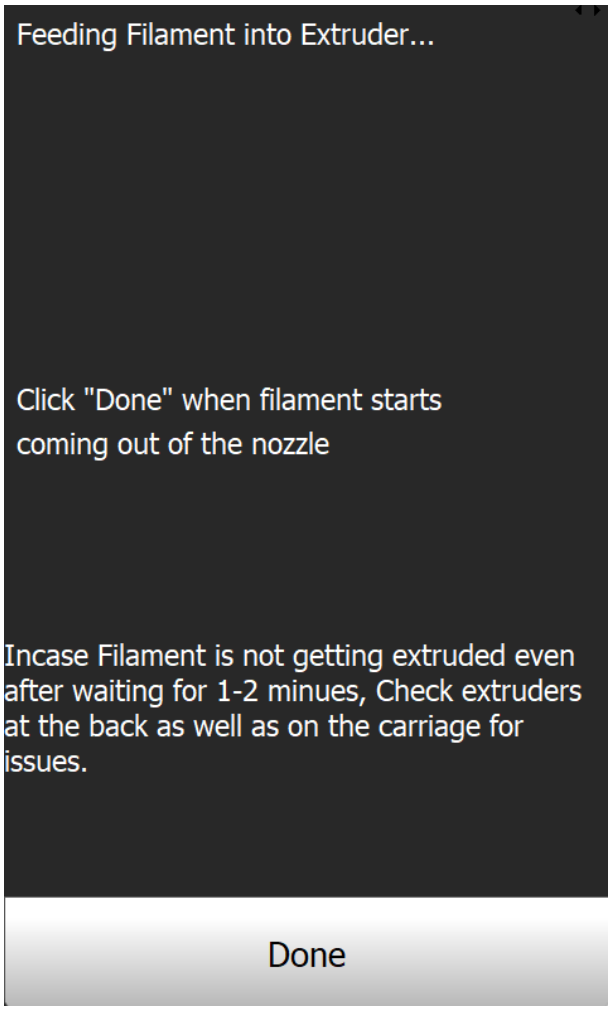


Figure 9.10: Change Filament Heating Process #2

When the filament gets pulled with a faster federate, and when the filament starts coming out of the nozzle, click on “DONE”. In cases when the filament does not come out of the nozzle waiting for approximately 1 – 2 minutes, do check the extruders at the back and as well as the carriage extruders if any issues persists.

9.2 Levelling the bed

Importance of bed levelling

Volterra has gone through the process of bed levelling at Fracktal Works. However, there is a chance that the alignment is disturbed during the transportation and unboxing process.
If the extruder nozzle is too far from the build platform, or if all parts of the build plate are not at the same distance from the nozzle while printing, then the build will not attach properly on the build surface. If the extruder nozzle is too close to the build platform, then the filament might be prevented from being extruded and it could also lead to scratches on the build plate.

Levelling the build plate ensures that the objects you print adhere well to the build plate, to give you a hassle free and smooth experience.

The Process of Levelling and Testing your first print

***Note**: Make sure there is no plastic sticking out of the nozzle. It is recommended to heat the nozzle and remove any excess plastic using supplied tweezers before continuing.*

To initiate Bed Levelling, on the home screen, click on  icon to open the main menu.

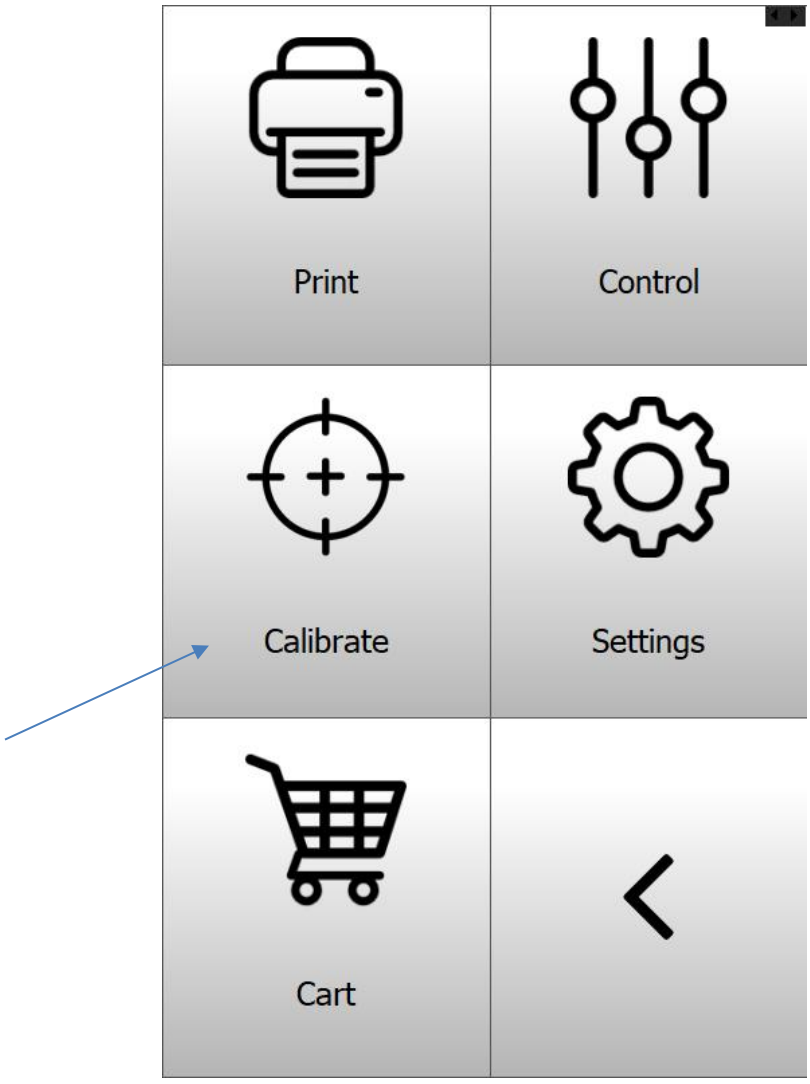


Figure 9.10: Main Menu

From there select the menu icon, after clicking on the menu icon, a new screen should come up which looks like the image shown above. From the menu select the **Calibrate** icon and that will take you to the calibration panel. The calibration panel should look like in Fig 9.11.

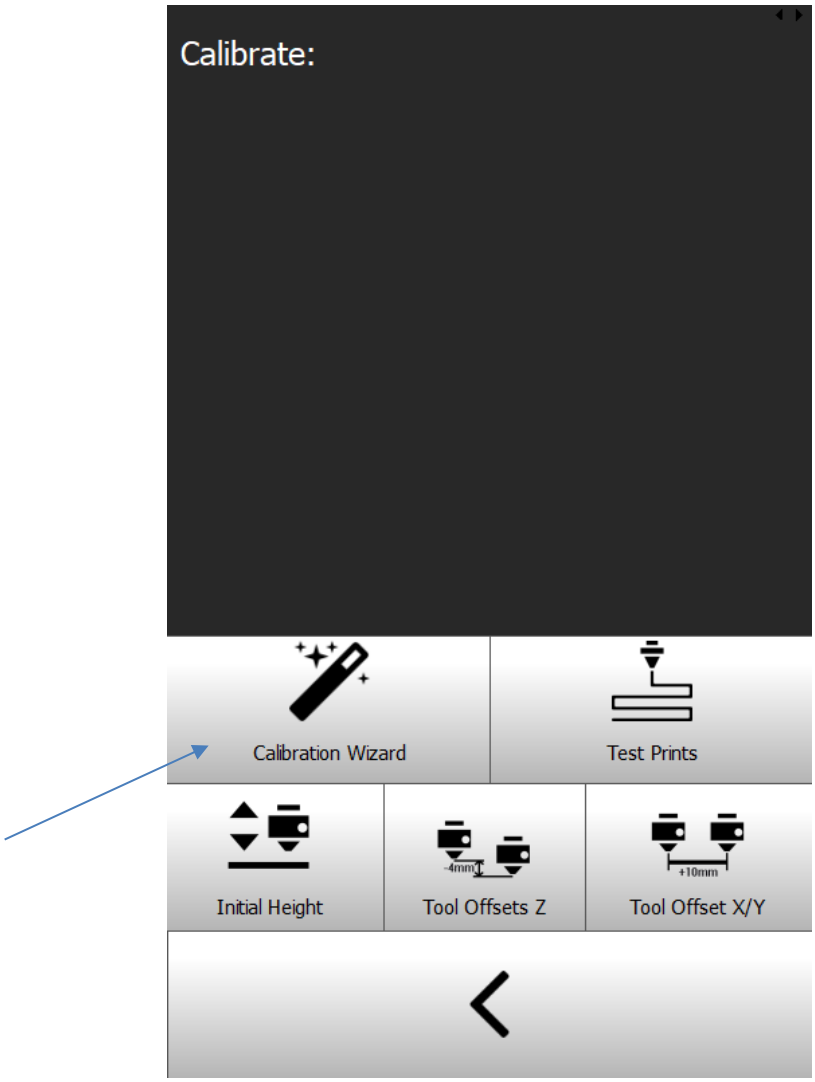


Figure 9.11: Main Menu

From that screen select the **Calibration Wizard** option and follow the on screen instructions that follow up
and you will have a perfectly leveled bed for your printer.

DOWNLOADING AND INSTALLING

10 Downloading and Installing

The preferred software for your Volterra printer is Fracktory 3 from Fracktal Works. This software package converts your 3D model(STL file) into instructions(G-code file) that your Volterra requires to produce an object.

- The Fracktory software package can be downloaded from **fracktal.in**
- Download the latest version of Fracktory for your operating system.
- *Note: You will require a 64 bit system to run Fracktory.*
- Open the installer and follow the directions to install the software.
- After installing Fracktory, open the application to configure the software to your 3D printer.

10.1 Adjusting the model

There are various ways to manipulate the object before printing like rotation, scaling and mirroring along axis.

10.1.1 Rotate

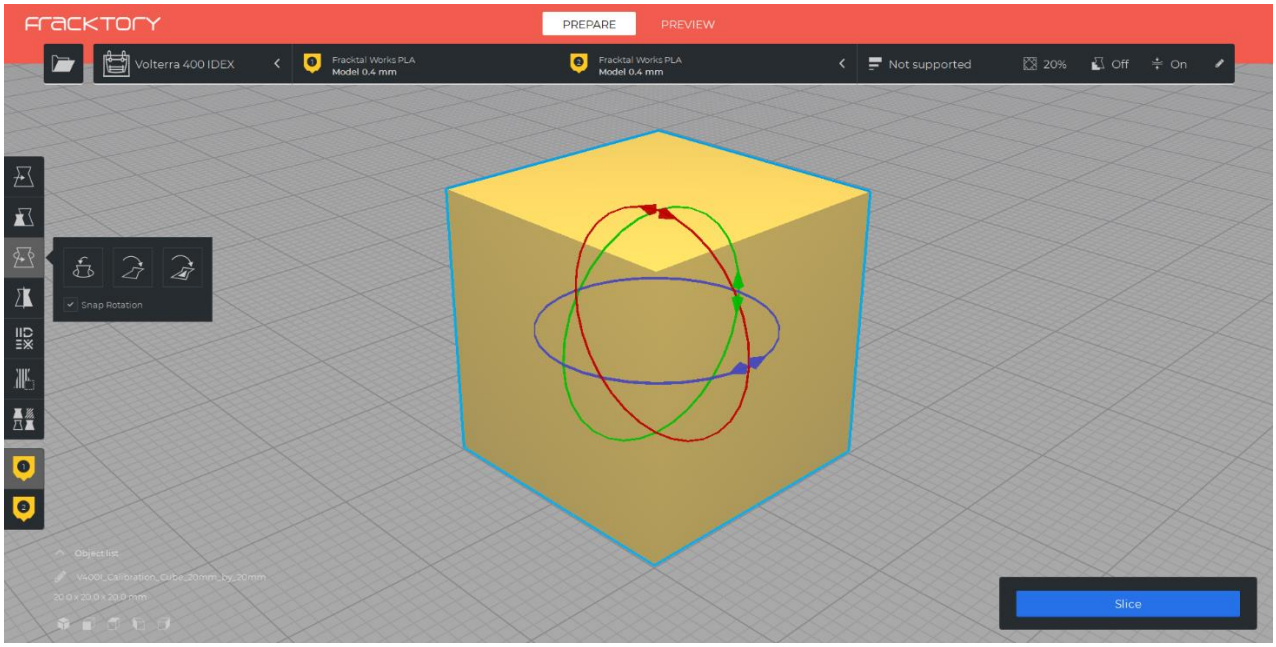


Figure 10.1: Fracktory rotate option

The icon on the left side shows the rotate button; it allows you to rotate the model in the X, Y or Z axes. By selecting one of the axes and on moving your mouse, you can rotate the object with an angleof 15 degrees.

You can also rotate the object with an angle of 1 degree by holding the “Shift” Key.
Once the rotate button has been selected a few more options will pop up just above the rotate button. The “Reset” button offers the possibility to resets the model to its original position. By using the “Lay flat” option your model will be placed flat on the surface of the build plate. This can become handy when your model doesn’t have a completely flat surface or when it doesn’t load correctly in Fracktory. The model will be placed on the face closest to the build plate.

10.1.2 Scale

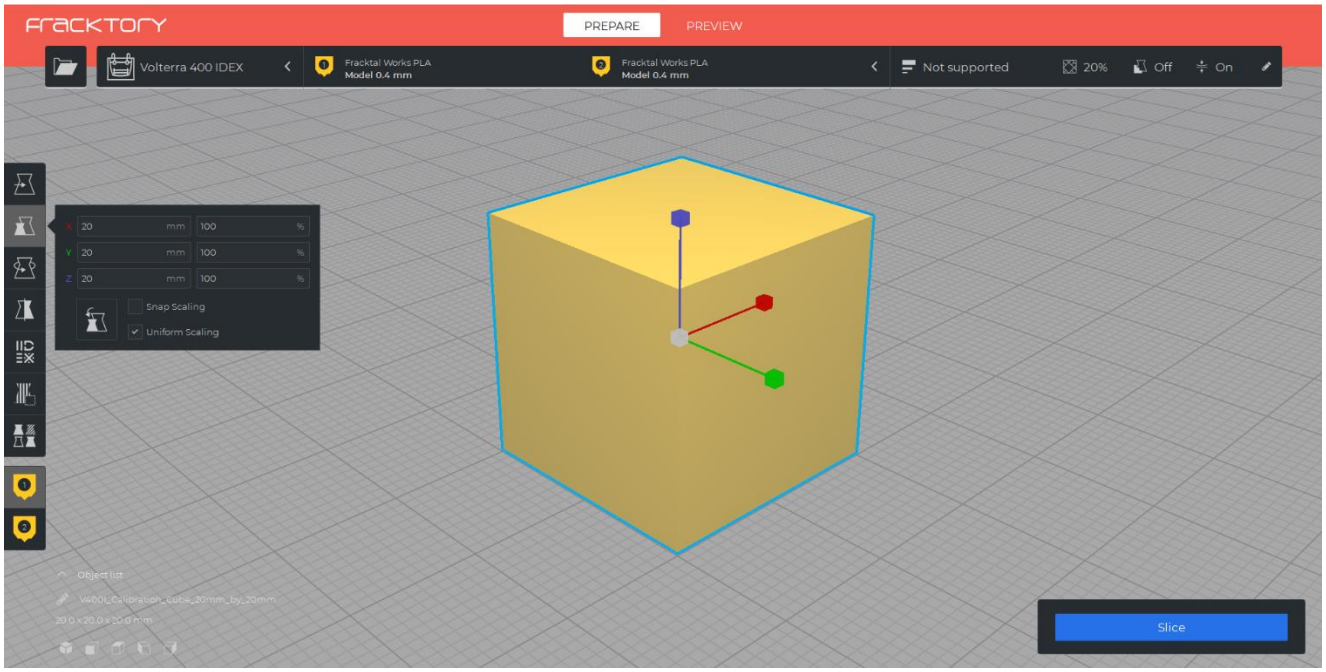


Figure 10.2: Fracktory scale option

The middle icon is the Scale button. This option can be used to change the dimensions of the model in X, Y and Z direction. Scaling can be done by clicking and dragging the (square) scaling icons that appear on the model, or by changing the numeric values that appear in the box just above the "Scale" button. You can either use a scale factor to change the dimensions or enter the exact size. A model will be scaled in all directions, simultaneously by default, but you can unmark “Uniform scale” in order to scale in each direction independently. Furthermore a “Reset” and “Scale to max” button will be shown above the Scale button. The Reset button allows you to reset the model to its original dimensions. By using the Scale to max option, the model will be scaled to the maximum size that fits in the machine.

10.1.3 Mirror

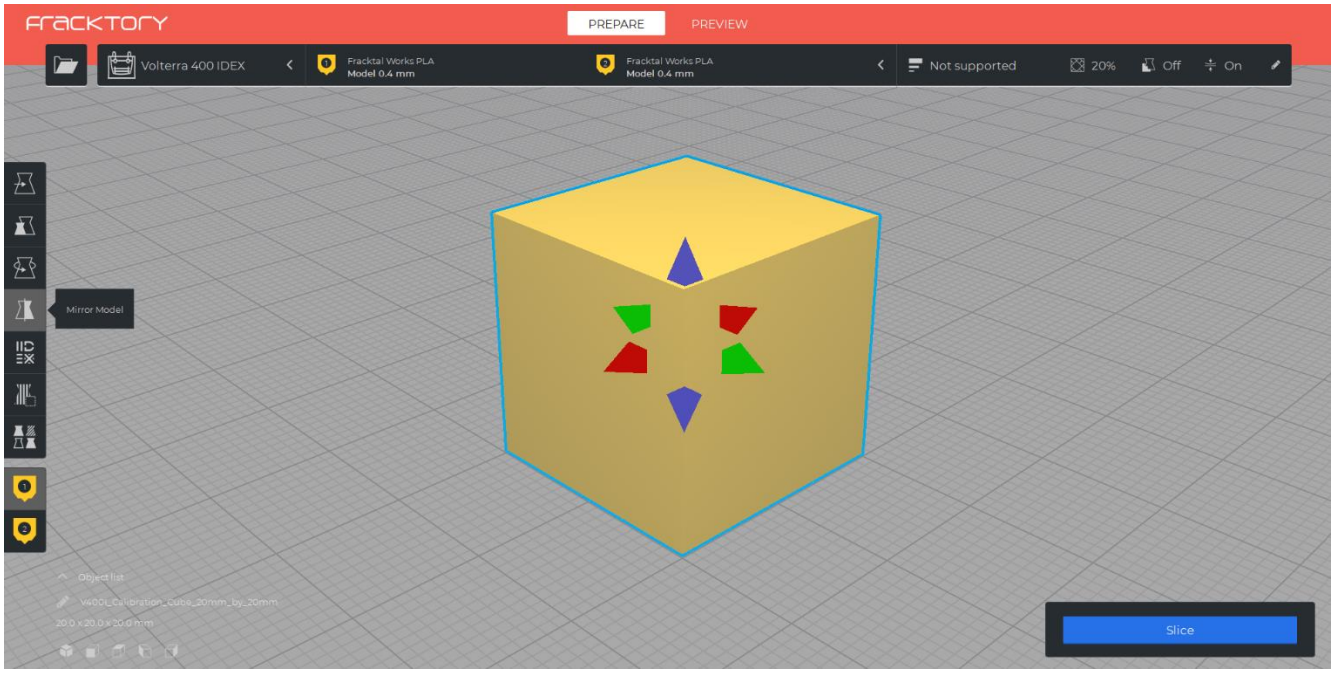


Figure 10.3: Fracktory mirror option

The right most icon at the bottom is the "Mirror" button. This can be used to flip the model in either the X, Y or Z direction.

PRINTING

11 Printing

Now that you have installed and configured Fracktory, you can print your first part. Some sample files are provided in the supplied SD card. Fracktory uses millimeters as the base unit. When adding any files please check that the units are correct by clicking on the scale button.

Click the load Button and select the required ".STL" file for printing.
Now your object will be placed in center. You can manipulate the object using move, scale, rotate etc.

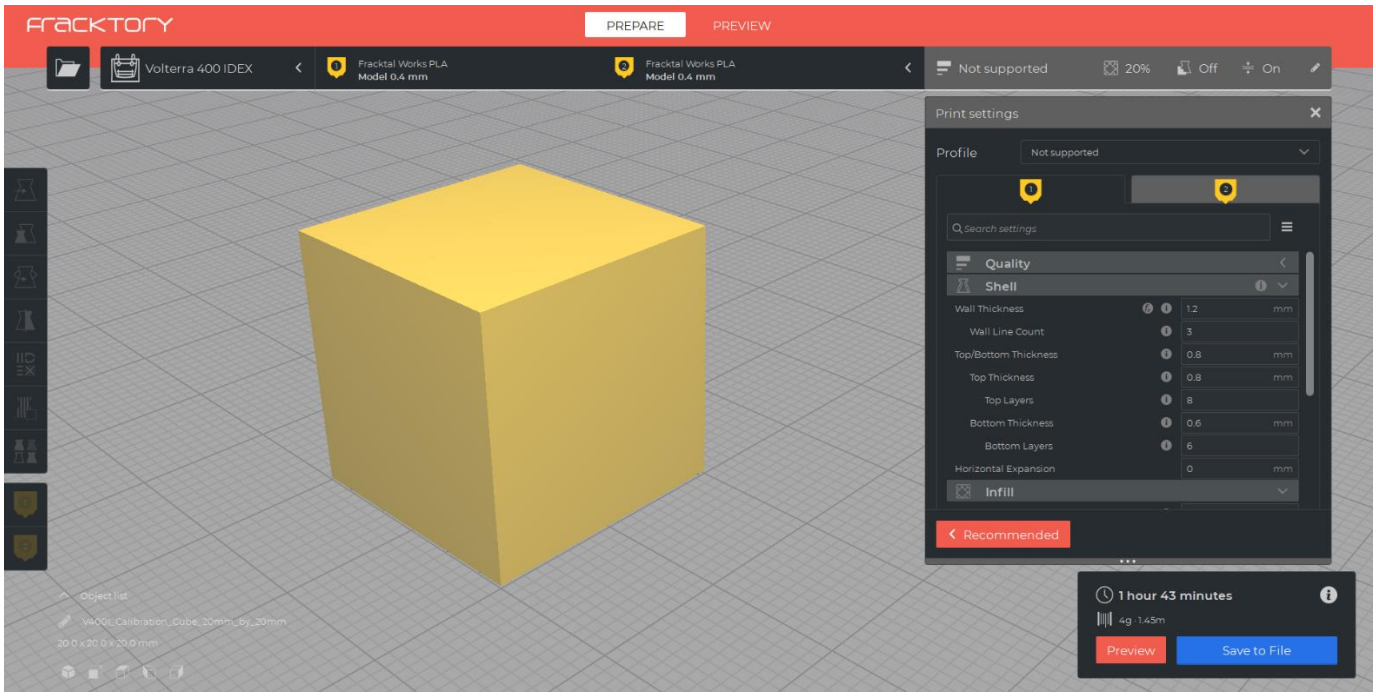
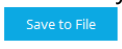


Figure 11.1: Fracktory loaded with STL for printing

Whenever you load a model, adjust a model or change settings, Fracktory starts processing the file on-the-fly.



You can see its progress below save G-code button. G-code is the processed file requiredby the machine to print your 3D object. When the file is processed you click the save G-code button. If you have inserted a SD card then the button turns into a SD card button. This will load the G-code directly into the SD card. Beware that it will overwrite the previous file of same name without warning.
When G-code file is generated it is saved on your system and can be used to print using Wi-Fi or USB mass storage device

If Printing from Wi-Fi then follow the below steps

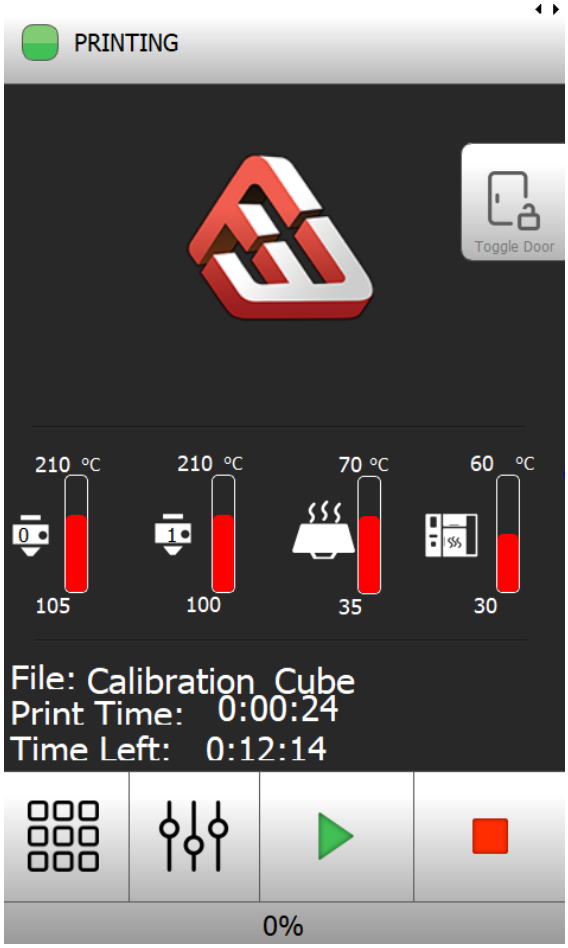


Figure 11.2: printing

When running the printer for the first time select the menu bar from the main screen. Open and select the settings icon in it.

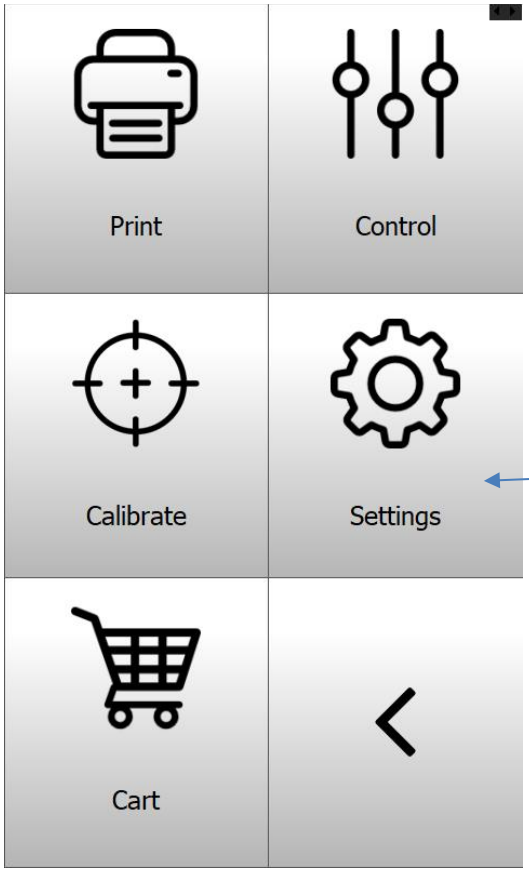


Figure 11.3: Menu UI in printer

When you select the settings icon, this window should open
Then click on Configure Wi-Fi icon (in Figure 11.3)

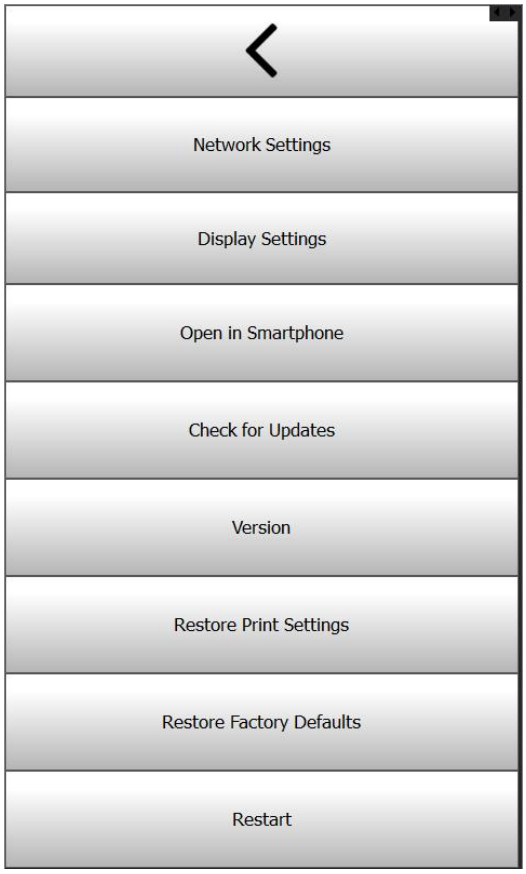


Figure 11.4: Setting UI in printer

When you click on configure Wi-Fi option, a new window should pop up which should look like the above Figure 11.4.

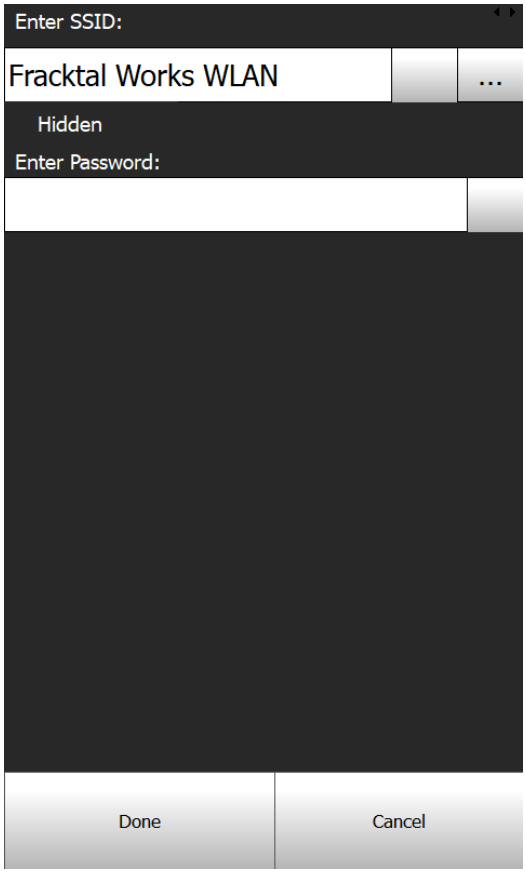


Figure 11.5: Wi-Fi setting UI in the printer

Choose your SSID Wi-Fi access point name and then click on the space provided to enter the password using the onscreen keyboard. This will take you back to the previous window.

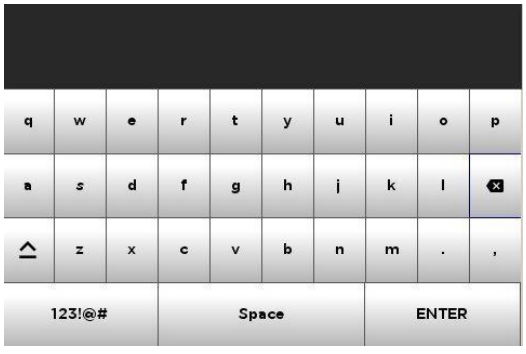


Figure 11.6: Keyboard to type the password for SSID

Now the configure window should look something like this

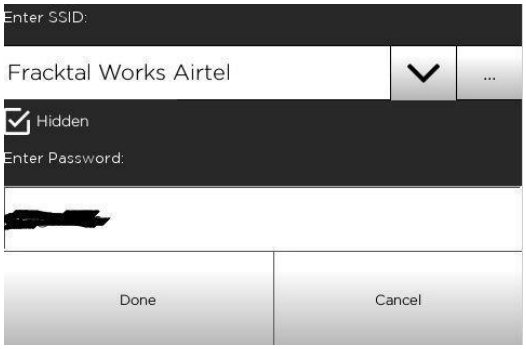


Figure 11.7: Wi-Fi configuration on typing the password

Press done if the SSID and password are correct. You will be brought back to the settings menu once you are connected and then next step is to click on the network info icon in the settings menu

Figure 11.8: Network Info button in settings

This should take you to a new page that has your Printer's IP address and the window should look like the image below.
Note down your printer's IP, it changes whenever you connect to a new network so make sure to visit network info to know your printer's IP address. Now let's focus on the system which has your G-code file generated from Fracktory.

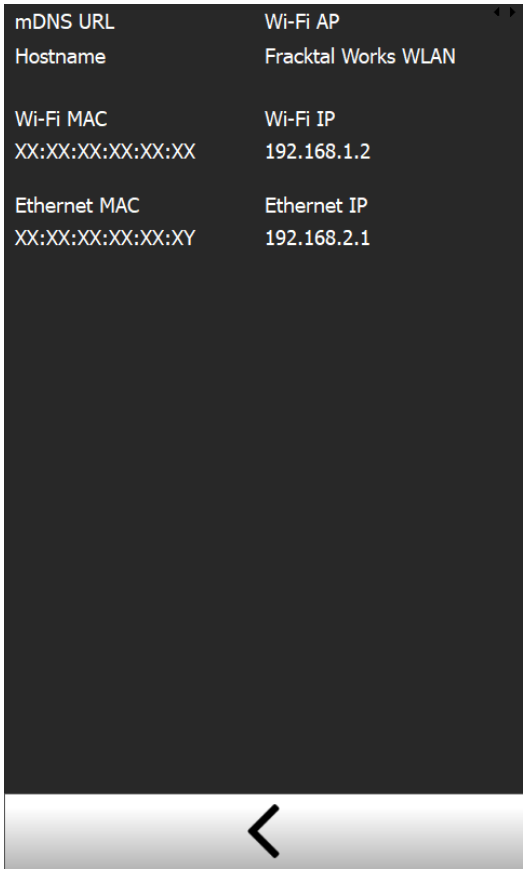


Figure 11.9: Network Info

NOTE: The printer and the computer are connected to same network in order to access the printer through the computer.
Then open your systems browser and enter your printer's IP address which you had noted in the previous step.

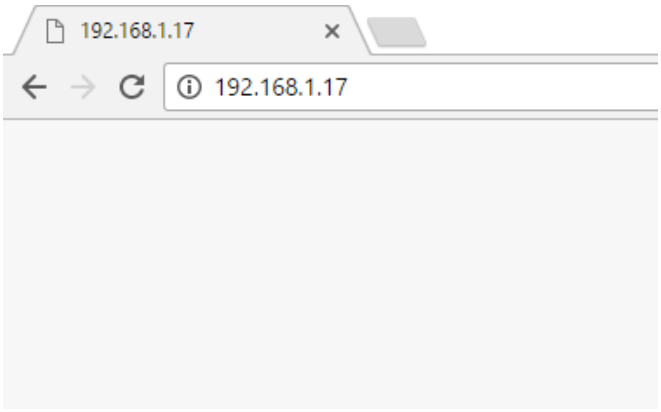


Figure 11.10: Web Browser with IP of the printer

After you enter, a new web interface should open similar to the image shown

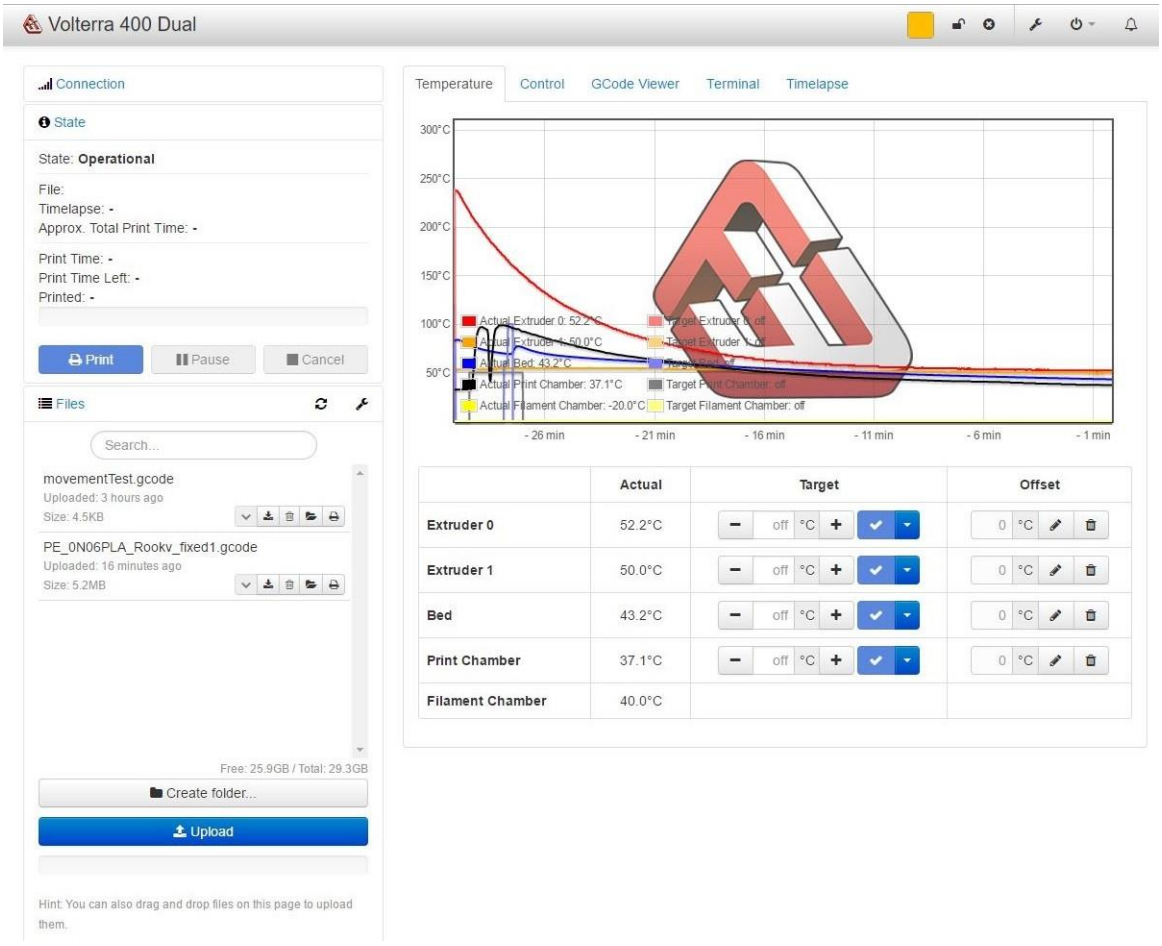


Figure 11.11: Web Interface

To upload the G-code press the upload on the left corner of your screen.

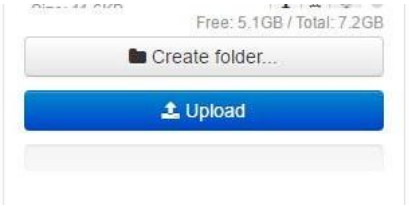


Figure 11.12: Upload icon on Web Interface

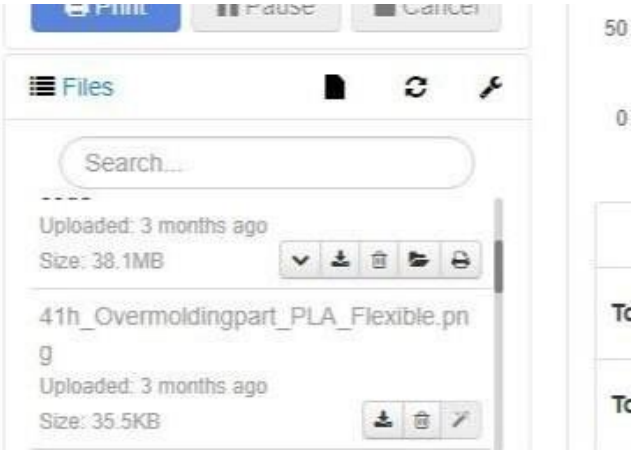


Figure 11.13: Load section on Web Interface

After clicking upload you have to locate and select the G-code file on your system and upload. After your file is uploaded you can see it in the uploaded files menu.

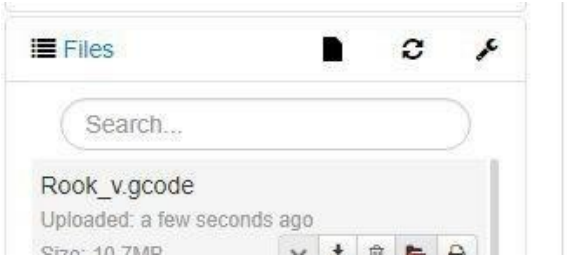


Figure 11.14: Load section on Web Interface

After that press the load icon below the uploaded file. The icon looks like a folder.
Once the file is loaded to the printer via Wi-Fi, it will be shown in the status menu of the printer which is present on the top right corner of the screen. The Connection icon shows that the

connection is established between printer and system. Now you can hit the print button and start your print directly.

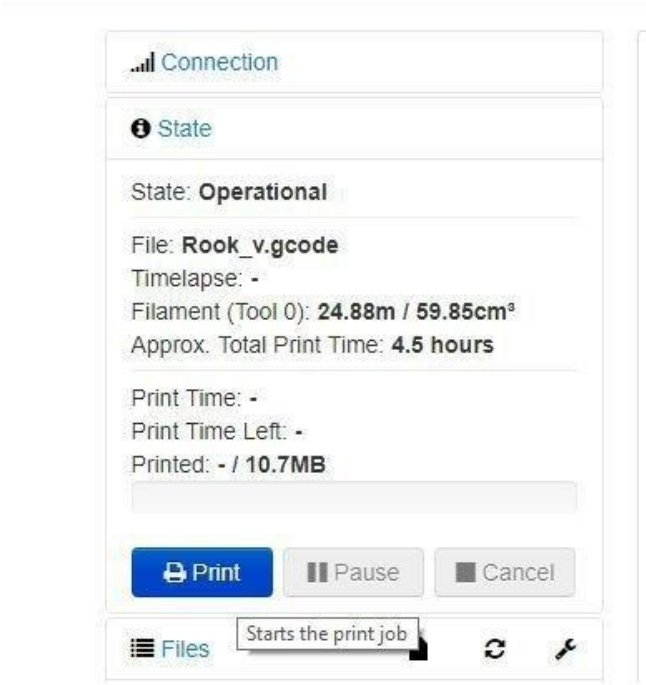


Figure 11.15: Status of the printer on Web Interface

The graphical representation in the center of the page shows all the vitals of the printer in graphical form which includes the temperature of both nozzles and bed and their target temperature.

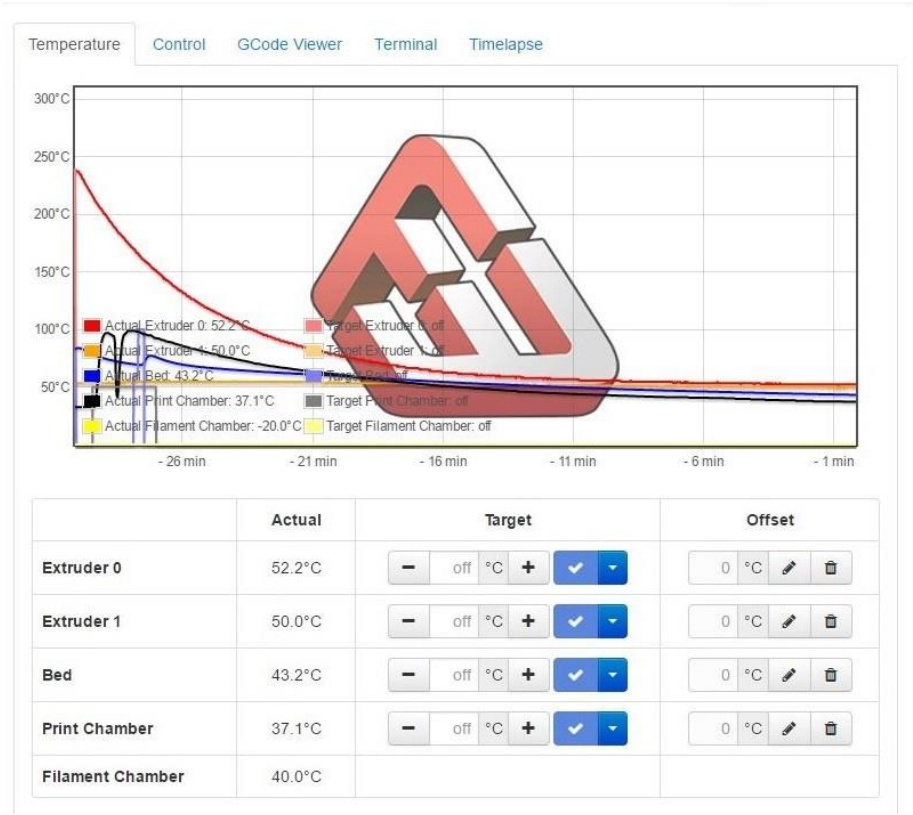


Figure 11.16: Temperature status of the printer on Web Interface

To change the Individual temperature of both the nozzles and bed you can use the option below the graph.

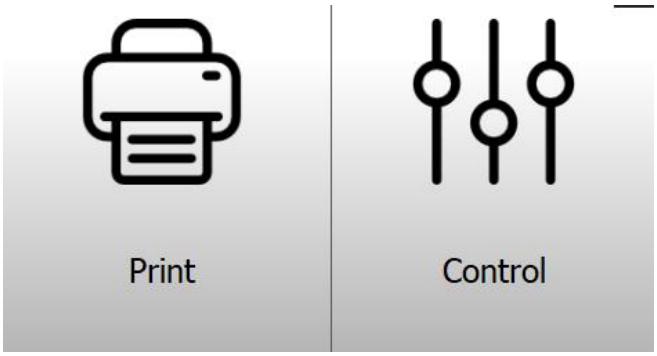


Figure 11.17: Standalone print menu on printer

After you have uploaded the file, if you have have not given the print command from the web interface already, then you can also give the print command on the machine itself by clicking on the menu icon on the main screen of the printer and clicking on the print icon in the menu.

Then it will ask you to select whether you want to print from the internal memory of the printer or from an USB mass storage device connected to the printer.

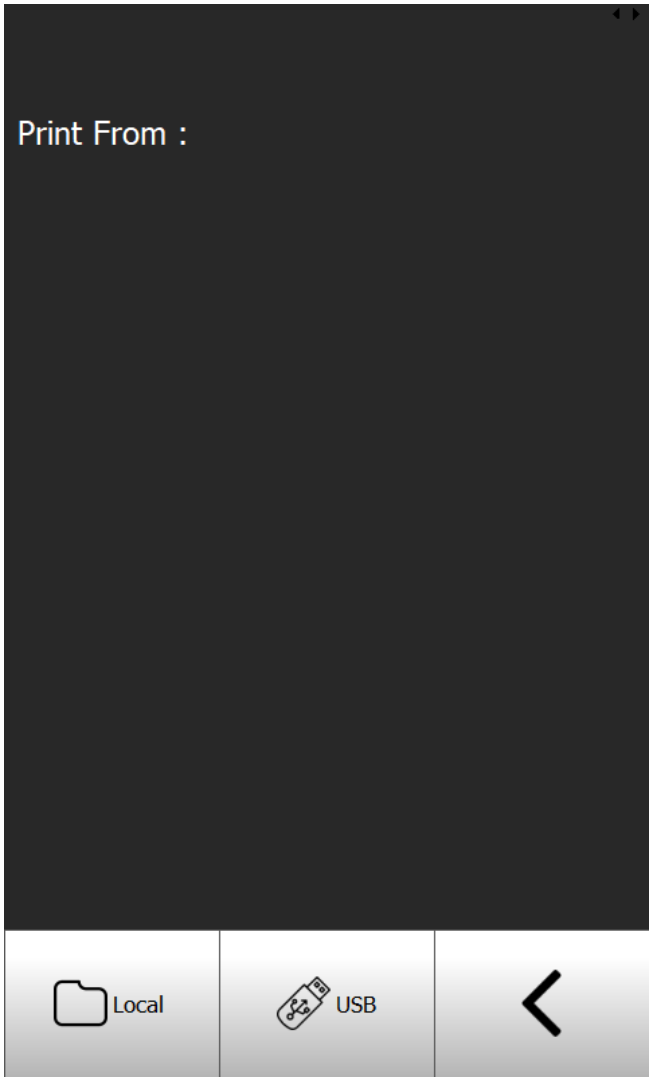


Figure 11.18: Standalone printing on printer

First let's see printing from internal memory of the printer.

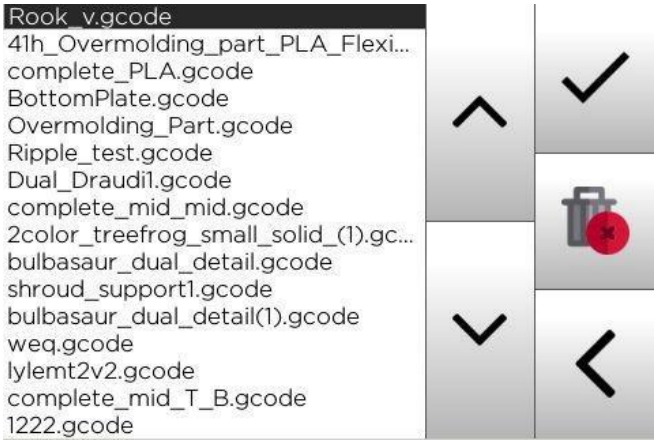


Figure 11.19: G-code on printer

Selecting the local icon will take you to the G-code files stored in the internal memory, you need to select the file you just uploaded from the web interface and click on the tick which will take you to the confirmation screen.
Click on the tick icon to confirm after which the print starts.

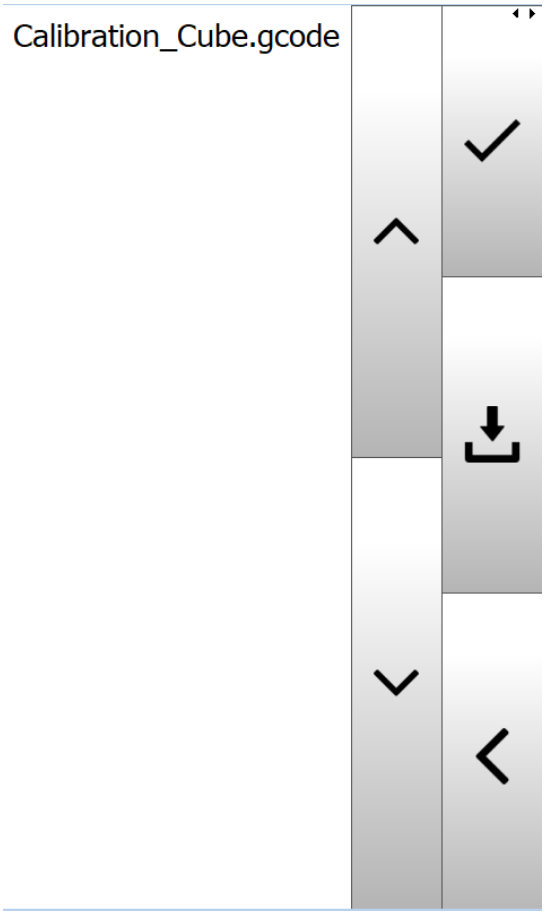


Figure 11.20: G-code on USB

Now let's see how to print using USB mass storage device
Copy the G-code file in your mass storage device and plug the pen drive to the printer and instead of selecting local, select USB which will take you to the file explorer where you can see all G-code files present in your mass storage device. Select the G-code and transfer the file to the local memory and then issue the print.

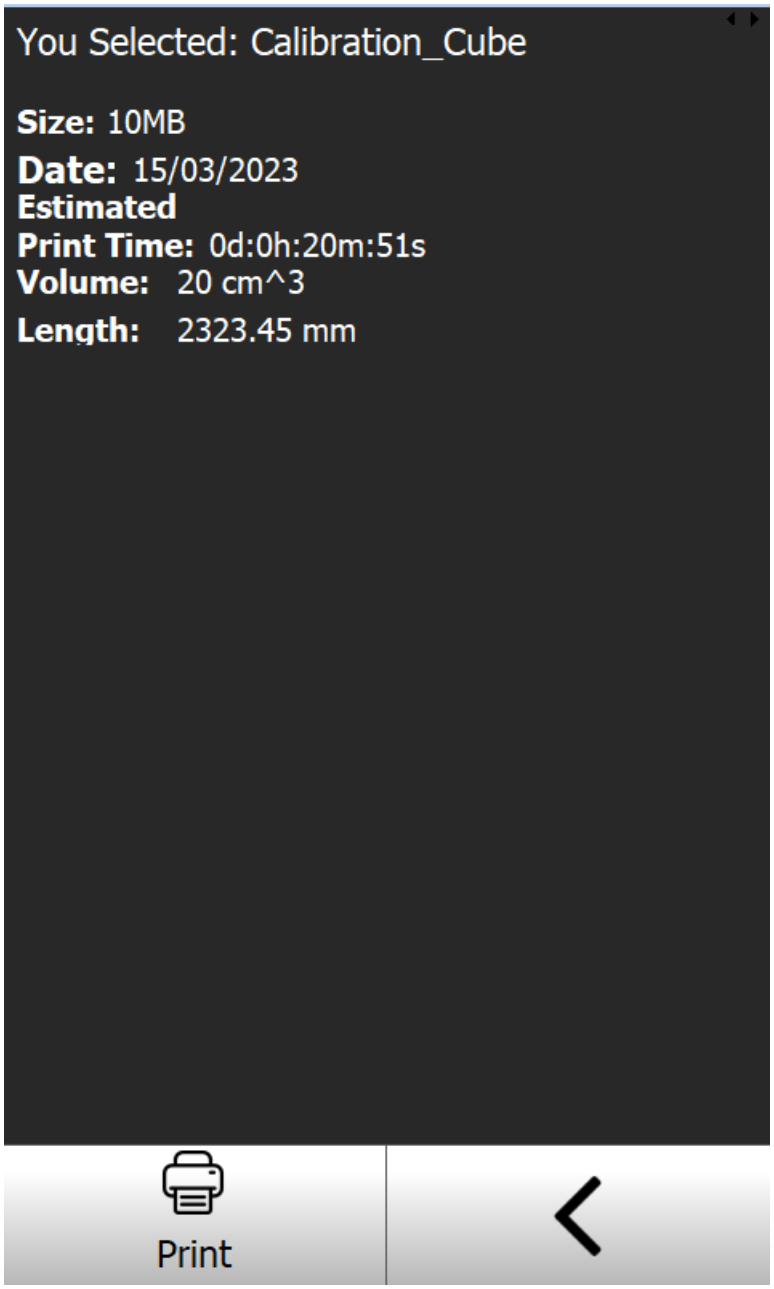


Figure 11.21: Print confirmation screen

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