

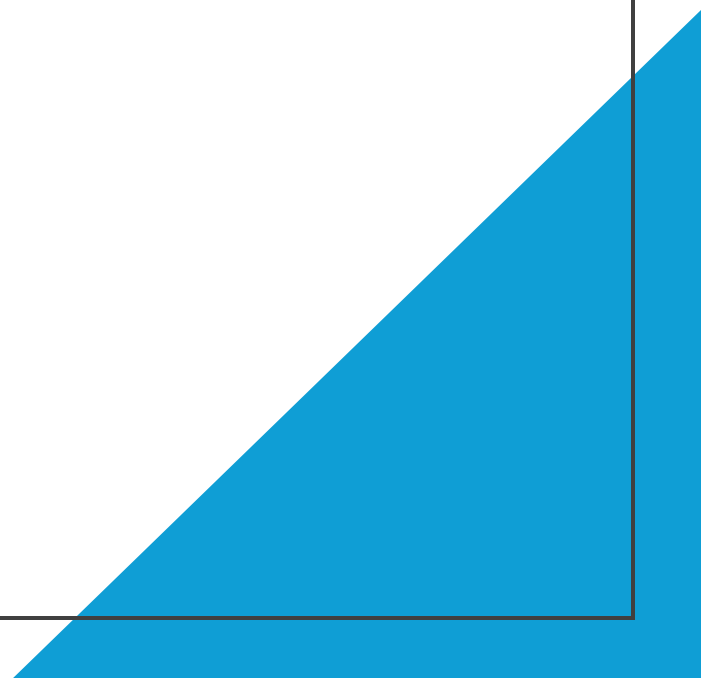
3D Printing

Bambu Lab P2S



Module 1

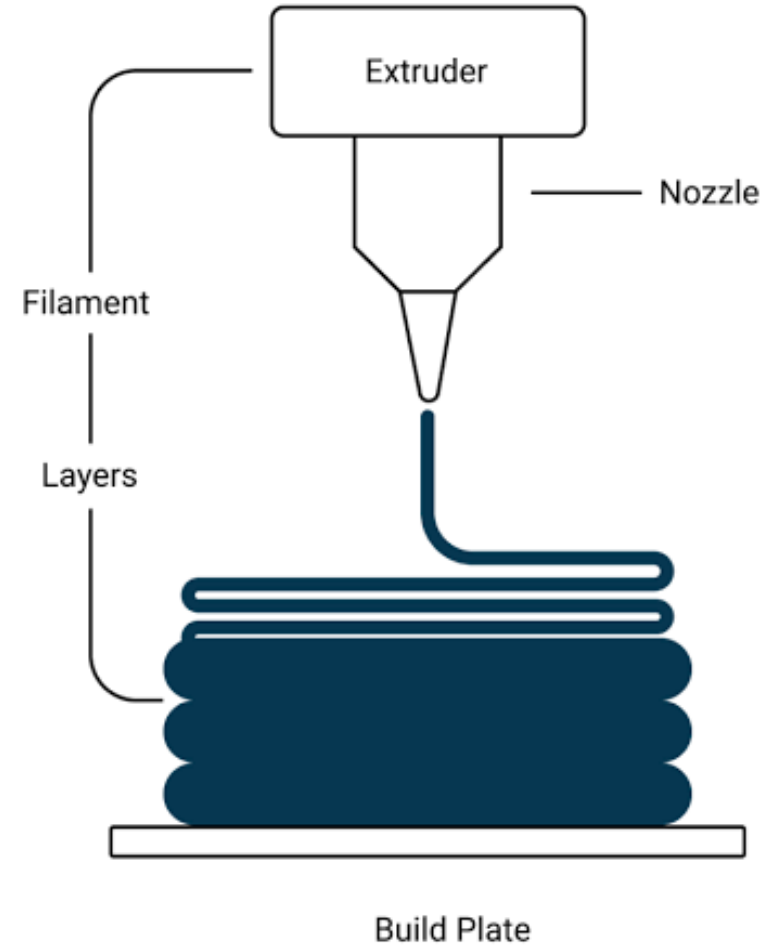
Introduction to 3D printing



What is 3D Printing?

3D printing (also known as additive manufacturing) is a process that creates objects one layer at a time until the object is fully formed.

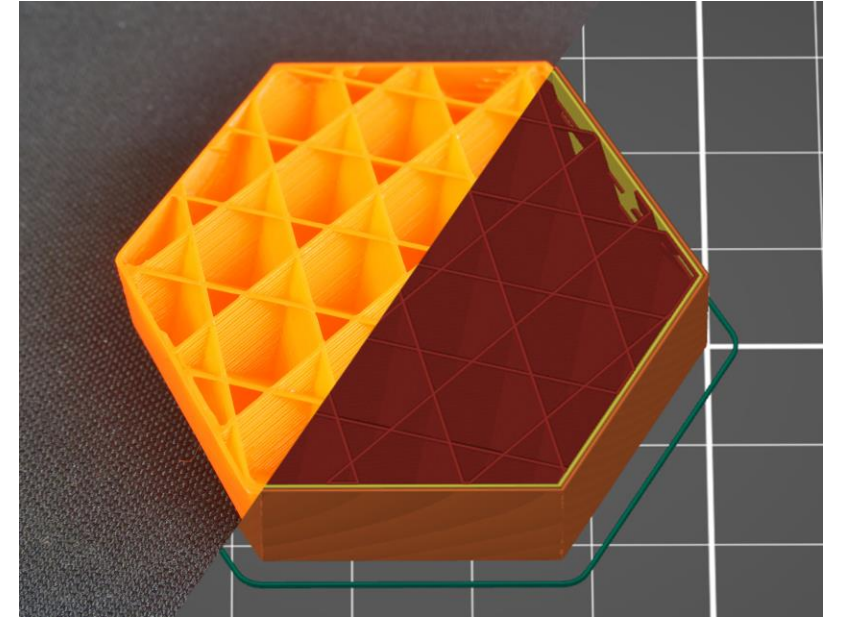
The 3D printer heats up the filament and extrudes it through a nozzle head. This is done layer by layer from the bottom up until the object is complete.



Infill

The inside of a 3D printed object is called infill. It can be adjusted in terms of density: 0% is hollow, while 100% is solid. Hollow 3D printing is commonly used to reduce material usage and to shorten printing time. The infill structure can determine strength, weight, and durability (see pictures).

[Read more](#) about different infill patterns and their unique features.



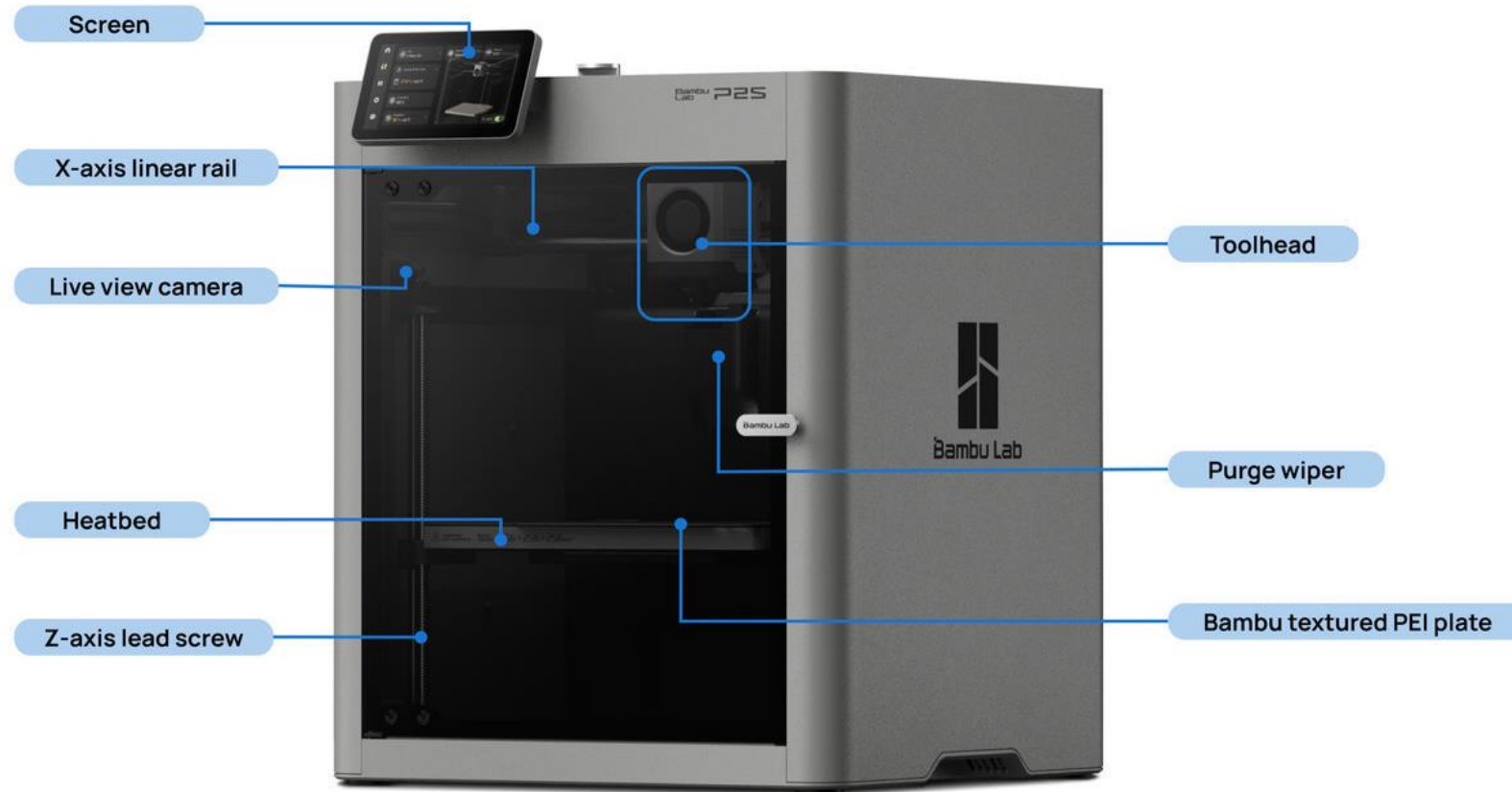
Bambu Lab P2S

Whitby Public Library uses the Bambu P2S 3D printers and polylactic acid (PLA) filament.

- PLA is a corn-based biodegradable plastic that is safe to use indoors (PLA is not food safe).
- The filament comes in a wide range of colours.
- Along with the printer, filament is what creates solid, three-dimensional objects.



Parts of the P2S



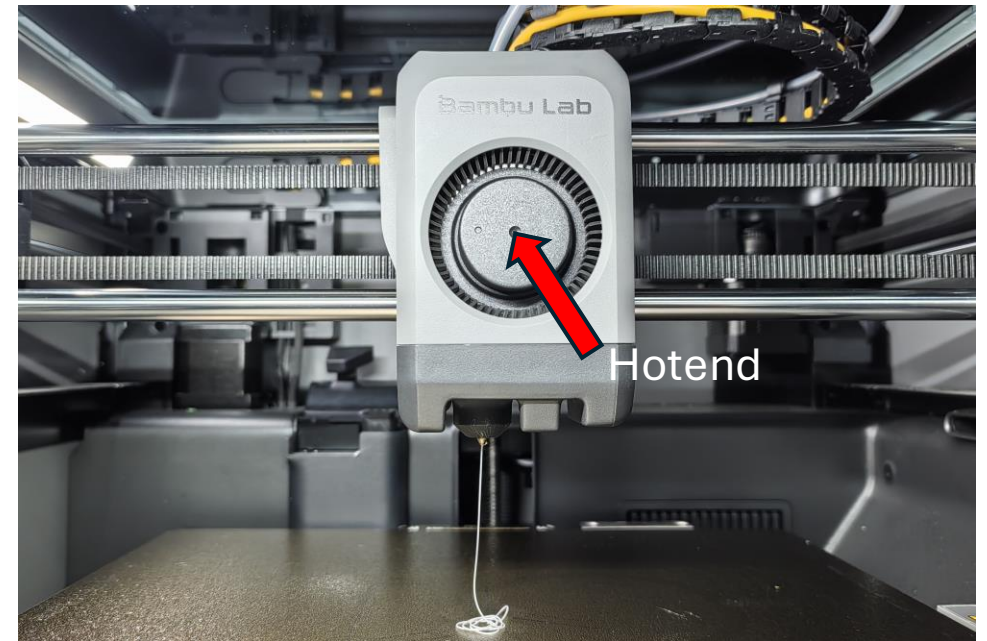
The only parts you will be interacting with in this diagram are the Screen and the textured PEI plate.

The Extruder and Nozzle Head (Hotend)

Filament is loaded into the printer and passes through a tube into the tool head.

Once it reaches the nozzle, it heats up and is extruded from the hotend.

Do not touch the hotend or any parts located near the bottom of the extruder. This part of the 3D printer reaches extremely high temperatures and **will cause burns**.

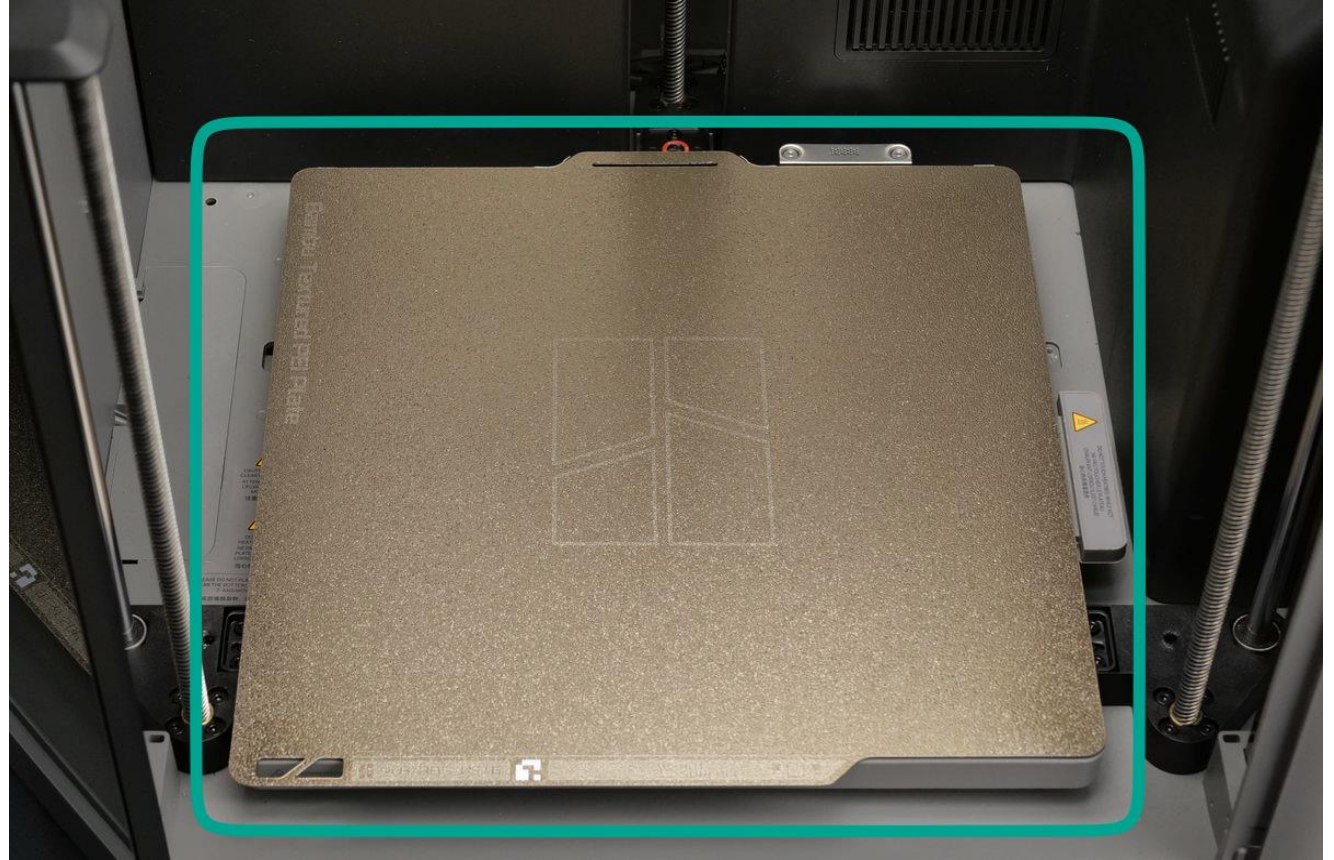


The Heatbed and Build Plate

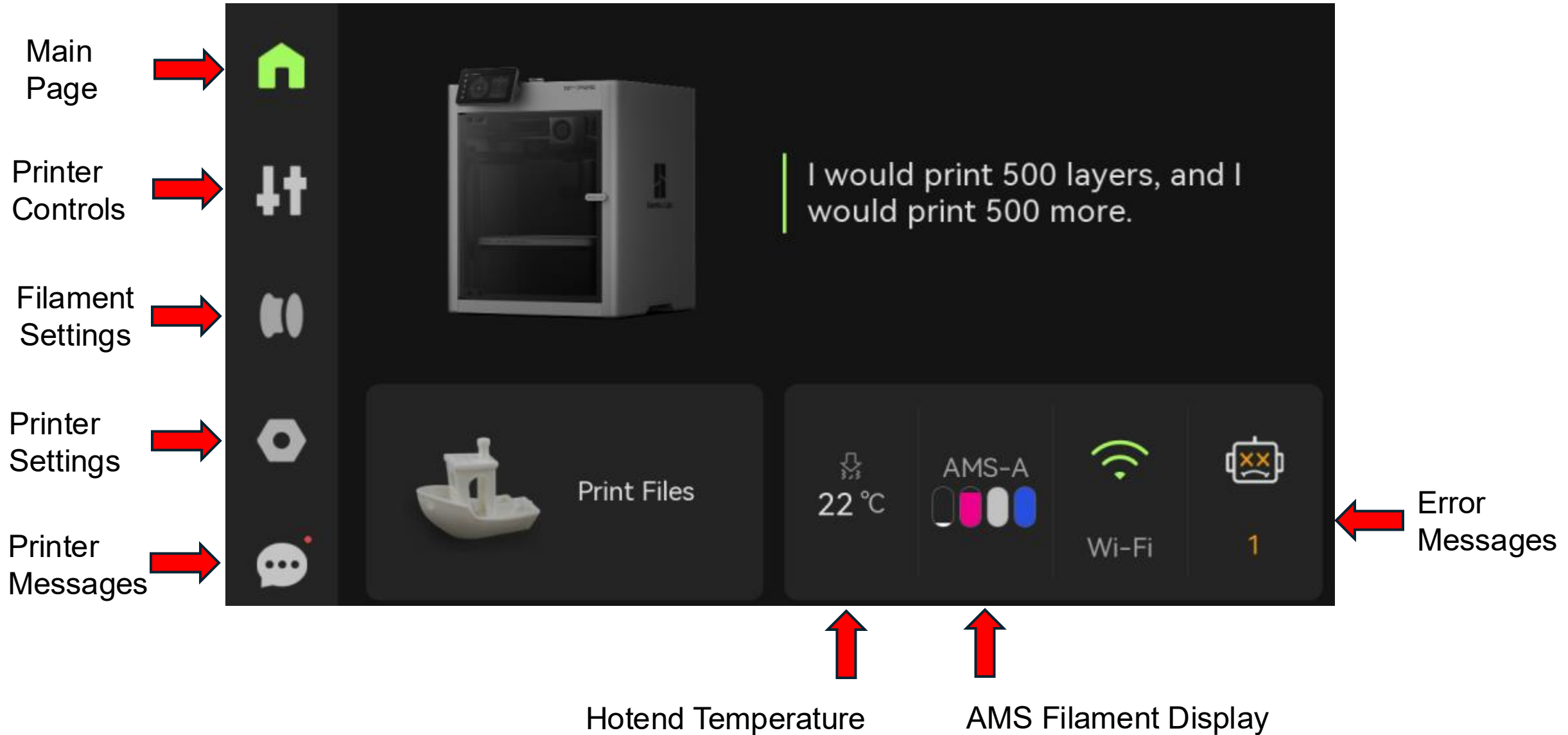
The P2S has a textured PEI plate that is attached magnetically to the heatbed.

All objects are printed onto this surface. The flexible build plate helps the prints adhere and allows for easier print removal.

Do not touch the heatbed or the build plate until after the 3D printer has indicated the print is complete.



Navigating the Touch Screen



The AMS 2 Pro (Automatic Material System)

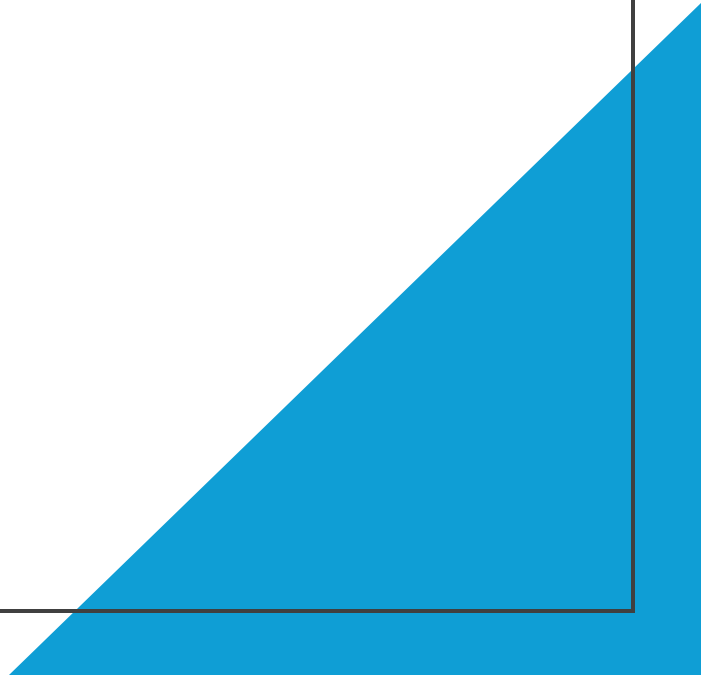
The AMS 2 Pro is the attachment that sits directly on top of the P2S 3D printer. It is an enclosure that can hold up to four spools of filament.

- **Automatic filament swapping:** Once loaded, it can automatically retract and feed different filaments.
- **RFID:** The printer can read the RFID tags on official Bambu Lab filament and automatically load the filament info.
- **Humidity Detection:** The system is airtight and helps maintain a low-moisture environment, which is important for filament integrity.



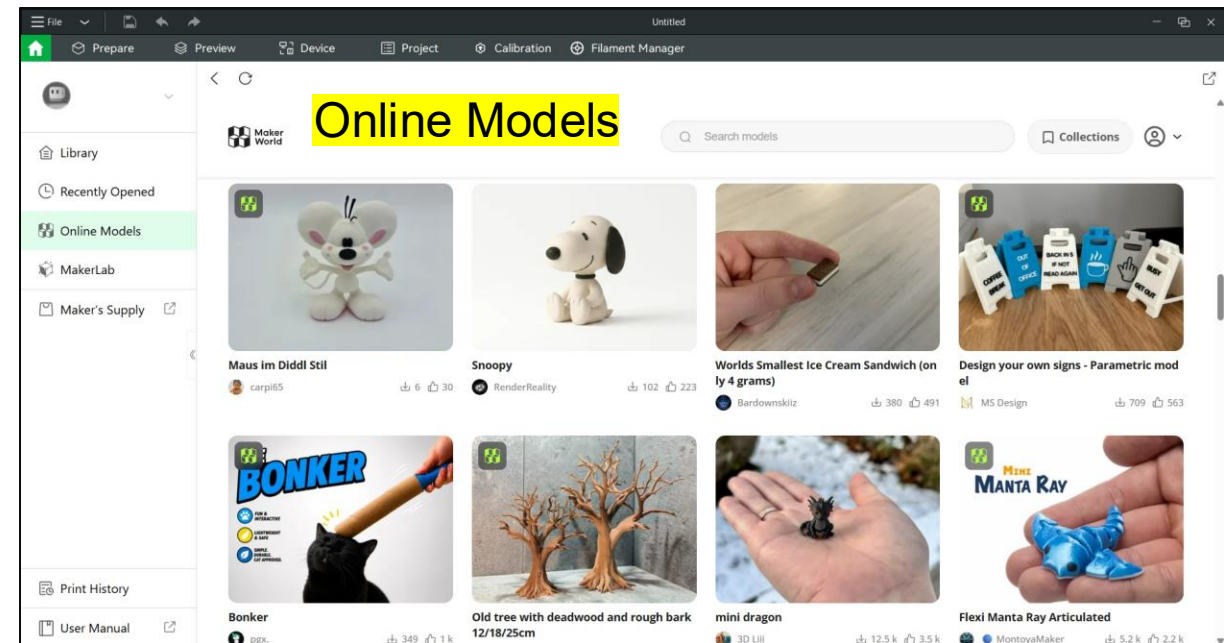
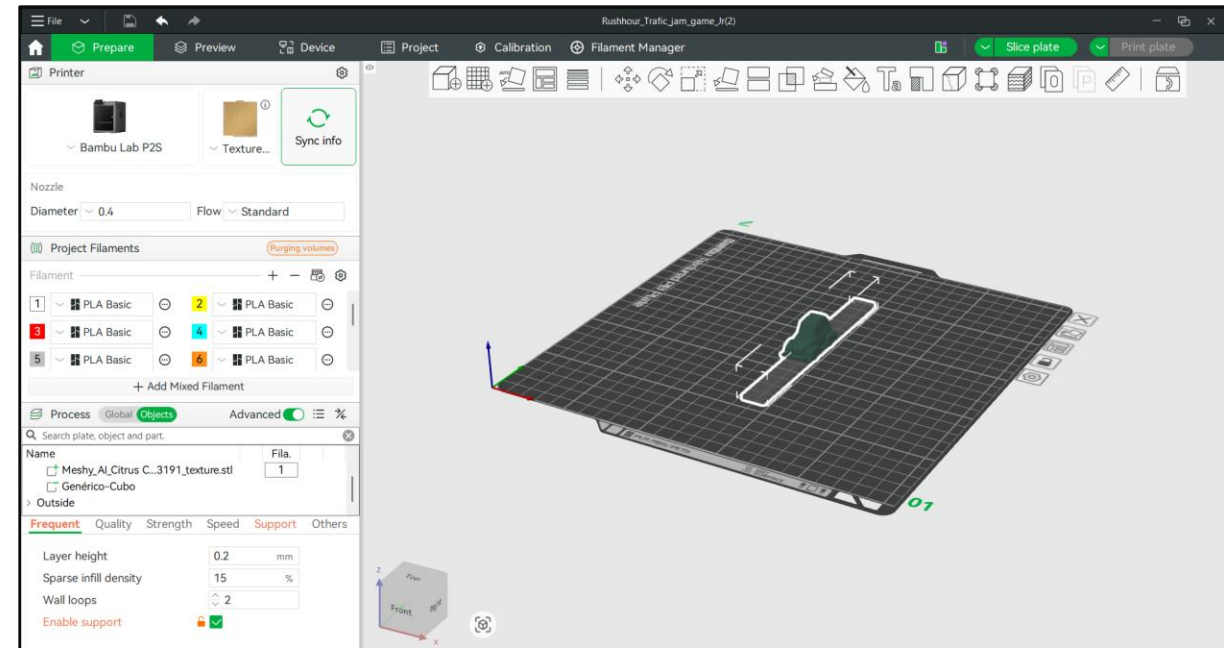
Module 2

3D printing software – Bambu Studio



Bambu Studio

- [The software](#) gives you the ability to adjust your project and then slice the file to .gcode.
- The "**Online Models**" section within Bambu Studio gives you access to a wide range of free prints to choose from [Makerworld](#).
- [Tinkercad](#) is a free web-based app where you can create your own models.
- There are also other free websites that offer ready-to-print projects such as [Thingiverse](#).
- When choosing your print, please consider copyright, intellectual property rights, and municipal/provincial/federal laws.



Editing a Project in Bambu Studio

The control panel located on the top of the screen in Bambu Studio has all the buttons needed to edit your project. Below is a list of the most important to make note of:



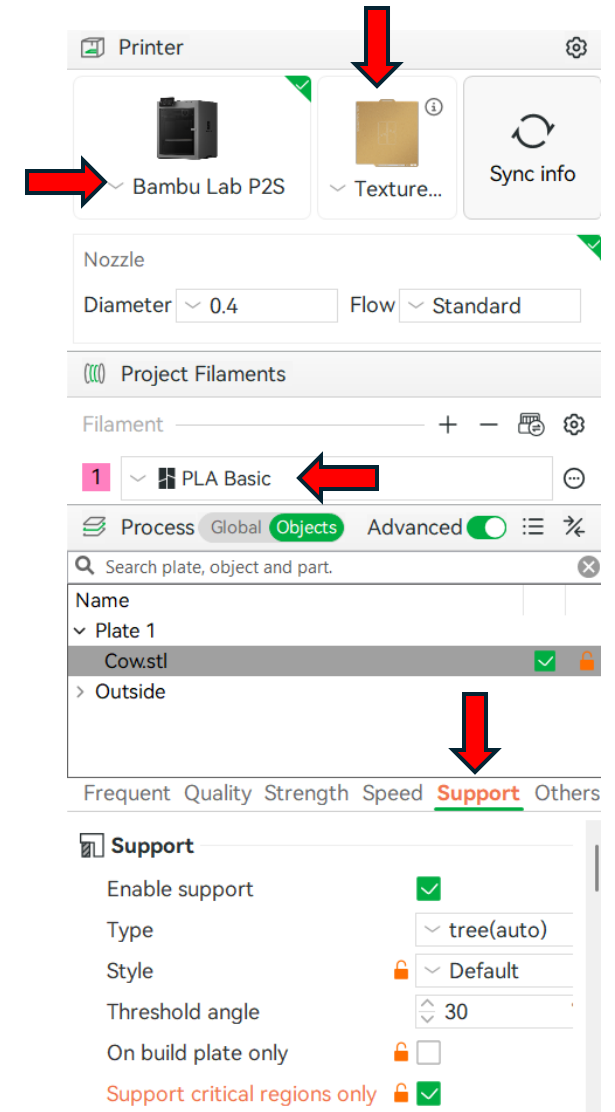
1. **"Add"** opens your file folder and allows you to add your object (.stl file) into Bambu Studio to edit.
2. **"Auto Orient"** rotates the object to optimize the printing surface and it ensures the object lays flat on the build plate.
3. **"Move"** allows you to precisely move your object on the x, y, and z axes.
4. **"Rotate"** gives you the option to turn your object on all three axes.
5. **"Scale"** increases or decreases the object's size.

*Right click on your object to access the options to **clone**, **centre**, **mirror**, or **delete** your object.

Editing a Project in Bambu Studio

The side panel is where other settings for your 3D print live.

- When editing your object, ensure you have the proper 3D printer selected (**Bambu Lab P2S**) and proper build plate selected (**Textured PEI**).
- Please select the correct filament type (**Bambu PLA Basic**).
- If you are printing an object that has any overhangs or floating parts, it is recommended to use **supports**.
 - Supports are removable scaffolding that are designed to hold up any parts of the object that may droop or collapse.
 - There are two types of supports available to choose from:
 - **Normal**: best for large or flat surfaces.
 - **Tree**: best for small or complex projects (these are easier to remove).



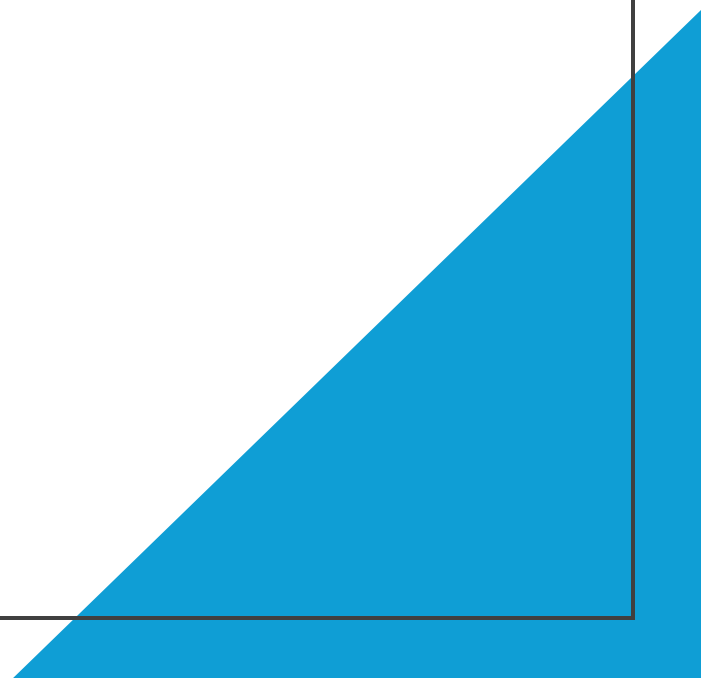
Saving Your Project

- To save your project on Bambu studio, click "**Slice Plate.**" Slicing gives you the estimated print time and price (\$0.10/gram) and converts the file into the proper format for printing (.gcode).
- Saving 3D models:
 - Visit staff at the information desk to retrieve the USB.
 - Insert the USB into the proper slot on the computer.
 - Save the file onto the USB by clicking the green arrow beside "**print plate**" and then clicking "**export plate sliced file**".
 - Once your design file has been saved onto the USB, insert it on the top of the 3D printer.
- To ensure the 3D printer can access your print:
 - Do not save your print into a file folder.
 - Keep file names under 10 characters and avoid special characters and spaces.



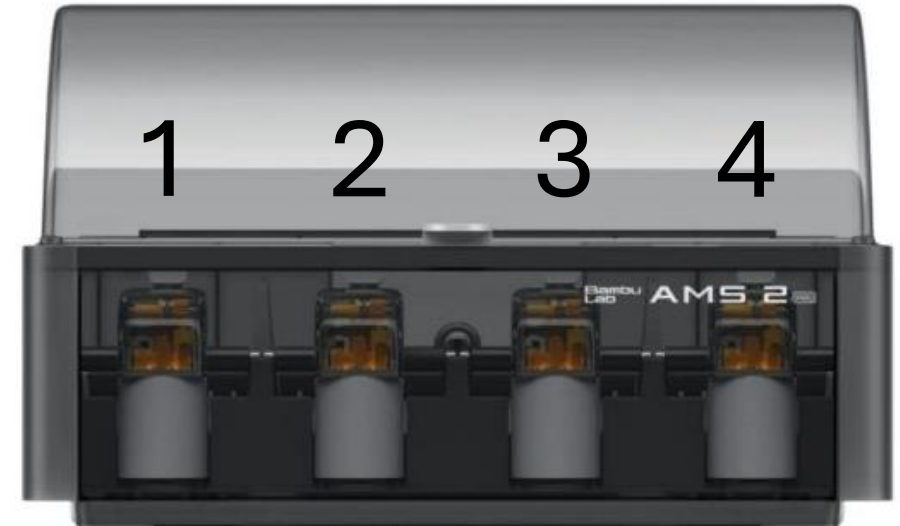
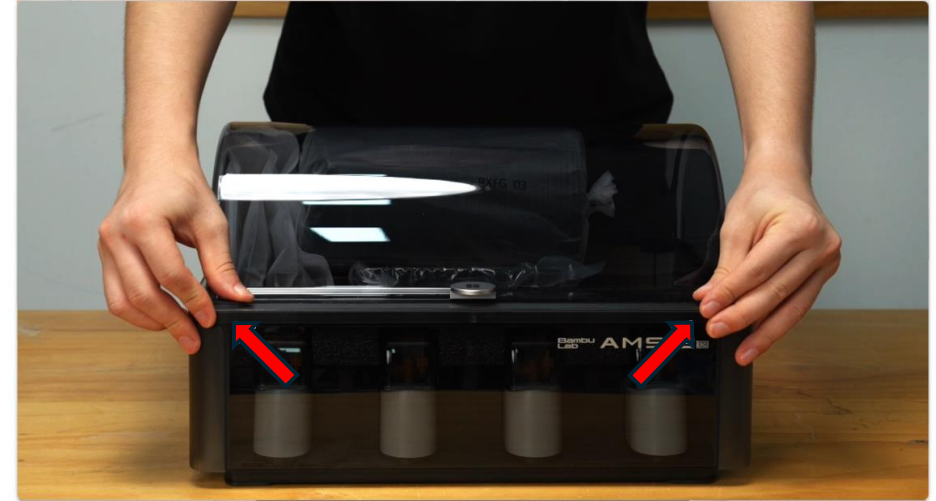
Module 3

How to start your first 3D print



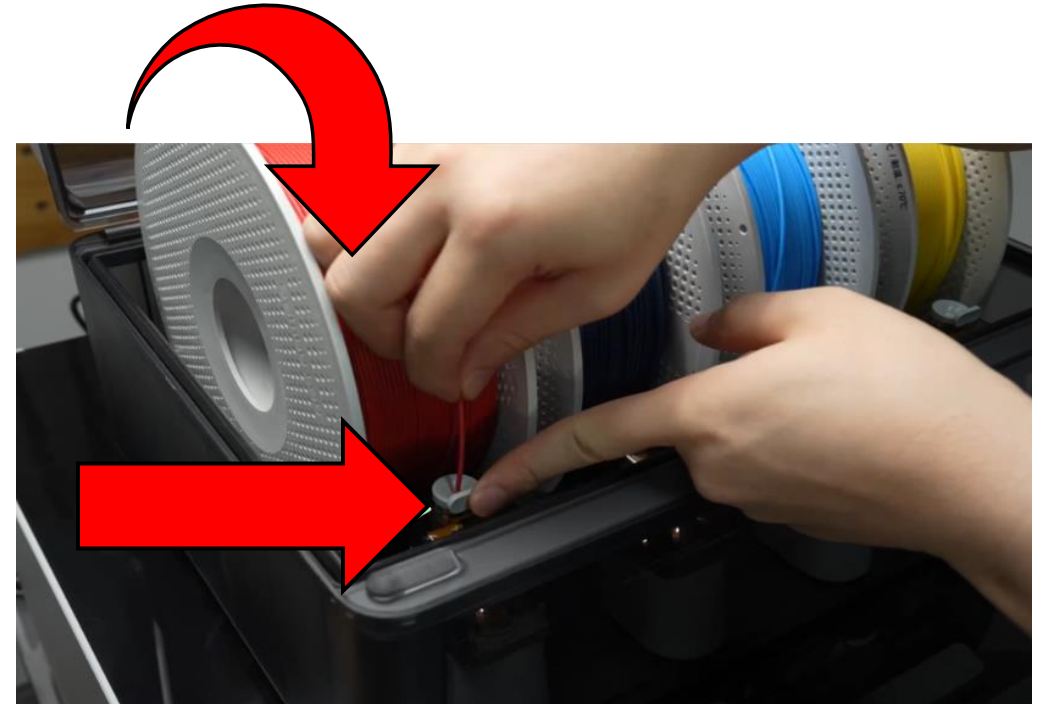
Loading Spool

- Unlock the tabs located on the corners by rotating outwards.
- Open the AMS cover and place a spool into an available slot, ensuring it sits securely and can rotate freely.
- A correctly positioned spool:
 - Sits flat on the rollers inside the AMS.
 - Rotates smoothly when nudged by hand.
 - Doesn't wobble or tilt in the slot.



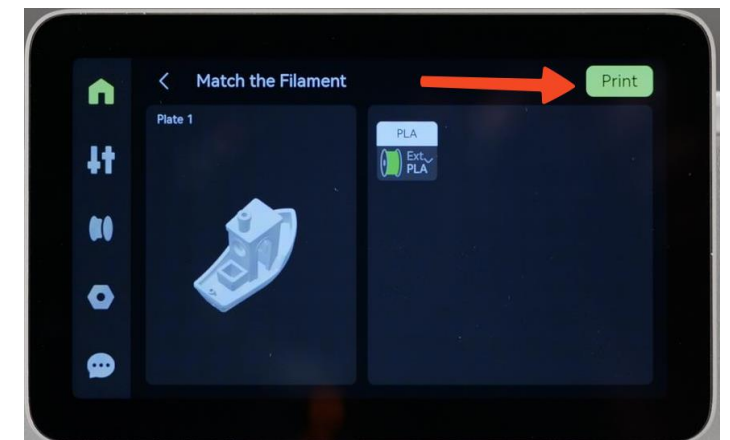
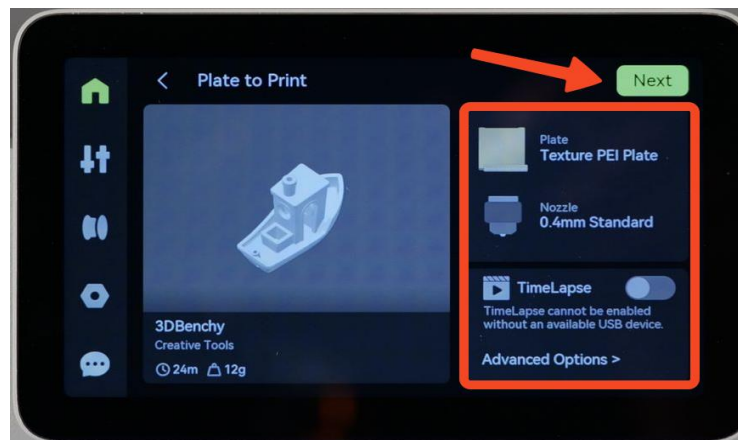
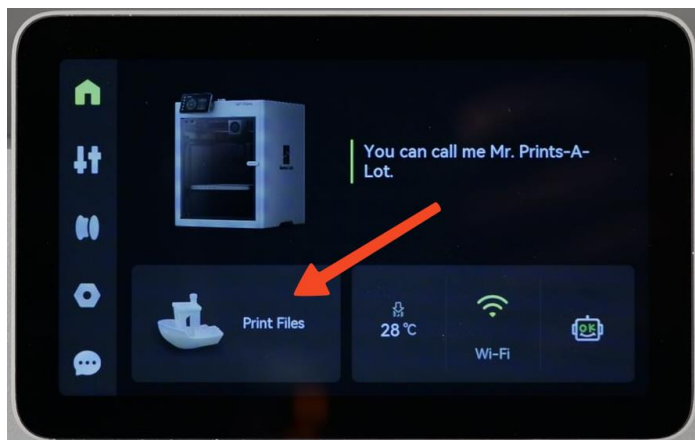
Loading Filament

- When loading filament, filament is fed from above and not below (see top arrow)
- Push the release tab toward the filament reel while guiding the filament strand into the machine.
 - The AMS will automatically grab the filament once engaged.
- The 3D printer will automatically detect the filament details and set the appropriate settings after reading the internal RFID tag



Starting Your Print

- Tap the **Files** button to open the object file.
- Select your print from the **External** tab.
- Click off the option for **TimeLapse** then press **Next**.
- Confirm the printer settings (**Plate** and **Nozzle**).
- If the filament colour showing isn't correct, click on the colour to show your options and change to the right colour.
- Press **Print**!



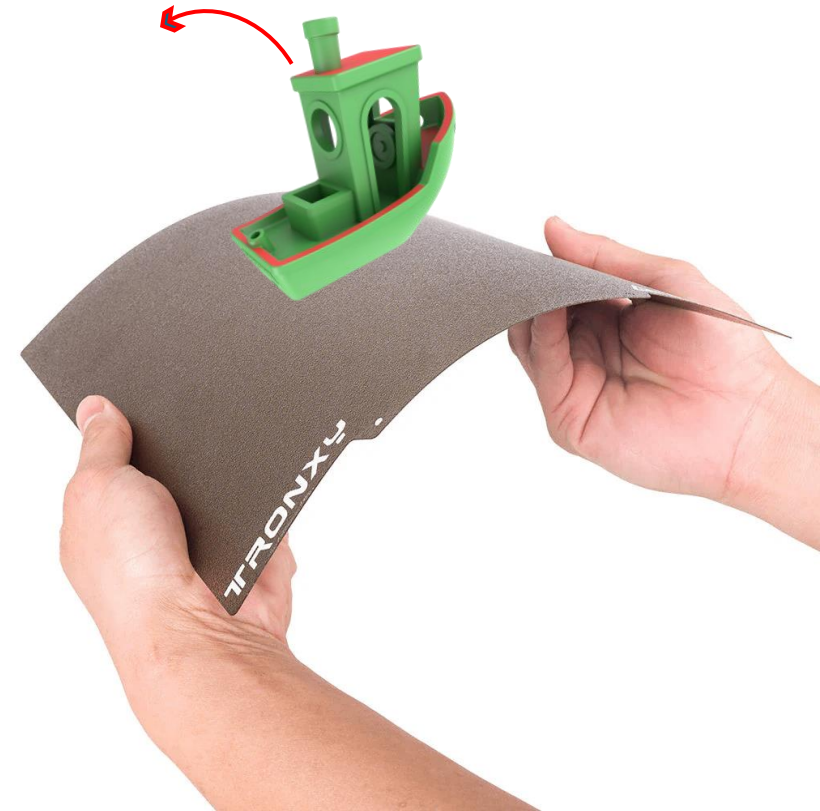
While an Object is Printing

- It is highly recommended that you remain with your print job for **15 minutes**. Printing failures tend to occur at the beginning of a print job (although they can occur at any time during printing).
- You are not required to remain at the printer for the entire print duration; however, it is **your responsibility to oversee your print job**.
- Staff will not be monitoring your print job.
- **Do not open the 3D printer while it is in operation.**
- If the printer locks up or becomes jammed during operation, do not attempt to fix the printer. **Please let staff know immediately**, we are happy to help!



Finishing Your Print

- Your print must finish 30 minutes before close; staff will turn off the machine and charge you for whatever you have done so far if it does not finish in time.
- Wait for your print job to complete before opening or touching the 3D printer.
- Tie your hair back and roll up your sleeves to avoid any snagging while reaching inside the 3D printer.
- The build plate is magnetic and can be removed by lifting the front edge and carefully pulling upwards.
 - To prevent contamination, avoid touching the print surface.
- When removing your project, slowly bend the build plate and the print will pop off.



Things You Should Know



- This is a first-come first-served model, you will need a **physical library card** to book the 3D printer and use it in person. An ecard is not sufficient.
 - The 3D printer can be booked through the [WPL website](#) by going to **Services** and then [Discovery Zones](#).
- 3D printing costs **0.10 cents per gram**.
 - Supports, towers and purged filament are included within the final cost.
 - You will be paying for all materials used including failures.
- Be advised that we do not guarantee a successful print. You will be expected to pay for the cost of a complete and/or incomplete print, regardless of quality.
- Your print **must finish 30 minutes before** the library closes.
- Check out the [manual for the Bambu Lab P2S](#) for more in depth information.