

3D Printing & Designing Workshop

by Sunway Robotics Club

Introduction

- How is 3D printing utilised
- Types of 3D printers
- Types of printing materials
- Common printing issues
- Types of file formats

Tinkercad Setup

- Account Creation
- Fiddling with Tinkercad web interface

Hands on Designing

- Learn to create a small ice cream keychain
- Do-it-yourself session

Printing Application

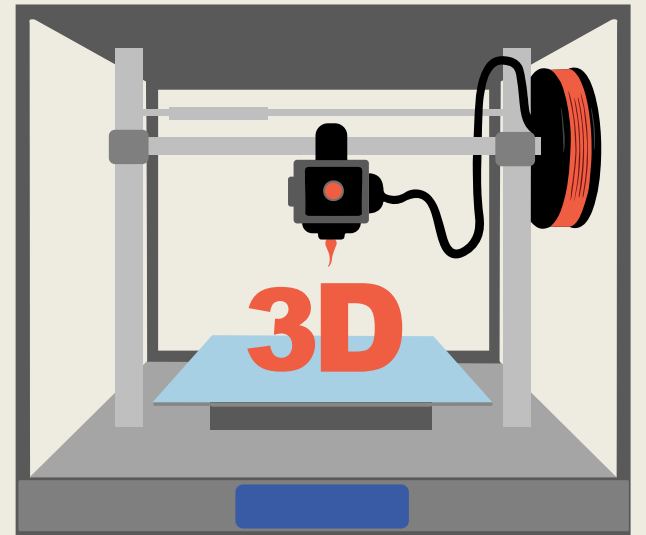
- Understanding Cura's printing menu
- Common Settings to look out for
- Do's and Don'ts during printing

01

02

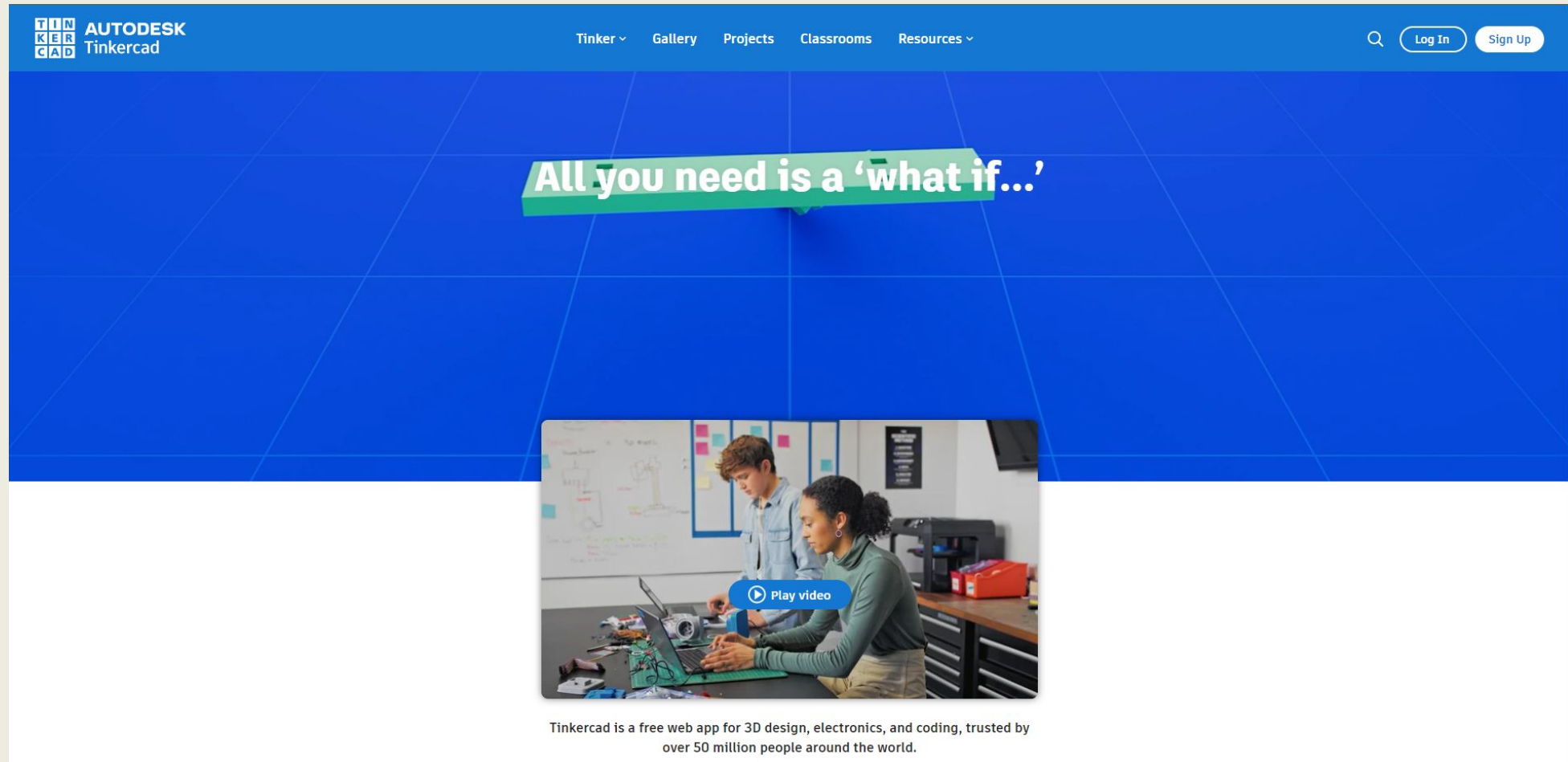
03

04



Tinkercad Setup

www.tinkercad.com



The screenshot shows the Tinkercad website homepage. The top navigation bar is blue and contains the Tinkercad logo (TINKER CAD) and the Autodesk logo. To the right of the logo are links for Tinker, Gallery, Projects, Classrooms, and Resources. Further right are search and login/sign up buttons. The main content area has a blue background with a white grid pattern. A green banner with the text "All you need is a 'what if...'" is centered. Below this is a video player showing two people working on a laptop in a workshop setting. A "Play video" button is overlaid on the video. At the bottom, a text block states: "Tinkercad is a free web app for 3D design, electronics, and coding, trusted by over 50 million people around the world."

TINKER CAD AUTODESK Tinkercad

Tinker Gallery Projects Classrooms Resources

Log In Sign Up

All you need is a 'what if...'

Play video

Tinkercad is a free web app for 3D design, electronics, and coding, trusted by over 50 million people around the world.

Sign Up in Tinkercad

Welcome back

How do you use Tinkercad?

In school

Educators

Students with Class Code

Student accounts

On your own

Personal accounts

Don't have an account yet?

[Join Tinkercad](#)

[Children's Privacy Statement](#) [Privacy settings](#)

Sign in

Email or Username

20040457@imail.sunway.edu.my

NEXT

OR [SIGN IN USING SOCIAL PROVIDERS](#)

NEW TO AUTODESK? [CREATE ACCOUNT](#)

Understanding TinkerCAD

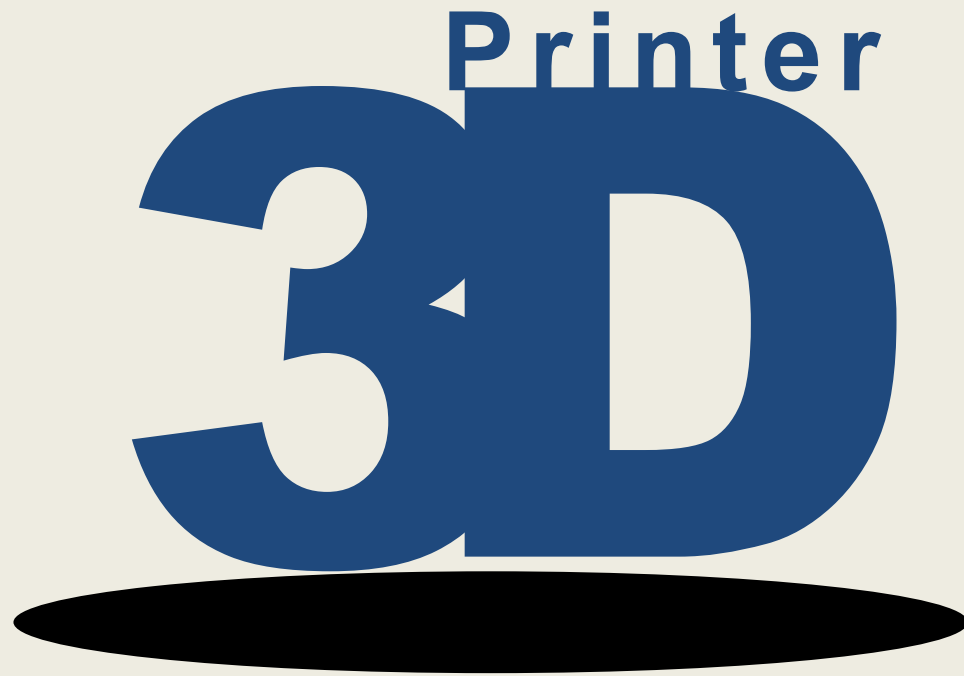
Always, Losing you game pieces(dice and chess pawns)? Never again! Today we will be designing a simple 6 sided die and a chess pawn!

Hands On Designing Session

**Utilizing the functionalities shown earlier,
have fun designing a model of your choice
within the measurements of
4cm x 4cm x 4cm!**



(Maybe an Among Us Character?)



How can I get started?

How is 3D printing utilised?



Medical Applications



Figurine/Art Models



**Prototype for Real
World Applications**



Functional Prints



Food

Questions to ask before starting 3D printing?



What is it used for?



Is it a complex design? Or is it a simple design?



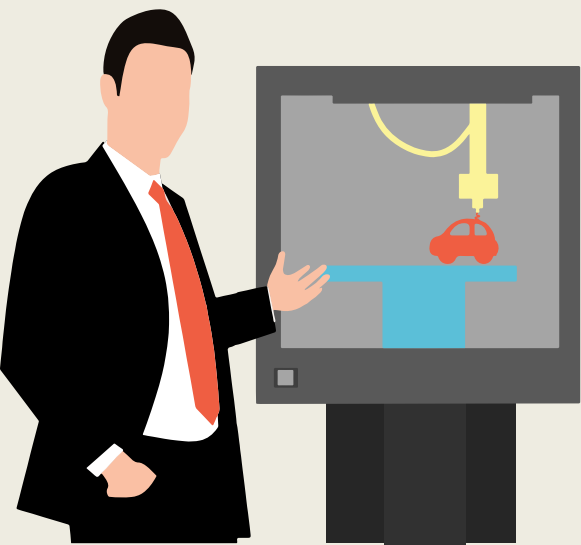
Is this for prototyping purposes?



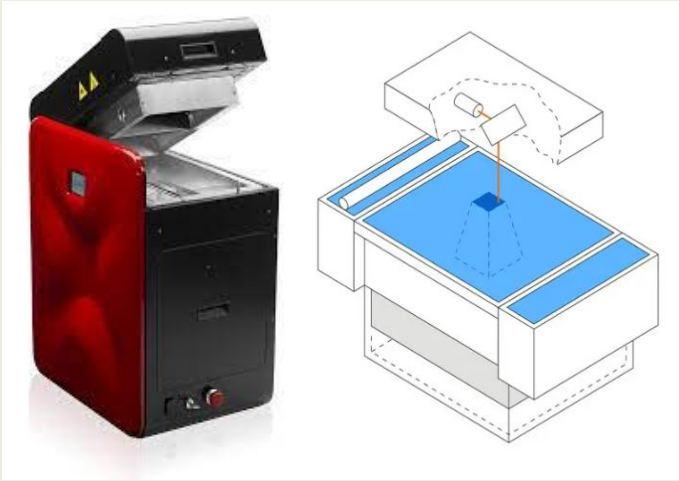
How long do I want it to last?



How tough or brittle should the print be?

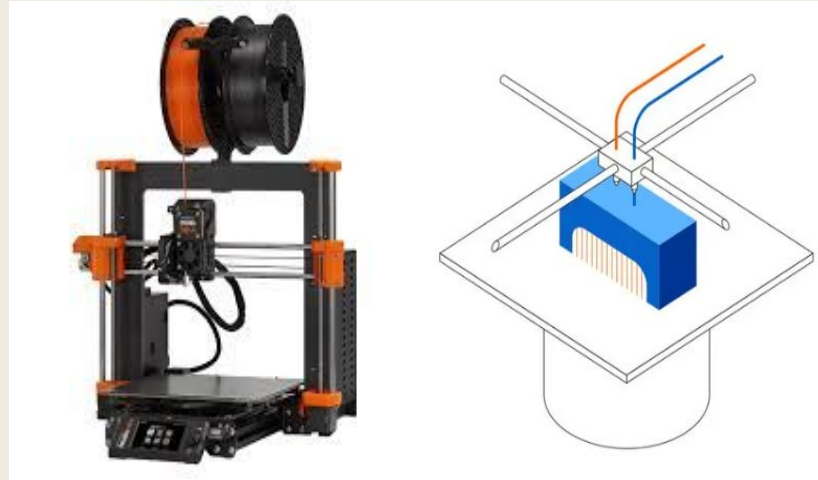


Types of Printers



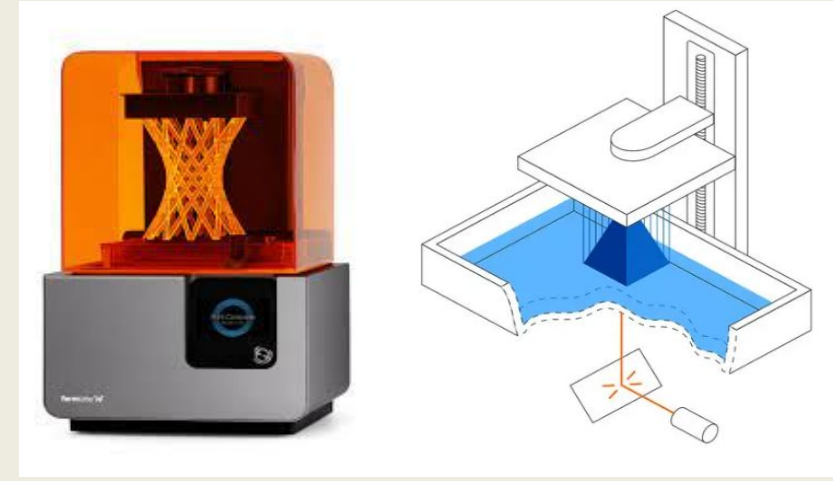
SLS Printer

- Utilizes laser to fuse polymer powder
- Most expensive printer and materials over time
- Excellent print integrity
- For functional prototyping and end-use production
- No support needed



FDM Printer

- Deposits filaments layer by layer
- Cheapest printer and materials
- Lowest Resolution and Accuracy
- Usually for prototypes
- Support needed



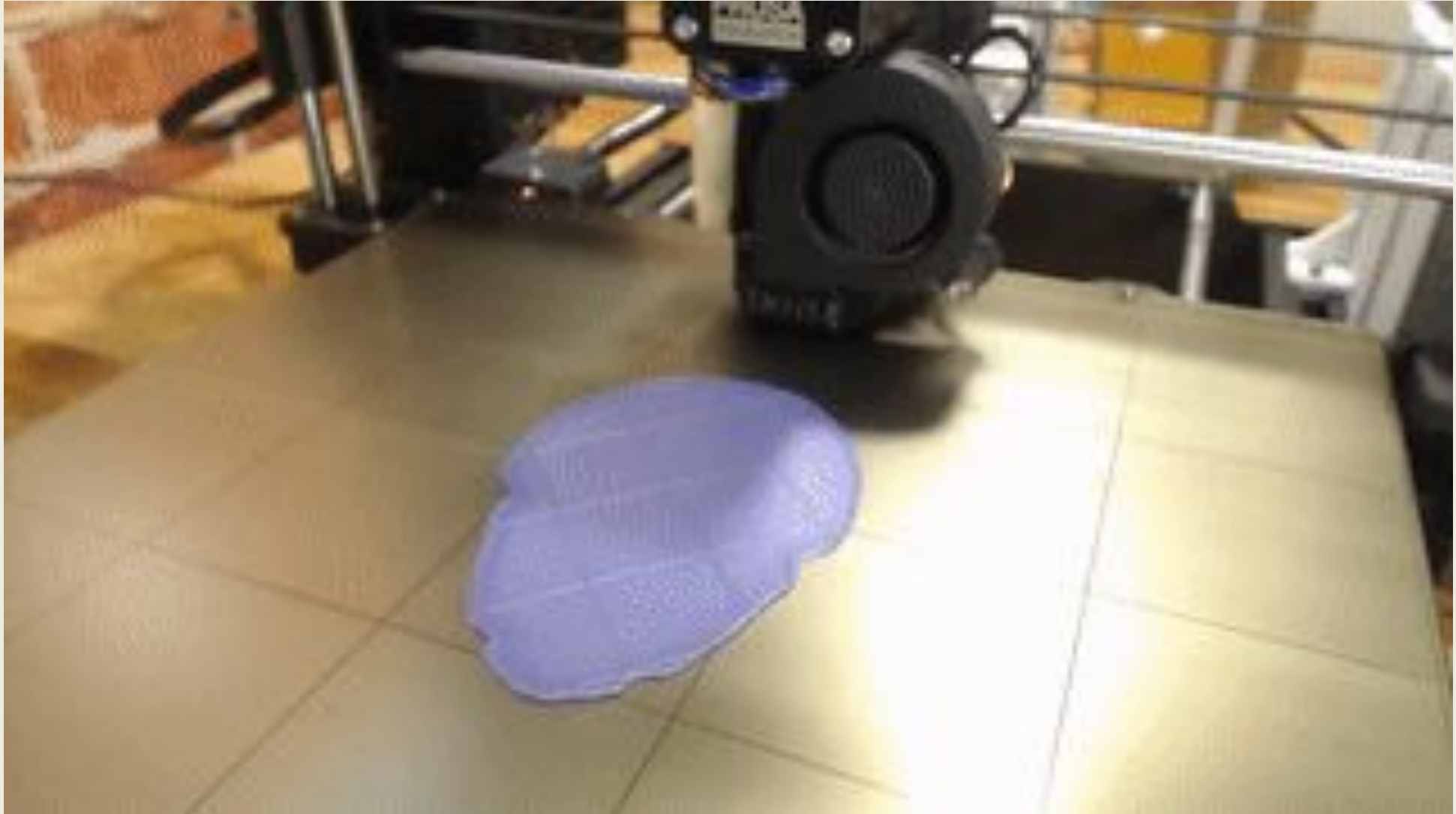
SLA Printer

- Laser cured resin liquid
- High printer and material cost
- Highest resolution and accuracy and fine details
- For functional prototyping, molds and tools
- Support needed

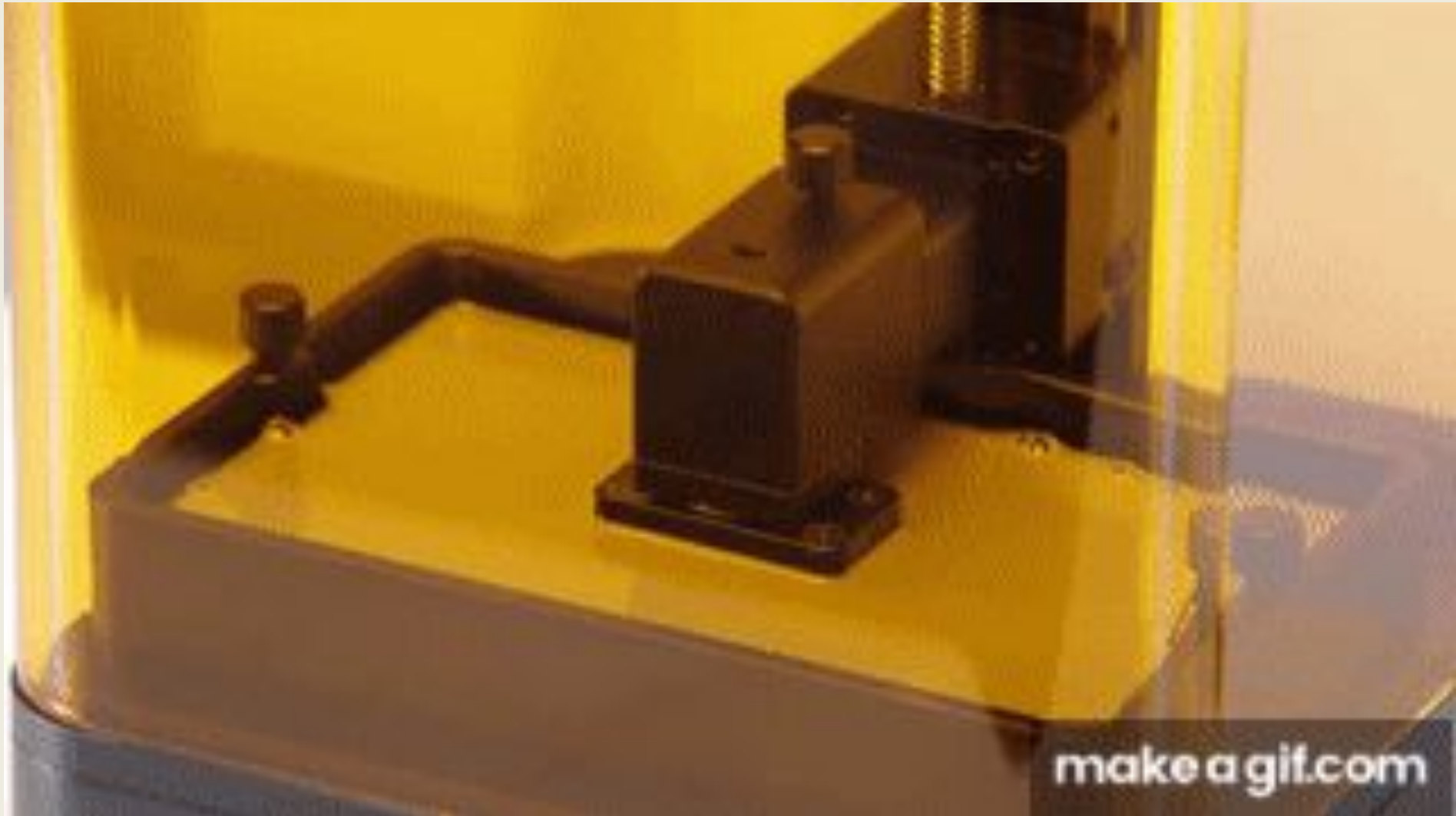
Types of Printers (SLS Printer)



Types of Printers (FDM Printer)



Types of Printers (Resin Printer)



Types of Commonly Used Materials



Thermoplastics

- PLA
- ABS
- PETG

Can be broken down and
re-printed!




Thermosetting Plastics


- Clear/Draft Resins
- Medical Resins
- Nylon Composites

Cannot be broken down and
re-used!


Comparison of Thermoplastic properties




High Quality Filament for 3d Printer




Minimal Warping



No Heating Bed Required



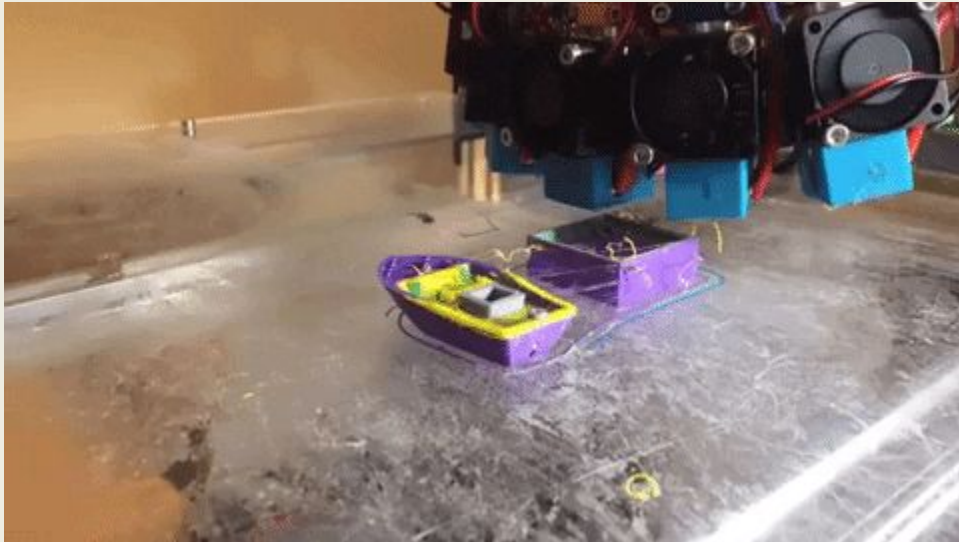
Little to No Odor



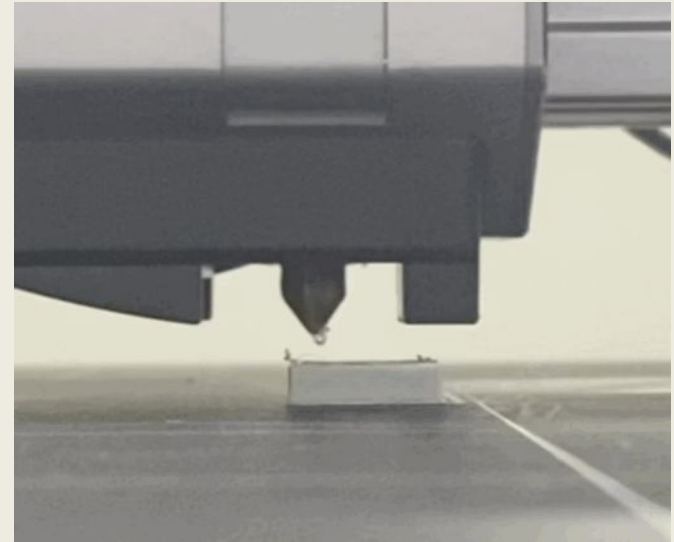
No Bubbles

Material	ABS	PLA	PETG
Diameter	1.75mm	1.75mm	1.75mm
Print Temperature	200-250 °C	190-230 °C	220-250 °C
Print Speed	50-100m/s	50-100mm/s	50mm/s
N.W.	1kg(2.2lbs)/Roll	1kg(2.2lbs)/Roll	1kg(2.2lbs)/Roll
Platform Temperature	100-120 °C	60-80°C	95°C

Common Printing Issues

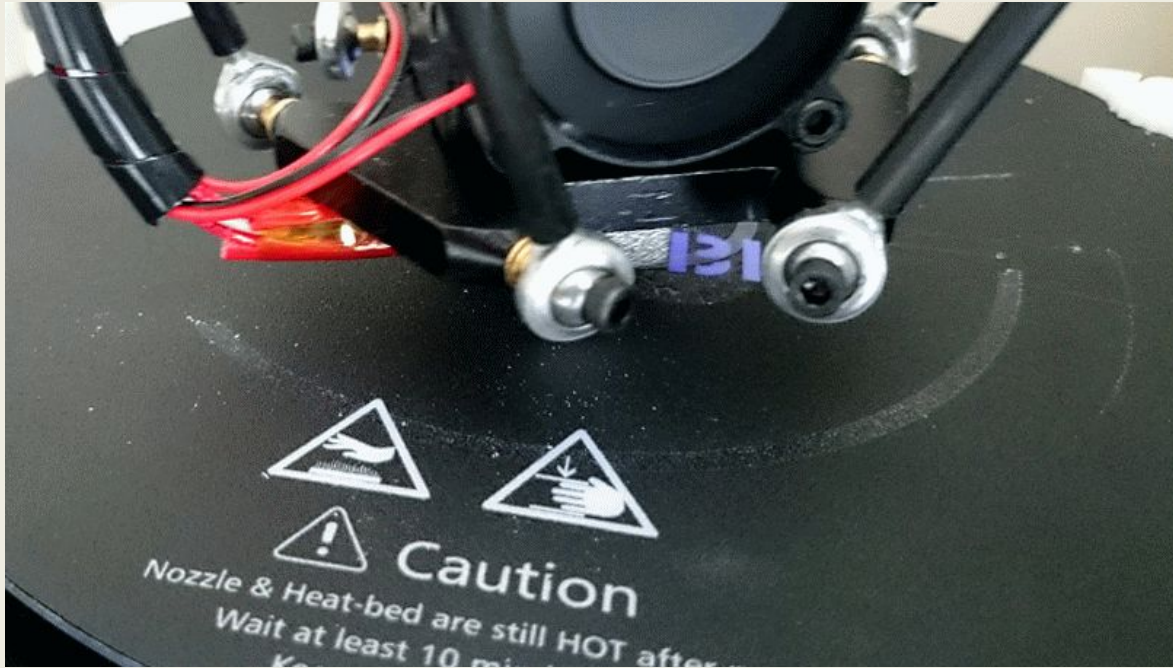


Stringing



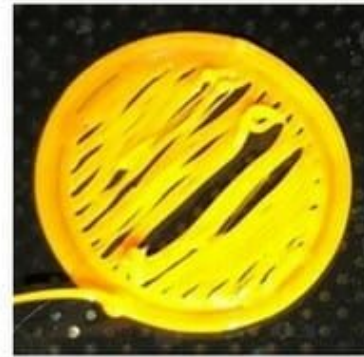
Nozzle Blocked

Common Printing Issues

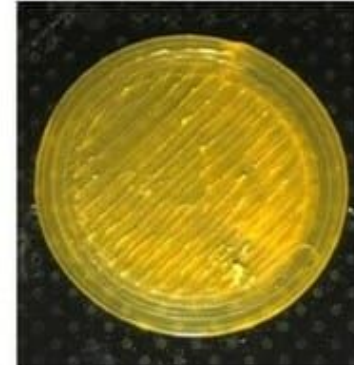


Nozzle grinding

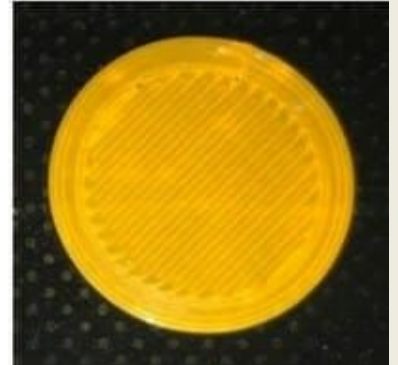
Nozzle too
far from bed



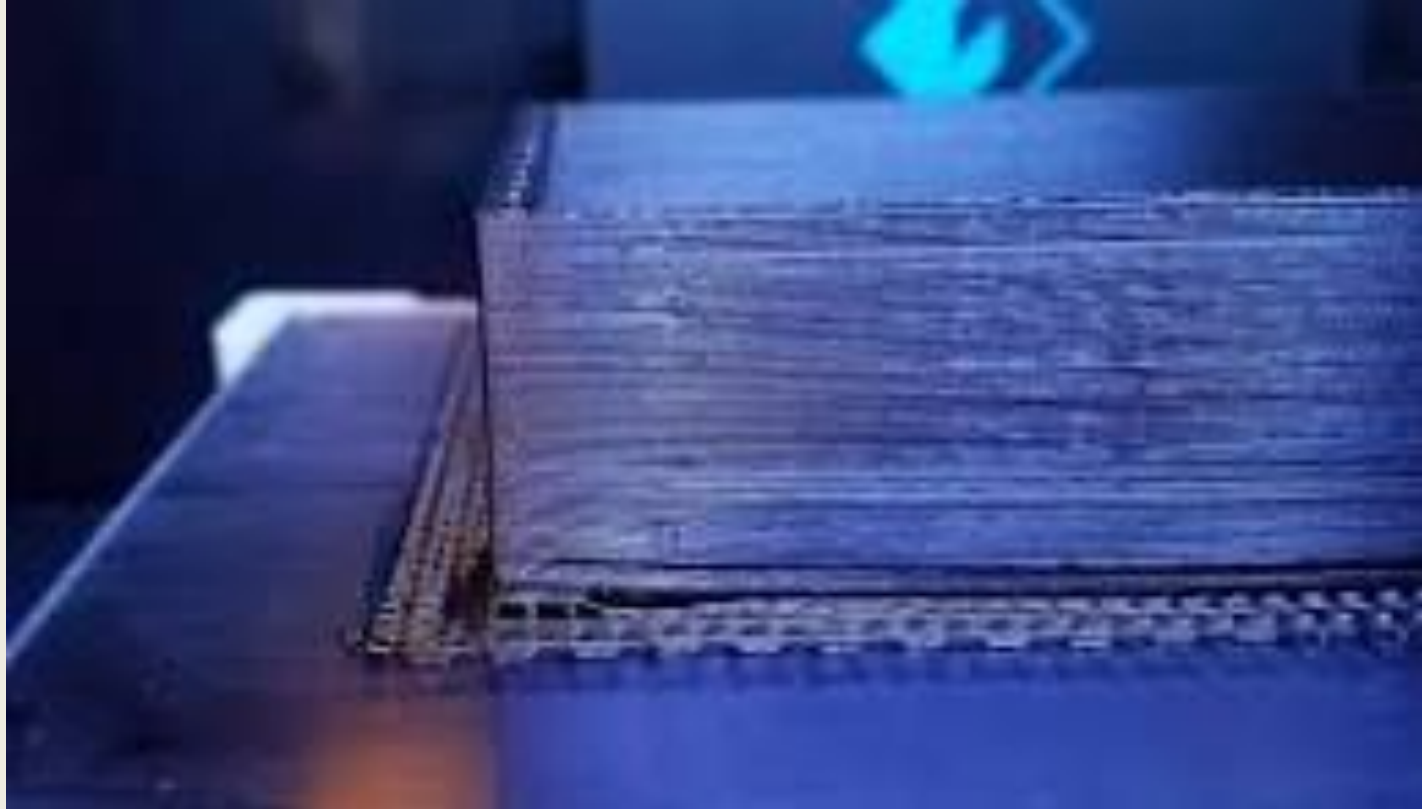
Nozzle too
near to bed



Good ✓



Common Printing Issues



Warping

Types of File Formats

[Most Commonly Used]



.Obj File

- Stores 3D geometry data
- Widely supported & easy to work with
- Does not store unit measurements



.Stl File

- Similar to Obj, doesn't store color, texture, material information
- Widely supported



.3MF File

- Stores color, texture, material information and geometry
- Supports advanced features (multi-material models)
- Machine and human readable



.AMF File

- Allows for advanced features & highly versatile
- Suitable for industry based usage
- Not yet widely supported

Websites for 3D prints



www.thingiverse.com

- Community Driven
- Widely Free
- Modelers may sell their designs
- Wider user base, ranging from beginners to professionals



www.cults3d.com

- 3D Printing Marketplace
- Mostly paid
- Attracts more professional and hobbyists



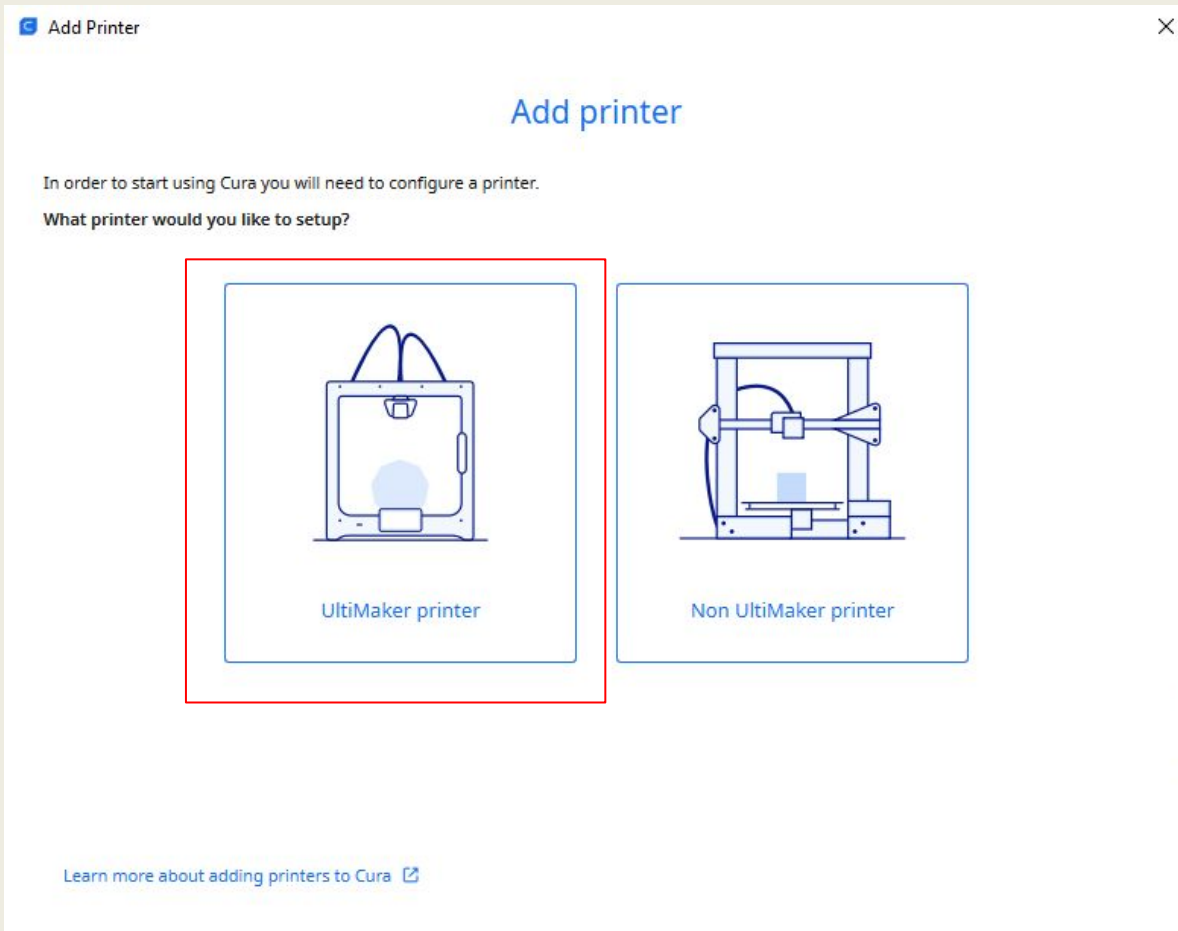
www.cgtrader.com

- 3D printing, gaming models, architecture models marketplace
- Mostly paid
- Used by Professional Modellers, Companies, Designers

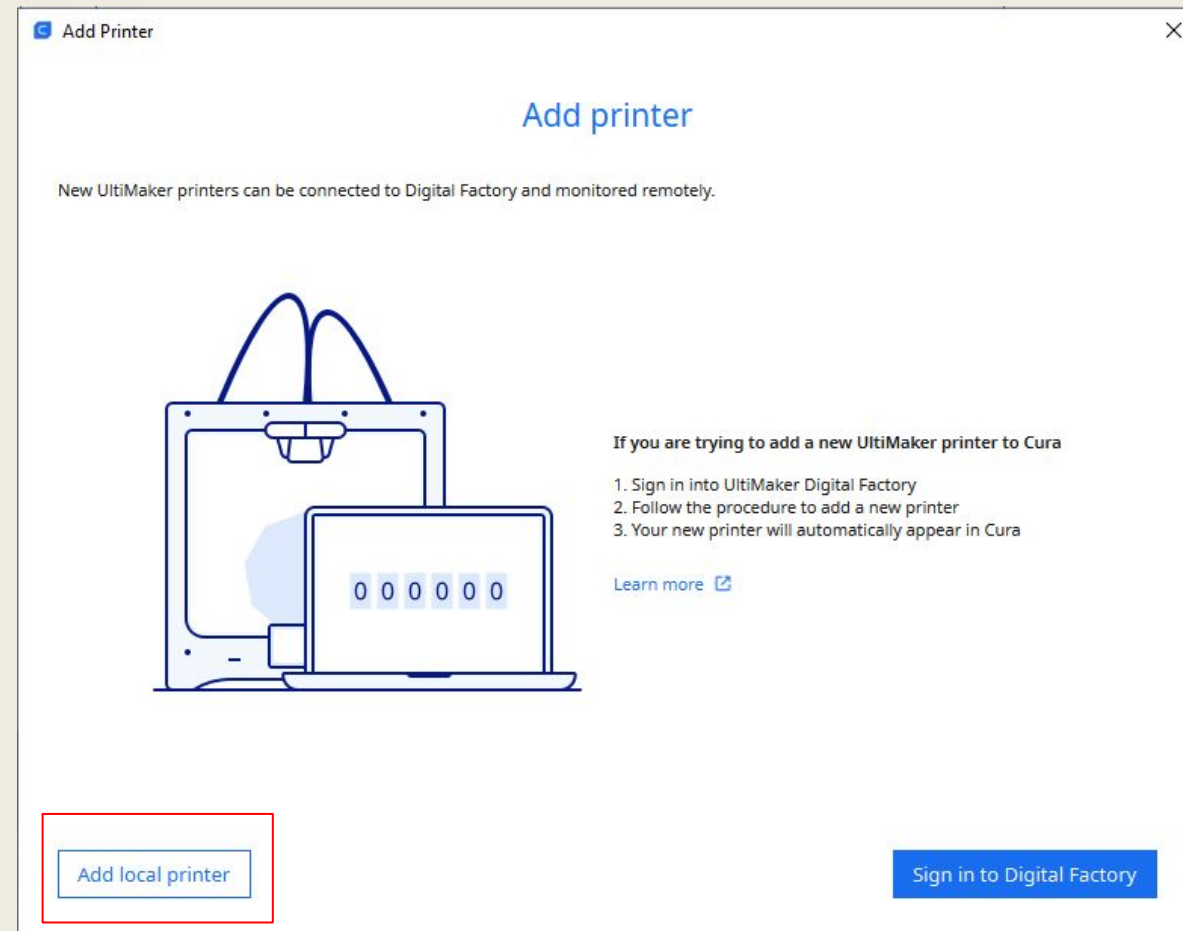
Introduction to Cura's Printing Menu

Ultimaker Cura Set Up

Step 1 Select: Ultimaker Printer



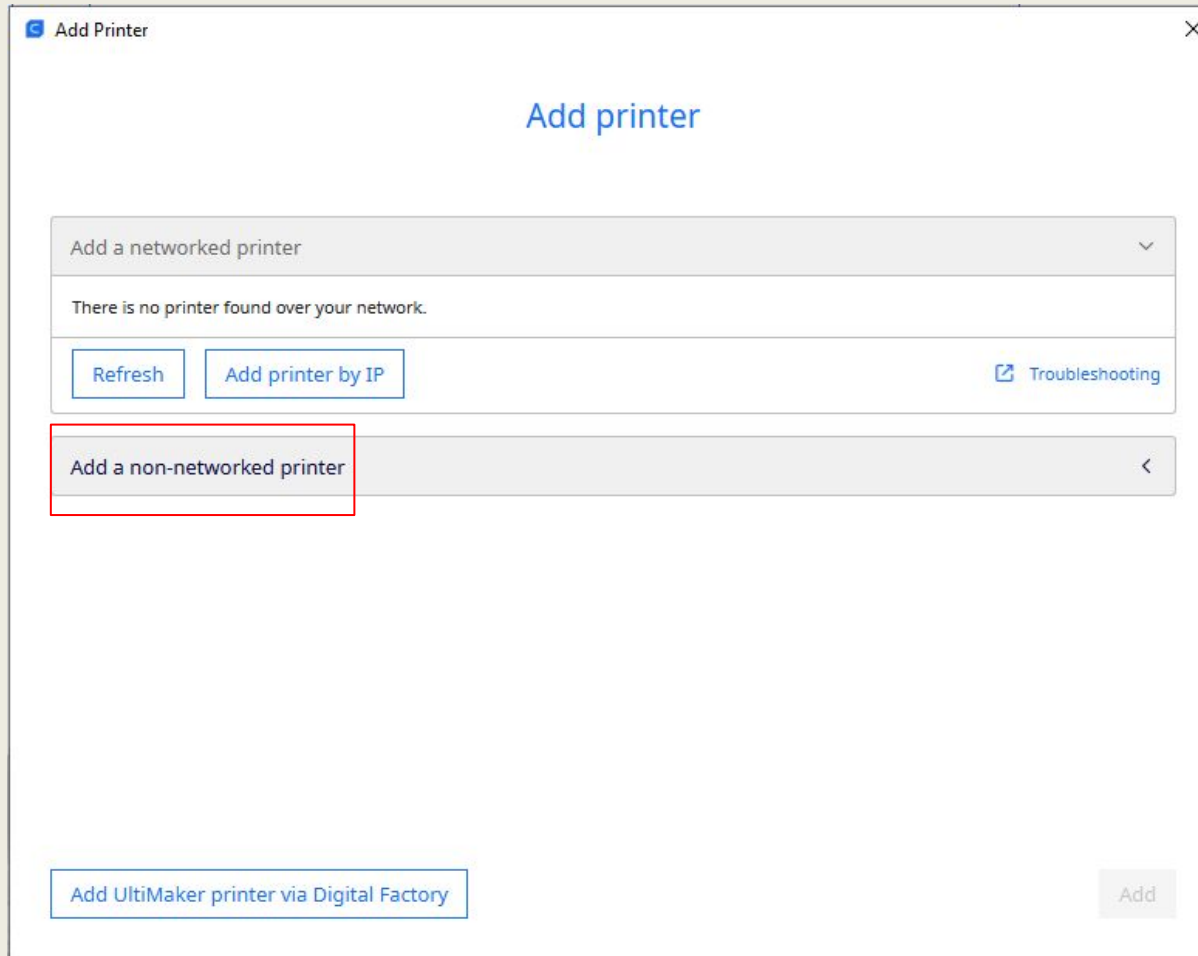
Step 2 Select: Add Local Printer



Step 3

Select:

“Add a non-networked printer”



The screenshot shows the 'Add Printer' window with the title bar 'Add Printer' and a close button. The main heading is 'Add printer'. There are two main sections: 'Add a networked printer' and 'Add a non-networked printer'. The 'Add a networked printer' section has a dropdown menu, a message 'There is no printer found over your network.', and buttons for 'Refresh', 'Add printer by IP', and 'Troubleshooting'. The 'Add a non-networked printer' section is highlighted with a red box. At the bottom, there is a button 'Add Ultimaker printer via Digital Factory' and an 'Add' button.

Add Printer

Add printer

Add a networked printer

There is no printer found over your network.

Refresh Add printer by IP Troubleshooting

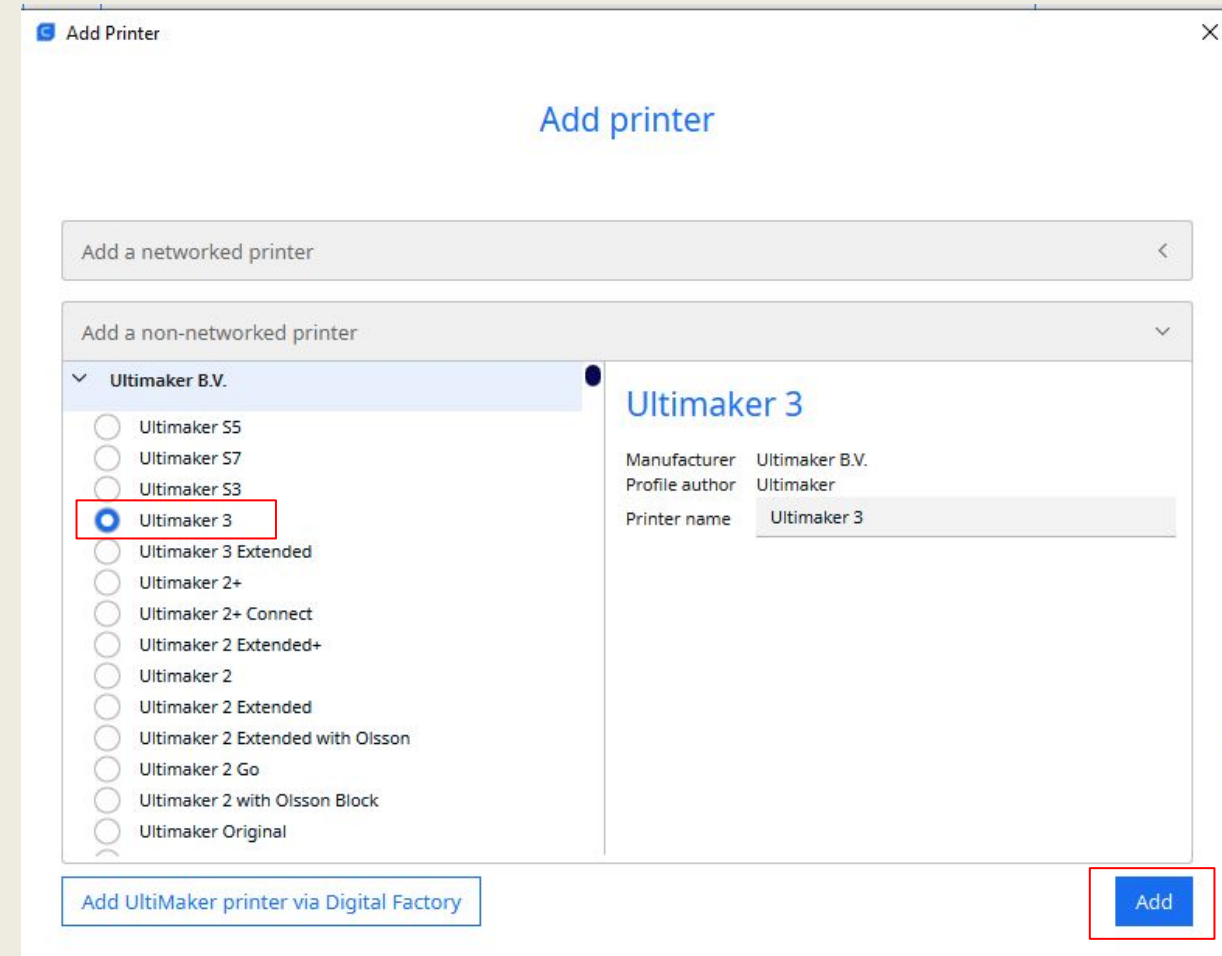
Add a non-networked printer

Add Ultimaker printer via Digital Factory Add

Step 4

Select:

“Ultimaker 3 & Add”



The screenshot shows the 'Add Printer' window with the title bar 'Add Printer' and a close button. The main heading is 'Add printer'. There are two main sections: 'Add a networked printer' and 'Add a non-networked printer'. The 'Add a non-networked printer' section is expanded, showing a list of printer models under the 'Ultimaker B.V.' category. 'Ultimaker 3' is selected and highlighted with a red box. To the right, the 'Ultimaker 3' details are shown, including 'Manufacturer: Ultimaker B.V.', 'Profile author: Ultimaker', and 'Printer name: Ultimaker 3'. At the bottom, there is a button 'Add Ultimaker printer via Digital Factory' and an 'Add' button, which is highlighted with a red box.

Add Printer

Add printer

Add a networked printer

Add a non-networked printer

Ultimaker B.V.

- Ultimaker S5
- Ultimaker S7
- Ultimaker S3
- Ultimaker 3
- Ultimaker 3 Extended
- Ultimaker 2+
- Ultimaker 2+ Connect
- Ultimaker 2 Extended+
- Ultimaker 2
- Ultimaker 2 Extended
- Ultimaker 2 Extended with Olsson
- Ultimaker 2 Go
- Ultimaker 2 with Olsson Block
- Ultimaker Original

Ultimaker 3

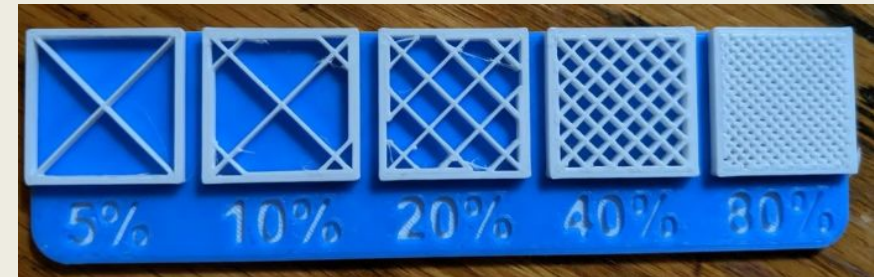
Manufacturer: Ultimaker B.V.
Profile author: Ultimaker
Printer name: Ultimaker 3

Add Ultimaker printer via Digital Factory Add

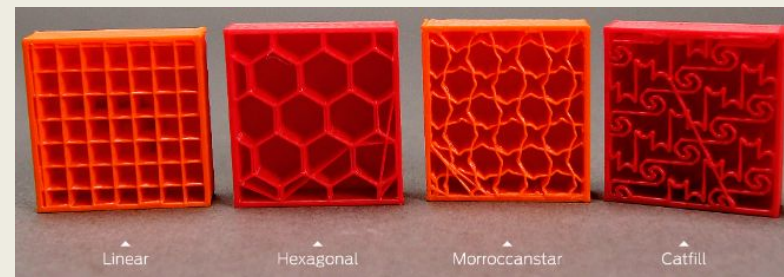
A Guide to Infill

Infill refers to “material that fills a space or hole”

Density



Pattern



Shell



Print settings

Profiles

Resolution Normal - 0.15mm

Recommended settings (for Normal) were altered.

Recommended print settings [Show Custom](#)

Strength

Infill Density 0 20% 100

Infill Pattern Grid

Shell Thickness 0.8 mm 1.0 mm

Support

Support Type Normal

Print with 1 2

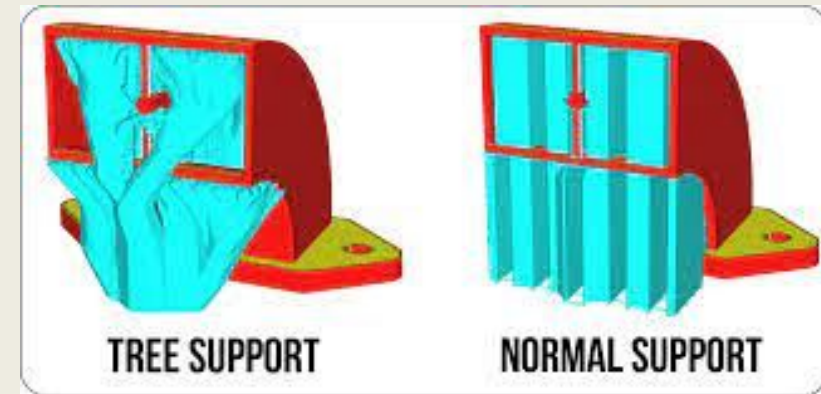
Placement Everywhere

Adhesion

A Guide to Supports

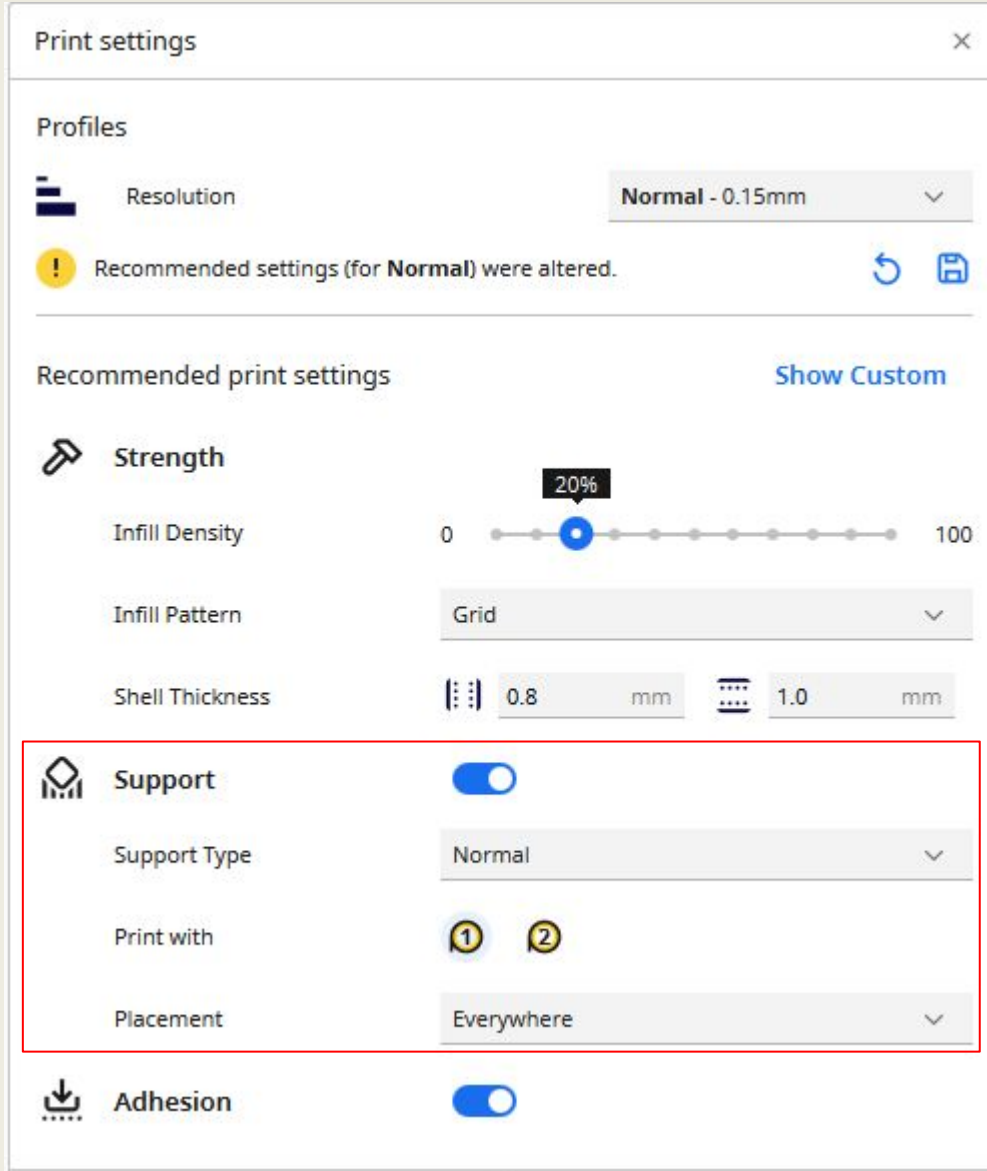
A support structure is the “added part that supports the overhanging structure or bridge structure when slicing the model, which needs to be removed after printing”

Support Types



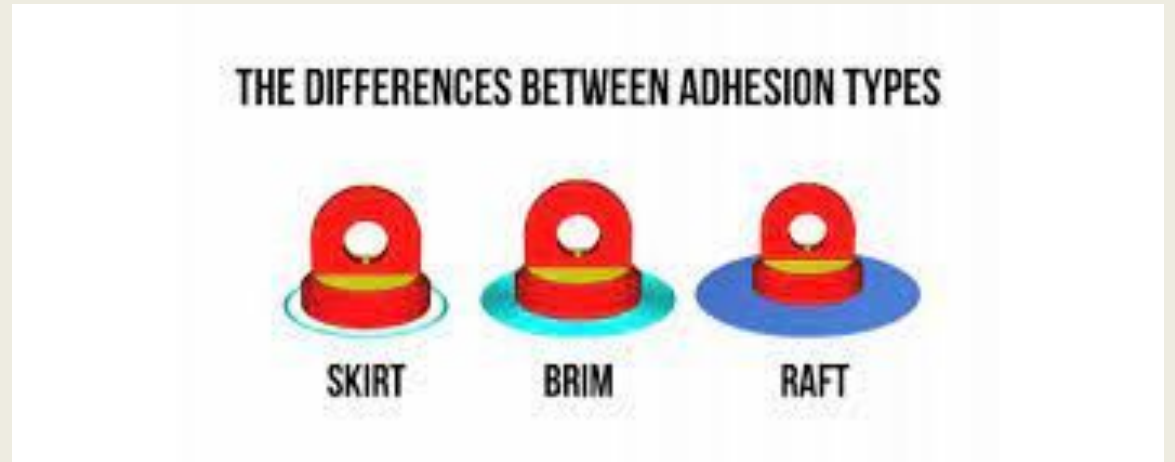
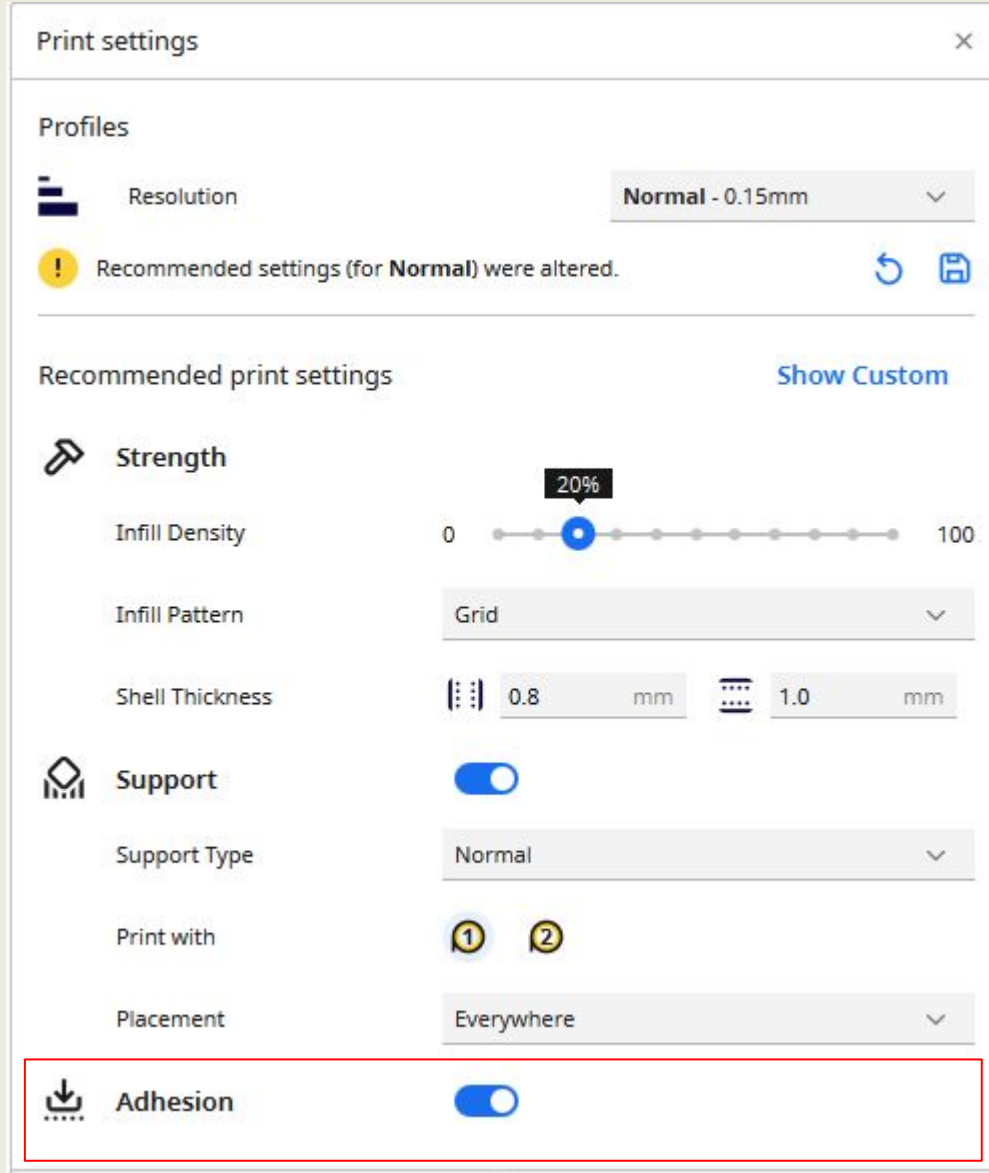
Placement Types

- Touching build plate: Support material is only printed from the build plate up.
- Everywhere: Support material is printed below every part that needs support, which means that it can also be placed on or inside a model.

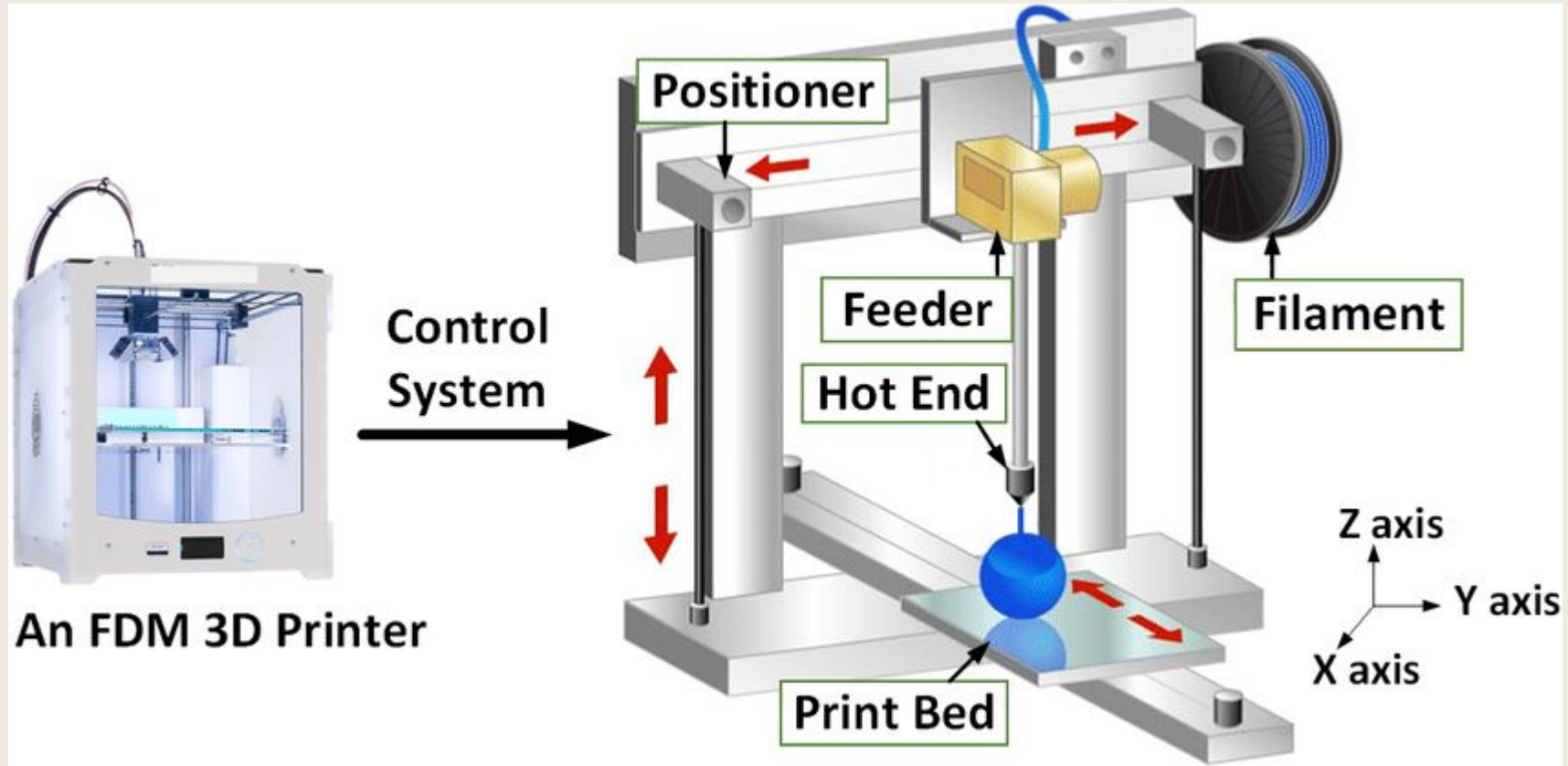


A Guide to Adhesion

Adhesions are used to ensure your prints are stuck onto the build plate safely and prevents it from being deformed during extraction or cooling.



Printing Application



Do's and Dont's During Printing

Do's

1. Understand the printer's tolerance
2. Calibrate and check your printer's settings
3. Check the print's clearances and tolerances

Dont's

1. Print your prints in the wrong direction
2. Design prints that are not suitable to be printed by the printer
3. Forget printer maintenances

Thank you for joining us today!



submit your feedback and your
design in the link!



SunwayRobotics



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