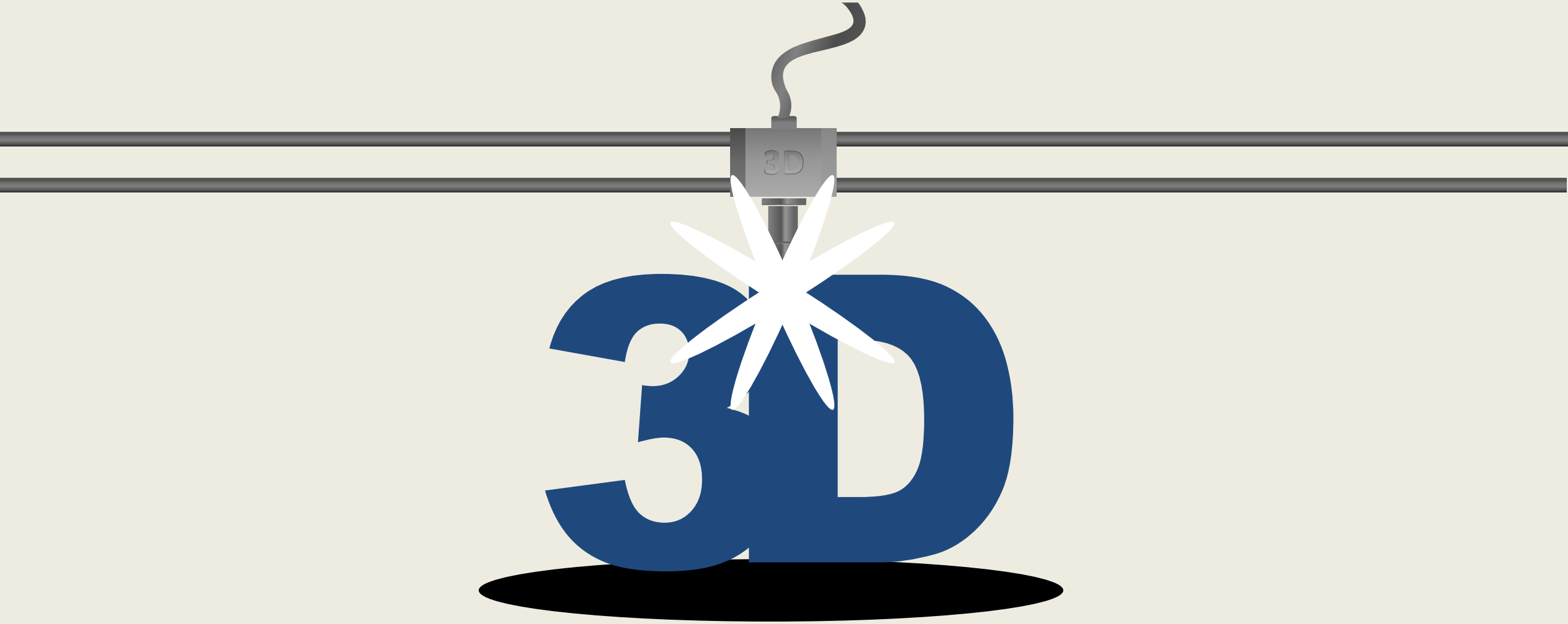


3D Printing & Designing Workshop

by Sunway Robotics Club

Introduction

01

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

Tinkercad Setup

02

- Account Creation
- Fiddling with Tinkercad web interface

Hands on Designing

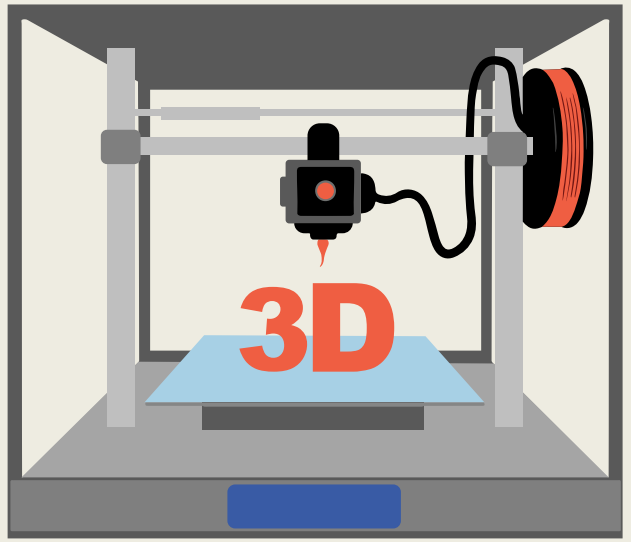
03

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

Printing Application

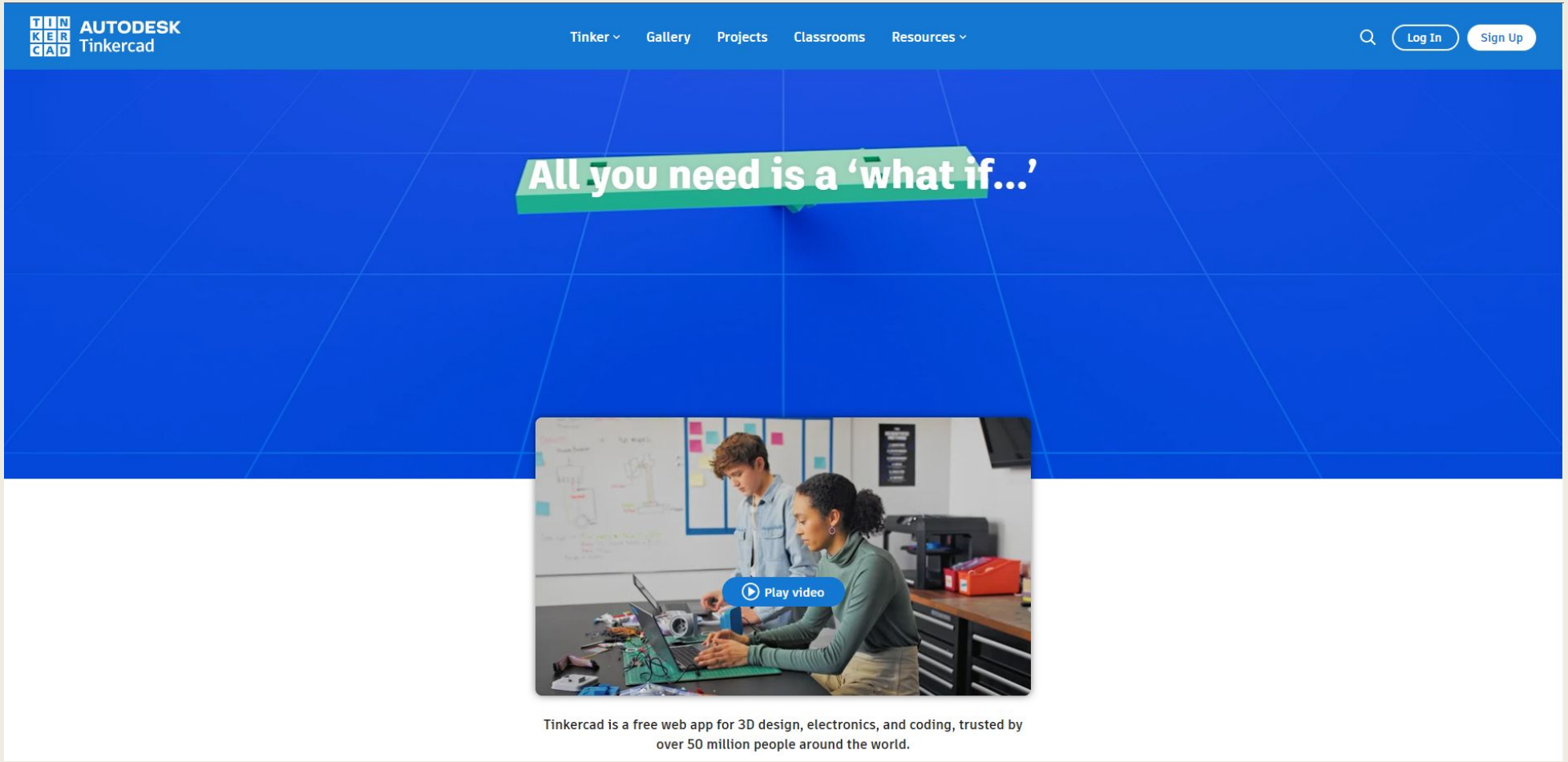
04

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

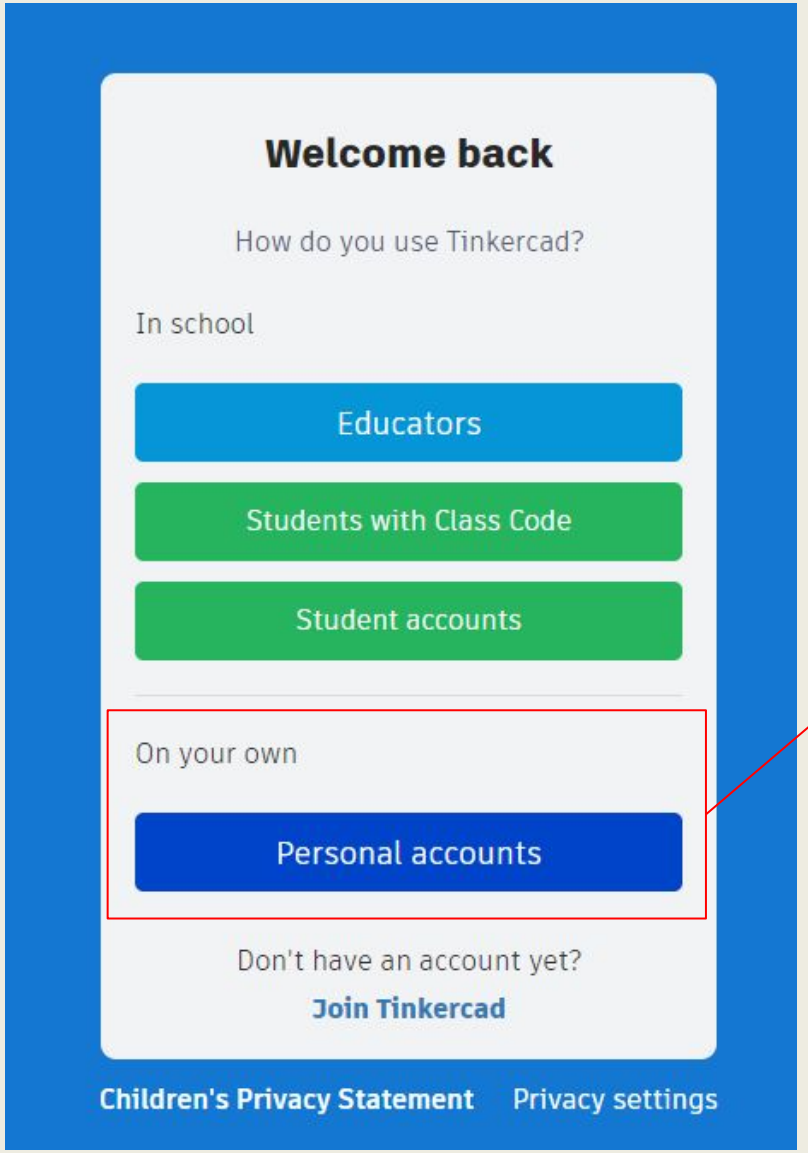


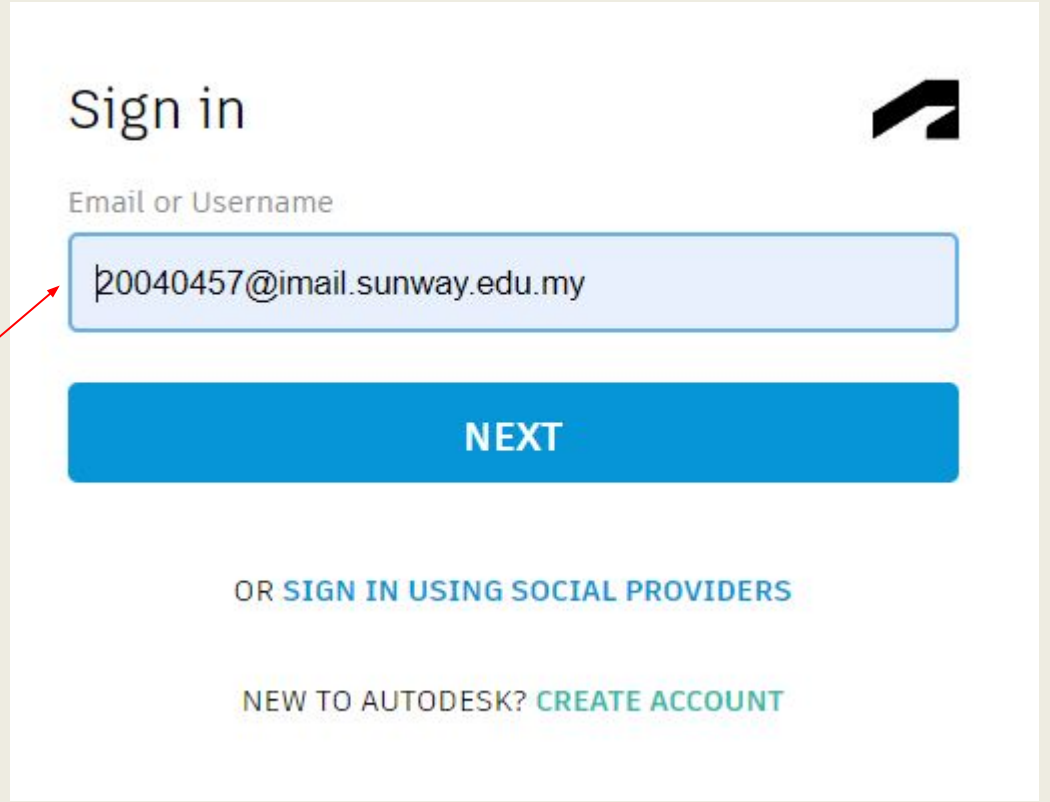
Tinkercad Setup

www.tinkercad.com



Sign Up in Tinkercad





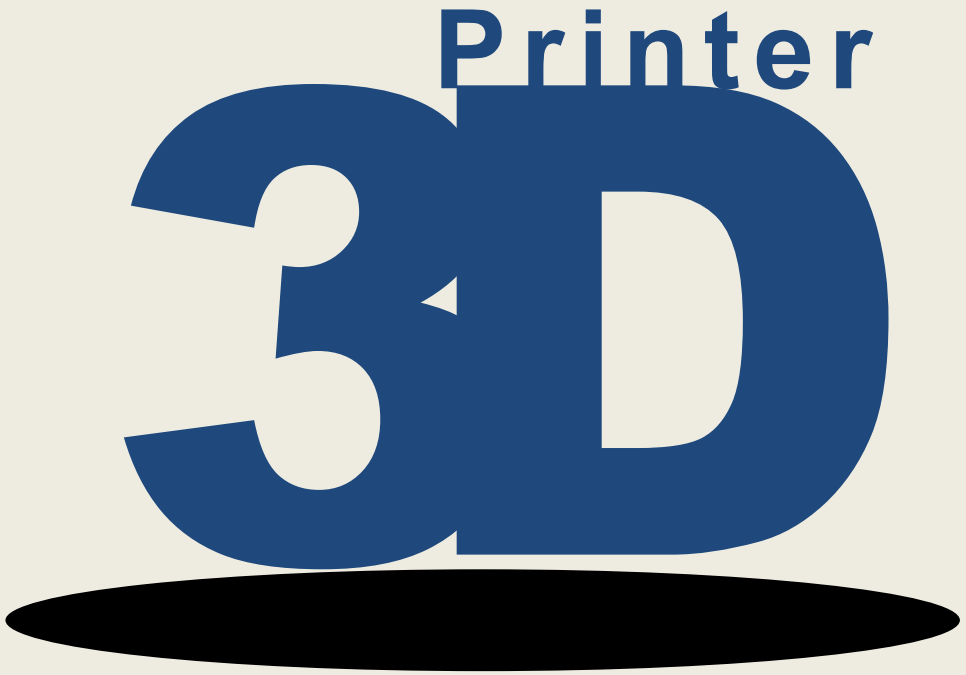
Understanding TinkerCAD

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?)

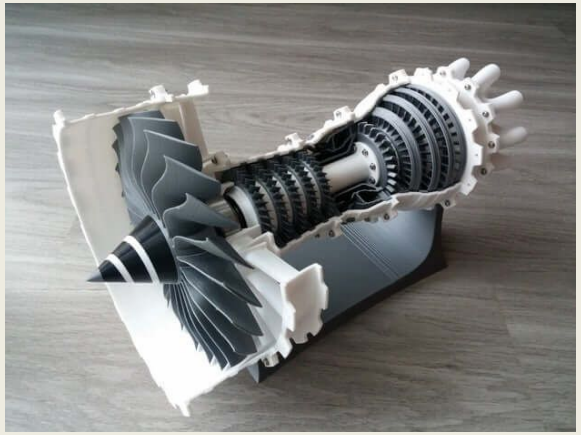


How can I get started?

How is 3D printing utilised?

Medical Applications

Figurine/Art Models

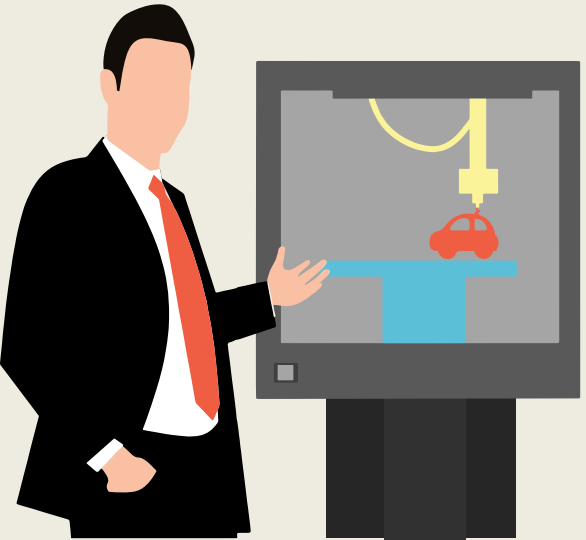


Prototype for Real World Applications

Functional Prints

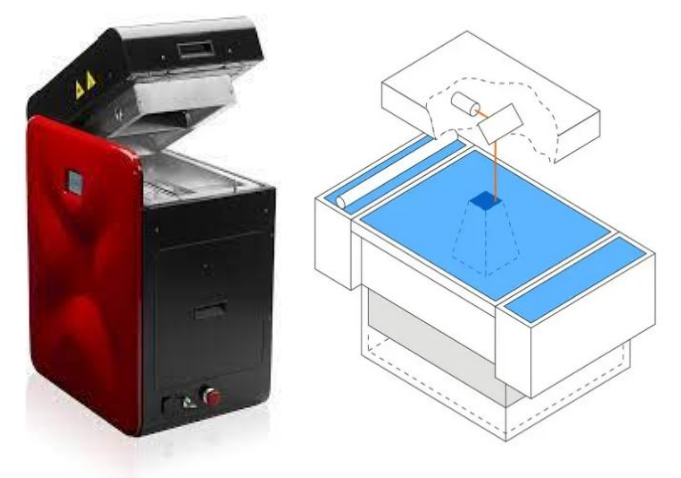
Food

Questions to ask before starting 3D printing?



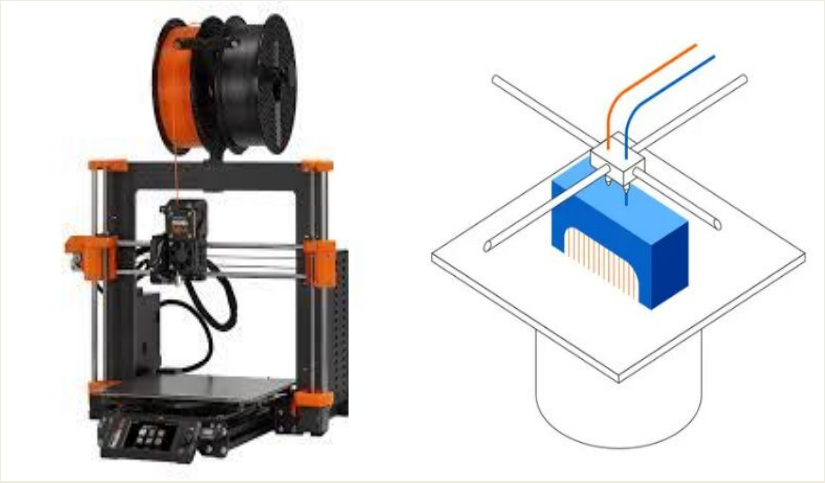
- What is it used for?
- Is it a complex design? Or is it a simple design?
- Is this for prototyping purposes?
- How long do I want it to last?
- How tough or brittle should the print be?

Types of Printers



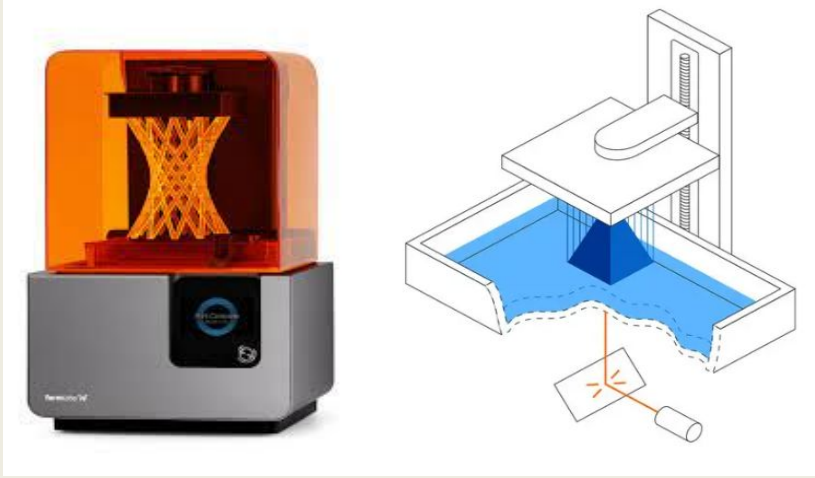
SLS Printer

- 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

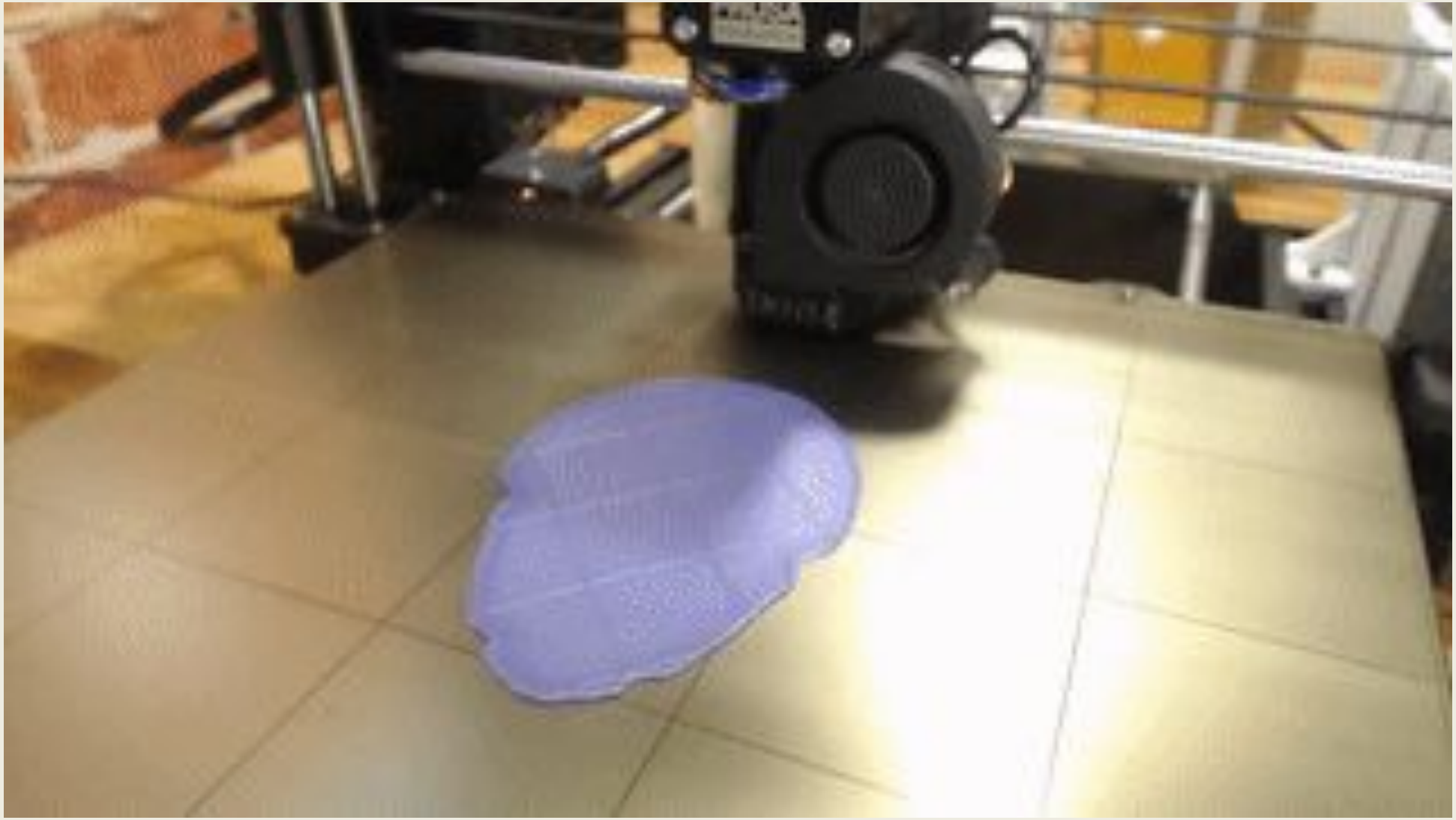


SLA Printer

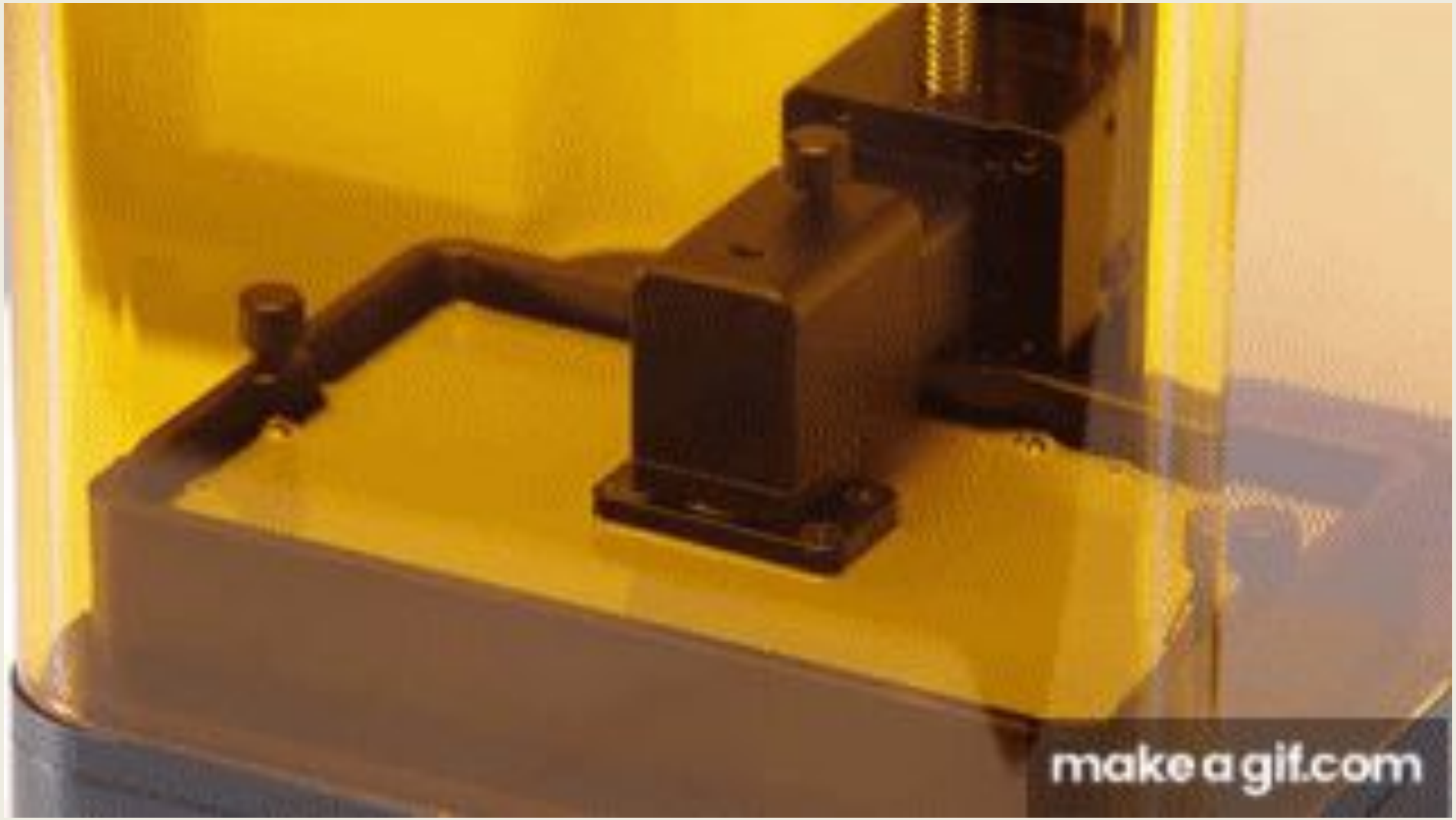
- Laser cured resin liquid
- High printer and material cost
- Highest resolution and accuracy and fine details
- For functional prototyping, molds and tools
- Support needed

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

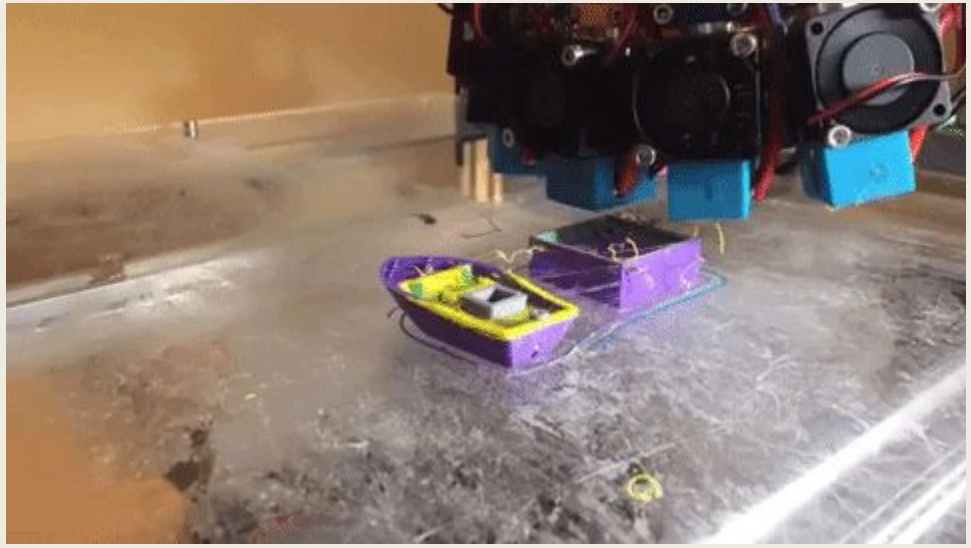
- Clear/Draft Resins
- Medical Resins
- Nylon Composites

Cannot be broken down and re-used!

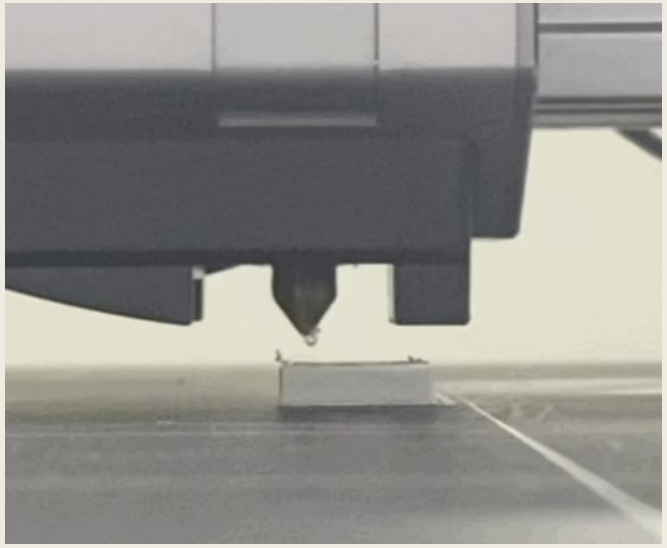
Comparison of Thermoplastic properties

Material	ABS	PLA	PETG
Diameter	1.75mm	1.75mm	1.75mm
Print Temperature	200-250 ℃	190-230 ℃	220-250 ℃
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 ℃	60-80℃	95℃

Common Printing Issues

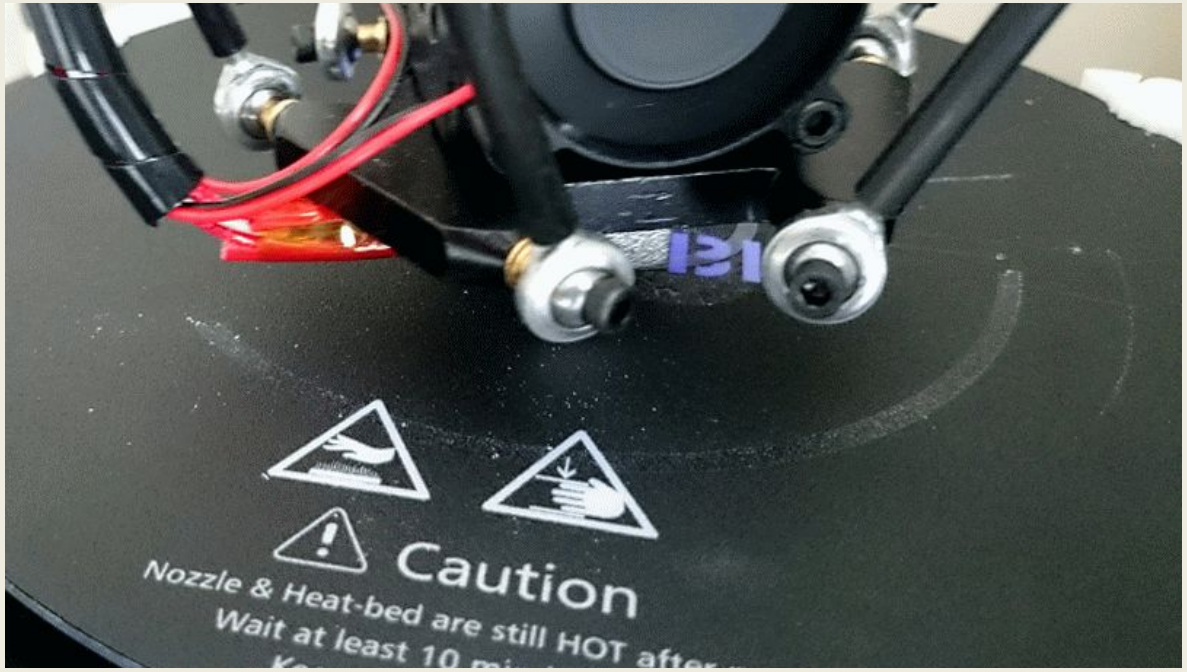


Stringing

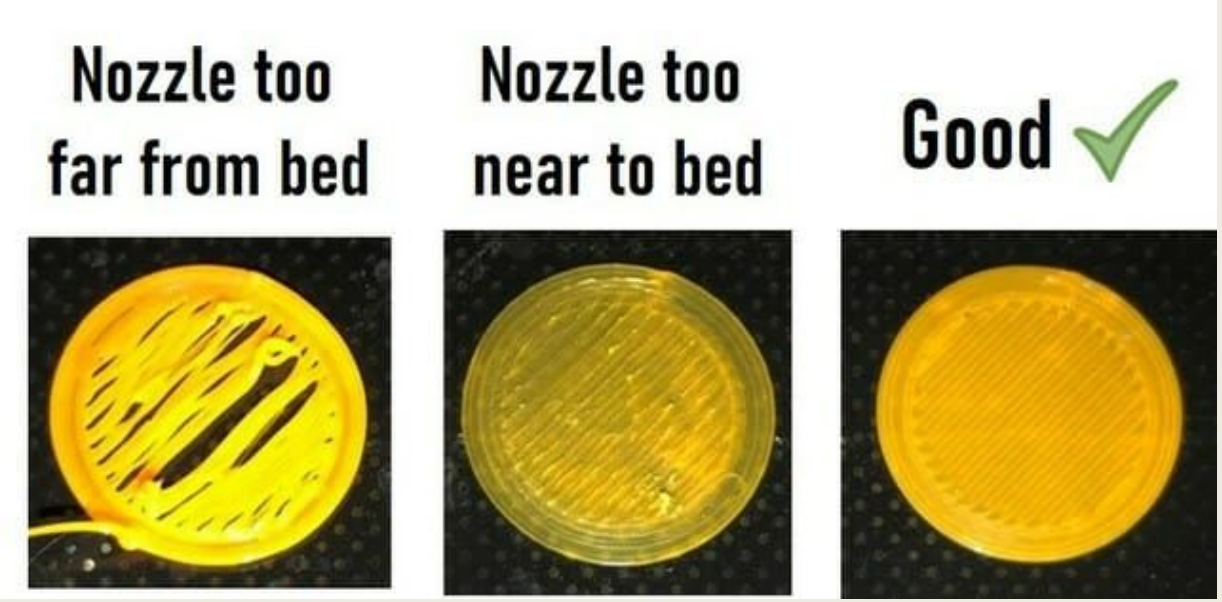


Nozzle Blocked

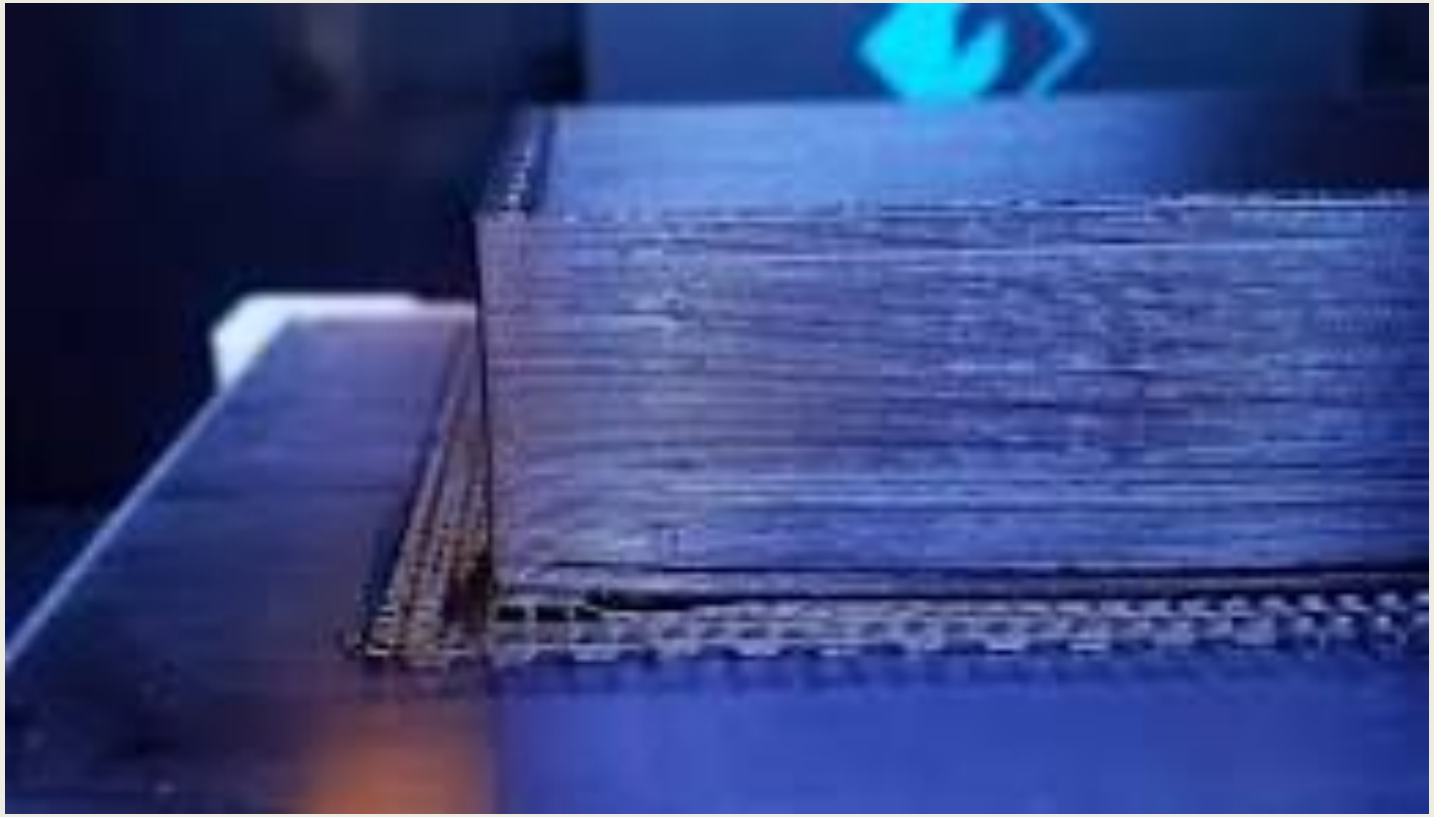
Common Printing Issues



Nozzle grinding



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

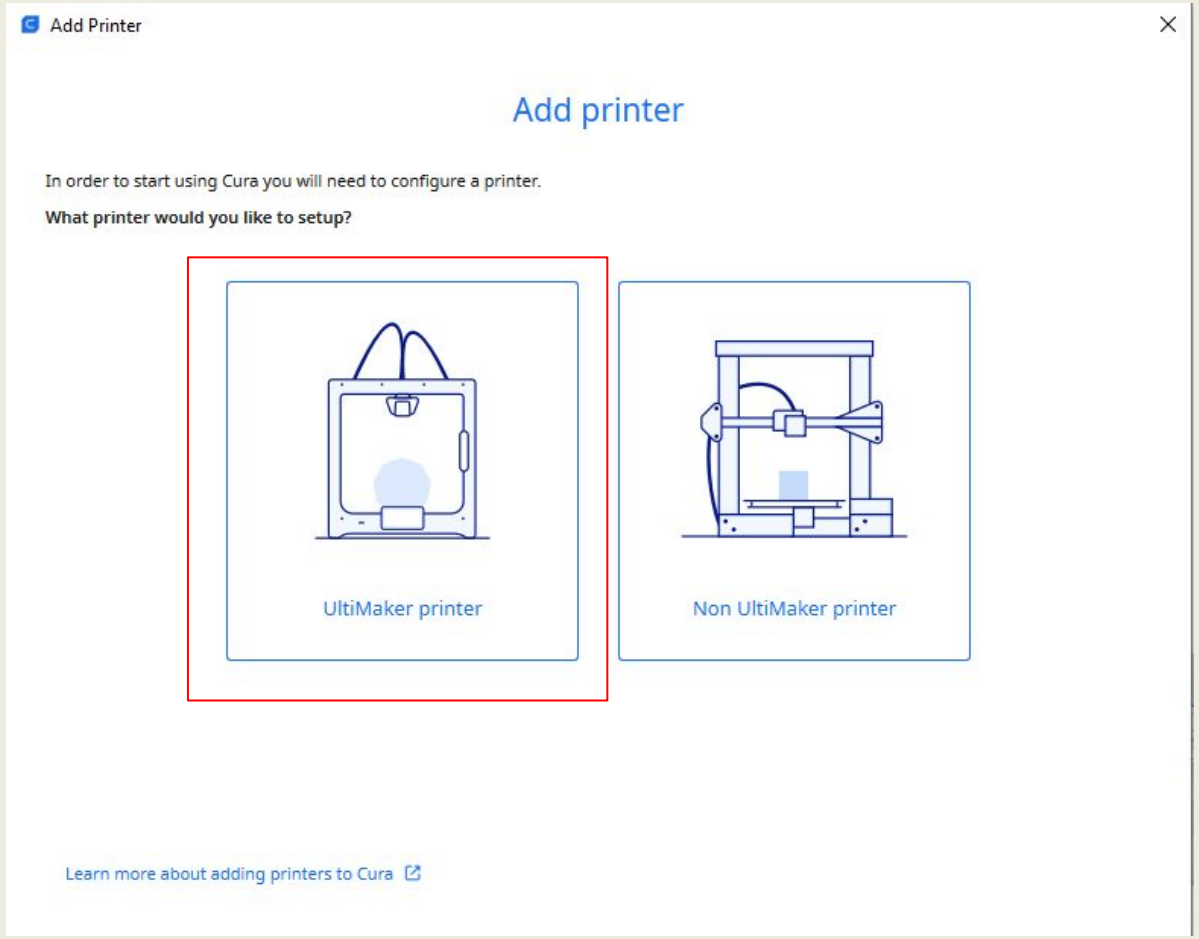
www.cgtrader.com

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

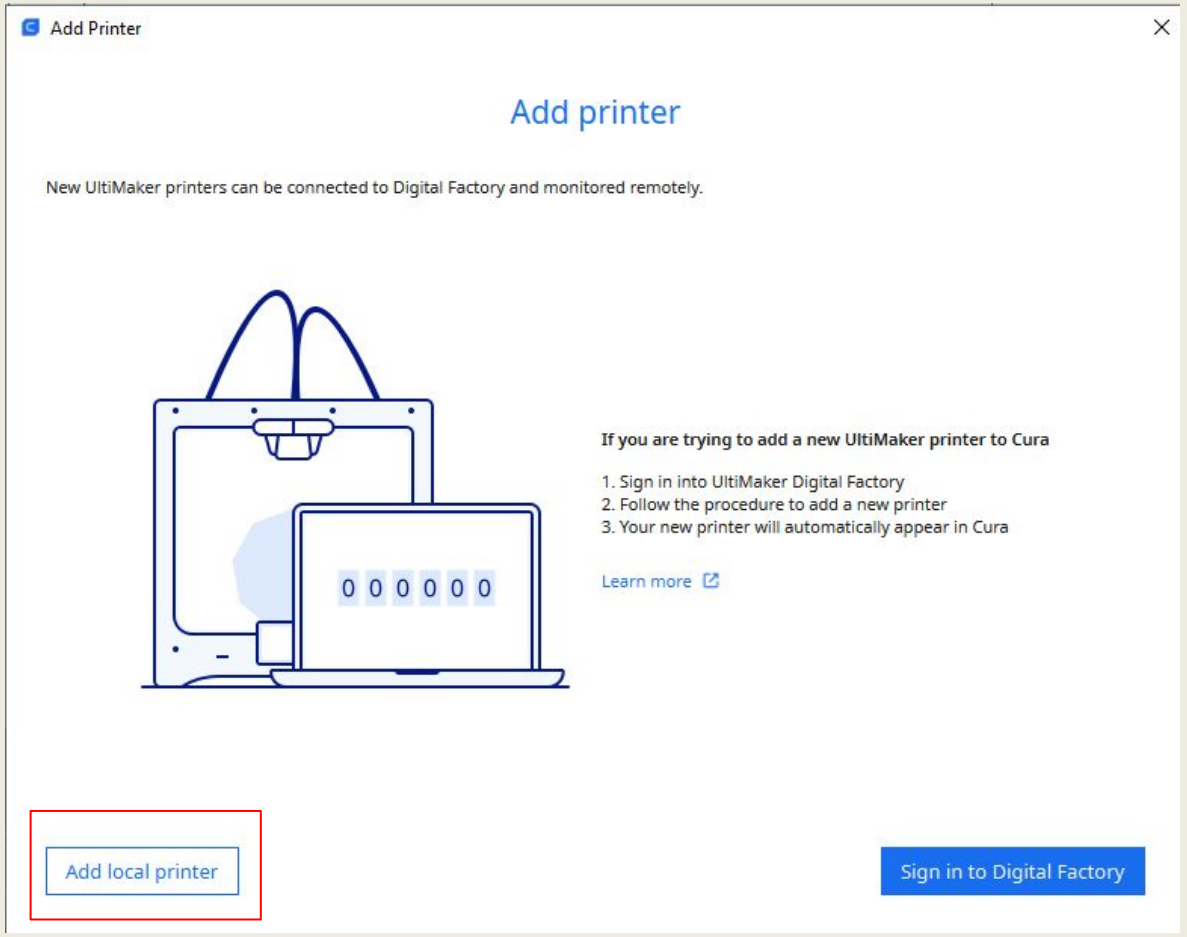
Introduction to Cura’s Printing Menu

Ultimaker Cura Set Up

Step 1
Select:
Ultimaker Printer

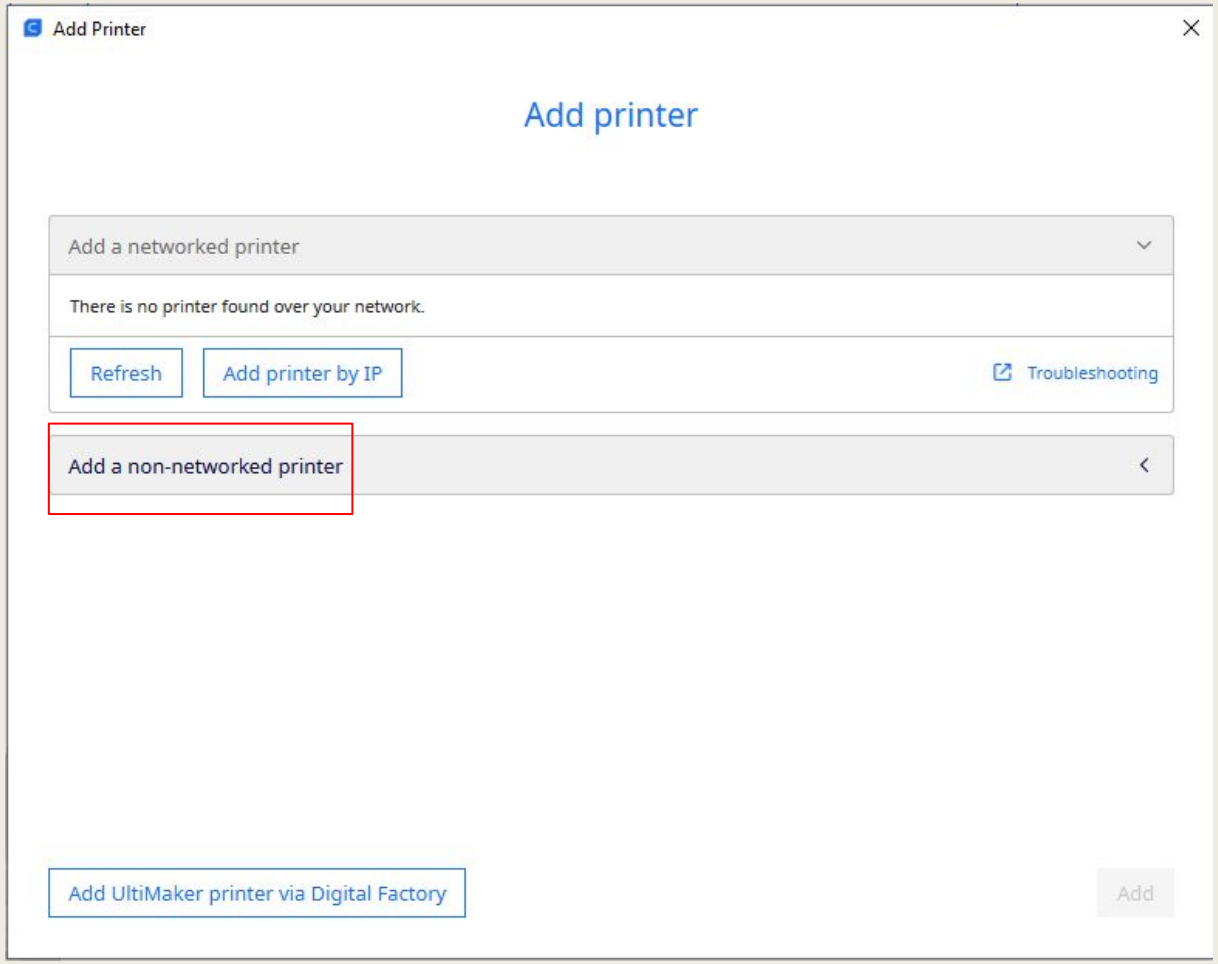


Step 2
Select:
Add Local Printer



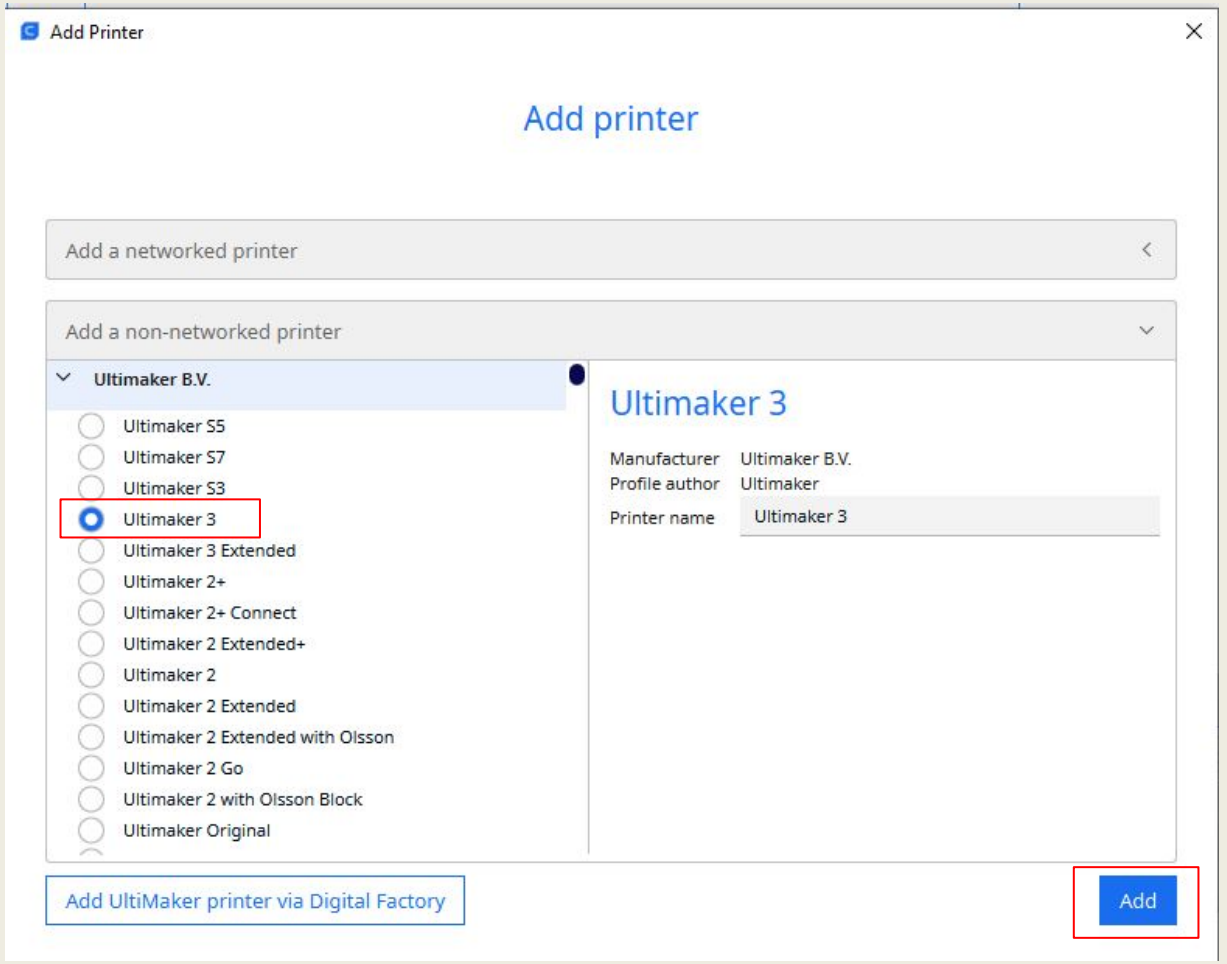
Step 3

Select:
“Add a non-networked printer”

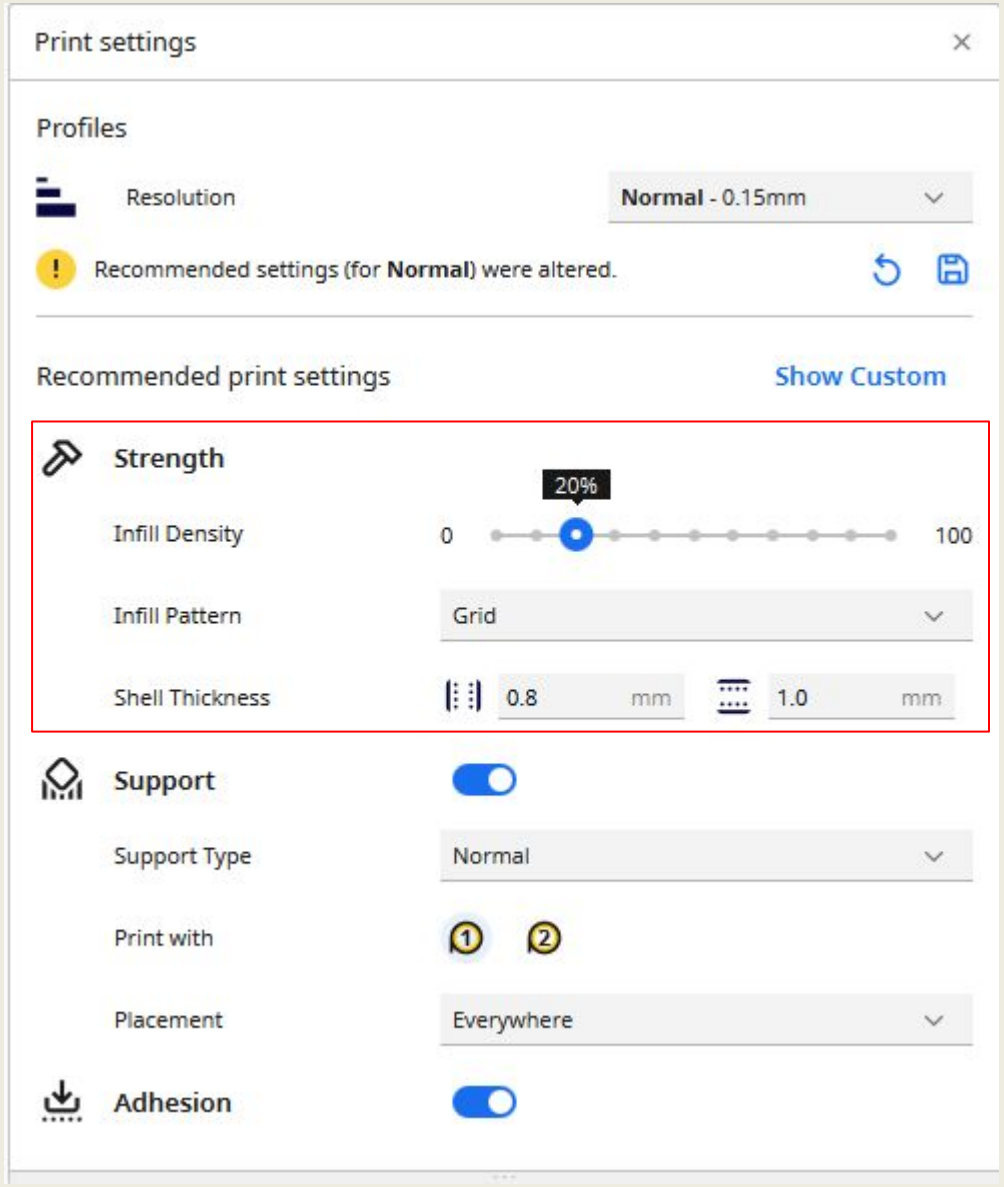


Step 4

Select:
“Ultimaker 3 & Add”

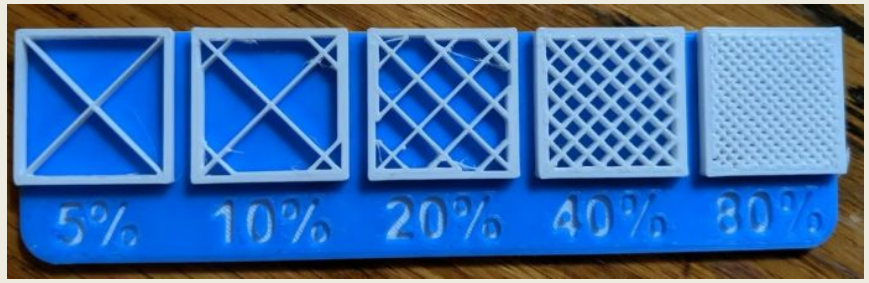


A Guide to Infill

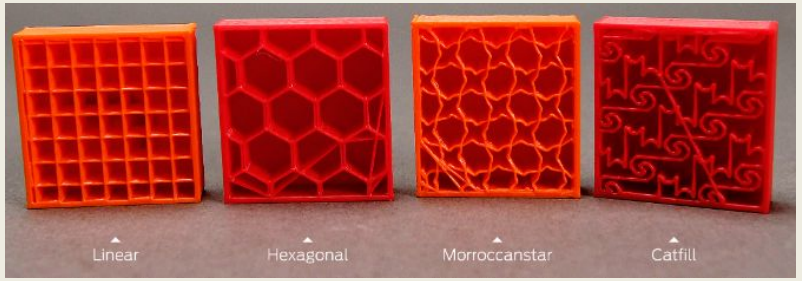


Infill refers to “material that fills a space or hole”

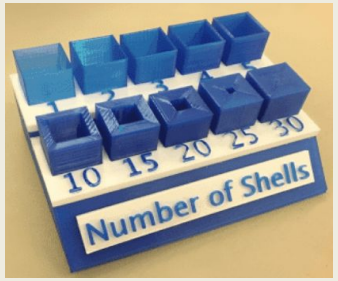
Density



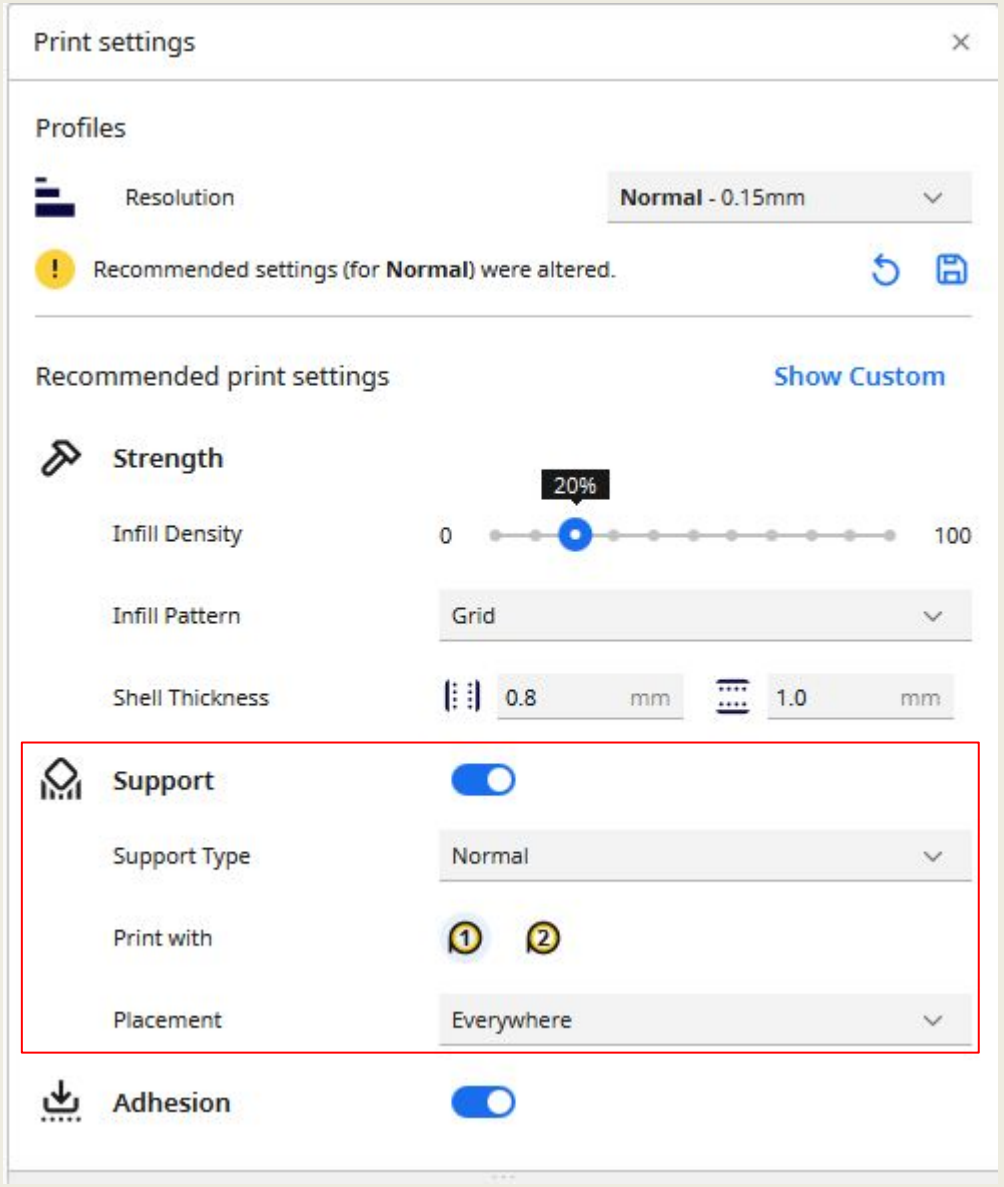
Pattern



Shell

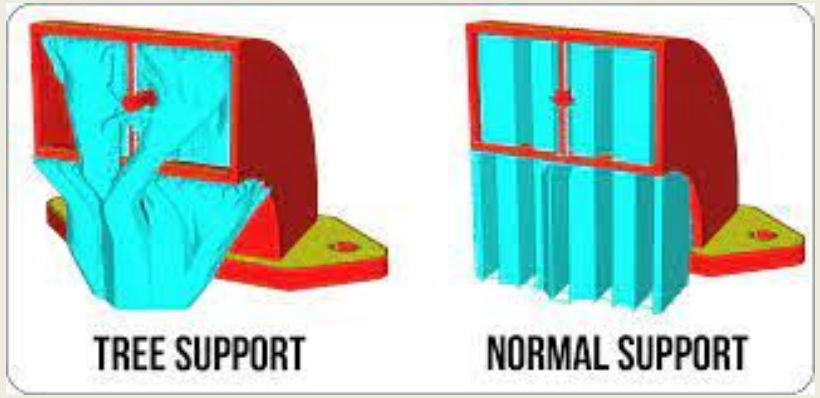


A Guide to Supports



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"

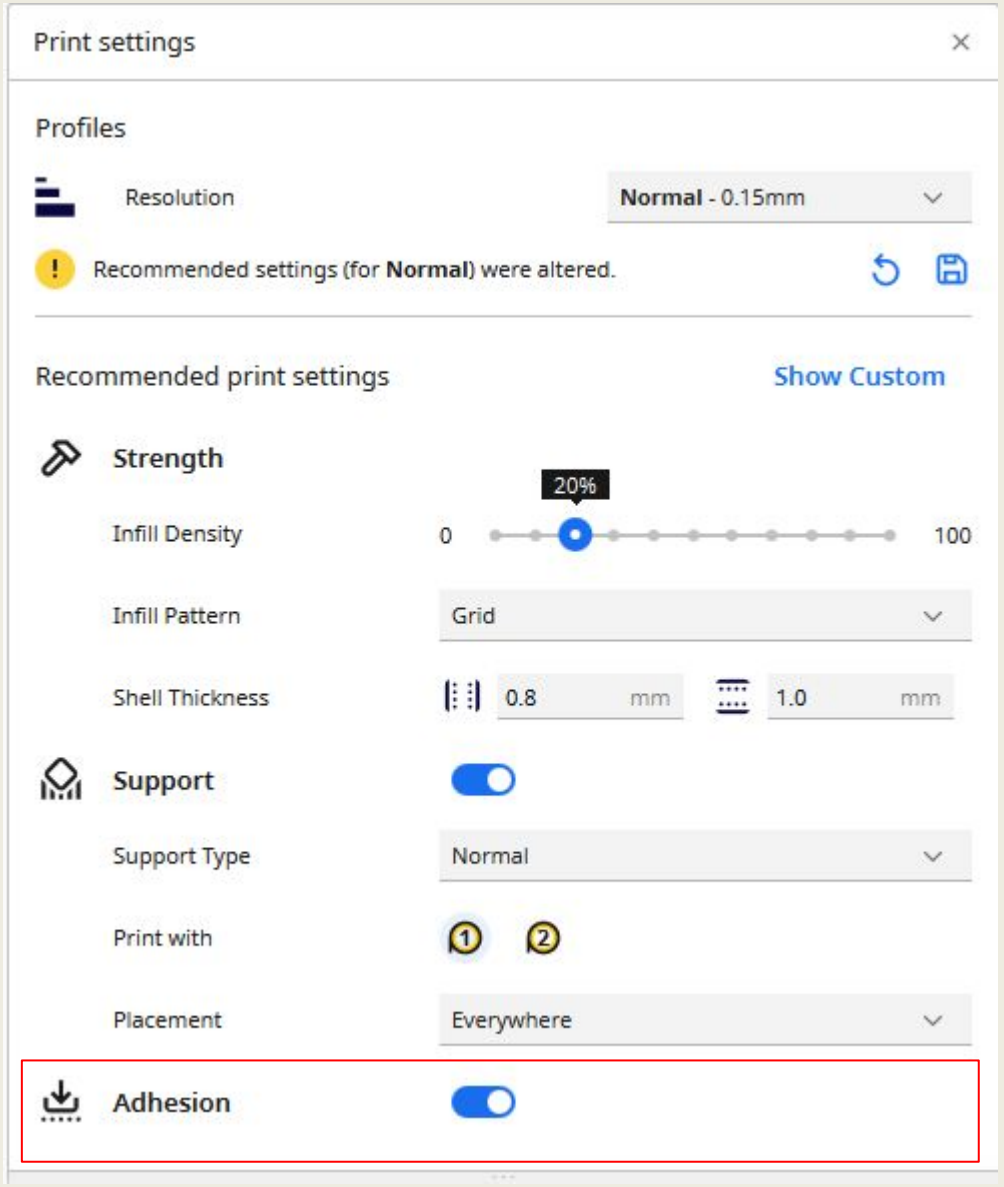
Support Types



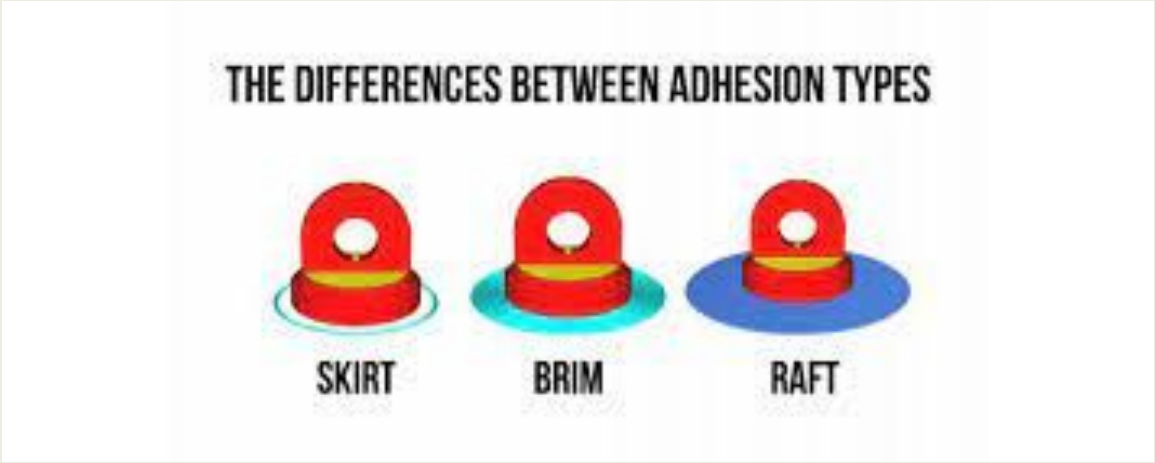
Placement Types

- 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.

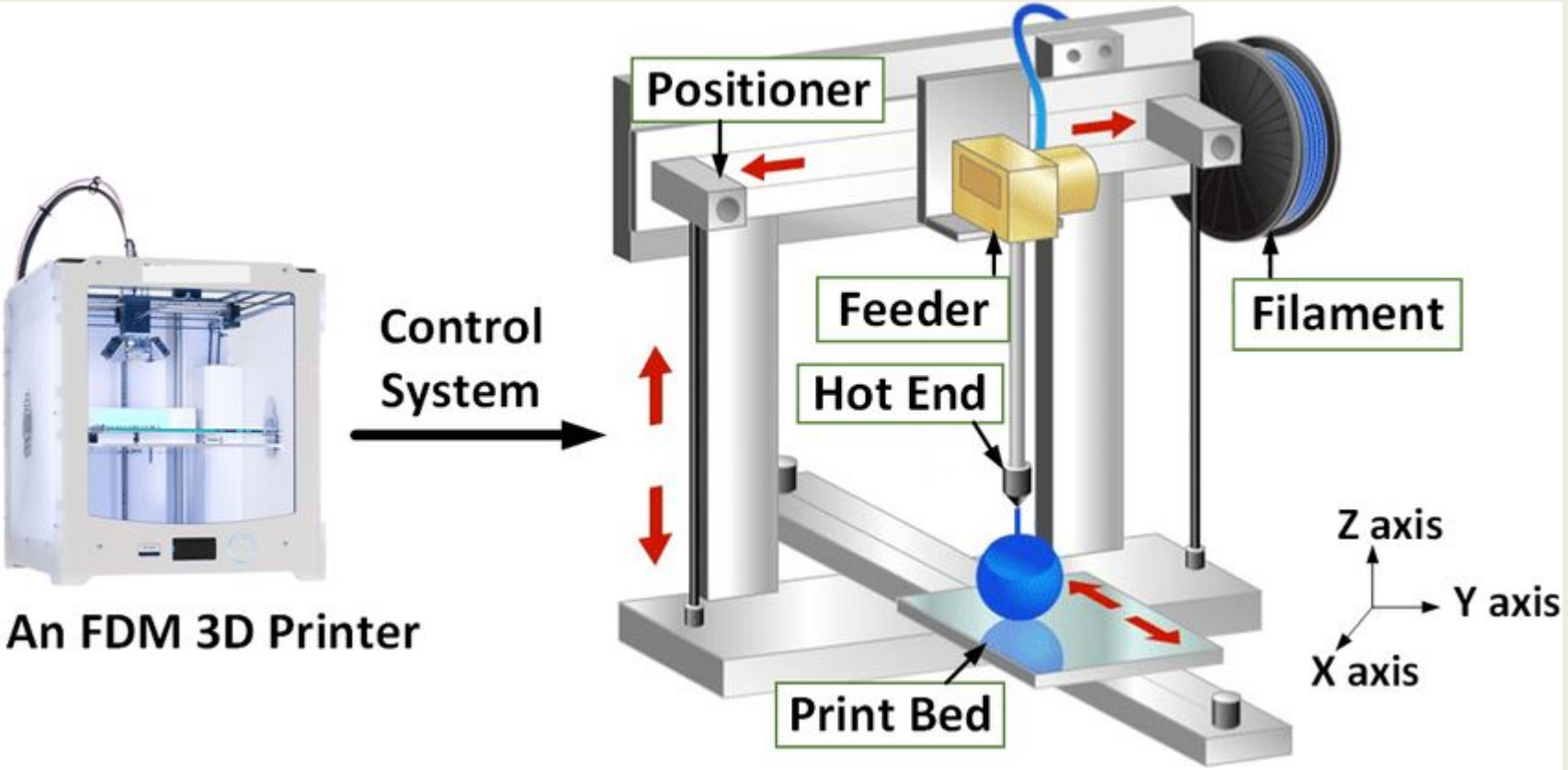
A Guide to Adhesion



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

sunwayroboticsclub@gmail.com