

# 3D Printing

Software and Design Projects

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<https://http://bit.ly/3dp3rtsoftware>

# 3D Printing

How it's Made

The Ultimate Beginner's Guide to 3D Printing

# What can be 3D Printing



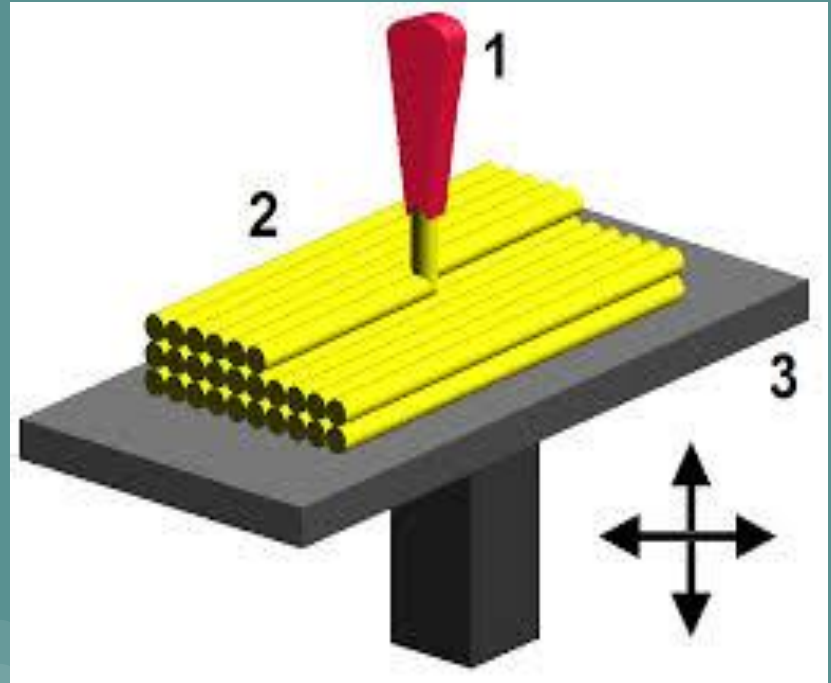
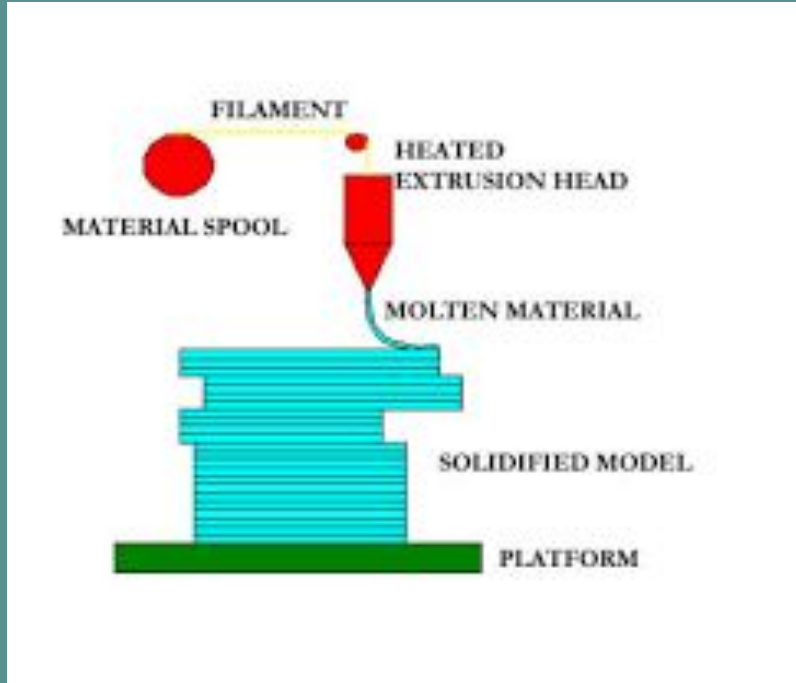
# Types of 3D Printers

1. Fused deposition Modeling (FDM)
2. Stereolithography (SLA)
3. Digital Light Processing (DLP)
4. Selective Laser Sintering (SLS)
5. Selective Laser Melting (SLM)
6. Electronic Beam Melting (EBM)
7. Laminated Object Manufacturing (LOM)
8. Binder Jetting (BJ)
9. Material Jetting (MJ)

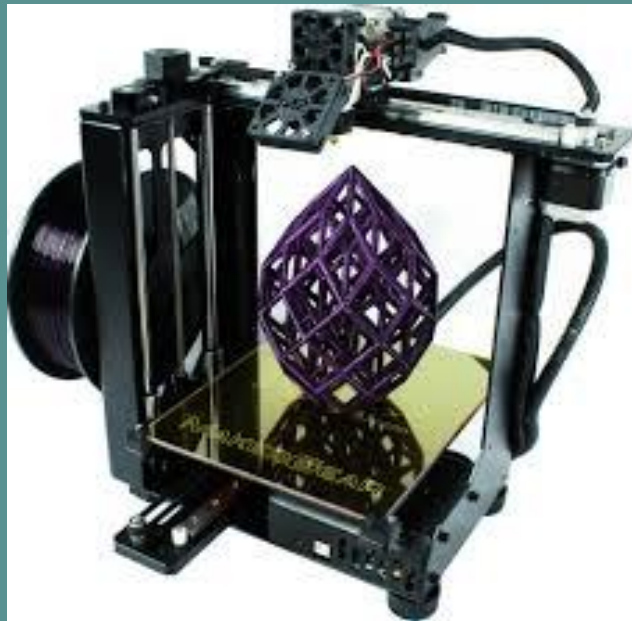
# 3D Printing Process



# How 3D FDM Printing Works

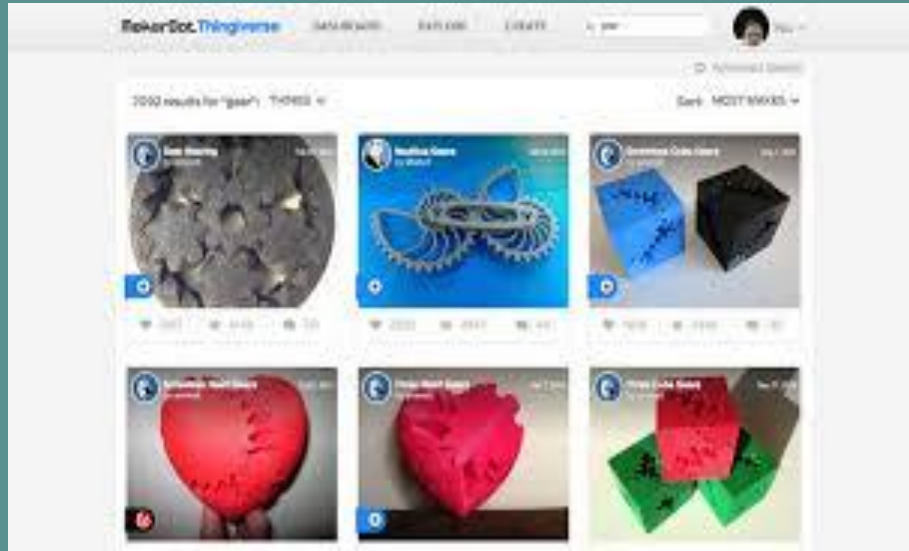


# Printers



# Implementation

Thinkiverse



MyMiniFactory

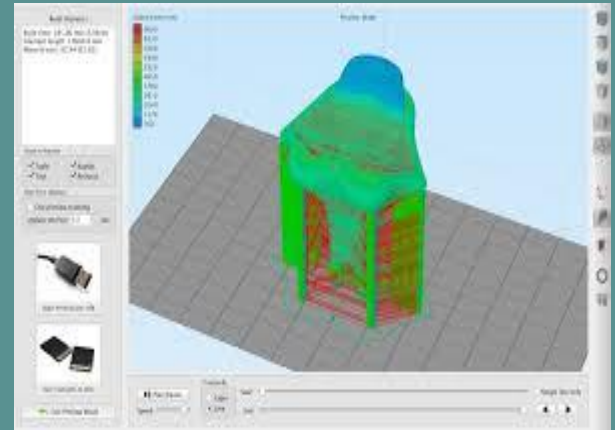


Allow time to test and play



# Slicing Software

## Simplify 3D



# Bridging and Overhangs



45 Degree or less no support more must have support

**45°  
Rule**



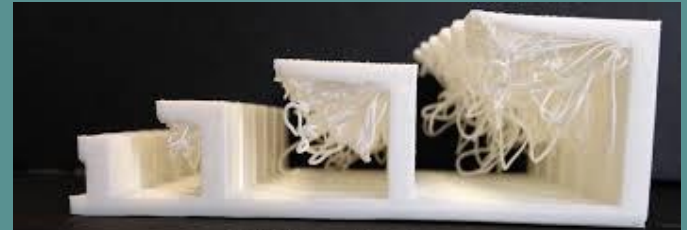
angle < 45°



angle = 45°

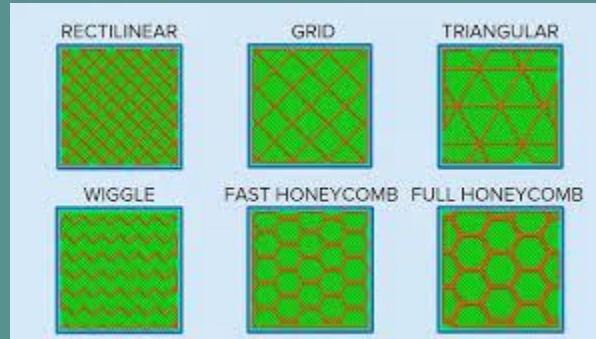


angle > 45°  
support filament needed



Failed Horizontal Overhangs

# Infills

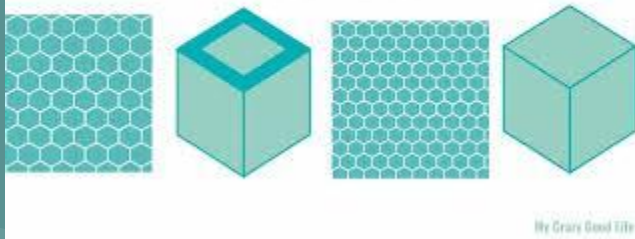


Infills 0% to 99%

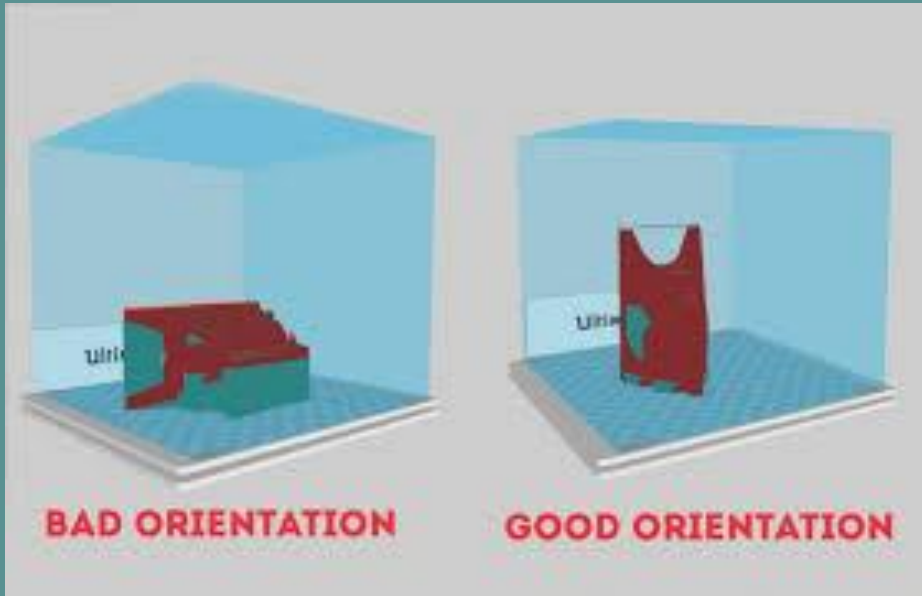
perimeter/shells

Bottom and Top  
Layers

## Infill vs. Shell



# Object Orientation



Use the least amount of support and overhang as possible.

Think about strength in layer position.

# 3D Filament Types



[all3dp website](#)

# File types and slicing types



***G-CODE***

```
26 ;Layer count: 336
27 ;LAYER:0
28 M107
29 G0 F9000 X91.800 Y93.520 Z0.300
30 ;TYPE:SKIRT
31 G1 F1200 X92.617 Y92.870 E0.01964
32 G1 X93.518 Y92.412 E0.03865
33 G1 X94.458 Y92.141 E0.05705
34 G1 X95.218 Y92.072 E0.07141
35 G1 X95.998 Y92.064 E0.08608
36 G1 X96.894 Y92.071 E0.10294
37 G1 X98.900 Y92.070 E0.14067
38 G1 X100.514 Y92.071 E0.17103
39 G1 X101.565 Y92.065 E0.19080
40 G1 X102.277 Y92.081 E0.20420
41 G1 X102.421 Y92.091 E0.20691
42 G1 X103.374 Y92.066 E0.22484
43 G1 X103.774 Y92.065 E0.23237
44 G1 X104.490 Y92.070 E0.24584
45 G1 X106.878 Y92.069 E0.29076
```

A blue rectangular box with the text "OBJ" in white, bold, sans-serif font. The box is positioned above a 3D wireframe cube. The entire icon is set against a light gray background with a subtle shadow effect.

**OBJ**

# Key design considerations for 3D Printing

- 3d Printing Design
- Sites to help with what can be done
  - Thingiverse
  - MyMiniFactory

# CAD (Computer Aided Design) Software

- TinkerCad (Beginners)
  - TinkerCAD youtube channel
  - Strongsville Middle School Makerspace Resources
- Solidworks (Used at High School)
- Autodesk Fusion 360 (Used at High School)
  - Autodesk youtube channel
- Google Sketchup
  - Sketchup youtube channel

All3dp website for CAD software



# Projects

- [Lithophanes](#)
- [Kimberly Scott Presentation](#) Math Class at High School
- [50 Cool projects for 3d printers](#)
- [55 Amazing 3d printer projects](#)
- [3D Printed Mechanisms](#)

# Resources

- Fablabs & MakerSpaces
- YouTube
  - [Maker Muse](#)
  - [3D Printing Nerd](#)
  - [MatterHackers](#)
  - Searches based on details of how to.
  - If video has ads in it the vendor supplied the product
- Blogs & Sites
  - [Simplify3D](#)
  - [3D Printing for Beginners](#)
  - [All3DP](#)
  - [Google+ Communities](#)
  - [MakerGear](#)
  - [Inventor Cloud](#)
  - [Case Western Reserve thinkbox](#)