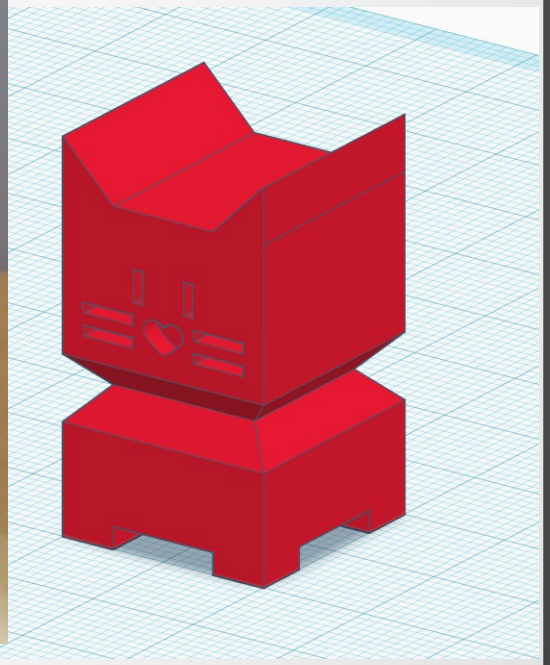
3D Design and Printing

- 3D Printing
  - Different Types
  - How it works
  - Types of Materials
  - Designing for 3D printing



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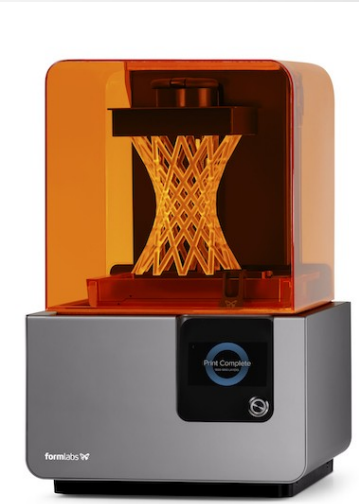
Types of 3D Printers

- Fused Filament Fabrication (FFF)
  - Melt plastic filament with heat (Youtube)

- Stereolithography (SLA)
  - Turn liquid plastic into solid plastic using light (YouTube)



- Selective Laser Sintering (SLS)
  - Melt plastic powder with laser (YouTube)

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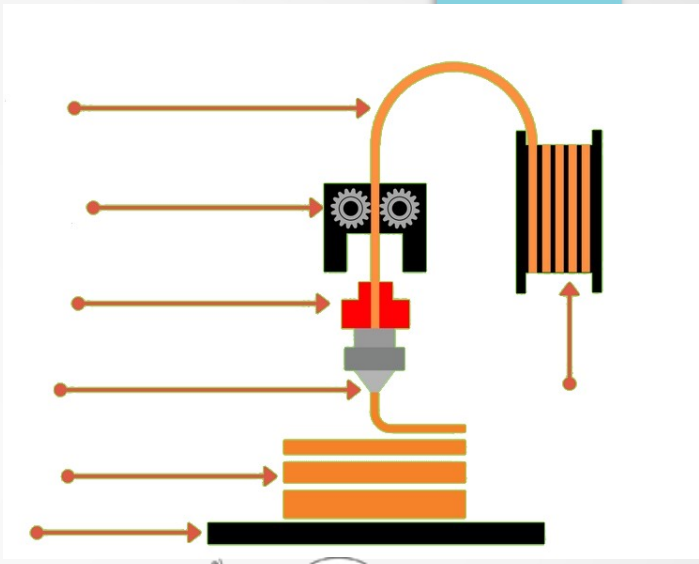
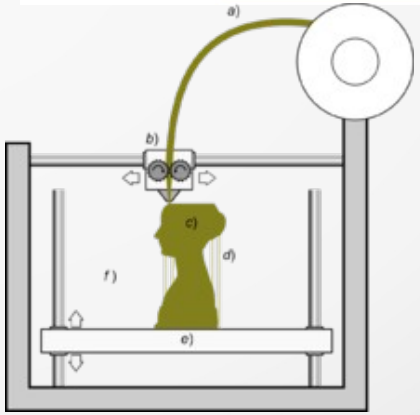
Fused Filament Fabrication (FFF)

- What we'll be using today!
- Melts a plastic filament and eject it out a nozzle
- Motors move the print head around, creating the desired shape





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Types of Materials

Type	Remarks
PLA	Polylactic Acid. Most common type. Strong and easiest to print, but brittle and soften easily at high temperature.
ABS	Acrylonitrile Butadiene Styrene. Very common plastic (eg. Lego, household appliances). No longer commonly used in 3D printing due to printing difficulties.
PETG	Polyethylene Terephthalate Glycol. Tougher and more flexible than PLA. Almost as easy to print as PLA.
ASA	Acrylic Styrene Acrylonitrile. Tolerate higher temperature than PLA, good resistance to outdoor environment. Can be difficult to print.
TPU	Thermoplastic Polyurethane. Soft and flexible. Good for making tires and phone casing. Can be difficult to print.

Many other types, but less commonly used.

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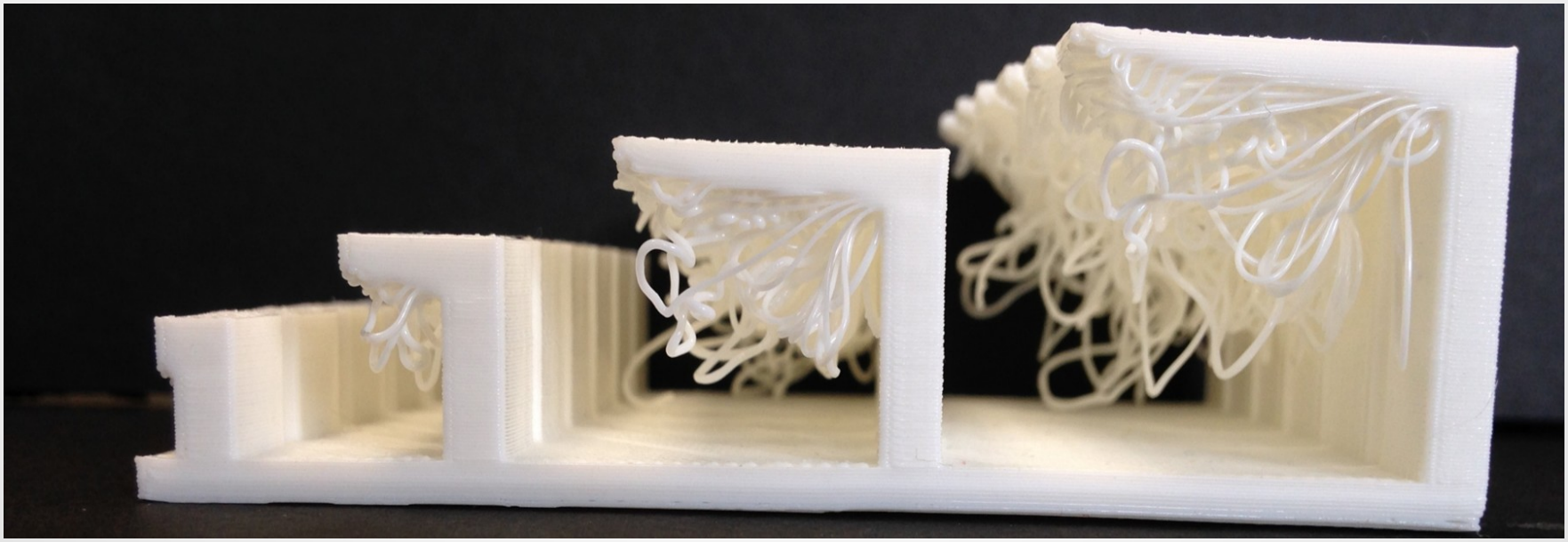
Designing for 3D Printing

Overhang

Good	OK	Bad
		



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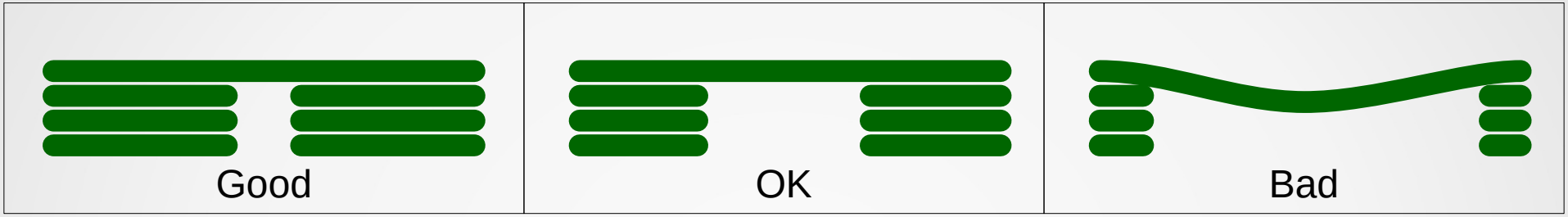
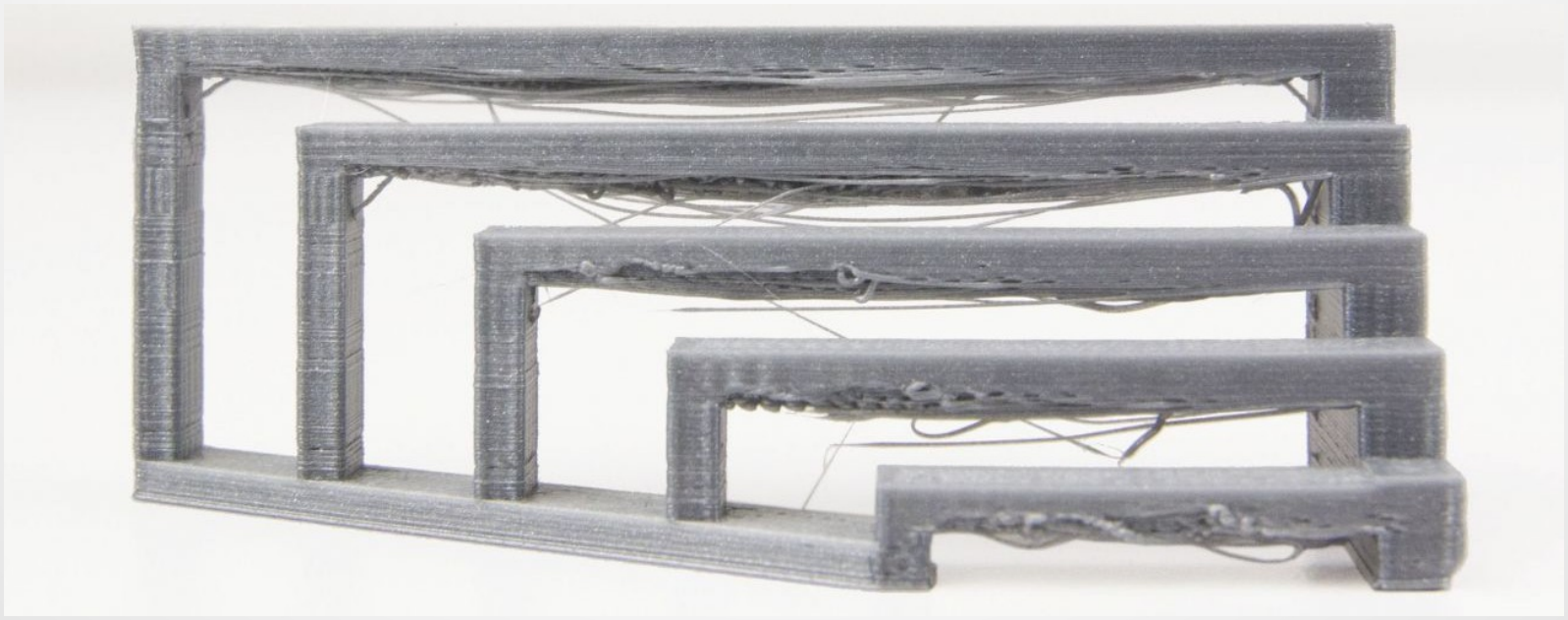
Bridge





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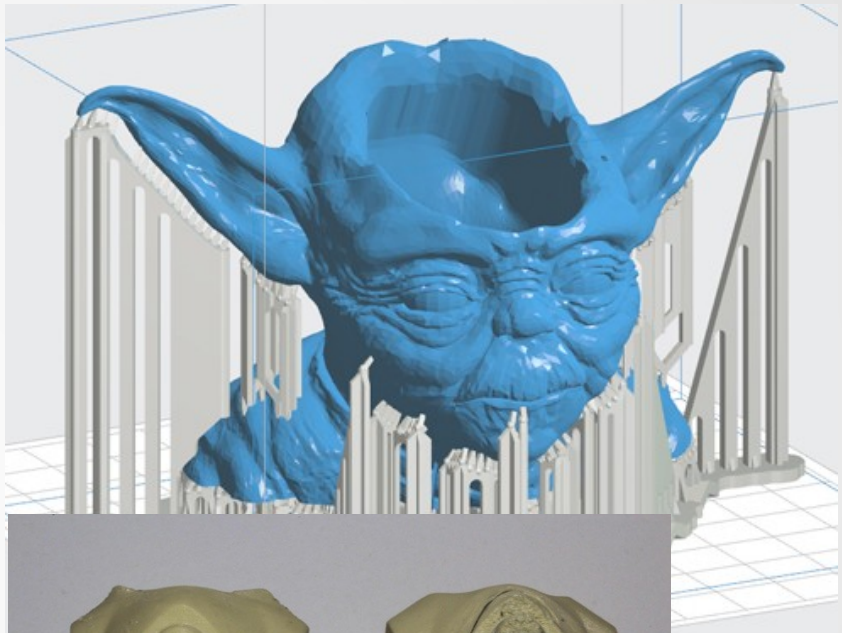
Support



Support prevents top layers from drooping down...

...but can make surface rough

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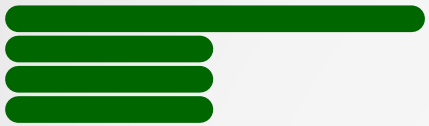
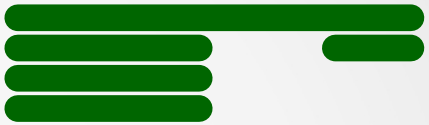


Good to have support

Good to have support



Must have support

Why must have support?

1st layer

2nd layer

3rd layer

Nothing below this part, it will drop to the ground!

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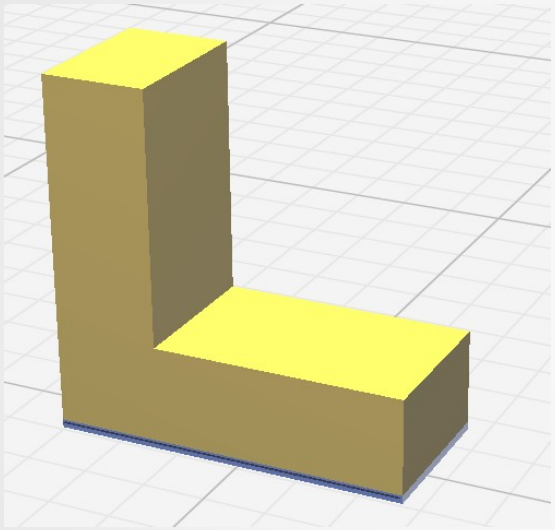
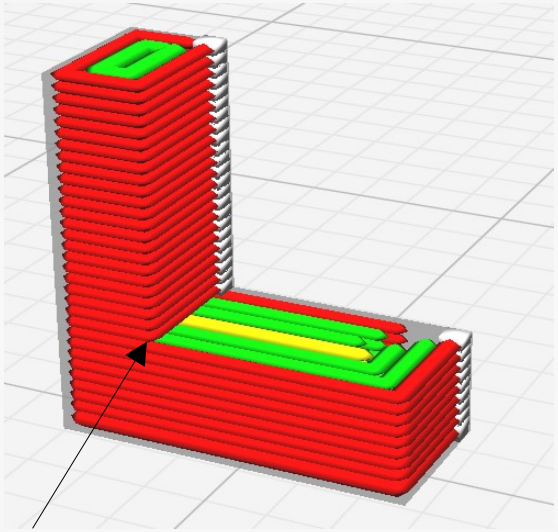
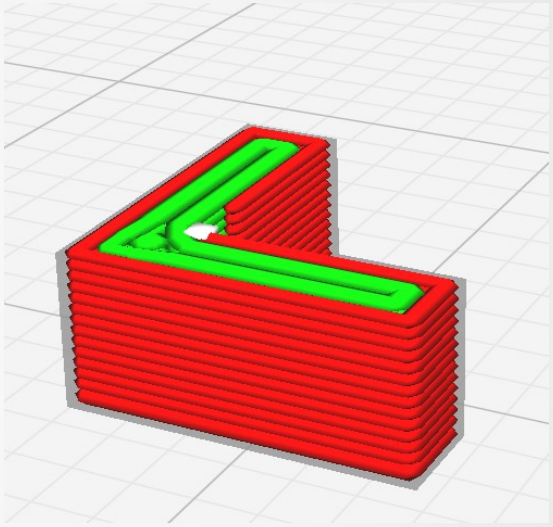
Print Orientation Matters!





Weak! Likely to break here.



Much stronger!

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Thank You!

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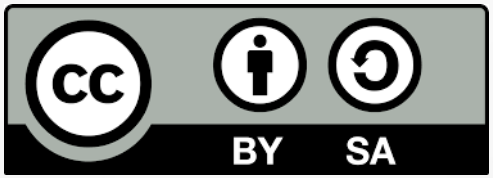

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