

3D Printing

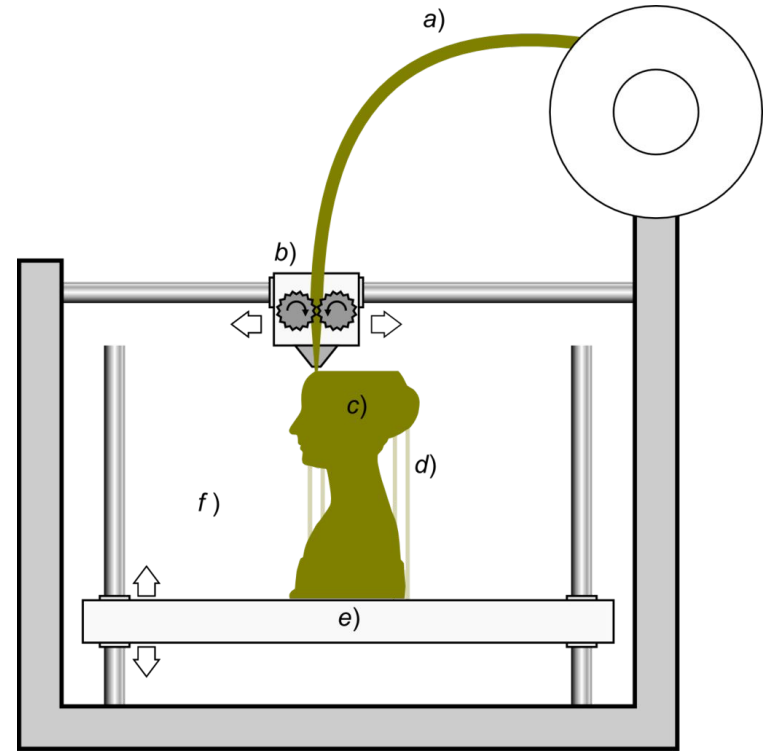
John Blackman
07/26/2021

Applications

- Rapid Prototyping
 - Cheaper and faster than other methods
- Producing odd shaped components or components with complex internal features
- Low cost manufacturing

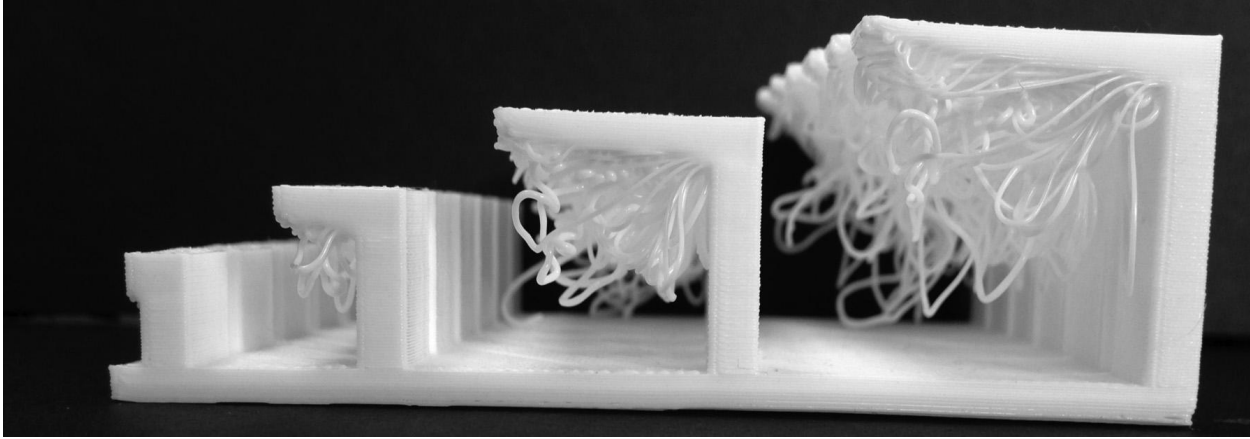
3D Printing Methods

- FDM (Fused Deposition Modeling)
 - Most common and cheap. Filament extruded in layers.
- SLA (Stereolithography)
 - Resin deposited and then hardened by a laser.
- SLS (Selective Laser Sintering)
 - Uses a laser to melt powders together.
- DMLS (Direct Metal Laser Sintering)
 - Similar process to SLS, but much higher temperatures



By Paolo Cignoni - Own work, CC BY-SA 4.0

Design Considerations

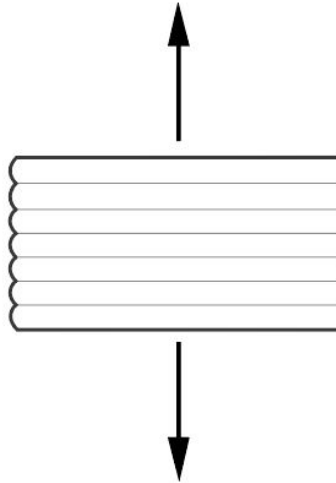


- Avoid large overhangs and unsupported features.
- If this is unavoidable, supports can be added

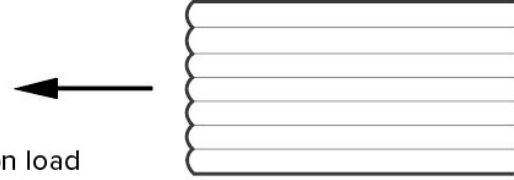
Design Considerations

Print orientation affects strength

Tension load
normal to layers
Part is weak



Tension load
parallel to layers
Part is strong



Hubs.com

Design Considerations

Different material choices change the characteristics of the print:

- PLA
 - Most common, cheap, easy to print. Not very strong
- ABS
 - Stronger than PLA, still easy to print and higher melting point
- Resin
 - Higher Detail
- Metals, carbon fiber, kevlar
 - Expensive, specialized machines needed

3D printers can be cheap!

- Basic FDM printers can be less than \$200

