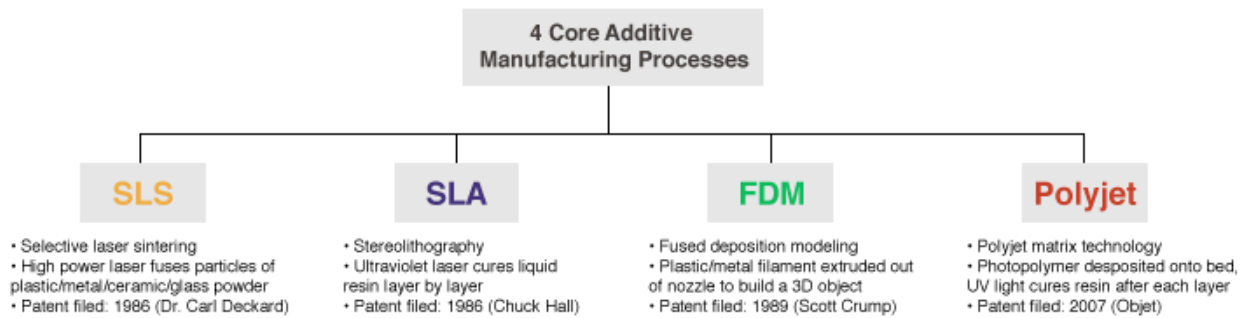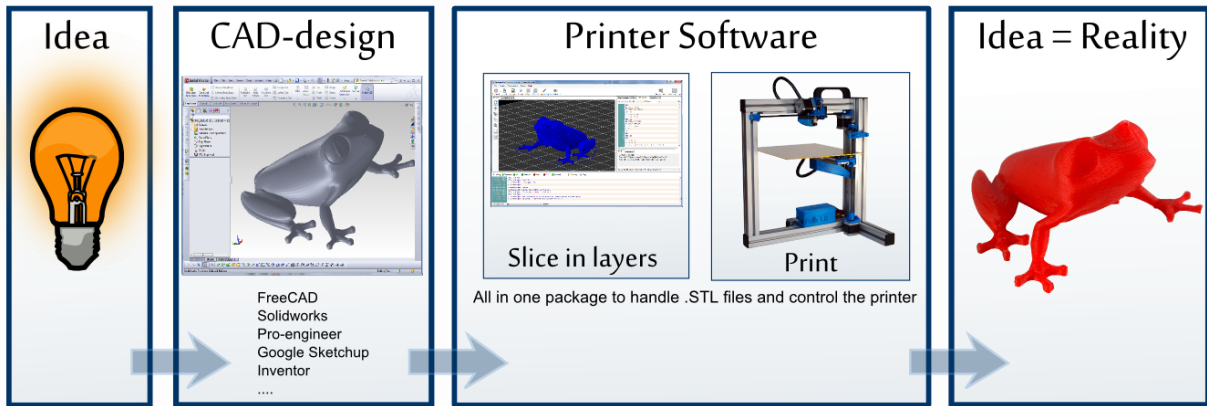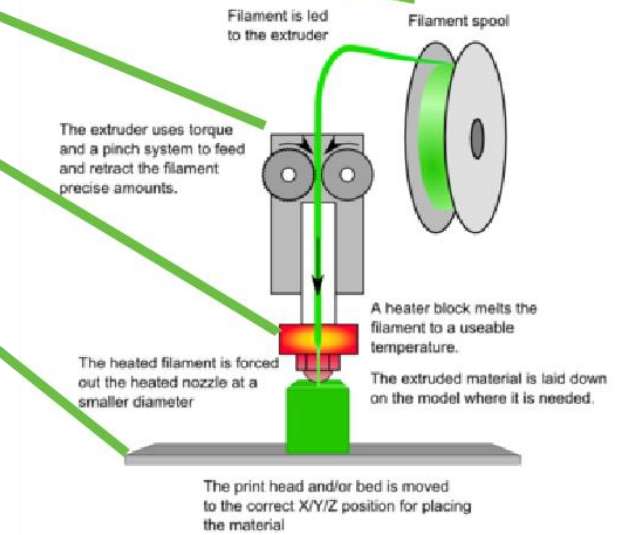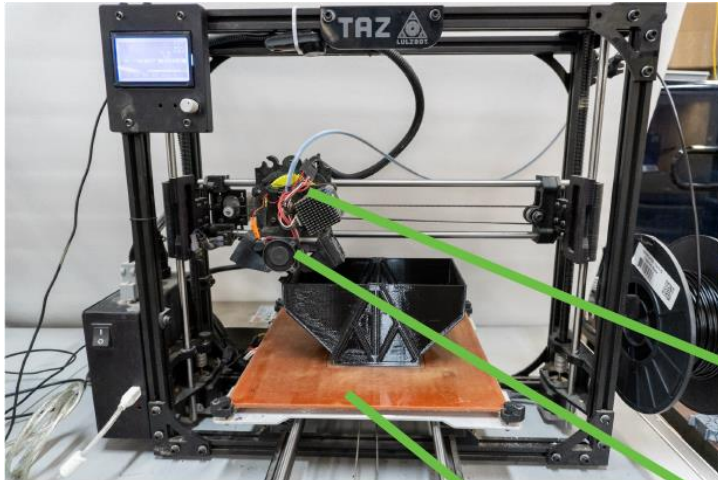**The Pikes Peak Makerspace**

We are a membership composed of Builders, Tinkerers, Engineers, Artist, Entrepreneurs, Designers, Educators all mashed up and revolutionizing creativity in the Pikes Peak Region.

Intro To 3D Printing

Overview

Idea

CAD-design
FreeCAD
Solidworks
Pro-engineer
Google Sketchup
Inventor
....

Printer Software
Slice in layers
Print
All in one package to handle .STL files and control the printer

Idea = Reality

4 Core Additive Manufacturing Processes

SLS
- Selective laser sintering
- High power laser fuses particles of plastic/metal/ceramic/glass powder
- Patent filed: 1986 (Dr. Carl Deckard)

SLA
- Stereolithography
- Ultraviolet laser cures liquid resin layer by layer
- Patent filed: 1986 (Chuck Hall)

FDM
- Fused deposition modeling
- Plastic/metal filament extruded out of nozzle to build a 3D object
- Patent filed: 1989 (Scott Crump)

Polyjet
- Polyjet matrix technology
- Photopolymer desposited onto bed, UV light cures resin after each layer
- Patent filed: 2007 (Objet)

FDM 3D Printing

Filament is led to the extruder

Filament spool

The extruder uses torque and a pinch system to feed and retract the filament precise amounts.

A heater block melts the filament to a useable temperature.

The heated filament is forced out the heated nozzle at a smaller diameter

The extruded material is laid down on the model where it is needed.

The print head and/or bed is moved to the correct X/Y/Z position for placing the material

Do not touch Extruder or Bed when heated up. Very hot and will burn you.

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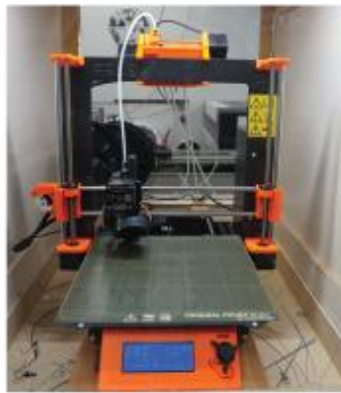
3D Printers

Prusa MK2 (Haywire)

1.75mm Filament
250x210x200mm
build volume
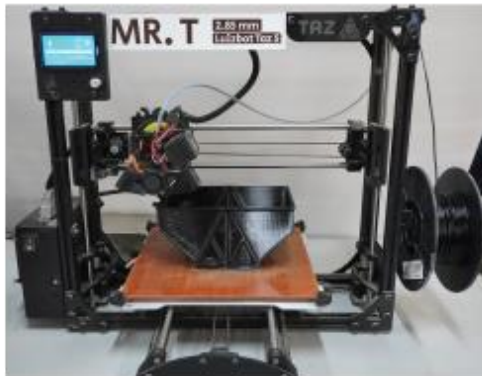
Prusa MK3S MMU2 (Medussa)

1.75mm Filament
250x210x200mm
build volume
multi-material 5 colors

Mono Price Mini

1.75mm Filament
120x120x120mm
build volume
PLA only

TAZ 5 (MR.T)

2.85mm Filament
.5mm nozzel
280 x 280 x 260mm build volume
.1mm - .3mm layer height

TAZ 5 (Tizzy)

2.85mm Filamen
1.3mm nozzel
280 x 280 x 260mm Build volume
.6mm - 1mm layer height

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Prusa Slicer

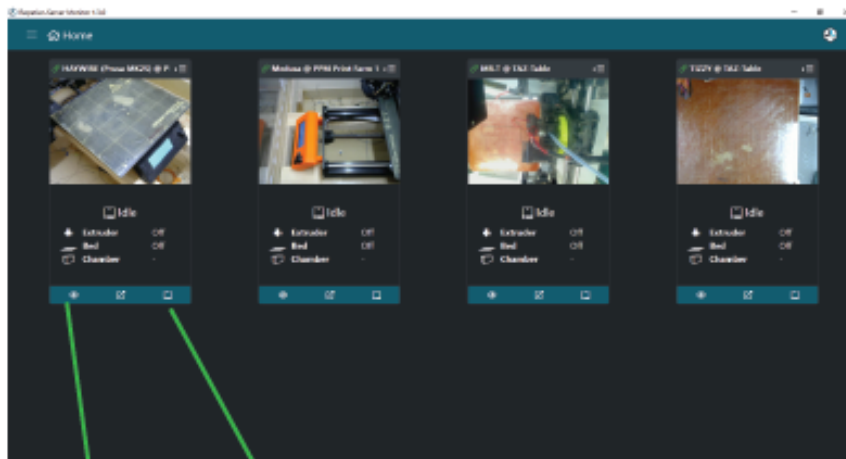Please name your exported Gcode with your name and part name.

E.g.   Bob Marley_Toy boat. Gcode

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Repetier Server Monitor

Printer Status   Open printer

Print Queue page

Upload Gcode

Start Print/Add to queue

Print Queue page

Part Printing

Upload Gcode to Queue

When part is done start next part

Parts in Queue

TAZ Filament change

First, make sure hot end is up to temp for your plastic.

Flip up tension block.

Release the idler arm

Pull out filament.
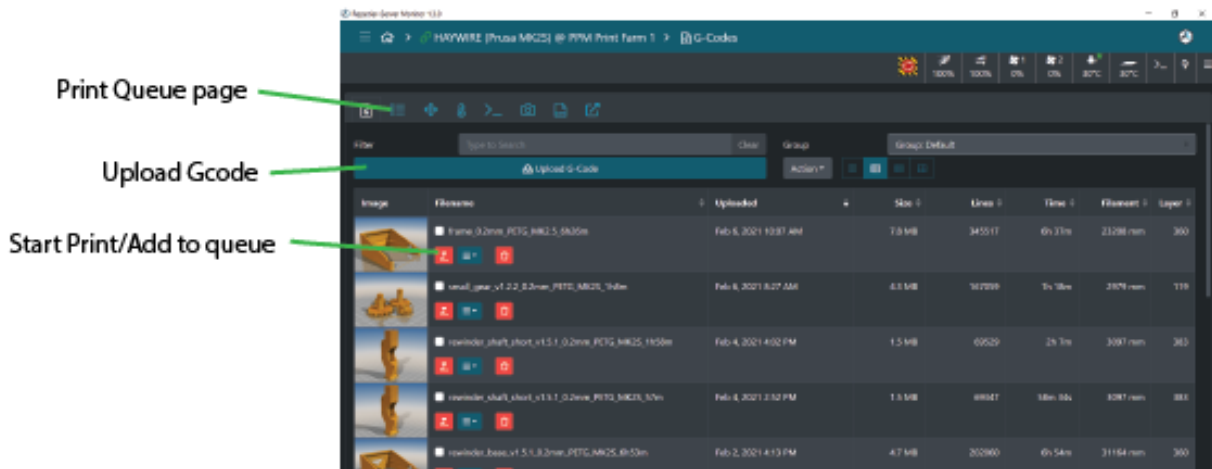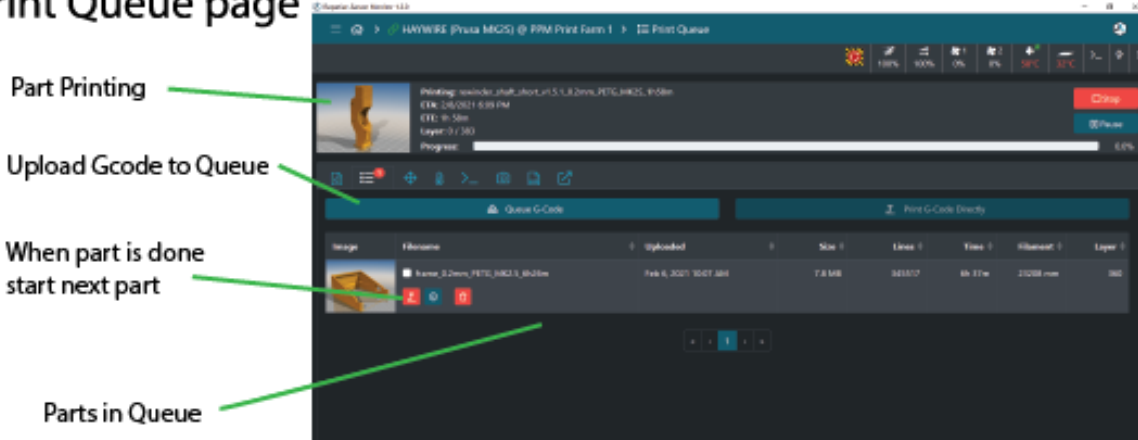Reverse process to load filament.

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Filament Gear Cleaning

Toothed bolt that can become full of stripped filament

If you try to extrude while the hotend is not heated you will gunk up this bolt until it doesn't have enough grip on the filament to extrude

Use wire brush to clean out before replacing filament

How to Avoid:
1. Always preheat hotend before removing filament
2. Use your hand or jog controls to extrude out all of the old filament
3. Set the temp for your new filament

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Prusa filament Change

1 Click Knob

2 Scroll down to unuload filament and remove filament from extruder
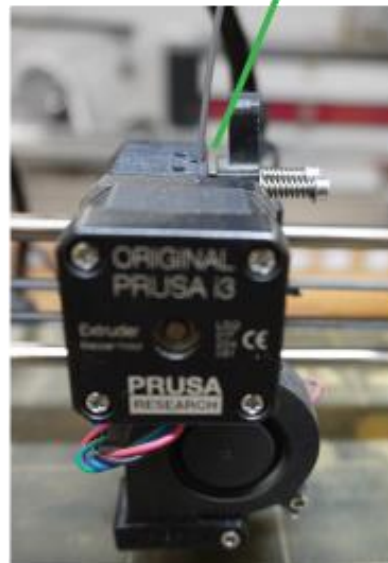
3 Cut Filament at angle with cutters

5 Click load filament while pushing filament into hole untill it starts pulling

4 push filament into hole

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Useful Links

3D Models

https://www.thingiverse.com/   Free printable 3Dmodels

https://grabcad.com/   Free 3d models

https://cults3d.com/   Free/paid 3d models

https://www.prusaprinters.org/   Free 3d models and prusa gcode

https://www.yeggi.com/   3D model search engine

https://www.youmagine.com/   Free 3D models

https://www.threeding.com/   Paid 3D models

https://repables.com/   Free 3D models

https://libre3d.com/   Free 3D models

Tools

https://convertio.co/   File Converter

http://www.greentoken.de/onlineconv/   3D model converter

https://www.scan2cad.com/   Pictures to vector file

3D modeling software(free)

https://www.autodesk.com/products/fusion-360/   Most advanced (**BEST**)

https://www.openscad.org/   Open source coding based

https://www.tinkercad.com/   Beginner browser based

https://www.sketchup.com/   intermediate