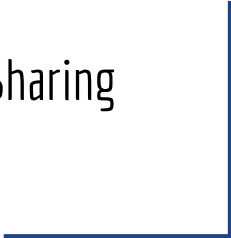


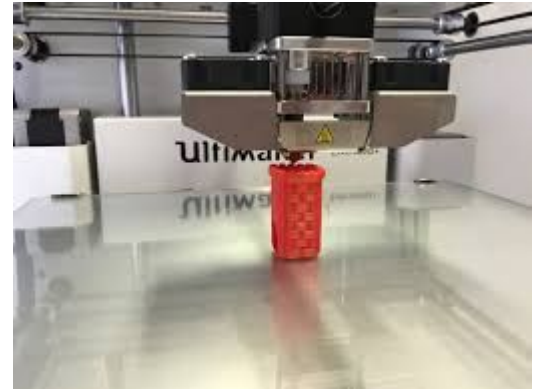
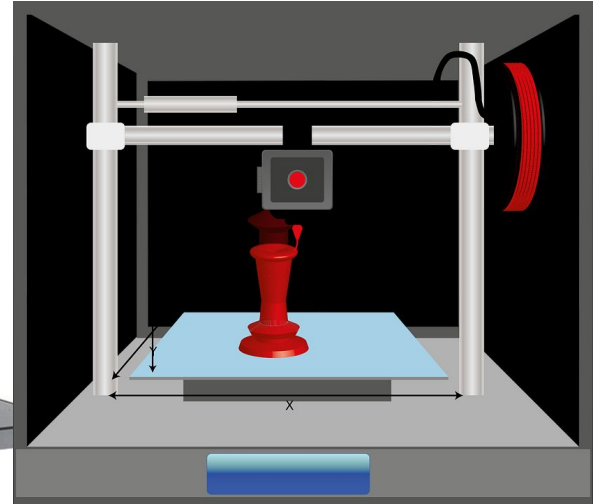
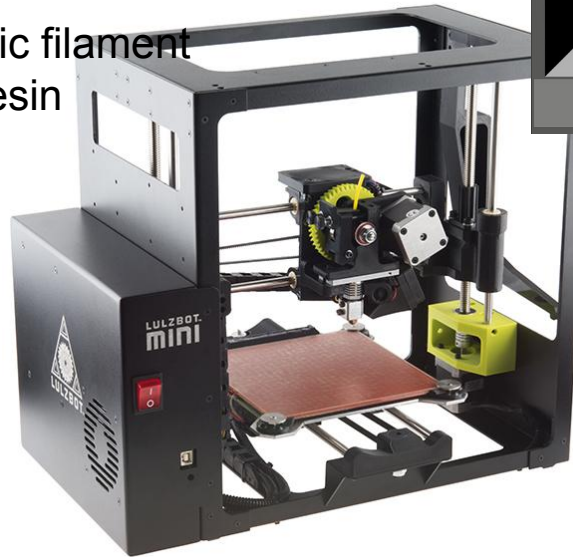
# Getting Started With 3D Printing

3D Printing and  
Thingiverse 3D Design Sharing



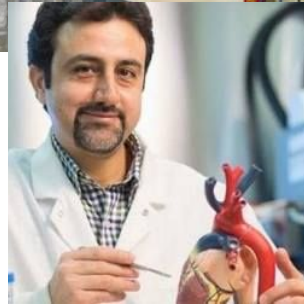
# What is a 3D print?

- Additive manufacturing
- Material is layered
- Two common methods
  - Most libraries use heat-extruded plastic filament
  - Light-cured liquid resin



# What's the Use?

- 21st Century Career and Job Skills
  - Industry Print-on-Demand
  - Armed Forces and Space
  - Healthcare applications
  - Design, Engineering, and Architecture
- Home Maintenance and Repair
- Entrepreneurship
  - Prototyping for manufacture
  - Jewelry models for casting
  - Wearable Tech
- In the library
  - Patron print on-demand
  - 3D printing and modeling programming
  - Print promotional items and programming “kits”



INSIDE 3D PRINTING™

# 3D Printer Options

3D printers vary in print size capability, single or dual extruders, the range of filament types used, and price. All models below are assembled when purchased. Prices for models that require assembly, not listed here, are often lower.

## Under \$500

- [Monoprice Maker Select](#) \$250
- [XYZ Printer DaVinci Jr. Pro.](#) \$289
- [Flashforge Finder](#) \$299

## Over \$500

- [Lulzbot TAZ Mini 2](#) \$1500
- [Lulzbot TAZ6](#) \$2500
- [Makerbot Replicator +](#) \$2499
- [Ultimaker 3](#) \$3495

Software is matched to your printer (just like a 2D printer)

- Install from printer documentation
- Install from website download

Also available:

[Multi-Purpose 3D Printers](#)

[How To Choose the Right 3D Printer For You](#)

# Filament

## ABS

- Acrylonitrile Butadiene Styrene, strong and heat resistant
- Print parameters: nozzle = 235c; print bed = 110c
- Best adhesion: Print on [Kapton tape](#), add a layer of glue stick if needed

## PLA

- Polylactic acid, a thermoplastic polyester
- Commonly derived from renewable resources, such as corn starch, tapioca roots or sugarcane
- Naturally degrades when exposed to the environment
- Print parameters: nozzle = 205c; print bed = 0
- Best adhesion: Print on blue “painter’s tape”

[More Temperature Recommendations](#)

# Safety and Cautions

- Hot surfaces – print head block and print bed
  - Use caution once you've preheated the printer
  - For ABS printing, the print bed will be hot during printing. Wait to remove the print or use tools to avoid burns.
  - Close printer front door during printing
- Moving parts – printing assembly
  - Moves in 3 directions
    - X = side to side
    - Y = front to back
    - Z = up and down
  - In some printers, movement is all in the print head.
  - In others, movement is divided between the print bed (usually Z axis) and print head (X and Y axes)

# What are the Basics?

An overview and first steps, using the Makerbot example.



**WHAT IS MAKERBOT  
DESKTOP?**



**HOW TO LAY OUT FILES**

MAKERBOT DESKTOP

# What are the Steps?

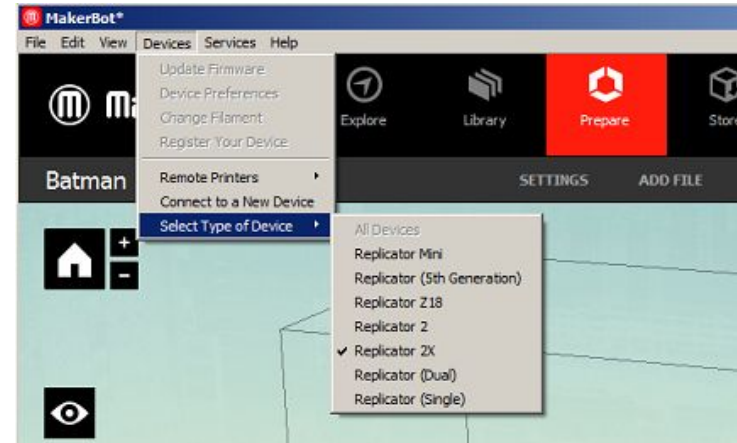
Check the settings and export





# MakerBot software

- Download and install MakerBot Desktop software  
<https://www.makerbot.com/download-desktop/>
  - In Devices > Select Type of Device
  - Choose your printer
- Go to File > Examples
  - Choose a file to work with. It will load in the workspace.
  - Many controls are similar to 3D modeling software.
    - Right-click to see different views
    - Use the scroll wheel to zoom in and out
    - To delete: Select the model and press the delete key on your keyboard.
- Go to File > Open or File > Insert File to load an .stl file



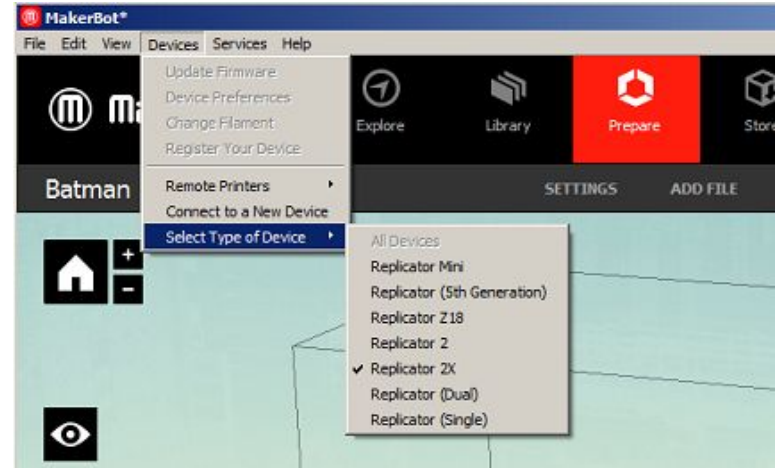
Use your printer software to

- level the print bed
  - Helps prints adhere to print bed
  - Cover stock (65lb paper) works to set up the nozzles

Load filament

# Prepare file in MakerBot software

- Open - Prepare
  - Check design to make sure the object sits on the print bed (Z=0.00)
  - View the design from different angles to look for print difficulties, like overhangs that need support
- Make optional changes
  - Size/Scale, Orientation, # of Prints
  - Check settings: Fill, Density, Raft, Supports
  - Preview: Export as .x3g file to SD card



- Preheat
  - ABS - warm print, warm print bed
  - PLA - cool print, cool print bed
  - Two nozzles - heat the one(s) you need
    - Specified in the print setup
    - Checked in the printer setup

# Prepare file for LulzBot TAZ6 and Cura

[LulzBot Cura Getting Started Video](#)

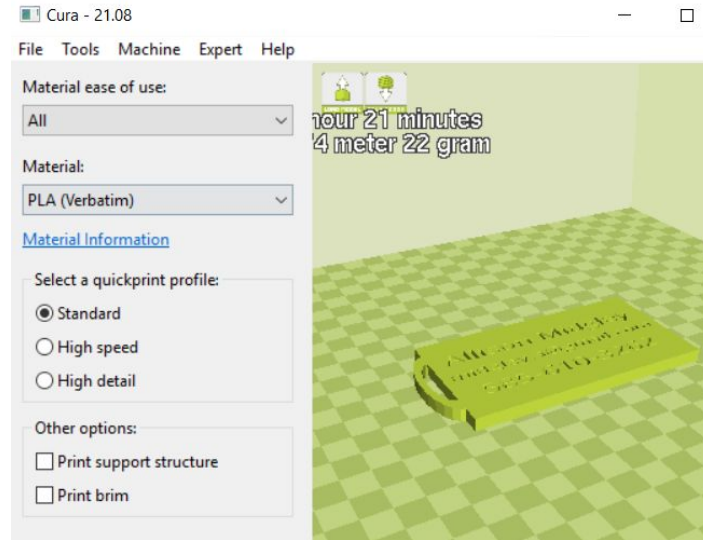
Load your .stls file File > Load

- Select the model
- Choose your print settings:  
Mode, Filament type
- Check design to make sure the object sits on the print bed (Z=0.00)
- Change Views to look for print difficulties:  
Fill, Density, Raft, Supports

Make optional changes:

Size/Scale, Orientation, # of Prints

Go to File > Export as .gCODE file to SD card



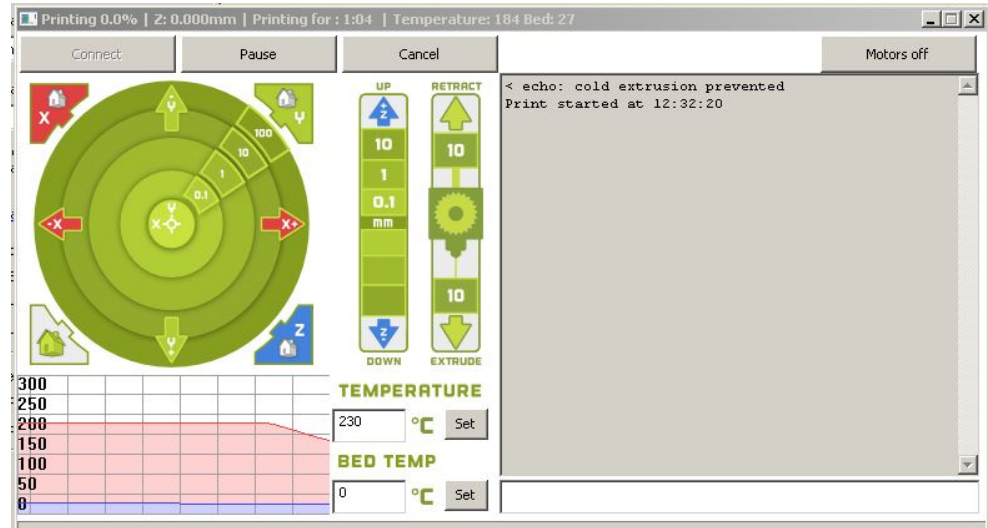
If needed, download and install Cura software

Follow the prompts to select your printer, nozzle, and print head

# Prepare file for LulzBot TAZ6 and Cura

The Control Panel is available when the laptop is connected to the printer via USB. It allows you to:

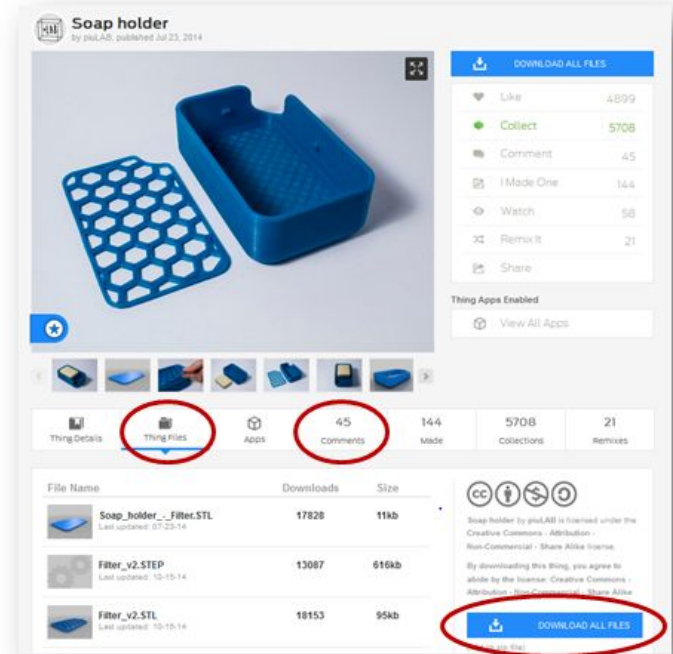
- Change filaments
- Raise and lower the print head
- Follow print progress



# Thingiverse

Go to <http://www.thingiverse.com/>

- Find a design that you want to print
- Search for items or browse the Explore section
  - Look for designs with photos of objects so you know they have been printed
  - Read the summary and Comments to find out details about printing
  - Check the design's licensing so that you're using it properly.
- Download the appropriate stl file(s) for printing or editing in Tinkercad or other 3D modeling software.
- Optional: Create an account so that you can save prints for later, share, comment, and upload designs



# Links

- [Thingiverse](#)
- [33 Best Sites for Free STL Files](#)
- [MakerBot Replicator2 Manual](#)
- [LulzBot Support](#)
- [LulzBot Cura for Windows Download](#)
- [All3dp STL File Format info](#)
- [3D Printing Methods: Fused Deposition Modeling vs. Laser SLA](#)
- [MatterHackers](#)



Resources on the Total BooX Shelf - [3D Print](#)

[WLS IT Wiki](#)

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