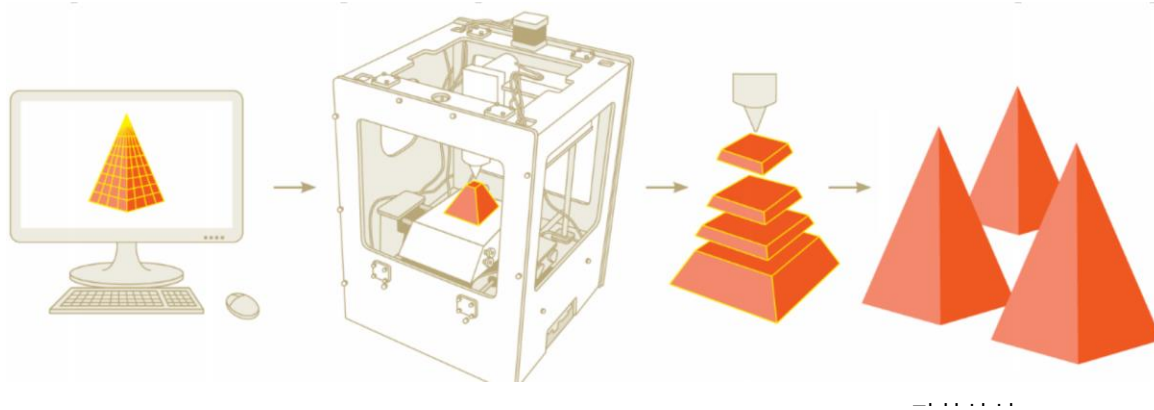


### What is 3D printing?

3D printing is an “additive manufacturing” process that begins with a computer model and builds a three-dimensional object. The 3D printers in Harris County Public Library branches use a technique called Fused Filament Fabrication (FFF) where a computer-controlled hot nozzle is used to melt plastic (much like a hot-glue gun) which is deposited layer-by-layer until the final form is completed. HCPL printers use a non-toxic plastic called PLA (polylactic acid).



### What can I print?

3d printing starts with a computer model which is typically obtained in one of three ways:

**Design using CAD (Computer-Aided Design):** There are number of free 3D design tools available. One of the most popular for beginners is [Tinkercad](#), a browser-based tool that requires no download or installation. More advanced users may consider [Fusion 360](#) which has free licenses for educators, students and hobbyists. Other free options include [OpenSCAD](#), [Sculptris](#), [FreeCAD](#) and [Onshape](#).

**Download existing models:** You can find designs online that are creative commons-licensed and public domain for personal use. Check out [Thingiverse](#), [Pinshape](#) or other 3D model repositories for a large variety of models.

**3D scanning:** It is possible to use special tools and computer software to scan existing objects and create 3D models. The technology isn't perfect and often requires significant “post-processing” to prepare the model for 3D printing.

### How can I 3D print at a HCPL branch library?

Patrons who wish to use one of the library 3D printers are expected attend a free orientation class (check the [Events Calendar](#) for dates and times) and earn a “3D Printing Badge” created on HCPL’s [Maker Central](#) site for the printer you wish to use. The orientation class covers the basic operation of 3D printers, the tools and techniques to create 3D models and HCPL’s 3D Printing Policy. After earning the badge, patrons may reserve time on a 3D printer to print their project. If you’ve already earned a 3D printing badge for a different 3D printer than the one you wish to use, you will earn a new badge during the hands-on portion of your orientation/reservation on the new machine.

Patrons must be present to begin the print. The cost of printing is 10¢/gram of the final part. Estimating the part cost and printing time is done using software taught during the orientation classes. Patrons under age 12 must be accompanied by an adult.

[Click here to access or create your Maker Central account.](#)

## I've taken the orientation class – now what?

- Access HCPL's Maker Central site at: [hcpl.beanstack.org](http://hcpl.beanstack.org)
- Either register for your free account (if you are a new users) or sign in to your existing account. (This may be the same account you have used for HCPL's Summer Reading Program or other activities.)
- Under the "Programs" tab, click on "Maker Central".
- Click on your "3D Printer Orientation Badge"
- If this is your first time using this badge after taking the orientation, please enter the "Secret Code".
- Return to the previous screen and click on your machine-specific badge and enter the secret code. For example, if you've taken the orientation class for the Makerbot 3D printers, then click on the Makerbot 3D Printer icon and enter the secret code to earn the "Makerbot Printer" badge.
- If you have already earned a badge, click on "Rewards" and then click the link to "Book a 3D Printer"
- Completely fill out the 3D Printer Equipment Reservation Form and click "Submit". You will receive an initial email confirming receipt of your request. Within a business day you should receive an email confirming or denying your print request.
- If you have any questions, [please contact the branch library for assistance](#).

## Which HCPL branches have 3D printing equipment available for patron use?

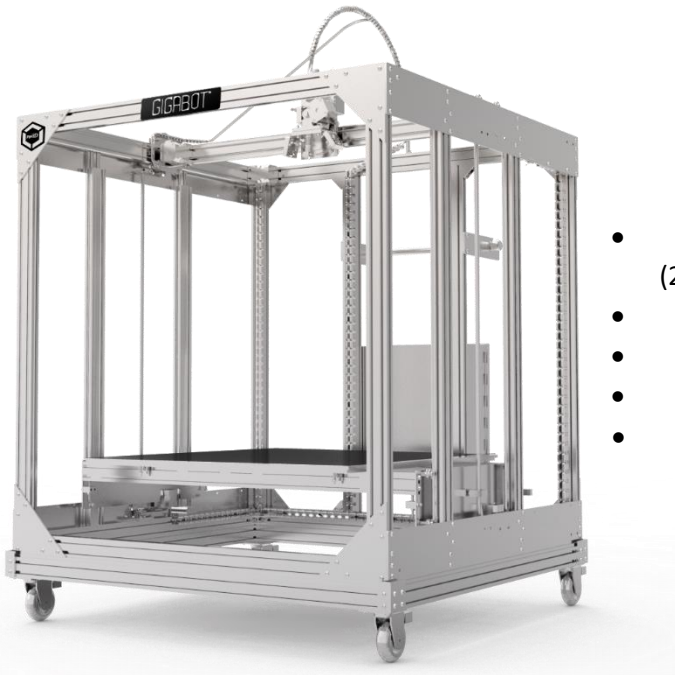
- **Clear Lake City-County Freeman Branch Library**
  - Makerbot Replicator 2
  - Ultimaker 3
  - re:3D Gigabot
- **Evelyn Meador Branch Library**
  - Polyprinter 229
  - Makerbot Replicator 1<sup>st</sup> Generation
- **North Channel Branch Library**
  - Makerbot 5<sup>th</sup> Generation
- **HCPL Administration**
  - Lulzbot Taz 6
  - Lulzbot Mini
- **Kingwood Branch Library**
  - Ultimaker 2+
- **Barbara Bush Branch Library**
  - Makerbot 5<sup>th</sup> Generation
- **Katherine Tyra Branch Library**
  - Makerbot 5<sup>th</sup> Generation
- **Tomball Community Library**
  - Monoprice Maker Select V2

❖ *Other branches may occasionally have 3D printers in the branch for special programs. Ask your local HCPL branch for details.*

## Equipment Descriptions

### Makerbot Replicator 2

- Max Build Volume: 285 x 153 x 155 mm (11.2 x 6 x 6.1 in)
- Max nozzle temperature: 250°C
- Print Bed: acrylic, unheated
- Layer resolution: 0.1 – 0.34 mm
- Recommended slicing software: [Makerbot Print](#)



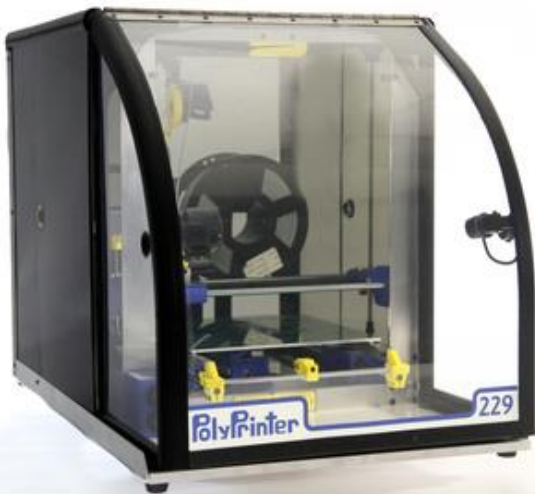
### re:3D Gigabot

- Maximum Build Volume: 590 x 600 x 600 mm (23.2 x 23.6 x 23.6 in) (somewhat less due to dual extruder)
- Max nozzle temperature: 300°C
- Print Bed: aluminum with PrintNZ surface, heated
- Layer resolution: 0.15 – 0.3 mm
- Recommended slicing software: [Slic3r](#) or [Simplify3D](#). Simplify3D is available for use in the Jocelyn H. Lee Innovation Lab at the Clear Lake City-County Freeman Branch Library.



### Makerbot 5<sup>th</sup> Generation

- Maximum Build Volume: 252 x 199 x 150 mm (10 x 7.8 x 5.9 in)
- Max nozzle temperature: 260°C
- Print Bed: glass, unheated
- Layer resolution: 0.1 – 0.3 mm
- Recommended slicing software: [Makerbot Print](#)



### PolyPrinter 229

- Max Build Volume: 229 x 229 x 299 mm (9 x 9 x 9 in)
- Max nozzle temperature: 300°C
- Print Bed: aluminum with PET surface, heated
- Layer resolution: 0.05 – 0.25 mm
- Recommended slicing software: [KISSlicer](#)



### Ultimaker 2+

- Maximum Build Volume: 223 x 223 x 205 mm (8.8 x 8.8 x 8.1 in)
- Max nozzle temperature: 260°C
- Print Bed: glass, heated
- Layer resolution: 0.02 – 0.2 mm
- Recommended slicing software: [Cura](#)



### Lulzbot Taz 6

- Max Build Volume: 280 x 280 x 250 mm (11 x 11 x 9.8 in)
- Max nozzle temperature: 300°C
- Print Bed: glass with PEI surface, heated
- Layer resolution: 0.05 – 0.5 mm
- Recommended slicing software: [Cura Lulzbot Edition](#)



### Lulzbot Mini

- Print Volume: 3,650 cm<sup>3</sup> (223 in<sup>3</sup>) of usable space
- Maximum Tool Head Temperature: 300°C (572°F)
- Recommended slicing software: Cura Lulzbot Edition
- Print Surface: Heated glass bed covered with PEI print surface
- Layer Thickness: From 0.05 mm to 0.50 mm (0.002in - 0.020 in)



### Ultimaker 3

- Maximum Build Volume: 223 x 223 x 205 mm (8.8 x 8.8 x 8.1 in)
- Max nozzle temperature: 260°C
- Print Bed: glass, heated
- Layer resolution: 0.02 – 0.2 mm
- Recommended slicing software: [Cura](#)

## MonoPrice



(200 x 200 x 180 mm) 7.9" x 7.9" x 7.1"

Max Extruder Temp: 500°F (260°C)

Filament: 1.75 mm

Bed: Heated; Aluminum

Bed leveling: Manual

Max heated bed temperature: 167 °F / 75 °C

Layer resolution: 100 Microns