3D PRINTING: JEWELRY BASICS

WHAT IS 3D PRINTING?

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A 3D printer works essentially like a traditional printer except it prints in plastic (or other material) layers to make 3-dimensional designs. 3D printers can print in several different materials including plastic, metal, wood, ceramics, limestone and even chocolate. Elmhurst Public Library uses a **MakerBot 5th Generation Replicator** which uses a PLA filament: a corn-based plastic. 3D printing has been around since as early as the 1990's but has exploded in popularity due to technology advances and lowered costs. Although many 3D printers themselves can cost thousands of dollars, the materials are relatively inexpensive after the initial purchase.   Ours cost about $2, 900 each.

Why 3D print?

Many different types of people use 3D printers for different things. Several news stories have covered incredible 3D printing projects like parents creating prosthesis for their children or the development of 3D printed cars, but there are plenty of uses for everyone. Some reasons you may use a 3D printer include:

- ♦ Replacing a broken cabinet handle
- ♦ Making fun gifts
- ♦ Printing the case for a prototype electronic component
- ♦ And maybe most importantly learning to use 3D printing software is a valuable skill

Where To Find 3D Jewelry Files to Download

Shapeways - will custom print designs in different materials for you. (shapeways.com)

Etsy - Lots of stunning options. (etsy.com/market/3d_printed_jewelry)

Pinshape – mix of paid and free downloads. (pinshape.com)

You Imagine – downloads are free. (youmagine.com)

Thingiverse – free downloads. (thingiverse.com)

There are new sites popping up all the time!

Ways to print:

The easiest way to start printing is to use a design created and uploaded on the Internet. Several websites have large libraries of user-uploaded designs which can be printed freely. Later we will be introducing the MakerBot site **Thingiverse** but other high quality sites include **Autodesk 123D**, and **My Mini Factory**.
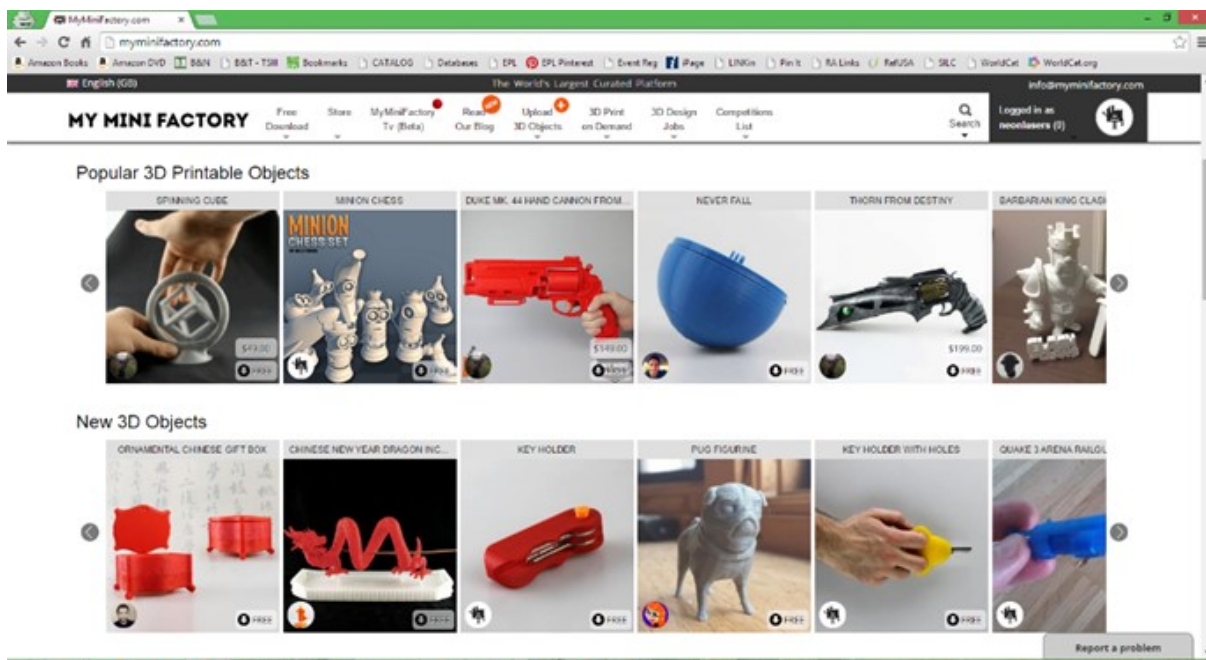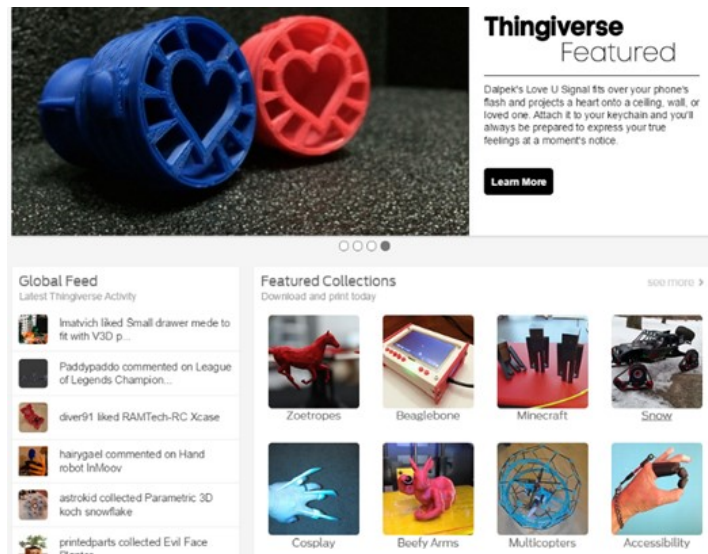
Submitting 3D Prints

To print at EPL you will need to submit your print through: elmhurstpubliclibrary.org/about-us/building-information/3d-print-request/3d-form/

Name:

Email:

Library Card #:

PLA Filament Color:

White

Object Dimensions:

Attach File:
Choose File   No file chosen
Acceptable file types: stl,obj,maker,thing.
Maximum file size: 25mb.

Additional Information:

Submit

Please note that there are a few limitations to printing:

♦ Elmhurst Public Library cardholders only

♦ 8-hour print limit

♦ Maximum size:
  ♦ 25.2 L x 19.9 W x 15.0 H cm
  ♦ 9.9 x 7.8 x 5.9 in

♦ 10 per gram, with a one dollar minimum

♦ Printing is done by Library staff and is attended to on a first come, first served basis

♦ Priority printing given to Library programs and events

♦ Email will be sent once the print job is complete

♦ Files should be submitted as .obj, .stl, or .MakerBot.

♦ If you have questions about anything, feel free to contact us!

3D Printing Limitations

While 3D printing is extremely useful, there are several limitations on what is possible right now. A few warnings before starting your project may include:

♦ 3D printing takes time! Printing a larger or more detailed design may take several hours of printing to complete and using some of the 3D printing creation software can be difficult at first.

♦ Size of prints is limited to the size of the MakerBot's work area and objects that are too large for the base will need to be cut into pieces and printed separately, and then combined after.

♦ Complicated designs may occasionally print incorrectly or with minor to major errors in the layers.

♦ At this point you can only 3D print in one color at a time per print

Design Your Own by Using 3D Printing as a Creation Tool

Create your own 3D designs with this FREE software

Tinkercad

- ◆ Web-based 3D modeling software
- ◆ Includes lesson modules that lead you through 3D design basics
- ◆ Great beginner design platform

123D Catch app

- ◆ Take photos and create 3D scans of virtually any existing object with this app
- ◆ Use with a mobile device

123D Design

- ◆ Powerful yet simple 3D creation and editing tool which supports many new 3D printers
- ◆ Part of the vast Autodesk suite of 3D tools
- ◆ Great stepping stone for more advanced 3D design software, like Maya
- ◆ Other free Autodesk software

Sculptris

- ◆ Beginner digital sculpting tool
- ◆ Great stepping stone for more advanced digital sculpting software, like ZBrush

MakerBot Desktop

- ◆ 3D printing solution for discovering, managing, and sharing your 3D prints

Scanning

The Elmhurst Public Library owns a **MakerBot Replicator** which will scan objects and create a 3d model of them. In addition there are several apps for smartphones such as **123D Catch**, which allow you to take a series of photos and convert them into a 3d model. While the Replicator will produce a better result, the quality of the generated 3d object will be nowhere near the quality of the original, as small details are hard to generate, and scanned objects will most likely need to be brought into software for additional work.

Exercise:

During this class we will practice downloading and preparing a design to 3D print.

> **Today we'll cover:**
>
> ♦ Pulling a model down from Thingiverse
> ♦ Importing into the Tinkercad software
> ♦ Preparing the item to print by rotating, moving, and resizing the object
> ♦ Assessing those designs (loops for findings, effect of supports, settings)
> ♦ A word about supports and printing settings
> ♦ Findings
> ♦ Painting and decorating

Top 3 things to remember:

1. **This is fun!**
2. **You can do this!**
3. **CTRL Z is Un-do**

1. Go to www.thingiverse.com/ and search for "Peace Earring." Select the one by tbuser from May 14, 2011.

2. Under the photo, select the **Thing Files** tab and download Peace_earing.stl to the downloads folder in your computer.
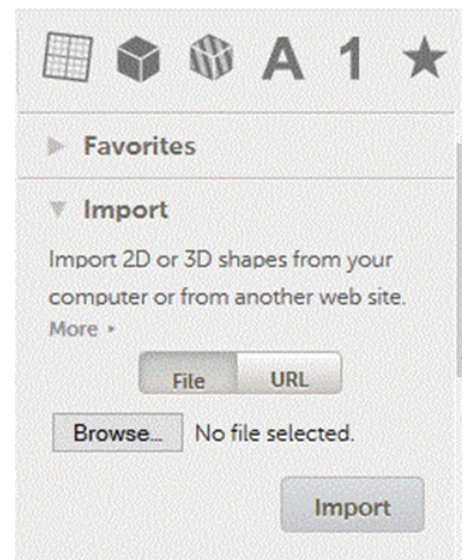
3. Go to www.tinkercad.com/ and either register for a free account or sign in.
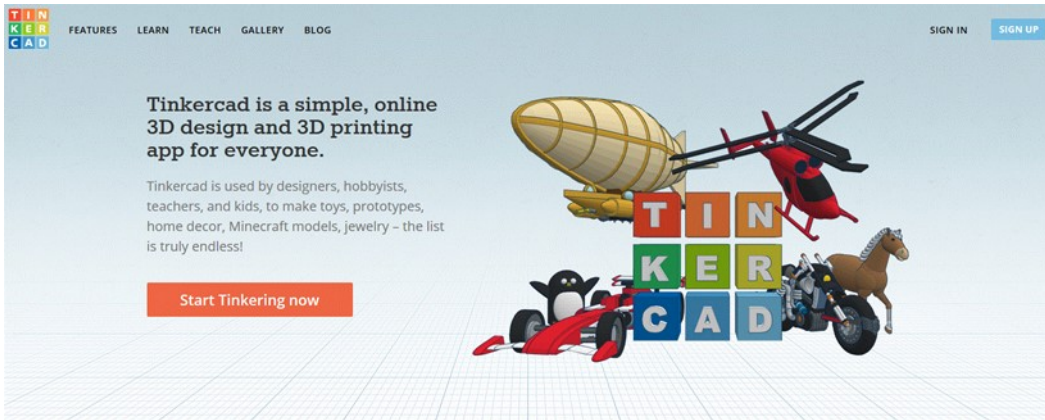
4. Once you are signed in, select 'Create Project;' from options on left side of screen.
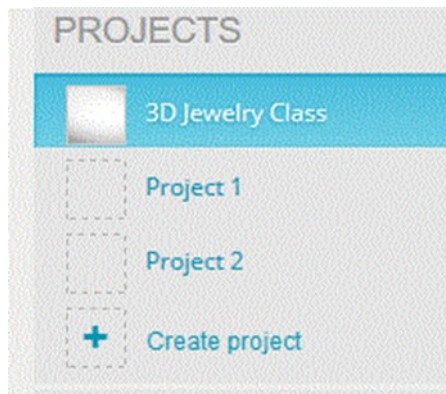
5. Import the Peace_earing.stl file into Tinkercad via the Import box on the right side of screen. Click **Browse**, then find the file in the Download directory. Click **Import**.

6. Next, we are going to see how big the print is. First, holding the left mouse button down, use your mouse to draw a box around the item. Next, select the **L** shaped ruler from the **Helpers** option on the right. Drag the ruler to the item and let go. Use your paper ruler to see if this is a size you want. (To close ruler, use X button in corner.)
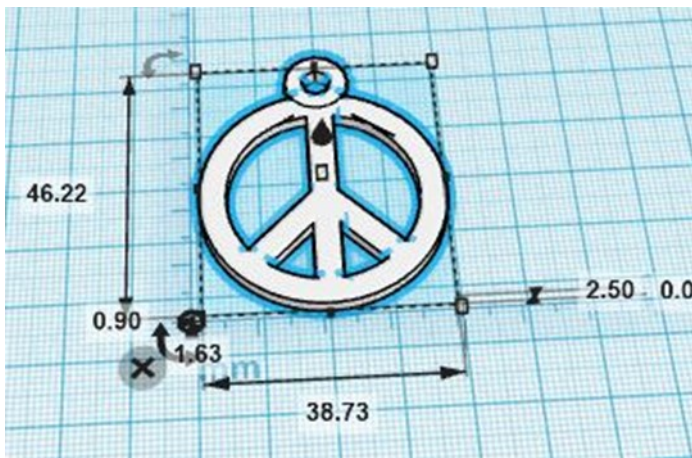
To resize the item, grab a corner with your mouse and keeping the left button down, drag it in or out diagonally. Experiment till you get it to a size you want for a pendant.

Note: To increase the height of an object, grab the box in the center of the item and raise or lower it, you can also click on the actual measurement and type in a desired measurement and the design will adjust.

7. Now to make earrings. The goal is to make one, then copy it so that they match.
   Step 1: Make a copy of the pendant by selecting it (CTRL+C) and then (CTRL+V) to paste the copy on the board.
   Step 2: Adjust the copy to the size you want for earrings.
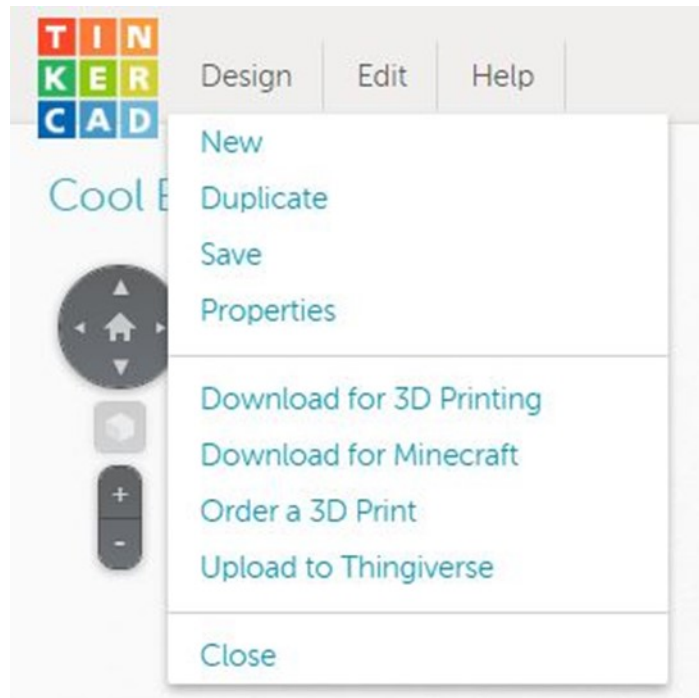   **Step 3:** Make a copy of the finished earring to complete the set.

8. Using the mouse to draw a box around all three, you can determine the print size which you will need to fill in on the form to upload to the Library.

9. When you are satisfied with your design, you can Download it for 3D print and then upload it to the library website.

Settings:

EPL staff usually set these, but you can make requests in the note section of the form.

Quality: Standard or High for detailed prints. The higher the quality, the longer the print.

Raft: This is the platform that is generated first for the print. It is made to snap off the print.

Supports: essential to proper prints. See Examples.

Conclusion:

Today we've covered the basics of 3D printing jewelry but there is a lot more to learn; the next step is to dive in! The best way to learn is to experiment and make mistakes. Creative Studio staff members will be available to help troubleshoot or assist you in starting a project. Also be on the lookout for our Intermediate 3D Jewelry printing courses which cover various creation software. Thanks so much for attending and we hope to see what cool and creative projects you come up with!