3D Printing at Lincoln Pelham Public Library

What will I learn?

Over the next 10 to 20 minutes, you will learn:

1. The basics of 3D printing.
2. How you can 3D print at Lincoln Pelham Public Library.
3. The 3 steps of 3D printing.
4. How to use software to prepare a 3D file for printing.
5. How to change filament / change colour (Fleming only).

Who is this course for?

- Anyone who would like to use the 3D printers at LPPL.
- Basic keyboard and Internet skills are required to complete the online course and use the 3D printer.
- This course is intended for information purposes only. Anyone wishing to 3D print at the library should complete this course first. There is no certificate of completion at the end.
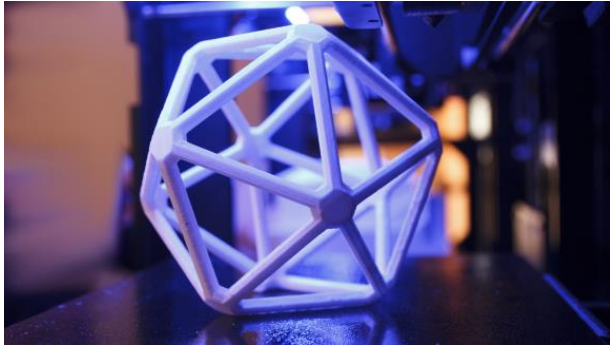
3D Printing Basics

This section includes:
1. 3D printing definition.
2. Examples of what can be 3D printed.

Definition of 3D Printing

3D printing is the action or process of making three dimensional solid objects from a digital file. An extruder applies filament layer by layer to turn a digital object into a physical object.

Shapes with challenging geometric angles

Bolts, hinges, custom project pieces

Detailed objects such as dinosaur bones

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In this section you will learn:

- How to design and print 3D objects at LPPL.
- The policies and procedures for 3D printing at LPPL.

LPPL Makerspace

The LPPL Makerspace provides access to technology, software, and classes:

- The printers are located at the Fleming, Fonthill, and Maple Acre Branches and include tools, laptops, creative software, and dedicated staff to support digital creativity.
- You can access 3D printers and software to design and print your own objects.
- Please visit our Makerspace Page for more information.

How to Book a 3D Printer

- At Fleming reserve the 3D printer at lppl.ca/makerspace or call the branch. At Maple Acre call the branch directly.
- 3D printers are also available on a first-come, first-served basis during library open hours.
- A maximum of two hours is allowed for most print jobs. For longer prints, please contact staff at your Branch directly.
- A Lincoln Pelham Public Library Card is required.

3D Printing Rules

- Printing items that contravene the library's rule of Conduct is not allowed (ex.: weapons, or replicas of weapons).
- Do not infringe on any person's intellectual property rights, including copyright, trademarks and patents, or any other rights, including privacy and publicity rights when using the 3D printer and other equipment and software at the Lincoln Pelham Public Library Makerspace.

Printing Costs

- A fee of $0.10 per one gram of filament (printing material) is charged for each print job.
- An average print job is about ten grams and costs $1.
- No charge for aborted / failed prints.

The 3 Steps of 3D Printing

Step 1: Download or design a 3D object

- Download 3D objects for free at Thingiverse.com and select "Download All Files" (see image below).
- Open the file in ideaMaker or Cura to slice it.
- Design software such as Tinkercad or freeCAD allows you to create your own objects and files.
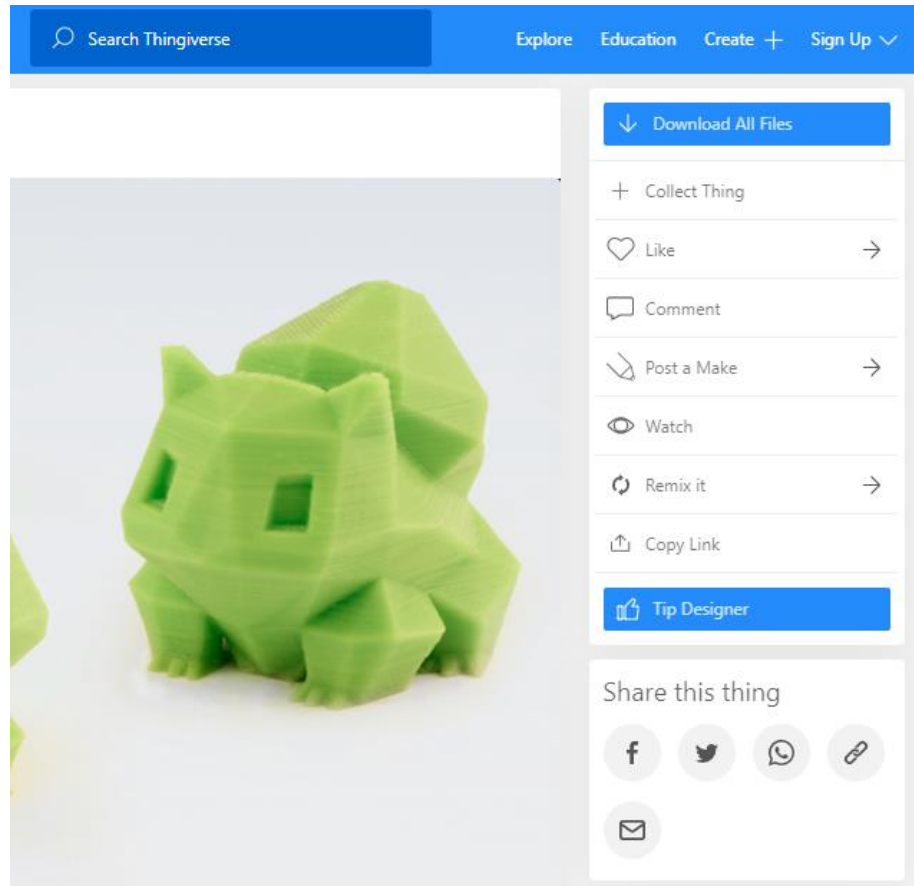
Step 2: Slicing - advanced

- In case slicing doesn't automatically happen, check these advanced steps:
- 3D files need to be sliced (processed) to cut the model into horizontal layers for the printer.
- Open your unzipped file (click twice to open).
- Edit size and placement of object. Set parameters such as extruder speed, supports, plate adhesion (more on this below).
- Accepted file formats: STL (.stl), OBJ (.obj), or GCODE (.gcode).
- We suggest the Recommended setting for new users, please click the Recommended tab.

- Custom slicing settings are recommended for experienced users that want more control over print settings.
- Place the SD card in an SD reader.
- Slice your model and save to SD card.
- Save the print file via the "Save to removable drive" button to the SD card.
- Eject the SD card and remove it from your computer.

Custom Slicing Settings (experienced users)

- **Layer height:** 0.2mm recommended. Intermediate and advanced users can select between 0.1mm (ultra fine) and 0.4mm (coarse).
- **Infill and shell:** 20% infill recommended. Most printouts do not require infill above 25%. Less infill means less weight and filament used.
- **Supports:** Supports are like scaffolding for overhangs that extend outward from its main body. Select if overhang tilts at an angle greater than 50 degrees.
- **Build plate adhesion:** Brim recommended. A skirt (two lines printed around the base of the object) is a good option if your print is steady. Rafts are available for special prints (please speak to a staff member).
- **Note on Thingiverse**: user take photos of their prints share print settings. If you like a print, follow their settings for best results.

Step 3: Print

- Insert the USB stick or SD card into the printer slot.
- Go to **PRINT** and select the file you want to print.
- Select your file and the print process will start.
- We suggest a thin layer of stick glue on the glass bed surface the size of your first layer. Please speak to a staff member if you are unsure.

Remove Print from Bed / Print Cleanup

- If your print does not come off the print bed easily, the Makerspace has palette knives available.
- You may have to remove extra filament or supports from your print. The LPL Makerspace has all the tools you need including sandpaper.

Congratulations, you are now ready to try 3D printing at Lincoln Pelham Public Library!