

## 3D Printing Guidelines

1. The Library's 3D printer may be used only for lawful, non-commercial purposes. All designs must comply with the Library's Acceptable Use Policy. Designs must not:

- Create materials prohibited by local, state, or federal law
- Be in violation of intellectual property rights, including copyright, patent, or trademark protection

The Library reserves the right to refuse any 3D print request.

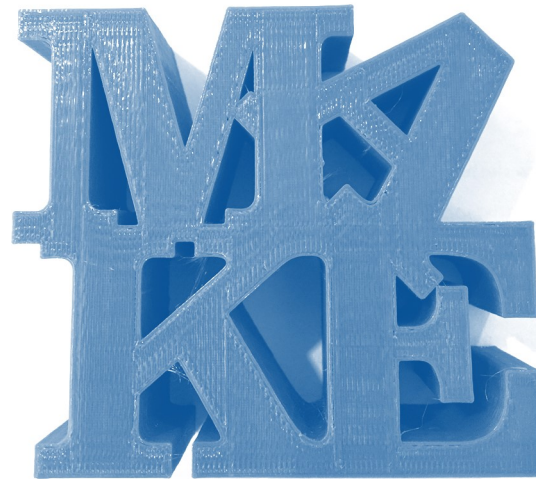
2. Payment, in the form of cash or check, must be made when the job is picked up. For print jobs or job groups costing \$30 or more, a 50% deposit is required before printing begins.

3. The Library assumes no fault if the design does not print as expected. Library staff will attempt one reprint if a job fails to print.

4. Items printed by the Library's 3D printer that are not picked up within 7 days will become property of the Library. Items must be picked up by the patron who ordered them, or an alternative designated by that patron.

5. Only trained Library staff will have hands-on access to the 3D printer.

*Please note that these guidelines governing the use of the Library's 3D printer are subject to change.*



### Portland Public Library

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# 3D Printing



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## How does 3D printing work?

The Library's MakerBot Replicator ("Turing") turns digital models drawn using CAD (computer-aided design) software into three-dimensional objects.

3D "printing" actually refers to the gradual build-up of heated plastic filament in very thin layers—usually just .2 millimeters thick.

Filament is available in several materials, but one of the most common (and the one that our MakerBot uses) is PLA, or polylactic acid. It comes on a big spool that feeds into the 3D printer's extruder, which is similar to the tip of a glue gun. The extruder has to heat up to over 400°F in order to melt the PLA!

PLA is a biodegradable plastic made from starches such as cassava root and sugarcane. Sometimes when it gets heated up, it even has a slightly sweet smell.

## Why at the library?

A 3D printer is a powerful tool for creativity, innovation, and STEM education for people of all ages. Libraries are in a unique position to make this cutting-edge technology available to the public.

Whether you want to create your own CAD files, submit a file from another designer, or just see it in action next time you visit the Main Library, PPL's MakerBot is for you!

## Designing in 3D

If you want to give 3D printing a try, you can either start with your own design or use someone else's (as long as it is meant to be shared—see Creative Commons below). These are all free to use or offer free options.



**Thingiverse** ([thingiverse.com](http://thingiverse.com)) is the official design community of MakerBot, where people share 3D models for others to download.



### 3D Warehouse

([3dwarehouse.sketchup.com](http://3dwarehouse.sketchup.com)) is also a sharing community where you can look for designs and learn from others. It's hosted by SketchUp, a 3D modeling software.



**Tinkercad** ([tinkercad.com](http://tinkercad.com)) is a great choice for beginners looking to create original designs. You can sign up for an account to access tutorials or just experiment.



**SketchUp** (free version: SketchUp

## Creative Commons

Users of websites like Thingiverse often display Creative Commons licenses to communicate to others that it's okay to reproduce their work. You might also notice icons for attribution, non-commercial use, and/or other conditions. Visit [creativecommons.org/licenses](http://creativecommons.org/licenses) for more information about Creative Commons.



## Printing Costs

There is a \$1 charge for every 10 (or fewer) hours of printing. For example, a job that takes 11 hours to print will start at \$2.

Classic colors cost an additional 10¢ per gram. Specialty colors are 15¢ per gram.

When you submit your file(s), 3D printing staff will let you know what the cost will be.

## Requesting a 3D Print Job

When you're ready to print a file you've designed or downloaded, submit it as an attachment in **.stl** format to:

**3Dprint@portlib.org**

In your email, be sure to include:

- **Color choice**, and perhaps a second choice  
*Filament is usually available in classic rainbow and neutral colors, and a selection of specialty colors such as glow-in-the-dark, neon, translucent, and sparkly filaments. One color per file, please.*
- **Size specifications**, if necessary  
*Maximum dimensions are 10" (25cm) L x 7.5" (20cm) W x 6" (15cm) H.*

Jobs are printed in the order they are received and there are many factors that can affect the time it takes to have your job printed. We cannot guarantee any particular timeframe, but we are able to complete most jobs within two weeks.

We look forward to hearing from you!