

INTRO TO 3D PRINTING

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How the 3D Printer Works

The library uses Makerbot's *Replicator 2* 3D printer. It can print single color or horizontally striped designs that fit within a 6" wide x 6" high x 11" long space. A digital 3D model is used to tell the printer what shape to print. Plastic PLA filament is melted to 160°C and extruded onto the building surface in horizontal layers, building from the bottom up.



For more information about the printer go to <http://store.makerbot.com/replicator2>

PLA is a nontoxic hard plastic derived from field corn. Most opaque paints and glues work well on it. For more information go to <https://store.makerbot.com/filament/pla>

Why 3D Print

3D printing is used recreationally to make custom toys and jewelry. It is also used as a supplement to teaching various subjects, such as robot parts for an engineering class. Small businesses often like using 3D printers for demo models and prototyping. Medically, 3D printing is well suited for making custom fit prosthetics for amputees.

For more information check out the library's [wondersOf3DPrinting](#) powerpoint.

Making a 3D model

You can make a 3D model to print various ways:

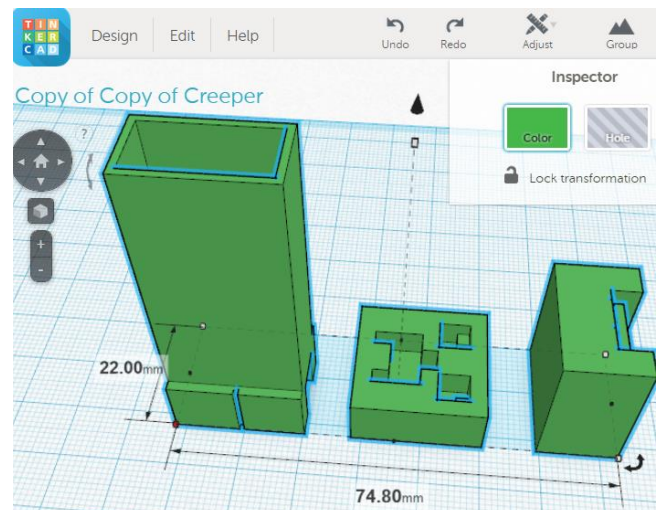
a) Modeling:

The library can show you how to use various free 3D modeling programs. For modeling you can use any program that exports .stl or .obj files. While modeling make sure:

- all parts of your model are at least ~0.4mm thick
- all gaps are at least ~0.4mm wide

Tinkercad is an excellent beginner's 3D modeling program. It is free and browser-based, but requires sign up for a free account. It is as easy as Legos to use, and has built in tutorials.

Go to www.tinkercad.com to check it out.



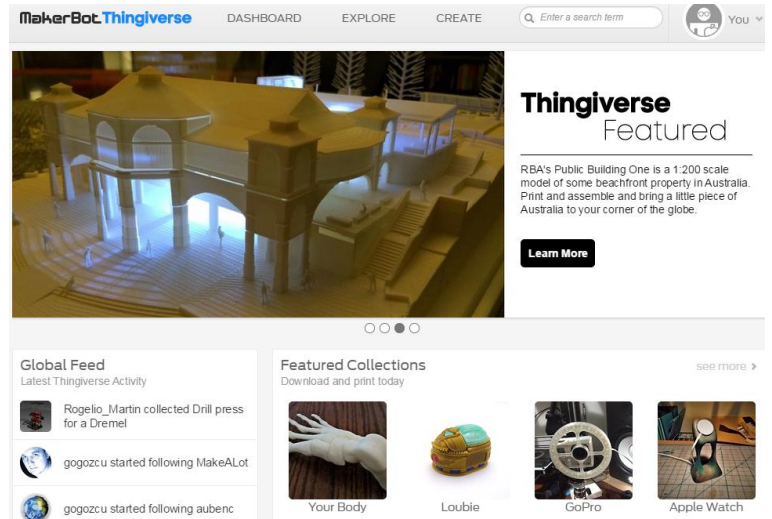
b) Download:

Download free 3D models others have made. Some things to keep in mind:

- Look for a model that has proof that it has been successfully printed before. Not all are easily printable!
- Note any special printing instructions the maker posts for the model and any comments/complaints.

Thingiverse.com is one of the largest sites for downloading 3D models others have made.

For a more websites, go to <http://www.3dprinter.net/directory/free-3d-models> or <http://www.3ders.org/3d-software/3d-software-list.html> for a list.



c) Scanning:

If you have access to a 3D scanner or 3D scanning booth, it can make a 3D digital copy of an existing object which can then be modified in a 3D modeling program. This is useful for difficult-to-model objects. Some free alternatives:

- Autodesk's [123D Catch](#) allows users to use any digital photos to scan
- [ReconstructMe](#) allows users to wave around a Kinect to scan, has a free trial version



Checking a 3D model for Printability

Once you have a 3D model, it is good to check ahead of time if it will print well, and to decide on what printing settings you will want. See the library's [3D printing Checklist](#) for full list of things to check.

Printing a 3D Model

See the library's [Submit A 3D Print Job](#) for details. The library accepts 3D print jobs for pick up after a few days and allows you to print yourself during 1-on-1 lessons.

More Information:

- See the library's [3D Printing Flier](#) for details on free 3D printing/modeling 1-on-1 lessons, workshops, and drop in hours.
- tutorials and tips for 3D printing: <http://www.shapeways.com/tutorials?li=nav>
- For excellent Sketchup video tutorials: <http://www.sketchup.com/learn/videos/58>
- Check out Youtube for excellent Blender tutorials for whatever your level of experience or your interest.