



## **3D Printing at the Cranston Public Library**

### **What is 3D printing?**

3D printing is the process of making a three dimensional object from a digital file. The object is created by laying down successive layers of plastic material on top of each other until the print is created.

You begin by creating a virtual design on a computer or using a 3D scanner to replicate an existing object. Software is then used to slice the designed object into hundreds of horizontal layers. The design is sent to the 3D printer where hot plastic is passed through a super-heated nozzle and laid down layer by layer via a robotic arm. The plastic cools off within a few seconds, so the finished object can be used right away. To learn more, visit [3dprinting.com](http://3dprinting.com).

The Cranston Public Library currently maintains a **Makerbot Replicator 2X 3D Printer** that uses ABS plastic and a **Cube 2<sup>nd</sup> Generation 3D Printer** that uses PLA plastic for use by the public in the Central library's C-Lab.

### **How do I create or find a design?**

There are 3 methods for obtaining 3D designs for printing:

Download: You can find free, online designs on [Thingiverse.com](http://Thingiverse.com)

Design: You can create a computer-aided design (CAD) through websites like [tinkercad.com](http://tinkercad.com), [sketchup.com](http://sketchup.com), [3dtin.com](http://3dtin.com), [blender.org](http://blender.org), or [openscad.org](http://openscad.org)

Scan: You can take an object that already exists and scan or digitize it to obtain the right dimensions for a 3D replica. (We do not currently own a digitizer here at the library.) There are also apps that enable you to take multiple photographs of an object to make a 3D file, such as 123D Catch.

### **How do I use the library's 3D printers?**

If you are just starting out with 3D Printing, it is best to attend one of our open Tech Times to learn more about the 3D Printers, designing, or downloading free files.

#### Open Tech Time Hours:

Tuesdays from 2:30-4:30pm

Thursdays from 2:30pm – 4:30pm

If you can't make one of our open Tech Times, you can make a **one-on-one appointment** with one of our staff. You can sign up for an appointment by visiting [cranstonlibrary.setmore.com](http://cranstonlibrary.setmore.com), send an email to [c-lab@cranstonlibrary.org](mailto:c-lab@cranstonlibrary.org) or call the library at 401-943-9080 ext. 4 to make an appointment.

**What if I just need my design printed and don't have time for training?**

If you have a design ready, you can submit your design .stl file to be printed. Before printing, you must first read and sign our 3D Printing Policy. Children under the age of 14 must have their parent or guardian sign the policy in person at the Reference Desk. You may email your design .stl file and signed policy to [kboden@cranstonlibrary.org](mailto:kboden@cranstonlibrary.org) or drop it off on a USB flash drive. We will then email you with an estimated cost for printing which you must agree to before printing commences.

**What if I need help with designing or troubleshooting my design?**

Library staff are available for printing assistance only. If you require additional assistance with basic designing or troubleshooting, please drop-in at one of our Open Tech Times.

**Are there any design rules for 3D printing?**

3D printing does not do well with "overhangs." Each layer of a 3D model needs a base layer below it, so the machine will have a hard time printing something that hangs out into space, like the brim of a cowboy hat. You can add breakaway supports to any overhangs that can be snapped off at the end, but the edges might not be as smooth.

**How much will my print cost?**

We charge 10¢ per gram of plastic. Before printing, the library will provide an estimated completed cost which you must agree to before printing commences.

**How long will it take for me to get my design printed? What if I have a deadline?**

Usually the process of 3D printing requires troubleshooting, whether that be from errors with the design or repair of the printer, which is why the library cannot guarantee that a design will be printed by a certain date. We will do our very best to have the design printed in a timely manner.

**How large can my design be?**

Files can be no larger than 25 MB and must be submitted as .stl files. We cannot print a file over 5 hours long. In regard to proportions, the design must be able to fit on the 3D printer's platform, so it must be under 8 inches high and 5 inches wide for our Makerbot printer.

**What is the difference between ABS plastic and PLA plastic?**

Both ABS and PLA are known as thermoplastics – they become soft and pliable when heated and solid when cooled. ABS is the more popular plastic as it is strong and flexible. PLA is more natural as it is created from plant-based products and is biodegradable.

**How many designs can I have printed?**

You may submit and have printed one file per week. Please keep in mind though that there may be other patrons ahead of you for printing and that the library cannot guarantee that the designs will be printed by a certain date.

**What if I have a large project with many files?**

The 3D printing service we offer is experimental and geared toward instructional learning. Since we can only accept one file a week per patron, our service cannot accommodate mass manufacturing or large projects.

### 3D Printing Policy

- Use of the 3D Printer is at the discretion of library staff. The library reserves the right to deny use of the equipment.
- The 3D printer may only be used by OSL library cardholders.
- It is expressly prohibited:
  - To print any guns, gun parts, knives, or objects that are intended to physically harm, or attempt to harm, a person or animal in any way.
  - To print obscene or inappropriate materials.
  - To print any object that violates or infringes upon a patent, trademark, or other proprietary right. Use of the 3D Printer and associated equipment shall follow all legal guidelines. U.S. Copyright Law governs the making of photocopies or other reproductions of copyrighted material.
- The library does not guarantee a successful print. Unless the print fails to finish, the cost of the completed print, regardless of quality, will still be charged.
- If a 0 – 2 hour print fails, it may be attempted only one more time without charge. If a 3-5 hour print fails, any additional attempts will be charged.
- Items that are not picked up after a month will become property of the Cranston Public Library. Items must be picked up by the individual who printed them.
- A charge in the amount of the print's cost will be added to the patron's record for any unclaimed items.
- Only designated library staff and trained patrons will have access to the 3D printer.
- The library is not responsible for the subsequent safety of any item made with the 3-D printer.

Agreement: by signing this policy, I understand the terms and agree to abide by them when using the 3D Printer and related software.

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Printed Name

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Printed Parent/Guardian Name

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Signature

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Parent/Guardian Signature

**Contact and Design Information**

Name: \_\_\_\_\_

Library Card #: \_\_\_\_\_

Email: \_\_\_\_\_

Phone #: \_\_\_\_\_

Name of File: \_\_\_\_\_

Description of Design (required): \_\_\_\_\_

\_\_\_\_\_

Preferred Color of Print (please circle only one – no guarantee of availability):

**ABS Plastic (printed with Makerbot 3D Printer)**

- Blue
- Green
- Red
- Neon Yellow
- Bright Pink
- Black
- White
- Beige

**PLA Plastic (printed with Cube 3D Printer)**

- Blue
- Brown
- Red
- Light Purple
- Lime Green
- Black

\*If you choose PLA plastic, your design will have to be printed on our Cube printer which has a smaller platform and may not accommodate all design sizes. We will notify you if there are sizing issues.