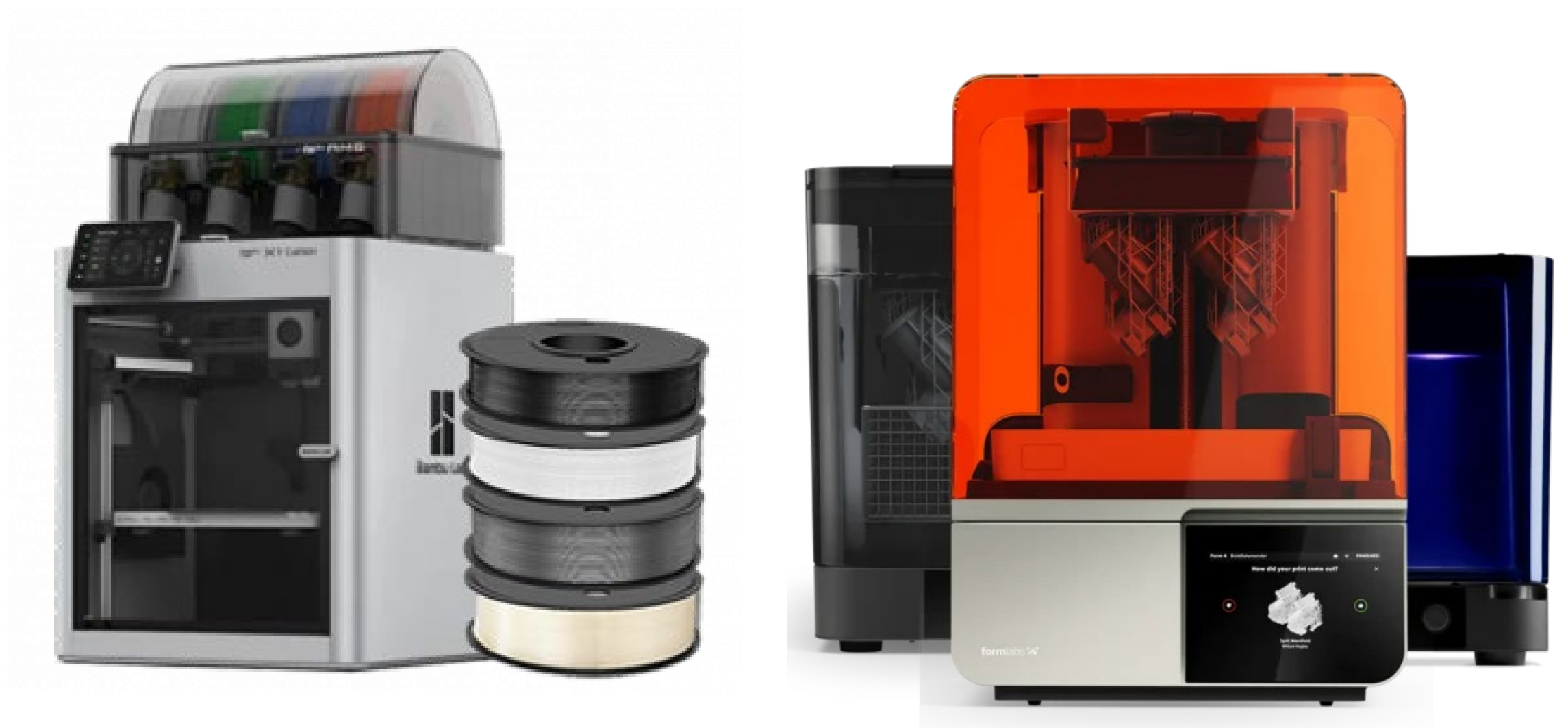# South Huntington Public Library

3D Printing Resource Guide

3D Printing in the Library

3D Printing services are available to

South Huntington library patrons upon request.

To submit a model for 3D printing, please complete the "3D-Print Request" form on our website or select the link below. Here you will upload your model in STL or OBJ file format to request it to be printed by our staff.

You may request your model be printed in a hardened resin material (SLA Printing) or in a lighter weight plastic-like material (FDM Printing).

FDM materials we offer are recyclable PLA and PETG filaments.

Colors offered include white and gray for resin prints.

For PLA, you may request any color and we will inform you as to the availability.

https://shpl.info/3dform.pdf

A member of our team will reply back to you with the cost of materials and the expected time for completion.

So that we may replenish depleted resins and filaments, there is a fee of 15 cents per gram/milliliter for the materials used to create your model.

PLEASE BROWSE SUBSEQUENT PAGES IN THIS DOCUMENT FOR
GENERAL INFORMATION REGARDING 3D PRINTING

What is 3D Printing

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the entire object is created.

3D printing starts with a digital file derived from computer aided design (CAD) software. Once a design is completed, it must then be exported as a standard tessellation language (STL) file, meaning the file is translated into triangulated surfaces and vertices. The STL file then has to be sliced into hundreds, sometimes thousands, of 2-D layers. This is performed using a software program called a Slicer. The Slicer then sends the job directly to the 3D Printer.

A 3D printer then reads the 2-D layers as building blocks which it layers one atop the other, thus forming a three dimensional object.

Getting Started With 3D Printing

Download a Model

Print-ready designs are available to download from various websites. Some designs are free of charge and others are available for sale. Downloaded models can be sent to a 3D printer immediately or they can be further customized using CAD 3D modeling software.

Design a Model

3D Modeling software can be used to design a 3D model from scratch or it can be used to customize models that have been downloaded from a website.

Replicate an object with a 3D scanner

A 3D scanner is a device that analyzes a real-world object or environment to collect data on its shape and appearance. The collected data can then be used to construct digital, three dimensional models.

Basic Finishing Steps

Finishing your 3D printed model requires the use of some basic tools. These tools include clippers, sand paper and paint.

Washing and Curing

Models created using resin require washing and curing after printing. The Library will wash completed prints in an alcohol solution and then allow the resin to cure under UV light for 30 minutes. It is recommended that all models printed with resin be coated with paint or primer to prevent sunlight UV rays from further curing the resin as this could cause it to become brittle.

Models created on FDM printers using filament do not require washing and curing.

Supports and Raft Removal

Both Filament and Resin based models may require the removal of support structures.

Support and Raft material may be removed using clippers to prevent damage to the model. Be sure to wear eye protection when clipping as small pieces of plastic tend to fly around. Speak to a staff member if you require assistance removing these support structures from your model.

Sanding

After the supports and rafts are removed, use a fine to medium grit sandpaper to smooth the surface of your model. Medium grit sandpaper may be used to remove leftover blemishes from where the supports and raft were clipped. Fine sandpaper should be used to smooth all surfaces in preparation for painting.

Priming & Painting

The goal of priming is to create a pristine surface before painting. After priming, it may be necessary to use sandpaper again to remove any imperfections exposed. A second coat of primer is optional. Priming of resin based models prevents sunlight from over-curing models which can cause them to become brittle.

Choose thin paint that's easy to control. Hardware store paint (or even fine art paints designed for rough surfaces) are the opposite of what you want. They tend to clump and form thick, rough layers.

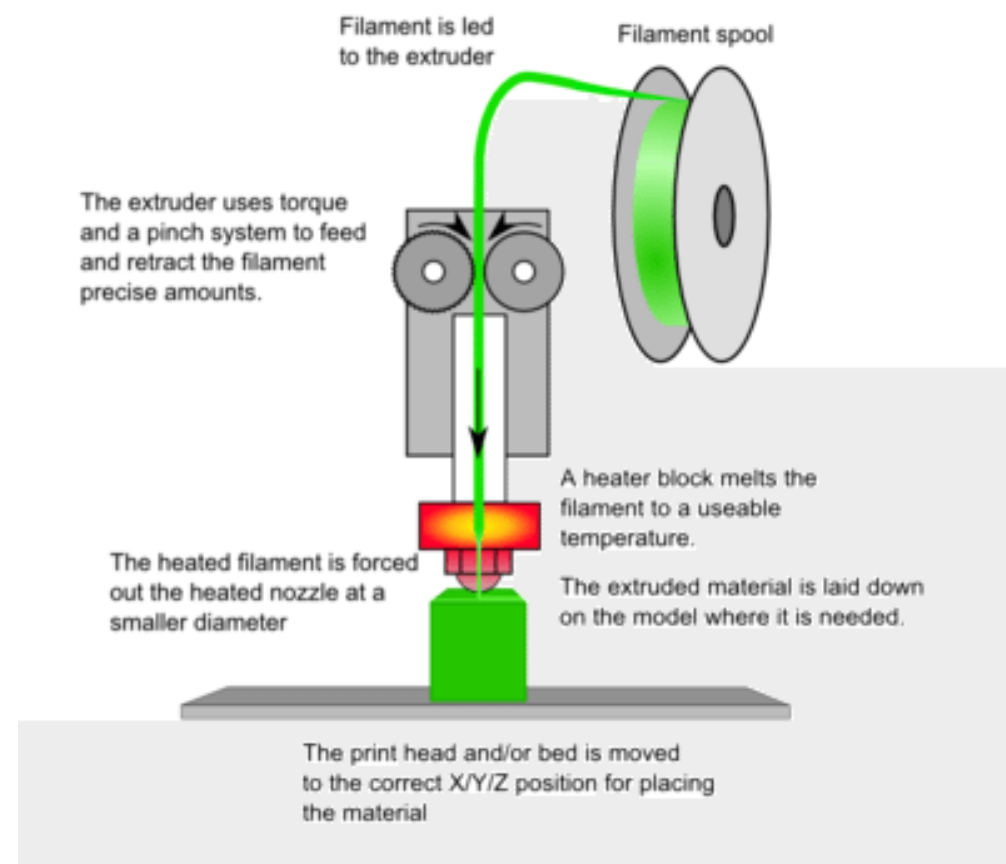Fine spray primer and paint by Tamiya is recommended for use on 3D models.

3D Printer Types Used In The Library

Fused Deposition Modeling (FDM)

3D printers which use FDM Technology construct objects layer by layer from the very bottom up by heating and extruding thermoplastic filament.

FDM printers are popular due to their speed and ease of use. FDM prints require little or no post-processing.

FDM printers are limited in their ability to produce finely-detailed objects.

Filament is led to the extruder

Filament spool

The extruder uses torque and a pinch system to feed and retract the filament precise amounts.

A heater block melts the filament to a useable temperature.

The heated filament is forced out the heated nozzle at a smaller diameter

The extruded material is laid down on the model where it is needed.

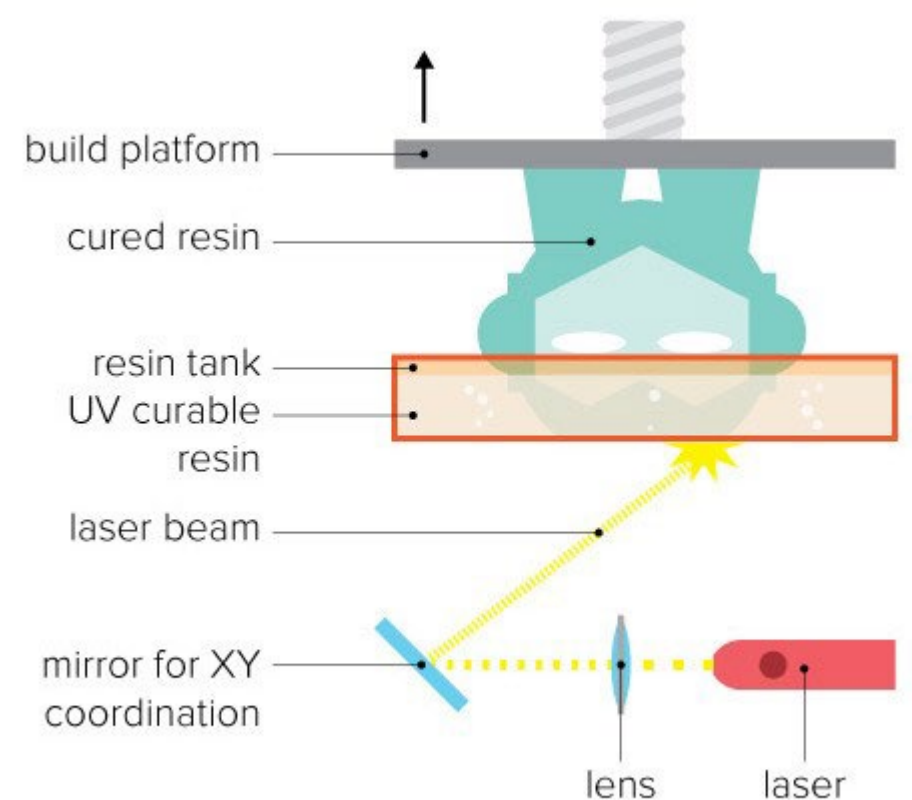The print head and/or bed is moved to the correct X/Y/Z position for placing the material

Stereolithography Apparatus (SLA)

3D printers using SLA technology work by curing liquid resin with UV light. The light, emitted via laser or a projector, solidifies resin and builds objects layer by layer.

SLA printers are popular due to their ability to produce highly detailed and intricate designs. The type of resin used will determine the mechanical strength, color and texture of the design.

Models created with an SLA printer will require post-processing routines or finishing procedures.

build platform

cured resin

resin tank
UV curable resin

laser beam

mirror for XY coordination

lens   laser

How Can I Download Models?

You can browse and download .STL and .OBJ files from various open-source marketplaces such as:

THINGIVERSE is the ultimate 3D printing community. *Thingiverse* is comprised of over 500,000 3D models downloadable for free, under the Creative Commons License.
www.thingiverse.com

YOUMAGINE'S 3D community consists of 10,000 designs which are customizable and sharable, for free. Like *Thingiverse, Youmagine* also has design reviews and images of prints made.
www.youmagine.com

MYMINIFACTORY consists of free downloadable 3D designs, as well as 3D prints for sale. 3D designers have the ability to earn tips for their original designs.
www.myminifactory.com

Design Your Own 3D Object

TINKERCAD- is the ultimate free tool for creating your own 3D designs. *Tinkercad* is a powerful, browser-based CAD program suitable for all ages and levels of skill.
www.tinkercad.com

SKETCHUP- is used by architects, engineers and professionals because of its specific drawing tools and options. A free version of Sketchup can be accessed via a web browser for personal use.
www.sketchup.com/products/sketchup-free

BLENDER- For those skilled in CAD, *Blender* is another free alternative for designing your own models. *Blender* is known to have advanced tools for more complex modeling designs and is available for download on PCs and Mac computers.
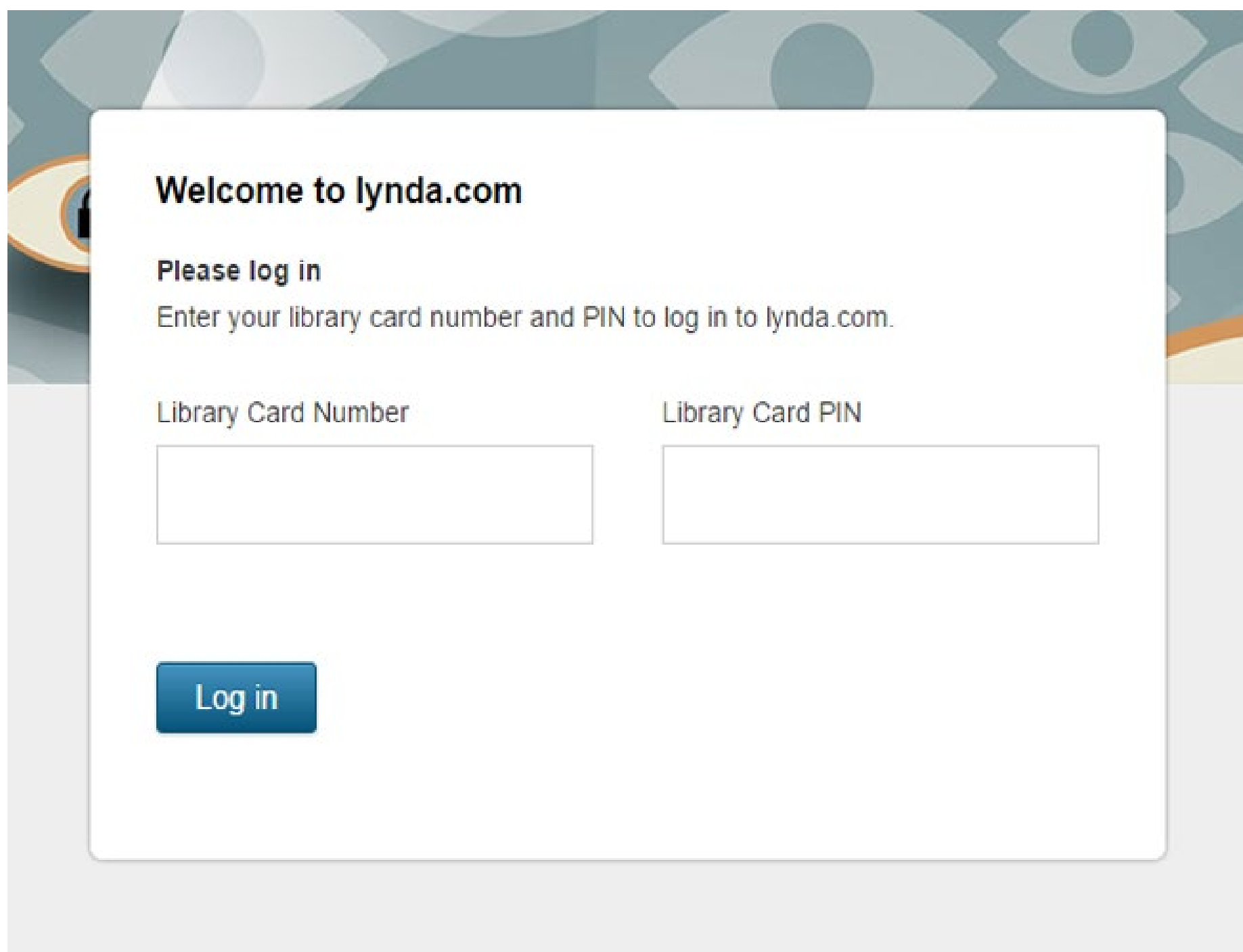www.blender.org

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https://www.lynda.com/portal/patron?org=shpl.info
Enter your library barcode and pin. Then click "Log in".

- Use Lynda, our free online learning tool, to watch instructional videos on everything from 3D basics to more advanced demonstrations of CAD software design.

- There are over 1,400 results for *3D Printing* on Lynda. Filter your search by subject, software, skill level and become an expert on 3D printing!

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Library Card PIN

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South Huntington Public Library

3D Printing Policy

- To advance its goal of providing free and open access to technology and information promoting literacy, education, enlightenment and entertainment, the South Huntington Public Library offers patrons the opportunity to 3D print their own original designs or those found on various open-source websites.

- Formats accepted are as follows: .stl or .obj. Patrons are permitted to submit their file for review through the Library's website. Upon approval, patrons will be notified of a print price.

- Prints will be priced according to the volume of material used. Prices are subject to change.

- Patrons will be contacted when their print is ready for pickup. Prints that are not picked up after 30 days will become the property of the Library and unpaid charges will be applied to the patron's library account.

- Users may not print items that are prohibited by law or do not comply with Library policy.

- In addition to the above restrictions, the Library reserves the discretionary right to refuse any 3D print request that it deems inappropriate or unwarranted.

- By submitting content, the patron agrees to assume all responsibility for, and shall hold the Library harmless in, all matters related to patented, trademarked, or copyrighted materials. The South Huntington Public Library is not responsible for any damage, loss, or security of data arising from the use of its computers or network, nor for the functionality or quality of content produced on the 3D printer.