

IDEA LAB



The IDEA Lab promotes Innovation, Design, Engineering, and Art to support its mission of educational, recreational and cultural experiences for families and individuals. We encourage patrons to learn new skill sets and technologies in this space at their own pace, independently or as part of a community of Makers.

Location

Main Library, Charleston

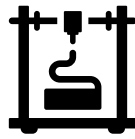
Hours

Monday - Thursday, 12 - 7:30

Friday & Saturday, 12 - 4:30

Website

<http://www.kcpls.org/idea-lab>



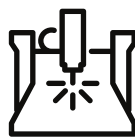
3D Printing

Create a prototype, a toy, or even a model for a school project with our variety of 3D printers.



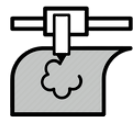
Laser Etching

Whether you are creating something functional or simply something pretty, our laser etcher and cutter will do the job.



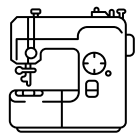
Water Cutting

Our waterjet can cut through a variety of heavy duty materials, such as aluminum and marble. It does not have the ability to engrave or etch.



Cricut

Use the Cricut Maker 3 to personalize coffee mugs, water bottles, tote bags, and even make your own cards for special occasions.



Sewing & Embroidery

We offer five sewing machines as well as two embroidery machines upon request. Thread and needle provided.



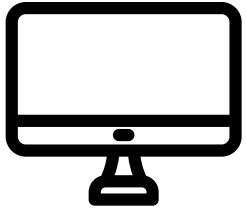
VocalBooths

Record anything from a song to a podcast in our VocalBooths. Microphone and editing software available.



Miscellaneous

We also offer 3D pens for adults and children, two buttonmakers, two zSpace augmented reality computers, stopmotion animation kits, Arduino, and SAM Labs coding hardware.



Reserving Space in the IDEA LAB



What You Need

- Library Card
- Signed Waiver
- Online Training

Training Required For:

- 3D Printers
- Laser Etcher
- Water Cutter
- Cricut Machines
- Sewing & Embroidery
- VocalBooths

Online Training Available At:

<http://my.nicheacademy.com/kanawhalibrary>

Once you are ready to use the IDEA LAB, all you need to do is reserve the piece of equipment you want to use. If you haven't signed a waiver or shown us your training certificate yet, no worries! You can do that on the day of your reservation.

Reserving the Equipment

Our equipment is listed under the Public Meeting Rooms link on the KCPLS.org webpage, located at <https://www.kcpls.org/public-meeting-rooms>.

To select the piece of equipment you want to use, choose the By Room button. You can select the IDEA LAB from the drop-down menu on the left of the screen or simply scroll down the page. Select the piece of equipment you would like to use and then select a time slot. Reservations can be made in increments of up to four hours and can be made back-to-back.

Projects must be completed or at a stopping point fifteen minutes prior to closing. If your project may take longer, please talk to an IDEA LAB staff member.

We may not always be able to approve your reservation in a timely manner. Please assume that your reservation is approved unless you receive an email stating an issue.

Payments

We will charge the appropriate amount to the library card of the individual or guardian listed on the waiver. Payments can then be made by cash or card at the Media Desk, located on the Jacobson Tower end of the library.

No-Shows and Abandoned Projects

If you do not show up for your reservation multiple times, you may be denied future use of the IDEA LAB.

Abandoned prints or projects become property of the IDEA LAB and may be displayed as examples or given away as donations or prizes.

Printers Available:

Creality CR-6 SE
DOBOT Mooz 2
DOBOT Mooz 3
Flashforge Adventurer
FLSUN QQ-S-PRO

Build Areas:

235 x 235 x 250 mm
200 x 200 x 190 mm
100 x 100 x 100 mm
388 x 340 x 405 mm
255 x 255 x 360 mm

Filament Type:

PLA 1.75mm

Colors Available:

White
Black
Blue
Red
Yellow
Pink
Purple

Cost:

2¢ per gram

The Process of 3D Printing

3D printing is an additive manufacturing method, which means the printer adds layer upon layer to build a finished physical object. That object is usually based upon a computer-aided design (CAD) or digital 3D model.

Your print file should be in an **.STL** format, which takes your design and converts it into smaller geometrical units -- usually triangles. We will then run your file through our Cura slicing software, using settings specific to the 3D printer you want to use. This translates the file into a language the 3D printer can read, known as a **.GCODE** file. Cura will tell us how long your project will take to print and how much filament will be used, which is what we base the cost on.

We use **PLA** filament, which is short for polylactic acid. It is the most common type of filament used in 3D printing. Because these printers add layers, you will want to consider where your piece will need added supports. **Supports** are lower quality pieces that breakaway easily after the print is complete. These hold up overhanging pieces to keep them from drooping.

The **Y-H-T rule** is something to keep in mind. Overhanging pieces that have a **Y** shape -- or a gradual slope -- should print without needing supports. A shorter **H** shape -- also known as a **bridge** -- will need supports if the bridge is longer than 40mm. A **T** shape will almost always need extra supports of some type.

If your print has an excess of supports, it will require a longer printing time and will use more material. Keep this in mind and only put supports where they are absolutely necessary. Supports will also cause the surface of your finished piece to look rougher, meaning you will spend more time working on it after the print is finished.

One way to avoid supports and potentially reduce print time is to split your project into multiple pieces. Most pieces can easily be put together with superglue, which is available in the IDEA LAB. This is also a great trick when you are wanting to print something larger than the build areas listed. No matter how many pieces are in your project, always align the flattest surface with the printer bed.

LASER ETCHER & CUTTER

Machine Available:

Glowforge

Build Area:

11.5 x 20 inches

Accepted Materials:

Wood

Non-Toxic Acrylic

Cork

Paper

Leather

Fabric

Magnetic Sheets

Plexiglass

Glass

Ceramic Tile

Marble

Anodized Aluminum

Titanium

Stone

Teflon

*Italics denote materials that
can only be engraved.*

Cost:

Bring Your Own Material

Using the Glowforge

The Glowforge uses a subtractive manufacturing process, taking away from the chosen material in order to create a finished piece. It does this by cutting, scoring, or engraving the material with a laser.

The machine can usually cut through ¼ inch (0.6 cm) in a single pass. Thicker materials may require multiple passes. Materials should be no longer than 21 inches and should not touch the edges of the unit. Material must be less than ½ in (1.2 cm) tall if the crumb tray is in, or less than 2 in (5.0 cm) tall if it is removed. Objects that you want to engrave need to be 0.5 - 2 inches. The depth of the engraving will depend on the material.

Designing

You have three options to create a design. You can create by using tools in the Glowforge app, by uploading something you have designed in another application or downloaded elsewhere, or by capturing a picture or design you have drawn using the Glowforge camera.

Glowforge is compatible with JPG, PNG, SVG, and PDF files which can be created in a variety of applications, such as Adobe Illustrator, Inkscape, CorelDraw, Adobe Photoshop, GIMP, Autodesk 360, Sketchup, and Silhouette Studio. We also recommend the ProCreate app for tablets and Canva for browser-based software.

To cut or score your design, it will need to be a vector image (.SVG). Raster objects, such as JPG or PNG files, are only able to be engraved. To achieve the highest quality engraving, you will want to convert your image into black-and-white to improve the contrast.

The settings will vary depending on the type of material you are using. Glowforge has a list of proofgrade materials in the app, which adjusts the settings as necessary. These can be useful if you are using a similar type of material. However, there can be a certain amount of trial and error involved. If at first you don't succeed, adjust your settings and try again!

WAZER WATERJET

Machine Available:

Wazer

Build Area:

18 x 12 x 0.5 inches

Cut Rate:

Varies

Accepted Materials:

Aluminum 6061

Steel 1008

Steel 4130

Aluminum 7075

Copper 110

Stainless Steel 316

Titanium G5

Steel O1

Steel 1018

Stainless Steel 440C

HDPE

Polycarbonate

Acrylic

Silicone, 50A

Glass, Borosilicate

Tile, Ceramic

Glass, Soda Lime

Tile, Porcelain

Carbon Fiber

Cost:

Bring Your Own Material

About the Wazer

The Wazer is a waterjet cutter that uses high water pressure and an abrasive material to cut through a variety of materials. Much like the Glowforge, this uses a subtractive manufacturing method unlike our 3D printers, which use an additive manufacturing method.

It can precisely cut through material up to ½ inch in thickness.

Designing

You will need to design your project in a **vector** design program, such as Adobe Illustrator or Inkscape, so that it will save your design as a .DXF or .SVG file. Then you will upload this file into WAM, the browser-based Wazer software.

When you import your design, you will want to make sure to convert all cut edges and text into paths.

You may also find it handy to understand the difference between a Cut Group and a Split. A **Cut Group** includes everything contained within a closed curve, while the **Split** option allows you to customize each curve individually.

When you import your file, all of the curves will be known in white. But the Wazer needs to know if it needs to cut on the outside or the inside of that line or on the line itself. Simply select your cut group, click on the Cutting Path menu on the left side of the screen, and choose from the options given.

Cutting

Once you've loaded your file, the next step is to lift and home the nozzle. Do this before fastening your material to the cut bed. Then you will set the nozzle height using the tool located on the top of the nozzle. For a more detailed explanation on how to do this, consult our training on NicheAcademy.

Once you've completed these steps, including an optional Dry Run, you are ready to cut your material.

Machine Available:

Cricut Maker 3
Cricut Joy

Cut Area:

11.5 in x up to 4 ft
4.5 in x up to 4 ft

Accepted Materials:

Cardstock
Copy Paper
Sticker Paper
Corrugated Cardboard
Iron-On Vinyl
Permanent Vinyl
Faux Leather
Faux Suede
Parchment Paper
Wrapping Paper
Window Cling

Cost:

Smart Vinyl: \$2 per ft
Smart Iron-On: \$5 per ft
Sticker Paper: 20¢ per sheet
Cardstock: 20¢ per sheet

About the Cricut

Cricut is a cutting machine that allows you to precisely cut out intricate designs for greeting cards, paper art, or the personalization of t-shirts, tote bags, coffee mugs and more. We offer two types of Cricut machines: the more robust Cricut Maker 3 and the smaller Cricut Joy. The Cricut Maker 3 features three blades: the original cutting blade, a rotary blade, and an engraving tip.

Materials

Cricuts can cut a wide variety of materials. Cricut-brand materials made specifically for the machine model work without the use of a cutting mat; however, if you want to use other brands or scraps, you will need to use a cutting mat. A list of accepted materials can be found on this page. Other materials may also be approved after consulting with an IDEA LAB staff member.

If you aren't sure what type of material you need for your project, please contact an IDEA LAB staff member.

Designing

The IDEA LAB has a subscription to Design Space Premium, which is where you will do most of your design work. Design Space gives you access to thousands of elements you can use to bring your idea to life. You can also upload your own designs; however, files must be in a .SVG format.

For a more in-depth tutorial on how to use Cricut Design Space, please see the IDEA LAB online training course, accessed via NicheAcademy.

Other Tools Provided

The IDEA LAB provides a variety of tools to help you once you have finished cutting your design. These tools include scissors, tweezers, weeders, scrapers, spatulas, trimmers, scorers, and a Cricut Heat Press to help you apply your iron-on designs.

Machine Available:

Singer 2277 Sewing
Brother SE1900 Embroidery

Singer 2277:

23 Built-In Stitches
Width/Length Adjustment
Automatic Buttonhole
Automatic Threader

Brother SE1900:

5" x 7" Field
138 Designs with 11 Fonts
240 Built-in Stitches
3.2" LCD Touchscreen Display

Cost:

Bring Your Own Material

Singer Traditions 2277

Our sewing machines might seem familiar, but they are perhaps our most difficult pieces of technology to use. Our training, accessed via NicheAcademy, goes over how to wind and install the bobbin as well as how to thread the machine. Easy-to-use dials on the front of the machine allow you to adjust the stitch pattern, width, and length.

It is important to familiarize yourself with the principle parts of the machine for proper use. We recommend starting out with the manual, which provides detailed diagrams as well as information on how to choose a stitch pattern (including stretch stitch patterns).

IDEA LAB staff can also help you find informative videos that you can follow while you learn.

Brother SE1900

Much like our sewing machines, it is best to start out by exploring the manual and learning the where each part of the embroidery machine is located, as well as what they do.

Using the LCD screen, however, you are able to customize your premade or loaded design on the machine itself by combining, adding text, rotating, flipping, resizing, or recoloring your design. Another helpful feature are **step-by-step tutorials** via the LCD screen on the front of the machine.

For those wanting to design their own embroidery patterns, we recommend My Editor, which allows you to convert file formats and print templates, and StichPad for Apple products.

Machine Available:

VocalBooth Gold

Features:

2" Pyramid Studio Foam

4' x 4' Size

Avid Pro Tools

Aston Microphone

VocalBooth Gold Series

Whether you are wanting to record a song, start a podcast, or narrate a book for your grandchild, our two VocalBooths provide you with the tools you need. Each booth can comfortably fit two people and provide 2" pyramid studio foam to help muffle stray noise.

Inside each booth is an Aston microphone with four settings to help you fine tune your sound as well as an Audient iD 14 audio interface. Also provided is a Mac Mini loaded with Avid Pro Tools and the iZotopes Elements Suite for all of your editing and mixing needs.

While Avid Pro Tools allows you to trim and rearrange your track, iZotopes Elements Suite does four things to perfect it: Neutron provides you with mixing plug-ins, Ozone helps you master your track, Nectar helps make your vocals sound crisp and beautiful, while RX helps you eliminate any unwanted sounds.

The provided online training goes into more detail about everything mentioned above. We also have copies of the Avid Pro Tools manual to help make the process as easy and seamless as possible.

All you need to bring is something to save your track on!

To Learn More

Ask an IDEA LAB staff member to help you find resources, such as articles and YouTube videos, that will help you in your recording journey.

For 13+

Arduino Starter Kits
Mynted 3D Pens
Quilling Kits

Up to 13

SAM Labs Coding Kits
Button Makers
Stopmotion Animation
3Doodler Pens
zSpace Computers

Arduino Starter Kits

Check out our calendar for drop-in events featuring our Arduino Starter Kits. These kits feature 15 starter projects to help you learn more about coding and electronics. Projects include making an instrument you play by waving your hands and even a crystal ball to answer all of your questions about the future. The Arduino site provides video tutorials for each project if you get stuck.

Mynted 3D Pens

These 3D pens are best suited for teenagers and adults. Cost is \$2 an hour. See an IDEA LAB staff member to use these pens.

Quilling Kits

Available during certain drop-in events and available upon request, our quilling kits provide you with the tools to create beautiful paper art.

SAM Labs Coding Kits

Check out our calendar for drop-in events featuring our SAM Labs coding kits. These kits include physical blocks that pair with the browser-based SAM Labs software, allowing you to learn coding through hands-on activities like making a stoplight or a robotic car.

Button Makers

One of our more low-tech options, make your own pinback button, keychain, or magnet using one of our pre-made designs or one of your own. Cost is 20¢ per button.

Stopmotion Animation

Available during scheduled drop-in events, you can use our Stopmotion Animation kits to create your own short film for free.

3Doodler Pens

These pens feature a low-heat tip which make them perfect for children. Cost is \$2 an hour.

zSpace Augmented Reality Computers

Operate on a human heart or dissect an atom using our zSpace computers, which bring technology to life with just a pair of glasses!

RESOURCES

