SADR

Studios for Art and Design Research
Digital Fabrication Lab Handbook

**Hours of Operation:
8am-5pm, M-F**

TABLE OF CONTENTS:

Purpose of this lab space

Welcome to The Ohio State University's Studios for Art and Design Research, where we are thrilled to have you embark on your journey towards achieving a degree. Our primary mission is to support and empower Art and Design students, faculty, and staff in their research pursuits. Within these cutting-edge lab spaces, you'll find an array of industry-standard and experimental equipment, designed to encourage exploration and creativity. Our woodshop and metal shop are fully equipped with an extensive range of hand and power tools, ready to bring your visions to life. Additionally, our state-of-the-art Digital Fabrication Lab houses advanced resources like two 36"X24" 60 WATT laser cutters, 3D printers, and a CNC Machine, enabling you to delve into the forefront of modern design technology.

Here, your ideas are valued, regardless of how unconventional they may seem. The Studios for Art and Design Research is a safe space where open dialogue and collaboration are highly encouraged. Our aim is to provide you with the resources needed to innovate and explore along your path of discovery. Emphasizing collaboration, mutual respect, and safety, we kindly ask you to uphold these guiding principles as you engage in developing your artistic practice. We are committed to fostering an inclusive and supportive environment, and we can't wait to witness the remarkable creations that will emerge from your journey within our Studios. Let's create, innovate, and inspire together!

Access

In order to use these lab spaces, you must be:

1. **Enrolled or employed by the departments of Art or Design**

2. **Be enrolled in a class offered by either department requiring use of the shop**

You must undergo a preliminary orientation that discusses the fundamentals of using this lab in a safe way. After reading through the Digital Fabrication Lab Handbook, you will be directed to take an online quiz. All questions in the online quiz have been generated using information taken directly from the handbook. The quiz requires that you achieve a 90% score and you can take it as many times as you need to. Help will be offered by the digital fabrication specialist. If you have any questions, you're encouraged to ask them. Reach out to Joshua Gagliardi (gagliardi.43@osu.edu). Orientations are available by appointment and are generally given to classes; however, individual orientations may also be offered. Upon successful completion of your orientation and quiz, lab users will be granted the privilege of using this lab space during **posted hours of operation (8-5, M-F with the possibility of extended hours in the evenings and weekends - subject to change).**

Overview of the Digital Fabrication Lab (Hopkins 175)

Hopkins Hall, Room 175 is your go-to destination for utilizing advanced digital fabrication technology. Here, you'll have access to an impressive array of tools, including laser cutters, 3D printers, a Vinyl Cutter, and sewing machines. We take pride in maintaining a clean and pristine environment in this space, ensuring the utmost care for our equipment. Please refrain from introducing sawdust, glue, or any potentially harmful substances here. To cut your materials, assemble, or refine objects, we have dedicated spaces for each task. For Foundations related work, head to Room 171; if you require woodwork space, Room 172 (wood shop) is at your service, and for CNC machining, you'll find Room 176 ideally equipped for your needs. By adhering to these guidelines, we can ensure the longevity and optimal performance of our equipment, enabling everyone to make the most of their creative pursuits. Let's keep our creative space thriving and efficient!

General Procedures (a loose framework):

1. Introduce yourself to the Manager or technician on staff.

2. If you haven't made an appointment, you will need to ask if there is available time and space to work on your project.

3. Explain what your project is in terms of MATERIALS and PROCESSES.

4. From there, the manager or technician on staff may ask you to clarify points followed by questions about your intended process.

5. If you're planning on using one of the laser cutters, you will need to set up your file using Adobe Illustrator. Log in and open your files.

6. When ready, turn on the laser cutter air assist and exhaust. **You must stay with your "print" while the laser cutter is working.** Eyes on the prize, so to say. *Fire safety is a paramount concern.*

7. When you're finished, turn off the laser cutter along with the air assist and exhaust. "Leave no trace" - Leave your work area better than you found it. You will need to clean up any debris left over from the job you've completed.

8. 3D printing requires conversation and strategy before printing. All prints must be uploaded to a shared 3D printing folder through OneDrive. All prints must be approved and set up by the Art & Design Staff or Faculty. All prints should be in **OBJ** or **STL** format.

Policy

1. Laser cutters are available to students enrolled in Art and/or Design classes. They are also available to all Art and Design Faculty and Staff.

2. Laser cutters are only available to students who go through the training course followed by successful completion of the assessment quiz.

3. No one may use the laser cutter during off hours due to risk of fire or exposure to toxic gas.

4. No one may use the laser cutter without a partner present. DO NOT USE THE LASER CUTTER ALONE/ WHEN THE LAB MANAGER OR STUDENT TECHNICIANS ARE NOT PRESENT. If they are not in the room, please wait for them to return before beginning.

5. If you are cutting material other than wood, cardboard, or paper, you must gain approval from the lab manager or student technician on staff. **NEVER CUT MYSTERY MATERIALS** due to risk of fire or exposure to toxic gas. REFER TO "Approved and Banned Materials".

6.   Do not attempt to cut anything on the laser cutter without being sure it is an approved material – see section on "Approved Materials".

7. If a fire occurs, you must tell the manager or student technician on staff immediately.

8. If the laser head does not move back to the home position upon completing your job, you must tell the manager or student technician on staff.

7.   Be aware that this lab is shared between many people. **Appointments are highly encouraged** and take priority over walk-in traffic.

Safety:

1. **In Case of Fire**
   a. Use the spray bottle next to the laser cutter to put out small fires if they occur.
   b. Opening the lid will stop the laser from engaging. Spray the affected area and tell the manager or student worker immediately.
2. If you notice a serious fire - flames coming out of the machine, immediately let the manager know. If you are working after hours and there is no manager on site, use the fire extinguisher next to the laser cutter to put out the fire. Serious fires are defined by flames coming out of the top of the machine.

FIRES MOST COMMONLY OCCUR WHEN THE JOBS ARE LEFT RUNNING, UNATTENDED. KEEP AN EYE ON YOUR JOB FOR THE WHOLE DURATION ITS RUNTIME UNTIL COMPLETION.

3. Always adhere to the approved/banned materials list. If you are unsure if a material is safe to cut, assume it is dangerous and DO NOT CUT that material. Feel free to ask as many questions as you have about this. We're happy to do the research to find out if the material you're working with is safe for the laser cutter/you.

Orientations will be given during the first 4 weeks of classes

on specific days and will be held for groups of 5 people or more. Individual orientations will be given as exceptions when circumstances require it.

In order to use the machines in this lab, **you must attend one of these training sessions.** Successful completion of the online training module, in person training, and the Digital Fabrication Lab quiz will grant you the ability to use the equipment in this lab space. Regardless, you must always inform the manager or student technician on staff what your project is and what materials you want to work with before beginning.

Using the laser cutters is a privilege granted to responsible users.

Failure to abide by the policies outlined in this document, including the use of approved/ banned materials will result in communication with the faculty member attached to the class you're making your project for.

Use of banned materials will result in the loss of access for 24 hours. Access may be suspended for egregious actions that compromise your safety and the safety of others, as well as the safety of the tools in this lab. Always ask if what you're working on is safe before beginning.

How to make an appointment

The best way to make an appointment to use a laser cutter, vinyl cutter, or 3D printer is through the SADR Bookings site.

https://u.osu.edu/studiosforartanddesign/about/

You can click "HERE" to go to the BOOKINGS SITE.

You can also see the hours of the SADR, including the Woodshop, Metalshop, and Digital Fabrication Lab.

In addition, if you would like to contact Joshua Gagliard (Digital Fabrication Shop Manager) or Paul Tenwalde (Woodshop Manager), you can click on the link to email them. Send them questions! Ask away

The bookings site will look like this:

(pictured below).
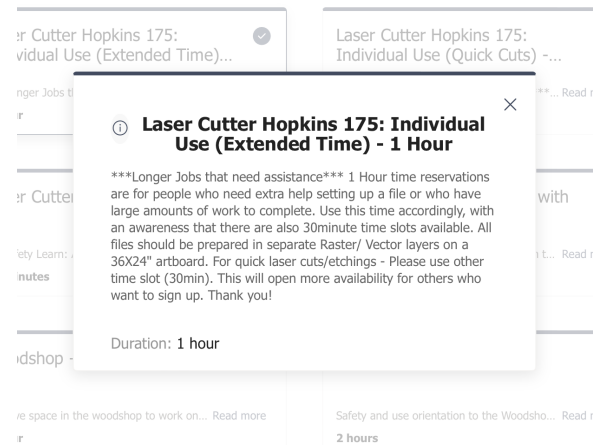
Each selection is intended for a specific purpose. For instance, "Laser Cutter Hopkins 175 Individual (Quick Cuts)" is meant for smaller jobs that you think will take less than 30 minutes.
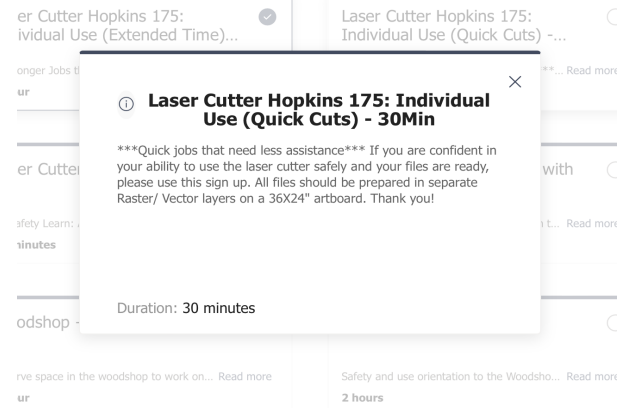
For laser cutter related projects that could take up to an hour, you should select the "Laser Cutter Hopkins 175 Individual (Extended Time) 1 Hour".

Choose the option that best fits the project you would like to work on. Ex. *vinyl cutting* for vinyl cutting, *3D printing* for 3D printing.

For laser cutting, vinyl cutting, and 3D printing, you will need to input specific information about the project you're working on and about the class you're taking. This information helps us better predict when busy periods occur and also creates room for accountability.

These questions are mandatory.

PROVIDE ADDITIONAL INFORMATION

If you are not able to attend your appointment, please cancel as soon as possible using the confirmation email sent when you book the appointment. Please confirm that you will do your best to communicate a cancelation. Appointments are subject to cancel

Add your answer here

Who is the teacher of the class you're using the laser cutter for? Appointments are subject to cancelation when required questions are not answered.

Add your answer here

What class name and number are you using the laser cutter for? Appointments are subject to cancelation when required questions are not answered.

Add your answer here

Book

Once you book an appointment:
- You will receive a confirmation email with the details of your booking.
- In this email, you will also have an opportunity to cancel your appointment if you are not able to make it.
- In an effort to be considerate to others using this lab, **please cancel your appointments as soon as you're aware you will not be using them**.
- This opens up the time window you booked to allow others to sign up.
  - We want to make sure we're doing everything we can to help you through this experience.
- If you miss more than three appointments, a letter will be sent to the teacher of the class your project is connected to, so that we may assist if necessary.
  - Communication goes a long way.

Tips

You will receive a reminder the day before your appointment letting you know you have an appointment the following day.
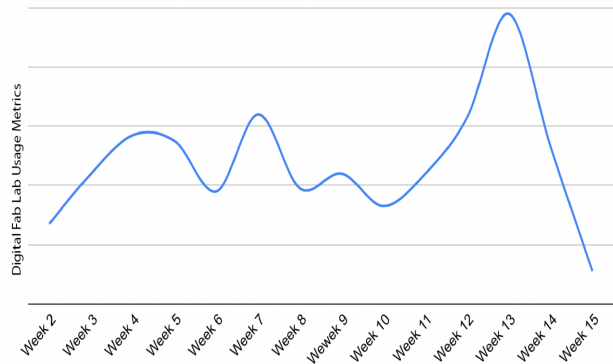
You will receive another reminder an hour before your appointment letting you know your timeslot is coming up.

It is HIGHLY RECOMMENDED that you input your appointment into your digital calendar with an alert set as a reminder. *It is best to do this directly after making the appointment to ensure follow through.*
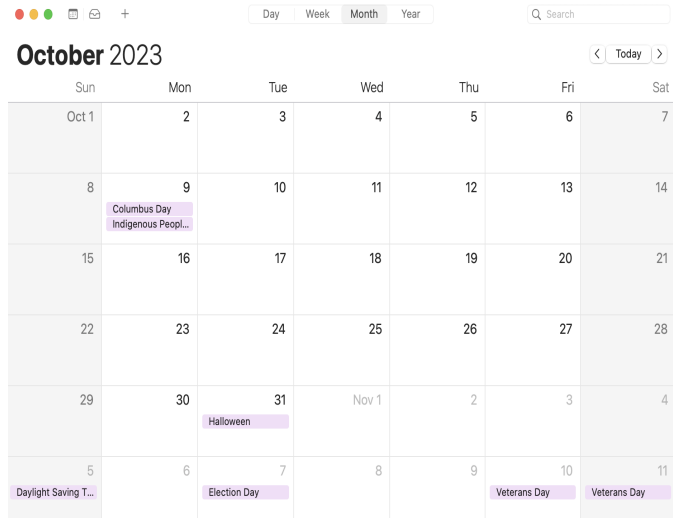
Etiquette

When your appointment extends longer than anticipated, which happens quite frequently, we suggest coordinating with the person scheduled after you. A simple, respectful communication such as, "Apologies, but my job is not done. Do you have time to wait another few minutes?" can go a long way. Often, people are understanding and willing to be flexible, emphasizing the significance of effective communication.

The busiest weeks are generally, but not limited to weeks 3-7 and 12-14. This will, of course, vary from semester to semester.

However, please note that we cannot guarantee that you'll have the extra time you need. The next person on the schedule may also have a busy schedule. In such a scenario, we recommend logging out of the laser cutter computer to make space for their project. You can coordinate with the manager or tech on staff to explore open availability or visit the SADR Bookings website to check for alternative date/time options.

To ensure ample space for your project, **it's advisable to book time at least two weeks in advance**. Always bear in mind that projects often take longer than expected, with unexpected issues that require troubleshooting or re-evaluation.

As a helpful strategy, consider scheduling an additional appointment later in the week that you can cancel if not needed. This approach provides a safety net and flexibility in managing your project's time requirements. With these considerations and proactive planning, you can make the most of our resources and enjoy a smoother creative process at our facility.

Cleaning

At this lab, we proudly uphold the guiding principle of **"Leave No Trace."** This essential principle revolves around **leaving the workspace even cleaner than you found it**. To adhere to this ethos, we kindly request that you sweep up any debris or mess generated during your work. It's essential to ensure that resources like "How to Guides" and "Speed, Power, Frequency Guides" are promptly returned to their designated locations after use, fostering an organized and efficient environment for all.

Please refrain from vacuuming out the laser cutters as doing so may lead to potential issues that could impact the machine's future functionality. **Only our Staff and Faculty members are permitted to handle this task**, ensuring proper maintenance and preservation of these vital tools.

**This lab is not meant for sanding, glue-ups, or acrylic welding.
To do this, you will need to work in Hopkins 171, 172, or 176.**

Material Safety

Whenever you're in a situation where you're aerosolizing, burning, or applying heat to materials, it's important to think about how those materials react/interact with our lungs and bodies.

Methods of intake include:
- **Inhalation**
- **Ingestion**
- **Absorption**
- **Injection**

In the case of using the laser cutter, we will primarily be dealing with possible inhalation hazards. Burning material produces smoke, vapor, or fumes.

HAZARDOUS CHEMICAL ROUTES OF ENTRY

Inhalation Do we breathe it in? This is the most common route of entry.

Absorption Does it pass through the skin, eyes or other membranes?

Ingestion Do we eat or drink it?

Injection Does it enter through a puncture or cut?

OSHAcademy
Occupational Safety & Health Training

www.oshatrain.org © 2021, OSHAcademy
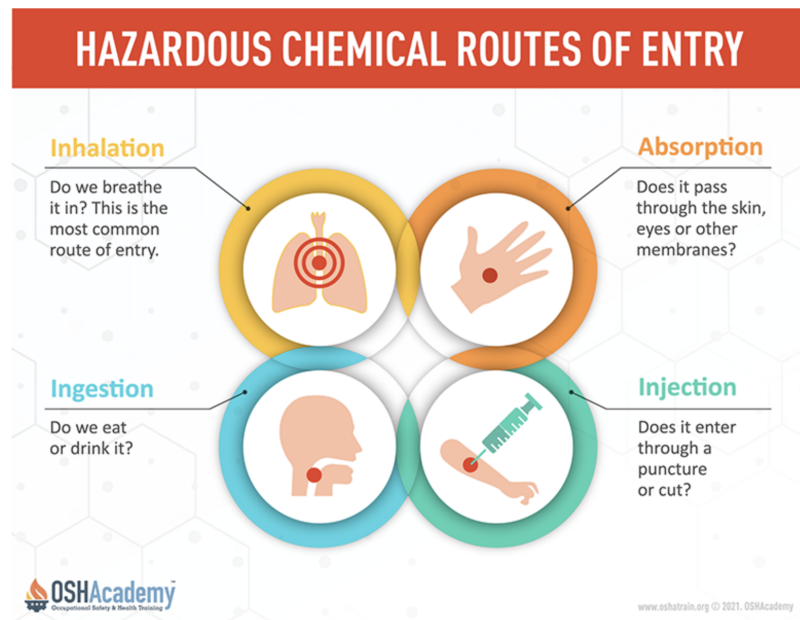
The exhaust and air assist must be on during every vector cut, etch, or raster engraving (see detailed description of laser cutter operation below). These actions prevent fires along with fumes exhausting into the room.

Many materials are safe to use. *Make a practice of asking the manager or tech on staff if the materials you have are safe to use.*

Approved materials are (not limited to):

- Wood (untreated - do not laser cut, etch, or engrave into weather treated wood)
- MDF (be careful of what it is sealed with. Polyurethane is acceptable)
- Melamine
- Plywood
- Masonite/ Hardboard
- Cork
- Cardboard
- ChipBoard
- Corrugated cardboard
- Scratchboard
- Sand Paper
- Bristol
- Cotton Fabric (Check for others)
- Genuine Leather (do not use Faux Leather - MAJOR HAZARD)
- Acrylic (must be acrylic - do not laser cut, etch, or engrave into LEXAN or Polycarbonate)
- Portland Cement (ask about others)
- Ceramic
- Plaster No.1
- Glass
- Marble
- Neoprene Neoprene (polychloroprene) is a synthetic rubber that is resistant to water, oil, and heat, making it a good insulator. It's commonly used to make wetsuits, but you can also get this fabric at your local craft store to make DIY phone cases, mouse pads, and even winter coats!
- Natural Rubber Stamps
- Vellum 100% Cotton Worbla
- (Natural Only)
- Polyethylene Foam
- Polyester Foam
- Anodized Aluminum (do not use bare aluminum or metal)

Melamine

Masonite

Polyethylene Foam   *Polyester Foam*
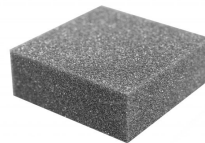
Banned materials are (not limited to):

- [ABS](#) - produces **Hydrogen Cyanide**
- [3form Varia](#) - **melts too much** during cutting
- [Acetate](#) - creates **nauseating odors**
- [Acrylic Paint](#) - produces **Formaldehyde**
- [Bamboo](#) (resin impregnated) - produces **Formaldehyde**
- Bending or warped plywood - can be an **obstacle for the laser**
- [Casting Wax](#) - **melts too much** during cutting
- [Corian](#) - creates a fine grit in the laser bed that **damages the machine**
- [Delrin](#) - produces **Formaldehyde, Hydrogen Fluoride**
- [Polyurethane foam](#) - produces **Isocyanates, Hydrogen Cyanide**
- [Foamcore](#) - produces **Benzene** (FOAMCORE is expanded polystyrene)
- [Formica](#) - produces **Formaldehyde**
- [Mylar](#) (PET) - produces **Ammonia, Hydrogen Cyanide**
- [MDF](#) - produces **Formaldehyde**
- [Nylon](#) - produces **Ammonia, Hydrogen Cyanide**
- [PETG](#) - - creates **nauseating odors**
- [Polycarbonate](#)/[Lexan](#) - produces **CHLORINE GAS**
- [Polyester Felt](#) - produces **Benzene and strong odors**
- [Polystyrene](#) /[Styrene](#) - creates **nauseating odors, generates a lot of smoke, and deposits melted plastic inside the laser bed**
- [PVC](#) - produces **CHLORINE GAS**
    - **Commonly found in placemats, wallets,**
    - **carrying cases, notebooks, etc.**
- [Tyvek](#) - produces **Formaldehyde** (Tyvek is
- polyethylene, which is known to contain formaldehyde
- [Vinyl](#) - produces **Hydrogen Cyanide**
    - **Commonly found in placemats, wallets, carrying cases, notebooks, etc.**
- [Faux leather](#) - produces **Hydrogen Cyanide**
    - **Other names:**
        - **PU Leather (polyurethane)**
        - **Bicast leather**
        - **Split leather**
        - **Bonded leather**
        - **Reconstituted leather**
        - **Corrected grain leather**

THE FOUR MOST COMMON FORMS OF WARPING
CUP   BOW
CROOK   TWIST

Corian or Avonite

polystyrene foam

REAL LEATHER   **PU** LEATHER
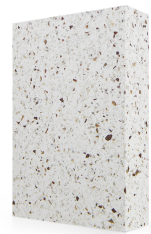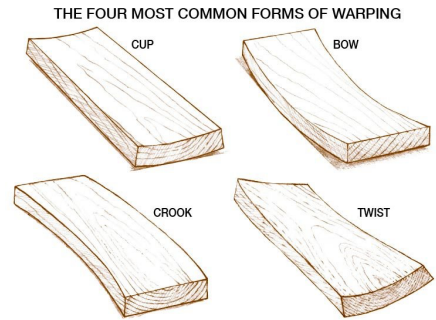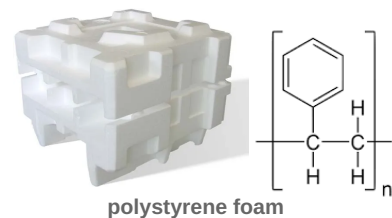
Laser Cutter SAFETY

1. NEVER WALK AWAY FROM A JOB THAT'S RUNNING.
The laser is very hot and can cause a FIRE. If you witness a flame occur, immediately press the RED BUTTON - "STOP". Use a water spray bottle located next to the laser cutter to put out the fire.
Let someone else know as soon as this happens.
2. NEVER OPERATE THE LASER CUTTER WHEN YOU ARE THE ONLY ONE IN THE BUILDING. ALWAYS PRACTICE THE BUDDY SYSTEM.
3. Always use AIR ASSIST - This helps prevent fire.
4. Always turn on the EXHAUST to evacuate fumes from the laser cutter AND the room you're working in.
5. Always be knowledgeable about the materials you're working with. Make a practice of researching what they are made with, where they come from, and how they interact with a laser cutter.
6. Approved materials are (not limited to):
- Acrylic (not polycarbonate or lexan)
- Paper (all kinds - avoid anything with vinyl coating)
- Fabric (all kinds - experiment!)
- Genuine Leather
- Marble
- Stone
- MDF
- Wood (ply, hard, veneer, untreated - do not cut treated wood)
- Some types of rubber
- Anodized aluminum
7. Never cut or etch into banned materials. BANNED MATERIALS ARE (not limited to):
- PVC
- Vinyl
- Polycarbonate
- Lexan
- Treated or sealed wood
- Faux Leather, Place mats, Self healing cutting mats
- Carbon Fiber
- Certain Foams
- Face up mirrored acrylic - always cut this face down to avoid reflecting light back into the machine.
- Etc.
8. Do not stare directly into the reflection of the laser. While the manufacturer says the safety glass stops harmful rays from damaging our vision, you can never be too careful.
9. CLEAN CAREFULLY WITH HANDS (versus a vacuum). Remove any debris left over from your job.
10. Always ask for help if you're unsure. The Studios for Art and Design Research Staff are here to help.

What to bring with you and what is provided.

You should plan to bring all of your own materials for laser cutting. The SADR also offers some scrap materials; however, you should not rely on these as your sole method of acquiring supplies.

Scrap materials offered are:
- Acrylic
- Paper
- Wood
- Matboard

These materials are first come, first serve and must be used for laser cutting at the time you request them. *Please do not take materials to support another class. The materials in this room are for usage in this room only.* When you are finished with scrap materials, you should replace the remainder back in the scrap storage area for the next person to use. - Thank you

3D printing is a filament consuming action. At the end of your 3D print, the manager or tech on staff will weigh your object and charge you for the cost of that material.

You are welcome to bring your own filament in for larger jobs, especially if there is a specific color you'd like to print with.
The Digital Fab Lab will offer Black and White Filament only.
It is highly recommended that you purchase material made by "[Hatchbox](#)". **It must be made of PLA (polylactic acid) and it must be 1.75mm.**

ABS, Nylon, Carbon Fiber, etc. ***are not*** ***acceptable filament choices.***
Each has a unique set of properties, many of which can be hazardous.

See Vendor list at the end of this handbook for ideas on where to source materials.

Acceptable Laser Cutting File Types

Most commonly, **Adobe Illustrator (.ai)** files can be used for Vector cutting, Vector Etching, and/or Raster Engraving. There are a number of other file types you can use that all depend on what type of job you're running. Vector Cutting, Vector Etching, and Raster Engraving are three types of laser applications.

Vector Cutting *(think "V" like it has a point or an edge that cuts")*
- *Adobe Illustrator (preferred)*
- SVG
- CDR
- DXF
- DWG

Acceptable 3D printing Files
- .OBJ
- .STL

<u>Vector Cutting</u>
Cuts through material
using .072 pt Stroke Width

<u>Vector Etching</u>
Partial Cut through material using combination of lower power and faster speed

<u>Raster Etching</u>
Etches an image into material
Similar to an inkjet printer

Preparing Files for Laser Cutting

All Art Boards NEED to be set at 36"X24" prior to entering the SADR.

When preparing your files for laser cutting, it will be important to consider how you've generated your files. Certain methods of making them produce desirable results while others do not.

Google Image | **Image Trace** | **Closeup of Image Trace**
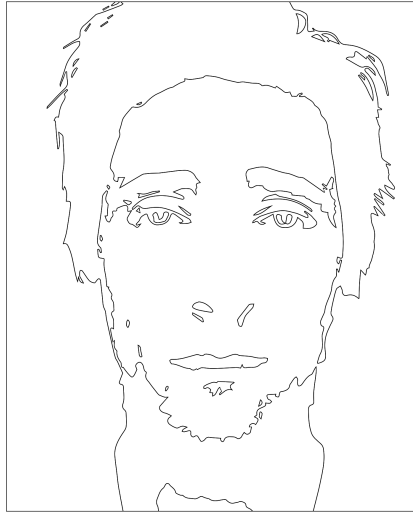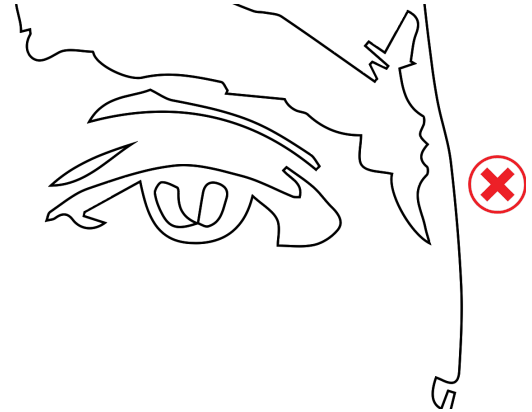
Using Image Trace can be a quick way of turning images from the internet into vector lines. When collecting these images, be aware that not all vector lines will produce the results you wish. Shapes within other connected shapes will be cut out along with their larger counterparts.

Depicted above in Adrien Brody's eyes in the closeup of the Image Trace function, there are two smaller amorphic ovals within the larger shape that makes up his eyelids and pupil. The shapes inside his pupil will not stay attached to the rest of the face and will be removed with the eyelid as the pupil shape falls away during VECTOR CUTS.

To make sure these details remain attached to the rest of your drawing, you must make bridges from the amorphic ovals to the rest of his face.
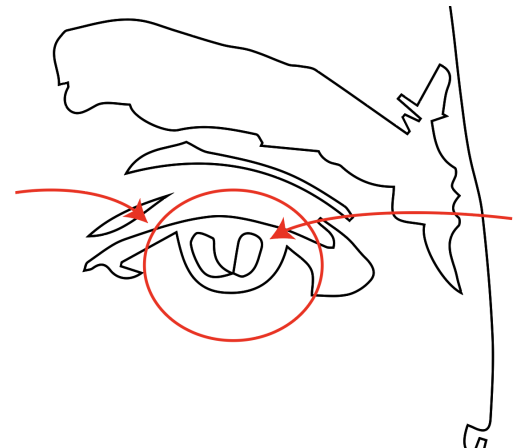
Highlight all vector lines in your drawing and activate the
"Shape Builder" tool. Hold down **"Option"** to take away sections.
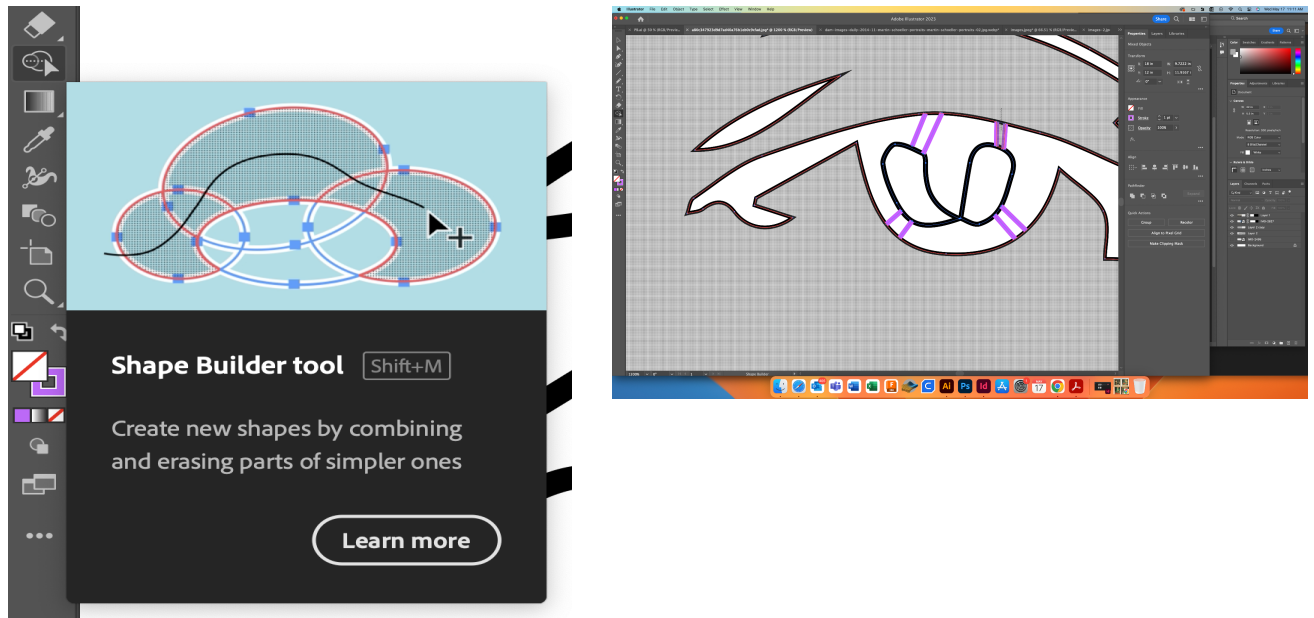
You should end up with something like this (pictured to the right)

You will need to do this to your entire drawing. Pay close attention to the details.

When you are ready to cut, make sure your Stroke Width is set to .072pts.
This will ensure the laser cutter recognizes it as a "Vector Cut", versus an image to
"Raster Engrave".

Avoid Double Lines

Double lines are created when one shape is stacked on top of another, instructing the laser cutter to **follow the same line twice**. This can lead to excessive burning during vector cuts. To identify double lines in your drawing, observe different shades of black when the stroke width remains uniform. Being mindful of this will help ensure optimal laser cutting results and prevent unnecessary burning.

To avoid double lines, highlight all shapes in your drawing. In the Pathfinder section of your properties menu, click on "Outline". Your shapes will lose their stroke width and fill. Re-highlight the area where your shapes are and add a stroke width of .072pts.
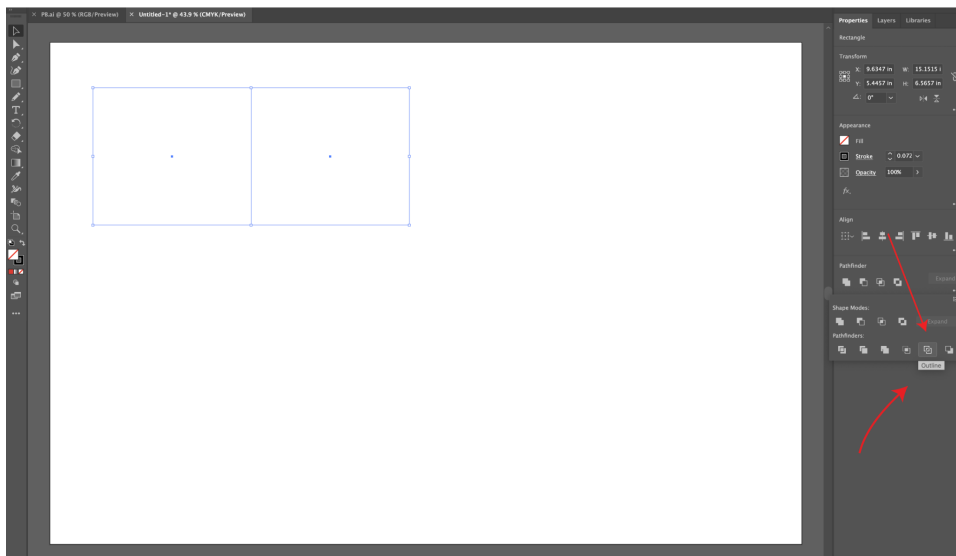
Make sure your opacity is set to 100%

Failure to do so will result in an ERROR when you attempt to start your file on the laser cutter.

Operating Epilog laser cutters - Legend 36EXT or Fusion Edge36
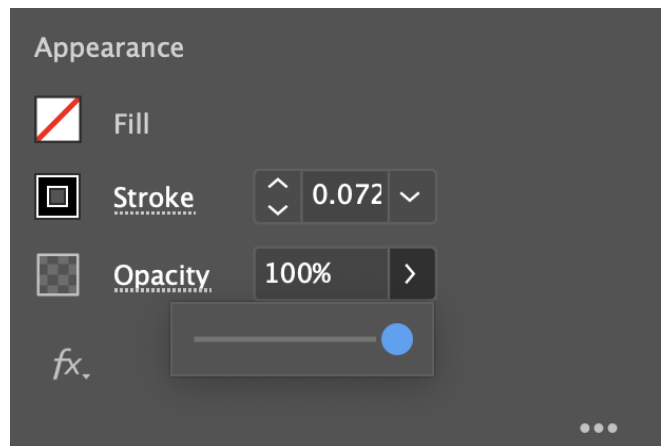
Begin by:

Logging into the computer
Log into your Creative Cloud account to access your files
Open Adobe Illustrator
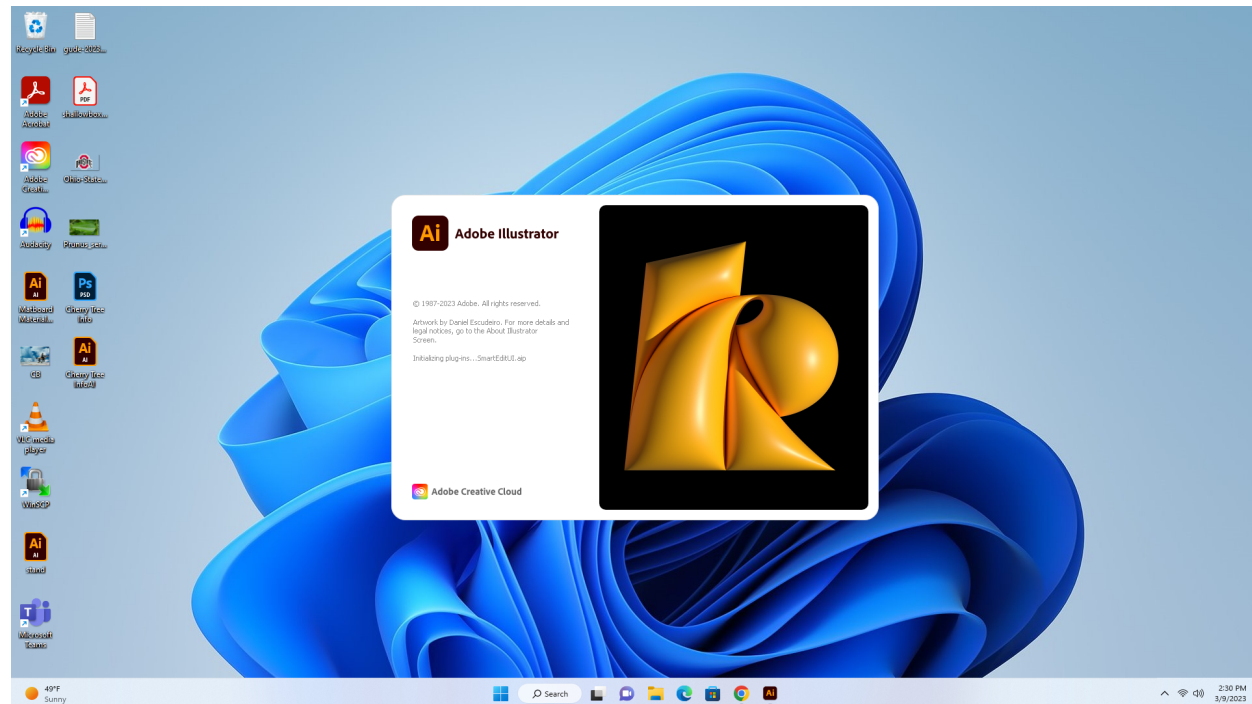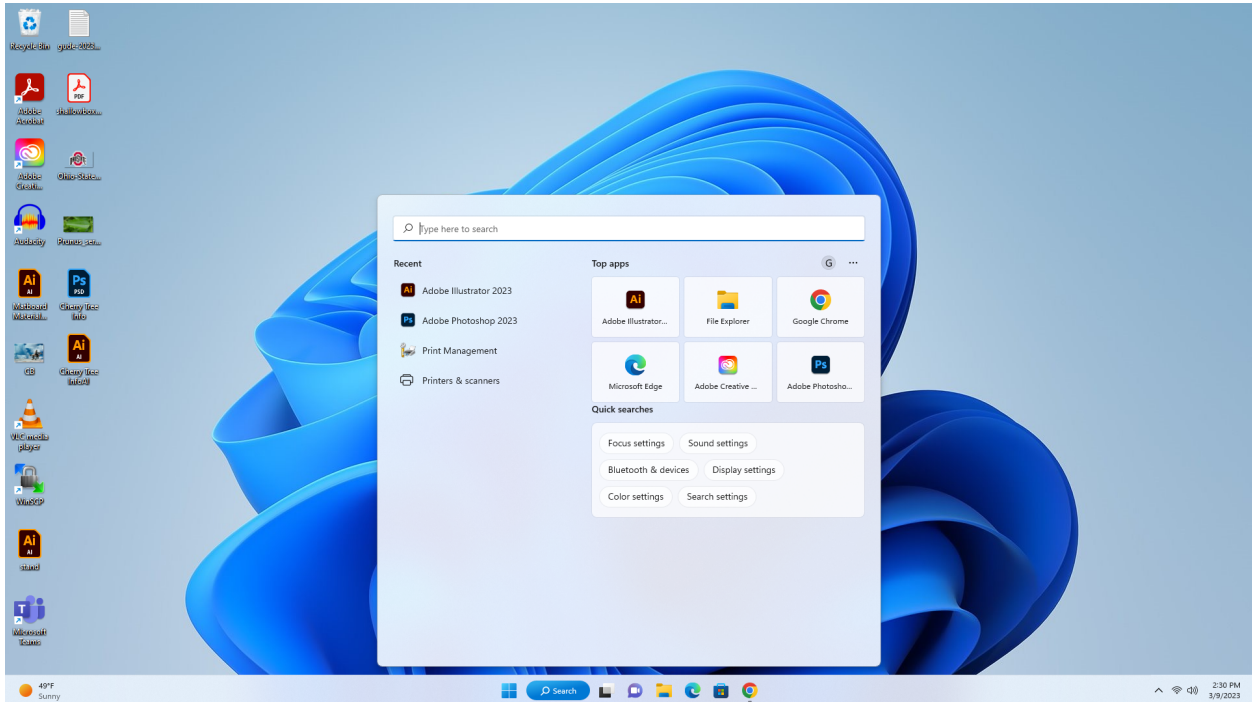
Open a 36"X24" Artboard (must match the size of the laser cutter print bed)
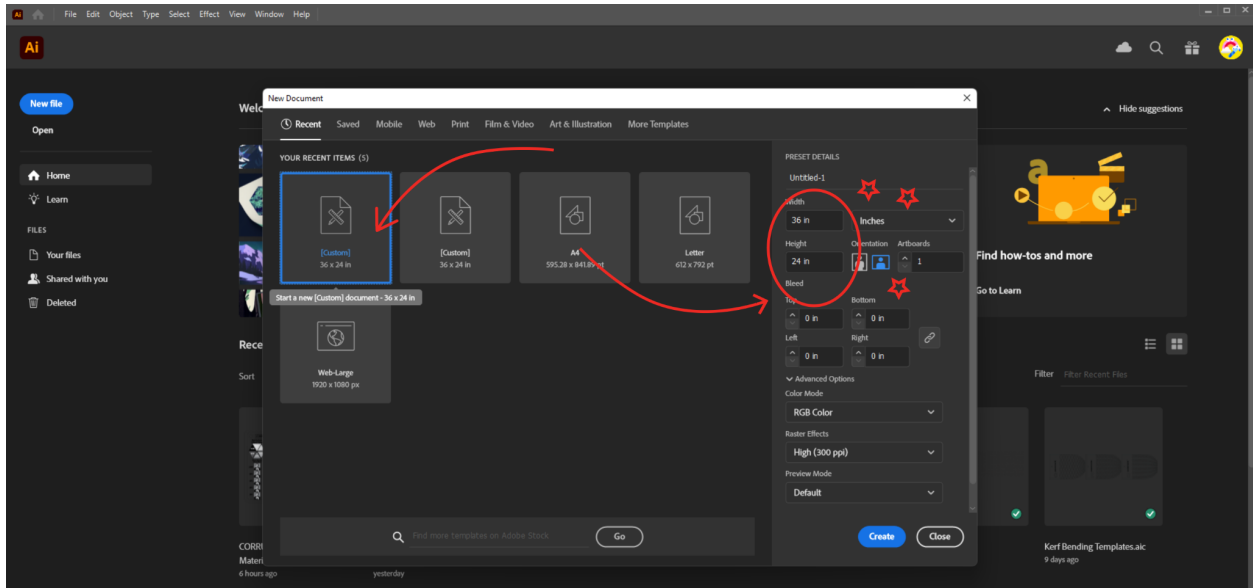
Double check to make sure your measurements are in INCHES - RGB Color Mode is Ideal
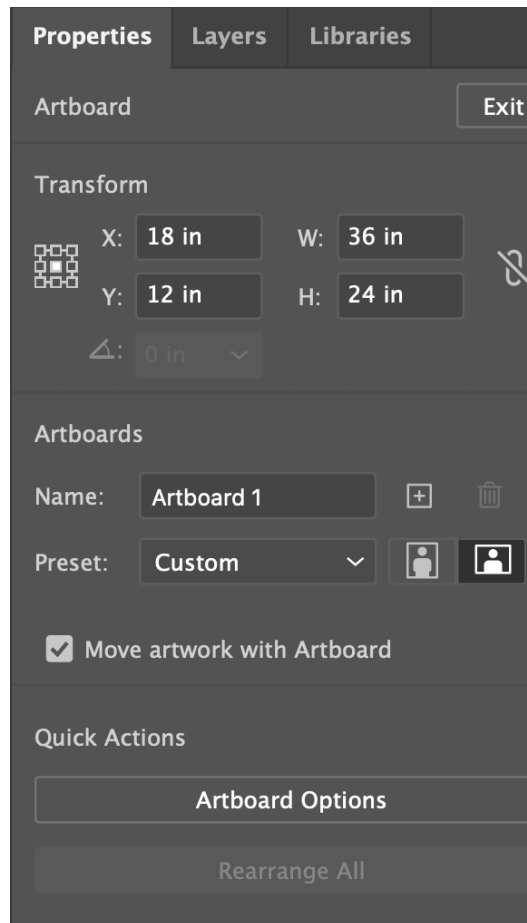
Bring Rulers into view by pressing "*Control R*".

You can also access this through the dropdown menu by pressing, "View" followed by "Show Rulers".
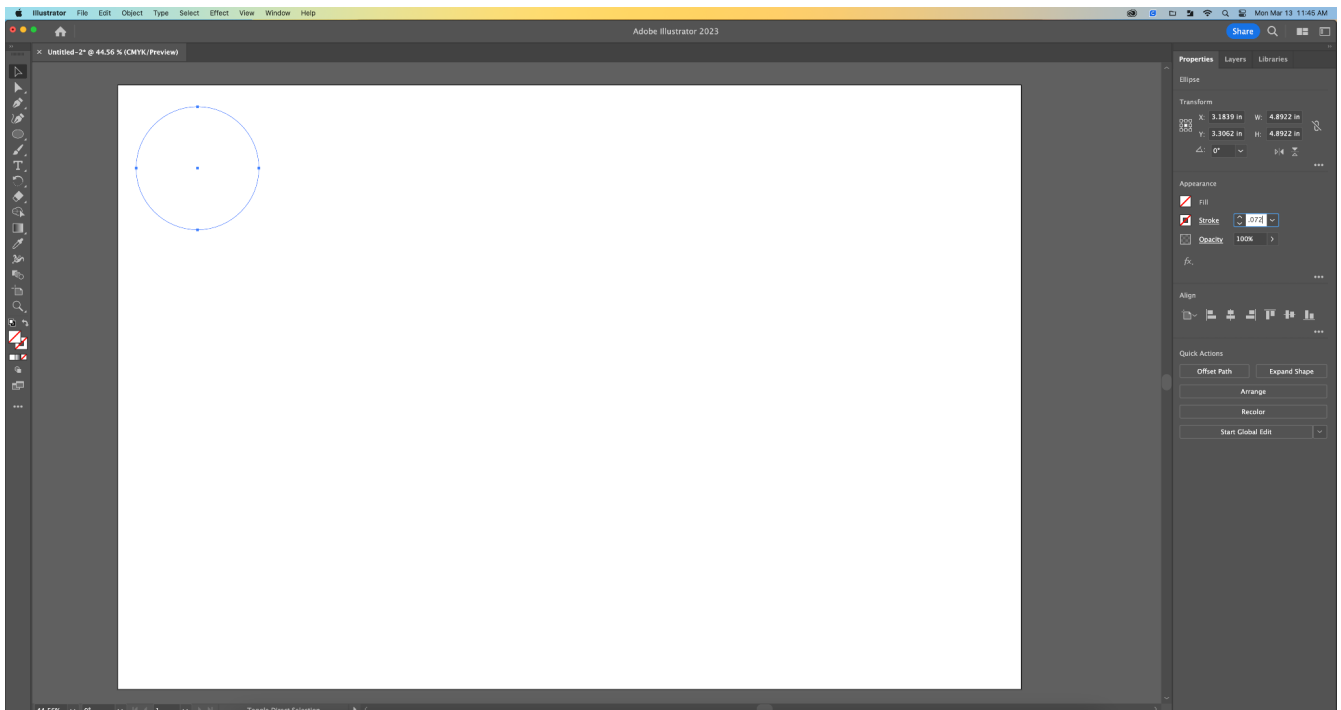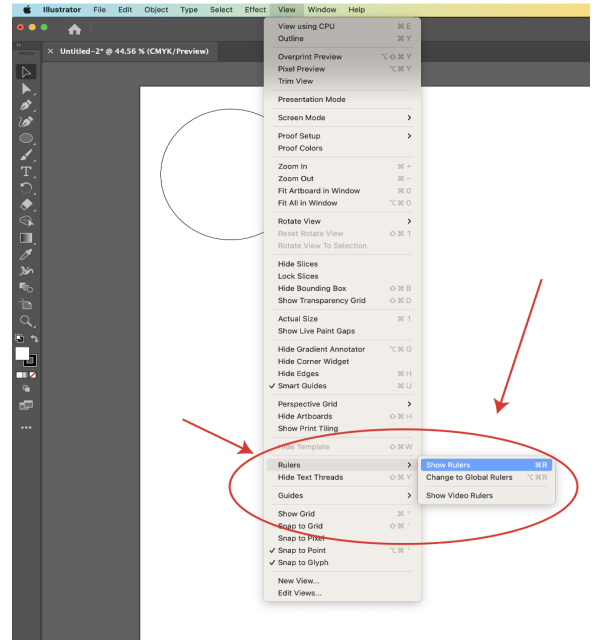
VECTOR CUTS/ ETCH - **Make your stroke width** **.072pts or .001 inches.**
Vector cuts should be **No FILL.**

Raster Etch - Set to "Fill Black" with "No Stroke"
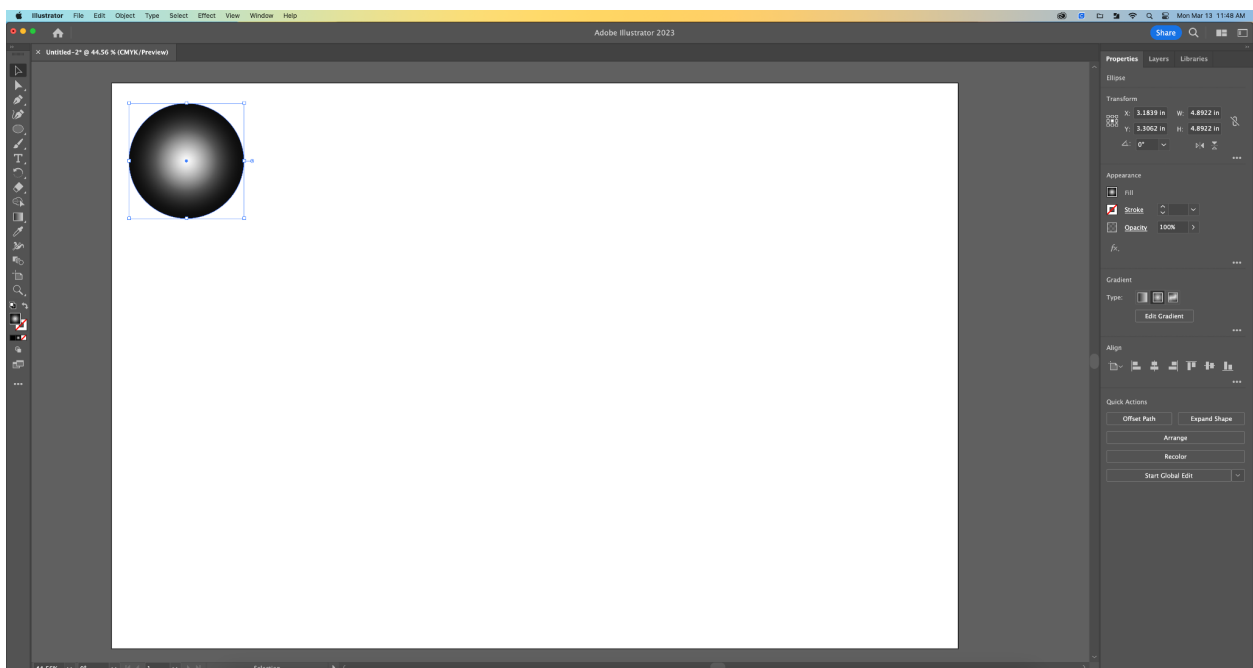
Press, "File" followed by, "Print"
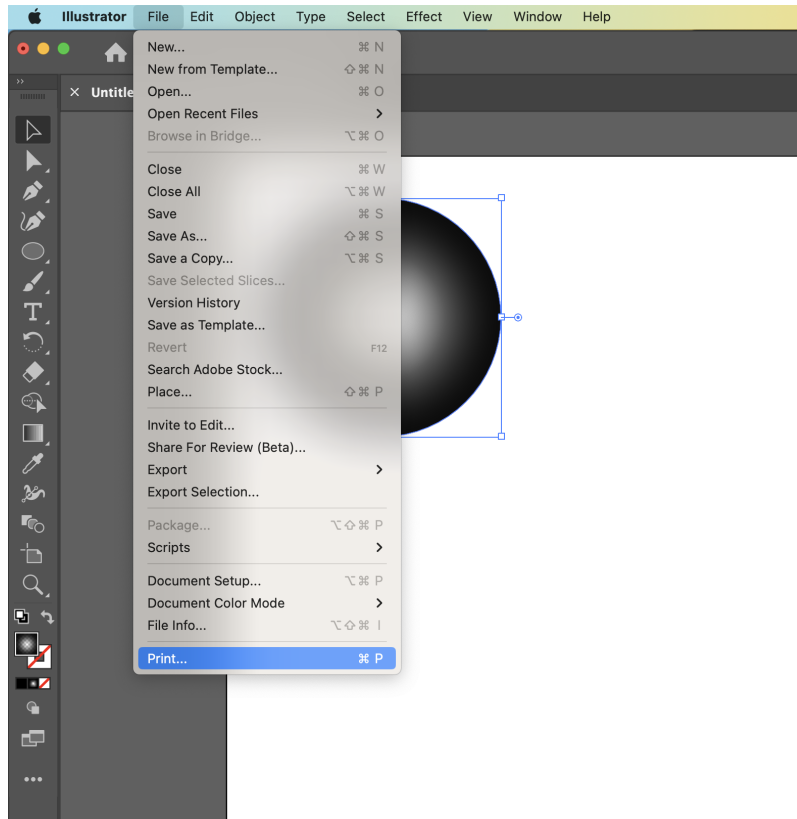
Choose the "Epilog Engraver Preset" at the top where it says, *Print Preset*. **Choose "Epilog Engraver" as your print Driver.**
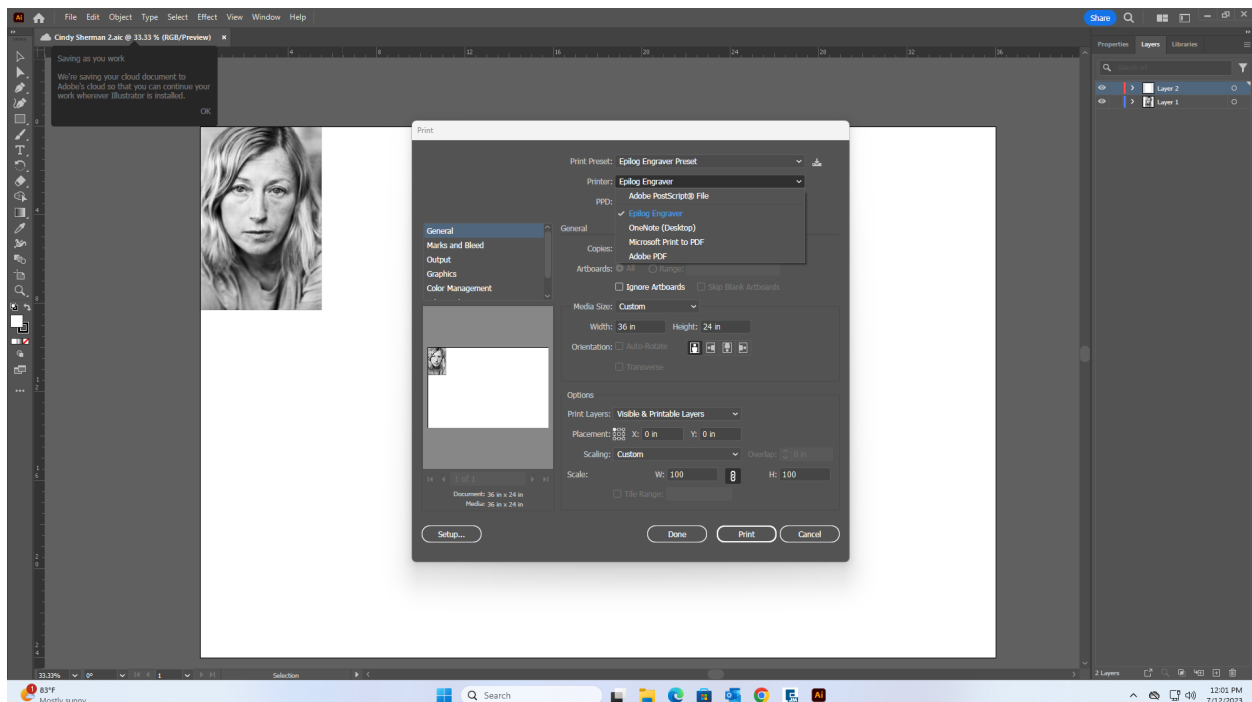
Click, **Setup** followed by **Print**, followed by **"PRINT"** again.
This will lead you to the **Epilog Print Dialog Box** where you can enter in your document settings. *Choose Epilog EXT or Fusion 36 as your printer.*
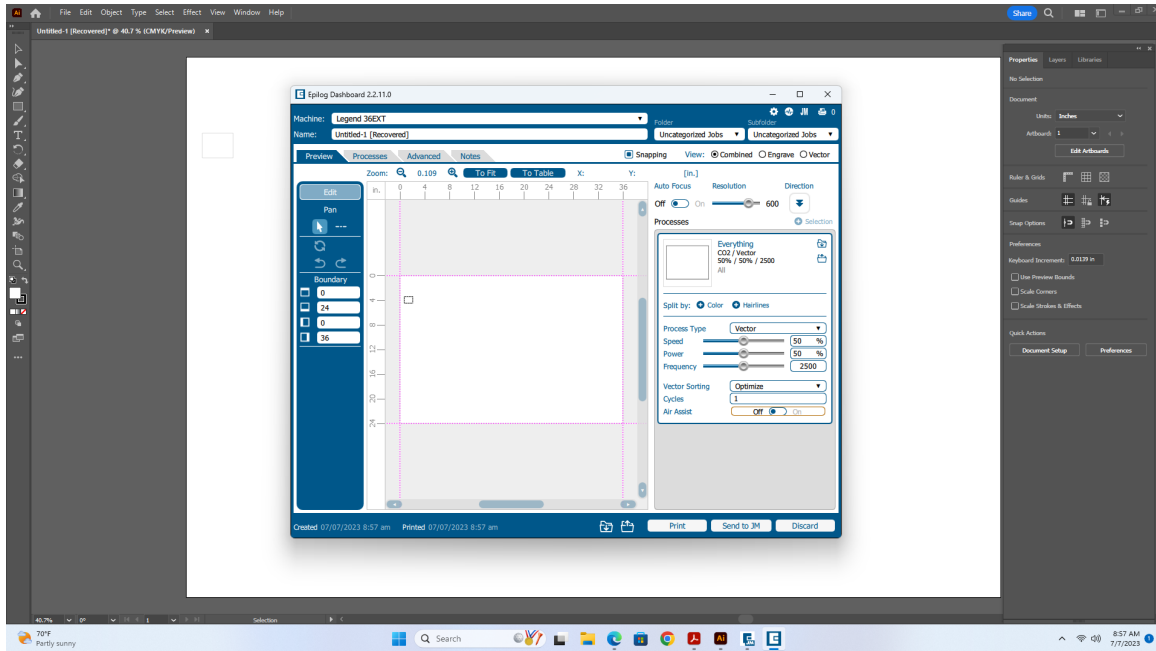
Choose **Raster** or **Vector** and begin specifying what **Speed/Power/Frequency** settings match the material/application you're working on.

For Vector Etching and Cutting, choose **"Vector"**.
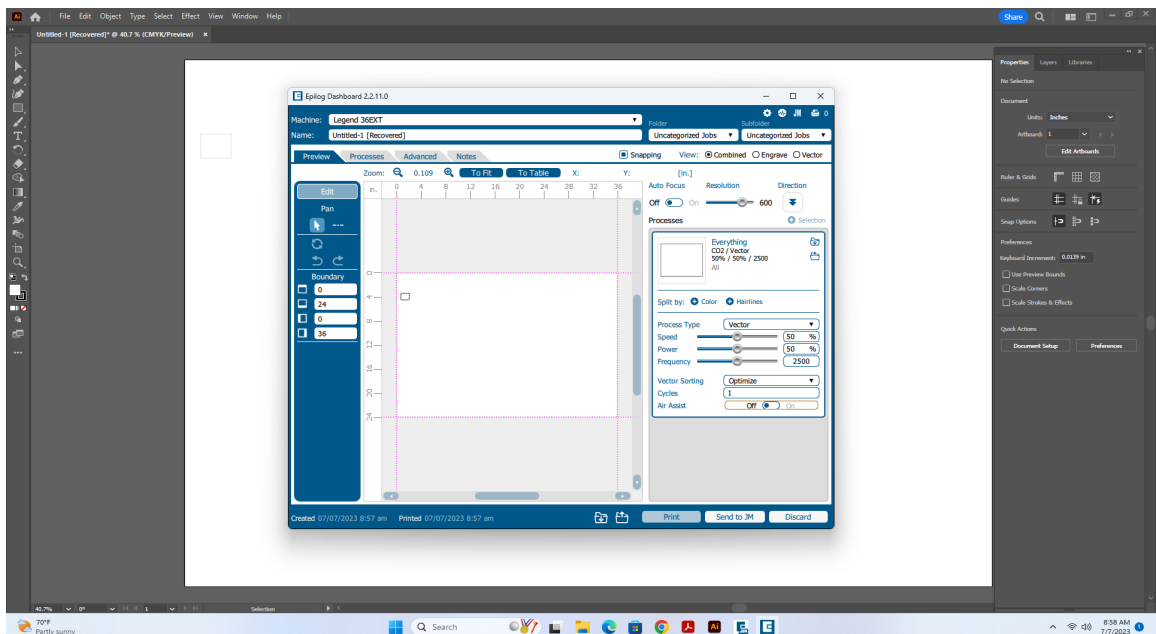
Before sending your print to the laser cutter, MAKE SURE THE AIR ASSIST BUTTON ON THE PRINT DIALOG BOX IS TURNED ON. FAILURE TO DO SO WILL RESULT IN A FIRE.

Before pressing the final Print button, turn it ON the laser cutter. Watch it go through the "Initializing" process.

The On Switch for the Older laser cutter (*Legend 36EXT*) is a <u>black button</u> on the left side of the machine

The On Switch for the Newer Laser Cutter (*Fusion Edge36*) is a <u>white button</u> on the back, right side of the machine.

Press "Print" on the computer to send the file to the laser cutter. If the laser cutter received the file, it will have your file name on the digital readout.

Place your material inside the laser cutter.
Keep in mind that delicate materials such as paper and bristol have a tendency to blow around as the laser cutter moves across them.
Clamp these materials down using the spring rulers located toward the back of the machine as well as on each side, left and right.
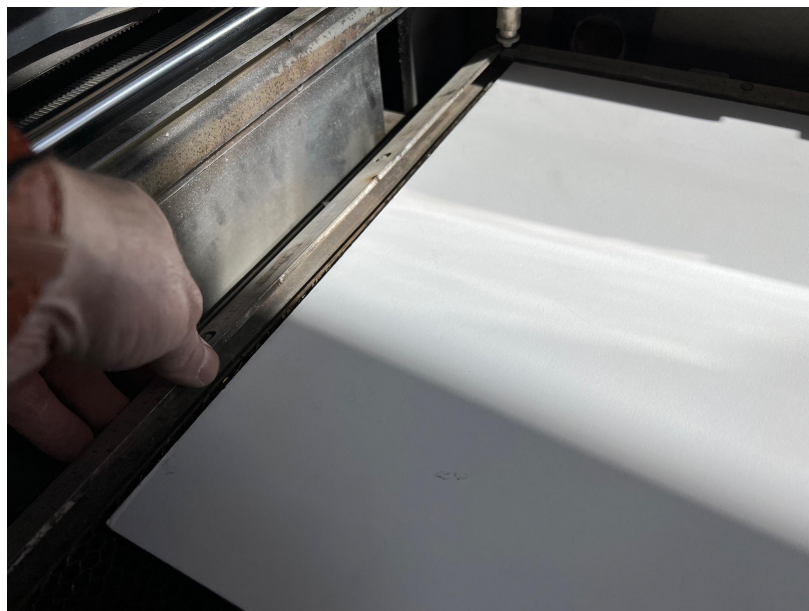
Focus the laser head to the correct focal length above the material you're working with (for the older machine).

Do this each time a new material has a different thickness. For example, you will need to lower the bed when you place thicker material on it, like 1/4" wood after cutting Bristol.

Press "Focus". This will bring the laser head toward you and to the right a few inches. Do not leave anything in the way of this apparatus that will impede it traveling to this point.

Using the calibration tool, press the **up** and **down** arrows on the digital read out display to lower or raise the bed of the laser cutter. *Beware of raising it too high as it will impact the laser head assembly and possibly move it out of alignment, or worse, break the machine.*

When the tip of the laser head assembly grazes the top of the calibration tool, you are in **FOCUS**.
Press "**RESET**".

………………………………………………………..*You're almost ready to print.*

Before pressing the green button on the digital readout display, turn on the **"EXHAUST"** as well as the **"AIR ASSIST"**.
EXHAUST - expels fumes away from the user
AIR ASSIST - blows air onto the surface of the material you're working with, cooling that spot so that it does not catch fire.
BOTH ARE VITAL TO HUMAN/ BUILDING SAFETY WHILE USING THE LASER CUTTER.

PRESS THE GREEN BUTTON - " GO "

For irregular shaped objects, use the FUSION EDGE36 Camera Settings. Align your object in the center of the print bed where the camera has the most accuracy. Drag your image over the object in the Epilog Print Dialog Box. Resize as necessary. Click "Print".

Be sure to autofocus on the top of the object surface. YOU MUST ASK FOR ASSISTANCE WHEN PERFORMING THIS ACTION.
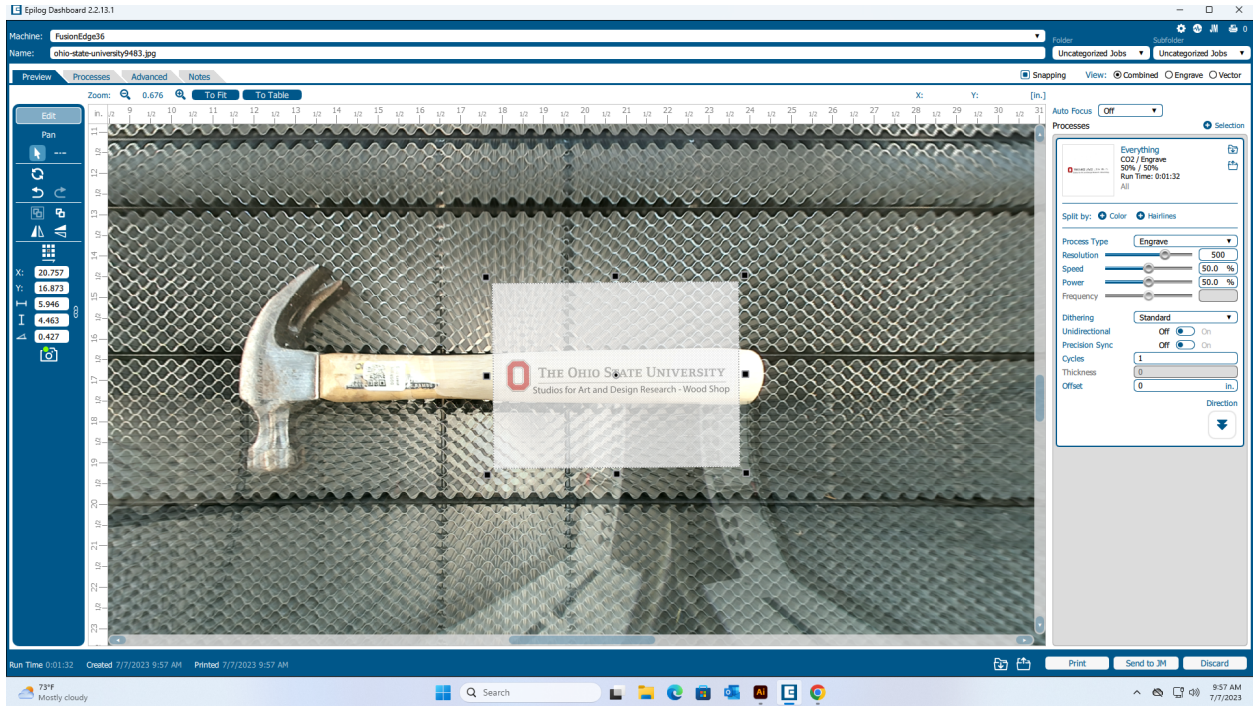
The Fusion Edge36 is capable of laser engraving onto cylindrical materials using a Rotary Device.

Use of this equipment must be approved by the manager of the shop. The manager of the shop must be with you if you would like to use this tool.

Keep in mind that the camera is an extreme fisheye that uses software to "flatten" out the image on screen. You will have the most success if you place the object towards the center of the bed - below the camera.

If the camera is on when you load a file that's positioned in the X0, Y0 position, it will look distorted on screen. Trust your placement despite what the camera shows you. You can also turn the camera off to revert back to the black dialog box that depicts a 36"X24" print bed.

SPEED POWER FREQUENCY SETTINGS

Speed & Power Settings (60w) > Epilog 36-EXT <	300 DPI Engraving	400 DPI Engraving	600 DPI Engraving	Vector ✂ -- Cutting
Material	Speed / Power	Speed / Power	Speed / Power	Speed / Power / Frequency
Acrylic (Remove Top Coating)	100/60	100/50	100/40	1/16" (1.6mm) – 40/100/4500 1/8" (3mm) – 20/100/4750 3/16" (5mm) – 10/100/5000 1/4" (6.4mm) – 6/100/5000
Anodized Aluminum	100/60	100/50	100/40	N/A
Bamboo	55/100	65/100	75/100	1/8" (3mm) – 25/100/1075
Basswood	45/100	45/100	45/100	1/8" (3mm) – 35/40/1000
Bristol	100/30	100/20	100/15	15/10/1000
Cardboard	N/A	N/A	N/A	1/16" (1.6mm) – 50/20/2500 1/8" (3mm) – 50/70/2500
Chip Board	100/30	100/20	100/15	20/20/1000
Corian / Avonite	55/100	65/100	75/100	1/8" (3mm) – 10/100/5000
Derlin Seals	100/60	100/50	100/40	25/75/1000
Fabric	30/100	34/100	38/100	1/16" (~ 2mm) – 30/75/500
Fabric w/ Coating	50/100	50/100	50/100	1/16" (~ 2mm) – 30/75/500
Genuine Leather	100/70	100/60	100/50	1/8" (3mm) – 15/20/1000
Glass	65/100	85/100	100/80	N/A
Hard Board	100/50	100/40	100/30	1/8" (3mm) – 20/90/1500
Laser Brass	100/50	100/40	100/30	N/A
Marble	100/100	100/85	100/75	N/A
Mat Board	100/60	100/50	100/40	15/20/1000
MDF	55/100	55/100	55/100	1/4" (6.4mm) – 3/100/5000 (multi-pass) 3/4" (19mm) – 3/100/5000 (multi-pass)
Melamine	65/100	75/100	85/100	N/A
Plywood	55/100	65/100	75/100	1/4" (6.4mm) – 8/100/5000
Rubber Stamps	30/100	40/100	50/100	30/100/100
Wood	55/100	65/100	75/100	1/8" (3mm) – 30/60/1000 1/4" (6.4mm) – 10/100/1000

**DANGER: If your material is not listed, speak to the SADR Technician. Some materials such as PVC and Fiberglass release toxic fumes when laser cut.

EVERY MATERIAL IS DIFFERENT. SETTINGS MAY REQUIRE MULTIPLE PASSES AND/OR DIFFERENT VALUES FOR DESIRED RESULTS. TEST!

How to use the MATERIAL LIBRARY

The material library consists of a number of sample materials that show the results of research pertaining to interactions with the laser cutter. Use these as a reference. The numbers they illustrate are specific to the materials we've tested. They should get you very close to knowing how to work with the material you're working with. Not all materials are the same, despite having the same name. Ex. Some corrugated cardboard is made with thicker paper than others. You will still need to do a small test before the final print.

ALWAYS DO A TEST before moving on to your official job.
Materials like acrylic and wood can be expensive.

3D Printing

What is 3D printing and what kind of printing does the Digital Fabrication Lab within the Studios for Art and Design Research offer?

Fused Deposition Modeling (FDM) 3D printing is a transformative technology that has revolutionized the world of art and design. **FDM** involves the creation of three-dimensional objects by layering and **bonding molten thermoplastic materials**, such as ABS or PLA, according to a digital model. This process allows artists and designers to bring their imaginative concepts to life, bridging the gap between virtual design and tangible reality.
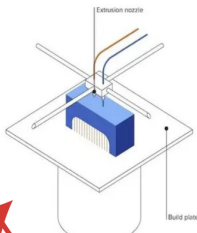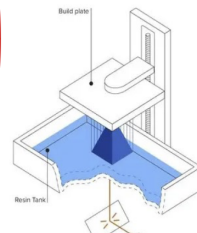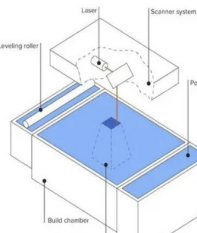
In the realm of art, FDM 3D printing opens up a world of possibilities for artists to materialize intricate sculptures, installations, and interactive artworks. It empowers artists to explore unconventional shapes, geometries, and textures that were once unattainable through traditional artistic methods. The *layer-by-layer nature of FDM printing enables artists to create complex structures with precise details, providing a new dimension to their creative expression*.

In the field of design, FDM 3D printing has become an indispensable tool for prototyping and product development. Designers can quickly iterate and refine their ideas by rapidly fabricating physical models. This allows for a more efficient and cost-effective design process, as designers can test

form, fit, and function before committing to large-scale production. FDM technology also promotes customization, as designers can easily modify and adapt their designs to meet specific requirements or individual preferences.

Furthermore, FDM 3D printing democratizes access to artistic and design capabilities. It empowers individuals to become creators, encouraging a culture of innovation and self-expression. Artists and designers can leverage FDM printers as a medium for experimentation, blurring the boundaries between traditional art forms and cutting-edge technology. This fusion of art and technology not only challenges conventional practices but also stimulates new avenues for creativity and collaboration within the art and design community.

Process

Make or acquire a model using 3D modeling software like Fusion 360. You can also collect objects from websites like Thingiverse.com.
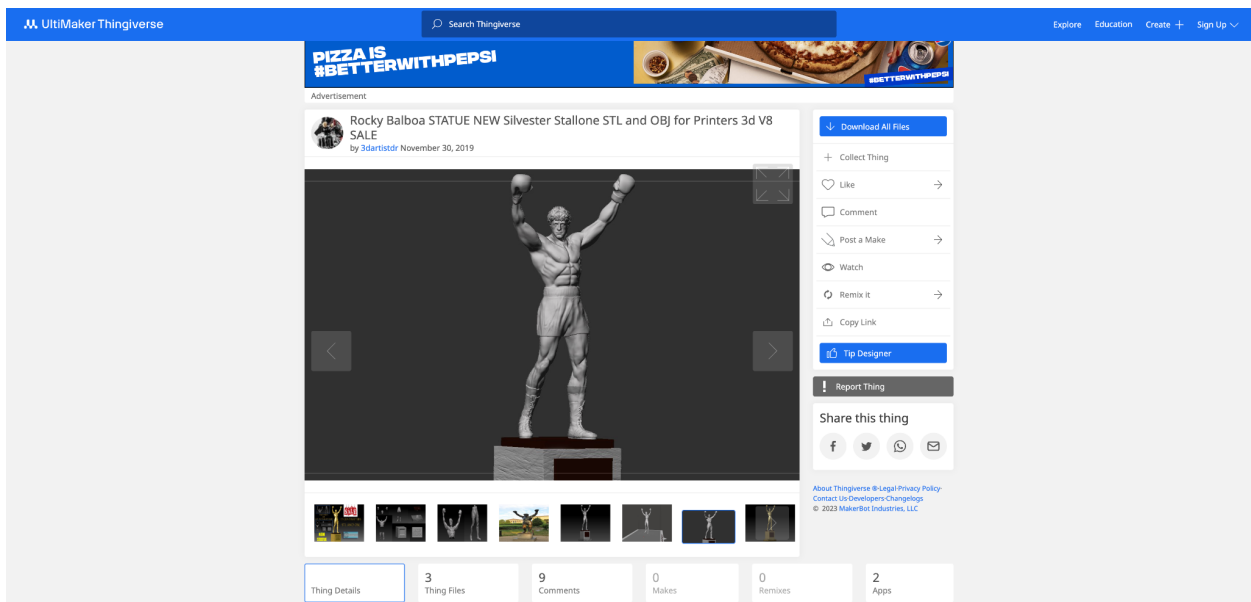
Schedule time to consult with a manager about the viability of your object using FDM 3D printing methods. Log into the Bookings site to make an appointment. This will be a good opportunity for you to receive guidance on preparing your 3D files.

You will need:

1. **Your computer**
2. **Your file - Emailed or on a Zip Drive**

Please expect 3D prints to take approximately **1-3 days for completion**. All printers operate on a first-come, first-serve basis, so there might be a queue ahead of you, which could extend the waiting time for your print. If you have a project that necessitates 3D printing, it's crucial to plan ahead and schedule your time as soon as possible.

Keep in mind that 3D prints typically require many hours to complete and may not always be flawless, often requiring additional steps like sanding or finishing. Achieving optimal results might involve cutting your object into sections. By being well-prepared and proactive, you can make the most of our 3D printing resources and ensure successful outcomes for your projects.

Be able to send your file in **.STL**, **.OBJ**, or **F3M** file format.
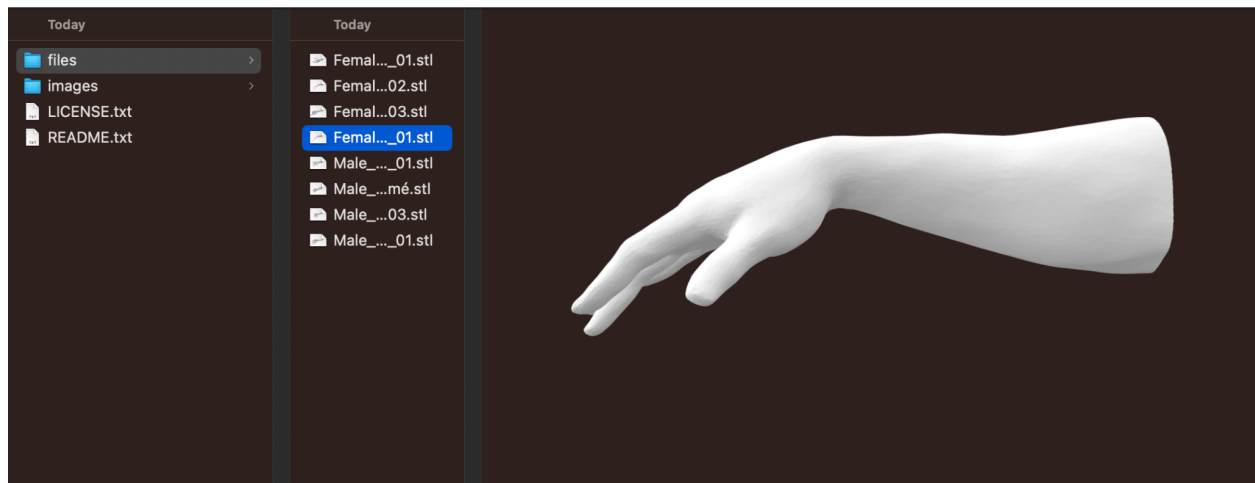
You will be given a gram amount that your object weighs along with a cost that coincides with that weight. We offer PLA filament at cost - we do not profit from sales of PLA. This is a service to help benefit you while navigating the sometimes tricky process of acquiring materials.

How to pay for your print

You will need to pay for your 3D print using this link.

https://art.osu.edu/printcost

Prints are valued at the weight of filament used based on the price spent by the university. No profit is made. This is a service that supplies greater access to resources.

When your print is finished, you will receive an email notifying you of it's completion along with the cost of filament.

Before taking your print home, you must email the receipt from payment to the Digital Fabrication Lab Email Address (digitalfablab@osu.edu).

DEPARTMENT OF ART

THE OHIO STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES

ABOUT   PROSPECTIVE STUDENTS   AREAS OF STUDY   COURSES   PEOPLE   RESOURCES   UNDERGRADUATE STUDENTS   GRADUATE STUDENTS

Home / Printing Cost Calculation

Printing Cost Calculation

PAY FOR PRINTING/MATERIALS >

Trained Epson Inkjet Printing

This type of printing is for those who have been properly trained and are using their own paper. Please do not purchase your ink usage until after your print(s) is completed.

The cost is $2.50 per square foot of printing done, rounded up, and you provide your own paper.
To calculate how much printing you need to pay for, use the following formula to get your square footage total.
((Height x Width / 144) x Number of Prints)

Once you have your square foot total, multiply that by $2.50 to get your final cost.

Assisted Epson Inkjet Printing

This is intended to be used by those printing in Hopkins Hall Digital Print Lab 380A. Please do not purchase an Inkjet Print before your file has been printed.

Each inkjet print costs $3.00 per squarefoot due to ink and paper usage.
Take your square foot total, multiply that by $3.00 to get your final cost.
If you have not received the square footage of your print from the Print Lab Manager please stop in to Hopkins 380A or 366 and see one managers.

Type A Machines PLA 3D Prints

This cost calculation is intended to be used by Students currently enrolled in an Art or Design Course for the current semester. Please do not purchase a 3D print before you have printed your file in the Studios for Art & Design Research Digital Fabrication Lab.

Each print costs $0.06 per gram of printed material.
Take the weight of your print and multiply by .06 to get the final cost.
If you have not received the weight of your print from the Studios please stop in to Hopkins 172 and see the Manager or Assistant Manager of the studios.

Online Payment Portal

Required fields are marked with an *

Payment Amount

Order Description:	3D Printing
First name:	Brad
Last name:	Gobright
Calculating printing cost:	Visit our website for details on calculating your printing cost.
Payment Amount*:	4.35
Total Amount:	4.35
Payment Method*:	Credit Card

Continue   Cancel

Resources:

Makercase.com - Easily make "Box Joint" Adobe Illustrator files
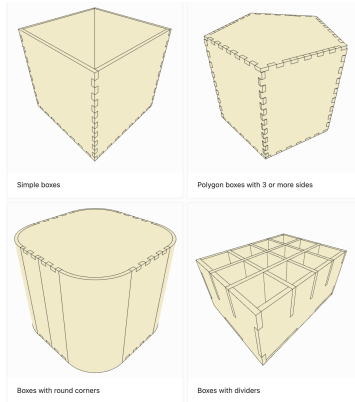
Sendcutsend.com - Digital Fabrication Source - send them your file and receive it in the mail

Thingiverse.com - Open Source 3D modeling files

[Atfab](#) - examples of CNC flat pack furniture design.

[Forton Ironworks](#) - Metal Fabrication and bending
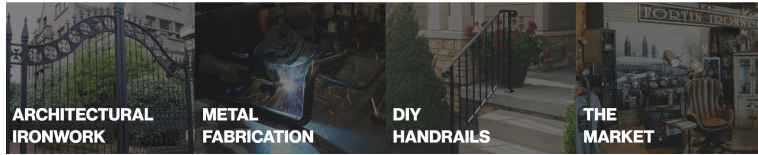
[IC3D](#) - Digital Rapid Prototyping

[Printables](#)