This tutorial is written for the Bowling Green State University CollabLab purposes.
The Universal Laser has an 18 X 32 build table. Acrylics, Metals, and wood are available to purchase in the CollabLab. Certain items are not allowed to be cut or engraved with this device due to it catching fire or emitting carcinogens.

In this tutorial you will learn the following:

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1. Safety

General Safety

Use of the equipment in a manner other than described in this manual or failure to follow the operational requirements and safety guidelines listed in this manual can result in injury to yourself and others and may cause damage to the equipment and your facility. **IT IS REQUIRED THAT YOU STAY AT THE UNIVERSAL LASER SYSTEM AT ALL TIMES DURING OPERATION.** Failure to operate machinery in accordance with designated procedures can result in the loss of Universal Laser System privileges.

**EXPOSURE TO THE LASER BEAM MAY CAUSE PHYSICAL BURNS AND CAN CAUSE SEVERE EYE DAMAGE.**

Proper use and care of this system are essential to safe operations. Use of controls of adjustments or performance of procedures other that those specified herein may result in hazardous radiation exposure.

**NEVER OPERATE THE LASER SYSTEM WITHOUT CONSTANT SUPERVISION OF THE CUTTING AND ENGRAVING PROCESS.**

Exposure to the laser beam may cause ignition of combustible materials which can lead to a fire. A properly maintained fire extinguisher should be kept on hand at all times. Staff have been instructed to turn off the laser if unattended. Staff will not watch your job for you. It is your responsibility to stay with the system through the entire printing process.

**NEVER LEAVE MATERIALS IN THE LASER SYSTEM AFTER LASER PROCESSING HAS FINISHED.**

Always remove all the material including scrap material from the machine after use. Scrap material left in the laser system including materials that collect in the removable cutting table device can be a fire hazard. It is also recommended you allow scrap materials to cool prior to leaving the work area. A properly maintained fire extinguisher should be kept on hand at all times.
Fumes and smoke from the engraving process must be extracted from the laser system and filtered or exhausted outside.

SOME MATERIALS, WHEN ENGRAVED OR CUT WITH A LASER, CAN PRODUCE TOXIC AND CORROSIVE FUMES.

We recommend that you obtain the material safety data sheet (MSDS) from the manufacturer or distributor (i.e. Lowes, Home Depot, etc.) of every material you intend to process in the laser system. The MSDS discloses all of the hazards when handling or processing a particular material. DISCONTINUE processing any material that causes chemical deterioration of the laser system such as rust, metal etching or pitting, peeling paint, etc. Damage to the laser system from corrosive fumes is NOT covered under warranty.

DO NOT ATTEMPT TO MOVE OR LIFT THIS SYSTEM ALONE.

Obtain the assistance of additional people when lifting or carrying (secure motion system and doors before lifting). Injury may occur if improper lifting or carrying techniques are used or the system is dropped.
2. Universal Laser Need to Know Information

What do you need

⚠️ Must attend a training session to receive accreditation that shows you are trained to use the universal.

⚠️ To be present when printing, engraving, and cutting

⚠️ If you bring in your own material, you will be required to provide the Material Safety Data Sheet (MSDS). If you cannot provide proof that your material is one of the approved materials you will be turned away.

About Materials

⚠️ Materials can be bought at Home Depot, Lowes, Hobby Lobby, BG Art Supply Depo, or on Amazon.

FYI

⚠️ You must stay with the Universal Laser printer for the entire print. If you walk away, an employee will stop the machine due to the fire hazard

⚠️ If you break the machines, you will be assessed the cost to repair or replace it.
3. Universal Laser Materials

**Approved Materials**

*MATERIALS CAN BE NO MORE THAN 1/4” THICK*

- Natural Wood (Can cut 1/4 inch)
  - Oak, Pine, Cedar, Maple, Balsa, Alder,
  - Cherry, Birch, Basswood, etc.
  - Avoid oily/resinous woods

- Plywood (Can cut 1/8 inch)
  - Birch plywood recommended

- Marble

- Glass (with no plastics in it)

- Paper/Cardstock
  - Matboard
  - Cardboard
  - Chipboard

- Acrylic (Can cut 1/4 inch)
  - Optix
  - Plastikote
  - Plexiglas brand

- Natural Cork (not engineered)

- Jean Material (wet down first)

**Banned Materials**

- Any painted materials

- Plastics

- PVC, Corrugated Plastic, ABS, PLA,
  - HDPE (Milk bottle), PET, PETG, Delrin, etc.

- MDF or any other engineered wood
  - Masonite, Bending Plywood, Tropical Hardwoods

- Polycarbonate

- Foam, Styrene, Polystyrene,
  - PolyPropylene, Depron, Gator,
  - Foam Core

- Fiberglass

- Nylon, Polyester, Vinyl, Leather

- Corian

- No Shinny Metals
  - Purchase Adonized metals in library (Engrave only)
4. Image Setup in Photoshop

1. Open the image that you want to use in Photoshop.
   Click Start> All Programs > Adobe Photoshop CC, or search for Photoshop in the start menu search bar. Photoshop icon in the menu. (Figure 1)

![Figure 1. Navigation to Photoshop CC on a PC.](image)

2. In Photoshop you want to over expose your image. This can be done by changing the brightness, contrast, and the levels depending on your picture. (Figure 2)

![Figure 2. Example of original and overexposed image.](image)
3. Once you have your image the way that you want it save it as either a .tif, .jpg, or .png file. Click File > Save As. This will open the Save As dialog box. Here you will be able to change a few settings and save your image.

   **Save As:** Here you can change the name of the file you are saving.

   **Where:** This is where you will choose where you want your saved file to go on the machine you are saving on.

   **Format:** This is where you will choose the file format that you want to save your image as. There are many options for file formats, but for this project you are going to want to choose either .tif, .jpg, or .png as your file format.

### 5. Image Setup in 1-Touch Laser Photo

1. Open the Universal Laser System Software “1-Touch Laser Photo”, on the computer networked with the laser cutter. Click on the 1-Touch Laser Photo shortcut on the desktop.

2. Open the file that you want to engrave. File > Open. From here navigate to the location where you saved your over exposed image that you created in Photoshop and open the image. (Figure 3)

![Figure 3. Overexposed image in 1-Touch Laser Photo](image-url)
3. Next you will need to adjust your image to fit the size of your material. This can be done on the toolbar to the right on the screen. Once you have your height and width set how you want it click Apply Resize. (Figure 4)

4. Next you will need to select your material from the drop down menu on the toolbar under Step 2. Once you have selected the correct material click Apply. In this example we have chosen wood as our material. Once you apply your filter the appearance of your image will change depending on what filter you have chosen. (Figure 5)

5. Finally, you are going to save your image. To save your image you click Save at the bottom of the toolbar. This will prompt a save dialog box to open up. Once this box opens up you will need to change .bmp to .png. (Figure 6)
6. Image setup in Adobe Illustrator

1. After setting up your image in “1-Touch Laser Photo” you will then need to bring your image in to Adobe Illustrator. Click Start > All Programs > Adobe Illustrator CC. From here you will need to open the UniversalTemplate.ait. This template will set up the 18 X 32 work table in illustrator. This template will also import the swatches of true black, red, and blue.

To open this template click File > New From Template > Documents > Select UniversalTemplate.ait (Figure 7)

Figure 6. Save as dialog box for 1-Touch Laser Photo

Figure 7: Navigation to the UniversalTemplate.ait template file.
The template opens at 33% by default, but this can be changed by clicking in the square in the left hand corner of the Illustrator window. (Figure 8) Here you can type in the percent that you would like to view the document at or you can click on the arrow to bring up options.

![Figure 8. Close up of the percentage]

**Swatches**

The Universal Laser System reads certain swatches as specific types of lines. This is why it is important to make sure you use the correct swatch on the areas where they are needed. Lines that are black are rastered, which is engraved onto the material. Lines that are blue are vector, this cuts deeper than black lines, but doesn’t cut through the object. Lines that are red are cut lines. These lines cut all the way through the material.

**Note:** The red lines must be .001 thickness for the machine to recognize that they are cut lines.

2. Click File &gt; Place &gt; find the image you saved from I-Touch Laser Photo, select it and click Place.

3. Once your image is on the template file you will need to place an outline around the image. Start by clicking on the **Rectangle Tool** and draw a rectangle around your image. When drawing your rectangle make sure your fill is set to none and your stroke is set to 100% RGB red. (Figure 9)

![Figure 9. Rectangle over top of image]
4. You will want to make sure that your rectangle is the correct swatch so that laser can tell what needs to be cut. To do this you will want to select your rectangle. On the top tool bar select the dropdown menu with the color of your rectangle. Change your rectangle color to the 100% RGB red swatch in the menu. (Figure 10)

![Figure 10. Color swatch menu](image)

5. Make sure that your stroke weight is set to .001. This will create a very thin line around your image and tells the laser where to cut the material for your project. (Figure 11)

![Figure 11. Stroke weight box](image)
7. Illustrator Setup with Illustrator Files

You can create an illustrator document without using a photo. When doing this make sure that you use true black, red, and blue. (Figure 12)

![Illustrator file example](image)

Make sure that the red line (cut line) is set to .001. In the example above the red lines go around the black areas of the cupcake. This is so the white areas will be cut out and the black areas will be engraved. You will need to place your picture inside of a red shape (rectangle, square, circle, oval) in this example we have used a square. Make sure that the shape that you chose to place your picture in has no fill.

**NOTE:** If your image has transparency the Laser Cutter will not be able to detect your red cutting line. Please fill in any transparency with white to avoid this issue.
8. Printer Setup

Once you have your photo or Illustrator file setup, you can setup the printer for the material that you will be cutting or engraving.

1. Click **File > Print**. In the print window you want to make sure that the Printer selected is the **VLS6.60**. In the bottom Left hand corner click **Setup**. A message window will pop up, when this happens click **Continue**. (Figure 13)

![Illustrator print window]

Figure 13: Illustrator print window
2. Once the setup window opens again you want to make sure that the printer that is selected is VLS6.60, if it is not selected click VLS6.60 from the list of options. Next click Preferences to open the laser settings. (Figure 14)

![Print setup window](image)

Figure 14: Print setup window

3. The Laser Setting window should now be open. Here is where you will select the type of material that you will be using, this is also where you can change various settings for your material. Some of these settings include:

**NOTE:** Material thickness maximum is 1/4”.

**Material Thickness:** Here you can enter the thickness of your material. Use the caliper provided to get an accurate measurement.

**Intensity Adjustments:** Increasing the intensity gives you a deeper cut. Decreasing the intensity gives you a more shallow cut. Adjustments can be made up to +/-50%. We recommend using the manufactures settings due to the change of causing flares during the print process.

**NOTE:** If you cause a fire or otherwise break the machine you will be held responsible.
4. In the Materials Database you will need to select the type of material that you will be using. The Materials Database has many different categories with a variety of materials under each category. To open a category, click the + sign. (Figure 15)

**NOTE:** Wood is located under the Natural category.

Materials not allowed include: Bright metals, PVC, Lumix Acrylic, Medium Density Fireboard (MDF). For a complete list please see page

![Figure 15: Laser Settings Materials Database](image)

5. Once you have selected your material you will need to enter the material thickness. To get the most accurate reading of the material thickness use the caliper located on the left inside the Universal Laser System.
9. Material Thickness

It is important to make sure that the material thickness is correct. This will ensure that the laser doesn’t cut too deep or too shallow in your material. The maximum material thickness that you can cut is 1/4 of an inch. You will want to use the caliper the measure the thickness of your material.

1. Press the “On” button on the Caliper. The Caliper should be reading in inches. If this is not the case press the mm/inch button until the units appear as inches.

2. Next you need to make sure that the Caliper is zeroed so that you get the most accurate reading. Make sure that the Caliper is closed all the way. Once it is closed press the zero button so that the screen shows all zeros. (Figure 17)
3. Now that the Caliper is set to zero you now want to measure your material's thickness. Open the Caliper and place it around the material and close it as much as you can. (Figure 18)
4. From this you should get a reading of the materials thickness. Take the number from the screen and put that into the material thickness section of the Laser Settings window.

5. After you have selected your material and set your material thickness, click **Ok** > Click **Print** > Click **Print (Once More)**.

**10. Universal Laser System Setup**

1. First click the red icon in the icon tray in the bottom right of the screen. (Figure 19) This will open up the VLS6.60 Control Panel. In this window, you will make the final adjustments before you print your image.

![Figure 19: VLS6.60 Control Panel icon](image)

Before continuing you need to turn on the Universal laser and the BOFA filter.

1. Next you will want to use the **Focus View** (indicated by the yellow square below) which is located in the tools panel on the right side of this software. Click in the top left corner of the screen. This lets the laser know where it should begin engraving and cutting. (Figure 20)

![Figure 20: Focus View in control panel window](image)
Once the laser is in place you will need to make sure that your image is also in place. To do this, click the **Relocate View Tool > Click To Pointer**. (It’s the red button indicated by a yellow rectangle below in Figure 21.) This tool will move your image on the screen to where you focused the laser.

![Figure 21: To Pointer](image)

**11. Setting up the Z Axis**

1. The next step is to set up the Z-axis in the Universal Laser. To do this you will need to lay your material down in the machine in the top left corner.

2. Take the Z-tool, located on the ledge on the left side of the Universal Laser, and place it on your material under the laser. (Figure 22)
3. Once the Z-tool is in place you want to use the up and down arrows to manually set the Z axis for your material. (Figure 22) You will need to move the Up or Down arrows until the Z-tool feels snug and in place. If the Z-tool feels too loose the axis is too low. If the tool kicks out of place then the axis is too high.

4. Once you can tell that the Z-tool is in a good position, remove it and return it to the ledge on the left of the laser and close the hood of the Universal Laser System.
You are now ready to engrave and cut on your material. Before you do so you may want to double check that your image is lined up with the laser one more time, this can be done by repeating step 8. If your image moves then it is now lined up with the laser, if not then the image was lined up correctly before.

You can check the estimated print time by selecting the Estimate View Tool (Figure 23).
If you have not already done so, turn on the BOFA air filter. Once you are ready to start engraving or cutting click on the **Green Play Button** to start the Universal Laser System. (Figure 24)

![Universal Laser Start button](image)

**Figure 24: Universal Laser Start button**