Laser Cutter

xTool S1 Diode Laser

User Guide

MMPL Makerspace

Mississippi Mills Public Library

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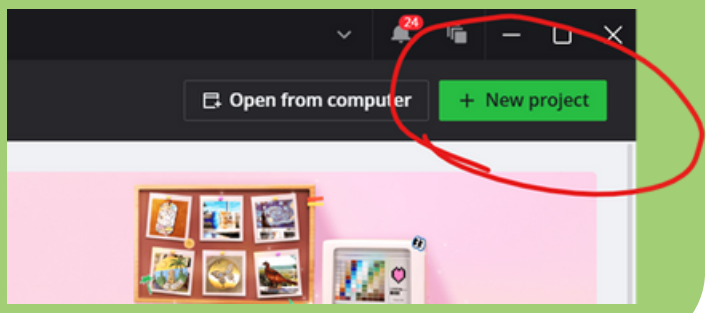
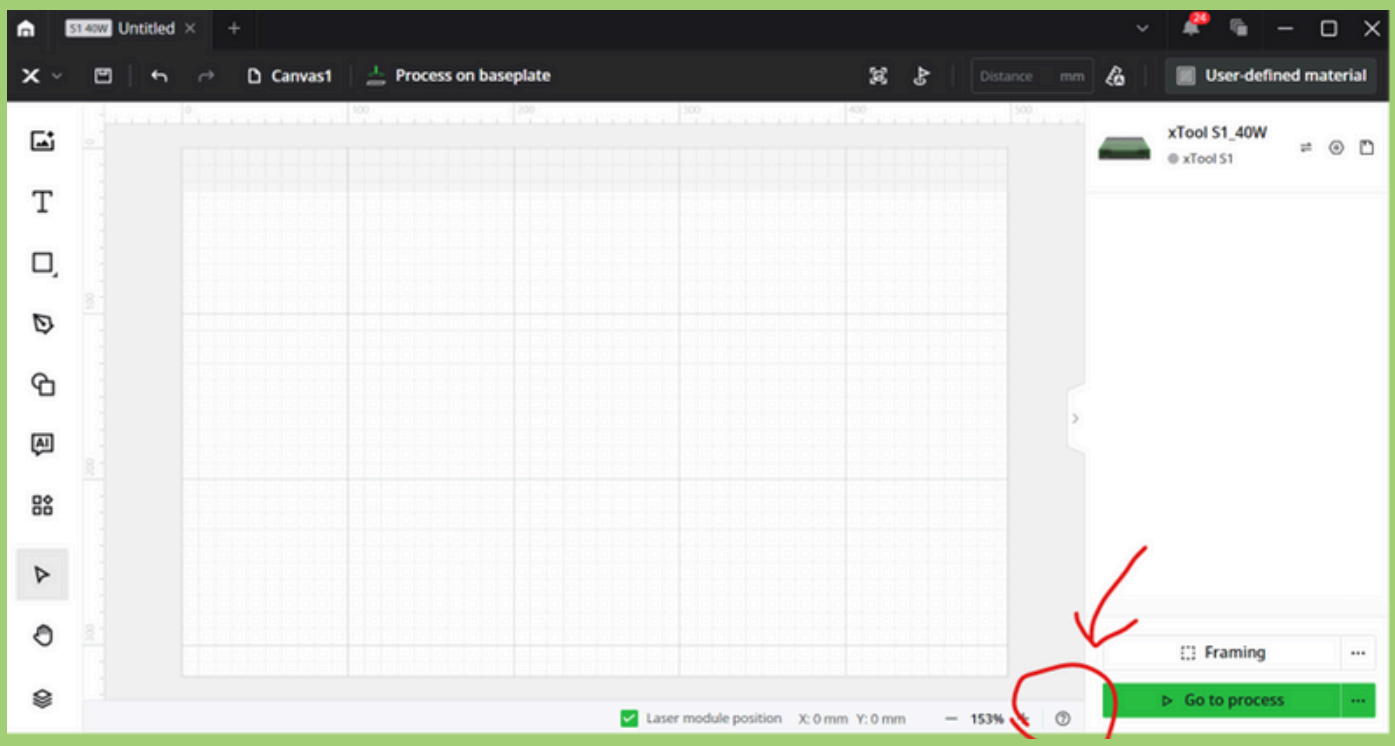
Create Your Design

Open XCS

Open xTool Creative Space (XCS) Software, open a new project

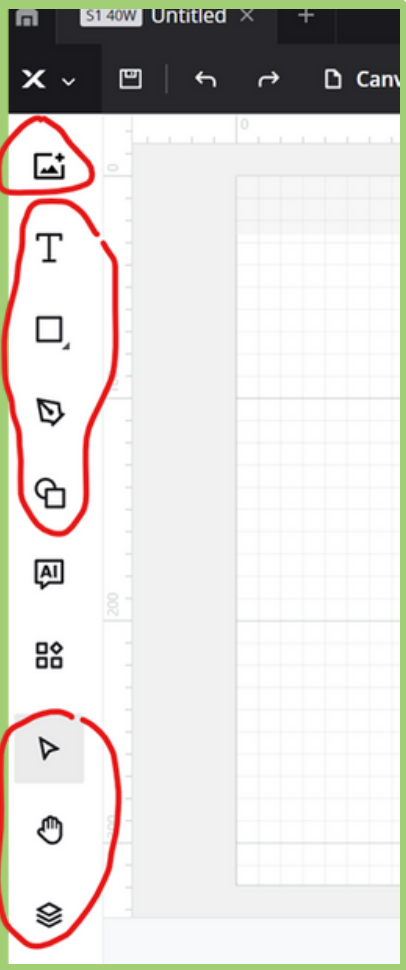


Welcome to your design space! The question mark at the bottom is your friend – click here to find the User Guide, which will walk you through the design space. Note the toolbars on the left, top, and right of the screen.



The Left Toolbar - Design Tools

On the left toolbar, you will find the buttons that will help you create! You can create your whole design from scratch, download a complete design from elsewhere, or create your design using a combination of a pre-created image and other elements you add.



Image

This will allow you to upload an image that you have obtained elsewhere into your design. Your image needs to be the correct file type for the software to recognize it. The file type you need will depend on the type of project you are working on.

SVG stands for "Scalable Vector Graphics" – it is one of the most common file types you will use for this software. "Vector" files or "SVG" files with a transparent background are a good place to start when searching for images to engrave! If your image is not an SVG, you can upload it into XCS and edit it to be the proper format.

Text

Insert a text box. Once the text box is created, you will see options for Font styles and sizes in the black toolbar at the top. You can also drag the corners of the text box to increase or decrease the size of your text.

Basic Shapes

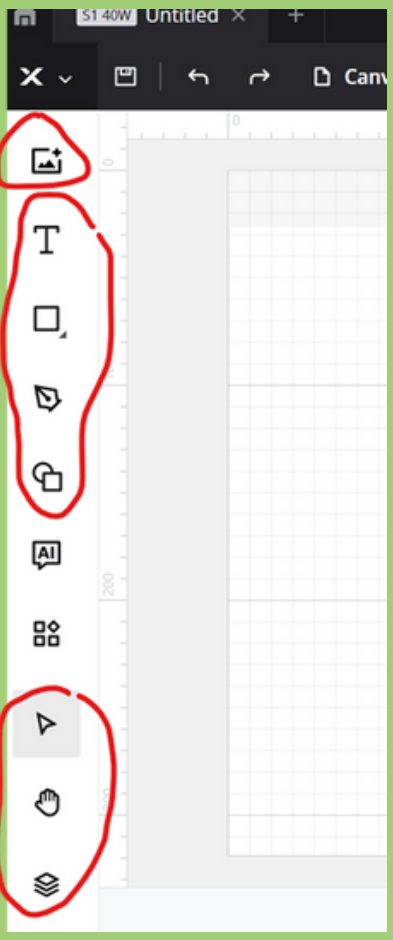
This will allow you to insert the basic shapes of a square, circle or line.

Vector

This will allow you to create a vector image from scratch, point by point.

Shapes

This will allow you to browse a small library of basic shapes and objects – explore to see what's available! This is one of the most valuable and easy tools if you are creating a design from scratch.



Select

This should be enabled as default – this allows you to click around the design area, and select and move objects.

Hand

Switch to this mode if you are zoomed in very close to an object and need to move the grid around to see another part of your canvas.

Layers

Use this tool if you need to create a more complex object made of multiple layers of shapes. Generally only used if you are creating a complex object from scratch and need to adjust things.

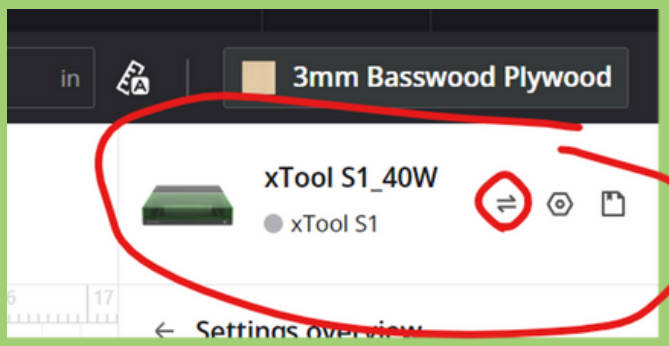
Note:

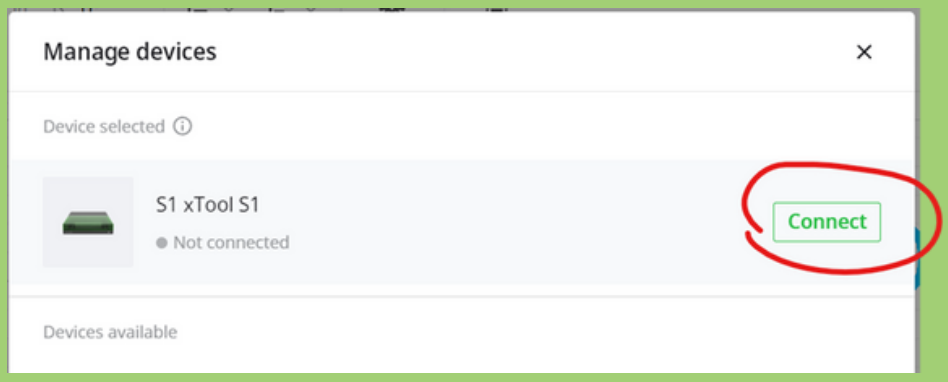
AIMake

This is xTool's built in AI tool that can auto-generate certain graphics and images for you. This function is accessible through a credit system - each image generated costs a certain number of credits. Credits can either be purchased, or earned by posting custom designs on the xTool community board. Below is an example - the standard shape library did not have an oak leaf silhouette available, so we prompted the AI tool to make one for us - it gave us four options. Now we can use any of these in our design.

Connect to the xTool

Now we have to connect our computer to the laser cutter! Plug the USB cord coming from the xTool into your laptop. Then, near the top right, click on the little arrows that look like they are going forwards and backwards. A little window will pop up – click "Connect" next to the xTool device name.





Place Your Material in the Machine

Lift the orange lid and place your material inside the machine. If your material is a thicker/taller object, ask staff for assistance in adjusting the height of the baseplate. It is generally best to place your material somewhere in the middle of the baseplate, but if you need to use the ruler guides, you can place your material up against the edges.

Define Your Parameters

On the top toolbar are general settings for the project. From left to right: project name, processing mode, mark the processing area (flag), set the distance (ruler), and set the material ("user-defined material"). All of these must be set before beginning to process.

Project name: here you can name your project so you can save it to your own storage device, and find it later or use it again.

Processing mode: tell the machine if you are processing on the flat baseplate, or if you are using a special attachment (only special cases).

Mark the processing area: this is where you tell the machine where your material is placed. Once you mark the processing area/shape of your material, you will be able to see an outline of your object in the software – and then place your design in it!

Set the distance: pressing this ruler prompts the machine to auto-measure the distance between the laser and your material. It will measure wherever the red crosshair is currently located. If you would prefer to manually measure, you can type the distance into the empty field where it says, "Distance".

Set the material type: Clicking here will open a window that allows you to select the material you are using. Selecting your material automatically populates the recommended settings for that material. You can skip this step if you have a material that does not exist in the materials library – but you will have to manually adjust the settings yourself.

Sample Procedure

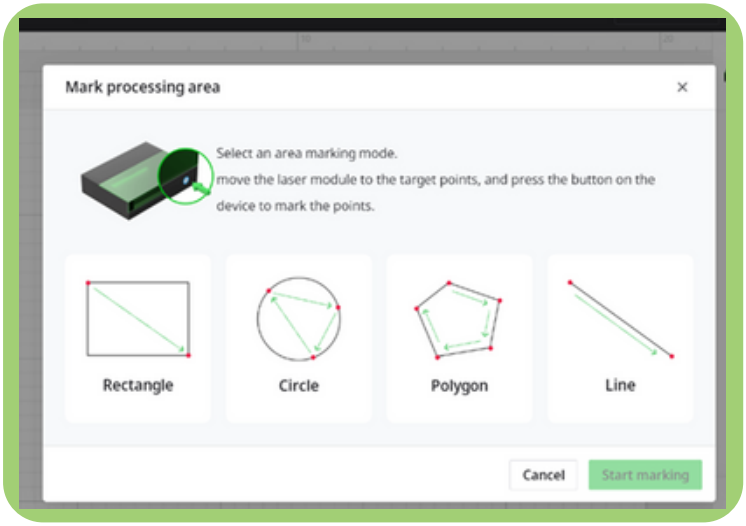
1. Choose the processing mode (most often, “Process on Baseplate”)

2. Set the distance (ruler icon)
   - Make sure the crosshair is directly over your material before pressing this

3. Mark the processing area (flag icon)

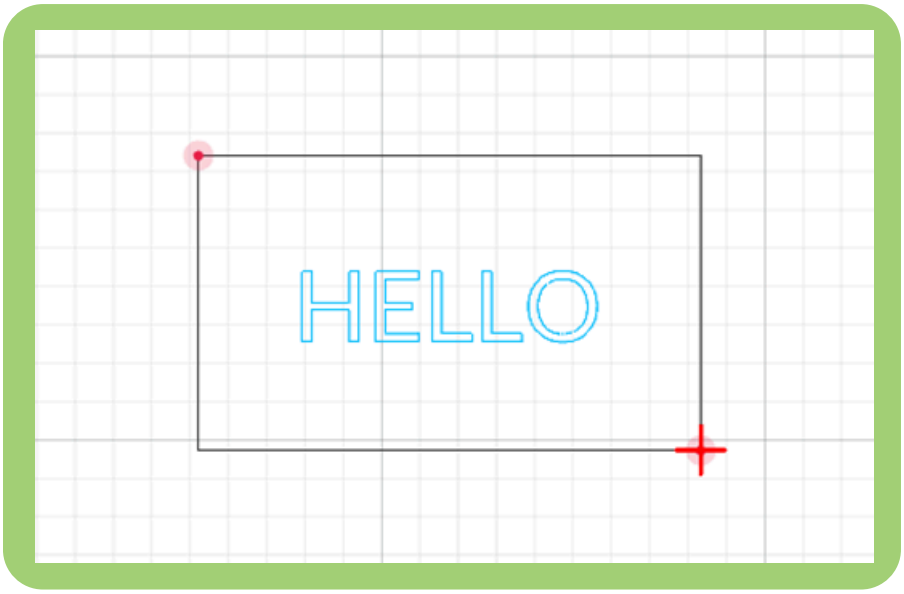
   When you click this icon, a window will pop up.

   Choose the shape of your material – rectangle, circle, polygon, or line, and hit the “Start Marking” button.



For a rectangle, we need two diagonal points. Move the laser module to one corner, and press the button on the front of the machine - you will see a dot appear. Move the laser module to the corner that is diagonal, and press the button again. You will see the second dot appear and the software will create a rectangle shape. Press “End marking”. If you have multiple rectangular objects, mark the next object. Once you are done, press the “Done” button in the bottom right corner.

You will now see the shape of your material on the canvas. You can now create your design and position it confidently on your material.



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Set the material type

- Choose a material from the xTool library. If your material is not listed, you can choose a material that is as similar as possible, or leave this as "user defined material". Later, you will have to search the internet or consult the xTool AI Chat Help on the xTool home page for settings suggestions.

Helpful Tip:
The position of the red crosshair shows in the design software in real time. As you move it in the machine, it moves in the software. This can be very helpful for precise positioning of your design!

Settings Overview

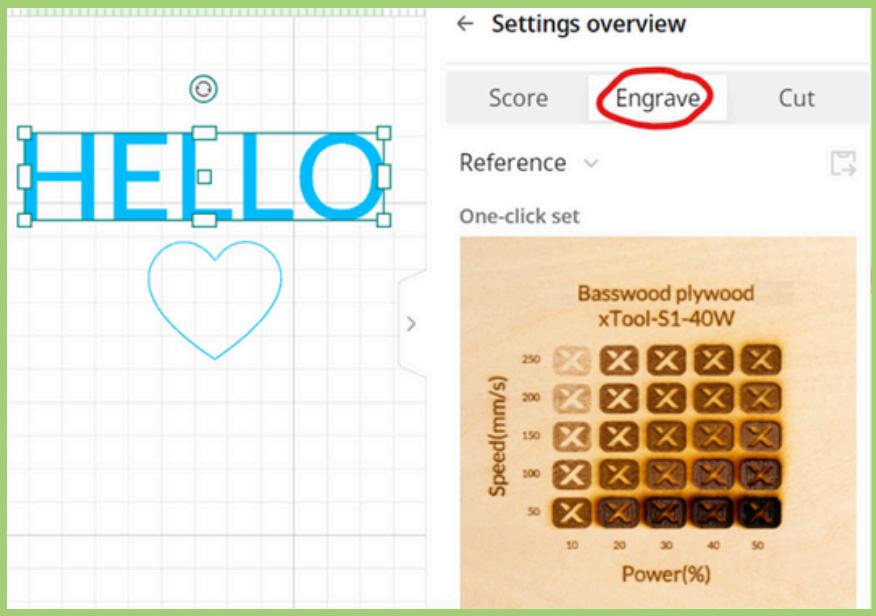
Once you define the parameters for your project, you will be able to fine tune the processing settings for each element of your design before beginning to process. This will show up on the right toolbar. You will have to select Score, Engrave, or Cut for each piece of your design.

Score
- A thin outline, cuts the material but not all the way through

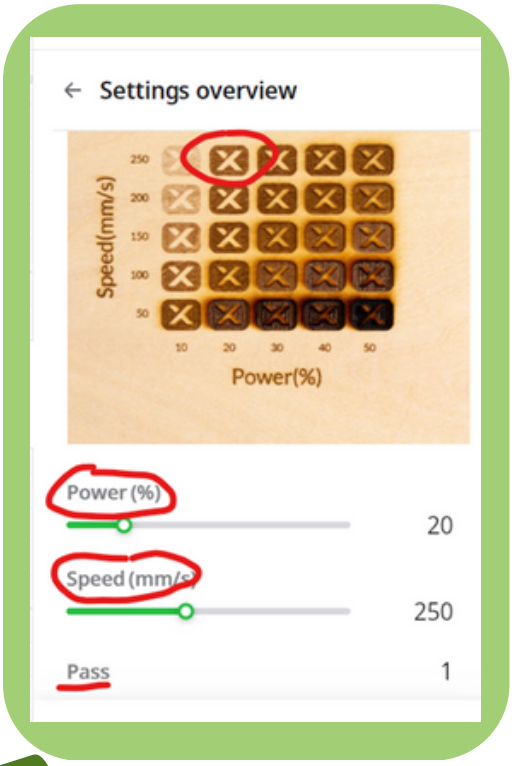
Engrave
- Engraves a solid design, lasers away a layer of the material

Cut
- Cuts through the material

In this example, we will use a simple design of the word "Hello" and a heart, and our material will be "3mm Basswood" from the material library. We want to engrave the text, and score the heart.



First, we click on the text box to select it. Next, we click Engrave. The recommended settings to Engrave 3mm Basswood auto-populates. Some materials will have a handy reference chart so we can see how the different settings might look.



Power, Speed, and Pass are the most important settings you will need to set in this toolbar.

Power

Defines the amount of power the laser will use, from 0-100%.

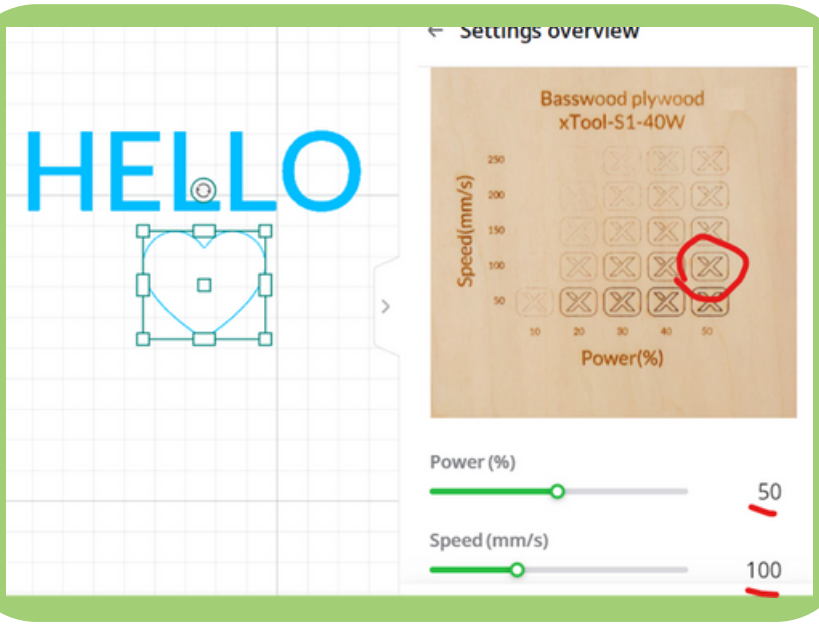
Speed

Defines the speed at which the laser will work, measured in mm/s.

Pass

The amount of times the laser will go over your design – how many passes it will make. Usually this is set at 1, but sometimes to engrave or cut deeper without having to increase the power, you can increase the number of passes. This is one way to avoid excessive scorching.

For this example, the settings have auto-populated to engrave with 20% Power, and 250 mm/s Speed, with 1 Pass. The reference chart shows us what these settings look like on 3mm Basswood. We could choose to tweak these if we wanted our design to be lighter or darker/deeper. If we were not using basswood, but a material similar to basswood, we would test using the suggested settings, then tweak them depending on the results.



Now, we click on the heart. After clicking on "Score", the settings to score the heart have auto-populated. It is suggesting Power 50% and a Speed of 100 mm/s. We can see how that looks on the reference chart – pretty good!

Almost there!

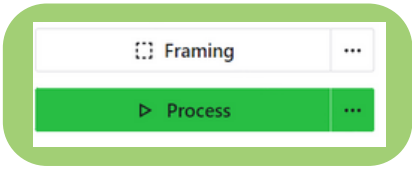
Framing

Once our Power, Speed and Pass is set, we can move on to Framing. Framing moves the crosshair around to preview where the very edges of your design will land on your material. This step is very simple!

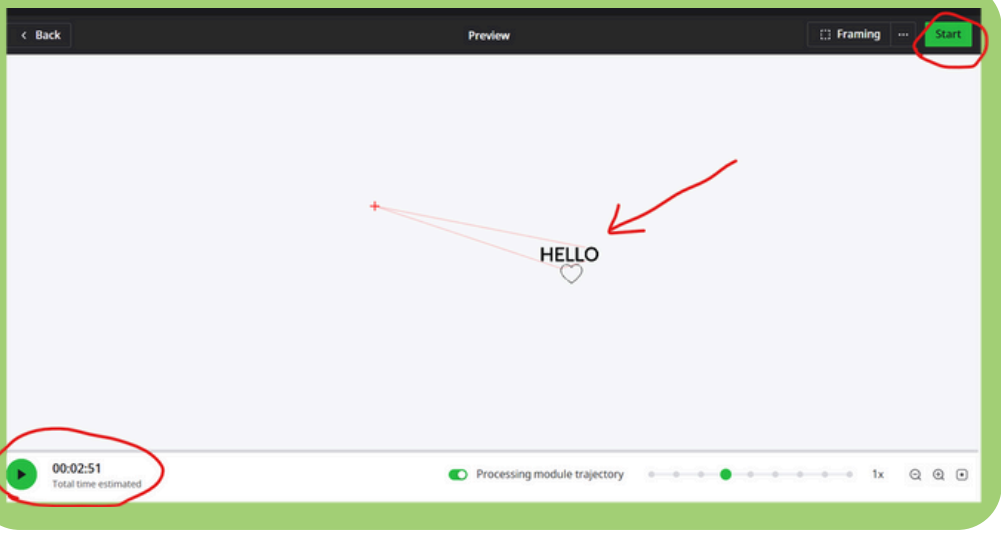
- Click on the Framing button – it will load for a moment, then the machine will beep.
- When it beeps, press the button on the front of the machine to initiate the framing.
- The machine will complete the framing. If you don't like where your design will be, adjust the positioning of the design in the software.

Begin Processing!

Now you are ready to begin lasering your design! Click the green "Process" button.



You will be brought to a preview screen. Here you can see the path the laser will travel to engrave, cut and/or score your design. You will also be given an estimate of the time the project will take, and can press the Play button to watch how the laser will move. You can also ask the machine to complete the Framing again if you wish.



If you are happy with everything, ask a Staff member for help and the lasering can begin! DO NOT begin lasering without a staff member's help - only staff are permitted to begin the lasering process.

Height Guide

There are 4 levels that the baseplate can be adjusted to, for materials of different heights. An adjustment may be necessary so your material is the correct distance away from the laser. Most thin flat materials will be fine on the highest level. If using the rotary attachment for deep cylindrical materials like a tumbler, the baseplate will need to be on the lowest level.

Baseplate Level	Material Height With Honeycomb Panel	Material Height No Honeycomb Panel
A (Highest level)	0mm to 44.5mm	15.5mm to 70.5mm
B	10.5mm to 65.5mm	36.5mm to 91.5mm
C	31.5mm to 86.5mm	57.5mm to 112.5mm
D (Bottom level)	52.5mm to 107.5mm	78.5mm to 133.5mm

Examples:

3mm Basswood sheet:

- Level A, with honeycomb panel

50mm (5cm) wooden plank:

- Level B, with or without honeycomb panel
- Level C, with honeycomb panel

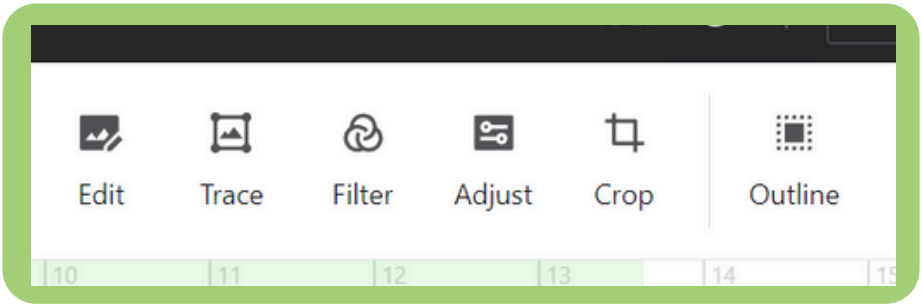
95mm (9.5cm) wooden box:

- Level C, without honeycomb panel
- Level D, with or without honeycomb panel

Creating a Vector Image from a Photo

xTool Creative Space (XCS) has easy to use tools that allow you to edit images, to make them the right format for lasering.

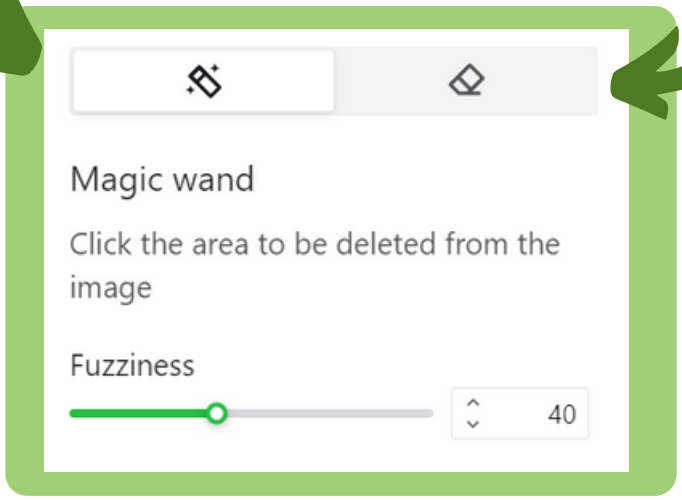
After importing an image into the software, make sure you have the image selected. Once the image is selected, editing tools will appear in the top toolbar.

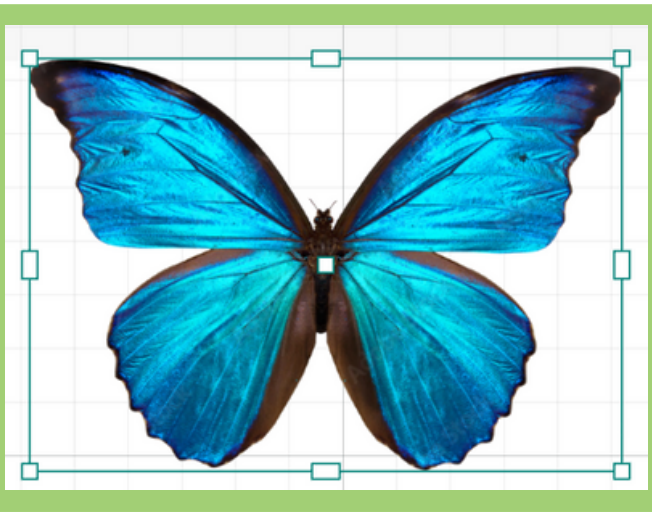


Edit

This will allow you to use the "magic wand" tool to auto erase solid colour backgrounds from the image.

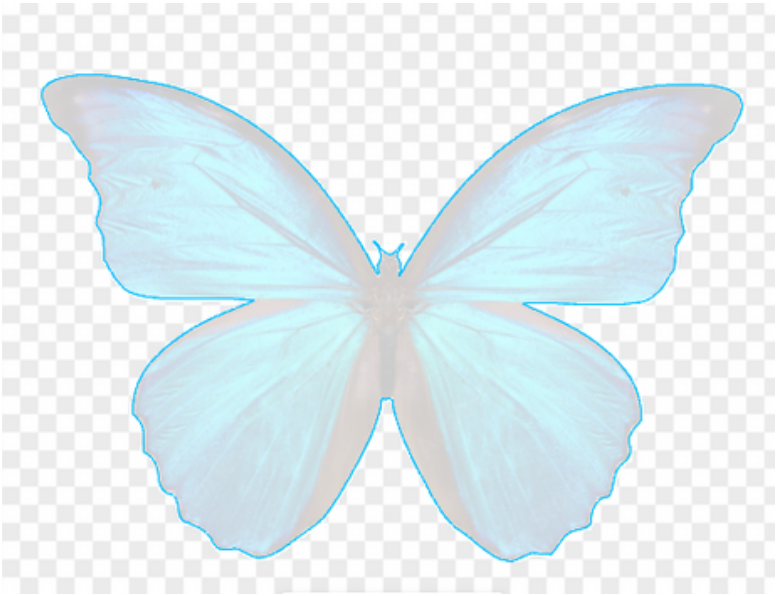
You can also use the eraser tool to erase small bits the magic wand tool may have missed. The eraser may be required to erase a more complex background, like scenery in a photograph. Extra adjustments can be made using the slider bars. Experiment with these to see the effect they have on your image!

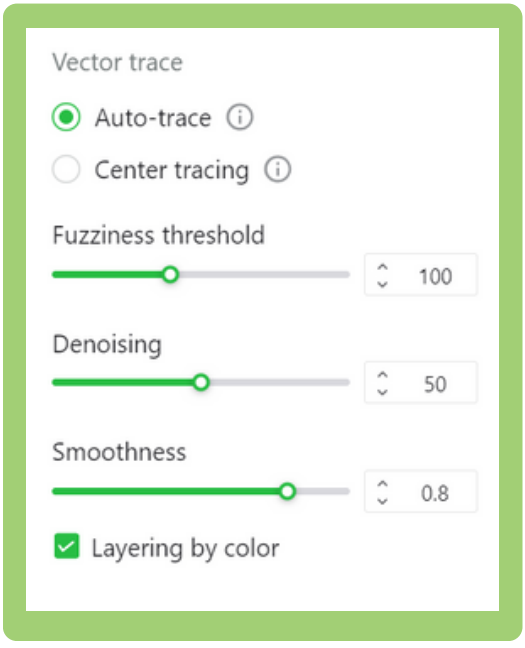




Trace

The Trace tool is extremely useful! The above image on the left is our starting image, with background removed. Once within the trace tool, it will automatically generate a traced image (right image). To get the image below where only the outside of the object is outlined, we slide the "Fuzziness Threshold" up. This makes the image fuzzier so the tracing function only recognizes outer edges, and not details on the inside of the object. Moving the slider in the opposite direction would create more detail lines. Play around with the rest of these sliders to see how they affect your image!





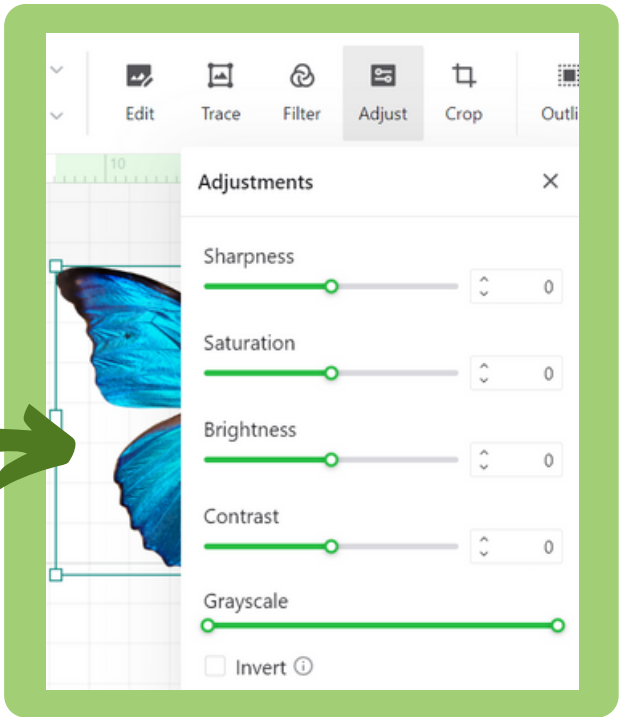
Preparing a Detailed Photo to Engrave

You can also engrave detailed photos, rather than a simple outline or object, by using the photo editing tools on the top toolbar. This guide will explain a simple way to do so - more complex adjustments are possible, but will not be covered in this guide. Try looking online for tutorials when you feel ready to step things up!

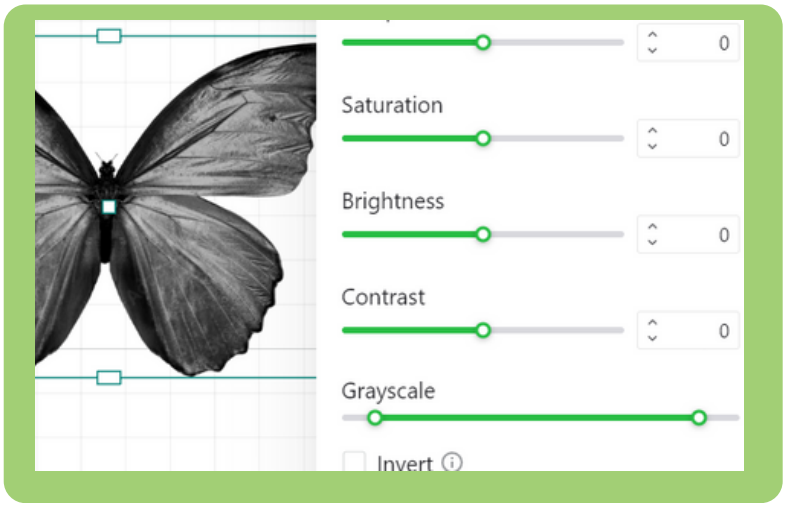
After importing an image into the software, remove the background using the Edit tool, as explained on the previous page of this guide.

Adjust

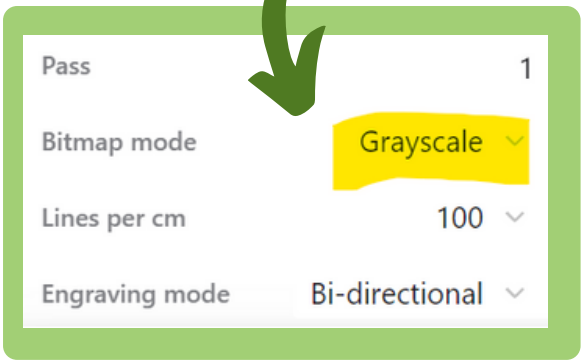
This tool will allow you to make necessary adjustments to make the photo compatible for engraving.



You will see these options when you click the Adjust tool. The "Greyscale" slider will convert the image into Greyscale (a black, white and grey image). Moving each end towards the center will increase the darkness of the blacks and the brightness of the whites. Converting the image into black and white makes it easier for the software to identify where the image should be lighter and darker, to accurately laser onto your material.



Once you are happy with how your image looks, prepare to process your material as usual, filling out the details in the top and right toolbars. On the right toolbar, below "Pass", set the Bitmap mode to "Greyscale". You may also wish to experiment with increasing the "Lines per cm" - this increases the detail of the image in the final result.



Now when you hit the "Process" button, you should see a preview of how your image will be engraved. If you are happy with how it looks, begin processing!

Below shows how the butterfly image looks on the preview page, with Bitmap Mode "Sierra" selected. Not quite what we're looking for in this instance!

This shows how the butterfly image looks on the preview page, with Bitmap Mode "Greyscale" selected. That's more like it!