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Using the xTool S1 Laser Engraver / Cutter

What is the xTool S1 Laser Engraver?

The XTOOL S1 is a fully enclosed "Diode" laser cutter. Unlike older industrial lasers that require complex cooling and venting, the S1 is designed for safety and ease of use in public spaces like libraries and classrooms. It uses a high-power beam of light to burn, melt, or vaporize material with extreme precision (down to 0.08mm). Because it is “Class 1 Safety Rated”, the enclosure blocks harmful laser light, but it is still recommended to use the included safety goggles while operating the S1

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What can you do with the xTool S1?

- Cutting (Cutting all the way through)
  - The S1 is excellent for cutting flat sheets of material to create shapes, puzzles, boxes, and prototypes

- Engraving (Etching the surface)
  - The S1 can vaporize the top layer of materials to add text, logos, or even photos

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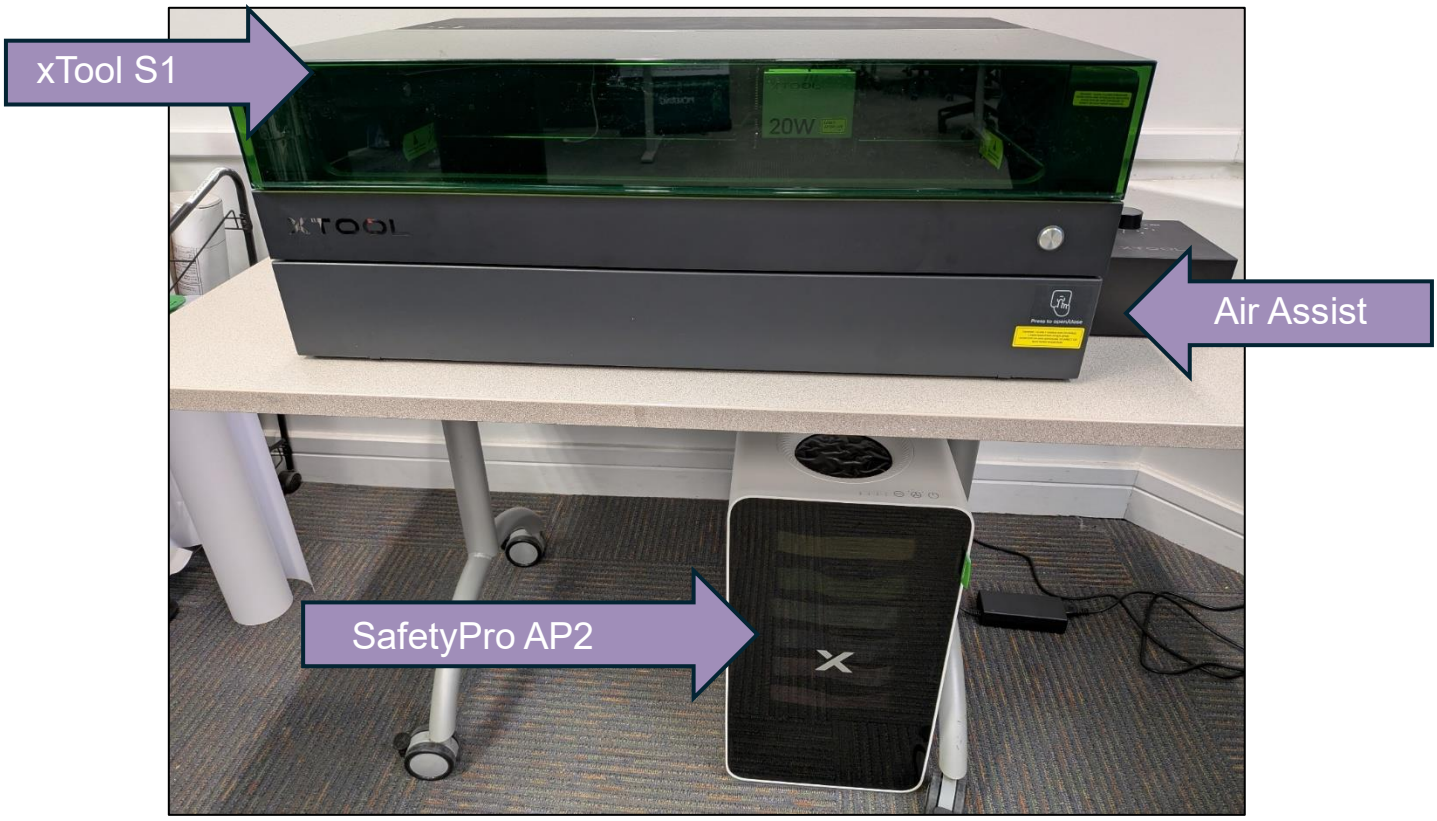
Meet the xTool S1 System



1. xTool Unit

   This is the main unit that houses the laser module. It features built-in safety mechanisms, including an automatic sensor that pauses the machine instantly if the green protective lid is opened. There is also a circular red button on the side of the unit, the emergency stop switch, to manually start or pause a job

2. Air Assist module

This is a small pump that shoots a high-pressure jet of air directly downwards where the laser beam hits the material.

Prevents Fire: By blowing constant air at the "burn point," it prevents small flare-ups and flames from starting.

Cleaner Cuts: It blows the smoke and debris away from the material immediately. Without it, wood gets "charred" (blackened edges) and acrylic can melt back together.

Protects the Lens: Smoke naturally rises. Without air assist, smoke would rise up and coat the laser lens, eventually cracking it. The air creates a barrier that pushes smoke away from the sensitive glass.

Deeper Cutting: It clears the "kerf" (the cut groove), allowing the laser to cut deeper in a single pass

3. SafetyPro AP2 Unit

This is the filtration system. Since we cannot vent smoke outside, this unit suctions the dirty air out of the S1 enclosure and scrubs it clean before releasing it back into the environment.

6-Stage Filtration: It doesn't just catch dust; it uses Activated Carbon and HEPA filters to trap toxic fumes and invisible particles created by burning glue/wood.

The "Cyclone" Feature: The AP2 is unique because it spins the air (like a Dyson vacuum) to separate heavy dust particles before they hit the main filter. This is critical because it makes the expensive filters last much longer.

Auto-Sync: Since it is connected to the S1, it will automatically rev up when the laser starts cutting and spin down (after a delay) when the job is done.

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Materials List (Safe and Forbidden)

xTool S1 can be used to cut wood, paper, cork, and some kinds of plastic; and engrave most materials such as wood, paper, coated metals, stainless steel, plastic, marble, stone, tiles, glass, etc. While it supports a whole array of materials, there are some materials that should NOT be used as it may potentially pose health and safety risks. If in doubt, DO NOT use your material on the S1. Consult with the official xTool S1 documentation for more information. Here is a brief list of materials (safe for cutting / engraving and forbidden)

Forbidden

These materials are NOT to be used with the xTool S1 as they pose serious fire and/or health and safety concerns:

- PVC (Polyvinyl Chloride)
- Vinyl
- Artificial leather (sometimes referred to as pleather or patent leather)
- ABS
- HDPE
- Acrylic
- Coated Carbon Fiber
- Polycarbonate, latex paint
- Polypropylene Foam
- Polystyrene Foam
- Highly reflective materials (mirrors)

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Cut and Engrave

- Wood (Unstained, Untreated, Unpainted with no glues, paint, resin, or oil)
- Paper, Cardboard & Cardstock
- 100% Natural cork
- Polycarbonate
- Depron Foam
- Fabric: cloth, felt, hemp fiber, cotton
- Natural leather without PVC or Vinyl (Vegetable Tanned Only)

Engrave Only

- Glass
- Ceramic Tile
- Anodized Aluminum
- Stainless steel
- Stone, marble, granite

Important Safety Considerations

⚠ CRITICAL WARNINGS

NEVER leave the unit unattended while it is running: Laser cutting is a thermal process. Fire can happen in seconds.

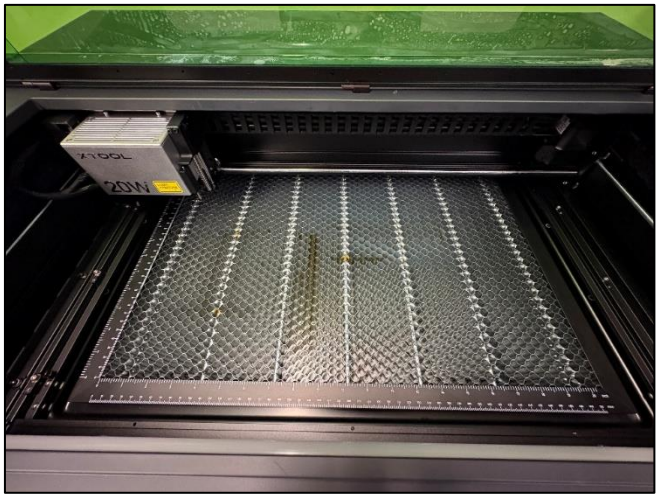
Material Safety: NEVER cut materials containing Chlorine or PVC (vinyl). This creates chlorine gas, which is fatal to humans and creates hydrochloric acid that creates instant rust on the machine.

Eye Protection: While the S1 is enclosed (Class 1), wearing specific laser safety glasses (green/orange lenses specific to 455nm wavelength) is recommended when the lid is open for alignment

Operating the xTool S1 and xTool Creative Space Software

1. Material Setup

- Place the material flat on the honeycomb panel bed. Remove any debris from the honeycomb panel bed if necessary

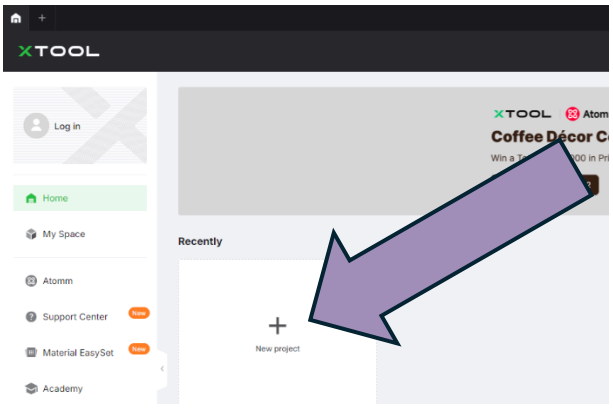


- Depending on the thickness of the material you may need to raise or lower the bed. You can press the button on the right side of the Riser Base and take out the bed to move it to a higher or lower gear.

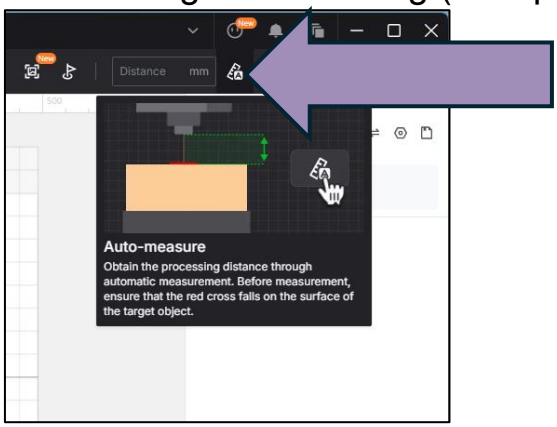
A: 15.5mm<H<70.5mm B: 36.5mm<H<91.5mm C: 57.5mm<H<112.5mm D: 78.5mm<H<133.5mm

2. Launch xTool Creative Space software

3. Create a New Project



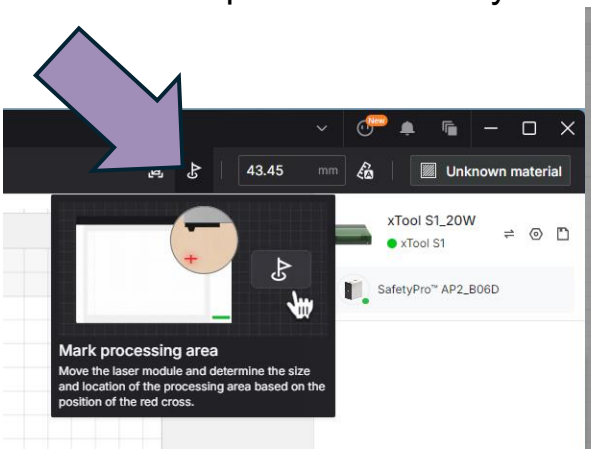
4. Focusing & Positioning (S1 Specifics)

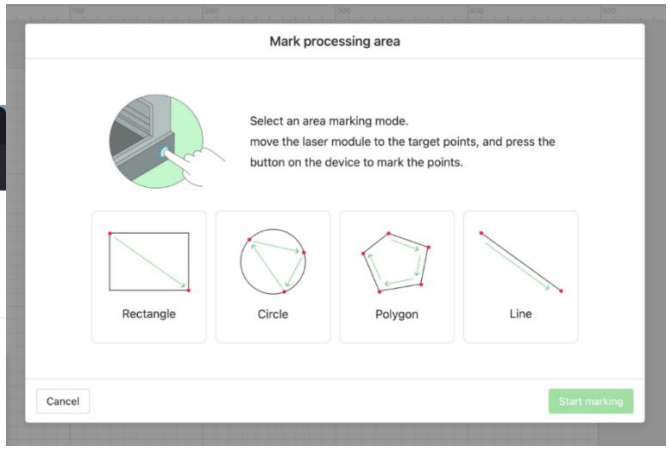


The XTOOL S1 uses a unique "Pin-point Positioning" system rather than a camera

- Focus: In XTool Creative Space, select "Auto-Measure" to let the probe touch the material and set the Z-height.

- Marking Area: In xTool Creative Space, select “Mark processing area” and choose a shape that best fits your material.





Move the laser module by hand to the top-left corner of your material and press the button on the front of the machine to mark point 1. Then, based on the shape you chose, move it to mark point 2 (For example the rectangle would have point 2 at the bottom-right corner). Click End Marking once you have the entire shape. This tells the software exactly where your material is located and its size

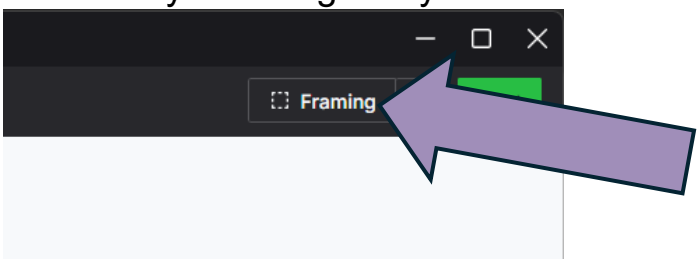
5. Software Configuration

- Import Design: Load your SVG, DXF, or image file.
- Set Parameters: Assign Power (%) and Speed (mm/s) based on the material.
- Process Type: Define lines as "Cut," "Score," or "Engrave."

6. Execution & Monitoring

- Close the lid (The S1 will not fire if the lid is open)
- Press "Process" in the software, then press the physical glowing button on the machine

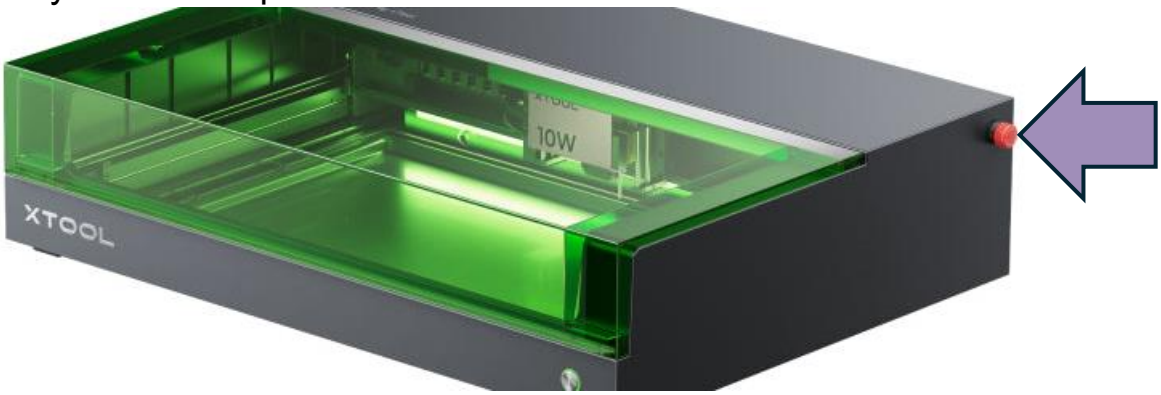
- Click “Framing” in the top right corner. This machine will move around the outline of your design so you can make sure it’s engraving on the material.



- Stay with the machine for the duration of the cut.

7. Post-Operation
    - Wait 30 seconds after the job finishes for fumes to evacuate
    - Open the lid and remove the material
    - Inspect the bed for small cutouts that may have fallen through and remove them.

<u>Emergency Stop:</u> If at any point there is cause for concern OR an immediate emergency, press the “Red Emergency Stop” button on the **right side** of the S1 immediately to halt all operations.



Rotary Attachment 2

The Xtool is equipped with an optional rotary tool designed for processing round objects; this tool can be customized to fit objects of varying size and shape. The default tool is the chuck attachment.

1. Chuck

Adjustable claw attachment used to hold objects in the air as they rotate. Different jaws can be added to support a wide variety of objects.

2. Rollers

Rotates objects across two rolling pins. Ideal for large or heavy objects.

3. Support Module (Optional)

Used to hold objects that are too long or irregular for Rotary Attachment 2

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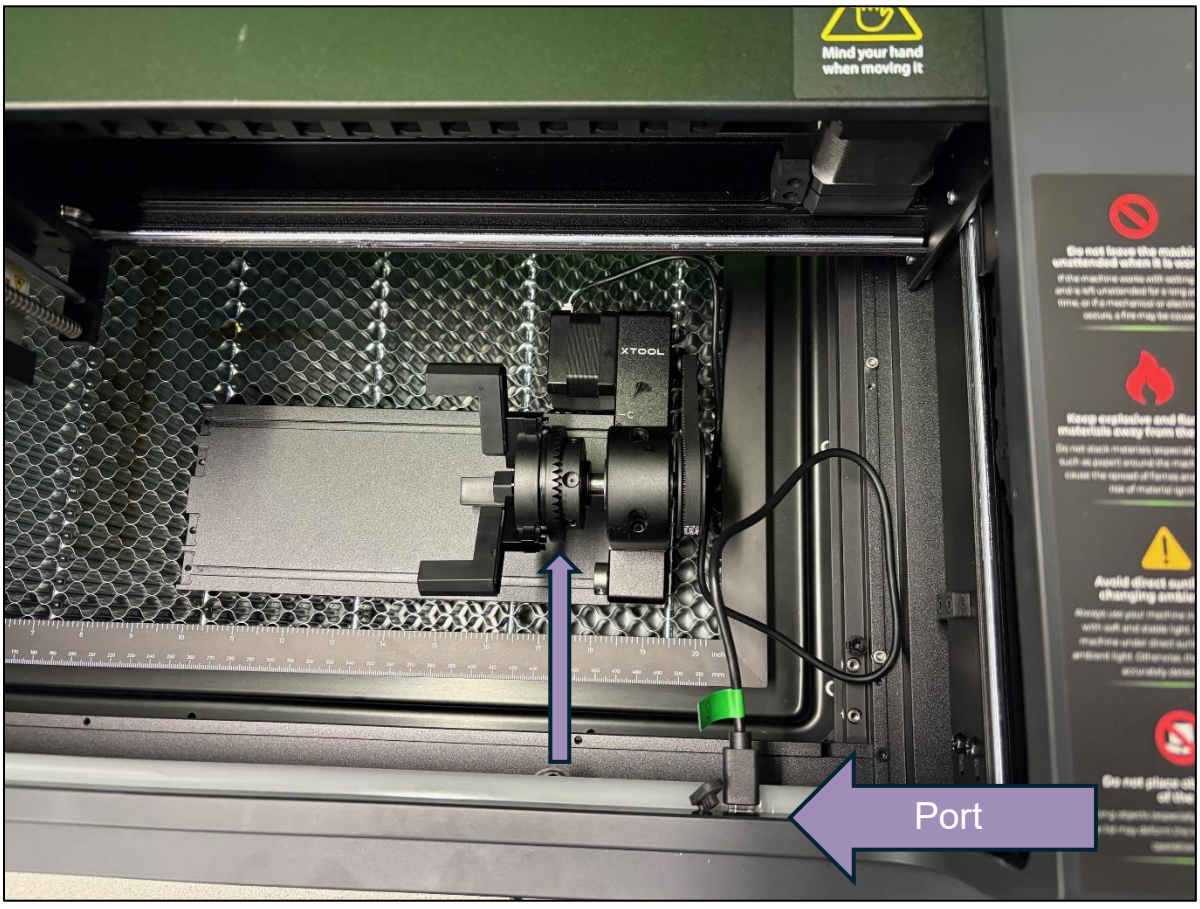
Using Rotary Attachment 2

1. Place Rotary Attachment on to bottom-right of honeycomb panel bed
2. Plug into port located on the inside of the Xtool
3. Tighten or loosen claw around your item by rotating dial at the back



4. In X-tool Studio under mode, select Chuck

5. Click auto measure

6. Enter Diameter of your object

7. Follow steps 4-6 of previous section: Operating Xtool S1 and Xtool Creative Suite Software