



Woodlands Innovation Zone

Introduction to Laser Engravers / Cutters

Typical Laser Engraver



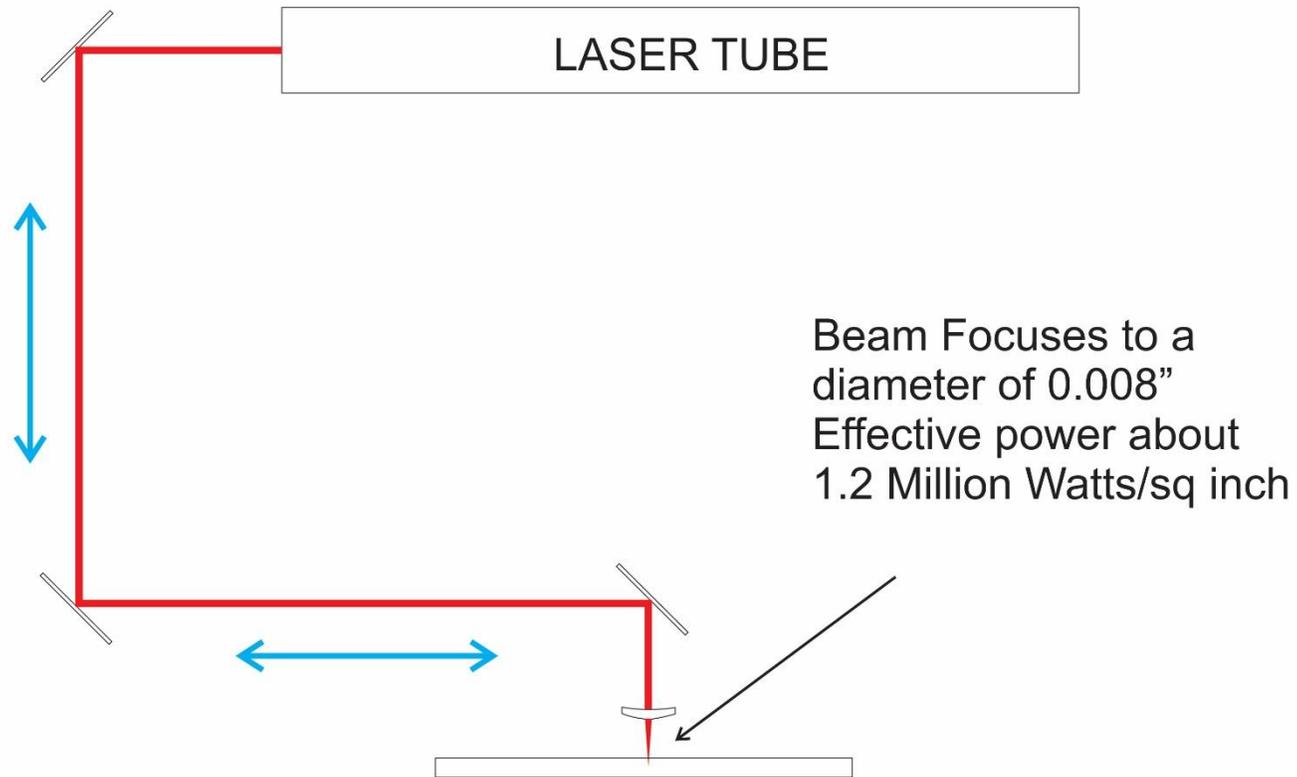
60 Watt CO2
Laser

24x36" Capacity

Easily cuts up to
1/4" Acrylic or
Wood

How does it work?

Laser Engraver Flying Optics



The laser tube and first mirror are stationary. The second mirror rides on the gantry, and the third mirror rides on the cutting head. Although the distance the beam travels changes with the position of the head, it makes little difference. The beam is focused to a tiny dot by a lens in the cutting head. Compressed air is fed into the nozzle chamber to cool the lens, keep smoke from getting on it, and clear the smoke from the workpiece.

Inside View



The Knife edge supports are best for larger pieces. They provide good support with little flash-back.

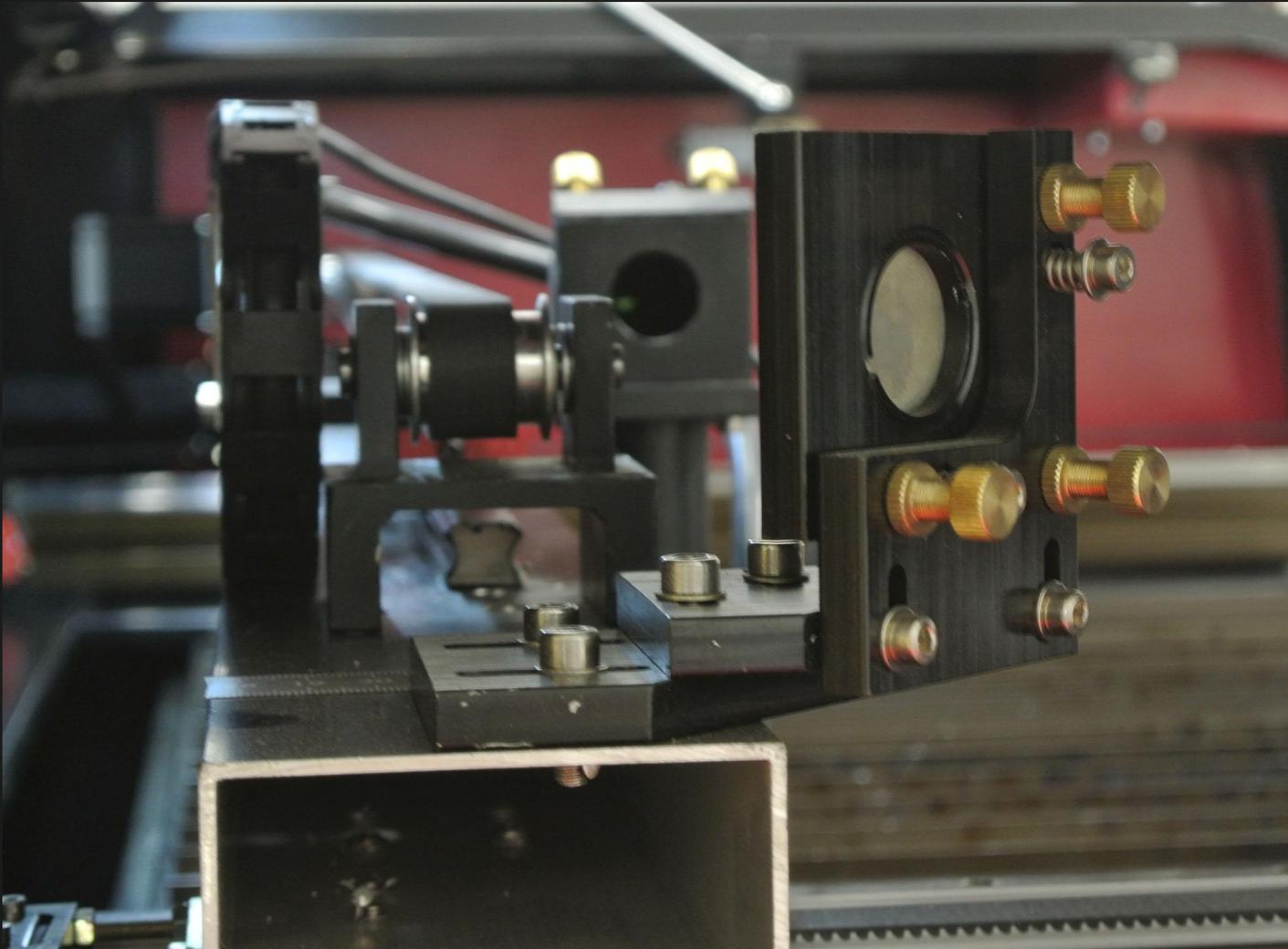
Notice the support bed can be raised or lowered to compensate for object thickness. This allows engraving objects such as jewelry boxes.

Honeycomb Support



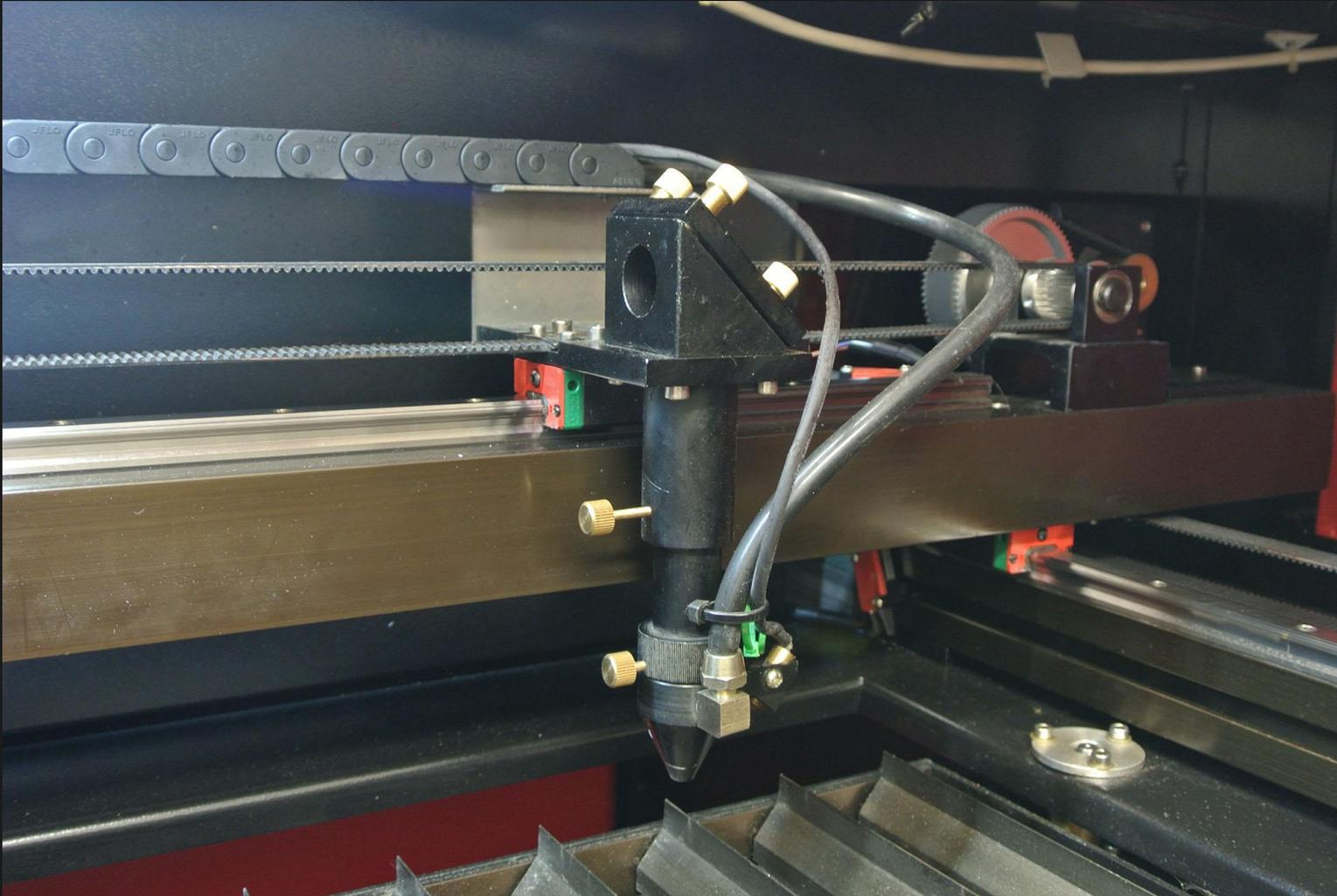
- For small pieces the honeycomb bed works best. The bed is made of steel which allows the use of magnets to hold light materials in place.

Gantry side view



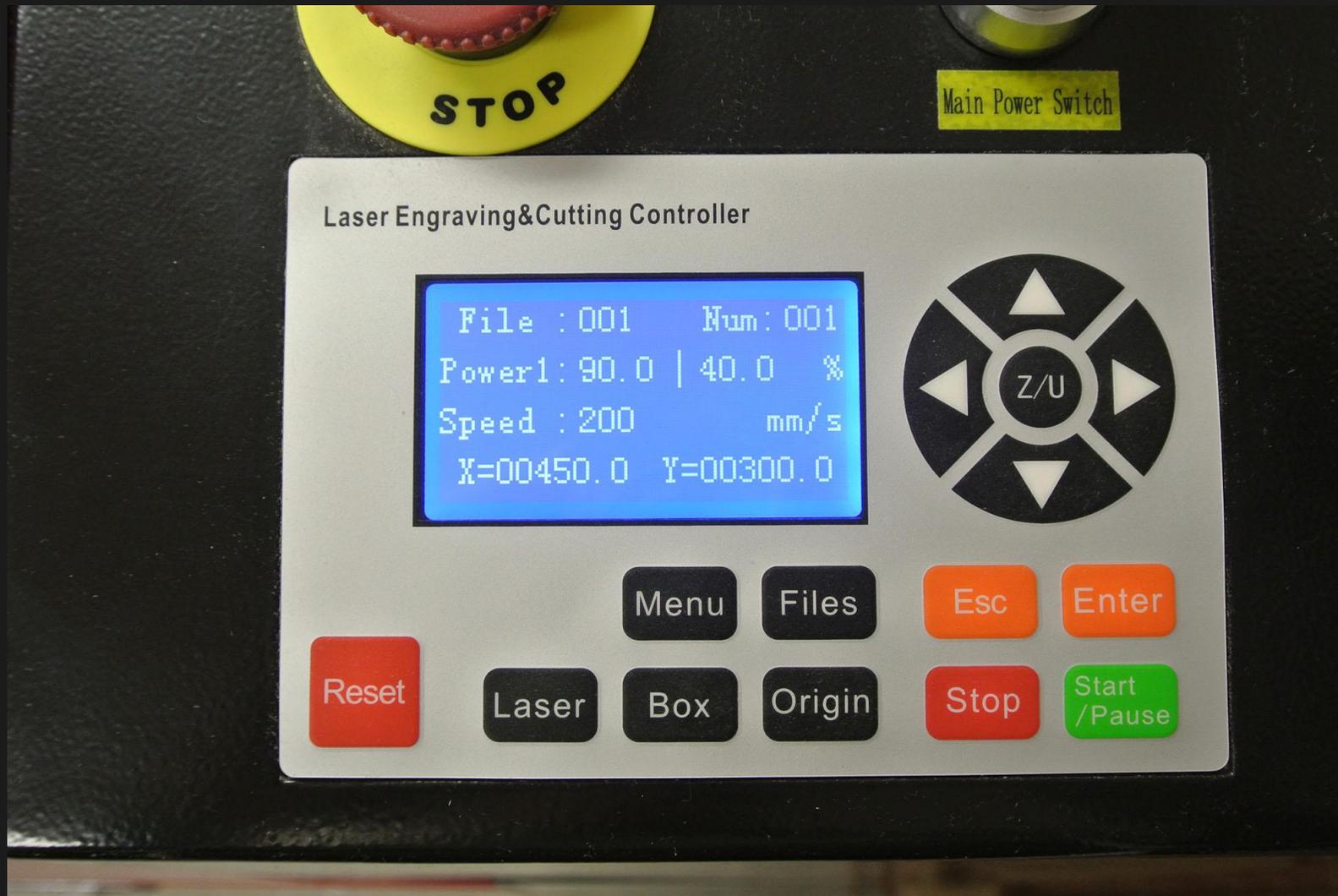
This is a view looking from the left side of the machine. The second mirror is in the foreground, the third mirror is located on top of the cutter head. Periodically, cleaning and alignment of the mirrors is done to retain best performance.

Cutting head assembly



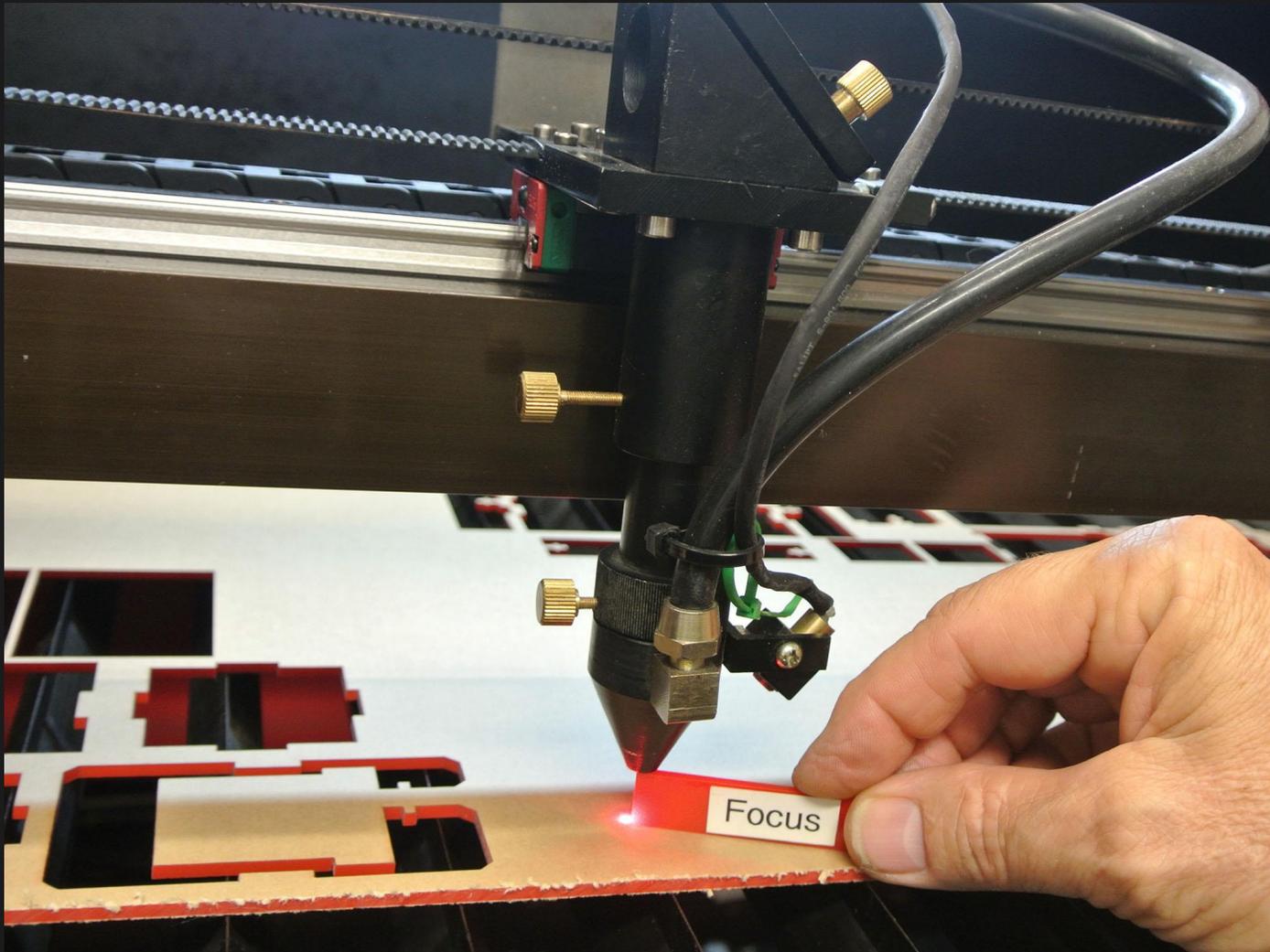
This is the cutting head assembly. It is driven on the X axis of the machine riding on top of the gantry. The mirror at the top of the assembly reflects the laser power down through the lens. The lens is located just above the nose cone. There is a compressed air line feeding air into the nose cone. This helps cool the lens and keep it clear of smoke.

Front panel controls



The front panel controls allow the user to set the origin of the job. Pressing the Box button causes the machine to trace the outer extents of the job, with out the laser on. This allows you to check and make sure the job will be cut where you expect it to be. The Start button starts the job. Never leave the laser while a job is in progress. The danger of fire is always present.

Focusing the laser



Before use, the laser must be focused. In improper focus can cause a fire, so this step is very important.

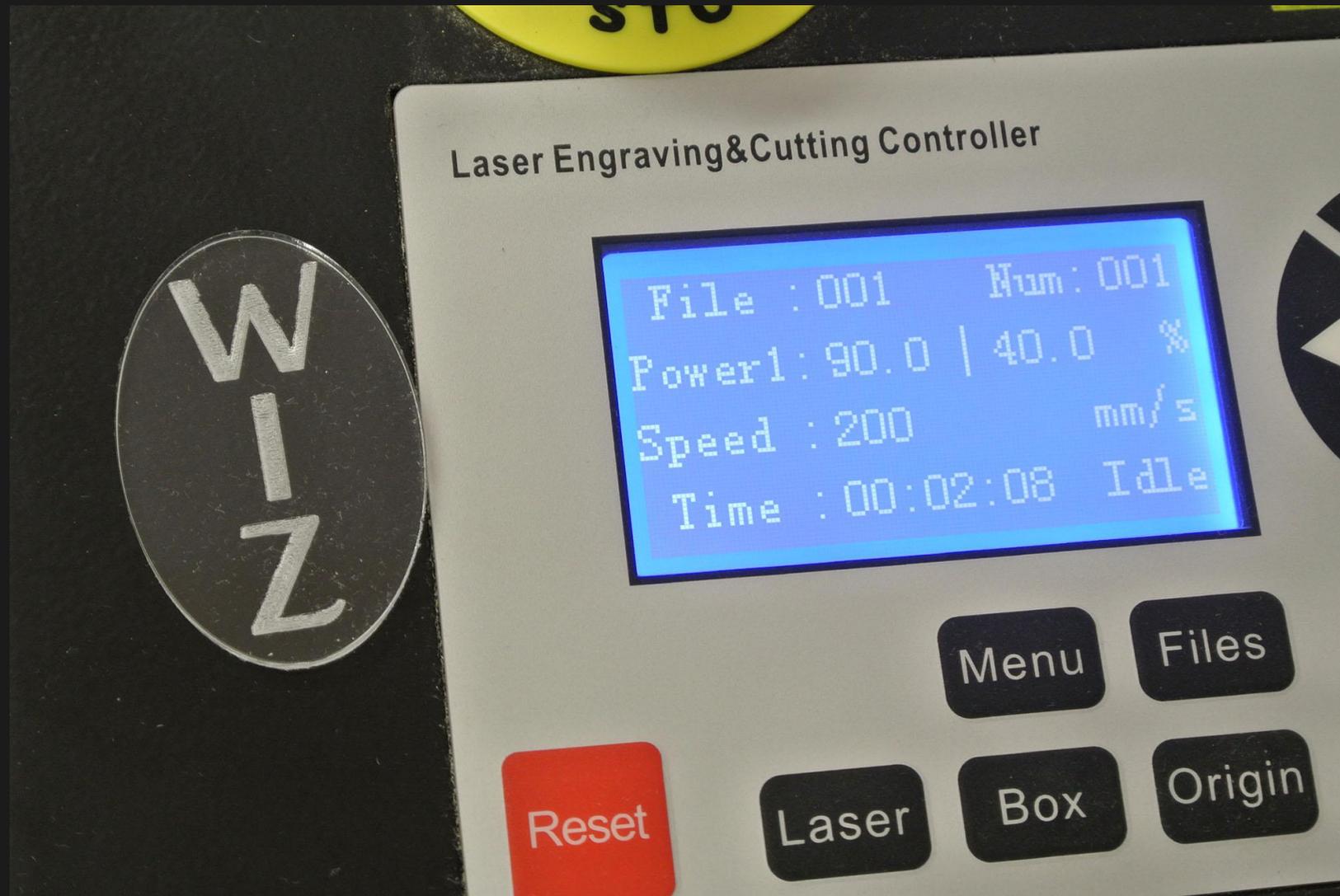
Focus is set using the spacer gauge. Either the table can be adjusted, or the cutting head.

Notice the small visible laser located on the side projecting a red dot. This laser is used as a pointer to set the origin location.

Video of the laser in action

- The next slide shows a small job being processed.
- First the origin (starting point) is established.
- Then the Box function shows where the job is being cut.
- The the job is started.
- The first process is engraving the text.
- The last operation cuts out the piece.

The finished product



Finished product. Notice the elapsed time of 2 minutes, 8 seconds.

The engraved area can be filled with paint, or left alone with the piece edge lit.

Materials

- This type of laser works well on many plastics and wood. Glass can be etched as well.
- Some plastics, such as PVC should never be lasered. They contain Chlorine, which forms HCl, and very corrosive and dangerous gas.
- Metals, even very thin metals, reflect the laser energy and can not be cut or engraved.
- Special brush-on ceramic coatings can be lasered and produce permanent markings on almost any metal.
- Anodized aluminum engraves very well. Although the laser does not mark the metal directly, it burns out the die in the anodized finish, leave a silvery mark.

