- The Laser
- Safety
- Capabilities
- Toolchains
- Machine Setup
- Vector Engraving and Cutting
- Raster Engraving
THE LASER
40 Watt CO2, Water Cooled, Air Assisted, Flying Optic Laser Engraver

Originally built by member, Brian Cribbs

Owned by Freeside thanks to donations from a handful of members

Open source plans (BuildLog.net)

Essentially a 2 axis CNC plotter

Cost to replace: Around $2000
The laser doesn’t melt or burn through the material. It vaporizes it! Burning and melting that occurs is a side effect of the heat.

- Infrared: 10,600nm/1,060um
- Most materials transparent to visible light are opaque at this wavelength
- Lenses are Germanium or Zinc Selenide
- Mirrors are a special silvered material, not glass
Big Scary Laser
Do not look into beam with remaining eye
Eye Protection
  - For you and anyone else in the workshop!
  - Sunglasses or shaded recommended for operator and laser observers when cutting some material (point of lasing can be very bright)
- The e-Stop switch should be ON (pressed in) any time the laser is not running a job
- The laser is invisible to the naked eye.
- Never leave the laser (or any CNC machine) unattended while in operation
- Ensure proper ventilation while cutting
- Do not bypass any interlocks or safety controls on the laser
- Do not turn on the laser unit until the PC is fully booted, the parallel port is connected, and MACH3 is started and in the foreground
Do not engrave or cut any plastics containing **Chlorine**
- This includes *MOST* vinyl and all **PVC**
- Check Wikipedia first for known plastics to see **formula**
- Test unknown plastics (Phone cases, notebook covers, anything you didn’t buy as known, raw material) with the copper flame test **DEMO**

Chlorine fumes are very poisonous and will also damage the optics and corrode the electronics
Cause of fire:

Machine not cleaned of debris
Materials may catch fire while being cut or engraved

- E-stop!
- Use the spray bottle of distilled water for small flare-ups
- Use the fire extinguisher
  - Lock out the laser and alert membership that it is down after a large fire
- Don’t try to engrave a Bic Lighter. If you engrave a laptop or cell phone, remove the battery first!
CAPABILITIES

- About a 10.5x20 inch working envelope, 12x24 bed
- Cutting
  - Thin wood (some plywoods with more than 3 layers can give it some issues)
  - Paper and cardboard
  - Plastics (acrylic cuts very well) up to ½” thick
  - Fabrics
- Engraving
  - Dark stone
  - Ceramic
  - Glass
  - Leather
CAPABILITIES

- Metal
  - Will NOT cut any metal
  - Will mark anodized aluminum
  - Can mark certain metals with a special coating applied (kind of a ceramic glaze) CerMark
UPGRADES

- Metal Bed (DONE!)
  - Won’t wear out
  - Magnetic hold down for thin material
- Rotary Attachment
  - Engrave round objects like wine glasses, bottles, etc.
- Milliamp Meter (DONE!)
  - Better than arbitrary power dial settings
- Temperature Gauges (DONE!)
  - For coolant temperature
- Flow Meter (Installed, nothing monitoring it yet)
  - Also for monitoring coolant
- Visible Laser Diodes
  - For aiming the head
- Radiator/Fan
  - Better coolant needed in the summer
CamBam
Mach3
Inkscape
Others
  Sketchup
  OpenSCAD
  MakerCase
MACHINE SETUP
FRONT PANEL
VECTOR ENGRAVING AND CUTTING
RASTER ENGRAVING