Laser Cutter Training - Overview

# Prerequisites

## USB Flash Drive

## Material to be cut

## CamBam (available on the HackRVA Digital Design Workstation)

## Inkscape (available on the HackRVA Digital Design Workstation)

# Introduce the Laser

## Laser power – 40W

## CO2 laser – invisible

## Doesn’t cut metal, will cut wood and plastics

## Maximum cutting area is 10” x 18”

## Thin stock only – mostly 1/8” (~3 mm), but can cut up to ¼” (~6 mm) with practice/planning

## Kerf (width of cut) is ~0.23 mm

## Controlled with Mach3

## Convert your design to “laser speak” with CamBam

## Introduce the parts

### Safety glasses

### Power director

### Front Controls

#### Estop

### Top Controls

#### Meter

#### Switch (use “Normal”)

#### Rotary Knob (for selecting power level)

#### Momentary Pushbutton for testing the laser

### Keyboard controls

#### Tab key brings up the pendant

#### Optional: Arrow keys

#### Optional: Page up and page down

#### If keys don’t work, look for a dialog box on the screen (may be underneath (i.e. covered by) the main screen

### Inside

#### Laser tube

#### Mirrors

#### Lens

#### Laser carriage

#### Cutting bed

### Calibrated stick

# Safety First!

## Inspect the Laser Cutter for Damage

## Check the cutting bed for other people’s stuff

### Remove old cutting stock and check the cutting bed for levelness

## Use safety glasses

### CO2 laser light is invisible

### Damage to your eye won’t be felt until after you loose your sight

## Focus the laser beam

### Adjust the z-axis so that the top of your material is 71 mm below the top of the laser-lens carriage.

## If not sure of your laser settings, ease into it

### First try cutting without the laser beam (keep the big red button on the front of the laser cutter pushed in)

### Next try a cutting pass with just a little laser power to check for focus (it will just etch a little)

### Now go for broke!

## Fire

### Not if, but when

### Primary cause of fires – unfocused laser beam (focus by adjusting Z axis)

### Fire Response

#### Kill the laser beam (big red button on front of laser cutter

#### Unplug the ventilation blower

#### Unplug the laser cutter

#### If still burning, lay metal sheet over fire (if you can do it safely)

#### If all else fails, use a fire extinguisher

## Materials

### Stick with wood and acrylic unless you know the chemistry of your material

### Don’t cut materials that you can’t guarantee are free of Chlorine

#### There is a chlorine test on the Internet

#### Even etching can release chlorine if it’s in the material

# Inkscape

## See the “Using Inkscape to Create a DXF File” Procedure

## Not all Inkscape features may work – check your pattern in CamBam!

## Converting Objects to a Path and using LWPOLYLINE is important.

# CamBam

## See the “Using CamBam with a DXF File” Procedure

## Is your pattern all there? If not, go back to Inkscape to convert objects to paths

## Default feed rate of ~17 in/min is good for cutting 1/8” plywood or 3 mm acrylic

## Feed rate can be changed if you wish either in CamBam or in Mach3

## Advanced Topics

### Multiple engraving steps

### Profiling (a laser “tool” is built into the “laser” style)

#### A laser “tool is built into the “laser” style

#### The kerf (cut width) is ~0.23 mm

## Check the units – are they correct? If not, fix them (upper left toolbar). This is usually only a problem when using AutoCad for the DXF file.

# Mach3

## See the “Using the Laser Cutter” Procedure