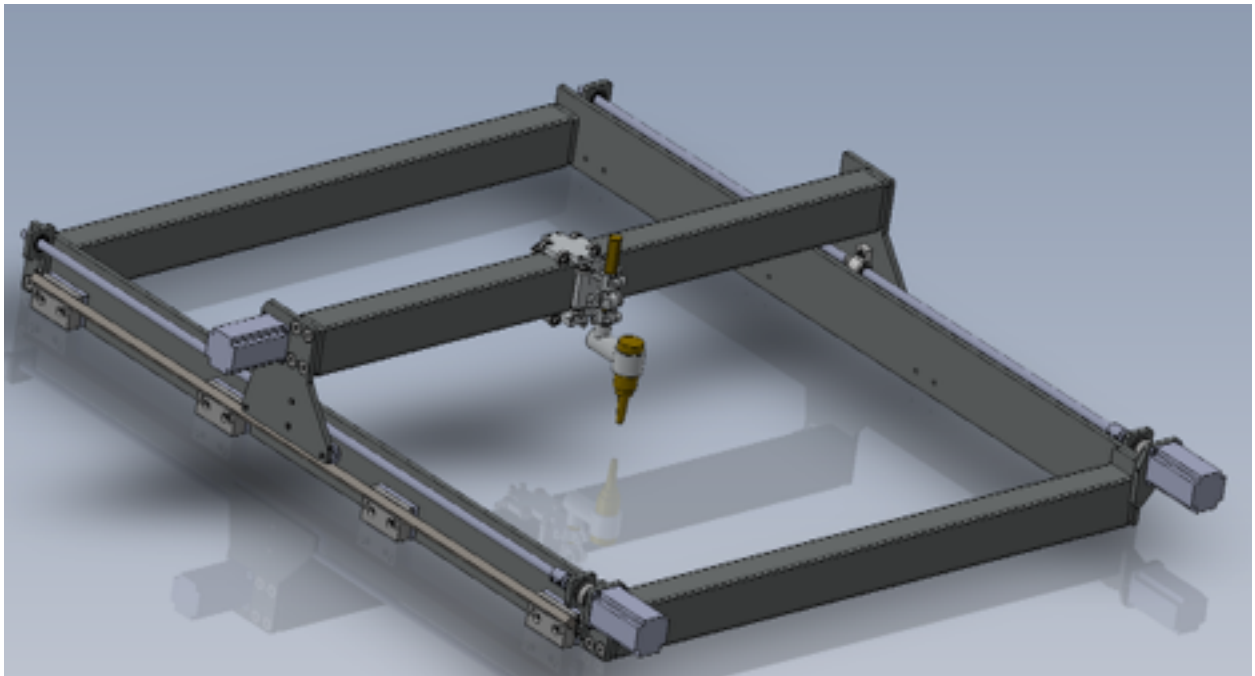


CNC Torch
By: Steven Chiu
& Rose Float Team



This CNC Torch cuts steel plate. It can cut up to a maximum area of 3x3 feet. The user builds a cut list on the touchscreen from a selection of predefined shapes and enters the parameters need for each shape. When the user is ready, the cut list is sent to an Arduino that will move each motors accordingly to the shapes desired.

The initial plan for this project was to parse a PDF or Illustrator file that someone created using Illustrator and cut whatever design they had in that file. After doing a little research on file structure for those two formats, it was unreasonable to write a program to interpret those two files within two quarters. So we moved forward with a different approach. This brought me to my next challenge.

Developing on two different processor and architecture made things a little more different. I couldn't build a common header file that both processor could share. The touchscreen uses a custom processor that the company makes themselves. This also meant that they made their own language for their processor. This processor also doesn't support floating points so I had to create my own structure for floating point input from the user. Then when the input is sent to the Arduino, the Arduino would change the custom structure to a regular floating point number.

After these two challenges in the software world, there wasn't much else that was difficult about coding the system, just a lot of busy work and extensive testing and user feedback. The most difficult part of this project was designing the physical system and getting all the parts needed without going over budget. I partnered up with an ME student who helped me design and CAD the system.

Initial Budget: \$1,500

Final Cost: \$1156.06

Tooling: \$150

Initial Development Time: 20 weeks

Final Development Time: 25 weeks

| Item | Quantity | Each | Price |
|---|----------|----------|-------------------|
| Torch | 1 | \$900 | Donated |
| Solenoid | 1 | \$500 | Donated |
| V-Con Clamp | 8 | \$7.50 | \$60.00 |
| Case Hardened Cold Rolled Steel Rail | 2 | \$50.00 | \$100.00 |
| V-Roller Bearing | 4 | \$10.25 | \$41.00 |
| 1/2" Shaft Adapter | 3 | \$11.95 | \$35.85 |
| DumpsterCNC Acme Assembly | 3 | \$34.95 | \$104.85 |
| Oldham Zero Backlash Couplers | 3 | \$21.50 | \$64.50 |
| 320 oz-in 2.8 mH Nema 23 Stepper Motor | 3 | \$52.50 | \$157.50 |
| 1018 Carbon Steel Precision ACME Threaded Rod | 2 | \$66.50 | \$133.00 |
| Hardware | 1 | \$200.00 | \$200.00 |
| | | | |
| Limit Switch | 2 | \$5.51 | \$11.02 |
| Arduino Mega | 1 | \$29.99 | \$29.99 |
| 4D Arduino Adaptor Shield | 1 | \$7.71 | \$7.71 |
| uUSB-PA5 | 1 | \$19.35 | \$19.35 |
| 4D Programming Cable | 1 | \$21.29 | \$21.29 |
| uLCD-70DT | 1 | \$179.00 | \$179.00 |
| Custom PCB | 3 | \$30 | Donated |
| Total | | | \$1,165.06 |