# S3

Storage Stool

by Anna Lai

## Materials

Steel Sheet and Tubing, Plywood, Nylon

## Processes

TIG welding, sheet forming, milling

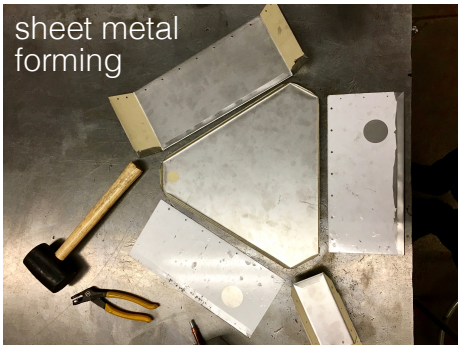
## Design Goals

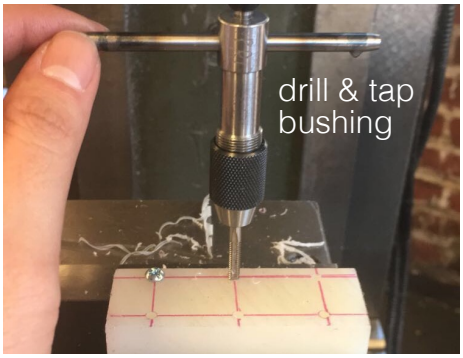
To build something that could optimize and brighten my dorm room space.

## Challenges

Fixturing and welding at the intersection of 3 tubes, getting rivet holes to line up precisely and uniformly, and woodworking joints.

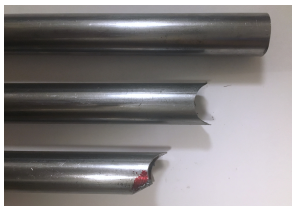
ME 203 Win 2017

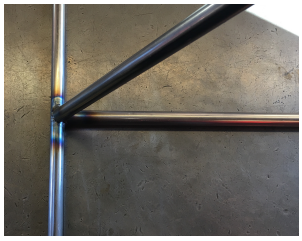

**FRAME**

Fish mouths (x3)



1. Cut tube to length (x 6): Cold saw 15” x 3 and 16” x 3
2. Mount tube in mill vice with v-block
3. Center tool in Y @ 800 RPM
4. Use ¾ in end mill and touch off in X and zero
5. Cut fish mouth from side with top of tool
6. Repeat with both sides of tube, making sure cuts are parallel
7. Rotate tube 90 degrees in v-block and angle down with 30 degree angle block or digital angle gage
8. Re-center
9. Cut from above with end mill using quill, advance in X by .025” until you reach .375” (radius)

Welding



1. Wash tubing with soap and water, rinse with ethanol
2. Wire brush weld locations
3. Sharpen electrodes, TIG PPE
4. TIG Settings for ¾” mild steel tubing (1/16) thick
    - Tungsten diode: 1/16”
    - Cup diameter: ¼-3/8
    - 60-90 Amps
    - Ar 11, 20 psi, 10 - 12 in/min

5. Fix 2 post parallel to one another with the fish mouth rod between
6. Tack 4 sides
7. Tack T-joint with third post and the other fish mouth.
8. Tack the two pieces together at about 60 degrees from each other, check the fit of the last beam
9. File down to size, tack last beam
10. Pray, complete welds
11. Sand to finish

**DRAWERS**

Test

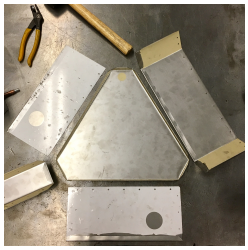
1. Bristol template from 2’X 2’, check order of operations
2. Redesign – rivet sides

Template

1. Design template in illustrator
2. Cut vinyl sticker template
3. Transfer guidelines, remove any rivet hole punches

Folding and Fastening

1. Cut rough shape:
    a. For triangular piece – go to bandsaw, plasma cut, or corner notch sides
2. Clean thoroughly
3. Apply vinyl guide
4. Punch out all rivet holes on bottom piece
5. Make all bends – PRACTICE FIRST
    a. For long sides, use one large and the second to smallest notches on the bending break
    b. For the small sides, use two of the smallest bending breaks



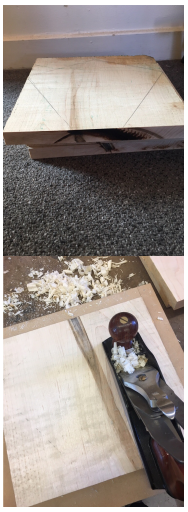
6. Line up rivet holes with partners and punch out, using temporary rivets (“clicos”) to fasten as you go and/or flange punch larger hole in one piece to give some tolerance
7. Send out to powder coat

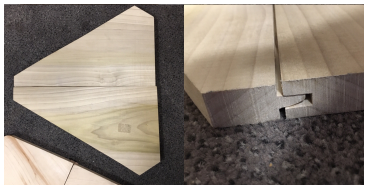
**BUSHING**

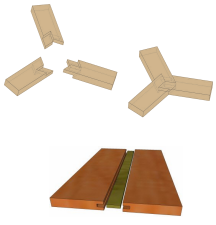
1. Cut nylon bar stock to length (3”)
2. Drill hole through piece (3/4”)
    a. Edge find on X and Y
    b. Center drill
    c. Use ¼” drill @ 1200 RPM -> ½” @ 800 RPM -> 49/64” @ 160 RPM (try 25/32 – 49/64 is too tight)
3. Face to length on both sides
4. Chamfer edges using 30 degree angle block, check fit with sheet metal pieces
5. Attachments
    a. Mark rough positions on side to be mounted (un-chamfered face)
    b. Center drill and zero on X and Y
    c. Center drill on each of attachment locations
    d. Drill through hole between (.106-.116)
    e. Tap #6-32
    f. Check fit

**STOOL TOP**

1. Cut pieces (should’ve used planer first but too late now)
2. Hand plane
    a. Check blade position to make sure not digging into part
3. Sand down surfaces to smooth things out
4. Cut corners to pentagon shape on band saw
5. Edge sand down to length, use joiner
6. Using a piece of walnut as wide as the thickness of the maple piece, make spline
7. Saw out slot for spline in maple piece
8. Sand/file to fit
9. Glue spline and insert into grove x3







10. Break part

11. Start campfire using broken part


12. Make smores
13. Repeat 1-12
14. Get large piece of plywood
15. Bandsaw rough shape then sand to length
16. Finish with polyurethane
17. Attachments: drill pilot hole and drive in screws


Initial CAD model and sample part drawing