Case-X

Progress Report

By: MELRR Engineering
Group #3

Weekly Updates

Week #1

Dimensions and Weight

- Determined volume and weight of solution and desired dimensions for compartments and case

Week #2

Finalize Design

- Finished design of compartments
- Completed drawings

Week #3

Materials

- Determined materials for case, nozzle and compartment.
- Began cost evaluation for all materials

Week #4

Mechanics

- Completed calculations for internal mechanics

Case Dimensions

- Length 15cm
- Width 6cm
- Height 5.8 cm (1.8cm larger than the height of an average glasses case to provide room for the fluid compartment and mechanics)

Volume Calculations

- Volume formula for a rectangular prism (L x W x H)
- Outer Volume: 15cm x 6cm x 5.8cm = 522cm^3
- Inner Volume: (15-0.10)cm x (6-0.10)cm x (5.8-0.10)cm = 501.087cm^3
- Total volume of material needed: (522-501.087) = 20.913cm^3

Weight Calculations

- Weight of solution (max filled)
  - 75% rubbing alcohol
    - (0.75)(94.5mL)(1cm^3/1mL)(0.78509 g/cm^3) = 55.643 g
  - 25% water
    - (0.25)(94.5mL)(1cm^3/1mL)(1g/cm^3) = 23.625 g
  - 2 drops soap
    - (0.1mL)(1cm^3/1mL)(0.801g/cm^3) = 0.0801 g
- Total weight of solution = 79.3481 g

Fluid Compartment

- The compartment that will hold the cleaning solution will be a 8.80 x 6 x 1.8 cm plastic casing capable of holding 95 mL.
- Plastic will keep the cleaning solution from leaking into the glasses compartment of the case.
- We expect that the 95mL of solution will last the user over a month and a half.

Calculations

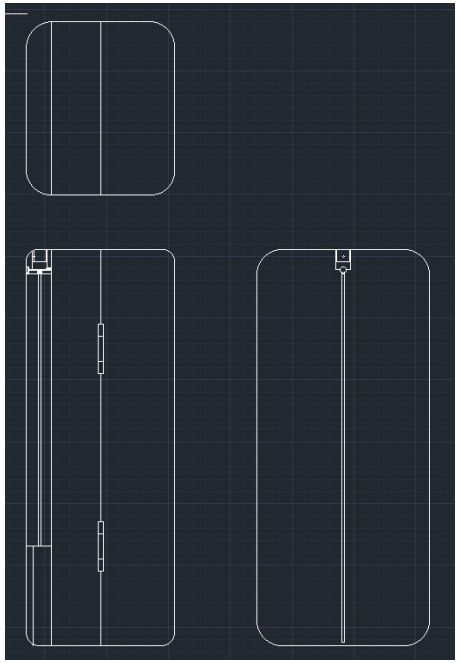
We estimated that a person would on average clean their glasses 5 times per day, at an average of 6 sprays per clean, where the average spray nozzle of our caliber dispenses 1mL per 12-15 sprays.

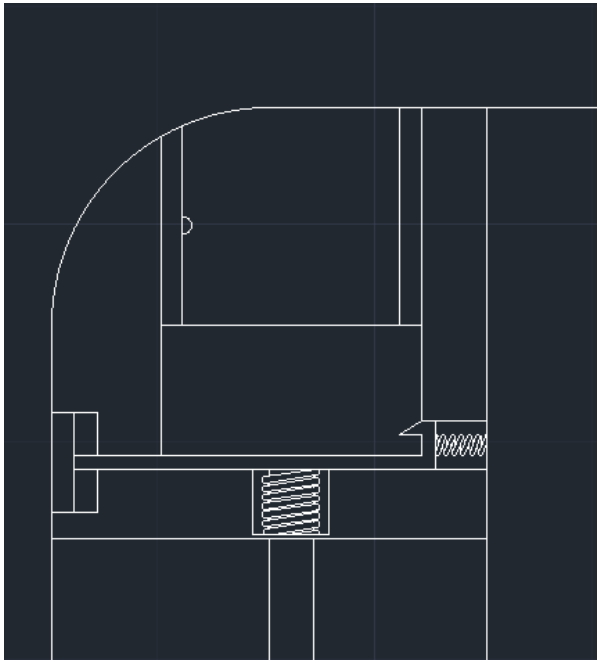
- 5 cleans per day x 6 sprays per clean = 30 sprays per day
- 1 mL x 2 = 2 mL per day
- 94.5 mL/ 2 mL per day = 47.25 days

Final Design

- Designed to carry 95mL of liquid (maximum)
  - Able to take with you on airplane
- Contains:
  - Two metal hinges to allow the case to open and close properly
  - Compartment to hold cleaning solution
  - Compartment to hold mircofibre cloth
  - Push-pin nozzle
  - Various other mechanical components

Design Drawings





Materials for the Casing

- We are looking into 3D printing our design, in order to produce a working prototype
- Materials needed to construct the exterior of the case:
- Carbon fibre as the exterior material to minimize the mass and keep the case strong and sleek.
- A protective layer of foam material to sit between the exterior and interior of the case to absorb the force if the case is dropped.
- Thick microfiber velvet material to line the inside of the case. This material is similar to that used in other cases and will act to protect the lenses from scratches.

Carbon Fiber Option

- Density of carbon fiber: 2.00g/cm^3
- Total weight of material needed: 2.00g/cm^3 x 20.913cm^3 = 41.826g
- Cost of carbon fiber is about $182/kg Canadian
- ($182)(0.041826kg) = $7.61

Cost of Materials

- Carbon Fiber - $182/Kg
  - $ 7.61 per unit
- Spray nozzle - $25/50 nozzle
  - $0.50 per unit
- Microfibre Velvet lining - $3.80/m
  - $0.08 per unit
- Metal Hinges - $0.20/hinge
  - $0.40 per unit
- Foam - $34/bundle (1 bundle = 0.15m x 380m)
  - $0.04 per unit
- TOTAL COST PER UNIT: $8.63

Total Weight

- Weight of solution (max filled) + weight of case
  - 41.826g + 79.3481g = 121.1741g

Projected Timeline

March 3rd - 10th	March 10th - 17th	March 17th - 24th	March 24th - 31st
Establish how we will build prototype	**Build the prototype**	**Evaluations**	**Final Report**
- Meet with Paul - Prepare for 3D printing - Gather necessary materials	- Complete 3D printing of each part - Assemble the pieces	- Perform total cost evaluation - Complete performance evaluation of the case	- Finish final report - Prepare for final presentation