Don’t Forget the Soap

ME170 Term Project
A Reinvented Shampoo Optimizer
Group #104
Valentino Wilson, Ji Hun Yu, Nicholas Wood

Product Description

Our product was designed to solve the common household issue of making use of the remainder of soap at the bottom of a shampoo bottle. Many times we all have this same issue for toothpaste so for our project we wanted to take this idea in mind and apply it to the shampoo bottle. The product was designed so that the consumer can empty the shampoo bottle into our dispenser and of course make full usage of the entire quantity of soap. Our product was designed to be used by all ages and in that manner is why we automated the system by having a circuit board and batteries in the bottom along with a motorized water wheel inside in order to dispense the perfect amount of shampoo per press of button. We decided that in order to make sure all of the shampoo is used that we make all internal surfaces of the dispensers be pitched like a toilet bowl toward the center and into a tunnel system that dispensed the shampoo. We decided to combine the waterwheel idea and the toilet bowl theme in order to effectively create this product. This combination not only makes this product easy to use but also accomplishes the task of using all the soap available. Also, by motorizing the wheel inside the dispenser, we are able to make sure the dispenser dispenses equal amounts of soap each time.

Ideation Process Narrative

We began our ideation process by firstly comparing our initial ideation sketches that we had to complete for the lecture class. From that point, we had to determine which idea we were going to go for, however, in our case, instead of choosing an entire ideation project to go with, we dissected Valentino’s initial ideation sketch and pulled one part from his idea. That idea was the soap dispenser on top of his idea of the shower ‘Caddy 2.0’. From that point, each of us created alternative ideation sketches modeling the shampoo dispenser in our own ways. In this way, we were then able to compare each of our ideation alternative sketches and then decide which route we wanted to go with. When doing this, we decided to go with Nick’s alternative sketch because of his simplistic design and overall effective nature of his idea. However, in the end, we went with adapting the product by adding pieces of all of our product design sketches into one. Overall, after using the Pugh Matrix, we were able to determine what pieces from which sketches we could include into the overall design, and in the end, we did exactly that. It turned out not how we expected but better in that manner.

Product Design Specification

1. Performance

The product must be durable enough to withstand water coverage for minimum of 5 years. The inner design should be delicate in order to avoid shampoo leakage. The outer design should be simple for any age group to use without difficulties.

2. Environment

The product should be durable to withstand light humidity, temperature difference, and corrosions from water.

3. Service Life

The expected service life for the product will be approximately 5 years. Key consideration will be the regular use of the product every day, and its durability to corrosions. The quality of the design should be able to last long due to its simple design.

4. Maintenance

This product will be fairly high maintenance; the design of the product is simple and thus easy to obtain its component parts.

5. Target costs

The target cost for the product will be between $20 and $40. Key considerations are the existing cost of shampoo dispensers, and the low complexity of product design.

6. Competition

The main competitors of the product are shampoo dispensers. This product will be concentrating on the solid and simple design of the product, and will be using quality material to last longer.

7. Shipping

This product is likely to be transported in high quantities considering its simple design and small size/mass.

8. Product Volume

The production method for this product will be aided through CAD design. Considering the product's simplistic design, the product quantity will be high.

9. Packing

Packing should be carefully considered due to lightness of the product; the product can easily be damaged. Bubble wrap packaging will be ideal.

10. Manufacturing Facility

Make-in policy; no need for off-the-shelf products

11. Size

Maximum size of the product should be no larger than 10 inches tall, 5 inches wide, and 5 inches long. The minimum should be 8 inches tall, 3 inches wide, and 3 inches long. Optimally the dimensions will be 9 inches tall, 4 inches wide, and 4 inches long.

12. Weight
Weight should be approximately 35 grams. However, the lightest possible weight will be the goal.

13. Aesthetics and Finish
The product should be a solid color throughout. It will be a simple rectangular prism. Different colors could be offered since it will all be inexpensive plastic.

14. Materials
LDPE plastic will work throughout the product.

15. Product Life Span
In a shower due to prolonged water exposure the product will be at risk for mold growth, but no wear and tear from usage. Life span will be expected to be one to two years.

16. Standards, Specifications, and Legal Aspects
The product should not have any legal specifications.

17. Ergonomics
There should not be much labor required to make the product, almost 100% plastic molding. The only concern will be in packaging the product.

18. Customer
Major concerns for the customer will be the size of the product and how well it will fit in the shower and ease of loading the product with shampoo.

19. Quality and Reliability
Due to a very basic design quality and reliability are expected to be very high.

20. Shelf Life
On the average retail shelf the product should have basically unlimited shelf life.

21. Processes
No special processes should need to be used. Since our product is light weight, it will have to be made of plastic; therefore, the only process really needed for the production is injection molding or equivalent processes.

22. Timescales
The time scaling for our product and project is already broken down into a weekly basis for us through our class. In a real life situation, the time scaling would be very different as more time would be placed into the research and design stage than what we have put into it and will.

23. Testing
The testing for our product must stress the durability aspect mainly and then from there will tell us the ratio of durability to lightweight that we can achieve through our production. If we go too lightweight, then we will compromise the durability factor so our testing will be important to fully understand our limits.

24. Safety

Since our target consumer age engulfs all ages, we must make sure that our product is friendly to all ages. We must take into account the usage of smaller pieces and the probability of them breaking off which brings us back to the durability side of our product. We must also be sure that our product can indeed be used by each age in terms of ease of usage as well.

25. Company Constraints

Our only constraint through our company is the constraint created by our team and that was that the product should not be complicated and must in turn be as simple as possible. Simplicity is key to our products success.

26. Market Constraints

Our market constrains us in really no way. We need to use the cheapest cost material available but in the light of patriotism, we want to aim to keep all production USA made.

27. Patents, Literature, and Product Data

There are no known patents that would clash with our product design. We will have to do more research in that area to ensure our protection.

28. Political and Social Implications

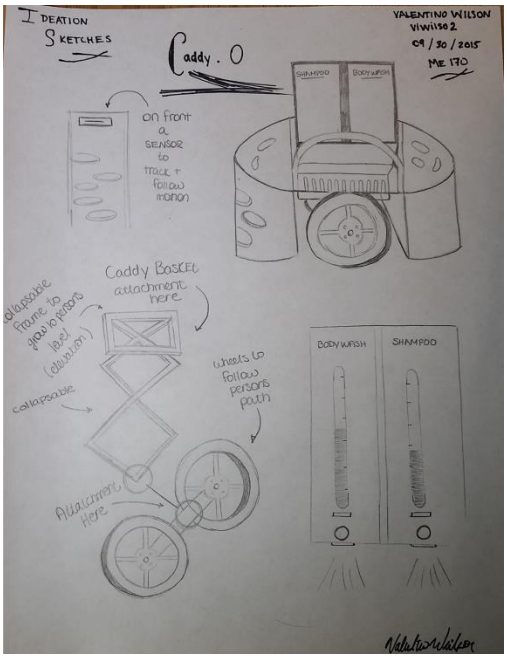
In terms of the structure of the markets where our product will be made, the US economy will be benefitted due to in country production creating jobs and increasing GDP amongst our consumers. We don't see how our product will affect any type of political power, however.

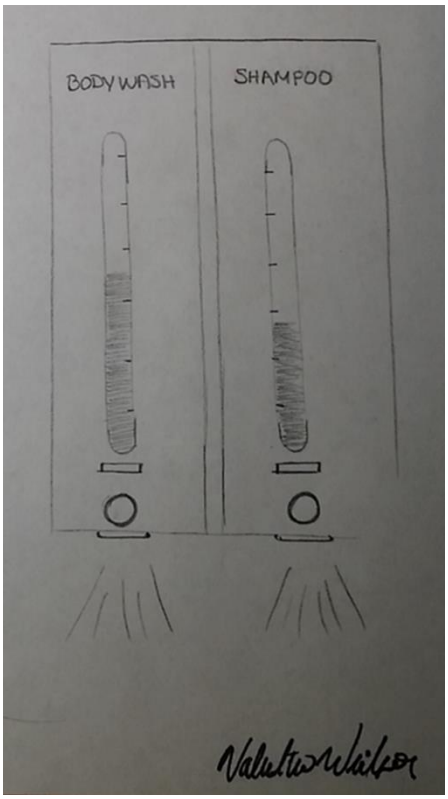
29. Disposal

Since our product will ideally be made of a lightweight plastic material, in terms of disposal, recycling would be the best bet. However, we are designing our product to last therefore trying to prevent the need to be disposed of at all

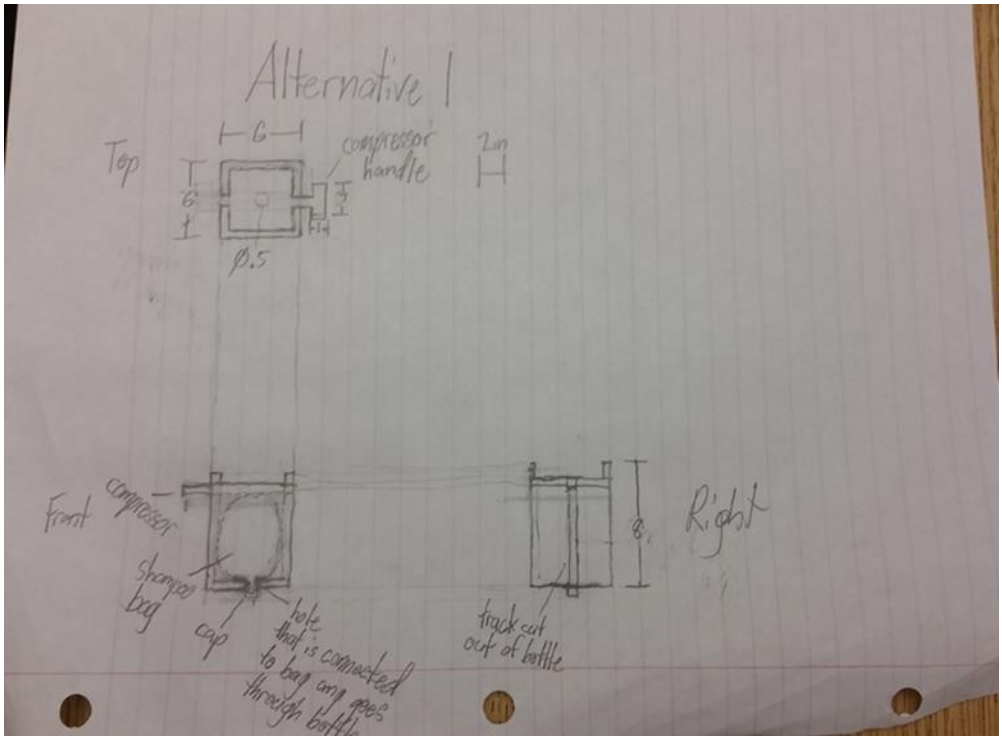
Concept Sketches

Initial Concept Sketch:





Alternative Sketch #1:



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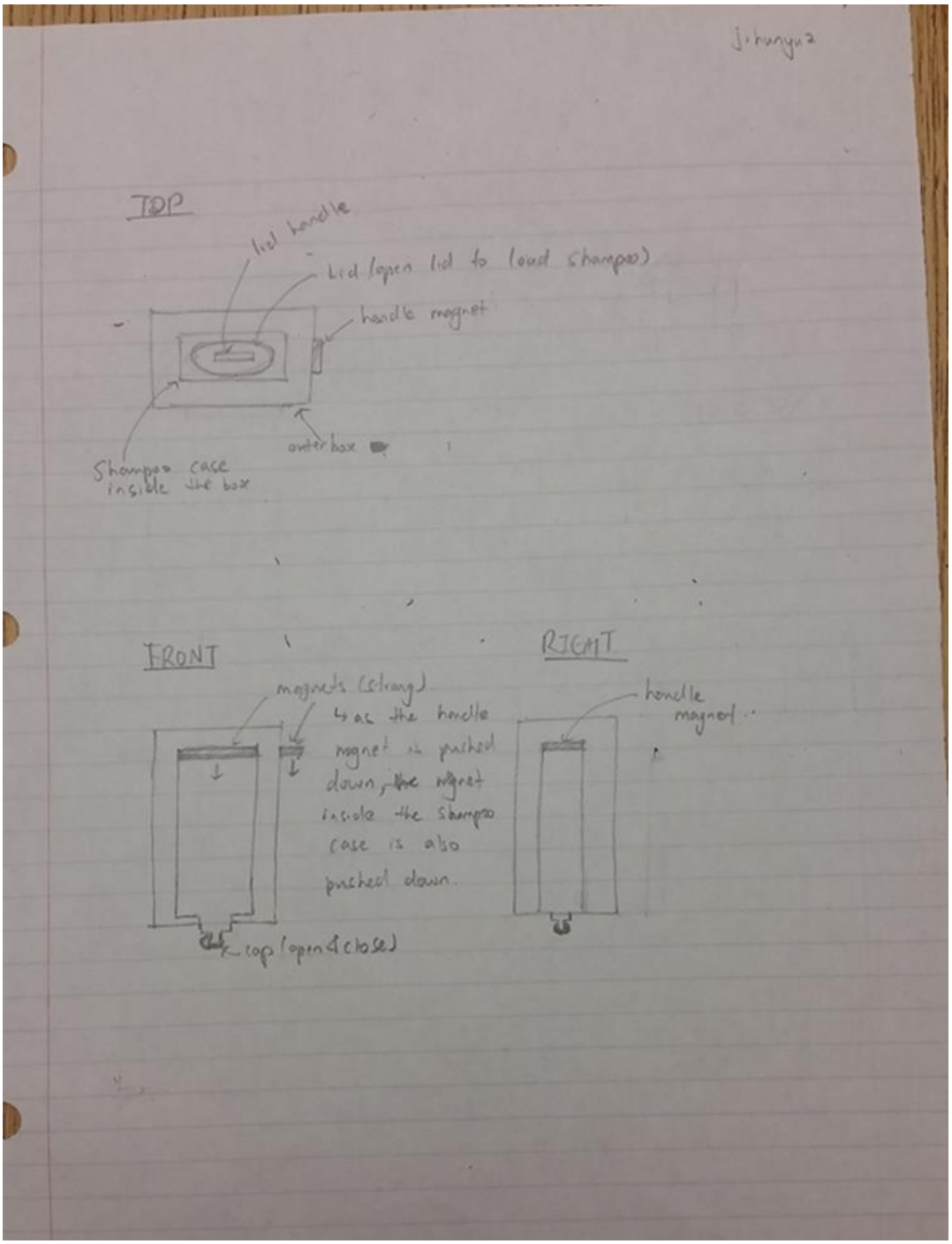
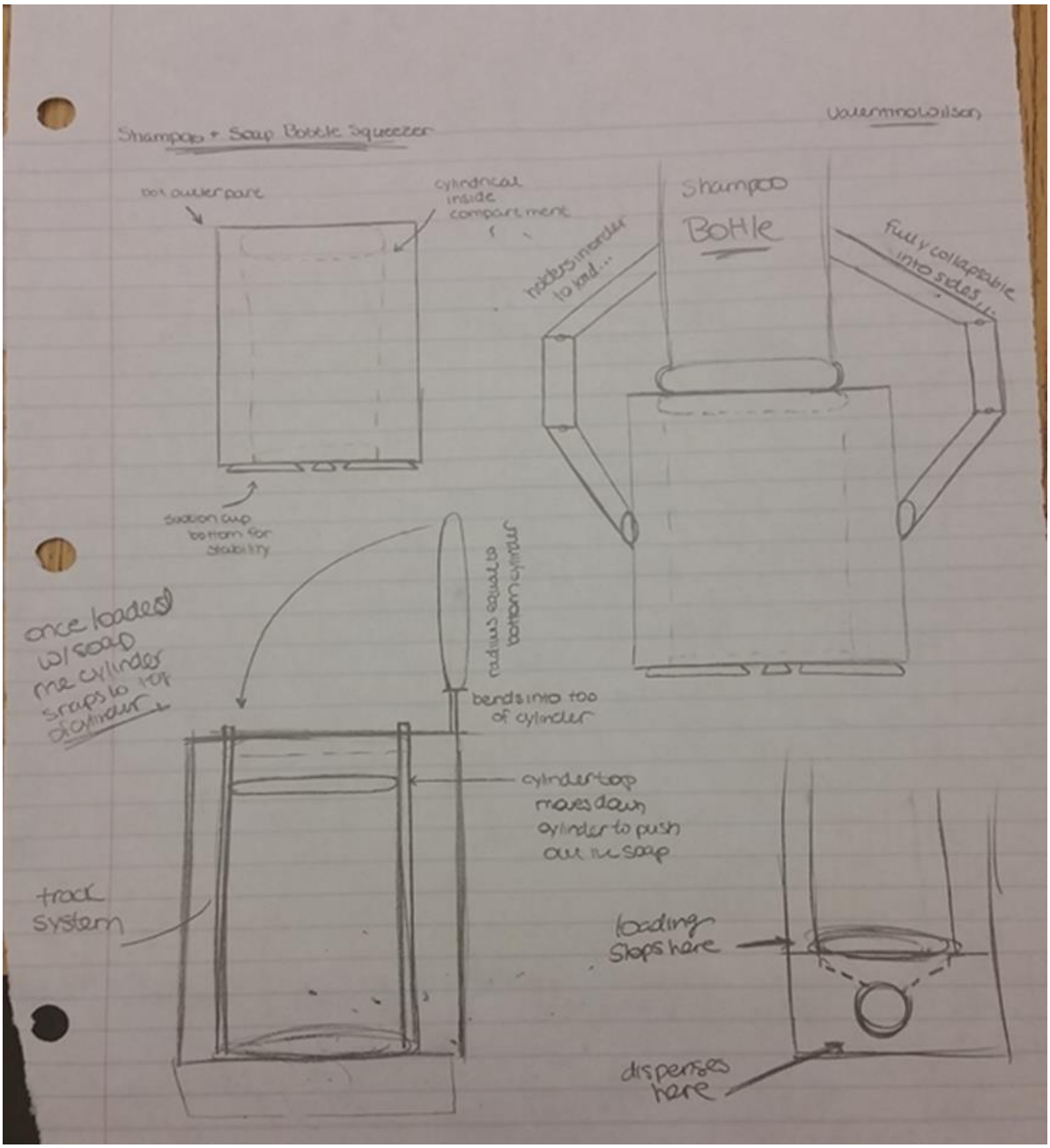


Alternative Sketch #3:

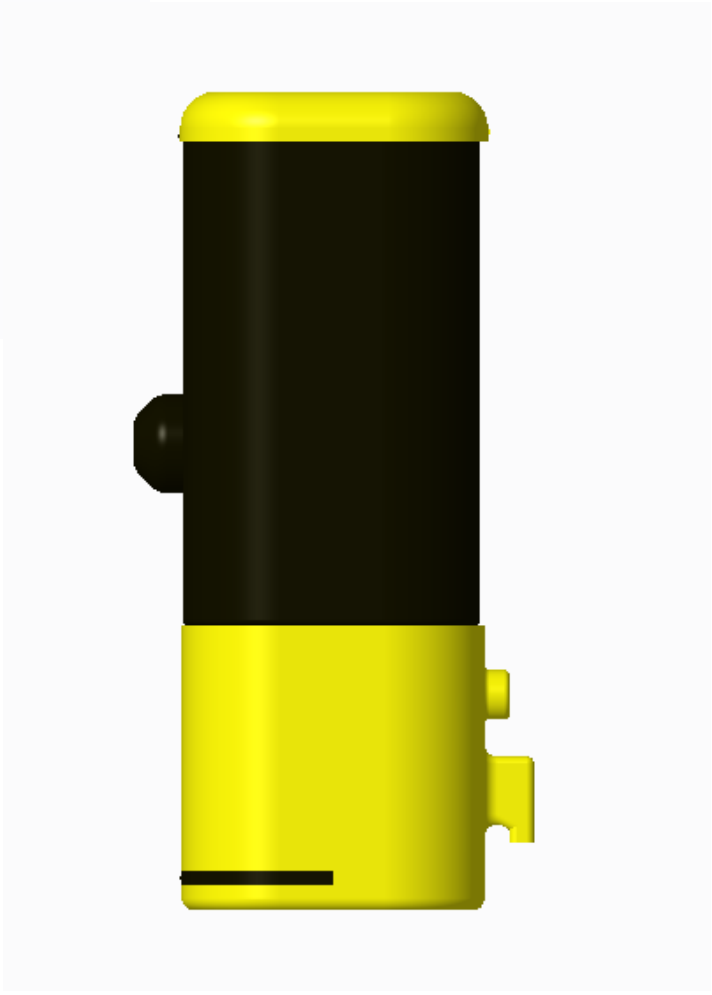


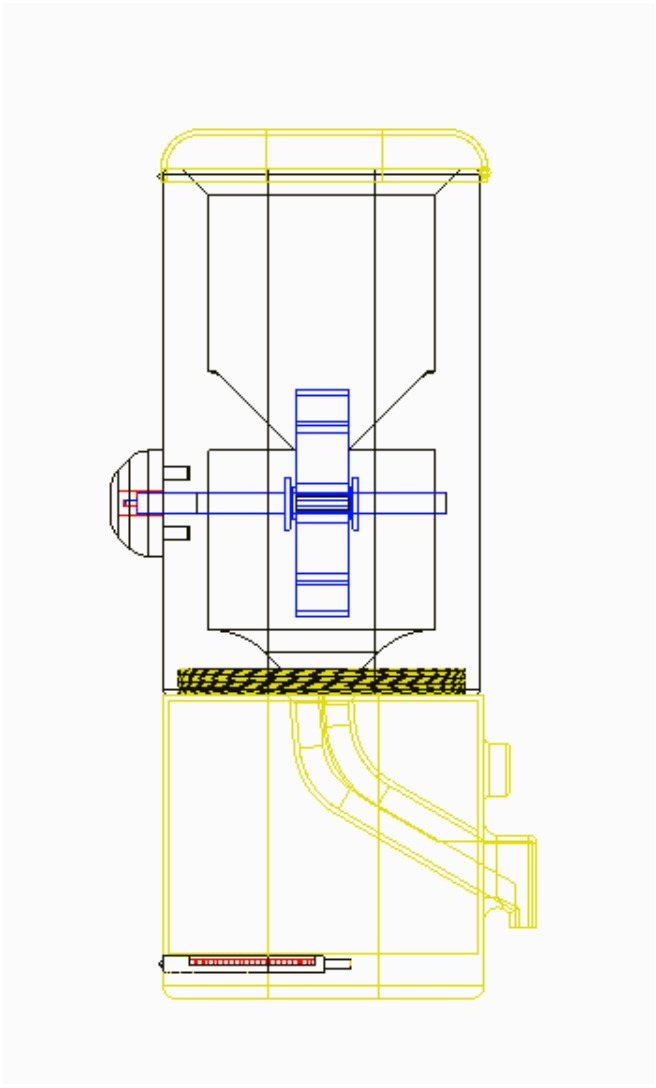
PUGH Convergence Chart

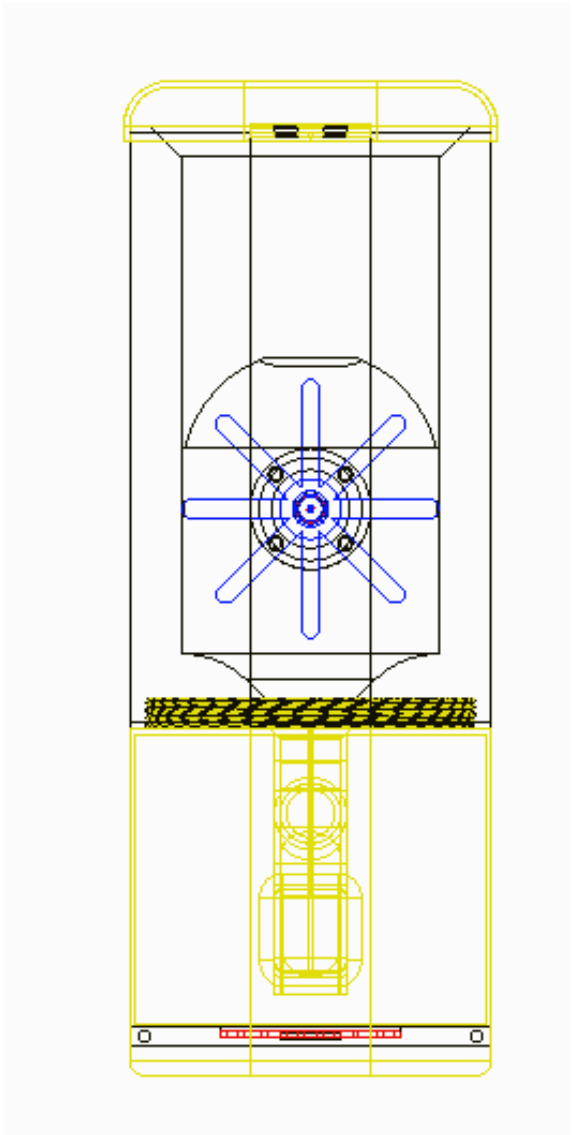
ME170 - Group 104						
Lab Section AB1						
Idea: Shampoo Optimizer						
Nick Wood, Ji Hun Yu, Valentino Wilson						
Pugh Convergence Chart						
		Original	**NW**	**JHY**	**VW**	
	Criteria/ Concept	**DATUM**	**ALT #1**	**ALT #2**	**ALT #3**	
	Less Weight		+	-	-	
	Compatible Size		S	S	S	
	Durability		S	+	S	
	Resistance to Water		S	S	S	
	Simplistic Design		S	S	-	
	Ease of Usage		+	-	-	
	Ability for all Age Use		S	S	S	
	Material Cost Effectiveness		+	-	-	
	TOTAL		**3+**	**2-**	**4-**	

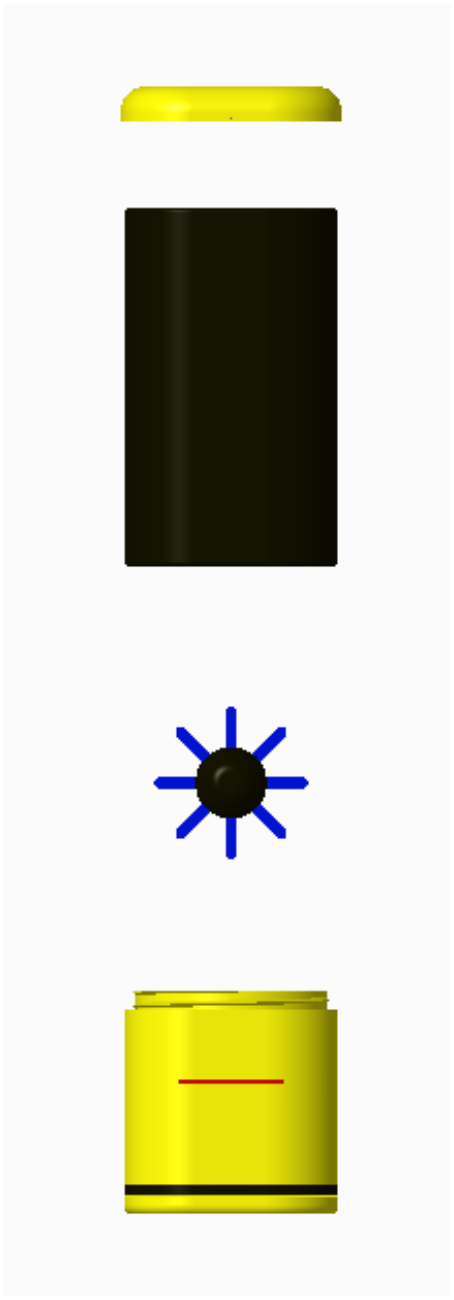
Based on our Pugh's Convergence Matrix that we had put each of the ideas through, the overall best alternative idea that we are deciding to base our project on is Alternative #1. Even though it lacked some of the extra design, we decided that it would be the best candidate based off its simplistic design, ease of usage and compatible size and weight. Through this team effort, we will be taking this design alternative to the next stage. However, as time progresses and we feel necessary, we will adapt the design with extra modifications from the other two design alternative sketches.

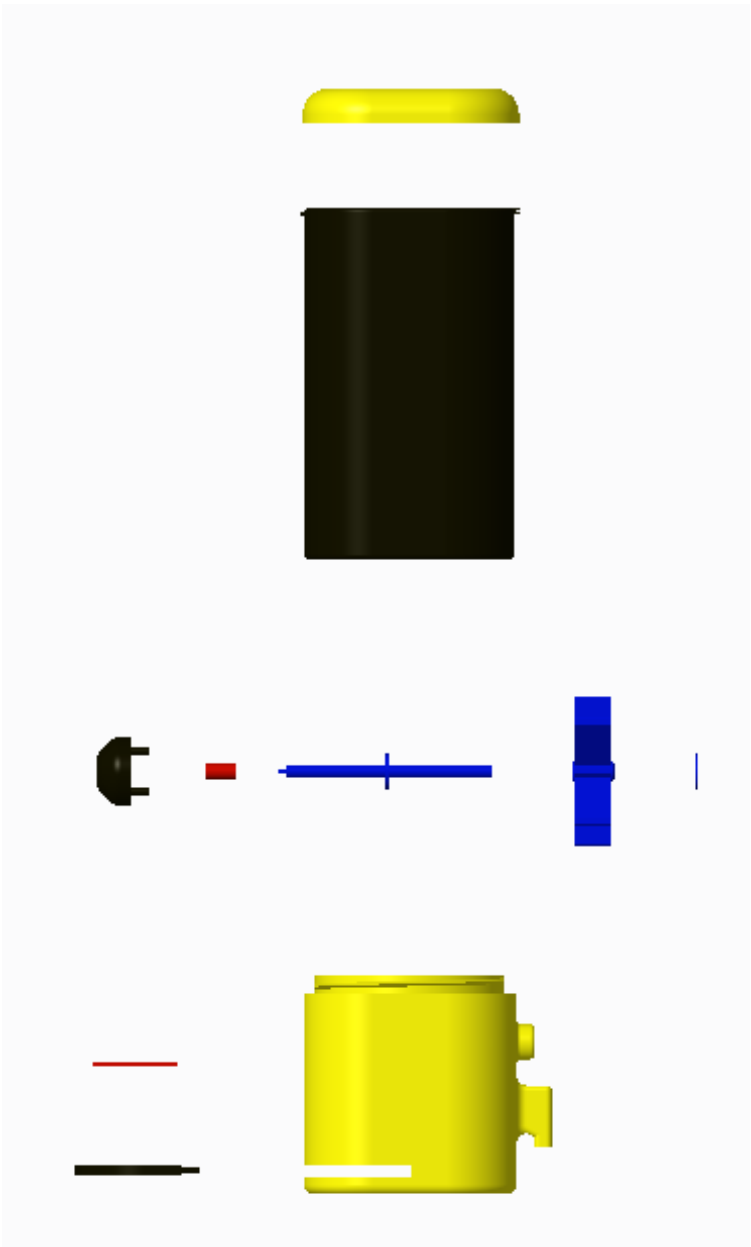
Assembly Model

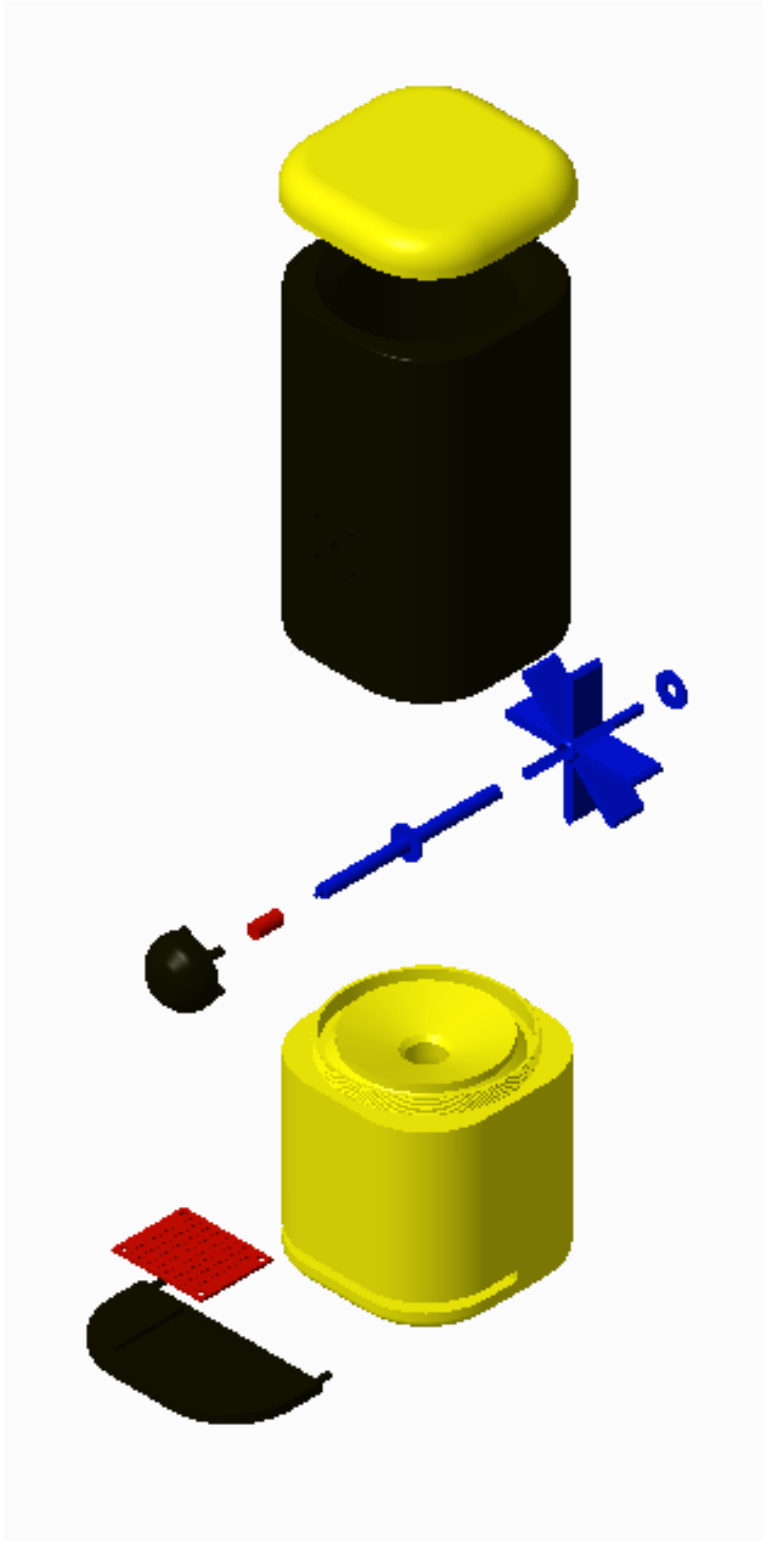








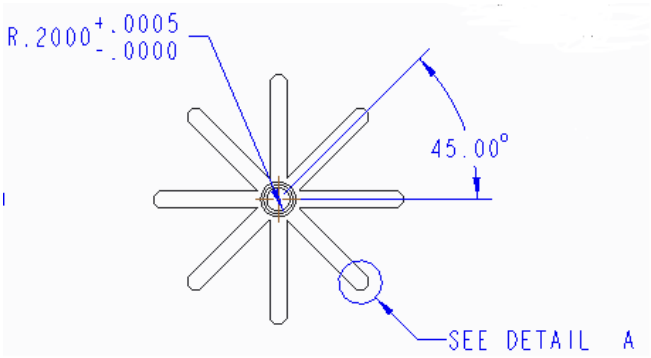




Tolerance Report

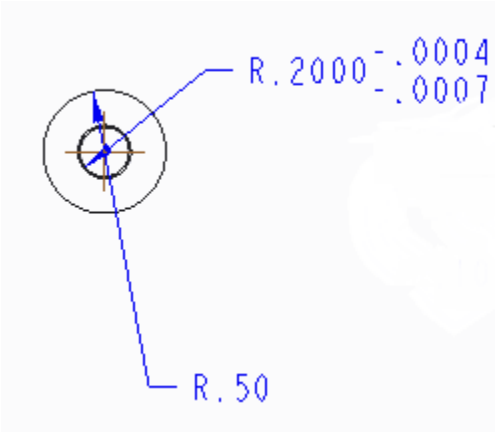
Wheel and Shaft Tolerance

The radius of the hole is .20in and we plan on using a precision running fit so that wheel can be slid onto the shaft. The hole falls under the H7 category with an upper limit of +.005 and a lower limit of 0. The shaft is in the f6 category with an upper limit of -.004 and lower limit of -.007. The worst case clearance will be .004in and the max allowance will be .012in.



Wheel with hole

Shaft



Materials and Manufacturability

Part	Material	Manufacturing Method	Quantity	Off the Shelf?	Product Info
Bottom	HDPE	Injection Molding	1	Manufacture	none
Middle Attachment	HDPE	Injection Molding	1	Manufacture	none
Lid Attachment	HDPE	Injection Molding	1	Manufacture	none
Inner Wheel	HDPE	Injection Molding	1	Manufacture	none
Circuitboard Holder	HDPE	Injection Molding	1	Manufacture	none
Internal Bracket	HDPE	Rapid Prototyping	1	Manufacture	none
Circuitboard	Copper Sheet	Lamination	1	Off the Shelf	Electronic Goldmine (G19389)
Battery	Alkaline Battery		2	Off the Shelf	Energizer (319 Battery)
Motor	DPDE	Injection Molding	1	Off the Shelf	Vex Robotics (EDR 393)
Motor Rotator	HDPE	Rapid Prototyping	1	Manufacture	none
Inner Washer	HDPE	Rapid Prototyping	1	Manufacture	none