Aiding Disabled Coffee Drinkers

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3 March 2016

Abstract

Coffee, behind only soda and water, is the third most widely consumed beverage in America. Due to its high caffeine concentration and addictive tendencies, coffee has become the fuel for much of the american workforce. However, over 60,000 disabled Americans suffer from partial hand amputations, and for this reason, even the simple task of drinking coffee becomes a daily struggle. Addressing this specific market, we decided to design from the ground up a modular coffee cup that can accommodate amputees with up to 4 fingers missing on one hand. Our product will be in high demand from those who otherwise would not be able to enjoy a cup of coffee in a timely or neat manner.

Key Words: Coffee mug, amputees, design process, aid, modular.

1. Introduction

Our coffee mug was designed so that persons with only one finger would be able to use it effectively. A lot of Americans suffer from partial hand amputations and they struggle with simple tasks in their everyday lives. 54% [1] of Americans over the age of 18 drink coffee. As you can see, this drink is very popular and we wanted to allow those with only one finger to be able to do this task effortlessly and not have to worry about their disability getting in the way. This is why we decided to pursue a coffee mug that would make drinking coffee much easier and safer for those with one finger. The solution that we came up with had to be usable for those with any one of their fingers as well as those with only their left or right hand. Our end goal was to make drinking coffee an easy and normal task for those with only one finger.

2. Literature Review

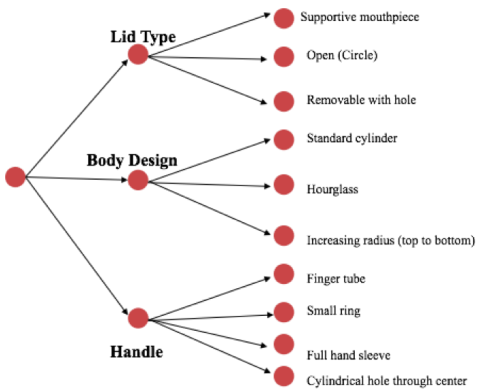
On the market, there are mugs on the market for those with disabilities. We researched these mugs and used one of these for inspiration for our own design. This mug is called the Easy Grip-In mug and it is designed to help those with arthritis [2]. It does this through having an easy grip slot for the individual to slip their hand through. This causes less stress on their fingers. Once their hand is in the mug, their user can effectively lift the cup and drink from it. We wanted to incorporate this hand slot in our own coffee mug/ Where the palm of the individual will be places inside the hand slot. and we would create another feature that would increase stability for those with only one finger.

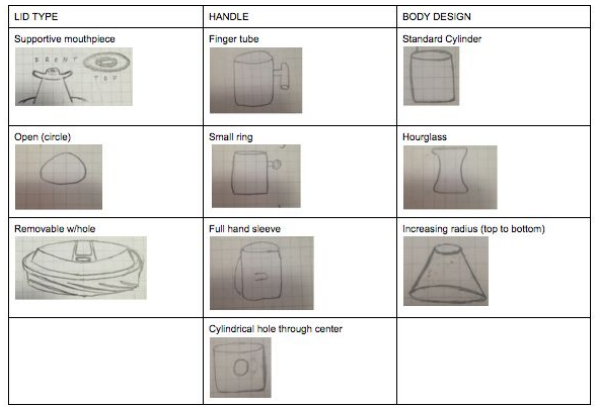
3. Design Process

Before finalizing the design of our mug, we went through a series of steps to determine the best design possible. We started the process by coming up with a mission statement, where we determined what our key business goals were, characteristics we wanted our mug to possess, and also thought about whom our stakeholders were. Once these things were thought through, we then thought about what our most important needs were. We made five main categories that we felt were important, and then came up with a total of 18 sub- categories that fit underneath the main customer needs. This was all organized in a chart, where we then assigned values to each customer need in order to compare the importance of each need to each other. The initial five customer needs that we compared to each other were user friendly, portable, durable, safe, and cost. From the values assigned, we determined that User Friendly and Safe were the most important customer needs. We also used this same process for the set of sub-categories, and determined the five most important mug features from those. We chose easy to drink, easy to fill, heat resistant, does not spill, and easy to pick up as the features we wanted to design our mug around. It made sense that the five chosen were all subcategories underneath User Friendly and Safe, since we assigned those main needs as the most important.

Next, we brainstormed different lid types, body designs, and handle designs that we pictured as a possibility for our mug. We organized the different features in a concept tree and drew out the different features in a

concept chart. When paired together in every way possible, we had a total of 36 design options for our mug. Once again, we compared each option to each other by assigning values in a decision matrix , and determined which option was the most suitable.





After talking about ideas for so long, we finally saw our design come to life when we made a clay, and solidworks model of our intended design. This really helped us evaluate if our design fit the necessary criteria. Even though we felt confident with our design, testing our prototype made us realize we would need to add some adjustments to improve our mug.

4. Design Result

After considering many options and following a series of decision making steps, we came to a conclusion. Our final design consisted of a mug with an hourglass shape, and open lid, a hand sleeve that fits the palm, and an adjustable ring piece that can easily support whichever finger necessary. The hand sleeve is made to act as the main support for the hand. It arches from the top of the mug to the bottom, so that someone can fit their full palm through it. The hourglass shape complements this type of handle, because it allows more room for the hand to comfortably fit through. Also, the ring piece adds support for the finger to wrap around the mug. We designed the mug so that the ring piece can click into different spots so that it can be accessible for both right and left handers, and also for whichever finger the person has. We decided on a stainless steel mug with rubber insulation. We feel that this design is very effective and could be very useful for disabled people.

5. Conclusion and Summary

As we are engineers, we tried using our basic engineering knowledge to help us to provide the full capability coffee mug for people who suffer from disability of one finger. Firstly, by using the product Design process, we managed out to create and develop every step of developing this new product. Secondly, we used Analytical Hierarchy Process(AHP) which gave us all the knowledge needed to develop the mug so it can satisfy most of the needs of the consumer. Thirdly, by using the Concept Classification Tree and by using combination Table, we drew 36 graphs which we were able to choose from these designs the most suitable mug and the one which contains the most helpful features, so it can satisfy the consumers needs. Finally, we used Solidworks software to create this concept into real life and we used clay to try making a rough prototype of the mug. We are satisfied with our results and we are still developing the mug to make it satisfy all the consumers needs.

6. Reference

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