Foldilocks

EDSGN 100 - Introduction to Engineering Design

Team #1

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<u>Abstract</u> (ECR5135)

Our mission was to create and easy-to-use, foldable cart for people to use for carrying groceries and such over long distances. This resulted in our product, Foldilocks. After much deliberation and attention to detail, we created a product that we know will satisfy the consumer, despite being a little more expensive than was originally planned.

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1 - Introduction

Based upon a customer needs assessment, it became clear that there was a market for foldable shopping carts that people could easily use and store. It was also necessary for the cart to have a high carrying capacity and have a reasonable price for an average consumer.

During seven weeks of entertaining different design ideas, we finally made a prototype that we were happy with and met our high standards for ease of use, price, and durability for the consumer.

2 - Description of Design Task

The aim of this design project was to design and build a prototype of a foldable shopping cart for people who may not have cars or for people who need an effective way to carry groceries for a longer than average distance.

The mission of Team #1 was to produce a prototype that is easy to use for the average consumer and durable along with having good folding features for easy storage of the product - all at a reasonable price.

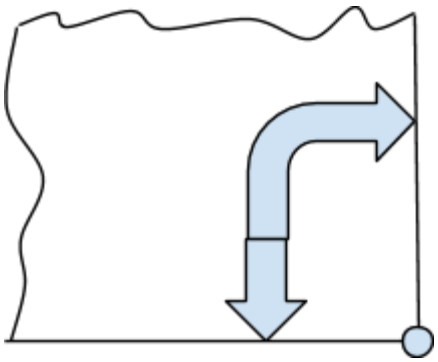
One of the main design specifications aimed to make the shopping cart easy to use for the consumer. The shopping cart needed to be ideal for moving your groceries wherever they needed to go and have a carrying capacity of at least 100 lbs. Another important design specification was to keep the material cost for the shopping cart below $50 unless it was absolutely necessary to exceed that. Also, of course, the main feature of the shopping cart design was the fact that it had to be foldable and could become more compact when needed.

3 - <u>Design Approach</u>

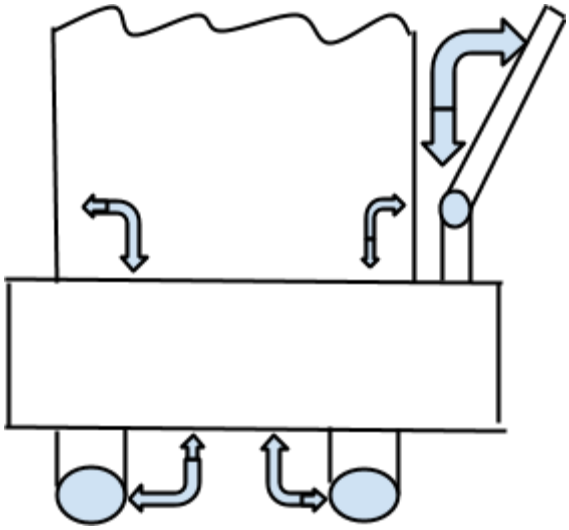
Customer needs assessment: We determined that customers valued compactness and ease of use, but also wanted lots of space for groceries and long term durability. We went off of the assumption that the users of our product did not have a car and thus would not need this to fit under a car seat (although, the product could be scaled down to meet this requirement). With this in mind, our design shifted towards a product that could encompass a large volume, but still be made small enough to store under a bed or in a small closet.

Concept generalization:

Our first concept was of a briefcase like device that would open up. Fabric would fold out to form three of the four sides, the fourth being made up by one half the "briefcase". The other half of the briefcase would form the "floor" of the shopping cart.



Our second concept was of a cube that had fabric sides supported by metal poles at the four corners. These poles would fold down into the base for easy storage. Wheels would be attached to the bottom and would fold up into the base. A handle would be attached to one side, which too would also fold down to be parallel with the base. When folded, the cart would take up not much more space than that taken up by the base.

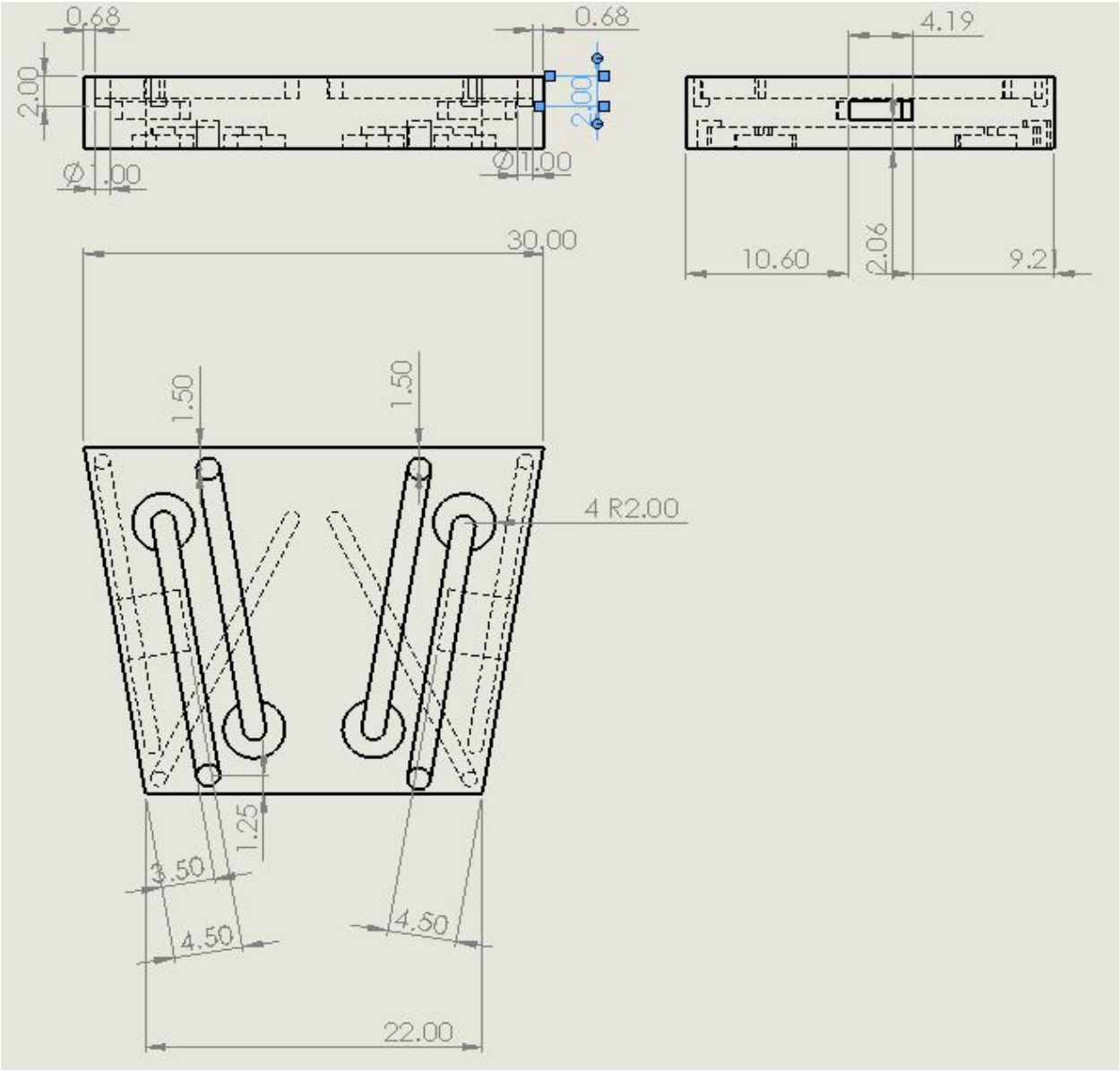


Our third concept revolved around a stroller like device that would fold out to encompass a volume in which you could place groceries. A separate "floor" plate reinforce the bottom of the fabric would need to be included as provide a flat surface to place objects on. This adds an extra piece that the customer must keep track of, thus reducing its ease of use.

Concept	Weight	A (brief-case)	B (folding fox)	C (stroller)
space	40%	-	+	0
foldability	20	+	+	0
durability	20	+	0	0
Ease of use	20	+	+	0
total +		.6	.8	0
total -		.4	0	0
total score		.2	.8	0

4 - <u>Final Design and Prototype</u>

With the selected concept we proceed. Taking cues from "normal" shopping carts, we changed our base from a square design to a trapezoidal design, with the narrower end towards the front. This change makes the cart easier to control and manage. We added slots along the two sloping sides to act as hand holds to facilitate carrying the cart in situations where the regular handle may not be optimal.



5 - <u>Engineering Analysis</u>

Making the base out of solid ABS or HDPE (High Density Polyethylene) would be cost prohibitive and make for a much heavier product than necessary. To cut down on weight and costs, the base will be made out of cut HDPE sheets that are ¼" thick. The poles that will fold up and down to form the basket do not need to be made extremely durable because they are not weight bearing, thus ABS plastic will do. The poles attached to the wheels, since they are weight bearing, should be made of metal. Aluminum is an optimal choice because it is light and cheap. The wheels, to cut down on costs, will be pre-made casters that can be welded to the aluminum tubes.

Costs

"Basket Tubes" - Easy to machine, Impact resistant ABS- .76 per foot ($5.00)

"Top/ bottom trapezoids and sides" - High Density Polyethylene sheeting- $25 per sheet ($50)

"Wheel Tubes" - Hollow aluminum tubing- $2.29 per foot ($16.03)

"Wheels" - swivel caster - $3.50 per caster ($14)

Total: $85.03

When the consumer receives their Foldilocks product, the model will be in its folded state. In the folded state of the product, the cart posts, handle, and wheels are folded into grooves on the body of the cart. All that is needed for the consumer to do is to put those appendages into their ready positions by pulling them away from the body of the cart. From there, they should lock into their respective positions and then the cart should be ready for use.

One useful feature of the Foldilocks product is the addition of handles on both sides of the cart. With these handles, the user of the product does not need to fold out the wheels of their cart if they do not want to. The cart can hold their groceries without the wheels being extended which makes it much easier to take the cart onto public transportation. The handles of the cart can also be used if the wheels are extended. We placed the cart's body at an easy height for average people to reach for whenever they wish to pick up their cart for climbing up stairs or whatever reason.

Once the consumer is done with using the product, all they have to do is fold down the appendages of the product into their initial folded states. This allows easy storage in a variety of places, especially in the tight trunks of cars and in home closets - almost anywhere!

6 - Summary and Conclusions

After weeks of design, Foldilocks is a product that we are very happy with. It met our objectives for ease of use, price, and carrying capacity, etc. Despite our happiness with our final prototype, things can always be done a bit differently.

One drawback to ours, the height of our cart could possibly be lowered. This would lower the material cost for our product which, over a large scale, could definitely make a large difference over our long term profit margins.

With the implementation of the grooves into the body of our cart, we wanted to err on the side of caution with regards to how thick it would be. We did not want to compromise the integrity of the cart's structure by placing too many grooves into its body so we made it a bit thick. Durability and a very high carrying capacity were two very paramount design features for us to have, hence the want for us to make the product a bit thicker. We probably could have gone with a little bit of a thinner body for our cart which again would have allowed for us to earn bigger profits or potentially even lower the retail cost of our product. A thinner body for the cart would also make it even easier to store. It would also make the product lighter for the user to carry.

Despite some potential minor design variations, Foldilocks is an awesome product that users will find easy to use, cheap, and durable. It can be used in a variety of different scenarios and can be useful for a wide array of different people - from college students to senior citizens. Everyone will enjoy their Foldilocks.

7 - References

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