A Design for Disabilities

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Introduction

- Our project is to mainly focus on children with disabilities
- Our purpose of this project is to build a device that will help disabled children in many ways
- A device that should be safe, fun, and educated

Figure 1: Children

Project Description

- Our project is designated for Marshall elementary school located in Flagstaff
- Our clients are teacher Eva Herberger, and the physical therapist Krista Branch from Marshall school
- Our stakeholders are the children with disabilities and their families
- This project is sponsored by GORE

Engineering & Customer Requirements

- Our design solutions were generated from the engineering and customer requirements

Table 1: Customer and Engineering requirements

Customer Requirements	Engineering Requirements
1. The device must be safe not to cause any injury	1. All the sharp edges should be rounded with dimensions of 3.375mm.
2. Device must be portable and easy to use	2. The volume of the cart should have dimensions of 1.8 m in width, 0.8 m in base, and 0.8 m height.
3. Device must be made up of a non toxic material	3. The motivation board must have dimensions of 0.28x0.56 m
4. Must be affordable and adjustable in different sizes (Seating belt)	4. Withstand various weather conditions
5. Must not have any sharp edges to minimize injuries	

Design Solution

- The proposed design that the team agreed on is to build a cart
- A cart that’s safe, fun, and with educated features
- We intended to design our own shape for the cart
- The solution to build and manufacture our design is to cast and mold our own shape of the cart

CAD Design Solution

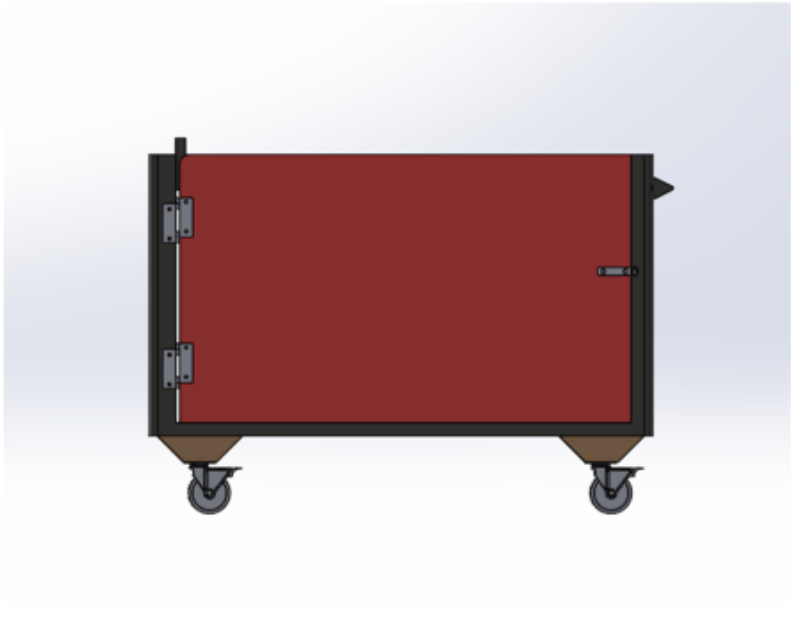

Figure 2 : The cart's door

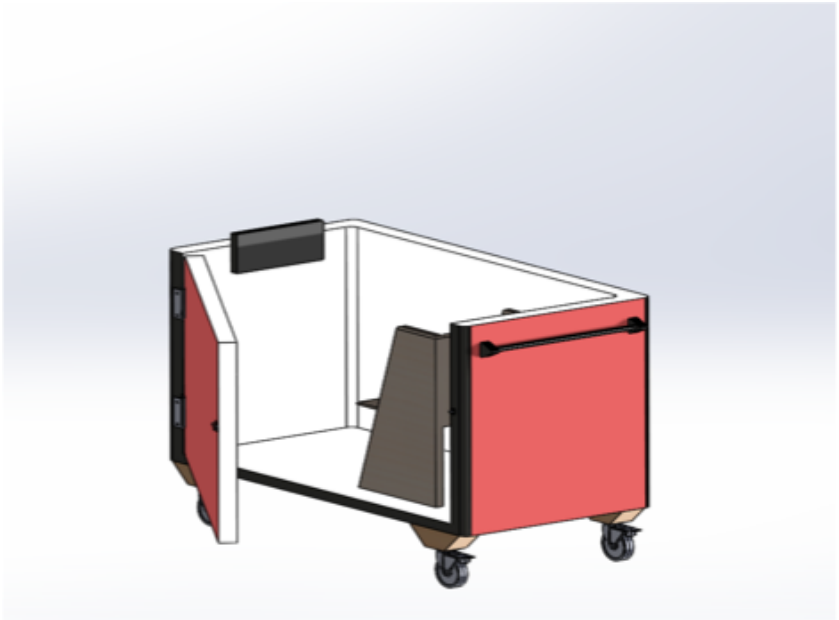

Figure 3: Interior cart's design

Manufacturing

- The manufacturing for the body of the cart was done by casting using fiberglass resin and a mix of polyurethane for some of the parts within the body of the cart

Figure 4: Steel rounded bars

Figure 5: Wooden plug

Body Manufacturing

- After the wooden plug was created, now, it's ready for casting with fiberglass
- What was the procedure? And how did it get finished?

Figure 6: Finished casted body

Figure 7: Painted body

Wheels Manufacturing

- We used caster wheels attached to the bottom of the cart's for the movement
- Four pieces of wood that was attached to the bottom before attaching the caster wheels
- Thereafter, we attached the caster wheels to the wood pieces

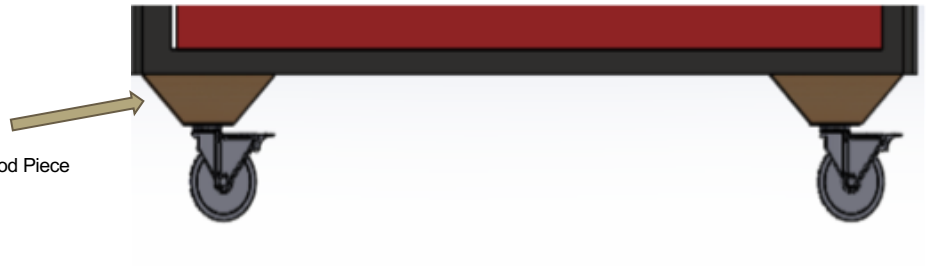

Figure 8: CAD model of the caster wheels

Figure 9: Real part for the caster wheels

Seating Manufacturing

- The seat was manufactured using wood
- The wood was cut into many parts
- Those parts are: the back part, the seating part, and the supports

Figure 10: Final construction of the seat

Testing

- The final testing was done to prove the customer requirements

Table 2: Testing

Part Tested	Test Procedure
Portability	Portability was proved tested by attaching wooden panels to the caster wheels.
Withstand various weather conditions	Heat transfer calculations were made to prove that fiberglass resin would withstand various weather conditions
No sharp edges	Round off sharp edges have been tested using Solidworks
Different sizes	This means the size of the seating belt needs to satisfy all children's waists sizes

Final Construction of the Design

Figure 11: Final construction of the design

Final Construction of the Design

Figure 12: Final construction of the interior design of the cart

Conclusion

- Finally, we would like to thank our Staff, Dr Oman and Jeremy Cook
- We would also like to thank our clients for helping us in many ways

Appendices