Marshall Playground – A Design for Disabilities

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Abstract

This project aims to design a cart for children with disabilities in the Marshall Elementary school located in Flagstaff. Children between the ages of 5 and 8 years. The project will have to meet certain specifications such as safety. Safety is the team's number one priority. Shooting to build a device for children with disabilities, you have to consider safety as your number one

Purpose of the project

Purpose of this project was generated and taken from both the Engineering and Design requirements which are:
1- To help children with disabilities have fun
2- Have fun and get educated with some toys attached to the cart
3- Be safe while using the device

Engineering & Design Requirements

Table 1: ER's and DR's

Design Requirements	Engineering Requirements
1. The cart 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 must have dimensions of 1.54 m in width, 0.76 m in base, and 0.86 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	

Acknowledgments/Sponsors

Clients: Teacher Eva Herberger and the Physical therapist Krista Branch from Marshall School
This project is sponsored by GORE

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The Final Design of the Cart

Figure 1: Final construction of the exterior body of the cart

Figure 2: Final construction of the interior body of the cart

Construction and Manufacturing

Our intended design for the cart was shaped a bit hard that we couldn't find an already costumed body to start working on it by attaching whatever we agreed on. Thus, we decided to mold our cart body by using fiberglass resin and a mix of polyurethane for some parts within the casting procedure.

Figure 3: The cart plug that was made by wood for the casting

Figure 4: Casted Body

Functionality

The cart will move and function by a mechanical human power. As demonstrated in figure 5. By your hand holding the back handle you can move the cart to any direction you want.

Figure 5: Functionality of the cart

Testing

These are some of the parts that we proved testing. Testing was operated upon the customer requirements provided by our clients Eva and Krista.

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

References

[1] P. Family, "Great Toys for Children" available [online],
[2] PBS parents, 'Learning Disabilities' available [online],