Team 13
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Kyle O’Brien
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BEACH WHEELCHAIR & WALKER
Overview

- Introduction
- Cerebral Palsy
- Client Background
- Project Purpose
- Previous Work
- Product Development
- Project Components
- Budget
- Acknowledgements
- Questions
Cerebral Palsy

- Refers to a number of non-curable neurological disorders that appear in infancy or early childhood and permanently affect body movement and muscle coordination but don’t worsen over time.
- Caused by abnormalities in parts of the brain that control muscle movements.
- Effects the body’s movement, balance, and posture.
- Many different treatments: Physical therapy, Botox to relax contracting muscles, drugs to control seizures, and orthotic devices.
Spastic Cerebral Palsy

- Most common type of Cerebral Palsy
- Neuromuscular mobility impairment
  - Stemming from an upper motor neuron lesion in the brain
- Have one or more tight muscle groups which limit movement
- Patients have a hard time holding and letting go of objects
- Difficulty moving from one position to another (stiff, jerky movements)
Beach Wheelchair
The Client

- Jack Davies
- 12 years old
- 72 pounds
- 4’ 4” tall
- Diagnosed with cerebral palsy, also suffers from scoliosis
Project Purpose

- Design a wheelchair capable of safely transporting Jack across sandy terrain
  - Important that there be enough restraints for Jack to be safe but also be comfortable
  - Device must be compatible with tumbleforms chair that parents have
  - Chair must also be able to support feeding tube and accompanying backpack apparatus
  - For maximum comfort, chair should recline at multiple angles
Previous Work

Landeez All Terrain Wheelchair

Ultralight Beach Wheelchair

Natural Access Beach Wheelchair
Product Development
Seat (Tumbleforms Chair)

- Parents are providing a seat that is tailored to Jack’s size and support needs.
- Seat is best suited to provide support for Jack’s scoliosis.
- Removable to allow wheelchair to fold smaller.
- Allows family to replace cushions to adjust to Jack’s figure as he grows.
Wheels

- Wheelez brand
  - Back wheels: 49 cm (19.3 in) PU beach wheels
  - Front wheels: 24 cm (9.4 in) PU beach wheels with caster
Casters

- Built modified casters to attach smaller Polyurethane tires to the front of the wheelchair
Rear Wheel Extensions

- Polyurethane tires significantly raised height of wheelchair
  - Built extensions so rear tires would be at proper height to match front tires
Rear Wheel Axles

- Modified axle to fit with the plate that was used for the original wheel
- Inserted spacers to keep tire from rubbing on the frame
- Attached locking quick release pins on either side of the axle to make it and the rear wheels easily removable
Reclining Mechanism
Reclining Mechanism Adjustability

Adjustable angle by 2 means:

- Locks bar at different angles
- Length adjustable with a locking pin
Reclining Mechanism Foot

- Provides stable connection with ground when wheelchair is reclined
- Swivels to adjust to any angle
Budget

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<tr>
<td>Aluminum Tubes</td>
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<td>Machine Shop</td>
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<td>Fasteners</td>
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<td>Serge and Pete’s Time (12 hours)</td>
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<td>Tires and Axles</td>
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<td>Transport Wheelchair</td>
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<td>Painting from CT Coatings</td>
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<td>Miscellaneous (Velcro, Fabric, Paint, Etc.)</td>
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<td>Quick Release Pins</td>
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<tr>
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The Client

- Matthew Davies
  - 12 years old
  - Cerebral Palsy
  - 98 lbs.
  - 4’ 11” tall
  - Can walk, is receptive
  - Uses a posterior walker or quad-can ofes to move around
Purpose of The Project

- Develop a posterior walker for Matthew that can be used across sand and other difficult terrain
  - Must be able to provide trunk support to promote proper gait
  - Safety is the most important aspect
  - Must be able to fold conveniently for easy portability
  - Will have a broad height adjustment range to make it suitable for Matthew for many years
Beach Walker

- CAD Model using SolidWorks 2010
Divisions of Labor

- Matt
  - Mechanical Design
  - Fabrication and Construction

- Danielle
  - Ordering Parts/Dealer Contact
  - Fabrication and Construction
Frame

- Wenzelite NIMBO Youth Lightweight Aluminum Posterior Walker Frame
- Portability
  - Lightweight Aluminum
  - Collapsible
Frame Height

- Adjustable height
  - Aluminum rods clamped to the original frame of the walker
  - Ensure the front two (larger) beach wheels will not make the walker above our minimum height requirements
Wheels

- Medical Wheeleez Wheels
  - Polyurethane balloon wheels
  - Non-corrosive and will not puncture
  - 8 inch diameter wheels for the back
  - 11 inch diameter wheels for the front
  - New swivel casters for the two front wheels to accommodate the change in size
Seat

- **Wenzelite Seat Harness**
  - Allow for Matthew to sit and rest anywhere
Accessories

- Cup Holder
- Tire Pressure Gauge and Pump
Completed Beach Walker

- Sent to Central CT Coatings to get it professionally painted
Budget

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<th>Part Name</th>
<th>Part Number</th>
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Total Spent $1,000
Total Projected ~$1,100

Allotted Budget = $1,100
Total Spent = $ 1,000
Conclusion

- Priority is Jack’s and Matthew’s safety
- Provide client with beach travel that can adjust to his size as he grows
- Design a product that is both easy to transport and easy for parents to push and use
- Design product to exactly meet the needs of the clients and their family
Acknowledgements

- The Davies Family
- Dr. Enderle
- Marek and Emily
- Jennifer Desrosiers and Kerrie Wenzler
- Serge and Pete – UConn Machine Shop
QUESTIONS?