Project Statement

Beach Wheelchair

Team 13: Maya Alfonso, Matthew Ellis, Danielle LaPointe, Kyle O’Brien

Project for Matthew and Jack Davies

Client Contact: Thomas and Kathleen Davies, 14 Chesterwood Court, Cheshire, CT 06410.

(203) 250-7508
**Statement of Need:**

The purpose of this project is to design and build a beach wheelchair for 11-year old Jack Davies, who suffers from cerebral palsy. Jack also suffers from scoliosis. When Jack was born, he was too small. Six weeks after birth he contracted pneumonia and developed cerebral palsy. Jack’s condition is very serious; he has approximately the capability of a 3-month old boy. He relies on a feeding tube and is completely dependent on his parents. Jack weighs 72 pounds and is 52 inches tall. The wheelchair must be tailored to his size and include numerous straps and other precautionary devices to ensure Jack’s safety.

Jack is currently in 5th grade and attends specialized classes. The Davies family travels to Rhode Island beaches for a week every year but have trouble accessing the beaches with Jack due to his limited mobility. Providing this beach wheelchair for Jack will allow him to better enjoy the beach and alleviate the mobility issues that previously plagued him and his family.

**Introduction and Overview:**

The goal of this project is to design and build a wheelchair that can be used on the beach. The beach wheelchair does not need to be motorized as Jack’s parents will simply push it from behind. Jack, with his disability, is unable to use a joystick which makes motorization of the wheelchair unnecessary and useless. The beach wheelchair needs to have large all-terrain tires that allow it to travel across the top of the sand instead of sinking immediately like a normal wheelchair. Jack cannot feed himself and relies on a feeding tube that originates from a backpack. The wheelchair must have a place of attachment for the backpack; whether it is a specialized rack or simply modifying the handles to allow for placement of the feeding backpack. The wheelchair must be designed with Jack’s safety in mind but also be adjustable enough to allow for his future growth. The wheelchair needs neck support and back guides to help keep Jack’s back straight and aligned. Jack’s mother, Kathleen, expressed interest in incorporating their tumbleforms chair into the beach wheelchair. The tumbleforms chair is made of plastic foam and provides comfort and support for Jack. For collapsibility purposes, the tumbleforms chair should be detachable from the main wheelchair. For comfort purposes, the chair should be able to recline at different angles. The priority is to ensure that the beach wheelchair is safe for Jack which means providing an adequate number of restraints and support in the chair.
**Realistic Constraints:**

One big constraint is the manufacturing cost of the wheelchair versus the budget given. The main concern of the Davies family was the extravagant cost of retail beach wheelchairs so the goal was to build one at a reduced cost. The size of the wheelchair is a constraint. The chair must be transported to the beach and if it becomes too large, it may become a problem to transport in a convenient manner. The size of the chair is the size of the tires. Jack is a small individual so the chair must be small enough to fit someone of his stature but also have enough rigidity and strength to properly support him and endure the rigors of use. Another constraint is that the wheelchair must be collapsible for storage and transportation purposes. Therefore, any specialized seat (tumbleforms chair) or other non-collapsible addition must be able to be removed quickly to allow efficient folding and unfolding of the wheelchair. The beach wheelchair is being specially created for Jack so it is not under mass manufacturing constraints, such as increasing cost and rate of production. Jack’s safety is by far the most important constraint. The beach wheelchair will be fully equipped with back guides, neck support, straps and harnesses to ensure Jack’s safety at all times. Ethical and social constraints are a non-factor for this project.

**Other Data:**

Jack resides in Cheshire, CT. His parents, Kathleen and Tom Davies, are both UCONN alumni. His twin, Matthew, also has cerebral palsy although to a much lesser degree. He has an older brother who does not suffer from cerebral palsy. Jack’s mental abilities seem to be on par with a 3-month old. His receptive and cognitive speech are also underdeveloped.

**Questions:**

- What will our budget be?
- What is the size and limitations of the transportation vehicle?
- What size and weight should it be?
- Does the chair need to be able to support Jack’s growth as he ages and if so, how can that be done?
- What should the turning radius be?
- How will the larger tires alter the braking of the chair and what modifications need to be made?
- Does Jack have any additional desires or add-ons for the chair?
- Is there a need to build some support for the feeding tube?