Adaptive Swing for a Special Needs Child

Overview
Madison was born a happy and healthy baby. At just 7 months old she contracted a severe case of meningitis that resulted in a quadruple amputation. She spends most of her days in a horizontal-motion infant swing that she has unfortunately outgrown. Her therapists at the Central Intermediate Unit have reached out to Penn State students to construct a new swing for Madison that provides the same motion, but is also able to facilitate her continued growth and development.

Objectives
Our team’s objectives include designing and manufacturing a horizontal motion swing that accounts for Madison’s continued growth, her future development, and ease of use for her caretakers. The swing will provide the same horizontal motion and allow Madison’s caretakers to recline the swing in multiple positions to ensure that she can be comfortable and attentive.

Approach
- Met with sponsor to gather customer needs and design suggestions
- Individually brainstormed, sketched and evaluated
- Used a Pugh Matrix to make final selections of components
- Created a small-scale foam prototype to study motion created
- Investigated similar products on market for motor ideas
- Created detailed SolidWorks model of final design
- Modified/changed SolidWorks model based on manufacturing needs
- Manufactured working prototype
- Performed weight testing on working prototype to ensure safety
- Validated performance through comparison to current swing
- Performed impact testing to investigate strength of materials

Outcomes
- The sponsor will have a swing that maintains the desired horizontal motion
- The sponsor will have the ability to adjust the swing’s dimensions with the increasing height of the child
- The swing will facilitate the child’s continued development by allowing multiple recline positions to better interact with her therapists
- The swing motor and attachment will allow prolonged use
- The swing will ensure the child’s health, happiness and safety