A Handcycle for Craig Deitz

Overview
The IM ABLE project is designing and building a cycle for Craig Dietz. Craig was born without full extremities. Craig currently participates in swimming competitions and would like to participate in the IM ABLE Got the Nerve 2011 triathlon race.

Objectives
The team’s objective is to design a safe, durable, and operational cycling device for Craig. At the end of the project, the expected results are an operational cycle that is dependable, safe, and includes controllable steering.

Approach/Outcomes
• The team travelled to the IM ABLE Foundation headquarters in Reading, PA. Here the team was able to meet their sponsors as well as meet with Craig. Both Craig and the IM ABLE Founder Chris Kaag were able to give the team some great ideas to start the project.
• The team did not want to compromise any one design of the cycle. Therefore, the team broke the cycle design down into four different areas; braking, steering, propelling, and shifting.
• An extensive outside research was completed. Although there are no cycles for the type of cycle the team was constructing, concepts from other cycles could be borrowed. In particular, the team was thoroughly looking into the way recumbent handcycles were design.
• The pedaling will be done using a bionic knee. The braking function will include a head plate. The head plate will resemble a headrest but when pushed backwards, the brakes will be applied. The shifting mechanism includes the use of shifting levers placed on the left arm limb. The concept that the team chose for steering is a steering column that attaches to the arm and moves in a linear motion.
• A prototype was constructed with the help of the learning factory staff. After the prototype was shown at the prototype showcase several modifications were made. The team realized that several of the designs needed to be reinforced so that the cycle frame would not be compromised.
• Testing was performed with the help of several ISO standards. The propelling was tested and compared to a gear ratio calculation. The braking was tested using a similar test to the propelling. The steering and tipping were tested just to give Craig a decent report that the cycle was safe.
• The final cost of this project was 1033.46. Although the team technically went over budget, there were expectations that the budget would have to be exceeded for this project.
• The operational cycle that Craig was able to ride on April 25th was completely assembled and our team tested the cycle to verify that it met various customer needs and target specifications determined at the beginning of the design process.