Seating System for Patient with Hip Disarticulation

Overview
Mrs. Fackler is a 12-year hip disarticulation amputee, which means she is missing her entire right leg up to her hip bone. She had been using the same wheelchair cushion, the ROHO Cushion, since her amputation. While it was never comfortable for her to sit on, it recently has been worse than ever due to her pain tolerance decreasing as she ages. There is a constant pressure on her right ischium bone that needs to be alleviated for her to sit more comfortably and decrease the pressure and pain she constantly experiences.

Objectives
Our objective was to create a new wheelchair cushion to alleviate the pressure and pain that Mrs. Fackler is experiencing. This was accomplished by researching other types of cushions besides the ROHO, testing materials with Mrs. Fackler, and constructing the cushion using appropriate adhesives.

Approach
- Customer needs were gathered at an initial site visit to the Hershey Rehabilitation Hospital
- Background research was done to compare the ROHO to other cushions on the market
- A concept was selected utilizing different foam & gel materials
- Memory foam, a mattress topper, high density foam, foamboard, & a gel pack were purchased for testing with Mrs. Fackler
- A second site visit determined which materials worked best and the layering order, as well as more needs being determined: cooling and a comfort scale
- A prototype was made at the site visit and given to Mrs. Fackler for testing purposes
- A CAD model of the cushion was made to see how the cushion would look and fit on the wheelchair
- A third site visit was used to test the materials with pressure mapping
- The final cushion was fabricated using the proper adhesives: foamboard glue, spray glue, & Velcro
- Additional testing was done for relaxation time of the cushion before sending it to Mrs. Fackler
- The pain, comfort, cooling scales, and the pressure mapping all showed improvement compared to the ROHO cushion

Outcomes
- Pain was decreased from a 7 to a 1/10
- Comfort was increased from a 1 to a 4/5
- Two gel packs added a cooling factor
- Average pressure decreased from 36.65 to 26.67 mmHg
- Sensing area increased from 194.29 to 320.89 in²
- The cushion can be used for temporary relief after a long work day
- We recommend a certified cushion made of foam and gel for all day use