Overview
Tyco makes Nurse Call Pull Stations which are used in medical facilities. Their current design is unreliable because it has inconsistent activation forces and breaks under high forces. These problems result from the ultrasonic welding process used to attach parts. The goal of this project is to redesign the station so that it has a consistent activation force and is strong enough to withstand high forces.

Objectives
The new design must be consistent in activation force and withstand high forces. The design must not use ultrasonic welding in its manufacturing process.

Approach
- Regular contact with Tyco was maintained to discuss progress, concepts, and prototyping.
- Tyco and nurses were contacted to obtain a list of customer needs.
- An AHP Pairwise Comparison Chart was used to determine the weighting of major customer needs.
- Thirteen design concepts were generated.
- A Pugh Concept Scoring Matrix was used to compare concepts and to determine ratings.
- A new design was generated from the top three rated concepts.
- An ABS plastic prototype was made at the Learning Factory.
- A final design was generated in SolidWorks after an analysis of this prototype.
- A Stereolithography prototype was made at Fine Line Printing.
- Finite Element Analysis was performed to show that the design is strong.
- Fatigue analysis was performed to show that the design will last for 100,000 cycles.
- Testing using a force gage was done to determine activation forces.

Outcomes
The redesign met Tyco’s design requirements:
- The manufacturing cost is decreased by approx. 10%.
- It is activated consistently at 1-3 lbs.
- Ultrasonic welding is eliminated from the manufacturing process.
- This design increased the usability and reliability of the product.