Modern Overhead Crane Cabin Design

Overview
The United States Steel Corporation, founded in 1901, has major production operations in the United States, Canada, and Central Europe. The use of overhead cranes is central to the overall material flow of a steel mill. Each overhead crane is run by a single operator from inside the cabin, located underneath the crane. The location of this project was based in the Irvin plant (located in Dravosburg, Pennsylvania) where steel slabs are rolled and treated. The Irvin plant is part of Mon Valley Works and has an annual production capability of 2.9 million tons.

Objectives
The objective was to develop a modern crane cabin design to maximize a crane operator’s performance and decrease ergonomic strains over an 8 hour shift. The project’s primary goal was improving operator comfort, usability, and safety.

Approach
- Performed online research, consulted Prof. Freivalds and Prof. Rothrock, site visit at Irvin plant
- Observed current modern overhead crane cabins and features to incorporate into design
- Conducted survey with current US Steel operators regarding usability, comfort, and safety
- Created House of Quality to compare operator desires and necessities with design capabilities
- Designed forward posture chair with fully adjustable armrests and data monitor mounts
- Performed cost analysis on feasible design options with additional consideration in pro and cons
- Ensured feature accommodation via data quantifying between the 5th and 95th percentile citizen
- Created a 3-D simulation of the newly developed cabin design using SolidWorks

Outcomes
A modern, ergonomic cabin was designed to reduce musculoskeletal stress, increase comfort, increase line-of-sight, promote safety, and accommodate 90% of operators at a quoted cost of about $44,790.35.

The design features the following:
- Ergoseat H ($13,000-$14,000)
- Ecocab ($23,000-$24,000)
- Climate Control/Air Filtration Unit
- L4 Series Radio Remote ($1,684.74)
- Camera System ($5,305)
- Monitor Mounting Arm x2 ($376.66)
- Jump Seat ($225.00)
- Wall Mounted Shelf ($201.95)