TMP Manufacturing Company 2 – Mold Fixture Redesign

Overview
The purpose of this project is to redesign a walk-in freezer panel mold unit. These molds are used by TMP Manufacturing Company Inc., otherwise known as Tafco, to produce walls and doors for their walk-in freezers. While the current molds are effective, they have remained unchanged for over fifty years, making them outdated and inefficient.

Objectives
The main objective of this project is to create a detailed CAD model that illustrates various design solutions to Tafco’s current mold units. The four needs the final design addresses are increased productivity, reduction in adjustment time, decrease in physical workload, and increased efficiency.

Approach
• Gathered customer needs from interviewing sponsor
• Seven key customer needs are weighted against each other to determine importance hierarchy
• External patent search is conducted and no patents are found for walk-in freezer panel mold units
• Target specifications are established from pre-existing Tafco standards and are then related to the key customer needs through a needs-metrics matrix
• A concept generation process is held and the best concepts are selected through a Pugh Chart
• After much trial and error, a final sophisticated design is constructed in SolidWorks
• Several FEA calculations were made on critical design components
• Tipping and push forces were made to ensure the mold can be safely operated by all employees
• Economic analyses are made to keep the team under budget
• A small scale prototype is built to showcase two of the major redesign concepts
• Since the outcomes of this project are not ideal, conclusions and improvement recommendations are made

Outcomes
• Reduced operating area from 491 ft² to 150 ft²
• Completely eliminated the need for 2-8 hour changeovers
• Reduced required push force from about 50 lbf to about 30 lbf
• Railed wheel design eliminates wheels tearing up concrete floor
• The new concepts introduced with this project are: a wheeled Hevi-Rail for the doors, enabling the mold to produce panels on each side, a torsional spring for top thickness bar, and the ability to control two doors on each side of the mold.
• A pre-existing water heating system is introduced as a new concept for this type of mold