Advanced Polymer Capping System

Overview
Sekisui is a thermoplastic extrusion company that runs several types of thermoplastic. The line we were assigned to improve upon is a high cost plastic that has an option for capping the thermoplastic with a specially designed polymer material. The current line has a current yield of 40% which results in a lot of wasted material due to creasing defects on the edges of the capping. Sekisui has tasked the team with improving the yield of the high cost plastic extrusion line in any way that is economically feasible to the company.

Objectives
The objectives that the team was tasked with were:
- Design and specify a system for alleviating defects that care causing a poor yield
- The system to be safe and operator friendly

Approach
- Visited the Sekisui plant to talk with management and operators to get a feel of what the company’s needs were
- Looked into current industries/patents that have similar processes to give the team a background on our project as well as what worked
- Broke the extrusion line system up with a black box model that visually showed sub-systems that could be improved upon
- Used the ‘post-it-note’ idea generation method on each sub-system to create ideas of improvement
- Created pre-alpha prototype from generated ideas that focused on improving chevron roll
- Tested pre-alpha prototype which gave team insight on how to improve upon design
- 3-D printed alpha prototype from solid works to test while also creating theoretical analysis
- Gathered information from theory and alpha prototype testing to move forward with design
- Came up with final design concept from gathered data and benchmarking
- Manufactured scaled down final prototype
- Tested final prototype by creating defects in test plastic and running it over the new design to qualitatively see results

Outcomes
The New advanced polymer capping design is a one of a kind system that improves upon a couple of features of the current system to reduce defects
- Has removable fins that configure to different line sizes
- Placement of design shortens unsupported length
- Fixed roll with sharper angles improve upon friction
- Fin widths reduce to put most contact on edge of capping