Lumax Semi-Automated Carton Closer and Sealer

Overview
The current packaging and sealing system at Lumax requires two workers and a combination of both tape and staples. As the company continues to grow, Lumax would like a system to close and seal their cartons around the lighting fixture and seal before placed on a pallet. The system needs to be reduced down to one worker in order to move the non-value added worker to a higher priority section of the assembly line.

Objectives
- Design a semi-automated or assistive system to package and secure boxes for lighting fixtures (requiring only one operator)
- Conduct testing on various sealing methods (tape, glue, staples) to determine best option to accommodate strength/quality requirements and specifications.
- Investigate all possible redesign of current box shape, keeping the same dimensions, instead having a top-closing design to enable automation.
- Develop a design that considers chosen sealing method, as well as chosen box design that can be created into a working system.
- Build the designed system and arrange the move to Altoona, PA for implementation by May 3, 2013.

Approach
- Visited plant in Altoona, PA and outlined key objectives and input variables with Lumax representatives.
- Researched automatic case erectors and sealers to determine fixtures needed for the solution.
- Researched sealing methods of boxes, including strengths and costs.
- Worked with Lumax’s supplier PSI to create and make 3 box design samples.
- Conducted an Edge Crush Test with all three designs and tested various tape strengths.
- Confirmed final box design & preferred sealing method.
- Created a CAD model of the conveyor belt and machine design.
- Created a prototype of machine and boxes using simple materials to finalize design.
- Purchased optimal tape header and coordinated shipping of conveyor belt to the Learning Factory.
- Assembled the conveyor belt and installed the 3 phase motor.
- Constructed the machine over a 6 week period.
- Received several sizes of the new box design from PSI, selected tape, and verified a working solution with the machine.
- Adjusted machine to reduce areas of high probability of failure in design.

Outcomes
- The sponsor will save $36,000 a year as a result of this project.
- The payback period of this project was 18.25 days.
- Manufacturing production rate increased causing the line capacity to double.
- Improved ergonomic working conditions for the operators in packaging.
- The assistive machine reduces 50% of labor required.