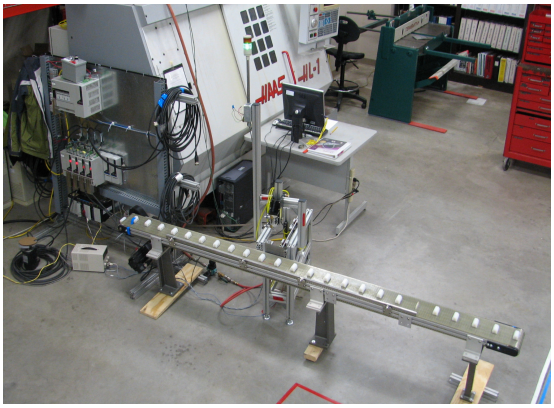
2007 Senior Design Show – University of St. Thomas – School of Engineering

High Speed Automated Packaging Machine

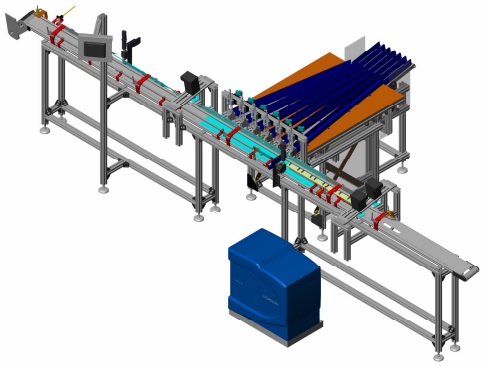
Sponsor: Tapemark
Sponsor's General Mission or Business Statement: Tapemark is a leading-edge contract manufacturer, providing innovative solutions for your unique requirements. We convert a wide range of flexible materials, integrating coating, printing, die cutting and packaging in order to maximize the functionality and cost-effectiveness of every product we deliver.
Sponsor's Advisor: Steve Rau, Engineering Manager, (651) 450-5392
Sponsor's Address: 1685 Marthaler Lane, West St. Paul, MN 55118
University of St. Thomas School of Engineering Academic Advisor: Dr. Michael P. Hennessey
Team Member Names: Robert Ertel (ME), Jason Given (ME), Brian Kjersten (EE), Joel Korte (EE)
Senior Design Clinic I-II (ENGR 480-1) 2006-7
Project Mission Statement: To design, test, and prototype a high speed automated packaging machine; this is to be inline with the Tech 10 production machine in order to streamline the production process of pouches containing water soluble medicated films.
Major Design Requirements:

1. Complete automation – machine packages and seals pouches into primaries
2. Satisfy a typical pouch range of 12-16 pouches per primary
3. Work seamlessly with Tech 10 production machine
4. Design for a budget of $40,000
5. Complete mechanical and electrical design for future implementation
6. Build a working prototype which tests key functionality of design
7. Operator accessible HMI touch screen
8. Consistent with Tapemark safety standards

Senior Design Project Summary: Tapemark's newly constructed Tech 10 production machine manufactures soluble film and packages the film into pouches. The pouches are manually carried to a separate machine in another area of the factory to be loaded into primaries. Tapemark desired that this process be streamlined with an automated packaging machine in line with the Tech 10. After a thorough design generation stage, we decided on utilizing a six lane spreading walking beam to stack and load the pouches into primaries, which are transported to the walking beam by an adjacent conveyer belt. The design has a "divert all" function at the beginning of the walking beam which allows for system troubleshooting while the Tech 10 is still in operation. There are also individual diverters at the end of each lane to ensure that jams do not become problematic in the event of faulty or missing primaries. An organized array of photo-electric and proximity sensors ensure that all assumed locations of pouches or primaries are verified with an electrical signal. Major and minor primary flaps are manipulated through a series of banding and are sealed with the aid of a Nordson glue system. This project's success required a multidisciplinary engineering team with a variety of skills. Leadership, discipline, and creativity from all group members were vital to the project's success.



Design prototype and test fixture



Three-dimensional drawing of the automation system