

Senior Capstone Projects

Spring 2015

Project A: Value Stream Improvement of Plastic Part Production

Sponsor: ATK Tactical Systems – BLACKHAWK!
Manhattan, MT 59741

Description: ATK-Blackhawk! manufactures accessories for sportsman, military, and police, and security personnel. Their production operations include 30 plastic injection molding machines which produce products and components for the Blackhawk! brand as well as other ATK companies and partners.

This project focuses on the Legacy Blackhawk product line consisting of plastic holsters, magazine cases, drop leg platforms, and other products. This product line is produced using ten dedicated molding machines followed by assembly and packaging operations. The project objectives are to reduce the production lead time and material handling requirements for Legacy Blackhawk products by applying lean manufacturing principles. The client expects the team to provide the Manhattan facility with a current state value stream map from customer order to shipment out of the facility. Based on analysis of the current state, the client anticipates a proposed future state map along with detailed solution plans to address the opportunities identified in the current state map. Time permitting the client would like to see one or more of the solutions implemented on a trial basis, and data collected to demonstrate improvement along the objectives outlined above. Specific solutions could involve changeover time reduction, inventory management, work cell redesign, and facility re-layout.

(Note: project requires students who have taken EIND 458)

Project B: Finished Goods Warehouse Re-design

Contact: Mystery Ranch
Bozeman, MT 59715

Description: Mystery Ranch is a Bozeman-based company that designs and produces high quality backpacks for outdoor adventure, fire and rescue, and military uses. As the company has grown, they have contracted out much of their sewing operations to contract manufacturers at different locations in the US and the Philippines. The Bozeman facility maintains a finished goods warehouse that currently stores product subassemblies. When they receive a customer order, the shipping department picks the appropriate subassemblies, performs final assembly and inspection of individual packs, and then packages and ships the customer's order.

In order to address some of the challenges in managing the contracted manufacturers, Mystery Ranch management is planning to change their finished goods warehousing strategy to store all SKU's in final assembled form. This means that final assembly will occur before finished goods, and the shipping department will just pick, package and ship finished goods without performing any assembly work. This change also means a significant increase in number of SKU's that will be stored in the finished goods warehouse.

The project, then, is to design a new finished good warehouse for Mystery Ranch's Bozeman facility. Specific deliverables will include:

- Analysis of existing shipping operations, including packaging.
- Analysis of storage requirements.

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- Examination of storage equipment and layout alternatives.
- Recommended storage design for maximum space utilization and picking efficiency.
- Recommended material handling solutions
- Workstation design for packaging and shipping activities.

Project C: Layout for Expansion of Screen Printing Operation

Sponsor: Lone Mountain Printing
Bozeman, MT

Description: Lone Mountain Printing (LMP) is a small business that specializes in custom screen printing for apparel. Two processes are required in the screen printing business. First is a set of activities to translate the customer's artwork to the screens used for color printing. The second is receiving the garments and matching the shipment to a customer order, printing the screens to the garments using an automated machine, drying the garments on a flow dryer, and then preparing the apparel for shipment which could include folding, labeling, and individual packaging.

The company has experienced significant growth over the past two years, and is planning to move to a larger space in summer 2015. The company owner desires an efficient layout design for the new space, accompanying workflow design and material handling systems from receiving to shipping for a production volume of up to 30,000 imprints per month, workstation designs for the various steps of the screen printing process, and storage solutions.

Project D: Re-layout and Expansion Planning for a Coffee Roasting Operation

Contact: Little Red Wagon Coffee Roasters
Bozeman, MT

Description: Little Red Wagon Coffee Roasters is a startup company located in downtown Bozeman, Montana. It is currently a small-scale operation, roasting and delivering or shipping approximately 150 pounds of coffee per week. As the company owners anticipate growing their company, they realize that their current operations are not very scalable, and therefore seek the help of an industrial engineering team to improve their systems and utilization of the existing space, and to plan a system that could scale to 4,000 pounds of coffee per week.

The needs here are several:

1. Assessment of the current operation, and reorganization of the existing space to improve efficiency.
2. Improved workstation design for packaging and shipping operations.
3. An enhanced inventory system suitable for the current operation, but scalable to the target production volume.
4. Space requirements assessment for the target production volume in order to determine when a new space would be needed, and what size would be required.
5. A capacity management plan as volumes increase, for use in business planning.

Thus the team would be expected to generate a cohesive operations management strategy to support the future growth of the company.

(Note: project requires students who have taken EIND 425)

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Project E: Improvement of Packaging Operations for a Pet Toy Product Line

Contact: West Paw Design
Bozeman MT 59715

Description: West Paw's Zogoflex line is a plastic injection molded product that has seen strong demand among pet owners. Prior to finished goods, a header board is attached to the product using zip ties, then placed in finished goods bins or, cases of large orders, directly into shipping boxes. The operations thus include: pulling up the production order from a prioritized queue, locating the appropriate finished goods box(es) and moving to the packaging area, locating the product and packaging materials and moving them to the packaging area, attaching the header boards and loading the finished product into boxes, and finally placing the full finished goods bins into finished goods inventory. Four workstations perform this operation for 15 different products.

The packaging was recently redesigned, resulting in changes to the packaging operation that increased production costs significantly. The goal of this project, then, is to realize a 50% reduction in packaging costs through a redesign of the Zogoflex packaging operations. After analyzing the existing operations, the team is expected to generate cost saving solutions that are scalable to the forecasted demand. The client is open to solutions ranging from re-organization of the work area to work cell redesign to semi-automation or job assist technology.

Project F: Manufacturing Plan and Economic Analysis of SAE Formula/Baja Car

Contact: Robb Larson, MET faculty member
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Description: Work with the Formula or Baja SAE Team to prepare for the Cost and Manufacturing Event of the 2015 competition. The scope of work will include: creating a manufacturing plan for the car they are designing, providing input on the manufacturability of part designs and helping the design team make trade-off decisions, generating a cost report based upon the car's bill of materials, and conducting an economic analysis of the planned design. Possibility exists to go with the Team and participate in the competition. Competition rules can be downloaded from: <http://students.sae.org/competitions/formulaseries/rules>. See Part S, especially Article 4.