

INTEGRATED MANUFACTURING SYSTEMS ENGINEERING INSTITUTE (IMSEI) RESEARCH PROJECTS 2005-06

Six Sigma Projects at B/S/H Home Appliances Corporation.

Steven D. Jackson
Un-sponsored
07/01/05-06/30/06

For project management, easy to use documents were introduced that help track and control the various projects that were being executed. A new database was created to store information on Gage R&R's. For training purposes, a new tool called the Six Sigma Roadmap was developed which provided guidelines in carrying out successful projects. Two cost-saving projects were performed using the Six Sigma methodology. These problems were interpreted into statistical form so that analysis clear data-driven solutions could be achieved.

Possibility of Using Deployment Scheduling Analysis Tool (DSAT) for Scheduling Military Deployments.

Thom J. Hodgson
Un-sponsored
07/01/05-06/30/06

This technical report handles two deployment models, DSAT and JFAST, from the perspective of a deployment planner. These days, deployment planners have to respond very quickly and reasonably to an operational planners' request. Although DSAT was developed for this reason, there is little work with respect to validation and verification testing of DSAT. Testing DSAT against the current model (JFAST), comparing the results from these two deployment models, and then determining the efficacy of using DSAT for scheduling military deployments from the results, is the main point of this report.

ePIPE- Parts and Returnable Pipeline Management System

Thom J. Hodgson
Un-sponsored
07/01/05-06/30/06

As Toyota continues to gain market share globally, its logistics network continues to grow in complexity. An analysis of the current logistics network between suppliers, cross-docks, and Toyota manufacturing plants across North America, Japan, and European regions revealed that better visibility and tracking was needed for parts orders and returnable containers throughout the supply chain. The ePIPE project was initiated to provide members within the supply chain with a centralized, web-based resource for viewing and reporting status on parts orders and returnable containers. This paper describes requirements analysis, high level design, and project management activities associated with the development ePIPE.

Reduction of an Automated Welding, Planishing, and Grinding Machine.

Steven D. Jackson
Un-sponsored
07/01/05-06/30/06

Scrap reduction of the automated welding, planishing, and grinding (WPG) machine involved standardizing operator tasks, improving the shearing process, and making the WPG machine more robust. The operator tasks that were standardized to best practice were weld tip sharpening, bowl shearing, and maintenance intervals. Improving the shearing process involved redesigning the measurement gauges. The last improvement aspect involved making the WPG machine more robust. The most important change was making the weld stations perform properly by fixing a design flaw. Other improvements included changes to the WPG program and modifying the torch head. These changes reduced scrap significantly.

Design, Development and Implementation of a Manufacturing Execution System at John Deere Turf Care, Fuquay-Varina, NC

Steven D. Jackson
John Deere Turf Care
\$30,000
07/01/05-06/30/06

Manufacturing Execution Systems (MES) are Software Solutions that enable the optimization of production activities from order launch to finished goods, by providing integration links between otherwise unrelated sources of planning and real-time information. An MES was developed and implemented at John Deere Turf Care. The system was developed to support manufacturing execution, control and data acquisition at the plant level. The core functionality included: Real-time WIP tracking, cycle time recording, critical task check list display, defect and repair tracking, engineering change notification and serial break recording, 5S and TPM recording, OMS visibility, subassembly task check list visibility and zone audit check lists.

Quick Response Manufacturing: Alternative to Lean Manufacturing (Data Analysis Performed at Elkay Southern, Inc., Lumberton, NC.

Thom J. Hodgson
Un-sponsored
07/01/05-06/30/06

Meeting promise (or delivery) times is a significant problem for many manufacturers. Root causes range from poor management, line balancing, logistics, etc. Industry has widely adopted Toyota's Lean manufacturing principles in their operations. Lean has an end goal of waste reduction—not lead-time reduction. A newer strategy is gaining popularity. Quick response manufacturing is a company-wide strategy that pursues the relentless reduction of lead times throughout the operation.

This project analyzes process flow between departments at Elkay Southern manufacturing facility. The scope of the analysis deals with job sequencing, in efforts to reduce lead times.

Strategic Value Chain Profitability Modeling

Steven D. Jackson
Un-sponsored

07/01/05-06/30/06

It is said that “Necessity is the Mother of Invention”. This is certainly true when one evaluates the current position of Caterpillar. As their product managers become more accountable for global strategies, it is imperative that tools are available for them to make informed and data driven decisions. It is the development of such a tool that is discussed in this report. Using 6 Sigma as the vehicle of choice, its development from translating the customer requirements into a working concept are discussed. Next steps and future work on the tool are outlined.

Lean Manufacturing Initiatives at Elkay Southern Corporation

Steven D. Jackson
Un-sponsored

07/01/05-06/30/06

Elkay Southern Corporation, located in Lumberton, NC, is a leading supplier of stainless steel sinks. As an intern at this facility, knowledge of sink manufacture was gained as well as knowledge of lean manufacturing practices and principles. Each of the projects accomplished during the internship used one of the eight lean tools to successfully achieve its goals. These tools are used to continually improve the process of manufacturing products and to achieve the total elimination of waste throughout the facility. Elkay’s commitment to the lean initiative is examined as well as their reasons for exploring lean manufacturing.

Development of More Accurate Knitting Element Measurement Systems and Techniques

Jon P. Rust
Un-sponsored

07/01/05-06/30/06

The techniques previously used to maintain warp knitting machine parameters were inadequate. A primitive system to correct the alignment of elements on the machine was used. Not only did the system allow for incorrect settings by each operator, but no two operators performed the tasks the same. The techniques used allowed for part-to-part measurement, not the measurement of each part to a standard. Through the development of visual assistive devices, standards, and new procedures, fabric defects caused by element misalignment have been eliminated. Part breakage and wear have been reduced by implementation of the project.

Automated Material Handling Systems Intel Fab 12 300mm Conversion

Steven Jackson
Un-sponsored

07/01/05-06/30/06

Recent advances in the semiconductor industry have driven Intel Corporation to upgrade their integrated circuitry fabrication facilities to utilize 300mm wafer technology. Located in Chandler, AZ, Intel’s Fab 12 was destined to be the first fab to be upgraded from its current 200mm to 300mm wafers. With a 2 billion dollar investment, all the current production equipment and material handling systems were removed and were replaced by new equipment and systems. During this upgrade, the automated material handling group oversaw the

installation of equipment from various vendors, monitored quality, tested equipment, and participated in several Intel sponsored events.

Development of a Real Time Data Acquisition and Control System for a Small Scale Resistance Welding Application.

Steven D. Jackson
Un-sponsored

07/01/05-06/30/06

This project’s objective was to determine and implement a better process for resistance welding carbon brush flex (braided copper wire) to a terminal, while providing real time diagnostics to differentiate good and bad welds. After adequate research and experimentation it was determined that weld force, weld current and weld time are the most critical weld input process parameters that affect the quality of the weld during resistance welding. They have direct correlation with weld strength (Pull and Peel tests). Weld displacement does not directly affect the quality of the weld but is a strong indicator of actual weld strength.

Networking Lab Inventory and Checkout System

Steven D. Jackson
Un-sponsored

07/01/05-06/30/06

Physically controlling equipment in a networking lab is very important and an inventory tracking tool is necessary. Furthermore, in a break-fix lab such as CentaurLab, loaning equipment to sister labs creates the need to track loaned equipment. To fill this need at CentaurLab, a web enabled system was designed and implemented. The Networking Lab Inventory and Checkout System is a web enabled application that allows users to keep track of the inventory and enables them to checkout the equipment. The system has the ability to keep track of these dynamic changes in a multi organizational multi user environment.

Lean Management Initiatives at Volvo Construction Equipment in Asheville, NC

Michael G. Kay
Un-sponsored

07/01/05-06/30/06

This report documents two of most important projects among a series of lean initiatives at Volvo in Asheville. The first one is PFEP, Plan For Every Part, and the second a project to develop a “Pull System” for material replenishment not only within Volvo plant but also from the Vendors. Implementation of PFEP- to get the right materials at the right time in right quantities to the production facility – required an overhaul of material procurement and handling and a supporting database. The Pull system project supported PFEP and also utilized new software and a database system interface.

Evaluation and Selection of Software for Implementation of Statistical Process Control Dr. Steven D Jackson

Un-sponsored
07/01/05-06/30/06

The purpose this project was to evaluate and select software that is best suited for implementation of statistical process control (SPC) at the BSH Dishwasher manufacturing plant. A factor based method was used to evaluate 4 different soft-

ware packages. The factors were grouped under four broad categories, namely, End-User considerations, SPC Considerations, Administrative Considerations and Company Profile. Each software package was tested under a common scenario involving data collection at a particular machine in the Fabrication area. The software that scored the maximum score out of the possible 172 points was recommended for installation.

Factory New Bern — Dishwasher [FNbG] Capacity Expansion Project.

Steven D Jackson
Un-sponsored
07/01/05 – 06/30/06

The purpose of this project was to design the new production system at the Dishwasher manufacturing plant of BSH Bosch Siemens Home Appliances. BSH planned to expand its production output by increasing its facility size and installing two new assembly lines by October 2005. The new production system was designed based on predefined principles and internal material logistics. The report illustrates the assembly area design, processes and handling methods implemented in the new production system. It also compares the new production system with the old production system in order to demonstrate the noticeable improvements achieved with the new system design.

Quality Control, Improvement, and Planning Efforts at John Deere Turf Care (Focus: Advanced Quality Planning)

Steven D. Jackson
John Deere Turf Care
\$30,000
07/01/05-06/30/06

John Deere follows Enterprise Product Delivery Process which provides a logical sequence of activities when dealing with revision of products or development of new products. The Advanced Quality Planning Engineers play an active role in this process. The project can be divided into three parts. The first involves Quality Implementation in EPDP Phases 4 and 5 of new model year project for a WAM. The second part is a database development project used to capture and store all AQP activities in a centralized and structured format. The third part explains in detail development of Weld Process Failure Modes Effects Analysis.

Shifting Sources of Supply to a Low Cost Country: Mexico (Which parts of the business to select and how to realize benefits while reducing risk)

Steven D. Jackson
Un-sponsored
07/01/05-06/30/06

Bosch and Siemens Home Appliances Group is a successful high-end home appliance manufacturer located in New Bern, NC; headquartered in Huntington Beach, CA. The laundry facility, where washers and dryers are produced, is currently in the process of looking for new suppliers in low cost countries like Mexico and China. Since seventy percent of the total cost of these appliances is raw material and purchased parts, the exchange rate dollar/euro is causing the overhead cost to increase when dealing with European suppliers. This project describes the process of finding, evaluating and shifting to new suppliers in Mexico.

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