AKPAN, MOSES IMO

"Standard Operating Procedures, Calibration and Uncertainty Measurements in the Constructed Facilities Laboratory." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

The Constructed Facilities Laboratory (CFL), situated on the Centennial Campus of North Carolina State University, is a research center attached to the Department of Civil and Environmental Engineering.

This report addresses the calibration and uncertainty measurement needs of CFL and preparation of standard operating procedures for test equipment used in the laboratory.

Using ASTM E74, E4 and GUM as guides for test setup and data analyses, the author writes about specific test measurements performed on the 100 Kips load cell, digital multimeter and a case study to find the reproducibility factor on a 6-inch potentiometer. Tests were performed to better understand how to setup sensors used on the MTS 647 hydraulic wedge grip and the Vishay Data Acquisition System. The results are of these were used to prepare standard operating procedures for operating the above mentioned testing equipment. These results have since been implemented in the CFL and are in use for calibration and uncertainty measurement testing. These operating procedures have helped reduce time delays during testing.

BHUTANI, GAURAV

"Implementation of Packaging Standard and Purchase Planning Analysis." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

The first project is to define and implement a procedure to standardize the packaging of incoming goods in a manufacturing company. The process involves the recording of the current state of packaging via a standard

packaging specification document. Then recommendations are given and implemented based on the data collected for each material number. This project resulted in the reduction of defects in the components and helped in better warehouse management. The second project "Purchase Planning" is a tool to forecast and track the performance of the purchasing department with respect to projected and achieved cost reductions. This analysis provided an insight into how purchasing performance can be tracked and the resulting reports can provide the management a broader view of purchasing performance.

DAYAL, KISHAN JANARDHANA

"Lean Management Initiatives at Volvo Construction Equipment in Asheville, NC." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

This report documents two of most important projects among a series of lean initiatives at Volvo in Asheville. The first one is abbreviated PFEP, Plan for Every Part, and the second a project to develop a "Pull System" for material replenishment not only within the Volvo plant but also from the vendors.

A very rudimentary definition for PFEP is the objective of any lean material replenishment system- to get the right materials at the right time in right quantities to the production facility. To be able to achieve this oft-repeated objective, Volvo came up with this powerful tool —PFEP. This is expected to streamline the flow of incoming logistics, optimize the order quantities and their packaging, reduce shipping costs and inventory, increase the space available in assembly areas, increase productivity due to reduced walking distances on the shop floor and drastically improve the "visibility" in the system. In short, a complete overhaul of the way materials are procured and handled at the Asheville facility.

One of starting points to be able to achieve above objectives was the need for an extensive database, which can serve as a "one stop shop" for all the information about every part sourced to Asheville. This report dwells into some of the details of this database.

The second project to develop a pull system for material replenishment was another piece in the PFEP jigsaw needed to achieve the lean objective. Close to 500 individual parts were taken from a MRP based "push" system to a Kanban based "pull" system. For this, new software was acquired and tailored to suit Volvo's needs. Another elaborate database had to be built to act as an interface between Kanban system and the new software. This report also documents some of the efforts towards this project and also the "Kanban database".

DESAI, CHINTAN

"Networking Lab Inventory and Checkout System." Directed by Dr. Steven D. Jackson (2005)

Ensuring that a networking lab has all its equipment, including routers and switches accounted for is very important. In order to help track the usage of lab equipment, a solid inventory tracking tool needs to be in place. Furthermore, in a break fix lab such as Centaurlab, loaning equipments to sister labs is a normal occurrence. Keeping track of equipment that is loaned out versus equipment that is in the lab becomes very important. In order to track these specific and unique situations at Centaurlab, a personalized web enabled system was designed and implemented. The Networking Lab Inventory and Checkout System, as it are referred to, is a web-enabled application that allows users to keep track of the lab inventory and enable them to checkout the lab equipment as well. The system has the ability to keep track of these dynamic changes in a multi-organizational multi-user type

environment. The primary target of this thesis is to discuss the way we accomplished these basic requirements and the process that we had to go through in order to avoid and solve the obstacles that we faced along the way.

HAYES, LYNNE

"The Planning and Development of a Material Kitting System for an Aircraft Engine Line." Directed of Drs. Ola Harrysson and Thom J. Hodgson, Industrial Engineering (2005)

Material kitting plays an important role in the efficient operation of a production line. Having materials delivered in a sequential, visually organized manner eliminates the need for assembly technicians to sort through materials. This project involved the creation of a material kitting system for a new aircraft engine line. It also entailed the investigation of outsourcing alternatives for the production of foam inserts utilized to hold the materials within the bins. It was established through this project that outsourcing the production of these inserts would save the company over $15,000 on a single engine line and decrease production time by 75%.

HURRELL, RYAN

"Alpha Stage Development of an Automated Pharmaceutical Dispensation System (APDS): Examination of Bin/Counter Subsystem Development." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

Vortex Holding Company (Vortex HC) is creating a product to enter the automated pills dispensation (APD) systems market. APD systems are used by hospitals, nursing homes, and consumer pharmacies to remove one or more of the processes involved in drug distribution such as inventory

management, pill counting, vial filling, labeling and capping. At the present time, there are approximately seven consumer pharmacy solution products available with two holding the majority of the market share. The ideal consumer product completes the prescription filling process from start, data entry of prescription information, to finish, a filled, labeled, and capped prescription vial. Vortex HC believes that the available consumer products operate on overly complex mechanisms and is developing a more intuitive solution through the Automated Pharmacy System (APS) project. The most challenging and complex processes of existing products to date are pill fluidization and singulation, the removal of a precise quantity of pills from a bin for dispensation. The APS integrates these complex processes into the bin/counter unit using proprietary technology (patents pending). This unit combines a pill storage location, pill agitator (fluidization), pill singulator, and counter to control quantity as singulated pills leave the bin/counter unit. This project focuses primarily on the technological development of the bin/counter unit and its interaction with the system as a whole. Initial funding calls for an Alpha stage to prove the viability of proposed technologies included in the APS to produce a consumer unit that can be competitive in the existing market. A competitive product would have a lower initial and recurring cost, fewer malfunctions, easier repairs, and better performance than available products.

RAGHAVAN, RAMAN V.

"Evaluation and Selection of Software for Implementation of Statistical Process Control." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

The purpose of this project has been to evaluate and select software that is best suited for implementation of statistical process control (SPC) at the Dishwasher manufacturing plant of Bosch Siemens Home Appliances,

New Bern, NC. A factor based method was used to evaluate four different software packages. The factors were grouped under four broad categories: 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. Each factor was given a rating from 1 to 4 and multiplied by its corresponding weight. The weights were decided primarily based on the judgment of the evaluator. The total for each software package was calculated. Finally, the software that scored the maximum score out of the possible 172 points was recommended for installation.

RAVAL, ABHIJIT

"Development of a Real Time Data Acquisition and Control System for a Small Scale Resistance Welding Application." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

The objective of the project was to determine and implement a better process for resistance welding carbon brush flex (braided strands of copper wire) to a terminal, while providing real time diagnostics to differentiate a good weld from a bad one. Though the study was conducted on the carbon brush flex to terminal weld using existing resistance welding equipment, the results are applicable to most small scale resistance welding applications. The existing process at ECS involves clamping the flex and the terminal with electrodes at constant force while applying a constant AC current for a given amount of time. Quality of the weld is determined by visually inspecting the weld and using SPC through destructive peel and pull test on random production samples. Current quality requirements of 0 ppm defects in the automotive industry forced ECS to look into developing a better and more consistent resistance welding process as well as develop inbuilt machine

diagnostics in the existing resistance welding machine that helps differentiate a good weld from a bad one which in turn prevents a bad part from reaching the customer.

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 and hence have direct correlation with weld strength (Pull and Peel test results) whereas weld displacement does not directly affect the quality of the weld but is a strong indicator of actual weld strength and is used for diagnostics. Design of Experiment (DoE) was used to determine optimal values for weld force, weld current and weld time required to achieve the maximum process capability index for weld strength and these optimal values were controlled during each welding cycle. A real time data acquisition and control system was developed to interface with the existing resistance welding equipment such that it monitors weld force, weld current and weld displacement. The real time data acquisition and control system differentiates a good weld from a bad one using an upper control limit and a lower control limit for weld force, weld current and weld displacement established through experimentation and DoE. A new process methodology of force triggered current firing and absolute displacement monitoring was added using the real time data acquisition and control system, in order to develop a better and more consistent resistance welding process as well as reduce/eliminate key contributors of scrap.

SEETHAMRAJU, SUMAN

"Improvement in Product Quality – First Pass Yield and Weld Process Capability on the 2500 Greens Mower at John Deere Turf Care." Directed by Dr. Steven D. Jackson, IMSE Institute (2004)

The John Deere Turf Care (JDTC) facility located in Fuquay-Varina manufactures products catering to the "Commercial Mowing," and "Golf & Turf Care" markets. JDTC, like all John Deere manufacturing facilities is aligned with the Deere Production System (DPS), which is closely modeled on the Toyota Production System – is an enterprise wide strategy consisting of Guiding Principles, Best Practices, and Tool and Training which facilitate the manufacturing operations to achieve Deere's performance goals. The DPS is structured into 10 elemental lanes: Employee Environment, Structured Operational Processes, Manufacturing Technology, Operational Planning, Material Logistics, Quality, Operational Availability, Leadership, Training and Metrics. This project aligns with the DPS laid out strategies for improvement in product quality and focuses on product first pass yield and use of Six Sigma methodology to improve product capability.

SHAH, PILAK

"Study of Workflow Processes and Change Management Systems at Ingersoll Rand Productivity Solutions, Southern Pines, NC." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

The tradition of producing large quantities of products and pushing them into the market is becoming obsolete. In today's dynamic markets, it is imperative for the provider to be able to respond to changes in order to maintain a competitive edge. This has resulted in a noticeable difference in products in terms of quality, variety and life cycles. Many products today have lifecycles of less than a year. There are products with longer life cycles too, but manufacturers must offer variants of these products.

The introduction of new models and products requires the maintenance of large amounts of new product data and relevant version data. It also involves information sharing amongst various operations of the firm, like sales

and service. This leads to the need for comprehensive data management techniques for effective after sales services, inventory management, planning, sales, etc. The desire to efficiently convert the large amounts of data into valuable information led to the development of Product Data Management (PDM).

Configuration Management is a key for a successful PDM implementation. It is a discipline that ensures that the configuration of an item is known and documented while changes are controlled and tracked. The ideal design strategy for a product is to get the design right the first time. However, changes during design cycle and changes in the customer requirements are inevitable. In order to track these engineering documents most companies use an Engineering Change Management (ECM) process to solve problems and prevent new errors. The efficiency of a change management process is measured by the lead time of change implementation.

My Co-op at Ingersoll Rand (IR) Productivity Solutions, Southern Pines, NC and CMII (Configuration Management II) for business process infrastructure by Vincent C. Guess has been the inspiration behind this paper. This research paper emphasizes the importance of Product Data Management (PDM) systems for large organizations like IR. As a most critical application of PDM, this paper describes configuration management.

Change Management plays an important role for successful configuration management implementation, so this paper also describes a case study of workflow processes and change management system at Ingersoll Rand.

SHINOUDA, NADER

"Networking Lab Inventory and Checkout System." Directed by Dr. Steven D. Jackson, IMSE Institute (2005)

Ensuring that a networking lab has all its equipment, including routers and switches accounted for is very important. In order to help track the usage of lab equipment, a solid inventory tracking tool needs to be in place. Furthermore, in a break fix lab such as Centaurlab, loaning equipments to sister labs is a normal occurrence. Keeping track of equipment that is loaned out versus equipment that is in the lab becomes very important. In order to track these specific and unique situations at Centaurlab, a personalized web enabled system was designed and implemented. The Networking Lab Inventory and Checkout System, as it are referred to, is a web-enabled application that allows users to keep track of the lab inventory and enable them to checkout the lab equipment as well. The system has the ability to keep track of these dynamic changes in a multi-organizational multi-user type environment. The primary target of this thesis is to discuss the way we accomplished these basic requirements and the process that we had to go through in order to avoid and solve the obstacles that we faced along the way.