Improving Supply Systems/Experiential Live Lean Six Sigma Problem-Solving Projects (MGMT 381-0; CRN 42147 and 46220)

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Program Mantra: *Ready Day One*

What are you majoring in? *Answer: Better, faster, cheaper!*

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https://wmich.edu/sites/default/files/curriculum-vitae/CurkovicVitae2019%20%28002%29_0.pdf

"WMU's ISM program named 5th among nation's best supply chain programs."
http://www.mlive.com/news/kalamazoo/index.ssf/2014/08/western_michigan_university_ra_3.html

WMU's Program..."Nation's best undergraduate SCM program for preparing students." Gartner, 2014

"WMU's ISM program named 2nd among nation's supply chain programs."
http://www.softwareadvice.com/scm/industryview/top-universities-report-2015/

"Global ranking of the top schools for SCM talent – the SCM World University – WMU ranked #2." SCM World, Inc., 2017
http://www.scmworld.com/top-supply-chain-universities-question-reputation/

Textbooks: ***None. Where we're going, there are no textbooks!***

Classroom/Day/Time: CRN: 42147 - Monday, September 9, 2019, 5:30 p.m. – 8:00 p.m., room 1325 SCH.

CRN: 46220 - Wednesday, September 4, 2019, 5:30 p.m. – 8:00 p.m., room 1330 SCH.

(BE THERE ON THE FIRST DAY!!!); drop the class if you cannot be there on the first day. We are getting started on projects ASAP.

Office Hours:

By appointment is always preferred during summer. Email is preferred over voicemail for appointments and all other correspondence. We will also be meeting regularly and/or weekly on these group projects.

There's an old saying that goes, "Tell me and I'll forget; show me and I'll remember; involve me and I'll learn."

EVERY ACCREDITED ENGINEERING PROGRAM HAS A SENIOR DESIGN PROJECT THAT PROVES THEIR STUDENTS KNOW WHAT THEY ARE DOING…

http://www.wmich.edu/news/2016/04/31597

Senior engineering students showcase engineering projects

by Deanne Puca
WMU News

Engineering students pose with one of their creations.

KALAMAZOO, Mich.—Western Michigan University engineering students will showcase and demonstrate their senior projects at WMU's 58th Conference on Senior Engineering and Design from **8 a.m. to 4 p.m. Tuesday, April 19**, at the College of Engineering and Applied Sciences.

The event, on WMU's Parkview Campus, is free and open to the public.

Seniors will present the projects they have completed to solve problems facing business and industry. Many of the projects are sponsored by more than 30 southwest Michigan companies listed online in the Senior Engineering Design Conference brochure, available at wmich.edu/engineer/news/seniors.

There are a variety of disciplines involved, including civil and construction engineering; computer science; electrical and computer engineering; engineering design, manufacturing and management systems; industrial and entrepreneurial engineering and engineering management; mechanical and aerospace engineering; and paper and chemical engineering.

Projects include a human powered bicycle generator that can power home and office applications, a large-scale self-synchronizing clock and an update to a mobile app identifying streetlight and power outages for energy company consumers.

The conference is held twice each year, in April and December, to showcase the work of graduating seniors in the engineering disciplines who are required to complete a real-world capstone project. The capstone design course is an important component of the senior year and is a traditional part of many engineering programs.

WHY SHOULD ISM BE ANY DIFFERENT?

The ISM Experience

http://www.wmich.edu/supplychain/academics/experiential-course-projects

Applying Supply Chain Techniques in Industry Settings

The ISM program requires that all students take an experiential course (MGMT 381-0) in which students, after mastering process management concepts and techniques (e.g., single minute exchange of dies, value stream mapping, value engineering, etc.), are given the chance to gain experience by applying these concepts and techniques to an on-site industry process.

The course provides student teams with a project formulated by ISM professor Sime Curkovic and industry partners, such as Stryker, Whirlpool, Kelloggs, Eaton, Bronson Hospital, and Mercedes Benz Technology, allowing the teams the opportunity to create solutions and then apply them to improve a company's operations.

The collaboration with industry partners provides every ISM student with the unique opportunity to apply their in-class learning to the goals of influential and successful corporations, giving the students a professional work experience.

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http://www.supplychaindigital.com/supplychainmanagement/4162/Supply-chain-study-reveals-inadequate-processes

Supply chain study reveals inadequate processes

Nearly a third of all supply chain processes are inadequate, according to research from Crimson & Co.

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This insight was generated by analyzing data from scprime, an improvement approach designed to generate step-change improvement of the supply chain in line with a business's strategy. Since 2010, over 1,000 scprime assessments have been completed in 20 countries across a range of sectors, making this one of the largest and most comprehensive independent studies in supply chains.

The analysis showed that 71 percent of processes in most organizations are executed effectively, achieving a 'competent' or higher rating. This means that a third of all processes are carried out inadequately, representing a significant risk to the reliability of operations and allowing competitors to operate more effectively and with greater responsiveness.

Only five percent of processes achieved 'mastery', i.e. proven best practice performance, with the highest proportion scored as only 'competent'. This presents an opportunity to those businesses that understand the competitive advantage that a supply chain can generate; by focusing on the right areas, a business can steal a march on its competitors.

Other notable trends identified include that Europe and North America appear to lag behind the rest of the world when it comes to process maturity, with fewer companies reaching the basic competency level - 32 percent of companies' processes in Europe and North America were inadequate vs. only 22 percent overall. This is a surprising result which may reflect the tendency of processes to get worse over time. It may also be a result of the move of manufacturing out of the old markets, removing good process discipline from those markets.

Crimson & Co's Helen Chiswell said: "It's clear that businesses are struggling to evolve their supply chain processes to match business needs. This results from a 'business-as-usual' mindset where companies prefer to maintain the status quo instead of understanding the drivers of competitive advantage and adapting accordingly. This is a real risk to organizational performance.

"Every company needs to configure its processes to support priorities, allowing the supply chain to deliver against business objectives. The supply chain is increasingly recognized as a key enabler of competitive advantage but understanding requirements is a major challenge.

"Process improvement tools, such as scprime, provide a framework for this. Supply chain assessments identify the areas which need to be improved to maximize performance. A key stage in this is recognizing the supply chain as a whole rather than simply an aggregation of functions."

Applying lean manufacturing practices

In this project, Stryker Medical sought to apply lean manufacturing practices to several of its production lines. To address this goal, Stryker enlisted a group of ISM students who focused on part consolidation to improve Stryker's use of production floor space.

Stryker Medical was concerned about reducing the large amounts of inventory on its production floor. The student group was in charge of carefully collecting data on every part by number, weight, location and container. After collecting the data, the students were able to propose ideas that would facilitate reductions in inventory and a Just-in-Time delivery system to the production floor. With that information, the students then created and carried out several successful milk runs to deliver inventory to the lines.

- **Stryker team leaders**: Bruce Parmelee and Karen Machiniak
- **ISM students** (above, from left): Kevin Hughes, Hans Zoeller, Matt Parowski, Jeffery Miller

The "Supermarket" Project

ISM students were assigned to Stryker Medical's “Supermarket” which was a mini warehouse for the Power Pro and Chair division. The students were responsible for taking an inventory of parts used, measuring size and weight, standardizing shipment packaging and holding bins, and implementing improvements for circulation of parts, known as “milk runs.”

According to Stryker's Lean Project Manager, Jake Ritz, the work performed reduced inventory and shipment costs, standardize holding containers, increase visibility of products and raw materials, and ultimately widen margins and improve ROI. He said "the students effectively focused their efforts on generating efficiencies and creatively thinking outside the box" and that he hopes to collaborate with other student groups in the future.

- **Stryker Lean Project Manager**: Jake Ritz
- **Student participants** (above, from left): Brittany O’Brien, Aaron Sunderlin, Allen Clark, and Chris Danner.

Stryker Instruments Indirect Supply Consolidation

A group of ISM students collaborated with Stryker Instruments purchasing managers on a project to consolidate and reduce the number of suppliers necessary for indirect material purchases.

The group formulated short- and long-term goals that included creating procedures for proper oversight of the indirect supply base, setting buyer authorization levels, creating a scorecard to evaluate indirect suppliers, converting transactions from paper form to digitalized form, suggesting up-to-date ERP systems and e-tools, creating a preferred list, using strategic purchasing methods, and improving communication with other Stryker divisions. The managers all agreed that the group's suggestions will create transparency, greater communication, more organization, lower overhead and tremendously lower costs.

This project was the first trial of its kind at Stryker Instruments and not only gave the students invaluable hands-on experience but also provided the Stryker managers with valuable information to make beneficial changes to improve Stryker systems.

- **Stryker purchasing managers**: Michael Hindman, Sally Newland and Terri Wilson.
- **Student participants** (above, from left): included Teena Blake, Priyanka Parekh, Ray Rupley, Dan Lauderbach, Gregory Stepanian, Henry Kwok, and Izaak Hammond.

The Stryker/WMU ISM Kanban Project:

In reevaluating their reorder point and quantities through lean manufacturing concepts, Stryker Medical's product line team leaders worked with a group of ISM students to effectively change the kanban sizes and reorder quantities of all the parts on an integral product line.

 The students suggested breaking up the parts of the product line into three cost categories and developed a strategy for each. The students reevaluated and changed the kanban sizes by using a model that included historical lead time, daily demand, service level, safety stock, standard cost, and standard deviation of demand and lead time. The new kanban sizes have eliminated excessive inventories while reducing the amount of stock outs. By reducing stock outs and preventing line shutdowns, the group's changes will have potentially enormous cost savings for the Stryker Medical division. The WMU ISM students gained very valuable practical experience that could potentially impact a Fortune 500 company.

- **Stryker team leaders:** Christina Albertson and Courtney Bockover.
- **Student participants** (below, from left): Scott Huard, Kurt Ellis, Kyle Obreiter, Kevin Dyer, Adam Brown, and Jeff Diegel.

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MGMT 381-0 (Improving Supply Systems – Experiential Live Lean Six Sigma Projects)

Course Description:

The primary objective of this course is to extend the student's knowledge of the basic elements, issues, and problems facing the firm's supply chain. This course builds on the concepts introduced in previous courses and offers more detail regarding supply chain strategies, operating practices, and principles. The course is designed to provide students with an understanding of the design, implementation, and broad management of the effective and efficient Integrated Supply Chain Systems, by solving real world industry issues using the A3 problem solving process.

The ISM program requires that all students take an experiential course. After mastering process management concepts and techniques (e.g., single minute exchange of dies, value stream mapping, value engineering, etc.), students gain experience by applying these concepts and techniques to an on-site industry process. Student teams create solutions for projects formulated by Dr. Sime Curkovic and industry partners, such as Stryker, Whirlpool, Kellogg, Eaton, Steelcase, Texas Instruments, Mann-Hummel, Eliason, Parker Hannifin, Bronson Hospital and Mercedes Benz Technology and then apply the solution to improve a company's operations.

The collaboration with industry partners provides every ISM student with the unique opportunity to apply their in-class learning to the goals of influential and successful corporations, giving the students a professional work experience. The class has sponsored over 100 industry projects since 2008.

http://www.wmich.edu/supplychain/academics/experiential-course-projects

Sample 5S Continuous Improvement Project at Dunkley International:

https://www.youtube.com/watch?v=u3KsbxUzzOU&t=36s

General Comments

The focus of this course is on the "Single-Minute Exchange of Die" (SMED) system. The SMED system is a theory and set of techniques that make it possible to perform equipment set-up and change-over operations in under ten minutes. Although, improving die press and machine tool set-ups was the original purpose of SMED, its principles apply to all types of processes and operations. While it may not be possible to perform all set-ups in less than ten minutes with SMED, it does reduce set-up time dramatically.

Tenacious application of SMED leads directly to rapid changeovers, and allows several benefits to a manufacturing firm. First, SMED allows the systematic reduction of lot sizes thereby reducing inventory. Second, there is an improvement in productivity by increasing the time for production. Third, eliminating the need for machine adjustments and trial runs reduces spoilage. Fourth, by reducing the influence of changeover to the total production lead-time, delivery performance is improved. In other words, SMED increases profitability by allowing stockless production and improves customer satisfaction by providing flexibility, better deliveries and reduced lead-times.

SMED Simulation and Application

This course will first use an experiential learning simulation, where the students will master the SMED concepts and techniques, and then the students will apply the SMED System to a real setup or process.

Simulating the SMED System

Students will systematically apply the SMED concepts and techniques to reduce the production lead-time of processes used to produce two products. An essential component of this simulation is the manufacturing environment the students will use. The environment must mimic an actual manufacturing setting, but the students *must* have the ability to experiment with, or change the processes, layouts, etc. A possible manufacturing environment is the cooking (production) of two dishes (products) on one stovetop burner (machine). For the last five years, this type of manufacturing environment has provided students with an opportunity to apply and master the SMED concepts and techniques. Students have the freedom of designing their products, layout, etc. However, in designing their production systems, students should produce products (dishes) from raw materials and not prepackaged items.

Applying the SMED System

After mastering the SMED concepts and techniques, students will systematically apply the SMED concepts and techniques to reduce the production lead-time of processes, or setup time, or lead-time of any non-manufacturing process. It is the students' responsibility to identify the process or setup for applying the SMED System. By the second week of the semester, you should have identified the process or setup, and have obtained approval from the course facilitator.

Students will work outside of class on this course requirement. The course facilitator will meet with each group on several occasions outside of class to assure the appropriate progress.

Course Description

Taught as a seminar for sharing learning, best practices and knowledge across teams and clients, the course requires all students to examine issues beyond their project scope and client concerns.

Students work in teams to frame problems, develop solution paths, and manage projects from conception to completion for an assigned client. The focus is on **improving processes, inspiring innovation, and creating competitive advantage** – both short and long term – for real world organizations. Client deliverables include a formal presentation to the client management team that will lead to productivity gains, cost savings, revenue increases, and profit growth when implemented by the client.

Students function as professional consultants, working closely with a client organization to analyze internal/external situations, drivers and risks; to identify problems and opportunities; to evaluate return on investment from alternative courses of action; and to recommend solutions for short- and long-term prosperity. Students apply proven models and methodologies and hone their skills as a project manager, researcher, analyst, writer, speaker and peer coach.

Course Mission

To provide meaningful opportunities for students to authenticate best practices in Supply Chain Management (SCM) while **developing professional skills for managing people, processes and resources**.

Alignment with Undergraduate Program Goals

- Project work provides exposure to organizations as holistic systems where students communicate across organizational levels, functional disciplines, and cultures in practical workplace situations.
- The course goes beyond academic case studies and simulations; it offers a professional proving ground for demonstrating that students can apply their graduate education, manage people and processes, and provide innovative, feasible solutions to improve an organization's bottom line.

Linkages across the Curriculum

Building on MGMT 2800 (Intro to SCM), you will apply more advanced concepts and models from marketing, finance, accounting, operations, human resources, economics, statistics, information technology, and your signature SCM courses. You will develop and test hypotheses; conduct primary and secondary research; collect and analyze data; establish goals and metrics and action plans; and prepare persuasive proposals and presentations.

Course Goals, Learning Objectives and Measurements

"The skill to do comes from doing." - Ralph Waldo Emerson

Course Goals	*Student Outcomes*	*Measurement Techniques*
To bring lasting value to a client: • Identify opportunities to improve competitiveness or enhance reputation • Recommend a process improvement	**Frames problems, issues, sub-issues** Formulates hypotheses Gathers and analyzes data to prove/disprove hypotheses Provides feasible recommendations and implementation plan	Client satisfaction with project deliverables Forecasted bottom line impact of student recommendations Faculty evaluation of student project presentations
To provide a practical, on-the-job managerial experience	**Manages socio/emotional challenges of team and client interface** Supports client's goals and work culture	Client and faculty observations of student decorum and interfaces with stakeholders
To nurture systems thinking tools and quantitative methodologies for decision-making	**Applies appropriate business models and frameworks** Prepares sound financial estimates Analyzes numerical data; provides meaningful insight Applies technology effectively	Client and faculty evaluation of how well students apply methodology and tools from core BBA & ISM courses
To seek innovative solutions with integrated-bottom-line benefits	Understands stakeholder needs and organizational risks Considers short- and long-term consequences of actions **Quantifies financial, social, and environmental impact**	Client and faculty evaluation of project deliverables Usefulness of student recommendations to client (When/how implemented?)
To foster effective small group problem solving and productive cross-functional teamwork	Manages project effectively, balancing contributions across team **Uses time and expertise of client and faculty wisely** Anticipates and resolves problems	Instructor observations Client feedback Peer evaluations
To promote regional economic development by sharing knowledge and best practices	**Produces businesslike written deliverables worthy of publication** Recommends course of action that is adopted by client	Likelihood that client will implement recommendations Faculty and client evaluation of deliverables Publication-worthy case study
To prepare students for managerial and leadership roles in a competitive global marketplace	Plans and manages project from inception to completion **Delivers promise to client – on time and on specification**	Client reported likelihood to sponsor another project Client interest in hiring graduates

Course Pedagogy

Serving as consultants with external clients, you will be representing Western Michigan University and the Haworth College of Business. Your **clients are looking for bold new ideas for improving competiveness and profitability**. **They expect rigorous analysis, both quantitative and qualitative, that reflects the breadth and depth of an accredited, globally-recognized curriculum**. Your clients have prepared a preliminary project description, but your team must refine and articulate project goals, scope, tasks, timetables and deliverables. We encourage you to bring curiosity, creativity and enthusiasm to uncovering opportunities.

We (course instructors) will function as senior partners and risk managers for your team's consulting engagement, providing overall direction, including standardized templates, tools, and protocols to assure quality control throughout the engagement. **We will preview all documents and presentations before you share them with your clients to ensure sound reasoning and professionalism.** This "no surprises" screening step will limit risk for you and the university while you are learning. The course schedule lists formal checkpoints and status reviews, but we are also available for informal coaching, and you will have access to the expertise of professionals throughout our educational community.

Student Responsibilities

- ***Accept feedback willingly and apply it cheerfully in the spirit of continuous improvement.***
- ***Prepare for and actively participate in class sessions and client/team meetings; arrive on time.***
- ***Incorporate learning from across BBA and ISM curriculum in your research, analysis and writing.***
- ***Document all sources for quotes, paraphrased ideas, statistics, facts, and pictures.***
- ***Meet deadlines for your project and the course; strive to exceed client expectations.***
- ***Make arrangements, in advance, for special assistance or missed meetings/class sessions.***
- ***Advise instructors of major team conflicts or non-performance by a member to resolve quickly***.

PROFESSIONALISM-
McKinsey and Co.

We believe in professionalism. For us this means to always:

Put the client's interest ahead of our own. This means we deliver more value than expected. It
doesn't mean doing whatever the client asks.

Behave as professionals. Uphold absolute integrity. Show respect to local custom and culture,
as long as we don't compromise our integrity.

Keep our client information confidential. We don't reveal sensitive information. We don't
promote our own good work. We focus on making our clients successful.

Tell the truth as we see it. We stay independent and able to disagree, regardless of the popularity of our views or their effect on our engagement. We have the courage to invent and champion unconventional solutions to problems. We do this to help build internal support, get to real issues, and reach practical recommendations.

Deliver the best of our firm to every client as cost effectively as we can. We expect that our
people spend clients' and our firm's resources as if their own resources were at stake.

WHAT DOES EVERY COMPANY HAVE TO COMPETE ON?

Quality (e.g., Product Reliability, Product Durability, Conformance to Specifications, Design Quality, Company Reputation)

Service (e.g., Pre-Sale Customer Service, Product Support, Procurement Lead-time, New Product Development Time, New Product Introduction Time, Manufacturing Lead Time, Delivery Speed)

Flexibility (e.g., Delivery Dependability/Reliability, Delivery Flexibility, Volume Flexibility, Mix Flexibility, Changeover Flexibility, Modification Flexibility)

Cost (e.g., Low Production Cost, Competitive Pricing)

Value = Performance (e.g., Quality, Service, and Flexibility)/Cost

HOW ARE COMPANIES LOWERING COSTS AND IMPROVING QUALITY, SERVICE, & FLEXIBILITY?

SUPPLY CHAIN MANAGEMENT

Closer Customer Relationships, Benchmarking, Open Organization, Zero-Defects, Process Improvement, Measurement, Supplier Development, Statistical Process Control, Product Traceability, Computer-Aided Design (CAD)/Computer-Aided Engineering (CAE), Computer-Aided Manufacturing (CAM), Cellular Manufacturing, Concurrent Engineering, Continuous Improvement, Design For Manufacturability (DFM), Integrated EDI, Group Technology, Integrating Information Systems, JIT Manufacturing, JIT Purchasing, Supplier Partnering, Manufacturing Lead Time Reduction, Modularity, Preventive Maintenance, Robotics, Setup Time Reduction, Standardization, Value Analysis/Product Redesign, Computer Integrated Manufacturing (CIM), Flexible Manufacturing Systems (FMS), Customer Compliance Bar Codes, Automatic Data Capture, Automated Materials Handling, General Purpose Equipment, Computerized Production Systems, Maintaining Extra Capacity, Contract Labor, Outsourcing, Broad Jobs, Employee Autonomy, Employee Impact, Cross Training/Job Rotation, Labor-Management Relations, …

YOU ARE MAJORING IN SUPPLY CHAIN MANAGEMENT. AMERICA'S LARGEST, MATURIST, AND MOST IMPORTANT INDUSTRIES BASICALLY COMPETE ON SUPPLY CHAIN MANAGEMENT AND NOTHING ELSE. THESE INDUSTRIES HAVE TO FIND WAYS OF REDUCING COSTS AND IMPROVING PERFORMANCE. HOW DO THEY DO IT? ANSWER: SCM. THINK ABOUT IT. LOOK AT AEROSPACE, CHEMICAL, STEEL, AUTO, ETC. HOW DO THEY REDUCE COSTS AND IMPROVE PERFORMANCE? ANSWER: SCM. THAT IS WHY YOUR MAJORS ARE SO IMPORTANT. WHILE COMPANIES IN THESE INDUSTRIES CONTINUE TO DOWNSIZE, THEY CONTINUE TO RELOAD IN THE AREAS OF SCM. THAT IS WHY YOU WILL HAVE A JOB WAITING FOR YOU WHEN YOU GRADUATE.

Lecture Topics

- anticipatory production, large-lot production, respond to demand fluctuations, reduce lead times, large-lot production, diversified, low-volume production, high-volume production of fewer kinds of items, set-ups and small-lot production, the model of production planning for the future, multiple set-ups and small lots, economic lot size concept, internal and external set-up.

  And more…

  CORE COMPETENCY, COMPETITIVE DIMENSIONS OF VALUE, VALUE MANAGEMENT, VIRTUAL ORGANIZATION, MASS CUSTOMIZATION AND ECONOMIES OF SCOPE, ECONOMIES OF SCALE , AUTOMATION, RAPID GROWTH, START-UP, MATURATION, DECLINE, PRODUCT LIFE-CYCLE, JUMBLED FLOW (JOB SHOP), DISCONNECTED LINE FLOW (BATCH), CONNECTED LINE FLOW (ASSEMBLY LINE), CONTINUOUS FLOW, TIME BASED COMPETITION, PRODUCT-PROCESS MATRIX, GERMAN AND JAPANESE MANUFACTURING PRACTICES.

Course Requirements and Grading Policy

Students shall participate in classroom discussion. Additionally, students shall complete all assigned readings before each class meeting. The following are the course requirements along with their assigned values for computing a student's final grade:

Final Exam (based on lecture and reading assignments handed out in class):	10%
Final Exam Week	
Final Project Presentation	65%
Homework, quizzes, participation, attendance, communication, etc.*	25%

*I expect your attendance for class and project meetings to be perfect. If you cannot be perfect then you must make sure you communicate with me. I will not tolerate any group members that do not do their part. Keep your emails professional with me and keep up with the emails. When you are in the real world, you will get over 100 emails a day and you will be expected to respond to them in a timely and professional manner. I expect the same. Always start every email with me with: "Hello Sime:" . End every email with me by saying "Thank you.". Emails are not text messages. People are going to judge your professional aptitude and capacity by your written correspondence. So, avoid text acronyms such as "ttyl", do not start emails with "hey", do not call me "dude", etc. Pretend I am your professional supervisor and your career depends on my impression of you. If you do all of this, you will notice that I will bend over backwards on your behalf while you are in college and beyond. There is nothing more that I want than to help you live the American Dream.

The educational process is an equally-shared partnership between students and the professor. Each party has roles and responsibilities that are formally and informally defined. However, at the end of the day, this is **YOUR** education; as such, you are **ultimately responsible** for your learning and getting everything that you can out of this experience.

Your undergraduate educational years are critical … "windows of opportunity" for you – an investment that if made wisely through solid performance, will pay MAJOR dividends in the future and define your life to a significant degree. I don't take this time frame lightly and you shouldn't either. Given this, my expectations of you are similar to what I expected of employees who worked for me: professionalism, teamwork, operating with a sense of urgency, and compassion and caring for others. My job is not only to help educate you, but also, to make you more employable. This mission I pursue with a passion.

Having said this, we will always balance our work with fun, laughter and camaraderie. This is how we grow as business professionals and people. Expect to work hard and play hard, and we will enjoy our many successes together. I look forward to this semester and you should too! And remember, passion and positive attitude are contagious.

Let's have a great semester together and make a difference!

Student Groups

Students will organize themselves into groups consisting of no more than five students. These groups will have the following responsibilities:

(1) Applying the SMED system to their process in a systematic manner.

(2) Using different problem-solving techniques when applying the SMED system

(3) Documenting their application of SMED and use of problem-solving techniques for the simulated project.

(4) Documenting their application of SMED and use of problem-solving techniques for the application project.

(5) Working with another group to verify the appropriateness of both groups' documentation.

(6) Presenting results of their efforts.

Electronic Devices:

Usage of Electronic Devices during Class

Cell phones are to be turned off or set to vibrate. Surfing the web, sending email, text messaging, talking on a cell phone, listening to an iPod or MP3 player in class is prohibited.

Process Improvement Project

Students will complete a project on process improvement with their group. The project will entail evaluating a business process **in an organization to which you have access** and developing a plan of action to improve the efficiency and effectiveness of the process. The phases of the project are as follows:

Each group will submit a description of at least 2 processes (1/2 to 1 page each) that they would like to evaluate. The process CANNOT be a process that is already undergoing an improvement effort. **You must have access to an actual process and be able to gather data from it.** From these process descriptions the group will select, with the instructor's input, a process to analyze. Examples of good processes for analysis from previous classes include:

- The medical record completion process at a major hospital
- A warranty claim process
- The Receiving process at a major hospital
- The process of buying a new car at a car dealership
- The process of assembling, preparing and packing components for shipment

The groups will make a preliminary presentation early in the semester. Each group will have 10 minutes for this presentation. This presentation will be a description of the current process (which will include a process map) and an evaluation of performance measures for the process (both current performance measures and suggested additions/changes) and a short discussion of where the problems are and where/how you expect to make improvements.

A final presentation of the project will be made to the class that will consist of a brief review of the process; the analyses performed on the current process; recommended process changes; impact of those process changes and a project plan for implementation. Each group will have 15 minutes for this presentation.

The presentations will be graded on the following criteria:

- Quality of PowerPoint Slides
- Correct Level of Detail
- Participation of all group members
- Speaking quality (eye contact, spoken not read, projection)
- Time management

Note that you will not be graded on your attire.

Each group will submit a written project report consisting of:

- Executive summary
- Table of contents
- Brief description of the organization
- Description and map of the existing process
- Analysis of the existing process
- Analysis of performance measures
- Recommended changes to the process and new process map
- Expected benefits of the changes to the process (in terms of recommended performance measures)
- Project plan for implementation (including time and resources).
- Tables and Figures, labeled and referenced

Each student project team must complete the following before proceeding with their projects:

WMU Student Project Proposal Sheet

To propose a student project please complete the following information:

1. Project Title:
2. Company Project Champion (Name, Title, Phone #, e-mail address):
3. Project Scope:
4. Project Deliverables (specific & measurable):
5. Background Information:

Examples are shown below.

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WMU Integrated Supply Management Projects

Project Title: **EMS Milk Runs**

Company A Medical Project Champion (Name, Title, Phone #, e-mail address):
Jake Ritz
Lean Project Manager
269-488-6438
Jake.ritz@Company A.com

Project Scope:
Collect part specific attributes according to the WMU PFEP Phase II spread sheet and develop designs for milk run delivery of those parts to their point of use.

There are four areas:
1. Supermarket; an existing supermarket area for the M1 and Power Pro products.
2. 6082; a product where all parts are stored on the production line.
3. Chairs & Cot Fasteners; two products where parts are stored on the line.
4. TL; a supermarket for an option built on the Power Pro line.

Project Deliverables (specific & measurable):
The project team will be responsible for the following project deliverables. Items are listed in priority order.
1. Collect all data in the WMU PFEP Phase II spreadsheet
2. Determine the appropriate bin size for a milk run system and the quantity of bins necessary based on the "qty/bin" that Company A Medical provides
3. Create an electronic spread sheet with all the information collected

4. Design a supermarket layout based on collected data that can store all parts in an ergonomic fashion that facilitates milk run pick ups
5. Design a milk run system that can replenish parts to the point of use at a frequency of every two hours

Background Information:

Our operators leave their workstation to get parts which interrupts the rhythm of our production line and creates a tremendous amount of waste where there is a supermarket. Where there is no supermarket the parts stored on the line take up too much space which creates waste. We would like to create on single supermarket for all of EMS that can support storing all the parts in our system and facilitate the use of a milk run system.

Future times desired on-site:
Every Wednesday from 3pm – 5pm.

WMU Integrated Supply Management Projects

Group 1:

Project Title:

Use of Level Loading Production Schedules to Improve Efficiency

Company A Medical Project Champion (Name, Title, Phone #, e-mail address):

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Med Surg Planner
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Project Scope:

The project team will be responsible for gathering necessary information on the current states of order entry, scheduling, and production in order to determine the specific benefits of level loading to the Beds Business Unit along with implications this type of system may have on other departments throughout the building. This will require the team to spend time with the appropriate internal representative for each function described above.

It will be the team's responsibility to analyze the data, costs (including soft costs) and benefits as well as the financial impact that the changes will have. The team will then be responsible for recommending an implementation strategy for level loading according to the Beds Business Unit's status quo.

Project Deliverables (specific & measurable):

The project team will be responsible for the following project deliverables. Items are listed in priority order.

1) A presentation that describes why an organization would want to use level loading in production. This should explore all benefits for the entire value stream and whatever draw backs there might be. We would like to use this presentation to help convince other departments within Company A why they might have to change their ways to better the entire organization (cause and affects explorations). The presentation should be tailored to fit Company A's organizational culture and our specific areas of improvement as it relates to level loading.
2) At least three value stream maps will be required (Current planning process, ideal state and future states).
3) A recommendation of how we should implement a level loading process within Company A taking into account our materials value stream, our customer service order entry process, our planning process and finally our physical loading of beds on to the line.
4) A financial analysis on the implications of a level loading program for Company A's Beds Business Unit.

Background Information:

Currently Company A Medical does not level load or mix model load its products to production. The operations team feels strongly that with a level loading production will be more efficient at reaching a consistent daily output. At first glance management believes there may be changes required for some of the other departments within Company A Medical before we can implement a level loading program.

Project Steps (please outline the activities you think need performed):

Please see "Project Deliverables"

Future times desired on-site:

As necessary for students to accomplish project

Resources (describe who and what are available to the students from Company A Medical and how to gain access to them):

Andy Bentz
Associate Business Unit Manager
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WMU Integrated Supply Management Projects

Project Title: **EMI Fabrication Kanban Sizing**

Company A Medical Project Champion (Name, Title, Phone #, e-mail address):
Dan Goodrich
Materials Buyer
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Dan.goodrich@Company A.com

Project Scope:
Review the usage and lead times of EMI fabricated parts and develop new kanban sizes.

Identify how many different part numbers pass through each EMI Fabrication Work Center.

Use work center change over times and part run times to estimate how many kanbans of each part can be produced per day and validate that the original lead times are accurate. Where the lead times can't be met due to part volumes a new lead time and kanban size should be recommended.

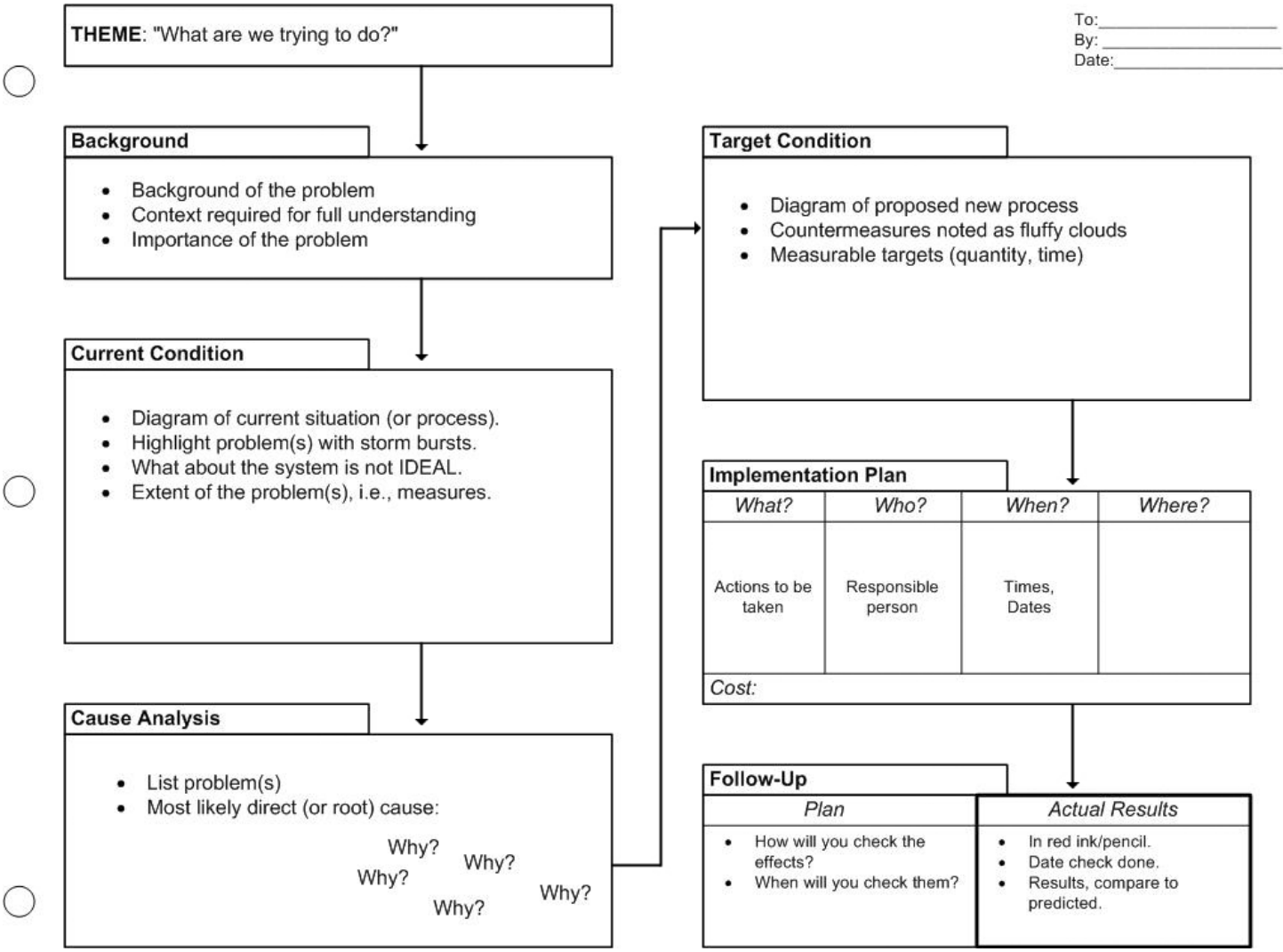
Project Deliverables (specific & measurable):
The project team will be responsible for the following project deliverables. Items are listed in priority order.

6. Create a spreadsheet that includes all kanban sizes (old and new quantity)
7. Create a spreadsheet showing each work center that a part passes through. Format this data spreadsheet to provide the most useful information for identifying work center bottlenecks.
8. Create a visual presentation of part loading through work centers.
9. Evaluate the throughput of parts through work centers to determine if the lead times provided by Company A are accurate. Where not accurate make recommendations on more appropriate lead times.

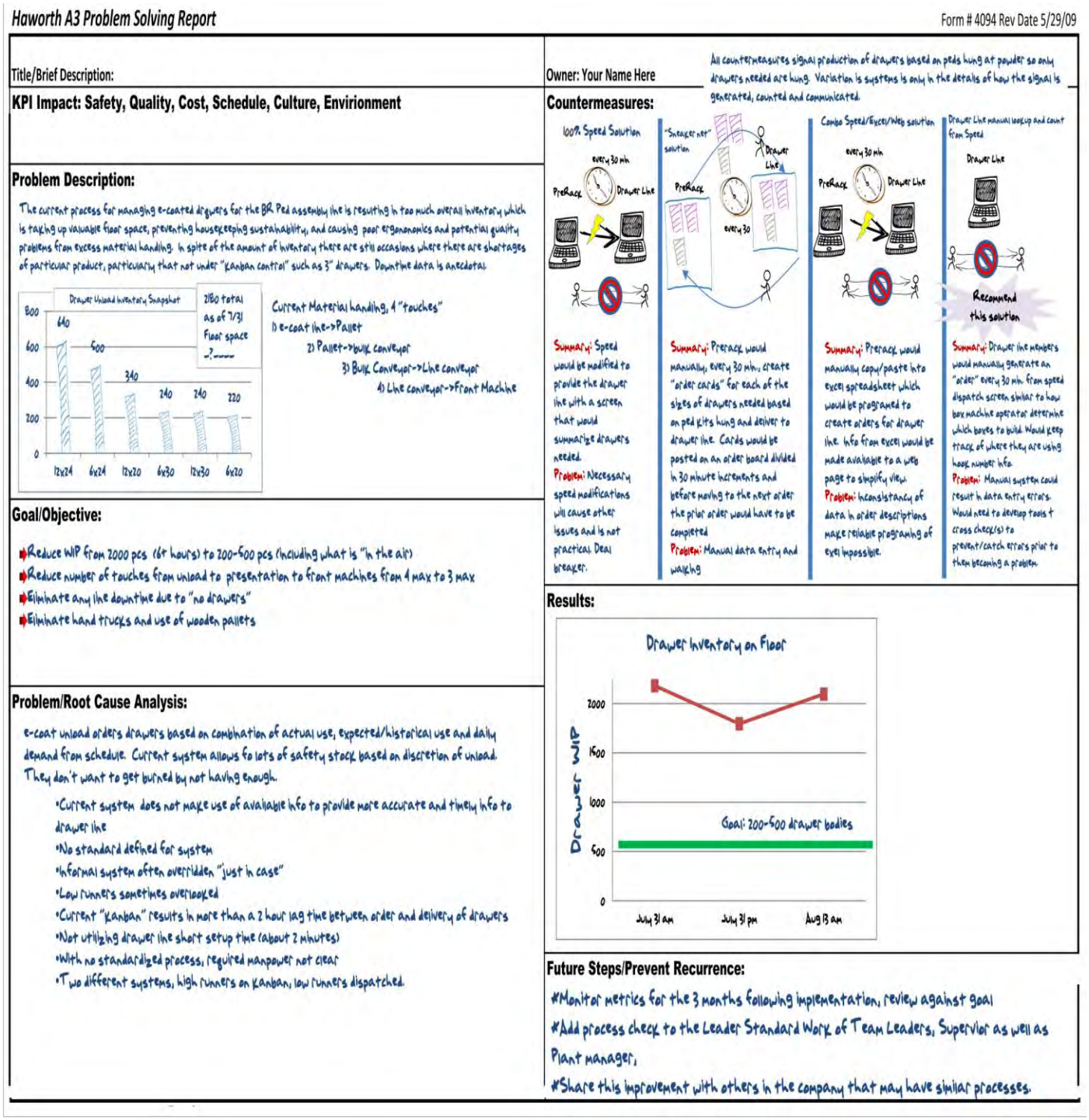
Background Information:
There is not a consistent, scientific method applied for the current kanban sizes of EMI fabricated parts. In most cases the kanban sizes are much larger than the usage rate relative to lead times. This results in large batch production, artificially inflating lead times and creating large backlogs. It also requires storing large quantities of finished goods that take up valuable space, are exposed to damage risks, and force operators to walk around a large area to obtain parts to produce product.

Future times desired on-site:
As necessary for students to accomplish project

Your final presentation should look something like this (you must use the A3 problem solving process format):



Or something like this (you should be able to fit your entire project on an 11x17 piece of paper):



The format is called the A3 problem solving format. A3 is a paper size (11x17) and Toyota created this problem solving technique. The approach is now used by everyone in the auto industry and throughout the global economy. The idea is that everyone has to be able to solve problems, but you have to keep it simple. Otherwise, changes are never made. On your resume, do you have problem solving skills listed someplace? If not, no worries, you will after this class.

Project Management Process

"We help our clients make change happen." - McKinsey

The following approach summarizes Chapters 1 through 5 of the course text, *The McKinsey Mind.*
Chapters 6 and 7 offer additional insight to managing the team, your client and yourselves.

Steps:	Milestones:
1. FRAME THE PROBLEM Analyze the client's situation and needs Identify the key issues Determine problem(s) to solve and why	Agreement to scope, goals, measurements and exclusions from project charter Documentation of "as is" model and practices Presentation of logic tree and organizing frameworks Understanding/acknowledgement of constraints
2. DEVELOP/SCREEN HYPOTHESES Articulate idealized state by brainstorming the possibilities ("What could be?") Define any project boundaries	Working agreement on which possibilities align with mission and values "QDT" analysis (see Chapter 1) Refined scope document
3. DESIGN THE ANALYSIS Determine information needed to prove/disprove hypotheses Structure analysis; select appropriate tools Decide what not to do	Work plan − tasks, duties, timetable − aligned to "big picture" and client culture Identification of key drivers/factors that have major impact on problem(s) Documentation of available facts
4. GATHER "SMART" DATA Develop/test questionnaires and protocols; conduct interviews Collect useful information quickly (per advice from text, faculty and client)	Knowledge management (KM) documents • Share/discuss with entire team • "Pre-wire" instructors • Get timely "reaction" from client (go/no go)
5. INTERPRET THE RESULTS Find the "so what" insight Assess the risks Draw conclusions Generate solution (per client capabilities) Forecast impact of change	Gap analysis Financial analysis Analysis and forecasts using proven models and tools Opportunity matrix − short and long term Recommendations and action plan that are "pre-wired" with faculty and primary client stakeholders
6. PRESENT YOUR IDEAS Develop team strategy for convincing clients that change is merited and achievable Prepare deliverables to specifications	Written strategic plan that outlines a significant change management recommendation, including implementation guidelines, timetable and budget PowerPoint slides for final client presentation

Rasiel, Ethan M. and Paul N. Friga. *The McKinsey Mind* (New York: McGraw Hill, 2001) ISBN 0-07-137429-9

Peer Rating Form

Your Name _____

Rate each member of your group, including yourself. Base your assessments on your interactions in the classroom and during group meetings. Each question is worth 0 - 10 points. Each member of your group can receive 0 - 50 points.

Dimensions	Points	Description of Behavior
Attendance	0 - 3	absent quite often; the group had to work around this member
	4 - 7	absent occasionally, but did not inconvenience the group
	8 - 10	routinely present; the group could count on this member to be present
Preparation	0 - 3	did not do required readings; did not preview exercises
	4 - 7	did required readings but did not preview exercises
	8 - 10	did required readings and previewed exercises
Cooperation	0 - 3	highly uncooperative
	4 - 7	moderately cooperative
	8 - 10	highly cooperative
Contribution	0 - 3	detracted from group performance
	4 - 7	had little impact either positive or negative on group performance
	8 - 10	added significantly to group performance
Fair Share	0 - 3	frequent free rider; did not do fair share of the work
	4 - 7	ordinary group member; did acceptable amount of the work
	8 - 10	did more than fair share of the work

Note: include yourself on this form.

Name of Group Member	Attendance	Preparation	Cooperation	Contribution	Fair Share	TOTAL
1.						
2.						
3.						
4. 5. 6. 7.						

Comments (feel free to use the back of this page or attach an additional page):
Did any member(s) make exceptionally strong contributions? Describe.
Did any member(s) fail to make appropriate contributions? Describe.

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Sample Student Projects

Eaton Process Dunnage Map Spring 2014

Eaton Corporation's Global Headquarters for Truck Components Operations is located in Galesburg, MI. They manufacture powertrain components such as transmissions and clutches. During the Spring of 2014, the company called out to four Western Michigan University students to help them create a process map for returnable packaging/dunnage. Eaton had two main issues. The first problem was that Eaton's suppliers were not receiving enough returnable packaging in time for shipment. The second was that Eaton had to place large orders for returnable packaging every year. The four WMU students were: Amber Thompson, Matthew Bigelow, Vikash Pillay, and Jordan Carini. These students were guided by Alison Stephanic and Amanda Gifford (two Eaton employees).

The project started with a kick-off meeting to learn about Eaton's process regarding returnable packaging. The team was later given a lesson from Alison and Amanda on how to use Value Stream Mapping. Alison and Amanda then brought the students to Indianapolis to visit the Eaton Logistics Center. They also stopped at Eaton's Clutch Logistics Center in Auburn, IN. This trip helped the students understand how the returnable packaging "loop" worked. The" loop" was between many suppliers, many Eaton locations, and a company that cleaned the dunnage.

The students were able to create a process and value stream map, analyze purchase data, and identify several opportunities for improvement. The movement of dunnage between Eaton's "loop" is quite complex. Amber, Matthew, Vikash, and Jordan laid groundwork for a detailed Value Stream Map which will be picked up by another group of students.

Eaton Cost Analysis Project Spring 2014

A team of five WMU ISM students were tasked with helping both the Aluminum and Iron Casting Commodity teams develop a cost analysis model to better understand supplier costs. The WMU team consisted of Leo Bieniek, Vytenis Karaitis, Michael Merling, Terry Stritzinger, and Tucker Wildermuth. They were under the direction of Seth Vaccaro who is also a WMU ISM student and is working at Eaton as an intern.

The project was divided into two phases coinciding with the needs of each commodity group. Phase one was working with the Aluminum Commodity group and involved taking an existing database of supplier quotes for all aluminum casted products and developing a convenient and efficient way of analyzing the variation in supplier costs across six specified categories. The Eaton Aluminum Group wanted us to create charts based on the six categories that met the following requirements:

1. All supplier quotes needed to remain anonymous
2. The data needed to be broken out into different groups based on production equipment size
3. The charts needed to be dynamically linked to the database so that all new updates would be included

In order to accomplish this, the team decided to initially develop a viable method to build the appropriate graphs and then move on to the live updating component. After getting feedback from Eaton about our first version of the charts, we determined that making a dashboard using Slicers would be the best solution. Slicers are a tool in MS Excel that connect to worksheet data through pivot tables, and allow for any column categories to be represented and filtered by a very convenient, easy to use graphical user interface that greatly simplifies parsing data through filters on the actual worksheet.

The Eaton Aluminum Group was very pleased with the resulting dashboard.

In parallel with phase one, the Eaton Iron Group was sending out modified RFQ's to all of their suppliers in order to get a variety of production process costing information for each specific part made by the supplier. The phase two goal was to build a similar cost catalog database based on what the Aluminum Group was using, as well as develop a similar cost analysis dashboard. It was a concern amongst the Iron Group at the launch meeting that it might take a longer time to get back supplier data then the timespan of the WMU side of the project allowed for.

As this proved to be the case, the phase two deliverable just became assembling a template for the Iron Cost Catalog database based on the modified RFQ developed by the Iron Group. The final database template ending up having 78 different column categories as well as having four rows of column groups/titles. During the database development stage, the team determined that actual data entry would quickly become a very time consuming task and began to brainstorm ways of improving that.

It was determined that one of the next steps for the following WMU team would be to take a blank Iron RFQ worksheet and fill in formulas in all of the appropriate value cells that would automatically populate the Iron Cost Catalog database. This could be done through excel command formulas or by developing a macro. Other next steps are to refine the anonymous quote numbering system from the phase one aluminum dashboard to make identifying quotes from the same supplier easier while still maintaining anonymity. The Iron Cost Catalog database still needs categories added to it that are based on other data not found in the RFQ and the same type of dashboard as the Aluminum Group has needs to be built.

The Eaton Cost Analysis project is ideal for students who wish to hone the skills that they learned in CIS 2640 and preferably CIS 3640 in a real world setting. Learning to build dashboards across multiple data sets will soon become an invaluable skill set for all types of data analysis.

Lacks Project Spring 2014

Lacks Enterprises is a cutting edge automotive company for exterior trim, rims, and grills for vehicles. Recently, Lacks has been having difficulty with one customer who changes the demand of parts frequently, making it nearly impossible to plan ahead for production. Lacks tasked a WMU group with creating a tool to measure their current demand and set the framework for a new lean manufacturing system.

The WMU group consisted of Dominic Ronchetto, Conor Hamilton, Maria Toth, and Seth Vaccaro. With help from John Ulrich, a supply chain manager from Lack's, the group was able to learn and create a current state map of their replenishment system for their paint west facility. Using that map, the group was able to identify waste issues in their production processes. From there they formulated a future state map to help visualize the new process with the inventory waste removed. From there, the group received a plant tour to see the operations and identify opportunities for improvement, taking into consideration current space constraints. The group came up with two final proposals to convert their current system from a push to an inventory based replenishment pull system. The next group will most likely focus on the beginning stages of implementing one of the proposals chosen by Lacks.

Bronson Supplier Strategic Evaluation and Implementation Spring 2014

In the Spring Semester of 2014, our group was assigned a project through Bronson Methodist Hospital working closely with the material manager, Tristan Stempien (a WMU ISM and WMU MBA alumn). The group consisted of current ISM students Joshua Johnson, Dave Burns, Robbie Mahon, Jeff Buckley and Wei Zhang. Our project was based on the fact that Bronson Methodist was in the processes of choosing a company to start implementing third party reprocessing. Our group's goal was to make a recommendation for which company to use, and the best way to apply third party reprocessing. Throughout the semester our group took tours of the OR rooms of Bronson in Battle Creek and in Kalamazoo to grasp an idea of the environment in which this process would be taking place. We then were able to see the two reprocessing companies present and researched any additional information that we thought would be beneficial.

The main objective was figuring out how to implement these new procedures with obstacles such as space constraints, education/training, and volume of materials Bronson would be handling. By the end of the semester we chose the best company that fit the Bronson environment. We then carefully formulated the details of implementing this process in the A3 problem solving format. Creating countermeasures for all issues, designing a process map, and forming a timeline were key parts to this project.

Eliason Template Project 2014

Eliason Corporation, founded in 1952, is the originator and only manufacturer of Easy Swing® double action impact traffic doors. Eliason has been implementing lean techniques and 5s lean manufacturing techniques to make their workspace more efficient. One area they have had trouble with was understanding how many, and what kind of templates for manufacturing they have on the floor. Eliason tasked a WMU group with implementing a system to identify, organize, and allow for reduction and expansion of the template supply.

The WMU group, consisting of Marc Thompson, Brittany Neudeck, Lauren Booth, Kevin Zarate, and Tumadhir Alzunaydi (Tami), worked closely with Eldon Barclay, Mason Deluca, and Tim St. Onge to implement a template management system. The WMU group began by getting out on the shop floor to understand how the production facility worked, what would be considered a template and how many there would be throughout the building. After some months, the WMU team was able to track down all templates being used throughout the facility, and built a system that would allow Eliason Management to add new templates, as well as remove old, unused templates, all while keeping track of where these templates are used. Also added to this system, is a tool for quarterly audits and yearly assessments of the efficiency this system provides to the company.

For moving forward, the WMU team suggested the best way to keep this system implemented is to ensure all templates remain accounted for, and to audit these templates four times a year. The team also suggested conveying this importance to the employees who use the templates, demonstrating value in the form of increased efficiency.

Mann-Hummel Warehousing Project Spring 2014

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Mann-Hummel is a major global leader in filtration and supplier of automotive air and fluid management systems and components. With exponential growth of late, the company has accumulated an overflow of material, obsolete equipment and customer tooling at their Three Rivers, MI warehouse and MidLink facility. To compensate for their growth, Mann-Hummel has recently acquired a new warehouse space that is located directly next to their Portage, MI building. The new warehouse will lead the company towards a lean manufacturing future in terms of warehouse flow, inventory management, and strategic logistics. Our goal was to propose inventory management solutions to implement in their new facility. Our group looked at various ways to improve the way they manage and store their equipment and parts. We looked at simple low cost solutions to big expensive solutions to show there are many different ways to handle this problem. Through our solutions of active racks, using excel, effective signs, and warehouse layout we proposed a solution to solve particular problems that can plague any warehouse. Our goal is to show that there needs to be more than one solution to solve the problem of using, obtaining and storing the parts they need on a daily basis or the parts that need to be stored because of a contractual obligation.

Lacks Service Product Flow Analysis Project Fall 2014

Lacks Enterprises is an automotive company based out of Grand Rapids, MI that revolutionized the chrome plating process for interior and exterior trim pieces. After pioneering a technique that allows them to produce a better product than their competitors, they have since become one of the more successful, privately owned, cash based automotive companies around.

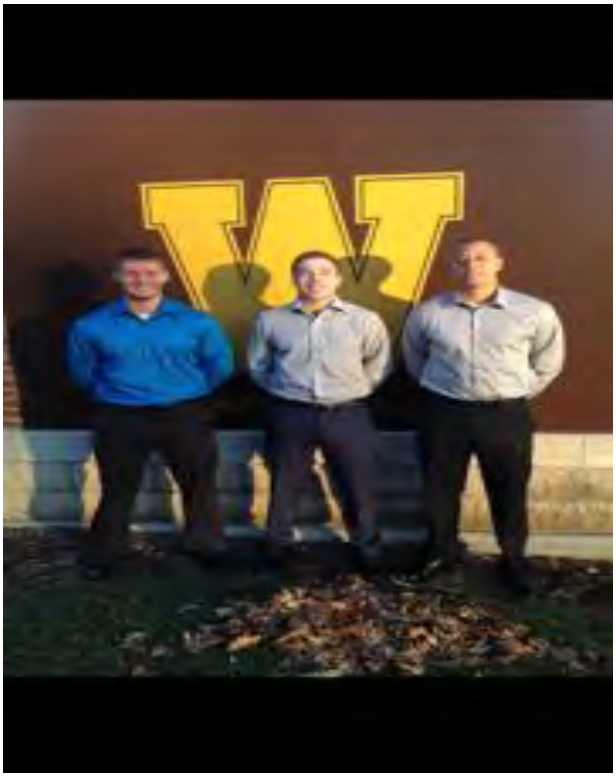
In recent history their supply chain department, headed by John Ulrich, has had a difficult time dealing with a particular bottleneck that was beginning to become increasingly frustrating with no potential solution in sight. The issue was that WIP was being overlooked when it needed to get ran through a particular RTV machine, which there was only one of, and in trying to push work through at the last minute it was causing other issues such as unorganized warehousing and dock congestion. It is worth noting that the reason for only having one RTV machine is because the part is no longer on production, however they are contractually obligated to be able to produce it for another decade.

Our team, consisting of Zach Cutshaw, Alexandra Leist, and Patrick Babel, created a set of proposals that would not only help rectify their current situation with the RTV machine but also allow them to optimize their entire warehouse where the RTV machine is located. After doing a root cause analysis we found that the underlying issue behind the inefficiencies in this facility was the fact that there is too much product in the warehouse. This causes an increase in changeover time due to it taking longer than necessary to find WIP, and too much product also doesn't allow for visual management of inventory, which is useful in scheduling.

Our first proposal consisted of implementing an offsite WIP center where they would store all of their WIP that needed to come through this warehouse. The warehouse itself would only hold a day's worth of inventory, and would be organized in the storage area in a manner that reflects how the work cells are set up in order to make it easier for the set-up tech to find what they are looking for. A drop-off zone would be implemented at the end of each column of inventory where the WIP would be dropped off by a forklift, and then the set-up tech would use a pallet jack to deliver it to the work cell. Before, forklifts were moving in and out of warehousing and work cells, which can create a safety issue. In only holding a day's worth of inventory it makes it easy for the supervisor on duty to be able to go out to the warehouse, see what they have, and schedule what needs to be ran or communicate to the other facilities that they need a certain product at a certain time.

Our second proposal consisted of taking this same strategy of organization in the warehouse and implementing it without having to use an offsite center to store WIP. This would allow for visual management of inventory, and a reduction in changeover time without having to make an initial capital investment.

Denso Returnable Packaging Inventory Tracking and Management Project- Fall 2014



DMMI is an automotive supplier for customers such as Toyota, Honda, GM, Chrysler, Ford, Fiat, Subaru, and Mitsubishi based out of Battle Creek, Michigan.

Denso does not currently track returnable packaging which causes over $1.2 Million in loss each year. The WMU team consisting of Brian Wise, Alex McDonald, and Karl Schaefer worked with Cody Leonard, Jeff Belknap, and Tony Morales and were tasked with benchmarking the industry on best practices in regards to tracking returnable packaging, studying cost impacts for missing returnable packing, and developing four options for Denso to pursue. They were then asked to study the total cost impacts for implementation of each of these options, and finally make a recommendation to the company with which route they believed was best suited for Denso.

The group came up with options that included barcoding, RFID, standardizing packaging, and a math based integration system. They decided to primarily pursue barcoding and RFID since these were the most feasible options, and they contacted many companies that have implemented these systems as well as those that sell them. They were able to bring in William Wappler, the President of Surgere, inc. as well as Eric Schweers who is the Senior Engineering and Process Manager, to tour the facility and make recommendations in regards to implementing RFID. They studied cost impacts for implementation of these options, and ultimately made the recommendation to implement RFID on a single product line as a prototype.

Impact Label Project Fall 2014

Impact Label Corporation is a custom printing company in Kalamazoo. Impact Label can print almost anything from standard labels to Fat Head posters. The company has been around for 50 years with some of their current employees having been there for over 40 years. That being said, the essence tribal knowledge is still very strong and is heavily used today. The fact that every order is customized makes it hard to standardize processes and the presence of tribal knowledge makes it difficult to implement standardization techniques, due to employee resistance.

Alexandra Folkema, Stacey Simon and Matt Breitag, a group from Western Michigan University's Bronco Force took on reorganizing Impact Label's warehouse. Their project for Impact Label was to implement lean strategies into the warehouse and to standardize processes and simple tasks. They helped Impact Label's warehouse become more organized and efficient and as a result, decreased the amount of time spent delivering material to operating lines.

This project started as a WMU Bronco Force project and gradually shifted into an Impact Label 5s project. While the organizing is still in progress, Alexandra, Stacey, and Matt's next step is to construct lean manufacturing workshops with Impact Label's employees and management team to stress the importance and benefits of daily lean manufacturing techniques. These techniques include, decreasing the amount of time it takes to deliver material to operating lines, which, can help speed up production times with the ability to take on more projects. Doing this will increase the company's revenue, potential employee bonuses, stimulate company growth, and help the company run more smoothly as a whole.

Through the many struggles faced during this project, Impact Label's management team and WMU Bronco Force's team (Ken Jones, Stacey Simon, Alexandra Folkema and Matt Breitag), they believe they can make Impact Label a more productive and efficient business by using daily methods of lean manufacturing throughout all of their tasks. Impact Label's management team will be responsible for executing these strategic techniques on a daily basis and maintaining them in order for their employees to fully adopt these new skills and accept these changes.

Denso Returnable Packaging Project Fall 2014

Denso Manager: Rich Stanley
Denso Contact: Aaron McCann
Western Michigan University Students: David Archer, Ogugua Okafor, and Zheng Wang

The scope of the project was to design a process and a layout for sorting and cleaning all returnable packaging that Denso Manufacturing Michigan (DMMI) receives. The process had to take into account space, touches per tote, walking distance, man hours, safety, quality and cost. The layout and process will be implemented at an onsite warehouse, in a different building, that DMMI currently pays an outside company to manage. We had to first study the current process at DMMI in order to determine inefficiencies and benchmark that against other Denso plants as well as outside companies. We received a large amount of raw data from DMMI that we had to sort through and decipher what information was relevant. After going through the information and determining how many different totes and the quantities of each tote that DMMI sorts each day we then had to figure out how to efficiently and effectively clean, sort, and store all totes with safety and floor space being top priorities. When all was said and done we presented DMMI with a layout that most efficiently utilized the space that they had available as well as keeping a physical barrier between all DMMI associates and moving fork lifts.

MGMT 3810 Eaton Group Spring 2015

Justin Giola, Molly Cahil, Michael Cartolano, Scott Gephart, Tyler Hansen & Charles Kaser

The team was tasked with identifying opportunities for Eaton Corporation to balance inventory and shipping costs by reducing shipment frequency; adjusting inventory min/max levels and creating "milk runs" to combine for cost savings. We were given the LTL shipment data for Eaton and all their suppliers. We evaluated the suppliers based on frequency of shipment and looked at the top ones that ship to Eaton. Then we looked at location of those suppliers and developed a milk run while combining the daily runs. We calculated the cost of the new run and set it against the current cost per run. We used this method as an example for Eaton to continue their evaluation of cost for their 50,000 suppliers.

Lacks Spring 2015

Lacks Enterprises is a top of the line automotive company for exterior trim, rims, and grills for vehicles. The Lacks project for spring 2015 was to analyze shipping data to help correct a labeling issue with a certain aftermarket product line. The project began with our team importing shipping data from Lacks ERP system into Excel. Once this was complete our team was able to analyze this data to determine the correct destination to ship parts to, effectively correcting the labeling issue that was occurring. The information produced by our team was used by Lacks IT department to correct shipping destinations in their system so that relabeling would not be necessary. It is estimated that the percentage of parts that are mislabeled is around 15% now, down from around 80% when we began the project. Through this project our team of ISM students was able to save over $20,000 annually for Lacks and the process used to solve this problem is going to be able to be applied to other labeling issues that Lacks has with aftermarket parts now and in the future.

Denso Spring 2015

A major criterion of WMU's ISM program is to do things better, faster and cheaper. We have worked with Denso Manufacturing to create and implement a supplier tracking system that is better, faster and cheaper. Throughout our Spring 2015 semester we have worked alongside engineers and management at Denso to create a Microsoft Access system that allows Denso to track all deliveries, and generate an on- time delivery rating. Denso's current system is very manually intensive and planners have to go off memory to input much of necessary data. In addition, the current system does not allow you to see the results of all your data until the end of the month report is printed out. Our system allows Denso planners to go in on a daily basis and enter specific criteria as to why a shipment is late and weather to charge the supplier or not. From there an on time- delivery rating is generated to give upper management a better idea of which suppliers are doing well and which ones need improvement.

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MGMT 3810 Bronco Force Spring 2014
Flow-Rite Controls Project

Flow-Rite Controls is a vertically integrated manufacturing company that specializes in fluid control devices for lead acid batteries, recreational fishing boats, and medical devices. Flow-Rite Controls has experienced tremendous market growth, and has been experiencing the "growing pains" that comes with it. The WMU team consisted of project manager Sam Kline, and Co-Team leads Tyler Terpening and Gavin Burstall. They worked directly with Mike Semm and John Stelmach of Flow-Rite Controls. The team was tasked with mapping the flow of information from customer to production, identifying bottlenecks in the process, identifying the root cause of those bottlenecks, and offering solutions based on those findings.

The team found a bottleneck caused by an underutilized ERP system, causing errors in most of the orders processed through the order entry clerk. The analysis showed that over the next 5 years, Flow-Rite would save over $100,000 if they better utilized their ERP system. The next groups at Flow-Rite will more than likely oversee the implementation of the new ERP module.

MGMT 3810 Glue Room Process Improvement Project Fall 2015

Nathan Fernandez, Aaron McClendon, Jon Lysik, Zach Floria, and Stu Wagner worked on the Eliason glue room process improvement during the Fall 2015 semester. Eliason is the only manufacturer of Easy Swing double action impact traffic doors. Due to the nature of the product, Eliason is set up more as a woodshop than an assembly line because of their made-to-order production method. The main deliverable for the project was to validate current efficiency reporting and processes for 1st and 2nd shift glue room. The specific goals of the project were; analyze start up and shut down processes and the time it takes to complete, verify employees are conforming to existing written procedures, Validate that operators are accurately reporting down times, document differences between 1st and 2nd shift, and suggest ways to improve efficiency within glue room operators.

In order to complete as many of these objectives with one implementation, we created a tool for the operators in the glue room that provides a step by step check list for both the start-up and shut-down procedures along with the added functionality of an insert time function in order to log the time it takes to complete each task down to the second. This takes out the variance of the operators entering the time based on the analog clock on the wall. Along with the start-up and shut-down procedures in this tool, we also embedded the ability to log downtime and produce data-driven visuals for management to evaluate their process.

In order to address that the employees are conforming to existing procedures, we created process maps that divide each action into operator 1 or operator 2 so that each person knows their individual responsibilities. This also addresses the issue of differences between 1st and 2nd shift because they have detailed standard work to follow.

As a group we wanted to implement controls in order to have a continuous loop of our goals for this project. Instead of manually analyzing the start-up and shut-down procedures, we introduced a tool that does this year round and automatically instead of just for a 3 month period.

Summer 2019: Standardizing Customer Service Procedures

In this project, Senneca Holdings sought to standardize their Customer Service processes and procedures to ensure that all Senneca customers receive the same standard of service from across the Traffic Door Division (Redmond, Cincinnati, and Kalamazoo). To achieve this, Senneca requested a group of Integrated Supply Management students who came together to survey the current procedures, establish which are relevant, and compile them into a new digital customer service training book for new hires that can be referenced at any time. The students were in charge of all operational aspects of the project from data collection to organization and compiling, with two Senneca employees, Jeff McNally and Rita Stark, acting as company liaisons and contact points for any questions or problems that arose.

Senneca Team Leads: Jeff McNally and Rita Stark

ISM Students: Gunny Boparai, Matej Svjetlicic, Peyton Kerns, Cameron Nolff, and Nicholas Stamper

In the Fall semester of 2019 in MGMT 3810, our group partnered with Mann-Hummel, a global leader in filtration and supplier of automotive parts, to help reorganize one of their plants. Our group consisted of Inkar Alibekova, Malika Bekbossynova, Rodolfo Nowakowski, Gabriela Slavova and was headed by our project leader and Mann-Hummel's Material Manager, Nick First. Mann-Hummel has experienced exponential growth recently and because of this, acquired a warehouse facility in the Midlink facility in Portage, Michigan. Mann-Hummel was looking to try and make this warehouse leaner and more efficient. So, our goal was to help achieve that by optimizing warehouse organization that would result in increased material flow. The plan was to use a Warehouse Management module in SAP software and equip workers with personal scanners to scan barcodes of inventory. To achieve the goal and execute the plan, our group helped with data collection of inventories using Excel and helped with identification of inventory rack locations. These changes also resulted in a new warehouse floor layout. We proposed routine check-ups of warehouse space usage, inventory usage, and production rates to measure the results of the Warehouse Management system after it is implemented to determine the success of the new system.

WMU ISM students Emily Wood, Andrew Hartfelder, Mitchell Farell, and Mike Francisco were paired with Prevention Works during the Fall 2019 semester for their Applied Six Sigma Problem Solving class with Dr. Sime Curkovic as their professor. Prevention Works is a local non-profit focused on helping families and specifically youth in the area. The current class team had the opportunity to build off what the first group accomplished for Prevention Works. The prior Summer 2019 team (Austin Kinard, Ammar Alfaraj, Ahlam Alnemer, and Richard Yusa) were able to create a much more efficient process for locating materials as well as creating a designated space to pack the program materials into bags. This solution worked until Prevention Works outgrew it and were on their way to a new location in Downtown Kalamazoo (309 Burdick Stree). The WMU ISM students took the time to source new shelving units, specially sized and customized bins, and a more detailed color-coding system to fit into the new storage area and building. The team also took the time to create a new template for standardized packing instruction creating a uniform instruction set for every volunteer and employee to use when packing program materials. This solution is focused on creating a customized storage solution that changes, grows, and moves with Prevention Works. This team continued the suggestion that they use a check-in and check-out system to keep track of materials and responsibility for keeping the area organized. The team hopes that this is a long-standing solution to all of Prevention Works storage needs.

Alexis Flicek, John Hayward, Conner Stager, Caleb Philipp, Alex Laurin

The Six-Sigma Problem solving team worked with JH Distributing (JHD) for the Fall 2019 Semester. JH Distributing is a Contracted Service Provider for FedEx Ground. The company owns 15 FedEx delivery routes in St. Joe, Benton Harbor, Dowagiac, Watervliet, Hartford, Coloma, and Covert. With so many moving parts in the operation, JHD had efficiency issues across its fleet. Different drivers were often delivering at the same houses in the same neighborhoods on the same days. To combat this problem, a team of 5 students from Western Michigan University's Integrated Supply Management program were paired with the company. Using tools and concepts learned in the Applied Six Sigma Problem-Solving class taught by Dr. Sime Curkovic, the team found some efficiencies in the routes that will lead to major cost savings for JHD in the future. The team used the work area planning tool developed by FedEx to optimize the entire delivery fleet for JHD. The team also ran a business case to move a segment of JHD's business to deliver out of a different terminal closer to the delivery zones. The team's analysis showed the JHD could save 240 hours and 14,872 miles per truck per year if the change was made. Assuming a gas price of $2.50, JH Distributing will save $20,655 per year on fuel for the whole fleet. The team was happy to help JH Distributing and apply their coursework from the Six-Sigma class and Business Analytics classes to solve the problem.

Fall 2019: These projects targeted Clark Logic's areas that were falling behind the fast-growing 3PL/4PL company. The students were tasked at creating solutions for these problems that were identified using Six-Sigma Lean Process Improvement techniques. The projects offered applied supply chain to students looking to gain insight into the logistics world. The projects were designed to address difficulties supply chain managers face and, through faculty and student involvement, determine the best methods to solve those problems in the workplace. Projects addressed included: Warehousing and Storage, Asset Management and Equipment Leasing/Rental/Sales, and Operations management. Brief descriptions are as follows:

Project 1: Students worked towards creating a standardized procedure for the dunnage wash station. Also students worked on creating a controlled audit process/procedure to measure daily outputs.

Project 2: Students worked towards finding solutions for raw materials on the shop floor. Students created an audit method to keep inventory counts and reorder processes and procedures. In addition, students also designed a map for new product placements for the raw materials to make the shop floor more efficient and effective. They also created a Chrome Cloud implementation for their data and the company to use.

Project 3: Students defined current shop floor errors and created diverse solutions to these problems. Also, students created a warehouse map and product placement map to standardize the material handling process.

Project 4: Students worked to improve trailer maintenance shops current processes through several different tasks.

Fall 2019: Time Standards & Time Sheet Reporting

In this project, Eliason Corporation, a division of Senneca Holdings, sought to establish and verify current time standards for operations and develop time sheet reporting specific to their Hardware Assembly and Woodshop areas. To achieve this, Senneca Holdings and Professor Sime Curkovic coordinated to bring in a group of Integrated Supply Management students who came together to conduct a time study on daily operations, establish a standard time, and develop an updated time sheet specific to each area for reporting. The students split into two groups and oversaw the operational processes in both the Hardware Assembly and Woodshop areas, collecting and organizing time standards. Senneca Production Supervisor, Mason Deluca, acted as company liaison and contact point for any questions or problems that arose.

Senneca Team Lead: Mason Deluca

ISM Students: Mike Wasik, Nathan Rowland, Treyson Fink, Brett Manoogian