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Ford P558 Extended Running Board – Product / Process Flow Improvement Event

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Ford P558 Extended Running Board – Product / Process Flow Improvement Event

Problem Statement

Dee Zee Manufacturing is a company that is most known for making running boards, tool boxes, and roof racks for trucks and SUV's. The company is becoming more sought after in the automotive industry as they are now producing OEM products for major car companies. The OEE does not reflect current process. The resources aren't at their point-of-use. The proper number of operators is not defined. By establishing one piece flow, the number of operators can be determined. Not having the correct number of operators could create certain areas in the process to be starved of productivity. By optimizing the number of operators, the process is able to function as a whole more efficiently.

Disciplines

Bioresource and Agricultural Engineering | Industrial Technology

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TSM 416 Technology Capstone Project

Ford P558 Extended Running Board – Product / Process Flow Improvement Event

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Client: Dee Zee Manufacturing, 1572 NE 58th Ave, Des Moines, IA, 50313, <https://www.deezee.com/>

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1 PROBLEM STATEMENT

Current subassembly layout isn't standardized.

Problem Statement

- Dee Zee Manufacturing is a company that is most known for making running boards, tool boxes, and roof racks for trucks and SUV's. The company is becoming more sought after in the automotive industry as they are now producing OEM products for major car companies.
- The OEE does not reflect current process. The resources aren't at their point-of-use.

- o The proper number of operators is not defined. By establishing one piece flow, the number of operators can be determined. Not having the correct number of operators could create certain areas in the process to be starved of productivity. By optimizing the number of operators, the process is able to function as a whole more efficiently.

Business Case Statement - Current subassembly layout isn't standardized, the line produces multiple assemblies, which requires a versatile layout. Resources aren't at point-of-use. Looking to set up a one piece flow and determine the proper number of operators needed. OEE isn't reflecting current process.

- A. The subassembly is not standardized. This is needed to optimize the performance and efficiency of the subassembly line. A new layout of the subassembly was created in order to incorporate one piece flow.
- B. The problem is occurring at the subassembly and the satellite assembly tables where the work is being batch produced. The flow of the work needs to be fixed within the assembly line.
- C. This problem was a great opportunity for our team to use the lean manufacturing skills we have been taught in TSM 440 in a real world situation. It is also beneficial to the client because this will improve the process of their subassembly line.
- D. Dee Zee cares about the problem because optimizing this subassembly line will save them money and allow them to produce more product more efficiently.

2 GOAL STATEMENT

- A. The fundamental improvement required is improving the product/process flow (one piece flow) to limit the building up of packaging material, improving material handling ergonomics - parts at point-of-use, and designing a new floor layout marked for one piece flow.
- B. It was planned to be measured using current state cycle times, OEE%, first time through %, 6S (or 5S) scores, and standard worksheets. These will be used to calculate time savings throughout the process which can then be converted to dollars.
 - The specific parameters being measured are current state cycle times, OEE%, first time through %, 6S (or 5S) scores, and standard worksheets.
 - The new layout should reduce cost and cycle time as well as improve ergonomics directly minimizing work-related injuries.
 - The more standardized and ergonomic subassembly layout will make the work performed by the employees easier and more enjoyable.
 - The estimated move date for this subassembly was late December-early January, however, the actual move date has been determined as late April 2017.

Due to customer approval, the line was not up and running in a sufficient time manner for our team to gather this data.

Main Objective(s) and Specific Objectives

- A. The main objective was to: Improve product/process flow by implementing a one piece flow design to limit the building up of packaging material. To do this, we developed an optimized floor plan to improve product flow and reduce the risk of injuries due to ergonomics.
 - B. A secondary objective was to provide data and reasoning as to why the move of the subassembly line to the new building is beneficial to both the process and the employee's working environment.
 - C. **Specific objectives include:**
 - a. Designed a new floor plan that meets all client criteria and constraints:
 - i. Area was marked out and have any necessary visual indicators
 - ii. Standard work could be set up for any operator to understand
 - iii. Incorporated one piece flow
 - iv. Cost must be less than \$5,000
 - v. New area size is 50' x 100'
 - vi. Once I-Mold is put in place it cannot be moved
 - b. Identified and minimized injury-prone areas and processes to reduce the risk
- B. Rationale**
- a. Reduced building up of packaging material to little or none
 - b. Reduced the risk of injuries to employees due to ergonomics
 - c. Reduced changeover time from product to product

3 PROJECT PLAN/OUTLINE

- A. **Methods/Approach**
 - o **Reference Material(s)**
 - o We referenced the lean principles we have learned in TSM 440 as well as facility layout and planning concepts taught in TSM 444
 - o **Data collection:**
 - o The main collection of data was planned to be done via time studies, photos will also be taken to show before and after states of the subassembly
 - o Lighting measurements, noise quality, air quality, as well as shipping and receiving distances were measured to show improvements when compared to the old building
 - o TSM 444 principles were utilized to show facility improvements of the new building
 - o **Skills:**
 - o Having a solid understanding of Lean principles, OEE, and the employees' views on the subassembly process helped us better understand the problem, and solve it
 - o Management of time and the team schedule are tools that we have that enabled us to lead a successful team to the final results of this project

- o TSM 210-Fundamentals of Technology, TSM 216-Advanced Technical Graphics, Interpretation, and CAD/AutoCAD, TSM 270-Principles of Injury prevention, TSM 370-Occupational Safety, TSM 440-Cellular Lean Manufacturing Systems, TSM 444-Facility Planning & Management
- o **Solutions:** Created subassembly layouts in AutoCAD based on client's constraints and perform time studies to determine most efficient layout
 - o All proposed solutions incorporated any client constraint in order to fully solve the problem
- o **Organization:** Our team met every week amongst ourselves and as necessary with the client. We communicated with the client via email to determine when it is necessary for us to meet in person.
 - o Our team proposed met weekly on Tuesdays from 11am-12pm to collaborate and work on weekly deliverables for the client
 - o Major milestones for our project were as follows; Met with client and understand the problem at hand, took measurements and gain information to help build a solution, generated ideas and came up with a proposed solution, presented proposed solutions through poster presentation, gathered more data, gathered data on implemented solution, prepared and finalized report and presentation
 - o Our team met to discuss any changes that have taken place and determine the correct steps in order to remain within the scope of the project

B. Results/Deliverables

- o Deliverables - 1. OEE (performance) reflects actual process. 2. Improved product/process flow (one piece flow) limit building up of packaging material 3. Improved material handling ergonomics – parts at point-of-use 4. Floor layout designed and marked for above flow
- o Throughout the process, reports were created to determine completion status of the project and how well they align with the overall scope of the project
- o Reports were created each week to discuss project progress
- o Final proposed layouts finished November 29, 2016. Assembly line move to be completed in late April 2017. Due to time constraints, we were not able to do the data collection of the new subassembly layout. Therefore, provided our methods and steps on how this data can be obtained to DeeZee so they will be able to gather and compare the data of the changes.

4 BROADER OPPORTUNITY STATEMENT

- A. The project can be understood by an 'average person', however it helps to have a background in lean manufacturing to gain a better understanding.

- B. The project does not have an immediate impact to some of the big challenges in the world, but it does help to improve worker safety by creating a more ergonomic work environment for employees.
- C. Automotive assembly industry may be experiencing similar problems and could be interested in solutions to line assembly improvements.
- D. All types of industries could benefit from our solution of a one piece flow assembly line.
- E. Other competitors use lean manufacturing and continuous improvement to address areas in need of improvement. This helps to increase the safety in the working environment.
- F. The solution will generate income in the long run by optimizing the work that is done by the operators and efficiently performing each task in the process. The cost to incorporate this solution will vary from company to company, but in our case the cost for improvements was minimal.

5 PROJECT SCOPE

- A. The starting steps were to visit Dee Zee to view and get an understanding of the current process and layout. The steps following that were all associated with designing the new floor plan layout in the alternative designated location.
- B. Any employees or processes related to the Ford P558 Extended Running Board subassembly line.
- C. Any employees or processes not related to the Ford P558 Extended Running Board subassembly line.
- D. The team did not work on anything not pertaining to the Ford P558 Extended Running Board subassembly line.
- E. The boundaries were set to only revolve around the subassembly layout itself. Other important processes that we were not instructed to address would be incoming and outgoing product flow before they arrive and after they leave the subassembly line. These two flows could be vital in the subassembly but were not given to us to work on during the course of the project.

