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Standardization of ISU Transportation Services Maintenance Shop

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Problem Statement
University Transportation Services offers a wide range of safe and economical rental vehicles to assist Iowa State University faculty, staff, and students in conducting university-related business along with many other organizations in and around the state of Iowa. As the population of Iowa State University increases, so must the size of ISU Transportation Services' fleet of vehicles. Transportation Services has requested a review of their current processes to ensure the ability to meet changing demands Iowa State University is presenting. ISU Transportation Services is looking to have their common operations standardized through the creation and implementation of standard operating procedures. ISU Transportation Services is responsible for the maintenance of a 575-vehicle fleet. In an effort to prevent their vehicles from having issues on the road, all vehicles will pass through their two-bay cleaning shop and then the three-bay service shop, on an as needed frequency dependent upon multiple use factors. Due to this increasing amount of service work, ISU Transportations Services is open to new ideas to meet the changing demands. ISU Transportation Services hopes that through this project, they will be able to continue to exceed their customer's expectations. As a group, we have arrived at the conclusion that most other mechanic shops are faced with an issue that is similar to the one ISU Transportation Services is currently facing. Though we are in agreeance with this, we are aware that this issue is not identical from one shop to another. ISU Transportation Services' mechanic shop focuses on preventative maintenance and outsources responsive maintenance when needed, this concept means our solution will not likely be transferable to a different shop.

Disciplines
Bioresource and Agricultural Engineering | Industrial Technology

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TSM 416 Technology Capstone Project

Standardization of ISU Transportation Services Maintenance Shop

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1 PROBLEM STATEMENT

Problem Statement

A. University Transportation Services offers a wide range of safe and economical rental vehicles to assist Iowa State University faculty, staff, and students in conducting university-related business along with many other organizations in and around the state of Iowa.
B. As the population of Iowa State University increases, so must the size of ISU Transportation Services' fleet of vehicles. Transportation Services has requested a review of their current processes to ensure the ability to meet changing demands Iowa State University is presenting. ISU Transportation Services is looking to have their common operations standardized through the creation and implementation of standard operating procedures.
C. ISU Transportation Services is responsible for the maintenance of a 575-vehicle fleet. In an effort to prevent their vehicles from having issues on the road, all vehicles will pass through their two-bay cleaning shop and then the three-bay service shop, on an as needed frequency dependent upon multiple use factors. Due to this increasing amount of service work, ISU Transportations Services is open to new ideas

Department of Agricultural and Biosystems Engineering (abe@iastate.edu) aims to be a premier team serving society through engineering and technology for agriculture, industry and living systems. ABE welcomes opportunities to discover and improve new technologies for all stakeholders. 1

to meet the changing demands. ISU Transportation Services hopes that through this project, they will be able to continue to exceed their customer's expectations.

D. As a group, we have arrived at the conclusion that most other mechanic shops are faced with an issue that is similar to the one ISU Transportation Services is currently facing. Though we are in agreeance with this, we are aware that this issue is not identical from one shop to another. ISU Transportation Services' mechanic shop focuses on preventative maintenance and outsources responsive maintenance when needed, this concept means our solution will not likely be transferable to a different shop.

Business Case Statement

A. **What:** Shop is always looking for a way to improve and there are limited standard operating procedures established with the new software system.

B. **How:** We will be observing the major processes performed in only the Service Shop including, but not limited to: Lube, Oil, Filter (LOF) Change, Tire Rotations, preventative maintenance, and work order documentation.

C. **When** & **Where:** Problems can occur within the service shop at any time when the mechanic has to follow a given process.

D. **Why**: Addressing this problem allows for us to develop a baseline standard for their current process and permits Transportation Services to make measurable improvements with projects in the future.

E. **Who:** Developing SOPs (e.g., similar to Akol et al., 2017) for the mechanic shop will help maintain the high quality and experience that students, faculty, and staff have when renting one of ISU Transportation Services' vehicles.

2 GOAL STATEMENT

A. Transportation Services is lacking a baseline for the processes performed in their mechanical shop.

B. The improvement will function as the baseline for future projects to be compared to.

C. *Goal of encounter*

a. Our team documented processes performed by the mechanics in the services shop.

b. The deliverables given to our client at the end of our project were the final SOP document, the Safety Information Plan, and Equipment Data Sheets.

c. The deliverables provided to our client are difficult to measure given that they are solely a baseline for future projects.

d. Our client plans to implement our SOP booklet into their shop, and have it available for use as soon as they are handed the final copy.

1. Main Objective(s) and Specific Objectives

a. The objectives of our project were to develop and implement an SOP booklet, create a safety information plan, and to post Equipment Data Sheets.

b. Identify the processes performed and develop a standard operating procedure:

i. Create booklets to be easily followed by new employees.

ii. The booklet should contain daily routine preventative maintenance procedures

iii. Rationalize possible improvements to be made to the process

iv. Cannot add equipment to the mechanic shop

v. No additional space can be allocated

vi. Improvements will not be related to labor force

c. Perform a product flow analysis and compare the results with the criteria and constraints

d. Identify areas that allow for variation in the process and standardize one process for all employees to follow.

2. **Rationale**
    a. ISU transportation will have a standard which they will need to maintain and improve upon.
    b. Reduce time spent training new employees.
    c. Reduce variance of routine preventative maintenance.

3 PROJECT PLAN/OUTLINE

1. **Methods/Approach**
    A. Reference Materials
        a. Butch Hansen
            i. Resourceful for providing specific details for the shop:
                1. Types of services and quantities on an annual basis.
            ii. ISU Environmental, Health, & Safety
                1. Provide links to training, templates, and safety information (Volkmann, 2018)
    B. Data collection
        a. Information was gathered directly from both shop mechanics and group observations (Standardization of Lab Practices) for Lube, Oil, Filter (LOF) Change, Tire Rotations and work order documentation.
    C. Skills
        a. Factoring in the vast number of vehicles and processes that need to be done regularly, skills we can use to eliminate the root cause are Lean tools and safety.
        b. TSM 444: Facility Planning and Management, TSM 440: Lean Manufacturing, TSM 371: Occupational Safety Management, TSM 470: Industrial Hygiene
    D. Solutions
        a. The solution was made measurable through the development of Standard Operating Procedures (SOP).
        b. The desired solution was outlined to us by Transportation Services.
        c. The metric to evaluate solutions was provided to us by Transportation Services.
        d. The proposed solution is the baseline to be used for future evaluations.
        e. The proposed solution met the clients' expectations. Their feedback guided the project objectives.
    E. Organization
        a. Work was delegated based on individual skills and strengths.
        b. Major milestones included: SOP drafts & final copies, Safety Information drafts & final copies, final presentation and deliverables given to the client.
        c. Setbacks were responded to in both an adapting and professional manner by the team.
2. **Results/Deliverables**
    a. Our deliverables were; a Standard Operating Procedure for the mechanical processes including data entry into Agile, Safety Data Sheets, and the Safety Information Plan.
    b. Our deliverables align with the project objective and scope.
    c. Our project was completed as planned and we exceeded the expectations of our client.
    d. Key recommendations to our client include:
        i. Implementation of SOPs
        ii. Further shop improvements, now measurable due to the now developed baseline.

iii. Utilize future TSM Capstone group(s) to further shop improvements.

3. **Timeline**
   - *A.* Project Poster - Monday, November 27, 2017
   - *B.* Project Report - Friday, December 8, 2017
   - *C.* Safety Information Plan Draft - Week of January 19, 2018
   - *D.* Standard Operating Procedures Drafts - Week of January 26, 2018
   - *E.* Final Safety Information Plan - Week of February 2, 2018
   - *F.* Standard Operating Procedure Final Booklets - Week of February 16, 2018
   - *G.* Final Capstone Presentation - Friday, April 20, 2018
   - *H.* Final Project Report - Friday, April 27, 2018

4 BROADER OPPORTUNITY STATEMENT

A. This project could be understood by an 'average person', it breaks up the processes into easy-to-follow steps that aid in the successful completion of preventative maintenance.

B. By establishing a baseline operating procedure, Transportation Services will be able to run more efficiently and effectively. Our project will improve workplace safety with Equipment Data Sheets specific to the shop, as well as, a Safety Information Plan to promote the understanding of safe working procedures in the shop.

C. Other mechanics and repair shops are likely to see similar issues and should concern themselves with the potential inefficiencies occurring within their shop(s).

D. The automotive repair industry could utilize the; SOP Template, Equipment Data Sheets, and Safety Information Plan as a starting point for their own personalized improvement plan.

E. The trends that affect broader opportunity is the adherence to the improvements made.

F. Other shops address similar issues much in the same way our team did. A baseline is established when a Standard Operating Procedure is set in place, allowing for uniform performance to be achieved.

G. While the cost of creating and generating a standard operating procedure for us is next to nothing, for ISU Transportation Services we are providing the potential to save money.

5 PROJECT SCOPE

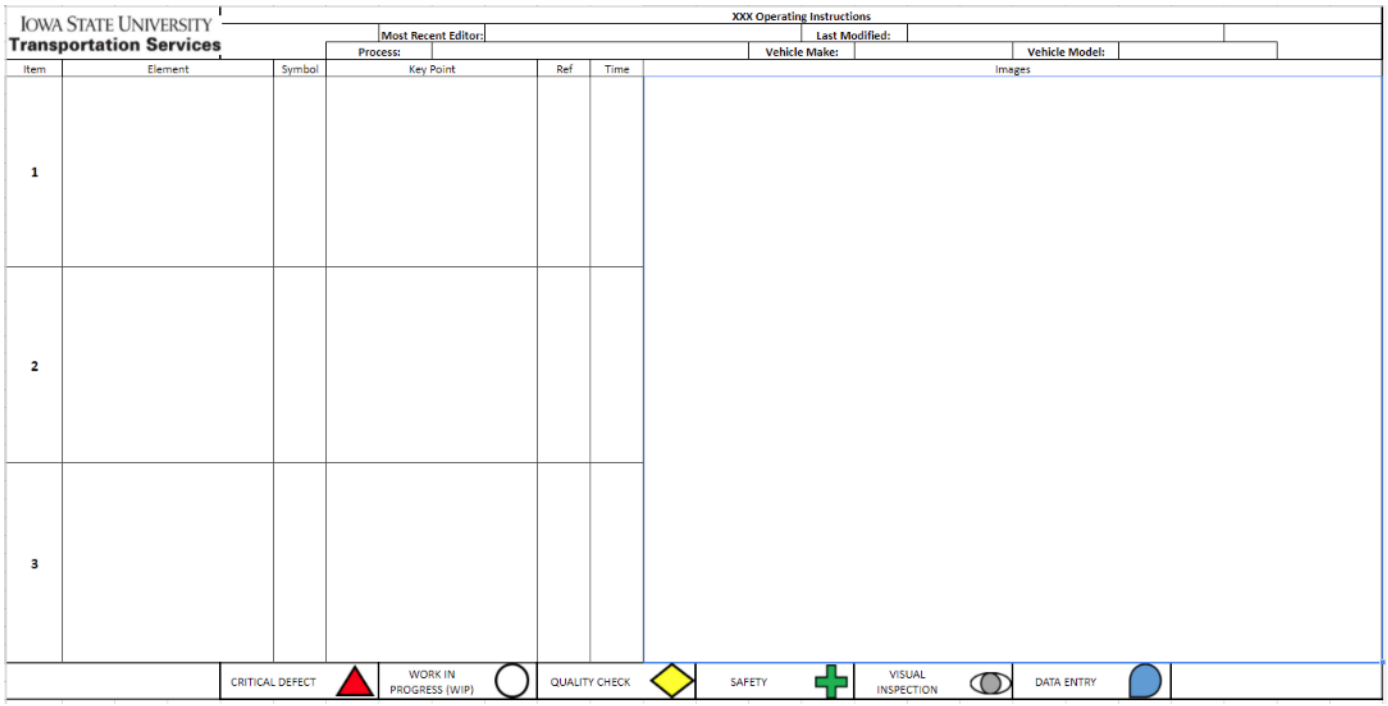
A. Transportation Services is looking to standardize the maintenance and Agile documentation processes in their mechanical shop. Processes include Lube, Oil, Filter (LOF) Change, Tire Rotations, and Agile documentation. A Safety Information Plan and Equipment Data Sheets were developed to identify and mitigate hazards in the shop. Our project scope changed, due to the realization that all processes are tied together, and one SOP was needed.

B. Our project was focussed on the mechanical shop department of ISU Transportation Services.

C. Our project did not include the cleaning shop or the rental/return processes of vehicles.

D. Something potentially obvious that was not included in our array of options was the use of already established mechanic handbooks, such as Chilton's. We did not consider this a valid option, due to the fact that Transportation Services already has a similar database to Chilton's, in place.

6 GRAPHICAL ABSTRACT



7 REFERENCES

Stephen Akol, Philip Hutson, Grant Ives, Allie Oder, Joseph R. Vanstrom and Jacek A. Koziel. Standardization of Lab Practices. Final Report. TSM 416 Technology Capstone Project, April 28, 2017.

Volkmann, Cody. ISU Environmental, Health, and Safety Equipment Data Sheets. 2018.

8 APPENDIXES