OREGON TOOL

Phuong Nguyen Tran
Mechanical + Manufacturing Engineering | Product Development
1st Mecop Internship

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COMPANY OVERVIEW & INTERN ROLES

COMPANY / ROLE BACKGROUND

Oregon Tool, formerly known as the Oregon Saw Chain Corporation, traces its roots back to 1947 when it was established in Portland, Oregon by Joe Cox. The company's inception was inspired by Cox's observation of timber beetle larvae effortlessly chewing through evergreen wood fibers in the Pacific Northwest. This observation led to the development of the modern saw chain design, which revolutionized the industry. In 1952, the company expanded by establishing its first manufacturing plant in Guelph, Canada, and later underwent a name change to Omark Industries in 1957. Over the years, it expanded its manufacturing presence in various locations, including Portland, Oregon, and Brazil. In 1985, Omark Industries was acquired by Blount, Inc., initiating a period of growth and diversification through strategic acquisitions. In 2021, the company was rebranded as Oregon Tool, Inc., emphasizing its legacy and connection to the Pacific Northwest.

COMPANY OVERVIEW

Oregon Tool, Inc., headquartered in Milwaukee, Oregon, is a leading cutting systems company specializing in the production of saw chains for handheld saws and large mechanical harvester machines. In addition to saw chains, the company is renowned for manufacturing cutting systems accessories such as chainsaw guide bars, chainsaw drive sprockets, and lawn mower blades. With a rich history dating back to 1947, Oregon Tool has consistently innovated its products and expanded its market presence. Notably, the company celebrated its 75th anniversary in 2022 and remains committed to its mission of global stewardship.

INTERNSHIP'S ROLE

Throughout my internship, I had the privilege of being under the guidance of Sean Sloanes within the Manufacturing Team. In my role, I was responsible for autonomously leading and overseeing a range of projects. This included not only executing these projects but also managing them effectively. Additionally, I played an active role in engaging with customers throughout the company who sought solutions that could be provided by our engineering team and embracing a continuous learning process by interacting with colleagues across the organization.

PROJECT LIST

1. Pan Splitter
2. Press Conveyor Lifter
3. Cutter Grinder Changeover
4. CNC Grinder Flood Control
5. SMED Die Table
6. Nitrogen Block Handling
7. Braking Resistor Calculations
8. Burr
9. L2L Data Collection
10. Assembly Machine Stop

EXECUTIVE SUMMARY

PAN SPLITTER – CAD / SOLIDWORK

Problem: During my internship, I undertook my first major project, which happened to be the largest one I had worked on thus far. The project involved addressing a significant issue related to high scrap generation, costing the company at least $2500 annually, with costs increasing steadily over the years. The challenge was rooted in an outdated design that had been initially created and tested seven years prior but had not received any updates since. Moreover, the design was incomplete, as it had been left unfinished by an engineer who had retired.

Solution Executed: My primary responsibility for this project was to reconstruct and modernize the existing design based on both the available CAD file and the design currently in use at the plant. Additionally, I incorporated ideas from other team members into the CAD model. To minimize the risk of failure, the first step was to ensure that the CAD file accurately reflected the dimensions of the design in use at the plant. This required precise measurements and comparisons between the CAD model and the physical design. Once the dimensions were replicated accurately in the CAD model, I proceeded to fill in the missing components and redesigned certain parts based on either customer suggestions or improvements in the model's functionality.

Accomplishment: The result of this project encompasses 29 different types of components and has a total weight of 300 pounds. Currently in the process of approval for vending. Despite the substantial investment and the fact that the project had previously undergone testing, I may not have had the opportunity to witness the final outcomes directly. Nevertheless, I consider my contributions to this project as pivotal in mitigating potential risks of failure. These contributions included the crucial tasks of locating and validating the correct CAD files, which were scattered across various locations, as well as meticulously measuring dimensions and calculating volumes. I also played a significant role in updating a substantial number of CAD files to ensure their accuracy and relevance. Additionally, I actively incorporated and implemented new ideas and enhancements suggested by our valued customers. Collectively, these efforts were instrumental in ensuring the project's success and minimizing potential setbacks.

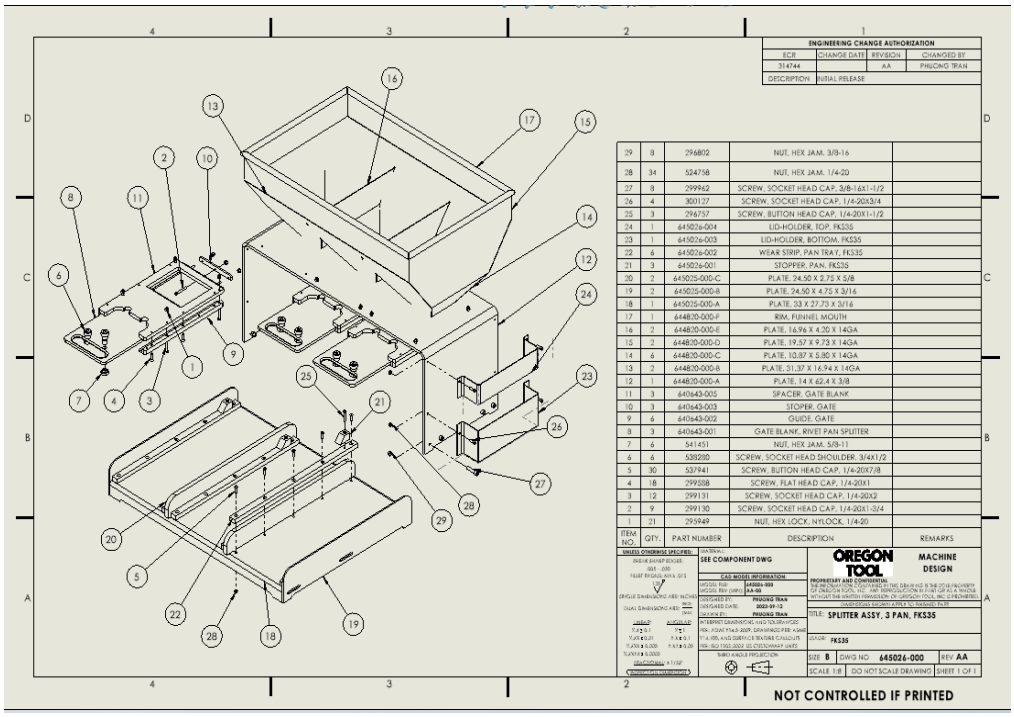

Figure 1: Pan Splitter Design

PRESS CONVEYOR LIFTER – SIMPLICITY

Problem: For my second project during my internship, I tackled a pressing issue in the Blanking department that had been causing frustration among the operators. The problem stemmed from a scrap generation during the Blanking process, where flat sheet metal passes through the Press Die Exit Chute and lands on a conveyor. Unfortunately, this process led to some of the parts bouncing off the conveyor. These bounced-off parts were unable to be collected due to the risk of mixing and this issue was estimated to result in a scrap cost of approximately $2300 annually across three different presses.

Despite the simplicity of the problem, implementing solutions across all presses proved challenging. This was primarily because of the diverse range of Press house designs, variations in conveyor positioning, differences in conveyor types, and unique Press Die designs. These variables necessitated tailoring each solution to fit a specific press configuration, as a one-size-fits-all approach was not feasible.

Solution Executed*:* In response to this challenge, a solution was implemented, incurring a total cost of $495. I developed a leveling system and proposed a ramping concept, which I then shared selectively with the Manufacturing Team. The objective was to create a more effective method for leveling the conveyor and guiding the falling parts to prevent any bouncing, ultimately improving the overall process.

Furthermore, it's worth noting that this solution was applicable to a majority of the presses in operation, and in this particular case, it successfully addressed the needs of all three presses.

Accomplishment*:* This solution proved highly effective, reducing scrap generation by over 85%. As a result, it is estimated that this improvement will lead to annual savings of approximately $1900. With such promising results, the project is expected to achieve a break-even point in just 3.10 months, making it a successful and cost-effective solution to the Blanking department's scrap problem.

A solution that was applicable to a majority of the presses in operation and approved to be put in the company system.

Figure 3: Before (Top) vs After (Bottom)

CUTTER GRINDER CHANGEOVER – LEAN MANUFACTURE

Problem*:* In the context of my third project, a significant challenge revolved around the lengthy changeover process for the Cutter Grind machine, which took a minimum of three hours to complete. This extended changeover duration was having a detrimental impact on production opportunities, causing notable disruptions.

Solution Executed: To address this challenge, I took the initiative to create a comprehensive document outlining the changeover procedure. The primary goal was to streamline and differentiate between internal and external activities. During the analysis, it became evident that a significant portion of the changeover process, accounting for approximately one hour, involved fetching parts and tools. This step could be optimized by preparing these materials in advance, even while the machine was still operational.

Additionally, we proactively engaged with our customers to propose an alternative solution. Instead of the labor-intensive process of uninstalling and reinstalling parts, we suggested a more efficient approach: making adjustments to the existing components.

Accomplishment*:* The implementation of these improvements is expected to result in a substantial reduction of at least 40% in the changeover time including 1 hour of external activities, 54 minutes of thought processing and adjusting parts.

Furthermore, these changes have alleviated frustration among the maintenance team, who previously had to collaborate to transport certain heavy parts. These accomplishments signify a notable enhancement in operational efficiency and a more seamless changeover process.

CNC GRINDER FLOOD CONTROL – ROOT CAUSE ANALYSIS

Problem*:* There has been witnessed instances of flooding occurring at the CNC Grinders, resulting in $3000 worth of labor expenses and 90,000 cutters going unground annually, especially safety issue. The control system failed to be activated and stopped the grinder during flood incidents which has resulted in a need for frequent and extensive machine cleaning to prevent flooding.

Nevertheless, the flood event was not documented since it was categorized as another incident. Consequently, there was no formal report prepared regarding the flooding incident. This, in turn, gave rise to another issue, namely, the absence of data or information regarding the cause of the flood.

Solution Executed: The approach initiated with a comprehensive understanding of the control system's functionality. Thorough testing was conducted to evaluate the potential pathways for flooding, effectively identifying the array of inherent failure modes within the control system. Utilizing tools such as the Fish Bone diagram and the Cause map, an A3 report was compiled to precisely identify the root cause of the flooding issue. This analysis also revealed multiple potential clogging points within the system, which, in turn, led to potential overflowing scenarios.

Subsequently, the impact and root cause of the flooding problem were documented, accompanied by the generation of inventive ideas to address the issue, all while maintaining a customer-centric perspective.

Accomplishments: The endeavor resulted in the successful identification and resolution of the root cause of the problem. A comprehensive list of countermeasures to forestall future occurrences was also formulated. These proposed countermeasures have gained approval and are presently in the stages of procurement and implementation, marking a noteworthy achievement in the quest to address and mitigate the flooding issue.

ASSEMBLY MACHINE DATA – DATA ANALYSIS

Problem*:* The challenge at hand was dealing with an extensive volume of data, comprising approximately 500,000 rows, 20 columns, and spanning across 3 sheets, resulting in an accumulation of at least 30 million data points. This dataset encompassed information related to faults, performance, run time, and other aspects collected over a span of 3 years from the Assembly departments. However, this wealth of data was rendered largely unusable for various analytical purposes. For example, we needed to determine the frequency of faults per hour to make comparisons across different machines or various types of faults. Unfortunately, with the raw data, conducting root cause analyses for implementing effective countermeasures proved to be a formidable challenge. Furthermore, it was a complex task to ascertain the extent of the impact caused by these faults on the company's overall productivity, specifically in terms of footage loss attributed to each fault.

Solution Executed*:* To address this data challenge, we employed a solution involving the utilization of different types of Excel formulas and Pivot tables. Through this process, we were able to filter and manipulate the data effectively, making it more accessible and conducive to analysis.

Accomplishment*:* Our efforts in handling this extensive dataset underscored the importance of conducting comprehensive root cause analyses for assembly machines and specific parts before their integration into the production process. Additionally, we recognized the necessity of quantifying the tangible impacts of any issues that may arise during the operation of assembly machines. These insights serve as valuable guiding principles for the company's future objectives, facilitating more informed decision-making and proactive measures to enhance productivity and mitigate issues in the Assembly departments.

"DETAIL DESCRIPTION IS PUT WITHIN THE PROJECT SUMMARY. HOWEVER, TO CHOOSE THE PROJECT THAT BEST DESCRIBE MY INTERNSHIP IS PRESS CONVEYOR LIFTER - SIMPLICITY"

CONCLUSION

INTERN'S BENEFITS

- **CAD Skills**: Proficient in creating professional drawings for vending purposes, Sheet Metal & Feature Functions.

- **Excel**: Experienced in data manipulation, including advanced functions like "Index", "Sumif", "Countif", and "Iferror" handling. Proficient in creating Pivot Tables for data analysis, particularly for assessing machine performance

- **Root Cause Analysis**: Skilled in utilizing problem-solving methodologies such as A3 reports, Cause Maps, Fishbone Diagrams, and conducting experiments to identify and address root causes.

- **Correlation & Hypothesis – Data Analysis**: Proficient in statistical analysis, including ANOVA and T-tests, and well-versed in conducting Correlation & Hypothesis testing. Familiar with Pugh Analysis and managing Type I and Type II Hypothesis errors.

- **Return on Investment (ROI):** Experienced in measuring the impact of problems against investments, assessing the cost-effectiveness of solutions.

- **Lean Manufacture:** Knowledgeable in Lean Principles, with expertise in Single-Minute Exchange of Dies (SMED) and Kaizen methodologies, aimed at eliminating waste in production processes.

- **Communication Skills:** Proficient in translating ideas into CAD files and effectively communicating with team members. Adept at actively listening to ideas from the operators to engineers and facilitating collaborative problem solving.

- **Simplicity:** The approach revolves around developing straightforward and efficient solutions that are user-friendly, easy to implement, and adaptable to different problem variables

- **Additional Knowledge:** Braking Resistor Calculation, Mechanical Advantage

COMPANY'S BENEFITS detailed in Accomplishment at Section "EXECUTIVE SUMMARY"

BUZZ WORDS

- Pan Splitter: a tool using for splitting parts to 3 pans below it.
- Press house: a small house built to isolate the Press Die during operation. This is for safety
- Press Conveyor: a Conveyor to transfer the pressed-parts. The Press Die is in the Press house so the Conveyor is for transferring the pressed-parts out of the Press house to a pan