

INTRODUCTION

Dynamic Metals LLC, located in Elkhart, Indiana, is a roll-forming company that specializes in complex metal shaping and tight tolerances. The company utilizes a wide range of innovative techniques and technologies to customize metals for their clients in the aerospace, defense, and rail transportation industries. One of Dynamic Metals' specialties is utilizing the method of roll forming to form large metal rings used in plane engines. This is one of the processes that has allowed Dynamic Metals to become a large competitor in the metal forming industry. Dynamic Metals requires the establishment of a preventative maintenance (PM) program for metal-forming machinery. A PM program is a group of processes and guidelines for conducting routine maintenance on equipment to keep them in good condition, which prevents machine failure and unplanned downtime. The team is responsible for creating a robust PM program that will allow Dynamic Metals to track daily, weekly, monthly, and yearly maintenance to ensure that the company will pass PM audits and eliminate unforeseen machinery downtime. The motivation behind this project is to ensure that Dynamic Metals passes its National Aerospace and Defense Contractors Accreditation Program (NADCAP) audits. Passing these audits allows the company to make and sell parts to aerospace and defense companies.



Figure 1:
Team pictured at Dynamic Metals

PROBLEM STATEMENT

Research, design, and implement a structured, well-organized preventative maintenance system to ensure the reliability of key equipment in our customer's manufacturing line such that they are compliant with NADCAP certification requirements.

SCOPE

Research and Development Phase

- Conduct research into PM measures required for each machine
- Validate necessary PM Measures through cross reference and meetings with Dynamic Metals Team
- Develop a PM schedule for each machine
- Determine most appropriate method for entering PM measures into Epicor

Implementation Phase

- Create Entries for each machine in Epicor
- Input monthly, quarterly, semi-annual, and annual PM measures into Epicor
- Develop a rotation for PM completion
- Create a method for entry of Daily PMs
- Evaluate system for ease of use and effectiveness

PREVENTATIVE MAINTENANCE RESEARCH

Preventative maintenance was somewhat new to the team, so research was done not only for the machine-specific maintenance plans but to understand the concept as well. A thorough walkthrough of the Dynamic Metals facility was done to understand and document the machines being utilized for the manufacturing processes. Most of the equipment includes the following:

- Roll forming machines
- Mechanical presses
- Laser cutting machines
- Hydroforming machines
- CNC machines

Thorough research of the machines and typical maintenance for similar types of machines gave the team a strong plan for Dynamic Metals. Daily, weekly, monthly, and annual maintenance plans were designed for each machine and approved by the maintenance team and plant manager. Final plans were implemented in the Dynamic Metals ERP so maintenance team members would be notified automatically when work needed to be done.

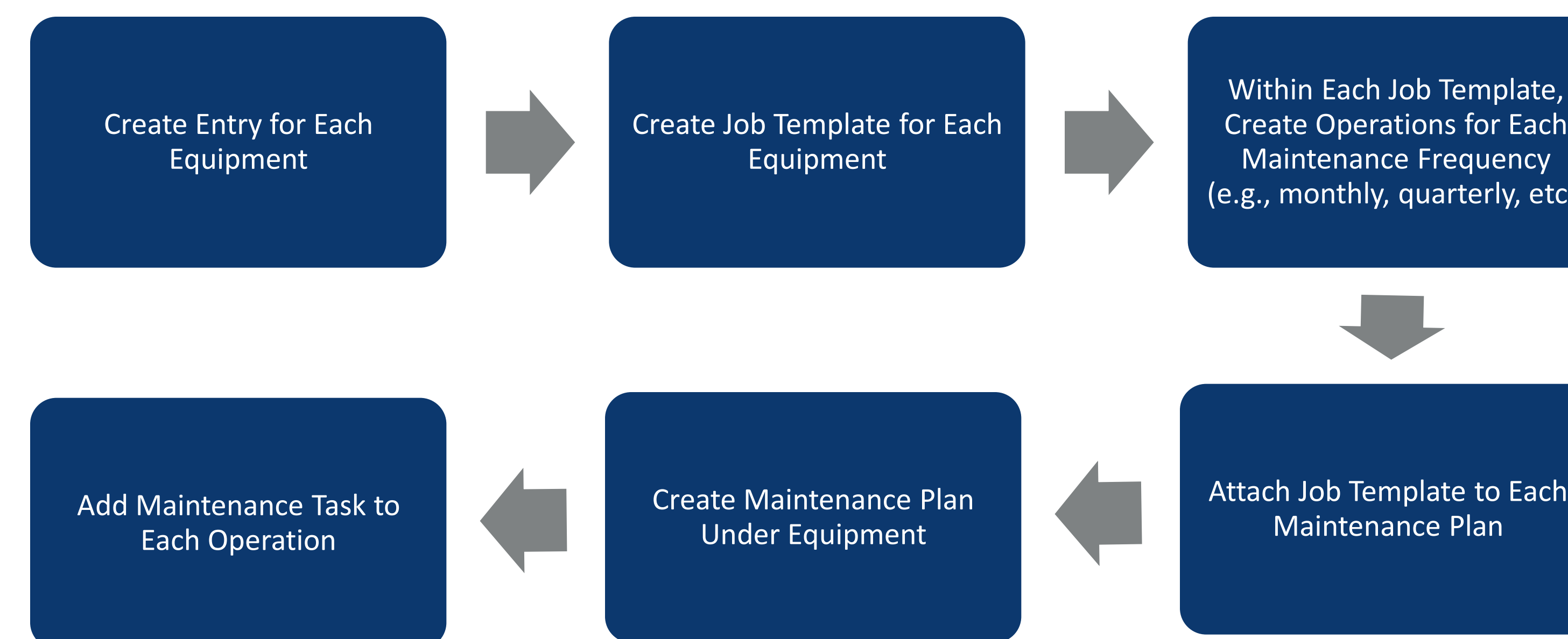


Figure 2:
Roll forming machines at Dynamic Metals

IMPLEMENTATION

The structure for creating maintenance schedules in Epicor is as follows:

Figure 3:
Maintenance Program Creation Steps



Using the above process, the team created entries for each of the 71 pieces of equipment in the factory and created maintenance entries for those which had monthly, quarterly, semi-annual, or annual maintenance requirements to be completed by maintenance personnel. Although these maintenance procedures cover the bulk of what is necessary, there are further measures that need to be completed on a daily and weekly basis. These tasks are to be performed by operators and as such the team decided a different method of recording completed maintenance was necessary to streamline the process. To this end, a google form was created that is accessible via QR code for operators to log what maintenance they performed on a given day.

FUTURE STEPS

The team has produced a robust starting point for maintenance tracking during this project; however, the client may choose to develop the PM system further. The team has put PM information and schedules into Epicor for the machines mentioned in the research section. To further develop the system, the client may choose to input the remaining machines into Epicor (the team has provided step-by-step instructions on how to do so). The work done so far was meant to be a starting point for their preventative maintenance system. With more use of the system, Dynamic Metals can get a better understanding of what schedules work well and what features do not work as well. Dynamic Metals also wants to incorporate portable tablets for operators to access the ERP from locations around the facility. This would enable more equipment maintenance to be tracked in the ERP and would improve overall compliance with the NADCAP audit standards.

TEAM TAKEAWAYS

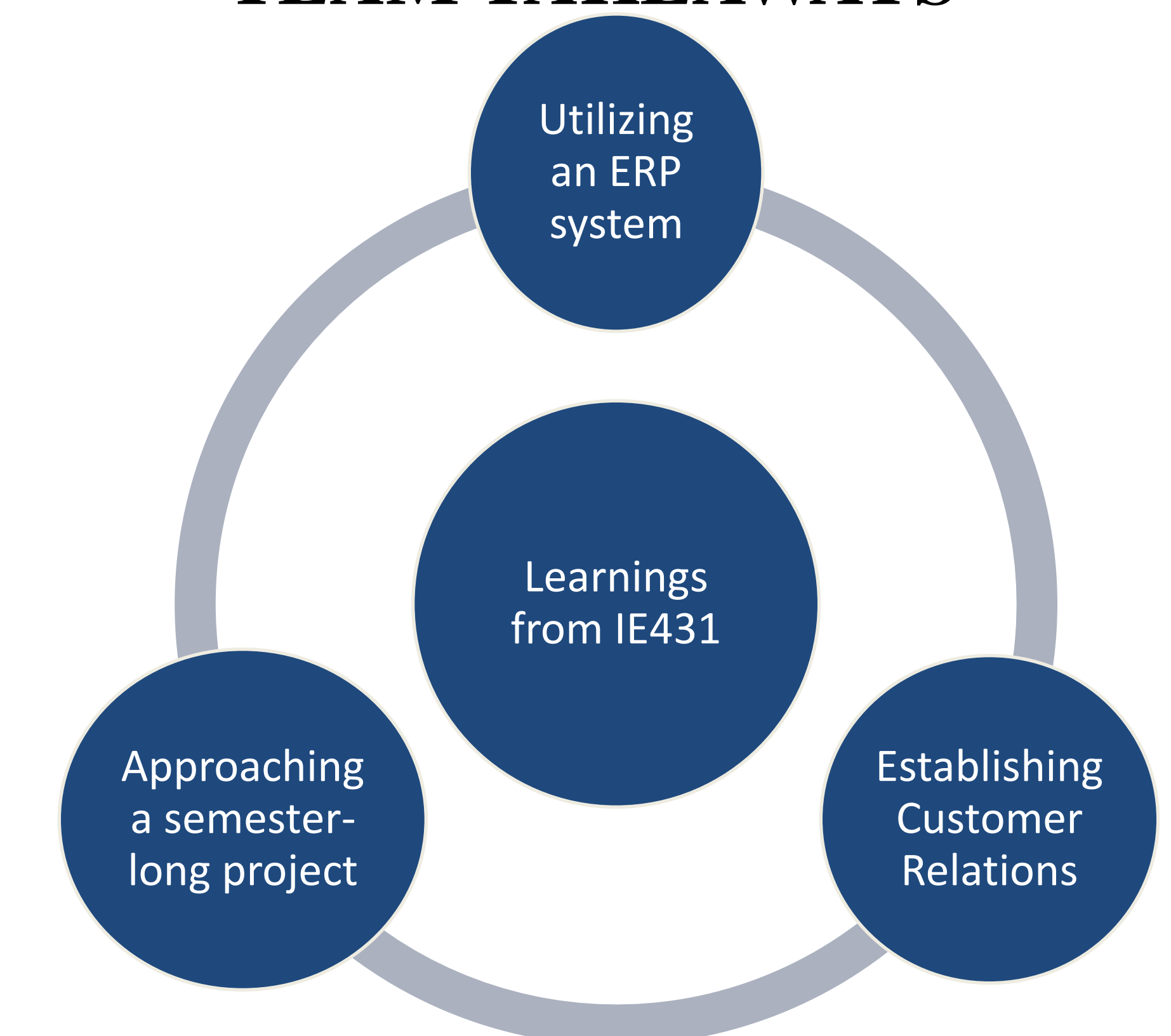


Figure 4: Team Takeaways

Collectively, the team has put together their three biggest learnings from the Preventative Maintenance project. First, the team learned how to utilize Epicor. ERP systems are oftentimes complex and difficult to navigate. The team had support from the IT team at Dynamic Metals when learning to navigate Epicor, which allowed them to get their questions answered throughout the implementation.

Secondly, the team learned the importance of establishing customer relations. The team worked closely with Alan Hoffman, plant manager at Dynamic Metals, as well as the maintenance and IT teams in order to fully understand the problem that the company was facing. To be successful, the team completed multiple site visits to understand the need for preventative maintenance at the site and to ensure that all machines and maintenance tasks were accounted for.

Lastly, the team learned the best way to approach a semester-long project. The team learned the importance of adhering to a schedule, meeting multiple times a week, collaborating with the client, and allocating the work equally among group members.

CONCLUSION

To conclude, the team was successful in implementing a PM program for Dynamic Metals. The team utilized the PM module in Epicor to create a robust system for tracking maintenance on machinery at the site. The PM module contains maintenance plans and step-by-step operations for over 40 machines. The team's work will assist Dynamic Metals in passing their NADCAP audits and allow them to continue to form metal for aerospace and defense companies.