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Kaiser Aluminum identifies process improvement opportunities by tracking delays, no matter how small.

Virtually any facility working with complex machinery to produce a large amount of goods will experience production delays. With a sizeable plant and a large-scale operation at Kaiser Aluminum s Trentwood facility in eastern Washington, it was apparent that a streamlined maintenance management system was necessary to ensure that maintenance and production costs were kept to an appropriate level. Frequent short duration delays can cost a plant a significant amount of money. Some of the production equipment can cost up to many thousands of dollars per hour in equivalent production when idle.

In 1994, plant management directed the maintenance organization to select and install a world-class maintenance system, capable of transitioning the plant from a system of reactive to proactive maintenance. The Maintenance Systems Team (MST) was chartered to make and implement the selection. Following an extremely comprehensive product review process, the MST made a unanimous decision and purchased MRO Software's enterprise asset maintenance solution, MAXIMO.

Equipment hierarchy and planning

The installation resulted in an equipment hierarchy of more than 20,000 records, 35,000 inventory items, 8000 preventive maintenance tasks, and more than 10,000 job (content) plans. Supervisors and craftsmen received maintenance planning training and more than 1000 hourly employees received training on the new system.

Kaiser Aluminum also decided to focus on the role of qualified planners, which it believed would lead to decreased emergency wrench time. The ratio of planners to craft people did increase significantly. Before this initiative, one planner prepared the work for 30 craft people. In the initial stages of the MST project, the ratio increased to 1:8. This was necessary during the creation of PM masters and standard job plans and the implementation of the weekly scheduling process. Once these processes were in place, and with maintenance effectiveness improved as a result, Kaiser was able to lower this ratio.

The Kaiser Trentwood management team also recognized that regularly scheduled PM tasks would help improve equipment reliability and reduce maintenance costs. The team decided to combat these costs by instituting a program with regularly scheduled inspection PMs as well as required planning and scheduling for all maintenance work. The successful results included greatly increased equipment uptime, a decline in maintenance costs, and improved product

quality.

Identifying the delays

While pleased with the results of the program, the Kaiser Trentwood plant maintenance and engineering management teams realized that in many situations equipment delays could be identified and corrected to further improve equipment uptime. The facility still regularly experienced 3-5 minute delays that were written off as a "part of doing business." The MST needed to identify the reason for delays such as the availability of supporting equipment (fork truck, crane, etc.) or equipment calibrations. With these issues in mind, the MST was charged with creating a Downtime Tracking System.

Ultimately, the MST wanted to define, analyze, and correct the delays that it would not fix by using a work order. For example, if a production person had a safety meeting, the MST would consider the time spent at this meeting a production delay, but it would not create a work order to track this delay. Initially, a custom MAXIMO application table was created to house a library of predefined delay causes and associated codes. Both production and maintenance employees were solicited for input on code creation. The codes then were associated with departments and equipment types. The MST set fields for several types of delays such as lockout/tagout, availability of supporting equipment, safety meetings, and equipment calibration.

The MST then defined the MAXIMO screen where the delays were entered. This screen was designed to document the equipment number, date, time, duration, and type of delay, as well as the appropriate shift contacts and any comments to further explain the reason for the delay. The MST also decided to work with one of MRO Software's Complementary Solution Provider partners, Work Technology. Work Technology's QuickPick product created a custom dynamic value list that links the department, equipment, and code held in the MAXIMO system, internally called the Downtime Tracking System. This technology allowed the MST to quickly query on specific words.

The company then supplied each operations center with the delay codes unique to the equipment and a daily schedule control (DSC) report. Although operations personnel could have inserted the delay data input as events occurred, in the interest of speed Kaiser Trentwood decided to have a data clerk insert each DSC on a daily basis. The data clerks' typing skills allowed them to enter the entire day's collection of delay codes into the system in a few minutes. Maintenance and operations management easily and frequently reviewed the cause of delays by either querying the custom application table or reviewing the DSC.

Analyzing the delays

After the data clerk inserted the information into the Downtime Tracking System, the MST also needed to graphically analyze this information. The team decided to incorporate Microsoft Excel with MAXIMO, and used Microsoft Query to select records from MAXIMO, which then were displayed on an Excel pivot table.

This report permits the user to select either the entire department or a specific piece of equipment and view the number of hours caused by each delay over the past 12 months. The results also can be ranked according to the type of delay. This allows the user to identify which delay is costing the company the most time and money.

By double clicking on any data cell the user can access the number of delays and accumulated hours. The user can drill further into the report and access additional delay information such as the crew, the time, and the date. The MST can view a month's worth of data represented in a Pareto chart that presents the top 10 causes of delays. The final graph is a line chart that illustrates the number of delay hours caused by each of the delay codes, by month over a year.

The collaboration of MAXIMO and Excel allows the measurement of each type of delay and the tracking of budgeting in real time to help improve maintenance practices and ultimately save costs. The MST found the Downtime Tracking System to be a management tool that allowed it to identify the largest cause of delays and take corrective action.

For example, the MST found that operations' dependence on maintenance for lockout procedures caused delays and was an excellent area to apply production-assisted maintenance. The team decided to reduce this delay by training the operators to lock out the equipment, thus allowing the operators to continue working without having to wait for maintenance and allowing maintenance to remain focused on more technical issues.

Data gets reviewed

The plant's management team frequently reviews and discusses downtime data with maintenance and operations personnel. The delays attributed to maintenance are challenged and reassigned to operations if the delay was caused by misuse of the equipment. Maintenance managers use the data to create work orders to remove or reduce the source of certain delays and to justify capital improvements.

This enhanced application also allows plant personnel to keep closer track of expenditures, ensuring that projects do not go over budget. The plant's financial team now has real time access to all costs associated with a project including work order, PM, labor, material, and equipment costs. With a click of a button in Excel, the predefined reports allow the financial team to pull the cost information from MAXIMO and automatically sort it in Excel. This visibility into the maintenance projects' cost center helps ensure that the department does not go over budget.

Prior to the collaboration of MRO Software and Microsoft's technology, the plant had no way to measure its production delays. Without this historical perspective, the exact amount of time and money that has been saved was unknown. However, one thing is certain; by identifying, tracking, and correcting production delays, uptime has improved, delays have decreased, the team stayed within budget because of enhanced visibility into the cost center, and the maintenance of production equipment has exceeded expectations. **MT**

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