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Dofasco's Hamilton, Ontario steel plant operations are among the most efficient and technologically advanced in North America. Read how reliability-centered maintenance increased asset utilization 8% at Dofasco.

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Dofasco's Hamilton, Ontario steel plant operations are among the most efficient and technologically advanced in North America. Approximately 85% of production (more than 2,200 coils per day) is stored and transported from Central Shipping facilities, including both in-process and finished materials.

With Central Shipping's stacker crane utilization rates at 90%, Dofasco required a 6% increase to meet growing production and storage demands. But higher volumes were resulting in a high incidence of stacker crane failures, which persisted despite ongoing crane upgrades.

Loss of crane control was a failure of particular concern. The stacker crane's digital radio system would occasionally register loss of power, causing the control mechanisms to fail, or kick out. Should this happen while a 25-ton coil was being moved toward a truck for loading, the operator would need to perform a rapid series of emergency steps to regain control and slow the bridge or trolley.

As a result, operators began to lose confidence in the equipment. Maintenance believed the radio was causing the problems and recommended a newer radio control system, and Dofasco decided to form a cross-functional task force to conduct a systematic, in-depth failure analysis to eliminate kick outs and build a technically sound maintenance program to support the goal of 96% utilization.

Dofasco selected RCM2, an RCM methodology from Aladon (www.aladon.com), to determine the root sources of failures and identify the needed maintenance program. RCM2 was seen as the right methodology because it would provide the most complete understanding of known and unknown failure modes. It also would serve as the foundation of a technically sound maintenance program.

The RCM2 analysis used teams of five to six subject matter experts comprised of maintenance, operations and engineering. The most problematic stacker crane was selected for the first analysis. Eight of the 10 stacker cranes in Central Shipping are similar in design, so results from one crane could be applied to the others. The crane system was divided into three analysis subsystems: the bridge, the trolley and the hoist. Because loss of control during bridging was considered to have the greatest potential consequence, the bridge subsystem was analyzed first.

All told, the three RCM2 analyses revealed 71 distinct functions of the stacker crane, 95 functional failures and 632 failure modes, of which more than 500 had safety and operational consequences. The RCM2 analyses confirmed the need to upgrade the radio control system, but also identified a problem with the electrical feed to the radio.

A fixed angle-iron collector assembly transfers electricity from the bridge to the hoist and carriage that traverses the bridge. Steel collector shoes pick up electricity from the angle iron and travel with the carriage, sliding along the feed rails. A slight curve in the feed rail caused a very brief separation of the collector shoes from the angle iron. This disconnect was the primary source of the radio kick outs, so a physical upgrade to a hardwired festoon system was required. Also, the main collector system was upgraded to spring-loaded collector shoes.

In total, 645 maintenance tasks were identified to manage the failure modes identified in the RCM2 analyses. Approximately 80% of those tasks are condition-monitoring inspections that require collecting massive amounts of data.

Dofasco operators and maintenance personnel had been recording inspection readings on paper, in many cases using personal notebooks. Now Dofasco is using Ivara EXP reliability software (www.ivara.com) to collect, store, display, analyze and manage maintenance program information automatically. As inspection data is collected on electronic handheld devices, EXP identifies potential failures and recommends the right maintenance task at the right time.

A detailed hierarchy of the stacker crane's bridge, hoist, trolley and their respective subsystems was built into EXP. Maintenance is able to see the functional states and initiate work orders in the CMMS against each component. This capability enables better analysis of spending history, which helps highlight growing problems.

Dofasco's Central Shipping department surpassed its 96% target, achieving 98% stacker crane utilization. The failure event that posed a threat to operator safety has been addressed, and operator confidence has been restored. Operations and maintenance personnel now have a much better understanding of how the equipment functions, how it fails and the specific proactive maintenance that is required.

Improvements in stacker crane reliability also have led to a 21% decrease in reactive maintenance work. Overall, 84% of maintenance work is now proactive. Ivara EXP also captures knowledge of experienced maintenance and operations workers, such as condition monitoring routes and condition tolerance levels, so it can be leveraged for the long term.



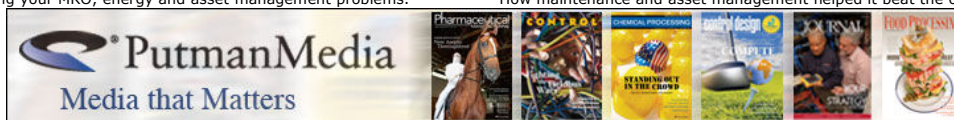
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