

Utilizing Real-Time Information in Enterprise Asset Management Systems

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Today, industries are looking for a change in the way maintenance is performed. In order to survive, organizations are searching for meaningful ways to offset the costs associated with performing maintenance activities while complying with evermore stringent regulatory compliance requirements at all levels of the organization.

There are also other less tangible factors to consider. It is no secret that organizations must find some way to offset the effects of an aging workforce, where many highly-skilled and experienced people are moving toward retirement. How will organizations cope? With fewer and fewer trades people entering the market, who will step up to take the place of those stepping down?

Costs are sometimes obvious -- labour costs, for example, and costs associated with procurement of parts or items – but some are less apparent... Hidden costs can be associated with changing parts that are still functioning within specifications or the cost of carrying inventory over a period of time.

There are many more scenarios where similar cost issues occur. Here is one to consider: Consider: a critical asset failure.

The costly aftermath of critical failure

An organization has just undergone a failure of an asset critical to the production process. Understandably, this failure has received considerable attention from management.

During a follow-up management meeting to discuss the issue, several potential strategies are identified to ensure that another such incident does not occur. It is decided that in order to prevent such a failure in the future, more conservative maintenance schedules need to be instituted for all critical assets. The justification for this is that if the maintenance strategy assumes worst-case failure rates and then compensates for this by applying a conservative scheduling buffer, failures will be eliminated. This is entirely correct.

However, there is a very high maintenance cost associated with this strategy. Labour costs increase as the frequency of maintenance increases. There is also an increase in parts procurement costs as more parts are replaced more often. Another hidden cost associated with this strategy is the cost of utilization. Replacement of parts that have not been utilized to the full extent of their remaining useful life can have a substantial cost impact.

Above all else, lost production matters most. This strategy for eliminating subsequent failures does not consider the impact to the production schedule; production may suffer worse damage over time than if a failure had occurred. The increased frequency of maintenance requires greater attention to planning and scheduling of not only the maintenance itself, but also of the production process. Companies today run so lean that any interruptions to production have a significant impact on the financial statement.

The Condition-Based Maintenance philosophy

As can be observed from this scenario, there are many opportunities for improvement to maintenance procedures. A business case is made for investing in technologies that maximize production while offsetting both hidden and direct maintenance costs.

One of the keys to improving maintenance is the proper and intelligent use of asset information that lies locked away within the minds of a retiring workforce and within the various control systems and data warehouses common in industry. Today data is collected and stored for everything from critical process equipment, to mobile units, to facilities assets. This data typically resides at the operations level of many organizations.

To realize the value this data can provide, the bridge between Operations and Maintenance needs to be built. Only when this is achieved can maintenance activities be optimized and taken to the next level.

Organizations need to optimize current maintenance practices, decrease costs, and offset the effects of a highly skilled, experienced workforce that won't be around in 10 years. Industry-leading companies have recognized that one of the most effective ways to address these issues is to turn to proactive asset management methods. Their objective is to adopt a maintenance strategy that involves doing maintenance only when it is required, while sustaining or even improving overall reliability.

Doing maintenance based on objective evidence of need, or in other words based on the condition of an asset and not on historical worst-case failure rates, is the cornerstone of Condition-Based Maintenance (CBM).

The CBM philosophy has been around for decades, and has recently enjoyed renewed interest as companies look for ways to improve equipment effectiveness and capitalize on the full lifecycle potential of the assets that are so important to their operations.

So why has the CBM approach to maintenance not been more widely adopted?
Why do many organizations continue to focus primarily on preventive maintenance?

Primarily because the volume and resolution of data required to effectively support CBM at or near real-time is largely unmanageable at the human level. Furthermore, gaining access to this information in a timely manner has proven to be a challenge. However, recent advances in technology are making real-time CBM a reality. Integrating real-time asset data at the operations level with an Enterprise Asset Management (EAM) system at the business layer of an organization to support Condition Based Maintenance efforts offers measurable improvements in maintenance effectiveness and efficiency.

Making the most of real-time asset information

Process-based organizations are very familiar with real-time data. It is the lifeblood of any control system. Operations have been taking advantage of real-time information for years to support production and processing functions. Process data is collected, stored, analyzed, and presented in order to improve on and support decision-making at the operations level.

Within the context of maintenance, there is a similarly large amount of untapped information waiting to be utilized. Getting this information to the right people at the right time allows

organizations to make fact-based decisions about how and when to do maintenance and to improve overall asset management strategies.

Making it happen

Most if not all critical assets are connected to the control system architecture of the operation. These assets already talk to the control systems via a complex web of sensors and instrumentation. The trick is to listen in on that conversation to determine what the assets are telling us, in real time.

This can be achieved using the following approach.

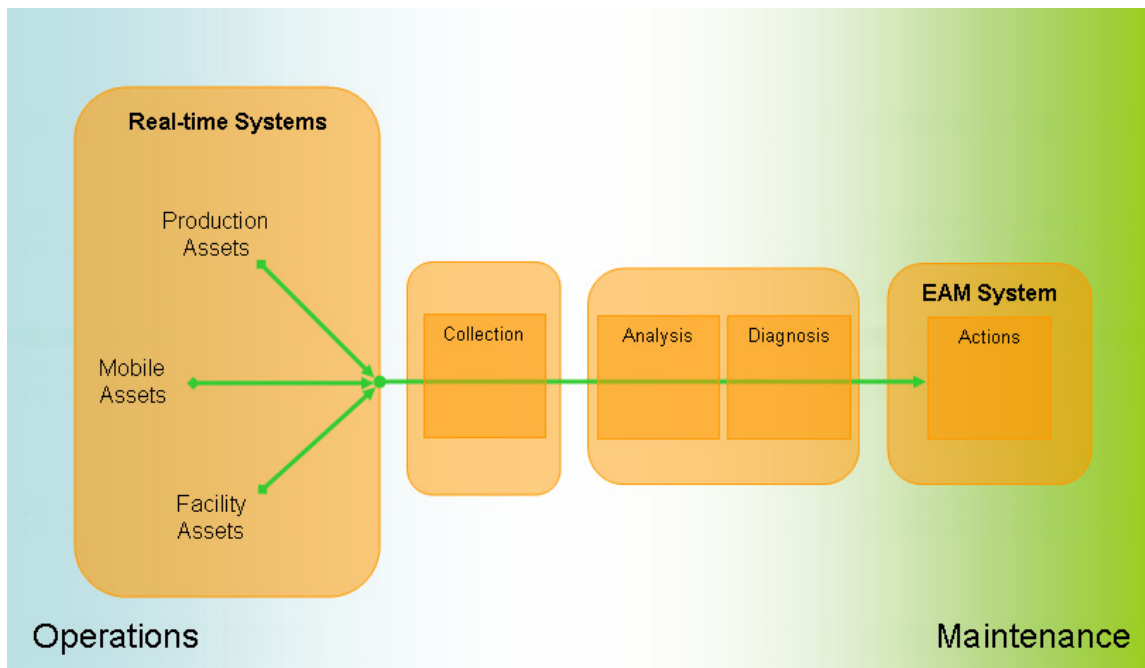


Figure 1 - Real-Time Asset Maintenance

The first step is to identify those assets which can provide information. This information can then be categorized and a determination made about how it can be used to generate a failure signature for the asset being monitored. I.e., what tells us the asset's health is deteriorating, and could potentially fail, if health is not restored?

Once the rules for determining failure signatures are detailed, the data is collected using data collection software standard to the process control industry. Commercially available off-the-shelf CBM applications like Matrikon's equipment monitoring solutions can then combine the failure signatures and data to provide a system that integrates the operations asset data with the EAM system.

The result is an integrated solution that can determine the health of an asset in real-time and take action to correct the issue before a fault occurs.

This is what CBM is all about: taking advantage of real-time information to determine the condition of assets and perform maintenance at the optimal time. It is a philosophy of only doing

maintenance when an impending fault or failure condition exists, or when there is objective evidence of need.

Today many companies focus on preventive maintenance strategies as the mainstay of their maintenance strategy. Preventive maintenance, while effective, is overly conservative in its approach based on worst-case historical failure rates, and may mask incidental costs associated with changing parts that still have remaining useful life, and with doing more maintenance than necessary.

The objective is a reduction in overall maintenance expenditures. Ways in which this can be achieved include eliminating reactive maintenance, streamlining and optimizing the use of preventive maintenance, and focusing on a more strategic, predictive, and cost-effective maintenance strategy that takes advantage of real-time asset information.

The benefits are real

Automation of maintenance processes. By freeing maintenance engineers from the mundane tasks of generating work orders and entering meter information manually, they are freed to focus on real value-added activities that improve and optimize maintenance.

Reduced maintenance costs. Less time spent repairing healthy assets means more time spent managing assets and developing more proactive approaches to how maintenance is achieved. CBM has been shown to reduce maintenance costs by as much as 50 per cent.

Fully utilized equipment lifecycles. Doing maintenance where there is an objective, fact-based need rather than at scheduled intervals will not only ensure that critical failures are minimized or eliminated, but will also ensure equipment and parts are utilized through their full lifecycle. The result is a new level of availability and operational effectiveness that is hard to achieve using a maintenance strategy focused on corrective or preventive maintenance.

Improved Production Capacity. By detecting potential failures before they become real failures, maintenance can be planned and scheduled in line with production requirements. The outcome is less unplanned downtime and fewer production disruptions as a result of asset failures.

One case which highlights the benefits of real-time information in a maintenance context involves a global pulp and paper company. For most companies in this industry, sheet breaks during the rolling process are a potentially significant source of increased operational costs due to unplanned downtimes and maintenance activities. For this particular company, sheet breaks occurred on average twice a day and were contributing to an Overall Equipment Effectiveness (OEE) of 69% and daily downtimes of at least one hour.

By taking advantage of Equipment Condition Monitoring software, this pulp and paper company was able to reduce sheet breaks by 40 per cent and improve production rate by 12 per cent within 12 months.

Properly implemented, integration of real-time asset information from operations with an EAM system at the business level allows assets to be maintained in a much more cost-effective manner. This results in reduced downtime, lower maintenance and inventory costs, and greater overall asset health and availability.

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