decision support

AhM asset health management

Achieving a Higher Level of Maintenance and Reliability

Augie DiGiovanni and John Renick

Progressive companies already implementing predictive maintenance are looking for proactive solutions to manage asset performance.

When a critical asset in a highly complex production system fails without warning, the cost in damage and downtime can be heavy – not to mention the potential risk to personnel and the environment, as demonstrated in several recent and highly publicized safety-related incidents. Asset reliability is becoming a competitive business differentiator causing organizations to rethink how they can leverage existing resources to improve the performance of their critical production assets.

Over the years, an ever-increasing volume of data on the condition of critical production assets has been generated by smart field assets connected to advanced automation systems. While this data has reduced machine breakdowns and associated costs, asset availability and uptime often remain below targeted levels. To facilitate an understanding of the reasons behind this problem, let's examine how asset data is used within an organization.

Personnel in plants with thousands of pieces of equipment generally have no good way of knowing if routine maintenance is being done too frequently or not often enough. Nor can they easily identify the "bad actors" -- those few machines and field devices that cause the most problems. According to the Boston-based ARC Advisory Group, plants in the process manufacturing industries "typically operate 20 percent below full operational capacity," and equipment reliability issues have been identified as one of the largest sources of loss.[1] Additionally, organizations struggle to answer:

- Are people spending their time on the right things every day?
- Are the predictive tools being fully utilized?
- Are maintenance dollars being spent correctly to achieve high reliability?
- How can maintenance practices be changed to produce better results?
- What equipment fails most often, and what's behind that failure frequency?
- Which assets represent the greatest risk to availability and safety?

The answers to these questions, as most managers know, have remained hidden in their existing asset-related data. However, new technology now offers the means to aggregate, analyze, and leverage this information, enabling end-users to uncover significant opportunities for improving reliability and asset performance.

Moving to Asset Management

Diagnostic information generated in the field by intelligent instruments and condition monitors provides critical information on plant assets in order to:

- Raise alarms when signs of impending failure appear so immediate corrective action can be taken to avoid unplanned downtime, reduce maintenance costs, and increase equipment reliability.
- Enable plant personnel to determine with some precision if repairs can be delayed until the most favorable time, such as a scheduled maintenance shutdown.

Predictive maintenance has proved to be less expensive than preventive maintenance and far less costly than reactive maintenance. Given the significant advantages associated with using predictive technologies for asset care, organizations are now looking for ways to more fully utilize the huge volume of their existing field-based data to develop optimal strategies for the management of their assets. According to Aberdeen Group's October 2010 report, *The Role of Software in Asset Performance Management*, "Linking Enterprise Asset Management (EAM) with performance management, analytics, and predictive maintenance are critical components/functionalities of an Asset Performance Management (APM) solution enabling companies to understand the value of both production and maintenance data which is critical to the success of any reliability driven strategy." The report stated that 44 percent of survey respondents are planning on investing in this type of solution.

The Changing Landscape

What does the asset management world look like when utilizing an integrated asset performance management approach capable of linking predictive intelligence with asset reliability information? Figure 1 displays an APM home page, which can be customized for each user, providing a quick view of the current state of asset performance, availability, and maintenance in a specific plant. Also displayed are historical charts showing monthly results for overall equipment effectiveness, availability, and maintenance costs. Users can obtain greater detail on any of these factors simply by clicking on one of the dials.

Figure 1

To learn about critical asset failures and how much they are costing the plant, the user moves the cursor to the "Linked Reports" box in the lower left-hand portion of the home page and clicks on "Critical Asset Failures and Cost Summary." The Critical Asset Failure and Cost Summary screen (Figure 2) shows where maintenance time and money are being spent, pinpointing ten pieces of equipment by tag number. Failure information pulled from predictive diagnosis applications and cost information from CMMS records are used to illuminate these "bad actors."

Figure 2

The bars on Figure 2 indicate the number of time-consuming failures suffered by each asset over the past year, and the green line shows the total maintenance cost of each piece. By clicking on tag number GC0036-083 (a gas compressor), the user finds out why that particular unit is costing more than $200,000 per year to maintain. Five failure modes for the compressor are highlighted on the subsequent screen, along with exactly which root cause is most costly. These reports can be updated as frequently as required by the end-user, so decisions can be made in real time.

Figure 3

By clicking on "Risks to Reliability" in the "Linked Reports" box, the user can access a report showing the highest priority assets with degraded health. All plant equipment is prioritized on the basis of failure modes and effects, understanding its operational significance, and the risk of failure. Each piece of equipment is then given a criticality rating. Appearance on this list is a strong indication that the asset is critically important to overall production and performance goals, which would be adversely affected by its failure.

Overall Equipment Effectiveness

System customization allows specific objectives to be established and tracked. For example, once key performance indicators are identified, a manager can very quickly determine whether the targets are being hit or missed.

As indicated earlier, higher level performance, including overall equipment effectiveness (OEE) and availability, is reflected on the home page, with details available by drilling down. For example, if OEE is declining as seen in Figure 3, the specific assets that are contributing to the decline can be identified with a single click, so the manager knows instantly where to focus attention to reverse the trend. The same is true of critical asset availability.

Reported benefits from organizations using this type of approach to asset management include:

- **Maintenance savings** of $10M within a year of implementation, related to the identification of "bad actors"
- **Reductions in reactive maintenance** by 40 percent in less than a year
- **Improvements in availability** totaling $3-5M per plant, per year

Conclusion

Predictive maintenance was a pivotal first step in increasing reliability and lowering costs. Now, organizations are identifying the necessity for a more comprehensive approach to the management of their critical production assets. Linking EAM with performance management, analytics, and predictive maintenance can offer an organization the opportunity to leverage their existing asset-related data to identify optimal asset strategies in support of their key business drivers.

1 Woll, Dave. "Emerson and Meridium Partner to Help Resolve the Asset Performance Management Puzzle," November 1, 2010. http://www.arcweb.com

Augie DiGiovanni is Vice President of Asset Optimization Services in Emerson's Asset Optimization business. He is responsible for leading the design, implementation, and completion of service projects, Machinery Health Management programs, and reliability solutions. This follows years of experience in reliability in a mission-critical marine environment.
www.emerson.com

John Renick is the Partner Solutions Manager for Meridium, Inc. He has over 12 years of experience working with asset-intensive industries. In his current role, John oversees Meridium's partnerships and ensures those partnerships deliver valuable solutions. Prior to serving as Partner Solutions Manager, John was the Product Manager overseeing Meridium's APM framework, Production Loss Accounting Module, Mobile Framework, and Meridium mobile solutions.
www.meridium.com