RIM is the Secret to Reliability Program Success:
Six industry pros share their reliability information management best practices

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With all the effort going into predictive maintenance (PdM) and asset management (EAM/CMMS) solutions, it is easy to overlook the fundamental role of reliability information management (RIM). For many, RIM is a completely unfamiliar concept, but is the glue that holds successful reliability programs together.

Condition monitoring technologies such as vibration, ultrasound, infrared thermography, and oil analysis are highly effective and rapidly becoming more sophisticated and affordable. Although companies are quickly adopting them to detect degrading asset conditions and perform timely PdM, their value cannot be fully realized if the information is segmented, isolated, or lost in the shuffle of day-to-day maintenance activity.

RIM is focused on bridging the gap. It consolidates asset condition data so it can be properly analyzed, understood, and pushed into the workflow with the appropriate notifications. It captures feedback from the plant floor on what does and doesn't work in order to continually improve the outcomes. And, it ensures that each condition is followed through to resolution.

Those aware of the opportunity are setting the bar for RIM best practices. The following five leaders share their experiences and offer advice about how to better manage RIM data, prevent more avoidable failures, and make a considerable difference in equipment life expectancy.

1. Chemicals manufacturer – Uses Red Meetings to turn asset health into work priorities.

Until RIM best practices were implemented, a certain chemical handling group had a highly reactive maintenance organization that lacked the tools to focus on proactive work. An initiative led internally by the corporate reliability manager, site maintenance and reliability managers, and PdM supervisors changed all that.

Tango software for RIM was implemented, and then weekly meetings were conducted to review, prioritize, and schedule asset conditions logged in the software that represent a risk to reliability. "We added open Tango condition entries to the maintenance KPIs. This can be done as a count or as a percentage of the assets in the program or production unit/site," says a senior reliability manager at the facility.

An initial challenge was the lack of PdM technicians, which was solved using small successes to negotiate for more resources in future year budgets. "Briefing site managers on the results earns credits toward getting more resources," explains the manager. "Give me $1, I'll give you back $5."

Already, this manufacturer has recorded $9M in annual avoided maintenance costs and production losses and a return on investment ranging from about 500% to 1,000% per site (including man-hours, software, and tools). Furthermore, avoiding catastrophic failures frees up maintenance dollars to use on improvement efforts, adds the senior reliability manager.

To implement RIM best practices, this manager explains that you must have the support of executive leadership because site directors and maintenance managers will not get on board without executive

support. In addition, weekly Tango condition entry review and scheduling meetings are mandatory to get the program going.

2. Energy company – Created a dedicated centralized asset health program.

A global coal company launched a centralized Asset Health program to better share information across more than a dozen mines. Until then, mobile equipment at each site was managed differently and the condition monitoring (CM) data was not properly used to plan changeouts. The reliability engineers and planners were overly focused on critical samples and too often interrupted by breakdowns or other emergencies. Additionally, they didn't communicate with other sites about failure modes or equipment condition issues even though they all run the same machines.

Today, a central team of six people manage CM data for all sites from a single RIM solution and freely share what works. Because these six are not pulled into emergencies or breakdowns, they're able to maintain focus on CM data to drive results. Their efforts quickly paid off: "The first year yielded $13M in cost avoidance, and in 2018 more than $30M – that includes life extension and component condition saves," says the company's asset health manager.

Previously, component lives were much shorter because undesirable conditions would propagate in the engines for an extended period. "We used to recommend component changes at 24,000 hours. Now, the average engine life is about 32,000 hours and we're looking to get to 40,000 hours before changeout," Lay explains. The engines are worth $750K each so run-to-failure is hugely expensive, and since they're not a common engine, the downtime is longer.

With the Asset Health program, the engines are kept running in the normal range and there are strategies and processes in place to manage risks. "Having software like Tango and Matrikon, we are able to set our own alert limits. We set the sensitivity up as high as we can, which gives us a much bigger window of opportunity to react and rectify deteriorating conditions," says the asset manager.

They found getting buy-in from each site was more challenging than from management. "We're able to pick up a crack in a piston in an engine from 1,200 KM away from the corporate office three months before it would have resulted in an engine failure, but initially it was difficult to get the guys to investigate, understand, and rectify the situation," the asset manager. "We had to slow down, fall back, and help them understand how we came to that conclusion."

The real value of the program is having someone actually use the information to fix something, which means getting meaningful information to and from the technicians on site. This includes translating what may be jargon from an oil sample result or a vibration report in a way the mechanics can understand and take action.

"When we learn there is a problem, we provide detailed recommendations for remedies in terms the mechanics can understand so they know exactly what to check and what action to take to rectify the condition. Then, we capture their feedback – was it fixed or was it different than expected? If still unresolved, the next time we'll try harder with better information and recommendations," explains the asset manager. "We don't let go of a condition until it's fully rectified and managed through to completion."

Make sure your KPIs don't drive the wrong behavior, the asset manager cautions. A work order completion KPI may incentivize closure even if the problem is not necessarily fixed, which can lead to multiple work orders for the same job. A better measure is the mean time to repair (MTTR).

3. Industrial services provider – An integrated database is critical to success.

A major North American inspection and engineering services company had been managing client asset reliability data via spreadsheets, emails, and Word documents – a practice that did not facilitate communication tracking or document control. Similarly, its clients were dealing with data management issues due to lacking a centralized document database.

"Lots of time was wasted finding the latest information as people searched for where they saved their documents. A document control process that tracks asset health history down to the component level was missing, and we determined that having a database portal was the solution," says the former regional director at the company.

The company chose Tango from 24/7 Systems for its RIM database portal along with iPad tablets for its field users to conduct rounds logging. In addition, a software subject matter expert (SME) was established to ensure that all CM databases were developed with the same general appearance, had consistent naming conventions for linked documents and asset pictures, and that the RIM software's asset hierarchy was structured similar to the existing CMMS asset hierarchy.

Field analysts quickly gained efficiency in minimizing reporting time with greater accuracy after a couple uses. "The first round of inspections usually requires a few tweaks before it is entirely accurate, but once the software went live, it immediately opened the communication chain with the ability to view the inspections, KPIs, integrated condition status reports (ICSR), and email notifications," explains the regional director.

The new RIM system also drives reliability planning and scheduling meetings. The participants and selected other authorized personnel have access to provide commentary notes, allowing them to interact and remain engaged with the plan-do-check-act (PDCA) process.

Now, maintenance costs are better tracked to a component level via the Cost Avoidance Calculator and the mean time between failure (MTBF) can be studied with more confidence in accuracy. Additionally, the KPIs generated from the software can help identify where training may be needed for the maintenance team thanks to Pareto analysis of the different types of failure mechanisms and component types involved with maintenance intervention, he adds.

To control the integrity of the RIM database, he strongly encourages establishing a Tango SME and limiting access to very few who can add/decommission equipment components and administer the program. "Too many cooks spoil the brew," he says.

The results are even better when the client uses the same RIM solution. He recommends trying to figure out how to include Tango from the very beginning of the process instead allowing the client to manage their side of the reliability program with their own spreadsheet or CMMS system.

4. Public utility – The RIM dashboard greatly increased the amount of planned maintenance.

The Metropolitan Sewer District of a major Midwestern US city, like any public utility, faces a constant demand for cost control in order to keep rates paid by customers as low as possible. This water works facility's progressive culture inspired the use of RIM best practices to better control costs and improve asset reliability.

The RIM initiative was part of a broader reliability program implemented over five years that included reliability-centered maintenance (RCM) analysis for critical systems, root cause analysis (RCA), extensive PdM technology application with advanced PM and PdM optimization, and advanced planning and scheduling practices. "All of this was backed by extensive training and reassignment of personnel from

hands-on repair positions, betting on success, and ultimately winning that bet," says a reliability pioneer and veteran industry consultant, including former PdM consultant for this facility.

The tools chosen included Tango RIM software, planning and scheduling software, KPI tracking software, and various PdM analysis software for vibration, ultrasound, lubricant and wear particle analysis, infrared thermography, and more. Centralizing and managing all the various condition data in the RIM software enabled the water treatment facility reliability team to collaborate, prioritize, act on conditions in a timely manner to prevent asset failure.

"Having a detailed plan really worked to help the initiative. Assigning champions to each of the major parts of the initiative sustained it," says the reliability expert. It wasn't always easy. Constant change of high-level management required constant briefing and justification of the initiatives undertaken in order to keep promised resources flowing. The information captured in the RIM software supported this effort.

The commitment paid off. Using RIM best practices greatly increased the amount of planned maintenance performed so there are fewer surprises, and it minimized maintenance cost increases. The public water treatment facility was also able to sustain and improve reliability without increasing the Maintenance Department's headcount.

5. **Petrochemical manufacturer – All reliability information in one system was critical to success.**

A large Middle Eastern petrochemical company needed to improve its RIM practices because its ability to manage assets against locations, track inspections, and provide component-level reporting had been lacking. The dearth of documentation was identified as a primary weakness.

Building an asset hierarchy folder system became a priority. "We developed a place for planners to start storing the documents as they found them, and we hired a clerk to start scanning old files into the electronic format," says a previous senior reliability engineer at the petrochemical company and now strategic programs manager-rotating equipment performance at the Group.

The files were linked into the company's new Tango RIM system and later into the company's EAM system for work management. Concurrently, the reliability team began conducting regular "Reds" meetings using the RIM software's dashboards and reports to discuss, prioritize, and schedule the maintenance work, improving outcomes as well as communication with the various departments.

The resultant improvements to cost tracking helped to quantify the savings and cost avoidance realized by the production and management teams, says the reliability manager. Additionally, recordkeeping and compliance improved for the petrochemical company's external insurance (ISO) audits and internal safety audits, as the RIM software provided the ability to pull up an asset quickly and show inspection dates and results.

Spread the word

Not only is it important to promote RIM-enabled saves and successes internally, but the asset manager encourages all reliability leaders to share their winning initiatives with peers in industry. Doing so establishes the business as a thought leader and its program leaders as authorities, while also enabling others to learn how to successfully implement best practices.

For example, the water treatment facility presented at workshops and major conferences and wrote articles about their efforts. Within three years of beginning their initiative, the public facility received recognition from the maintenance and reliability community with awards at major conferences. Who is next to raise the bar for RIM best practices?

6. Engineering & Construction – Created a Cost-Benefit case for Condition Monitoring.

In early 2014, a large engineering, procurement and construction (EPC) service company sought to determine the best way to justify a condition monitoring investment. They needed a way to assure a client's management team that condition monitoring service delivers a measurable value.

The service company had been performing vibration analysis, oil analysis, ultrasound, motor management, infrared thermography, and visual inspections at the client's plant beginning in June 2013. The benefits were clear to the plant's Operations and Maintenance (O&M) personnel, who wanted to expand the program, but their management team remained unaware of the bottom-line benefits. A decrease or elimination in funding would return the plant to reactive mode.

Not only did the petrochemical managers accept the cost justification numbers and attribute the value to the reliability team's efforts, but they also decided to become more financially invested in equipment reliability. As a result, the program has since grown in scope and impact.

The review team built their successful cost-benefit case for condition monitoring using three easy steps, which anyone who owns, or services critical assets can follow.

a. Start small and leverage available tools.

Cost benefits are based on the difference between what could have occurred upon failure vs. what action was actually taken as a result of monitoring. The details from their Tango reliability information management system from 24/7 Systems, which integrates all company condition monitoring activity. The software captures data on both actual and projected costs, providing the basis for measuring avoided costs.

b. Ensure trust with credible cost-benefit analysis results.

Though individual numbers may be debatable, having sufficient analysis cleanly presented in charts by asset type and by technology makes the savings tangible and actionable. Building trust began with the plant's reliability review team members. The service company faced resistance early on, but gradually the participants recognized the value of their efforts and the reviews were no longer considered a nuisance.

Confidence was also gained from Operations. Over time, consultation with the operations representative by the review team was reduced to seeking a final agreement. After 18 months, the team no longer had to involve Operations in each case.

c. Quantify the PdM program successes and act on conclusions.

Nearly $2 million in cost avoidance savings over the first-year analysis period were revealed.

Cost-benefit analysis results allow the petrochemical plant to visualize hard dollar savings, validate the condition monitoring program, and justify PdM expansion costs. It also reveals trends in equipment and asset types. Any asset owner, operator, or service provider who builds a business case for condition monitoring following these three steps is sure to enjoy similar advantages and enduring executive support.

Best Practice #1: Consolidate on a Single Database
Most plants have an expensive asset management (EAM/CMMS) system holding their maintenance information, and many companies mistakenly believe it will suffice for reliability information management. However, these systems are not designed to handle comprehensive reliability information.

Best Practice #2: Manage Information, Not Raw Data
Meaningful asset reliability information drives effective maintenance decisions. However, too often there is a tendency to conflate asset data with reliability information, and a desire to push too much data out to the plant floor. Not all data is valuable and having more of it won't necessarily lead to reliability success. It is more important to manage and communicate useful reliability information.

Best Practice #3: Track Both, Location and Equipment Reliability
Is that chronic reliability problem tied to a specific baseplate location or is it migrating from location to location with a specific piece of equipment? It is essential to track reliability information both by equipment location and by the lifecycle details of each tag numbered component installed in the locations.

Best Practice #4: Manage Condition Monitoring Tasks Effectively
The compilation of asset health requires that the reliability program define the critical assets that are to be inspected by each PdM technology and the interval for inspection. The assessment task provides the inspection plan, inspection results validation and problem description Asset health metrics are derived from assessment results such as task compliance, percentage degraded and components at risk because of problems or failure to inspect.

Best Practice #5: Integrate Walk-Around Inspections

Operators doing basic operator care, mechanics/millwrights/electricians performing craft inspections and lubrication technicians running lube routes probably spend more time around your operating assets than anyone else in the plant. Best practice RIM programs collect this information with portable tablets and integrate findings with other PdM technologies. Significant reliability success is provided by knowing what those inspection techs know about developing equipment condition problems.

Best Practice #6: Use an Integrated Status Dashboard
An integrated condition status dashboard is a key tool for any reliability program, because people should not have to go searching for information. Dashboard call out the most important information very quickly and simply.

Best Practice #7: Conduct Reds Meetings
Since reliability is not achieved in isolation, a reliability program is not complete without regular interaction between all stakeholders – particularly maintenance, production, analysts, and reliability engineers. Reds Meetings are the best-practice method to raise awareness of the most critical conditions and drive their corrective actions to completion.

Best Practice #8: Establish a Repair Vendor Interface
Give repair vendors the ability to directly and securely access and contribute to the plant's repair tracking information system. Repair tracking software with a professional, well-defined vendor interface will show what equipment is out for repair, the status of where it is in the repair process, and autopsy information about the failure and how to prevent it from reoccurring in the future.

Best Practice #9: Optimize RCFA Management
RCFAs are great provided they result in corrective actions. Many plant teams and repair shops utilize RCFA, whether formally or informally, but most do little, if any, systematic root cause tracking. These reliability programs fall short in managing the completion of the corrective actions.

Best Practice #10: Identify Bad Actor Locations
Most programs fail to identify locations that frequently fail. If a plant has 10,000 pieces of equipment deemed critical enough to inspect with condition monitoring, it can be difficult over the years to remember where all the bad actors are located. It is a best practice to track this information and use it to improve future outcomes.

Best Practice #11: Maintain Avoided Cost Records
One of the most helpful best practices is to calculate avoided costs. This involves comparing the cost to repair a piece of equipment to an estimate of what the cost would have been if it failed in service. When deteriorating equipment is allowed fail in place, it will fail catastrophically, and the damage to the machine and the cost of repairs or replacement will be much greater than had it been repaired before failure.

Best Practice #12: Track the Basic Metrics of Your Reliability Program
Metric tracking for reliability programs is simplified with a strong RIM system. Having online, real-time access to basic metrics helps to reveal successes and weaknesses in the reliability program so that continuous improvements can be made.

The best way to track a reliability program's effectiveness is to maintain three basic metrics: mean time between failure (MTBF), root cause of failure, and cost of failure. Unfortunately, this practice is relatively rare, putting funding and support for most reliability programs at risk.

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