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Building and Maintaining a Modern Asset Ecosystem





Modernising Equipment and Maintenance Strategies

In today's highly competitive landscape, it's no longer enough to simply track and fix equipment assets. A more aggressive asset strategy is needed – one that ensures equipment efficiency and effectiveness that maximises the return on investment (ROI), especially that of physical assets. Today's maintenance strategies need to go deeper. Asset data needs to be collected and analysed so that companies can not only better understand what the maturity of their assets means, but also assess equipment condition and predict why and when assets are likely to fail.

Using operational data to track and fix assets

Asset downtime is costly in any industry, where it can equate to millions of dollars in lost production, extra materials additional labour costs. Across asset-intensive industries, equipment problems can go well beyond just the loss of output and product; faulty equipment can even result in serious safety and environmental complications.

Most companies have maintenance programs in place to prevent equipment failures. However, many of these programs still focus on tactical procedures that track and fix assets – they don't provide much in the way of analysis into why assets fail or even predict when they

will. With today's focus on reducing operational expenditure across the enterprise, oil and gas companies need to gauge their current procedures; determine what kind of asset management system they have in place; and, depending on what they find, move to a more strategic process that incorporates predictive practices.

Understand the maturity of assets

We believe there are five stages in a company's asset management maturity process – starting from the very basic and progressing to a comprehensive, enterprise-wide maintenance strategy.

These five stages are:

1. Operate

In this stage, the company is reactive to all of its maintenance issues; it fixes something when it's broken. The company takes few or no preventive measures. This approach increases downtime costs and often results in lost opportunity. It prompts excessive safety stocks that reduces inventory turn and increases pressure on cash flow.

2. Consolidate

Here, the company recognises their approach to maintenance could be improved, but can't properly fund a major overhaul in systems and practices. It continues to focus on reactive procedures, but adds some element of planning, such as ensuring critical spare parts are in inventory and, when practical, overhaul instead of replacing equipment.

3. Integrate

This is the stage when the company begins to emphasise financial aspects of maintenance. In this stage, the company should communicate its expected ROI to senior leaders, stressing the importance of securing extra funding for additional preventive maintenance measures such as routine inspections, lubrications, adjustments, and scheduled service plans. Planning ahead will help improve equipment 'Mean Time Between Failures' (MTBFs).

4. Optimise

As time goes on, enterprise participation grows. That means having the support of management is critical and mandatory. With a growing shift towards predictive maintenance, more data will be collected and analysed. This is need for organisations to understand when failure is likely to occur and its impact on the business. The MTBF will significantly improve during this stage because the company is proactively managing risk.

5. Innovate

The final stage includes maintenance as part of a total company system where the company combines prior techniques with operator involvement that frees maintenance technicians to concentrate on repair data analysis and major maintenance activities.

These stages have followed the evolution of enterprise asset management (EAM) systems, from computerised maintenance management systems (CMMS) to today's advanced asset performance management systems. CMMS is usually tactical in nature and provides an understanding of when to repair assets. It also sets the flow for issuing and tracking work orders. Such a system is well suited to small single-plant operations with limited resources. However, it doesn't consider the hierarchical nature of complex assets.

Achieving the highest ROI from your equipment

According to a strategy report from PWC, one of the top issues impacting global oil production is deferred maintenance. This report states, "some operators have put off non-critical spending in recent years to help reduce operating costs." This is especially troubling for an industry that often relies on ageing assets – some that are used long past the expected lifespan. When a company invests in a mature asset management strategy, it's much better positioned to ensure that it maximises MTBF and achieves the highest potential ROI on equipment— aging or otherwise.

Managing a modern asset ecosystem

Assets are not typically isolated, instead, each asset consists of a complex system of multiple components which are more often inter-related.

This hierarchical setup requires the ability to monitor, track, report, and execute work order activities based on an understanding of how one move will impact another –often with potentially far-reaching implications.

Managing this asset ecosystem requires an understanding of how each asset works with another, identifying failure indicators that help determine where a failure is located and acting to correct any problem.

Modern asset management systems provide EAM tools to help manage the ecosystem, including:

Asset hierarchies

Help process users view assets from a system and positional perspective so they can understand the true costs of any asset with the aim of controlling, planning, and avoiding unnecessary capital expenditure.

Inventory management

Provides real-time inventory visibility which helps reduce inventory and material waste and cost, while enhancing purchasing control and stock use efficiency.

Maintenance control and scheduling

System functionality that helps prevent overtime and down time, while improving maintenance effectiveness and labour worktime scheduling.

Inspection management

Are tools that help plan and control inspection routes, measurement points which to highlight vulnerable or critical assets.

Regulatory and safety requirements

Providing specific information capture and material labelling requirements by categorisation that helps manage Environmental Protection Agency (EPA) inspections, internal audit, spill and safety reporting and all safety related matters.

The right EAM tools

These can track and manage key safety and regulatory data relating to assets, maintenance, and inventory.

Asset warranties

EAM systems will allow users to track asset warranties, the warranty statuses and help reduce maintenance expenditures. This prevents unnecessary time work and costs being incurred on assets under warranty.

Asset analysis

Analytics and reporting can indicate why assets fail, the costs of operating each asset, the asset location for optimised deployment.

Trying to predict the future

With today's focus on reducing operational costs and increasing production, it is time to assess current procedures, re-evaluate your current asset management system and move to a more strategic system that incorporates predictive analysis practices.

All parts of a modern EAM tool work together that help improve the overall asset ecosystem, however building the maintenance program around these best practices should be your target.

Earlier, we referenced five key stages in an energy company's asset management maturity process starting with the very basic stages and progressing to a comprehensive, enterprise-wide maintenance strategy.

There is also the need to rely on five best practices in order that you achieve the goal of a 'predictive maintenance strategy'.

1. Assess the existing maintenance strategy

The stages outlined in our earlier editorial provides a good indicator of where a company is in its asset management strategy, but the company must first understand the past and establish a performance baseline. For example, analysing benchmarks such as percentage of work that's planned versus breakdown related or reactive in nature.

These indicators should be further evaluated by equipment class or type to determine more accurate baselines and possibly even root causes of failures.

The company should also determine its proficiency in capturing and analysing asset data. The amount of data it can collect and analyse will

form the foundation for the entire program and is often driven by the limitation of legacy systems.

More often, the information needed to drive decision-making and processes comes from multiple disparate sources including asset management and production systems.

The overall equipment effectiveness (OEE) metric, for example, 'required availability information' comes from an asset management system, as well as 'quality and capacity information' comes from a production system.



Likewise, production, maintenance requirements and labour planning schedules can reside in two or even three distinct systems, yet apply to the same asset equipment.

Today, all company's need a holistic view across their business enterprise. Disparate systems and data sources make driving greater efficiencies very difficult and limit decision-making. With the right system and accurate data, companies can develop a sense for how their asset portfolio is performing and where to invest additional budget. This ensures assets and asset performance are aligned with strategic business goals.

Every company that has a multi-facility operation should look at how well it's sharing best practices. They should also look at how well they are managing inventory and procurement processes across their facilities.

Answering these questions will help your organisation gauge how well its operation leverages industry best practice.

Unfortunately, asset and maintenance are typically thought of as a silo - one plant and location at a time. Instead, economies of scale can

offer substantial cost savings if all assets are viewed across the business as one.

2. Identifying strategic assets

Predictive maintenance does not necessary apply to all assets. Instead, strategic assets should be identified as ones that directly impact revenue. A reactor is strategic if it is essential for producing product or output, for example, if its performance and availability affect output. In addition, production output should be a factor in determining the extent that equipment failure would lower revenue.

Failure of highly efficient production lines that operate with high output may be more tolerable to the business than stopping production lines that struggle to meet output requirements. All the above can also be determined by the environmental conditions in which the asset is operating.

3. Determining the best equipment failure indicators

Failures occur for different reasons and these vary by equipment, environment and operating requirements.

For example, a pump handling abrasive slurries may suffer excessive vibration before experiencing bearing and seal failure, while excessive energy consumption may signal wear and tear problems in another pump.

Trends and patterns can be discovered by looking at the history of the asset, its performance, combined with failure studies and reference cases. Institutional knowledge and your own experience is also key. In addition, the company's most important strategic assets could be monitored for multiple indicators to minimise failure.

Assets are not typically isolated, instead most assets consist of a complex system of other components. Components are likely to have a relationship with other assets that must also be monitored, tracked,

The questions you should be asking:

- Are common performance measures established so that comparisons can be made?
- Can information be easily consolidated across plants and facilities into a single source of truth for analysis?
- Is cross-facility collaboration taking place?

and reported across the business. But don't be fooled by false positives. Relating high material usage variances to excessive energy consumption in equipment could be a false positive, for example, the use of extra energy could stem from poor material or formula quality and wouldn't serve as a leading indicator of an equipment performance problem.

4. Automated analysis

Time to action, based on real-time Scada data is instrumental to an effective predictive maintenance plan. Maintaining a dated method of sorting through data is inefficient and may provide poor analysis because of the time lag. Plus, manual review and analysis takes staff away from performing maintenance and creates a backlog of activities.

Automating the process allows the company to take immediate action based on real-time data analysis.

The right analytical tools can help identify issues and trends quickly. Analysis that can be derived from EAM software that includes trending algorithms can pinpoint problems, filter false alarms, immediately notify asset owners, and adapt to ever-changing conditions. EAM software helps drive industry standards and good asset management practices. In contrast to systems that only captures performance information and reports for an engineer to sift through for answers). A strategic EAM solution that supports real-time analysis will take you

many steps forward.

Asset performance data is automatically analysed for predetermined trends. For example, a 10% or more excess energy consumption for more than 60 minutes resulted in significantly higher operating costs. In this situation, any modern EAM system would alert key stakeholders and for them to act when specific performance issues are found or where non-conformities exist.

An alert can be in the form of a prescriptive set of steps (e.g. a 12-point inspection work order plan) that pertains to the asset's condition that guides the engineer through the diagnosis, repair, and restore process or something as simple as an email.

Furthermore, industry leading EAM systems can assess situations in real-time, including identifying stalled work orders, issuing alerts to escalate matters, ensure work is completed, or enforce regulation and safety compliance.

5. Measuring and refining analytical results

An asset management program must be continually measured and refined to achieve best analytical results. This ensure it scale to cover additional assets and business processes. To do this, the company should identify the best opportunities for improvement and monitoring the most critical plant. The impact of process change





across the program must be evaluated, not just at one data point relating to a single asset. Automating the process allows the company to take immediate action based on real-time data analysis.

With today's leaner supply chains and reduced safety stocks, the company must be able to minimise time taken to correct issues and increase equipment availability.

While there are many different approaches to these measurements, from OEE to MTBF and energy efficiency, there is no single "Holy Grail" for measurement. The company must find one or a combination of several approaches that best meets its respective needs. For them to act when specific performance issues are found or where non-conformities exist.

6. Measuring efficiency for predictive plant failure

Energy efficiency is often overlooked as part of most company's asset management practices. Indeed, measuring energy efficiency is one of the best-kept secrets about predicting asset failure.

Energy consumption can actually indicate, well in advance of a failure, that a problem is developing or already exists.

The complex nature of identifying the cause of a change in pressure and monitoring energy usage of each asset can indicate which asset is either drawing too little or too much energy. By identifying a start point for inspections, this will often lead you immediately to the problem area.

An added benefit is asset sustainability, the combination of asset and energy demand management in one system. It has been shown that asset sustainability will lower energy consumption by up to 20% across an entire operation or facility.

By measuring the consumption of each asset, companies can identify which equipment is drawing more power than the manufacturer specification. This alert can generate a chain reaction to determine why the asset isn't performing at its optimum, giving rise to the opportunity for correcting it.

Most organisations will incur significant added expense by continuing to operate assets whose energy consumption has increased. When integrated with an enterprise asset management (EAM) system, alerts can be triggered when energy consumption or efficiency reaches a pre-determined threshold, and alerts can be assigned to each asset.

The alert can initiate a case-management incident requiring inspection. In some cases, the energy consumption indicator can serve as a warning signal for a larger issue that could impact production if it isn't caught early enough.

Capital assets and operational efficiency dictate economic return and this determines the success of your business. Today's asset management involves more than balancing asset performance with asset longevity. Energy companies across the spectrum must employ predictive maintenance techniques for their most strategic assets. In addition, they must consider energy efficiency to develop a comprehensive strategy that eliminates unplanned downtime and reduces operational costs along with asset inefficiencies.

About Touchstone

Touchstone provides enterprise class business software and IT consultancy services, focusing on asset-intensive industries. We specialise in the supply of Enterprise Asset Management, Asset Performance Management Financial ERP, and Business Intelligence solutions.

Our team leverages their combined 350 years of experience, knowledge, and skills to offer consultative and solution-driven support that helps our clients overcome many day-to-day business challenges.

We use these qualities in conjunction with highly capable and proven software from world class software authors such as Infor and Hexagon to improve efficiency, and deliver real business value for our growing client base.

About Hexagon

Hexagon is the global leader in precision technologies at any scale. Our digital twins, robotics and AI solutions are transforming the industries that shape our reality.

Hexagon's Asset Lifecycle Intelligence division helps clients design, construct, and operate more profitable, safe, and sustainable industrial facilities. We empower customers to unlock data, accelerate industrial project modernization and digital maturity, increase productivity, and move the sustainability needle.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 24,800 employees in 50 countries and net sales of approximately 5.4bn EUR.

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