



A STREAMLINED APPROACH TO PREVENTATIVE MAINTENANCE:

WHY YOU DON'T HAVE TO GO BACK TO THE DRAWING BOARD TO OPTIMIZE OPERATIONS



Introduction

Most organizations begin their reliability journey in a reactive state. For example, if a new plant is under construction, the main priority is often getting it up and running—not what could go wrong in the future. But just like a new car, after a few years, the equipment becomes worn and things routinely fail that would have failed regardless; however, you weren't looking for it ahead of time. This is where the establishment of asset strategies comes in. Asset strategies define activities such as preventative maintenance (PM), inspections and condition monitoring to find impending failures. We know that assets will ultimately fail, but through effective asset strategies, organizations can give themselves time to do adequate planning and scheduling, so the failure doesn't impact production or safety.

In this white paper, we explore the importance of PM in ensuring equipment and machinery are running at optimal levels and aligning with core business goals. We will examine the common practice of basing PM on original equipment manufacturers' (OEM) recommendations and the limitations of standard PM and propose involving operators and maintenance technicians in the creation and optimization of PMs for a more efficient and effective program. We also introduce the concept of reliability centered maintenance (RCM) as a set of principles and explain why going back to the drawing board with long-established maintenance procedures is not necessary.

Addressing Antiquated PM Tactics

Original Equipment Manufacturers (OEM) Recommendations

PMs are not intended to be a diagnostic procedure but instead an inspection to ascertain the health of equipment compared to the last reading, which helps organizations project when an asset needs corrective maintenance over time. As easy as this sounds, when most companies institute PM, they usually base it on the OEM's recommendations, which mainly follow the construction phase, as equipment may be under warranty. OEM recommendations sound like a straightforward solution to PM; however, in most construction, the typical two-year warranty has already expired by the time the equipment is up and running. Additionally, OEM recommendations result from massive testing at the manufacturer site to cover a wide variety of circumstances that a plant may not experience in applying that equipment. Unless you intend to utilize an OEM for a long-term service agreement or performance guarantees, building your reliability program around warranty purposes should be avoided as you're executing PMs which may not align to your business objectives or operating context.

Standard Preventative Maintenance

Standard PM is when a traditional plant limits its implementation to the OEM recommendations for an extended period. Often, this procedure is adopted usually by an engineer without the consultation of an

operator or maintenance technician. The handoff of this procedure becomes a task for the maintenance technician, which to them is just that, a job that needs to be done in a specific period. The technician often has no skin in the game with a standard maintenance program.

So how do you improve this? Get all stakeholders from engineering, maintenance and operations involved in the creation and optimization of the PMs to drive broader buy-in and ownership. People (and their knowledge) are the bread and butter of any organization, and a continuous conversation between the operator and technicians needs to be in place to have an optimized PM program. If you don't do this, you may find yourself with a team member that is just going through the motions.

Classic Reliability Centered Maintenance (RCM)

Reliability centered maintenance (RCM) is a set of principles rather than a process. Let's look at the example of an equipment manufacturer with a new product. One of the things manufacturers do is go through a process of laying out all the functional parts of their equipment and trying to play a "what if" scenario (What could fail on this and how would it fail? What would it look like and what kind of conditions do you need to be under for that failure to happen?) - this is called a failure mode and effects analysis (FMEA). As they go through this analysis, they list and examine the failure mode they know would cause failure. (What



would be the effects of that failure if it were to occur? What is that going to do to the rest of the equipment? What will that do to your ability to produce or operate that piece of equipment or the system that equipment is in?) This is Classic RCM: list failure modes and the likelihood of those things happening. However, this traditional approach to developing asset strategies has proven to be resource-intensive and impractical as an initial step for organizations seeking to move out of a reactive state.

Why You DON'T Need to Go Back to the Drawing Board

Many clients ask us if we can go into their maintenance procedures that have been in place for 10+ years and do classic RCM. We advise against this because, especially for a company that has been operating the same way for an extended period, they have seen 95% of all the failures that will occur. Our approach is to address the failures that we know will occur instead of returning to the drawing board as though the plant is brand new. This strategy avoids unnecessary labor-intensive work that dreams up scenarios rather than starting with optimizing what an organization has and making subtle changes to improve efficiencies.

Back to Basics: Key Questions to Guide Your PM Journey

Do You Know What's Important to You?

Asset Criticality Ranking (ACR)

Before we look at optimizing PMs, the first step we recommend is asset criticality ranking (ACR). Asset criticality is an objective process where all assets are ranked (i.e., pumps, motors, valves, fans, etc.). Although this process does not immediately address PM, asset criticality not only provides you with a prioritized master asset list (MAL), but it also tells you the relative importance of every asset at a plant and how that asset affects the bottom line of your operations. With that list, an organization can start at the top and work its way down effecting improvement actions. ACR is a necessary step to getting the most benefit out of doing PM optimization.

Typically, it is the top 25% of the list that is contributing to 80% of all the failures at a facility. If you get a good handle on the maintenance strategies, or PM, for that top 25%, you will likely take care of most of your problems. That does not mean that the other 75% of this list isn't important, but you know where to focus your attention and improvement investment to gain the maximum value of your efforts.

Are You Doing the Right Things?

PM Optimization – Focus On *Your* Failure Risks

For any given PM task, define the failure modes – According to the American Society of Quality (ASQ), a failure mode is defined as the ways, or modes, in which something might fail (physical material condition). Failures are any errors or defects, especially ones that affect the customer and can be potential or actual. To ensure maintenance activities are mitigating actual business risk, we need to identify and define asset failure modes. This approach allows the maintenance manager to prioritize maintenance activities and corrective actions with the full context of actual failure risk to the organization. The information captured in computerized maintenance management software (CMMS) can be generated automatically based on the equipment's maintenance history (if available). Through this approach, the maintenance team can identify and evaluate the most persistent and impactful failures and define PM plans with the specific purpose of mitigating those consequences.

One example of this approach is the Asset Risk Analyzer, a free solution to analyze failure risk and benchmark asset performance (Figure 1). Maintenance history is analyzed to quickly identify assets with the highest probability and consequence of failure.

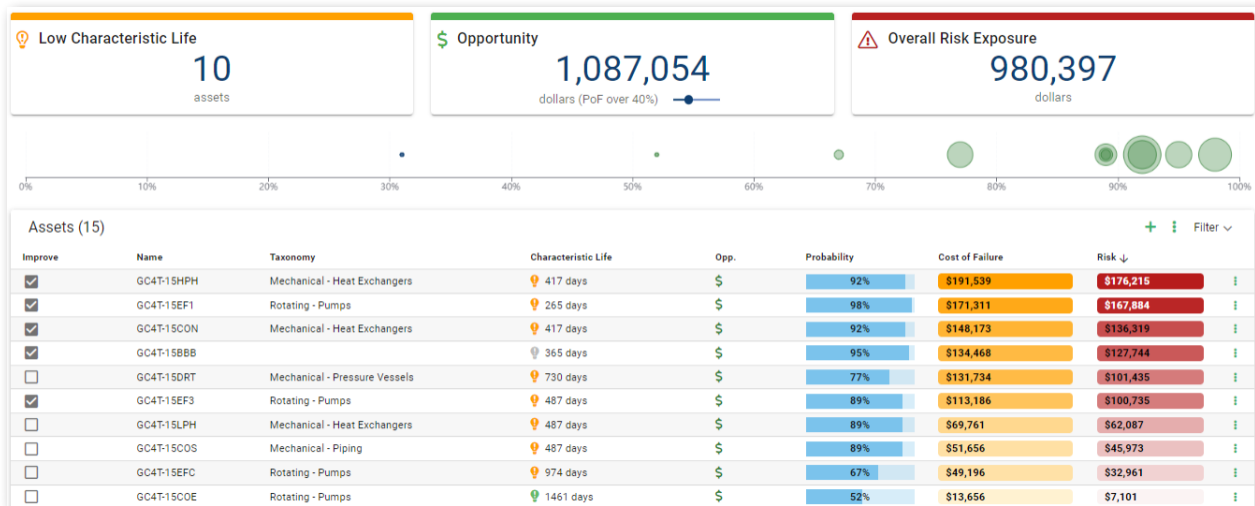


Figure 1 – Asset Risk Analyzer Dashboard

1. Correctly address the failure modes - All PM should address a failure mode or physical material condition of a piece of equipment. And once those failure modes are validated as being real, then you have a tailored program that addresses issues that occur instead of the theoretical possibilities. What we are trying to achieve is a streamlined PM program that really does address the problems that occur on a day-to-day basis.
2. Based on consequences, determine if the PM needs to be done – Just because a failure is likely and there is something that can be done to identify impending failure or mitigate the impact, ask yourself: is the action worth doing? If there is no safety, environmental or operational failure impact, is it cheaper to do the maintenance or suffer the failure? Just because you can does not mean you should. Does the PM make the asset feel better or just make us feel better? Run to failure (RTF) can be an appropriate strategy if the failure modes and impact have been properly assessed.

Are you Training/Empowering/Involving Your People?

Integrate the Process and Change the Culture

Information about operational requirements and equipment condition comes largely from people and their experience. Therefore, we highly encourage our clients to include their operations and maintenance technicians when identifying the appropriate failure modes and then working together to tailor the PM program to address those failure modes.

By involving maintenance technicians in the process, organizations can tap into their expertise and provide buy-in, resulting in a more effective and sustainable PM program. Additionally, by creating a culture of knowledge, organizations can empower their people to take ownership of their equipment and required operations, leading to improved performance, increased efficiency and ultimately, achieving business goals.

For example, a plant's PM may involve going out and greasing the bearings on a motor to prevent it from failing in service. However, it's crucial to consider the failure mode and the applicability of the task in addressing it. Organizations can determine the appropriate task frequency and adjust as necessary by involving maintenance technicians in this process. This approach helps in identifying impending failures and reducing unscheduled downtime brought on by in-service failures.

Once you have established maintenance tasks which are targeted to address failures modes, it is important to ensure all stakeholders can easily access the asset strategy and understand the status. An example of how this can be achieved is provided below (Figure 2). In one view engineering, operations and maintenance can collaborate around the identified failure modes and PM tasks. More importantly the team can also see the current state of the plan which includes emerging failure risks and appropriate execution of PM activities.

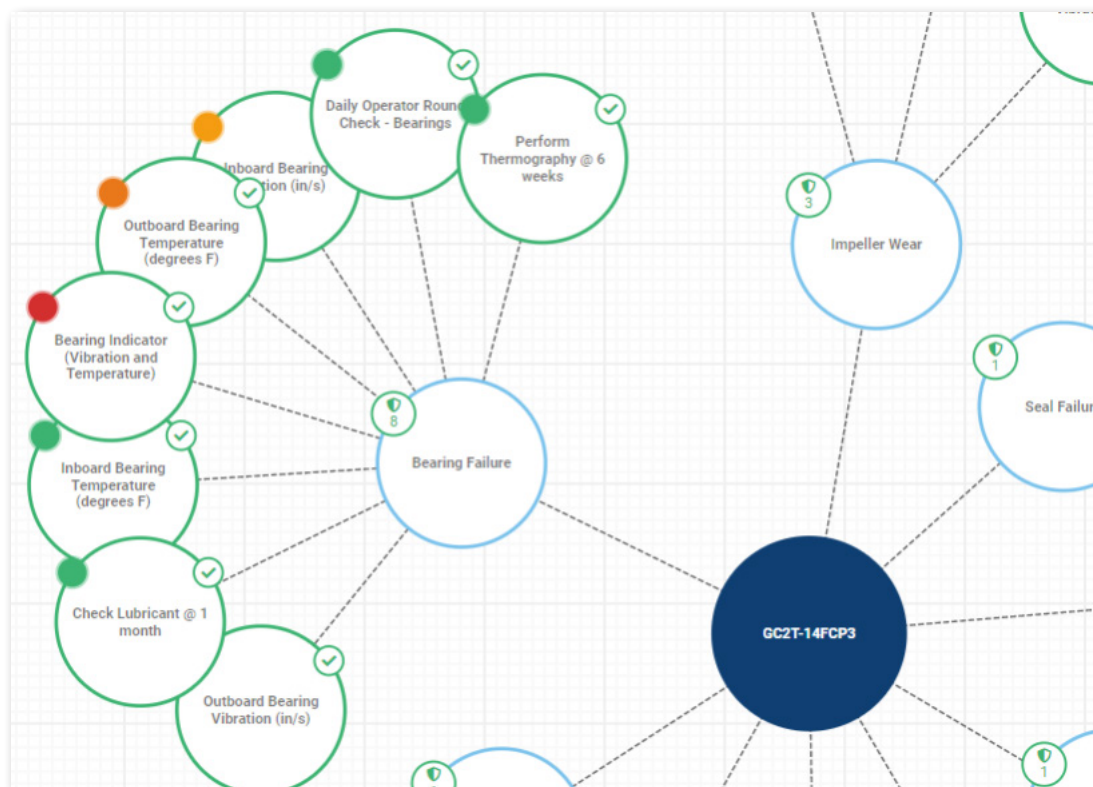


Figure 2 – Asset Strategy Overview (From Itus APM)

Do you know your core business needs?

Preventative maintenance (PM) is a critical component of any business, as it helps ensure that equipment and machinery are running at optimal levels. However, in order to be truly effective, a PM program must be aligned with the core goals of the business. This means that before implementing any PM strategies, practitioners must first evaluate the business to identify any gaps in processes, people and knowledge. These gaps will dictate the approach that should be taken for PM, as they will identify which strategies will be most effective for addressing the specific needs of the business. By aligning PM with core business goals, practitioners can ensure that their maintenance program is tailored to the unique needs of their organization and is helping to drive its overall success.

How to Streamline PM in Your Organization: PM Basics + Innovative Capabilities

Streamlining your PM program through innovative capabilities and knowledge transfer can have a significant positive return on investment (ROI), ensuring the longevity of equipment and changing the culture of the organization. As we uncovered, traditional PM tactics can be time-consuming and costly, leaving organizations looking for ways to streamline their PM program. One way to achieve this is by incorporating innovative capabilities.

Asset Performance Management (APM) – Powered by Itus Digital

Itus Digital offers a continuous improvement and sustainability approach to PM. Their innovative solutions allow for real-time monitoring of equipment, identifying potential issues before they become major problems.

ABS Group works with organizations to transfer knowledge and skills to their staff, so they can be self-sufficient in maintaining equipment and machinery. This not only improves efficiency but also helps to ensure the longevity of the equipment.





Investing Today for Positive ROI Tomorrow

“Tell me where I can triple my ROI in a year, and I’ll invest all I have.”

Investing in a streamlined approach to PM, such as those offered by ABS Group and Itus Digital, can have a significant positive ROI. By identifying potential issues before they become major problems, organizations can reduce labor and unscheduled downtime. For example, spending \$100,000 from the operations maintenance (O&M) budget but saving \$300,000 in labor and downtime costs, typically results in a 3:1 ROI in the first year. Additionally, unlike Capital Projects, the O&M budget is not new money. It is what you plan on spending if you do nothing in the coming year. With this approach, the 3:1 ROI is the savings in the O&M budget.

This approach not only improves efficiency and reduces downtime, but it also allows for safer planned maintenance activities and helps to ensure the longevity of equipment. And with the help of ABS Group, organizations can change their culture by transferring knowledge and skills to their staff, so they can be self-sufficient in maintaining equipment and machinery.



About ABS Group

ABS Group of Companies, Inc. (www.abs-group.com), through its operating subsidiaries, provides data-driven risk and reliability solutions and technical services that help clients support the safety, integrity, quality and environmental efficiency of critical assets and operations. Headquartered in Spring, Texas, ABS Group operates with more than 1,000 professionals in over 20 countries serving the marine and offshore, oil, gas and chemical, government and industrial sectors. ABS Group is a subsidiary of ABS (www.eagle.org), one of the world's leading marine and offshore classification societies.

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