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# SAVE YOUR PLANT

# 6 Challenges & Solutions

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**A condition-based maintenance (CBM) program is part of a comprehensive maintenance management program, which should consist of one or more non-intrusive testing technologies applied in a routine scheduled manner for critical assets in your plant.**

These technologies include vibration testing and analysis, thermal imaging, lubrication sampling and analysis, reciprocating equipment testing, motor testing and ultrasonic testing, among others. Larger companies often employ in-house personnel and have their own equipment to perform these services without help from outside vendors. Conversely, midsize and smaller companies more often choose to purchase these services from qualified vendors outside the company due to the high costs associated with maintaining equipment and technology, training, and the limitations to staff and/or funding. But even large companies can benefit when outsourcing, depending on the limitations or gaps in their in-house capabilities to run an effective CBM program.

When evaluating your ability to sustain a CBM program, **knowing your challenges is essential.** Spending the time to be realistic about your limitations up front will allow you to choose the right mix of outsourcing and in-house CBM components.

**Evaluate your organization by considering these six challenges:**

**1** Time constraints: Your awareness of how little time you and your staff have is probably crystal clear to you. Staffing cutbacks and personnel assignments have left most people with more to do with less help available. It is also a limitation in which you probably have little control.

**2** Expertise: If your company is like most, you don't have enough access to staff with high levels of training, certifications and knowledge. This includes in-depth understanding of machinery design, operation, common failures and best maintenance practices. It also includes more specific and fundamental expertise, such as software system familiarity and data analysis skills. These analysis skills can include vibration test setup and analysis of variable speed equipment.

**3** Machinery knowledge: Experienced maintenance staff should be familiar with machines and systems that they are responsible for maintaining. That's the assumption, but the fact is, this is not guaranteed and certainly is not the case for all your equipment. Furthermore, staff new to the plant or the industry may have little or no exposure to the types of equipment critical to the operation of your plant. This puts you at a distinct disadvantage when issues arise. Addressing gaps in machinery knowledge normally requires hiring consultants or

looking outside your immediate organization for corporate personnel with the necessary experience.

**4** CBM technology knowledge: Advanced test techniques that are within the capability of the tools you possess can offer important information in the hands of those trained to use it. These same tests can provide little or negative value if misunderstood or misapplied. High frequency envelope processing of vibration measurements is a good example of this. Given the right application, this technique can provide early warning signs of bearing wear and race cracks, but if the wrong filters are chosen or the wrong test location or sensor is used, the results will be incorrect or misleading. This could cause you to waste money and/or lose all credibility personally and with your program in general.

**5** Continuity year over year/day after day: One of the most significant challenges facing maintenance managers is long-term consistency in approach and competency as it relates to the operation of technical inspection programs like vibration testing and other condition monitoring. If and when in-depth analytical and procedural understanding is assumed as a requirement for personnel heading up and running the program, risk of interruptions and cessation of the program is high. If one person retires, leaves, or gets hit by a real or proverbial bus, all of this critical knowledge instantly disappears. Turnover of personnel can be a distinct disadvantage when attempting to run a con-

dition monitoring program. When turnover occurs, part or the entire CBM program can get dated quickly, shelved and forgotten.

**6** Money: A given. Who doesn't have this as a challenge?

## Solutions for common challenges

Adequate awareness of these challenges, along with others, allows you to address them and provide improvements on your maintenance program's effectiveness. One very effective solution that addresses all of the above limitations and allows for overall program improvement is the concept of outsourcing your predictive maintenance (PdM) needs. The values that CBM service vendors are able to deliver to their customers are valid and undeniable.

**1** Time constraints: By its very nature, outsourcing solves time constraint issues. Allowing a trusted and competent service provider to handle the most time-consuming part of PdM, such as the test setup, analysis and reporting, it frees up valuable time for maintenance departments. Outsourcing these tasks results in focused and consistent high-quality results conducted by someone with specialization and experience and relieves your organization of the time commitment.

**2** Expertise: Selecting a provider comprised of teams of analysts with education, training, experience and exposure to your industry and equipment types will maximize your success in addressing both routine and specific machinery maintenance issues. Outsourcing can provide ready and routine access to a team with a broad base of talent. When this team includes analysts with expertise in your industry and especially experience with specific machinery that you maintain and in applications that are relevant to your process, it will be invaluable when problems occur. Selecting a provider with a good team means your program will have consistency year after year and not be susceptible to turnover, retirements and other causes of expertise loss.

**3** Machinery knowledge: Closely related to expertise, relevant knowledge of machinery details, including operational principles, design flaws, historical uses in industry, common failure modes, common

maintenance issues and applications, are invaluable when addressing maintenance issues and troubleshooting problems. Your existing staff, if they have been with your facility and equipment for an extended time, will probably have the necessary background and knowledge. However, if it's new equipment and/or the staff is on the learning curve, you would do well to link up with a team of maintenance professionals with broad exposure through years of experience in various industry verticals. Outsourcing portions of your CBM program can provide immediate access to these experts and guarantee a level of continuity and familiarity with your equipment that won't vary with staff reductions, retirements and transfers.

**4** CBM technology knowledge: This is where outsourcing makes the most sense. The technical work of setting up test parameters, establishing baselines or thresholds and setting up diagnostic



Figure 1: Vibration Analyst using diagnostic software for CBM program

criteria and fault identification parameters can be tricky processes. This work, along with the analysis and interpretation of resultant measurements, requires years of specialized training and exposure to various testing constraints and scenarios. Contracting this out to specialists will ensure that you obtain the most accurate, efficient and effective CBM program results. Choosing a provider that controls the software and hardware development and deployment process provides an even greater advantage. This contractor will have guaranteed experts in the application of their technology and will be in the unique position to develop and configure the tools to best meet the needs of your CBM program.

**5** Continuity year over year/day after day: Institutionalizing CBM program components through outsourcing provides

a means for establishing continuity. Your staff turnover is not going to easily affect the program either in its continuity or quality. The service provider will be tracking the machinery status, trending this information, and watching compliance with the program's testing and data acquisition requirements. Continuity of quality, performance and content is maximized when selecting and keeping with a single provider who can maintain a database of results and provide routine, business-level metrics, such as program compliance statistics, long-term risk assessment trend statistics, safety program compliance metrics, and other historical and strategic measures of asset management effectiveness.

**6** Money: This limited resource is the whole point of having a CBM program. An effective CBM program is about cost avoidance. When properly applied, elements of a CBM program will provide benefit-to-cost ratios in the neighborhood of 20:1. This ratio will be higher in the beginning years of the program while critical maintenance issues are first identified and eliminated. The ratio will then most likely taper off to a repeatable and sustainable benefit level that is realized through reduction of downtime and unplanned repairs, elimination of unnecessary periodic maintenance, reduction of spare parts inventory, reduced overtime labor costs and avoided collateral damage from identifying issues early.

In summary, it has been established that identifying the challenges faced by your organization and working to fill these gaps by selecting an appropriate level of outsourced CBM services and expertise can result in a number of significant advantages that translate directly to the bottom line. This can increase your overall equipment reliability because it removes obstacles to performance. The right partner can offer effective services in testing, analysis and reporting, while also supplying added depth of knowledge, technical expertise, continuity of results and metrics, industry experience and advice that provides lasting advantages in maintenance strategy.



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