Plant Services

SPECIAL REPORT

WHY PDM PROGRAMS FAIL: LACK OF GOOD PARTNERING

Begin >

Choose Your Partners Wisely

Or Discover Another Reason Why PdM Programs can Fail

By Joe Van Dyke, P.E., Vice President, Operation and Business Development, Azima DLI

Many companies have failed to experience the 10:1, 20:1 or even 30:1 ROI promised with the adoption of a Predictive Maintenance (PdM) or Condition Monitoring (CM) program. In recent years, the industry has seen a trend towards outsourcing these monitoring functions to experienced third parties. This article will explore one aspect of why in-house programs often fail to produce the expected rewards, namely a lack of good partnering and how this knowledge can be used to revamp a dead program or select the best partner to help you manage it or manage it for you.

A Bit of History

Back in the 80's and earlier, vibration analysis was carried out by a few consulting companies who were experts in using complex equipment to collect and analyze vibration data. In some cases, individual plants or companies employed in-house experts to monitor key assets, such as steam turbines, but generally the expertise was relegated to specialized companies. As digital computers became the norm and digital data collectors and software came on the scene, many companies purchased this equipment and attempted to evolve their maintenance practices. These efforts produced a variety of results ranging from good long term successes and huge returns on investment to money spent on equipment that now sits on a shelf and training for long gone employees.

In general, the concept of PdM has been well accepted; the problem now is how to create a successful program and keep it running year in and year out. Some facilities have given up completely, others are looking to gain or maintain their in-house expertise and others are looking to outsource these functions entirely. Current trends seem to point to the latter option as being the most common as companies can establish partnerships to either completely hand over their PdM program or combine in-house manpower with external expertise.

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Successful Programs Depend on Consistency

One reason many in-house programs fail is a lack of consistency on many levels. A successful PdM program relies on long-term consistency on the technical level in terms of collecting repeatable data for trending. This means that assets must be tested the same way time after time, year after year, in terms of test speeds, loads, test positions, test types etc. Consistent testing ensures accurate trending of machine condition, the development of meaningful baselines and alarm criteria and therefore accurate fault diagnosis and repair recommendations. This is very different from the process of using the technology to troubleshoot an asset. Troubleshooting is a valid use of these technologies but does

not result in a change in maintenance philosophy nor does it provide the large ROI's such a change in philosophy should produce.

On a higher level, such technical consistency also depends on the reliability of management and personnel. Oftentimes, due to lack of financial justification, PdM programs are stopped and personnel are reassigned to different tasks. New maintenance managers may not understand the technology and may recommend a new approach to using – or not using – it which disrupts the consistency of a program. In-house "experts," in seeking to keep their jobs secure, may not document or follow fixed procedures for monitoring equipment or share information with others, causing programs to fail when they leave for greener pastures.

There are many reasons why programs bloom and then decay. People come and go who have different ideas about how PdM should be done, priorities change, technology changes, expertise changes and approaches change. The one sure thing is that all of these starts and stops and changes in direction ensure a program will never be successful. This is another reason why an external partner is a good option to keep the program running steadily regardless of what is happening within the maintenance department of your facility.

In general, it can be said that a good PdM program requires a consistent approach with a clear set of objectives that can be measured to monitor the success or failure of the program. The program must continue to remain consistent through good times and bad and regardless of who in the facility (or outside the facility) is running the program, collecting data, analyzing it or writing reports. This sort of consistency is often difficult to maintain within a facility and is an example of where a good partnership with a PdM service provider can be a huge asset. Especially if this partner has a long track record of managing successful PdM programs and has a well-defined approach to managing such programs. This is different from hiring a vibration expert to come onsite at times to troubleshoot machines or structures.

A Good Partner Has the Right Tools and Approach

A good partner will promote a specific methodology or approach to condition monitoring and will help you understand its goals and set up in-house procedures to manage the program and measure its results. The partner is not just someone who can tell you what all of the buttons on the data collector do or how to install your software, nor is it someone who will spend most of their time training you on how to interpret graphs. A successful program depends more on methodology and consistency than analysis prowess.

Regarding tools, a good partner should provide or recommend software that facilitates trending, baseline and alarm configuration and reporting. Another common feature in some of today's packages is the ability to easily share information over the web. This allows your partner to help you when you need it, simply by logging onto your database in order to check test setups or baselines or to help you analyze data or review your recommendations. In the long term, this allows you to outsource program management to the service provider when times are lean and your workforce is stretched to their limits or when an in-house expert leaves. Later, your partner may help train up a new employee and move the program back into your hands. It is exactly this

sort of back and forth, getting help with your program or even outsourcing the work from time to time, that makes partnering so important and keeps programs running smoothly from year to year.

Program Audits

Regarding methodology, if your partner has set up your program correctly, or helped you to set it up correctly, then all of the procedures will be well defined and documented. This allows your partner to occasionally audit your program to make sure the physical equipment in the plant matches the information that has been entered in your software. For example, if the software defines a test point as being in the vertical direction on the motor free end bearing, but the motor itself has a sensor mounting pad installed only on the motor coupled end bearing in the horizontal direction, then there is a discrepancy that needs to be resolved. It is exactly

these sorts of issues that cause programs to fail – not the debate over which point is the better one to test, but that the machine is always tested at the same point and that this point is correctly defined in the software.

On a similar note, a good program will include the management of asset information to ensure that the actual machine in the plant you are testing today is identical to the machine you entered in your software five years ago. Oftentimes motors are replaced with similar motors of a different make or model but these changes are not updated or accounted for in the monitoring program. Documenting and periodically auditing this information for accuracy is an important component of a successful program and a component that a good partner can help you with.

Ongoing Training

As noted earlier, successful long-term programs are those that take advantage of a reliable partner to go back and forth between in-house and outsourced in varying capacities whenever necessary. Although there are many professional benefits to certified training classes and in learning how certain technologies work, they are not a replacement for in-house, on-site courses that involve reviewing your application, actual database, baselines, reports, questions and concerns. It is one thing to understand how it is done; it is a very different thing to do it yourself successfully. In order to do the latter, it helps to have a partner come in and review your work and answer questions or collaborate online to have them remotely view your database.

On site training should not just be related to how to use a software or hardware product and understand its features, nor should it be relegated to data analysis. Both of these topics are useful and important but do not lead directly into the proper management of a good long-term program. Onsite training should be a combination of theory and actual review, help and support in setting up and managing your program on an ongoing basis. Once your PdM program has matured, the onsite training and support should evolve its focus towards Proactive Maintenance, Reliability, Performance Monitoring or other levels of competency that can be attained only after an effective PdM program has been in place for some time.

Economic Justification

A good PdM program should earn you money. A good PdM partner should be able to help you see the bigger picture and monitor the efficacy of the program in financial terms. It is often difficult to quantify the cost of an averted failure, we don't often consider that due to all the money we put into testing and maintenance our airplane did not crash this trip, but we certainly become aware of the costs and implications when an airplane does crash! Sometimes the economic justification is done in these terms and we have to remind ourselves that failures are constantly being avoided, perhaps by comparing current performance to prior performance, looking at reductions in orders for spare parts and a reduction in planned and unplanned downtimes etc. One might also look at key performance indicators (KPI's) such as Overall Equipment Effectiveness (OEE) to measure the impact that PdM technologies are having on the profitability of the plant. In any case, a good partner should be in a position to help justify your program and calculate the return on investment.

VIDEO: Why Vibration Troubleshooting Tools are Inadequate for Predictive Maintenance (PdM)

WHITE PAPER: 10 Critical Elements for Successful PDM

ARTICLE: Machine Reliability Moves to the C-Suite

CASE HISTORY: What Works: Predictive Maintenance Technology Saves Time and Money

Conclusion

Whether you are considering starting a new program, revamping a dead one, outsourcing or looking for someone to become a long term partner to step in when needed and step back when not needed, make sure you pick the correct partner. The company should have a good track record of managing successful programs, uses good equipment for the job, will make necessary equipment available to you as part of a sale or service or as a lease as needed. Make sure your partner can train staff at all levels, from using the products to analyzing graphs, but more importantly is capable of managing your particular program and answering specific questions related to auditing your program and helping you calculate the economic impacts of these technology and maintenance practices to your bottom line.

More than anything, consider that choosing the right partner may make the difference between a consistent and effective program that runs smoothly over the next ten or twenty years and an endless series of false starts and investments in misused equipment. One thing is for sure, successful programs more often than not require good partners.

Manufacturer weaves predictive maintenance into its very fabric

By Mike Bacidore, Editor in Chief, Plant Services

Kimberly-Clark's nonwovens plant in LaGrange, Georgia, went into operation in January 1985. The plant manufactures fabrics and synthetic fibers that are the cornerstone in the development of many of Kimberly-Clark's premier personal care and health care products, including diapers, training and youth pants, incontinence products, and feminine pads and wipes, as well as protective apparel, surgical drapes, gowns and face masks. "The materials are produced in rolls and sent to other Kimberly-Clark locations for converting into finish products," explains David Walls, maintenance technician. "Our materials support our health care, North Atlantic consumer products and Kimberly-Clark professional businesses."

Four base machines produce nonwovens and elastomeric material, and each line has an assortment of extruders, mass air flow, a conveying system, calendaring system and a winding system.

The 616,500-sq ft plant needs 230 employees to operate 24 hours/day, 365 days/year. "There are 35 people under the maintenance umbrella," says Walls. "Of these, 12 cover the 24-hour operation, 17 provide improvement on the assets and six provide planning and scheduling support."

In recent years, the plant's general population is using more of the predictive techniques on a daily basis. They're returning to area responsibilities. Predictive maintenance equipment has been upgraded lately, and some new equipment has been added. Lean manufacturing principles were implemented in 2010, as well.

"We've always had a proactive maintenance program in place," explains Walls, "but we started a dedicated predictive program in 1996. Before that, it was a when-we-have-time situation. The reasons behind a dedicated program were to improve equipment reliability and identify the recurring problem machines. This also improved the maintenance efficiency."

The plant's predictive maintenance (PdM) program is responsible for managing more than 200 pieces of equipment across four lines including fans, compressors, pumps, gear boxes, extruders and ac/dc motors — variable speed and constant speed.

"By combining the predictive and preventive programs, we're able to schedule the equipment that needs to be worked on during a scheduled down," explains Walls. "Along with scheduled outages when all the equipment is down, we're able to perform needed maintenance. We also bring in vendor reps to assist on critical equipment. And operations has an understanding that the equipment has to be maintained so they can produce a product on their time frame."

The predictive maintenance program features infrared thermography, high-speed photography and ultrasound. Kimberly Clark also relies on Azima DLI's portable vibration data collectors, online systems, and software for machine condition assessment and vibration analysis.

"Vibration analysis is used for bearings, alignment, imbalance and the general health of the equipment," says Walls. "Infrared is used to determine electrical faults, bearings, process conditions and again the general health of the equipment. We also use high-speed photography to slow the equipment down to be able to see the process and the condition of the belts and gears." Sound equipment and strobe lights are used in conjunction with the vibration program. Ultrasound's primarily applications are on steam traps, gear boxes, bearings and valves. "If you can hear it, you have found it," quips Walls. "Strobe lights are used for the general

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The plant has three automated SpriteMax online monitoring systems and is in the process of setting up a fourth and last one now, in addition to the utilities equipment. "We will still use the manual system on the redundant equipment until those are set with an automated system," explains Walls.

As part of the manufacturing process that requires managing massive air flow, the plant might have as many as nine pumps that it's monitoring, but not all of them run all the time, so the criticality ranking is lower. On the other hand, a large compressor without redundancy takes priority.

"Several things go into how critical a piece of equipment is — cost of replacement, time to replace, can we rent a replacement and can we run for a short time without it?" explains Walls. "We also use the manufacturers' recommendations."

Maintenance and replacement schedules are based on readings and the weight of specific equipment's criticality. "We have scheduled maintenance items on all of the equipment in addition to the predictive program," says Walls. "If something is found, time will be scheduled to correct or troubleshoot that problem."

Equipment readings are taken on a cycle of scheduled maintenance, versus a formal, documented criticality ranking. Nearly all equipment in the plant is considered critical. However, some pieces of equipment are read more frequently based on size, cost of the equipment and redundancy. For example, higher-cost equipment without redundancy is read more frequently than other equipment, and often between cycles.

"We have always had a CMMS system," says Walls. "Currently, we're using SAP. We established manual vibration and IR routes early and refined them over time. We're now rolling over to automated online vibration data collection systems. We had vibration and IR from the beginning. But starting in 1996, the information gave us a different picture. This allowed us to work on the problems and become more efficient within the maintenance group."

Daily/weekly consumables and long lead items are kept in spare parts inventory. "We have a computerized system that keeps up with the items we keep on hand and reorders on an as-needed basis," explains Walls. "All of this is reviewed and updated as needed."

The plant also has an energy monitoring program in place to help track that cost. "It lets us know if there has been a change up or down," explains Walls. The mill manager ultimately is responsible for energy costs. "He, in turn, has someone on the staff looking at what the cost is and whether we can affect it," he says. The maintenance organization's role in maintaining energy efficiency involves keeping the equipment in the best shape possible.

Within the first year-and-a-half of using a formal PdM program, the plant calculated savings of approximately $1.5 million in actual cost avoidance. "These were calculated from a time avoidance evaluation," explains Walls. "It was calculated from a best-case scenario. In other words, all the parts were on hand, all the right people were on hand, the job went perfectly, the machine was already down, the lowest possible machine costs were used, and, last but not least, the machine came back up on the first try with the lowest possible waste."

These are real numbers if you identify the items that would have caused a delay, if they were run to failure, explains Walls. "We threw out any item that was questioned or disagreed with," he says. "We quit recording this number because it became so large that no one believed it. After that, we began to report uptime from a maintenance perspective. Now it's looked at from how many failures we've had in the past month, six months and year. We're fortunate in that management and operations support and believe in what we are doing."

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Azima DLI World Headquarters
300 TradeCenter, Suite 4610
Woburn, MA 01801 USA
Toll-free U.S. 800-482-2290
International (+1) 781-938-0707
www.AzimaDLI.com

Produced by

Plant Services

555 W. Pierce Road, Suite 301, Itasca, IL 60143
630-467-1300 | www.PlantServices.com