

# Avoiding the Pitfalls

## Why Do Predictive Maintenance Programs Fail?

by Alan Friedman

In the past few years we have witnessed a marked change in predictive maintenance (PdM) practices whereby more and more companies are choosing to outsource their programs. While many facilities routinely calculate 20:1 return on investment metrics, others cynically refer to aging data collectors as "dust collectors" or use them as bookends. Although the concept of PdM is now widely known, and its potential benefits generally accepted, many plants have failed to successfully exploit the available techniques and technologies in practice. This state of affairs begs the question: "Why do some programs succeed while others fail?"

As we enter a recession and maintenance staffs are cut, we will once again be asked to do more with less. This means that now we need to think about how we conduct maintenance and determine how to do it more efficiently and intelligently in the future whether that is through new internal processes or outside help. As we rise to meet the challenges of the emerging economy, we implement best practices, restructure, invest in infrastructure and are prepared to hit the ground running when the economy turns upwards again.

In the coming months, I will be writing a number of articles addressing the subject of why PdM programs succeed or fail from the managerial, technical and financial perspectives. Whether one decides to use this information to beef up or restart an in-house program, determine what type of training may be best or to outsource some, or all, of these functions, the hope is to provide enough practical information to help you be successful in your endeavor. The article you are reading now will touch on some of the main themes that we will be exploring in more detail in the future.

### Lack of Vision

No program can succeed if it is not well conceived. If done correctly, a predictive maintenance program should change the culture, philosophy and work flow of the maintenance department. It is not just the addition of a new technology or tool, but a different approach or strategy towards maintaining one's assets. This approach is being undertaken in order to gain specific benefits that can and should be measured. These benefits include: increased uptime, reduced failures, shorter planned outages, fewer preventive maintenance actions and, ultimately, a more efficient facility. Failure to adapt the culture to this new philosophy, and benchmark the gains, will eventually lead to the program's dissolution. Adopting new technologies without changing maintenance strategies will not produce the desired benefits.

### Using a Tool without Understanding Why

Many facilities purchase a new technology, such as a vibration data collector or alignment tool, spend time and money learning how to use the tool, but little time understanding why it is being used. As an example, a particular facility I know of had the capacity and ability to detect incipient bearing wear in a pump using a vibration analysis system. Although the pump showed no signs of wear, the facility went ahead and changed out the bearings according to

their preventive maintenance schedule. At another plant, a vibration analyst was adept at detecting mechanical faults in his plant's machinery, but he was afraid to tell his supervisor about all of the problems he found because his supervisor might get angry at having to repair all of these machines! Both of these cases demonstrate the use of the technology as an end in itself without an overall vision of why the technology is being employed.

### **Failure to Justify the Program**

In those facilities where the technology is being used correctly, and in the right context, I have often seen a program fail because its successes were not adequately documented. This is to say that the facility changed their philosophy to a predictive mode, correctly employed technology to reduce preventive maintenance actions and minimized catastrophic failures, but they failed to adequately document the efficiencies and savings associated with these actions. So, while employees within the maintenance department acknowledged that their work was useful, they had no data to prove this to those outside of their group. Sadly, they then saw their program get cut when managers had to tighten their budgets. In other cases, the person managing the PdM program left and no one picked up the ball.

### **Lack of Consistency**

Another component of a failed program is the lack of consistency over time. There are many causes for this, ranging from a failure to commit adequate personnel, lack of proper training, loss of skilled personnel, change in program direction/technology, failure to adequately define the program at the start and, finally, the lack of a consistent model to monitor the efficacy of the program over time. These false starts and stops add confusion to the process and typically result in a lack of faith by the workers who see the company invest in "change", but then quickly revert back to old patterns.

A lack of consistency over time has the additional ill effects of not allowing the facility to "evolve" to a proactive maintenance mode. As a brief review, there are four levels of maintenance practices: run-to-failure, preventive, predictive and proactive. In run-to-failure programs, facilities adopt a technology, such as vibration analysis, to test or troubleshoot machines they know have problems. Preventive mode refers to maintenance departments that test machines on a schedule much like a preventive maintenance task, but do not act on the information gleaned from these tests. In predictive maintenance mode, one bases maintenance actions on the results of these tests to eliminate unnecessary preventive actions and avoid catastrophic failures.

The next stage in maintenance evolution is the proactive mode, whereby the facility has enough historical information about the machines and their failure modes to make educated decisions on how to extend their lives, replace them with machines of different makes or models or weed out inherent design flaws. To reach these lofty goals and bask in the glory of a highly efficient plant, one needs the backbone of an historically consistent program to lean on.

Looking at these evolutionary stages from a qualitative viewpoint, one will note that a plant in run-to-failure mode will contain machinery in various states of disrepair that seem to fail at random. Personnel in a run-to-failure plant will often be "busy" and may think that they are too busy to adopt new procedures! In the preventative mode, one is taking better care of one's assets and they are failing less frequently. In predictive mode, one should be able to reduce

preventive actions where applicable, extend machine life and drastically and reduce unplanned outages. In proactive mode, one will have removed or redesigned troubled machinery and will have a plant that operates smoothly, predictably and efficiently over time. To attain this goal, consistency is required over a long period of time.

### **Training and Partnering**

Ongoing training is an important ingredient of a successful program. However, it needs to be the correct type of training, a combination of complimentary technology and managerial expertise. ISO and ASNT-certified vibration courses focus on machine dynamics and vibrations on a general technical level. It is important to take these courses, pass the exams and become certified, but this training alone will not necessarily translate to running a successful PdM program.

Equipment vendor training is often useful because it requires trainees to learn how to use a data collector and correctly set up software, but oftentimes does not expand outside these topics to provide the user with the tools he or she needs to run a successful program. While learning how to use data collection tools is an essential skill, it defeats the purpose if that same person does not know what to do with the data they've collected or how to manage a successful PdM program. One last note to consider about equipment vendor training: once the training has been completed, there is often no one around to ensure employees are using the tool correctly.

Onsite training, database reviews, program audits and choosing the correct long term partner, or PdM service provider, will go a long way to ensuring a successful program. If done correctly, a service partner will provide onsite training and support in managing your ongoing program in different capacities as your program evolves. At different times and in different circumstances, a good partner will take over parts of the program for you and later provide training and support as you bring the program back in-house.

### **Lack of Procedures / Methodology**

As alluded to in the last section, a successful monitoring program is more than just interpreting graphs and data, it depends on consistency and repeatable performance. In general, we are interested in monitoring assets in order to diagnose deteriorating health or other problems. In order to do this correctly and accurately, one needs to test the assets in a repeatable fashion, month after month and year after year for many years. When this is understood, one will see that a successful program depends much more on consistency and program management (unfortunately, this aspect is not often taught in standardized courses) than it does on technical prowess. Another way of stating this is to say that a successful program depends on methodology and organization. A good partner or service provider with a good track record should be able to help you implement a program with tried and true methodologies and manage it for you.

### **Lack of Experience / Commitment**

So far, we have touched on a number of different aspects of successful and unsuccessful programs, and it may be clear that there are a lot of issues involved. This highlights another problem, which is simply a lack of experience and/or commitment by a particular facility. Even if one has the best intentions and the highest level of commitment, it may take a long

time to train an employee or group of employees to the point where they can implement a good maintenance program. In the meantime, as they are learning, little may be happening or things may be going in the wrong direction.

More typically, one will see a facility trying to accomplish a great deal without dedicating any money or people to the project or, when they do dedicate one or the other, it is only for a short period of time. Within this window, corporate priorities change, personnel change positions and, subsequently, the program gets shelved. Like many things in today's world, PdM is becoming a highly specialized area of expertise where, if one wants to gain the depth and expertise currently existing in the market place, it takes a great deal of dedication and time, which, unfortunately, may not be compatible with the other 100 duties you are expected to take care of as part of your other work. This is one reason why partnering or outsourcing has become a viable option for many organizations.

## **Conclusion**

Having gone through this brief exercise, perhaps it is becoming apparent why there are advantages to outsourcing PdM programs. And, while many companies have the expertise in-house to develop and sustain high quality PdM programs, there are also many companies who might benefit more, or at least benefit more quickly, by outsourcing their predictive maintenance programs. It is a decision that each organization needs to explore for themselves.

Service providers understand the context in which their technology is being employed and many have an enormous amount of experience in successfully managing large programs over extended periods of time. They know what is required to make a program succeed and can educate you and your staff on these points. A service provider should maintain a consistent approach over time and be able to maintain the appropriate expertise within their company, in part because their people completely believe in the technology they are employing. They will be experts at utilizing the tools and technology at their disposal, but this should take a backseat to their track record on managing long-term programs. Lastly, a service provider should be able to work with you to benchmark the program and demonstrate its return on investment over time.

In future articles, we will explore these topics in greater depth to provide you with enough practical information to run a better in-house program or find an appropriate partner or service provider to help take it off your hands. In either case, understanding why things fail is the key to understanding how to get them to work!

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