

# SHOULD PREDICTIVE MAINTENANCE BE YOUR CORE COMPETENCY?





# Should predictive maintenance be your core competency?

Contracting PdM tasks boosts uptime, productivity and cost effectiveness

by Sheila Kennedy

Choosing to do predictive maintenance (PdM) is easy. The challenge is in implementing and sustaining an effective PdM program. Companies seeking to begin PdM or who want to improve an existing program need not feel pressured to develop internal expertise in all things predictive. Instead, they should look outside their four walls and consider engaging the services of a trusted reliability service provider.

It is well known that detecting the early telltale signs of equipment deterioration or impending failure allows for more timely corrective action. However, most plant managers are dealing with a reduced or aging workforce and are challenged to train their existing staff to effortlessly absorb the latest PdM technology innovations and best practices. Internal focus instincts put companies at a disadvantage because they draw attention and investment away from core competencies.

In modern business environments, collaborative work models provide better ROI and accountability. Strategic partnerships have become a must, not a luxury. Recognizing the benefits and intelligently selecting and leveraging a PdM service partner allows the plant to keep control of its assets while optimizing uptime, productivity and cost effectiveness.

## Common business goals

Businesses large and small are turning to PdM service partners to fill skills gaps and control costs. “I’ve seen a lot of in-house PdM programs fail even when exceptional talent is involved. It takes years to build a strong program along with the discipline and determination to keep it going,” says Steven Hudson, senior analyst at Azima DLI ([www.azimadli.com](http://www.azimadli.com)). “PdM requires specialized training, and only a small percentage of people excel at this type of technology.”

As a U.S. Navy Submarine Nuclear Operator, Hudson was a vibration analyst for the Performance Monitoring Team. He owned a PdM service company from 1992-2011, served as Chairman of the Pacific NW chapter of the Vibration Institute from 1997-2002, and joined Azima DLI in 2011.



“Most of the customers I encounter are replacing their in-house PdM program, usually for cost or personnel reasons with an outside contractor,” says Dan Hogan, a vibration/oil analyst at Azima DLI who also performs field services. “A smaller percentage have no PdM experience and there is no commitment within the company to get the internal staff up to speed. Realizing that investing in training is not only expensive but also requires significant time before personnel can be productive, they’ll look for an outside PdM contractor that can become part of the fabric of their PdM program, both operationally, and culturally.” Hogan is a Certified ISO Category III Vibration Analyst as well as an ICML Level 1 Machine Lubricant Analyst.

“Larger companies are more likely to have the determination to support and operate in-house PdM programs. These programs are usually successful until there is a retirement or personnel change,” says Jacob Schlottman, a Certified Category III Vibration Analyst and Certified Balancing Technician at Azima DLI. “A fully capable service provider should be able to support in-house programs with hardware and software, or provide full field service work for those looking to contract parts of their program.”

## Basic Vibration Analysis “To-Do” List For The Maintenance Professional

### □ IDENTIFY

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#### In-house and/or out-sourced

- Identify critical and important machinery assets within your plant to include in your program
- Identify “bad actors” or machinery assets causing reliability troubles or headaches to include in your program

### □ CATALOG AND CONFIGURE

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- **Machine Setup:** This setup requires on-site time, but is often best to be outsourced for a better database foundation by the contractor

This setup includes documenting the configuration and components of the machinery asset, including rotating speeds, number of shafts, gear ratios, bearing types and numbers, etc.

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## Outsourcing benefits

Procedural, educational, technological and cost benefits are realized when PdM service providers are engaged.

- **Compliance:** Maintenance organizations are under pressure to comply with inspection standards from organizations such as ANSI, ISO, IEC, and NBIC as well as local codes. “Many customers have told me directly that compliance is a big deal and they need to get multitudes of inspections done,” says Hogan. “PdM programs are very dependent on regular, routine data collection. When the people involved and responsible are overburdened, vibration and other predictive tasks frequently suffer. With outsourcing, you can pay a contractor to do the work, hold them accountable, and impose consequences if they don’t perform as expected,” he explains.
- **Visibility:** Companies with plants that are geographically separate from one another need enterprise visibility. “If one plant uses CSI hardware for vibration analysis and another uses Entek, the report output is different and the data can’t be compared. Azima DLI’s Watchman Reliability Portal coupled with their ExpertAlert software delivers a collaborative environment to share and compare

### COLLECT DATA

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#### Can be performed by in-house or outsourced

- Survey and Collect Vibration readings

A technician or mechanic will walk to each machinery asset and collect vibration data adhering to a set of standard test conditions, including set load, normal operating temperature, etc to insure usable vibration data is collected

This walk-down also allows an opportunity to record process readings specific to the machinery assets, such as inlet temperature, output pressure, and bearing temperatures to “snap-shot” the conditions relevant to the asset

### ANALYZE , TREND, REPORT

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#### Ideal for outsourcing

- Analyze and Document

Vibration data is reviewed and suspect mechanical/ electrical conditions are identified. A severity can be assessed from the latest data and compared to the past history. A report summarizing the conclusions and actions necessary to save and avoid downtime is created.



analysis machine condition results. A PdM service partner that utilizes a standard set of hardware and software can centrally view and compare data across a customer's facilities," says Hogan.

- Purchasing efficiencies: Unexpected failures often require the short-notice purchase of very costly or non-standard parts. "In successful in-house PdM programs, short-notice purchases are seldom required, but many programs are floundering. For instance, after an operator complains about a noise in an air handler, a technician will use an analyzer to verify that it is failing. In a mature program, you'll know up to a year earlier that it is failing so there is less reactive maintenance," says Hudson.
- Broad knowledge base: If an internal PdM program doesn't work with a broad spectrum of machines, they will likely need help with their more complex machines. "You may be a solid vibration analyst but you won't have a high level of expertise if you are not fully immersed in the task on daily basis. At least 70-80 percent of the time, in-house analysts are assigned to other maintenance tasks," says Hudson. "One wastewater treatment facility has a PdM team that does much of their own analysis, but they still rely on us to inspect all of their machines a few times a year and they'll send us emails almost weekly with particular problems that they don't understand," he adds.
- Supplemental resources: "A lot of manufacturing and power generation facilities run on very lean staffs and the odds of hiring someone just to perform vibration and oil analysis are very low. Rather than investing in new hires and training, they can get the job done at a lower cost with a service partner," says Hogan. A new trend across all industries is to contract out a portion of a company's PdM program. "Outside contractors can validate a plant's vibration analysis results. Or, for complex analysis beyond Category II, such as diesels, large air compressors or odd machines, they can be relied upon to perform the analysis," explains Hudson. "We work with many customers that collect their own vibration data but rely on Azima DLI to perform the analysis," says Schlottman. "Following an initial site setup that includes training on our data collectors and software, the plant technician will periodically collect vibration data and send it to our servers. This





generates an alert to the analyst assigned to the customer. If an issue is developing from a machine, a new set of vibration readings can be collected and sent for review. This model keeps the customer involved, and some will use it to build towards developing an in-house program because it allows them to learn and develop the necessary skills,” he adds.

- **Training services:** PdM is a very specific skill that requires specialized knowledge and regular training. It is easy to learn vibration analysis for standard machines like pumps, motors and fans, but the analysis is much more difficult for complex and slower speed machines. “For someone with a maintenance background, it takes training and a year of actual hands-on experience before they can be a good Category II analyst and put out serviceable reports. It is difficult and some will still struggle with the more complex machines,” says Hudson. “This knowledge has a shelf-life. It must be used daily and supplemented by continuing education in order to keep the program intact. Outside PdM service partners can be leveraged to perform PdM training as needed and at a given level,” he adds.
- **Modern technology:** The capital investment for data collectors and associated hardware and software can be prohibitive. PdM service partners are better positioned to keep up with technological improvements. “If an internal PdM program is suspended after a couple of years, the company can’t recoup the upfront costs. With a service partner, you lease the equipment rather than buy it. You’re controlling the costs while still getting a full-fledged vibration analysis and PdM program,” says Hogan. “One company’s current system configuration limited them to storing only current readings on their data collector



and they could not trend vibration levels while their vibration analyst was on leave,” says Schlottman. “They are very interested in our system because everything can be done from the data collector. It stores the entire database and changes to it can be made in the field. New data is sent to an Azima DLI vibration analyst within minutes, and the physical presence of an in-house vibration analyst is not required.”

- **Comparative data across machine types:** Reference or comparative data sets can be used to troubleshoot problems in similar types of equipment. “A PdM service partner with broad industrial experience is able to cover any and every machine regardless of how uncommon or odd the configuration,” says Hogan. “For example, experience in niche industries, like aircraft carriers, naval equipment and maritime fleets, can be leveraged in chemical plants and other industries with similar machine types.”
- **Comparative data across customer types:** “Although PdM data cannot be shared between customers because of security concerns, in theory, the pieces are there to allow the removal or export of raw, anonymous data for analysis and comparison,” explains Hogan.

### What tasks can be outsourced?

Vibration analysis itself is best suited for outsourcing, according to Hudson. “It is easy to maintain the skills to perform machine setups, data collection, and data transmission for analysis. We have clients who carry our analyzers and send us vibration and machine data daily or weekly for analysis. This includes industrial plants and maintenance service providers,” he says.

“Vibration and oil reporting analysis is ideal for outsourcing,” agrees Hogan. “Data collection is also useful, although a lot of times it is better for the customer to do it because they know the machines and the time spent on collection is minimal,” he adds.

“One skill most companies outsource is field balancing, particularly of industrial fans, and a vibration analyst will also be trained to perform this service,” says Schlottman. “Most vibration data collectors offer a balancing program. However, balancing is a skill that requires an understanding of forces and how they will affect imbalance. Too much weight in the wrong location can damage a machine.”

### Impact on professional growth and success

Plant maintenance and reliability professionals who work with PdM service partners develop more robust, marketable skills. “In-house PdM teams are limited in exposure to a finite set of equipment, specific types of problems, a single methodology and tool set, and a narrow knowledge base,” says Hogan. “On the other hand, plants with strategic partner relationships have ready access to a large resource pool of analysts with expansive industrial and field experience who can help when problems come up.”



“When we teach vibration monitoring, we also teach analysis, and the trainee’s resume will be imparted with vibration technologies, whether Category I or II,” says Hudson. “We encourage training from Azima DLI or the Vibration Institute at whatever level they choose to pursue so that they can learn to speak in the language of vibration and understand the meanings of the symptoms.”

### Impact on plant uptime, productivity and costs

Outsourcing PdM programs, whether in full or in part, is a cost effective means to increase maintenance productivity and improve plant uptime and performance. “A lot of times the only reason a company starts a conversation with an outside firm is because their current system is broken or not working,” says Hogan.

“In every scenario I’ve seen, we will improve our customers’ PdM program even if it is already in good shape, because we bring a huge amount of experience and analysis bench strength to the table,” says Hudson.

“One of the biggest problems with internal programs is the confidence of maintenance personnel in the analysis results,” adds Hudson. “For instance, millwrights at a steel company may not believe their vibration analyst when he says a bearing is going bad. Having an outside service partner brings a higher standard to the analysis, and when they can make a ‘just in time’ call to repair a fault that they have been tracking for months, the program will flourish and the cost justification will be very apparent,” he explains.

### Accountability through KPIs

“Contractors should keep tabs on their own analysis turnaround time, from the point of data collection to when the repairs needed are explained in a report. For companies wanting to evaluate a service partner’s performance, that’s key. Another metric is the response time for calls or emails,” says Hogan.

“At a broader plant level, two important KPIs include monitored machine uptime and the number of unexpected breakdowns of monitored machines. Some facilities also use mean time between failures. To help service partners understand which machines are the bad actors, they can track the maintenance costs as a percentage of asset cost to show which assets are prone to failure and expensive to keep running. If a plant has already calculated that KPI, tracking the change in that number after outsourcing will show the benefit of the services,” explains Hogan.



### Qualities of an effective outsourcing partner

When selecting a strategic partner, aim for one with the following characteristics:

- **Expertise:** Choose a partner based on the number of years of experience they have with PdM programs, their analysts' skill levels, and the number of analysts available. "Too little experience will result in a mediocre program that won't save you much money or be as effective," says Hudson. "Look for a service partner with experience in your industry but also in other industries, especially the unusual machinery used in those industries. Also look at their geographic coverage area," suggests Hogan. "If you have a unique machine problem, you'll want them to have ample resources to draw upon. Smaller contractors have a disadvantage when it comes to the depth of expertise," he adds.
- **24/7 support:** An outsourcing partner should always be accessible. "Choose a company that can receive and analyze vibration data over the Internet day or night," says Hudson. "Every Azima DLI customer is assigned an account manager, a primary analyst, and a secondary analyst, which helps us to provide 24/7 support," adds Schlottman. "Because



machines will not tell us when they are going to fail, our analysts are virtually always on call. We have more than 40 trained vibration analysts in various locations across the county to support our customer base,” he adds.

- **Scalability:** Find a partner who can meet your specific needs. “It is easier to find a partner resource for a facility with simple machines, such as pumps and motors, than it is to find one that can handle more complex machinery, such as refrigeration, diesel power, or larger slow machines,” says Hudson. “We have analysts representing a wide variety of skill types, including rare ones such as the analysis of diesel engines, complex gear boxes, and compressors with multiple speed changes.”
- **Accountability:** Establish KPIs and other measures of accountability for compliance. “Ensure that the data is collected and analyzed so you can get a full picture of where there are problems at the plant,” says Hogan.
- **Security:** Ensure that your data will be kept private. “Azima DLI’s portal is almost like banking software – you only see your own data and you control what’s going on with your particular database. Service providers who use our technology are provided an additional level of security, allowing them to selectively display data and reports to each of their own clients,” says Hudson.
- **Client references:** “Make sure to get references from a variety of existing customers,” suggests Hogan.

Choosing to outsource all or part of your PdM program and selecting the right strategic PdM service partner can make all the difference in your program’s success and cost effectiveness. At the same time, it allows you to concentrate on making the most of your core competencies.



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