PdM SECRETS REVEALED

How to Improve Your PdM Program
Or Start One from Scratch

A Must-Read Guide for Maintenance and Reliability Leaders
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The Basic Concept of Predictive Maintenance

Although the Predictive Maintenance technologies can be very complex, the basic concept is simple enough:

Most industrial equipment doesn’t suddenly break down all at once. Instead, it breaks down gradually – over a period of weeks or months – giving off warning signals along the way.

These warning signals, which are changes in conditions such as temperature, vibration or sound, can be detected by PdM technologies. As a result, PdM gives you the time you need to plan, schedule and make repairs before the equipment fails, so you can avoid major breakdowns and costly downtime.

The following graph illustrates this concept:
What’s important to realize is this: The difference in repair costs from the time a PdM specialist can detect a problem to the time an operator sees it can be huge.

In fact, one study showed that PdM-driven, proactive maintenance costs half as much as emergency, breakdown maintenance.

No other maintenance strategy can give you more time for advanced planning and scheduling than PdM. That’s why PdM should be your number 1 source of planned maintenance.

Studies show that a planned repair job typically takes only half as much time as an unplanned job. Planned work is always more efficient than unplanned work.
The Top 6 Benefits of Predictive Maintenance

In his book, Plant Engineer’s Handbook, Keith Mobley links the following benefits to PdM:

- Maintenance costs - down by 50%
- Unexpected failures - reduced by 55%
- Repair and overhaul time - down by 60%
- Spare parts inventory - reduced by 30%
- 30% increase in machinery mean time between failures (MTBF)
- 30% increase in uptime

Now these numbers may seem high. But even if you take only a fraction of these benefits, the financial impact of an effective PdM program at most plants can easily reach into millions of dollars.

And for the typical manufacturing plant, a 10% reduction in maintenance costs has the same bottom line impact as a 40% increase in sales.

Another benefit of predictive maintenance is this:

Studies have shown that with a properly-engineered PdM program, you can replace up to 30% of your Preventive Maintenance tasks (PMs). Find out more about right-sizing your PM program in our latest free report:

“Are You Doing Too Much PM? How to Optimize Your Preventive Maintenance Program”

This report is another must-read for maintenance and reliability leaders. To reserve your copy:

The Hidden Benefit of Predictive Maintenance

For at least the last 40 years, the financial benefits of Predictive Maintenance have been proven again and again.

However, when you actually talk to Maintenance and Reliability professionals who have seen the change from the "reactive" to the "proactive" world, chances are you will hear something different.

Here are just a few examples of what they are saying:

“I like to fish and hunt and play with my kids. I’m definitely not a maintenance geek. Man, I don’t want to get called out in the middle of the night. I’m just telling you that if you don’t do this [Predictive Maintenance], God bless your soul. And you better like coming in and doing maintenance, because you’re going to do it a lot. I don’t like maintenance. I like my free time.”

“Now that we are down the road quite a ways in predictive technologies and implementing the overall proactive maintenance model, we are seeing the results of it. It’s made my job easier. There are less call outs than what we had in the past. That reduces my shop level and improves my employee’s morale and the overall relationship between operation and maintenance.”

“We’ve been able to demonstrate to the operations group the validity of PdM technologies and where we can plan scheduled outages around the PdM work that’s been identified. That’s less stressful to me. It’s safer because I can plan out that activity instead of working on it at midnight on Saturday night. It’s reduced my stress level.”

“I hardly ever get called in at night anymore. We don’t need as many people here every day. We are at a 70 or 80% proactive work level. The quality of life is a big improvement. A big improvement for the worker.”
“When you start implementing a [PdM] program like this there is always some push back. ‘What’s in it for me?’ ‘Why are we doing this?’ Basically for a guy that likes a lot of overtime at the end of the day - his paycheck is less. But on the flip side of that is they’re not working as hard and you’re not fighting as many fires and you get more time off. About 5 years ago we’d have an estimated 120 calls in a year’s time. Now we are running the plant 24-7 and are down to about 12-20 calls.”

“My life has gotten much simpler. I’m not involved in the emergencies because typically we don’t have that many and they are usually not catastrophic. Not as many phone calls in the middle of the night – a lot fewer.”

So there you have it -- the "hidden" benefits of successful Predictive Maintenance:


So let’s go behind the scenes and look at the keys to highly successful PdM programs.
The First Job of Your PdM Program

Despite what you may have heard, the foundation of a successful PdM program is a list: A detailed, accurate equipment list.

Why? Because your equipment list is the foundation for all of the key steps that follow. For example, a good list is essential for:

- Identifying how your equipment can fail
- Choosing the right PdM technologies to apply to the asset
- Determining the best amount of PdM coverage for your plant
- Ranking the criticality of each piece of equipment
- Building databases for each PdM technology
- Determining PdM staffing levels

So if your list is incomplete or incorrect, everything that's built from it will be flawed. Any shortcuts or inaccuracies will be exposed as big problems later.

What makes a good list? For starters:

- Equipment number
- Equipment description
- Equipment type
- Area / location of the equipment

Surprisingly enough, most plants do not have a good equipment list, unless the data was captured when the plant was built. So if you don't have this information, or if it's less than 75% accurate, here are two options:

1. The manual, paper-based approach

In the past, the conventional method was to walk up to each piece of equipment and write down the key data on a clipboard. Then, this information is transcribed and entered into a database.
Now, depending on the size of your plant and the number of pieces of equipment, this process can be extremely time-consuming. The other option is,

2. Using a software tool

When time is a factor, equipment lists can be created much faster and easier with a tablet PC and an equipment walkdown software tool. Here's how it works.

First, you import your existing equipment data into the database. Then additional data is gathered in the field and entered directly into the database. Finally, it's a simple matter of exporting the compiled data to the appropriate databases.

This speeds up the process tremendously and greatly reduces the effort compared to the manual, paper-based approach.

However you decide to do it, don’t be tempted into shortcutting this step. A good equipment list is one of the most overlooked and underappreciated elements of a successful PdM program.

For more information on a time saving walkdown tool:

E-mail us at info@alliedreliability.com or call 918-382-9400.
How To Choose the Right PdM Technologies

Many companies begin a Predictive Maintenance program by choosing one of the most common technologies – like vibration analysis. Then, they get some basic training, experiment for awhile and then start applying the technology to their most critical equipment.

Seem like a sensible, low-risk approach, right? Wrong. Let’s go back to the basic concept of condition monitoring.

Almost all equipment gives off early warning signals – such as changes in temperature, vibration or sound – before it fails. These warning signals, or failure modes, can be detected with certain condition monitoring technologies.

The problem is that one or two technologies alone can’t detect the majority of the warning signals in your plant. As a result, a single-technology PdM program will miss far more faults than it will catch.

You see, the key to a successful monitoring system is to make sure it is highly sensitive to the failure modes of your equipment. That’s why you need to apply multiple technologies to make sure you can detect the majority of failure modes in your plant.

What’s important to remember is that the failure modes and criticality ultimately determine which technologies you apply. Not the other way around.

This is a simple concept, but a lot of people get this backwards.

In addition, the multi-technology approach lets you double-check and confirm “fault findings” between technologies. Plus, it allows you to catch problems with one technology that might be missed by another.

But the biggest reason to apply multiple technologies is this: There is little, if any, payback from using just one or two PdM technologies. You will miss warning signals that occur, so the equipment will fail anyway.
The payback comes from integrating a full range of technologies across a high percentage of your asset base. That’s why the fundamental starting point for a PdM program is:

- Understanding all the failure modes in your plant, and
- Applying the technologies that will detect them.

**Recommended Resource**

If you don’t have the time or expertise to determine the failure modes for all your equipment and map them to the appropriate PdM technologies, here’s a software driven-process that can help.

Using a database with several hundred equipment types already mapped to the appropriate technologies, now you can:

- Take the equipment on your equipment list
- Identify the possible failure modes for each, and
- Confirm which PdM technologies and inspections to apply

Here’s a sample of recommended technologies by equipment type for a specified environment:

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>MECHANICAL</th>
<th>ELECTRICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vibration Analysis</td>
<td>Mechanical Ultrasound</td>
</tr>
<tr>
<td>Compressor</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Evaporator</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Valve</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Basically, this model tells you which PdM technologies are required to cover your equipment. Best of all, the whole process takes hours - rather than weeks or months - to complete.

For more information,

E-mail us at info@alliedreliability.com or call 918-382-9400.
Which Equipment to Monitor with PdM

It’s important to have a criticality ranking of your asset list so you can determine your maintenance strategy, prioritize work and make better risk management decisions. Criticality rankings should be a single score based on collective agreement from:

- Production
- Maintenance
- Purchasing and Logistics
- Environmental, Health and Safety
- Accounting
- Sales, Marketing, and Customer Service

Unfortunately, some companies use the ABC approach – where all equipment is given an A, B or C priority. The problem is that most equipment falls in the middle and gets a “B” rating. So when it comes to priorities, which one are you going to work on first? You can’t address all of them at once, so what is your priority?

That’s why you need a single score and overall ranking with granularity for each asset so you can focus PdM resources on equipment that has the biggest impact on plant performance.

A sample criticality ranking for a single piece of equipment is shown on the following page.

Notice how each asset has a single, composite score based on 5 key criticality factors

- Safety
- Environmental
- Maintenance
- Production
- Quality
Sample Criticality Ranking

![Criticality Ranking Chart]

- Safety
- Environmental
- Maintenance
- Production
- Quality

Asset ID Number

- 295
- 233
- 430C
- 430D
- 620-10
- 540
- 910C
- 104B
- 302A
- 101A

Sum of Category Scores
Choosing the Right Level of PdM Coverage

For many industries, there is benchmark data available which describes how much PdM coverage is considered “best practice” for that industry. For example:

<table>
<thead>
<tr>
<th>QUARTILE</th>
<th>VIBRATION COVERAGE</th>
<th>MECHANICAL THERMOGRAPHY COVERAGE</th>
<th>ELECTRICAL THERMOGRAPHY COVERAGE</th>
<th>OIL ANALYSIS COVERAGE</th>
<th>OTHER COVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top First</td>
<td>88.9%</td>
<td>79.0%</td>
<td>100.0%</td>
<td>60.1%</td>
<td>38.0%</td>
</tr>
<tr>
<td>Middle First</td>
<td>76.0%</td>
<td>67.2%</td>
<td>92.0%</td>
<td>53.9%</td>
<td>31.0%</td>
</tr>
<tr>
<td>Top Second</td>
<td>71.2%</td>
<td>59.8%</td>
<td>88.1%</td>
<td>46.1%</td>
<td>27.4%</td>
</tr>
<tr>
<td>Middle Second</td>
<td>62.0%</td>
<td>51.0%</td>
<td>85.1%</td>
<td>37.8%</td>
<td>22.1%</td>
</tr>
<tr>
<td>Top Third</td>
<td>54.0%</td>
<td>41.9%</td>
<td>79.8%</td>
<td>31.0%</td>
<td>17.7%</td>
</tr>
<tr>
<td>Middle Third</td>
<td>39.9%</td>
<td>30.8%</td>
<td>74.5%</td>
<td>25.1%</td>
<td>13.1%</td>
</tr>
<tr>
<td>Top Fourth</td>
<td>27.1%</td>
<td>19.7%</td>
<td>68.7%</td>
<td>19.6%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Middle Fourth</td>
<td>12.8%</td>
<td>4.5%</td>
<td>60.9%</td>
<td>9.8%</td>
<td>5.8%</td>
</tr>
</tbody>
</table>

As you can see, the data reveals the percent of equipment which is covered by each technology for the 1st, 2nd, 3rd and 4th quartile performers.

This is very useful information for seeing how your current coverage ranks versus best practices in your industry.
Engineering Your Program At-a-Glance

Now that you know what technologies to apply, what equipment to apply them to, and what level of coverage is possible, this allows you to:

- See different program scenarios based on the criticality of your equipment
- Compare your coverage vs. best practice performers
- See what equipment would be included if your technology coverage is increased to the next quartile.

Essentially, this is the information you need for engineering a PdM program, evaluating your “best investment” and comparing it to best practices based on 1st, 2nd, 3rd and 4th quartiles of industry coverage.

This information is displayed in the following Asset Health Matrix.

<table>
<thead>
<tr>
<th>Equipment Number</th>
<th>Equipment Description</th>
<th>Equipment Type</th>
<th>Criticality Ranking</th>
<th>Inspection</th>
<th>Lubrication Route</th>
<th>Vibration</th>
<th>Thermography</th>
<th>Ultrasound</th>
<th>Motor Circuit</th>
<th>Oil Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 % Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Plant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Equipment</td>
<td></td>
<td></td>
<td>526</td>
<td>526</td>
<td>526</td>
<td>526</td>
<td>526</td>
<td></td>
<td>526</td>
<td></td>
</tr>
<tr>
<td>Equipment Coverage</td>
<td></td>
<td></td>
<td>321</td>
<td>386</td>
<td>171</td>
<td>264</td>
<td>300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology Applied</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criticality Cutoff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>237</td>
<td>Fluid Bed Dryer</td>
<td>Dryer Vibrating</td>
<td>790</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>540</td>
<td>Boiler</td>
<td>Boiler</td>
<td>600</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>199</td>
<td>4 lb. food grade brick press</td>
<td>Press</td>
<td>581</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
What to Measure – 11 Key PdM Metrics

There are many ways to measure the results and impact of a PdM program, so it’s important to consider carefully which metrics to use. Here are some guidelines and suggestions

If you don’t measure something, you can’t prove that it ever happened.
You may have heard, “In God we trust. Everybody else brings data.” So if you want to prove success to upper management, you need to have the data to back it up.

The less you know, the more you have to measure.
For any process, if you know little or nothing about it, everything appears to be random. So you have to measure it until you understand it. The less you know the more you have to measure.

What gets measured gets improved.
Measurements are a great way to drive positive behavior changes.

With that said, the number 1 PdM metric to consider is:

What percent of your total maintenance man-hours is driven by PdM?

That’s the single most important metric to track. Because on average, best practice maintenance programs generate an average of 50% of their work from PdM inspections and corrective work.

So if PdM and the results of PdM aren’t generating at least half of your work total, you’ve got room for improvement.

Predictive maintenance is proven to be more cost-effective than preventive maintenance or emergency maintenance.

Surprisingly enough, most companies don’t know how much PdM work they do. That’s because they mix PM and PdM together, so they can’t break out a true PdM number.

However, we’ve found that the majority of plants in North America generate less than 10% of their maintenance workflow from PdM.
**What Else To Track**

Depending on the maturity of your program, here’s a list of the top 10 metrics to track the success of your efforts:

1. PdM effectiveness – hours of corrective work identified by PdM divided by hours spent on PdM inspections
2. Percent of PdM recommendations completed within 30 days and 90 days
3. Percent of work flow that is planned maintenance (target is 80%+)
4. Total planned work in planner’s backlog
5. Adherence to PdM schedule
6. Wrench time
7. Mean time between failure
8. Maintenance costs as a percent of asset base
9. Maintenance costs and as percent of sales
10. Overall equipment effectiveness and asset utilization

**What Not to Measure**

Some organizations spend a lot of time tracking cost avoidance. In other words, “If we hadn’t caught this problem in advance, it would have cost us X dollars in emergency repairs later.”

The problem is, you will never find cost avoidance on a company’s financial statements. So it has little real value to management.

What’s important to measure are those things that lead to:

- Lower labor costs
- Reduced energy consumption
- Lower spare parts inventory
- Improved product quality
- Better safety performance
- More throughput capacity

These are the key indicators that directly impact financial performance.
Four Reasons Why PdM Doesn’t Work

Many people expect that after applying PdM technologies, a more reliable plant will magically appear. This idea is attractive, appealing – and wrong.

You see, it’s one thing to identify equipment problems with the technologies. But it’s another thing to plan and schedule the corrective work, get the craftsperson out there and get the repairs done in a timely, disciplined, orderly manner.

That’s why the heart of a successful Predictive Maintenance program is a sound work order system. Because ultimately, it’s your work order process that lets you leverage the power of PdM.

Remember, the true return on your investment in PdM comes from eliminating defects – not just identifying them. So you must be able to plan, schedule and execute the corrective work that results from PdM inspections. Otherwise, there’s very little value associated with condition monitoring technologies.

A good work order system doesn’t have to be highly sophisticated. But you must have a process in place that will turn PdM work requests into work orders.

Sounds easy, right? Yet here are the 4 most common things that go wrong with a PdM work request:

1. PdM corrective work is identified, but the work request never makes it to planning.

2. The corrective work gets planned but never scheduled.

3. The work gets on the schedule, but when it’s time to perform the job, the parts aren’t available.

4. The work gets planned, scheduled, the parts are available, but then emergency work takes precedence and the PdM corrective work never gets executed.

That’s why the specific PdM work processes must be outlined and mapped for your facility. For example:

- How the PdM schedule will be managed
- How the reports will flow
Another key consideration is the routing and approval process for PdM work.

Some companies want all PdM work requests reviewed and approved before converting them to work orders. The problem is that very few Maintenance Managers, Reliability Engineers and Planners are well-grounded in PdM technologies. As a result, they can’t always make the best decisions about the work requested.

So we believe that if you have qualified PdM technicians, they should be able to put in their own work requests. Then, as soon as the job gets planned, it gets turned into a work order.

But that’s not always acceptable to some organizations. So if you want to have someone reviewing and approving PdM work requests, make sure they are well-educated in the PdM technologies.

One final point: Increasing your PdM inspections will increase the amount of work in your system.

So the question is: How much additional PdM work can your plant absorb?

You must factor that into the equation when you are designing or expanding a PdM program. The goal is to take full advantage of the technologies without overwhelming the capacity and limitations of your work management system.

The following diagram represents a successful PdM work management model.
Are You Collecting The Right Data?

Predictive Maintenance is a data-driven process: Collecting and analyzing data to determine what corrective work needs to be done. The key is to make sure your PdM team is looking at the right data.

Unfortunately, a lot of companies spend a lot of time looking at the wrong data, because the data collection specifications were set up incorrectly to begin with. So the data can’t do what it’s supposed to do: Identify equipment problems.

That’s why setting up the PdM technology databases is such an important step. Done right, these databases let you trust your alarms to catch impending problems. Then you can look at exception reports, see what equipment is in alarm, and only analyze that equipment.

But if you can’t trust the data and the alarms, analysts must look at all data from all equipment and all collection points.

The difference is huge. Because, with the right database, a vibration analyst can collect and analyze data on 400 – 450 pieces of equipment per month.

Without it, productivity drops by 50% - down to 200 – 225 pieces of equipment per month per technician.

So having the right database has a direct impact on the productivity of your team and success of your program.

Depending on the size of the plant, setting up these databases can take a lot of time and effort. But it’s well worth it, because the payback is enormous.

The No. 1 Question to Ask

During the process of setting up PdM databases, the main question to ask is this:

What data do we need to collect, so that if there’s a problem with this equipment, it shows up and we see it?

The answer requires understanding:

- The failure modes of the equipment
- The capability of each PdM technology to detect them
- What points on the equipment to look for the failure modes
The theory behind the PdM technology

How to present the data for analysis

How the individual hardware and software package works

What the alarm limits should be

That's a lot to know. And it doesn’t come from a one-week training class. That’s why setting up PdM databases is best handled by analysts who hold a level 3 certification with several years of experience in that specific technology.
What Kind of PdM Program – the 3 Options

At this point you have determined:

- What PdM technologies to apply
- Which equipment to apply the technologies
- How to manage the PdM workflow
- What metrics to use to measure the success of your program
- The level of knowledge and skills you have in your workforce
- What resources you have available internally
- What amount of training it will take to develop your people into PdM technicians

Basically, that's the information you need to make a sound, strategic business decision on selecting the right PdM sourcing model. It's simply a matter of “running the numbers” and seeing which type of program makes the most sense.

Here are the three options:

1. Internal
   The PdM program is managed entirely in-house: including all data collection, interpretation, analysis, and recommendations.

2. Contract
   All key functions are outsourced to a professional PdM service organization.

3. Hybrid
   Part of the work is done in-house and part of it is outsourced. For example, data collection handled internally, analysis and recommendations outsourced.

How to decide? Here are some of the key factors that can help you determine the most cost-effective strategy:

- Labor costs
- Training and development
- Coaching and mentoring
- Recruiting and staffing
- Hardware and software
- Timeline for implementation
- Remote diagnostics and supplemental support
- Union vs. non-union environment
- Career development opportunities

In addition, here are five unique situations that tend to favor outsourcing:

1. **When you need the PdM expertise right away**
   Some companies can’t wait two years to develop the PdM capabilities in-house; they need the improvements now.
   
   So you can accelerate the process by bringing in qualified analysts who are already trained and certified, have the right tools and understand the capability of the predictive technologies.

2. **If PdM is not a core competency**
   For many companies, PdM is not a core competency within their maintenance organization. Their internal analysts haven’t been trained properly, they don’t have the right tools and they don’t have time to get up to speed.
   
   If your team lacks in-depth understanding of the full range PdM technologies, their capabilities, and how to apply them, outsourcing is a viable solution.

3. **For companies with multiple sites**
   Multiple sites mean each facility has to learn PdM on their own - and at their own pace.
   
   Partnering with a third-party provider allows you to quickly implement standardized methods across many facilities. Each site gets immediate support in the areas where they need it most. That means they can focus on the results of the PdM program rather than on developing the program itself.
4. If there are opportunities to improve other areas of Reliability

There are plenty of other aspects to Reliability that offer big payback, such as improvements in leadership, planning and scheduling, precision craft skills, root cause analysis, RCM analysis, etc.

These are essential elements that, for the most part, you have to do yourself. If these represent major opportunities for improvement, consider focusing your time and effort on them rather than PdM.

5. For a true picture of the health of your equipment

Typically, internal Predictive Maintenance programs are overly optimistic about the health of their equipment. Why? Because there’s internal pressure to make assets look better than they really are.

So having a third party provider of predictive services means you’ll get a better, clearer picture of the condition of your assets.
How To Choose A PdM Service Provider

When you look at the range of PdM service providers, you’ll find a mind-boggling range of companies - ranging from local motor shops and machine shops all the way to large oil companies, bearing manufacturers, and compressor manufacturers.

So the 3 keys to look for in a service provider are:

1. **The ability to integrate multiple technologies**
   
   Most service providers only focus on 1 or 2 predictive maintenance technologies. But an effective PdM program requires a multi-technology approach to detect all the possible failure modes for your equipment.

   Therefore, the provider should have the ability to bring in 8-12 of the key PdM technologies that comprise 15-20 specific PdM applications under one integrated approach.

2. **PdM is a core competency**
   
   Different companies have different core competencies. For motor rewind shops, data collector manufacturers, bearing manufacturers, oil refiners – those are their core competencies.

   To think they reach outside their core competencies and effectively deploy motor circuit analysis, ultrasound, vibration – all of the PdM technologies – simply isn’t realistic.

3. **Qualified analysts in each technology**
   
   It’s critical to have qualified analysts who can identify the root causes of equipment problems. Otherwise you will constantly be fixing symptoms rather than the root cause.

   For example, if you have a misalignment problem on a piece of equipment that’s causing a bearing failure, you can spend a lot of time and money replacing bearings. Or you can address the root cause and fix the misalignment problem.

   That’s why it’s so important to have PdM analysts who can make the right recommendations. At a minimum, the service provider should employ analysts with:

   - Training and certification in the technology
   - Desire, motivation and passion for the job
- A technical background in the field
- 1-2 years of experience under a mentor
Dealing With The Skills Crisis

Everyone talks about the crafts skills crisis in North America. But does it really exist?

Unfortunately, the answer is yes. Consider the facts:

- In a 2005 survey by the National Association of Manufacturers, more than 90% of manufacturers reported a shortage of production workers – including craft workers, machinists and technicians.

- In tests administered on craftspeople, they demonstrated only 34% of the skills and knowledge their supervisors say are needed to do their jobs.

The impact on Predictive Maintenance is huge. Because the real purpose of PdM is not detecting problems early – it’s correcting them. So it’s essential to have skilled crafts people who make precision repairs if you want to get the maximum return on investment in PdM.

What to do about it

In brief, a skills assessment that evaluates skills and knowledge against the tasks the employee is expected to perform. The result is a customized individual development plan designed to close the skills gap and improve job performance.

How a Skills Assessment Should Work

Job and task analysis
First off, the manager or supervisor defines the job by verifying the duties and tasks associated with it.

Generating the assessment
Once the job is defined, an assessment should be generated with test questions and skills demonstrations directly related to the tasks the employee is expected to perform.

Taking the assessment
The employee then takes the assessment. When completed, the results should be tallied and sent to the supervisor.

Individual development plans and training curriculums
The assessment should identify the employee’s deficiencies in skills and knowledge and recommend specific training courses to help close those gaps.
Once the supervisor selects a customized training curriculum that meets their needs, an individual development plan should be generated.

**Benefits of a Skills Assessment**

An automated skills assessment should solve a number of common maintenance workforce problems.

Doing a job analysis or an individual development plan is often viewed as too difficult and time-consuming. So it rarely gets done. With an automated skills assessment, you can accomplish in hours what normally takes days or weeks.

In the past, employers have relied on generic skills training. A targeted skills assessment is a much better way to assess individual skills and get tailored learning objectives and training content.

Precise job standards give you a fair and objective basis for hiring and evaluating employees.

Employees can take control of their careers by understanding their strengths and weaknesses, which allows them to mature in their current role and stretch into the next one.

The bottom line is, your labor costs will never be less than companies in the rest of the world. So instead, your workforce must be better educated, more highly trained and more efficient than the competition.
Putting It All Together - The PdM Design and Scope

Your PdM program will be most effective when the scope of the program is clear and well-defined. A design and scope document provides your team with the information necessary to clarify and fully understand the program.

Basically, a design and scope document is a blueprint that helps plan, schedule and control the implementation of the project. Some of the information that should be included:

- Targeted equipment for applying PdM technologies
- Resource requirements to deploy the PdM Program
- Resource model to be used – internal, external or hybrid program
- Costs involved for ongoing support
- Workforce training and individual development plans
- Written standards for personnel certifications and qualifications
- Written standards for inspection procedures and technology standards
- PdM workflows and work management processes
- Performance metrics and targets for each category
- A 2-year Gant chart with implementation timelines

In addition, it should also include the business case – an objective financial analysis of current and expected benefits of the Predictive Maintenance process. The business case can be broken down into maintenance cost components such as:

- Parts/materials
- Internal labor
- Production improvements
- Capital expenditures
- External labor
- Tools and rental equipment
- Other reliability related results

Having all of this information compiled and published in one final document is a powerful way to lay out your plans.
Why go through the trouble of preparing a design/scope document?

First off, it serves as a reference guide that justifies the investment in the program.

Plus, let’s face it, in a lot of companies, managers turn over every 2-3 years. So when a new manager comes in and asks questions, you can pull out this document and show exactly what you’re doing and why.
Conclusion

To sum it all up, there are two ways to do maintenance on equipment. You can either wait until it breaks down, and then fix it. Or you can use Predictive technologies to monitor equipment, diagnose conditions and anticipate failures before they occur.

The choice is yours.

“We've known for a long time, both intuitively and through RCM studies, that a condition based approach, when combined with effective work management, planning and scheduling, and a proactive, defect elimination mindset, is the most cost effective means of maintaining a plant.”

-- Ron Moore, author of “Making Common Sense Common Practice”

Your Feedback Please

While it's still fresh on your mind, would you please take a moment to give us your opinion of this report? It's easy - all you have to do is jot down your answers to a few questions and send it to pdmreport@alliedreliability.com.

1. What did you like best about the report?
2. What information would you like to see that was not included in the report?
3. What do you consider to be the "retail" value of the report? In other words, what price would you feel comfortable recommending it to other maintenance and reliability leaders?
4. Any other comments or suggestions?

If you'll be kind enough to give us your feedback, we will be pleased to return the favor by sending you the following FREE bonus section:

"Key Facts About the PdM Service Industry - Size, Scope, Trends and Outlook for the Future"

Nothing like this has ever been published before, so we think you'll find it very informative.

Meanwhile, we look forward to learning what you liked about the report - and also welcome any suggestions or criticisms you might have. Thanks so much for your time.
About Allied Reliability

Founded in 1997, Allied Reliability and Allied Services Group have quickly become the largest maintenance and reliability engineering firm specializing in Predictive Maintenance and Condition Monitoring services.

Today, Allied serves clients in over 200 plants and facilities in 40 states in the U.S., 3 provinces in Canada, plus countries in Europe and Latin America.

Allied technicians routinely monitor over 150,000 pieces of equipment with a full range of PdM technologies.

For more information about our Consulting and Training offerings in:

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