

Benefits of Predictive Maintenance in Manufacturing

You are responsible for keeping the equipment in your manufacturing facility in good repair while keeping costs and downtime at a minimum. You've heard that predictive maintenance might be the answer to some of your problems, but can it really make that much of a difference?

The short answer is yes, but let's talk about why.

What is Predictive Maintenance?

One of the best ways to explain what predictive maintenance -- also known as **condition-based maintenance** -- would be to talk about what it is not.

Breakdown maintenance means maintenance isn't really performed until you recognize the signs that something is going wrong. You would basically run a machine to failure before it receives attention, and that is going to lead to frequent failures.

You can also have preventative maintenance which depends on carefully scheduled maintenance that follows manufacturer's recommendations. It is certainly an improvement over breakdown maintenance, but doesn't take into account the environment or applications involved (e.g., exposure to dust, extreme temperatures, regular brownouts) so that means not all equipment will receive maintenance when actually needed.

Predictive maintenance (PdM), on the other hand, focuses on data about the condition of equipment in your facility and uses it to make decisions about when maintenance should take place. Maintenance tasks are performed when they are actually needed, not according to a strict schedule set by the requirements of a manufacturer or only when equipment starts to fail.

Benefits of Predictive Maintenance

There are a host of benefits to following a preventative maintenance paradigm, but we are only going to discuss seven key benefits, starting with the ability of PdM to account for the conditions and applications of your equipment.

Accounts for Actual Conditions and Applications

By looking at the condition and performance of your equipment in its actual working environment and applications, you can be sure that its actual maintenance needs are being met as opposed to a generic schedule based on averages and statistics that may not apply to your facility.

For example, the manufacturer may state that filters on a certain pneumatic system should be changed every 1,000 working hours, but your facility is exposed to dust from the processes involved. It may be that you need to change out those filters every 750 working hours. However, you follow that schedule and that system keeps failing. With pressure data for that system integrated into a PdM approach, you can more accurately determine when those filters are becoming clogged and get them changed before the system fails.

Early Fault Detection

One of the key benefits of predictive maintenance is the early detection of an impending failure that could bring your production to a grinding halt, as we just alluded to in the previous section.

As an example, suppose that your PdM plan involves regular temperature profile assessments for key pieces of equipment. The most recent infrared thermography data for one of your key motors reveals a significant rise in the operating temperature over the last several months. If the motor is overheating, there is a problem that needs to be addressed. If it isn't, more problems are going to develop and can include accelerated degradation of the windings.

This early alert that something is wrong -- the detection of a fault before it causes failure -- means that your team has time to pull the appropriate surplus motor and switch it out so that catastrophic failure occurs. This also leads to reduced downtime!

Less Downtime

There are two ways that PdM reduces downtime:

- Less downtime required for maintenance because it is only performed as needed
- Less downtime associated with failed equipment because early fault detection helps to prevent catastrophic failures

And we all know downtime is costly. Every hour that your production line or assembly line is down, regardless of the cause behind it, is money lost. And there can be other repercussions, such as missed deadlines and loss of reputation.

Improved Reliability

Reliability is important to so many key aspects of successful manufacturing, including reduced downtime and lower repair costs. As it turns out, predictive maintenance and the tools that support are at the **heart of reliability**. When your equipment is monitored and the data generated is compiled into useful information, your team can recognize maintenance needs as soon as they arise.

This means, for example, **ball bearings in an electric motor** can be greased as soon as the lack of lubrication is detected (often through **modal analysis of motor vibration data**) -- extending the useful life of those bearings and enhancing the reliability of that motor. If you wait too long, a catastrophic failure may occur that could lead to more extensive damage that involves other motor components. PdM addresses that lubrication problem before it gets out of hand, and that also means your equipment will have a chance at performing better.

Better Performance

When a maintenance is performed as needed, that means your team won't be late performing key maintenance tasks, either. Keeping bearings lubricated, electric motors free of dust build up, shafts balanced, and similar maintenance operations mean that the equipment throughout your production line have their best opportunity to operate at peak performance. And that improved performance means higher efficiency.

Which motor is going to require more power: one that is connected to an out-of-balance shaft and has ball bearings that have been over-greased, or one that is connected to a properly balanced shaft and has just the right amount of grease?

Extends Equipment Life

In addition to enhancing the reliability of your equipment, PdM will also make it possible to wait much longer before a motor has to be replaced or refurbished. A motor that has an expected life of 10 years can see life span extended by monitoring its condition and attending to those problems that crop up before they cause more damage. Keeping shafts balanced, bearings lubricated, windings clean, wiring in good repair, and fasteners tight (and similar tasks!) can keep your motor running for much longer than predicted by the manufacturer.

Reduced Cost

As we've already pointed out, predictive maintenance means equipment will be maintained when needed, not after a problem has had time to escalate. This has some very positive implications for costs:

- Reduced power requirements because the equipment will be operating more efficiently
- Reduced downtime because the frequency of catastrophic equipment failure is reduced and unnecessary maintenance is avoided
- More efficient consumption of key maintenance supplies such as lubricants and filters because no unnecessary maintenance is performed
- Lower repair costs because repairs become more infrequent due to better maintenance practices and equipment lasts longer

Easier than Ever to Implement

The tools and equipment you need to implement predictive maintenance probably don't cost as much as you may fear. And thanks to **innovations in predictive maintenance technology**, the entire process of **condition monitoring** is easier than ever. You have the freedom to select what equipment you want monitored, which usually turns out to be the most critical equipment to your manufacturing process.

For certain types of data, you can set up continuous monitoring of parameters such as vibration or temperature. That data is gathered automatically at intervals you set and transmitted wirelessly to a server where it can be analyzed and visualized for the purpose of informing your maintenance schedule.

For other types of data, such as ultrasound readings or infrared thermography, you can have evaluations scheduled (this is referred to as performing surveys) and include that data with your maintenance decisions. And if all of that seems overwhelming, you can find repair vendors like HECO who can help you develop and implement a customized **predictive maintenance program**.

Conclusion

Predictive maintenance, also called condition-based monitoring, means that maintenance is performed when it's needed, not after something fails or according to a generic schedule that just doesn't apply to your facility's needs. This approach to maintenance addresses the weaknesses of breakdown maintenance and predictive maintenance and has the benefits you need to keep costs down and production up.

HECO Knows PdM

If you are looking into PdM, contact the experts here at HECO. We have ISO/ANSI Certified Vibration Analysts (Cat II to Cat IV), Level II Tribologists (Oil Analysis), and Certified Level I Infrared Thermographers on staff at our EASA-accredited facility that can advise you about the right equipment surveys for your needs, condition-monitoring tools that fit your budget, and software to help you make sense of the data you collect.

In fact, our **Predictive Services Group** provides on-site maintenance and reliability services for manufacturing facilities like yours. Our PSG team can help you with everything from setting up and running your own PdM to performing corrective actions such as balancing or alignment. If you agree that it's time to start implementing PdM and reaping its many benefits, contact HECO today.