



Predictive Maintenance: Condition Monitoring for Material Handling and Logistics Equipment



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In major distribution and fulfillment centers, when equipment shuts down unexpectedly, it can easily cost tens of thousands of dollars per hour of downtime. In peak shipping seasons, the costs can be even higher. Because of this, predictive maintenance solutions are becoming essential to modern distribution and fulfillment centers. The ability to accurately track equipment performance and anticipate failures before they occur is helping major online retailers reduce unplanned downtime, optimize maintenance schedules, and reduce wasted time and costs.

A leading solution for predictive maintenance is condition monitoring; however, collecting equipment performance metrics is only the beginning. The ability to accurately interpret and communicate this data is essential for system reliability, and that's where machine learning comes into play. A condition monitoring solution with machine learning removes human error from the equation and makes predictive maintenance solutions smarter and more effective.

This article explains the challenges of traditional maintenance, how condition monitoring for predictive maintenance solves these challenges, and 5 key capabilities to look for in a reliable motor monitoring solution.



The Challenges of Traditional Maintenance

Traditionally, distribution and fulfillment centers relied on preventative maintenance schedules provided by the equipment manufacturer, including regularly replacing components based on a suggested timeline. However, actual use of the equipment can greatly affect the reliability of these estimates.

In addition, many things can go wrong between scheduled maintenance visits. For example, if bearings wear prematurely or a motor overheats, a conveyor may require service sooner than anticipated. Furthermore, if a problem

remains undetected for too long, the issue could escalate to further damage the equipment and lead to costly unplanned downtime. Predictive maintenance helps avoid these problems, saving time and costs.

The Solution: Condition Monitoring for Predictive Maintenance

Predictive maintenance solutions track the performance of components like motors, gearboxes, bearings, conveyor rollers, and tension rollers on critical equipment like conveyors and sorters to more accurately anticipate when maintenance will be needed based on real-time data from the equipment itself. Because of this, predictive maintenance can help reduce downtime, as well as the costs of unnecessary machine maintenance and spare parts inventory.

Condition monitoring plays a key role in predictive maintenance by allowing users to identify critical changes in equipment performance. One important condition to monitor is vibration, which is often caused by imbalanced, misaligned, loose, or worn parts. As vibration increases, so can damage to the equipment. By monitoring motors, pumps, compressors, fans, blowers, and gearboxes for increases in vibration, problems can be detected before they become severe and result in unplanned downtime.

Vibration sensors typically measure RMS velocity, which is a key indicator of general rotating machine health, and high frequency RMS acceleration, which is indicative of early bearing wear. Another key data point is temperature change (i.e. overheating). With predictive maintenance solutions from Banner Engineering, machine learning takes this data and automatically defines a machine's baseline conditions and sets thresholds for acute and chronic conditions, so you know in advance—and with confidence—when equipment will require maintenance.

Installing vibration sensors on critical equipment allows distribution and order fulfillment facilities to remotely monitor their equipment 24/7 and respond to critical conditions quickly—before they escalate.

5 Key Capabilities of a Predictive Maintenance Solution

With any equipment monitoring solution, gathering performance metrics is only the beginning. Monitoring critical equipment continuously, accurately interpreting the data, communicating warning and alert statuses quickly, and visualizing data for long-term analysis is essential for system reliability. In addition, a system that is too complex can be challenging to install and see results quickly—and can easily become a liability.

The following are the top 5 capabilities to look for in a motor monitoring solution:

1. Continuous Monitoring

The most effective predictive maintenance solutions will continuously monitor equipment for critical changes, including changes in RMS velocity, high frequency RMS acceleration, and temperature. Changes in these conditions are leading indicators of future failure, and a continuous monitoring solution will pick up on these changes in real-time and allow for timely action.

2. Machine Learning

After mounting the vibration sensor onto a motor or other component, most sensors require you to collect enough data to establish a baseline for the machine. Machine learning removes the risk of human error by automating the data analysis. A condition monitoring solution with machine learning will recognize the equipment's unique baseline of vibration and temperature levels and automatically set warning and alert thresholds at the appropriate points. This makes the condition monitoring system more reliable and less dependent on error-prone manual calculations.

3. Wireless Communication

A wireless condition monitoring solution is easy to deploy quickly, and it can be adapted as your needs change without requiring extensive downtime for cable runs. In addition, the ability to monitor equipment in inconvenient locations allows for more comprehensive monitoring and increased reliability throughout your facility.

4. Local and Remote Indication

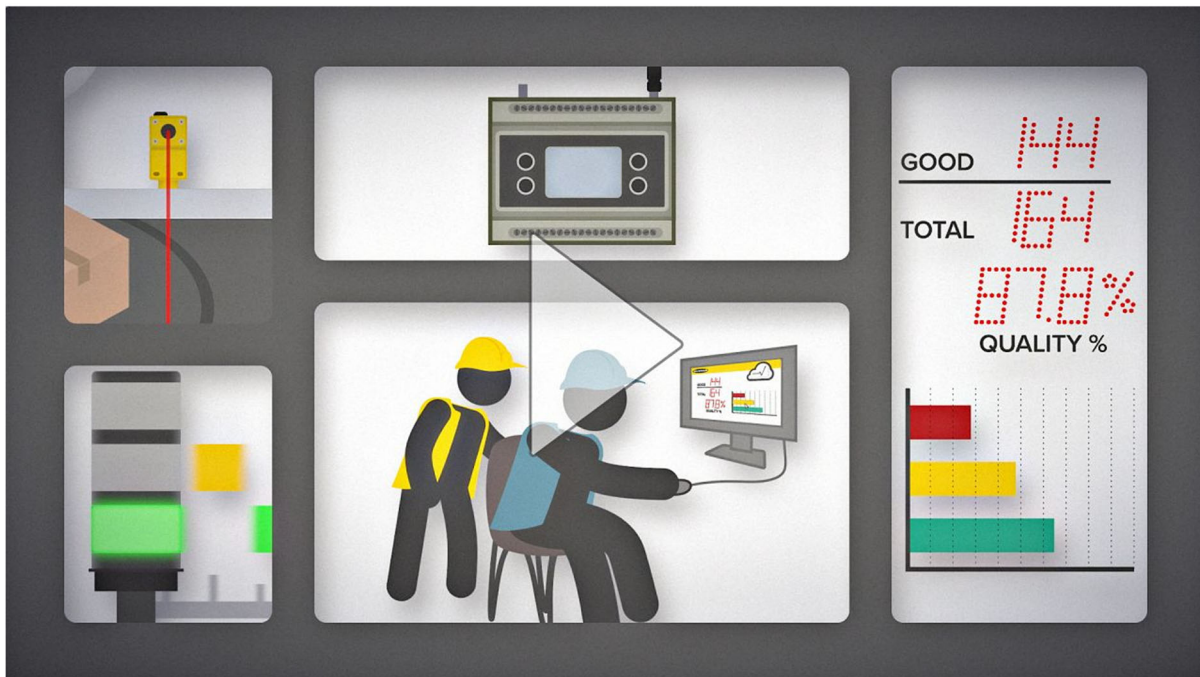
When a vibration or temperature threshold has been exceeded, a smart condition monitoring system should provide both local and remote indication, such as sending a signal to a tower light in a central location or sending an email or text alert. This will ensure that warnings are addressed quickly regardless of whether the equipment is within the sightlines of an operator. A condition monitoring solution that allows you to log the collected data over time enables even more optimization. With a wireless system, data can be sent to a wireless controller, PLC, or cloud software for more in-depth, long term analysis.

5. Simple Deployment

Finally, a solution that is easy to use can mean the difference between success or failure in condition monitoring applications. A simple, easy-to-implement solution can provide immediate benefit and can easily be proven out on a few machines before scaling throughout the facility. Condition monitoring data should be easy to access, interpret, and quickly take action to ensure the system provides the desired results and doesn't become a liability.

For More Information

To learn more about predictive maintenance, condition monitoring, and other IIoT solutions, visit www.bannerengineering.com. Or watch the video linked below to learn how IIoT technology solves real challenges throughout your facility.



Video: IIoT Solutions for the Data-Driven Facility