'Predictive' plants: A modern solution

Moving away from a reactive maintenance culture to predictive condition monitoring can offer many benefits to today's plants. **Jean-Luc Goutagny**, director of Reliability Solutions Europe for Emerson Process Management, explains how

Until recently, one of the UK's petrochemical plants was collecting vibration data and analysis manually for its olefins cracker pumps. Problems, however, sometimes arose between the manual readings, resulting in higher maintenance costs and reduced plant availability. Simply put, a solution was needed to improve the monitoring of critical pumps at the plant.

To help, the plant's olefins team chose to install a wireless condition monitoring and prediction system that included Emerson's CSI 9420 Wireless Vibration Transmitter with its PeakVue impact measurement technology.

As an Emerson Smart Wireless network was already in use, the installation of the wireless vibration transmitters was simple, and the devices started broadcasting machinery health alerts based on the vibration readings to the distributed control system almost immediately. In the future, the established mesh network will simplify adding or relocating wireless-enabled devices for additional process information from remote or difficult-to-access locations.

The CSI 9420 measured overall vibration and temperature in the assets, while the PeakVue measurements indicated faults that could cause friction, impacting and fatigue – particularly in gearboxes and rolling element bearings. The monitoring system reported machinery health alerts every 30 minutes and conducted a full-spectrum analysis once every day.

A member of the team commented: "Wireless monitoring has shown itself to be a valuable tool in our condition monitoring armoury. Predicting failures in our gearboxes can make considerable savings on any subsequent turnaround and help to keep equipment available."

DETECTING PROBLEMS
Condition monitoring is normally used on rotating equipment and other machinery (e.g. turbines, pumps, electric motors, internal combustion engines, presses), while periodic inspection using non-destructive testing techniques and fit-for-service (FFS) evaluation are used for stationary plant equipment such as steam boilers, piping and heat exchangers.
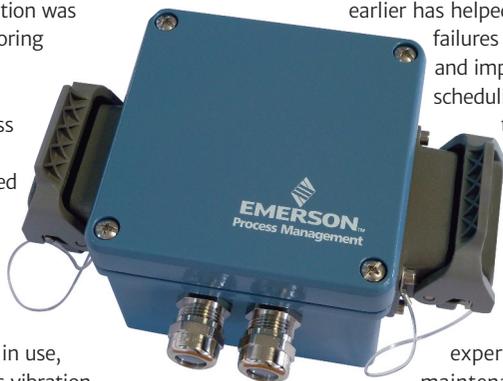
The CSI 3000 Machinery Health Monitor can deliver protection data for a wide range of machinery such as pumps, compressors, centrifuges, blowers and generators

Following the installation, the online vibration monitoring system has detected a number of problems that could have resulted in equipment failure – including a chipped tooth on a gearbox gear and an impending bearing failure. Being able to identify and rectify potential problems earlier has helped minimise pump failures and maintenance costs, and improved maintenance scheduling. It also helped reduce the risk of unexpected failures that can result in lost production as well as safety and environmental incidents.

MAINTENANCE
Emerson's reliability experts designed a new maintenance strategy for the plant to help them take advantage of evolving predictive maintenance technologies supported by condition-based monitoring of key assets. Condition monitoring is a major component of the company's predictive maintenance offerings, including route-based, wireless and continuous online options to address a wide range of applications in the field.

Predictive maintenance techniques are designed to help determine the condition of in-service equipment in order to predict when maintenance should be performed. The use of condition monitoring allows maintenance to be scheduled, or other actions to be taken to prevent failure and avoid its consequences. With condition monitoring, conditions that would shorten the normal lifespan of equipment can be addressed before they develop into a major failure.

In situations where a standard rack-based protection system will not fit or is not a cost-effective approach, Emerson has a new compact protection system – the CSI 3000 Machinery Health Monitor. This can deliver protection data for machinery such as pumps, compressors, centrifuges, blowers and generators.

The CSI 3000 offers easy assembly and user-friendly customisable setup. It measures shaft vibration, bearing vibration, position and speed, and generates key signals. It also provides the user with alarm outputs for each channel

Emerson is able to support the move from a reactive maintenance culture to a predictive maintenance programme

and does not require additional signal converters for shaft vibration and displacement measurements.

REMOTE SERVICES
Many companies recognise the benefits of machinery monitoring and analysis programmes but cannot dedicate resources to a complete in-house programme. In that case, the following remote services can help to supplement and optimise existing reliability and performance programmes:
· Machinery Performance and Condition Monitoring Services deliver real value by producing validated information about mechanical equipment and operating performance.
· Machinery Oil and Lubrication Analysis Services provide remote testing of lubricants and hydraulic fluids. Used to identify problems in machinery, oil analysis is a powerful predictive tool for identifying potential failures.

Advanced warning of faults means downtime can be reduced and maintenance resources used effectively.

The vibration data is collected on a periodic basis and sent to Emerson's global network of ISO-certified analysts who analyse the data and provide a detailed report, including any significant machinery problems identified during the analysis and recommended actions.

Today, existing plants can be modernised to become 'predictive' plants. Whether they are using route-based periodic monitoring with portable analysers or full protection and prediction monitoring, Emerson can support the move from a reactive maintenance culture to a predictive maintenance programme.

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