Vibration-based condition monitoring implemented as part of an automation system boosts maintenance

At any power plant, the steam or gas turbine is not only critical with regard to production, but it is also the most expensive individual rotating machine. You should not take even the smallest risk with its maintenance. Predictive condition monitoring reduces safety- and environment-related risks caused by unexpected equipment failure or system disturbances.

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When you know the turbine condition, you are able to predict its service need and add efficiency to its maintenance. You can schedule repairs to take place during the next planned service shutdown so they cause no extra production downtime.

Being predictive also brings cost savings. You will be prepared for the necessary repairs in good time by being able to reserve the needed spares, tools and resources. In case of sudden equipment failure, getting all these organized at a short notice can be challenging – and the process will be down the whole time.

Adding a turbine controller, vibration monitoring and protection features

Traditionally, power plant automation has been composed of separate islands, whose systems and applications often come from different suppliers. Turbine availability and safety can be improved significantly when the turbine controller, mechanical protection and vibration monitoring are implemented as part of the automation system that controls the whole power plant process.

Metso has integrated its renewed turbine controller, turbine mechanical protection and turbine vibration diagnostics into the Metso DNA automation system, where they operate seamlessly together. In addition to the more advanced turbine controller, also mechanical and vibration measurements are part of the automation system. In this way, Metso’s strong condition monitoring know-how is fully utilized.

Integrated condition monitoring improves turbine generator diagnostics and removes the need for a separate condition monitoring system. The measurement results can be used for turbine protection and for everyday online condition monitoring as well as for more demanding diagnostics purposes.

Vibration-based condition monitoring helps predictive maintenance

Machine protection monitors the most critical turbine parameters and activates interlockings to prevent machine failure. Vibration-based condition monitoring can be expanded to a more comprehensive diagnostics tool for predictive maintenance. It enables the plant to follow up the turbine condition online, gather diagnos-
tics data from it and notice creeping faults before they have time to develop into problems.

Metso’s new solution for mechanical condition monitoring, Metso DNA Machine Monitoring, makes it possible to implement vibration measurements and analyses as part of the automation system. The operators and maintenance staff are able to monitor the machine condition data based on vibration measurements directly on the control system user interface at their own workstations. One common view of the machine condition data enables them to solve issues related to the condition of mechanical equipment – together, fast and efficiently. The operators can follow how mechanical failure develops and, if there is a serious risk of damage, forward the information quickly to the maintenance staff.

The maintenance staff gets the same information at their own workstations on the same displays and is able to analyze the vibration measurements in more detail to find out the cause for the disturbances and to plan right-timed actions. Using the same data on the same display pages also improves cooperation and communication between the maintenance and operations staff.

No more separate data links
Condition monitoring as part of the control system makes it easier to combine information from the process measurements and vibration measurements. Interpreting results and drawing conclusions is more efficient when all the information needed can be collected together easily. Separate data links or manual information combined between different information sources are no longer needed.

The investment costs will be lower as both the control and condition monitoring applications share the same system resources, such as the operator stations and the history database. Also, system maintenance is more efficient since all applications are configured and maintained in the same engineering environment.

Complementing vibration data with efficiency calculations and reports
Vibration-based condition monitoring can be complemented with the Metso DNA Steam Turbine Performance Monitoring application. It provides the operators and the maintenance staff with useful information about turbine performance, thermal condition and operational efficiency, both in real time as well as based on operation history. It calculates, monitors and reports parameters related to turbine performance. The calculation results are shown on the displays and as web-based reports, which provide an overall picture of turbine performance at a glance.

Information directly to the maintenance system
The information produced by the condition monitoring applications can be better utilized when there are information transfer solutions between the automation system and the maintenance information system. For example, a fault notification entered in the electric shift diary, Metso DNA Report Diary, can be transferred to the maintenance information system just by pushing a button. Linking boosts the maintenance process and the flow of information in the organization.

Condition monitoring of auxiliary equipment as part of the total solution
Condition monitoring can be expanded to also cover boiler feedwater pumps, combustion air and flue gas fans and similar devices, as well as fuel feed and handling equipment. This results in a comprehensive solution that ensures plant availability and access to real-time information about equipment condition for maintenance planning.

Condition monitoring services support the customer’s predictive maintenance
Metso provides power plants with a wide range of services that support the staff in maintenance operations. There are support services for control loop tuning, field device monitoring and analyzing vibration measurements of mechanical devices. If needed, the services can also include regular condition monitoring reports, which the customer can use directly in maintenance planning.

The vibration-based condition monitoring products and services offer an excellent way to improve process availability and boost maintenance at a power plant. Implementing condition monitoring as part of the automation system creates new opportunities for the cooperation between the operators and the maintenance staff. It is also a cost-efficient way to build and maintain condition monitoring system solutions.

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