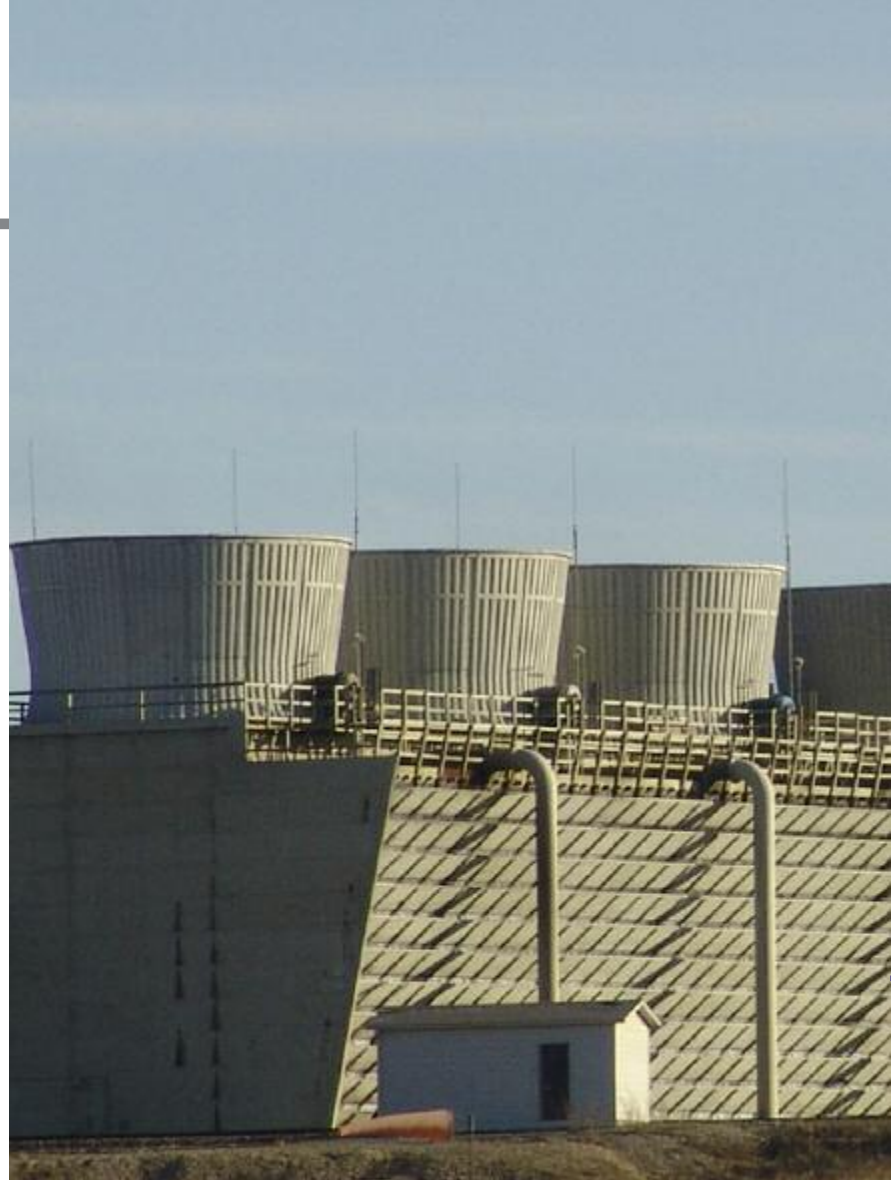


Cooling Tower Monitoring

Wireless Vibration Monitoring for Motor and Gearbox Combinations



Cooling tower fans operate under different load conditions. They often only run at peak load for short periods. With differing stresses over a prolonged period, the mechanical components can develop degraded performance, which leads to failure. As with any rotating equipment, bearing and gear failures, misaligned drive shafts, and excessive vibration are common.



SIMPLIFYING VIBRATION MONITORING OF A COOLING TOWER FAN

Failures that can be detected with predictive diagnostics

- Imbalance
- Water intrusion
- Misaligned drive shaft
- Rolling element bearing failure
- Chipped, broken, or worn gear teeth
- Resonance
- Misaligned gears
- Bent shaft
- Damaged couplings
- Lubrication problems
- Structural and mechanical looseness

The structure of a cooling tower makes collecting vibration data on the gearbox difficult and dangerous without permanently installed sensors. Because the gearbox is a typical failure point, lack of feedback on the machine's health puts you at risk for unexpected failure.



Access to continuous information allows you to detect problems before they lead to failure.

As part of Emerson's Smart Wireless solution, the CSI 9420 Wireless Vibration Transmitter provides insight into the health of cooling tower gearboxes and motors. Vibration alerts warn of pending problems, enabling further investigation to detect and diagnose the fault so maintenance can be scheduled.

Overall vibration with embedded temperature measurement will identify developing mechanical faults. Emerson's patented PeakVue™ technology provides advanced diagnostics for early indication of bearing and gearbox faults.

Vibration energy bands enhance trending and alarming, making it easier to interpret the data. More detailed information can be accessed through high resolution spectra and waveform data.

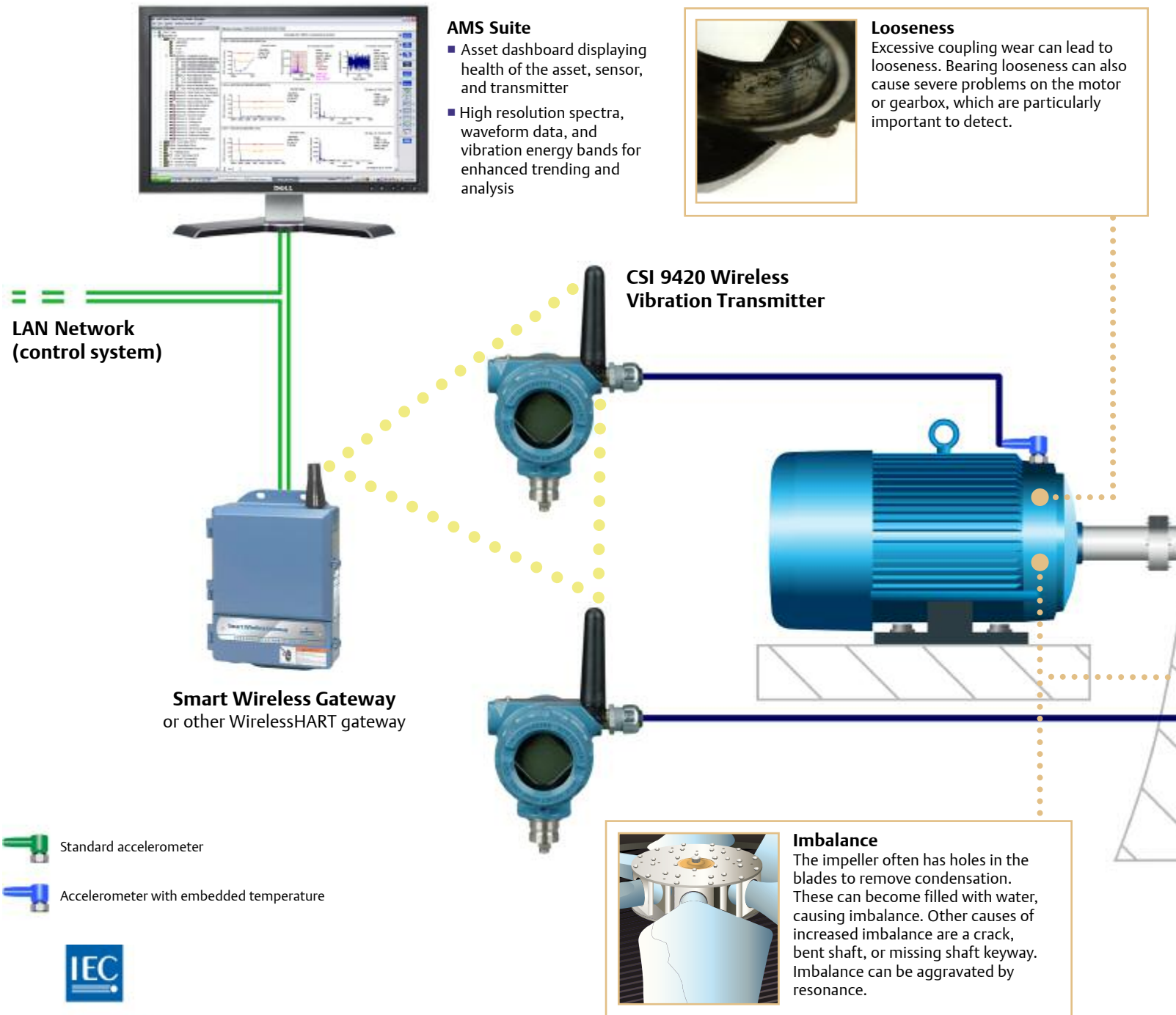
Trend values can be compared against appropriate alert levels, informing you when the condition of the gearbox or motor is deteriorating — as well as providing the underlying cause of the problem.

Vibration monitoring data is communicated over a self-organising Smart Wireless network, removing the additional costs associated with running cables.

DIAGNOSING VIBRATION FAULTS ON MECHANICAL EQUIPMENT

The CSI 9420 delivers insight on the health and performance of previously inaccessible cooling tower gearboxes and motors. Vibration diagnostic data allows reliability specialists to analyze and troubleshoot developing issues.

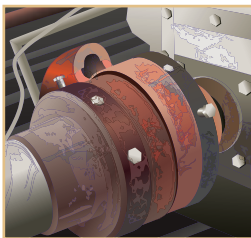
All of these problems can be detected and diagnosed in AMS Suite.





Bearing Defects

Bearings often operate under heavy, variable load and extreme environmental conditions. Because of the force applied to bearings in a cooling tower, defects often progress quickly and lead to friction, bearing damage, and gearbox failure.



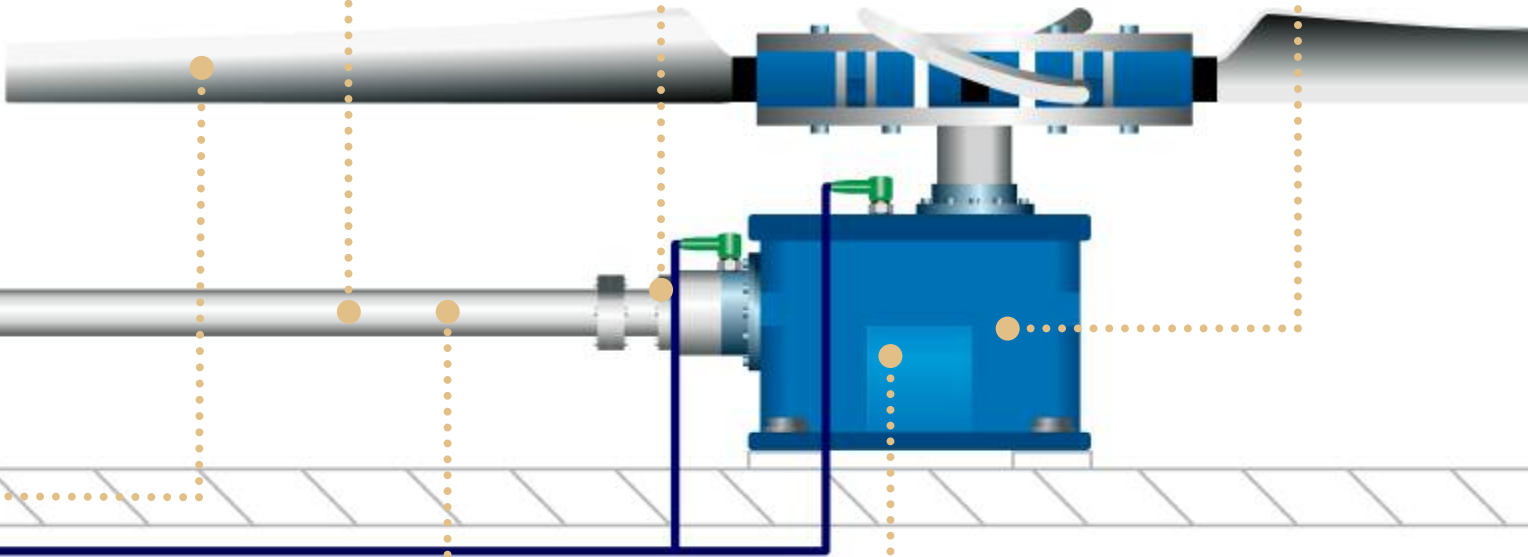
Shaft Misalignment

Due to the length of the shaft in a cooling tower and the thermal changes that the shaft experiences, misalignment is a common issue. Stress inside the shaft can damage couplings, cause bearing fatigue, and even lead to shaft breakage.



Broken/Chipped/Worn Teeth

Shaft misalignment causes increased load on the input gear, which causes bad meshing of the gears and generates debris. Damaged and misaligned gears can result in failure of the gearbox.



Coupling Issue

Excessive shaft misalignment can damage the coupling, which can lead to shaft separation. Severe coupling damage can lead to gearbox failure, damaged shafts, and rotor cracks.



Insufficient Lubrication

The extreme conditions of the cooling tower often lead to issues with lubrication. Bearing wear and gear teeth damage caused by insufficient lubrication contributes to premature equipment failure. However, the inaccessibility of a cooling tower makes it virtually impossible to perform accurate grease and oil analysis.

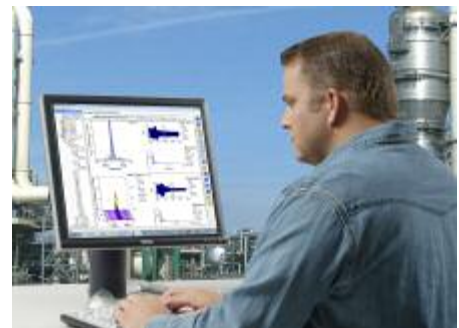
CSI 9420 AND AMS SUITE: POWERFUL PREDICTIVE DIAGNOSTIC SOLUTION

Vibration data from the CSI 9420 can be accessed through the control system, while advanced diagnostic data can be displayed and trended in AMS Suite.

The asset dashboard in AMS Suite displays the health of the sensor, the transmitter, and the motor and gearbox being monitored. In addition, detailed diagnostic data including vibration energy bands and thumbnail spectra are accessible.

The vibration data displayed in AMS Suite provides an indication of imbalance, misalignment, and mechanical looseness. Using PeakVue technology, users can separate stress waves from overall vibration data for accurate early identification of wear on bearings and gearboxes. Together these predictive technologies can identify most common developing mechanical faults.

The comparison of vibration data to an alert level provides an alarm notification when the asset condition is deteriorating as well as information about the underlying cause of the problem. This allows operators to take action to protect the asset, while maintenance personnel can diagnose the root cause and schedule work.



TURN TO EMERSON FOR A COMPLETE MONITORING SOLUTION

When you need a partner you can trust to improve your cooling tower fan performance, turn to Emerson.

Our Asset Optimization Services will ensure you get your application up and running as soon as possible. Our services experts can help you extract the full value of your investment and train your team on the complete set of diagnostic tools. Our support commitment is to ensure your system is running smoothly and reliably.

With Emerson, you have a partner for monitoring your cooling tower fan. Whether it's misaligned gears, chipped gear teeth, insufficient oil lubrication or coupling damage, detection is made easier through the CSI 9420 and AMS Suite.

Turn to Emerson as your partner to:

- Achieve optimal health of your cooling tower fan
- Prevent catastrophic failure and unplanned shutdown
- Determine the best time to schedule maintenance to overhaul the asset
- Shift from reactive and preventive to predictive maintenance
- Diagnose the root cause of degradation and reoccurring problems
- Safely monitor inaccessible cooling tower fans to keep people out of hazardous areas
- Receive advanced notification of a developing problems, such as rolling element bearing defects, imbalance, and misalignment

Move from reacting to detecting mechanical problems so your cooling tower fans aren't putting your operational goals at risk.

EMERSON'S INTEGRATED SOLUTION FOR COOLING TOWERS

The CSI 9420, together with AMS Suite, provide an early warning of vibration problems. This is just one solution in the portfolio of integrated Smart Wireless solutions for cooling towers.

ROSEMOUNT ANALYTICAL 6081C WIRELESS CONDUCTIVITY TRANSMITTER

The concentration of impurities increases as cooling water is lost through evaporation. Higher levels of impurities allow the buildup of scale. The Rosemount Analytical 6081C wireless transmitter monitors conductivity, an indication of impurity concentration, so that adjustments to blowdown rate can be made.



ROSEMOUNT 3051S WIRELESS DP FLOWMETER

High performance flow measurements provide valuable insight into cooling tower operation. Cooling water supply and return flows are indications of cooling tower performance and can indicate a problem with an associated pump. The Rosemount 3051S wireless DP flowmeter has industry leading stability to maximize uptime and performance.



ROSEMOUNT 648 WIRELESS TEMPERATURE TRANSMITTER

Accurate, reliable temperature measurements are critical to determine the efficiency of heat transfer in cooling towers and fin fans. The Rosemount 648 wireless temperature transmitter is ideal for this high performance application to enable optimization of the cooling tower at a low installed cost.



ROSEMOUNT ANALYTICAL 6081P WIRELESS PH TRANSMITTER

Cooling water builds up impurities that can cause corrosion and scale buildup. The Rosemount Analytical 6081P wireless transmitter monitors the pH and ORP of the water to help protect metal surfaces from damage while minimizing the consumption of treatment chemicals that are discharged to the environment.



Get started with Wireless at emersonprocess.com/smartwireless

©2012, Emerson Process Management.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

All rights reserved. AMS and PlantWeb are marks of one of the Emerson Process Management group of companies.

The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.

Emerson Process Management

North/South America

835 Innovation Drive
Knoxville, TN 37932 USA
T 1(865) 675-2400
F 1(865) 218-1401

Europe

Blegistrasse 21
6341 Baar Switzerland
T 41 41 768 61 11
F 41 41 761 87 40

Asia

1 Pandan Crescent
Singapore 128461
T 65 6777 8211
F 65 6777 0947

Middle East

PO Box 17033
Dubai - United Arab Emirates
T 971 4 883 5235
F 971 4 883 5312