Reduce Slowdowns and Fulfill Your Production Goals

Air Cooled Heat Exchanger Health Monitoring

EMERSON

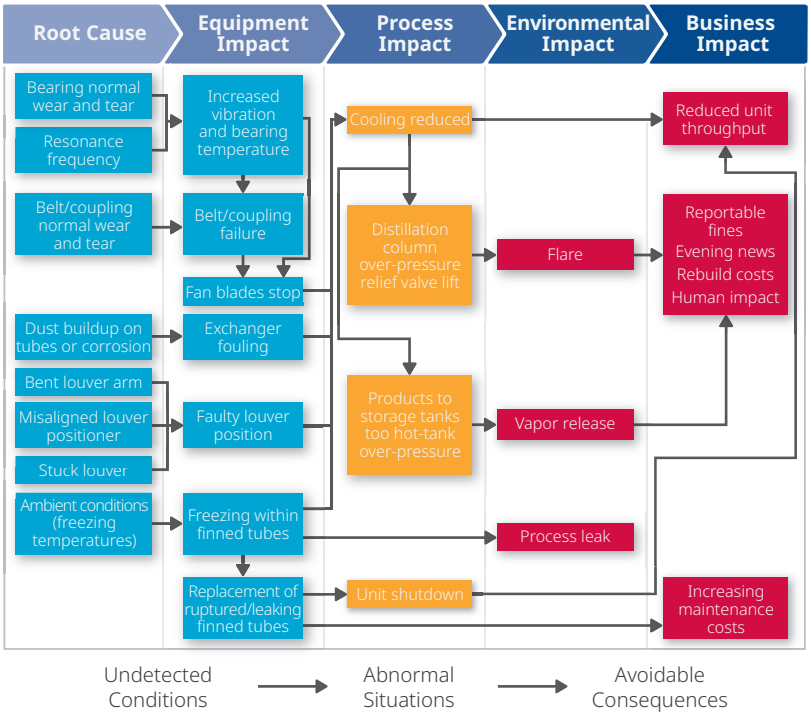
With hundreds of fans, need to know where to focus?

Overhead air cooled heat exchanger failure puts plant operators face to face with an industry-wide enemy: unscheduled slowdowns and process disruption. An exchanger problem can cause lost production, reduced margins, overextended maintenance budgets, and recordable incidents—including the possibility of a government audit.

In a cooling-limited operation, losing one fan can lead to a recordable incident if the fan affects a distillation column's overhead receiver and causes the relief valve to lift. Should the relief valve fail to reseat, then not only will this constitute another recordable incident, but a shutdown will also be required to fix the unseated valve.

Other factors such as freezing temperatures, dust or oil fouling the heat transfer areas, and an inability to cool hot chemicals can cause maintenance woes and environmental incidents. These common issues can increase costs and make it difficult to meet production goals, particularly if a repair requires overtime pay and expedited parts. The situation only becomes worse if root causes are undetected and repeat failures occur.

Anatomy of an Overhead Air Cooled Exchanger Failure



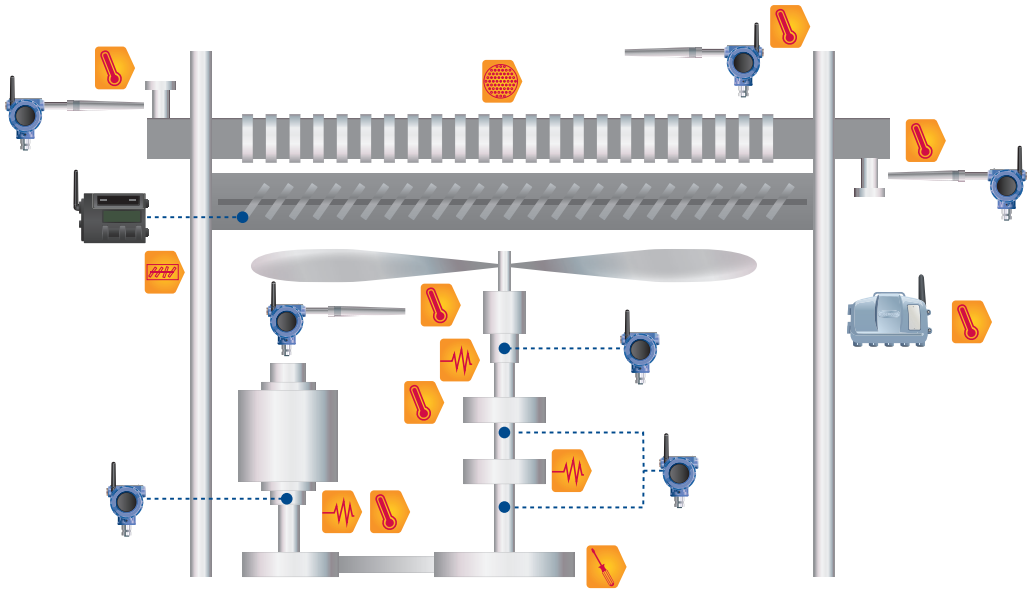
Common Threats to Air Cooled Heat Exchanger Health

BAD INSTALLATION

Improper installation can lead to shaft misalignment and excessive vibration, resulting in fan damage and possible failure.

EXCHANGER FOULING

Limited cooling is an indication of exchanger fouling. This can reduce the cooling capacity of the exchanger, leading to diminished unit throughput. In addition to other process impacts, fouling can cause products heading to storage tanks to become too hot, resulting in possible environmental or health and safety issues. Root causes can include dust buildup on tubes or corrosion.



HIGH VIBRATION AND BEARING TEMPERATURE

Increasing motor or fan vibration and bearing temperature can result in belt and coupling failure or can cause fan blades to stop. Root causes can include bearing normal wear and tear, operation at resonance frequency, and mechanical support failures.

LOUVER/PITCH ACTUATOR MECHANICAL DEFECTS

Faulty louver or pitch actuator position can restrict airflow and reduce cooling capacity, leading to diminished unit throughput. Root causes can include broken or bent louver arms, a misaligned louver positioner, and stuck louvers.

What if you could...

Reduce Unplanned Shutdowns

Keep a closer eye on fan vibration, bearing temperature and overall asset health without having to increase manual maintenance checks. Discover abnormal situations or subtle variations such as temperature changes before they cause problems, slowdowns, or shutdowns.

Increase Asset Reliability

Uncover the root causes behind "bad actor" equipment. Perform maintenance on your exchangers only when required and in time to prevent failure. Reduce the costs incurred by repeat failures and unnecessary preventive maintenance.

Mitigate Safety and Environmental Risks

Receive early warning of potential fan failures and resulting safety hazards before they become plant-wide problems. Reduce reportable incidents through early detection. Limit the number of trips into potentially hazardous plant areas for maintenance or data collection related to fan vibration and bearing temperature.

Increasing your profit

Unscheduled shutdowns and slowdowns are a leading cause of lost profit opportunities. What assets are contributing to this number at your plant?

INPUT	
a. Plant capacity in tons per day	1,700
b. Plant net margin per ton	$200
c. Operating time in days per year	365
d. Capacity utilization	0.93
e. Plant total annual maintenance spend, excluding turnarounds	$40,000,000
f. % of production capacity lost due to ACHE failure	0.70%
g. % of plant total annual maintenance attributable to ACHE	0.90%
h. Process ACHE not currently monitored	30
OPERATIONAL BENEFITS	
i. % reduction in lost production with ACHE monitoring	30%
Annual Net Profit Improvement (=a x b x c x d x f x i)	**$242,367**
MAINTENANCE BENEFITS	
j. % anticipated reduction in ACHE maintenance cost with diagnostics	30%
k. Annual maintenance budget per ACHE (= e x g/h)	$12,000
Annual Maintenance Savings (= h x j x k)	**$108,000**
TOTAL ANNUAL IMPROVEMENT	**$350,367**

Notes

This is an example of an olefin plant.

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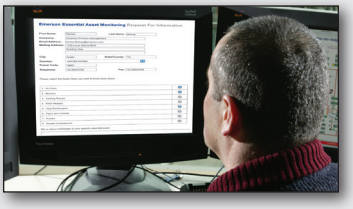
Air Cooled Heat Exchanger Solution

Emerson's overhead air cooled heat exchanger health monitoring solution gives operators greater confidence and control over asset planning by replacing manual, periodic reading with automated monitoring that indicates abnormal operation and allows for alarm, analysis, trending, and historization. Automated monitoring will allow you to know about and respond to real-time condition changes such as fluctuations in vibration and bearing temperature, which can cause exchanger failure, fouling, and damage. Wireless installation and monitoring reduces your installation-related costs and frees personnel from manual trips to hazardous plant areas, allowing them to focus their energies on other vital areas.



Request Information

Use our simple online form to select the options most important to you. An Emerson specialist will contact you shortly.

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Emerson Overhead Air Cooled Heat Exchanger Monitoring Products

SOFTWARE INTERFACE

AMS SUITE: ASSET GRAPHICS FOR OPERATIONS

Provides real-time graphical displays that indicate abnormal operation, including resonance frequency detection, louver defects, exchanger fouling detection, and overall exchanger health. A pre-engineered algorithm delivers diagnostic information for alarms, process analysis, trending, historization, and key performance indicators.

NETWORK INTERFACE

SMART WIRELESS GATEWAY

Connects IEC 62591 (*Wireless*HART®) self-organizing networks with any host system.

DEVICES

CSI WIRELESS VIBRATION TRANSMITTER

Provides early warning of excessive vibration in heat exchangers. Helps determine root cause and guides corrective action. Optional functionality can identify premature bearing wear and predict failure.

ROSEMOUNT WIRELESS TEMPERATURE TRANSMITTER

Enables temperature measurements to determine heat transfer efficiency on exchangers. Ideal for this high performance application to enable optimization of exchangers at a low cost.

ADDITIONAL OPTIONS

FISHER WIRELESS POSITION MONITOR

Indicates equipment position with a percent of span plus on/off indication. Monitors louver position for mechanical defect detection.

ROSEMOUNT WIRELESS TEMPERATURE TRANSMITTER

Enables (high density) temperature measurements to determine heat transfer efficiency on exchangers. Ideal for this high performance application to enable optimization of exchangers at a low cost.

AMS SUITE FOR MAINTENANCE

Aids early identification of asset problems using predictive diagnostics, allowing maintenance to schedule repairs while reducing cost and downtime.

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