

# Reduce Slowdowns and Fulfill Your Production Goals

## Air Cooled Heat Exchanger Health Monitoring



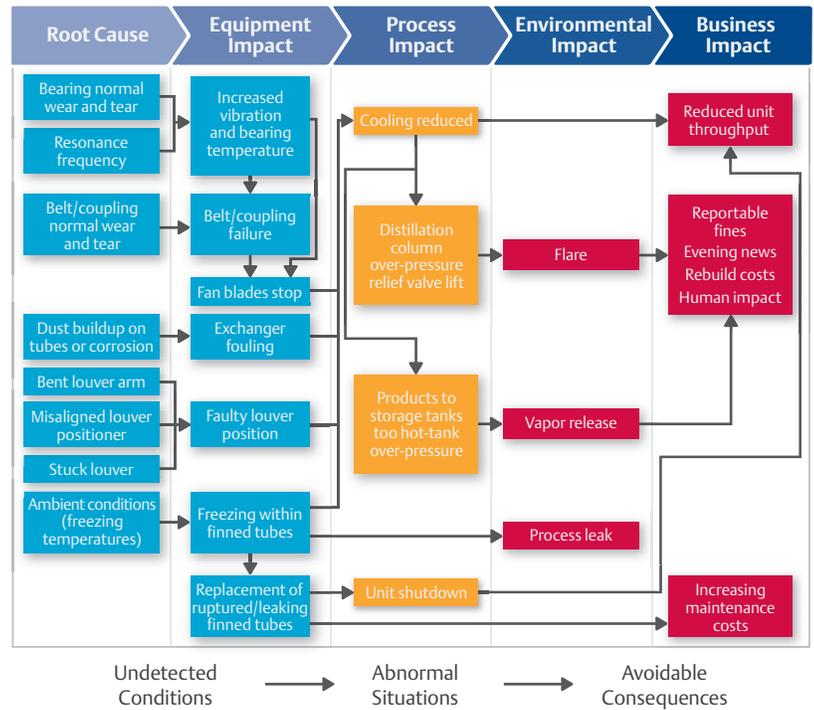
# With hundreds of fans, need to know where to focus?

Air-cooled heat exchanger failure puts plants 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 reportable incidents—including the possibility of a government audit.

Losing one fan, at least in a cooling-limited operation, can cause a recordable incident for flaring if the fan affects a distillation column, overhead receiver and causes the relief valve to lift. Should the relief valve not reseal, then not only is there a reportable incident but also a required shutdown to fix the unseated valve.

Other factors such as freezing, dust or oil fouling the heat transfer area, and an inability to cool hot hydrocarbons can cause maintenance woes and environmental incidents. These common failures hinder meeting production goals and increase costs, particularly if a repair requires overtime pay and expedited parts not available onsite. 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 leading to fan damage and possible failure.



### EXCHANGER FOULING

Limited cooling is an indication of exchanger fouling. This can result in reducing cooling capacity and throughput.



This can also cause products heading to storage tanks to be too hot and other process impacts, leading to environmental (flaring), or human impact issues. Root causes can include dust buildup on tubes or corrosion.



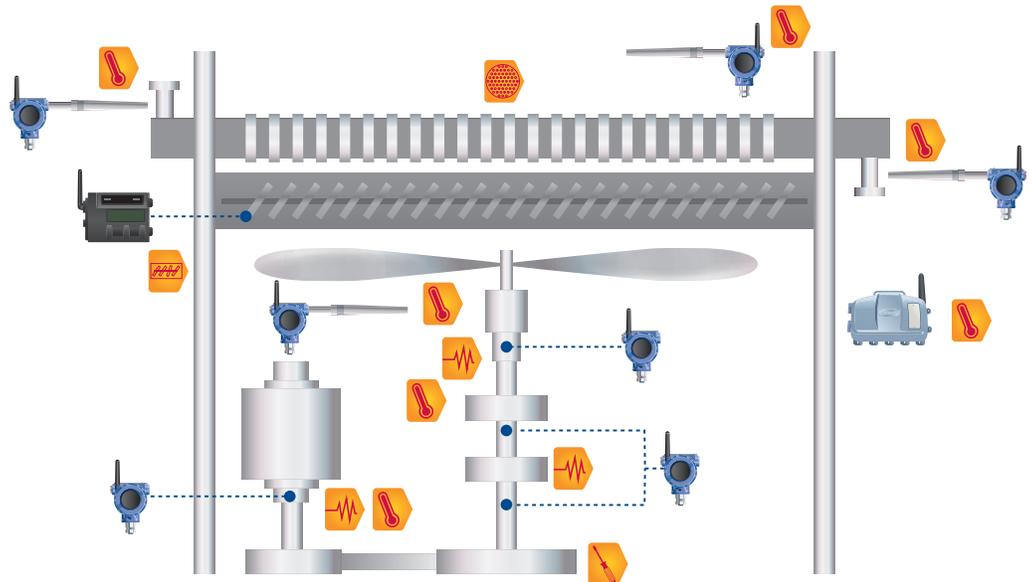
### HIGH VIBRATION AND BEARING TEMPERATURE

Increasing motor or fan vibration and bearing temperature can result in belt and coupling failure or can cause fan blades to stop, reducing the unit's cooling capacity and throughput. This can also cause other process impacts, including products that are too hot going to storage tanks. This can cause health, safety and environmental (flaring) issues. 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 result in restricting airflow and reducing cooling capacity, leading to a throughput reduction. This can also cause other process impacts, including product that are too hot going to storage tanks. This can cause safety, environmental (flaring), or human impact issues. Root causes can include broken or bent louver arm, misaligned louver positioner, and stuck louver.



## What if you could...

### Reduce Unplanned Shutdowns

Detect the underlying problem between asset issues and equipment problems. 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 overhead air cooled 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 failure 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 refinery?

### INPUT

Refinery capacity in barrels per day	250,000
Refinery net margin per barrel refined	\$5
Refinery total annual maintenance spend, excluding turnarounds	\$50,000,000
% of refinery total annual maintenance attributable to air cooled heat exchangers	1.5%
% anticipated reduction in lost production with diagnostics	30%
% anticipated reduction in asset maintenance cost with diagnostics	30%

### OPERATIONAL BENEFITS

a. Refinery capacity in barrels per day	250,000
b. Net margin per barrel	\$5
c. Production capacity lost due to process fan failures	0.18%
d. Reduction of lost production with air cooled heat exchanger monitoring	30%
e. Operating time in days per year	365
<b>Annual Net Profit Improvement (=a x b x c x d x e)</b>	<b>\$246,375</b>

### MAINTENANCE BENEFITS

f. Annual maintenance budget per air cooled heat exchanger	\$5,000
g. Process exchangers not currently monitored	150
h. Reduction in average cost to repair if exchangers weren't run to failure	30%
<b>Annual Maintenance Cost Reduction (=f x g x h)</b>	<b>\$225,000</b>

### TOTAL ANNUAL PROFIT IMPROVEMENT

**\$471,375**

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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 harmful 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 detects, 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 (WirelessHART®) 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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