

# Real-time Condition Monitoring for Heat Exchangers with IIoT JOIN



## Products/Solutions: Sushi Sensors, JOIN

Real-Time Condition Monitoring for Higher Reliability, Performance, and Energy Efficiency

### Your benefits

- Industrial IoT (IIoT) solutions for easily and cost-effectively improve visibility into the health of heat transfer equipment.
- Simple monitor long-term heat exchanger performance continuously to boost energy efficiency and reduce costs.
- Improve unit utilization and maintaining product quality.

### Background

A heat exchanger is used to transfer heat between two or more fluids, typically used in both cooling and heating processes (Vafai, 2017). There are hundreds of tubes and shell heat exchangers in a refinery operating on a continuous basis that are crucial to operational efficiency. Even though most process heat exchangers are installed with a margin of design

heat exchange capacity, gradual fouling of the exchanger surfaces reduce the effectiveness of heat transfer, requiring more fuel to be burned in the process heaters and more heat rejected to the environment.

Often operators wonder whether: is there a way to assess the performance of heat exchangers? Heat exchanger performance can vary, so how do you correlate it to operating cost or energy savings? This is an important matter because this will determine whether a process shutdown is needed for cleaning the heat exchanger or if operation can continue until a turnaround or a planned shutdown. Most decisions for this come down to operating capacity and bottlenecks. In certain cases, such as crude oil exchanger trains, severe fouling can cause increased exchanger pressure drop reducing the capacity of the unit by reaching hydraulic limits of the crude pump.

### The Challenge

The performance of heat exchangers degrades with time due to fouling or deposition of material

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on the heat transfer surface. The fouling of critical ex-changers in manufacturing plants results in a significant cost impact in terms of production losses, energy efficiency, and maintenance costs. While most plants monitor their exchangers to a certain degree, the ability to effect real and sustainable improvements requires four essential components: (1) real time monitoring; (2) an pre-warning mechanism; (3) the ability to detect the cause of fouling; and (4) the ability to treat the cause in order to slow the degradation.

Same accounts for the current case, where the customer had no insight into the performance of the compressor. Due to undetected contamination in the heat exchanger, the compressor failed which caused high repair costs and production losses.

## The Solution

Adding IIoT sensors to continuously monitor the effectiveness of process heat exchangers is cost-effective and simple to implement. Many process heat exchangers were installed with only thermo wells rather than temperature measuring elements. Now the refinery can add wireless temperature measuring sensors to monitor long-term heat exchanger performance. By monitoring and trending the inlet and outlet temperatures, operators have a better view to heat exchanger performance. Apart from temperature and vibration, Yokogawa's Sushi Sensors can also monitor process pressure.

JOIN offers an open IIoT platform that monitors, predicts, and diagnoses heat exchanger performance. The unique features of this advanced IIoT technology include: numerous data cleaning steps to improve data quality and isolate a net fouling trend, an adaptive model which learns from the past, and knowledge-based diagnostics offered by Perfect which identify the probable cause(s) of fouling and recommend corrective actions.

## Results

By monitoring and use of analytics using the data of the IIoT sensors, operators have a better view to heat exchanger performance. Problems such as fouling will be visible over time if they occur. By applying JOIN, contamination gets visible due to anomalies that are detected at an early stage. The condition information became directly available on the dashboard and the performance of assets is displayed in real time, all directly after the startup of the plant. The user is informed in advance and appropriate measures can be taken to avoid future damage or dangerous situations. Also, in case of a sudden change, there will be an alarm given.

The JOIN program offers an easily and cost-effective solution, providing operators visibility to long-term heat exchanger performance. Greater insight enables operators to attain maximum energy efficiency for lower fuel usage and energy costs. Operating within heat transfer and hydraulic capacity limits ensures greater unit utilization and product quality.

## About Sushi Sensor

Sushi Sensor is an OpreX™ brand wireless solution for the Industrial IoT. The first product XS770A can measure vibration and surface temperature to monitor machine or facility conditions for industrial applications. It also has environmental resistance features to support heavy-duty use (IP66/67, explosion proof). Monitoring and visualizing the condition of equipment utilizing Sushi Sensor is the first step to make the plant maintenance more efficient.

Sushi Sensor will be a strong tool for reforming the plant maintenance works in combination with advanced analytics such as AI, machine learning in a cloud.



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## About JOIN

JOIN is an open, collaborative IIoT program that offers a complete value chain from consultancy, data collection, connectivity, cloud, predictions and dashboards. It signifies a collaboration between Yokogawa and Perfact Group. Being an open, collaborative IIoT ecosystem that acts as an IIoT system integrator, which offers a complete value chain for all Industry 4.0 related issues. It is an open collaboration platform where other Value-Added Resellers (VAR), Original Equipment Manufacturers (OEM) or Maintenance Service Providers (MSP) who can add value participate.



More info? Visit [yokogawa.com/nl/join](http://yokogawa.com/nl/join) or contact us at [info@nl.yokogawa.com](mailto:info@nl.yokogawa.com).



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- Starters Kit for Rotating Equipment
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