

## Explosion Proof LoRaWAN Smart Vibration Sensor in Oil Refinery

3/31/2022

Location: Asia

### Background

Refineries are very large industrial complexes that involve many different processing units and auxiliary facilities, such as crude oil distillation units, vacuum distillation units, heat exchangers, cooling towers, and many more. These facilities are dispersed over a vast industrial complex, and some of them are in hazardous environments or nearly inaccessible locations, thus making maintenance extremely difficult.

The project needed a pre-integrated predictive maintenance solution, linking smart sensors, IoT software and cloud platform together, to help reshape the daily operations of refineries, and enhance their efficiency, safety and profits.

### System Requirements

Due to the refinery's large premises and the long list of equipment requiring monitoring, it would be too costly to physically wire sensor nodes to local gateways. The many metal surfaces throughout the entire site would also make it difficult to install cabling. Furthermore, all devices had to be rated for use in outdoor and hazardous environments in order to meet safety requirements. Therefore, an explosion-proof wireless vibration sensor integrated with LoRaWAN private networking solution and data management service was required in order to overcome the growing management and operational challenges of manual inspections and reduce maintenance costs.

### Project Implementation

- Advantech WISE-2410X Explosion Proof LoRaWAN Smart Vibration Sensor
- Actility ThingPark Enterprise
- AWS IoT SiteWise

### System Description

The WISE-2410X, an IP65-rated vibration and temperature integrated sensor with ATEX2 and IECEx (Zone 2 and Zone 21) certification for installation in hazardous and explosive environments, was mounted on all rotating facilities. It provides operational statuses by cross-comparison of RMS speeds and eigenvalues against ISO 10816-3 standards and vibration characteristic values. By utilizing LoRaWAN, the turnkey predictive maintenance solution provides long-range (up to 15 km) bidirectional communication between sensors and gateways, thus requiring fewer devices to be installed in the field.

ThingPark Enterprise IoT platform provides a LoRaWAN private networking solution, managing over 35,000 commercial gateways worldwide. It enabled the deployment of a dedicated and fully controlled LoRaWAN network in the refinery.

AWS IoT SiteWise, a managed service, allows to collect, organize and analyze industrial data locally and build hybrid industrial applications that work seamlessly across the edge and cloud.

## System Diagram



## Summary

The off-the-shelf pre-integrated predictive maintenance solution combined of Actility, AWS and Advantech's technological strengths, has improved productivity, reduced labor requirements, and increased profits in oil refining industry. The refinery is now able to remotely monitor rotating equipment, record utilization data more frequently, and conduct centralized management from any place at any time.



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