Remote field device diagnostics: confidence in process analysers

Industry 4.0 and IIOT is changing chemical plants

The Internet of Things (IOT) is already influencing our daily life and will continue to do so in new and innovative ways. The ability to have everyday household objects analyse, observe, and interact with us is a valuable tool for improving our lives. Similarly, a key aspect of Industry 4.0 is the Industrial IOT (IIOT), the ultimate means of bringing the future of modern technology into your chemical plant.

With the implementation of Industry 4.0 and IIOT concepts, asset management software platforms have become critical for receiving, organising, and analysing the vast amount of data generated throughout chemical plants. These platforms allow staff to easily prioritise asset maintenance and other interventions based on how critical a task is, as well as its urgency. Access to this data from remote locations also limits the need for technicians to enter hazardous areas for non-critical routine tasks.

Intelligent maintenance systems bring it all together

The combination of the network, software and plant assets make up a complete example of IIOT: the Intelligent Maintenance System (IMS). The IMS includes the use of advanced sensors, data collection and data analytical tools. Thus, the system can collect data from machinery and instrumentation to predict and prevent their potential failure. As failures in equipment can be costly and even catastrophic, the system analyses the behaviour of the asset and provides alarms and instructions for predictive maintenance. Maintenance based on such intelligent information can save upwards of 50% of the costs associated with repairing assets after they have failed and can prevent potentially life-threatening accidents.

Intelligent sensors fit into these principles by offering smart diagnostics to optimise their maintenance, replacement and inventory planning as well as provide reliable fault alerts.

Process analysers need frequent servicing

Analytical instrumentation such as pH, ORP and (dissolved) oxygen analysers will require regular maintenance, cleaning, and calibrations. Eventually, sensors need to be replaced when no longer measuring reliably. Standardising procedures for instrument maintenance is difficult as different processes require different sensors dependent on process conditions at the measurement location.

Not all digital sensors are smart

Digital analytical sensors are rapidly gaining ground over analogue models but being digital does not automatically mean the sensor is intelligent. Some sensors may store calibration settings, or may simply record their duration of service, but none of this information will contribute to Intelligent Maintenance Systems if the sensors lack predictive diagnostics. Such simple data does not bring greater reliability than simple routine maintenance. Sensors that simply count down days until a maintenance task should be performed generate a false idea of the state of operations or process safety. If a counter has not reached zero, a maintenance engineer may wrongly assume that a heavily compromised sensor is still fit for use.

Intelligent analysers

Intelligent sensors and analysers that truly embrace Industry 4.0 should use real process information to constantly calculate unambiguous diagnostic values while measuring, namely:

- Number of <u>days</u> until a sensor will require calibration or maintenance - a precise date when attention will be required based on actual process conditions. Costs of calibrating or maintaining earlier than necessary are saved.

- Number of <u>days</u> remaining in which a sensor can confidently be used - calculated in <u>real time</u>. Avoids early replacement or unexpected failures.

- <u>Instant</u> alerts in the event of breakage, instrument fouling etc

- <u>Verified alarms</u> that use intelligent diagnostics to remove spurious or nuisance control room alerts

These genuinely intelligent diagnostics will provide clear guidance to inform users exactly when sensor calibration, maintenance and replacement will be required. Visibility of these unambiguous diagnostics can then be provided to asset management system using modern communication protocols such as HART, PROFIBUS, FOUNDATION Fieldbus and Profinet.

Summary

Industry 4.0 will continue to be a driving force for modern chemical plants. An inherent part of the strategy is an Intelligent Maintenance System that improves reliability, plant safety and profitability. Continuous real-time availability of instrument and machine diagnostics form the core of the IMS, while asset management platforms enable instant access to remote field devices and help define maintenance task to optimise workers' time and ensure safety.

As with any system, it is only as strong as its weakest link. Only unambiguous device diagnostics based on real process data and continuous instrument self-assessment can predict maintenance needs and protect safe operation.

For further information on this subject, please visit www.mt.com, visit us at CHEMUK 2022, May 11th/12th (Stand E17) or contact Ewan Jones, UK Chemical Industry Specialist, METTLER TOLEDO ewan.jones@mt.com