Intelligent Sensor Management Systems: Information for Efficiency

These systems can offer higher productivity, less downtime, better operational safety, lower operational costs and improved profit margins

Maintenance and consumable costs are a self-fulfilling problem in that the very presence of the equipment and the fear of downtime justify high maintenance budgets. An intelligent sensor management system can alleviate this situation.'In the U.S. alone, $20 billion per year is lost to unscheduled industrial plant downtime.' By Eric Kirleis The marketplace is full of instrumentation advances that are either smart or intelligent. Smart sensors store information and intelligent sensor management systems use the information in an adaptive way. The new focus of these instruments is not so much on detection technology but on communication, interrogation and performance-status features. This is a result of the fact that process analytics companies are driven by their customers' demands for additional information. It's the impetus of these demands and how an intelligent sensor management system meets them that the process engineer, plant manager and maintenance group members need to understand. The main challenge faced by today's process industries is to remain globally competitive. To do this, a firm must not only establish a competitive core competency in a given product area, but it also must continually improve their processes in order to retain that competency. This means maximizing quality throughput and minimizing cost with the existing plant infrastructure. This often causes situations where a 30-year-old plant, for example, competes globally with a 2-year-old plant. The findings of a 2004 ARC Advisory Group report show that in the U.S. alone, $20 billion per year is lost to unscheduled industrial plant downtime, with one-third that amount attributed to equipment failure. The same report suggests that 25 percent of a plant's overall maintenance budget is dedicated to maintaining field instruments. Thus, the impetus from process industry plant engineers and plant managers on process analytic companies is clear. They need more useful information in order to make better decisions. They want to proactively manage their processes to make their product more efficiently. This is compounded by the general notion that they need to do more with less. Traditional information gathering and maintenance practices can be expensive. According to the ARC report, a "loop" or a measurement point such as pH can cost a plant up to four times the initial acquisition cost over its lifetime. Costs driving this include maintenance, consumables and downtime. In some industries, downtime can mean millions of dollars of product that has been delayed, is out of specification or lost altogether. Maintenance and consumable costs are a self-fulfilling problem in that the very presence of the equipment and the fear of downtime justify having high maintenance budgets and elaborate schedules to "monitor" equipment. An

intelligent sensor management system can alleviate this situation, provided it has the following attributes: &#149 Ease of operation: Workers must be able to understand the instrument. A system too complex to implement does not get used. &#149 Safe operation: To ensure process safety, an intelligent system can permit use only of a specific authorized sensor type. For personal safety, exposure to hazardous environments can be minimized by using pre-calibrated, self-configuring sensors.&#149 Self-configuring: This feature provides communication between transmitter and sensor, including connectivity status, sensor identification and calibration information. A smart sensor allows access to this information upon request, while the intelligent sensor management system displays the information at connection. &#149 Self-assessment and advanced diagnostics: Using pH measurement as an example, these instruments are capable of monitoring sensor slope, zero point, reference impedance, glass impedance and response-time monitoring. In addition, intelligent sensor management systems monitor operating time, process temperature and chemical concentration exposure. They use all the above information in an adaptive manner to establish sensor wear and automatically adjust calibration timing. Smart sensors are historic and intelligent sensor management systems are predictive and adaptive. Intelligent sensor management systems should also be expandable and compatible with industry standards. This means they must utilize an open communication protocol such as IEEE 1451.4 and utilize a widely acceptable connection system such as VarioPin connectors. The last thing you want to do is lock your plant into a proprietary installation. Intelligent sensor management systems yield benefits at many organizational levels. For example, the maintenance group can install a factory-calibrated sensor "out of the box." Further calibrations can be done in a controlled laboratory environment and automatically downloaded in the field. Frequent "just-in-case" calibrations can be replaced by timely "as-needed" calibration. Sensors are discarded only when the empirical "sensor wear" indicator says they should be discarded. Furthermore, an aging electrode can be removed prior to a critical process event. Process engineers benefit from automatic transmitter configuration of sensor settings, quick troubleshooting ability, continuous reference check in the case of pH and the recording of peak sensor temperature. Intelligent sensor management systems mean higher productivity and less downtime due to quick setup, troubleshooting capabilities and adaptive sensor diagnostics. They can also provide better operational safety due to the "plug-and-measure" concept, electronic documentation and audit trail links, which result in lower overall operational costs and improved profit margins. *Eric Kirleis is responsible for the sales and marketing organization at Mettler-Toledo Ingold, 36 Middlesex Turnpike, Bedford, MA 01730. Mettler-Toledo Process Analytics is a leading supplier of liquid analytical measurement solutions to control production processes. It has two divisions: Ingold and Thornton. Prior to joining Mettler-Toledo Ingold, Kirleis worked at Thermo Electron, Environmental Instruments Division, where part of his focus was on engineering continuous emission monitoring systems. He has a bachelor's degree from the State University of New York at Plattsburgh and master's degrees from Harvard University and Cornell University. Questions about this article can be directed to him at 781-301-8800. Additional information is available at www.mtpro.com.*

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