

5 Benefits of Upgrading Your Process Analyzer to Digital

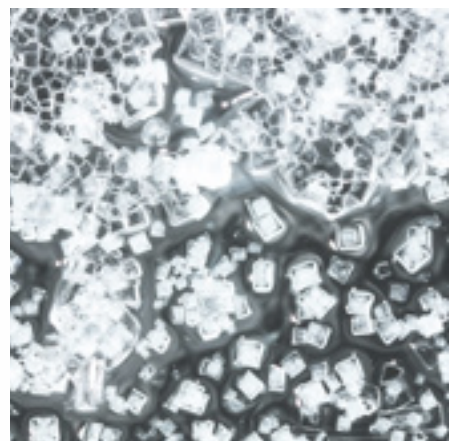
1 Eliminate Interference
on Your Measurement

2 Extend the Life
of Analytical Sensors

3 Clear Record Keeping
for Compliance

4 Implement a Predictive
Maintenance Plan

5 Faster Control
& Better Integration



METTLER TOLEDO

Eliminate Analog Measurement Issues with Digital Sensors

Digital sensor technology does not suffer from sensor measurement and calibration issues caused by insufficient electrical isolation on analog equipment. METTLER TOLEDO digital pH and DO solutions have restored measurement confidence for one of Big Pharma's companies.



Global pharmaceutical leader

One of the world's leading pharmaceutical companies, based in the USA, operates a large biopharmaceutical facility in New York State. Several critical functions are located at this site, including the manufacture of biologic medicines for use in clinical trials and for commercial use. As with all biopharmaceutical manufacturers, the revenue value of each production batch is worth millions of dollars; therefore, anything that can risk yield or drug quality must be avoided.

Poor electrical isolation threatens productivity

pH and dissolved oxygen (DO) monitoring and control on bioreactors is

central to optimizing productivity, so high performance of measurement systems for these parameters is essential. Facility process scientists and maintenance engineers were experiencing an issue with this equipment that was causing a loss in confidence in the data they were receiving.

The personnel noticed that pH and DO levels displayed on transmitters changed whenever they approached the instruments. And due to the close proximity necessary during sensor calibration, the effect at these times was particularly pronounced: data from sensors would rapidly fluctuate, resulting in a lack of assurance in calibration accuracy. Investigations

revealed the cause of the problem to be poor electrical isolation on the transmitters.

Further, the sensor-transmitter cables would often fail after only a few months of operation. As the replacement cost per cable was USD 600, facility managers were keen to find a better solution.

Digital technology provides the answer

METTLER TOLEDO met with a team of decision makers at the plant to discuss our Intelligent Sensor Management (ISM®) digital technology, as we were certain we could restore total confidence for process scientists and





ISM sensor offering

The parameters covered by ISM sensors is wide and includes pH, dissolved oxygen, gas phase oxygen, conductivity and TOC.

maintenance engineers in these important measurements.

The combination of our multi-parameter M400 transmitter and AK9 sensor-transmitter cables provides the electrical stability and low cost of ownership that are essential in any manufacturing environment. A demonstration of the solution clearly showed that measurements from sensors and calibration data on the transmitter remained stable regardless of personnel proximity.

An even more attractive aspect of our ISM technology for facility personnel is the ability to maintain and calibrate ISM pH and DO sensors in a remote

lab via our iSense PC software. This allows convenient sensor calibration and verification as well as documentation of sensor operations away from the production environment.

Perhaps the most desired deliverable that any customer wants is superior customer support. The availability of local, competent support from our New York agent made the METTLER TOLEDO solution even more attractive.

Problems eliminated, confidence restored

Certain that our systems would solve their pH and DO measurement issues, the decision was taken to convert over

80 installation points at the facility to METTLER TOLEDO ISM technology. Now, as expected, problems with noisy signals, questionable calibrations, and failing cables have been eliminated. The high performance and reliability of the equipment has since prompted other facilities operated by the company to also transfer to ISM solutions.

Find out more:

► www.mt.com/ISM



From One Month to Eighteen Massive Improvement in Sensor Lifetime

pH measurement on fluid catalytic cracking unit gas scrubbers is central to their efficient operation. At a US refinery, switching to a METTLER TOLEDO solution has dramatically extended sensor life.

Waste gas must be scrubbed

One of the largest oil refineries in southern USA has a crude processing capacity of around 300,000 barrels a day. Maintaining high productivity at the facility depends on the reliability of all unit operations, and one of the most critical is its fluid catalytic cracking unit (FCCU). Here, long chain hydrocarbons in heavy gas oils are broken down into shorter chains to produce gasoline and fuel oils.

The cracking of long chain hydrocarbons is achieved by mixing vaporized feedstock with catalyst beads at a very high temperature. When in the FCCU's reactor, the catalyst beads become coated with carbon from the cracking activity. This build-up reduces the catalyst's effectiveness and so is removed in a process called catalytic regeneration.

This process produces large quantities of sulfur oxide compounds, carbon monoxide and dioxide, and particulate matter. To prevent hazardous exhausts being vented to atmosphere, the refinery uses a gas scrubber to wash the sulfur oxides and dust from the waste gas stream.

Maintaining the right pH is vital

Efficient scrubber operation is reliant on monitoring and controlling the condition of the scrubbing liquid. Reduced scrubber efficiency not only carries the risks of pollutants being released to atmosphere; corrosion of plant equipment, scaling of the scrubber vessel and plugging of pipes caused by a buildup of by-products inevitably leads to expensive maintenance.

For monitoring the performance of the scrubber, the refinery relies on pH measurements. To ensure efficiency, process engineers endeavor to maintain the circulating scrubbing solution at a pH of 5.5 to 6.

In order to safeguard dependability of the six pH measurements on the scrubber, a maintenance technician had been cleaning and calibrating





sensors weekly, and even then the probes were surviving for no more than a month due to the harsh environment. Refinery engineers saw the situation as being frustrating but unavoidable.

Excellent results from advanced measurement solution

In 2014, METTLER TOLEDO was given an opportunity to demonstrate our measurement technology at the refinery. We showed our InPro® 4800i pH sensor and M400 transmitter which both feature Intelligent Sensor Management (ISM®) technology. We believed that the combination of the high performance sensor and instrument plus the benefits of ISM would significantly improve the pH measurement workload burden the refinery had been dealing with.

Following the impressive and successful demonstration, two METTLER TOLEDO measurement systems were installed on the scrubber to gauge sensor performance in the field. With biweekly maintenance, both sensors

survived for over six months.

So pleased were the refinery engineers that the remaining four pH measurement points were also converted to the METTLER TOLEDO solution. In addition, a further six InPro 4800i sensors were purchased. This was to allow the refinery to benefit from one of ISM's major benefits – pre-calibration.

Plug and Measure reduces workload

Using our iSense™ software running on a standard PC or laptop, ISM pH sensors can be calibrated then stored until they are required. And because six sensors are installed in the process, the other six can be calibrated, thoroughly cleaned then kept with their measurement tips in 3M KCl solution. This allows sensors to rejuvenate and extends their lifetime.

When it is time to rotate the sensors, because they are already calibrated it is a simple matter of removing the installed sensors at the measurement points and replacing them with the

“fresh” ones. Previously, a maintenance technician spent two and a half hours at the scrubber cleaning and calibrating the pH probes. Now, thanks to Plug and Measure, he swaps the six sensors in only 15 minutes.

The customer is extremely happy with the METTLER TOLEDO solutions. Not only has time spent on maintenance been reduced, but in the past 18 months none of the 12 sensors have been replaced and all are still performing reliably.

Find out more:

► www.mt.com/pro-pH

More Batches and Higher Yield in Italian Fermentation Plant

The advantages offered by digital sensor technology are convincing more and more pharmaceutical companies to switch from analog systems to Intelligent Sensor Management (ISM®) technology. One such company is Patheon Capua. Now they are benefiting from greater productivity and reduced batch failure.

Global science company

Patheon is a North American multinational pharmaceutical company. It has annual net sales of around USD 2 billion and employs approximately 6,000 people worldwide. Patheon's Capua facility outside Naples, Italy is a Contract Manufacturing Organization dedicated to the production of pharmaceutical API and pharma and food enzymes. With over 20 reactors, the facility is one of Italy's largest fermentation plants.

Over the last few years, pH and oxygen measurement points installed on the reactors were changed from standard analog sensor systems to METTLER TOLEDO's digital Intelligent Sensor Management (ISM) technology. This task was overseen by Sergio Andreutti, Reliability Engineer at Patheon in

Capua. Pharmaceutical & Biotechnology News spoke to him about the move to ISM.

Mr Andreutti, what issues were you having with the analog sensors you were using?

Firstly, we had to keep a dedicated log book for each sensor to record calibration data, etc. That was very inconvenient and carried too much risk of information being entered or read incorrectly. We also had to calibrate pH sensors twice: in the workshop after maintenance and again after connection in the field. Obviously this meant we were spending a lot of time on calibration. And thirdly, we had no real idea as to when a pH sensor would no longer measure reliably or when an oxygen sensor's membrane would need exchanged.

What first attracted Patheon to Intelligent Sensor Management?

When we discovered that we could record and trace the history of sensors, such as the number of CIP or SIP cycles they'd been exposed to and calibration history, we became interested in ISM.

In 2011 we were planning to change our control system for fermentation operations. We took the opportunity to move from analog sensors to state-of-the-art technology, and so we decided to implement ISM.

According to your experiences, what are the most important benefits that ISM technology has brought to your plant's processes?

Mainly two. Firstly, traceability. With ISM's iSense™ software we can trace all the information about sensor use, maintenance we've performed on sensors, and also can follow-up all the aspects of a sensor's performance over its life. This is very important when we have to analyze some process failure, or the performance of a sensor, and to study how to assess the maintenance activities on a sensor.

And with ISM's diagnostics we can plan well in advance when to maintain or replace a sensor.



Mr. Sergio Andreutti, Reliability Engineer at Patheon's Capua facility.



The other important benefit is that this technology allows us to reduce maintenance activities due to the fact that we do not need to calibrate sensors two times. Now we just calibrate in the workshop and connect the sensor to the transmitter in the field. This has allowed us to reduce the turnaround around time between fermentation runs. Thanks to that we have increased fermenter availability in order to raise batch numbers and to add new campaigns over the year.

What cost savings has ISM delivered?

Of course spending less time calibrating sensors has reduced costs but the main savings have been achieved through increasing plant reliability and reducing the number of failed or low yield batches due to sensor failure.

Are you planning to expand the use of ISM in your processes?

Our fermentation processes are now fully-covered with ISM technology. There are downstream processes where we can implement ISM and we're now looking at how to do that.

Find out more:

► www.mt.com/iSense

Find out how much you can save with ISM

► www.mt.com/ISM-pharma-calc

Switching to Condition Based Maintenance “Indispensable” Sensor Technology at Mitsubishi

Failure of pH sensors in processes was a costly and concerning issue for Mitsubishi. The ability to see when sensor maintenance or replacement will be needed has transformed their pH measurement operations.

World leading chemical company

The Mitsubishi Chemical Corporation (MCC) is Japan's largest chemicals manufacturer. Its product range spans industrial chemicals, petrochemicals, solvents, methyl methacrylate and acrylonitrile. MCC has the world's largest market share of acrylic resin raw material.

The need to know when a sensor will need exchanged

At the corporation's Mizushima plant near Okayama, pH measurement during the neutralization of strong acids is closely monitored. For this important measurement Tsutomu Ishikawa and

Naoto Ogura, engineers at the plant's Instrumentation and Engineering Department, were not satisfied with the performance of the pH sensors they were using. Mr. Ishikawa said: “The

conditions in the process are harsh: pH is in the range of 5 to 12, and temperature swings between 40 and 80 °C. Typically, a pH sensor survives for three months, but sometimes a

“Knowing the correct remaining sensor life is a major advance in Plant Asset Management.”





sensor becomes unusable after just one. The unexpected interruption of processes affects product quality, so the reliability and stable operation of measuring instruments is an important factor.”

For this reason sensors were regularly exchanged at the plant to minimize the chance of failure in the process. But the operation cost was high and Mr. Ishikawa and Mr. Ogura needed a better solution. Specifically, they required to know in advance when a pH sensor would need to be cleaned, calibrated or replaced: “We wanted to grasp how deposits forming on the pH sensors would affect the timing of sensor maintenance and exchange.”

Diagnostics predict sensor maintenance and replacement

Intelligent Sensor Management (ISM®) provides exactly this ability. By continuously monitoring process conditions, sensor slope and reference system impedance value ISM pH sensors can predict their remaining lifetime and when calibration and

cleaning should be performed. Further, ISM’s predictive diagnostic tools (displayed on the connected transmitter) are dynamic, so as process and sensor conditions change, the diagnostics readjust.

Mr. Ishikawa and Mr. Ogura were impressed with a demonstration of ISM and could immediately see its potential. Mr. Ogura stated: “In our existing operation method, sensor state is confirmed on site or periodic sensor maintenance is performed on a Time Based Maintenance rule of thumb. Using the Condition Based Maintenance function provided by the algorithms in the ISM sensors means we could implement an efficient and more appropriate maintenance plan. In short, systems equipped with ISM technology would be indispensable.”

To test ISM at the facility, two pH measurement systems comprising InPro 4260i sensors and M400 transmitters were installed on neutralization equipment. The METTLER TOLEDO solutions functioned extremely well

and further ISM pH systems were installed for monitoring organic solvents.

High satisfaction leads to major replacement program

Mr. Ishikawa and Mr. Ogura are delighted with the sensor performance and particularly ISM’s Dynamic Lifetime Indicator: “Knowing the correct remaining sensor life is a major advance in Plant Asset Management.”

Such is their satisfaction that Mitsubishi are now considering replacing 200 pH measurement points at their Mizushima plant with ISM solutions.

Find out more:

► www.mt.com/ISM-chem-wp

Faster Control, Better Asset Management

Multi-Parameter Transmitter with Profinet

With its full color touchscreen and intuitive menu structure, the M800 transmitter is developed to a high industry standard for transmitting signals from process analytical sensors, including pH/ORP and conductivity. Now, the addition of Profinet™ gives you even more possibilities.

Rapidly growing bus technology

Due to its high flexibility, performance and efficiency, Profinet's growth is outstripping other industrial bus technologies. For chemical plants that have installed Profinet, its addition to the M800 multi-parameter transmitter means easy integration of process analytical measurements and sensor diagnostics into their PLC.

Sensor diagnostics – the key to efficient maintenance

Intelligent Sensor Management (ISM®) diagnostic tools, featured in the M800, are helping hundreds of companies across the world switch from reactive or periodic maintenance to predictive maintenance – saving time and expense, and increasing uptime.

Complete control at a touch

The M800's 5.7", full color, high-resolution touchscreen, simply structured menus and user management functions mean the M800 is the benchmark for convenient transmitter operation.

The freely-configurable display provides information on measurement values plus diagnostics data on a



ISM® **PROFI**
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single screen. Logbook and user management features offer excellent traceability and operating security. Wizard set-up allows the user to reach any menu in only three touches, reducing

training efforts and configuration failures to an absolute minimum.

Find out more:

► www.mt.com/M800

Hot Swap of ISM Sensors

5 Advantages



90 % time saving on maintenance efforts

Precalibrate sensors with iSense™ software and swap them when necessary. Analog sensor calibration in the field needs 1 hour. Digital sensor calibration with iSense in a controlled environment takes only a few minutes.



Eliminate the risk of human error

Guided calibration and automatic audit trail. No more manual transcription of data.



100 % signal reliability

No interferences from electromagnetic fields or presence of moisture.



No more measurement downtime

Swap sensors before they fail thanks to predictive diagnostics.



No unnecessary exposure to process hazards

Pre-calibrated sensors limit maintenance staff exposure time in the field.



Analytical Transmitters

To Meet Your Production Requirements



Pairing the right transmitter with application-specific Intelligent Sensor Management (ISM) sensors creates a digital analyzer that provides accurate measurement and reduces maintenance efforts. METTLER TOLEDO offers a wide range of transmitters that will meet your specific needs.

The M800 multi-parameter transmitter provides simultaneous monitoring of one, two or four in-line sensors. It offers measurement of pH/ORP, optical DO, amperometric oxygen (DO as well as O₂ gas), conductivity, resistivity, TOC, dissolved ozone, flow and turbidity in pure water as well as process applications.

The M400 multi-parameter process transmitter is suitable for pH/ORP, oxygen and conductivity measurements. Intuitive touchscreen with easy-to-use graphical user interface allows fast navigation. Rugged design ensures solid operation through soft keys with intuitive touchscreen interface to withstand an industrial plant environment.

Request more information or pricing on these digital analyzers at

► www.mt.com/transmitters

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Process Analytics
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