Pulp & Paper

Perspectives in Liquid Process Analytics

21 News

INGOLD

Leading Process Analytics

Streamline Your Processes with the New iSense Software

Intelligent Sensor Management (ISM®) technology is helping pulp and paper mills the world over to increase process reliability, reduce sensor lifecycle costs, and simplify sensor handling. With the new iSense software for ISM sensors, realizing the benefits of digital sensor technology is easier than ever.

Significant benefits

Analytical measurements are going digital. The advantages offered by the latest, cutting-edge in-line sensors and transmitters, such as greater process quality and yield, reduced sensor maintenance, and simplified sensor handling, are hard to ignore.

ISM, METTLER TOLEDO's digital sensor technology, has transformed the way analytical sensors are handled and maintained from first installation to end of life. ISM offers a level of performance and convenience that is not available with other systems.

Convenience is the key

Whether in production or in the lab, the greater the convenience provided by analytical equipment the more efficient will be your processes.

iSense, the accompanying software for ISM, streamlines all your sensor activities. It provides highly valuable features such as sensor calibration away from the process, electronic documentation, instant evaluation of a sensor's "health", and predictive information on when maintenance will be required. The latest version of iSense enables seamless management of ISM sensors and delivers exceptional usability.

It is easier with iSense

Spending hours learning new software is a costly use of operator time, so we have made iSense extremely intuitive to operate.

METTLER TOLEDO

For a new sensor, just connect the Bluetooth® communicator supplied with the software. iSense automatically recognizes the probe and displays a registration page where you can add any important information. The next time that particular sensor is connected, the iMonitor screen will provide an easy-to-read overview of the sensor's condition and, if maintenance is required, tell you what steps to follow.

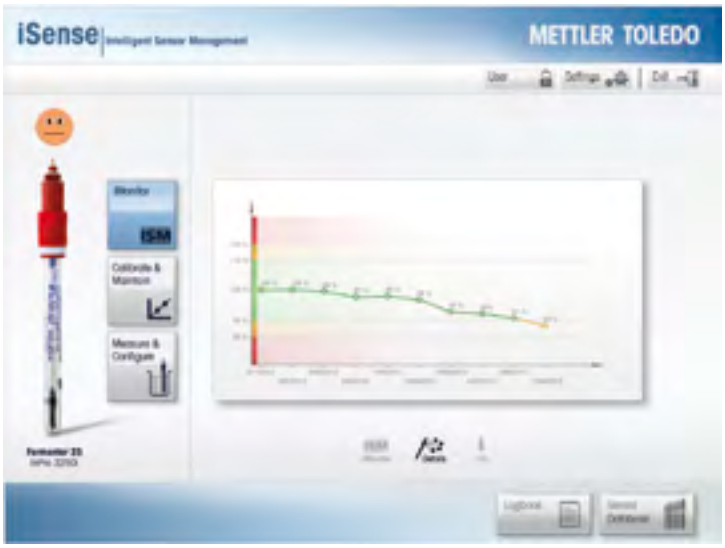
Whether you want to calibrate a pH sensor, check how a sensor's performance has been affected by a process, or print sensor maintenance documentation iSense guides you through the steps.

For today's processes and tomorrow's

ISM and iSense have been designed to be adaptable to your current needs and your future ones. Planned developments, such as a mobile app to provide a quick sensor check on the go, mean that ISM will remain in the forefront of analytical measurement technologies.

Discover more at:
▶ **www.mt.com/ISM**

The smiley provides at-a-glance notification of sensor "health". Diagnostics show that this sensor needs calibrated.



The Sensor History feature allows you to see how a sensor has been affected by process exposure over time, assisting with maintenance planning.

On-screen animations guide you through maintenance procedures, helping to ensure proper handling.

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Flexible, Intuitive, and Intelligent
New Transmitter for All Parameters

Our M800 transmitter series has now been extended. The new M800 1-Channel is a multi-parameter, single-channel device which combines a state-of-the-art user interface and advanced Intelligent Sensor Management (ISM®) technology with the broadest parameter coverage that has ever been available on a METTLER TOLEDO transmitter.

Full parameter coverage

The M800 1-Channel extends METTLER TOLEDO's portfolio of high-performance transmitters with a single-channel instrument that covers all major measurement parameters. pH / ORP, dissolved and gas phase oxygen (amperometric and optical), conductivity, and turbidity measurement are all possible in conjunction with either ISM or analog sensors. The M800 1-Channel's multi-parameter ability means that most applications in process analytic applications, covered until now by different transmitters, can be equipped with just one instrument platform.

Cutting-edge user interface

Transmitters, as the interface between process analytical sensors and the user or control system, are central to successful and efficient production. With its 5.7" full-color, high-resolution touchscreen, simply structured menus, and user management functions, the M800 1-Channel sets a high standard in the market for convenient transmitter operation.

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

At-a-glance diagnostics

Thanks to the iMonitor display the condition of each sensor is determined in an instant, allowing preventive action to be taken before processes are affected. The ISM predictive diagnostics tools shown on the iMonitor, such as the Dynamic Lifetime Indicator (DLI), Adaptive Calibration Timer (ACT), and Time to Maintenance (TTM) indicator are color coded and shown in a distinctive way. The sensitivity of the DLI can even be altered to match process conditions.

With the introduction of the M800 1-Channel METTLER TOLEDO offers an outstanding measurement solution for applications across all process industries at a very competitive price.

Find out more at:
▶ **www.mt.com/M800**

Greater Yield with Less Reagent
in Tall Oil Production

Tall oil production can be a valuable revenue stream for pulp mills. However, inaccurate pH measurement during production can lead to reduced yield and costly overuse of chemicals. To help ensure maximum production and optimal consumption of sulfuric acid, Sweden's Södra chose METTLER TOLEDO pH measurement systems.

Swedish pulp producer

The Swedish forestry group Södra is one of the world's leading producers of paper pulp, and has a history dating back to 1926. The group is an economic association wholly owned by its 52,000 members. Together, they look after more than half of all the privately owned forest in southern Sweden.

Södra Cell Mörrum is one of the group's three pulp mills. Here, two production lines produce dissolving pulp and long-fiber softwood pulp. Combined, the lines have an annual capacity of 440,000 tons. In addition to pulp, the mill produces 12,000 tons of tall oil which is sold and used to manufacture biodiesel.

Optimal pH to balance yield and reagent consumption

The key stage in tall oil production takes place in the tall oil reactor. Here, tall oil soap, formed by evaporating black liquor extracted from softwood pulp, is mixed with sulfuric acid and boiled in a vessel for several hours. The heat and low pH causes the soap to break down into several phases, one of which is crude tall oil.

pH control is critical during the process to balance efficient separation and formation of tall oil with minimal reagent consumption. Mill engineers have found the optimum pH value to be between 2.5 and 3. Higher pH would negatively affect tall oil quality and reduce yield as it inhibits the separation of the different soap phases. Although a lower value would improve the separation further, the required increase in reagent is substantial (maintaining the pH 0.5 units too low will result in approximately three times more acid consumption than necessary). In addition, the risk of corrosion on fixed equipment would also be much greater.

Tough process conditions

Achieving accurate pH measurements in tall oil reactors can be very challenging due to the presence of sticky hydrocarbons, high temperature, high concentration of sulfide ions and calcium salts, and very low water content. Consequently, pH sensors require regular cleaning (up to four

times a day in extreme cases) if reliable pH measurements are to be achieved.

Södra asked METTLER TOLEDO to provide a measurement solution that would tolerate the conditions and would not require much maintenance.

Highly dependable pH system

The InPro 2000 i is a pH sensor designed for high reliability in the most extreme conditions. Its pressurized reference electrolyte gives excellent resistance to any clogging issues or effects from sulfide ions. The sensor is available with Friscolyt® electrolyte solution for best measuring performance in the organic process media encountered in tall oil processes.

The sensor is housed in an InTrac 776 e with Hastelloy® wetted parts. This rugged, retractable housing features a built-in flushing chamber in which the pH sensor can be cleaned and calibrated without process interruption, and without danger of process fluid leaking.

To counteract the maintenance issue, we installed an EasyClean 200 e automatic sensor cleaning unit. In conjunction with the housing, the EasyClean 200 e periodically rinses and cleans the InPro 2000 i sensor, ensuring the sensor is able to measure accurately when reinserted into the reactor vessel.

Of particular benefit to mill engineers is the Intelligent Sensor Management (ISM®) technology that is incorporated in the InPro 2000 i. ISM is a concept for analytical measurement systems that simplifies sensor handling, enhances measurement reliability, and reduces lifecycle costs.

Stable digital signal

The InPro 2000 i sensor communicates digitally with the connected transmitter. The digital signal is more precise than an analog signal and as it is unaffected by moisture, electrical interference, or cable length is 100 % stable. This benefits pulp and paper applications as moisture is often present and cable runs tend to be long.

Sensor calibration away from the process

Using METTLER TOLEDO's iSense™ software running on a standard PC or laptop, ISM sensors can be easily and accurately calibrated in a convenient location such as a workshop. ISM sensors hold their calibration data on an internal microprocessor and can be stored ready for use until required.

Plug and Measure

Because ISM sensors retain their calibration data, when one is connected to an ISM transmitter the calibration data is automatically uploaded and the transmitter configures itself without any operator intervention. Measurement point start-up is therefore fast and reliable.

Advanced sensor diagnostics

ISM sensors contain sophisticated algorithms that constantly monitor sensor "health" and predict when calibration or replacement should be performed. Information is displayed as easy-to-intepret diagnostics tools on ISM transmitters and iSense software and can also be viewed on control system displays. This allows Södra engineers to schedule maintenance for when it will actually be required.

Greater yield with less reagent

The robustness and accuracy of the pH measurement solution and the benefits of ISM and automated sensor cleaning are helping Södra maximize the yield of tall oil production and prevent overuse of reagents.

Find out more at:

► **www.mt.com/InPro2000**

Intelligent Sensor Management (ISM®)
for the Pulp and Paper Industry

Ensuring your production can cope with today's competitive challenges includes the use of highly dependable process analytical instruments. With ISM, METTLER TOLEDO's digital sensor technology, maintenance becomes predictable, sensor handling is easy, and production becomes more efficient.

The benefits of ISM translate into substantial gains for pulp and paper mills in relation to process reliability, sensor lifecycle management, and cost of ownership.

Unlike analog probes, ISM sensors output a robust digital signal and retain their own calibration as well as process data. Thanks to diagnostics tailored to pulp and paper production applications, ISM sensors even predict when they will need maintained or replaced.

In pH, conductivity, and turbidity measurement systems ISM gives you much more than just a measurement.

Greater process reliability

Increased operational uptime
ISM provides real-time information on sensor condition, helping you run production at peak efficiency.

Read the white paper on achieving greater process integrity:
► **www.mt.com/ISM-chem-wp**

Easy sensor handling

Convenient lifecycle management
With iSense software you can pre-calibrate sensors for error-free exchange at the process.

Discover the new iSense software for ISM sensors:
► **www.mt.com/iSense**

Reduced maintenance

Low cost of ownership
ISM reduces sensor lifecycle costs and enables higher sensor use.

Find out how much time and money you can save by switching to ISM:
► **www.mt.com/ISM-cost-calculator**

Systems for your processes …
From the digester to the paper machine to effluent monitoring, your entire mill benefits from the unsurpassed reliability, simplified sensor handling, and low maintenance requirement of ISM solutions.

… adaptable to your requirements
Our ISM transmitter portfolio covers single-parameter, single-channel units for maximum process safety, to multi-parameter, multi-channel devices for greater convenience and flexibility.

Incorporating ISM solutions into your asset management or plant control system via transmitters or converters allows seamless integration of sensor diagnostics information for remote monitoring.

Discover how ISM can help you at:
► **www.mt.com/ISM**

M800 transmitter showing iMonitor sensor diagnostics utility.

How Can ORP Analysis Improve Your Bottom-line?

Controlling oxidant levels in your mill by measuring oxidation reduction potential (ORP) in-line may not seem an obvious cost cutting process. But for a paper mill in the US it has reduced chemical costs and production downtime, and improved product quality.

CFS manufacturer

One of our customers in the USA produces over 1,000 tons per day of coated free sheet (CFS) paper on three paper machines. Their CFS grade lines have diverse furnishes, some of which include bleached chemical thermo-mechanical pulp (BCTMP) and varying levels of machine and recycled broke. Subsequently, maintaining levels of oxidants in the system sufficient to maintain microbiological control without adversely affecting product quality, has been a challenge.

ORP measurement

Mill engineers recognized that ORP measurement would be extremely useful in monitoring oxidant levels throughout the mill and so installed a number of METTLER TOLEDO ORP measurement systems. The first ORP system was installed to monitor the water leaving the upflow filters and gravitating into the 750,000 gallon clearwell storage container. The second ORP system was installed to check the water leaving the clearwell for the mill's distribution system. In the following year a third ORP measurement point was installed at the end of the filtered water distribution system to ensure full disinfection throughout the entire system.

The obvious next step was to take ORP technology to the paper machine. Over the following five years, in-line ORP measurement on various machine water loops encountered problems, primarily due to sensor fouling caused by the level of material present. The mill then decided to install a METTLER TOLEDO redox probe in the cleaner tank very close to the headbox on the #1 paper machine. The velocity of the stock furnish in this area was very effective at preventing the sensor from fouling. As an added precaution, a retractable housing was installed to allow operators to clean the probe when necessary, without interrupting the process.

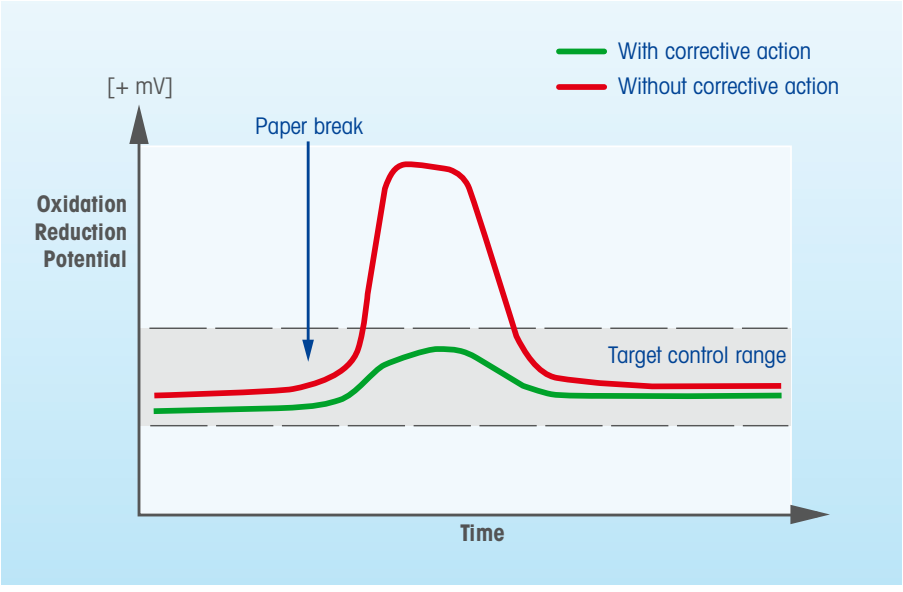

Fig. 1: Effect of corrective action

ORP technology from METTLER TOLEDO

The installed in-line ORP measurement system consisted of:

- InPro 3250 SG pre-pressurized, liquid-electrolyte ORP electrode with platinum contact near the tip (solution ground) allowing measurements of the redox potential
- InTrac 777 retractable housing with Tri-Lock safety system and an integral flushing chamber for regular cleaning without process shut down
- pH 2100 e transmitter with diagnostic functions and PID controller.

Operational and experimental observations

Several cause and effect ORP relationships were observed during normal mill operations. In addition, deliberate "upset" testing has been performed to demonstrate further interactions, as summarized below.

Cause and effect ORP relationships

- The most significant process change to impact ORP values is a paper break. It was standard procedure on a break to shut off the dyes, ash, and broke. The ORP spiked substantially on every break because the flow of all the reducers in the system was shut off, but the oxidant continued to flow. The excess oxidant in the system was causing bleaching and loss of color control when the sheet was back on the rolls.
- Another significant finding was the unexpected reductive potential of the filler materials, granulated calcium carbonate and precipitated calcium carbonate. Increasing flow of either of these fillers caused a lowering of ORP value. With this information the mill was able to stabilize the dramatic changes in oxidant demand observed above, by reducing rather than completely shutting off some of the fillers on machine breaks.
- During machine breaks, additional fresh process water is drawn into the machine system. This water contains a high chlorine residual. An increase in the ORP value was seen each time a large amount of process water entered the system.
- Changing between various grades of product in some cases resulted in an increase in ORP while other grades caused a decrease in ORP.
- Use of post-consumer waste acts as a reducer and was shown to cause a moderate decrease in ORP.

InPro 3250 SG ORP electrode

METTLER TOLEDO solution

In the months that followed the initial trial of the METTLER TOLEDO system on the # 1 paper machine, ORP measurement was extended to the other two machines, and the oxidant addition programs adjusted based on the ORP results. The mill then took the process one step further and fed the signal from the transmitter to the mill's DCS process control system to provide real-time, in-line measurements at the control center.

Quick return on investment

In all the applications, the installation of ORP measurement provided a return on investment within one month.

Many reducers have been identified as contributors to oxidant demand competing directly with added oxidant, thereby lessening disinfection action. Knowledge of these interactions permits implementation of corrective actions to minimize the ORP upset and keep concentrations within the target control range, as illustrated in Fig. 1. This results in shorter times of out of spec product color and minimizes corrosion while maintaining sufficient disinfection action.

The most significant economic outcome of ORP monitoring has been the ability to run increased levels of machine broke and CFS broke without the typical loss in microbiological control and subsequent deposits / holes in the sheet. By maintaining a target ORP setting and adjusting the oxidant feed, optimal running conditions are maintained.

METTLER TOLEDO systems demonstrated that dependable, accurate in-line measurement of ORP at the paper machine can be achieved. Required maintenance is minimal, particularly due to the use of InTrac 777 retractable housings.

If you want to reduce production downtime and improve product quality at your mill, go to:

www.mt.com/InPro3250

Advanced Scale Terminals
Automate Your Weighing Process

Is your scale carrying its share of the workload? In today's business climate, you need every advantage you can get to compete successfully. Choosing a terminal with the right capabilities can turn your vehicle scale into a high-efficiency material handling operation.

METTLER TOLEDO offers several options for controlling vehicle scales that use POWERCELL® PDX® load-cell technology. Both the IND560 and IND780 terminals are designed to get the most out of this technology's advanced diagnostic capabilities. They provide easy access to diagnostic screens that monitor the load-cell network's performance and assure you that your vehicle scale continues to weigh accurately day in and day out. In addition to simplifying the scale operator's job, these powerful terminals provide the connectivity needed to integrate a scale with existing systems. Regardless of your vehicle weighing application, one of these terminals can handle the job.

IND560 Scale Terminal

This powerful terminal can be equipped with software designed specifically for vehicle weighing. It allows you to process inbound/outbound transactions on a single scale. The IND560 terminal stores vehicle IDs and temporary or permanent tare IDs. With built-in discrete input/output options, the terminal can turn a vehicle scale into an accurate filling system that provides one- or two-speed filling.

► **www.mt.com/IND560**

IND780 Scale Terminal

This advanced terminal is available with software for processing inbound/outbound weighing transactions on one or two scales. It includes tables for storing vehicle IDs, commodities, customers and other information. The IND780 terminal offers built-in control of traffic lights and gates. Two-speed outputs are available to provide accurate filling control. The terminal's large graphic display simplifies the scale operator's job.

► **www.mt.com/IND780**

The Right Terminals for Any Vehicle Weighing Application

Inbound/Outbound Vehicle Weighing on One Scale
Choose the IND560 for precise weighing or IND780 for precise weighing with additional data storage capabilities.

Inbound/Outbound Vehicle Weighing on Two Scales
Choose the IND780 for processing inbound/outbound weighing transactions on two scales.

Vehicle Weighing Integrated with Filling or Loading
Customize your reliable vehicle weighing solution with either the IND560 or IND780 terminal.

Network Multiple Scales in a Single Database
Combine a vehicle scale software solution with individual scales controlled by IND560 or IND780 terminals.

Hazardous Area Weighing
The IND780 with POWERCELL PDX load cells is approved for use in Division 2/Zone 2, 22 hazardous areas.

Unattended Vehicle Weighing
Combine an IND9U unattended terminal with the IND560 or IND780 to allow drivers to process weighing transactions.

Get in-line with METTLER TOLEDO

A Small Footprint in Your Plant

A Leap Forward in Analytical Measurement

Compact, head mount, temperature transmitters have been a common sight in production plants for decades. Calibration of analytical sensors requires a transmitter with keys and a display, which has prevented the head mount concept being used for pH/ORP, conductivity, and oxygen sensors – until now!

The M100 – the world's first transmitter for analytical measurement based on a compact, head mount design.

Key features

- Small footprint
- Aluminum head and stainless steel body
- Intrinsically safe
- Plug and Measure start up
- Predictive sensor diagnostics
- No display
- HART® communication

► **www.mt.com/M100**

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