Sugar Starch & Yeast
Perspectives in Liquid Process Analytics

22 News

INGOLD
Leading Process Analytics

Streamline Your Processes with the New iSense Software

Intelligent Sensor Management (ISM®) technology is helping sugar refineries the world over 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.

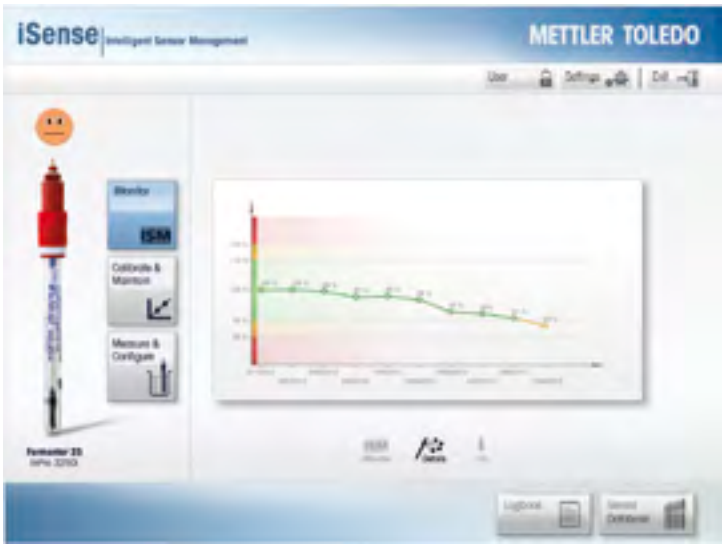
Whether you want to calibrate a pH sensor, check how a sensor's performance has been affected by a process, or print sensor maintenance documentation iSense guides you through the steps.

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 that provides 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.

Publisher / Production
Mettler-Toledo AG
Process Analytics
Im Hackacker 15
CH-8902 Urdorf
Switzerland

Illustrations
Mettler-Toledo AG
Azpworldwide, Okea, Margouillat,
I Dreamstime.com

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 for 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**

Beet That!

Sensor Maintenance Reduced by 50 %

The sugar beet processing season in Italy is very short. Time pressures mean production equipment must be tough and reliable. For Italy's largest sugar producer, switching to dependable, intelligent sensors has dramatically reduced pH system maintenance.

One and a half million tons of beets processed in three months

Founded in 1962, Italy's COPROB Group has grown from producing sugar from the beets of 30 agricultural holdings to now working with over 5,000 and processing 1.5 million tons of beets.

Sugar production in Italy is highly seasonal, and COPROB's facility near Pontelongo, Padova only operates between August and October. With just three months' production COPROB cannot afford to make any mistakes during beet processing. Equipment at the facility therefore has to function to a very high degree of efficiency.

The diffuser process

Once the beets have been cleaned and cut into thin strips (cossettes), extraction of sugar takes place in a diffuser. Here, the cossettes are in contact with water at 70 °C and slowly move through the diffuser while the water travels in the opposite direction. The process transfers sucrose plus impurities from the cossettes to the water.

The cossettes that leave the diffuser still contain a useful quantity of sugar, so are pressed to remove the liquid content. The resulting juice is filtered, heated, and recycled back to the diffuser.

High sugar extraction relies on pH measurement and control

To extract the maximum amount of sucrose during diffusing and pressing, the pH of the process water must be maintained at around pH 5. Sustaining the correct water quality increases cossette permeability, which is important not only for the diffusion process but also to ensure the cossettes are soft during pressing. This increases juice extraction and prevents damage to the presses. pH control involves dosing calcium sulfate and sulfuric acid.

The calcium sulfate is used to harden the source water, the sulfuric acid to reduce the pH to the desired level.

Achieving accurate pH measurements in the diffuser is problematic as particulate matter in the medium coats sensors and clogs their diaphragms. Also, the rate of production is not constant. When the feeding of cossettes is increased, the ratio of water to cossettes is altered and the liquid can become very viscous, which makes pH measurement more difficult. Sulfuric acid is continually being added to the water, and during periods of high viscosity does not mix well. The acid may come into contact with the pH sensors without being diluted, leading to severely reduced sensor lifetime.

Old technology is problematic

COPROB was using an older generation of pH measurement system where the pH electrode and reference electrode were separate. This meant a significant amount of time was being spent on sensor maintenance, and while one or other of the electrodes was being cleaned or replaced, in-line pH measurement was not possible. Frustrated with the situation, COPROB looked for an alternative that would reduce maintenance, frequency of sensor replacement, and ensure pH measurement reliability.

Durable pH sensor for demanding conditions

After consultations with COPROB engineers, we installed a solution based around our InPro 4800 i sensor. This sensor combines pH and reference electrodes plus temperature measurement into one, highly robust design. The sensor features a very long diffusion path, giving it strong resistance to contamination from acids and an extended lifetime. It operates comfortably in temperatures up to 130 °C and its annular PTFE diaphragm prevents coating, reducing the need for cleaning.

Intelligent benefits

The InPro 4800 i also offers COPROB the benefits of Intelligent Sensor Management (ISM®) technology. These include a robust sensor-transmitter digital signal that is unaffected by the moisture in the environment; Plug and Measure for fast, error-free measurement point start up; and predictive diagnostics that keep maintenance staff aware of sensor condition at all times.

The diagnostics are displayed on the connected M400 transmitter. This versatile, multi-parameter unit accepts conventional analog probes as well as ISM sensors and has a quick set up mode for fast installation.

The system was completed with a highly durable InFit 761 housing with stainless steel wetted parts.

Significant reduction in maintenance

For a period after installation, COPROB engineers periodically compared the measurements from the InPro 4800 i with those from a portable meter. They were always aligned, giving COPROB the confidence in the in-line system that they were looking for.

COPROB realizes that the high humidity in the production environment is problematic for analog technology. With ISM's digital signal, they know that the environment is not altering the data received at the M400 transmitter.

Regarding time spent on pH system maintenance, due to the InPro 4800 i's resilience and ISM's predictive diagnostics it has dropped by 50 %. Now, engineers have more time for ensuring COPROB's sugar is of the highest purity and quality.

If you want to spend less time on sensor maintenance, visit:

► **www.mt.com/ISM**

Intelligent Sensor Management (ISM®)
for the Sugar 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 sugar refineries 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 sugar 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 extraction to carbonation to effluent monitoring, your entire refinery 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**

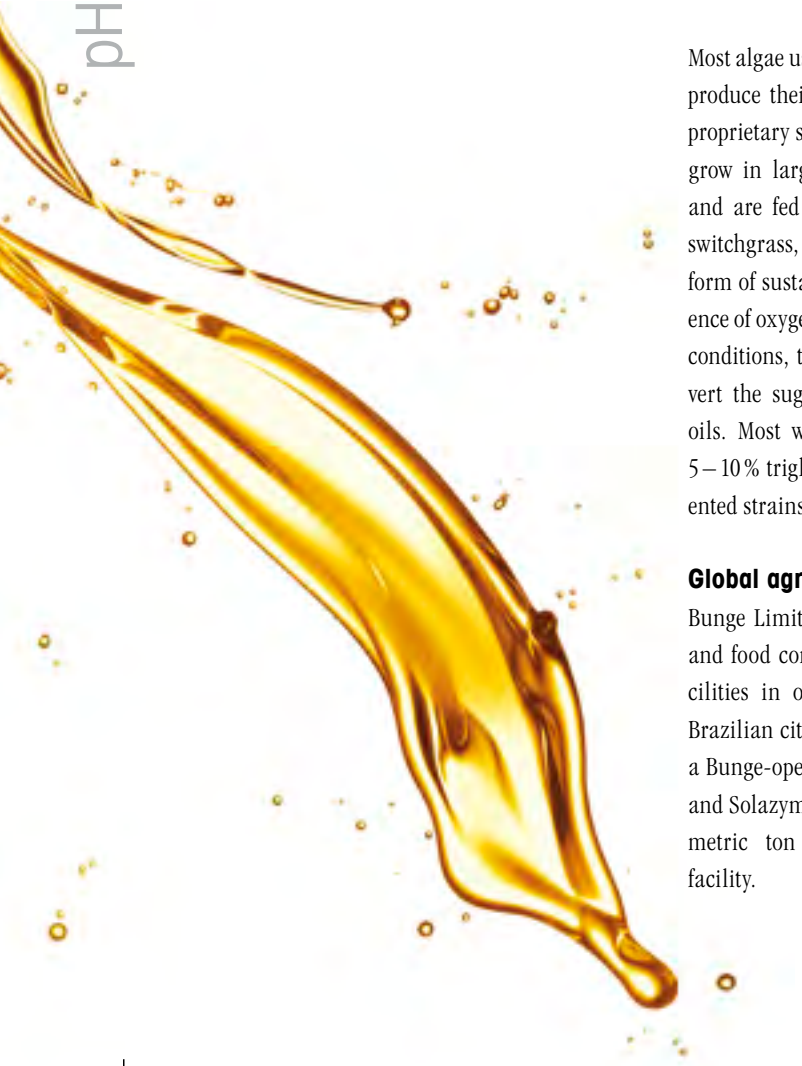
M800 transmitter showing iMonitor sensor diagnostics utility.

From Sugarcane to Oil
with the Help of Intelligent Sensors

Products from the biotechnology industry are being increasingly adopted worldwide. One leading biotech company in a joint-venture with a global agribusiness is constructing a large renewable oil production plant in Brazil. To ensure reliability in fermentation processes they have selected METTLER TOLEDO sensors.

Impressive growth of biotechnology sector

The global biotechnology industry is growing at approximately 11 % per year and by 2015 is expected to be worth USD 320 billion. This rapid growth is due in no short part to the innovations that biotech companies continue to make in modifying living organisms to develop commercial products.



Renewable oils from algae and glucose

One such company is California-based Solazyme. Since its inception in 2003, Solazyme has used its proprietary biotechnology to produce a wide range of renewable oils for nutritional, cosmetic, chemical, and transportation use; all of them produced from microalgae and plant-based sugars.

Most algae use a photosynthetic process to produce their own nutrients. Solazyme's proprietary strains of heterotrophic algae grow in large stainless steel fermenters and are fed glucose derived from corn, switchgrass, Miscanthus grasses, or other form of sustainable biomass. In the presence of oxygen and in carefully controlled conditions, the bioengineered algae convert the sugar into tailored triglyceride oils. Most wild forms of algae contain 5 – 10 % triglycderide oil. Solazyme's patented strains contain over 80 %.

Global agribusiness

Bunge Limited is a leading agribusiness and food company that operates 400 facilities in over 40 countries. Near the Brazilian city of Moema, and adjacent to a Bunge-operated sugarcane mill, Bunge and Solazyme are constructing a 110,000 metric ton renewable oil production facility.

Innovative use of sugarcane

At the Moema plant it is sugarcane that will provide the energy source for the algae. The cane will pass through the normal first stages of sugar production until pure sucrose juice is obtained. This will be transferred to the fermenters where the genetically-modified algae will feed on the sucrose and rapidly multiply. When maximum biomass is achieved, oil extraction will be carried out through a drying process.

Efficient fermentation requires highly reliable sensors

Achieving maximum yield from the fermentation processes will be dependent on the control of physical and analytical parameters throughout the batch run. As with any other fermentation process, pH and dissolved oxygen (DO) levels will play a critical role, so Solazyme/Bunge want in-line sensors that will provide accurate measurements and operate reliably. They approached METTLER TOLEDO to explore available solutions.

For pH we suggested our InPro 3253 i sensors. This is a low maintenance sensor with high temperature-resistant glass. Its rugged design means it provides fast, accurate measurement even after repeated sterilization cycles.

The InPro 6850 i DO sensor is designed for use in hygienic processes. Its three-electrode measuring principle provides high measurement precision and its easily replaceable membrane and inner bodies reduce service time.

To partner the sensors, we suggested the M400 transmitter. This is a versatile, multi-parameter unit that combines robust construction with easy operation.

Intelligent Sensor Management provides major benefits

It is not just the performance of our sensors and transmitters that attracted Solazyme / Bunge to METTLER TOLEDO. They were drawn to the added benefits that our Intelligent Sensor Management (ISM®) technology brings. ISM simplifies sensor handling and increases measurement reliability, but more importantly to Solazyme / Bunge, it offers predictive sensor diagnostics.

Before starting a fermentation run, Solazyme / Bunge technicians will need assurance that sensors will operate reliably until batch end. With conventional sensors, that knowledge is not available. ISM sensors, on the other hand, continuously monitor their condition and display predictive diagnostics information, such as remaining lifetime or time to maintenance, on the connected transmitter and asset management software. This will allow Solazyme / Bunge technicians to check the condition of sensors before fermentation starts and conduct any corrective maintenance necessary. ISM diagnostics will provide them with a level of measurement assurance that is not possible with analog sensors.

If you want to operate your fermentation processes with confidence, go to:

▶ **www.mt.com/ISM**

InPro 3253 i pH sensor

InPro 6850 i O_2 sensor

M400 transmitter

Sugar Extraction from Beets
A Job That Weighs Tons

At the Aarberg Sugar Refinery, more than 12,000 tons of sugar beets a day are delivered in the harvest season. Problems with weighing vehicles in goods receiving because of old or poorly maintained load-cells would result in logistical problems and high costs. Thanks to the PDX® modification kit, the existing load-cell installation was replaced quickly and without complications, ensuring continued delivery punctuality.

Sugar provides both nourishment and enjoyment. It not only tastes good, but helps the body as an important supplier of energy. In Switzerland, this sweet energy supplier is attained from sugar beets. To this end, around 6,000 farmers supply the harvested beets to the sugar refineries at Aarberg and Frauenfeld AG (ZAF), which are the only companies in Switzerland to do the processing. Annually, from 1.5 million tons of sugar beets, about 250,000 tons of sugar and 400,000 tons of by-products are produced. Eighty percent of the produced crystal sugar is industrially recycled and only 20 percent flows into direct consumption. Valuable side products, such as beet slices and molasses, are used as nutrient-rich feedstuffs or are re-used in the baking industry.

Environmentally sensitive transport by rail

In the harvest season (October – December), 12,000 tons of beets having a total value of over USD 855,000 are processed every day. Practically without interruption, tractors and entire freight trains with sugar beets roll in and must be weighed quickly and without errors. The current beet price multiplied by the weighed amount ultimately determines the total that each individual farmer receives for his delivery and work. Half of the delivered amount at the Aarberg production site is delivered by road and half by rail transport.

Dependability is a must

A failure of the weighing system would immediately result in massive obstacles on roads and rails. The beets would have to be temporarily stored again and massive costs and losses in quality would result. Therefore, nearly 100 percent reliability and high precision are essential factors that a new weighing system must satisfy.

Simple load-cell replacement

In 2012, the Aarberg sugar refinery decided to replace its eight load cells in the rail scale. The new system would have to be easy to install and handle the daily load of 300 cargo-car loadings without problems or disruptions. Because the system used until

New installed PDX® load cell.

Fast weighing process with PDX® technology.

now had worked reliably and flawlessly, ZAF decided to replace the existing METTLER TOLEDO installation using a special modification kit. With this kit, older load cells are replaced by load cells with the latest PDX® technology.

The load cells were installed together with a new IND780 terminal. The terminal offers an optimum presentation of relevant information and allows the simple implementation of customer-specific applications via a graphics programming tool. It is the optimum tool to implement the required weighing accuracy in applications that require Weights and Measures calibration.

100 years of sweet success

The modification was completed shortly before the start of the harvest in autumn 2012 and up to the present day has been supplying continuous and precise measurement results. The hundredth year of production at the Aarberg sugar refinery was concluded and deemed a sweet success.

- www.mt.com/powercell
- www.zucker.ch

PDX® Technology Benefits

- **Robust design**
  Prevents typical load-cell system problems
- **Simplified network**
  No junction boxes to cause failures
- **Predictive diagnostics**
  Predicts faults to minimize repair expense
- **Double-shielded cables**
  Prevents rodent or other costly damage
- **Quick-connect cables**
  Rapid and secure connection/replacement

Conversion Kits

- Designed for retrofitting existing rail and truck scales
- Used to install POWERCELL® load cells in place of high-maintenance lever systems, analog load-cells and hydraulic load cells
- Also available to update previous generations of POWERCELL to the latest technology.

Tips and Tricks

FREE

How Much Does Downtime Cost?

Don't be taken by surprise. Find out how much money you stand to lose if your vehicle scale is shut down temporarily.

The METTLER TOLEDO return-on-investment (ROI) calculator lets you see how much money downtime can cost you and how much POWERCELL® PDX® technology can save you.

Use the ROI calculator to estimate your savings:

- www.mt.com/powercell-reliability

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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www.mt.com/pro
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