Brewery
Perspectives in Liquid Process Analytics

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News

INGOLD
Leading Process Analytics

More Uptime, Reduced Cost of Ownership
with Optical DO Measurement

The fast response, excellent signal stability, and low maintenance of METTLER TOLEDO's intelligent optical dissolved oxygen sensors will help you produce a higher quality product and save on costs.

Keeping oxygen at a minimum

Oxygen can be detrimental to beer quality: Its presence can oxidize flavorings, allow the growth of microorganisms, and reduce shelf life. Moreover, longer distribution channels have put increasing pressure on breweries to minimize dissolved oxygen in products. Therefore, filler line, filtration, blending, and deaeration processes require oxygen measurement systems with high accuracy at very low levels in order that any increase in oxygen concentration can be detected immediately. Of equal importance, time required for O_2 sensor maintenance must be kept short due to the cost of unplanned process interruptions.

Innovative optical dissolved oxygen system

The InPro 6970 i optical O_2 sensor is highly accurate at ppb O_2 levels, offers a very fast response time, and is also extremely easy to maintain.

Some amperometric systems require up to 10 minutes after a Clean-in-Place (CIP) cycle before they produce a stable reading. The 20 second response time of the InPro 6970 i enables fast start up of the filling process after a switch from rinsing water to beer, and consequently, beer losses are reduced.

Simple maintenance, fast calibration

Optical oxygen sensors are also characterized by their easy maintenance: Instead of membrane body, inner body, and electrolyte that have to be replaced on amperometric sensors, the InPro 6970 i has only

METTLER TOLEDO

one consumable component, the OptoCap. It contains a fluorescing, oxygen-sensitive membrane which is the key to the sensor's superb accuracy and speed of response. Replacement of the OptoCap can be done by even un-skilled personnel in only a few minutes. In typical applications, the OptoCap needs to be replaced annually, compared with maintenance every three to six months for amperometric sensors.

The long lifetime of the OptoCap, together with its fast and easy replacement, drastically reduces maintenance costs and the risk of handling errors.

Calibration is a quick and straightforward procedure, and in-line calibration within the process is even possible. After calibration, system status information is displayed on the transmitter in real time, increasing the reliability of the measurement point.

Plug and Measure

The InPro 6970 i features METTLER TOLEDO's unique Intelligent Sensor Management (ISM®) technology. ISM provides an array of features that simplify sensor operations and improve process reliability. All sensor data, including calibration history, are stored in the sensor itself. After performing maintenance and calibration, installation in the process is simple. Upon connecting the sensor to an ISM transmitter, such as the M400, all relevant data is automatically transferred to the transmitter and an oxygen reading is available immediately – no pre-polarization is required. Thanks to iSense software that allows ISM sensor calibration in any convenient location, the InPro 6970 i can even be calibrated in advance and stored ready for use, making sensor replacement even quicker and more convenient.

Predictive diagnostics

Another useful ISM feature of the InPro 6970 i and M400 is a set of advanced diagnostics tools. The Dynamic Lifetime Indicator monitors the quality of the OptoCap after each calibration and, together with the current process conditions, calculates and displays on the M400 the remaining lifetime of the OptoCap. Unscheduled downtime due to sudden failure of the sensing element is therefore avoided.

Top performance

The combination of optical measurement technology, ISM, and METTLER TOLEDO's years of experience in designing sensors for the brewery industry means that the InPro 6970 i is the most efficient and reliable oxygen sensor on the market.

If you want to reduce costs in your brewing processes, go to:

- ► **www.mt.com/InPro6970i**
- ► **www.mt.com/M400**

M400 transmitter

ISM

InPro 6970 i optical oxygen sensor

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Robust, Accurate, and Trouble-free
Intelligent pH Measurement for Hot Wort Processes

One of the most demanding in-line measurements in a brewery is pH regulation during boiling of the wort. In the past, reliability of the measurement was affected by the extremely harsh conditions. Robust, modern pH measurement systems that predict their own maintenance offer a dependable, cost-effective solution.

Why a pH measurement?

During wort boiling, protein and hop tannins are released which coagulate during the hot break process. Optimal separation of these substances, e.g., through precipitation, is important for the stability of the flavor of the beer.

Coagulation of the proteins can be improved if, at the end of the boiling process, the pH value is reduced to 5 – 5.2. This is achieved by adding mineral acids or by means of biological acidification, i.e., by adding lactic acid. The acidification is regulated through monitoring the pH value.

What are the conditions?

Temperatures of about 100 °C, high suspended solids content, and extreme pH jumps between CIP cycles are a tremendous challenge for pH sensors. These stress factors can cause a creeping loss of measurement performance and eventually lead to measurement errors, with a negative impact on the hot break process.

What are the expectations?

In light of these considerations, the lifetime of most pH sensors is approximately three months, during which its operational behavior should be continuously monitored and any need for maintenance promptly carried out by the user.

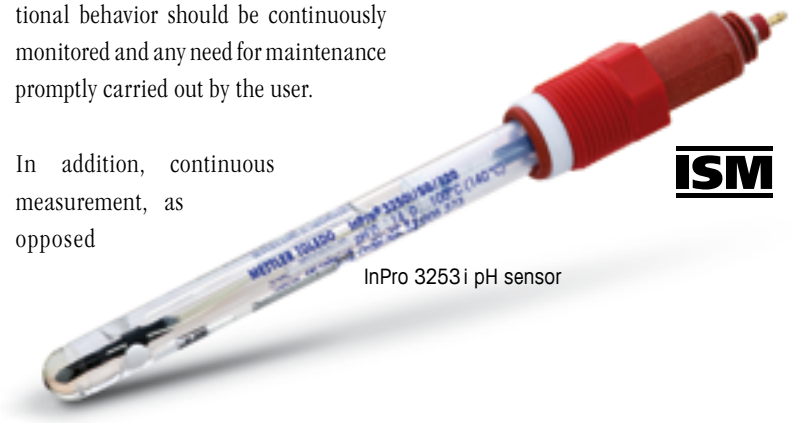
In addition, continuous measurement, as opposed to off-line grab sample measurement, provides the possibility of creating a pH profile for every boiling process, i.e., a 'fingerprint' of the process that can then be used for quality assurance procedures.

What is the METTLER TOLEDO solution?

For wort kettles with an external boiler, the InPro 3253 i pH sensor can be installed in the boiler piping system using an InTrac 777 retractable housing. For kettles with an internal boiler, direct installation into the kettle is also possible.

Tolerance of high temperatures means that the pH sensor can remain in the measuring position during CIP cycles. During long production downtimes, the pipe should be filled with water so that the sensor does not dry out.

The compatible multi-parameter / multi-channel M800 transmitter is suitable for either pipe or panel mounting.



InPro 3253 i pH sensor

What are the results?

Practice has shown that the InPro 3253 i provides reliable and reproducible values for well over three months, due to its special membrane glass and self-cleaning diaphragm.

Intelligent Sensor Management (ISM®) diagnostics tools predict when sensor calibration and replacement should be performed. The InTrac 777 retractable housing enables safe removal of the sensor without process interruption.

In interaction with the M800 transmitter, the sensor's operational behavior is constantly monitored, and any deviations from plant-typical characteristics are immediately reported so that ideal operational performance can be re-established without significant delay.

What are the benefits?

The sensor's long lifetime under these demanding measurement conditions results in a significant reduction in costs for replacement sensors.

Over and above this, continuous pH measurement allows optimal acidification for the extraction of protein and hop tannins, and in the case of biological acidification, even at fluctuating concentrations of lactic acid in the batch tank.

Operational behavior and availability of the measurement point are significantly improved by ISM's diagnostics features.

Find out more about the InPro 3253 i at:
▶ **www.mt.com/InPro3250**

InPro 8200 Sensor

Reduced Flocculant Costs at ETP

Thanks to In-line Turbidity Measurement

Turbidity monitoring is important for liquid/solid separation in waste treatment. A low maintenance, backscatter, turbidity sensor from METTLER TOLEDO is helping a UK brewery to control flocculant dosing at their effluent treatment plant.

Flocculants for wastewater treatment

Flocculants are chemicals that promote the clumping together of substances by causing suspended particles in liquids to aggregate, forming a 'floc'. Use of flocculants in wastewater treatment is important for removing contaminants, as they improve the sedimentation or filterability of small particles in the waste stream and thereby ease their removal.

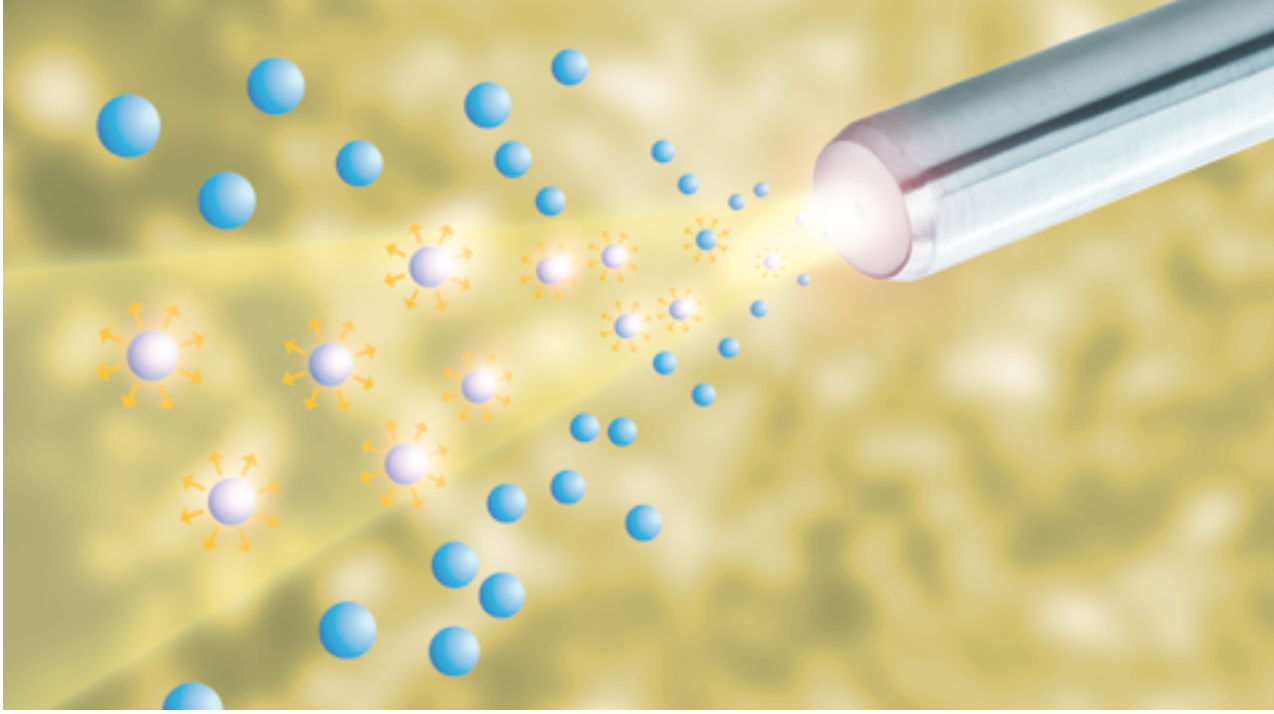
Common flocculants often include cationic species such as aluminum, calcium, iron, and magnesium. Commercially available long-chain polymer flocculants, such as modified polyacrylamides, are widely used in wastewater treatment. They usually have a number of functions besides flocculation such as break up of emulsified oils in water, pH alteration, and encapsulation of metals. These processes all help to separate solids from the effluent stream by forming a waste sludge that easily precipitates out of the solution. The treated water can then be safely discharged to drain or reused.

Flocculation also allows a reduction in process time, which means wastewater can be treated faster and throughput can be increased.

In recent times, naturally-based flocculants that produce environmentally benign floc are becoming increasingly popular, as they help to reduce disposal costs.

Why use turbidity?

A UK brewery was looking for a way to monitor the levels of flocculants added to



wastewater so that it could be dosed correctly and prevent wasteful over-dosing and potentially ineffective under-dosing. The turbidity sensor would also be used for monitoring the efficacy of the flocculants to ensure they were producing the desired effect. METTLER TOLEDO was asked to provide a solution.

Turbidity is the ideal measurement for this application, as the resulting flocs from turbid sediments can easily be measured using backscatter turbidity techniques. METTLER TOLEDO backscatter turbidity sensors have a wide measurement range that provides great application flexibility. In addition, these low maintenance and robust sensors are particularly beneficial for use in continuous and often unmanned processes, such as those at ETP installations.

Low-maintenance solution

The brewery required a sensor suitable for medium to high levels of total suspended solids (15 g/l) that could be retracted from a pipe installation to allow easy sensor cleaning whilst the process was still running.

The supplied METTLER TOLEDO system comprised the InPro 8200 turbidity sensor, InTrac 779e retractable housing, and Trb 8300 transmitter. The InPro 8200 sensor is a dual optical fiber turbidity sensor that is designed for a wide variety of industrial applications, including liquid/solid separation. Due to the nature of the brewery's process, it was important that the sensor be resistant to fouling and easy to maintain. The InPro 8200 was therefore a wise choice, as it requires little maintenance and has a uniform structure that reduces fouling on its scratch-resistant sapphire window. This prevents build-up of contaminants, allowing error-free measurement.

Combined with the InTrac 779e retractable housing with integral flushing chamber, our customer is able to retract the sensor at regular intervals and clean or calibrate the sensor without interrupting the process.

Reduced costs

By installing the InPro 8200 turbidity sensor with the Trb 8300 transmitter and InTrac 779e retractable housing, the brewery is now able to monitor the dosing of flocculants with precision and ease. This has helped to reduce costs as only the necessary amount of flocculant is added. Consequently, the process has become more efficient as throughput of the effluent treatment plant has been increased.

If you want to reduce your effluent treatment costs, visit:

▶ **www.mt.com/turb**

InPro 8200 turbidity sensor

Trb 8300 transmitter

Reliable, Simple, Convenient Measurement
with a Temporary Data Logger

Temporary data logging in many applications is needed for process optimization, quality assurance or troubleshooting purposes. The temporary data logger, iRO, from METTLER TOLEDO offers a unique solution, providing easy installation and commissioning thanks to ISM® technology.

Easy to install, simple to use

The iRO data logger is the ideal tool, in combination with METTLER TOLEDO Intelligent Sensor Management (ISM) systems, for temporary in-line analytical measurement. iRO (which stands for "intelligent remote operation") records real-time in-line measurements without the need for time-consuming installation, as no wiring for power supply or data acquisition is required. Plug and Measure functionality, a feature of our ISM technology, ensures error-free commissioning. While Bluetooth communication for data read out and system configuration sets a new standard in ease of use.

Here, we look at three uses for iRO that will save you both time and money.

iRO with sensor

Process optimization

During process development and optimization of production processes, in-line measurement of analytical parameters, such as pH, oxygen concentration, and conductivity, is often vital. Finding the most suitable installation points for analytical instruments can be a long and complex process if complete measuring systems have to be installed temporarily.

The iRO data logger is easy to commission, as it needs no wiring and thus simplifies short-term data acquisition. Measurements from up to two sensors can be logged for several months, and data read out with a computer over a Bluetooth connection can be performed within a minute. The data can be stored in a format that can be easily imported into Excel for processing and analysis. Each data set contains the measurement value, date and time, and important sensor details such as serial number and diagnostics information.

Quality assurance

Quality managers need data. The traceability of process parameters at different measurement positions is required for guaranteeing the reproducibility of a production process and compliance with validation requirements. The iRO temporary data logger is able to provide additional information to the existing measurement points, without the need for complicated installation.

Troubleshooting

In processes such as filtration and filling, oxygen contamination can significantly reduce the quality and shelf life of the final product. To find the source of the contamination, oxygen measurement at various positions is necessary. Installation of a complete measurement system needs wiring and connection to the control system. iRO is the perfect tool for these situations. No wiring is needed and the data can be read out at any time. Data acquisition over weeks or months is simply achieved.

Discover more reasons to use iRO, at:
► **www.mt.com/iRO**

White Papers

Discover More
and Increase Your Brewery's Efficiency

Find out in our complimentary white papers how modern analytical measurement systems can help you increase productivity, maintain product quality, and reduce costs.

Greater Process Reliability with Intelligent Sensors

In-line analytical measurement systems are of great value throughout the brewing process for monitoring product quality, dissolved gas levels, water to beer phase transition, etc. For reliable operation, measurement sensors must be kept in good order, but it can be difficult to tell when maintenance or calibration is required. Cutting-edge process analytical systems with Intelligent Sensor Management (ISM®) are the solution. Find out why in our white paper.

► **www.mt.com/ISM-brewery-wp**

Optical Oxygen Measurement: Illuminate Your Process Control

For many decades, oxygen measurement systems based on amperometric technology have been a reliable and easy to use solution in many brewery applications. But the interest of the market in new solutions has grown in line with increasing requirements for reliability, user friendliness, and cost efficiency in demanding processes. Optical measurement technology has significant advantages over amperometric technology. This white paper explains what these advantages are and why optical measurements are replacing amperometric systems.

► **www.mt.com/pro-optical-wp**

Don't Lose Your Fizz: Safeguarding CO_2 Measurements

Measurement of dissolved CO_2 is important in certain beer and carbonated soft drinks production processes. In the past, in-line measurement systems have been prone to failures in operation that can lead to wasted product. This white paper explains how an in-line sensor with Intelligent Sensor Management (ISM) technology has solved these problems by monitoring itself for performance issues, and providing early alarms to allow rapid corrective action.

► **www.mt.com/pro-co2-beer**

Premium Brands Benefit
from 100 % Packaging Confidence

For an established wine company, presentation and product quality are crucial to its success. These are both factors they do not want to jeopardize. By using a vision inspection system, this manufacturer has 100 % confidence in its product quality, ensuring brand reputation is maintained.

Producers of the world famous Franzia® and the sensational Cupcake® Vineyards brand, The Wine Group, Inc. (TWG) uses vision inspection on its production lines. This ensures high quality in filling accuracy, packaging and bottling presentation. This technology also has the advantage of automated checking, rather than manual inspection. Therefore, cases are produced more efficiently with improved quality.

A need for accuracy and reliability

Its widely recognized brands could be severely diminished with the distribution of just one batch of defective product. Not only this, inappropriately filled bottles go against standards, which are regulated by industry specifications.

A confident choice

TWG chose to implement vision inspection systems into its production lines instead of manual inspectors. By utilizing vision inspection technology, any errors caused by manual inspection have been stopped, ensuring overall product quality. Also, substituting manual inspectors has led to additional labor resources being used in other quality control initiatives within the facility.

With production speeds of 200 bpm running through the labeler, manual inspection became nearly impossible. CI-Vision is able to accurately inspect at speeds of 200 bpm and greater. TWG's vision inspection solution currently performs the job of what normally requires six quality inspectors. CI-Vision designed TWG's two solutions according to the needs of the wine manufacturer.

Complete protection

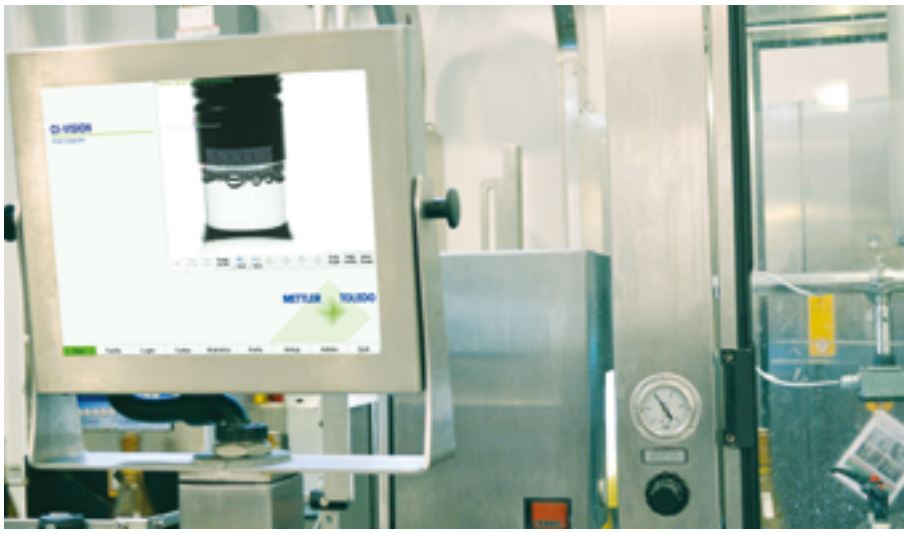
The first station is installed directly after the filler, with inspection of correct fill height, presence of cap, screw cap, and cork, with the majority of defects occurring during the capsules process. Station two is found directly after the labeler and consists of three cameras inspecting for the presence of capsule, front and back label, and correct product registration.

Inspection priority

TWG's greatest inspection need is ensuring accuracy of label application. Label presence and quality is essential for upholding the brand reputation. According to Wine Marketing Consultants, "A brand is an idea, and if perceptions by anyone interacting with the product are negative the strength of the brand will suffer and brand equity will be lost."

Prevention is key

In one instance, CI-Vision's label inspection system prevented wrong labels from being applied on up to 1000 cases. Thanks to the system's accurate specifications, TWG was able to prevent a potential liability. With an average pro-



Bottle top inspection

Vision inspection systems on the production line at The Wine Group, ensuring labels are straight and legible, seals are safe and secure, and that bottles are filled accurately.

duction turnover of 30 million bottles on a single line, reliable inspections that never tire are essential for successful production and brand integrity.

Vision training

As a part of a vision inspection program at CI-Vision, expert training is provided to customers and line operators by vision experts, making ownership of the solution easy and efficient. Using their knowledge gained from the training courses, operators are able to challenge the system to always ensure its accuracy. Once systems are product trained and quickly tested for accuracy, they run efficiently on their own and inspections no longer become a concern to manufacturers.

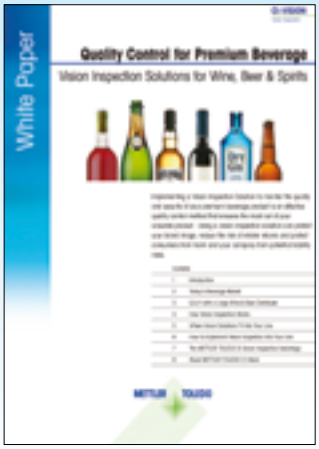
* TWG brands and case study used with the express written permission of The Wine Group, Inc.

► **www.mt.com/civision**

White Paper – Quality Control for Premium Beverage

The global premium beverage manufacturing and packaging industry demands excellent product quality every time in order to ensure brand integrity.

This new white paper covers topics such as the growing demand within the premium beverage market, and why it is more valuable than ever to integrate vision inspection technology into the production line. It examines how a vision inspection program can be a valuable tool for premium beverage manufacturers, helping to protect their brand image and their bottom line.



Download the free white paper:
► **www.mt.com/civ-premium**

Unequalled Reliability
A New Benchmark in CO_2 Sensors

Maintaining the desired dissolved carbon dioxide concentration in brewery processes gives beer the sparkle that consumers like. Dissolved CO_2 sensors based on thermal conductivity determination provide accurate measurements, but a decrease in sensor membrane integrity or the required purge gas supply can easily cause problems. METTLER TOLEDO's CO_2 sensor has the answers.

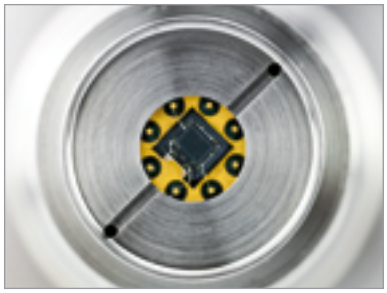
The InPro 5500i CO_2 sensor combines the well-proven thermal conductivity measurement method with the simplified handling and predictive diagnostics features of the unique Intelligent Sensor Management (ISM®) concept.

ISM's predictive diagnostics tools provide an immediate alarm should the integrity of the CO_2-permeable membrane drop or purge gas supply decrease. The sensor's sensing element will even shut down to protect itself from damage.

The InPro 5500i sensor helps breweries to maintain product quality and control CO_2 costs by providing accurate measurements in CO_2 critical processes.

Find out more at:
► **www.mt.com/InPro5500i**

Your benefits



Proven technology
Improved thermal conductivity technique for greater accuracy and low drift.

Convenience
Simple maintenance with hygienic membrane cap design.

High uptime and greater durability
Membrane integrity detection for high process availability. Automatic sensor protection if purge gas fails.

ISM

InPro 5500 i
dissolved CO_2 sensor

Get in-line with METTLER TOLEDO

Intelligent Sensor Management
for Brewing Processes

ISM® is METTLER TOLEDO's digital technology platform for process analytical measurement systems. With ISM solutions, maintenance becomes predictable, sensor handling is simple, and process uptime is increased.

See the complimentary brochure, white papers, and software on our website for the brewery industry and discover how ISM delivers:

Greater process reliability
Easy sensor handling
Reduced maintenance

▶ **www.mt.com/ISM-brewery**

ISM

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