Sugar Starch & Yeast
Perspectives in Liquid Process Analytics

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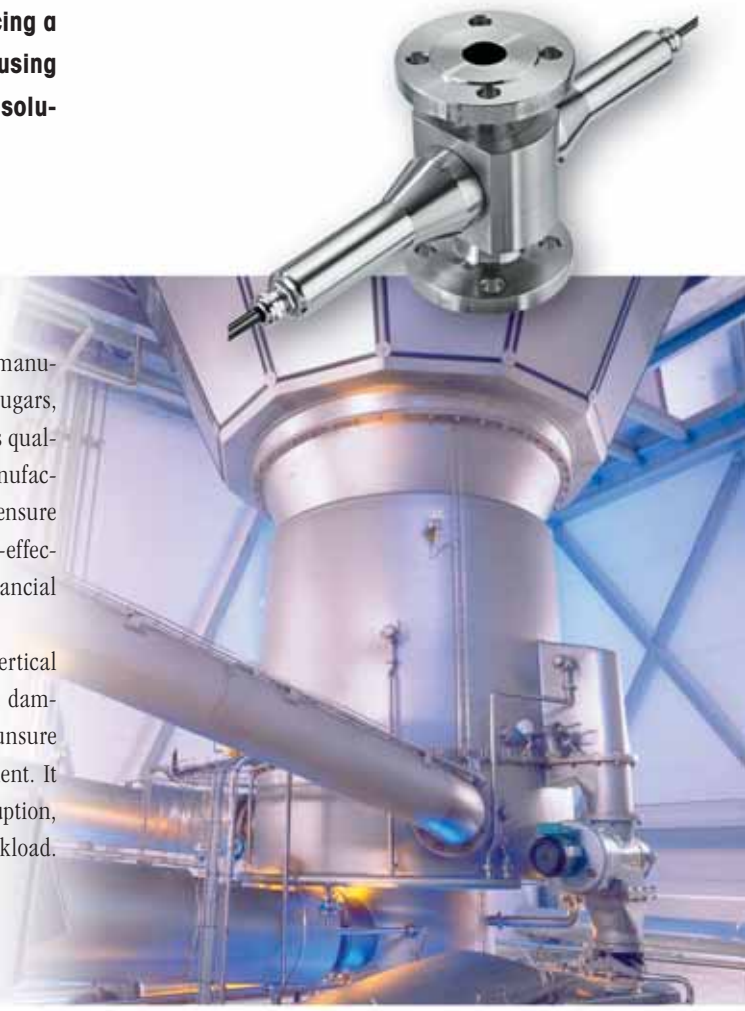
News

INGOLD
Leading Process Analytics

Forward Scattered Turbidity Provides Quick Payback on Filtration Application

A manufacturer of sugars, starches and sweeteners was experiencing a problem with filtration of starch towards the end of a process, causing disruption and process downtime. The company needed a reliable solution from a supplier it could trust.



The sugar, sweetener and starch industry in the UK

In the UK, sugar is made of home-grown sugar beet. However, 45% of sold sugar is cane sugar (refining of imported raw cane sugar). Sugar production in the UK is restricted by EU quotas (e.g. UK beet sugar production is limited to around 1.2 million tons) and accounts for 2.2 million tons of sugar per year, approximately 80% of which is sold direct to industrial users. The UK also produces 470 000 tons of sweeteners (natural and artificial). Starch in the UK is made mainly from cereal grains and imported maize. The production volume is around 800 000 tons. There are about 30 starch, sugar and sweeteners plants in the UK, some of them recognized as the most efficient ones in the EU.

The customer – a global key player

The company – part of a global manufacturer whose portfolio includes sugars, sweeteners and starches – produces quality products using high-tech manufacturing processes. It works hard to ensure operations are as efficient and cost-effective as possible to deliver real financial and environmental benefits.

At one of its UK operations, the vertical tank filters were getting worn and damaged. These meant operators were unsure when the filters required replacement. It also led to unexpected process disruption, filters downtime and increased workload.

METTLER TOLEDO

Good reasons to select METTLER TOLEDO

The company sought the advice of Mettler-Toledo Ingold. It currently uses INGOLD products for pH and conductivity and has been pleased with the performance over a long period of time. In addition, the company has been happy with the product support it receives from application consulting through to installation and maintenance contracts.

The suggested turbidity solution

The proposed solution was a forward scatter inline turbidity system including an InPro 8400 MT sensor, to provide immediate warning of filter breakthrough. Forward scatter turbidity provides a better measuring technique for low turbidity readings than the backscatter method. It has been designed for measurement applications in industrial pipelines and provides important data for optimization, control and monitoring of production processes.

A sensor was installed on a recirculation pipe via ANSI flange on the outlet of a filtration tank, the transmitter Trb 8300 F/S processes the information and an alarm limit was set. The turbidity transmitter provides a 4-20mA signal to the company's DCS (Distributed Control System) so that when the set point is reached, the company can take appropriate action.

System performance and benefits

Such a system provides several benefits. The Trb 8300 F/S turbidity transmitter operates with a fiber-optic measuring probe immersed in the reaction mass of the process. Sapphire optics allow measurements in the harshest conditions and resist coating thereby maintaining peak accuracy and process safety. Sensor diagnostic features provide reliable and accurate measurements, preventing time consuming cross checks with offline laboratory equipment and consequently avoiding process interruptions. In addition, on-site correlation of sensor and transmitter allows for flexible interchangeability of system components and faster operational readiness.

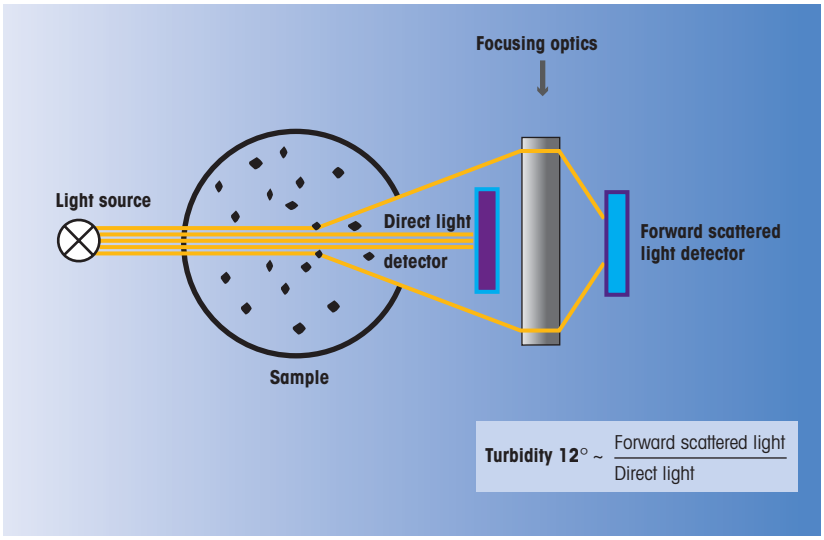
Payback in less than 12 months

The company found that payback for the equipment has taken less than 12 months, mainly due to improved productivity through reduced downtime. The system has given the company visibility of when a breakthrough is occurring so that action can be taken and expensive re-filtration minimized.

www.mt.com/turbidity

InPro 8400 MT.

Trb 8300 transmitter.



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Cost-saving pH and conductivity measurement in desalting process

High-fructose syrups (HFS) are produced from various starchy raw materials. In ensuring that process salts are entirely removed during the demineralization stage, precise pH and conductivity measurement systems from METTLER TOEDO have proved highly reliable and, moreover, particularly cost-effective.

Background

The process for making the sweetener high fructose syrup from corn (HFCS) or other starchy cereals was commercially developed in the 1970s. HFCS is produced by processing corn starch to yield glucose, and then processing the glucose to produce a high percentage of fructose. HFCS and other corn syrups now account for 40 percent of caloric sweetener use in Japan, and more than 50 percent in the U.S.A. Main use is in softdrinks, processed foods, breads, breakfast cereals, baking and cooking ingredients.

Desalting of HFCS

Following the saccharification process, which entails the use of salt-based enzymes, it is necessary to remove the mineral salts present in the raw corn syrup in order to avoid negative influence on the flavor of the final product. To remove these salts, the syrup is passed through a battery of ion-exchange resin columns. In all there are six columns arranged alternately, cationic / anionic:

C-1, A-1, C-2, A-2, C-3, A-3. (see fig. p4)

Normally, two pairs of cationic / anionic columns are in operation, the third pair either going through regeneration or in waiting position. The syrup circulates through the columns in upwards flow direction. Passing through the first pair of columns removes the major part of the salt content. In the second pair of columns, the salt content, and consequently the conductivity of the syrup, is reduced even further. Monitoring of conductivity is performed at the entry and exit of each column. Adjustment of the pH value is carried out continuously as appropriate.

Process requirements

In each pair of anionic / cationic ion exchange columns, precise measurement and control of the pH and conductivity parameters are necessary to ensure that the salts have been removed entirely. Conductivity declines at each sequential ion-exchange stage, starting at a value of 3000 to 5000 µS and falling to an end value of ~2 µS. One difficulty of the process lies in the extremely low ultimate conductivity of the concentrated syrup which calls for pH electrodes and sensors of sufficient sensitivity to enable exact, correct measurement of the pH value. The sensitivity and precision of the electronics also play a key role in this application. Moreover, due to the highly contaminating sample media, frequent cleaning of the pH sensor is crucial to successful measurement.

Mettler-Toledo Solution

Each ion-exchange column was equipped with a pH loop and two conductivity loops, one at the inlet and one at the exit of the column:

1. pH loop

- Transmitter pH 2100 e for continuous monitoring of pH value. SENSOCHECK® function with continuous diagnostics of electrode status to provide early warning of problems deriving from contamination or aging of the electrode
- pH electrode 465-50-S7 / 250 with liquid electrolyte offering the most precise pH measurement value. Continuous outflow of electrolyte results in constant cleaning of the diaphragm, avoiding erroneous readings as a result of coating of the diaphragm.
- Retractable housing InTrac 776 e Hygienic material PVDF. Pneumatically-actuated withdrawal of the electrode from the sample medium and consequently automated electrode maintenance. Internal chamber that allows the electrode, once isolated from the process, to be flushed and calibrated without contaminating the process medium Immersion length 70 mm in operation mode.

2. Conductivity loop

- Transmitter Cond 7100 e for continuous monitoring of the conductivity value and temperature. SENSOCHECK allowing continuous diagnostics of the status of the sensor, providing early warning of need for calibration.
- Conductivity sensor InPro 7100 VP Hygienic material PVDF with two titanium sensors Pressure-resistant up to 34 bar at 25 °C (77 ° F), and 7 bar (101.5 psi) at 100 °C (212 °F). Sensitivity: one 1/100 µS Integrated

temperature sensor Pt1000 providing temperature compensation of the measurement.VP Connector (IP68).

First-time installation for new plant

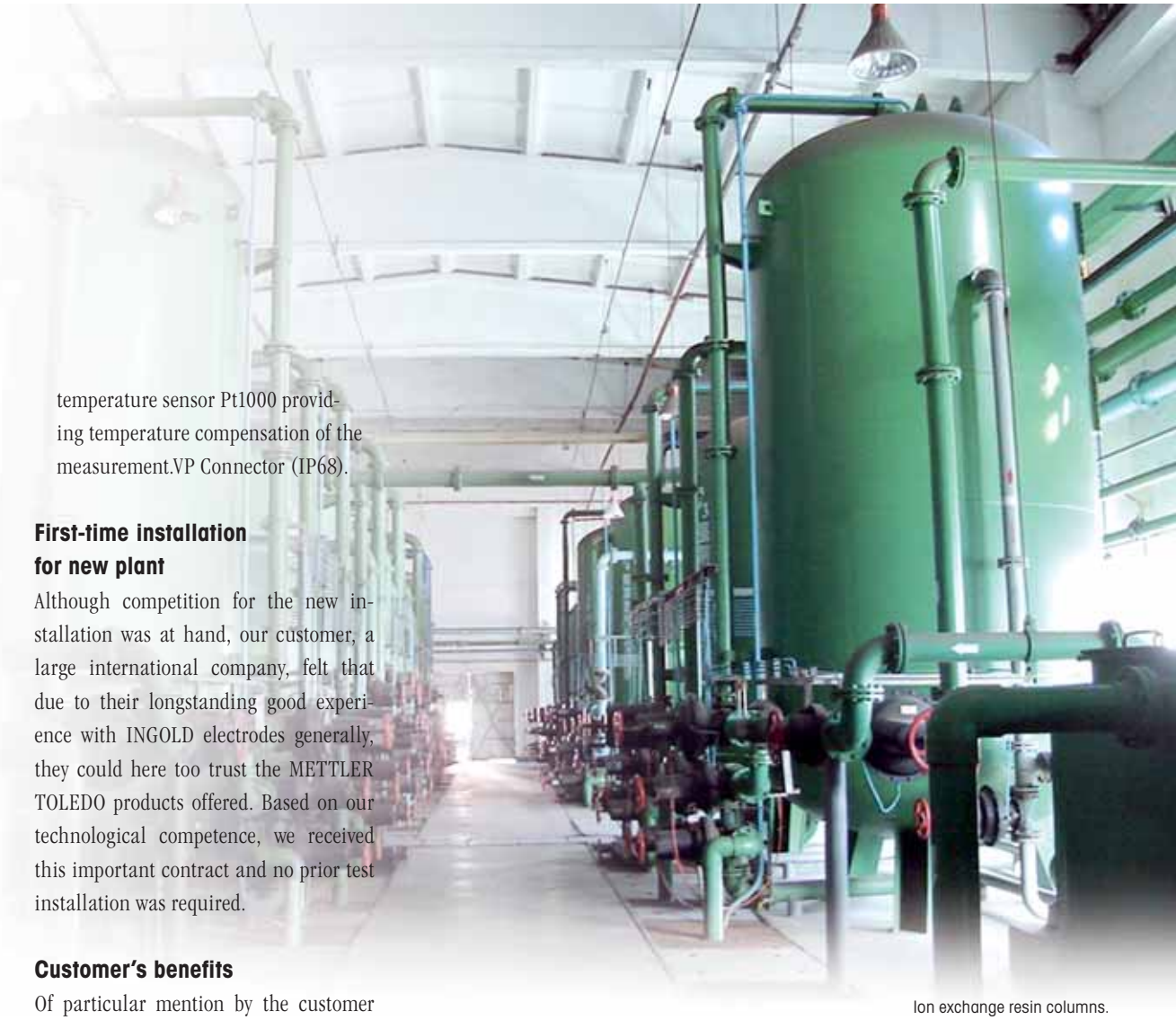
Although competition for the new installation was at hand, our customer, a large international company, felt that due to their longstanding good experience with INGOLD electrodes generally, they could here too trust the METTLER TOLEDO products offered. Based on our technological competence, we received this important contract and no prior test installation was required.

Customer's benefits

Of particular mention by the customer was the fact that pH electrode maintenance was made all that much easier by the use of the InTrac retractable housing. Regular cleaning and calibration of the electrode with very little effort, provided superior, reproducible measurement values, extended the life of the electrode, and resulted in tangible cost savings.

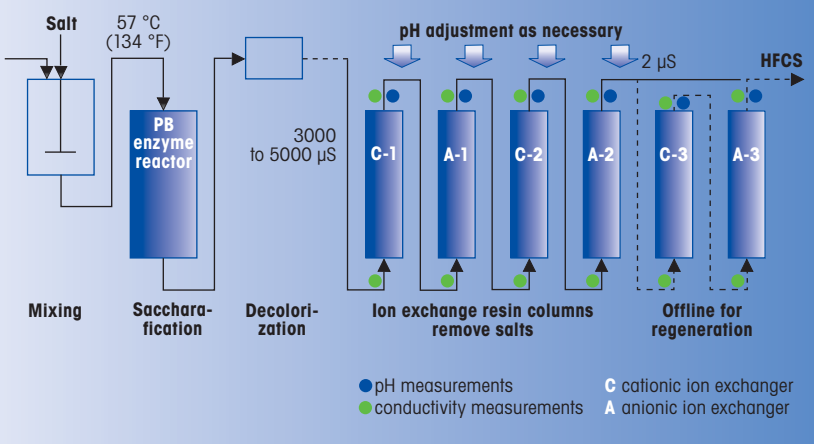
www.mt.com/pro-pH

www.mt.com/cond



Ion exchange resin columns.

Production of HFCS
(High fructose corn syrup)



ISM® Systems:
Information for Efficiency

ISM® Intelligent sensor management systems can offer higher productivity, less downtime, better operational safety, lower operational costs, and improved profit margins.

Intelligent sensors – a must for any modern process plant

Smart sensors store information and intelligent sensor management systems use information in an adaptive way. The focus of these new instruments is on communication, interrogation and performance-status features in line with customers' rising demands.

Costs for maintenance and consumables are often exploited to justify high operating budgets. ISM systems can alleviate this situation.

What are the cost drivers?

A conventional "loop" or a measurement point such as pH can cost up to four times the initial acquisition cost over its lifetime. Costs driving this include maintenance, consumables and downtime. Maintenance and consumables costs are often exploited to justify high operating budgets and elaborate schedules to "monitor" equipment. The pressure from the process industry is clear. It needs more useful, predictive information in order to be able to make timely and prudent decisions.

ISM® helps to control the cost drivers

An intelligent sensor management system (ISM®) can alleviate the situation:

- Ease of operation: Workers must be able to understand the instrument.
- Safe operation: 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.
- Self-configuring: This feature provides communication between transmitter and sensor, including connectivity status, sensor identification and calibration data, such information being displayed immediately on connection.
- Self-assessment and advanced diagnostics: pH instruments are capable of monitoring sensor slope, zero point, reference impedance, glass impedance and response-time monitoring. ISM® systems monitor operating time, process temperature and chemical concentration exposure. They are predictive and use the above information in an adaptive manner to establish sensor wear and automatically adjust calibration timing.

Open communication enables flexibility

ISM® systems should be compatible with industry standards and able to utilize an open communication protocol such as IEEE 1451.4 as well as a widely acceptable connection system such as VarioPin connectors.

Practical benefits of ISM® sensors

With ISM® systems, 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. 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.

Economic benefits

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.

A conventional "loop" or a measurement point such as pH can cost up to four times the initial acquisition cost over its lifetime.

www.mt.com/pro-ISM

Original INGOLD Accessories
Keep your Measuring Systems Running

METTLER TOLEDO not only provides complete measuring systems to control parameters such as pH/ORP, dissolved and gaseous oxygen, CO_2, conductivity and turbidity, it also offers you a comprehensive and well-balanced package of accessories.

pH and ORP Accessories

METTLER TOLEDO offers a wide selection of pH buffers, electrolytes, cleaning and storage solutions to facilitate operation and maintenance of its high-accuracy pH measurement systems.

Oxygen Accessories and Maintenance

To maintain the membrane integrity of oxygen sensors, kits of multiple membrane types, including membrane body, electrolytes and O-rings are offered.

Continued Support

Many customers still rely on our previous generations of products. We are committed to continue to provide maintenance materials, service and technical support for all of these products.

For more information, we invite you to visit:

www.mt.com/pro-service

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