

# Chemical & Petrochemical

Perspectives in Liquid Process Analytics



# 23 News

**INGOLD**

Leading Process Analytics

## 400 % Improvement in Sensor Lifetime at Coke Power Plant

**The effluent gas produced after combustion of coke fuel has to be processed by a wet scrubber prior to release. For a power plant in a Japanese refinery, the highly demanding scrubber environment was taking its toll on pH sensors. After switching to a METTLER TOLEDO measurement solution, pH sensor lifetime has increased dramatically.**

### **Coke fuel**

Fuel-grade petroleum coke is produced in the refinery process and typically uses vacuum resid and various other heavy fractions as feedstock. The coke contains around 7 % sulfur, so the exhaust effluent produced during combustion must be passed through a desulfurization unit (wet scrubber) prior to discharge.

### **High cost of measurement point maintenance**

In order to sustain scrubber efficiency, measurement and control of pH is required. But coating of the sensor from gypsum present in the effluent makes pH measurement highly problematic.

To maintain a reliable measurement at a Japanese refinery's power plant, the in-

stalled pH system required weekly calibration and daily cleaning of the sensor. Even with this regular maintenance sensors would survive only three weeks. Power plant instrument engineers required a system that would be far more cost efficient.

METTLER TOLEDO proposed a solution that would not only be very reliable, but would also be significantly easier to maintain.

### **Scrubber tolerant pH sensor**

The InPro 4800 i pH sensor has been designed to tolerate the type of conditions found in the refinery's scrubber. It features a very long diffusion path in a double electrolyte chamber and a dirt-repellent PTFE junction. These features give the



**METTLER TOLEDO**



sensor a high resistance to aggressive chemical environments. It will also operate dependably in process pressures up to 13 bar (188 psi) and temperatures of 130 °C (266 °F).

Advanced predictive diagnostics, as part of the sensor's Intelligent Sensor Management (ISM®) technology, mean that maintenance or replacement can be planned in advance, crucially, before measurements are affected.

#### **Retractable housing and automated sensor cleaning**

The sensor is securely retained in an InTrac 777 housing. This is a retractable design which includes METTLER TOLEDO's unique Tri-Lock™ safety system. Tri-Lock prevents the escape of process media, even when the sensor is being replaced. The housing includes a flushing chamber for washing the pH sensor with water as regularly as is required.

Sensor cleaning is automatically handled by an EasyClean 150. The unit is pro-

grammed to withdraw the sensor into the housing's flushing chamber, run the washing cycle, and return the sensor to the measurement position.

The accompanying transmitter for the whole system is the multi-channel, multi-parameter M700. Its modular design means it can be configured to measure a range of process parameters simply by exchanging modules.

#### **90 % drop in labor costs**

The proposed METTLER TOLEDO solution was duly installed at the scrubber and has been running reliably since. As expected, sensor lifetime has increased substantially, and sensor maintenance has taken a dramatic fall. Instrument engineers report that the InPro 4800 i has a lifetime of four months – five times longer than the previous sensor – and that labor costs for this measurement point have fallen by 90 %.

If you want to reduce measurement point costs at your plant, go to:

► [www.mt.com/ISM-chem](http://www.mt.com/ISM-chem)



InPro 4800 i pH sensor

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## Now for All Major Bus Networks the M400 Transmitter

**By enabling real-time monitoring of sensor assets, fieldbus networks can add long-term value to production facilities. With the M400 series of multi-parameter transmitters, advanced sensor diagnostics information is available over HART®, FOUNDATION fieldbus™ and now PROFIBUS® PA; helping to improve process reliability and safety, and lowering operating costs.**

### Fieldbuses are prolific

The adoption of fieldbuses in the world of automation continues to grow rapidly across all process industries. It is a very well accepted technology and is installed by all major manufacturers worldwide.

Benefits including reduced wiring and installation costs are obvious. Less apparent are the long-term advantages of fieldbus networks that become clear many months after a facility has been commissioned. According to research by the ARC Advisory Group, the greatest benefits of fieldbus networks are realized in relation to maintenance and operation. This means fieldbuses themselves are often not a lasting cost-saver directly, but merely

allow a higher level of asset management that can significantly reduce operating costs.

As an example, a fieldbus can simplify the collection of device data for Plant Asset Management systems that track the condition of the connected field devices and sensors. METTLER TOLEDO, as a manufacturer of intelligent sensors and transmitters, rose to the challenge of providing real-time information on the installed sensor base.

### Remote diagnostics avoid needless maintenance trips

We fulfill this requirement with our unique Intelligent Sensor Management

(ISM®) technology. Contrary to conventional analog sensors, digital ISM sensors offer flexible integration of key diagnostics data into control systems for remote monitoring. Besides the transmission of the process variables via common communication protocols, sensor identification as well as the diagnostics can be directly accessed via control systems or standard asset management tools. Due to this direct access to information on fieldbus instruments, unnecessary trips to the field can be avoided.

### M400 – a common platform for all applications

Our successful M400 transmitter series exemplifies our commitment to continuous improvement in order to meet customer requirements, especially in the area of digital communication.



### Highlights of the M400 PA

- PROFIBUS PA communication
- Covers wide range of parameters including (optical) dissolved oxygen
- Multi-parameter capability reduces inventory
- Mixed mode for easy transition from analog to ISM technology
- Available approvals for hazardous area use: NEPSI, ATEX / IECEx Zone 1

The M400 is already available with HART and FOUNDATION fieldbus communication protocols. Now, we have completed the portfolio with the introduction of our PROFIBUS PA version.

Across all process industries the M400 provides excellent reliability and reduced total cost of ownership by offering diagnostic utilities and a wide range of communication capabilities.

Find out more at:

► [www.mt.com/M400](http://www.mt.com/M400)



## Less Complexity, Less Maintenance, Less Risk Laser-Based Oxygen Analyzer Does It All

**Paramagnetic oxygen analyzers used with sample extraction and conditioning systems measure reliably, but maintaining their performance can require a great deal of maintenance. For one of Brazil's major chemical facilities, switching to tunable diode laser (TDL) technology has simplified the measurement system, reduced maintenance, and increased process safety.**

### **Chemical company struggles with paramagnetic analyzer**

Brazil's chemical industry is the 7<sup>th</sup> largest in the world. But, over recent years demand has outstripped production and imports of chemicals have been growing. In order to reverse the trend Brazilian chemical companies are investigating how to increase productivity while at the same time reduce operating costs and maintain process safety. To help achieve this they are looking to technical advances in production equipment.

One chemical company operating in Brazil is part of a major international player in the global chemical industry. At a facility in Southern Brazil a paramagnetic analyzer with an extraction and conditioning system was being used to measure O<sub>2</sub> levels in the off-gas of an oxidation column. Although the system measured dependably, it required frequent maintenance to keep it operational which involved taking the measurement off-line.

Also, there existed the possibility of catastrophic failure of the system as the measuring cell of these analyzers is rendered useless if moisture enters them. Such an event would lead to extended downtime of the process and a high cost to restore the measurement.

### **Tunable diode laser analyzers offer a major improvement**

The expense of regular maintenance and worry over system failure led to the company looking to replace the existing system with a tunable diode laser (TDL) solution. TDL analyzers are usually used in situ without the need for sample extraction or

conditioning. They achieve very accurate measurement of the target gas by analyzing the absorption of laser light that passes through the gas matrix. Nitrogen is used as a purge gas to keep moisture as well as dust away from the analyzer's optical windows, and there is no possibility of moisture or dust entering the instrument.

Commonly, TDLs are of a cross-stack design, meaning that the unit that outputs the laser light is installed opposite the unit that receives and analyzes it. For this system to operate dependably the two parts must be very carefully aligned. Maintaining alignment can be difficult as changes in process temperature can cause the stack to warp, resulting in misalignment and a consequent drop in measurement integrity.

### **The GPro 500 TDL ticks all the boxes**

METTLER TOLEDO offers a TDL solution that not only eliminates the alignment problem, but also simplifies analyzer installation and maintenance. The GPro 500 series of O<sub>2</sub>, CO, and moisture analyzers



### Gas Applications for GPro 500 Analyzers

The GPro 500 series of O<sub>2</sub>, CO, and moisture analyzers is designed for ease of installation and low maintenance operation in a wide variety of process applications.

This complimentary eBooklet is a convenient reference to a selection of the most common GPro 500 applications.

Download your copy today.



► [www.mt.com/GPro500-ebook](http://www.mt.com/GPro500-ebook)

uses a unique design whereby the laser light emitted from the sensor head travels down a probe that is open to the process gas and is returned by a retroreflector back through the gas to a receiver which is also within the analyzer's head. This design means that alignment of the analyzer is not required, even if the process involves a significant temperature ramp.

As sender and receiver are in a single instrument, only one flange needs to be installed into the duct, greatly simplifying installation. A range of unique process adaptations (such as the wafer cell for very narrow pipes) significantly increases the range of applications for the GPro 500 series.

#### Almost zero maintenance and low running costs

Verification of the GPro 500 is necessary only once a year, on average. And as the analyzer can be detached from the probe (which remains installed in the process) there is no downtime associated with analyzer maintenance.

Compared with cross-stack TDLs, the running cost of GPro 500 analyzers is very low due to the probe's narrow diameter, meaning far less purge gas is required. Of greater importance to plant managers is the GPro 500's fast response (< 2 seconds), which improves process safety by rapidly identifying any increase in target gas levels.

#### Trouble-free operation

Satisfied that a GPro 500 O<sub>2</sub> analyzer would provide the accuracy and reliability needed, the chemical company installed a unit in the aforementioned oxidation column in late 2013. The company reports that it has been providing dependable, trouble-free oxygen measurement since then.

The success of the GPro 500 in this application encouraged the plant operators to install two further units: at the entrance of the oxidation column and in a hydrogenation process, and further installations are being considered.

Discover more about the GPro 500 at:

► [www.mt.com/chem23-TDL](http://www.mt.com/chem23-TDL)



## Faster Filling Boost Process Speed and Reliability

**Manufacturers need to optimize productivity and minimize operating costs to remain competitive. At the same time, they are required to fulfill the increasingly stringent quality demands of their customers. That is why filling processes require faster and more reliable and accurate weighing systems.**

Maximize efficiency and reliability of your filling processes and minimize costly unplanned downtime. Throughout your entire manufacturing process, the METTLER TOLEDO IND 780 is the highly

flexible weighing indicator capable of supporting a variety of weighing and control applications, from simple standalone installations to complex integrated systems. Connected with a set of METTLER TOLEDO

MultiMount™ weigh modules, for example, the IND 780 easily controls an automated filling procedure in a mixing tank. In another area of the plant, the indicator works with both analog and high-precision scale platforms to help operators perform fast, precise filling of drums and other containers.

METTLER TOLEDO solutions make fast material transfer possible with rapid processing, short stabilization times, and intuitive operator prompts. Handling time and the risk of error caused by manual operations are significantly reduced as well as material waste due to the efficiency of the high-accuracy weighing systems. Furthermore, continuous uptime of your production is guaranteed due to TraxEMT™, the embedded predictive maintenance technology of the IND 780 weighing indicator.

### **Don't stop your process – just “run flat”!**

The predictive maintenance technology TraxEMT™ allows the IND 780 weighing indicator to monitor on a continuous basis the condition of each individual load cell and to predict failures before they even occur. And in case of failing load cell, the IND780 starts the “run flat” function: the faulty load cell is virtually replaced by the other load cells. The indicator also alerts the need for maintenance by sending an



Courtesy Alliana





eMail to designated people and showing a warning message on the local display. Your process can continue to work accurately and reliably until the service technician is on site to repair it.

#### **Maximized productivity and minimized operating costs**

The features of the IND 780 add key benefits to your process and help you achieve the highest product quality:

- Improve speed and accuracy of manual or semi-automatic operations with SmartTrac™ graphical display
- Wide range of communication options: Ethernet, serial ports, a built-in USB Master and a wide range of PLC interfaces
- True multi-tasking capability for weigh-in or weigh-out sequences utilizing two-speed feed, target and spill values up to four scales simultaneously
- Ultra fast and accurate control with TraxDSP™ vibration rejection
- Increased uptime with predictive maintenance TraxEMT™
- PC-based InSite™ configuration tool supports off-line or ahead of time configuration

► [www.mt.com/ind780](http://www.mt.com/ind780)



IND 780  
batch terminal

## Cost-effective Amine Sweetening with In-line pH Analysis

**Amine sweetening is a common unit process in refineries for the removal of sour gases. However, it can be a costly procedure that is often inefficient. With real-time in-line pH analysis from METTLER TOLEDO you can be sure sweetening is effective and energy is not being wasted.**

### Controlling amine sweetening

The removal of hydrogen sulfide and carbon dioxide by amine sweetening relies on maintaining the quality of the amine solution fed to the absorber and proper adjustment of the steam feed to the amine stripper. Insufficient steam at the stripper results in incomplete amine regeneration, while excessive steam represents a costly waste of energy. Feeding the absorber with an amine solution that is not sufficiently lean means gas absorbance will not be optimal, and adding fresh amine when it is not required is simply throwing money away.

Typical methods employed for monitoring acid gas load in amine units are labora-

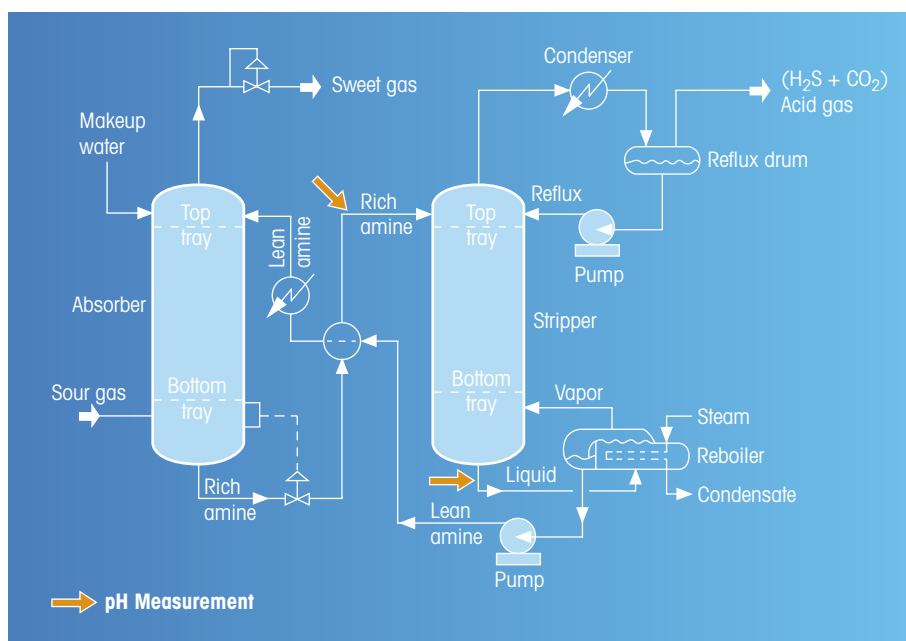
tory analysis of samples or in-line  $H_2S$  monitoring. Both techniques are not without their problems. Lab analysis is time consuming and does not provide real-time data. The amine sweetening process is a continuous operation and the acid gas load of the feedstock can fluctuate dramatically. Therefore, basing process control on grab sample analysis can be ineffective. Although in-line  $H_2S$  analyzers do provide real-time data, they are expensive to purchase, install and maintain, and do not measure  $CO_2$  content which is the other common constituent of sour gas. But there is a third alternative: one that is not only cost effective, it is also highly efficient – in-line pH analysis.

### Value of pH monitoring

Simply by monitoring the pH upstream and downstream of the amine stripper, the acid gas load on the amine solution can be easily measured. When the acid gas load is known, the steam feed to the stripper can be adjusted to the point where it efficiently removes the acid gases from the amine solution. Degeneration of the amine solution is also easily detected, so fresh make-up amine can be added in order to guarantee sufficient absorption.

Before making adjustments to the process, the exact relationship between the pH value of the amine solution and the acid gas loading must be ascertained. The easiest way of doing this is empirically. First, the actual acid gas content of the rich and lean solutions needs to be measured in the laboratory by analyzing grab samples. Then, by comparing the acid gas concentrations found in the laboratory with the process pH values and temperatures at the time of taking the samples, the correlation between pH and acid gas loading can be determined.

The use of a METTLER TOLEDO M700 transmitter can be of great help here. With its internal flash memory card, the M700 can log both pH and temperature values for an extended period. This makes it easy to look up the process values at the time the samples were taken. And only one M700 is required for both pH sensors.



Schematic of amine sweetening process



### Stay one step ahead of maintenance with ISM

Intelligent Sensor Management (ISM) reduces the installation, maintenance and calibration effort for METTLER TOLEDO's digital sensors to a minimum. This considerably improves process reliability, productivity, and system availability.

Find out how ISM can help you, at:

► [www.mt.com/ISM](http://www.mt.com/ISM)

Now, based on the upstream real-time pH level, adjustments to the steam feed can be made to ensure the optimum amount of steam is continually being fed to the stripper. A decrease in the pH level downstream of the stripper indicates that stripping is not sufficient or that amine in the solution is spent and that fresh amine must be added.

#### Rugged sensors

For the pH measurement itself, the InPro 4260 i sensor is ideal and designed for extended life in harsh chemical environments. The InPro 4260 i benefits from a solid electrolyte and an open junction instead of a diaphragm, so fouling of the

junction is minimized. Fitting a retractable housing, such as the InTrac 777, allows any maintenance work to be conducted without interruption to the process. Additional benefits come from the inclusion of Intelligent Sensor Management (ISM®) technology. ISM functionality includes Plug and Measure for fast, error-free start-up; and on-board diagnostics that predict when maintenance will be required.

#### Cost savings

An in-line pH measurement solution from METTLER TOLEDO will not only verify that your amine sweetening process is doing its job, it will ensure you are not

wasting steam and energy at the stripper or misapplying fresh amine.

If you want to save costs at your facility, go to:

► [www.mt.com/pro-pH](http://www.mt.com/pro-pH)



M700 transmitter



InPro 4260 i pH sensor showing the open junction and Xerolyt EXTRA solid polymer electrolyte

## Reliable pH Measurement in Chlorine Production

**For the chlor-alkali industry, maximizing productivity is hampered by the unreliable measurement and short lifetime of traditional pH probes. The InPro 4850 i dual-membrane pH sensor has been designed specifically for the harsh chlor-alkali production process. Its measurement performance, longevity, and low maintenance ensure exceptional process reliability.**

### Demand for chlorine increases

Chlorine is one of the most widely used constituents in the production of industrial and consumer products. It is also the most important chemical used in the treatment of water. As the world continues to develop, demand for chlorine rises. Today, total global chlorine production is in excess of 55 million tons.

### The importance of pH control in chlorine production

Production of chlorine through the chlor-alkali process is most commonly achieved through the membrane cell process. Here, brine (aqueous sodium chloride) is electrolyzed to produce chlorine gas at the anode and, as co-products, caustic soda

and hydrogen at the cathode. Anode and cathode are separated by an ion-exchange membrane. The membrane prevents the chlorine being reduced by the hydrogen and forming chloride and hypochlorite ions.

pH value is extremely important in a number of steps throughout the process. Purity of the brine entering the cell has a great bearing on process yield. By adding various salts as precipitants and increasing the pH to between 10 and 12, impurities such as sulfates and metal hydroxides can be extracted. On the anode side of the electrolysis cell the reaction takes place under acidic conditions (pH 3–4). Although a lower pH would improve yield, it

would damage the cell membrane, which is expensive to replace. The depleted brine that leaves the cell contains chlorate. Through a destruction process at pH 2, the chlorate is converted to chlorine and extracted.

### Sensor resists tough conditions

Accurate monitoring of pH is crucial to efficient operations. However, conditions in the chlor-alkali process are very tough on pH sensors: chlorine poisons sensor reference systems, crystalized brine and precipitated impurities clog diaphragms, and the environment corrodes contacts. The result is poor measurement accuracy and short sensor lifetime. Regular cleaning and calibration of sensors to main-

**InPro 4850 i dual-membrane pH sensor**





**ISM®**

tain their accuracy and extract the maximum lifetime is labor intensive for technicians.

The InPro 4850 i dual-membrane pH sensor from METTLER TOLEDO has been designed specifically for the needs of the chlor-alkali industry. Two features of the sensor make it the ideal choice.

### 1: pNa- and pH-sensitive glasses

Two types of glass membrane are incorporated in the sensor. The first is sensitive to sodium ions and is used as a reference. The second is sensitive to oxonium ions and operates in the same way as most pH sensors. By measuring the difference between the potentials of the two glass membranes, the pH of the solution can be accurately determined. The sodium-sen-

sitive pNa reference is a completely closed system; no diaphragm exists, therefore the possibility of sensor poisoning or clogging is eliminated.

### 2: Digital signal for stable measurement

Other pH/pNa sensors are available, but they suffer greatly from electrical interference. The sodium-sensitive glass has a very high impedance, and that combined with the impedance of the cable between the sensor and transmitter means that touching or simply approaching the system can create a change in the output measurement. And the longer the cable, the worse the effect.

The second significant design feature of the InPro 4850 i is that it communicates

digitally with its transmitter. Being digital, the output signal from the sensor is always 100 % stable and arrives at the transmitter unaffected by electrical interference, cable length, or moisture in the environment.

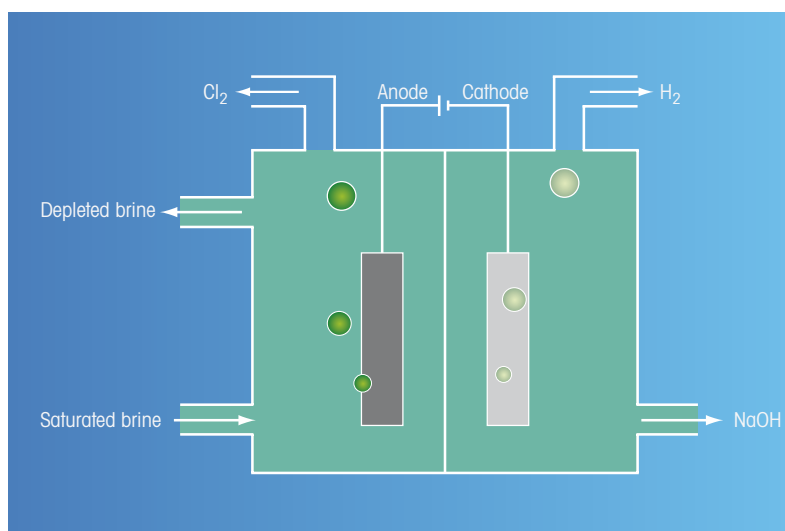
The InPro 4850 i is one of METTLER TOLEDO's Intelligent Sensor Management (ISM®) sensors. All ISM sensors transmit a digitized signal to ISM transmitters; however, digital communication is not the only advantage of ISM technology. Plug and Measure functionality provides fast and simple measurement point start-up. And advanced diagnostics offer real-time data on sensor "health" so that any corrective actions can be made before measurement is affected.

### Highly dependable performance

The combination of pNa- and pH-sensitive membranes with ISM technology means that the InPro 4850 i provides unequalled measuring reliability and signal stability, long sensor life and minimal maintenance requirements.

Find out more about the InPro 4850 i at:

► [www.mt.com/InPro4850](http://www.mt.com/InPro4850)



Schematic of membrane cell chlor-alkali process



## Stop Wasting Time Prevent Unnecessary Maintenance

**Every minute spent repairing your vehicle scale is lost production time. POWERCELL® PDX® load cells protect your profits by keeping service to a minimum. In addition to providing unmatched reliability, they dramatically reduce the time it takes to carry out troubleshooting and replacement work in case something goes wrong.**

When it comes to preventing problems, POWERCELL® PDX® load cells help quickly to identify the problem, locate the problem and make solving it faster and easier than ever. A POWERCELL PDX load cell network eliminates troublesome junction boxes and uses a built-in predictive diagnostics system to monitor network health.

### Load cell replacement

Vehicle scales are often used in harsh environments, where there are many ways to damage a load cell. Every minute your scale is shut down to replace a damaged load cell can mean lost business. POWERCELL PDX load cells help you avoid those losses by speeding up the replacement process every step of the way.

Firstly, the predictive diagnostics system identifies the problem load cell quickly. In fact, it can alert you the instant a load cell is damaged. Other load cell systems often continue producing costly weighing errors for months before you notice something is wrong. Even then, time-consuming tests might be needed to locate the problem load cell.

With POWERCELL PDX load cells, the predictive diagnostics system tells the service technician exactly which load cell needs to be replaced.

Secondly, replacing a POWERCELL PDX load cell is a quick and easy job. Just disconnect the cables, jack up the scale, and remove the load cell. Then connect the cables to the new load cell, position it in the receiver, and lower the scale. Replacing other types of load cells can take much longer. Even the simplest analog system requires extra work, such as opening the junction box, routing the load cell cable, and wiring the cable to the terminals inside the junction box.

And finally, a POWERCELL PDX network requires very little setup. Just use the scale terminal's simple addressing procedure. In most cases, no adjustments are needed, so the scale is ready to weigh. If local

weights and measures regulations require calibration, the job can be done in about an hour. Compare that with conventional load cells, which require numerous re-adjustments and can easily take a full day to calibrate.

### Cable replacement

POWERCELL PDX load cells use cables with quick-locking connectors that make replacement a snap. Just turn the connector slightly and remove it from the load cell. Plug the new cable's connector into the load cell and turn it until it clicks into place. The watertight connection seals the network to IP 68 standards. As soon as the new cable is connected, the scale is ready to weigh. No recalibration is needed.



The POWERCELL PDX load cell network combines unequalled reliability with easy troubleshooting and replacement.



Most other load cells have permanently attached cables. If a cable is damaged, you need to replace both the cable and the load cell. Instead of a simple cable replacement, you are faced with time-consuming recalibration and the extra downtime it requires.

### **Junction box replacement**

Since a POWERCELL PDX load cell network has no junction boxes, there's nothing

to replace. That is not the case with conventional load cell systems. They all use some type of junction box, totalizer, or sectional controller to combine the load cell signals. Not only are these components the most frequent cause of vehicle scale failures, they are also difficult to troubleshoot. Once you have found the problem junction box, replacing it means disconnecting the wires for each load cell and for adjacent junction boxes. After the

junction box has been replaced, recalibration is required.

The biggest problem is moisture, and there are plenty of ways for it to enter a junction box. Most junction boxes have five or more openings for cables, with connectors that are tightened by hand. The lids are fastened with screws, so again you rely on hand tightening to seal out moisture.

Stop wasting valuable time on repairs and recalibration. The POWERCELL PDX load cell network combines unequalled reliability with quick and easy service to keep your vehicle scale up and running.

► [www.mt.com/powercell](http://www.mt.com/powercell)



Replacing a conventional load cell, cable, or junction box requires time-consuming recalibration with heavy test weights.

## Intelligent Sensor Management (ISM®) for Chemical Processes

**ISM is METTLER TOLEDO's digital technology platform for process analytical measurement systems. With ISM solutions, maintenance becomes predictable, sensor handling is easy, and unplanned downtime is avoided.**

The benefits of ISM translate into substantial gains for chemical companies 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

chemical applications, ISM sensors even predict when they will need maintained or replaced. And the new mobile app provides a quick sensor check on the go.

In pH, ORP, DO, gas phase oxygen, and conductivity systems ISM gives you much more than just a measurement.

### Greater process reliability



#### Increased operational uptime

ISM is more reliable by design and helps avoid unplanned downtimes by sustaining measurement performance.

Read the white paper on achieving greater process integrity:

► [www.mt.com/ISM-chem-wp](http://www.mt.com/ISM-chem-wp)

### Easy sensor handling



#### Convenient lifecycle management

Simplified sensor handling reduces time spent at measurement points.

Discover the new iSense software for ISM sensors:

► [www.mt.com/iSense](http://www.mt.com/iSense)

### Reduced maintenance



#### Low cost of ownership

ISM enables time-saving installation and drives down operating costs.

Find out how much time and money you can save by switching to ISM:

► [www.mt.com/ISM-cost-calculator](http://www.mt.com/ISM-cost-calculator)





#### A platform for plant-wide use ...

From raw material storage to chemical synthesis, from process water preparation to wastewater treatment: whether in safe or hazardous areas your entire plant benefits from the unsurpassed reliability, simplified sensor handling, and low maintenance requirement of ISM solutions.

**ISM®**



#### ... 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.



M800 transmitter showing iMonitor sensor diagnostics utility.

Discover how ISM can help you at:

► [www.mt.com/ISM-chem](http://www.mt.com/ISM-chem)

# Get in-line with METTLER TOLEDO



## Best Practice Guide: Corrosion Prevention in Chemical Plants and Refineries

**This free guide includes best practice examples from leading chemical companies and refineries, and articles on the role in-line analytics play in corrosion prevention:**

- Fighting Corrosion, Scaling, and Fouling in China's Largest Petrochemical Plant
- TNK-BP Improves Its Desalting with In-line pH Analysis
- pH Control in Ethylene Quenching
- Improved Optical DO Technology Minimizes Power Plant Corrosion
- and much more

► [www.mt.com/chem23-corrosion](http://www.mt.com/chem23-corrosion)