

innovations

IN PROCESS CONTROL



Safety

Health

Environment

“Operators are challenged by the vast array of skills, knowledge and resources required to maintain process safety. Emerson helps to reduce your need to maintain specific competencies and processes.”

Russell Cockman, SIS Consultant, Emerson Process Management – full story on page 6.



Making a difference for those in the know

“Emerson’s Micro Motion Coriolis flowmeters reduce annual costs, simplify the process of meeting regulatory requirements, and reduce the risk of overpayment for energy.” Merethe Pepevnik, Technical Manager, RHI Normag AS

RHI Normag was using turbine flow meters to measure energy used at its refractory materials plant in Porsgrunn, Norway. However, due to wear and tear, the measurement system’s accuracy was poor and calibration/refurbishment costs were €150,000 per annum. Emerson’s Micro Motion® Coriolis flowmeters were installed to measure the mass flow of natural gas and recycled fuel oil and the highly accurate measurements are also submitted to KLIF, Norway’s national environmental agency, to ensure compliance with environmental regulations. www.EmersonProcess.com/IM501

“Emerson’s Operator Training Solution will offer a safe environment for operators and others to learn the best ways to deal with real situations.”

Carl Slatter, Quad 204 Project OMS Manager, BP
BP chooses DeltaV™ Operator Training Solution to help achieve safer and more efficient operation of the Quad 204 facilities in the North Sea.
www.EmersonProcess.com/IM503

“Emerson’s reliable and highly sophisticated ballast control technologies are an important factor in allowing us to provide this first-of-its-kind carrying capacity.”

Eugène van Dodeweerd, Manager, Fleet Supervision, Dockwise
Dockwise, has selected Emerson’s control systems to help maintain stability and structural integrity for the world’s largest semi-submersible heavy transport vessel.
www.EmersonProcess.com/IM505

“New functionality in AMS Suite will reduce commissioning time for FOUNDATION fieldbus devices by 10,000 to 20,000 man-hours for mid-size to large projects.”

Rong Gul, Corporate Subject Matter Expert, Shell
Emerson and Shell work together to develop new bulk commissioning tool in AMS Suite to streamline device configuration and enable faster start-up.
www.EmersonProcess.com/IM502

“Having installed the most advanced equipment and systems, Emerson technical experts are now helping us maximise performance.”

Igor Šepić, Refinery Director, INA Rijeka Refinery
Emerson has installed integrated automation and safety systems on a new hydrocracking complex at the INA Rijeka Refinery in Croatia.
www.EmersonProcess.com/IM504

Welcome to innovations



Emerson understands that for its customers, the number one priority is to run their plant with zero safety incidents. This ensures employees go home safe in the evening and the facility has minimal impact on the local environment and surrounding community. Emerson

continues to support this objective by developing products, services and solutions that help run plants in a safer way.

For example, meeting the requirements of IEC 61511 is a challenge for many process operators. Emerson’s SIS consultants can help by applying today’s smart technologies to develop designs which address personnel safety, environmental, and commercial implications.

Our latest sensor technology is also helping to protect the safety of workers and the environment, by providing greater visibility into the entire plant. Taking full advantage of wireless networks, ‘pervasive sensing’ enables industrial facilities to get more and deeper data about all aspects of the enterprise, giving them even greater visibility to operate more safely, reliably and profitably.

This issue focusses on Emerson initiatives and technologies that will help you improve safety and operational effectiveness at your plant – including a success story at BP at Geel in Belgium, where Emerson’s Smart Wireless technology has helped BP to meet the latest government regulations for the storage and handling of flammable liquids.

Roel Van Doren
President, Emerson Process Management Europe

Contents

- 4 Pervasive Sensing
- 6 Functional safety consultancy
- 8 Minimising shale gas emissions
- 10 Level integrity testing
- 12 Integrated Operations
- 14 Innovative technologies
- 16 Further information



Pervasive Sensing



In the past, manufacturing processes were instrumented to make quality product efficiently and safely.

Bert Konings, Director of Marketing, Rosemount Europe explains how the introduction of Smart Wireless technologies and advances in sensor technology and installation techniques makes it quick and easy to implement a ‘pervasive sensing’ approach to process instrumentation – delivering significant benefits for plant operators.

Plant operators want actionable information that can make their lives safer, more predictable, and save them cost, risk and time. In today’s process plants this goes beyond the control room and optimising process performance. They want clarity and certainty of conditions for business-critical decision-making across all aspects of their operations. To achieve this, a more comprehensive network of sensors is needed.

Pervasive sensing can help enhance site safety, security, equipment reliability, and energy efficiency, where installing additional sensors to monitor non-process parameters has traditionally been physically difficult, expensive or technically challenging. For example, the risks associated with equipment degradation or failure, were historically dealt with by periodic manual inspections and reactive maintenance, or energy losses were simply unidentified.

With the advent of Smart Wireless technologies and advances in sensor technology and installation techniques, Emerson has overcome the cost/value barrier by providing lower cost of deployment, reliable non-intrusive installation, and low lifecycle costs, combined with unparalleled ease-of-use in sensor applications. New software applications and

embedded sensor intelligence is also becoming available to interpret the data from these sensors and convert it into actionable information, enabling a prompt response to potential problems and better insight for improved decision-making.

To meet the need for a more comprehensive network of sensors, Emerson is introducing an expanded product portfolio that extends the company’s focus beyond traditional process control and safety systems. These include gas leak detection sensors, well corrosion and erosion detection technology, wireless vibration sensors for monitoring rotating equipment, and wireless steam trap monitors and wireless bolt-on surface temperature probe.

As process manufacturers implement this pervasive sensing approach, they will see for example, early detection of pump and rotating equipment failure, a significant reduction of steam consumption, and nearly instant dangerous emission alerts. Working with more information than ever before, refineries, chemical plants, and other industrial facilities will be able to achieve greater visibility into all aspects of their operations, allowing them to operate more safely, reliably, and profitably.

Pervasive Sensing in action

At BP’s chemical production centre in Geel, Belgium, the introduction of new and stricter government regulations required continuous monitoring of storage tanks, valves and pipelines throughout the

plant. However, a traditional online monitoring solution would require extensive cabling, together with the associated I/O, signal converters, and installation costs.

A solution based on Emerson’s Smart Wireless technology is providing a reliable, affordable way to gather information from the sensors across the plant. These include Rosemount Wireless Discrete Transmitters in combination with hydrocarbon fuel sensors and sensor cables. When one of the sensors detects xylene or benzene, the associated Rosemount 702 wirelessly transmits an alarm signal to a Smart Wireless Gateway that relays it to the control room.

Emerson’s Smart Wireless technology eliminated the need for new instrumentation cabling and associated trenches and ducting, saving an estimated 50% of the cost and 90% of the time required to install a conventional wired system.

This automated monitoring system has enabled BP to meet the latest government regulations for storage and handling of flammable liquids – and at much lower cost than with traditional wired technology.

www.EmersonProcess.com/IM506

www.EmersonProcess.com/IM507

Functional safety consultancy



Russell Cockman,
SIS Consultant with
Emerson Process
Management explains
how Emerson's SIS
Functional Safety

Consulting Services and Smart technologies - correctly applied and maintained, can help companies meet the requirements of IEC 61511.

International safety standards, IEC 61508 and IEC 61511, were developed as a direct result of plant accidents that occurred in the industrial world. By applying the lifecycle approach of IEC 61511 to your process, the likelihood of a failure is significantly reduced, making your process more reliable and increasing uptime.

However, process operators are challenged by the vast array of skills, knowledge and resources required to maintain process safety, while at the same time meet production targets. This is resulting in an increased number of instances where installations are failing to comply with the national inspectorate's requirements. When a non-compliance is identified, inspectors need to be assured that plans are in place to quickly and effectively address any issues so that the impact on process systems is minimised.

Emerson is supporting this requirement with a team of consultants specifically trained in the application of IEC 61511. Emerson SIS consultants follow processes to comply with IEC 61511 using a TÜV-certified Safety Management System. They can help a customer develop solutions to the inspectorates concerns. They also develop designs which address personnel safety, environmental, and commercial implications. In addition, the correct application of today's smart technologies can significantly benefit the user by reducing interventions (in both duration and frequency).

Emerson's SIS consultants are able to assist in all aspects of SIS design and application. We leave the job of hazard analysis and risk assessment to the process experts. Once the safety target has been set, we have a range of specific services aimed at optimising the SIS design and simplifying the job of regulatory compliance.

To minimise error during implementation and operation phases, IEC 61511 requires that the process safety requirements are clearly and concisely documented and maintained. Our SIS consultants can develop a client specific Safety Requirements Specification format that ensures data is captured, interpreted and presented in a user friendly way.

Selection of appropriate field devices and their architecture is crucial to meeting the performance requirements. Emerson SIS consultants advise on technology selection and provide complete designs for the safety functions.

Our services interpret the Safety Instrumented Function (which may have been designed by others) into a suitable model that can assess the theoretical SIL Level and Spurious Trip Rate that can be achieved. The consultant can verify the performance against project targets and provide a comprehensive assessment report with recommendations for maintaining compliance.

As operational experience grows, the actual SIS performance must be carefully monitored for performance against the assumptions made during design. Emerson provides the procedures and resources to inspect, monitor, audit and report on system integrity.

By using the SIS consultant we help to reduce your need to maintain specific competencies and processes. Diversity of skills and thought provides a significant improvement to the reduction of systematic failure. To find out more go to:

www.EmersonProcess.com/JIM508

Smart technologies

Smart devices are able to collect, manage, and communicate not only process variables and control signals, but also information about the status of the devices themselves, related equipment, and even the surrounding process. For example, a smart temperature transmitter can signal when it detects a failed temperature probe. Similarly, a smart digital valve controller can signal a loss of air supply pressure, or increasing stem friction that could keep the valve from moving properly when needed. These Smart diagnostic tools detect, identify, and even predict problems that could lead to poor safety or undermine SIS reliability – diagnostics that include not only the system components themselves but also the surrounding process and equipment.

Safety

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Minimising shale gas emissions



Independent energy management consultant, David Stockill considers how modern control technology,

used alongside other process improvements, can play a vital part in controlling and supervising shale gas production operations – with a key aim of minimising greenhouse gas emissions.

The European shale gas industry is still in its infancy. Significant infrastructure and equipment investments, coupled with comprehensive community engagement will be required in the coming years to make it a viable and sustainable industry.

The rapid growth of shale gas exploitation in the US has highlighted the issues of greenhouse gas emissions from production facilities. A prime concern is leakage of natural gas (methane), which has a greenhouse gas impact twenty times greater than that of CO₂. This is likely to frame government operational guidelines and at the very least, the adoption of best practices to minimise the risks of greenhouse gas release. This can be seen as an important statement by operators in managing public concerns over leaks from non-conventional gas production facilities.

High quality measurement and control of the production process has a key role to play and is one of the most effective means of minimising methane

emissions. Two distinct and complementary approaches can be considered, firstly the use of modern high integrity equipment to reduce the potential for greenhouse gas emissions (e.g. replace gas-driven self-acting controllers with modern high integrity, low leakage valve technology). Secondly, advanced applications and solutions will provide improved monitoring and control of the production activities (e.g. online gas emissions monitoring, remote supervision data collection and real-time fault detection).

Traditionally, measurement and control technology on natural gas installations has been basic. Simple, low-tech equipment requiring minimal infrastructure, easy maintenance and low skill requirements has been a pragmatic solution. However, this comes at a cost – by its nature such solutions can have a downside in terms of reliability and integrity. Modern automation and control technology provides new solutions. Technologies such as wireless communications and solar power have enabled a new generation of rugged, reliable and easy-to-use instruments and systems. In turn these have enabled new techniques such as remote monitoring, fault detection, modelling and more intelligent supervision of operations to be applied to installations that were previously considered impractical.

A best practice scenario emerges based on the application of technologies and procedures that include automatic control of process equipment,

the installation of safety shut-down systems, measurement and transmission of process parameters and the provision of remote monitoring via wireless networks/satellite enabling supervision of multiple installations.

The use of advanced calculation tools, models and algorithms provides real-time optimisation and fault detection of the facilities, and sampling and gas detection systems can be used to automatically detect gas in the atmosphere. Procedures such as plunger lift operation should be automated.

Alongside other process improvements, such as green completion techniques and vapour recovery, modern control technology plays a vital part in controlling and supervising shale gas production operations. With a key aim of minimising greenhouse gas emissions, operations become steadier and more reliable, faults are detected earlier and the plant is maintained in a safe manner.

Given that the likely location of potential shale gas installations will be much closer to areas of conurbation than in the US, the adoption of such techniques can play a pivotal role in enabling a safe, reliable and socially acceptable shale gas industry in Europe.



Level integrity testing



The latest overflow protection standard requires semi-annual device verification of most overflow

prevention sensors. Carl-Johan Roos, Functional Safety Officer at Emerson explains how this can be achieved without raising the level in the tank above its maximum working level.

In tank storage applications overflow presents a risk to the environment, workers, the plant and people living nearby. Several high profile accidents have highlighted the need to reduce the risk of an overflow incident occurring. In response, the API/ANSI Standard 2350 Edition 4: 'Overflow Protection for Storage Tanks in Petroleum Facilities' was created to prevent overfills and improve safety. This is a description of the minimum requirements for non-pressurised, above-ground petroleum storage tanks to comply with modern best practices.

API 2350 states that all overspill protection systems that are required to terminate receipt must be tested annually, while the High-High sensor alarm must be tested semi-annually. Additionally, continuous level sensors should be tested once a year and point level sensors, semi-annually. In many cases, high level alarm testing requires the fluid level in the vessel to be raised to the high level alarm limit. The fluid must be moved in and out of the tank – increasing the risk of spills, the process can take up to half a day, which can interrupt normal activities, and needs to be

supervised – increasing health and safety risks due to possible exposure to tank contents.

The latest version of API 2350 does not recommend that the tank level be raised above the maximum working level. So what other options are there to test the high level sensor alarm? Emerson's vibrating fork liquid level switch, features a magnetic test-point, which causes the output state to change – simulating the alarm condition. This enables a functional test of the switch and the overall system. However, the ability to simulate an alarm condition has not been available for all popular level technologies such as Guided Wave Radar (GWR).

Recognising the benefits this additional feature would provide, Emerson has introduced an automated high level alarm testing function for its Rosemount 5300 Series GWR transmitters. Emerson's Verification Reflector function is designed for applications requiring periodic transmitter integrity tests to ensure that the device is functioning correctly and prevents overfilling.

The Verification Reflector functionality enables automated transmitter integrity tests without stopping the process or manually raising product level in the vessel. In addition this function reduces the risk of accidental spills and the high level alarm testing process can be completed more quickly. Moreover, not only the device itself is being tested, but also the loop from the device to DCS.

How does it work?

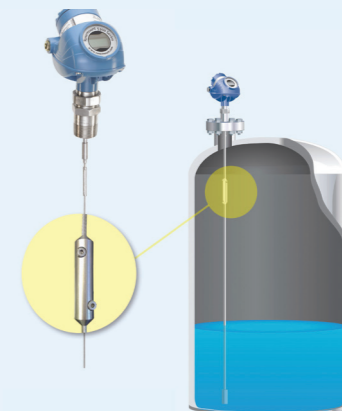
In a Guided Wave Radar installation a low energy pulse of microwaves is sent down the probe and when the pulse reaches the media surface, a reflection is sent back to the transmitter.

The transmitter measures the time taken for the pulse to reach the media surface and be reflected back and calculates the distance to the media surface using 'time-of-flight' principles.

The Verification Reflector function uses an adjustable reference reflector fitted to the probe at a desired height to generate a unique echo signature. The device constantly tracks the reflector echo to determine if the level is above or below the alarm limit.

A built in 'Test' function verifies that the Guided Wave Radar has been correctly configured and is correctly tracking the reflector echo. It also confirms that the alarm loop is working with a high level alarm being displayed in the control room. This 'Test' function can be accessed locally or remotely.

www.EmersonProcess.com/IM510





Integrated Operations



Today's process plants face increasing challenges in personnel, technology and management organisation. In order

to remain profitable – or even viable – companies must address all of these areas. Jeff Dymond, Director of Oil & Gas Industrial Solutions Group at Emerson explains how manufacturers are turning to a new model called Integrated Operations (iOps) to overcome these challenges and improve operational effectiveness.

In the past, plant personnel had to live close to their jobs, whereas people today want to work where they live, but not necessarily where the 'job' really is. Where the 'job' is could be dangerous, dirty, distant and frankly the location could be just plain dull. This can make it difficult to attract new qualified workers. And while new workers may be in short supply, experienced employees, the ones with the deep knowledge of how a plant or process actually works, are moving into retirement.

At the same time, processes have become increasingly complex, and often require expert knowledge to manage – knowledge that may be available only part of the time or from people located in a remote facility. In addition, the volume of data flowing into today's control systems threatens to bury operators in alarms and maintenance personnel in work orders.

To overcome these challenges, manufacturers are turning to a new organisational model called 'Integrated Operations'. While implementations may vary, iOps executions comprise collocation of essential personnel from cross-functional roles including operations, production, maintenance, business planning, and logistics. The physical

manifestation of iOps usually takes the form of an Integrated Operations Command Centre in which cross-functional roles work and collaborate together to make better business decisions.

Engineering support can be readily supplied anywhere in the world directly to and from an iOps command centre, which allows personnel to remotely consult on their operations. Remote monitoring and diagnostics capability in an iOps Command Centre by internal experts or from outside organisations allows them to connect to process control devices and equipment to diagnose and solve problems. The collective knowledge of experienced personnel is now readily available to operations at a site or plant.

These advances have been made possible because of the broad availability of wideband communications technology and the growth in pervasive sensing – the installation of networks of intelligent (and frequently wireless) field sensing devices. Pervasive sensing provides process and equipment health data not only to process control and safety systems, but also to applications and business systems throughout the enterprise. The additional information that pervasive sensing provides is one of the foundational enablers that provides accurate, real-time, validated data for use in making smart business decisions.

To accelerate industry realisation of the benefits iOps can provide, Emerson has developed three distinctive offerings in their Integrated Operations Initiative, these being – the industry's most comprehensive and

scalable automation architecture, an iOps Innovation Centre, which is a real-world lab experience to test Integrated Operations concepts, and consulting services to help customers envision, plan and execute their own iOps strategy.

Real-time access to essential information is fundamental to iOps and has been a core focus within Emerson for decades. Emerson's innovation in key technologies is unmatched: the world's first fully digital plant architecture, the first fully digital safety system, the most robust wireless technology portfolio, remote/low-power field communications, the industry's broadest offering of diagnostics-based 'Pervasive Sensing' instruments, and monitoring applications to convert this data into actionable information.

To give customers a clear sense of what's possible in the future of Integrated Operations, Emerson has recently opened its state-of-the-art iOps Centre in Austin, Texas, USA. A real-world, working model of a production enterprise, customers can experience the next generation of collaboration and real-time, multi-disciplinary decision-making.

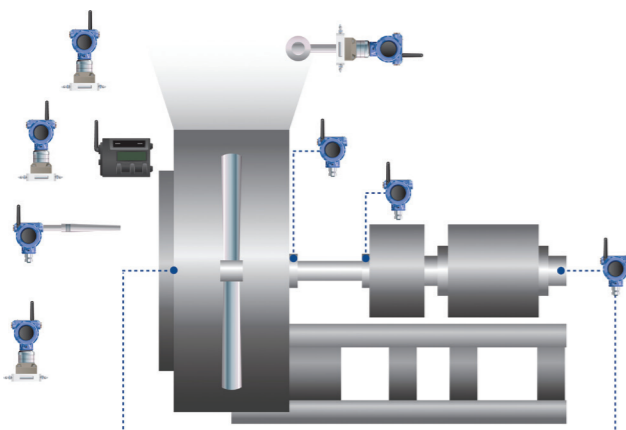
To help customers establish and execute their vision, Emerson has developed Integrated Operations Consulting Services to explore opportunities and alternatives for taking advantage of new integrated operations capabilities.

www.EmersonProcess.com/IM511

Innovative technologies

Blower Health Monitoring Solution expands automated health monitoring

Blowers are essential for fired heater or boiler operations and a blower failure can trip fired heaters or boilers, resulting in plant slowdowns or shutdowns. Many blowers are not sufficiently instrumented to perform online health monitoring and the high costs for wired solutions have typically resulted in forced and induced draft blowers being monitored only periodically by maintenance checks and during field rounds.

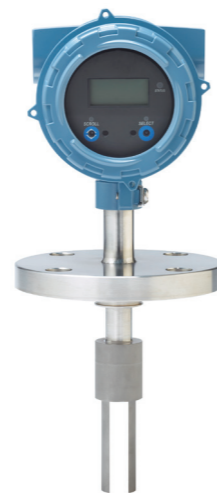


Emerson's new blower monitoring solution is part of a family of Essential Asset Monitoring applications. It uses a pre-engineered application and networks of wireless or wired instruments that lower implementation costs and provide an early warning system for operations and maintenance staff. The new blower solution expands online, automated monitoring and health analysis to a new class of equipment. The result is reduced manual measurements, increased blower availability, fewer process upsets, reduced production outage and lower maintenance costs.

www.EmersonProcess.com/IM512

New generation Fork Viscosity Meter for demanding applications

To help reduce oil fired heater combustion emissions, minimise cutter-stock usage in HFO blending and reduce contamination risks on multi-product pipelines, accurate, fast-response viscosity and density monitoring is essential.



Emerson's new generation, direct insertion Micro Motion Fork Viscosity Meter is the ideal choice for these demanding applications. It incorporates a hazardous area approved head-mounted transmitter that has the flexibility to connect to control systems via a wide range of digital and analogue protocols.

Because it supports 4-20mA, HART®, *WirelessHART*®, FOUNDATION fieldbus and RS485 Modbus, system integration and start-up/commissioning costs are significantly reduced. The Fork Viscosity Meter incorporates a diagnostic capability called Known Density Verification that checks the meter for measurement alarm conditions, sensor integrity and the presence of coating, erosion or corrosion.

The availability of diagnostics information in critical viscosity and density measurement applications can significantly reduce maintenance costs and cycle time.

www.EmersonProcess.com/IM513

Integrated prediction and protection system for hydroelectric turbines

Helping hydro power plants avoid catastrophic failure, comply with safety, health and environment regulations, maximise availability and reduce maintenance costs, Emerson has introduced an integrated predictive diagnostics and protection system that offers real-time monitoring for all major types of hydro turbines. Low frequency sensors with built-in signal filtering and conditioning have been developed for use with the CSI 6500 Machinery Health Monitor. By accurately monitoring vibration, temperature and eccentricity, the CSI 6500 captures meaningful data for every aspect of hydro machinery operation.



www.EmersonProcess.com/IM516

Wireless level transmitter for remote applications

To help prevent the risk of spills from vessels/storage tanks in remote or difficult to reach locations and where installing new cabling is costly or impractical, Emerson has launched the industry's first true wireless Guided Wave Radar transmitter. The Rosemount 3308 is a top mounted device that provides continuous level and interface monitoring of liquids. It provides an easy and cost effective way to add visibility across a wide range of industries and applications, ensuring plant and operator safety and improving process efficiency.



www.EmersonProcess.com/IM514

High flow capacity tank blanketing regulators

Tank blanketing regulators ensure proper vapour pressure in liquid storage tanks by adding blanketing gas or relieving tank vapour. This is important for safety, product quality, and the environment. To meet the need for regulators with a greater flow capacity, Emerson has released the new Fisher® T200 series tank small size blanketing regulators that meet the latest sizing guidelines (ISO 28300 and API 2000). Three models are available including pressure reducing tank blanketing regulator – with balanced and non-balanced trim, and a pressure relief tank blanketing regulator.



www.EmersonProcess.com/IM517

Liquid ultrasonic meter for liquefied natural gas

Increasing amounts of liquefied natural gas to be traded in short-term contracts and the use of shared or commingled storage tanks, means dynamic measurement is required to quantify and allocate ownership among multiple parties. Emerson's Daniel 3818 Liquid Ultrasonic Flow Meter for LNG applications is designed to reduce flow measurement uncertainty throughout the value chain. By measuring LNG volume dynamically the Daniel 3818 delivers higher accuracy than static measurement methods and can result in real savings.



www.EmersonProcess.com/IM515

Further information

Emerson Process Management is always looking for new and innovative ways to enable customers to connect with them. These include local country websites, the award winning Emerson Process Experts blog – which includes an automatic translation tool, social media pages and twitter.

Web

www.EmersonProcess.com

Community

The Emerson Global Users Exchange is a unique opportunity to exchange ideas, best practices, and proven solutions with leaders in the process industry.

www.EmersonExchange.org

Emerson Exchange 365 is the global peer-to-peer on-line Emerson Users Exchange Community with a built-in translation facility.

EmersonExchange365.com

Blogs

Emerson Process Experts

Connecting with the people behind the technologies and expertise. Site equipped with automatic translation.

www.EmersonProcessxperts.com

DeltaV News

DeltaV - Emerson's digital automation system for process control.

news.easydeltav.com

Modelling and Control

The dynamic world of process control, site equipped with automatic translation.

www.modelingandcontrol.com

Analytic Expert

Discussing the application of liquid and gas analysers.

www.analyticexpert.com

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The next three editions of Innovations in Process Control will be dedicated to **Reliability, Energy Efficiency and Productivity.**

innovations

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