September 2023 - Volume 20

SEPTEMBER

PCN Europe

processing & control news

DIGITALIZATION & COMMUNICATION:
A More Sustainable Production Needs Digitalization

Page 12

www.pcne.eu

ISSN : 2031-9177

WWW.PCNE.EU

- **Fast loading time**
- **Responsive design**
- **Relevant contents**
- **On-demand Webinars & Podcasts**
- **Clear request form**
- **Integration of Twitter live feed**

editorial

Kay Petermann
k.petermann@tim-europe.com

Dear Reader,

sport is often compared to industry. How far the comparisons carry in detail is hard to say. But at least for both areas, the most diverse talents and abilities can make the difference depending on the area of application. You can already see this in a team, even more when you compare the requirements of different sports.

But what you can see in all areas, both in individual and team sports, is that great players can make a big difference. The process industry is one of the major players in the economy, no matter how you look at it. In this way, the contribution made by digital transformation and the use of renewable raw materials and energies can also be significant.

It is therefore good that the industry is on the move, even if efforts must continue to pick up momentum. We are pleased to present examples and ideas of how this can be done in this issue. Axel Lorenz, CEO Process Automation at Siemens, for example, outlines how he sees the transformation to a more sustainable industry through digitalization on page 12.

The article on page 18 reports on one of the first large-scale power plants in the world to mix hydrogen as an energy carrier and the contribution that sensor technology and measurement technology have to make to this end.

I would also like to draw attention to the interview with Steve Biegacki from the FDT Group, in which he shows what prerequisites the communication structure must fulfil for a "connected world" in industry.

I wish you an interesting read

Kay Petermann

Editor of PCN Europe

PCN Europe

TIM Global Media BV
140 rue de Stalle - 3ème étage, 1180, Uccle
Brussels, Belgium
o.erenberk@tim-europe.com
www.pcne.eu

ASSOCIATE PUBLISHER	Marco Marangoni m.marangoni@tim-europe.com
EDITOR	Kay Petermann k.petermann@tim-europe.com
ORDER ADMINISTRATION	Francesca Lorini f.lorini@tim-europe.com
WEBSITE & NEWSLETTER	Carlo Cucchi c.cucchi@tim-europe.com
MARKETING MANAGER	Marco Prinari m.prinari@tim-europe.com
PRESIDENT	Orhan Erenberk o.erenberk@tim-europe.com

ADVERTISING SALES OFFICES

EUROPE

AUSTRIA, SWITZERLAND
• Monika Ailinger
Tel: +41 41 850 44 24
m.ailinger@marcomedia.ch

BENELUX, NORWAY, SWEDEN
• Nadia Liefsoens
Tel./Fax: +32 (0)11 22 43 97
Cell: +32 (0)475 59 31 96
n.liefsoens@tim-europe.com

FRANCE
• Roxanne Akbulut
Tel: +33 06 52 31 41 56
r.akbulut@tim-europe.com

• M'fumu Tiya Mindombe
Tel: +32 465 443 530
m.mindombe@tim-europe.com

GERMANY
• Simone Ciolek
Tel: +49-(0)9771-1779007
s.ciolek@tim-europe.com

ITALY
• Andrea Rancati
Rancati Advertising
Tel: +39-02-7030 00 88
Fax: +39-02-7030 00 74
arancati@rancatinet.it

TURKEY
• Onur Dil
Tel: +32 (0)15 45 86 79
Fax: +32 (0)15 45 86 37
o.dil@tim-europe.com

UNITED KINGDOM, DENMARK, FINLAND
• Dave Harvett
Tel: +44-(0)121 705 21 20
daveharvett@btconnect.com

NORTH AMERICA
• John Murphy
Hamilton-Murphy Global, LLC
Tel: +1 616 682 4790
Fax: +1 616 682 4791
john@hamiltonmurphymedia.com

JAPAN
• Ichiro Suzuki
Incom Co. Ltd.
Tel: +81-(0)3-3260-7871
isuzuki@INCOM.co.jp

OTHER COUNTRIES
• Cristian Son
Tel: +39 027030631
c.son@tim-europe.com

Digital File Requirements available at:
http://www.pcne.eu/technical-guidelines/

Production by Design3, Milano, Italy
Printing by Logo Srl - Padova, Italy
POSTMASTER: Send address changes to:
Processing & Control News Europe,
Marco Prinari - m.prinari@tim-europe.com

Next Issue:
November 2023

Pumps, Valves & Compressors

Process Modularization and Process Automation

New Area of Business: Bosch to Develop Systems for Water Treatment

"A climate-neutral world won't work without green hydrogen," says Dr. Stefan Hartung, chairman of the Bosch board of management. Bosch is now expanding its business to include technology for water treatment. In addition to systems using the usual water treatment method of reverse osmosis, Bosch also plans to offer new solutions specifically engineered for remote areas and offshore locations. "Above all, the production of green hydrogen requires ultrapure water. With our special-purpose systems, water treatment can be done anywhere, even in the most remote areas of the world, in an economical and environmentally friendly way," Hartung says. The systems designed by Bosch Manufacturing Solutions are not only robust and low maintenance, but compared to solutions commonly available on the market, they eliminate the need for chemicals in water treatment. With its entry into this new business field, Bosch is closing the circle and rounding off its range of products and services: "We're developing technology for water treatment as well as for the generation, compression, storage, and use of hydrogen – and doing so for various sectors. Hardly any other company offers such a broad portfolio," Hartung says.

Red Lion Opens Its New European Headquarters

Red Lion Controls, based in York (Pennsylvania, USA), announces the official opening of Red Lion Europe GmbH in Dinkelsbühl, Germany. The opening of Red Lion Europe GmbH aligns with the renaming of the company MB connect line GmbH that was acquired by Red Lion Controls Inc. in April 2022. MB connect line offers remote maintenance systems and is a leading provider of remote access and data collection in the secure connection of machines and plants. Red Lion Controls is a global company with three product segments, Access, Connect and Visualize. The IoT-enabled solutions enable users to securely access, network and visualize industrial data.

The name MB connect line will be continued as a brand name for the product series Secure Remote Access, Industrial IoT and Industrial IT-Security Services in the DACH region (Germany / Austria / Switzerland). In Europe and worldwide, MB connect line products are branded and distributed under the company name Red Lion Controls Inc. The opening of the European headquarters strengthens the team relationship of both organizations. The aim is to strengthen sales, technical support, marketing, logistics as well as technical development in one team.

Powtech Rebranding With Extended Pharma-Focus

Starting in 2025, POWTECH, the International Processing Trade Fair for Powder, Bulk Solids, Fluids and Liquids, will operate under the name POWTECH TECHNOPHARM, and with this new enhancement it will provide the perfect platform for the growing pharmaceutical and life sciences industry. POWTECH is consistently fine-tuning its efforts to promote the process engineering sector and adopting the current trends of deglobalization and re-Europeanization, all of which underlay its decision to rebrand. NürnbergMesse and APV (International Association for Pharmaceutical Technology), one of the honorary sponsors of the trade fair, are taking their collaboration to a new level with POWTECH TECHNOPHARM. Jörg Breitkreutz, President of APV, is pleased with the new trade fair platform: "With POWTECH TECHNOPHARM and the collaborative arrangements agreed with PARTEC and FACHPACK, we are opening a new chapter in the long and successful history of cooperation between APV and NürnbergMesse."

Participants at POWTECH TECHNOPHARM will also benefit from the fact that, every three years, the trade fair will be held in conjunction with FACHPACK, the European Trade Fair for Packaging, Technology and Processing.

New Managing Director Appointed at Lödige

Maximilian Hoyer took over new management position at the Paderborn-based process technology Gebrüder Lödige Maschinenbau GmbH specialist in July. Maximilian Hoyer has initially acted as commercial manager and authorized signatory at Lödige since August 2021. In his new position, he succeeds Dr. Frank Sandfort, who has managed the company on an interim basis for the past few months and is now chairing the advisory board of the family company again. Founded in 1938, Lödige revolutionized mixing and processing technology with the invention of the Ploughshare® mixer, patented in 1949. In the meantime, the company is a leading global full-service provider for process engineering applications in the areas of mixing, granulating, coating, drying, reacting and related processes. The fields of use for the machines and systems ranges from the food industry to pharma, cosmetics, chemical products, plastics and many more.

LINEAR CARRIAGE IN HYGIENIC DESIGN

FDA-compliant combination of plastic and stainless steel

Motion plastics manufacturer **igus** has developed the first drylin W linear guide system based on the hygienic design guidelines. FDA-compliant materials such as the high-performance polymer iglide A160, high-alloy stainless steel and a washable interior of the carriage ensure compliance with hygienic design guidelines. Companies are now demanding self-lubricating components that can be cleaned quickly ensuing downtimes are limited. The main challenge was how to construct a gap-free design. The focus was on designing a self-draining carriage and rail that would allow liquids to drain freely without collecting water. The new self-draining carriage consists entirely of the high-performance polymer iglide A160. The lubrication-free material has already proved itself as a plain bearing material in numerous applications in the food industry. Hygienic screws and large grooves are also used as a method to prevent water from accumulating and bevelled edges allow cleaning solutions to run off easily. The bottom seal protects the space under the rail from dirt accumulation, ensuring no residues of food can be caught. The shafts are also sealed to prevent any gaps from collecting debris. A corrosion-resistant and high-alloy 316 stainless steel is used as the linear rail to avoid microscopic surface structures that prevent dirt from adhering.

▶▶ 63728 at www.pcne.eu

ELECTROMAGNETIC FLOWMETER

With SPE interface for consistent IP communication

The new **JUMO** flowTRANS US W02 uses the magnetic-inductive measuring principle and stands out with its high degree of accuracy (+/- 0.5%). An additional temperature sensor is already integrated. Due to such factors as its metal case and a Tri-Clamp process connection in nominal widths from DN 06 to DN 25, it can be used especially well in food-related areas along with other industries for which a G external thread is available. The nominal pressures can be up to PN 16 and the medium temperature up to 90 °C so that it can also be cleaned using CIP. Its IP65/IP67 protection type makes the device a flexible partner for a wide variety of processes. The HMI of the device consists of a TFT display on which 2 process values including the status and info messages are displayed. This device is configured locally via the Bluetooth interface and the JUMO smartCONNECT app. The SPE with PoDL interface uses the Modbus TCP protocol, which enables a continuous IP communication from the sensor to the automation system. An integrated JUMO Cloud connector simplifies the connection to the JUMO Cloud. Another variant is available with an IO-Link interface, which, as with the JUMO flowTRANS US W02, also allows other inputs and outputs. The application possibilities are diverse and range from food technology to the dosing of food additives.

▶▶ 63825 at www.pcne.eu

SURFACE TREATED DRIVE SOLUTIONS

Aluminium components higher with corrosion resistance

For almost all its drive components **Nord Drivesystems** offers the nsd tupH surface treatment. This special treatment makes drive surfaces with aluminium housings particularly corrosion-resistant, similar to stainless steel. It's not a coating, but a treatment based on an electrolytic process that creates a protective layer that is permanently bonded to the substrate material. So nothing can detach or flake off. Drives with the nsd tupH surface treatment are largely resistant to acids and alkalis, and easy to clean. The advantages of the nsd tupH treatment compared with stainless steel are a more competitive price and availability for a larger product range. The aluminium housings also provide better thermal conductivity and ensures lower temperatures in the gear unit/motor components and are lighter than stainless steel. NORD offers nsd tupH for a wide range of industries. The surface treatment is not only optimally suited for the use in hygienically critical areas in the food, beverage, packaging, pharmaceutical or chemical industry, but also for applications in extremely humid environments, for example in car wash facilities or waterworks, or in maritime and coastal areas.

▶▶ 63832 at www.pcne.eu

WHEN SIMPLE MEASUREMENT IS NOT ENOUGH

Customized solution with 2 pressure transmitters

Production processes in industry are complex and often involve strongly fluctuating temperatures and pressures - a potential source of error and a safety hazard. This calls for an individual solution, because "off the shelf" measuring devices are unable to cope. **Labom** supplies customised measuring solutions that satisfy such needs. For example, in a solution developed for a pharmaceuticals company to measure the filling level of a tank. With significantly varying pressures and a large temperature range the challenge was to measure with very high accuracy from a single measuring point. Depending on the stage of the production process and the filling level of the tank, the system can switch from a wider measuring range of up to 4 bar to a finer measuring range of up to 400 mbar - ensuring the highest measuring accuracy. The smaller measuring range is overload protected and the sensor disregards the higher pressures. In order to achieve such high levels of measuring accuracy under widely fluctuating temperatures, the diaphragm seal is further equipped with an LTC diaphragm, developed and patented by Labom. The LTC (Low Temperature Coefficient) compensates for any temperature-related expansion of the seal's transmission fluid with a specially formed steel diaphragm.

▶▶ 63937 at www.pcne.eu

LEVEL SWITCH FOR A WIDE RANGE OF MEDIA

For viscous and difficult to detect media

EBE sensors + motion presents a new generation of the CorTEC® sensor technology that drives the possibilities of industrial level measurement even further. The sensor system is capable of measuring fill levels also in case of viscous media or slightest dielectric constants. Even media that are difficult to recognize, such as foam, can be detected or masked out by the sensor where required. Thanks to special algorithms, the sensor system is capable of particularly precise measurements of a wide range of substances, including powders and other solids, oils, conductive liquids, cleaning agents, and even highly viscous media such as honey or pastes. Media with minimum dielectric constants (> 2) can also be reliably detected by sensors. Even if the sensor is completely coated by the substance, it is capable of detecting the fill level. In this process, the level switch can recognize and if necessary mask out media that are difficult to detect such as foam. This allows precise and reliable measuring even under most difficult conditions. The new sensors are particularly suitable for industrial and process technology applications, especially in the food, pharmaceutical, and chemical industries. Here, precise level measurement is indispensable for meeting standards and reliable production. The sensor system can be used in different applications, e.g. for the monitoring of tanks and containers, in dosing systems, or with the filling of liquids.

▶▶ 63767 at www.pcne.eu

HYGIENIC DETECTION SENSORS

Robust sensor series in miniature stainless steel housings

The 53C and 55C sensor series from **Leuze** are suitable for hygiene-sensitive production and packaging processes. They are characterized by the housing made of high-quality, particularly smooth V4A stainless steel and a glass-free, scratch-resistant optics cover. With the 53C and 55C series, system operators get flexibly applicable sensors in the form of throughbeam photoelectric sensors, retro-reflective photoelectric sensors or diffuse sensors. Depending on the model, Leuze solutions reliably detect glass, PET, film or small parts. The fill level of aqueous liquids can also be easily detected. The new 53C and 55C sensor series are dust-proof and waterproof and meet the requirements of protection classes IP67, IP68 and IP69K. The sensors can be configured, operated and maintained via IO-Link. For wet areas, Leuze has developed the 55C series in a Wash-Down design. Optics and operational controls are made of non-diffusive and chemically-stable materials. A gap-free design contributes to maximum hygiene. The sensors of the 53C series are consistently designed to prevent bacterial contamination. Smooth contours without fastening holes prevent deposits. The 53C series is suitable for particularly hygiene-sensitive areas with direct contact with food or for installation above unpackaged products.

▶▶ 63912 at www.pcne.eu

HIGHLY SENSITIVE GAS LEAK DETECTOR

For a wide range of industrial applications

ION Science has announced the launch of the new Panther gas leak detector, featuring a host of new features and twice the sensitivity of its predecessor, the GasCheck G. The new detector has a highly sensitive thermal conductivity sensor that is able to rapidly detect a variety of gases, the most popular applications are helium, hydrogen, ammonia and refrigerants. The Panther PRO allows users to zero the instrument in ambient air, providing visual, audible and vibration alarms when leaks are detected. A colour LCD display and a built-in Gas-Table enables the measurement of concentration and leak rates in a variety of user-selectable units. All measurements can be logged internally and downloaded via Bluetooth or USB. The Panther also features an integrated torch and a flexible probe, which help in low light and restricted areas. For smaller budgets, a basic Panther model is available. This instrument has the same features as the PRO version, but without data logging and Bluetooth capabilities. Panther and Panther PRO have been designed for demanding applications and challenging environments, with an internal rechargeable battery that lasts for up to 19 hours.

▶▶ 63844 at www.pcne.eu

ULTRASONIC SENSOR WITH ROTATABLE HEAD

Flexible and versatile sensor for easy integration

The new cube ultrasonic sensors from **microsonic** are characterised by their flexibility and versatility. The rotatable sensor head of the sensors permit their alignment in five radiation directions and enable ideal adaptation to different applications and installation conditions. Its QuickLock mounting bracket enables the cube to be mounted quickly and easily. This enables sensor replacement without tools. The LED display on the sensor is clearly visible in all installation positions, enabling the user to keep the sensor status in view at all times. The cube sensors have a small cuboid installation dimension (40 x 40 x 40 mm). With three detection ranges, they cover a measurement range from 65 mm to 5 m. The fully equipped version is factory-set with a push-pull switching output and an analogue output. If required, the analogue output can be deactivated using LinkControl or IO-Link and a second switching output can be activated. Thus, only one sensor type with all output stages can be used for several applications. This reduces the storage capacity. In addition, a standard version with a push-pull switching output is available. Equipped with an IO-Link interface in version 1.1, the sensor transmits identification, status and diagnostic values in addition to the measured distances. Limit values or switching points can be set easily using IO-Link.

▶▶ 64023 at www.pcne.eu

Commitment to the Connected World

A PCN Europe Interview with Steve Biegacki, Managing Director of the FDT Group

PCN Europe: FDT started more than 20 years ago with the release of the FDT 1.2 standard. What were the goals and visions at that time?

Biegacki: FDT is a user-driven standard born 20+ years ago with the goals and vision to simplify industrial device integration and communication within a control system independent of the protocol or vendor equipment used while supporting the entire device lifecycle (configuration, commissioning, monitoring, diagnostics, parameterization, replacement, and asset management).

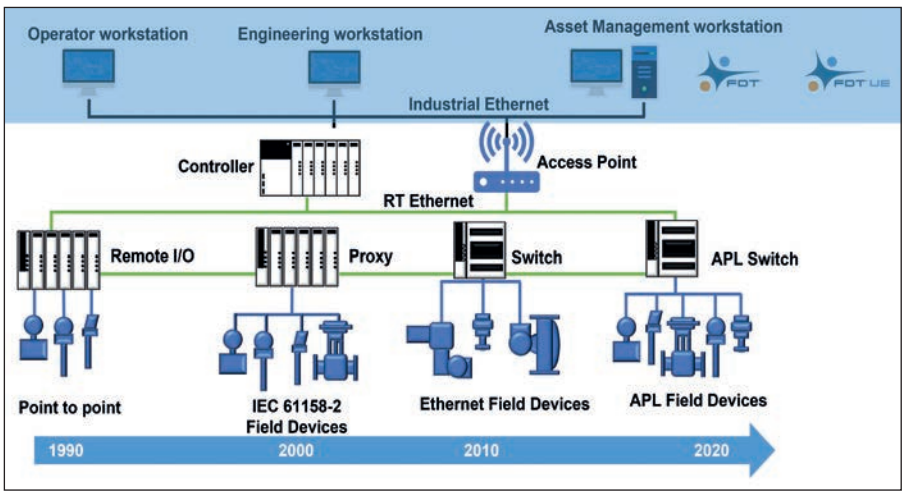
The FDT solution solves intelligent device management challenges for users by providing consistency to integrating devices in a multi-vendor environment, allowing users a consistent way to work with all devices in a single tool in different situations (in a vendor tool, system environment, or service tool) while storing all device data consistently.

The easy-to-use solution enables plant/facility asset management by using advanced diagnostic data allowing applications to move to predictive and proactive maintenance approaches, improving reliable operations and productivity. These foundational goals and vision still exist today.

PCN Europe: How many companies at the moment are members of the group? On the user side, could you give an estimation about how many devices this represents in factory and process applications

Biegacki: The FDT community consists of approximately 100 member companies (system and device vendors, service providers, government and educational institutions and end users) – with six companies representing our leadership team (Schneider Electric, Yokogawa, Rockwell Automation, Flowserve, Endress+Hauser, PACTware) with officers that sit on the FDT Group Board of Directors and Executive Committee.

Steve Biegacki, Managing Director of the FDT Group



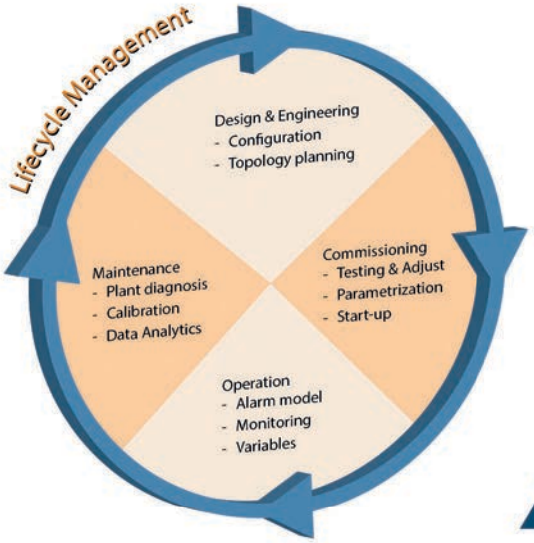
FDT is a universal network/device integration and asset management standard innovating the way automation architectures connect and communicate in process, hybrid and factory markets transforming manufacturing excellence.

FDT leadership is dedicated to the mission of developing and promoting world-class technology that is incorporated by industrial device and system vendors and implemented by end-users in a wide range of automation applications.

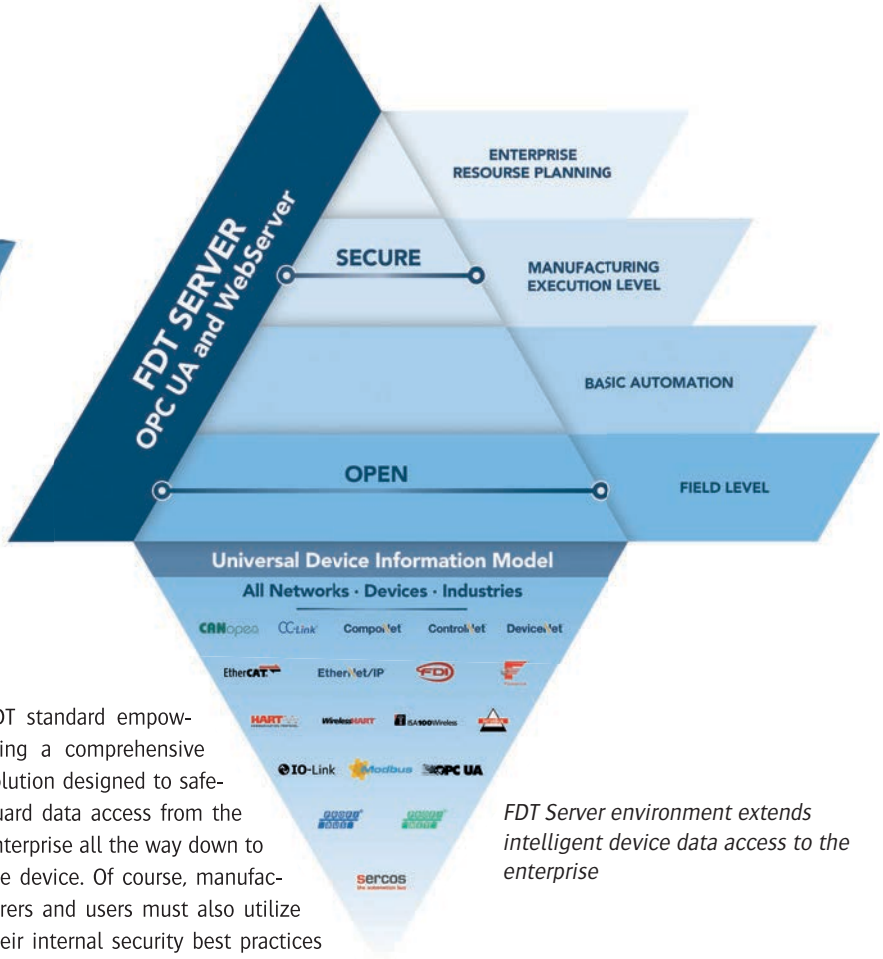
Today, there are tens of millions of FDT/DTM devices deployed and serviced by FDT-enabled engineering applications globally in the process and factory markets.

PCN Europe: What are the main benefits for operators? And what new developments and benefits brings the new 3.0 standard, introduced not long ago?

Biegacki: FDT is a defacto industrial device



FDT bring consistency to industrial lifecycle management in a multi-vendor/network environment.



FDT Server environment extends intelligent device data access to the enterprise

integration standard (IEC 62453), widely accepted and deployed by all leading system and device suppliers today. User operators' benefit greatly by being able to select best-in-class system and device solutions that best fit their application requirements that provide a common interface and consistent method for intelligent device configuration, operation, and maintenance with remote access.

FDT is a harmonizing standard that supports intelligent device management of all connected devices (process, hybrid and discrete) via a single system environment using any networking topology.

If you're not familiar with FDT, it's easy to get started. Many FDT-enabled Desktop environments (ie: PACTware, fdtCONTAINER, FieldMate, DeviceCare, etc.) and device DTMs are freely available.

The new FDT (3.0) Unified Environment (FDT UE) solution provides an opportunity to advance intelligent automation with data-driven business models transforming manufacturing practices with open, secure, and flexible architectures with OPC UA and Web Services built-in to the new FDT Server hosting environment. The new software-based server solution extends the reach of data from sensor to cloud and provides comprehensive control for cloud, on-premise, edge and enterprise-wide applications.

PCN Europe: Talking about the connected industry, remote services and mobile devices: what can users expect regarding cybersecurity in the context of ever-increasing threat levels?

Biegacki: Security is built-in to the core of the FDT standard empowering a comprehensive solution designed to safeguard data access from the enterprise all the way down to the device. Of course, manufacturers and users must also utilize their internal security best practices procedures in the deployment of FDT-based systems and devices.

The FDT standard features robust multi-layered security and leverages vetted industry standards such as Transport Layer Security (TLS) enabling Web Sockets Secure (WSS) and Hyper Text Transfer Protocol Secure (HTTPS).

The FDT (3.0) Unified Environment (FDT UE) security strategy encompasses:

- Encrypted communications using TLS
- Role-based user security for authorization
- 509v3 certificates for authentication
- On-the-wire-security for enabled industrial control protocols

PCN Europe: Process industries is said to be far behind compared with factory automation settings when it comes to IIoT- and cloud technologies. How do you look at this statement and the development in the next years?

Biegacki: This is mainly driven by two factors; capital cycles of investments by manufacturers and certifications or confidence in technologies that are being used. FDT Group's standard, developer tools and service providers can help manufacturers in the process and factory markets migrate their solutions allowing end users in both markets to take advantage of IIoT benefits while preserving their current investments in control systems and related process equipment.

PCN Europe: Process industry installations and plants have a long life. Do you have a recommendation when it comes to being able to operate existing plants in a sustainable way? And what can be done to make new plants now as future-proof as possible?

Biegacki: Great question! We are currently working with users along with our members to preserve control system investments while helping them migrate their networking connectivity to contemporary standards like Ethernet-APL and related protocols, supplying them a device configuration environment that supports their field devices – both process and discrete. Some device networking standards support their preferred connectivity standard and device model. The FDT standard supports all networking standards and device models making migration possible and easier to implement ensuring seamless data exchange across the enterprise.

PCN Europe: Thank you for this interesting insights!

▶▶ 64028 at www.pcne.eu

Flexible Test Cycles for No Compromises in Plant Safety

Using a Smart Safety Test by safety specialist HIMA, specialty chemicals manufacturer Evonik in Marl, Germany, was able to increase the availability of a propene distillation unit. With the help of partial stroke tests on safety-relevant butterfly valves, the cycles between plant shutdowns can be extended from one to three years. The successful project is being acclaimed as groundbreaking because of its economic significance

Regular proof tests on safety devices require organizational effort and expense and frequently impair production. In the case of the safety device in propene distillation at Evonik in Marl, a 100% check of an open-close valve means that the steady state of the column breaks down and restarting the plant causes at least one day of production downtime – with consequences for downstream processes.

One solution is to apply flexible testing concepts for safety equipment, which have already been discussed in the process industry for several years and, since 2018, have also been described in NAMUR Worksheet NA 106. HIMA, the specialist for safety-related automation solutions, has taken up this task. HIMA has set itself the goal of digitalizing functional safety with added value and is pursuing a comprehensive approach that addresses four core topics: Safety and Security, Enduring Compliance, Streamline Engineering, and Effective Management of Change.

This strategy also includes the concept for automating proof testing. "The Smart Safety Test from HIMA makes it possible for the first time to use comprehensive diagnostic options from the field level in the application logic," explains Peter Sieber, Vice President Strategic Marketing at HIMA.

C3 distillation columns of Evonik in Marl (Picture: Evonik)

DEFINITION OF TEST CYCLES

In the application at Evonik, the maximum possible test interval for the partial stroke test on a positioner was determined in tests in which, among other things, the torque characteristic curve of the positioner was evaluated. To automate the partial stroke test, this was combined with a new HART solution from HIMA. For the test, the HIMax safety controller activates the HART channel, which is normally switched off in SIL mode, and "listens" to the HART communication. It controls the partial stroke test and compares values from the positioner with setpoints. Finally, the test result is communicated by the safety control system to the process control system and a test report is generated at the same time.

When implementing the application, the project participants benefited from the preliminary work of HIMA and the existing coordination between the manufacturer of the safety controller and that of the positioner. "A big advantage for us was that the Smart Safety Test is already part of the certification of the safety controller," explains Functional Safety Engineer Marc Langehegermann. "It was important to us not to develop a makeshift or just a prototype, but to create a complete application that can be copied to other use cases if necessary," adds project manager Ralph Michaely.

DIGITALIZING FUNCTIONAL SAFETY CREATES ADDED VALUE

Evonik expects significant added value from

Marc Langehegermann and Ralph Michaely, Evonik (PICTURE: Evonik)

automated tests: "The existing positive operating experience shows that we have mastered systematic faults. We can therefore implement a test concept that manages without a full stroke test for as long as possible," explains Functional Safety Engineer Marc Langehegermann. "In the cooperation with HIMA, we liked the very structured procedure," sums up project manager Michaely. Evonik now wants to use the knowledge and experience gained in other areas to increase plant availability with flexible test cycles because this not only increases productivity, but also significantly reduces maintenance costs.

"We see enormous potential benefits for digitalization over the lifecycle of a safety device," says Peter Sieber. "Digitalizing functional safety can create added value for the company beyond the safety function, not only by helping to cut costs but also by increasing the availability of plants."

▶▶63957 at www.pcne.eu

A More Sustainable Production Needs Digitalization

As a pillar of the global economy, the process industry is facing major challenges: high energy consumption and high use of fossil fuels, rising energy costs and stricter legal regulations make the decarbonization of the industry increasingly urgent. In order to achieve CO_2 reductions and higher energy efficiency in their own operations, it is essential that companies drive the digitalization and automation of their entire production process.

Author: Axel Lorenz, CEO Process Automation, Siemens

The first step begins even before the actual plant optimization – namely with the production resources used in process plants such as oil and gas. These must be defossilized as far as possible. This is possible by using oils and gases from chemical recycling processes. In these processes, waste such as plastic or used tires is reprocessed and converted into usable oils, gases, or carbon black. In Europe, several innovative companies are already working on such processes to serve the process industry. Chemical recycling is particularly relevant for plastics, which have a short life span and contribute significantly to environmental pollution.

Plant operators should then take a look at the drive systems in their production. Electric motors account for almost 70 percent of production's electricity needs. Through a holistic system approach, energy savings of up to 60 percent can be achieved for the entire powertrain. These include, for example, increasing the efficiency of the motor, using the latest frequency converters for variable-speed operation, and integrated digital solutions. This, in turn, saves CO_2 emissions. Other plant components in chemical plants with high energy consumption include reactors and distillation columns.

Information from different components have to be collected to detect deviating operating patterns and ensure maximum reliability and efficiency

SMART SENSORS AND AI-BASED MAINTENANCE

Existing plant components can also be retrofitted with intelligent sensors to avoid unplanned failures and the associated unnecessary consumption of energy and raw materials. Asset management solutions based on artificial intelligence support the predictive maintenance of plant components such as pumps or valves. They detect deviating operating patterns and ensure maximum reliability and efficiency of these components. Operators receive transparent information about where a component is in its life cycle and when is the optimal time for maintenance.

With modern software, intelligent sensors can also be monitored from a distance. This avoids long journeys to distant measuring points. Intelligent positioners in the valve control system should also not be underestimated. They ensure that the compressed air used for control is only used when it is actually needed. Here, plant operators can save up to 80 percent of the energy that would normally be consumed with conventional positioners.

In addition, the control technology of a plant can also be optimized for greater sustainability. Although traditional process control systems are very durable, they often require on-site maintenance. If, on the other hand, operators rely on a web-based control system, it can be maintained from anywhere. There is no need to travel for maintenance. Moreover, such systems can also be controlled by several users in parallel and dis-

The goal of industrial companies is to monitor the energy consumption of their plants to identify key energy consumers and take appropriate action for reduction and optimization

tributed via the web. This is a massive gain in time and costs that promotes the sustainability of operations.

DIGITIZATION IN THE BROWNFIELD

The next step is to optimize the processes in the production facilities and thus make them more energy-efficient and sustainable. In Europe, the focus is primarily on existing plants, some of which are decades old. The problem is that documentation of plant construction is often not available in digitized form, and in addition, changes to the existing structure are sometimes poorly documented or not documented at all. Before production processes can be digitally optimized, different data sources and formats must first be merged or paper-based documentation must be converted into digital information. With the right software, all this data and information can be brought together, put into context, validated, and visualized.

Through so-called Advanced Process Control, the process control of these plant areas can be optimized, and energy consumption can be reduced at the same time. This means that operators use multi-variable model predictive controllers in the control system, which allows faults to be eliminated more quickly, the use of raw materials and energy consumption is minimized, and throughput and product quality are increased.

THE NEXT LEVEL: DIGITAL TWIN

An even greater boost for more sustainable production in chemical plants is created when Advanced Process Control is combined with a fully comprehensive digital twin. The Digital Twin for process industries is a virtual representation of the current and future physical reality, e.g., of a product, a production process, a plant or even something as small as a sensor or pump, including their behaviour and health status. It brings together data from all lifecycle phases and from all functions and levels, helping to understand, manage and predict the performance of the corresponding process or plant and thereby laying the groundwork for informed data-based decisions. The digital twin is constantly modified and improved in parallel with ongoing operations so that product and production can be optimized in real time. Operators can use the data collected in the real world for simulation models to create continuous optimization loops between the digital and real worlds. This is done across the entire value chain and thus enables well-founded insights and safe decisions in terms of comprehensive sustainability management.

With the help of special simulation software such as gPROMS from PSE, the digital twin of the chemical, biological or pharmaceutical process can be produced. Users can simulate and optimize in advance of production, which helps to save resources and ultimately CO_2.

NEED FOR HOLISTIC ENERGY MANAGEMENT

Ultimately, industrial companies must constantly monitor the energy consumption of their plants. To do this, they should implement company-wide energy management solutions – from recording energy data at the field level to company-wide energy analysis – to identify key energy consumers and take appropriate action. In this way, energy peaks can be avoided. Systems can be shut down and made available again via an automated load management system. Operators can also bargain with their energy supplier for a contract that is most advantageous thanks to estimates of the anticipated load profile.

These examples alone show that digital transformation is crucial to overcoming the challenges ahead. The path to a more sustainable process industry is closely linked to the degree of automation and digitalization in production. Every step on this path is delivered by added value – from smart sensor technology and artificial intelligence in maintenance to a comprehensive digital twin of the entire production process. An up-to-date and digitized database is the foundation for digitization measures that are necessary for sustainability management.

▶▶ 64035 at www.pcne.eu

Finding the Knowledge in Process Manufacturing

As process manufacturing plants journey along the road to digital transformation, the information gained accrues to form a vast knowledge bank that can be used to support new efficiencies and performance improvements. This organizational knowledge and harder-to-find tacit knowledge – information that is not written down but resides in the experience of an operator – can be captured into job-specific insights. By utilizing AI, this data can be processed and becomes a significant advantage for workers.

Process manufacturing plants generate many thousands of data points every day— more than any human could ever sift through. But embedded in all those data points are answers to critical questions that can help employees do their jobs faster and more accurately. Questions may be:

- What previous events may have occurred on the last shift that relates to today's equipment performance?
- How does a performance of a specific piece of equipment compare to its historical performance?
- What may have caused a product quality issue, and what recommendations may there be to correct it?

Traditionally, tacit knowledge transfer was communicated in person with no formal process for capture. Seasoned employees were experienced in the ins and outs of the equipment they handled and the workarounds to make sure it operated properly. This process was workable but became problematic when there were interruptions in communications due to sick leave, vacations, or other unexpected events.

While informal communication is helpful, it can be detrimental from a procedural point of view if operators haven't been privy to all the informal communications that had been taking place over time. Therefore, it is not surprising that more and more plants are digitizing their operations and knowledge transfer. Strategic PPM solutions are now collecting all information pertinent to operations, maintenance, and plant performance in one centralized digital database. This way whoever needs to know what actions are to be performed when an issue occurs, can access the one source of truth – the centralized digital database.

Implementing a digitized PPM system plays an important role in a digital transformation for process manufacturing plants. By digitizing shift handover, equipment records, and other key data that reside in a central data repository, information can be easily and transparently shared across shifts, teams, and other areas of responsibility. This enables vital organizational knowledge to remain accessible as experienced workers move on or retire. It also gives new employees a quicker and easier way to learn how to optimize important processes, yielding to better and safer outcomes.

Too often the magnitude of information contained in a PPM system can create challenges for operators and users that access it. For instance, questions may arise regarding what information is most vital for the task at hand. Additionally, it can be troubling to figure out how to search through all the data to determine which information could best solve the issue at hand. Time and time again, operators grope with trying to find the answers to the specific questions they have at any specific time.

However, the next generation of technologies to emerge are aimed at addressing many process manufacturing issues. AI tools like NLP and ML are transforming PPM from a passive information repository into a smart, reactive knowledge system that provides actionable insights.

HOW TO BUILD AI INTO PLANT PROCESS MANAGEMENT

Once AI tools are integrated into PPM applications systems, they become more responsive to human needs and priorities. Expect AI-powered PPM to transform plant operations in positive ways such as by conducting smart searches on all the data in the repository. Employees are able to extract the information they need using natural human language by conducting a smart search powered by NLP. The operator no longer needs to look up individual process records and spend hours searching through the history files to find solutions to issues that may arise. Instead, they can simply conduct a smart search to call up the specific data points and/or information needed. It can be as simple as typing into the system, "When was the last time the color of the product was out of specification?"

A Smart Search engine using AI would instantly filter through all the data pulling up only pertinent information from search results and thus save lots of time and money. It puts the information they are most likely to need in front of them right when they need it. With a Smart Search engine, day and night shifts have access to all relevant historical knowledge. It helps eliminate any problems with communications between the shift handovers and can provide teams with answers to their questions within seconds. AI will also help to diagnose issues with equipment, processes, or products and then suggest solutions based on what has solved similar problems previously. For example, a problem that may seem novel may be identified as having precedents due to AI's ability to quickly uncover within the maintenance or operational records common anomalies. Smart search also comes to the rescue in helping operators narrow down where they need to look and what questions they should ask. A solution suggestion system powered by ML can also sort through years of history—even history across plant locations—to identify patterns and suggest potential solutions. As new issues and their resolutions are logged, that data then becomes part of the knowledge bank for future inquiries.

THE SMART FACTORY IS PEOPLE AND MACHINES WORKING TOGETHER

Industry 5.0 is the promise of moving far beyond Industry 4.0 to provide solutions to empower people. With the power of AI in a PPM system, people and machines can work together to improve operational efficiency, quickly solve emerging problems, and accelerate the pace of improvement. These systems have the power to capture the full organizational knowledge of the workforce across multiple systems and sites and can make that knowledge easily available to others in the way they need it.

As AI tools continue to evolve, they will energize smart PPM applications to help workers make quicker decisions, solve problems faster, and optimize the performance of equipment and processes. This leads to safer, more resilient, more transparent, and more efficient plant operations.

Process manufacturers will benefit from implementing smart knowledge management systems to meet future challenges. As plant systems and organizations have grown in complexity, the industry is also facing an exodus of experienced workers who are reaching retirement age. PPM solutions embedded with AI will facilitate the capture and documentation of important tacit knowledge. Hence, AI-powered PPM will allow companies to quickly get new team members up to speed and maximize the effectiveness and contributions of every worker. An AI assist will support the efforts of companies to stay safe, productive, and competitive while continuing their journey as they adapt to the new advantages of Industry 5.0.

By Andreas Eschbach, CEO, eschbach

63885 at www.pcne.eu

DEFINITION:

Artificial Intelligence (AI) is a type of software that mimics aspects of human intelligence to perform tasks without direct human instruction.

Natural Language Processing (NLP) is a form of AI that allows computers to understand and respond to natural human language in text or speech.

Machine Learning (ML) is a form of AI that allows algorithms to learn and adapt behavior without explicit instructions by looking for patterns in large data sets.

Digital Service for Reduction of Compressed Air Costs

For compressed air consumption measurement and avoidance of losses due to leakages and inefficiencies

SICK presents the Monitoring Box FTMg Premium, a new digital service for compressed air monitoring. In addition to continuous compressed air monitoring, this solution makes it possible to detect leaks at an early stage and report them by means of an alert, as well as identify consumption losses due to inefficiencies in machines or processes. Furthermore, the digital service is able to compare compressed air consumers with each other in regard to their consumption and costs, and consequently suggest optimization opportunities.
The benefits include cost savings in production, a lower carbon footprint, and more efficient service planning. Bottom line is that production planners, energy managers and maintenance staff can reduce compressed air costs in the company by up to 30 % using the service.
Compressed air is one of the most expensive forms of energy. Companies report the cost of this energy source to be up to eight times higher than the cost of electricity. The carbon footprint of compressed air is correspondingly high – especially since leakages and inefficiencies can further worsen the efficiency. Consequently, the ISO 50001:2018 standard calls for the consumption of compressed air to also be taken into account when setting up energy management systems. The FTMg Premium Monitoring Box digital service from SICK helps to identify causes of compressed air losses, and to take measures to reduce compressed air consumption significantly, efficiently and sustainably.

DIGITAL SERVICES FOR COMPREHENSIVE COMPRESSED AIR MONITORING

In addition to continuous compressed air monitoring, the FTMg Premium Monitoring Box digital service makes it possible to detect leaks early, reliably identify consumption losses due to inefficiencies in machines or processes, and compare compressed air consumers. The digital solution for monitoring and analyzing compressed air consumption consists of three components: a multifunctional FTMg flow sensor, a TDC gateway system, and the new FTMg Premium Monitoring Box. The plug and play digital service can be implemented and operated independently of existing customer IT systems. It is ready to go in no time at all with no further configuration measures – especially since it requires neither intervention in control systems nor special programming knowledge. The Monitoring Box FTMg Premium runs in the SICK cloud by default but can also run in the customer's cloud on request. It can be accessed via URL from any suitable mobile device. It is also possible to provide raw or processed data to the customer's energy management system via a commonly used interface.

CONSUMPTION AND COST TRANSPARENCY THROUGH DATA ANALYTICS

While the FTMg Basic Monitoring Box, which has already been successfully launched on the market, focuses on continuous compressed air monitoring, the Monitoring Box FTMg Pre-

mium offers an extended range of functions, which are unique on the market for solutions of this kind. The condition monitoring of the Basic variant is extended by the Data Analytics functionality, which offers both the ability to detect leaks and to analyze compressed air data. This makes it also possible to identify consumption losses due to inefficiencies, the causes of which lie in machines or processes (for example, because of a dirty filter). The FTMg Premium Monitoring Box not only makes the costs for compressed air, leakages, inefficiencies, and excess consumption transparent – it also allows "compressed air benchmarking", i.e., the comparison of compressed air consumption at comparable measurement locations, machines, lines or production sites. This allows valid, data-driven profitability calculations as well as a realistic quantification and presentation of potential cost savings.

The data provided by the digital service can be used to derive measures for reducing energy consumption in accordance with ISO 50001. Specifically, these include the start-up and shutdown management of processes and machines, compressor control, or peak load management. The enhanced information provided by data analysis thus enables targeted decision-making for greater production efficiency. From a sustainability perspective, the digital service from SICK helps reduce compressed air consumption by up to 30 %. The increased energy efficiency reduces carbon emissions from compressed air generation – and thereby the carbon footprint of the company. For service, the FTMg Premium Monitoring Box provides dashboards and alerting tools tailored to the application. Maintenance work can be carried out on an as-needed basis, which saves time and money. At the same time, the transparency that the digital service provides can help avoid unplanned service measures and machine downtimes.

▶▶ 63962 at www.pcne.eu

SOLENOID INTERLOCK IN HYGIENIC DESIGN

With high protection class IP69 for the food industry

Schmersal has developed a completely new actuator design for the AZM 300 solenoid interlock. The characteristic feature is the patented operating principle with rotating shaft and star handle. The advantage: The safety door, when in a closed position can be pulled-to and held with practically no free-play. Thanks to the innovative guard locking system, the solenoid interlock can be approached from three sides. The AZM 300 has an integrated RFID sensor, used for secure identification of the actuator, which enables three different levels of coding and thus protection against tampering. Other advantages of this actuator design include its hygienic design. The AZM 300 is also resistant to a wide range of cleaning agents and has IP 69 protection class. The AZM300 solenoid interlock is optionally available with serial diagnostics (SD). Solenoid interlocks with serial diagnostic feature have a serial input and output cable instead of the conventional diagnostic output. When solenoid interlocks are connected in series, the serial diagnostic cables are also connected in series in addition to the safety channels. The resulting "common diagnostic line" is wired to a serial diagnostic gateway for evaluation. The SD system creates the prerequisite for solenoid interlocks to be able to forward extensive diagnostic information to a higher-level control system.

▶▶ 63770 at www.pcne.eu

COMPACT ELECTRO-HYDRAULIC ACTUATORS

Robust quarter-turn actuators for safety-related duties

The SI range of actuators from **Rotork** combine the simplicity of electrical operation with the precision of hydraulic control and the reliability of mechanical spring-return fail-safe action. Typical applications for Skilmatic SI actuators include functional safety-related Emergency Shutdown (ESD) inputs and Remotely Operated Shutoff Valve (ROSoV) duties. The new actuator uses a rack and pinion drive for a torque output of up to 1,000 Nm. Robustly constructed for challenging environments, SI actuators deliver a highly reliable means of safety valve positioning and intelligent management. With a wide choice of operating speeds, ESD options with single or dual inputs and partial stroke testing (PST) to meet a wide range of applications. All actuators are available with hazardous area certification and are suitable for use in SIL 2/3 systems. The actuators share the same intelligent features as Rotork's IQ3 range, including non-intrusive commissioning by means of an intrinsically safe handheld Bluetooth wireless setting tool, performance monitoring and configurable data logging, increased functionality, and enhanced availability of valve and process data for asset management and data analysis. The logger is capable of storing up to 3,000 events and exports data logs to Insight 2 or Rotork's cloud-based iAM system.

▶▶ 63737 at www.pcne.eu

Pioneering Green Spirit

Long Ridge Energy is one of the world's first power plant operators to blend hydrogen with natural gas at scale. Measurement technology plays a critical role in paving the way for the decarbonization of the energy industry

Text: Christine Böhringer, Endress+Hauser

The energy transition is not making things easy for gas-fired power plants. On the one hand, they are supposed to ensure a steady supply of electricity and heat when there is no wind or sunshine. On the other, by burning a fossil-based source of energy, the plants themselves release harmful CO_2 emissions. "Operators therefore want to get their facilities ready for hydrogen, gradually blending more of it into the natural gas, to lower the overall carbon content of the fuel," explains Cory Marcon, Power & Energy Industry Marketing Manager at Endress+Hauser USA.

PRECISE CONTROL FOR EFFICIENT PLANT OPERATION

A trailblazer on this road to climate neutrality is the combined gas and steam cycle power plant operated by Long Ridge Energy in Hannibal, Ohio. The 485 MW facility is the first in the world built with the goal of utilizing pure hydrogen mixed in with natural gas. The conversion requires first and foremost a good process control system: hydrogen has different physical properties than natural gas, so it combusts differently. It also has a lower volumetric energy content. For these reasons, the mixture must be precisely controlled to ensure safe and efficient operation of the plant.

This is where Long Ridge Energy places its trust in Endress+Hauser. The solution relies on two innovative technologies. The Promass Q Coriolis flowmeter provides highly accurate mass flow, density and volumetric flow measurements, even when process conditions fluctuate. This helps to ensure that hydrogen is injected at a stable rate. A Raman Rxn5 in-line analyser determines the gas composition of the blend and thus indirectly its energy content, allowing the integrity of the fuel blending system to be validated almost in real time.

OFF-THE-SHELF INNOVATION

Long Ridge Energy had already successfully blended the natural gas with 5 percent hydrogen on multiple occasions. Drawing on these experiences and findings from the installation, Endress+Hauser developed a hydrogen blending skid for natural gas fuel systems and pipelines, thus enabling automation of the process. Proving that Long Ridge Energy's pioneering spirit lives on, the company plans to fire the power plant completely with hydrogen by the year 2030.

▶▶ 64027 at www.pcne.eu

A Raman analyzer (cabinet on the right) enables precise monitoring and control of the hydrogen injection process. © Endress+Hauser

INDUSTRIAL ENERGY MONITORING TOOL

Complete monitoring system in ruggedized case

VPInstruments releases VPVision Mobile. The complete energy monitoring system VPVision, but now in a sturdy explorer case. It enables a complete audit of plant utilities. It can be used for on-site data logging, with remote access, thanks to built-in cellular connectivity. This gives the option to check systems remotely, saving time and money. By monitoring plant utilities like compressed air, industrial gases, steam, water, and electricity factual system and performance data can be provided and pinpoint areas to save energy and money and reveal opportunities to the production capacity. VPVision Mobile enables a complete audit of their plant system. The mobile system can be used for assessments in the following applications: Supply & demand audits for compressed air, nitrogen, oxygen, CO_2, helium, argon, and other technical gases. Leak detection. Vacuum/blower audits or general energy management audits (electricity, steam, natural gas). Control system analysis and compressor room performance measurements. Companion 1m and 10m cables and Modbus T-splitters provide an easy plug-and-play setup. It offers the opportunity for on-site data logging, combined with cellular connectivity for remote access. The device comes with 8 analog (4..20 mA) inputs for third party analog sensors, all fully protected.

▶▶ 64014 at www.pcne.eu

INTRINSICALLY SAFE LIQUID LEVEL SENSORS

For direct contact with flammable liquids

Using innovative infrared technology and the principle of total internal reflection, these hazardous approved switches from **PST** are suitable for a wide range of applications, including presence or absence of any liquid, petrochemicals/oil and gas, heavy-duty automotive, leak detection, hydraulic reservoirs, tank/container level-control, and downstream analyzer protection. The switches offer an almost instantaneous response time and switch point repeatability of +/- 1 mm, providing highly accurate readings, and require no calibration. These liquid level switches are highly robust and resistant to chemical attack, with an operating temperature range between -30 and +80°C (-22...+176°F). The switches are housed in 316 stainless steel and come with a choice of sensing tip materials, making them ideal for use in challenging environments. ATEX, UKCA, and IECEx certified, these switches offer metric and imperial process connection options with NAMUR output. The PST range of intrinsically safe optical liquid level switches offer exceptional reliability and accuracy for use in challenging environments and are designed and certified to meet the highest industry standards.

▶▶ 63897 at www.pcne.eu

WATER-COOLED DRY SCREW COMPRESSOR

Oil-free compressed air at low life cycle costs

ELGi introduces its first two-stage oil-lubricated screw air compressor enabling industry-leading low total cost of ownership and increased reliability. The OF90-160 range of compressors is compliant with class zero ISO 8573-1 air purity standards. The two-stage dry screw and water-cooled oil-free air compressors are available in fixed and variable speed options with a nominal power of 90 to 160kW. The range can also be equipped with an integrated and stand-alone Heat Recovery System (HRS), recovering up to 90% of the heat generated during the compression process, and has improved performance within the 4.5 - 10 bar -operating range. These units can also be installed outdoors with protection kits. Another important focus was on ELGi's "Air~Alert", the IoT-based Machine Monitoring System. Enabling data analytics and real-time monitoring of air compressor parameters, ELGi's Air~Alert is a data transmission and analysis service that monitors a compressor's critical parameters to minimize downtime and maximize efficiency. Predictive alerts are a step closer to prognostics for detecting and preventing failures. With Air~Alert, customers worldwide are assured of highly accurate advanced predictive machine downtime alerts and minimized unplanned downtime.

▶▶ 63730 at www.pcne.eu

IP65-PROTECTED INDUSTRIAL TRANSMITTER

With display for local data visualisation

Vaisala introduced the new Indigo300 industrial transmitter. It has been designed to provide ease of use for industrial applications requiring high reliability. As part of Vaisala's Indigo family, Indigo300 is compatible with the Indigo measurement probes. The transmitter is ideal for demanding industrial applications requiring accurate measurements of one parameter at a time. A rugged IP65-rated metal enclosure ensures reliable performance in rough conditions. In addition to supporting one smart probe at a time, a display allows local data visualisation. The need for a simple solution with single probe support and analog outputs, delivered ready for use in even the most demanding environments was a common request from customers that is fulfilled by Vaisala. The transmitter is pre-configured at the factory, so installation is quick and easy for users. Indigo300 is a durable transmitter with a metal housing that works with Vaisala's comprehensive range of Indigo-compatible smart probes for measuring humidity, temperature, dew point, carbon dioxide, vaporised hydrogen peroxide, and moisture in oil. Probes can be swapped easily whenever needed. The modular design enables users to combine elements according to their requirements for working in the most demanding industrial environments.

▶▶ 63960 at www.pcne.eu

A Matter of Safety

With the increase in hydrogen mobility, the network of refuelling stations is densifying. The sector is investing heavily into the infrastructure. This creates a significant demand for measurement technology, mainly to ensure the safety of the refuelling process.

The goals are ambitious: The network of "Hydrogen Refuelling Stations" (HRS) worldwide is expected to increase tenfold over the next ten years. In parallel, it will be vital to step up the production of "green" hydrogen, in other words the production of H_2 by electrolysis using renewable energies. This is considered to be the only truly climate-neutral method. The atmosphere-friendly "fuel" is delivered to the refuelling stations in so-called tube trailers, which consist of semi-trailers with a cluster of steel tube tanks. Type IV carbon fibre tanks are increasingly used here. They are designed for a more than twice as high tank pressure, enabling a higher payload.

In the light of the projected development, there is a great need for measuring solutions used to monitor and control the refuelling process, especially in the field of sensor systems. However, the changing landscape of standards makes it difficult for manufacturers to get a clear picture of which guidelines should be defined for their H_2 products. Durable specifications for hydrogen refuelling stations can be found, for example, in the ISO 19880 series of standards.

HIGH DEMANDS ON SAFETY

Irrespective of the specific requirements of refuelling stations, the physical and chemical properties of hydrogen alone place substantial demands on the measurement technology, which cannot be met using standard equipment.

Hydrogen is highly flammable, which is why the equipment usually has to meet explosion protection requirements in stationary applications. Due to its small particle size, H_2 penetrates materials and forms an explosive mixture in the air in concentrations as low as four percent. Welded connections or ones with metal seals are therefore generally considered when it comes to adapting the instrument processes.

The extremely small H_2 molecules also penetrate metal structures, where they can lead to material embrittlement and become a safety risk. Austenitic steels such as 316L are preferred for this reason for measuring instruments in H_2 applications.

Furthermore, hydrogen can impair the desired long-term stability of a sensor's measurement signal. If it adheres to the resistor and / or penetrates into sensitive structures of the electronic measuring instrument, this can ultimately result in signal offset and hence measurement errors. One possible countermeasure is to use separating layers to prevent hydrogen penetration. Gold is only one suitable material for this kind of solution.

PRESSURES UP TO 900 BAR

Beyond these generally applicable requirements for H_2 applications, there are also specific challenges to be addressed in connection with hydrogen refuelling stations. Owing to the design of both these stations and the

The measuring solutions in the H_2 refuelling process must work reliably over a long period at pressures of up to 900 bar and temperatures from -40°C to +85°C ©: istockphoto

Pressure sensor IS-3. Picture: WIKA

High-pressure thermocouple TC90. Picture: WIKA

refuelling process itself, the measurement and control technology must be rated for pressures of up to 900 bar and temperatures from -40°C to +85°C.

The hydrogen is currently delivered in the tube trailers at a pressure of 200 bar and then further compressed to 900 bar in high-pressure tanks by means of compressors. This happens in several stages. The compression corresponds to the 700 bar pressure in the tank of a passenger car. The pressure and flow rate required in each case are controlled by communication between the sensor systems of the fuel pump, referred to as the dispenser, and the vehicle tank.

Customers are keen for the refuelling process to be completed in the shortest possible time. Pressure and temperature play an important role here: the larger the pressure difference between the refuelling station and the vehicle, the faster the hydrogen will flow. It goes without saying that the specified vehicle tank pressure must not be exceeded.

VEHICLES ARE SETTING THE LIMIT

The temperature profile over the refuelling line means the time factor is relevant too: hydrogen heats up when it expands. The gas is accordingly cooled down beforehand to -40°C by means of a heat exchanger, so that a temperature below 85°C can subsequently be maintained. This is necessary because the vehicle tanks are only specified up to this value. The closer the temperature gets to 85°C, the more the refuelling process must be slowed down and regulated by cooling.

In view of the potentially critical situation, the refuelling line of an H_2 station ships with complex instrumentation – including sensors for pressure, temperature and flow as well as shut-off and vent valves. Coriolis flow meters are particularly suitable for monitoring the flow rate due to the high pressures involved.

The temperature and pressure measuring points are crucial for operational safety. The thermometers must work with short response times and be pressure-tight: the need for a rapid response means it is not a good idea to use a thermowell. The probe tip must thus be capable of withstanding pressures of up to 875 bar unprotected. At the same time, it must have a compact design in order to restrict the influence on the media flow to a minimum. A conical threaded connection, for instance, gives the thermometer the requisite strength and keeps the measuring point reliably sealed.

The pressure sensors installed in the tank system usually have a nominal pressure of 1000 bar or 1050 bar. This value is based on the nominal tank pressure in the vehicle – 700 bar in the case of passenger cars – plus a temperature-related safety factor. The sensors must also operate to specification in the typical HRS temperature range from -40°C to +85°C. Last but not least, the task at hand necessitates devices with explosion protection – or even SIL certification at certain measuring points in the system.

Summary: Expanding the infrastructure for hydrogen mobility is just as promising a market for the manufacturers of measurement technology as the H_2 propulsion systems. The focus is the safety of the refuelling process, which requires complex instrumentation for trouble-free operation.

▶▶ 64038 at www.pcne.eu

Analysis of Hydrogen Quality in Hazardous Areas

The use of conventional analysis equipment in hazardous areas is complicated due to a lack of approvals. Equipment without ATEX or IECEx certification must be specially protected so that it does not act as an ignition source. At the same time, analysis equipment is essential for many processes. For example, for testing the purity of hydrogen at hydrogen refuelling stations

Author: Alexander Aust, Pepperl+Fuchs

The use of green hydrogen as an alternative to fossil fuels is becoming an increasingly important issue for industries worldwide. The areas of application of hydrogen are diverse and can be adapted to a very large number of industries. The applications are global and universal: whether as a reducing agent in the steel industry, as a substitute for oil in the chemical industry, or as a cleaning agent in the petrochemical industry. The most well-known area of application is the use of hydrogen as fuel in transportation. Thanks to fuel cells, electric power can be generated from the combination of hydrogen and oxygen, which can be used to power cars with an electric motor.

WHY HYDROGEN ANALYSIS?

For optimal use of hydrogen, the purity of the element must be ensured at all times. Impurities can cause premature ageing of the fuel cell, dilute the fuel, reducing efficiency, or lead to faults and replacement of the fuel cell stack. To prevent this kind of damage, analysis equipment is placed on-site at transition points to continuously monitor the quality of the hydrogen supplied and report any deviations from the specifications.

Since hydrogen is a flammable gas, this means that refuelling stations are always located in hazardous areas. These are declared as Ex zones or divisions. In most cases, how-

Front view of the cabinet with viewing window for analysis equipment.

Specially produced pipes as a supply line to the analysis equipment.

ever, the analysis equipment used does not have specific approval for use in Ex zones and must therefore not be used in hazardous areas. It is therefore necessary to make the devices "Ex-compatible" to be able to use them. In most cases, this is done using an enclosure, which is protected by the type of protection Ex p (purge and pressurization).

ENABLING THE USE OF HYDROGEN ANALYSIS EQUIPMENT IN HAZARDOUS AREAS

The concept of purge and pressurization is to separate the installed electrical equipment from the potentially explosive atmosphere. For this purpose, an enclosure is used, which is equipped with a purge and pressurization system approved for the respective Ex zone or division. To enable purge and pressurization, the enclosure is first "purged" by pressurization using either an inert gas or clean air. After purging, a minimum overpressure of a few millibars is maintained inside the enclosure. Components associated with the purge and pressurization system, such as the manifold and enclosure protection vent, are connected to the controller and ensure that no potentially explosive atmosphere can enter the enclosure. This ensures that conventional electrical devices such as analyzers can also be used in hazardous areas. In case of a fault, the control unit responds by reporting the fault and safely switching off the systems in the event of an emergency. However, this only occurs if the readings fall below the default minimum pressure value. In case of slight drops in pressure, the automatic leakage compensation compensates for the pressure loss, allowing the fault to be resolved during operation.

A large, US-based analysis equipment manufacturer also required an enclosure solution of this type for analyzing hydrogen quality. The aim was to develop a product that enables hydrogen filling station providers to ensure the quality of hydrogen directly at the refuelling stations. Three analysis devices developed for this purpose were required to check whether all standard specifications for hydrogen quality are fulfilled. Depending on the production process, a wide variety of impurities can occur in hydrogen. In this case, seven different gases were detected and analyzed. The customer approached Pepperl+Fuchs to develop

Purge Controller 6500 with automatic monitoring and control of enclosure pressure and temperature. Pictures Pepperl+Fuchs

an enclosure solutions fully certified for use in hazardous areas. There were a lot of specific requirements and wishes which had to be integrated into the design. The customer provided the equipment developed in-house and placed their trust in Pepperl+Fuchs—an expert in this field—to develop a practical and safe solution.

FULLY CERTIFIED AND READY-TO-USE PLUG-AND-GO SOLUTION

Pepperl+Fuchs were responsible for the engineering, including selecting a suitable cabinet, and developed a solution. The result was a ready-to-use enclosure solution with analysis equipment, suitable for use in Zones 1, 21 and 2, 22. The engineers paid attention to the small but important details. For example, doors were installed at the front and rear of the cabinet to ensure simple maintenance. This allows the analysis equipment to be inspected without having to remove them first. In addition, special stainless steel pipes required for use with hydrogen were used to supply the analysis equipment. The Pepperl+Fuchs project engineers also took over the complete certification and construction of the enclosure solution in accordance with ATEX and IECEx directives. The Ex pxb level of protection of the purge and pressurization system therefore corresponds to the approval in accordance with IEC 60079-2 standard for Zone 1.

This fully certified and ready-to-use solution is now offered as a standard solution for hydrogen refuelling facilities. This is not a one-off project, but a highly flexible solution for customers. End customers buy a product that is ready for use on-site, and quick analyses with reliable explosion protection are guaranteed with maximum operational safety.

A LONG-STANDING PARTNER IN THE PROCESS INDUSTRY

Many other partners also benefit from the extensive expertise of Pepperl+Fuchs. Engineering teams, spread over six Solution Engineering Centers (SECs) worldwide, always find the best solution for customers in terms of cost-effectiveness and technology. The product specialists take over the engineering, design, certification, and construction of tailor-made control and distribution solutions. After joint acceptance, the solutions are immediately ready for use and can be delivered to their intended operating location.

▶▶ 64034 at www.pcne.eu

ATEX-CERTIFIED WIRELESS TRANSMITTER

For absolute and gage pressures up to 1.000 bar

With the wireless **Amsys** M5601 with Bluetooth communication practically all monitoring processes for pressures of up to 1,000 bar can be reliably remotely controlled. What's special about this sensor is its explosion-proof ATEX and CSA HazLoc (IECEx) certification that enables it to be used in hazardous environments. Whether for the measurement of air, gas or oil pressure in plant areas that are difficult to access, for mobile maintenance work with logging of measurement data or for more reliability through predictive maintenance, this sensor transmits measurement data quickly and reliably via Bluetooth. Precise pressures and temperatures can be immediately retrieved on the app for Android™ 4.3 or iOS 7 and higher versions. With the M5601 AMSYS provides a media-resistant Bluetooth sensor for the measurement of absolute and gage pressure. As it is IP65 certified, it also qualifies for use in harsh ambient conditions. Measurable maximum pressures lie between 70 and 1,000 bar (also available as the M5600 without ATEX certification for smaller pressures starting at 3.5 bar). The pressure transmitters are powered by a CR2032/CR2050W button cell and can be read out using an app or Windows PC software. They measure the gage or absolute pressure independently of the media.

▶▶ 63966 at www.pcne.eu

SPACE-SAVING INDICATOR & OPTICAL SENSOR

Easy-to-configure sensor and indication combination

Turck's K30 Pro optical sensor is a space saving and cost-effective solution for applications that require both an optical sensor and a multicolor LED indicator. The highly compact 30 mm diameter device was developed by Turck's optical sensor partner Banner Engineering and is designed to detect objects within an adjustable range from 20 to 1,000 mm for clear operator guidance. In order to meet the requirements of different areas of application, the K30 Pro has different teach modes. These include object mode for detecting an object within a specified area, background mode for detecting an object with background suppression, and window mode for detecting an object in a range between two threshold values. This flexibility prevents unnecessary triggering of the sensor and makes the K30 Pro fit for various applications in the automotive industry, process industry, material handling and conveyor technology. The user-friendly K30 Pro optical sensor is easy to connect via M12 connector and quick to disconnect if required. The free Pro Editor software enables indication colors, ranges and logic to be configured easily and intuitively onsite. Thanks to IP65 protection, the sensor is ideally equipped for use in demanding environments.

▶▶ 63886 at www.pcne.eu

HYGIENIC METERING PUMPS

Certified for food contact under Reg. (EC) 1935/2004

ProMinent has now had all its low pressure metering pumps certified for food contact under Regulation (EC) 1935/2004. The company can therefore provide solutions for applications in which materials and objects come into direct contact with foodstuffs. ProMinent places a strong emphasis on product quality and safety. The certification under Regulation (EC) 1935/2004 provides customers in the food industry with assurance that the metering pumps meet the strict requirements for use in food-related applications. The compliance extends to various pump types, including diaphragm pumps with a dosing rate of 1 ml/h to 1000 l/h, as well as peristaltic pumps with a dosing rate of between 10 ml/h and 410 l/h. Particularly notable is the motor driven metering pump sigma Hygienic, designed specifically for hygiene applications. All the pump's components meet the applicable directives and standards for use in hygienically sensitive production areas, including European food contact machinery regulations. The liquid end's simple construction and smooth, almost gapless surfaces, which have been optimised in terms of dead space, form the basis for the hygienic design, which enables easy CIP and fast disassembly.

▶▶ 63822 at www.pcne.eu

MAGNETIC LEVEL INDICATORS

For high or low temperature/pressure applications

KROHNE completes the BM26A series of Magnetic Level Indicators (MLI) with the introduction of BM26A-8000. Replacing the previous generation, the devices are designed according to specific industry needs. BM26A is available for measuring ranges from 0.3 m / 1 ft up to 5.5 m / 18 ft (other dimensions on request). Accessories and options include e.g. valves, thermal insulation, various materials, limit switches, hazardous area approvals, interface measurement, or designs for extreme operating conditions. Depending on the application, communication options for BM26A reach from local indication without external power supply to optional reed switches or reed-chain level transmitters providing analogue or digital output signals. The new BM26A-8000 for redundant level measurement is available in two versions: the BM26A-8000-TWIN consists of a double measuring chamber with one chamber featuring a flapper indication, and the other one acting as a bypass chamber equipped with a TDR guided radar, FMCW radar or displacer level transmitter. The BM26A-8000-BI version features a unique measuring chamber with two compartments, one for the OPTIFLEX 7200 TDR transmitter probe and one for the float moving next to it.

▶▶ 63934 at www.pcne.eu

EMERGENCY PULL-WIRE SWITCHES

Additional housings for extreme ambient conditions

The **steute** business unit "Extreme" presents an expansion - or rather doubling - of its ZS 92 S/SR series. To date, these extremely robust and versatile emergency pull-wire and belt alignment switches have been "packaged" in a die-cast aluminium enclosure ideally suited to unfavourable ambient conditions thanks to multiple coatings (passivation, base coat, powder coat). Users can now alternatively opt for an enclosure which is made out of top-quality duroplastic and is anti-corrosive beyond all reasonable doubt. All screws and connecting elements are stainless steel. The entire series features a high degree of flexibility. The ZS 92 S is available with a variety of pre-installed settings for the release lever and the unlocking mechanism. This means that the switch can be installed in nearly every conceivable operating position, including the rear side. Installation dimensions are compatible with other readily available emergency pull-wire and belt alignment switches, making it easy to retrofit existing (conveyor) plants with the new switches or to exchange them later. In the ZS 92 SR belt alignment switch, the switching points for advance warning and switch off are easily adjustable in 5° steps, considerably increasing its practicality and versatility.

▶▶ 63927 at www.pcne.eu

LASER OPEN PATH H2S GAS DETECTOR

Gas detection for safety related applications

The global importance of SIL (Safety Integrity Level) has grown substantially in the oil, gas, petrochemical and other process industries over the past 10 years. It makes sense, therefore, that devices such as gas detectors demonstrate their suitability and competence in line with the latest SIL2 third-party certification.

Teledyne GFD´s innovative GD1 open path H_2S gas will prove attractive in SIL2 applications for several reasons, not in the least its unique customized tuneable laser diode that eliminates environmental effects from sun, rain or fog. In fact, the GD1 can operate with up to 98% obscuration, boosting overall site safety. This capability is possible because light emitted by the detector travels as a cone from one point to another, rather than as a conventional straight beam. In other words, the beam expands after transmission and is almost a meter in diameter when it reaches the receiver mounted 75m away. It can therefore penetrate harsh environments that other solutions may find difficult. With its fast and fail-safe laser, the GD1 performs real-time dual automatic calibration and automatic proof testing, thus eliminating the need for manual intervention and reducing maintenance costs.

▶▶ 63968 at www.pcne.eu

PRECISE SPOT IR THERMOMETER

With accurate object targeting at long distances

Teledyne FLIR presents a new spot IR thermometer, the FLIR TG56-2. It provides professionals in utility, manufacturing, building electricians, and industrial mechanics with an advanced tool to perform accurate inspections and detect hazards before any contact is made. For those dealing with higher temperature readings, the FLIR TG56-2 measures IR temperature up to 1300°C (2372°F) and includes a Type K thermocouple for contact temperature measurements. The TG56-2 is also designed to offer non-contact temperature measurements from an safe distance, thanks to its infrared technology, 30:1 distance-to-spot ratio and Class II laser sighting. The TG56-2's color display screen is designed for easy viewing of current and reference temperature readings simultaneously. It allows to adjust settings quickly and set high/low alarms to efficiently perform inspections. Up to 99 measurement points can be stored internally and can be quickly referenced for comparison and trending. With the ergonomic 'Single Hand' design for simplified measurements and menu access device handling is really simple.

▶▶ 63970 at www.pcne.eu

STANDARDISED PUMPS IN NEW SIZES

Available in a wide range of sizes and materials

KSB adds 19 sizes to its MegaCPK type series. This means that users can now choose from 55 sizes with more than 78 hydraulic systems for these standardised chemical pumps. The available materials of grey cast iron, nodular cast iron and cast steel, stainless steel as well as duplex and special alloys, such as titanium and Hastelloy, result in a very wide range of applications. Fluids that require heating or cooling can also be transported. The pumps are primarily characterised by their high output per size and their low energy consumption. The developers placed particular emphasis on good suction behaviour with a low NPSH value in order to minimise the risk of cavitation, thus enabling smooth and stable pump operation even under difficult operating conditions. Every pump is supplied to the customer with the impeller diameter trimmed exactly to the duty point. Impeller trimming combined with the large range of pump sizes available for selection helps ensure that the energy consumption of pumps is kept to the minimum necessary, even if they are run at fixed speed. By using the finite element method (FEM), a calculation method for the simulation of solids, the developers were able to achieve a high degree of strength and rigidity of the installed components while at the same time optimising the use of materials.

▶▶ 63828 at www.pcne.eu

index

Companies in this issue

Red for companies advertising in this issue

upcoming events

SEPTEMBER

Powtech
26 – 28
Nuremberg
www.powtech.de

ILMAC
26 – 28
Basel
www.ilmac.ch

OCTOBER

Adipec
02 – 05
Abu Dhabi
www.adipec.com

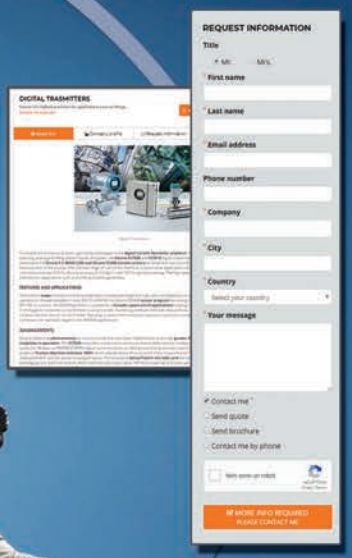
Motek
10 – 13
Stuttgart
www.motek-messe.de

Note: Dates and descriptions of events have been obtained from official industrial sources. The publisher, therefore, cannot be held responsible for errors, changes or cancellations.

TIMLAB Customer Zone™

EDITORIAL
ARTICLES & ADVERTORIALS

LEADS GENERATION



TIMGLOBAL MEDIA CREATES CONNECTIONS BETWEEN SUPPLIERS & DECISION MAKERS IN THE INDUSTRIAL WORLD

TIMGLOBALMEDIA

PRINTED MAGAZINES

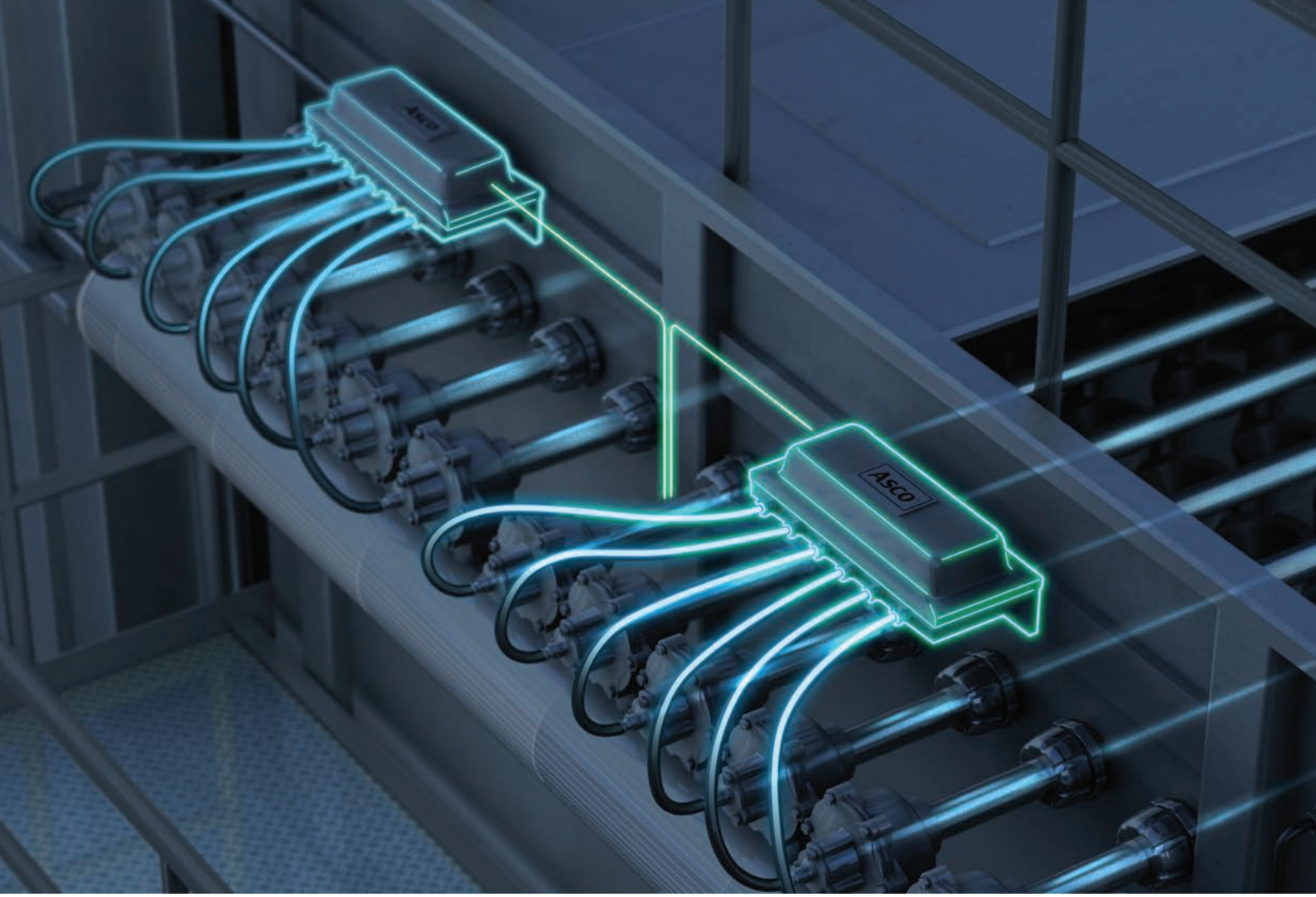
WEBSITES

E-MAILINGS

EVENTS

www.tim-europe.com

marketing@tim-europe.com



Go clean.
Go Boldly™

Emerson's solutions for dust collector and filtration systems provide real-time visibility and precise control to reduce downtime, energy consumption, and emissions.

Learn more at **Emerson.com/DustCollector**

EMERSON™