



 **PEPPERL+FUCHS**

News for
Process
Automation

1/2016

Sharing Knowledge, Creating Solutions

Know-how on site: tailor-made systems and components for explosion protection

Across All Boundaries

OPC UA is a standardized protocol for the smart factory



04

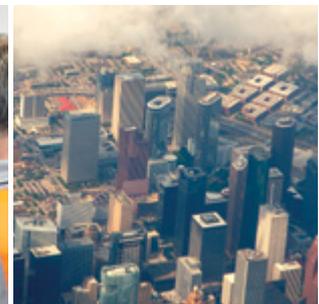


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Dear Reader,

Having a partner at your side helps when it comes to brainstorming ideas, improving existing processes, and continuing to grow together. After all, exchanging thoughts with someone at eye level enhances your ability to see things from another's perspective and in turn develop yourself – not only privately but professionally as well. With this in mind, our company maintains numerous close partnerships to ensure that our products meet market demands. This helps us drive innovations and meet customer needs in the most effective way, anywhere in the world.

A good example is our cooperation with distributed control system manufacturers, which we cover in more detail in this issue. For over 30 years, we have maintained a close relationship with these contacts and have now established a network of key account managers who are in constant contact with these system manufacturers. The advantage for you is obvious: tailor-made solutions that have already been tested in the system structure and can be quickly implemented.

Our networking philosophy is also reflected in our Solution Engineering Centers (SECs): Our customers benefit not only from the global expertise gained from close cooperation between the SECs but also from on-site maintenance worldwide. For everything from our extensive portfolio of electrical components and systems for explosion protection to individual system solutions, we are available to advise you throughout the entire engineering process.

I hope this issue provides you with some exciting insights into the world of Pepperl+Fuchs – happy reading!

Dr. Gunther Kegel
CEO

We look forward to receiving your feedback on this issue.

Please e-mail any comments to: newsletter@pepperl-fuchs.com

Focus

From Product to Solution



Demanding applications in process automation require tailor-made solutions. Pepperl+Fuchs offers a comprehensive range of electrical explosion protection equipment. With seven Solution Engineering Centers worldwide, the company supports its customers throughout the entire engineering process – providing you with a safe solution designed to your specific needs.

Today's companies must meet the challenges of a globalized world, with increasingly complex production processes – especially when it comes to explosion protection for process automation. For this reason, Pepperl+Fuchs provides support in the form of high-quality products – along with complete systems and expert knowledge made available to you around the world.

Ex de Solutions Combine the Advantages of Two Types of Protection

Ex de combinations are a popular form of electrical explosion protection. "These solutions combine the advantages of the increased safety Ex e type of protection and the flameproof enclosure Ex d type of protection," explains Rainer Naegle, Head of the Electrical Explosion

Protection Equipment product group. Such solutions consist of an Ex d enclosure combined with an Ex e enclosure, in which terminals and operating elements are integrated according to customer requirements. Thomas Kasten, Product Marketing Manager for Systems+Solutions, points out: "Components involving measurement and control technology or electrical installation technology that are not specifically designed or suitable for hazardous areas can be installed in the Ex d enclosure." This configuration is possible because the flameproof enclosure rules out any threat to the environment. In contrast, only Ex-certified components are installed in the Ex e enclosure; these are much easier to access and easier to install than Ex d enclosures, making it simple to perform maintenance or replace components.



Success is a matter of technology and consulting

“The more complex the applications of our customers are, the more important the engineering is, i.e. a precise planning and production process is required that takes into account individual applications and requirements,” explains Markus Hertel, Head of the Solution Engineering Center (SEC) Buehl, Germany and Europe. With seven SECs across Germany, the USA, Great Britain, Italy, China, India, and Australia, the complete solution provider supports customers all over the world throughout the entire engineering process in the field of explosion protection.

“Our experienced project engineers are in a constant dialog with users, working together to create a tailor-made solution,” says Hertel. The possibilities are nearly unlimited: Based on a wide range of enclosure types and sizes, the team at each SEC engineers a customized solution that can integrate any interface, from conventional interface modules, remote I/O systems, and FieldConnex® fieldbus solutions to HMI components, utilizing the Ex d, Ex e, and Ex p types of protection. »



» **Modern Engineering with 3-D CAD Tools**

It is important to have in-depth knowledge of the industry branch and the application in order to fulfill the specific requirements. “We have system and application specialists on site at the SECs. When we receive a request, we assign the right contact person to support our customers until the solution is ready for use, and to share our knowledge with them,” explains Hertel. The responsible project engineer performs a precise analysis of the requirements and works out a proposal for a solution in close cooperation with the customer. “Often, the users already have a specific solution in mind based on old recommendations, for example, when pneumatic control is used instead of electrical control for reasons of explosion protection,” says

Kasten. “We recommend alternatives involving modern network technologies – and by using modern and efficient engineering tools, we are able to work out alternative solutions based on the specified cabinet dimensions. These solutions can be presented, interchanged, and improved by using 3-D representations.”

Complete Certification and Documentation

Production of the individual solution starts only after all the essential details have been precisely clarified and the project plan and time frame for the finished solution have been confirmed. “All our production plants are certified in accordance with ISO 9000. Of course, when it comes to the quality of our products and solutions and those of the



 www.pepperl-fuchs.com/news-sec

supply companies we are very strict and perform constant checks on them,” explains Hertel. With a high degree of vertical integration – from the enclosure manufacturing to packaging – Pepperl+Fuchs ensures that customers receive their solutions quickly and at a consistently high standard of quality. This quality focus is key because the period between the first planning steps and the finished system is usually only 6 to 12 weeks.

Before the client performs the factory acceptance test, all the integrated components in the customized solution additionally have to pass a function test. “And we offer our customers even more: complete certification and documentation. This saves time and further costs because it enables our solutions to be commissioned right away. Finally, users

benefit from a tailor-made comprehensive solution featuring fully reliable explosion protection, which they can use immediately,” explains Hertel.

In order to offer this “single source” approach all over the world, a strong network between SECs is crucial. “We have established an active network that we use to regularly exchange information – as well as to balance the workload during order peaks so that we are able to meet our quality standards in the projected time frame,” explains Hertel. “In this way, our customers can benefit from the experience and expertise of all of our SEC employees around the world.” The company thus lives up to the vision of developing the best solution through globally networked engineering expertise. ■

Extra Smart: Thin Client Solution for Industry 4.0

Operating and Monitoring Systems Take the lead with innovative technologies and pave the way for Industry 4.0: With this focus in mind, Pepperl+Fuchs is continually pushing ahead, developing new products that provide users with solutions that keep pace with the challenges of Industry 4.0. The most recent example is the smart VisuNet RM GXP thin-client solution with the new RM Shell 4.1.

Networking sensors which are using Internet technology to an ever greater extent are opening up a wide range of possibilities for the process industry. However, as automation components become increasingly networked, users are faced with an ever-growing flood of data. To ensure this information can be handled in a simple and convenient process, smart HMI systems are required.

At Pepperl+Fuchs, solutions for Industry 4.0 must meet one fundamental requirement – that users are granted direct horizontal and vertical access to information regarding production systems, whether in Zone 1/21 or in the clean room. This means communication within the production process and, at the same time, direct access right down to the sensor – across all hierarchical levels. This is exactly the functionality offered by the smart thin-client-based remote monitors which are equipped with RM Shell 4.1 firmware.

With the innovative new VisuNet GXP HMI system, it is now possible to make optimum use of the opportunities that Industry 4.0 has to offer – even in Zone 1/21.

Like all remote monitors, the thin-client solution communicates with the process control system or the MES (which can also be located in the cloud, if necessary) via Ethernet, allowing the automation system to be controlled and monitored with a high level of convenience. At the same time, the remote monitors can also access the sensors via an embedded web browser for commissioning, configuration, or maintenance purposes.



The highlight of the smart thin-client-based remote monitors is the additional software control center. Using IP-based communication, remote monitors can be set up, configured, and monitored from a central workstation, meaning users no longer have to physically enter hazardous areas or clean rooms – a benefit that saves both time and costs.

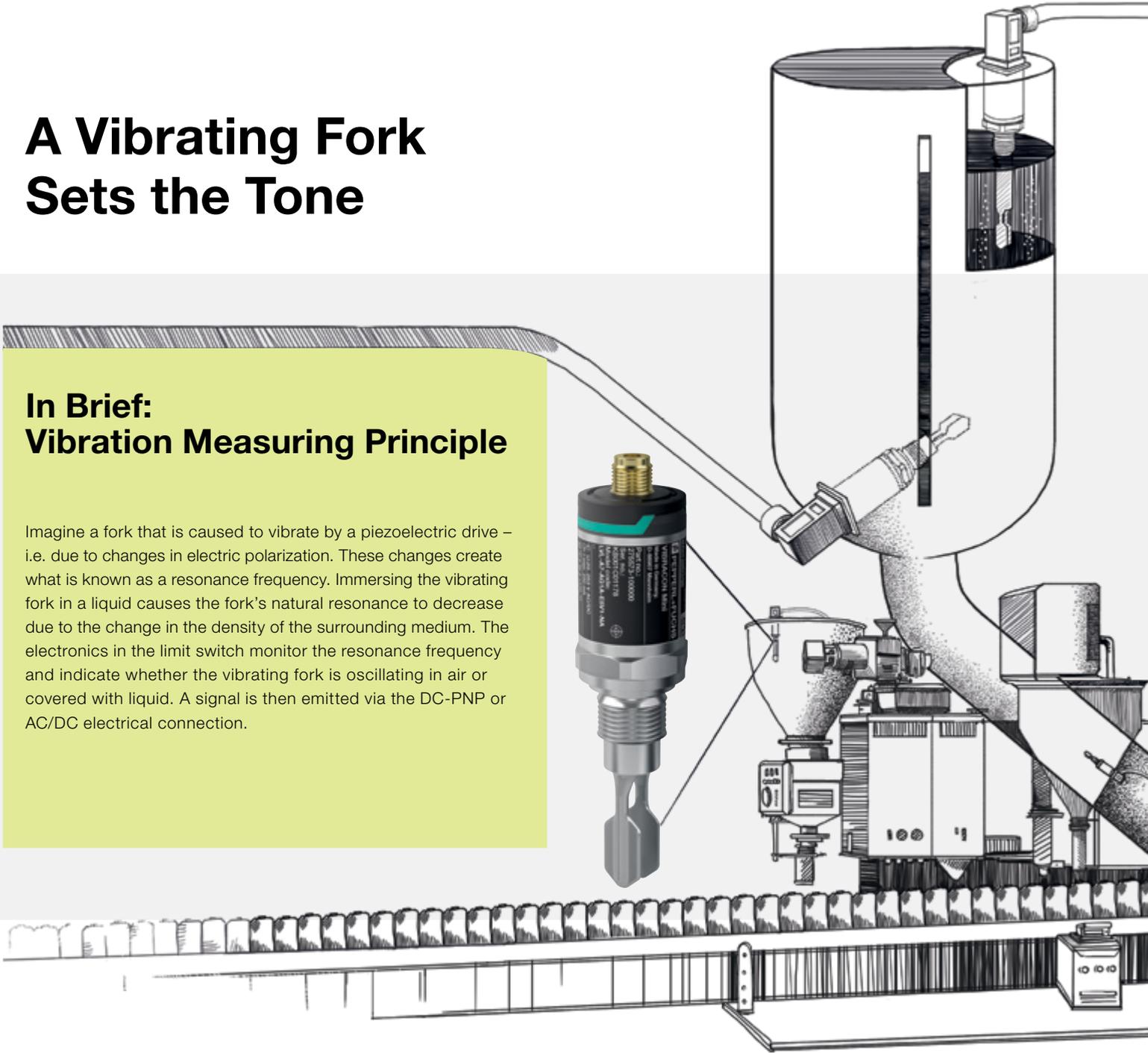
Remote monitoring capabilities in the new control center demonstrate what is possible through the industrial Internet of Things. With these capabilities, administrators can connect to each smart remote monitor with the RM Shell 4.1 in the field. In this way, users can also receive remote support directly on site at any time, to resolve faults in a quick and cost-effective manner. This makes the smart HMI system VisuNet GXP with RM Shell 4.1 the perfect solution for utilizing the benefits of Industry 4.0 for the process industry in Zone 1/21. ■

 www.pepperl-fuchs.com/news-rm-shell

A Vibrating Fork Sets the Tone

In Brief: Vibration Measuring Principle

Imagine a fork that is caused to vibrate by a piezoelectric drive – i.e. due to changes in electric polarization. These changes create what is known as a resonance frequency. Immersing the vibrating fork in a liquid causes the fork's natural resonance to decrease due to the change in the density of the surrounding medium. The electronics in the limit switch monitor the resonance frequency and indicate whether the vibrating fork is oscillating in air or covered with liquid. A signal is then emitted via the DC-PNP or AC/DC electrical connection.



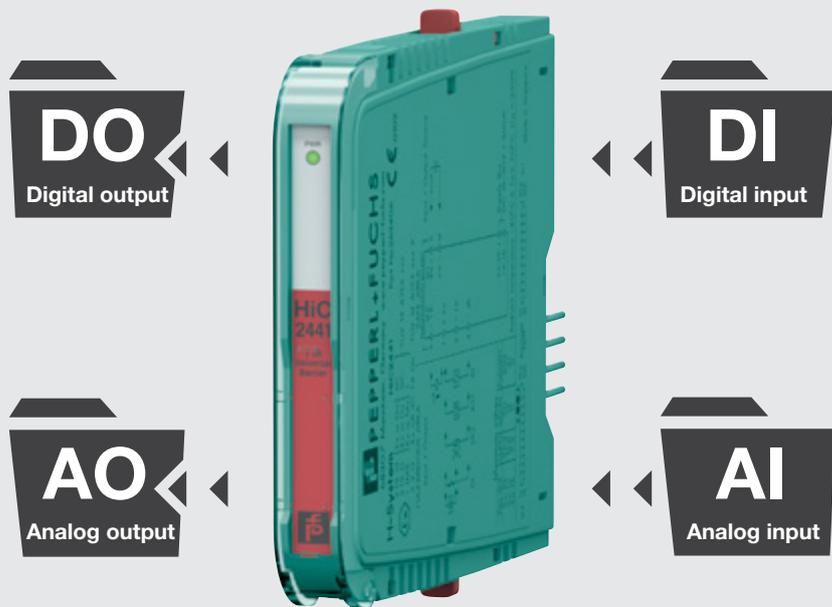
Level Measurement Whether you want to determine your storage capacity or obtain accurate information about tank contents in real time, the **Vibracon LVL-A7** reliably takes care of measurement tasks.

Thanks to the solid overflow and dry run protection offered by the new Vibracon LVL-A7 vibration limit switch, reliable monitoring of your liquid measurement process is guaranteed – even for applications in the food industry where hygiene is critical (Vibracon LVL-A7H). Level measurement technology has a broad range of applications, since storage tanks can contain such a wide variety of materials. While other measuring principles commonly fail as a result of the particular filling substances or tough environments in question, the Vibracon LVL-A7 offers a high level of resistance, taking factors such as conductivity, deposits, currents, or air bubbles in its stride. This is partly due to the robust stainless steel housing (316L), which ensures a high level of

durability as no maintenance is required. This particular vibration limit switch also features no mechanically moving parts that can wear out or break. The plug-and-play functionality offered by the device ensures the Vibracon is easy to handle as well as install, and what's more, the device can offer all of these benefits within a temperature range of $-40\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$. ■

 www.pepperl-fuchs.com/news-vibracon

Keep it Simple



The Benefits of THE BARRIER at a Glance:

- An isolated barrier for AI, AO, DI, and DO
- Automatically adjusts to signal types
- Fast, easy commissioning without any adjustments to hardware or software
- Part of the H-System; power supply via termination board
- Cross-connect level can be omitted; less wiring required and no need for a marshalling cabinet
- Simplified maintenance and storage thanks to a reduced number of parts

Interface Technology Keep it Simple! This motto puts THE BARRIER – a smart universal barrier – into practice perfectly. It's the first isolated barrier to replace several traditional modules with a single multifunctional I/O module, combining standardization with flexibility. It saves space, and simplifies planning, engineering, configuration, and maintenance.

Two people can understand each other only if they communicate in the same language – or if an interpreter who understands both languages facilitates their communication. The situation is similar in the process industry: For field devices to be able to relay their message to the control system, all components involved in signal transmission must be capable of understanding the same language, or in this case, the same signal type.

For process technology plants, there is one more requirement: explosion protection. For tried-and-tested interface technology, isolated barriers are often used for intrinsically safe protection. These isolated barriers limit the power that can enter into the hazardous area.

Previously, if different signal types were used, different barriers were required. But this is not the case with the new HiC2441 universal barrier, which is a member of the tried-and-tested H-System from Pepperl+Fuchs. THE BARRIER automatically adapts to the required signal type and the universal input cards of control systems. "The

self-adjusting I/O module is optimally designed for modern, universal I/O cards from leading control system manufacturers and covers more than 90 percent of all applications," explains Andreas Grimsehl, Product Marketing Manager for Interface Technology at Pepperl+Fuchs."

Because you no longer have to worry about different signal requirements, THE BARRIER significantly reduces planning and engineering effort. "Since the user only has to use a single barrier, the cross-connect level with the switch cabinet is not required, meaning that the amount of required wiring and storage costs are greatly reduced. Furthermore, configuration and maintenance in the field are considerably simpler," states Grimsehl. "In this way, THE BARRIER intelligently optimizes flexibility and standardization – in short, this means more possibilities with fewer variants." ■

 www.pepperl-fuchs.com/news-barrier

Backward Compatible and Future-oriented

Fieldbus Technology Fieldbus solutions offer powerful advantages: They are robust, compact, and space saving, as well as future-proof thanks to digital data transfer. The new PROFINET gateway enables direct communication between the PROFIBUS PA and the Ethernet-based PROFINET, and complements the completely revised series of FieldConnex® Compact Power Hubs.



Rather humble on the outside, FieldConnex® Compact Power Hubs line up side by side in the typical Pepperl+Fuchs green. However, what you cannot see at first glance is their technical features: The extremely low heat dissipation (1.6 watts per channel in comparison to the usual 3 watts to 7 watts) and the housing design at just 12.5 mm wide represent real savings. "Due to the high packing density, not as many switch cabinets need to be installed for the same number of power hubs – thus, less enclosed space is required," says Andreas Hennecke, Product Marketing Manager for fieldbus technology. With the PROFINET gateway and the models for four segments, the entire FieldConnex® Power Hub series now features a new, compact design. The series consist of various motherboard designs as well as plug-in modules for communication, diagnostics functionality, and power supply.

The new Power Hubs are available for four or eight segments, and with optional redundancy for each of the two modules coupled per segment. The Power Hubs can be used for the popular PROFIBUS PA and FOUNDATION fieldbus H1 bus systems.

Future-Proof Connections

The PROFINET gateway raises the bar: For the first time, PROFIBUS PA can be integrated directly into high-speed, Ethernet-based PROFINET. "This setup allows users to protect the installed base and be well prepared to meet the demands of a networked future," says Hennecke.

The configuration and integration tools offer an elegant solution for automating control system integration and are easy to use from the planning stage to operation. For maximum availability, the PROFINET Power Hubs support control system redundancy "S2" and installation with ring redundancy.

Users who choose the PROFIBUS gateway can count on a variety of advantages: backward compatibility, the integration of existing PROFIBUS technology into existing structures or when constructing new plants, as well as the easy procurement of spare parts. Like the power supply, the gateway is available with complete redundancy. To convert to PROFINET, simply replace the gateway module. Whether you choose PROFIBUS or PROFINET, fieldbus investments are protected in the event of future changes to the process control system or migration to Ethernet technology – users can respond in a flexible manner, and costly modifications to the field devices or infrastructure are avoided. ■



www.pepperl-fuchs.com/news-fieldconnex

All-rounder:

The Robust BULLET



WirelessHART To ensure flawless wireless communication in a process plant, the right backbone is required. If this network communication also offers fast commissioning, easy maintenance, and a high level of immunity to interference, it must be **WirelessHART** technology in action.

Pepperl+Fuchs has added a new product to the *WirelessHART* portfolio: A loop-powered Ex-d *WirelessHART* adapter for use in harsh environments. While battery-powered adapters have been part of the product portfolio for some time now, the “BULLET” opens up a whole new range of possibilities, not least through its modified power supply and its ability to connect up to eight field devices (multidrop procedure). The BULLET can also be used in all zones/divisions – a key benefit.

The BULLET – the Ideal Extension to the Existing Portfolio

With the acquisition of global HART specialist MACTek, and with it, the BULLET adapter for use in explosion-hazardous areas, Pepperl+Fuchs is expanding its product range. “This acquisition complements our current product lines well, and allows us to provide an even greater breadth of services to our customers,” says Jim Bolin, Executive Vice President for the Americas at Pepperl+Fuchs. But what is so special about the new adapter with its robust-sounding name?

Loop power enables HART data from already wired HART field devices to be communicated in a completely wireless process. The power is supplied by the 4 mA ... 20 mA loop that is already installed. With the patented StepVolt technology, the existing loop power and bandwidth can be used for optimum wireless communication. The user can select a voltage between 1 V and 2.5 V. “By drawing on this technology, the BULLET is able to deliver reliable data, even if only a low voltage is available,” Mr. Bolin continues, adding: “In addition to the Ex-d *WirelessHART* adapter, an Ex-i version of the BULLET even makes it possible to use this durable adapter in Zone 0.” If the plant already features a 24-V power supply, the adapter and field device can be powered by this supply and transfer data to the process control system wirelessly.



Tried-and-Tested Fields of Application of the BULLET

The adapter is ideal for systems in which dirt and moisture prevail, such as those used in the manufacture of paper. After all, wherever bleach is used, dangerous concentrations of gases may occur. But even in tank applications where many different measurements take place, the BULLET is the right choice: With the multidrop feature, up to eight field devices can be bundled together for connection to a single adapter. This makes it possible to achieve huge savings when expanding networks.

The loop-powered adapter can be used in the chemicals industry and pharmaceutical industry too, in mobile mixing tanks, for example. These mobile mixing tanks fulfill a wide range of functions in the process-engineering processes that apply for this sector thanks to their integrated agitator. The mixing tanks may serve as preparation containers, material buffers, or as stores for dosed products. Since they are frequently used in safeguarded procedures that are subject to special monitoring processes, the mixing tanks are equipped with sensors. These 4 mA ... 20 mA HART-compatible sensors control

the drive speed of the agitator and detect the temperature, pressure, pH value, and fill level of the tank. Using the BULLET, the data from these field devices can be transmitted to the process control system wirelessly via the gateway. "This ensures the mixing tank can remain mobile while at the same time making sure the existing power supply is used to optimum effect," explains Garry Cusick, Business Development Manager USA at Pepperl+Fuchs. This is because both the BULLET adapters and the field devices can be powered directly from the existing energy source. While a BULLET adapter transmits the 4 mA ... 20 mA signal from the agitator, the HART signals indicating the temperature, pressure, pH value, and fill level are transmitted to a second BULLET device via the multidrop procedure. In this way, the BULLET adapter makes it possible to achieve a high level of performance, cost-efficiency, and flexibility when planning systems. ■



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Working Together for Tailor-Made Solutions

When installing new components into process plants, these components must be compatible with the distributed control system (DCS). For this reason, Pepperl+Fuchs works in close cooperation with the major control system manufacturers. The result: Customized solutions for explosion protection that are easy to integrate.



Descriptions such as “the heart of control” or “the backbone of communication” clearly show how important the distributed control system is to process plants. The control system processes all of the information and data related to the plant and processes, links these logically, and provides an abstract representation of the process within a system. With all these tasks, error-free operation is crucial to the plant operator. When choosing a specific distributed control system, the operator is making an important decision that will have an impact for decades to come: To ensure ongoing operation, it must be possible to integrate new explosion-protection components into the control system as part of future plant modernizations, upgrades, or expansions.

Proven DCS Solutions

“Every hardware test in the field costs plant operators a lot of money. If newly installed components cause faults during operation, this becomes an even greater burden in terms of costs and time. To resolve this issue, over 30 years ago we started to take steps towards establishing close relationships with the major control system manufacturers,” says Karsten Fischer, Director of Global Account Management, Pepperl+Fuchs Houston, USA. “By taking these steps, we can now offer our customers tailor-made solutions that are tested in terms of their system structure.”

Pepperl+Fuchs has built up a tight network with its own experts. Key account managers act as the main contact for control system manufacturers. The advantage is clear: The engineered solutions from the automation specialists are comprehensively tested for compatibility with the relevant DCS in addition to being field tested. The solutions are advertised by the control system manufacturers as preferred solutions that can be quickly integrated into ongoing operations.



Convenient and Simple to Integrate

“Our tested solutions provide explosion protection for the entire product range: from conventional interface technology and remote I/O, to fieldbus solutions,” says Fischer. One example is the Intrinsically Safe Base Plate (ISBP). Pepperl+Fuchs designed this customized termination board in cooperation with Yokogawa. The intrinsically safe isolated barriers of the H-System – which are only 12.5 mm wide – are mounted on the ISBP along with the N-IO modules of the Centum VP control system from Yokogawa. The isolated barriers and the N-IO modules are then automatically identified by the ISBP via an integrated ID. What’s special about this solution is that the terminals are attached directly to the board for permanent wiring in the field. “This design enables quick installation and simplifies maintenance significantly – modules can be replaced without making any changes to the wiring,” says Fischer.

The increasing complexity of production processes raises the demand for human-machine interfaces (HMI) that are easy to integrate into control systems. “There is a very high demand for our thin client solutions. Some control system manufacturers are already recommending our HMI products, and with others we are still in talks or in the test phase for the engineered solutions,” says Fischer. “Our RM Shell software is also receiving a great deal of interest and positive feedback. Thanks to the convenient user interface, our HMI devices can be easily integrated into control systems.” With the new firmware version RM Shell 4.1, communication within the production process and direct access to the sensor is now possible across all hierarchical levels – enabling users to take advantage of the benefits offered by Industry 4.0. ❏

Three Questions for ...

Karsten Fischer

Director of Global Account Management
at Pepperl+Fuchs in Houston, USA



» ***In Your Opinion, What Makes These Collaborations So Successful?***

I believe that cooperation coming from an equal partnership is important in achieving the best possible result. Over the years we have been able to establish close contact with control system manufacturers. We offer innovative, tailor-made/engineered solutions – something that both the system manufacturers and end clients are aware of. When our control system manufacturers develop new products, they involve us in the process as early as the feasibility study stage. As a result, we are able to advise right from the beginning about technical possibilities and jointly develop solutions that provide control system manufacturers with unique selling points, allowing them later to promote these again to their end customers. Early involvement is also of benefit to us: We can simultaneously develop solutions resulting from feasibility studies for our customers and introduce them to the market.

What Are the Advantages of This Close Cooperation?

We can respond quickly and adapt our products to the specific requirements of the control system manufacturers. The major bonus for plant operators is that products can be implemented immediately. A good example of this is in the area of conventional interface technology, in particular in the development of our intelligent universal barrier “THE BARRIER”. With this product, we have developed a unique technical solution that enables control system manufacturers to offer their universal input/output (I/O) cards with intrinsically safe signals to their end

customers. This solution is based on the good working relationship between us, industry-recognized end clients, and a leading control system manufacturer, which has helped to define the requirements for automatic configuration of the barriers and to fulfill these requirements according to the customer’s wishes. The result: The control system manufacturer can now present solutions using our products and offer them for projects in a targeted manner.

What Feedback Do You Receive from Control System Manufacturers?

We get a lot of positive feedback. But of course it is more interesting to let our partners have their say:

Grant Le Sueur, Director – Control and Safety Software, Schneider Electric – Process Automation Division

“I recently had the pleasure of testing a Pepperl+Fuchs-supplied thin client device. My interest was to determine the capabilities of RM Shell in order to gauge the user experience. My observation during experiments was that the RM Shell client setup software struck the right balance of functionality and ease of use, while shielding the end user from cryptic setup procedures. I am confident that our delivery teams and our end users would find the user experience to be a pleasantly surprising, straightforward user experience, while also addressing key failure modes typically associated with thin client deployment.”

Safety First

Award-Winning Safety in a Compact Design

Purge and Pressurization Systems For nearly 25 years, the Pepperl+Fuchs Bebco EPS® brand has been synonymous with reliable explosion protection in purge and pressurization. This past summer, readers of Plant Engineering magazine confirmed that notion by selecting the Bebco EPS 5500 as its Product of the Year in the category of Electrical Safety.

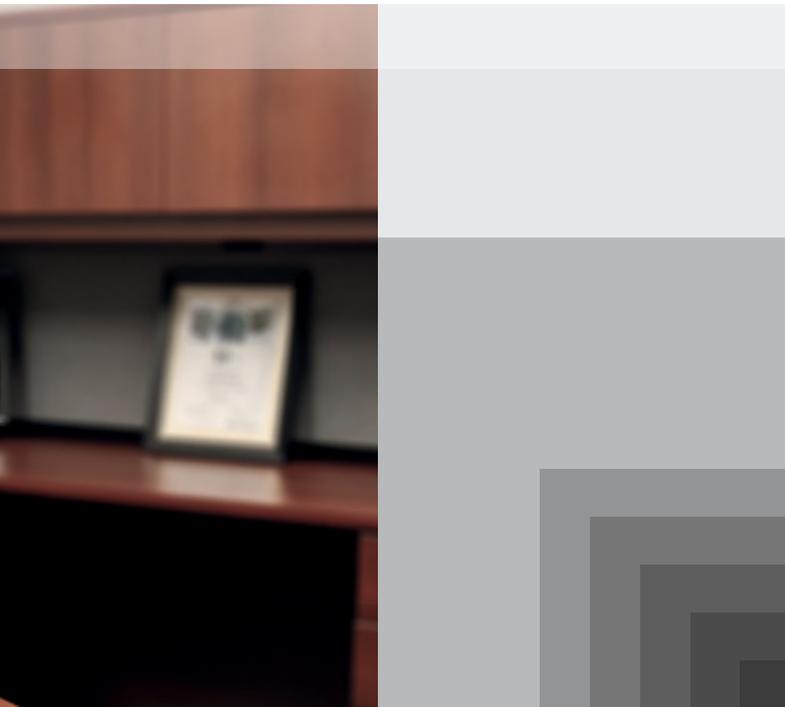
Each year this prestigious award begins with the magazine's editors, who develop a short list of products in various categories. They then ask readers to make their selections among 100 finalists. In 2015, the editors tallied the votes, and the compact Bebco EPS 5500 was this year's winner.

Its compact design and fully automated functions make the Bebco EPS 5500 extremely efficient. An automatic start feature and automatic temperature and leakage control minimize unplanned downtimes.

Designed for easy installation, the housings are also globally certified for Zone 2 and Division 2. The ingenious enclosure protection vent leads the industry, enabling these units to tackle the challenges of nearly any application, indoors and outdoors. ■



www.pepperl-fuchs.com/news-bebco



Doug McEldowney – Business Manager, Rockwell Automation Technologies, Inc.

“Rockwell Automation has been collaborating with Pepperl+Fuchs for more than 20 years to ensure our customers have access to robust and integrated process control system capabilities. By working together, we continue to leverage the deep industry knowledge that our respective engineering teams bring as we address complex customer problems. We are confident that this partnership will continue to provide differentiated solutions to the industrial market as customers proceed on their journey to build a Connected Enterprise.”

Nobuaki Konishi, Vice President für System Business Division, Yokogawa Industrial Automation Platform Business Headquarters

“We decided to work with Pepperl+Fuchs – the market leader – due to the company's extremely high level of expertise and innovative capacity in the field of intrinsically safe interface systems. Pepperl+Fuchs understands our requirements and those of our customers by making their backplane size the same height as the Yokogawa standard N-IO backplane, to allow customers to maximize their cabinet space using intrinsic safety barriers.” ■



www.pepperl-fuchs.com/news-dcs

Standardized and Borderless

A standardized protocol where all the elements of an automation solution agree – a key factor for the smart factory of Industry 4.0.

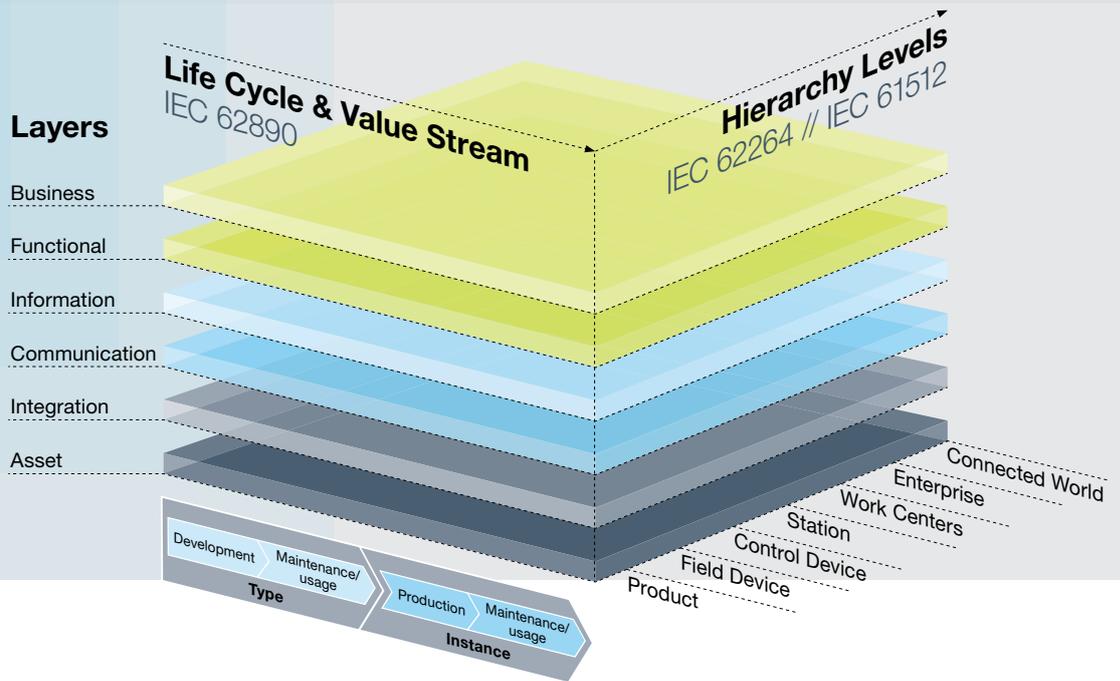


Around 7,000 different languages are spoken worldwide. That is why English is so often used as a bridge to help people of different nationalities understand each other. As production processes are more and more networked, a common basis for understanding is becoming important. This is particularly crucial in light of current developments in the industry: To ensure that all the elements involved in the production process of the smart factory of the future – from the plant to the product – can communicate with one another, a common, standardized protocol is essential.

Global Consensus on One Protocol

The concept of Industry 4.0 is breaking through borders that in many cases are still in place today. It is bringing systems that previously were separate much closer together: Going forward, it will not only be possible to exchange and process data across all levels of the automation pyramid within a company, but also globally between all industries. The new network structures that are emerging – without the vertical separation into layers within the company that is still common

today – are facilitating a truly flexible approach to production. These networked structures are making it possible for communication to be adapted, both vertically within a factory and horizontally along the value chain. In this respect, data security is just as important as finding a new, flexible approach to abstracting information sources and achieving a global consensus on a standardized protocol. In order to drive developments over the next industrial revolution, the German trade associations for information technology (BITKOM), the electronics industry (ZVEI), and mechanical engineering (VDMA) have launched "Plattform Industrie 4.0" (Platform Industry 4.0). Within the context of this initiative, representatives from the fields of politics, industry, and science, as well as trade unions, are working together to make recommendations to help achieve a networked Industry 4.0. This mix of backgrounds serves to highlight the fact that Industry 4.0 is an interdisciplinary concept. The challenges of the next industrial revolution can only be mastered by companies from the IT, mechanical engineering, and automation technology sectors working closely together.



RAMI 4.0

The first real result to come from the platform is the Reference Architecture Model for Industry 4.0 (RAMI 4.0), which was created as part of a working group for "Reference Architectures, Standards, and Standardization" under the leadership of Dr. Peter Adolphs, CTO at Pepperl+Fuchs. The three-dimensional model allows all the essential elements of the Industry 4.0 concept to be covered – from simple field devices, such as an intelligent sensor, to complex, globally networked production systems, taking into account the entire life cycle and all the organizational layers of the company.

The following section will take a brief glance at the horizontal and vertical axes of the model, to highlight the importance of having a standard communication system. The horizontal axis, "Hierarchy Levels", describes how an entity is classified into the former hierarchies within the organizational levels of a smart factory in Industry 4.0. In this regard, the RAMI model covers aspects ranging from the analysis of a product to be manufactured through the field device (e.g. an intelligent sensor), all the way to the "Connected World" outside of a production plant.

The vertical axis, "Layers", regulates the information technology aspects and provides digital maps of the assets of production plants. Taking the example of a sensor, the importance of the layers becomes obvious: The base is formed by the asset, in this case, the device, i.e. the sensor. The following integration layer covers everything that is necessary to make the sensor data available to the next layers. Above this is the communication layer, which creates a secure connection between the field device and the higher-level application software. The information layer encompasses the digital map of the assets, also known as the administration shell. In the functional layer, rules and decision-making logic are implemented. The top layer – the business layer – represents the business models and the business process as a whole. ❏



» OPC UA as Standard

Plattform Industrie 4.0 advocates OPC UA – UA stands for Unified Architecture (IEC 62541) – as a standard protocol. The communication standard enables data to be exchanged between all levels of a company and the connected world outside of the company. OPC UA includes various transport layers, as well as a semantic data model to ensure the meaningful display of information. In addition to the clearly specified semantic data models, OPC UA also features mechanisms for storing and providing historical data, for signaling events, and for executing functions on the server. OPC UA is an open standard, independent of any particular manufacturer. When using OPC UA in productive systems, one key factor is that each device that makes its functionality available via an integrated OPC UA server can provide a kind of self-assessment to other communication partners. This eliminates the need for the usual distribution of description files, such as IODD or GSD files, via a separate channel. Instead, when a client accesses the server, all properties are immediately available in a sorted, searchable tree.

By using discovery servers, the properties of registered devices can be searched before the connection is established. The discovery server also provides the requesting entity with information on how the relevant device, such as a sensor, can be reached via the network. An integrated security and authentication concept ensures the secure exchange of data between communication partners in OPC UA. If the corresponding access authorizations are available, OPC UA enables the seamless and universal exchange of information across all levels of an organization and its borders. Given the three-dimensional RAMI, this means that OPC UA can be unified with all layers and aspects of RAMI. ■

Three Questions to ...



Dr. Jörg Nagel, Senior Expert on Industry 4.0 – Industrial Internet Solutions at Pepperl+Fuchs

What Are the Advantages of OPC UA Compared to OPC Classic?

OPC UA is a successor protocol that delves much deeper and offers functionalities of which OPC Classic is not yet capable. For example, OPC UA is independent of any platform. However, the key advantage offered by OPC UA that makes it very interesting in terms of achieving a communication system within the scope of Industry 4.0 is the universal data model. What was previously determined by the application developer with OPC Classic is now standardized and independent of any particular manufacturer.

Thanks to the service-oriented architecture of OPC UA, any information technology system can access the data sources in the field. No special communication paths need to be maintained for the integration; simple network access is enough. As a result, a device with an OPC UA server can easily be integrated into existing systems.

Why Is OPC UA Particularly Suitable as a Standardized Protocol for Industry 4.0?

OPC UA can do more than just “transport” data from A to B. The actual transport layer is supplemented by a semantic data model, which enables semantic interoperability between all communication partners. From the field level and intelligent sensors, for example, it is not only the actual measured values (process data) that are forwarded, but information about the form, importance, context, and structure of the data as well. The sensors can be accessed directly via OPC UA from the IT level. The simple interpretation of the data is ensured by a kind of “self-assessment” of the sensor, which details its abilities.

How Do You View Future Developments Towards Achieving a Global Protocol?

I think it will take a while until all parties involved really agree on one protocol which can be used universally and also enables connection to cloud solutions, for example. A publish/subscribe mechanism, as is commonly found in message-based systems, is currently in development for OPC UA. In addition, OPC UA is not yet suitable for hard real-time applications, because no determinacy is given by the underlying TCP/IP. Concepts for the expansion of the transport layer accordingly, for example, through TSN (time-sensitive networking), already exist, so it can be expected that such expansions will find their way into the standardization of OPC UA in the near future. A universal protocol is essential, especially from a global networking perspective – otherwise production processes will only ever be able to communicate within companies and countries. With its standardized data model, OPC UA is very well-positioned in the race for first place. We should use the current lead to establish OPC UA as a protocol through which each element can communicate with all the others; after all, that is the core enabler of Industry 4.0. ■

Home

OF THE BRAVE + STATE OF

FRIENDS



The theme of the 2016 Hannover Trade Fair is “Integrated Industry – Discover Solutions.” This year, HANNOVER MESSE is partnering with the USA, the world’s largest economy, to showcase Industry 4.0 and the systems that bring intelligence, transparency, and increased productivity to the manufacturing floor.

The US is truly a land of superlatives. It’s home to some of the world’s most majestic mountain ranges, magnificent redwoods and sequoias, the Grand Canyon, and New York City, a global center of art, culture, fashion, and finance. It is a land of boundless promises, and it is where Pepperl+Fuchs, the Mannheim-based automation company, has had a base for over 30 years. Our cooperation is built on mutual exchange and fair strategies in all areas of our company – from innovative product development to intercultural marketing concepts.

US Continues to Expand

The United States is an interesting production location for German companies: Pepperl+Fuchs has been located in North America with a subsidiary in Twinsburg, Ohio for more than three decades. “The guiding principle for this location, which was opened in 1983, was to organize sales, development, transportation, and production with the customer requirements of the North American market in mind,” recalls Jim Bolin, Executive Vice President for North and South America at Pepperl+Fuchs. This principle was reinforced with the opening of two Solution Engineering Centers (SEC) in Houston, Texas. ❏



AMERICAN FLAG

The 50 stars of the American Flag represent the 50 states of the United States of America. Nowadays, the 13 stripes are symbols for the 13 colonies, which declared their independence from Great Britain in 1776.

WHY “STARS AND STRIPES”?

Stars are a symbol of the heavens and the divine goal to which human beings have been aspired from time immemorial. The stripes are symbolic of the rays of light emanating from the sun.



STATE OF OHIO

naturally

BEAUTIFUL



Did you know

A PAIR OF IDENTICAL TWINS RENAMED MILLSVILLE TO TWINSBURG AT THE BEGINNING OF THE 19TH CENTURY.



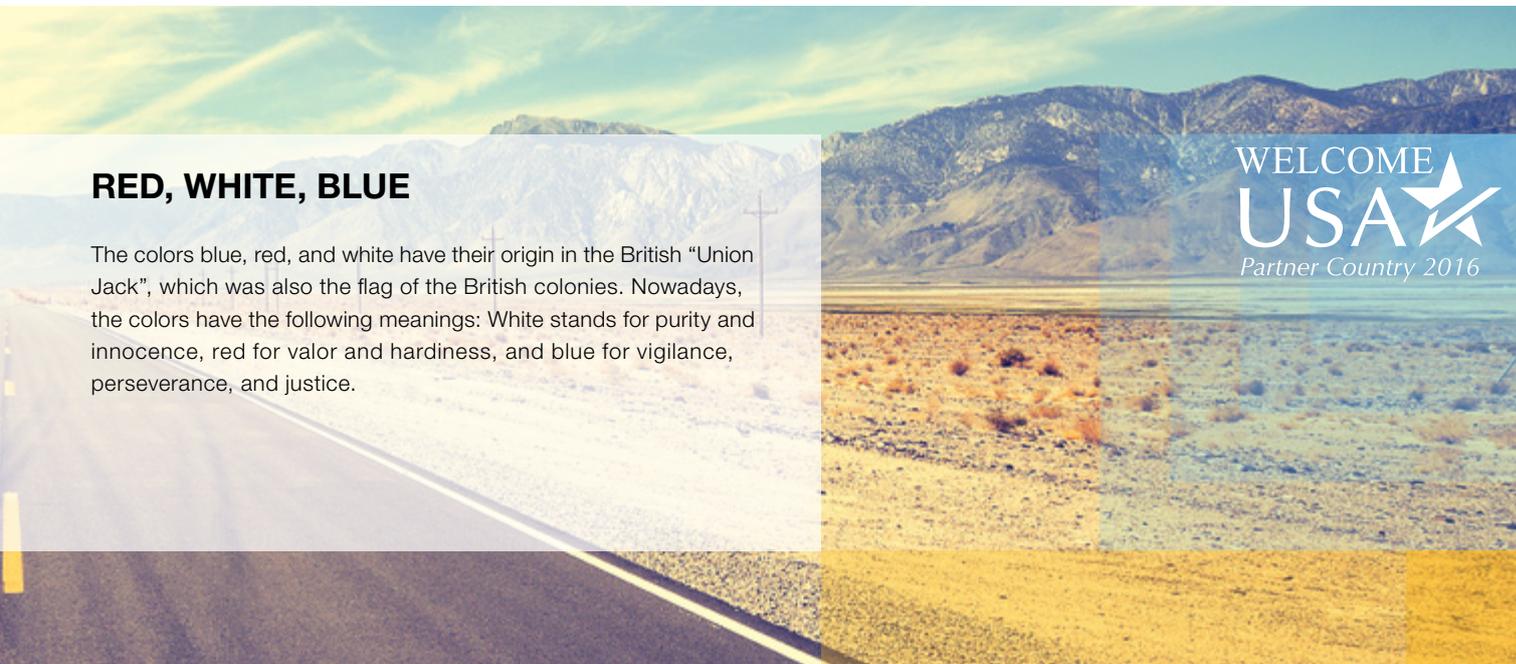
TWINSBURG HOLDS A YEARLY FESTIVAL JUST FOR PAIRS OF TWINS CALLED TWINS DAYS.



RED, WHITE, BLUE

The colors blue, red, and white have their origin in the British "Union Jack", which was also the flag of the British colonies. Nowadays, the colors have the following meanings: White stands for purity and innocence, red for valor and hardiness, and blue for vigilance, perseverance, and justice.

WELCOME
USA
Partner Country 2016



» **Successful from the Start**

Just 20 miles southeast of Cleveland, the Rock and Roll Capital of the World, you will find the North American headquarter of Pepperl+Fuchs in Twinsburg. More than a sales office, the site includes office space, R&D, manufacturing areas, a customer training facility, and distribution plants. The Twinsburg plant is the only global subsidiary to be responsible for a global business unit: The Global Center of Excellence and Innovation for Bebcos EPS and VisuNet HMI is based here. This year, Pepperl+Fuchs was voted best provider of industrial enclosure purge and pressurization systems by Control magazine in its 2016 Readers' Choice survey for the 13th consecutive year. In Twinsburg, the sensor modification group for factory automation works with customers one-on-one to modify and provide basic sensing products to solve unique application challenges. One of these unique solutions was the Pile Driver developed in 1997, a proximity switch designed for toughness and durability.

The Call of Black Gold

Texas is the second most populous and second largest state by area in the USA. An economic boom in Texas started when large oil reserves were discovered in 1901. The impact of this "black gold" changed the state's economy. Texas was transformed into a major petroleum producer and has become a key player in the US economy: from oil and gas production, to oil refining, to the petrochemical industry.

Texas Means "Friend"

The name Texas is derived from the Hasinai word Táysha' and means "friends" or "allies". "This association is a good reason for Pepperl+Fuchs to take up residence in this state and to strengthen collaborative relations with America with another subsidiary," explains Bolin. On May 1, 2013, the SEC opened its doors in Houston. This location mainly develops and produces control stations, switch cabinets, and purge and pressurization systems. It has over 1,100 m² of space available; more than 800 m² of this is dedicated to production. But Pepperl+Fuchs wants to take service to a new level.





Did you know



WHEN THE APOLLO

11

MOON LANDER TOUCHED DOWN, NEIL ARMSTRONG SAID, "HOUSTON, TRANQUILITY BASE HERE. THE

EAGLE HAS LANDED".



MORE THAN

90

LANGUAGES ARE SPOKEN THROUGHOUT THE HOUSTON AREA.



THE NICKNAME OF HOUSTON IS **SPACE CITY**



Close to the Industry, Close to the Customers

This spring, Pepperl+Fuchs plans to break ground on a 11,000 m² state-of-the-art warehouse and manufacturing plant near Houston that will house an expanded Solution Engineering Center, a customer training area, warehouse space, and distribution plants. "The warehouse will be a showcase for Pepperl+Fuchs products," says Bob Smith, Chief Operations Officer for Factory Automation in Twinsburg. "Customers will be welcome to visit and see how our technology is used in real-world applications." Rather than taking months to certify hazardous-location equipment, this new center will enable Pepperl+Fuchs to build and certify industry-leading products in a matter of days.

Houston, One of the Coolest Cities in America

In addition to Pepperl+Fuchs, thousands of corporations have relocated or expanded to Houston. In fact, Houston is home to more Fortune 500 company headquarters than anywhere in America except for New York. In 2012, Forbes magazine ranked Houston at the top of their annual list of America's coolest cities. Besides, Houston is home to the Lyndon B. Johnson Space Center. It is the home of America's astronaut corps, and the place where astronauts are trained to go to space. Even on the hottest days of the year, Houston is a pretty cool city.

Made in USA – the Benefits of Customer Proximity

Pepperl+Fuchs' growth has been tremendous, our continued commitment and investment in the Americas and Houston is significant. The "Made in USA" mark is important for the American market. Many Americans insist that products are manufactured in their home country. For years, the US sent more and more of its manufacturing to lower-cost corners of the global economy. However, it has now become profitable again to produce locally. Service is also a critical success factor in America: "Service quality is vitally important." says Bob Smith, Chief Operations Officer for Factory Automation in Twinsburg. He adds: "Today we are focusing more and more on increased customer service. This ensures greater customer proximity – as we have had for over 30 years." ■

Weighing Over 300 Kilos and Always Hungry



Every year, poachers in South Africa kill hundreds of rhinos to sell their horns for money. The young ones are often left helpless. Pepperl+Fuchs has now adopted an orphan baby and given “Oz” a new home.



They have inhabited the earth for almost 50 million years. Other animals rarely bother them – hardly surprising, considering they weigh up to 1.5 tons and measure up to four meters in length. We are talking about rhinos, which, despite their size, are threatened with extinction. This is because these enormous leaf and grass eaters have a ruthless enemy against which they are defenseless: Illegal hunters who have their sights on the horns.

In Asia, the rhino horn is seen as a means of salvation – reason enough for poachers to hunt the animals. They shoot the rhinos or tear their horns from their flesh while alive, leave the rhinos to bleed to death, and turn the horn into powder. This they then smuggle to China and Vietnam via an illegal network of traffickers. This is a major problem in South Africa, which is home to around three-quarters of the world’s rhinos. The young are often left alone, hungry, and disoriented.

An orphaned baby rhino from Kruger National Park has now found a new home thanks to Pepperl+Fuchs. The company adopted the young male rhino, gave their protégé the name of the magician Oz – Hebrew for force – and put him in the care of a wildlife reserve. His “adoption contract” has already been signed, and Oz has settled in well. The one year-old “baby” already weighs over 300 kilos, and guzzles up to 16 liters of milk a day – after the experience in the park, he needed additional nourishment. When Oz is an adult in two years and strong enough, he will be released back into the wild. ■

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HANNOVER MESSE

April 25–29 // Hall 9, Booth D76 // Hanover, Germany

INTERPHEX

April 26–28 // Booth 2057 // New York City, New York, USA

OTC

May 2–5 // Booth 4835/8457 // Houston, Texas, USA

SCHNEIDER AUTOMATION CONFERENCE

May 23–26 // New Orleans, Los Angeles, USA

ELIADEN 2016

May 31–June 2 // Booth C02-12 // Lillestrøm, Norway

SEPEM EST

May 31–June 2 // Colmar, France

CEMAT

May 31–June 3 // Hall 27, Booth D43 // Hanover, Germany

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07

08

AUTOMATION 2016

August 22–25 // Booth H1 // Mumbai, India

ONS

August 29–September 1 // Booth 750 // Stavanger, Norway

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SEPEM SUD-OUEST

September 27–29 // Toulouse, France

TESISLERDE MODERNIZASYON VE VERIMLILIK ZIRVESI 2016

September 29–October 1 // Istanbul, Turkey

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YOKOGAWA USERS CONFERENCE

October 3–6 // Orlando, Florida, USA

OTD

October 19–20 // Booth B-1090 // Bergen, Norway

EMERSON EXCHANGE

October 24–28 // Austin, Texas, USA

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AUTOMATION FAIR

November 9–10 // Atlanta, Georgia, USA

SPS IPC DRIVES

November 22–24 // Hall 7A, Booth 330 // Nuremberg, Germany

VALVE WORLD

November 29–December 1 // Hall 4, Booth 4A22 // Düsseldorf, Germany

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