PEPPERL+FUCHS
PROTECTING YOUR PROCESS

NEWS FOR PROCESS AUTOMATION

Edition 2/2013

Whether Water, Lightning, or Extreme Cold

Intelligent Fieldbus detects dangers and achieves maximum plant availability

Industry 4.0

How Web technologies will result in lasting changes to automation

PROFIBUS at 2 Kelvin

Pepperl+Fuchs products in use at DESY, one of the world's leading accelerator centers

Technologies + Products

Applications + Knowledge

Markets + Trends

EDITORIAL

Dear reader,

More than 250 years have passed since the invention of the steam engine heralded the first industrial revolution. Nowadays, it is the Internet that plays the pivotal role when it comes to serious technological upheavals. Industry 4.0, which encompasses complete, automatically controlled networking of machines and plants using Web technologies, is one of the key issues facing the industry in the future. The idea, for example, that all the stages of a production process – including the products themselves – could autonomously control and optimize an entire factory suggests that the radical changes that this revolution brings will define industry to a similarly considerable extent as the three previous industrial revolutions. Find out what Industry 4.0 means for the industry and for Pepperl+Fuchs beginning on page 18.

Our cover story deals with natural elements such as water and lightning. Intelligent Fieldbus, the latest development in the FieldConnex® product range from Pepperl+Fuchs, detects hazard sources such as short circuits, lightning, moisture ingress, or device faults on a progressive basis, thereby ensuring maximum plant availability.

Happy reading,

Dr. Gunther Kegel
CEO

We look forward to your feedback on the new layout and the contents of this issue: newsletter@pepperl-fuchs.com

The Intelligent Field Thinks Ahead!

Wouldn't it be perfect if a new generation of diagnostic fieldbus system components were to simply start troubleshooting? Once faults are detected, they could be easily isolated and deactivated – before they turn into malfunctions.

That, at least, is what the developers at Pepperl+Fuchs thought. As a result, they started working on a technology that allows the field devices to provide their own diagnostics, thus enabling maximum transparency and plant availability. The specialists in Mannheim are never known to be at a loss when it comes to making fieldbus segments more stable.

It was merely a question of time before the successful implementation of an innovative concept could once again be announced: Intelligent Fieldbus, a technology that guarantees uninterrupted fault monitoring without compromise and maximum availability.

Learning from Typical Faults

Learning from typical faults played a decisive role in the development of a technology that can detect and isolate problems in a timely manner. Pepperl+Fuchs identified these mistakes and studied them intensely working closely with users. Each scenario – be it a short circuit, a lightning strike, penetrating moisture, an extreme variation in temperature, or a device malfunction – requires very specific measures for error detection and prevention.

The developers adopted an unconventional approach and set their sights on an innovative and progressive method of error detection to prevent the problem of short circuits and overloads occurring when working on the segment. The result is a diagnostics technology that far exceeds all other methods of current conventional static and linear short circuit detection.

Early Detection and Correction of Problems

When bouncing is caused by loose contacts and vibrating enclosures, the emitted signals develop a special kind of dynamics. Pepperl+Fuchs has developed components that are able to detect these dynamics and differentiate them from regular signals. This enables the fast and reliable detection and isolation of faults. The associated source can be accurately deactivated – before the fault can extend to an entire fieldbus segment, additional field devices are shut down, or the entire plant switches to safe mode.

Progressive fault detection of this nature can also resolve other problems: contact bounce, as caused by connecting and disconnecting connections during maintenance; data collisions caused by malfunctioning devices (jabber); and even elusive temporary faults such as declining signal levels caused by the ingress of rainwater.

bus That

Even the sturdiest infrastructure can get into trouble when lightning strikes, rain pours, or someone pulls a plug somewhere.

Anticipating Every Lightning Strike

A feedback function was implemented for Intelligent Fieldbus for greater lightning and surge protection. It activates an alarm as soon as the protection inside the plant is used up at any position. Since the energy in the pulses caused by a lightning strike varies significantly and causes different levels of wear on the lightning protection, the new diagnostic technology measures the number and strength of power surges.

This data is used to precisely calculate and report back to the control room the exact position of where the protection in the plant has failed. Time-consuming manual inspections after thunderstorms are no longer necessary. Even a decline in protection and the formation of leakage currents are reliably detected and reported. »

DID YOU KNOW THAT WATER ...

+ **has its greatest density and is at its heaviest at 3.98°C?** This temperature is at best suitable for a refreshing gulp, but not for carrying crates around.

+ **has the greatest surface tension after mercury?** Show a little more spirit when you next fill a glass.

+ **can cost a fortune not only in marshalling cabinets but also in bottles?** The most expensive table water from Mount Rokko in Japan costs no less than 124 euros a bottle. If you go to Mount Rokko yourself, you can get it for less than a euro per liter.

+ **is actually offered on gourmet water menus by water sommeliers?** Depending on your preference, it may be soft or perhaps a little harder on the finish.

+ **covers 71 percent of our planet, but only around 3 percent of it is freshwater, of which no more than 1 percent is immediately fit for human consumption?** However, that only goes a little way to explaining the price of Japanese table water.

The new technology also means the switch cabinet area is monitored continuously. Extremely hot or cold conditions are compensated for as the air-conditioning units are activated at an early stage.

FOCUS

» Reporting Moisture

The ingress of water is another threat to fieldbus availability. It can lead to serious malfunctions in fieldbus devices and marshalling cabinets and result in failures in the process sequence. There are many causes of the ingress of water: heavy rainfall, the use of high-pressure cleaning equipment, or simply high relative humidity in tropical regions. Intelligent Fieldbus offers sufficient room for a compact sensor that can report the accumulation of moisture.

Intelligent Fieldbus enables comprehensive fault monitoring through the perfect interaction between components with diagnostic capability. They include the Advanced Diagnostic Module at the heart of the system, the corresponding FieldConnex® Advanced Diagnostic Gateway, the Segment Protector, the Surge Protector with self-monitoring, and the intelligent Leakage Sensor. They all work without additional engineering, without their own fieldbus addresses, and without taking up additional segment bandwidth. All in all, a new generation of components to make fieldbus installations even more reliable and further increase plant availability. +

www.pepperl-fuchs.com/intelligent-fieldbus

LIGHTNING ...

+ **can overdo it sometimes.** American woodsman Roy Cleveland Sullivan was supposedly struck seven times. Melvin Roberts from South Carolina and Jorge Márquez from Cuba can both boast six strikes.

+ **should be avoided.** That is why it became fashionable in Paris in 1778 to wear a lightning rod attached directly to the hat.

+ **can strike anyone.** Or so it might seem on the B 252 in Germany. There are no fewer than 14 concealed radar traps on a 23-kilometer stretch between Marburg and Frankenberg.

+ **really can strike anyone.** Anyone who happens to be near the town of Kifuka in the Republic of Congo will tell you. The area apparently attracts up to 158 lightning strikes per square kilometer every year.

Intelligent Early-Warning System

The FieldConnex® Leakage Sensor (ELS-1) detects even the tiniest changes in moisture quickly and reliably before they can cause any malfunctions.

Its compact design means the FieldConnex Leakage Sensor (ELS-1) can be connected not only inside a marshalling cabinet but also in tight field instruments and control cabinets. It detects moisture and reports the exact location of the malfunction. Fast intervention prevents costly damage and negative effects on plant performance. The sensor is easy to connect and runs without further configuration.

Self-Monitoring Lightning Protection

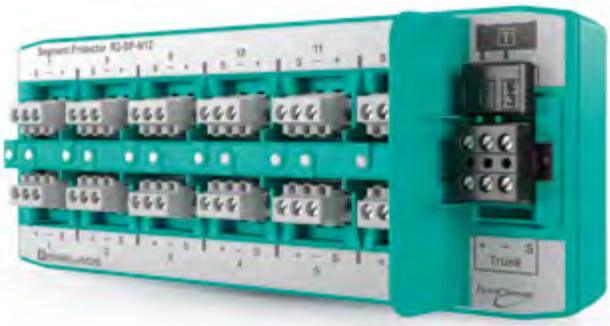
The FieldConnex Surge Protector affords protection from lightning strikes and voltage peaks – and emits an alarm when the functional reserve is exhausted.

Automatic self-monitoring measures the number and strength of surges, calculates precisely when the remaining lightning protection is exhausted, and reports the information to the control console. The module can even detect a decline in power (leakage flow). Installation and replacement are child's play: the FieldConnex Surge Protector is simply plugged into the junction box – with no additional wiring.

Progressive Short Circuit Protection

The FieldConnex Segment Protector offers progressive short circuit protection with excellent fault isolation.

Intelligent diagnostics technology detects the special dynamics that differentiate malfunction signals from communication signals. Whether a declining signal level, contact bounce, or changes in load characteristics caused by the ingress of water – malfunctions are quickly and reliably detected and isolated. This avoids time-consuming troubleshooting and deactivates fault sources before the malfunction can extend to other areas. The result is significantly higher plant availability.



The Communications Center

The FieldConnex Advanced Diagnostic Gateway is the link between the Advanced Diagnostic Modules (ADM) and the control console.

The gateway now offers an interface for a FOUNDATION Fieldbus H1. Up to 16 ADMs can be integrated into the control console as an FF node via the Advanced Diagnostic Gateway. For the first time, it has an integrated I/O function that allows monitoring of the control cabinet. The gateway has inputs for frequency, temperature, and humidity sensors or door contacts. Devices such as air-conditioning units can be controlled via two power relays.

3 Questions about DART® Fieldbus

Michael Kessler is Vice President – Business Unit Components & Technology at Pepperl+Fuchs. In this update interview with our editorial team, he tells us about the status and latest news in relation to DART Fieldbus.

The DART technology developed by Pepperl+Fuchs unites intrinsic safety and high performance in a single system for the first time. What are its special features and how well has the innovation taken off?

We have indeed once again entered uncharted waters with DART. We are building on the safest explosion protection method: intrinsic safety. However, we do not achieve this as before through power limitation. With DART, sparks that occur as a result of errors or when a plug is disconnected are eliminated – the energy in the spark is limited to an intrinsically safe level. One could say that the most spectacular thing about DART is that it is completely unspectacular – namely because absolutely nothing happens. Despite full power. The feedback from manufacturers and customers is accordingly positive. The new technology is meanwhile known as Power-i, regardless of the manufacturer.

"THE MOST SPECTACULAR THING ABOUT DART IS THAT IT IS COMPLETELY UNSPECTACULAR."

What are the next steps? How will things progress with DART or Power-i?

While the innovative concept and its successful implementation are decisive for a new technology, they are nonetheless still only the initial steps. DART will need an internationally valid standardization within the scope of an IEC standard to achieve acceptance on a broad level and become a standard. That will give customers and manufacturers the certainty they need.

Can you announce any initial results?

Yes, a lot has happened behind the scenes. Over the past few years a work group consisting of 13 companies and headed by the Physikalisch-Technische Bundesanstalt (PTB) has defined the interoperability and proof of explosion protection for DART. Part 39 of the IEC 60079 standard is currently being drawn up on this basis as a technical specification (TS). The final draft should be available in spring 2014 and will be presented to the IEC for coordination. We assume that the standard will become valid by the end of 2014. This will represent an important milestone for DART. There are already products, such as the FieldConnex DART Fieldbus, that have been approved for ATEX and IEC-Ex as a system solution in accordance with the established Part 11, Intrinsic Safety. Standardization, which is expected at the end of 2014, will make approval considerably more straightforward and will support the interconnection of products from different manufacturers – a concept that has been taken for granted for many years in the field of conventional intrinsic safety. For DART, it will be the starting shot for use on a broad basis. +

www.pepperl-fuchs.com/dart-fieldbus

Robustness Refined

Industrial Monitors + HMI Solutions ***VisuNet XT is a targeted, well-built industrial workstation.***

As the search for oil and gas moves into uncharted and often extreme conditions, the products that service these industries must evolve. Working closely with key customers in the exploration industry, Pepperl+Fuchs developed a product to meet the demanding requirements. VisuNet XT brings new meaning to the term rugged HMI. It is a Zone 2/Div. 2-rated, enclosed PC with a display that is readable even in direct sunlight. VisuNet XT has a powder-coated cast aluminum housing that supports an extended temperature range from -40 to +65°C. All without cooling fans! VisuNet XT is available with a 15- or 19-inch display and a full range of options to support customer and OEM requirements.

www.pepperl-fuchs.com/visunet-xt

New Dust Certification

Purge and Pressurization Systems ***The 6000 Series purge and pressurization component kit is now certified for use in Zone 21 applications.***

The 6000 Series type X/Ex px system continues to impress customers and OEMs with its global design, simple implementation, and easy operation. The component kit provides a cost-effective and complete certified purging and pressurization solution that is easily integrated into a protected enclosure. With the certification now extended to include Zone 21 hazardous dust environments, this protection method offers greater flexibility to machine builders and OEMs needing to provide practical and effective hazardous location protection solutions.

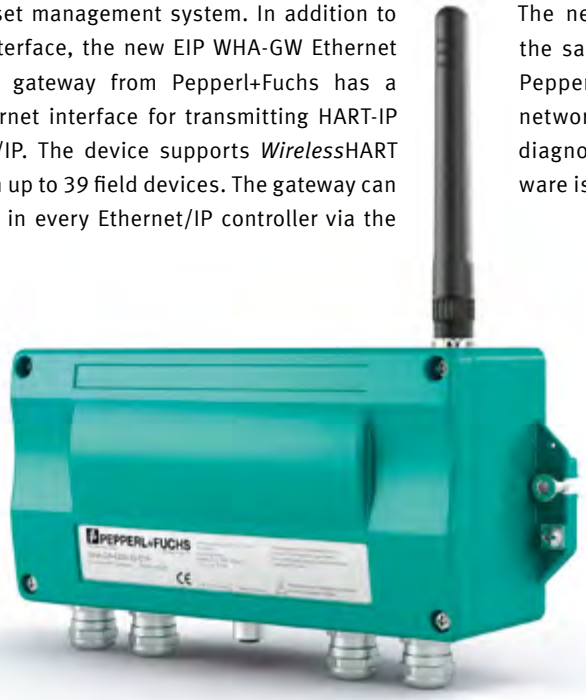
www.pepperl-fuchs.com/6000

Intuitively Integrable

Wireless*HART** ***Pepperl+Fuchs now offers a WirelessHART gateway with an Ethernet/IP interface. Intuitive commissioning makes it easy to connect to Ethernet/IP controllers.

*Wireless*HART gateways form the heart of a *Wireless*HART network. They connect *Wireless*HART field devices or devices connected via a *Wireless*HART adapter to the process control system or asset management system. In addition to the RS485 interface, the new EIP WHA-GW Ethernet *Wireless*HART gateway from Pepperl+Fuchs has a physical Ethernet interface for transmitting HART-IP and Ethernet/IP. The device supports *Wireless*HART networks with up to 39 field devices. The gateway can be integrated in every Ethernet/IP controller via the device description without any additional parameterization. This significantly simplifies commissioning.

The new Ethernet *Wireless*HART gateway works in exactly the same way as the MODBUS *Wireless*HART gateway from Pepperl+Fuchs. It takes over the management of the entire network, including easy-to-understand, graphic network diagnostics that reduce maintenance costs. Additional software is not required.



www.pepperl-fuchs.com/wirelesshart-gw

More Room in the Cabinet

Remote I/O Systems ***In addition to the narrow analog remote I/O modules, Pepperl+Fuchs has developed eight-channel digital input modules that are only half the size they used to be.***

Space in the control cabinet is at a premium. And that makes the size, or rather width, of I/O modules a significant cost factor. Every module installed in a control cabinet increases the importance of every millimeter spared per device. The new high-density LB remote I/O modules for digital inputs supplement the Pepperl+Fuchs product range for particularly compact installations. Measuring a mere 16 millimeters, they are now only half as wide as the previous design. The modules fit into existing backplanes and are easy to configure.

They are equipped with status LEDs for quick diagnosis to simplify commissioning. Taking the example of a complete LB remote I/O system including com unit and power supplies, the new narrow modules can save around 40 percent of installation space compared to the previous module sizes, depending on the signal mix. That means either much smaller systems or twice as many I/O modules in the same amount of space, depending on the configuration.

www.pepperl-fuchs.com/lb-high-density

HAPPY BIRTHDAY

HART Communication Foundation!

Twenty years ago, all rights to the HART Communications Protocol were transferred to the HART Communication Foundation (HCF). The international nonprofit organization has been the central authority in relation to the HART protocol ever since. HCF has made committed contributions towards establishing HART as a global process industry standard for communications between intelligent field devices. The figures speak for themselves: more than 40 million HART-enabled devices are installed in plants around the world. Over 280 manufacturers support the organization – among them Pepperl+Fuchs.

CONGRATULATIONS!

Reliable Even in Dusty Conditions

Level Measurement ***Pulscon LTC is a transmitter series for continuous level measurement for powdery to grainy bulk material and liquids.***

The transmitters are based on guided microwave technology and guarantee precise measurement even under difficult conditions. Turbulence and formation of foam in the case of liquids or a dusty environment have no impact on the measurement result.

Commissioning could not be easier with the menu navigation and factory settings. The device is operated locally via a four-line plain text display. The Pulscon LTC series is available in rod, cord, and coaxial versions for media with measuring ranges of up to 45 meters. The transmitters have SIL 2 approval.

True Multi-Talents

Level Measurement ***Hydrostatic pressure sensors from the LHC and PPC series offer extremely high measurement accuracy and are specially designed for the hygienic requirements in the food and pharmaceutical industries.***

These multitalented sensors measure absolute and relative pressure in gases, vapors, liquids, and dusts. And with the diversity of the electronic inserts, suitable connections for every control system, and process connections according to EHEDG, they can be used just about anywhere.

The LHCR/LHCS models are available in both rod and cord versions. They have a hermetically sealed measuring cell and are absolutely resistant to condensation and climate. The PPC-M51 model is approved up to SIL 2 in accordance with IEC 61508.

www.pepperl-fuchs.com/level

PROFIBUS

Valves on a cold box. Controlled via PROFIBUS PA and protected against short circuits using segment protectors

The refrigeration plant is monitored from a central control room

at 2 Kelvin

Lowest temperatures for high-tech research

Scientists at the German Electron Synchrotron, or DESY, have for years been relying on the fieldbus standard PROFIBUS as a control system for instrumentation and control equipment.

The process control systems for the huge refrigeration plants represent a very special challenge. They are used to create superfluid helium II that is essential for operations. It is needed to cool the supraconducting cavities and magnets of the accelerators down to 2 Kelvin (-271°C) – that's colder than outer space.

The German Electron Synchrotron is one of the world's leading accelerator centers and belongs to the Helmholtz Association. Construction work on the first ring accelerator known as DESY, from which the research center derives its name, began back in 1960. Much in demand as a partner for international cooperation and projects, DESY attracts more than 3,000 guest researchers to Hamburg every year.

Charged Particles and Lowest Temperatures

The fields in the research center's accelerators are used to accelerate charged particles to high energy levels. An operating temperature of 2 Kelvin is needed to make the best use of the supraconducting cavities and magnets used in the process. To this end, they are cooled with fluid helium II (superfluid helium). The scientists at DESY operate a large, high-performance helium refrigeration plant to produce fluid helium in sufficient quantities.

The plant consists of three identical subplants that can be operated independently from one another. Two of these subplants are currently undergoing conversion and extension work – for European XFEL, a unique X-ray laser for researching processes in the nanocosmos. The third subplant supplies, among others, the Accelerator Module Test Facility (AMTF) test plant, built specifically for the project and used to test the cavities and more than 100 accelerator modules prior to installation.

PROFIBUS in the Control Room

The entire refrigeration plant at the research center is monitored from a central control room that is occupied around the clock. Every bit of information needed for safe and reliable operation is collated here. The operators at DESY use PROFIBUS DP and PA to control the instrumentation and control equipment for the entire plant. »

IN BRIEF: COOLING HELIUM TO 2 KELVIN

Cooling helium to 2 Kelvin is a multistage process. First, the helium is compressed to 4 bar in a low-pressure stage and then to 18 bar in a high-pressure stage. This is followed by the so-called Claude process, a combination of expansion turbines and counterflow heat exchangers. The effect of the helium on the expansion turbines and the heat exchange with colder helium flowing back from the consumer cools the medium further still. Finally, the helium is decompressed to a pressure of 30 mbar via so-called Joule-Thomson valves. Decompressing the helium can cause it to cool to a stage where some of it is liquefied. The liquid reaches a temperature of 2 Kelvin at a pressure of 30 mbar.

Redundant systems for maximum availability – coupling of PROFIBUS DP and PA via SK3

» The plant components responsible for the XFEL are controlled and monitored via EPICS (Experimental Physics and Industrial Control System). EPICS is a joint development by international research institutes that can be used free of charge under the GNU General Public License.

The IOCs (Input/Output Controllers) of the process control system communicate with the I/O components via PROFIBUS. In the case of this refrigeration plant, the valves, pressure transmitters, and flow transmitters are interconnected via PROFIBUS PA technology. All PROFIBUS PA field devices are connected via segment protectors that protect data transfers from interference and allow live work on the fly.

Redundant Design for Maximum Availability

All of the process control system's major components, such as IOCs, power supply and segment coupler (SK3 from Pepperl+Fuchs), Optical Link Module, and fiber optic cables (double ring) are designed as redundant systems. The intention is to guarantee the maximum availability of the refrigeration plant that is operational 24 hours a day. After all, unscheduled plant deactivation will put the accelerator out of action for a number of hours.

The requirements for continuous operation of the AMTF test plant are a little more relaxed. In this case there was no need for redundant components and segment protectors to be installed with the process control system.

A compact segment coupler (model SK3 from Pepperl+Fuchs) and a bus structure from device to device were chosen for the AMTF. The cable lengths in the test plant are very short, with a maximum trunk length of 20 meters and spurs of no more than 50 meters.

Simple Design, High Reliability

The use of PROFIBUS DP and PROFIBUS PA to monitor and control the DESY refrigeration plants has proved its worth from the start. Designing a plant with PROFIBUS could not be easier and does not require any special tools. Producing the documentation is equally as simple, using Excel or Visio, for instance.

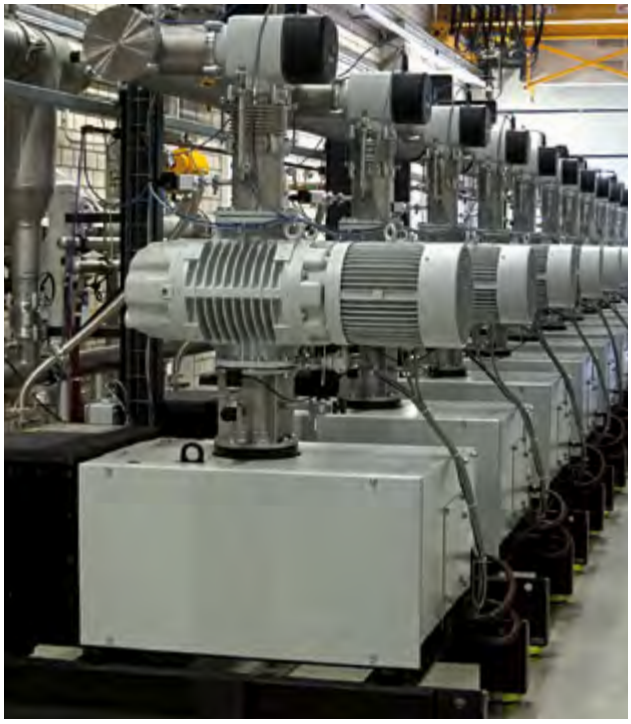
Installation and commissioning are just as straightforward with PROFIBUS. The field devices transmit diagnostic information alongside the measured values and are remotely parameterizable via the control technology.

The greatest benefit, however, and a crucial factor for the research center, is the reliability of PROFIBUS: the system is robust and runs trouble-free when properly installed. The scientists at DESY appreciate the excellent diagnostic capabilities of the PROFIBUS technology all the more in the event of a problem, as it also visualizes field devices, in contrast to previous solutions.

This ensures the timely diagnosis and rectification of plant faults and enables preventive maintenance.

Plant Availability of the Highest Standard

Prior to its conversion, the operator of the refrigeration plant achieved a massive availability of more than 99 percent. One of the three compressor trains was used exclusively for stand-by redundancy.

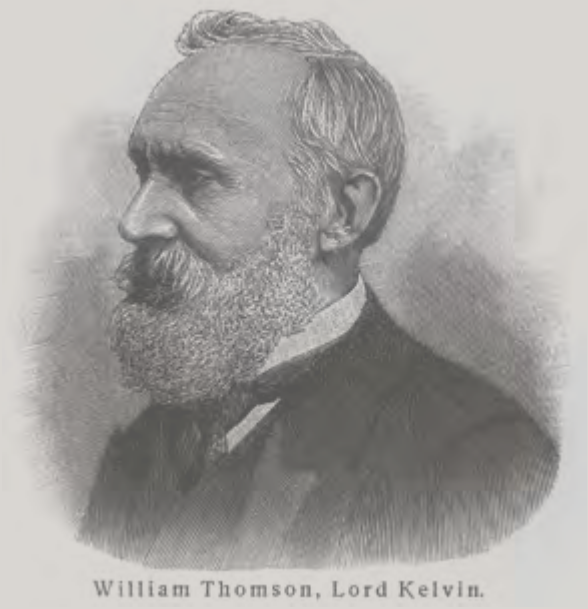


Compressors for helium

After a failure cause analysis, a decision was made to remove the redundant compressor and to have redundancy only for the control technology, the PROFIBUS DP rings, and segment coupler 3.

This solution guarantees that the accelerators do not come to a standstill due to an interruption to the helium supply. Considering the plants at DESY are booked years in advance, a standstill would have fatal consequences: an experiment that did not take place could not be repeated. Years of preparation, planning, and expenditure would have been for nothing.

PROFIBUS technology does more than guarantee the usual high level of plant availability, as it is expected to increase it further still. +



DID YOU KNOW ...

+ **that Kelvin – after whom the unit of measurement was named – was originally called William Thomson?** It was not until 1892, seven years before his death, that he was knighted and became the first Baron Kelvin of Largs.

+ **that the baronial title was named after a river?** The river Kelvin that flows through the Scottish city of Glasgow.

+ **that Kelvin was not knighted for his research into thermodynamics?** He was honored for his contributions towards the construction of the transatlantic telephone cable.

+ **that two moon formations are named after the scientist?** Cape Kelvin and Rupes Kelvin.

+ **that Kelvin did not think much of Wilhelm Conrad Röntgen?** His evaluation, however, that "Mr. Röntgen's rays will prove to be a fraud" did not catch on.

+ **that Kelvin is laid to rest in London in very illustrious company?** Right next to Sir Isaac Newton.

3 Misconceptions about SIL

Plants and machinery can pose risks that are so dangerous that man and the environment should not be exposed to them under any circumstances.

If such a hazard exists, the associated risks must be mitigated to meet the need for safety. The Safety Integrity Level, or SIL for short, is an indicator that makes risk reduction quantifiable. SIL is therefore a core element of functional safety – and simultaneously the object of many misconceptions. Dr. Andreas Hildebrandt, SIL expert at Pepperl+Fuchs, clarifies three of the most common misunderstandings.

SIL expert Dr. Andreas Hildebrandt

Misconception 1: SIL is a device characteristic

Despite the obdurate nature of this assumption: SIL is not a characteristic of a device, plant, or machine. SIL always relates to a risk-reducing function. A Safety Integration Level – and therefore the statement that "this circuit reduces the existing risk by the factor n" – can only be assigned to a completely fail-safe circuit. However, the devices used for the fail-safe circuit must be SIL-capable to enable such a statement to be made in the first place.

Misconception 2: SIL3 is automatically the better choice compared to SIL2

The SIL rating required depends on the initial risk inherent to the plant's systems or processes. The following applies: the residual risk remaining after risk reduction must be lower than the tolerable risk. If this is achievable with SIL2, then the installation of a SIL3 protective device could in some circumstances be too much of a good thing. The overfulfillment of a SIL can result in unnecessary effort and avoidable cost, much the same as overinsurance in the private sector is unnecessarily expensive. The aim is to design the protective device so that the risk reduction it achieves corresponds as closely as possible to the required SIL.

IN BRIEF: SIL

SIL stands for Safety Integrity Level and is a measure for quantifying risk reduction. SIL is used to assess safety-relevant circuits (loops) in plants with regard to the reliability of their safety functions. Protective devices have to fulfill a lower or higher level on the four-level SIL scale, depending on the required degree of risk reduction. Details of SIL are defined in the international standards IEC/EN 61508, 61511, and 62061.

www.pepperl-fuchs.com/sil

Misconception 3: Considering the probability of a system failure is sufficient with regard to SIL

Quantifying the probability of a failure of a protective device is not sufficient to fulfill a Safety Integrity Level. Primary measures for the prevention and control of faults must be implemented to this end. The relevant standard requires, first and foremost, the application of a special quality management system (Functional Safety Management System). In addition, failure control by means such as redundancy, fail-safe behavior, and fault detection (diagnostics) are mandatory. The extent to which these measures need to be applied depends on the targeted SIL.

FUNCTIONAL SAFETY TRAINING

Do you have any questions about SIL? The experts at Pepperl+Fuchs will be pleased to be of assistance. Our internationally experienced trainers offer tailor-made, company-specific training events on the subject of functional safety in German, English, and French.

www.pepperl-fuchs.com/training

Industry 4.0

Complete, automatically controlled networking of plants and machines using Web technologies is one of the key issues facing the industry.

In this interview, CEO Dr. Gunther Kegel and Dr. Peter Adolphs, Managing Director Development & Marketing, explain how the ideas behind Industry 4.0 will revolutionize the world of production and the opportunities this will present for Pepperl+Fuchs.

Dr. Kegel, Dr. Adolphs, the issue of Industry 4.0 is a hot topic in the automation industry. What do you think of it – trend or hype?

Dr. Kegel: Web technologies are finding their way into almost every area of our lives. The Internet of people is being increasingly accompanied by the "Internet of Things," also known as "cyber-physical systems," and this trend began long before this year's hype about Industry 4.0. Internet technologies will certainly result in lasting changes to production in the future – not just in direct areas of value creation, but also in areas like planning, operating data acquisition, logistics, distribution, quality assurance, etc.

Dr. Adolphs: The trend of Web technologies becoming established in automation has been evident for years, and would have come about even without the term "Industry 4.0." The wide-ranging possibilities presented by cross-plant networking over the Internet are resulting in completely new functionalities that will be just as revolutionary as the establishment of the processor in automation, or even earlier innovations such as assembly line production, electricity, or the steam engine. With that in mind, I think it's useful that this trend is being publicly recognized, and that targeted research is starting to be promoted. This is a clear acknowledgment to further expand the strong role of industrial manufacturing and automation.

What does the idea behind Industry 4.0 mean for Pepperl+Fuchs' strategy?

Dr. Kegel: The new, sometimes visionary ideas surrounding Industry 4.0 continuously remind us that there still need to be huge advances in the cognitive capabilities of "cyber-physical systems." Unlike with computing power and data rates, there's no "Moore's Law" here stating that a doubling in power can be expected every ten months almost automatically. »

» Increasing cognitive capability will require new sensors and sensor systems that allow comprehensive acquisition of all process and geometric data in real time. For example, the expansion of our PRT technology into a third dimension is based on the visionary idea of acquiring this geometric data in the form of an exact stereo image. For a sensor specialist like us, Industry 4.0 is therefore a massive challenge, and the success of Industry 4.0 will depend to a large extent on our innovations.

Dr. Adolphs: What this trend means to us is that we need to consider how our sensors and systems can realistically be integrated into this new communication layer. We should be looking to bring innovative ideas to the discussion. One possible area of activity would be Web-based parameterization and commissioning tools using smartphones or tablets, which use special interfaces to communicate directly with sensors in the plant, and thus make operation easier. We will be presenting some of our specific ideas at the SPS/IPC/Drives 2013 in Nuremberg, Germany.

"INDUSTRY 4.0 WILL BRING NEW FUNCTIONALITIES THAT WILL BE AS REVOLUTIONARY AS THE STEAM ENGINE AND ASSEMBLY LINE PRODUCTION." *Dr. Peter Adolphs*

How do you see your position in terms of Industry 4.0? Is Pepperl+Fuchs a pioneer, and will this result in competitive advantages?

Dr. Kegel: Industry 4.0 represents a massive opportunity and challenge for Pepperl+Fuchs, yet at the same time we have not identified any drastic risks. Sensor capabilities need to be significantly improved across all technologies and this is something that only sensor manufacturers can do. We might need to "borrow" technologies and concepts from totally different areas – games consoles for example. Still, the only ones who can make these processes industry-compatible are the sensor manufacturers. When it comes to control, changes are likely to be more fundamental and rapid, as this is where Internet technologies have a more direct impact.

Dr. Adolphs: Initial innovations in the Industry 4.0 area will come from control engineering. The skill will then be to pick up on those ideas and to develop and implement the sensor and system links to support them. This will require flexibility, speed, and creativity, so that we can set ourselves apart from our competitors. In this phase, we are likely to see a situation where supply creates its own demand. Many of the functions on smartphones that are now an integral part of our daily lives were unimaginable before the first smartphones appeared.

"INDUSTRY 4.0 REPRESENTS A HUGE OPPORTUNITY AND CHALLENGE FOR PEPPERL+FUCHS." *Dr. Gunther Kegel*

It was the technology that spurred on the creative ideas, and now the App Store has everything you could imagine. I am convinced that a similar thing will happen with Industry 4.0, and that Pepperl+Fuchs will contribute to these developments.

Dr. Kegel: Industry 4.0 will lead to years of coexistence of different transmission technologies. Replacing current optical fiber and radio transmission systems such as *Wireless*HART with pure Internet-based technologies will be a slow process. Our components are developed for a service life of several decades, so that they match the usage periods of our customers' machines and plants. This base of preexisting technology will not transform into a "cyber-physical system" overnight. What this means is that migration paths for communication and integration will have to be created between these networks and the world of the Internet. These could include gateways, segment couplers, or linking devices. The volumes involved are not attractive enough for the really major players, which makes digital interface systems a potentially lucrative market for medium-sized manufacturers – even if many things may end up taking longer than the bold visions promoted by all the hype are currently promising. +

How Time Flies
Three Pepperl+Fuchs Subsidiaries Celebrate Their Anniversary

Forty years ago, Pepperl+Fuchs founded its first foreign subsidiary in Great Britain.
It was the starting shot for rapid international growth. Today, the company has more than 30 subsidiaries around the world. Two other subsidiaries will celebrate their anniversaries alongside the British branch: Pepperl+Fuchs has been in the USA for 30 years, while Switzerland, like Great Britain, can proudly look back on 40 years. The subsidiaries have achieved a great deal in this time – and still have many plans.

30 Years of Pepperl+Fuchs in the USA

Founded on May 1, 1983, the US subsidiary Pepperl+Fuchs Inc. had its headquarters in Solon, Ohio, and consisted of only four employees. Today, years after relocating to Twinsburg, the subsidiary now employs 255. The product focus of the US subsidiary is on manufacturing automation with HMI products and purge and pressurization systems, alongside modifications of existing products. The sale of 85,000 ultrasound double sheet sensors to assist with the vote counting during the 2010 elections in the Philippines is a highlight fondly remembered in Twinsburg.

40 Years of Pepperl+Fuchs in Switzerland

Pepperl+Fuchs has been represented in Switzerland since 1973. This was initially in the form of the Digitrade AG sales agency, which was changed in 2001 to Pepperl+Fuchs AG. The company from the Biel-Bienne region shaped the history of automation technology in this Alpine country right from the start with its innovative ideas. Pepperl+Fuchs employs a staff of 17 to take care of its Swiss customers – trilingual in the German, French, and Italian regions of the country.

Pepperl+Fuchs Inaugurates New Facility in Melbourne

Pepperl+Fuchs Pty Ltd have relocated the Australian head office to the GOVAN 4,000 m² facility in Campbellfield Industrial Park, Melbourne. The facility has been renovated to meet Pepperl+Fuchs global standards, with room available for future expansion. On Friday, December 6, 2013, Pepperl+Fuchs will host an inauguration event, inviting major customers and channel partners from both the Factory Automation and Process Automation divisions. The latest technology will be on display, allowing guests to gain "hands-on" experience with key products and solutions.

The facility provides design, engineering, and manufacturing capabilities for explosion protection equipment products and integrated solutions, to support the Australasian markets.

Celebrating Successful Collaboration

For the second year in a row, Pepperl+Fuchs Hungary thanked its customers for their close collaboration by hosting a special event. This year, they surprised guests by holding an event in Bodrogkeresztúr, located in the heart of the Hungarian winegrowing region of Tokaj. To kick off proceedings, a boat trip was planned on the river Bodrog in the north-east of the country. After the boat trip, all the guests came to visit a family-run winery, where they gained insight into the high-tech production and bottling systems in use at the traditional vineyard. Finally – as you would expect for a wine region – all participants whiled away the evening with dinner and a wine-tasting session in the 200-year-old wine cellar.

We look forward to continuing this tradition next year.

On the Road with the Demo Bus in Northern Europe

If a green-and-white truck stops outside your door, it could be a demo bus from Pepperl+Fuchs. The buses are taking to the roads all over the world – in Scandinavia, Italy, North America, Eastern Europe, and China.

One of the demo buses has been touring Northern Europe since the end of the 1990s, where it has been visiting customers at their locations. The overwhelmingly positive experiences have confirmed the success of the "exhibition on wheels." Last year, the old demo bus was taken out of operation and a new, larger bus took to the road. On board, Pepperl+Fuchs keeps a comprehensive selection of products for factory automation and process automation, and customers can take the opportunity to discuss their particular applications and projects on-site with an experienced member of Pepperl+Fuchs staff.

Trade Shows + Events

Automation Fair
November 13 – 14, 2013
Houston, TX, USA
www.rockwellautomation.com/events/automationfair

Explosionsschutz-Sprechstunde
November 18 – 19, 2013
Mannheim, Germany
www.explosionsschutz-sprechstunde.de

SPS/IPC/Drives
November 26 – 28, 2013
Nuremberg, Germany
www.mesago.com/sps

NOVEMBER 2013 | **DECEMBER 2013** | **JANUARY 2014**

PROFIdag
November 14, 2013
Eindhoven, Netherlands
www.profibus.nl/profidag2013

HazardEx in the Regions
November 27, 2013
Dartford, Great Britain
www.hazardexonthenet.net/event.aspx?EventID=2217

Closer to Customers

Customer proximity is the core concept behind the Solution Engineering Center opened by Pepperl+Fuchs in Houston, Texas, USA, in the spring of 2013. First, the Pepperl+Fuchs experts there develop customized solutions for a wide range of different customer requirements – with a focus on applications in areas subject to the risk of explosion. Secondly, the 1,000 m² Solution Engineering Center puts Pepperl+Fuchs in closer proximity to many of its US customers.

Houston is a stronghold of the oil and gas industry, and many companies from the sector are located there. The proximity of the Solution Engineering Center adds value to our cooperation with customers – closer communication and short distances are bonuses, not least when it comes to things like Factory Acceptance Tests.

"RoboCup" Team Comes Out On Top in Project Competition

Practical applications and models relating to the field of automation were the focus of a project competition among pupils, advertised by Pepperl+Fuchs Austria. Customers were able to vote online for their personal favorite project – the RoboCup. Small robots go head to head on a bordered soccer field with the aim of landing as many goals as possible in the opponent's goal, just the same as a soccer match. Students aged 17 to 19 from the St. Ursula high school in Vienna built and programmed the robots themselves. Pepperl+Fuchs Austria was on hand to provide the students with the expertise and products required to give life to their ideas. The robots are fitted with ultrasonic sensors from Pepperl+Fuchs, which are used for position detection and collision prevention on the field.

The winning team presented its robot at the Pepperl+Fuchs trade fair booth at SMART 2013 – Automation Austria, the leading Austrian trade fair for modern automation technology, from October 1 to 3, 2013, in the Linz Design Center. The students have already taken part in the RoboCup world championships held in Istanbul in 2011 and in Mexico City in 2012. The team is currently in preparation for the RoboCupJunior Austrian Open in 2014.

www.pepperl-fuchs.com/events

Interphex
March 18 – 20, 2014
New York, NY, USA
www.interphex.com

FEBRUARY 2014 | **MARCH 2014** | **APRIL 2014**

Australasian Oil & Gas Exhibition and Conference (AOG)
February 19 – 21, 2014
Perth, Australia
www.aogexpo.com.au

Hannover Messe
April 7 – 11, 2014
Hanover, Germany
www.hannovermesse.com

Vietnam is the world's number one exporter of pepper and the number two for coffee – with Germany as the biggest buyer. The Vietnamese government is promoting a smooth transition from a socialist planned system to a market economy, and since 2006 has been increasingly encouraging the development of its industry and supporting inward investment from foreign investors. In the high-tech sector, Pepperl+Fuchs has been there from the very beginning with a site in Ho Chi Minh City.

Pepp
Thin

er Is not the Only
g That's Growing

The streets of the Vietnamese metropolis Ho Chi Minh City are plagued by heavy traffic. Swarms of motorbikes and mopeds dodge in and out of the cars, blasting their horns persistently as they go. Vietnam is growing, that is unmistakable. Apartment buildings are being built, while smartphones and Western clothing are increasingly the norm on the streets. Although the infrastructure is outdated, there is a lack of specialist personnel and the political leadership is dragging its heels in moving to a market economy, Pepperl+Fuchs was quick to identify Vietnam's potential. Factors that might put other medium-sized companies off from investing here are seen as a challenge by Pepperl+Fuchs. For Hong Hanh Than, Managing Director of Pepperl+Fuchs Vietnam, the opportunities are what count. "This is a very young country. The average age is around 25. The Vietnamese are very ambitious and want to achieve lots of things." »

» From Vietnam to the Global Market

Vietnam is aiming to supplement its traditional economic sectors of textiles and agriculture with new industries, particularly in electrical engineering and high-end products. In 2006, the government brought in new enterprise and investment laws, and since then around 2,500 foreign companies have located in so-called industrial zones (IZ) and export processing zones (EPZ), playing a major role in Vietnam's economic development. Pepperl+Fuchs (VN) Co. Ltd. was established in 2007, and in 2008 the first employees moved into the newly constructed production facility in Tan Thuan, the country's first EPZ, just four kilometers from downtown Ho Chi Minh City. Within a year of its foundation, production of circuit boards began, closely followed by a production line for cable assembly. Now, the plant also produces photoelectric and inductive sensors for factory automation, and Pepperl+Fuchs supplies the global market with more than two million of them from Vietnam every year.

State-of-the-Art Workplaces

"I certainly didn't expect that. You would think we were in Germany." This is something that Hong hears quite often when he welcomes business customers and partners to the Pepperl+Fuchs site in Ho Chi Minh City. "We established a modern plant to Pepperl+Fuchs standards here," Hong reveals. "As a German company, we stand for quality and integrity. We are very popular and people want to work for us," Hong says. Five working days per week, fully air-conditioned and structured workplaces, state-of-the-art office equipment, social facilities, and salaries well above the local minimum wage have all helped to establish the site.

"I CERTAINLY DIDN'T EXPECT THAT."

PEPPERL+FUCHS SUPPORTS YOUNG VIETNAMESE ENGINEERS

The Vietnamese population is young, with the average age at around 25. This makes it difficult to find experienced engineers, while graduates from technical colleges are in demand and can be equally hard to find. As a result, in 2009 the German government and the Vietnamese central government jointly set up the Vietnamese-German University (VGU) in Ho Chi Minh City. Pepperl+Fuchs works closely with the VGU to cover its need for specialist staff and has set up several bursaries and finances placements in Germany, which see prospective staff given training at the company's headquarters in Mannheim.

CEO Dr. Gunther Kegel (center) and the former German Minister for Economic Affairs, Dr. Philipp Rösler (right), at the Pepperl+Fuchs site in Ho Chi Minh City

Impressive Figures

A total of 390 employees, 10,000 m² of production area, high volumes, and all of these on an upward trend. The former German Minister for Economic Affairs, Dr. Philipp Rösler, rates these figures as very impressive. In September 2012, Pepperl+Fuchs' site in Vietnam played host to a German delegation made up of former Minister Rösler and Minister of State Cornelia Pieper, the German Ambassador in Hanoi, Jutta Frasch, and around 100 other political representatives. Rösler particularly liked the processes directly on the production lines and he was very impressed that Pepperl+Fuchs, as a medium-sized company, was one of the pioneers who took the risk of producing in Vietnam – and with visible success. Pepperl+Fuchs has long-term plans for Vietnam, with a further plant due to be established directly across the street. It will have a production area of 10,000 m² and will create 500 jobs. +

VIETNAM FACTS AND FIGURES

Form of government: *Socialist Republic of Vietnam*
Capital: *Hanoi*
Population: *around 90 million*
Area: *331,210 km²*
GDP (2012): *141 billion US dollars*
Per capita income (2012): *1,595 US dollars*
Key international trade partners: *EU, USA, China*

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