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Digital Conveyor Lines

SSI SCHAEFER is digitalizing its conveyor lines with the "Conveyor Control Unit" for controlling CAN roller motors – the technology behind it comes from Turck

Safe Link - Efficient Protection
Turck Safe Link and safe multiprotocol I/O modules enable efficient safety solutions for small to medium-sized systems

RFID - Reliable Filling
RFID solution guarantees reliable mixing and filling processes at B. Braun Medical AG through safe verification of hose connections in ATEX zone 2

Looking Ahead!

2024 was marked by difficulties in the economy and many challenges that German industry in particular had to overcome. The upturn that was actually expected in the middle of the year did not initially materialize, but sentiment in the German economy has now improved again slightly for the first time. The ifo Business Climate Index, in which companies assess their current situation, rose by 1.1 points to 86.5 points in October following four months of decline. This initial ray of hope is supported by a current estimate from the Federal Statistical Office, according to which the German economy grew at a surprising rate in the third quarter. Gross domestic product increased by 0.2% between July and September. Even if skepticism is still warranted, this does fuel hope for the expected recovery in the near future.

We at Turck are also ready for a positive development. This issue of your **more@TURCK** magazine once again presents some exciting innovations and applications that show how Turck solutions are driving industrial automation forward through smart digitalization.

Modularization and decentralized automation are two hot topics that are currently occupying the industry – and Turck as well of course. For example, we will be presenting our efficient, decentralized safety concept for small machines such as production cells, which is based on Turck's Safe Link protocol and our Ethernet multiprotocol safety I/O modules. Another exciting topic is the digitalization of conveyor lines, including decentralized control concepts. This ensures simple scalability, fast installation and high availability when status data from the system is evaluated predictively. Turck is responding to these trends with a sophisticated portfolio of robust IP67 block I/O and PLC modules. A further IP67 module, which was developed specifically for controlling roller motors, is another important component for making conveyor systems more flexible and modular.

SSI Schäfer is also using this new module in the new generation of its conveyor systems. From page 14 onwards, you can read what the intralogistics specialist expects from digitalization and what the experience with the "Conveyor Control Unit" for controlling CAN roller motors has been like. RFID solutions are not neglected in this issue either: B. Braun Medical AG, for example, relies on Turck's RFID technology to ensure reliable mixing and filling processes in ATEX Zone 2. At BASF in Antwerp, our RFID system guarantees that an inspection robot works safely and is charged reliably. You can also read reports on the sensor-based control of driverless transport systems at Proferro and the first hydrogen filling station in Portugal to be equipped with Turck interface devices and Banner safety controllers. Wishing you an exciting read.

Yours sincerely

Christian Wolf, Managing Director

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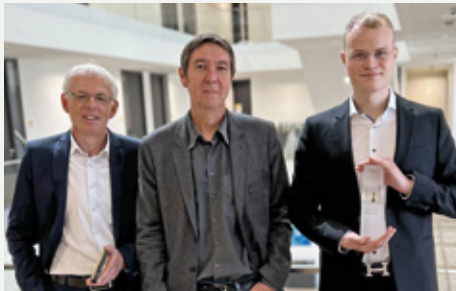
Control Cabinet Guard CCM60 Awarded

The IM18-CCM60 condition monitoring platform has been awarded the SSB Innovation Award 2024 by the German trade journal Schaltschrankbau. An independent jury had awarded prizes to five particularly innovative products and solutions in the field of switchgear and control cabinet construction. Turck's IM18-CCM60 control cabinet guard impressed the jury with its successful overall concept of hardware and siineos operating system, which enables every user to monitor control cabinets without any effort. The system monitors temperature, humidity and door distance in control cabinets and, thanks to the software, enables the simple parameterization of a wide range of interfaces.

Ethernet Multiprotocol Now Also with CC-Link

Turck's multiprotocol Ethernet technology now also supports CC-Link IE Field Basic. Devices with this standard operate in networks with Profinet, Ethernet/IP, Modbus TCP or CC-Link IE Field Basic without the need for manual adaption. The extension can be activated through a simple firmware update and is initially available for the TBEN-S and TBEN-L IP67 block I/O series.

Processing Unit for Remote Flow Sensors

Turck is expanding its Fluid+ series with the only IO-Link processing unit on the market for remote flow sensors with a plain text display and IP67 protection. The flexible use of different measuring probes enables the FS121 to cover a broad range of applications and thus allows considerable cost savings. For example, the flow sensor solution is ideal for use in modular process skids, lubrication systems, compressor cooling systems in confined spaces, cleaning and washing systems, as well as for applications in the food and beverage industry. The robust FS121 with IP67 protection allows decentralized cabinet-free installation close to the process, making it ideal for applications with few measuring points or specific positioning requirements. It offers user-friendly operation thanks to its 12-segment alphanumeric plain text display and SSP.

Update Offers Fieldbus Integration and Enhanced

The latest firmware update now allows Turck's TBEN-Lx-SE-M2 managed Ethernet switches to be fully integrated in typical engineering applications. This enables the use of robust IP67 modules as active stations in fieldbus networks such as Profinet, Ethernet/IP and Modbus TCP, and also allows extensive network diagnostics. Seamless integration into existing fieldbus networks gives users a comprehensive insight into their network and its components, which also enables predictive maintenance. The redundancy mechanisms of the switches, such as MRP, DLR and RSTP, enable a further increase in network availability and security.
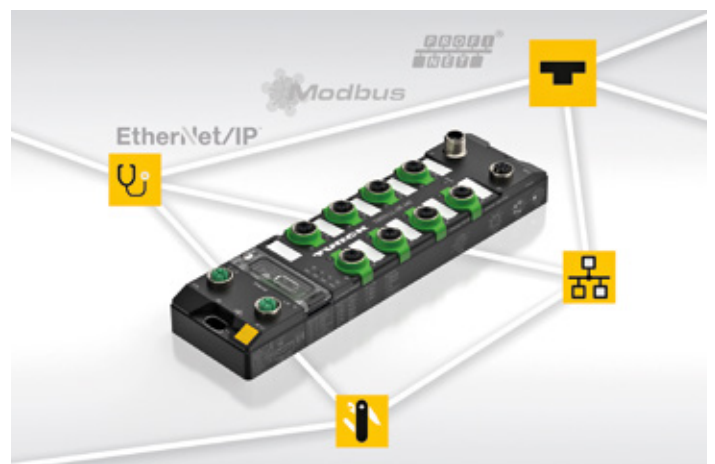
Safety Multiprotocol Modules with Safe Link

Turck is presenting a networked machine safety solution that is specially tailored to the requirements of small to medium-sized plants: The combination of the Turck Safe Link safety protocol with the TBEN-LL-4FDI-4FDX safety block I/O modules allows the creation of flexible and cost-efficient safety control with a decentralized installation. The multi-protocol modules support Ethernet/IP, Profinet and Modbus TCP and use the Turck Safe-Link protocol for safety cross communication. The logic is implemented directly in the modules with safety inputs and outputs. The networked modules produce a modular and scalable safety architecture that considerably reduces cabling effort and installation time. Up to 31 modules can be networked in an application.

Photoelectric Sensors

With the Q2X series from Banner Engineering, Turck is offering compact miniature photoelectric sensors with maximum detection ranges and five different detection modes for a wide range of applications. The photoelectric sensors enable precise and reliable position detection of small components and can be installed even on the smallest surfaces. A highlight of the series is the Q2X laser measurement with a range of up to 3 meters, almost four times greater than comparable models. The Q2X laser sensors use laser time-of-flight technology, which enables high-precision measure-ments and reliably detects even small objects, a particularly beneficial feature for the semiconductor and packaging industries.

Compact Switches for Control Cabinets

With the TNIC series, Turck is expanding its portfolio with unmanaged switches with the smallest possible housing dimensions and robust full metal housing. These features allow optimum space utilization in the control cabinet for the creation of efficient and cost-saving network solutions. A wide voltage range from 6 to 36 VDC allows a flexible power supply. Their wide operating temperature range between -40 and +70 °C guarantees reliable operation even in switch cabinets in exposed locations. The robust unmanaged switches of the TNIC series with protection to IP30 are available with 5, 8 or 16 ports for Fast Ethernet and 5 and 8 ports for Gigabit Ethernet.

Dynamic Inclinometers with CANopen

Turck is now also offering its QR20 inclinometers with a CANopen interface, thus expanding the existing range with IO-Link, switching and analog outputs. The new CANopen inclinometers with their large power supply range from 8 to 36 VDC and the E1 approval are ideal for use in mobile machinery such as wheel loaders, tippers and telescopic platforms. The patented spirit level function enables quick and easy installation. All QR20 inclinometers are available as single- or dual-axis devices for static or dynamic applications. The incli-nometers use a fusion of a gyroscope signal and MEMS acceleration measurement.
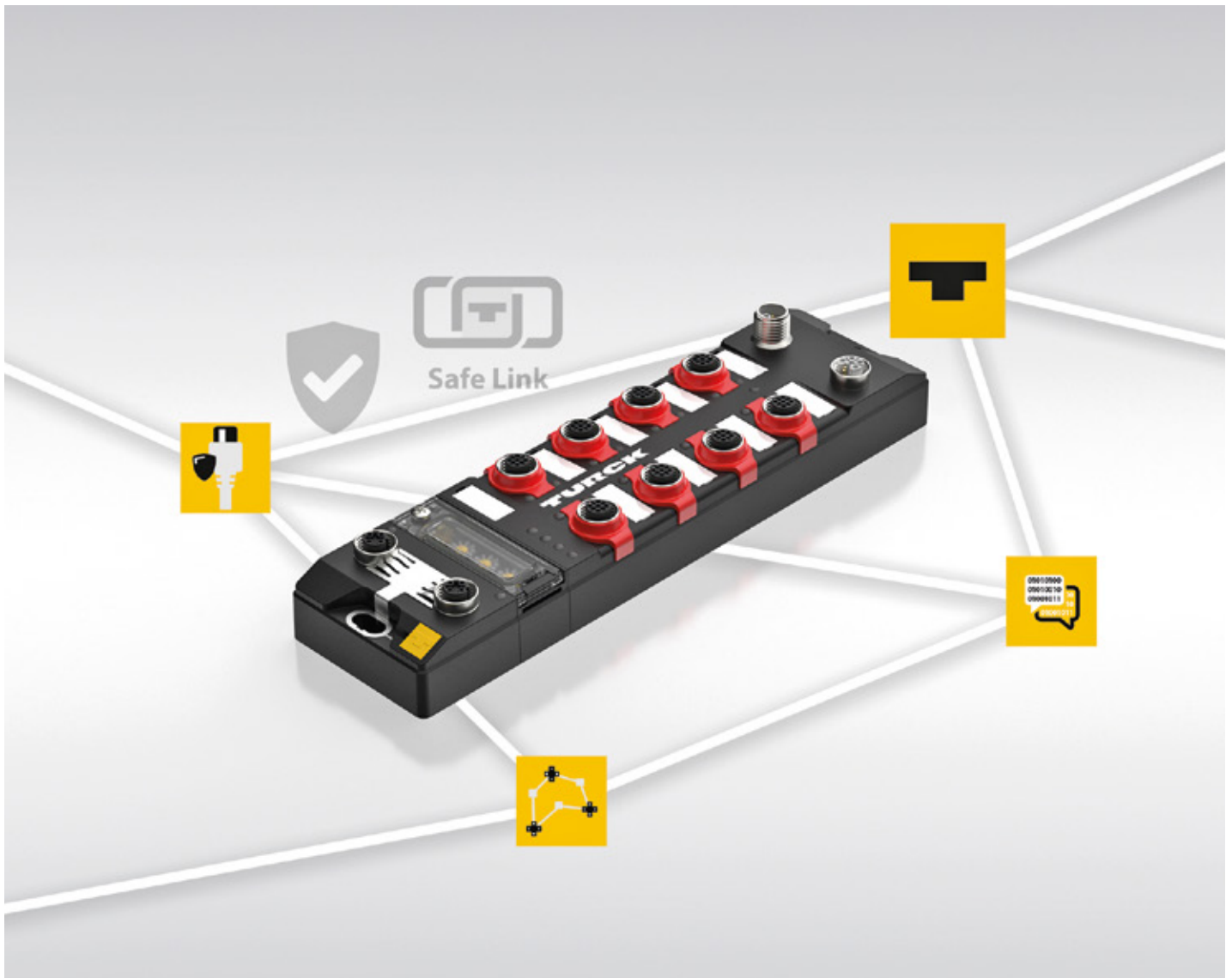
Safe Link

Safety Network

Turck's networked safety platform based on the Safe Link protocol and the Ethernet multiprotocol safety I/O modules allows efficient and flexible safety solutions for small to medium-sized plants – right through to ATEX Zone 2/22

Turck's TBEN-LL-4FDI-4FDX safety block I/O modules offer flexible and decentralized safety control without the need for central control cabinets

Machine safety plays a central role in modern industrial environments and encompasses a wide range of technologies and measures aimed at preventing accidents and injuries. In an increasingly complex industrial land-scape, it is crucial that safety devices do not work in isolation but are integrated and networked with each other. For example, a safety light curtain can stop a production line immediately if an employee enters a danger zone, while at the same time bringing nearby machines to a standstill by activating an emergency stop system. This coordinated communication between the safety components creates a comprehensive safety

network that not only ensures the safety of employees, but also maximizes machine uptime.

This means in practice that an operator working on a punching machine, for example, can rely on the fact that when the safety curtain is triggered, not only the machine itself but also all conveyor belts and feed systems in the entire area are stopped immediately. This integrated reaction not only prevents injuries but also minimizes the risk of machine damage through the sudden stopping of isolated parts of the system. Another example is a robot arm in a production line: If a safety laser detects that an employee is moving too

close to the robot's working area, not only is the robot stopped, but also all the machines interacting with the robot. This ensures that the entire area is safe and that no isolated part of the system continues to run in an uncontrolled way.

Safety in small to medium-sized systems
The increasing complexity of industrial environments calls for advanced safety solutions that do not work in isolation but are integrated and networked. Particularly in small to medium-sized systems with a moderate number of safety applications, users are often confronted with specific challenges. Another critical point is the lack of flexibility of conventional solutions in dynamic production environments. Production lines that are regularly retooled require scalable safety solutions. Traditional central safety PLC systems are often oversized for the applications mentioned and involve high acquisition and operating costs. Added to this are the considerable cabling costs and the complexity of installing central systems. Adaptions to changing production requirements or system expansions are often difficult to implement with central safety solutions and are usually very expensive.

Coordinated safety measures through networking
Thanks to the Safe Link protocol, Turck's TBEN-LL-4FDI-4FDX multiprotocol safety I/O modules can communicate safely with each other and with other devices in the network. This networking enables a coordinated response to safety-critical events throughout the entire production line. For example, a module that receives an emergency stop signal can immediately forward this information to all other modules so that all affected machines are stopped immediately. This not only ensures the safety of employees, but also minimizes the risk of machine damage and production downtime. The ability for real-time communication between the modules ensures that the safety measures are always synchronized, particularly fast and therefore efficient.

Decentralized installation for maximum flexibility and efficiency
The decentralized installation of the TBEN safety modules offers decisive advantages, especially in smaller production lines where space and cabling are often a problem. The IP67 modules can be installed directly at the machines where the safety functions are required. This reduces the need for central control cabinets as well as the amount of cabling, which not only simplifies installation, but also the maintenance and expansion of the systems. The modules offer a direct connection via M12 L-coded power supply connections and M12 D-coded Ethernet connections for reliable network communication. This means that safety-related functions can be positioned remotely directly at the source, which significantly increases the flexibility and efficiency of the production line, as short distances for safety signals allow faster cycle times.

    An outstanding feature of the TBEN-LL-4FDI-4FDX multiprotocol I/O modules is their variability: Each
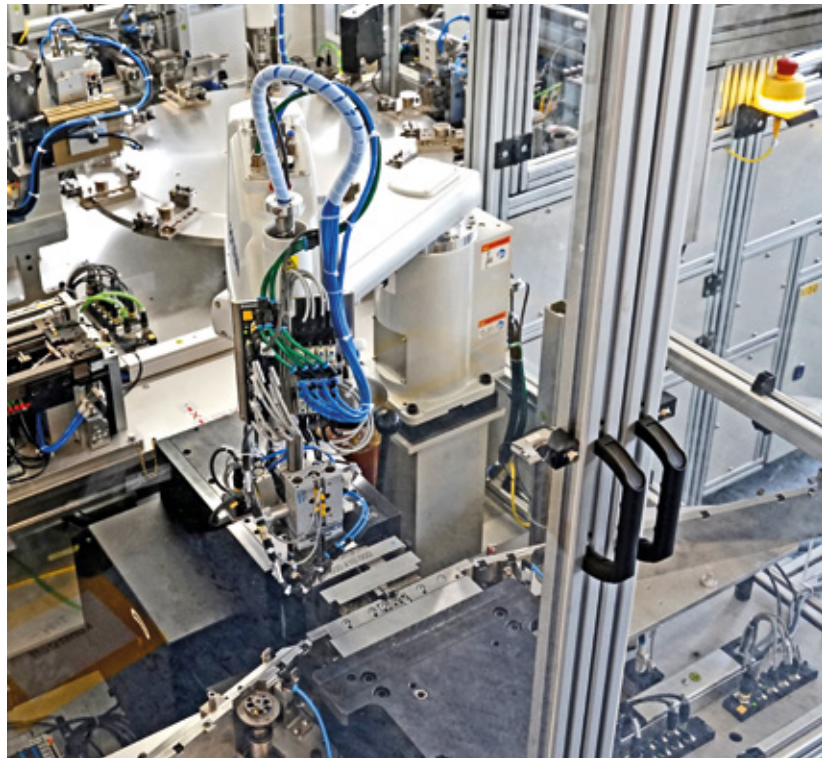

Assembly cells like these can be efficiently and reliably safeguarded with Turck's Safe Link modules

module can be added, removed or replaced independently, enabling a rapid adaption to changing production requirements. The ability to network up to 31 modules in one application offers considerable flexibility in the design and expansion of safety solutions. Moreover, each module provides 127 diagnostic bytes for monitoring and rapid fault diagnostics, thus further increasing operational reliability. Each module is assigned two bytes of safety-related input and output data and two bytes of non-safety fieldbus bits, which can be used for communication with a non-safety PLC. The integration of one and two-channel inputs as well as safety outputs, which can be used directly to control machines and drives, allows the modules to be easily integrated into existing safety networks. This scalability enables companies to react flexibly to market requirements and technological developments without having to invest in rigid and cost-intensive safety solutions.

QUICK READ

Turck's Safe Link and the TBEN-LL-4FDI-4FDX Ethernet multiprotocol safety I/O modules offer an efficient and flexible solution for machine safety, particularly for small to medium-sized plants. Thanks to the Ethernet multiprotocol, the decentralized installation of the IP67 modules and the ability to network up to 31 modules with Safe Link, it is possible to create an easily scalable and modular safety network without the need for control cabinets. This solution reduces cabling effort and simplifies the installation – the ATEX approval also allows use in Zone 2/22 hazardous areas.
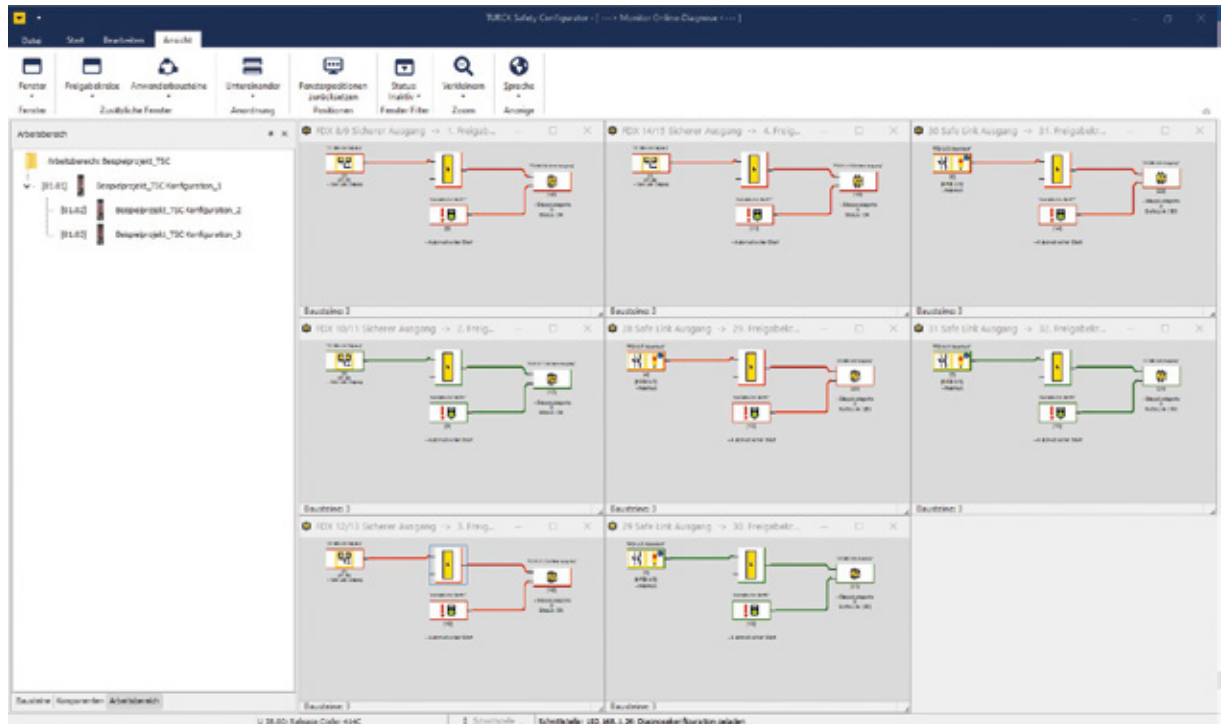
The safety modules can be easily configured using the Turck Safety Configurator

Seamless integration thanks to multiprotocol
The TBEN multiprotocol safety modules support a wide range of communication protocols, including Ethernet/IP, Profinet and Modbus TCP as well as the CIP Safety and Profisafe safety protocols. This capability enables companies to maintain their existing network infrastructure and still integrate the new safety modules, thus saving time and money. This versatility makes the modules particularly attractive for companies that work in heterogeneous system landscapes and require a standardized, flexible safety solution.

Safety solutions for potentially explosive areas
For applications in hazardous areas, the multiprotocol I/O modules offer a decisive advantage thanks to their ATEX approval for Zone 2/22. The certification ensures that the safety solutions operate reliably and in accordance with legal requirements even in extreme conditions. By using these modules in potentially explosive environments, companies can ensure that

their employees and systems are optimally protected, which significantly expands the possible applications and creates additional flexibility in sensitive areas.

Conclusion
The integration of Turck Safe Link in the TBEN-LL-4FDI-4FDX multiprotocol safety I/O modules enables companies – especially in small to medium-sized plants – to implement a flexible, scalable and cost-efficient safety solution – up to ATEX Zone 2/22. The decentralized IP67 concept allows a tailor-made adaption to individual requirements, while the multiprotocol capa-bility simplifies integration into existing systems. With the ability to network up to 31 modules and the integrated diagnostic functions that enable rapid fault detection, this solution offers a high level of scalability and operational reliability. The TBEN modules provide overall an efficient and economical safety platform that not only offers the highest safety standards, but also helps to maximize uptime and minimize machine damage.

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»The Turck Automation Suite stands out from other automation platforms above all on account of its comprehensive management and configuration options including batch functions.«

Christoph Schmermund | TAS Product Manager

The Turck Automation Suite (TAS) provides engineers and technicians with a comprehensive IIoT platform that supports device management, commissioning and the continuous monitoring of plants. Product manager Christoph Schmermund spoke to Frank Nolte, editor-in-chief of SPS-Magazin, about the features, types and areas of application of the software platform.

The networking of machines and systems plays a central role in modern industrial automation. With the increasing integration of sensor technology and decentralized control systems, the need for intelligent IIoT platforms that enable end-to-end communication and monitoring is growing. This is where the Turck Automation Suite (TAS) comes in, which has been available since the end of 2022. The TAS Cloud module was added to the IIoT platform for configuration, parameterization and commissioning for Hannover Messe 2024. The previously available TAS set of service tools will be further developed under the name TAS Desktop. Release 1.11 has just come out and this brings new functions and a large number of improvements, particularly for TAS Desktop. The IIoT and service platform will be completed in the medium term by TAS Edge with tools for edge computing on Turck hardware and TAS Mobile, a special version for mobile devices.

Efficient device management and fast commissioning
TAS Desktop is the first pillar of the Turck Automation Suite. It focuses on simplified and structured device management as well as quick and easy commissioning of devices. "TAS Desktop enables users to put many devices into operation with just a few clicks, thus saving a lot of time," product manager Christoph Schmermund emphasizes and continues: "Its outstanding features include the support provided for troubleshooting and the efficient implementation of firmware updates. This allows users to carry out tests without having to do any programming.

Schmermund gives an example of this with the evaluation of an RFID sensor: "Commissioning this kind of sensor previously required the creation of a PLC program, uploading it to the PLC and possibly the creation of a user interface. With TAS Desk-

top, these tasks can now be carried out directly via the desktop tool. The measurement results of the sensor are visualized, which considerably simplifies evaluation and parameterization."

"This simplification also enables the efficient implementation of feasibility studies for RFID systems and the management of all Turck devices within a production network," Schmermund adds and continues. "The network scan function identifies all available Turck Ethernet devices in the network and makes their device information directly available. This view also makes it easier to assign IP addresses and passwords and to carry out firmware updates for all devices in the network."

Logic software included
Another feature of TAS is the ability to execute many functions of the network view as a batch function. This enables the simulta-

neous configuration and processing of many devices, which saves time, especially in large networks – and without the need for third-party software. The Argee logic software transforms Turck's Ethernet I/O modules into IP67 logic controllers for use directly in the field as so-called field logic controllers. "This function is unique on the market. TAS thus makes it possible to load Argee programs conveniently and manage them centrally on a group of devices using the batch function," Schmermund says.
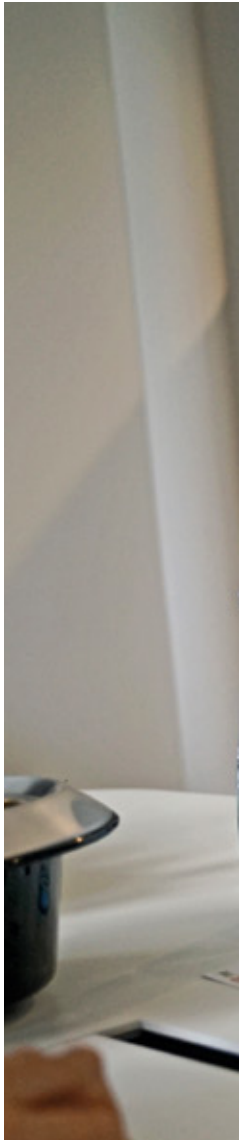
The Codesys view in TAS enables almost all Turck controllers in the network with Codesys to be displayed and the controller programs of the connected devices to be downloaded and saved. Users can also run or stop the programs in cold or warm start via TAS. TAS Desktop also offers a comprehensive service concept with updates, efficient fault analysis and user-friendly visualization of device data. By integrating the smart M12Plus Bluetooth connector, which can measure voltage curves and transmit the values via Bluetooth, TAS Desktop also offers a solution for detecting impending cable breaks, resistances or other faults.

Continuous monitoring and intelligent data acquisition
While TAS Desktop is primarily used for event-based work, TAS Cloud offers a solution for the continuous monitoring of machines and systems. TAS Cloud enables 24/7 condition monitoring, in which all relevant values can be recorded and alarm messages issued.

A central feature of TAS is the ability to automatically recognize and configure devices when they are replaced. This considerably reduces the effort for the user, as no manual adjustment by an installer is required. Continuous central network monitoring and backup and restore func-

tionalities round off the TAS offering. "TAS can be operated both locally and in the cloud. Thanks to the support of numerous OT protocols such as Profinet, Profibus and Modbus, seamless integration into existing automation infrastructures is possible," Schmermund emphasizes.

Central data management and intelligent analyses
TAS Cloud enables centralized management and analysis of the data collected from different devices and locations. The functions include the creation of dashboards, the management of alarm systems and the running of maintenance tasks. This not only makes it easier to monitor and maintain systems, but also to optimize processes through data-based decision-making.

Schmermund offers a glimpse into the future: "The central platform for analyzing machine data supports the implementation

Efficiency booster TAS: TAS Cloud turns the Turck Automation Suite into a comprehensive solution for device management and operation of automation solutions

of predictive maintenance and condition monitoring. "A great feature in TAS Cloud is the Maintenance Manager, which simplifies guided maintenance and commissioning through digitalization and standardization and thus efficiently compensates for disadvantages caused by inexperienced personnel. TAS Cloud will be further developed in future so that users won't even notice whether they are in the web browser on the edge, on the desktop or in the cloud."

The introduction of TAS Mobile is also planned, which will enable the use of TAS on mobile devices. This would allow users to carry out configurations or analyses directly via their smartphone.

Support for standards
A major benefit of the Turck Automation Suite is the broad support of standard protocols such as Profinet, Ethernet/IP, Modbus TCP and many more. This enables easy integration with a wide range of devices and systems, both from Turck and from third-party suppliers. Particularly noteworthy is the support of IO-Link or DCP, which means that TAS can also be used with third-party devices as long as they comply with the relevant standards.

"The support of protocols such as MQTT and OPC UA also makes it possible to seamlessly connect OT data with IT systems and improve connectivity within the production environment," Schmermund explains, emphasizing the uniqueness of TAS: "The Turck Automation Suite stands out from other automation platforms primarily on account of its comprehensive management and configuration functions. The batch functions in particular make it possible to carry out many actions simultaneously for several network devices, which saves a considerable amount of time, especially when assigning IP addresses or updating firmware. This central management function is unique."

The integration of predictive security technologies and data protection-compliant monitoring methods will also be part of the TAS platform. These functions help to increase the safety and efficiency of industrial processes.

Conclusion: the future of automation with TAS
The Turck Automation Suite offers a comprehensive solution for the requirements of modern automation. With its four pillars – TAS Desktop, TAS Cloud and soon TAS Edge and TAS Mobile – it covers all important areas, from commissioning and continuous monitoring to centralized or decentralized data management and analysis. An engineer can use TAS Desktop to commission and manage all machines quickly and efficiently. TAS Edge will add powerful edge computing capabilities to the platform, enabling local processing of data for faster responsiveness. The collected data is then analyzed in TAS Cloud to optimize processes and identify potential problems at an early stage. By supporting common protocols and working with Codesys, TAS is a flexible and future-proof solution that can be seamlessly integrated into existing systems.

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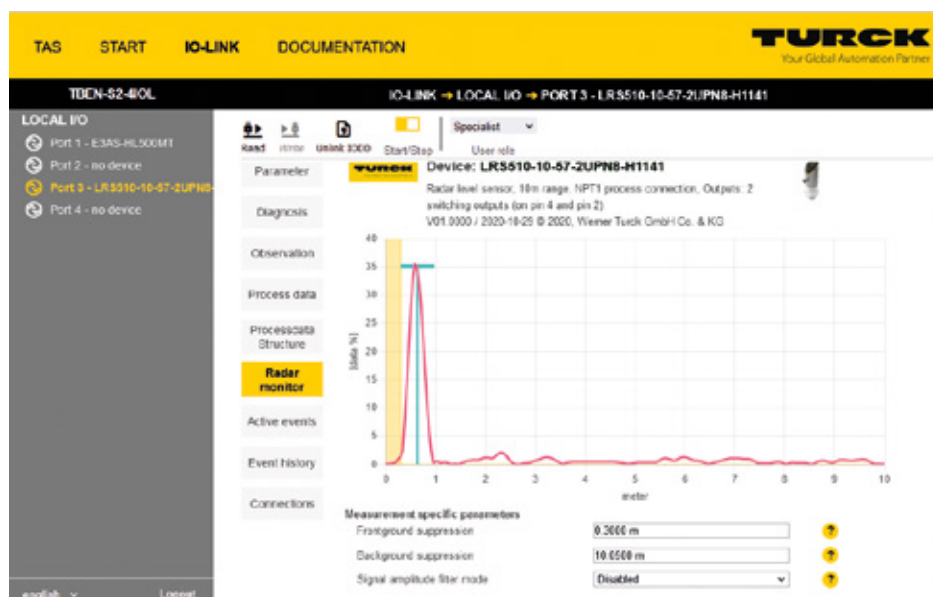
TAS Desktop: The Radar Monitor makes it easier to set up the sensors thanks to real-time visualization and interference signal filtering options

Get Rolling

Intralogistics specialist SSI SCHAEFER is digitalizing its conveyor lines with the "Conveyor Control Unit" for controlling CAN roller motors – the technology behind it comes from Turck

In the new generation of its conveyor systems, SSI SCHAEFER uses the CCU "Conveyor Control Unit", a CAN I/O module developed by Turck for controlling the drum motors and recording the sensor data

Many people in Germany are regularly in contact with one product from SSI SCHAEFER, because the household waste garbage can they put by the roadside often come from this group of companies. However, the product diversity of the group, which coordinates the many subsidiary companies at its headquarters in Neunkirchen/Siegerland, should not be based on the prominence of its waste garbage alone. With more than 80 companies and around 8,600 employees, the Group generates sales of around 1.9 billion euros euros and is today one of the world's leading solution providers for intralogistics. This is made possible by a product portfolio that today covers the entire range of logistics requirements – from sustainable container systems and conveyor technology for small and large load carriers to complex overall intralogistics solutions, including software for internal material flow and supporting services.

The Graz site of the SSI SCHAEFER Group in Austria produces and develops container conveyor technology,

among other things. At the end of 2018, conveyor control product manager Christian Steiner and his colleagues were considering what requirements the next generation of conveyor systems should meet. Steiner is also responsible as product manager for the automation and control of the conveyor technology. Hansjörg Lerchster was also part of the project team at the time as R&D product manager. Today Lerchster is product owner and business operations manager at SupplyBrain, a startup founded by SSI SCHAEFER, where he is responsible for the development of predictive maintenance solutions and other data-based services for intralogistics systems.

Digitalization of conveyor technology

The next generation of conveyor technology is to be automated and controlled digitally as much as possible. The previously used roller motors with analog control and the associated control modules could no longer

> »Although it was possible to also buy CAN bus controllers on the market, we wanted an SSI SCHAEFER solution that was really tailored to our needs.«

Christian Steiner | SSI SCHÄFER

Turck has customized its TBEN-LL-4RM-4DI-4DXP I/O module for the control of CAN roller motors and for the digitalization of conveyor lines exactly to meet the demanding requirements of SSI SCHAEFER

meet the increased number of requirements. The next generation of motorized roller drives therefore is to be controlled digitally throughout. Interroll, the company that was selected to supply and manufacture the motor rollers to be implemented, uses CAN bus as the fieldbus protocol and so this was also chosen for the I/O and controller technology. The power supply of the new motors also had to be changed from 24 volts to 48. The larger voltage range allows smaller cable cross-sections and longer cables on account of the lower losses, and therefore larger and more efficient power supply units.

No perfect I/O solution on the market
SSI SCHAEFER searched the market for systems that could offer a data connection to the motor rollers with a CAN interface, the required 48 volt power supply and Profinet communication for controlling the systems. The devices were required to have a robust design with protection to IP67 for direct installation on the convey-or belts. The perfect solution for this was not available on the market: "Although it was possible to also buy CAN bus controllers on the market, we wanted an SSI SCHAEFER solution that was really tailored to our needs," says Christian Steiner. After initial contact with Turck at the SPS automation trade fair in Nuremberg, the automation specialist checked whether it was possible to modify its own I/O solutions to meet SSI SCHAEFER's requirements. Long story short – it was.

CCU module saves on separate I/O modules
The TBEN-LL-4RM-4DI-4DXP I/O module for controlling CAN roller motors, which was then further developed by Turck, is known at SSI SCHAEFER as the Conveyor

Control Unit or CCU for short. Digital inputs and outputs for external trigger signals or actuators were also required in addition to the 48-volt power supply for the roller motors, 24 volts for conventional actua-tors, CAN communication to the motor and Profinet communication to the PLC. Besides four conventional I/Os, four DXP ports are provided on the module, which can be used either as inputs or outputs. "The module now enables us to collect more sensor data, or to be more precise, double the number of I/Os compared to the previous module. We previously had to use additional I/O modules from other manufacturers to collect the signals from the sensors," Hansjörg Lerch-ster explains the benefit of the new CCU. "We can now combine all this together. Bus communication also makes the solution plug-and-play compatible."

Automatic address assignment simplifies commissioning
There are also benefits gained from the easier installa-tion and commissioning of the CCU modules. "Address-es are now assigned automatically. We have received very good feedback from the plants under construc-tion. The CCU module is easy to install and the error handling is also very good. It directly displays which motor roller is not working. That wasn't possible with the old technology," says Steiner, describing the feed-back from his colleagues.

The new motor rollers have been gradually intro-duced since 2021. SSI SCHAEFER produces over 100 kilometers of conveyor technology every year. The

QUICK READ

Intralogistics specialist SSI SCHAEFER is in the process of digitalizing its conveyor technology end-to-end. Energy efficiency, short time-to-market and maximum availability through predictive maintenance are the driving factors behind this. Turck supports this approach with a Profinet I/O module for the digital, decentralized control and power supply of 48V roller motors via CAN. Besides greater efficiency for assembly and the centralization of the power supply architecture of its conveyor technology, SSI SCHAEFER values the module's ability to offer digital services such as predictive maintenance thanks to the transparent data provided.

»The module now enables us to collect more sensor data, or to be more precise, double the number of I/Os compared to the previous module. We used to have to use additional I/O modules from other manufacturers to collect the signals from the sensors«

Hansjörg Lerchster | SSI SCHÄFER

motor rollers are integrated into various product groups, from straight conveyor belts to curves and inclined rollers right through to complex alignment conveyors. Due to the extensive conversions and adjustments required in the design drawings, this type of transition does not happen overnight.

Future security and modular
Thanks to their digital control, the CCU modules offer a wide range of options for optimization and automation. The option of controlling the modules both via Profinet and via I/O signals ensures a high degree of flexibility and backwards compatibility. This flexibility enables the intralogistics specialist to retrofit older systems with the new technology. Not only can the motors be controlled more precisely via the fieldbus interface, but status data such as the temperature or operating parameters such as operating hours, can be transmitted in parallel with the cyclical process communication of the operating data.

"With the module's new firmware, we can control this not only via Profinet, but also via the I/O signals. This enables us to also use the modules in the context of devices with software that cannot yet work with Profinet," Steiner adds. Even if not every option is already being used to its fullest extent today, SSI SCHAEFER appreciates the flexibility and future-proof capability that Turck's CCU module offers.

Turck and SSI SCHAEFER launched the project in the middle of the corona virus pandemic and therefore at a time when there were supply chain problems. "Besides the improved cost efficiency and what we have achieved technically, the cooperation with Turck was crucial for me. Despite the challenges of the joint development, I found them to be very cooperative, working with us on equal terms and in a targeted way," Hansjörg Lerchster recalls his work on the project. "We continue to be very satisfied, also with the ongoing activities such as firmware updates etc.," his colleague Christian Steiner adds. Based on the foundations that have been laid, further joint projects cannot be ruled out.

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With the decentralized CCU module, SSI SCHAEFER conveyor lines can be set up, tested and operated much more efficiently and are easier to install – including the option of predictive maintenance

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To the Point.

Turck's intralogistics specialist Frank Morassi on the trend towards digitalized conveyor lines

Modularization and digitalization are among the top issues in mechanical and plant engineering, not least in intralogistics. The best way for today's users to meet their customers' rapidly changing requirements is with modular and flexibly scalable conveyor lines. For these to also offer high availability and work ideally with zero pressure accumulation, an efficient digitalization strategy is unavoidable. The trend is moving away from massive, centrally controlled and driven lines towards decentralized control modules and roller drives directly in the field.

The digitalization of the conveyor line and decentralized, cabinet-free control concepts offer a number of advantages. First of all, there is the benefit of simple scalability. If requirements change, digitalized conveyor modules can be quickly combined to create new route layouts, all with very little wiring effort.

short cycle times. Conveyor lines fitted like this benefit from improved energy efficiency as it is possible to switch off motor rollers that are not in use almost immediately.

Last but not least, the digitalization of the conveyor line also increases its availability. Smart control modules also record in the background the status of the connected motor rollers. An increase in the power requirement above a standard value indicates an imminent failure of the drive in the foreseeable future. If these values are continuously monitored, the system issues a warning in good time, allowing the user to replace the defective motor rollers as part of a planned maintenance measure. In this way, unplanned downtimes can be kept to a minimum.

Turck's response to the trend towards the digitalization of conveyor lines is a sophisticated portfolio of robust IP67 block modules. The I/O modules of the TBEN-S and TBEN-L series for signal distribution

Users of Interroll drum motors have been able to use Turck's TBEN-L-4RMC module for some time now. It controls the motor rollers via the CAN interface and the Turck Multiprotocol enables it to communicate automatically with the controller via one of the three Ethernet languages Profinet, EtherNet/IP or Modbus TCP. The module can now also be used for motors from the manufacturers MPC and MTA.

Actuators or sensors can be connected via four digital inputs or four universal inputs or outputs (DXP ports). The user can execute various pre-programmed control routines via the module's four CAN ports, for example to easily set up zero pressure accumulation (ZPA). Specific control operations that are not included in the pre-programmed logic routines can be carried out by the user using the ARGEE code-free control logic.

»Digitalized conveyor lines offer high performance, are highly flexible, and can be set up with zero pressure accumulation in no time at all.«

Smart I/O modules on the conveyor modules not only provide the control intelligence but also inputs and outputs for sensors and actuators, the latter primarily in the form of roller motors. All devices are supplied via robust IP67 power supply units on the modules for which the voltage is looped through via M12 power cables thanks to the line topology. The connected motors require a power supply of either 48 or 24 volts.

Decentralized control modules significantly reduce data traffic and also enable

directly on the conveyor system or the TBEN-L-PLC IP67 PLC for autonomous control directly on the module are increasingly being used in intralogistics systems. A further IP67 module, which was developed specifically for controlling roller motors, is another important component for making conveyor systems more flexible and modular.
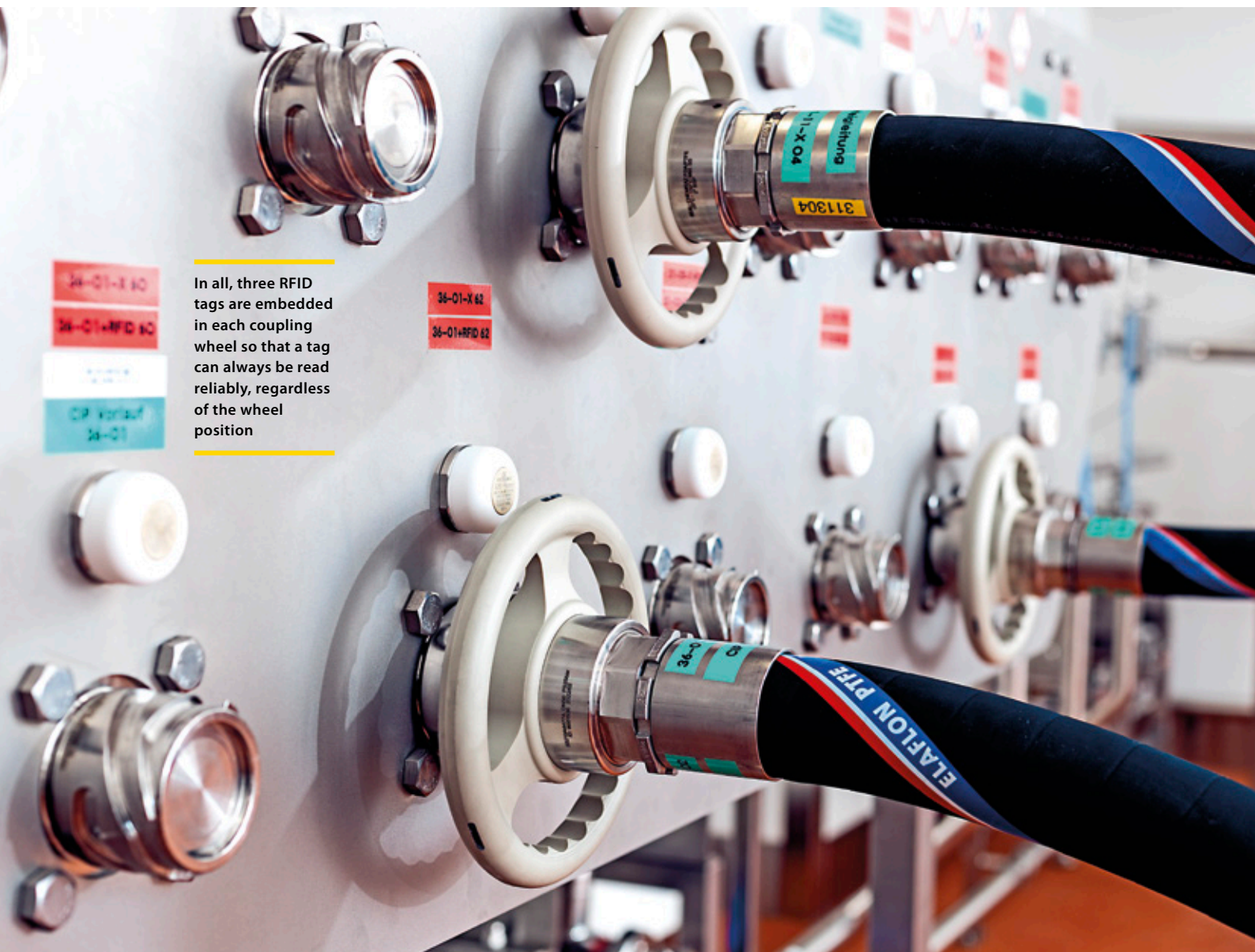
In all, three RFID tags are embedded in each coupling wheel so that a tag can always be read reliably, regardless of the wheel position

Correct Coupling

B. Braun Medical AG guarantees reliable mixing and filling processes through fail-safe verification of hose connections in ATEX zone 2 – with an RFID solution from Turck

B. Braun Medical AG is a subsidiary of the German B. Braun Group, one of the world's leading manufacturers and suppliers of medical technology products. The B. Braun Group employs around 65,000 people in 64 countries, including over 1000 in Switzerland. In development, production and sales, they ensure the supply of high-quality products to the healthcare market.

The production facility of B. Braun Medical AG in Sempach in the Swiss canton of Lucerne specializes in the manufacture of medical disinfectants, hygiene products and medicines for the treatment of chronic wounds. Complex mixing and filling processes are carried out here, in which various chemical raw materials are mixed in tanks and then filled. The company is in the process of doubling its production capacity due to a sharp increase in demand.

Identification ensures safety
The core process of the new systems essentially involves feeding the various chemical raw materials from the weighing containers into the mixing tanks

»It´s not easy to find products with Zone 1 and 2 explosion protection that are also suitable for clean rooms, and vice versa.«

Thomas Mühlebach | B. Braun

and transferring the finished products to the filling line. The nodes in the system are two coupling stations, one of which is located at the feeding station and the other at the interface to the filling line.

During the process, the hoses have to be moved three to four times per batch. To prevent mix-ups with disastrous consequences, the hose stations are integrated into the RFID system, which monitors the entire system. For each connection, one RFID tag on the hose side must interact with a corresponding RFID read/write head. The outlet only opens when the system has identified the correct medium.

The communication-capable coupling wheel
There are a large number of hose couplings with integrated RFID tags on the market. However, a standard solution was not an option in this case due to the limited space available and the weight of the hoses – a major challenge for the inventors among the RFID specialists at Bachofen AG, Turck's national sales partner in Switzerland. Their vision: a hose coupling with a coupling wheel into which the RFID tags are cast.

Together with the specialists for coupling technology and hose systems, MannTek and Schudel AG, Bachofen implemented the unconventional idea and developed a prototype that completely impressed B. Braun Medical. "The specialists at Bachofen really got to grips with the task and didn't give up until we had a solution that we could unreservedly say 'yes' to," explains Thomas Mühlebach, head of maintenance and technology at the Sempach site.

The final rotary wheel version contains three RFID tags embedded 120° apart. Their signals identify the connection instantly when rotated and release the flow if the result is positive. Bachofen used Turck's BL ident RFID system with TBEN I/O block modules with IP67/IP69K protection to integrate and control the coupling solution. With special protective housing, these are also approved for use in ATEX zone 2, which is rarely the case with Ethernet I/O modules. The read/write heads used can also be used in zone 2, the TN-R42TC-EX even in zone 1. Thanks to the multiprotocol capa-

bility of Turck's TBEN modules, they can be used in any industrial Ethernet network with Profinet, Ethernet/IP or Modbus TCP networks. B. Braun Medical uses OPC UA to communicate with the higher-level production system.

Precision with easy handling
The system works with the utmost precision: The three RFID tags in each coupling wheel ensure that they are read quickly and reliably. The IN TAG 200 tags used are specially designed for use in potentially explosive atmospheres. The TN-EM30WD-H1147-EX read/write head used is also approved for potentially explosive atmospheres up to ATEX zone 2. Its stainless steel and liquid crystal polymer housing meets protection class IP69K and withstands even the harshest cleaning processes.

Hose couplings and RFID verification
As soon as the hose is connected, the read/write head reads the information from the RFID tags in the coupling wheel. The recorded data is immediately compared with the tank information. This ensures that only the correctly identified components are

QUICK READ

The medical technology company B. Braun Medical AG manufactures medical disinfection and hygiene products as well as medicines for the treatment of chronic wounds at its Sempach site in Switzerland. This requires the use of highly precise and reliable mixing and filling processes. To meet the strict safety and quality requirements involved, an RFID system using Turck TBEN I/O modules verifies the correct connection of the hoses in ATEX zone 2. Three RFID tags are located in the coupling wheels of the hose connections for this purpose. The Turck solution impressed with its ATEX approvals, high degrees of protection and Ethernet multiprotocol.

As soon as the hose is connected, the RFID system verifies the connection

The Turck BL ident system reliably prevents incorrect coupling and thus ensures consistent product quality

The TBEN I/O block modules are installed under the cable trays in ATEX protective housings to save space

combined. If a faulty coupling is detected, the system blocks the flow. This automated verification process has several benefits: It firstly increases safety, and also improves efficiency, since the verification process is fast and reliable without the need for manual checks.

Optimized production reliability and reproducible quality

The module also enables the RFID tags to be written with specific data about the completed processes and the materials used. This data logging not only supports traceability in quality control, but also optimizes the documentation and compliance of production processes. For example, the last time a hose was cleaned can be stored on the RFID tag. If this period is exceeded, the system automatically stops the material flow to ensure the sterility and quality of the production process. This ensures that both production reliability and consistent product quality are guaranteed.

Conclusion

The development of the special solution was a highlight in the collaboration between B. Braun Medical and Turck's swiss sales partner, Bachofen. They were also able to fully meet the product requirements of the plant operator with the automation components from Turck and Banner Engineering. Besides the RFID components, Turck supplied numerous TBEN-L5-8IOL I/O block modules which connect the valves, among other things, as well as all Ethernet, power and many sensor-actuator cables.

"It's not easy to find products with zone 1 and 2 explosion protection that are also suitable for clean rooms," summarizes Thomas Mühlebach. "Bachofen understood what we needed and provided us during the evaluation with expert advice and the right products."

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The robot's ID is read as soon as it enters the detection range of the TN865-Q120

Open Sesame!

At the BASF plant in Antwerp, a four-legged inspection robot ensures the safety of the water treatment plant – and Turck's RFID solution ensures its reliable access to the charging station

BASF SE, headquartered in Ludwigshafen, operates in over 90 countries and supplies a wide range of industries with a broad portfolio ranging from chemicals, plastics and finishing products right through to plant protection products. The Antwerp plant, the largest chemical production site in Belgium and the second largest within the BASF Group worldwide, plays a central role in this. The facility benefits from its strategic location close to the port of Antwerp, which enables efficient raw material and production logistics as well as good connections to the European infrastructure.

To increase the safety and efficiency of the inspection processes in the extensive water treatment plant, BASF relies on the four-legged inspection robot "Spot" from Boston Dynamics. Equipped with a large number of sensors and cameras, the robot carries out inspection tasks autonomously, helping to optimize operating processes and ensure the highest safety standards.

The water treatment system is crucial for compliance with environmental regulations and ensuring trouble-free operation. Employees previously had to regularly check the systems in person and measure values at numerous checkpoints in order to avoid breaches of environmental regulations and identify the emergence of technical problems at an early stage. These time-consuming, repetitive tasks are now performed by the inspection robot: it carries out three inspection rounds a day at 150 checkpoints on eight different routes. Data such as the temperature of pumps and motors, oil levels or possible leaks are recorded accurately and reliably. With the help of artificial intelligence, the robot recognizes deviations from the target status and then automatically triggers an alarm. The robot dog works round the clock and returns to its station after each inspection round to recharge its battery.

Secure access control through RFID technology
To ensure that the inspection robot has unrestricted access to the charging area at all times and that unauthorized persons are reliably excluded, Tom Delbecque, project manager at BASF, set out to find a system that would automatically open the door of the

QUICK READ

In order to make inspection processes safer and more efficient, BASF relies on an autonomous inspection robot at its Antwerp site, which independently carries out important monitoring tasks. An RFID solution from Turck Multiprox ensures that the robot dog can access its "charging kennel" and at the same time protects this space from unauthorized access – with Turck's UHF RFID reader and the compact TBEN-S RFID interface.

»In this application, we were fortunately able to rely on the experience of the Turck Multiprox employees, who quickly came to the conclusion that an RFID solution would be ideal here.«

Tom Delbecque | BASF

station exclusively for the robot. The decision was made in favor of a smart RFID solution, which was developed in close cooperation with long-standing partner Turck Multiprox. Alternative approaches such as optical or radar-based systems proved to be inadequate, as they reacted to every movement and could therefore open the door unintentionally. "With this application, we were fortunately able to rely on the experience of the Turck Multiprox employees, who quickly came to the conclusion that an RFID solution would be ideal here," explains Tom Delbecque.

Turck's TN865-Q120 UHF RFID reader reliably detects the inspection robot with its range of up to 1.5 meters. The robot dog wears an RFID tag with a unique identifier that is read as soon as it enters the reader's detection range. A TBEN-S2 RFID interface with integrated ARGEE logic control continuously sends read requests to the reader in order to identify the robot at all times. The door opens automatically once this has been successfully completed. After the inspection robot has docked at the charging station, the TBEN-S2 module initiates the automatic closing of the door to protect the charging station from unauthorized access. The system experts from Turck Multiprox created this control logic directly in Turck's ARGEE programming environment on the TBEN-S2-2RFID interface.

The TBEN-S module programmed with Turck's ARGEE logic software continuously sends read requests for robot detection

Optimized security and efficiency through RFID technology

For BASF in Antwerp, the RFID-based access solution is an efficient way to automate inspection processes. Precise detection of the robot dog and automatic access control reliably protect the charging area from unauthorized access. The robust design of the components used and the high IP67 protection rating also ensure stable operation in the challenging industrial environment. Especially in times of high demand for skilled workers, this solution shows how companies can use intelligent automation to relieve employees of time-consuming, repetitive tasks without risking compromises in terms of operational safety or environmental protection.

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Once the robot has docked, the TBEN-S RFID interface automatically initiates the closing of the door to the charging area

Production Line in View

Chinese electric motor manufacturer ensures quality and traceability of stator production by using Turck's RFID system to track the workpiece carriers

With the rapid rise of electric vehicles in recent years, the automotive industry has changed considerably. Electric vehicles are increasingly replacing vehicles with

QUICK READ

A Chinese system integrator automates the quality assurance and trace-ability of its customer's motor stator production using RFID technology. The company chose Turck's BL ident RFID system, which can be seamless-ly integrated into the existing systems thanks to multi-protocol Ethernet. The solution enables flexible production on complex mixing lines, provides actual data for production management and allows comprehen-sive production monitoring. Turck's robust RFID technology guarantees reliable read processes even under harsh conditions, thus increasing the productivity and efficiency of the production line.

pure combustion engines and promise a more environmentally friendly, low-noise and low-maintenance driving experience.

A key component of these vehicles is the electric motor, consisting of a stator and a rotor. Assembling the stator requires maximum precision, especially with regard to the winding and connection of the cables. The materials and components used must be logged throughout the entire production process and be traceable at all times. This ensures that the correct materials are used during production.

A Chinese automobile manufacturer therefore commissioned its system integrator to implement a solution for recording this data for its motor stator production in order to ensure the quality of the motors already in the production stage and to also be able to document the use of the correct materials over the long term. An automated identification solution was

needed that would guarantee seamless monitoring and documentation of all production steps.

Digital workpiece carriers as the ideal solution
After carefully evaluating various technologies and making a comparison with optical identification using barcodes, the system integrator finally opted for an RFID solution to capture data from the entire production process. For this purpose, the workpiece carriers are fitted with RFID tags which record them digitally.

Digitized workpiece carriers with embedded RFID tags proved to be the ideal solution. They enable unique identification of the material on the carrier plate, as they can be read and written contactlessly and reliably, even in demanding environments. RFID tags can also store larger amounts of data and are more resistant to soiling than barcodes.

This ensures flexible production on complex mixing lines, as the information about each material and each stator is stored directly on the RFID tag of the respective workpiece carrier. This production data relieves the control logic of the information management system by enabling continuous and precise monitoring and adjustment of the production process.

Improved traceability and productivity
At the start of the assembly line, the relevant data is written to the RFID tag on the pallet. Turck's Q80 HF read/write head with its extended read distance is used for this. As soon as a stator is placed on the pallet, the system writes a range of different information, including the product ID, from the Enterprise Management System (EMS) to the RFID tag. As this is a closed circuit application in which the workpiece carriers are reused within the system, no long-term documentation of the RFID data is required. For efficient and reliable data acquisition, the system integrator opted for a TBEN-S RFID interface, which as a Turck multiprotocol device also supports Profinet and offers a 16 kByte data buffer per channel for fast read processes. The Profinet capability enables seamless integration and fast data transmission in the production environment. The module provides a mode in which it automatically reports data to the controller as soon as a tag is located in the detection range of the read/write head. This automatic data reporting function simplifies the programming of the PLC and reduces the load on the control system and the network in the process.

The Q80 HF read/write head with its extended read distance used in the system guarantees reliable operation of the RFID system, even if a tag is not located in the center of the read range with millimeter precision. For the choice of tag, the system integrator opted for the TW-R30-K2 FRAM chip, which supports up to 10 billion write operations. Its 2 kByte data memory is sufficient for the process at hand.

By implementing Turck's RFID system, the system integrator was able to ensure reliable tracking of the materials during stator assembly. The production data collected in this way also provides a solid basis for identifying weak points and error sources and thus for the continuous improvement of production processes.

Turck's compact TBEN-S2 RFID interface ensures fast and reliable data transmission

With 10 billion write operations, the TW-R30-K2 also guarantees very good readability in the long term

Turck's robust RFID technology in IP67 ensures that the carriers can be reliably read even under harsh environmental conditions, thus increasing the overall productivity of the production line and leading to a significant increase in operational efficiency.

"By using Turck's RFID products, we have achieved reliable material traceability in the stator assembly process. This not only opens up the data flow in production, but also provides effective data support for production decisions," the system integrator sums up.

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Thanks to its large range, Turck's robust Q80 HF read/write head enables reliable RFID detection even if the position of the tags varies

Turck's sensor-based complete solution ensures smooth round-the-clock operation of the AGVs

Fit for Purpose

Proferro optimizes production and logistics efficiency as well as safety with automated guided vehicles – with round-the-clock control provided by a sensor-based complete solution from Turck

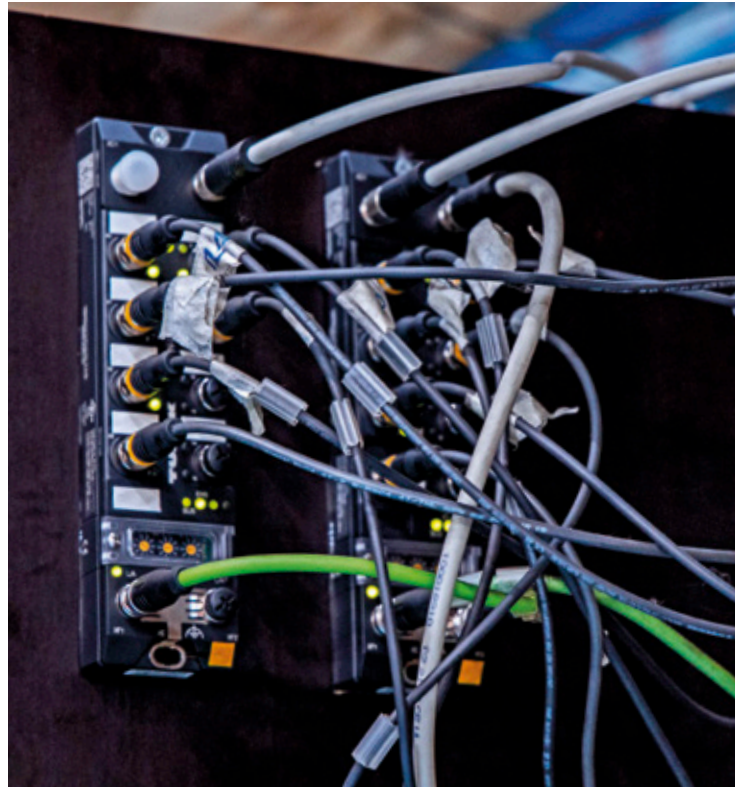**The compact TBEN-LL-16DXP block I/O modules combine the sensor data and transmit it in real time**

With over 80 years of experience, Proferro NV is one of the leading specialists in metal processing. Headquartered in Ypres, Belgium, the company manufactures custom castings and offers comprehensive services including cast iron production, machining, assembly and co-engineering for manufacturers of agricultural machinery or mining equipment, compressors, textile machinery and others. With its focus on quality and innovation, Proferro is a reliable, long-term cooperation partner and global partner for OEMs. An extensive machine park with more than 100 CNC-controlled machines and a dedicated team of around 600 employees are the basis for success. Smart automation is a central element of production.

In order to optimize safety and ergonomics for employees and make production and logistics processes more efficient, the company planned the introduction of a fleet of automated guided vehicles (AGVs). These were intended to replace the gas-powered forklift trucks previously in use. The forklift drivers often had to search for the right parts in the warehouse and do a lot of manual scanning, which led to frequent errors and delays. The AGVs now automate the supply and removal of cast parts for CNC machines and enable the maximum possible level of automation in order to eliminate time losses and errors caused by manual operation.

Robust solution for dusty environments
One challenge was the reliable control of the fleet, especially in the dusty production environment of a metal processing company, which requires a particularly robust solution. Reliable sensor technology is just as important as a robust system for recording, saving and transferring data to higher-level systems.

"Our aim was an automated logistics solution that would enable just-in-time delivery of parts to the machines in the neighboring production plant," says Mathieu van Den Berghe, transformation manager at Proferro when describing the task. "A fully automated high-bay warehouse ensures that the required parts are already available at the pick-up points. However, the production itself was always a particularly challenging environment due to the dust and dirt present." A system for sensor-based data acquisition and wireless transmission would have to overcome these challenges and ensure the smooth operation of automated guided vehicles over the long term.

As an RFID system with vision cameras proved to be too expensive due to the large number of parts, Turck proposed an integrated solution with ultrasonic and optical sensors as well as robust I/O modules, switches and an IIoT gateway: "The Turck Multiprox team quickly made it clear to us that sensors alone would not be enough. Although they can reliably detect signals, an overall solution is required for correct data transmission to the target software for AGV control," explains van Den Berghe.

The proposed overall solution stood out on account of its simplicity and robustness. Retroreflective sensors, ultrasonic retroreflective sensors with a switching output and retroreflective laser sensors with adjustable background suppression form the basis. The installation of ultrasonic sensors under the shelves proved to

QUICK READ

As one of the leading specialists for high-precision metal castings, Proferro supplies OEM manufacturers worldwide in various market segments, such as agricultural machinery, earth moving equipment, compressors, textile machinery or mechanical engineering in general. To optimize ergonomics and safety for employees and make production and logistics processes more efficient, the Belgian company has introduced a fleet of automated guided vehicles (AGVs). Turck Multiprox developed a sensor-based complete solution for autonomous and reliable round-the-clock control of the AGVs.
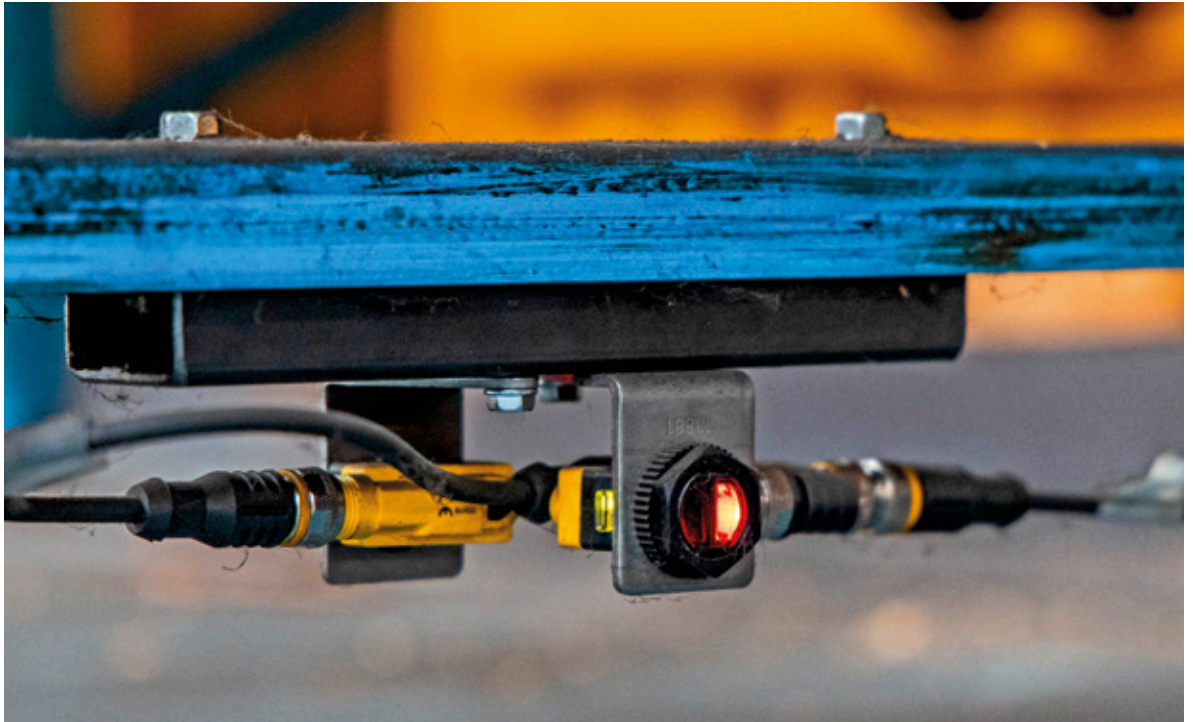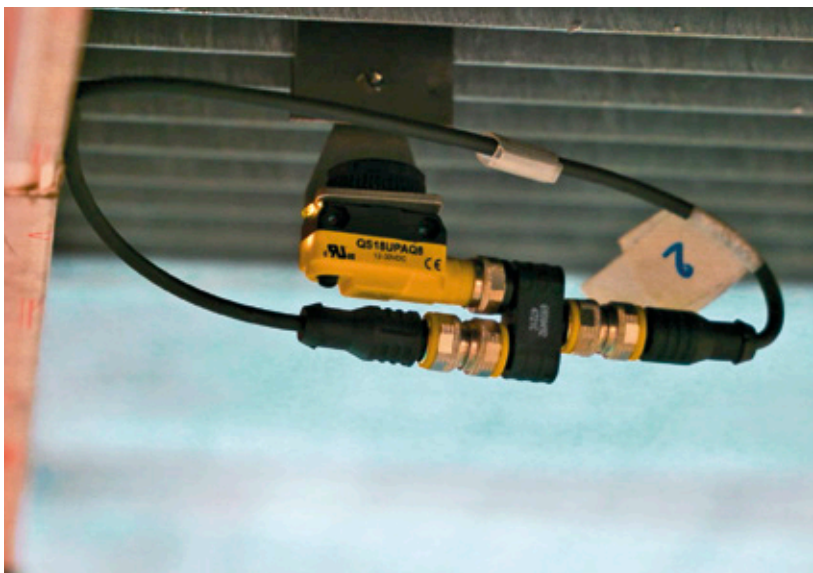
be particularly effective, as this prevented the accumu-lation of dust deposits. Light barriers and lasers were also used to detect pallets on the shelf.

Real-time transmission and flexibility thanks to multiprotocol

The sensors reliably detect the presence of a pallet and continuously transmit this information to the TBEN-LL-16DXP, the heart of the system. This compact block I/O module with 16 universal digital channels, which can be configured as inputs or outputs, bundles the sensor data and transmits it to the controller in real time. With its IP67 certification, it is protected against water and dust, allowing it to be installed in the field without the need for an additional control cabinet.

This makes it particularly suitable for the intended use in the demanding production environment of a metalworking application, where reliability and dura-bility are crucial.

Another benefit of the block I/O modules is the Turck multiprotocol concept. This enables the modules to automatically adapt to the Ethernet protocol spoken in the network, whether Ethernet/IP, Profinet or Modbus TCP, without any intervention by the user. In this way they can be used flexibly in different systems without the need for complex adaptions. This versatility not only simplifies integration into existing infrastructures, but also makes Turck's overall solution future-proof, as it is compatible with a wide range of systems.

Robust network infrastructure and efficient data transmission

Turck supplied TBEN-L5-SE-M2 managed Ethernet switches to implement a robust network infrastructure. The compact 10-port switches with a GBit high-speed backbone guarantee short cycle times and reliable operation at the highest data rates in the IIoT. The high-speed link-up function supports fast tool changes in under 150 ms for minimum cycle times. Thanks to the decentralized mounting option directly in the field, the switch also reduces the amount of wiring required.

In addition to the switches, the TX700Q was implemented as an IIoT gateway. It forms the interface between the sensors and the higher-level system and controls data transmission and processing as a PLC, which reduces the complexity of the overall system. The TX700Q is particularly suitable for less complex applications, as it enables simple integration into the existing infrastructure. With its three RJ45 Ethernet ports and a serial interface, it offers enough interfaces

To prevent dust from accumulating, the ultrasonic sensors are protected under the shelves

» Our experience to date has shown that Turck components offer perfect reliability and require no maintenance. This makes it an extremely cost-efficient and robust solution – exactly what we were looking for.«

Mathieu van Den Berghe | Proferro

for communication with different devices and systems. The gateway also supports the programming of logic functions using Codesys, which facilitates customization to specific application requirements and shortens implementation time.

The combination of the TBEN-L5-SE-M2 switches with the TX700Q IIoT gateway ensured reliable and efficient data transmission into the production environment. "Besides the hardware, Turck Multiprox also supplied a Codesys software solution to implement the integration with our WMS system. Our AGVs are controlled autonomously and reliably thanks to Turck's solution," van Den Berghe explains.

Autonomous AGV control round the clock
The new solution enables Proferro to now reliably detect whether pallets are present and transmit this data wirelessly to higher-level systems. This information forms the basis for the autonomous control of the AGVs and thus enables smooth operation round the clock.

"Two key elements were critical for the successful implementation of this solution," Mathieu van Den Berghe sums up. "The software to reduce complexity and enable easy monitoring, as well as the reliability of the sensors. Our experience to date has shown that Turck components offer perfect reliability and require no maintenance. This makes it an extremely cost-efficient and robust solution – exactly what we were looking for."

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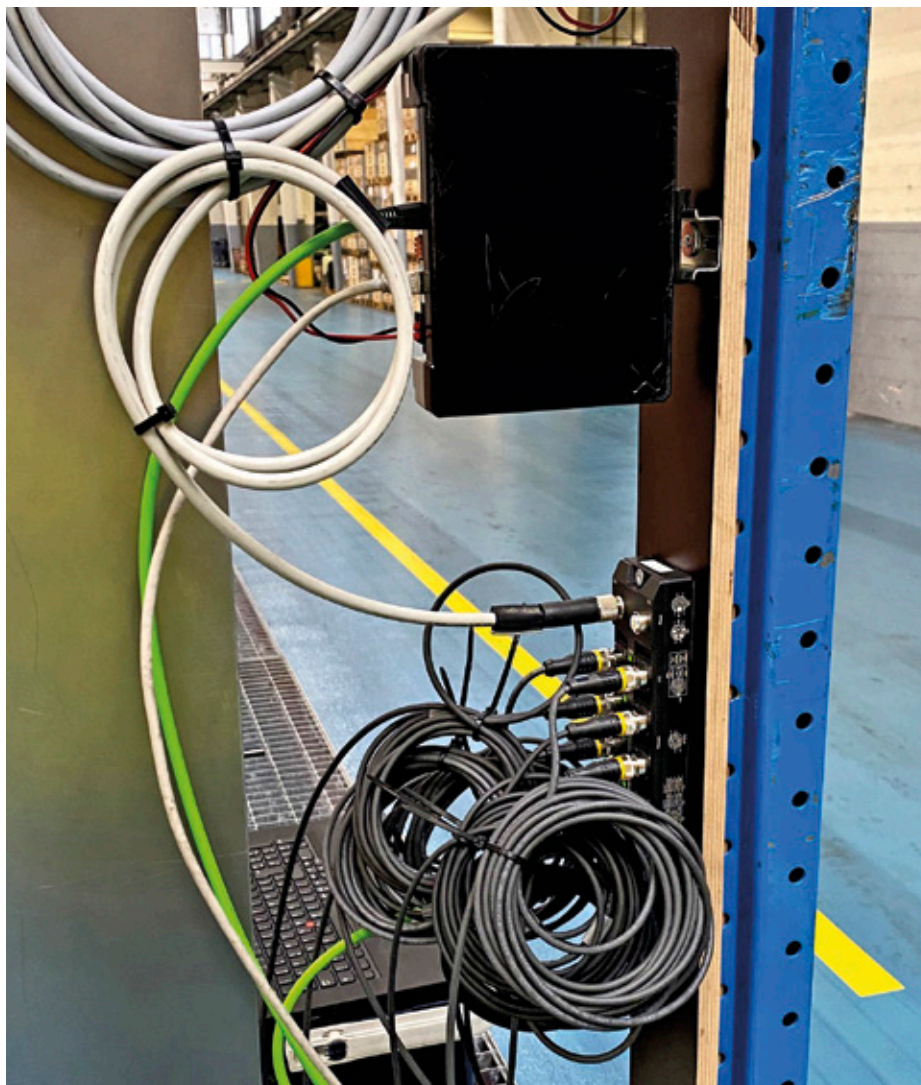
The TX7000Q IIoT gateway not only acts as an interface between the sensors and the higher-level system, but also as a PLC

Safety Service

Turck's interface devices ensure reliable isolation of the Ex signals in Portugal's first hydrogen filling station, and the safety controller from Banner ensures the safety of the overall system

The first hydrogen filling station in Portugal is operated by the municipality of Cascais in the Lisbon region, to refuel its hydrogen buses. This commitment is no coincidence, as two of the largest manufacturers of hydrogen-powered buses, CaetanoBus and Toyota, produce their hydrogen buses in Portugal.

These buses will be refueled for the first time at a mobile hydrogen filling station operated by PRF Gas Solutions. The company has specialized for thirty years

in systems for the distribution, compression, storage, refueling and transport of natural gas – and also hydrogen since 2021. The tender for the first hydrogen filling station reached PRF in the middle of the Covid-19 pandemic. Supply chains were under particular strain at that time and as a result replenishment and delivery times for many industrial goods were extended. PRF ordered hydrogen compressors, valves, pipes and other components in advance in order to be able to manufac-

The control cabinets house the hydrogen filling station's control and communication technology

QUICK READ

PRF Hydrogen Solutions implemented the first hydrogen filling station for refueling H2 buses for the Portuguese municipality of Cascais in record time – despite difficult conditions due to supply chain problems caused by the pandemic. The system has a modular design and can therefore be transported at any time if required. Bresimar Automação, Turck's representative in Portugal, supported PRF with the appropriate interface technology for safe processing of the Ex signals and safety controllers from Banner Engineering, which ensure the system safety of the H2 filling station.

ture a hydrogen filling station in the shortest possible time.

This foresight quickly paid off when the municipality of Cascais purchased two hydrogen buses and commissioned PRF to build the hydrogen filling station. Despite the foresighted procurement, there was only a little more than a month to implement the H2 filling station. "There really wasn't much time to design everything, calculate everything, lay out the mechanics and structure and everything else. We finally received the compressor we ordered two days before the deadline," says Hugo Antunes, project engineer for hydrogen filling stations at PRF, describing the tight schedule of the project.

The automation and control of hydrogen filling stations is considerably more complex and demanding than conventional filling stations for petrol and diesel fuels. During refueling, the vehicles communicate pressure values, temperatures and other data with

the refueling system via an infrared interface to ensure a smooth and safe refueling process. In the event of a malfunction or emergency, the system is immediately put into a safe state.

Technological support from Bresimar and Turck

PRF turned to its long-standing partner Bresimar Automação, Turck's representative in Portugal, for the electrical control and safety of the system. Bresimar and PRF have been working closely together for over 20 years. The long-standing partnership and the expertise of the employees at Bresimar enabled the automation experts to offer considerable support – even with the relatively new hydrogen filling station project. "The galvanic isolation barriers from Turck, which Bresimar supplied were particularly important for us," explains Hugo Antunes. "These barriers were crucial to ensure the connections between the non-ATEX and ATEX areas of the plant."

»By working with Bresimar and Turck, we were able to ensure that our systems not only work safely and efficiently, but are also future-proof.«

Hugo Antunes | PRF

Turck's interface devices are responsible for the isolation of the intrinsically safe signals and their pre-processing. For example, the IM33-22Ex-HI two-channel isolating transducers and the single-channel IM33-14EX-CDRI are used in the filling station. They and other variants process temperature and pressure signals and pass them on to the Siemens controller at the filling station. The XS26 safety controller from Turck's strategic partner Banner Engineering is responsible for controlling all safety-related processes.

Flexible thanks to modular design
PRF's hydrogen filling station is housed in a 20-foot container and can therefore be transported if necessary, as can the three high-pressure modules for

hydrogen compression. "This modular structure enabled us to work flexibly and efficiently," Hugo Antunes emphasizes. "We were able to complete the system on time because we already had many of the necessary components in stock."

The galvanic isolation barriers from Turck stood out on account of their competitive price and delivery time as well as their reliability. "Another major benefit was the excellent after-sales support we received from Bresimar," the project engineer adds.

Success and expansion
The hydrogen filling station in Cascais was an immediate success. It not only provided for the refueling of the local hydrogen buses but was also used by Toyota for
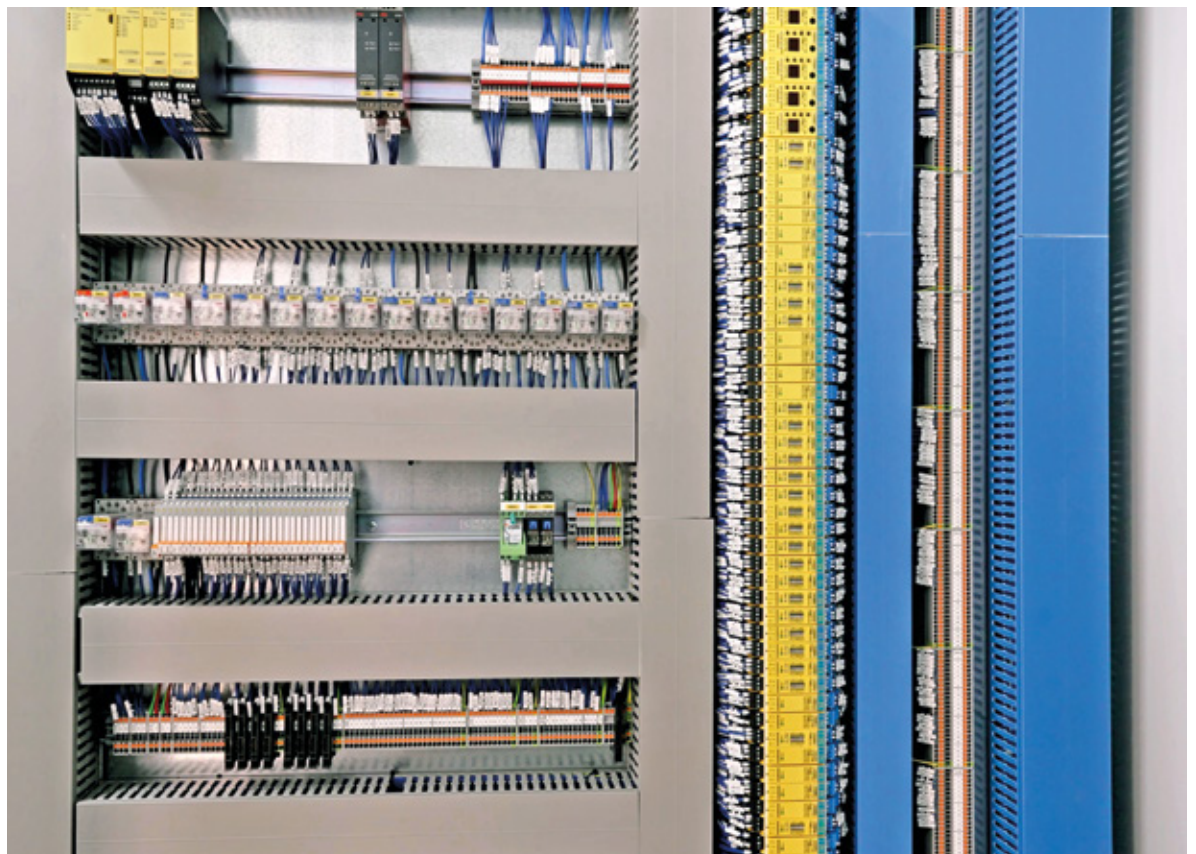
The Turck interface technology (on the right in yellow) isolates Ex signals, amplifies them and supplies the connected devices with the permissible voltage

The first hydrogen filling station in Portugal was built by the municipality of Cascais to refuel its hydrogen buses

the first time to refuel its hydrogen buses and cars produced in Portugal. "We have refueled more than 26 tons of hydrogen so far and carried out over 2,000 refuelings without any failures," reports Antunes.

The success of this first filling station led to the municipality of Cascais issuing a tender for a larger, permanently installed hydrogen filling station, which PRF also won. The new station will include four compressors and local hydrogen production with a capacity of one megawatt through electrolysis. "This plant will be one of the largest in Europe and will supply completely green hydrogen, provided the power supply comes from renewable energies," the project manager explains.

Conclusion
The project shows how forward-looking planning, modular construction and the use of reliable technology partners such as Bresimar and Turck can create innovative and sustainable infrastructures that make an important contribution to sustainable mobility in Europe. "We are very proud of what we have achieved and look forward to the upcoming projects with excitement," project manager Hugo Antunes sums up. "By working with Bresimar and Turck, we were able to ensure that our systems not only work safely and efficiently but are also future-proof."

The Banner SC26 safety controllers process all safety-related signals

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