Issue 02
2013

more@TURCK

The Magazine for Customers of the Turck Group

Targeted

Jürgen Grabow: "We will open up new markets with dedicated sector management."

Protected

RFID technology from Turck identifies micro gas capsules to the dust Ex zone

Renewed

Turck's HMI/PLC VT250 brings state-of-the-art technology to old lathes

Unmatched Mid Range Sensing

New ultrasonic sensor series reduces the number of variants for sensing distances up to 300 centimeters

On Our Way

After the invention of the steam engine, the mass production of electrical energy and the digital revolution, the fourth industrial revolution is to make the vision of the smart factory, or rather the intelligent factory, reality. The required automation technology must necessarily become more intelligent, communicative and "stand-alone" as most of the products are today.

It will be a long time until intelligent factories are able to integrate customers and business partners into their value-added processes. On our way there, we must further develop our solutions as you develop your production processes. There is no doubt that this needs to happen in close cooperation between us of course. In the automotive industry for example, there are already first steps. Suppliers make their components identifiable with an RFID tag which is then further used in the production process of the car manufacturer. In order to implement this, Turck has intensively further developed the RFID-UHF portfolio in the last two years.

The introduction of Ethernet technology in all our fieldbus components is a further milestone in the expansion of our portfolio. In combination with the platform strategy, Turck is the only provider that offers you as a user the possibility to operate a wide variety of Ethernet fieldbuses with the same hardware – fully automated and without operator intervention. These are just two examples that show how customer needs and market trends influence our product development for innovative and challenging system solutions.

With its huge product variety, Turck is the only manufacturer of automation components that can offer you a consistent and concerted automation solution from the sensor to the HMI. In this way, we are always at your side to provide the optimum solution to your application. And if the standard is no longer sufficient, we develop customer-specific solutions.

With our product portfolio that we continually develop, we want to pave the way for Smart Factory. We will show how we do this in the following pages, but also on the SPS IPC Drives in Nuremberg at our booth **351 in Hall 7**. We are looking forward to welcome you!

Yours sincerely,

Oliver Merget, Vice President Business Unit Automation Systems

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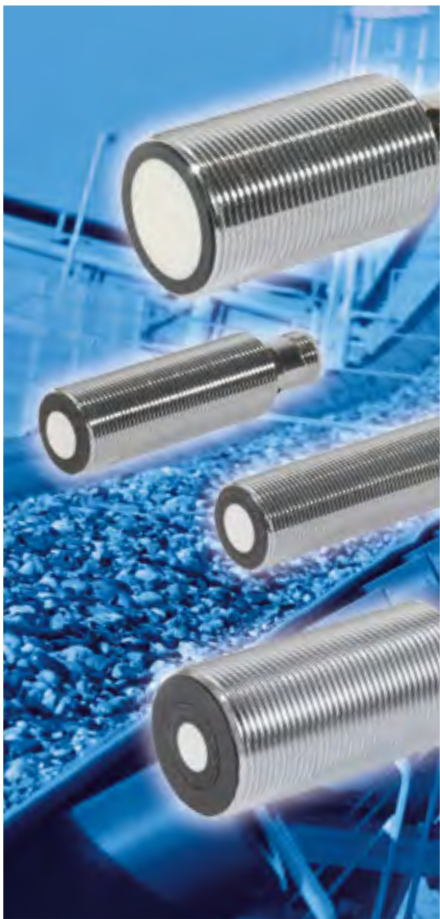

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SERVICE

The new generation of Turck's TBEN/TBDP block I/O-modules combine the ruggedness of the predecessor models with many new features. **Page 16**

The Swedish Purac Puregas has improved the service opportunities of their modular biogas plants significantly with Turck's I/O system excom. **Page 30**

The iron foundry Friedrich Wilhelms-Hütte uses efficient infrared measurement instead of expensive pyrometer measurement. **Page 34**

Turck Expects 5 % Increase

▶ Turck is expecting an increase in turnover of approximately 5 percent for the financial year 2013. As Christian Wolf, Turck's Managing Director said at a press conference in Düsseldorf, the company expects a consolidated group turnover of **approximately 450 million euros** at the end of the year. The number of employees at all 27 locations of the Turck Group increased by 150 to more than 3,350 people. In Germany, Turck currently employs at its four locations in Mülheim an der Ruhr, Halver, Beierfeld and Detmold 1,670 people, including 86 trainees. In order to achieve sustainable growth, Turck has invested heavily in the last few years. The costs for infrastructure projects – especially new buildings and IT-systems for process optimization will amount to just under 60 million euros between 2012 and 2016. "In addition to the investment in infrastructure, our focus was and is in the continuous expansion of staff and product development, as well as in sales and service. Only with innovation and customer-oriented structures can we keep and really fulfill our promise to our customers around the world as a holistic automation partner", says Wolf.

QR24 Nominated for Award

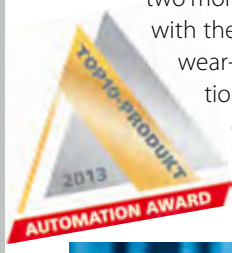
▶ A jury of experts has nominated Turck's non-contact inductive encoder RI360P-QR24 for the Top10-list of the most innovative new products 2013. The "**Automation Award**" is presented annually by the journal elektro Automation at the SPS IPC Drives show in Nuremberg. During the fair, visitors can vote for their favorite.

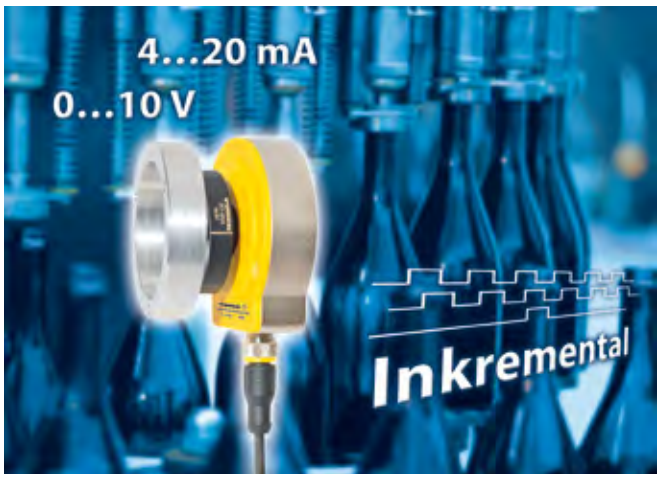
High Performance Ultrasonic Sensors

▶ The new **RU-U ultrasonic sensor series** from Turck enables the user to cover large sensing ranges with fewer sensor variants. The Turck ultrasonic sensors in M18 and M30 housing styles thus effectively reduce the range of variants required for stock. This is made possible by the short blind zones of the sensors, which offer long sensing ranges at the same time – for example with a 40 cm range the blind zone is only 2.5 cm. In order to offer the right sensor for every application Turck has increased the versatility of the individual models: Thus the simple compact version of the RU40 and RU100 modules enables the user to set diffuse mode and opposed mode operation as well as NC and NO switching outputs with a teach adapter. The standard sensor versions also enable the setting of switch windows and two separate switching points, either by a teach adapter or via a teach button directly on the sensor. The high-end versions can be operated as a switch or as an analog sensor. more on page 8 ▶

QR24 Contactless Inductive Encoders

▶ The contactless inductive encoder series **RI360P-QR24** has been extended with two more output signal variants: one version with an incremental output and another with the conventional 0-10 V or 4-20 mA output. This makes these high resolution, wear-free and magnetic field resistant encoders available for a number of additional applications. As with other QR24 models, the sensor and the positioning element of the encoder are fully encapsulated and designed as two independent and fully sealed units that can withstand vibration or shocks on the shaft. Wear-intensive ball bearings or seals, which break down, leading to machine downtimes or long maintenance times are not required. The RI360P-QR24 has the edge over both optical and magnetic encoders. Thanks to its intelligent mounting concept using adapter rings, the permanently sealed IP69K encoders can be fitted on all standard shafts with diameters up to 20 millimeters.





New Block I/O Generation

▶ Turck has developed a new block I/O generation with an extended operating temperature from -40 to +70 °C. The **TBEN** (Ethernet) and **TBDP** (Profibus DP) module series can thus also be used in and applications in which virtually all other I/O modules would fail. All modules of the new generation separate the I/O channels into two electrically isolated potential groups "switchable I/O" and "non-switchable I/O". This enables the safe disconnection of individual plant sections allowing the safety disconnection of individual plant sections via emergency-stop circuits, even if the flexible 16DXP-versions are used. Like their predecessors, the TBEN block I/Os are designed as multiprotocol devices that can be run in Profinet, Ethernet/IP and Modbus TCP networks thanks to their automatic protocol detection function. In Profinet and Ethernet/IP networks the modules also now support bus redundancy (MRP and DLR) as well as the fast startup (FSU and QC). The digital outputs of both device series have a switch output current of 2 A. This reduces the stock needed to support different output currents. All devices also support standard grounding concepts without any extensive modification required to the I/O module. more on page 16 ▶

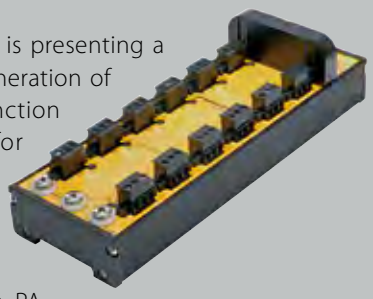
Communication-Enabled Temperature Sensors

▶ Turck is extending its range of **TTM** temperature transmitters with new models in a compact plastic or stainless steel housing, with an output that can be individually set by the customer. In addition to an analog output (4-20 mA) in a 2-wire circuit, the new sensors offer a switching output as well as the possibility to communicate via IO-Link. Users requiring temperature sensors with different parameters can thus effectively reduce the number of device variants that need to be kept in stock. This is also made simpler thanks to the modular concept: As well as the temperature sensor with a fixed probe, a variant is also available which can be fitted with a probe in the required mounting form via the M12 interface. Like other sensors of the TTM series, the new devices with their integrated electronics are similar in size to are a M12 connector.

Photoelectric Sensors

▶ Turck is offering the new **QM26** and **QMH26** photoelectric sensors specially for the requirements of the food and pharmaceutical industry. The sensors come from Banner Engineering – Turck's partner for optical sensors. With their IP69K stainless steel housings, the devices are resistant to chemical cleaning agents and high cleaning pressures. Both variants are made with FDA compliant materials. Furthermore, the QMH26 comes in a hygienic design, and can therefore be used wherever the sensor can come into direct contact with food. Its smooth, self-drying surface does not have any gaps that would be difficult to clean or sanitize.

Junction Boxes with Diagnostics



▶ Turck is presenting a new generation of IP20 junction boxes for Foundation Fieldbus and Profibus PA networks. The fieldbus junction boxes of the **JRBS** series can be used in the safe area and in the Ex area in zones 1, 2, 21 and 22. The short-circuit current limitation on the spur lines also provides greater safety. This prevents the failure of the entire segment. The integrated LEDs are used for local diagnostics at the device. They offer the user fast and reliable indication of short-circuits, voltage drop or communication failure. The JRBS-40DC modules will be available with 4, 6, 8, 10 and 12 channels in the second quarter 2014.

Pressure Sensors on Demand

▶ In spite of the enormous range of pressure sensors available, Turck is promising its customers with immediate delivery of **PS500** sensors within a few working days. The customer can individually configure the right pressure sensor for the application using three electronic variants – with two switching outputs, a switching and voltage output, or a switching and current output – for twelve different relative pressure ranges up to 600 bar with twelve different process connection threads. In order to offer customers optimum flexibility, Turck has given the devices a modular design, thus enabling final assembly in the shortest possible time. Each device of the PS500 series can be made ready for shipment within a maximum of 48 hours.

Robust Photoelectric Sensors

▶ Turck is presenting a new generation of **S18** photoelectric sensors from Banner Engineering, its optoelectronics partner. The robust IP67 sensors can withstand ambient temperatures from -40 to +70 °C and are also suitable for demanding applications. Thanks to an improved signal processor, all S18-2 devices achieve considerably higher sensing ranges than their predecessors. The optimized crosstalk avoidance feature improves the use of several optical sensors in close proximity to each other. The S18-2 sensors are also optimally protected from interference factors such as ambient light or electromagnetic waves.

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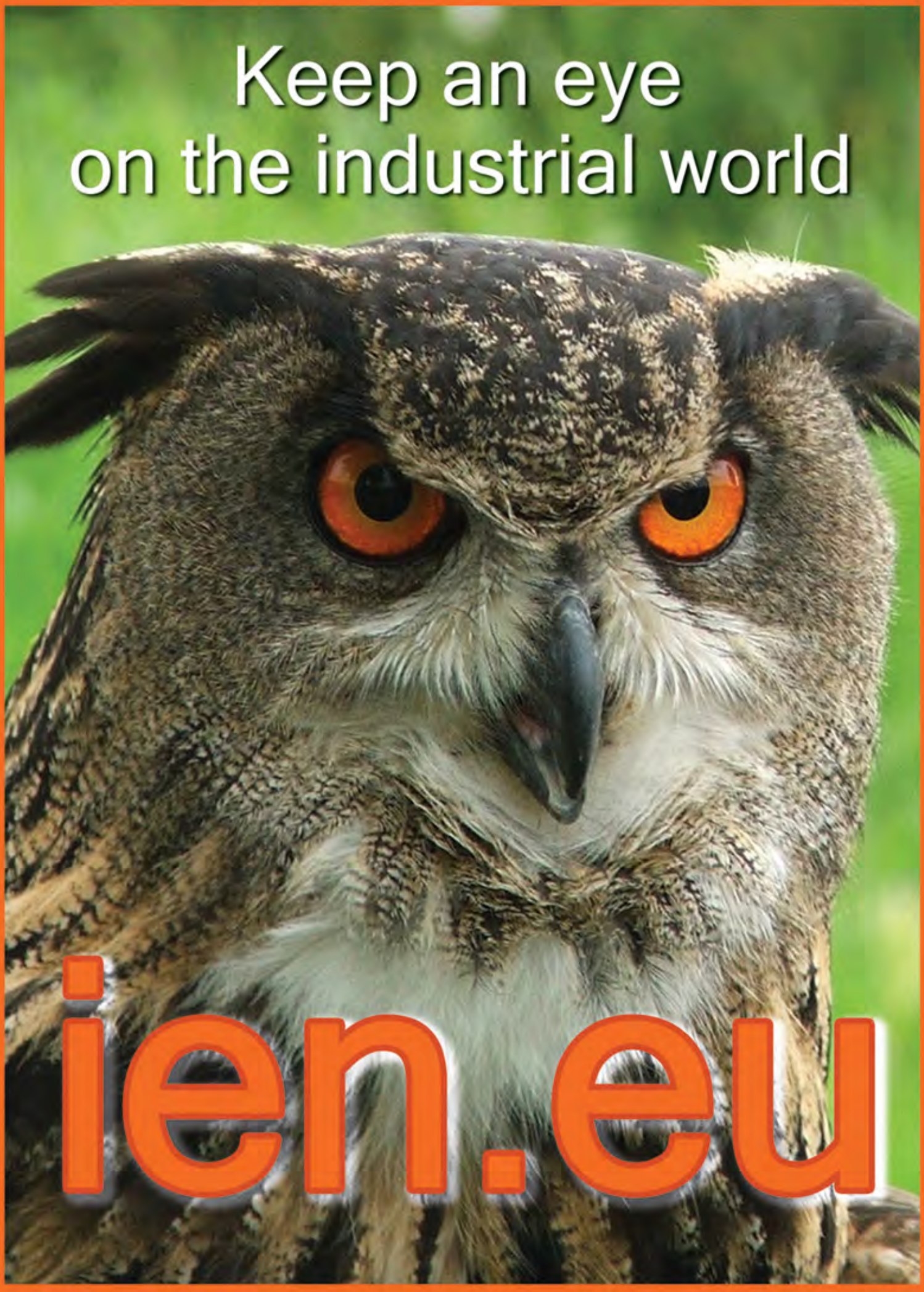
Compact UHF RFID Read/Write Head

▶ Turck has added the new compact **TN865-Q120** UHF read/write head to its BL ident RFID system. In its space saving IP67 aluminum housing, the Q120 combines a circular polarized antenna and the electronics in one. The Q120 is smaller than a 1 liter milk carton and is particularly suitable for applications with restricted mounting space – such as in automated materials handling systems. The Q120 can be used for the close and medium UHF ranges. The read/write head completes the BL ident RFID system in the UHF frequency band. This makes BL ident even more attractive for UHF applications in which different ranges are required – especially due to the excellent price performance ratio of the Q120. Like all Turck RFID read/write heads, the Q120 can be operated on all RFID modules of the Turck fieldbus systems – if necessary, also in parallel with HF components if required. The UHF reader measures 130 x 120 x 60 mm and supports the ISO 18000-6C and EPCglobal Gen2 standards.

Flexibly Positioned Flow Sensors

▶ At this year's SPS IPC Drives fair Turck will be presenting flow sensors with a sensor unit that can be freely aligned. The new plug-in mounting concept of the **FCST** series enables the sensor unit to be aligned in the flow channel as required – irrespective of how the process connection is mounted. This simplifies the aligned fitting that is required for reliable and precise flow monitoring. Screw-in adapters in standard industrial thread sizes enable the user to mount the flow sensors on different pipe diameters. In spite of the fast screw-in mounting capability, the sensor adapter system can withstand process pressures of up to 100 bar. Another benefit of the FCST mounting concept is flow sensors with an integrated signal processor. Thanks to the flexibly oriented sensor unit, the LED display on these compact devices is always easy to read and the potentiometers for setting the switchpoint or the analog signal are always easy to reach. The IP67 sensors monitor flow speeds of up to 300 cm/s and are available in stainless steel or plastic housings with a switch or analog output. The portfolio also includes types with additional temperature monitoring (FTCST) as well as with a remote measuring probe.


Keep an eye
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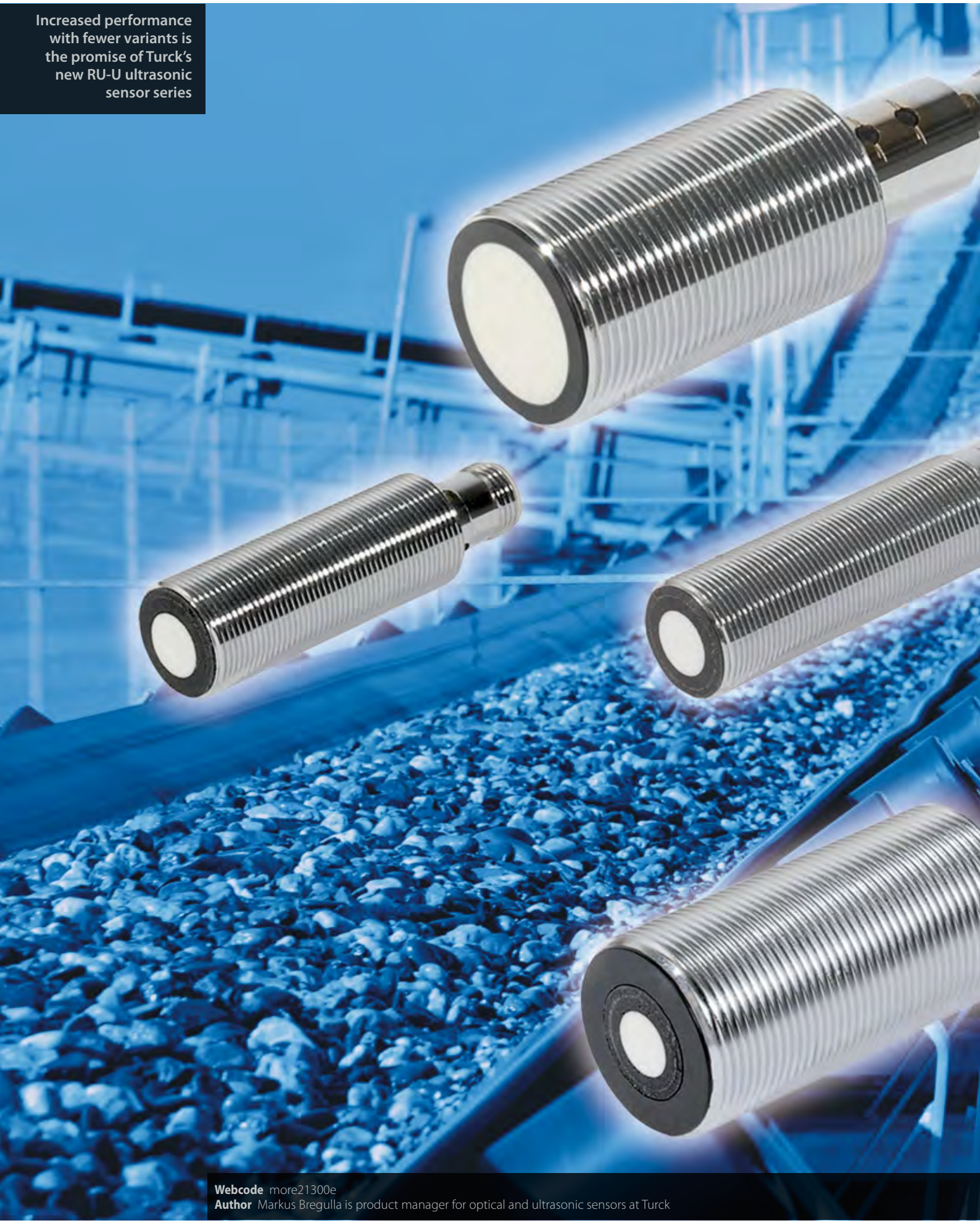
Increased performance with fewer variants is the promise of Turck's new RU-U ultrasonic sensor series



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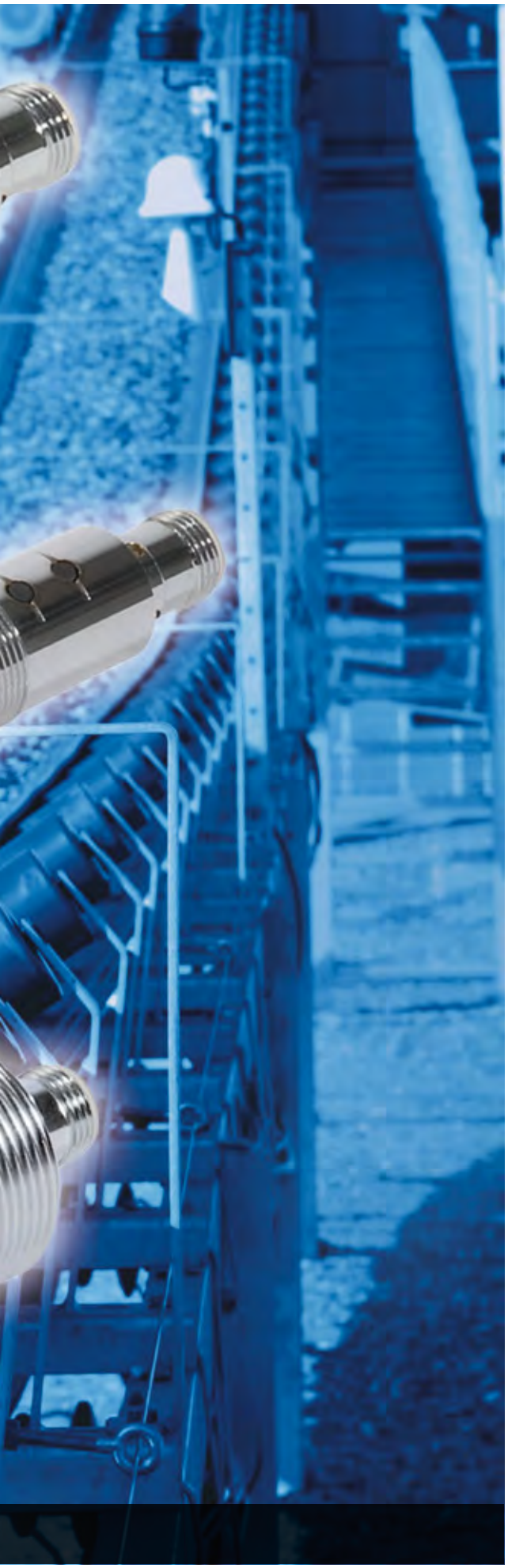
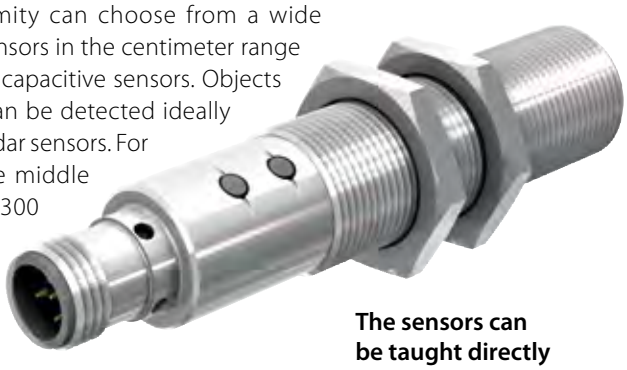
Author Markus Bregulla is product manager for optical and ultrasonic sensors at Turck



Unmatched Mid Range Sensing

New ultrasonic sensor series with short blind zones and large measuring ranges reduces the number of variants required for sensing distances up to 300 centimeters

Whoever wants to sense objects located in close proximity can choose from a wide variety of sensors in the centimeter range –such as inductive and capacitive sensors. Objects located further away can be detected ideally with photoelectric or radar sensors. For object detection in the middle distance range up to 300 centimeters, ultrasonic sensors are often the best choice. However, these have the drawback that they can often only serve a limited measuring range due to their large blind zones and limited distances – a clear disadvantage at least for those wishing to cover different sensing ranges in the mid distance zone. For these implementations, the user must have a number of different variants available.



The sensors can be taught directly on the sensor via pin 5 – via the teach cable, adapter or button, depending on the model

Another ideal application for ultrasonic sensors is in the detection of high gloss materials such as glass, liquids, or granulate. The use of ultrasonic sensors here is considerably more effective than photoelectric sensors, as they are insensitive to reflections.

Ultrasonic challenge

Sound is a mechanical wave that is propagated in solid material, gases or liquids. The speed of this propagation depends on the composition of the parameters for pressure, temperature and the ambient medium (air). Ultrasonic sensors measure the time of flight of their signal, the accuracy of the result depends on the speed

Quick read

Anyone wishing to sense objects in the mid distance range up to 300 centimeters previously had to keep a large number of variants in stock, as each one could only cover a limited measuring range. Turck now has the solution with its new RU-U ultrasonic sensor series: Three sensor lines with short blind zones and a long measuring ranges that can be taught via pin 5 can cover all requirements, regardless of whether analog or switching outputs are needed. The high-end version also offers parameterization and communication via IO-Link.

Operating principle

Ultrasonic sensors primarily operate using the time of flight measuring principle. The sensor emits a sonic pulse and receives the sound reflected back by objects. The time of flight between the emitted pulse and the received pulse enables ultrasonic sensors to be used not only for the discrete detection of objects, but also for measuring distances with an analog signal if required.

at which the sound is propagated. This means that factors that can be ignored with other technologies have an effect here. Air pressure and the composition of the ambient air in open space are normally constant, while the temperature may fluctuate therefore ultrasonic sensors compensate for the difference in time of flight at different temperatures by means of an integrated or external temperature measuring function.

Another special requirement is presented by the measuring principle: All ultrasonic sensors have a large blind zone directly in front of the sonic transducer. The size of this depends on the frequency at which each sensor swtiches between emitter and receiver. If an object is too near to the sensor, it continues to transmit while the signal being received is already being reflected by the object. The object is thus too near in order to detect it. It is the same with some conversation partners: If the answer comes too quickly, the sensor doesn't hear the reflected signal because it is still talking. Sensors with large sensing ranges work at low frequencies and have accordingly large blind zones. The aim of the manufacturer is to keep the blind zone as small as possible in order to cover a large operating range with one sensor.

Turck has made a major step towards this aim with its new RU-U ultrasonic sensor series. With the development of the new sensor technology, the Turck specialists made use of their many years of experience with ultrasonic sensors and placed particular importance on reducing the weaknesses present in previous models. The sensors are particularly robust and also operate with longer measuring ranges and shorter blind zones than the previous models. The new ultrasonic sensor series also offers devices that are highly flexible and easy to operate, with practical features such as the easy-teach function and IO-Link capability.

Short blind zone, large measuring ranges

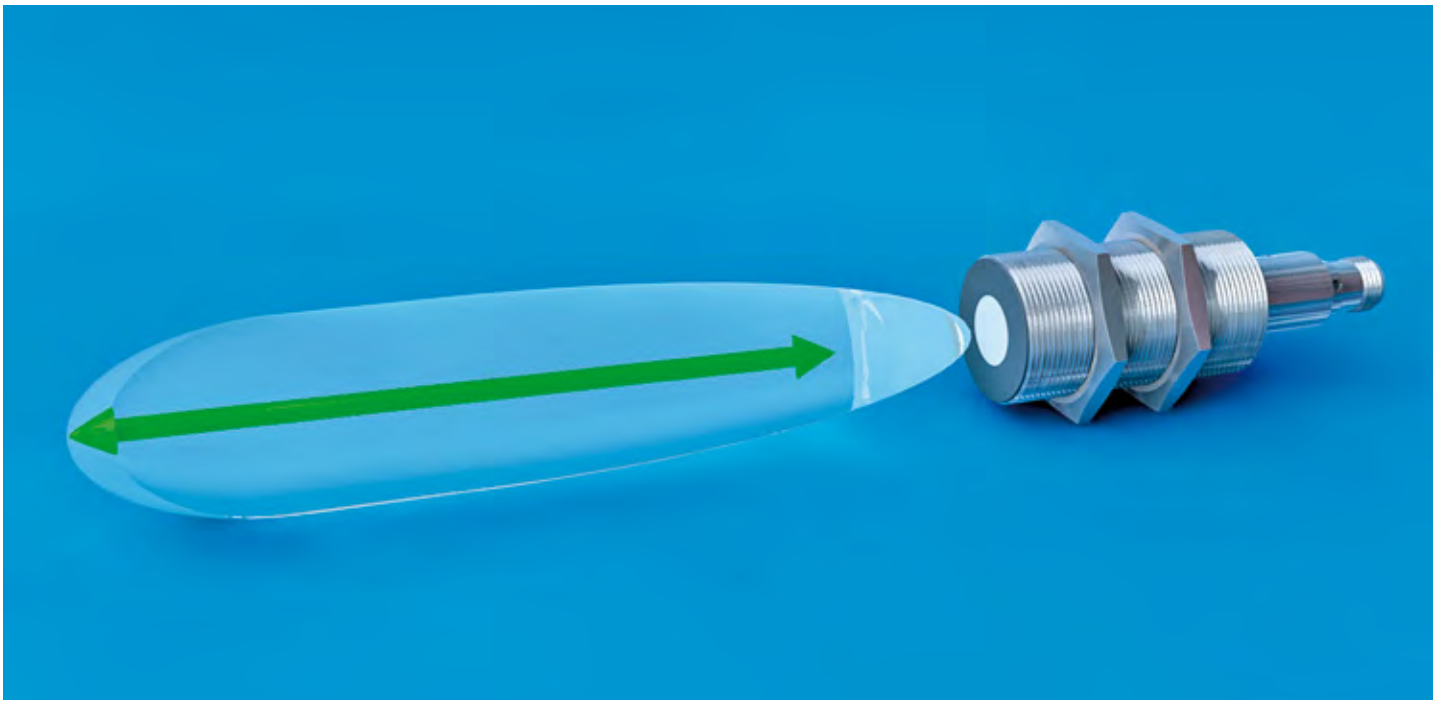
The extremely short blind zones enable objects to be detected that are close to the sensor. For example, the M18 version with a 40 centimeter range has a blind zone of only 2.5 centimeters. This increases flexibility in many mounting positions. The mounting depths – such as for level sensing applications – are less, as space does not have to be reserved for a large blind zone. Thanks to the shorter blind zones it was also possible for Turck to reduce the number of variants in the series. The newly developed sonic transducers offer particularly large measuring ranges over the entire sensor series: In the M18 model up to 130 centimeters, in the M30 version up to 300 centimeters.

The downward compatibility of the new ultrasonic sensors is their special feature: Every sensor of the series being phased out can be replaced directly with a model from the RU-U series. It is also possible to use the previous accessories.

Increased operating safety

Ultrasonic sensors are used in particularly harsh environments and therefore must be able to withstand a wide range of different environmental conditions

With their short blind zones and large measuring ranges the sensors effectively reduce the number of variants required in stock



such as dust, water, temperature changes or vibration. The RU-U series meets all these requirements. Their improved process safety is firstly due to their robust metal housing design: threaded sleeve and plug thread are designed as one piece. This eliminates any potential weak points that could cause damage in harsh environments and at low temperatures. The male thread on all new models runs over the entire length of the sensor so that customers can adjust the mounting position within the mounting bracket.

The smooth front flush sonic transducer membrane also contributes to greater process safety as it cannot accumulate dirt that may cause incorrect signals. The mechanical movement of the membrane even shakes off deposits and thus cleans itself. Particle deposits that can arise when the air humidity is high can likewise be simply wiped off completely without any residue remaining in the transition area between the transducer layer and the transducer ring.

The ultrasonic sensor offers robust and flexible mounting thanks to its throughout metal housing and integrated M12 connection

Easy-teach simplifies settings

The flexibility provided for mounting is also present in the operating concept since a teach-in setting is possible for all sensors via pin 5. Depending on the model, users can teach the sensors via pushbuttons directly on the sensor, with a teach adapter, or via a teach cable. The teach function enables the setting of individual switching or measuring range limits. The buttons have a clear pressure point and are embedded in the sensor housing so that the user cannot actuate them unintentionally. With the M18 series, the start of switch and measuring ranges can be set without any additional software. Alternative concepts use potentiometers, but the turn setting of these devices is often unreliable and imprecise.

Full flexibility with high end version

The high-end versions of the new ultrasonic sensor series also feature an IO-Link interface so that they can offer enhanced parameter and communication options. The widely used and free Pactware parameterization software enables some sensor parameters to be tuned precisely to the requirements of the particular application. For example, the ultrasonic sensors can be set as a pure emitter or receiver, so that two sensors can be installed to create an ultrasonic opposed mode sensor.

However, even more extensive setting options are provided, enabling for example the setting of a time lock, temperature compensation of the internal or an external temperature sensor, the setting of the analog output signal as a rising or falling characteristic or even as an additional switching output. If two independent switching outputs are required instead of the switching output and analog output, these can be set to PNP or NPN switching output types with N/C or N/O function.

If several devices are installed in close proximity, the user can synchronize the sensors in order to prevent any mutual interference. An alternative to this is multiplex operation in which the individual devices operate in sequence. Besides the parameter options provided, IO-Link provides an elegant communication route between sensor and master. It also enables the latest process value to be read out directly at any time if a switching or analog signal is not required.

The flexibility offered by IO-Link has enabled Turck to improve the maintainability of its ultrasonic sensors in many applications with specific requirements. The largely compatible connectors and pin assignments simplify the change for customers wishing to switch to the new ultrasonic sensors from Turck.

Three equipment lines

Turck addresses the different requirements of its customers with three product lines: The compact series is aimed at large market of single ultrasonic sensors in the M18 housing style with one switching output. As the output characteristics – diffuse mode or opposed mode, both with an N/O as well as an N/C switching output – can now be adjusted, two versions are enough to replace the previous multitude of types: A version with a 40 centimeter range and one with a 100 centimeter range are now available. The setting is carried out via the teach cable or an adapter.

Turck's sensors with a double switching output are the standard variant. Switching points, switching range limits and output functions can either be set via the teach cable/adapter or via teach buttons on the device. The switch window can be set as required within the sensing range. For this only switching output 1 is set and switching output 2 is linked by default with switching output 1. This enables up to three ranges to be detected and evaluated at the same time. The standard variants are available as 40 and 130 centimeter sensors in the housing styles M18, and as 300 centimeter sensors in the M30 housing style.

For particularly demanding applications, Turck has included the high-end variants in the series. With the parameter options via IO-Link, these offer total flexibility. These versions are available in the M18 housing style with a 40 and 130 sensing range, and as an M30 version with a range of 130 and 300 centimeters. ■

Jürgen Grabow aims to open up new markets with intensive vertical market management

"New Target Sectors Lined Up"

A&D chief editor Mathis Bayerdörfer spoke to Jürgen Grabow, vice president sales factory automation, about Turck's involvement in vertical market management

A&D: Turck is increasingly developing a vertical structure. What is the strategy behind this, Mr Grabow?

The existing vertical market management in the company is very successful – both in the automotive and in the food sector. In both markets we have now provided a wide range of applications with very adaptable solutions and with a very significant benefit to customers. Our message is therefore clear at this stage: We speak the customer's language and have a good knowledge of their market. Vertical market management at Turck has developed a holistic approach.

How is your road map going to continue?

We want to roll out vertical market management in other markets that we have already been serving intensively for a long time. We intend to bundle our activities and coordinate operations beyond the

individual sites. We have further developed our vertical market management concept specifically for this purpose using an integral and global approach. After all, the customer doesn't just expect us to accompany him through the entire portfolio but also all over the world; in terms of availability and logistics and in terms of commissioning or support.

Have you already appointed other vertical market managers?

You can't just stumble into new markets so we can't develop the concept too hastily. We have looked at the areas in which we can offer our customers a genuine value addition and now have a new target sector in our sights: the area of mobile machinery and utility vehicles. We have now also established vertical market management for this segment and were already able to record our first successes as well as develop application and solution examples. More vertical markets will certainly be added in the near future.

What role will partnerships with other companies along the value chain play?

As well as having our own expertise and the right products, a competent partner network is also needed to ensure success. However, it is also necessary to stay flexible, since the collaboration required can vary quite a lot from case to case. Normally the application is approached through the machine builder, however, sometimes the approach is through system integrators or end users. There is no standard route.

Turck further developed its resonator linear position sensor jointly with a machine builder from the plastics processing industry. Is there a basis here for the next vertical market management?

The linear position sensor is not specifically designed for particular sectors: Injection molding was just one of many applications that were addressed. Arburg is a company that had more demanding requirements, and that is why we ran an optimization loop with them. First, in order to improve the product in terms of speed for the specific application, and second in order to add an interface that was required. Although we have optimized a product for the sector, we will not be setting up a separate vertical market management for the plastics industry. The entire market is meant to benefit from our application successes and the increased customer benefits.

Turck has attracted a great deal of attention with its resonant circuit measuring principle. What importance do you now give these position and angle sensors in the portfolio?

The resonator principle gives us a technology that can eliminate many of the problems that customers have; particularly with regard to wear or mechanical problems that often occur with the standard sensors and encoders available on the market. The alternative special heavy duty components is much more expensive. For us, the adaption of the measuring principle of linear position sensors to contactless angle measurement was just a logical step. We also want to further expand these sectors and invest a lot of resources. We are finding here that many of our concepts and ideas for new products or improvements are in line with the requirements of users.

How does the competition view this value addition? Are you afraid of plagiarism and severe competition?

The new sensors have caused a stir. Unlike the previous approaches, the resonant circuit measuring principle does not involve any disadvantages for the user. Similar products will definitely appear on the market in the long term. However, we are not afraid of someone getting the better of us. If competitors take up this technology, this will only be another indication of the fact that it offers great opportunities and potential.

What future developments are in the pipeline for sensors? And what will Industry 4.0 mean for tomorrow's sensors?

Industry 4.0 stands for the fourth industrial revolution. I think it is very doubtful if this will be initiated by politicians or interest groups. A very precise look at what is behind it is therefore needed. A great deal is possible since microprocessors virtually cost nothing these days. However, intelligence alone will bring the user very little. The sensor of the future must offer a genuine value addition – precisely like our position and angle sensors. ■

> "We have looked at the areas in which we can offer our customers a genuine value addition and now have a new target sector in our sights: the area of mobile machinery and utility vehicles."
>
> **Jürgen Grabow**

> "As well as having our own expertise and the right products, a competent partner network is also needed for success."
>
> **Jürgen Grabow**

Author
Mathis Bayerdörfer is chief editor of the technical journal A&D
Web www.aud24.net
Webcode more21330e

When Standard Doesn't Work

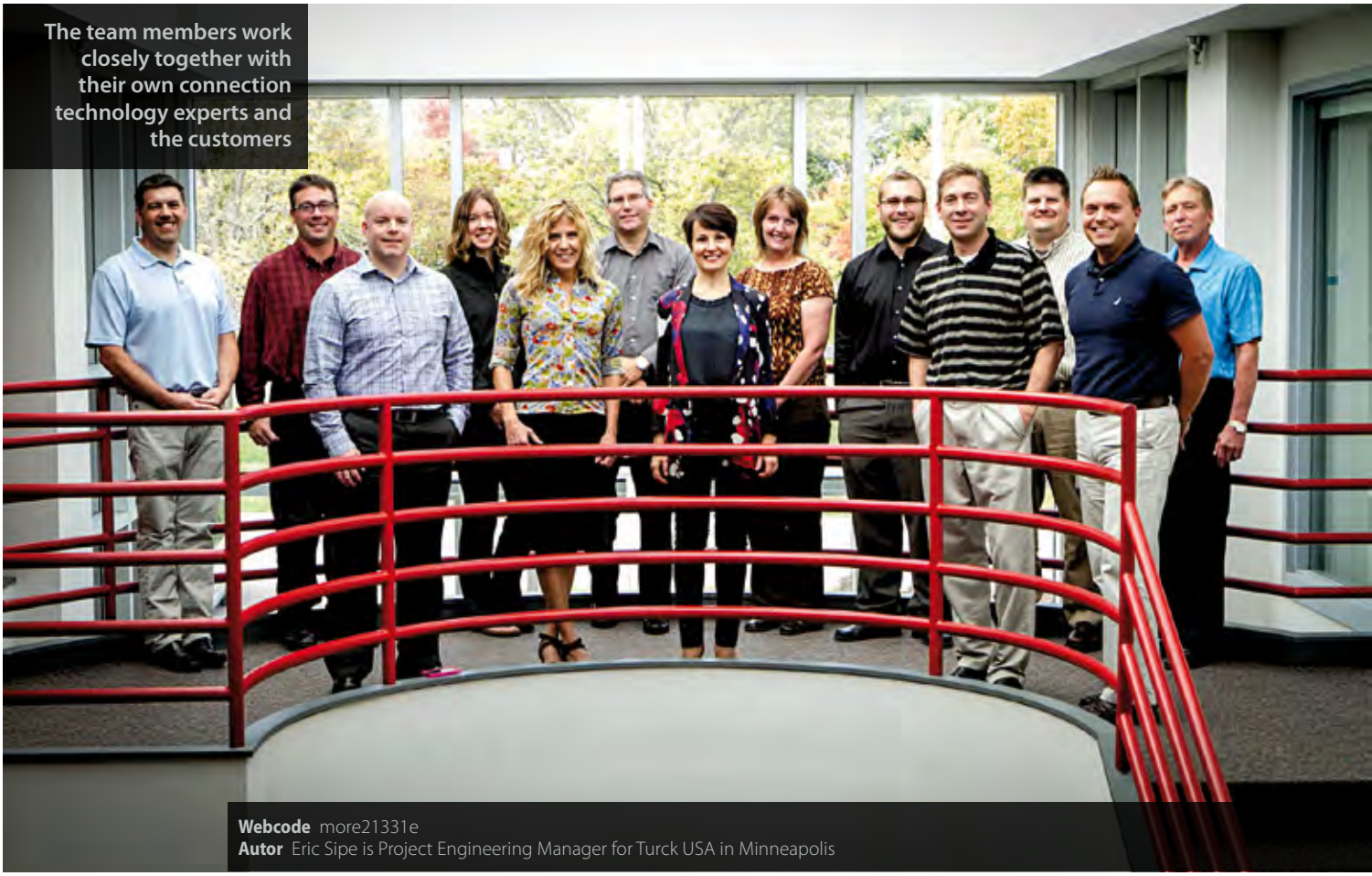
The Custom Connectivity Team of Turck USA provides custom made solutions tailored specifically for north american customer's needs

The automation world is driven by productivity. It focuses on completing a task as quickly and efficiently as possible. Automation systems are continuously being refined to be more productive and to run longer with less maintenance. With this focus on efficiency and longevity, choosing the right connectivity solution to implement into an application is more important than ever.

For many applications, Turck's standard offering can fulfill their needs without issue. However, all applications are not created equal and many applications have requirements that cannot be met by off-the-shelf product. For these applications, Turck's Custom Connectivity Team steps in to provide custom made solutions tailored specifically for the customer's needs. When a customer has a need for a product that isn't offered in the Turck catalog, a call is made to the custom connectivity team which sets a series of events into motion.

First, the Connectivity Business Development Manager and the custom connectivity team will meet together to see if the request is feasible and if a solution similar to the request already exists. If it is determined feasible, the team then gives the customer an offer customized to what they are looking for; which can range from 3D drawings to a lead time proposal and cost.

Once the offer has been proposed and accepted, Turck's research and development and manufacturing engineering teams become involved to help put together the resources needed and get the production set up. Once complete, the specifics are handed off to a product manager to make sure raw materials are ordered and lead-times are met to move at the speed of the customer's application. While the following success stories only represent a small amount of the capabilities of the custom connectivity team, they serve as a good example at what can be done.



The team members work closely together with their own connection technology experts and the customers

Webcode more21331e
Autor Eric Sipe is Project Engineering Manager for Turck USA in Minneapolis

Custom made field-wireable cable systems ensure correct connection also overseas

Anyone can connect these color-coded cables correctly to this junction box

Realized solutions

Assembly: Turck was successful in providing a value added assembly solution by being willing to install connectors from other manufacturers to meet the customer's needs. Turck worked directly with the customer throughout the design phase to ensure the customer's needs were met and even provided quick-turn prototypes that allowed the customer to test the designs in the field before final production.

Welding equipment: When a plastic equipment company needing a cordset with a custom pin arrangement approached Turck, the custom connectivity team stepped in to develop an ideal solution. Working with the customer throughout the design phase, Turck modified a traditional M12 cordset and customized the pins to meet the connection demands on the customers welding equipment. Turck was able to produce the highly customized solution providing the customer with the exact cordset they needed.

Agricultural Equipment: When companies have equipment and parts traveling all over the world it is of the utmost importance to ensure everything will be installed correctly and that maintenance is kept to a minimum. Turck helped a customer create a harness system that not only ensures proper installation with custom labeling but also provides easier maintenance during the products life cycle. The success of the initial harness also spun off into multiple other designs to be used in numerous other applications in the agricultural market.

Motors: While Turck's line of power cables (powerfast) has been available for years, Turck was able to adapt the line to create a new product for a customer. Turck expanded the existing powerfast line to include a disconnect switch into the product line giving the customer the ability to disconnect power, lock out and tag out a motor for maintenance or replacement while also eliminating the need to hardwire the system. The customer worked with the custom connectivity team and Turck was able to respond quickly and implement multiple changes throughout the design process and deliver a solution that met the customers' every need. Today, the powerfast disconnect switch is considered part of the complete powerfast family.

The power button is now part of the standard Powerfast series

Chemical Handling: To help overcome language barrier issues for a company that needed junction boxes and cordsets installed in non-English speaking countries, Turck helped develop a custom wiring solution that relied on visual identification rather than language understanding. Turck devised a solution involving colored cordsets matching colors printed on the j-box labels to easier signify the correct spot ensuring a quick and correct installation.

Conclusion

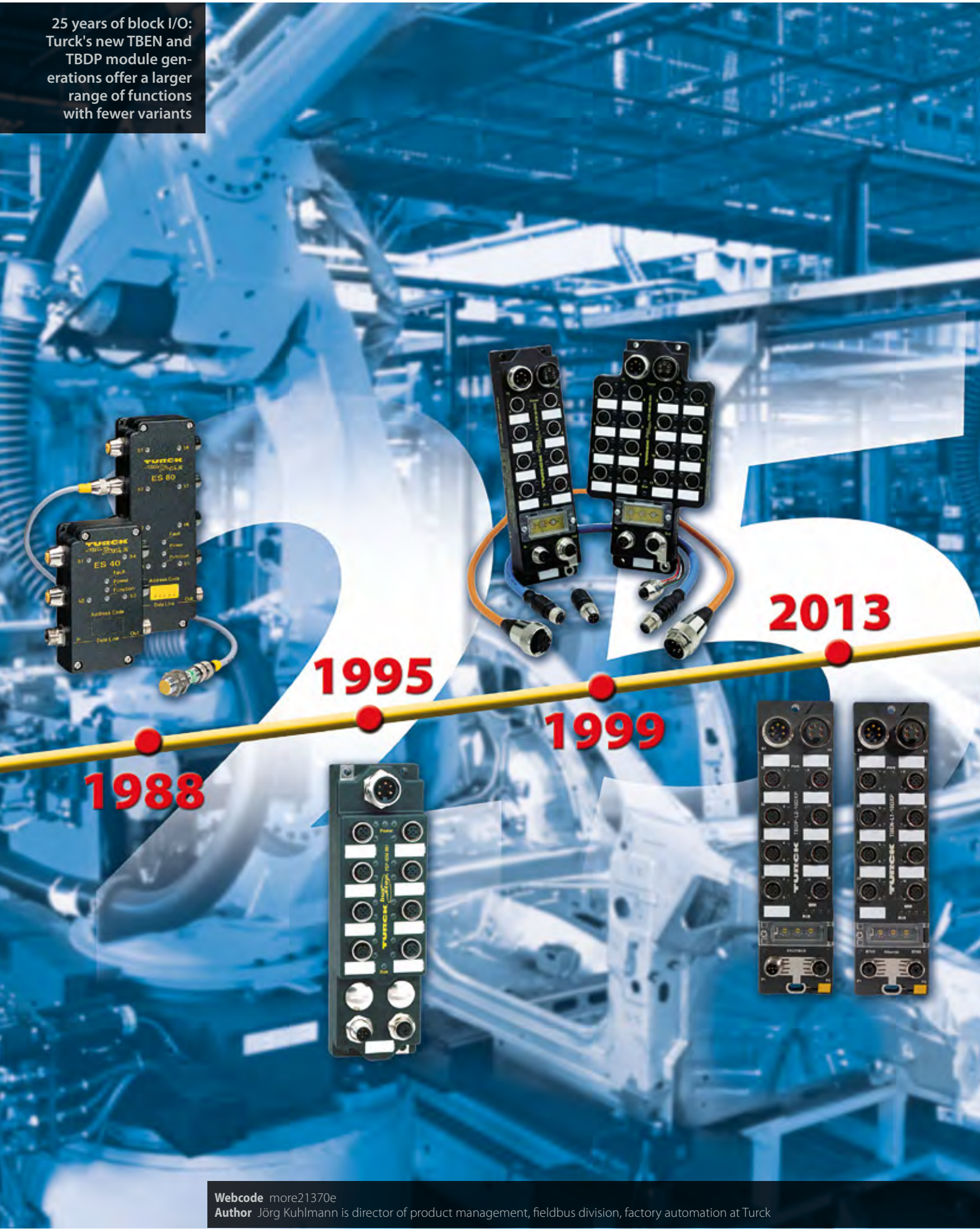
The custom connectivity team is enabled by a great deal of support as well. Without the support from places like the research and development department, the toolroom, the entire connectivity department and the custom team at Turck would not be able to take on the types of project's and entertain the kinds of ideas they are able to.

In the end, custom connectivity is about looking at something that hasn't been done before and finding a way to do it. For customers, the custom connectivity team provides a valuable resource for products made specifically for their application and that previously did not exist. For Turck, it provides an opportunity to create a new product, and more importantly, an opportunity to make yet another customer happy. ■

Quick Read

No matter how big the portfolio of a manufacturer is, there are always customer requirements that are not covered by the standard. In order to be able to realize special solutions, Turck, as the leader in this segment, has established the Custom Connectivity Team in the United States. Individual labels, special color codes or other requests, are realized by the team members in close cooperation with their own experts and customers. Individual solutions often find their way into the standard program.

25 years of block I/O: Turck's new TBEN and TBDP module generations offer a larger range of functions with fewer variants



Webcode more21370e
Author Jörg Kuhlmann is director of product management, fieldbus division, factory automation at Turck

Generation Change

On its 25th anniversary, Turck, the inventor of block I/O modules, is bringing a new generation of these devices to the market

In 1931 the Empire State Building was the tallest building in the world with a height of 381 meters. A taller building was not possible, at least that was the unanimous belief at that time. The Sears Tower in Chicago (442 m), the Petronas Towers in Kuala Lumpur (452 m) and Taipei 101 (508 m) now share the fate of the former title holder. Even the Burj Khalifa in Dubai (828 m) will not be the tallest building in the world. By the end of this decade the Kingdom Tower in Saudi-Arabia is meant to become today's benchmark with a height of around 1,000 meters.

The example clearly illustrates the point: The time when a development has come to an end cannot be predicted but can only be determined in hindsight – if at all. This is true in industrial automation in the same way as it is in architecture, and so there is no end in sight to the development of established product categories, such as compact fieldbus stations.

Fewer variants

The challenges and future developments of block I/O and other fieldbus stations are in the ability to cover a wider range of applications with fewer variants. For this, each individual device must be able to do more, but by being simpler, without any more complex setting up, use and maintenance required. With Ethernet fieldbus stations, there is also the fact that the protocol stacks are growing, and the latest fieldbus stations have to offer all the features that the user organizations and manufacturers have specified.

As part of this development, Turck has recently integrated fast startup and quick connect functions in all Ethernet devices in order to ensure a fast start-up. The relatively new multiprotocol Ethernet block I/O devices and multiprotocol Ethernet gateways also offer the fast startup. The multiprotocol devices themselves represented a major step forward on the road to "less is more". Although there were fewer different devices, they were able to offer more than the previous generation.

Evolution not revolution

Turck is further pursuing this approach and is presenting with the TBEN and TBDP models, a radically revised generation of its block I/O modules. Like their predecessors, the Ethernet block I/Os of the TBEN series are designed as multiprotocol devices. Thanks to their automatic protocol detection they can be run in Profinet, Ethernet/IP and Modbus-TCP networks without any intervention by the user.

As well as fast startup, the TBEN block I/Os now support the bus redundancy functions Media Redundancy Protocol for Profinet and Device Level Ring for Ethernet/IP. This enables redundant communication connections to be established in applications requiring an increased level of failsafe performance. As before, the Ethernet devices are fitted with an integrated switch that also enables installation in linear and ring topologies as well as the star and tree topologies typically used with Ethernet. Linear structures are more flexible to install and reduce the wiring required.

The Ethernet I/O blocks offer another benefit for the user through the LLDP topology detection for Profinet networks. LLDP stands for Link Layer Discovery Protocol. The controller interrogates these information blocks at the individual stations and from the entirety of the information automatically detects the topology of a network, including each individual station. Like their predecessors, the devices can be configured in the engineering software of different PLCs using GSD or EDS files. Their integrated web server means that the Ethernet devices can also be accessed at any time, in order, to receive diagnostic messages in plain text.

Turck has developed the TBDP series for Profibus-DP applications. In both series it was possible to increase the range of functions and standardize the variants in order to reduce the product range without restricting the performance range at the same time.

Quick read

Turck has launched a new generation of block I/O modules. The compact fieldbus stations of the TBEN and TBDP series combine the robustness of their predecessors with many new functions, thus offering a greater performance range in spite of only having a few variants. Additional protocol functions, a versatile grounding concept and enhanced safety features are some of the innovations of the new block I/O generation.

Suitable for temperatures from -40 to +70 degrees

Turck has also optimized the operating temperature range of the devices, a feature requested by many customers. The block I/O devices of the TBEN and TBDP series can now be used at temperatures between -40 and +70 degrees Celsius. Previously the devices could only be used from 0 to +55 degrees. In many outdoor applications or extreme climate zones, the devices were operating very close to their limits. The extended temperature range now makes the devices suitable for use worldwide in virtually all outdoor applications from Siberia to the tropics.

Two generations compared: The new TBEN model (right) can be mounted with two screws and offers more convenient connections than the previous solution (left)

In safety applications it is important to isolate the input and output potentials so that outputs can be de-energized safely through a higher-level connection. This previously prevented the use in these applications of devices with freely configurable I/O in which each channel could be operated as an input as well as an output, as these did not have galvanic isolation.

Safety shutdown

The new generation modules(16DXP) do not separate the I/O channels as before into inputs and outputs, but into the electrically isolated potential groups of "disconnectable I/O" and "non-disconnectable I/O". The use of these highly flexible device variants make it possible to implement the safety shutdown of plant sections using emergency-stop circuits. Only during project design is it necessary to note which channels are disconnected externally and which channels are not. Furthermore, individual output signals are also required when the plant is in the safe state, and these can be made available without any problem using 16DXP modules.

In all new modules Turck has standardized the maximum power of the digital outputs. All outputs now switch up to 2 amps. Devices were previously available with different output currents (0.5, 1.4 and up to 2 amps). As 2 amps can supply all standard consumers, the stock-keeping of different types is unnecessary.

Each I/O slot also has an auxiliary voltage for supporting sensors and actuators. Light screens, for example, require an auxiliary voltage. The light curtain is switched via an output, while the power of the LEDs is taken from an auxiliary voltage. Now these kinds of actuators can be connected via a single socket on the module.

Greater flexibility also allows the use of a simpler shielding and grounding concept for the device family: The modules are factory shipped with shielding and functional ground interconnected on the housing through metal elements. If required by the application, the user can remove this connection easily and quickly by simply removing the appropriate metal clamp.

Mechanical optimizations

Turck has not only thought about optimizing the electronics and software of the new block I/O generation – the mechanical design was also improved. Now only two six millimeter mounting holes located in the middle are required instead of the previous four. The previously used small M4/M5 screws sometimes proved too delicate. M6 screws simplify mounting and speed up the replacement of modules during service. Only a single screw needs to be undone for address setting, thus simplifying any changes in the network. The designers also increased the space between the M12 female connectors for more convenient commissioning and maintenance.

With its new development, Turck has retained the proven benefits of the block I/O modules. The high degree of protection to IP65/IP67/I69K also enables the TBEN and TBDP modules to be mounted directly in the machine or plant. This saves valuable space in the control cabinet and simplifies the electrical installation. The housings are still made from robust plastic. The electronics are encapsulated, making them resistant to shock and vibration. The stable metal threads of the male and female connectors also contribute to ensuring the long service life of the devices. The rotary switches for address setting on the Ethernet devices are also field proven. Users appreciate the intuitive handling provided for address assignment.

Four variants

The first TBEN and TBDP modules offer 8 ports that each have a double assignment. Turck offers the TBEN devices in four variants: with 16 digital inputs, 8 digital inputs and 8 outputs, with 16 digital outputs or with 16 freely configurable digital inputs or outputs. The TBDP block I/Os are available accordingly in the same four variants. ■

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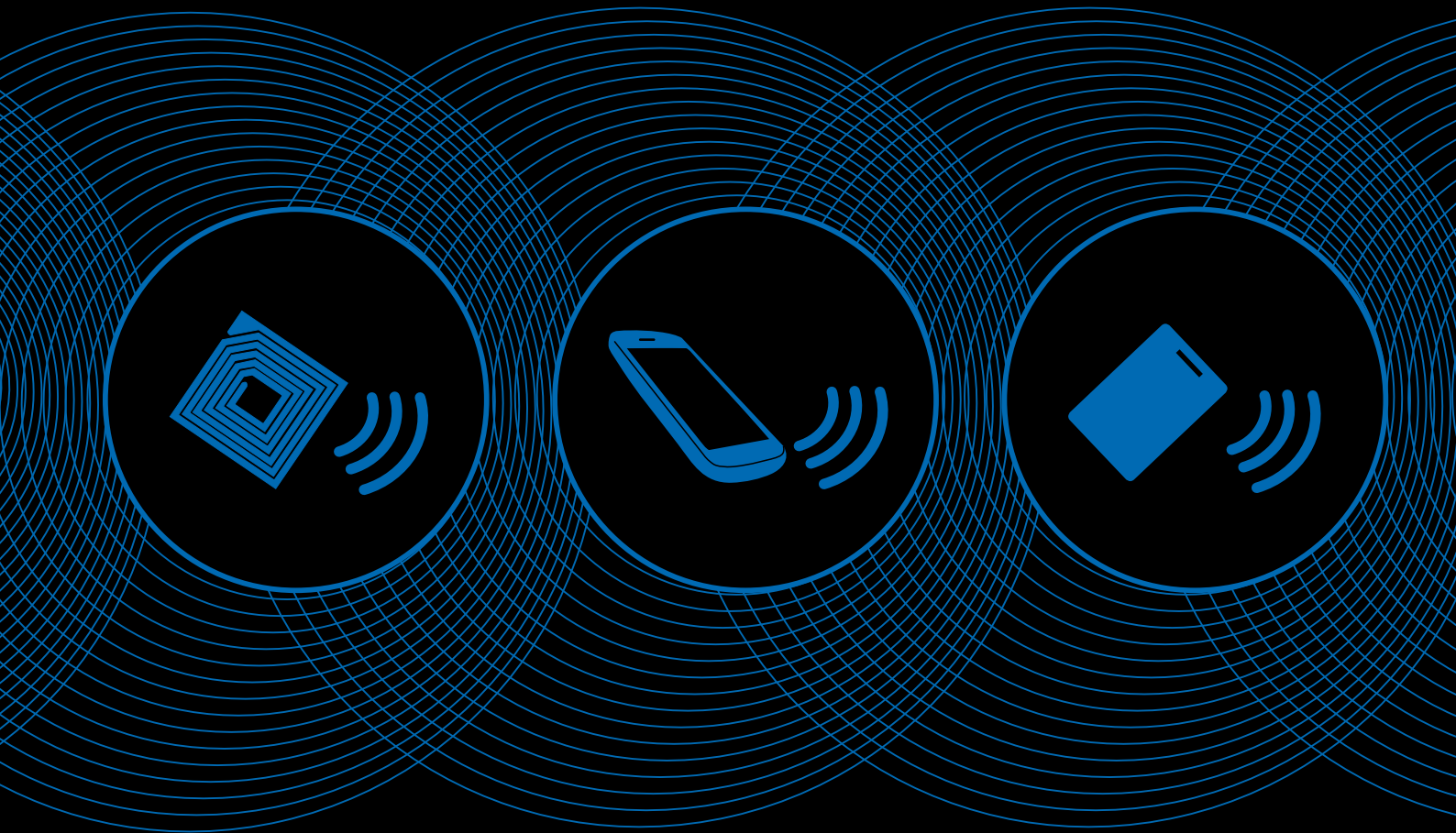

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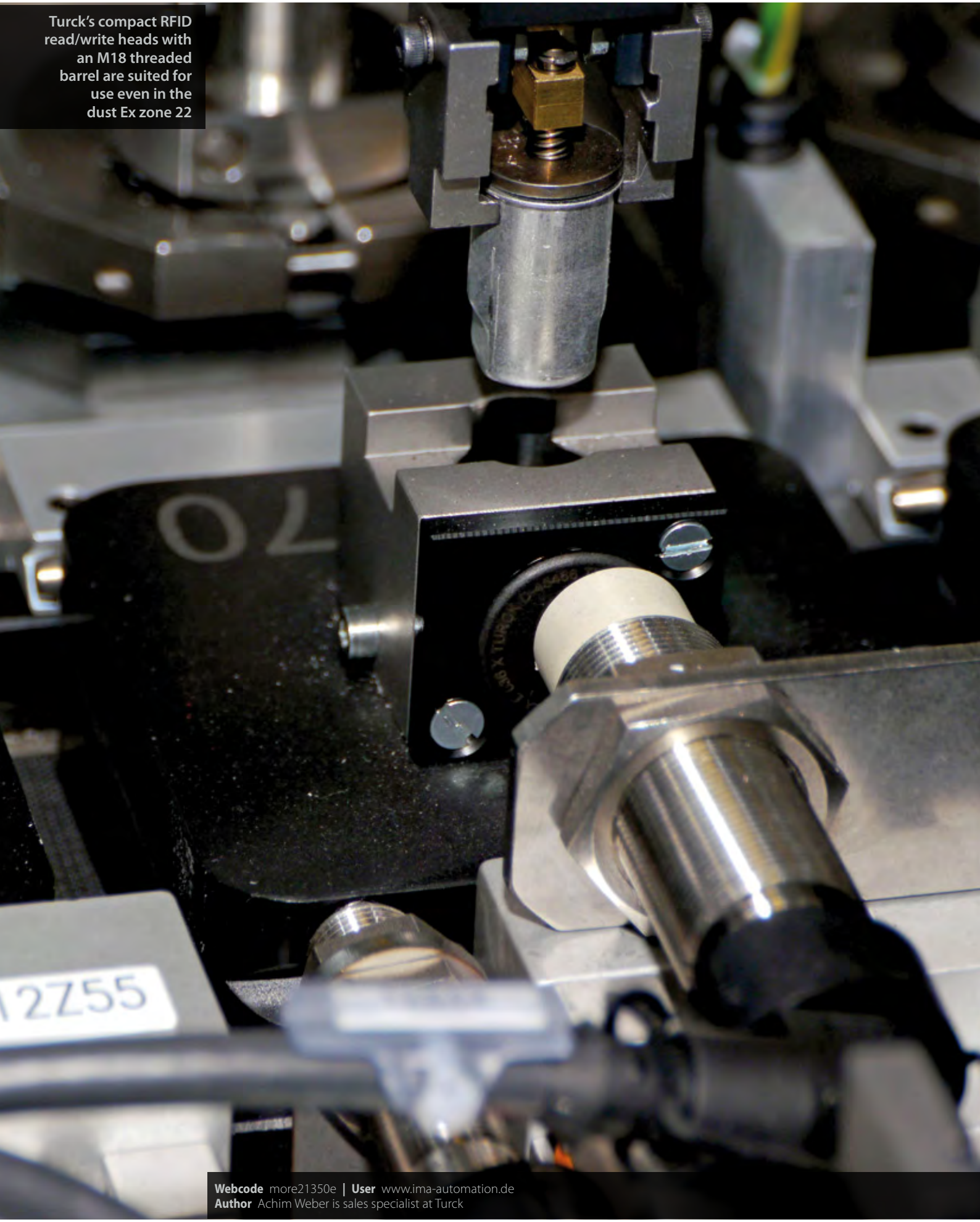


Turck's compact RFID read/write heads with an M18 threaded barrel are suited for use even in the dust Ex zone 22

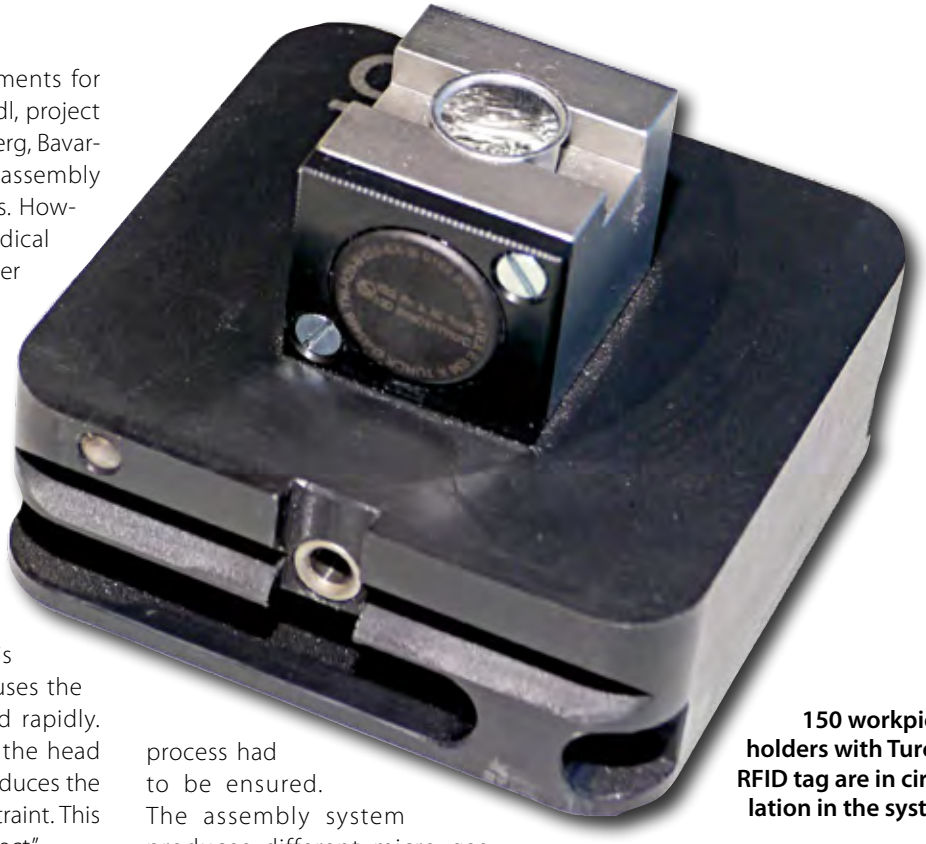
Webcode more21350e | **User** www.ima-automation.de
Author Achim Weber is sales specialist at Turck

Compact Explosion Protection

Turck's RFID technology enables IMA Automation Amberg GmbH to trace every single capsule for micro gas generators (MGG) right into the dust Ex zone

Atex zones are not routine environments for machine builders," says Andreas Gradl, project manager at IMA Automation in Amberg, Bavaria. The company manufactures innovative assembly and production systems for different sectors. However, none of these sectors, such as the medical technology, electronics, automotive, consumer goods and the cosmetic industry, typically operate in the explosion hazardous area. IMA was therefore breaking new ground when it developed a system for producing micro gas generator capsules in dust Ex zone 22.

Micro gas generators are small explosive capsules that are fitted in active seat belt pretensioners or head restraints in vehicles. In the event of collision, the active belt pretensioner initiates a pre-tightening of the safety belt. An active head restraint is primarily used for a rear collision which causes the heads of passengers to be thrown forward rapidly. Through the automatic safety mechanism, the head restraint moves forward with the head and reduces the distance between the head and the head restraint. This therefore prevents the so-called "whiplash effect".



150 workpiece holders with Turck's RFID tag are in circulation in the system

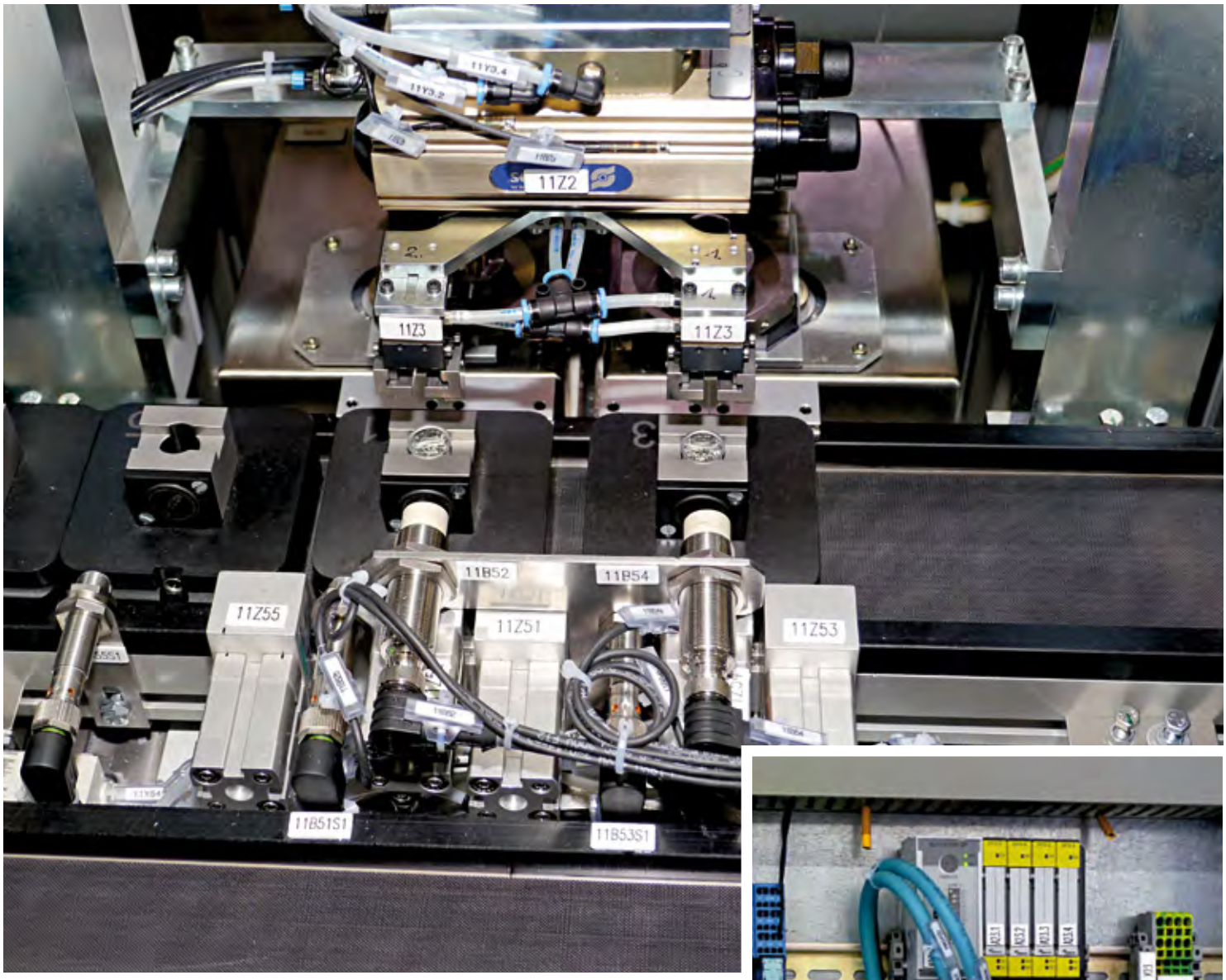
Explosion protection concept

The manufacturer of the capsules awarded IMA Automation Amberg GmbH the contract to build an automated assembly system for micro gas generator capsules. Part of the explosion protection concept involved the location of the hazardous processes in a separate Atex zone. The empty capsules are inserted in the workpiece holder and weighed in the safe area. The loaded workpiece holders are transported via a conveyor system into the hazardous area where they are filled at various metering stations. The separated area in a different building is intentionally designed with a weaker wall so that any pressure caused by an explosion is dissipated in a controlled manner.

Besides its requirements regarding explosion protection the customer also wanted the ability to fill the capsules with milligram precision and to integrate quality control and quality assurance in the plant. Any faulty capsules have to be detected as early as possible in the manufacturing process and rejected immediately. With a limited window for quality control of the explosive capsules an absolutely fault-free production process had to be ensured. The assembly system produces different micro gas generators that are filled with different powders or powder mixtures depending on type. Some types of powder are metered by weight and some according to volume. With some types both weight and volumetric metering processes are used. At the final weight check in the process the system must know the precise microgram weight and powder type of each capsule. The manufacturer specified directly in its initial order that each individual capsule must be identified during the manufacturing process.

Quick read

Micro gas generators in seat belt pretensioners and head restraints ensure that vehicle safety systems respond immediately in the event of an emergency. For this the capsules are filled with a precisely defined quantity of powder in a fully automated assembly system of IMA Automation Amberg GmbH. The assembly system builder uses the Turck RFID system, which includes compact read/write heads that are approved for the dust Ex zone.



The empty aluminum capsules are weighed in the safe area in order to deduct the capsule tare weight to the nearest milligram during the control stage

The data from the read/write heads reaches the controller via the BL20 Profibus gateway

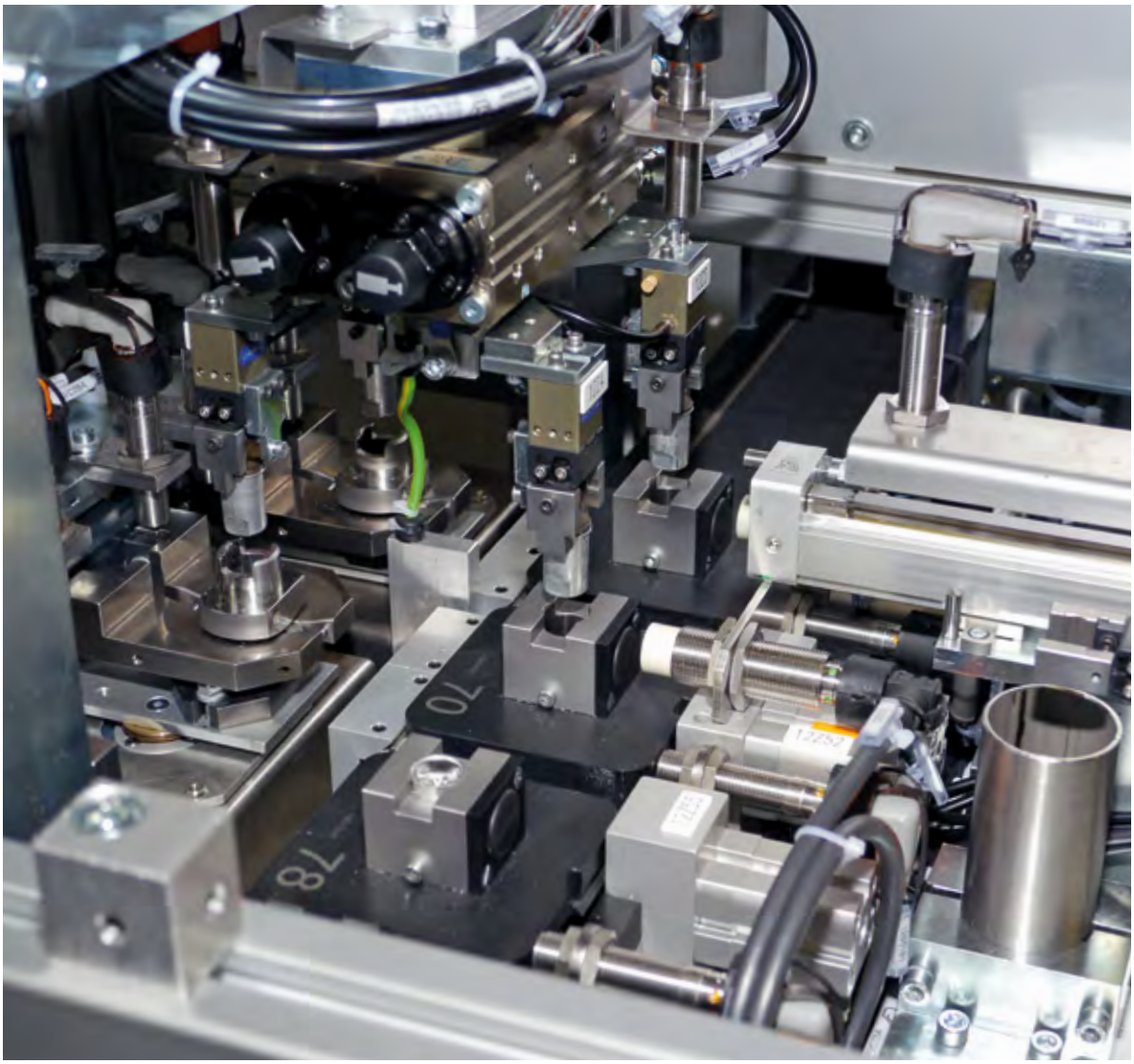
Capsule tare weight determined

The empty aluminum capsules are firstly weighed in the safe area since the weight of these thimble-sized receptacles varies only by milligrams. The controller stores the weight in a database to determine after each filling exactly how many milligrams of powder are added. 150 workpiece holders transport the capsules in the closed circuit system. They are identified using Turck's BL ident RFID system. An RFID tag is embedded in each workpiece holder for this purpose.

In the first process step, the machine weighs the capsules and writes the tare weight to the database. The read/write head links the database entry with the UID (unique identification number) of the tag and thus with the material holder. IMA was able to keep the cycle time of the system high at more than 30 parts per minute using just the UID and two weighing scales working in parallel.

After the first weighing, the capsules are transported via the conveyor into the explosion protected area where they are filled at the first station – by weight. A second volumetric-based filling takes place later in the process. After the fillings have been completed, which vary according to quantity and type, the capsule filled with the powder is weighed in order to check the precise filling quantity based on the difference from the tare weight of the capsule. The entire filling quantity and the individual powder quantities are metered at the different stations are calculated and checked in this process with milligram precision.

The system also identifies the workpiece holders with the capsules. If the capsules contain too much or too little powder, they are marked as bad parts in the database and are rejected. The correct capsules are



The RFID read/write heads in the M18 stainless steel housing with a white sensor head read out the tag on the workpiece holder so that every capsule can be identified uniquely

"The flameproof RFID readers of other suppliers were simply too big. An M18 read/write head or something equally compact could only be found at Turck."

Andreas Gradl, IMA Automation Amberg GmbH

finally fitted with initiators which were pre-assembled in another system section.

Compact RFID solution also for zone 22

In all, seven robust type Ex RFID read/write heads are installed in the system. The key reason for choosing the Turck read/write heads with an M18 threaded barrel was their suitability for the dust Ex zone 22. "Zone 22 is one of the lower Atex zones. Turck has read/write heads specially made for this zone. Although other manufacturers offer explosion-protected RFID devices, some of these are flameproof devices for higher Ex zones which are thus also very expensive. In this respect, the technical and financial benefits supported the choice of the Turck system," Andreas Gradl explains. He adds: "The size of components is also important to us. The flameproof RFID readers of other suppliers were simply too big. An M18 read/write head or something equally compact could only be found at Turck."

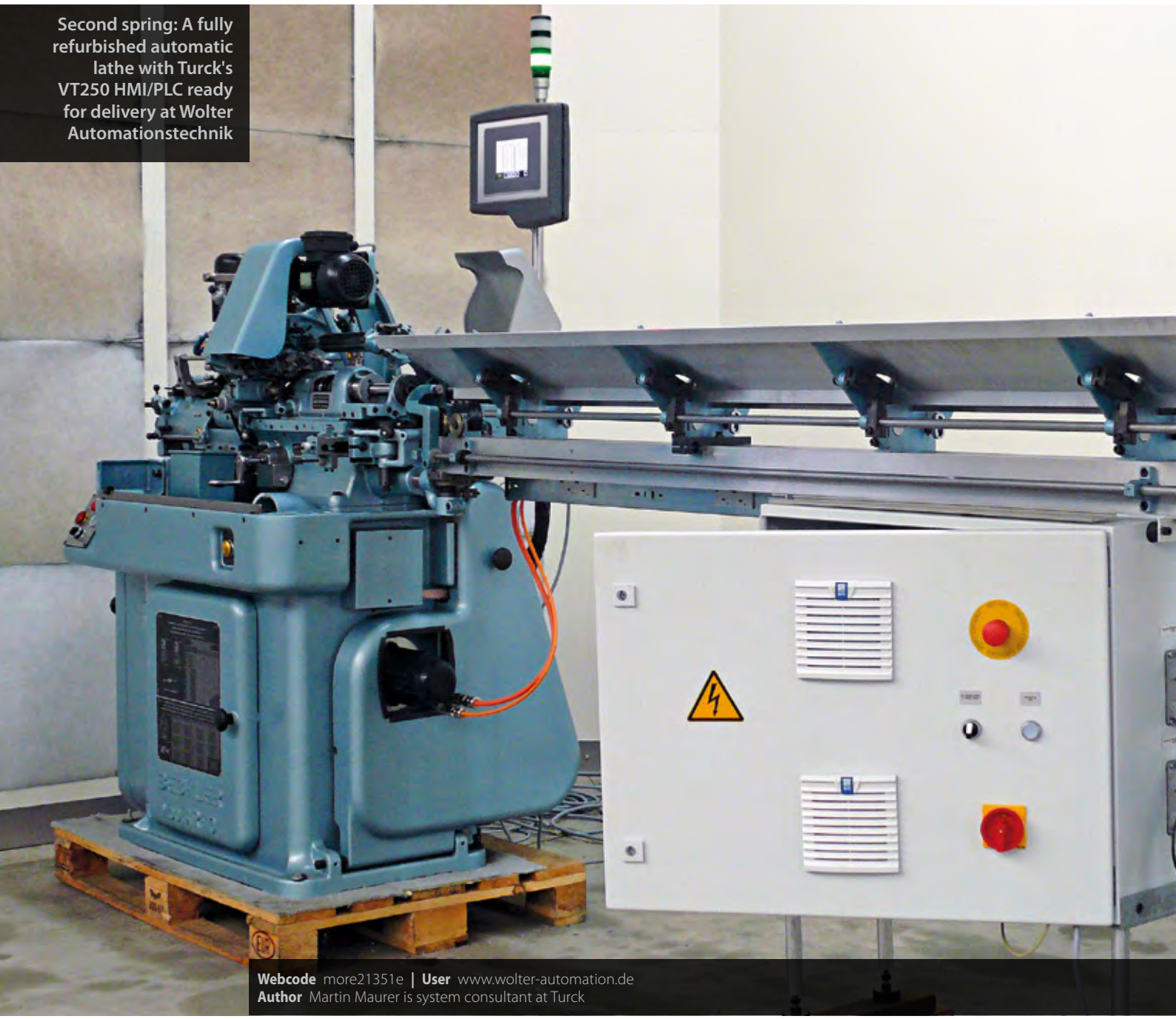
It was the actual customer who drew the attention of IMA Automation Amberg GmbH to Turck as a complete supplier for RFID. "Turck provided us with a test system consisting of a read/write head, tags and fieldbus gateway. In our test, the system identified the material holder perfectly. Our decision was thus already made," Gradl describes the short search for the right RFID solution for the system. A gateway with four RFID slices from Turck is used to connect the seven RFID read/write heads via Profibus to the system controllers. The 150 tags that are embedded in the workpiece holders are also from Turck.

Matching the software of the entire system, consisting of weighing and filling stations and the different profiles for the various capsules used was particularly challenging. Each filling sample of capsules is stored in a database and is mapped automatically by the system when the particular batch is produced – including the integrated quality assurance. At the end of the process, only precisely filled capsules are located on the workpiece holders. IMA make use of Turck's RFID technology again: "The technical clarification went quickly and without a hitch, the products function perfectly. We therefore know exactly who we can contact when we look again for a compact RFID system for the Ex area," project manager Gradl explains. ■

Yesterday's Machinery – Today's Intelligence

Wolter Automationstechnik combines tried and trusted precision lathes with state-of-the-art control technology using Turck's VT250 HMI/PLC

In times gone by, every farmer on the Heuberg, a plateau in the southwest of the Schwäbisch Alb region, had their own turned parts company. As they like to humorously recount, each night every farmer would push out the next metal rod from his bed with his foot. The fact that the concentration of turned parts manufacturers in this region was and still is very high is beyond doubt. Today there are still around 200 turned parts factories in the Heuberg area. It is highly likely that one of the many old automatic lathes on which precision turned parts were manufactured in the Schwäbisch Alb region is currently standing in the

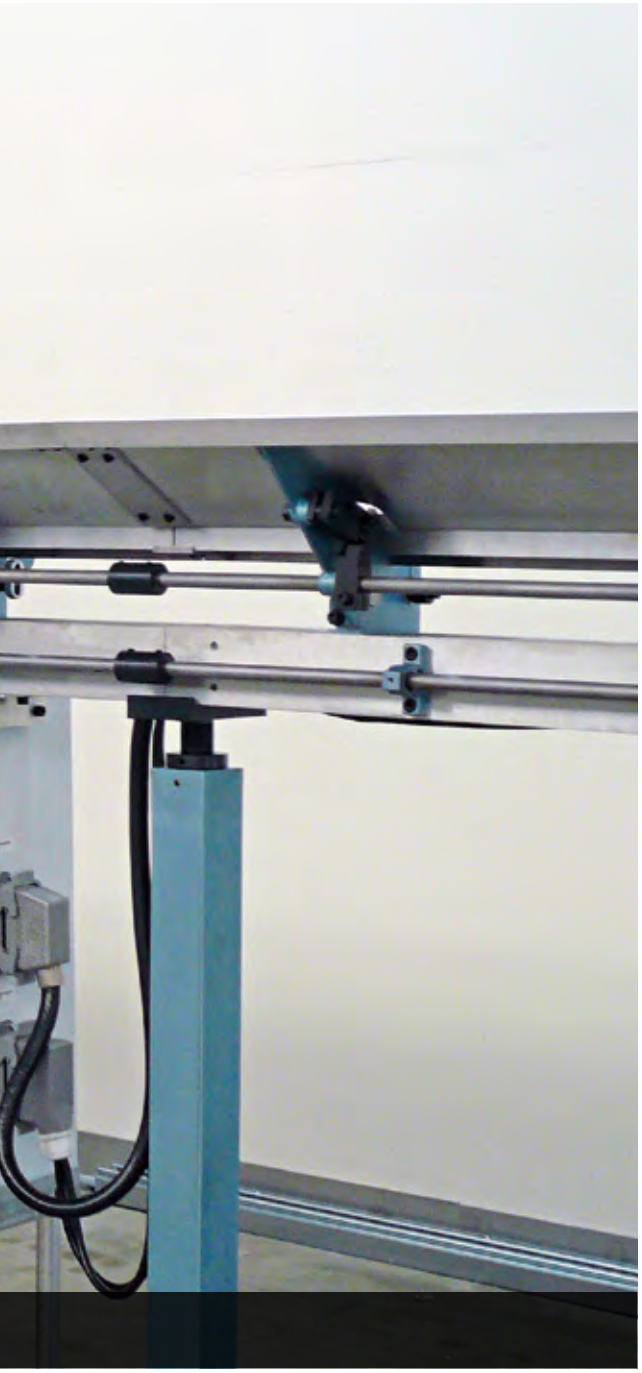


Second spring: A fully refurbished automatic lathe with Turck's VT250 HMI/PLC ready for delivery at Wolter Automationstechnik

Webcode more21351e | **User** www.wolter-automation.de
Author Martin Maurer is system consultant at Turck

machine shop of Lothar Wolter in Löffingen. Wolter is the managing director of Wolter Automationstechnik WAT GmbH, which specializes in the automation of special machines, automatic handling machines and test stands. Together with partner company Schorp, Wolter has discovered and filled a promising gap in the market.

The two partners buy old automatic lathes and modernize them from the bottom up. While Bernhard Schorp brings the mechanical parts of the machines up-to-date, Wolter modernizes the automation, the drive concept, as well as the electronics and controls. For this, Wolter relies on Turck technology. The installation of a new drive concept and the integration of an HMI/PLC enable these modernized automatic lathes to combine the benefits of their solid and indestructible technology with the high degree of flexibility offered by state-of-the-art CNC machines.



Quick read

The fact that new technology does not necessarily have to be better is being demonstrated by Wolter Automationstechnik with their refurbished and modernized automatic lathes. Fitted with two servo motors and the Turck VT250 HMI/PLC for controlling the machine, the refurbished lathes can match any state-of-the-art CNC machine in terms of flexibility. In terms of precision, the lathes even outperform the CNC machines.

Servos instead of gears

Instead of the original cam motor with its many ratios for different tools, a servo motor each for the spindle and cam drive now provides the CNC functionality of the lathe. Normally it is only possible to manufacture rotationally symmetrical components on conventional lathes. With the programmable and electronically controlled lathe it is now also possible to produce movements that deviate from the rotational symmetry. It is also possible to produce turned parts with groove profiles for which a CNC machine was previously needed. The overhauled lathes are controlled with the Turck VT250 HMI/PLC which can be programmed with Codesys.

One of the lathes that were refurbished and automated by Wolter can today produce miniature 2 mm diameter gear wheels – for a well-known Swiss clock manufacturer. Turck supplied the connectivity components for the re-design of this machine and also the controller and display, via the VT250. Wolter programmed the controls for the machine on the VT250. New requirements are simply entered via the touch screen directly on the machine that was built in the sixties.

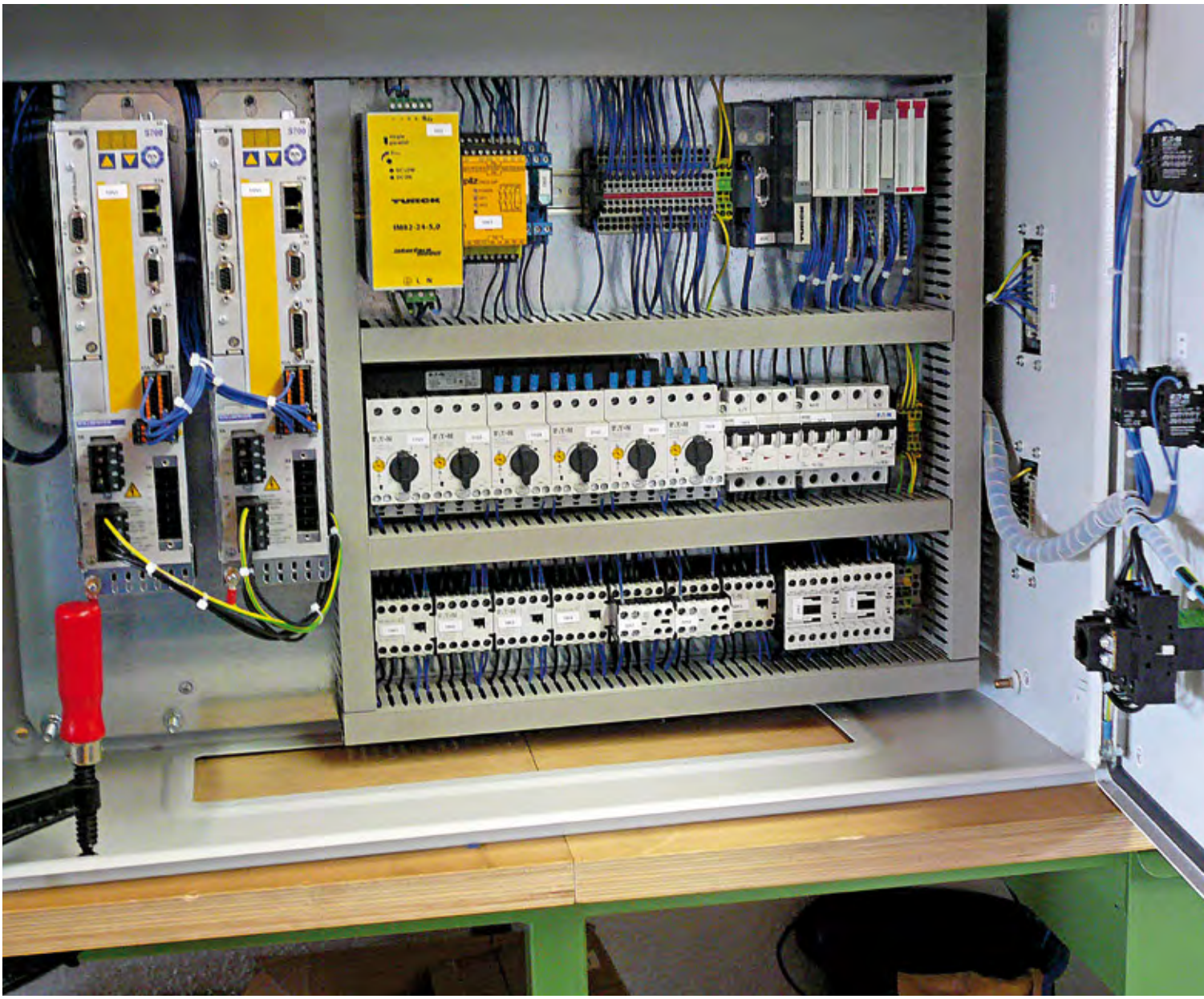
The VT250 is ideal for modernizing the automatic lathes. It controls the two motors independently and is used at the same time as an operator panel, via which the user can enter the different machining parameters. "The VT250 is not the only device that can perform these tasks. However, it has a really extensive range of features for its price category, starting from its Ethernet capability to the Profibus interface, right through to the color touch screen," says Wolter. "The system has exactly the right dimensions for controlling the automatic lathes."

Easy handling

The benefit of lathes compared to CNC machines is their ease of maintenance – a valuable benefit, particularly when producing many parts with the same shape. "With a CNC machine you have to refill blanks and need well trained employees to maintain and set them up. With automatic lathes this is completely different. Furthermore, the machine bed of old automatic lathes is so good that the modernizing of old machines is almost always worthwhile. In those days the machine bed was still cast. The age of the machines is also their key benefit: The material is stable. It does not change shape a single micrometer. "In other words, you can

"The VT250 is not the only device that can do these tasks. However, it has a really extensive range of features for its price category, starting from its Ethernet capability to the Profibus interface, right through to the color touch screen. It has exactly the right dimensions for controlling the automatic lathes."

Lothar Wolter, Wolter Automation



Turck's BL20 I/O system (top right) handles the communication between the VT250 and the connected sensors and actuators

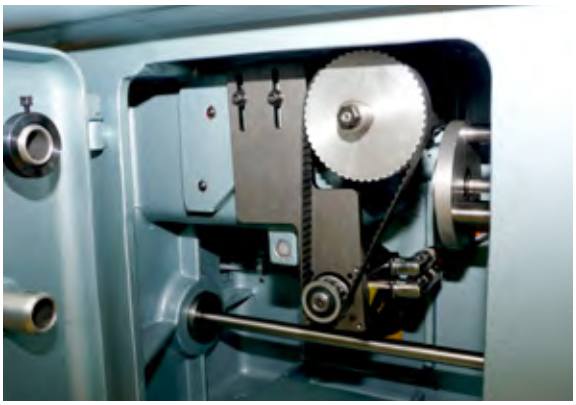
HMI/PLC VT250

Turck's VT250 HMI/PLC system is an ideal multi-functional solution for many machines and automated equipment, and combines the PLC with interfaces and operator terminal in a single unit. As well as visualization, the device offers a full range of PLC functions that can be programmed with CoDeSys version 3 in all IEC 61131 programming languages. The package is rounded off with a large number of interfaces such as Profibus, CANopen, DeviceNet, Profinet, Ethernet/IP and others, which ensure as master that signals from the field find their way to the PLC. The connections for the real-time Ethernet protocols are doubled up so that a separate switch is unnecessary. Local serial interfaces for RS232 and RS485 round off the range of connections provided. The visualization on the device is implemented using a 5.7" QVGA TFT touch screen in a compact 212 x 156 x 50 mm plastic housing.

work very precisely with these modernized machines," Wolter explains and sums up: "Manufacturers can at last produce parts with these modernized machines at a more favorable price than with CNC machines because personnel costs do not have to be factored in as well."

Wolter Automationstechnik WAT GmbH is a Turck system partner. Both companies together offer complete solutions for customers who cannot afford the programming required for interfaces or similar requirements. In such cases, Wolter handles the entire project from the quotation right through to the integration and programming. Turck provides the components and offers onsite assistance through its sales force and technical support. "For automation specialists like us, the Turck portfolio is attractive because it offers us the entire remote periphery together with sensors and connectivity components from a single source," Wolter explains. Both parties benefit from the system partnership: Together with its system partners, Turck can offer

The core of the "new" machine is Turck's VT250 HMI/PLC, programmable with Codesys 3



There is still a lot of space in the gear box after the servo motors have been installed

Exhibition model of the automated gas spring machine: This enabled Wolter to use the full range of Turck products

its services as a solution supplier and also handle projects that require extensive integration. Wolter Automationstechnik is able to obtain access to more customers through the Turck sales organization.

Wide offer for assembly machines

Wolter Automationstechnik was able to use the entire range of the portfolio in another project. The company automated the assembly plants for a manufacturer of gas springs, which, can be found in trunk lids or in roof boxes for cars. The assembly machine has a holder into which the operator places the tube for the gas spring to be produced. The tube must be placed in the holder in a precise vertical position to prevent damage to the machine and tube when the subsequent press operation then takes place. This is monitored with the iVu vision sensor. The machine presses an end cap into the tube and then slightly bends the tube over (flanging) to produce a slight dome and prevent the cap from sliding out of the tube. As well as the iVu, the safety technology of Banner Engineering is also used from the Turck portfolio: Two-hand control switches and safety light curtains. The junction boxes, the machine light, the connectivity products and the VT250 HMI/PLC come from Turck.

For Wolter, the modernization of automatic lathes is still unfinished business: Although he has already delivered 50 refurbished machines, there are still dozens of machines in the warehouse waiting for their second home. The machines are not only being used in the Schwäbisch Alb region. Due to their simplicity and ease of maintenance, many of the old machines are being used in India – however, up to now, without the modernization implemented by Wolter and his partner Schorp. Perhaps the business trips made by Wolter in the next one or two years won't just be to the "turning capital" of the Heuberg hills but to the Himalayas. ■

Two excom stations are installed in control cabinets at the foot of the gas flare stack

Webcode more21352e
Author Baolai Tian is PA product manager at Turck China in Tianjin

Safe Burn Off

The acetic acid production plant of a Chinese company is using Turck's excom remote I/O system

Natural gas flare stacks are used in the petrochemical industry or other chemical plants to occasionally burn off any gas that is produced in the production plant. These natural gas flare stacks process the flare gas and other exhaust gases, and ensure the safety and stability of the entire process.

Customer requirement

The plant of a major Chinese coal and chemical company produces 400,000 tons of acetic acid a year. Flare stacks play a particularly important role here in ensuring the safety of the entire plant. During the production of acetic acid, excess gases must be flared off during specific process incidents. Otherwise the entire plant would be facing an incalculable risk. Conventional natural gas required to ignite the gas flare is also present in the gas flare stack, as well as other explosive gases. Intrinsically safe electronic components must be used in the hazardous area at the flare stacks.

A wide range of different field instruments, such as pressure and temperature transmitters, level transmitters, gas detectors, valve controls, solenoid valves and other instruments, are used at the gas flare stacks. In all, 44 measuring signals (sensor signals) and 39 control signals (actuator signals) have to be connected in the field to the DCS. In order to ensure the interference immunity of the signals, the customer required the galvanic isolation of the individual signals.

The enormous safety relevance of the gas stacks meant that the plant owner placed a great deal of importance on the standard and quality of the electrical components used. However, these components also had to be cost efficient and easy to maintain in spite of the high level of quality and reliability required. The gas flare stacks required the use of intrinsically safe technology due to the explosion protection specified.

The customer also required a redundant connection for the communication between the flare stacks and the DCS. As the flare stacks were located far away from the DCS, it must also be ensured that the data reaches the DCS fast enough and vice versa in spite of the long signal distance involved.

Perfect combination

The customer uses two excom remote I/O stations from Turck for the connection of the 83 signals of the gas flare stacks. The system fully meets all the customer's requirements: The remote I/O station is compact, easy to install and can be implemented with explosion protection in Zone 1. excom can also be implemented with a redundant communication and power supply in order to provide the required level of failsafe performance. The customer was also impressed by the optocouplers used, which enabled the required communication speed to the DCS to be achieved. The optocouplers transfer the Profibus signal to the fiber optic cable for the long transmission section.

An excom station consists of the module rack, power supply unit, gateway and the individual I/O modules. With its diverse I/O modules the system offers

outstanding performance and high channel density. With its safety barrier function, the I/O system can connect intrinsically safe field devices directly as the associated equipment. Unlike the standard I/O systems available that are isolated in groups, all I/O of excom come with integrated galvanic isolation for each individual input and thus provide the level of interference immunity required by the customer without the need for external signal isolators.

The excom system uses Profibus DP, a mature and reliable bus protocol which can transfer detailed diagnostic data as well as controlling and monitoring the field instruments. A redundant communication connection and power supply is provided throughout: starting with the power supply units and the gateways, to the optocouplers, right through to the redundant implementation of the DP communication modules of the DeltaV DCS from Emerson. If a field device fails, this is indicated by the DCS or the LED on the excom station. The technicians on site can swap the appropriate device during operation. The modules in the excom system can be fitted and removed during operation (hot-swap-in-run). This ensures that the communication with the field devices is absolutely reliable and fail-safe.

Another reason for the use of excom was the excellent scalability of the remote I/O system, an important requirement for the Chinese company. The connection of additional field devices only requires additional modules to be plugged onto free slots in the module rack. In order to make larger expansions, additional excom stations can simply be connected to the existing Profibus network. This considerably simplifies requirements for the designers and technicians of the customer when further expanding field communication during operation.

Signal conversion via optocouplers

The Chinese customer was also impressed by how simply the signals are converted from the copper cable to the fiber optic cable. The Profibus signal is sent to the DCS via two pairs of redundant optocouplers. "With Turck's excom system supporting the Profibus DP protocol and the system portfolio including redundant optical transmission, our requirements for long-distance communications are met perfectly," says engineer Lei Zhang, responsible for the electrical engineering and instrumentation of the plant.

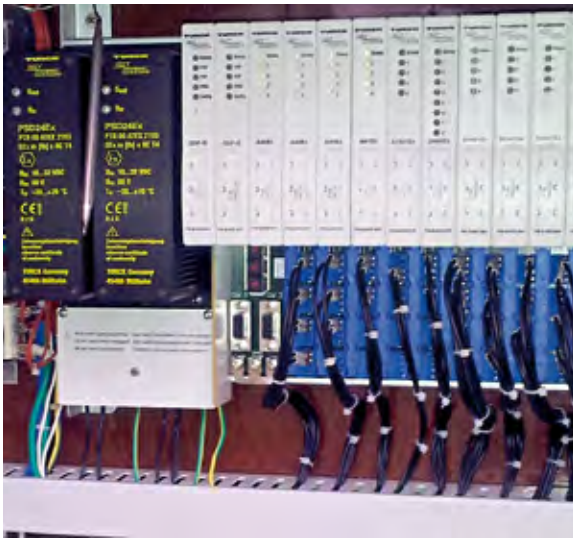
The benefit of the fiber optic connection is the fact that the OC11Ex/3G optocoupler on the DCS converts the electrical signal to an intrinsically safe optical signal that the customer can route in zone 1 to the second optocoupler (OC11Ex/2G). This converts the optical signal once more into an intrinsically safe electrical signal. This ensures the intrinsic safety of the entire Profibus network, as well as providing faster signal transmission via fiber optic cable. The optical signals are moreover completely immune to electromagnetic interference. Thanks to the high-speed fiber optic connection, all the field devices can be evaluated, monitored and if necessary controlled in the control center of the plant.

Conclusion

Compared to other remote I/O solutions, the Turck solution was more user-friendly, efficient and reliable for use at the gas flare stacks. The modular structure of excom reduces error sources and considerably simplifies maintenance as well as system expansion. These were the key benefits for the customer. ■

Quick read

A Chinese company uses Turck's excom for the redundant, safe and explosion protected connection of remote gas flare stacks to the central DCS of the plant. Two remote I/O stations at the gas flare stacks provide the connection of the field devices to the Profibus DP network. Besides the simple installation, expansion and maintenance of excom, the customer particularly appreciates the high-speed signal transmission to the DCS over large distances that the Turck solution provides.



Other modules can be added to excom if field devices need to be retrofitted

The optocouplers bring the Profibus signal from excom to the DCS via fiber optic cables

Valuable Waste

In biogas upgrading plants of Purac Puregas Turck's I/O-system excom enables convenient maintenance directly in zone 1

Almost every human activity creates waste. But waste can be a valuable resource. Excess agricultural produce, manure, wastewater sludge, household and restaurant waste are perfect raw materials for biogas production. The biogas can be upgraded to pure biomethane, which is used as vehicle fuel or for injection into the natural gas grid. The digestion of organic solids produces raw biogas that contains 50 - 70 % biomethane, 30 - 50 % carbon dioxide and traces of sulphur, nitrogen and oxygen.

The whole biogas plant consists of three modules

Webcode more21353e | **User** www.lackebywater.se
Author Thomas Pettersson is District Sales Manager at Turck Sweden

Through the window in the excom metal cabinet all status LED are visible directly in the compressor room

With its gas company Purac Puregas the Swedish Läckeby Water Group offers biogas upgrading plants. The Purac Puregas gas plants take this raw biogas and upgrade it to practically pure bio methane. With its chemical absorption process, called CApure, the plants remove carbon dioxide and hydrogen sulfur (H2S) from the raw biogas. That increases the efficiency of the biogas plant and improves its ecobalance. The system ensures that 99,9% of the methane in the raw biogas is upgraded to biomethane for commercial use. For big producers of natural waste like local waste management enterprises biogas production can be a useful renewable energy source.

Quick read

The Swedish Purac Puregas company is an expert for biogas upgrading plants, which can upgrade biogas from fermented household garbage and other organical waste very efficiently into methane and CO2. Purac Puregas recently improved the maintenance work for its gas plants with a new remote I/O system that met all their demands: Turck's excom system for use in hazardous and non hazardous areas.

"The well visible LEDs and the easier maintenance through hot swap in run were our main reasons for excom. Besides that, excom matches aesthetically. We try to build everything in stainless steel."

Anders Rosengren, Purac Puregas

Purac Puregas has found a way to limit the startup costs for biogas plants with a modular approach. Usually when customers want to enlarge their plant they have to build a complete second plant with a second control system and other elements doubling the existing plant. With the modular concept the customer only invests in the startup once. To enlarge the biogas plant later they add more gas skid modules to their existing plant. The skids are hooked up the existing plant and connected to the PLC-system and its Profibus. The single skids can be shipped like a container. By the current state Purac Puregas is the only biogas plant manufacturer with such a modular concept.

excom for compressor room

For the gas plant of a local energy company in Savsjo Purac Puregas looked for a better remote I/O solution for its biogas plant skids. In the compressor room of every plant module a remote I/O system in zone 1 collects all sensor and other signals from the hazardous areas. The former remote I/O could not be operated directly in zone 1. For maintenance, the customers always had to shut down the plant module and de-gas the compressor room. A lot of time, work and money were required - often for minor problems like, for example, a wire break.

Convenient maintenance

Turck introduced its remote I/O system excom to Purac Puregas. Unlike the system being used, excom can be mounted directly in zone 1. Additionally, the excom status LEDs are easily visible through the window of the stainless steel box the excom is mounted in. The electrical staff of the local waste company, for example, can now easily identify potential problems. And if necessary, the customer can get simple remote support just by calling Purac Puregas and describing what the status LEDs are signaling or the diagnostic messages show.

Most of the time Turck's or Purac Puregas' support staff can tell what the cause of the error is just by interpreting the LED signals. With the old I/O system a service engineer from Purac Puregas had to work on site. Today a phone call instead of a long distance maintenance visit is a very efficient way to solve problems. In case of a defect module, excom supports hot swap in run to change modules without downtime. This allows a defect module to be changed while the plant is still running quickly and efficiently; another feature the old remote I/O could not offer. Despite all those features Turck's excom still equals the price level of the customer's former I/O system.

In the hazardous CApure room the BL67 is connecting all sensors to the Profibus

According to Anders Rosengren, senior electrical engineer at Purac Puregas, the easy maintenance of excom was the major reason for the system change: "The well visible LEDs and the easier maintenance through hot swap in run were our main reasons for excom. Besides that, excom matches aesthetically. We try to build everything in stainless steel. With its designated stainless steel housing excom fits like a hand in a glove."

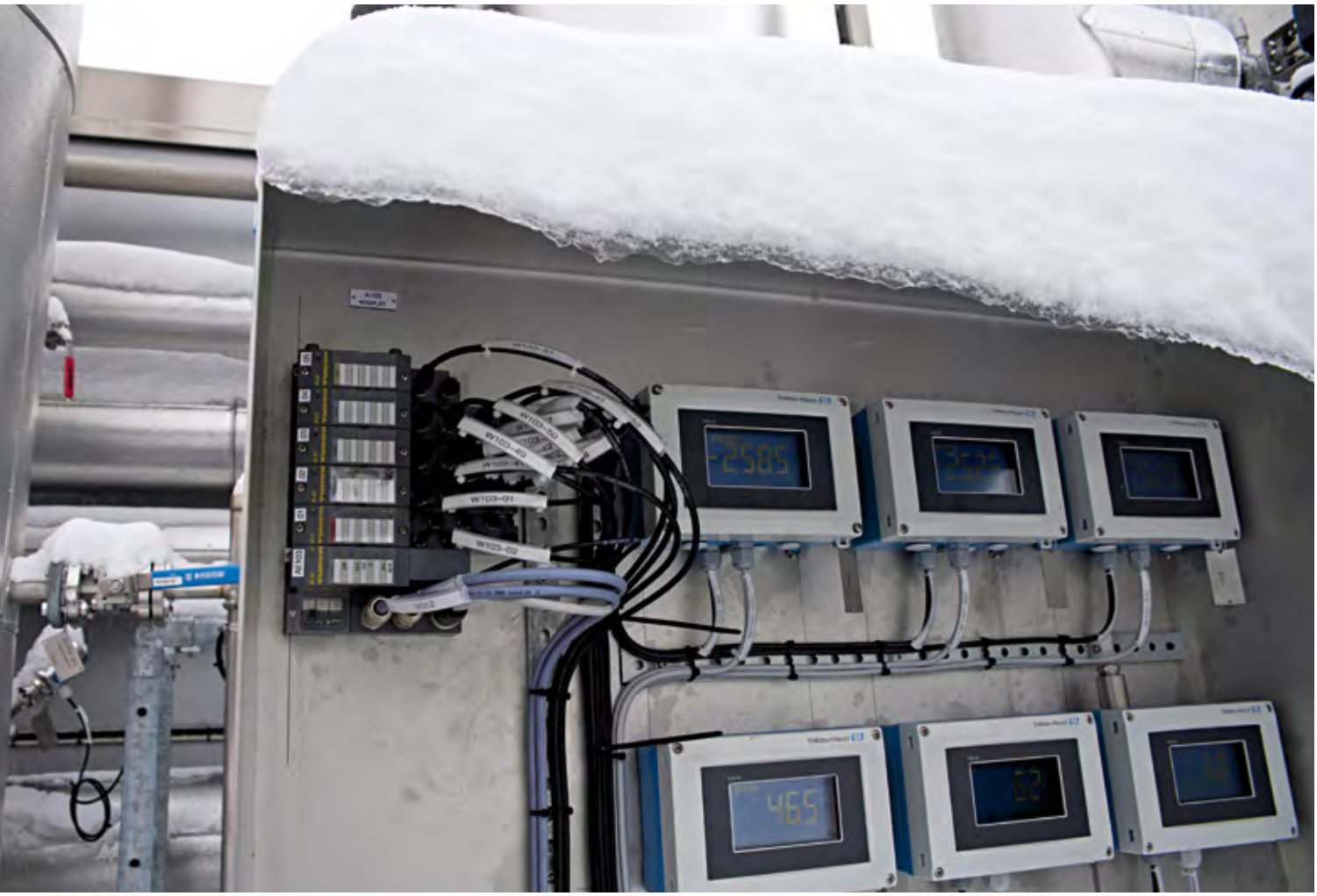
BL67 withstands swedish winters

During the project Purac Puregas found other solutions in the Turck portfolio to enhance their gas plant. In the outdoor parts of the plant, at the CO2-absorbation tower, a fieldbus system has to connect several valve indicators to the Profibus of the PLC. Turck's modular fieldbus I/O system BL67 with a temperature range up to -40 °C can be used outdoors even in harsh swedish winters. The Profibus is connected to the PLC via the same node as excom. The Turck segment couplers SC12 provide the intrinsically safe Profibus. The direct outdoor mounting of the BL67 saves Purac Puregas the construction of a preheated control cabinet and that accounts for the energy efficiency of the gas plant as the preheaters would use energy themselves.

Another BL67 station connects digital and analog signals from several sensors and indicators in what is called the CApure room. BL67 could score especially with its modular architecture: If the plant is enlarged and sensors or actuators have to be added, the system can be extended easily. Another point is the easy connection of the periphery with ready-made cables with premoulded M12 connectors. No wiring or connection with a cable clamp or screw terminal is needed equaling more security and time efficiency. A sensor can be practically replaced within a few seconds.

Resume

This project demonstrates how a solution provider can win customers over. Starting with one product other helpful solutions come in sight. Today Purac Puregas is using Turck products in three automation layers. Beginning with sensors over the connectivity to segment couplers and also the fieldbus remote I/O solutions including Bl67 and excom. For Purac Puregas, export projects using the excom solution is a useful improvement. Whether in gas plants in Germany, Switzerland or other European countries: within one day the customer can get a Turck exchange product if needed. And in the future the company will also install Turck's DSU35 inductive dual sensors for rotary actuators for their valve indication. ■



Keeping cool: With a temperature range up to -40 °C Turck's BL67 I/O system resists even Swedish winters

The T-Gage temperature sensors are installed along the production line under the running rail of the crane that transports the ladles

Webcode more21354e | **User** www.fwh.de
Author Bert Kinzius is a sales specialist at Turck

Less is More

Temperature sensors from Turck have enabled the iron foundry of Friedrich Wilhelms-Hütte Eisenguss GmbH to reduce its annual gas consumption for preheating the iron ladles by 25 percent

When a company has been established in the market for over 200 years, it knows with some certainty when it's time to make changes in order to continue staying competitive. Otherwise the company would probably not have lived to see its 200th anniversary. This is the case with the Friedrich Wilhelms-Hütte (FWH) casting foundry in Mülheim an der Ruhr. Iron and steel have been produced at the plant on the banks of the Ruhr since 1811 – currently with over 700 employees.

The steel and iron casting are separated into two companies because the two production processes are considerably different. The steel casting area has a series production of cast components weighing up to around five tons. The smallest cast products in the iron casting area start at ten tons with the heaviest weighing 200 tons and over. The cast iron parts such as cast steel molds or other components for the steelworks are usually produced as individual pieces or in small series. A recently cast 140 ton machine component for a mineral grinding plant is one of the larger castings produced.

Energy-intensive iron casting

Iron casting is an energy-intensive industrial sector. Steel scrap is melted in induction furnaces and smelted to iron through the addition of carbon. The liquid metal is poured into so-called ladles from the from the furnaces, transported with a crane and poured into the cast molds. This results in the produced components which weigh several tons. To ordinary people the ladles look like large cauldrons. In order to withstand the exposure to the hot liquid iron with a temperature of 1,200 degrees they are lined with fireclay. The ceramic stones are able to withstand high temperatures. However, this is only possible if the temperature rise is slow, otherwise the fireclay lining of the ladles would be damaged. The steelwork-

Quick read

It is often the simple solutions that have the greatest effect. The cast iron foundry at the Friedrich Wilhelms-Hütte in Mülheim was able to reduce its annual gas consumption for preheating cast iron ladles by 25 percent – simply by using the right temperature measuring technology from Turck. Instead of using complicated and expensive pyrometer measuring devices to measure the ladle temperature, the solution was based on the infra-red measuring of the ladle exterior.

Gas burner XXL: The ladles (right) weighing several tons are heated in front of the white gas burners

ers must ensure that they never pour 1,200 degree hot iron into a cold ladle. The ladles are preheated with gas burners to between 800 and 1,000 degrees before the iron is poured.

Potential savings with ladle heating

The ladles had long been preheated according to empirical values and estimates. "The foreman would put his hand on the ladle and guess how much more preheating was required. And if he wasn't there, a ladle would be kept for several hours under the heater before casting and kept warm," as Guido Günther, plant manager for technical support and smelting, explains the previous practice in the iron foundry. This resulted in a monthly consumption of enough natural gas to supply hot water and heating to 50 small families living in 100 square meter apartments for a year.

"We saw that we could make considerable savings and looked for a solution that was precisely matched to the casting process and the temperatures of the individual ladles, so that any unnecessary preheating or warming of the ladles is kept to a minimum," Günther adds. FWH looked for a system that would show ongoing and upcoming production, and also monitor all the ladles in the iron foundry, including their location and temperature.

The engineers responsible at FWH initially thought of pyrometer measuring in order to measure the temperature of the ladles. The devices compare the color of an object electronically with a color chart to determine its temperature. With glowing ceramic material this functions very reliably and precisely. However, the pyrometers for the application in the iron casting process were relatively expensive and involved some difficult installation. The sensors would have to be fitted so that they could look inside the ladle in order to determine the temperature.

Alternative infrared sensor

Turck presented FWH with an alternative solution using an infrared temperature sensor. Instead of inside the casting ladle, the T-Gage temperature sensor from the Turck portfolio looks at the outside surface of the ladle and measures the temperature there. The accompanying software uses the outer temperature to determine the temperature on the inside surface of the ladle. This extrapolation of the temperature is accurate to within 15 degrees, which for this application is sufficient. Besides the simple implementation, the key benefit of the Turck solution was a considerably more affordable price: For each measuring point, the infrared sensors cost around 700 euros less than the corresponding pyrometers. "The infra-red sensors from Turck gave us a much more efficient temperature measuring than the expensive and more cumbersome pyrometer solution," says the plant manager.

Heavy caliber: The current location of all ladles can be called up on the production management system

The ultrasonic sensor triggers the temperature measuring of the infra-red sensor (left)

The crane driver in the control cabin (top right) sees all the temperatures of the relevant ladles

Six M18TIP14Q T-Gage infra-red sensors are installed on the casting line. They are fitted so that the crane with the ladles always moves past one of the sensors prior to use. A Turck ultrasonic sensor (T30UXDBQ8) is also located next to each temperature sensor. This detects the ladle in passing and triggers the temperature measuring process. The crane driver uses the ladle numbers and his control panel in the driver cabin to identify the ladle currently in the crane. The operator panel displays all the ladles with their locations and temperatures. This gives the crane driver all the information required in order to avoid any unnecessary heating of the ladles.

25 % less gas consumption each month

The analog signal of the temperature sensors and the switch signal of the adjacent ultrasonic sensors are transmitted using Turck's BL20 fieldbus gateway via Modbus TCP to the host computer at FWH, where it is processed by the production management system. The system knows exactly when a ladle is needed. The crane driver has the temperature of all ladles in view and can decide which ladle needs to be heated and when. A cold ladle needs more time than one that has just been used.

This optimized process enables FWH to reduce its gas consumption for the heating of ladles by 25 percent just for the iron casting. The savings potential also impressed the Federal Environment Ministry, who funded this project in 2012 within the scope of its environmental innovation scheme. The application and approval of the funds took some time. "The actual technical clarification was completed quickly and smoothly with the support of Turck sales," Günther recalls. "When selecting the right ultrasonic sensor, we somewhat incorrectly estimated the distance between the sensor and the ladle. After I called Turck, an alternative device that was suitable for the distance was already on my desk within two days." When selecting the sensor, the project designers had not taken into account that with smaller ladles, the distance between the sensor and the ladle would increase.

Turck also supplied directly the right maintenance accessories for the T-Gage temperature sensor. A special metal sleeve is fitted around the sensor. This can be filled with compressed air in order to blow the dust off the front of the sensor. With optical sensors dust removal is a vital operation.

Outlook

There are other potential savings in the foundry plants of the Friedrich Wilhelms-Hütte. It is possible that the steel smelting process will also be more intensively automated in future. If an efficient temperature measuring is needed then, the good experience gained in the iron casting production will be useful. ■

"The infra-red sensors from Turck enabled much more efficient temperature measuring than the expensive and more cumbersome pyrometer solution."

Guido Günther, Friedrich Wilhelms-Hütte Eisenguss GmbH

Turck at Trade Shows

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Date	Trade Show	City, Country
25.01. – 27.01.2014	Russian Oil & Gas	Moscow, Russia
29.01. – 31.01.2014	Ifam	Celje, Slovenia
11.02. – 13.02.2014	ATX West	Anaheim, USA
25.02. – 27.02.2014	Logimat	Stuttgart, Germany
04.03. – 07.03.2014	Automation World	Seoul, South Korea
04.03. – 08.03.2014	Con Expo	Las Vegas, USA
19.03. – 22.03.2014	WIN – World of Industry	Istanbul, Turkey
07.04. – 11.04.2014	Hannover Messe	Hanover, Germany
08.04. – 10.04.2014	RFID live	Orlando, USA
30.04. – 01.05.2014	ISA	Edmonton, Canada
05.05. – 08.05.2014	OTC	Houston, USA
06.05. – 08.05.2014	Smart Automation Austria	Vienna, Austria
08.05. – 14.05.2014	Interpack	Düsseldorf, Germany
20.05. – 22.05.2014	SPS IPC Drives Italia	Parma, Italy
27.05. – 30.05.2014	Korea Pack	Kyöngju, South Korea
02.06. – 05.06 2014	Eliaden	Lillestrøm, Norway
02.09. – 04.09.2014	Sindex	Bern, Switzerland
03.09. – 04.09 2014	Euro Expo industrimesse	Ålesund, Norway
September 2014	Expo1520	Moscow, Russia
30.09. – 03.10.2014	World of Technology & Science	Utrecht, Netherlands
02.11. – 05.11.2014	Pack Expo	Chicago, USA
03.11. – 06.11.2014	Adipec	Abu Dhabi, United Arab Emirates
11.11. – 13.11.2014	Metalform	Atlanta, USA
11.11. – 15.11.2014	IA Shanghai	Shanghai, China
15.09. – 18.09.2014	Rio Oil & Gas	Rio de Janeiro, Brazil
25.11. – 27.11.2014	SPS IPC Drives	Nuremberg, Germany

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Publisher
Hans Turck GmbH & Co. KG
Witzlebenstraße 7
45472 Mülheim an der Ruhr, Germany
Tel. +49 208 4952-0
more@turck.com
www.turck.com

Editorial staff
Klaus Albers (responsible)
klaus.albers@turck.com
Simon Dames
simon.dames@turck.com
Paul Gilbertson
paul.gilbertson@turck.com

Contributors to this issue
Mathis Bayerdörfer, Markus Bregulla, Bert Kinzius, Jörg Kuhlmann, Martin Maurer, Thomas Pettersson, Baolai Tian, Eric Sipe, Achim Weber

Art Direction / Graphic Design
Arno Kraemer, Britta Fehr (Art design)

Webcode more21380e

Turck on Site

With **27 subsidiaries** and numerous branch offices, Turck is always nearby, anywhere in the world. This guarantees fast contact to your Turck partners and direct support on site.

GERMANY
Headquarters HANS TURCK GmbH & Co. KG
Witzlebenstraße 7 ı Mülheim an der Ruhr ı + 49 208 4952-0 ı more@turck.com

ARGENTINA ı Aumecon S.A.
(+54) (11) 47561251 ı aumeco@aumecon.com.ar
AUSTRALIA ı TURCK Australia Pty. Ltd.
(+61) 3 95609066 ı australia@turck.com
AUSTRIA ı TURCK GmbH
(+43) (1) 4861587 ı austria@turck.com
BAHRAIN ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
BELARUS ı FEK Company
(+375) (17) 2102189 ı turck@fek.by
BELGIUM ı Multiprox N. V. (TURCK)
(+32) (53) 766566 ı mail@multiprox.be
BOLIVIA ı Control Experto
(+591) 4 4315262 ı conexturck@controlexperto.com
BRAZIL ı TURCK do Brasil Ltda.
(+55) (11) 26769600 ı brazil@turck.com
BRUNEI ı TURCK Singapore
(+65) 65628716 ı singapore@turck.com
BULGARIA ı Sensomat Ltd.
(+359) (58) 603023 ı info@sensomat.info
CANADA ı Chartwell Automation Inc.
(+1) (905) 5137100 ı sales@chartwell.ca
CHILE ı Seiman S.A.
(+56) (32) 2699310 ı ventas@seiman.cl
CHILE ı Intech Analytica E.I.R.L.
(+56) (2) 2037700 ı ricardo.aspe@intechil.cl
CHINA ı TURCK (Tianjin) Sensor Co. Ltd.
(+86) (22) 83988188 ı china@turck.com
COLOMBIA ı Dakora S.A.S.
(+571) 8630669 ı ventas@dakora.com.co
COSTA RICA ı TURCK USA
(+1) (763) 5539224 ı usa@turck.com
CROATIA ı Tipteh Zagreb d.o.o.
(+385) (1) 3816574 ı tipteh@tipteh.hr
CYPRUS ı AGF Trading & Engineering Ltd.
(+357) (22) 313900 ı agf@agfelect.com
CZECH REPUBLIC ı TURCK s.r.o.
(+420) 495 518 766 ı czech@turck.com
DENMARK ı Hans Folsgaard A/S
(+45) (43) 208600 ı hf@hf.dk
Dominican Republick ı TURCK USA
(+1) (763) 553-7300 ı usa@turck.com
ECUADOR ı Bracero & Bracero Ingenieros
(+593) (9) 7707610 ı bracero@bracero-ingenieros.com
EGYPT ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
EL SALVADOR ı Elektro S.A. de C.V.
(+502) 7952-5640 ı info@elektroelsalvador.com
ESTONIA ı Osauhing "System Test"
(+37) (2) 6405423 ı systemtest@systemtest.eem
FINLAND ı Sarlin Oy Ab
(+358) (10) 5504000 ı info@sarlin.com
FRANCE ı TURCK BANNER S.A.S.
(+33) (1) 60436070 ı info@turckbanner.fr
GREAT BRITAIN ı TURCK BANNER LIMITED
(+44) (1268) 578888 ı enquiries@turckbanner.com
GREECE ı Athanassios Greg. Manias
(+30) (210) 9349903 ı info@manias.gr
GUATEMALA ı Prysa
(+502) 2268-2800 ı info@prysaguatemala.com
HONDURAS ı TURCK USA
(+1) (763) 5539224 ı usa@turck.com
HONG KONG ı Hilford Trading Ltd.
(+852) 26245956 ı hilford@netvigator.com
HUNGARY ı TURCK Hungary Kft.
(+36) (1) 4770740 ı hungary@turck.com
ICELAND ı Km Stal HF
(+352) 5678939 ı kalli@kmstal.is
INDIA ı TURCK India Automation Pvt. Ltd.
(+91) (20) 25630039 ı india@turck.com
INDONESIA ı TURCK Singapore Pte. Ltd.
(+65) 65628716 ı singapore@turck.com
IRELAND ı Tektron Electrical
(+353) (21) 4313331 ı webenquiry@tektron.ie
ISRAEL ı Robkon Industrial Control & Automation Ltd.
(+972) (3) 6732821 ı robkonfr@inter.net.il
ISRAEL ı Nisko Electrical Engineering & System Ltd.
(+972) (8) 9257355 ı joseph.shapira@niskoeng.com
ITALY ı TURCK BANNER S.R.L.
(+39) 2 90364291 ı info@turckbanner.it
JAPAN ı TURCK Japan Office
(+81) (3) 57722820 ı japan@turck.com
JORDAN ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
KENYA ı Westlink Limited
(+254) (53) 2062372 ı sales@westlinkltd.co.ke
KOREA ı TURCK Korea Co. Ltd.
(+82) (2) 20831630 ı korea@turck.com
KUWAIT ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
LATVIA ı Will Sensors
(+37) (1) 67718678 ı info@willsensors.lv
LEBANON ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
LIBYA ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
LITHUANIA ı Hidroteka
(+370) (37) 352195 ı hidroteka@hidroteka.lt
LUXEMBOURG ı Multiprox N. V. (TURCK)
(+32) (53) 766566 ı mail@multiprox.be
MACEDONIA ı Tipteh d.o.o. Skopje
(+389) 70399474 ı tipteh@on.net.mk
MALAYSIA ı TURCK Singapore Pte. Ltd.
(+65) 65628716 ı singapore@turck.com
MEXICO ı TURCK Mexico S. DE R.L. DE C.V.
(+52) 844 4116650 ı mexico@turck.com
NEW ZEALAND ı CSE-W Arthur Fisher Ltd.
(+64) (9) 2713810 ı sales@cse-waf.co.nz
NETHERLANDS ı TURCK B. V.
(+31) (38) 4227750 ı netherlands@turck.com
NICARAGUA ı Iprocen S.A.
(+505) 22442214 ı ingenieria@iprocen.com
NIGERIA ı Milat Nigeria Ltd.
(+234) (80) 37236262 ı commercial@milat.net
NORWAY ı HF Danyko A/S
(+47) 37090940 ı danyko@hf.net
OMAN ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
PANAMA ı TURCK USA
(+1) (763) 5539224 ı usa@turck.com
PERU ı NPI Peru S.A.C.
(+51) (1) 2731166 ı npiperu@npiperu.com
PHILIPPINES ı TURCK Singapore Pte. Ltd.
(+65) 65628716 ı singapore@turck.com
POLAND ı TURCK sp.z o.o.
(+48) (77) 4434800 ı poland@turck.com
PORTUGAL ı Bresimar Automação S.A.
(+351) 234303320 ı bresimar@bresimar.pt
PUERTO RICO ı TURCK USA
(+1) (763) 5539224 ı usa@turck.com
QATAR ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
ROMANIA ı TURCK Automation Romania SRL
(+40) (21) 2300279 ı romania@turck.com
RUSSIA ı O.O.O. TURCK Rus
(+7) (495) 2342661 ı russia@turck.com
SAUDI-ARABIA ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
SERBIA ı Tipteh d.o.o. Beograd
(+381) (11) 3131057 ı damir.vecerka@tipteh.rs
SINGAPORE ı TURCK Singapore Pte. Ltd.
(+65) 65628716 ı singapore@turck.com
SLOVAKIA ı Marpex s.r.o.
(+421) (42) 4440010 ı marpex@marpex.sk
SLOWENIA ı Tipteh d.o.o.
(+386) (1) 2005150 ı info@tipteh.si
SPAIN ı Elion S.A.
(+34) 932982000 ı elion@elion.es
SOUTH AFRICA ı R.E.T. Automation Controls (Pty.) Ltd.
(+27) (11) 4532468 ı sales@retautomation.com
SWEDEN ı TURCK Office Sweden
(+46) 10 4471600 ı sweden@turck.com
SWITZERLAND ı Bachofen AG
(+41) (44) 9441111 ı info@bachofen.ch
SYRIA ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
TAIWAN ı Taiwan R.O.C. E-Sensors & Automation Int'l Corp.
(+886) (7) 7220371 ı ez-corp@umail.hinet.net
TAIWAN ı Jach Yi International Co. Ltd.
(+886) (2) 27312820 ı james.yuan@jachyi.com
THAILAND ı TURCK Singapore Pte. Ltd.
(+65) 65628716 ı singapore@turck.com
TRINIDAD AND TOBAGO ı TURCK USA
(+1) (763) 5539224 ı usa@turck.com
TURKEY ı TURCK Otomasyon Tic. Ltd. Şti.
(+90) (216) 5722177 ı turkey@turck.com
Ukraine ı SKIF Control Ltd.
(+380) (44) 5685237 ı d.startsew@skifcontrol.com.ua
UNITED ARAB EMIRATES ı TURCK Middle East S.P.C.
(+973) 77 082882 ı bahrain@turck.com
URUGUAY ı Fidemar S.A.
(+598) 2 402 1717 ı info@fidemar.com.uy
USA ı TURCK Inc.
(+1) (763) 553-7300 ı usa@turck.com
VENEZUELA ı CADECI C.A.
(+58) (241) 8345667 ı cadeci@cantv.net
VIETNAM ı TURCK Singapore Pte. Ltd.
(+65) 65628716 ı singapore@turck.com


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TURCK

Industrial Automation

Hans Turck GmbH & Co. KG
Witzlebenstraße 7
45472 Mülheim an der Ruhr, Germany
more@turck.com | www.turck.com

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