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The Magazine for Customers of the Turck Group



Focused on Solutions

Christian Wolf talks about
Turck's formula for success for
the future **Page 14**



Data at a Glance

Bayer CropScience tests
new components with RFID
support from Turck **Page 21**



Car Bodies in View

Volkswagen relies on Turck's
measuring light curtains and
BL67 I/O system **Page 24**



A New Era

Inductive resonant circuit technology ushers in a new era
of position detection

Full Speed



Dear readers, when the SPS/IPC/Drives 2010 opens the gates again, all visitors and exhibitors can get together in Nuremberg, Germany, with a good feeling. As fast and dramatic as the crisis arose last year, it seems to be over just as quickly this year. Mechanical engineering gathered speed at the beginning of 2010, and the whole automation industry followed along. The growth rates are rising, so much so that even the good sales figures from 2008 are near at hand. The Turck group could increase its sales volume more than 30 percent this year.

Nonetheless, we should not let ourselves be blinded by this dynamic. We expect the effects of the crisis to fade slowly and that normal growth rates will resume in the upcoming year. In the meantime, this will lead to a reduction in the long delivery times and the high prices for prefabricated parts that were caused by the high demand experienced this year.

This issue of **more@TURCK** features an interview with Christian Wolf that gives insight to where we face challenges in the upcoming years and how we place ourselves in the market so that we are still able to provide innovative solutions for our customers with market-driven prices. On the pages preceding the interview, we showcase our latest news from the Turck portfolio. If you would like to experience this in person, visit us at the SPS/IPC/Drives at our **booth 351 in hall 7**.

Be our guest and see for yourself how the specialists from Turck present efficient products and innovative solutions for your applications.

We are looking forward to meeting you!

Warmest regards,

A handwritten signature in black ink that reads "Ulrich Turck". The signature is fluid and cursive, written in a professional style.

Ulrich Turck, Managing Partner

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NEWS

Innovations for the Automation Industry 04

COVERSTORY

SENSOR TECHNOLOGY: A New Era 08

Inductive resonant circuit technology ushers in a new era for position detection

INSIDE

INTERVIEW: "Focusing on Solutions" 14

Angela Scheufler, editor in chief of developmentscout.com, talked to Turck's managing director, Christian Wolf, about the formula for success for the upcoming years

TREND

INTERFACE TECHNOLOGY: Alternatives to 19 Inch Systems 16

Many 19 inch systems are in need of replacement. In addition to plug-in card exchanges and DIN-rail devices, Turck offers another alternative – the excom remote I/O system

TECHNOLOGY

PRESSURE MEASUREMENT: Flexible Hydraulics Specialists 18

The new PC200 and PS300 pressure sensor family by Turck meets the requirements for hydraulics engineering

APPLICATIONS

RFID: Efficiently Control 21

Bayer CropScience tests new active components with RFID support from Turck

SENSOR TECHNOLOGY: Safe Transfer 24

Volkswagen AG in Wolfsburg relies on measuring light curtains and the BL67 I/O system from Turck for a flawless vehicle transfer from a lifter onto an overhead monorail

SENSOR TECHNOLOGY: Cast Off 28

Updated level measurement system for the sea and domestic port in Papenburg uses wireless data-transfer as a cost-saving alternative to complex cable laying

SENSOR TECHNOLOGY: Hot Iron 30

Inductive sensors from Turck's robust uprox+ family guarantee the reliable operation of hot rolling mills from the Ningbo Iron & Steel Corporation in China

FIELDBUS TECHNOLOGY: Intelligent Water Treatment 32

Water treatment plants from WJP Solutions are used in many Australian buildings – now they are working with DeviceNet fieldbus technology from Turck

FIELDBUS TECHNOLOGY: Let the Water Flow 34

An extensive sprinkler system reduces the dust pollution that is caused by shipping iron ore in the Taicang port

CONNECTIVITY: Facing the Winter 36

Using connectivity solutions by Turck, Cirus Controls creates deicing systems that clear snow and ice from roads and lessen the environmental impact of sodium chloride

SERVICE

CONTACT: The Fast Lane to Turck 38

We will show you how, when and where Turck is there for you

CONTACT: Imprint 39



There are alternatives for updating 19-inch interface technology – from plug-in card exchanges to remote I/O. **Page 16**



Turck's DX70 guarantees an efficient, wireless data-transfer of the water level measurement at the sea and domestic port in Papenburg. **Page 28**



In Australia, WJP Solutions uses Turck's robust connection technology and BL20 distributed I/O system for their modular water treatment plants. **Page 32**

Significant Growth



► Turck expects a considerable increase in sales of more than 30 percent for the business year 2010. The managing director of Turck, **Christian Wolf**, disclosed that the consolidated transaction volume of the Turck-group should exceed 350 million Euro at the end of this year. The number of employees at all 27 sites increased in 2010 about 7 percent to 2,740 employees worldwide. In Germany the family business employs about 1,400 members of staff at its sites in Mülheim an der Ruhr, Halver and Beierfeld. "After a fantastic year 2010 we are going to position the company for a lasting successful future," says Wolf. "We are ambitious and target-orientated and therefore want to reach a 400 million Euro transaction volume in 2011." To reach this goal, there will be an adjustment of the model's parameters, according to the managing director of Turck. Among them, will be the redefinition of regional, trade and application specific solution portfolios with corresponding sales and marketing, the reduction of complexity by the modularization and the development of platforms, plus the definition of adequate pricing systems for system solutions and service features. The focus will lie on the internationalization strategy as well.

Info

You can find more information on the reports or product presentation in **more@TURCK** under www.turck.com. Simply enter the Webcode that you find at the end of each article in the search field. The following article page takes you directly to the product database or you can download or send the article as a PDF.

Inductive Angle Sensors

► After the success of the inductive linear displacement sensors, LI-series, Turck presents an angle sensor family that works with the same revolutionary measuring principle and unites all the positive qualities of customary measuring systems in one solution. With the new **RI-Sensors**, the position of the angle isn't measured with a magnetic locator any longer, but by an inductive resonant circuit. That way, the sensor is utterly insensitive to magnetic fields, like those produced by large drives or welding machines. The RI-sensors have a measurement range of 360° at an accuracy of 0.15 percent of the final value. The separated construction of the sensor unit and the locator, as well as an offset compensation of ± 4 mm, guarantees an easy installation and a safe operation of the sensors. The locator



can be mounted flexibly on to solid or hollow shafts. The contactless principle compensates bearing tolerances of the applications as reliably as vibrations that are caused by the jolting of shafts which guarantees a high linearity. The sensor also adapts on the output side: 0 to 10V, 4 to 20mA, 0.5 to 4.5V and SSI-interfaces are available.

[more on page 08](#) ►

AIDA Profinet Gateway

► Turck developed new Profinet fieldbus gateways for its I/O system BL67, in accordance to the guidelines of AIDA (Automation initiative of German automobile manufacturers), that are mainly intended for use in the automobile bodyshell work. While the type **BL67-GW-PN-AC** is designed for AIDA-RJ45-copper-connectors, the type **BL67-GW-PN-AF** is suitable for the use with AIDA-SCRJ-optical fibers. The AIDA gateways can be expanded with the already existing BL67 I/O modules or with a directly connectable valve cluster to an integrated solution. This option was developed in cooperation with the pneumatic manufacturer Parker Hannifin for use in the automobile industry. This coordinated concept increases the availability of the equipment



and reduces the service and start-up efforts for the user. Next to the standardized connectors, the AIDA guidelines demand a fast start-up of the fieldbus stations (under 500 ms), the automatic recognition of the topology within the network and software support through the Tool Calling Interface (TCI), among other things. All these guidelines are met by the gateways from Turck.

New Building

► The Turck group will invest about 15 million Euros into a **new production facility** at the site in Halver. The building is expected to be finished in the spring of 2012 and extends the capacity in Halver by about 11,000 square meters of production area and 1,100 square meters of office space. Together with the existing buildings at the Kirchlöher Weg, the family business will have a production area of 26,000 square meters. The new construction will be erected on an area of 18,500 square meters, directly next to the already existing production area. On 33,000 square meters, Turck has centralized all activities of production in Halver in close proximity. Everything is within easy walking distance which is the best condition for efficient internal logistics. "With the new building in Halver, we set the course for the future," says Werner Turck, founder of the company.



RFID panel at the SPS/IPC/Drives

► True to the motto "**Choco Visions – optimization of the chocolate production with RFID**", Turck and three partners present a user panel for interested end users from the food industry at the SPS/IPC/Drives show in Nuremberg, Germany. During the 45-minute panel, the partners will introduce the advantages of RFID for the production process of chocolate. Next to Turck's manager for the food & beverage industry, Dr. Bernhard Grimm, the managers of the companies **agathon** (chocolate forms) and **Hildebrand** (industrial cleaning machines), Volker Krämer and Harry Imhof, will answer your questions, as well as and Bernd Plies, head of electronic department at **Winkler and Dünnebier Süßwarenmaschinen** (confectionery plants).



Signal Processors for Flow Sensors

► With a new signal processor family, Turck completes its range of surveillance products for flow. The developers of the **FM (Flow Module) family** focused on easy usability, high functionality and a connection variety, which covers all modern requirements. The modules are implemented into the approved IM DIN-rail rack and may be configured at the push of a button or via IO-Link, respectively HART. Indicator-LED's, as well as a 10-segment-LED-bargraph show the current measuring status on-site. In addition to the flow, all modules continuously measure the temperature and possible failures. The FM-family consists of six types: three are applicable for the non-ex-area and three for the ex-area. Next to the FM-IM-3UP with three switching outputs and the FM-IM-3UR with three relay-outputs, the FM-IM-UPLI offers an analog output and two switching outputs. The FMX ex-type is additionally equipped with a HART-interface, while the other five types have an IO-link interface.

Wireless Modbus Network

► A scalable wireless network that can monitor and control I/O functions or provide serial communication at up to 56 locations has been introduced by Turck and Banner Engineering. The new **SureCross DX80** product line replaces costly wiring in a wide range of industrial, agricultural, power generation, water supply and waste disposal applications. Discrete, serial and analog devices that can be controlled by the network include ultrasonic and photoelectric sensors, pumps, counters, thermocouple and RTD temperature sensors. The remote nodes gather data and transmit control commands between the sensors or other devices and a central Gateway. The Gateway maps inputs from the remote nodes and interfaces with a PLC or HMI via RS-485 modbus or Ethernet/IP. Designed for applications where wiring is impractical or unaffordable, DX80 nodes and the devices they monitor can be powered by 10-30 VDC, battery or solar panels.



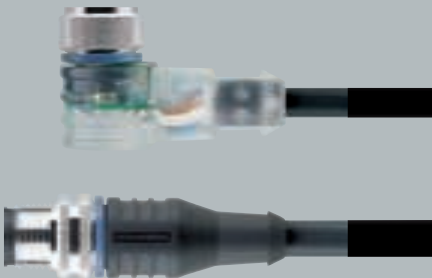
Supplier Award from Hauni

► The Hauni Maschinenbau AG, Germany, awarded Turck with the first Supplier Award in the commodity group electro-technics/electronics as the **"Best Supplier for the Tobacco Industry 2009"** With 95 out of 100 points, Turck has succeeded against the other competitors and fulfilled the sophisticated requirements for performance and quality of the world market leader in the field of engineering for the international tobacco industry.



Automation Line

► With the new **Automation Line** from Escha, specialist for cable and connection technology, Turck now offers a wide range of connector products which meet nearly all demands of engineering. The Automation Line with the new S370 cable is UL-approved and suitable for drag chains. It is free of halogen, silicone and PVC, flame-retardant and resistant against welding sparks, chemicals, oil, micro-



bes and hydrolysis. The Automation Line consists of M8x1 and M12x1 round plug-in connectors in different types and polarities. The two designs are also available with LED in an angular type. All products are available with 3, 4 or 5 poles.

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I/O Block Modules in IP67

► Turck supports the continuing trend of the use of Ethernet within the automation technology with **new I/O block modules** for CANopen, Ethernet/IP

and Modbus TCP. Together with the already existing modules for Profibus-DP and DeviceNet, the robust series now covers all established fieldbus and Ethernet standards. The Ethernet versions contain an internal switch and allow a network installation in line topology. The fully encapsulated BL Compact blocks combine a great variety of signals within a minimum of space: No matter if discrete signals or special applications like RFID – up to

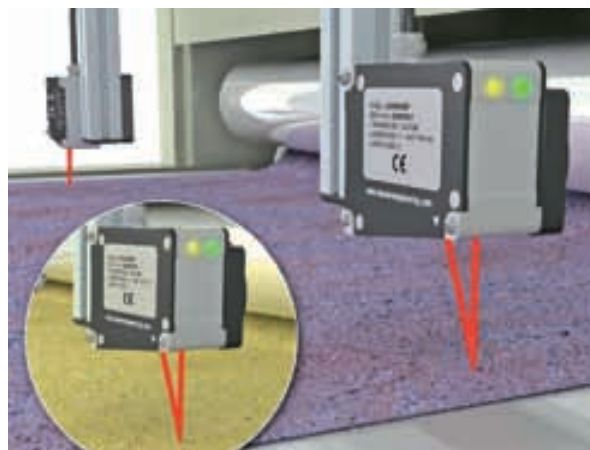


16 digital and/or analog I/Os of the BL Compact blocks allow a new compatibility for applications which is the next step on a way to a consistent, local automation. The combination of different field signals – analog and digital I/Os, PT100, thermocouples, RS232, SSI and RFID – in a compact case makes it easy for the user to find a solution. The new concept is based on the BL67 I/O system from Turck and combines the electronics of different BL67 modules in a single housing that is resistant against strong vibrations and dirt. The modules are equipped with either M8, M12 or M16 metal connectors for full plug-and-play functionality, monitoring diodes for on-site diagnostics and a dip switch for easy set up.

Laser Displacement Sensors

► Turck extends its portfolio with a series of triangulation laser displacement sensors for non-contact height or thickness measurement of a wide variety of materials, made by Turck's partner Banner Engineering. Sheet metal, wood, ceramic, paper, plastic, rubber, foam and baking dough are just some of the materials that can be measured for quality assurance. The new **LH Series sensors** provide precise measurement of distance, thickness and alignment. Applications include hot parts, machined parts, semiconductors and PCBs, shiny or reflective parts, and soft or sticky parts. There are three models in

the series, with measurement ranges of 25-35, 60-100 and 100-200 mm. Thickness is measured by two sensors mounted at either side the target that automatically synchronize with one another. Up to 32 sensors can be easily combined in a mixed measurement network of multi-track displacement or thickness sensors.



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Author

André Brauers is the product manager for linear displacement sensors and rotary encoders at Turck Germany in Mülheim



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The solid IP67-rated housing protects the new linear displacement and angle sensors from failures

A New Era

Inductive resonant circuit technology ushers in a new era of position detection

There are plenty of sensors for measuring distances and angles in industrial applications, as well as different measuring methods. When introducing a new sensor to the market, a company must provide more than just new housing and slight accuracy improvements. Turck, the sensor, interface, fieldbus and connection specialist, has introduced a new measuring principle that ushers in a new era for distance and angular measurement.

The biggest challenge is the transmission of the current position to the measuring system. The easiest way to accomplish this is a direct mechanical connection between the position detection and the sensor, like a potentiometric sensor. Though these sensors are inexpensive, they have their disadvantages; installation is a huge effort, especially achieving the exact axial adjustment. For fast rotations, there is an additional torsion spring coupling necessary to compensate for the vibrations. Furthermore, it is necessary to cover potentiometric odometers if they stick out from the machine. Last but not least, there is no enclosed housing possible for these sensors, which means a higher susceptibility to failure.

With the use of magnetic position detectors, a mechanical connection to the sensor is unnecessary. Corresponding systems deliver exact results of measurement and do not wear because of their enclosed housings. Although they are more expensive than alternative sensing options, linear displacement and angle sensors with magnetic position detectors are used in numerous applications, but they are not suitable where metallic splinters or electromagnetic fields are present. Furthermore, magnetostrictive linear displacement sensors have a large blind zone of up to 80 mm at each side: with an installation length of 200 mm, the user would have to trade off a measuring range of 40 mm with a blind zone of 160 mm.

Resonant circuit principle provides alternative

Turck developed new linear displacement and angle sensors that overcome these challenges. Unlike magnetostrictive or conventional inductive position sensors that use magnets to detect position, the new sensor detects an object's position via a resonant positioning device.



Turck offers the LI-sensors with a programmable measuring range of 100 to 1,000 mm

Quick read

With its new linear displacement and angle sensors, Turck shows that a developmental leap in sensor technology is still possible. The sensors unite all the positive qualities of customary measuring systems in one solution and eliminate the disadvantages. The new sensors work with the resonant circuit principle and detect an object's position via a resonant positioning device.



The robust IP67-rated linear displacement and angle sensors are ideal for renewable energies, as well as for...



...use in automotive engineering – models with 0.5 to 4.5V output and a temperature range of -40 to +70 °C are available



The functional principle: A transmitter coil integrated into the IP67-rated housing generates a high-frequency alternating field that activates the resonator integrated into the positioning device. Each time the transmitting coil stops transmitting, the resonator induces voltage into two receiving coils integrated into the sensor. The voltage intensity depends on where the positioning device overlaps the receiving coils. An integrated processor provides a corresponding proportional output signal in different formats: 0 to 10 V, 4 to 20 mA, IO-Link or SSI. The linear displacement sensors of Turck's LI-family have a resolution of up to 1 μm and the resolution of the angular sensors of the RI-family is up to 0.005°.

Turck's LI-sensor has high accuracy and reproducibility: To increase the measuring accuracy and the flexibility, the developers from Turck equipped the sensors with a coarse and a fine receiving coil system. The coarse system locates the resonant positioning device and finds out in which segment it is located. Then the sensitive receiving coil system performs a measurement that shows a high-precision determination of position. The advantage of this procedure is sensor to element distance independence resulting in consistent accuracy and reproducibility with the LI-sensor.

Fail-safe measuring system

Unlike magnetostrictive sensors, this resonant circuit principle is completely immune to external electromagnetic fields, and since there are no magnets involved, splinters that may affect the sensor's function do not accumulate on the positioning device. Unlike potentiometric detection solutions, not even dirt or dampness affect the sensor – thanks to a fully sealed housing. Moreover, the coils' special design guarantees that the output signal is not affected by the distance between the sensor and the positioning device. Because of this, measuring errors caused by slight deviations are effectively eliminated, as long as it is within the sensors 0 to 4 mm measuring range.

Wide range of application

The sensor's flexibility allows users to apply it to diverse applications like injection molding machines or metal working, where chippings or external magnetic fields might affect the sensor's functionality. The versatile LI-sensor series helps users optimize their applications and increase the machine's availability. Turck's linear displacement sensors are also suited for welding machines, as they are absolutely insensitive to strong magnetic fields that occur during welding processes. This feature allows users to utilize inductive linear displacement sensors in various applications like machine tools, molding presses, rolling machines, die-casting, bending or lining machines, dosing systems, mixing units, packing machines, wind turbines or stroke and alignment control systems.

With its high interference resistance and infinite mechanical life-span, RI-sensors for angle detection are suitable for numerous tough applications. For example, when adjusting rotor blades at wind energy plants, tracking solar panels or swiveling handles at the entry of a supermarket.

Easy to adapt

Due to their high accuracy and resistance to interference, the wear-free LI- and RI-sensors can replace many current solutions for distance and angular measurement. The linear displacement sensors include features that make them easy to apply in many areas. Opposite to the active sensing face, the sensor housing features an aluminum profile that allows easy application via optional mounting accessories, and stainless steel accessories provide safe mounting and flexibility with regard to the alignment of the sensor. Extremely short blind zones of only 30 mm on each side, along with a wide temperature range of -25 to 70 °C and the option to adapt the sensor by programming it to different measuring ranges, allows users to dispense with special



Inductive RI-sensors measure the opening angle of swiveling handles, like those used at the entry of a supermarket



**LI-sensors
have proved
effective in
injection mold-
ing machines**

sensors for specific applications. Using only one sensor family for measuring ranges between 100 and 1,000 mm simplifies warehousing and helps users reduce their total cost of ownership.

The RI-angular sensors can be easily attached with two shoulder bolts to solid or hollow shafts. With the help of an adapter with a diameter of 6 mm and 8 mm, a standardized hollow shaft sensor can be altered into a solid shaft sensor.

Both sensor families are available with different outputs: current/voltage and SSI-interface. Users can rely on Turck for the most versatile linear displacement solution for their application. Flexible output configurations allow the sensor to be easily integrated into existing automation structures. Whether the application calls for an analog output, IO-Link or SSI, a standard M12x1 connector provides a convenient connection to a wide range of fieldbus installations, including Turck's BL20, BL67 and BL Compact families.

LI-version with IO-Link

The LI-sensor is also available as a programmable high-end-model with an IO-Link interface where the user can define the measurement range, as well as the output signal from 0.5 to 4.5 V. Furthermore, up to four switching points can be adjusted.

Based on the popular three-wire technology, the IO-Link standard enables users to commission their intelligent field devices faster and maintain them more

conveniently. Requiring only one cable for data transmission and power supply, IO-Link simplifies connection diagrams and reduces cabling expenses, in addition to allowing users to download device parameters from one sensor to an identical replacement sensor. In this way, cumbersome manual parameterization on site becomes unnecessary. Since IO-Link sensors may provide additional diagnostics data via the combined process/configuration data channel, failures can be localized faster – allowing plant operators to reduce machine downtime significantly. Turck provides a corresponding driver – the device type manager, DTM – for its new LI-Q25 series. Allowing user-friendly visualization via a non-proprietary software tool like PACTware, DTM enables users to manage and parameterize their intelligent sensors with only a few mouse-clicks.

Conclusion

Based on the resonant circuit principle, the new linear displacement and angle sensors can be used in a wide area of applications that could not be solved efficiently in the past. Whether an application contains short or long-range distances, limited installation space or external interferences – Turck's new LI- and RI-sensors offer a flexible solution that can easily be applied to various applications. Turck developed the new sensors true to their motto "Sense it, Connect it, Bus it, Solve it" – meaning not only to supply single components, but integrated solutions. ■



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Christian Wolf expects a growth rate of more than 30 percent for 2010



“Focusing on Solutions”

Angela Scheufler, editor in chief of the engineering portal, developmentscout.com, talked to Turck's managing director, Christian Wolf, about the company's formula for success for the upcoming years

Where is Turck's place in the market currently? Do you classify the company as a component supplier or as a solution provider?

More and more companies pursue multiple business models at the same time and the lines are increasingly blurred. Today, we are mainly a provider of solutions with advisory skills and technical expertise, but we still have product and customer segments

where we offer complete system solutions. Our core competence lies in providing solutions. We position our company on three business models: complex components, problem solutions and systems business.

You established a strategic plan for 2010 to 2015. What does it contain?

To face future challenges, we included some of the following points into our plan.

With regard to sales, the vertical integration of industries is very important. We need a well-balanced mix between product/regional sales and solutions/industry sales. Therefore, it is essential to understand what our customers do and what their needs are. Our internal processes need to be reorganized to enable the vertical integration of the industries. We also need a global production footprint that identifies the cost of

design and localized production. We also have to reduce the complexity of our product portfolio by returning to the modular concept and pushing the modular principle. In this way, we will not be able to satisfy every request the customers have, but we will be able to offer innovative solutions at market-driven prices.

Modularization and not fulfill every request – isn't that less customer specific and therefore less customer friendly?

Within the limits of a strategic plan, the question is always: "What are we going to do?" and "What are we not going to do?" With the business models Turck has chosen to pursue, the risk lies in significantly increasing costs and complexity. To meet this challenge we have to slim down some business fields and therefore can't satisfy every single customer request. This is a difficult process, because if you remove products from your portfolio, you may be forced to say 'no' to the customer. But we never say 'no' without offering an alternative solution.

You announced a significant growth rate of 30 percent in sales for 2010. Do you have the capacity for that?

In regard production capacity, we had to restock our resources in 2010 as fast as we had to reduce them in 2009. We are organized very flexibly to support our modular concept and redundant operations at our different sites. However, we have experienced problems within the supply chain. In particular, electronic components have extremely long delivery times or you are forced to pay horrendous prices for them. But overall, we do a good job within the supply chain, which explains our good growth rates.

What industry provides the biggest challenge for your company at the moment?

The industries that were hit very hard by the crisis have higher needs than before the crisis, such as increased cost pressure and need for efficiency in operations. The requirements for advanced technology and promptness in delivery while reducing costs leads to a vicious cycle that intensified during crisis.

What is the current status of IO-IINK technology with your products?

We use IO-IINK for many products from Turck, but only for those where the user gains additional benefits through the

technology. We don't announce this on the market since it is not our task to merchandise the IO-IINK system. We focus more on the benefits to our customers. There are a lot of applications where IO-IINK is advantageous, but there are also applications where this technology isn't relevant.

But you were one of the initial companies that promoted the IO-IINK. Aren't you interested in pushing the technology further?

It is not our task to push a technology. It is our task to provide solutions that our customers really need and that are optimized for their specific requirements. Even if we use the IO-IINK technology on a regular basis, we don't make it a point to promote it. We support our image with unique features; IO-IINK is not a unique feature, but an initiative that we gladly support. We distinguish ourselves by the benefits of our solutions and products.

Turck also supports wireless technology. Will cables disappear in your opinion?

I don't think that they are going to disappear at all. In the biggest automation market, the USA, Turck is the market leader in the field of connectivity with more than \$90 million in sales volume. That shows the significance of the classic connection technology. Wireless is advantageous for some applications, but will not become the exclusive connection technology for production sites. The susceptibility for interference and an – admittedly small – default risk cannot be entirely eliminated. In reality, wireless is more a hype than a comprehensive solution. But if a customer wants a wireless solution, we are able to provide it through our strategic partner, Banner Engineering.

What are the innovations Turck is going to present at the SPS/IPC/ Drives in Nuremberg?

We have a few interesting new developments, among them a swiveling angle sensor family, which works with the same revolutionary system as the inductive linear displacement sensors of our LI-series. It makes the sensor absolutely insensitive to electromagnetic fields. Furthermore, we are going to show a new set of stream sensors and our new Profinet gateway that was developed in accordance to the guidelines of AIDA and the new modules for our block I/O system, BL compact. ■



“ We need a well-balanced mix between product/regional sales and solutions/industry sales. Therefore, it is essential to understand what our customers do and what their needs are. ”

Christian Wolf



“ It is not our task to push a technology but to provide solutions that our customers really need and that are optimized for their specific requirements. ”

Christian Wolf

Author



Angela Scheufler is editor in chief of the design engineering portal

www.developmentscout.com

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Alternatives to 19 inch systems

Many 19 inch systems are in need of replacement. In addition to plug-in card exchanges and DIN-rail machines, Turck offers another alternative – the excom remote I/O system

After decades of use, many 19 inch systems are in need of replacement. In addition to plug-in card exchanges and DIN-rail machines, Turck offers another alternative - the excom remote I/O system. Even if most of the old 19 inch cards still work – the electronic components are aging continuously and the older the cards get, the more likely a failure is to occur. To reduce this risk, the replacement of the 19 inch technology is recommended. A lot of manufacturers back out of this segment slowly.

As a specialist for interface and fieldbus technology, Turck offers its customers a choice for the modernizing

existing 19-inch installations: users can choose 19-inch interface cards, a DIN-rail machine, the interface modules backplane with their high packing density or the remote I/O system, excom.

A modern concept

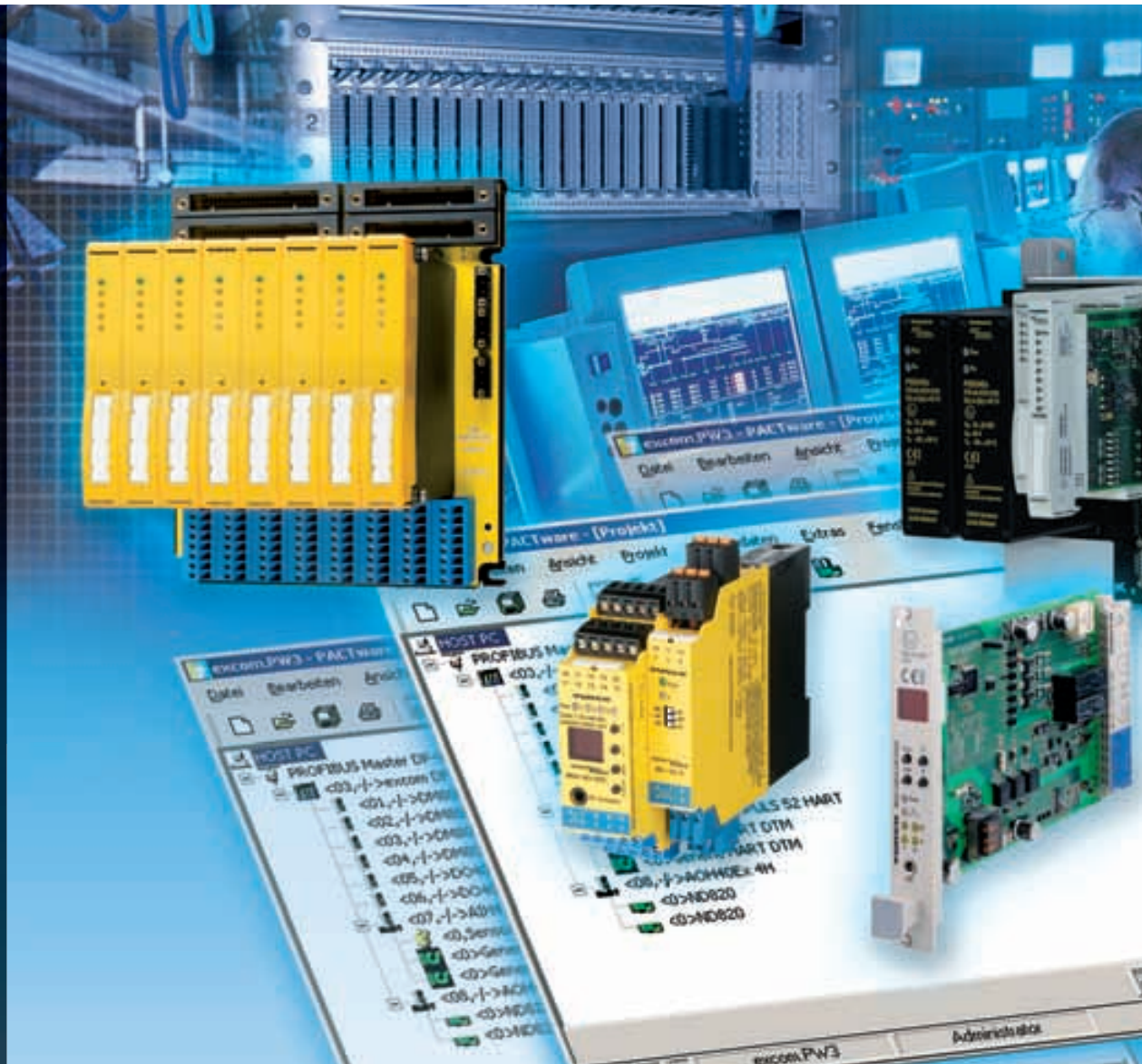
When a user thinks about an acceptable way to modernized their equipment, many questions come to mind: What are the arguments for one method over the other method? How much of the existing structure can continue to be used? How much additional infor-

Author

Stefan Kappel is key account manager process automation at Turck Germany in Mülheim



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The interface technology in 19-inch racks that was first installed in the 80s, is increasingly replaced by modern solutions

mation from the field is needed to organize a good asset management system?

If the user decides to keep the 19 inch format, the replacement is done with little effort. With cards from Turck, the user also receives a guarantee Turck still will support the 19-inch format in the future.

If the user decides to replace the 19-inch technology, DIN-rail technology is suitable. Turck also offers numerous solutions for the separation, forming, processing, converting and adapting of analog signals for nearly all operational areas. However, this option involves more time dedicated to installation, and problems with the packing density and the documentation could occur if there are too many signals in the old 19-inch base frame at the same time.

To avoid this issue, Turck provides an interface module backplane solution (IMB). It can process up to 32 I/O channels on a backplane with an area of 175 x 210 mm. The IMB combines a high channel density with a galvanic division and redundant power supply within a small space, thereby creating more space within the control cabinet. Analog cards that are pervious to HART and measurement amplifiers for temperature that are able to be parameterized via DTM complete the I/O solu-



The new excom Profibus gateway, GDP-IS, from Turck offers more functionality with little dissipation loss

tion and allow integrated asset management concepts for the physical layer. However, the use of the IMB system requires some structural alterations of the already existing 19-inch installations.

Remote I/O in 19-inch rack

Turck's excom system is a viable alternative for users who want to replace the classic point-to-point technology with a remote I/O solution. The modular rack is 19-inch compatible and can be easily installed into preexisting frames. Only a fieldbus cable needs to be laid, which forwards all signals to the control system. excom is very user-friendly in general, because it is possible to run a signal transmission test during start-up without requiring the connection to a PLC (Masterclass 1). In regard of the chosen redundancy procedure, complete stations can be added or removed from the bus – an important criterion for a retrofit or the initial configuration of a plant.

The excom system can be operated by 24 VDC, 115 or 230 VAC. The rack has space for two power packs, two Profibus gateways and up to 16 I/O cards. This equates a maximum expansion of 128 binary (NAMUR) or 64 analog signals. All cards are hot-swap-able and have an additional LED status display on the front of the card. All Zone 0 and Zone 1 signals can be operated from the field. The connection of the system to the controls is carried out by Profibus-DP V1. Profibus can be configured to be redundant if needed – just like the feed-in. The connection via Profibus has the advantage of additional enhanced diagnostics, and direct and automatic HART access to the field devices is possible. ■

▶ Quick read

About 30 years after its launch, many 19-inch cards can be found in numerous plants. Turck supports updating these systems with a large portfolio of FDT/DTM-based interface solutions that ranges from modern 19-inch cards, over DIN-rail machines, to the convenient remote I/O system, excom, that easily can be installed into 19-inch racks.



Author

Thorsten Evers is the product specialist for fluid sensors at Turck Germany in Mülheim



Webcode | [more21070e](#)



IO-Link



The PC200 and PS300 (with display) sensors are available with G1/4", 1/4"-NPT and R1/4" process connections

Flexible Hydraulics Specialists

The new PC200 and PS300 pressure sensor family by Turck meets the requirements for hydraulics engineering

Pressure sensors that are used for hydraulic systems have to meet specific requirements, but mainly they have to be very robust. Usually the hydraulic pressure is between 6 and 600 bar, but it is dynamic and not static. The constant alternating pressure not only strains the cells and the sealing material, but also the housing itself. It is important to choose the right combination of cell technology, sealing material and the sensor's housing to ensure reliable pressure monitoring.

To resist dangerous pressure peaks that may exceed the normal operating pressure by several times over, the choice of the right cell technology is essential. Pressure measuring cells made of ceramic are approved for these kind of applications. They offer over-pressure capability, a good drift performance and a fast reaction time. Furthermore, ceramic is resistant to aggressive substances.

Because of these positive qualities, a measuring cell made of ceramic is the core of the new pressure sensor families, PC200 and PS300, from Turck. This piece of equipment processes the measuring signals directly from the cell and forwards them digitally to the evaluation electronics. The result is better performance when it comes to excess pressure, compared to standard ceramic cells.

High protection category IP69K

The pressure sensor is not only stressed by the hydraulic pipes, but also through outside influences like oil spray, mechanical forces or EMC influences. The PC200 and PS300 family (with display) are IP69K-rated for all areas of pressure measuring. The housing is made of special steel and the sealed control and display elements don't allow moisture into the device. Further, mechanical forces up to seven joules – even on the display – don't have any effect. Because of the new cell technology with integrated digitalization of the data, the PS300 achieves a high electromagnetic tolerance, as well as a high accuracy of 0.5 percent. The repeatability of sensors like this is mostly underestimated.



Often, people look at the data sheet for the tolerance and the error information first, but what looks accurate at first may not be because temperature, hysteresis and other factors have not been considered.

The reason for inadequate repeatability often results from choosing the wrong material, which cannot guarantee the ideal interaction under pressure and temperature load changes. Naturally, the electronic components play an important role. Turck took this into account and made sure that the new cells had an improved repeatability by working on the signal processing. The signal is no longer analog but digital, which reduces interfering signals that occur through the development of extra-low voltage.

The sensors from Turck with their robust, ceramic measuring cells and integrated digital signal processing show a considerable better performance than a standard ceramic cell, because the measuring signals are digitally forwarded to the evaluation electronics

Quick read

To measure hydraulic pressure doesn't seem to be a big challenge at first glance, but it is not easy to find the right pressure sensor for this application in the right range. Not every sensor can cope with the special requirements of the hydraulic industry.



The PS300 is parameterized with two push buttons that are easily operated with gloves

User-friendly

Product characteristics are not the only important factors; manageability is essential. This includes, among other things, enough space for the use of tools during mounting, sufficient access for the electronic connections and adequate programming possibilities.

Turck built upon its PS400/500 pressure series in the new sensor family. A large, four-digit display shows the user the operating pressure, even through oily glass. The equipment is parameterized with two push buttons that are easily operated with gloves. A recessed push button needs to be pushed to confirm the changes with the parameterization; mistakes can be avoided with this safety feature. Optionally, the PS300 family can be operated according to the VDMA specification 24574-1.

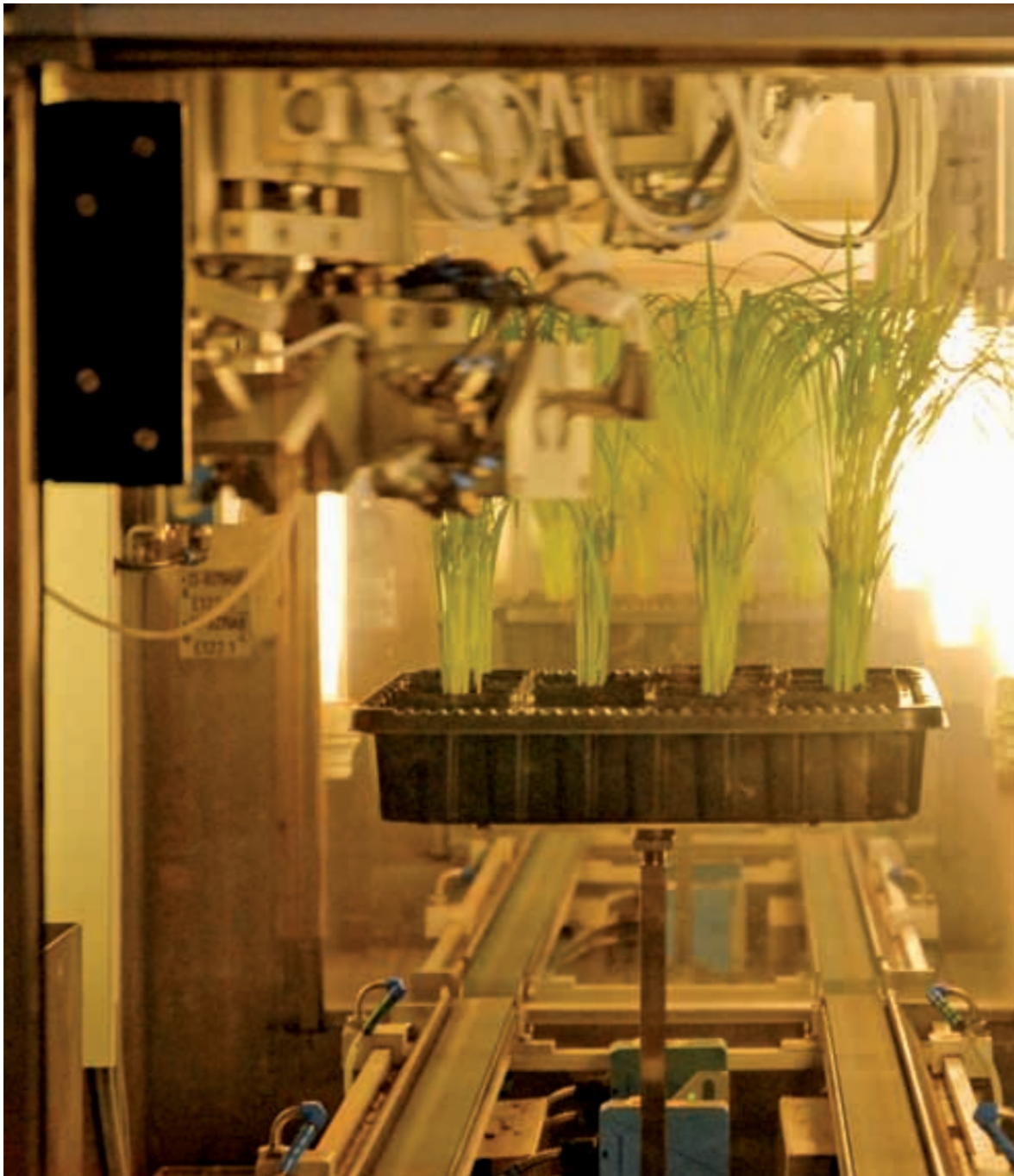
Until 15 years ago, mainly contact switches were used for monitoring pressure. These were reliable, but only to a certain extent. Higher requirements demanded by applications – like easily switching the units or reprogramming the switch points – made the electronic push button necessary. Today we face a change again: Better access to the instruments is needed to read the sensor data more easily. These days, a simple binary or an analog signal is not sufficient.

IO-Link in the future

IO-Link is the technological solution to these changing demands, and provides users with a standardized tool for the world of sensor technology and actuating elements. The technology offers new possibilities to make machines and systems even more efficient. The IO-Link technology is integrated into the PS300 sensors, so that users can switch to the IO-Link in the future and not at the present moment if they choose. If you talk about investment protection, you also have to talk about reliability and quality. A low price is tempting, but if there is a quality problem with the equipment it gets more expensive in the end, i.e. when there is a shutdown of a machine because of a low-quality sensor.

Conclusion

During the development of the PC 200 and PS300 family, Turck focused on quality and longevity of the product, as well as on the cutback of storage costs. The sensors with their robust, ceramic measuring cells and integrated digital signal processing show a considerable better performance than a standard ceramic cells. The two sensor families offer a device for all applications, and with the IO-Link the sensors adapt very quickly to different situations. ■

**Author**

Stefan Kappel is a key account manager for process automation at Turck Germany in Mülheim

Webcode | **more21050e**

Primary-screening: In three spraying units, the plants are sprayed automatically with the substance that is about to be tested to see if there is any effect

User www.bayercropscience.de Integrator www.tectrion.de

Efficiently Control

Bayer CropScience tests new active components with RFID-support from Turck

In their research laboratories in Monheim, Germany, scientists at Bayer CropScience are continuously looking for new active components with the help of new and modern machines. After a lengthy process, these active components are developed into efficient agricultural pesticides for worldwide use.

One of the first steps in this process is called primary-screening. During this process, the newly developed substances are tested for their effectiveness by apply-

Quick read

Scientists from Bayer CropScience AG test new active components for their suitability as agricultural pesticides by spraying them onto plants in an automated system. The RFID-system, BL ident, from Turck guarantees transparency and the clear identification of each plant.



After the plant pots leave the spray units, all the relevant data is written onto the RFID tag in the middle of the plant pot



After the plants have passed through the current program, the data can be read on the display

ing them onto plants automatically. Depending on the effect of the application, further research is conducted in the laboratory, then in the greenhouse and finally outdoors.

Fully automatic primary-screening

Bayer CropScience developed a fully automatic spraying line for the primary-screening process that manages more than 25,000 spraying operations every year. During each application cycle, three plant sets are sprayed with three different test components simultaneously. The plant sets contain the host plants for eight plant diseases. "During the primary-screening process, we spray up to 100 new substances in different concentrations onto the plants on a daily basis," says Bernd Schulten, operating engineer at Bayer CropScience. "To not lose the general view and the control, we use soft-



BCS engineer Bernd Schulten sees the current status of the machine at a glance

ware support for our tests. We get the test series designs from the data processing service center. We import them here, execute them and send back the results," says Schulten.

The most important factor during this process is the clear identification of the plant sets and the correlation to the substances applied to them. Originally, barcode-stickers were used, but the machines were recently updated with contact-free RFID-technology. "In cooperation with the industrial supplier Tectrion, who maintains and updates all our machines in Monheim, we updated our machines with a third spraying booth and the whole system with a new SPS. Previously, only single machine processes, like the spray booth, conveyor and pipette machines, could exchange signals, but now we can control and monitor everything via SPS," Schulten explains. "In this context we wanted to get rid of the barcode-stickers, because they were not ideal for the wavy design of the plant pots and the environmental conditions they were exposed to. Also, the printer was high-maintenance."

During the search for the ideal RFID-solution, the technical project-team considered various different systems and providers. In the end, the decision was made in favor of the BL ident RFID system from Turck. "We wanted an RFID system that is easy to handle, robust and cost-saving in comparison to other products. We found all this with the system from Turck," Schulten comments.

Easy handling with CoDeSys

For Volker Bachmann, a specialist for controls in the Robotik department at Tectrion, BL ident has another unbeatable advantage: "Turck's RFID-System is programmable with CoDeSys and therefore creates the flexibility to outsource complex actions to the controls on-site. That is how we unburden the computer that controls the test procedure."

During the change to RFID, the technicians from Tectrion had to equip about 1,000 plant pots with a tag that was glued to the center of the pot. Each tag has a memory space of 128 Byte and contains all the information regarding the specific plant. "Originally, we con-



Dietmar Kleist, laboratory assistant for biology, is able to read the data from each plant pot with a handheld-reader, if needed

sidered saving only the ID-Number on the tag, but that wouldn't ensure enough flexibility. Now, where all the information is saved on the tag, the machine can work self-sufficient and every single plant pot is identifiable, even without a central computer," says Bachmann.

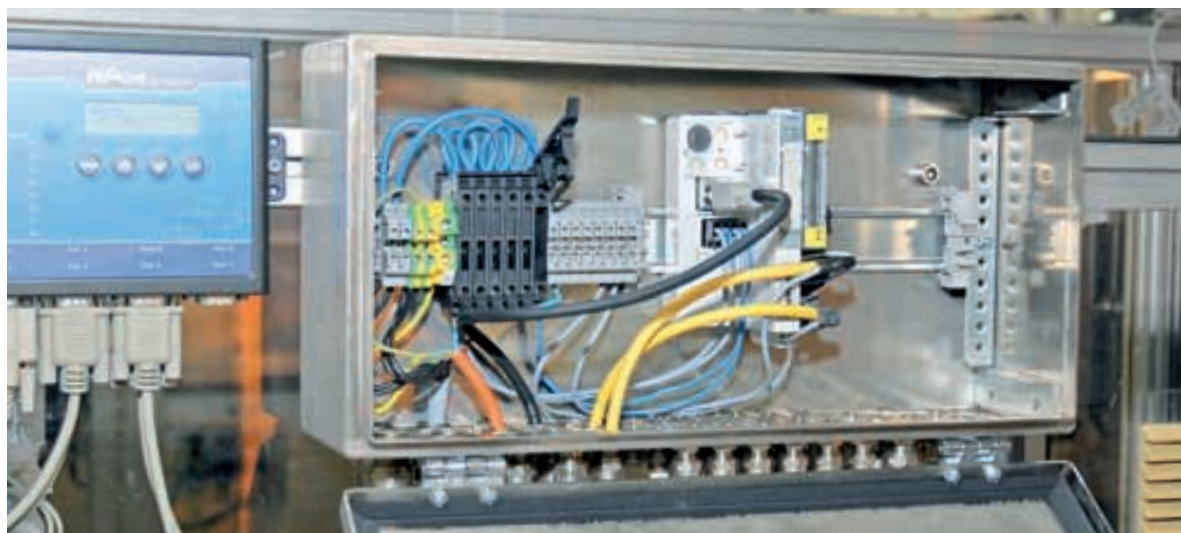
A Turck Q80 combined read/write RFID head writes and reads the data directly after the plant pots have left the spraying units. Another read/write head is located at the spot where the plant pots leave the machine. If the machine fails or the pots have to be identified for some other reason, Bayer employees can read the current status of the pots with a handheld RFID reader. The read/write heads send RFID signals to the BL20 modular remote I/O system. With the help of a special RFID disc, the data is collected and transferred to a gateway that carries out the local RFID communication, so that only reference data has to be sent to the main computer via Modbus TCP.

"Working with the system from Turck was very comfortable," Bachmann adds. "It was not difficult to program and I could rely on established standards, like Ethernet, so that we could integrate the system into the machine easily. Because of the modular concept, we also could set up everything exactly as we wanted to." ■



“Turck's RFID-System is programmable with CoDeSys and therefore creates the flexibility to outsource complex actions to the controls on-site. That is how we unburden the computer that controls the test procedure.”

**Volker Bachmann,
Tectrion**



The BL20 gateway is programmable with CoDeSys and carries out the RFID communication

Author

Toralf Märtin is the Key Account Manager for the Volkswagen group at Turck Germany in Mülheim



Webcode | **more21053e**



After the coating, the car body is transferred from the skid system to the overhead monorail

User www.volkswagen.de

Safe Transfer

Volkswagen AG in Wolfsburg relies on measuring light curtains and the BL67 I/O-system from Turck for a flawless vehicle transfer from a lifter onto an overhead monorail

Fans of track and field recognize the critical moment when a baton is passed during a relay race. Is the transfer successful or does the team lose because the baton was not passed successfully?

Less spectacular, but much more expensive, are unsuccessful transfers for Volkswagen AG in their factory in Wolfsburg, where coated car bodies are transferred from a skid system to a power and free system on their



way from the paint finishing system to the final assembly. This transfer is executed with the help of four transfer lifters that lift the car body to a required position so that the transport gear is able to use the openings through the front and back window to lift the vehicle onto an overhead monorail. The car bodies rest on grapplers attached to the monorail and glide securely to their next destination. The critical point in this process is the moment when the grapplers take the car body from the skid system.

The position of the car bodies during the transfer was originally diagnosed by a switch on the base of

▶ Quick read

In the Volkswagen AG factory in Wolfsburg, Germany, freshly coated car bodies are transferred by four transport lifters onto an overhead monorail. Because of the tolerances that are inherent to the system and imprecise measuring, problems with the positioning of the car bodies required an adjustment for the vehicles. With the new EZ-Array measuring light curtains and BL67 I/O system from Turck, the transfer lifters work without malfunction.



All information at a glance: The measured data is displayed graphically on the control panel

a measuring system. Only 20 to 50 millimeters within the overhead monorail and the car body, as well as potentially unstable positions of the vehicles, led to a margin of error that required costly adjustments during the transfers. The position of the transfer lifters and the grapples was based on operators visually monitoring the system, and the exact position of the vehicle

wasn't safely identified since it couldn't be guaranteed that the car body really was in the correct position.

New measuring system

To guarantee that the vehicles were transferred safely, a new measuring system that would show the exact

With the Modbus-RTU protocol, measured data from the light curtains is sent to the IP67 rated I/O system, BL67, from Turck, where it is transformed by a programmable gateway into the Modbus-TCP format and is forwarded to the controls



► EZ-Array measuring light curtain

The EZ-Array light curtain has a resolution of five mm and comes with two PNP or NPN switching outputs, as well as two 0-10V or 4-20mA analog outputs. Due to its anodized aluminum body, the light curtain may also be used in extreme environments with temperatures between -40 to 70 °C. The two-part light curtain allows an easy startup: The body of the receiver contains the electricity for analysis, which can be configured with the help of six DIP-switches. An external controller is not necessary. A three-figured display and a LED bar graph show the status and the alignment of the sender and the receiver. The adjustment of the receiver also can be done via software with the use of the RS485 gateway, which is also used for the data transfer of the Modbus-RTU protocol.

position of the lifters, grapplers and car bodies was necessary. The company came to the conclusion that the most efficient solution to their problem was measuring light curtains. After analyzing different models and providers, the specialists at Volkswagen chose the EZ-Array light curtains manufactured by Turck's optic partner, Banner Engineering.

With a range of up to four meters between the sender and the receiver and a resolution of five millimeters, the light curtains from Turck provided the necessary range required by Volkswagen. In addition to using light curtains from Turck, Volkswagen chose to use Turck's BL67 modular I/O system. This system incorporates a gateway that can be programmed with CoDeSys and it sends the data to the controls via Modbus-TCP, exactly as needed for the application.

Real-time measurement

Volkswagen is able to measure the exact position of the vehicle during transfer, because the measuring light curtains are placed in a horizontal position at the transfer point on the overhead monorail. The concerns related to spacial distances and human error are no longer relevant.

In principle, the measuring light curtain consists of numerous, parallel light barriers that send a signal as soon as the ray of light is interrupted. Volkswagen uses two EZ-Array pairs with 900 and 1,200 millimeter lengths for each transfer lifter. The light curtains measure the exact position of the roof edge on the car body and the position of the front and back grappler in real time.

With the position of the edge of the roof of the car body identified, the grapplers can be operated precisely. Even if the car bodies move during the procedure, the measuring light curtains record the change of position reliably and the grapplers are repositioned accordingly. This allows a precise procedure and a safe transfer of car bodies with a drastically reduced possibility of the cars being damaged. During the first month of testing this system, Volkswagen noticed an explicit improvement in the availability of the equipment, and



The EZ-Array measuring light curtains record the position of the car body and the grappler in real time

the transfer problems were reduced by 50 percent within four weeks. In the meantime four transfer lifters are working with the new measuring light curtains in Wolfsburg – without any problems. ■

Cast Off

Updated level measurement system for the sea and domestic port in Papenburg uses wireless data-transfer as a cost-saving alternative to complex cable laying

If the placid banks of the river Ems between Papenburg and Emden in the northwest of Germany are as crowded as the Hockenheimering when Michael Schumacher is driving a good race, then the time has come: a cruise ship has arrived at the Meyer dockyard and must be led through the tight waterway towards the North Sea – an impressive spectacle that attracts a lot of onlookers.

The first challenge for the ship captains comes directly after the boat leaves the dockyard in the deep water harbor, because of the locks located between the dockyard and the river Ems. The first lock is responsible for making sure the tidal range of the river (about three meters deep in the middle) doesn't affect the water level of the inner harbor. About 100 meters away from the dock lock, a sea lock separates the industrial harbor in Papenburg from the river Ems. No matter if it is a dock lock or a sea lock, the most important factor

for a safe sluice is a perfectly calculated water level in front of and behind the lock gates.

For many years, the Papenburg port used a mechanical measuring system to measure the water levels at the locks. When the city decided this process was no longer up to standard, it began searching for a new way to measure and display the exact water level. After a public tender offer, Josef Graupe GmbH & Co. KG from the city Haren got the job to update the harbor. The founder of the company, Josef Graupe, and his ten employees are specialists for control and measurement engineering on docks, bridges and weir systems in Germany.

Level measuring with radar sensors

At the Papenburg port, Graupe equipped the four measuring points with radar sensors that measure

Author

Hans-Peter Lörer
is a sales specialist
at Turck Germany
in Mülheim



Webcode | **more21054e**

Modern radar sensors replaced the mechanical measuring system at the sea and domestic port in Papenburg



User www.papenburg.de



On the roof of the station, four radio receivers are installed



At a glance: The display at the central station always shows the water level of the Ems, the lock and both inner harbors



The waves of the radar sensors are reflected by the water surface, the elapsed time defines the level

the water level by using electromagnetic waves. The waves emitted by the radar sensors are reflected by the water surface, and the elapsed time defines the water level. While one of the sensors measures the level of the river Ems continuously, the other sensors measure the water level in the sea lock and the water level in the harbor. At the central station of the sea lock, this data is processed and displayed on four readouts and a monitor.

Only a wireless radio-based system was considered for sending the data from the four measuring points

to the monitor, because of the distance involved and the cost of laying new cables. To find the right wireless solution, Graupe checked systems from different providers before choosing the DX70 solution, which is developed and produced by Turck's partner Banner Engineering. "Regarding the price-performance ratio, Turck is unbeatable," Graupe explains. "The DX70 devices are fantastic. I can install them everywhere and quickly have a connection of more than hundreds of meters. Also, the installation of the radio system was done quickly; we only had to install the data line from the sensors to the senders and the power supply system from a facility nearby."

The analog radio signals are recorded at a central station by four DX70 receivers and sent to Web based displays that can be accessed from the internet. Plans are being developed for a Smartphone version as well. In this way, ship captains and other interested people have the opportunity to check the current water level in the Papenburg harbor with ease.

Radio solution for every application

Turck's DX70 is a point-to-point radio solution that – as in this example – is mainly used for the transfer of data from subsequent measurements. With the DX70-gateways, up to eight binary inputs and four binary outputs, or, alternatively, four analog signals can be transferred. For more complex automation tasks, Turck offers the DX80, a radio based network topology that can handle a gateway and up to 99 remote nodes.

All DX radio systems work with a 2.4GHz frequency band and use FHSS technology with TDMA as a protection against perturbation. The gateway and nodes are IP67 rated type and work in temperatures between -40 and 85 °C. ■



“Regarding the price-performance ratio, Turck is unbeatable. The DX70-devices are fantastic. I can install them everywhere and quickly have a connection of more than hundreds of meters.”

**Josef Graupe,
Graupe Elektro**

▶ Quick read

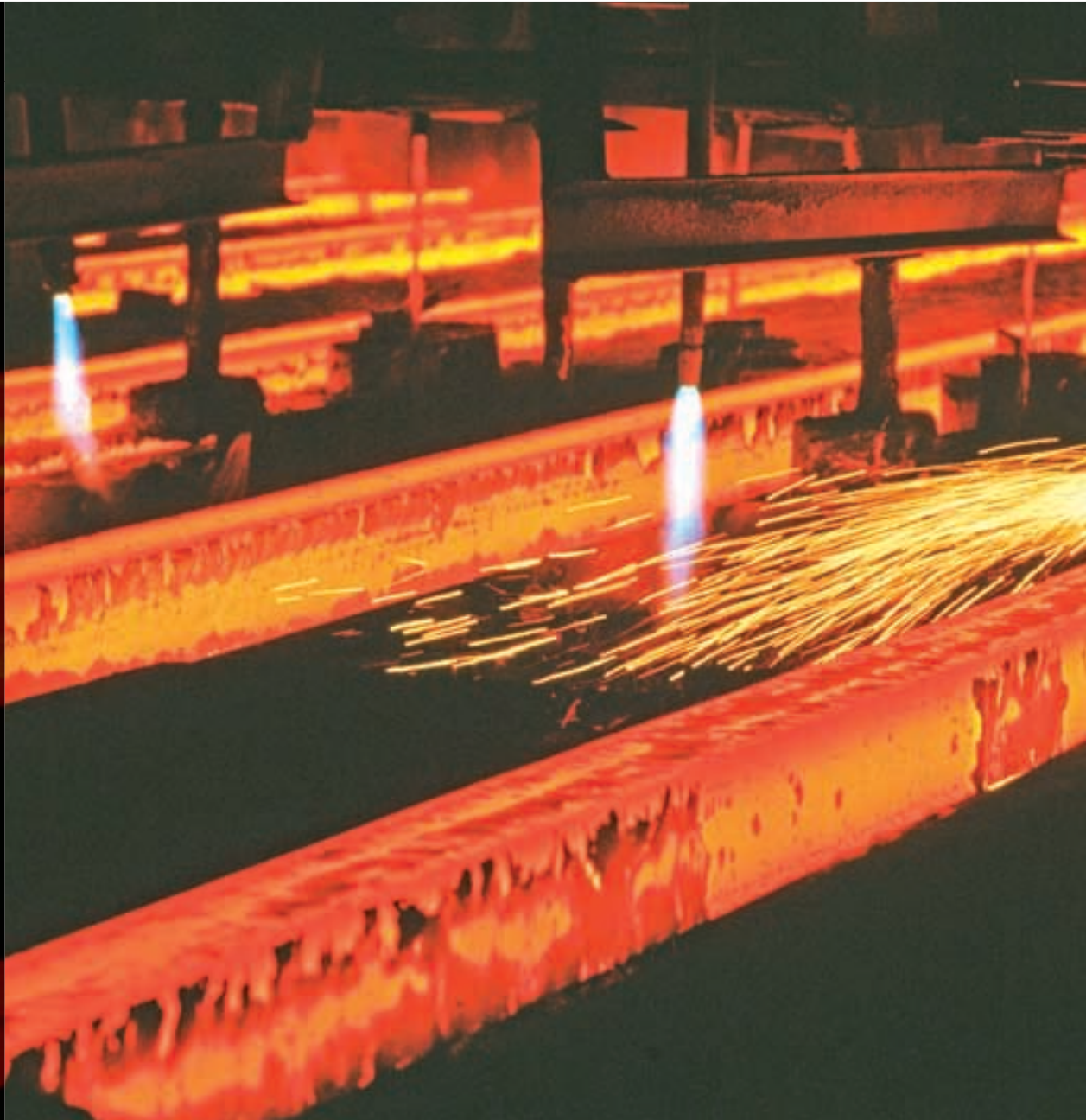
To update the level measurement at the Papenburg port, the old mechanical measuring system was replaced with modern radar sensors. Turck's wireless solution, DX70, guarantees an efficient and reliable signal transfer via radio.

Author

Zukui Zhang is a product manager at Turck China in Tianjin



Webcode | **more21055e**



Turck's uprox+ sensors resist vibrations, heat, water vapor and oil in the hot rolling mill

Hot Iron

Inductive sensors from Turck's robust uprox+ family guarantee the reliable operation of hot rolling mills from the Ningbo Iron & Steel Corporation in China

The Ningbo Iron & Steel Corporation is a subsidiary of the Shanghai Baosteel Group Corporation and produces about 4 million tons of iron and steel products in China every year. Located at the south of the Yangtze estuary, the company produces numerous metal sheets using the cold and hot rolling method.

The hot rolling method alone produces 9,000 tons of sheet metal every day. To improve the automation of the production and logistics, the hot rolling mill uses numerous inductive sensors from Turck

that measure the horizontal and vertical movements of the plant components to obtain an exact measurement of the position. Employees from the Ningbo Iron & Steel Corporation tried using products from other manufacturers, but experienced negative results. Because of the small sensing distances and installation restrictions, the sensors had to be installed in close proximity to the moving metal blocks, and were often destroyed by heavy vibrations or through direct contact. Furthermore, the sensors could only



The robust uprox+ sensors meet all requirements of the Ningbo Iron & Steel Corporation

▶ Quick read

Because of repeated shutdowns caused by the malfunction of inductive sensors, the Ningbo Iron & Steel Co. was looking for a reliable replacement – a sensor solution for the rough working conditions. These days the robust factor 1 sensors of the uprox+ family from Turck guarantee a safe operation of the plants.

be installed at the lower part of the plant, where they were exposed to water, oil and dust.

To avoid a plant shutdown due to sensor malfunction, it was important to find more reliable sensors with a larger sensing distance that could resist the extreme conditions of the steel production. However, sensors with a higher sensing distance create stronger magnetic fields that can cause two-way disturbances, therefore it was also important to find sensors with a high resistance to electromagnetic interference.

Robust Factor 1 Sensors

After an intensive analysis of the sensors that currently are offered on the market, the automation experts from Ningbo Iron & Steel Co. decided on the robust uprox+ sensor from Turck. Thanks to their multi-coil technology, uprox+ factor 1 sensors recognize all metals

without a reduction factor: they have the same rated sensing distance for iron, special steel, copper, aluminum or brass. This fact means that only a few sensor types are applicable to numerous applications, where the user previously needed many different types of sensors. Compared to conventional ferrite core sensors, uprox+ sensors measure the metal targets with considerable higher sensing distances – up to 50 mm. The model NI30U-M30-AP6X-H1141, which is used in Ningbo, offers a rated switching distance of 30 mm.

Uprox+ sensors don't contain a ferrite core and are immune to magnetic fields so that two-way disturbances are not an issue. This feature also results in installation options that protects against collisions. Additionally, the high IP68 protection rating makes the sensors resistant to the extreme environmental conditions of the hot rolling mill, like water vapor, vibrations, oil or heat. ■

Intelligent Water Treatment

Water treatment plants from WJP Solutions are used in many Australian buildings – now they are working with DeviceNet fieldbus technology from Turck

As specialists for water treatment plants that deal with waste water and water for domestic use, WJP Solutions, headquartered in Melbourne, Australia, has completed various large projects in Victoria, New South Wales and Queensland. WJP Solutions' water treatment plants are mainly found in public buildings, shopping malls, universities and golf courses. With a team of approximately 25 employees, WJP Solutions is able to implement entire projects – from the design stage all the way to installation, commissioning, fine-tuning and maintaining of the complete system.

WJP Solutions' latest project was to design and implement a waste water treatment plant at the

South East Queensland Correctional Facility in Gatton. This plant was first built in a modular fashion at WJP Solutions site in Melbourne and then shipped to the location in Queensland. To use the modular concept efficiently, Petar Bijelac, the electrical automation manager of the company and his colleague, Aleksandar Stanojevic, made the strategic decision to utilize fieldbus technology to replace the conventional methods used in the design and implementation of their projects. Compared to the conventional methods, fieldbus solutions cost less and are faster to install – especially with regard to the modular installation during reconstruction on site.

Author

Christian Homoc
is the Product
Support Engineer
at Turck Australia
in Melbourne



Webcode | **more21056e**



**WJP Solutions relies on
fieldbus technology
from Turck for their
new water treatments
plants**





The motor starters, which are connected with a BL20 DeviceNet gateway, are installed in no time at all

Comprehensive portfolio

After Bijelac and his team compared the current products on the market, they decided on Turck. "We assessed similar systems from other manufacturers and we found the solution offered by Turck to be the best in terms of ease of integration and cost. Support of the

product has played an important role in selecting Turck as a supplier, as well," says Bijelac. Since the beginning of the project, Turck has provided support from software or CAD-data to specific device configurations. In addition to the support Turck provides, the functionality, reliability and price-performance ratio Turck offers with its robust IP67-rated components is exactly what WJP Solutions needed for its project.

For the project in Gatton, Turck delivered 16 digital and analog advanced I/O modules (AIM stations) and 27 motor starters for its BL20 distributed I/O system. The motor starters can be easily installed next to each other within the control cabinet, and are connected to the plant via three BL20 DeviceNet gateways.

With the robust connection technology from Turck, WJP Solutions was able to connect the pumps, valves and numerous sensors, including the devices that measure pH-value and chlorine, easily and reliably. WJP Solutions is also using Turck products for a project at the Westfield Sydney City Shopping Center. Turck is supplying this project with 16 AIM stations, both digital and analog, as well as two BL67 distributed I/O systems with analog output modules. Both systems utilize DeviceNet cables, splitters and connectors from Turck.

DeviceNet on board

Another advantage of the fieldbus solution from Turck is the fact that each I/O station can be connected directly to the DeviceNet network. The systems are easily integrated into the network controlled by an Allen Bradley PLC with a DeviceNet master. The alternative, a central DeviceNet station where the sensors are connected in a star topology, becomes superfluous. ■



“We assessed similar systems from other manufacturers and we found the solution offered by Turck to be the best in terms of ease of integration and cost. Support of the product has played an important role in selecting Turck as a supplier, as well.”

Petar Bijelac,
WJP Solutions

▶ Quick read

To support the modular concept of their water treatment plants, the Australian company WJP Solutions replaced conventional wiring with fieldbus technology. Their partner from the beginning was Turck, because of its comprehensive portfolio of compact and modular I/O systems for DeviceNet.

Author

Peng Wang is a product manager for fieldbus technology at Turck China in Tianjin



Webcode | **more21057e**



A modern shipping plant for iron ore was developed at the Taicang Wugang Port

User www.tcport.gov.cn

Let the Water Flow

In the port of Taicang, an extensive sprinkler system reduces the dust pollution that is caused by shipping iron ore – Turck's fieldbus modules support the system

China has become the world's export champion. To develop and keep this title, China generated a huge need for resources. This need can only be filled with the help of modern transportation solutions. Therefore, numerous shipment centers for coal, minerals and iron ore, as well as computer terminals, need to be expanded. China will form five large-scale, intensive, modern port groups, such as the Bohai Sea, the Yangtze River Delta and regions at the southeast and southwest coast.

Taicang, located in the south bank of the Yangtze River estuary, is the best intersection for river-and-sea coordinated transport. In order to meet the growing iron ore import demand and to provide efficient iron

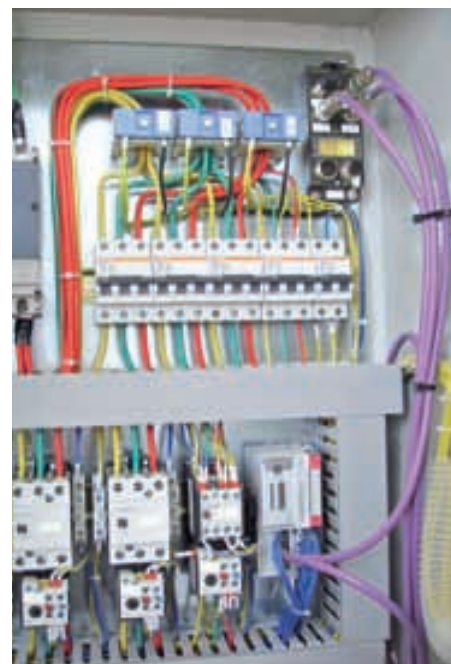
ore transit services in the Yangtze region, the Ningbo Port Group, the Wuhan Iron & Steel Group and the Sino-trans Group established the joint venture of the Taicang Wugang Port Company Limited in 2003. Next to the Ningbo Port, the Taicang Wugang Port will be the second biggest port for the local production of iron and steel. If the port is completed, the annual throughput will be up to 30 million tons.

Sprinkler system against dust

A huge bucket wheel for iron ore works at the bulk material port of the Taicang Wugang Port. A large amount of dust is produced during the shipping pro-



Each sprinkler is equipped with a control cabinet with a BL20 station



BL20 station and Profibus repeater

cess so the operating company decided to install a sprinkler system to reduce the dust impact on the environment. Twenty-one sprinklers on each column are distributed over a length of 800 meters in order to cover the entire area. There are two traditional control methods for the sprinkler system. First, the signals of each sprinkler will be transmitted through cables to a central control unit. This option would allow easy start-up and programming of the system, but laying the countless cables would lead to a substantial increase in cost.

The second method is to equip each sprinkler with a small SPS to achieve control. Although this method could solve the cable problem, a large number of small SPS's would increase the cost and manpower because of the programming required. Also, these local solutions are not ideal for maintenance work. For the system integrator, Shanghai TGE Environment Equipment & Engineering Co. Ltd., in charge of the control system's installation, programming and commissioning, only a fieldbus solution came into consideration. All advantages of a central control can be used without having the disadvantages of a complex wiring. All signals are collected from I/O stations directly at the sprinklers and are forwarded via Profibus to the controllers.

Flexible BL20 system

After comparing different products, the system integrator chose the BL20 Economy distributed I/O system from Turck. With its modular concept, high signal density, small size and low price per channel, Turck's fieldbus solution was the clear choice. "Because of the flexible structure and ability for expansion, the tailored I/O system, BL20, from Turck is quite fit for our distributed system," says Chunyang Zhong, manager of Shanghai TGE Environment Equipment & Engineering Co. Every fieldbus station consists of one gateway and I/O mod-

ules, which are configured for the different required signal types. The signals are forwarded from the gateway to the main controls via Profibus-DP. Because of the large distance within the plant, an additional Profibus-repeater from Turck was used to increase the maximum distance from 1,200 to 2,400 meters.

Turck's I/O-assistant diagnostic software was another reason for the BL20 becoming the product of choice. The FDT/DTM based tool supports the user during design, start-up and maintenance of the network. With the help of the I/O-assistant, each BL20 station can be configured on-site – without having to be connected to the main controls.

Conclusion

The BL20 system from Turck contains the features needed for use in the spacious Taicang Wugang Port. The modular system is flexible and adapts to the requirements of the different stations. The system integrator and users benefit from numerous possibilities to save costs – not only through the reduction of the cables, bridges, terminal blocks and control cabinets, but also through the fast start-up and operation of the I/O network. Thanks to the extensive diagnostics function provided by I/O-assistant, network errors are located and taken care of quickly. ■



“Because of the flexible structure and ability for expansion, the tailored I/O system, BL20, from Turck is quite fit for our distributed system.”

Chunyang Zhong,
Shanghai TGE
Environment
Equipment &
Engineering Co.

▶ Quick read

The Taicang Wugang Port will be the second biggest port for the local production of iron and steel in the Yangtze-Region in China. To reduce the dust impact on the environment that is caused by shipping iron ore, the operating company decided to install a sprinkler system that is controlled by a local SPS. BL20 I/O stations and Profibus-repeaters from Turck guarantee a reliable Profibus communication between the SPS and the sprinklers.

Facing the Winter

Using connectivity solutions by Turck, Cirus Controls creates deicing systems that clear snow and ice from roads and lessen the environmental impact of sodium chloride

As the people in Minnesota know, winters can be cruel. Residents there are all too familiar with subzero temperatures that leave ice and snow covered roadways for months on end. Snowplows that clear the road and spread the ice-melting products that make traveling less treacherous are a necessity for people living in many northern climates. Even so, most drivers don't think about what happens to the deicing material – usually sodium chloride (salt) – until they are washing it off of their vehicles.

Though the salt effectively melts ice and snow off the roadway, it also winds up in the ditches, marshes, lakes and streams that surround the area of application. Numerous studies have shown an increase in sodium chloride levels in waterways that has been attributed to the application of salt as a deicing material, which has led many industry professionals to investigate ways to reduce the salt on the road.

Paul Mortell, President of Cirus Controls in Brooklyn Park, Minnesota, and his team have been working to design control systems used on the snowplows to regulate the amount of salt being applied to roadways since 2001. According to Mortell, without the use of control systems, snowplow operators are relied upon to use their best judgment about how much salt to apply

to the roadway, and in an abundance of caution, are oftentimes using too much.

How much is enough?

Imagine how difficult it would be to see the salt coming off of the rear of a snowplow during blowing snow conditions using only your rearview mirrors. "When our calibrated systems are used for the first time by an experienced snowplow driver, they sometimes think that there is very little salt coming off of the spreader. This is because Cirus Controls' systems are configured to only apply as much salt as is needed to melt the ice, which is usually far less than what is applied without a calibrated system and is hard to see in the rearview mirror," explains Mortell. "Calibrated controls reduce the driver's requirement to constantly watch how much salt is being spread and lessens the amount of salt that ultimately winds up in the watershed. In addition, it frees the operator's attention to be more focused on what is in front of him instead of the spreading going on behind."

The incentive for keeping salt on roadways to a minimum is obvious: it's better for the environment and it helps reduce the deterioration of guard rails

Author



Eric Lavigne is a sales specialist with Turck's representative Mtech Minnesota in USA

Webcode | **more21058e**

Cirus customers can reduce cost of materials by 30 to 80 percent





The junction boxes and cordsets from Turck are well prepared for the tough winter conditions



and vehicles. However, using control systems to manage salt application did not immediately become a standard practice. Says Mortell, "The implementation of electronics in the control system was slowed by the lack of durable electrical connections for the environment that they must operate in. The revolution in molded, shielded cables accelerated the introduction and adoption of calibrated electronic controls."

Electronic control systems

Where traditional systems rely on user expertise, electronic control systems are used to measure system features that help regulate salt usage. Some of these features include the ground speed of the truck used to apply the salt, the temperature of the road, the pressure of hydraulic system fluid, remaining amount of liquid and granular de-icing material, and the GPS position of the vehicle. This data is available to snowplow drivers so that they can accurately gauge system performance.

In Cirus Controls' electronic control systems, a valve bank is mounted onto the truck frame and is connected to the controllers in the cab of the snowplow. Finding a cable supplier with connectors that can hold up in the cold, wet and abrasive conditions found on a snowplow led Cirus to Turck. Depending upon the configuration, Cirus uses Turck 4 and 8 port junction boxes with either M8, M12, M23 or 1-1/8 inch molded connectors to connect the devices in the valve bank. Turck's connector's large size makes it easier for operators to connect the devices in the field, and integrated LEDs improves field diagnostics by allowing the user to visually see if the connection is operational.

"Outside the cab, electrical connections are exposed to water, ice, salt, hydraulic fluid and other

materials so the connections must be IP68 rated or better," says Mortell. "It's also important that the connectors can be easily applied in the field. Both of these requirements were met by Turck junction boxes and cordsets."

Since Cirus Controls makes custom valve banks per their customer's requests, another benefit of using Turck connectors is the company's ability to customize terminated valve connections for specific valve manufacturers. In this way, Cirus customers are ensured the right connection for the valve back system they've chosen to use.

Less salt equals less expense

Using Cirus systems has numerous benefits to the user aside from the environmental impact, including having to purchase less salt. A Cirus customer that retrofitted 25 snowplow systems was able to save over 30 percent in material costs for a full season by using the control system. Even more savings can be experienced when using a closed loop system, where event and performance data is recorded and downloaded to provide performance feedback to operators.

Among other features, this data allows users to see exactly where the salt has been applied via a GPS system so that cities are better able to manage the de-icing process. According to Mortell, users that move to a closed loop system can experience a savings of up to 80 percent. In an example of true partnership, a city and a watershed district authority partnered to purchase and install this equipment and to share the de-icing performance data, as well as the data regarding the amount of chloride going into the watershed surrounding the city, to accurately gauge the outcome. ■



“The connections must be IP68 rated or better. It's also important that the connectors can be easily applied in the field. Both of these requirements were met by Turck junction boxes and cordsets.”

**Paul Mortell,
Cirius Controls**

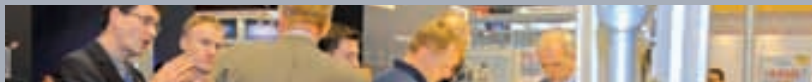
Quick read

Cirius Controls develops and produces deicing system for new snowplows or to those that are already in service. In order to connect valve banks, sensors and controls reliably, the company, based in Brooklyn Park, Minnesota, decided to apply Turck's junction boxes and cordsets, which are withstanding water, ice, salt, hydraulic fluid and other materials.

Turck at Trade Shows

At numerous national and international trade shows, Turck will introduce you to current product innovations and reliable solutions for plant and process automation. Be our guest and see for yourself.

Dates	Trade Show	City, Country
26.01. - 28.01.2011	IFAM	Celje, Slovenia
08.03. - 11.03.2011	Automation World	Seoul, South Korea
17.03. - 20.03.2011	WIN – World of Industry	Istanbul, Turkey
22.03. - 26.03.2011	ConExpo	Las Vegas, USA
29.03. - 01.04.2011	Amper	Brno, Czech Republic
04.04. - 08.04.2011	Hannover Messe	Hanover, Germany
12.04. - 15.04.2011	Electron	Prague, Czech Republic
13.04. - 14.04.2011	ISA	Calgary, Canada
09.05. - 13.05.2011	Technical Fair	Belgrade, Serbia
12.05. - 18.05.2011	Interpack	Düsseldorf, Germany
24.05. - 27.05.2011	MSV	Nitra, Slovakia
20.05. - 22.05.2011	Indumation	Kortrijk, Belgium
24.05. - 26.05.2011	SPS	Parma, Italy
21.06. - 24.06.2011	Neftegaz	Moscow, Russia
03.10. - 07.10.2011	MSV	Brno, Czech Republic
20.09. - 22.09.2011	Assembly Technology Expo	Rosemont, USA
04.10. - 06.10.2011	Smart Automation	Linz, Austria
11.10. - 14.10.2011	EloSys	Trencin, Slovakia
26.09. - 28.09.2011	Pack Expo	Las Vegas, USA
13.11. - 16.11.2011	Metalform	Chicago, USA
22.11. - 24.11.2011	SPS/IPC/Drives	Nuremberg, Germany



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Headquarters HANS TURCK GmbH & Co. KG

Witzlebenstraße 7 | Mülheim an der Ruhr | (+49) (0) 208 4952-0 | more@turck.com

- **ARGENTINA | Aumecon S.A.**
(+54) (11) 47561251 | aumecon@aumecon.com.ar
- **AUSTRALIA | TURCK Australia Pty. Ltd.**
(+61) (0) 395609066 | australia@turck.com
- **AUSTRIA | TURCK GmbH**
(+43) (1) 4861587 | austria@turck.com
- **BAHRAIN | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **BELARUS | FEK Company**
(+375) (017) 2102189 | info@fek.by
- **BELGIUM | Multiprox N. V. (TURCK)**
(+32) (53) 766566 | mail@multiprox.be
- **BRAZIL | Sensor do Brasil**
(+19) 38979412 | comercial@sensordobrasil.com.br
- **BRUNEI | TURCK Singapore**
(+65) 65628716 | singapore@turck.com
- **BULGARIA | Sensomat Ltd.**
(+359) (58) 603023 | info@sensomat.info
- **CANADA | Chartwell Automation Inc.**
(+1) (905) 5137100 | sales@chartwell.ca
- **CHILE | Seiman S.A.**
(+56) (32) 2699310 | ventas@seiman.cl
- **CHINA | TURCK (Tianjin) Sensor Co. Ltd.**
(+86) (22) 83988188 | china@turck.com
- **COLOMBIA | Dakora S.A.S.**
(+57) (1) 8611888 | info@dakora.com.co
- **COSTA RICA | TURCK USA**
(+1) (763) 5539224 | usa@turck.com
- **CROATIA | Tipteh Zagreb d.o.o.**
(+385) (1) 3816574 | tipteh@tipteh.hr
- **CYPRUS | AGF Trading & Engineering Ltd.**
(+357) (22) 313900 | agf@agfelect.com
- **CZECH REPUBLIC | TURCK s.r.o.**
(+420) 495 518 766 | czech@turck.com
- **DENMARK | Hans Folsgaard A/S**
(+45) (43) 208600 | hf@hf.dk
- **ECUADOR | Bracero & Bracero Ingenieros**
(+593) (9) 7707610 | bracero@bracero-ingenieros.com
- **EL SALVADOR | Elektro S.A. de C.V.**
(+502) 7952-5640 | info@elektroelsalvador.com
- **ESTONIA | Osahung "System Test"**
(+37) (2) 6405423 | systemtest@systemtest.ee
- **EGYPT | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **FINLAND | Oy E. Sarlin AB**
(+358) (9) 504441 | info@sarlin.com
- **FRANCE | TURCK BANNER S.A.S.**
(+33) (1) 60436070 | info@turckbanner.fr
- **GREECE | Athanassios Greg. Manias**
(+30) (210) 9349903 | info@manias.gr
- **GREAT BRITAIN | TURCK BANNER LIMITED**
(+44) (1268) 578888 | info@turckbanner.co.uk
- **GUATEMALA | Prysa**
(+502) 2268-2800 | info@prysaguatemala.com
- **HONDURAS | TURCK USA**
(+1) (763) 5539224 | usa@turck.com
- **HONG KONG | Hilford Trading Ltd.**
(+852) 26245956 | hilford@netvigator.com
- **HUNGARY | TURCK Hungary Kft.**
(+36) (1) 4770740 | hungary@turck.com
- **ICELAND | Km Stal HF**
(+352) 56789-39 | kall@kmstal.is
- **INDIA | TURCK India Automation Pvt. Ltd.**
(+91) (20) 25630039 | india@turck.com
- **INDONESIA | TURCK Singapore Pte. Ltd.**
(+65) 65628716 | singapore@turck.com
- **IRELAND | Tektron Electrical**
(+353) (21) 4313331 | frankurell@tektron.ie
- **ISRAEL | Robkon Industrial Control & Automation Ltd.**
(+972) (3) 6732821 | robkonfr@inter.net.il
- **ISRAEL | Nisko Electrical Engineering & System Ltd.**
(+972) (8) 9257355 | joseph.shapira@niskoeng.com
- **ITALY | TURCK BANNER S.R.L.**
(+39) (02) 90364291 | info@turckbanner.it
- **JAPAN | TURCK Japan Office**
(+81) (3) 54722820 | japan@turck.com
- **JORDAN | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **KOREA (SOUTH) | TURCK Korea Co. Ltd.**
(+82) (31) 5004555 | korea@turck.com
- **KUWAIT | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **LATVIA | Lasma Ltd.**
(+37) (1) 7545217 | inga@lasma.lv
- **LEBANON | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **LIBYA | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **LITHUANIA | Hidroteka**
(+370) (37) 352195 | hidroteka@hidroteka.lt
- **LUXEMBOURG | Sogel S.A.**
(+352) 4005051 | sogel@sogel.lu
- **MALAYSIA | TURCK Singapore Pte. Ltd.**
(+65) 65628716 | singapore@turck.com
- **MACEDONIA | Tipteh d.o.o. Skopje**
(+389) 70399474 | tipteh@on.net.mk
- **MEXICO | TURCK Mexico S. DE R.L. DE C.V.**
(+52) 844 4116650 | mexico@turck.com
- **NEW ZEALAND | CSE-W Arthur Fisher Ltd.**
(+359) (9) 2713810 | sales@cse-waf.co.nz
- **NETHERLANDS | TURCK B. V.**
(+31) (38) 4227750 | netherlands@turck.com
- **NORWAY | HF Danyko A/S**
(+47) 37090940 | danyko@hf.net
- **OMAN | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **PANAMA | TURCK USA**
(+1) (763) 5539224 | usa@turck.com
- **PERU | NPI Peru S.A.C.**
(+51) (1) 2731166 | npiperu@npiperu.com
- **PHILIPPINES | TURCK Singapore Pte. Ltd.**
(+65) 65628716 | singapore@turck.com
- **POLAND | TURCK sp.z o.o.**
(+48) (77) 4434800 | poland@turck.com
- **PORTUGAL | Bresimar Automação S.A.**
(+351) 234303320 | bresimar@bresimar.pt
- **PUERTO RICO | TURCK USA**
(+1) (763) 5539224 | usa@turck.com
- **QATAR | TURCK Middle East S.P.C.**
(+973) 13 638288 | usa@turck.com
- **ROMANIA | TURCK Automation Romania SRL**
(+40) (21) 2300279 | romania@turck.com
- **RUSSIA | O.O.O. TURCK Rus**
(+7) (495) 2342661 | russia@turck.com
- **SAUDI-ARABIA | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **SERBIA AND MONTENEGRO | Tipteh d.o.o. Beograd**
(+381) (11) 3131057 | damir.vecerka@tipteh.rs
- **SINGAPORE | TURCK Singapore Pte. Ltd.**
(+65) 65628716 | singapore@turck.com
- **SLOVAKIA | Marpex s.r.o.**
(+421) (42) 4440010 | marpex@marpex.sk
- **SLOWENIA | Tipteh d.o.o.**
(+386) (1) 2005150 | damijan.jager@tipteh.si
- **SPAIN | Elion S.A.**
(+34) 932982000 | elion@elion.es
- **SOUTH AFRICA | R.E.T. Automation Controls (Pty.) Ltd.**
(+27) (11) 4532468 | info@retauto.co.za
- **SWEDEN | TURCK Office Sweden**
(+46) (31) 471605 | sweden@turck.com
- **SWITZERLAND | Bachofen AG**
(+41) (44) 9441111 | info@bachofen.ch
- **SYRIA | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **TAIWAN | Taiwan R.O.C. E-Sensors & Automation Int'l Corp.**
(+886) (7) 7220371 | ez-corp@umail.hinet.net
- **THAILAND | TURCK Singapore Pte. Ltd.**
(+65) 65628716 | singapore@turck.com
- **TURKEY | TURCKBANNER Consulting Office Turkey**
(+90) (216) 5722177 | turkey@turck.com
- **UKRAINE | SKIF Control Ltd.**
(+380) (44) 5685237 | d.startsew@skifcontrol.com.ua
- **UNITED ARAB EMIRATES | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com
- **URUGUAY | Dregal S.A.**
(+598) (2) 9031616 | cratti@dregal.com.uy
- **USA | TURCK Inc.**
(+1) (763) 553-7300 | usa@turck.com
- **VENEZUELA | CADECI C.A.**
(+58) (241) 8345667 | cadeci@cantv.net
- **VIETNAM | TURCK Singapore Pte. Ltd.**
(+65) 65628716 | singapore@turck.com
- **YEMEN | TURCK Middle East S.P.C.**
(+973) 13 638288 | middleeast@turck.com



www.turck.com

Imprint

Publisher

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

Editorial Staff

Klaus Albers (responsible)
klaus.albers@turck.com
Karen Keller
karen.keller@turck.com

Contributors to this issue

André Brauers, Thorsten Evers, Christian Homoc,
Stefan Kappel, Eric Lavigne, Hans-Peter Löer,
Toralf Märting, Angela Scheufler, Peng Wang,
Zukui Zhang

Art Direction / Graphic Design

Arno Kraemer, Britta Fehr (Art design)

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Page 16



Page 18



Page 21



Page 24



Page 28



Page 30



Page 32



Page 36