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The Magazine for Customers of the Turck Group

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Total Transparency

How the automotive industry benefits from the general use of RFID technology – from the supplier to the delivery

Demand and Reality

Let's be honest – how many manufacturers do you know that present themselves as 'solution providers' – at least on paper? To offer solutions instead of single components is an honorable thought, but often it is difficult to realize this challenge during the daily business. Historically grown sales structures and corporate strategy often differ widely.

However, Turck offers solutions to its customers, such as in RFID and image processing or with the CoDeSys-programmable fieldbus gateways and HMI/PLC systems. The more often these solutions are requested, the more important it becomes to adapt our processes accordingly; both internally and externally. Much has changed at Turck during the past few years, and today we are able to provide the support for the solution business that you rightly expect. Turck's new support concept provides systematic guidance and project management in the fields of industrial image processing and RFID.

For complex questions about automation, you will get support from our newly created regional distribution system. If a challenging project arises, a project management team in Mülheim professionally coordinates the whole project design and management. If necessary, our system partners with their distinct knowledge ensure the efficient implementation of the project – especially with identification solutions. In addition to our already existing partnerships, we added two more partners recently: The Company ISW in Hamburg for the field of vision and the company AIT Göhner in Stuttgart for RFID projects.

Already at the **Hannover Fair** we are going to hold subject related panels in cooperation with our partners and we would like to invite you to attend (see page 5). Of course, we also would like to welcome you at our **booth H55 in hall 9**.

Sincerely, yours

Christoph Zöller, Director Sales Factory Automation

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Source cover image: Volkswagen Sachsen GmbH

To offer its customers the ideal sensor solution, Turck expanded its portfolio with a comprehensive range of encoders **Page 24**

With the PB-XEPI, Ertsoverslagbedrijf C.V. in Rotterdam is able to identify disturbances of the Profibus-net centrally via web browser **Page 38**

Ferrara Fire Apparatus Inc. in the USA guarantees the stability of their fire engines with a static tilting test – inclinometers from Turck measure the angle **Page 40**

Turck at Interpack

▶ Turck will exhibit its portfolio for the food and packaging industry at **booth D77 in hall 13** at the Interpack trade show in Düsseldorf. Visitors can see the BL ident modular RFID-system with special developments for the food and packaging industry, such as data carriers (tags) with on-board sensor tags for use in autoclaves, as well as read/write heads with wash-down capable design. Also on display are factor-1 sensors with a terminal chamber from the uprox+ wash-down series. Like the sensors, the terminal chamber is resistant to cleansing agents and high-pressure cleansers. The same applies to FBplus connectors, as well as the completely metal M25U Ultrasound sensor from Banner Engineering.

Connector Series

▶ The new M12x1 **"base line"** connector series has been designed by the connector specialist, Escha, for classical applications in the fields of machine-building and automation. For the time being, male and female versions are available as 3-, 4-, and 5-pole straight versions with A- or B-coding. The angled variants will follow in the second quarter. Two cable qualities (PVC or PUR halogen-free) are available, through which base line can be adapted to the respective application.

Fail-Safe Mini Displacement Sensor

▶ Turck developed the first miniature linear displacement sensor, the **LI-Q17,** especially for very short measuring ranges between 50 and 200 mm. The LI-Q17 doesn't work with a magnetic locator but with the resonant circuit measuring principle, where an object's position is detected via an inductive oscillating system consisting of a condenser and a coil. As the only sensor of its kind, the LI-Q17 is able to work reliably where the functionality of a magnetic position device is massively affected by electromagnetic fields caused by large motors or welding plants. The robust LI-Q17 in an IP67-rated housing is available in four different sizes with measuring ranges of 50, 100, 150 and 200 mm, and a temperature range from -40 to +70 °C. The first models have an analog output (0…10 V, 4…20 mA, 0,5…4,5 V), and a high-resolution SSI model will be available in the future.

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Triangulation Sensors

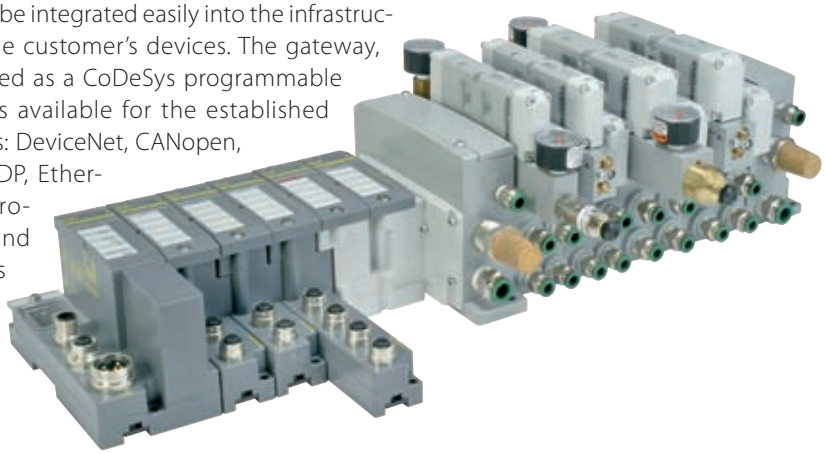
▶ Turck extends its portfolio with a series of triangulation laser displacement sensors for non-contact height or thickness measurement of a wide variety of materials, made by Turck's partner Banner Engineering. Sheet metal, wood, ceramic, paper, plastic, rubber, foam and baking dough are just some of 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 of 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.

Flexible Factor-1 Sensor

▶ The **QP08** is the latest member of the ferrite-core-free uprox+ family from Turck. The compact factor-1 sensor offers a high EMC and magnetic field resistance, as well as high switching distances for all metals – like all uprox+ sensors. Especially for use in cramped spaces with little room for the installation – for example in the machine handling industry or in packaging machines – the non-flush sensor in a plastic housing provides time and cost savings with regard to installation and service. The new factor-1 sensor reaches up to 300 percent higher switching distances compared to customary sensors when detecting aluminum, which is often used as target in this industry. Not only does the sensor have a small and compact housing (32 x 20 x 8 mm, LxWxH), it also features small metal-free zones, a switching distance of 10 mm and the possibility to install the sensor directly onto metal. Furthermore, the boreholes are compatible with all Q08 sensors and similar designs, which allows a fast and uncomplicated replacement of customary sensor types. Large, curved LEDs display the operational readiness and the switching state of the QP08.

BL67 Adapter for Parker Valves

▶ In cooperation with Parker Hannifin, Turck developed a **valve adapter for its BL67 I/O-system** and the valve series **Isys Micro and Isys ISO** from Parker. With the new modules, up to 32 valves can be controlled directly with the BL67. The combination of the IP67 rated I/O system and the valves allows an easy installation and an uncomplicated connection of electrical and pneumatic components in a minimal space. With its BL67 gateway, the new dream-team can be integrated easily into the infrastructure of the customer's devices. The gateway, also offered as a CoDeSys programmable version, is available for the established fieldbuses: DeviceNet, CANopen, Profibus DP, EtherNet/IP, Profinet IO and Modbus TCP.



Innovation Forums

▶ During the fair at Hannover, Turck offers a number of innovation forums in cooperation with its system partners. Interested visitors can attend the free forums about: **„Plagiarism protection through RFID and iDot", „Manage RFID-projects effectively"** and **„Optimization of quality management and production processes with parametrizable camera sensors".** Participants will have the opportunity to talk with the experts over a small snack after the presentation. For further information on the web, visit: **www.turck.de/foren**

Identification in Application Park

▶ At the Vision Application Park at the Hannover Messe **(booth A12, hall 17)**, visitors can order their own special figure of Playmobil and witness the automatic transformation of their order into a customized product. In a large multi-vendor-machine, consisting of ten modular test units and processing cells, the Park shows a multitude of optical test procedures. The visitor can see for himself that there is a solution for nearly anything. The Park connects vision, handling and automation technology.

more on page 14

Robust M40 Connectors

▶ Turck's expanded **powerfast** series provides robust connection technology for power and signal transmissions up to 42 Amps and 600 Volts. Cordsets and tees are available in 7/8", M16, 1-3/8", M23 and M40 and provide a plug and play solution for wiring power and signal transmission. To eliminate possible disturbances, Turck offers shielded cables in addition to the standard lines. A **powerlok** safety-clip that protects a connector against accidental disconnection is also available. All connector sizes are rated to IP67 at a minimum. The user benefits from a remarkably short installation time because of the abandonment of terminal boxes and the possibility of prefabrication.

Training

▶ Turck now offers training courses about its products, technologies and systems for interested customers. The training will teach the customers how to implement and operate the solutions from Turck fast and reliably. More information and registration online: **www.turck.de/training**

▶ Webcode **more11110e**

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 file.

New Range of Encoders

▶ To offer its customers the ideal sensor solution, Turck completes its portfolio with a **comprehensive range of encoders**. The company now offers magnetic and optical encoders in all categories, from incremental over absolute singleturn, absolute multiturn up to analog. Turck offers the new encoders in different sizes. In addition to the standard model with 58 mm, there are miniature models of 24 mm up to 37 mm, as well as models for large hollow shafts with up to 100 mm. Thanks to the robust mechanical construction and the compact die-cast housing, the encoders are insensitive to change in temperature, jolts and vibrations. The IP67 rated devices – special models for offshore use are IP69k-rated – cover a temperature range of -40 to +105 °C. more on page 24 ▶

Image Sensor with Multiple Inspections

▶ An image sensor offering enhanced recognition, communication and rapid changeover capabilities has been introduced by Turck and its partner Banner Engineering. The new **iVu Plus TG** sensor extends the iVu image sensor platform with capability to save up to 30 inspections. It monitors labels, parts and packaging for type, size, orientation, shape and location. Its color touch-screen display and on-board memory allow fast and easy installation and application setup without connection to a PC. Ethernet communication assures compatibility with most industrial systems. In addition to previously available functions, the iVu Plus TG has a sort sensor that can recognize up to ten different patterns within the same inspection. Applications for this new capability include identifying parts on a production line and ensuring that all required parts are present in a package. Other functions included in the unit is an area sensor to ensure that some features are present on a part, blemish sensor to detect flaws, such as scratches or color variation and match sensor to verify that a pattern, shape or part is identical to a reference. Ease of use is supported by integrated lighting, adjustable focus lenses, automatic exposure control and high speed processing.

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Many automobile manufacturers are currently evaluating the possibilities of continuous identification

Total Transparency

How the automotive industry benefits from the use of RFID technology – from the supplier to the delivery

Auto-ID procedures for the automatic identification of components, workpiece carriers or tools have been used in manufacturing for a long time. For decades, manufacturers have used optical procedures, like barcodes or data-matrix-codes for contactless identification, but the focus now lies on wireless identification technology RFID (radio frequency identification) .

One of the main advantages of RFID: As opposed to the optical Auto-ID procedures, the user can read the authenticity features and also rewrite them to a data carrier. Data carriers (also known as tags) accompany the part through the whole production cycle or quality test; relevant data is written automatically onto the tag and read at the end of the production cycle. Together, with the finished product, there is also a quality management protocol available that shows all production steps of the product, as well as the quality test.

Another benefit of RFID technology is that the information transfer by electromagnetically radio waves is less susceptible to environmental influences. While the externally applied, printed bar codes become unusable through high temperatures, dirt or moisture, the special RFID data carriers and robust scanners allow the use of RFID systems under very rough conditions or through nontransparent media, for example in painting plants or kilns.

Turck's modular RFID system, BL ident, can operate interference free HF and high transmission range UHF combined read/write heads at the same time

Rethinking in the automotive industry

The triumphal procession of RFID for the automobile production started about 20 years ago. For more than five years, Turck has been part of it with its modular RFID-system, BL ident, that was developed in close cooperation with automobile manufacturers at that time. One of the first BL-ident data carriers was a high temperature tag and could resist 210 °C without problems. This tag is attachable to a carriage – so called skid – that transports a vehicle body through production. That is how the path of the vehicle can be tracked from shelling to the final assembly, as long as the transport system stays the same.

This procedure is a typical example for the previous use of RFID-technology in the automobile production: Mostly monorail conveyors, skids or other carriers for the vehicle body and larger components, like engines or axles, are identified. Compared to optical measuring, this procedure increased the performance remarkably, but with further development of data carriers and combined read/write heads, the potential has increased even more. Nearly all automobile manufacturers think about equipping the vehicle bodies or even the single components with a tag directly instead of equipping the transport system. This has the additional advantage that control about the installed components is possible directly after the assembly. Also, assignment problems because of a change of the transport system are ruled out.

If a data carrier is firmly connected to the vehicle body at the beginning of the production process, the body can be identified safely at any time - from shelling to painting and the final assembly to the delivery. One of the pioneers in this field is Volvo. The car manufacturer has used vehicle body identification in its plant in Gent in Belgium for about three years. The RFID-tag is installed to the front side member of the vehicle at the beginning of the production process. Through the whole process, including the painting where tempera-

Quick read

For more than two decades, the automotive industry has used RFID solutions, mainly for the identification of their vehicle body transport systems. Thanks to improved technology and the automotive knowledge of the RFID specialist Turck, the industry today considers equipping every single vehicle body and component with data carriers, to benefit from a continuous identification and quality control through the whole production process.

At Volvo in Gent, a robust plastic tag is attached to the side member of the vehicle body directly at the beginning of the shelling

tures up 200 °C can cause problems to the electronics of most data carriers, the tag stays on the vehicle. Most car manufacturers paint their vehicle bodies three to five times and expose them correspondingly frequent to the high temperatures. The electronics of conventional data carriers often break during this procedure. With a few technical tricks, Turck is able to deliver disposable data carriers that are able to resist a limited amount of high-temperature phases and therefore can stay on the vehicle all the time. Essentially it is only a question of the durability of the connection between the ICs and the antenna coil under the influence of high temperature. Classical solder connections are unsuitable. Instead, technologies like friction welding are used to guarantee a lasting stability. Alternatively, an inductive coupling can be used instead of the direct connection, although it needs more energy during the transmission.

Vehicle body identification demands UHF-system

When transport systems are equipped with tags, there are always defined, relatively small distances between the data carriers and the combined read/write heads, so that it is guaranteed that the maximum transmission range is kept. If the tag is attached to the vehicle body directly, the range is inevitably larger – it mostly varies between 30 and 100 cm. For this reason, HF-systems, which are working within the frequency range of 13.56 MHz, can't be used any longer. This frequency range is very popular because it guarantees failure free radio communication and a high read-write speed, so that the tags can be read very quickly while driving by. Since the transmission range is limited to 20 cm, another solution is needed for the vehicle body identification.

The solution is to find within the UHF-range of 865-868 MHz, that allows ranges up to three meters. Unfortunately, there is also the disadvantage that the installation is a lot more complex because of the high range. Through reflections, it can overreach the signals, so that the combined read/write heads read more than they should. Furthermore, there are often problems when an UHF-tag has to be read while standing upright, because interferences can lead to zero points in the transmission field. This is a challenge, because in the processes where the previously used barcodes are replaced by RFID, there is a process-related stop at the reading station because the barcodes can't be read while driving by. To be able to read UHF-systems while standing upright, Turck developed combined read/write heads with two antennas that change their polarization direction and simulate a moving field. The staff of Volvo in Gent works with this UHF-technology without any problems.

From the supplier to the final assembly

The fact that UHF-challenges can be mastered and carry considerably lower data carrier prices – a temperature resistant design costs about 50 cent today – convinced

At exhibitions, Turck demonstrates the feasibility of gen

Until today, usually the transport systems are identified by RFID data carriers, like in this example the transport hangers of the supplier Tower Automotive

many automobile manufacturers to equip the coming model ranges with data carriers on the vehicle bodies, which means that they can be identified throughout the whole process, from shelling to painting. But this is not all: In further projects where Turck is involved, the possibilities are tested to also optimize the delivered parts of the suppliers with RFID and thereby optimize the whole production process up to the final assembly with the wireless identification.

At the moment, the delivered single components are still identified with barcodes, but they shall be equipped increasingly with data carriers in the future. With RFID, these components can be identified without problems. Furthermore, RFID lessens the risk that wrong components are installed. An example: The barcode of an airbag is read before the installation. Afterwards it can't be read any longer because it is either covered by the vehicle body or was removed from the component. Based on the bill of materials it becomes apparent during the final inspection, that the wrong airbag was installed. Now an expensive rework is necessary. With RFID it would be possible to install a scanning station directly after the attachment mounting station. This scanning station reads the ID of the airbag and alarms the staff if something is wrong.

eral wireless identification for the automotive industry

Conclusion

Turck has shown in numerous tests with suppliers and manufacturers that it makes sense to also equip the supplier components, like airbags, interior trim, seats or engines, with the powerful RFID technology to make them an efficient part of the production process. At innovation forums and events during fairs and conferences for the automotive industry, the automation specialists will present how the industry is able to benefit from the general use of RFID technology and the BL ident system. Most recently, Turck introduced its concept at the AutoID/RFID Solutions Park at the CeBIT. The next possibility to gather information about the benefits of RFID for the automotive industry will be at the 22. Automobil-Forum in Stuttgart at the 24th and 25th of May 2011, which takes place at the Forum of the Schlosspark in Ludwigsburg. ■

For many applications, sensor data carriers are a cost-effective transmission solution that is easy to implement, Walter Hein asserts

"Savings on Process Costs"

Mathis Bayerdörfer, editor in chief of the German trade journal A&D, talked to product manager Walter Hein about RFID data carriers with integrated sensors from Turck

At the Hannover fair, Turck will present a RFID data carrier with an integrated temperature sensor. Why this unusual combination, Mr. Hein?

We often get requests from the industrial sector where a customer needs a sensor, but it isn't possible to connect the sensor with a cable. We are talking about very small distances where a complex wireless system doesn't make sense. The industrial sector has difficulties with wireless solutions in general because the process

data needs to be transferred flawlessly, but systems like WLAN or Bluetooth often interfere with each other. Therefore, the users often do not trust the safety of the wireless transfer. With our new solution, we provide a reliable data transfer, and establish a solution for a specific range of applications, which is very cost-effective compared to wireless-solutions.

What is the difference Turck makes to provide a safe data transfer?

We rely on established RFID technology; a high frequency solution at 13.56 megahertz. It is standardized, ISO15693 compatible, popular and insensitive to environmental influences. The possibility of interferences through other systems is eliminated from the beginning, especially because the transmission distance is only a couple of centimeters. Furthermore, the customer isn't bound to a proprietary system.

How do the sensor data carriers work exactly?

For the data carrier, also called a tag, we use a basic-IC that has an integrated temperature sensor and two interfaces for additional sensors. The temperature sensor is permanently attached, but the other two inputs can be connected to sensors that are required by the application, such as a proximity switch or a pressure sensor. The tags regularly record a result and save it to be read. There is also a data logger that is able to record measuring curves. The tag receives the needed energy over the high frequency field it is located in.

Is this new approach able to improve the reputation of wireless technology?

If it is in relation to small distances and data volume, then the answer is yes - especially because the system can be adapted to different applications. The size of the sensor depends on the transmission distance, an energy storage device supplies the sensors – coordinated with the measuring intervals.

Are there already pilot projects for the new system?

We work with renowned customers from different industries that have specific requirements for this technology. The food industry in particular has a lot of use for this technology, because it allows processes to become transparent. Among other things, temperature cycles can be recorded exactly and adapted precisely, which is essential for quality management. For example, the user can retrace how chocolate forms are exposed to temperature fluctuations and cleaning liquids during the process, so that they can be replaced before the forms get brittle and plastic splinters get into the chocolate.

What are other possible fields of application?

There are a lot of applications in the food industry, such as the continuous monitoring of cold chains and the sterilization of cans. A lot of food is made durable in huge pressure cookers, also known as autoclaves. Through heat, they reduce the amount of bacteria in the food to a harmless level. The autoclaves are operated by hand so it is possible for them to be open longer than intended. That can increase the bacteria growth, so that the normal processing time isn't sufficient any longer – the cans threaten to burst after some time. That's why many producers temporarily store their goods for a couple of weeks for observation. With the new solution, the user can control at what exact temperature the process in the autoclaves started – and adjust it, if needed. With this solution, interim storage isn't necessary any longer.

Are there other applications beyond the food industry?

The sensor tags are also suitable for engineering processes at any place where you can find rotating parts. For example, in the paper industry all rollers have to apply a constant, exactly defined pressure onto the paper so that it doesn't rip. Oftentimes, there is a specific temperature needed too. With the new solution from Tuck, the user attaches the new sensor tag including the temperature and a pressure sensor to the rollers and installs a combined head for analysis. This provides a cost-efficient transmission solution that is easy to implement.

What are the costs for the system?

Since the solution is customer-specific, there is no package price. But in most cases, the savings on the process costs are remarkable and the return on investment can be achieved within days, weeks or a few months at the latest. With the new sensor data carriers, Turck offers a solution for numerous problems that either couldn't be solved in the past at all or that only could be solved with high financial and technical effort. ■

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> **Walter Hein**

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>
> **Walter Hein**

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Webcode | **more11130e**

Automation to Go

At the Vision Application Park, visitors can witness the automatic transformation of their order into a customized product in a multi-vendor machine

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Webcode | **more11131e**

In cell number 1, a palletizer from Hirata provides the Playmobil characters and circulates them with the help of a Hirata robot

Information www.application-park.de

The Vision Application Park at the Hannover Messe tradeshow (booth A12, hall 17), hosted by Vereinigte Fachverlage Mainz that publishes the trade journals IndustrialVision and MSR Magazine, will showcase technology from more than 30 associates – among them Turck – from the fields of vision, material handling, automation, packaging and labeling technology. In a large multi-vendor machine, the Application Park shows a multitude of optical test procedures.

The user can see for themselves that there is a solution for nearly anything. The Application Park connects vision, handling and automation technology and offers additional information on these subjects. Ten modular test units and processing cells are connected to a transfer system within the machine.

Hirata and Turck in cell number1

The visitor can choose one out of four Playmobil characters at the entrance of the Vision Application Park – a knight, pirate, firefighter or musketeer. The visitor then receives a ticket to get his Playmobil character at the end of the machine. The order information is imprinted on a work piece carrier with a RFID tag and inserted into the machine. At the entrance of cell number 1, the BL ident RFID system from Turck reads the data and forwards the information via RS232-interface to the robotic controls.

The Playmobil characters are kept in a palletizer from Hirata and are removed with the help of a robotic arm. A camera observes the 27 positions of the trays

At the entrance of cell number 1, the BL ident RFID System from Turck reads the RFID tag on the workpiece

that contain the different Playmobil characters. Here, the PresencePlus Pro Minicam from Turck's partner, Banner Engineering, comes into operation. The miniature camera is connected to an external controller, which sends the signal via RS232-interface to the PLC of the robot. That's how the robot knows which Playmobil figure to choose. Additionally the controller sends a video-signal to an external screen, so that the visitor can see a simulcast of the tray.

Cell number 1 is illuminated by two white, linear LED panel lights from Banner Engineering. To be able to create a contrast ratio against the normal light in the exhibition halls, the trays are illuminated by two linear infrared lamps.

After the Scara-robot has picked the right Playmobil character, a tag is attached to the back of the figure, which contains the DataMatrix-Code and the name of the receiver. For control reasons, the Scara-robot places the figure above a DataMatrix/Barcode reader with an integrated ring-lights from Banner's iVu-series. The compact reader is available in two versions, either with a touch screen at the back or with an external display. Since the reader had to be installed with the back facing downwards for this special purpose, the version with the external display was used here.

The DataMatrix/Barcode reader from the iVu family reads the code from the back of the figure

Quick read

At the Hannover Messe, visitors can experience how image processing and quality management in a multi-vendor machine work at the Vision Application Park, booth A12, hall 17. From the initial order, through the various test procedures, to the packaging – the Playmobil characters pass through a realistic test course. Visitors can take their toy home at the end – individually labeled and packaged.

Comprehensive diagnostic program

If the Playmobil figure passed all tests in cell number 1, it passes through the other cells. Here the figure runs through different stations for color recognition and spectral analysis, the inspection for scratches, 3D-recognition and the creation of an elevation profile or the geometrical measuring. All results of measurement can be viewed by the visitors over monitors at the control stations. At the end of the process, the accessories and the tested figure are transported to the packaging station. Finally, a robot hands the packed figure to the visitor who can take it home as a souvenir. The Vision Application Park is accompanied by a vision nature trail, where visitors receive detailed information about the contents and training opportunities in the image processing industry on presentation boards.

If you miss the Application Park at the tradeshow in Hannover, you can see the multi-vendor machine at three other tradeshows in Germany this year, amongst others at the Vision in Stuttgart. ■

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Webcode | **more11105e**

Intelligent Chocolate Production

Informational advantage through RFID: Wireless identification of chocolate forms guarantees transparency during the whole production chain

Dark chocolate, milk chocolate, white chocolate, with nuts or praline, shell-shaped or a truffle – the possible forms of chocolates are as numerous as the preferences of the users. Confectionery manufacturers usually offer different products, which means flexible production processes: different casting moulds are needed, new loads need to be inducted into the manufacturing plants and be replaced or cleaned during the production process.

The efficiency of industrial large-scale production depends on the availability of all components along the production chain, especially with flexible production processes. Information about the production steps is essential. For the subprocesses involved in chocolate production, wireless identification (Radio Frequency Identification) contains enormous automation potential – and improves plant efficiency and safety at the same time.

Opposite to customary auto-ID procedures, like bar or data-matrix code, robust wireless identification solutions like the BL ident RFID system from Turck offer an advantage for confectionery manufacturers. The electronic data medium (tag), as well as the combined read-write heads that are necessary for the data transfer, work reliably under the difficult conditions of the food production – neither increased temperatures nor

With an integrated RFID solution, confectionery manufacturers are able to identify every single form

From left to right: Bernd Plies, manager electrical- and automation technology of WDS; Harry Imhoff, president & CEO of Hildebrand Industry; Dr. Bernhard Grimm, industry manager of Turck; Volker Krämer, president & CEO of Agathon

pressure, cleaning supplies or moisture can harm the components. The contact-free, fully automated data transfer between the tag, combined read-write head and controls allows a continuous tracking of the goods and the forms through all steps of the production process. With an RFID system that is compatible with this specific process chain, every step of the supply chain can be monitored, recorded and traced back.

Teamwork for RFID

To meet the specific requirements of the chocolate manufacturers, Turck cooperates with the industry giants Winkler and Dünnebier, producer of confectionery machines; Hildebrand, maker of cleaning systems; and Agathon, the manufacturer of forms. The common goal: To understand the requirements of the production chain and to offer a trade-specific solution for confectionery manufacturers.

The solution that combines the knowledge of the different industries has been met with interest by more and more chocolate manufacturers. Among other things, the four project partners presented the results of their cooperation at a workshop at the SPS/IPC/Drives show. Representatives of known chocolate manufacturers caught up on the practical saving and optimization options a RFID solution offers. Because of the demand, the partners will offer another workshop at the Interpack show in Düsseldorf. For free registration contact claudia.kall@turck.com.

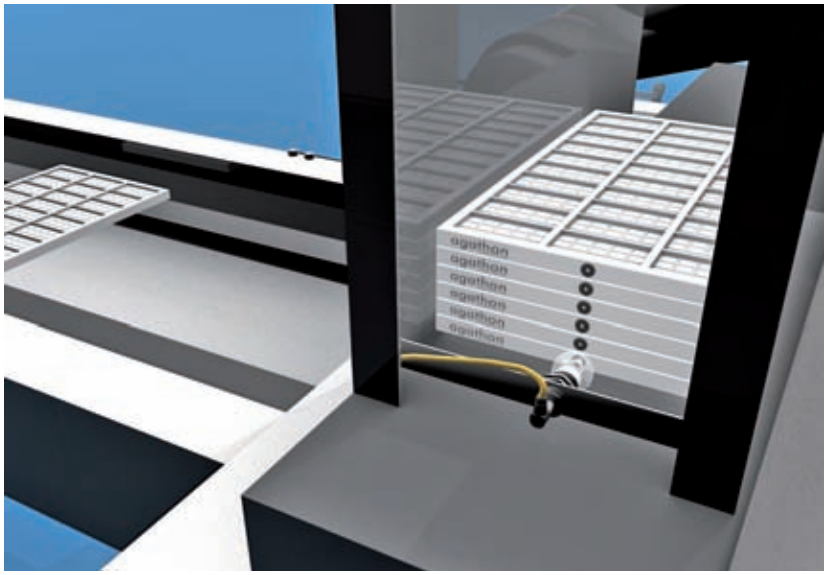
Constant identification

For constant identification of the chocolate forms throughout the entire process, the producer of the forms equips them with robust RFID tags. This allows the different forms for the numerous end products to be identified easily and anytime – even when stocked. The data of every single form is available centrally, so stocking procedures can be carried out without having to count the stocked forms manually at high personnel costs.

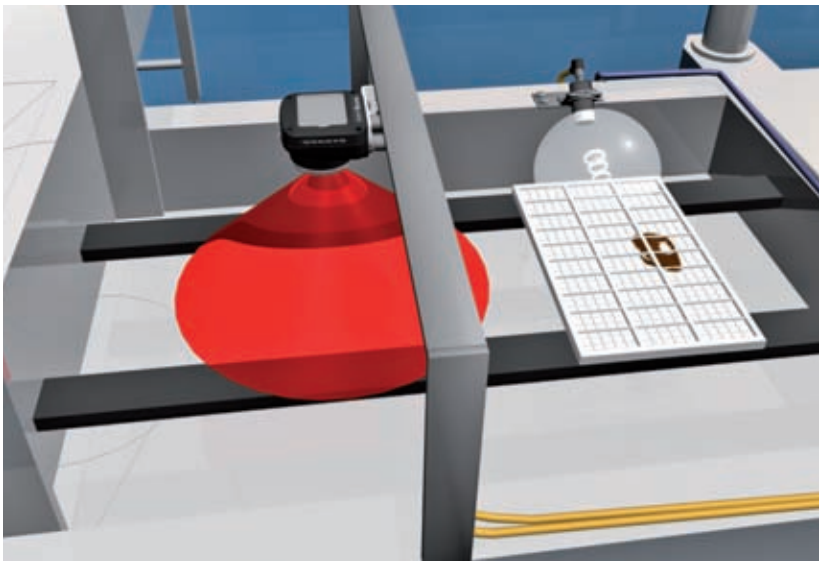
During the production process, the tags allow the backtracking of every single form – up to thousands of

Quick read

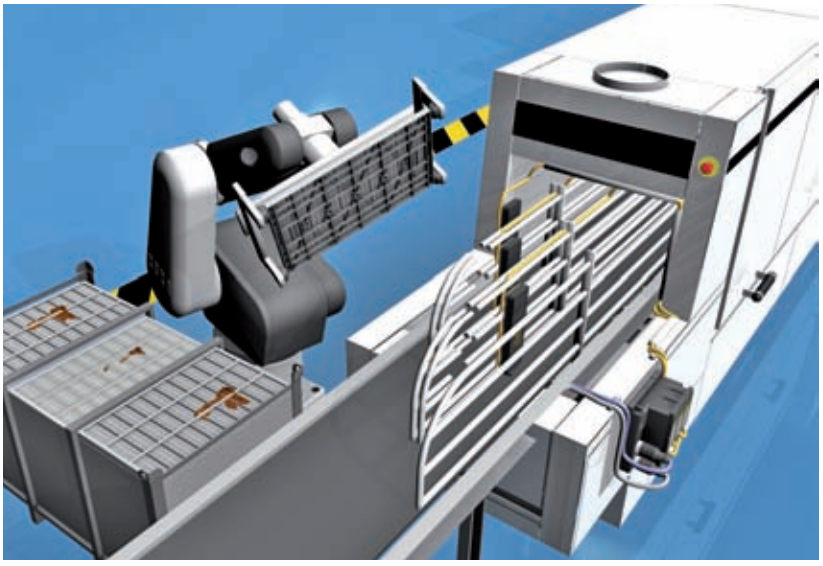
Wireless identification via RFID creates an enormous potential for all production processes. The technology finds its way into more and more processes. The RFID solution becomes thoroughly efficient if used during the whole supply chain of a production process, for example through the identification of forms during the production of chocolate.



Efficient process management: Robust data carriers attached to the forms provide identification and status information of each form at any time



When the sensor detects a contamination, the form is identified immediately and locked out for cleaning



Special read/write heads capture forms in different sizes and shapes when they are inserted in the cleaning machine

forms can be at one plant. Combined read-write heads at the loading stations, the casting machines or important checkpoints, record and forward the saved data to the controls. The operating staff knows at anytime at which point of the production process the forms are in and what their current status is; for example, if they need to be filled, if they have received their content, if they are cooled down or if they have finished the whole production process and are ready to start the cycle once again. This information helps to organize the load changes more efficiently and avoid plant downtimes – the whole production cycle is monitored in real time and disturbances are discovered immediately.

Chocolate forms that are damaged or contaminated are easily identified through RFID and can be removed from the production process and sent directly to a connected cleaning plant. The special RFID tags and combined read-write heads from Turck even withstand wash-down environments. Thanks to the modular RFID concept with robust tags (up to IP69K), combined read-write heads, food and beverage compatible cables, and fieldbus and interface components, Turck's BL-ident system can be easily integrated into difficult environmental conditions and preexisting automation structures.

Identification with additional value

Wireless identification offers more advantages than the identification of intermediate or end products or product carriers. The EEPROM or FRAM memories, with capacities up to multiple kilobytes, record production dates or cleaning times that are saved with the identification numbers (Unique IDs), so guidelines of hygiene and quality can be monitored. Also, automated procedures, like the loading of the casting machines or the precise placement of the products or product carriers close to handling robots, can be carried out reliably with a RFID system. Last, but not least, the forms that have to be replaced because of contamination or material defects can be identified and ejected immediately before they lead to faulty end products.

Safety creates efficiency

Because all of the relevant data is written onto and read-out from the RFID tag automatically, the plant operator doesn't have to enter the data manually and has the updated data of the production facility. The waiving of manual input and controls doesn't only minimize the direct operating costs but also the follow-up costs that are caused through plant downtimes. The automatic data transfer opens up a lot of new automation potential, because of the applicability along the whole production chain. It provides a comprehensive and flexible tracing system that is easy to integrate and upgrades the production safety and the plant efficiency. Despite the numerous intermediate products, product carriers and handling processes, the manufacturers can survey their whole production with a few mouse clicks – according to EG-Guidelines for the food industry. ■

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Fail-Safe Mini Measuring Device

Turck presents the first inductive miniature linear displacement sensor for a measuring range from 50 to 200 mm using the interference-free resonant circuit measuring principle

The biggest challenge posed by distance and angular measurement is the transmission of the current position to the measuring system. There are different measuring systems with specific pros and cons, but until now there has been no solution that met all sensing requirements.

The easiest way to detect angular measurement is through a direct mechanical connection between the position being detected and the sensor, like a potentiometric solution. Potentiometers are inexpensive, but have other disadvantages. For example, the installation is a huge effort, especially determining 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 for security reasons if they stick out from the machine. Last, but not least, there is no enclosed housing possible for these sensors, which means a high maintenance and a higher susceptibility to failure.

With the use of magnetic position generators, a mechanical connection to the sensor is needless. Corresponding systems deliver exact measurements and do not wear because of their closed housings. Despite

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Webcode | **more11170e**

The inductive linear displacement sensors of the new LI-Q17 series fit into the smallest corner and are insensitive to electromagnetic interferences because of the oscillator within the position generator

their high price, distance and angular sensors with magnetic position generators are used in numerous fields of applications. However, magnetic measuring systems are unsuitable 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 a measurement range of 50 mm at each side the user would have to trade off an installation length of up to 210 mm.

Resonant circuit principle produces relief

Turck developed new distance and angular measurement sensors to put all these disadvantages in the past. Unlike magnetostrictive or conventional inductive position sensors that use magnets, the new sensor detects an object's position via a resonant positioning device. The functional principle: A transmitter coil integrated into the IP67-rated housing generates a high-frequency alternating magnetic field (190 kHz) that activates the resonator integrated in the positioning device. Each time the transmitting coil stops transmitting, the resonator induces voltage into two receiving coils integrated in the sensor. The voltage intensity depends on where the positioning device overlaps the receiving coils. An integrated 16 bit processor provides a corresponding proportional output signal in different formats: 0 to 10 V, 4 to 20 mA, IO-Link or SSI.

Unlike magnetostrictive sensors, this resonant circuit principle is completely immune to external electromagnetic fields, like those caused by large motors or welding cells, and since there are no magnets involved, splinters do not accumulate on the positioning device. Unlike potentiometric detection solutions, not even dirt nor dampness affect the sensor – thanks to a fully sealed IP67-rated housing.

LI-Q17 expands resonator portfolio

Turck uses the resonant circuit measuring principle for three sensor families. The miniature linear displacement sensor was developed especially for a very short measuring range between 50 and 200 mm. The compact miniature sensor completes the portfolio consisting of the inductive RI-series of angle sensors and the inductive displacement sensors of the LI-Q25-series that cover a measuring range of 100 to 1,000 mm.

The robust LI-Q17, in an IP67-rated housing, consists of four different models with measuring ranges 50, 100, 150 and 200 mm. With the 12-Bit-DA-converter, the sensors reach 0.012 to 0.05 mm. The first models – available in April – have an analog output (0 to 10 V, 4 to 20 mA, 0.5 to 4.5 V). An SSI model is in development.

The inductive angular sensors of the RI-series are able to compensate a radial offset of 4 mm

Despite their compact design, Turck's new sensor family has extremely short blind zones of 10 mm at the connecting end and 22 mm at the head end. For the connection, a pigtail with a 30 cm cable and an M12 connecter or an open connection line of 2 m is needed.

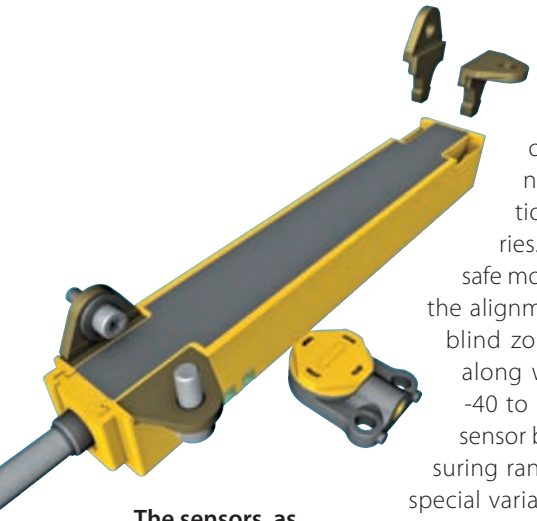
The pre-assembled concept lets the user install and operate the LI-Q17 sensor and the provided standard accessories fast and easy. Robust metal clips are integrated into the housing and allow either a vertical or a horizontal installation. The electronic module of the positions generator is pivoted and provides an exact position corresponding to the installation situation. If an application needs a special measuring range, a teach-adapter is able to provide it according to the requirements. LEDs on the sensor show the user if the position generator is located within the measurement range.

LI-Q25 for higher measurement range

The LI-Q17 is the next step in the resonator-technology that Turck presented for the first time with the linear displacement sensor series, LI-Q25. The LI-Q25 sensors have a resolution of 1 µm (repeat accuracy 10 µm)and are especially suitable for applications like mills, injection molding plants or metal processing machines that

Quick read

The first fail-safe miniature linear displacement sensor for a measuring range of 50 to 200 mm has been presented by Turck. The LI-Q17 doesn't work with a magnetic locator, but with the resonant circuit measuring principle, where an object's position is detected via an inductive oscillating system, consisting of a condenser and a coil. Thus, the LI-Q17 that combines all the positive qualities of customary measuring systems in one solution without having the disadvantages.



The sensors, as well as the pivoted position generator, can be installed either vertically or a horizontally with the provided installation clips

have problems with the technical restrictions of the established measuring systems. The housing of the Q25-sensor features an aluminum profile that allows easy application via optional mounting accessories. 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 -40 to 70 °C and the option to adapt the sensor by programming it to different measuring ranges, allows users to dispense with special variants 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 Q25 sensor family is available with different outputs. In addition to to electricity/voltage and SSI-interface, Turck offers a high-end model with a programmable IO-Link-interface where the user can define the measurement range, as well as the output signals. For applications in automotive engineering, for example, there is an output signal of 0.5 to 4.5 V. Furthermore, up to four switching points can be adjusted.

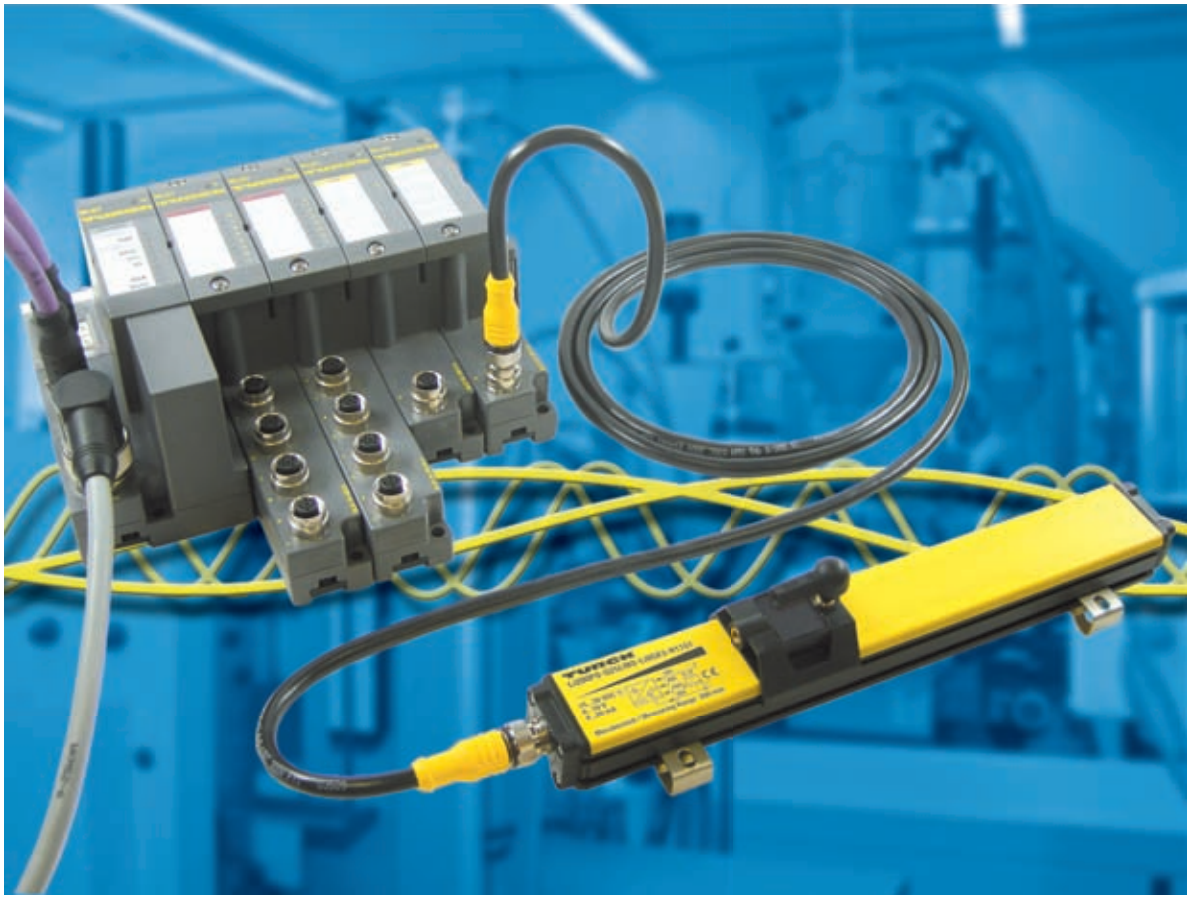
RI-sensors measure swiveling angle

Along with the linear displacement sensors, the resonator portfolio contains a series of angular sensors. The RI-sensors have a measurement range of 360° at an accuracy of 0.15 percent of the full scale. The separated assembly of the sensor unit and the positioning device, as well as a compensation of ±4 mm, provides an easy installation and a safe operation of the sensors. The RI-sensors can be easily attached with two shoulder bolts to solid or hollow shafts. With the help of an integrated adapter with a diameter of 6 mm and 8 mm, a standardized hollow shaft sensor can be altered into a solid shaft sensor.

The contact-free principle compensates application-specific bearing tolerances, such as vibrations that are caused by the jolting of shafts. The sensor provides an output of 0 to 10 V, 4 to 20 mA, 0.5 to 4.5 V and SSI-interface.

Conclusion

Because of their resistance to interferences and their high resolution, the LI and RI-sensors can replace the customary measuring systems for distance and angular measurement in nearly all fields of application. Whether an application contains short or long-range distances, limited installation space or external interferences – Turck's LI and RI-sensors offer a flexible solution that can easily be applied to various applications and integrated into preexisting structures. With the M12x1 connection, linear distance and angular sensors can be connected to fieldbus installations, like BL20, BL67 or BL compact, easily. 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. ■



Turck offers the LI-Q25 linear displacement sensors with a programmable measuring range of 100 to 1,000 mm

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Whether incremental, absolute, single or multiturn, SSI or fieldbus interface, Turck offers a comprehensive standard portfolio of encoders for numerous applications

To measure distances, angles, positions or revolutions of machines, numerous sensor solutions are offered to the user, among them a variety of encoders which are divided in two different types: incremental and absolute measuring systems. The most cost-efficient solution is an incremental encoder. It provides signal periods whose numbers measure the revolutions, the length or the position. Incremental encoders are usually used for monitoring revolution and speed.

Absolute encoders are used to monitor positions or angles. Here, a code pattern is assigned to each position. The user can chose between a singleturn encoder, also called an angle sensor, that measures the position over one rotation, or a multiturn encoder that can process several rotations. The clear assignment of a code for each position means that absolute encoders have exact information about the position, compared to incremental encoders that calculate the position. Disturbances in the communication that lead to miscounts are possible - especially at long cable lengths. To prevent this, the encoders have to be calibrated to a zero position, which is difficult. Also, after a power failure, the plant has to be set up again with a reference run. Absolute encoders, on the other hand, show the current position immediately, so that the information is available directly after a new activation of the plant.

Scanning technologies

There are two established scanning technologies for industrial encoders: optical and magnetic scanning. Optical scanning provides high resolution and accuracy, as well as a high resistance against electromagnetic interferences. Magnetic technology is especially shock resistant and may have a high protection rating of IP69K. Furthermore, the devices are compact and especially suitable for high temperature fluctuations. Often magnetic encoders are cheaper but have less resolution and are less precise.

Turck offers both scanning technologies for all categories of encoders (incremental, absolute, singleturn, absolute multiturn and analog) and has a standard comprehensive portfolio, from which the user can apply the most fitting technology for the corresponding application.

Mechanical design

Linear position sensors and encoders are usually placed in close proximity to the action and therefore need to resist environmental influences and mechanical stress. Technical attributes, like protection category, temperature zone, resistance to shock and vibrations, as well as load capacity of the

The Right Turn

Turck expands its sensor portfolio with encoders in different types and designs

shaft, are important selection criteria for the user. However, these attributes don't guarantee absolute certainty about a long lifespan of the encoder under difficult conditions.

When used outdoors, encoders have to withstand temperatures of -40°C and meet the IP67 protection category. But is this good enough? Often, outdoor devices are exposed to strong temperature fluctuations that leads to regular warming and cooling cycles that allow the formation of condensation inside the housing of the encoder. This can be avoided through a stable and compact die-cast housing and multiple seals between the encoder flange and the housing. The compact encoders only have minimal airspace, which reduces the possibility of condensation furthermore.

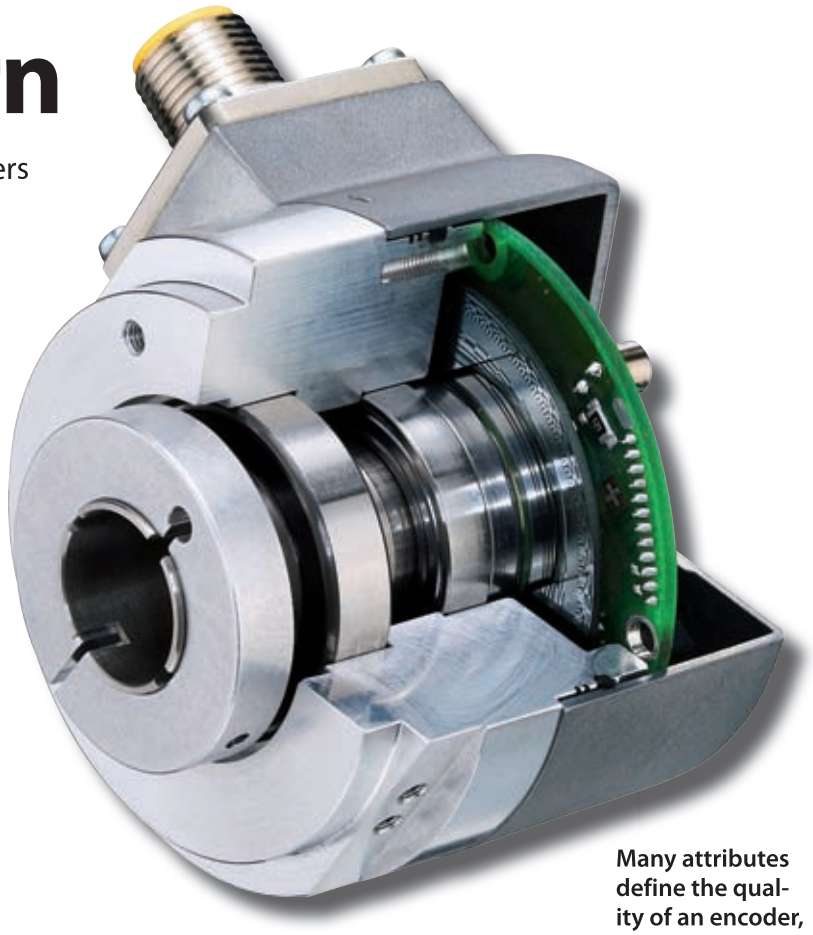
If the encoders are exposed to high-pressure water or steam jets, as it often occurs when cleaning the machines, an IP69K-rated encoder is needed. The connection technology must also withstand the same conditions.

Next to environmental conditions, mechanical stress through shock and vibrations has to be considered. An encoder that is used for a drive or engine should have a shock resistance of at least 1,000 m/s^2 and a vibration resistance of at least 100 m/s^2. For heavy industry applications, a shock resistance of up to 2,500 m/s^2 is recommended, and for extreme stress found in some construction machines, up to 5,000 m/s^2 is needed.

The deciding factor for the lifespan of encoders is the quality of the bearing assembly. The maximum radial and axial bearing load indicates the bearing strength – for engineering and assembly at drives, 80 N radial load capacity of the shaft and 40 N axial load capacity of the shaft are recommended. But this is not the only quality feature. The bearing assembly also defines what installation conditions the encoder is able to tolerate. The encoders from Turck have a very robust bearing assembly with two large ball bearings that are mechanically interlocked and have a maximum distance to each other.

Quick read

For nearly every automation task, positions and movements need to be measured exactly. The market offers several sensor solutions for this task but encoders are one of the most common. To offer its customers the ideal sensor solution, Turck expanded its portfolio with a standard comprehensive range of encoders for different fields of application.



Many attributes define the quality of an encoder, among them a robust mechanical design

Interfaces

For the connection to the control systems, incremental encoders either use a RS422 interface for large cable length or push-pull. For higher resolutions sine signals are used. The common push-pull interface is used for the connection to counter cards, electrical counters and SPS-inputs. The synchronous serial SSI-Interface has prevailed as the standard for absolute encoders. For real-time capability, the parallel output is irreplaceable, although it needs a complex wiring. For the different fieldbus systems like Profibus-DP, CANopen, DeviceNet, EtherCAT and Profinet, Turck offers absolute multiturn encoders that can be connected directly to the particular system.

Speed

Encoders with precise integral bearings and powerful electronics can also be used for procedures with high operational speed. The reaction rate of the sensor plays a role for the measuring speed, but normally the interface or the communication structure is the limiting factor. The incremental encoders from Turck are equipped with especially fast electronics with a frequency of up to 300 kHz. The absolute encoders provide very fast SSI-interfaces with a frequency of 2 MHz. The refreshing rate of the position value lies with more than 100 kHz at a maximum jitter of 1 µs real-time. Because of the short control cycles, this precision allows a high productivity of the application. If a high resolution feedback system in real-time is needed, for example for gearless-drives, the type with additional SIN/COS-track would be the best option. ■

Efficiently Stored

The Bachofen AG from Switzerland optimizes their logistics system with the wireless identification system, BL ident, from Turck for automatic guidance

A 3,000 square meter storage space over three stories, a bidirectional elevator system, approximately 350 transport boxes and a stock of mechanical, pneumatic, hydraulic and electronic articles worth several millions of Swiss francs are the key points for the latest automation project undertook by the Bachofen AG from Uster in Switzerland. The family business began in 1945 and offers industrial automation solutions for motion engineering, fluid control and pneumatics, hydraulics, robotics, vision and

Author

Frans Brouwer is the regional sales manager Western Europe at Turck in Mülheim

Webcode | **more11150e**

Intelligent circle: About 350 transport boxes reach their destination at the Bachofen warehouse thanks to the RFID-system, BL ident, from Turck

User www.bachofen.ch **Integrator** www.gilgen.com

RFID to OEM and end customers from Switzerland and Liechtenstein. Along with single components, Bachofen's portfolio also contains special branch and system solutions.

Modification during operation

Within the restructuring of the logistics between March and May 2010, the container conveyor system in the storage space was also modernized to meet the growing requirements of the future. "The replacement of the equipment had to happen during operation, so we had to keep the time for modification as short as possible,"

Walter Landtwing, director of sales at Gilgen Logistics, was convinced by "the flexible integration of the system from Turck into the existing controls."

Walter Landtwing, director of sales at the assigned system integrator Gilgen Logistics AG, describes the task. Further important requirements were the modularity of the transport system and the zero-pressure transport of the boxes. "The old transportation plant was nearly 40 years old and we weren't satisfied with its performance any longer," Kurt Gfrerer, product manager automation of the Bachofen AG, summarizes.

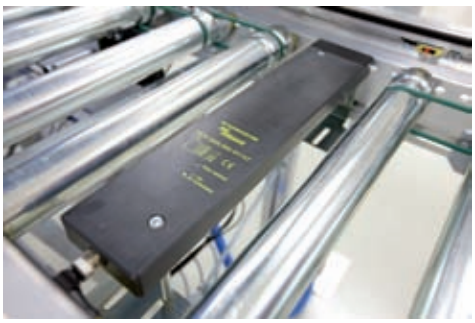
In consultation with Bachofen, the system integrator decided to implement a touchless, wireless identification system in order to organize the transport processes of the goods more efficiently. Although Bachofen is the sales partner of Turck in Switzerland, RFID solutions from different providers were evaluated before the decision was made in favor of the modular RFID system, BL ident, from Turck. "We were convinced by the intelligent design of decentralization, the easy and flexible integration into the already existing controls and the flexibility of the whole system," Landtwing explains. "With the decision for the RFID system from Turck, Bachofen relies on intelligent control technology for their logistics. The decentralized intelligence has the advantage, that the superior controls of complex applications are considerably relieved."

Intelligent transport system

And that's how the transport system works: At one of the three stations, the staff of the warehouse manually assigns a destination at one of the three stories to the transport box via an operation unit – incoming goods, commissioning or outgoing goods. As soon as the box is transported, a special read/write head (TNL R-Q80L400) that is integrated into the runways, writes the destination onto a FRAM data carrier (tag) underneath the box. The read/write head

Quick read

During the operation of their plants, Bachofen AG from Uster in Switzerland, equipped their box conveyor system with a wireless identification system (RFID) for automatic guidance. Read/write heads are integrated into the roller conveyors, read the data tags that are attached to the bottom of the transport boxes and make the data available via Profibus DP. Thanks to its modular concept with tags, read/write heads and interface components, the RFID system, BL ident, from Turck allows a custom automation solution.



At each floor, three special Q80 read/write heads for roller conveyors read the data tags that are attached to the bottom of the transport boxes – contactless and reliable

"The function module that is needed for the PLC is executed directly in the gateway, therefore the superior S7-control is relieved. It couldn't be easier."

Kurt Gfrerer, Bachofen AG

that is used fits exactly into the spaces of the 80 cm wide standard roller conveyor. Now the transport is fully automated.

If the box has to be transported into another story because of commissioning, another read/write head located on the service lift reads the destination at the tag. If all spaces at the destined story are occupied, the box stays in front of the lift until there is free space again. The boxes from the upper stories reach their destination on the ground level in the same way. A third read/write head at the exit of the service lift reads the according target data.

CoDeSys programmable gateways

With only three read/write heads on each story, Bachofen realized an efficient and fully automated destination guidance system – a circle with decentralized intelligence at the I/O stations. First the read/write heads forward the target data of the boxes to the modular fieldbus system, BL67, from Turck. BL67 includes a programmable gateway for fieldbus communication and individual integrated interface modules with numerous advantages: Since the I/O modules are independent from fieldbus and can be replaced during the operation of the plant, the whole communication environment can be upgraded flexibly and adapted to new automation requirements – no matter if more RFID-interfaces, additional sensors or actuators are needed.

By request, CoDeSys programmable gateways (IEC 61131-3) that support the consistent decentralization with additional control and diagnostic functions are available. Bachofen relies on an easy programmable Profibus gateway. "The biggest advantages are the onsite intelligence regarding the data handling and the uncomplicated integration into the controls," Gfrerer explains. "The function module that is needed for the PLC is executed directly in the gateway, therefore the superior S7-control is relieved and only relevant data is exchanged. It couldn't be easier," the automation specialist summarizes. ■

In front of the service lift, a read/write head reads the destination data from the tag at the bottom of the box

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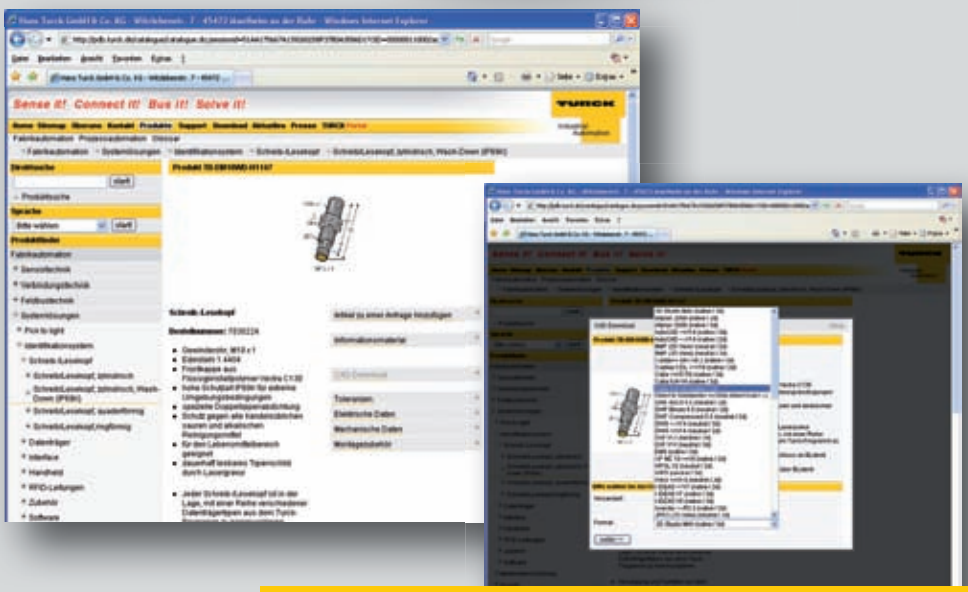

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Author

Yonglai Zhang is a product engineer at Turck China in Tianjin

Webcode | **more11151e**

SMTCL plants contain horizontal and vertical machining centers, conventional and CNC-machine tools

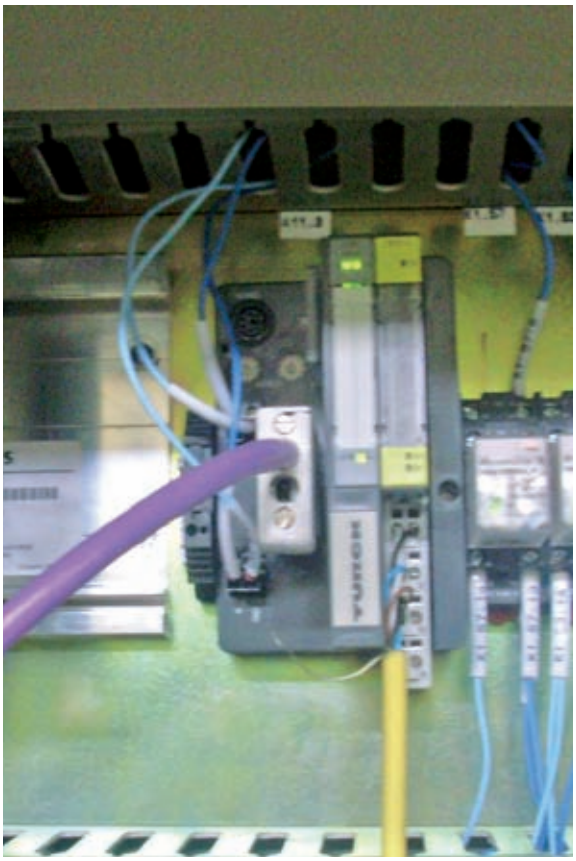
User www.smtcl.com

Easy Cutting Tools

Turck's RFID-system, BL ident, creates transparency for the cutting tool management of the Shenyang Machine Tool Co. Ltd. (SMTCL)

With a business volume of about 660 million Euro in 2009 the Northeast-Chinese Shenyang Machine Tool Co. Ltd. (SMTCL) is not only the biggest manufacturer of tools in China – the company is also one of the biggest providers of metal processing lathes, drilling and milling machines worldwide. The company was founded in 1995 and offers conventional and CNC-machine tools for numerous industries, including automotive, rail (transit), shipping, aviation and aerospace, and defense.

To guarantee the high performance and reliability of the machine tools, and to optimize production capacities to ensure plant availability, the Chinese manufacturer relies on identification technology from Turck. The BL ident modular RFID-system provides a reliable and powerful solution for monitoring



Turck's BL ident gateway communicates via Profibus-DP with the PLC

The robust read/write head on the machine reads the RFID tag on the cutting tool as soon as it is inserted

and tracing the diverse cutting tools that are used in the machine tools.

Frequent tool changes

The need for real-time information about the current location of each tool is rising with the increasing degree of automation at the manufacturing plant and the rising frequency of tool changes. Because of this, SMTCL decided to replace their identification system with the wireless solution from Turck. Thanks to this modular system with robust data carriers (tags), read/write heads of different types and sizes, as well as IP20 and IP67 rated gateways, the identification system from Turck can easily be integrated into already existing automation structures and expanded if needed. That is how SMTCL could achieve communication with controls from different manufacturers, like Fanuc Robotics and Siemens. "There was no additional programming effort during the implementation of the system, and that is why we will rely on Turck's BL ident system in the future," asserts Chengjun Lin, construction engineer at Shenyang Machine Tool Co. Ltd.

Continuous monitoring is well organized at SMTCL: A FRAM data carrier with a memory capacity of two kilobytes is attached to every new cutting tool. Before the tool is sent to the warehouse, all the relevant data, such as unique ID, type, control time or current position, is written to the tag. The data is read by the read/write heads on the warehouse doors at the production plants and forwarded to the controls at a central database. In this way, personnel knows where each cutting tool is located at any time – even during the plant operation – and if it needs to be replaced or repaired.

Flexible solution

Implementing Turck's BL ident RFID system allowed SMTCL to increase its production efficiency remarkably and reduce manufacturing and maintenance costs at the same time. The variety of available components – from tags to read/write heads to IP20 and IP67 rated gateways and interface modules – allows Turck's BL ident system to adapt to nearly all identification scenarios. Different fieldbus protocols (Profibus-DP, DeviceNet, CANopen, Profinet IO, Ethernet Modbus TCP and EtherNet/IP) and transmission frequencies (HF/UHF) increase the versatility even further, and allow an efficient identification solution. ■

Quick read

Since the current identification tool couldn't meet the growing requirements of the plant any longer, the Shenyang Machine Tool Co. Ltd. replaced it with wireless RFID technology from Turck. The BL ident system can easily be integrated into already existing infrastructures, due to the variety of available components, like tags, read/write heads, and IP20 and IP67 rated gateways and interface modules.

"There was no additional programming effort during the implementation, and that is why we will rely on Turck's BL ident-system in the future."

Chengjun Lin, Shenyang Machine Tool Co. Ltd.

Cards on the Table

Elantas Beck modernizes 19" interface cards with the compact remote I/O system, excom, from Turck

The products made by Elantas Beck are found in numerous electrical devices, including household appliances, television sets, wind turbines, computers and lighting. The company develops, produces and sells impregnation resins, potting compounds and encapsulating resins (thin or thick layer), that are used in electric motors, transformers, generators, capacitors, printed circuit boards and sensors. Elantas Beck is part of the Elantas Electrical Insulation of Altana AG, one of the leading developers of specialty chemicals .

At the company's headquarters southeast of Hamburg, approximately 120 employees develop and produce several thousand tons of resins for the electrical industry every year. During production, the products run through reactor line where the synthetic resins are heated, condensed and processed in vacuum. To carry out this process reliably, numerous monitoring stations are installed. During the construction of the plant, the analog and binary measuring signals were sent to 19" interface cards installed in large racks.

Author

Stefan Kappel is the head of key account management process automation at Turck in Mülheim

Webcode | **more11152e**

The excom remote I/O system from Turck provides 128 binary or 64 analog channels in a very small space

User www.elantas.de **Integrator** www.eab-automation.de

Fieldbus instead of 19“ cards

After many years of use, the cards became susceptible to defects. Since new cards were more and more difficult to obtain, an alternative was sought out. The decision was made to modernize the interface technology for one reactor line first and use the still intact cards as spare parts for the other reactor lines. Thomas Pölking, head of maintenance, chose from different alternatives, like modern 19” cards or DIN rail devices, and decided on a fieldbus solution in the end. “We wanted an easy and modern solution, with integrated Ex-separation and easy, direct connection to our S7-PLC,” Pölking explains. “Before the modification, the connection worked only indirectly. The signals were sent to Ex-barriers, then to an old PLC and only then via Profibus to the S7.”

After the fundamental decision for a remote I/O system was made in the summer of 2008, the search for a qualified provider began. EAB Automation, a company that specializes on modernizations, extensions and new constructions of procedural and manufacturing automation plants, was retained to aid in the search. EAB employees and manager, Jochen Ahrend, support their customers during the design and control engineering realization of the projects, create the software and the switching cabinets and carry out the assembly and the startup.

Assembly in 19” rack

Within the search for a remote I/O system provider, EAB compared solutions from different manufacturers before the decision was made in favor of the excom remote I/O system from Turck. "With the excom system from Turck, we found a remote I/O solution that is really easy to handle and so compact that we could install it into the already existing 19” racks, together with all 150 I/Os,” Jochen Ahrend says. The excom systems fulfills

Quick read

Elantas Beck produces liquid impregnation resins and varnishes in Hamburg, and is one of the leading manufacturers in this market. On their way to the end product, the resins run through a reactor line that is equipped with numerous monitoring stations for temperatures, pressures and more process relevant parameters. The 19” interface technology was installed in the 1990's and there are only few spare parts available today. That is why the company upgraded the first reactor line with modern technology – Turck's excom remote I/O system.

In the reactor lines at Elantas, numerous analog and binary signals are forwarded from the switching room to the interface cards and the excom system to the controls

Thomas Pölking, head of maintenance at Elantas, wanted a compact and modern solution that could be connected directly to the control system without a detour over the PLC

Since the modernization of the plant, the 19" rack (in the back) hosts two excom systems instead of the interface cards

In only one weekend, EAB Automation installed the new excom systems into the 19" racks

"With the excom system from Turck, we found a remote I/O solution that is really easy to handle and so compact that we could install it into the already existing 19"-racks, together with all 150 I/Os."

Jochen Ahrend, EAB Automation

another requirement of Elantas, because the additional PLC for the reactor line is no longer necessary. "Now the signals are sent to the excom system from Turck and then directly to the S7, so we can save a detour over another control," Pölking states.

Even though this was the first project where EAB implemented excom, the plan was as successful as the realization. In the fall of 2008, employees were able to install and start the system over the course of only one weekend, so the plant was fully operational again on Monday morning. "We had no experience with the product then, insofar the support from Turck helped a lot," Ahrend explains. "Even the description was particularly good, and all our additional questions were answered by the specialists from Turck quickly so we could continue on our project successfully."

Flexible system

Even though the remote-I/O system wasn't installed in a hazardous area for this project, it is possible to install excom in zones 1 and 2. The field circuits are approved for the use up to zone 0. The IP20 rated I/O modules offer four analog or four to eight binary inputs or outputs at a width of 18.2 mm. Two redundant power supplies, two redundant gateways and up to 16 E/A-modules can be installed on an area of 43.2 cm by 20.6 cm by 11 cm. In this configuration, up to 128 binary or 64 analog channels are available in a very small space.

The SC12Ex segment coupler is used for intrinsically safe separation of RS485 and RS485-IS

All modules have "EEx ia" interfaces, so that no further protective measures are needed. The energy supply is available in 24 VDC or 230 VAC. All modules – including the power supplies – can be replaced during full operation, even in zone 1. In addition to increased availability, hot swapping and ex-protection, the system allows a general HART-parameterization of the fieldbus devices via bus. ■

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PROCESS WORLDWIDE

The Right Mix

Somakon Verfahrenstechnik uses Turck's HMI/PLC solution, VT250, for intelligent control and operator guidance of its MP blender family

Author

Jörg Süßmann is a sales specialist at Turck in Mülheim

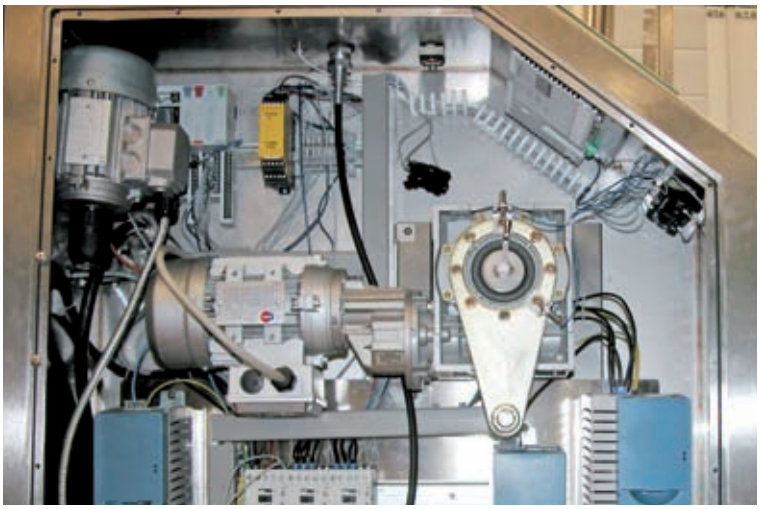
Webcode | **more11153e**

Turck's HMI/PLC solution, VT250, is the central control and operating element of the MP blenders

User www.somakon.de

Blending, as an independent procedural step in development laboratories, has become more and more important over the last couple of years. Combined with the demand for small quantities and transferability to larger systems, a need arose on this area that can only be fulfilled by few laboratory blenders today.

Wolfgang Naton has dealt with the problem of mixing and granulating on a laboratory scale for the last ten years. The process engineer is the manager for Somakon Verfahrenstechnik, a company that develops and sells blending systems for numerous fields of application. The blenders from Somakon are used in the research laboratories of the chemical industry and the producers of pharmaceuticals and pesticides. Along with their entry model, the LB, which was designed as a pure blender, Somakon also offers the MP blender family.



The VT250 (at the slant) communicates via Ethernet over the BL20 remote I/O (upper left) with sensors and frequency converters

MP blenders from Somakon can be adapted to the requirements of the customer

Modular blender concept

"MP stands for multi-purpose, which means that we can configure the systems individually according to the requirements of the customer," Naton explains. "Many customers start with a base model, but quickly request further functions. With our MP solution, we have the flexibility to update the base model according to our customers wishes, and add temperature, pressure or humidity measurements. With this you can handle whole processes."

In addition to blending, the MP machines can be used for granulating, pelletizing, emulsifying, suspending, kneading, loading, crushing or drying – based on the configuration level. Along with the containers and tools, the blender is equipped with sensors and actuators, depending on the process steps that are performed. To offer the needed flexibility of its machines, Somakon turned away from mechanical control elements and classic controls, and tried the VT250 from Turck instead.

The VT250 is a compact operator terminal with a PLC that was developed especially for independent control and the operation of small and medium sized machines – the ideal solution for the MP blender family. VT250 includes a 5.7"-QVGA-TFT touchscreen in a compact plastic housing; QViS visualization software provides the communication between human and machine, which is implemented by the common control software CoDeSys 3. "With the VT250 from Turck, we have a PLC that meets all our requirements at an optimal price performance ratio," Naton adds. "We have implemented the first project with Turck and received a lot of support during the set-up of the new machine. This includes the programming of the controls with CoDeSys." Naton has had bad experiences with other renowned PLC providers in the past, especially in regard to their support: "I worked with the PLC from another provider, but as a comparatively small company, it takes ages until you get the right contact on the phone. That is different with Turck. We experienced exceptional support from the product management, as well as the field and indoor service."

As well as using the VT250, Somakon uses the economy version of Turck's BL20 I/O system to connect the sensors and drives of the blenders. The BL20 Ethernet gateway coordinates the communication with four I/O modules and serves as the interface to the controls within the VT250. For example, one module with eight analog inputs may be used for PT100 or pressure signals, another module with four analog outputs is used for the frequency converter, as well as two modules with 16 digital inputs and outputs are used for the binary signals.

Container identification via RFID

The subject of wireless container identification is another important factor for the future plans of Naton. In this area, Turck's modular RFID system, BL ident, with tags that can be installed directly onto metal and the possibility to connect the combined read/write head via RFID module over the existing BL20 I/O system, can be easily included into the machine. Alternatively, there also is the possibility to connect the combined read/write head to the VT250 directly. The RFID labeling makes sure that containers or tools are used exclusively for the process steps for which they are designed. That increases the safety and the lifespan of the blender.

Concludes Naton, "Turck doesn't just offer the fitting products for my requirements but also has employees that are very supportive and find a solution for everything." ■

"With the VT250 from Turck we have a PLC that meets all our requirements at an optimal price performance ratio."

Wolfgang Naton, Somakon

Quick read

The blenders at Somakon are very popular at the research and development departments of renowned industrial users, because they can be adapted individually to most tasks because of their modular concept. To offer this flexibility at a good price performance ratio, Somakon uses Turck's HMI/PLC, VT250, as efficient control and operation unit.

Author

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With about 30 million tons of iron ore and coal, the plant from EECV is one of the biggest bulk handling installations in Europe

User www.eecv.nl

Good Listener

Ertsoverslagbedrijf Europoort C.V. installed the Ethernet-Profibus-Interface, PB-XEPI, from Turck for constant monitoring of the fieldbus communication

At the harbor of Rotterdam, Ertsoverslagbedrijf Europoort C.V. (EECV) runs one of Europe's biggest bulk handling installations. On an area of about 82 hectare, every year roughly 23 million tons of iron ore and up to 5 million tons of coal are unloaded, stored temporarily and loaded from sea-going vessels onto smaller transport ships for the transportation into the Ruhr area. Size and age of the plant – the facility is modernized and has been updated consistently for the last 40 years – are a challenge for the logistics, as well as for the automation technology of the robust load cranes, conveyer belts and loading installations. Because the communication between the automated equipment components and the superior controls has to be very robust and reliable, EECV relies on the Profibus protocol. Fiber

optics lines have to bypass large distances of up to one kilometer which makes the fieldbus communication susceptible to failures.

Easy to diagnose

Last summer, the general wish was expressed to monitor the overall 20 Profibus networks and all participants centrally, to recognize and avoid failures at an early stage. During their research for a powerful surveillance tool, the responsible staff from the electrotechnical office found the Ethernet-Profibus-Interface, PB-XEPI, from Turck. The decisive factor for the decision was mainly the diagnostics functionality: "The Ethernet-Profibus-Interface from Turck is ideal for us, because you can figure out where the mistake lies – down to the single participants," John van Hoorn, planning engineer, explains.

So far, EECV uses five interfaces for diagnosis, seven more are already scheduled and eight additional interfaces could be in use for the coal facility soon too. The interfaces make an important contribution to the vertical communication and maintenance concept over the office to the single field components. With the new interfaces, the staff of EECV is able to monitor the connected Profibus networks simultaneously, constantly and centrally for the first time. Unlike the local proprietary diagnostic tools, the PB-XEPI, that is acting as a webserver, allows the remote maintenance over a PC webbrowser – the equipment or number of participants of the plant isn't important. "You assign an IP-address for the interface, connect the Profibus-cable and it works," van Hoorn exclaims.

Error message by e-mail

At the Profibus network of the huge bulk handling installation, Turck's PB-XEPI's are configurated merely as listeners. Without an own Profibus address, the diagnose units monitor the data flow of the networks without taking part in the communication. In the case of a malfunction of the network communication, the interface concerned records an error message independently or sends it by e-mail. Over an attached link, the maintenance staff can access the interface and retrieve detailed information and instructions.

Thanks to the system-independent communication via Ethernet and integrated webserver, there is no special software or license needed to reach the full diagnostic functionality – a webbrowser is all that is needed. "Some time ago, a PB-XEPI showed so called repeats from an old part of the facility. I could read the error report in my office and immediately replace a part of the cable before there was a bigger failure."

Future-proof functionality

As a universal interface for the Profibus-net, PB-XEPI supports the standard FDT/DTM. Thanks to the license free software PACTware and fitting "device drivers" for the field components (so called Device Type Manager) the user can easily visualize and manage the diagnose data of the participants. The easy handling also supports future upgrades of the fieldbus net and turns the diagnose interface into a future proof enrichment for automation technology. ■

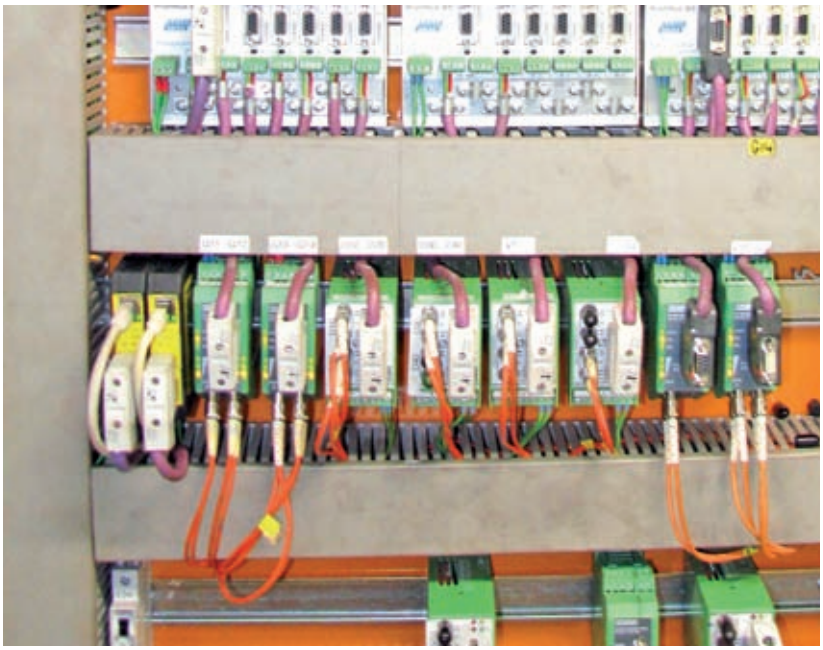
"Some time ago, a PB-XEPI showed so called repeats from an old part of the facility. I could read the error report in my office and immediately replace a part of the cable before there was a bigger failure."

John van Hoorn, Ertsoverslagbedrijf Europoort C.V.

Quick read

At the harbor of Rotterdam, numerous field devices in robust load cranes, conveyer belts and loading installations communicate with the controls via Profibus protocol. As soon as failures of the fieldbus communication are signaled, the maintenance staff can identify and fix the problem centrally with the help of a webbrowser – thanks to the support of the Ethernet-Profibus-Interface PB-XEPI from Turck.

Ethernet-Interface and webserver of the PB-XEPI allow a central monitoring of the Profibus network



If the PB-XEPI is configurated as a listener, the diagnose-tool is able to monitor the whole network without an own Profibus address

Preventing Rollovers

Ferrara Fire Apparatus uses Turck's inclinometer for tilt testing to make sure that its fire trucks are stable in the field

Firefighters put their lives on the line doing far more than running into burning buildings. Even getting to the emergency scene can be dangerous. That is why the National Fire Protection Association (NFPA) developed standards for new fire apparatus equipment used to transport firefighters. The code, 1901 Standard for Automotive Fire Apparatus, outlines the standards required for manufacturing a fire truck to ensure the firefighters' safety.

One of these requirements involves vehicle stability to ensure that the fire truck does not roll over during operation. NFPA 1901 4.13.1 outlines the ways in which a fire truck can adhere to this standard: by tilting the truck on a tilt table to 26.5 degrees in both directions or to equip the truck with an electronic stability control (ESC) system. According to A.K. Rosenhan, a consulting engineer specializing in fire apparatus construction, testing, evaluation and failure analysis: "ESC systems are expensive, prone to problems and not available on all chassis. Plus, many drivers do not like their controls being overridden. Though using a tilt table is a quasi-static test, it is much easier and less dangerous to conduct – and certainly much easier on the fire truck than driving around in a circle of a specified radius

Author

Marty Cwach is a product specialist for sensors at Turck USA in Minneapolis

Webcode | **more11155e**

Ferrara Fire Apparatus uses inclinometers at its on-site testing facility

User www.ferrarafire.com

The tilt table is moved to 26.5 degrees in both directions

Turck inclinometers detect the angle of a tilt table

Quick read

Before a fire truck can be used in the field, it must conform to all the requirements set forth by NFPA 1901 Standard for Automotive Fire Apparatus. Ferrara Fire Apparatus uses Turck inclinometers to ensure the requirements for vehicle stability are met.

at a specified speed to see if you roll over." Ferrara Fire Apparatus, a leading manufacturer of custom emergency response vehicles located in Holden, Louisiana, has been heavily involved in crash testing and safety analysis, and offers both electronic stability control systems and on-site tilt table testing for their vehicles. "Knowing that stability testing was coming with the new 1901 standard, Ferrara Fire Apparatus made the investment in a test facility at our factory, compliant with SAE 2180," says Chris Ferrara, President of Ferrara Fire Apparatus.

Tilt Table Testing

The tilt table at the Ferrara factory is 12 feet wide by 50 feet long, actuated by jackscrews, and is capable of handling vehicles up to 150,000 pounds. It is also equipped with digital scales to ensure compliance with other NFPA requirements dealing with total weight, axle loading, and transverse loading. An important component of the tilt table is to accurately measure the amount of tilt and to record other test parameters, such as body shift, for documentation and ultimate certification. After using a simple pendulum type angle indicator to gauge the tilt of the table, Ferrara chose to use Turck's single axis inclinometer because of its reliability and ease of use. "Many driver/operators have a strong preference for tilt table testing, wanting to avoid the throttle limitations associated with ESC," notes Ferrara.

"As gravity is pretty constant, the results of a tilt-table test are consistent, not prone to error or interpretation, and have rather graphic proof that a fire apparatus is compliant with the NFPA standard," adds Rosenhan. "Turck's inclinometer does a fine job of providing such data." "It's a dramatic thing to see some 65,000 pounds of fire apparatus, worth up to $1 million, hanging up in the air. Obviously there are chains and straps that loosely anchor the apparatus but do provide for enough movement to determine if the vehicle 'flunks' testing," concludes Rosenhan. ■

"As gravity is pretty constant, the results of a tilt-table test are consistent, not prone to error or interpretation, and have rather graphic proof that a fire apparatus is compliant with the NFPA standard. Turck's inclinometer does a fine job of providing such data."

A.K. Rosenhan, Consulting Engineer

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.

Date	Trade Show	City, Country
05.04. - 08.04.2011	Automaticon	Warsaw, Poland
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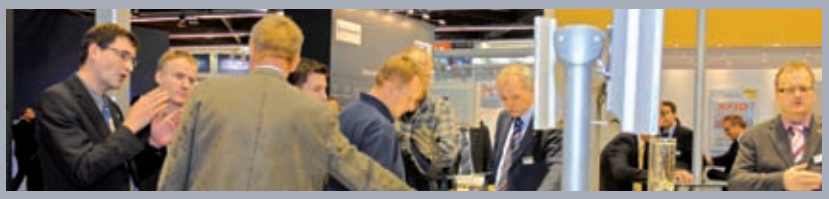
12.04. - 15.04.2011	Electron	Prague, Czech Republic
13.04. - 14.04.2011	ISA	Calgary, Canada
09.05. - 13.05.2011	Technical Fair	Belgrade, Serbia
12.05. - 18.05.2011	Interpack	Düsseldorf, Germany
24.05. - 27.05.2011	MSV	Nitra, Slovakia
20.05. - 22.05.2011	Indumation	Kortrijk, Belgium
24.05. - 26.05.2011	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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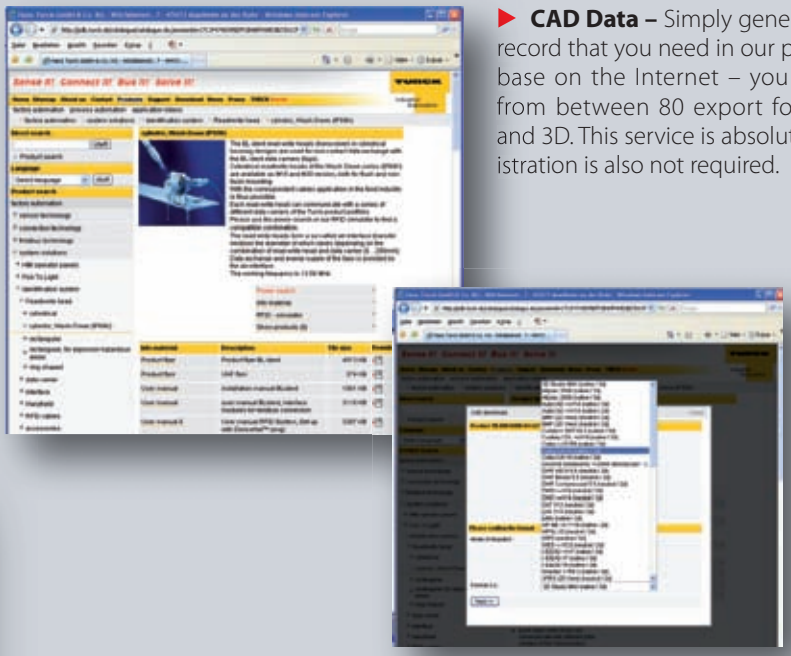

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