

more@TURCK

The Magazine for Customers of the Turck Group



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Robust LED machine and work-
place illuminations conquer
industrial applications **P. 14**



Waterproof

RWW monitors more than 100
well covers with wireless sensor
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Process Greening

SAS Automotive optimizes the
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IO-Link
HART
COMMUNICATION PROTOCOL

Flow Under Control

With sensors, signal processors and know-how Turck offers
flexible solutions for efficient flow surveillance

Expectations exceeded



Dear readers, it is that time of the year again. We have finished the preparations for the large annual fall event of our sector, the SPS/IPC/DRIVES and now we are looking forward to those three days in Nuremberg. Traditionally this is also the time to take a look back at last year.

With joy we look back at the past eleven months. After the successful year 2010, in which Turck could compensate the year of the crisis 2009 almost completely with a sales increase of 30 percent, we again managed to grow above average. At the end of this year, our sales growth will be about 25 percent which exceeds our expectations by far. With that the Turck group makes its largest turnover in the history of the company.

I want to thank you, our customers, for your trust in Turck. I also want to thank our more than 3.000 employees worldwide, which made our success possible with their outstanding commitment. Obviously we are on the right way with our approach to be the solution partner for your automation requirements. We work intensively on walking this path together with you to exceed your expectations too. That is why we invest into new production capacities in Halver and Minneapolis as well as in our fieldbus development at our location in Detmold. And if required, we also walk the path together with partners, as the RFID cooperation with the UHF specialist Deister Electronic proves.

You will find more information in this issue of your customer magazine **more@TURCK**. On the following pages we inform you about our new portfolio and numerous interesting automation solutions. If you want to meet us personally, come and visit us at the **SPS/IPC/Drives at our booth 351 in hall 7**.

Be our guest, we are looking forward to meeting you!

Sincerely, yours

A handwritten signature in black ink that reads "Ulrich Turck". The signature is fluid and cursive.

Ulrich Turck, Managing Partner

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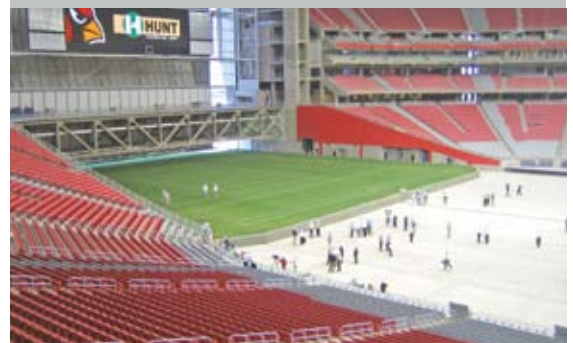
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LED lights are robust, durable and energy-efficient and therefore ideal for the industrial use as machine and workplace illumination. **Page 14**



Uni-Systems relies on sensor and fieldbus technology from Turck when it comes to solutions for retractable stadium roofs and comparable projects. **Page 30**



The manufacturer of bottom brackets for bicycles, Thun, optimized his production process with Turck's BL ident RFID system to make it transparent and retraceable. **Page 33**

Highest Sales Turnover



► Turck looks to conclude the current financial year with the highest sales turnover in company history. As Christian Wolf, Turck's Managing Director said at the annual press conference in Neuss (Germany), the family-owned company expects a consolidated total turnover of more than **430 million euro**, of which 100 million will be in Germany. After a 30% increase in turnover last year, Turck will grow about 25% this year. The number of employees has also grown with the sales turnover: Currently, the company employs more than 3,000 people worldwide, of which 1,530 work at German sites in Beierfeld, Halver and Mülheim an der Ruhr. "Based on our current assessments, this year we will well exceed our ambitious target of 400 million euro annual turnover," says Wolf. "This is due to the favourable economic trend in our target markets, as well as our implementation of growth strategies. This year, Turck has invested in markets and production capacities and has founded new subsidiaries in Brasil and Turkey. About 15 million euro have been invested in the expansion of 18,500 square meters of manufacturing capacities in Halver (Germany) and about 6 million US dollars into 4,000 square meters of manufacturing capacities in Minneapolis (USA).

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.

Application-Optimized RFID-Components

► Turck's RFID-system BL ident has been expanded with application-specific read/write heads and with data-carriers (tags) for the meat industry. A tag designed for high-temperature applications rounds out the product offering. The new read/write head TNSLR-Q42TWD with its associated tag was developed especially for **applications in wet environments with an increased range-requirement**, where UHF-technology won't work. The head is based on the proven 13,56MHz-HF-technology, but triples the usual range. In connection with Turck's 12mm-tags, maximum distances of 35 mm can be achieved instead of the usual 10 to 15 mm. This technology allows the functionality of read/write processes for the reliable

identification of meat hooks during the operation of conveyor belts. Furthermore, Turck equips the RFID-system BL ident with robust, high temperature proof tags with a protection category IP68. The data carriers TW-Q51-HT-B128 are suitable for ambient temperatures of -25 up to 85 °C. The temperature of the tag itself can reach -55 and 240 °C.



excom Remote I/O with New Functions

► Turck optimized its zone 1 remote I/O system excom for **use in zone 2** applications. We also expanded the system functions with new firmware and a new DTM (Device Type Manager). Because of the smaller power supplies in the modular design and a compact as well as a backplane, the system can be installed with even less space requirements. With the help of the new firmware and DTM, the excom-system along with connected field instrumentation can be put into operation without prior connection to the process control system, PCS. This allows a validated operation and connection between the field installation and control technology and eliminates potential sources of error from the beginning. Even during operation the user is able to add new measuring points or modules and test and operate them in the run up, without having to consider changes in the PCS. This guarantees that only validated system expansions are connected to the PCS. The new firmware enables updates via communication interface, so new functions can be implemented without downtime.



New Managing Director

► **Guido Frohnhaus** has been appointed managing director of the Werner Turck GmbH & Co. KG in Halver. Within the management board the 41-year old engineer takes charge of technical management and is also responsible for development and production. With the retirement of company co-founder Werner Turck, a change of structure and youth was needed. The Werner Turck GmbH & Co. KG with headquarters in Halver is responsible for development and production, and the Hans Turck GmbH & Co. KG headquartered in Mülheim is responsible for sales and marketing of the Turck group. Each are managed by a member of the founding families and an additional managing director. In Halver, Guido Frohnhaus and Markus Turck lead the company, in Mülheim Christian Wolf and Ulrich Turck, son of co-founder Hans Turck, manage the family enterprise.



24 V Switching Power Supplies

► With four new switching power supplies added to the series IM82-24 Turck completes its interface technology program. The power supplies **provide safety extra-low voltage (SELV)** according to EN 60950 and are suitable for the 24V supply of equipment, as well as for interface modules in the series IM, IME, IMB, IMS and IMC. Due to their wide-range input – 90 to 370 VAC – the IM84-24 can be used in numerous supply networks worldwide. Depending on the type, output current of 2.5, 5, 10 or 20 A are available. Using a potentiometer the output voltage can be adjusted from 22.5 up to 28.5 VDC – or respectively 24 up to 28 VDC. The IM82-24-series are IP20 rated and were developed to guarantee a reliable DC supply in the industrial environment. The power supply units provide high efficiency, the possibility for parallel connection and an overload protection of up to 150 percent. A power-good-relay guarantees a reliable functional check, meaning that in the case of irregularities the power supply-sided cause or a wire breakage can be excluded. The device bypasses power failures up to 30 ms automatically.

Linear Position Sensors for Hydraulic Cylinders

► With the new magnetostrictive LTX-linear position sensors in rod design, Turck promises **optimized position detection in hydraulic cylinders**. Additionally, level detection can be achieved with the help of float magnet accessories. Due to their high shock- and vibration resistance the sensors can also be used in construction machines and other harsh applications. The series completes the inductive linear position sensor portfolio of solutions for applications where a magnetic locator is needed. The LTX-series meets IP68 standards and is resistant against many chemicals and oils. The rod is made of high-quality stainless steel and offers optimal protection against aggressive media. The wear-free LTX-sensors provide precise measuring signals with a high degree of linearity and repeatability. They are available with analog output (4...20 mA, 0...10 VDC) or with a high-resolution digital SSI-output. A three-colored LED at the sensor output shows the current device- and signal status at anytime. The low power input (1 Watt type) enables the direct connection to display-, control- and interface modules.



Turck Acquires MTX Interest



► Turck has acquired Eaton Automation Holding's 50-percent interest in the joint venture MTX Elektronik GmbH (MTX) in Detmold. Turck now owns 100 percent of the shares. In 2002, Turck acquired 50 percent of the shares in Moeller Electronix GmbH from Eaton – at the time still under the name Moeller GmbH. The two companies jointly founded MTX to **develop automation components**, in particular I/O modules and fieldbus gateways.

Increased Focus on RFID



► Turck increases its activities for the **HF/UHF-RFID-system BL ident**, which is now available for the long-range UHF (Ultra High Frequency). The automation specialist arranged a technology and marketing cooperation with its partner Deister Electronic, who manages a long-term technology and knowledge transfer in UHF-RFID-technology. According to the cooperation contract, Turck is now allowed to develop, produce and market the Deister-UHF-technology in the field of automation. In other fields, Deister will still market the technology on its own. "This cooperation is a milestone in corporate development of both partners and the customers are going to benefit from this." Turck's managing director Christian Wolf comments, "With our application know-how in the field of industrial automation and based on the elaborate UHF-technology from Deister, we will be able to develop it further. Our customers always find the applicable read/write head for their requirements, whether in the established HF – or in the long range UHF-band." "Users increasingly expect custom-fit system solutions that are coordinated with one another," says Anatoli Stobbe, managing partner of Deister Electronic.

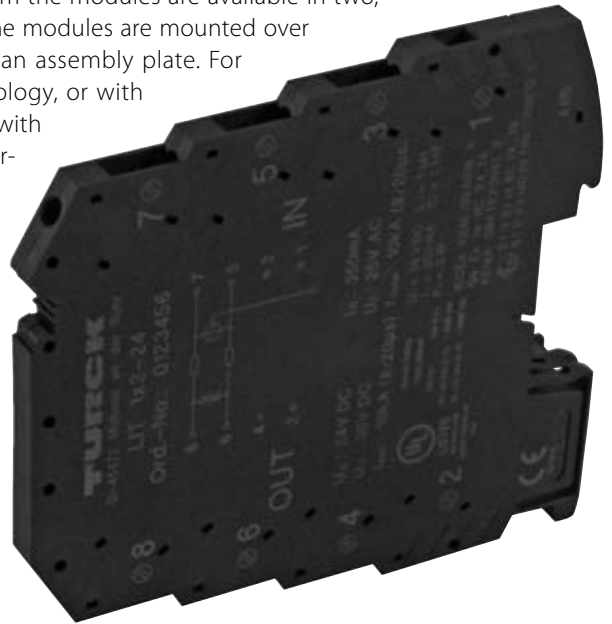
Training

► 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 **more21110e**

Voltage Surge Protection for PMC-Circles

► With new voltage surge protection devices for PMC (Process Measurement & Control) interface modules, Turck expands its position as a **complete provider of interface components**. The six new modules of the IMSP series (interface-module surge-protection) are installed ahead of the regarding interface modules and offer reliable protection against overvoltage. The devices in protection category IP20 can be used in explosion proof or non explosion proof zones. Despite their small width of 6.2 mm the modules are available in two, three and four wire technology. The modules are mounted over the standard top-hat rail or onto an assembly plate. For analog signals in two wire technology, or with analog data separator – modules with one (IMSP-1x2-24) or two signal circuits (IMSP-2x2-24) are available. Binary signals of switches, inductive or capacitive sensors are processed via floating signal wires of the modules IMSP-2-12 and IMSP-2-24. With the modules IMSP-4-12 and IMSP-4-24 temperature amplifiers can be connected with voltage surge protection.



Wireless Connection of Modbus Nodes

► The new **Multi-Hop Data Radio** from Turck's partner Banner Engineering extends the reach of the Banner's SureCross wireless systems by repeating transmissions in 3 km 'hops'. Multiple units can be placed, allowing signals to pass over hills and other obstacles that would block a single wireless hop. The Multi-Hop Data Radio can be used to connect a wide variety of field devices directly, including PLC's, Controllers, HMI's, DCS's, transmitters, level, pressure and temperature sensors. It allows extension of the widely used Modbus communication protocol to many applications where wiring is impractical because of distance or accessibility. The large wireless

networks enabled by the new radio provide previously unavailable information to users in a wide range of industries. In Irrigation, soil moisture can be measured, zone valves can be operated and flow rate measured. In automated parking applications, thousands of parking spots city-wide can be monitored. More traditional applications include tank level, pressure, flow and temperature monitoring in a variety of markets.



LED Work Lights for Industrial Use



► Turck extends its **lighting technology range** with energy-saving LED work lights of protection categories up to IP67/IP69K. The robust design and a life-span of 100,000 hours allow their use in a wide range of applications, where a reliable, bright source of illumination is needed under rough environmental conditions. The color temperature in daylight range between 5,000 and 10,000 Kelvin. The work lights can be connected either via a standardized M12x1-plug connection or directly via open wire ends. The power-on/-off is carried out either over the connection with the supply voltage

(10...30 VDC) or – when there is a constant power supply – over the integrated switch directly at the LED work light, which is incorporated in some versions. The lights are available in three different construction groups: As compact spot lights, as line light rails and as square LED lights for flat illuminations. Every work area can be illuminated optimal with luminous flux of 65 up to 1,800 lumen. [more on page 14 ►](#)

FF and Profibus-PA Portfolio Expanded

► With a new **multi-barrier** and firmware for the **Diagnostic Power Conditioner (DPC)**, Turck expands its portfolio for process automation. The new multi-barrier MBD40 in protection category IP20 is a compact 4- and 8-channel solution for the connection of intrinsically safe electric circuits to Foundation-Fieldbus- or Profibus-PA-networks. The multibarrier can be operated reliably in temperature ranges between -40 °C (optional -55 °C) and 70 °C. Using housings made of stainless steel or plastic, user specific applications like 12- or 16-channel types can be achieved in a small space.

The multibarrier can be operated reliably in temperature ranges between -40 °C (optional -55 °C) and 70 °C. Using housings made of stainless steel or plastic, user specific applications like 12- or 16-channel types can be achieved in a small space. With the new multi-barrier, the 4-channel derivative in a die-cast aluminum housing is available as 8-channel type. With the new



firmware, Turck's Diagnostic Power Conditioner DPC-HSEFD for Foundation Fieldbus has expanded functions such as an integrated web-server, which offers the same possibilities for parameterization and configuration as the DTM-based solution. An internal diagnostic buffer memorizes detected alarms from the monitored FF-segments, so that a constant surveillance through an external DTM-based software is no longer necessary.

New Automation Systems VP

► **Oliver Merget** is the new vice president of Turck's automation systems business unit. The 41-year old engineer is responsible for all product management activities in the areas of

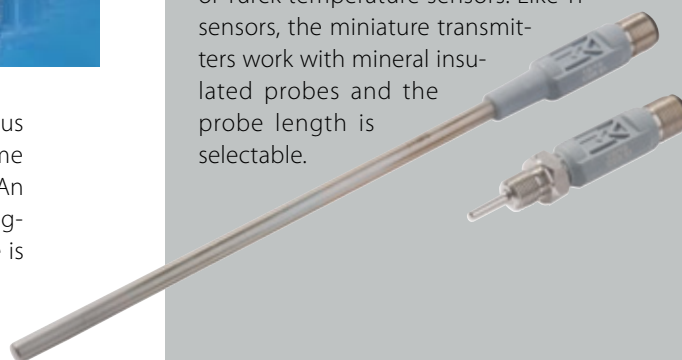


fieldbus technology, HMI and RFID worldwide. Merget is the successor of Norbert Gemmeke, who recently left the company. Oliver Merget has many years of

experience in the areas of sales, product management and engineering. Before joining Turck, he worked in factory and process automation for Siemens for 12 years, before he took over the responsibility for sales process automation Germany at ABB. With his extensive experience, the automation specialist is well prepared for his new role.

Compact Temperature Sensors

► Turck has introduced a new series of **compact temperature sensors** with processing electronics integrated into the M12x1-connector. The miniature series TTM uses Pt1000 measuring elements for precise temperature measurement in small spaces. Being only 25 mm longer and 1.5 mm wider than a standard M12x1 connector, the fully encapsulated TTM sensors, not needing additional processing devices, provide an output signal of 4...20 mA in 2-wire technology. Despite the compact design, the user still benefits from the flexibility of Turck temperature sensors. Like TP sensors, the miniature transmitters work with mineral insulated probes and the probe length is selectable.



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Webcode | more21100e



The Turck portfolio offers numerous inline and immersion solutions for flow monitoring, starting with simple sensors to IO-Link capable monitoring systems with FM signal processors

Flow Under Control

With sensors and IO-Link capable signal processors Turck offers a comprehensive portfolio for the efficient flow surveillance of gases and liquids

Standing still means taking a step backwards! This short worldly wisdom can also be applied to cooling circuits in industrial plants and machines. An interruption, too little of the cooling medium, or the wrong temperature can have exten-

sive and serious consequences. Additionally, security issues, downtime, quality loss, and machine or product damages can be caused through irregularities in the cooling circuit. Plant operators and mechanical engineers have to install a continuous and precise



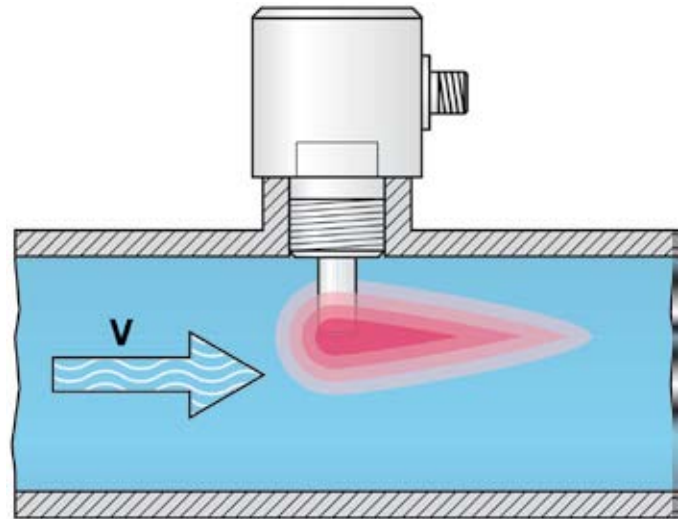
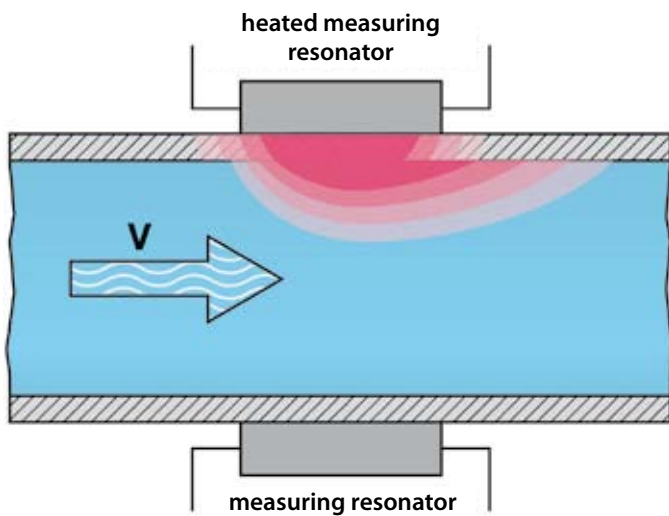
monitoring device to the cooling circuit. This allows a considerable optimization of the energy balance in energy intensive applications. Thanks to real time measurement, cooling systems don't have to run at maximum rate permanently, but can be operated to match the needs of the cooling demand. Therefore, continuous flow monitoring of cooling circuits provides great benefit. This solution is recommended where energy efficiency and reliability of a plant are first priority.

Turck offers a wide range of inline and immersion sensors as well as fitting signal procedures for monitoring the flow of gases and liquids. This broad

range of products provide efficient and reliable cost saving solutions with a high degree of reproducibility in their results.

▶ Quick read

For the smooth operation of numerous machines and plants, the reliable monitoring of cooling circuits is indispensable. Turck offers a complete range of solutions for this, from the simple flow monitoring in cooling circuits, over comprehensive flow and temperature data collection up to the device parameterization via IO-Link.



The calorimetric measuring principle is based on the different heat dissipation at different flow speed

The FM signal processors are, as FMX modules, also available for use in hazardous areas with IO-Link or HART interface

Calorimetric measuring principle

The classic flow sensor works following the calorimetric principle which is based on the laws of thermodynamics. The sensor creates heat energy at its tip that is higher than the temperature of the medium surrounding the sensor. The different temperatures of the sensor and the medium lead to an increasing temperature of the medium directly at the tip of the sensor.

If the flow rate increases, the sensor loses heat energy through the streaming medium. The tip of the sensor cools down, which is called heat dissipation. The temperature at the tip of the sensor is measured and compared to the temperature of the medium. The temperature difference indicates the flow rate. With compact sensors, the processing of the measured information takes place over the sensor integrated electronics.

Flow sensors that work on the calorimetric principle are available as inline or immersion sensors. In the inline sensor, the heated and the non-heated measuring resistor face each other in the inside of the pipe. With the immersion sensor, the tip of the sensor is immersed into the flowing medium. For liquid media, the heated and the unheated measuring resistor of the immersion sensors are together in one sensor tip. For gas media they are usually separated in two tips because of the low thermal conductivity and higher temperature of gaseous media.

Calorimetric sensors are a reliable, robust and cost-saving solution for many applications. The advantages include their ability to be placed independently from applicative influences such as vibrations or pressure fluctuations. Even temperature fluctuations up to 4 K/s are no problem for modern calorimetric sensors. Furthermore they are almost maintenance and wear-free, because they don't have any moving parts which extend into the flow channel. Calorimetric flow sensors also measure the temperature of the medium. Separate temperature measurements therefore aren't necessary which reduces the cost for installation, wiring and maintenance.

Challenges for the calorimetric system include processes with fast temperature changes of the cooling medium. Also, the monitoring of poor heat conducting media, like specific oils or liquids with a high solid content, require a special construction of the sensor as well as a careful installation. If the sensor has only one measuring point, data could be misinterpreted. Not only a change of the flow speed, but also a change in the temperature can cause an output change. This is an error source that has to be eliminated, especially with cooling applications. To suppress this effect, the flow sensor has a second measuring point, a compensation element that is specifically placed in the tip of the sensor so that its heating can only be caused by the medium itself.

Calorimetric flow sensors are very reliable, because of their high repeat accuracy and long-term stability over the whole temperature range. If the speed that is going to be monitored is set up once, it will stay on the same level, even if there is a repeated overtravel or underrun. For the user and the operator of the plant, the high long-term stability also has an effect on the availability of the plant: it extends the time period in which another review of the set switching point is due.

If the application requires classical switching points, they can be freely assigned within the measuring range of the sensor. The switching output



changes its status depending whether the appointed flow is overtravelled or underrun. An alternative to the switching point is the use of a standardized analog signal of 4...20 mA (or 20...4 mA) for the coverage. Depending on the requirements of the application, the display spectrum can be expanded to gain a better detail level. The mapping of the desired flow speed to the analog signals occurs via a simple teach procedure. Temperature data and signals of the flow speed are available to higher levels.

Additional value through IO-Link integration

Everyone who wants efficient flow monitoring ends up with a standard that prevails for a reason, which is IO-link. The protocol enables the sensor system to communicate and therefore makes the conventional analog output needless. With the FM/FMX (Flow Module) series, Turck offers signal processors for flow sensors, enabling users to benefit from the advantages of IO-Link over standard flow sensors. The FMX devices can even be used in hazardous areas.

The IO-Link advantage is that the “virtual analog” process value is submitted digitally and therefore is less susceptible to faults. It also allows the use of unshielded sensor cables which reduces the costs for storage considerably. IO-Link also allows software supported device parameterization. For example, the parameterization can be realized over the FDT-based engineering tool Pactware in connection with device drivers like DTM (Device Type Manager) or IODD (IO Device Description). For the controls the parameterization can be realized in different ways. Either as start-up-initialization during PLC booting via GSD (Device-Master Data) or acyclic during running operation via ORDO (On-Request Data Objects) in connection with IEC61131-3 functional modules.



The FCS immersion sensor can be adjusted onsite with the help of the LED display and the potentiometer

Due to the ability to transmit process data cyclically and parameter data acyclically on-request, numerous evaluation options are available to the higher level controls that go beyond classic flow monitoring. For example, it allows the continuous visualization of process data such as temperature or flow profiles and tendencies. This is far beyond the simple switching information “flow ok/not ok.” The follow up and review of the flow allows diagnostic functions, which wouldn't be possible otherwise.

Long-term measuring and cross references between flow speed, medium temperature and other process data allow analyses that make cooling problems detectable before they even occur. Flow monitoring of the second generation doesn't just protect from machine-, product-, and image damages, it also allows an insight into industrial plants that enhances their transparency and maximizes the availability of the plant. ■

▶ Aligned fitting prevents measurement errors



To eliminate misinterpretation, immersion sensors need to be aligned properly when it comes to rapid temperature changes of the medium. That means that the measuring resistor and the heated measuring resistor have to be aligned parallel to the flow direction. This isn't necessary for inline sensors because the measuring and heat elements are aligned this way by design.

Through the aligned fitting the full precision potential of the sensors can be used. This is relevant for resistance spot welding in automobile manufacturing. The quality of the welding depends on the welding temperature and therefore the precise configuration of the cooling process is of great importance. The cooling medium is lead over different parallel cooling circles to the welding robot (welding transformer, robot arm etc.). In the backflow the heated cooling medium has to pass flow control sensors shortly after the welding procedure.

Rapid temperature changes of the cooling medium are normal here. That is why the aligned fitting of the flow sensors is so important for this application. The heated cooling medium otherwise would cause the sensor to report a flow change or hold-up which could cause a complete standstill of the robot in turn. With the use of the aligned fitting however, the sensor works safely even when the adjusted flow is underrun.



After a 30 percent growth in sales in 2010 Turck's managing director, Christian Wolf, is expecting almost 25 percent for this year

"On the Right Path"

Andrea Gillhuber, editor of the German trade journal, Elektronik, talked to Turck's managing director Christian Wolf about markets, crises and partnership

Turck is expecting record sales in 2011. Are automation systems or automation products responsible for the growth?

Both business units are important although there is slightly bigger growth in automation systems than in automa-

tion products. As you can see, our solution orientated business works for us. For the whole Turck group we expect to see a growth of 25 percent in 2011.

What region had the best sales numbers?

Regarding the overall sales numbers, the region with the strongest growth was North America with a relative growth of about 28 percent. With the high total volume, North America is on top of the rankings with overall numbers. The biggest percentage increase we have is in Eastern

Europe, specifically Russia. They have had the biggest growth over the last two years.

■ Why is Russia growing so rapidly?

The Russian market is driven by process automation, mainly because of the large deposits of raw material. The oil- and gas business is going well. Raw materials dominate the market and are the economic power of Russia. If you look at factory automation in this region, you see that the degree of automation is remarkably lower than elsewhere.

■ You describe Turkey as a region with an enormous potential. What is your strategy there?

Turkey is strong in factory automation and has a good machine building industry. The automobile, packaging machine and food industries are anchored there. Many companies located in Turkey are also functioning worldwide. Fundamentally Turkey has a national economy and an industrial environment that is similar to the conditions in Germany, although on a different level. Turkey is the sixth largest machine builder in Europe and therefore already shows enormous potential. Turck already does business with partners there but now we founded our own subsidiary and we expect a growth of 50 percent annually over the next three years.

■ Turck is still growing. How do you manage the order situation?

That isn't very easy, especially in production. Of course after two years with high growth we have reached the capacity limits of our organization. On the other hand it is getting a little quieter. That isn't bad for us because we have time to recover, recruit new employees and put new buildings into operation. If everything runs smoothly, we can think about increasing our growth rates again in about one or two years. But it is a challenge for every company to work at the pace we have worked over the last two years.

■ How do you assess the European crisis and its impacts?

It is difficult for an industrial company to assess the situation. We try to work separately from this. But I think that as long as there is a financial security umbrella and cooperation of the European countries with the federal governments, we can expect stability. It is a psychological effect: If there is insecurity, the investment behavior changes. That is how we look back at 2009 – not

as an industrial crisis but as barriers to investment and insecurity based on the collapsing markets.

■ Turck cooperates with Deister Electronic. What does this partnership look like?

Deister has great expertise in the area of ultra high frequency (UHF) and that is what our partnership is about. Deister provides us with UHF-technology for our markets and Turck can develop targeted automation products based on this. The advantages for Deister lie mainly in sales and distribution: the company is quite diversified but does not have the distribution assets for potential market's like factory and process automation. The most important thing about this partnership is that you collaborate based on technology on the one hand but stay independent in your own business on the other hand.

■ Are there any other partnerships planned for the future?

Of course this is always an option. The Turck group is diversified and we always ask ourselves if we can reduce complexity by producing something ourselves or if we use a partner's expertise. It is a question of identifying the right partner. They have to have the same standard regarding a partnership; it has to fit technologically but also on a personal level. For us it means strengthening the development of our core competencies on the one hand and at the same time looking at how we can approach the market faster. We are also always looking for other core competences that we could integrate profitably.

■ How is the transition into a solution provider going?

As the numbers, the takeover of the MTX and the cooperation with Deister show, it is proceeding very well. The growth rates prove that we are on the right path. This is a never ending process. What is defined today as a solution and system provider will be defined differently by our customers in about 10 - 15 years. Perhaps next we have to engage more in areas such as IT and web. Then, for example with a continuous information and data flow into the ERP system of the customer. We have to observe precisely where the users are going. That is essential to adapting to the changing requirements and that is how we can be measured as a solution provider. ■



“Regarding the overall sales numbers, the region with the strongest growth was North America with a relative growth of about 28 percent. With the high total volume, North America is on top of the rankings with overall numbers.”

Christian Wolf



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Edison's Heritage

Whether signal light, pick-to-light system, workplace or machine illumination – LED lights conquer more and more industrial fields of application

With the EG-regulation 244/2009, the European Union started to phase out the classical light bulb. This has generated the need to replace these bulbs with alternative light sources. The latest step of the regulation occurred in September 2011; since then luminous elements above 60 Watt have to meet the energy efficiency class C, accordingly 60 Watt bulb must meet class E standards. Basically it means light bulbs with more than 40 Watt will not be used much longer.

Everyday users are not happy about this, wanting the old light bulbs back, complimenting their warm light and complaining about the disadvantages of

the energy saving lamp. Some of the disadvantages include complicated disposal and the delay in reaching the full luminous intensity. Despite the genius inven-

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LED lights are more robust, energy efficient and long-lasting than other illuminants. That is reason enough for automation specialist Turck to expand their portfolio about LED machine and workplace lights that are connectable to the controls or Fieldbus junction boxes via M12 connectors.

Author

Markus Bregulla is the product manager for opto- and ultrasonic sensors at Turck Germany in Mülheim



Webcode | **more21105e**



Robust, energy-efficient and long-lasting: LED workplace lights are ideal for the industrial use

tor of the classic light bulb, Thomas Edison, the functionality of the classic bulb is very archaic. The design allows electricity through an electric conductor until it heats up and begins to glow, radiating light – rather bright but not very energy efficient. The ratio of visible light is only up to five percent from the total energy consumption.

Because of the new energy savings, LED lights are quickly taking the place of the classic light bulb. The LED technology from Edison's heirs is so well engineered that it is already established in niche areas and conquering more and more shares in the market. LED's are already being used in traffic lights, street lights and medical engineering applications, as well as mainstream applications including flashlights and bicycle lamps. Each of the specific characteristics of LED is an advantage for those areas of application: the energy efficiency, the precise light color and the long life span of about 100,000 hours are features that outmatch other illuminators.

In the industrial environment, the LED technology has already been used for status and signal lights for a some time. The difference between traditional bulbs is that the light emitting diodes is that they are not thermal emitters. LED's emit almost monochrome light in a limited spectral range. That is why they are so efficient compared to other illuminants, where color filters have to filter a large part of the spectrum to reach monochrome color characteristics. Next to these advantages the LED also thrives in rough environmental conditions because it is very robust and highly resistant to vibrations.

Robust lighting portfolio

Turck uses the advantages of the LED for a comprehensive LED lighting technology portfolio; in addition to traditional uses, users also can find LED industrial lamps for machines and workplaces. Most LED lights come from Turck's partner Banner Engineering, but the machine lights are being developed and produced by Turck.

Signal lights are usually used for displaying the status of systems, machines or process stages. For such start and stop signals or traffic light signals, the high light intensity of the LED pays off and bright signal lights can be seen in a minimum amount of space. One type of signal light is the pick-to-light system where Turck is one of the market leaders. Pick-to-light solutions show the installation sequence in manual production and packing processes. The LED light shows the assembler the specific product configuration with light signals at the output trays. The assembler simply takes a component from the illuminated tray and installs it. The signal light has an integrated light sensor that confirms the removal of a component automatically. The signal lights are connected via Turck's I/O systems BL20 or BL67 and controlled with the integrated CoDeSys-programmable gateway or by the superior SPS. To connect the system to the automation structure of the user, the I/O system offers numerous gateways for the common fieldbus and ethernet solutions.

LED machine lighting

LED isn't only suitable as a signal light for industrial environments, it also has its advantages as a light source. For this reason LED machine and workplace light fixtures complete the Turck portfolio. The housing materials and the construction principle are the same as sensors. The lamps are moulded and resistant from common solid cooling lubricants such as oils and aggressive cleansing materials. This technology provides a decrease in susceptibility to malfunctioning and allows longer life spans.

LED machine lights can be connected directly with a M12 connector to a standard SPS output, a fieldbus station or a passive junction. They are supplied with 24 VDC and have a power consumption of less than 0,5 A. Over an SPS or a programmable fieldbus gateway from Turck, the illumination can be controlled externally depending on other control variables. This option makes the installation easier and offers new possibilities to save energy. Instead of using a permanent illumination of 100 percent, individual illumination scenarios regarding production step, product, needed brightness and other parameters are programmable. The reduced wiring effort of the M12 connector is an additional bonus. The machine lights are available as built-in longitudinal light as well as surface mount, and beacon and cube light, with or without a gooseneck for easier alignment.



Workplace lights are available as square, longitudinal and spot lights (picture)



The LED lights from the pick-to-light system show the assembler from which output tray he has to pick the next component

Application example machine center: LED machine lights guarantee sufficient brightness to monitor the drilling procedure through an inspection window

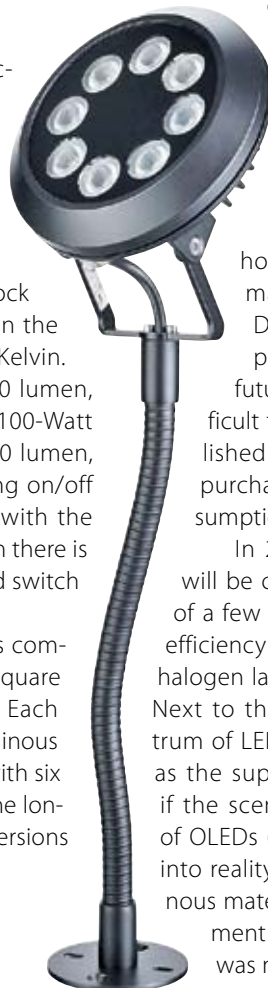


LED workplace illumination

If you want to abstain from expensive protective housings, LED lights are often the only option for illumination in close proximity to machines where they are exposed to dirt, dust, steam or aggressive cleansing materials. The use of LED in the production environment is possible because they are robust (protection category IP67) and shock resistant. The color temperature of the LED in the daylight areas is between 5,000 and 10,000 Kelvin. The luminous flux lies between 65 and 1,800 lumen, depending on the type. As a comparison a 100-Watt light bulb has a luminous flux of about 1,400 lumen, a 60-Watt light bulb about 700. The switching on/off of the lights happens over the connection with the needed supply voltage (10...30 VDC) or – when there is a constant power supply – over the integrated switch at the LED light.

The lights are available in three types: As compact spot light, as longitudinal light and as square LED light for extensive light requirements. Each work area can be illuminated optimal with luminous flux of 65 up to 1,800 lumen. The spot lights with six LED's are available with or without a switch. The longitudinal lights are offered in eight different versions

The machine light from Turck in a round case can be aligned easily due to the gooseneck



of three up to 24 LED's, with or without a switch. For the extensive illumination of large work areas Turck offers four square LED lamps with twelve up to 48 LED's.

Conclusion

With their life span of about 100,000 hours, LED lights increase the availability of machines and reduce maintenance costs. Design engineers and plant designers will prefer the installation of LED lights in the future, especially with illuminants that are difficult to access. The LED light will also be established for private use soon. Design, light color, purchase price and most of all the power consumption will be the main factors for its use.

In 2016, the last step of the EG-regulation will be carried out: all lamps (with the exception of a few halogen lights) have to meet the energy efficiency class B. Common light bulbs and normal halogen lamps will then be completely phased out. Next to the energy efficient lamps, a broad spectrum of LED lights will be available and established as the superior technology. It remains to be seen if the scenarios of illuminated walls with the use of OLEDs (Organic Light Emitting Diodes) will turn into reality or not. With OLED and its organic luminous material the circle will be complete as the filament of Edison's improved light bulb from 1880 was made of charred bamboo fibers. ■

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Numerous wells from RWW are located directly at the Ruhr river

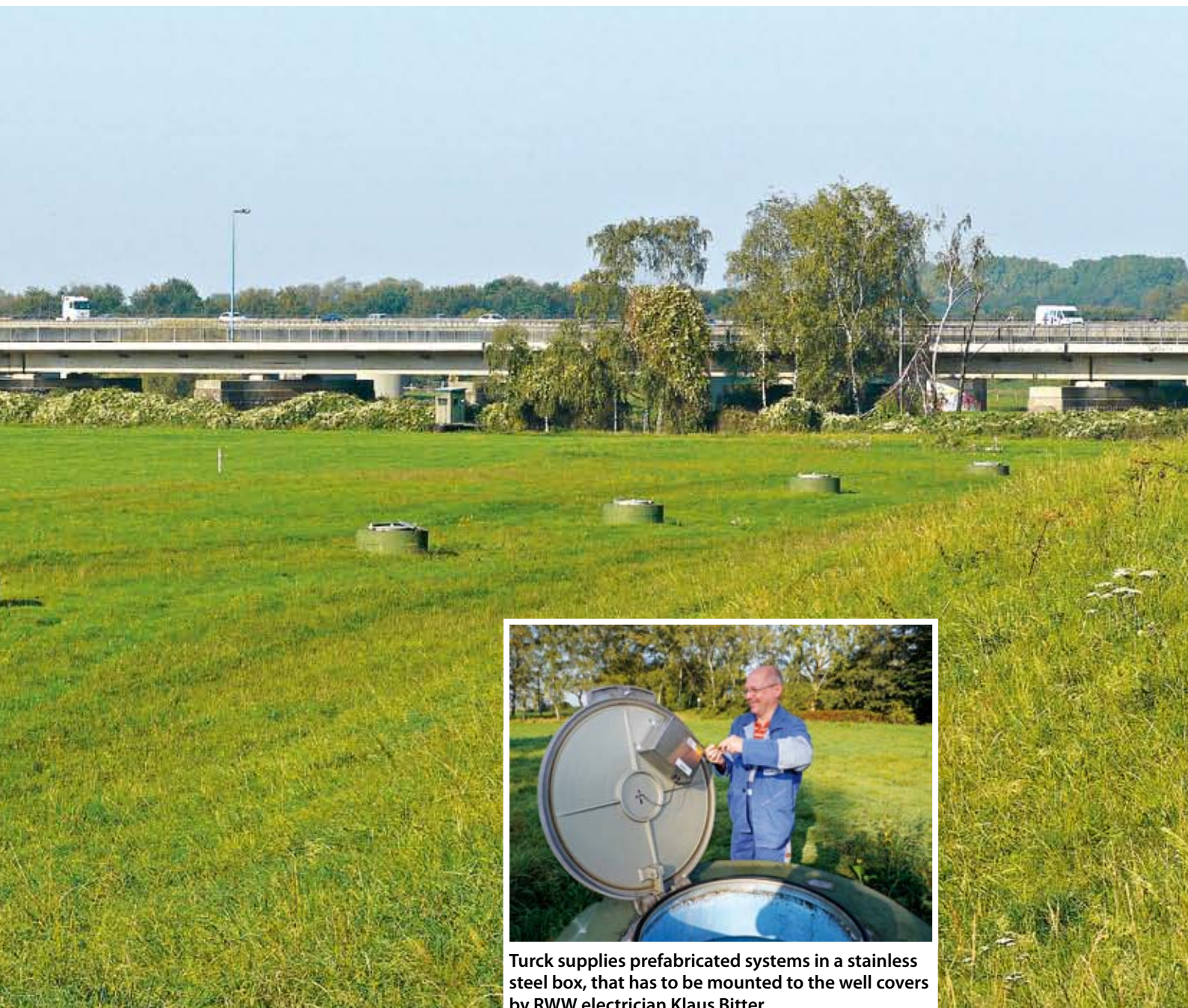
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Waterproof

RWW Rheinisch-Westfälische Wasserwerksgesellschaft (Water Works Company) in Mülheim secures more than 100 well covers with Turck's Uprox-sensors and the wireless-system DX80

The water works: anyone who bought that space on the board game Monopoly hoping for large profits was usually disappointed. Other players seldom land on this space and if it were to happen, the profit wasn't even enough for a night on Baltic Avenue. With increasing frequency, copper pipes, power supply lines, brass components or railway tracks are being stolen by raw material thieves who are interested in real, but illegal, incomes.

The RWW Rheinisch-Westfälische Wasserwerke in Mülheim has been faced with the challenge of trying to make the theft of copper and the brass parts of well covers almost impossible. Within their supply area which covers a large part of the German state North-Rhine-Westfalia, RWW supplies about 825,000 people as well as numerous businesses with drinking water. In 2010, that included 84.5 Million cubic meters in all. In their water plants in Mülheim and Essen, RWW stores



Turck supplies prefabricated systems in a stainless steel box, that has to be mounted to the well covers by RWW electrician Klaus Bitter

processed water from the Ruhr river in underground reservoirs. If requested, the water gets pumped into the numerous wells that are located on the premises and fed into the supply network. The nationwide increase of raw material theft led the management of RWW to question how to best secure the well covers. The loss of material would cause an enormous financial loss but the damage that could be caused by open wells is even worse. Next to the danger of accidents there is also the risk that the drinking water gets contaminated or even poisoned.

Danger foreseen – danger averted

Until recently, the existing fences with barbed wire were sufficient but now a constant monitoring of the well covers was needed. In 2010 the supplier from

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To guarantee the safety of the water supply, RWW has to ensure sure that the numerous well covers of the water reservoirs aren't opened unauthorized or even get stolen. While looking for the most efficient solution, Turck was able to convince the specialists from RWW with a pre-converted IP67 system consisting of sensors and a wireless radio connection. Today the system monitors more than 50 wells, 90 more are about to be equipped with the system soon.

Mülheim decided to constantly monitor the well covers to ensure they were closed correctly. With several hundred wells to be monitored, a classic wiring system was impossible because the earthwork would have

In the case of an alarm, the service technician in the control room is able to see immediately which well is concerned



► Pre-finished IP67-solution of Turck mechatec

To make the installation of the monitoring system as easy as possible for the customer, Turck delivers the whole system consisting of sender, battery and sensor already wired in a water proof switchbox made of stainless steel. The employees of RWW only have to mount the switchbox to the well cover and attach the vandal resistant antenna. The whole assembly and the technical installation of the system within the switchbox have been carried out by Turck mechatec in advance. The Turck subsidiary is specialized on the construction of switchboxes including the system installation. Turck mechatec offers customer orientated electromechanical complete solutions for all areas of the industrial automation technology.

been extremely expensive. The only alternative was a wireless solution with battery operation. Although anti-theft systems and alarm installations aren't exactly the core business of an automation specialist, Turck could fulfill the requirements from RWW and deliver a wireless fallback system for the well covers. "The fallback system had to reliably and wirelessly monitor and report the opening of a well cover to the control center," says Frank Siepmann, responsible for electronics maintenance at RWW. "The further details were about to be worked out individually by the requested companies. Since we already had good experiences with Turck in the field of sensor and interface technology, we also requested them this time." After a selection process during the summer of 2010, the management of RWW

decided upon the solution from Turck, which the automation specialist had developed in close cooperation with the responsible employees from RWW. "The individual solution, the good support from Turck, and last but not least the provision of a sophisticated test system on our premises convinced us," Siepmann explains as the reasoning for their decision.

Today RWW uses a Turck system that currently captures the status of more than 50 wells and transfers it to the central controls of the water plant. The unnoticed opening of a well and therefore the risk of a contamination is now impossible. An additional 90 wells are currently being equipped at other locations. The next expansion is planned for the upcoming spring, as soon as the system has proved its reliable performance under winter conditions.

Uprox-sensor monitors cover closure

In principle, Turck's monitoring solution is as easy as it is well thought out: An inductive proximity sensor is located at the outer edge of the well cover and captures the metal edge of the well while closed. If the well cover is removed, the sensor doesn't "see" the cover any longer and changes its signal. Because the well cover edges are made of different kinds of metal (i.e. Aluminum) Turck uses a Uprox factor-1 sensor, which has the same sensing distance for all metals.



The antenna on the roof of the filter hall receives the signals of all 55 connected wells



The IP67 components of the DX80 system including sensors are installed in a switchbox



The DX80 gateway processes the radio signals and forwards them to the control room onsite and to the superior controls via Modbus RTU

The battery operated wireless-sender of signals, the DX80- series from Turck's Partner Banner Engineering, sends the sensor signal over the 2,4GHz-band via radio to the DX80 gateway in the filter hall where the signal is forwarded via Modbus RTU to the control room in the filter hall, and onto the central control room. There, the status of all well covers is visualized on an HMI, so that problems are recognizable at once. The DX80-series allows the connection between a gateway and up to 48 senders (nodes) with two digital or analog sensors each. The RWW system could be expanded by adding sensors to the nodes. These sensors could measure the level of the well and transmit the data to the controls for example.

Next to the digital switching signal that shows the status of the well cover, the DX80 also transmits a status that confirms that the data transfer is working correctly. If this status fails to appear, the receiver gateway sends a notification to the superior controls. This distinguishes the opening of a well from a data transfer problem through power failure or other errors. The communication between node and gateway works bidirectionally; the nodes are senders and receivers at the same time. The battery pack supplies the node as well as the connected sensor. An intelligent power management operates the system so that it is able to transmit for more than two years with only one battery.

Wireless challenge

A wireless transmission path is installed easily but there are possible pitfalls. Sometimes the transmission of single wells is faulty and leads to a faulty notification. The suspected cause for this is trees or high grass interrupting the transmission between sender and gateway for a short time. Turck has a solution for this problem; single nodes can be linked to a subnetwork, where signals are sent over a DX80 data radio to the gateway. This is how sensors can be installed where connection to the central antenna can be problematic.

Turck works in close cooperation with RWW for a solution to this problem. From previous experiences with Turck, Frank Siepmann is optimistic that the problems will be solved shortly. "We had initial difficulties during the implementation of the transmission path but all of the problems have been solved in a very short time. If that continues and the system works well during the winter, we are going to equip further wells with the Turck solution in 2012," Frank Siepmann explains.

Thanks to the smart radio solution and the successful partnership between Turck and RWW, the company is well prepared for the challenge of securing their raw material. And the next time someone tries to open a well cover in Mülheim unauthorized, this could mean: Go to jail. Go directly to jail. Do not pass go, do not collect \$200! ■



“The individual solution, the good support from Turck and last but not least the provision of a sophisticated test system on our premises convinced us.”

Frank Siepmann,
RWW

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Pick-to-light systems optimize manual production processes and reduce the error rate remarkably



A diffuse mode sensor integrated into the signal light acknowledges the removal automatically

Process Greening

At its factory in Zwickau, automobile supplier SAS Automotive Systems optimizes the production of cockpit modules with a pick-to-light system

SAS Automotive Systems produces cockpit modules for the automobile industry at four locations in Germany. In 2010 the SAS Group produced about four million cockpits. At the location in Zwickau they were looking for new ways to reduce sources of error during the production and composition of the cockpits. SAS Zwickau produces cockpits for the Volkswagen vehicle plant next door. Oliver Graf, jointly responsible for the plant design, describes the process: "About 2.5 hours before delivery time we get the demand requirements and then have to produce and deliver the cockpits in the allotted time." To be able to produce a number of up to 1,300 cockpits a day, one cockpit has to be completed every minute. The mounting time at each of the 40 stations of the line is short.

If quality control discovers an error at the end of the production chain, it has to be corrected manually, which is time consuming. Therefore, the easiest way for flawless production is an integrated quality control during the installation process. Before the pick-to-light system was introduced, the assemblers read the

respective configuration of the cockpit from an order slip and equipped the cockpit accordingly. Mistakes, especially at the types with rare components, couldn't be completely avoided.

Less mistakes with pick-to-light

With the recently installed pick-to-light system from Turck and Banner, SAS could reduce the mistakes during cockpit mounting remarkably. The system translates the specific configuration of a cockpit into light signals, which show the assembler the needed components in the right order. All output trays were equipped with a signal light and the assembler simply takes a component from the illuminated tray and installs it into the cockpit. The signal light has an integrated light sensor that acknowledges the removal of a component automatically. The system monitors the progress and sends the information to the product line controls; this captures the order completion and releases the light signal for the next order.

Quick read

SAS Automotive Systems produces cockpits for the automobile industry, individually mounted and just-in-time. For the assembler at SAS in Zwickau, Germany, that means, that one module has to be finalized every minute. To improve this work, a pick-to-light system now indicates exactly what component has to be installed in which order. Turck's pick-to-light solution could convince the SAS specialist because of the comprehensive approach consisting of sensors, I/O system and fieldbus gateway, as well as its easy integration into the production line.

Turck modular I/O system BL20 guarantees a reliable communication to the plant controls via Modbus TCP



“With other providers you usually have to find your own solution for connecting the production line controls, but Turck provided a complete solution, including I/O system.”

Oliver Graf,
SAS Automotive Systems

An unwanted activation of the light sensor is impossible because of the background suppression set at 100 mm. In addition, the system provides another protection level so if the assembler picks something from the wrong tray, a red light signal indicates the mistake immediately.

The effect of the pick-to-light system is remarkable. Next to the reduction of mistakes, pick-to-light makes the installation process faster; and the assemblers are able to concentrate on the quick assembly instead of having to identify the right components first.

Competitive advantage: system approach

SAS decided to use the solution from Turck for various reasons. One of the main requirements was the automated acknowledgment through a light barrier or alternative sensors. Turck was not the only provider that offered this solution, but what convinced the customer in the end was the fact that the automation specialist from Mülheim offered a solution and also provided the needed hardware for the connection to the production line.

During normal operation, 20 mounting stations got equipped with the pick-to-light system and a K50 signal light was implemented into all relevant trays of the mounting stations. A BL20 I/O system, which was connected over a fieldbus gateway via Modbus TCP to the line control of SAS, is responsible for the signal transfer between lights and controls. Only minor adaptations regarding the software were necessary.

On the way to standard

The SAS plant in Cologne has been using the pick-to-light-system for five years now without any problems. As a result, the people in Zwickau knew that the system would blend in perfectly with the utilized line con-

trol. Because of the good experiences of the Cologne crew, the optimization process in Zwickau could be implemented confidently.

After the pick-to-light system was connected perfectly in Zwickau, the SAS employees responsible for the plant in Saarlouis now are convinced of this process optimization and shortly the system is going to minimize the error rate during the cockpit assembly at their location too. ■



The light signal marks the box with the component that is next to install

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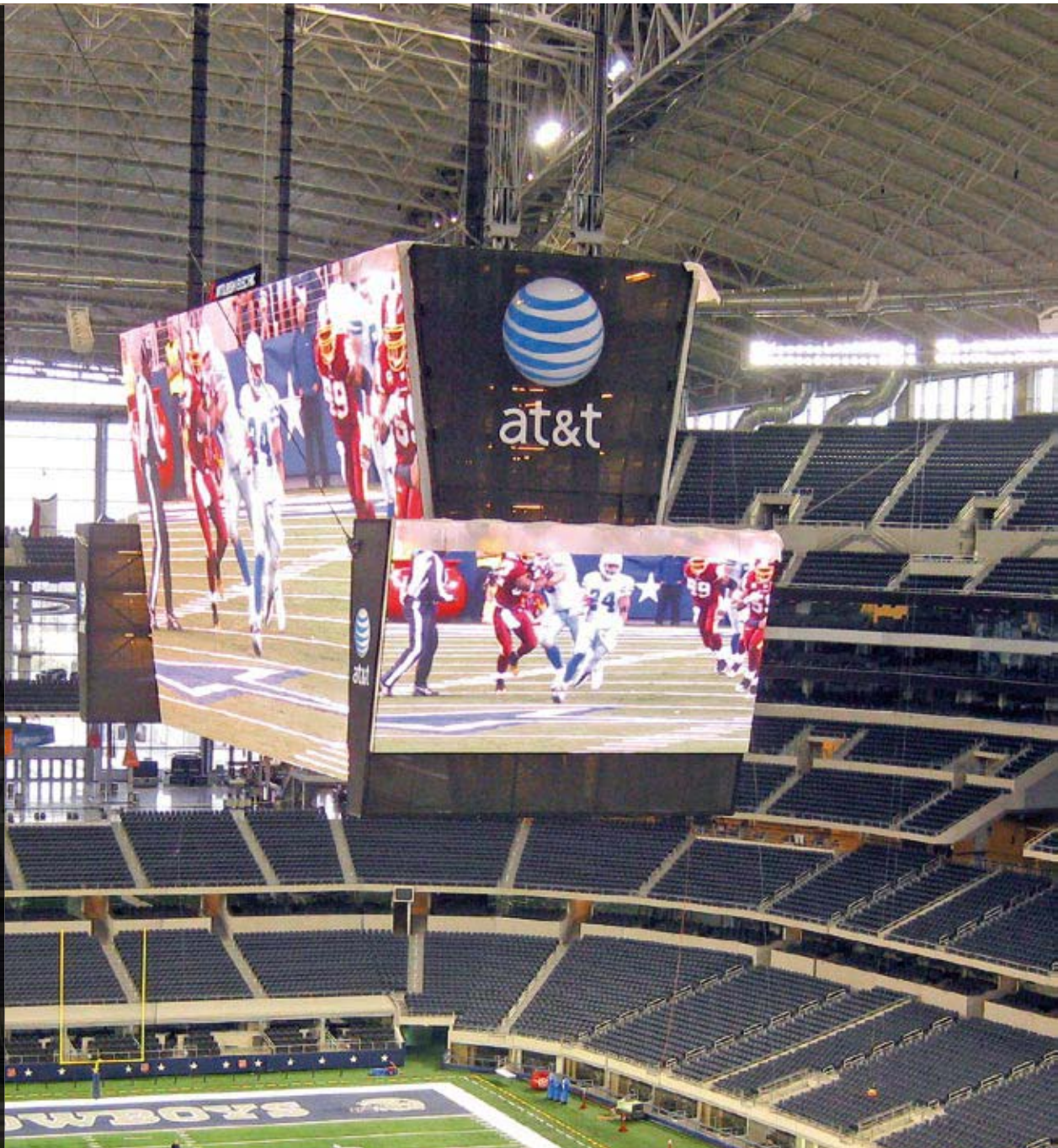
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Turck solutions are used to retract the scoreboard at the Dallas Cowboys stadium

User www.uni-systems.com Integrator www.powermation.com

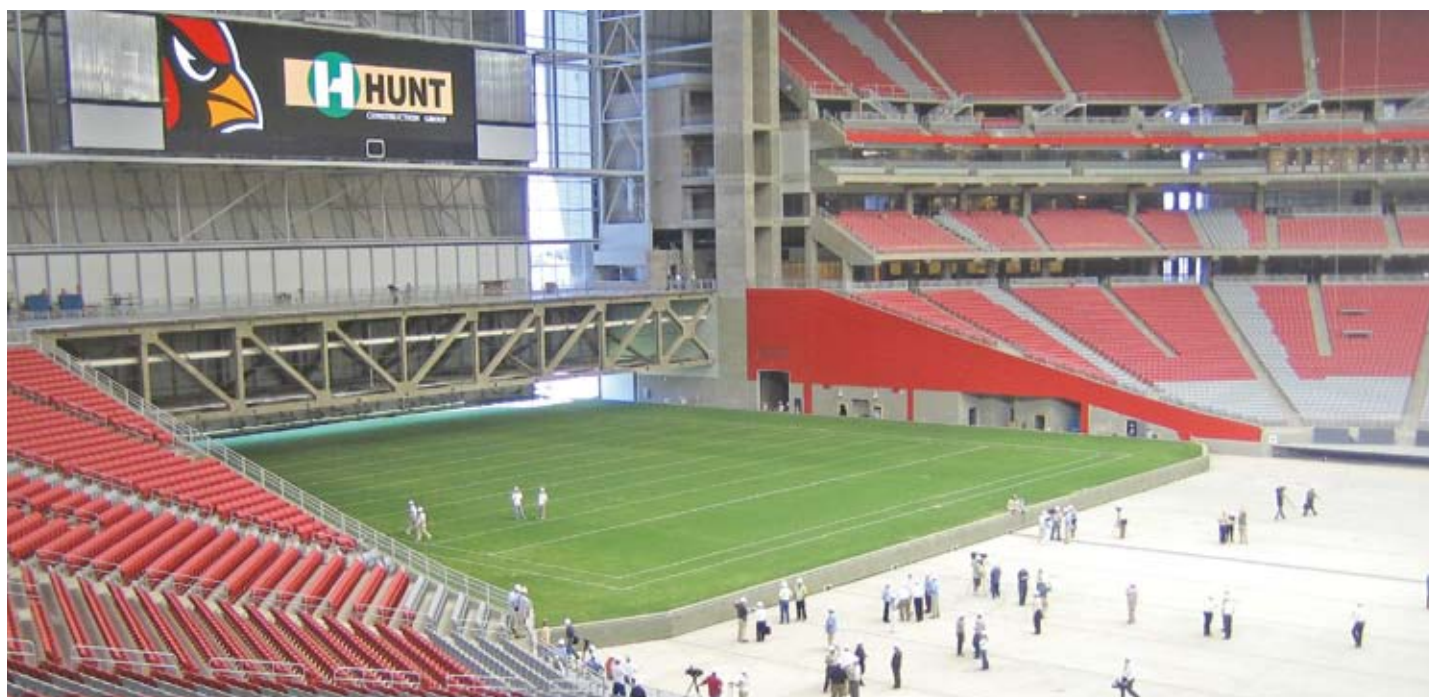
Open Air Stadiums

Uni-Systems utilizes Turck solutions to bring the outdoors in to structures around the world

What do drawbridges and retractable stadium roofs have in common? They are both examples of a trend called "Kinetic Architecture". While it wasn't called a trend in the times of drawbridges, today the combination of functionality and form is based on this trend. Kinetic architecture is construction that reacts to changing environmental conditions and requirements by changing architectural form. A sta-

dium roof can be opened or closed, theater buildings can set up to accommodate different audience sizes and performing acts, or whole buildings can be aligned according to the position of the sun.

Uni-Systems is an industry leading designer of kinetic architecture, having designed and developed moving structures for applications in aerospace, military, construction, entertainment, and sports. The



University of Phoenix stadium's entire playing field is retractable

company has designed, fabricated and installed the mechanization components for five of the last seven retractable sports-stadium roofs built in North America. Minneapolis based Uni-Systems works closely with designers and architects around the world to produce cutting-edge structures that push the boundaries of traditional engineering. Their projects include the Lucas Oil Stadium in Indianapolis, the University of Phoenix Stadium in Arizona, Minute Maid Park Stadium in Houston and the Cowboys Stadium in Dallas, just to name a few.

When it comes to architectural innovation, Uni-Systems is not limited to retractable roofs; the University of Phoenix Stadium's entire playing field is retractable. Other stadiums boast "home-run" features like a steam locomotive that whistles through Minute Maid Park, a retractable pitcher's mound at RFK Stadium, and an apple that rises out of Citi Field's center field to celebrate a New York Mets home run. Uni-Systems also designed the system that retracts the enormous scoreboard in the Cowboys Stadium so that it can serve its original purpose during football games, along with doubling as a backdrop for concerts that take place off-season.

Transitioning a vision into an actual structure is a complex and dynamic process. Each roof mechanization system that Uni-Systems designs includes a specific number of roof panels attached to rails that, together, create the entire roof structure. If the roof is sloped, a cable drum or rack and pinion system may be used to retract the roof panels, while a traction drive is typically used on a flat surface. Aside from the mechanical challenges of moving and controlling multi-ton structures, there is the control aspect that must incorporate simplicity, reliability, safety and redundancy. Uni-Systems specifies industrial controls of the highest quality into its designs, including those from Turck.

A complex process

A Uni-Systems' roof mechanization project typically involves several different motor control applications. In addition to moving the roof, motors are also used in jack screws to open and close rail clamps that lock the roof firmly onto the drive rails. Turck proximity sensors are placed at each end of each jack screw's travel to ensure that the travel is complete and the clamp is holding, as well as to protect the motor and gear reducer from damage caused by over travel. On the Lucas Oil Stadium project, small lift doors were placed at the end of each of the ten drive rails (five per roof panel). These doors were also operated by electrical jack screws, monitored by Turck proximity sensors.

In addition to auxiliary roof systems, the primary motion is also monitored by Turck sensors. One proximity sensor per rail signaled the motor VFDs (variable frequency drives) to slow the motors down at the fully open and fully closed position. At the same time, the sensor provided the roof's PLC with a fixed reference point. This is used to check the validity of the encoder position provided by the Kübler by Turck absolute encoder, which provides a precise location for each roof transporter (wheel and motor assembly).

“Powermation always provides extremely good service, and Turck stands behind its products if something goes wrong.”

**Lennart Nielsen,
Uni-Systems**

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The US company Uni-Systems, a specialist for kinetic architecture, relies on sensor, fieldbus and connection technology from Turck when it comes to solutions for retractable stadium roofs and many other objects like XXL video cubes. The solutions from Turck make sure that the large structures can be precisely and safely moved and controlled.



IP20-rated distributed I/O systems collect all of the signals from a local area

On projects using cable drums, such as the Lucas Oil Stadium and University of Phoenix Stadium projects, there are two measuring applications: one to measure the roof's actual position and a second to measure the cable paid out by an individual cable drum. Depending on the roof construction and degree of slope, many drums may be used, and it is extremely important to know that all drums are working together and paying out at the same rate. Uni-Systems typically uses Kübler by Turck incremental encoders to measure the progress of the cable while using absolute encoders to measure the roof position. The reasons for this difference are the small inaccuracies in cable payout measurements caused by temperature-induced cable stretch as well as long-term cable stretch. This requires the encoders to be reset periodically, which is simpler with incremental encoders, and the position can always be confirmed by the main absolute encoders.



Installation and maintenance is fast and simple with plug-and-play cordsets

In applications such as the Cowboys scoreboard project, there is no feedback from any other source, so absolute encoders are deployed on all of the 24 cable drums holding the scoreboard. On the main 16 lifting drums there is one encoder per drum, since adjacent cables take the same path as long as the VFDs report equal load. Two absolute encoders are used to verify the position of the eight stay drums that control two cables per corner of the board all radiating out in different directions.

Diagnostics make maintenance simpler

All of the signals from these devices must be brought over the large geography of a stadium back to the main controlling PLC for processing. To make design, construction and maintenance simpler and less expensive, these systems are designed with many smaller motor control "cells" where typically four to eight motors are controlled from each motor control center. Uni-Systems uses Profibus as the preferred network to transmit the signals and Turck BL20, IP20-rated distributed rack I/O systems to collect all of the signals from a local area. In some installations, Uni-Systems use Namur input modules and Namur rated Turck proximity sensors to take advantage of the detailed point-level diagnostics (open-wire and shorted wire) these BL20 modules offer. "In such widely distributed projects, it is very beneficial to know if a device has been left unplugged by maintenance personnel, rather than simply being an open contact," says Lennart Nielsen, Electrical Engineering Manager with Uni-Systems.



Cordsets connect everything from proximity sensor and encoders to motors and brakes

To make installation and maintenance fast and simple, Uni-Systems uses plug-and-play pre-molded cordsets from Turck throughout the projects for connecting everything from proximity sensors and encoders to motors and brakes. The motors and brakes are pre-wired with Turck receptacles in their wire boxes, which makes exchanges fast and simple and removes possibilities for wiring errors. For VFD-controlled motors, Uni-Systems uses custom-molded Turck motor cables using VFD-rated shielded cables.



Custom-molded Turck motor cables for VFD-controlled motors

The strong partnership that exists between Uni-Systems and Turck is a direct result of the credence of Turck's St. Paul-based distributor, Powermation. According to Nielsen, "Powermation always provides extremely good service, and Turck stands behind its products if something goes wrong." ■

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In Abu-Qir, 60 DPC-49-4RMB diagnostic power conditioner systems supply and monitor the 220 Foundation Fieldbus segments

User www.abuqir.com Integrator www.uhdeservices.com

Field Transparency

Uhde Services relies on Turck's Foundation Fieldbus portfolio with diagnostic functions for the modernization of the fertilizer complex Abu Qir II in Egypt

The Abu Qir Fertilizers and Chemical Industries Company (AFC) in Alexandria, Egypt, is one of the leading manufacturers of nitrogenous fertilizers in Egypt, Africa and the Middle East. The company has more than 3,300 employees and relies on international standards during production and quality management, including ISO 9001/2000. To guarantee environmentally friendly and efficient production, the plants in Alexandria are continuously being upgraded and optimized. The use of modern automation solutions for ammonia plants is critical in the fertilizer industry because it provides increases in production and energy savings.

“With the Abu-Qir-revamp-project, a large fertilizer plant in North Africa is being converted into an ultra-modern automation solution for the first time”, says Dr. Bernd Jordan, Head of Electrical and Instrumentation at Uhde Services. The service provider Uhde, a fully owned subsidiary of ThyssenKrupp AG, develops individual concepts for industrial plants worldwide for modernization and increased production, for maintenance, compliance with environmental standards, and increased cost and performance efficiency. The focus of Uhde lies with the power plant technology, mineral oil processing, chemical, as well as the petrochemical industry.

High requirements

Because of the geographical position of the fertilizer complex, the Foundation Fieldbus wiring as well as the Foundation Fieldbus system components must meet very high standards. The ambient temperature usually lies between 3° and 45 °C and the surface temperature can rise up to 75 °C in direct sunlight. A relative humidity of about 85 percent as well as the chemical and the mechanical demands through urea, ammonium nitrate, dust and sand complete the profile of requirements.

The revamp-project can be divided into two parts: Foundation Fieldbus loops for measurements and process control as well as ESD-loops for fail-safe plant monitoring. All in all, 350 devices in hazardous classified areas and 1,050 devices in unclassified areas had to be connected via Foundation Fieldbus, divided into 220 segments – 60 each in the ammonia plant, the nitric acid plant and the utilities and factory services, plus 40 more for the visualization. After a search for a suitable solutions partner for the Foundation Fieldbus installations in Abu Qir, the general contractor Uhde Services and the operator of the plant selected Turck, the sensor, fieldbus, and interface specialist. “Turck wasn’t just able to provide us with an extensive Foundation Fieldbus portfolio, but also with detailed diagnostic functions that make a new Foundation Fieldbus installation all the more efficient”, says Markus Mahlandt, Project Engineer E&I Engineering, Uhde Services.

Universal Foundation Fieldbus Portfolio

To supply and monitor all 220 segments, Turck delivered 60 preconfigured diagnostic-power-conditioner-systems (DPC) in control cabinets. The DPC-systems



165 eight channel JBBS-49SC-T815 junction boxes from Turck guarantee a safe connection between the field devices and the DPC-systems

supply FF H1-segments with power and offer comprehensive diagnostic capabilities for monitoring, which allow a plant-wide asset management. The start-up of a fieldbus plant is already supported by the DPC-system. During operation, the solution even recognizes gradual changes within single fieldbus segments over an extended period of time. So disturbances or failures that develop slowly can be prevented.

One DPC-system can supply up to 16 segments redundantly with up to 800 mA output current and 30 VDC output voltage. It consists of one or more DPC-49-4RMB module racks with up to eight DPC-49-IPS1 power supply modules and one DPC-49-ADU diagnostic

▶ Quick read

To update their fertilizer production in Alexandria, Egypt, the Abu Qir Fertilizers and Chemical Industries Company (AFC) assigned the revamping of their existing plants to Uhde Services. In cooperation with Honeywell Process Solutions as supplier for control systems and physical-layer-specialist Turck, Uhde Services converted the complex to Foundation Fieldbus, including detailed diagnostic functions for a comprehensive asset management system.

module. Per module rack, up to four H1-segments can be operated and monitored redundantly. The diagnostic data from the H1-segments can be transferred via a FF-HSE-field device DPC-49-HSEFD/24VDC to a higher level asset-management-application – in this case an Experion PKS from Honeywell.

165 JBBS junction boxes and 110 multi-barriers from Turck are responsible for the safe and secure



connection of the field devices to the DPC-systems in Abu Qir. The eight channel JBBS junction boxes are equipped with an adjustable short circuit limit (30, 35, 45 and 60 mA). Common shielding concepts can be realized with the help of two switches on the circuit board, and a terminating resistor for the bus can be switched on. The enclosure is IP67 rated and made of powder coated aluminum with a breather to prevent internal condensation. Despite their high ingress protection rating, Turck placed the junction-boxes in additional protective housings to ensure their ability to defy the harsh ambient conditions.

Multi-barriers MBD49-T415/Ex are applied for connection to field devices in hazardous classified areas. The multi-barriers increase the maximum number of fieldbus nodes per segment up to 32. The number of nodes is extended by the explosion protected fieldbus supply which can be daisy chained from multi-barrier to multi-barrier in Zone 1. Each fieldbus node in Zone 0 and Zone 1 is supplied by one of the four intrinsically safe and galvanically isolated outputs of each multi-barrier. Galvanic isolation exists between the

trunk line and the output circuits as well as between the four output circuits themselves. For the customer, the use of multi-barriers has clear cost advantages. All field devices in a single fieldbus segment can be operated in the hazardous classified area; there are no costs for additional bus couplers, or a new segment card with its integration and parameterization. There is no need for additional supply wiring as the power supply of the multi-barriers takes place over the bus with the support of Turck.

Local support

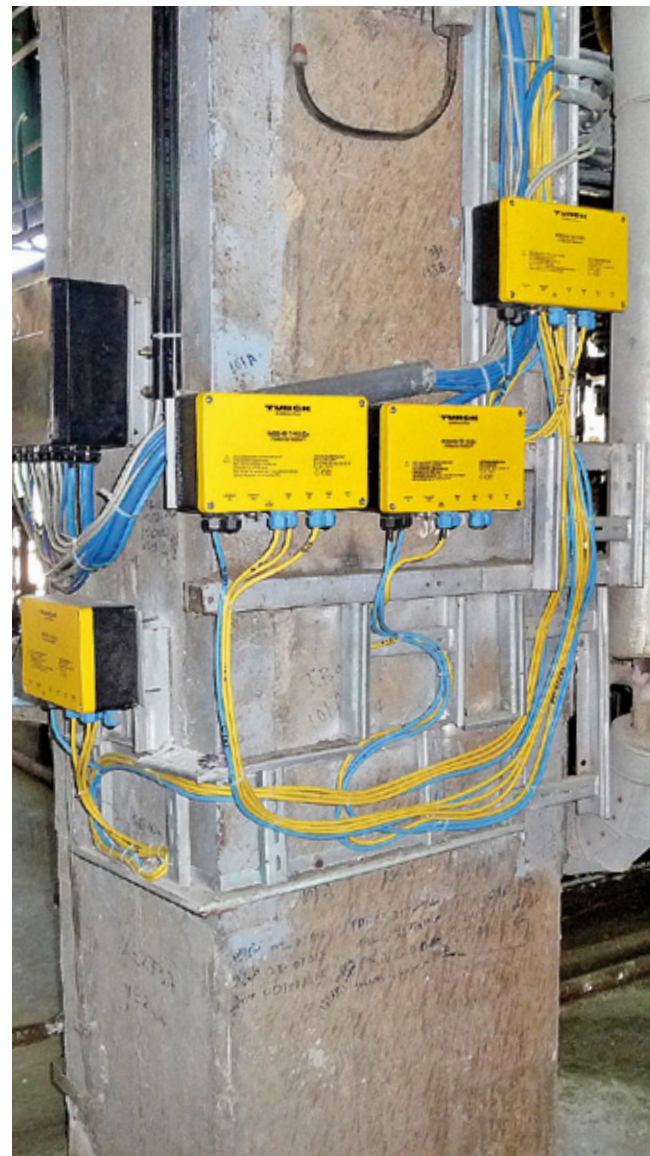
Even with the complete package from Turck, there were a few obstacles to overcome at the beginning of the project, which contained 200 kilometers of fieldbus lines. "It is normal that some problems arise when it comes to a project of this size", Dr. Jordan explains. But ultimately the first two reconstruction phases were completed on time and to the satisfaction of the operator. Today AFC operates one of the world's most modern and most efficient fertilizer plants. ■

“Turck wasn't just able to provide us with an extensive Foundation Fieldbus portfolio, but also with detailed diagnostic functions that make a new Foundation Fieldbus installation more efficient.”

**Markus Mahlandt,
Uhde Services**



Because of the special ambient conditions in the ammonia facility, Turck placed the IP67-fieldbus components into additional protective housings



In hazardous areas, multi-barriers MBD49-T415/Ex with four intrinsically safe and isolated outputs are used



Author



Bert Kinzius is a sales specialist at Turck Germany in Mülheim

Webcode | **more21156e**

The HF read/write head reliably reads the RFID data carrier at the transport boxes, despite the metal environment

User www.thun.de Integrator www.at-wg.de

Tracking Bearings

Bicycle supplier Thun automates the control and surveillance of their inner bearings production with the RFID system from Turck

"If we want to produce results with reliability and repeatability, we need to implement an automated system with RFID that requires little operator involvement," explains Heinz Ehmman, EDV manager and controller at Alfred Thun GmbH & Co. KG in Ennepetal. During the 43 years Ehmman has worked for the traditional family company, he witnessed a few attempts to install a manual batch and production surveillance system. Because of the high effort of manual solutions

Quick read

Alfred Thun GmbH & Co. KG from Ennepetal is one of eight manufacturers of bicycle bottom brackets worldwide. With the help of system integrator Weingärtner Automatisierung and Turck's RFID components Thun optimized large areas of its production processes and made them retraceable and transparent.



“With their broad portfolio, Turck could fulfill most of the requirements, even though some additional requirements only arose during the project. The good support from Turck also convinced me.”

**Matthias Weingärtner,
Weingärtner
Automatisierung**

this was never a viable option. Today, RFID technology allows a new opportunity to implement an automated and transparent production chain and batch surveillance system. With a solution like this, the family could expand the company, and maintain a leading market position in all of their product segments.

Thun supplies the bicycle industry worldwide with inner bearings for city, trekking, children and mountain bikes. In addition, they provide complete system components for Pedelecs, which are bicycles with electrical auxiliary drives that have become popular. With 60 employees the company provides about one million inner bearings to the bicycle industry each year. With a market share of 60 % Thun is one of the market leaders in Europe in their market segments.

Requirements

In 2009 the company decided to modernize their production chain. The intention was to implement a reliable batch surveillance system over the whole production chain using RFID. The first step in the process involved the assembly of the bottom brackets being controlled via RFID. The next step was the reception of supplied goods to be recorded by RFID. Last but not least the refinement and electroplating of shafts and prefabricated products would be optimized. However, during the process more and more automation options appeared that would be included in the project.

The first solution considered was UHF due to the longer range and flexibility. But in the production environment of Thun, the tags with the UHF technology couldn't be read reliably due to the metal housings the data carriers were attached to. Thun decided to use an alternative solution, which was suggested by the system integrator Weingärtner Automatisierung from Oberhausen in Germany. This solution worked with the RFID system BL ident from Turck. "Mister Weingärtner directly understood our situation and showed vast experience and a deep knowledge about the details of implementation. His knowledge convinced us and it proved to be useful during the process."

With Turck's BL ident solution, Matthias Weingärtner found a comprehensive and versatile RFID package that met all of the project's requirements: "With their broad portfolio, Turck could fulfill most of the requirements, even though some additional requirements only arose during the project. The good support from Turck also convinced me."

The RFID system from Turck allows the use of both UHF and HF components. The first phase used HF technology which functions at 13,56 MHz. HF reduces potential disturbances, thus a reliable and precise outcome could be reached. Weingärtner and Turck convinced the customer to use the system and RFID tags by doing a successful test in electroplating baths. The high temperatures and the acidic electroplating environment didn't harm the IP67 tags. One challenge was the tuning of the communication between the fieldbus components which also had to be adapted to the ERP system Navision.

Registration at goods received

The identification solution at Thun starts when the goods are received. If the delivery note is equipped with a data matrix code, the components from the suppliers are scanned. The data gets into the ERP system and is connected with the UID of the RFID tag to the corresponding transport box.

All data is collected in a central SQL data base that is read and written by the Middleware Visam. The registration of the stock can be retrieved on an up to the minute basis over the ERP system. Here, Thun optimized the process by letting the supplier keep the stock at a minimum level. The current stock and the required quantity can be retrieved from the ERP system via online access at any time.

The system demonstrates its biggest advantage through the integration of the RFID surveillance into the process stages refinement and assembly. On the way to the finalized bearing, the batch purity has to be guaranteed at any step in the process. Through the RFID combined head, the machine knows at any time

**Turck's I/O system
BL67 captures the
RFID and sensor
signals directly at
the machine and
forwards the data
via Modbus TCP
to the controls**



The read/write head at the feeding recognizes if the right batch is supplied to the blasting machine



The RFID tags are attached to the metal boxes reliably with a spacer

what batch is being processed. A K50 light shows the employee if the procedure is being carried out correctly or not, and if a red light appears, there is an error.

During implementation, another issue was identified and resolved with the help of Weingärtner: The blasting plant only had capacity for 80 kilogram of shafts, and a transport box was double that. In the past, the weights for the blasting process had to be identified with a scale and entered manually; today an integrated scale unit automatically carries out this step. Thanks to the RFID surveillance, all shafts from one transport box can easily be assigned to a batch. With an inclination sensor, the emptying of the box is measured, so it can be released again automatically for a new filling.

This option is highly valued by Thun because if a full transport box is reintroduced into the process it causes a delay. "As much automation as possible," is the motto of Ehmann, because "even the most reliable employee can make a mistake now and then and that disturbs the automation process."

Side effect quality assurance

The next phase involved the automated assembly machines, which make machine mount bottom brackets. "We have many types of bottom brackets. Previously the employees entered the specific configuration via a display into the machine. Unfortunately this led to mistakes," Ehmann describes. Today the order is entered centrally over the ERP system and forwarded to the machine directly, then an employee accepts the order and starts the process. The machine now reads all relevant data, including the machine settings and the components, from the data base and programs the right configuration immediately.

At the feedings of the assembly machines an RFID head reads the transport boxes tag to ensure that the right components for the current order are installed. Turck's inclination sensors measure if the boxes are

emptied correctly. "This process saves a lot of time and we are even more flexible and reliable now," Ehmann says. The data of the combined heads and the inclination sensors are collected directly at the machines with Turck's I/O system BL67 and are sent with the CoDeSys programmable fieldbus gateway via Modbus TCP to the Middleware Visam.

Outlook

The company from Ennepetal is confident they have created additional value for their customers through the surveillance and the traceability of their batches via RFID because the new transparency allows a more flexible production without additional costs. Through automation, Thun also created a competitive advantage, especially if the system is optimized continuously. The next phase will include the connectivity to other systems like quality assurance and checking facilities. ■



The inclination sensor at the feeding gives a signal when the box is emptied

Author

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Austromatisierung



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Truck washing station by Ness-Schneider: Only when there is a successful notification via RFID chip the door lock of the hose box (in the back of the picture) opens and the cleaning process can begin



User www.ness-schneider.at

A Clean Thing

The Austrian wastewater treatment plant designer Ness-Schneider automates washing stations for animal transporters with the RFID system BL ident from Turck

Whether ski lift tickets, hotel room keycards or admission cards in a thermal bath – RFID is very prevalent in everyday life. The convenient identification technology is also used in more and more applications in the industrial area. For this reason, Turck developed a modular system that can be linked to almost all control systems, independent from the PLC manufacturer. In one such system, the Austrian wastewater treatment plant designer Ness-Schneider uses the new flexible design.

To complete its portfolio of wastewater treatment solutions for the food industry, the company also offers washing stations for the cleaning of animal transport

vehicles. The identification of the transporters and the registration of the exact duration of the cleaning process takes place automatically via RFID-Key. Only when the chip is recognized as "legitimate" the system enables control of the water pump.

The company Ness-Schneider, located in Vienna and Grünau/Austria, has been founded 1994. Originally it was a trading company for wastewater treatment components but over the years it developed into a producer as well. In 2004 the company was taken over by NTA, New Technology Anlagenbau, a plant manufacturer that specializes in the food industry. Since then the business is privately owned by the Steinmaurer family.



Today Ness-Schneider is a research orientated company and offers plants for drinking water supply, environmental compact systems and components for the cleaning of industrial wastewater.

The customers are mainly from the food industry. "We offer the whole range of wastewater treatment plant design – from biological process technology to project management, development and construction, the actual machine- and plant design up to the installation and start-up onsite. During the process we act as general contractors. Only for building processes, like concrete work, do we hire a partner, but everything else comes from us," managing partner Walter Steinmaurer explains, and emphasizes, "we rarely build wastewater treatment plants for communities – we are more specialized on industrial wastewater."

Robust ID system wanted

It is our daily business to fulfill individual customer requests. This often results into solutions that are later

▶ Quick read

To run his washing stations for animal transporters fully automated, the Austrian plant designer Ness-Schneider uses Turck's RFID system BL ident. After the authorization with a RFID tag, the robust ID solution allows the driver to use the high pressure washing station and reliably registers water consumption, use of cleaning agents and duration.

included into our standard portfolio. "We often face applications where it would make sense to take over identification tasks as well," Steinmaurer says. "That is why we were looking for a suitable identification system, that is already offered as a matured solution and that is being expanded as well. After all we strive for good and long lasting partnerships with our suppliers."

The company finally found Turck. For many years the plant designer had purchased various components for measuring and control technology from the automation specialist located in Mülheim. After an intense



“We deliver our plants worldwide, so we have to be very flexible regarding the used control hardware. The Turck system can be connected to numerous controls of different manufacturers without problems, either over a standard fieldbus or via Ethernet.”

**Walter Steinmaurer,
Ness-Schneider**

testing phase, Turck's modular RFID system BL ident proved to be perfect and met all of the requested requirements. The first project that was installed with the Turck system was an important upgrade of the functionality of the animal transporter washing stations for slaughterhouses, developed by Ness-Schneider. According to the EU hygiene directive the transport vehicles have to be cleaned immediately after the discharge of the animals and the accruing wastewater has to go into the wastewater treatment plant directly.

A cleaning facility has to be provided by the operators of the slaughterhouses, although they are not provided free of charge. To be able to operate the washing station onsite without staff, the engineers of Ness-Schneider developed an elaborate self-service concept of their high pressure cleaning unit using RFID technology from Turck. The solution uses a RFID tag, which is as small as a coin. Each driver loads a time credit onto the data carrier. If the RFID tag is placed in front of the combined read/write head of the control station, the identification starts.

“All the data from the tag is read automatically, for example the name of the driver and the transport company, the number plate and any additional data. The system software checks if the owner is authorized to use the washing station and if there is still enough credit available,” Steinmaurer describes. If everything fits, the lock on the door of the hose box opens; the driver can take the cleaning gun and start the cleaning process. Water consumption, use of cleaning agents and duration are registered. Afterwards, the hose has to be rolled up again and the door needs to be locked. Only then the driver can place the tag in front of the read/write head again to end the process, reverse any remaining credits and sign off.

Industry compatible outdoor solution

It was more than one benefit of the RFID system from Turck that made the decision for Walter Steinmaurer.



The driver places the RFID tag in front of the read/write head, which reads all the relevant data and forwards it to the control systems



With its robust design, Turck's BL ident system is very suitable for outdoor use

The robust design of the components, the fact they are available in IP20 and IP67, as well as the temperature range of -25 to +85 °C, guarantee outdoor use and is industry compatible. In addition, the diverse FRAM data carriers (tags) are available in different sizes and designs, the elaborate modular system offers fully encapsulated heads, that are available in protection category IP69K, RFID I/O modules and gateways as well as the fitting connection technology.

“For us the openness with all kinds of controls was especially important. We deliver our plants worldwide and therefore have to be very flexible regarding the control hardware. At the moment we are using four different SPS systems,” Steinmaurer explains. “The Turck system can be connected to all four controls without problems, either over a standard fieldbus or via Ethernet. It can be upgraded anytime.” The gateways are programmable with CoDeSys and turn into decentralized controls.

The software integration into the system of Ness-Schneider was no problem because of the open interfaces. “I am highly satisfied,” Steinmaurer praises. “The solution from Turck works perfectly. We have also had very good support from Alfred Fröstl, sales manager of Turck in Upper Austria. We have found the reliable partner that we have been looking for. The implementation into our system was done in only a few days and we invested less than 100 working hours.”

Not only because of his positive experiences with Turck, the company director is already thinking about other applications for the Turck RFID system. “For example, the milk delivery to dairies, where documented and traceable proof of the tank truck cleaning is needed,” Walter Steinmaurer finally admits. ■



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Transparency Enhancer

RFID system BL ident guarantees efficiency during the production of sodium glutamate

Nowadays RFID is widely applied in industrial production as well as in logistics and warehouse management all over the world. Chinese companies are using this technology to create more transparent and efficient processes. This was the reason that a significant Chinese company in the food industry applied RFID technology to the raw material processing, production, storage and transportation to trace materials and improve production efficiency.

Requirements of the customer

The company produces sodium glutamate with the most advanced processes and technologies. The flavor enhancer is called "Gourmet Powder" in China. The food producer emphasizes modern and reliable but also cost-saving technology in their warehouse management. More precisely: they wanted to implement a real-time material management system that allowed

the tracing and control of the raw material transfers via RFID technology. The system has to evaluate the information from the warehouse data list and assign the single pallets to material stocks. Then the data is written by a combined read/write head via RFID onto the data carrier that is attached to the pallet.

Next, the PLC automatically assigns warehouse areas to the pallets and guides the forklift to store the materials at the corresponding locations. The forklift, which is also equipped with a combined read/write head, saves the location and the product information from the data carrier in the central system.

To guarantee a high availability, the system is operated with redundancy built in for central and decentralized data. For the outbounding process, the First-In-First-Out (FIFO) principle applies. The system automatically guides the forklift to carry the materials to the corresponding production lines according to the production tasks. During the transport, the read/

Author

Qiang Lin operates the market and technology department at Turck in China



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Each pallet is equipped with a resistant RFID data carrier at the middle bridge

The Chinese food producer uses Turck's RFID system for the control and the tracing of the whole material flow

write head at the forklift checks the data carrier on the pallet to determine if the material is really required. If there is an error during warehousing, outbounding or carrying materials to the production line, the system gives an alarm and automatically indicates what measures need to be taken to restore the system. The pallets are recycled during the whole warehouse management process.

Digitalized pallets

The RFID tags are already integrated into the pallets. Compared to the traditional pallets with bar codes, the digitized pallets make it easy to implement a precise digital management for large quantities of goods. The workers do not need to print lots of bar codes in advance, stick them onto the pallets and scan them with a bar code gun. For the tagged pallets all this takes place during one read/write procedure.

The RFID tags can also be applied in harsh environments. This is because scratches and stains on their surfaces don't affect them as they affect a bar code. Tags are recyclable and can be used during rain as well – contrary to common barcodes. Additionally the specific tag UID improves the precision of the material tracing.

The production of sodium glutamate takes place under humid production conditions. The powdery raw materials are stored separately from the production because they need a dry environment. The system has to be able to work perfectly in dry and dusty conditions as well as in a humid environment. That is the reason the company uses Turck's BL67 fieldbus gateways with the RFID module BL ident in IP67. It is attached to the forklift and, due to its IP67 rating, it is able to operate in both environmental conditions. As tradition in the food industry, tags in IP68 are needed because raw materials come into direct contact with the pallets. A BL ident read/write head that is attached to the forklift allows reading and writing to occur during transport.

Wireless forklift connection

The biggest challenge of this project was the connection of the gateways at the forklifts to the controls. Since the forklifts move around it was impossible to connect them with cables. After several discussions and experiments, Turck suggested a wireless Ethernet network that allowed the communication between the programmable gateways and the control level. This solution met the requirement of the customer to implement a real-time management for the whole logistics of the production system and the life-cycle management of the products.

The technical department of Turck (Tianjin) Sensor Co. Ltd was the system integrator of the project. Project leader Li Jiakuan summarizes the advantages of BL ident: "The shape of the read/write head from Turck is identical to that of the proximity switch, which makes them flexible to use and easy to install. In addition, the tags can be read and written to a capacity of 200 bytes while driving by and the 0 to 200 mm read/write



The read/write head at the forklift collects the data of the pallet and forwards it wireless over the BL67 I/O system to the PLC

distance absolutely meets our requirements. Together with the prefabricated connection cables of 50 meter length, Turck was able to provide a robust RFID package, which guarantees a reliable data transfer even under harsh environmental conditions. Furthermore the wireless network could be implemented with few gateways and network nodes without any problems." ■

Quick read

Storage and production environments of sodium glutamate have to meet different requirements. Turck's RFID system BL ident can be used optimally in both environments, the dry one at the warehouse and the humid one during the production process. This guarantees transparency during the whole production and logistics chain, from storage and outsourcing of the raw materials, over the production process up to the storage of the finalized sodium glutamate powder.

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.



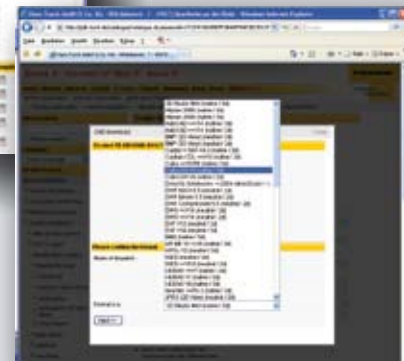
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29.03. – 01.04.2012	WIN 2	Istanbul, Turkey
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23.04. – 27.04.2012	Hannover Messe	Hanover, Germany
14.05. – 18.05.2012	Technical Fair (UFI)	Belgrade, Serbia
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26.06. – 29.06.2012	Expo Pack	Mexico City, Mexico
09.10. – 12.10.2012	Vienna-Tec	Vienna, Austria
09.10. – 12.10.2012	EloSys	Trencin, Slovakia
06.11. – 08.11.2012	ISA	São Paulo, Brazil
27.11. – 29.11.2012	SPS/IPC/Drives	Nuremberg, Germany



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Turck on the Internet

Whether sensor, fieldbus, interface or connection technology, HMI/PLC or RFID, in the product database on www.turck.com you will find the right solution to your needs at the touch of a button. Three search functions will help you.



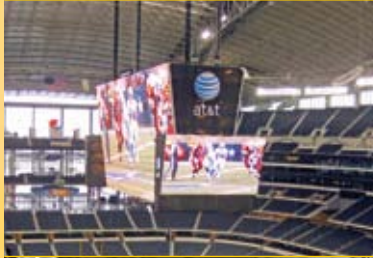
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